

Table of Contents

Power BI Service

Get started

[Power BI - basic concepts](#)

[Get started with Power BI](#)

[Self-service signup for Power BI](#)

[Power BI Free vs Pro](#)

[Data sources for Power BI](#)

[Getting around in Power BI - navigation experience](#)

[10 tips for getting help](#)

[Searching and sorting content](#)

[Related content](#)

[Extended Pro Trial activation](#)

[Opt-in for Power BI preview features](#)

[Frequently asked questions](#)

[What's new in the Power BI service](#)

[Microsoft Flow and Power BI](#)

[Power BI for US Government](#)

[Enroll your US Government organization](#)

[FAQ for Power BI for Germany Cloud customers](#)

[Power BI get started with third-party apps](#)

[Supported browsers for Power BI](#)

[Supported languages and countries/regions for Power BI](#)

Samples

[Samples for Power BI](#)

[Tutorial: Using the Power BI sample content packs](#)

[Download the Financial Sample workbook for Power BI](#)

[Supplier Quality Analysis sample for Power BI: Take a tour](#)

[IT Spend Analysis sample for Power BI: Take a tour](#)

[Sales and Marketing sample for Power BI: Take a tour](#)

[Customer Profitability sample for Power BI: Take a tour](#)

[Human Resources sample: Take a tour](#)

[Opportunity Analysis sample for Power BI: Take a tour](#)

[Procurement Analysis sample: Take a tour](#)

[Retail Analysis sample for Power BI: Take a tour](#)

Common tasks

[Favorite dashboards, reports, and apps in Power BI](#)

[Print a dashboard, print a dashboard tile, print a report page](#)

[Recent content](#)

[Subscribe to a report or dashboard](#)

[Rename content within Power BI](#)

[Display dashboards and reports in Full Screen mode \(TV mode\)](#)

[Remove content within Power BI](#)

[Display a dashboard tile in Focus mode](#)

Premium

[Power BI Premium - what is it?](#)

[How to purchase Power BI Premium](#)

[Manage Power BI Premium](#)

[Support for large datasets](#)

[Power BI Premium FAQ](#)

[Power BI Premium release notes](#)

Connect to services

[Connect to the services you use](#)

[Adobe Analytics](#)

[Azure Audit Logs](#)

[Google Analytics](#)

[Marketo](#)

[Salesforce](#)

[Acumatica](#)

[Alpine Metrics Sales Predictions](#)

[appFigures](#)

[Application Insights](#)

AT Internet Bridge
Azure Mobile Engagement
Microsoft Azure Consumption Insights
Azure Search
Azure Security Center
Bing
Circuit ID
ClickDimensions
comScore Digital Analytix
GitHub
Insightly
IntelliBoard
Lithium
MailChimp
Mandrill
Microsoft Azure Enterprise
Microsoft Dynamics AX
Microsoft Dynamics CRM
Microsoft Dynamics Marketing
Microsoft Dynamics NAV
Office365Mon
Planview Enterprise
Prevedere
Project Online
Project Madeira
Projectplace
QuickBooks Online
SendGrid
ServiceNow Incidents
Smartsheet
SparkPost
SQL Database Auditing

[SQL Sentry](#)

[Stripe](#)

[SweetIQ](#)

[Trouw](#)

[Twilio](#)

[tyGraph](#)

[UserVoice](#)

[VMob](#)

[Webtrends](#)

[Windows Dev Center](#)

[Xero](#)

[Zendesk](#)

[Ziosk](#)

[Zuora](#)

[Dashboards](#)

[Dashboards in Power BI](#)

[Create a dashboard from a report](#)

[Create a copy of a dashboard](#)

[Dashboard tiles in Power BI](#)

[Pin a tile to a Power BI dashboard from a report](#)

[Pin a tile from one dashboard to another dashboard](#)

[Pin a tile to a Power BI dashboard from Excel](#)

[Power BI publisher for Excel](#)

[Pin a tile to a Power BI dashboard from the Q&A question box](#)

[Pin an entire report page to a Power BI dashboard](#)

[Shared with me](#)

[Usage metrics for dashboards](#)

[Data alerts in Power BI service](#)

[Power BI Unified Notification Center](#)

[Add an image, text box, video, or web code to your dashboard](#)

[Edit a tile — resize, move, rename, pin, delete, add hyperlink](#)

[Tips for designing a great Power BI dashboard](#)

[Quick Insights in Power BI](#)

[Types of Quick Insights supported by Power BI](#)

[Optimize your data for Power BI Quick Insights](#)

[Featured dashboards in Power BI](#)

[Create a phone view of a dashboard](#)

[Create a QR code for a tile](#)

[Add an image to a dashboard](#)

[Dashboard data classification](#)

[Ask questions of your data](#)

[Overview](#)

[Quickstart](#)

[Tutorials](#)

[How To](#)

[Resources](#)

[Share your work](#)

[How should I collaborate and share dashboards and reports?](#)

[Install and use apps, with dashboards and reports](#)

[Create and distribute apps with dashboards and reports](#)

[Organizational content packs: Introduction](#)

[Create and publish an organizational content pack \(tutorial\)](#)

[Share dashboards and reports](#)

[Share a filtered report](#)

[Publish from Power BI to the web](#)

[Embed report in SharePoint Online](#)

[Connect to files on your group's OneDrive for Business](#)

[Collaborate in your Power BI group workspace](#)

[Manage your group in Power BI and Office 365](#)

[Manage, update, and delete organizational content packs](#)

[Find and connect to an organizational content pack](#)

[Organizational content packs: Copy, refresh, and get access](#)

[Remove your connection to an organizational content pack](#)

[Share a dashboard that links to an Excel workbook on OneDrive for Business](#)

[Publish to PowerPoint](#)

Reports

[Reports in Power BI](#)

[Create a new report from a dataset](#)

[Create a new report from an existing report](#)

[Recent content](#)

[The report editor...Take a tour](#)

[Add a page to a Power BI report](#)

[Add a filter to a report in Power BI](#)

[Save a report in Power BI](#)

[About filters and highlighting in Power BI reports](#)

[How to use report filters](#)

[Analyze in Excel](#)

[Change how visuals interact in a report](#)

[Open a Power BI report in Reading view or Editing view](#)

[Interact with a report in Editing View in Power BI](#)

[Tips and tricks for creating reports in Power BI service](#)

[Analytics pane](#)

[Usage metrics for reports](#)

[Create a QR code for a report](#)

[Aggregates \(sum, average, maximum, etc.\) in Power BI](#)

[Page display settings in a Power BI report](#)

[Tutorial: Change the display settings for a page in a Power BI report](#)

[Reorder pages in a report in Power BI](#)

[Duplicate a report page in Power BI](#)

[Export a report from Power BI service to Desktop \(Preview\)](#)

[Filter a report using query string parameters in the URL](#)

[Best practices for building fast and reliable reports in Power BI](#)

Visualizations

[Visualizations in Power BI](#)

[Visualization types in Power BI](#)

[Visualization best practices](#)

Custom visualizations in Power BI

Tutorial: Part 1, Add visualizations to a Power BI report

Tutorial: Part 2, Add visualizations to a Power BI report

See the data used to create the visual

Export data from a visualization

Change the type of visualization in a Power BI report

Getting started with color formatting and axis properties

Tips and tricks for color formatting in Power BI

Change how a chart is sorted in a Power BI report

Copy and paste a visualization in Power BI

Move, resize, and pop out a visualization in a Power BI report

Drill down in a visualization in Power BI

Hyperlinks in tables

Add a hyperlink to a Text Box in a Power BI report

Histograms

Tips and tricks for Power BI map visualizations

Text boxes in Power BI reports

Tutorial: ArcGIS in Power BI

Tutorial: Basic area chart

Tutorial: Combo chart in Power BI

Tutorial: Customize visualization title, background, and legend

Tutorial: Customize X-axis and Y-axis properties

Tutorial: Doughnut charts in Power BI

Tutorial: Filled maps (Choropleths) in Power BI

Tutorial: Funnel charts in Power BI

KPI Visuals

Tutorial: Radial gauge charts in Power BI

Tutorial: Scatter charts in Power BI

Tutorial: Slicers in Power BI

Tutorial: Working with tables

Tutorial: Treemaps in Power BI

Tutorial: Waterfall charts in Power BI

Tutorial: Cards (big number tiles) in Power BI

Create advanced analytics and visualizations using R scripts in Power BI

Data from files

Get data from files

Tutorial: From Excel workbook to stunning report in no time

Get data from Excel workbook files

Get data from Power BI Desktop files

Get data from comma separated value (.csv) files

Real-time streaming in Power BI (Preview)

Publish to Power BI from Excel 2016

Reduce the size of an Excel workbook to view it in Power BI

Data from databases

Azure SQL Data Warehouse with DirectQuery

Azure SQL Database with DirectQuery

Spark on HDInsight with DirectQuery

SQL Server Analysis Services live data in Power BI

Azure and Power BI

Data refresh

Data refresh in Power BI

Configure scheduled refresh

Refresh a dataset created from a Power BI Desktop file - local

Refresh a dataset created from a Power BI Desktop file - cloud

Refresh a dataset created from an Excel workbook - local

Refresh a dataset created from an Excel workbook - cloud

Refresh a dataset created from a comma separated value (.csv) file on OneDrive

Troubleshooting refresh scenarios

Disable privacy settings

Gateways

Get started with gateways

Guidance for deploying a data gateway

On-premises data gateway

On-premises data gateway - in-depth

[High availability clusters for on-premises data gateway](#)

[On-premises data gateway FAQ](#)

[On-premises data gateway \(personal mode\)](#)

[Troubleshooting the on-premises data gateway](#)

[Power BI gateway - personal](#)

[Use Kerberos for single sign-on \(SSO\)](#)

[Configuring proxy settings](#)

[Manage your enterprise data source - Analysis Services](#)

[Manage your enterprise data source - SAP HANA](#)

[Manage your enterprise data source - SQL](#)

[Manage your data source - Oracle](#)

[Manage your enterprise data source - import/scheduled refresh](#)

Administration

[Administering Power BI in your organization](#)

[Power BI \(free\) in your organization](#)

[Purchasing Power BI Pro](#)

[Power BI governance and deployment approaches](#)

[Power BI security](#)

[Signing up for Power BI with a new Office 365 Trial](#)

[Where is my tenant located?](#)

[Power BI and ExpressRoute](#)

[Administration role in Office 365](#)

[Admin portal](#)

[Auditing Power BI](#)

[Using Azure AD B2B](#)

[Find users that have signed in](#)

[Row-level security with Power BI](#)

[Manage your data capacity in Power BI](#)

[Power BI archived workspace](#)

[Unable to add Power BI to O365 partner](#)

[Closing your Power BI account](#)

[Configure mobile apps with Intune](#)

[Power BI for Office 365 is transitioned to Power BI](#)

Troubleshooting

[Forgot your password for Power BI?](#)

[Capturing additional diagnostic information for Power BI](#)

[Alternate email address for Power BI](#)

[How to use the same account login for Power BI and Azure](#)

[Office 365 dedicated - known issues](#)

[Troubleshooting analyze in Excel](#)

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting Power BI gateway - personal](#)

[Troubleshooting unsupported data source for refresh](#)

[Troubleshooting scheduled refresh for Azure SQL Databases](#)

[Error: We couldn't find any data in your Excel workbook](#)

[Troubleshooting tile errors](#)

[How to refresh your Xero content pack credentials if refresh failed](#)

Power BI Desktop

Get started

[Get Power BI Desktop](#)

[Getting started with Power BI Desktop](#)

[What's new in the latest Power BI Desktop update?](#)

[Power BI Desktop videos](#)

[Previous monthly updates to Power BI Desktop](#)

Connect to data

[Data sources in Power BI Desktop](#)

[Connect to data in Power BI Desktop](#)

[Connect to datasets in the Power BI service](#)

[Import Excel workbooks into Power BI Desktop](#)

[Connect to data using generic interfaces](#)

[Connect to an Oracle database](#)

[Running R scripts in Power BI Desktop](#)

[Using R in Query Editor](#)

[Use an external R IDE with Power BI](#)

Supported R packages

Data types in Power BI Desktop

Enter data directly into Power BI Desktop

Connect to Excel in Power BI Desktop

Analysis Services multidimensional data in Power BI Desktop

Connect to CSV files in Power BI Desktop

Connect to an Impala database in Power BI Desktop (Preview)

Connect to an OData feed in Power BI Desktop

Connect to an Amazon Redshift database in Power BI Desktop (Preview)

Connect to a Web page from Power BI Desktop

Connect to a Snowflake computing warehouse in Power BI Desktop

Connect to Azure Consumption Insights data

Use SAP HANA in Power BI Desktop

Analysis Services tabular data in Power BI Desktop

Use DirectQuery in Power BI Desktop

Power BI and DirectQuery

Data sources supported by DirectQuery

DirectQuery for Oracle and Teradata databases

DirectQuery and SAP Business Warehouse (BW)

DirectQuery and SAP HANA

Assume referential integrity setting in Power BI Desktop

Tutorial: Dynamic row level security with Analysis Services tabular model

DirectQuery for Oracle and Teradata databases

Use the SAP BW connector in Power BI Desktop (Preview)

Use OneDrive for Business links in Power BI Desktop

Power BI data source prerequisites

Bidirectional cross-filtering in Power BI Desktop (Preview)

Power BI Desktop privacy levels

Third-party service: Facebook connector for Power BI Desktop

Third-party service: Google Analytics connector for Power BI Desktop

Project Online: connect to data through Power BI Desktop

Transform and shape data

[Query overview in Power BI Desktop](#)

[Shape and combine data in Power BI Desktop](#)

[Common query tasks in Power BI Desktop](#)

[Use Shape Maps in Power BI Desktop \(Preview\)](#)

[Combine binaries](#)

Model your data

[Data view in Power BI Desktop](#)

[Relationship view in Power BI Desktop](#)

[Create and manage relationships in Power BI Desktop](#)

[DAX basics in Power BI Desktop](#)

[Data categorization in Power BI Desktop](#)

[Tag a barcode field in Power BI Desktop for the Power BI mobile apps](#)

[Set geographic filtering in Power BI Desktop for the Power BI mobile apps](#)

[Calculated columns in Power BI Desktop](#)

[Calculated tables in Power BI Desktop](#)

[Measures in Power BI Desktop](#)

[Import and display KPIs \(Preview\)](#)

Create reports

[Report view in Power BI Desktop](#)

[Q&A in Power BI Desktop](#)

[Analytics pane in Power BI Desktop](#)

[Using insights in Power BI Desktop](#)

[Bookmarks in Power BI](#)

[Use Report themes](#)

[Use Quick Measures](#)

[Using What if parameters](#)

[Use drillthrough](#)

[Use a relative date slicer and filter](#)

[Accessibility in Power BI reports](#)

[Use grouping and binning](#)

[Ribbon charts](#)

[Use the new matrix visual](#)

[Create Power BI visuals using R](#)

[Use R-powered custom visuals](#)

[Use gridlines and snap-to-grid](#)

[High density line sampling](#)

[High density scatter charts](#)

[Add a column from an example](#)

[Add a custom column](#)

[Create responsive visuals in Power BI](#)

[Use inline hierarchy labels in Power BI Desktop \(Preview\)](#)

[Use the numeric range slicer](#)

[Create a responsive slicer you can resize](#)

[Create custom Power BI answer cards for Cortana](#)

[Row-level security](#)

[Customizing tooltips in Power BI Desktop](#)

[Conditional table formatting in Power BI Desktop](#)

[Sort by column in Power BI Desktop](#)

[Create reports optimized for the Power BI phone apps](#)

[Publish from Power BI Desktop](#)

Learn more

[Use See Data and See Records](#)

[Tutorial: Importing and analyzing data from a Web Page using Power BI Desktop](#)

[Tutorial: Analyzing sales data from Excel and an OData feed](#)

[Tutorial: Create your own measures in Power BI Desktop](#)

[Tutorial: Create calculated columns in Power BI Desktop](#)

[Tutorial: Facebook analytics using Power BI Desktop](#)

[Power BI Desktop Send a Smile privacy statement](#)

Troubleshooting

[Resolve issues importing Access Databases and Excel spreadsheets in Power BI Desktop and Power Query](#)

[Resolve issues when starting Power BI Desktop](#)

Power BI Mobile Apps

Get started

[Power BI apps for mobile devices](#)

[Find your dashboards and reports on your mobile device](#)

[What's new in the mobile apps for Power BI](#)

All mobile apps

[Power BI for iOS apps](#)

[View on-premises reports and KPIs in the Power BI mobile apps](#)

[Dashboards for mobile Power BI](#)

[Reports in the Power BI mobile apps](#)

[Interact with tiles in the mobile apps](#)

[Share a dashboard from the Power BI mobile apps](#)

[Favorite items in the Power BI mobile apps](#)

[Get Power BI data from the real world with the mobile apps](#)

[Scan a Power BI QR code from your phone](#)

[Get notifications in the Power BI mobile apps](#)

[Annotate and share a tile, report, or visual in the mobile apps](#)

[Set data alerts in the Power BI mobile apps](#)

[Filter a report by location in the Power BI mobile apps](#)

[Ask questions about your data in the iOS mobile apps \(Tutorial\)](#)

[Create a deep link that goes to a specific location](#)

[View your data offline in the Power BI mobile apps](#)

[View and interact with Power BI reports optimized for your phone](#)

[Configure mobile apps with Intune](#)

[Using OAuth to connect to Reporting Services](#)

[Supported languages in the Power BI mobile apps](#)

iPad app (Power BI for iOS)

[Get started with the iPad app](#)

iPhone app (Power BI for iOS)

[Get started with the Power BI for iOS app on an iPhone](#)

[Power BI Apple Watch app](#)

[Scan a barcode from the Power BI app on your iPhone](#)

Power BI app for Android phones

[Get started with the Power BI for Android app](#)

[Fixing 'your corporate SSL certificate is untrusted'](#)

Power BI app for Android tablets

Get started with the Power BI for Android tablet app

Power BI app for Windows 10 devices

Get started with the Power BI mobile app for Windows 10

View Reporting Services mobile reports and KPIs on the Power BI mobile app for Windows 10

Pin a Power BI tile or dashboard to the Start screen

View Power BI in presentation mode on Surface Hub

Power BI Developer

Overview

What can developers do with Power BI?

What can I do with the Power BI API?

Embedding

Embedding with Power BI

How to embed your content

How to migrate Power BI Embedded

Integrate a dashboard into an app (user owns data)

Integrate a Power BI tile into an app (user owns data)

Integrate a Power BI report into an app (user owns data)

Integrate a content into your application (app owns data)

Embed custom layouts into an app

Create an Azure Active Directory tenant

Register an application

Authenticate to Power BI service

Power BI permissions

Row-level security (RLS)

Embedding Q&A

Power BI Embedded migration tool

Migration code snippets

Troubleshooting your embedded application

FAQ

Create a custom visual

Create a custom visual with the Developer Tools

[Review custom visuals for security and privacy](#)

[Get a custom visual certified](#)

[Push data into a dashboard](#)

[Push data into a dashboard](#)

[Register an app with Azure AD](#)

[Get an authentication access token](#)

[Create a dataset](#)

[Get a dataset to add rows](#)

[Add rows to a table](#)

[Complete code listing](#)

[Content Pack Certification](#)

[Content Pack Certification Program](#)

[Template Content Pack authoring](#)

[Template Content Pack testing](#)

[Template Content Pack experiences](#)

[References](#)

[REST APIs](#)

[Power BI C# Git Repo](#)

[.NET SDK Download](#)

[JavaScript Git Repo](#)

[Custom Visuals Git Repo](#)

[Resources](#)

[JavaScript embed demo](#)

[Samples](#)

[Power BI community](#)

[Stack Overflow](#)

[Power BI Report Server](#)

[Overview](#)

[Get started](#)

[What's new](#)

[Release notes](#)

[Change log](#)

[Support timeline](#)

[User handbook](#)

[Overview](#)

[Navigating content](#)

[Quickstart: Power BI reports](#)

[Quickstart: Paginated reports](#)

[Advanced Power BI reports](#)

[Power BI report scheduled refresh](#)

[Advanced paginated reports](#)

[Working with KPIs](#)

[Supported data sources](#)

[Connect to data sources](#)

[Access shared datasets as OData feeds](#)

[Configure scheduled refresh](#)

[Add comments to a report](#)

[Subscriptions](#)

[Using the mobile app](#)

[Quickstart: Embed reports](#)

[Troubleshoot scheduled refresh](#)

[Administrator handbook](#)

[Overview](#)

[Hardware and software requirements](#)

[Find your product key](#)

[Quickstart: Install](#)

[Install a report server](#)

[Install Power BI Desktop](#)

[Upgrade a report server](#)

[Migrate a report server](#)

[Browser support](#)

[Configure Kerberos to use Power BI reports](#)

[Capacity planning whitepaper](#)

[Host Excel workbooks](#)

Developer handbook

[Overview](#)

[Report Viewer control](#)

[Develop extensions](#)

[Quickstart: Embed reports](#)

Reference

[REST API](#)

[WMI](#)

[SOAP APIs](#)

[URL Access](#)

[Extensions](#)

Resources

[Power BI videos](#)

[Power BI webinars](#)

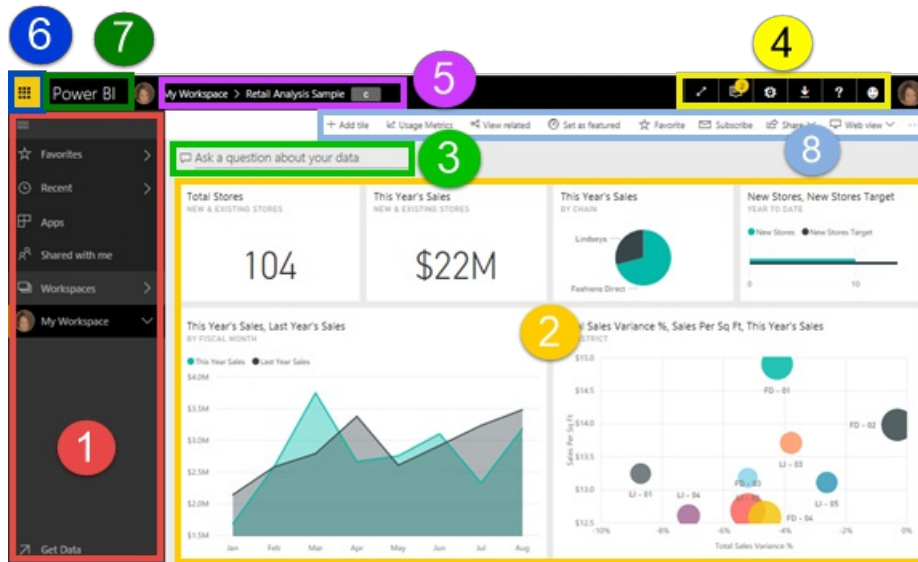
[Whitepapers](#)

Power BI – basic concepts for Power BI service

1/23/2018 • 12 min to read • [Edit Online](#)

This article assumes that you've already [signed up for Power BI service](#) and [added some data](#).

When you open the Power BI service, you'll see a **dashboard** displayed. Dashboards are something that differentiates Power BI service from Power BI Desktop.



The main features of your Power BI service UI are the following:

1. navigation pane (left nav)
2. canvas (in this case, dashboard with tiles)
3. Q&A question box
4. icon buttons, including help and feedback
5. dashboard title (navigation path, aka breadcrumbs)
6. Office 365 app launcher
7. Power BI home button
8. Labeled icon buttons

We'll dig into these later, but first let's review some Power BI concepts.

Or, you might want to watch this video first before reading the rest of this article. In the video, Will reviews the basic concepts and gives a tour of Power BI service.

Power BI concepts

The 4 major building blocks of Power BI are: **dashboards**, **reports**, **workbooks**, and **datasets**. And they're all organized into **workspaces**. It's important to understand workspaces before we dig into the 4 building blocks, so let's start there.

Workspaces

Workspaces are containers for dashboards, reports, workbooks, and datasets in Power BI. There are two types of workspaces: *My workspace* and app workspaces. So what is an *app*? A Power BI *app* is a collection of dashboards and reports built to deliver key metrics for your organization. Apps are interactive but can't be edited

- *My workspace* is the personal workspace for any Power BI customer to work with their content. Only you have access to your My workspace. If you want to share any of your content, you have several choices: create an app workspace where you bundle content into an *app* and make it available to others in your organization, or create an app workspace and give colleagues access to that workspace so you can share and collaborate.
- *App workspaces* are used to collaborate and share content with colleagues. They are also the places where you create, publish, and manage apps for your organization. Think of them as staging areas and containers for the content that will make up a Power BI app. You can add colleagues to your app workspaces and collaborate on dashboards, reports, workbooks, and datasets. All app workspace members need Power BI Pro licenses, but app consumers (the colleagues who have access to the apps) don't necessarily need Pro licenses.

To learn more, see the **Share your work** section of the Table of contents, starting with [How should I collaborate and share dashboards and reports](#)

Now on to the Power BI building blocks. You can't have dashboards or reports without data (well, you can have empty dashboards and empty reports, but they're not very useful until they have data), so let's start with **datasets**.

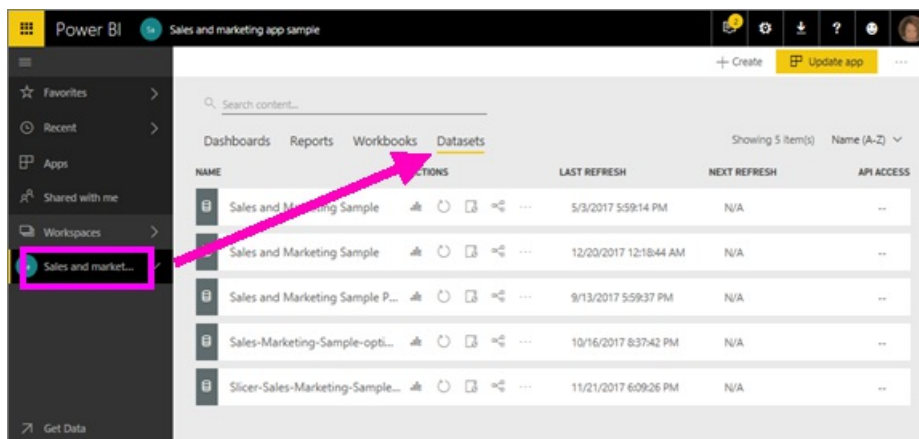
Datasets

A *dataset* is a collection of data that you *import* or *connect* to. Power BI lets you connect to and import all sorts of datasets and bring all of it together in one place.

Datasets are associated with *workspaces* and a single dataset can be part of many workspaces. When you open a workspace, the associated datasets are listed under the **Datasets** tab. Each listed dataset represents a single source of data, for example, an Excel workbook on OneDrive, or an on-premises SSAS

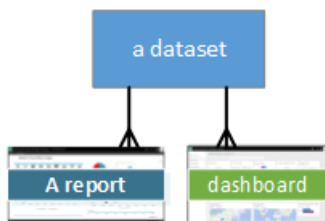
tabular dataset, or a Salesforce dataset. There are many different data sources supported, and we're adding new ones all the time. [See the list of dataset types that can be used with Power BI.](#)

In the example below, I've selected the "Sales and marketing" app workspace and clicked the tab for **Datasets**.



ONE dataset...

- can be used over and over in one or in many workspaces.
- can be used in many different reports.
- Visualizations from that one dataset can display on many different dashboards.



To [connect to or import a dataset](#), select **Get Data** (at the bottom of the left navigation) or select **+ Create > Dataset** (in the upper right corner). Follow the instructions to connect to or import the specific source and add the dataset to the active workspace. New datasets are marked with a yellow asterisk. The work you do in Power BI does not change the underlying dataset.

If you're [part of an app workspace](#), datasets added by one workspace member are available to the other workspace members.

Datasets can be refreshed, renamed, explored, and removed. Use a dataset to create a report from scratch or by running [quick insights](#). To see which reports and dashboards are already using a dataset, select **View related**. To explore a dataset, select it. What you're actually doing is opening the dataset in the report editor where you can really start digging into the data and creating visualizations. So, let's move on to the next topic -- reports.

Dig deeper

- [Power BI Premium - what is it?](#)
- [Get data for Power BI](#)
- [Sample datasets for Power BI](#)

Reports

A Power BI report is one or more pages of visualizations (charts and graphs like line charts, pie charts, treemaps, and many many more). Visualizations are also called **visuals**. All of the visualizations in a report come from a single dataset. Reports can be created from scratch within Power BI, can be imported with dashboards that colleagues share with you, or can be created when you connect to datasets from

Excel, Power BI Desktop, databases, SaaS applications and [apps](#). For example, when you connect to an Excel workbook that contains Power View sheets, Power BI creates a report based on those sheets. And when you connect to an SaaS application, Power BI imports a pre-built report.

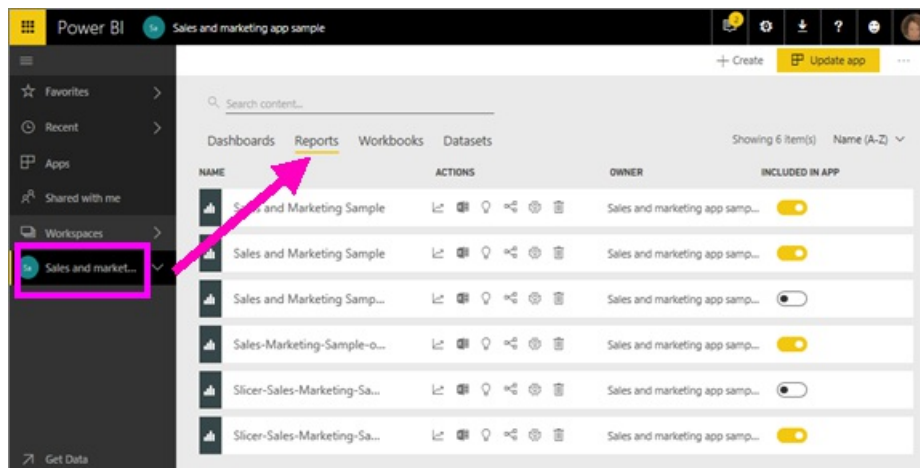
There are 2 modes to view and interact with reports: [Reading view](#) and [Editing view](#). Only the person who created the report, co-owners, and those granted permission, have access to all of the exploring, designing, building, and sharing capabilities of **Editing View** for that report. And the people they share the report with can explore and interact with the report using **Reading View**.

When you open a workspace, the associated reports are listed under the **Reports** tab. Each listed report represents one or more pages of visualizations based on only one of the underlying datasets. To open a report, simply select it.

When you open an app, you'll be presented with a dashboard. To access an underlying report, select a dashboard tile (more on these later) that was pinned from a report. Keep in mind that not all tiles are pinned from reports, so you may have to click a few tiles to find a report.

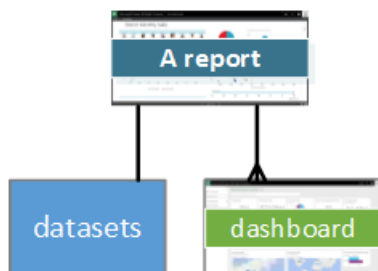
By default, the report opens in Reading view. Just select **Edit report** to open it in Editing view (if you have the necessary permissions).

In the example below, I've selected the "Sales and marketing" app workspace and clicked the tab for **Reports**.



ONE report..

- is contained in a single workspace
- can be associated with multiple dashboards within that workspace (tiles pinned from that one report can appear on multiple dashboards).
- can be created using data from one dataset. (the slight exception to this is that Power BI Desktop can combine more than 1 dataset into a single report and that report can be imported into Power BI)



Dig deeper

- [Reports in Power BI service and Power BI Desktop](#)
- [Reports in Power BI mobile apps](#)

Dashboards

A *dashboard* is something you create **in Power BI service** or something a colleague creates **in Power BI service** and shares with you. It is a single canvas that contains zero or more tiles and widgets. Each tile pinned from a report or from [Q&A](#) displays a single [visualization](#) that was created from a dataset and pinned to the dashboard. Entire report pages can also be pinned to a dashboard as a single tile. There are many ways to add tiles to your dashboard; too many to be covered in this overview topic. To learn more, see [Dashboard tiles in Power BI](#).

Why do people create dashboards? Here are just some of the reasons:

- to see, in one glance, all the information needed to make decisions
- to monitor the most-important information about your business
- to ensure all colleagues are on the same page, viewing and using the same information
- to monitor the health of a business or product or business unit or marketing campaign, etc.
- to create a personalized view of a larger dashboard -- all the metrics that matter to you

When you open a workspace, the associated dashboards are listed under the **Dashboards** tab. To open a dashboard, simply select it. When you open an app, you'll be presented with a dashboard. Each dashboard represents a customized view of some subset of the underlying dataset(s). If you own the dashboard, you'll also have edit access to the underlying dataset(s) and reports. If the dashboard was shared with you, you'll be able to interact with the dashboard and any underlying reports, but will not be able to save any changes.

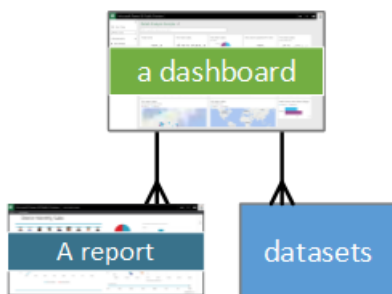
There are many different ways that you, or a colleague, can [share a dashboard](#). Power BI Pro is required for sharing a dashboard and may be required for viewing a shared dashboard.

NOTE

Pinning and tiles are covered in more detail below under the heading "Dashboard with tiles."

ONE dashboard...

- is associated with a single workspace
- can display visualizations from many different datasets
- can display visualizations from many different reports
- can display visualizations pinned from other tools (e.g., Excel)



Dig deeper

- [Create a new blank dashboard and then get some data](#) .
- [Duplicate a dashboard](#)
- [Create a phone view of a dashboard](#)

Workbooks

Workbooks are a special type of dataset. If you've read the **Datasets** section above, you know almost all you need to know about workbooks. But you may be wondering why sometimes Power BI classifies an Excel workbook as a **Dataset** and other times as a **Workbook**.

When you use **Get data** with Excel files, you have the option to *Import* or *Connect* to the file. When you choose Connect, your workbook will appear in Power BI just like it would in Excel Online. But, unlike Excel Online, you'll have some great features to help you pin elements from your worksheets right to your dashboards.

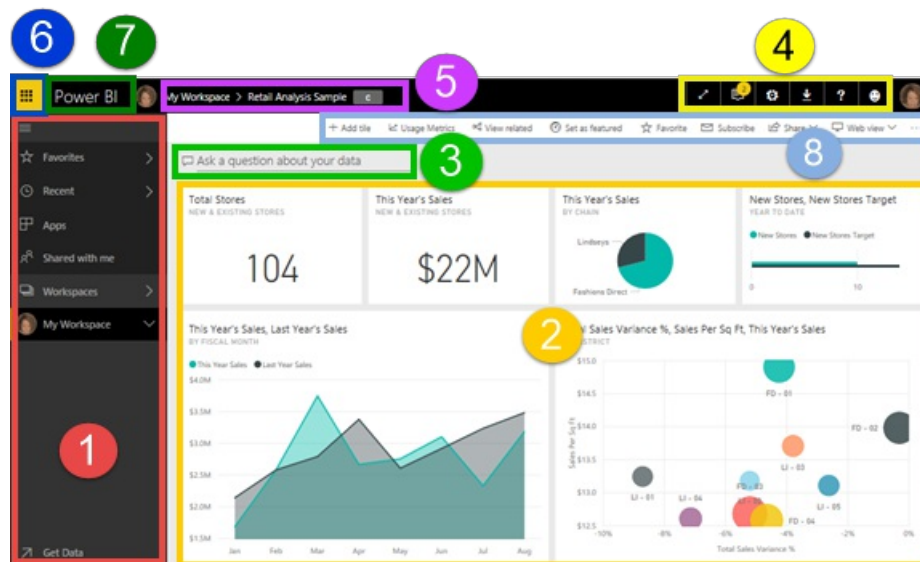
You can't edit your workbook in Power BI. But if you need to make some changes, you can click Edit, and then choose to edit your workbook in Excel Online or open it in Excel on your computer. Any changes you make are saved to the workbook on OneDrive.

Dig deeper

- [Get data from Excel workbook files](#)
- [Publish to Power BI from Excel](#)

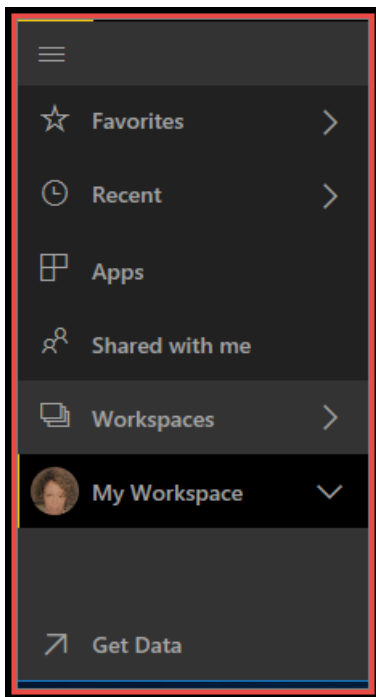
My Workspace


We've covered workspaces and building blocks. Let's take another look at the Power BI interface and review the pieces that make up the landing page for Power BI service.



1. Navigation pane (left nav)

Use the navigation pane to locate and move between your workspaces and the Power BI building blocks: dashboards, reports, workbooks, and datasets.



- Select **Get Data** to [add datasets, reports, and dashboards to Power BI](#).
- Expand and collapse the navbar with this icon .
- Open or manage your favorite content by selecting **Favorites**.
- View and open your most-recently visited content by selecting **Recent**
- View, open, or delete an app by selecting **Apps**.
- Did a colleague share content with you? Select **Shared with me** to search and sort that content to find what you need.
- Display and open your workspaces by selectig **Workspaces**.

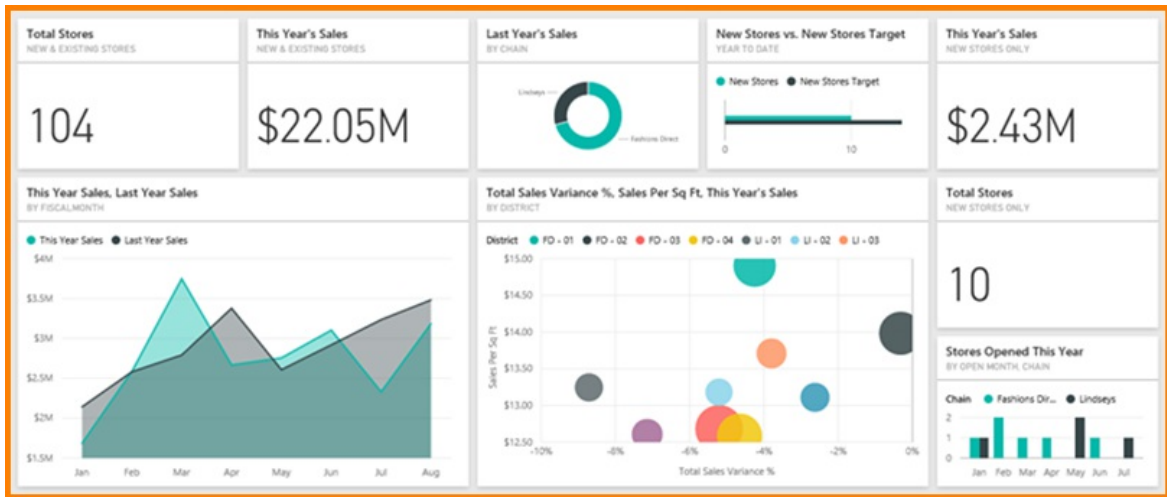
Single-click

- an icon or heading to open in content view
- an arrowright (>) to open a flyout menu for Favorites, Recent, and Workspaces.
- a chevron icon (∨) to display the **My Workspace** scrollable list of dashboards, reports, workbooks, and datasets.
- a dataset to explore it

2. Canvas

Because we've opened a dashboard, the canvas area displays visualization tiles. If, for example, we had opened the report editor, the canvas area would display a report page.

Dashboards are composed of [tiles](#). Tiles are created in report Editing view, Q&A, other dashboards, and can be pinned from Excel, SSRS, and more. A special type of tile called a [widget](#) is added directly onto the dashboard. The tiles that appear on a dashboard were specifically put there by a report creator/owner. The act of adding a tile to a dashboard is called *pinning*.

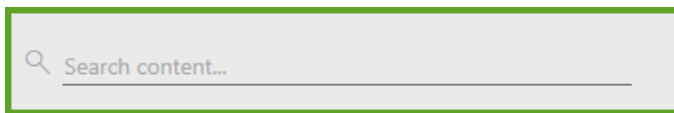


For more information, see **Dashboards** (above).

3. Q&A question box

One way to explore your data is to ask a question and let Power BI Q&A give you an answer, in the form of a visualization. Q&A can be used to add content to a dashboard or report.

Q&A looks for an answer in the dataset(s) connected to the dashboard. A connected dataset is one that has at least one tile pinned to that dashboard.



As soon as you start to type your question, Q&A takes you to the Q&A page. As you type, Q&A helps you ask the right question and find the best answer with rephrasings, autofill, suggestions, and more. When you have a visualization (answer) you like, pin it to your dashboard. For more information, see [Q&A in Power BI](#).

4. Icon buttons

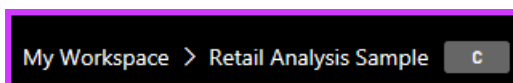
The icons in the upper right corner are your resource for settings, notifications, downloads, getting help, and providing feedback to the Power BI team. Select the double arrow to open the dashboard in **Full screen** mode.



5. Dashboard title (navigation path aka breadcrumbs)

It's not always easy to figure out which workspace and dashboard are active, so Power BI creates a navigation path for you. In this example we see the workspace (My workspace) and the dashboard title (Retail Analysis Sample). If we opened a report, the name of the report would be appended to the end of the navigation path. Each section of the path is an active hyperlink.

Notice the "C" icon after the dashboard title. This dashboard has a [data classification tag](#) of "confidential." The tag identifies the sensitivity and security level of the data. If your Admin has turned on data classification, every dashboard will have a default tag set. Dashboard owners should change the tag to match their dashboard's proper security level.



6. Office 365 app launcher

With the app launcher, all your Office 365 apps are easily available with one click. From here you can

quickly launch your email, documents, calendar, and more.



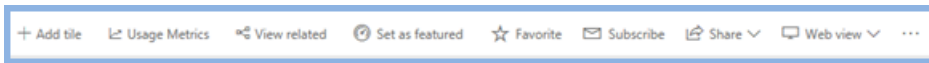
7. Power BI home

Selecting this opens your [featured dashboard](#) (if you've set one), otherwise it opens the last dashboard you viewed.



8. Labeled icon buttons

This area of the screen contains additional options for interacting with the content (in this case, with the dashboard). Besides the labeled icons you can see, selecting the ellipses reveals options for duplicating, printing, refreshing the dashboard and more.



Next steps

[Get started with Power BI](#)

[Navigation: Getting around in Power BI service](#) [Power BI videos](#)

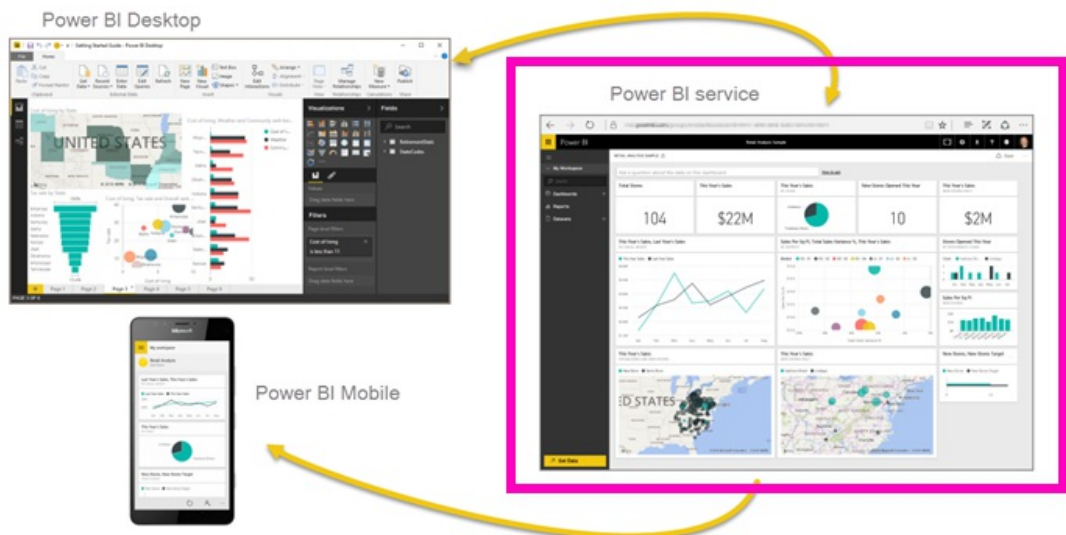
[Report editor - take a tour](#)

More questions? [Try asking the Power BI Community](#)

Get started with Power BI service (app.powerbi.com)

1/3/2018 • 6 min to read • [Edit Online](#)

This tutorial helps you get started with **Power BI service**. For an understanding of how Power BI service fits in with the other Power BI offerings, we highly recommend that you start by reading [What is Power BI](#).



Power BI service has a free version and a Pro version. No matter which version you're using, *if you already have an account*, open a browser and type app.powerbi.com to open Power BI service. If you're a new user, we recommend starting at www.powerbi.com instead. From here you can learn more about Power BI before logging in to the service. When you're ready to try it out, select the **Sign up free** link that you'll see in the upper right corner. If your administrator has already enabled Power BI for you, don't use the Sign up free button, but instead go directly to app.powerbi.com.

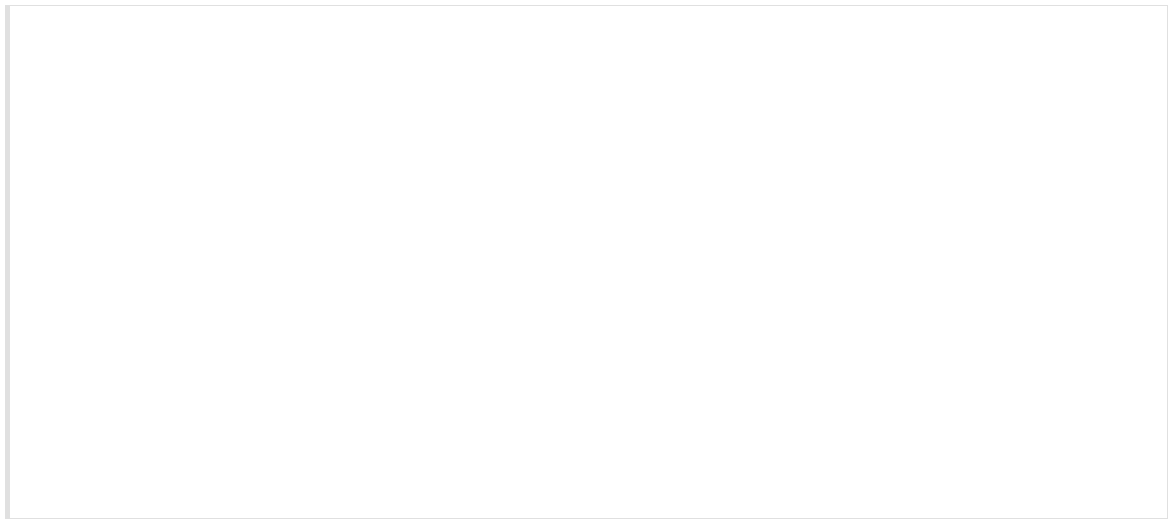
[Sign in](#) [Sign up free](#)

If you're looking for help with Power BI Desktop, see [Get started with Desktop](#). If you're looking for help with Power BI mobile, see [Power BI apps for mobile devices](#).

TIP

Prefer a free self-paced training course instead? [Enroll in our Analyzing and Visualizing Data course on EdX.](#)

Visit our [playlist on YouTube](#). A good video to start with is Introduction to Power BI service:



Microsoft Power BI helps you stay up to date with the information that matters to you. With Power BI service, **dashboards** help you keep a finger on the pulse of your business. Your dashboards display **tiles** that you can click to open **reports** for exploring further. Connect to multiple **datasets** to bring all of the relevant data together in one place. Need help understanding the building blocks that make up Power BI? See [Power BI - Basic Concepts](#).

If you have important data in Excel or CSV files, you can create a Power BI dashboard to stay informed anywhere and share insights with others. Do you have a subscription to a SaaS application like Salesforce? Get a head start by connecting to Salesforce to automatically create a dashboard from that data, or [check out all the other SaaS apps](#) you can connect to. If you are part of an organization, see if any [apps](#) have been published for you.

Read about all the other ways to [get data for Power BI](#).

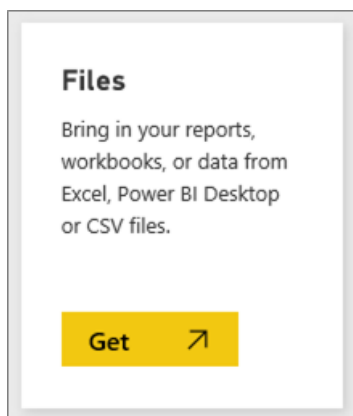
Step 1: Get data

Here's an example of getting data from a CSV file. Want to follow along with this tutorial? [Download this sample CSV file](#).

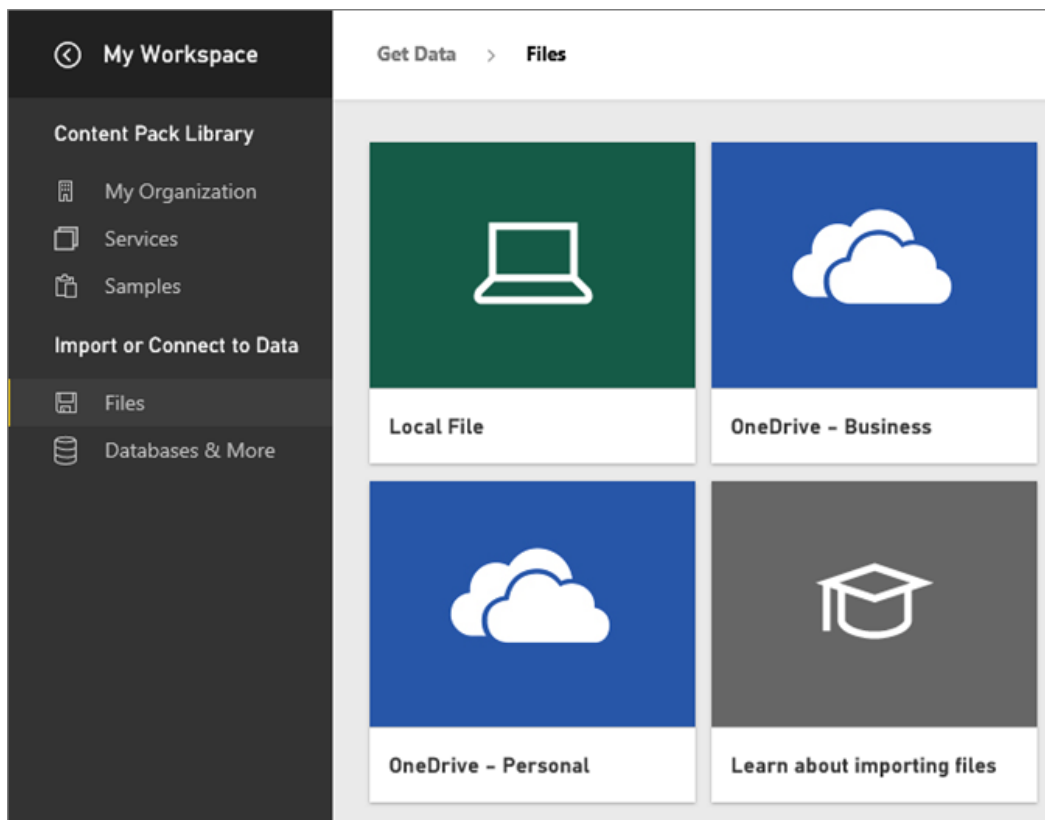
1. [Sign in to Power BI](#). Don't have an account? No worries, you can sign up for free.
2. Power BI opens in your browser. Select **Get Data** at the bottom of the left navigation bar.



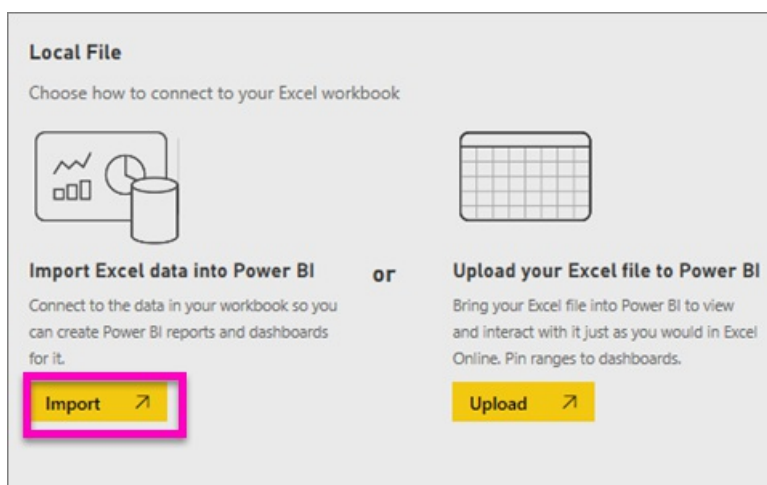
3. Select **Files**.



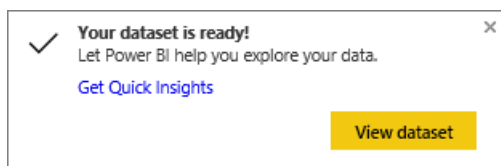
4. Browse to the file on your computer, and choose **Open**. If you saved it in OneDrive for Business, select that option. If you saved it locally, select **Local file**.



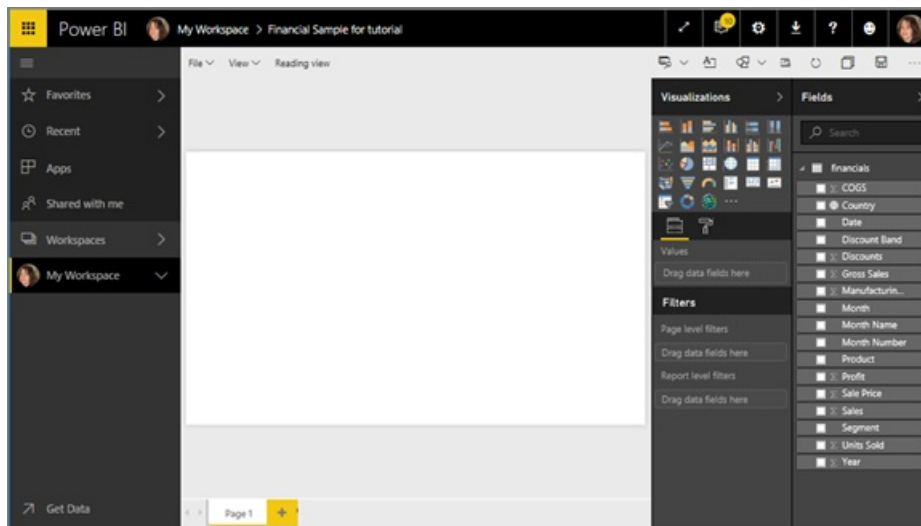
5. For this tutorial we're going to select **Import** to add the Excel file as a dataset that we can then use to create reports and dashboards. If you select **Upload**, the entire Excel workbook is uploaded to Power BI where you can open and edit it in Excel online.



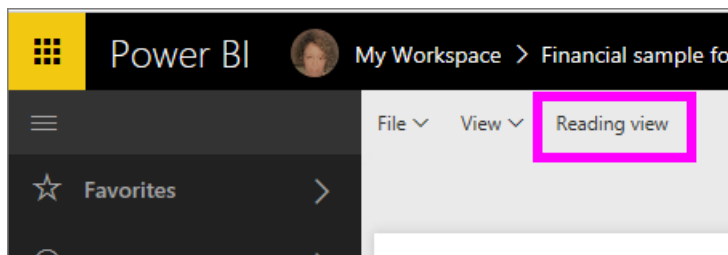
6. When your dataset is ready, select **View dataset** to open it in the report editor.



Since we haven't yet created any visualizations, the report canvas will be blank.



7. Take a look at the top menubar and notice that there is an option for **Reading view**. Since you have an option for Reading view, that means you are currently in **Editing view**.



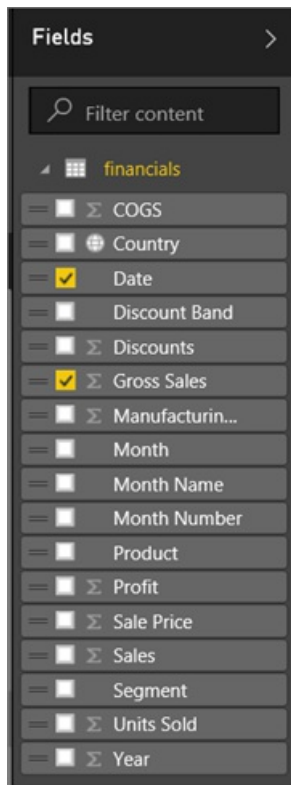
While in Editing view you can create and modify your reports because you are the *owner* of the report; you are a *creator*. When you share your report with colleagues, they'll only be able to interact with the report in Reading view; they are *consumers*. Learn more about [Reading view and Editing view](#).

A great way to get familiar with the report editor is to [take a tour](#)

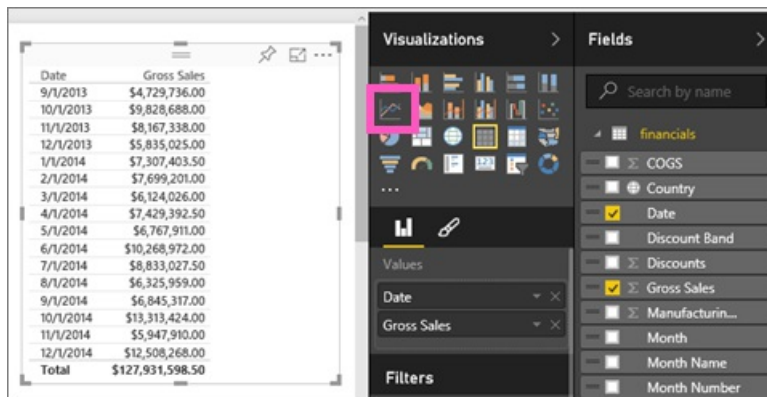
Step 2: Start exploring your dataset

Now that you've connected to data, start exploring. When you've found something interesting, you can create a dashboard to monitor it and see how it changes over time. Let's see how that works.

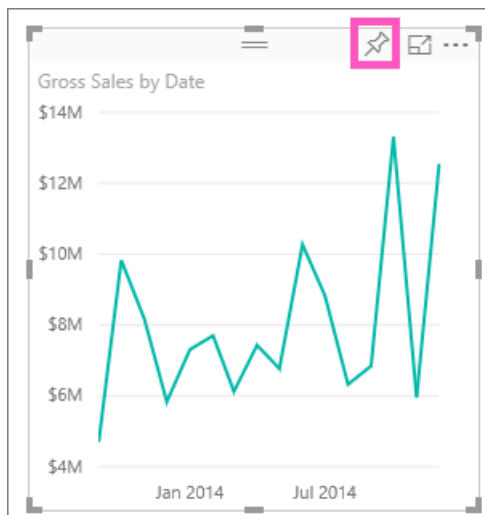
1. In the report editor, we'll use the **Fields** pane on the right side of the page to build a visualization. Select the checkbox beside **Gross Sales** and **Date**.



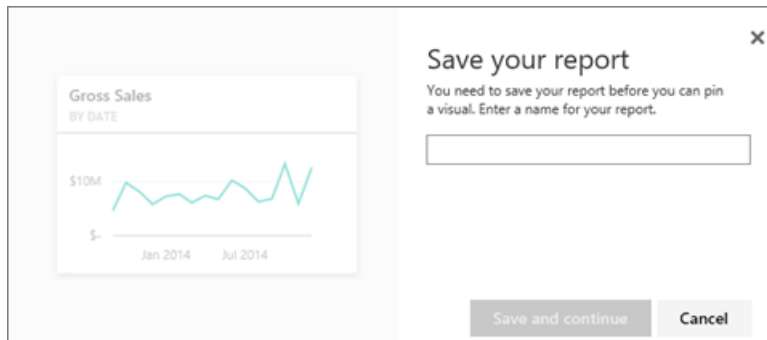
- Power BI analyzes the data and creates a visualization. If you selected **Date** first, you'll see a table. If you selected **Gross Sales** first, you'll see a chart. Switch to a different way of displaying your data. Let's see this data as a line chart. Select the line chart icon (also known as a template) from the **Visualizations** pane.



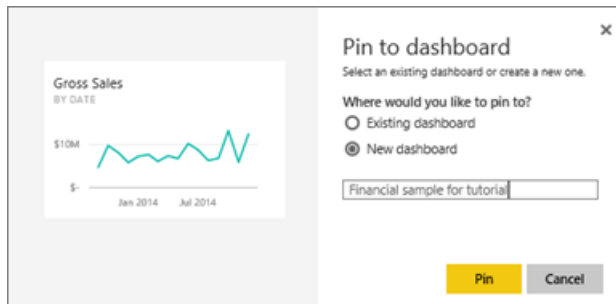
- This looks interesting, so let's *pin* it to a dashboard. Hover over the visualization and select the **Pin** icon. When you pin this visualization, it is stored on your dashboard and kept up-to-date so you can track the latest value at a glance.



4. Because this is a new report, you'll be prompted to save it before you can pin a visualization to a dashboard. Give your report a name (e.g., *Sales over time*) and select **Save and Continue**.

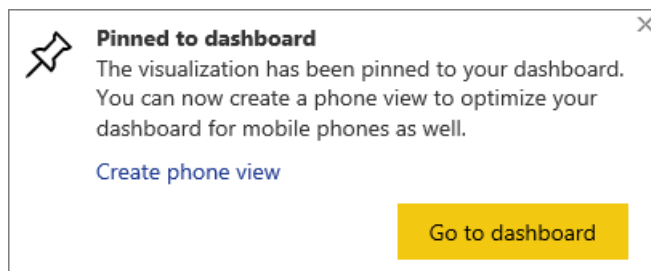


5. Let's pin the line chart to new dashboard and name it "Financial sample for tutorial".

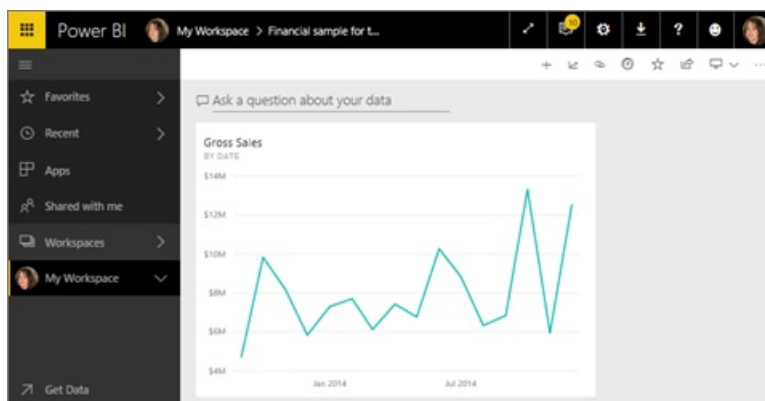


- a. Select **Pin**.

A Success message (near the top right corner) lets you know the visualization was added, as a tile, to your dashboard.



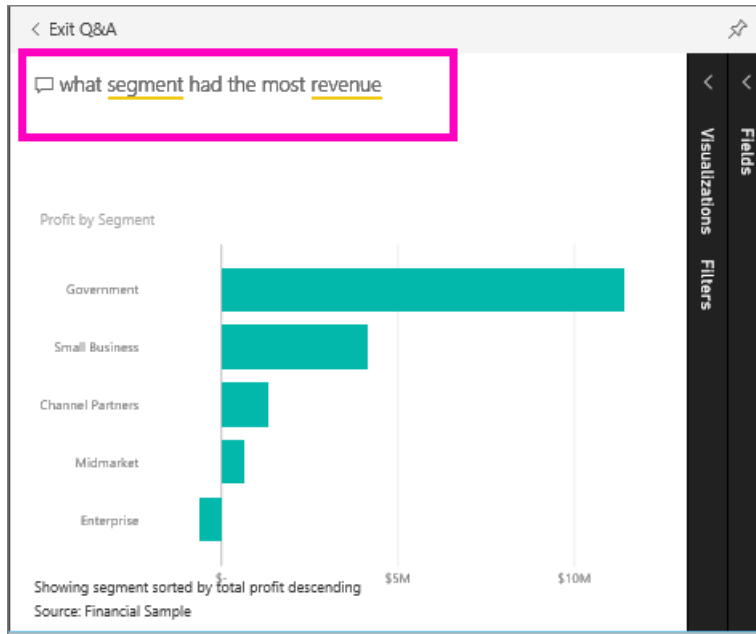
6. Select **Go to dashboard** to see the line chart pinned, as a tile, to your brand new dashboard. Make your dashboard even better by adding more visualization tiles and [renaming](#), [resizing](#), [linking](#), and [repositioning tiles](#).




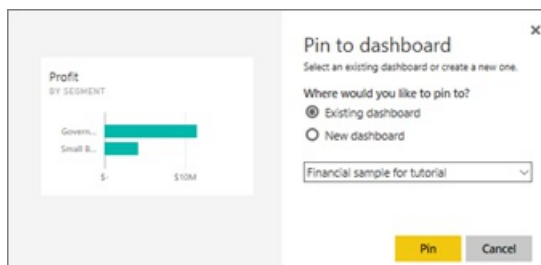
Select the new tile on your dashboard to return to the report any time. Power BI returns you to the report editor in Reading view. To switch back to Editing view, select **Edit report** from the top menubar. Once in Editing view, continue exploring and pinning tiles.

Step 3: Continue the exploration with Q&A (natural language querying)

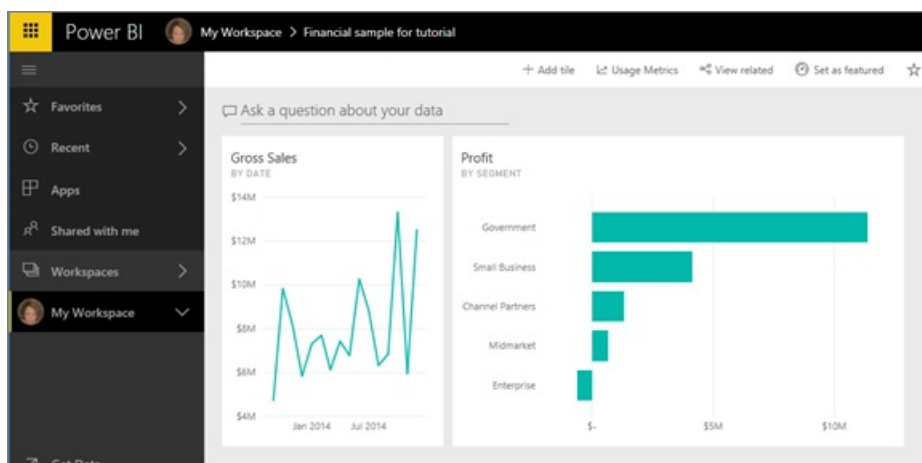
1. For a quick exploration of your data, try asking a question in the Q&A box. The Q&A question box is located at the top of your dashboard (**Ask a question about your data**) and in the top menubar in your report (**Ask a question**). For example, try typing "what segment had the most revenue".



2. Q&A searches for an answer and presents it in the form of a visualization. Select the pin icon  to show this visualization on your dashboard too.
3. Pin the visualization to the "Financial Sample for tutorial" dashboard.



4. Return to your dashboard where you'll see the new tile.



Next steps

Ready to try more? Here are some great ways to explore Power BI.

- [Connect to another dataset.](#)
- [Share your dashboard](#) with your colleagues.
- Read [tips for designing dashboards](#).
- View your dashboards with a [Power BI app on a mobile device](#)

Not quite ready to jump right in? Start with these topics designed to help you feel comfortable with Power BI.

- [Learn how reports, datasets, dashboards, and tiles all fit together](#)
- Visit our [Power BI Guided Learning](#) site and take a few (very short) courses
- Watch some [Power BI videos](#)
- [See what samples we have available for you to use](#)

Stay in touch with Power BI

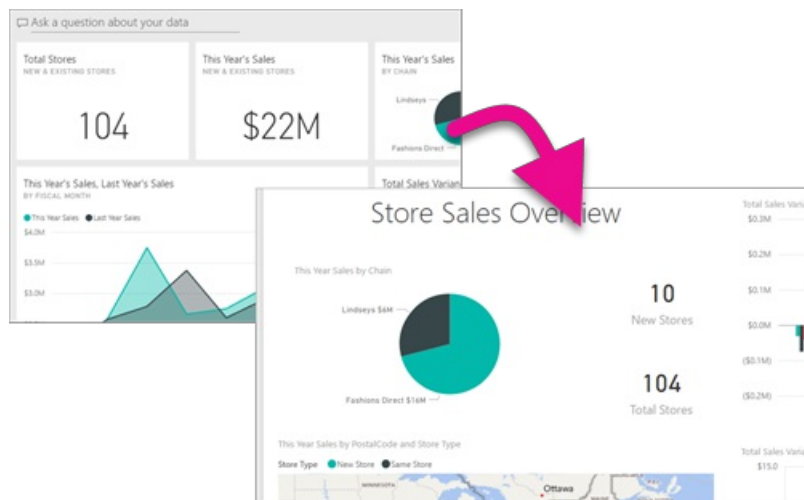
- Follow [@MSPowerBI on Twitter](#)
- Subscribe to our [YouTube video channel](#)
- Watch our [Power BI Getting Started webinars](#) on demand
- Not sure where to go for help? See our [10 tips for getting help](#) page

More questions? [Try asking the Power BI Community](#)

Signing up for Power BI as an individual

1/30/2018 • 8 min to read • [Edit Online](#)

Learn how to sign up for Power BI and begin using it for your personal report and visualization needs.



Power BI can be your personal report and visualization tool, and can also serve as the analytics and decision engine behind group projects, divisions, or entire corporations.

This article will walk you through your options on how to sign up and begin using the Power BI service. For information on the differences between Power BI Free and Pro, see [Power BI Free vs Pro](#).

You have a few options

As an individual you have several options to sign up and begin using Power BI. You can choose to sign up for free or you can purchase a Power BI Pro subscription. If you sign up for a free account, once you are in the service, you can opt into a free 60 day trial of Power BI Pro.

If you are part of an existing organization, that uses Office 365, you can still sign up for a free account. Your IT Admin also has some options to purchase Power BI Pro and assign licenses. For more information about what options are available as an IT Admin, see [Purchasing Power BI Pro](#).

NOTE

If you are in an organization, individual sign up may be disabled. See [Individual Sign up has been turned off](#) for more information if you get an error indicating it has been turned off.

What you need to sign up

In order to sign up for Power BI, you need a work email address. A personal email address won't work with the Power BI service.

What email address can be used with Power BI?

Power BI requires that you use a work, or school, email address to sign up. Power BI does not support email addresses provided by consumer email services or telecommunication providers. This includes outlook.com, hotmail.com, gmail.com and others.

If you try to sign up with a personal email address, you will get a message indicating to use a work or school

email address.

NOTE

Power BI does not support self-service sign-up for .gov or .mil addresses at this time. Please contact your Office 365 admin.

Which one do you need?

You can determine which one you need by reviewing what comes with each license type. Free users have most of the functionality of the services with the exception of sharing and collaboration features. Power BI Pro users can make use of all features in the service, but is not free. If you don't have a need to share any content, Free may be the route for you. You can learn more on the [Power BI Pricing page](#).

The remainder of this article will look at how to sign up for each option.

Signing up for Power BI (free) as an individual

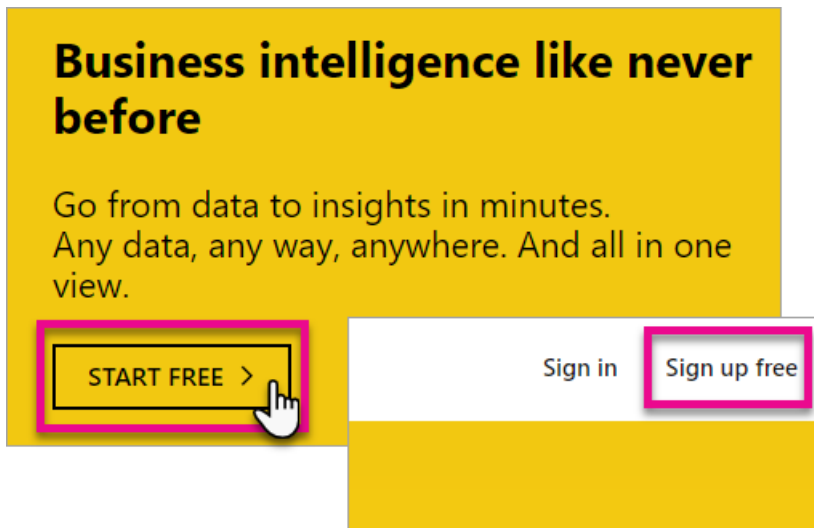
The quickest way to sign up for Power BI is to sign up for a Power BI (free) account. There is no cost to this account, and it allows you to use many of the features available in the service.

NOTE

If you receive a message that we already know you, try navigating to <https://app.powerbi.com> and signing in.

To sign up for Power BI, you can do the following.

1. Browse to powerbi.com.
2. Select **Start Free** or **Sign up free**.



3. On the get started page, select **Try Free >** under Power BI.

Power BI

Cloud collaboration and sharing

Use Power BI Pro to share and distribute reports with others, without any complicated setup. Get started now with a free 60-day trial of Power BI Pro.

TRY FREE >

4. Enter the email address you are signing up with, and then select **Sign up**. Be sure your email address is allowed for sign up. For more information about what email address you can use, see [What email address can be used with Power BI](#).

Get started

adam@contoso.com

Sign up →

5. You will get a message indicating to check your email.

Great! Go check your email.

To finish signing up, click the link in the mail from Office 365.

Didn't get the mail? Check your spam folder or [resend the mail](#)

6. Select the link within the email to verify your email address. This will bring you back into the sign up flow. You may need to supply some additional information about yourself.
7. You will then be taken to <https://app.powerbi.com> and you can begin using Power BI as a free user.

What this looks like within the service

When you are in the service, you can verify that you have a free account by going to the **gear** icon and selecting **Manage personal storage**.

Joe **Free user**

0 MB of 1 GB used

0 MB Owned by me 0 MB Owned by others

What if you're already part of an existing organization?

If your account is part of an existing organization, you will get a message asking you to sign in with that account. Select **Continue** and sign in with your Office 365 login.

You already have an account

To complete signup, sign in with your Office 365 user ID and password.

Continue →

You will then see a message asking you to select **Start**.

Almost there

You're signed in as adam@contoso.com

By choosing **Start**, you agree to our [terms and conditions](#) and understand that your name and email address will be visible to other people in your institution. [Microsoft Privacy Policy](#)

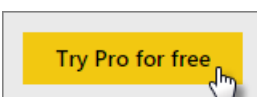
Start →

In-service Power BI Pro 60-day trial

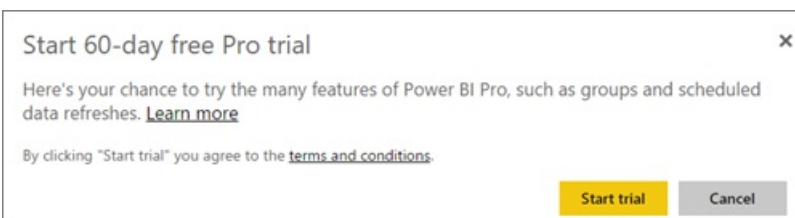
After you have signed up for your free account, you can optionally choose to try Pro free for 60 days. You will have access to all of the Pro features for the duration of the trial. Power BI Pro has all the features of the free version of Power BI, and additional sharing and collaboration features. For more information, see [Power BI Pricing](#). To try a 60-day free trial of Power BI Pro, sign into Power BI, and try one of these Power BI Pro features:

- [Create an app workspace](#)
- [Share a dashboard](#)

When you try any of these features, you will be prompted to start your free trial. You can also choose to make use of it by going to the gear icon and selecting **Manage personal storage**. Then select **Try Pro for free** on the right.



Then you can select **Start trial**.



NOTE

Users taking advantage of this in-product Power BI Pro trial do not appear in the Office 365 admin portal as Power BI Pro Trial users (they appear as Power BI free users). They will, however, show up as Power BI Pro Trial users in the **manage storage** page in Power BI.

NOTE

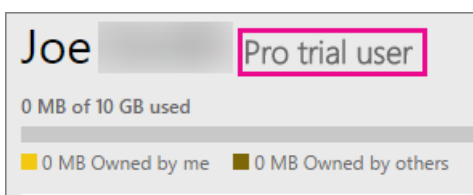
If you are an IT Administrator wishing to acquire and deploy Power BI trial licenses to multiple users in your organization without having individual users accept trial terms individually, you can sign up for a [Power BI Pro subscription trial](#). You will need to be an Office 365 Global or Billing Admin or create a new tenant to sign up for an admin trial. For more information, see [Purchasing Power BI Pro](#).

NOTE

With the availability of Power BI Premium, and the changes to the Power BI Free offering on June 1, 2017, you may be eligible for an Extended Pro Trial. For more information, see [Extended Pro Trial activation](#).

What this looks like within the service

When you are in the service, you can verify that you have a Pro trial account by going to the **gear* icon and selecting **Manage personal storage**.



What if you want the full Power BI Pro?

There is not a way to get the Power BI Pro license as an individual. You will need to speak to your IT Admin to purchase and assign the license to your account. For more information, see [Purchasing Power BI Pro](#).

Troubleshooting

In many cases, registering for Power BI can be achieved by following the simple self-service signup process listed above. However, there are several reasons why you may not be able to complete self-service signup. The table below summarizes some of the most common reasons you may not be able to complete signup and ways you can work around these issues.

SYMPTOM / ERROR MESSAGE	CAUSE AND WORKAROUND
<p>Personal email addresses (e.g. nancy@gmail.com) You receive a message like the following during signup:</p> <p><i>You entered a personal email address: Please enter your work email address so we can securely store your company's data.</i></p> <p>or</p> <p><i>That looks like a personal email address. Enter your work address so we can connect you with others in your company. And don't worry. We won't share your address with anyone.</i></p>	<p>Power BI does not support email addresses provided by consumer email services or telecommunications providers.</p> <p>To complete signup, try again using an email address assigned by your work or school.</p> <p>If you still can't sign up and are willing to complete a more advanced setup process, you can register for a new Office 365 trial subscription and use that email address to sign up.</p>

SYMPTOM / ERROR MESSAGE	CAUSE AND WORKAROUND
<p>Self-service signup disabled You receive a message like the following during signup:</p> <p><i>We can't finish signing you up. Your IT department has turned off signup for Microsoft Power BI. Contact them to complete signup.</i></p> <p>or</p> <p><i>That looks like a personal email address. Enter your work address so we can connect you with others in your company. And don't worry. We won't share your address with anyone.</i></p>	<p>Your organization's IT administrator has disabled self-service signup for Power BI.</p> <p>To complete signup, contact your IT administrator and ask them to follow the instructions on the page below to allow existing users to sign up for Power BI and to allow new users to join your existing tenant.</p> <p>You may also experience this problem if you signed up for Office 365 through a partner. Learn more</p> <p>Power BI in Your Organization</p>
<p>Email address is not an Office 365 ID You receive a message like the following during signup:</p> <p><i>We can't find you at contoso.com. Do you use a different ID at work or school?</i></p> <p><i>Try signing in with that, and if it doesn't work, contact your IT department.</i></p>	<p>Your organization uses IDs to sign in to Office 365 and other Microsoft services that are different than your email address. For example, your email address might be Nancy.Smith@contoso.com but your ID is nancys@contoso.com.</p> <p>To complete signup, use the ID that your organization has assigned to for signing in to Office 365 or other Microsoft services. If you don't know what this is, contact your IT administrator.</p> <p>If you still can't sign up and are able to complete a more advanced setup process, you can register for a new Office 365 trial subscription and use that email address to sign up.</p>

Next steps

[Power BI \(free\) in your organization](#)

[Purchasing Power BI Pro](#)

[Power BI Service agreement for individual users](#)

[Power BI Premium - what is it?](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Power BI Free vs Pro

1/30/2018 • 1 min to read • [Edit Online](#)

Every user within Power BI is either Free or Pro. It is helpful to understand the differences between these two types of users.

All users in the service are either Free or Pro. The main difference between a Free or Pro user is centered around sharing and collaboration. Only Pro users can publish content to app workspaces, consume apps without Premium capacity, share dashboards and subscribe to dashboards and reports. Free users can now connect to all data sources through all connectivity options such as DirectQuery, live connection and the use of the data gateway.

If an app is published, and the app workspace it is for is assigned to Premium capacity, Free users can consume those apps.

Free vs Pro comparison

Here is a list of features supported by user type.

	FREE	PRO
Connect to 70+ data sources	✓	✓
Publish to Web	✓	✓
Peer-to-peer sharing	✗	✓
Export to PowerPoint, Excel, CSV	✓	✓
Enterprise distribution		
Apps	✗	✓
Email subscriptions	✗	✓
Embed APIs and controls	✗	✓
Collaboration		
App workspaces	✗	✓
Analyze in Excel, analyze in Power BI Desktop	✗	✓

Next steps

If you are interested in learning more about Power BI Premium, see [Power BI Premium - what is it?](#).

To get started with Power BI by signing up, see [Signing up for Power BI as an individual](#).

More questions? [Try asking the Power BI Community](#)

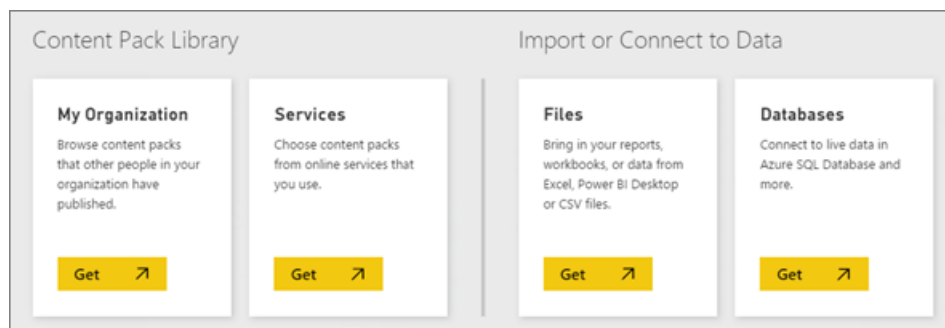
Data sources for the Power BI service

12/6/2017 • 9 min to read • [Edit Online](#)

Data is at the heart of Power BI. Whenever you're exploring data, creating charts and dashboards, asking questions with Q&A, all of those visualizations and answers you see are really getting their underlying data from a dataset. But where does that dataset come from? Well, from a data source.

In this article, we're going to go over the different types of data sources you can connect to from the Power BI service. Keep in-mind, there are many other types of data sources you can get data from, too. But those might require first using Power BI Desktop or Excel's advanced data query and modeling features. We'll go into more about that later. For now, let's look at the different types of data sources you can connect to right from your Power BI service site.

You can get data from any of these data sources in Power BI by clicking **My Workspace > Get Data**.



Files



Excel (.xlsx, .xlsm) – Excel is unique in that a workbook can have both data you've entered into worksheets yourself, and you can query and load data from external data sources by using Power Query (Get & Transform in Excel 2016) or Power Pivot. You can import data that is in tables in worksheets (the data *must* be in a table), or import data that is loaded into a data model. To learn more, see [Get data from Excel](#).

Power BI Desktop (.pbix) - You can use Power BI Desktop to query and load data from external data sources, extend your data model with measures and relationships, and create reports. You can import your Power BI Desktop file into your Power BI site. Power BI Desktop is best for more advanced users who have a good understanding of their data sources, data query and transformation, and data modeling concepts. To learn more, see [Connect to data in Power BI Desktop](#).

Comma Separated Value (.csv) - Files are simple text files with rows of data. Each row can contain one or more values, each separated by a comma. For example, a .csv containing name and address data can have a number of rows where each row has values for first name, last name, street address, city, state, and so on. You cannot import data into a .csv file, but many applications, like Excel, can save simple table data as a .csv file.

For other file types like XML Table (.xml) or text (.txt) files, you can use Get & Transform to query,

transform, and load that data into an Excel or Power BI Desktop file first. You can then import the Excel or Power BI Desktop file into Power BI.

Where you store your files makes a big difference, too. OneDrive for Business provides the greatest amount of flexibility and integration with Power BI. If you keep your files on your local drive, that's ok, but if you need to refresh your data, a few extra steps are involved. More details are provided in the linked articles.

Content packs



Content packs contain all of the data and reports you need already prepared for you. In Power BI, there are two types of content packs; those from services like Google Analytics, Marketo, or Salesforce, and those created and shared by other users in your organization.

Services – There are literally dozens of services with content packs for Power BI, and more are being added all the time. Most services require you to have an account. To learn more, see [Connect to services](#).

Organizational – If you and other users in your organization have a Power BI Pro account, you can create, share, and use content packs. To learn more, see [Organizational content packs](#).

Databases



Databases in the Cloud – From the Power BI service, you can connect live to Azure SQL Database, Azure SQL Data Warehouse, Spark on Azure HD Insight, and SQL Server Analysis Services using DirectQuery. Connections from Power BI to these databases are live, that is, when you've connected to say an Azure SQL Database, and you begin exploring its data by creating reports in Power BI, anytime you slice your data or add another field to a visualization, a query is made right to the database. To learn more, see [Azure and Power BI](#).

Databases on-premises – From the Power BI service, you can connect directly to SQL Server Analysis Services Tabular model databases. A Power BI Enterprise gateway is required. If you're unsure how to connect to your organization's tabular model database, check with your administrator or IT department. To learn more, see [SQL Server Analysis Tabular data in Power BI](#).

For other types of databases in your organization, you'll need to first use Power BI Desktop or Excel to connect to, query, and load data into a data model. You can then import your file into Power BI where a dataset is created. If you setup scheduled refresh, Power BI will use connection information from the file along with refresh settings you configure to connect directly to the datasource and query for updates. Those updates are then loaded into the dataset in Power BI. To learn more, see [Connect to data in Power BI Desktop](#).

What if my data comes from a different source?

There are literally hundreds of different data sources you can use with Power BI. But regardless of where you get your data from, that data has to be in a format the Power BI service can use to create reports and dashboards, answer questions with Q & A, and so on.

Some data sources already have their data in a format ready for the Power BI service, like content packs from service providers like Google Analytics, and Twilio. SQL Server Analysis Services Tabular model databases are ready, too. And you can connect live to databases in the cloud like Azure SQL Database and Spark on HDInsight.

In other cases, it might be necessary to query and load the data you want into a file. For example, let's say you have logistics data in a data warehouse database on a server in your organization. In the Power BI service, you cannot connect directly to that database and begin exploring its data (unless it is a tabular model database). You can, however, use Power BI Desktop or Excel to query and load that logistics data into a data model you then save as a file. You can then import that file into Power BI where a dataset is created.

You're probably thinking "But that logistics data on that database changes every day. How do I make sure my dataset in Power BI is refreshed?" Connection information from the Power BI Desktop or Excel file is imported into the dataset along with the data. If you setup scheduled refresh or do a manual refresh on the dataset, Power BI will use the connection information from the dataset, along with a couple other settings, to connect directly to the database, query for updates, and load those updates into the dataset. A Power BI gateway will likely be required to secure any data transfer between your on-premises server and Power BI. Any visualizations in reports and dashboards are refreshed automatically.

You see, just because you cannot connect to your data source right from the Power BI service doesn't mean you can't get that data into Power BI. It just might take a few more steps and maybe some help from your IT department. See [Data sources in Power BI Desktop](#) to learn more.

Some more details

You'll see the terms dataset and data source used a lot in Power BI. They're often use synonymously, but they really are two different things, albeit related.

A **dataset** is automatically created in Power BI when you use Get Data to connect to and import data from a content pack, file, or you connect to a live data source. A dataset contains information about the data source, data source credentials, and in many cases, a sub-set of data copied from the data source. In most cases, when you create visualizations in reports and dashboards, you're looking at data in the dataset.

A **data source** is where the data in a dataset really comes from. For example, an online service like Google Analytics or QuickBooks, a database in the cloud like Azure SQL Database, or a database or file on a local computer or server in your own organization.

Data refresh

If you save your files on your local drive, or a drive somewhere in your organization, a Power BI gateway might be required in-order to refresh the dataset in Power BI. And, the computer where the file is saved must be on when a refresh happens. You can also re-import your file, or use Publish from Excel or Power BI Desktop, but those are not automated processes.

If you save your files on OneDrive for Business or SharePoint – Team Sites, and then connect to or import them into Power BI, your dataset, reports, and dashboard will always be up-to-date. Because both OneDrive and Power BI are in the cloud, Power BI can connect directly to your saved file, about once every hour, and check for updates. If any are found, the dataset and any visualizations are refreshed automatically.

Content packs from services are automatically updated. In most cases, once a day. You can manually refresh, but whether or not you'll see any updated data will depend on the service provider. Content

packs from others in your organization will depend on the data sources used and how the person who created the content pack setup refresh.

Azure SQL Database, Azure SQL Data Warehouse, and Spark on Azure HDInsight are unique in that they are data sources in the Cloud. Because the Power BI service is also in the cloud, Power BI can connect to them live, using DirectQuery. What you see in Power BI is always in-sync and there's no need to setup refresh.

SQL Server Analysis Services is unique in that when you connect to it from Power BI, it's a live connection just like an Azure database in the cloud, but the database itself is on a server in your organization. This type of connection requires a Power BI gateway, which is usually configured by an IT department.

Data refresh is a super important part of Power BI, and much too deep to cover here. If you want to get a thorough understanding, be sure to checkout [Data Refresh in Power BI](#).

Considerations and Limitations

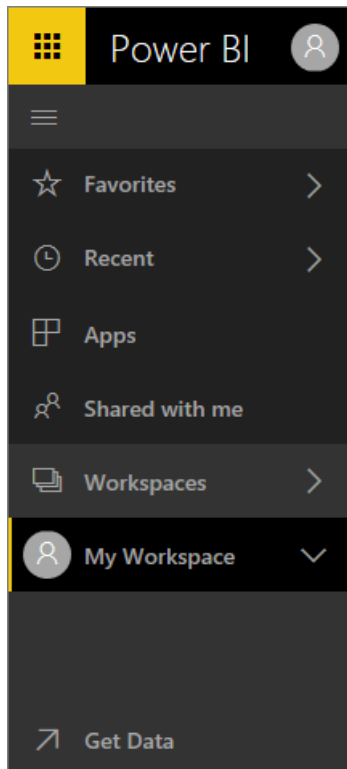
For all data sources used in the Power BI service, the following considerations and limitations apply. There are other limitations that apply to specific features, but the following list apply to the Power BI service overall:

- **Dataset size limit** - there is a 1 GB limit for each dataset in the Power BI service.
- **Row limit** - the maximum number of rows in your dataset (when not using DirectQuery) is 2 billion, with three of those rows reserved (resulting in a usable maximum of 1,999,999,997 rows); the maximum number of rows when using DirectQuery is 1 million rows.
- **Column limit** - the maximum number of columns allowed in a dataset, across all tables in the dataset, is 16,000 columns. This applies to the Power BI service and to datasets used in Power BI Desktop. Power BI uses an internal row number column per table included in the dataset, which means the maximum number of columns is 16,000 minus one for each table used in the dataset.

Getting around in Power BI service

1/10/2018 • 5 min to read • [Edit Online](#)

The left navigation pane



Quick reference guide

ACTION	NEW (CURRENT) PATH
Favorite a dashboard or report	Workspace > Dashboards or Workspace > Reports and select the star icon to turn it yellow
Favorite an app	Select Apps from left navpane and select star next to app name
View a list of your favorites	Select Favorites from left navpane
View a list of recently-visited dashboards and reports	Select Recent from left navpane
View a list dashboards that have been shared with you	Select Shared with me from left navpane
Share a dashboard	Open dashboard and select Share or create and publish an app
Delete a dashboard	My workspace > Dashboards > trashcan icon
Delete a report	My workspace > Reports > trashcan icon
Delete a dataset	My workspace > Datasets > ... > Delete

ACTION	NEW (CURRENT) PATH
Open a dashboard	Workspace > Dashboards > and select the name of the dashboard
Open a report	Workspace > Reports > and select the name of the report
Open a dataset	Workspace > Datasets > and select the name of the dataset
Create a dashboard	From the top navbar select Create > Dashboard
Create a report	From the top navbar select Create > Report
Create a dataset	From the top navbar select Create > Dataset
Create an app	Workspaces > Create app workspace
View a list of all the dashboards, reports, and datasets that you own	Workspaces > My workspace

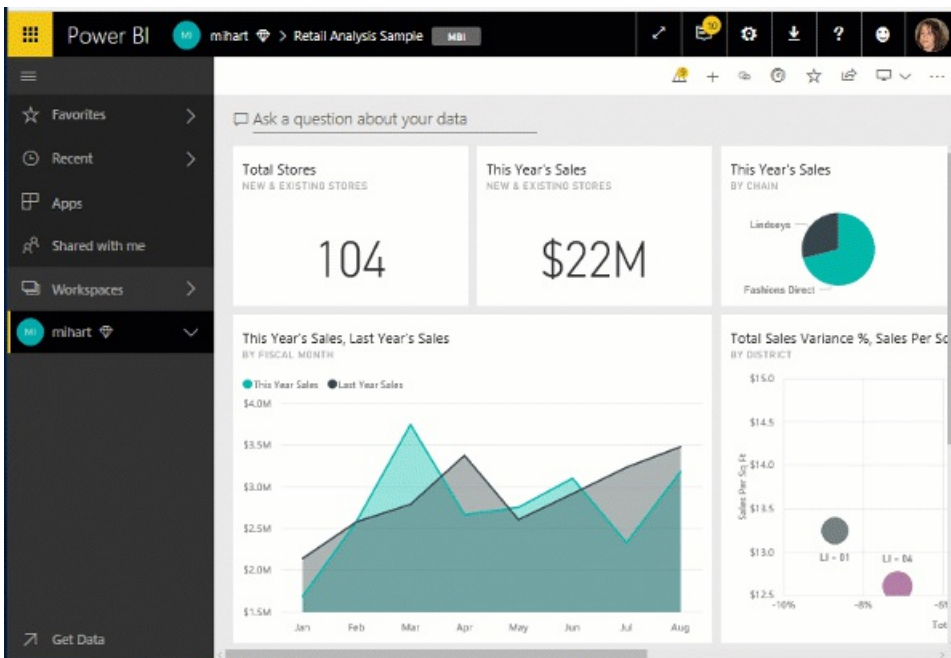
Common tasks

Watch Amanda take you on a tour of the Power BI service navigation experience. Then follow the step-by-step instructions below the video to explore for yourself.

View content (dashboards, reports, workbooks, datasets, workspaces, apps)

Let's start by looking at how the basic content (dashboards, reports, datasets, workbooks) is organized. Before this, all of your content was listed in the left navigation pane. Now, you still have that option, but the default is to display by content type within the context of a workspace. Select a workspace from the left navigation pane (left navpane) and the tabs for the associated content (dashboards, reports, workbooks, datasets) fill the Power BI canvas to the right.

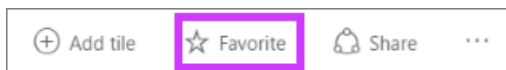
If you have Power BI Free, you'll only see one workspace -- **My Workspace**.



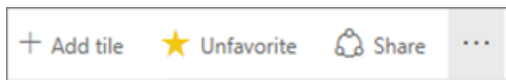
Favorite dashboards, reports, and apps

Favorites lets you quickly access content that is most important to you.

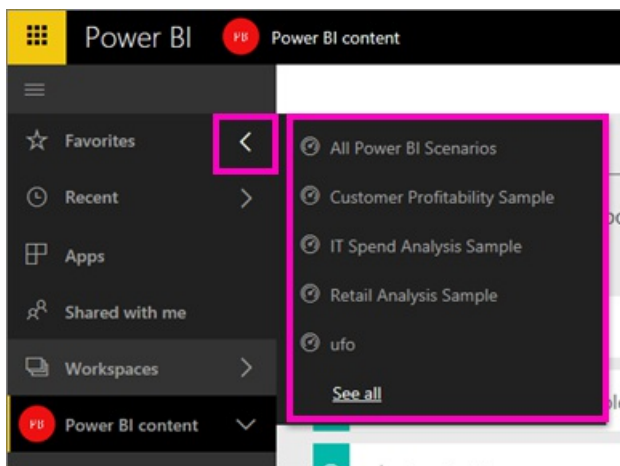
1. With the dashboard or report open, select **Favorite** from the upper right corner.



Favorite changes to **Unfavorite** and the star icon becomes yellow.



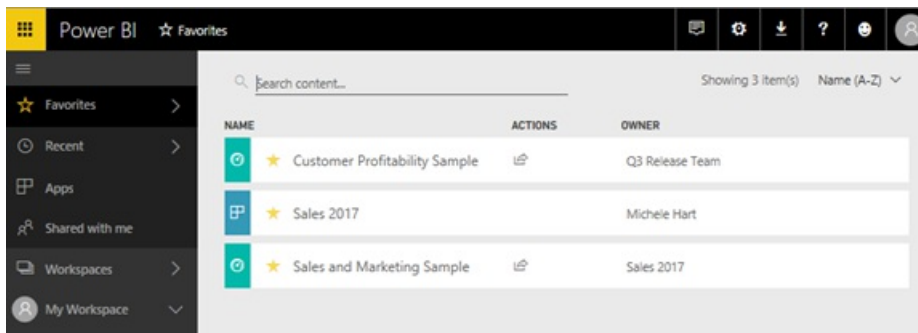
2. For an app, select **Apps** from the left navpane, hover over the app and choose the star to set it as a favorite.
3. To display a list of all the content that you have added as favorites, in the left navpane, select the arrow to the right of **Favorites**. Because the left navpane is a permanent feature of Power BI service, you have access to this list from anywhere in Power BI service.



From here you can select a dashboard, report, or app to open it.

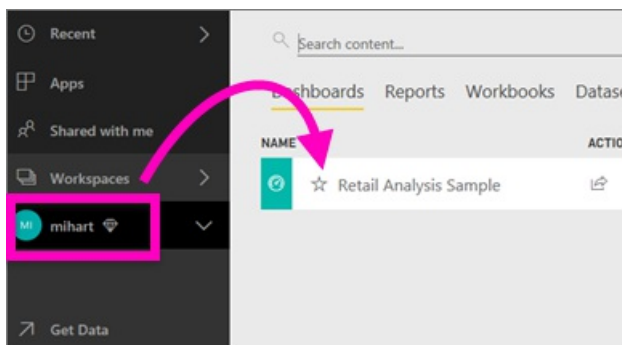
4. To open the **Favorites** pane, in the left navpane, select **Favorites** or select the Favorites icon





From here you can open, find the content, unfavorite, or share content with colleagues.

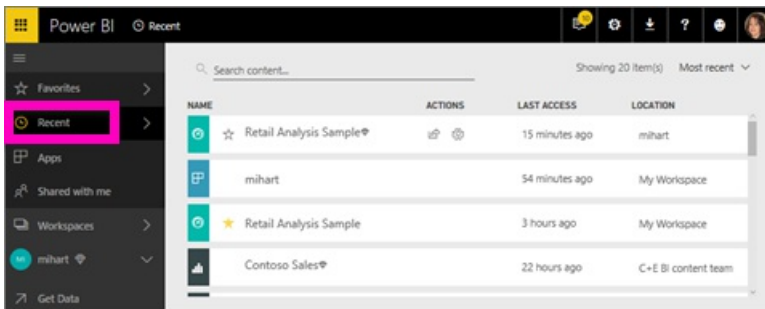
- Another way to mark either a dashboard or report as a favorite is from the **Dashboards** or **Reports** workspace tab. Just open the workspace to display the content view, and select the star icon to the left of the name.



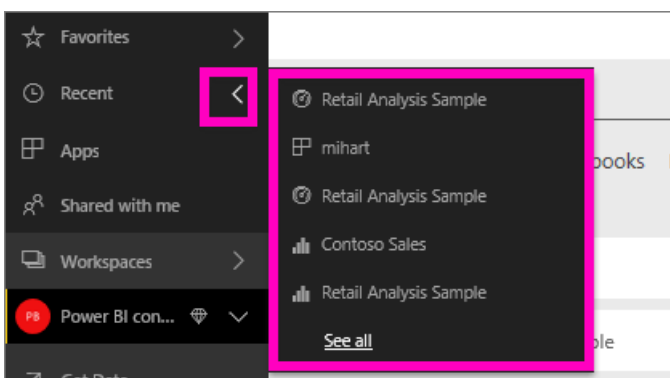
To learn more, see [Favorites](#)

Recents

Quickly get to the content that you've most recently accessed by visiting the **Recents** pane. This includes content from across all of your workspaces.



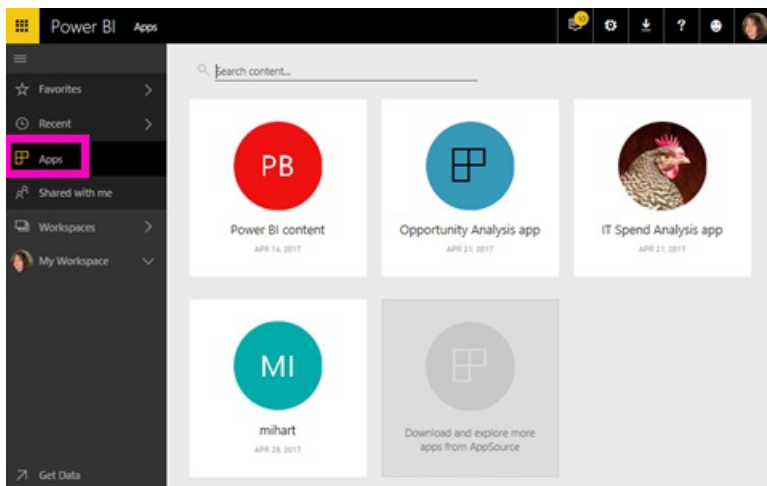
Similar to Favorites, you can quickly access your recents from anywhere in Power BI service by selecting the arrow next to **Recents** in the left navpane.



To learn more, see [Recents in Power BI](#)

Apps

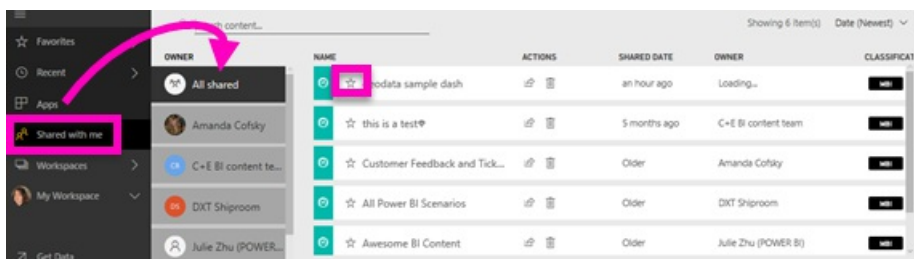
An app is a collection of dashboards and reports built to deliver key metrics, all in one place. You can have apps internal to your organization, and also [apps for external services](#) such as Google Analytics and Microsoft Dynamics CRM.



To learn more, see [App workspaces](#) (below) and [What are Power BI apps](#).

Shared with me

Shared with me is the location for all content that colleagues have shared with you. Filter by dashboard owner, use the search field to find what's relevant, and sort the items by date. And for shared content you visit frequently, it's even easier to favorite it right from the **Shared with me** view.



To learn more, see [Shared with me](#)

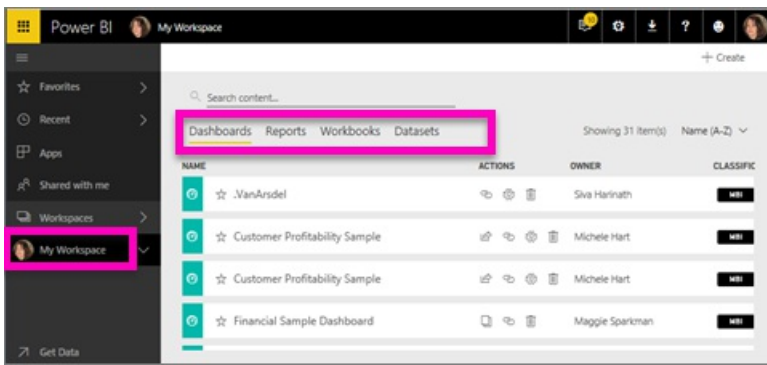
Working with workspaces

Next in the left nav is *workspaces*. Workspaces can be thought of as *containers* for Power BI content. There are two types of workspaces: **My Workspace** and App workspaces.

If you are not a member of an app workspace or an admin, you may not see any app workspaces in your left nav. And if you are a Power BI Free customer, you will not see any app workspaces.

My Workspace

My Workspace stores all the content that you own. Think of it as your personal sandbox or work area for your own content. You can share content from My Workspace with colleagues. Within My Workspace, your content is organized into 4 tabs: Dashboards, Reports, Workbooks, and Datasets.

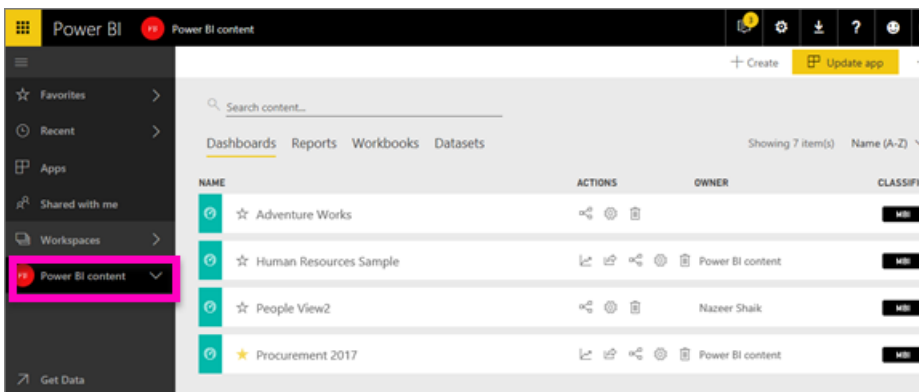


App workspaces

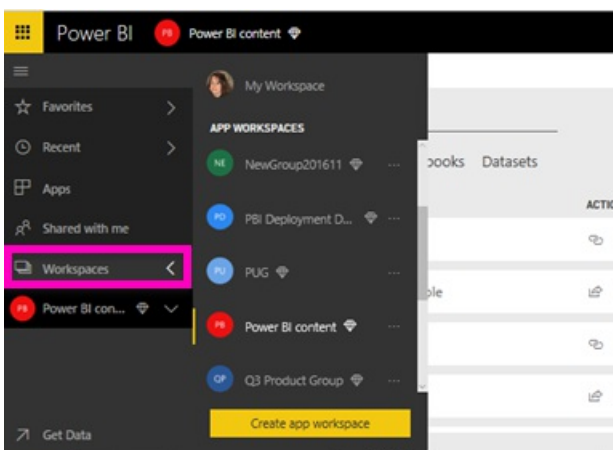
Apps and app workspaces are a feature of Power BI Pro. If you are someone who authors dashboards and reports for others, you'll use app workspaces to do this. An app workspace is the place where you'll create the app, so to create an app, you'll first need to create the app workspace. They're the evolution of group workspaces – staging areas and containers for the content in the app. You and your colleagues can collaborate on dashboards, reports, and other content that you plan to distribute to a wider audience, or even your entire organization.

To learn more, visit [Create and distribute an app in Power BI](#).

As with **My Workspace**, your content is organized into 4 tabs: Dashboards, Reports, Workbooks, and Datasets.

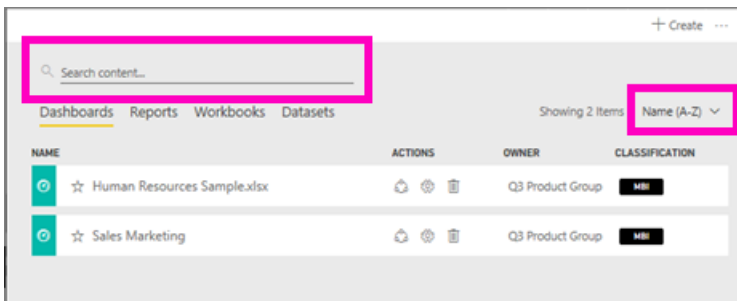


Switch workspaces by selecting **Workspaces** in the left navpane.



Search and sort content

The content view makes it easier to search, filter and sort your content. To search for a dashboard, report or workbook, type in the search area. Power BI filters to only the content that has your search string as part of the name.



You can also sort the content by name or owner.

SORT BY

Name (A-Z)

Name (Z-A)

Owner (A-Z)

Owner (Z-A)

To learn more, see [Power BI navigation: search, sort, filter](#)

Next steps

Power BI service [Basic concepts](#)

Have questions or feedback? [Visit the Power BI community forum](#)

10 tips for getting help with your Power BI questions

11/15/2017 • 3 min to read • [Edit Online](#)

Do you ever get frustrated using Power BI, or struggle because you can't get answers to your Power BI questions when you need them -- i.e. "just-in-time"?

Here are 10 tips that Power BI experts (including people who work on the product at Microsoft) commonly follow to find answers to their Power BI questions.

1 Use a search engine

Experts who need answers for Power BI often use search. Want to find a DAX formula for a common business calculation? You can find this on the internet. Bookmark where you find the best answers. Create a folder for yourself on tips and answers you find.

2 Check the Power BI documentation

The Power BI team is continually updating and improving the Power BI documentation and training. You can find great content including recordings of webinars, white papers, guided learning, and links to blog posts on all the latest features.

3 Read the Power BI blog for the latest news

The Power BI team explains all the new features in their regular [Power BI blog posts](#). Find out what's new in everything from Power BI Desktop to the Power BI mobile apps. Make a habit of returning often to see what's new: Take a few minutes each week to scan the blogs. You never know when you'll benefit from that bit of information you noticed months ago.

4 Try Twitter

Lots of Power BI customers and experts are on Twitter. Ask your question in a tweet. Add the hashtags #powerbi and #powerbihelp so the people who know will see your tweet.

5 Watch videos on YouTube

Do videos fit your learning style better? Power BI has two sets you'll be interested in:

- A good place to start is the [Analyze and Visualize data with Power BI playlist](#).
- Then try the [Power BI channel](#) for a much bigger selection.
- If you have more experience with Power BI, the [Guy in a Cube YouTube channel](#) might be a better fit for you.

6 Attend training

The training options available to you are nearly endless, from in-person lab training to short videos.

- [Guided learning](#) on the Power BI site.
- [Free Power BI webinars](#), live and on-demand, on the Power BI site.

You can find additional options online, such as:

- [edX.org](#) offers a free course, [Analyzing and Visualizing Data with Power BI](#).

- **Lynda.com** offers has courses such as [Power BI Pro Essential Training](#).
- Look for in-person "**Dashboard in a Day**" training sessions.

7 Ask or search in the Power BI community

Ask questions and find answers in the [Power BI community](#). BI experts around the world are active in the community. Make sure to benefit from their knowledge by using this resource.

8 Join or create a Power BI user group

Join a [Power BI user group](#) and ask your group for help in answering your questions. Or you start your own user group and create a community of people who help each other out, focused on your needs: in your area, for your data, in your time zone.

9 Check the service status

If you're having an issue with the service, it may be that the service itself is having issues. [Check the Support page](#) for any reports.

10 Just try it

If all else fails, the final tip is to observe the system. Often, people ask what capabilities Power BI has. You can often answer this type of question by going into the Power BI service or Power BI Desktop, looking at the options in the user interface, and then trying to use them.

For example, say you're wondering if you can share dashboards with a security group. To answer that question, go to the sharing dialog box and try adding a security group. Either way, you'll have your answer after this test.

Next steps

- [Get started with Power BI](#)
- Try asking the [Power BI Community](#)
- Still have an issue? Please visit the [Power BI support page](#)

Navigation: searching, finding, and sorting content in Power BI service

12/20/2017 • 1 min to read • [Edit Online](#)

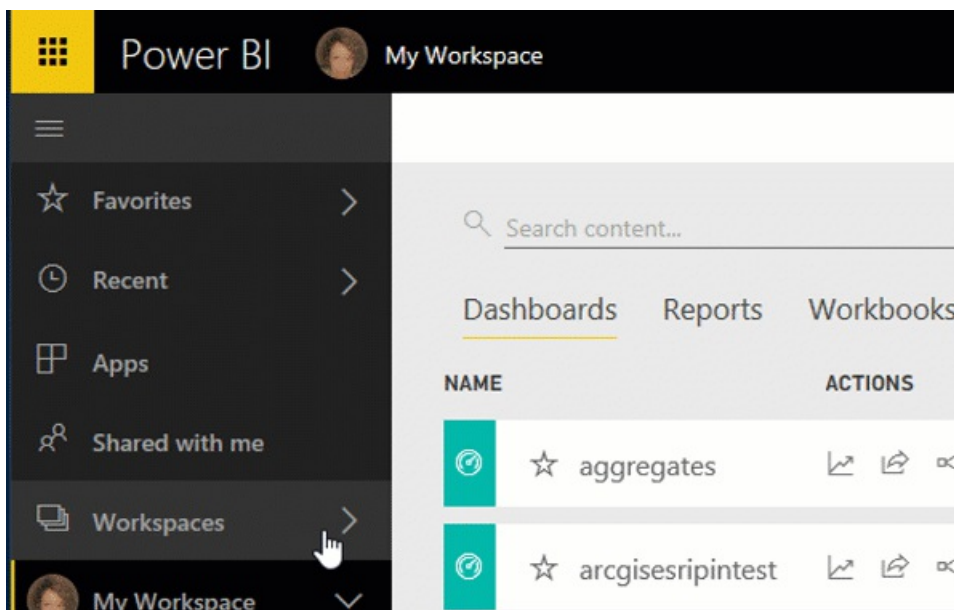
There are many ways to navigate your content in Power BI service. The content is organized within workspaces by type: dashboards, reports, workbooks, and datasets. And the content is also organized by usage: favorites, recent, apps, shared with me, and featured. These different pathways into your content allow you to quickly find what you need in Power BI service.

NOTE

This article applies to Power BI service (app.powerbi.com) and not to Power BI Desktop.

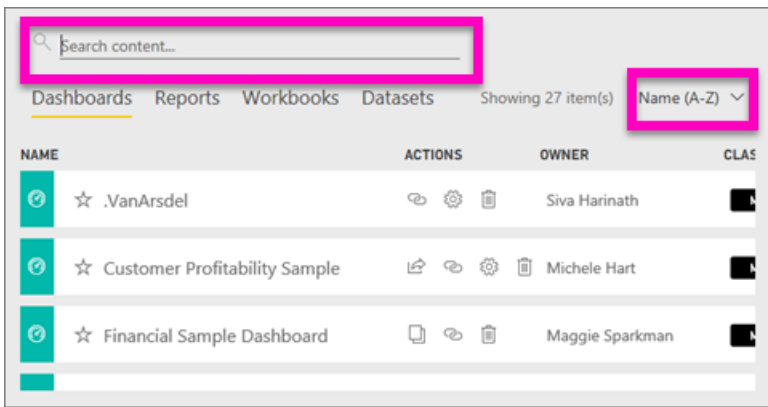
Navigation within workspaces

Power BI service separates your workspace content by type: dashboards, reports, workbooks, and datasets. You'll see this organization when you select a workspace. In this example, the app workspace is named "Sales and marketing app sample" and it contains 2 dashboards, 6 reports, 1 workbook, and 5 datasets.

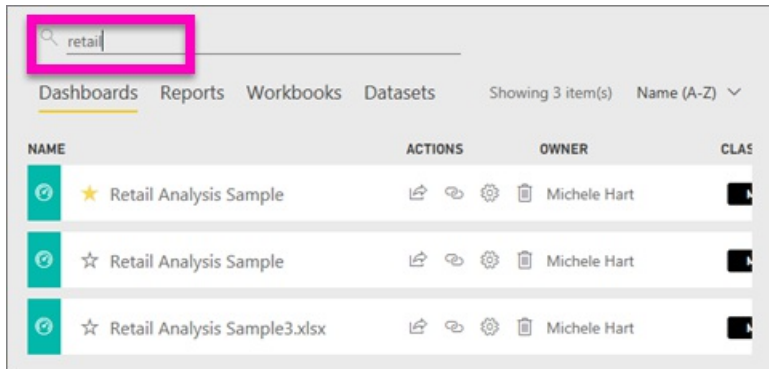


Searching and sorting in workspaces

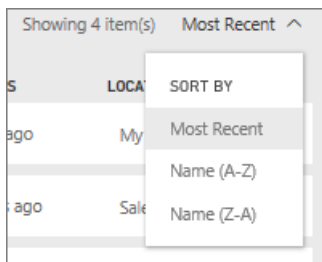
A workspace has four content tabs: Dashboards, Reports, Workbooks, and Datasets. Each of these tabs contains a search field and a sort button. When you're starting out with Power BI service, you might not find these helpful because you'll have only one or two items per tab. However, over time you may end up with long lists of content. Use searching and sorting to easily find what you need.



- Enter a search term to find a match on the current screen

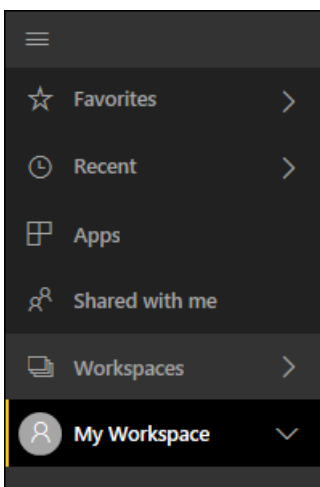


- Select the sort button to display options for the current page. The options are to sort by name or by owner.



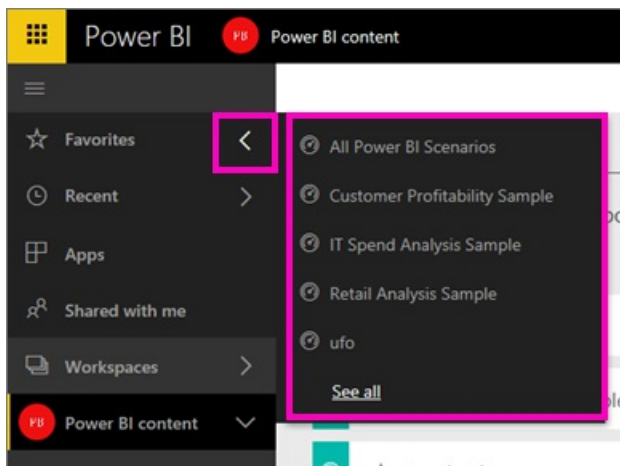
Navigation using the left navbar

The left navbar classifies your content in ways that make it even easier to find what you need, quickly.



Content that you create for your own use is available in **My workspace**, content that you create and share with a group is available in an **Apps** workspace, content that is shared with you is available in **Shared with me**, and your last-viewed content is available in **Recent**.

Additionally, you can tag content as [favorite](#) and [featured](#). Pick the one dashboard that you expect to view most often, and set it as your *featured* dashboard. Each time you open Power BI service, this is the dashboard that will display first. Do you have a number of dashboards and apps that you visit often? By setting them as favorites, they'll always be available from your left navbar.



Considerations and troubleshooting

- For datasets, **Sort by** is not available by owner.

Next steps

[Power BI - Basic Concepts](#)

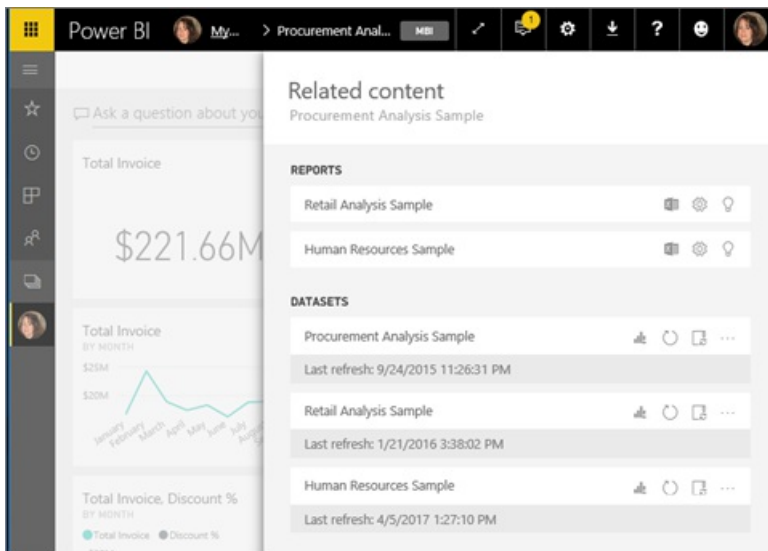
More questions? [Try the Power BI Community](#)

View related content in Power BI service

1/8/2018 • 3 min to read • [Edit Online](#)

The **Related content** pane shows you how your Power BI service content -- dashboards, reports, and datasets -- are interconnected. And it gets better, from this pane you can perform common task such as refreshing, renaming, generating insights, and so much more. Select a related report or dashboard, and it opens in your Power BI workspace.

As you've probably already discovered, reports are built on datasets, report visualizations are then pinned to dashboards, and dashboard visuals link back to reports. But how do you know which dashboards are hosting visualizations from your Marketing report? And how do you locate those dashboards? Is your Procurement dashboard using visualizations from more than one dataset? If so, what are they named and how can you open and edit them? Is your HR dataset being used in any reports or dashboards at all or can it be moved without causing any broken links? Questions like these can all be answered on the **Related content** pane. Not only does the pane display the related content, it also allows you take action on the content and easily navigate between the related content.



NOTE


The related content feature does not work for streaming datasets.

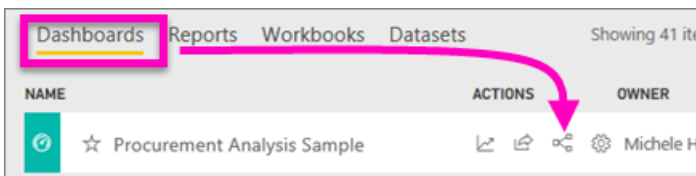
View related content for a dashboard

Watch Will view related content for a dashboard. Then follow the step-by-step instructions below the video to try it out yourself with the Procurement Analysis sample dataset.

You'll need at least *view* permissions to a dashboard to open the **Related content** pane. In this example we're using the [Procurement Analysis sample](#).

Method 1

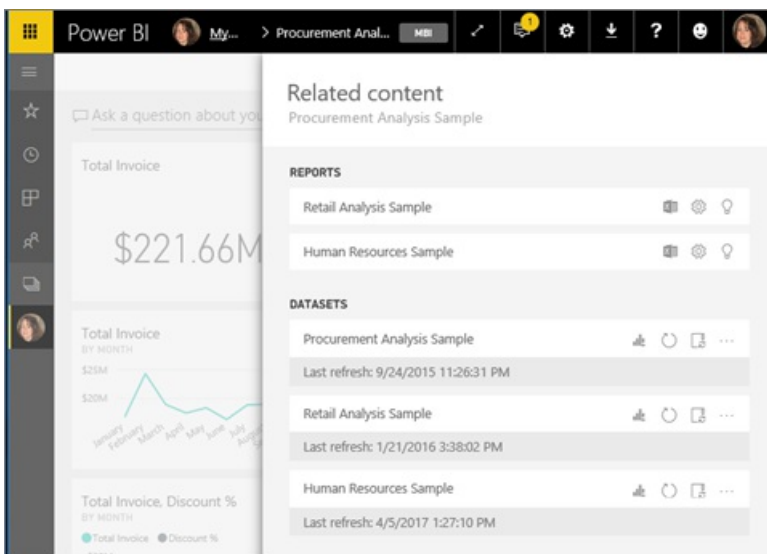
In a workspace, select the **Dashboards** tab and then select the **View related** icon .



Method 2

With a dashboard open, select  View related from the top menubar.

The **Related content** pane opens. It shows all the reports that have visualizations pinned to the dashboard and their associated datasets. For this dashboard, there are visualizations pinned from 3 different reports and those reports are based on 3 different datasets.




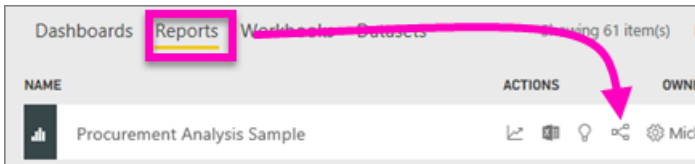
From here, you can take direct action on the related content. For example, select a report name to open it. For a listed report, select an icon to [analyze in Excel](#), [rename](#), or [get insights](#). For a dataset, select an icon to [create a new report](#), [refresh](#), [rename](#), [analyze in Excel](#), [get insights](#), or open the **Settings** window for the dataset.

View related content for a report


You'll need at least *view* permissions to a report to open the **Related content** pane. In this example we're using the [Procurement Analysis sample](#).

Method 1

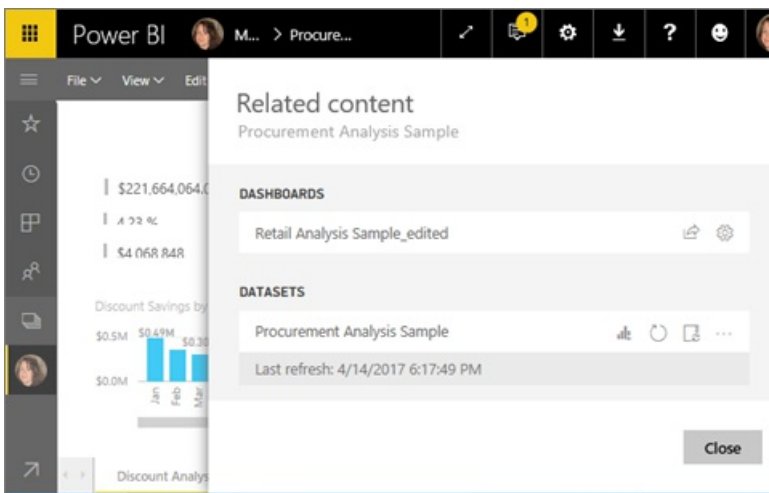
In a workspace, select the **Reports** tab and then select the **View related** icon .



Method 2

Open the report in [Reading view](#) and select  from the top menubar.


The **Related content** pane opens. It shows the associated dataset and all dashboards that have at least one tile pinned from the report. For this report, there are visualizations pinned to 2 different dashboards.

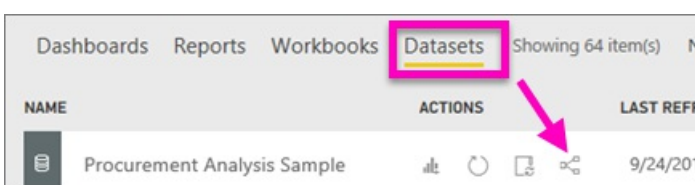


From here, you can take direct action on the related content. For example, select a dashboard name to open it. For any dashboard in the list, select an icon to [share the dashboard with others](#) or to open the **Settings** window for the dashboard. For the dataset, select an icon to [create a new report](#), [refresh](#), [rename](#), [analyze in Excel](#), [get insights](#), or open the **Settings** window for the dataset.

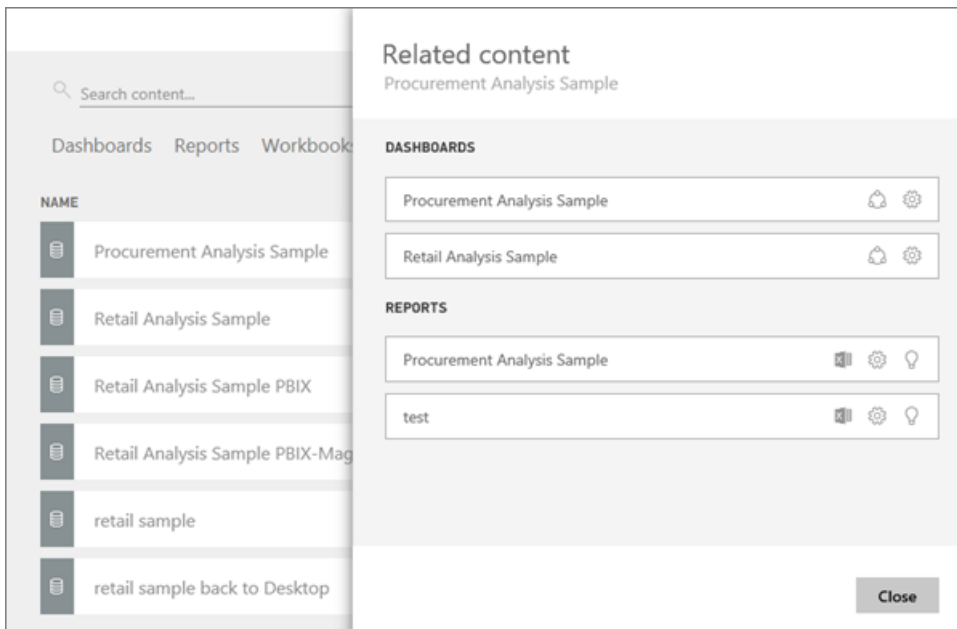
View related content for a dataset

You'll need at least *view* permissions to a dataset to open the **Related content** pane. In this example we're using the [Procurement Analysis sample](#).

In a workspace, select the **Datasets** tab and locate the **View related** icon .




Select the icon to open the **Related content** pane.



From here, you can take direct action on the related content. For example, select a dashboard or report name to open it. For any dashboard in the list, select an icon to [share the dashboard with others](#) or to open the **Settings** window for the dashboard. For a report, select an icon to [analyze in Excel](#), [rename](#), or [get insights](#).

Limitations and troubleshooting

- If your browser doesn't have enough space, you won't see an option for **View related** but you will still see the View related icon . Select the icon to open the **Related content** pane.
- To open Related content for a report, you need to be in [Reading view](#).
- Related content is not available in Power BI Desktop.
- The Related content feature does not work for streaming datasets.

Next steps

- [Get started with Power BI service](#)
- More questions? [Try the Power BI Community](#)

Extended Pro Trial activation

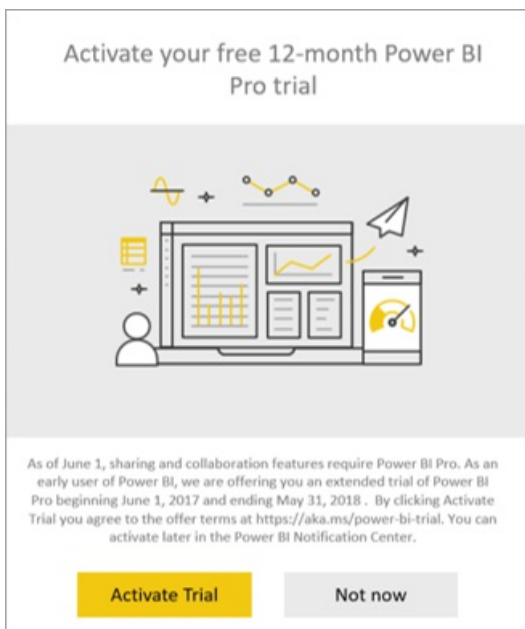
1/30/2018 • 5 min to read • [Edit Online](#)

Beginning on June 1, 2017, all eligible users will be able to opt-in to the Extended Pro Trial for the Power BI service.

As part of the [May 3, 2017 Power BI Premium announcement](#), Microsoft communicated changes to the free Power BI service effective June 1, 2017. These changes include extending access to all data sources, higher workspace storage limits, and higher refresh and streaming rates to the Free service, making it equivalent to Power BI Pro.

Also announced was that sharing and collaboration features will be exclusive to Power BI Pro users, including peer-to-peer dashboard sharing, group workspaces (now called app workspaces), export to PowerPoint and analyze in Excel with Power BI apps. Export to CSV/Excel and PowerPoint were identified in the May 3 communication as a capability limited to Power BI Pro, but after receiving feedback from the broad user community the strategy has evolved to make the capability available to users of the Free service as well.

Beginning June 1, 2017 existing users of the Free service who have been active within the past year (on or before May 2, 2017) will be eligible for a free, 12-month extended trial of Power BI Pro. The offer will let users take advantage of the full capabilities of Power BI Pro for the next year as a sign of appreciation to the community and to provide users with time to adjust to the changes.



On June 1, 2017 eligible users will receive a notification when they sign into the service letting them know the changes have gone into effect with a prompt to register for the Extended Power BI Pro trial offer. A user's IT admin does not control the in-product notifications, nor does the IT admin have the ability to register for the extended Power BI Pro trial on behalf of a user. Each eligible user must individually take action to complete this process.

Users can opt to register for the offer at any time during the 12-month period, but the Extended Pro trial will conclude for all users on May 31, 2018 regardless of when they accept the offer. At this time users will have the option to purchase Power BI Pro or be converted to the Free version of Power BI, without the sharing and collaboration capabilities, if they elect not to take action and purchase Power BI Pro.

No changes are being made to Power BI Pro. These users are not impacted and will not receive notifications when signing into the service on June 1, 2017 or after. Users who decline the extended Power BI Pro trial offer or are ineligible for the offer will continue using the Free version of Power BI without the sharing and collaboration capabilities. They can register at any time for a standard 60-day Power BI Pro trial by visiting the Power BI [website](#).

Eligibility for Extended Pro Trial

Your account must meet the following requirements in order to be eligible for the Extended Pro Trial offer.

- Power BI Free users active between May 3, 2016 and May 2, 2017 are eligible for an Extended Pro Trial.
- Users that have previously used or are currently on the *60-day in-product Pro trial* are still eligible for the Extended Pro Trial.

NOTE

Users that have licenses assigned from the Power BI Pro or Power BI Pro Trial subscriptions, within Office 365, are excluded from this offer.

How to activate

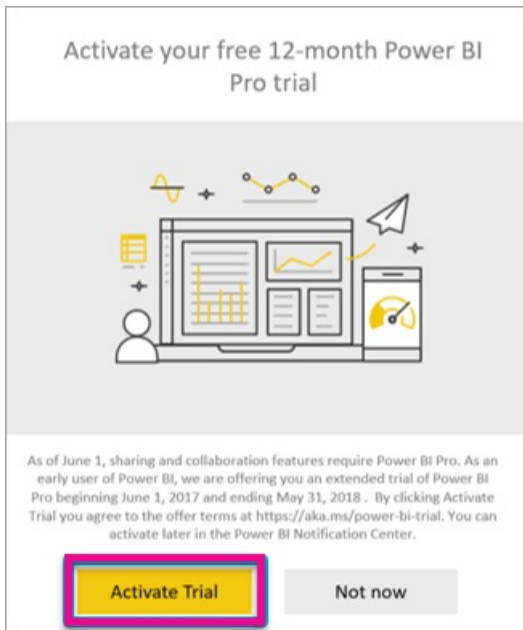
There are two ways to activate the Extended Pro Trial. The first is when you sign into Power BI. If you had dismissed that, you will also see an option within the notification area.

NOTE

The in product communications are not controlled by the admin and will go out to eligible users.

Experience at sign in

When you sign in to the Power BI service, and are eligible, you will get a pop-up notice. Selecting **Activate Trial** will begin the Extended Pro Trial. No further action will be needed.



You will then have the ability to access all existing shared dashboards and reports for the duration of the trial.

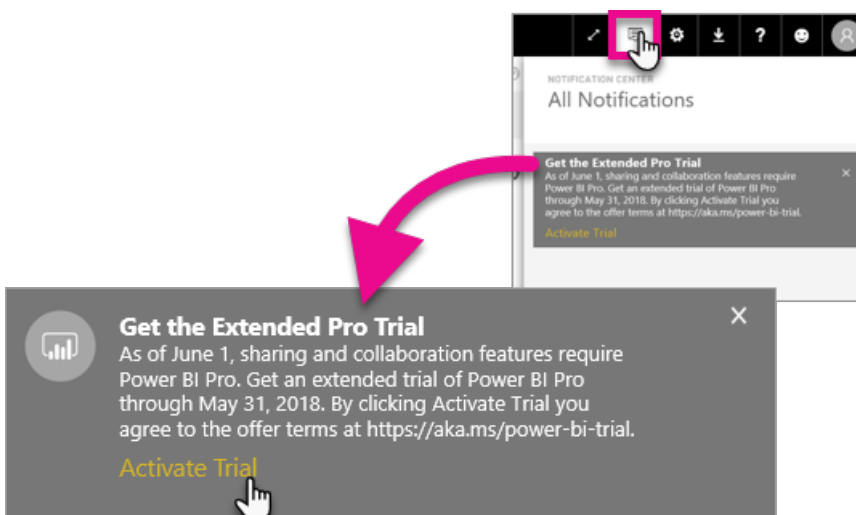
If you selected **Not Now**, the Extended Pro Trial can be activated any time until the end of the trial period on May 31, 2018.

Activation at a later date

If you dismissed the pop-up by selecting **Not Now**, the Extended Pro Trial can be activated any time until the end of the trial period on May 31, 2018. This can be done in the **Notification center**.

Within the notification center, you will see a notification regarding the Extended Pro Trial. The notification will be available until the user dismisses it.

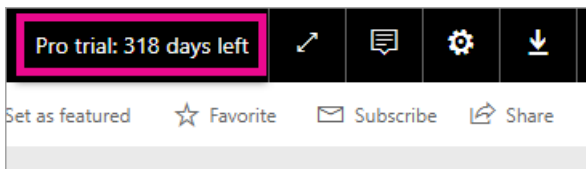
Within the notification, you can select **Activate Trial** to begin the trial. No further action will be needed.



You will then have the ability to access all existing shared dashboards and reports for the duration of the trial.

After activation

After activation, you will see how many days are left in your trial in the top right.



You can review the terms within the [Extended Pro Trial offer terms and conditions](#). The Extended Pro Trial runs through May 31, 2018 for all eligible users.

Frequently Asked Questions

What happens to new users who signed up after May 3, 2017?

Users who signed up to Power BI Free on or after May 3, 2017 are not eligible for the Extended Pro Trial. However, they are eligible for the standard 60-day Pro Trial.

How do I find out who in my organization is eligible for the Extended Pro Trial?

While there is not a direct way to discover this, you can view the Azure Active Directory Integrated Applications report for Power BI to see who are active users within your organization within the last 30 days. This may give you an idea of who may be eligible. For more information, see [Find Power BI users that have signed in](#).

Those active users in the eligibility period, and who are on free licenses, will receive the pop-up notification.

NOTE

The Azure AD report does not indicate if a user is Free or Pro within Power BI. It only reports which users have signed in to Power BI and when they logged in. If a user is listed in this report, it does not necessarily mean that they are eligible for the Extended Pro Trial.

Can admins restrict a user from activating the Extended Pro Trial?

No. Admins do not have a way to restrict users from activating the Extended Pro Trial or the in-service 60 day trial of Power BI Pro.

Next steps

[Extended Pro Trial offer terms and conditions](#)

[Power BI Service agreement for individual users](#)

[Power BI Premium announcement](#)

[Find Power BI users that have signed in](#)

More questions? [Try asking the Power BI Community](#)

Opt-in for Power BI preview features

12/20/2017 • 1 min to read • [Edit Online](#)

What are *preview features*?

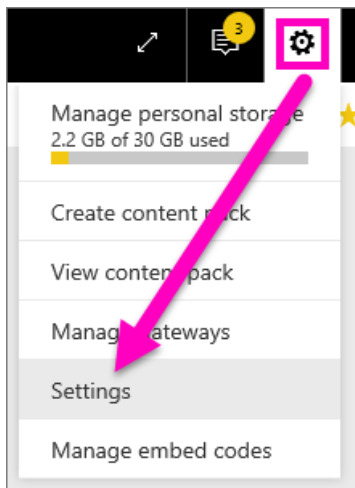
As we make improvements to Power BI, we'll release some new functionality as *preview features*. Preview features can be turned on and off, giving you the opportunity to try them out.

TIP

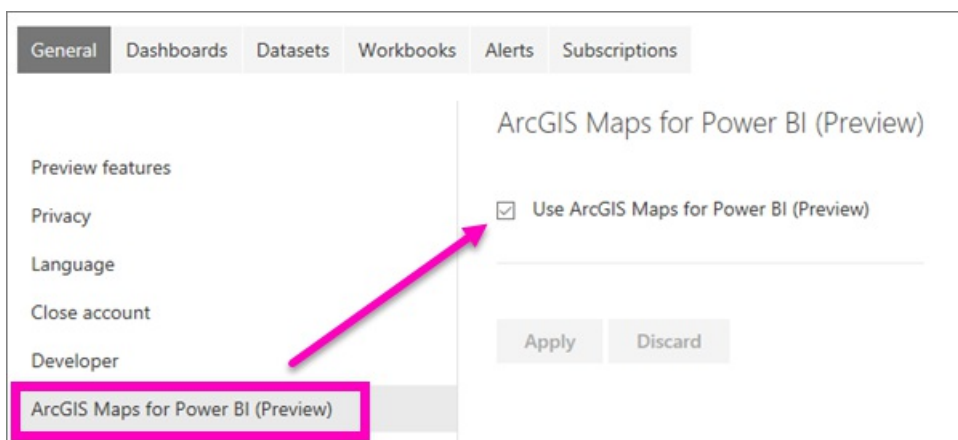
Have questions or feedback? [Visit the Power BI community forum](#).

Find previews and turn them on (and off)

1. Open your Settings menu by selecting the gear icon in the top right corner of your Power BI screen and choosing **Settings**.



2. Select the **General** tab. If previews exist, you'll either see an option for **Preview features** or you'll see a preview feature listed on the left. In this example, there is a preview listed for ArcGIS Maps.



3. Select the **On** radio button, or mark the checkbox, to try out the new experience. Then select **Apply**.
4. To turn preview features off, follow steps 1-3 above, and in step 3, choose **Off**, or remove the checkmark, and select **Apply**.

Have questions or feedback? [Visit the Power BI community forum](#).

Frequently asked questions about Power BI

1/3/2018 • 7 min to read • [Edit Online](#)

- If you have other questions, [try asking the Power BI Community](#).
- Still have an issue? Please visit the [Power BI support page](#).

What is Microsoft Power BI?

[Power BI](#) is a cloud-based business analytics service that enables anyone to visualize and analyze data with greater speed, efficiency, and understanding. It connects users to a broad range of data through easy-to-use dashboards, interactive reports, and compelling visualizations that bring data to life.

What's the difference between Power BI and Power BI Pro?

Power BI provides all sorts of features to help you get started exploring data in a whole new way. Power BI Pro provides all of the same great features in Power BI, plus additional features like more storage capacity, scheduling data refresh more frequent than daily, live data sources with full interactivity, groups, and more. Learn more about [the differences between Power BI Pro and the free Power BI](#).

How much does Power BI cost?

Power BI Desktop are free. There is a 60-day free trial available for Power BI Pro. Read about pricing at [Power BI pricing](#).

What if I have questions about Power BI Premium?

For questions related to Power BI Premium, see [Power BI Premium FAQ](#).

Are users who signed up after May 3, 2017 eligible for the Extended Pro Trial?

Users who signed up to Power BI (free) on or after May 3, 2017 are not eligible for the Extended Pro Trial. However, they are eligible for the standard 60-day Pro Trial.

How do I find out who in my organization is eligible for the Extended Pro Trial?

While there is not a direct way to discover this, you can view the Azure Active Directory Integrated Applications report for Power BI to see who are active users within your organization. Those active users in the eligibility period, and who are on free licenses, will receive the pop-up notification. For more information, see [Find Power BI users that have signed in](#).

NOTE

The Azure AD report does not indicate if a user is Free or Pro within Power BI. It only reports which users have signed in to Power BI and when they logged in. If a user is listed in this report, it does not necessarily mean that they are eligible for the Extended Pro Trial.

What is Power BI Desktop?

[Power BI Desktop](#) is a free desktop application you can install right on your own computer. Power BI Desktop works cohesively with the Power BI service by providing advanced data exploration, shaping, modeling, and report creation with highly interactive visualizations. You can save your work to a file, and publish your data and reports right to your Power BI site to share with others.

What do I need to use Power BI?

Just a Web browser and work email address.

NOTE

Work email addresses ending in .gov and .mil aren't currently supported.

Why do I have to sign up with my work email?

Power BI does not support email addresses provided by consumer email services or telecommunications providers. Learn more about [the Power BI self-service sign-up process](#).

Which work email addresses are supported?

Work email addresses ending in **.edu** and **.org** are supported.

Those ending in **.gov** and **.mil** aren't currently supported.

Is government, academic and non-profit pricing available for Power BI?

Yes, non-profit pricing is available when purchasing directly from Microsoft. You can learn more and sign up through the [Microsoft Product Donation](#) site. Government and academic pricing is offered through the MOSP/Direct, EA, and Open licensing programs. Government pricing is also available in syndication. Power BI is not yet available for the US Government Community Cloud (GCC).

Is Power BI available on-premises?

The Power BI service <https://powerbi.com> isn't available as a private, internal cloud service. However, you have three other options for viewing and working with data on premises.

On-premises data gateway

With Power BI and Power BI Desktop, you can securely connect to your own on-premises data sources. With the [on-premises data gateway](#), you can connect live to your on-premises SQL Server Analysis Services server, and other data sources. You can also set scheduled refresh with a centralized gateway. If a gateway is not available, you can refresh data from on-premises data sources using the [Power BI Gateway - Personal](#).

Power BI Report Server

Power BI Report Server is a solution that you deploy on your own premises for creating, publishing, and managing reports, then delivering them to different users in different ways: in a web browser, on their mobile device, or as an email in their in-box. Read more about [Power BI Report Server](#).

Power BI mobile apps

You can also [view on-premises Power BI reports, Reporting Services mobile reports, and KPIs with the Power BI mobile apps](#).

Does Power BI support mobile devices?

Yes. Power BI has native apps for Android phones and tablets, iOS devices, and Windows 10 devices. Download one of the [Power BI mobile apps](#) from its respective store:

- [Apple App Store](#)
- [Google Play](#)
- [Windows Store](#)

What data sources can I connect to?

The list of data sources for Power BI is extensive, but it can be grouped into the following:

- Data from [Excel and Power BI Desktop files](#).
- [Content packs for services](#), with ready-made dashboards, reports, and datasets for services such as Salesforce. In addition to establishing a data connection, Power BI provides pre-built dashboards and reports for each of these services.
- Connectors to databases and other datasets such as [Azure SQL Database](#) and SQL Server [Analysis Services](#) tabular data.

Read more about [getting data](#) in Power BI.

What are content packs?

[Content packs for services](#) are pre-built solutions for popular services as part of the Power BI experience. A subscriber to a supported service can quickly connect to their account from Power BI and see their data through live dashboards and interactive reports that have been pre-built for them. We've released content packs for popular services such as Salesforce.com, Marketo, and Adobe Analytics. Read more about [connecting to services with content packs](#).

[Organizational content packs](#) provide users, BI professionals, and system integrators the tools to build their own content packs to share purpose-built dashboards, reports, and datasets within their organization.

What do I need to install in order to use Power BI?

To use the Power BI service for free, you just need a Web browser and email.

To explore data and create reports in Power BI Desktop, download [Power BI Desktop](#) for free.

You can download the Power BI mobile apps from their respective stores, also for free:

- [App Store](#)
- [Google Play](#)
- [Windows Store](#)

Am I limited to one copy of Power BI Desktop for my entire company?

Power BI Desktop's Software License Terms say "You may install and use one copy of the software on your premises." This does not limit you to one copy of Power BI Desktop for the entire company. Each individual user at the company may install and use one copy on their premises.

Where do I get started with Power BI?

The following resources are available to help get your started:

- [Power BI Blog](#)

- [Webinars](#)
- Getting started videos on our [YouTube Channel](#)
- [Get started with Power BI](#) article
- [Join our community](#) and ask questions
- See [10 tips for getting help](#) for more suggestions

What browsers does Power BI support?

Here's a complete list of [supported browsers for Power BI](#).

What regions and languages does Power BI support?

Here's a complete list of [regions and languages supported by Power BI](#).

How can I buy Power BI Pro in my country?

You can purchase Power BI Pro licenses directly or chat with a representative at www.powerbi.com.

You can also find a [Microsoft Partner](#) to help you with your Power BI implementation.

What happens if my Power BI Pro license expires?

There is a 30-day grace period after a Power BI Pro license expires.

Power BI Pro has the same subscription lifecycle as Office 365. For more information, see [What happens to my data and access when my Office 365 for business subscription ends?](#)

Does Power BI meet national, regional, and industry-specific compliance requirements?

Learn more about Power BI compliance, at the [Microsoft Trust Center](#).

Where can I learn more about security?

Learn more about Power BI security, privacy and compliance in this [Power BI Security](#) whitepaper and our [Power BI security support article](#).

What has happened to the Power BI for Office 365 experience?

The Power BI for Office 365 experience has been deprecated.

How do I undo in Power BI?

Like many other Microsoft services and software, Power BI provides an easy way to undo your last command.

- To **undo** your last action, or last few actions, press CTRL+Z.

Next steps

- More questions? [Try asking the Power BI Community](#)
- Still have an issue? Please visit the [Power BI support page](#)

What's new in the Power BI service

1/19/2018 • 30 min to read • [Edit Online](#)

Check this page for known issues and recently released features in the **Power BI Service**. For related "What's New" information, see:

- [What's new in Power BI Desktop](#)
- [What's new in the mobile apps for Power BI](#)
- [Power BI team blog](#)

You can also check out the YouTube channels for information about "What's new" and features.

- [Microsoft Power BI \(YouTube\)](#)
- [Guy in a Cube \(YouTube\)](#)

September 2017

- Share dashboards to free users with Premium.
- Allocate capacities to suit your business needs with v-core pooling.
- Instantly scale-up or scale-down capacities with one click.
- [PubNub block](#) to easily push data into REST APIs
- Improved load performance for [usage metrics](#).

Previous months (2017)

August 2017

- Know your audience with [per-user usage metrics](#).
- Get started with [Power BI service](#) apps for online services.
- Connect to IBM Netezza with the on-premises data gateway through both import and DirectQuery connectivity modes.
- [Dynamic RLS](#) now supported for Power BI Embedded.
- Advanced [filtering API](#) now added for the 1.7 release of custom visuals API.

July 2017

- Support for [email subscriptions](#) on dashboards.
- Inspect and diagnose why the loading time is poor for dashboards using the Performance Inspector.
- Snowflake and SAP BusinessWarehouse DirectQuery now supported for on-premises data gateway.
- New [APIs to manage data refresh](#) in Power BI service.

June 2017

- [Power BI Premium](#) made generally available.
- Multiple API improvements to [automate scheduled refresh, clone and rebind reports, update gateway bindings](#), and much, much more
- Relative links in Power BI apps from dashboard tiles to other dashboards and reports.
- [Impala connector](#) generally available on Power BI Desktop.
- Extend visual capabilities of Power BI with [interactive R custom visuals](#).

April and May 2017

- Measure and magnify your impact with [usage metrics for dashboard and report creators](#).
- Connect to PostgreSQL with the on-premises data gateway.
- Power BI SharePoint Web Part made available for all users.
- Connect Power BI to any data source using the [Data Connector SDK](#).
- Navigate to reports with multiple URL filter parameters.
- Preview: [Use Power BI Apps](#) to widely distribute your dashboards and reports to large audiences.

March 2017

- Fine-tune how Power BI used in your organization with [granular admin controls](#).
- Get more done in less time with the [View Related Content](#) pane.
- Improved [troubleshooting messages for DAX queries](#).
- Exercise more control over your datasets with [custom cache refresh schedules](#).
- Connect to [Amazon Redshift](#).
- Browse [Power BI custom visuals in the Office Store](#).
- Preview: [Subscribe to report pages](#) to stay on top of your data.
- Use the Azure AD Content Pack to learn more about how your employees and partners are using Azure AD.

February 2017

- [Navigation Preview improvements](#) – more easily switch between workspaces, and take action on content within the current workspace.
- [Embed Power BI dashboards](#) into your custom application.
- Preview: [Integrate Power BI reports in SharePoint Online](#).

January 2017

- Administer Power BI using the [Power BI admin role](#).
- [Power BI audit logs](#) in the Office 365 auditing portal are globally available.
- Version 1.4 of [developer tools and custom visuals APIs](#) released.
- [Real-time streaming feature set](#) released to general availability.
- [Push data to Power BI using Microsoft Flow](#) without writing a line of code.
- Preview: [Subscribe to report pages](#) to stay on top of your data.
- Use the Azure AD Content Pack to learn more about how your employees and partners are using Azure AD.

2016

November 2016

- Preview: Try out the [new navigation for the Power BI service, powerbi.com](#)
- Preview: [Export a Power BI report to PowerPoint](#).
- Preview: [Download Power BI reports \(PBIX files\)](#) from the Power BI service so you can edit them in Power BI Desktop.
- Create a [liquid fill gauge](#), a circle gauge that represents a percentage value with animated liquid waves.
- Explore your [Jira project-management data](#) with this Power BI content pack
- Explore your [Insightcentr data](#) with this Power BI content pack
- Create infographics quickly with the [infographic designer custom visual](#)
- Private preview: [Azure Stream Analytics](#) outputs Power BI streaming datasets, with which you can create streaming tiles.
- Preview: Add [ESRI ArcGIS Maps Visualizations](#) to your reports and dashboards

October 2016

- Take advantage of [Power BI integration with the new Microsoft Teams](#).

- Design [R visualizations](#) in Power BI without understanding R.
- Preview: With [Azure Analysis Services](#), BI professionals can create BI semantic models based on data that resides in the cloud or on premises, to provide business users with a simplified view of their data.
- The new [Power BI Service Administrator Role](#) can be assigned to users who should have access to the Power BI Admin Portal but not other Office 365 administrative access.
- Explore your [MYOB Advanced data with Power BI](#).
- How a non-administrator can review the [Power BI audit log](#)
- Display [text columns as ToolTips](#).

July 2016

RLS graduates from preview

- Row Level Security (RLS) lets you restrict data access based on who is accessing it. Recently we streamlined the process of configuring RLS by exposing roles and rules in Power BI Desktop. Today, we are happy to announce that RLS is now generally available for all Power BI Pro users.

Data classification

- You can now tag your dashboards with classifications defined by your company's IT department, raising awareness of those viewing your dashboards about what level of security should be used.

Analyze your on-premises data in Excel

- Analyze in Excel feature has expanded to support on-premises datasets. We establish a secure and direct connection to your on-premises dataset that enables you to analyze it in Excel. We also introduced a setting for admins to turn off the Analyze in Excel feature for on-premises sources.

For all the details, [visit the Power BI team blog](#)

June 2016

Quick Insights

- Quick Insights work with Complex Filters: We are happy to announce that Quick Insights scoped to a single tile now understand complex filters.

For all the details, [visit the Power BI Team blog](#)

May 2016

Get Data

- File size limit increase to 1 GB: We increased the file size limit for both Excel workbooks and Power BI Desktop files to 1 GB.
- Find SSAS servers set up with the Enterprise gateway and other gateway updates: Now when you set up an Enterprise gateway, users in your company will be able to access these servers in the Power BI service through the Get Data page. We also added support for refreshing datasets that include data from SAP Business Warehouse Server using the gateway and creating UPN mapping rules when you are using Analysis Services with the gateway.

Row-level security (RLS)

- Azure Active Directory (AAD) group support: Users can now assign AAD groups (security groups and distribution lists) to a role. This makes it easier to assign roles to a large group of users at once.
- [Test your RLS roles with reports backed by the data with RLS in place](#): We added a feature to our RLS preview that lets you test your dataset as a specific role. This will make sure the role works as you expect before any users get their hands on your dashboard.
- Define and apply RLS to cloud models based on direct queries: You can now create and apply RLS rules for

direct query data sources.

Dashboards

- Favorite dashboards: To help you reach the dashboards you go to most, we added a way to favorite those dashboard and make them easily accessible from all your workspaces.

Analyze in Excel

- Improved download experience: Easily download updates to the Analyze in Excel feature through a new dialog experience.
- Support for RLS: Once you set up RLS, the rules you apply to the data now flow through when a user analyzes the data in Excel.
- Improved error messaging for on-premises Analysis Services databases: Previously, if you selected Analyze in Excel for an unsupported data source, you wouldn't get an error message until after you downloaded the ODC file and tried to connect to Power BI. Now as soon as you select Analyze in Excel for a data source we don't support, you'll see a message letting you know we don't yet support that data source.

For all the details, [visit the Power BI Team blog](#)

- [Power BI Q&A support for SQL Server 2016 Analysis Services tabular models](#): We are pleased to announce improvements to the Power BI Q&A user experience and the start of the public preview for Power BI Q&A for enterprise gateway connected data sources - starting with support for SQL Server 2016 Analysis Services tabular models. For all the details, [see the blog post](#)
- [Local File Support for Excel Reports](#): You can now upload your Excel files from your local drive or other storage services and use that Excel Report just as you would in Excel Online with the added benefits of Power BI. For all the details, [see the blog post](#)

April 28, 2016

- [Quick Insights on Dashboard Tiles](#): When viewing a tile in Focus mode, click Get Insights to search the tile and its related data for correlations, outliers, trends, seasonality, change points in trends, and major factors automatically, within seconds.

For all the details, [visit the Power BI Team blog](#)

April 26, 2016

- Narratives for Power BI: As you interact with your data and visualizations, this custom visual dynamically delivers insights in narrative form, just like you'd expect an analyst would write. This visual is fueled by [Narrative Science Quill](#).

For all the details, [visit the Power BI Team blog](#)

April 16, 2016

- Microsoft Trust Center: Power BI joined the Microsoft Trust Center, a single source for documenting compliance certifications for Microsoft products. Power BI's certifications include ISO 27001, ISO 27018, EU Model Clauses, HIPAA BAA, and UK G-Cloud.

For all the details, [visit the Power BI Team blog](#)

April 14, 2016

Enterprise

- [ExpressRoute](#): use to establish a private, managed connection to Power BI.
- [Content pack support for RLS](#) (Preview): If RLS is defined for those dashboards and reports that are distributed as part of a content pack, then the security rules will be respected for those content packs.

Dashboards

- [Vimeo video tile](#): From the dashboard, add a tile that contains an embedded Vimeo player.

Analyze in Excel

- [Analyze in Excel](#) available to all users: the ability to access your Power BI data models in Excel has been extended to all users; free and Pro.
- Improved multi-user account experience: if you have more than 1 Power BI user account, it's now easier to sign-in.

For all the details, [visit the Power BI Team blog](#)

March 31, 2016 Lots of updates announced at the Microsoft Data Insights Summit.

Dashboards

- Featured dashboard: makes it easier to reach the dashboard you care about most.
- Filter dashboard list: show all, show content you created, show content shared with you.

Enterprise features

- Admin usage reporting: added a usage report to the Power BI admin center.
- Row-level security: this is a Preview feature that allows you to set permissions on Power BI datasets.
- Disable exporting data: users in your tenant will no longer be able to export tile and visual data to a .csv file.

Q&A

- Auto complete for "is": Q&A will suggest values if you type column name followed by "is".

Mobile

- KPIs on your Apple watch: monitor your KPI and card tiles without having to open Power BI app.

Excel

- Analyze in Excel: connect your Power BI data model to Excel and do your analysis inside of Excel instead of Power BI.

Other

- Power BI in Australia: now anyone in Australia, individual or through an organization, can go to powerbi.microsoft.com and sign up for Power BI.
- Language settings: override the automatic language detection and set the language for Power BI.

For all the details, [visit the Power BI Team blog](#)

March 11, 2016

This month we made some updates to dashboards, Quick Insights, and Q&A.

Dashboards

- Full Screen mode: print without having to exit Full Screen mode first
- Full Screen mode: expand your tiles to fill the entire canvas and remove excess white space by selecting **Fit to Width**
- Use Tile Flow to automatically align your tiles to the top left corner of the canvas.

Quick Insights

- The Trend and Correlation insights now have trend lines to make it easier to see patterns in the data.

Q&A

- You can now specify Gauge and Area charts in Q&A
- Improved auto-complete for Q&A - as soon as you type just a few characters, Q&A begins auto completing and suggesting visuals for you.

For all the details, [visit the Power BI Team blog](#)

February 10, 2016

Today we released a long list of top-requested features. [Read the blog post.](#)

Sharing

- Share with users outside your organization
- Request access to a dashboard

Admin Portal

- Easy user management with a link to the O365 Admin Center
- Ability to disable publish to web
- Prevent users from publishing content packs to the entire org
- Ability to disable sharing content to external users

Quick Insights

- Quick Insights when you publish Power BI Desktop files

Dashboard

- Add Web content to your dashboard (via Widget)
- Add video content to your dashboard (via Widget)
- Zoom on dashboards

Connectivity

- Connect to files on your team SharePoint site through a URL

For all the details, [visit the Power BI Team blog](#)

January 28, 2016

Updates to reports and visualizations:

- [Add borders to visuals](#)
- [Add background images to pages and Cartesian chart plot areas](#)

Performance Improvements for report rendering, cross-highlight, etc.

- Regardless of the browser version being used, a significant Performance improvement can be noticed by users when loading reports, switching between pages, cross-highlighting data across visuals, etc. with this new update.

January 6, 2016

The Power BI team has been busy over the holiday break. For all the details, [visit the Power BI Team blog](#)

Dashboards

- Export tile data
- Add an image or text box widget to dashboards

- Print dashboards
- Refresh time on tiles
- Tooltips on dashboard tiles

Collaboration

- Shared dashboard notification
- Contact owner of a shared or organizational dashboard

Reports

- Print current report page
- Export report visual data

Connectivity

- Connect to files on SharePoint team sites

Excel Reports

- Open Excel reports in Excel desktop
- Pin Excel charts
- Format improvements for Excel tiles

Other

- Power BI in Brazil
- Hebrew and Arabic support

For all the details, [visit the Power BI Team blog](#)

2015

December 16, 2015

Lots of updates this week, most apply to Power BI Desktop but several significant updates to report authoring and visualizations as well. The [Power BI Team Blog](#) contains full descriptions and even a video describing the updates.

[Download Power BI Desktop](#)

- Updates to the report authoring formatting pane and ribbon:
 1. Format data labels per category series
 2. Change number of decimal places showed in visuals
 3. Change text size in visuals
 4. Ability to lay out visuals accurately: alignment, distribute, size, position (requires Power BI Desktop for authoring)
 5. Set styles across multiple visuals through Format Painter (requires Power BI Desktop for authoring)
- Enhancements to visualizations:
 1. visuals cue for sort state in Table visual
 2. new visual: Stacked Area chart
 3. smart tooltips for Area and Line charts on hover
 4. ability to create Reference line/region for a Cartesian visual
 5. improved data labels for pie and scatter chart
- R visuals integration in Desktop (Preview feature)

- Desktop will suggest table to table relationships when trying to create 2 tables which are not related.
- Desktop optimized Home ribbon layout.
- Desktop data modeling updates in Relationships View:
 1. zooming slider
 2. fit zoom to
 3. reset layout
 4. ability to zoom in using Ctrl-Mouse selection rectangle
- Desktop data connectivity enhancements
 1. SSAS Multidimensional support - Hierarchies support (Preview Feature)
 2. Stripe Connector
 3. Smartsheet Connector
 4. "Enter Data": Paste or enter data to create a table
 5. DirectQuery Improvements: Support for all data types of T-SQL and SAP HANA, resulting in Performance improvements.
 6. ODBC Connector: Support for selecting User/System DSNs
 7. CSV Connector: Ability to specify Column Delimiter in the Source dialog

For all the details, including a video demonstrating many of these updates, visit the [Power BI Blog](#).

December 10, 2015

- Pin report pages to dashboard
- Refresh dashboard tiles
- Use images in slicers
- Change interactions between report visuals

For all the details, visit the [Power BI Blog](#).

December 8, 2015

- [QR codes in Power BI](#)

December 3, 2015

- Automatically discover trends and uncover patterns in a dataset with Quick Insights: [video](#) or [article](#)
- [Visualize your VMob data in Power BI](#)
- [Power BI integration with Cortana](#)
- [Preview of Power BI gateway for enterprise](#)
- Introducing a new content pack: [Search Analytics from Bing on Power BI dashboards](#)
- New Developer-focused enhancements: [Two new APIs and easier app registration](#)

November 24, 2015

- Pin Excel ranges to dashboards
- Chromeless full screen mode for dashboards and reports
- Know where your data is stored
- Improved loading of on-premises reports
- Share dashboards directly to another user's workspace
- Improved Google Analytics connector experience
- Close your power bi account

For all the details, visit the [Power BI Blog](#)

November 18, 2015

- Create a duplicate dashboard
- Freely position dashboard tiles
- Improved navigation for full screen view
- Better experience when inviting peers from your organization to Power BI groups
- Improved error messages for tiles

For all the details, visit the [Power BI Blog](#)

November 11, 2015

- New site for Power BI documentation, localized
- Improved load time for reports
- Update organizational content packs with report-only changes
- Power BI health status in Office 365 Admin Portal
- KPIs and images in tables, matrices, and cards

For all the details, visit the [Power BI Blog](#)

November 3, 2015

- Guided Power BI purchase experience.
- Individuals can buy Power BI Pro.
- Duplicate report page.

For all the details, visit the [Power BI Blog](#)

October 28, 2015

- Share dashboards with Active Directory Security groups
- People picker
- Sharing with a large number of email addresses
- Collapse navigation pane through an URL parameterized

For all the details, visit the [Power BI Blog](#)

October 20, 2015

- Read-only members in Power BI groups
- Featured questions in Q&A
- Full screen pop-out mode for report visualizations

For all the details, visit the [Power BI blog](#)

October 13, 2015

- Full screen mode to display your dashboards and reports on big screen TVs
- 'Fit to screen' support in full screen mode to display your entire dashboard in the available space
- In-focus mode to get more details on dashboard tiles
- Ability to view last update time for each tile
- Ability to view the source for each tile
- Planview Enterprise is an end-to-end portfolio and resource management solution that connects strategy to execution, improving decision-making across the enterprise. The Planview Enterprise content pack for Power BI allows you to visualize your resource and work management data in an entirely new way. Simply sign in with your credentials and begin to interactively explore your portfolio investment spend, budget status, and

how well your projects align with strategic priorities.

View our [blog](#) and [online documentation](#) to learn more.

October 6, 2015

- With Power BI Q&A, you can explore your data using simple, intuitive questions and receive answers in the form of interactive charts and graphs. With this release, we have added a feature to help you get started with Power BI Q&A, even when you do not know anything about the data. To get started with this, [navigate to any dashboard and click the "How to ask" link near the Q&A question box](#). Power BI presents you with a number of suggestions based on your data.
- Two weeks ago, we introduced support for inserting shapes into the report canvas in Power BI Desktop. This week, we are happy to announce that you can now add shapes to your report canvas when you are authoring and/or editing reports in the Power BI web app.
- We have added the option to turn off email notification when you share a dashboard. Simply uncheck the "Send email notification to recipients" check box in the Power BI share dialog. You will be presented with a URL – copy and share this URL to your colleagues to give them access to the dashboard.
- Microsoft Dynamics NAV is a business management solution for small to medium organizations. It offers customers a full solution for their business with greater control over their financials and business processes. The Power BI content pack provides out-of-box reports for Dynamics NAV users, such as sales and profit, opportunities pipeline, profitability and more. These metrics are organized on a dashboard that can be fully customized, allowing you to easily connect and immediately start exploring your data.

Check out the [blog](#) and [online documentation](#) for more information.

September 29, 2015

- With this week's service update, when creating new reports you can now choose from multiple page sizes as well as define your own page size. This controls the size and aspect ratio of each page in the report.
- We added additional visual formatting support for images and bubble charts. You can lock the aspect while resizing images to avoid image distortion and scatter chart bubbles can be configured to be filled or not.
- Today, Power BI will send sharing invites to an alternate email address. When a dashboard is shared with you, we will send the sharing invite link both to your original email address and to your alternate email address (if you have it configured).
- Power BI is available to all customers including those on the Dedicated on Multitenant (DonMT) O365 architecture. You will be using Power BI as a shared service in multi-tenant mode. In most cases, you can register for Power BI by following the simple [self-service-signup process](#) – just enter your work email address, enter your name and password to get started. If you are the tenant administrator, you can assign licenses to your users using the instructions [here](#).
- Azure Audit Logs allows you to view control-plane operational logs in your Azure subscription. The Power BI Azure Audit Logs content pack can help you easily analyze and visualize the wealth of information contained in these logs. The content pack allows you to connect to your data and begin to discover insights with the out-of-the box dashboard and reports. Read our [blog](#) and [online documentation](#) for more information.

[Learn more in our blog.](#)

September 22, 2015

- Have more flexibility on your dashboard to customize your dashboards with additional tile sizes, ranging from 1x1 to 5x5.
- You can now [share \(and un-share\) a dashboard from your group space](#) exactly the way you would do it in your own space. Once colleagues accept your sharing invitation, the shared dashboard (and their associated reports) will be added in their own space with read-only permission.
- We added 5 additional [industry related samples](#) to Power BI: Customer Profitability, Human Resources, Opportunity Analysis, Procurement Analysis, and Sales and Marketing Sample.

- Stripe is an advanced payment platform for online businesses. From start-ups to Fortune 500 companies, thousands of businesses use Stripe to accept payments in over 130 currencies, from anyone in the world. By connecting Power BI with your existing Stripe account, you'll be able to [use the Power BI Stripe content pack to monitor, explore, and visualize your Stripe activity](#).

[Learn more in our blog](#).

September 15, 2015

- You can now choose which dashboard you want to pin your visual to! You can choose the target dashboard from your existing dashboards, or even create a new dashboard and pin the visual to it in one shot.
- Additionally, you can control your visual colors in the dashboard. If your report is using a different theme from the dashboard theme, you can control whether the visual retains current theme, or uses the default dashboard theme to achieve consistency across visuals from various sources.
- You can now simply pin the tile from one dashboard to another, the same way you would pin a report visual to a dashboard.
- If your 60-day Power BI Pro trial period is close to expiration, you can [contact us](#) to request an extension to your trial. If approved, your trial will be extended for another 60 days.
- comScore Digital Analytix is an online solution that provides insights into your user base through the best of analytics and audience demographics. With the Power BI comScore content pack, you can quickly connect and begin gaining insights into your web analytics data. This content pack includes an out-of-the box dashboard, a set of reports, and a curated data set to help you explore and drill into your data. Learn more about the content pack in our [blog](#) and [help topic](#).

September 8, 2015

- Friendly Hyperlinks now allow you to provide links for your users without needing to display the entire URL in the textbox.
- Drill Support has been added to Power BI Reports. You can create a Drill path that enables users to navigate from one level of data to related data.
- Two new Industry Related Samples, It Spend Analysis and Supplier Quality Analysis, have been added under the samples section of the Get Data experience. These samples are great examples of how you can use your data to create insightful reports and dashboards.
- We have a new content pack for tyGraph, which allows you to easily gain deeper insights into your Yammer data. The content pack includes a dashboard, a set of reports and a curated dataset to explore and provide insights such as the Measure of Active Engagement (The MAE Score) and content consumption metrics such as File Views and File Downloads. Learn more on our [blog](#) and [help topic](#).

September 1, 2015

- Webtrends helps companies make sense of their customer data to drive digital marketing success. Users have the ability to observe, analyze and deliver insights on the visitor journey across web, social, mobile and SharePoint channels. With the release of [the Webtrends content pack](#), users will now have the ability to use Power BI to monitor, analyze, and visualize their Webtrends analytics data. The Webtrends content pack for Power BI [help page](#) has more information.
- Getting started with Q&A is even simpler. The moment you put your cursor inside the Q&A text box, we instantly display a list of questions and key metrics that are relevant to your data. In the drop down, by default, you will see the questions for tiles already pinned to the dashboard as well as an entry for each table you have in your dataset.
- The dynamic canvas size we display by default renders all our report items with optimal dimensions for the browser window size. If you want to lock in the aspect ratio, or want to fit your report in a different way, we now support another three options for you: Fit to Page, Fit to Width, and Actual Size.
- We also Increased the limit on the number of datasets and reports you can have. You can now have up to 200 datasets and 200 reports for each dataset in your Power BI account.

August 25, 2015

- Now you can use Power BI to monitor, explore and [visualize your Adobe Analytics data](#). With an out-of-box content pack, you can connect and discover insights from your data immediately. To learn more, visit the [Adobe Analytics content pack for Power BI help page](#).

August 18, 2015

- Azure Mobile Engagement is an app analytics service that allows developers to track their application's performance helping them increase retention and app usage. Using the [Power BI Azure Mobile Engagement content pack](#) you can quickly connect to an out-of-box dashboard, a set of reports and a curated data set, and instantly get insights into how well your app is doing. Please see the [Azure Mobile Engagement content pack for Power BI help page](#) for more information.

August 11, 2015

- Mandrill is an email infrastructure service developed by MailChimp that lets you analyze your email campaigns from a wide variety of information. With the [Power BI Mandrill content pack](#), you can quickly connect to your Mandrill data and immediately gain insights into your newsletter or marketing campaign. For additional details on how to get started, please see the [Mandrill content pack for Power BI help page](#).

August 4, 2015

- Power BI now offers [Circuit ID](#) users the ability to track and monitor all their Circuit ID cloud communications services, empowering them to make the right business decisions. For additional details on how to get started, please see the Circuit ID content pack for [Power BI help page](#).
- Today we've released an enhancement to the Share Dashboard feature to make it even easier to use. If your organization uses Office 365 for email, you can now [share to an email distribution group](#) just the same way you would send an email in Outlook. Just enter the address of the distribution group and click Share. All members of the distribution group will receive an email invitation to view the dashboard.

July 28, 2015

- We're excited to announce that this week's update to Power BI now offers database performance tracking with the [SQL Sentry content pack](#). This content pack includes a dashboard and reports that help you monitor the SQL Server deployments you track using the SQL Sentry Cloud. For additional details on how to get started, please see the SQL Sentry content pack for Power BI [help page](#).

July 24, 2015

- We're excited to announce our "general availability" (GA) release of Power BI. You can continue to use the free version of Power BI, or sign up for [Power BI Pro](#). As part of the GA release, we are offering some great new features:
- A new visualization and report creation experience: The new reporting canvas has a larger selection of visualizations, more control over formatting of titles, legends, axes, colors, backgrounds, and more.
- [Power BI groups](#): groups offer a powerful collaborative experience built on Office 365 groups.
- [Organizational content packs](#): Power BI makes creating dashboards and reports extremely simple, and now users can publish this content to the organizational content gallery.
- [Bring in whole Excel files](#): You can bring any Excel workbook stored on OneDrive for Business into Power BI and view the entire workbook, exactly as you would in Excel Online.
- [Bring in CSV files](#): Just like Excel or Power BI Desktop file, a comma-separated values text (CSV) file can also be a dataset for your Power BI dashboards and reports.
- Replace Excel, Power BI Desktop, and CSV files: you can upload an updated version of a file to Power BI and it will replace the existing dataset. All the reports and dashboards that are connected to this dataset now automatically use the new version.

- We're excited to announce that this week's update to Power BI now offers work item tracking in [the Visual Studio Online content pack](#). This update includes a new dashboard, report and an updated data set offering insights on your work items in addition to important metrics about your Git repository, pull requests, and version control content included in the initial version. For additional details on how to get started, please see [the Visual Studio Online content pack for Power BI help page](#).

July 14, 2015

- Acumatica Cloud ERP delivers a suite of fully integrated business management applications such as Financials, Distribution, CRM and Project Accounting, powered by a robust and flexible platform. With the Power BI [Acumatica content pack](#), you can quickly connect and immediately gain insights into your opportunity data. This content includes an out-of-box dashboard, a set of reports and a curated dataset to explore and provide details such as your total won opportunities by date. Read more [here](#).
- [Azure HDInsight](#) now offers a fully managed Spark service. This capability allows for scenarios such as iterative machine learning and interactive data analysis. Power BI allows you to directly connect to the data in Spark on HDInsight offering simple and live exploration. Read our [help doc](#) for more information.
- [Office 365 navigation and application launcher integration](#). With a single click, you can now navigate to all of your Office 365 applications.
- [Specifying a custom URL](#) that users navigate to when they click a tile. You now have the ability to control exactly where users go: a specific report, another dashboard, an SSRS report, or an external website.
- [Visibility and management of the storage](#) you are consuming in Power BI
- [Configuring the visual and fields displayed in Q&A](#)

July 7, 2015

- One of the most awaited and requested feature is now available in Power BI. Starting today, in Power BI you can [refresh datasets](#) connecting to your on-premises sources such as SQL Server. You can refresh a dataset that has been created from a Power BI Designer file or an Excel workbook with data imported into the workbook using Power Query or Power Pivot.

June 30, 2015

- We released a new [Power BI UserVoice content pack](#) that can help you monitor and visualize your UserVoice data and immediately gain insights into it with the ready-to-use dashboard and report.

June 23, 2015

- Power BI Desktop files can be [refreshed](#) (scheduled refresh & refresh now) when uploaded to the Power BI service.
- We are releasing the biggest visual change to Power BI since December: a cleaner and simpler experience to [Get Data](#). When you click on Get Data, you are now presented a single screen with a set of categories to choose from. This will make it even easier to find the content that matters to you.
- [Azure SQL Data Warehouse](#) offers elastic scale and massive parallel processing. With the limited public preview announced today, Power BI allows you to directly connect to the data stored in your Azure SQL Data Warehouse offering simple and dynamic exploration. After creating a connection to your data warehouse, queries are generated in real time and sent back to the source as you explore the data. This removes the need to create and upload a custom data model and offers interactive exploration of your data.

June 16, 2015

- SweetIQ lets you to easily track your local listings by providing location and review data from your local search ecosystem. Power BI allows you to analyze and monitor that data, by offering [out of box content](#) built from your SweetIQ data. For additional details on how to get started, please see the SweetIQ content pack for Power BI [help page](#).

June 9, 2015

- Power BI allows you to monitor and explore that data using the [MailChimp APIs](#), offering a set of out-of-box content for your analytics. The dashboard, reports and dataset curated for the MailChimp scenario allow you to easily access data such as Top Campaigns of Total Opens by Day of Week. For additional details on how to get started, please see the MailChimp content pack for Power BI [documentation](#).

June 2, 2015

- Now tracking important statistics about your apps is easy with Power BI and the [appFigures content pack](#). For additional details on how to connect and get started, see the [documentation](#) for appFigures content pack for Power BI.

May 28, 2015

- Get quick insights into your QuickBooks Online account data using our [content pack](#). For additional details on how to connect and get started, see the QuickBooks Online content pack for Power BI [documentation](#).

May 13, 2015

- With the latest update to Power BI, you can connect to the data logged by **SQL Database Auditing** with a set of out of box reports and a customized dashboard. This content pack makes it easy to find suspicious events, unusual activity, and trends, based on a dataset that has been created for your reporting. Learn more in the [blog post](#) and [documentation](#).
- You can connect directly to data stored in your **Azure SQL Database**. We dynamically generate and send down queries to the source, allowing you to create interactive reports directly over your database. You can read the [blog post](#) and [documentation](#) for more information.

May 7, 2015

- We updated our look to a new modern design, a look that is fresh and distinctive while keeping your focus on what matters: your data and your insights.

April 28, 2015

- Power BI is now available in **44 languages**. Read our [blog post](#) to see the full list.

April 23, 2015

- You can now visualize and explore your **Microsoft Dynamics Marketing** data with our new content pack! You can read our [blog post](#) and [documentation](#) for more information.

April 15, 2015

- You can now visualize and explore your **Google Analytics** data with our new content pack! With the Google Analytics content pack you will get a dashboard, report and dataset that allow you to gain insights into the usage of your site in the last 6 months. You can read [our blog post](#) and [documentation](#) for more information.
- You can now **pin all cards** expect those containing KPIs and Images from Q&A and reports
- You can now **use cards in Q&A** by using the phrase 'as card' at the end of your query

March 31, 2015

- ****GitHub**** dashboards have new visuals that focus on community building, improved calculations, and improved layout
- ****SendGrid**** dashboards have new visuals and a new layout to help you find better insights
- You can now use **** treemaps in Q&A**** by using the phrase 'as treemap' at the end of your query
- You can now **pin treemaps** from Q&A and reports
- Lots of bug fixes!

February 25, 2015

- Bug fixes and improvements to user experience and reliability.

January 26, 2015

- Service usability and reliability has been improved through various bug fixes.

2014

December 11, 2014

- Reliability of refresh with OneDrive has been improved. Some situations where workbooks were not refreshing from OneDrive have been resolved.

Next steps

[Get started with Power BI](#)

More questions? [Try asking the Power BI Community](#)

Microsoft Flow and Power BI

1/24/2018 • 3 min to read • [Edit Online](#)

[Microsoft Flow](#) is a SaaS offering for automating workflows across the growing number of applications and SaaS services that business users rely on. With Flow you can automate tasks by integrating your favorite apps and services (including Power BI) to get notifications, synchronize files, collect data, and more. Repetitive tasks become easy with workflow automation.

[Get started using Flow now.](#)

Watch Sirui create a Flow that sends a detailed email to colleagues when a Power BI alert is triggered. Then follow the step-by-step instructions below the video to try it out yourself.

Create a flow that is triggered by a Power BI data alert

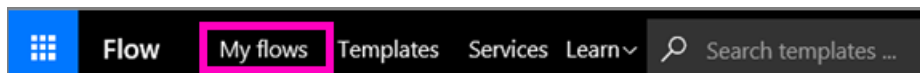
Prerequisites

This tutorial will show you how to create two different flows; one from a template and one from scratch. To follow along, [create a data alert in Power BI](#), create a free Slack account, and [sign up for Microsoft Flow](#) (it's free!).

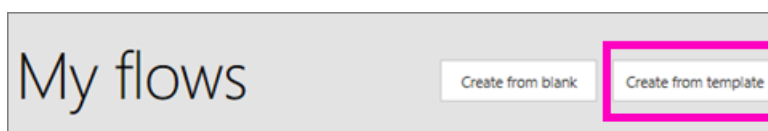
Create a flow that uses Power BI - from a template

In this task we'll use a template to create a simple flow that is triggered by a Power BI data alert (notification).

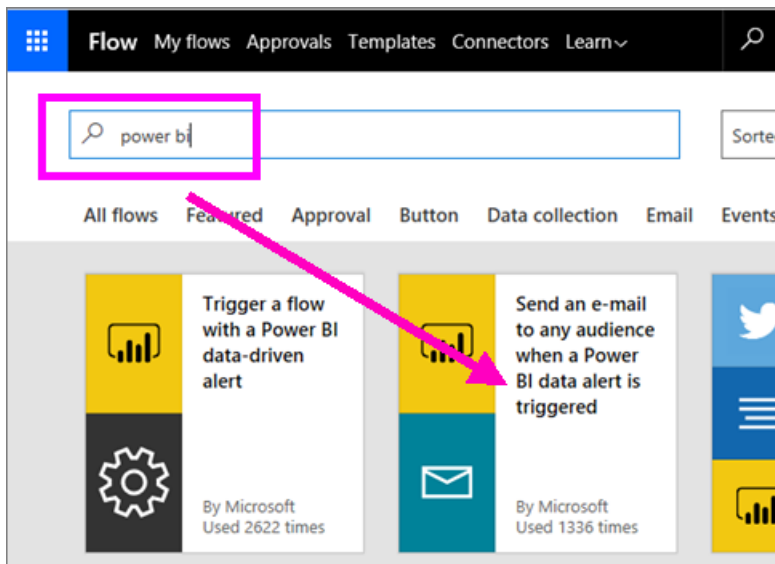
1. Sign in to Microsoft Flow (flow.microsoft.com).
2. Select **My flows**.



3. Select **Create from template**.

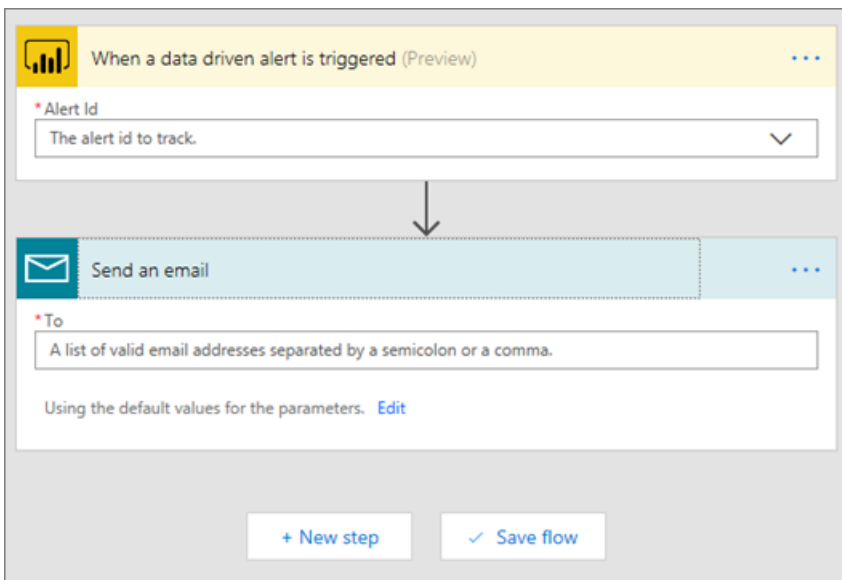


4. Use the Search box to find Power BI templates and select **Send an e-mail to any audience when a Power BI data alert is triggered > Continue**.

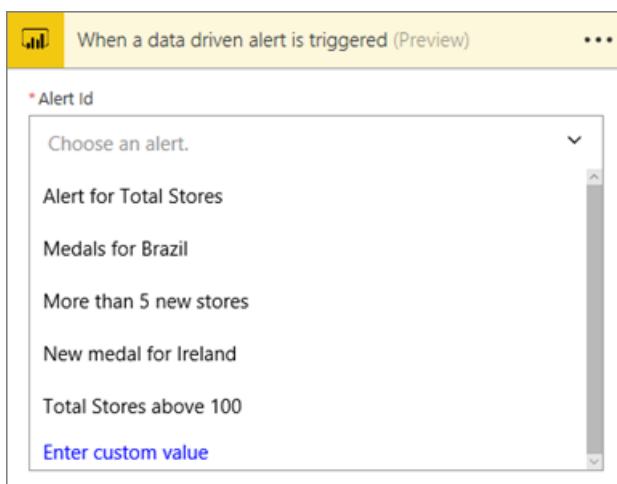


Build the flow

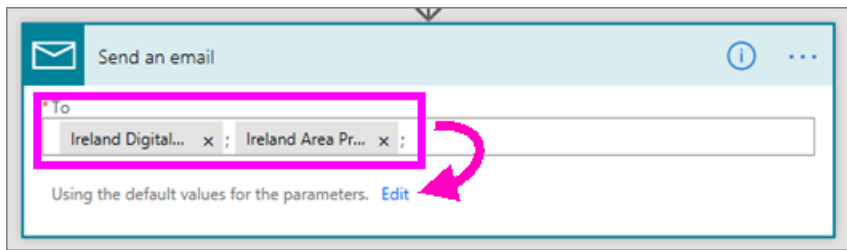
This template has one trigger (Power BI data alert for new Olympic medals for Ireland) and one action (send an email). As you select a field, Flow displays dynamic content that you can include. In this example we'll included the tile value and the tile URL in the message body.



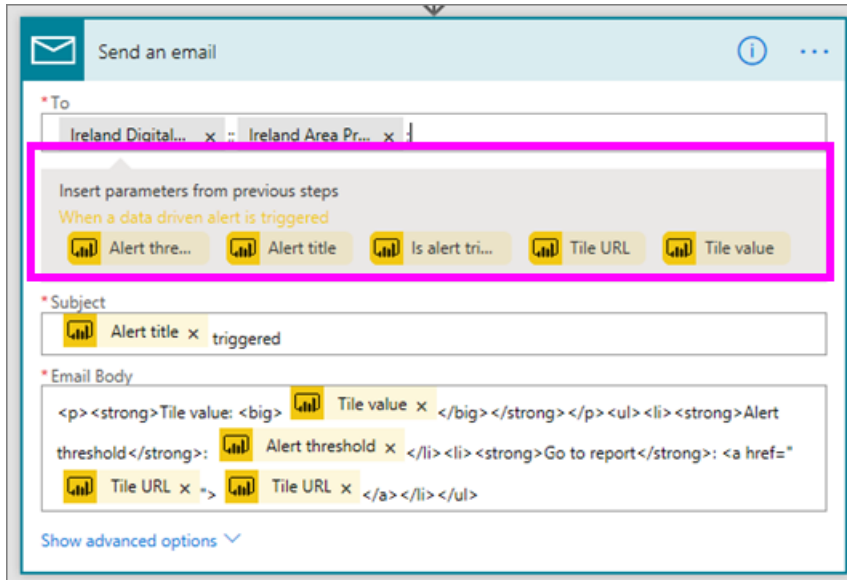
1. From the trigger dropdown, select a Power BI data alert. Select **New medal for Ireland**. To learn how to create an alert, see [Data alerts in Power BI](#).



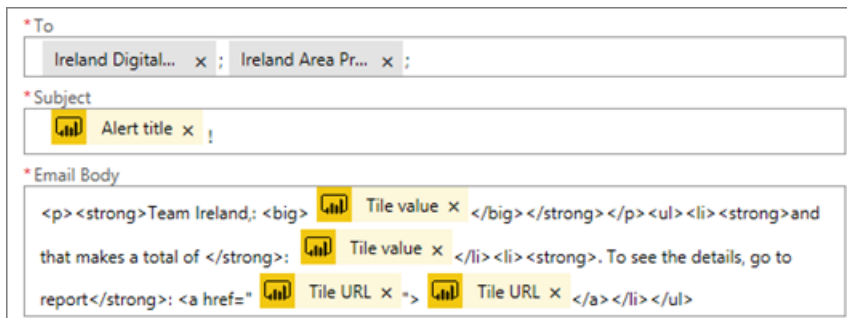
2. Enter one or more valid email addresses and then select **Edit** (shown below) or **Add dynamic content**.



- Flow creates a title and message for you which you can keep or modify. All the values you set when you created the alert in Power BI are available for your use -- just place your cursor and select from the grey highlighted area.

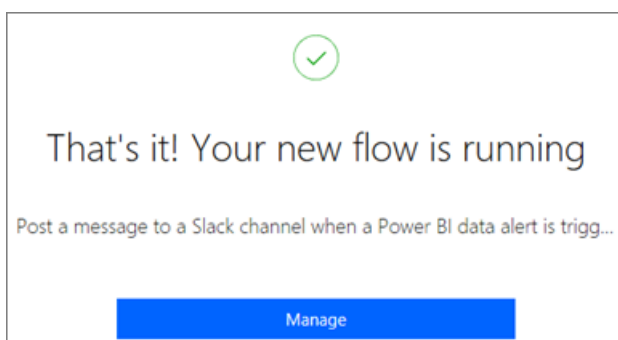


- For example, if you created an alert title in Power BI of **We won another medal**, you can select **Alert title** to add that text to your email Subject field.



And, you can accept the default Email body or create your own. The example above contains a few modifications to the message.

- When you're done, select **Create flow** or **Save flow**. The flow is created and evaluated. Flow lets you know if it finds errors.
- If errors are found, select **Edit flow** to fix them, otherwise, select **Done** to run the new flow.



7. When the data alert is triggered, an email will be sent to the addresses you indicated.



Create a Flow that uses Power BI - from scratch (blank)

In this task we'll create a simple flow from scratch that is triggered by a Power BI data alert (notification).

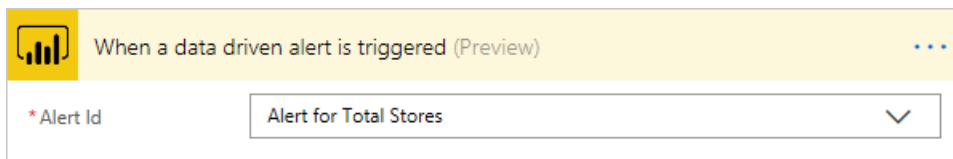
1. Sign in to Microsoft Flow.
2. Select **My flows** > **Create from blank**.



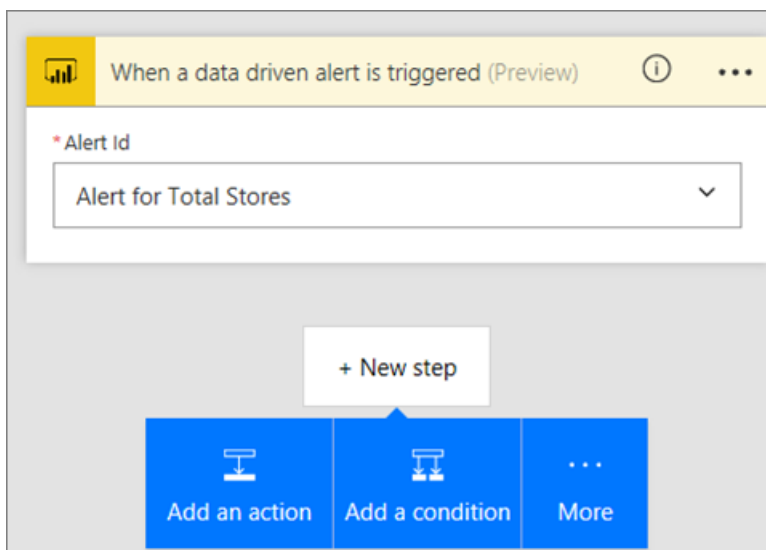
3. Use the Search box to find a Power BI trigger and select **Power BI - when a data driven alert is triggered**.

Build your flow

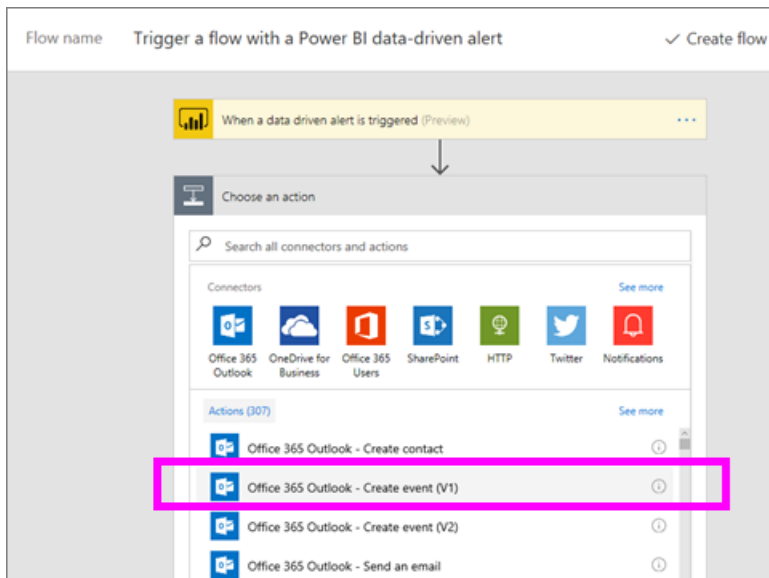
1. From the dropdown, select the name of your alert. To learn how to create an alert, see [Data alerts in Power BI](#).



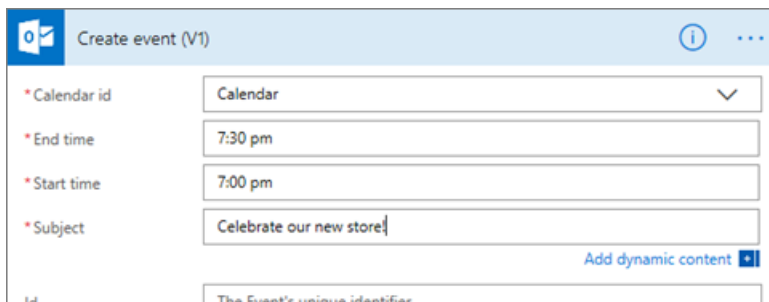
2. Select **New step** > **Add an action**.



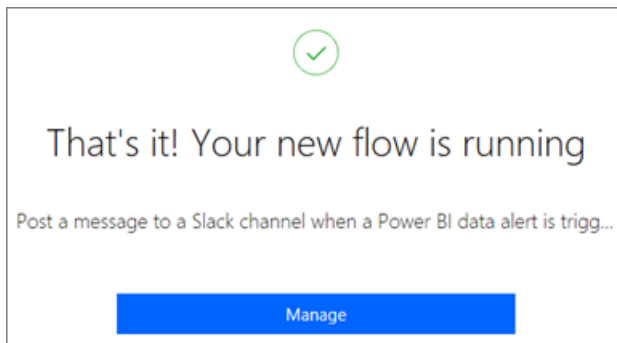
3. Search for **Outlook** and select **Create event**.



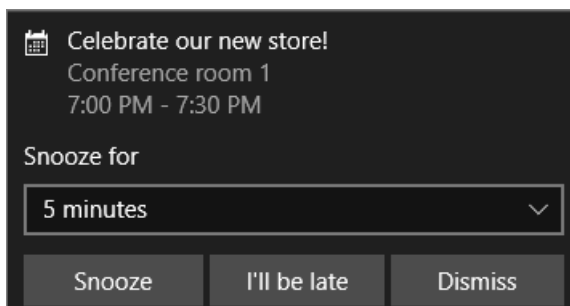
4. Fill in the event fields. As you select a field, Flow displays dynamic content that you can include.



5. Select **Create flow** when done. Flow saves and evaluates the flow. If there are no errors, select **Done** to run this flow. The new flow is added to your **My flows** page.



6. When the flow is triggered by your Power BI data alert, you'll receive an Outlook event notification similar to this one.



Next steps

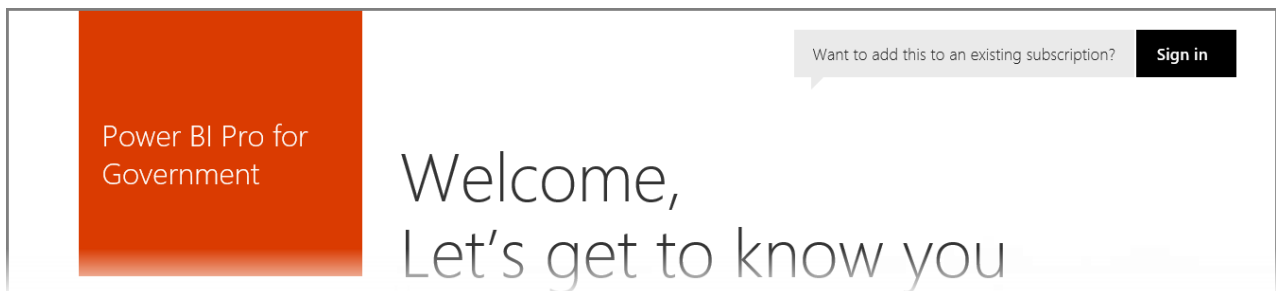
- [Get started with Microsoft Flow](#)
- [Set data alerts in Power BI service](#)

- [Set data alerts on your iphone](#)
- [Set data alerts in the Power BI mobile app for Windows 10](#)
- [More questions? Try the Power BI Community](#)

Power BI for US Government customers

1/24/2018 • 4 min to read • [Edit Online](#)

The **Power BI service** has a version available for United States Government customers as part of the **Office 365 US Government Community** subscriptions. The **Power BI service** version discussed in this article is specifically designed for US Government customers, and is separate and different from the commercial version of the **Power BI service**.



The following sections describe the *features* available to the US Government version of the **Power BI service**, clarifies some of the *limitations*, lists Frequently Asked Questions (**FAQ**) and answers (including how to sign up), and provides links for more information.

Features of Power BI US Government

It's important to note that **Power BI US Government** is only available as a **Pro license**, and is not available as a Free license. Certain features of the Power BI service are available in the **Power BI US Government** version of the service.

The following features are available to **Power BI US Government** customers, as they apply to **Pro** license functionality:

- Create and view dashboards and reports
- [Data capacity limits](#)
- [Scheduled data refresh](#)
- Refreshable team dashboards
- Active Directory groups for sharing and managing access control
- [Import data](#) and reports from Excel, CSV, and Power BI Desktop files
- Data Management Gateway
- All data is encrypted in both Azure SQL and Blob Storage for Power BI
- Connect to services with [content packs](#)

Connectivity between Government and Public Azure Cloud services

Azure is distributed among multiple clouds. By default, tenants are allowed to open firewall rules to a cloud-specific instance, but cross-cloud networking is different and requires opening specific firewall rules to communicate between services. If you are a Power BI customer and you have existing SQL instances in the public cloud which you need to access, you must open specific firewall rules in SQL to the Azure Government Cloud IP space, for the following datacenters:

- USGov Iowa
- USGov Virginia

- USGov Texas
- USGov Arizona

In the public cloud the IP spaces are available, but for the government cloud, you must open an Azure Support ticket to request the IP ranges for the above listed datacenters.

Limitations of Power BI US Government

Some of the features that are available in the commercial version of the **Power BI service** are *not* available in the **Power BI service** for US Government customers. The Power BI team is actively working on making these features available to US Government customers, and will update this article when these features become available.

- **Power BI US Government** is only available as a **Pro** license. Any references to Power BI (Free) licenses in an admin portal (or as users) are running in a commercial Power BI service cloud.
- **Auditing** - auditing is not available through the Office 365 Security and Compliance portal.
- **Power BI content in Cortana** - Power BI results will not show up in Cortana search results, which includes results for your Power BI content (dashboards, reports, apps) as well as results that show Cortana-optimized report pages for specific keywords.

If you have **Power BI** Free licenses assigned to your account, those accounts are running in a commercial version of the **Power BI** service, and are not part of the **Power BI US Government** offering. For those Free accounts, you may encounter the following issues:

- Gateway, Mobile, and Desktop can't authenticate
- You cannot access Azure commercial data sources
- PBIX files must be manually uploaded from commercial
- Power BI mobile apps are not available

To resolve issues, please contact your account representative.

Frequently Asked Questions (FAQ) for the US Government version of the Power BI service

The following questions (and answers) are provided to help you quickly get information you need about the service.

Question: How do I migrate my commercial **Power BI** data to the **Power BI service** for US Government?

Answer: Your admin must create a new instance of **Power BI** under a separate, US Government-specific subscription. You can then replicate your commercial data in the **Power BI service** for US Government, remove your commercial license, and associate your existing domain to the new US Government-specific service.

Question: Why can't I connect to a specific content pack?

Answer: You need to ensure your subscription is enabled before connecting to that content pack.

Question: I'm interested in getting **Power BI** for my US Government organization. How do I get started?

Answer: Signing up (often called *onboarding*) might differ based on your existing license and subscription. See the [Sign Up for Power BI US Government](#) article for more information.

Question: Is the URL for connecting to **Power BI** for US Government different than the commercial **Power BI** URL?

Answer: Yes, the URLs are different. The following table shows each URL:

COMMERCIAL VERSION URL	US GOVERNMENT VERSION URL
https://app.powerbi.com/	https://app.powerbigov.us

Next steps

There are all sorts of things you can do with Power BI. For more information and learning, including an article that shows you how to sign up for the service, check out the following resources:

- [Sign up for Power BI for US Government](#)
- [Power BI US Government Demo](#)
- [Guided Learning for Power BI](#)
- [Get started with the Power BI service](#)
- [Getting started with Power BI Desktop](#)

Enroll your US Government organization in the Power BI service

1/25/2018 • 5 min to read • [Edit Online](#)

The **Power BI service** has a version available for United States Government customers as part of the **Office 365 US Government Community** subscriptions. The **Power BI service** version discussed in this article is specifically designed for US Government customers, and is separate and different from the commercial version of the **Power BI service**.

For more information about the **Power BI service** for US Government, including its features and limitations, check out [Power BI for United States Government customers - Overview](#).

NOTE

This article is intended for administrators who have authority to sign up their US Government organization for Power BI. If you are an end-user, contact your administrator about getting a subscription to Power BI for US Government.

Want to add this to an existing subscription? [Sign in](#)

Power BI Pro for Government

Welcome, Let's get to know you

Select This can't be changed after sign-up. [Why not?](#)

First name Last name

Business email address

Business phone number

Company name

Your organization size

Next →

Microsoft [Legal](#) [Privacy & cookies](#) [Community](#)

Select the right sign-up process for your US Government organization

Your US Government organization might be new to the **Office Government Cloud**, or might already have a subscription. The following sections detail the sign-up steps based on where you are with the Office Government Cloud and Power BI, and are different based on your existing subscription.

Once you have signed up for Power BI US Government some features may not work until your sales or support

representative completes your onboarding process. To find out about these features see the [Power BI for United States Government customers - Overview](#). To complete the onboarding process to enable these features, contact your sales or support representative.

US Government organizations that are new Office Cloud customers

If your organization is a new **Office Government Cloud** customer, follow these steps:

NOTE

These steps should be performed by the portal administrator.

1. Go to <https://products.office.com/en-us/government/office-365-web-services-for-government>. >[!NOTE] >If you don't want to sign up for Office Government Cloud at this time, please reach out to your sales representative.
2. Select Office G3 and complete the form for an Office trial
3. Once you are an Office Cloud customer continue on with the steps below for "Existing Office Government Cloud customers"

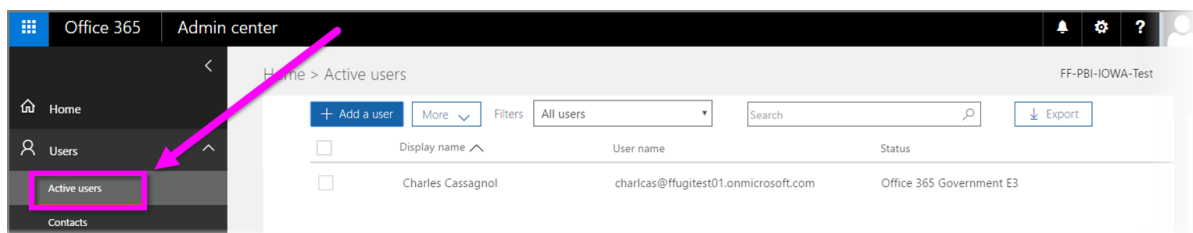
Existing Office Government Cloud customers

If your organization is an existing **Office Government Cloud** customer, but you don't have a **Power BI** subscription (Free or otherwise), follow these steps:

NOTE

These steps should be performed by the portal administrator.

1. Log in to your existing Office Government Cloud account and go to the admin portal
2. Select **Billing**.
3. Select **Purchase Service**.
4. Select the Power BI Pro Government Option and choose between **Try** and **Buy Now**
5. Complete your order
6. Assign users to the account.



7. Log in to the **Power BI service** for US Government customers at <https://app.powerbigov.us>

Additional Signup Information

The below is additional information for signing up for **Power BI US Government** in various licensing migration cases.

Direct Power BI Trial to Pro Customer Onboarding

- Click and follow through the Billing > Purchase Service > Power BI Pro Gov and select purchase and not Trial
- Fill in the necessary and get the licenses
- Remove the Power BI Pro Trial or remove the old licenses and Assign the new ones to the users
- Log in to <https://app.powerbigov.us>

Reseller Power BI Trial to Pro Customer Onboarding

Go to **Billing > Subscriptions** and select **Power BI Pro for Government** subscription. There you will see:

- Available
- Assigned
- Assign to users links
- If you still have the Trial assigned:
 - Click on **Assigned** under the Trial subscription and remove the users you want to add to paid
 - Go to the Paid subscription and assign those users

Whitelisting Instructions

Whitelisting is a process that the Power BI engineering team uses to move customers from the commercial cloud environment into the secure, Government cloud environment. This ensures that features available in the US Government cloud work as expected. All existing (or new) US Government customers that purchase US Government **Power BI** services for the first time *must* initiate the following whitelisting process. The process must be done prior to setup or migration to US Government **Power BI** services.

To have your tenant *whitelisted* for the US Government cloud, fill out a support ticket that makes the request, from the following link. Note that only administrators can make this request:

- [Whitelisting online support request](#)
- Make sure you include the domain to be *whitelisted*, and the email for the Microsoft representative who is working with you on the process.

The process for *whitelisting* takes approximately three weeks, during which the Power BI engineering team makes appropriate changes to ensure your tenant operates properly in the US Government cloud.

Customers migrating from Power BI **Free** licenses to **Power BI US Government** (and by definition, migrating to the associated **Pro** license features described earlier in this article) will encounter the issues described in the following section of this article, until their tenant is *whitelisted* by the Power BI engineering team.

Mixed Free and Pro licenses in US Government tenants

If you have both Free and US Government Pro licenses in your tenant, both Free and (US Government) Pro licenses remain present, but one or the other license types will not work properly. If your tenant successfully goes through the *whitelisting* process, then the following occurs:

- Any Free license users will no longer be able to log in to Power BI using **Power BI Desktop**, and will experience functionality gaps described in the following section.
- All clients assigned to US Government Pro licenses will work as expected, including use of gateways, Power BI Desktop, and Mobile apps.

When using a mix of Free and Pro licenses in a US Government tenant, and going through the *whitelisting* process, the following can be expected:

Before **whitelisting**:

- Users with Free licenses are running in commercial cloud
- Pro US Government licenses show up in the portal, and the administrator can assign those licenses to users. Pro US Government users will not lose data from their Free licenses once the admin assigns a US Government Pro license. The assigned users have access Power BI Pro features for US Government customers, but the following bullet list functionality gaps will exist until the tenant is successfully *whitelisted*:
 - Gateway, Mobile, and Power BI Desktop can't authenticate
 - You cannot access Azure commercial data sources
 - PBIX files must be manually uploaded from the commercial Power BI service

- Power BI mobile apps are not available

After *whitelisting*:

- Free users running in the commercial Power BI service can continue to run, but they will stop authenticating as expected.
- Pro users running in the US Government cloud can use the **Power BI for US Government customers** service as expected.

To identify users in your tenant that are running the Free license of Power BI, administrators can run the licensing report, after which Free license users show up as **Power BI Standard**.

Next steps

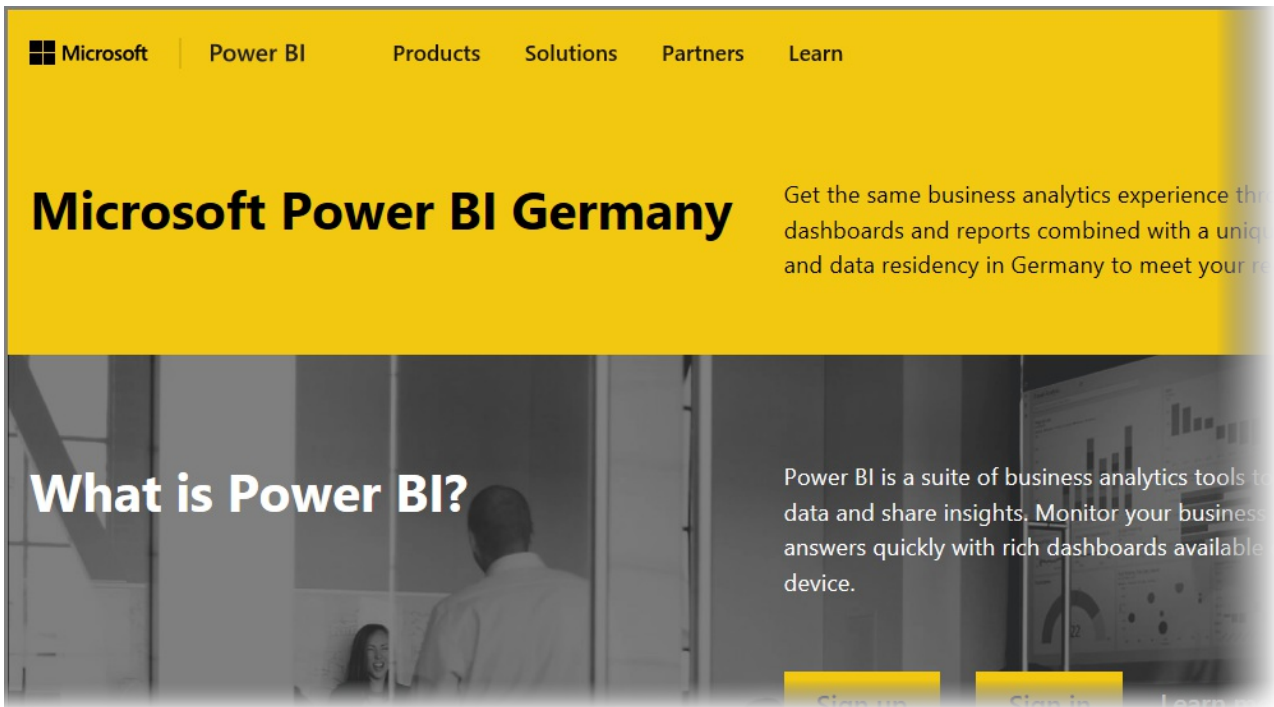
There are all sorts of things you can do with Power BI. For more information and learning, including an article that shows you how to sign up for the service, check out the following resources:

- [Overview of Power BI for US Government](#)
- [Guided Learning for Power BI](#)
- [Get started with the Power BI service](#)
- [Getting started with Power BI Desktop](#)

Frequently Asked Questions for Power BI for Germany Cloud customers

12/6/2017 • 3 min to read • [Edit Online](#)

The **Power BI service** has a version available for European Union/European Free Trade Agreement (EU/EFTA) customers, often referred to as Microsoft Cloud Deutschland (MCD). The **Power BI service** version discussed in this article is specific to EU/EFTA customers, and is separate and different from the commercial version of the **Power BI service**, or Power BI services provided to government customers.



The following questions and answers provide important information for Power BI Pro Service in Microsoft Cloud Deutschland (MCD), which is the Power BI service cloud specifically provided for EU/EFTA customers.

1. What is the Power BI service for Germany Cloud?

The Power BI service for EU/EFTA customers, also referred to as Microsoft Cloud Deutschland (MCD), is an EU/EFTA compliant cloud with the Power BI service delivered from German datacenters. All customer data in the Power BI service for EU/EFTA cloud is stored at rest in Germany with T-Systems working as the independent German data trustee, and with physical and logical access to data controlled by German law. The Power BI service for EU/EFTA cloud requires a distinct and separate account from the commercial version of the Power BI service. Learn more about Microsoft Cloud Deutschland [here](#).

2. Where can I find pricing and sign up information for the Power BI Germany Cloud?

You can find lots of information on the [Power BI Germany Cloud home page](#), including pricing information. On that page you can also find a link to sign up for **Power BI Pro service** 30-Day trial with 25 user licenses. As part of trial sign up, you have an option to purchase or add additional licenses as needed. We also offer Enterprise Agreement (EA), Government, and non-profit pricing. Please reach to your Microsoft customer representative for more details.

3. I have a Germany Cloud tenant as part of Azure Germany and/or Office 365 Germany subscriptions. Can I use the existing tenant to sign up for Power BI Germany?

Yes. As part of the sign up process, you'll have an option to login with an existing Germany Cloud tenant administrator account, and add the Power BI Pro service licenses to your existing tenant in the Germany Cloud. Please note that Germany Cloud tenants and user accounts are different from the Power BI service for Germany cloud.

4. Is there a free service in the Power BI service for Germany cloud?

No. We don't offer free license versions in the Power BI service for Germany cloud. However, we encourage you to sign up for [Power BI free offering in our public cloud](#) if your business needs are met with the Power BI free offering.

5. Can I use Power BI Desktop, Power BI Mobile, on-premises data gateway and Publisher for Excel with the Power BI service for Germany cloud?

Yes. We've updated our Power BI client products to seamlessly work with the Power BI service for Germany cloud. Please login with your Power BI service for Germany cloud account to start using the same client products with Power BI service for Germany cloud. You can download the latest version of client products from the following locations:

- [Power BI Desktop](#)
- [Power BI Mobile](#)
- [On-premises data gateway](#)
- [Power BI Publisher for Excel](#)

6. Are there any feature limitations of the Power BI service for Germany cloud?

The following service features are currently not available in Power BI service for Germany cloud:

- Publish to Web
- ArcGIS maps by Esri
- Power BI Embedded (separate metered ISV licensing, will be offered through [Microsoft Azure Germany](#) in the future)

7. Where can I find the Power BI service for Germany cloud specific configuration information for use and integration in my applications?

We updated our [SaaS Embedding developer samples](#) with Germany and other Power BI clouds specific configuration information. Please look at the **Cloud Configs** folder in samples for cloud specific configuration end points. The following table lists various configuration end points for the Power BI service for Germany cloud (and Public Cloud for cross-reference).

ENDPOINT NAME AND/OR USAGE	POWER BI SERVICE FOR GERMANY CLOUD URL	EQUIVALENT URL IN PUBLIC CLOUD (FOR CROSS-REFERENCE)
Home Page, Sign Up and Sign In	https://powerbi.microsoft.com/power-bi-germany/	https://powerbi.microsoft.com/
Power BI Service direct sign in	https://app.powerbi.de/?noSignUpCheck=1	https://app.powerbi.com/?noSignUpCheck=1
Service API	https://api.powerbi.de/	https://api.powerbi.com/
Office Portal for user license management, service health status and support requests by administrators	https://portal.office.de/	https://portal.office.com/
AAD Authority Uri	https://login.microsoftonline.de/common/oauth2/authorize/	https://login.microsoftonline.com/common/oauth2/authorize/

ENDPOINT NAME AND/OR USAGE	POWER BI SERVICE FOR GERMANY CLOUD URL	EQUIVALENT URL IN PUBLIC CLOUD (FOR CROSS-REFERENCE)
Power BI Service Resource Uri	https://analysis.cloudapi.de/powerbi/api	https://analysis.windows.net/powerbi/api
Custom Visuals Library	https://app.powerbi.de/visuals/	https://app.powerbi.com/visuals/
Register an Application for Power BI (For Embedded)	https://app.powerbi.de/apps	https://app.powerbi.com/apps
Azure Portal (For Embedded)	https://portal.microsoftazure.de/	https://portal.azure.com/
Community	https://community.powerbi.com/	https://community.powerbi.com/

Next steps

There are all sorts of things you can do with Power BI. For more information and learning, including an article that shows you how to sign up for the service, check out the following resources:

- [Guided Learning for Power BI](#)
- [Get started with the Power BI service](#)
- [Getting started with Power BI Desktop](#)

Get started with third party apps

1/30/2018 • 2 min to read • [Edit Online](#)

With Power BI, you can use an app built by a company or individual other than Microsoft. For example, you might use a third party app which integrates Power BI tiles into a custom built web application. When you use a third party app, you will be asked to grant that application certain permissions to your Power BI account and resources. It is important that you only grant permissions to applications that you know and trust. Permissions to an application can be revoked at any time. See [Revoke third party app permissions](#).

Here are the types of access an application can request.

Power BI App permissions

- **View all Dashboards**

- This permission gives an application the ability to view all dashboards you have access to. This includes dashboards that you own, have gotten from content packs, and have been shared to you and are in groups that you belong to. The application cannot make any modifications to the dashboard. Among other things, this permission can be used by an application to embed your dashboard content into its experiences.

- **View all Reports**

- This permission gives an application the ability to view all reports you have access to. This includes reports that you own, have gotten from content packs, and are in groups that you belong to. Part of viewing the report, means that the application can also see the data within it. The application cannot make any modifications to the reports themselves. Among other things, this permission can be used by an application to embed your report content into its experiences.

- **View all Datasets**

- This permission gives an application the ability to list all datasets that you have access to. This includes datasets that you own, have gotten from content packs, and are in groups that you belong to. An application can see the names of all your datasets as well as their structure including table and column names. This permission gives rights to read the data in a dataset. The permission does not give the application rights to add or make changes to a dataset.

- **Read and Write all Datasets**

- This permission gives an application the ability to list all datasets that you have access to. This includes datasets that you own, have gotten from content packs, and are in groups that you belong to. An application can see the names of all your datasets as well as their structure including table and column names. This permission gives rights to read and write the data in a dataset. The application can also create new datasets, or make modifications to existing ones. This is commonly used by an application to send to data directly to Power BI.

- **View user's Groups**

- This permission gives the application the ability to list all groups that you are a member of. It can use this permission along with some of the other permissions listed to view or update content for that particular group. The application cannot make modifications to the group itself.

Revoke third party app permissions

You revoke permissions for a third party app by going to the Office 365 My Apps site.

On the **Office 365 My apps** site, here's how to revoke third party permissions:

1. Go to [Office 365 My Apps site](#).
2. On the **My apps** page, locate the third party app.
3. Hover over the app tile, click the (...) button, and click **Remove**.



Supported browsers for Power BI

12/19/2017 • 1 min to read • [Edit Online](#)

Power BI runs in these browsers:

- Microsoft Edge
- Internet Explorer 11
- Chrome desktop latest version
- Safari Mac latest version
- Firefox desktop latest version

These browsers are supported on all platforms where they're available.

Next steps

- [Get started with Power BI](#)
- Try asking the [Power BI Community](#)
- Still have an issue? Please visit the [Power BI support page](#)

Supported languages and countries/regions for Power BI

12/19/2017 • 5 min to read • [Edit Online](#)

This article provides lists of supported languages and countries/regions for the Power BI service, Power BI Desktop, and Power BI documentation.

Countries and regions where Power BI is available

For a list of countries and regions where Power BI is available, see the [international availability list](#).

Languages for the Power BI service

The Power BI service (in the browser) is available in the following 42 languages:

- Arabic
- Basque - Basque
- Bulgarian - Български
- Catalan - català
- Chinese (Simplified) - 中文(简体)
- Chinese (Traditional) - 中文(繁體)
- Croatian - hrvatski
- Czech - čeština
- Danish - dansk
- Dutch - Nederlands
- English - English
- Estonian - eesti
- Finnish - suomi
- French - français
- Galician - galego
- German - Deutsch
- Greek - Ελληνικά
- Hebrew
- Hindi - हिंदी
- Hungarian - magyar
- Indonesian - Bahasa Indonesia
- Italian - italiano
- Japanese - 日本語
- Kazakh - Қазақ
- Korean - 한국어
- Latvian - latviešu
- Lithuanian - lietuvių
- Malay - Bahasa Melayu
- Norwegian (Bokmål) - norsk (bokmål)
- Polish - Polski

- Portuguese (Brazil) - Português
- Portuguese (Portugal) - português
- Romanian - română
- Russian - Русский
- Serbian (Cyrillic) - српски
- Serbian (Latin) - srpski
- Slovak - slovenčina
- Slovenian - slovenski
- Spanish - español
- Swedish - svenska
- Thai - ไทย
- Turkish - Türkçe
- Ukrainian - українська
- Vietnamese - Tiếng Việt

What's translated


Menus, buttons, messages, and other elements of the experience are translated into your language, making it easier to navigate and interact with Power BI.

At this time, a few features are available in English only:

- Dashboards and reports that Power BI creates for you when you connect to services such as Microsoft Dynamics CRM, Google Analytics, Salesforce, and so on. (You can still create your own dashboards and reports in your own language.)
- Exploring your data with Q&A.

Stay tuned as we work to bring additional features to other languages.

Choose your language in the Power BI service

1. In the Power BI service, select the **Settings** icon  > **Settings**.
2. On the **General** tab > **Language**.
3. Select your language > **Apply**.

Choose your language in the browser

Power BI detects your language based on the language preferences on your computer. The way you access and change these preferences may vary depending on your operating system and browser. Here's how to access these preferences from Internet Explorer and Google Chrome.

Internet Explorer (version 11)

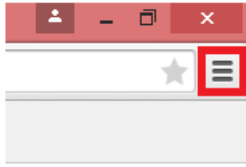
1. Click the **Tools** button in the top-right corner of your browser window:



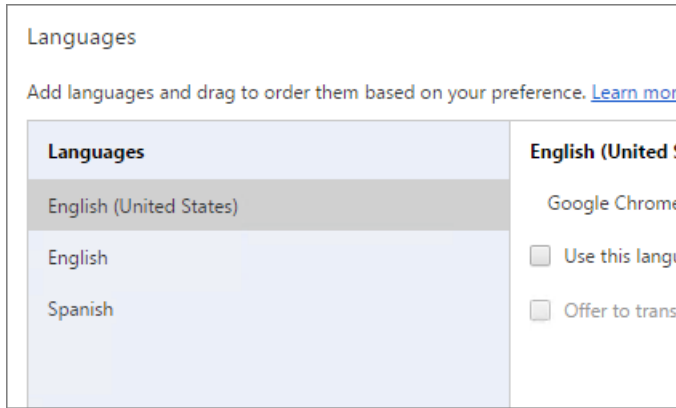
2. Click **Internet Options**.
3. In the Internet Options dialog, on the General tab under Appearance, click the **Languages** button.

Google Chrome (version 42)

1. Click the menu button in the top-right corner of your browser window:

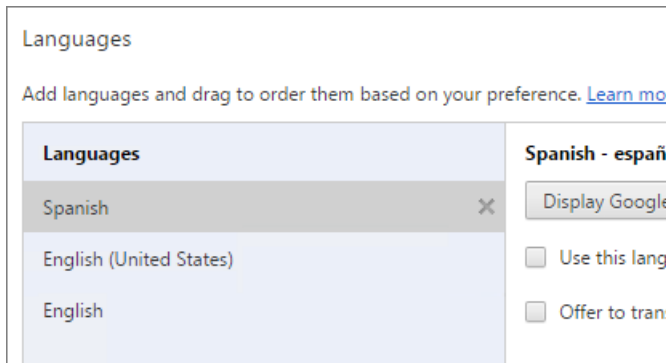


2. Click **Settings**.
3. Click **Show advanced settings**.
4. Under Languages, click the **Language and input settings** button.
5. Click **Add**, select a language, and click **OK**.



The new language is at the end of the list.

6. Drag the new language to the top of the list, and click **Display Google Chrome in this language**.



You may need to close and reopen your browser to see the change.

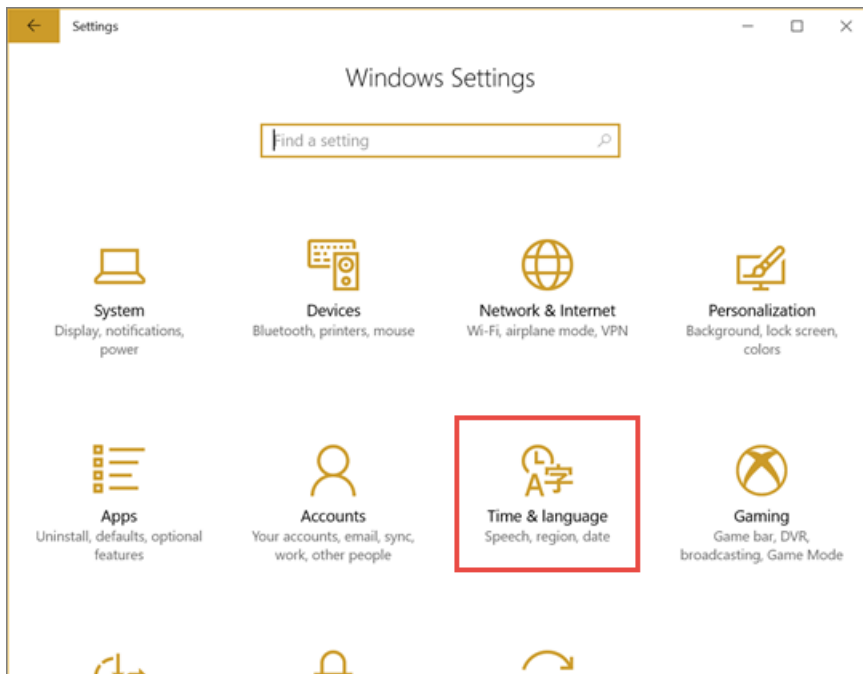
Choose the language or locale of Power BI Desktop

You have two ways of getting Power BI Desktop: You can download it, or install it from the Windows Store.

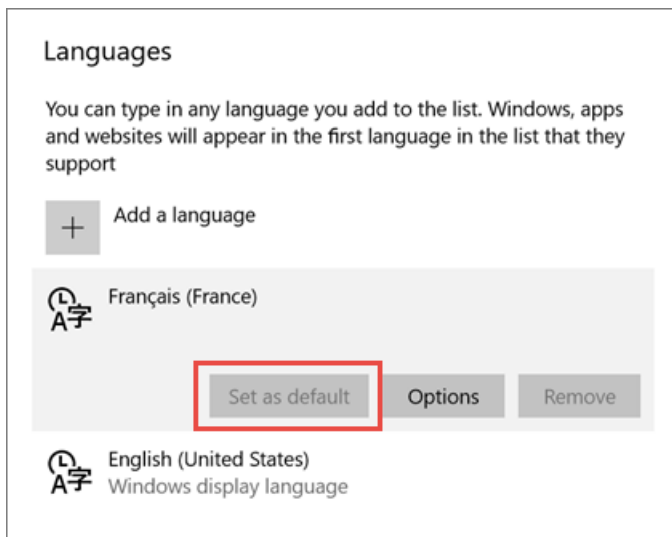
- When you [install Power BI Desktop from the Windows Store](#), it installs all the languages and shows the language that corresponds to the Windows default language.
- When you [download Power BI Desktop](#), you choose the language when you download it.
- You can also [choose a locale to be used when importing data](#) for a specific report.

Choose a language for Power BI Desktop installed from the Windows Store

1. [Install Power BI Desktop](#) from the Windows Store.
2. To change the language, on your computer search for **Windows Settings**.
3. Select **Time & language**.



4. Select **Region & language**, select a language, and select **Set as default**.



The next time you start Power BI Desktop it will use the language you set as the default.

Choose a language when you download Power BI Desktop

The language you choose for Power BI Desktop affects the display format of numbers and dates in reports.

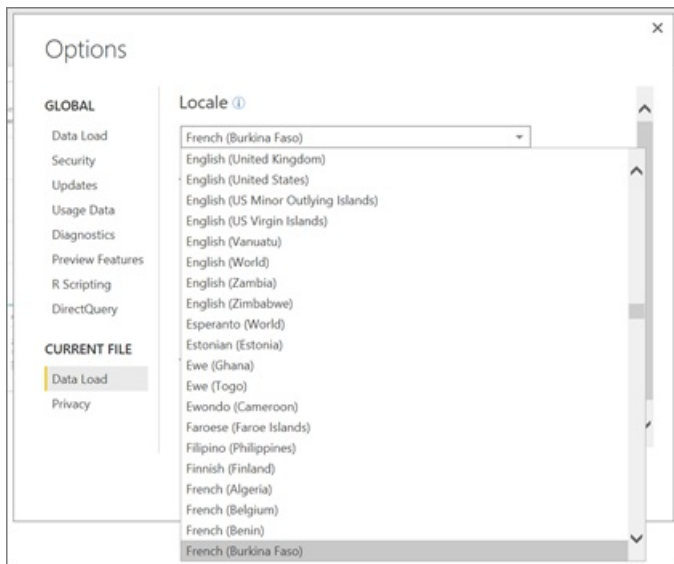
- Select a language when you [download Power BI Desktop](#).

To change the language in Power BI Desktop, go back to the download page and download it in a different language.

Choose the locale for importing data into Power BI Desktop

Whether you download Power BI Desktop or install it from the Windows Store, you can choose a locale for a specific report to be something other than the locale in your version of Power BI Desktop. This changes the way data is interpreted when it's imported from your data source, for example whether "3/4/2017" is interpreted as 3rd April or March 4th.

1. In Power BI Desktop, go to **File > Options and settings > Options**.
2. Under **Current file**, select **Regional Settings**.
3. In the **Locale** box, select a different locale.



4. Select **OK**.

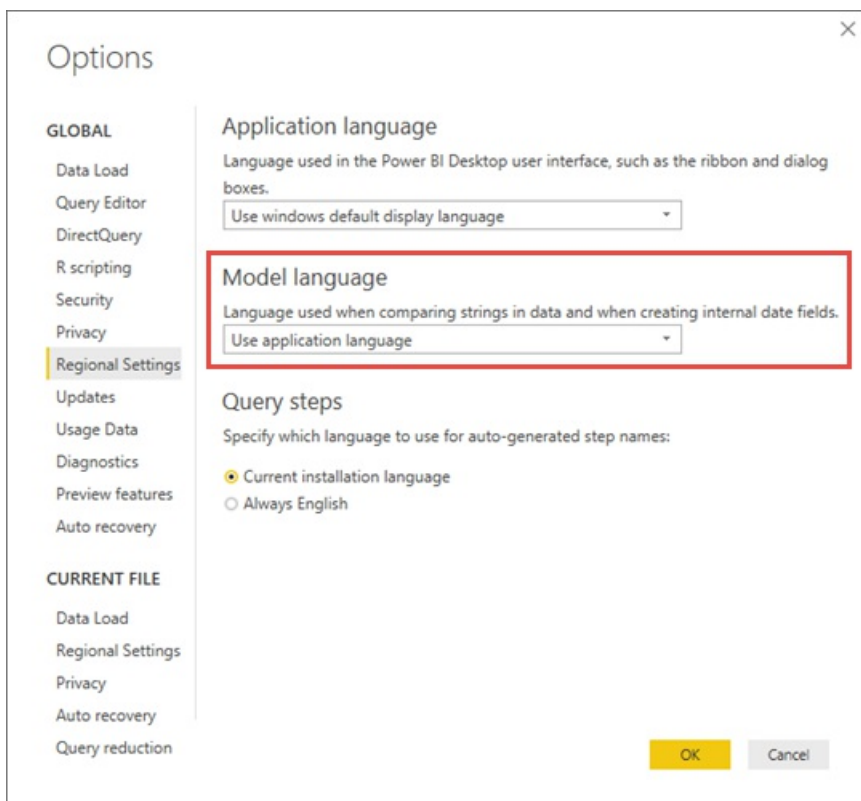
Choose the language for the model in Power BI Desktop

Besides setting the language for the Power BI Desktop application, you can also set the model language. The model language affects chiefly two things:

- How we compare and sort strings. For example, because Turkish has two of the letter i, depending on the collation of your database, the two can end up in different orders when sorting.
- The language Power BI Desktop uses when creating hidden date tables from date fields. For example, fields are called Month/Monat/Mois, etc.

Here's how to set the model language.

1. In Power BI Desktop, go to **File > Options and settings > Options**.
2. Under **Global**, select **Regional Settings**.
3. In the **Model language** box, select a different language.



Languages for the help documentation

Help is localized in these 10 languages:

- Chinese (Simplified) - 中文(简体)
- Chinese (Traditional) - 中文(繁體)
- French - français
- German - Deutsch
- Italian - italiano
- Japanese - 日本語
- Korean - 한국어
- Portuguese (Brazil) - Português
- Russian - Русский
- Spanish - español

Next steps

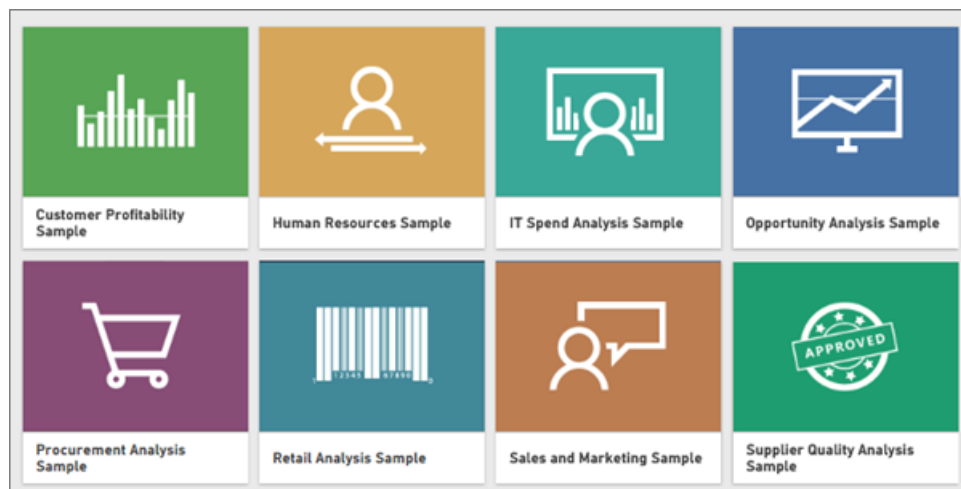
- Are you using one of the Power BI mobile apps? See [Supported languages in the Power BI mobile apps](#) for details.
- Questions? Try asking the [Power BI Community](#).
- Still have an issue? Please visit the [Power BI support page](#).

What sample data is available to use with Power BI?

1/19/2018 • 11 min to read • [Edit Online](#)

Say you're new to Power BI and want to try it out but don't have any data. Or maybe you have a dataset, but because you don't understand (yet) how Power BI works, you worry that you might somehow damage your dataset?

No need to stress out! obviEnce (www.obvience.com) and Microsoft have created samples for you to use until you feel more comfortable with Power BI. The data is anonymized and represents different industries: finance, HR, sales, and more. And as you read through our online documentation you'll discover tutorials and examples that use these same samples which means that you'll be able to follow along.



Each of these samples is available in several formats: as a content pack, as an individual Excel workbook, and as a .pbix file. If you don't know what these things are, or how to get your hands on them -- don't worry. We'll explain it all later in this article. And for each sample we've created a *tour* which is a type of article that tells the story behind the sample and walks you through different scenarios. One scenario might be answering questions for your manager, another might be looking for competitive insights, or creating reports and dashboards to share, or explaining a business shift.

But before we get started, please read through these legal guidelines for using the samples. When you're done we'll introduce the samples and show you how to use them.

Usage guidelines for the Power BI sample Excel workbooks

Please read this information before using the Power BI samples.

©2015 Microsoft Corporation. All rights reserved. The documents and workbooks are provided "as-is." Information and views expressed in the workbooks, including URL and other Internet Web site references, may change without notice. You bear the risk of using it. Some examples are for illustration only and are fictitious. No real association is intended or inferred. Microsoft makes no warranties, express or implied, with respect to the information provided here.

The workbooks do not provide you with any legal rights to any intellectual property in any Microsoft product. You may copy and use this workbook for your internal, reference purposes.

The workbooks and related data are provided by obviEnce. www.obvience.com

ObviEnce is an ISV and an Intellectual Property (IP) Incubator focused on Microsoft Business Intelligence. ObviEnce works closely with Microsoft to develop best practices and thought leadership for jump-starting and

deploying Microsoft Business Intelligence solutions.

The workbooks and data are property of obviEnce, LLC and have been shared solely for the purpose of demonstrating Power BI functionality with industry sample data.

Any uses of the workbooks and/or data must include the above attribution (that is also on the Info worksheet included with each workbook). The workbook and any visualizations must be accompanied by the following copyright notice: obviEnce ©.

By clicking any of the links below to download the Excel workbook files or .pbix files, you are agreeing to the terms above.

Available samples

Eight samples are available for you to use. Each one represents a different industry.

Customer Profitability sample



[Take a tour of the Customer Profitability sample](#)

This industry sample analyzes a CFO's key metrics for her executives, products, and customers. You can investigate what factors impact the company's profitability.

Human Resources sample



[Take a tour of the HR sample](#)

This industry sample focuses on the hiring strategy for a company by analyzing new hires, active employees, and employees who've left. By exploring the data, you can find trends in voluntary separations and biases in the hiring strategy.

IT Spend Analysis sample



[Take a tour of the IT Spend Analysis sample](#)

In this industry sample we analyze the planned vs. actual costs of the IT department of a company. This comparison helps us understand how well the company planned for the year and investigate areas with huge deviations from the plan. The company in this example goes through a yearly planning cycle, and then quarterly it produces a new Latest Estimate (LE) to help analyze changes in IT spend over the fiscal year.

Opportunity Analysis sample



[Take a tour of the Opportunity Analysis sample](#)

This industry sample explores a software company's sales channel. Sales managers monitor their direct and partner sales channels by tracking opportunities and revenue by region, deal size, and channel.

Procurement Analysis sample



[Take a tour of the Procurement Analysis sample](#)

This industry sample analyzes a CFO's key metrics for her executives, products, and customers. You can investigate what factors impact the company's profitability

Retail Analysis sample



[Take a tour of the Retail Analysis sample](#)

This industry sample analyzes retail sales data of items sold across multiple stores and districts. The metrics compare this year's performance to last year's in these areas: sales, units, gross margin, and variance, as well as new store analysis.

Sales and Marketing sample



[Take a tour of the Sales and Marketing sample](#)

This industry sample analyzes a manufacturing company, VanArsdel Ltd. It allows the Chief Marketing Officer to watch the industry and the market share for VanArsdel. By exploring the sample, you can find the company's market share, product volume, sales, and sentiment.

Supplier Quality sample



[Take a tour of the Supplier Quality sample](#)

This industry sample focuses on one of the typical supply chain challenges — supplier quality analysis. Two primary metrics are at play in this analysis: total number of defects and the total downtime that these defects caused. This sample has two main objectives: understand who the best and worst suppliers are, with respect to quality, and identify which plants do a better job finding and rejecting defects, to minimize downtime.

Now you know what's available. Time to learn how to get ahold of these samples.

How to get the samples

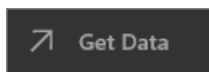
As you read above, the samples are available in several formats: content packs, Excel workbooks, and .pbix files. We'll describe how to use each of these, starting with content packs.

The Power BI samples as content packs

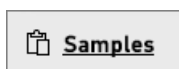
Content packs are the only sample format that is available from within Power BI; you don't have to leave Power BI to find them. A content pack is essentially a bundle of one or more dashboard, dataset, and report that someone creates and that can be used with Power BI service. People create content packs to share with colleagues. Each of the Power BI sample content packs contains a dataset, report, and dashboard. Content packs are not available for Power BI Desktop. If you'd like to learn more about content packs, read [Intro to content packs in Power BI](#).

Get and open a sample content pack in Power BI service

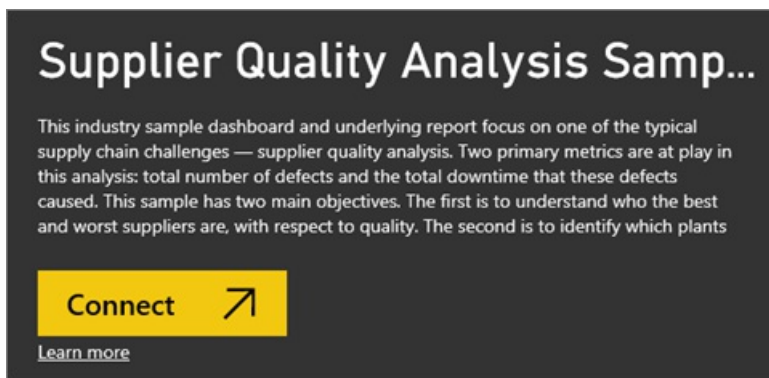
1. Open Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.



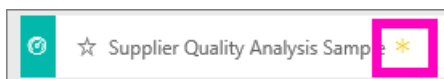
3. On the Get Data page that appears, select the **Samples** icon.



4. Select one of the samples to open a description of that sample. Then choose **Connect**.



5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk. Use the samples to take Power BI for a test run.



Now that you have data, you're on your way. Try out some of our tutorials using the sample content packs or just open Power BI service and explore.




The Power BI samples as Excel files

Each of the sample content packs is also available as an Excel workbook. The Excel workbooks are designed to be used with Power BI service.


1. Download the files individually using the links below, or [download a zip file of all the sample files](#). If you're an advanced user, you might want to download the Excel workbooks to explore or edit the data models.

- [Retail Analysis Sample](#)
- [Supplier Quality Analysis Sample](#)
- [Human Resources Sample](#)
- [Customer Profitability Sample](#)
- [Opportunity Tracking Sample](#)
- [IT Spend Analysis Sample](#)
- [Procurement Analysis Sample](#)
- [Sales and Marketing Sample](#)

2. Save the downloaded file. Where you save the file makes a difference.

-  **Local** - If you save your file to a local drive on your computer or another location in your organization, from Power BI, you can import your file into Power BI. Your file will actually remain on your local drive, so the whole file isn't really imported into Power BI. What really happens is a new dataset is created in your Power BI site and data, and in some cases the data model, are loaded into the dataset. If your file has any reports, those will appear in your Power BI site under Reports.
-  **OneDrive - Business** – If you have OneDrive for Business and you sign into it with the same account you sign into Power BI with, this is by-far the most effective way to keep your work in Excel, Power BI, or a .CSV file in-sync with your dataset, reports, and dashboards in Power BI. Because both Power BI and OneDrive are in the cloud, Power BI connects to your file on OneDrive about every hour. If any changes are found, your dataset, reports, and dashboards are automatically updated in Power BI.
-  **OneDrive - Personal** – If you save your files to your own OneDrive account, you'll get many

of the same benefits as you would with OneDrive for Business. The biggest difference is when you first connect to your file (using Get Data > Files > OneDrive – Personal) you'll need to sign in to your OneDrive with your Microsoft account, which is usually different from what you use to sign in to Power BI. When signing in with your OneDrive with your Microsoft account, be sure to select the Keep me signed in option. This way, Power BI will be able to connect to your file about every hour and make sure your dataset in Power BI is in-sync.

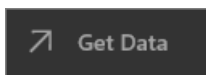
-  **SharePoint Team-Sites** Saving your Power BI files to SharePoint – Team Sites is much the same as saving to OneDrive for Business. The biggest difference is how you connect to the file from Power BI. You can specify a URL or connect to the root folder.

3. Open Power BI service (app.powerbi.com) and log in.

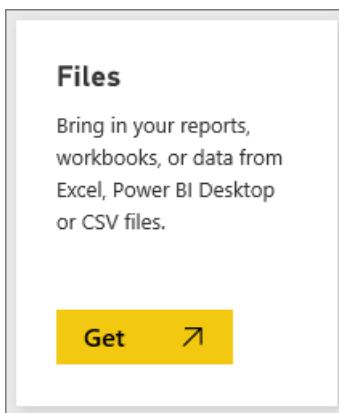
TIP

At this point you may want to create a new dashboard and name it after the file you plan on importing. Otherwise, when you import the Excel dataset, Power BI won't create a new dashboard named after the sample but instead will add a tile to the dashboard that you currently have open. Selecting that tile will take you to the dataset's report. This isn't a major big deal as you can always create a new dashboard later, but starting with a new dashboard saves you a step or two.

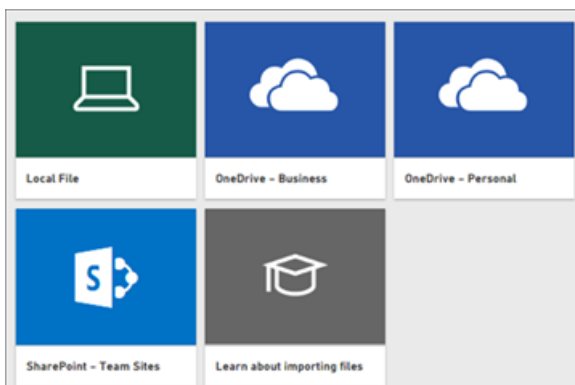
4. In the bottom left corner select **Get data**.



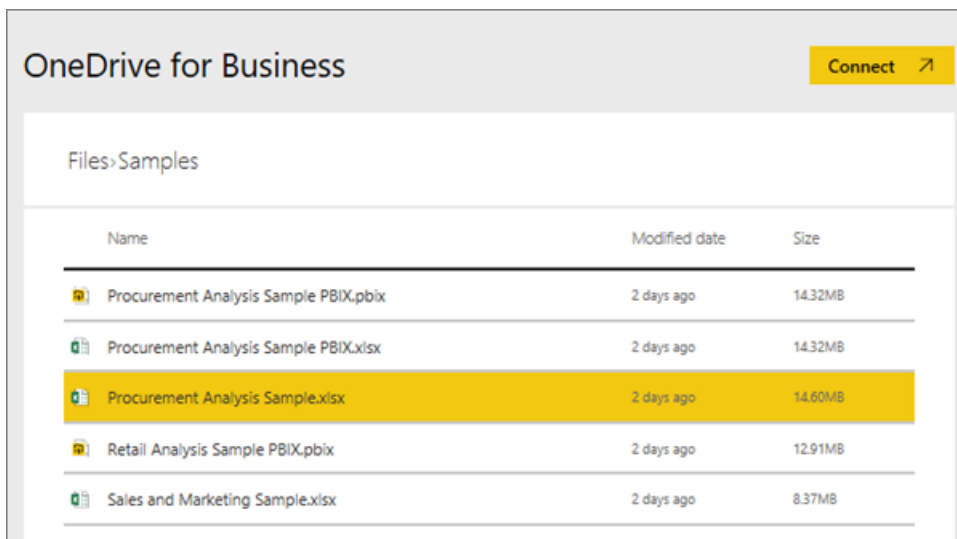
5. On the Get Data page that appears, select **Files > Get**.



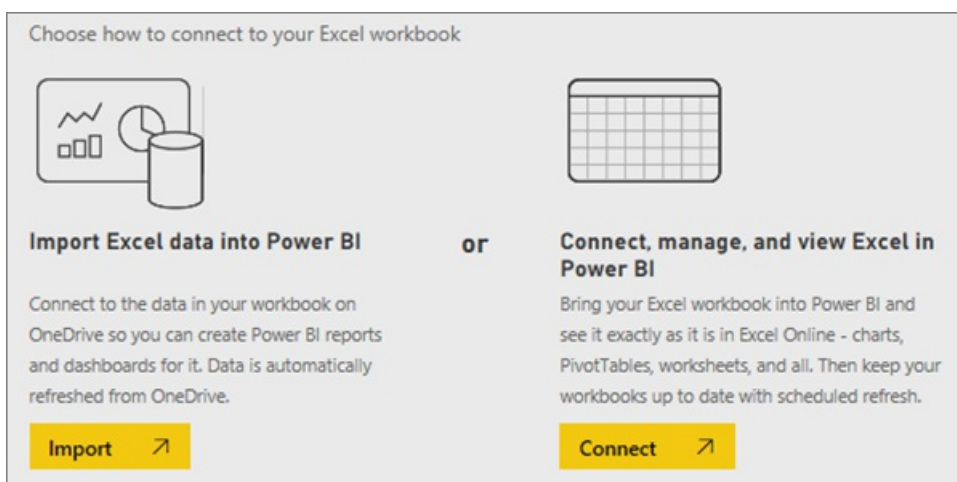
6. Navigate to the location where you downloaded and saved the sample.



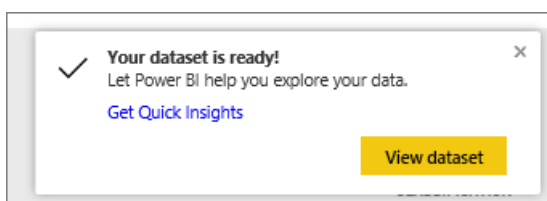
7. Select the file, in this case **Procurement Analysis Sample.xlsx** which was saved on OneDrive for Business, and choose **Connect**.



- Choose whether to import the data or to bring the workbook into Power BI and see it exactly as it is in Excel online.



- If you select **Import**, Power BI imports the sample workbook and adds it as a new dataset named **Procurement Analysis Sample**. If the workbook has any Power View sheets, tables or ranges, or a data model, Power BI also creates a report (with the same name). And if you don't already have a dashboard open, Power BI creates a new dashboard. (If you had a dashboard open when you clicked **Get Data**, you'll see a new blank tile on that dashboard. Clicking that tile will take you to the report for the dataset you just added). The new content is named after the sample and is marked with a yellow asterisk.
- When the **Your dataset is ready!** screen appears, select **View dataset** or **Get Quick Insights** or simply use your Power BI left navbar to locate and open the associated report or dashboard.



(Optional) Take a look at the Excel samples from inside Excel itself

Want to understand how the data in an Excel workbook gets converted to Power BI datasets and reports? Opening the Excel samples *in Excel* and exploring the worksheets provides some of the answers.

- When you first open a sample workbook in Excel, you may see two warnings. The first says the workbook is in Protected View. Select **Enable Editing**. The second may say that the workbook has external data connections. Select **Enable Content**.
- Each workbook contains several sheets. Because these Excel samples all have at least one Power View

sheet with visualizations, when you import the Excel file into Power BI you'll end up with a dataset **and** a report.

You may need to [enable the Power View add-in](#).

- So where's the actual data? It's in the Power Pivot data model. To see the data, on the **PowerPivot** tab, select **Manage Data Model**.

Don't see the PowerPivot tab? [Enable the Power Pivot add-in](#).

- The Info tab provides information about obviEnce, the company that created the sample.

The Power BI samples as .pbix files

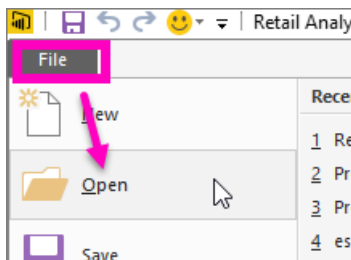
Each of the sample content packs is also available as Power BI .pbix file. The .pbix files are designed to be used with Power BI Desktop.

1. Download the files individually using the links below.

- [Retail Analysis Sample](#)
- [Supplier Quality Analysis Sample](#)
- [Human Resources Sample](#)
- [Customer Profitability Sample](#)
- [Opportunity Tracking Sample](#)
- [IT Spend Analysis Sample](#)
- [Procurement Analysis Sample](#)
- [Sales and Marketing Sample](#)

2. Save the downloaded file.

3. From Desktop, select **File > Open** and navigate to the location where you saved the sample .pbix.



4. Select the .pbix file to open it in Desktop.

Next steps

[Power BI basic concepts](#)

[Tutorial: Connect to the Power BI samples](#)

[Data sources for Power BI](#)

More questions? [Try the Power BI Community](#)

The Power BI samples, a tutorial

1/26/2018 • 5 min to read • [Edit Online](#)

We recommend starting with the article [Sample datasets for Power BI](#). In that article you'll learn all about the samples; how to get them, where to save them, how to use them, and some of the stories each sample can tell. Then, when you have a grasp of the basics, come back to this Tutorial.

Prerequisites

The samples are available for Power BI service and Power BI Desktop. To follow along, we'll be using the Retail analysis sample.


The *Retail Analysis* sample content pack used in this tutorial consists of a dashboard, report, and dataset. To familiarize yourself with this particular content pack and its scenario, you may want to [take a tour of the Retail Analysis sample](#) before you begin.

About this tutorial

This tutorial teaches you how to

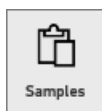
- import a sample content pack, add it to Power BI service, and open the contents. A *content pack* is a type of sample where the dataset is bundled with a dashboard and report.
- open a sample .pbix file in Power BI Desktop.

Samples and Power BI service

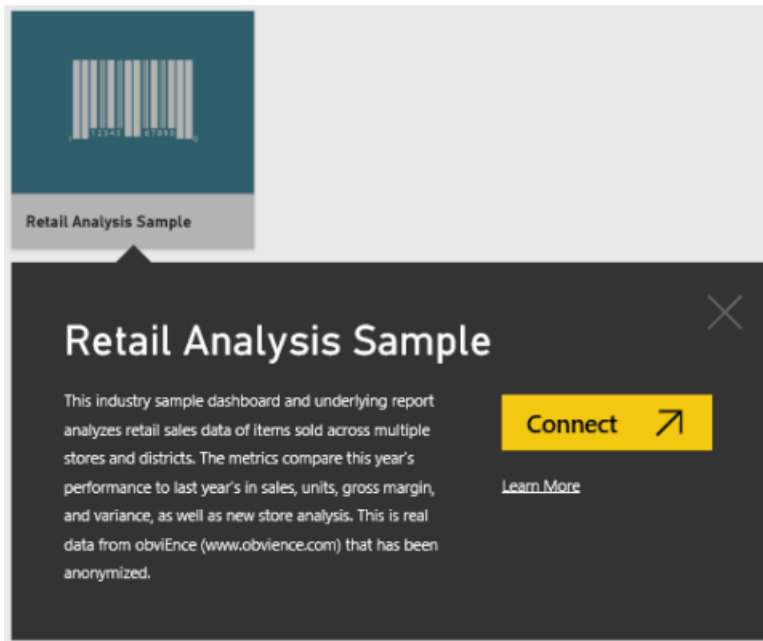
1. Open and sign in to Power BI Service (app.powerbi.com).
2. Select **Get Data** at the bottom of the left navigation pane. If you don't see **Get Data**, expand the nav pane by selecting .



3. Select **Samples**.



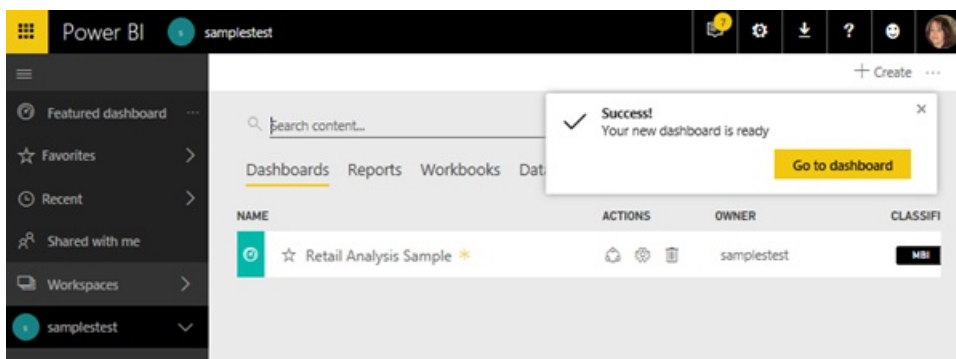
4. Select the *Retail Analysis Sample*, and choose **Connect**.



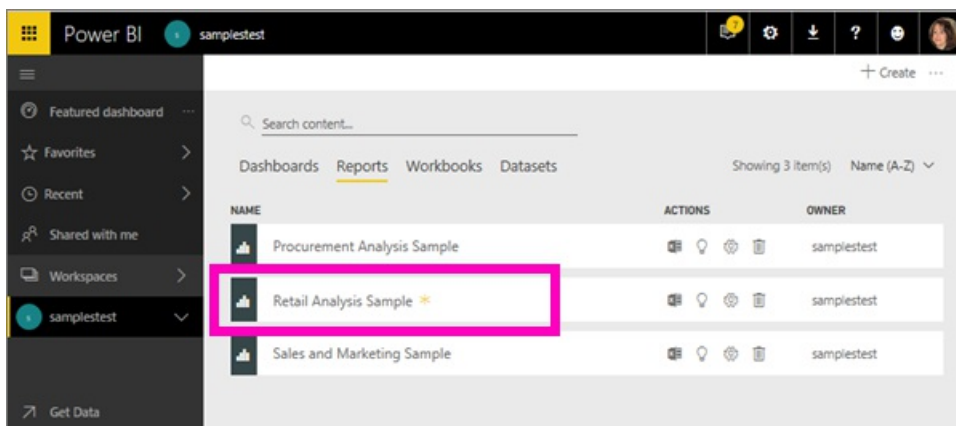
What exactly was imported?

With the sample content packs, when you select **Connect**, Power BI is actually bringing in a copy of that content pack and storing it for you in the cloud. Because the person who created the content pack included a dataset, a report, and a dashboard -- that's what you get when you click **Connect**.

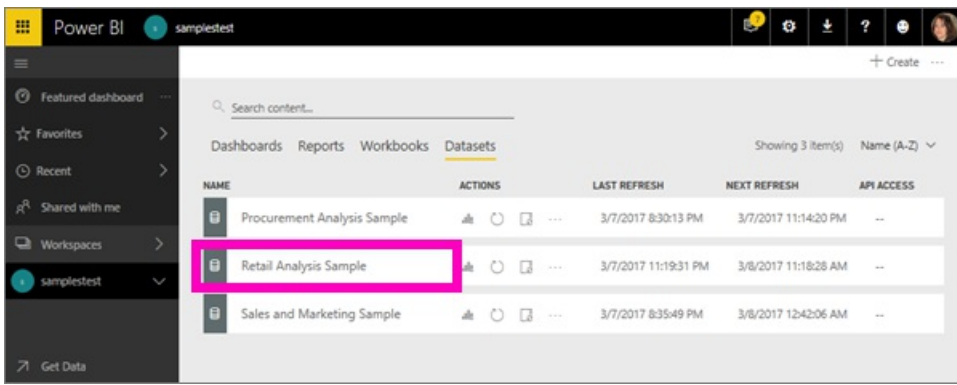
1. Power BI creates the new dashboard and lists it on your **Dashboards** tab. The yellow asterisk lets you know it's new.



2. Open the **Reports** tab. Here you'll see a new report named *Retail Analysis Sample*.



And check out the **Datasets** tab. There's a new dataset as well.



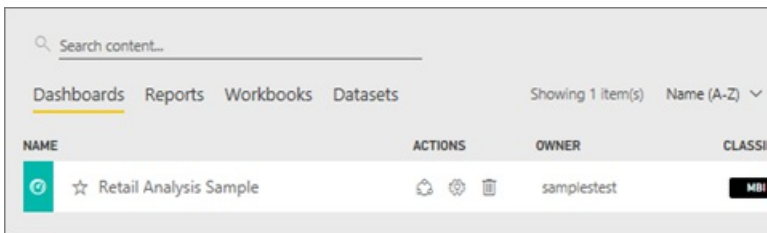
Explore your new content

Now explore the dashboard, dataset, and report on your own. There are many different ways to navigate to your dashboards, reports, and datasets, and just one of those many ways is described below.

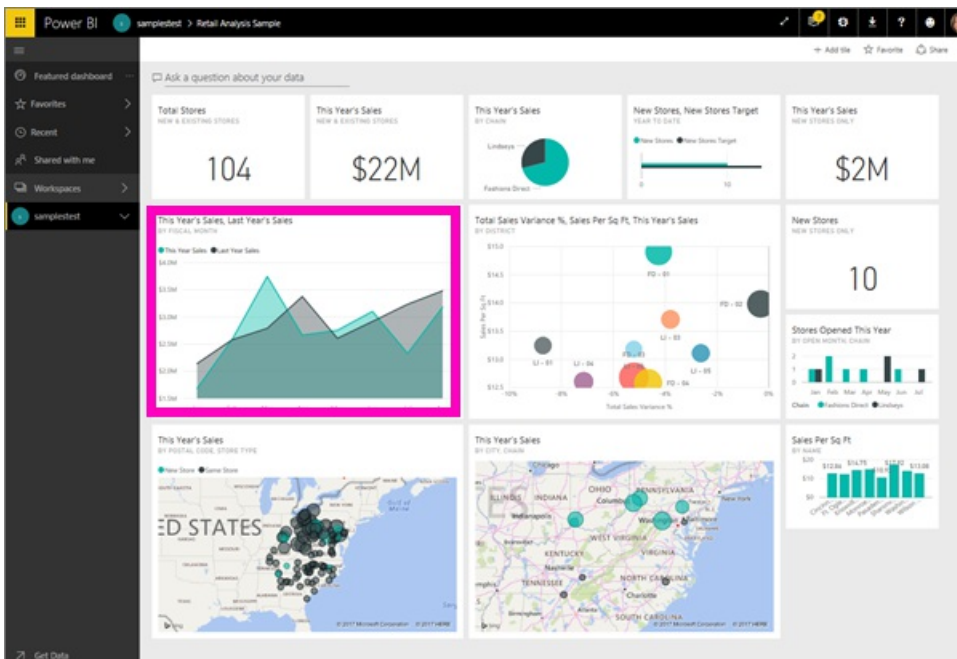
TIP

Want a little hand-holding first? Try the [Tour of the Retail Analysis sample](#) for a step-by-step walkthrough of this sample.

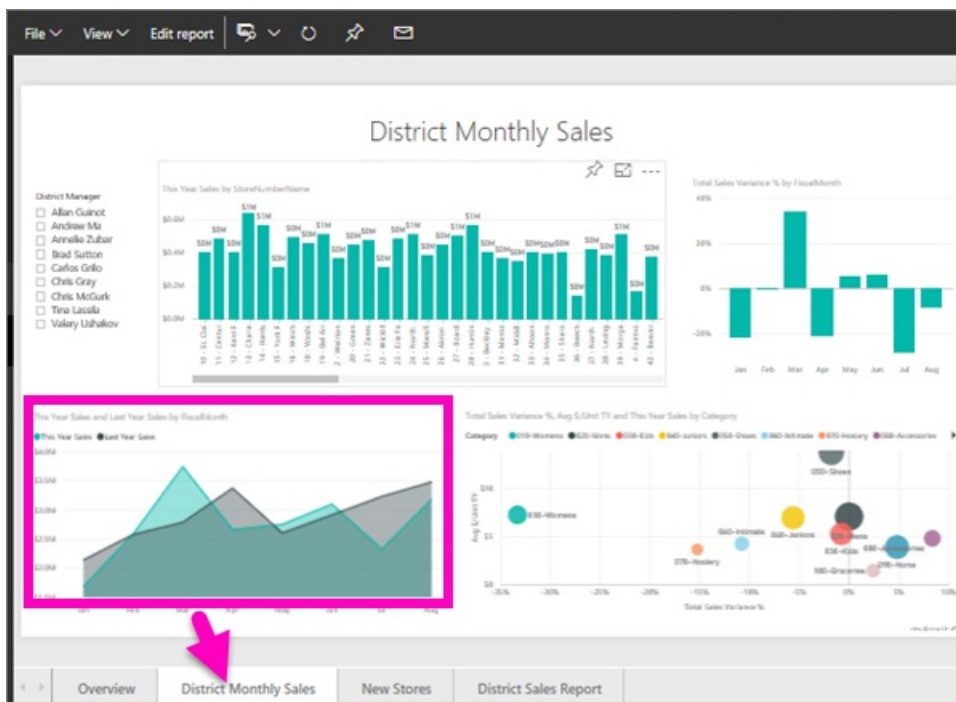
1. Navigate back to your **Dashboards** tab and select the *Retail Analysis Sample* dashboard to open it.



2. The dashboard opens. It has a variety of visualization tiles.



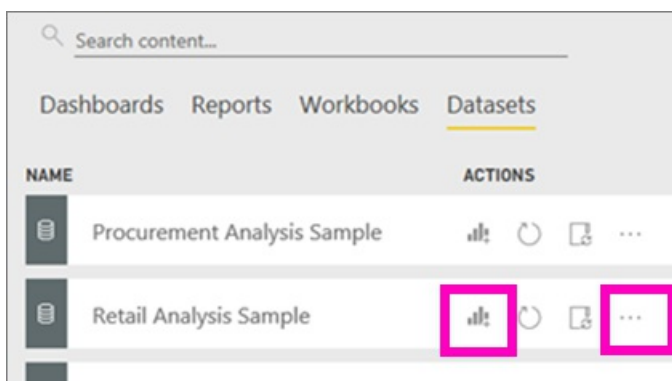
3. Select one of the tiles to open the underlying report. In this example, we'll select the area chart (outlined in pink in the previous image). The report opens to the page that contains that area chart.




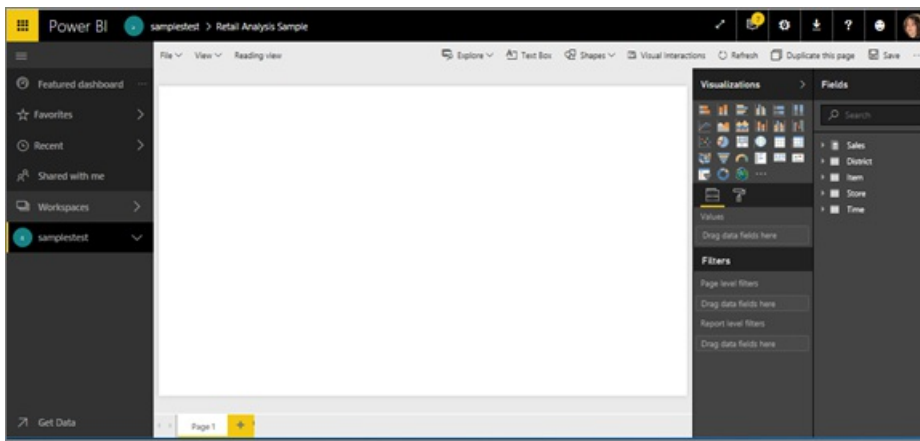
NOTE

If the tile had been created using [Power BI Q&A](#), the Q&A page would've opened instead. If the tile was [pinned from Excel](#), Excel Online would've opened inside of Power BI.

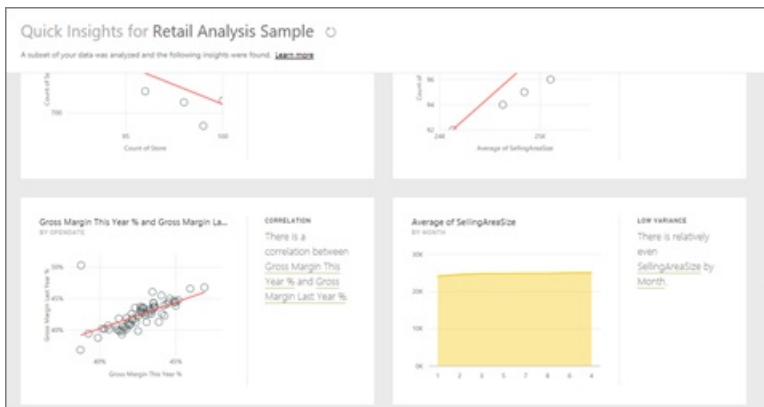
- Back on your **Datasets** tab, you have several options for exploring your dataset. You won't be able to open it and see all the rows and columns (as you can in Power BI Desktop or Excel). When someone shares a content pack with colleagues, they typically want to share the insights, not give their colleagues direct access to the data. But that doesn't mean you can't explore the dataset.



- One way of exploring the dataset is by creating your own visualizations and reports from scratch. Select the chart icon  to open the dataset in report editing mode.



- Another way of exploring the dataset is to run **Quick Insights**. Select the ellipses (...) and choose **Get insights**. When the insights are ready, select **View insights**.

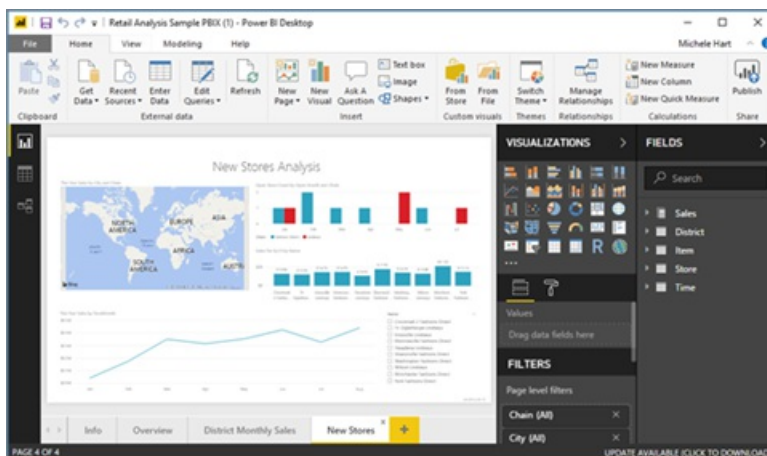


Samples and Power BI Desktop

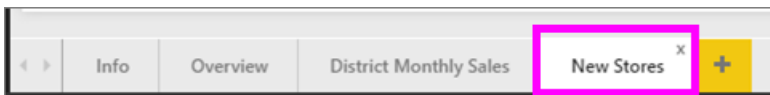
When you first open the sample PBIX file, it displays in Report view where you can explore, create, and modify any number of report pages with visualizations. Report view provides pretty much the same design experience as a report's Editing view in the Power BI service. You can move visualizations around, copy and paste, merge, etc.

The difference between them is when using Power BI Desktop, you can work with your queries and model your data to make sure your gross data supports the best insights in your reports. You can then save your Power BI Desktop file wherever you like, whether it's your local drive or to the cloud.

1. Open the [Retail Analysis sample .pbix file](#) in Power BI Desktop.




2. The file opens in Report view. Notice the 4 tabs at the bottom of the report editor? That means that there are 4 pages in this report, and the "New Stores" page is currently selected.



3. For a deep dive into the report editor, see [Take a tour of the report editor](#)

What exactly was imported?

When you open the sample PBIX file in Desktop, Power BI is actually bringing in a copy of that data and storing it for you in the cloud. From Desktop you have access to the report **and the underlying dataset**. When the data is loaded, Power BI Desktop will attempt to find and create relationships for you.

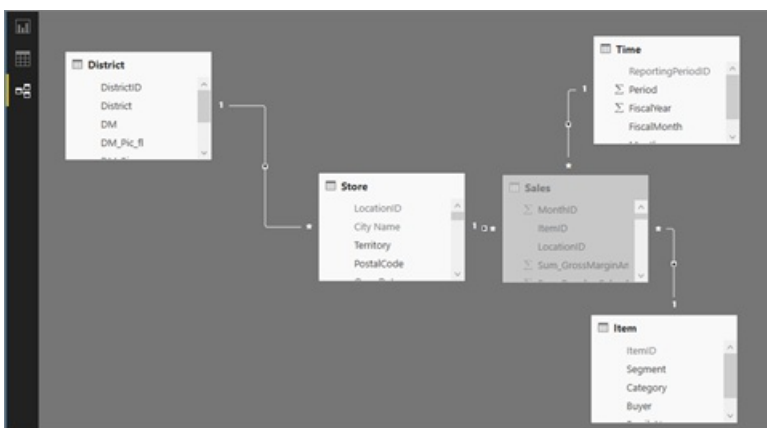
1. Switch to [Data view](#) by selecting the table icon .

LocationID	City Name	Territory	PostalCode	OpenDate	SellingAreaSize	District	Name
1	Weston	WV	26032	8/1/2010 12:00:00 AM	40000	FD - District #4	Weston Fashioning D
2	Beckley	WV	25801	2/1/2008 12:00:00 AM	40000	FD - District #2	Beckley Fashions D
4	Fairmont	WV	26554	10/1/2006 12:00:00 AM	25000	FD - District #1	Fairmont Fashions
5	Uniontown	PA	15401	10/1/2006 12:00:00 AM	55000	FD - District #4	Uniontown Fashion
6	Parkersburg	WV	26101	8/1/2007 12:00:00 AM	40000	FD - District #2	Parkersburg Fashion
7	Belle Vernon	PA	15012	10/1/2007 12:00:00 AM	45000	FD - District #4	Belle Vernon Fashion
8	Lewis	MD	21502	10/1/2006 12:00:00 AM	40000	FD - District #1	Cumberland Fashion
9	Clerksburg	WV	26130	8/1/2009 12:00:00 AM	40000	FD - District #1	Clerksburg Fashion
10	St. Charlesville	OH	43950	4/1/2010 12:00:00 AM	50000	FD - District #4	St. Charlesville Fashion
11	West Millen	PA	15122	4/1/2011 12:00:00 AM	55000	FD - District #3	Century III Fashion
12	Kent	OH	44240	7/1/2012 12:00:00 AM	50000	FD - District #3	Kent Fashions Direct
13	Charleston	WV	25387	1/1/2013 12:00:00 AM	50000	FD - District #2	Charleston Fashion
14	Harrisburg	PA	17109	1/1/2013 12:00:00 AM	60000	FD - District #1	Harrisburg Fashion
15	York	PA	17402	4/1/2014 12:00:00 AM	50000	FD - District #1	York Fashions Direct
16	Winchester	VA	22602	2/1/2014 12:00:00 AM	40000	FD - District #1	Winchester Fashion
18	Washington	PA	15301	2/1/2014 12:00:00 AM	55000	FD - District #4	Washington Fashion

Data View helps you inspect, explore, and understand data in your Power BI Desktop model. It's different from how you view tables, columns, and data in Query Editor. With Data View, you're looking at your data after it has been loaded into the model.

When you're modeling your data, sometimes you want to see what's actually in a table or column without creating a visual on the report canvas, often right down to the row level. This is especially true when you're creating measures and calculated columns, or you need to identify a data type or data category.

2. Switch to [Relationships view](#) by selecting the icon .



Relationship view shows all of the tables, columns, and relationships in your model. From here you can view, change, and create relationships.

Explore your new content

Now explore the dataset, relationships, and report on your own. For help getting started, visit the [Desktop Getting Started Guide](#).

Next steps

[Power BI basic concepts](#)

[Samples for Power BI service](#)

[Data sources for Power BI](#)

More questions? [Try the Power BI Community](#)

Download the Financial Sample workbook for Power BI

11/15/2017 • 1 min to read • [Edit Online](#)

Need some data to try with Power BI service? We have a simple Excel workbook of sample financial data available for download. Here's how to download it:

Financial sample Excel workbook: [download the sample directly](#).

This workbook has one table of data of sales and profit data by market segment and country/region.

Next steps

[Get Data](#)

[How to import Excel data](#)

[Other data you can try with Power BI -- Sample datasets and content packs](#)

More questions? [Try the Power BI Community](#)

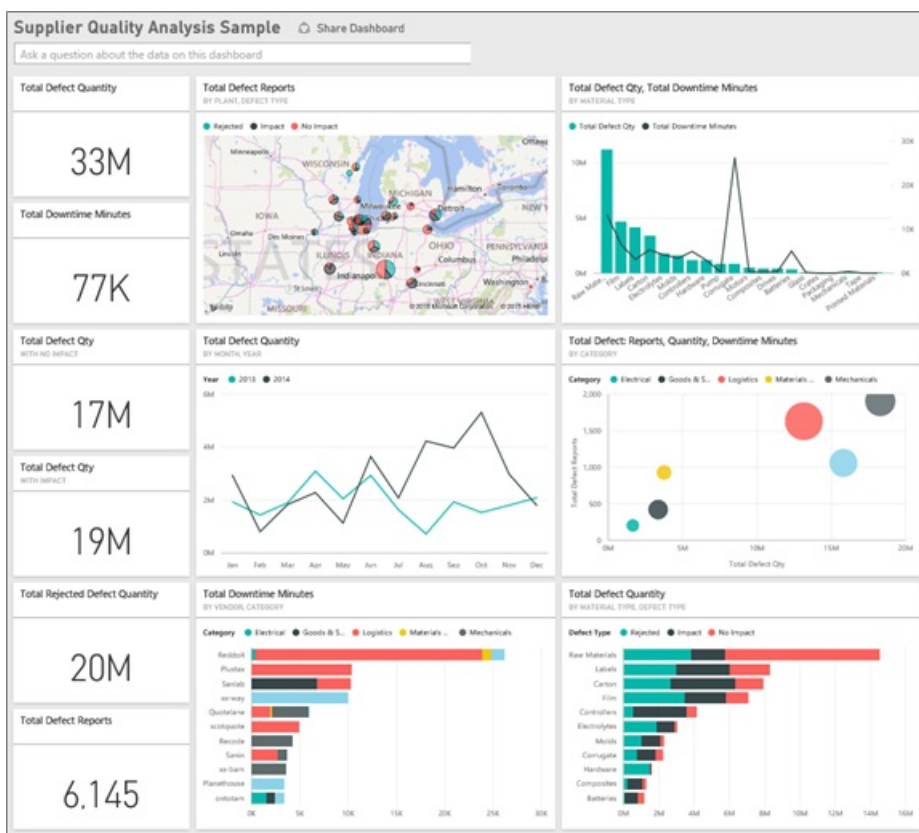
Supplier Quality Analysis sample for Power BI: Take a tour

1/24/2018 • 6 min to read • [Edit Online](#)

A brief overview of the Supplier Quality Analysis sample

This industry sample dashboard and underlying report focus on one of the typical supply chain challenges — supplier quality analysis. Two primary metrics are at play in this analysis: total number of defects and the total downtime that these defects caused. This sample has two main objectives:

- Understand who the best and worst suppliers are, with respect to quality
- Identify which plants do a better job finding and rejecting defects, to minimize downtime



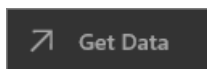
This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports, and dashboards. This is real data from obviENCE (www.obviENCE.com) that has been anonymized.

Prerequisites

Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

Get the content pack for this sample

1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.



3. On the Get Data page that appears, select the **Samples** icon.

4. Select the **Supplier Quality Analysis Sample**, then choose **Connect**.



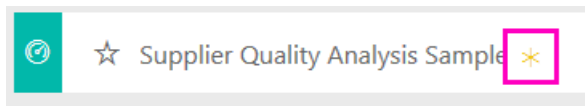
Supplier Quality Analysis Sample

This industry sample dashboard and underlying report focus on one of the typical supply chain challenges — supplier quality analysis. Two primary metrics are at play in this analysis: total number of defects and the total downtime that these defects caused. This sample has two main objectives. The first is to understand who the best and worst suppliers are, with respect to quality. The second is to identify which plants do a better job finding and rejecting defects, to minimize downtime. This is real data from obviEnce (www.obvience.com) that has been anonymized.

Connect ↗

[Learn more](#)

5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

- [Supplier Quality Analysis Sample](#)

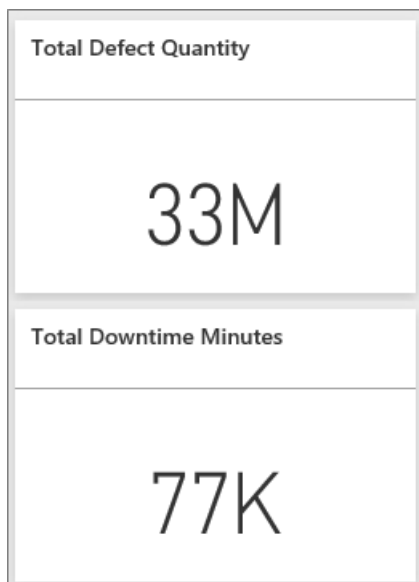
Get the Excel workbook for this sample

You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

Downtime caused by defective materials

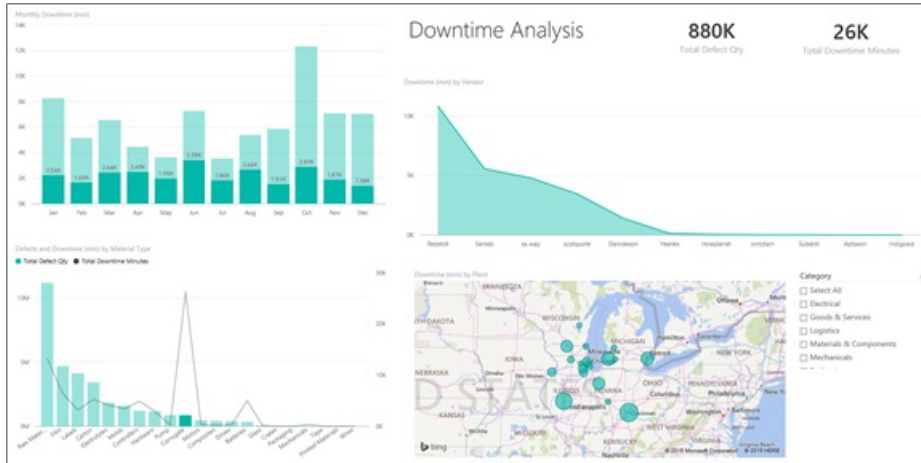
Let's analyze the downtime caused by defective materials and see which vendors are responsible.

1. On the dashboard, select the **Total Defect Quantity** number tile or the **Total Downtime Minutes** number tile.



The "Supplier Quality Analysis Sample" report opens to the "Downtime Analysis" page. Notice we have 33M total defective pieces, and the total downtime caused by these defective pieces is 77K minutes. Some materials have fewer defective pieces but they can cause a huge delay resulting in larger downtime. Let's explore them on the report page.

- Looking at the **Total Downtime Minutes** line in the **Defects and Downtime (min) by Material Type** combo chart, we see corrugate materials cause the most downtime.
- Select the **Corrugate** column in the same combo chart to see which plants are impacted most by this defect and which vendor is responsible.

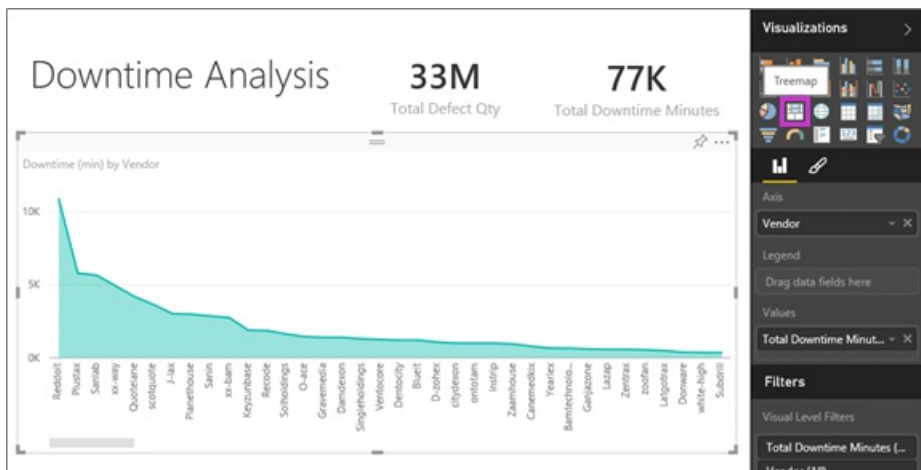


- Select individual plants in the map to see which vendor or material is responsible for the downtime at that plant.

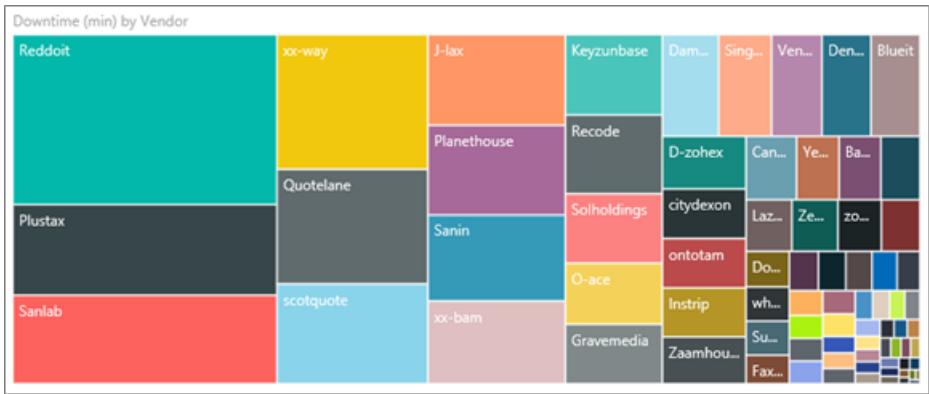
Which are the worst suppliers?

We want to find the worst eight suppliers and determine what percentage of the downtime they are responsible for creating. We can do this by changing the **Downtime (min) by Vendor** area chart to a treemap.

- On page 3 of the report, "Downtime Analysis," select **Edit Report** in the upper-left corner.
- Select the **Downtime (min) by Vendor** area chart, and in the Visualizations pane select Treemap.



The treemap automatically puts the **Vendor** field as the **Group**.



From this tree map, we can see the top eight vendors are the eight blocks on the left of the tree map. We can also see they account for about 50% of all downtime minutes.

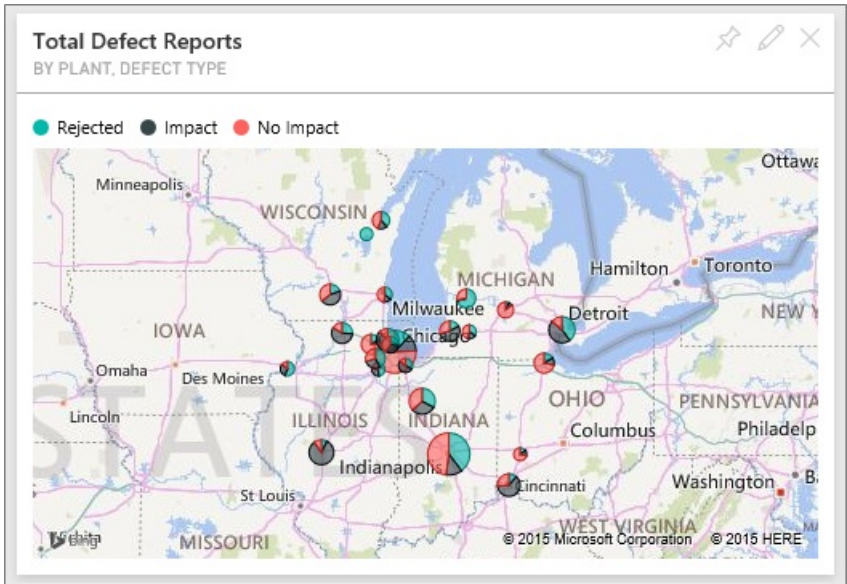
3. Select **Supplier Quality Analysis Sample** in the top navigation bar to go back to the dashboard.

Comparing plants

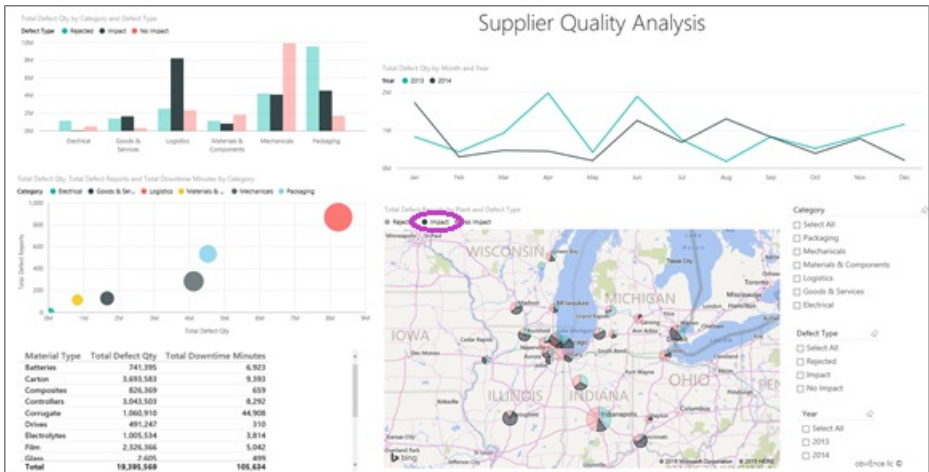
Now let's explore which plant does a better job managing defective material, resulting in less downtime.

1. Select the **Total Defect Reports by Plant, Defect Type** map tile.

The report opens to the "Supplier Quality" page.

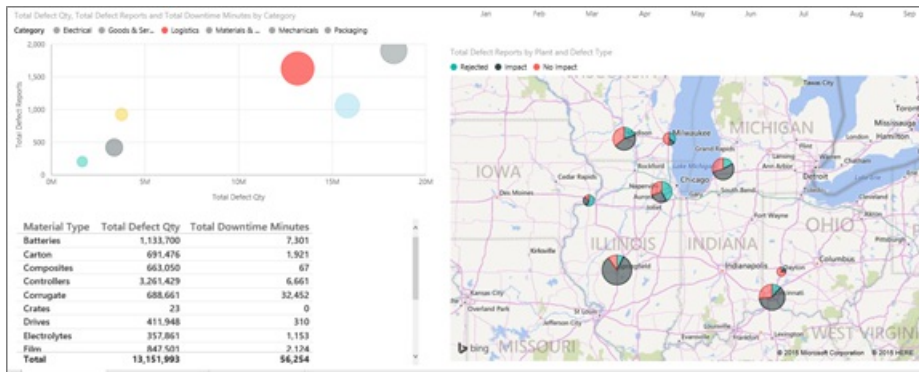


2. In the map legend, select the **Impact** circle.



Notice in the bubble chart that **Logistics** is the most troubled category – it's the largest in terms of total defect quantity, total defect reports, and total downtime minutes. Let's explore this category more.

- Select the Logistics bubble in the bubble chart and observe the plants in Springfield, IL and Naperville, IL. Naperville seems to be doing a much better job of managing defective supplies as it has a high number of rejects and few impacts, compared to Springfield's large number for impacts.

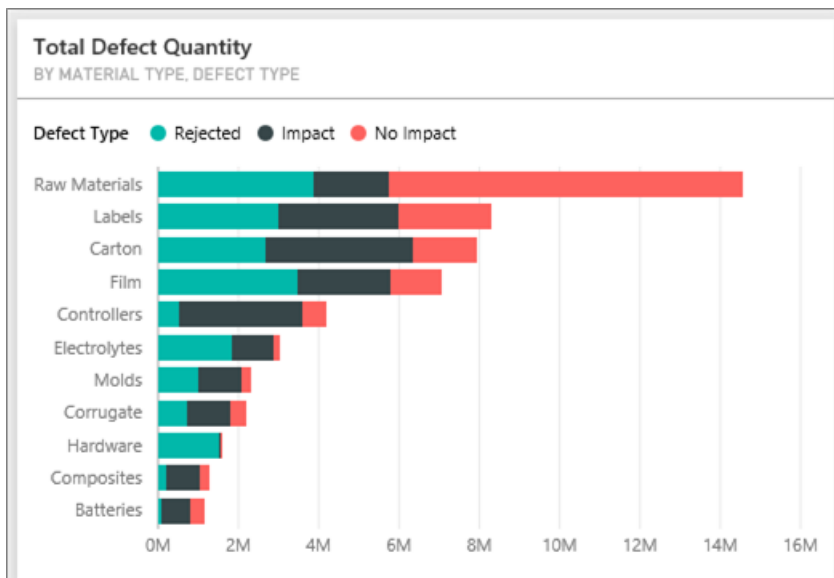


- Select **Supplier Quality Analysis Sample** in the top navigation bar to return to your active workspace.

Which material type is best managed?

The best managed material type is the one with lowest downtime or no impact, regardless of defect quantity.

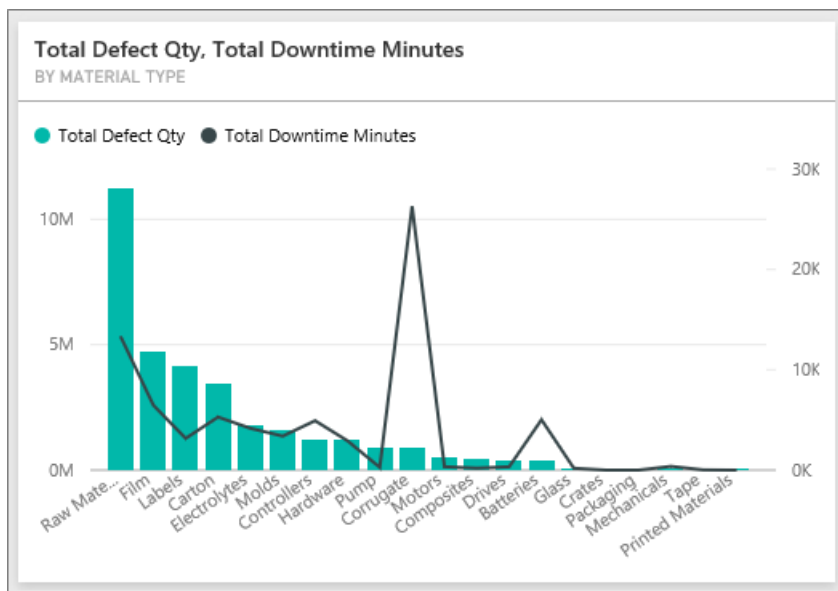
- In the dashboard, look at the **Total Defect Quantity by Material Type, Defect Type** tile.



Notice that **Raw Materials** have a lot of total defects, but most of the defects are either rejected or have no impact.

Let's verify that raw materials don't cause a lot of downtime, despite high defect quantity.

- In the dashboard, look at the **Total Defect Qty, Total Downtime Minutes by Material Type** tile.



Apparently raw materials are well managed: they have more defects, but lower total downtime minutes.

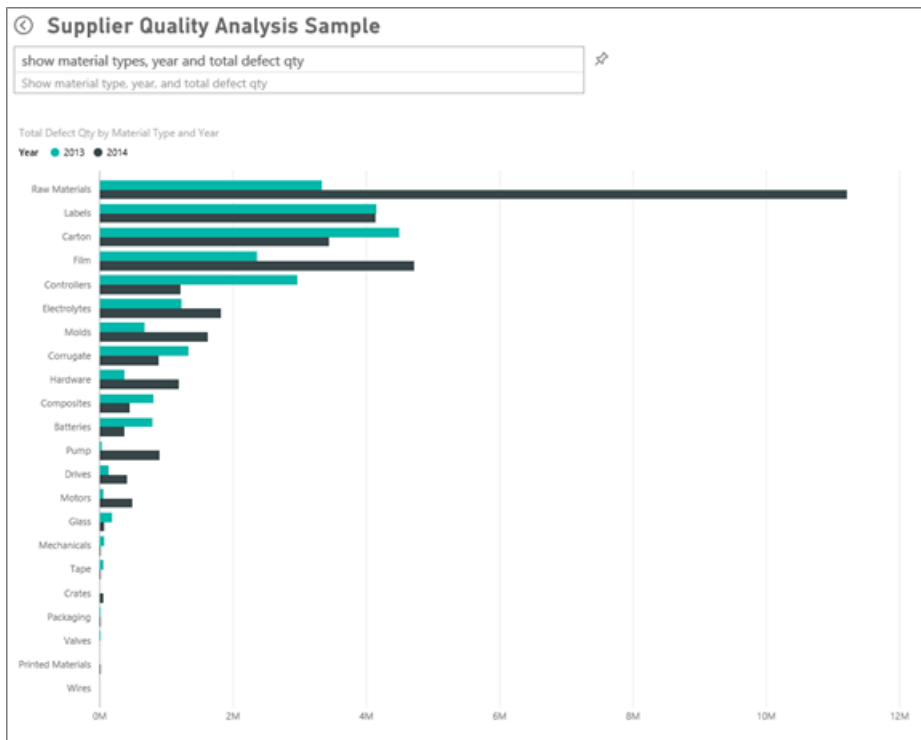
Compare defects to downtime by year

1. Select the **Total Defect Reports by Plant, Defect Type** map tile to open the report to the first report page, Supplier Quality.
2. Notice that **Defect Qty** is higher in 2014 than in 2013.

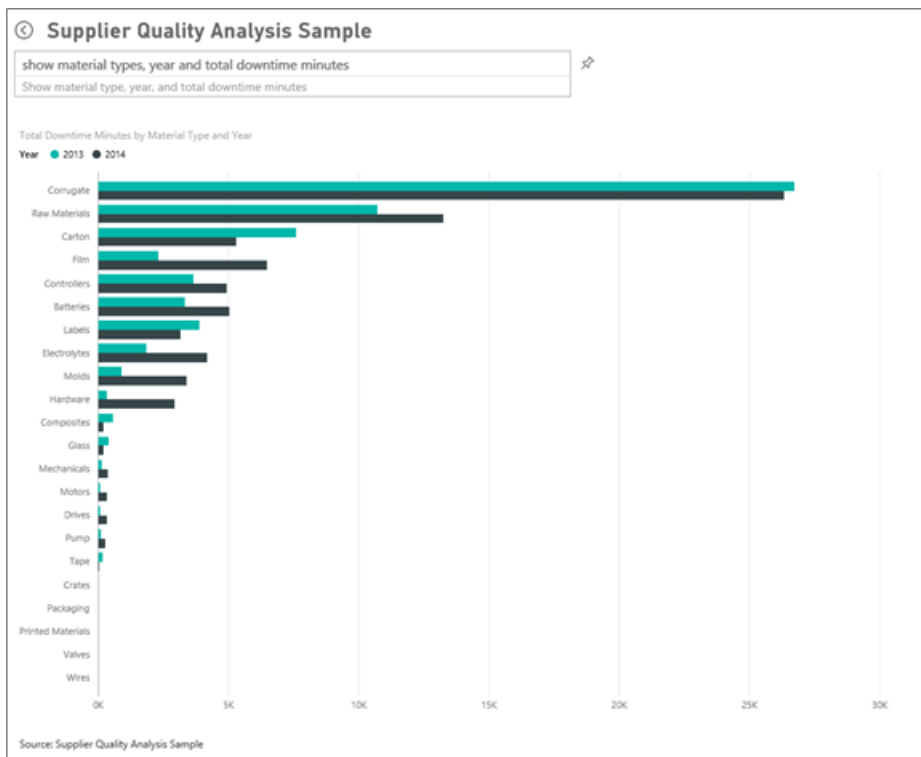


3. Do more defects translate into more downtime? We can ask questions in the Q&A box to find out.
4. Select **Supplier Quality Analysis Sample** in the top navigation bar to go back to the dashboard.
5. Since we know Raw Materials have the highest number of defects, in the question box, type "show material types, year and total defect qty".

There were many more raw materials defects in 2014 than in 2013.



6. Now change the question to “show material types, year and total downtime minutes”.



Raw materials downtime was about the same in 2013 and 2014, even though there were many more raw materials defects in 2014.

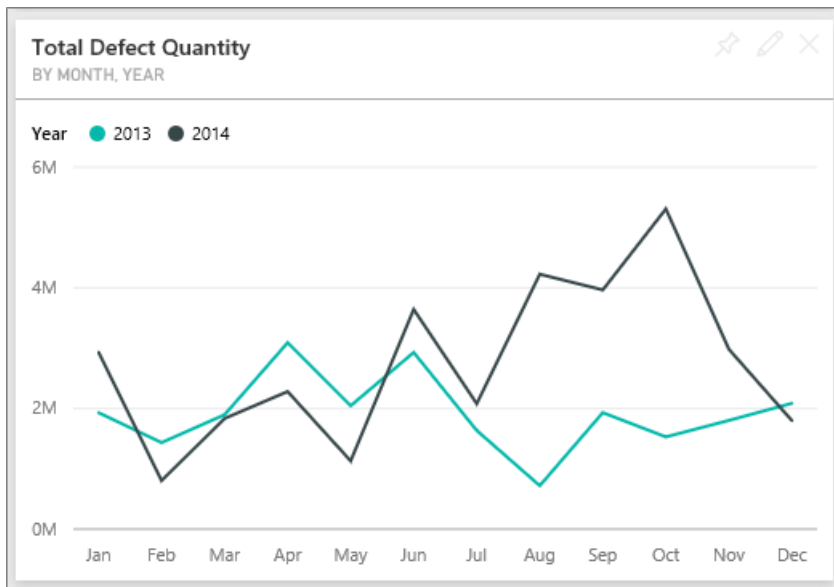
It turns out more raw materials defects in 2014 didn't lead to much more raw materials downtime in 2014.

Compare defects to downtime month to month

Let's look at another dashboard tile related to total defective quantity.

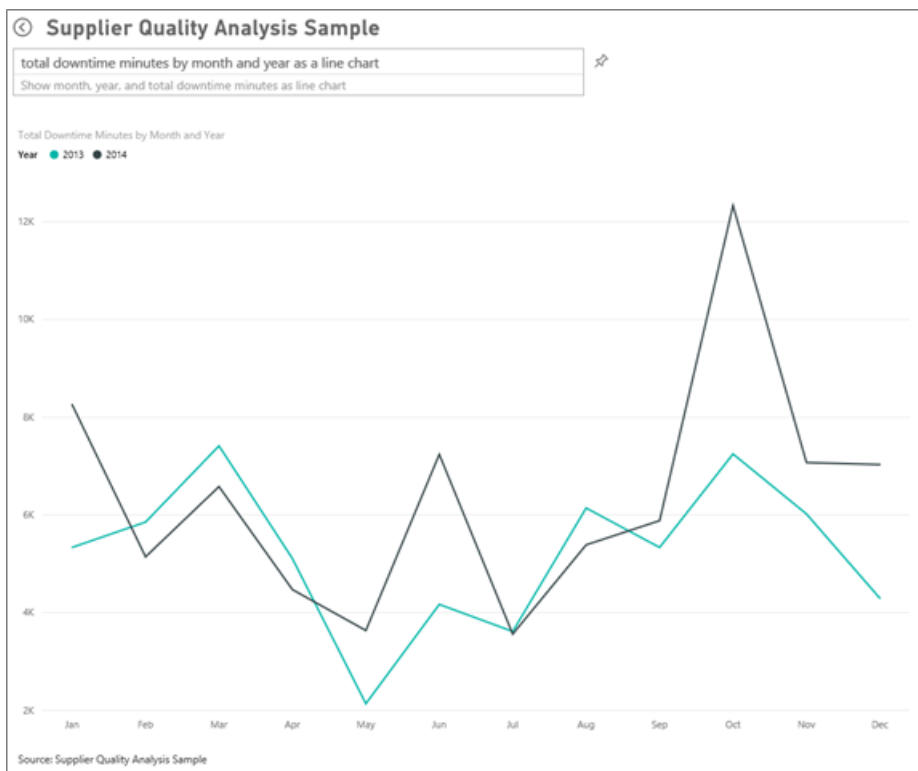
1. Select the back arrow (⏪) in the upper-left corner above the question box to get back to the dashboard.

Looking more closely at the **Total Defect Quantity by Month, Year** tile shows that the first half of 2014 had a similar number of defects as 2013, but in the second half of 2014, the number of defects jumped significantly.





Let's see if this increase in defect quantity led to an equal increase in downtime minutes.

2. In the question box, type "total downtime minutes by month and year as a line chart".



We do see a jump in downtime minutes during June and Oct, but other than that, the jump in the number of defects didn't result in significantly more downtime. This shows we're managing defects well.

3. To pin this chart to your dashboard, select the pin icon  to the right of the question box.
4. To explore the outlier months, check out the downtime minutes during Oct by material type, plant location, category, etc. by asking questions such as "total downtime minutes in October by plant".
5. Select the back arrow  in the upper-left corner above the question box to get back to the dashboard.

This is a safe environment to play in. You can always choose not to save your changes. But if you do save them, you can always go to **Get Data** for a new copy of this sample.

Next steps: Connect to your data

We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into supplier

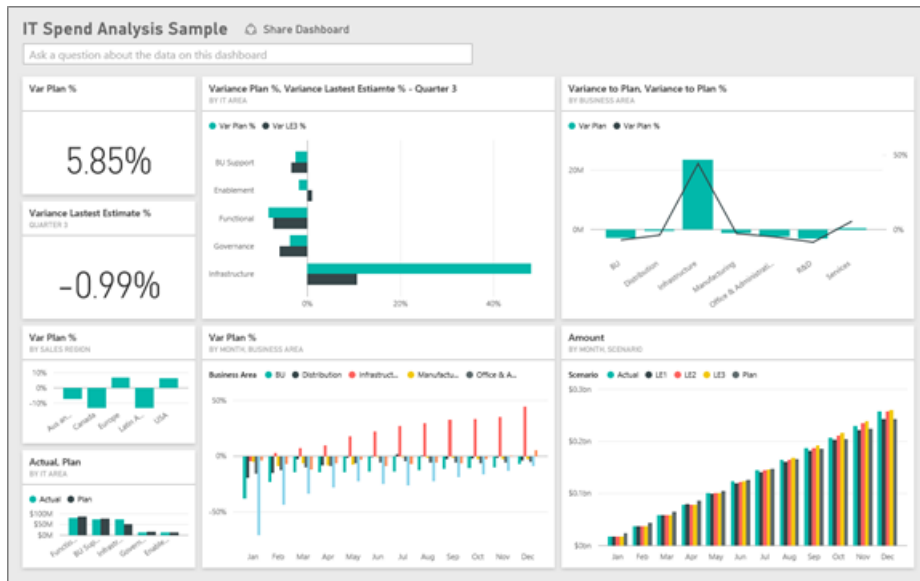
quality data. Now it's your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

IT Spend Analysis sample for Power BI: Take a tour

1/24/2018 • 5 min to read • [Edit Online](#)

Overview of the IT Spend Analysis sample

The IT Spend Analysis [content pack](#) (dashboard, report, and dataset) analyze the planned vs. actual costs of an IT department. This comparison helps us understand how well the company planned for the year and investigate areas with huge deviations from the plan. The company in this example goes through a yearly planning cycle, and then quarterly it produces a new Latest Estimate (LE) to help analyze changes in IT spend over the fiscal year.



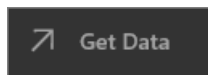
This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports and dashboards. This is real data from obvience.com that has been anonymized.

Prerequisites

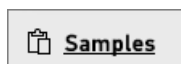
Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

Get the content pack for this sample

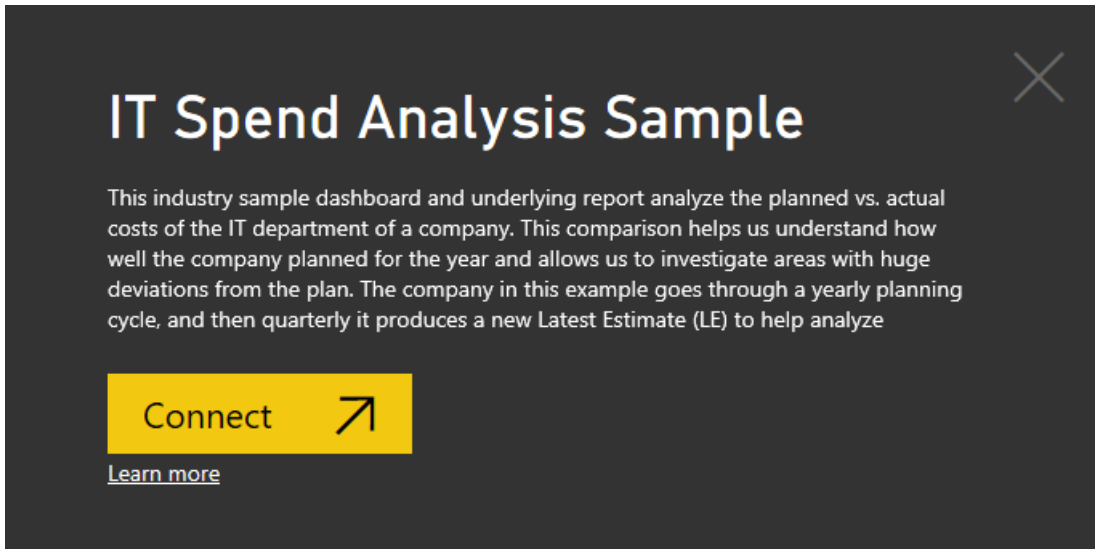
1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.



3. On the Get Data page that appears, select the **Samples** icon.



4. Select the **IT Spend Analysis Sample**, then choose **Connect**.



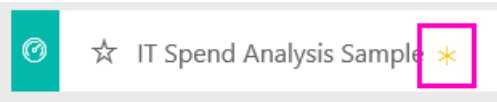
IT Spend Analysis Sample

This industry sample dashboard and underlying report analyze the planned vs. actual costs of the IT department of a company. This comparison helps us understand how well the company planned for the year and allows us to investigate areas with huge deviations from the plan. The company in this example goes through a yearly planning cycle, and then quarterly it produces a new Latest Estimate (LE) to help analyze

[Connect](#) ↗

[Learn more](#)

5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

- [IT Spend Analysis Sample](#)

Get the Excel workbook for this sample

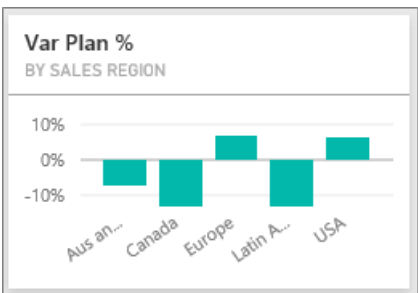
You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

The IT Spend Analysis Sample dashboard

The two numbers tiles on the dashboard, the **Var Plan %** and **Variance Latest Estimate % Quarter 3**, give us an overview of how well we are doing against plan and against the Latest Qtr estimate (LE3 = Latest Estimate Quarter 3). Overall we are about 6% off the plan. Let’s explore the cause of this variance – when, where, and which category?

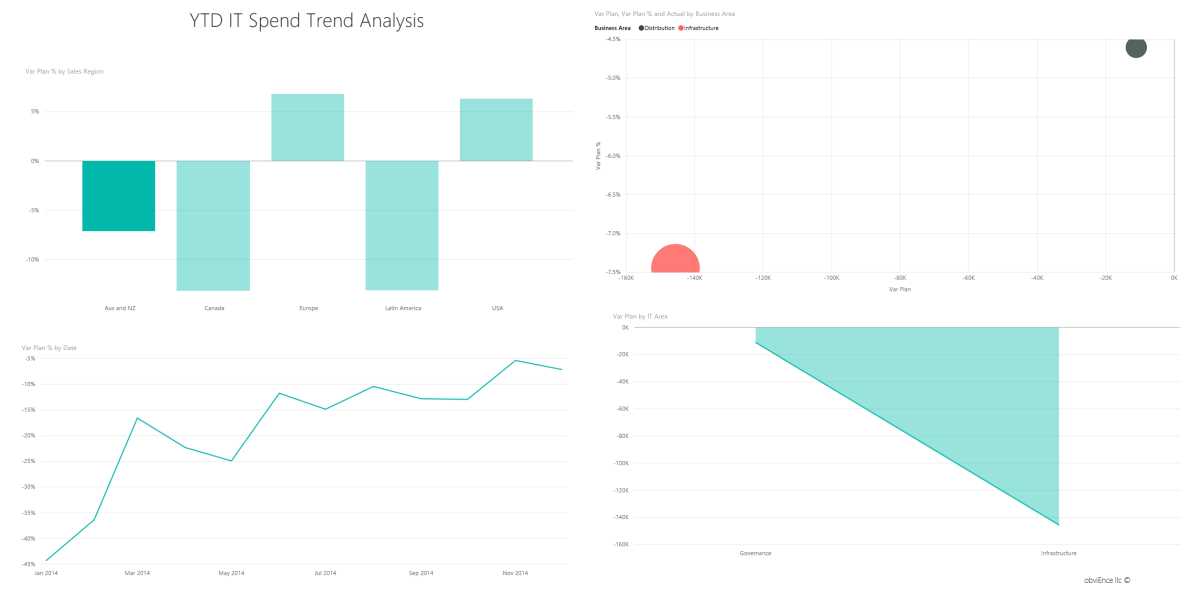
“YTD IT Spend Trend Analysis” page

Selecting the **Var Plan % by Sales Region** dashboard tile takes you to the “IT Spend Trend Analysis” page of the IT Spend Analysis Sample report. We see at a glance that we have positive variance in US and Europe and negative variance in Canada, Latin America, and Australia. US had about 6% +LE variance and Australia has about 7% -LE variance.



But just looking at this chart and drawing conclusions can be misleading. We need to look at actual dollar amounts to put things in perspective.

1. Select **Aus and NZ** in the Var Plan % by Sales Region chart, and observe Var Plan by IT Area chart.

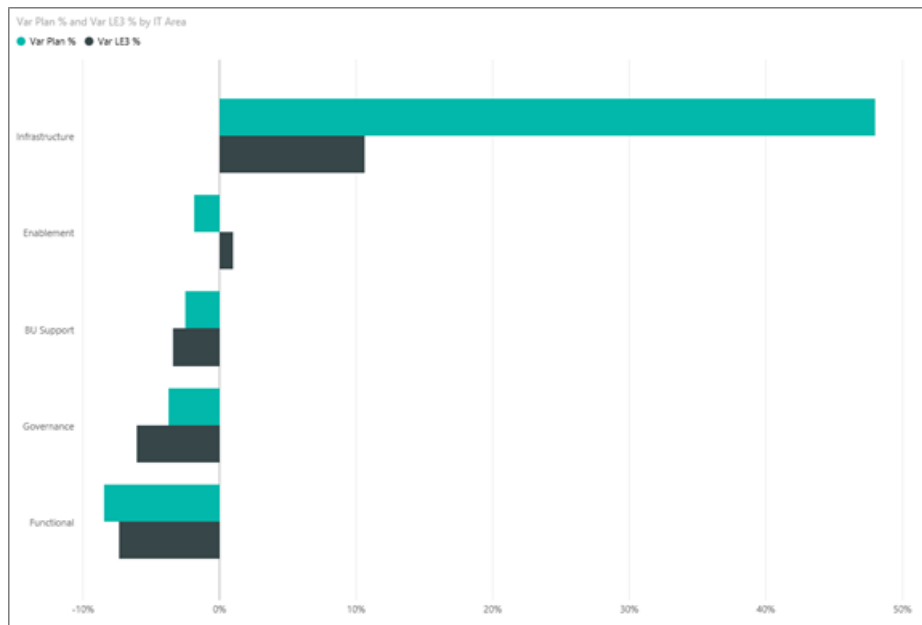


2. Now select **USA**. You get the idea — Australia is a really small part of our overall spend as compared to US.

So we narrowed it down to the USA, now what? Let's explore which category in the USA is causing the variance.

Ask questions of the data

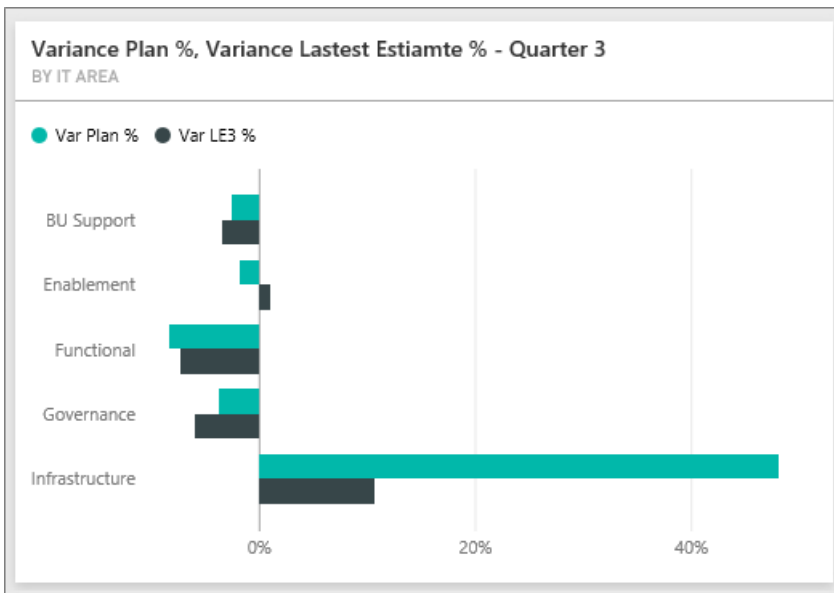
1. Select **IT Spend Analysis Sample** in the top navigation bar to return to the Dashboards.
2. In the question box, type "show IT areas, var plan % and var le3 % bar chart".



In the first IT area, **Infrastructure**, the percentage has changed drastically between the initial variance plan and the variance plan latest estimate.

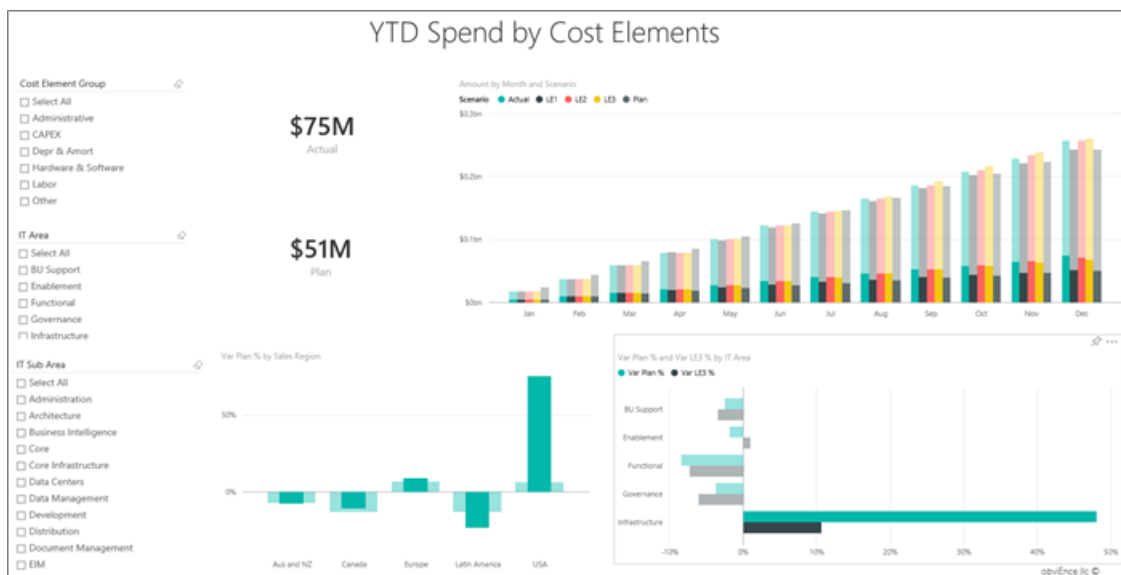
"YTD Spend by Cost Elements" page

Go back to the dashboard and look at the **Var Plan %**, **Var LE3%** dashboard tile.



Infrastructure jumps out with huge positive variance to plan.

1. Click this tile to go to the "YTD Spend by Cost Elements" page of the IT Spend Analysis Sample report.
2. Click the **Infrastructure** bar in the "Var Plan % and Var LE3 % by IT Area" chart in the lower left, and observe the variance to plan in the "Var Plan % by Sales Region" to the left.



3. Click the name of each Cost Element Group in the slicer to find the cost element with a large variance.
4. With **Other** selected, click **Infrastructure** in the IT Area and click the sub areas in the IT Sub Area slicer to find the sub area with the largest variance.

We see a huge variance in **Networking**.

Apparently the company decided to give its employees phone services as a benefit but this move was not planned for.

"Plan Variance Analysis" page

Still in the report, click the "Plan Variance Analysis" tab on the bottom of the report to go to page 3 of the report.

In the "Var Plan, and Var Plan % by Business Area" combo chart on the left, click the Infrastructure column to highlight infrastructure values in the rest of the page.

Plan Variance Analysis



Notice on the “Var plan% by Month and Business Area” chart that infrastructure started to have a positive variance around February and then it keeps increasing. Also, notice how the variance to plan value for infrastructure varies by country, compared to the value for all business areas. Use the “IT Area” and “IT Sub Areas” slicers on the right to filter the values in the rest of the page rather than highlighting them. Click the different IT Areas on the right to explore the data in another way. You can also click IT Sub Areas and see the variance at that level.

Edit the report

Click **Edit Report** in the upper-left corner and explore in Editing View.

- See how the pages are made – the fields in each chart, filters on the pages
- Add pages and charts based on the same data
- Change the visualization type for each chart
- Pin them to your dashboard

This is a safe environment to play in. You can always choose not to save your changes. But if you do save them, you can always go to Get Data for a new copy of this sample.

Next steps: Connect to your data

We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into IT spend data. Now it is your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

Sales and Marketing sample for Power BI: Take a tour

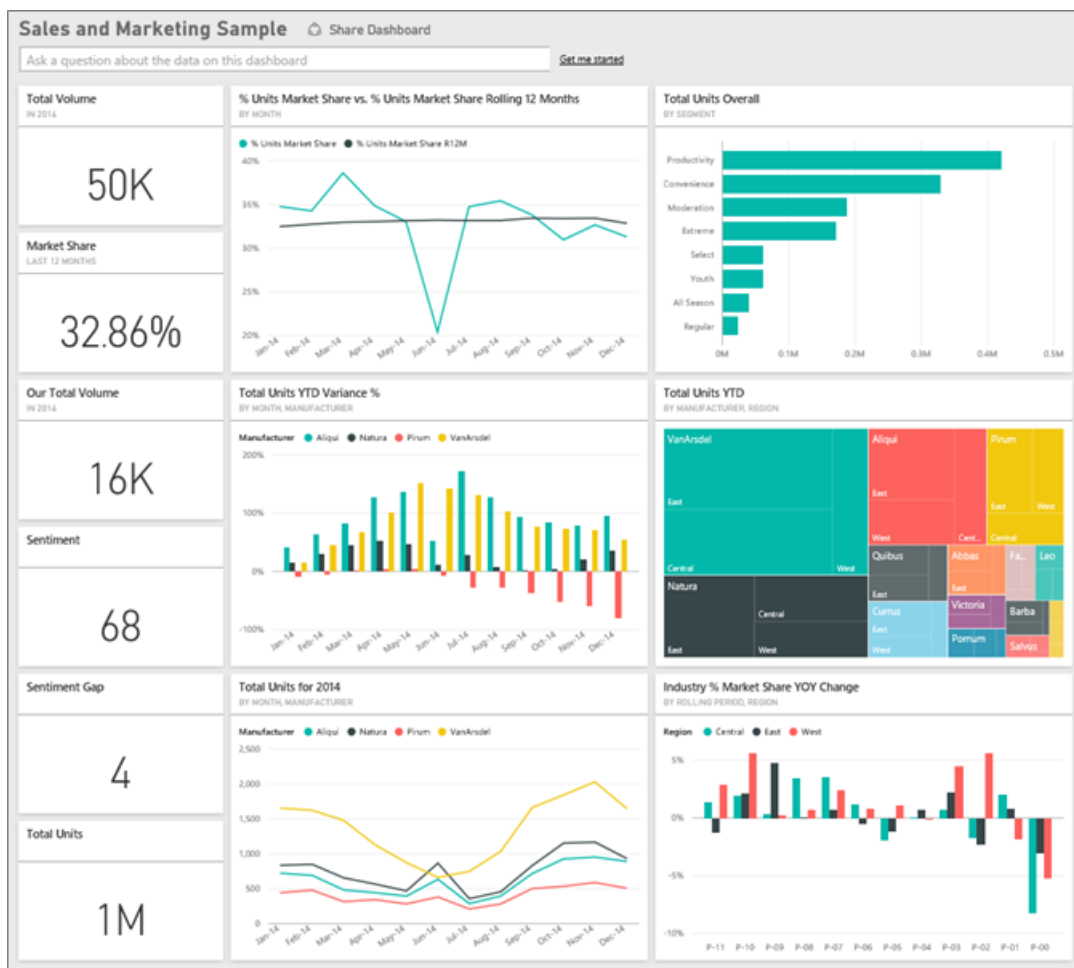
1/24/2018 • 7 min to read • [Edit Online](#)

Overview of the Sales and Marketing sample

The **Sales and Marketing Sample** contains a dashboard and report for a fictitious manufacturing company named VanArsdel Ltd. This dashboard was created by the VanArsdel Chief Marketing Officer (CMO) to keep an eye on the industry and his company's market share, product volume, sales, and sentiment.

VanArsdel has many competitors but is the market leader in its industry. The CMO wants to increase market share and discover growth opportunities. But, for some reason, VanArsdel's market share has started to decline, with significant dips in June.

This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports and dashboards. This is real data from obviEnce (www.obviEnce.com) that has been anonymized.



Prerequisites

Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

Get the content pack for this sample

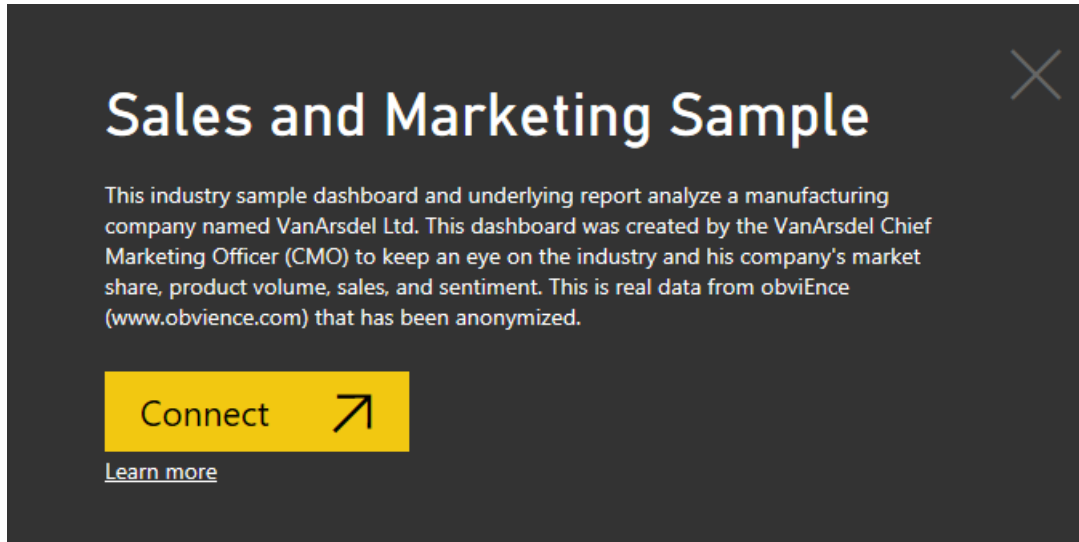
1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.

Get Data

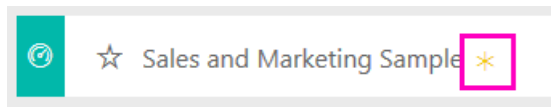
3. On the Get Data page that appears, select the **Samples** icon.

Samples

4. Select the **Sales and Marketing Sample**, then choose **Connect**.



5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

- [Sales and Marketing Sample](#)

Get the Excel workbook for this sample

You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

What is our dashboard telling us?

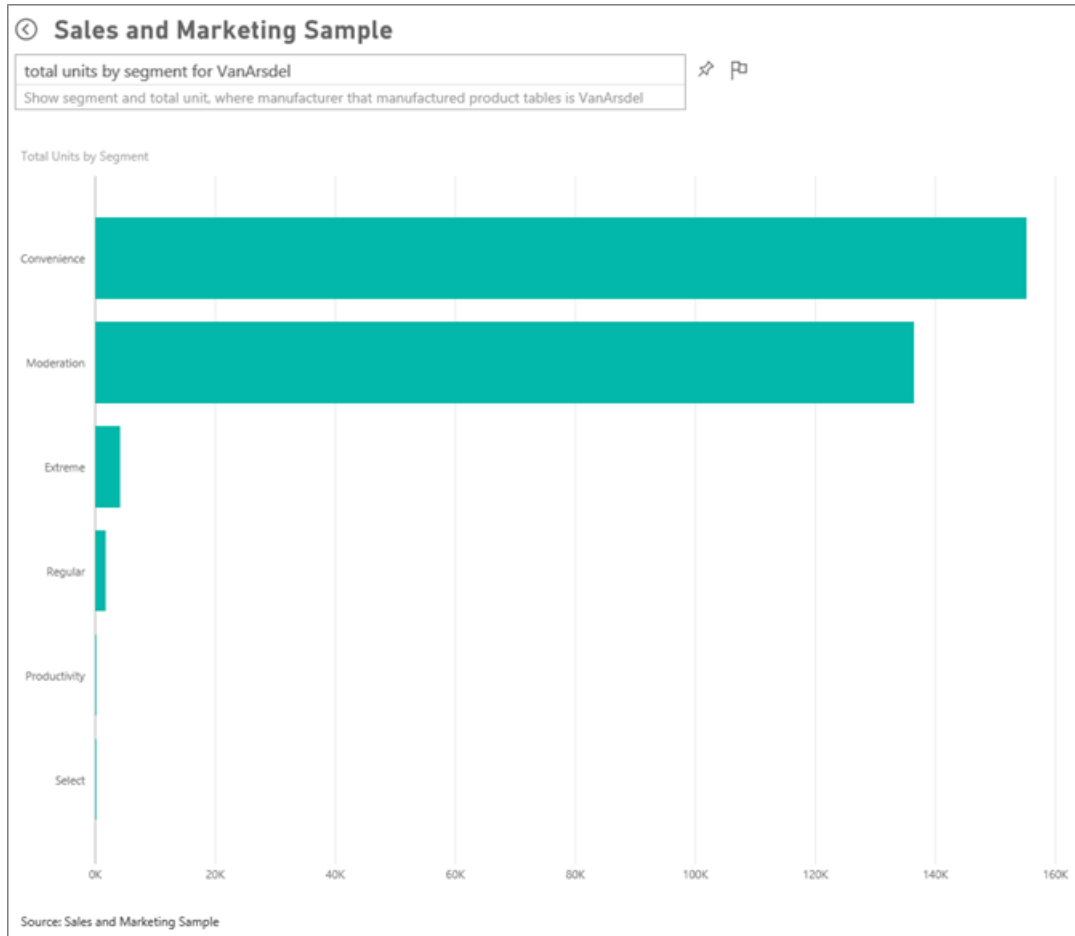
Let's start our tour at the dashboard and look at the tiles the CMO has chosen to pin. We see information about our market share, sales, and sentiment. And we see that data broken down by region, time, and competition.

- The number tiles down the left column show industry sales volume this past year (50K), market share (32.86%), sales volume (16K), sentiment score (68), sentiment gap (4), and total units sold (1M).
- The top line chart shows how our market share fluctuates over time. Our market share really drops in June. Also, our R12M (Rolling 12 Months) share which was increasing for a while, is starting to stall.
- Our biggest competitor is Aliqui (evident in the middle column chart tile.)
- Most of our business is in the East and Central regions.
- The line chart at the bottom shows that our dip in June is not seasonal – none of our competitors show the same trend.
- The two "Total Units" tiles show units sold, by segment and by region/manufacturer. The largest market segment for our industry are **Productivity** and **Convenience**.

Use Q&A to dig a little deeper

Which segments drive our sales? Does it match the industry trend?

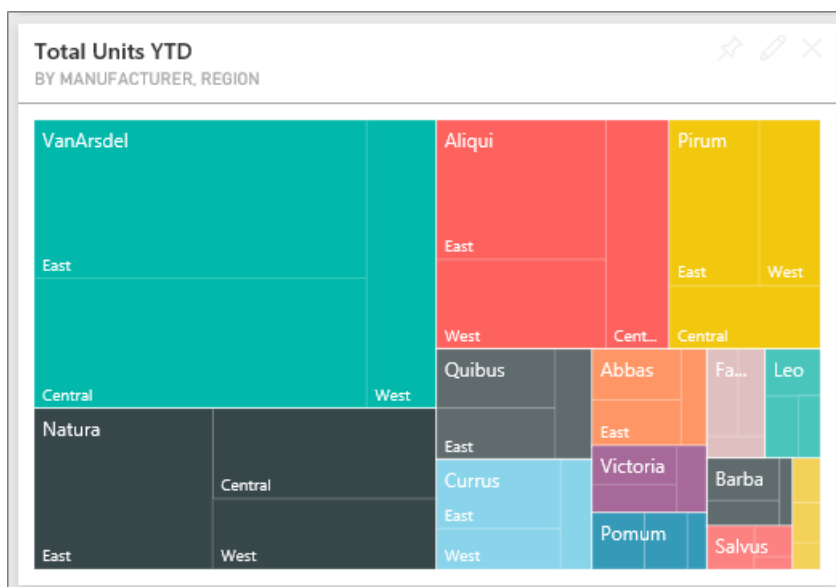
1. Select the "Total Units Overall by Segment" tile which will open Q&A.
2. Type **for VanArsdel** at the end of the existing query. Q&A interprets the question and displays an updated chart with the answer. Our product volume comes from Convenience and Moderation.



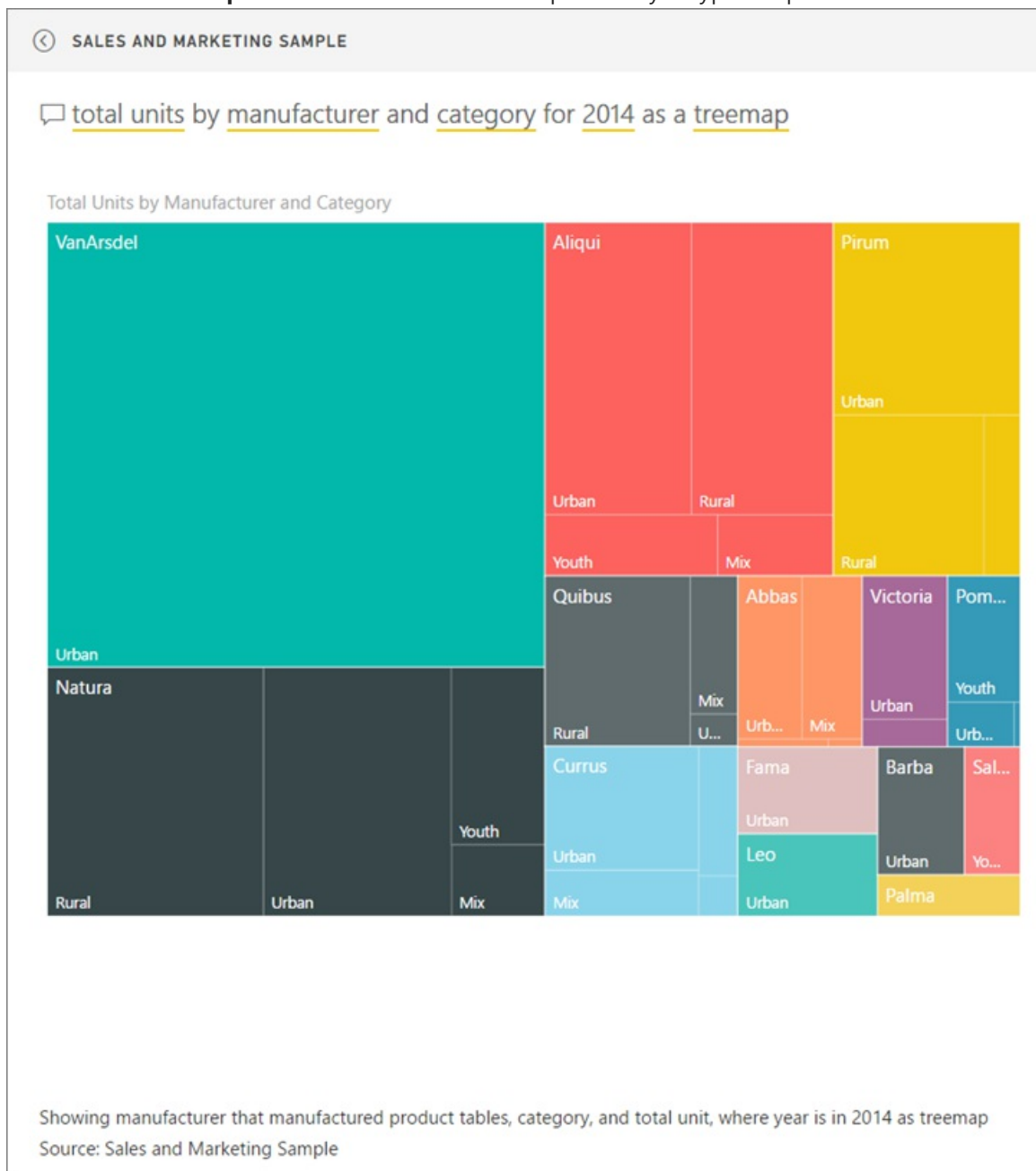
3. Our share in the **Moderation** and **Convenience** categories is very high; these are the segments where we compete.
4. Navigate back to the dashboard by selecting the dashboard name in the top navbar (breadcrumbs).

What does total unit market share look like for category (versus region)?

1. Notice the "Total Units YTD by Manufacturer, Region" tile. I wonder how the total unit market share looks by category?



- In the question box at the top of the dashboard, type the question **total units by manufacturer and category for 2014 as a treemap**. Notice how the visualization updates as you type the question.



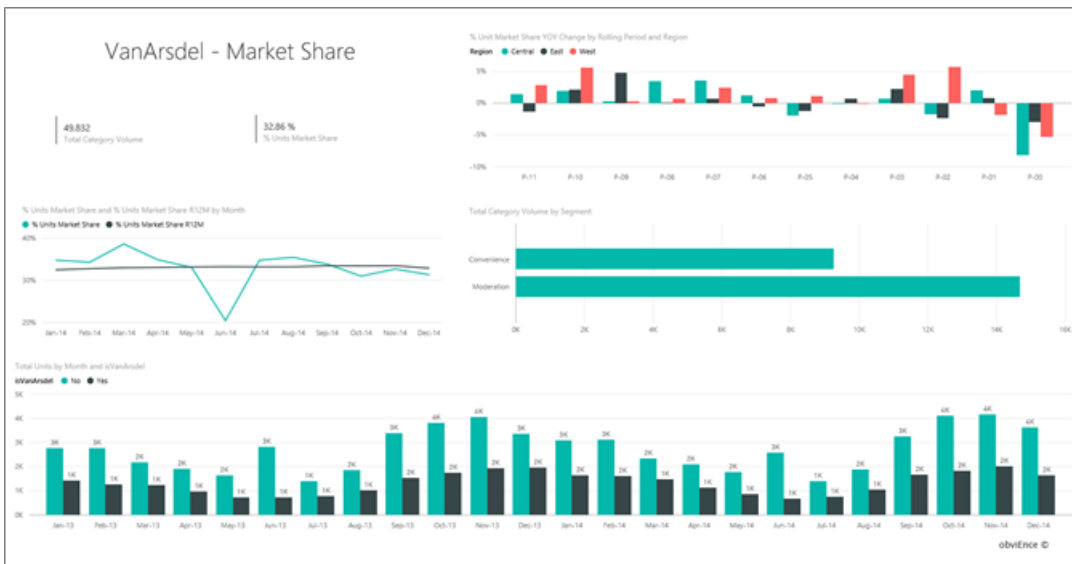
- To compare the findings, pin the chart to your dashboard. Very interesting; in 2014 VanArsdel only sold products that fall into the **Urban** category.
- Navigate back to the dashboard.

Dashboards are also an entry point into reports. If a tile was created from an underlying report, clicking that tile opens the report.

On our dashboard, the R12M (Rolling 12 Months) line shows that our market share is no longer increasing over time, it's even declining a bit. And why do we have a big market share dip in June? To investigate further, click this visualization to open the underlying report.

Our report has 4 pages

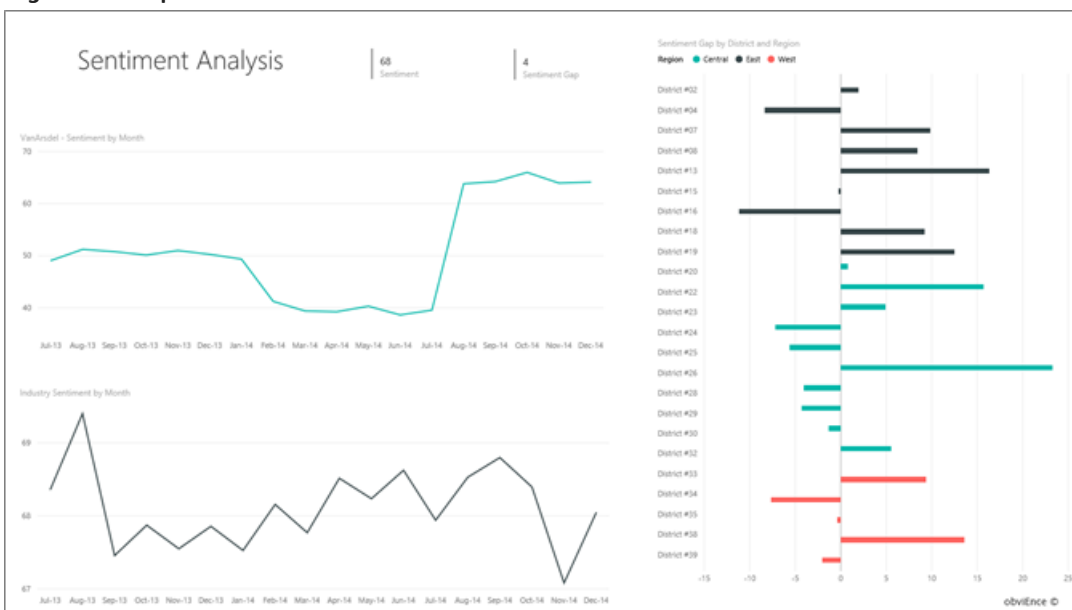
Page 1 of our report focuses on VanArsdel's market share.



1. Look at the "Total Units by Month and isVanArsdel" column chart at the bottom. The black column represents VanArsdel (our products) and green is our competition. The drop in June 2014 that VanArsdel experienced is not experienced by the competition.
2. The "Total Category Volume by Segment" bar chart in the middle on the right, is filtered to show VanArsdel's top 2 segments. Take a look at how this filter was created:
 - a. Expand the Filters pane on the right.
 - b. Click to select the visualization.
 - c. Under Visual Level Filters, notice that **Segment** is filtered to include only **Convenience** and **Moderation**.
 - d. Modify the filter by selecting Segment to expand that section and then checking **Productivity** to add that segment as well.
3. In "Total Units by Month and isVanArsdel", select the black "Yes" in the legend to cross-filter the page by VanArsdel. Notice that we don't compete in the Productivity segment.
4. Select the black "Yes" again to remove the filter.
5. Take a look at the line chart. It shows our monthly market share and 12 month rolling market shares. Rolling 12 months data help in smoothing out monthly fluctuations and shows the long term trends. Select Convenience and then Moderation in the bar chart to see how much fluctuation in market share there is for each segment. The Moderation segment shows much more fluctuation in market share than the Convenience segment.

We're still looking to find out why our market share dipped so low in June. Let's check Sentiment.

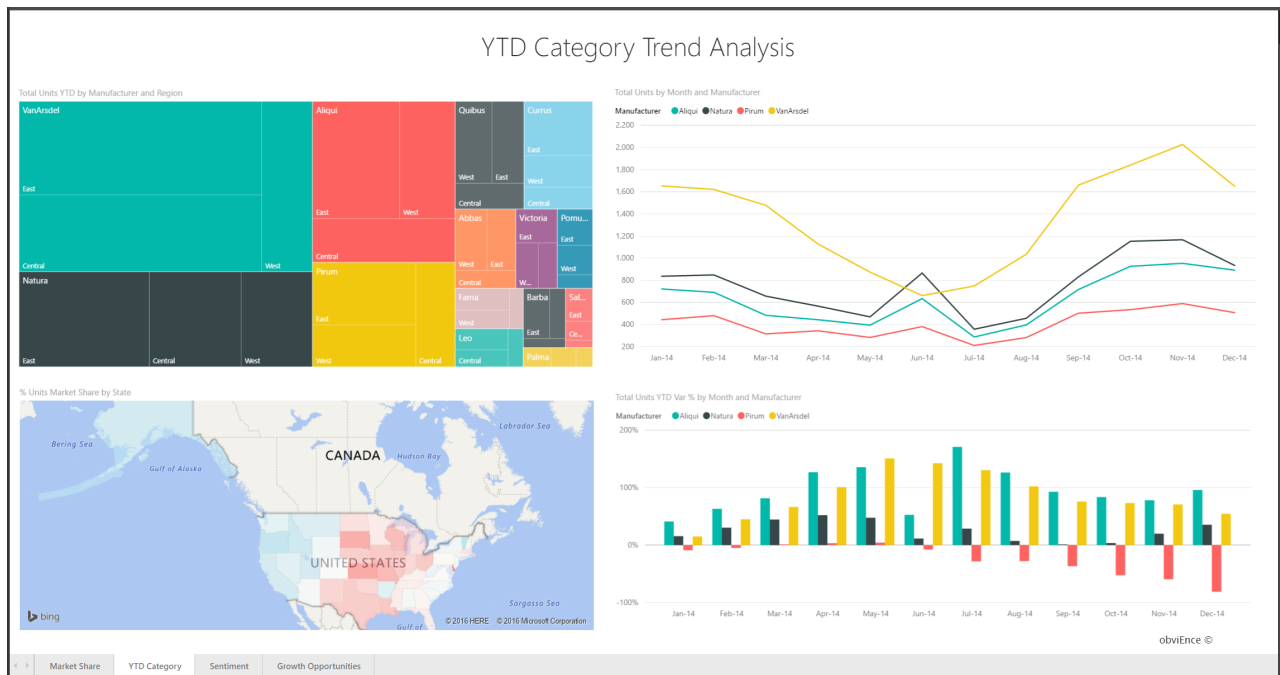
Page 3 of our report focuses on Sentiment.



Tweets, Facebook, blogs, articles, etc. contribute to sentiment which is shown in the two line charts. The sentiment chart in the top left shows that sentiment for our products were pretty much neutral up until February. Then a big drop started in February and bottomed out in June. What happened to cause this drop in sentiment? We need to look at external sources. In February, several articles and blog posts rated VanArsdel's customer service the worst in the industry. This bad press had a direct correlation to customer sentiment and sales. VanArsdel worked hard to improve customer service and customers and the industry took note. In July positive sentiment started to rise and then reached an all-time high in the 60s. This uptick in sentiment can be seen reflected in "Total Units by Month" on pages 1 and 3. Perhaps this partially explains our market share dips for June?

Sentiment gap would be another area to explore: which districts have the highest sentiment gap, how can management capitalize on this, and discover ways to replicate it in other districts.

Page 2 of our report focuses on YTD Category Trend



- Of all the companies in this category, VanArsdel is the largest and our biggest competitors are Natura, Aliqui, and Pirium. We'll keep our eyes on them.
- Aliqui is growing, but product volume compared to us is still low.
- The treemap shows VanArsdel in green. In the East, customers prefer our competition, in Central we're doing OK, and our share in the East is our lowest.
- Geography has an impact on units sold. East is the dominant region for most manufacturers and VanArsdel has a strong presence in the Central region as well.
- On the chart "Total Units YTD Var % by Month and Manufacturer" in the bottom right- we have positive variance and that is a good sign, we are doing better than last year but so is another competitor, Aliqui.

Page 4 of our report focuses on competitive product analysis.



- The bottom left chart shows all the category segments except for VanArsdel's two strongest segments. Filtering by category by clicking on the bars helps identify potential expansion areas for VanArsdel. The **Extreme** and **Productivity** segments are growing faster than others.
- But we don't compete in these segments. If we want to move into these areas, we can use our data to see which segments are popular in which regions. We can further investigate questions like which region is growing faster and who would be our biggest competitor in that segment.
- Remember our market share dip in June? June is a huge month for the Productivity segment – a segment we don't compete in at all. This could help explain our market share dip in June.

By filtering the visualizations by VanArsdel, by segment, by month, and by region, we can discover growth opportunities for VanArsdel.

This is a safe environment to play in. You can always choose not to save your changes. But if you do save them, you can always go to **Get Data** for a new copy of this sample.

Next steps: Connect to your data

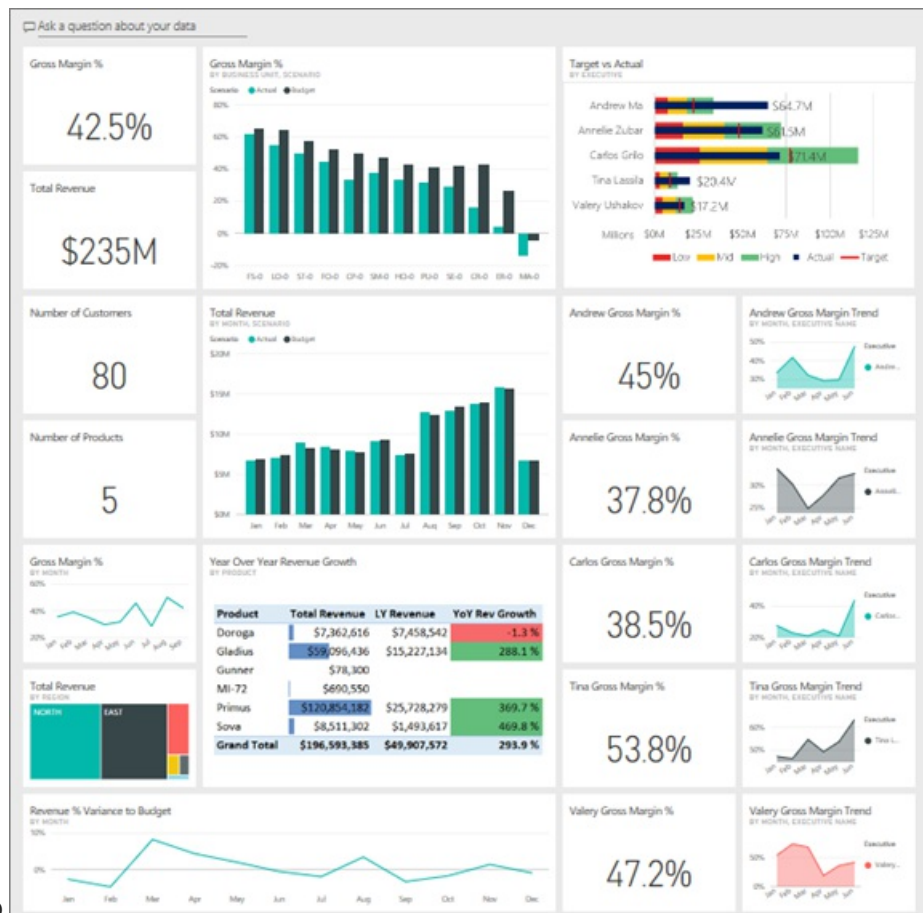
We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into sales and marketing data. Now it's your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

Customer Profitability sample for Power BI: Take a tour

1/26/2018 • 9 min to read • [Edit Online](#)

Overview of the Customer Profitability sample

The "Customer Profitability Sample" content pack contains a dashboard, report, and dataset for a company that manufactures marketing materials. This dashboard was created by a CFO to see key metrics about her 5 business unit managers (aka executives), products, customers, and gross margins (GM). At a glance she can see what factors are impacting profitability.



<<<<<<< HEAD

This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports and dashboards. This is real data from obviOnce (www.obviOnce.com) that has been anonymized. The data is available in several formats: content pack/app, Excel workbook, or .pbix Power BI Desktop file. See [Sample datasets](#).

Prerequisites

Want to follow along? This tutorial uses Power BI service and the "Customer Profitability" sample content pack. Because the report experiences are so similar, you can also follow along using Power BI Desktop and the sample PBIX file. Instructions for connecting to the content pack and the PBIX file are below.

Get the content pack for this sample

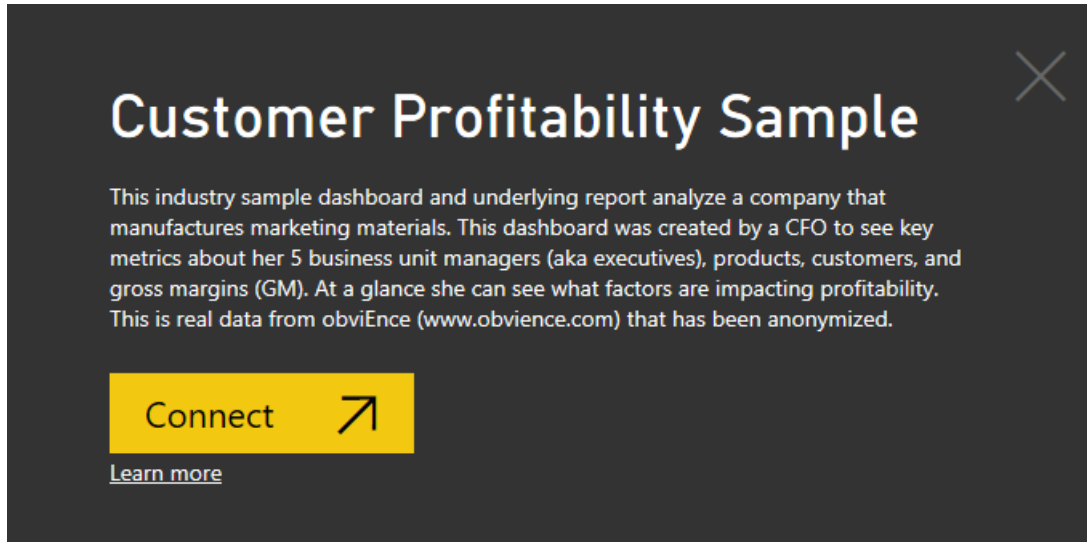
1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.

Get Data

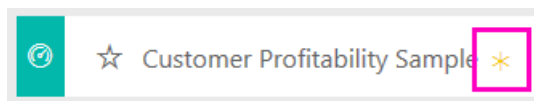
3. On the Get Data page that appears, select the **Samples** icon.

Samples

4. Select the **Customer Profitability Sample**, then choose **Connect**.



5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk. Use the samples to take Power BI for a test run.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

[Customer Profitability Sample](#)

Get the Excel workbook for this sample

If you want to dig into the datasource for this sample, it's also available as an [\(Excel workbook\)](#). The workbook contains Power View sheets that you can view and modify. To see the raw data, select **Power Pivot > Manage**.

This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports and dashboards. This is real data from obviEnce (www.obvienc.com) that has been anonymized. The data is available in several formats: content pack/app, Excel workbook, or .pbix Power BI Desktop file. See [Sample datasets](#).

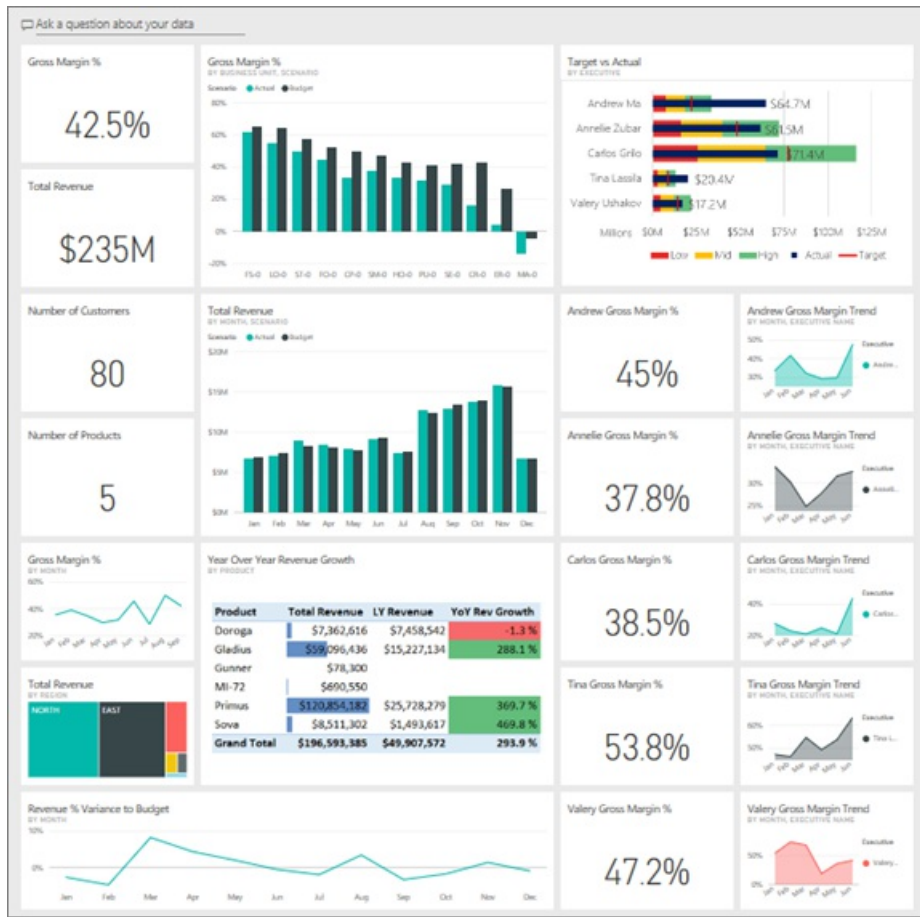
Prerequisites

Want to follow along? In the [Power BI service](#), go to **Get Data > Samples > Customer Profitability > Connect** to get your own copy of the sample.

def2c8e086d65b6a3fb92247175730746226ae3e

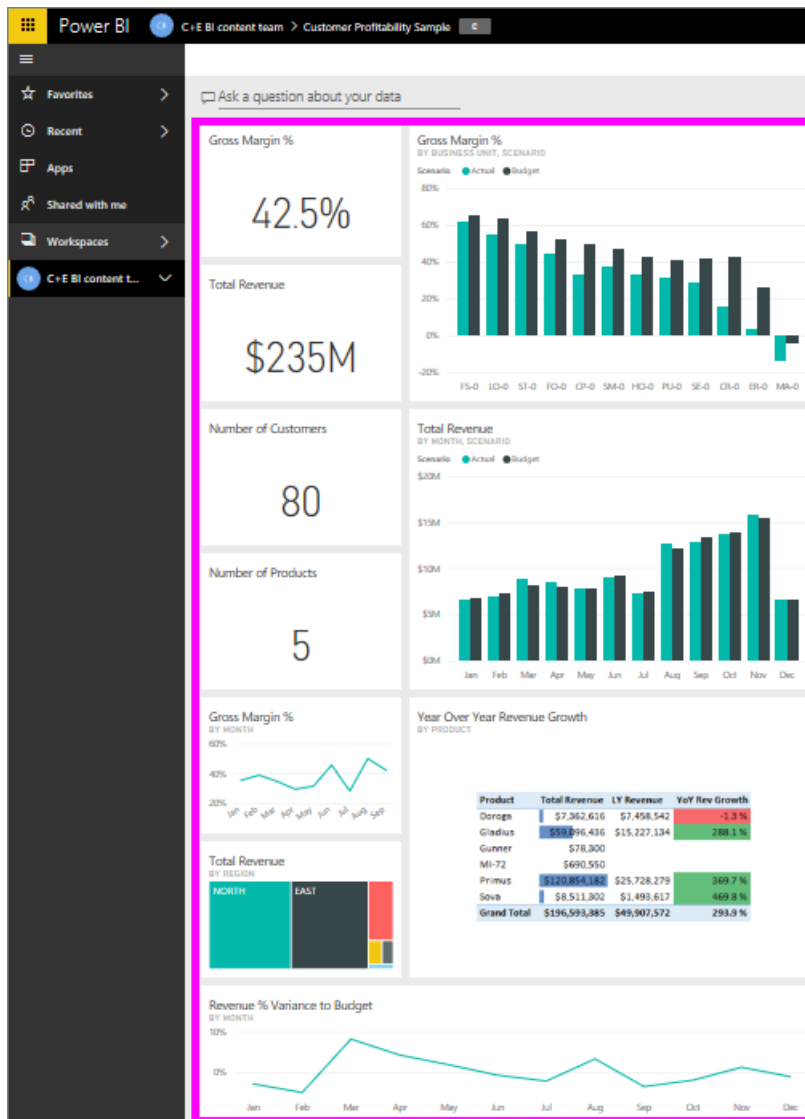
What is our dashboard telling us?

Under **My Workspace**, find the dashboard for the Customer Profitability sample:



Company-wide dashboard tiles

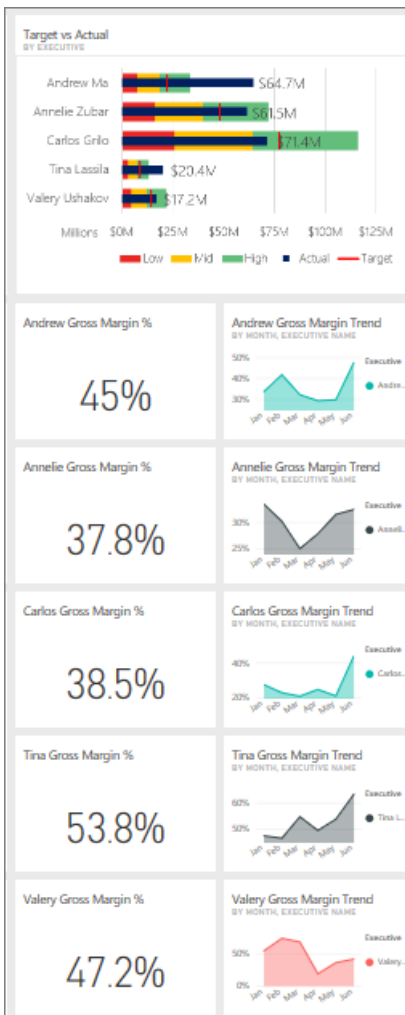
1. Open the dashboard in Power BI service. The dashboard tiles give our CFO a view of the high-level company metrics important to her. When she sees something interesting, she can select a tile to dig into the data.
2. Review the tiles on the left side of the dashboard.



- Our company gross margin is 42.5%.
- We have 80 customers.
- We sell 5 different products.
- We had our lowest revenue variance% to budget in February, followed by our highest in March.
- Most of our revenue comes from the East and North regions. Gross margin has never exceeded budget, with ER-0 and MA-0 requiring some further investigation.
- Total revenue for the year is close to budget.

Manager-specific dashboard tiles

The tiles on the right side of the dashboard provide a team scorecard. The CFO needs to keep track of her managers and these tiles give her a high level overview of profit – using GM%. If the GM% trend is unexpected for any manager, then she can investigate further.



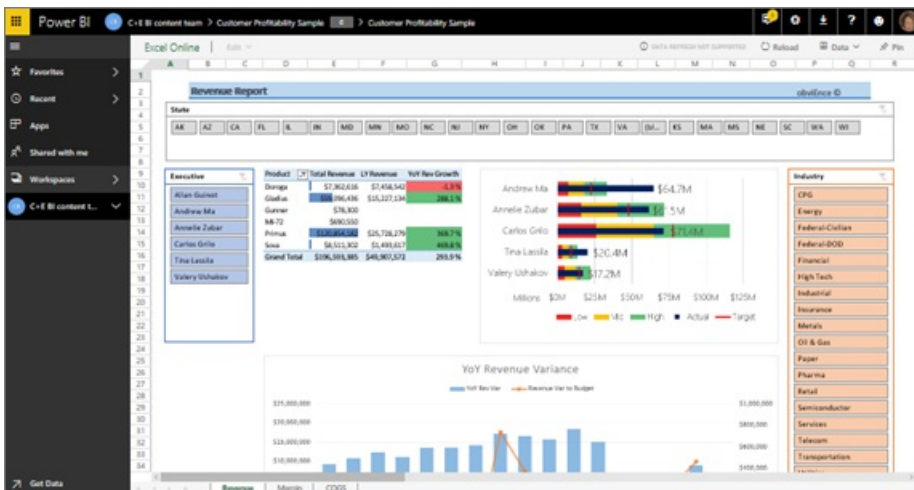
- All executives, except Carlos, have already exceeded their target sales. But Carlos' actual sales are the highest.
- Annelie's GM% is the lowest, but we see a steady increase since March.
- Valery, on the other hand, has seen her GM% drop significantly.
- And Andrew had a volatile year.

Explore the dashboard's underlying data

This dashboard has tiles that link to a report and to an Excel workbook.

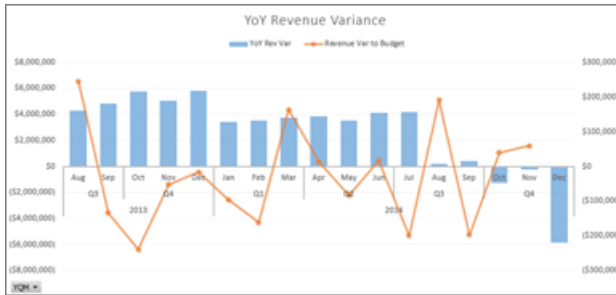
Open the Excel Online data source


Two tiles on this dashboard, "Target vs Actual" and "Year Over Year Revenue Growth" were pinned from an Excel workbook. So when you select either of these tiles, Power BI opens the data source -- in this case, Excel Online.



1. Select either of the tiles that were pinned from Excel. Excel Online opens within Power BI service.
2. Notice that the workbook has 3 tabs's worth of data. Open "Revenue".
3. Let's look into why Carlos hasn't hit his target yet.
 - a. From the "Executive" slider, select **Carlos Grilo**.
 - b. The first PivotTable tells us that Carlos' revenue for his top Product, Primus, is down 152% from last year. And the YoY chart shows that for most months he's below budget.

Product	Total Revenue	LY Revenue	YoY Rev Growth
Gladius	\$3,336,146		
Primus	\$64,781,560	\$25,718,021	151.9 %
Sova	\$455,668	\$85,228	434.6 %
Grand Total	\$68,573,374	\$25,803,249	165.8 %

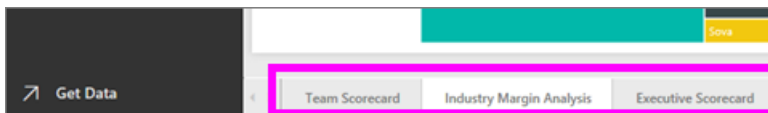


4. Continue exploring, and if you find something interesting, select **Pin**  from the upper-right corner to [pin it to a dashboard](#).
5. Use your browser's back arrow to return to the dashboard.

Open the underlying Power BI report

The majority of the tiles on the Customer Profitability sample dashboard were pinned from the underlying Customer Profitability sample report.

1. Select one of these tiles to open the report in Reading view.
2. The report has 3 pages. Each tab at the bottom of the report represents a page.



- "Team Scorecard" focuses on the performance of the 5 managers and their "books of business."
- "Industry Margin Analysis" provides a way to analyze our profitability compared to what's going on in our entire industry.
- "Executive Scorecard" provides a view of each of our managers formatted for viewing in Cortana.

Team Scorecard page

Team Scorecard

Revenue Status (Total Year)

83

Number of Customers

7

Number of Products

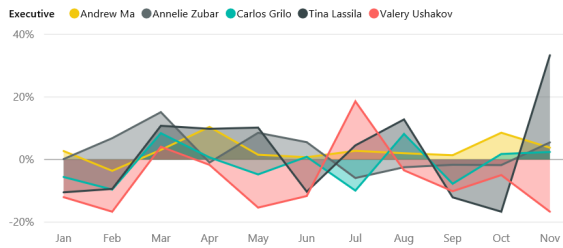
42.5%

Gross Margin %

Executive

- Andrew Ma
- Annelie Zubar
- Carlos Grilo
- Tina Lassila
- Valery Ushakov

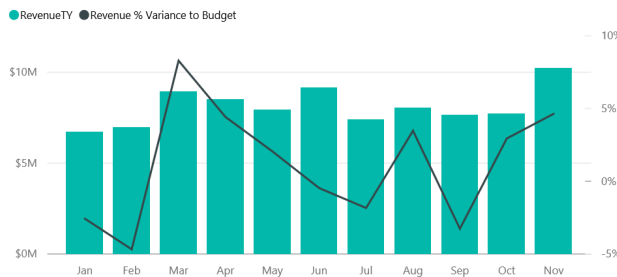
Revenue % Variance to Budget by Month and Executive



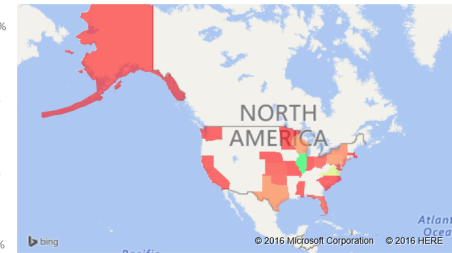
Total Revenue by Region



RevenueTY and Revenue % Variance to Budget by Month



RevenueTY by State



obviEnce ©

Let's look at two of the team members in detail and see what insights can be gained. In the slicer on the left, select Andrew's name to filter the report page to display only data about Andrew.

- For a quick KPI, look at Andrew's **Revenue Status** - he is green. He's performing well.
- The "Revenue Var % to Budget by Month" Area chart shows that except for a dip in February, Andrew is doing pretty well overall. His dominant region is East and he handles 49 customers and 5 (out of 7) products. His GM% isn't the highest or lowest.
- The "RevenueTY and Revenue Var % to Budget by Month" shows a steady even profit story. But when you filter by clicking on the square for **Central** in the region treemap, you discover that Andrew has revenue only in March and only in Indiana. Is this intentional or is this something that needs looking into?

Now on to Valery. In the slicer, select Valery's name to filter the report page to display only data about her.

Team Scorecard

Revenue Status (Total Year)

9

Number of Customers

2

Number of Products

47.2%

Gross Margin %

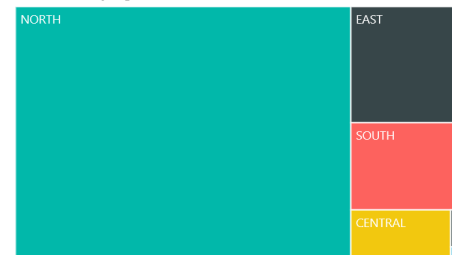
Executive

- Andrew Ma
- Annelie Zubar
- Carlos Grilo
- Tina Lassila
- Valery Ushakov

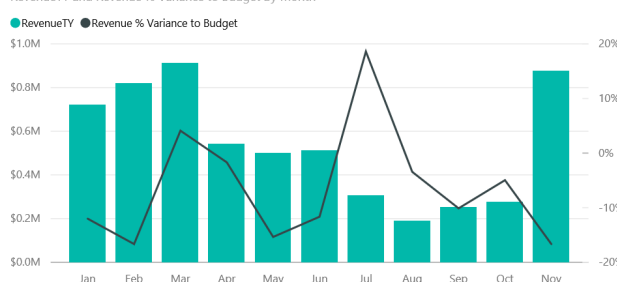
Revenue % Variance to Budget by Month and Executive



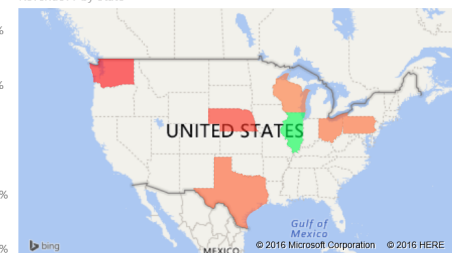
Total Revenue by Region



RevenueTY and Revenue % Variance to Budget by Month



RevenueTY by State



obviEnce ©

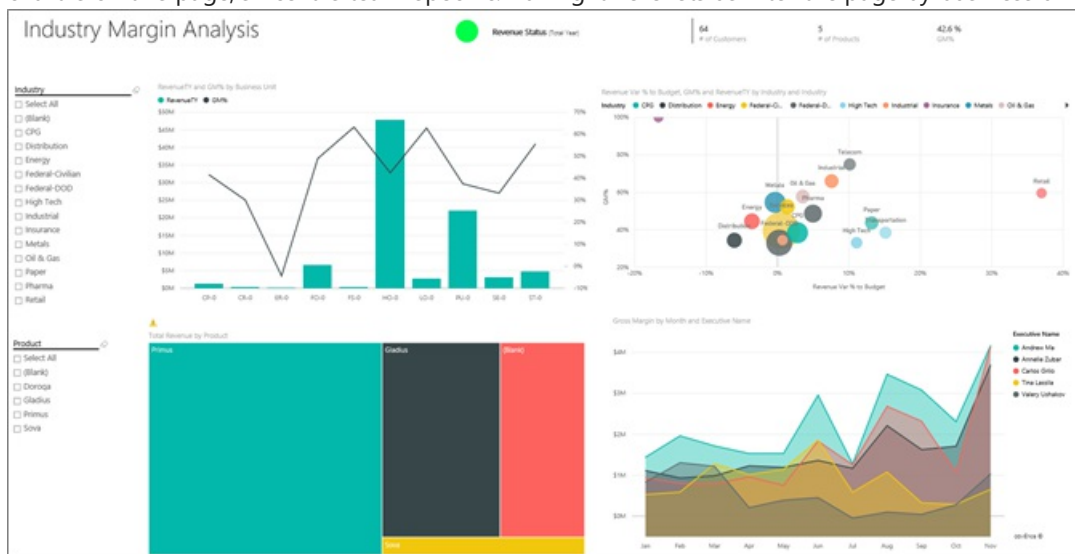
- Notice the red KPI for **RevenueTY Status**. This definitely needs further investigation.
- Her revenue variance also paints a worrying picture – she is not meeting her revenue margins.

- Valery has only 9 customers, handles only 2 products and works almost-exclusively with customers in the north. This specialization could explain wide fluctuations in her metrics.
- Selecting the **North** square in the treemap shows that Valery's gross margin in the North is consistent with her overall margin.
- Selecting the other **Region** squares tells an interesting story: her GM% ranges from 23% to 79% and her revenue numbers, in all regions except North, are extremely seasonal.

Continue digging to find out why Valery's area is not performing well. Look at regions, the other business units, and the next page in the report – "Industry Margin Analysis."

Industry Margin Analysis

This report page provides a different slice of the data. It looks at gross margin for the entire industry, broken down by segment. The CFO uses this page to compare company and business unit metrics to industry metrics to help her explain trends and profitability. You might wonder why the "Gross Margin by Month and Executive Name" area chart is on this page, since it is team-specific. Having it here lets us filter the page by business unit manager.



How does profitability vary by industry? How do the products and customers break down by industry? Select one or more industries from the top left. (Start from the CPG industry) To clear the filter, select the eraser icon.

On the bubble chart, the CFO looks for the largest bubbles since these are the ones that have the biggest impact on revenue. Filtering the page by manager by clicking on their names in the area chart makes it easy to see each manager's impact by industry segment.

- Andrew's area of influence spans many different industry segments with widely varying GM% (most on the positive side) and Var%.
- Annelie's chart is similar, except that she concentrates on only a handful of industry segments with a focus on the Federal segment and a focus on Gladius product.
- Carlos has a clear focus on the Services segment, with good profit. He's greatly improved variance % for the High Tech segment and a new segment for him, Industrial, performed exceptionally well compared to budget.
- Tina works with a handful of segments and has the highest GM%, but the mostly small size of her bubbles shows that her impact on the company's bottom line is minimal.
- Valery, who is responsible for only one product, works in only 5 industry segments. Her industry influence is seasonal, but always produces a large bubble, indicating a significant impact on the company's bottom line. Does industry explain her negative performance?

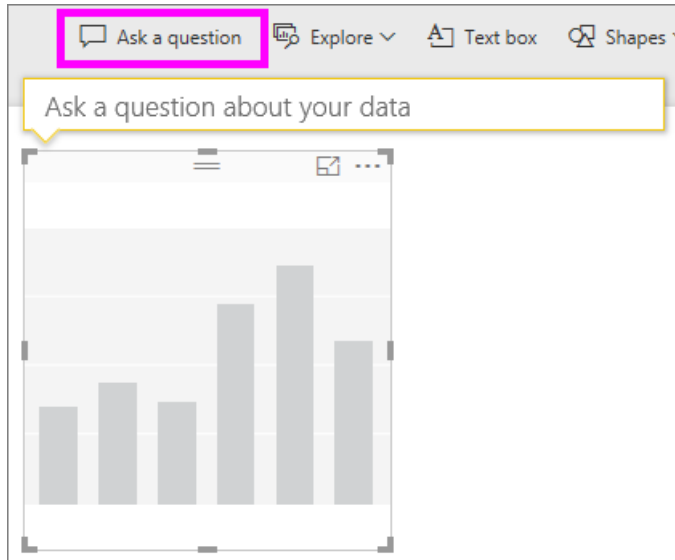
Executive Scorecard

This page is formatted as an Answer Card for Cortana. To learn more, see [create Answer Cards for Cortana](#)

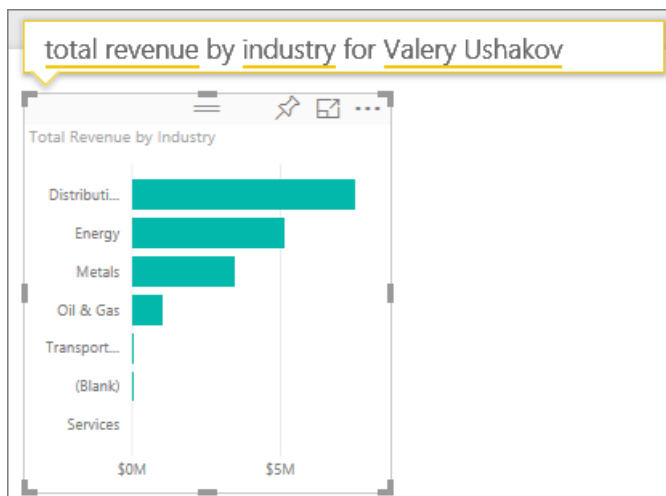
Dig into the data by asking questions with Q&A

For our analysis, it would be helpful to determine which industry generates the most revenue for Valery. Let's use Q&A.

1. Open the report in Editing view by selecting **Edit report**. Editing view is only available if you "own" the report; this is sometimes referred to as **creator** mode. If, instead, this report had been shared with you, you wouldn't be able to open it in Editing view.
2. From the top menubar, select **Ask a question** to open the Q&A question box.



3. Type **total revenue by industry for Valery**. Notice how the visualization updates as you type the question.

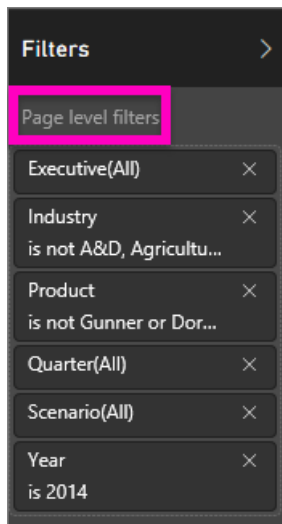


Distribution is the biggest revenue area for Valery.

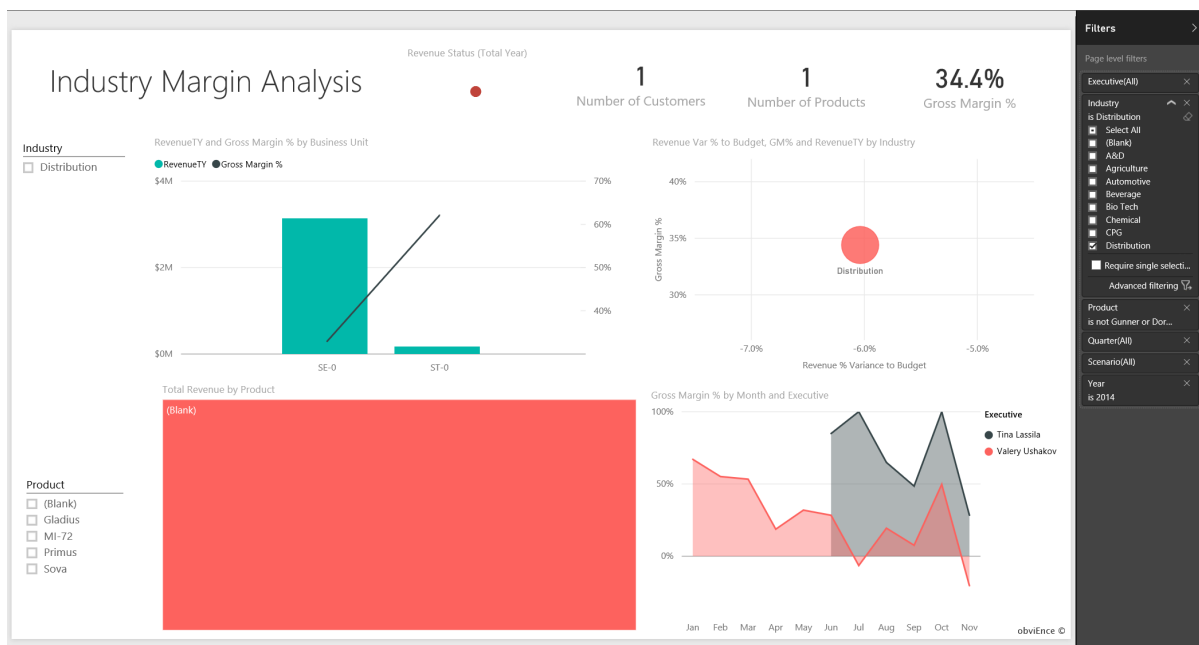
Dig deeper by adding filters

Let's take a look at the *Distribution* industry.

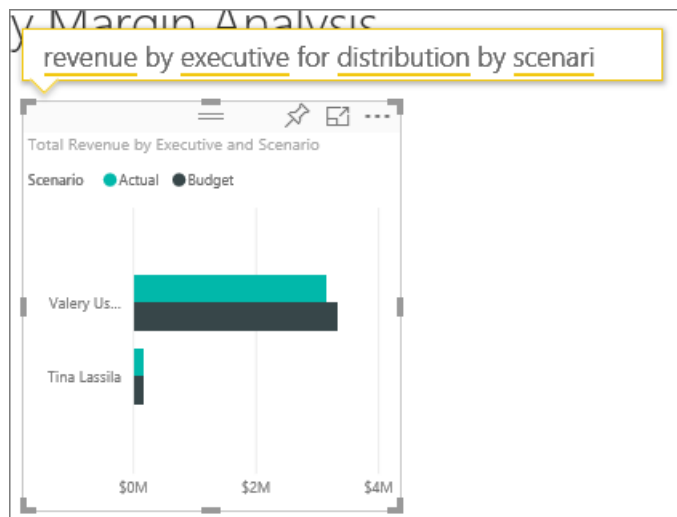
1. Open the "Industry Margin Analysis" report page.
2. Without selecting any visualizations on the report page, expand the filter pane on the right (if it isn't already expanded). The Filters pane should display only Page level filters.



3. Locate the filter for **Industry** and select the arrow to expand the list. Let's add a page filter for the Distribution industry. First, clear all selections by clearing the **Select All** checkbox. Then select only **Distribution**.



4. The "Gross margin by Month and Executive Name" area chart tells us that only Valery and Tina have customers in this industry and Valery only worked with this industry from June to November.
5. Select **Tina** and then **Valery** in the "Gross Margin by Month and Executive" area chart legend. Notice Tina's portion of "Total Revenue by Product" is really small compared to Valery.
6. To see actual revenue, use Q&A to ask **total revenue by executive for distribution by scenario**.



We can similarly explore other industries and even add customers to our visuals to understand causes for Valery's performance.

This is a safe environment to play in. You can always choose not to save your changes. But if you do save them, you can always go to **Get Data** for a new copy of this sample.

You can also [download just the dataset \(Excel workbook\) for this sample](#).

Next steps: Connect to your data

We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into customer data. Now it is your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

[Back to Samples in Power BI](#)

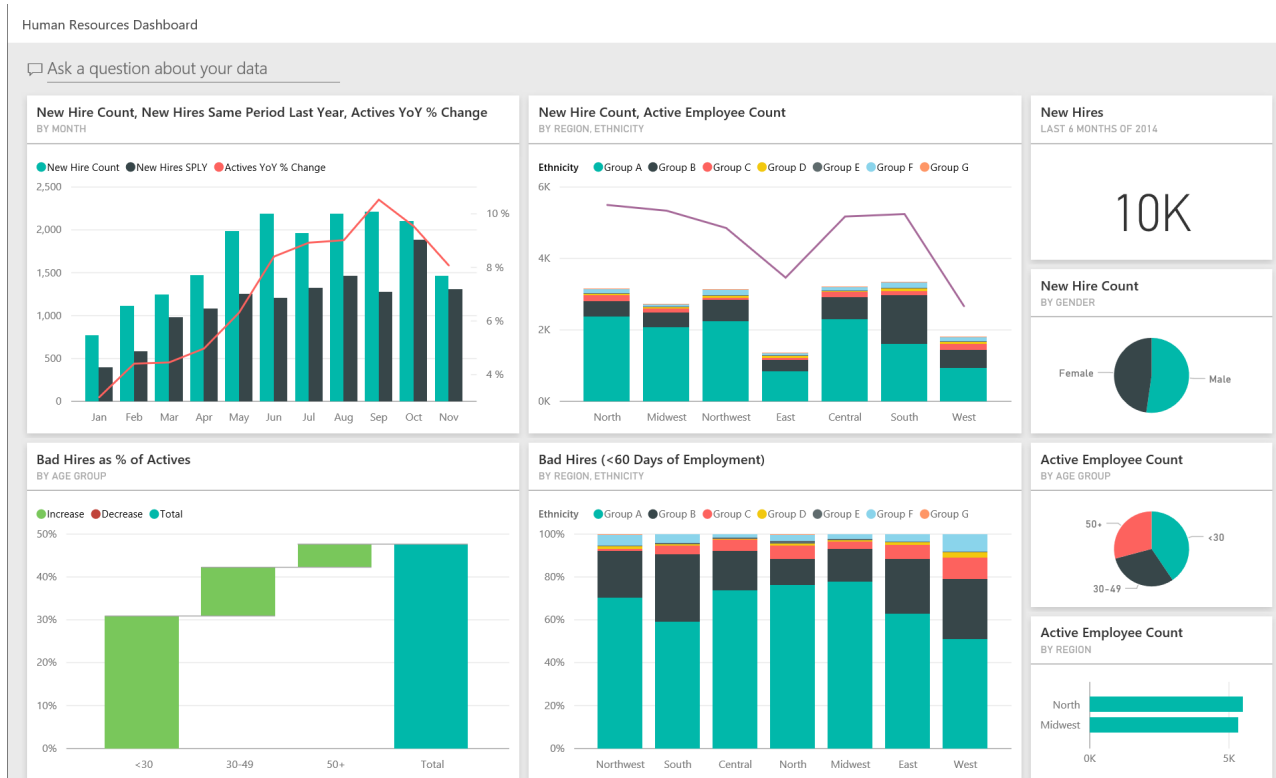
Human Resources sample for Power BI: Take a tour

1/24/2018 • 6 min to read • [Edit Online](#)

Overview of the Human Resources sample

The HR department has the same reporting model across different companies, even when they differ by industry or size. This sample looks at new hires, active employees, and employees who left and tries to uncover any trends in the hiring strategy. Our main objectives are to understand:

- Who we hire
- Biases in our hiring strategy
- Trends in voluntary separations



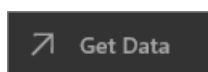
This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports, and dashboards. This is real data from obviEnc (www.obvienc.com) that has been anonymized. The data is available in several formats: content pack/app, Excel workbook, or .pbix Power BI Desktop file. To learn more, see [Sample datasets](#).

Prerequisites

Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

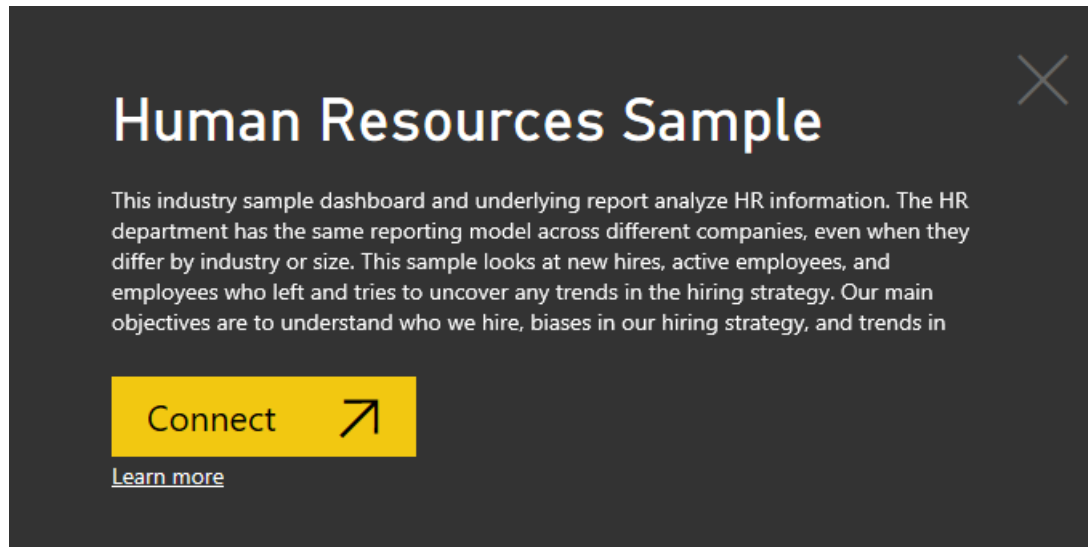
Get the content pack for this sample

1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.

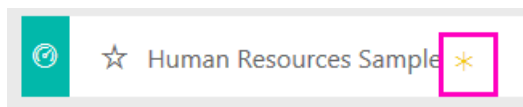


3. On the Get Data page that appears, select the **Samples** icon.

4. Select the **Human Resources Sample**, then choose **Connect**.



5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

- [Human Resources Sample](#)

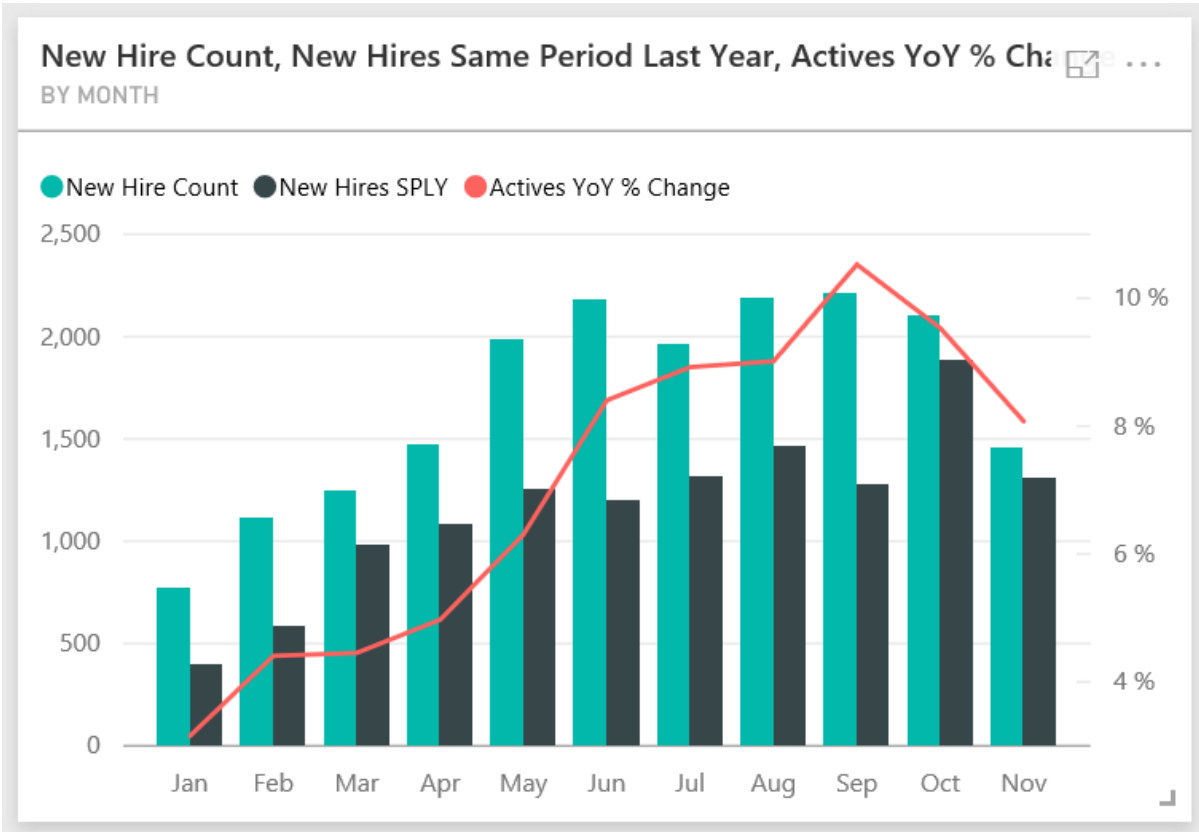
Get the Excel workbook for this sample

You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

New hires

Let's explore new hires first.

1. In your workspace, select the **Dashboards** tab, and open the Human Resources dashboard.
2. On the dashboard, select the **New Hire Count, New Hires Same Period Last Year, Actives YoY % Change By Month** tile.



The Human Resources Sample report opens to the **New Hires** page.



Notice the following:

- The **New Hire Count, New Hires SPLY and Actives YoY % Change by Month** combo chart shows we hired more people every month this year compared to last year — significantly more people in some months.
- In the combo chart **New Hire Count and Active Employee Count by Region and Ethnicity**, notice we're hiring fewer people in the **East** region.
- The **New Hires YoY Var by Age Group** waterfall chart shows we're hiring mainly younger people. This may be due to the mainly part-time nature of the jobs.
- The **New Hire Count by Gender** pie chart shows a pretty even split.

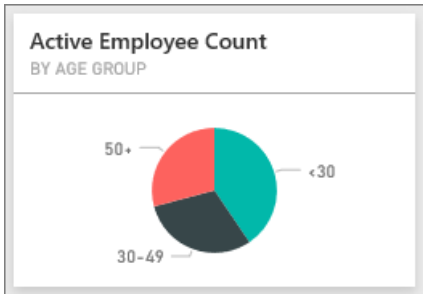
Can you find more insights; for example, a region where the gender split is not even? Select different age groups and genders in the charts to explore the relationships between age, gender, region, and ethnicity group.

Select the name of the dashboard from the top navbar to return to the dashboard.

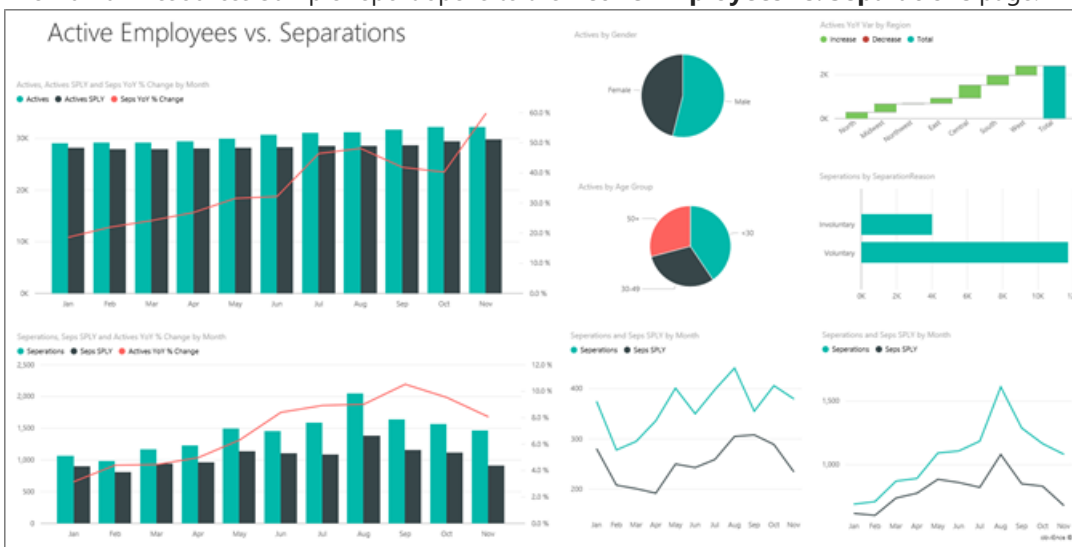
Compare current active and former employees

Let's explore data for current active employees and employees who no longer work for the company.

On the dashboard, select the **Active Employee Count by Age Group** tile.



The Human Resources Sample report opens to the **Active Employees vs. Separations** page.



Items of interest:

- Combo charts on the left show year-over-year change for active employees and separates. We have more actives this year due to rapid hiring, but also more separates than last year.
- In August we had more separates compared to other months. Select the different age groups, genders, or regions to see if you can find any outliers.
- Looking at the pie charts, we notice we have a pretty even split in our active employees by gender and age groups. Select different age groups to see the gender split differs by age. Do we have an even split by gender in every age group?

Reasons for separation

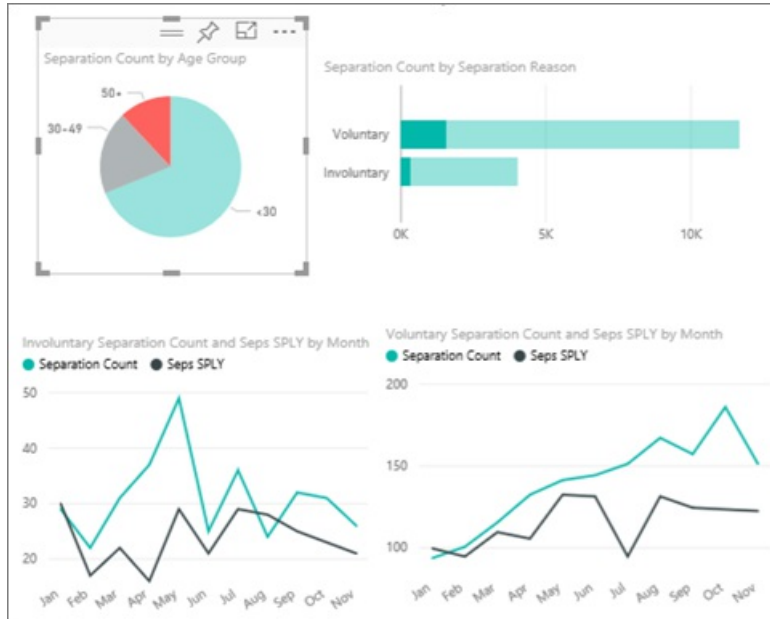
Let's look at the report in Editing View. Select **Edit report** in the upper-left corner.

Change the pie charts to show Separates data instead of Actives.

1. Select the **Active Employee Count by Age Group** pie chart.
2. In **Fields**, select the arrow next to **Employees** to expand the Employees table. Clear the check box next to **Active Employee Count** to remove that field.
3. Select the check box next to **Separation Count** in the Employees table to add it to the **Values** box in the field well.
4. Back on the report canvas, select the **Voluntary** bar in the **Separation Count by Separation Reason** bar chart. This highlights those who left voluntarily in the other visuals in the report.

- Click the 50+ slice of the Separation Count by Age Group pie chart.

Look at the Separations by Reason line chart in the lower-right corner. This chart is filtered to show voluntary separations.



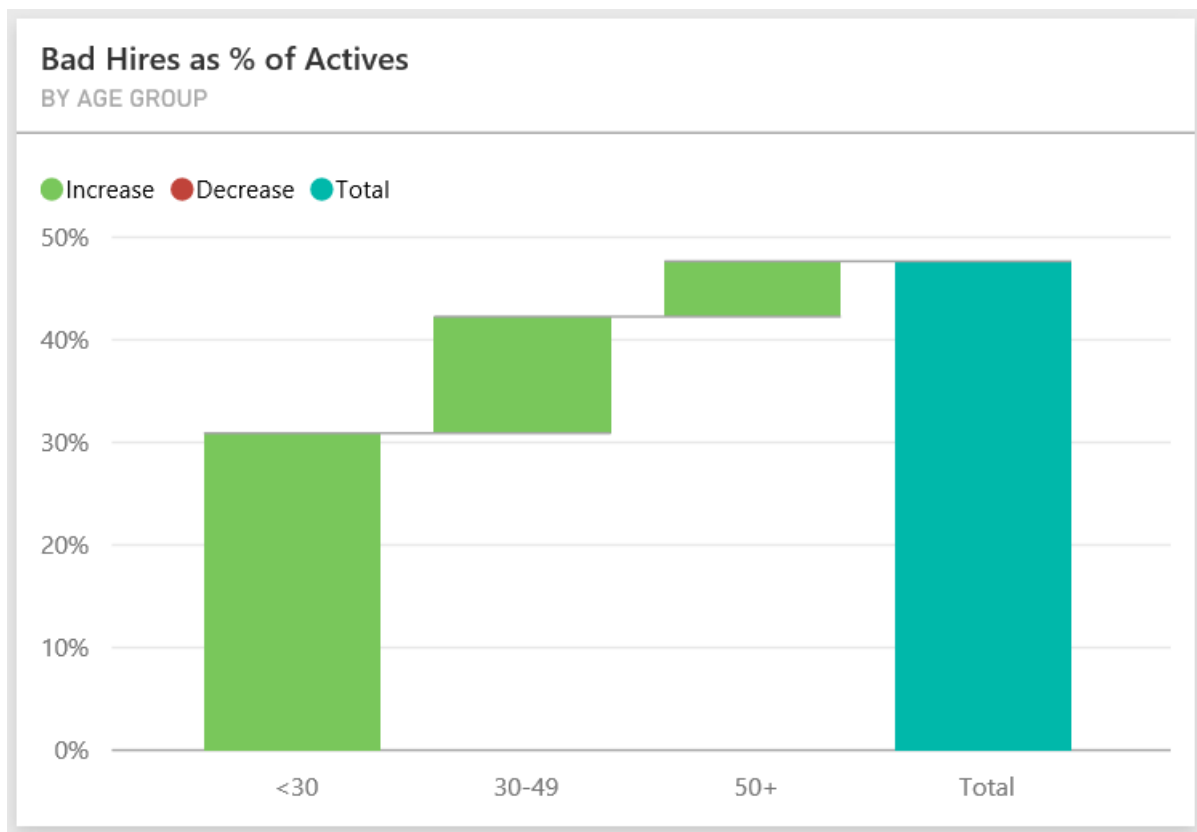
Notice the trend in the 50+ age group? During the latter part of the year more employees over age 50 are leaving voluntarily. This would be an area to investigate further with more data.

- You can follow the same steps for the **Active Employee Count by Gender** pie chart too, changing it to separations instead of active employees. Look at the voluntary separation data by gender to see if you find any other insights.
- Click **Power BI** in the top navigation bar to return to the dashboard. You can save the changes you've made to the report or not.

Bad hires

The last area to explore is bad hires. Bad hires are defined as employees who didn't last for more than 60 days. We're hiring rapidly. Are we hiring good candidates?

- Select the **Bad Hires as % of Actives by Age Group** dashboard tile. This opens the report to page 3, "Bad Hires".



2. Select the **Northwest** check box in the Region slicer on the left and the **Male** slice in the Bad Hire Count by Gender donut chart. Look at other charts on the "Bad Hires" page. More male bad hires than females and lot of Group A bad hires.



3. Looking at the **Bad Hires by Gender** donut chart and clicking through the **Region** slicer we notice that East is the only region with more female than male bad hires.
4. Select the name of the dashboard from the top navbar to return to the dashboard.

Asking a question in the Q&A box

The [Q&A question box](#) is where you type a question using natural language. Q&A recognizes the words you type and figures out where in your dataset to find the answer.

1. Click in the Q&A question box. Notice before you even start typing, the Q&A box contains suggestions:

< Exit Q&A

Ask a question about your data

HUMAN RESOURCES DATA:

count of new hires from July 2014 to December 2014

bad hires by region and ethnicity as a 100% stacked column chart

active employee count by region

average tenure days

date tables

sum of bad hires

bad hires as % of actives

YQM

business units

norm of percent of turnover

[See more...](#)

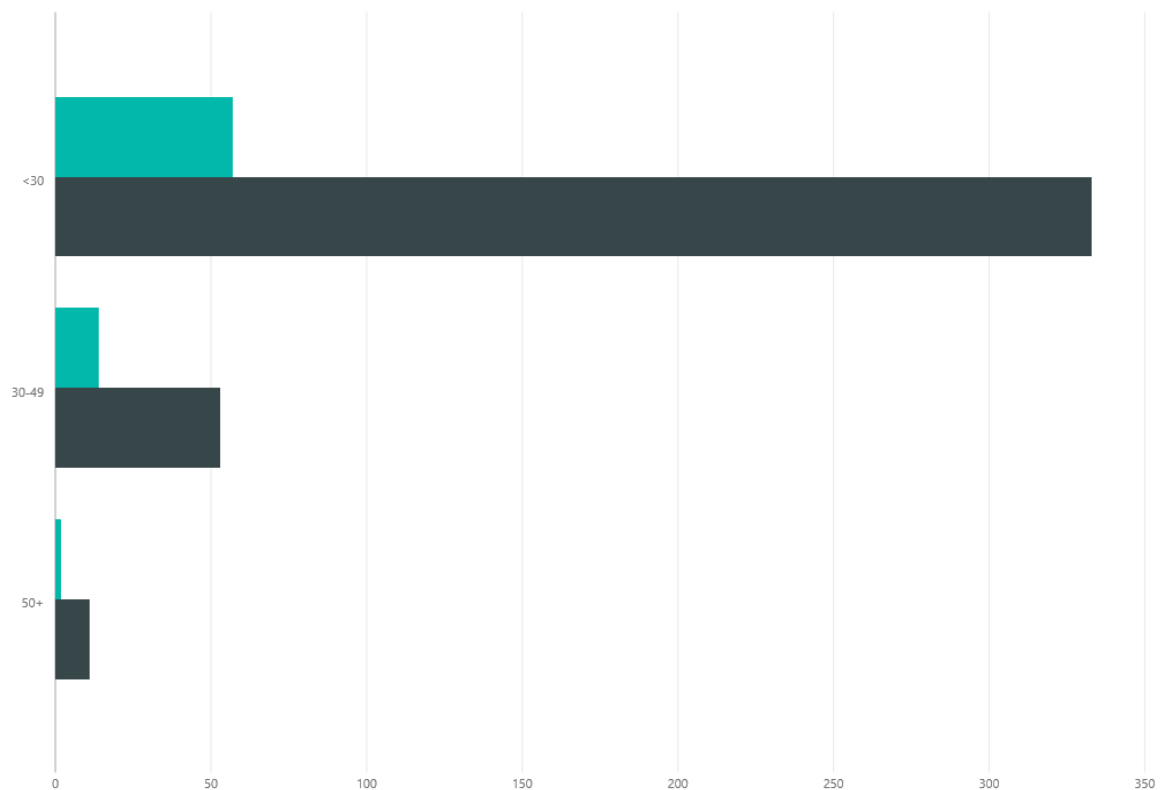
2. You can pick one of those suggestions, or type: **show age group, gender and bad hires SPLY where region is east.**

< Exit Q&A

show age group, gender, and bad hires where region is east

Bad Hires SPLY by Age Group and Gender

Gender ● Male ● Female



Showing age groups, genders, and bad hires SPLY, where region that BU are in is east
Source: Human Resources Data

Notice most of the female bad hires are under 30.

This is a safe environment to play in. You can always choose not to save your changes. If you do save them, you can always go to **Get Data** for a new copy of this sample.

Next steps: Connect to your data

We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into human

resources data. Now it is your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

Opportunity Analysis sample for Power BI: Take a tour

1/24/2018 • 5 min to read • [Edit Online](#)

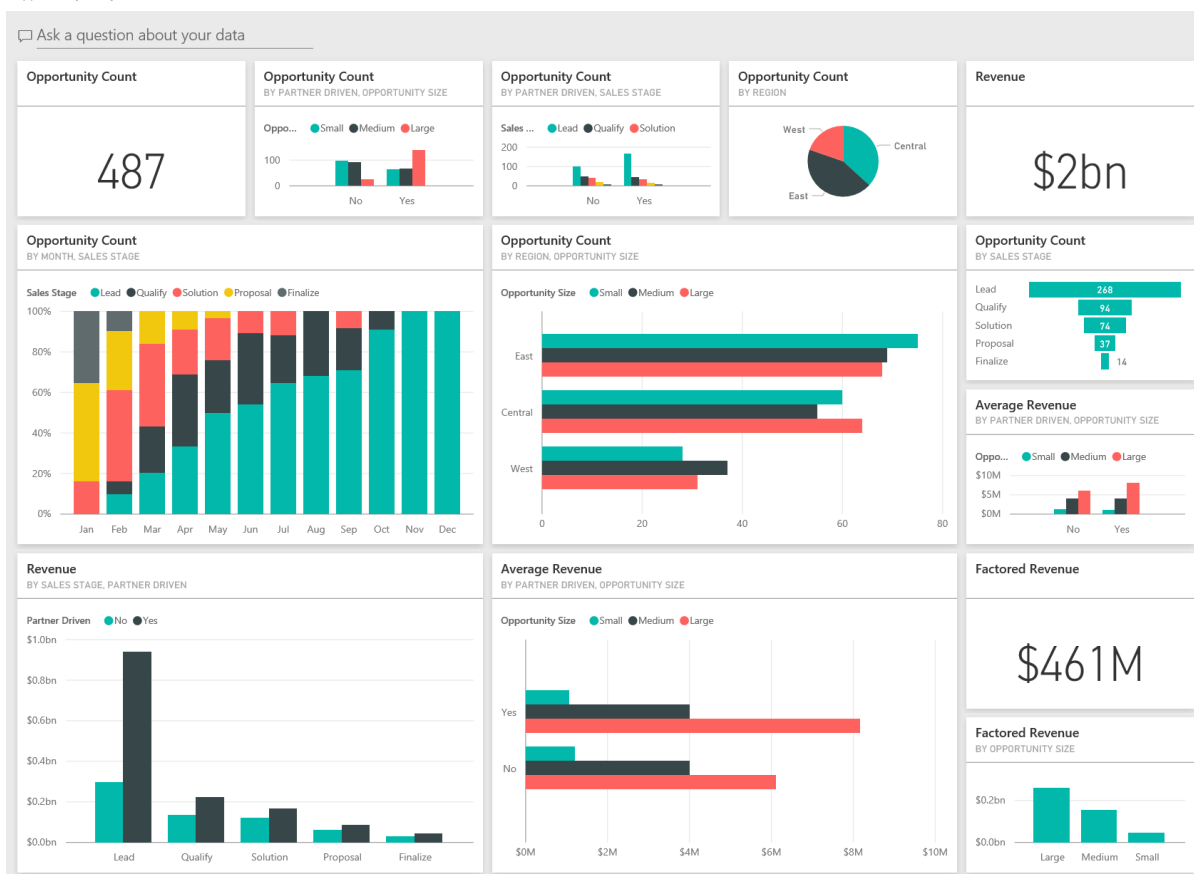
Overview of the Opportunity Analysis sample

The **Opportunity Analysis Sample** contains a dashboard (and associated report) for a software company that has 2 sales channels: *direct* and *partner*. The Sales Manager created this dashboard to track opportunities and revenue by region, deal size, and channel.

The Sales Manager relies on two measures of revenue:

- **Revenue** – this is a salesperson’s estimate of what he believes the revenue will be.
- **Factored Revenue** – this is calculated as Revenue X Probability% and is generally accepted as being a more-accurate predictor of actual sales revenue. Probability is determined by the deal’s current **Sales Stage**.
 - Lead – 10%
 - Qualify – 20%
 - Solution – 40%
 - Proposal – 60%
 - Finalize – 80%

Opportunity Analysis Dashboard



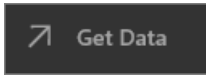
This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports and dashboards. This is real data from obviEnc (www.obvienc.com) that has been anonymized.

Prerequisites

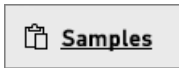
Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

Get the content pack for this sample

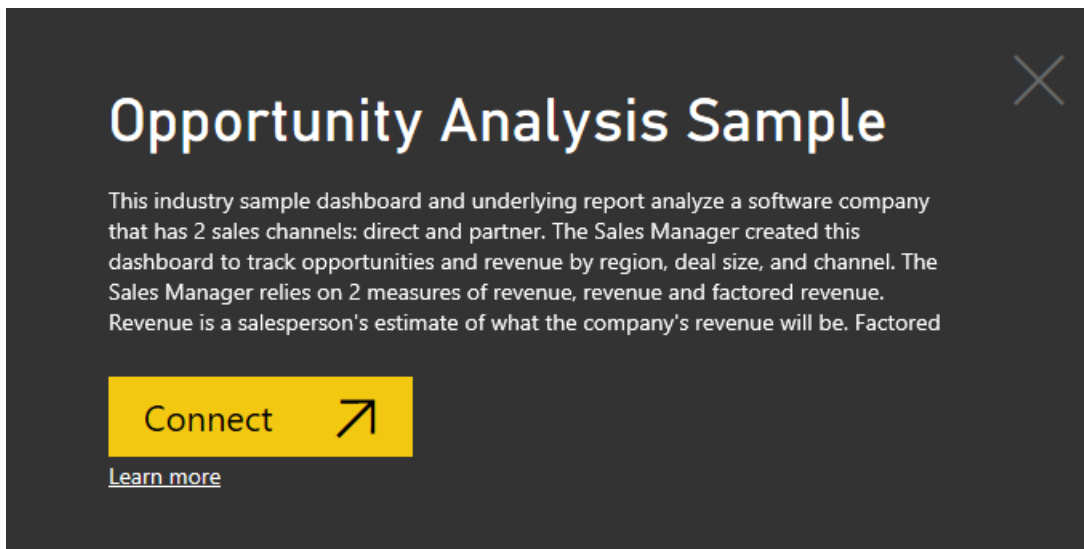
1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.



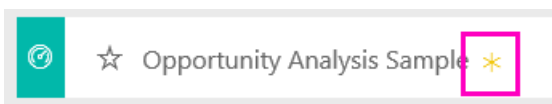
3. On the Get Data page that appears, select the **Samples** icon.



4. Select the **Opportunity Analysis Sample**, then choose **Connect**.



5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

- [Opportunity Analysis Sample](#)

Get the Excel workbook for this sample

You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

What is our dashboard telling us?

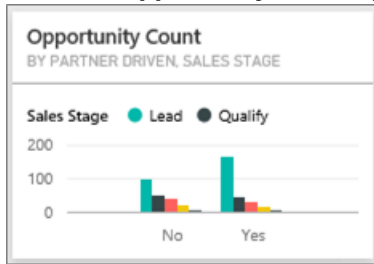
Our Sales Manager has created a dashboard to track those metrics most important to her. When she sees something interesting, she can select a tile to dig into the data.

1. Company revenue is \$2 billion and factored revenue is \$461 million.
2. Opportunity count and revenue follow a familiar funnel pattern, with totals decreasing each subsequent stage.
3. Most of our opportunities are in the East region.

- The large opportunities generate more revenue than the medium or small opportunities.
- Partner large deals generate more revenue: \$8M on average versus \$6M for direct sales.

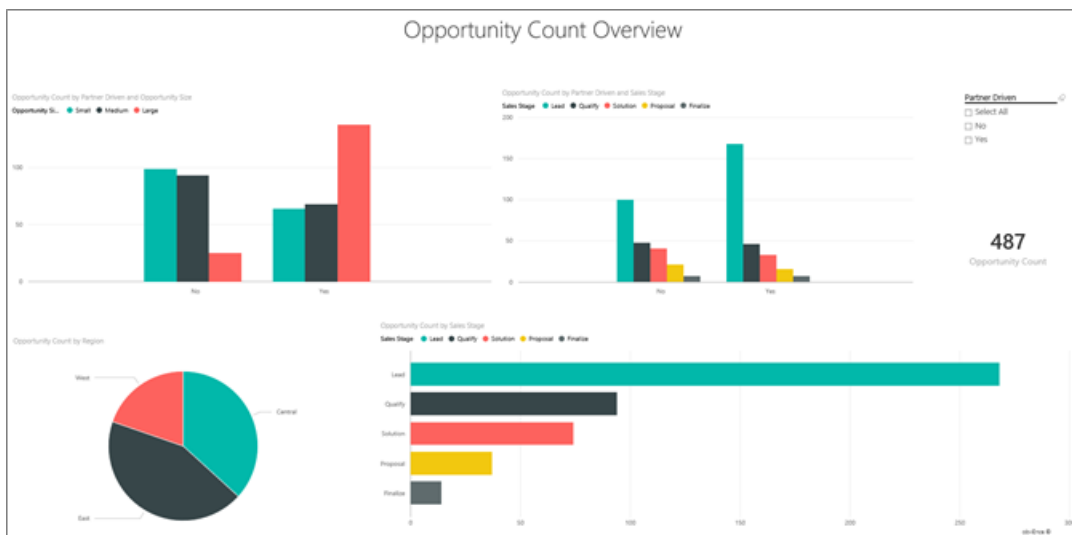
Since the effort to land a deal is the same whether the deal is classified as large, medium, or small; our company should dig into the data to learn more about large opportunities.

Select the **Opportunity Count by Partner Driven and Sales Stage** tile to open page 1 of the report.



Explore the pages in the report

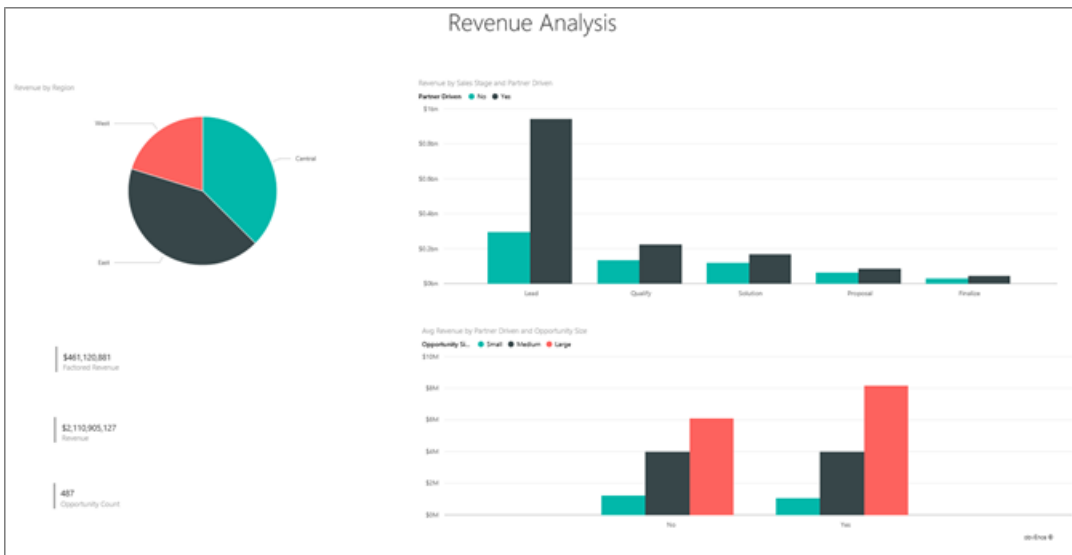
Page 1 of our report is titled "Opportunity Count Overview."



- East is our biggest region in terms of opportunity counts.
- On the pie chart, select each region one at a time to filter the page. For each region, partners are pursuing significantly more large opportunities.
- The Opportunity Count by Partner Driven and Opportunity Size column chart clearly shows that most of the large opportunities are partner-driven and more of the small and medium opportunities are not partner-driven.
- Select each Sales Stage in the bar chart in the bottom left to see the difference in regional count and notice that even though East is our biggest region in terms of counts, in the Solution, Proposal and Finalize stages all 3 regions have comparable counts. This means we close a higher percent of deals in Central and West.

Page 2 of our report is titled "Revenue Overview."

This page takes a similar look at the data but using a revenue perspective instead of count.

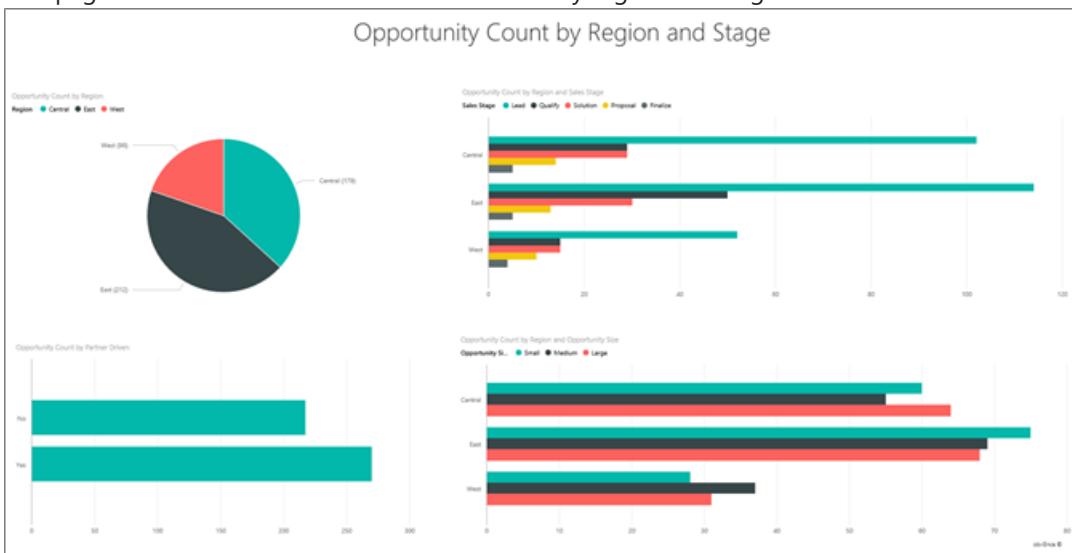


- East is our biggest region not only in opportunity count but in revenue also.
- Filtering by Partner driven (select **Yes** in the legend in the top right) reveals revenue of \$1.5B and \$294M. Compare this to \$644B and \$166M for non-partner driven revenue.
- Average revenue for large accounts is larger (8M) if the opportunity is partner driven as compared to 6M for non-partner driven business.
- For partner driven business, average revenue for large opportunities is almost double that of medium sized opportunities (4M).
- Average revenue for small and medium businesses is comparable for both partner driven and non-partner driven business.

Clearly our partners are doing a better job selling to customers. It might make sense to funnel more deals through our partners.

Page 3 of our report is titled "Region Stage Counts"

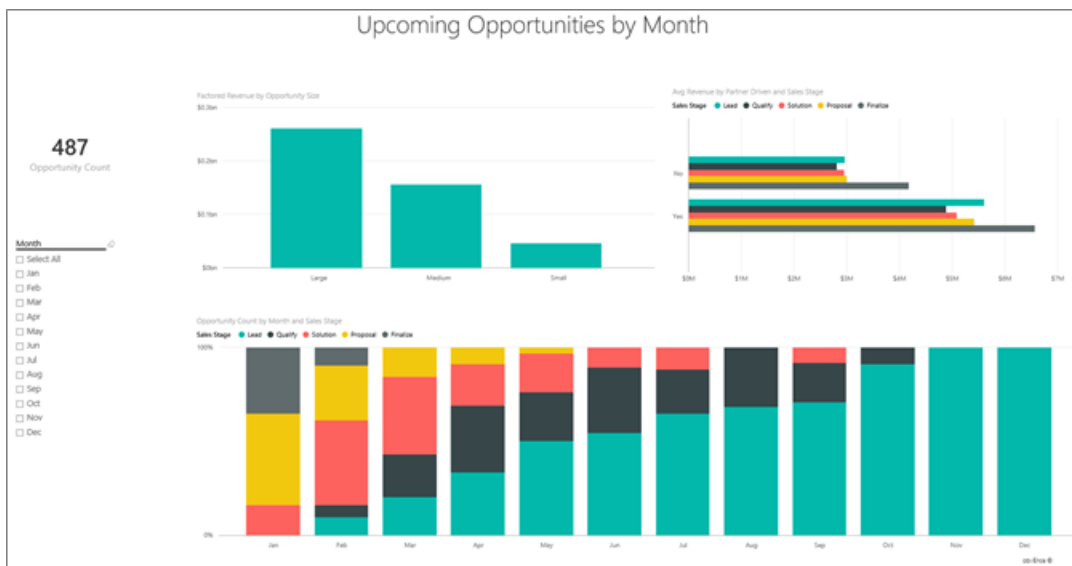
This page looks at similar data but breaks it down by region and stage.



- Filtering by East (select **East** in the pie chart) reveals that the opportunities in the east are split almost equal between partner driven and non-partner driven.
- Large opportunities are most common in the central region, small opportunities are most common in the east region, and medium opportunities are most common in the west region.

Page 4 of our report is titled "Upcoming Opportunities"

Again, we're looking at similar factors, but this time from a date/time perspective.



Our CFO uses this page to manage workload. By looking at the revenue opportunities by sales stage and month, she can plan appropriately.

- Average revenue for the Finalize stage is the highest. Closing these deals is a top priority.
- Filtering by month (by selecting the month name in the left slicer) shows that January has a high proportion of large deals in the Finalize stage with factored revenue of \$75M. February, on the other hand, has mostly medium deals in Solution and Proposal stage.
- In general, the factored revenue numbers fluctuate based on sales stage, number of opportunities, and deal size. Add filters (using the filter pane on the right) for these factors to discover further insights.

This is a safe environment to play in. You can always choose not to save your changes. But if you do save them, you can always go to **Get Data** for a new copy of this sample.

Next steps: Connect to your data

We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into opportunity tracking data. Now it's your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

[Download samples](#)

Procurement Analysis sample for Power BI: Take a tour

1/24/2018 • 4 min to read • [Edit Online](#)

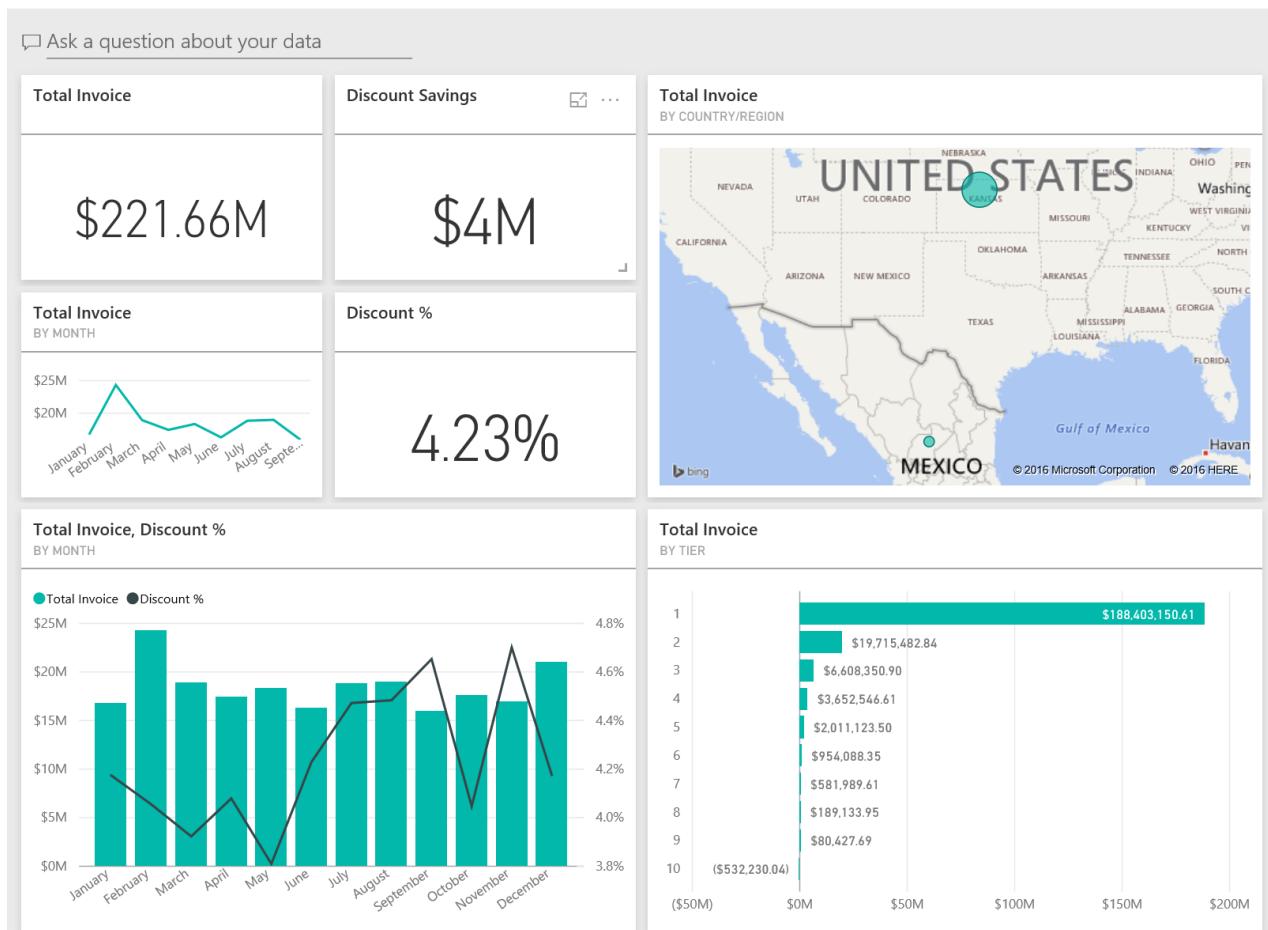
Overview of the Procurement Analysis sample

This industry sample dashboard and underlying report analyze a manufacturing company's spending on vendors by category and location. In the sample, we explore these areas:

- Who the top vendors are
- What categories we spend most on
- Which vendors give us the highest discount and when

This sample is part of a series that illustrates how you can use Power BI with business-oriented data, reports and dashboards. This is real data from obviENCE (www.obviENCE.com) that has been anonymized.

Procurement Analysis Sample



Prerequisites

Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

Get the content pack for this sample

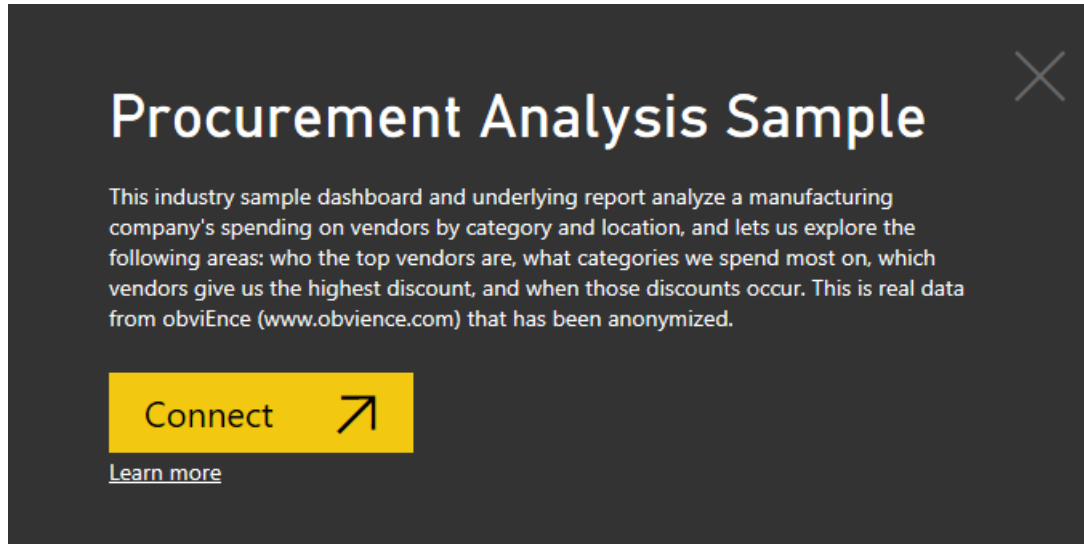
1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.

↗ Get Data

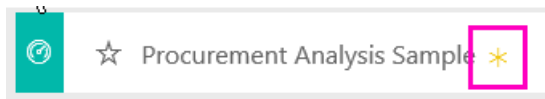
3. On the Get Data page that appears, select the **Samples** icon.

📁 **Samples**

4. Select the **Procurement Analysis Sample**, then choose **Connect**.



5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

- [Procurement Analysis Sample](#)

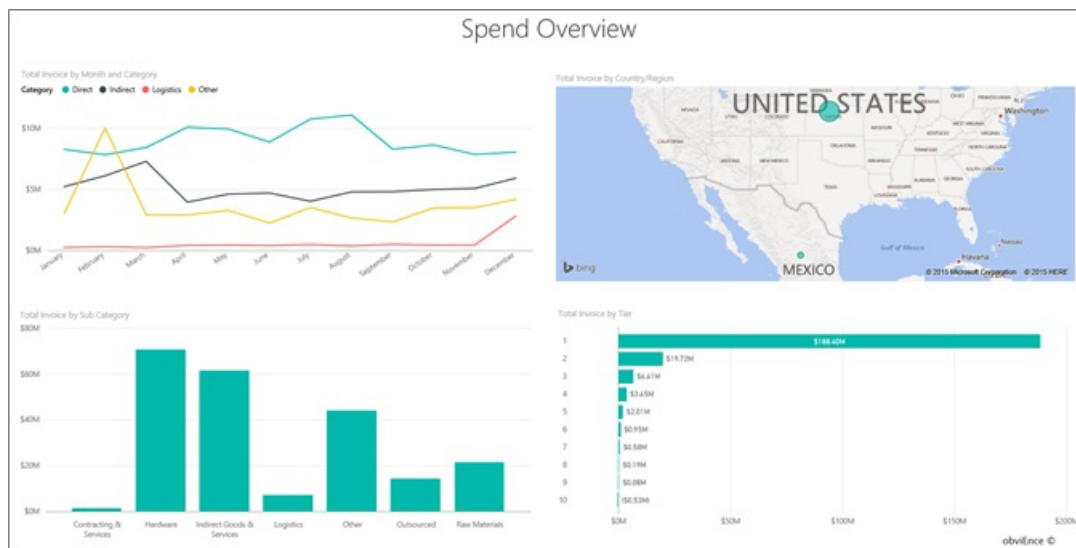
Get the Excel workbook for this sample

You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

Spending trends

Let's first look for trends in spending by category and location.

1. From your workspace, open the **Dashboards** tab and select the Procurement Analysis dashboard.
2. Select the dashboard tile **Total Invoice by Country/Region**. It opens to the "Spend Overview" page of the "Procurement Analysis Sample" report.



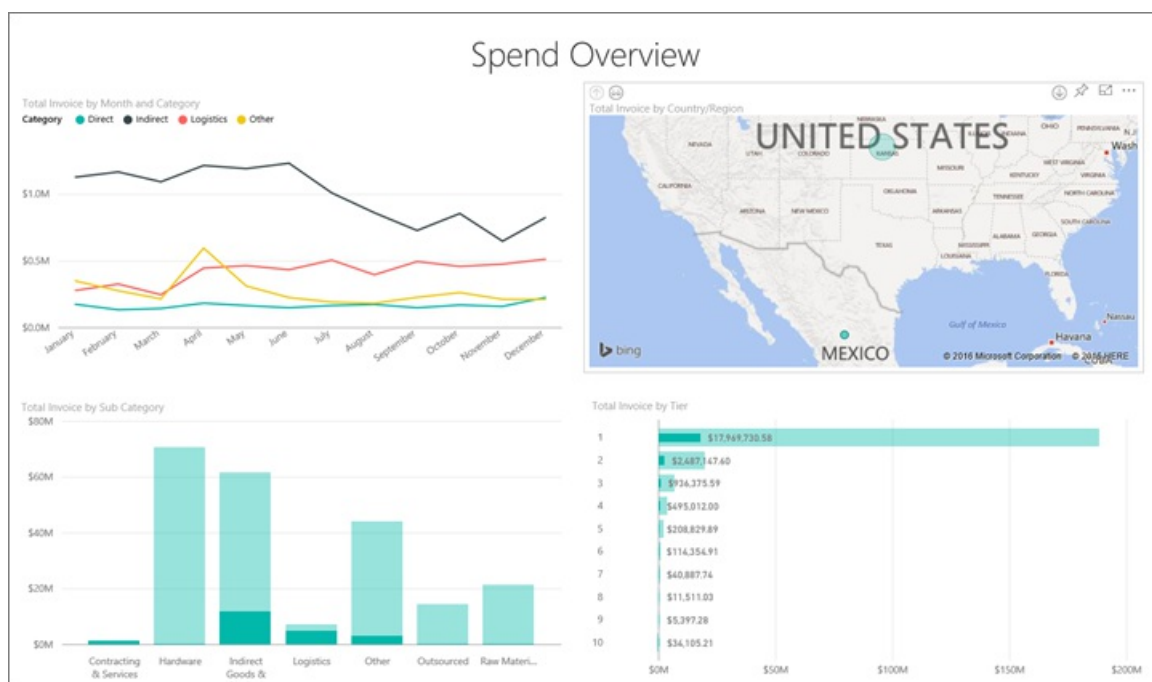
Notice a few things:

- In the **Total Invoice by Month and Category** line chart: The **Direct** category has pretty consistent spending, **Logistics** has a peak in December, and **Other** has a spike in February.
- In the **Total Invoice by Country/Region** map: Most of our spending is in the USA.
- In the **Total Invoice by Sub Category** column chart: **Hardware** and **Indirect Goods & Services** are the biggest spend categories.
- In the **Total Invoice by Tier** bar chart: Most of our business is done with our Tier 1 (top 10) vendors. This helps in managing vendor relationships better.


Spending in Mexico

Let's explore the spending areas in Mexico.

1. In the pie chart, select the **Mexico** bubble in the map. Notice that in the "Total Invoice by Sub Category" column chart, most of it is in the **Indirect Goods & Services** sub category.



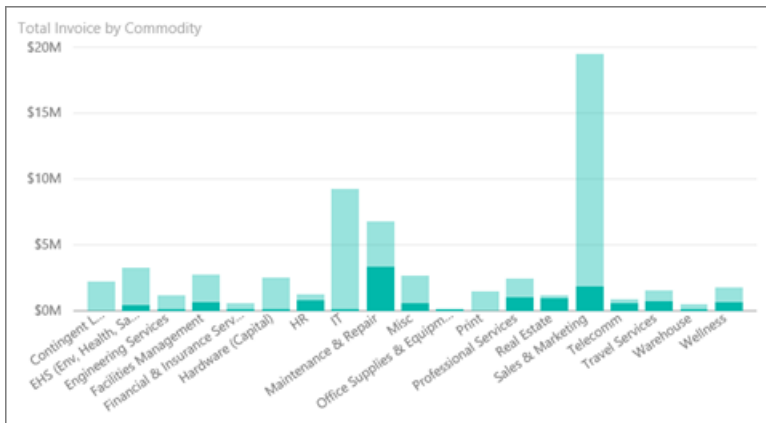
2. Drill down into the **Indirect Goods & Services** column:

- Select the drill-down arrow  in the upper-right corner of the chart.
- Select the **Indirect Goods & Services** column.

By far the biggest spend in this category overall is Sales & Marketing.

- Select **Mexico** in the map again.

The biggest spend in this category in Mexico is Maintenance & Repair.

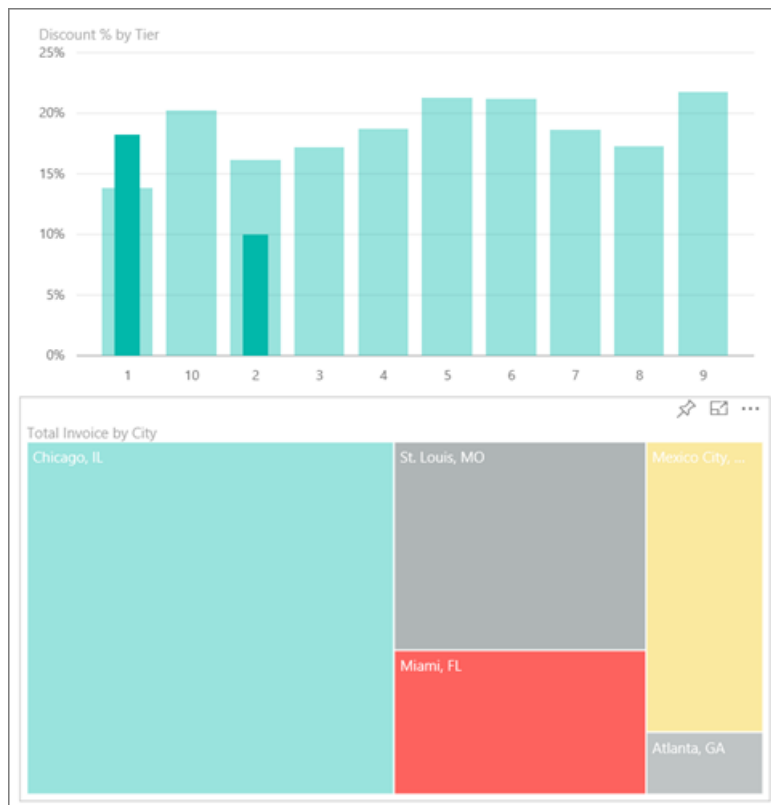


3. Select the up arrow on the upper-left corner of the chart to drill back up .
4. Select the arrow again to turn drill down off.
5. Select **Power BI** in the top navigation bar to return to your workspace.

Evaluate different cities

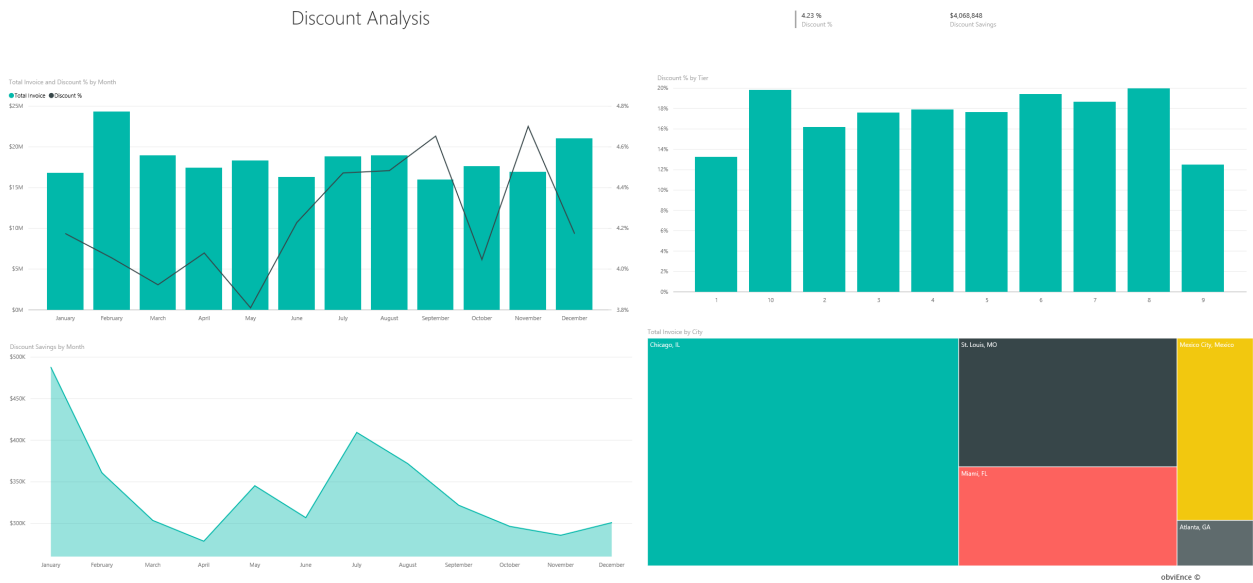
We can use highlighting to evaluate different cities.

1. Select the dashboard tile **Total Invoice, Discount % By Month**. The report opens to the "Discount Analysis" page.
2. Select the different cities in the **Total Invoice by City** treemap, to see how they compare. Almost all of Miami's invoices are from Tier 1 vendors.



Vendor discounts

Let's also explore the discounts available from vendors, and the time periods when we get most discounts.

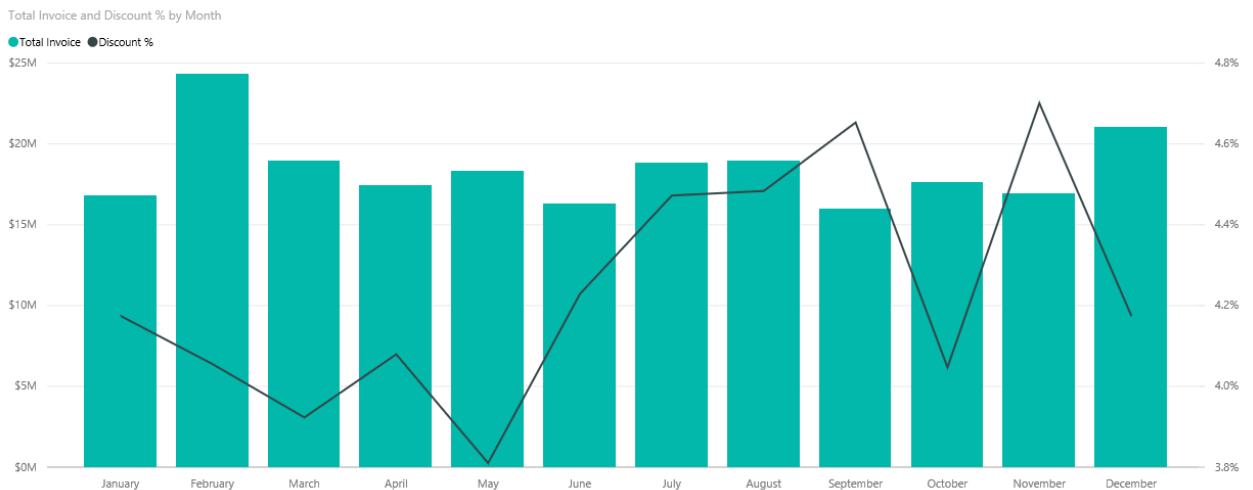


Specifically, these questions:

- Are discounts different month by month, or are discounts the same every month?
- Do some cities get more discounts than others?

Discount by month

Looking at the **Total Invoice and Discount % by Month** combo chart, we see that **February** is the busiest month, and **September** the least busy month. Now look at the discount percent during these months. Note that when volume goes up, the discount shrinks, and when volume is low, the discount goes up. The more we need the discount, the worse deal we get.



Discount by city

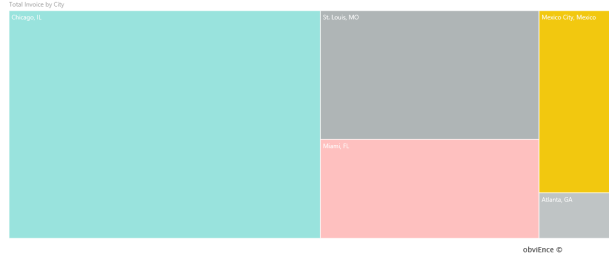
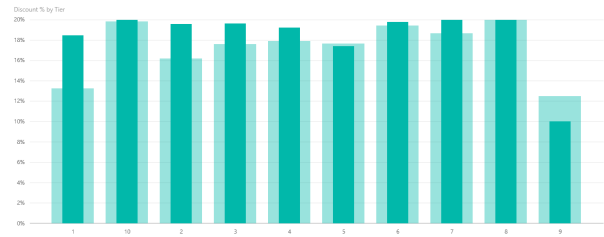
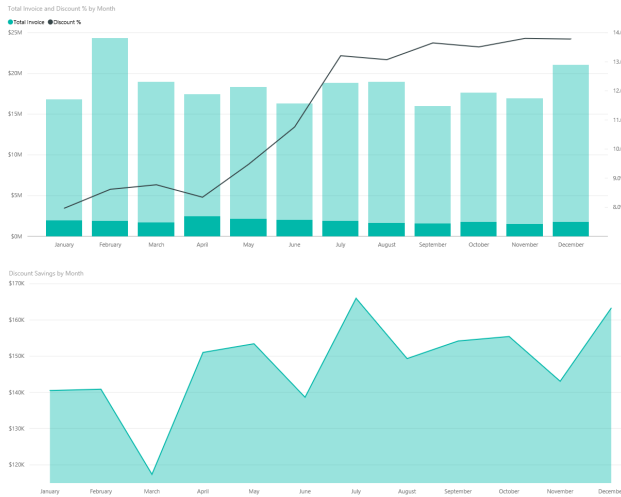
Another area to explore is discount by city. Select each city in the treemap and see how the other charts change.

- St. Louis, MO had a big spike in total invoice in February and a big dip in discount savings in April.
- Mexico City, Mexico has the highest discount % (11.05%) and Atlanta, GA has the smallest (0.08%).

Discount Analysis

13.05 %
Discount %

\$1,773,287
Discount Savings



Edit the report

Select **Edit report** in the upper-left corner and explore in Editing View.

- See how the pages are made
- Add pages and charts based on the same data
- Change the visualization type for a chart – for example, change the treemap to a donut chart
- Pin them to your dashboard

This is a safe environment to play in. You can always choose not to save your changes. If you do save them, you can always go to **Get Data** for a new copy of this sample.

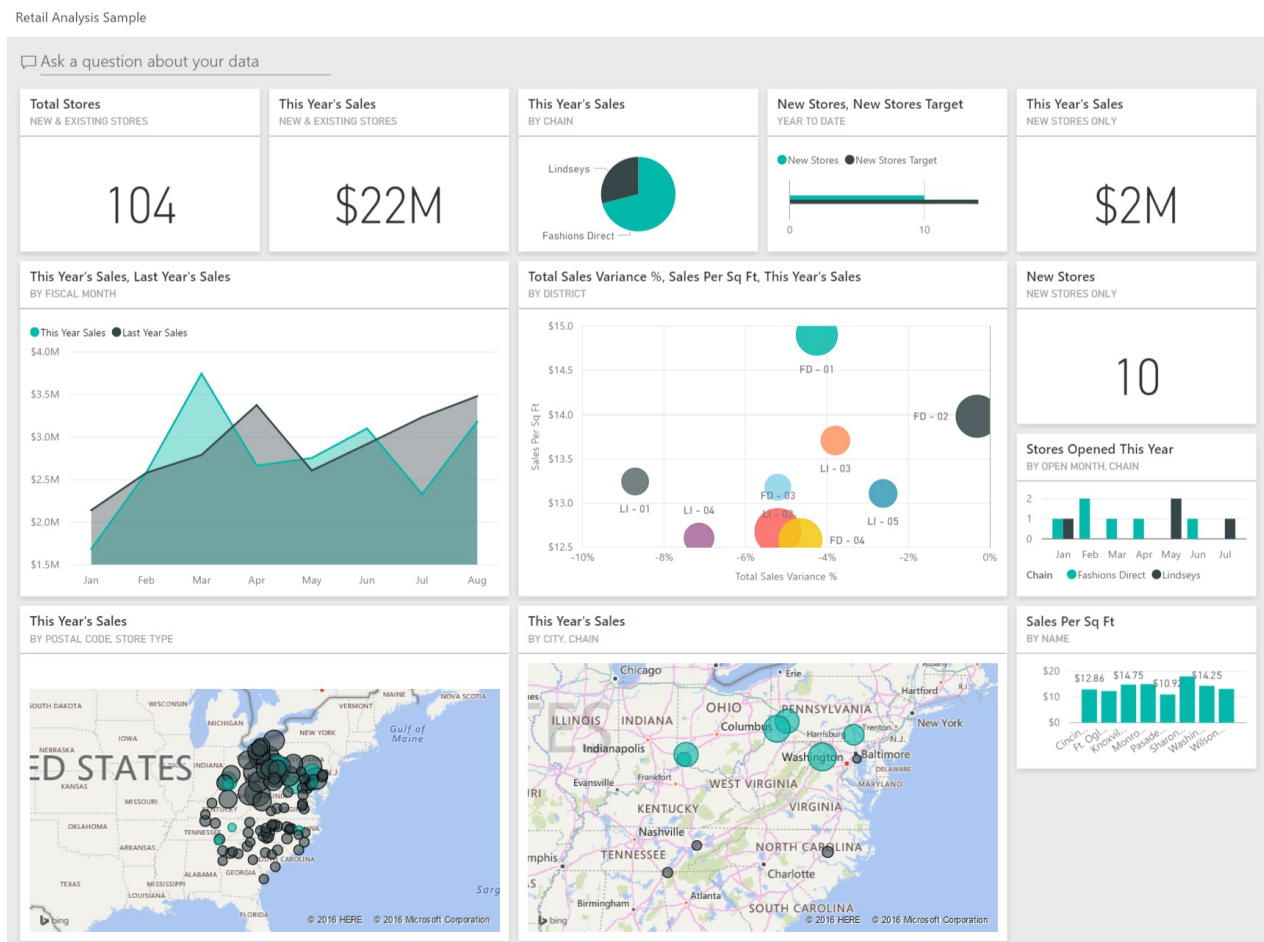
Next steps: Connect to your data

We hope this tour has shown how Power BI dashboards and reports can provide insights into procurement data. Now it's your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

Retail Analysis sample for Power BI: Take a tour

1/24/2018 • 4 min to read • [Edit Online](#)

This industry sample dashboard and underlying report analyze retail sales data of items sold across multiple stores and districts. The metrics compare this year's performance to last year's in these areas: sales, units, gross margin, and variance, as well as new store analysis. This is real data from obviEnc (www.obvienc.com) that has been anonymized.

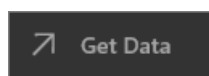


Prerequisites

Before you can use the sample, you must first download it as a content pack, .pbix file, or Excel workbook.

Get the content pack for this sample

1. Open the Power BI service (app.powerbi.com) and log in.
2. In the bottom left corner select **Get data**.




3. On the Get Data page that appears, select the **Samples** icon.



4. Select the **Retail Analysis Sample**, then choose **Connect**.

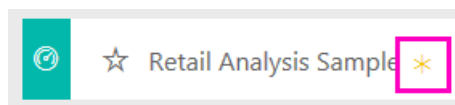
Retail Analysis Sample

This industry sample dashboard and underlying report analyzes retail sales data of items sold across multiple stores and districts. The metrics compare this year's performance to last year's in sales, units, gross margin, and variance, as well as new store analysis. This is real data from obviEnce (www.obvience.com) that has been anonymized.

Connect 

[Learn more](#)

5. Power BI imports the content pack and adds a new dashboard, report, and dataset to your current workspace. The new content is marked with a yellow asterisk.



Get the .pbix file for this sample

Alternatively, you can download the sample as a .pbix file, which is designed for use with Power BI Desktop.

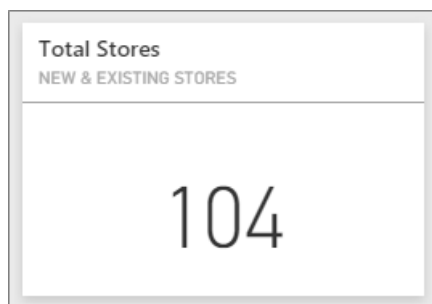
- [Retail Analysis Sample](#)

Get the Excel workbook for this sample

You can also [download just the dataset \(Excel workbook\)](#) for this sample. The workbook contains Power View sheets that you can view and modify. To see the raw data select **Power Pivot > Manage**.

Start on the dashboard and open the report

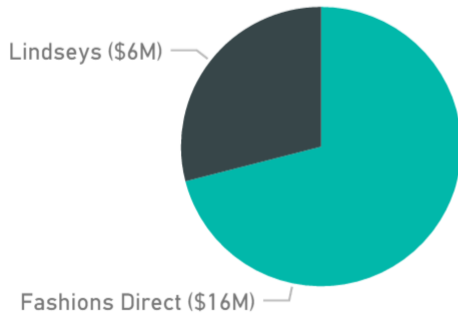
1. On the dashboard, select the "Total Stores" tile:



This takes you to the "Store Sales Overview" page in the report. You see we have 104 total stores, 10 of them new. We have two chains, Fashions Direct and Lindseys. Fashions Direct stores are larger on average.

2. In the pie chart, select **Fashions Direct**.

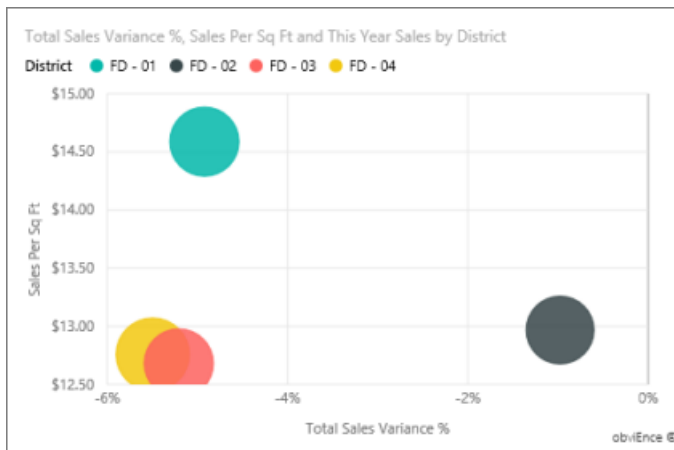
This Year Sales by Chain



10
New Stores

104
Total Stores

Notice the result in the bubble chart:

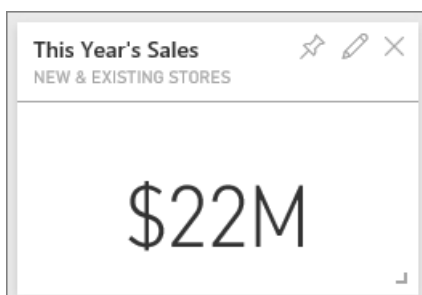


FD-01 district has the highest Average Sales per Square Foot, FD-02 has the lowest Variance in Sales compared to last year, FD-03 and FD-04 are worst performers overall.

3. Select individual bubbles or other charts to see cross highlighting, revealing the impact of your selections.
4. To return to the dashboard, select its name from the top navbar (breadcrumbs).



5. On the dashboard, select the tile that has "This Year's Sales."



This is equivalent to typing "This year sales" in the question box.

You see this screen:

□ this year's sales

\$22,051,952
This Year Sales

Showing this year sales
Source: Retail Analysis Sample

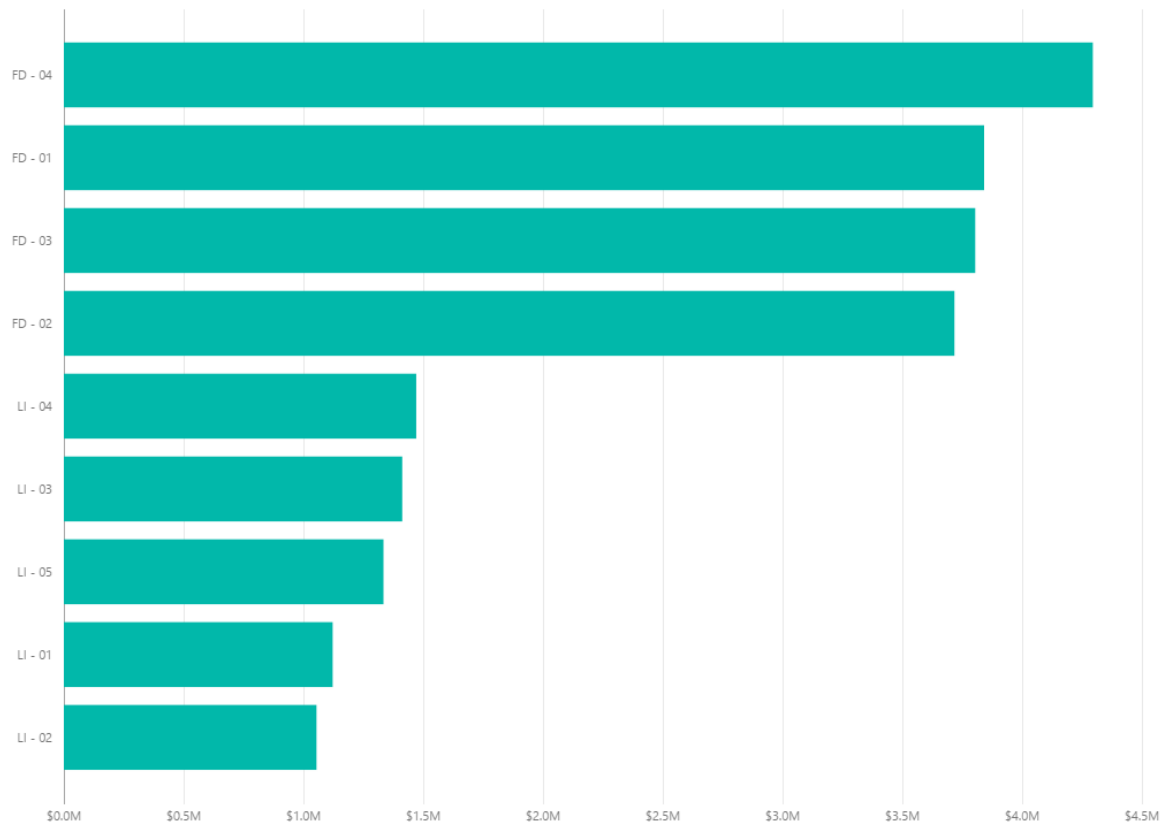
Review a tile created with Power BI Q&A

Let's get more specific.

1. Add "this year sales **by district**" onto the question. Observe the result: It automatically put the answer in a bar chart and suggests other phrases:

this year's sales by district

This Year Sales by District



Showing district that district tables that managed stores are in and this year sales
Source: Retail Analysis Sample

2. Now change the question to "this year sales **by zip and chain**".

Notice how it answers the question as you type with the appropriate charts.

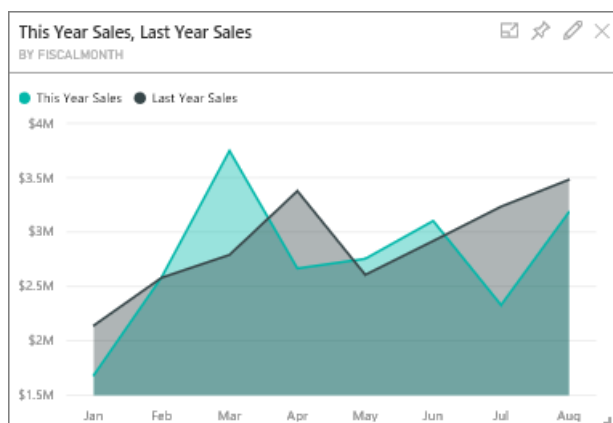
3. Play around with more questions and see what kind of results you get.

4. When you're ready, return to the dashboard.

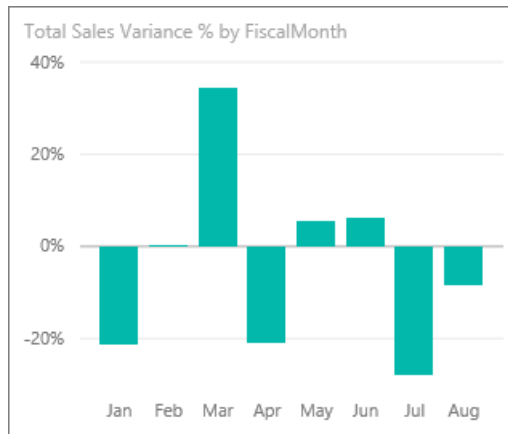
Dive deeper into the data

Now let's explore on a more detailed level, looking at the districts' performances.

1. On the dashboard, select the tile comparing this year's sales to last year's.

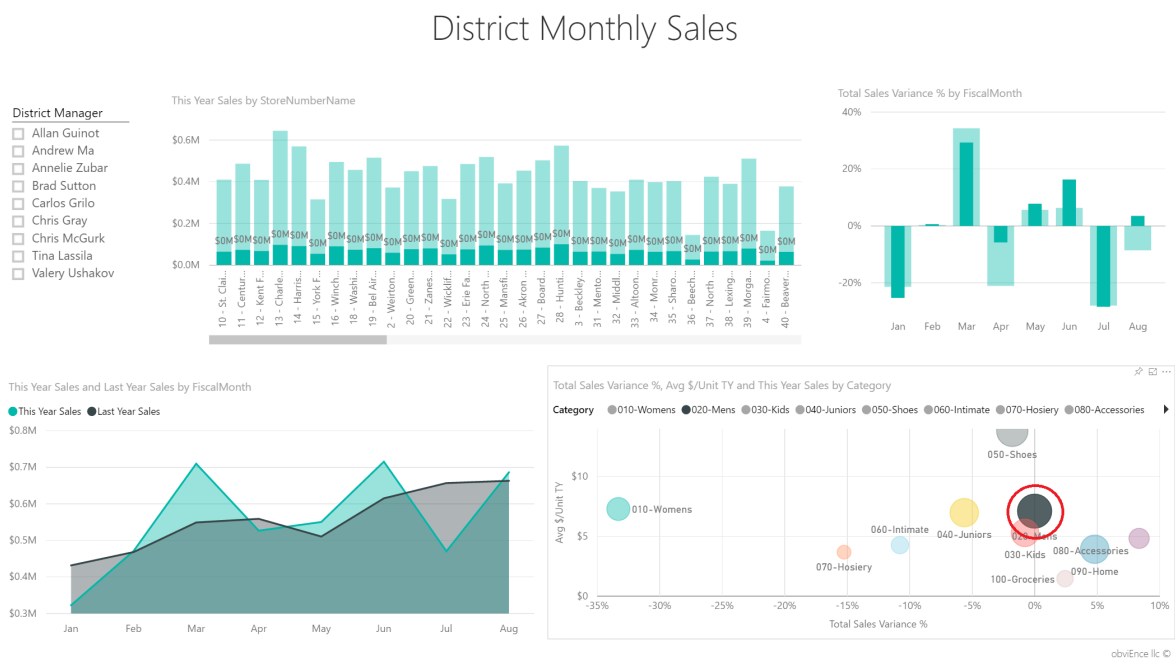


Notice the large variability on Variance % to last year, with Jan, Apr, and Jul being particularly bad months.



Let's see if we can narrow down where the issues might be.

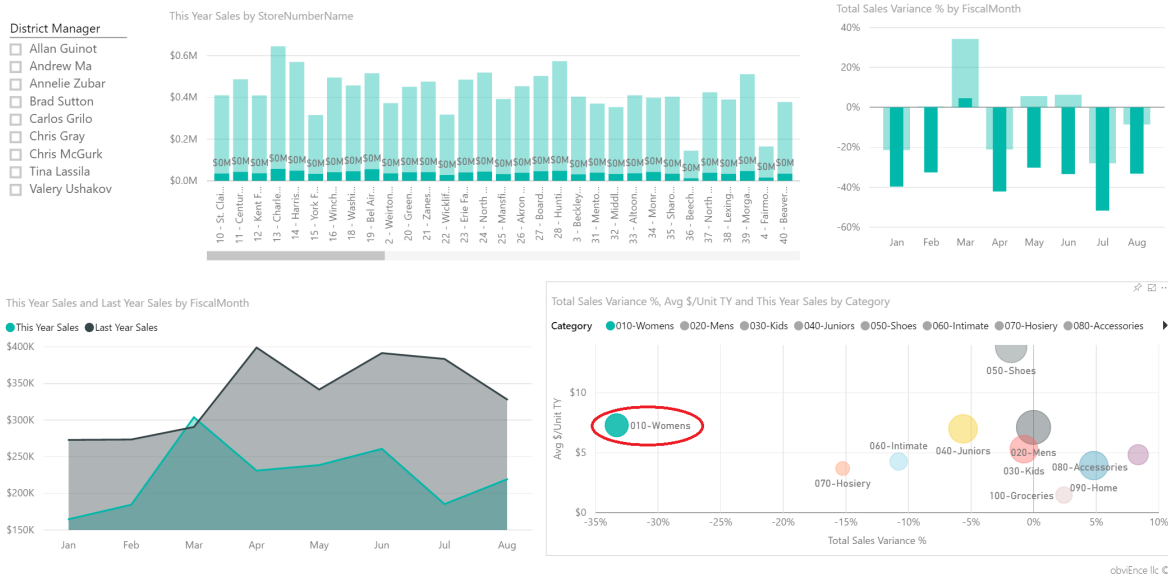
2. Select the bubble chart, and choose **020-Mens**.



Observe the men's category wasn't as severely affected in April as the business overall, but January and July were still problem months.

3. Now, select the **010-Womens'** bubble.

District Monthly Sales



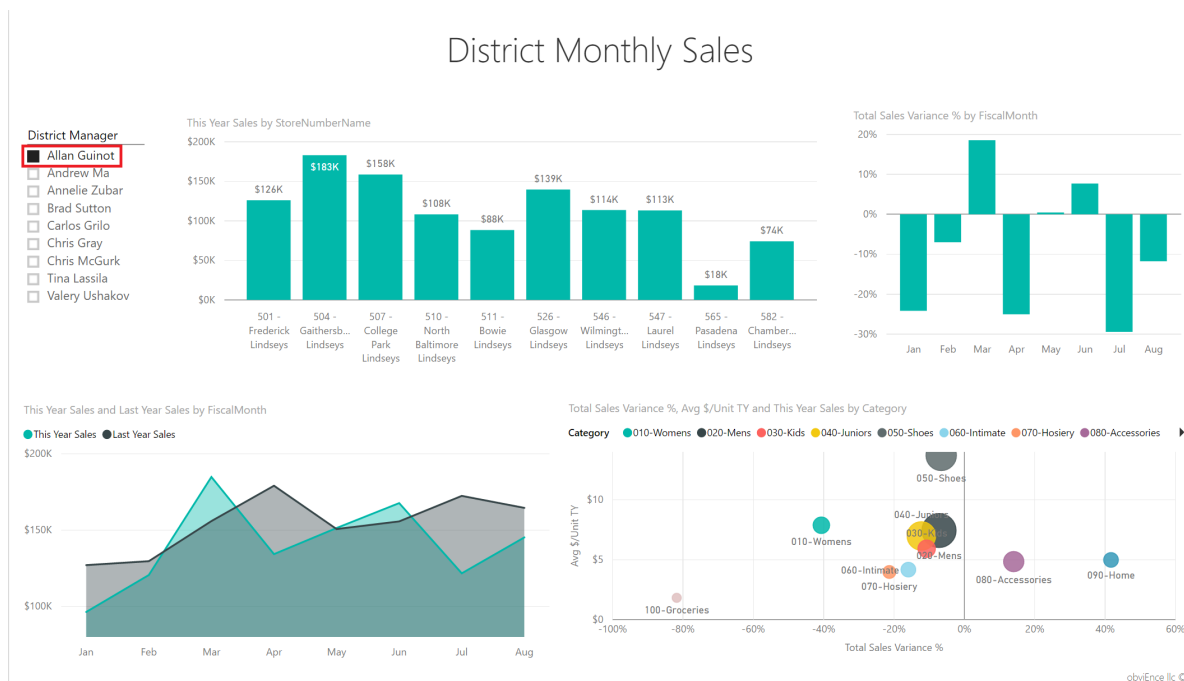
Notice the women's category performed much worse than business overall across all months, and much worse in almost every month compared to the previous year.

4. Select the bubble again to clear the filter.

Try out the slicer

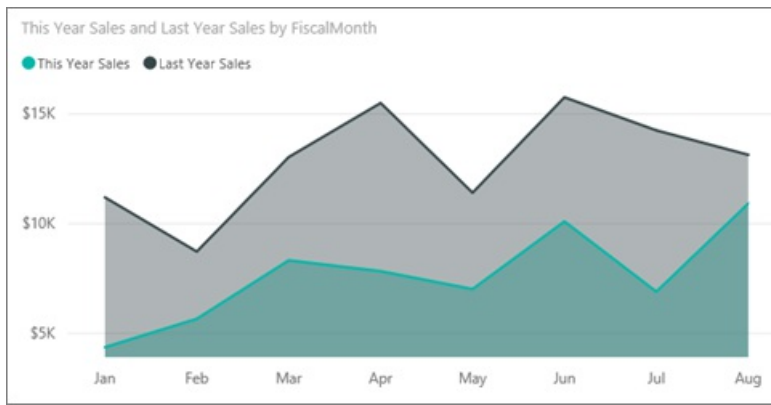
Let's look at how specific districts are doing.

1. Select Allan Guinot in the slicer on the top left.



Note that Allan's district outperformed Last Year in March and June.

2. Now, while Allan is still selected, select the Women's bubble.



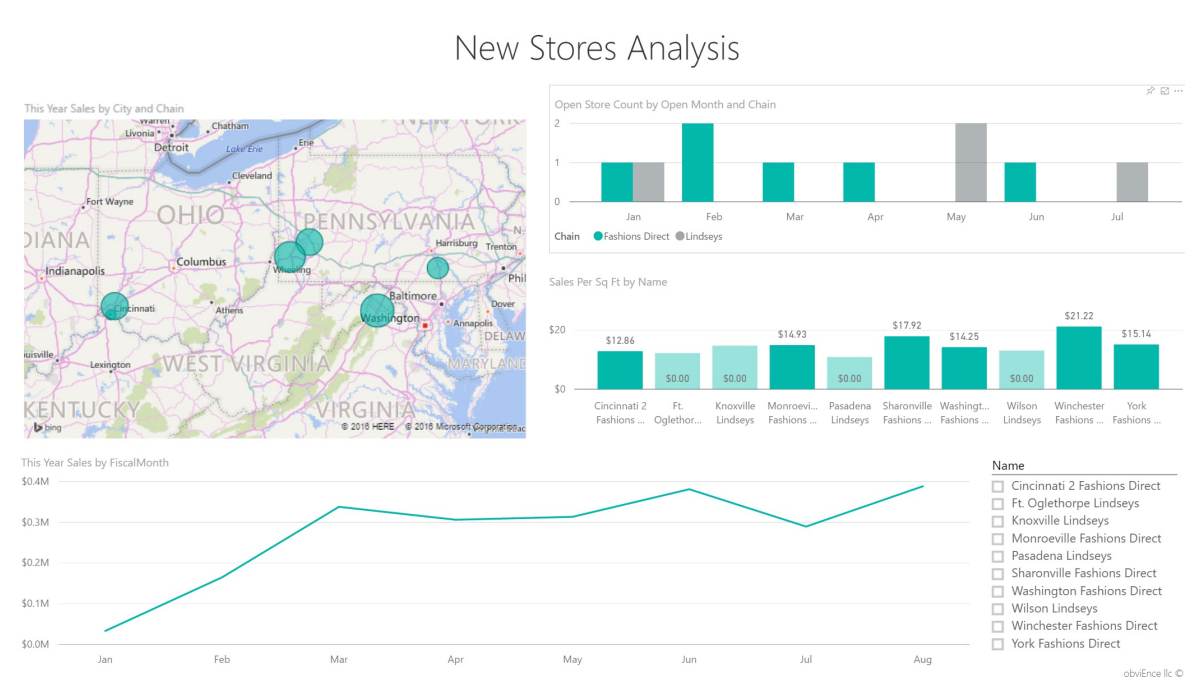
Note that for the Women's category, his district never met last year's volume.

3. Explore the other district managers and categories – what other insights can you find?
4. When you are ready – return to the dashboard.

What is our data telling us about sales growth this year?

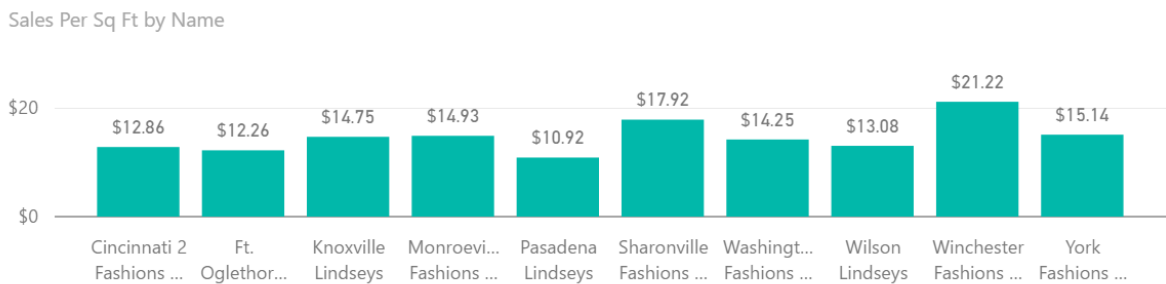
The last area we want to explore is our growth – new stores opened this year.

1. Select the 'Stores Opened This Year' tile.



As evident from the tile – more Fashions Direct stores than Lindseys stores opened this year.

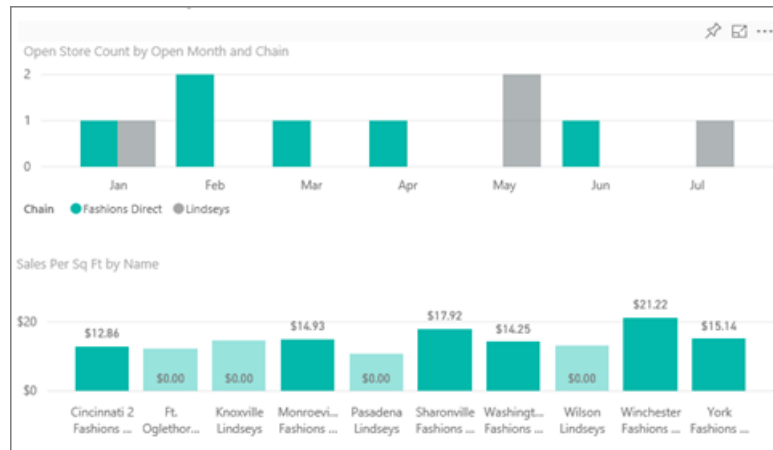
2. Observe the 'Sales Per Sq Ft by Name' chart:



There is quite a bit of difference in Average Sales per SQF across the new stores.

3. Click on the Fashions Direct legend item in the top right chart. Notice, even for the same chain, the best

store (Winchester Fashions Direct) significantly outperforms the worst store (Cincinnati 2 Fashions Direct) \$21.22 vs \$12.86 respectively.



4. Click Winchester Fashions Direct in the slicer and observe the line chart. The first sales numbers were reported in February.
5. Click on Cincinnati 2 Fashions Direct in the slicer and you will see in the line chart that it was opened in June and it seems to be the worst performing store.
6. As before, explore by clicking on other bars, lines and bubbles throughout the charts and see what insights you can discover.

This is a safe environment to play in. You can always choose not to save your changes. But if you do save them, you can always go to Get Data for a new copy of this sample.

Connect to your data

We hope this tour has shown how Power BI dashboards, Q&A, and reports can provide insights into retail data. Now it's your turn — connect to your own data. With Power BI you can connect to a wide variety of data sources. Learn more about [getting started with Power BI](#).

Next steps

- [Download the Retail Analysis sample content pack](#)
- [Download the Excel workbook for this Power BI sample](#)
- [Get data \(for Power BI\)](#)
- [Power BI - Basic Concepts](#)
- More questions? [Try the Power BI Community](#)

Favorite dashboards, reports, and apps in Power BI service

1/10/2018 • 1 min to read • [Edit Online](#)

When you make content a *favorite*, you'll be able to access it from all of your workspaces. Favorites are typically the content that you visit most often.


NOTE

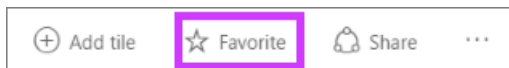
This topic applies to Power BI service, and not to Power BI Desktop.

You can also select a single dashboard as a [featured dashboard](#) in Power BI service.

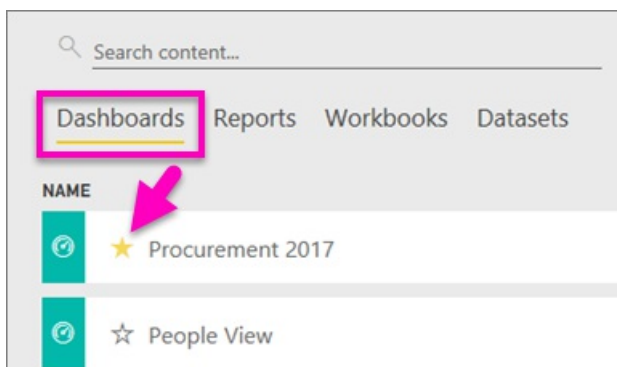
Add a dashboard or report as a *favorite*

Watch Amanda add favorites to her workspace, then follow the step-by-step instructions below the video to try it out yourself.

1. Open a dashboard or report that you use often. Even content that has been shared with you can be a *favorite*.
2. From the upper right corner of Power BI service, select **Favorite** or the star  icon.

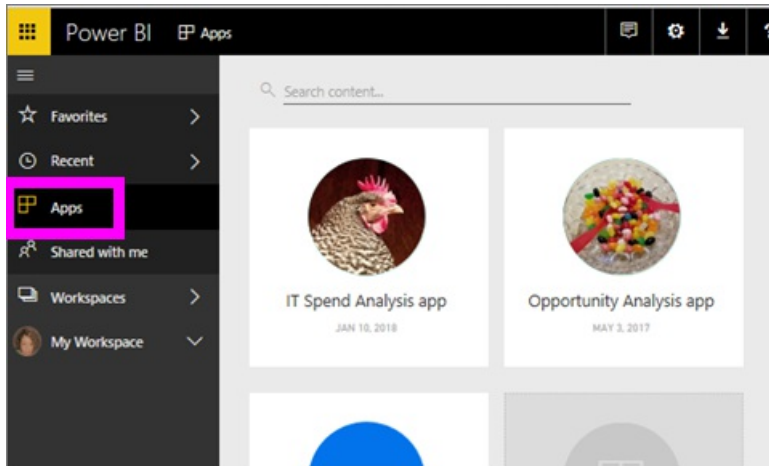



You can also favorite a dashboard or report from your workspace **Dashboards** or **Reports** content view tab.

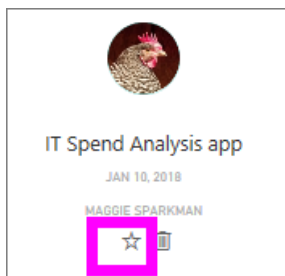


Add an app as a *favorite*

1. From the left navpane, select **Apps**.

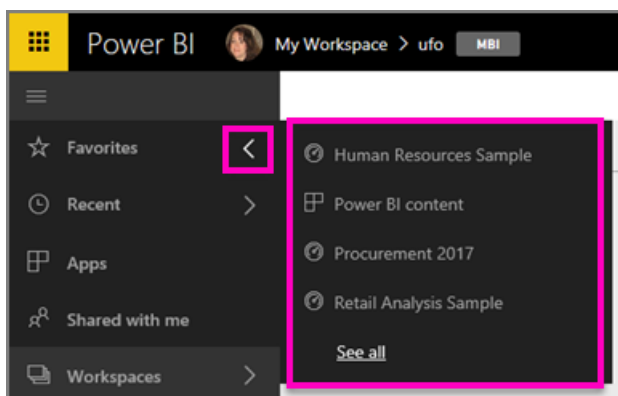



2. Hover over an app to display more detail. Select the star  icon to set as a favorite.

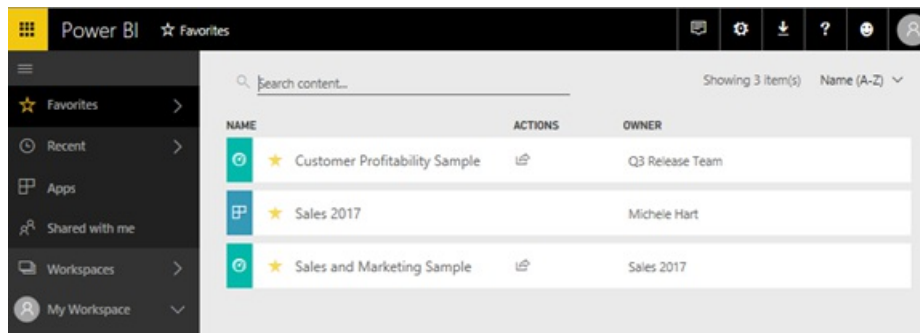


Working with *favorites*

1. To access your favorites, from any workspace, select the flyout arrow to the right of **Favorites**. From here you can select a favorite to open it. Only five favorites are listed (alphabetically). If you have more than five, select **See all** to open the favorites screen (see #2, below).



2. To see **all** the content that you have added as favorites, in the left navpane, select **Favorites** or the Favorites  icon.

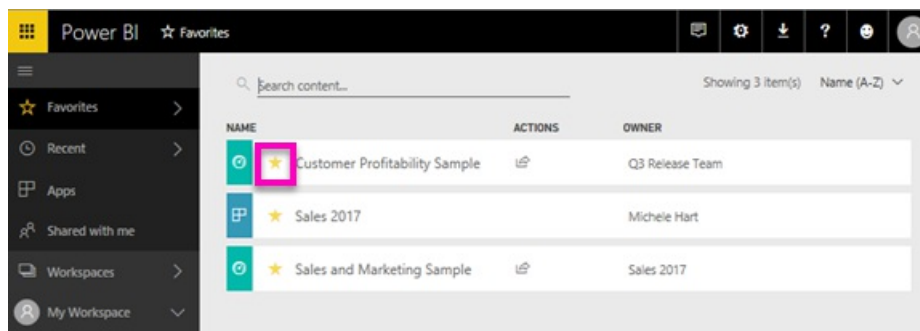


From here you can take action: open, identify owners, and even share with your colleagues.

Unfavorite content

No longer use a report as often as you used to? You can unfavorite it. When you unfavorite content, it is removed from your Favorites list but not from Power BI.

1. In the left navigation pane, select **Favorites** to open the **Favorites** screen.



2. Select the yellow star next to the content to unfavorite.

NOTE: You can also unfavorite a dashboard, report, or app itself. Just open and de-select the yellow icon.

Next steps

[Get Started with Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Printing from Power BI service

12/7/2017 • 2 min to read • [Edit Online](#)

Print an entire dashboard, a dashboard tile, a report page, or a report visual from Power BI service. Reports can only be printed one page at a time -- you can't print the entire report at once.

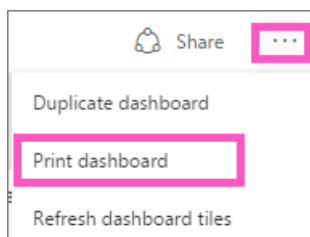
NOTE

Printing is only available in Power BI service and not Power BI Desktop.

Watch Amanda print from her dashboard and report. Then follow the step-by-step instructions below the video to try it out yourself.

Print a dashboard

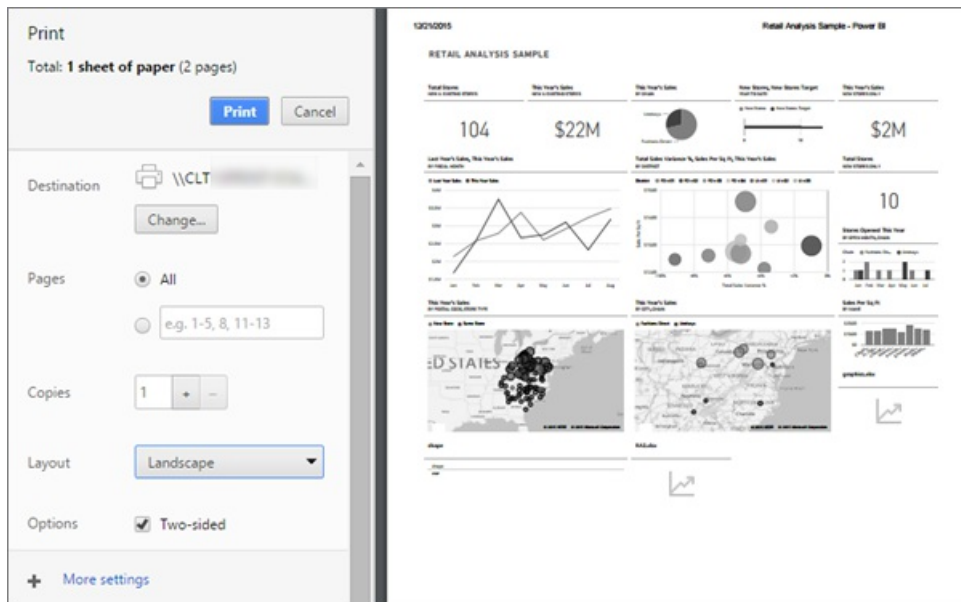
1. Open the dashboard that you'd like to print.
2. In the top right corner, select the ellipses (...) and choose **Print dashboard**.




3. The Print window for your browser opens. Choose the settings and print destination, and select **Print**.

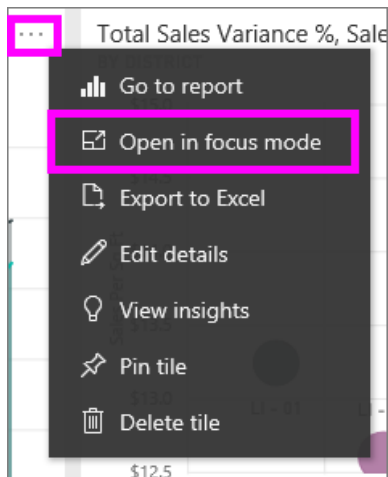
NOTE


The print dialog you see will depend on which browser you are using.



Print a dashboard tile

1. Open the tile in Focus mode by selecting the ellipses and choosing the Focus icon  .



2. Open the tile in full screen mode by selecting the full screen icon  from the top navbar.
3. Hover over the tile to reveal the Options menu.



4. Select the Print icon  .

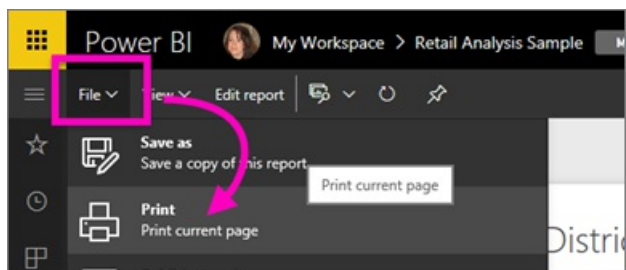
NOTE

The print dialog you see will depend on which browser you are using.

Print a report page

Reports can be printed one page at a time.

1. Open the report in either Reading View or Editing View.
2. Select **File** > **Print** to print the current report page.




3. The Print window for your browser opens.

NOTE

The print dialog you see will depend on which browser you are using.

Print a report visual

1. [Open the visual in Focus mode](#) by hovering over the tile and selecting the Focus icon  from the top-right corner.
2. Follow steps 2-3 under *Print a report page* above.

Considerations and troubleshooting

- Q: I cannot find the **Print** button.
- A: If you are using Power BI Desktop, printing is not supported. Printing only works in Power BI service.
- Q: I cannot print all the report pages at once.
- A: That is correct. Report pages can only be printed one page at a time.
- Q: I cannot print to PDF.
- A: You will only see this option if you've already configured the PDF driver in your browser.
- Q: What I see when I select **Print** doesn't match what you're showing me here.
- A: The Print screens vary by browser and software version.
- Q: My printout isn't scaled correctly. My dashboard doesn't fit on the page. Other scaling and orientation questions.
- A: We cannot guarantee that the printed copy will be exactly the same as it appears in Power BI service. Things like scaling, margins, visual details, orientation, and size are not controlled by Power BI. For help with issues like this, refer to the documentation for your specific browser.

Next steps

[Share dashboards and reports with colleagues and others](#)

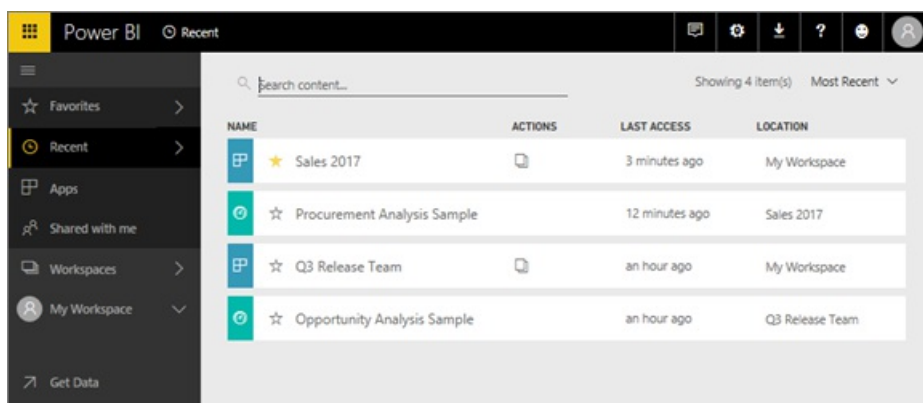
More questions? [Try the Power BI Community](#)

Recent content in Power BI service

12/7/2017 • 1 min to read • [Edit Online](#)

What is recent content

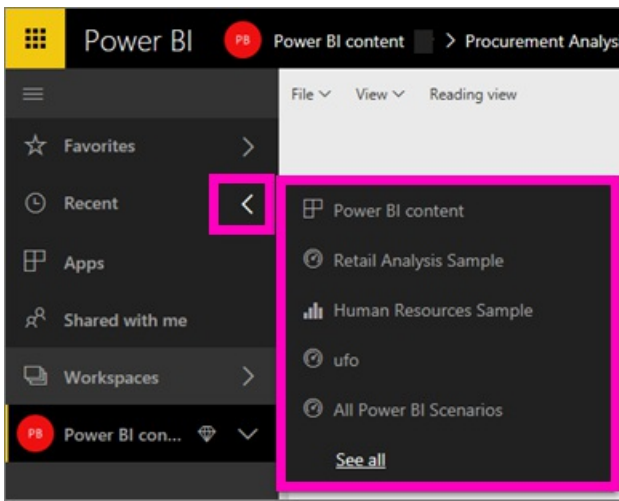
Recent content is the last items you visited, up to a maximum of 20 items. These include: dashboards, reports, apps, and workbooks across all of your workspaces.




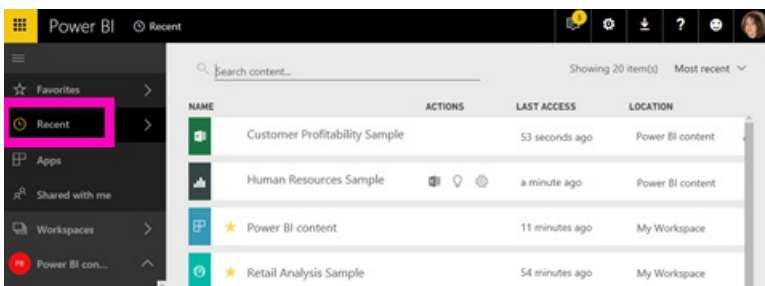
Watch Amanda demonstrate how **Recent** content lists are populated, then follow the step-by-step instructions below the video to try it out yourself.

Display recent content

To see your five most-recently visited items, from the left navigation, select the arrow to the right of **Recent**. From here you can select recent content to open it. Only the five most-recent items are listed.



If you have more than five recently-visited items, select **See all** to open the Recent screen (see below). You can also select **Recent**, or the Recent  icon, from the left nav.



From here you can interact with the content as you would on the individual **Dashboards**, **Reports**, and **Workbooks** tabs, and on the **Apps** screen.

Next steps


[Power BI service Apps](#)

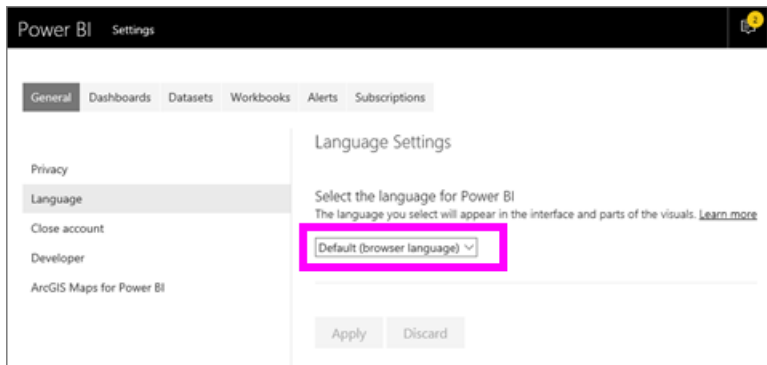
More questions? [Try the Power BI Community](#)

Subscribe to a Power BI report or dashboard

1/25/2018 • 6 min to read • [Edit Online](#)

It's never been easier to stay up-to-date on your most important dashboards and reports. Subscribe to report pages and dashboards that matter most to you, and Power BI will email a snapshot to your inbox. You tell Power BI how often you want to receive the emails: from once a day to once a week. The email and snapshot will use the language set in Power BI Settings. If no language is defined, Power BI uses the current browser language.

To see or set your language preference, select the cog icon  > **Settings** > **General** > **Language**.



NOTE

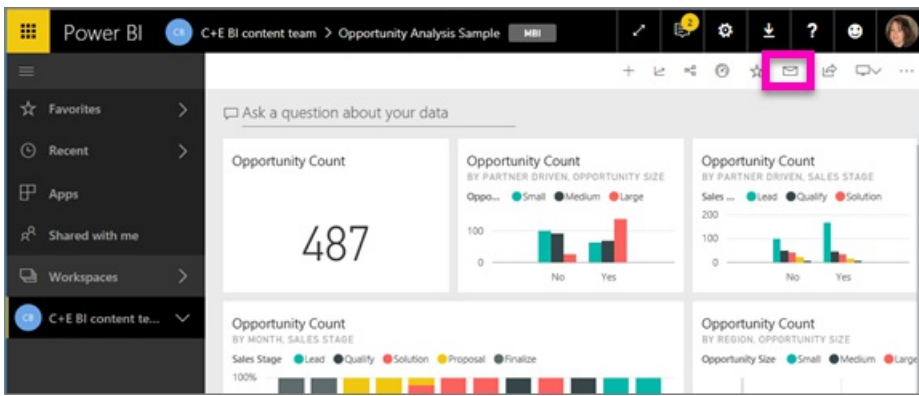
Subscriptions can only be created in Power BI service. When you receive the email it will include a link to "go to report/dashboard". On mobile devices with Power BI apps installed, selecting this link launches the app (as opposed to the default action of opening the report or dashboard on the Power BI website).

Watch Sirui set up an email subscription for a report. Then follow the step-by-step instructions below the video to try it out yourself.

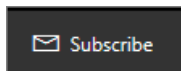
Requirements

Creating a subscription is a Power BI Pro feature and you must have view or edit permissions to the content (dashboard or report).

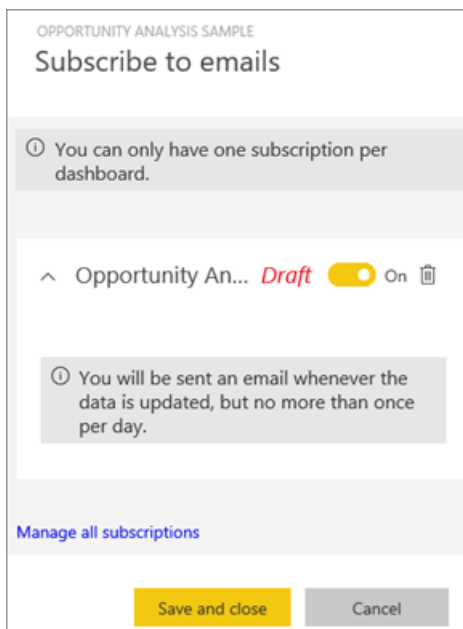
Subscribe to a dashboard



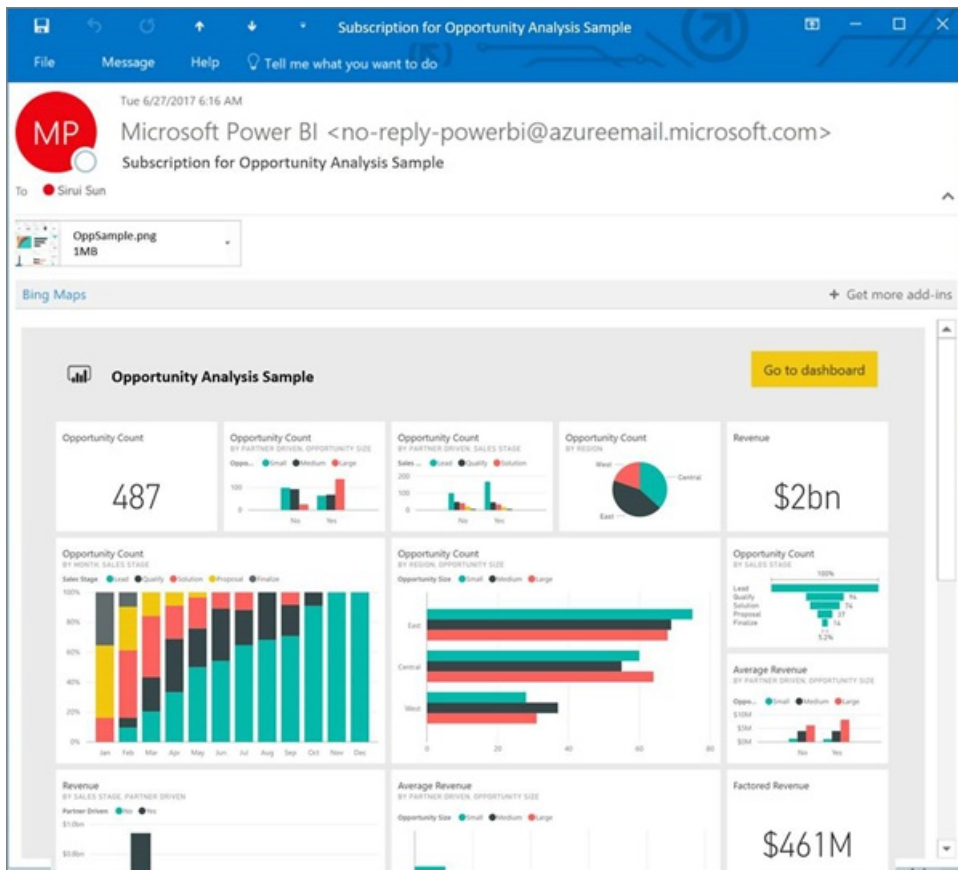
1. Open the dashboard.
2. From the top menubar, select **Subscribe** or select the envelope icon .



3. Use the yellow slider to turn the subscription on and off. Setting the slider to Off will not delete the subscription. To delete the subscription, select the trashcan icon.




4. Select **Save and close** to save the subscription. You will receive an email snapshot of the dashboard each time any of the underlying datasets change. If the dashboard refreshes more than once a day, you will only receive the email snapshot after the first refresh.

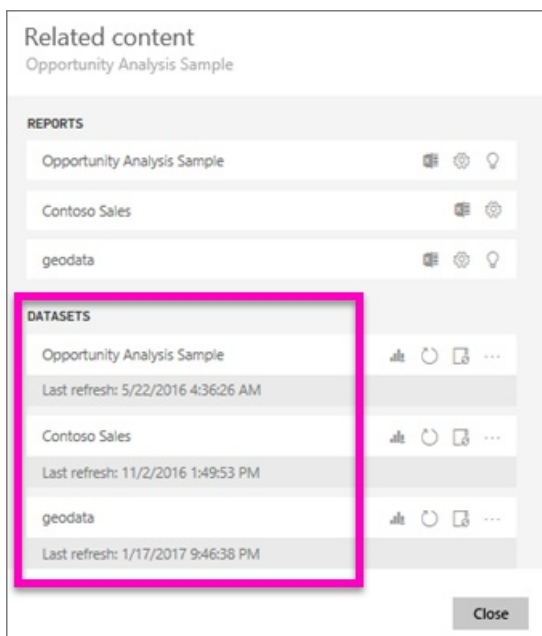


TIP

Want to see the email right away? Trigger an email by refreshing one of the datasets associated with the dashboard. (If you don't have edit permissions to the dataset, you will have to ask someone who has those permissions to do this for you.) To find out which datasets are being used to create the dashboard, from the dashboard, select the

View related icon 

to open **Related content** and then select the refresh icon .

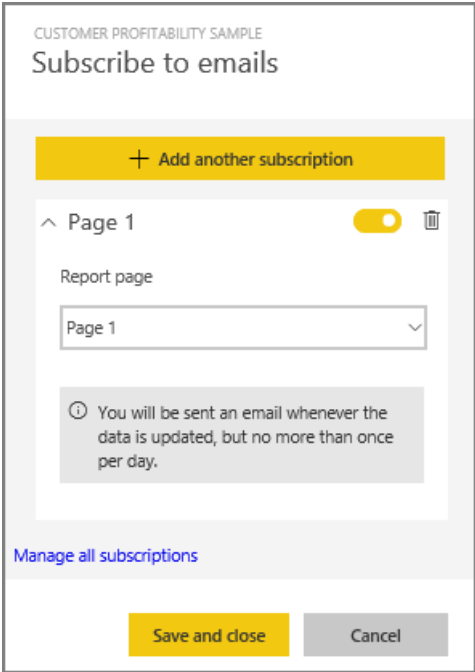


Subscribe to a report page

1. Open the report in [Reading view](#).
2. From the top menubar, select **Subscribe**.



3. You can subscribe to one report page at a time. Select the particular report page from the dropdown.

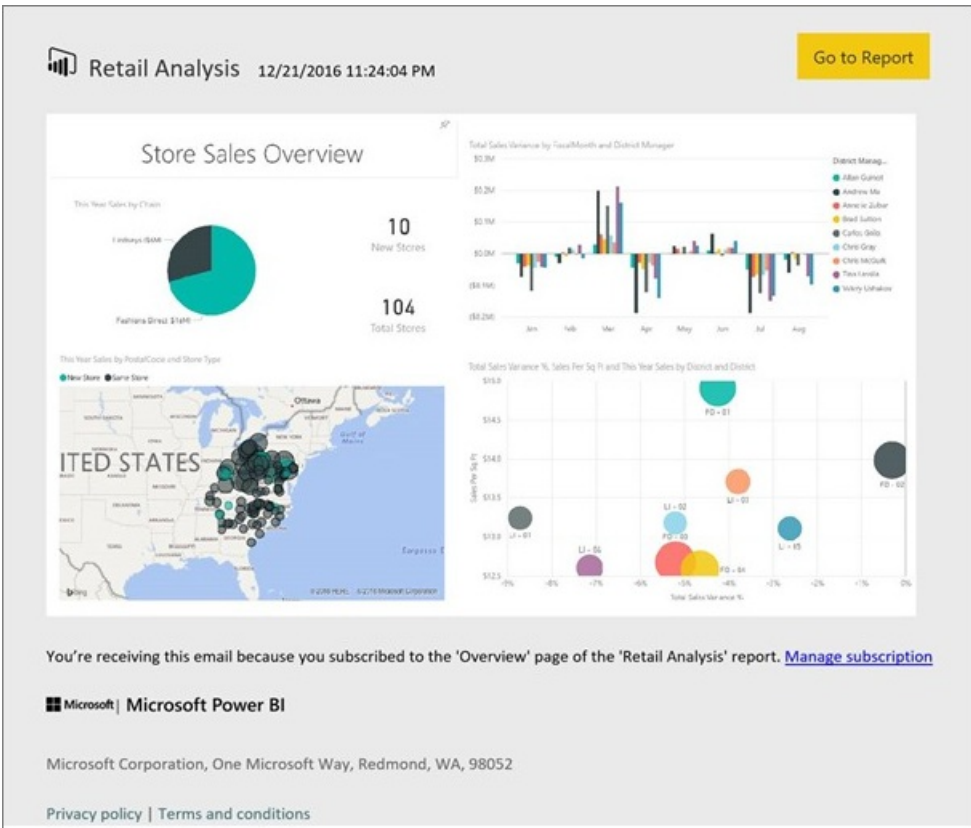


Continue to add report pages.

4. Use the yellow slider to turn the subscription for each page on and off. Setting the slider to Off will not delete the subscription. To delete the subscription, select the trashcan icon.



5. Select **Save and close** to save the subscription. You will receive an email snapshot of each report page when the report is refreshed. If the report doesn't refresh, you will not receive a snapshot email that day. If the report refreshes more than once a day, you will only receive the email snapshot after the first refresh.



TIP

Want to see the email right away? Trigger an email by opening your dataset and selecting **Refresh now**. If you don't have edit permissions to the dataset, you will have to ask someone who has those permissions to do this for you.




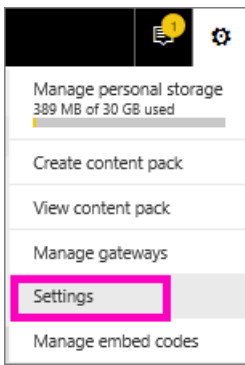
How the email schedule for reports is determined

The following table describes how frequently you will receive an email. It all depends on the connection method of the dataset upon which the dashboard or report is based (DirectQuery, Live connection, imported to Power BI, or Excel file in OneDrive or SharePoint Online) and on the subscription options available and selected (daily, weekly, or none).

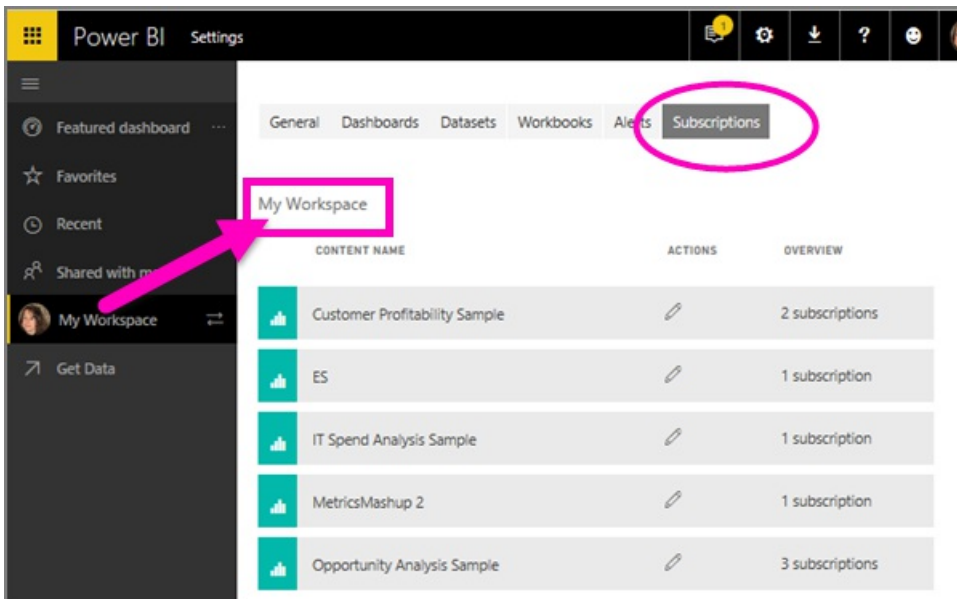
	DIRECTQUERY	LIVE CONNECT	SCHEDULED REFRESH (IMPORT)	EXCEL FILE IN ONEDRIVE/SHAREPOINT ONLINE
How often does the report/dashboard get refreshed?	Every 15m	Power BI checks every 15 minutes, and if the dataset has changed, the report is refreshed.	User selects none, daily, or weekly. Daily can be up to 8 times a day. Weekly is actually a weekly schedule that the user creates and sets refresh for as few as once a week and as often as daily.	Once every hour
How much control does the user have over the subscription email schedule?	Options are: daily or weekly	No options: users is sent an email if the report refreshes, but no more than once per day.	If the refresh schedule is daily, options are daily and weekly. If the refresh schedule is weekly only option is weekly.	No options: user is sent an email whenever the dataset is updated, but no more than once per day.

Manage your subscriptions

There are 2 paths to the screen for managing your subscriptions. The first is by selecting **Manage all subscriptions** from the **Subscribe to emails** dialog (see step 3 above). The second is by selecting the Power BI cog icon  from the top menubar and choosing **Settings**.



The particular subscriptions displayed will depend on which workspace is currently active. To see all of your subscriptions at once for all workspaces, be sure that **My Workspace** is active. For help understanding workspaces, see [Workspaces in Power BI](#).




A subscription will end if the Pro license expires, the dashboard or report is deleted by the owner, the user account used to create the subscription is deleted.

Considerations and troubleshooting

- At the current time, subscribe is not available for dashboards or reports that come from content packs or Power BI apps. But there is a workaround...make a copy of the report/dashboard and add subscriptions to that version instead.
- Report page subscriptions are tied to the name of the report page. If you subscribe to a report page, and rename it, you will have to re-create your subscription
- For email subscriptions on live connection datasets, you will only get emails when the data changes. So, if a refresh occurs but no data changes, Power BI will not send you an email.
- Email subscriptions do not support most [custom visuals](#). The one exception is those custom visuals that have been [certified](#).
- Email subscriptions are sent with the report's default filter and slicer states. Any changes to the defaults that you make before subscribing will not show up in the email.
- E-mail subscriptions are not yet supported on reports pages created by the Power BI Desktop live connect to service feature.
- For dashboards subscriptions specifically, certain types of tiles are not yet supported. These include: streaming tiles, video tiles, custom web content tiles.
- If you share a dashboard with a colleague outside of your tenant, they will not be able to subscribe to the dashboard or its associated report pages. So if you are aaron@xyz.com, you can share with anyone@ABC.com.

But anyone@ABC.com cannot subscribe to the shared content.

- Subscriptions may fail on dashboards or reports with extremely large images due to email size limits.
- Power BI automatically pauses refresh on datasets associated with dashboards and reports that have not been visited in more than 2 months. However, if you add a subscription to a dashboard or report, it will not be paused even if it goes unvisited.
- If you are not receiving the subscription emails, ensure that your User Principal Name (UPN) is able to receive emails. [The Power BI team is working on relaxing this requirement](#), so stay tuned.
- Sent reports and dashboards use your Power BI language setting. The default language is English. To see or set your language preference, select the cog icon  > **Settings** > **General** > **Language**.

Next steps

- More questions? [Try asking the Power BI Community](#)
- [Read the blog post](#)

Rename almost anything in Power BI service


12/20/2017 • 2 min to read • [Edit Online](#)

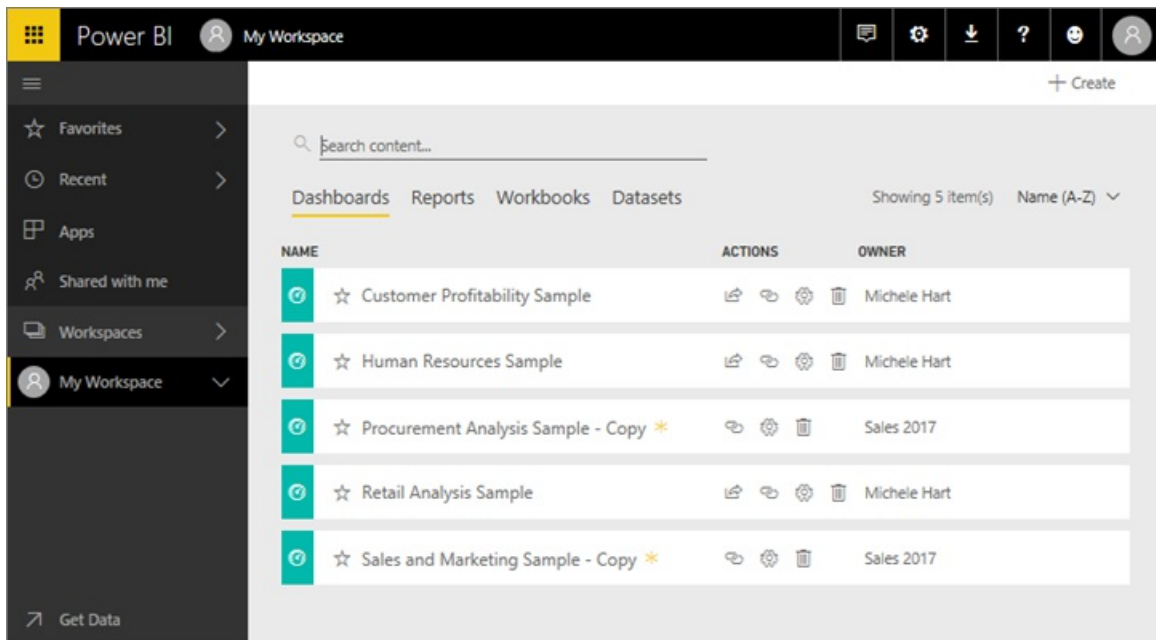
This article teaches you how to rename a dashboard, report, report page, workbook, dataset, app, and workspace in Power BI service.

Can I change the name?

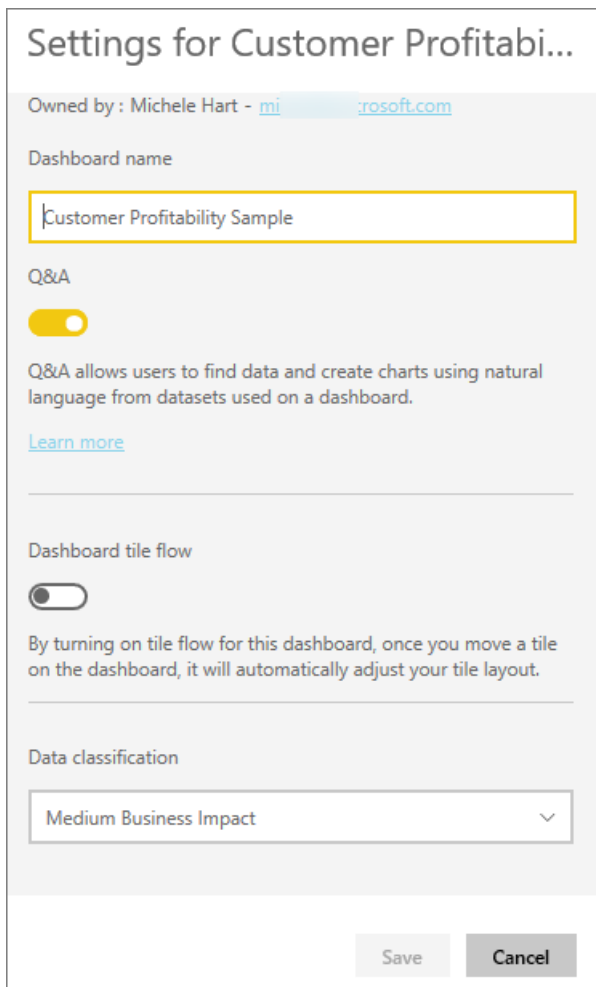
CONTENT TYPE	I'M THE AUTHOR OR CREATOR	SHARED WITH ME
Dashboard in a workspace	Yes	No
Report in a workspace	Yes	No
Workbook in a workspace	Yes	No
Dataset in a workspace	Yes	No
App workspace	Yes, if you are the owner or have Admin permissions	No
Published apps	Not from the App screen, but the app name can be changed from the app workspace and re-published with a new name if you have Admin permissions	No
App content (dashboard, report, workbook, dataset)	Not from the App screen, but the app's content can be renamed from the app workspace and re-published with a new name if you have Admin permissions	No
Content in Shared with me	No	No

Rename a dashboard, report, or workbook

1. Start in a workspace and select the **Dashboards**, **Reports**, or **Workbooks** tab. Hover over the item to rename, and select the gear icon . If there is no gear icon, you do not have permissions to rename.












2. On the Settings page, type the new name and select **Save**.

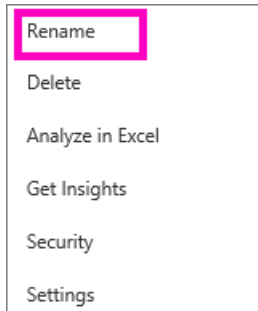


Rename a dataset

1. Start in a workspace and select the **Datasets** tab.

Dashboards Reports Workbooks <u>Datasets</u>			
NAME		ACTIONS	LAST
 Human Resources Sample	   		5/3
 People View	  		7/6

2. Hover over the item to rename, select the ellipses (...), and choose **Rename**.



NOTE

The options in the dropdown will vary.

3. On the Settings page, type a new name and select **Save**.

Rename Retail Analysis Sample

Dataset name

Retail Analysis Sample

Save
Cancel

Rename an App workspace

Anyone with Admin permissions can rename an app workspace.

1. Start in the workspace you'd like to rename.
2. In the top-right corner, select the ellipses (...) and choose **Edit workspace**. If you don't see this option, then you don't have permissions to rename this workspace.

- Files
- Members
- Calendar
- Conversations
- Edit workspace
- Leave workspace
- Unpublish App

3. Type a new workspace name and select **Save**.

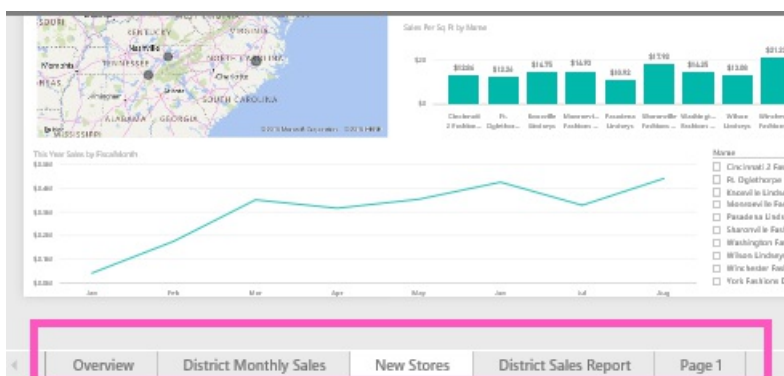
Edit workspace

Name

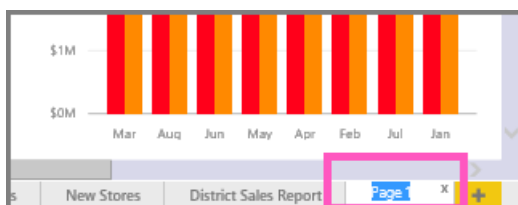
Rename a page in a report

Don't like the name of a page in your Power BI report? A new name is just a click away. Pages can be renamed in [report Editing view](#).

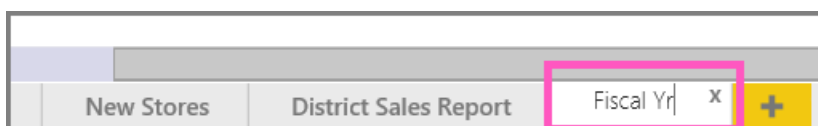
1. Open the report in [Editing View](#).
2. Locate the report page tabs at the bottom of the Power BI window.



3. Open the report page that you'd like to rename by selecting the tab.
4. Double-click the name on the tab to highlight it.



5. Type a new report page name and select ENTER.



Considerations and troubleshooting

- If the item to be renamed has been shared with you, or is part of a content pack, you won't see the gear icon and you won't have access to Settings.

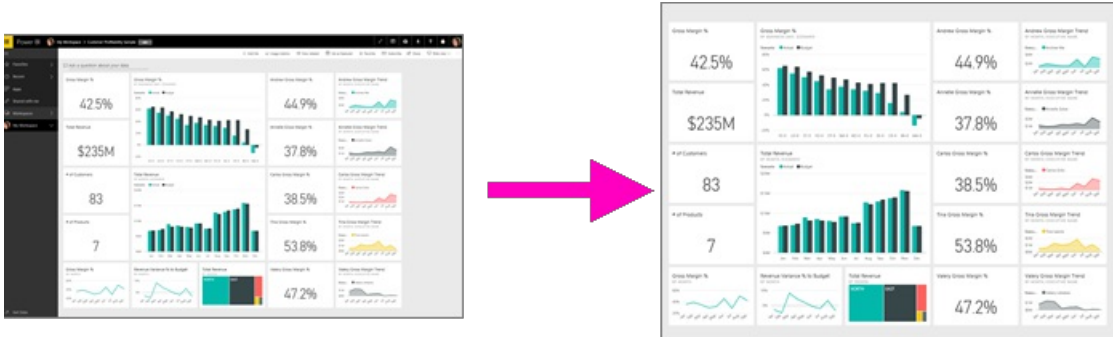
- On the **Datasets** tab, if you don't see the ellipses (...), expand your browser window.

More questions? [Try the Power BI Community](#)

Full screen mode in Power BI

12/7/2017 • 2 min to read • [Edit Online](#)

What is full screen mode?



Display your content (dashboards, report pages, tiles, and visualizations) without the distraction of menus and navigation bars. You get an unadulterated, full view of your content at a glance, all the time. This is sometimes referred to as TV Mode. The functionality available in full screen mode varies by content.


Some uses for full screen mode are:

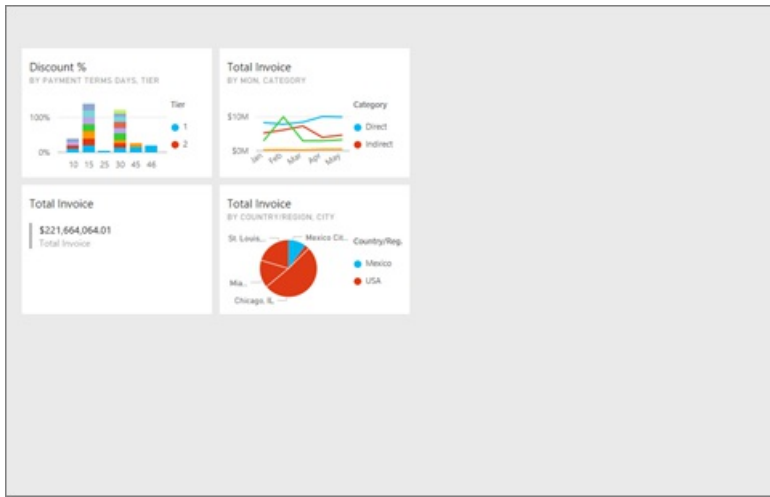
- presenting your dashboard, tile, visual, or report at a meeting or conference
- displaying in an office on a dedicated large screen or projector
- viewing on a small screen
- reviewing in locked mode -- you can touch the screen or mouse over tiles without opening the underlying report or dashboard

NOTE: Full screen mode is different from [Focus \(pop out\) mode](#).

Watch Amanda open and navigate her dashboard in full screen mode and then apply some URL parameters to control the default display. Then follow the step-by-step instructions below the video to try it out yourself.

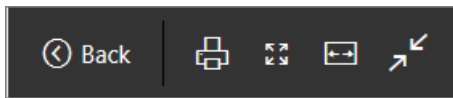
Dashboards and report pages in full screen mode

1. From the Power BI menu bar above your dashboard or report, select the **full screen** icon . Your dashboard canvas or report page fills the entire screen. The example below is a dashboard.



2. In full screen mode, you have several menu options. To reveal the menu, just move your mouse or cursor.

Menu for dashboards



Menu for report pages



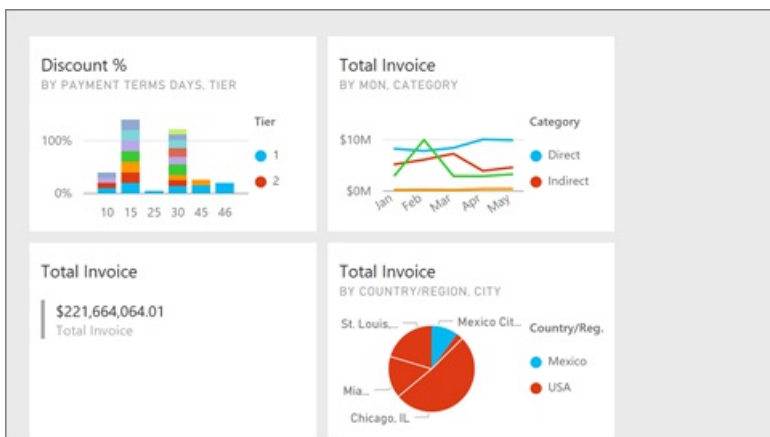
Use the **Back** button to navigate to the previous page in your browser. If the previous page was a Power BI page, it too will display in full screen mode. Full screen mode will persist until you exit out.



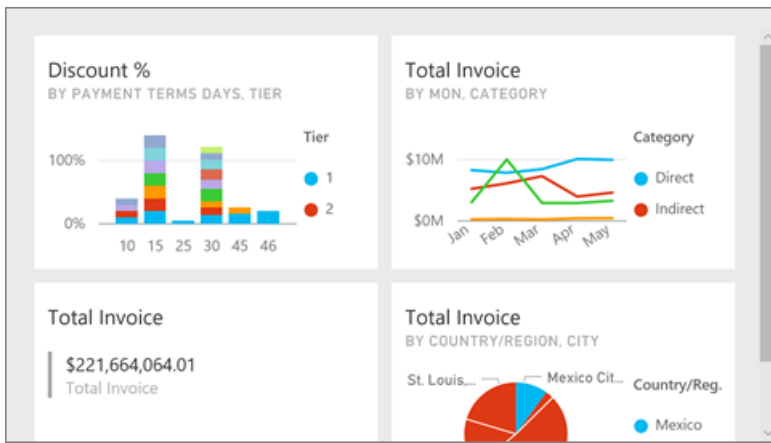
Use this button to print your dashboard or report page in full screen mode.



Use the **Fit to screen** button to display your dashboard at the largest size possible without resorting to scrollbars.



Sometimes you don't care about scrollbars, but want the dashboard to fill the entire width of the available space. Select the **Fit to width** button.



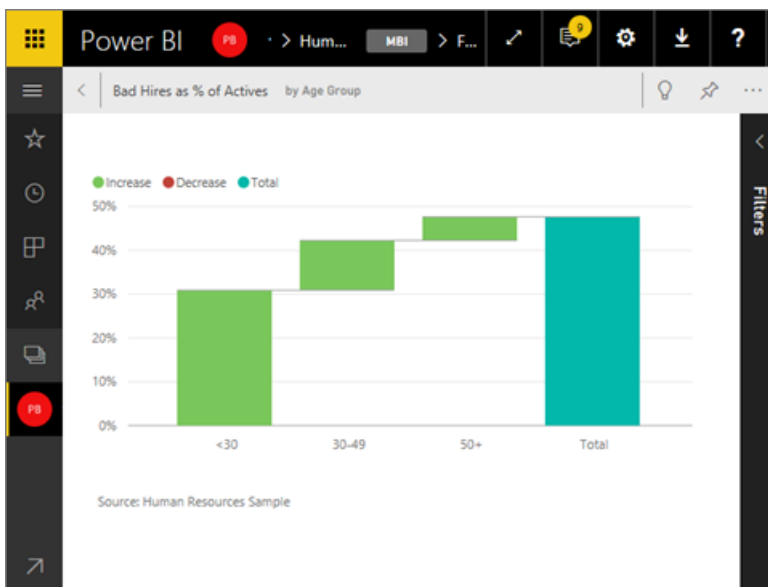
In full screen reports, use these arrows to move between the pages in the report.


- To exit full screen mode, select the **Exit full screen** icon.

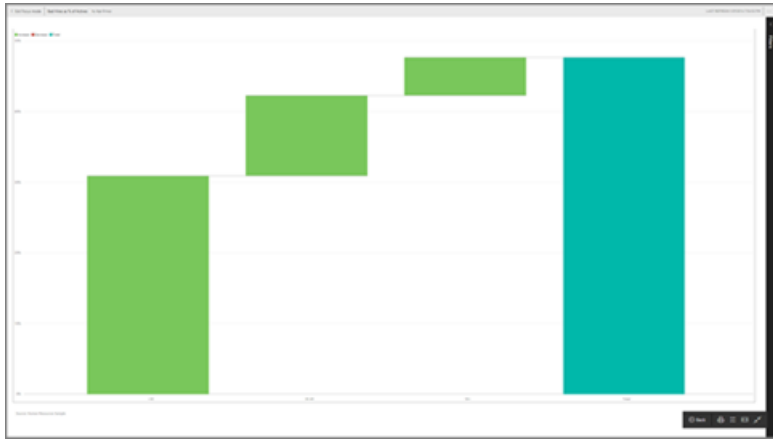


Visualizations and dashboard tiles in full screen mode

- To display dashboard tiles and report visualizations in full screen mode, you must start with that tile or visualization already in [Focus mode](#).



- Then, select the Full screen icon  for that tile or visual. The tile or visual will display full screen without menus or navigation bars.



Next steps

[Dashboards in Power BI](#)

[Focus mode](#)

More questions? [Try the Power BI Community](#)

Delete almost anything in Power BI service

1/10/2018 • 4 min to read • [Edit Online](#)


This article teaches you how to delete a dashboard, report, workbook, dataset, app, visualization, and workspace in Power BI service.

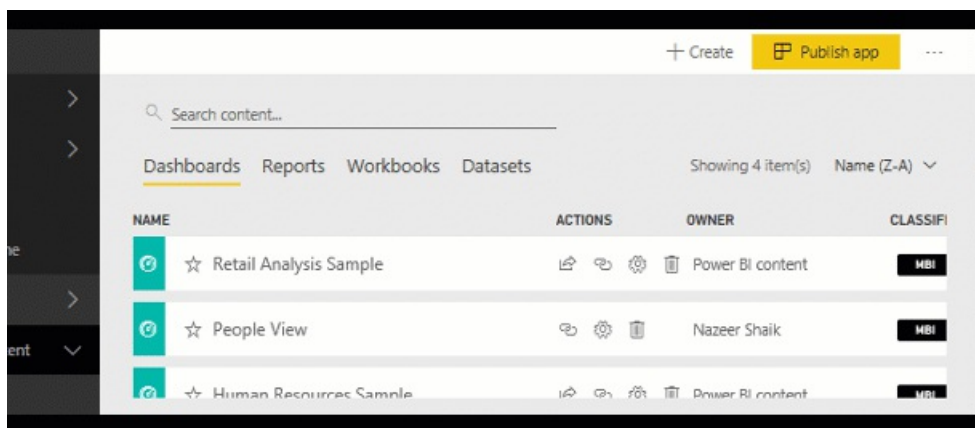
Delete a dashboard

Dashboards can be removed. Removing the dashboard does not delete the underlying dataset or any reports associated with that dashboard.

- If you are the owner of the dashboard, you can remove it. If you've shared the dashboard with colleagues, removing the dashboard from your Power BI workspace will remove the dashboard from their Power BI workspaces.
- If a dashboard is shared with you and you no longer want to see it, you can remove it. Removing a dashboard does not remove it from anyone else's Power BI workspace.
- If a dashboard is part of an [organizational content pack](#), the only way to remove it is to remove the associated dataset.

To delete a dashboard


1. In your workspace, select the **Dashboards** tab.
2. Locate the dashboard to delete and select the Delete icon  .

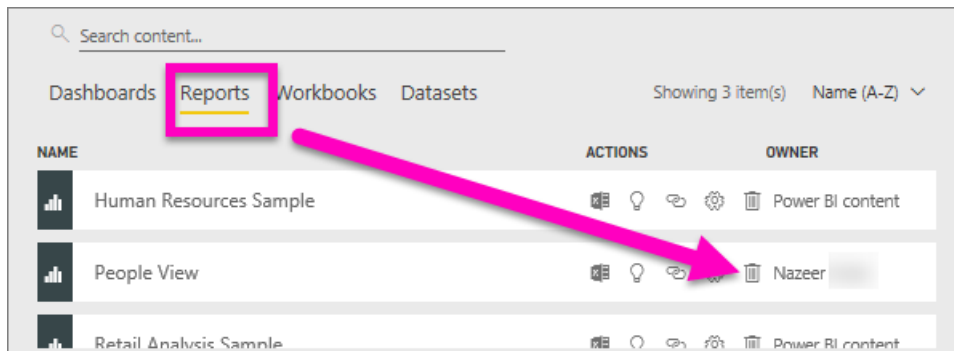


Delete a report

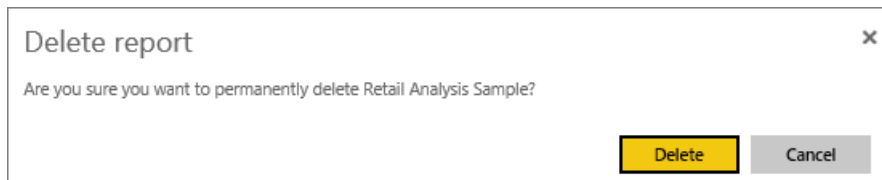
Don't worry, deleting a report does not delete the dataset that the report is based on. And any visualizations that you pinned from the report are also safe -- they remain on the dashboard until you delete them individually.

To delete a report

1. In your workspace, select the **Reports** tab.
2. Locate the report to delete and select the Delete icon  .



3. Confirm the deletion.



NOTE


If the report is part of a [content pack](#), you will not be able to delete it using this method. See [Remove your connection to an organizational content pack](#).

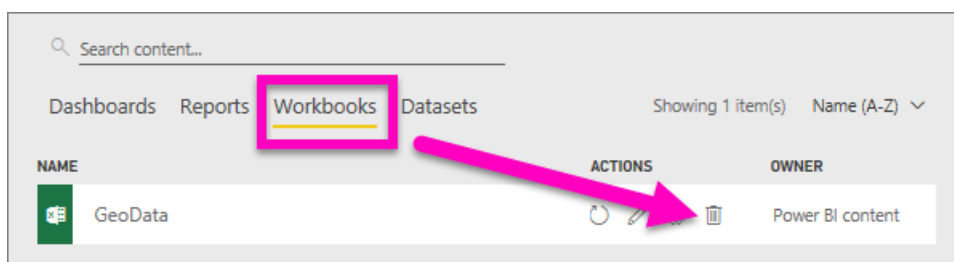
Delete a workbook

Workbooks can be removed. However, removing a workbook also removes all reports and dashboard tiles that contain data from this workbook.

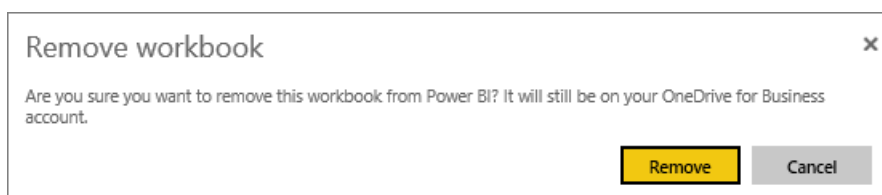
If the workbook is stored on OneDrive for Business, deleting it from Power BI does not delete it from OneDrive.

To delete a workbook

1. In your workspace, select the **Workbooks** tab.
2. Locate the workbook to delete and select the Delete  icon.



3. Confirm the deletion.



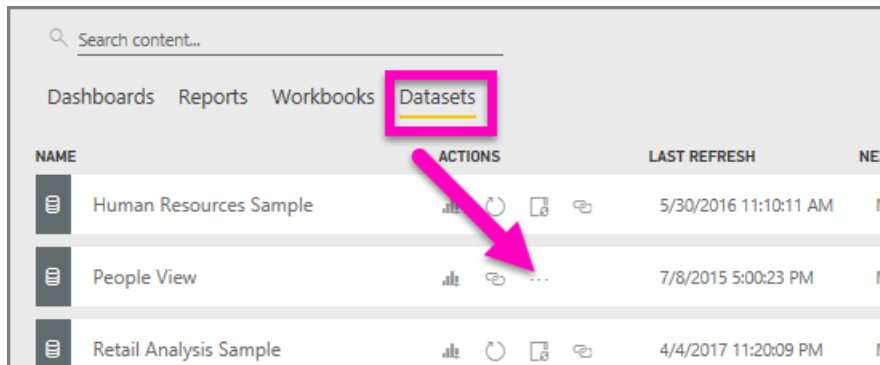
Delete a dataset

Datasets can be deleted. However, deleting a dataset also deletes all reports and dashboard tiles that contain data from that dataset.

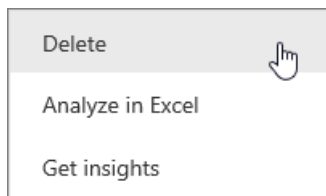
If a dataset is part of one or more [organizational content packs](#), the only way to delete it is to remove it from the content packs where it's being used, wait for it to be processed, and then try deleting it again.

To delete a dataset

1. In your workspace, select the **Datasets** tab.
2. Locate the dataset to delete and select the ellipses (...).



3. From the dropdown, select **Delete**.



4. Confirm the deletion.



Delete an app workspace

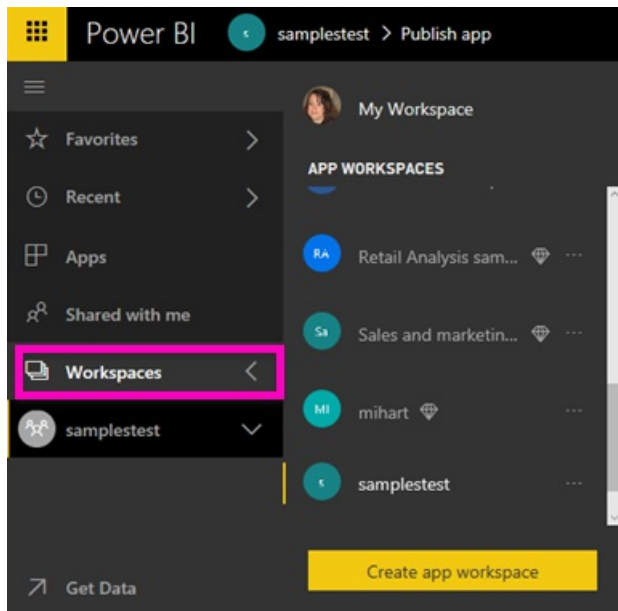
WARNING

When you create an app workspace, you create an Office 365 group. And when you delete an app workspace you delete that Office365 group. What this means is that the group will also be deleted from other O365 products like SharePoint and Microsoft Teams.

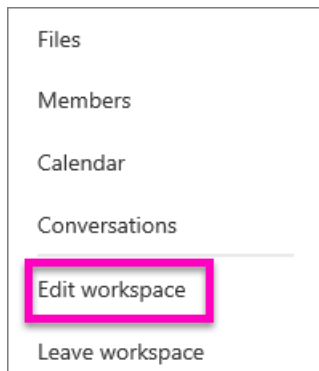
As the app workspace author, you can delete it. When you delete it, the associated app is also deleted for all group members and removed from your AppSource if you had published the app to your entire organization. Deleting an app workspace is different from leaving an app workspace.

To delete an app workspace - if you are an Admin

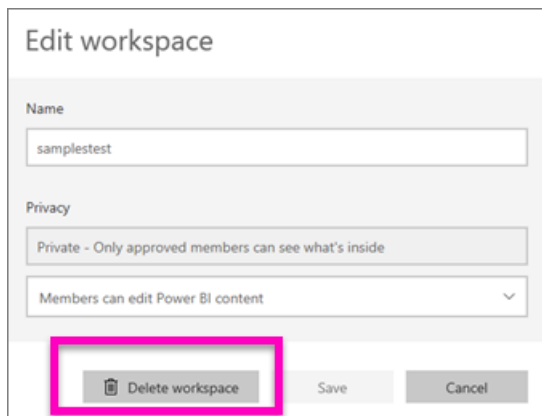
1. From the left nav, select **Workspaces**



2. Select the ellipses (...) to the right of the workspace to be deleted and choose **Edit workspace**.



3. In the **Edit workspace** window, select **Delete workspace > Delete**.



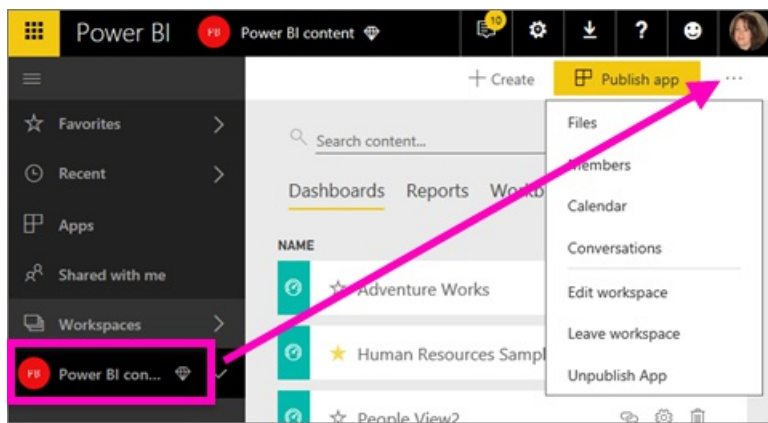
To remove an app workspace from your list

If you no longer want to be a member of an app workspace, you can **leave** it and it will be removed from your list. Leaving a workspace leaves it in place for all other workspace members.

IMPORTANT

If you are the only Admin for the app workspace, Power BI will not allow you to leave.

1. Start in the app workspace you'd like to remove.
2. In the top-right corner, select the ellipses (...) and choose **Leave workspace > Leave**.



NOTE


The options you see in the dropdown depend on whether you are an Admin or Member of that app workspace.

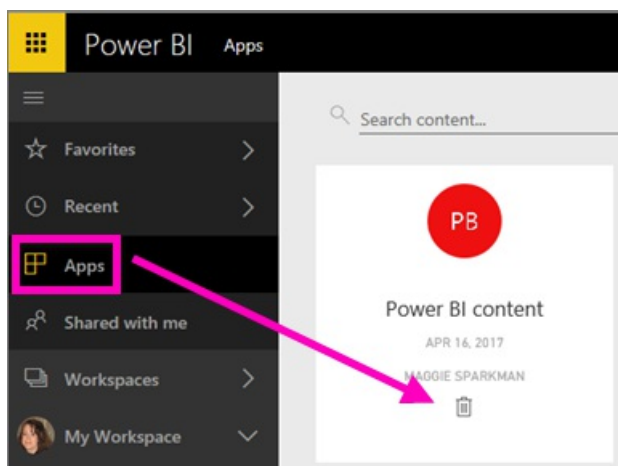
Delete or remove an App

Apps can be easily removed from your apps list page. But only an app Admin can permanently delete an app.

Remove an app from your app list page

Deleting an app from your app list page does not delete the app for other members.

1. In your left nav, select **Apps** to open the apps list page.
2. Hover over the app to delete, and select the Delete  icon.



If you remove an app accidentally, you have several options for getting it back. You can ask the app creator to re-send it, you can find the original email with the link to the app, you can check your [Notifications center](#) to see if the notification for that app is still listed, or you can check your organization's [AppSource](#).

Considerations and troubleshooting

This article covered how to delete the major building blocks of Power BI service. But there are more things that you can delete in Power BI.

- [Remove your Featured dashboard](#)
- [Remove \(unfavorite\) a dashboard](#)
- [Delete a report page](#)
- [Delete a dashboard tile](#)
- [Delete a report visualization](#)

More questions? [Try the Power BI Community](#)

Display a dashboard tile or report visual in focus mode

12/7/2017 • 1 min to read • [Edit Online](#)

What is focus mode?

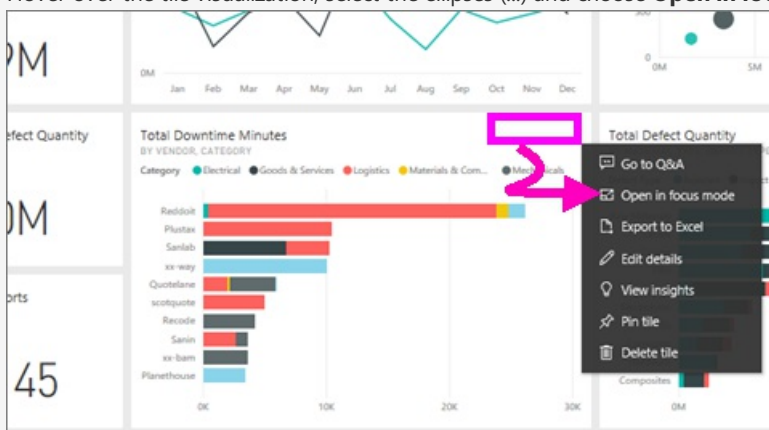
Focus mode lets you expand (pop out) a dashboard tile or report visual to see more detail. While in focus mode, you can view and modify filters that were applied when this visual was created.

NOTE

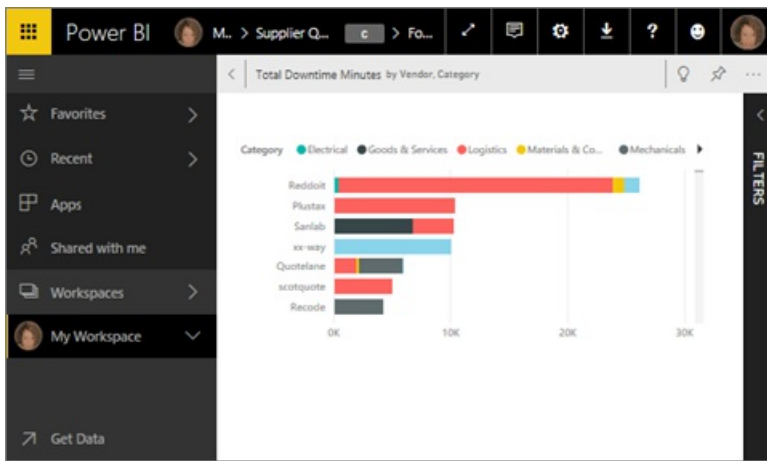
Focus is different from [full screen mode](#).

Focus mode for dashboard tiles

1. Hover over the tile visualization, select the ellipses (...) and choose **Open in focus mode**



1. The tile opens and fills the entire report canvas.

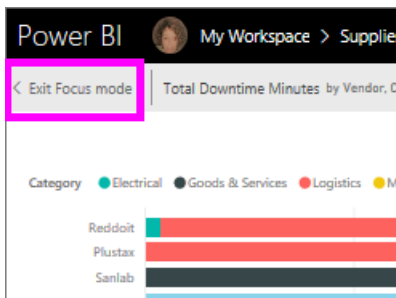


2. Expand the Filters pane to see all filters applied to this visual.



3. Explore further by modifying the filters and, if you discover something interesting, pin the visual to a dashboard.

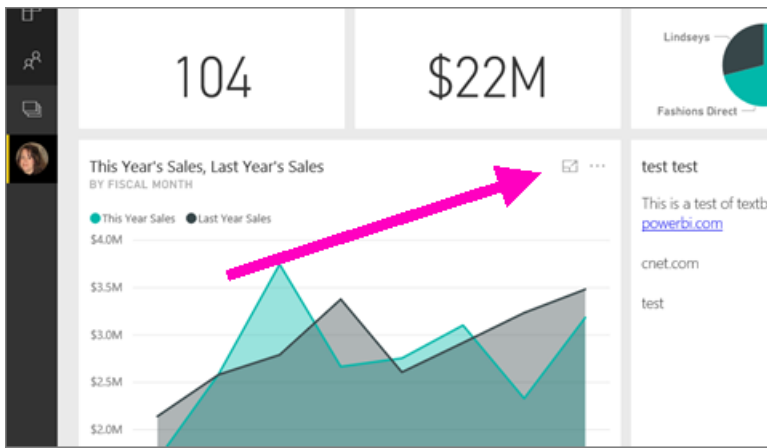
4. Leave focus mode and return to the dashboard by selecting < **Exit focus mode** (in the top left corner of the visual).



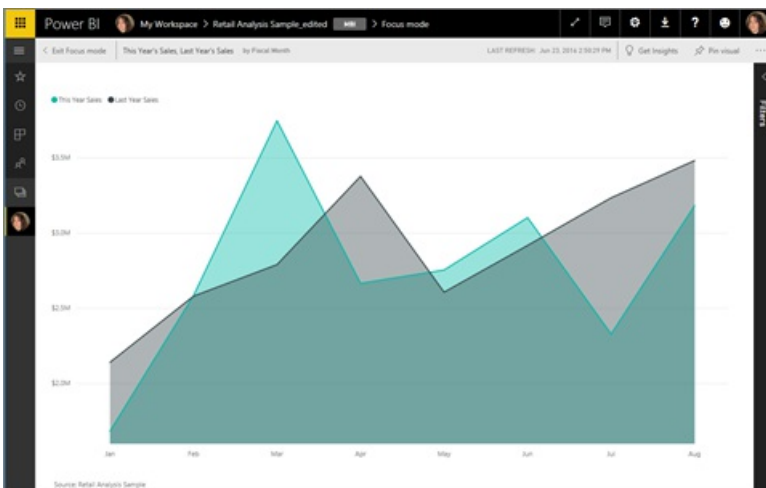
Focus mode for report visualizations

1. Hover over the report visualization and select the **focus mode** icon

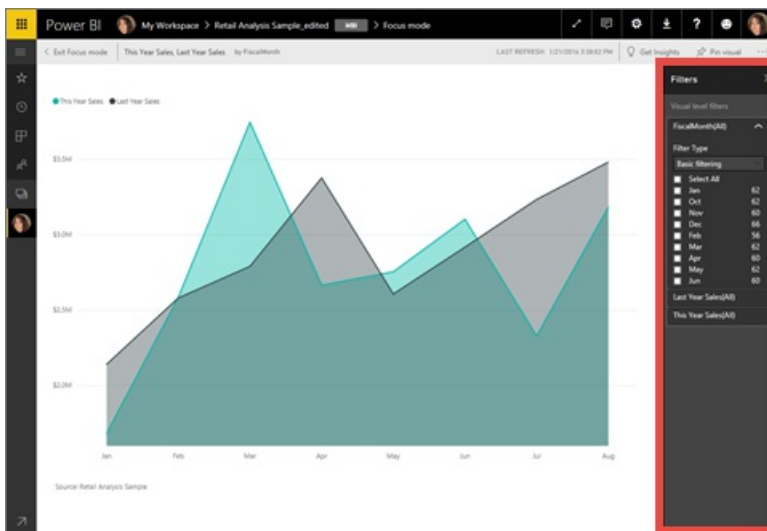




2. The visualization opens and fills the entire canvas.

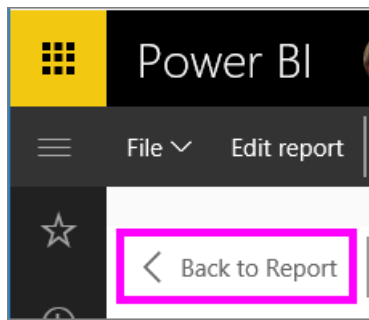


1. Expand the Filters pane to see all filters applied to this visual.



2. Explore further by modifying the filters and, if you discover something interesting, pin the visual to a dashboard.

3. Leave focus mode and return to the report by selecting **Back to report** (in the top left corner of the visual).



Go from focus mode to full screen mode

Once in focus mode, the tile or visual can then be [viewed in full screen \(TV mode\)](#). Full screen mode displays without the distraction of menus and navigation buttons.

Considerations and troubleshooting

- When using focus mode with a visualization in a report, you'll be able to view and modify all filters: Visual level, Page level and Report level.
- When using focus mode with a visualization on a dashboard, you'll be able to view and modify only the Visual level filter.

More questions? [Try the Power BI Community](#)

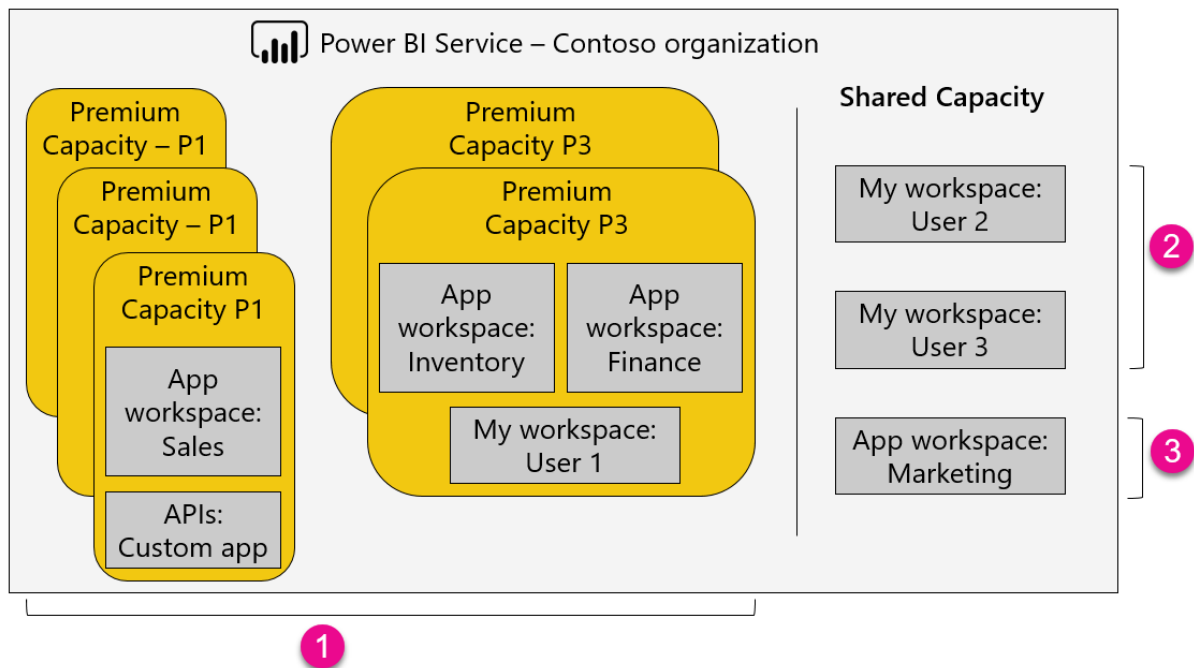
Power BI Premium - what is it?

1/30/2018 • 4 min to read • [Edit Online](#)

Power BI Premium provides resources dedicated to running the Power BI service for your organization or team, giving you more dependable performance and larger data volumes. Premium also enables widespread distribution of content without requiring you to purchase per-user licenses for viewers.

You can take advantage of Power BI Premium by assigning workspaces to a Premium capacity. *Premium capacity* is a dedicated resource for your organization. For workspaces that are not assigned to a premium capacity, these will be in a shared capacity.

Shared capacity is the experience you are used to with Power BI, where your workloads run on computational resources shared by other customers. In shared capacity, more limits are placed on individual users to ensure quality of the experience for all users.



1. Items within a Premium capacity

- Accessing app workspaces (as members or admins) and publishing apps requires a Power BI Pro license.
- App readers can be Power BI Pro or free users.
- Sharing requires a Power BI Pro license but recipients can be Power BI Pro or free users.
- Whether they have a Power BI Pro or free license, dashboard recipients can set data alerts.
- REST APIs for embedding utilize a service account, with a Power BI Pro license, rather than a user.

2. My workspace in Shared capacity

- Sharing requires a Pro license. Recipients also need Pro licenses.

3. App workspaces in Shared capacity

- Any app usage requires Pro licenses.

Capacity tiers

There are two types of capacity within Power BI. Shared capacity and Power BI Premium capacity. Here is a look at what the differences are between them.

	SHARED CAPACITY	POWER BI PREMIUM CAPACITY
Refresh rate	8/day	Not restricted
Isolation with dedicated hardware	✗	✓
Enterprise Distribution to <i>all users</i>		
Apps	✗	✓ ¹
Embedded API and controls	✗	✓ ²
Publish Power BI reports on-premises	✗	✓

¹ Free user consumption in apps includes viewing content in web and mobile, using Q&A, Quick Insights, Cortana, export to CSV, Excel and PowerPoint.

² Future enhancements coming to Power BI Premium post GA.

Premium capacity

To start using a Power BI Premium capacity, you need to assign a workspace to a capacity. For more information on how to assign a workspace to a premium capacity, see [Manage Power BI Premium](#).

When a workspace is backed by premium capacity, you enjoy the benefits of Power BI Premium.

- Scheduled refreshes: users prior were limited to 8x a day when scheduling refreshes with imported models. This limitation is lifted for datasets in Premium workspaces. This does not apply to the scheduled cache refresh settings for DirectQuery. Those remain the same between Premium and Shared capacities.
- Isolation with dedicated hardware – by nature of shared capacity, the performance of your reports and dashboards may be impacted by the resource demands of other workloads in the capacity, despite our safeguards against it. Conversely, Premium provides more consistent, dependable performance for your workloads by isolating it from unrelated workloads.

If an app is backed by premium capacity (i.e. it was published from an app workspace that is currently

assigned to Premium), the published app can then be used by any user in your organization regardless of the license they are assigned. This means that even Power BI Free users can use those published apps.

Shared capacity

By default, your workspace will be in shared capacity. This includes your personal *My workspace* along with App workspaces. A Shared capacity is the experience you are used to with Power BI, where your workloads run on computational resources shared by other customers.

Premium capacity nodes

Power BI Premium is available in node configurations with different v-core capacities. For more information about specific SKU offerings and cost, see [Power BI pricing](#). A [cost calculator](#) is also available. For information regarding embedded analytics capacity planning, see [Planning a Power BI Enterprise Deployment whitepaper](#).

- P nodes can be used for embedded or service deployments
- EM nodes can be used for embedded deployments only
- EM1 and EM2
- Links in this table only operate properly for users who are Office 365 global admins - others receive a 404 error.

CAPACITY NODE	TOTAL CORES (BACKEND + FRONTEND)	BACKEND CORES	FRONTEND CORES	DIRECTQUERY /LIVE CONNECTION LIMITS	MAX PAGE RENDERS AT PEAK HOUR	AVAILABILITY
EM1 (month to month)	1 v-core	.5 cores, 2.5GB RAM	.5 cores	3.75 per second	150-300	Available
EM2 (month to month)	2 v-cores	1 core, 5GB RAM	1 core	7.5 per second	301-600	Available
EM3 (month to month)	4 v-cores	2 cores, 10GB RAM	2 cores		601-1,200	Available
P1	8 v-cores	4 cores, 25GB RAM	4 cores	30 per second	1,201-2,400	Available (month to month is also available)
P2	16 v-cores	8 cores, 50GB RAM	8 cores	60 per second	2,401-4,800	Available
P3	32 v-cores	16 cores, 100GB RAM	16 cores	120 per second	4,801-9600	Available

- The frontend cores are responsible for the web service, dashboard and report document management, access rights management, scheduling, APIs, uploads and downloads, and generally for everything that relates to the user experience.
- The backend cores are responsible for the heavy lifting: query processing, cache management, running R servers, data refresh, natural language processing, real-time feeds, and server-side rendering of reports and images. With the backend cores, a certain amount of memory is reserved as well. Having sufficient memory becomes especially important when dealing with large data models or with a large number of active datasets.

Power BI Report Server

Power BI Premium includes the right to run Power BI Report Server on-premises. For more information, see

[Get started with Power BI Report Server.](#)

Next steps

[Power BI Premium FAQ](#)

[Power BI Premium release notes](#)

[How to purchase Power BI Premium](#)

[Managing Power BI Premium](#)

[Microsoft Power BI Premium whitepaper](#)

[Planning a Power BI Enterprise Deployment whitepaper](#)

[Administering Power BI in your organization](#)

More questions? [Try asking the Power BI Community](#)

How to purchase Power BI Premium

1/30/2018 • 3 min to read • [Edit Online](#)

Learn how to purchase Power BI Premium capacity for your organization.

You can purchase a Power BI Premium capacity node through the Office 365 Admin center. You can also have any combination of Premium capacity SKUs (P1 through P3) within your organization. They provide different resource capabilities.

For more information about what Power BI Premium is, see [Power BI Premium - what is it?](#). To see the current pricing for Power BI, see the [Power BI pricing page](#). You can also plan your costs for Power BI Premium by using the [Power BI Premium calculator](#).

IMPORTANT

Authors of content will still need a Power BI Pro license, even if you purchase Power BI Premium.

Create a new tenant with Power BI Premium P1

If you don't have an existing tenant and want to create one, you can purchase Power BI Premium at the same time. The following link will walk you through the process of creating a new tenant for use with Office 365 and allow you to purchase Power BI Premium. You will need to purchase a Power BI Pro license for a user after the tenant is created. When you create your tenant, you will automatically be the Global Admin for that tenant.

To make this purchase, see [Power BI Premium P1 offer](#).

Power BI Premium P1

Welcome, let's get to know you

Where's your company located?

This can't be changed after sign-up. Why not?

First name Last name

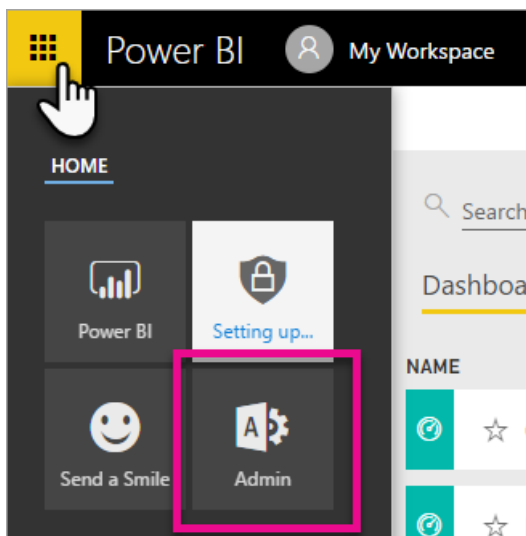
Business email address

Purchase a Power BI Premium capacity for an existing organization

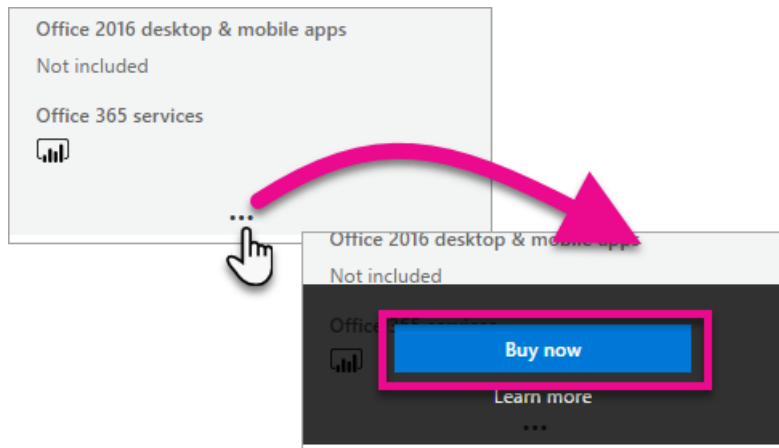
If you have an existing organization, you need to be either a Global admin or a Billing admin, to purchase subscriptions and licenses. For more information, see [About Office 365 admin roles](#).

To purchase a Premium capacity, you will need to do the following.

1. From within the Power BI service, select the **Office 365 app picker** > **Admin**. Alternatively, you can browse to the Office 365 Admin center. You can get there by going to <https://portal.office.com> and selecting **Admin**.



2. Select **Billing** > **Purchase services**.
3. Under **Other plans**, look for Power BI Premium offerings. This will list as P1 through P3, EM3 and P1 (month to month).
4. Hover over the **ellipsis (...)** and then select **Buy now**.



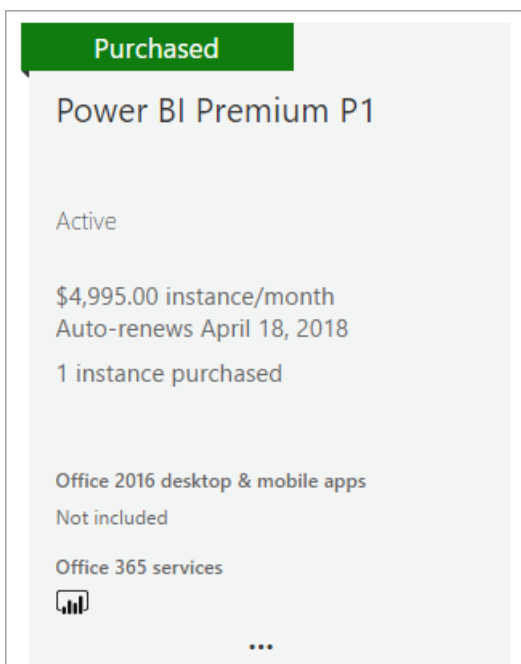
5. Follow the steps to complete the purchase.

You can also select the following links to take you directly to the purchase pages of those items. For more information about these SKUs, see [Power BI Premium - what is it?](#).

In order to purchase a Power BI Premium SKU, **you must be a Global or Billing admin** within your tenant. Selecting the links below will produce an error if you are not an admin.

DIRECT PURCHASE LINKS
EM3 (month-to-month) SKU
P1 SKU
P1 (month-to-month) SKU
P2 SKU
P3 SKU

After you have completed the purchase, the Purchase services screen will show that the item is purchased and active.



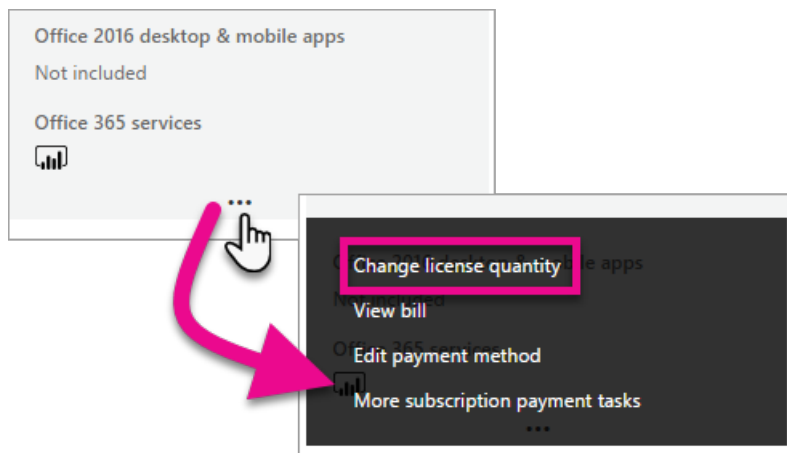
You can now manage this capacity within the Power BI admin center. For more information, see [Manage Power BI](#)

Premium.

Purchase more capacities

When you are in the **Premium settings** section of the Power BI Admin portal, if you are an admin, you will see a **Purchase more** button. This button will take you to the Office 365 portal. Once you are in the Office 365 Admin center, you can do the following.

1. Select **Billing > Purchase services**.
2. Find the Power BI Premium item you want to purchase more of under **Other plans**.
3. Hover over the **ellipsis (...)** and then select **Change license quantity**.

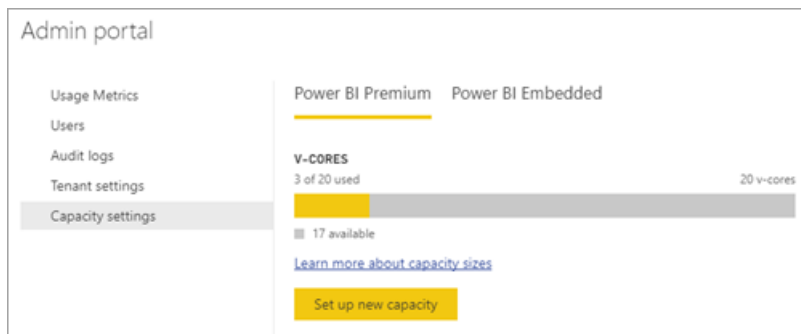


4. Change the number of instances that you want to have for this item. Then select **Submit** when finished.

IMPORTANT

Selecting **Submit** will cause charges to be made to the credit card on file.

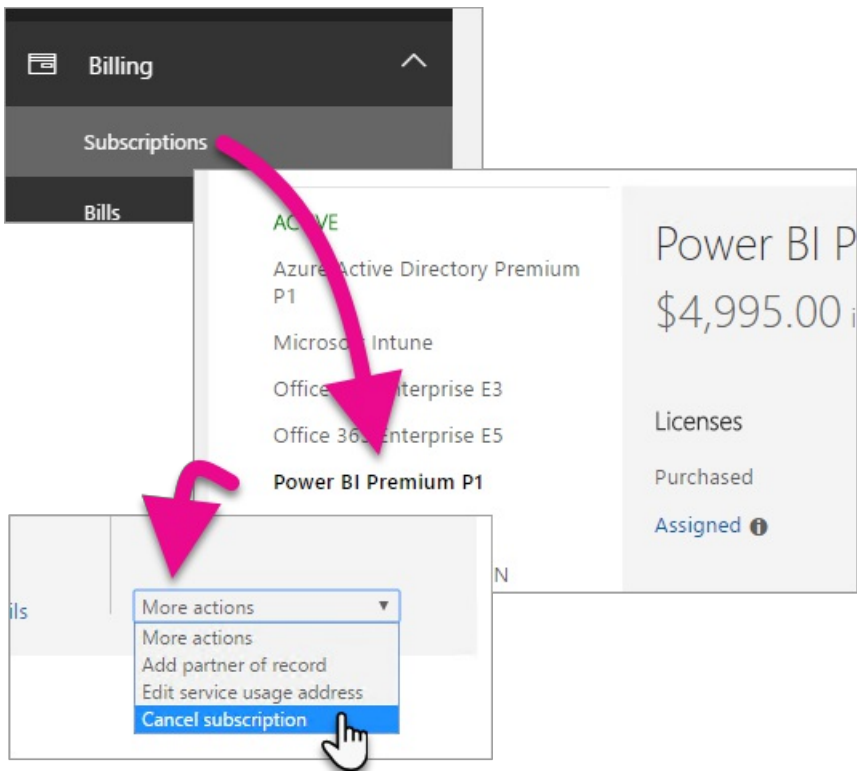
The **Purchase services** page will then indicate the number of instances you have. Within the Power BI admin portal, under **Capacity settings**, the available v-cores reflects the new capacity purchased.



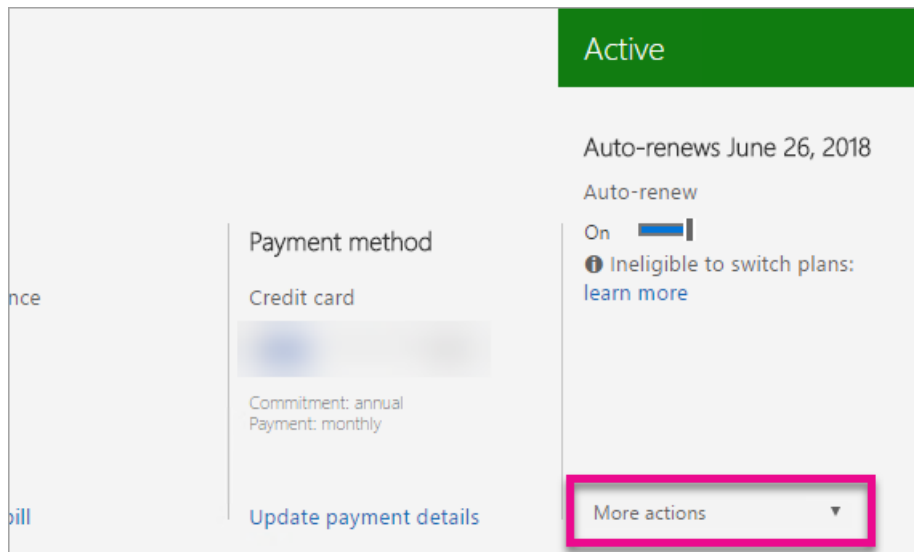
You can now manage this capacity within the Power BI admin center. For more information, see [Manage Power BI Premium](#).

Cancel your subscription

You can cancel your subscription from within the Office 365 admin center. To cancel your Premium subscription, do the following.



1. Browse to the Office 365 admin center.
2. Select **Billing** > **Subscriptions**.
3. Select your Power BI Premium subscription from the list.
4. In the **More actions** dropdown, select **Cancel subscription**.



5. The **Cancel subscription** page will indicate whether or not you are responsible for an [early termination fee](#). This page will also let you know when the data will be deleted for the subscription.
6. Read through the information, and if you want to proceed, select **Cancel subscription**.

Next steps

- [Power BI pricing page](#)
- [Power BI Premium calculator](#)
- [Power BI Premium - what is it?](#)
- [Manage Power BI Premium](#)
- [Power BI Premium FAQ](#)
- [Power BI Premium release notes](#)
- [Microsoft Power BI Premium whitepaper](#)

[Planning a Power BI Enterprise Deployment whitepaper](#)

[Power BI admin portal](#)

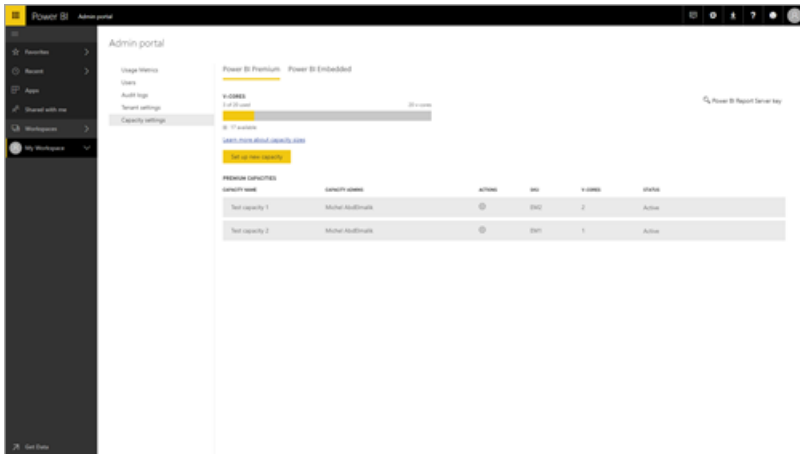
[Administering Power BI in your Organization](#)

More questions? [Try asking the Power BI Community](#)

Manage capacities within Power BI Premium and Power BI Embedded

1/30/2018 • 9 min to read • [Edit Online](#)

Learn how you can manage Power BI Premium and Power BI Embedded capacities which provides dedicated resources for your content.

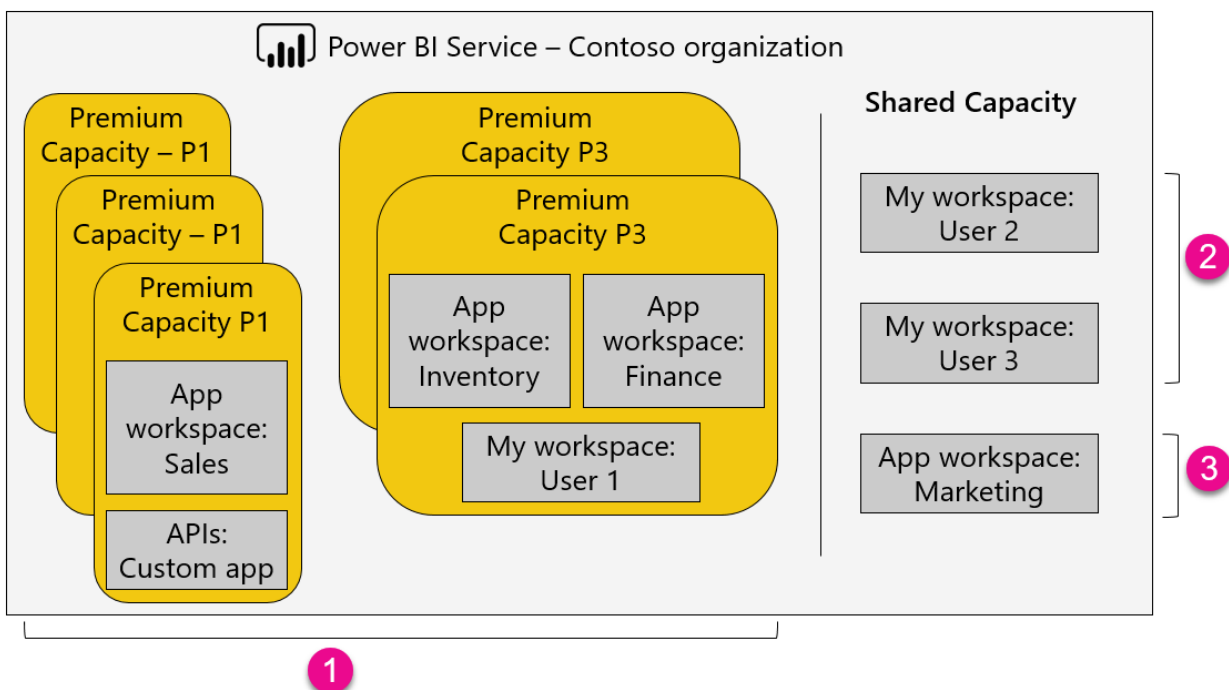


Capacity is the heart of the Power BI Premium and Power BI Embedded offerings.

What is capacity?

Capacity is the set of resources reserved for the exclusive use by you. Having capacity allows you to publish dashboards, reports, and datasets to users throughout your organization without having to purchase licenses for them. It also guarantees dependable, consistent performance for the contents hosted in capacity.

Capacity is all transparent to your end users. They will continue to use Power BI or your application as usual. They don't have to be aware that some (or all) of the content is hosted in your dedicated capacity. For your users, everything works exactly as before.



1. Items within a Premium capacity

- Accessing app workspaces (as members or admins) and publishing apps requires a Power BI Pro license.
- App readers can be Power BI Pro or free users.
- Sharing requires a Power BI Pro license but recipients can be Power BI Pro or free users.
- Whether they have a Power BI Pro or free license, dashboard recipients can set data alerts.
- REST APIs for embedding utilize a service account, with a Power BI Pro license, rather than a user.

2. My workspace in Shared capacity

- Sharing requires a Pro license. Recipients also need Pro licenses.

3. App workspaces in Shared capacity

- Any app usage requires Pro licenses.

For more information, see [What is Power BI Premium?](#).

Purchase capacity

To take advantage of dedicated capacity, you will need to purchase a subscription for Power BI Premium within the Office 365 admin center or create a Power BI Embedded resource within the Microsoft Azure portal. For more information, see the following:

- **Power BI Premium:** [How to purchase Power BI Premium](#)
- **Power BI Embedded:** Coming soon.

When you purchase Power BI Premium SKUs, your tenant will receive the corresponding number of v-cores for use in running capacities. For example, purchasing a Power BI Premium P3 SKU provides the tenant with 32 v-cores.

Capacity admins

NOTE

Capacity admins, for Power BI Embedded capacity, are defined within the Microsoft Azure portal.

When you are assigned as a capacity admin to a capacity, you have full control over the capacity and its administrative features. From the Power BI admin portal, you can add more capacity admins (Power BI Premium only) or give users capacity assignment permissions. You can bulk assign workspaces to a capacity and view usage metrics on a capacity.

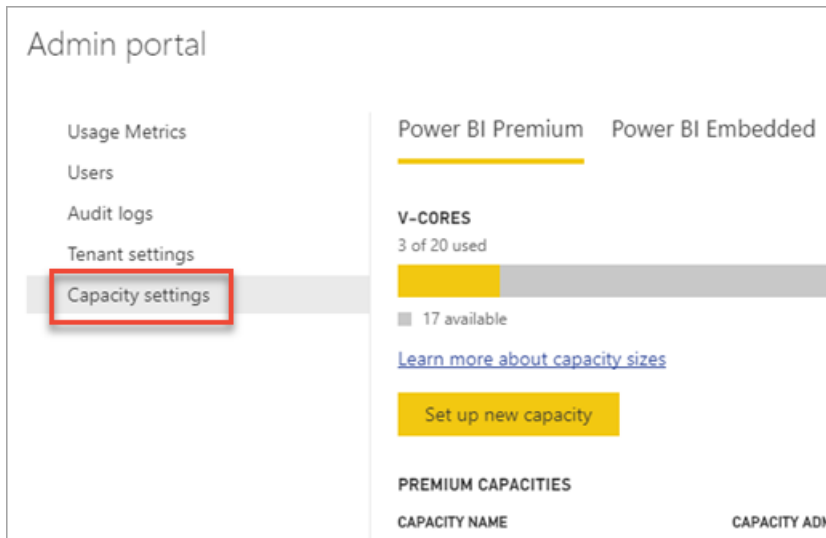
Each capacity has its own admins. Defining a capacity admin to one capacity does not give them access to all capacities within your organization. Capacity admins do not have access to all Power BI admin areas by default such as usage metrics, audit logs or tenant settings. Capacity admins also do not have permissions to set up new capacities or change the SKU of existing capacities. Only Global admins or Power BI service administrators have access to those items.

All Office 365 Global admins and Power BI admins are automatically capacity admins of both Power BI Premium capacity and Power BI Embedded capacity.

Managing capacity

After you have purchased capacity nodes within Office 365, you will then need to set up a new capacity. This is done through the [Power BI admin portal](#). Within the admin portal, you will see a section called **Capacity settings**.

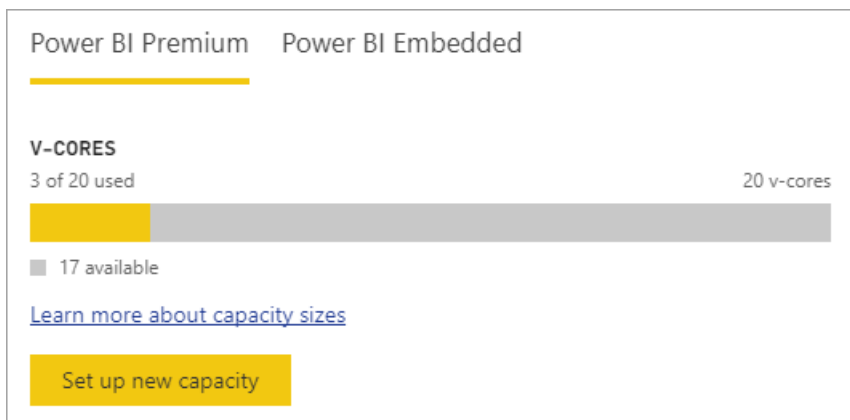
This is where you will manage Power BI Premium capacities for your organization.



Selecting **Capacity settings** will take you to the capacity management screen defaulting to Power BI Premium.

Setting up a new capacity (Power BI Premium)

The number of v-cores will reflect the amount used and the amount available to create capacities with. The amount of v-cores available to your organization is based on the Premium SKUs that you have purchased. For example, purchasing a P3 and a P2 would result in 48 available cores – 32 from the P3 and 16 from the P2.

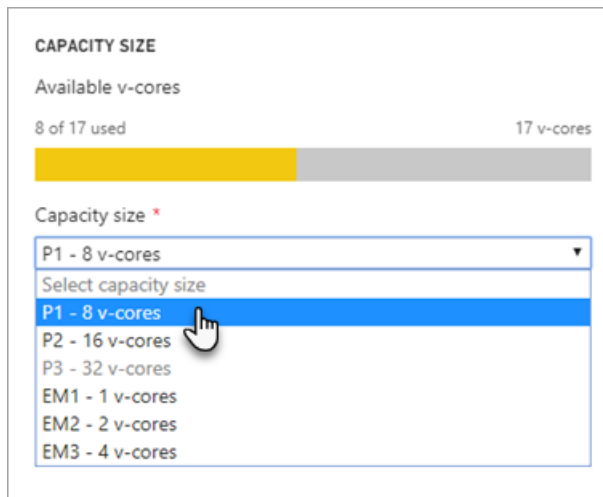


If you have available v-cores, setup your new capacity by doing the following.

1. Select **Set up new capacity**.
2. Give your capacity a **name**.
3. Define who the capacity admin is for this capacity.

Capacity admins do not have to be a Power BI admin or an Office 365 Global admin. For more information, see [Power BI Premium capacity admins](#)

4. Select your capacity size. Available options are dependent on how many available v-cores you have. You can't select an option that is larger than what you have available.



5. Select **Set up**.

Power BI Premium > Set up new capacity

Please take a minute to set up your new Premium capacity.

* Required

Capacity name

Contoso Sales

Capacity admins * ⓘ

Michel AbdElmalik X Enter email addresses

CAPACITY SIZE

Available v-cores

8 of 17 used 17 v-cores

Capacity size *

P1 - 8 v-cores

[Learn more about capacity sizes](#)


Set up

Cancel

Capacity admins, as well as Power BI admins and Office 365 Global Admins, will then see the capacity listed within the admin portal.

Capacity settings

Within the Premium capacity management screen, you can select the **gear icon (settings)** under actions. This will allow you to rename or delete a capacity. It will also indicate who the service admins are, the SKU/size of the capacity and what region the capacity is in.

ACTIONS	SKU	V-CORES
	P1	8

Settings for Contoso Sales

Capacity name

Contoso Sales

SERVICE ADMIN

Colin Murphy	colin@granularcontrols1.onmicros...
Michel AbdElmalik	admin@granularcontrols1.onmicr...
Nancy Leary	nancy@granularcontrols1.onmicr...
Tim Larson	tim@granularcontrols1.onmicroso...

SKU/SIZE

P1

REGION

Central US

Delete Capacity Apply Cancel

NOTE

Power BI Embedded capacity settings are managed within the Microsoft Azure portal.

Change capacity size (Power BI Premium)

Power BI admins and Office 365 Global admins change Power BI Premium capacity size by selecting **Change capacity size**. Capacity admins who are not a Power BI admin or Office 365 Global admin will not have this option.

CAPACITY SIZE

This capacity is a P1, which is 8 v-cores.

Change capacity size

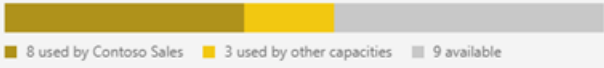
The **Change capacity size** screen lets you upgrade or downgrade your capacity size if you have the available resources. Administrators are free to create, resize and delete nodes, so long as they have the requisite number of v-cores.

P SKUs cannot be down graded to EM SKUs. You can hover over disabled options which provide an explanation.

Change capacity size

Contoso Sales

V-CORES
11 of 20 used 20 v-cores



■ 8 used by Contoso Sales ■ 3 used by other capacities ■ 9 available

Capacity size

P1 - 8 v-cores ▼

- P1 - 8 v-cores
- P2 - 16 v-cores
- P3 - 32 v-cores
- EM1 - 1 v-cores
- EM2 - 2 v-cores
- EM3 - 4 v-cores

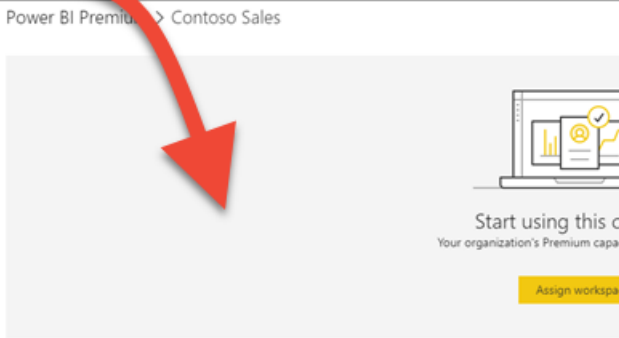
Capacity assignment

You can manage a capacity by selecting the name of the capacity. This will take you to the capacity management screen.

PREMIUM CAPACITIES

CAPACITY NAME	CAPACITY ADMINS
Contoso Sales	Michel AbdElmalik
Test capacity 1	

Power BI Premium > Contoso Sales



CAPACITY SIZE
This capacity is a P1, which is 8 v-cores.
[Change capacity size](#)

USER PERMISSIONS
▶ Capacity admins

If no workspaces have been assigned to the capacity, you will see a message allowing you to **Assign workspaces**.

User permissions

You can assign additional **Capacity admins** for Power BI Premium capacities. As well as assign users that will have **capacity assignment permissions**. Users that have assignment permissions can assign an app workspace to the capacity if they are an admin of that workspace. They can also assign their personal *My Workspace* to the capacity. Users with assignment permissions will not have access to the admin portal.

NOTE

For Power BI Embedded capacity, capacity admins are assigned within the Microsoft Azure portal.

User permissions

- ▶ Capacity admins
- ▶ Users with assignment permissions
Disabled for the entire organization

User permissions

- ▶ Capacity admins
- ▲ Users with assignment permissions
Enabled for a subset of the organization

Apply to:

The entire organization

Specific users or groups Clear all

capacity assigner X Enter email addresses

Apply Cancel




Usage measurements (Power BI Premium)

For each capacity, you will be able to use usage measurements for CPU, memory and Direct Query. Each KPI has three indications, **Good (green)**, **Marginal (yellow)** and **Critical (red)**. We suggest monitoring these metrics to ensure that your users see good performance while using Premium content.

Power BI Embedded capacity usage is monitored within the Azure portal.

Usage in the last 8 days (5/11/2017 - 5/18/2017)

⚠ Some usage metrics are over the safe zone: CPU and Memory thrashing. Consider purchasing more capacity. [Purchase more](#)

 CPU: Critical Exceeded 80% utilization 63 times	 Memory thrashing: Critical Exceeded 80% utilization 64 times	 Direct Query: Good Exceeded 80% utilization 0 times
--	---	--

METRIC	DESCRIPTION
CPU	CPU usage of your cores.
Memory	Represents the memory pressure of your backend cores. Specifically, this is a metric of how often models are evicted from memory due to memory pressure from usage of multiple models.
DQ/s	<ul style="list-style-type: none"> * We limit the total number of DirectQuery and live connection queries per second. * The limits are 30/s for P1, 60/s for P2 and 120/s for P3. * DirectQuery and live connection queries count equally to the above throttle. For example, if you have 15 DirectQueries and 15 live connections in a second, you hit your throttle. * This applies equally to on-premises and cloud connections.

When these metrics are marginal/critical, your users may see degradation of report and refresh performance, especially during peak load times.

Metrics reflect utilization over the past week, and are designed to count instances when the capacity is overloaded, and is therefore providing less-than-optimal performance for your users.

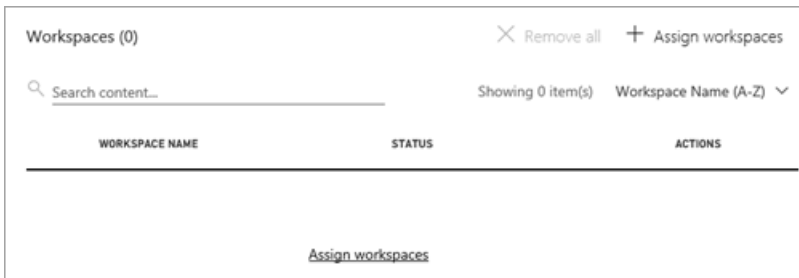
Each occurrence of *utilization over 80%* should be considered a potential case of performance degradation. Too many cases is a good indicator of significant performance problems for users.

Assign a workspace to a capacity

There are a few ways that a workspace could be assigned to a capacity.

Capacity management in admin portal

Capacity admins, along with Power BI admins and Office 365 global admins, can bulk assign workspaces within the premium capacity management section of the admin portal. When you manage a capacity, you will see a **Workspaces** section that allows you to assign workspaces.



1. Select **Assign workspaces**. This is listed in multiple places and will all perform the same task.
2. Select either **The entire organization's workspaces** or **Specific workspaces by user**.

SELECTION	DESCRIPTION
The entire organization's workspaces	Assigning the entire organization's workspaces to Premium capacity will assign all App Workspaces and My Workspaces, in your organization, to this Premium capacity. In addition, all current and future users will have the permission to reassign individual workspaces to this capacity.
Specific workspaces by user	When you assign workspaces by user, or group, all the workspaces owned by those users are assigned to Premium capacity, including the user's personal workspace. Said users automatically get workspace assignment permissions. This includes workspaces already assigned to a different capacity.

3. Select **Apply**.

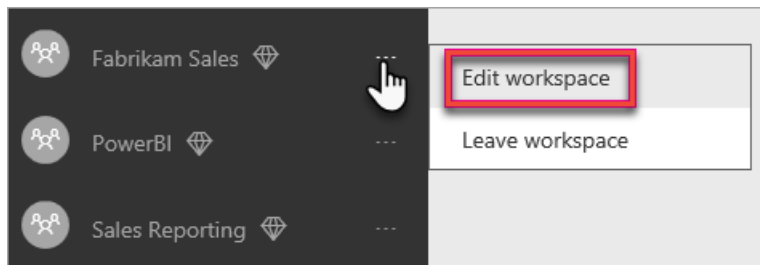
This option does not allow you to assign specific workspaces to a capacity.

App workspace settings

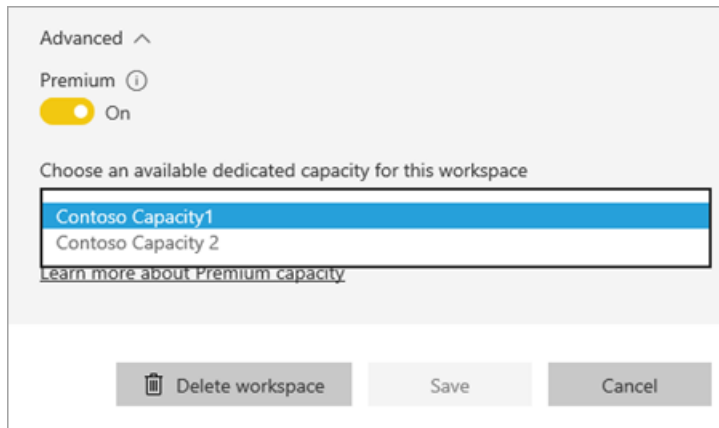
You can also assign an app workspace to a Premium capacity from the settings of that workspace. To assign an app workspace to a premium capacity, do the following.

To move a workspace into capacity, you must have admin permissions to that workspace, and also capacity assignment permissions to that capacity. Notice that workspace admins can always remove a workspace from Premium capacity.

1. Edit an app workspace by selecting the **ellipsis (...)** and selecting **Edit workspace**.



2. Within **Edit workspace**, expand **Advanced**.
3. If you have been given capacity assignment permissions to any capacity, you will have the option to turn **Premium** on for this workspace.
4. Select the capacity that you want to assign this App workspace to.

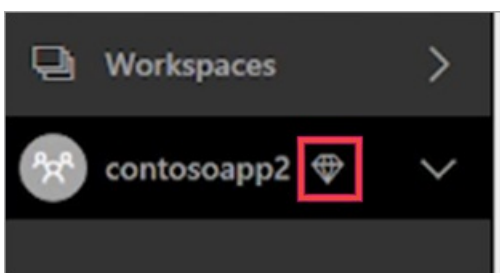


5. Select **Save**.

Once saved, the workspace, and all its contents, will be moved into Premium capacity without any experience interruption for end users.

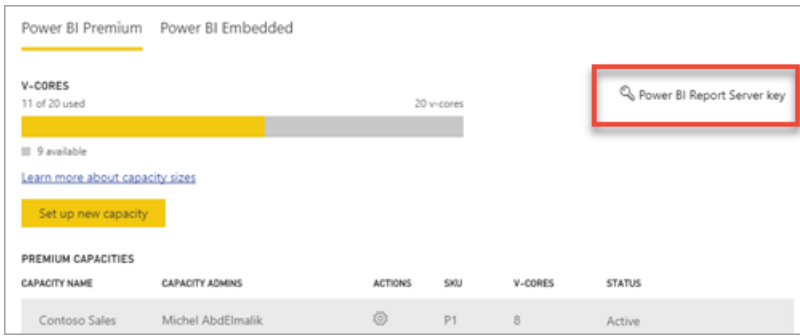
What Premium looks like for users

For the most part, users will not even need to know they are in a Premium capacity. Their dashboards and reports will just work. As a visual hint, you will see a diamond icon next to workspaces that are in a Premium capacity.

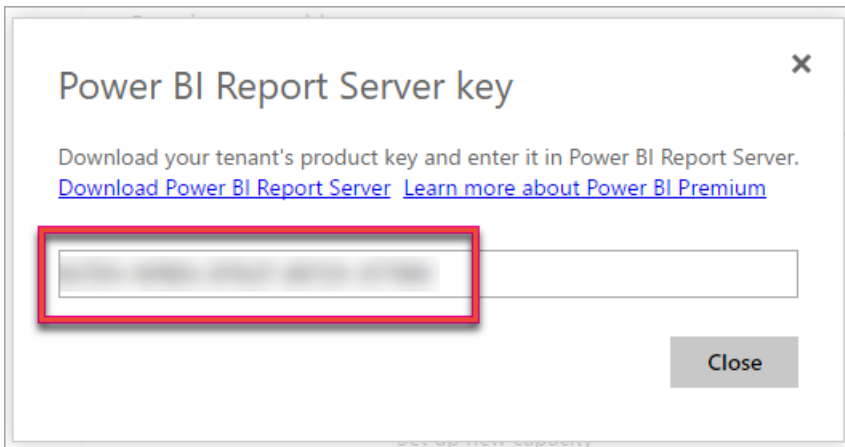


Power BI Report Server product key)

Within the **Capacity settings** tab of the Power BI admin portal, you will have access to your Power BI Report Server product key. This will only be available for Global Admins or users assigned the Power BI service administrator role and if you have purchase a Power BI Premium SKU.



Selecting **Power BI Report Server key** will display a dialog contain your product key. You can copy it and use it with the installation.



For more information, see [Install Power BI Report Server](#).

Next steps

Share published apps with Free users when you assign the workspace to a Premium capacity. For more information, see [Create and distribute an app in Power BI](#).

More questions? [Try asking the Power BI Community](#)

Power BI Premium support for large datasets

12/11/2017 • 1 min to read • [Edit Online](#)

Power BI Premium supports uploads of Power BI Desktop (.pbix) files that are up to 10 GB in size. To use a large dataset, publish it to a workspace that is assigned to Premium capacity.

Best practices

This section describes best practices for working with large datasets.

Large models can be very resource-intensive on your capacity; we recommend at least a P1 SKU for any models larger than 1 GB. The following table describes recommended SKUs for various .pbix sizes:

SKU	SIZE OF .PBIX
P1	< 3 GB
P2	< 6 GB
P3	up to 10 GB

Your .pbix files represent data in a highly compressed state. The data will likely expand several times when loaded in memory, and from there it may expand several more times during data refresh.

Scheduled refresh of large datasets can take a long time and be very resource-intensive. Accordingly, do not schedule too many overlapping refreshes. Notice also that the timeout for scheduled refresh jobs has been doubled to four hours for all datasets in this capacity.

The initial report load of large datasets can take a long time if it has been a while since the last time the dataset was used, because the model is loaded into memory of your Premium capacity. A loading bar for longer-loading reports displays the load progress.

If you remove the workspace from Premium capacity, the model and all associated reports and dashboards will not work.

While the per-query memory and time constraints are much higher in Premium capacity, it is highly recommended you use filters and slicers to limit visuals to display only what is necessary.

Next steps

[Power BI Premium - what is it?](#)

[Power BI Premium release notes](#)

[Microsoft Power BI Premium whitepaper](#)

[Planning a Power BI Enterprise Deployment whitepaper](#)


[Extended Pro Trial activation](#)

More questions? [Try asking the Power BI Community](#)

Power BI Premium FAQ

1/30/2018 • 14 min to read • [Edit Online](#)

Browse a list of frequently asked questions and answers about the Power BI Premium offering.

- If you have other questions, [try asking the Power BI Community](#).
- Still have an issue? Please visit the [Power BI support page](#).
- Or click the **Contact Me** icon  in the lower-right corner of this browser window.

Power BI Premium

What is Power BI Premium?

Power BI Premium is a new capacity-based offering that includes:

- Flexibility to publish reports broadly across an enterprise, without requiring recipients to be licensed individually per user.
- Greater scale and performance from dedicated capacity in the Power BI service.
- The ability to maintain BI assets on-premises with Power BI Report Server.
- One API surface, a consistent set of capabilities and access to the latest features for embedded analytics.

What does Power BI Premium do? How does it work?

Power BI Premium consists of capacity in the Power BI service exclusively allocated to each organization and supported by dedicated hardware fully managed by Microsoft. Organizations can choose to apply their dedicated capacity broadly, or allocate it to assigned workspaces based on the number of users, workload needs or other factors—and scale up or down as requirements change.

How is Power BI Pro different than Power BI Premium? Why is Power BI Premium necessary?

Power BI Premium is a capacity-based license, while Power BI Pro is a user-based license.

Power BI Premium consists of capacity in the Power BI service exclusively allocated to each organization and supported by dedicated hardware fully managed by Microsoft—removing restrictions on dataset sizes and refresh rates, and supporting isolation due to the dedicated hardware. Power BI Premium also provides the flexibility to publish reports broadly across an enterprise, without requiring recipients to be licensed individually per user.

Power BI Pro is for those users publishing reports, sharing dashboards, collaborating with colleagues in workspaces and engaging in other related activities – such as the ability to:

- Edit and save customized views
- Create personal dashboards (pin to new dashboard)
- Analyze data in Excel or Power BI Desktop
- Share with Excel Web App support
- Share dashboards and collaborate with Office 365 Groups
- Integrate content with Microsoft Teams

Do I need Power BI Pro to use Power BI Premium?

Yes. Power BI Pro is required to publish reports, share dashboards, collaborate with colleagues in workspaces and engage in other related activities.

How much will Power BI Premium cost? How many SKUs will you make available?

Power BI Premium can be purchased based on the number of virtual cores. You can see prices at the [Power BI pricing page](#). For more information on nodes and v-cores, see the [Microsoft Power BI Premium whitepaper](#). Also

use this [calculator](#) to get an estimate of how much Premium capacity you may need.

What do you mean by "capacity"?

"Capacity" refers to a named capacity provisioned by an admin through the Power BI Premium capacity admin portal. A capacity is a grouping of one or more nodes. See the [Microsoft Power BI Premium whitepaper](#) for more information.

How is Power BI Premium billed?

Power BI Premium is billed monthly with an annual commitment.

How will I buy Power BI Premium?

Power BI Premium is available as an add-on to Power BI Pro in the O365 admin center. For more information, see [How to purchase Power BI Premium](#). You can also contact your Microsoft representative for more information.

How do I know how much Power BI Premium capacity I need to purchase?

Use this cost [calculator](#) to estimate how much Power BI Premium capacity you may need.

When will Power BI Premium be available? Will it be available simultaneously across all geographies?

Power BI Premium will be generally available in late Q2 of 2017 for all geographies currently supported by the Power BI service.

Will Power BI Premium meet certification and regulatory compliance at the time of release? What about national clouds?

Power BI Premium will be generally available in late Q2 of 2017 for all geographies currently supported by the Power BI service. National clouds—specifically Germany, China and the U.S. government—are planned to be available in Q3 of 2017. Power BI's certification and regulatory compliance standards will apply to Power BI Premium at the time of general availability.

Is Power BI Premium available with Office 365 E5?

Power BI Premium is available as an add-on to Power BI Pro. Office 365 E5 includes Power BI Pro. E5 customers can purchase Premium as an add-on to their existing Pro licenses.

Can you outline a scenario of how Power BI Pro and Power BI Premium work to cover an organization for Modern BI?

The follow examples outline how customers can meet their BI needs using a combination of Power BI Pro + Power BI Premium.

SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
An organization / department wants every employee to have self-service BI and collaborate with each other – sharing dashboards, performing ad hoc analysis, and publishing reports	An organization / department has a combination of users who require self-service BI and collaboration as well as users who only need to consume BI content	An organization / department has users who require self-service BI and collaboration as well as the requirement to keep reports on-premises	A finance department is actively working to analyze several large datasets in advance of an earnings announcement and requires unthrottled and isolated capacity to manage the workloads

SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4
<p>Solution:</p> <ol style="list-style-type: none"> 1. Power BI Pro for every user 2. Look to expand the opportunity adding Power BI Premium – see the additional scenarios 	<p>Solution:</p> <ol style="list-style-type: none"> 1. Power BI Pro for users requiring self-service BI and collaboration 2. Add Power BI Premium to be able to distribute BI content to users who only need to consume 	<p>Solution:</p> <ol style="list-style-type: none"> 1. Power BI Pro for users requiring self-service BI and collaboration 2. Add Power BI Premium to be able to publish reports on-premises – and move to the cloud at their own pace 	<p>Solution:</p> <ol style="list-style-type: none"> 1. Power BI Pro for every user in the finance department 2. Add Power BI Premium for the dedicated resources – in the cloud – to be used exclusively by the finance team providing larger scale and greater performance

What is Power BI Report Server? Does this mean you're making Power BI available on-premises?

Power BI Report Server is available as part of Power BI Premium and compatible with SQL Server Reporting Services reports, allowing the deployment and distribution of interactive Power BI reports, and paginated reports, on-premises within the boundaries of an organization's firewall. Organizations can choose Power BI in the cloud, or elect to keep reports on-premises with Power BI Report Server and move to the cloud at their pace.

Power BI capabilities such as real-time dashboards, natural language query, and others in the Power BI service are not available as part of Power BI Report Server.

For more information about Power BI Report Server, see [Get started with Power BI Report Server](#).

Is Power BI Report Server the feature Microsoft made available as the Power BI Reports for SSRS technical preview? Why is this now part of Power BI when it appeared to be a feature of SQL?

Power BI Report Server is available as part of Power BI Premium and compatible with SQL Server Reporting Services reports, allowing the deployment and distribution of interactive Power BI reports, and paginated reports, on-premises within the boundaries of an organization's firewall.

The announcement of Power BI Premium is the first time we've disclosed how this functionality will be brought to market.

For more information about Power BI Report Server, see [Get started with Power BI Report Server](#).

What are Power BI Apps?

We are evolving content packs into Power BI apps to improve how users discover and explore insights at enterprise scale. Available today, Power BI apps offer a simplified way of deploying dashboards and reports to specific people, groups or an entire organization. Business users can easily install these apps and navigate them with ease, centralizing content in one place and updating automatically.

For more information about Apps, see [What are apps in Power BI?](#)

Are you making changes to Power BI Pro, Power BI Free, Power BI Desktop, et al. as part of the Power BI Premium rollout?

Today we're also simplifying the distinction between Power BI Pro and the free service. We've received feedback that while the free service is intended for personal use and Power BI Pro enables collaboration, functional differences between them have created confusion for users. Going forward, we will improve the free service to have the same functionality as Power BI Pro, but will limit sharing and collaboration features to only Power BI Pro users.

Users of the free Power BI service will benefit from access to all data sources, increased workspace storage limits, and higher refresh and streaming rates. These changes will be effective June 1, 2017, and you can read more at [Self-service sign up for Power BI](#). Power BI Desktop remains available for free.

For information regarding the Extended Pro Trial offering, see [Extended Pro Trial activation](#).

Power BI Free

What capabilities are being added to the free service?

Beginning June 1, 2017, the free service will have capabilities equivalent to Power BI Pro, except for sharing, enterprise distribution, and collaboration. This includes the same 10 GB workspace limit, up to 8 daily scheduled refreshes for datasets, and maximum 1M/hour streaming data rate. We're also including access to all data sources, including those available through the on-premises data gateway.

Which Power BI Pro capabilities are not available with the free service?

Peer-to-peer dashboard sharing, app workspaces (previously referred to as group workspaces), Analyze in Excel and Power BI Apps (unless backed by Premium capacity) are capabilities limited to Power BI Pro.

When will these changes go into effect?

Changes to the free service will go into effect on June 1, 2017.

How will impacted users of the free service be notified of these changes?

Active users of the free service impacted by the changes on June 1, 2017 will receive an email communication from Microsoft, as well as notifications when they sign into the Power BI service beginning May 3, 2017.

Existing users of the free service who have been active within the past year can take advantage of the free, 12-month extended trial of Power BI Pro. The offer will deliver the full capabilities of Power BI Pro to ensure users have the appropriate time to adjust how you use the service. For information regarding the Extended Pro Trial offering, see [Extended Pro Trial activation](#).

Will users lose access to their content (dashboards, reports) at that time?

No. They will not lose access to any content they've uploaded to the Power BI service. Content shared with others may no longer be accessible by recipients on June 1, 2017. Likewise, at that time they may no longer have access to content others have shared with them.

Existing users of the free service who have been active within the past year can take advantage of the free, 12-month extended trial of Power BI Pro. The offer will deliver the full capabilities of Power BI Pro to ensure users have the appropriate time to adjust how you use the service. For information regarding the Extended Pro Trial offering, see [Extended Pro Trial activation](#).

How do users know if they're eligible for the extended Power BI Pro trial?

Please refer to the Extended Pro Trial [terms and conditions](#).

For information regarding the Extended Pro Trial offering, see [Extended Pro Trial activation](#).

What should users do if they're not eligible for the extended Power BI Pro trial?

Sign up for a standard 60-day Power BI Pro trial [here](#).

Does the introduction of Power BI Premium change the capabilities of the free service?

Users of the free service with access to dedicated capacity in Power BI Premium will have the ability to receive content distributed to them by Power BI Pro users via published Apps.

Power BI Pro

What is changing with Power BI Pro?

No changes are coming to Power BI Pro.

What about Office – is Power BI Pro still included in Office 365 E5?

Yes. Power BI Pro will continue to be included in Office 365 E5.

Do I have the option to return my Power BI Pro licenses if I want to switch to Power BI Premium?

No. Power BI Premium is an add-on to Power BI Pro; therefore Premium requires Pro licenses.

Why is Power BI Pro necessary? Shouldn't I just buy Power BI Premium?

Power BI Premium is a capacity-based license, while Power BI Pro is a user-based license intended for quick, easy-to-use self-service analytics for users requiring collaboration, dashboard sharing, ad hoc analysis, and report publishing – such as the ability to:

- Edit and save customized views
- Create personal dashboards (pin to new dashboard)
- Analyze data in Excel or Power BI Desktop
- Share and view Excel workbooks with Excel Web App support
- Share dashboards and collaborate with Office 365 Groups
- Integrate content with Microsoft Teams

Power BI Embedded

What's changed with Power BI Embedded?

As part of Power BI Premium we are converging Power BI Embedded with the Power BI service to deliver one API surface, a consistent set of capabilities and access to the latest features. Moving forward we encourage those interested in embedding Power BI in their apps to start with Power BI Desktop and move to deployment with Power BI Premium.

What are the benefits of Power BI Premium for embedding analytics in apps?

Power BI Premium is a capacity-based offering that runs on dedicated hardware and is fully managed by Microsoft as part of the Power BI service. When you think about your application development lifecycle, Power BI Premium will offer new benefits like flexible and predictable costs, improved content management for developers and the full availability of Power BI capabilities for embedded scenarios.

Do I need to migrate my existing app built on Power BI Embedded?

Power BI Embedded will continue to be available for existing apps per the following schedule:

LICENSING AGREEMENT	AVAILABILITY OF POWER BI EMBEDDED
Enterprise Agreement	Until expiration of existing agreement
Direct and CSP	One year from General Availability of Power BI Premium

Yes, you should start thinking about migrating your embedded analytics solution to Power BI Premium. For more information, see [How to migrate Power BI Embedded workspace collection content to Power BI](#).

How do I migrate my existing app built on Power BI Embedded?

Refer to the [migration documentation](#) for guidance on migrating apps.

Is Microsoft going back on its commitment to Power BI Embedded Free?

Under the previous model, we offered a limited number of sessions for developing and testing. In the new scenario, customers will continue having options available to them to start developing and testing for free in their way to be production ready. Customers will benefit from a 2-month Power BI Pro trial to get started with dev & test. Power BI Desktop, the data exploration and report authoring tool, will continue to be available for free.

Is Power BI Embedded still an Azure Service? Where will I purchase, provision and manage Power BI Embedded?

Power BI Embedded is converging with Power BI service and therefore it will be purchased, provisioned and managed as such moving forward. For more information, see [Embedding with Power BI](#).

Power BI Desktop

What changes are you making to Power BI Desktop?

No changes are being made to Power BI Desktop.

Power BI Report Server

Why is Power BI Report Server included in Power BI Premium rather than being sold as a separate product?

Power BI Premium introduces the ability to maintain BI assets on-premises with Power BI Report Server. Power BI Report Server is an on-premises server that allows the deployment and distribution of interactive Power BI reports, and paginated reports, completely within the boundaries of the organization's firewall. With Power BI Premium the same number of virtual cores an organization provisions in the cloud can also be deployed on-premises through Power BI Report Server, without the need to split the capacity. Organizations can choose Power BI in the cloud, or elect to keep reports on-premises with Power BI Report Server and move to the cloud at their pace.

For more information, see [Get started with Power BI Report Server](#).

How can customers get access to Power BI Report Server?

Power BI Report Server is available through Power BI Premium or as a benefit for customers with SQL Server EE with SA. Contact your Microsoft representative for more information.

Why is Power BI Report Server not available as benefit for SQL Server Standard or Enterprise Edition customers?

Power BI Report Server is available to SQL Server customers with EE + SA licenses or for purchase through Power BI Premium. Power BI is a SaaS service, and Power BI Report Server will follow the same subscription-based delivery model.

Next steps

[Power BI Premium - what is it?](#)

[Power BI Premium release notes](#)

[Microsoft Power BI Premium whitepaper](#)

[Planning a Power BI Enterprise Deployment whitepaper](#)

[Extended Pro Trial activation](#)

More questions? [Try asking the Power BI Community](#)

Power BI Premium release notes

1/30/2018 • 1 min to read • [Edit Online](#)

These are the release notes for Power BI Premium, a dedicated capacity giving your organization or team more dependable performance, larger data volumes, and the ability to distribute content without per-user licenses for viewers.

- Users with Power BI Free licenses can now view dashboards shared with them from Premium workspaces in the Power BI service.
- Capacity admins now automatically get capacity assignment permissions.
- Dynamic row-level security (RLS) is now available for embedded use cases. For more information, see [Row-level security \(RLS\) with embedded analytics](#).
- Distributing Power BI apps to users in other AAD tenants using powerbi.com is not yet supported. We are working on enabling this.
- Users of the Personal Gateway must upgrade to the latest version in order to continue refreshing their data in Premium workspaces.
- Imported datasets greater than 1 GB are not supported in Premium capacity at initial release. We are working on enabling this.
- Users must log in at least once to the Power BI service before they can be assigned as capacity admins or given workspace assignment permissions.
- You may see transient cases where you achieve more Direct Query/live connection queries per second than what is included in your capacity SKU. You shouldn't rely on throughput above what is included in your capacity SKU.

Next steps

[Power BI Premium FAQ](#)

[How to purchase Power BI Premium](#)

[Managing Power BI Premium](#)

[Microsoft Power BI Premium whitepaper](#)

[Administering Power BI in your organization](#)

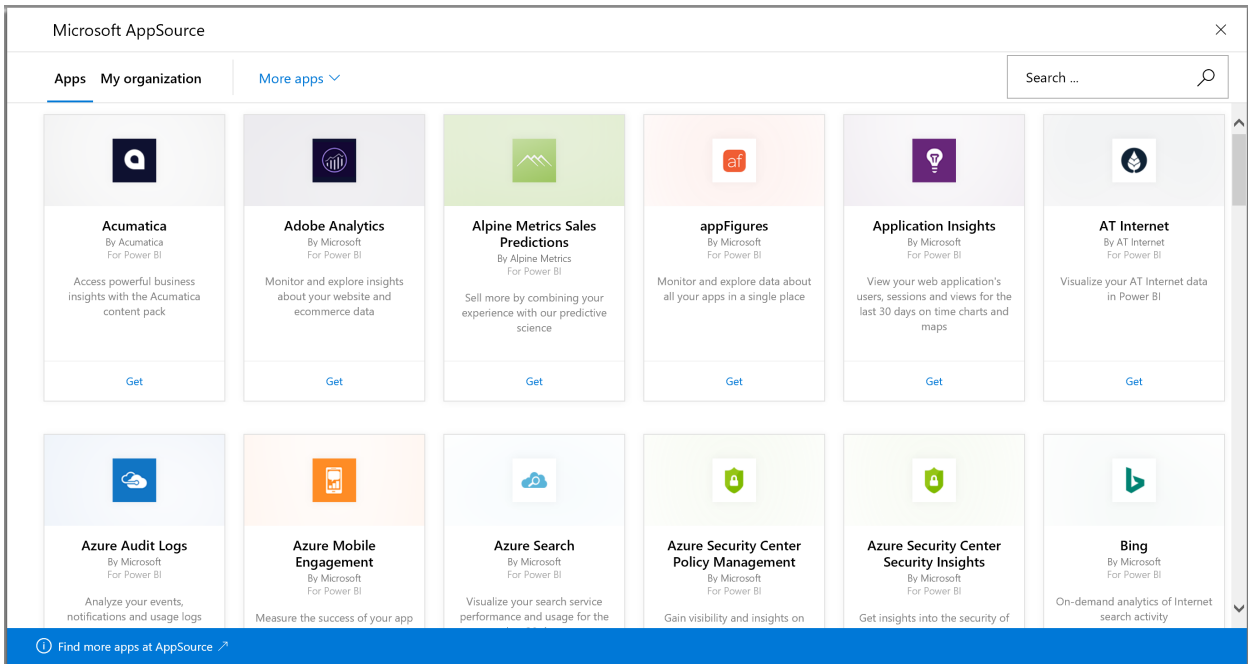
More questions? [Try asking the Power BI Community](#)

Connect to the services you use with Power BI

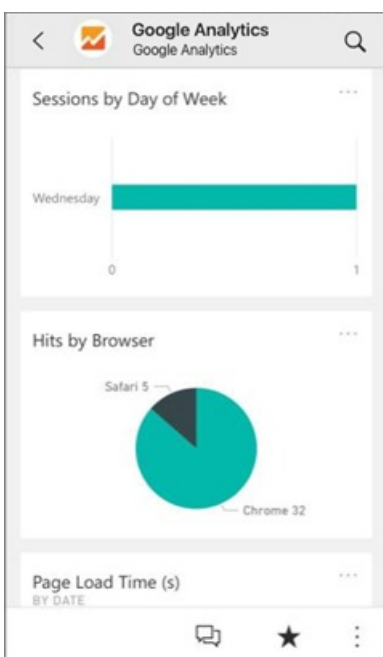
1/30/2018 • 2 min to read • [Edit Online](#)

You can connect to a number of services you use to run your business, such as Salesforce, Microsoft Dynamics, and Google Analytics. Power BI starts by using your credentials to connect to the service, and then creates a Power BI app with a dashboard and a set of Power BI reports that automatically show your data and provide visual insights about your business.

Log in to Power BI to view all of the [services you can connect to](#). The Power BI team adds new services regularly.

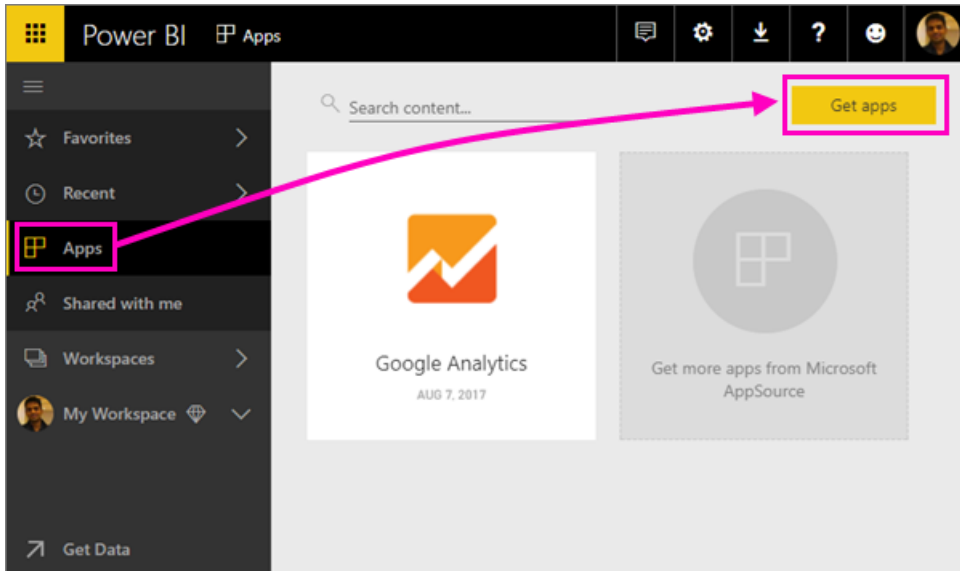


After you install the app, you can view the dashboard and reports in the Power BI service (<https://powerbi.com>), and in the Power BI mobile apps.

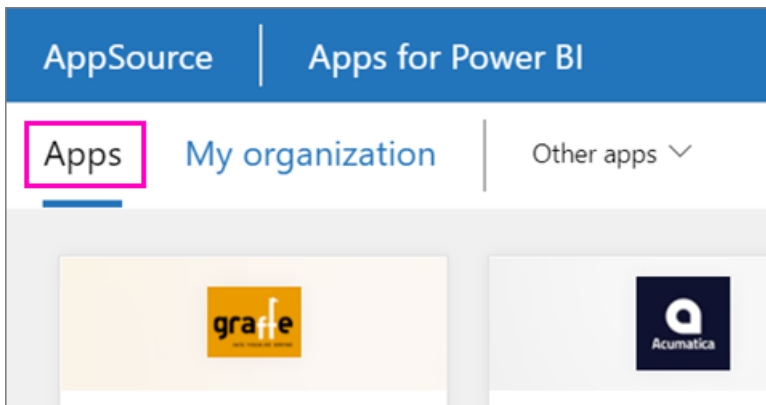


Get started

1. Select **Apps** in the left navigation pane > select **Get apps** in the upper-right corner.



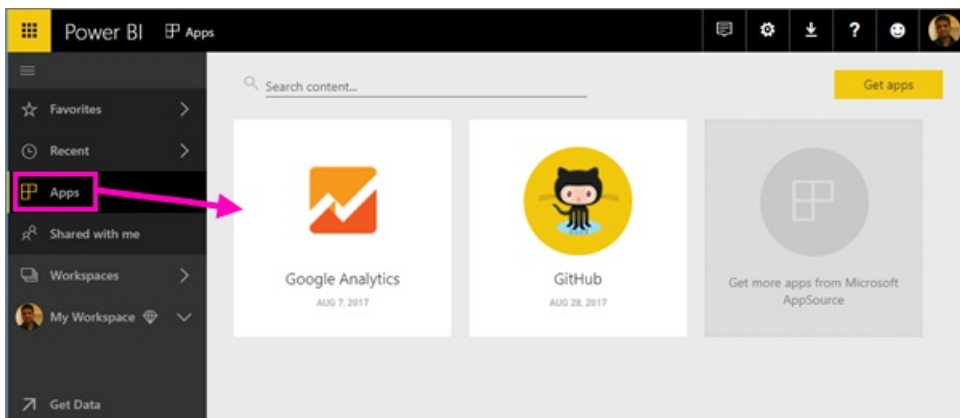
2. In AppSource, select the **Apps** tab, and search for the service you want.



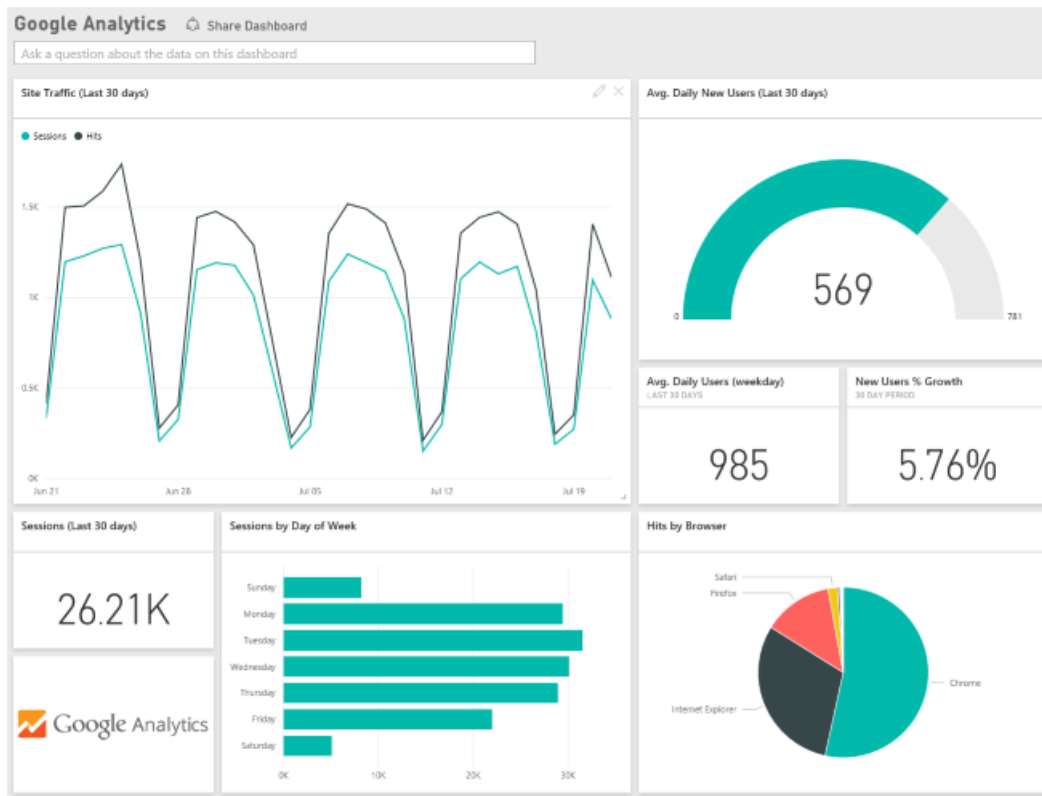
View the dashboard and reports

When the import is complete, the new app appears on the Apps page.

1. Select **Apps** in the left navigation pane > select the app.



2. You can ask a question by typing in the Q&A box, or click a tile to open the underlying report.



You can filter and highlight the data in the report, but you can't save your changes.

What's included

After connecting to a service, you see a newly created app with a dashboard, reports, and dataset. The data from the service is focused on a specific scenario and may not include all the information from the service. The data is scheduled to refresh automatically once per day. You can control the schedule by selecting the dataset.

You can also use [Power BI Desktop](#) to connect to some services, such as Google Analytics, and create your own customized dashboards and reports.

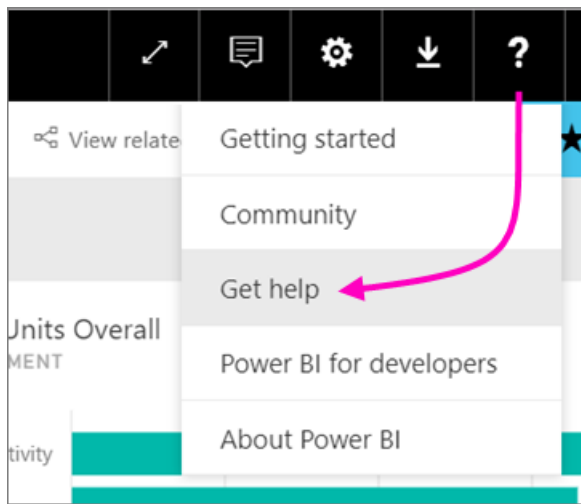
For more details on connecting to specific services, please refer to the individual help pages.

Troubleshooting

Empty tiles

While Power BI is first connecting to the service, you may see an empty set of tiles on your dashboard. If you still see an empty dashboard after 2 hours, it's likely the connection failed. If you didn't see an error message with information on correcting the issue, please file a support ticket.

- Select the question mark icon (?) in the upper-right corner > **Get help.**



Missing information

The dashboard and reports include content from the service focused on a specific scenario and do not include all the information from the service. If there's a specific metric that you're not seeing in the content pack, please add an idea on the [Power BI Support](#) page.

Suggesting services

Do you use a service you'd like to suggest for a Power BI app? Go to the [Power BI Support](#) page and let us know.

Do you have a service you'd like to build an app for? [Submit your nomination](#) and select "Publish a Power BI Content Pack" to get started.

Next steps

- [What are apps in Power BI?](#)
- [Get data in Power BI](#)
- More questions? [Try asking the Power BI Community](#)

Connect to Adobe Analytics with Power BI

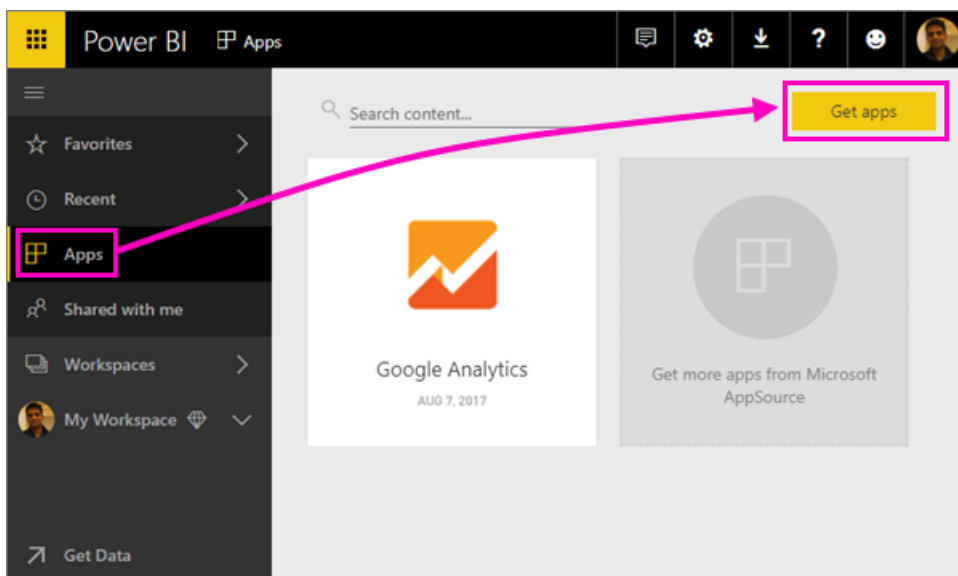
11/9/2017 • 4 min to read • [Edit Online](#)

Connecting to Adobe Analytics through Power BI starts by connecting to your Adobe Analytics Marketing Cloud account. You get an app with a Power BI dashboard and a set of Power BI reports that provide insights about your site traffic and user dimensions. The data is refreshed automatically once per day. You can interact with the dashboard and reports, but you can't save changes.

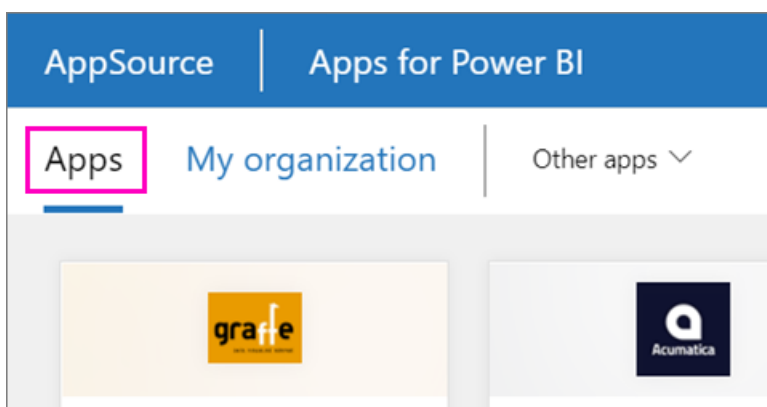
Connect to [Adobe Analytics](#) or read more about the [Adobe Analytics integration](#) with Power BI.

How to connect

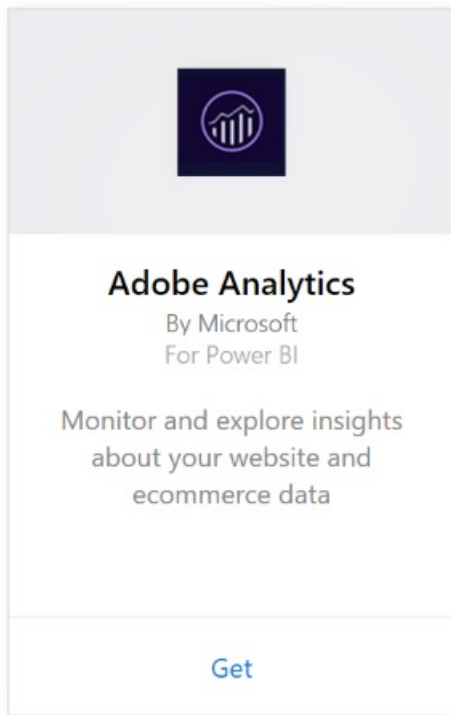
1. Select **Apps** in the left navigation pane > select **Get apps** in the upper-right corner.



2. In AppSource, select the **Apps** tab, and search for the service you want.



1. Select **Adobe Analytics** > **Get**.



2. Power BI connects to a specific Adobe Analytics Company and Report Suite ID (not the Report Suite name). See details on [finding those parameters](#) below.

A dialog box titled "Connect to Adobe Analytics" with a close button (X) in the top right corner. It features the Adobe Analytics icon and the text: "To start using your Adobe Analytics data in Power BI, follow the prompts below. Need help connecting? [Learn More](#)". Below this, there are two input fields. The first is labeled "Company" with the subtext "Adobe Analytics Company" and contains the text "Microsoft". The second is labeled "Report Suite ID" with the subtext "ID of the Report Suite" and contains the text "Sales". At the bottom right, there are two buttons: a yellow "Next" button and a grey "Cancel" button.

3. For **Authentication Method**, select **oAuth2 > Sign In**. When prompted, enter your Adobe Analytics credentials.

Connect to Adobe Analytics



To start using your Adobe Analytics data in Power BI, follow the prompts below.

Need help connecting? [Learn More](#)

company

Partner Development Red

Authentication Method:

oAuth2

Sign In

Cancel

Sign in - Adobe ID - Google Chrome

<https://adobeid-na1.services.adobe.com/renga-idprovider/pages/login?callback=https%3A%2F%2Fims-na1.adobelogin.com%2Fims%2>

Adobe ID

Sign in

Email address

Password

Stay signed in [Forgot password?](#)
Uncheck on public devices.

SIGN IN

Not a member yet? [Get an Adobe ID](#)

Want to use your company or school account?
[Sign in with an Enterprise ID](#)

Secure Server
[Tell me more](#)

One Adobe account. Infinite possibilities.

4. Click **Accept** to allow Power BI to access your Adobe Analytics data.

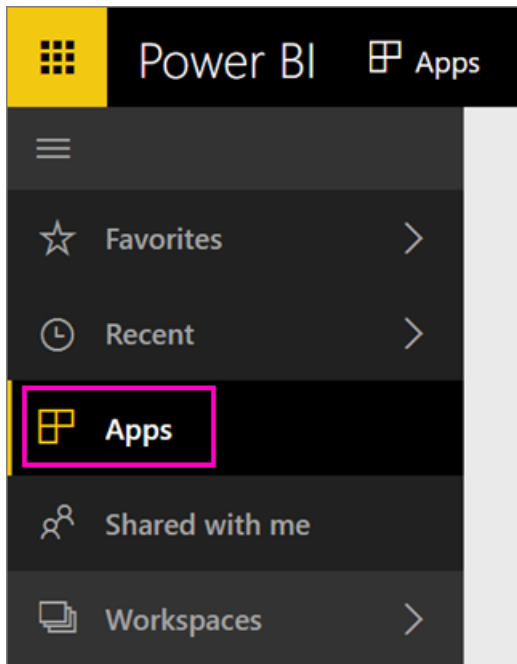


5. After you approve, the import process begins automatically.

View the Adobe Analytics dashboard and reports

When the import is complete, the new app will appear on the Apps page.

1. Select **Apps** in the left navigation pane > select the app.



2. You can ask a question by typing in the Q&A box, or click a tile to open the underlying report.

![Adobe Analytics dashboard](media/service-connect-to-adobe-analytics/dashboard.png)

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard.
- [Select a tile](#) to open the underlying report.
- You can filter and highlight the data in the report, but you can't save your changes.
- Your dataset is scheduled to be refreshed daily. You can change the refresh schedule or try refreshing it on demand using **Refresh Now**.

What's included

Power BI uses the Adobe Analytics Report API to define and run reports for the following tables:

TABLE NAME	COLUMN DETAILS
Products	elements= "product" (top 25) metrics="cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units"
Browsers	elements= "browser" (top 25) metrics="bounces", "bouncerate", "visitors", "visits", "uniquevisitors", "totaltimespent", "pageviews"
Pages	elements= "page" (top 25) metrics="cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units", "visits", "uniquevisitors", "pageviews", "bounces", "bouncerate", "totaltimespent"
JavaScript Enabled	elements= "javascriptenabled", "browser" (top 25)
Mobile OS	elements= "mobileos"(top 25) metrics="bounces", "bouncerate", "visitors", "visits", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "checkouts", "revenue", "units", "pageviews"
Search Engines Keywords	elements= "searchengine" "searchenginekeyword" metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units", "pageviews"
Search Engine to Products	elements= "searchengine", "product" metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units", "pageviews"
Referring Pages	elements= "referrer" (top 15), "page" (top 10) metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units", "pageviews"
Geocountry Pages	elements= "geocountry" (Top 20), "page" metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units", "pageviews"

TABLE NAME	COLUMN DETAILS
Geocountry Product	elements= "geocountry" (Top 20), "product" metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units"
Country and Region Lookup	elements= "geocountry" (Top 200) metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units"
Language	elements= "language", "browser" (Top 25) metrics="bounces", "bouncerate", "visitors", "visits", "uniquevisitors", "totaltimespent", "pageviews", "cartadditions", "cartremovals", "checkouts", "carts", "cartviews"
Search Engines Look Up	elements= "searchengine" (top 100) metrics="bounces", "bouncerate", "visitors", "visits", "entries", "uniquevisitors", "totaltimespent", "cartadditions", "cartremovals", "carts", "cartviews", "checkouts", "revenue", "units"
Browser Lookup	elements= "browser" (top 25)

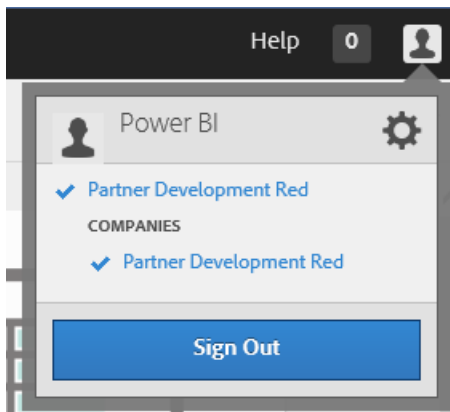
System requirements

Access to [Adobe Analytics](#) is required, including access to the correct parameters as described below.

Finding parameters

Company

The Company value can be found in the top right of your account once you're signed in. The value is case and spacing sensitive. Enter it exactly as you see in your account.



Report Suite ID

The Suite ID is created when the Report Suite is created. You can contact your administrator to identify the ID value. Note that this is not the Report Suite name.

From Adobe [documentation](#):

Element	Description
Report Suite ID	<p>Specifies a unique ID that can contain only alphanumeric characters. This ID cannot be changed after it is created. Adobe sets the required ID prefix. Contact your account manager or Customer Care to change the prefix value.</p> <p>When creating multiple report suites, ensure that the naming convention you use guarantees unique report suite IDs.</p>

Troubleshooting

If you're seeing an error after providing your credentials indicating you do not have permissions, please confirm with your admin that you have access to the Adobe Analytics API. Also confirm the Adobe ID provided is linked to your Marketing Cloud Organization (associated to an Adobe Analytics company).

If you've successfully passed the credentials screen before encountering an error, it's possible the reports are taking too long to complete. A common error is in the form *"Failed to get data from the Adobe Analytics report. Contents included "referrer, page", approximate duration was xx seconds"*. Please review the "What's included" section and compare to the size of your Adobe instance. Unfortunately there isn't a way to work around this timeout today. However, we're considering updates to better support larger instances, please provide feedback to the Power BI team at <https://ideas.powerbi.com>

Next steps

- [What are apps in Power BI?](#)
- [Get data in Power BI](#)
- More questions? [Try asking the Power BI Community](#)

Connect to Azure Audit Logs with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

With the Azure Audit Logs content pack you can analyze and visualize the information stored in the audit logs. Power BI retrieves your data, builds an out-of-the box dashboard, and creates reports based on that data.

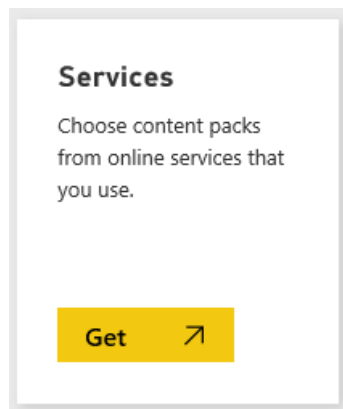
[Connect to the Azure Audit Logs content pack](#) or read more about the [Azure Audit Logs integration](#) with Power BI.

How to connect

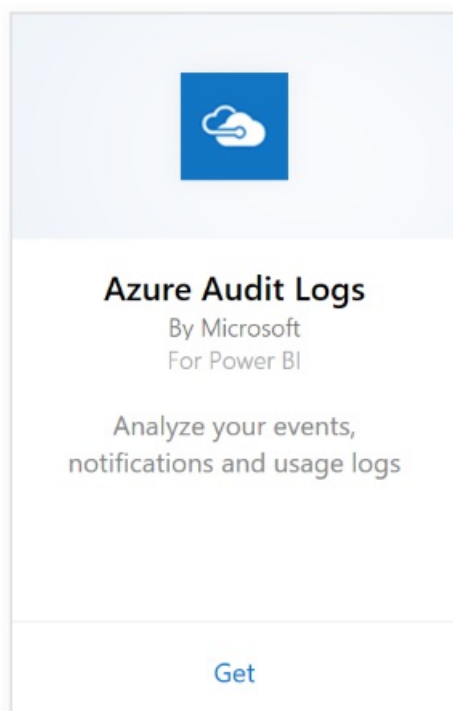
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.




3. Select **Azure Audit Logs** > **Get**.



4. When prompted, enter your **Azure Subscription ID**. See details on finding your [subscription ID](#) below.

Connect to Azure Audit Logs




To start using your Azure Audit Logs data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Subscription Id
Azure Subscription Id

Next **Cancel**

5. For **Authentication Method**, select **oAuth2** > **Sign In**.

Connect to Azure Audit Logs



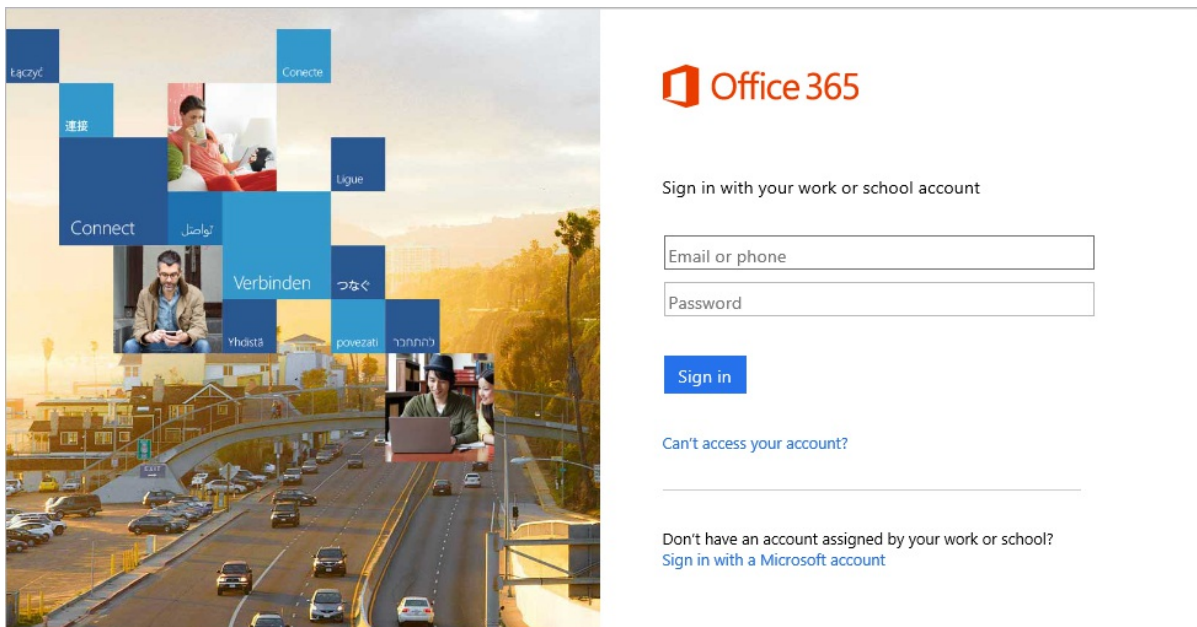
To start using your Azure Audit Logs data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Url

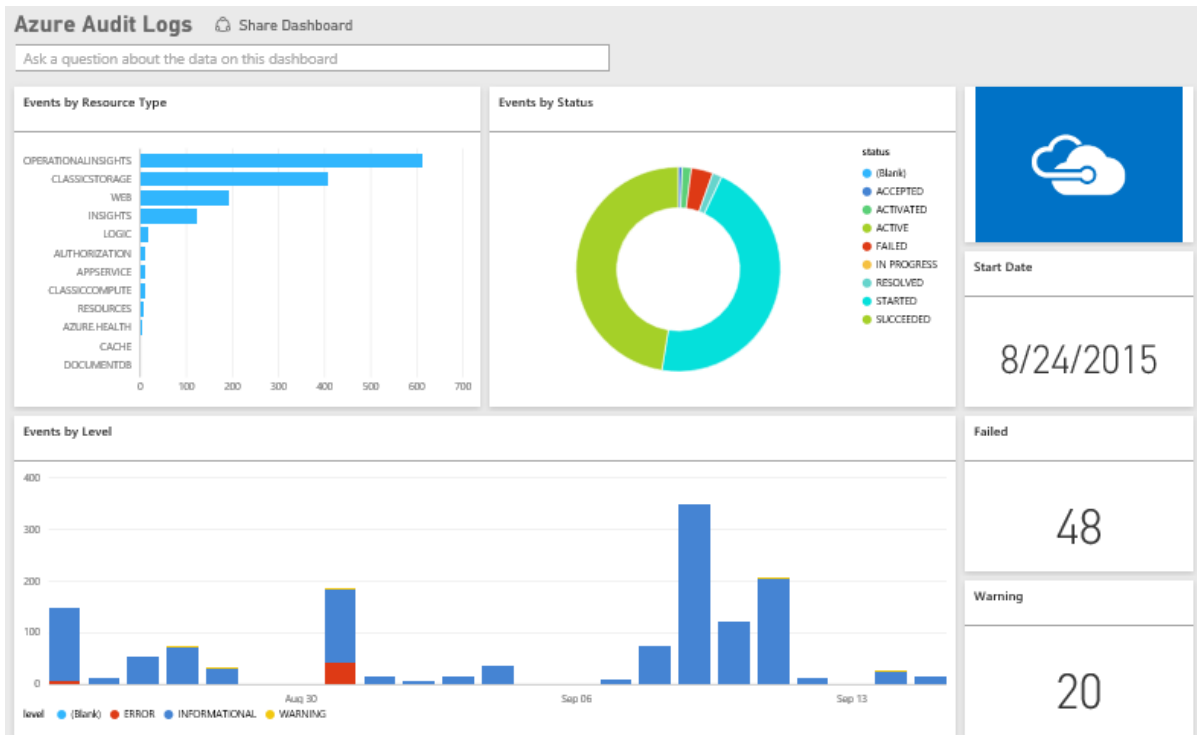
Authentication Method:

Sign In **Cancel**

6. Enter your account credentials to finish the sign in process.



7. Power BI will retrieve your Azure Audit Log data and create a ready-to-use dashboard and report.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

The Azure Audit logs content pack requires access to Audit Logs in the Azure Portal. More details [here](#).

Finding parameters

There are two easy ways to find your Subscription Id.

1. From <https://portal.azure.com> -> Browse -> Subscriptions -> Subscription Id
2. From <https://manage.windowsazure.com> -> Settings -> Subscription Id

Your subscription ID will be long set of numbers and characters, similar to the example in Step #4 above.

Troubleshooting

If you're seeing a credentials error or an error trying to refresh due to invalid credentials, please try deleting all instances of the Azure Audit logs content pack and reconnecting.

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Google Analytics with Power BI

11/15/2017 • 2 min to read • [Edit Online](#)

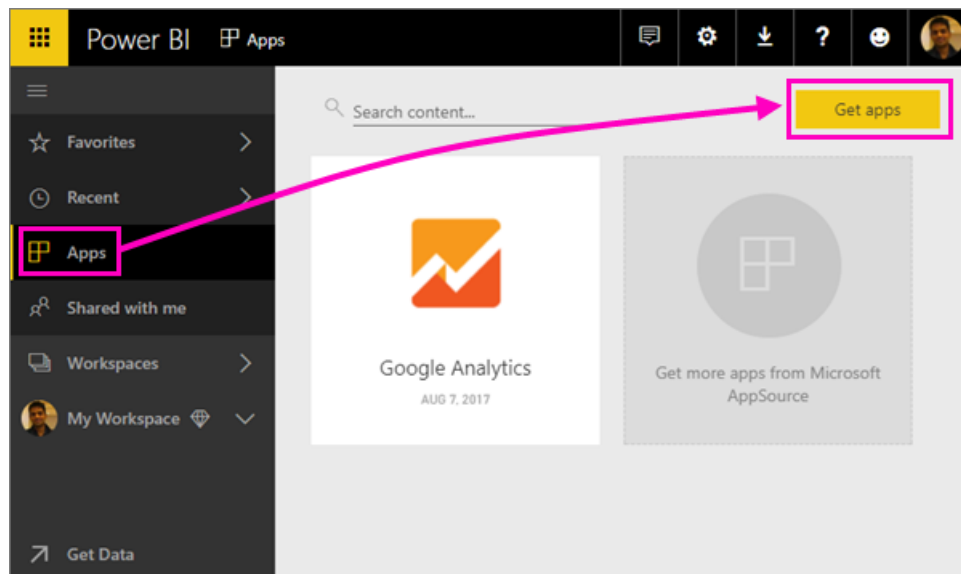
Connecting to Google Analytics through Power BI starts by connecting to your Google Analytics account. You will get a Power BI dashboard and a set of Power BI reports that provide insights about your site traffic and user dimensions. You can interact with the dashboard and reports, but you can't save changes. The data will be refreshed automatically once per day.

Connect to [Google Analytics](#) for Power BI. Read more about the [Google Analytics integration](#) with Power BI.

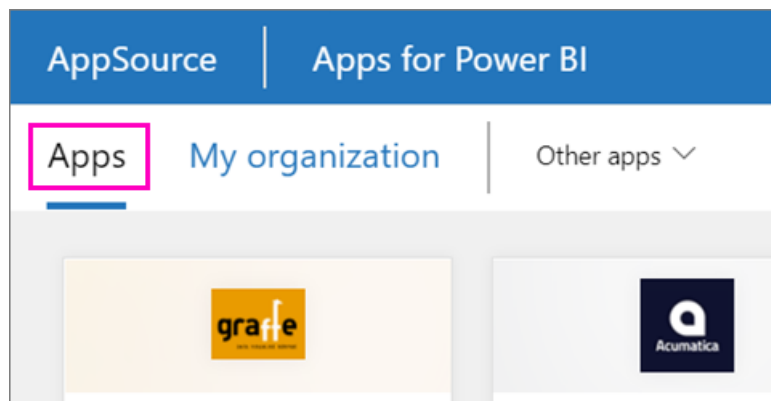
You can create customized dashboards and reports by starting from the [Google Analytics connector](#) in Power BI Desktop. Just connect with your Google Analytics account and create your custom reports, which you can publish to the Power BI service.

How to connect

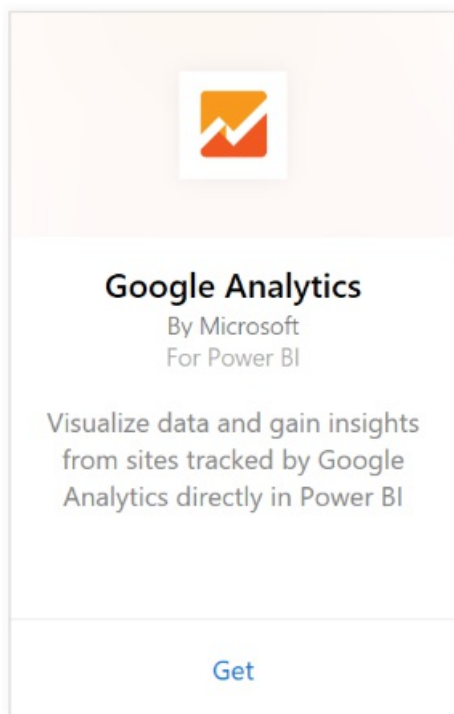
1. Select **Apps** in the left navigation pane > select **Get apps** in the upper-right corner.



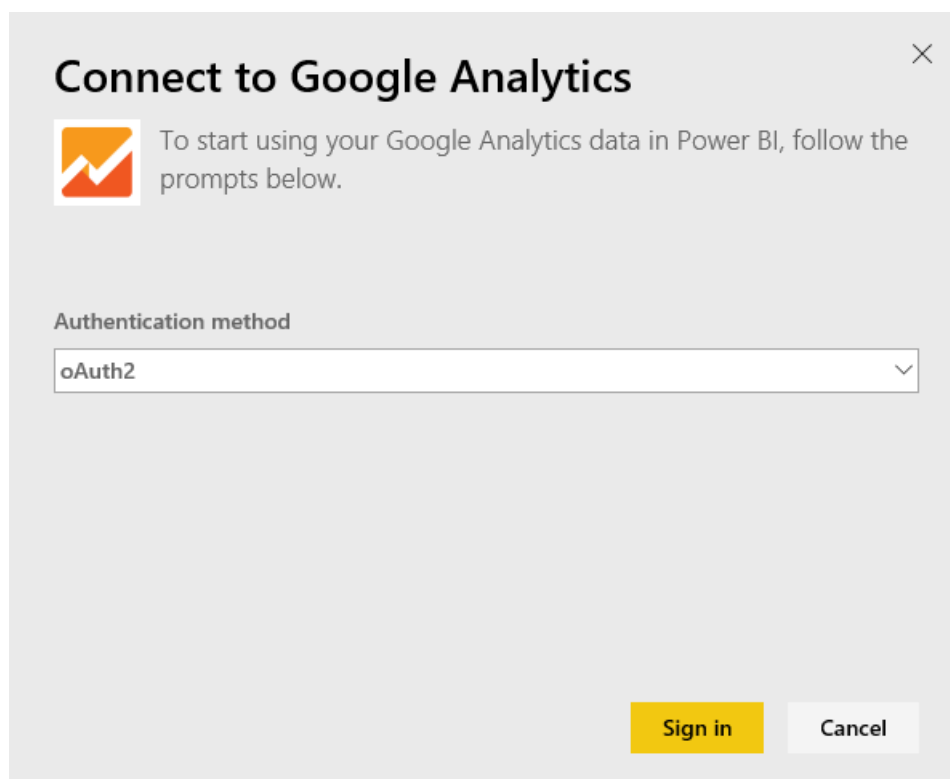
2. In AppSource, select the **Apps** tab, and search for the service you want.



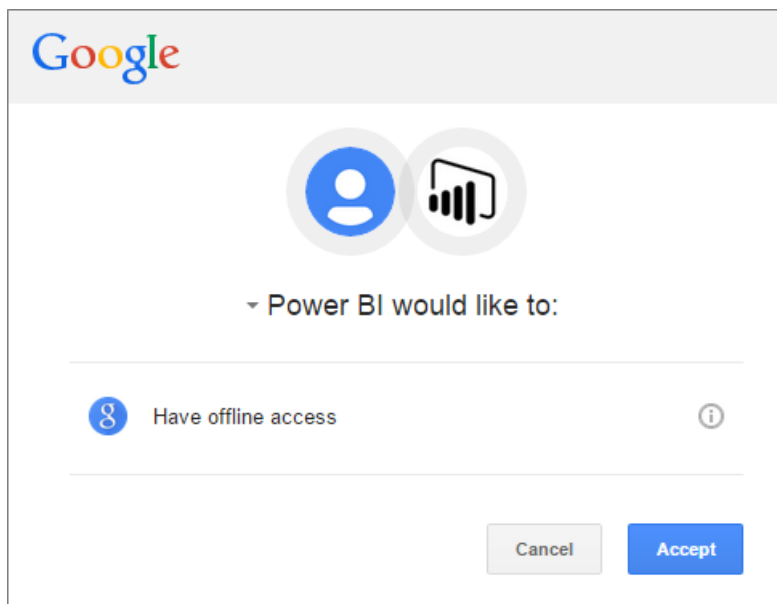
1. Select **Google Analytics** > **Get**.



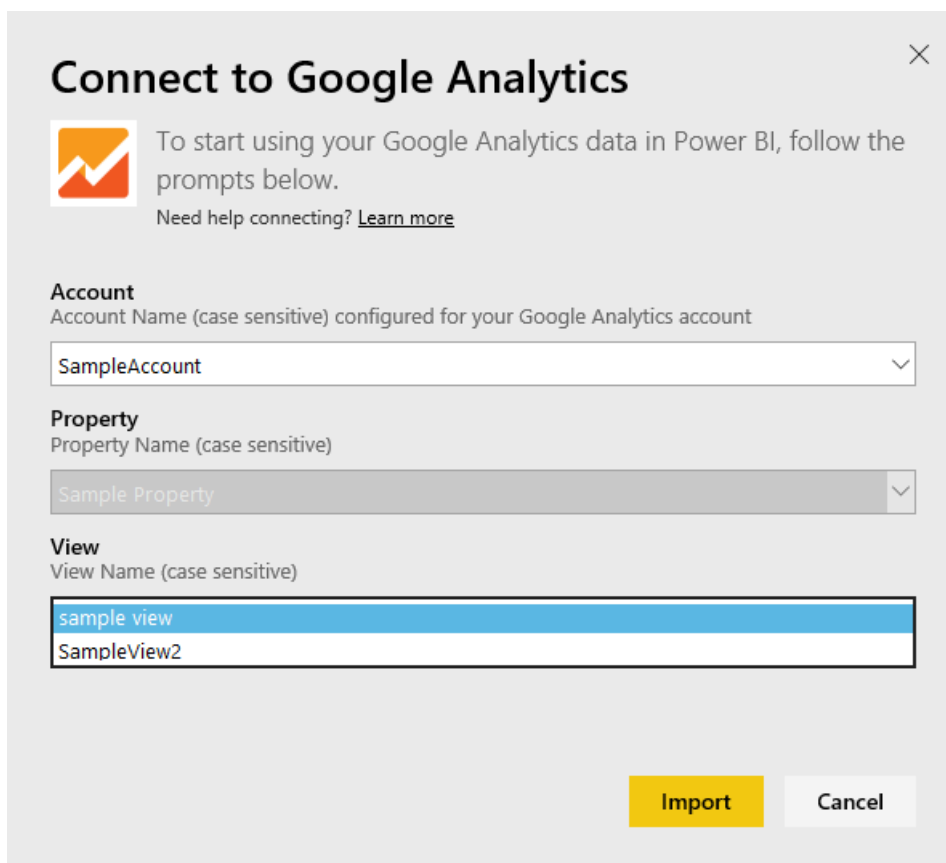
2. When prompted, enter your Google Analytics credentials. Select **oAuth 2** as the Authentication Mechanism and click **Sign In**. Follow the Google authentication flow, which may include 2-factor authentication if you have it configured.



3. Click **Accept** to allow Power BI to access your Google Analytics data.



4. Power BI connects to a specific Google Analytics View. Select the account name, property name and view name you'd like to connect to. This information can be found in your Google Analytics account, either in the top left or on the **Home** tab. See details below.

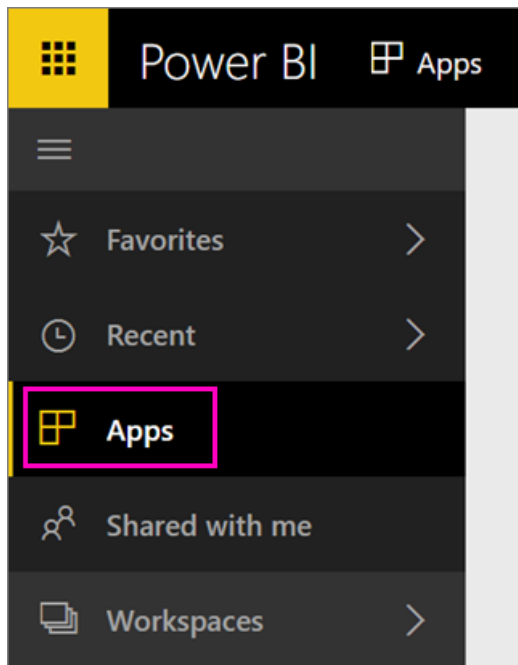


5. Click **Connect** to begin the import process.

View the Google Analytics dashboard and reports

When the import is complete, the new app will appear on the Apps page.

1. Select **Apps** in the left navigation pane > select the app.



2. You can ask a question by typing in the Q&A box, or click a tile to open the underlying report.

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard.
- [Select a tile](#) to open the underlying report.
- You can filter and highlight the data in the report, but you can't save your changes.
- Your dataset is scheduled to be refreshed daily. You can change the refresh schedule or try refreshing it on demand using **Refresh Now**.

System requirements

To connect from Power BI, you need to have a [Google Analytics](#) account. Other Google accounts that do not have a Google Analytics account connected to it will see an authentication error.

Troubleshooting

Credentials If you have multiple Google accounts, please use an incognito or an in-private browser window during connection to ensure the correct account is used.

If you're getting an error indicating your credentials are invalid however you were able to sign into Google, please confirm you have a [Google Analytics](#) account.

Parameters Unique names are currently required for the parameters. If you see an error indicating the value you selected is duplicated, please select another value or change the names in Google Analytics to make them unique. We're actively working to improve this.

NOTE

Parameters are case-sensitive. Enter them exactly as they appear in your Google Analytics account.

Connect to Google Analytics

To start using your Google Analytics data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Account
Account Name (case sensitive) configured for your Google Analytics account
SampleAccount

Property
Property Name (case sensitive)
Sample Property

View
View Name (case sensitive)
sample view

Google Analytics Home Reporting Customiz.

SampleAccount
Sample Property
sample view

Next Cancel

Still having issues? Open a support ticket to reach the Power BI team:

- While in the Power BI app, select the question mark > **Contact Support**.
- From the Power BI Support site (where you're reading this article), select **Contact Support** on the right side of the page.

Next steps

- [What are apps in Power BI?](#)
- [Get data in Power BI](#)
- More questions? [Try asking the Power BI Community](#)

Connect to Marketo with Power BI

1/19/2018 • 3 min to read • [Edit Online](#)

The Power BI content pack for Marketo allows you to gain insights into your Marketo account with data around Leads and their activities. Creating this connection retrieves your data and automatically provides a dashboard and related reports based on that data.

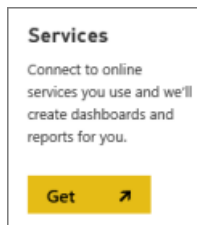
Connect to the [Marketo content pack](#) for Power BI.

How to connect

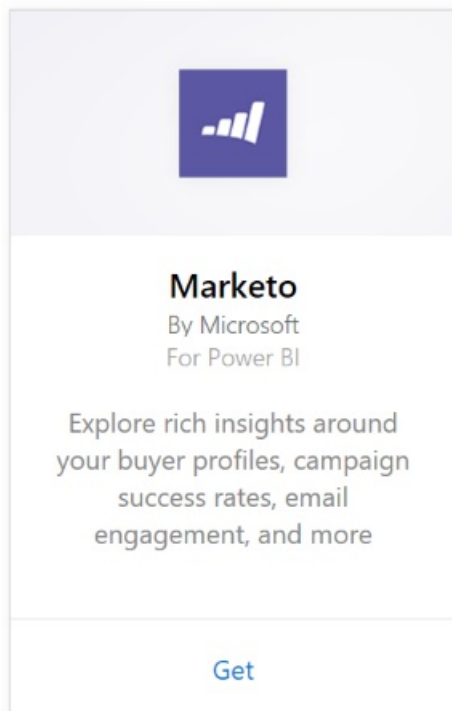
1. Select **Get Data** at the bottom of the left navigation pane.



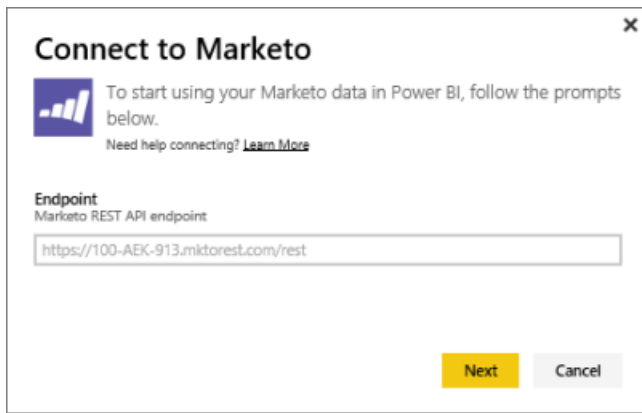
2. In the **Services** box, select **Get**.



3. Select **Marketo > Get**.



4. Enter the Marketo REST endpoint supplied to you by Marketo or your Marketo admin, and select Next.



Connect to Marketo

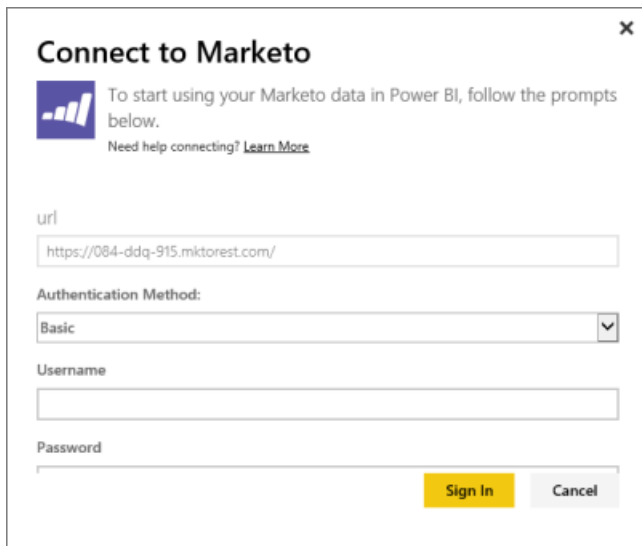
To start using your Marketo data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Endpoint
Marketo REST API endpoint

Next **Cancel**

Read more about the Marketo REST endpoint: <http://developers.marketo.com/documentation/rest/endpoint-url/>.

- Using the **Basic** Authentication Method, enter the Client ID as the **Username** and the Client Secret as the **Password**. Client ID and Client Secret are available in Marketo or from your marketo admin (<http://developers.marketo.com/documentation/rest/custom-service/>).



Connect to Marketo

To start using your Marketo data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

url

Authentication Method:
Basic

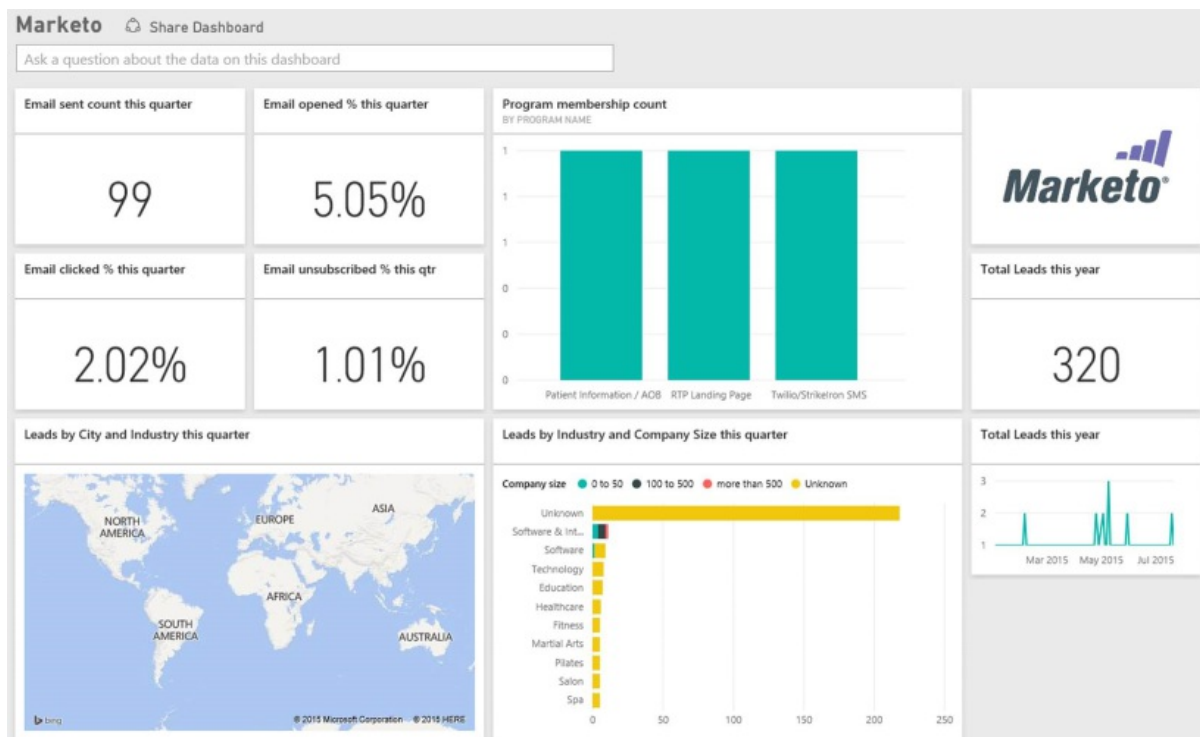
Username

Password

Sign In **Cancel**

This gives the *Marketo for Power BI *content pack access to your [Marketo analytics](#) data and allows you to analyze the data in Power BI. The data is refreshed once a day.

- Once connected to your Marketo account, a dashboard with all your data is loaded:



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The following data is available from Marketo in Power BI where the activity occurred between today and one year ago:

TABLE NAME	DESCRIPTION
EmailActivities	Data about email sent to leads/contacts, with details about devices, categories, bounced count and percentage, clicked count and percentage, opened count and percentage, and program name. The Email Activities as shown in Power BI is an absolute email deliverability report, it does not apply any additional logic to the data. You might see some different results between the Marketo client and Power BI because of this.
ProgramActivities	Data on programs that have had a change a Status. This includes details such as: Reason, Success, Program acquisition count and percentage, and Program success count and percentage.
WebPageActivities	Data from user web page visits, including search agent, User agent, web page and hour of day.
Datetable	Dates from today and the past year. Allows you to analyze your Marketo data by date.

TABLE NAME	DESCRIPTION
Leads	Lead information like company, revenue size, number of employees, country, industry, Lead score and Lead status. The leads are retrieved based on their presence in the email, program, and webpage activities data.

All dates are in UTC. Depending on which time zone your account is in, dates may vary (similar as is seen in the Marketo client)

System requirements

- The Marketo account you use for connecting has permission to access leads and activities.
- Sufficient API calls available to connect to the data. Marketo has an API for each account. When the limit is reached, you won't be able to load data into Power BI.

API Limit Details

Importing data from Marketo uses Marketo APIs. Every customer of Marketo has a total limit of 10,000 API calls per day that are shared between all applications that use the Marketo APIs. You may use the APIs for other integrations as well as the Power BI integration. For more information on the APIs see:

<http://developers.marketo.com/documentation/rest/>.

The amount of API calls Power BI makes to Marketo depends on the amount of data in your Marketo account. Power BI imports all Leads and Activities for the last year. Here is an example of data from Marketo and the amount of API calls that are used by Power BI when importing:

DATA TYPE	NUMBER OF ROWS	API CALLS
Leads information	15,000	50
Mail activities	150,000	1,000
Program activities	15,000	100
Web activities	150,000	1,000
Program changes	7,500	50
Total API Calls		2,200

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

[Power BI blog: Monitor and analyze your Marketo data with Power BI](#)

Connect to Salesforce with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

With Power BI, you can easily connect to your Salesforce.com account. Creating this connection retrieves your data and automatically provides a dashboard and related reports based on your data.

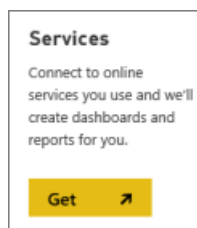
Connect to the [Salesforce content pack](#) for Power BI or read more about the [Salesforce integration](#) with Power BI.

How to Connect

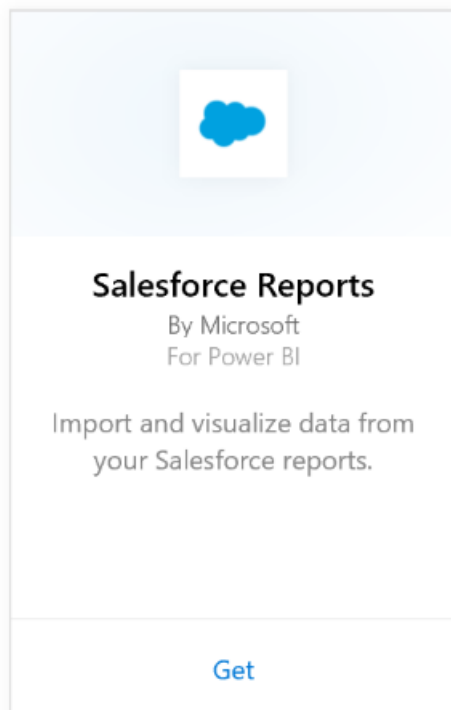
1. Select **Get Data** at the bottom of the left navigation pane.



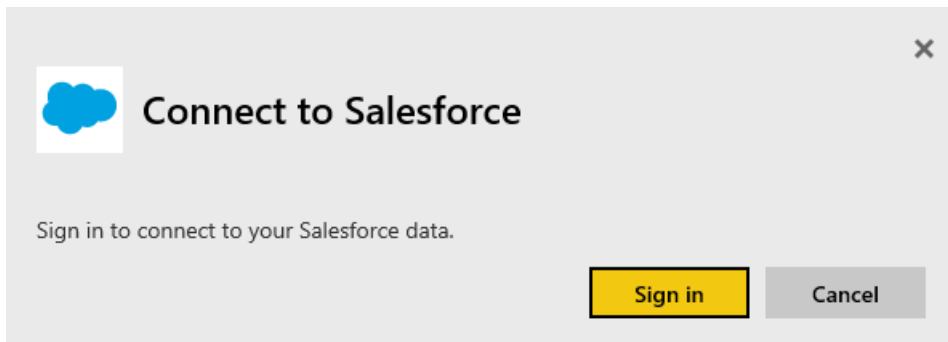
2. In the **Services** box, select **Get**.



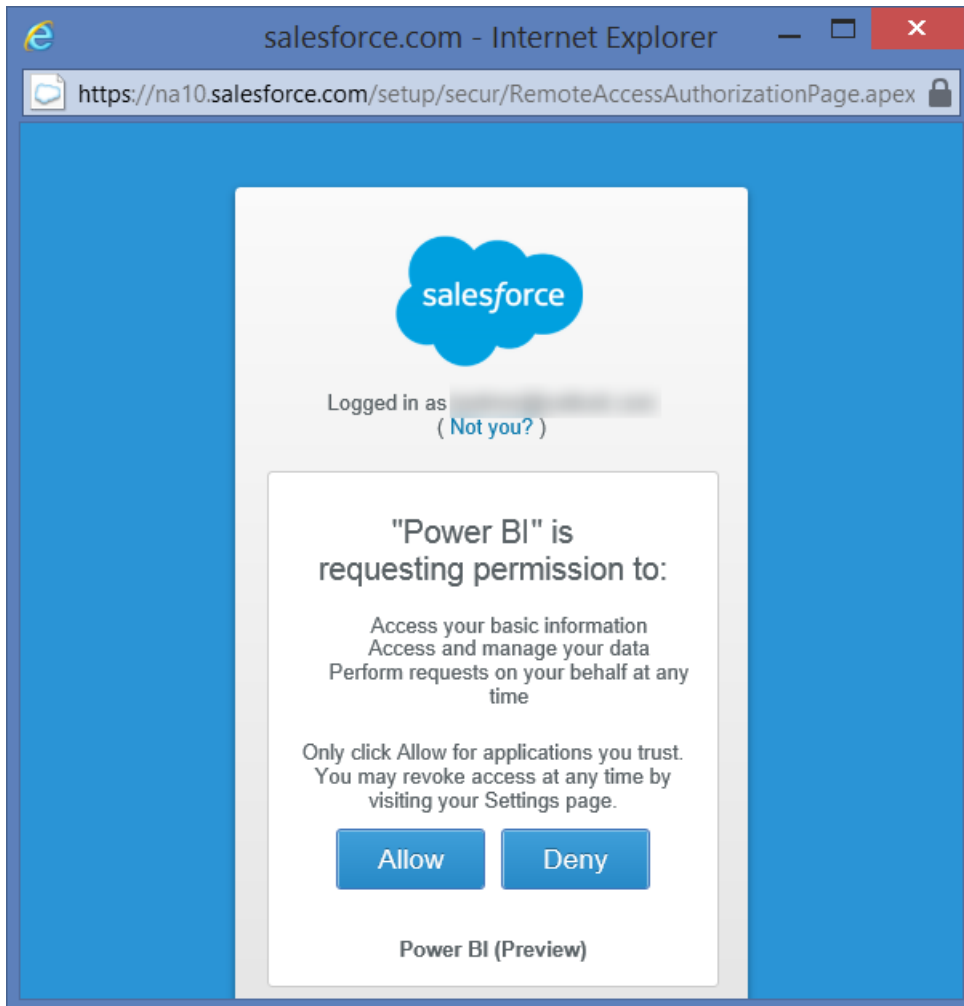
3. Click **Salesforce** and select **Get**.



4. Select **Sign In** to initiate the login flow.



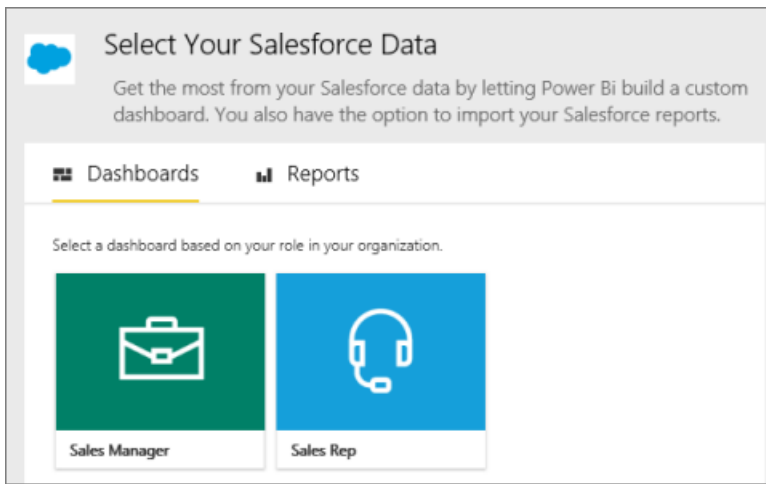
5. When prompted, enter your Salesforce credentials. Click **Allow** so Power BI can access your basic Salesforce information and data.



6. Configure what you'd like to import into Power BI using the dropdown option:

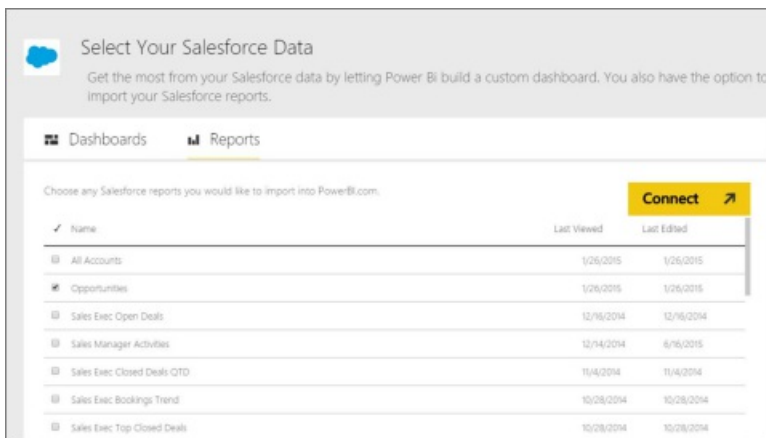
- **Dashboard**

Select a predefined dashboard based on a persona (such as **Sales Manager**). These dashboards bring in a specific set of standard data from Salesforce and will not include custom fields.



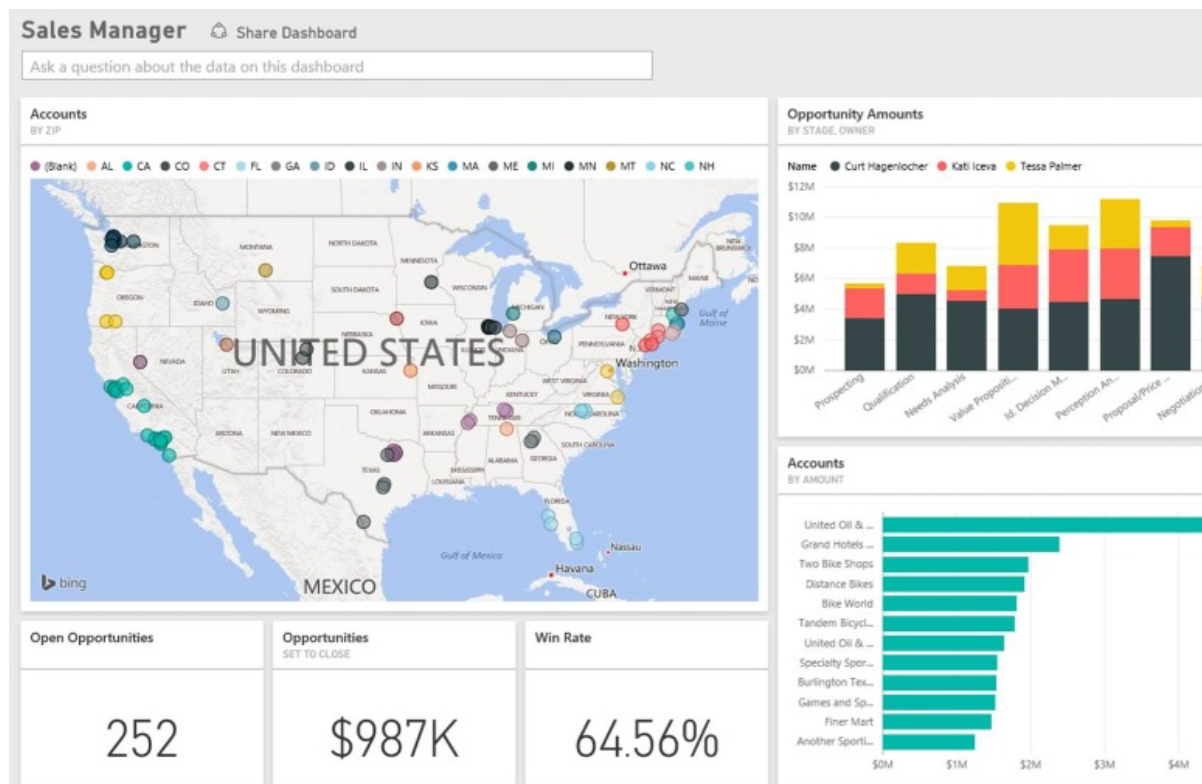
- **Reports**

Select one or more custom reports from your Salesforce account. These reports will match your views in Salesforce and can include data from custom fields or objects.



If you don't see any reports, add or create them in your Salesforce account and try connecting again.

7. Click **Connect** to begin the import process. During the import you see a notification showing the import is in progress. When the import is complete, you see a dashboard, report, and dataset for your Salesforce data listed in the navigation pane on the left.



You can change this dashboard to display your data any way you want. You can ask questions with Q&A - Or click a tile to [open the underlying report](#) and [change the tiles](#) in the dashboard.

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard
- [Select a tile](#) to open the underlying report
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

- Connected with a production Salesforce account that has API access enabled
- Permission granted to the Power BI app during log-in
- The account has sufficient API calls available to pull and refresh the data
- A valid authentication token is required for refresh. Ensure you have 5 or less Salesforce data sets imported, as Salesforce has a limit of 5 authentication tokens per application

Troubleshooting

If you encounter any errors, please review the requirements above. Also note the ability to login into a custom or sandbox domain is not currently supported.

Next steps

[Get Started with Power BI](#)

[Get Data](#)

Connect to Acumatica with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

The Power BI Acumatica content pack allows you to quickly gain insights into your opportunity data. Power BI retrieves your data, including opportunities, accounts, and customers, then builds a default dashboard and related reports based on that data.

Connect to the [Acumatica content pack](#) or read more about the [Acumatica integration](#) with Power BI.

NOTE

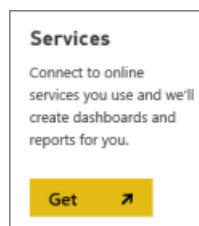
This content pack requires Acumatica v5.2 or higher.

How to connect

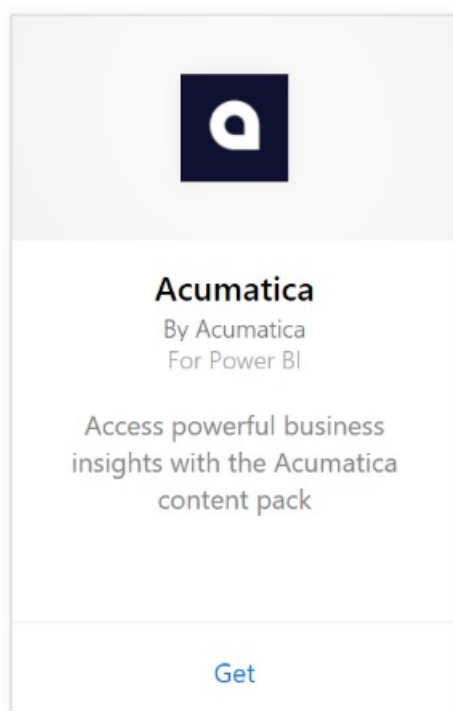
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Acumatica > Get**.

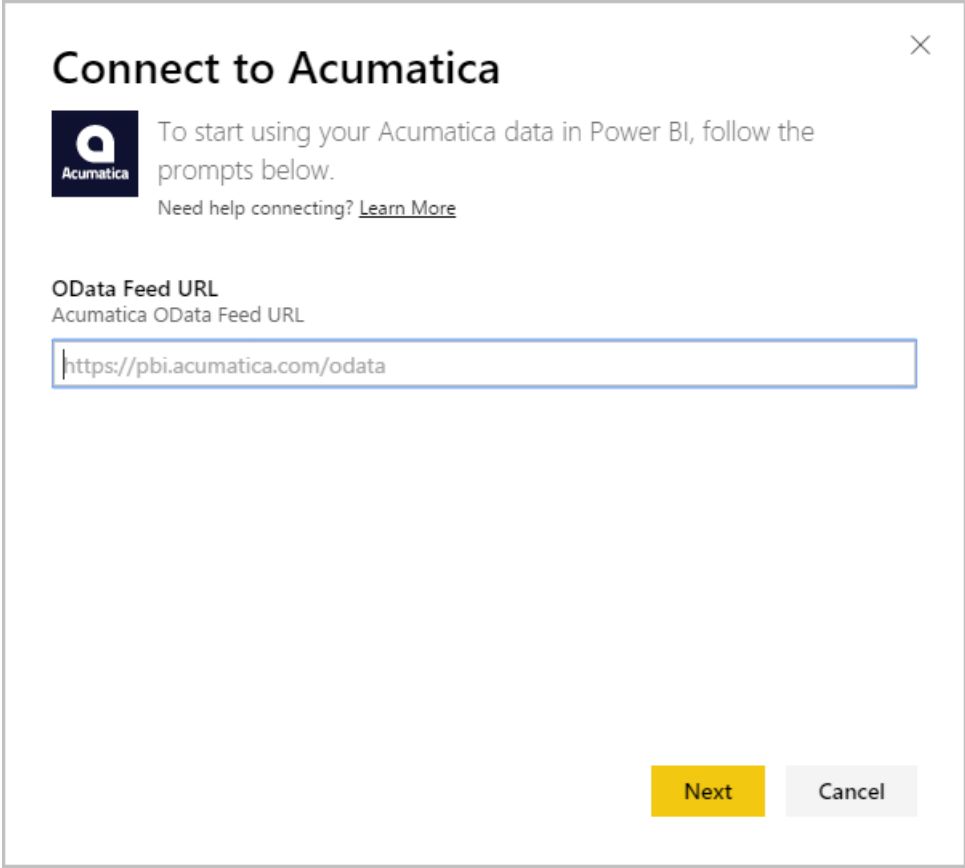


4. Enter your Acumatica OData endpoint. An OData endpoint allows an external system to request data from

Acumatica. Acumatica OData endpoint is formatted as follows and should us HTTPS:


```
https://[sitedomain]/odata/[companyname]
```

The Company Name is only required if you have a multi-company deployment. More information about finding this parameter in your Acumatica account is included below.



- 5. For Authentication Method, select **Basic**. Enter your username and password from your Acumatica account, then click **Sign In**.

Connect to Acumatica



To start using your Acumatica data in Power BI, follow the prompts below.

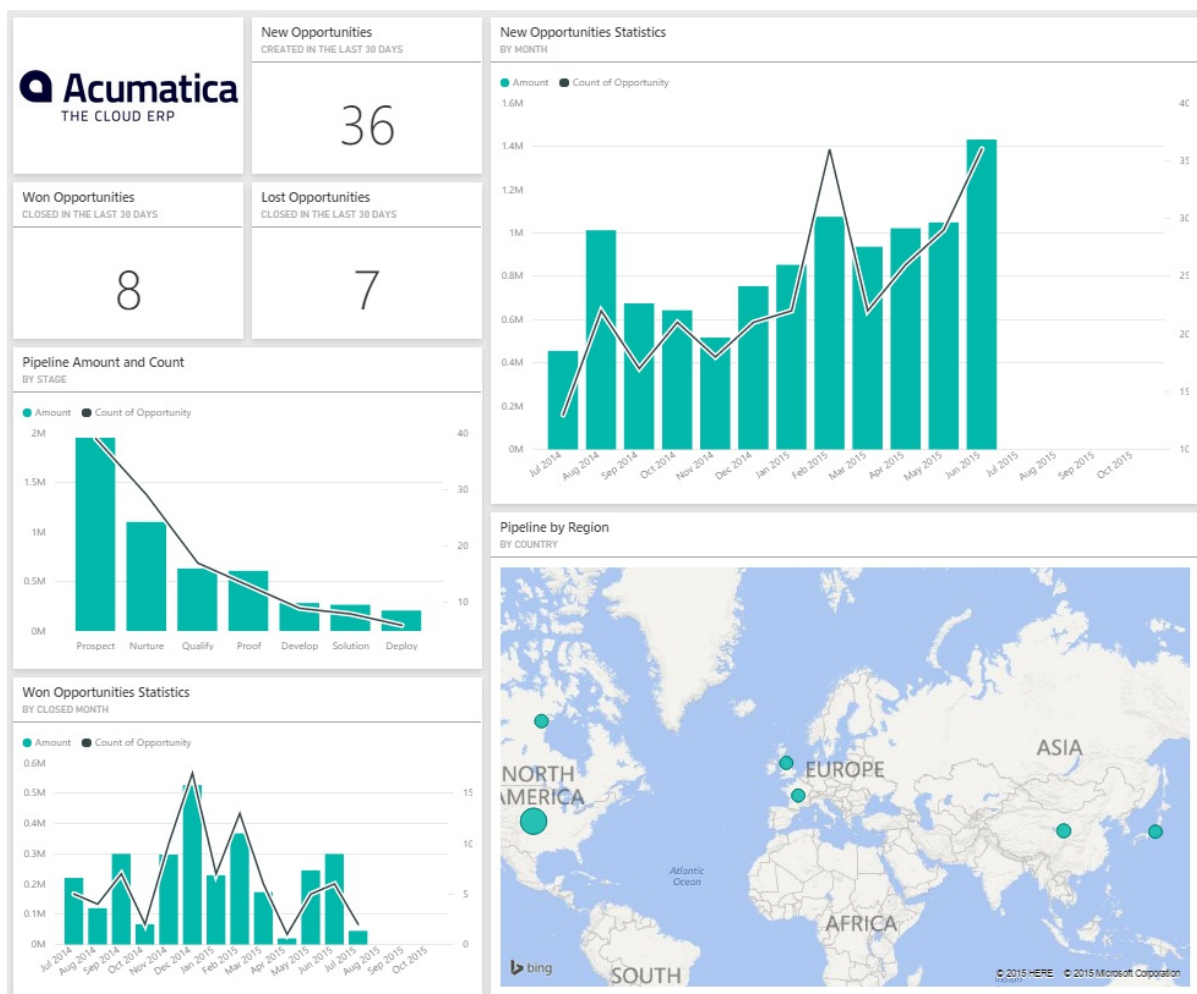
Need help connecting? [Learn More](#)

Authentication Method:

Username

Password

6. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk * which disappears once selected, choosing the dashboard will show a similar layout to the one below:



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

This content pack requires Acumatica v5.2 or higher, please confirm the version with your Acumatica admin.

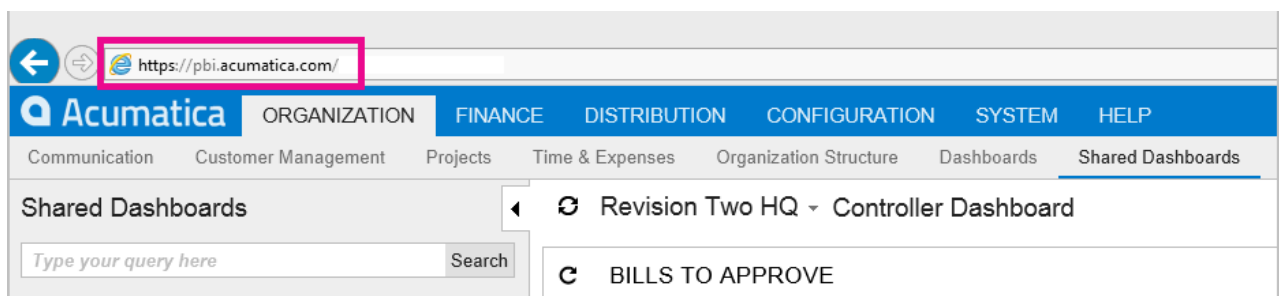
Finding parameters

Acumatica OData Endpoint

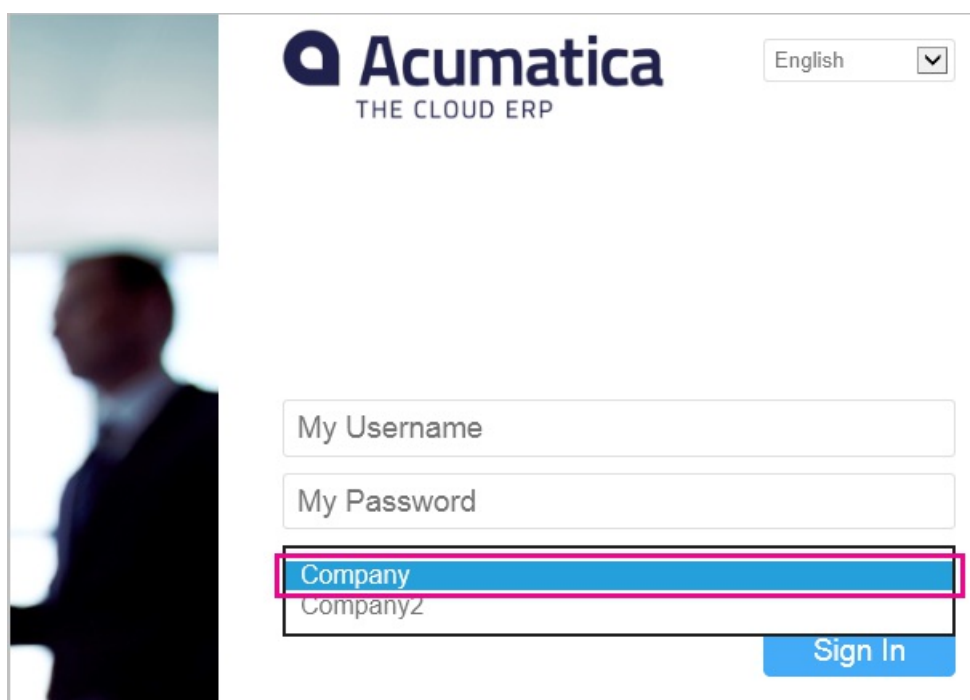
The Acumatica OData endpoint is formatted as follows and should us HTTPS:

```
https://[sitedomain]/odata/[companyname]
```

The Application Site Domain can be found in your browser's address bar when you're signed into Acumatica. In the example below, the site domain is "<https://pbi.acumatica.com>" so the OData endpoint to provide would be "<https://pbi.acumatica.com/odata>".



The Company Name is only required if you have a multi-company deployment. You can find this information from your Acumatica sign in page.



Troubleshooting

If you're not able to login, verify the Acumatica OData endpoint you provided is formatted correctly.

```
https://<application site domain>/odata/<company name>
```

If you're having trouble connecting, please confirm with your admin your version of Acumatica. This content pack requires version 5.2 or later.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Alpine Metrics Sales Predictions with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Alpine Metrics provides state of the art Predictive Sales Process Optimization in the cloud and on demand for sales organizations large and small. The Alpine Metrics Sales Predictions content pack for Power BI includes metrics such as potential and predicted sales and risks, allowing you deeper insight into the future of your business.

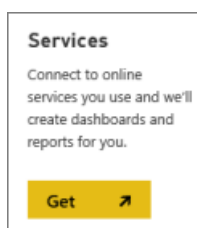
Connect to the [Alpine Metrics Sales Predictions content pack](#) for Power BI.

How to connect

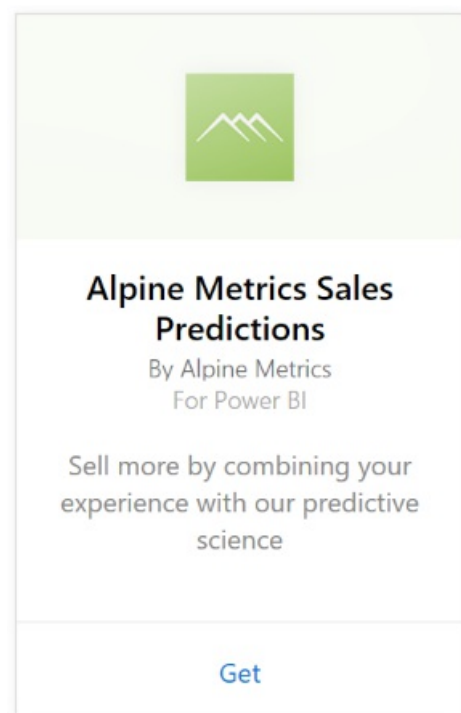
1. Select Get Data at the bottom of the left navigation pane.



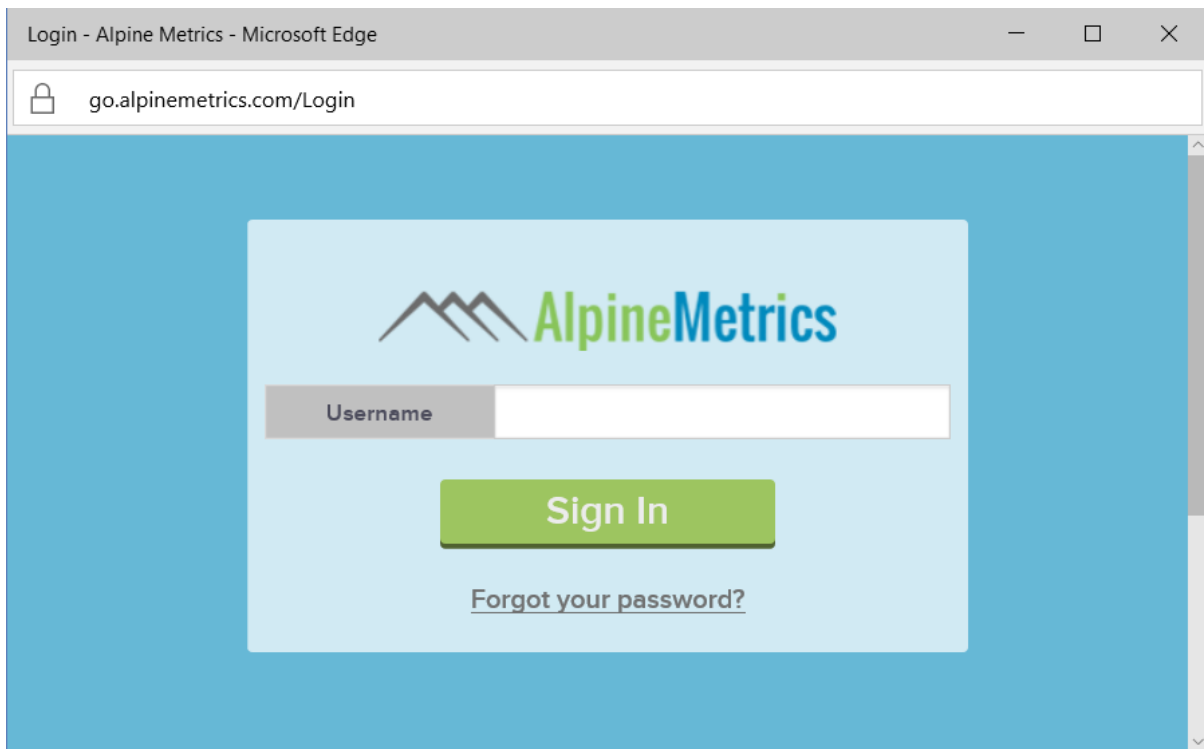
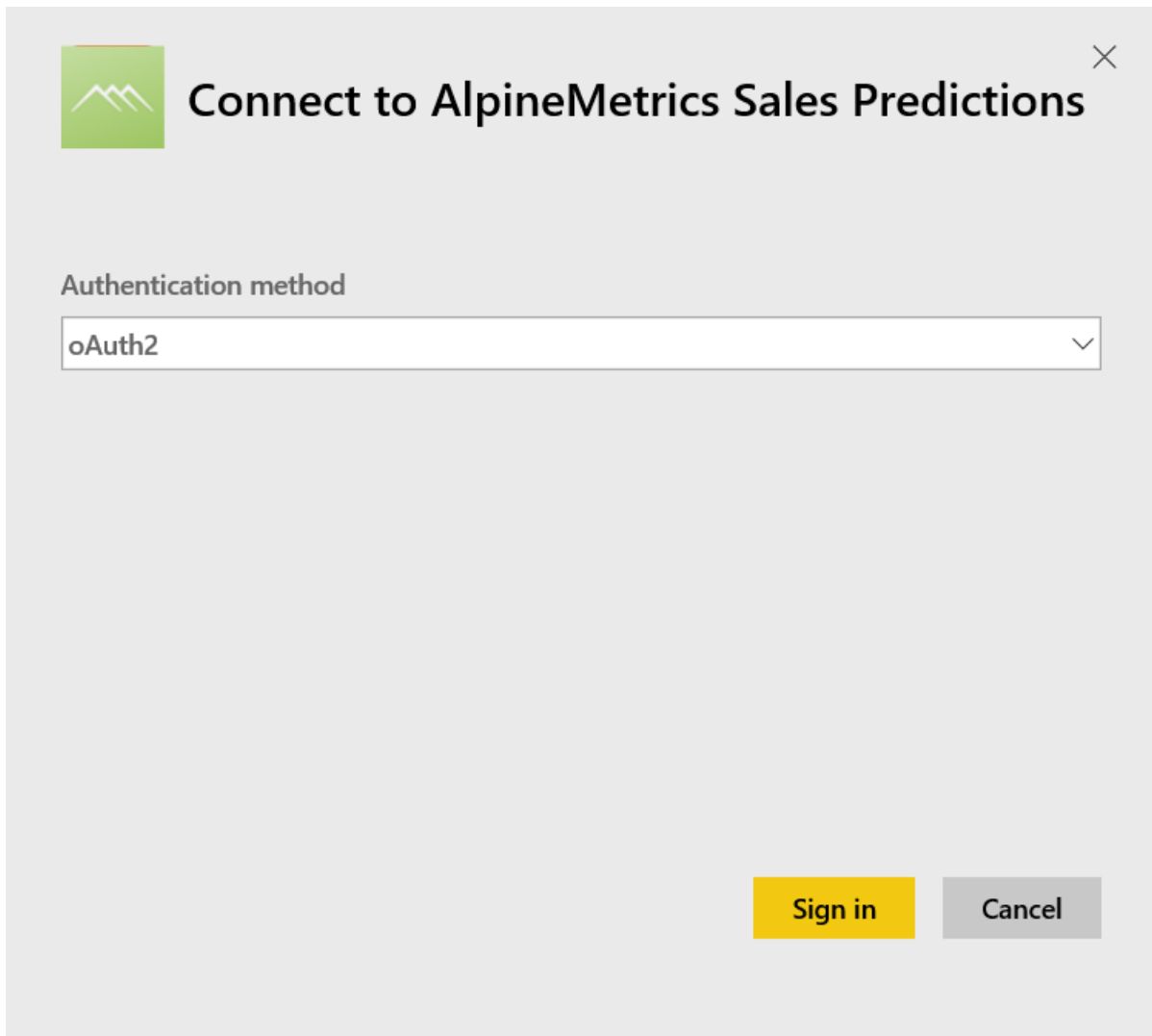
2. In the **Services** box, select **Get**.



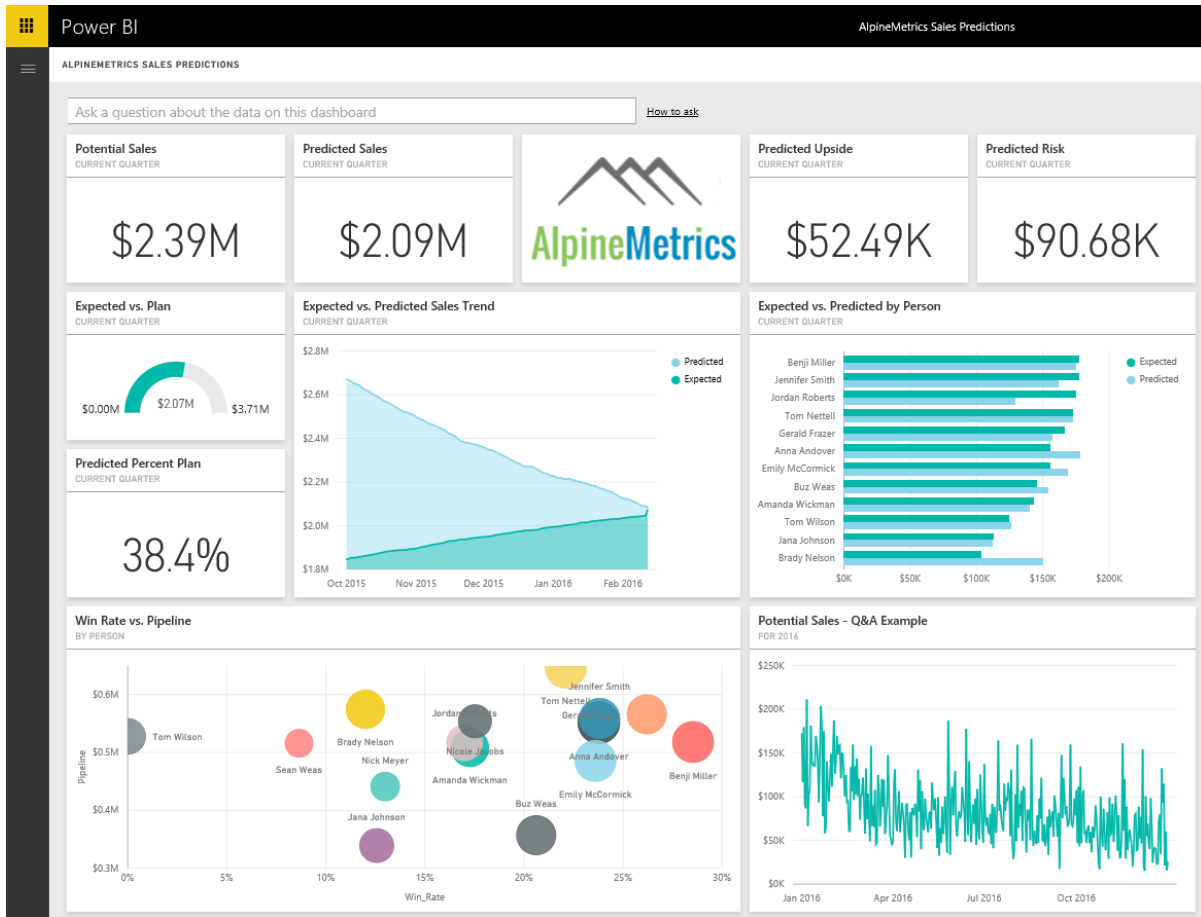
3. Select **AlpineMetrics Sales Predictions**, then select **Get**.



4. Select **OAuth 2** and then **Sign In**. When prompted, provide your AlpineMetrics credentials.



5. Once connected, a dashboard, report and dataset will automatically be loaded. When completed, the tiles will update with data from your account.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack includes data from the following tables:

- Account
- Business
- Country
- Industry
- Opportunity
- Person
- Prediction
- Prediction History
- Product
- Region

System requirements

An Alpine Metrics account with permissions to the above tables is required in order to instantiate this content pack.

Next steps

[Get started with Power BI](#)

Connect to appFigures with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Tracking important statistics about your apps is easy with Power BI and the appFigures content pack. Power BI retrieves your data, including app sales, downloads, and ad statistics, then builds a default dashboard and related reports based on that data.

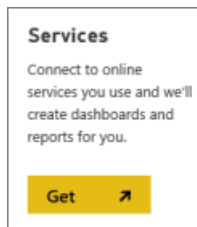
Connect to the [appFigures content pack](#) or read more about the [appFigures integration](#) with Power BI.

How to connect

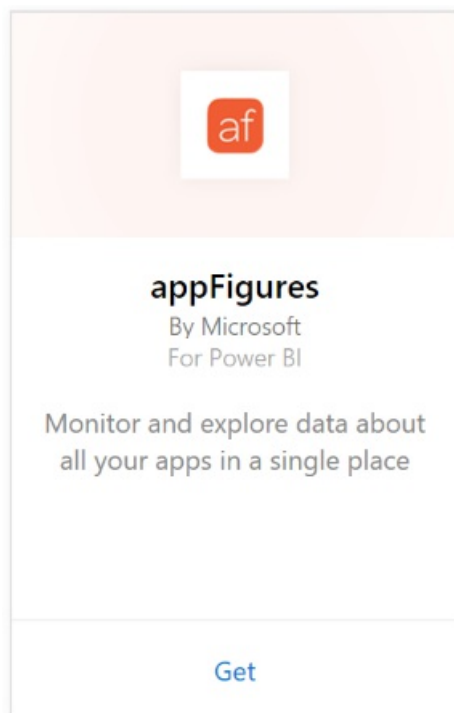
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

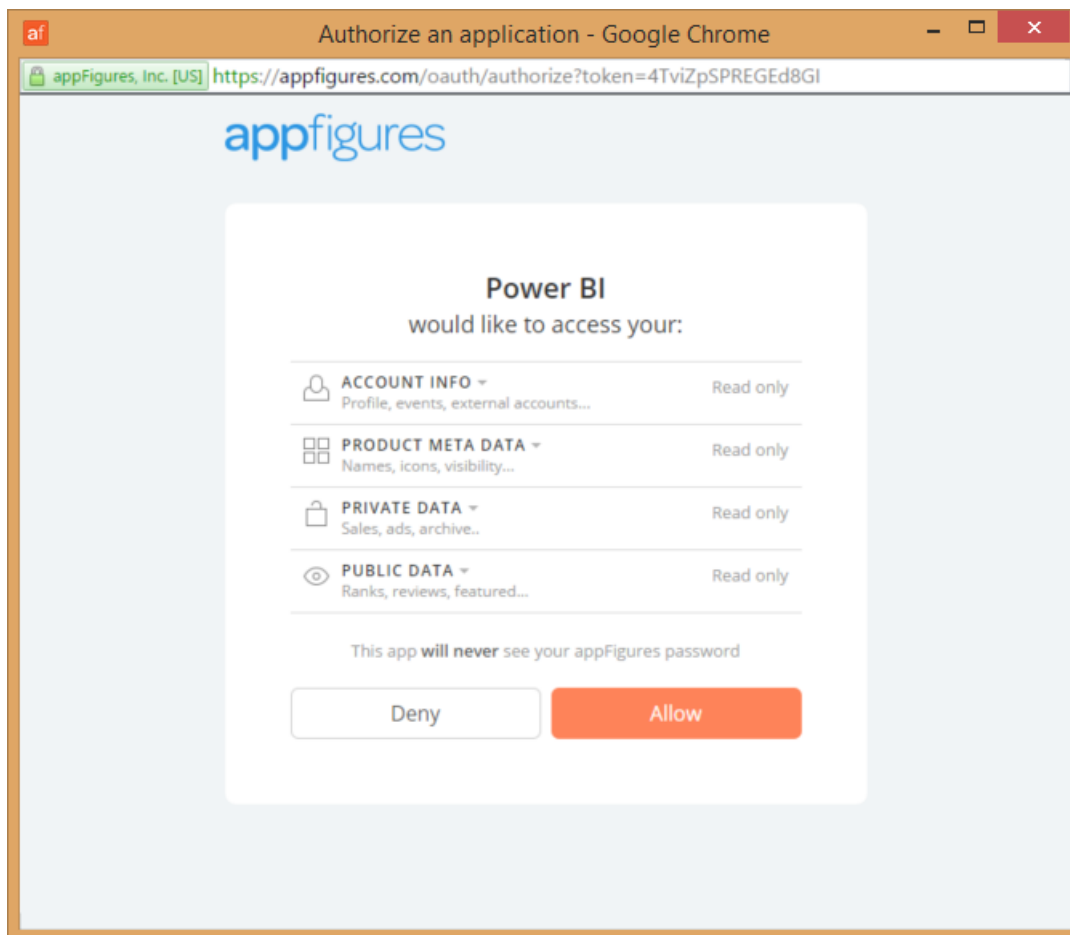


3. Select **appFigures** > **Get**.

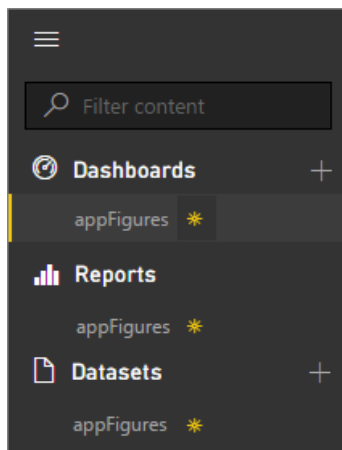


4. For **Authentication Method**, select **OAuth2** > **Sign In**. When prompted, enter your appFigures credentials and follow the appFigures authentication process.

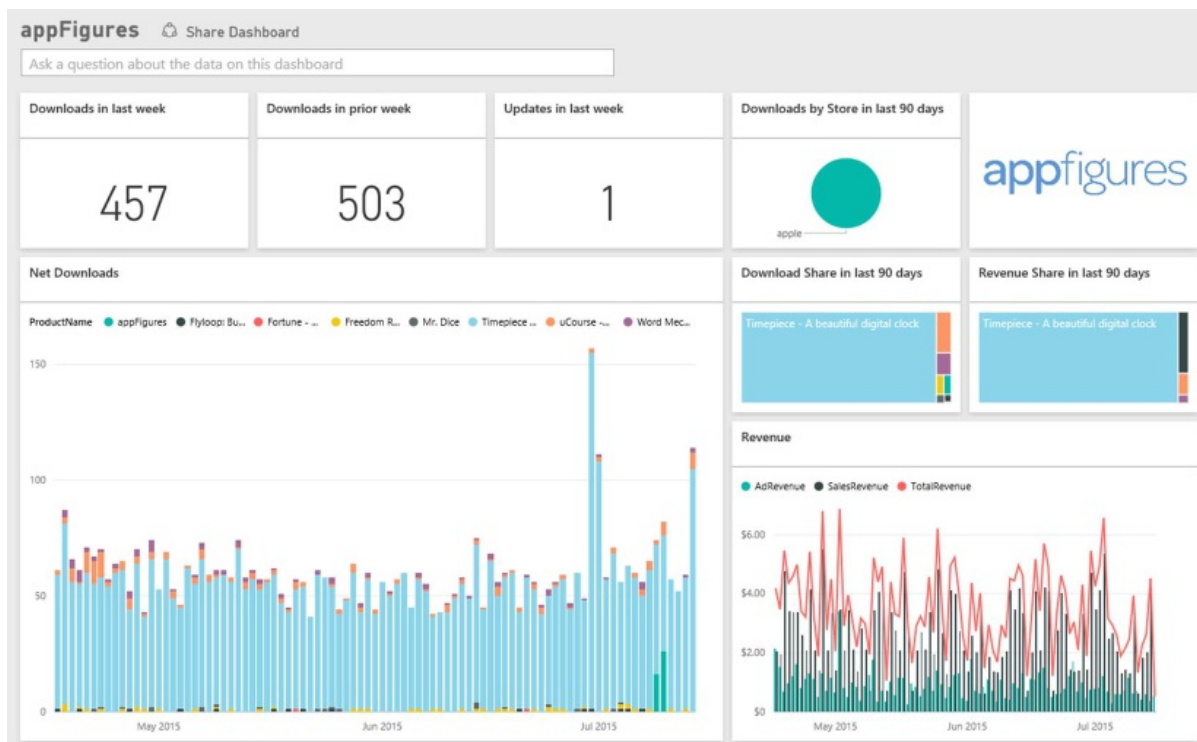
The first time you connect, Power BI prompts you to allow read-only access to your account. Select **Allow** to begin the import process. This can take a few minutes depending on the volume of data in your account.



5. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *:



6. Select the appFigures dashboard. This is the default dashboard that Power BI creates to display your data. You can modify this dashboard to display your data in any way you want.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The following data is available from appFigures in Power BI.

TABLE NAME	DESCRIPTION
Countries	This table provides country name information.
Dates	This table contains dates from today back to the earliest PublishDate of apps that are Active and Visible in your appFigures account.
Events	This table contains download, sales, and ad information for each app, by country, on a daily basis. Note that both app and in-app purchase information is all in this single table—you can use the Type column to differentiate.
Inapps	This table contains data about the different types of In-App Purchases that are associated with Active, Visible apps on your appFigures account.
Products	This table contains data about the different apps that are Active and Visible on your appFigures account.

Troubleshooting

If data from some of your apps is not showing up in Power BI, check to make sure that those apps are Visible and

Active on the **apps** tab of the appFigures site.

The screenshot shows the appFigures website interface. The navigation bar at the top has the 'apps' tab highlighted with a red box. Below the navigation bar, the 'Your Apps' section is visible, featuring a search bar and filter buttons for 'All', 'Active', and 'Inactive'. A summary indicates '12 active and 1 inactive' apps. A table lists the apps with columns for 'PRODUCT', 'SOURCE', 'DISCOVERED', 'VISIBLE', and 'ACTIVE'. The 'VISIBLE' and 'ACTIVE' columns for the first two apps are highlighted with a red box.

	PRODUCT	SOURCE	DISCOVERED	VISIBLE	ACTIVE
<input type="checkbox"/>	Mr. Dice <small>Apple ID: 672514972</small>	TimeTap	07/19/13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Flyloop: Butterfly Looping Fun	Default...	06/11/12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Next steps

- [Get started in Power BI](#)
- [Get data in Power BI](#)

Connect to Application Insights with Power BI

1/24/2018 • 1 min to read • [Edit Online](#)

Use Power BI to create powerful custom dashboards from [Application Insights](#) telemetry. Envision your app telemetry in new ways. Combine metrics from multiple apps or component services onto one dashboard. This first release of the Power BI content pack for Application Insights includes widgets for common usage-related metrics such as active users, page view, sessions, browser and OS version, and geographic distribution of users in a map.

Connect to the [Application Insights content pack for Power BI](#).

NOTE

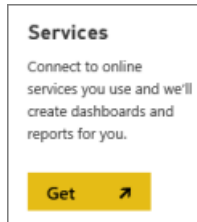
Access to the Application Insights overview blade for your application in the Azure Preview Portal is required to connect. More details on requirements below.

How to connect

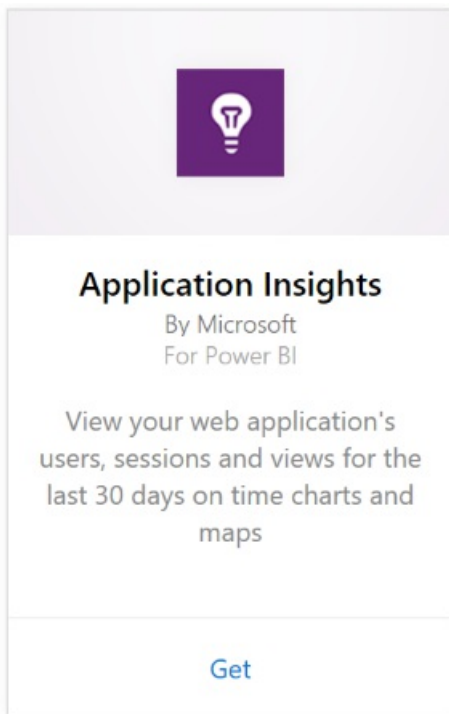
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Application Insights > Get**.



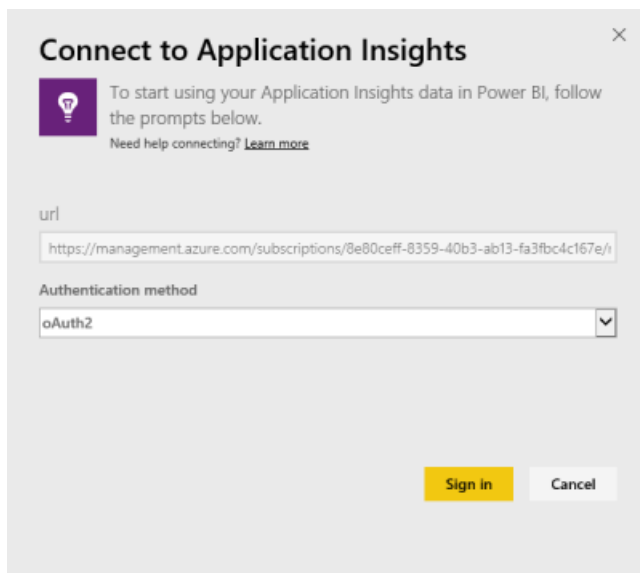
4. Provide the details of the application you want to connect to, including **Application Insights Resource Name**, **Resource Group**, and **Subscription ID**. See [Finding your Application Insights parameters](#) below for more details.

A dialog box titled "Connect to Application Insights" with a close button (X) in the top right corner. The dialog contains a purple lightbulb icon and the text: "To start using your Application Insights data in Power BI, follow the prompts below." Below this is a link: "Need help connecting? [Learn more](#)". The dialog has three input fields:

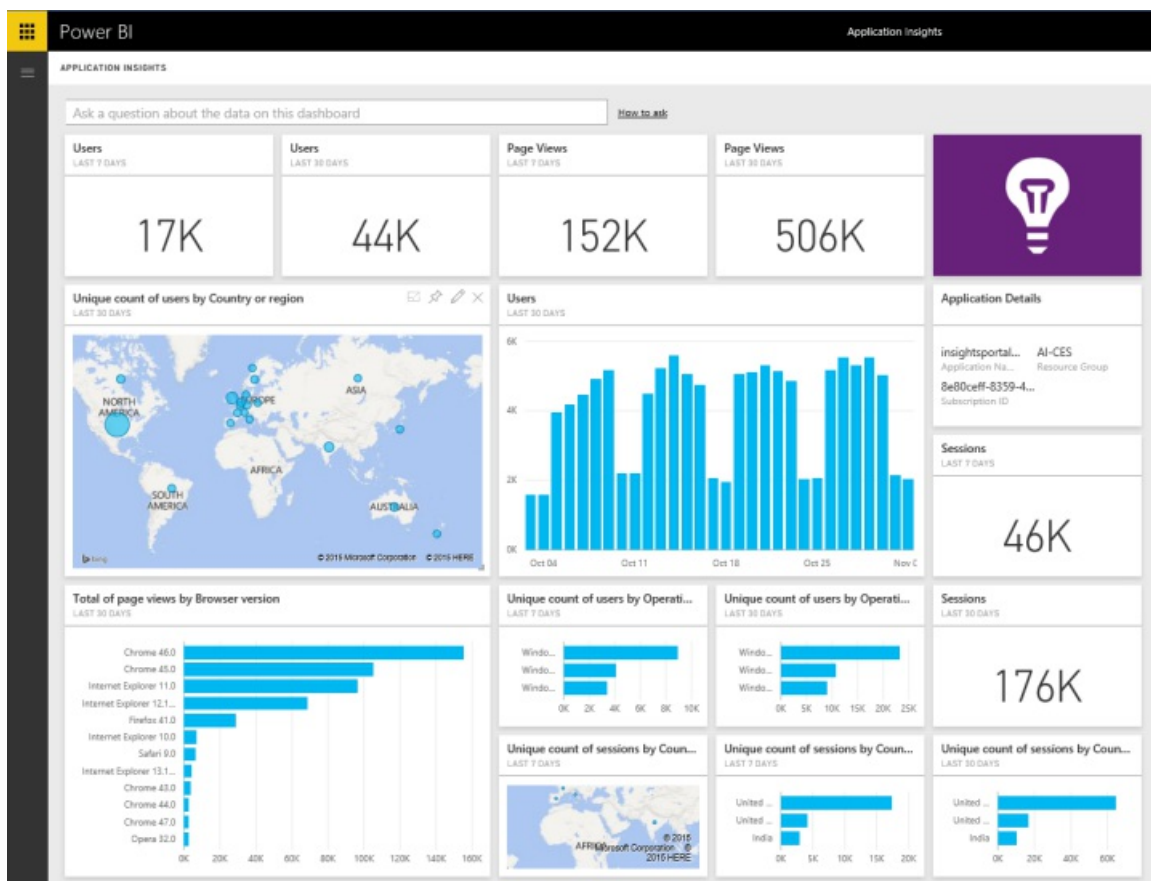
- Application Insights Resource Name**: Copy from the Essentials dropdown on the the resources blade in the Azure Portal. Example: MyApp
- Resource Group**: Resource group containing the Application Insights resource. Example: MyResourceGroup
- Azure Subscription ID**: ID of the subscription containing Application Insights resource. Example: 00000000-0000-0000-0000-000000000000

At the bottom right are two buttons: "Next" (yellow) and "Cancel" (grey).

5. Select **Sign In** and follow the screens to connect.



6. The import process begins automatically. When complete, a notification is shown and a new dashboard, report, and dataset appear in the Navigation Pane marked with an asterisk. Select the dashboard to view your imported data.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

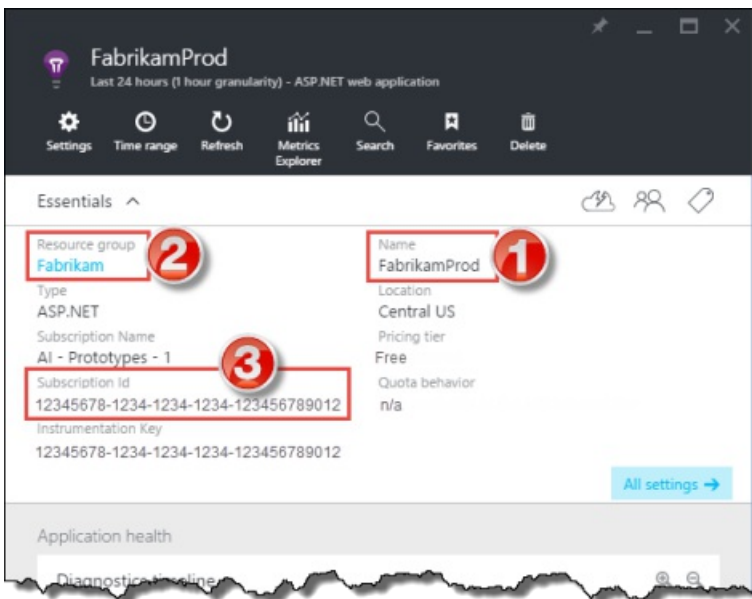
What's included

The Application Insights content pack includes the following tables and metrics:

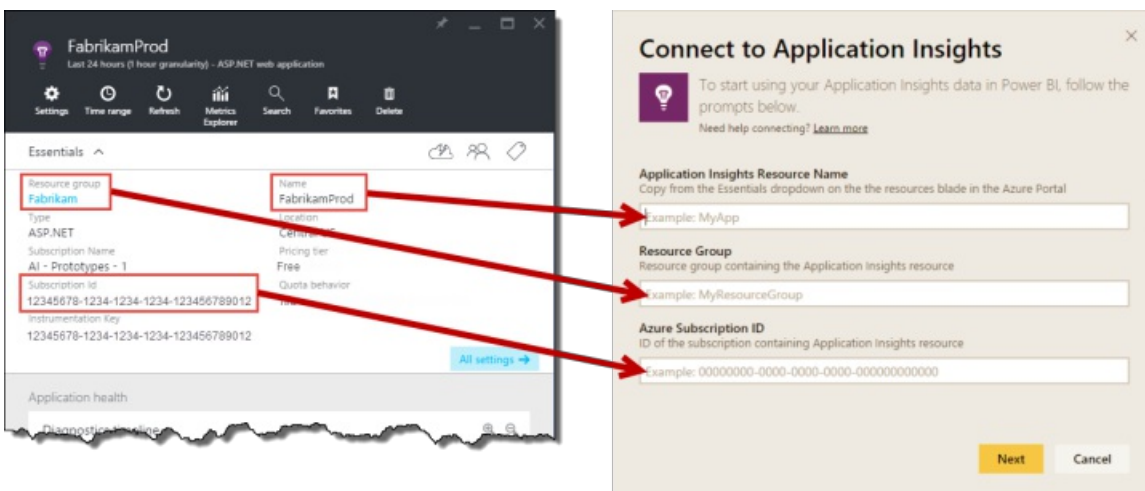
- ApplicationDetails
- UniqueUsersLast7Days
- UniqueUsersLast30Days
- UniqueUsersDailyLast30Days
- UniqueUsersByCountryLast7Days
- UniqueUsersByCountryLast30Days
- PageViewsDailyLast30Days
- SessionsLast7Days
- SessionsLast30Days
- PageViewsByBrowserVersionDailyLast30Days
- UniqueUsersByOperatingSystemLast7Days
- UniqueUsersByOperatingSystemLast30Days
- SessionsDailyLast30Days
- SessionsByCountryLast7Days
- SessionsByCountryLast30Days
- PageViewsByCountryDailyLast30Days

Finding parameters

Your Resource Name, Resource Group and Subscription ID can all be found in the Azure Portal. Selecting the Name will open a detailed view and you can use the Essentials drop-down to find all the values you need.



Copy and paste these into the fields into Power BI:



Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to AT Internet Bridge with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

AT Internet helps you to extract immediate value from your data using its unified digital analytics platform, the Analytics Suite. The AT Internet Bridge content pack for Power BI includes data around visits, sources, localization and devices for your site.

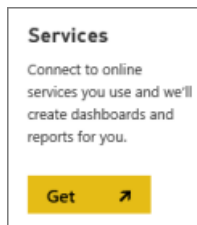
Connect to the [AT Internet Bridge content pack](#) for Power BI.

How to connect

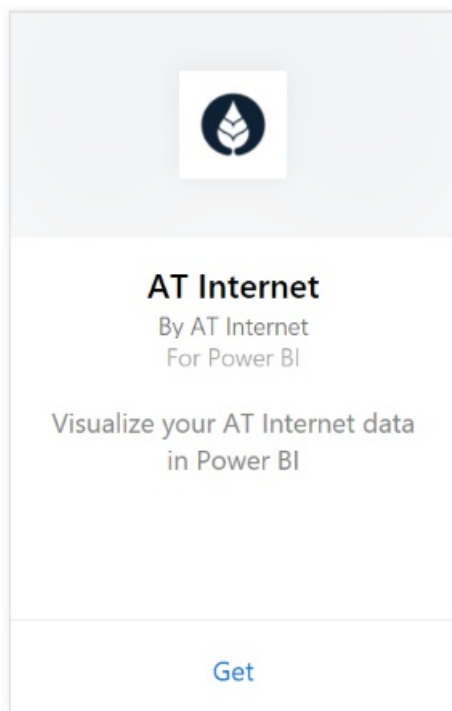
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.




3. Select **AT Internet Bridge > Get**.



4. Specify the AT Internet Website Number you'd like to connect to.

Connect to AT Internet Bridge ✕


 To start using your AT Internet Bridge data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Website Number

Next **Cancel**

5. Select **Basic** as the Authentication Mechanism, provide your AT Internet username and password, and click **Sign In**.

Connect to AT Internet Bridge ✕

 To start using your AT Internet Bridge data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Authentication method

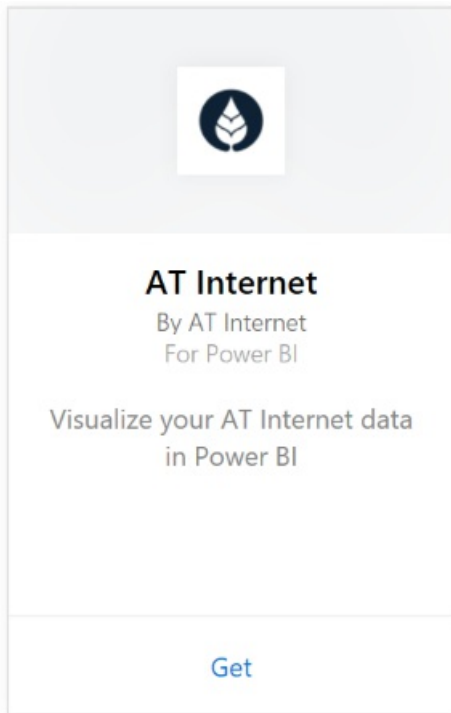
User name

Password

Sign in **Cancel**

6. Click **Connect** to begin the import process. When complete, a new dashboard, report and model will appear

in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

This content pack contains data from the last 45 days in the following tables:

- Conversion
- Devices
- Localization
- Sources
- Global Visits

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Azure Mobile Engagement with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI Azure Mobile Engagement content pack allows to you quickly gain insights into your app data.

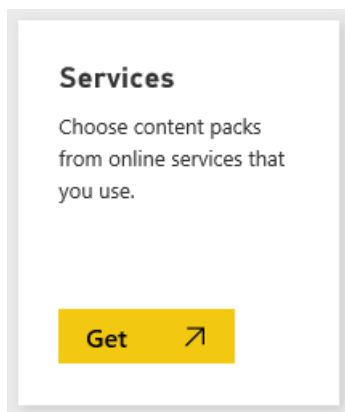
Connect to the [Azure Mobile Engagement content pack](#) for Power BI.

How to connect

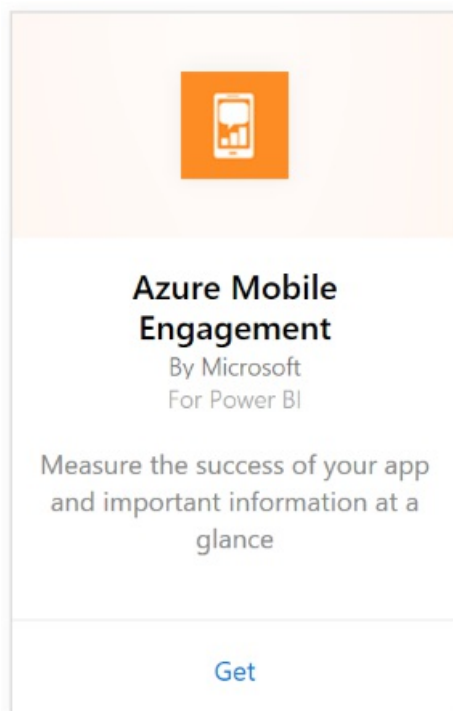
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Azure Mobile Engagement > Get**.



4. Specify your App Collection and App Name. This information can be found in your Azure Mobile Engagement account.

Connect to Azure Mobile Engagement

To start using your Azure Mobile Engagement data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Application Collection
Collection where application is located

Application ID
ID of the application

Next **Cancel**

5. For Authentication Method, provide your Key then click Sign In.

Connect to Azure Mobile Engagement

To start using your Azure Mobile Engagement data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

url

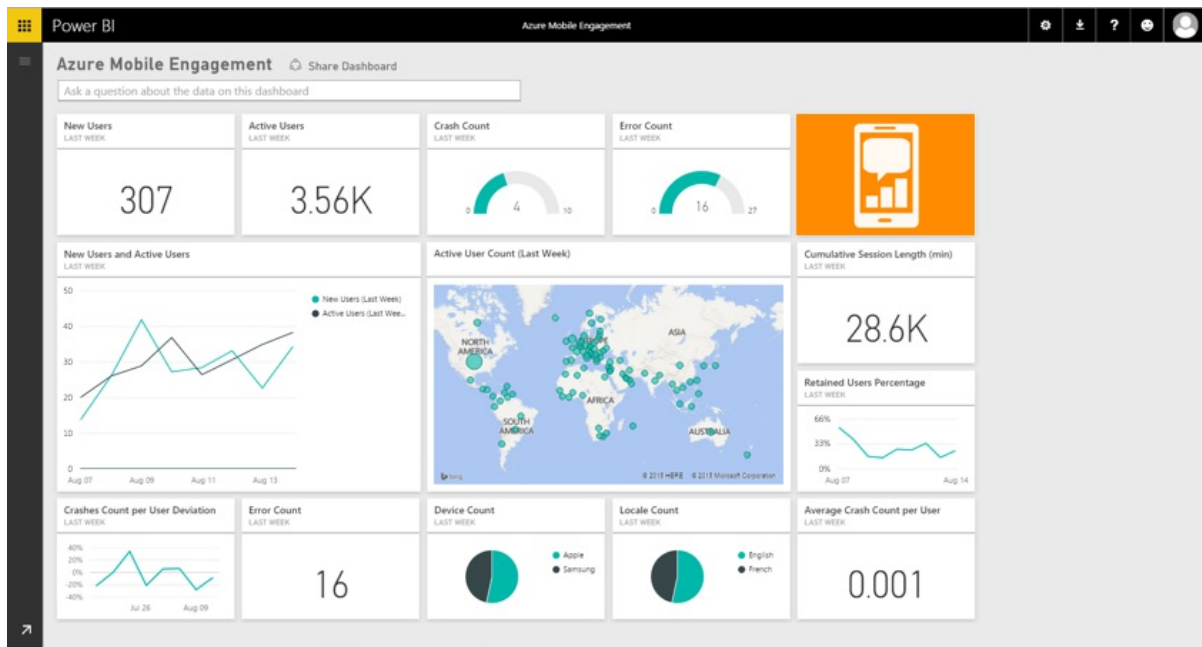
appID

Authentication Method:

Account key

Sign In **Cancel**

6. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk * which disappears once selected:



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Microsoft Azure Consumption Insights with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Explore and monitor your Microsoft Azure consumption data in Power BI with the Power BI content pack. The data will be refreshed automatically once per day.

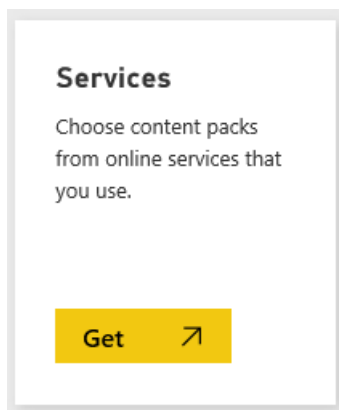
Connect to the [Microsoft Azure Consumption Insights content pack](#) for Power BI.

How to connect

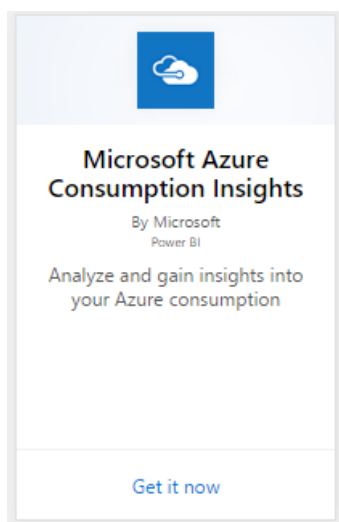
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Microsoft Azure Consumption Insights > Get**.



4. Provide the number months of data you want to import and your Azure Enterprise enrollment number. See details on [finding these parameters](#) below.

Connect to Microsoft Azure Consumption Insights ✕

Enrollment Number

Number Of Month
The number of months, between 1-12, for which to get usage detail data

Need help connecting? [Learn more](#)

Next Cancel

5. Provide your Access key to connect. The key for your enrollment can be found in your Azure EA Portal.

Connect to Microsoft Azure Consumption Insights ✕

extensionDataSourceKind

extensionDataSourcePath

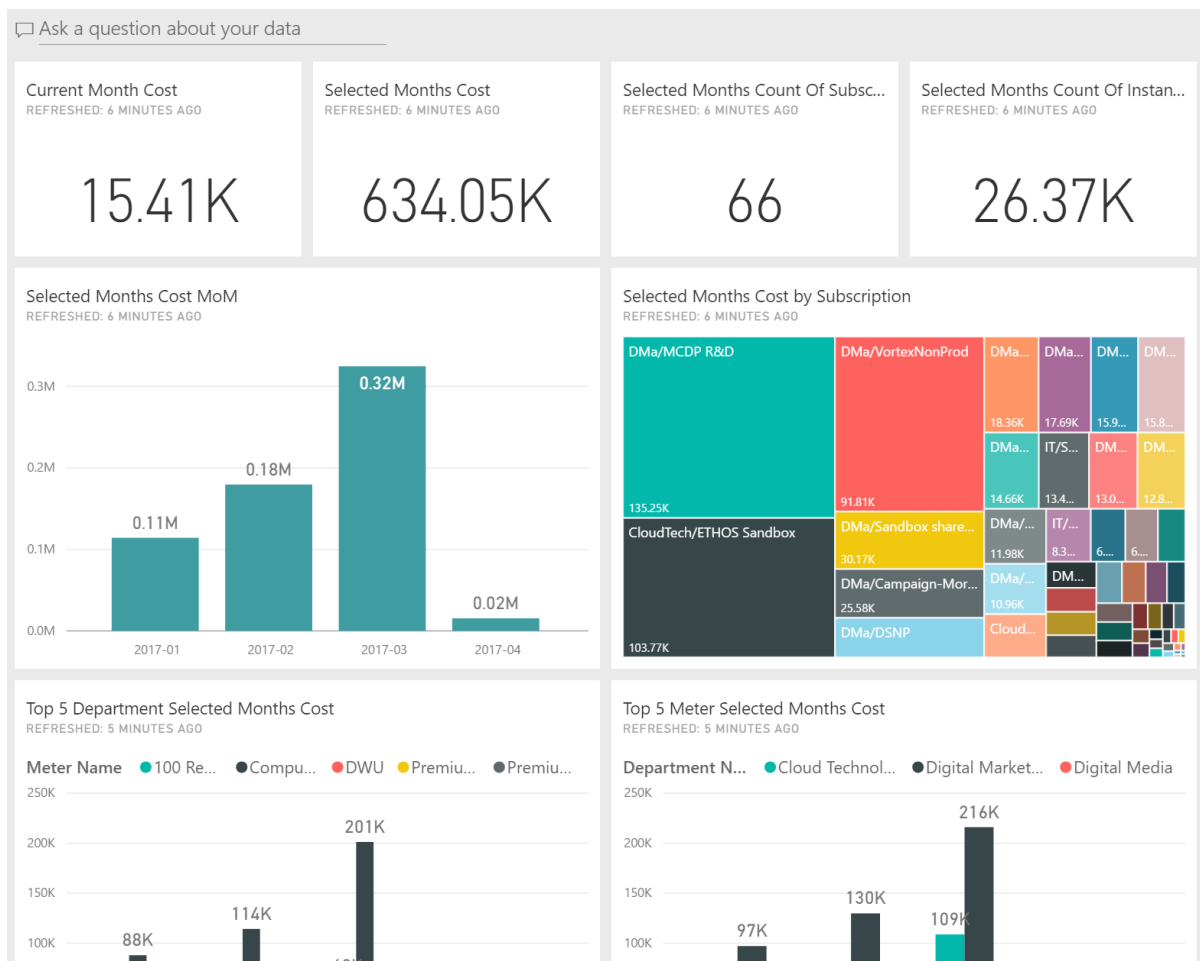
Authentication method

Account key

Need help connecting? [Learn more](#)

Sign in Cancel

6. The import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The Microsoft Azure Consumption Insights content pack includes monthly reporting data for the range of months that you provide during the connection flow. The range is a moving window, so the dates included will update as the dataset refreshes.

System Requirements

The content pack requires access to the Enterprise features within the Azure Portal.

Finding parameters

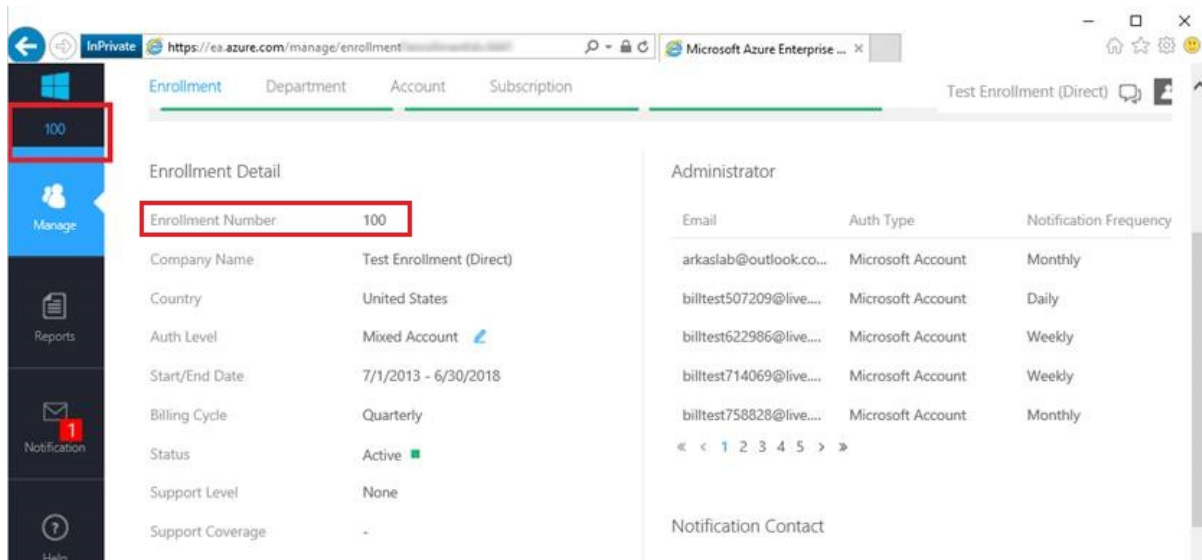
Power BI reporting is available for EA Direct, Partner and Indirect Customers who are able to view billing information. Please read below for details about finding each of the values the connection flow expects.

Number of Months

- This should be a number between 1-36 representing the number of months of data (from today) you'd like to import.

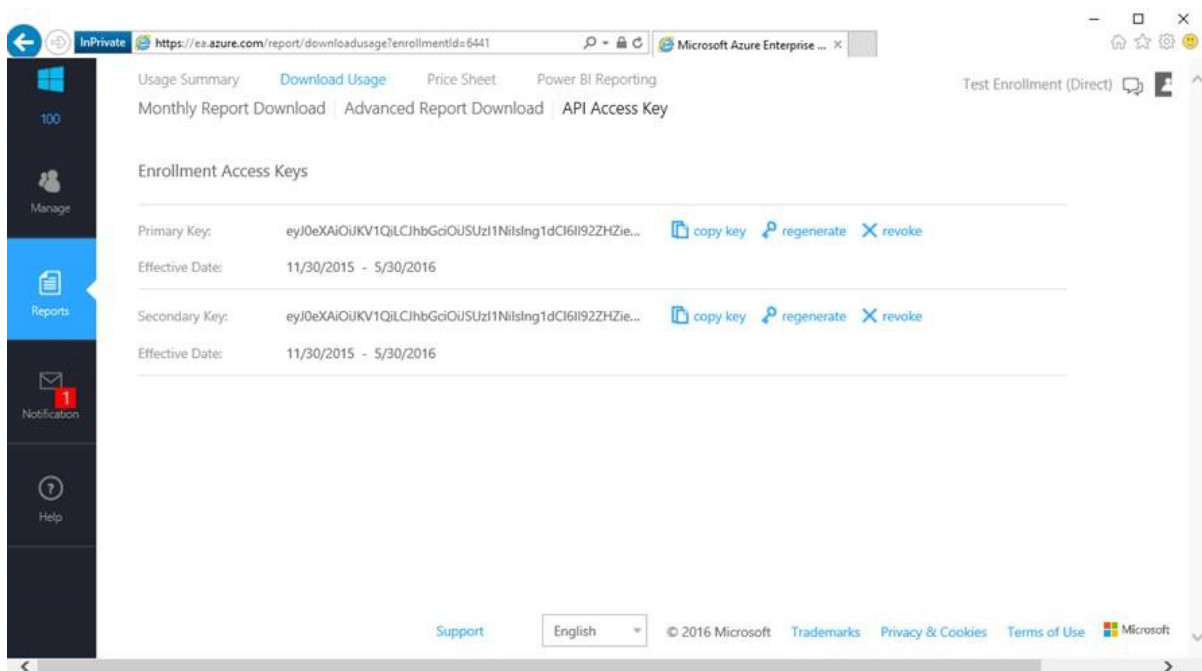
Enrollment Number

- This is your Azure Enterprise enrollment number which can be found on the home screen of the [Azure Enterprise Portal](#) under "Enrollment Detail".



Access Key

- Your key can be found in the Azure Enterprise portal, under "Download Usage" > "API Access Key"



Additional Help

- For additional help setting up the Azure Enterprise Power BI Pack, log in to the Azure Enterprise Portal to view the API Help File under "Help" and additional instructions under Reports -> Download Usage -> API Access Key.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Azure Search with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Azure Search Traffic Analytics allows you to monitor and understand the traffic to your Azure Search service. The Azure Search content pack for Power BI provides detailed insights on your Search data, including Search, Indexing, Service Stats and Latency from the last 30 days. More details can be found in the [Azure blog post](#).

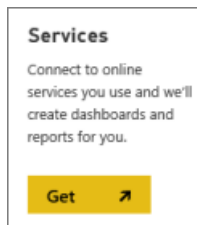
Connect to the [Azure Search content pack](#) for Power BI.

How to connect

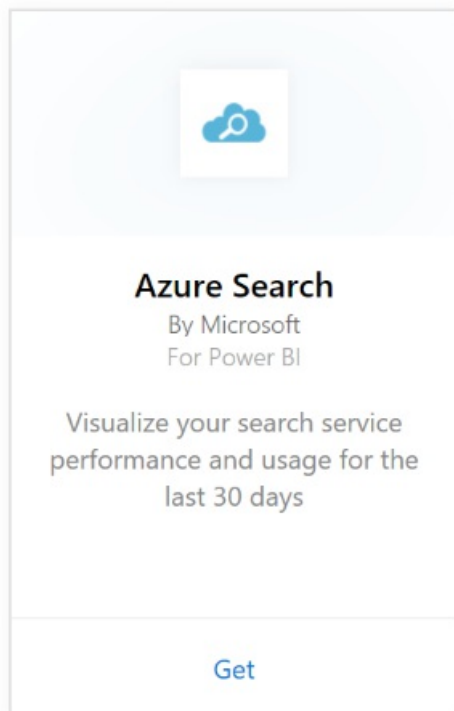
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Azure Search > Get**.



4. Provide the name of the table storage account your Azure Search analysis is stored.

Connect to Azure Search

To start using your Azure Search data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Azure storage account name
The name of the Azure storage account you are using for search traffic analytics in your Azure Search service

Next **Cancel**

5. Select **Key** as the Authentication Mechanism and provide your storage account key. Click **Sign In** and to begin the loading process.

Connect to Azure Search

To start using your Azure Search data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Account
azsshoebox

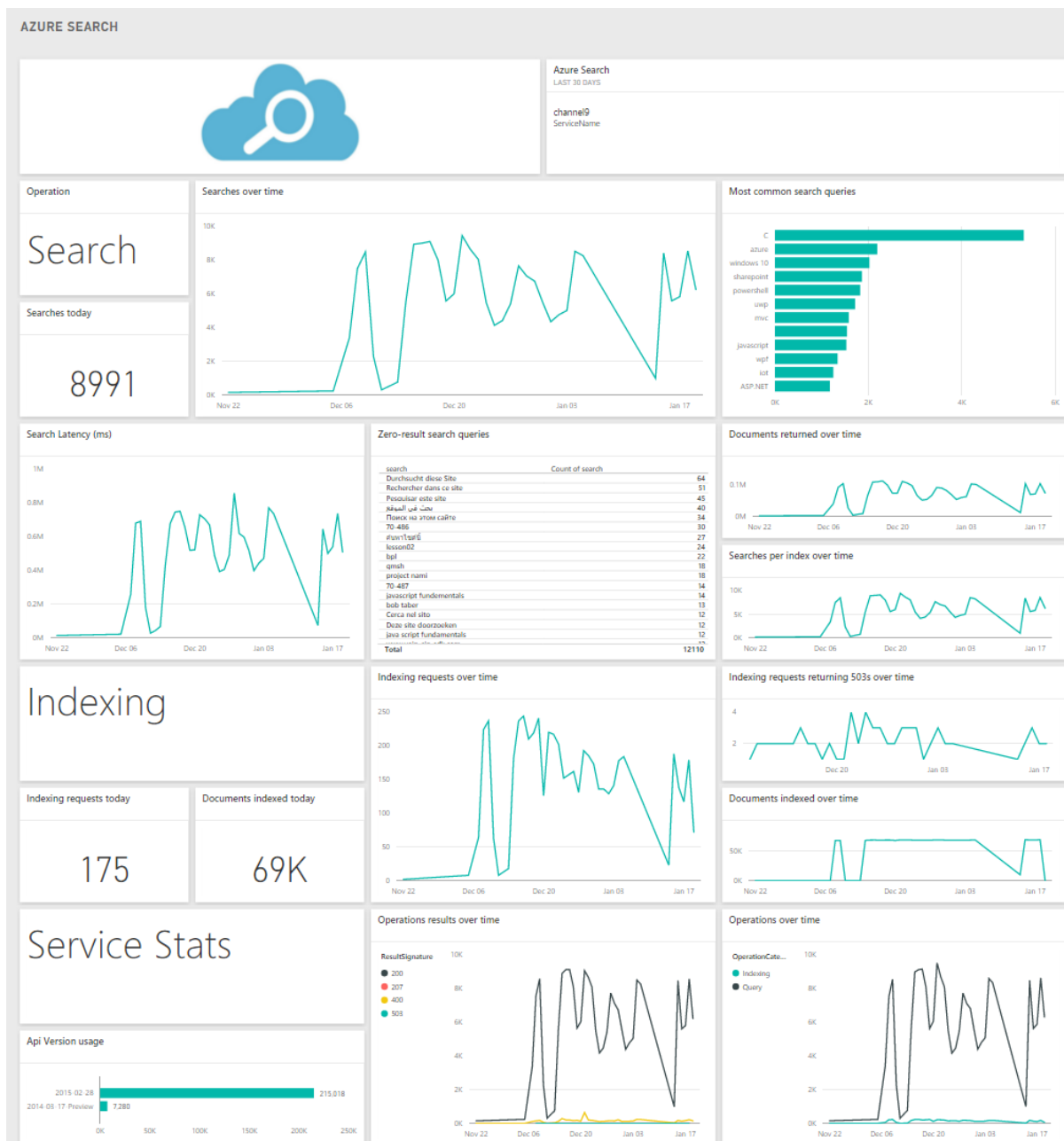
Domain
blob.core.windows.net

Authentication method
Key

Account key

Sign in **Cancel**

6. Once the loading is complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

The Azure Search content pack requires Azure Search Traffic Analytics to be enabled on the account.

Troubleshooting

Ensure the storage account name is correctly provided along with the full access key. The storage account name should correspond to the account configured with Azure Search Traffic Analytics.

Next steps

[Get started with Power BI](#)

Connect to Azure Security Center with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Get insights into your Azure workload security by connecting your Azure Security Data with Power BI. Power BI automatically creates a dashboard and report on top of your Azure Security Center data enabling you to analyze and explore the data.

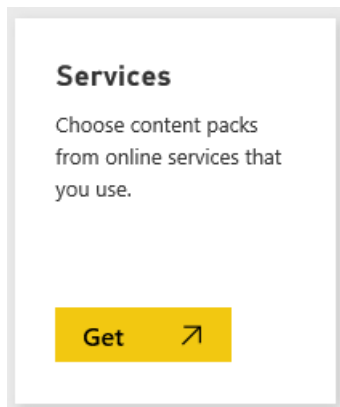
Connect to the [Azure Security Center content pack](#) for Power BI.

How to connect

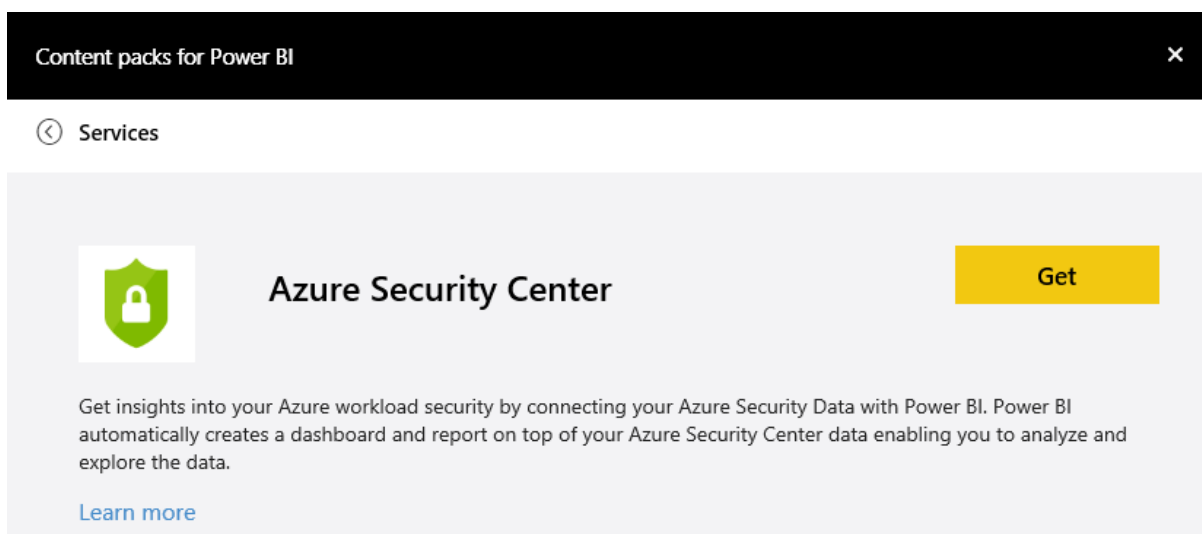
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Azure Security Center > Get**.



4. Specify your Subscription ID. See details on [finding those parameters](#) below.

Connect to Azure Security Center

Azure Subscription Id

df76ede4-08b9-48ab-90ff-acf519e6212e

Need help connecting? [Learn more](#)

Next Cancel

- For **Authentication Method**, select **oAuth2** > **Sign In**. When prompted, enter your Azure credentials.

Connect to Azure Security Center

Url

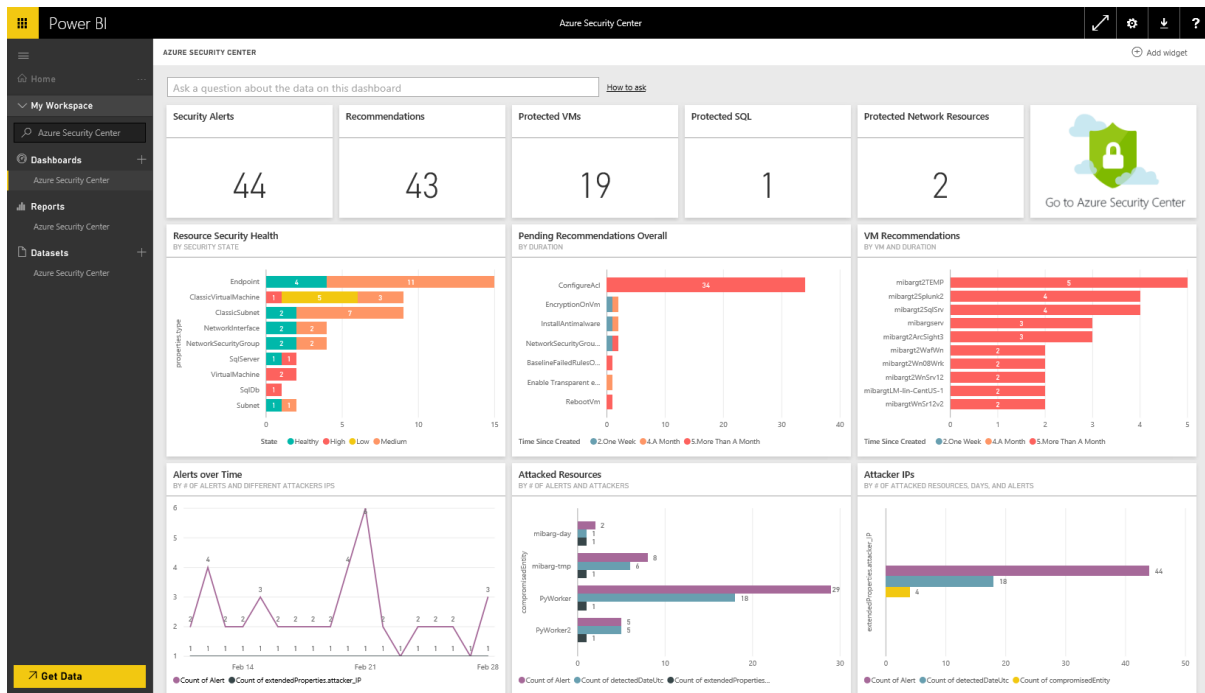
https://management.azure.com/subscriptions, [subscription ID]

Authentication method

oAuth2

Sign in Cancel

- After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack includes insights around resource security stat, alert analysis and prevention analysis.

System requirements

This content pack requires access to a subscription ID with Azure Security Center enabled. See more details in the [Azure Security Center](#) in the Azure Portal.

The content pack also requires the user to connect with an organizational account (not a personal account).

Finding parameters

There are two easy ways to find your Subscription Id.

1. From <https://portal.azure.com> -> Browse -> Subscriptions -> Subscription Id
2. From <https://manage.windowsazure.com> -> Settings -> Subscription Id

Your subscription ID will be long set of numbers and characters, similar to the example in Step #4 above.

Troubleshooting

The data may take some time to load depending on the size of your account. If you hit an error during login, please confirm your parameters and the account has Azure Security Center enabled.

If the content pack loads but doesn't show any data, please confirm you're connecting with an organizational account. Although personal accounts are supported by Azure Security Center, the API (and therefore the content pack) does not return the expected values if the user connects with a non-organizational account. Please provide

access to an organizational account and try connecting again.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Bing with Power BI

11/15/2017 • 1 min to read • [Edit Online](#)

The Bing content pack will allow you to view analytics around Internet search activity for a term of your choice.

Connect to the [Bing content pack](#) for Power BI.

NOTE

Bing tiles will automatically update approximately every ~5 minutes and the only tile that can be selected is the News tile, which will take you to the corresponding news article.

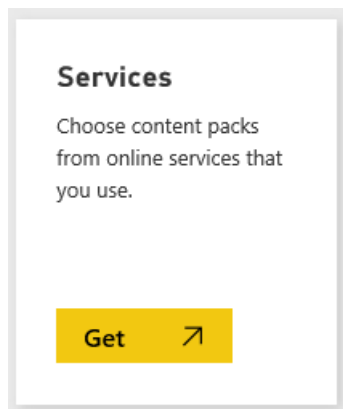
NOTE

Tiles from the Bing content pack do not render in the mobile applications. We're working to resolve this issue.

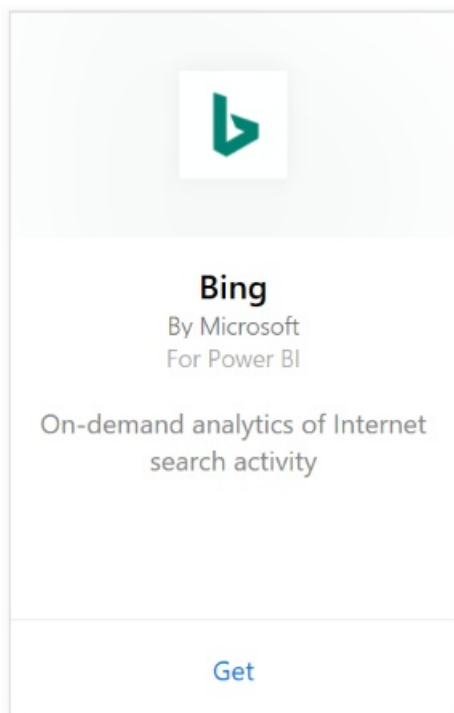
1. Select **Get Data** at the bottom of the left navigation pane.



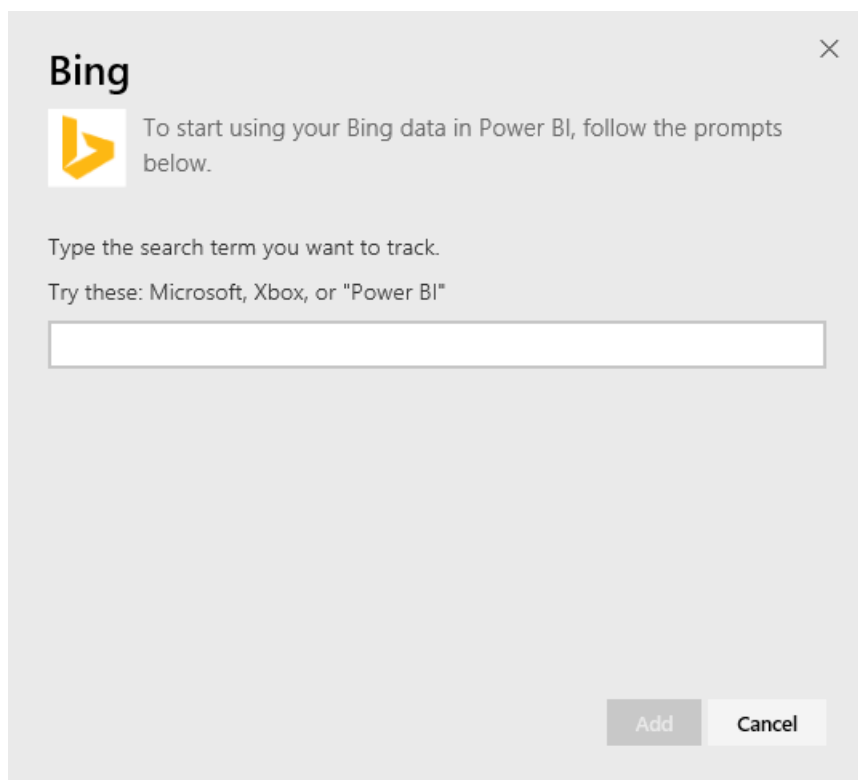
2. In the **Services** box, select **Get**.



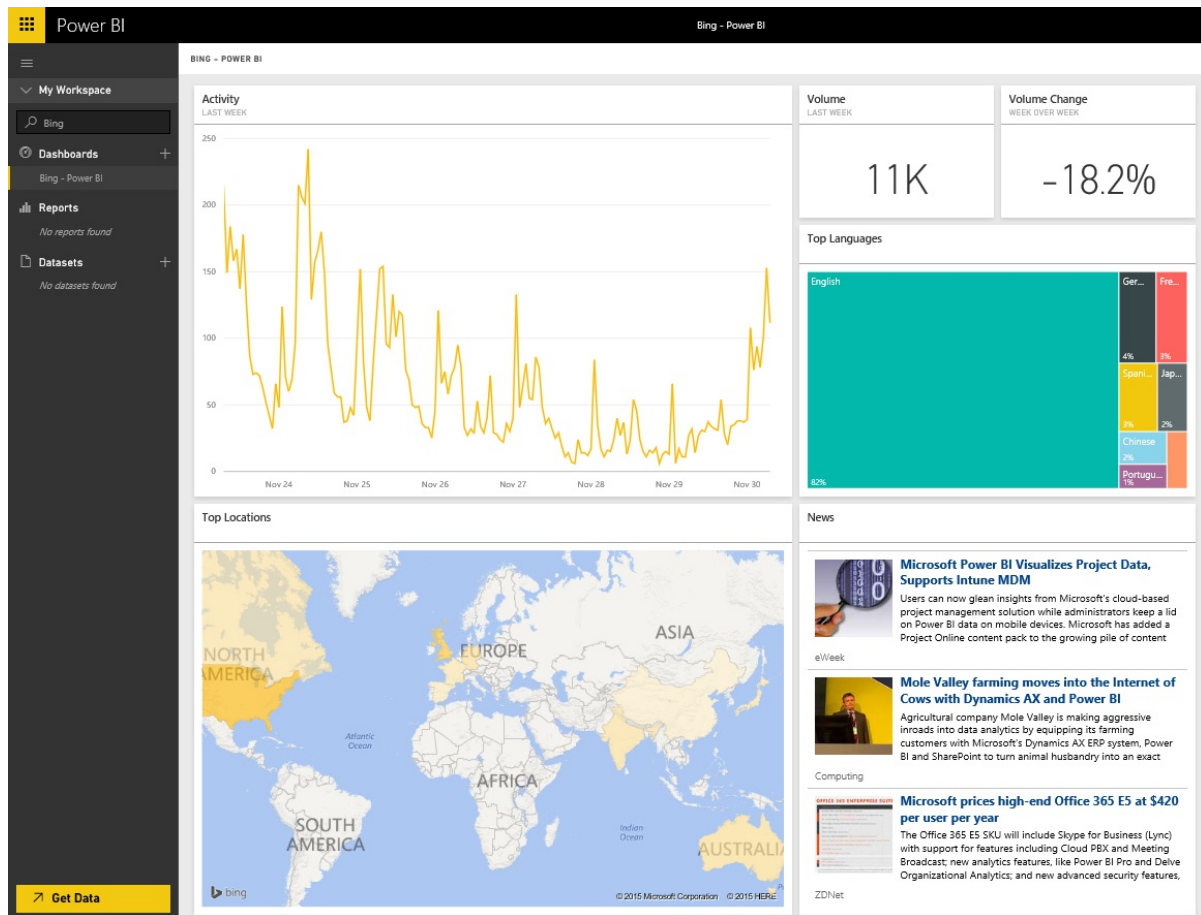
3. Select **Bing > Get**.



4. In the parameters dialog, enter the search term you want to track and hit Add.



5. On the left you'll see a new entry in your list of dashboards, named with Bing and the search term you provided. Note there is no dataset or report associated with this dashboard. The tiles may take some time to load but once completed you'll see a layout similar to the below.



Once the loading has completed, you can start exploring your data, including pinning tiles from this dashboard to other dashboards in your account.

Connect to Circuit ID with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Analyzing your communication data from Circuit ID is easy with Power BI. Power BI retrieves your data, then builds a default dashboard and related reports based on that data. After you have created the connection, you can explore your data and customize the dashboard to meet your needs. Data is automatically refreshed every day.

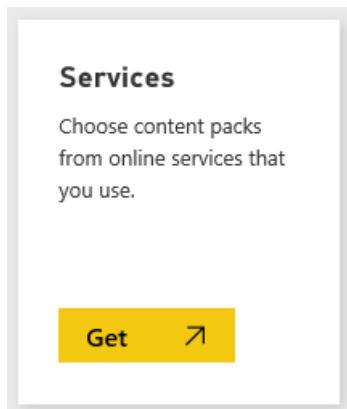
Connect to the [Circuit ID content pack](#) for Power BI.

How to connect

1. Select **Get Data** at the bottom of the left navigation pane.



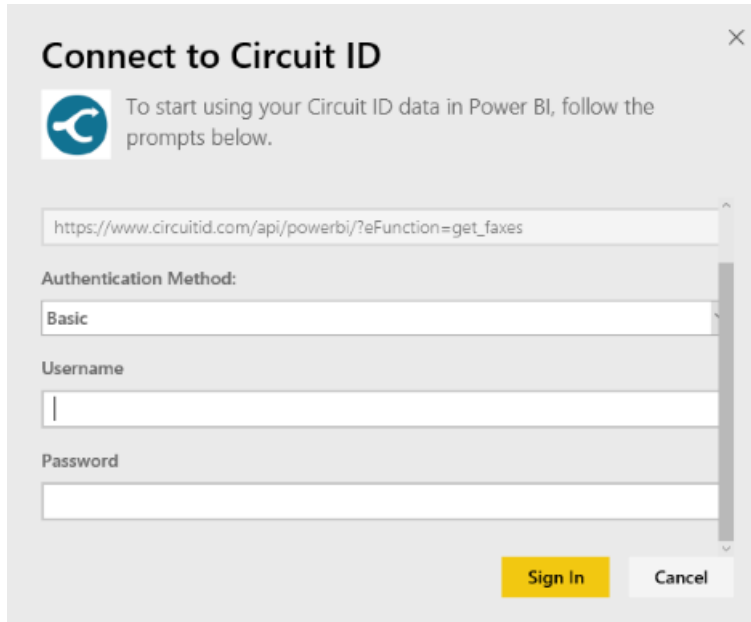
2. In the **Services** box, select **Get**.



3. Select **Circuit ID > Get**.



4. For Authentication Method, select Basic and provide your username and password. Then hit Sign In.



Connect to Circuit ID

To start using your Circuit ID data in Power BI, follow the prompts below.

https://www.circuitid.com/api/powerbi/?eFunction=get_faxes

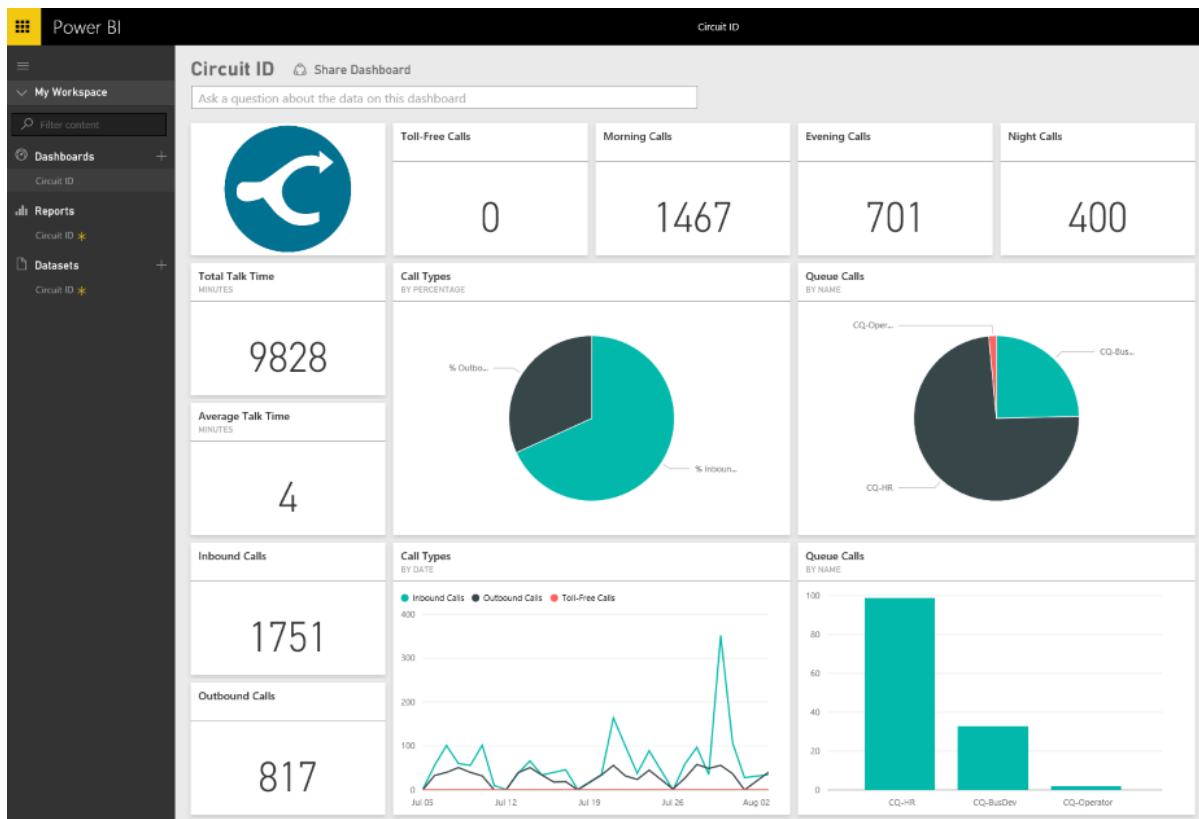
Authentication Method:
Basic

Username
|

Password
|

Sign In Cancel

5. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to ClickDimensions with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The ClickDimensions content pack for Power BI allows users to utilize ClickDimensions marketing data in Power BI, giving management teams further insight into the success of their sales and marketing efforts. Visualize and analyze email interactions, web visits and form submissions in Power BI dashboards and reports.

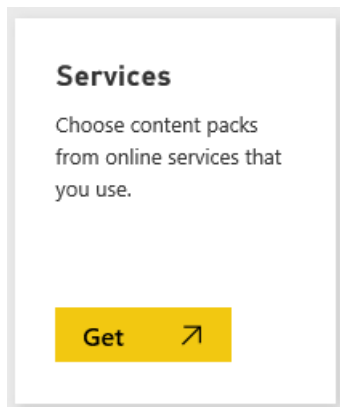
Connect to the [ClickDimensions content pack](#) for Power BI.

How to connect

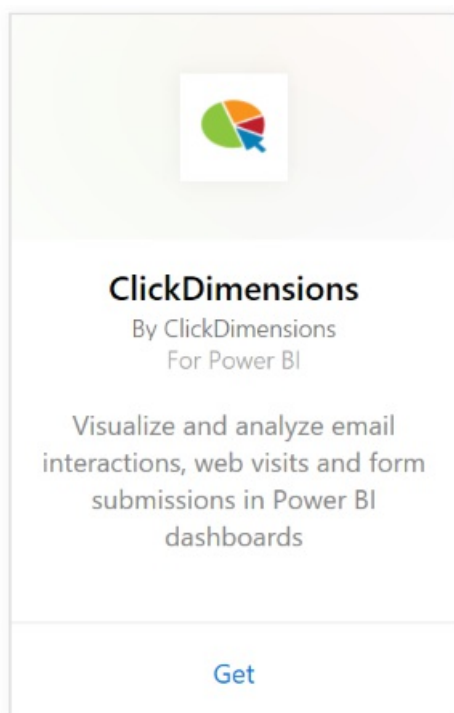
1. Select **Get Data** at the bottom of the left navigation pane.



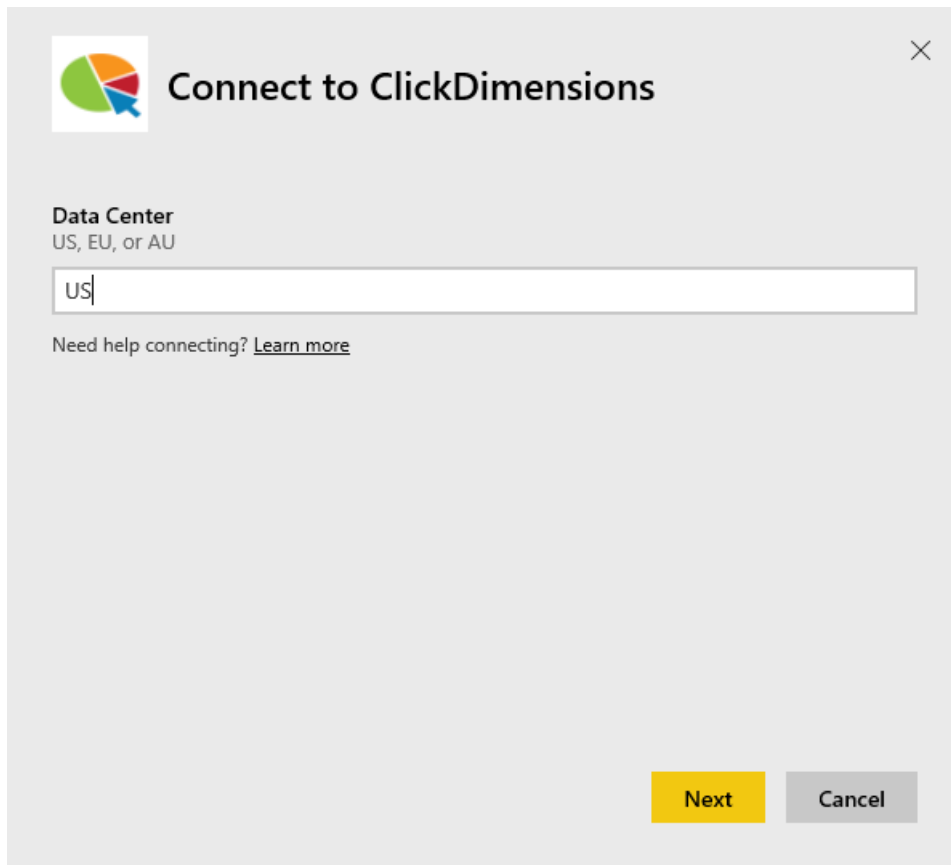
2. In the **Services** box, select **Get**.



3. Select **ClickDimensions** > **Get**.

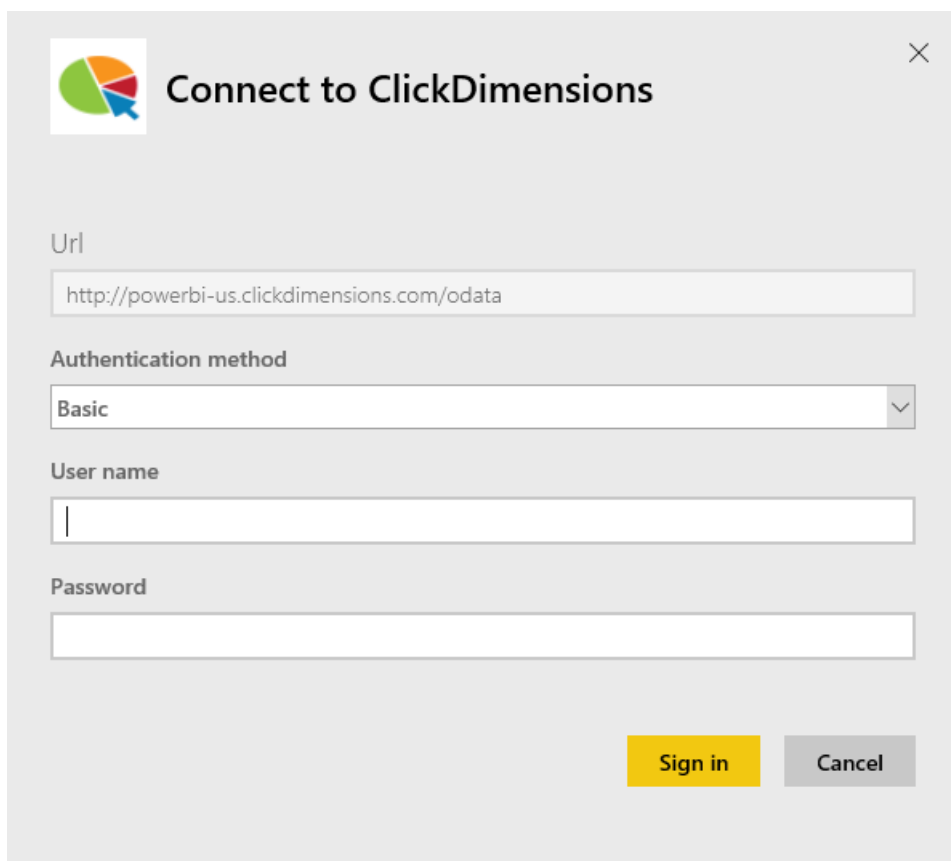


4. Provide the location of your data center (US, EU or AU) and select **Next**.



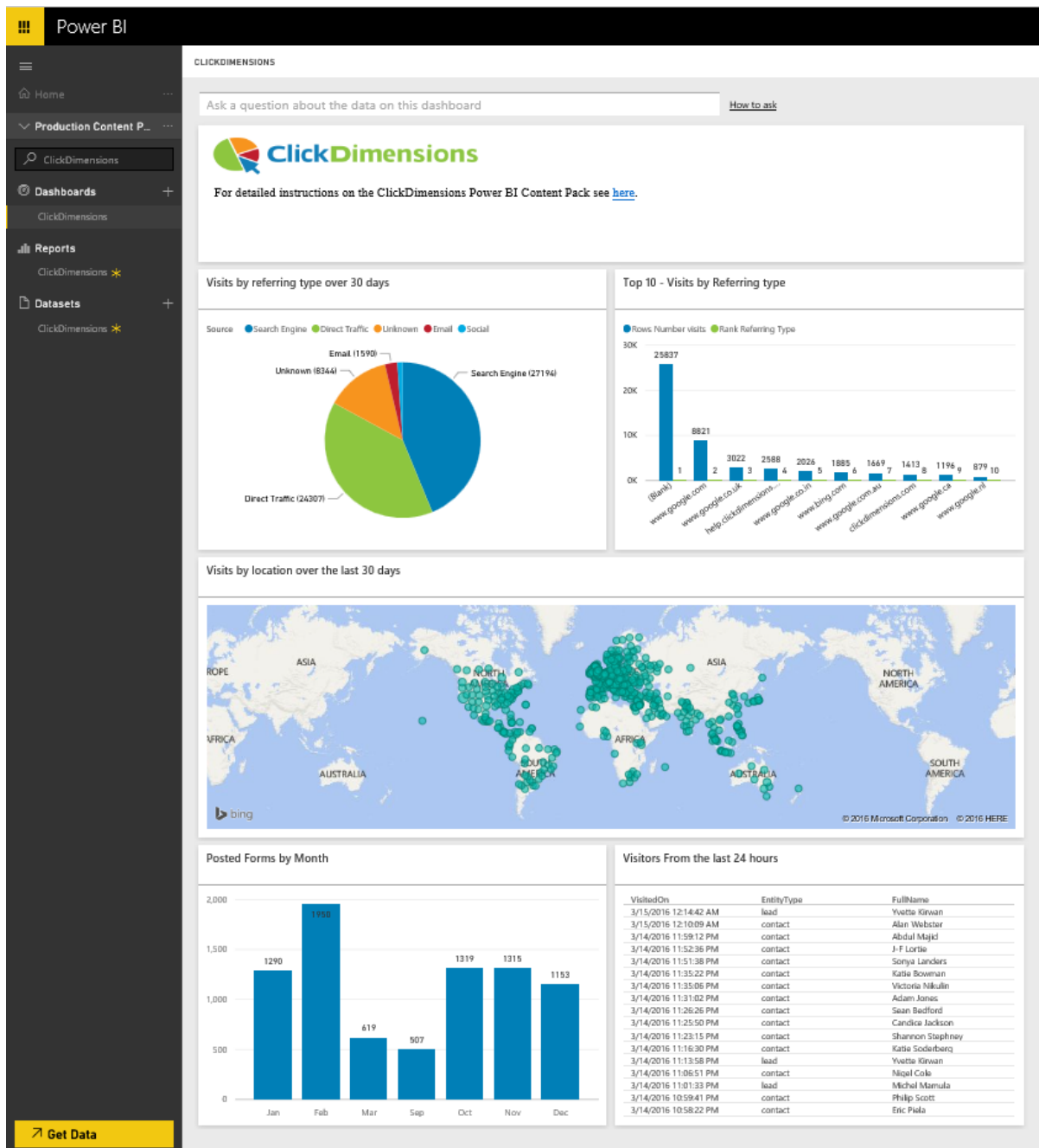
The dialog box is titled "Connect to ClickDimensions" and features a logo with a pie chart and a cursor. It contains a "Data Center" section with the text "US, EU, or AU" and a text input field containing "US". Below this is a link that says "Need help connecting? [Learn more](#)". At the bottom right, there are two buttons: a yellow "Next" button and a grey "Cancel" button.

5. For **Authentication Method**, select **Basic** > **Sign In**. When prompted, enter your ClickDimensions credentials. See details in [finding those parameters](#) below



This dialog box is titled "Connect to ClickDimensions" and includes a "Url" field with the text "http://powerbi-us.clickdimensions.com/odata". Below the URL is the "Authentication method" section, which has a dropdown menu currently set to "Basic". Underneath are three input fields: "User name" (empty), "Password" (empty), and a "Sign in" button (yellow) and a "Cancel" button (grey) at the bottom right.

6. After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

To connect to the Power BI content pack, you must provide the data center corresponding to your account and log in with your ClickDimensions account. If you're unsure which data center to provide, please check with your admin.

Finding parameters

The Account Key is found within CRM Settings > ClickDimensions Settings. Copy the Account Key from within ClickDimensions Settings and paste it into the User name field.

NEW ACTIVITY | NEW RECORD | IMPORT DATA

ClickDimensions Account Information

CRM Organization Name: TomatoGardens

License Level: Standard

External CRM URL: http://mscrm13beta.cloudapp.net:5555/TomatoGardens

Account Key:

Power BI Token:

Note: If this information does not match the CRM organization and URL that you are currently logged into, see [here](#).

Copy the Power BI Token from within ClickDimensions Settings and paste it into the Password field. The Power BI Token is found within CRM Settings > ClickDimensions Settings.

NEW ACTIVITY | NEW RECORD | IMPORT DATA

ClickDimensions Account Information

CRM Organization Name: TomatoGardens

License Level: Standard

External CRM URL: http://mscrm13beta.cloudapp.net:5555/TomatoGardens

Account Key:

Power BI Token:

Note: If this information does not match the CRM organization and URL that you are currently logged into, see [here](#).

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to comScore Digital Analytix with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Visual and explore your comScore Digital Analytix data in Power BI with the Power BI content pack. The data will be refreshed automatically once per day.

Connect to the [comScore content pack for Power BI](#).

NOTE

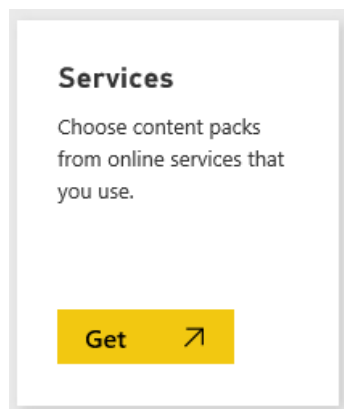
To connect to the content pack you need a comScore DAX user account and have comScore API access. More [details](#) below.

How to connect


1. Select Get Data at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **comScore Digital Analytix** > **Get**.




comScore Digital Analytix
By Microsoft
For Power BI

Monitor and explore your web analytics data, including visits and views by country, browser and more

[Get](#)

4. Provide the datacenter, comScore Client ID and Site you'd like to connect to. For more details on how to find these values, please see [Finding your comScore Parameters](#) below.

Connect to comScore



To start using your comScore data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

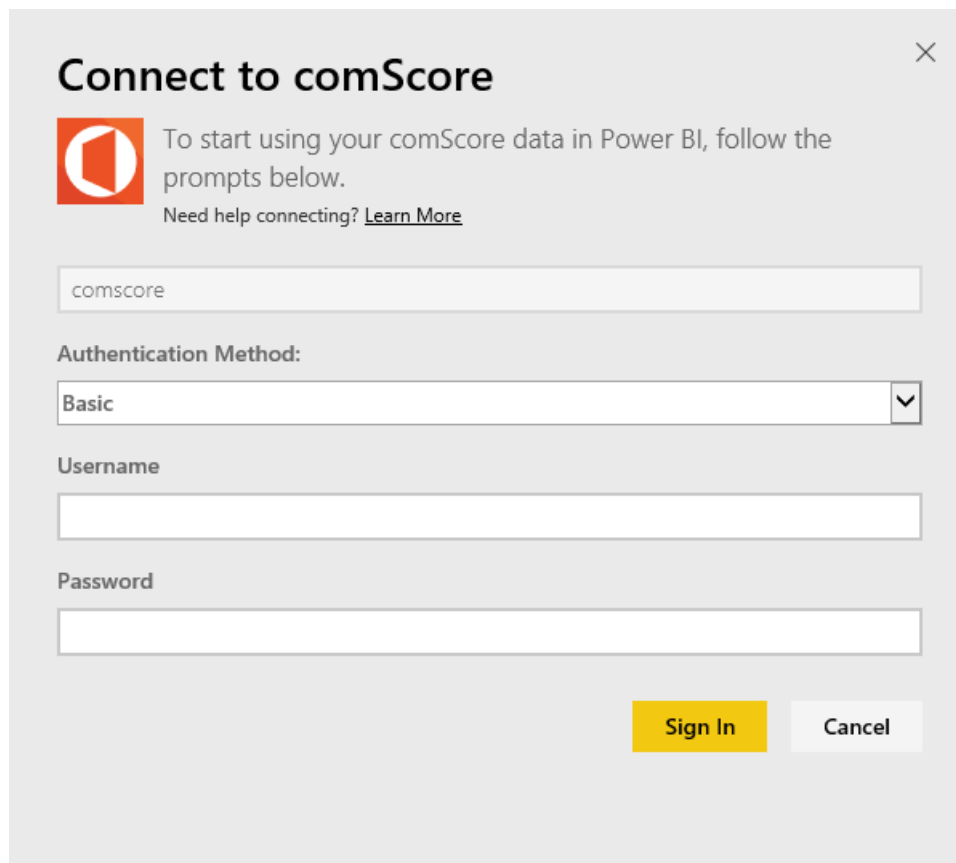
Datacenter
Enter the Data Center. Example: US or EU

Client
The Client ID provided by comScore


Site
The comScore site you want to track

[Next](#) [Cancel](#)

5. Provide your comScore username and password to connect. See details on finding this value below.



Connect to comScore

 To start using your comScore data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

comscore

Authentication Method:

Basic

Username

Password

Sign In **Cancel**

6. The import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

A comScore DAX user account and access to the comScore DAX API is required to connect. Please contact your comScore DAX admin to confirm your account.

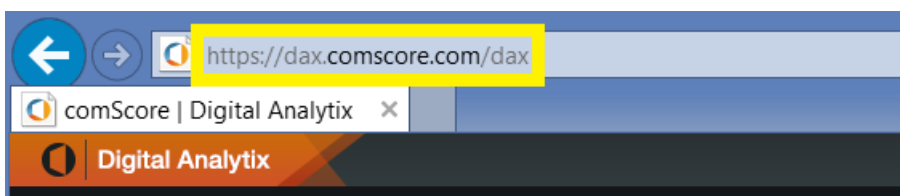
Finding parameters

Details on how to find each of your comScore parameters is below.

Data Center

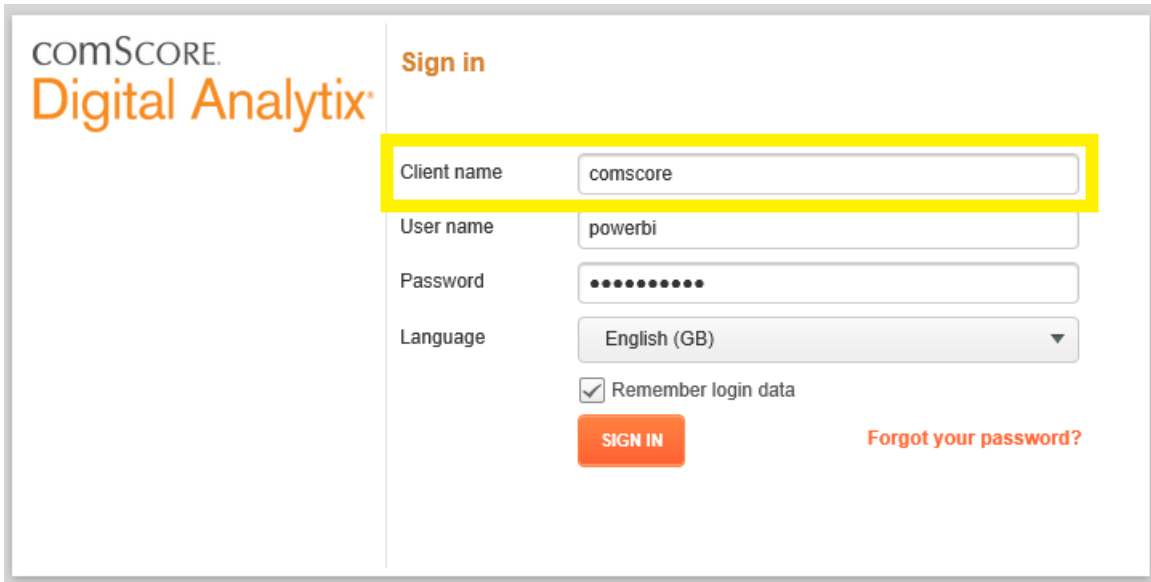
The data center you connect to is determined by the URL you navigate to in comScore.

If you use <https://dax.comscore.com>, enter "US", if you use <https://dax.comscore.eu>, enter "EU".



Client

The Client is the same one you provide when signing into comScore DAX.



comSCORE.
Digital Analytix

Sign in

Client name

User name

Password

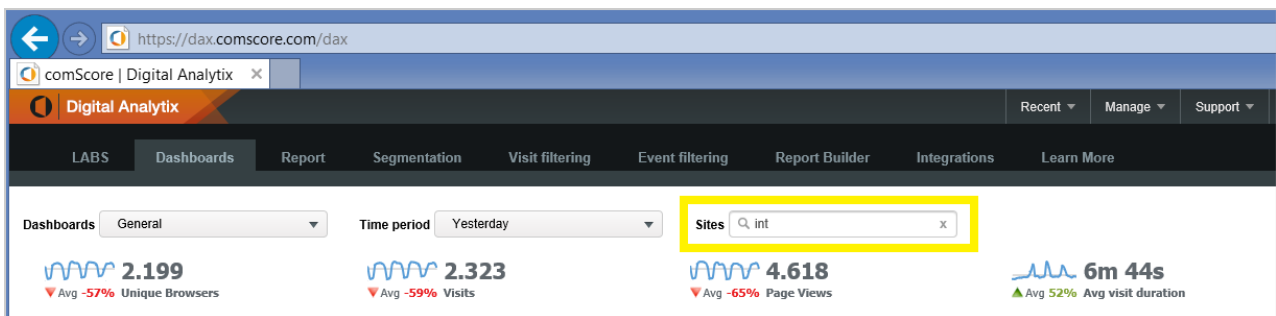
Language

Remember login data

SIGN IN [Forgot your password?](#)

Site

The comScore site determines which site you'd like to see the data from. You can find the list of sites from your comScore account.



https://dax.comscore.com/dax

comScore | Digital Analytix

Digital Analytix Recent Manage Support

LABS Dashboards Report Segmentation Visit filtering Event filtering Report Builder Integrations Learn More

Dashboards General Time period Yesterday Sites

2.199
▼ Avg -57% Unique Browsers

2.323
▼ Avg -59% Visits

4.618
▼ Avg -65% Page Views

6m 44s
▲ Avg 52% Avg visit duration

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to GitHub with Power BI

1/19/2018 • 3 min to read • [Edit Online](#)

The GitHub content pack for Power BI allows you to gain insights into a GitHub repository (also known as repo) with data around contributions, issues, pull requests and active users.

Connect to the [GitHub content pack](#) or read more about the [GitHub integration](#) with Power BI.

NOTE

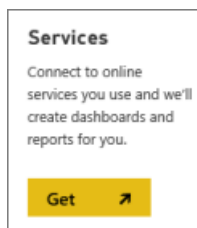
The content pack requires the GitHub account to have access to the repo. More details on requirements below.

How to connect

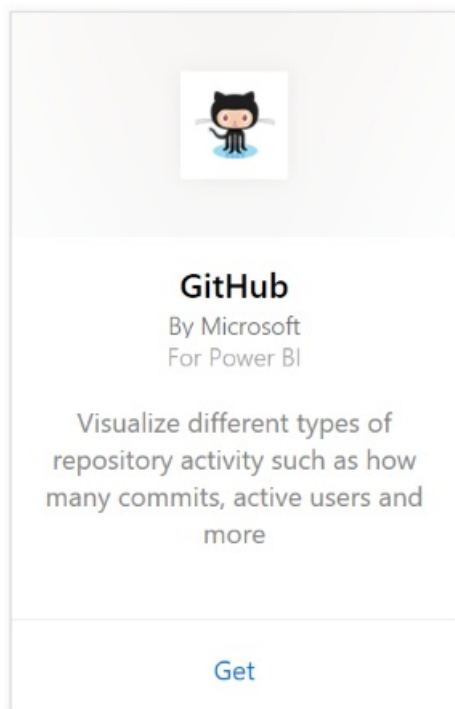
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **GitHub > Get**.

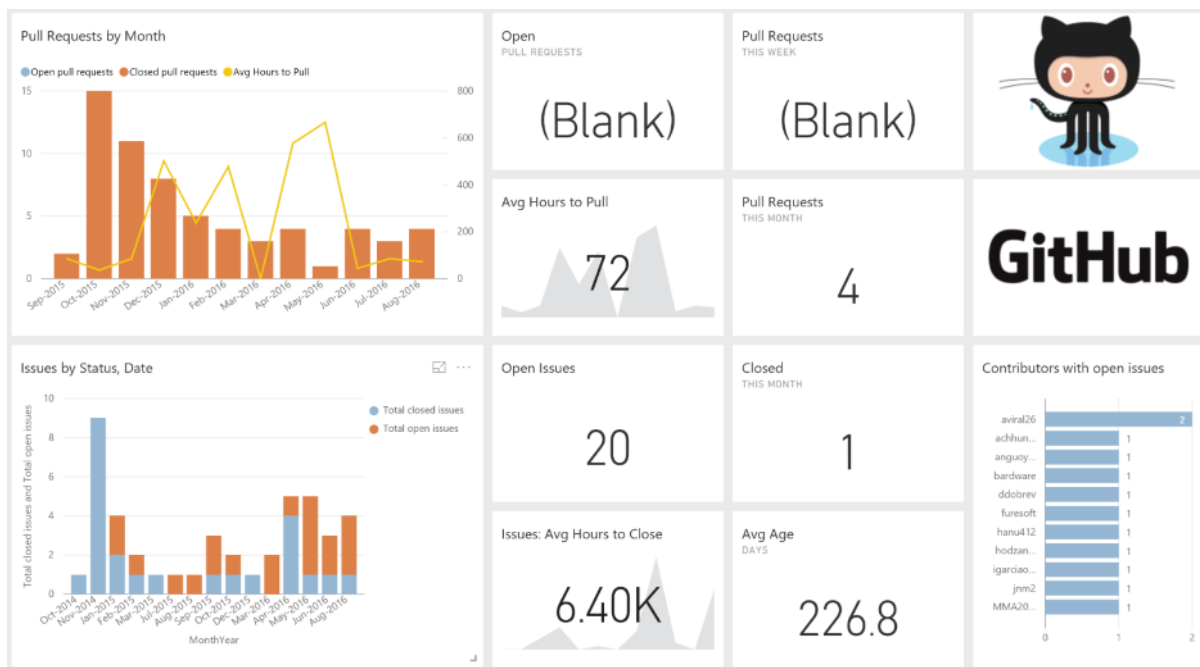


4. Enter the repository name and repository owner of the repo. See details on [finding these parameters](#) below.

5. Enter your GitHub credentials (this step might be skipped if you are already signed in with your browser).
6. For **Authentication Method**, select **oAuth2** > **Sign In**.
7. Follow the Github authentication screens. Grant the Github for Power BI content pack permission to the Github data.

This connects Power BI with GitHub and allows Power BI to connect to the data. The data is refreshed once a day.

8. After you connect to your repo, Power BI imports the data. You see a new [GitHub dashboard](#), report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The following data is available from GitHub in Power BI:

TABLE NAME	DESCRIPTION
Contributions	The contributions table gives the total additions, deletions and commits authored by the contributor aggregated per week. The top 100 contributors are included.
Issues	List all issues for the selected repo and it contains calculations like total and average time to close an issue, Total open issues, Total closed issues. This table will be empty when there are no issues in the repo.
Pull requests	This table contains all the Pull Requests for the repo and who pulled the request. It also contains calculations around how many open, closed and total pull requests, how long it took to pull the requests and how long the average pull request took. This table will be empty when there are no issues in the repo.
Users	This table provides a list of GitHub users or contributors who have made contributions, filed issues or solved Pull requests for the repo selected.
Milestones	It has all the Milestones for the selected repo.
DateTable	This tables contains dates from today and for years in the past that allow you to analyze your GitHub data by date.

TABLE NAME	DESCRIPTION
ContributionPunchCard	This table can be used as a contribution punch card for the selected repo. It shows commits by day of week and hour of day. This table is not connected to other tables in the model.
RepoDetails	This table provides details for the repo selected.

System requirements

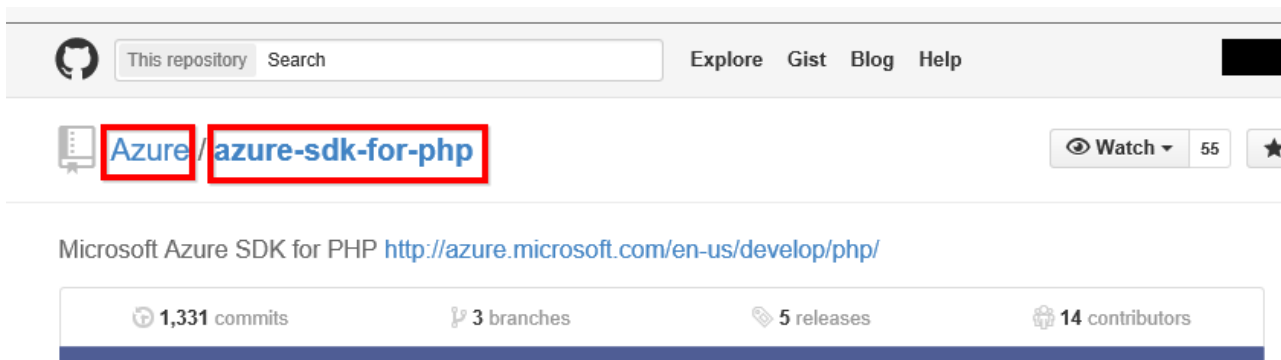
- The GitHub account that has access to the repo.
- Permission granted to the Power BI for GitHub app during first login. See details below on revoking access.
- Sufficient API calls available to pull and refresh the data.

De-authorize Power BI

To de-authorize Power BI from being connected to your GitHub repo you can Revoke access in GitHub. For more details see this [GitHub help](#) topic.

Finding parameters

You can determine the owner and repository by looking at the repository in GitHub itself:



The first part "Azure" is the owner and the second part "azure-sdk-for-php" is the repository itself. You see these same two items in the URL of the repository:

```
<https://github.com/Azure/azure-sdk-for-php> .
```

Troubleshooting

If necessary, you can verify your GitHub credentials.

1. In another browser window, go to the GitHub web site and log in to GitHub. You can see you're logged in, in the upper-right corner of the GitHub site.
2. In GitHub, navigate to the URL of the repo you plan to access in Power BI. For example: <https://github.com/dotnet/corefx>.
3. Back in Power BI, try connecting to GitHub. In the Configure GitHub dialog box, use the names of the repo and repo owner for that same repo.

Next steps

- [Get started with Power BI](#)
- [Get data](#)

Connect to Insightly with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Visualize and share your Insightly CRM data in Power BI with the Insightly content pack. Connect to Power BI using your Insightly API key to view and build reports and dashboards from your CRM data. With Power BI, you can analyze your data in new ways, create powerful graphs and charts, and display contacts, leads, and organizations on a map.

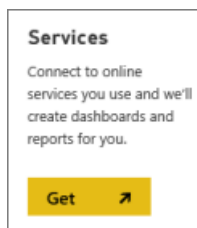
Connect to the [Insightly content pack](#) for Power BI.

How to connect

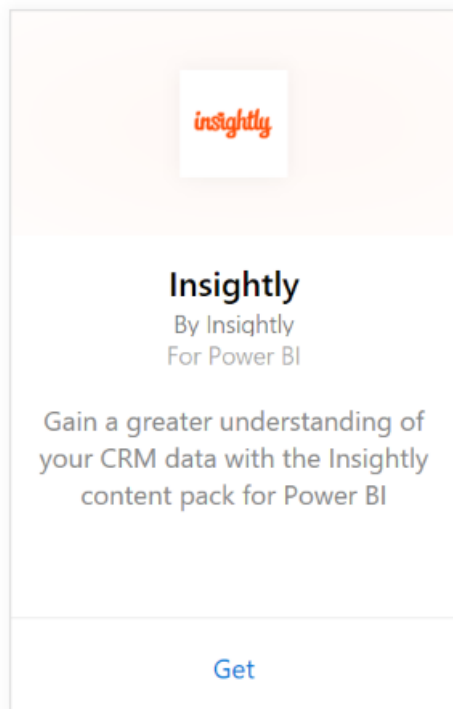
1. Select **Get Data** at the bottom of the left navigation pane.



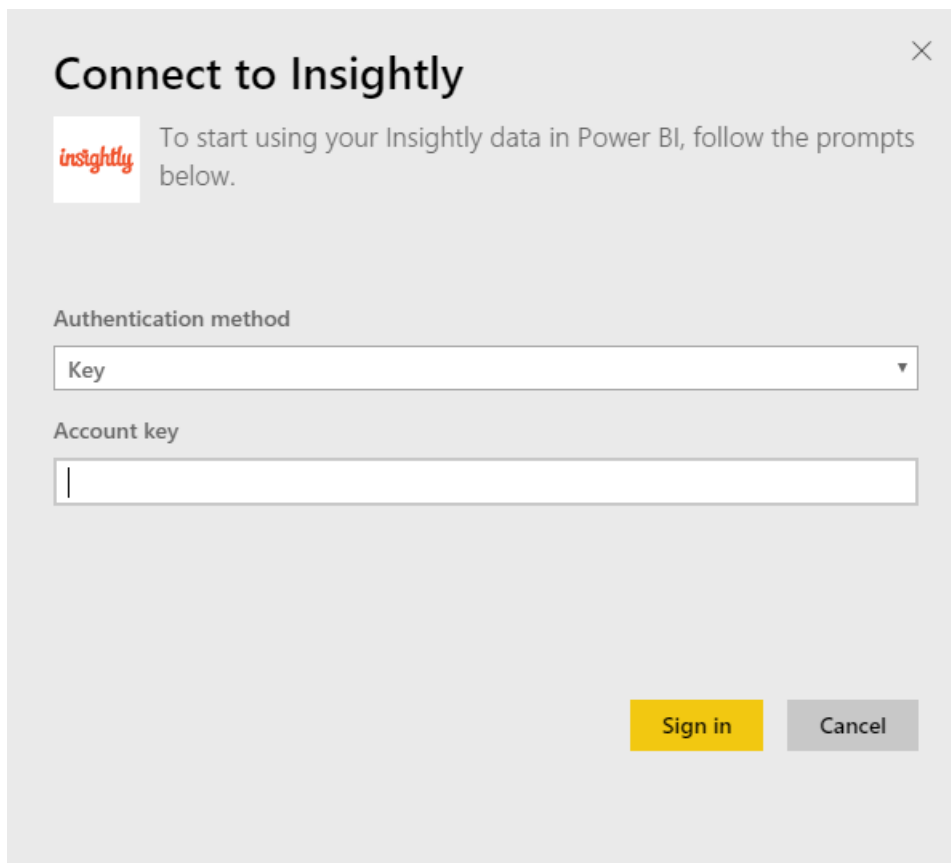
2. In the **Services** box, select **Get**.



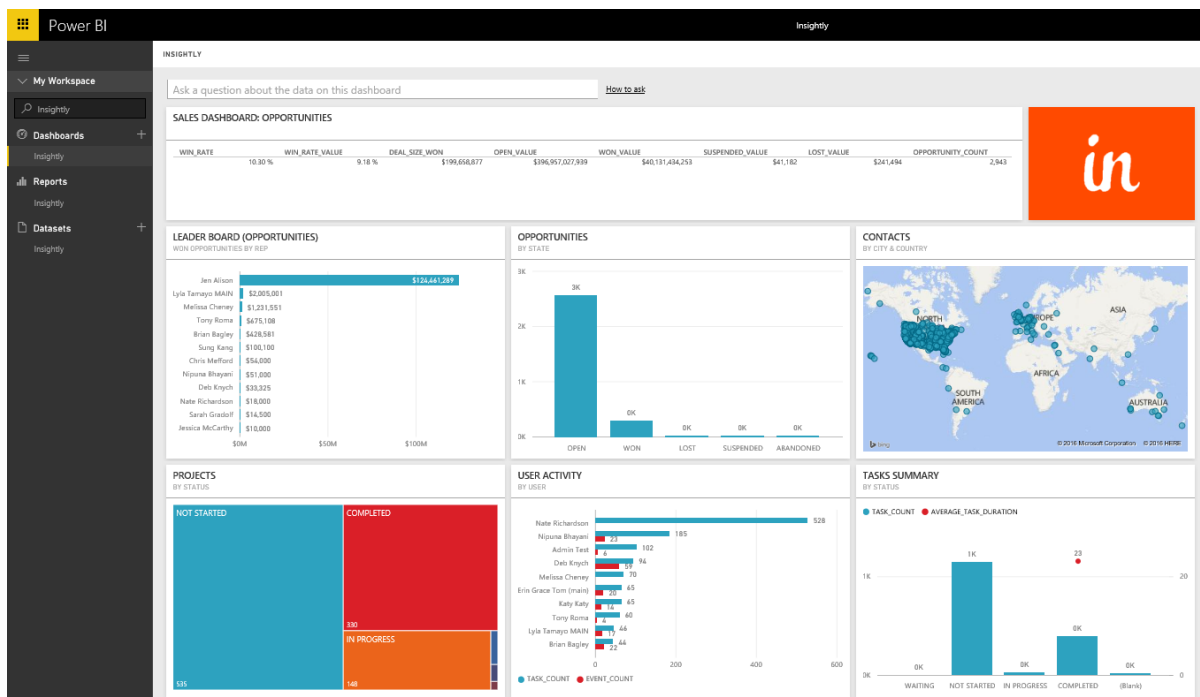
3. Select **Insightly** > **Get**.



4. Select **Key** as the Authentication type and provide your Insight API Key then select **Sign In**. See details on [finding this](#) below.



- After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack includes the following tables with fields from the corresponding records:

TABLES			
Contacts	Opportunities	Pipeline Stages	Task Complete Date
Custom Fields	Opportunity Close Date	Project Complete Date	Tasks
Events	Opportunity Forecast Date	Projects	Teams/Members
Leads	Organizations	Tags	Users

Many tables and reports also include unique calculated fields, such as:

- Tables with "grouped" opportunity forecast close dates, opportunity actual close dates, project completion dates, and task completion dates for analysis by month, quarter, or year.
- A weighted value field for opportunities (opportunity value * probability of winning).
- Average and total duration fields for tasks, based on start and completed dates.
- Reports with calculated fields for opportunity win rate (count of won/count of total opportunities) and win rate value (value of won/value of total opportunities).

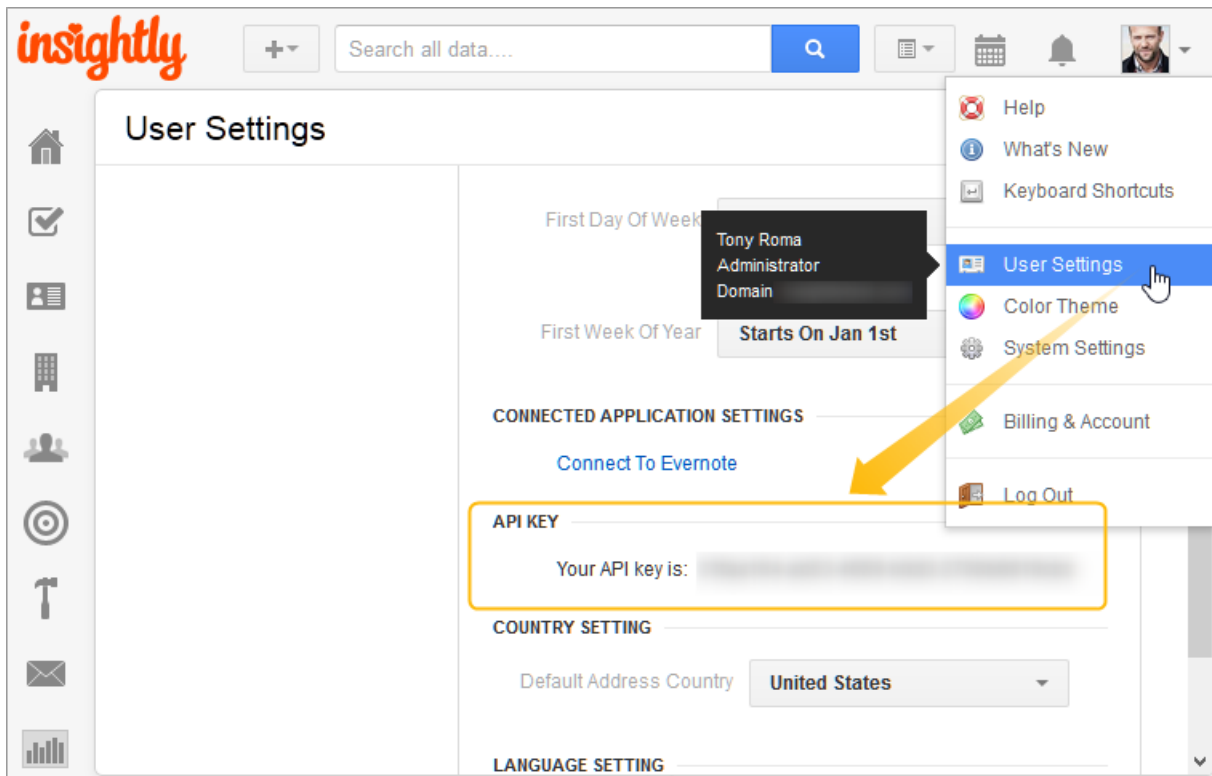
System requirements

An Insightly account with access to the Insightly API is required. Visibility permissions will be based on the API key used to establish the connection to Power BI. Any Insightly records visible to you will also be visible in the Power BI reports and dashboards that you share with others.

Finding parameters

API Key

To copy your API key from Insightly, select User Settings from the Insightly profile menu and scroll down. This string of characters will be used to connect your data to Power BI.



Troubleshooting

Your data is imported via the Insightly API, which includes a daily limit based on your Insightly subscription plan level. The limits are listed in the Rate Limiting/Throttling Requests section of our API documentation:

<https://api.insight.ly/v2.2/Help#!/Overview/Introduction#ratelimit>

The provided reports use default fields from Insightly and may not include your customizations. Edit the report to view all the available fields.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to IntelliBoard with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

IntelliBoard offers simplified access to your Moodle learning management system data through reporting services. The IntelliBoard content pack for Power BI offers additional analytics, including metrics on your courses, registered users, overall performance, and your LMS activity.

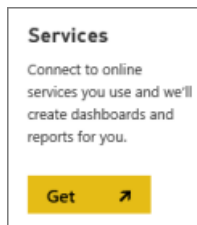
Connect to the [IntelliBoard content pack](#) for Power BI.

How to connect

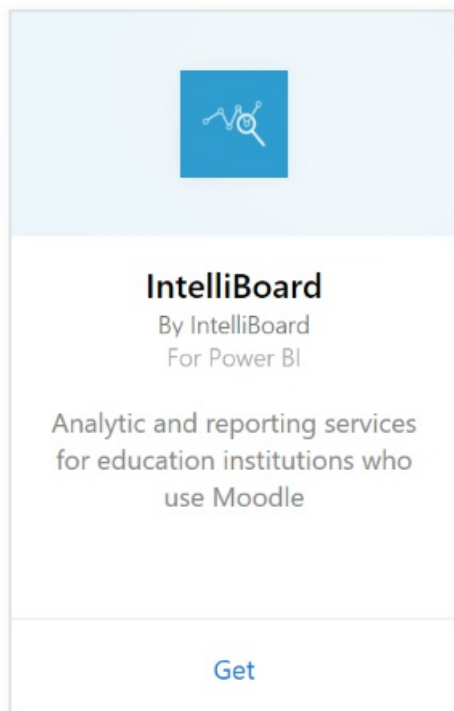
1. Select **Get Data** at the bottom of the left navigation pane.



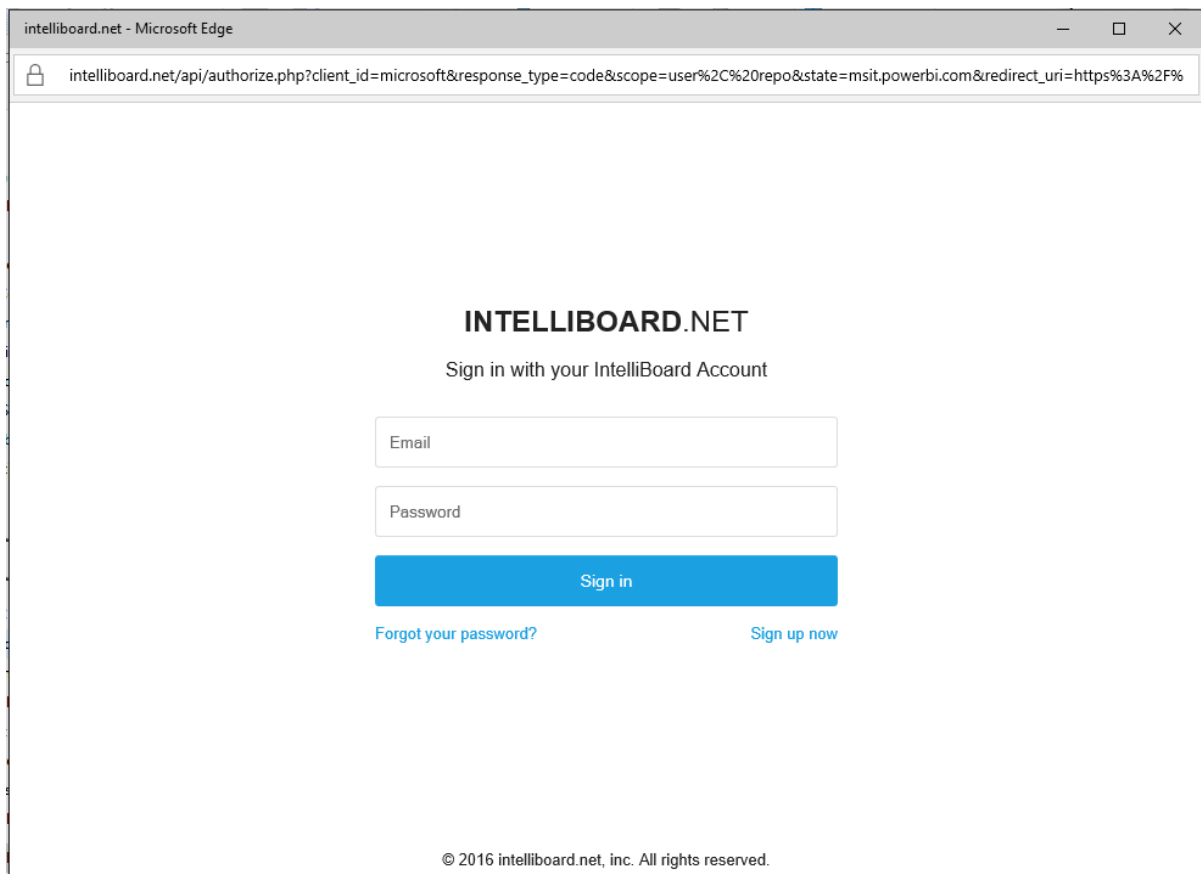
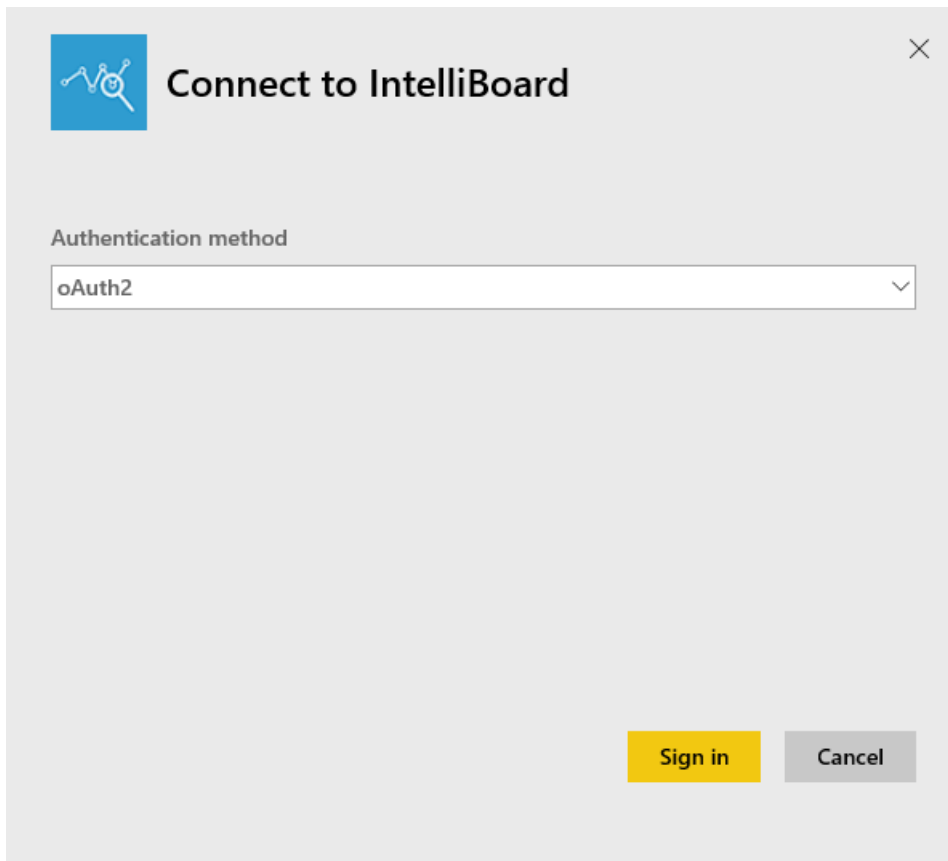
2. In the **Services** box, select **Get**.



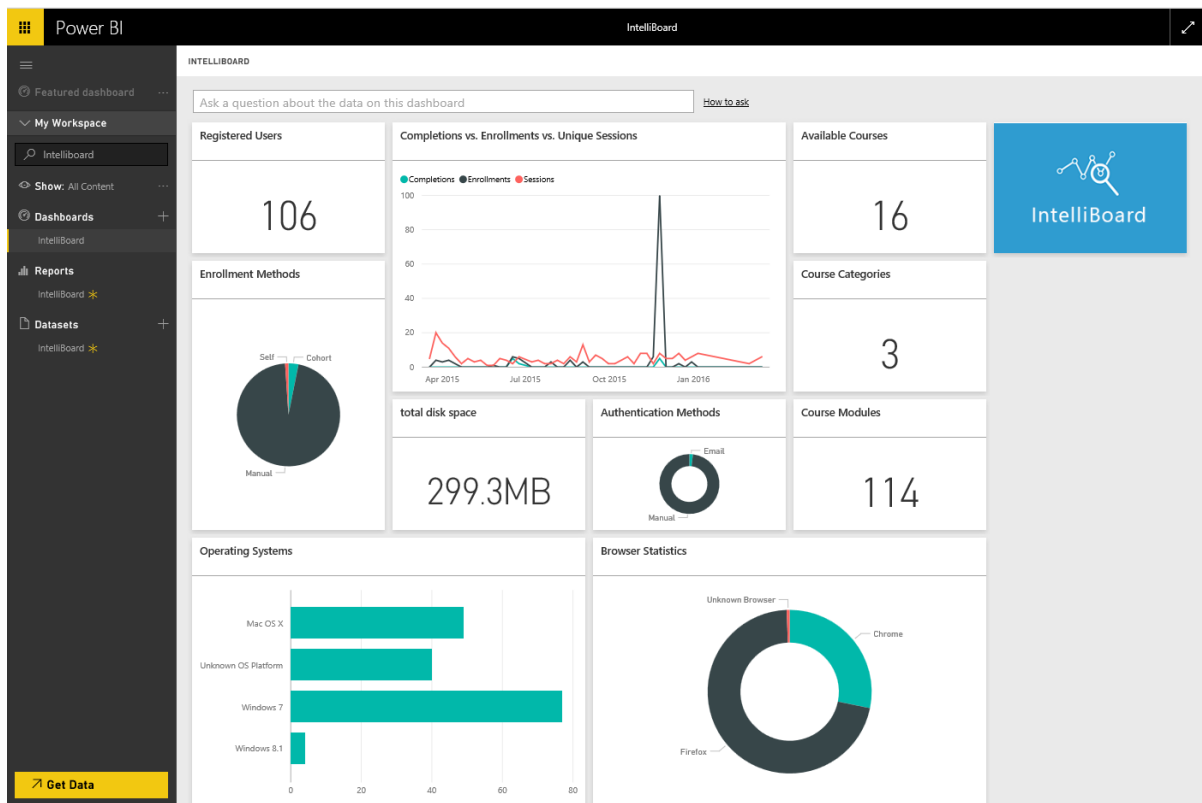
3. Select **IntelliBoard**, then select **Get**.



4. Select **OAuth 2** and then **Sign In**. When prompted, provide your IntelliBoard credentials.



5. Once connected, a dashboard, report and dataset will automatically be loaded. When completed, the tiles will update with data from your IntelliBoard account.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack includes data from the following tables:

- Activity
- Agents
- Auth
- Countries
- CoursesProgress
- Enrollments
- Lang
- Platform
- Totals
- UsersProgress

System requirements

An IntelliBoard account with permissions to the above tables is required in order to instantiate this content pack.

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Lithium with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Lithium builds trusted relationships between the world's best brands and their customers, helping people get answers and share their experiences. By connecting the Lithium content pack to Power BI, you can measure key metrics about your online community to help drive sales, reduce service costs and increase loyalty.

Connect to the [Lithium content pack](#) for Power BI.

NOTE

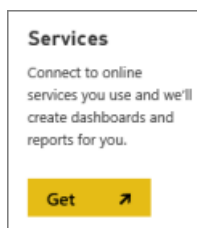
The Power BI content pack uses the Lithium API. Excessive calls to the API may result in additional charges from Lithium, please confirm with your Lithium administrator.

How to connect

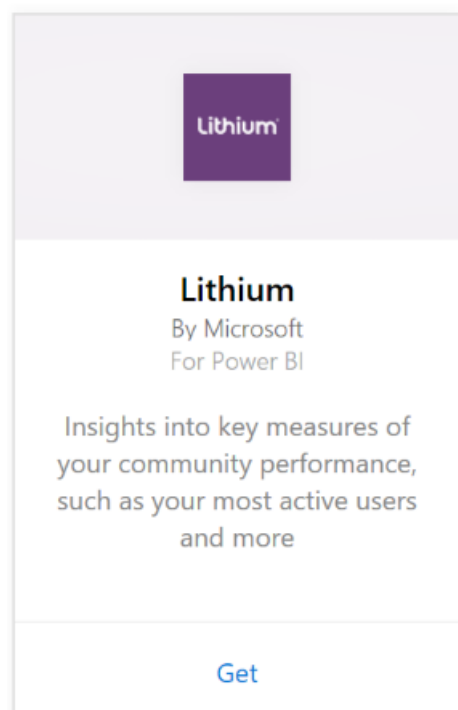
1. Select **Get Data** at the bottom of the left navigation pane.



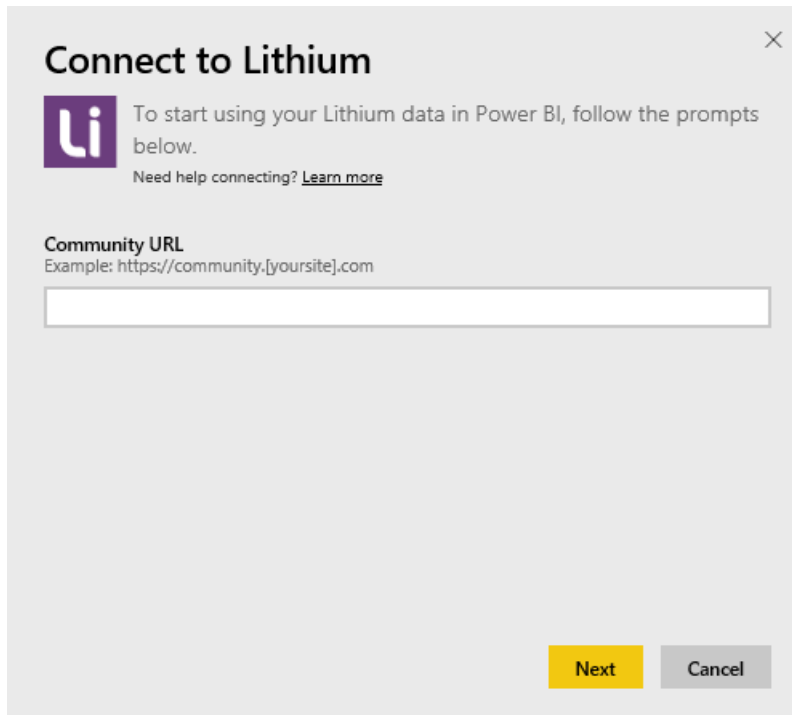
2. In the **Services** box, select **Get**.



3. Select **Lithium > Get**.



4. Provide the URL of your Lithium community. It will be in the form of <https://community.yoursite.com>.



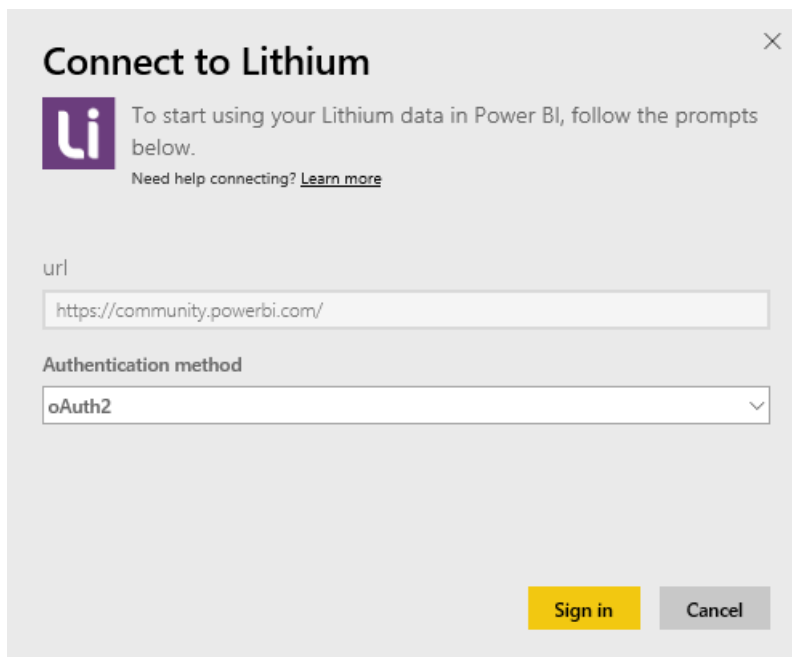
Connect to Lithium ×

Li To start using your Lithium data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Community URL
Example: [https://community.\[yoursite\].com](https://community.[yoursite].com)

Next **Cancel**

5. When prompted, enter your Lithium credentials. Select **oAuth 2** as the Authentication Mechanism and click **Sign In** and follow the Lithium authentication flow.



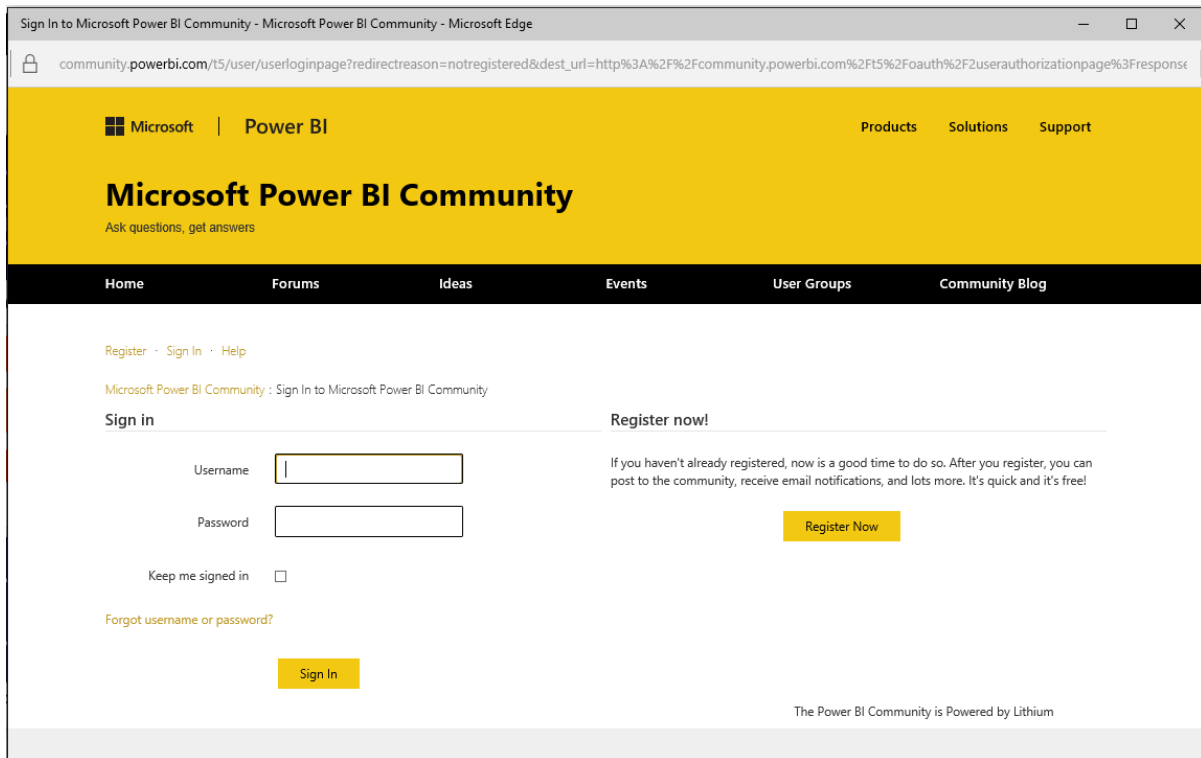
Connect to Lithium ×

Li To start using your Lithium data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

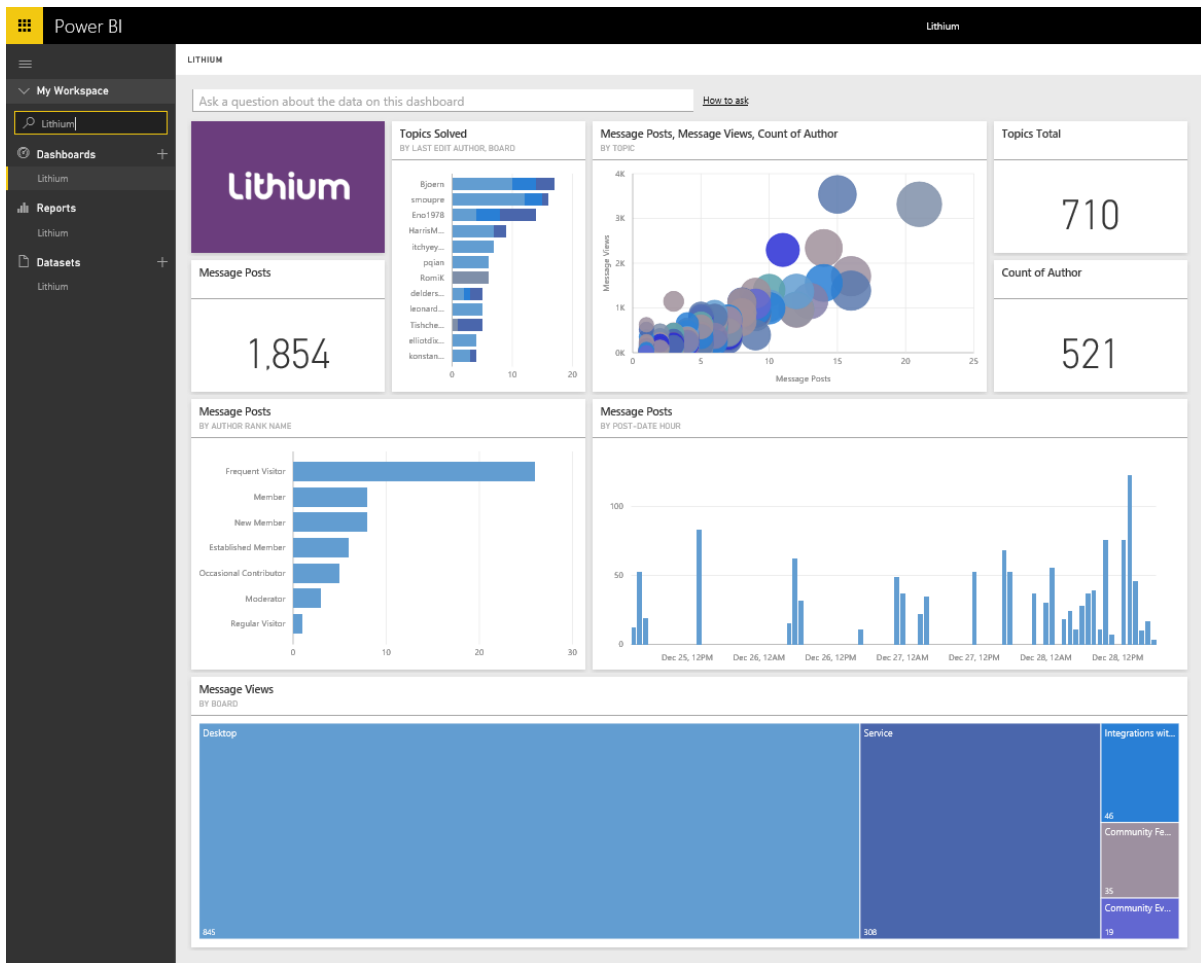
url

Authentication method

Sign in **Cancel**



- Once the login flow is completed the import process will begin. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.

- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

The Lithium content pack requires a Lithium community v15.9 or greater. Please check with your Lithium admin to confirm.

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to MailChimp with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI content pack pulls data from your MailChimp account and generates a dashboard, a set of reports and a dataset to allow you to explore your data. Pull in analytics to create [MailChimp dashboards](#) and quickly identify trends within your campaigns, reports, and individual subscribers. The data is set to refresh daily ensuring the data you're monitoring is up to date.

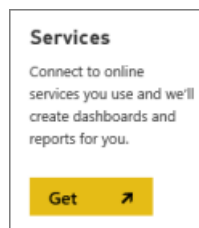
Connect to the [MailChimp content pack](#) for Power BI.

How to connect

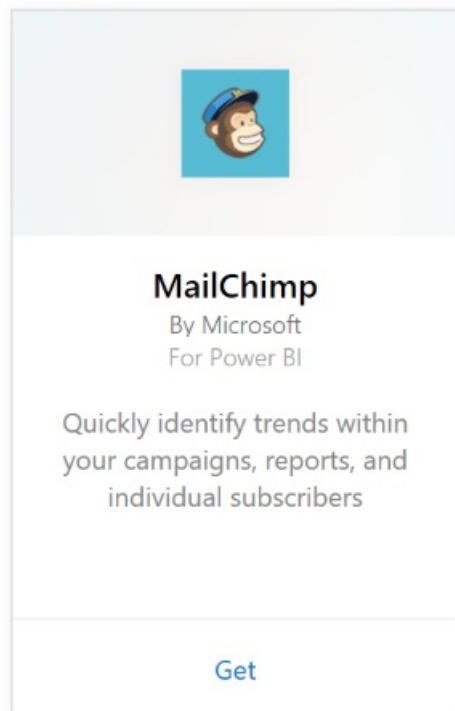
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **MailChimp** > **Get**.





4. For Authentication Method, select **oAuth2** > **Sign In**.

When prompted, enter your MailChimp credentials and follow the authentication process.

The first time you connect you will be prompted to allow Power BI read-only access to your account. Select

Allow to begin the import process, which can take a few minutes depending on the volume of data in your account.

 ↔ 

Connect Power BI to your account

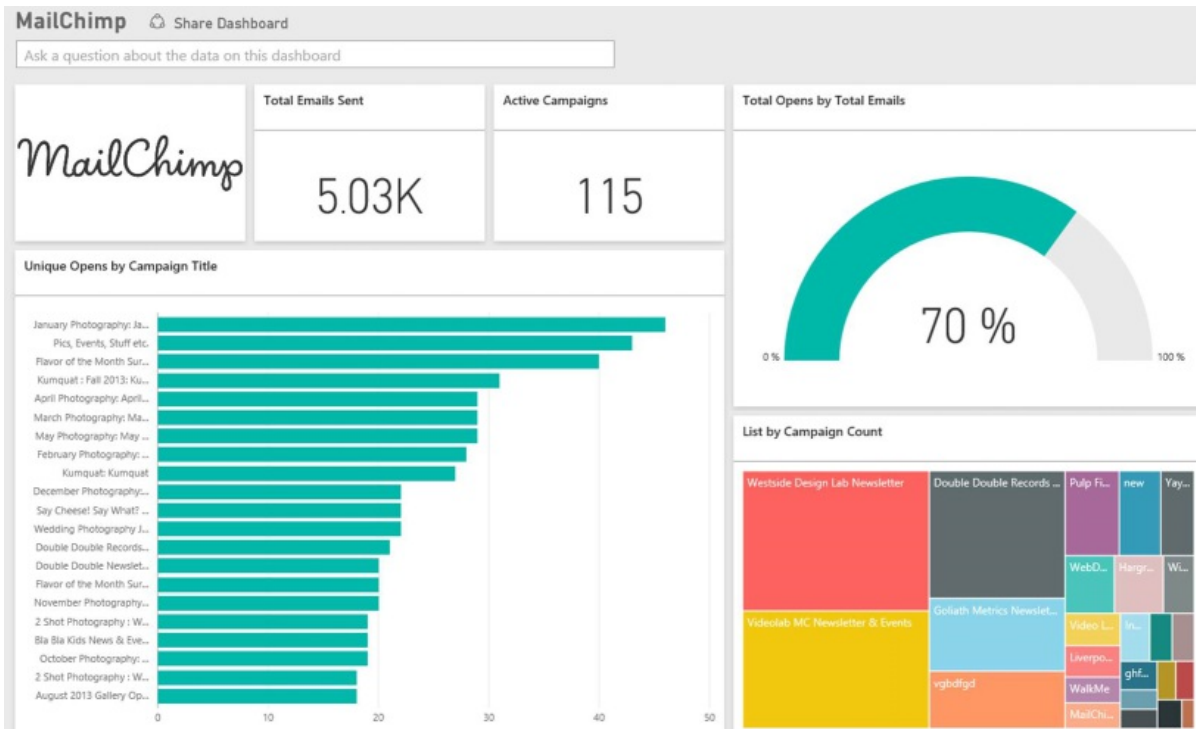
Power BI Connector for Mailchimp

Username

Password

Log In

5. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. This is the default dashboard that Power BI created to display your data. You can modify this dashboard to display your data in any way you want.



What now?

- Try asking a question in the Q&A box at the top of the dashboard

- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Mandrill with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI content pack pulls data from your Mandrill account and generates a dashboard, a set of reports and a dataset to allow you to explore your data. Use Mandrill's analytics to quickly gain insights into your newsletter or marketing campaign. The data is set to refresh daily ensuring the data you're monitoring is up to date.

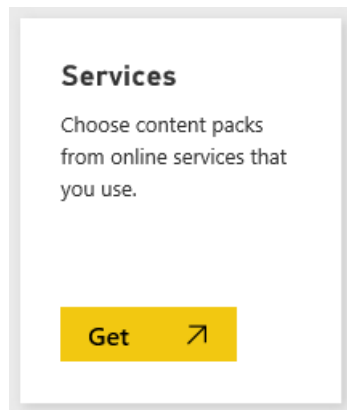
Connect to the [Mandrill content pack for Power BI](#).

How to connect

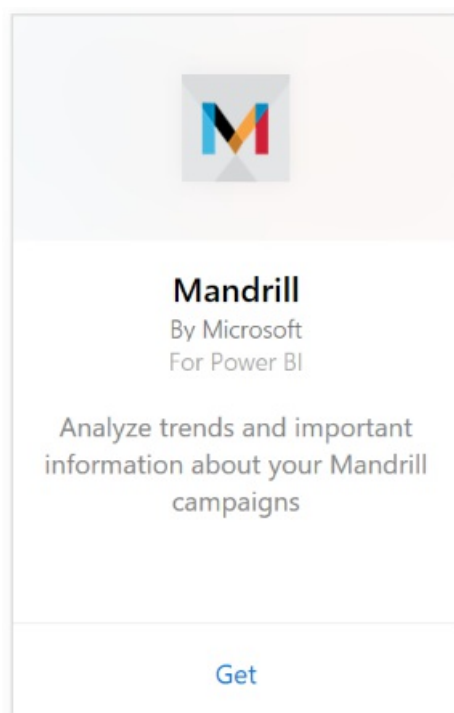
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Mandrill** > **Get**.



4. For **Authentication Method**, select **Key** and provide your API key. You can find the key on the **Settings**

tab of the Mandrill dashboard. Select **Sign In** to begin the import process, which can take a few minutes depending on the volume of data in your account.

Connect to Mandrill

To start using your Mandrill data in Power BI, follow the prompts below.

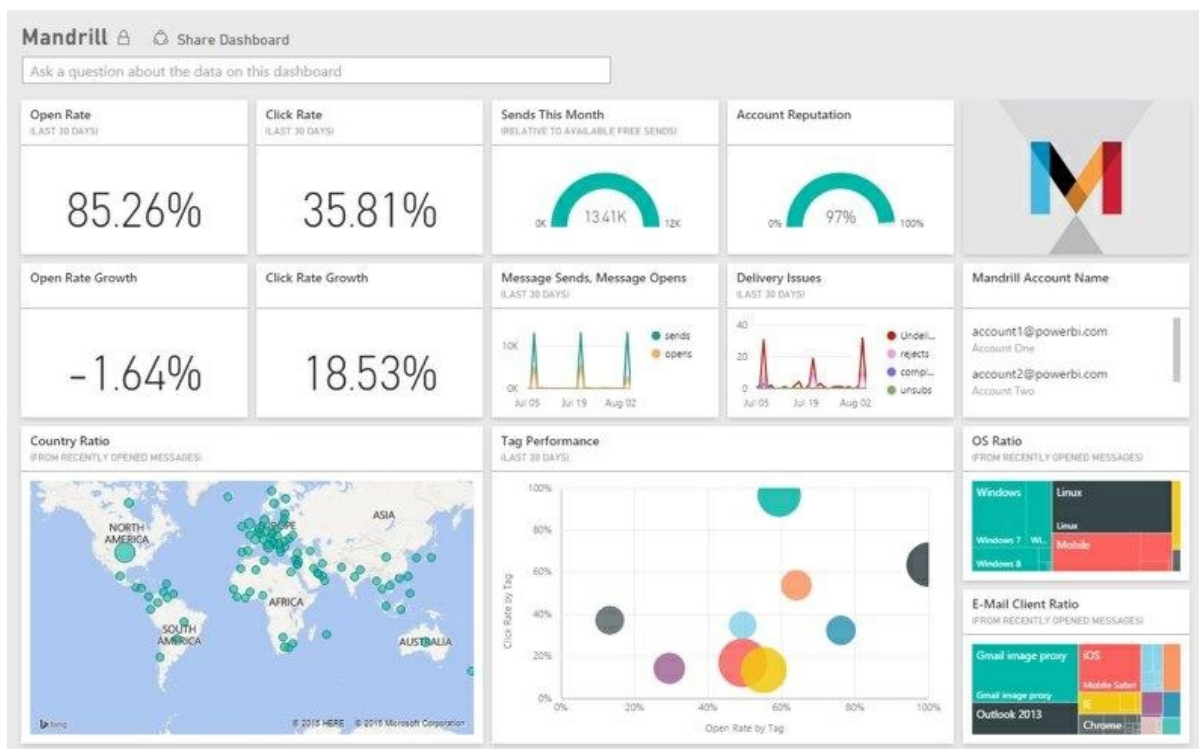
Authentication Method:

Key ▼

Account key

Sign In **Cancel**

5. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. This is the default dashboard that Power BI created to display your data.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.

- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Microsoft Azure Enterprise with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Explore and monitor your Microsoft Azure Enterprise data in Power BI with the Power BI content pack. The data will be refreshed automatically once per day.

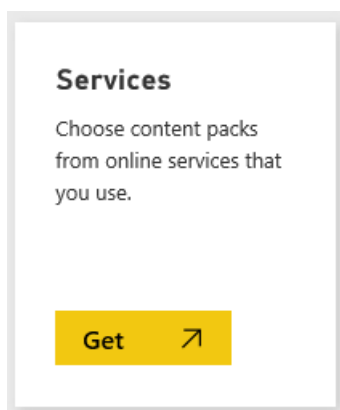
Connect to the [Microsoft Azure Enterprise content pack](#) for Power BI.

How to connect

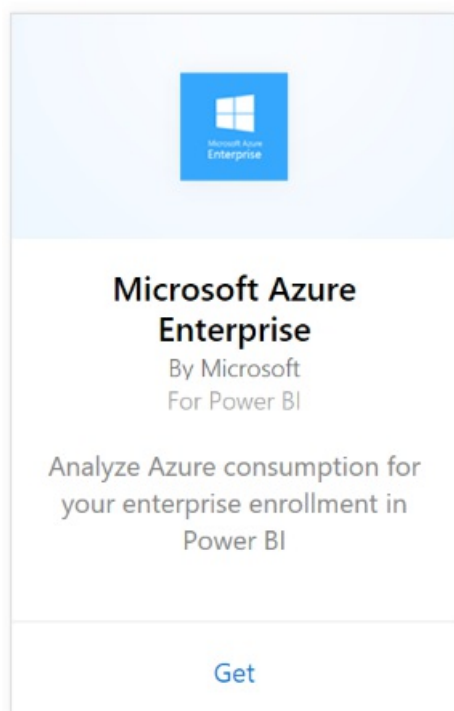
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

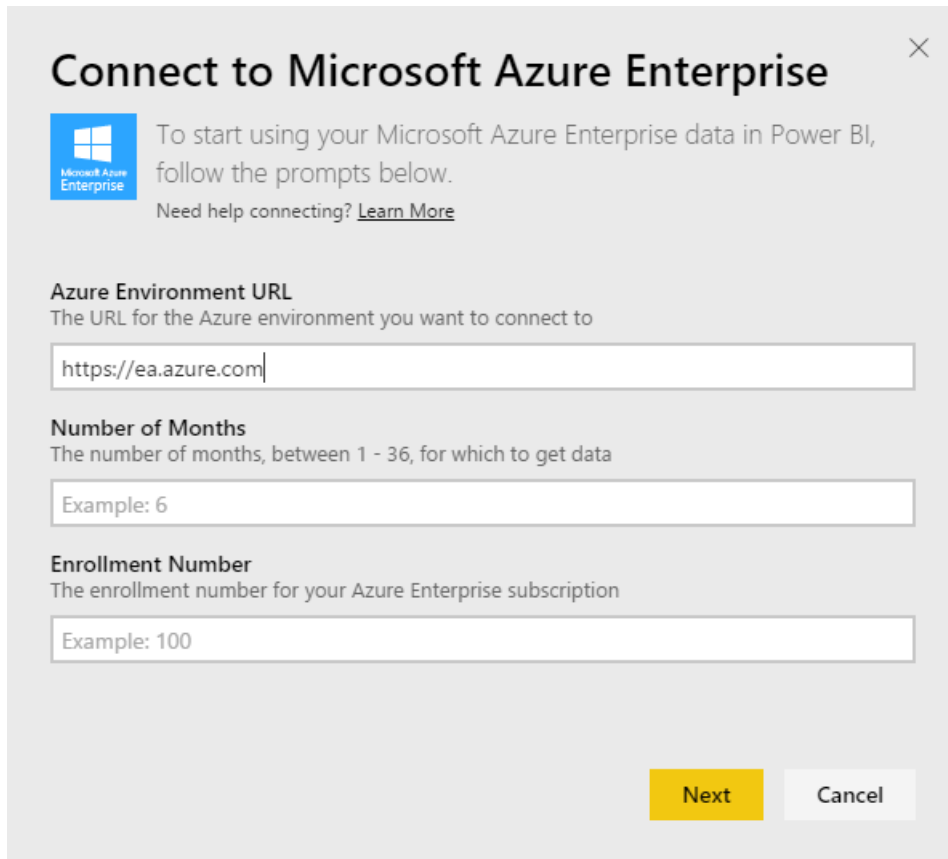


3. Select **Microsoft Azure Enterprise** > **Get**.




4. Provide the Azure Environment URL, the number months of data you want to import and your Azure

Enterprise enrollment number. Your Azure Environment URL will be `https://ea.azure.com` or `https://ea.windowsazure.cn`. See details on [finding these parameters](#) below.



Connect to Microsoft Azure Enterprise ✕

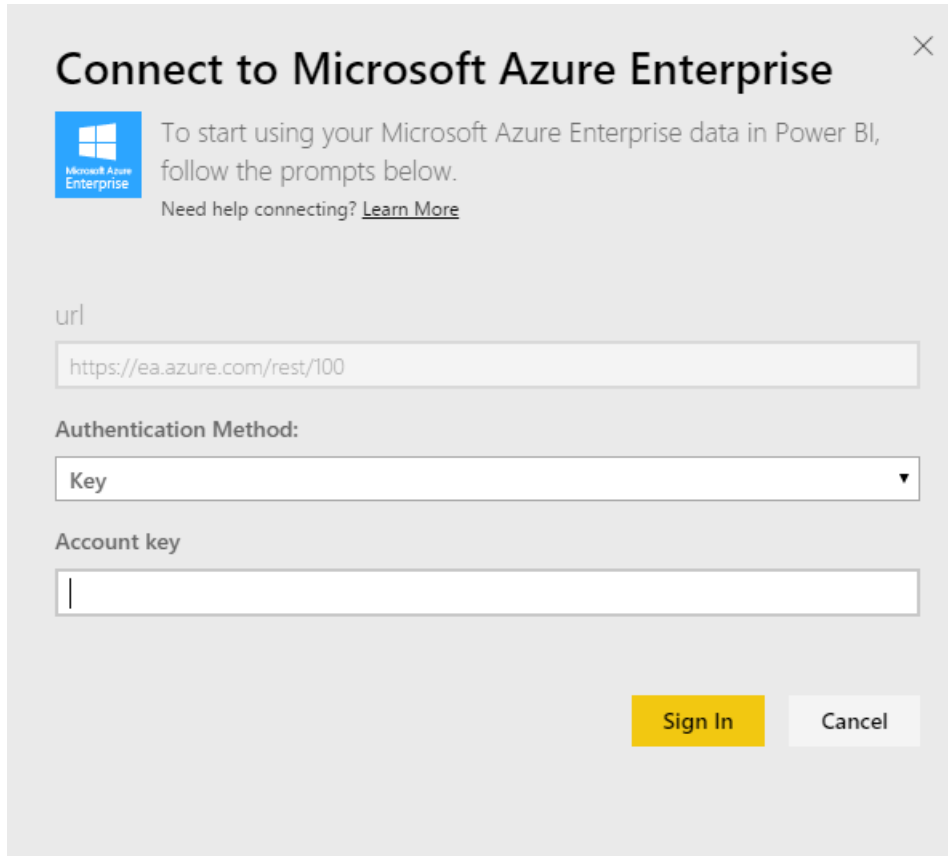
 To start using your Microsoft Azure Enterprise data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Azure Environment URL
The URL for the Azure environment you want to connect to


Number of Months
The number of months, between 1 - 36, for which to get data

Enrollment Number
The enrollment number for your Azure Enterprise subscription

5. Provide your Access key to connect. The key for your enrollment can be found in your Azure EA Portal.



Connect to Microsoft Azure Enterprise ✕

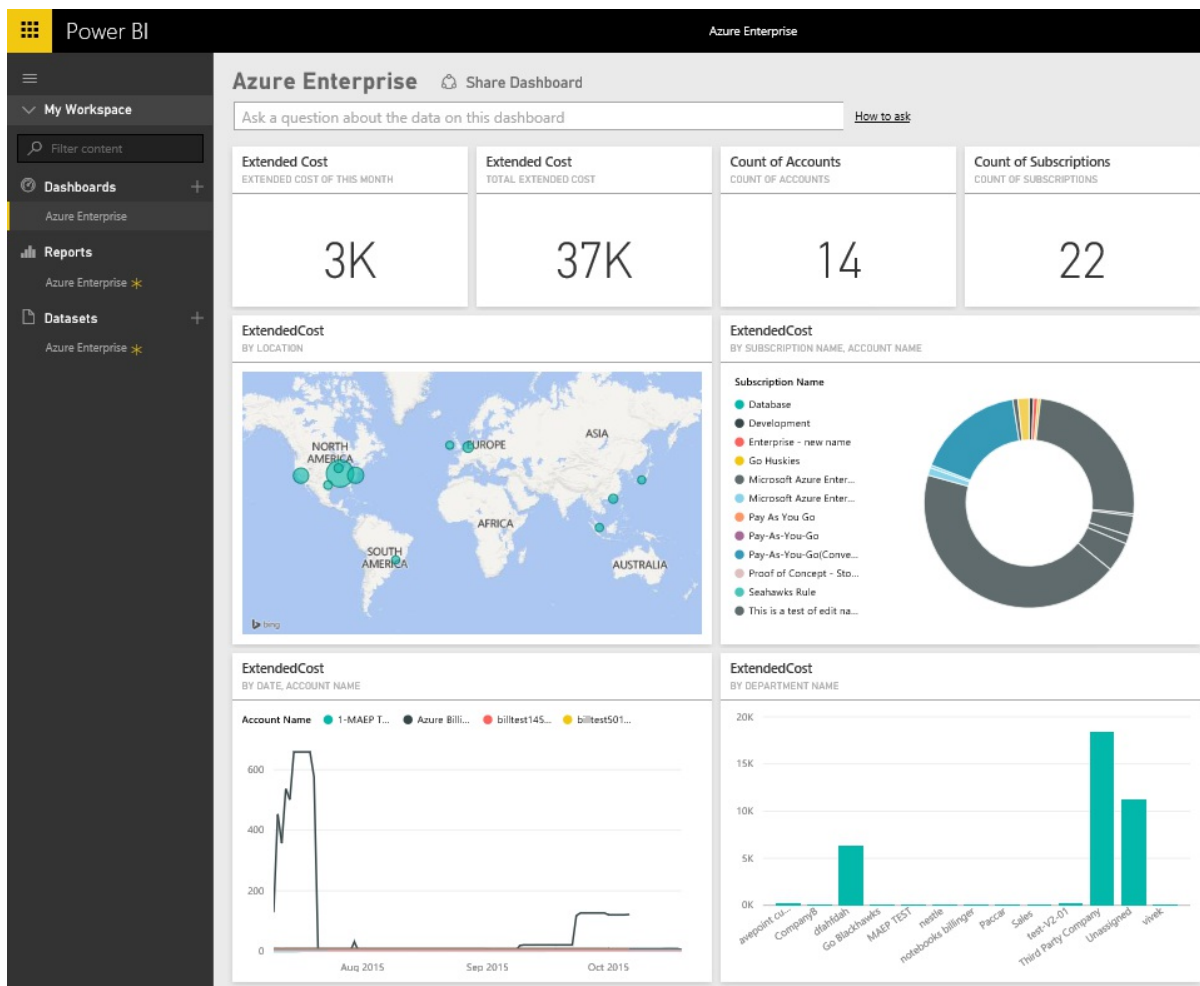
 To start using your Microsoft Azure Enterprise data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

url

Authentication Method:

Account key

6. The import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The Azure Enterprise content pack includes monthly reporting data for the range of months that you provide during the connection flow. The range is a moving window, so the dates included will update as the dataset refreshes.

System Requirements

The content pack requires access to the Enterprise features within the Azure Portal.

Finding parameters

Power BI reporting is available for EA Direct, Partner and Indirect Customers who are able to view billing information. Please read below for details about finding each of the values the connection flow expects.

Azure Environment URL

- This value is typically <https://ea.azure.com>, however you can check the URL once you sign in to confirm.

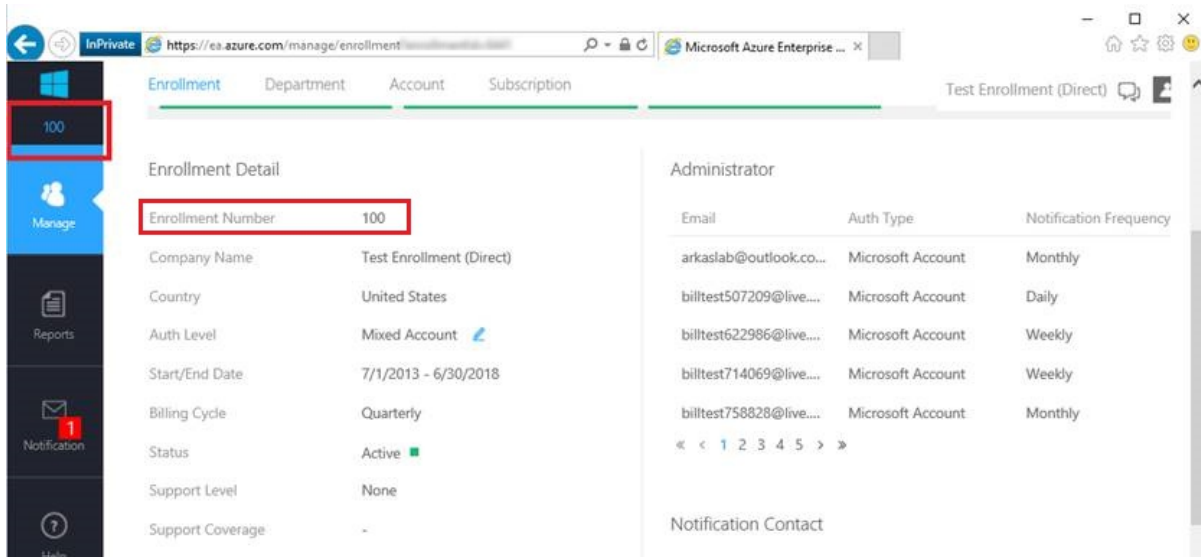


Number of Months

- This should be a number between 1-36 representing the number of months of data (from today) you'd like to import.

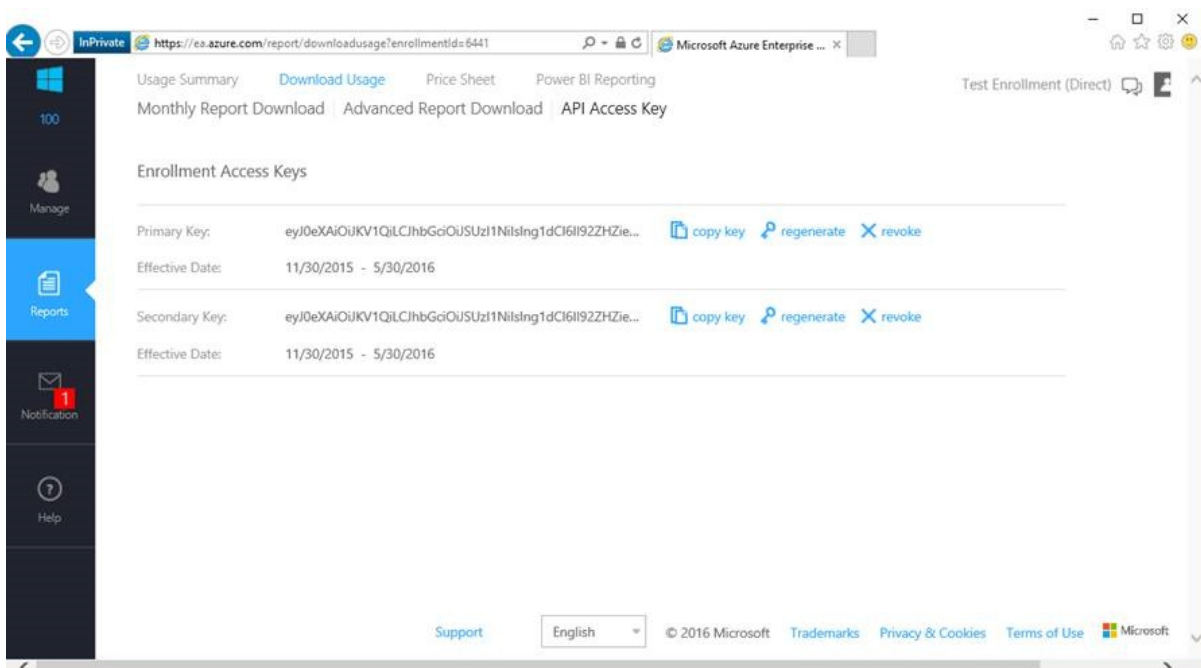
Enrollment Number

- This is your Azure Enterprise enrollment number which can be found on the home screen of the [Azure Enterprise Portal](#) under "Enrollment Detail".



Access Key

- Your key can be found in the Azure Enterprise portal, under "Download Usage" > "API Access Key"



Additional Help

- For additional help setting up the Azure Enterprise Power BI Pack, log in to the Azure Enterprise Portal to view the API Help File under "Help" and additional instructions under Reports -> Download Usage -> API Access Key.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Microsoft Dynamics AX content pack with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Microsoft Dynamics AX has three Power BI content packs targeted at different business users. The Financial Performance content pack, designed specifically for CFOs, provides access to insights about your organization's financial performance. The Retail Channel Performance content pack is targeted for channel managers focuses on sales performance to predict trends and uncover insights by drawing directly from Retail & Commerce data. The Cost Management is designed for COOs and CFOs and provides details on operation performance.

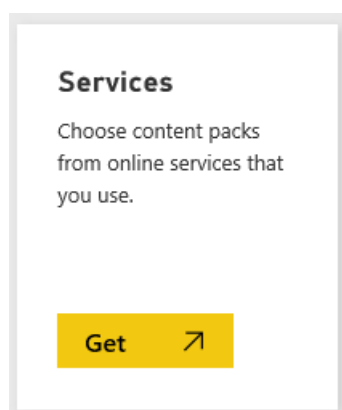
Connect to the Microsoft Dynamics AX [Retail Channel Performance](#), the [Financial Performance](#) or the [Cost Management](#) content pack for Power BI.

How to connect

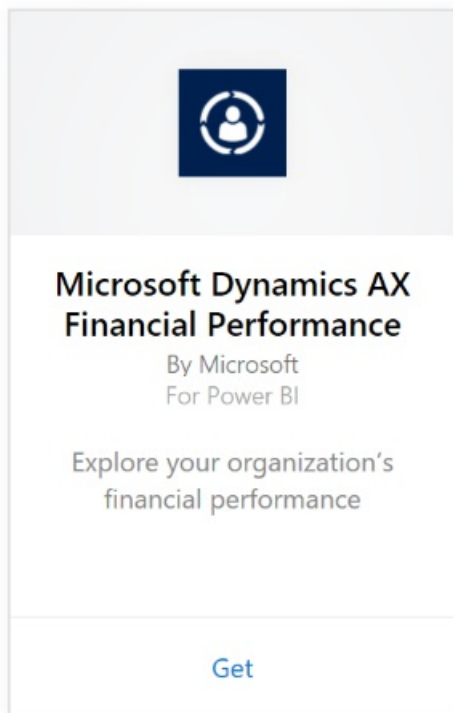
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



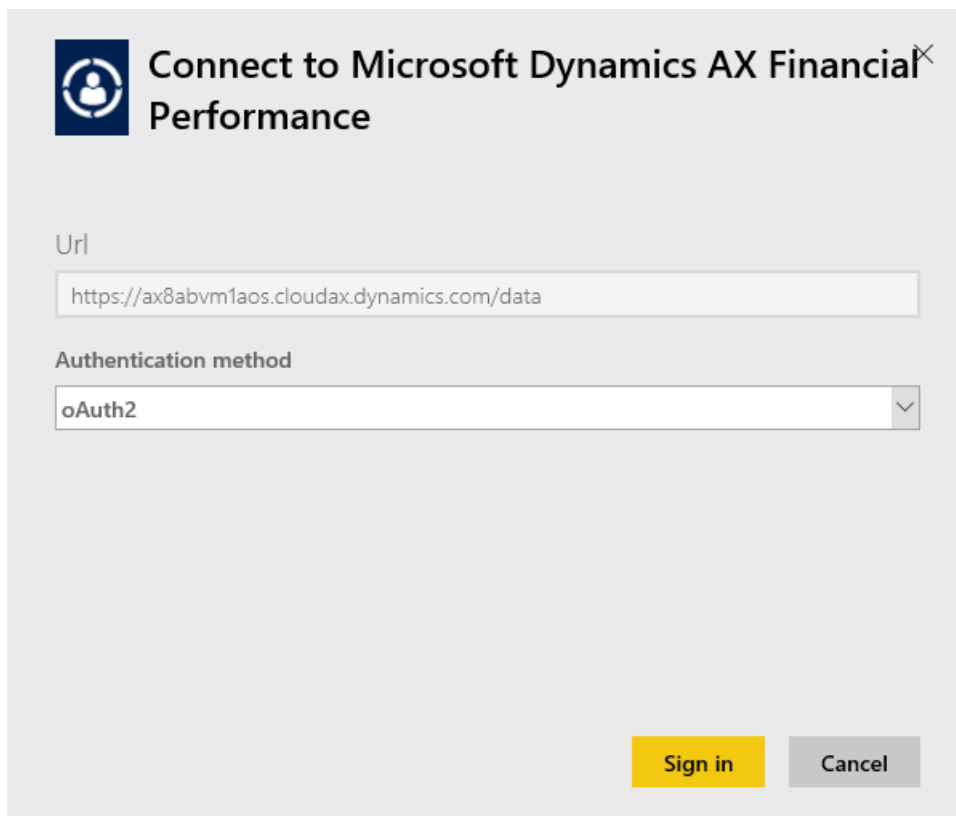
3. Select one of the Dynamics AX content packs and choose **Get**.



4. Specify the URL of your Dynamics AX 7 environment. See details on [finding those parameters](#) below.

A grey dialog box titled "Connect to Microsoft Dynamics AX Financial Performance" with a circular icon on the left. Below the title, it says "Environment URL" followed by the text "https://[tenant].cloudax.dynamics.com". There is a white text input field below this. At the bottom left, it says "Need help connecting? [Learn more](#)". At the bottom right, there are two buttons: "Next" and "Cancel".

5. For **Authentication Method**, select **oAuth2** > **Sign In**. When prompted, enter your Dynamics AX credentials.

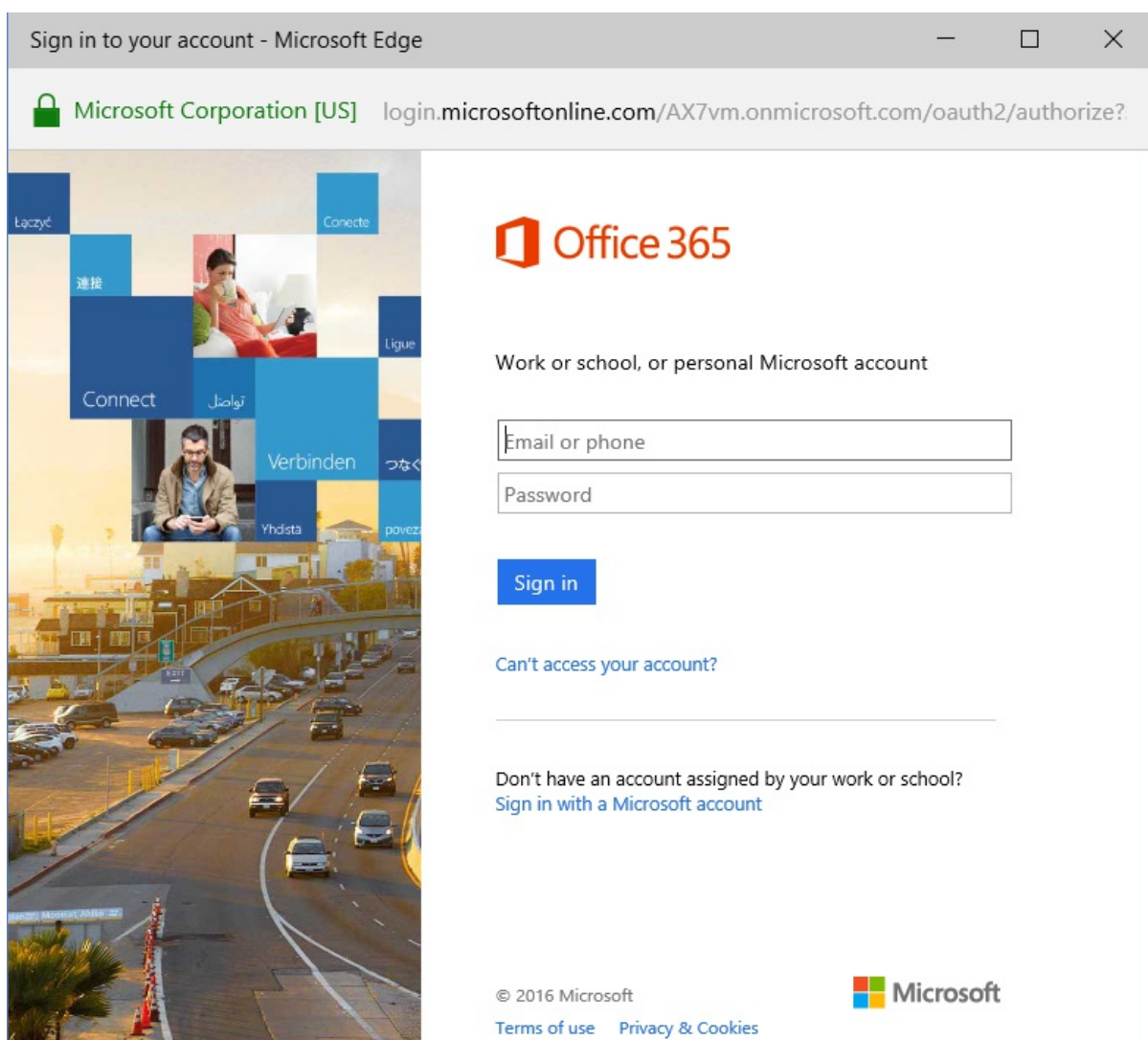


Connect to Microsoft Dynamics AX Financial Performance

Url

Authentication method

Sign in **Cancel**



Sign in to your account - Microsoft Edge

Microsoft Corporation [US] login.microsoftonline.com/AX7vm.onmicrosoft.com/oauth2/authorize?

Office 365

Work or school, or personal Microsoft account

Sign in

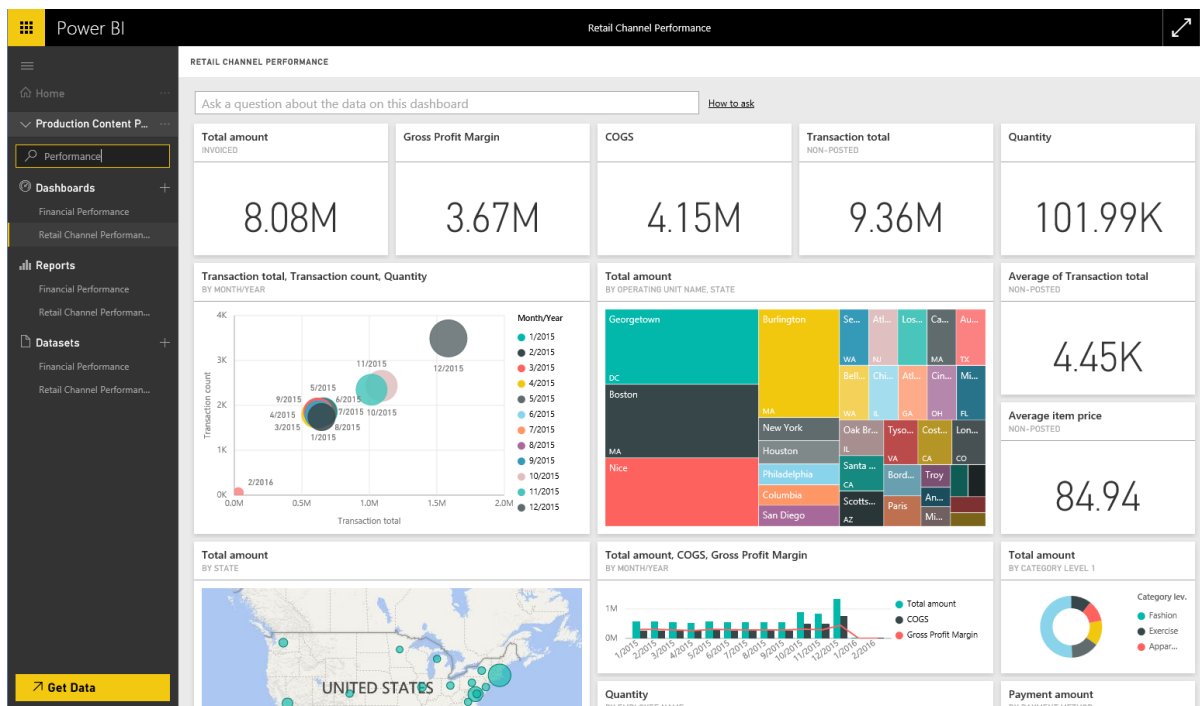
[Can't access your account?](#)

Don't have an account assigned by your work or school?
[Sign in with a Microsoft account](#)

© 2016 Microsoft
[Terms of use](#) [Privacy & Cookies](#)

Microsoft

- After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack uses the Dynamics AX 7 OData feed to import data related to Retail Channel, Financial, and Cost Management performance respectively.

System requirements

This content pack requires a Dynamics AX 7 environment URL and the user should have access to the OData feed.

Finding parameters

The Dynamics AX 7 environment URL can be found in the browser when the user signs in. Just copy the URL of the root Dynamics AX environment into the Power BI dialog.

Troubleshooting

The data may take some time to load depending on the size of your instance. If you're seeing empty reports within Power BI, please confirm you have access to the OData tables required for the reports.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Microsoft Dynamics CRM with Power BI

11/9/2017 • 6 min to read • [Edit Online](#)

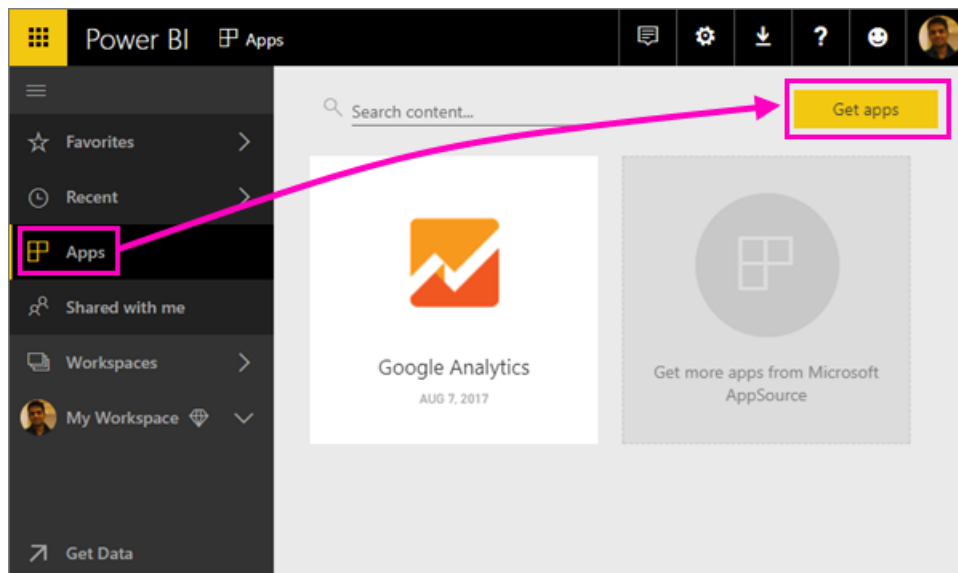
Microsoft Dynamics CRM Online for Power BI allows you to easily access and analyze your data. Power BI uses the OData feed to create a descriptive model, with all the entities and measures needed such as Accounts, Activities, Opportunities, Product, Leads, Users and more. After you install the app, you can view the dashboard and reports in the Power BI service (<https://powerbi.com>), and in the Power BI mobile apps.

Connect to Dynamics CRM Online [Sales Manager](#) or [Service Manager](#). Read more about [Dynamics CRM Online integration](#) with Power BI.

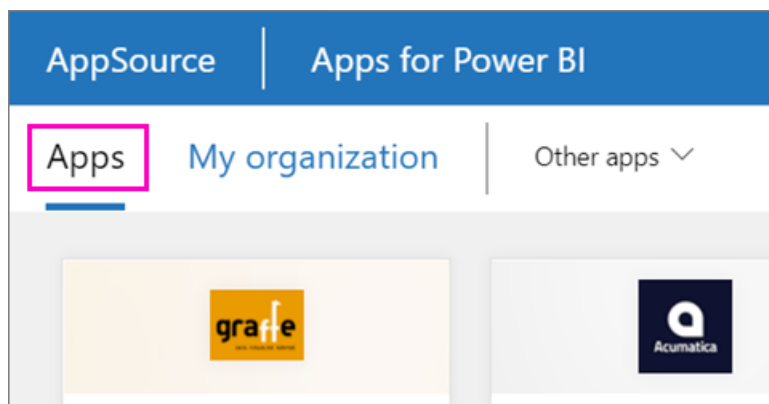
This connection requires **Microsoft Dynamics CRM Online 2016 or later**. More details on [requirements](#) below.

How to connect

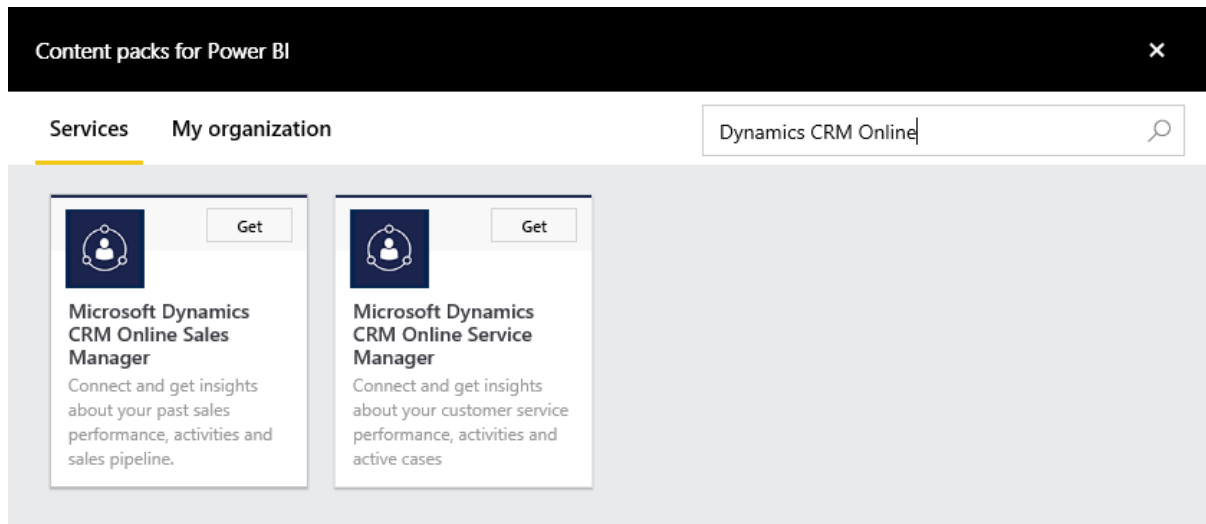
1. Select **Apps** in the left navigation pane > select **Get apps** in the upper-right corner.



2. In AppSource, select the **Apps** tab, and search for the service you want.

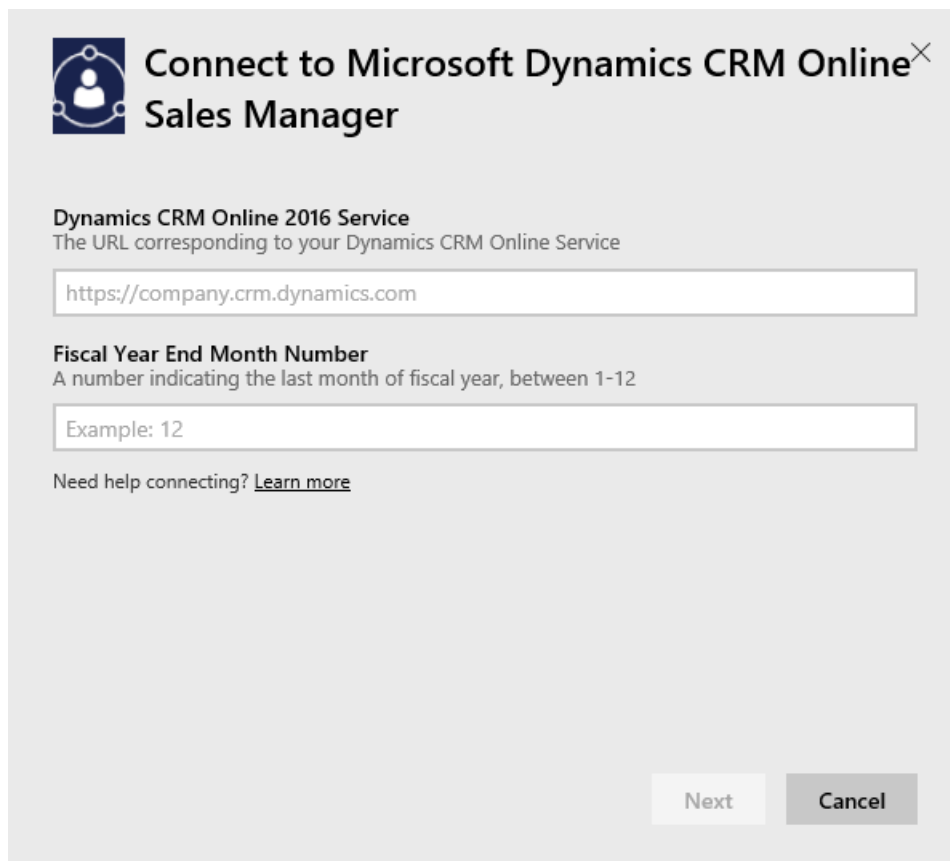


1. Select **Microsoft Dynamics CRM Sales Manager** or **Microsoft Dynamics CRM Service Manager** and click **Connect**.




2. Provide the Service URL associated with your account. This will be in the form

, see more details [below](#).



3. When prompted, provide your credentials (this step might be skipped if you are already signed in with your browser). For Authentication Method, enter **oAuth2** and click **Sign In**:



Connect to Microsoft Dynamics CRM Online Sales Manager

✕

Url

Authentication method

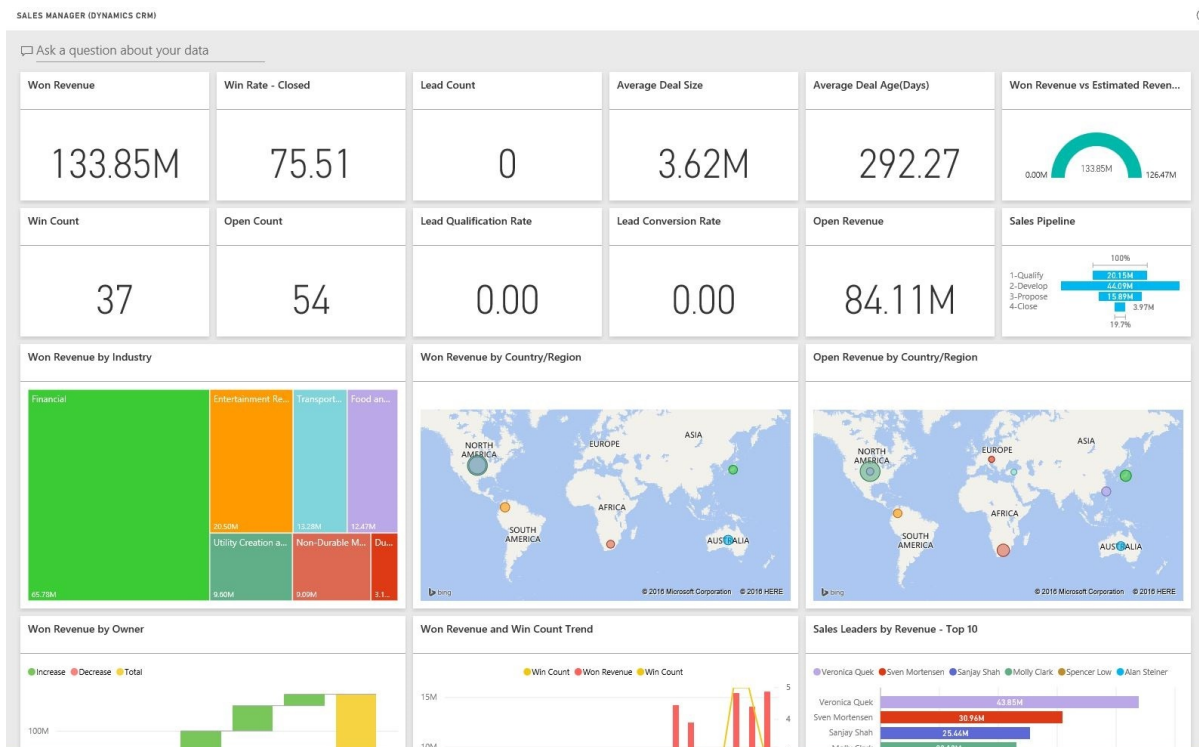
oAuth2
▾

Need help connecting? [Learn more](#)

Sign in

Cancel

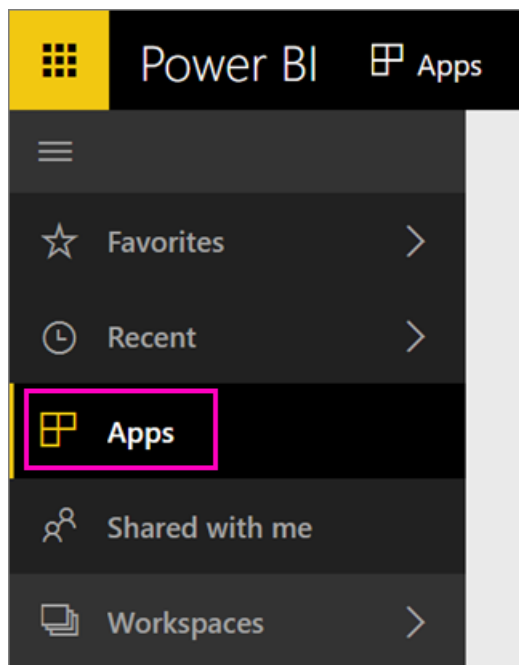
4. After connecting, you'll see a dashboard customized for a Sales Manager or Service Manager, populated with your own data:



View the Microsoft Dynamics CRM dashboard and reports

When the import is complete, the new app will appear on the Apps page.

1. Select **Apps** in the left navigation pane > select the app.



2. You can ask a question by typing in the Q&A box, or click a tile to open the underlying report.

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard.
- [Select a tile](#) to open the underlying report.
- You can filter and highlight the data in the report, but you can't save your changes.
- Your dataset is scheduled to refresh daily. You can change the refresh schedule or try refreshing it on demand using **Refresh Now**.

What's included

The sections below detail what's included for the [Sales Manager](#) and [Service Manager](#) personas.

Note that data in addition is limited based on the security role assigned to the Dynamics CRM Online user.

The dashboard and reports are meant to provide operational reporting on near term data with focus on a team or group. Each query is limited to retrieve a maximum of 100K records from Dynamics CRM Online. If this limit is exceeded due to high volume of data in your organization, provisioning will fail as data refresh Dynamics CRM online will be terminated. If your account is too large, consider connecting through the Power BI Desktop to build a custom solution.

Sales Manager

The dashboard and reports contain key metrics such as:

- Won Revenue
- Win Rate
- Open Revenue
- Lost revenue
- Expected Revenue
- Average Deal Size and more.

They also contain key charts such as:

- Won and Lost Revenue Trend, Won Revenue Vs Estimated Revenue Trend
- Won Revenue by various dimensions such as Industry, Region, Territory
- Sales Leaders By Revenue, Activities,

- Top Accounts, Top Won/Lost Deals,
- New Leads Trend, Sales Pipeline and more.

These metrics and charts help to understand your sales organization performance and analyze sales pipeline across your sales team.

Following table lists the CRM entities available for this service and also gives details on the filters applied to each of the entity records.

CRM ENTITY	FILTERS APPLIED
Account	All accounts which have related opportunities that have been modified in the last 365 days.
Activity	All activities modified in the last 90 days [modifiedon] > today - 90 days
Business Unit	All business units which are not disabled [isdisabled] = false
Lead	All leads modified in the last 180 days [modifiedon] > today - 180 days
Opportunity	All opportunities modified in last 365 days [modifiedon] > today - 365 days
Opportunity Product	All opportunity products modified in last 365 days [modifiedon] > today - 365 days
Product	All active products [statecode] <> 1
Territory	All territories
User	All active users and not delegated admins [isdisabled] = false and [accessmode] <> 4

Service Manager

These dashboard and reports contain key metrics such as:

- CSAT Percentage
- SLA Met percentage
- Escalated Cases Percentage
- Average Handling Time
- Total Resolved Cases
- Total Active Cases
- Number of Times KB Article Used in cases and more.

They also contains key charts such as:

- Case Volume Trends for Incoming Cases, Resolved Cases, Escalated Cases
- Case Volume by various dimensions such as Origin, Location, Priority, Type
- Leaders by CSAT percentage, SLA met percentage, Activities, Resolved cases
- Most Used and Most viewed KB Articles and more.

These metrics and charts help to understand your support organization performance and analyze active cases

workload across your service team and service queues.

Following table lists the CRM entities available for this service, as well as details on the filters applied to each of the entity records.

CRM ENTITY	FILTERS APPLIED
Account	All accounts which have related cases that have been modified in the last 90 days.
Activity	All activities modified in the last 90 days [modifiedon] > today - 90 days
Case	All cases modified in the last 90 days [modifiedon] > today - 90 days
Case Resolution Activity	All case resolution activities modified in the last 90 days [modifiedon] > today - 90 days
Contact	All contacts which have related cases that have been modified in the last 90 days.
Knowledge Article	All latest version of knowledge articles [islatestversion] = true
Knowledge Article Incident	All knowledge article incidents which are modified in the last 90 days [modifiedon] > today - 90 days
Queue	All active queues [statecode] = 0
Queue Item	All case related queue items created on the past 365 days [createdon] > today - 365 days and [objecttypecode] = 112
User	All active users [isdisabled] = false

System requirements

- A valid Dynamics CRM Online 2016 or later instance (Power BI won't work with an on-premises CRM version). If you do not have 2016 or later:
- An administrator must enable the OData endpoint in the site settings.
- An account with less than 100k records in any of the tables. Note if the account has access to more than 100k records the import will fail.

Finding parameters

The address of the instance can be found in the URL bar of your browser. It typically has the format:

```
https://[instance_name].crm.dynamics.com .
```

Power BI only supports Dynamics CRM 2016 endpoints. The connection will not work with earlier versions of CRM Online. Use Power BI Desktop to connect directly to your account.

Troubleshooting

If you're having trouble connecting, confirm:

- you're providing the correct instance URL (check with your admin)
- the instance is CRM Online 2016
- the OData endpoint is enabled

Also, try connecting directly in Power BI Desktop, with the OData URL

```
https://[instance_name].crm.dynamics.com/api/data/v8.0/
```

If you confirm you have Dynamics CRM Online 2016 but you're still hitting issues connecting, contact your CRM Admin to confirm you have all available updates.

If you do not have CRM Online 2016 or later, use the Power BI Desktop to connect directly to your account.

If you see an error "Data refresh failed as query exceeded the maximum limit of 100000 records," consider connecting directly from the Power BI Desktop or leveraging the CRM solution template.

Next steps

- [What are apps in Power BI?](#)
- [Get data in Power BI](#)
- More questions? [Try asking the Power BI Community](#)

Connect to Microsoft Dynamics Marketing with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

The Microsoft Dynamics Marketing content pack for Power BI allows you to easily access and analyze your data from Dynamics Marketing. The content pack uses a descriptive model on top of the OData feed, with all the entities and measures needed such as Programs, Campaigns, Marketing Contacts and Companies, Leads, Lead Interactions and Lead Scoring, Email Marketing Messages and Web Sites, behavioral observations, budgets, financial transactions, performance KPIs, and many more.

Connect to [Dynamics Marketing content pack](#) for Power BI.

NOTE

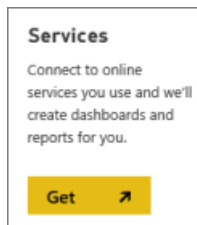
You need to specify a valid OData URL for a Dynamics Marketing instance (the content pack will not work with an on-premises CRM version). See additional requirements below.

How to connect

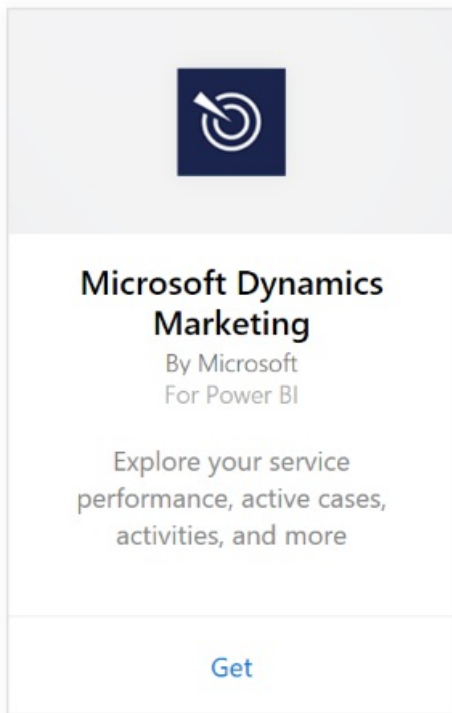
1. Select Get Data at the bottom of the left navigation pane.



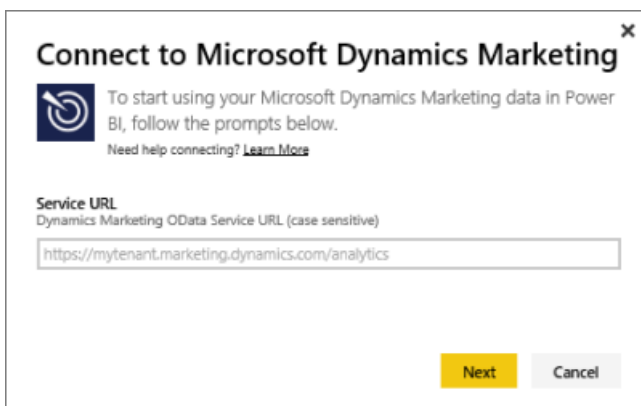
2. In the **Services** box, select **Get**.



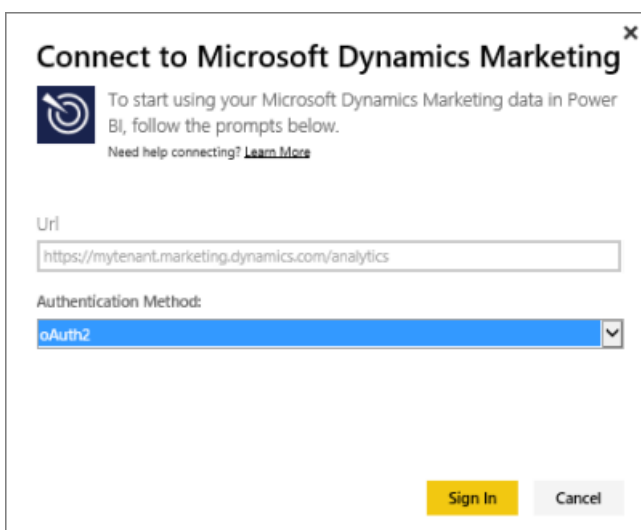
3. Select **Microsoft Dynamics Marketing > Get**.



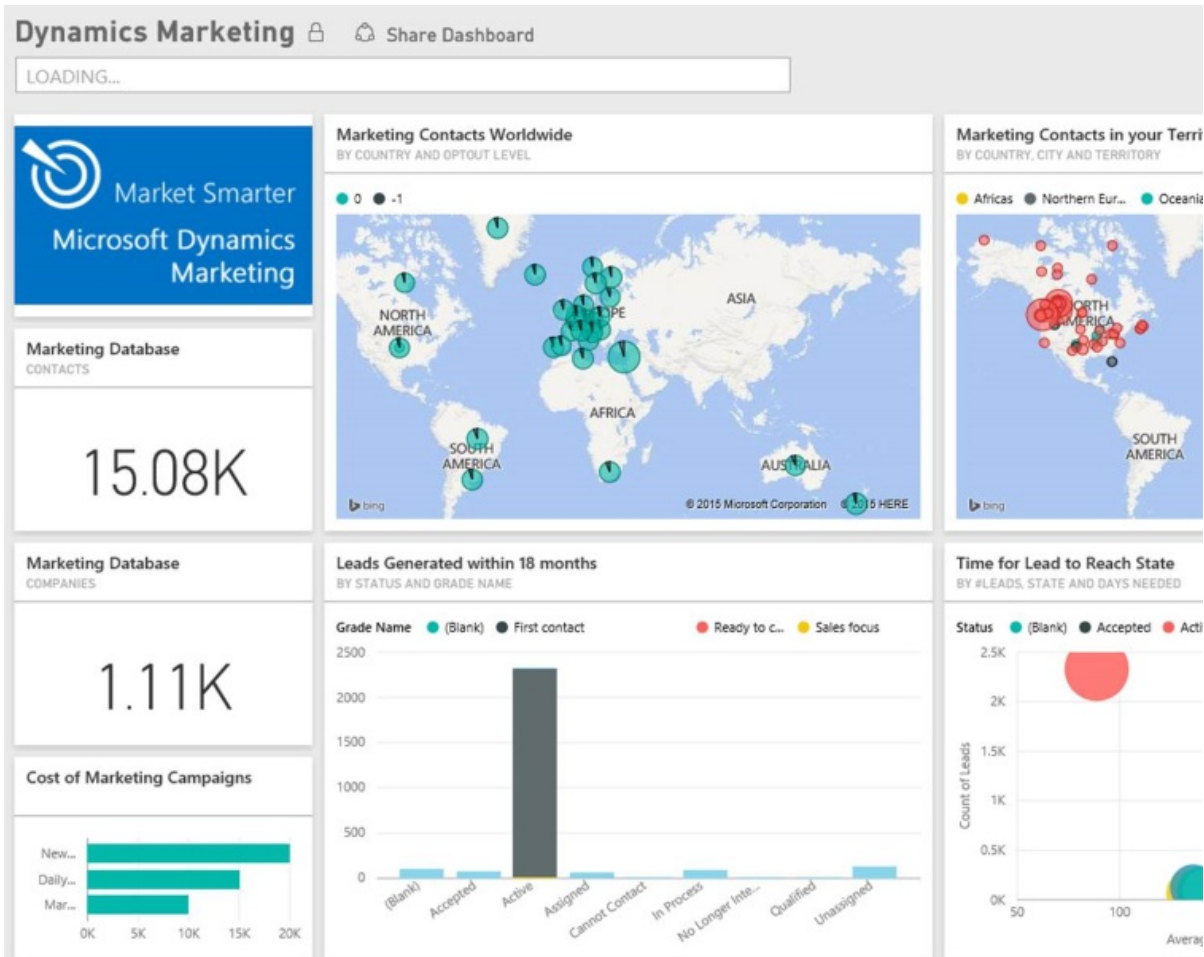
4. Provide the OData URL associated with your account. This will be in the form "https://[instance_name].marketing.dynamics.com/analytics."



5. When prompted, provide your credentials (this step might be skipped if you are already signed in with your browser). For Authentication Method, enter **oAuth2** and click **Sign In**:



6. After connecting, you'll see a Dynamics Marketing dashboard, populated with your own data. The yellow asterisks mark the new items in the left navigation pane.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

- You need to specify a valid OData URL for a Dynamics Marketing instance (the content pack will not work with an on-premises CRM version).
- An administrator must enable the OData endpoint in the site settings. The address of the OData endpoint can be found by navigating to **Home > Settings > Site Settings** in the section **Organization Data Service**. The OData URL has the format: `https://[instance_name].marketing.dynamics.com/analytics`
- The user account/identity that you use to access Microsoft Dynamics Marketing must be the same as the one you are signed up for using with Power BI. When logging into Microsoft Dynamics Marketing, you will be auto-signed in with the same identity you are using for Power BI. If you wish to sign into Microsoft Dynamics Marketing with a different account, please register as a Power BI user using that other account. We hope to resolve this issue in an upcoming release.

Troubleshooting

If you see a "Login failed" message when trying to connect to your Dynamics CRM account, confirm that you're signing into Power BI with the same account you would use to access the CRM Online OData feed. Try logging into the feed in your browser as well, to test it there.

Ask your admin to confirm the correct OData URL, and that the OData endpoint is enabled.

Check the version of Dynamics Marketing you're using - there were additional fixes made in 18.0 and 18.1, if you're still hitting issues and are on an older version, you may considered upgrading.

If you're still having issues, open a support ticket to reach the Power BI team:

- While in the Power BI app, select the question mark > **Contact Support**.
- From the Power BI Support site (where you're reading this article), select **Contact Support** on the right side of the page.

Next steps

[Get Data for Power BI](#)

[Get Started with Power BI](#)

Connect to Microsoft Dynamics NAV with Power BI

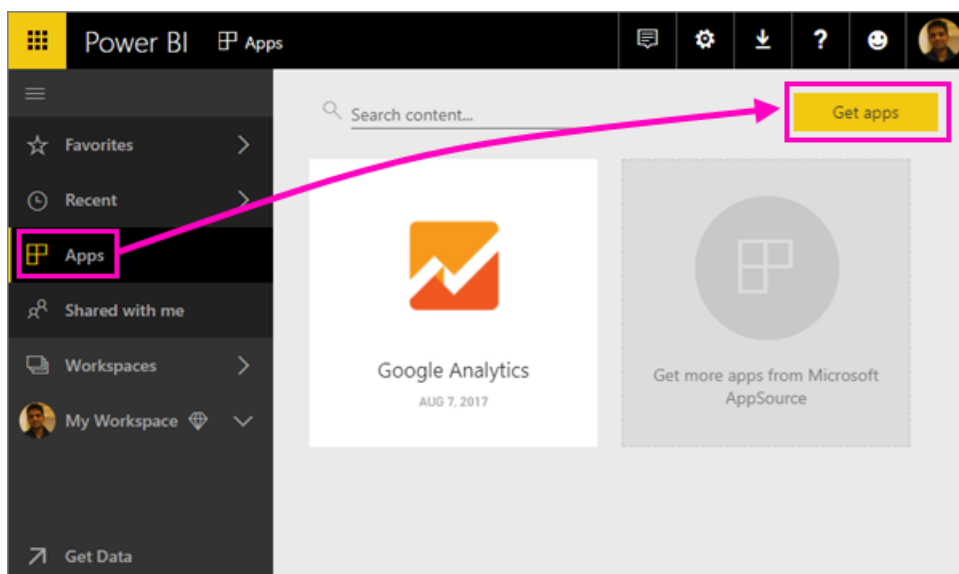
11/9/2017 • 3 min to read • [Edit Online](#)

Getting insights into your Microsoft Dynamics NAV data is easy with Power BI. Power BI retrieves your data, both Sales and Financial, then builds an app with a dashboard and reports based on that data. Power BI needs your permissions to the tables where data is retrieved from, in this case sales and finance data. More details on requirements below. After you install the app, you can view the dashboard and reports in the Power BI service (<https://powerbi.com>), and in the Power BI mobile apps.

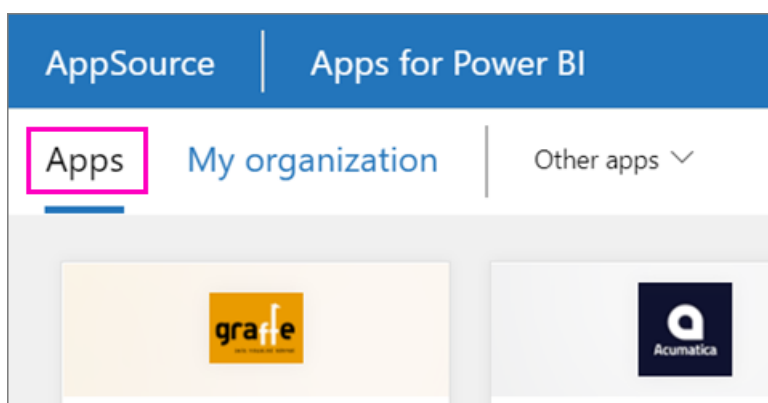
[Connect to the Microsoft Dynamics NAV for Power BI](#) or read more about the [Dynamics NAV integration](#) with Power BI.

How to connect

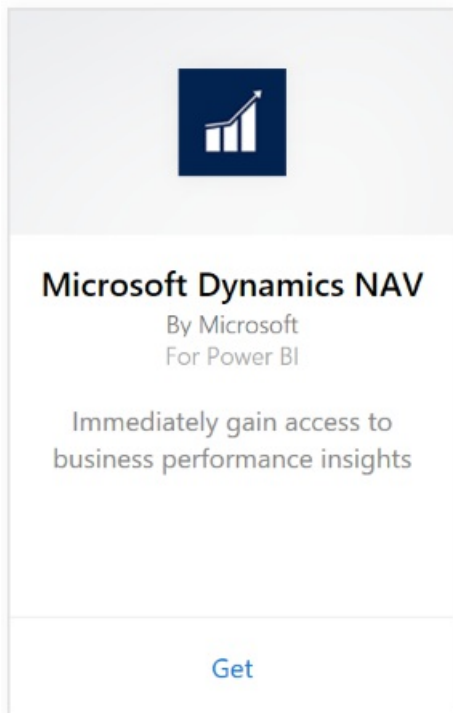
1. Select **Apps** in the left navigation pane > select **Get apps** in the upper-right corner.



2. In AppSource, select the **Apps** tab, and search for the service you want.



1. Select **Microsoft Dynamics NAV**, then select **Get**.

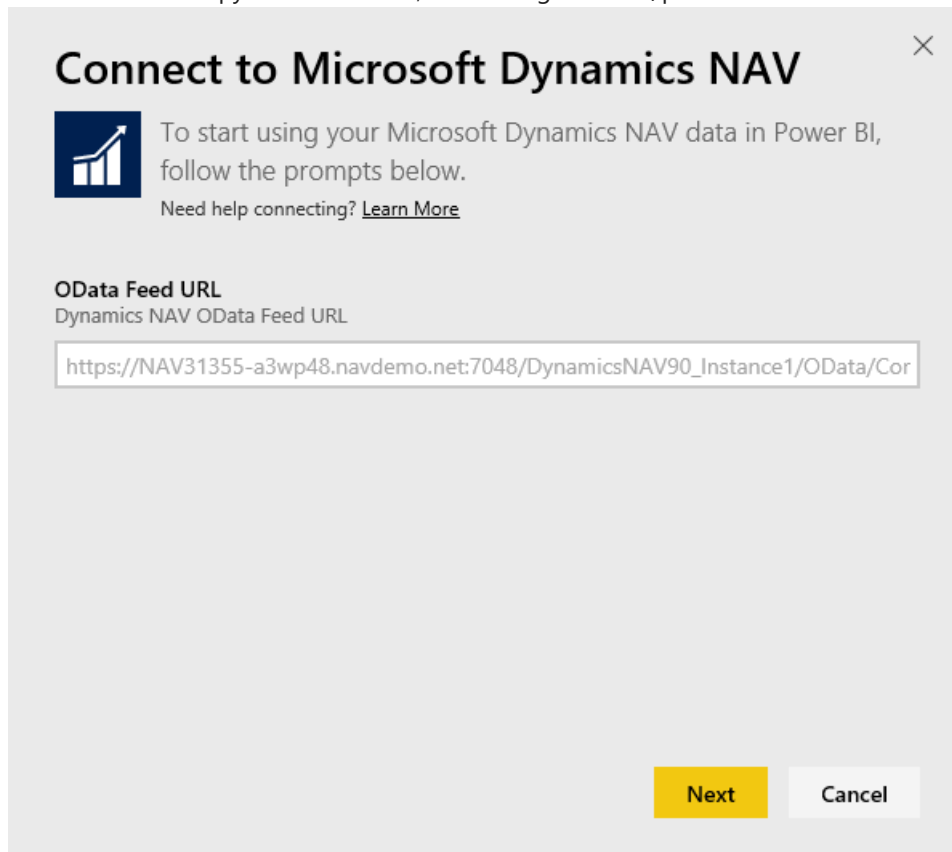


2. When prompted, enter your Microsoft Dynamics NAV OData URL. The URL should match the following pattern:

```
https://instance.navserver.com:7048/DynamicsNAV90_Instance1/OData/Company('CRONUS%20International%20Ltd.')
```

- "instance.navserver.com" with your NAV Server name
- "DynamicsNAV90_Instance1" with your NAV Server Instance name
- "Company('CRONUS%20International%20Ltd.')" with your NAV Company name

An easy way to obtain this URL is in Dynamics NAV to go to Web Services, find the powerbifinance web service and copy the OData URL, but leaving out the "/powerbifinance" from the URL string.



3. Select **Basic** and enter your Microsoft Dynamics NAV credentials.

You need admin credentials (or at least permissions to sales and finance data) for your Microsoft Dynamics NAV account. Only Basic (Username and Password) authentication is currently supported.

Connect to Microsoft Dynamics NAV ✕

To start using your Microsoft Dynamics NAV data in Power BI, follow the prompts below.
 Need help connecting? [Learn More](#)

http://https/instance.navserver.com:7048/DynamicsNAV90_Instance1/OData/Company'

Authentication Method:

Basic ▼

Username

Password

Sign In
Cancel

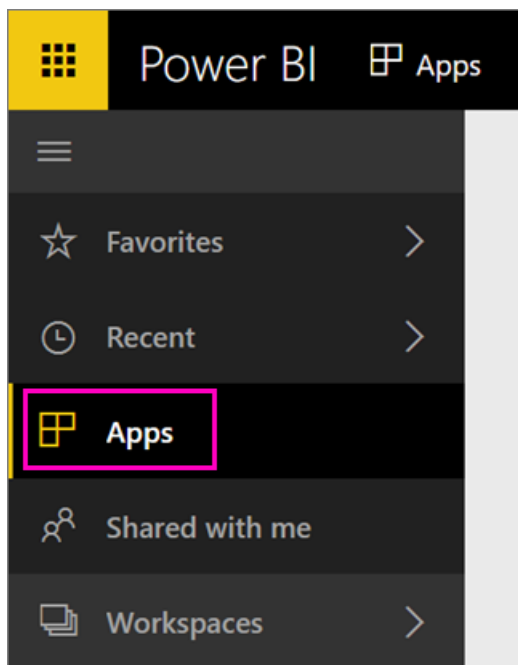
4. Power BI will retrieve your Microsoft Dynamics NAV data and create a ready-to-use dashboard and report for you.



View the dashboard and reports

When the import is complete, the new app will appear on the Apps page.

1. Select **Apps** in the left navigation pane > select the app.



2. You can ask a question by typing in the Q&A box, or click a tile to open the underlying report.

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard.
- [Select a tile](#) to open the underlying report.
- You can filter and highlight the data in the report, but you can't save your changes.
- Your dataset is scheduled to refresh daily. You can change the refresh schedule or try refreshing it on demand using **Refresh Now**.

What's included

The dashboard and reports contain data from the following tables (case sensitive):

- ItemSalesAndProfit
- ItemSalesByCustomer
- powerbifinance
- SalesDashboard
- SalesOpportunities
- SalesOrdersBySalesPerson
- TopCustomerOverview

System requirements

To import your Microsoft Dynamics NAV data into Power BI, you need to have permissions to the sales and finance data tables where data is retrieved from (listed above). The tables are also required to have some data, empty tables will currently fail to import.

Troubleshooting

Power BI uses Microsoft Dynamics NAV's web services to retrieve your data. If you have a lot of data in your Microsoft Dynamics NAV instance, a suggestion to minimize the impact on your web service usage is to change the refresh frequency depending on your needs. Another suggestion is to have one admin create the app and share it instead of having every admin create their own.

"Parameter validation failed, please make sure all parameters are valid"

If you see this error after typing your Microsoft Dynamics NAV URL. Make sure the following requirements are satisfied:

- The URL follows exactly this pattern:

```
https://instance.navserver.com:7048/DynamicsNAV90_Instance1/0Data/Company('CRONUS%20International%20Ltd.')
```

- "instance.navserver.com" with your NAV Server name
 - "DynamicsNAV90_Instance1" with your NAV Server Instance name
 - "Company('CRONUS%20International%20Ltd.')" with your NAV Company name
- Make sure all the letters are lower case.
 - Make sure the URL is in 'https'.
 - Make sure there are no trailing forward slash at the end of the URL.

"Login failed"

If you get a "login failed" error after using your Microsoft Dynamics NAV credentials to login, then you may be hitting one of the following issues:

- The account you are using doesn't have permissions to retrieve the Microsoft Dynamics NAV data from your account. Verify it is an admin account and try again.
- The Dynamics NAV instance you're trying to connect to doesn't have a valid SSL certificate. In this case you'll see a more detailed error message ("unable to establish trusted SSL relationship"). Note that self-signed certs are not supported.

"Oops"

If you see an "Oops" error dialog after you pass the authentication dialog box, Power BI is running into an issue while loading the data.

- Verify the URL follows the pattern specified above. A common mistake is to specify:

```
https://instance.navserver.com:7048/DynamicsNAV90_Instance1/0Data
```

However, you need to include the 'Company('CRONUS%20International%20Ltd.')" section with your NAV Company name:

```
https://instance.navserver.com:7048/DynamicsNAV90_Instance1/0Data/Company('CRONUS%20International%20Ltd.')
```

Next steps

- [What are apps in Power BI?](#)
- [Get data in Power BI](#)
- More questions? [Try asking the Power BI Community](#)

Connect to Office365Mon with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Analyzing your Office 365 outages and health performance data is easy with Power BI and the Office365Mon content pack. Power BI retrieves your data, including outages and health probes, then builds an out-of-box dashboard and reports based on that data.

Connect to the [Office365Mon content pack](#) for Power BI.

NOTE

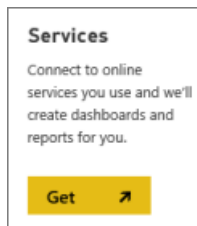
An Office365Mon admin account is required to connect and load the Power BI content pack.

How to connect

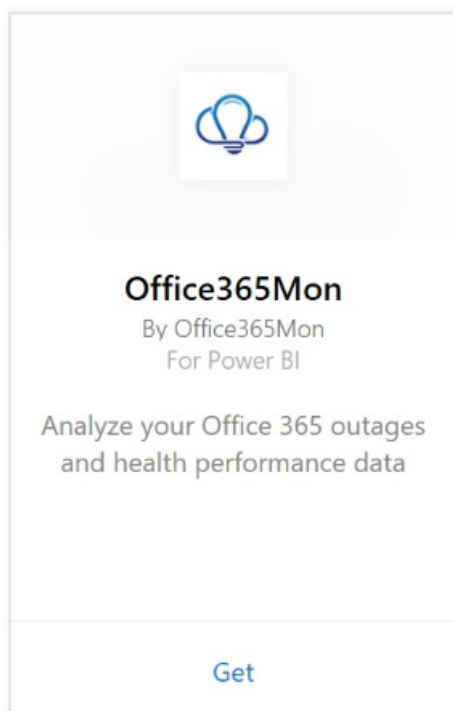
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

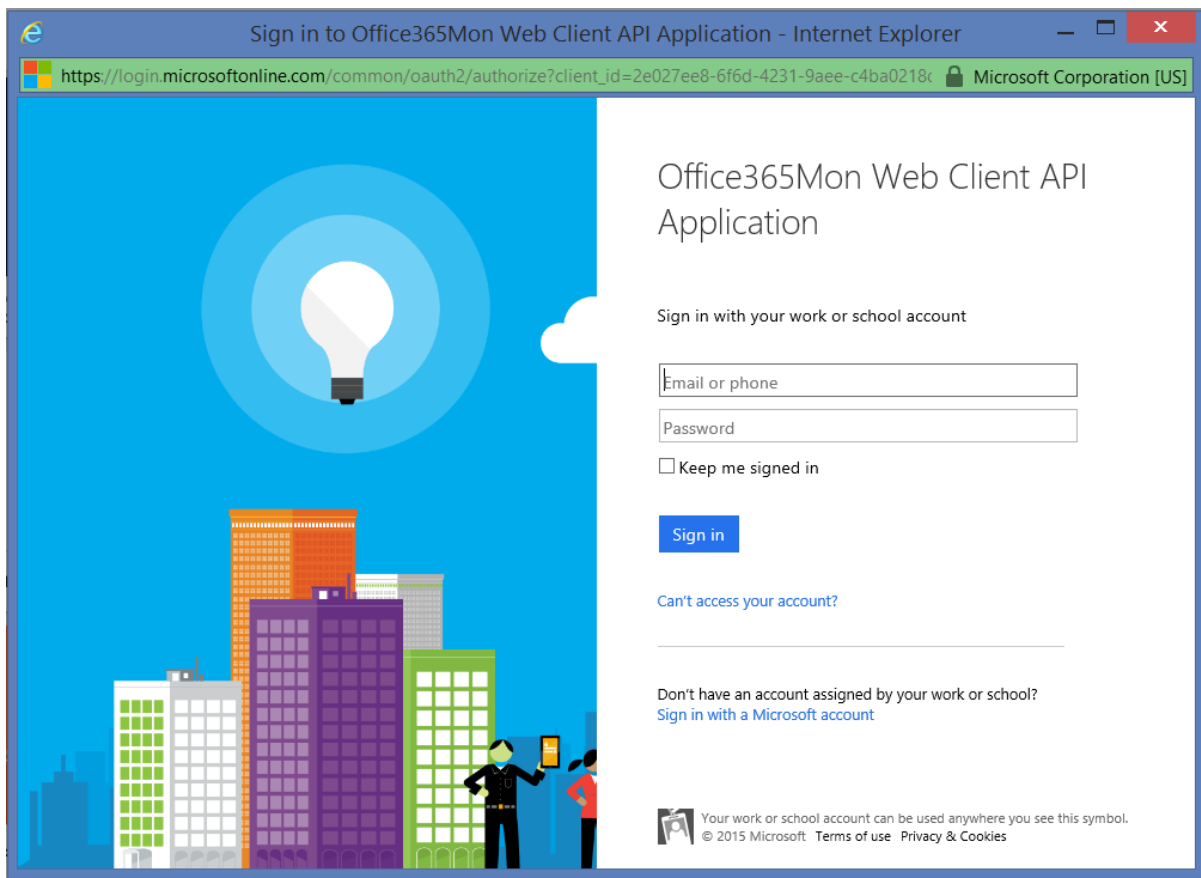
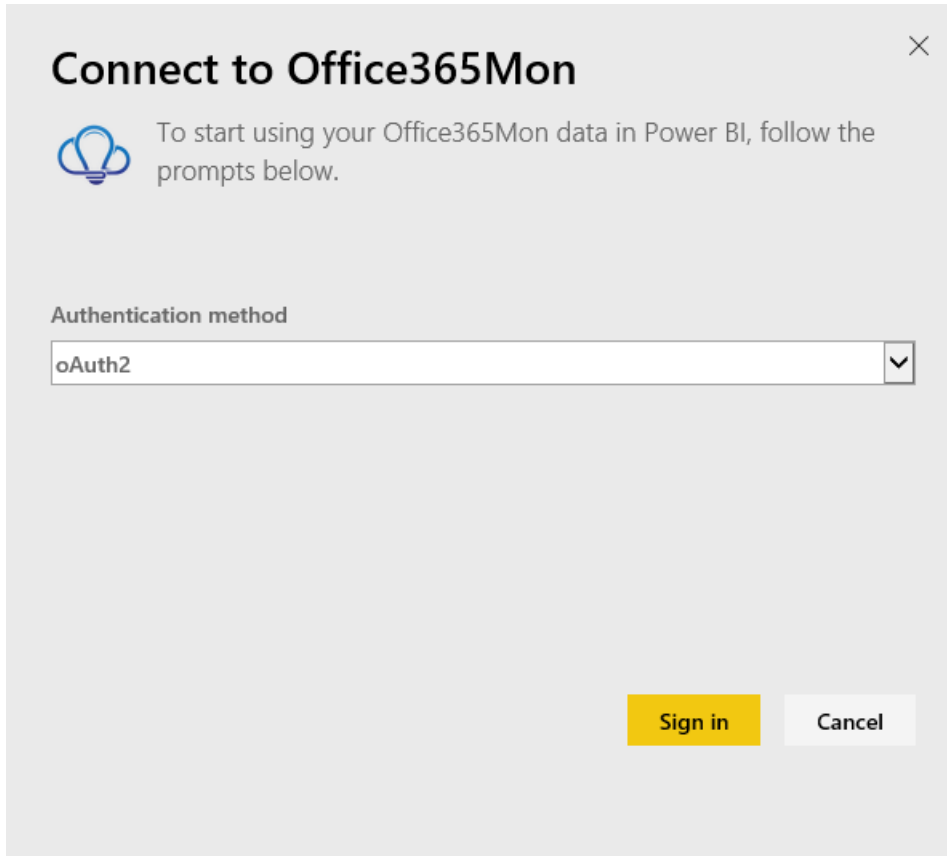


3. Select **Office365Mon** > **Get**.

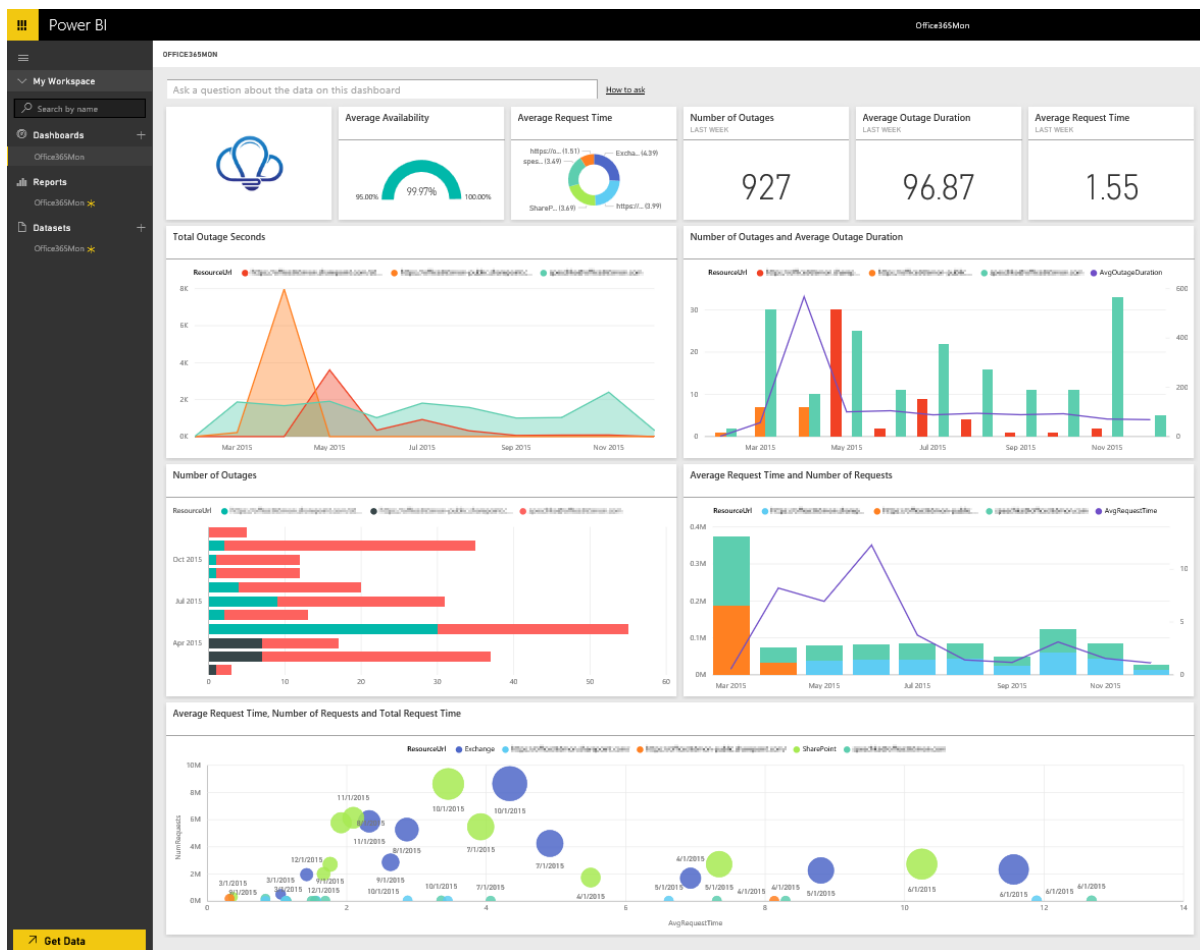


4. For Authentication Method, select **oAuth2** > **Sign In**.

When prompted, enter your Office365Mon admin credentials and follow the authentication process.



5. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *, select the Office365Mon entry.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Troubleshooting

If you get a **"login failed"** error after using your Office365Mon subscription credentials to login, then the account you are using doesn't have permissions to retrieve the Office365Mon data from your account. Verify it is an admin account and try again.

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to Planview Enterprise with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

With the Planview Enterprise content pack, you can visualize your resource and work management data in entirely new ways directly in Power BI. Use your Planview Enterprise sign-in credentials to interactively see your portfolio investment spend, understand where you are over and under budget, and know how well your projects align with your corporate strategic priorities. You can also extend the out-of-the box dashboard and reports to get the insights that are most important to you.

Connect to the [Planview Enterprise content pack in Power BI](#)

NOTE

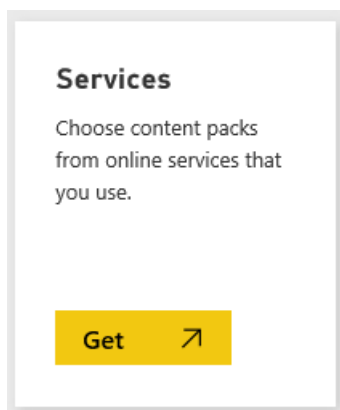
To import your Planview Enterprise data into Power BI, you must be a Planview Enterprise user with the Reporting Portal Viewer feature enabled on your role. See additional requirements below.

How to connect

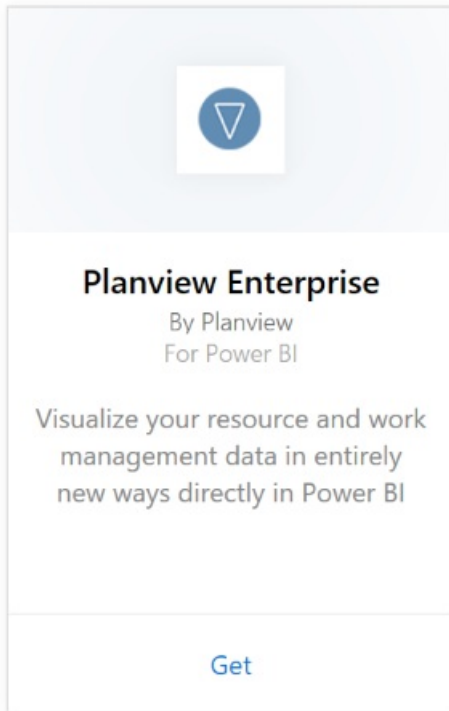
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. On the Power BI page, select **Planview Enterprise**, then select **Get**:



4. In the Planview Enterprise URL text box, enter the URL for the Planview Enterprise server you want to use. In the Planview Enterprise Database text box, enter the name of the Planview Enterprise database, then click Next.

A dialog box titled "Connect to Planview Enterprise" with a close button (X) in the top right corner. It features a blue icon with a white downward-pointing triangle. The main text says: "To start using your Planview Enterprise data in Power BI, follow the prompts below." Below this is a link: "Need help connecting? [Learn More](#)". There are two text input fields. The first is labeled "Planview Enterprise URL" with the subtitle "The URL corresponding to your Planview Enterprise account" and contains the text "https://contoso.com/planview". The second is labeled "Planview Enterprise Database" with the subtitle "The name of the Planview Enterprise database" and contains the text "Example: pve". At the bottom right, there are two buttons: a yellow "Next" button and a white "Cancel" button.

5. On the Authentication Method list, select **Basic** if it is not already selected. Enter the **Username** and **Password** for your account and select **Sign In**.

Connect to Planview Enterprise

To start using your Planview Enterprise data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

pve

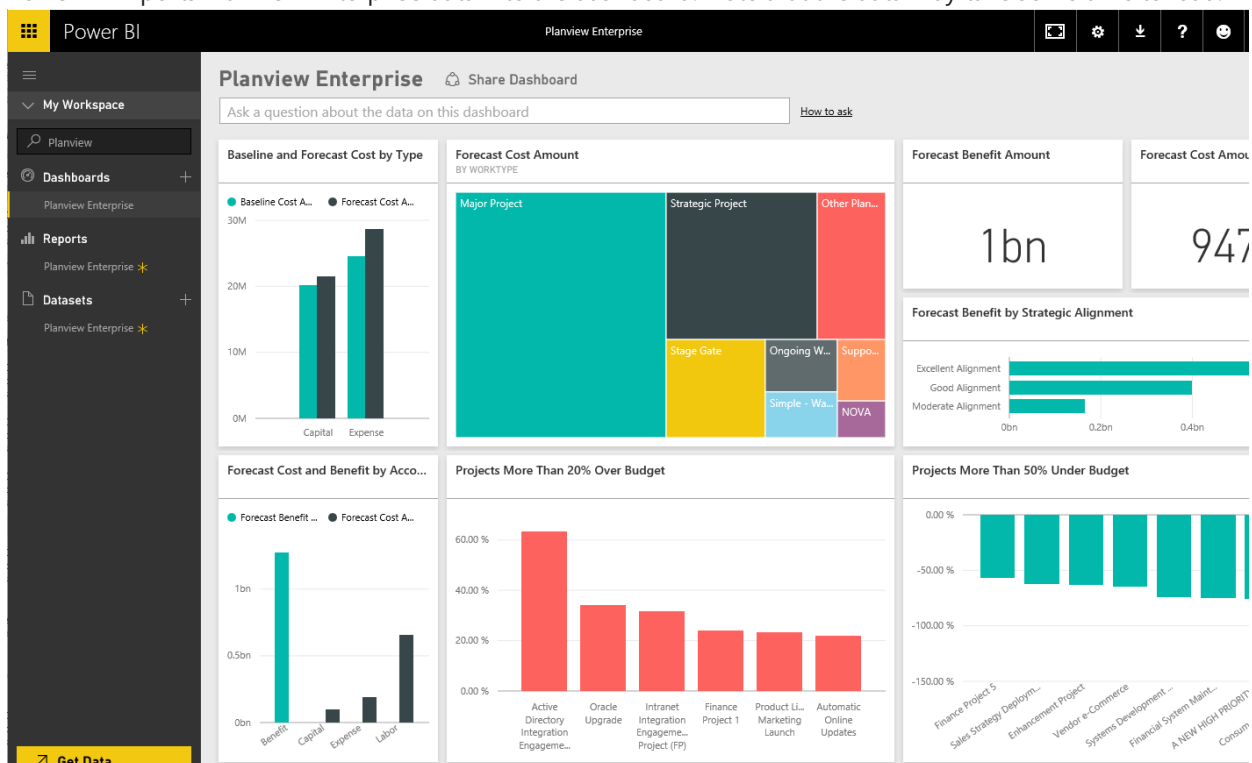
Authentication Method:
Basic

Username

Password

Sign In Cancel

- On the left pane, select Planview Enterprise from the list of dashboards. Power BI imports Planview Enterprise data into the dashboard. Note that the data may take some time to load.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

To import your Planview Enterprise data into Power BI, you must be a Planview Enterprise user with the Reporting Portal Viewer feature enabled on your role. See additional requirements below.

This procedure assumes you have already signed in to the Microsoft Power BI home page with a Power BI account. If you do not have a Power BI account, create a new free Power BI account on the Power BI home page, and then click Get Data.

Next steps:

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to Prevedere with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Gain access to exclusive and critical financial information to confidently and proactively drive your business forward.

Connect to the [Prevedere content pack](#) for Power BI.

NOTE

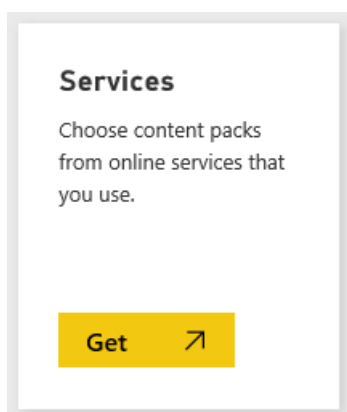
If you are not an existing Prevedere user, please use the [sample key](#) to try it out.

How to connect

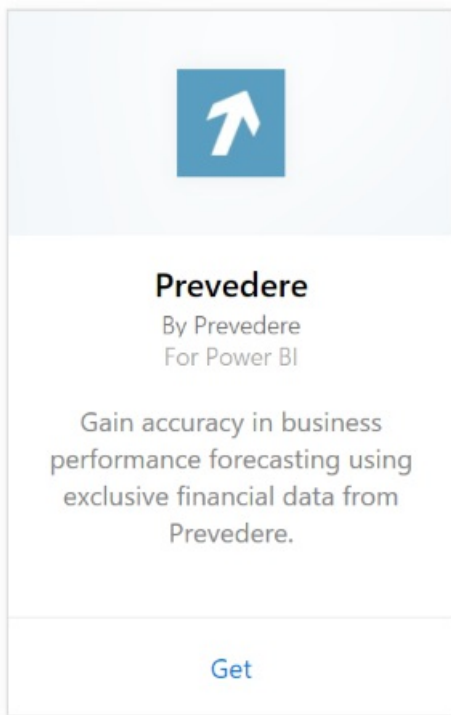
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Prevedere** and then **Get**.



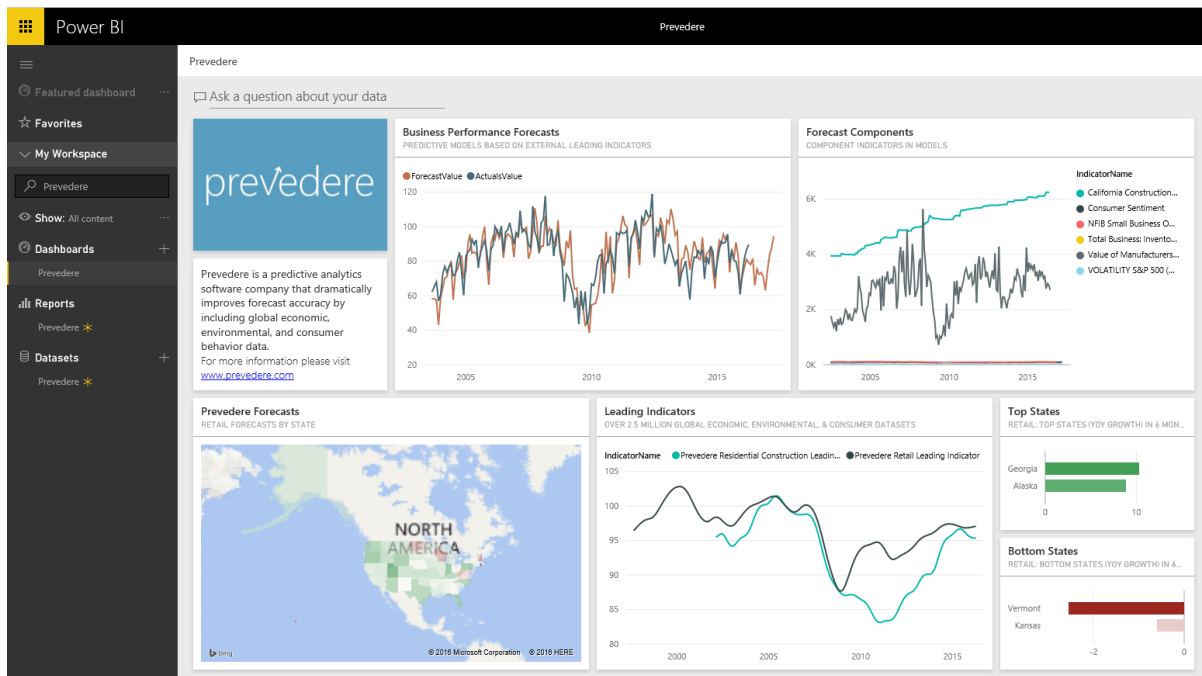
4. For **Authentication Method**, select **Key** and enter your Prevedere API key.

A dialog box titled "Connect to Prevedere" with a close button (X) in the top right corner. It features a blue icon with a white arrow pointing up and to the right. The form contains the following fields:

- A "url" field with the text "https://prevederepowerbiconnector.azurewebsites.net/data".
- An "Authentication method" dropdown menu with "Key" selected.
- An "Account key" field, which is currently empty.

At the bottom, there is a link that says "Need help connecting? [Learn more](#)". At the very bottom are two buttons: a yellow "Sign in" button and a grey "Cancel" button.

5. Select **Sign in** to begin the import process. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack gains insights on your retail forecasts, forecast models, leading indicators, and more.

System requirements

This content pack requires access to a Prevedere API key or the sample key (see below).

Finding parameters

Existing customers can access their data using their API key. If you are not yet a customer, you can see a sample of the data and analyses using the [sample key](#).

Troubleshooting

The data may take some time to load depending on the size of your instance.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Project Online with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Microsoft Project Online is a flexible online solution for project portfolio management (PPM) and everyday work. Project Online enables organizations to get started, prioritize project portfolio investments and deliver the intended business value. The Project Online content pack for Power BI allows you to explore your project data with out-of-box metrics such as portfolio status and project compliance.

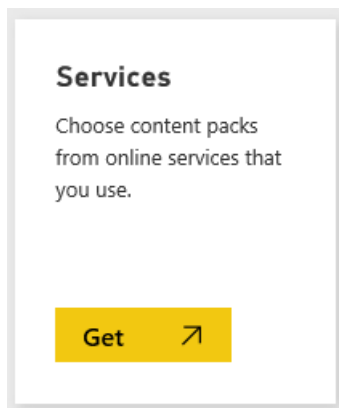
Connect to the [Project Online content pack](#) for Power BI.

How to connect

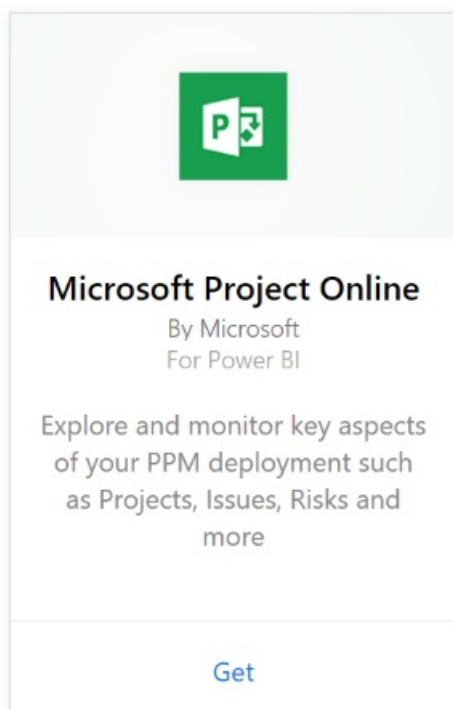
1. Select **Get Data** at the bottom of the left navigation pane.



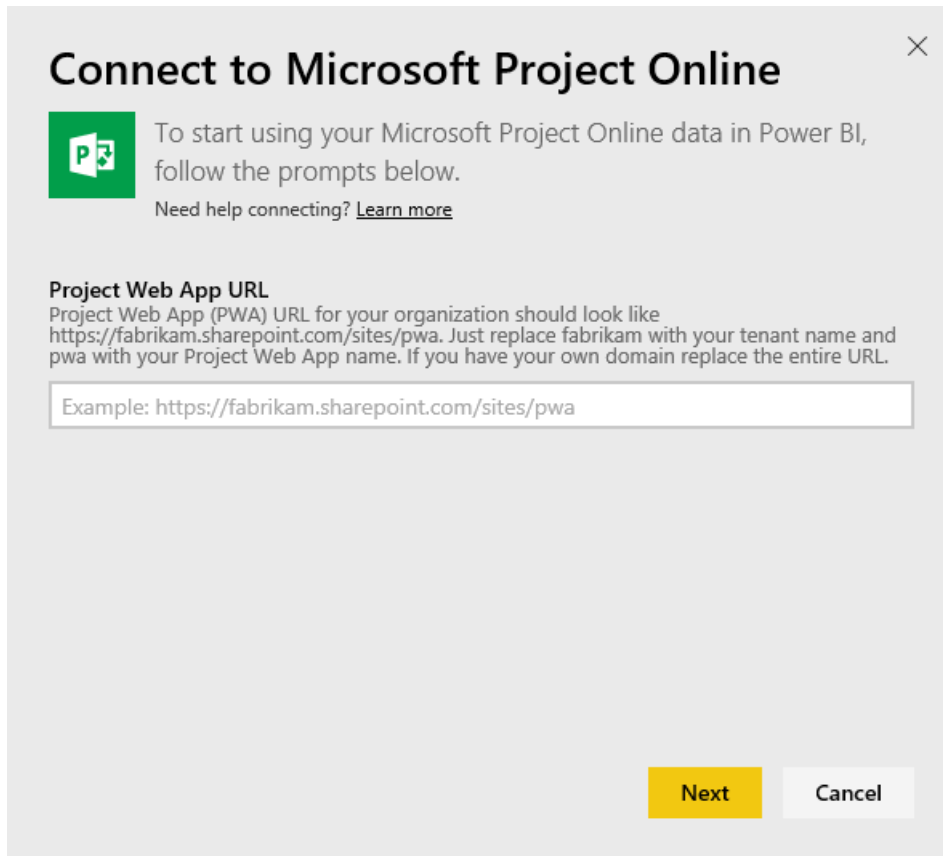
2. In the **Services** box, select **Get**.



3. Select **Microsoft Project Online > Get**.



- In the **Project Web App URL** text box, enter the URL for the Project Web Add (PWA) you want to connect to and hit **Next**. Note this may differ from the example if you have a custom domain.



Connect to Microsoft Project Online

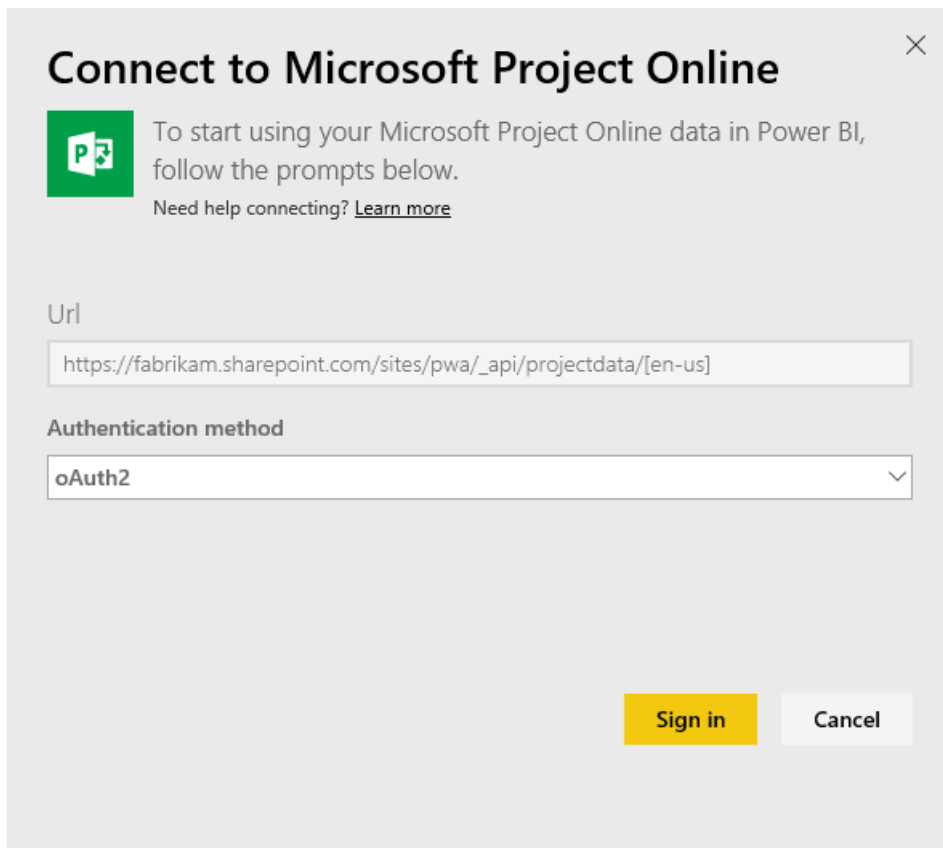
To start using your Microsoft Project Online data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Project Web App URL
Project Web App (PWA) URL for your organization should look like https://fabrikam.sharepoint.com/sites/pwa. Just replace fabrikam with your tenant name and pwa with your Project Web App name. If you have your own domain replace the entire URL.

Example: https://fabrikam.sharepoint.com/sites/pwa

Next **Cancel**

- For Authentication Method, select **oAuth2** > **Sign In**. When prompted, enter your Project Online credentials and follow the authentication process.



Connect to Microsoft Project Online

To start using your Microsoft Project Online data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

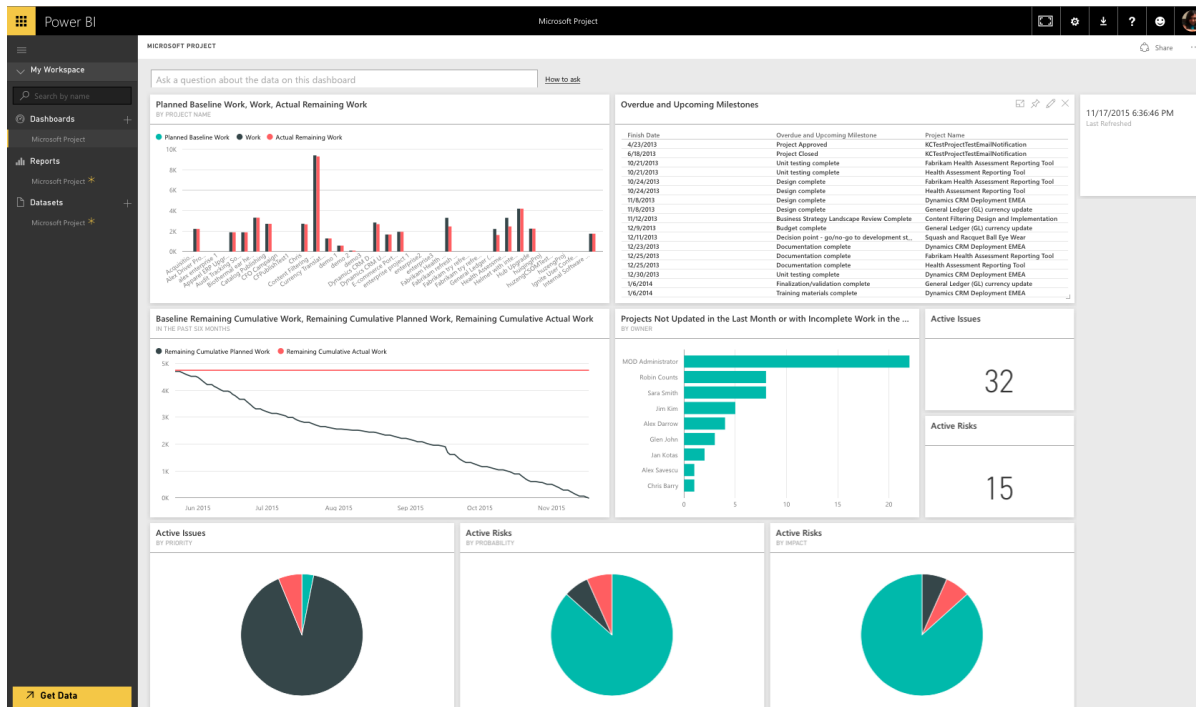
Url
https://fabrikam.sharepoint.com/sites/pwa/_api/projectdata/[en-us]

Authentication method
oAuth2

Sign in **Cancel**

- You'll see a notification indicating your data is loading. Depending on the size of your account this may take some time. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. This is the default dashboard that Power BI created to display your data. You can modify

this dashboard to display your data in any way you want.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Project "Madeira" with Power BI

1/24/2018 • 4 min to read • [Edit Online](#)

Getting insights into your Project "Madeira" data is easy with Power BI and the Project "Madeira" content pack. Power BI retrieves your data, both Sales and Financial data then builds an out-of-box dashboard and reports based on that data. Connect to the Project "Madeira" for Power BI or read more about the Project "Madeira" integration with Power BI.

NOTE

This content pack requires permissions to the tables where data is retrieved from, in this case sales and finance data. More details on requirements [below](#).

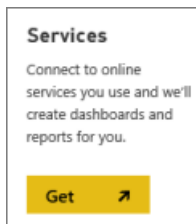
Connect to the [Project "Madeira" Analytics content pack](#) for Power BI.

How to connect

1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

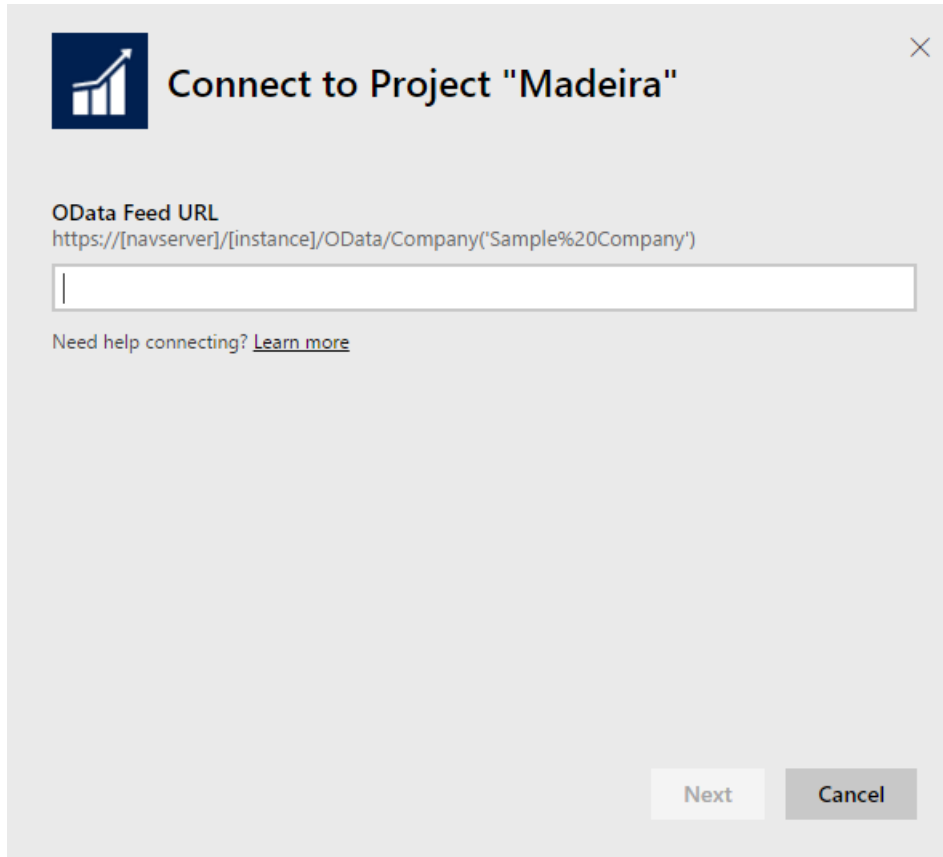


3. Select **Project "Madeira"**, then select **Get**.



4. When prompted, enter your Project "Madeira" URL. The URL needs to follow the following pattern exactly

[https://mycronusus.projectmadeira.com:7048/NAV/OData/Company\('CRONUS%20US'\)](https://mycronusus.projectmadeira.com:7048/NAV/OData/Company('CRONUS%20US')) with your Project "Madeira" company name. Note that there is no trailing slash at the end, and the connection is must be https. See details on finding this URL [below](#).



Connect to Project "Madeira"

OData Feed URL
https://[navserver]/[instance]/OData/Company('Sample%20Company')


Need help connecting? [Learn more](#)

Next Cancel

- When prompted, select Basic as the Authentication Method, enter your Project "Madeira" email address as the username, and then enter the web service access key for your Project "Madeira" account as the password. If you are already signed in to Project "Madeira" in your browser, you may not be prompted for credentials. See details on generating this access key [below](#).

NOTE

You must be a superuser in Project "Madeira".



Connect to Project "Madeira"

✕

Url

Authentication method

Basic
▼

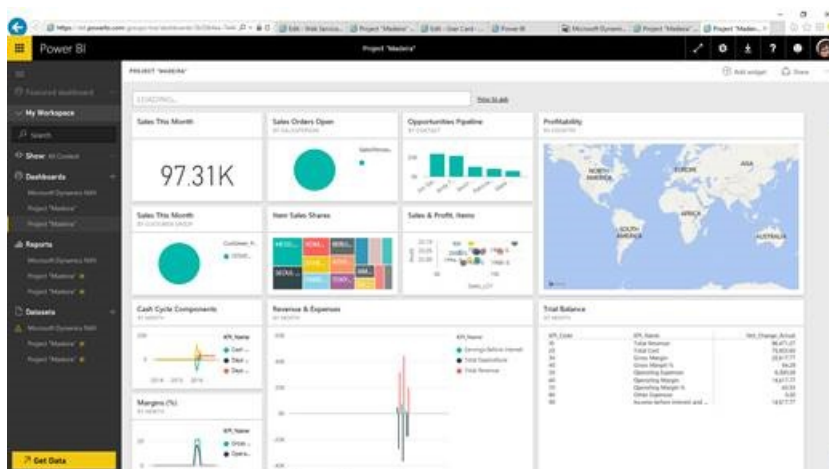
User name

Password

Sign in

Cancel

6. Once connected, a dashboard, report and dataset will automatically be loaded. When completed, the tiles will update with data from your account.



What now?

- Try asking a question in the [Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

To import your Project "Madeira" data into Power BI, you need to have permissions to the sales and finance data tables where data is retrieved from. All the tables (case sensitive) required for the content pack include:

```
---  
- ItemSalesAndProfit  
- ItemSalesByCustomer  
- powerbifinance  
- SalesDashboard  
- SalesOpportunities  
- SalesOrdersBySalesPerson  
- TopCustomerOverview  
---
```

Finding Parameters


Getting the right URL An easy way to obtain this URL is in Project "Madeira" to go to Web Services, find the powerbifinance web service and copy the Odata URL (use right-click and Copy Shortcut), but leaving out the "/powerbifinance..." part from the URL string.

Web Service Access Keys In order to use data from Project "Madeira", you will need to create a web service access key for your user account. In Project "Madeira", search for the Users page, and then open the card for your user account. Here you can generate a new web services access key and copy it to the Password field in the Power BI connection page.

Web Service Access

Web Service Access Key > Web Service Expiry Date

When you start using Web Service Access Keys you will have to use in going forward, so select OK to the message that pops up. When Creating the key you can select if it expires at a specific date or not.

Edit - Set Web Service Access Key 

Key Never Expires

Key Expiration Date

When you choose OK, a key is created, so you can copy it to the Password field in the Power BI connection page.

Web Service Access

Web Service Access Key >

Troubleshooting

The Power BI dashboard relies on the published web services that are listed above, and it will show data from the

demonstration company or your own company if you import data from your current finance solution. However, if something goes wrong, this section provides a workaround for the most typical issues.

***"Parameter validation failed, please make sure all parameters are valid" ** If you see this error after you enter your Project "Madeira" URL, make sure the following requirements are satisfied:

- The URL follows exactly this pattern
`https://mycronusus*.projectmadeira.com:7048/NAV/OData/Company('*CRONUS%20US*')`
- Delete any text after the company name in parenthesis
- Make sure there are no trailing forward slash at the end of the URL.
- Make sure the URL is uses a secure connection as indicated by the URL starting with https.

"Login failed" If you get a "login failed" error when you log in to the dashboard, using your Project "Madeira" credentials, then this can be caused by one of the following issues:

- The account you are using does not have permissions to read the Project "Madeira" data from your account. Verify your user account in Project "Madeira", and make sure that you have used the right web service access key as the password, and then try again.
- The Project "Madeira" instance that you are trying to connect to does not have a valid SSL certificate. In this case you'll see a more detailed error message ("unable to establish trusted SSL relationship"). Note that self-signed certs are not supported.

"Oops" If you see an "Oops" error dialog after you pass the authentication dialog, this is most frequently caused by a problem connecting to the data for the content pack. Verify that the URL follows the pattern that was specified earlier:

`https://mycronusus.projectmadeira.com:7048/NAV/OData/Company('CRONUS%20US')`

A common mistake is to specify the full URL for a specific web service:

`https://mycronusus.projectmadeira.com:7048/NAV/OData/Company('CRONUS%20US')/powerbifinance`

Or you might have forgotten to specify the company name:

`https://mycronusus.projectmadeira.com:7048/NAV/OData/`

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Projectplace by Planview with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

With the Projectplace by Planview content pack, you can visualize your collaborative project data in entirely new ways directly in Power BI. Use your Projectplace sign-in credentials to interactively view key project statistics, find out who your most active and productive team members are, and identify at-risk cards and activities across projects in your Projectplace account. You can also extend the out-of-the box dashboard and reports to get the insights that are most important to you.

[Connect to the Projectplace content pack in Power BI](#)

NOTE

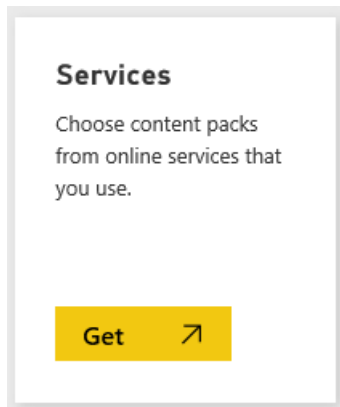
To import your Projectplace data into Power BI, you must be a Projectplace user. See additional requirements below.

How to connect

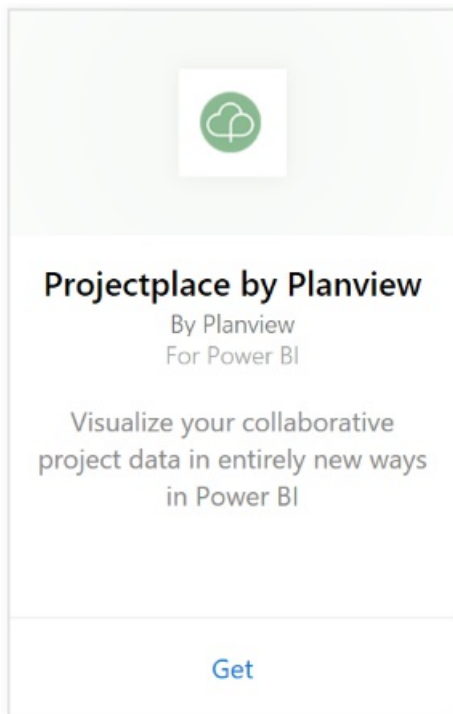
1. Select **Get Data** at the bottom of the left navigation pane.



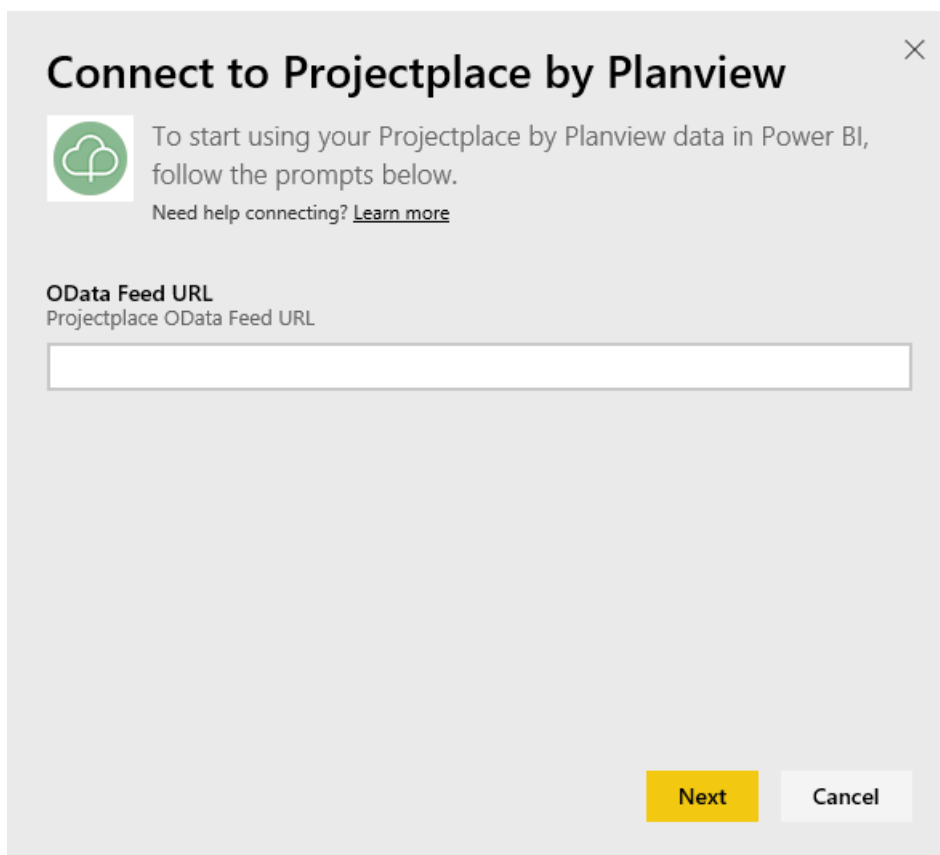
2. In the **Services** box, select **Get**.



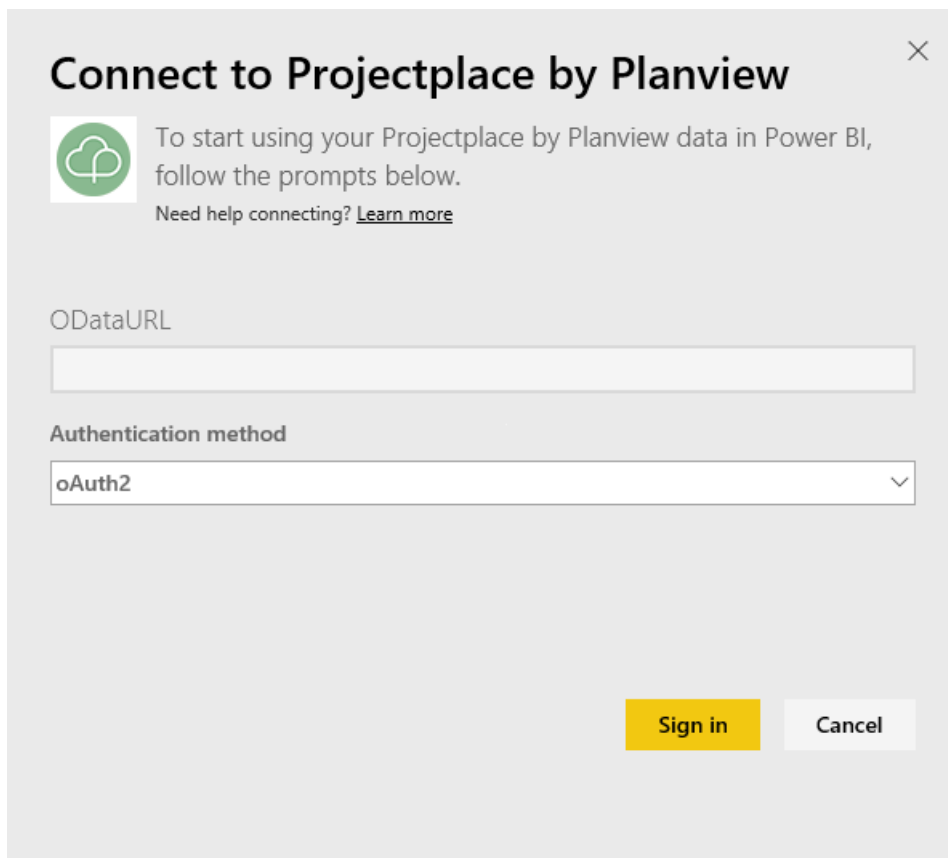
3. On the Power BI page, select **Projectplace by Planview**, then select **Get**:



4. In the OData Feed URL text box, enter the URL for the Projectplace OData feed you want to use, as shown in the following image:

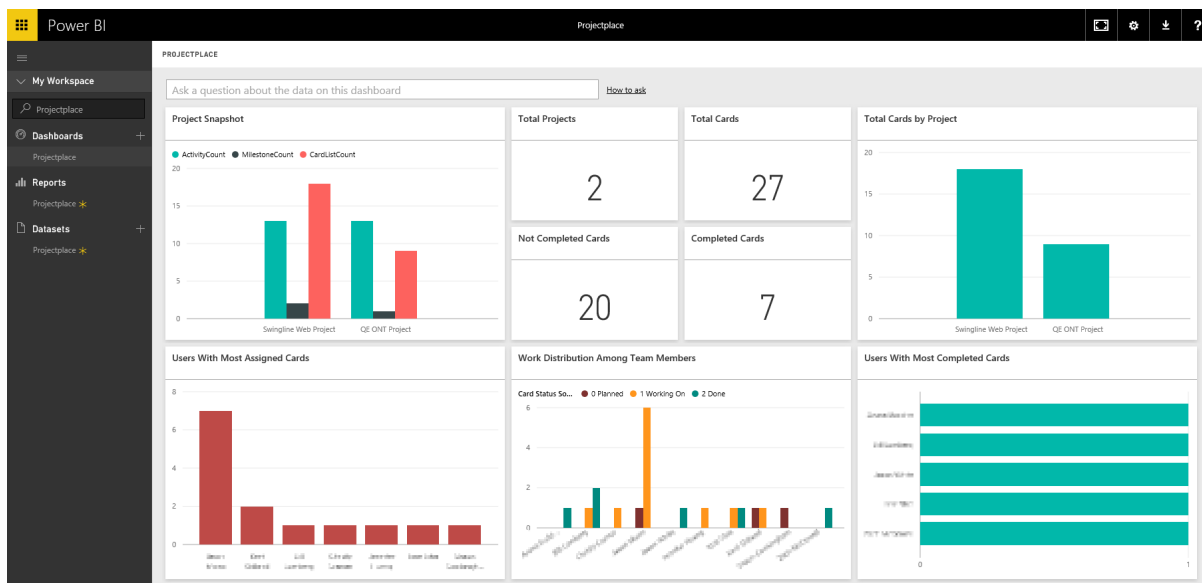


5. On the Authentication Method list, select **OAuth** if it is not already selected. Hit **Sign In** and follow the login flow.



- On the left pane, select **Projectplace** from the list of dashboards. Power BI imports Projectplace data into the dashboard. Note that the data may take some time to load.

The dashboard contains tiles that display data from your Projectplace database. The following image shows an example of the default Projectplace dashboard in Power BI.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

To import your Projectplace data into Power BI, you must be a Projectplace user. This procedure assumes you have already signed in to the Microsoft Power BI home page with a Power BI account. If you do not have a Power BI account, create a new free Power BI account on the Power BI home page, and then click Get Data.

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to QuickBooks Online with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

When you connect to your QuickBooks Online data from Power BI you immediately get a Power BI dashboard and Power BI reports that provide insights about your business cash flow, profitability, customers, and more. Use the dashboard and reports as they are, or customize them to highlight the information you care most about. The data is refreshed automatically once a day.

Connect to the [QuickBooks Online content pack](#) for Power BI.

NOTE

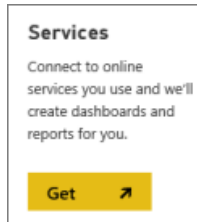
To import your QuickBooks Online data into Power BI, you need to be an admin on your QuickBooks Online account and sign in with your admin account credentials.

How to connect

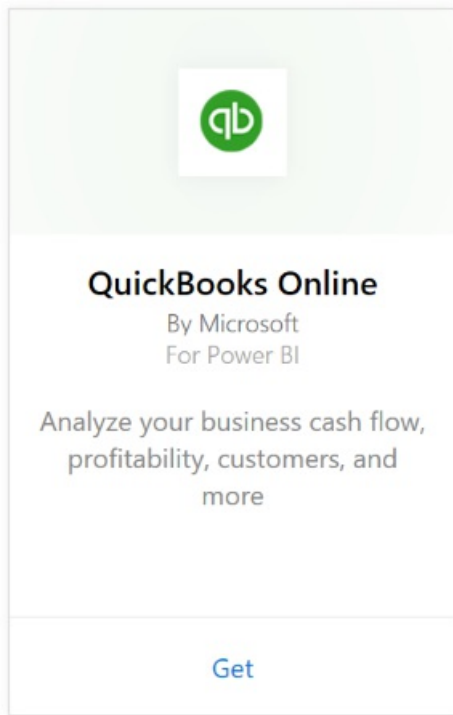
1. Select **Get Data** at the bottom of the left navigation pane.



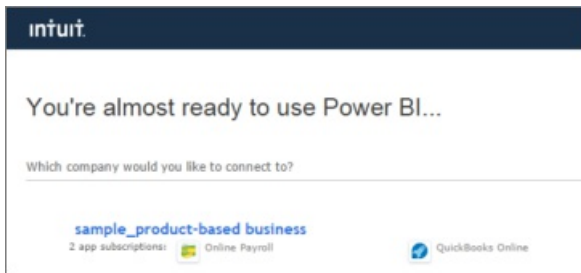
2. In the **Services** box, select **Get**.



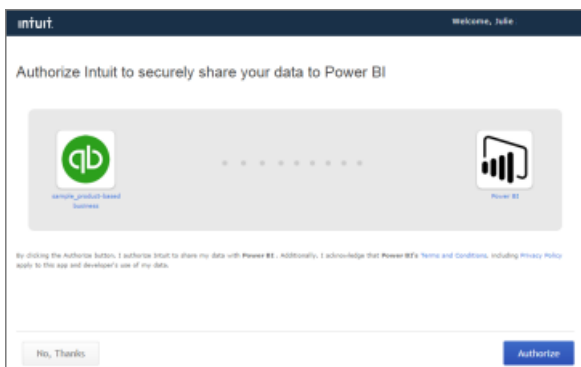
3. Select **QuickBooks Online**, then select **Get**.



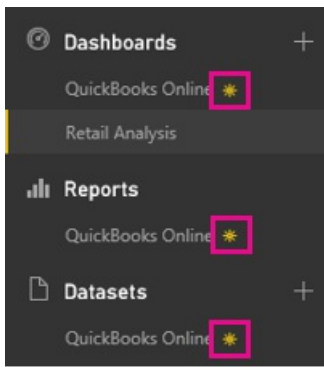
4. Select **oAuth2** for Authentication Method and select **Sign In**.
5. When prompted, enter your QuickBooks Online credentials and follow the QuickBooks Online authentication process. If you are already signed in to QuickBooks Online in your browser, you may not be prompted for credentials. >[!NOTE] >You need admin credentials for your QuickBooks Online account.
6. Select the company you would like to connect to Power BI in the next screen.



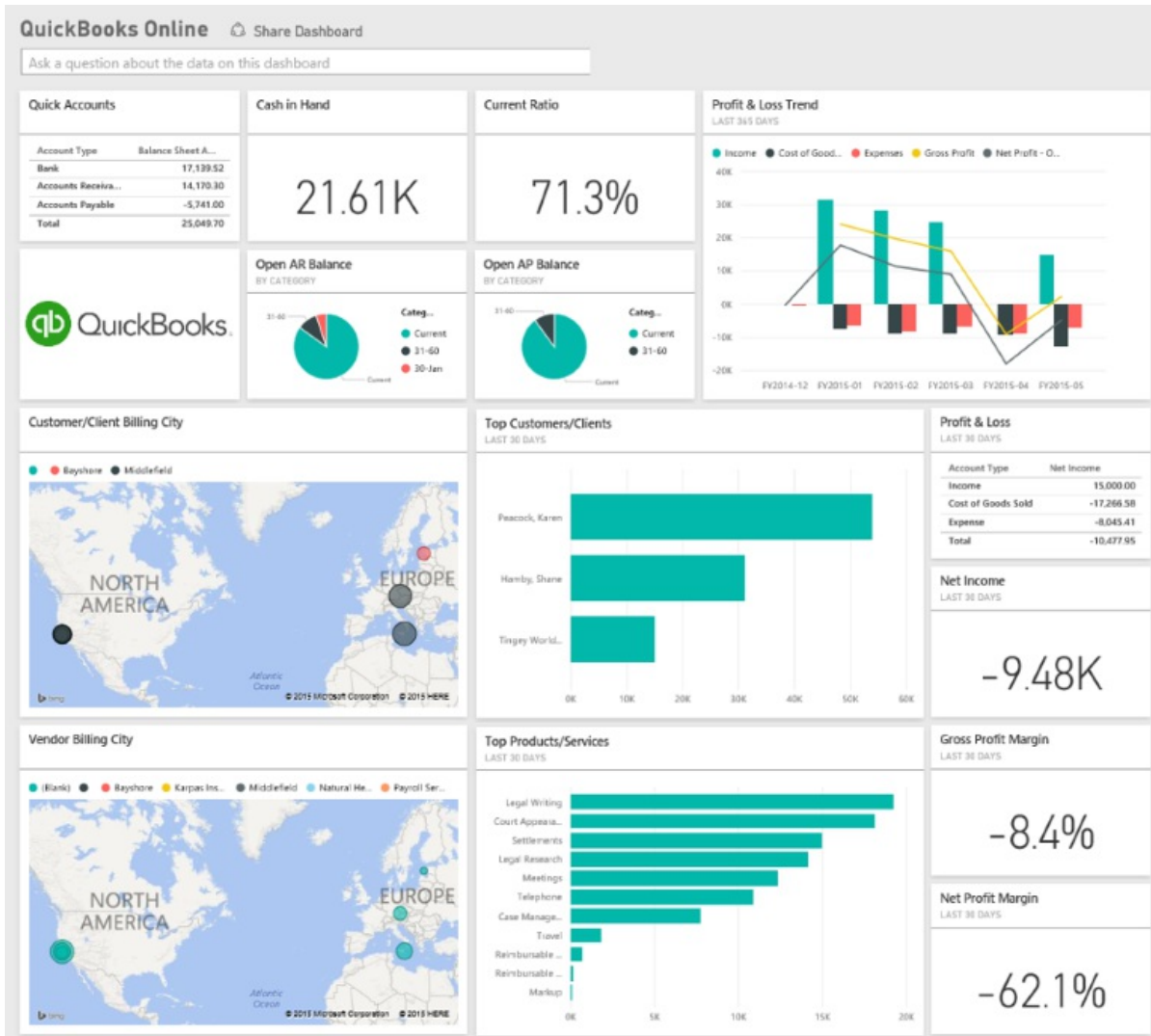
7. Select **Authorize** in the next screen to begin the import process. This can take a few minutes depending on the size of your company data.



After Power BI imports the data, you see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *.



8. Select the QuickBooks Online dashboard. This is the dashboard Power BI created automatically to display your imported data. You can modify this dashboard to display your data any way you want.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Troubleshooting

“Oops! An error has occurred”

If you get this message after selecting **Authorize**:

"Oops! An error has occurred." Please close this window and try again.

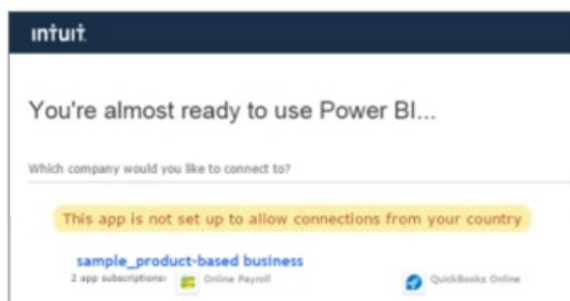
The application has already been subscribed to by another user for this company. Please contact [admin email] to make changes to this subscription."



... this means another admin in your company has already connected to your company data with Power BI. Ask that admin to share the dashboard with you. Currently, only one admin user can connect a particular QuickBooks Online company dataset to Power BI. After Power BI creates the dashboard, the admin can shared it with multiple colleagues on the same Power BI tenants.

"This app is not set up to allow connections from your country"

Currently Power BI only supports US editions of QuickBooks Online.



Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to SendGrid with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI content pack for SendGrid allows you to extract insights and statistics from your SendGrid account. Using the SendGrid content pack you can visualize your SendGrid statistics in a dashboard.

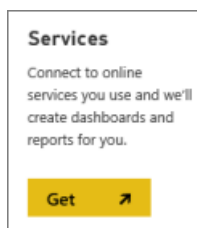
Connect to the [SendGrid content pack](#) for Power BI.

How to connect

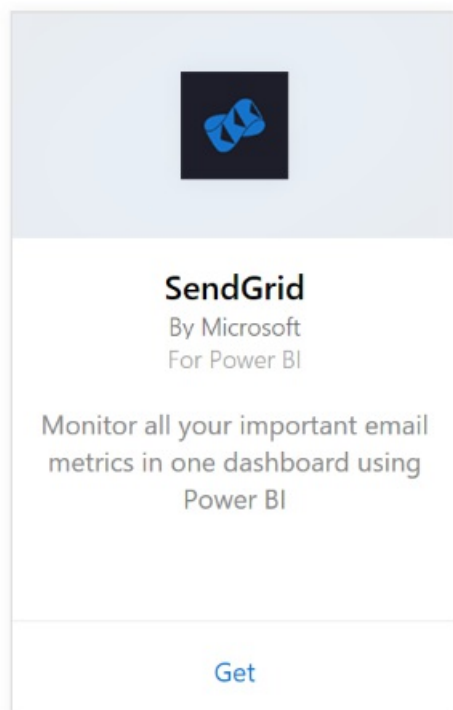
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.




3. Select the **SendGrid** content pack and click **Get**.



4. When prompted, provide your SendGrid user name and password. Select **Sign In**.

Connect to SendGrid ✕

 To start using your SendGrid data in Power BI, follow the prompts below.

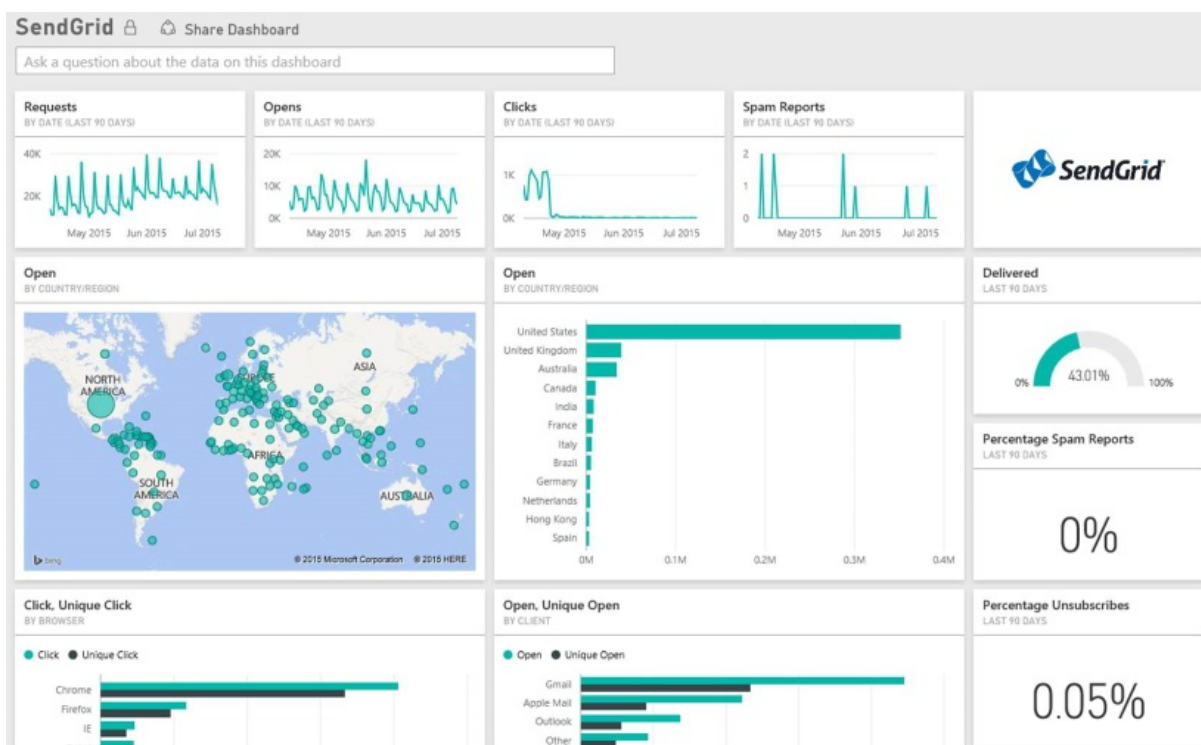
Authentication Method:

Username

Password

Sign In
Cancel

5. After Power BI imports the data, you see a new dashboard, report, and dataset in the left navigation pane, populated with your email statistics for the past 90 days. New items are marked with a yellow asterisk *.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The following metrics are available in the SendGrid dashboard:

- Overall email statistics - Requests, Delivered, Bounced, Spam Blocked, Spam Report, etc.
- Email statistics by category
- Email statistics by geography
- Email statistics by ISP
- Email statistics by device, client, browser

Next steps

[Get started with Power BI](#)

[Get Data](#)

Connect to ServiceNow with Power BI for incident reporting

1/19/2018 • 1 min to read • [Edit Online](#)

ServiceNow offers multiple products and solutions including business, operations and IT management to improve your business. This content pack includes multiple reports and insights on your open, recently resolved and recently closed incidents.

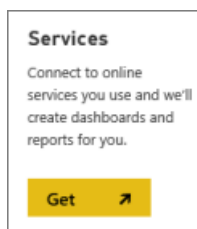
Connect to the Power BI content pack for [ServiceNow Incidents](#).

How to connect

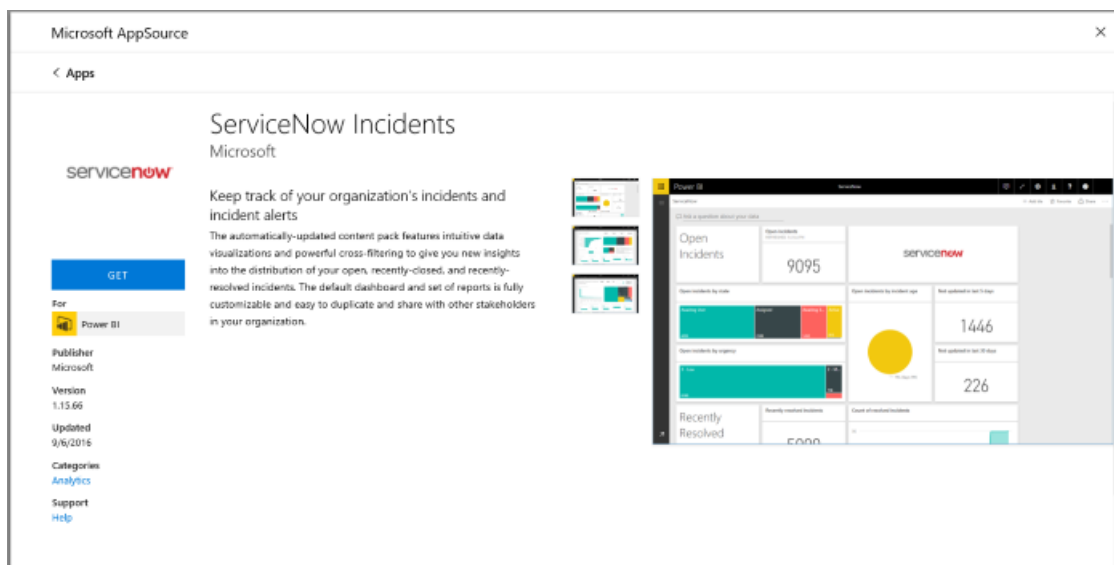
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **ServiceNow Incidents** > **Get**.



4. Provide the URL of your ServiceNow instance and the range of days/records to bring in. Note as soon as one limit is hit the import will stop.

now Connect to ServiceNow Incidents

Instance URL
ServiceNow instance

Example: https://powerbi.service-now.com

History
Days of resolved and closed incidents

Example: 4

Incident count ceiling
Maximum number of resolved and closed incidents to retrieve (NOTE: 20,000 records will take around 30 minutes to retrieve)

Example: 900

Next Cancel

5. When prompted, enter your ServiceNow **Basic** credentials. Note single sign on is not supported today, more details on the system requirements below.

now Connect to ServiceNow Incidents

extensionDataSourcePath

https://dev17204.service-now.com/

Authentication method

Basic

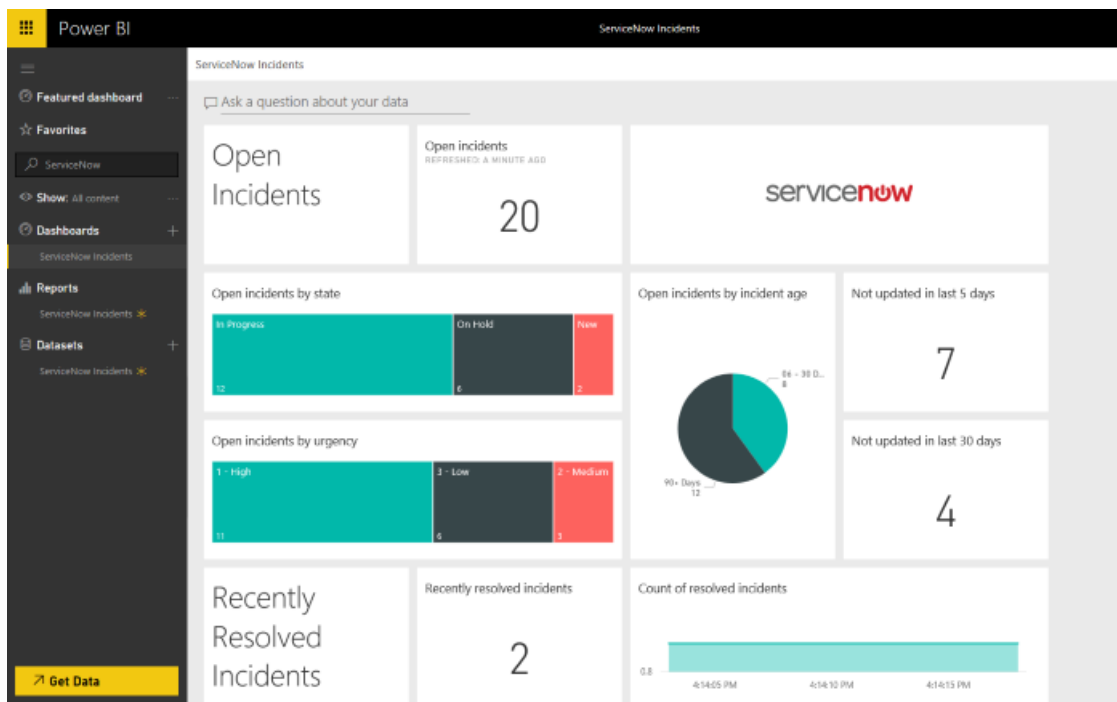
User name

Password

Need help connecting? [Learn more](#)

Sign in Cancel

6. Once the login flow is completed the import process will begin. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

To connect you will need:

- An account that can access yourorganization.service-now.com with Basic authentication (Single Sign-On is not supported in this version)
- The account must have rest_service role and read access to incident table

Troubleshooting

If you're hitting a credential error during load, please review the access requirements above. If you have the correct permissions and are still hitting issues, please work with your ServiceNow admin to ensure you have any additional permissions that may be required for your custom instance.

If you're seeing long load times, please review the number of incidents and number of days you specified during connection and consider reducing it.

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Smartsheet with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Smartsheet offers an easy platform for collaboration and file sharing. The Smartsheet content pack for Power BI provides a dashboard, reports and dataset that shows an overview of your Smartsheet account. You can also use the [Power BI Desktop](#) to connect directly to individual sheets in your account.

Connect to the [Smartsheet content pack](#) for Power BI.

NOTE

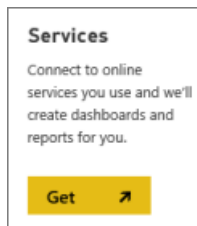
Smartsheet admin account is preferred to connect and load the Power BI content pack as it has additional access.

How to connect

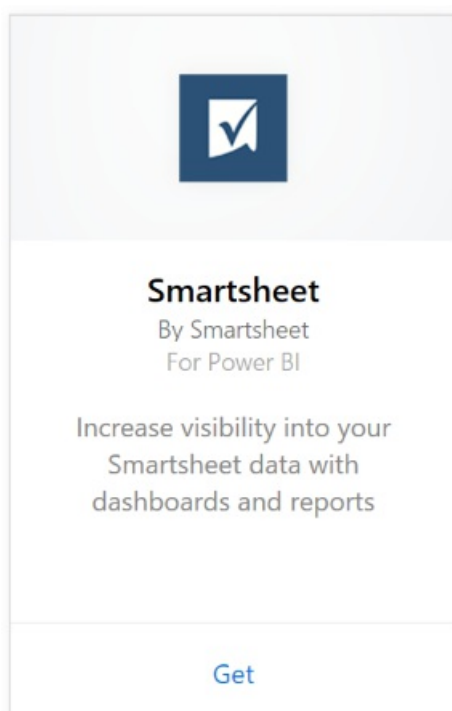
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

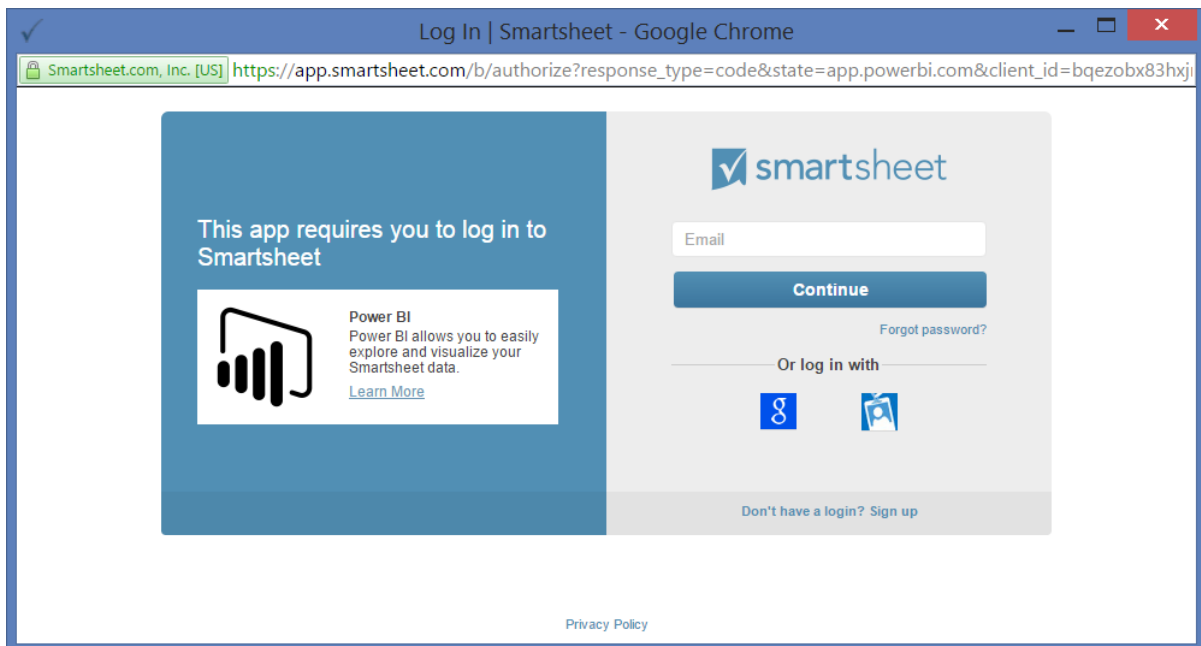
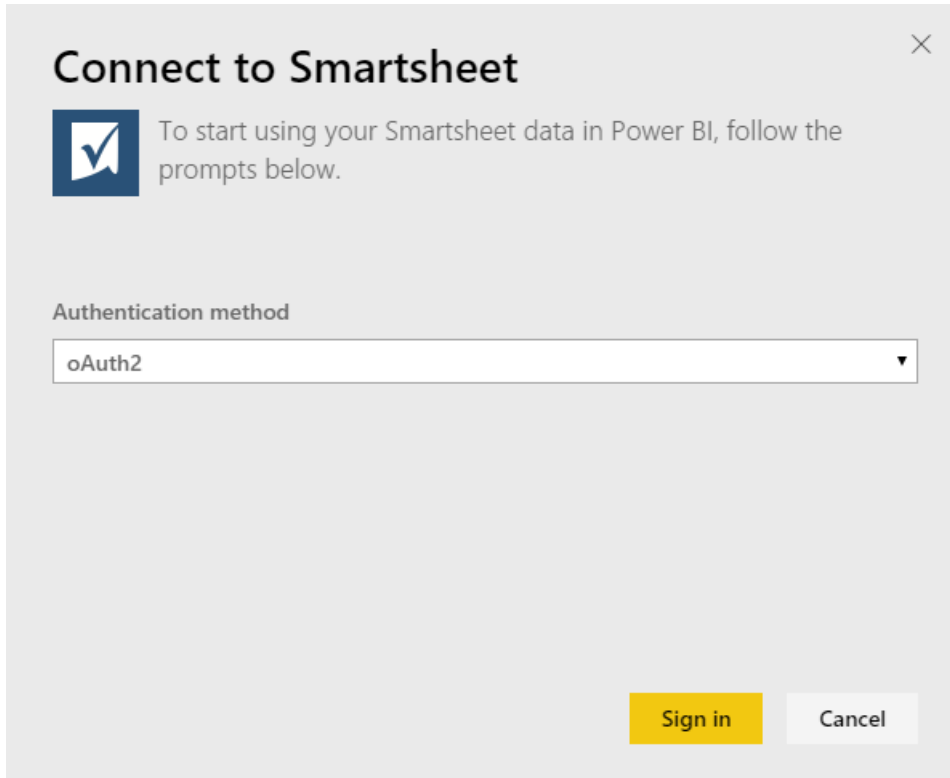


3. Select **Smartsheet > Get**.

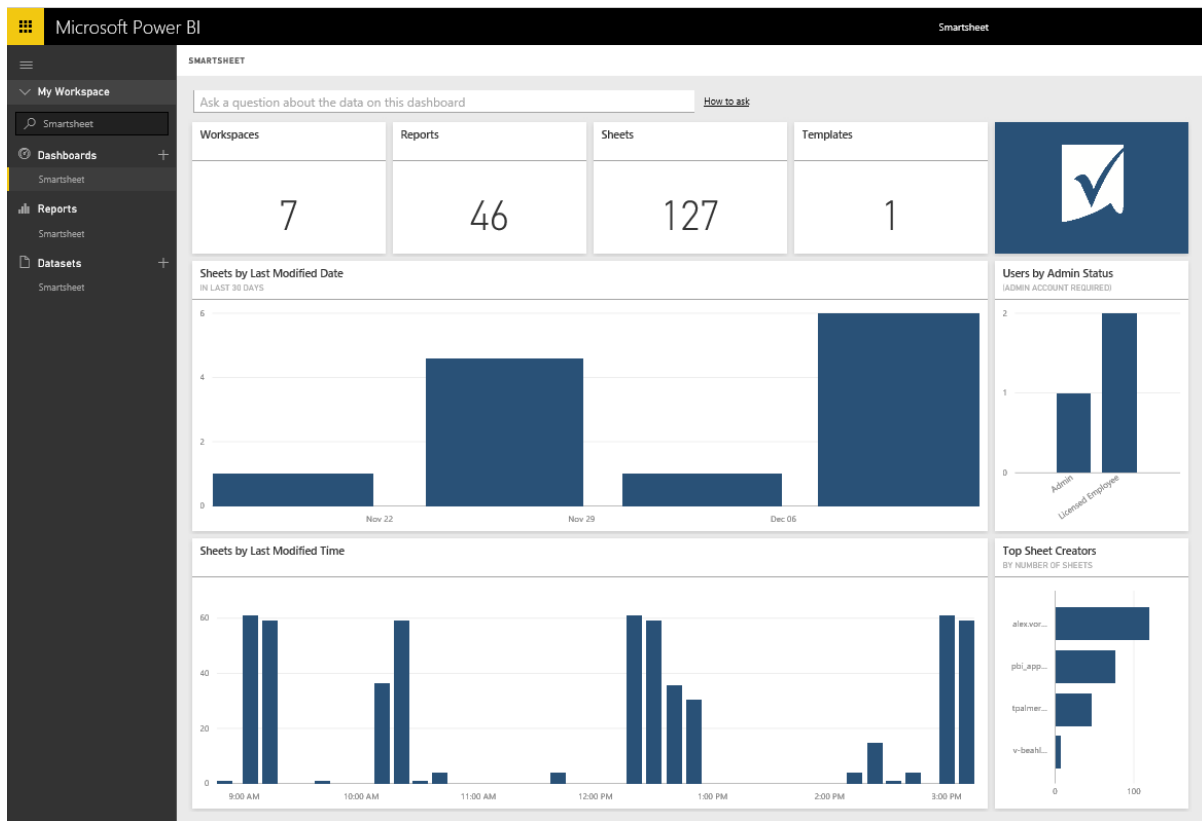


4. For Authentication Method, select **oAuth2 > Sign In**.

When prompted, enter your Smartsheet credentials and follow the authentication process.



5. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *, select the Smartsheet entry.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The Smartsheet content pack for Power BI includes an overview of your Smartsheet account, such as the number of workspaces, reports and sheets you have, when they're modified etc. Admin users will also see some information around the users in their system, such as top sheet creators.

To connect directly to individual sheets in your account, you can use the Smartsheet connector in the [Power BI Desktop](#).

Next steps:

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to SparkPost with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI content pack for SparkPost allows you to extract valuable datasets from your SparkPost account all into one insightful dashboard. Using the SparkPost content pack you can visualize your overall email statistics, including domains, campaigns, and engagement by ISP.

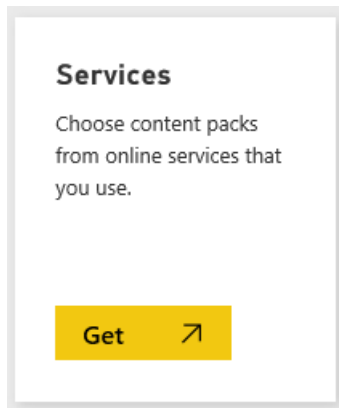
Connect to the [SparkPost content pack for Power BI](#).

How to connect

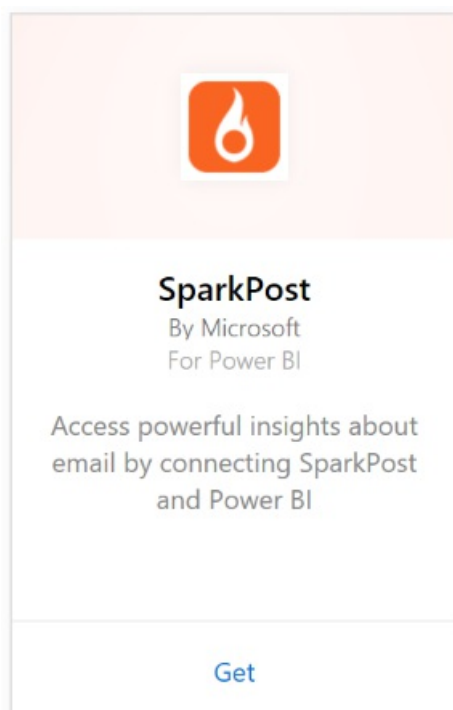
1. Select **Get Data** at the bottom of the left navigation pane.



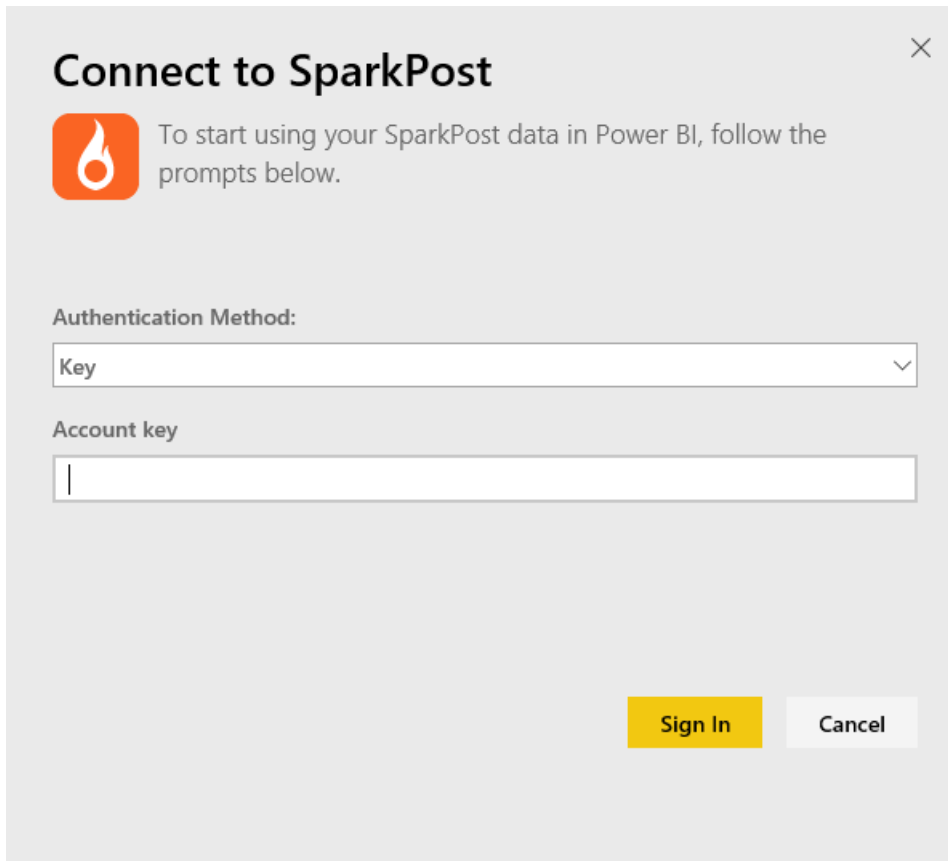
2. In the **Services** box, select **Get**.



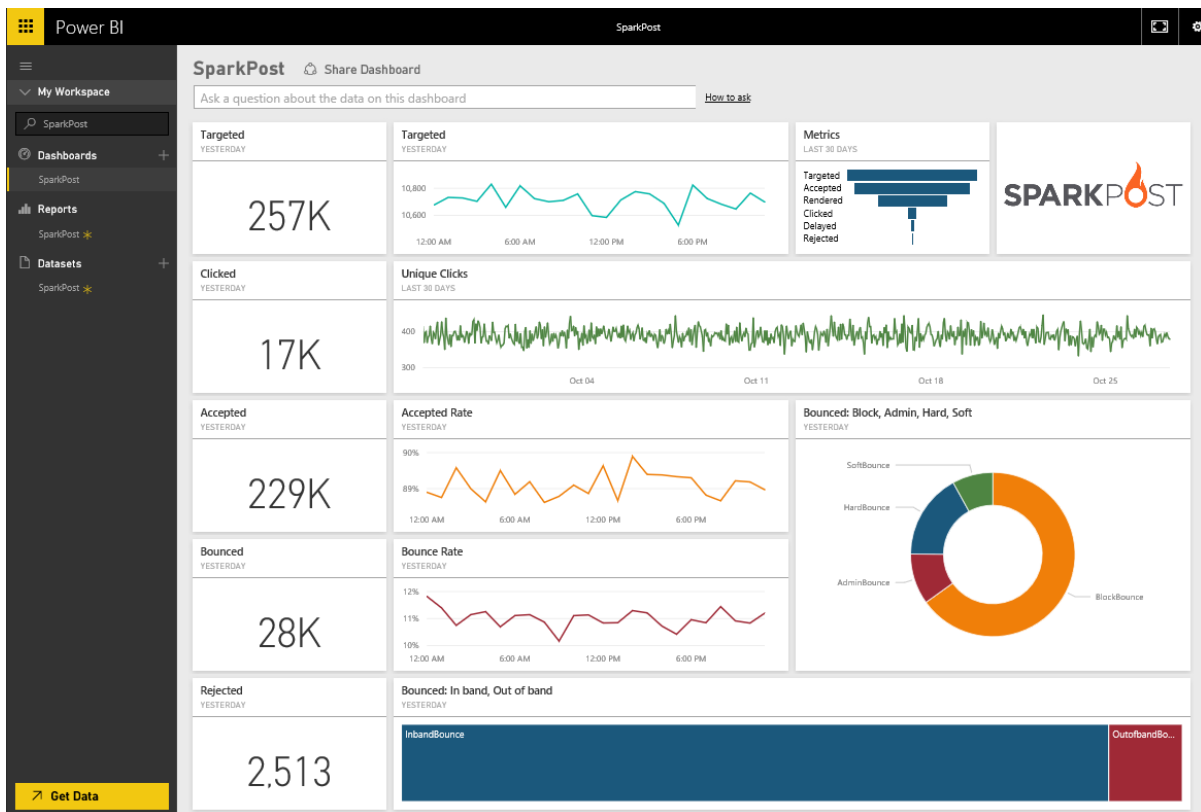
3. Select the **SparkPost** content pack and click **Get**.



- When prompted, provide your SparkPost API key and select Sign In. See details on [finding this parameters](#) below.



- Your data will start to load, depending on the size of you account this may take some time. After Power BI imports the data, you'll see the default dashboard, report, and dataset in the left navigation pane, populated with your email statistics for the past 90 days. New items are marked with a yellow asterisk *.



What now?

- Try asking a question in the Q&A box at the top of the dashboard

- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The SparkPost content pack for Power BI includes information including unique clicks, accepted rates, bounce rates, delayed rates, rejection rates and more.

Finding parameters

The content pack uses an API key to connect your SparkPost account to Power BI. You can find your API key in your account under Account > API & SMTP (more details [here](#)). We suggest using an API key with permissions for

Message Events: Read-only and Metrics: Read-only

The screenshot shows the SparkPost account settings page. The left sidebar contains navigation options: SPARKPOST, BILLING, PROFILE, SECURITY, SENDING DOMAINS, TRACKING DOMAINS, ACCOUNT (highlighted), USAGE, WEBHOOKS, HELP & DOCS, and SIGN OUT. The main content area is titled 'API & SMTP' and is divided into two sections: 'SMTP' and 'API Keys'. The 'SMTP' section displays the following configuration: Host: smtp.sparkpostmail.com, Port: 587, Username: SMTP_Injection, Password: Any API key with the Send via SMTP permission, Authentication: AUTH LOGIN, and Encryption: STARTTLS. The 'API Keys' section shows a 'NEW API KEY' button and a list of keys. One key is shown for 'Power BI' with a partial ID '8b4d' and a 'Permissions' field set to 'Message Events: Read-only, Metrics: Read-only'. The 'Permissions' field is highlighted with a red dashed box.

SQL Database Auditing content pack for Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI content pack for Azure [SQL Database Auditing](#) allows you to understand your database activity and gain insight into discrepancies and anomalies that could indicate business concerns or suspected security violations.

Connect to the [SQL Database Auditing content pack](#) for Power BI.

NOTE

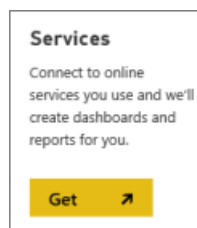
The content pack imports data from all tables that contain "AuditLogs" in their name and append it to a single data model table named "AuditLogs". The last 250k events will be included and the data will be refreshed daily.

How to connect

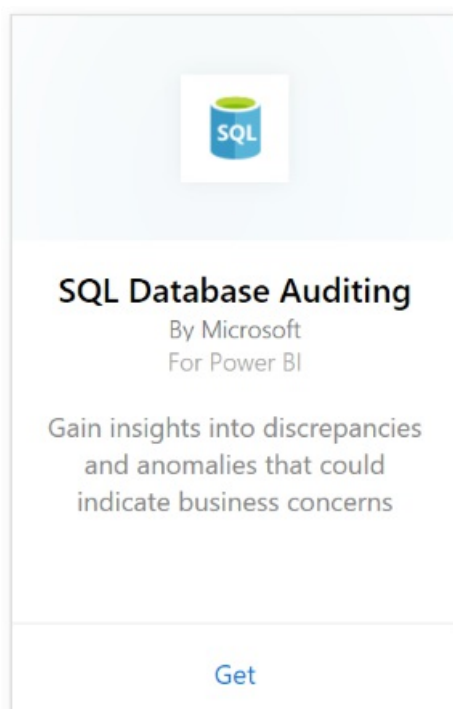
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the Services box, select Get.



3. Select **SQL Database Auditing > Get**.



4. In the Connect to Sql Database Auditing window:


- Enter the Azure Table Storage account name or URL where your logs are stored.
- Enter the name of the SQL server that you are interested in. Enter "*" to load audit logs for all servers.
- Enter the name of the SQL database that you are interested in. Enter "*" to load audit logs for all databases.
- Enter the name of the Azure table that contains the logs you are interested. Enter "*" to load audit logs from all tables that contain "AuditLogs" in their name.

IMPORTANT

For performance reasons it is advisable to always specify an explicit table name even if all audit logs are stored in a single table.

- Enter the start date of audit logs you are interested in. Enter "*" to load audit logs without a lower time limit, or "1d" to load audit logs from the last day.
- Enter the end date of audit logs you are interested in. Enter "*" to load audit logs without an upper time limit.

Connect to SQL Database Auditing

 To start using your SQL Database Auditing data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Azure Table Storage Account
Azure Table Storage Account Name or URL

Filter by Server
Show audit logs for a specific server.

Filter by Database
Show audit logs for a specific database.

▼ . . .

Next **Cancel**

5. For Authentication Method, select **Key**, enter your** Account Key** > **Sign In**.

Connect to SQL Database Auditing

To start using your SQL Database Auditing data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Account
sqlauditpowerbi

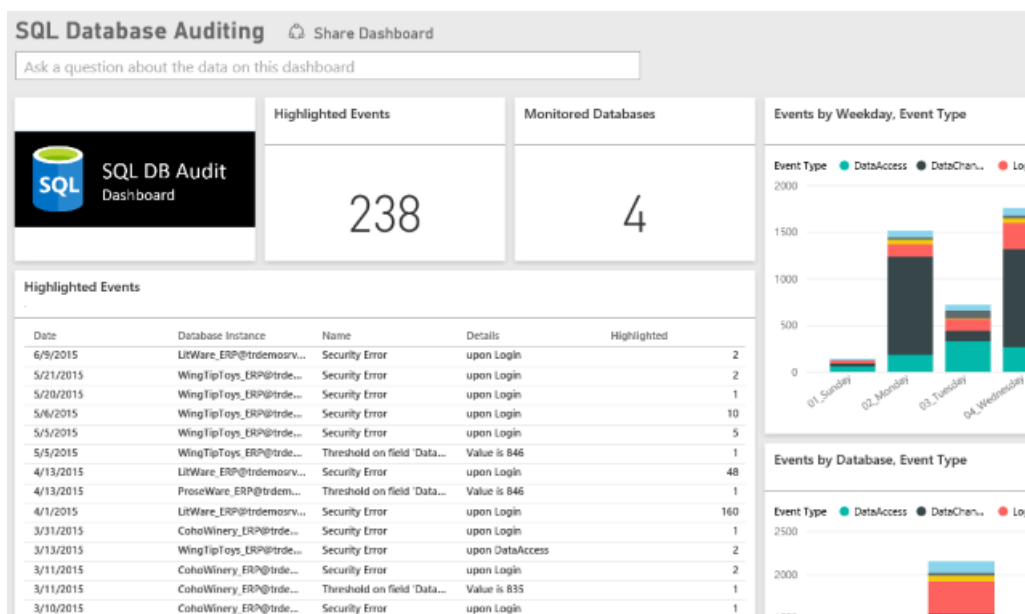
Domain
table.core.windows.net

Authentication Method:
Key

Account key

Sign In Cancel

6. After Power BI imports the data, you see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get data for Power BI](#) [Get started with Power BI](#)

Connect to SQL Sentry with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Analyzing your performance data collected by SQL Sentry is easy with Power BI. Power BI retrieves your data, then builds a default dashboard and related reports based on that data.

Connect to the [SQL Sentry content pack](#) for Power BI.

NOTE

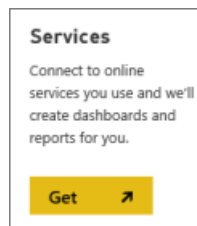
Access to a SQL Sentry account you use for connecting to <http://cloud.sqlsentry.com> and a Database ID you will monitor is required to connect. Instructions for where to find the Database ID are below.

How to connect

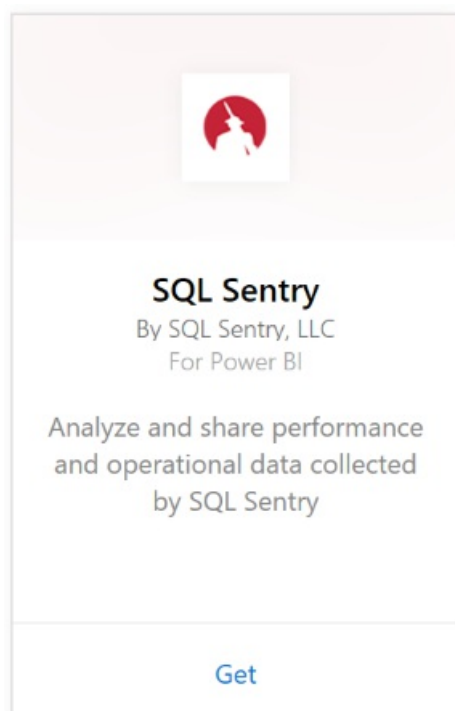
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

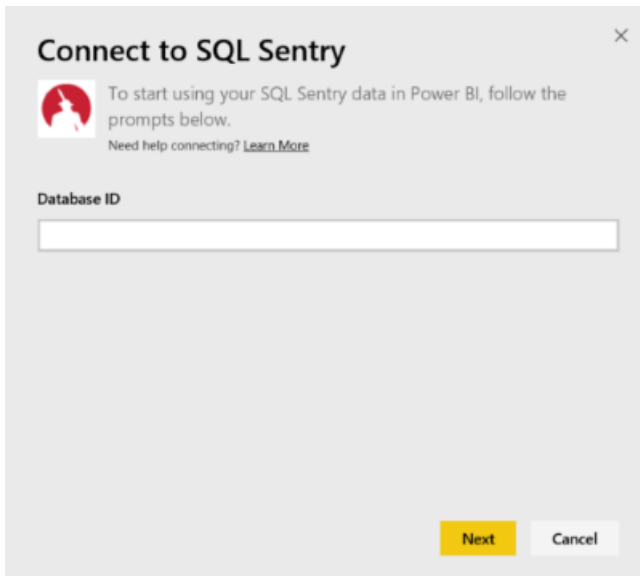


3. Select **SQL Sentry > Get**.



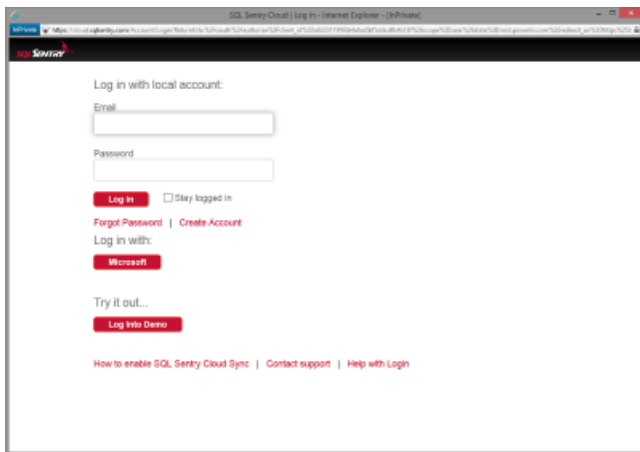
4. Provide the **Database ID** of the database you'd like to monitor in Power BI. See more details on [finding this](#)

below.

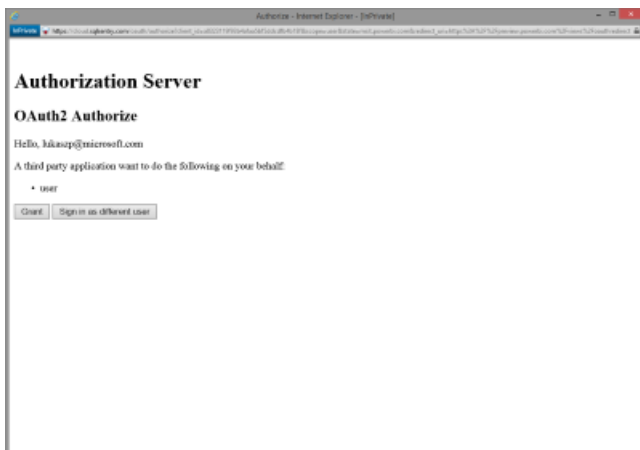


5. For Authentication Method, select **oAuth2 > Sign In**.

When prompted, enter your cloud.sqlsentry.com credentials and follow the SQL Sentry authentication process.



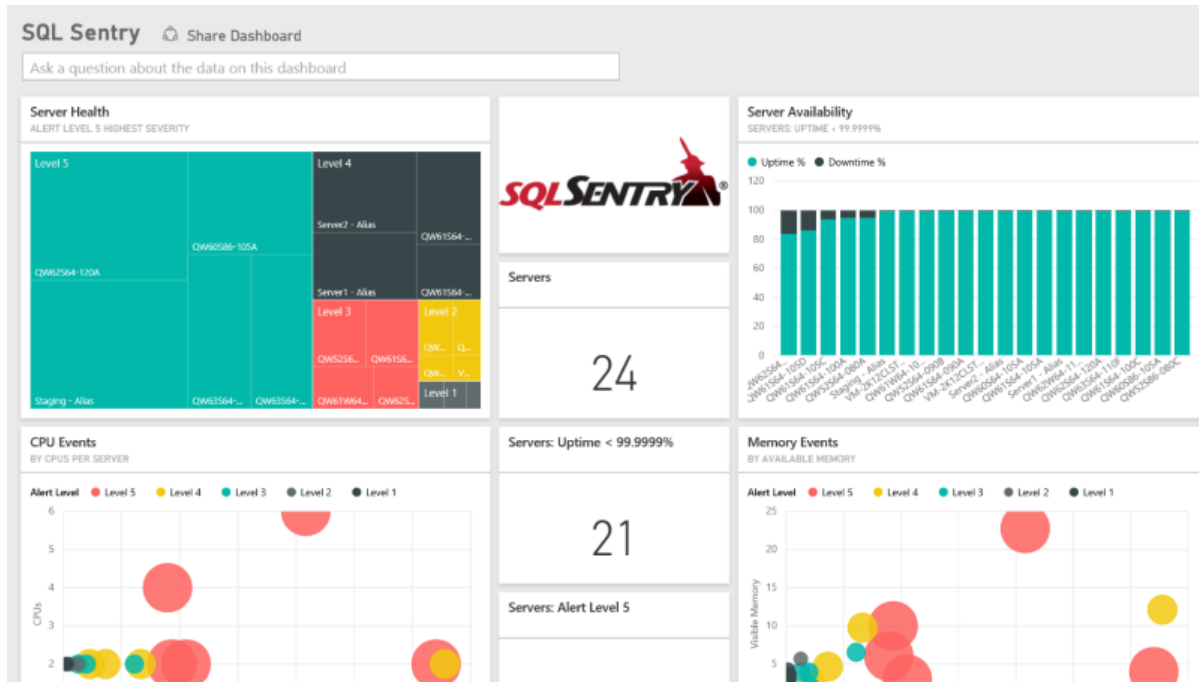
The first time you connect, Power BI prompts you to allow read-only access to your account. Select Grant to begin the import process. The import process can take a few minutes depending on the volume of data in your account.



6. After Power BI imports the data you will see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *:

7. Select the SQL Sentry dashboard.

This is the default dashboard that Power BI creates to display your data. You can modify this dashboard to display your data in any way you want.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The following data is available from SQL Sentry in Power BI :

TABLE NAME	DESCRIPTION
Connection	This table provides information about your SQL Sentry defined connections.
Date	This table contains dates from today back to the earliest date from which performance data was collected and retained.
Downtime	This table contains information related to your downtime and uptime for each server that is monitored in your environment.
Memory Usage	This table contains data about how much memory is available or free in each of your servers.
Server	This table contains records for each server in your environment.

TABLE NAME	DESCRIPTION
Server Health	This table contains data for all the events generated by custom conditions in your environment, including severity and count.

Finding Parameters

The **Database ID** can be found by logging into <https://cloud.sqlsentry.com> in a new web browser window. The **Database ID** is listed on the main overview page:

The **Database ID** is also shown on the Database Details screen:

Troubleshooting

If data from some of your apps is not showing up in Power BI, check to make sure that you are using the correct Database ID and that you have the authority to view the data.

If you are not the owner of the SQL Sentry database that is being synchronized to <https://cloud.sqlsentry.com>, please contact your administrator to make sure you have rights to view the collected data.

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to Stripe with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Visual and explore your Stripe data in Power BI with the Power BI content pack. The Power BI Stripe content pack pulls in data about your Customers, Charges, Events and Invoices. The data includes the most recent ten thousand events and five thousand charges over the last 30 days. The content will be refreshed automatically once per day at a schedule you control.

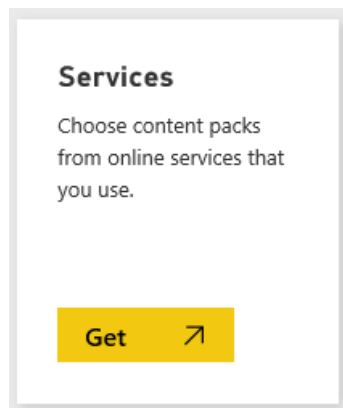
Connect to the [Stripe content pack for Power BI](#).

How to connect

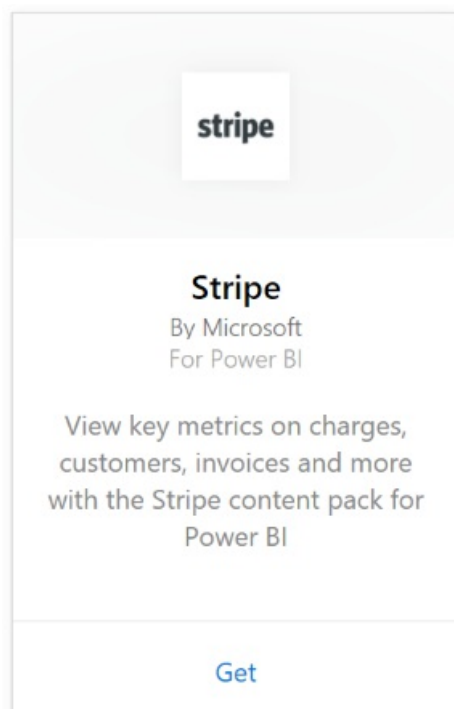
1. Select Get Data at the bottom of the left navigation pane.



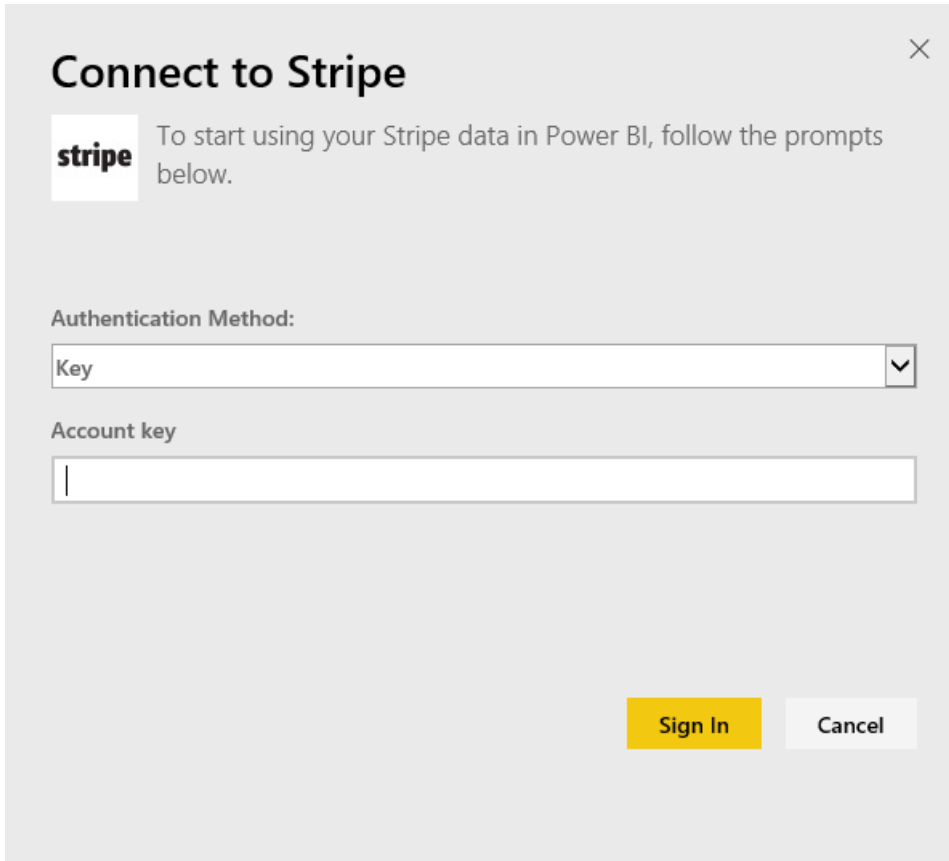
2. In the **Services** box, select **Get**.



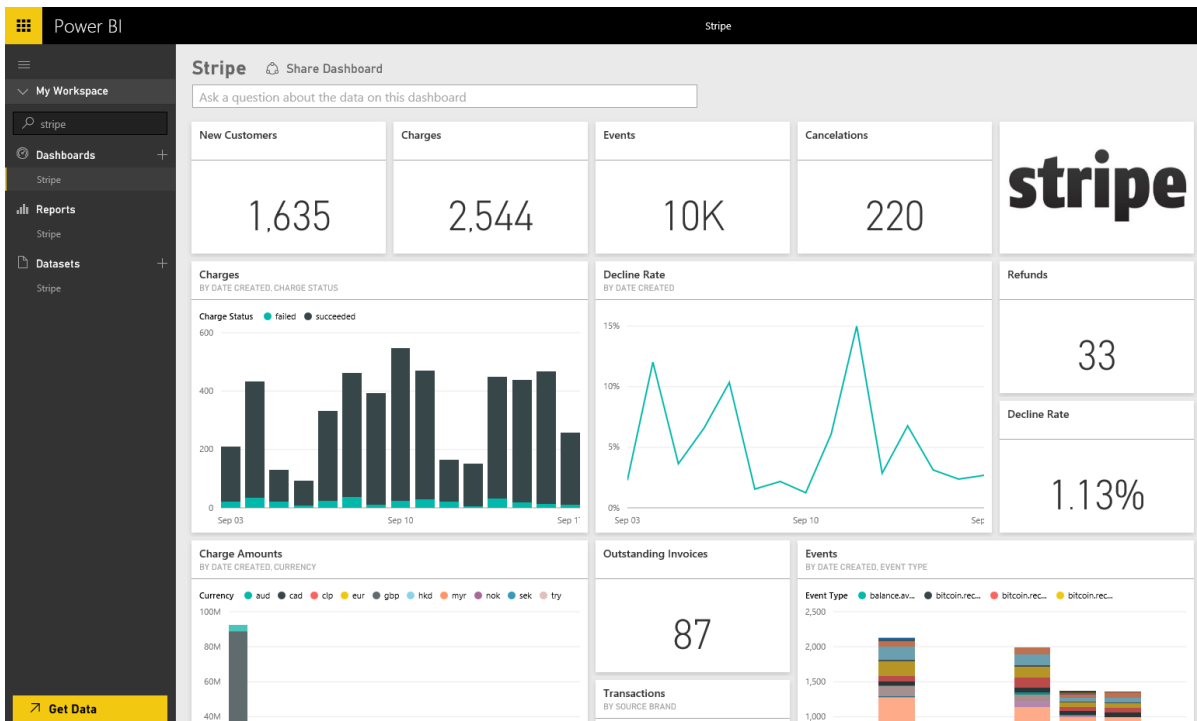
3. Select **Stripe** > **Get**.



4. Provide your Stripe [API key](#) to connect.



5. The import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane, marked with an asterisk. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to SweetIQ with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

The Power BI content pack pulls data from your SweetIQ account and generates set of out of box content allowing you to easily explore your data. Use the SweetIQ content pack to analyze data about your locations, listings, ratings and reviews. The data is set to refresh daily ensuring the data you're monitoring is up to date.

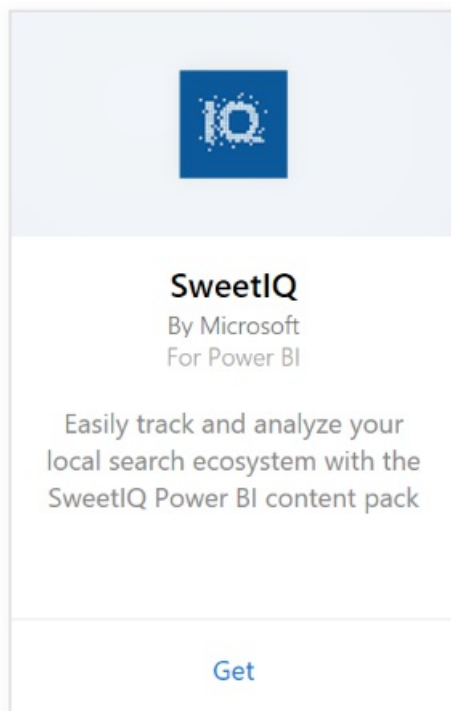
Connect to the [SweetIQ content pack](#) for Power BI.

How to connect

1. In the navigation pane on the left, click **Get Data**.




2. Select **SweetIQ** and click **Get**.



3. Provide your SweetIQ Client ID. This is typically an alpha-numeric value. For more details on finding this value, see below.

Connect to SweetIQ



To start using your SweetIQ data in Power BI, follow the prompts below.


Need help connecting? [Learn More](#)

ClientID
The Client ID provided by SweetIQ

Next **Cancel**

4. Select **Key** authentication type and provide your Sweet IQ API Key. This is typically an alpha-numeric value. For more details on finding this value, see below.

Connect to SweetIQ



To start using your SweetIQ data in Power BI, follow the prompts below.

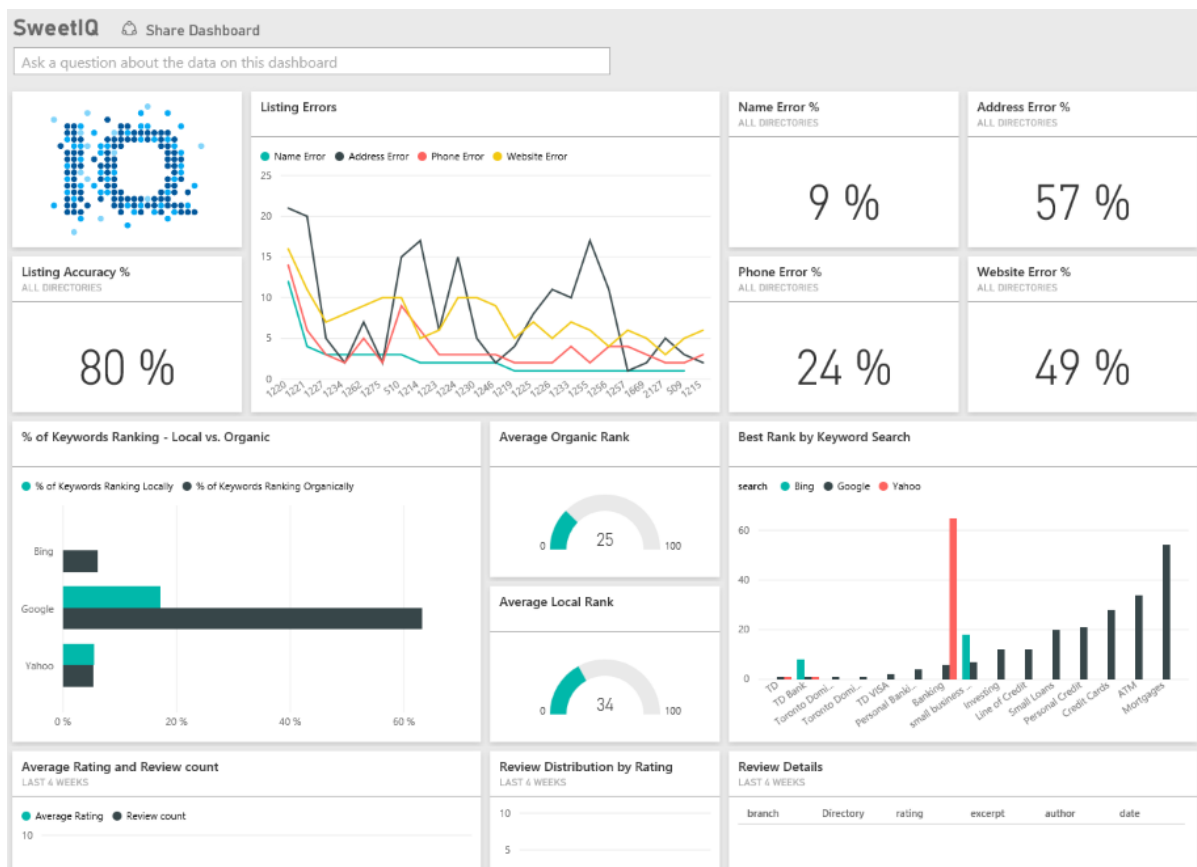
Need help connecting? [Learn More](#)

Authentication Method:

Account key

Sign In **Cancel**

5. Power BI will start loading your data, which may take some time depending on the size of data in your account. Once the load has completed, you'll see a new dashboard, report and dataset in the left navigation pane.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Finding parameters

The Client ID and API key for this content pack is not the same as your SweetIQ username and password.

Select a Client ID for one of the clients your account has access to. You can find the list of clients under "Client Management" in your SweetIQ account.

Talk to your administrator for your API key, to access the data for specific client.

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

Connect to Troux for Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

With the Troux content pack, you can visualize your Enterprise Architecture repository in entirely new ways directly in Power BI. The content pack offers a set of insights on your business capabilities, the applications that deliver those capabilities, and the technologies that support those applications that can be fully customized using Power BI.

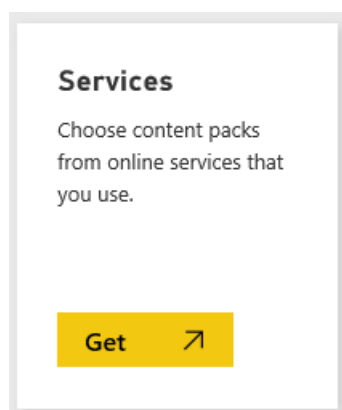
Connect to the [Troux content pack](#) for Power BI.

How to connect

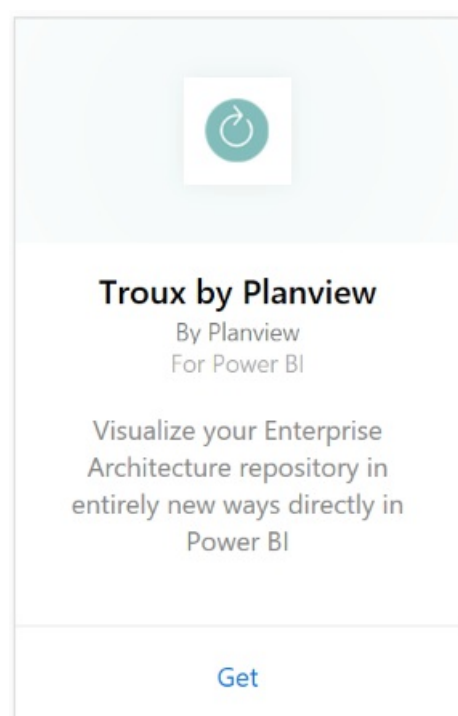
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Troux > Get**.



4. Specify your Troux OData URL. See details on [finding those parameters](#) below.

Connect to Troux by Planview

To start using your Troux by Planview data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

OData Feed URL
https://[[server]].[[domain]].com

5. For **Authentication Method**, select **Basic** and provide your username and password (case sensitive), then select **Sign In**.

Connect to Troux by Planview

To start using your Troux by Planview data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

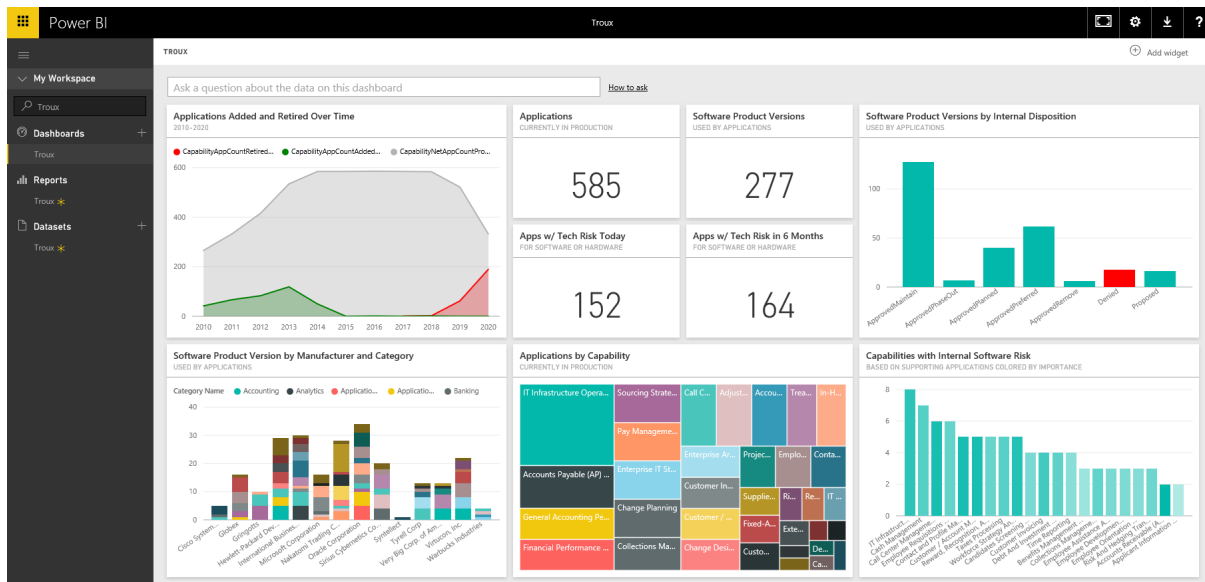
Authentication method

Basic

User name

Password

6. After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

System requirements

Access to the Troux OData feed and Troux 9.5.1 or higher is required.

Finding parameters

Your Customer Care team can provide your unique Troux OData feed URL to you

Troubleshooting

If you are seeing a timeout error after providing credentials, try connecting again.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Twilio with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

The Microsoft Twilio content pack for Power BI allows you to pull your data into Power BI and creates an out of box [Twilio dashboard](#) and report that shows insights on your data. You can also create your custom reports and dashboard on the dataset Power BI creates. The data will be refreshed once a day so you are always looking at the latest data.

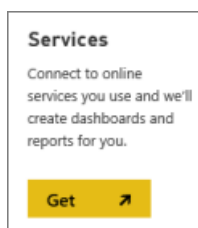
Connect to the [Twilio content pack](#) for Power BI.

How to connect

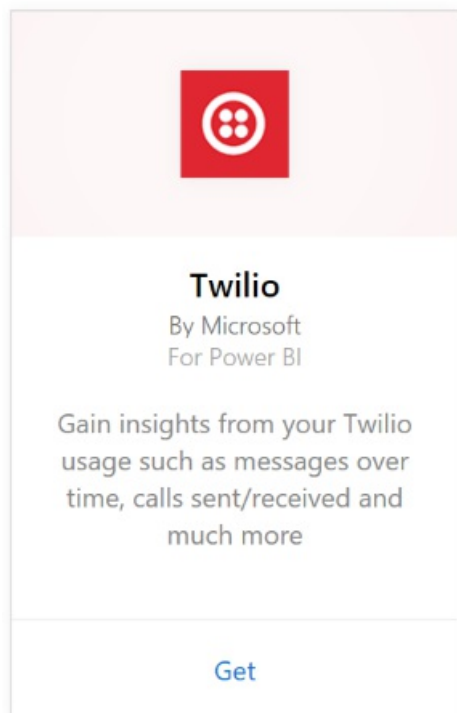
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Twilio** > **Get**.



4. For **Authentication Method**, select **oAuth2** > Sign In. When prompted provide your Twilio credentials and authorize the Power BI application to access your data.



Microsoft Power BI
Track your calls and messages with Microsoft Power BI.

Twilio is a simple, powerful, pay-as-you-go provider of voice & SMS telephony infrastructure to power apps that communicate. No contracts and no shenanigans.
[See pricing](#)

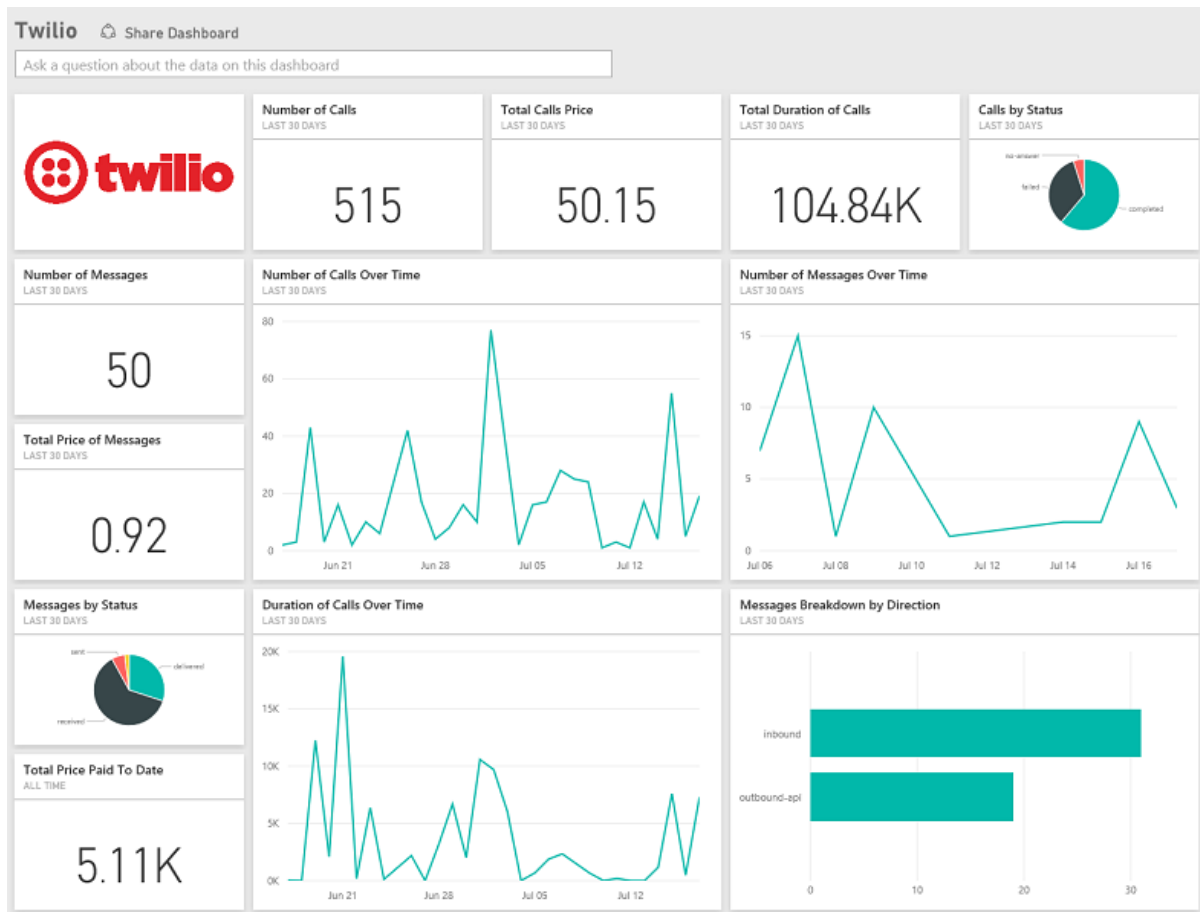
Don't have a Twilio account? [Sign up](#)

TWILIO SIGN IN

[Forgot your password?](#)

[Privacy Policy](#) [Terms of Service](#) [Acceptable Use Policy](#) [Pricing](#)

- This will begin importing data from your Twilio account, and you will have your dashboard populated with your calls and messages usage for the past 30 days.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The details for all calls and messages transactions for the last 30 days. You can do all sorts of analysis and aggregation on this data.

A set of already aggregated stats that you may want to keep an eye on. This set includes:

```
All Time Calls Count
All Time Calls Duration
All Time Calls Price
All Time Messages Price
All Time Messages Count
All Time Count of Phone Numbers
All Time Price of Phone Numbers
All Time Twilio Client Calls Price
All Time Twilio Client Calls Duration
All Time Twilio Client Calls Count
All Time Total Price
All Time Inbound Calls Price
All Time Inbound Calls Duration
All Time Inbound Calls Count
All Time Outbound Calls Price
All Time Outbound Calls Duration
All Time Outbound Calls Count
This Month Calls Price
This Month Calls Duration
This Month Calls Count
This Month Messages Count
This Month Messages Price
This Month Count of Phone Numbers
This Month Price of Phone Numbers
This Month Twilio Client Calls Price
This Month Twilio Client Calls Duration
This Month Twilio Client Calls Count
This Month Total Price
This Month Inbound Calls Price
This Month Inbound Calls Duration
This Month Inbound Calls Count
This Month Outbound Calls Price
This Month Outbound Calls Duration
This Month Outbound Calls Count
This Month Inbound Messages Price
This Month Inbound Messages Count
This Month Outbound Messages Price
This Month Outbound Messages Count
```

Troubleshooting

If you have a very large amount of data in the past 30 days (hundreds of thousands of transactions), the data retrieval step might fail. We are aware of the problem and working on solving it. Meanwhile, if you hit this issue please use the support link at the top of your Power BI page to let us know and we'll contact you for further investigations.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to tyGraph with Power BI

1/19/2018 • 3 min to read • [Edit Online](#)

Visualize and explore your tyGraph data in Power BI with the Power BI content pack. Start by connecting to your tyGraph account and loading the dashboard, reports and dataset. The out of box content includes insights such as the Measure of Active Engagement (MAE score) and Top Contributors. Customize it further to highlight the information you care most about. The data will be refreshed automatically according to a schedule that you set.

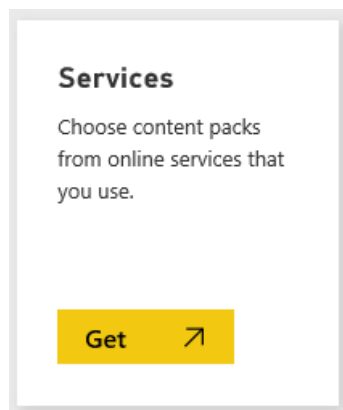
Connect to [tyGraph for Power BI](#).

How to connect

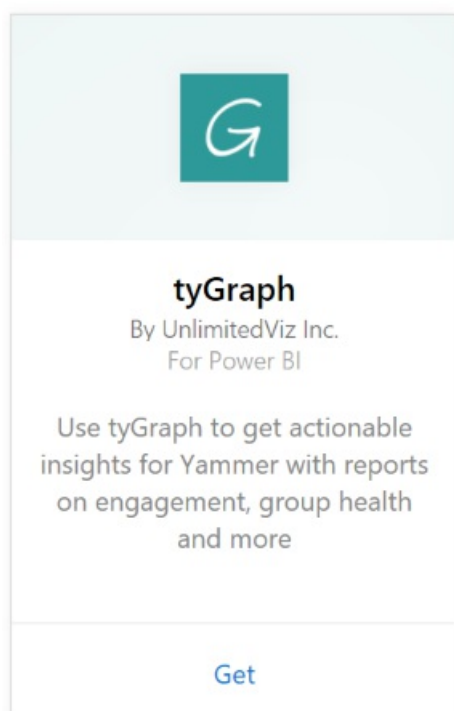
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.




3. Select **tyGraph > Get**.



4. Specify the groups and time range you'd like to connect to, otherwise specify "All" to bring in all the data. Note the date format that's expected (YYYY/MM/DD). See details on [finding the parameters](#) below.

Connect to tyGraph ✕



To start using your tyGraph data in Power BI, follow the prompts below.

Need help connecting? [Learn More](#)

Groups
Comma separated list of Yammer group IDs. Specify 'All' for all available groups to be retrieved.

From Date
Earliest date of Yammer data to be retrieved (YYYY/MM/DD). Use in conjunction with To Date for a range. Specify 'All' for no start date to be used.

To Date
Latest date of Yammer data to be retrieved (YYYY/MM/DD). Use in conjunction with From Date for a range. Specify 'All' for the date of refresh to be used.

5. Provide your tyGraph key to connect. See details on finding this value below.

If you are a Yammer Verified Admin

Your API key is sent to you in an email when your tyGraph account is successfully created. If you can no longer find your key, you can request a new one by sending an email to support@unlimitedviz.com. If you do not yet have a tyGraph account, you can start a trial at <http://www.tygraph.com/>.

If you are not a Yammer Verified Admin

The tyGraph content pack requires a tyGraph account created by a Yammer verified administrator. Once created, supplemental keys can be issued to users within the same organization. If your verified admin has not yet created a tyGraph account, contact them to have them do so. If they have, you can request a key by sending an email to support@unlimitedviz.com.

Connect to tyGraph

To start using your tyGraph data in Power BI, follow the prompts below.

Need help connecting? [Learn More](#)

url

Authentication Method:

Account key

Sign In **Cancel**

6. After successful authentication, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.

The screenshot shows a Power BI dashboard for tyGraph. The left navigation pane includes 'My Workspace', 'Dashboards', 'Reports', and 'Datasets'. The main dashboard area contains several key metrics and a line chart.

Metric	Value
Messages	13K
Messages Private	47
Responded not @mentioned (%)	30.04%
Harvest Date	9/1/2015
Message Contributors	15
Current Active Users	81

The line chart, titled 'Measure of Active Engagement', shows data points over time from July to January. The y-axis ranges from 0 to 4,000. The data points are: 6, 3, 3, 17, 313, 109, 35, 36, 59, 35, 30, 33, 32, 45, 156, 237, 202, 745, 564, 1082, 1398, 1496, 1094, 1537, 1190, 1395, 1697, 2121, 2758, 3896, 3040, 1144.

What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Finding parameters

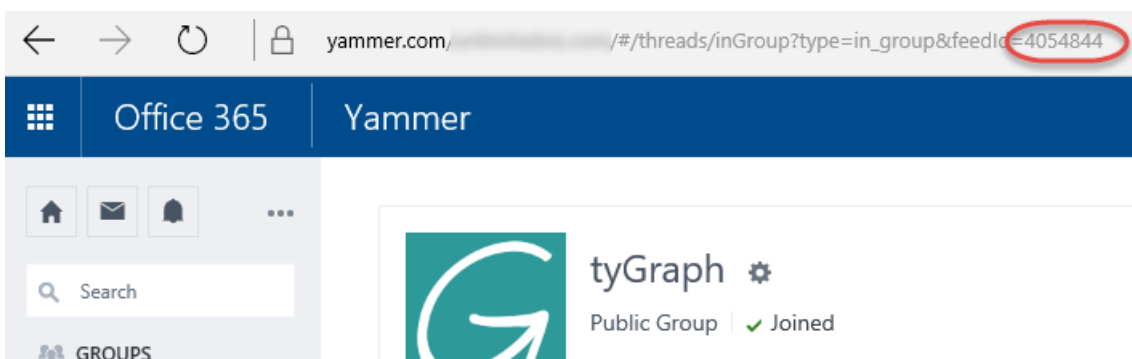
You can bring in data on all the groups you have access to, or you can choose to specify a subset. You can also create a subset of data by date. You can create multiple tyGraph dashboards to monitor specific sets of groups and/or dates. Details on these parameters are below.

Groups

The tyGraph API can filter data by specific group ID. These are provided to the content pack in a comma separated list.

Example: 2427647,946595,1154464

You can identify the group ID for a particular group in Yammer by navigating to the feed for the group, and examining the URL.



In the above example, the Yammer Group ID is 4054844

From Date

The From Date allows you to restrict the earliest value for the data returned. Only data created on or after this date will be loaded into the content pack. The format of the From Date is YYYY/MM/DD.

Example: 2013/10/29

In the above example, all data from on or after October 29, 2013 will be loaded into the content pack.

To Date The To Date allows you to restrict the latest value for the data returned. It can be used in conjunction with the From Date to load data from a range of dates. Only data created on or before this date will be loaded into the content pack. The format of the To Date is YYYY/MM/DD.

Example: 2014/10/20

In the above example, all data from on or prior to October 20, 2014 will be loaded into the content pack.

Next steps

[Get started in Power BI](#)

Get data in Power BI

Connect to UserVoice with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

Tracking and exploring your UserVoice data is easy with Power BI and the UserVoice content pack. Power BI retrieves your data, including tickets, suggestions and satisfaction ratings, then builds an out-of-box dashboard and reports based on that data.

Connect to the [UserVoice content pack](#) for Power BI.

NOTE

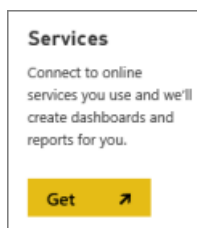
An admin account is required to connect to the Power BI content pack. The content pack also leverages the UserVoice API and will contribute usage towards the UserVoice limits. More details below.

How to connect

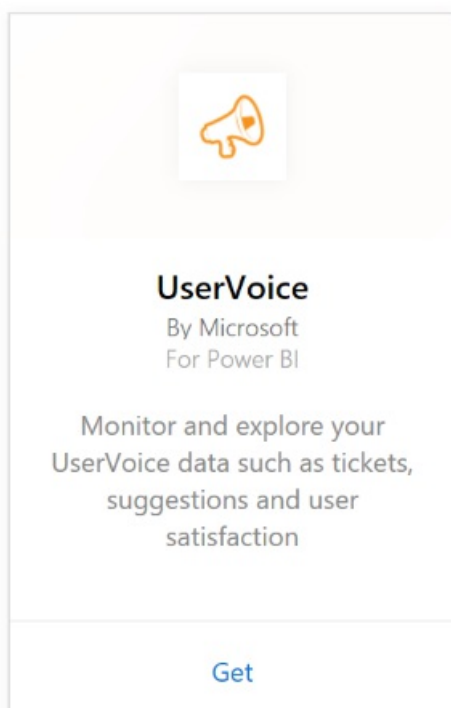
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



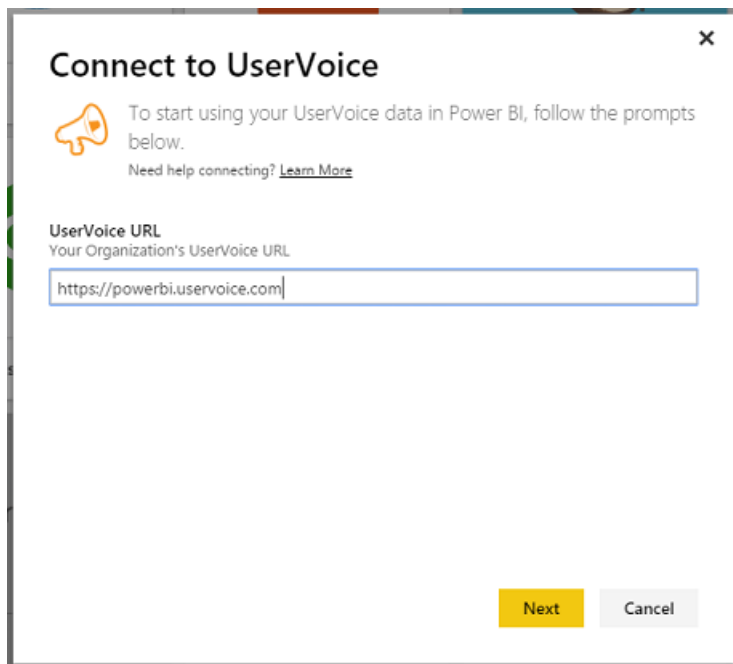
3. Select **UserVoice**, then select **Get**.



- When prompted, enter your UserVoice URL. The URL needs to follow the following pattern exactly <https://fabrikam.uservoice.com> replacing "fabrikam" with your product or service name.

NOTE

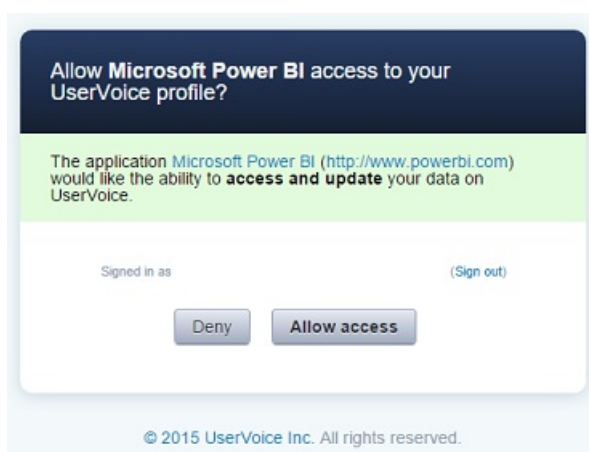
There is no trailing slash at the end and the connection is in https.



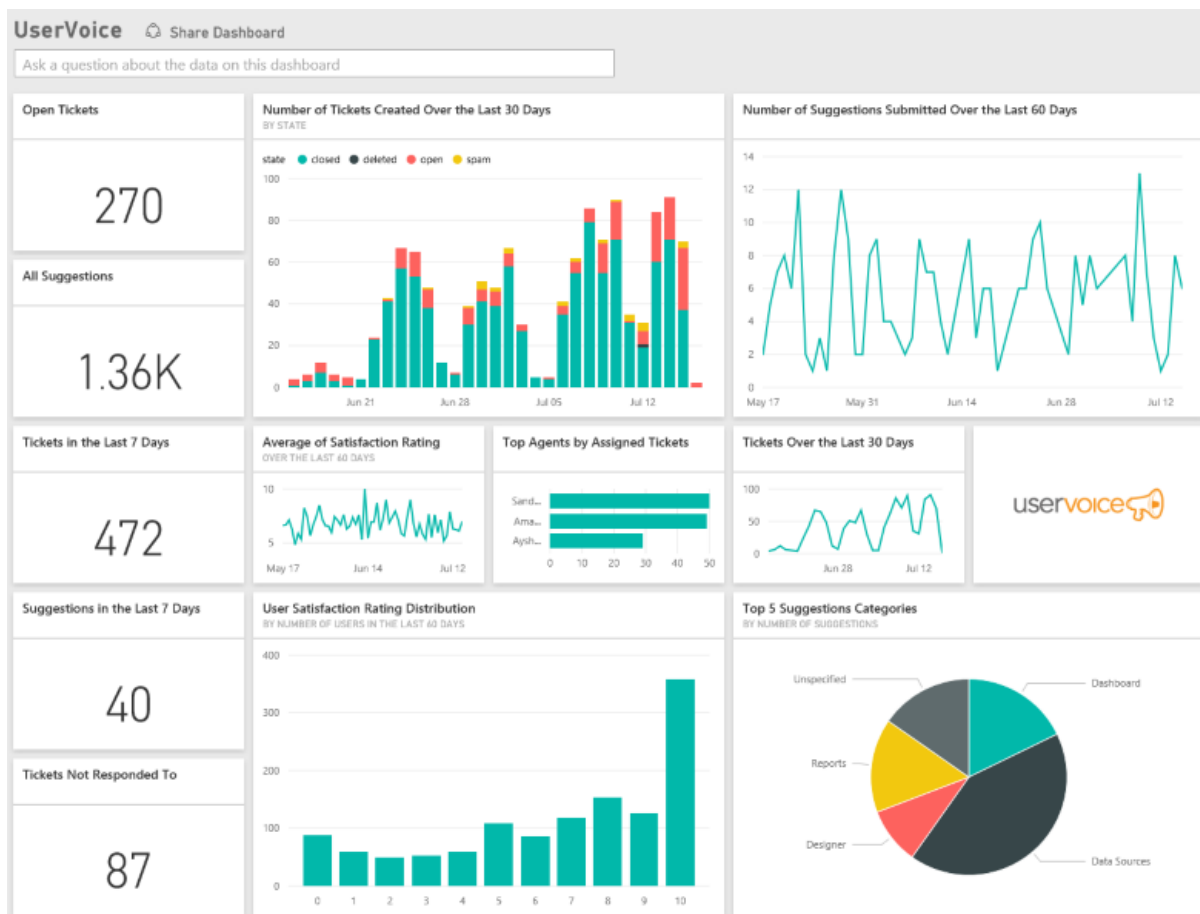
- When prompted, enter your UserVoice credentials and follow the UserVoice authentication process. If you are already signed in to UserVoice in your browser, you may not be prompted for credentials. Grant the Power BI application access to your data by clicking "Allow Access".

NOTE

You need admin credentials for your UserVoice account.



- Power BI will retrieve your UserVoice data and create a ready-to-use dashboard and report for you. Power BI will retrieve the following data: all your suggestions, all your open tickets, all tickets created in the last 30 days including closed ones and all the user satisfaction ratings.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Troubleshooting

"Parameter validation failed, please make sure all parameters are valid"

If you see this error after typing your UserVoice URL. Make sure the following requirements are satisfied:

- The URL follows exactly this pattern "<https://fabrikam.uservoice.com>" replacing "fabrikam" with your correct UserVoice URL prefix.
- Make sure all the letters are lower case.
- Make sure the URL is in 'https'.
- Make sure there are no trailing forward slash at the end of the URL.

"Login failed"

If you get a "login failed" error after using your UserVoice credentials to login, then the account you are using doesn't have permissions to retrieve the UserVoice data from your account. Verify it is an admin account and try again.

"Oops something went wrong"

If you get this error message while the data is being loaded, make sure your UserVoice account hasn't exceeded its monthly APIs usage quota. If all looks good, try connecting again. If the problem persists, please contact Power BI support at <https://community.powerbi.com>.

Other

The Power BI UserVoice content pack uses UserVoice's APIs to retrieve your data. Make sure you monitor your API usage so that you don't exceed your limit. If you have a lot of data in your UserVoice account, a suggestion to minimize the impact on your API usage is to change the refresh frequency from the current default which is once a day to only refresh on weekdays or every other day depending on your needs. Another suggestion is to have one admin create the content pack and share it with the rest of the team instead of having every admin in your organization create their own putting extra unnecessary load on the APIs

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to VMob with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Tracking and exploring your VMob data is easy with Power BI and the VMob content pack. Power BI will retrieve the following data: User Statistics for all time and in the last 30 days, Retail KPI for the last 30 days and Campaign Performance for the last 30 days.

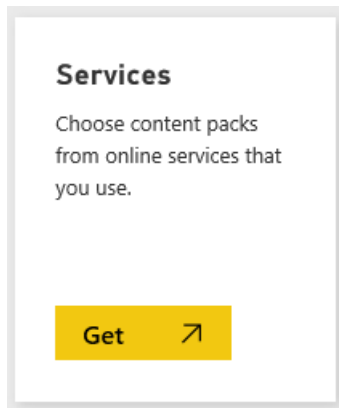
Connect to the [VMob content pack](#) for Power BI.

How to connect

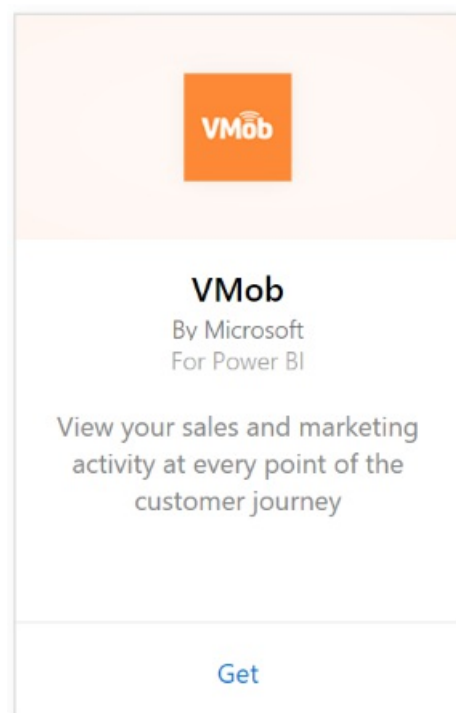
1. Select **Get Data** at the bottom of the left navigation pane.



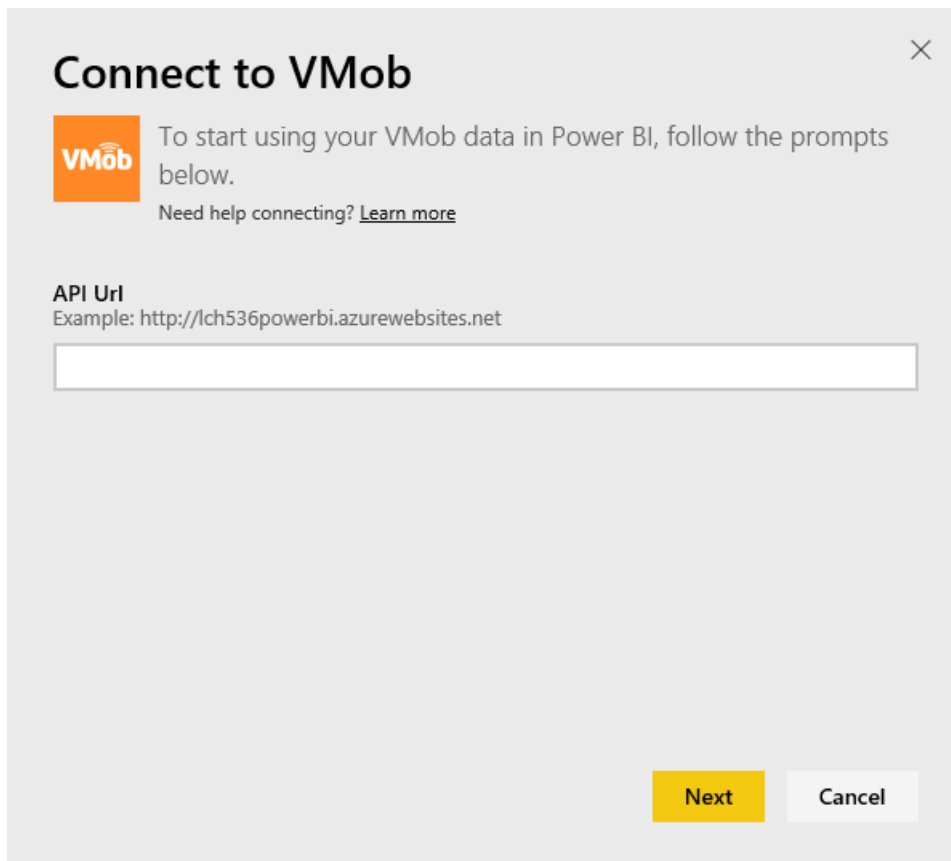
2. In the **Services** box, select **Get**.




3. Select **VMob** > **Get**.



- When prompted, enter your VMob URL and click on the Next button. This URL is provided by VMob separately.



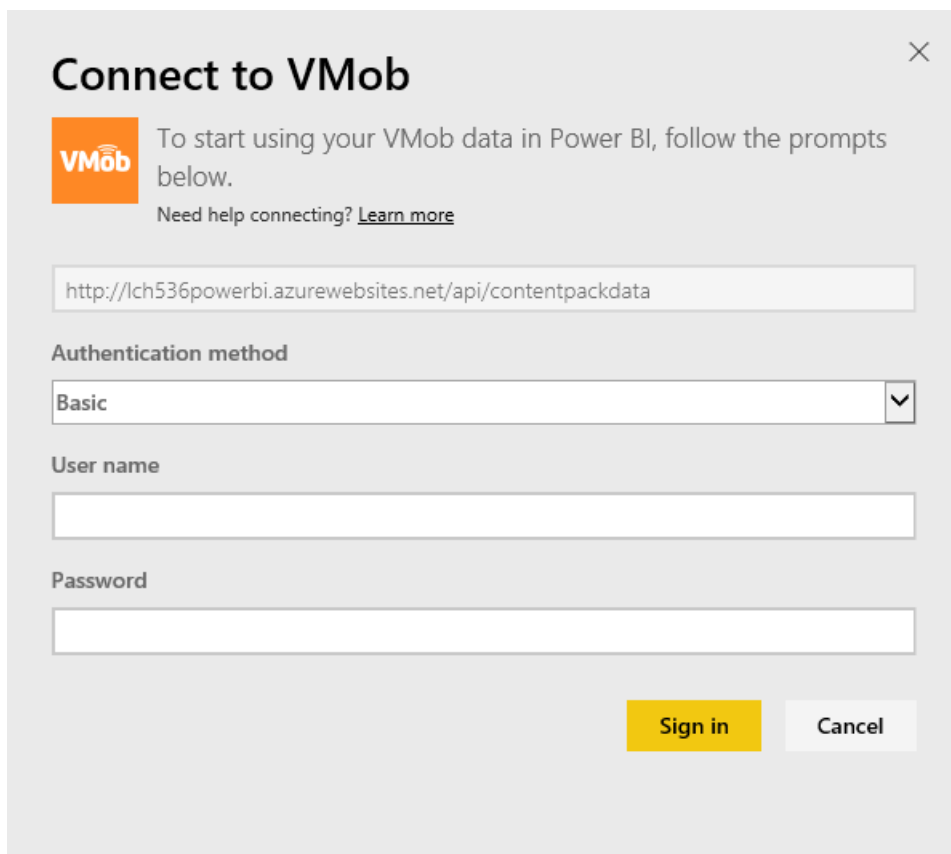
Connect to VMob ✕

 To start using your VMob data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)


API Url
Example: http://lch536powerbi.azurewebsites.net

Next **Cancel**

- Choose **Basic** option in the Authentication method dropdown, enter your VMob username and password and click on **Sign In** button.



Connect to VMob ✕

 To start using your VMob data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Authentication method

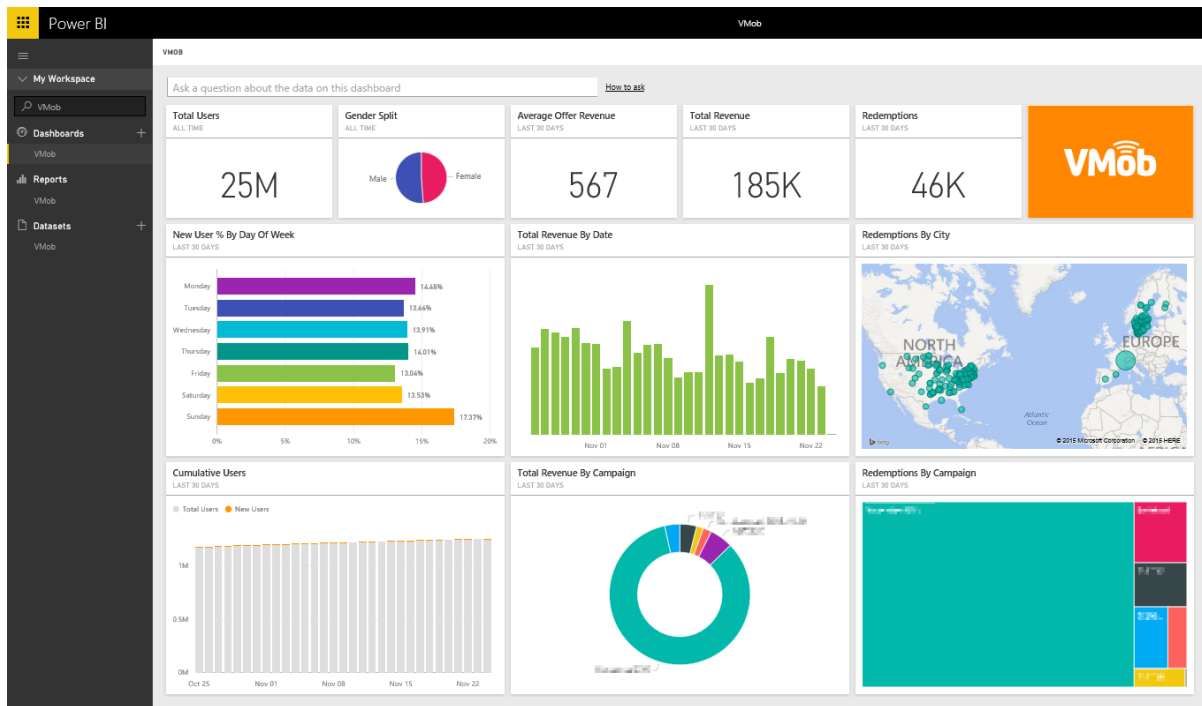
Basic ▼

User name

Password

Sign in **Cancel**

- The import process will begin automatically and Power BI will retrieve your VMob data to create a ready-to-use dashboard and report for you.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Webtrends with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

The Webtrends content pack for Power BI includes a variety of out of box metrics such total page views and visits by traffic source. Visualizing your Webtrends data in Power BI starts by connecting to your Webtrends account. You can use the dashboard and reports provided, or customize them to highlight the information you care most about. The data will be refreshed automatically once per day.

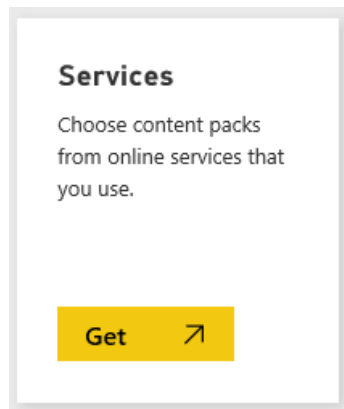
Connect to the [Webtrends content pack for Power BI](#).

How to connect

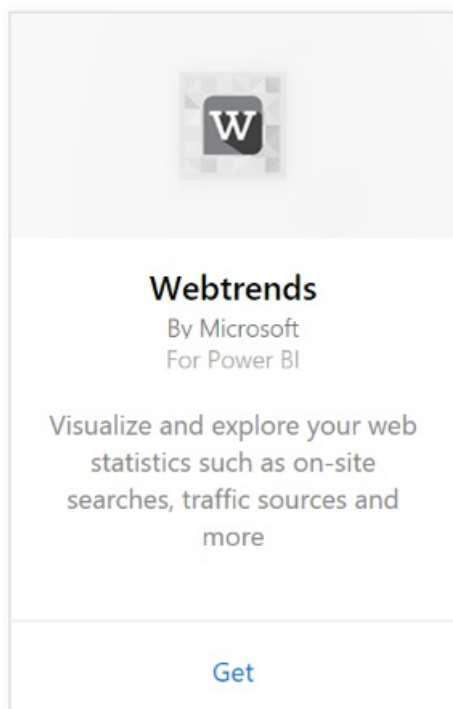
1. Select **Get Data** at the bottom of the left navigation pane.



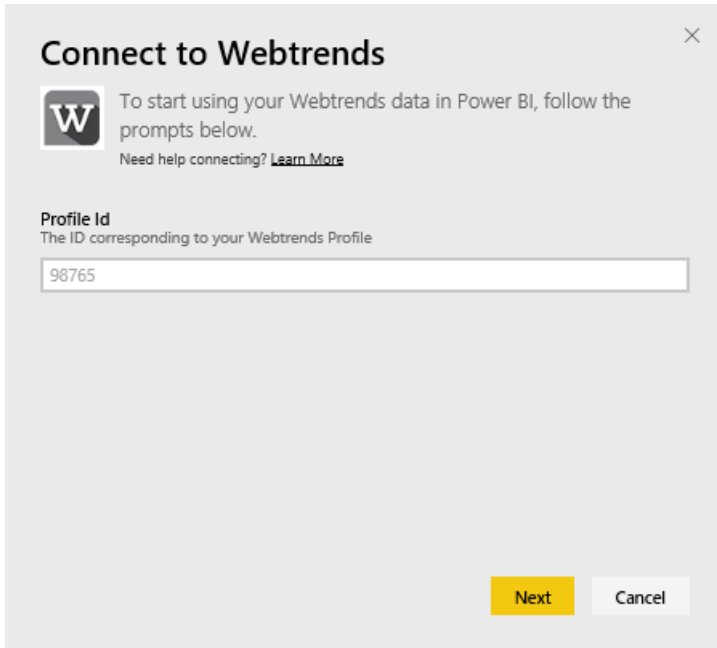
2. In the **Services** box, select **Get**.



3. Select **Webtrends > Get**.



4. The content pack connects to a specific Webtrends profile ID. See details on [finding this parameter](#) below.



Connect to Webtrends ×

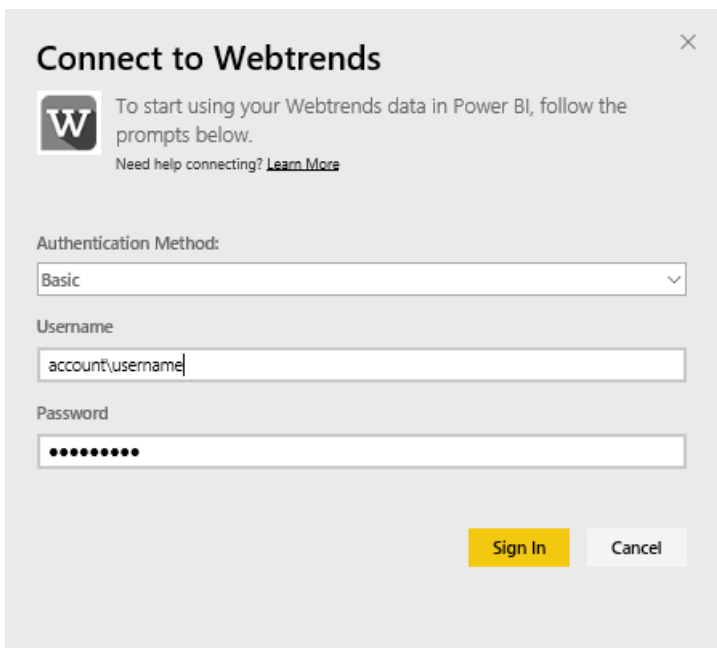
W To start using your Webtrends data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Profile Id
The ID corresponding to your Webtrends Profile

98765

Next **Cancel**

5. Provide your Webtrends credentials to connect. Note that the username field expects your account and username. See [details](#) below.



Connect to Webtrends ×

W To start using your Webtrends data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

Authentication Method:

Basic

Username

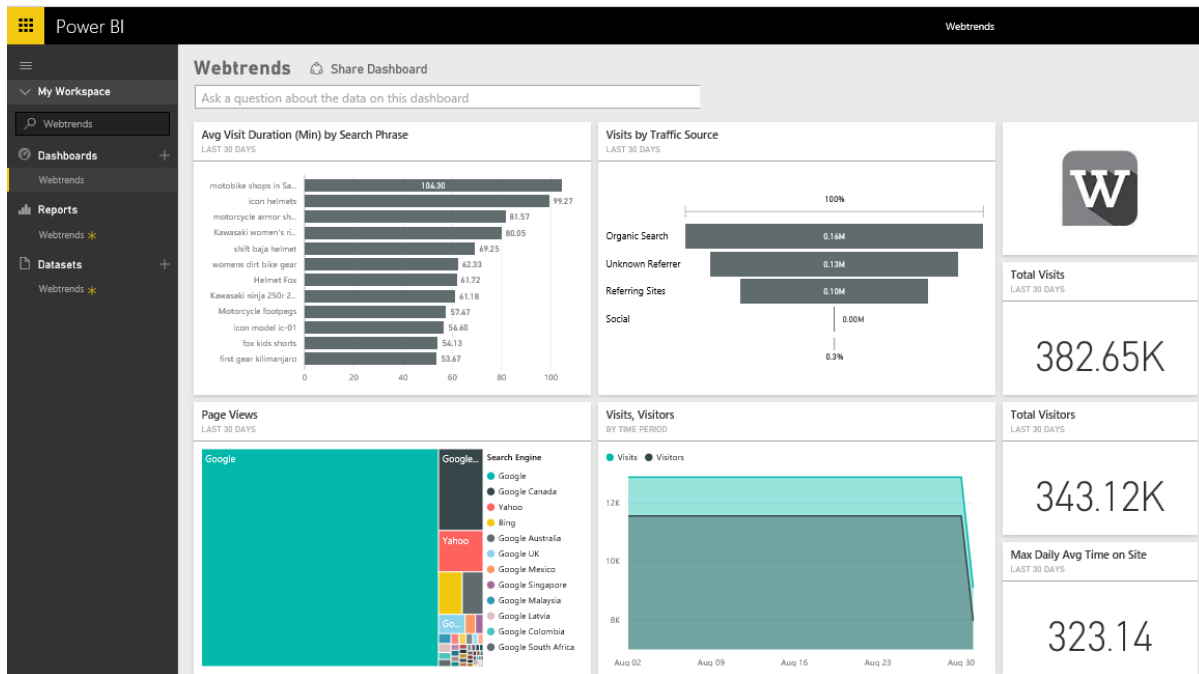
account\username

Password

••••••••

Sign In **Cancel**

6. After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The Webtrends content pack pulls data from the following reports:

REPORT NAME	REPORT ID
Key Metrics	
On-Site Searches	34awBVEP0P6
Exit Pages	7FshY8eP0P6
Next Pages	CTd5rpeP0P6
Previous Pages	aSdOeaUgnP6
Site Pages	oOEWQj3sUo6
Onsite Ads Clickthroughs	41df19b6d9f
Cities	aUuHskcP0P6
Countries	JHWXJNcP0P6
Visitors	xPcmTDDP0P6

REPORT NAME	REPORT ID
Visit Duration	U5KAyqdPOP6
Search Phrases	IKYEDxIP0P6
Traffic Sources	JmttAolP0P6
Search Engines	yGz3gAGP0P6
Entry Pages	i6LrkNVRUo6

NOTE

For SharePoint profiles, the metric names may be a little different than what's show in the Webtrends UI. The following mapping is done to maintain consistency between SharePoint and Web profiles:

- Sessions = Visits
- New Users = New Visitors
- Views per Session = Page Views per Visit
- Avg Daily User Duration = Avg Time on Site per Visitor

System requirements

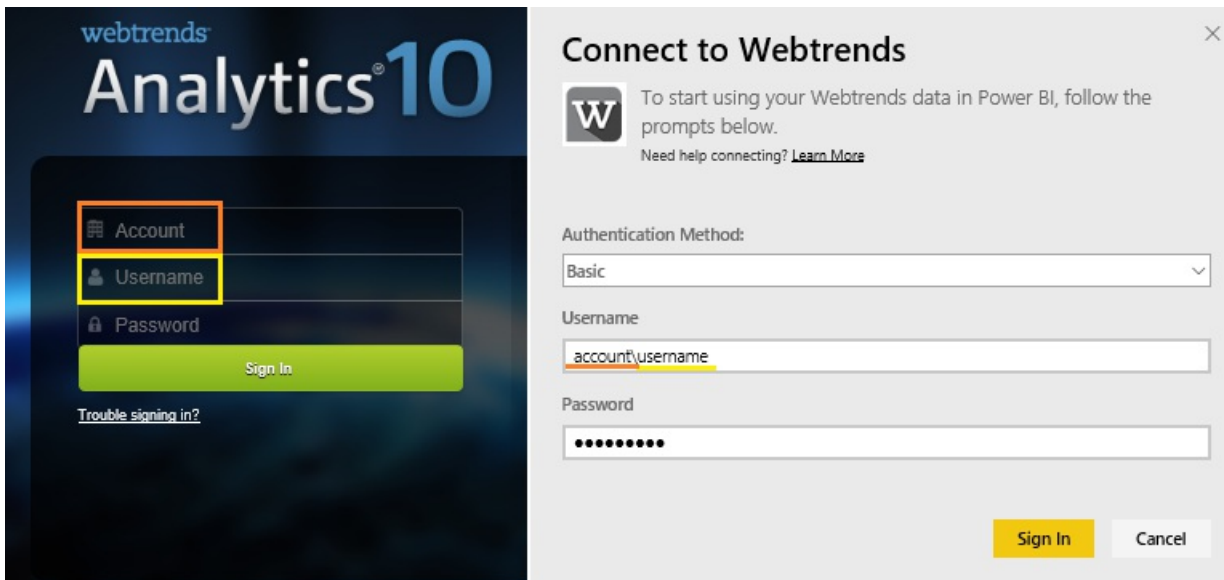
The content pack requires access to a Webtrends profile with the [correct set of reports](#) enabled.

Finding parameters

Your Webtrends Profile ID can be found in the URL after you've selected a profile:

The screenshot shows the Webtrends analytics interface. The URL in the browser's address bar is `analytics.webtrends.com/analytics/spaces/116717/profiles/887618%7B%22profile%22%3A%7B%22dashboardType%22%3A%...`. The profile ID `887618` is highlighted with an orange box. The dashboard is titled "Groundhog Day" and shows "Partner reporting data set" for "This month" (SEP 1ST - 30TH, 2015). The dashboard includes several metrics: PAGE VIEWS, VISITS, PAGE VIEWS PER VISIT, NEW VISITORS, AVG VISITORS PER DAY, AVG TIME ON SITE, and BOUNCE RATE.

Your credentials are the same as what you enter when you sign into Webtrends, however we expect your account and username in the same line, separated by a backslash:



Troubleshooting

You may hit an issue while the content pack is loading, after you've provided your credentials. If you see the "Oops" message during the loading, please review the troubleshooting suggestions below. If you're still having issues please file a support ticket at <https://support.powerbi.com>

1. The correct Profile ID is being used, see the [Finding Parameters](#) for more details.
2. The user has access to the reports listed in the "What's included" section

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Windows Dev Center with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Explore and monitor your Windows Dev Center app analytics data in Power BI with the Power BI content pack. The data will be refreshed automatically once per day.

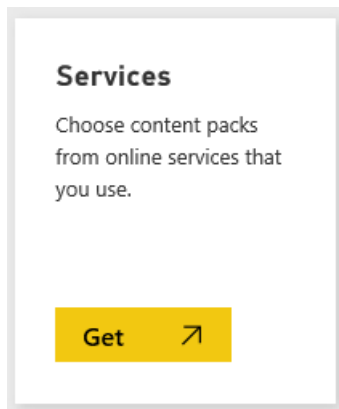
Connect to the [Windows Dev Center content pack](#) for Power BI.

How to connect

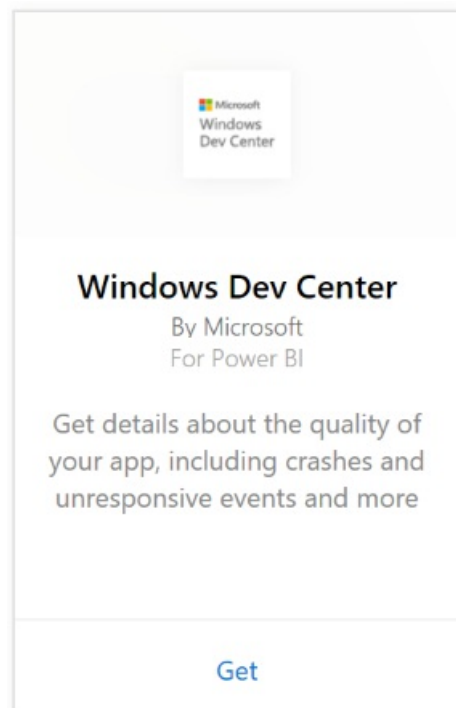
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Windows Dev Center > Get**.



4. Enter the application ID of an app you own and click Next. See details on [finding those parameters](#) below.

Microsoft
Windows
Dev Center

Connect to Windows Dev Center

Application ID
ID corresponding to your Dev Center Application

Need help connecting? [Learn more](#)

Next Cancel

5. For **Authentication Method**, select **oAuth2** > **Sign In**. When prompted, enter your Azure Active Directory credentials associated with your Windows Dev Center account (more details in [System Requirements](#)).

Microsoft
Windows
Dev Center

Connect to Windows Dev Center

Url

Authentication method

Sign in Cancel



Work or school, or personal Microsoft account

[Sign in](#)

[Can't access your account?](#)

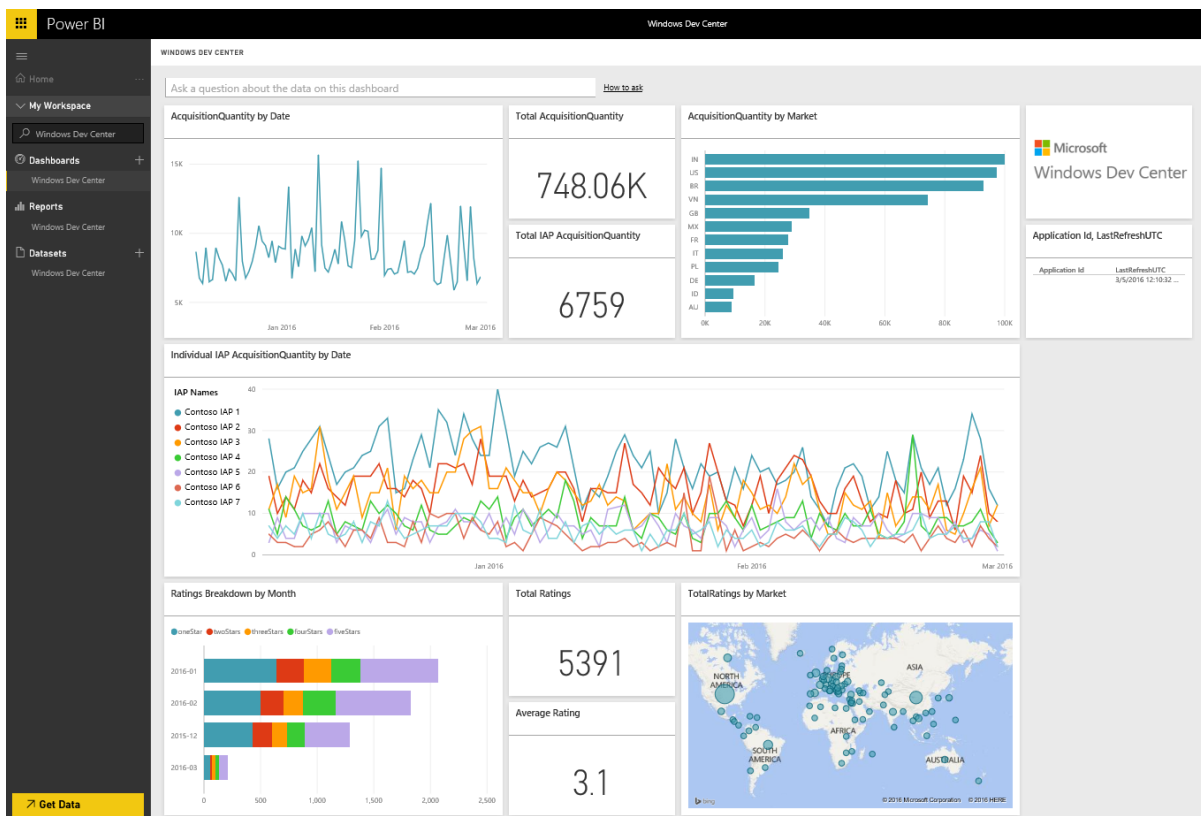
Don't have an account assigned by your work or school?
[Sign in with a Microsoft account](#)

© 2016 Microsoft



[Terms of use](#) [Privacy & Cookies](#)

- After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data and choose a tile to navigate to the underlying reports.





What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The Dev Center Power BI content pack includes analytics data for your app and IAP acquisitions, ratings, reviews and app health. Data is limited to the last 3 months. and is a moving window, so the dates included will update as the dataset refreshes.

System requirements

This content pack requires at least one at least one app published to the Windows Store and a Windows Dev Center account (more details [here](#)).

Finding parameters

You can find the application ID for an app by going to the App identity page under App management.

The application ID is on the end of your URL for Windows 10 Store, <https://www.microsoft.com/store/apps/{applicationId}>

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Xero with Power BI

1/19/2018 • 3 min to read • [Edit Online](#)

Xero is easy to use online accounting software that's designed specifically for small businesses. Create compelling visualizations based on your Xero financials with this Power BI content pack. Your default dashboard includes many small business metrics like cash position, revenue vs. expenses, profit loss trend, debtor days and return on investment.

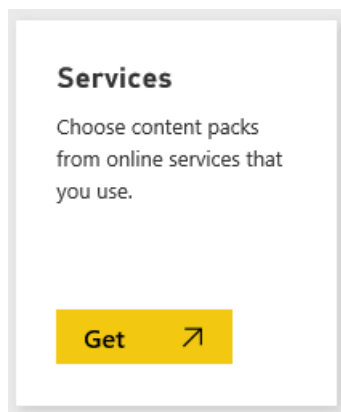
Connect to the [Xero content pack](#) for Power BI or learn more about the [Xero and Power BI](#) integration.

How to connect

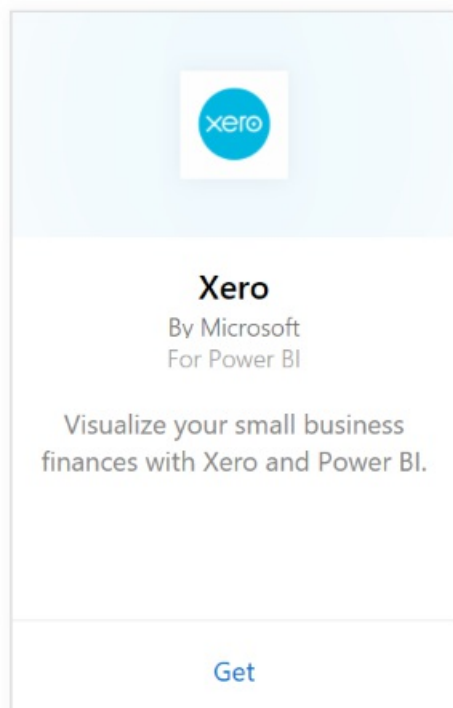
1. Select **Get Data** at the bottom of the left navigation pane.



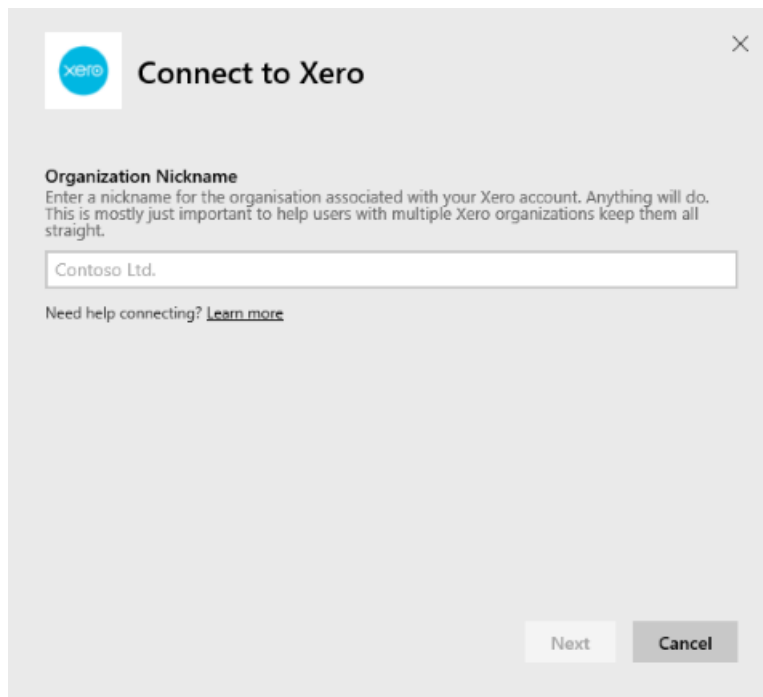
2. In the **Services** box, select **Get**.



3. Select **Xero > Get**.

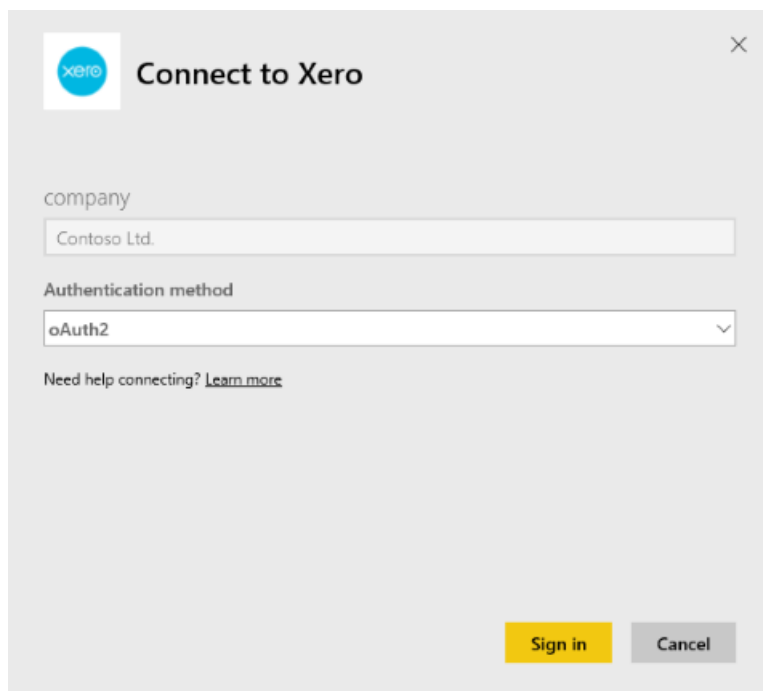


4. Enter a nickname for the organisation associated with your Xero account. Anything will do, this is mostly to help users with multiple Xero organizations keep them all straight. See details on [below](#).



The screenshot shows a dialog box titled "Connect to Xero" with the Xero logo in the top left corner. Below the title, there is a section labeled "Organization Nickname" with a sub-header. The sub-header text reads: "Enter a nickname for the organisation associated with your Xero account. Anything will do. This is mostly just important to help users with multiple Xero organizations keep them all straight." Below this text is a text input field containing the text "Contoso Ltd.". Underneath the input field, there is a link that says "Need help connecting? [Learn more](#)". At the bottom right of the dialog, there are two buttons: "Next" and "Cancel".

5. For **Authentication Method** and select **OAuth**, when prompted sign into your Xero account and select the organisation to connect to. Once the login completes, select **Sign In** to start the loading process.



The screenshot shows the same "Connect to Xero" dialog box. In this step, the "company" field is visible above the "Contoso Ltd." input. Below the company field is a section labeled "Authentication method" with a dropdown menu. The dropdown menu is open, showing "OAuth2" as the selected option. Below the dropdown, there is a link that says "Need help connecting? [Learn more](#)". At the bottom right of the dialog, there are two buttons: "Sign in" (highlighted in yellow) and "Cancel".


Welcome to Xero

To authorise the application Power BI, simply login to your Xero account...

Login

[Forgot your password?](#)

Better protect your Xero data with two-step authentication

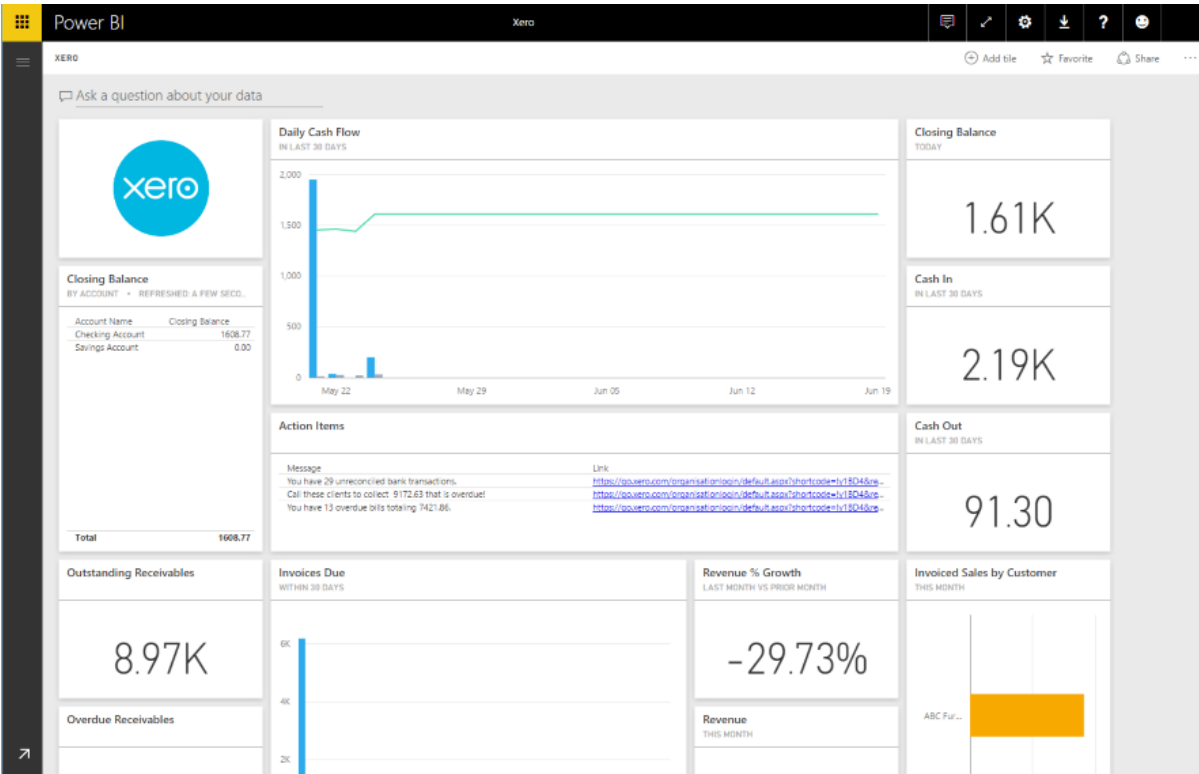


[Learn More >](#)

Don't have a login? [Try Xero for free](#)

[Terms of use](#) [Privacy](#)

6. After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.

- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack dashboard includes tiles and metrics that cover a variety of areas, with corresponding reports to learn more:

AREA	DASHBOARD TILES	REPORT
Cash	Daily cash flow Cash in Cash out Closing balance by account Closing balance today	Bank Accounts
Customer	Invoiced sales Invoiced sales by customer Invoiced sales growth trend Invoices due Outstanding receivables Overdue receivables	Customer Inventory
Supplier	Billed purchases Billed purchases by supplier Billed purchases growth trend Bills due Outstanding payables Overdue payables	Suppliers Inventory
Inventory	Monthly sales amount by product	Inventory
Profit and loss	Monthly profit and loss Net profit this fiscal year Net profit this month Top expense accounts	Profit and Loss
Balance sheet	Total assets Total liabilities Equity	Balance Sheet
Health	Current ratio Gross profit percentage Return on total assets Total liabilities to equity ratio	Health Glossary and Technical Notes

The dataset also includes the following tables to customize your reports and dashboards:

- Addresses
- Alerts
- Bank Statement Daily Balance
- Bank Statements
- Contacts
- Expense Claims
- Invoice Line Items
- Invoices

- Items
- Month End
- Organisation
- Trial Balance
- Xero Accounts

System requirements

The following roles are required to access the Xero content pack: "Standard + Reports" or "Advisor".

Finding parameters

Provide a name for your organisation to track in Power BI. This allows you to connect to multiple different organisations. Note that you cannot connect to the same organisation multiple times, as it will affect the scheduled refresh.

Troubleshooting

- Xero users must have the following roles to access the Xero content pack for Power BI: "Standard + Reports" or "Advisor". The content pack relies on the user-based permissions to access reporting data through Power BI.
- If you receive a failure after loading for some time, verify how long it took to see that error message. Note that the access token provided by Xero is only valid for 30min so accounts with more data than can be loaded in that timeframe will fail. We're actively working to improve this.
- During the load the tiles on the dashboard will be in a generic loading state. This is not expected to change until the full load completes. If you receive a notification that your load completed but the tiles are still loading, try refreshing the dashboard tiles using the ... in the top right of your dashboard.
- If your content pack fails to refresh, please check if you have connected to the same organisation more than once in Power BI. Xero only allows a single active connection to an organisation and you may see an error indicating your credentials are invalid if you connect to the same one more than once.
- For issues connecting the Xero content pack for Power BI like error messages or very slow load times, first clear the cache / cookies and restart the browser, then reconnect to Power BI.

For other issues, please file a ticket at <http://support.powerbi.com> if the issue persists.

Next steps

[Get started in Power BI](#)

[Get data in Power BI](#)

Connect to Zendesk with Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

The Zendesk content pack offers a Power BI dashboard and a set of Power BI reports that provide insights about your ticket volumes and agent performance. You can use the dashboard and reports provided, or customize them to highlight the information you care most about. The data will be refreshed automatically once a day.

Connect to the [Zendesk content pack](#) or read more about the [Zendesk integration](#) with Power BI.

NOTE

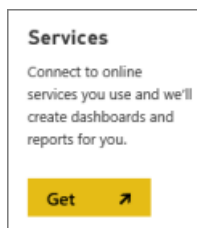
A Zendesk Admin account is required to connect. More details on [requirements](#) below.

How to connect

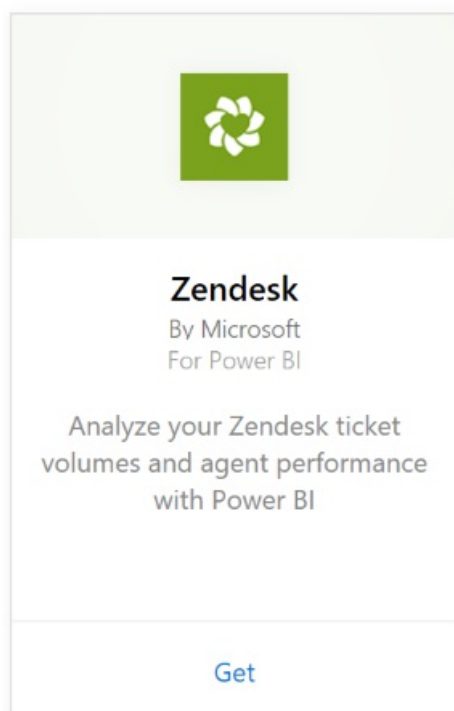
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.

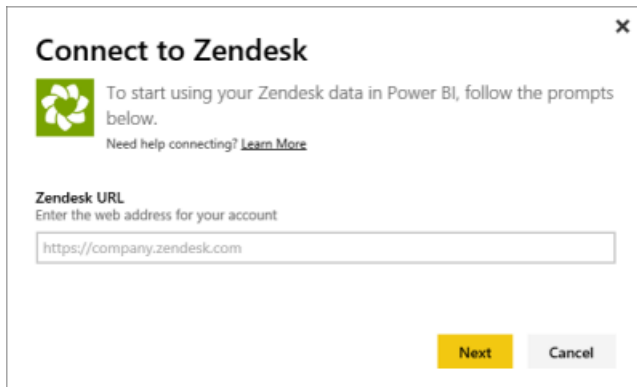


3. Select **Zendesk > Get**.




4. Provide the URL associated with your account. This will be in the form <https://company.zendesk.com>, see

details on [finding these parameters](#) below.



Connect to Zendesk ✕

 To start using your Zendesk data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

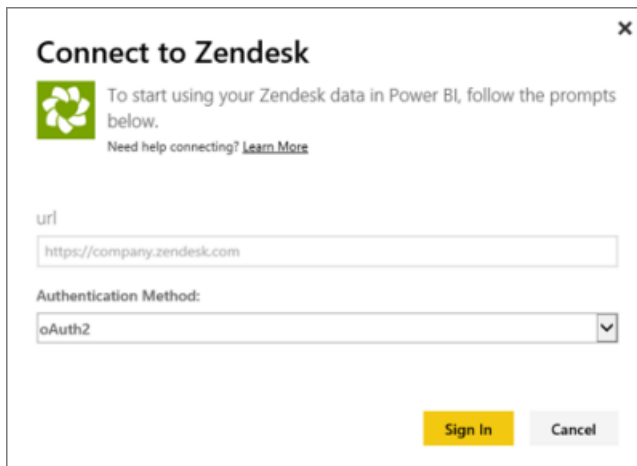
Zendesk URL
Enter the web address for your account

Next **Cancel**


5. When prompted, enter your Zendesk credentials. Select **oAuth 2** as the Authentication Mechanism and click **Sign In**. Follow the Zendesk authentication flow. (If you are already signed in to Zendesk in your browser, you may not be prompted for credentials.)

NOTE

This content pack requires you connect with a Zendesk Admin account.



Connect to Zendesk ✕

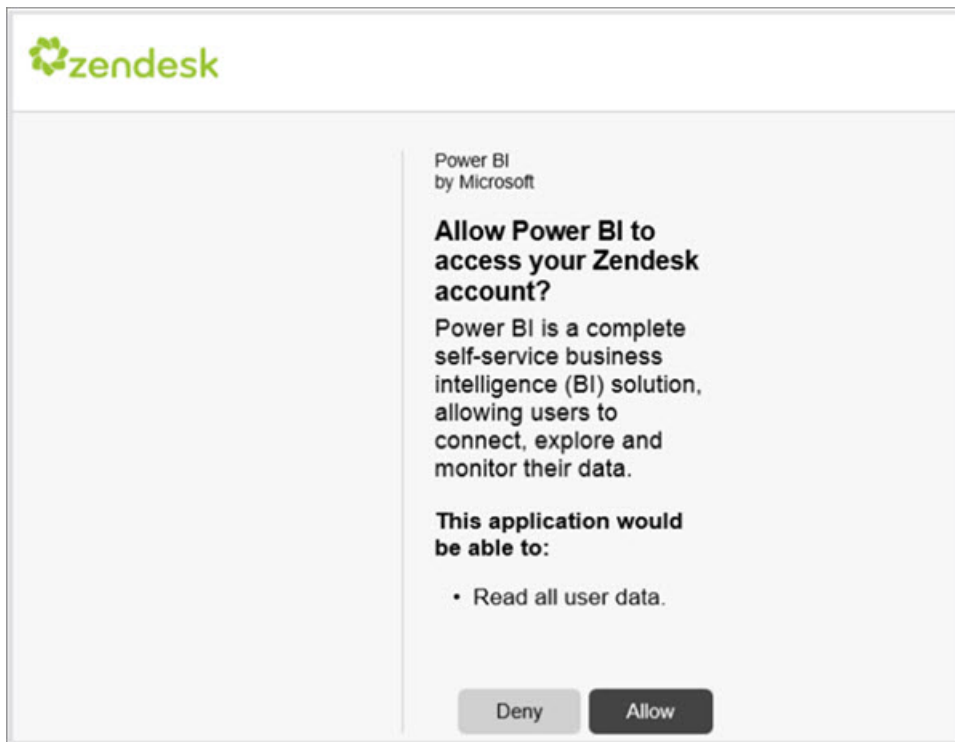
 To start using your Zendesk data in Power BI, follow the prompts below.
Need help connecting? [Learn More](#)

url

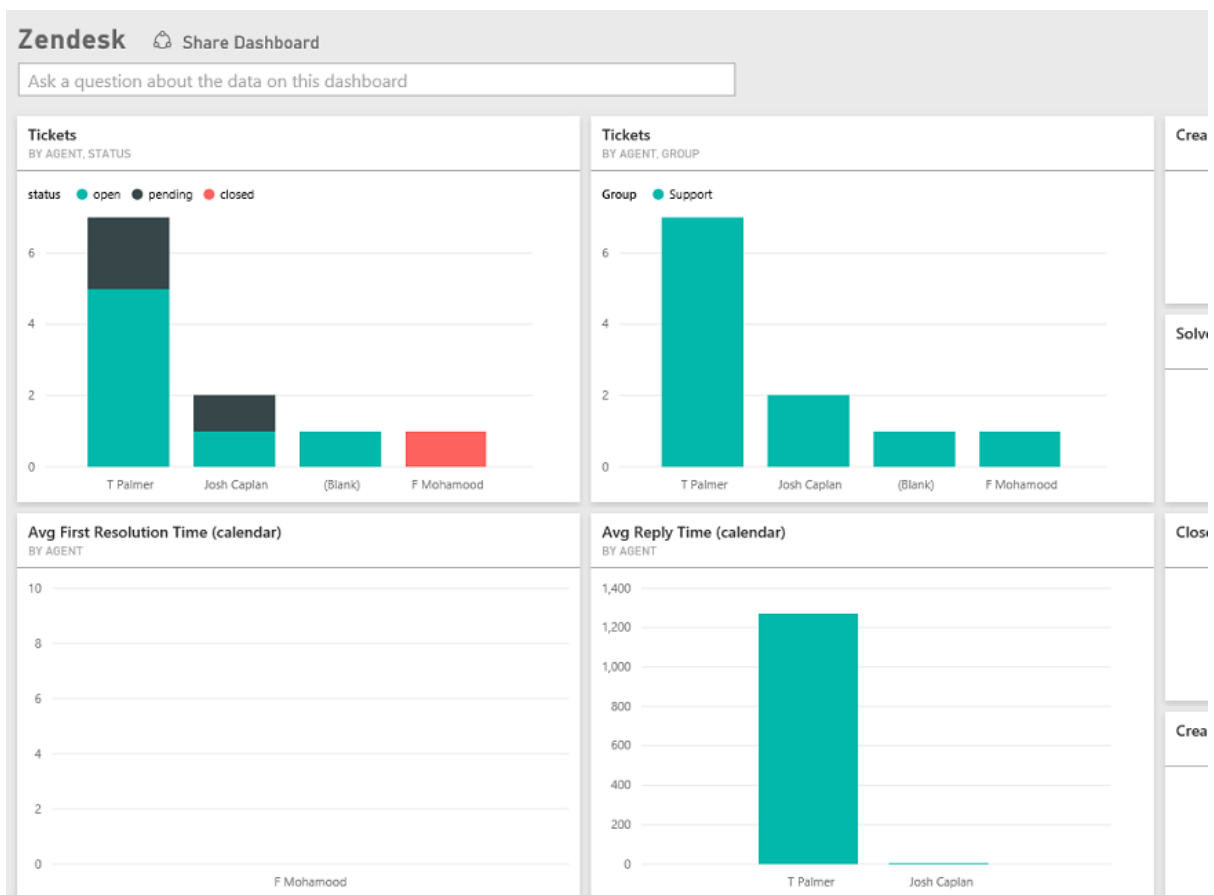
Authentication Method:

Sign In **Cancel**

6. Click **Allow** to allow Power BI to access your Zendesk data.



7. Click **Connect** to begin the import process. After Power BI imports the data, you see a new dashboard, report, and dataset in the left navigation pane. New items are marked with a yellow asterisk *.



What now?

- Try asking a question in the Q&A box at the top of the dashboard
- Change the tiles in the dashboard.
- Select a tile to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The Power BI content pack includes data on the following:

- Users (end users and agents)
- Organizations
- Groups
- Tickets

There's also a set of measures that have been calculated, such as Average Wait Time and Tickets Solved in the Last 7 days. A full list is included in the content pack.

System requirements

A Zendesk Administrator account is required to access the Zendesk content pack. If you're an agent or an end user and are interested in viewing your Zendesk data, please add a suggestion and review the Zendesk connector in the [Power BI Desktop](#).

Finding parameters

Your Zendesk URL will be the same as the URL you use to sign into your Zendesk account. If you're not sure of your Zendesk URL, you can use the Zendesk [login help](#).

Troubleshooting

If you are having issues connecting, please check your Zendesk URL and confirm you're using an Zendesk administrator account.

Next steps

- [Get started with Power BI](#)
- [Get data](#)

Connect to Ziosk Survey Analytics with Power BI

1/19/2018 • 1 min to read • [Edit Online](#)

Ziosk Survey Analytics content pack for Power BI offers restaurants with Ziosk tablets unparalleled access to insights provided by Ziosk survey data, including segmentation by day, location, employee, and more.

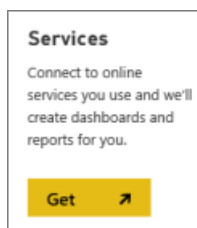
Connect to the [Ziosk Survey Analytics content pack](#) for Power BI.

How to connect

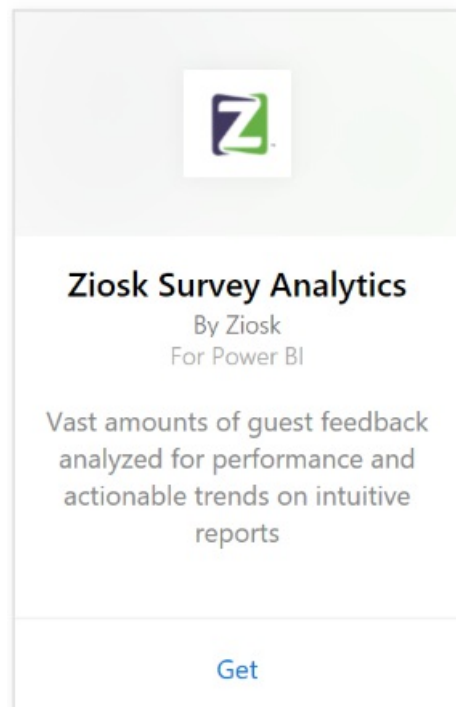
1. Select **Get Data** at the bottom of the left navigation pane.



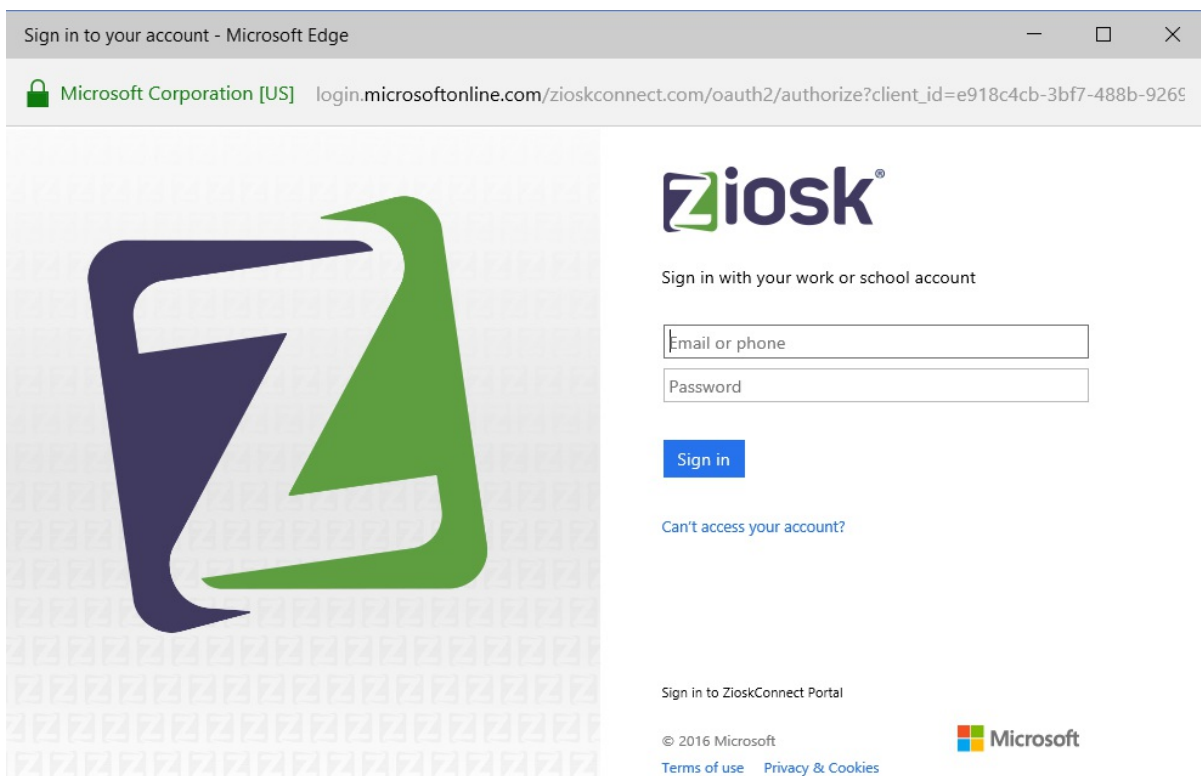
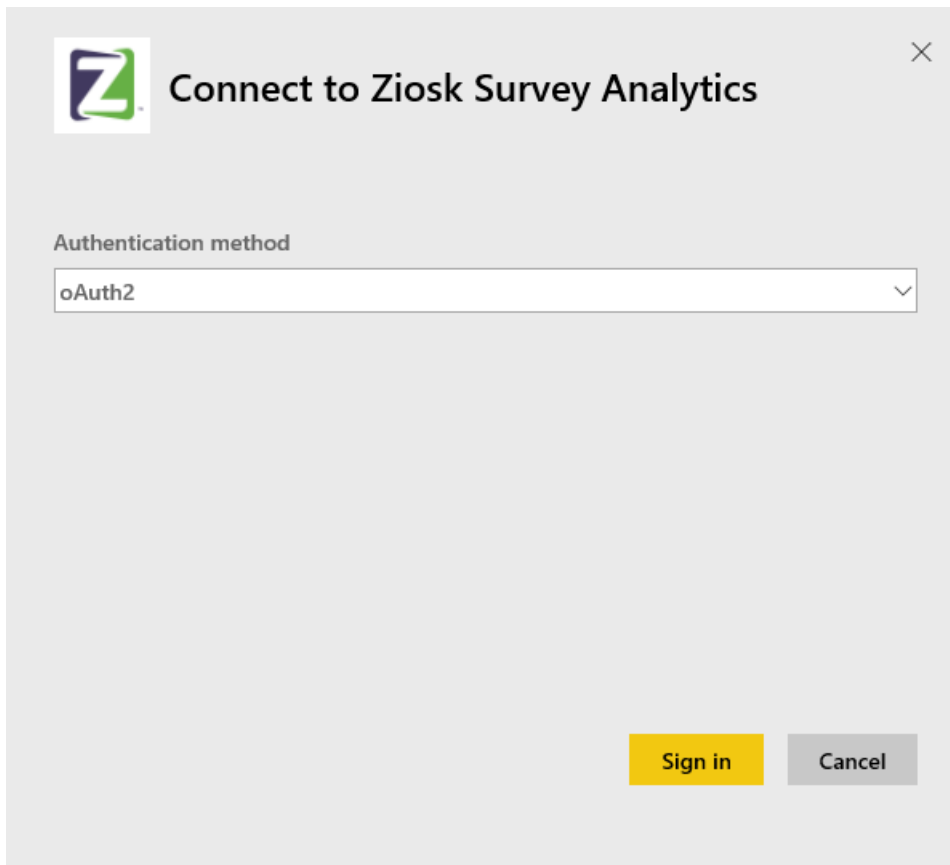
2. In the **Services** box, select **Get**.



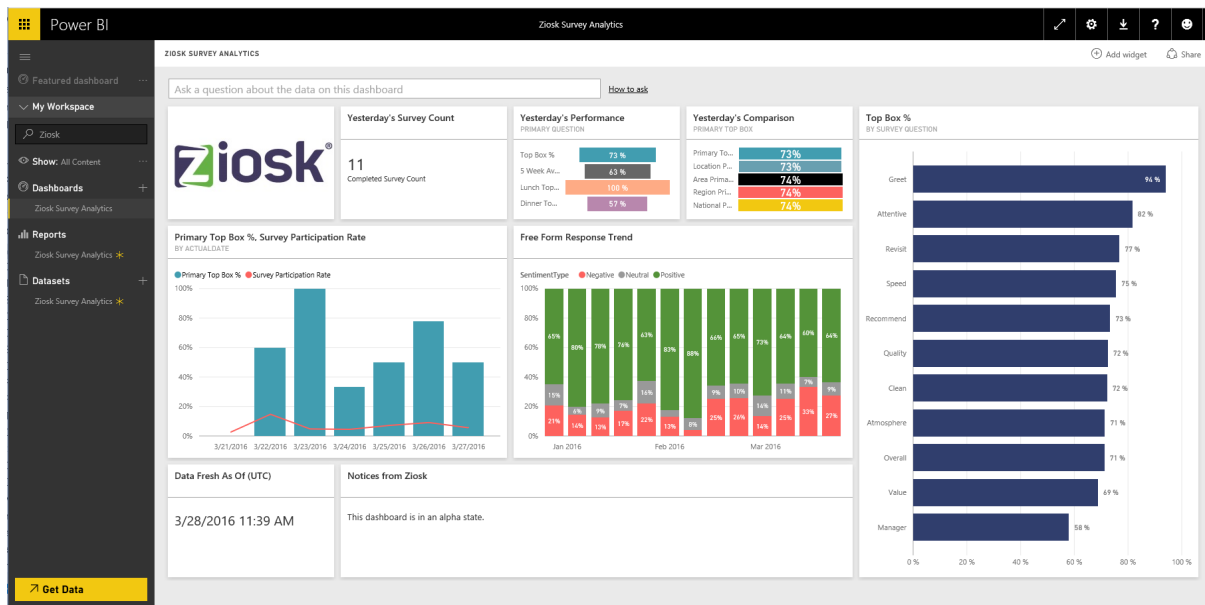
3. Select **Ziosk Survey Analytics**, then select **Get**.



4. Select **OAuth 2** and then **Sign In**. When prompted, provide your Ziosk credentials.



5. Once connected, a dashboard, report and dataset will automatically be loaded. When completed, the tiles will update with data from your Ziosk account.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be scheduled to refresh daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack includes data from the following tables:

- Alcohol Category
- Appetizer Category
- CommentKeywords
- Date
- Daypart
- Dessert Category
- FreeForm
- Kids Category
- Messages
- Premium Content Category
- Question
- Store
- Surveys
- Weekday

System requirements

A Ziosk account with permissions to the above tables is required in order to instantiate this content pack.

Next steps

[Get started with Power BI](#)

[Power BI - Basic Concepts](#)

Connect to Zuora with Power BI

1/19/2018 • 3 min to read • [Edit Online](#)

Zuora for Power BI allows you to visualize important revenue, billing, and subscription data. Use the default dashboard and reports to analyze usage trends, track billings and payments, and monitor recurring revenue, or customize them to meet your own unique dashboard and reporting needs.

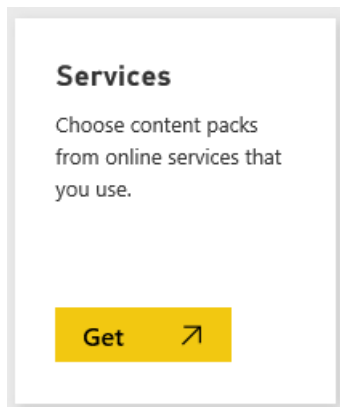
Connect to the [Zuora](#) for Power BI.

How to connect

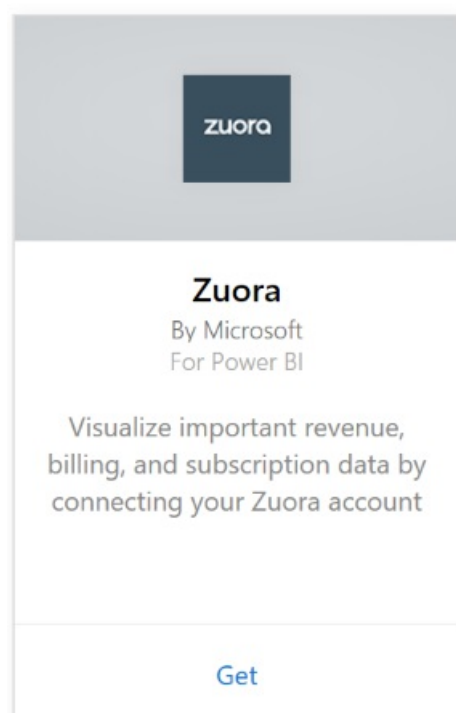
1. Select **Get Data** at the bottom of the left navigation pane.



2. In the **Services** box, select **Get**.



3. Select **Zuora > Get**.



4. Specify your Zuora URL. This is typically "<https://www.zuora.com>", see details on [finding those parameters](#)

below.

Connect to Zuora

zuora To start using your Zuora data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Zuora Service URL
This is likely <https://www.zuora.com> or <https://apisandbox.zuora.com>

Example: <https://www.zuora.com>

Next Cancel

5. For **Authentication Method**, select **Basic** and provide your username and password (case sensitive), then select **Sign In**.

Connect to Zuora

zuora To start using your Zuora data in Power BI, follow the prompts below.
Need help connecting? [Learn more](#)

Zuora Service URL
This is likely <https://www.zuora.com> or <https://apisandbox.zuora.com>

Example: <https://www.zuora.com>

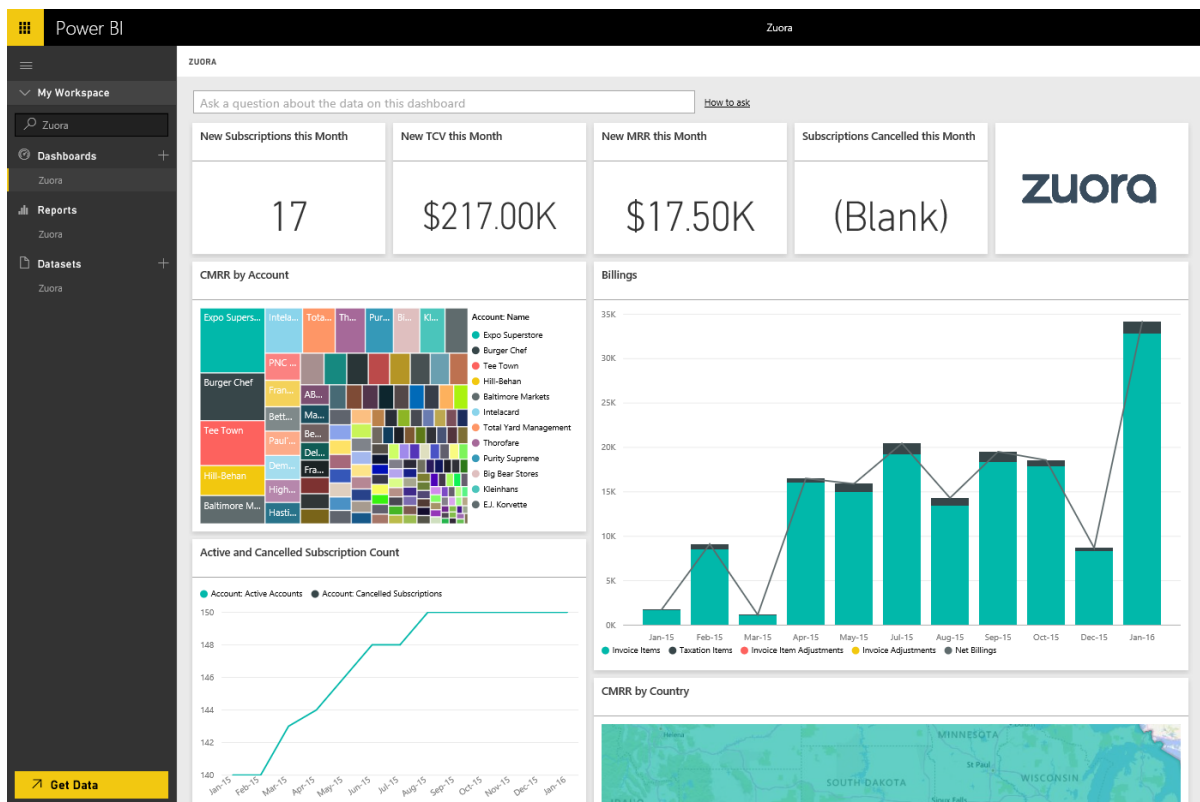
Authentication method
Basic

User name

Password

Sign in Cancel

6. After approving, the import process will begin automatically. When complete, a new dashboard, report and model will appear in the Navigation Pane. Select the dashboard to view your imported data.



What now?

- Try [asking a question in the Q&A box](#) at the top of the dashboard
- [Change the tiles](#) in the dashboard.
- [Select a tile](#) to open the underlying report.
- While your dataset will be schedule to refreshed daily, you can change the refresh schedule or try refreshing it on demand using **Refresh Now**

What's included

The content pack uses the Zuora AQUA API to pull in the following tables:

TABLES		
Account	InvoiceltemAdjustment	Refund
AccountingCode	Payment	RevenueSchedule
AccountingPeriod	PaymentMethod	RevenueScheduleItem
BillTo	Product	Subscription
DateDim	ProductRatePlan	TaxationItem
Invoice	ProductRatePlanCharge	Usage
InvoiceAdjustment	RatePlan	
Invoiceltem	RatePlanCharge	

It also includes these calculated measures:

MEASURE	DESCRIPTION	PSEUDO-CALCULATION
Account: Payments	Total payment amounts in a time period, based on payment effective date.	SUM (Payment.Amount) WHERE Payment.EffectiveDate = < TimePeriod.EndDate AND Payment.EffectiveDate >= TimePeriod.StartDate
Account: Refunds	Total refund amounts in a time period, based on refund refund date. Amount is reported as a negative number.	-1*SUM(Refund.Amount) WHERE Refund.RefundDate = < TimePeriod.EndDate AND Refund.RefundDate >= TimePeriod.StartDate
Account: Net Payments	Account Payments plus Account Refunds in a time period.	Account.Payments + Account.Refunds
Account: Active Accounts	The count of accounts that were active in a time period. Subscriptions must have started before (or on) time period start date.	COUNT (Account.AccountNumber) WHERE Subscription.Status != "Expired" AND Subscription.Status != "Draft" AND Subscription.SubscriptionStartDate <= TimePeriod.StartDate AND (Subscription.SubscriptionEndDate > TimePeriod.StartDate OR Subscription.SubscriptionEndDate = null) –evergreen subscription
Account: Average Recurring Revenue	Gross MRR per active account in a time period.	Gross MRR / Account.ActiveAccounts
Account: Cancelled Subscriptions	The count of accounts that cancelled a subscription in a time period.	COUNT (Account.AccountNumber) WHERE Subscription.Status = "Cancelled" AND Subscription.SubscriptionStartDate <= TimePeriod.StartDate AND Subscription.CancelledDate >= TimePeriod.StartDate
Account: Payment Errors	Total value of payment errors.	SUM (Payment.Amount) WHERE Payment.Status = "Error"
Revenue Schedule Item: Recognized Revenue	Total recognized revenue in an accounting period.	SUM (RevenueScheduleItem.Amount) WHERE AccountingPeriod.StartDate = TimePeriod.StartDate
Subscription: New Subscriptions	Count of new subscriptions in a time period.	COUNT (Subscription.ID) WHERE Subscription.Version = "1" AND Subscription.CreatedDate <= TimePeriod.EndDate AND Subscription.CreatedDate >= TimePeriod.StartDate

MEASURE	DESCRIPTION	PSEUDO-CALCULATION
Invoice: Invoice Items	Total invoice item charge amounts in a time period.	SUM (InvoiceItem.ChargeAmount) WHERE Invoice.Status = "Posted" AND Invoice.InvoiceDate <= TimePeriod.EndDate AND Invoice.InvoiceDate >= TimePeriod.StartDate
Invoice: Taxation Items	Total taxation item tax amounts in a time period.	SUM (TaxationItem.TaxAmount) WHERE Invoice.Status = "Posted" AND Invoice.InvoiceDate <= TimePeriod.EndDate AND Invoice.InvoiceDate >= TimePeriod.StartDate
Invoice: Invoice Item Adjustments	Total invoice item adjustment amounts in a time period.	SUM (InvoiceItemAdjustment.Amount) WHERE Invoice.Status = "Posted" AND InvoiceItemAdjustment.AdjustmentDate <= TimePeriod.EndDate AND InvoiceItemAdjustment.AdjustmentDate >= TimePeriod.StartDate
Invoice: Invoice Adjustments	Total invoice adjustment amounts in a time period.	SUM (InvoiceAdjustment.Amount) WHERE Invoice.Status = "Posted" AND InvoiceAdjustment.AdjustmentDate <= TimePeriod.EndDate AND InvoiceAdjustment.AdjustmentDate >= TimePeriod.StartDate
Invoice: Net Billings	Sum of invoice items, taxation items, invoice item adjustments, and invoice adjustments in a time period.	Invoice.InvoiceItems + Invoice.TaxationItems + Invoice.InvoiceItemAdjustments + Invoice.InvoiceAdjustments
Invoice: Invoice Aging Balance	Sum of posted invoice balances.	SUM (Invoice.Balance) WHERE Invoice.Status = "Posted"
Invoice: Gross Billings	Sum of invoice item charge amounts for posted invoices in a time period.	SUM (InvoiceItem.ChargeAmount) WHERE Invoice.Status = "Posted" AND Invoice.InvoiceDate <= TimePeriod.EndDate AND Invoice.InvoiceDate >= TimePeriod.StartDate

MEASURE	DESCRIPTION	PSEUDO-CALCULATION
Invoice: Total Adjustments	Sum of processed invoice adjustments and invoice item adjustments associated with posted invoices.	SUM (InvoiceAdjustment.Amount) WHERE Invoice.Status = "Posted" AND InvoiceAdjustment.Status = "Processed" + SUM (InvoiceItemAdjustment.Amount) WHERE Invoice.Status = "Posted" AND InvoiceItemAdjustment.Status = "Processed"
Rate Plan Charge: Gross MRR	Sum of monthly recurring revenue from subscriptions in a time period.	SUM (RatePlanCharge.MRR) WHERE Subscription.Status != "Expired" AND Subscription.Status != "Draft" AND RatePlanCharge.EffectiveStartDate <= TimePeriod.StartDate AND RatePlanCharge.EffectiveEndDate > TimePeriod.StartDate OR RatePlanCharge.EffectiveEndDate = null --evergreen subscription

System requirements

Access to the Zuora API is required.

Finding parameters

Provide the URL you typically sign into to access your Zuora data. The valid options are:

- <https://www.zuora.com>
- <https://www.apisandbox.zuora.com>
- The URL corresponding to your service instance

Troubleshooting

The Zuora content pack pulls in many different aspects of your Zuora account. If you don't use certain features you may see corresponding tiles/reports empty. If you have any issues loading, please contact Power BI Support.

Next steps

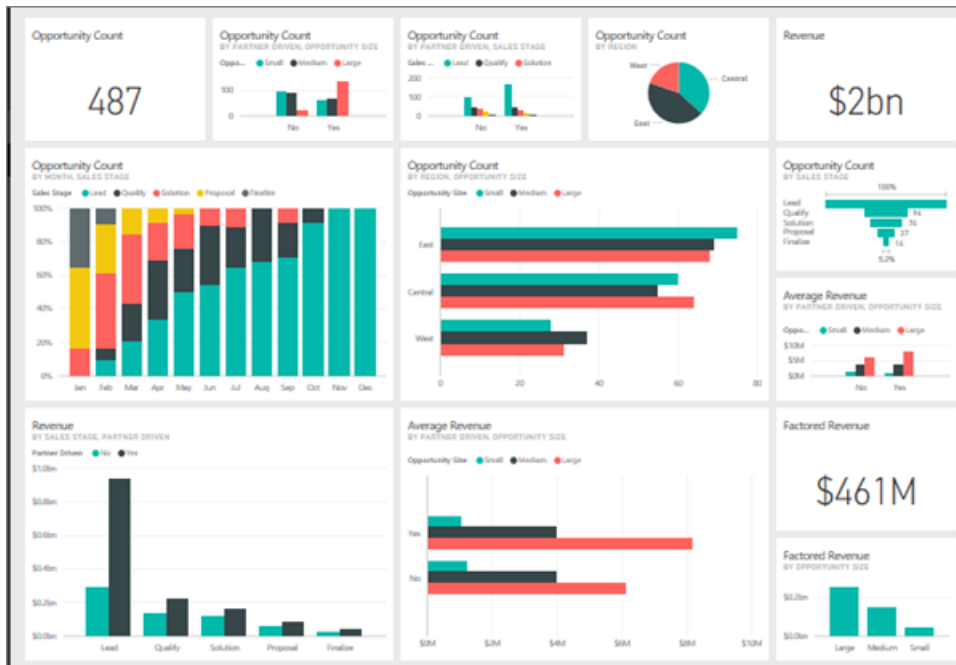
[Get started in Power BI](#)

[Get data in Power BI](#)

Dashboards in Power BI service

1/19/2018 • 4 min to read • [Edit Online](#)

A Power BI **dashboard** is a single page, often called a canvas, that uses visualizations to tell a story. Because it is limited to one page, a well-designed dashboard contains only the most-important elements of that story.

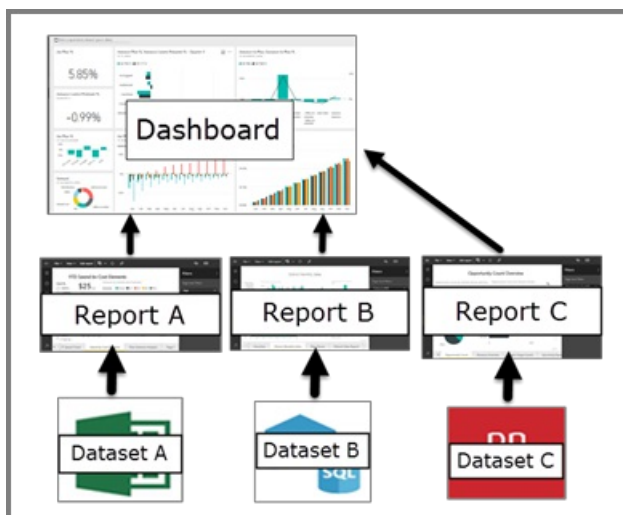


The visualizations you see on the dashboard are called *tiles* and are *pinned* to the dashboard from reports. If you're new to Power BI, you can get a good foundation by reading [Power BI basic concepts](#).

NOTE

Dashboards are a feature of Power BI service and are not available in Power BI Desktop. Dashboards can't be created on mobile devices but they can be [viewed and shared](#).

The visualizations on a dashboard come from reports and each report is based on one dataset. In fact, one way to think of a dashboard is as an entryway into the underlying reports and datasets. Selecting a visualization takes you to the report (and dataset) that was used to create it.



Advantages of dashboards

Dashboards are a wonderful way to monitor your business, to look for answers, and to see all of your most-important metrics at a glance. The visualizations on a dashboard may come from one underlying dataset or many, and from one underlying report or many. A dashboard combines on-premises and cloud-born data, providing a consolidated view regardless of where the data lives.

A dashboard isn't just a pretty picture; it's highly interactive and highly customizable and the tiles update as the underlying data changes.

Dashboards versus reports

[Reports](#) are often confused with dashboards since they too are canvases filled with visualizations. But there are some major differences.

CAPABILITY	DASHBOARDS	REPORTS
Pages	One page	One or more pages
Data sources	One or more reports and one or more datasets per dashboard	A single dataset per report
Available in Power BI Desktop	No	Yes, can create and view reports in Desktop
Pinning	Can pin existing visualizations (tiles) only from current dashboard to your other dashboards	Can pin visualizations (as tiles) to any of your dashboards. Can pin entire report pages to any of your dashboards.
Subscribe	Can't subscribe to a dashboard	Can subscribe to report pages
Filtering	Can't filter or slice	Many different ways to filter, highlight, and slice
Set alerts	Can create alerts to email you when certain conditions are met	No
Feature	Can set one dashboard as your "featured" dashboard	Cannot create a featured report
Natural language queries	Available from dashboard	Not available from reports
Can change visualization type	No. In fact, if a report owner changes the visualization type in the report, the pinned visualization on the dashboard does not update	Yes
Can see underlying dataset tables and fields	No. Can export data but can't see tables and fields in the dashboard itself.	Yes. Can see dataset tables and fields and values.
Can create visualizations	Limited to adding widgets to dashboard using "Add tile"	Can create many different types of visuals, add custom visuals, edit visuals and more with Editing permissions

CAPABILITY	DASHBOARDS	REPORTS
Customization	Can do things with the visualizations (tiles) like move and arrange, resize, add links, rename, delete, and display full screen. But the data and visualizations themselves are read-only.	In Reading view you can publish, embed, filter, export, download as .pbix, view related content, generate QR codes, analyze in Excel, and more. In Editing view you can do everything mentioned so far and so much more.

Dashboard creators and dashboard consumers

Depending on your role, you may be someone who creates dashboards for your own use or to share with colleagues. You want to learn how to create and share dashboards. Or, you may be someone who receives dashboards from others. You want to learn how to understand and interact with the dashboard.

Here are some topics, by role, to help you get started.

Power BI Pro is required for both sharing a dashboard and viewing a shared dashboard.

If you will be creating and sharing dashboards

- Use one of our samples to [create a dashboard from a report](#).
- Learn about [dashboard tiles](#) and all the different ways to pin them to a dashboard.
- Help your dashboard consumers by creating dashboards that [work well with Q&A natural language queries](#) and with [Quick insights](#).
- Discover all the different ways you can [share a dashboard with colleagues](#).

If you will be receiving and consuming dashboards

- Get comfortable with dashboards by taking a tour of one of our [sample dashboards](#).
- Learn about [dashboard tiles](#) and what will happen when you select one.
- Don't like the look of a dashboard? You can [resize, move, and rename the tiles](#).
- Want to track an individual dashboard tile and receive an email when it reaches a certain threshold? [Create alerts on tiles](#).
- Have fun asking your dashboard questions. Learn how to use [Power BI Q&A](#) to ask a question about your data and get the answer in the form of a visualization.

TIP

If you didn't find what you're looking for here, use the Table of Contents to the left.

Next steps

[Get Started with Power BI](#)

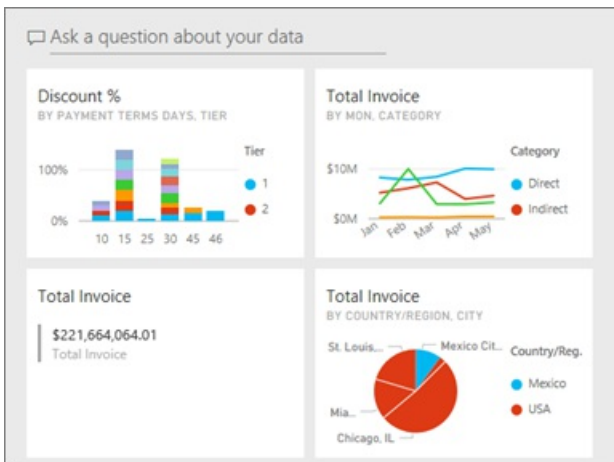
[Power BI - Basic Concepts](#)

[Power BI Premium - what is it?](#)

More questions? [Try asking the Power BI Community](#)

Create a copy of a dashboard in Power BI service

1/23/2018 • 1 min to read • [Edit Online](#)

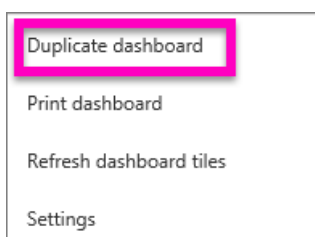


There are many different reasons to make a copy of a dashboard. Maybe you want to make changes and test its performance against the original; or create slightly different versions to distribute by colleague, region, or team. Perhaps a colleague admires your dashboard design and wants to use it for reporting out to her managers. Another reason would be if you have a new database with the same data structure and data types and want to reuse the dashboard you've already created -- this too can be done but would require some work in Power BI Desktop.

Dashboards are created (and copied) using Power BI service and can be viewed in Power BI mobile and Power BI Embedded. Dashboards are not available in Power BI Desktop.

To make a copy of a dashboard, you must be the dashboard *creator*. Dashboards that have been shared with you as an app cannot be duplicated.











1. Open the dashboard.
2. From the top-right corner, select the ellipses (...) and choose **Duplicate dashboard**.



3. Give the dashboard a name and select **Duplicate**.



4. The new dashboard is saved in the same workspace as the original.

Dashboards		Reports	Workbooks	Datasets	Showing 5 item(s)	Na
NAME		ACTIONS			OWNER	
 ☆ Procurement 2018						Power BI content
 ★ Procurement 2017						Power BI content

5. Open the new dashboard and edit as needed. Here are some things you might want to do next:
 - a. [Move, rename, resize or even delete tiles.](#)
 - b. Edit tile details and hyperlinks by selecting the tile ellipses (...) and choosing **Edit details**.
 - c. [Add new tiles from the dashboard menubar \(Add tile\)](#)
 - d. Pin new tiles [from Q&A](#) or [from reports](#).
 - e. Rename the dashboard, turn Q&A on or off, and set the tile flow from the dashboard Settings pane. (select the dashboard ellipses (...) dropdown and choose **Settings**)
 - f. Share your dashboard directly with colleagues or as part of a Power BI app.

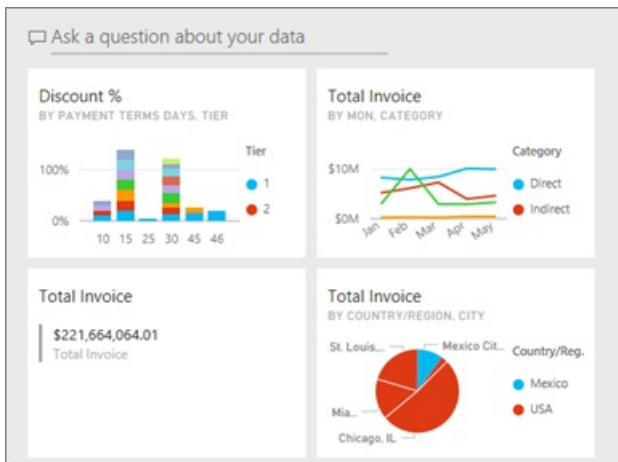
Next steps

- [Tips for designing a great dashboard](#)

More questions? [Try the Power BI Community](#)

Create a copy of a dashboard in Power BI service

1/23/2018 • 1 min to read • [Edit Online](#)

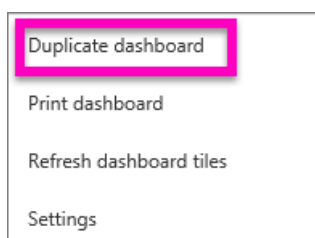


There are many different reasons to make a copy of a dashboard. Maybe you want to make changes and test its performance against the original; or create slightly different versions to distribute by colleague, region, or team. Perhaps a colleague admires your dashboard design and wants to use it for reporting out to her managers. Another reason would be if you have a new database with the same data structure and data types and want to reuse the dashboard you've already created -- this too can be done but would require some work in Power BI Desktop.

Dashboards are created (and copied) using Power BI service and can be viewed in Power BI mobile and Power BI Embedded. Dashboards are not available in Power BI Desktop.

To make a copy of a dashboard, you must be the dashboard *creator*. Dashboards that have been shared with you as an app cannot be duplicated.











1. Open the dashboard.
2. From the top-right corner, select the ellipses (...) and choose **Duplicate dashboard**.



3. Give the dashboard a name and select **Duplicate**.



4. The new dashboard is saved in the same workspace as the original.

Dashboards		Reports	Workbooks	Datasets	Showing 5 item(s)	Na
NAME		ACTIONS			OWNER	
 ☆ Procurement 2018						Power BI content
 ★ Procurement 2017						Power BI content

5. Open the new dashboard and edit as needed. Here are some things you might want to do next:
 - a. [Move, rename, resize or even delete tiles.](#)
 - b. Edit tile details and hyperlinks by selecting the tile ellipses (...) and choosing **Edit details**.
 - c. [Add new tiles from the dashboard menubar \(Add tile\)](#)
 - d. Pin new tiles [from Q&A](#) or [from reports](#).
 - e. Rename the dashboard, turn Q&A on or off, and set the tile flow from the dashboard Settings pane. (select the dashboard ellipses (...) dropdown and choose **Settings**)
 - f. Share your dashboard directly with colleagues or as part of a Power BI app.

Next steps

- [Tips for designing a great dashboard](#)

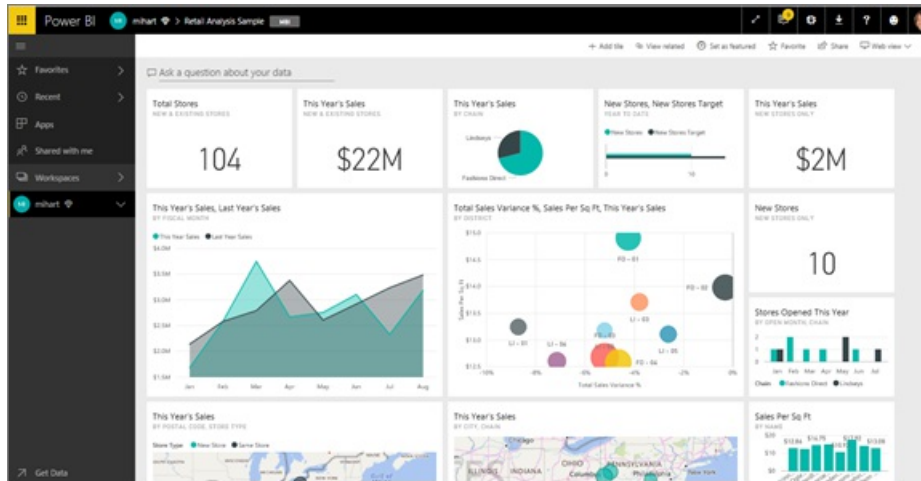
More questions? [Try the Power BI Community](#)

Dashboard tiles in Power BI

1/3/2018 • 3 min to read • [Edit Online](#)

Dashboards and dashboard tiles are a feature of Power BI service, not Power BI Desktop. While dashboard tiles cannot be created or pinned in Power BI mobile, [they can be viewed and shared](#). And, in Power BI mobile, you can [add pictures to your dashboard with your iPhone app](#).

Dashboard tiles



A tile is a snapshot of your data, pinned to the dashboard. A tile can be created from a report, dataset, dashboard, from the Q&A box, Excel, and from SQL Server Reporting Services (SSRS), and more. This screenshot shows many different tiles pinned to a dashboard.

Besides pinning, standalone tiles can be created directly on the dashboard using [Add tile](#). Standalone tiles include: text boxes, images, videos, streaming data, and web content.

Need help understanding the building blocks that make up Power BI? See [Power BI - Basic Concepts](#).

NOTE

If the original visualization used to create the tile changes, the tile doesn't change. For example, if you pinned a line chart from a report and then you changed the line chart to a bar chart, the dashboard tile continues to show a line chart. The data refreshes, but the visualization type does not.

Pin a tile from...

There are many different ways to add (pin) a tile to a dashboard. Tiles can be pinned from:


- [Power BI Q&A](#)
- [a report](#)
- [another dashboard](#)
- [Excel workbook on OneDrive for Business](#)
- [Power BI Publisher for Excel](#)
- [Quick Insights](#)
- [SSRS](#)

And standalone tiles for images, text boxes, videos, streaming data, and web content can be created directly on the dashboard using [Add tile](#).



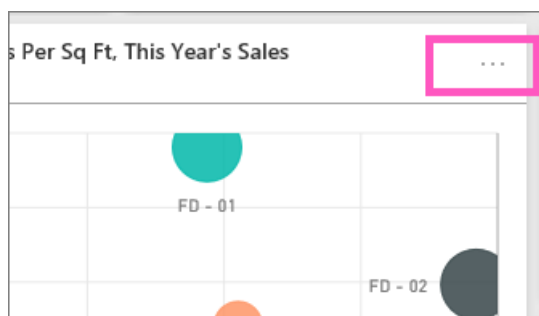
Interacting with tiles on a dashboard

Move and resize a tile

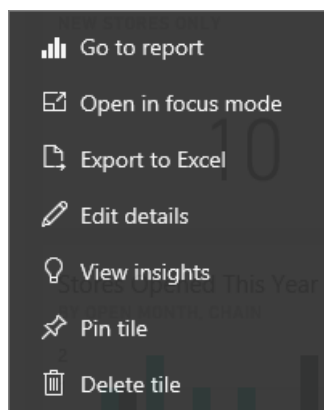
Grab a tile and [move it around on the dashboard](#). Hover and select the handle  to resize the tile.

Hover over a tile to change the appearance and behavior








1. Hover over the tile to display the ellipses.



2. Select the ellipses to open the tile action menu.



From here you can:

- [Open the report that was used to create this tile](#) 
- [Open the worksheet that was used to create this tile](#) 
 - [View in focus mode](#) 
 - [Export the data used in the tile](#) 
 - [Edit title and subtitle, add a hyperlink, display last refresh time](#) 
 - [Run insights](#) 
 - [Pin the tile to another dashboard](#) 

- [Remove the tile](#)



3. To close the action menu, select a blank area in the canvas.

Select (click) a tile

When you select a tile, what happens next depends on how the tile was created and if it has a [custom link](#). If it has a custom link, selecting the tile takes you to that link. Otherwise, selecting the tile takes you to the report, Excel Online workbook, SSRS report that is on-premises, or Q&A question that was used to create the tile.

NOTE

The exception to this is video tiles created directly on the dashboard using **Add tile**. Selecting a video tile (that was created this way) causes the video to play right there on the dashboard.

Considerations and troubleshooting

- If the report that was used to create the visualization was not saved, then selecting the tile produces no action.
- If the tile was created from a workbook in Excel Online, and you do not have at least Read permissions for that workbook, selecting the tile will not open the workbook in Excel Online.
- For tiles created directly on the dashboard using **Add tile**, if a custom hyperlink has been set, selecting the title, subtitle, and or tile will open that URL. Otherwise, by default, selecting one of these tiles created directly on the dashboard for an image, web code, or text box produces no action.
- If you don't have permission to the report within SSRS, selecting a tile created from SSRS will produce a page indicating you don't have access (rsAccessDenied).
- If you don't have access to the network where the SSRS server is located, selecting a tile created from SSRS will product a page that will indicate it cannot locate the server (HTTP 404). Your device needs to have network access to the report server to view the report.
- If the original visualization used to create the tile changes, the tile doesn't change. For example, if you pinned a line chart from a report and then you change the line chart to a bar chart, the dashboard tile continues to show a line chart. The data refreshes, but the visualization type does not.

Next steps

[Create a Card \(big number tile\) for your dashboard](#)

[Dashboards in Power BI](#)

[Data refresh](#)

[Power BI - Basic Concepts](#)

[Export a tile to Power Point](#)

[Pin Reporting Services items to Power BI Dashboards](#)

More questions? [Try the Power BI Community](#)

Pin a tile to a Power BI dashboard from a report

12/20/2017 • 2 min to read • [Edit Online](#)

Pinning tiles from a report

One way to add a new [dashboard tile](#) is from within a [Power BI report](#). In fact, you can add many new tiles from a report. Each of these tiles, when clicked, is a link back into the report.

And entire report pages can be pinned to a dashboard. This is also known as pinning a *live* tile. *Live* because you can interact with the tile on the dashboard and because, unlike individual visualization tiles, changes made in the report are synced with the dashboard. Read more about this below.


You can't pin tiles from reports that have been shared with you or from Power BI Desktop.

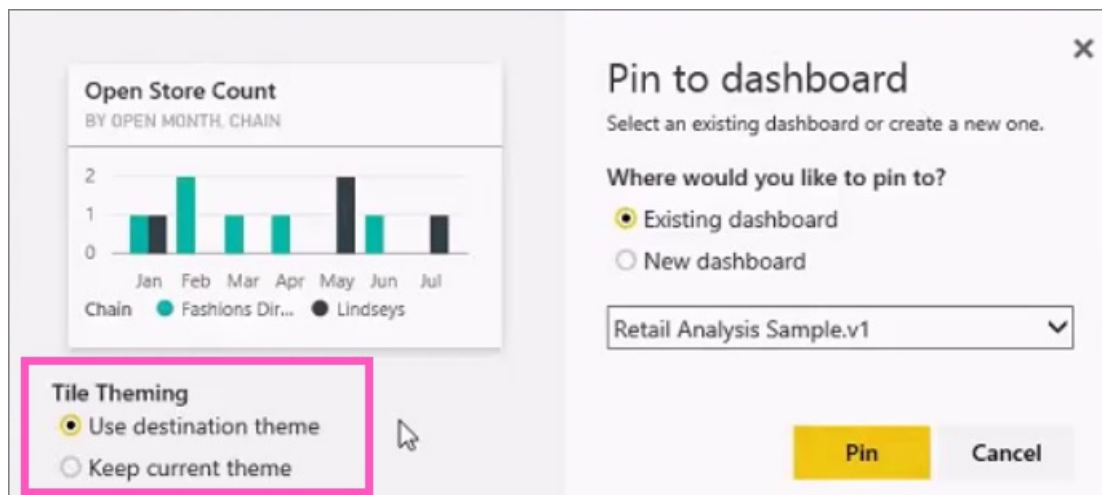
TIP: Some visualizations use background images. Pinning may not work if the background image is too large. Try reducing the image size or using image compression.

Pin a tile from a report

Watch Amanda create a dashboard by pinning visuals and images from a Power BI report.

Now create your own dashboard using one of the Power BI sample reports.

1. Hover over the visualization you want to pin, and select the pin  icon. Power BI opens the **Pin to dashboard** screen.



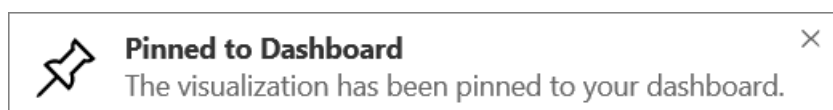
2. Decide whether to pin to an existing dashboard or new dashboard.

- Existing dashboard: select the name of the dashboard from the dropdown. Dashboards that have been shared with you will not appear in the dropdown.
- New dashboard: type the name of the new dashboard.

3. In some cases, the item you are pinning may have a *theme* already applied. For example, visuals pinned from an Excel workbook. If so, select which theme to apply to the tile.

4. Select **Pin**.

A Success message (near the top right corner) lets you know the visualization was added, as a tile, to your dashboard.



5. From the navigation pane, select the dashboard with the new tile. Select the tile to jump back into the report. Or, [edit the tile display and behavior](#).

Pin an entire report page

Another option is to pin an entire report page to a dashboard. This is an easy way to pin more than one visualization at a time. Also, when you pin an entire page, the tiles are *live*; you can interact with them right there on the dashboard. And changes you make to any of the visualizations back in the report editor, like adding a filter or changing the fields used in the chart, are reflected in the dashboard tile as well.

For more information, see [Pin an entire report page](#)

Next steps

[Dashboards in Power BI](#)

[Dashboard tiles in Power BI](#)

[Reports in Power BI](#)

[Data refresh in Power BI](#)

[Power BI Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Pin a tile from one dashboard to another dashboard

12/20/2017 • 1 min to read • [Edit Online](#)

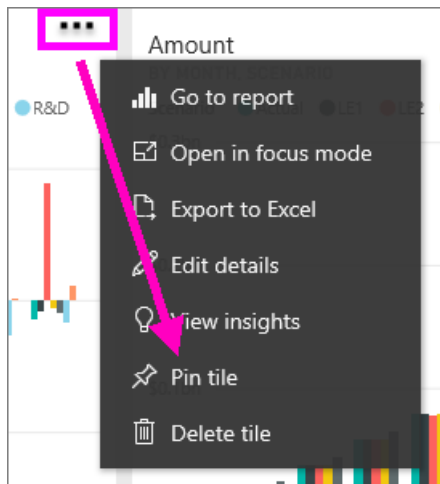
One way to add a new [dashboard tile](#) is by copying it from another dashboard. Each of these tiles, when clicked, is a link back to where it was created -- either in Q&A or a report.

NOTE

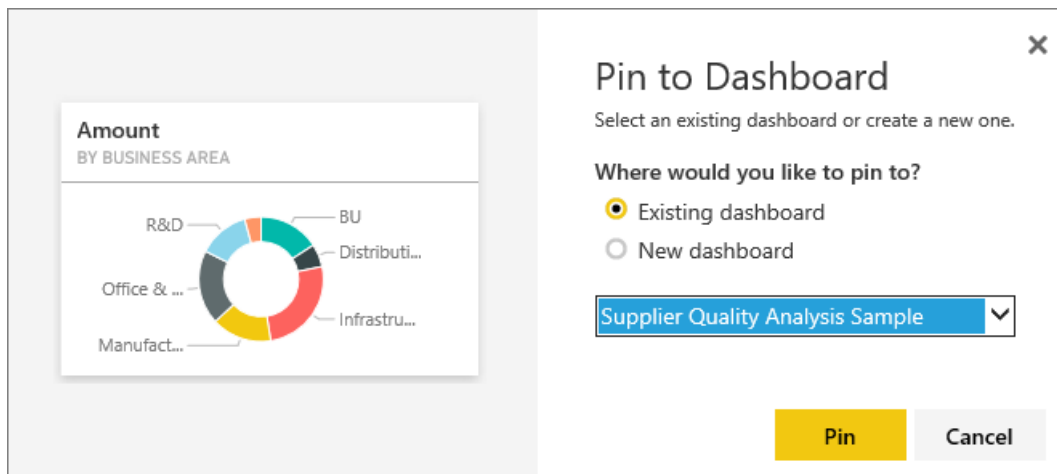
You cannot pin tiles from shared dashboards.

Pin a tile to another dashboard

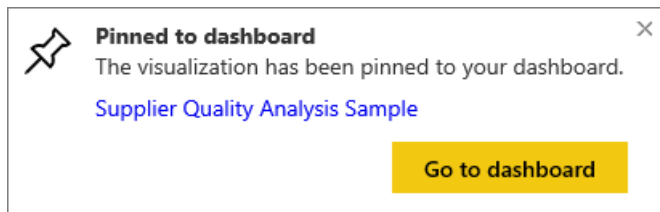
1. [Get data](#). This example uses the [IT Spend Analysis sample](#).
2. Open a [dashboard](#).
3. Hover over the tile you want to pin, select the ellipses (...) and choose **Pin tile**.



4. Pin the tile to an existing dashboard or to a new dashboard.
 - **Existing dashboard:** select the name of the dashboard from the dropdown.
 - **New dashboard:** type the name of the new dashboard.



5. Select **Pin**. A Success message (near the top right corner) lets you know the visualization was added, as a tile, to the selected dashboard.



6. Select **Go to dashboard** to see the pinned tile. There, you can [rename](#), [resize](#), [link](#), and [move](#) the pinned visualization.

Next steps

[Tiles in Power BI](#)

[Dashboards in Power BI](#)

More questions? [Try the Power BI Community](#)

Pin a tile to a Power BI dashboard from Excel

1/24/2018 • 3 min to read • [Edit Online](#)

Before you can pin a tile from your Excel workbook, you'll connect that workbook to Power BI service (app.powerbi.com). Connecting a workbook essentially brings a linked read-only version of that workbook into Power BI service and allows you to pin ranges to dashboards. You can even pin an entire worksheet to a dashboard. If a workbook has been shared with you, you'll have the ability to view the tiles pinned by the owner, but not create any dashboard tiles yourself.

For in-depth information about how Excel and Power BI work together, see [Get data from Excel workbook files](#).

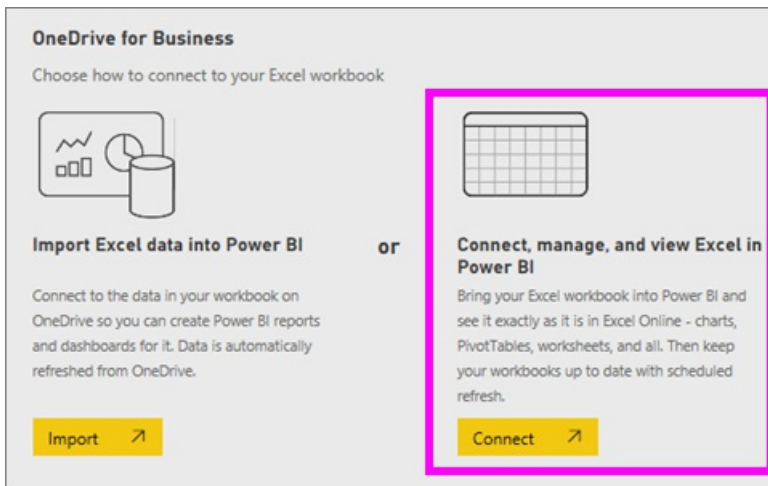
Watch Will demonstrate several ways to import data from, and connect to, Excel workbooks.


Connect your Excel workbook from OneDrive for Business to Power BI

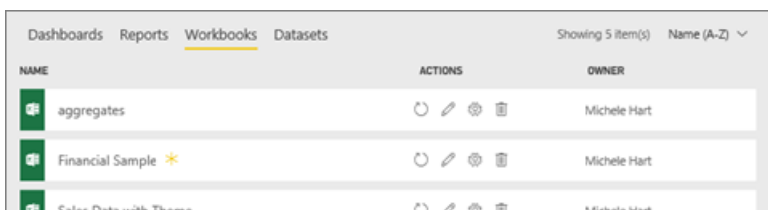
When you choose **Connect**, your workbook will appear in Power BI just like it would in Excel Online. But, unlike Excel Online, you'll have some great features to help you pin elements from your worksheets right to your dashboards.

You can't edit your workbook in Power BI. But if you need to make some changes, you can select the pencil icon from the **Workbooks** tab of your workspace, and then choose to edit your workbook in Excel Online or open it in Excel on your computer. Any changes you make are saved to the workbook on OneDrive.

1. Upload your workbook to your OneDrive for Business.
2. From Power BI, [connect to that workbook](#) by selecting **Get Data > Files > OneDrive - Business** and navigating to the location where you saved the Excel file. Select the file and choose **Connect > Connect**.

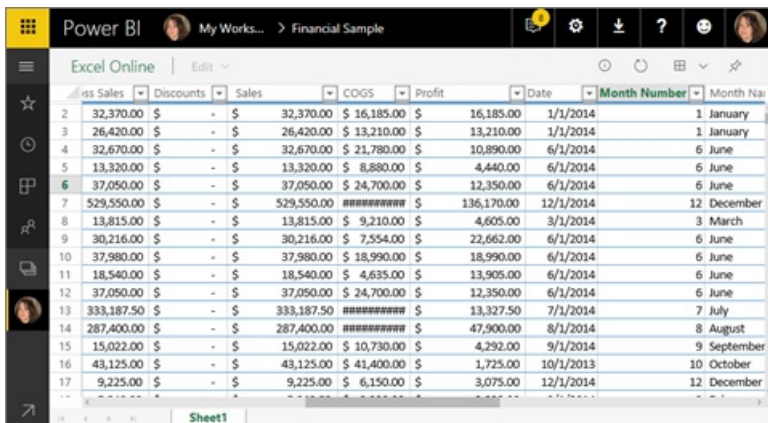


3. In Power BI, the workbook is added to the **Workbooks** tab of your workspace. The  icon indicates this is an Excel workbook and a yellow asterisk indicates it's new.



1. Open the workbook in Power BI by selecting the workbook name.

Changes you make to the workbook in Power BI are not saved and do not affect the original workbook on OneDrive for Business. If you sort, filter, or change values in Power BI, those changes cannot be saved or pinned. If you need to make changes that will be saved, select **Edit** from the upper-right corner to open it for editing in Excel Online or Excel. Changes made this way may take a few minutes to update the tiles on the dashboards.




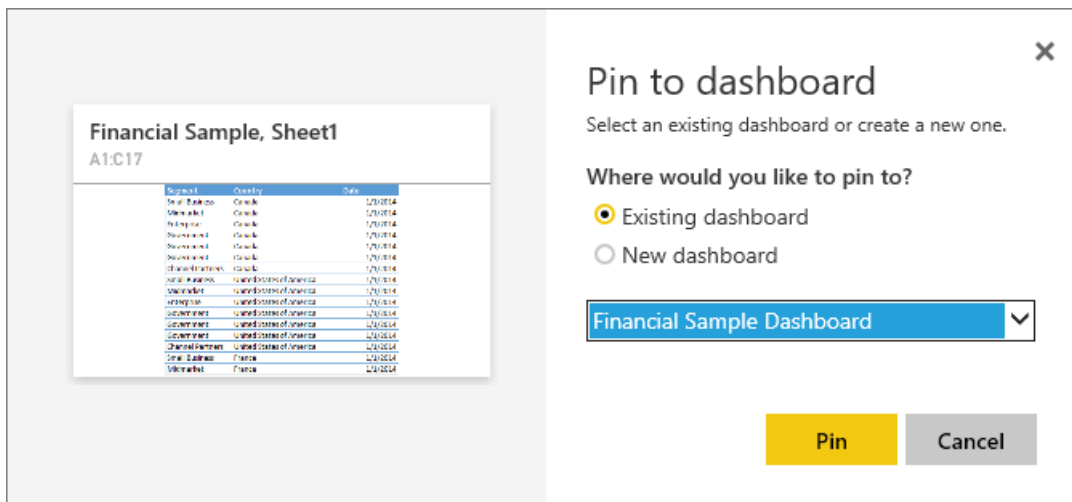
Pin a range of cells to a dashboard

One way to add a new [dashboard tile](#) is from within an Excel workbook in Power BI. Ranges can be pinned from Excel workbooks that have been saved in your OneDrive for Business or another group-shared document library. The ranges can contain data, charts, tables, PivotTables, PivotCharts, and other Excel parts.

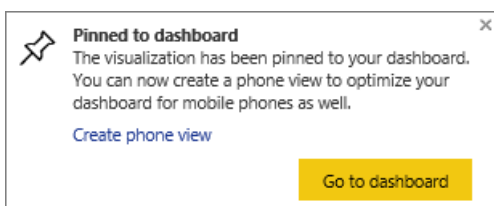
1. Highlight the cells that you'd like to pin to a dashboard.

	A	B	C	D	E	F	G
1	Segment	Country	Date	Month	Month	Year	Units Sold
2	Small Business	Canada	1/1/2014	1 January	2014		8
3	Midmarket	Canada	1/1/2014	1 January	2014		3
4	Enterprise	Canada	1/1/2014	1 January	2014		16
5	Government	Canada	1/1/2014	1 January	2014		2227
6	Government	Canada	1/1/2014	1 January	2014		42
7	Government	Canada	1/1/2014	1 January	2014		1618
8	Channel Partners	Canada	1/1/2014	1 January	2014		3244
9	Small Business	United States of America	1/1/2014	1 January	2014		34
10	Midmarket	United States of America	1/1/2014	1 January	2014		5
11	Enterprise	United States of America	1/1/2014	1 January	2014		5
12	Government	United States of America	1/1/2014	1 January	2014		982
13	Government	United States of America	1/1/2014	1 January	2014		1438
14	Government	United States of America	1/1/2014	1 January	2014		1117
15	Channel Partners	United States of America	1/1/2014	1 January	2014		19
16	Small Business	France	1/1/2014	1 January	2014		2434
17	Midmarket	France	1/1/2014	1 January	2014		3997
18	Enterprise	France	1/1/2014	1 January	2014		1987
19	Government	France	1/1/2014	1 January	2014		1384
20	Government	France	1/1/2014	1 January	2014		39
21	Government	France	1/1/2014	1 January	2014		2521

- Select the pin  icon.
- Pin the tile to an existing dashboard or to a new dashboard.
 - Existing dashboard: select the name of the dashboard from the dropdown.
 - New dashboard: type the name of the new dashboard.



- Select **Pin**. A Success message (near the top right corner) lets you know the range was added, as a tile, to your dashboard.



- Select **Go to dashboard**. From here you can [rename](#), [resize](#), [link](#), and [move](#) the pinned visualization. By default, selecting the pinned tile opens the workbook in Power BI.

Pin an entire table or pivot chart to a dashboard

Follow the steps above except instead of selecting a range of cells, select an entire table or pivot table.

To pin a table, select the entire range of the table and be sure to include the headers. To pin a pivot table, be sure to include every visible part of the pivot table, including filters if used.

	A	B	C	D	E
1	a	b	c	d	
2	1	2	3	4	
3	5	6	7	8	
4	9	10	11	12	
5					
6					

A tile created from a table or pivot table will show the entire table. If you add/remove/filter rows or columns in the original workbook, they will also be added/removed/filtered in the tile.

View the workbook linked to the tile

Selecting a workbook tile opens the linked workbook in Power BI. Since the workbook file is located on the owner's OneDrive for Business, viewing the workbook requires you have Read permissions for the workbook. If you do not have permission, you will receive an error message.

The screenshot shows the Power BI application interface. The top navigation bar includes 'Power BI', 'My Workspace > Financial sample for tutorial', and various utility icons. A left-hand navigation pane contains 'Favorites', 'Recent', 'Apps', 'Shared with me', 'Workspaces', and 'My Workspace'. The main content area displays a tile titled 'Financial Sample, Sheet1' with the range 'A1:C16'. A warning message at the top of the tile reads 'There was an issue loading one or more tiles.' Below the warning is a table with the following data:

Segment	Country	Product
Government	France	Paseo
Small Business	France	Paseo
Channel Partners	Germany	VTT
Government	Canada	Paseo
Government	Germany	Paseo

Considerations and troubleshooting

Unsupported features: Power BI uses Excel Services to retrieve the workbook tiles. Therefore, since some features from Excel are not supported in Excel Services REST API, they will not be seen on tiles in Power BI. For example: Sparklines, icon set conditional formatting, and time slicers. For a full list of unsupported features see [Unsupported Features in Excel Services REST API](#)

Next steps

[Share a dashboard that has links to an Excel workbook](#)

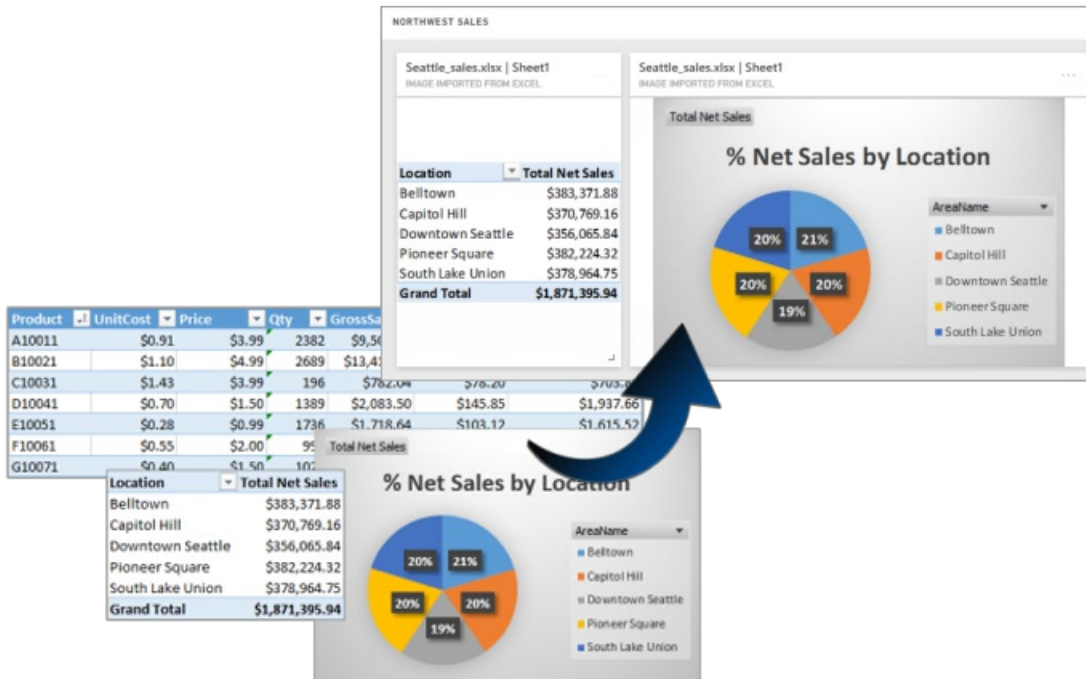
[Get data from Excel workbooks](#)

More questions? [Try the Power BI Community](#)

Power BI publisher for Excel

12/6/2017 • 7 min to read • [Edit Online](#)

With Microsoft **Power BI publisher for Excel**, you can take snapshots of your most important insights in Excel, like PivotTables, charts, and ranges and pin them to dashboards in Power BI.



What can you pin? Just about anything in an Excel worksheet. You can select a range of cells from a simple sheet or table, a PivotTable or PivotChart, illustrations and images, text.

What you can't pin: you cannot pin 3D Maps or visualizations in Power View sheets. There are also some elements you can pin, but it wouldn't make much sense to, like a Slicer or Timeline filter.

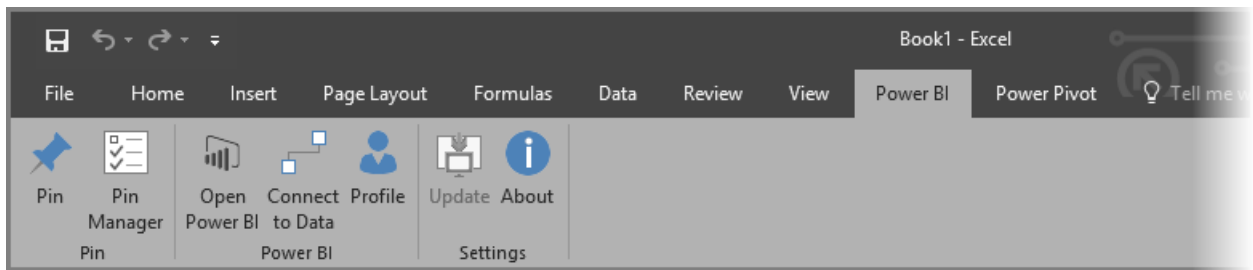
When you pin an element from Excel, a new tile is added to a new or existing dashboard in Power BI. The new tile is a snapshot, so it's not dynamic but you can still update it. For example, if you make a change to a PivotTable or chart you've already pinned, the dashboard tile in Power BI isn't updated automatically, but you can still update your pinned elements by using **Pin Manager**. You'll learn more about **Pin Manager** in the following sections.

Download and install

Power BI publisher for Excel is an add-in you can download and install on desktop versions of Microsoft Excel 2007 and later.

[Download Power BI publisher for Excel](#)

Once you have the publisher installed, you'll see a new **Power BI** ribbon in Excel, where you can sign in (or sign out) of Power BI, pin elements to dashboards, and manage elements you've already pinned.



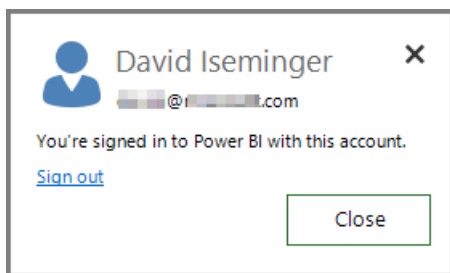
The **Power BI publisher for Excel** add-in is enabled by default, but if for some reason you don't see the Power BI ribbon tab in Excel, you'll need to enable it. Click **File > Options > Add-ins > COM Add-ins**. Select **Microsoft Power BI Publisher for Excel**.

Pin a range to a dashboard

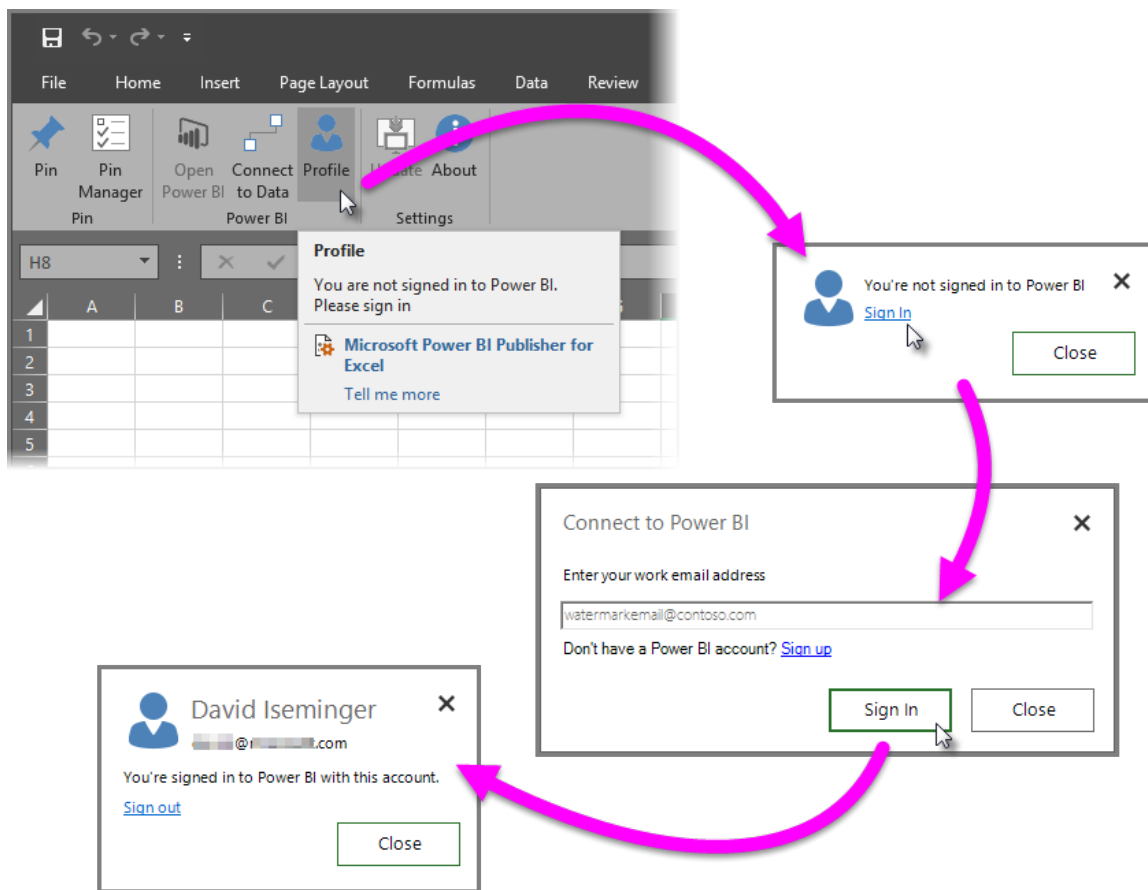
You can select any range of cells from your worksheet, and pin a snapshot of that range to an existing or a new dashboard in Power BI. You can pin the same snapshot to multiple dashboards, too.

To begin, you need to make sure you're signed in to Power BI.

1. Select **Profile** from the **Power BI** ribbon tab in Excel. If you're already signed in to Power BI, you'll see a dialog that shows which account you're currently signed in with. If that's the account you want to use, great - go to the next set of steps to pin your range. Select *Sign out* if you want to use a different Power BI account. If you're not signed in, go to the next step (Step 2).



2. If you're not signed in, select the **Sign In** link that appears when you select **Profile** from the **Power BI** ribbon tab in Excel, in the **Connect to Power BI** dialog type in the email address of the Power BI account you want to use, then select **Sign In**.



Once you're signed in, follow these steps to pin a range to a dashboard:

1. In Excel, select the **Power BI** ribbon tab to see the **Pin** ribbon button.
2. Select a range from your Excel workbook.
3. Click the **Pin** button from the **Power BI** ribbon to show the **Pin to dashboard dialog**. If you're not already signed into Power BI, you'll be prompted to do so. Select a workspace from the **Workspace** dropdown list. If you want to pin to your own dashboard, verify **My Workspace** is selected. If you want to pin to a dashboard in a group workspace, select the group from the drop-down list.
4. Choose whether you want to pin to an *existing dashboard* or create a *new dashboard*.
5. Click **Okay** to pin your selection to the dashboard.
6. In **Pin to dashboard**, select an existing dashboard in the workspace or create a new one, and then click the **Ok** button.

Products.xlsx - Excel David Iseminger

File Home Insert Page Layout Formulas Data Review View Power BI Power Pivot Tell me Share

Pin Pin Manager Open Power BI Connect to Data Profile Update About Settings


F18 39

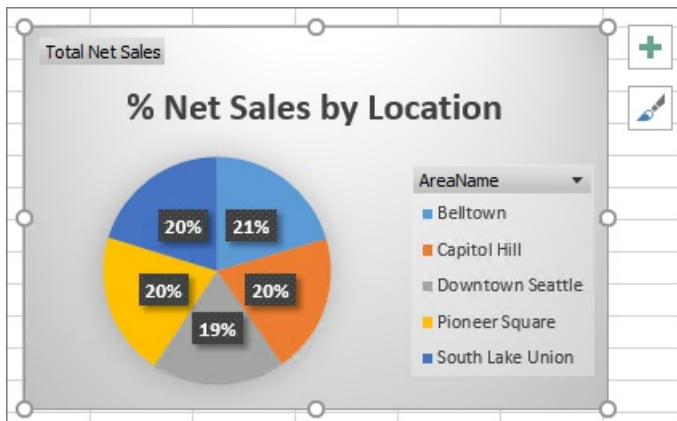
ProductID	ProductName	SupplierID	CategoryID	QuantityPerUnit	UnitPrice	UnitsInSto	UnitsOnOr	ReorderLe	Discontin
1	Chai	1	1	10 boxes x 20 bags	18	39	0	10	FALSE
2	Chang	1	1	24 - 12 oz bottles	19	17	40	25	FALSE
3	Aniseed Syrup	1	2	12 - 550 ml bottles	10	13	70	25	FALSE
4	Chef Anton's Cajun	2	2	48 - 6 oz jars	22	53	0	0	FALSE
5	Chef Anton's Guml	2	2	36 boxes	21.35	0	0	0	TRUE
6	Grandma's Boyser	3	2	12 - 8 oz jars	25	120	0	25	FALSE
7	Uncle Bob's Orgar	3	7	12 - 1 lb pkgs.	30	15	0	10	FALSE
8	Northwoods Cranl	3	2	12 - 12 oz jars	40	6	0	0	FALSE
9	Mishi Kobe Niku	4	6	18 - 500 g pkgs.	97	29	0	0	TRUE
10	Ikura	4	8	12 - 200 ml jars	31	31	0	0	FALSE
11	Queso Cabrales	5	4	1 kg pkg.	21	22	30	30	FALSE
12	Queso Manchego	5	4	10 - 500 g pkgs.	38	86	0	0	FALSE
13	Konbu	6	8	2 kg box	6	24	0	5	FALSE
14	Tofu	6	7	40 - 100 g pkgs.	23.25	35	0	0	FALSE
15	Genen Shouyu	6	2	24 - 250 ml bottles	15.5	39	0	5	FALSE
16	Pavlova	7	3	32 - 500 g boxes	17.45	29	0	10	FALSE
17	Alice Mutton	7	6	20 - 1 kg tins	39	0	0	0	TRUE
18	Carnarvon Tigers	7	8	16 kg pkg.	62.5	42	0	0	FALSE
19	Teatime Chocolate	8	3	10 boxes x 12 pieces	9.2	25	0	5	FALSE

Sheet1 Sheet2

Ready 90%

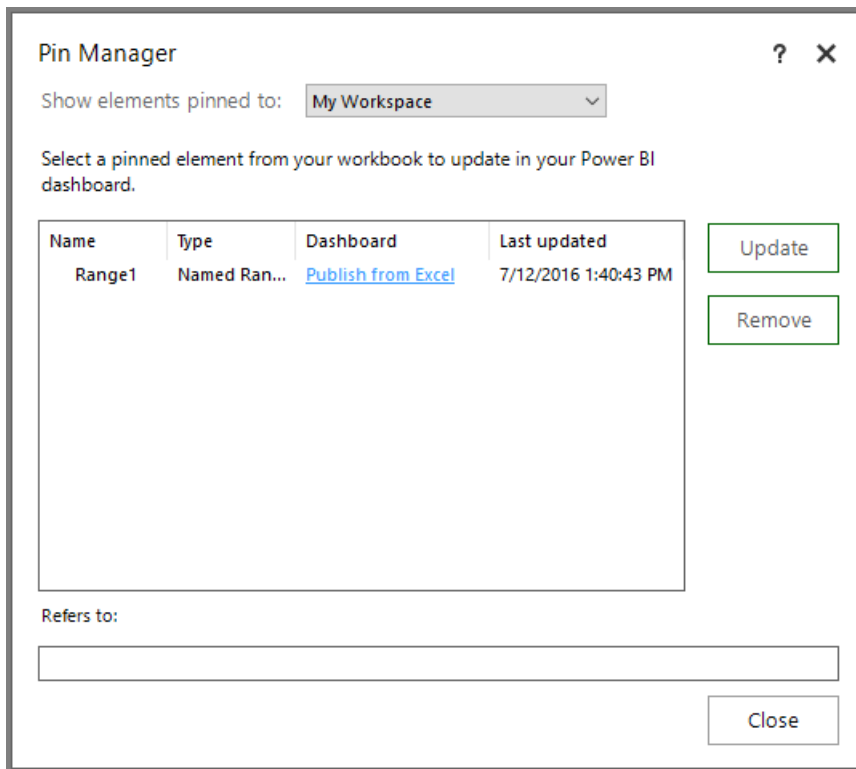
Pin a Chart to a dashboard

Just click on the chart, and then click Pin .



Manage pinned elements


With **Pin Manager**, you can update (refresh) a pinned element's associated tile in Power BI. You can also remove the pin between an element you've already pinned to dashboards in Power BI.



To update tiles in your dashboard, in **Pin Manager** select one or more elements and then select **Update**.

To remove the mapping between a pinned element in Excel and the associated tile in a dashboard, remove **Remove**. When you select **Remove**, you're *not* removing the element from your worksheet in Excel or deleting the associated tile in the dashboard. You are removing the pin, or *mapping*, between them. The removed element will no longer appear in **Pin Manager**. If you pin the element again, it will appear as a new tile.

To remove a pinned element (a tile) from a dashboard, you'll need to do that in Power BI. In the tile you want to

delete, select the **Open menu** icon  and then select **Delete tile** .

Connect to data in Power BI

Beginning with the July 2016 release of **Power BI publisher for Excel** (including the current release, linked to above), you can connect directly to data in the Power BI service and analyze that data in Excel using PivotTables and PivotCharts. This features makes it easy to use Power BI data and Excel together to analyze data that's most important to you.

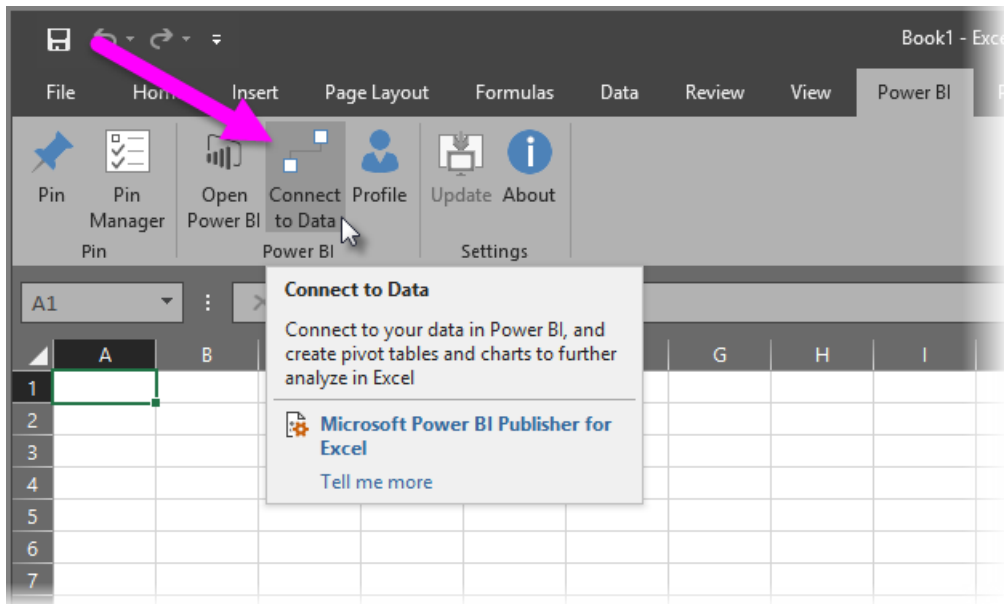
Improvements include the following:

- Any drivers required to connect to data in Power BI are automatically updated with each release - no need to install or manage those drivers yourself.
- You no longer need to download .odc files to create the connections - **Power BI publisher for Excel** creates the connections automatically when you select which report or dataset you want to use.
- Now you can create multiple connections and PivotTables in the same workbook
- Errors are improved and specific to **Power BI publisher for Excel**, rather than using default Excel messages

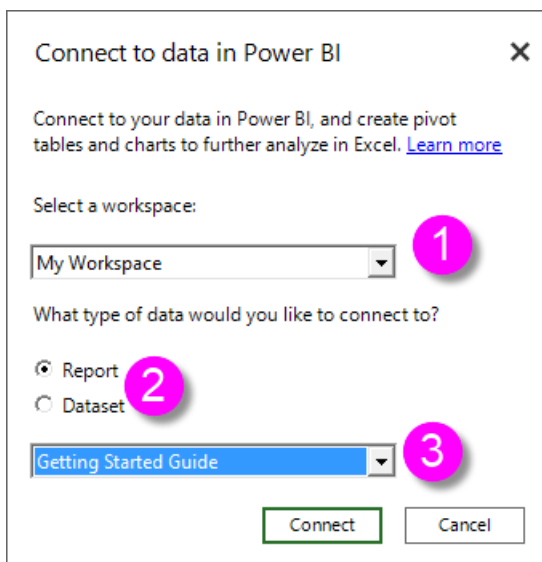
How to connect to Power BI data in Excel

To connect to Power BI data using **Power BI publisher for Excel**, follow these easy steps:

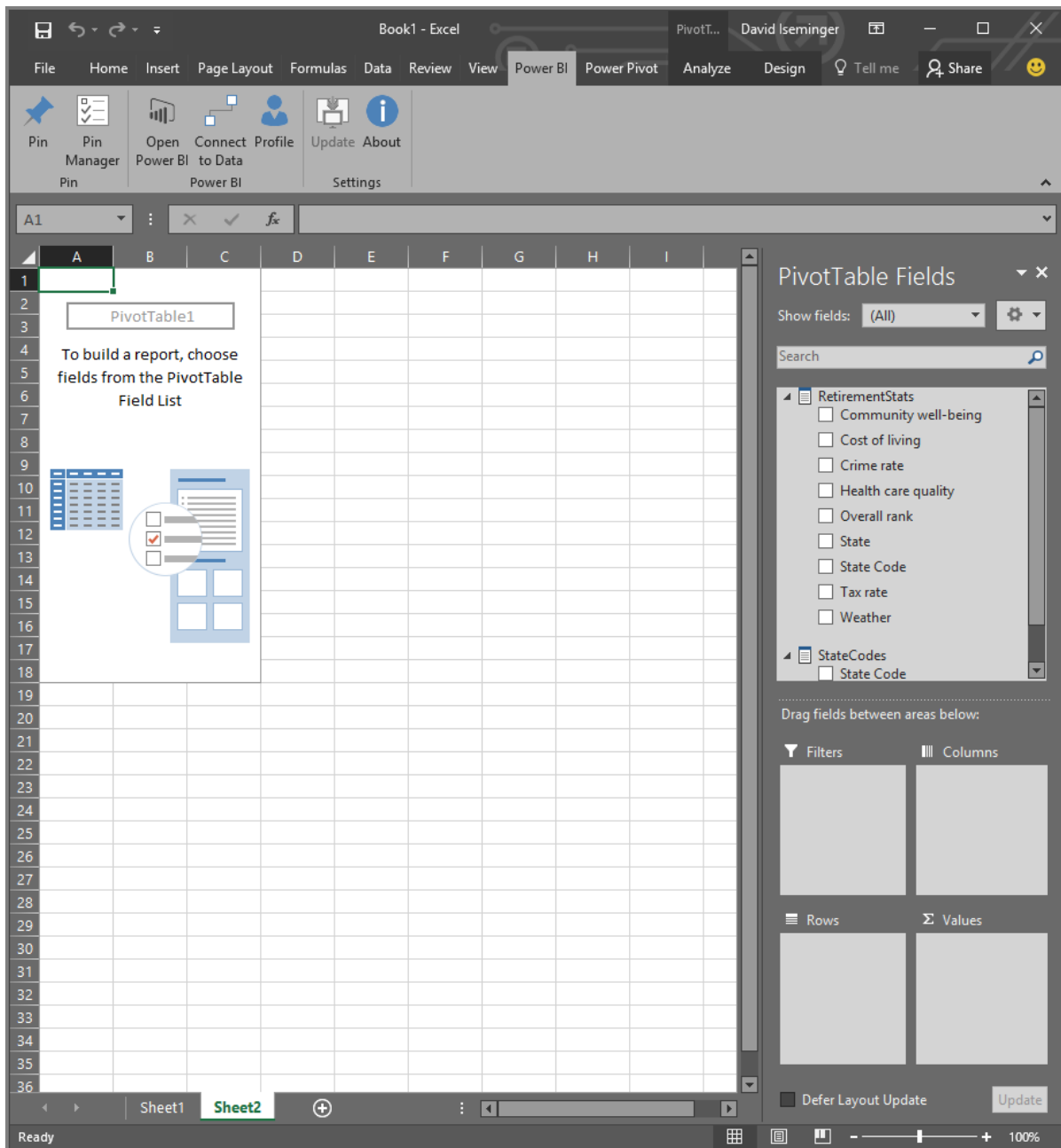
1. Make sure you're signed in to Power BI. The steps describing how to sign in (or to sign in with a different account) are provided earlier in this article.
2. Once you're signed in to Power BI with the account you want to use, select **Connect to Data** from the **Power BI** ribbon tab in Excel.



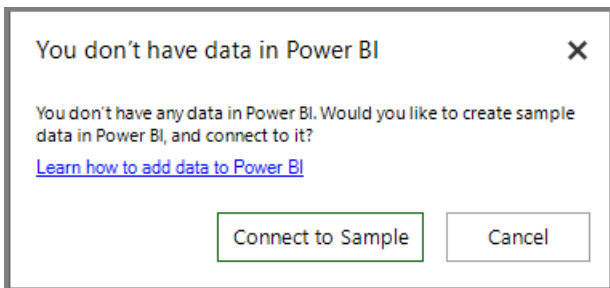
- Excel connects to Power BI using an HTTPS connection and presents the **Connect to data in Power BI** dialog, where you can select the *workspace* from which you want to select your data (1, in the image below), which *type of data* you want to connect to, either a **report** or a **dataset** (2), and a drop down (3) that allows you to select which *available report or dataset* to which to connect.



- When you make your choices and select **Connect** from the **Connect to data in Power BI** dialog, Excel prepares a PivotTable and displays the **PivotTable Fields** pane, where you can select fields from your connected Power BI data, and create tables or charts that help you analyze the data.



If you don't have any data in Power BI, Excel detects that and offers to create sample data for you to connect to and try.



There are a few things to consider in this release of **Power BI publisher for Excel**:

- **Shared data** - Data that has been shared with you, but isn't directly visible to you in Power BI, is not available in **Connect to Data**.
- **SSAS on-premises** - If the dataset you select originates from an on-premises SQL Server Analysis Services (SSAS) and the dataset in Power BI uses DirectQuery to access the data, **Power BI publisher for Excel** connects to that data through the on-premises network connection, and does *not* go through Power BI to connect to that data. As such, any user trying to connect to such datasets must be connected to the on-premises network, and is authenticated for access to that data using the authentication method employed by the Analysis

Services instance where the data is stored.

- **Required drivers - Power BI publisher for Excel** installs all the necessary drivers for this feature to work, and does so automatically. Among those automatically installed drivers is the Excel OLE DB driver for Analysis Services; if that driver is removed by the user (or for any other reason), the connection to Power BI data will not work.
- **Dataset must have measures** - The dataset must have model measures defined in order for Excel to treat the measures as values in PivotTables, and to correctly analyze the data. Learn more about [measures](#).
- **Support for Groups** - Datasets shared with people outside the specified group are not supported, and cannot be connected to.
- **Free versus Pro subscriptions** - Activities associated with groups are not supported for free users of Power BI, and thus won't see any datasets or reports shared with a group in their own workspace.
- **Shared reports or datasets** - Reports or datasets that were shared with you cannot be connected to.
- **Using Tables instead of Data models** - Datasets and reports that are created by importing only tables from Excel (without a data model) are not supported at this time, and cannot be connected to.

Once you've created compelling charts or other visuals such as a range of data, you can easily pin those to a dashboard in Power BI, as described earlier in this article.

Related Articles

There are many ways to use Excel and Power BI together, and get the best out of both. Take a look at the following articles for more information.

- [Analyze in Excel](#)
- [Analyze in Excel troubleshooting](#)

Pin a tile to a dashboard from Q&A

1/19/2018 • 2 min to read • [Edit Online](#)

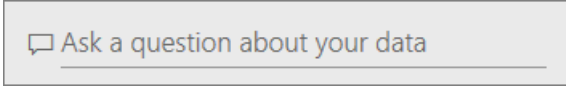
How to pin a tile from Q&A

Q&A is the Power BI ad hoc reporting tool. Need to find a particular insight? Ask a question about your data, and receive an answer in the form of a visualization.

In this How-to, we'll use Power BI service (app.powerbi.com) to open a dashboard, ask a question using natural language to create a visualization, and pin that visualization to a dashboard. Dashboards are not available in Power BI Desktop. For information on using Q&A with other Power BI tools and content, see the [Power BI Q&A overview](#).

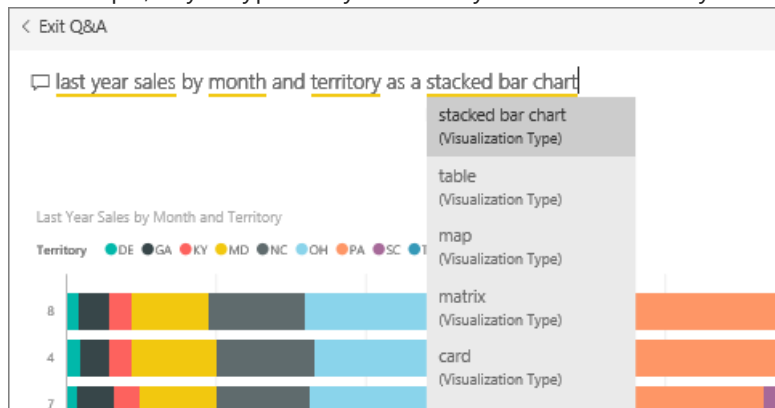
To follow along, open the [Retail Analysis sample dashboard](#).

1. Open a [dashboard](#) that has at least one tile pinned from a report. When you ask a question, Power BI looks for the answer in any dataset that has a tile pinned to that dashboard. To learn more, see [get data](#).
2. In the question box at the top of your dashboard, start typing what you want to know about your data.




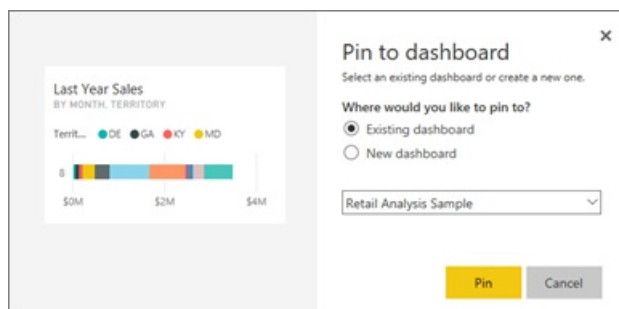
Ask a question about your data

3. For example, as you type "last year sales by month and territory"...



the question box gives you suggestions.

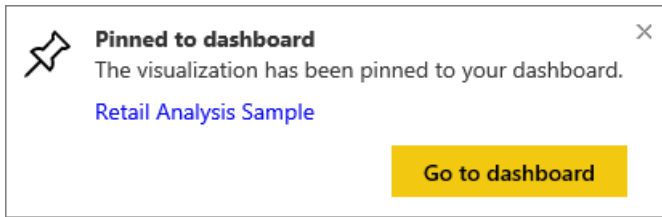
4. To add the chart to your dashboard as a tile, select the pin  on the top-right side of the canvas. If the dashboard has been shared with you, you won't be able to pin any visualizations.
5. Pin the tile to an existing dashboard or to a new dashboard.



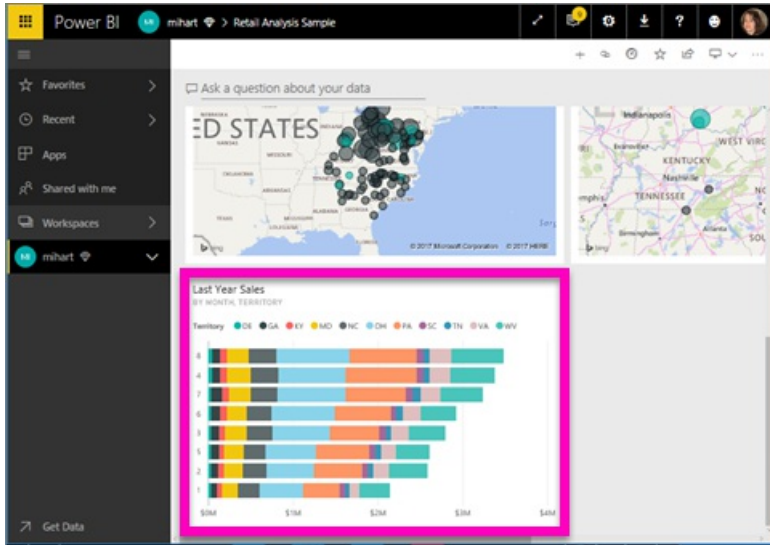
- Existing dashboard: select the name of the dashboard from the dropdown. Your choices will be limited to only those dashboards within the current workspace.
- New dashboard: type the name of the new dashboard and it will be added to your current workspace.

6. Select **Pin**.

A success message (near the top-right corner) lets you know the visualization was added, as a tile, to your dashboard.

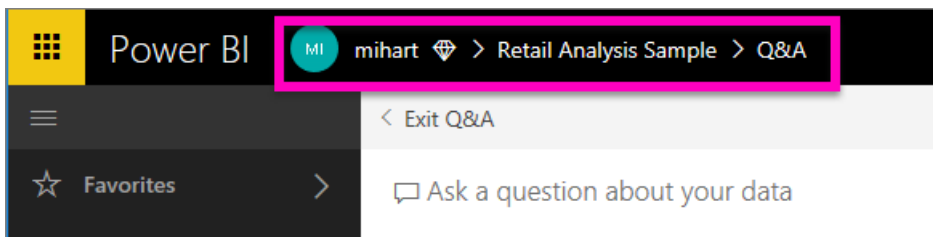


7. Select **Go to dashboard** to see the new tile. There, you can [rename](#), [resize](#), [add a hyperlink](#), [reposition the tile](#), and [more](#) on your dashboard.



Considerations and troubleshooting

- When you start typing a question, Q&A immediately begins searching for the best answer from all datasets associated with the current dashboard. The "current dashboard" is the dashboard listed in the top navigation bar. For example, this question is being asked in the **Retail Analysis Sample** dashboard that is part of the **mihart** app workspace.



- **How does Q&A know which datasets to use?** Q&A has access to all datasets that have at least one visualization pinned to that dashboard.
- **Don't see the question box?** Check with your Power BI administrator. The administrator has the ability to disable Q&A.

Next steps

[Rename, resize, add a hyperlink, reposition the tile, and more](#)

[Display your dashboard tile in Focus mode](#)

[Back to Q&A in Power BI](#)

More questions? [Try the Power BI Community](#)

Pin an entire report page, as a live tile, to a Power BI dashboard

1/24/2018 • 1 min to read • [Edit Online](#)

Another way to add a new [dashboard tile](#) is by pinning an entire report page. This is an easy way to pin more than one visualization at a time. Also, when you pin an entire page, the tiles are *live*; you can interact with them right there on the dashboard. And changes you make to any of the visualizations back in the report editor, like adding a filter or changing the fields used in the chart, are reflected in the dashboard tile as well.

Pinning live tiles from reports to dashboards is only available in Power BI service (app.powerbi.com).

NOTE

You can't pin tiles from reports that are shared with you.

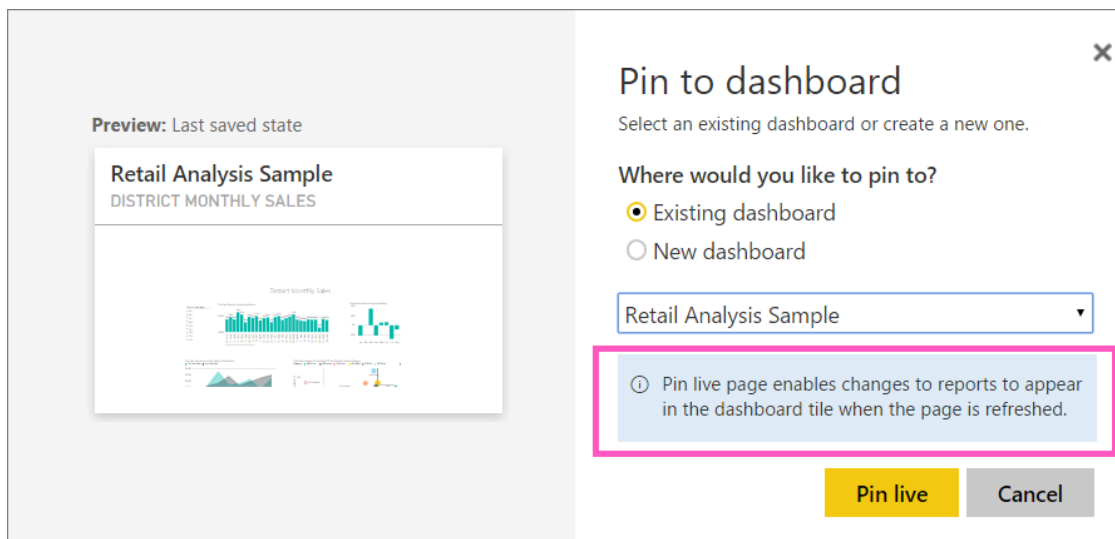
Pin a report page

Watch Amanda pin a live report page to a dashboard and then follow the step-by-step instructions below the video to try it yourself.

1. Open a report in [Editing view](#).
2. With no visualizations selected, from the menubar, select **Pin Live Page**.



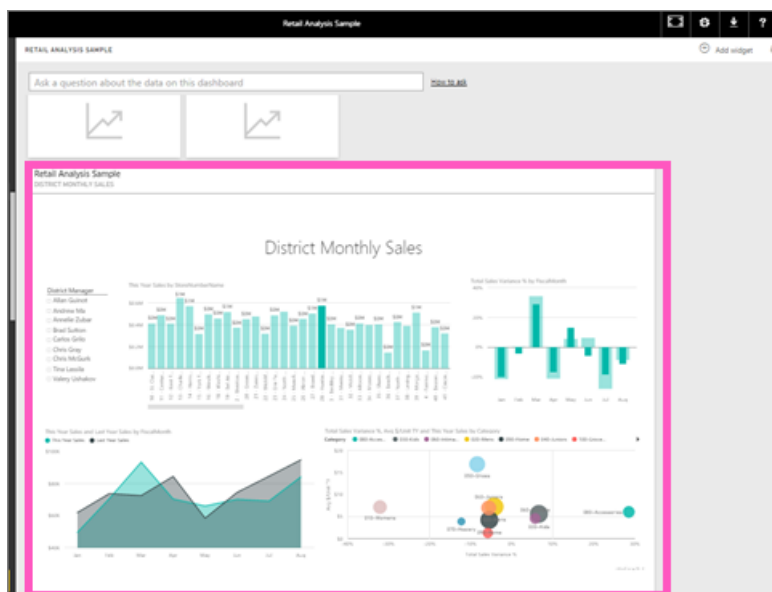
3. Pin the tile to an existing dashboard or to a new dashboard. Notice the highlighted text: *Pin live page enables changes to reports to appear in the dashboard tile when the page is refreshed*.
 - Existing dashboard: select the name of the dashboard from the dropdown. Dashboards that have been shared with you will not appear in the dropdown.
 - New dashboard: type the name of the new dashboard.



4. Select **Pin live**. A Success message (near the top right corner) lets you know the page was added, as a tile, to your dashboard.

Open the dashboard to see the pinned live tile

1. From the navigation pane, select the dashboard with the new live tile. There, you can do things like [rename](#), [resize](#), [link](#), and [move](#) the pinned report page.
2. Interact with the live tile. In the screenshot below, selecting a bar on the column chart has cross-filtered and cross-highlighted the other visualizations on the tile.



Next steps

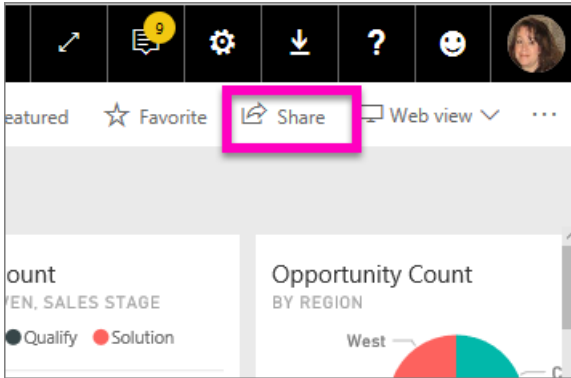
[Dashboards in Power BI](#)

More questions? [Try the Power BI Community](#)

Display the Power BI dashboards that have been shared with me

1/8/2018 • 1 min to read • [Edit Online](#)

Shared with me



When a colleague shares a dashboard with you, its title is added to your **Shared with me** list. The dashboard is only available from **Shared with me** and not available from a workspace or from **Apps**.


Watch Amanda explain the **Shared with me** content list and demonstrate how to navigate and filter the list. Then follow the step-by-step instructions below the video to try it out yourself. For you to view dashboards shared with you, you need to have a Power BI Pro license. Read [What is Power BI Premium?](#) for details.

You'll have many options for interacting with the dashboard and underlying report, depending on the permissions the owner gives you. These include being able to make copies of the dashboard, open the report in [Reading view](#), and re-share with other colleagues.

Actions available from the **Shared with me** screen

- Select the star icon to [Favorite a dashboard](#).

- [Remove a dashboard](#) 

- Some dashboards can be re-shared 

- Additionally, if your lists of dashboards gets long, [use the search field and sorting to find what you need](#).

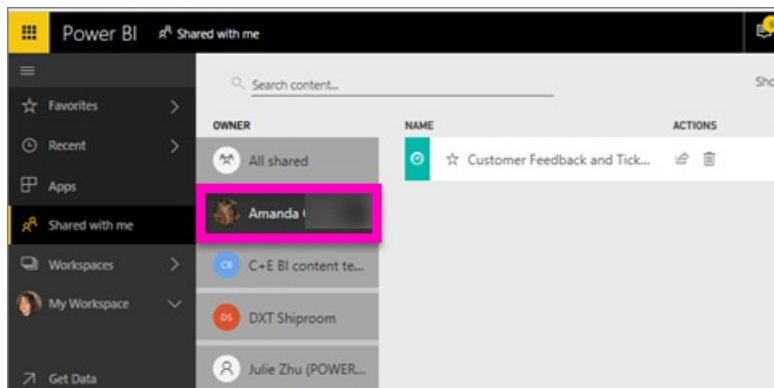
NOTE

For information about EGRC classifications, select the classification button or [visit Dashboard data classification](#) .

- Select the name of a dashboard to open it and explore. Once you've opened the shared dashboard you can use Q&A to ask questions about the underlying data or select a tile to open and interact with the report in Reading view.

Filter shared dashboards by owner

The content in the **Shared with me** screen can be further filtered by content owner. For example, if I select **Amanda**, I see only the dashboard that Amanda has shared with me.



Next steps

[Power BI - Basic Concepts](#)

[Power BI Premium - what is it?](#)

More questions? [Try asking the Power BI Community](#)

Usage metrics for dashboards and reports

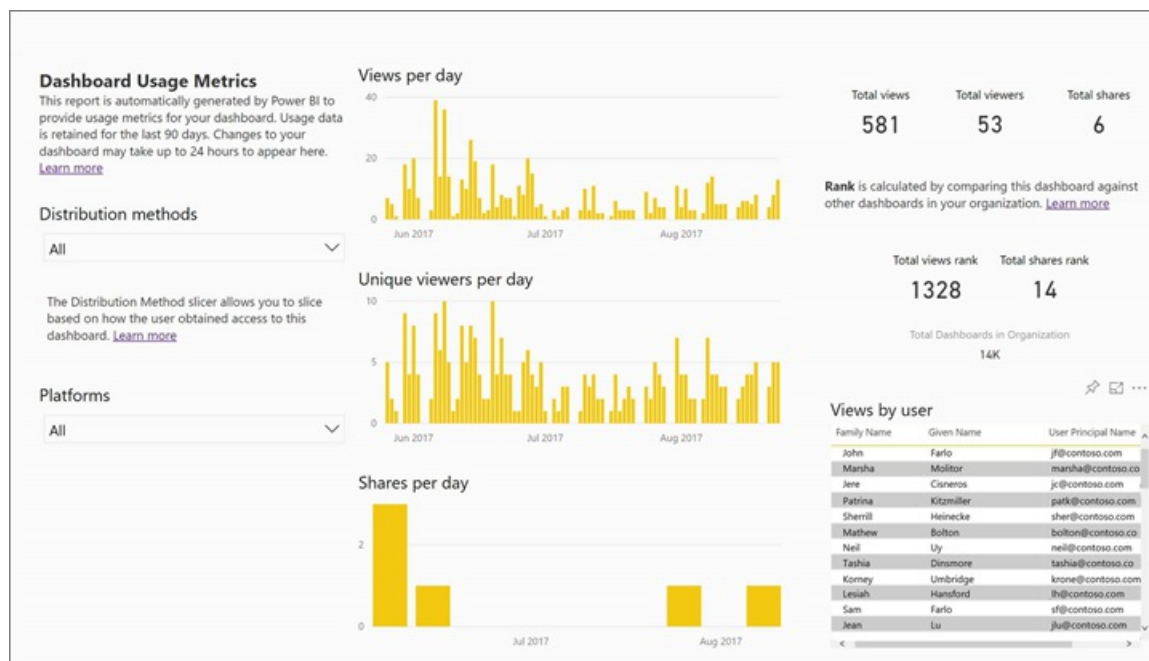
1/23/2018 • 10 min to read • [Edit Online](#)

If you create dashboards and reports, usage metrics help you understand their impact. When you run either dashboard usage metrics or report usage metrics, you discover how those dashboards and reports are being used throughout your organization; what is being used, by whom, and for what purpose.

NOTE

Usage metrics will track usage of reports that are embedded in SharePoint Online. They will also track embedding of dashboards and reports via both the "user owns credentials" and "app owns credentials" flow. Usage metrics will not track usage of reports embedding via [publish to web](#).

These usage metrics reports are read-only. However, you can personalize a usage metrics report by using "Save as." This creates a brand new dataset and converts the read-only report to a full-featured Power BI report that you can edit. Not only does the personalized report contain metrics for the selected dashboard or report, but by removing the default filter, you now have access to usage metrics for all dashboards or all reports in the selected workspace.



Why are usage metrics important to me?

Knowing how your content is being used helps you demonstrate your impact and prioritize your efforts. Your usage metrics may show that one of your reports is used daily by a huge segment of the organization and it may show that a dashboard you created isn't being viewed at all. This type of feedback is invaluable in guiding your work efforts.

Running usage metrics reports is only available in Power BI service. However, if you save a usage metrics report or pin it to a dashboard, you will be able to open and interact with that report on mobile devices.


Prerequisites

- The usage metrics feature captures usage information from all users, both Free and Pro. However, a Pro license is required to run and access the usage metrics data.
- Usage metrics are provided on dashboards or reports in the selected workspace. To access usage metrics for a

particular dashboard or report, you must:

- Have edit access to that dashboard or report
- Have a Pro license


About the Usage Metrics report

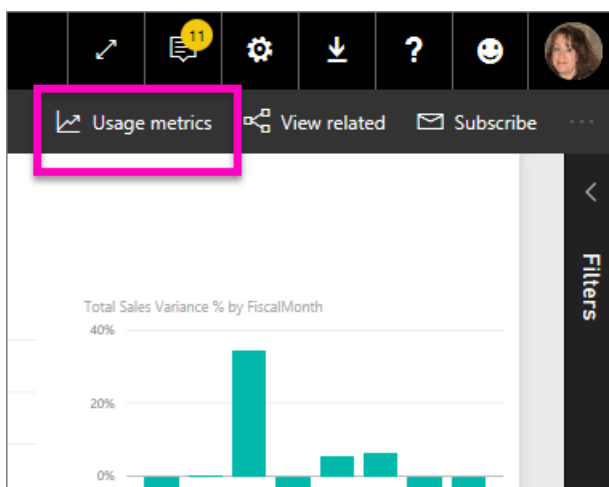
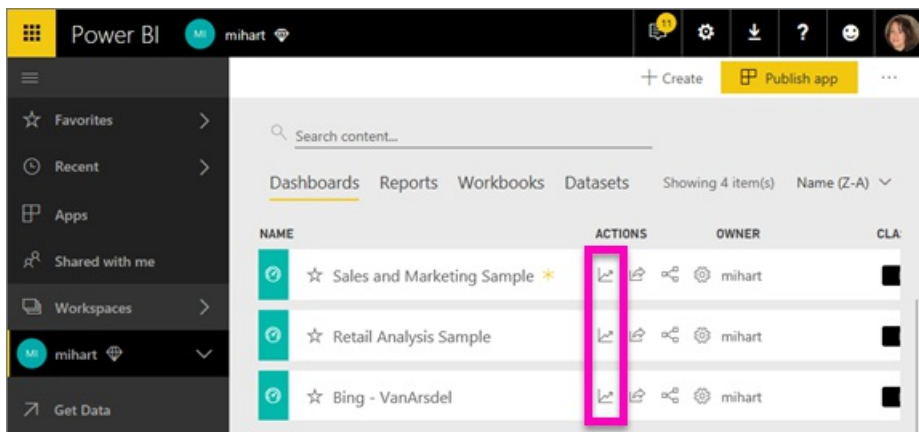
When you select **Usage metrics** or the icon  , Power BI generates a pre-built report with usage metrics for that content for the last 90 days. The report looks similar to the Power BI reports you're already familiar with, but it's designed to be informational -- not interactive. You'll be able to slice based on how your end users received access, whether they were accessing via the web or mobile app, etc. As your dashboards and reports evolve, so too will the usage metrics report, which updates every day with new data.

Usage metrics reports won't show up in **Recent**, **Workspaces**, **Favorites**, or other content lists. They cannot be added to an app. If you pin a tile from a usage metrics report to a dashboard, that dashboard cannot be added to an app or content pack.

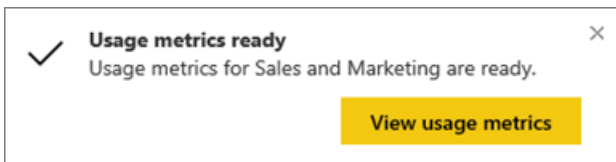
To dig down into the report data, or to build your own reports against the dataset, use **Save as** (see [Save the Usage Metrics report as a full-featured Power BI report](#)).

Open a Usage Metrics report for a dashboard or report

1. Start in the workspace that contains the dashboard or report.
2. From either the workspace content list or from the dashboard or report itself, select the icon for **Usage metrics**  .



3. The first time you do this, Power BI creates the usage metrics report and lets you know when it's ready.



- To open the results, select **View usage metrics**.

Usage metrics will be a powerful ally as you work to deploy and maintain Power BI dashboards and reports. Wondering which pages of your report are most useful, and which ones you should phase out? Slice by **Report page** to find out. Wondering if you should build a mobile layout for your dashboard? Slice by **Platforms** to discover how many users are accessing your content via the mobile apps vs. via web browser.

- Optionally, hover over a visualization and select the pin icon to add the visualization to a dashboard. Or, from the top menubar, select **Pin Live Page** to add the entire page to a dashboard. From the dashboard you can monitor the usage metrics more-easily or share them with others.

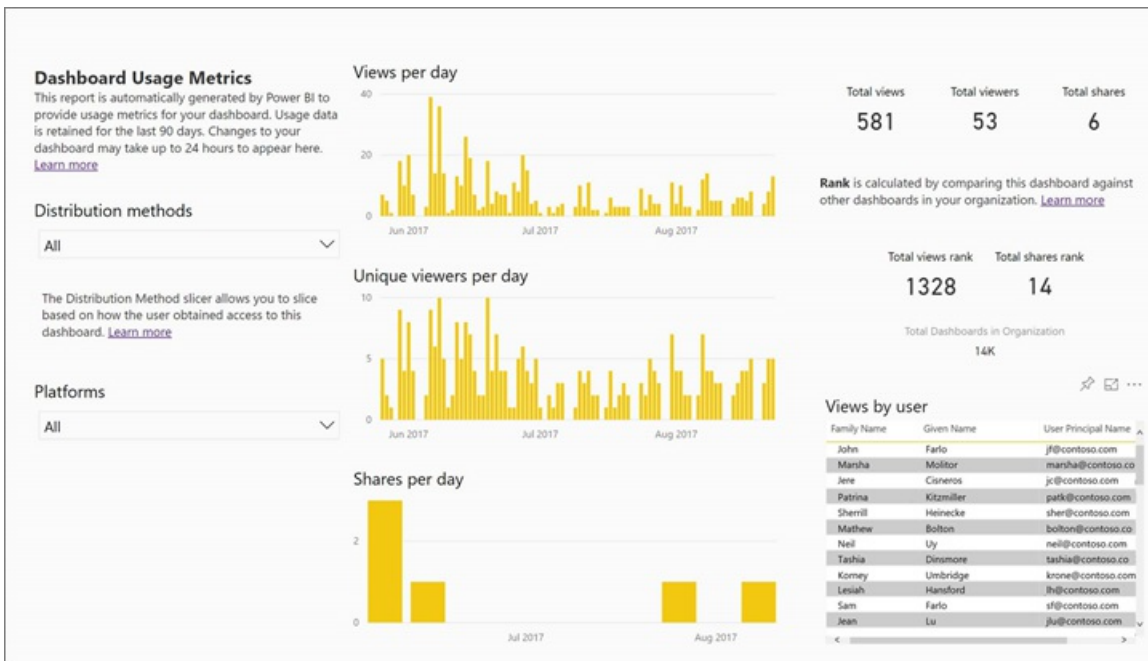
NOTE: If you pin a tile from a usage metrics report to a dashboard, that dashboard cannot be added to an app or content pack.

What metrics are reported?

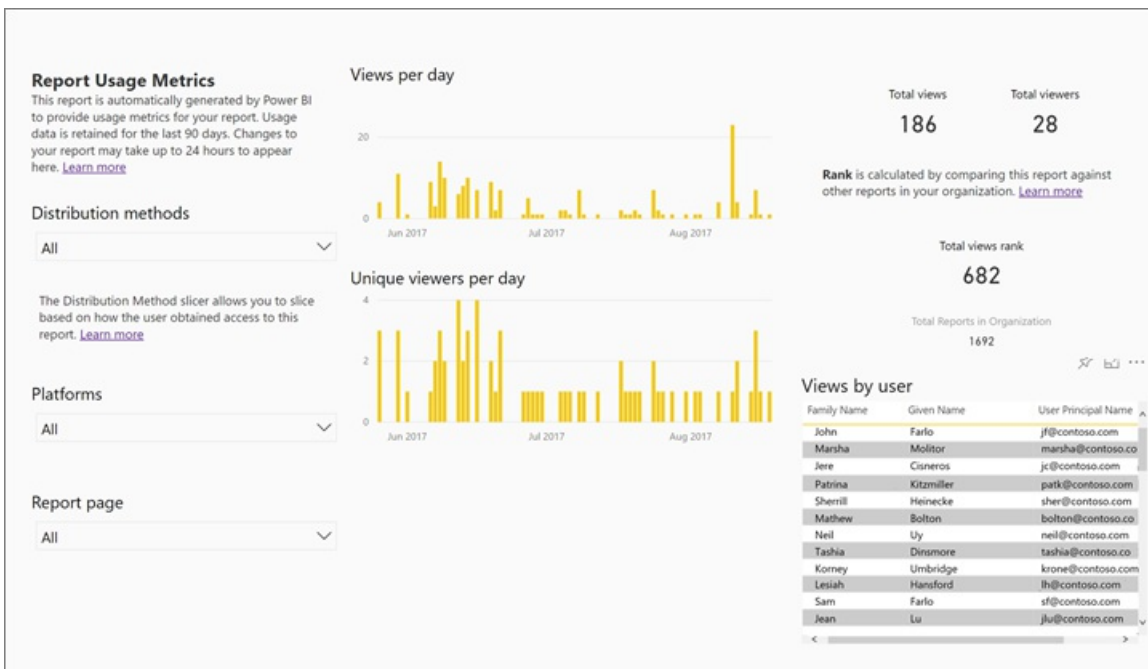
METRIC	DASHBOARD	REPORT	DESCRIPTION
Distribution method slicer	yes	yes	How users got access to the content. There are 3 possible methods: users can access the dashboard or report by being members of an app workspace , by having the content shared with them , or by installing a content pack/app. Note that views through an app are counted as "content pack."
Platforms slicer	yes	yes	Was the dashboard or report accessed via the Power BI service (powerbi.com) or a mobile device? Mobile includes all our iOS, Android, and Windows apps.
Report page slicer	no	yes	If the report has more than 1 page, slice the report by the page(s) that was viewed. If you see a list option for "Blank," that means a report page was recently added (within 24 hours the actual name of the new page will appear in the slicer list) and/or report pages have been deleted. "Blank" captures these types of situations.

METRIC	DASHBOARD	REPORT	DESCRIPTION
Views per day	yes	yes	Total number of views per day - a view is defined as a user loading a report page or dashboard.
Unique viewers per day	yes	yes	Number of <i>different</i> users who viewed the dashboard or report (based on the AAD user account).
Views per user	yes	yes	Number of views in the past 90 days, broken down by individual users.
Shares per day	yes	no	Number of times the dashboard was shared with another user or group.
Total views	yes	yes	Number of views in the past 90 days.
Total viewers	yes	yes	Number of unique viewers in the past 90 days.
Total shares	yes	no	Number of times the dashboard or report was shared in the past 90 days.
Total in organization	yes	yes	Count of all dashboards or reports in the entire organization which had at least one view in the past 90 days. Used to calculate rank.
Rank: Total views	yes	yes	For total views of all dashboards or reports in the organization over the past 90 days, where does this dashboard or report rank.
Rank: Total shares	yes	no	For total shares of all dashboards in the organization over the past 90 days, where does this dashboard or report rank.

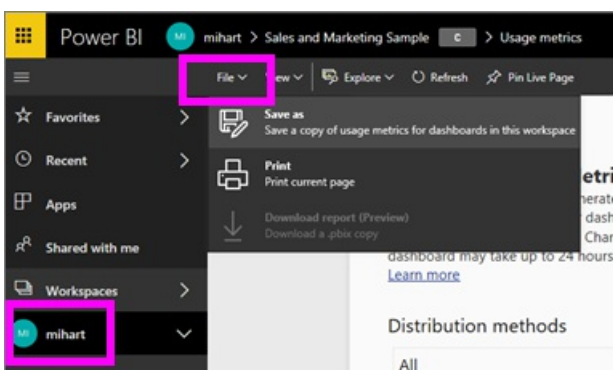
Dashboard Usage Metrics report



Report Usage Metrics report



Save the Usage Metrics report as a full-featured Power BI report (personalize)



Use **Save as** to convert the usage metrics report to a full-featured Power BI report that can be customized and shared. Once you've created a personalized copy, you'll get full access to the underlying dataset, allowing you to customize the usage metrics report to your specific needs. You can even use Power BI Desktop to build custom

usage metrics reports using the [live connection to Power BI service feature](#).

Better yet, the underlying dataset includes the usage details for all dashboards or reports in the workspace. This opens up yet another world of possibilities. You could, for example, create a report which compares all dashboards in your workspace based on usage. Or, you could create a usage metrics dashboard for your Power BI app by aggregating usage across all the content distributed within that app. See [remove the Page level filter](#) below.

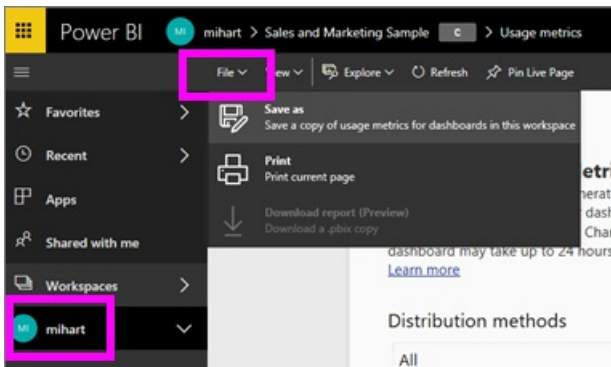
What is created when using "Save as"?

When Power BI creates the full-featured report, it also creates a new dataset **made up of all the dashboards or all the reports contained in the current workspace** that have been accessed in the last 90 days. For example, say you have a workspace named "Sales" and it contains three dashboards and two reports, and you create a usage metrics report on the "Northeast" dashboard. And then you use **Save as** to personalize and convert it to a full-featured report. The dataset for that new report contains the usage metrics *not only for that one dashboard named "Northeast"* but for all three dashboards in the "Sales" workspace. By default, the report will display data for the "Northeast" dashboard and you'll need to [remove a filter](#) (single click) to display data for all three dashboards.

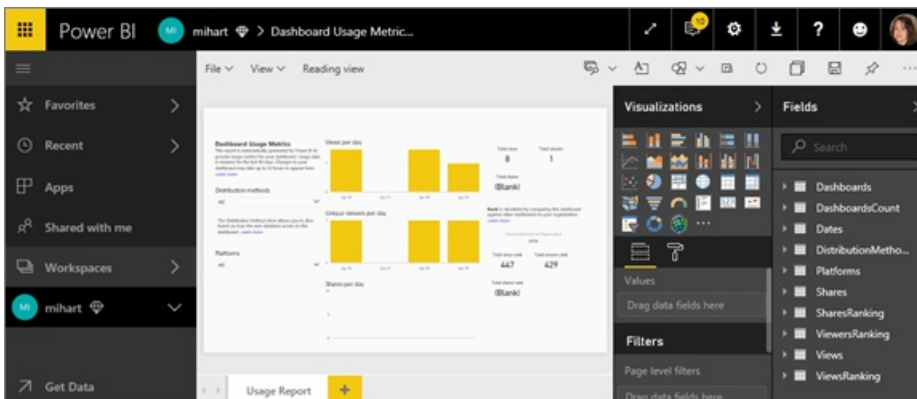
Create a copy of the usage report using "Save as"

When you create a copy using "Save as" (personalize), Power BI converts the read-only pre-built report to a full-featured report. At first glance, it looks exactly the same. However, you can now open the report in Editing view, add new visualizations, filters, and pages, modify or delete existing visualizations, and so much more. Power BI saves the brand new report and dataset in the current workspace. In the example below, the current workspace is **mihart**.

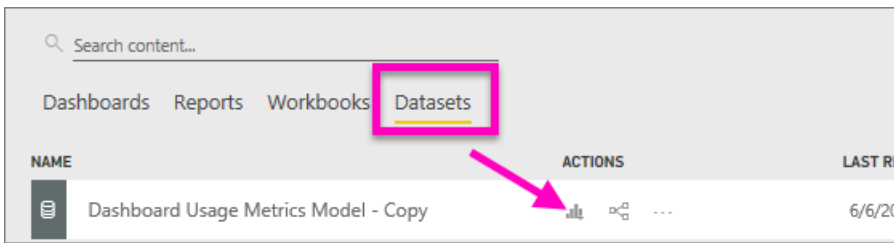
1. From the pre-built usage metrics report, select **File > Save As**. Power BI converts the usage metrics report into a full-featured Power BI report. This is called a *personalized* usage metrics report. The personalized usage report and dataset are saved in the current workspace which is named **mihart*.



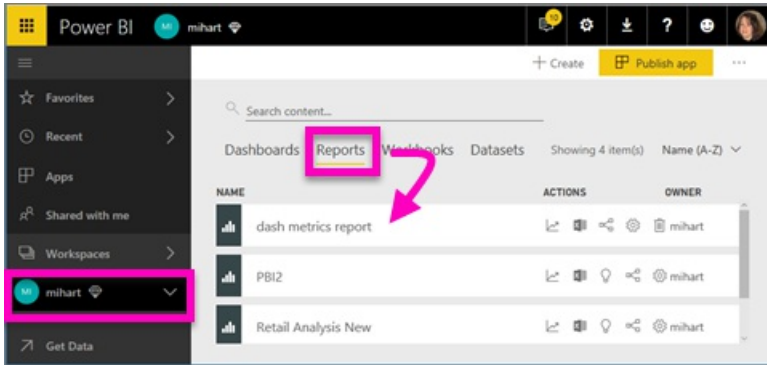
2. Open the report in Editing view and [interact with it as you would with any other Power BI report](#). For example, add new pages and build new visualizations, add filters, format the fonts and colors, etc.



3. Alternately, start with the new dataset and build a report from scratch.



4. The new report is saved in the current workspace (mihart) and also added to the **Recent** content list.

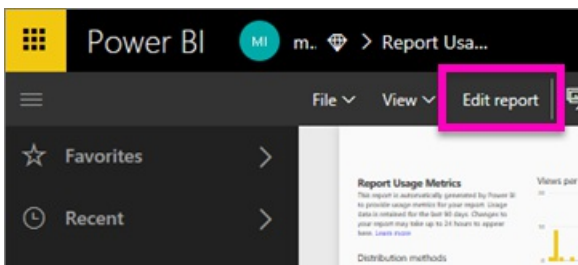


Remove the filter to see *all* the usage metrics data in the workspace

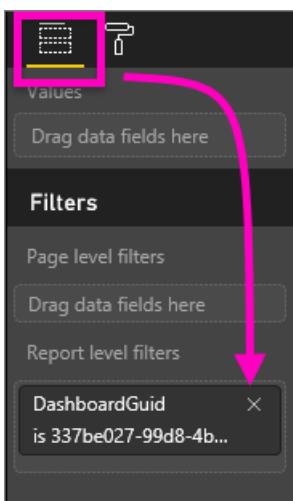
To see the metrics for all the dashboards or for all the reports in the workspace, you'll have to remove a filter. By default, the personalized report is filtered to display metrics for only the dashboard or report that was used to create it.

If, for example, you used the dashboard named "European sales" to create this new personalized report, only usage data from the "European sales" dashboard will display. To remove the filter, and enable data from all the dashboards in that workspace:

1. Open the personalized report in Editing view.



2. In the Filters pane, locate the **Report level filters** bucket and remove the filter by selecting the "x".

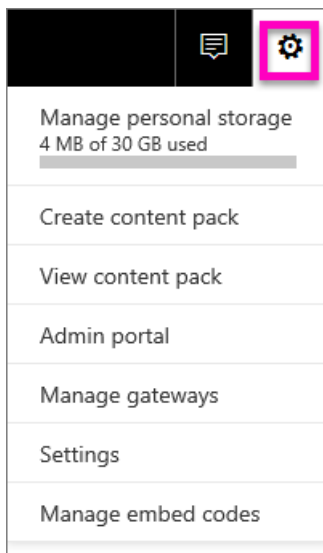


Now your personalized report displays metrics for the entire workspace.

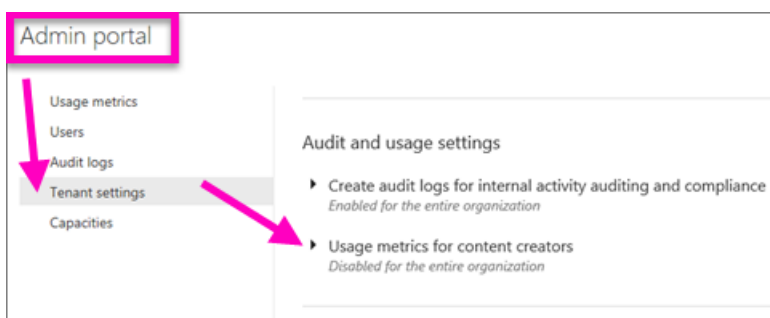
Admin controls for usage metrics - for Power BI administrators

Usage metrics reports are a feature that the Power BI or Office 365 administrator can turn on or off. Administrators have granular control over which users have access to usage metrics; they are On by default for all users in the organization.

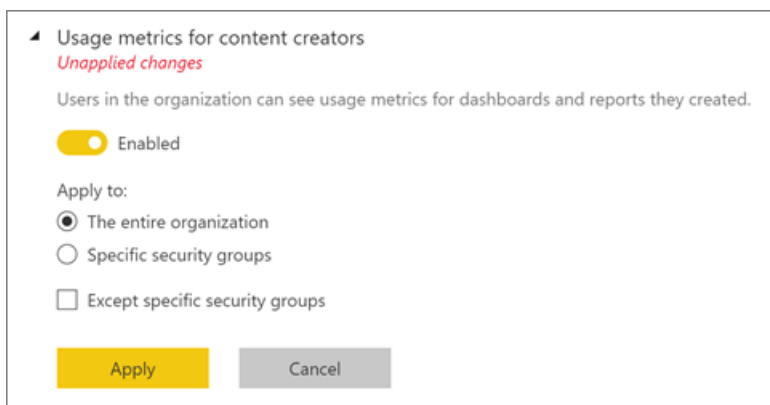
1. Open the Admin portal by selecting the gear icon in the top-right-corner of Power BI service and choosing **Admin portal**.



2. From the Admin portal, select **Tenant settings** and choose **Usage metrics for content creators**.



3. Enable (or disable) usage metrics and select **Apply**.



When disabling usage metrics for their entire organization, admins can use the **delete all existing usage metrics content** option to delete all existing reports and dashboard tiles that were built using the usage metrics reports and datasets. This option removes all access to usage metrics data for all users in the organization who may already be using it. Be careful, because deleting existing usage metrics content is irreversible.

Considerations and limitations

Q: I can't run usage metrics on a dashboard or report

A: You can only see usage metrics for content you own or have permissions to edit.

Q: Will usage metrics capture views from embedded dashboards and reports?

A: Usage metrics currently does not support capturing usage for embedded dashboards and reports, including the [user owns data](#) flow, the [app owns data](#) flow and the [publish to web](#) flow. In those cases, we recommend using existing web analytics platforms to track usage for the hosting app or portal.

Q: I can't run usage metrics on any content at all.

A1: Admins can turn off this feature for their organization. Contact your Admin to see if this is the case.

A2: Usage metrics is a Power BI Pro feature.

Q: The data doesn't seem up-to-date. For example, distribution methods don't show up, report pages are missing, etc.

A: It can take up to 24 hours for data to update.

Q: There are four reports in the workspace but the usage metrics report only displays 3.

A: The usage metrics report only includes reports (or dashboards) that have been accessed in the past 90 days. If a report (or dashboard) does not show up, likely it hasn't been used in more than 90 days.

Next steps

[Favorite a dashboard](#)

More questions? [Try the Power BI Community](#)

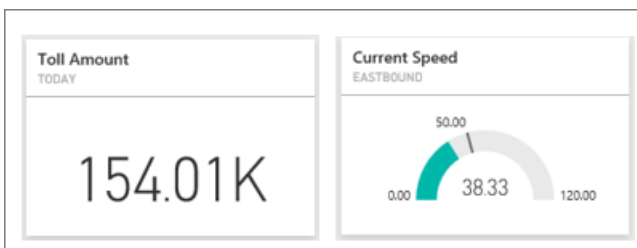
Data alerts in Power BI service

12/20/2017 • 3 min to read • [Edit Online](#)

Set alerts to notify you when data in your dashboards changes beyond limits you set.

Alerts can only be set on tiles pinned from report visuals, and only on gauges, KPIs and cards. Alerts can be set on visuals created from streaming datasets that have been pinned from a report to a dashboard, but cannot be set on streaming tiles created directly on the dashboard using **Add tile > Custom streaming data**.

Only you can see the alerts you set, even if you share your dashboard. Data alerts are fully synchronized across platforms; set and view data alerts [in the Power BI mobile apps](#) and in the Power BI service. They are not available for Power BI Desktop. Alerts can even be [automated and integrated with Microsoft Flow](#) - [try it out yourself](#).



WARNING

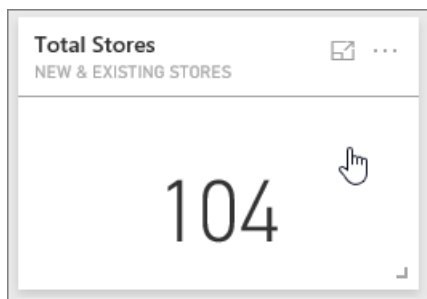
Data-driven alert notifications provide information about your data. If you view your Power BI data on a mobile device and that device gets stolen, we recommend using the Power BI service to turn off all data-driven alert rules.


Set data alerts in Power BI service

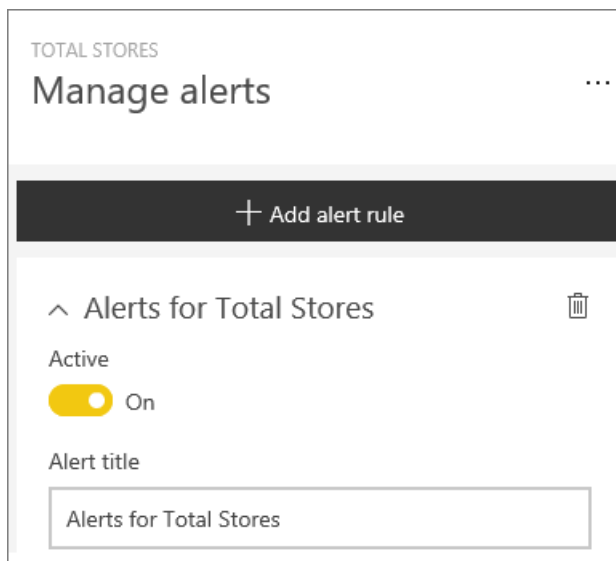
Watch Amanda add some alerts to tiles on her dashboard. Then follow the step-by-step instructions below the video to try it out yourself.

This example uses a card tile from the Retail Analysis sample dashboard.

1. Start on a dashboard. From a dashboard gauge, KPI, or card tile, select the ellipses.



2. Select the bell icon  to add one or more alerts for **Total stores**.
3. To start, select **+ Add alert rule**, ensure the slider is set to **On**, and give your alert a title. Titles help you easily recognize your alerts.



4. Scroll down and enter the alert details. In this example we'll create an alert that notifies us once a day if the number of total stores goes above 100. Alerts will appear in our Notification center. And we'll have Power BI send us an email as well.

A screenshot of the alert configuration dialog box. It has two columns: 'Condition' and 'Threshold'. The 'Condition' dropdown is set to 'Above'. The 'Threshold' input field contains the number '100'. Below these fields, there is a section for 'Maximum notification frequency' with two radio button options: 'At most every 24 hours' (which is selected) and 'At most once an hour'. A note states 'Alerts are only sent if your data changes.' Below that, there is a checkbox labeled 'Send me email, too' which is checked. At the bottom, there is a link that says 'Use Microsoft Flow to trigger additional actions'. At the very bottom, there are two buttons: 'Save and close' (highlighted in yellow) and 'Cancel'.

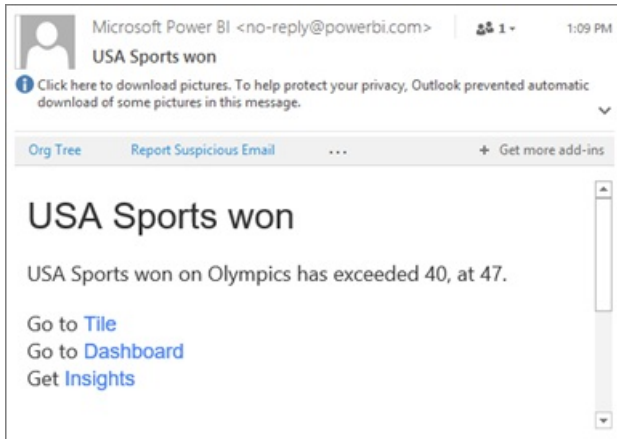
5. Select **Save**.

Receiving alerts

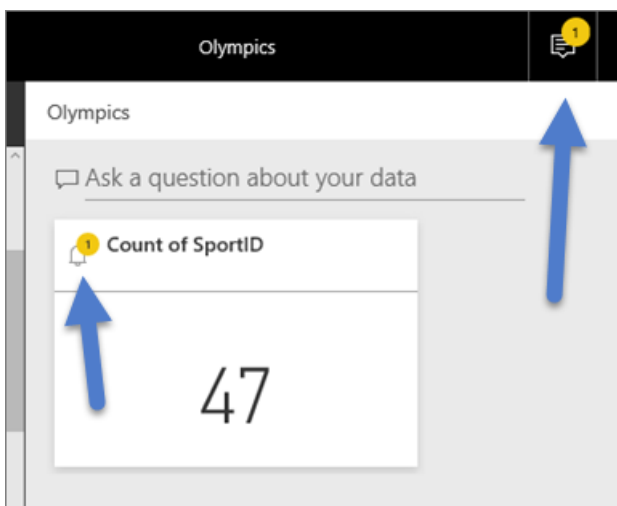
When the data being tracked reaches one of the thresholds you've set, several things will happen. First, Power BI checks to see if it's been more than an hour or more than 24 hours (depending on the option you selected) since the last alert was sent. As long as the data is past the threshold, you'll get an alert.

Next, Power BI sends an alert to your notification center and, optionally, in email. Each alert contains a direct link to your data. Select the link to see the relevant tile where you can explore, share, and learn more.

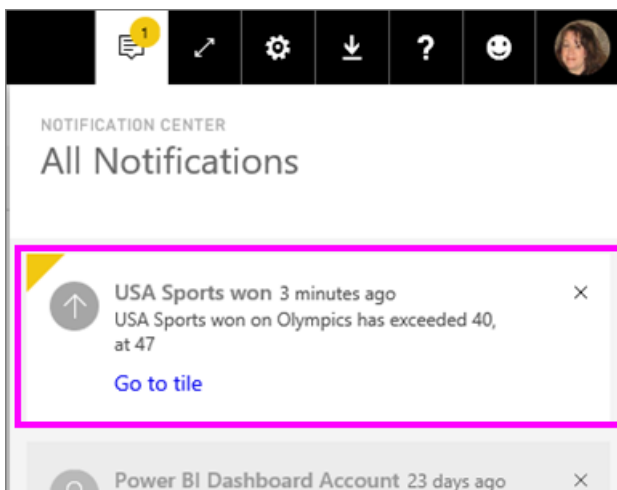
1. If you've set the alert to send you an email, you'll find something like this in your Inbox.



2. Power BI adds a message to your **Notification center** and adds a new alert icon to the applicable tile.



3. Open your Notification center to see the alert details.




NOTE

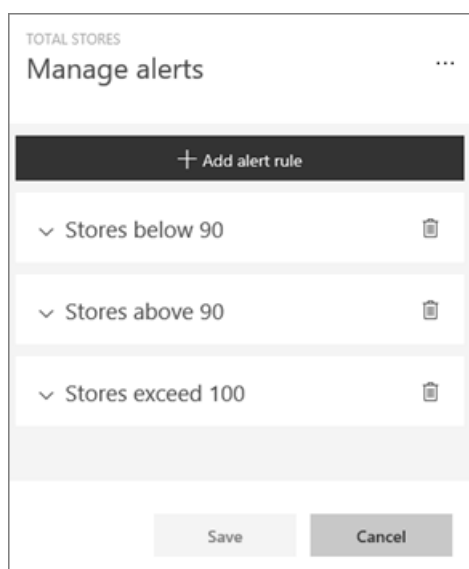
Alerts only work on data that is refreshed. When data refreshes, Power BI looks to see if an alert is set for that data. If the data has reached an alert threshold, an alert is triggered.

Managing alerts

There are many ways to manage your alerts: From the dashboard tile itself, from the Power BI Settings menu, on an individual tile in the [Power BI mobile app on the iPhone](#) or in the [Power BI mobile app for Windows 10](#).

From the tile itself

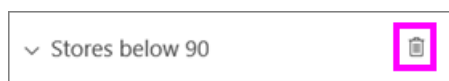
1. If you need to change or remove an alert for a tile, re-open the **Manage alerts** window by selecting the bell icon . All the alerts that you've set for that tile are displayed.



2. To modify an alert, select the arrow to the left of the alert name.



3. To delete an alert, select the trashcan to the right of the alert name.



From the Power BI settings menu

1. Select the gear icon from the Power BI menubar.



2. Under **Settings** select **Alerts**.

Settings

General Dashboards Datasets Workbooks Alerts

My workspace

ALERT	DASHBOARD	DATE CREATED			
Stores exceed 100	Retail Analysis Sample	11:10 AM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Alerts for This Year's Sales	Retail Analysis Sample	11:11 AM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Sales exceed 20M	Retail Analysis Sample	11:11 AM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Stores above 90	Retail Analysis Sample	11:12 AM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Stores below 90	Retail Analysis Sample	11:15 AM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Defects over 10M	Supplier Quality Analysis Sample	12:15 PM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Titles more than 50	MetricsMashup2	12:25 PM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
Phelps medals	Olympics Demo	12:38 PM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete
US won 50+	Olympics Demo	12:39 PM 07.07.2016	<input checked="" type="checkbox"/>	On	Edit Delete

- From here you can turn alerts on and off, open the **Manage alerts** window to make changes, or delete the alert.

Tips and troubleshooting

- Alerts are currently not supported for Bing tiles, or card tiles with date/time measures.
- Alerts only work with numeric data types.
- Alerts only work on data that is refreshed. They do not work on static data.
- Alerts will only work on streaming datasets if you build a KPI/card/gauge report visual and then pin that visual to the dashboard.

Next steps

[Create a Microsoft Flow that includes a data alert](#)

[Set data alerts on your mobile device](#)

[Get started with Power BI](#)

More questions? [Try asking the Power BI Community](#)

Power BI Notifications

1/3/2018 • 1 min to read • [Edit Online](#)

The Notification Center is a sequential feed of information related to your Power BI experience. Open it to see messages about new dashboards that have been shared with you, changes to your Group space, information about Power BI events and meetings, alerts you've set, and more. You can [set alerts in the Power BI service](#) and also in the Power BI mobile apps.

Watch Amanda review notifications she's received, manage her notifications, and respond to them. Then follow the instructions below the video to try it out yourself.

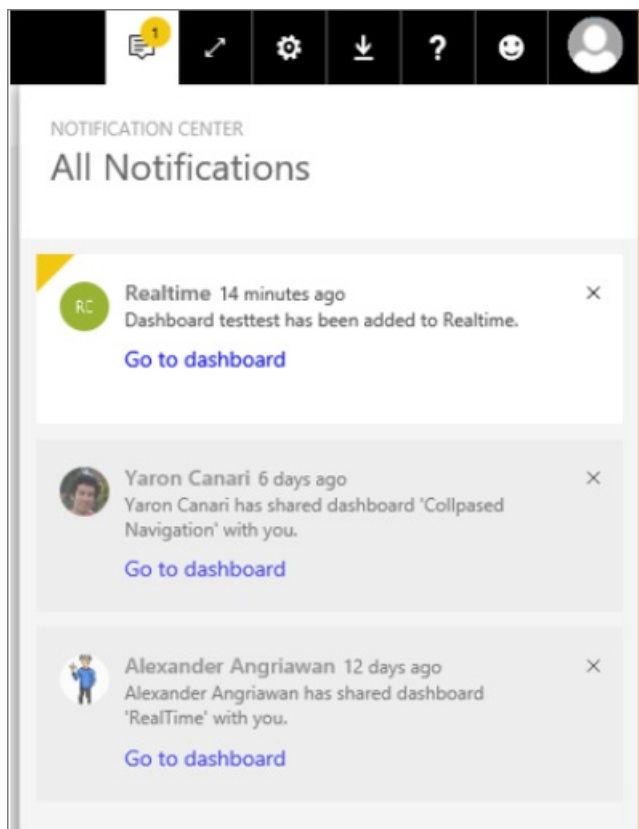
1. When you log in to Power BI, any new notifications that were sent to you while you were offline are added to your feed. If you do have new notifications, Power BI displays a yellow bubble with the number of new items.



2. In the Power BI menubar, select the Notifications icon.



3. Notifications are displayed with the most-recent on top and unread messages highlighted. Notifications are retained for 90 days, unless you delete them sooner or reach the maximum limit of 100.



4. To dismiss a notification, select the X icon.

Next steps

- [Data alerts in Power BI service](#)
- [Create a Microsoft Flow that is triggered by a Power BI data alert](#)
- [Set data alerts in the iPhone app \(Power BI for iOS\)](#)
- [Set data alerts in the Power BI mobile app for Windows 10](#)
- More questions? [Try the Power BI Community](#)

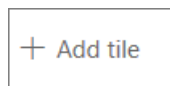
Add image, text, video, and more to your dashboard

12/20/2017 • 4 min to read • [Edit Online](#)

Add tile

The **Add tile** control lets you directly add an image, text box, video, streaming data, or web code to your dashboard.

1. Select **Add tile** from the top menu bar. Depending on space limitations, you may see only the plus **+** sign.



2. Select which type of tile to add: **Image**, **Text box**, **Video**, **Web content**, or **Custom streaming data**.



Add an image

Say you want your company logo on your dashboard, or some other image. You'll need to save the image file online and link to it. Make sure special credentials aren't required to access the image file. For example, OneDrive and SharePoint require authentication, so images stored there can't be added to a dashboard this way.

1. Select **Image** > **Next**.
2. Add image information to the **Add image tile** window.

Add image tile

* Required

Details

Display title and subtitle

Title

Subtitle

Content

URL *

Functionality

Set custom link

Link type

External link

Link to a dashboard or report in the current workspace

URL *

Open custom link in the same tab?

Yes

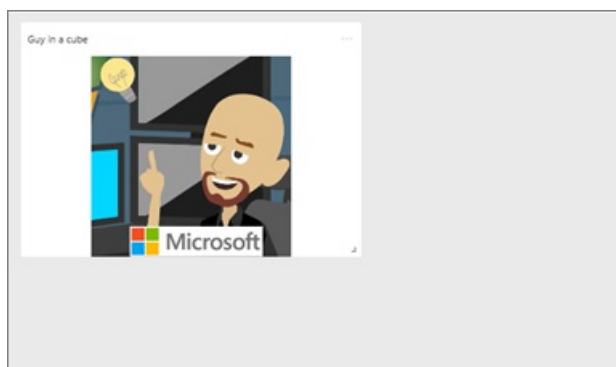
No

[Restore default](#)

[Technical Details](#)

Back Apply Cancel

- to display a title above the image, select *Display title and subtitle* and type a title and/or subtitle.
- enter the image URL
- to make the tile a hyperlink, select **Set custom link** and enter the URL. When colleagues click this image or title, they'll be taken to this URL.
- Select **Apply**. On the dashboard, resize and move the image as needed.



Add a text box or dashboard heading

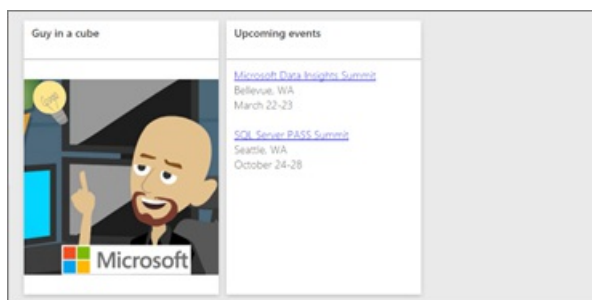
1. Select **Text box > Next**.

NOTE: To add a dashboard heading, type your heading in the text box and increase the font.

2. Format the text box:

- to display a title above the text box, select **Display title and subtitle** and type a title and/or subtitle.
- enter and format content for the text box.
- Optionally, set a custom link for the title. A custom link can be an external site or a dashboard or report in your workspace. However, in this example we've added hyperlinks within the text box itself, so will leave **Set custom link** unchecked.

3. Select **Apply**. On the dashboard, resize and move the text box as needed.



Add a video

When you add a YouTube or Vimeo video tile to your dashboard, the video plays right on your dashboard.

1. Select **Video > Next**.
2. Add video information to the **Add video tile** pane.

Add video tile

*** Required**

Details

Display title and subtitle

Title

Subtitle

Content

Video URL (YouTube or Vimeo) *

Functionality

Set custom link

Link type

External link

Link to a dashboard or report in the current workspace

URL *

Open custom link in the same tab?

Yes

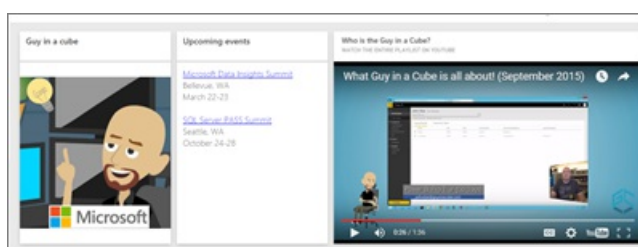
No

[Restore default](#)

[Technical Details](#)

Back Apply Cancel

- to display a title and subtitle at the top of the video tile, select *Display title and subtitle* and type a title and/or subtitle. In this example, we'll add a subtitle and then turn it into a hyperlink back to the entire playlist on YouTube.
- enter the URL for the video
- Add a hyperlink for the title and subtitle. Perhaps after your colleagues watch the embedded video you'd like them to view the entire playlist on YouTube -- add a link to your playlist here.
- Select **Apply**. On the dashboard, resize and move the video tile as needed.



3. Select the video tile to play the video.
4. Select the subtitle to visit the playlist on YouTube.

Add streaming data

Add web content

Paste or type in any HTML content. Power BI adds it, as a tile, to your dashboard. Enter the embed code by hand or copy/paste from sites such as Twitter, YouTube, embed.ly, and more.

1. Select **Web content > Next**.
2. Add information to the **Add web content tile** pane.

Add web content tile

Required

Details

Display title and subtitle


Title

Subtitle

Content

Embed code *****

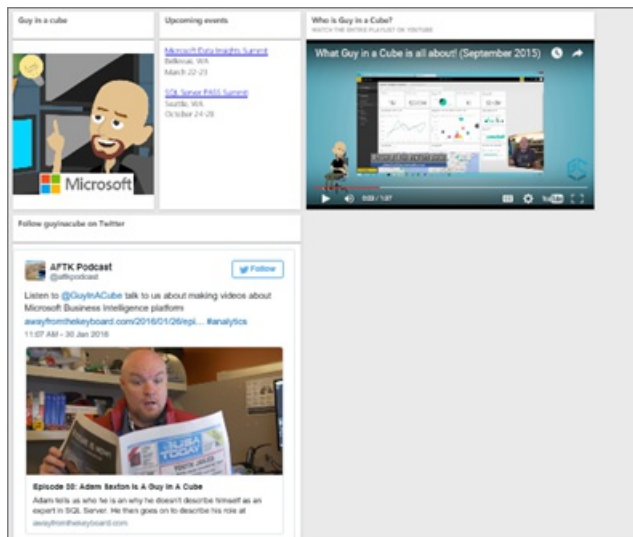
```
<blockquote class="twitter-tweet" data-partner="tweetdeck"><p lang="en" dir="ltr">Listen to <a href="https://twitter.com/GuyInACube">@GuyInACube</a> talk to us about
```

 Having issues viewing your content? [Learn more](#)

Functionality

Set custom link

- to display a title above the tile, select *Display title and subtitle* and type a title and/or subtitle.
 - enter the embed code. In this example we're copying and pasting a Twitter feed.
3. Select **Apply**. On the dashboard, resize and move the web content tile as needed.



Tips for embedding web content

- For iframes, use a secure source. If you enter your iframe embed code and get a blank tile, check to see if you're using **http** for the iframe source. If so, change it to **https**.

```
<iframe src="https://xyz.com">
```

- Edit width and height information. This embed code embeds a video and sets the video player to 560 x 315 pixels. This size will not change as you resize the tile.

```
<iframe width="560" height="315"
src="https://www.youtube.com/embed/C1e_rKBpZ28" frameborder="0"
allowfullscreen></iframe>
```

If you'd like the player to resize to fit the tile size, set width and height to 100%.

```
<iframe width="100%" height="100%"
src="https://www.youtube.com/embed/C1e_rKBpZ28" frameborder="0"
allowfullscreen></iframe>
```

- This code embeds a tweet and retains, as separate links on the dashboard, links for the **AFTK** podcast, **@GuyInACube's Twitter page**, **Follow**, **#analytics**, **reply**, **retweet**, and **like**. Selecting the tile itself takes you to the podcast on Twitter.

```
<blockquote class="twitter-tweet" data-partner="tweetdeck">
<p lang="en" dir="ltr">Listen to
<a href="https://twitter.com/GuyInACube">@GuyInACube</a> talk to
us about making videos about Microsoft Business Intelligence
platform
<a href="https://t.co/TmRgalz7tv">https://t.co/TmRgalz7tv </a>
<a href="https://twitter.com/hashtag/analytics?src=hash">
#analytics</a></p>&mdash; AFTK Podcast (@aftkpodcast) <a
href="https://twitter.com/aftkpodcast/status/693465456531771392">
January 30, 2016</a></blockquote> <script async src="//platform.twitter.com/widgets.js" charset="utf-
8"></script>
```

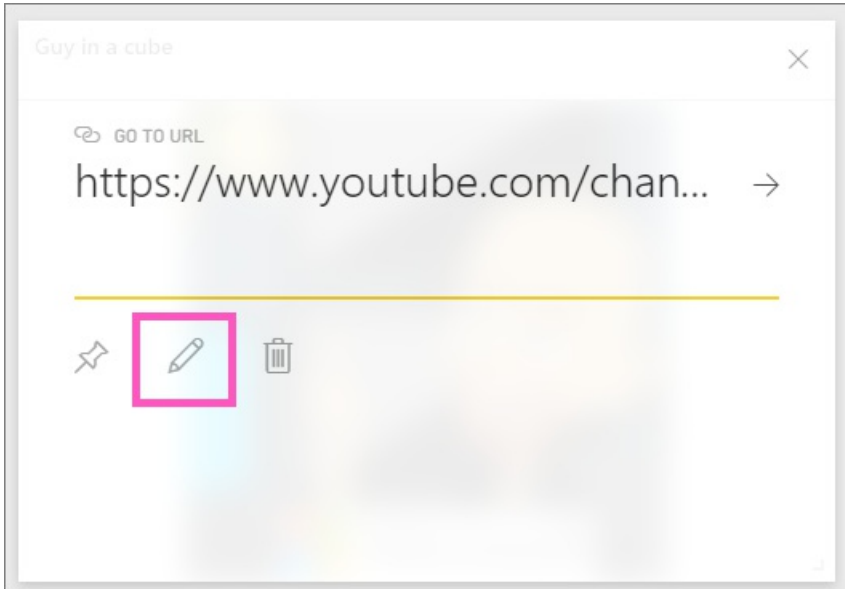
Edit a tile

To make changes to a tile...

1. Hover over the top right corner of the tile and select the ellipses.



2. Select the edit icon to re-open the **Tile details** pane and make changes.



Considerations and troubleshooting

- To make it easier to move the tile on your dashboard, add a title and/or subtitle.
- If you'd like to embed some content from a website, but the website doesn't give you embed code to copy and paste, check out embed.ly for help generating the embed code.

Next steps

[Dashboard tiles](#)

More questions? [Try the Power BI Community](#).

Edit or remove a dashboard tile

1/23/2018 • 3 min to read • [Edit Online](#)

Dashboard *owners* versus dashboard *consumers*

When you create or own a dashboard, you have many options for changing the look and default behavior of the tiles on that dashboard. Use the settings and strategies below to design the dashboard *consuming* experience for your colleagues. Will selecting a tile open the underlying report, a custom URL, or a different dashboard? Maybe you'll [add a tile that displays a video or streaming data](#)? And you might even want to [create a tile that has interactive slicers](#). As a *creator* you have many options.

This article covers the following.

- [Create a visualization and pin it to a dashboard](#)
- [Move a tile](#)
- [Resize a tile](#)
- [Rename a tile](#)
- [Add a hyperlink to a tile](#)
- [Pin a tile to a different dashboard](#)
- [Delete a tile](#)

TIP

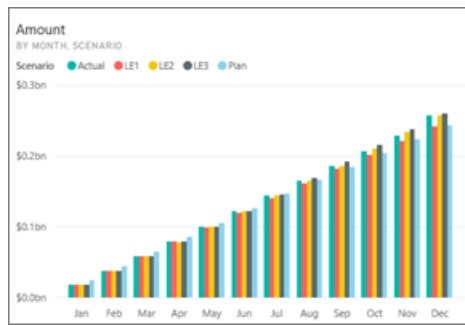
To change the visualization shown on the tile itself, delete the tile and add a new [dashboard tile](#).

Prerequisites

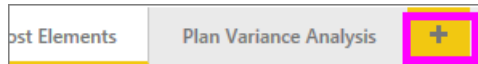
1. To follow along, open Power BI service (not Power BI Desktop) and [download the IT Spend Analysis sample](#). When the "Success" message appears, select **Go to dashboard**

Create a new visualization and pin it to the dashboard

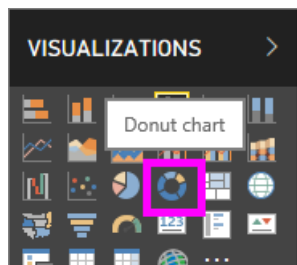
1. From the IT Spend Analysis dashboard, select the "Amount" tile to open the report.



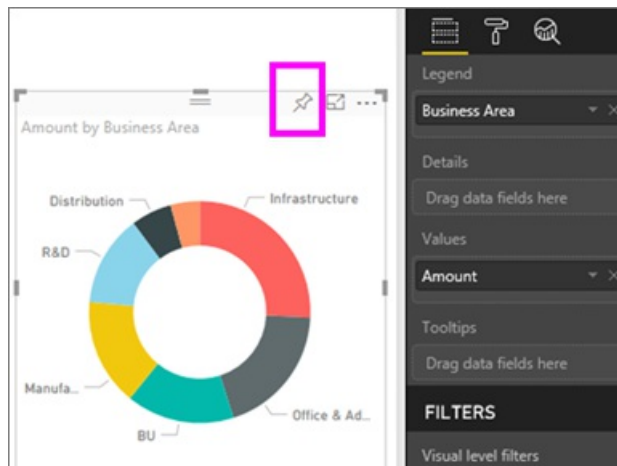
- Open the report in Editing view by selecting **Edit report** from the top menubar.
- Add a new report page by selecting the plus sign (+) at the bottom of the report.



- From the FIELDS pane, select **Fact > Amount** and **Business Area > Business Area**.
- From the VISUALIZATIONS pane, select the Donut chart icon to convert the visualization to a Donut chart.



- Select the pin icon and pin the Donut chart to the IT Spend Analysis sample dashboard.



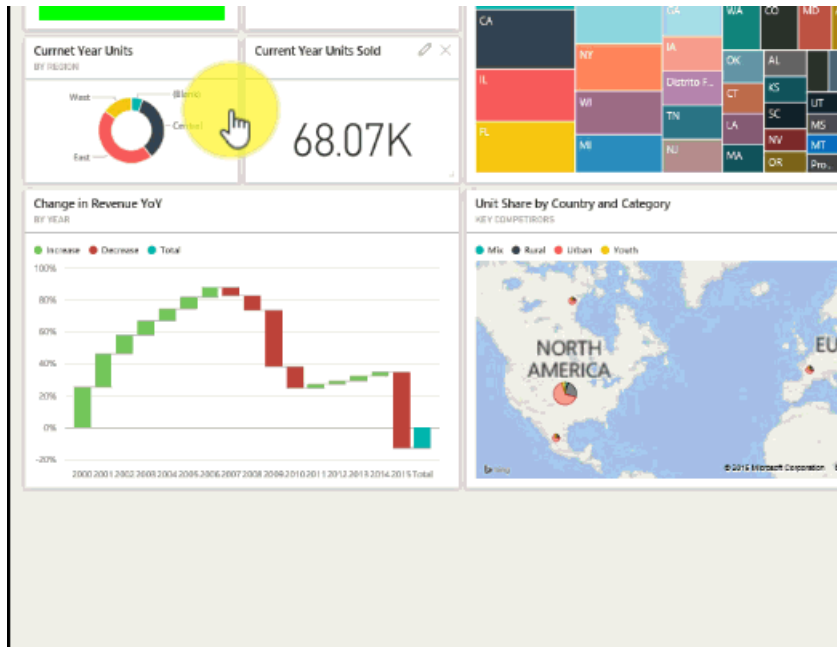
- When the "Success" message appears, select **Go to dashboard**. You will be prompted to save your changes. Select **Save**.

Move the tile

On the dashboard, locate the new tile. Select and hold the tile to drag it to a new location on the dashboard canvas.

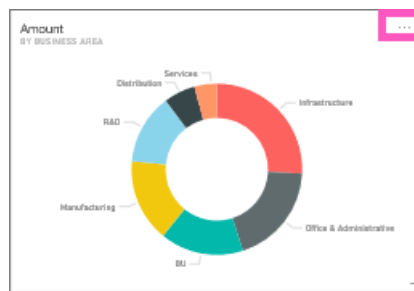
Resize the tile

You can make tiles many different sizes -- from 1x1 tile units up to 5x5. Select and drag the handle (in the bottom right corner) to resize the tile.

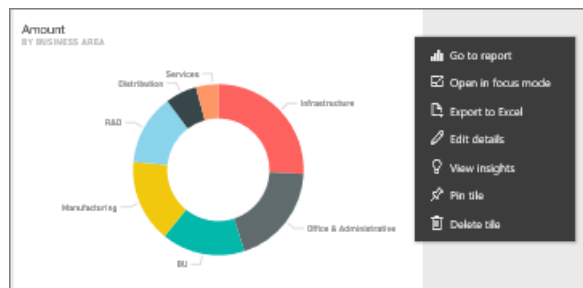


The ellipses (...) menu

1. Select the ellipses (...) in the upper-right corner of the tile.

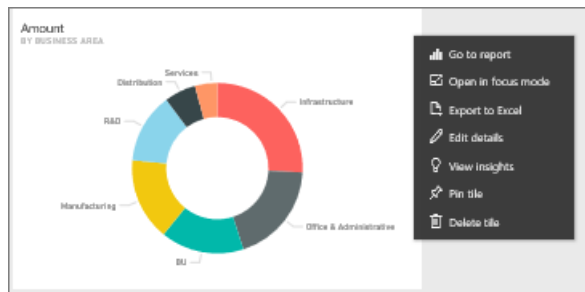


2. Hover over the "Account" tile and select the ellipses to display the options. The options available will vary by tile type. For example, the options available for a live tile are different from options available for a standard visualization tile. Also, if a dashboard has been shared with you (you are not the owner), you will have fewer options.



3. Select **Edit details** to open the "Tile details" window.

Change the title and default behavior of the tile. For example, you may decide that when a *consumer* selects a tile, instead of opening the report that was used to create that tile, a new dashboard displays instead.



Rename the tile

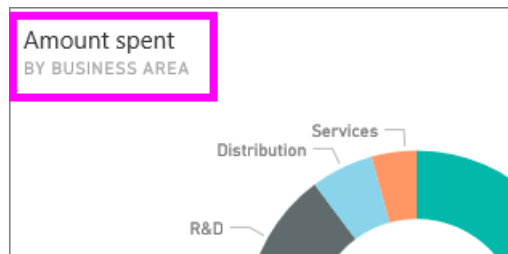
At the top of the "Tile details" window, change **Title** to **Amount spent**.

Change the default hyperlink


By default, selecting a tile usually takes you to the report where the tile was created or to Q&A (if the tile was created in Q&A). To link to a webpage, another dashboard or report (in the same workspace), an SSRS report, or other online content - add a custom link.

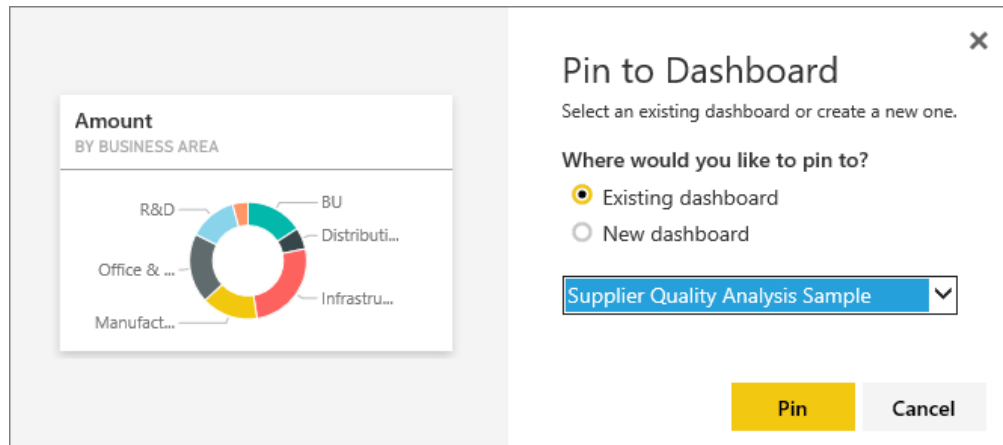
1. Under the Functionality heading, select **Set custom link**.
2. Select **Link to a dashboard or report in the current workspace** and then select from the dropdown. In this example I've selected the Human Resources sample dashboard. If you don't have this sample already in your workspace, you can add it and come back to this step, or you can select a different dashboard.

3. Select **Apply**.
4. The new title displays on the tile. And, when you select the tile, Power BI opens the Human Resources dashboard.




Pin the tile to a different dashboard

1. From the ellipses dropdown menu, select **Pin tile** .
2. Decide whether to pin a duplicate of this tile to an existing dashboard or to a new dashboard.



3. Select **Pin**.

Delete the tile

1. To permanently remove a tile from a dashboard, select **Delete tile**  from the ellipses dropdown menu.
2. Deleting a tile does not delete the underlying visualization. Open the underlying report by selecting the "Amount" tile. Open the last page in your report to see that the original visualization has not been deleted from the report.

Next steps

[Dashboard tiles in Power BI](#)

[Dashboards in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Tips for designing a great Power BI dashboard

1/3/2018 • 4 min to read • [Edit Online](#)

Now that you've created a dashboard and added some tiles, think about how to make your dashboard not just pretty, but also functional. In general, that means making the most important information stand out, and making it clean and uncluttered.

Here are a few tips.

TIP

Many of the design principles for reports apply to dashboards as well. Read our whitepaper [Best design principles for reports and visualizations](#).

Consider your audience

What are the key metrics that will help them make decisions? How will the dashboard be used? What learned or cultural assumptions may affect design choices? What information does your audience need to be successful?

Keep in mind that the dashboard is an overview, a single place to monitor the current state of the data. The dashboard is based on underlying reports and datasets, and those can contain loads of details. Your readers can drill into the reports from your dashboard. So don't put the detail on the dashboard unless that's what your readers need to monitor.

Where is the dashboard going to be displayed? If it will be on a large monitor, you can put more content on it. If readers will view it on their tablets, then fewer tiles will be more readable.

Tell a story and keep it to one screen

Because dashboards are meant to show important information at a glance, having all the tiles on one screen is best. Can you avoid scroll bars on your dashboard?

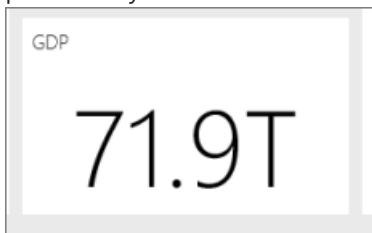
Is the dashboard too cluttered? Remove all but essential information that can be easily read and interpreted.

Make use of full screen mode

Display your dashboard in [full screen](#) without distractions.

Make the most important information biggest

If the text and visualizations on your dashboard are all the same size, your readers will have a hard time focusing on what's most important. For example, card visualizations are a good way to display an important number prominently:



But be sure to provide context.

Read about [creating a tile with just a number](#).

Put the most important information in the upper corner

Most people read from top to bottom, so put the highest level of detail at the top and show more detail as you

move in the direction the audience uses for reading (left-to-right, right-to-left).

Use the right visualization for the data and format it for easy reading

Avoid visualization variety for the sake of variety. Visualizations should paint a picture and be easy to "read" and interpret. For some data and visualizations, a simple graphic visualization is enough. But other data may call for a more-complex visualization - be sure to make use of titles and labels and other customization to help the reader.

- [Choose appropriate data visualizations](#). Be careful using charts that distort reality i.e. 3-D charts. Keep in mind that it is difficult for the human brain to interpret circular shapes. Pie charts, donut charts, gauges and other circular chart types may look pretty but they are not a data visualization best practice.
- Be consistent with chart scales on axes, chart dimension ordering and also the colors used for dimension values within charts.
- Be sure to encode quantitative data nicely. Don't exceed three or four numerals when displaying numbers. Display measures to one or two numerals left of the decimal point and scale for thousands or millions i.e. 3.4 million not 3,400,000.
- Don't mix levels of precision and time. Make sure that time frames are well understood. Don't have one chart that has last month next to filtered charts from a specific month of the year.
- Don't mix big and small measures on the same scale, such as on a line or bar chart. For example one measure can be in the millions and the other measure in the thousands. With such a large scale, it would be difficult to see the differences of the measure that is in the thousands. If you need to mix, choose a visualization that allows the use of a second axis.
- Don't clutter your charts with data labels that are not needed. The values in bar charts are usually well understood without displaying the actual number.
- Pay attention to how [charts are sorted](#). If you want to draw attention to the highest or lowest number, sort by the measure. If you want people to be able to quickly find a particular category within many other categories, sort by the axis.
- Pie charts are best if they have fewer than eight categories. Because you can't compare values side by side, it's harder to compare values in a pie chart than in bar and column charts. Pie charts can be good for viewing part-to-whole relationships rather than for comparing the parts. And Gauge charts are great for displaying the current status in the context of a goal.

For more visualization-specific guidance, see [Visualization types in Power BI](#).

Learning More about Best Practice Dashboard Design

To master the art of excellent dashboard design, consider learning basic Gestalt Principles of visual perception and how to clearly communicate actionable information in context. Luckily, there is a plethora of resources already widely available and sprinkled within our blogs. A few of our favorite books include:

- *Information Dashboard Design* by Stephen Few
- *Show Me the Numbers* by Stephen Few
- *Now You See It* by Stephen Few
- *Envisioning Information* by Edward Tufte
- *Advanced Presentations by Design* by Andrew Abela

Next steps

[Dashboards in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Automatically generate data insights with Power BI

1/8/2018 • 2 min to read • [Edit Online](#)

Have a new dataset and not quite sure where to start? Need to build a dashboard quickly? Want to look for insights you may have missed?

Run quick insights to generate interesting interactive visualizations based on your data. Quick insights can be run on an entire dataset (quick insights) or on a specific dashboard tile (scoped insights). You can even run insights on an insight!

NOTE: Insights do not work with DirectQuery - they only works with data uploaded to Power BI.

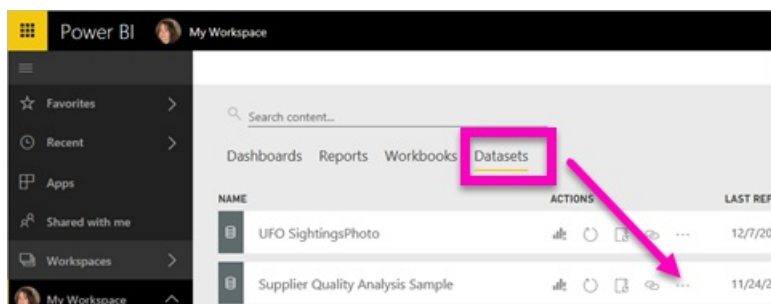
The insights feature is built on a growing [set of advanced analytical algorithms](#) developed in conjunction with Microsoft Research that we'll continue to use to allow more people to find insights in their data in new and intuitive ways.

Run quick insights on a dataset

Watch Amanda run quick insights on a dataset, open an insight in Focus mode, pin one of these insights as a tile on her dashboard, and then get insights for a dashboard tile.

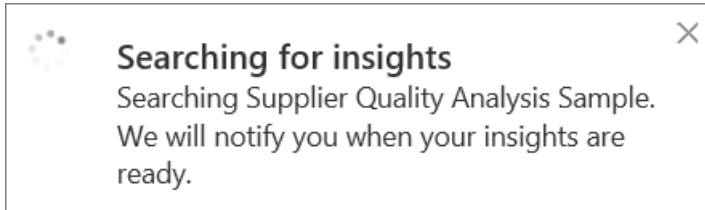
Now it's your turn. Explore insights using the [Supplier Quality Analysis sample](#).

1. From the **Datasets** tab, select the ellipses (...) and choose **Get insights**.

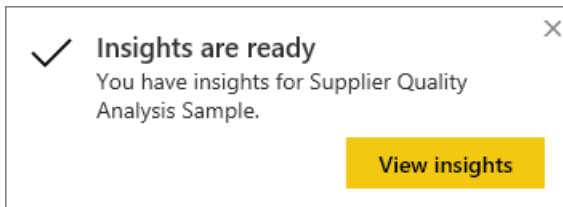


- Rename
- Delete
- Analyze in Excel
- Get insights
- Settings

2. Power BI uses [various algorithms](#) to search for trends in your dataset.

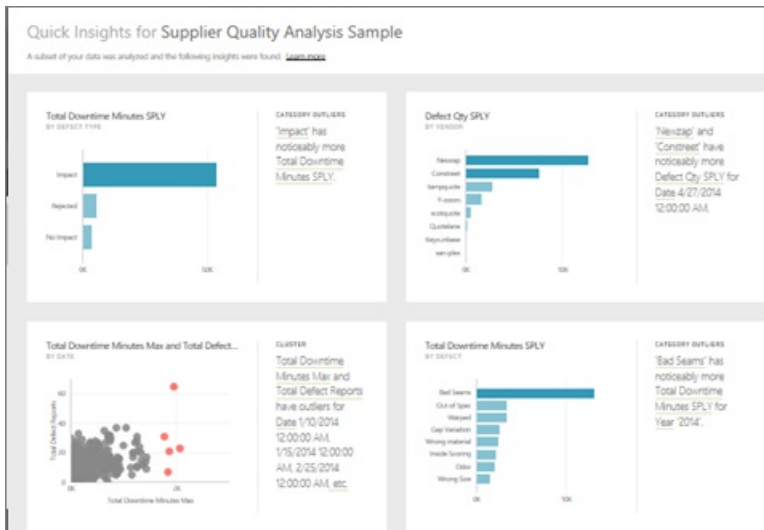


3. Within seconds, your insights are ready. Select **View insights** to display visualizations.



NOTE: Some datasets can't generate insights because the data isn't statistically significant. To learn more, see [Optimize your data for insights](#).

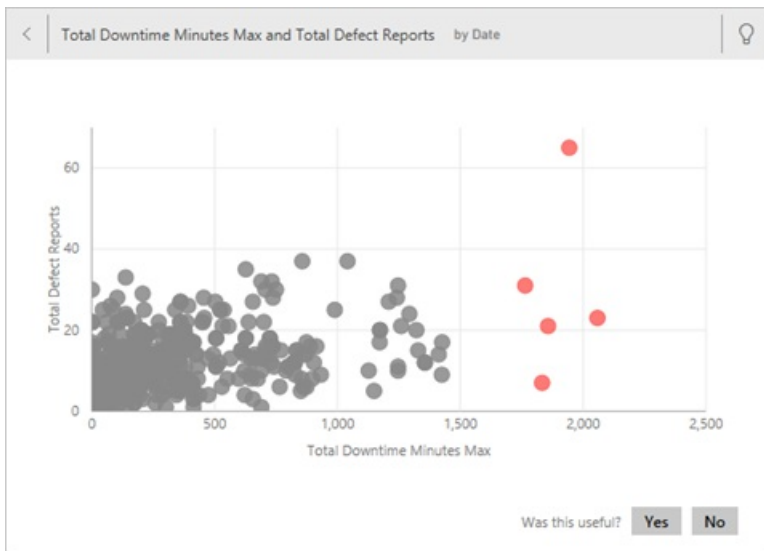
4. The visualizations display in a special **Quick Insights** canvas with up to 32 separate insight cards. Each card has a chart or graph plus a short description.



Interact with the insight cards

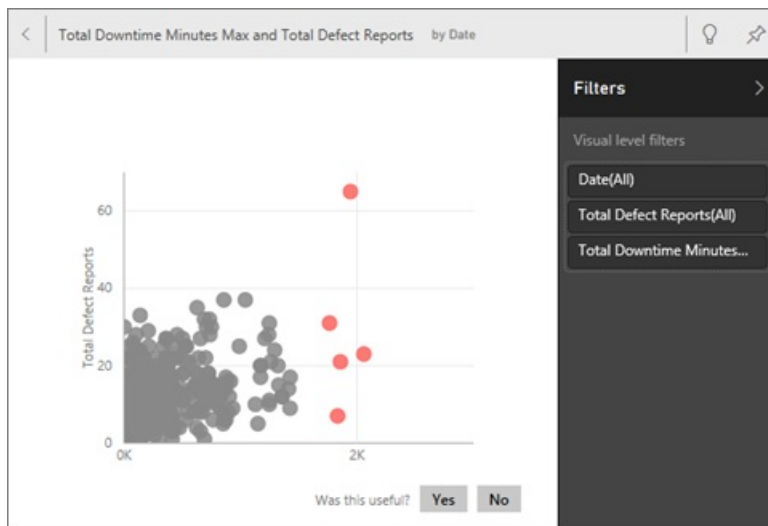




1. Hover over a card and select the pin icon to add the visualization to a dashboard.
2. Hover over a card, select the ellipses (...) and choose **View insights**. This opens the insight fullscreen.

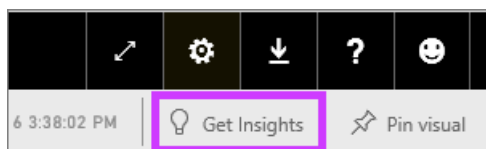


3. In Focus mode you can:

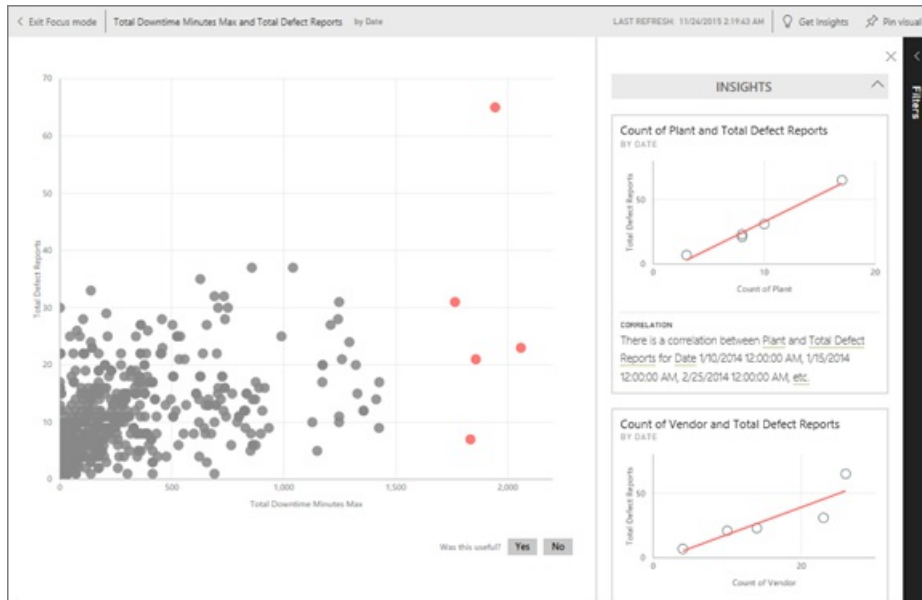
- Filter the visualizations. To display the filters, in the top right corner, select the arrow to expand the Filters pane.



- Pin the insight card to a dashboard by selecting the pin  icon or **Pin visual**.
- Run insights on the card itself. This is often referred to as **scoped insights**. In the top-right corner, select the lightbulb icon  or **Get insights**.



The insight displays on the left and new cards, based solely on the data in that single insight, display along the right.

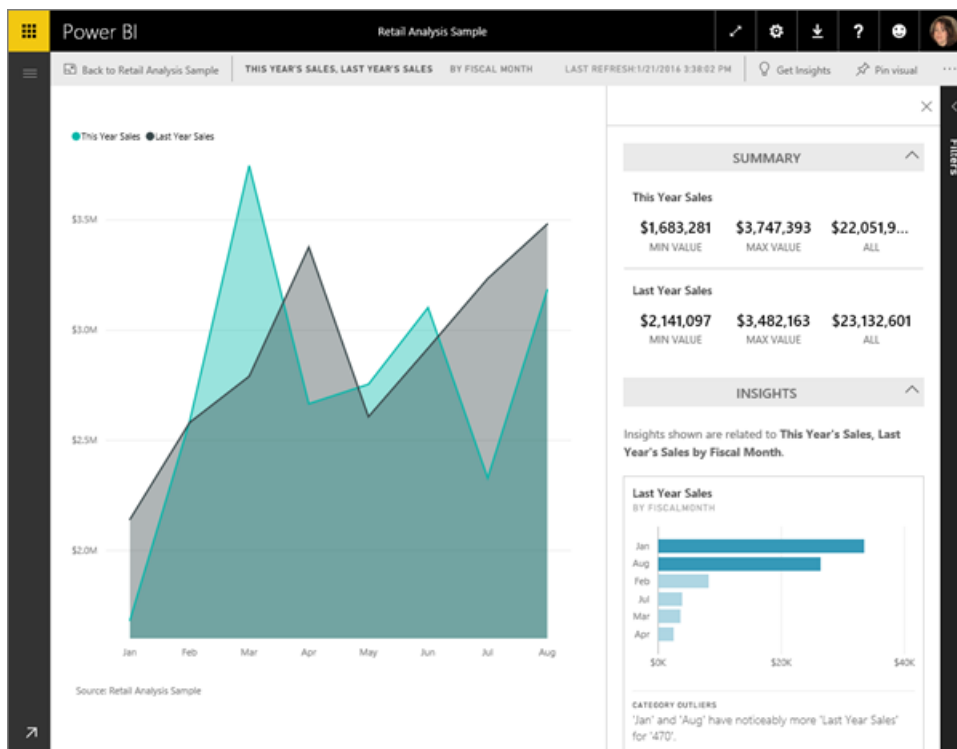


4. To return to the original insights canvas, in the top-left corner, select **Exit Focus mode**.

Run insights on a dashboard tile

Instead of searching for insights against an entire dataset, narrow your search to the data used to create a single dashboard tile. This too is often referred to as **scoped insights**.

1. Open a dashboard.
2. Hover over a tile. select the ellipses (...), and choose **View insights**. The tile opens in **Focus mode** with the insights cards displayed along the right.



3. Does one insight pique your interest? Select that insight card to dig further. The selected insight appears on the left and new insight cards, based solely on the data in that single insight, display along the right.
4. Continue digging into your data, and when you find an interesting insight, pin it to your dashboard by selecting **Pin visual** from the top-right corner.

Next steps

If you own a dataset, [optimize it for Quick Insights](#)

Learn about the [types of Quick Insights available](#)

More questions? [Try the Power BI Community](#)

Types of insights supported by Power BI

12/20/2017 • 1 min to read • [Edit Online](#)

How does Insights work?

Power BI quickly searches different subsets of your dataset while applying a set of sophisticated algorithms to discover potentially-interesting insights. Power BI scans as much of a dataset as possible in an allotted amount of time.

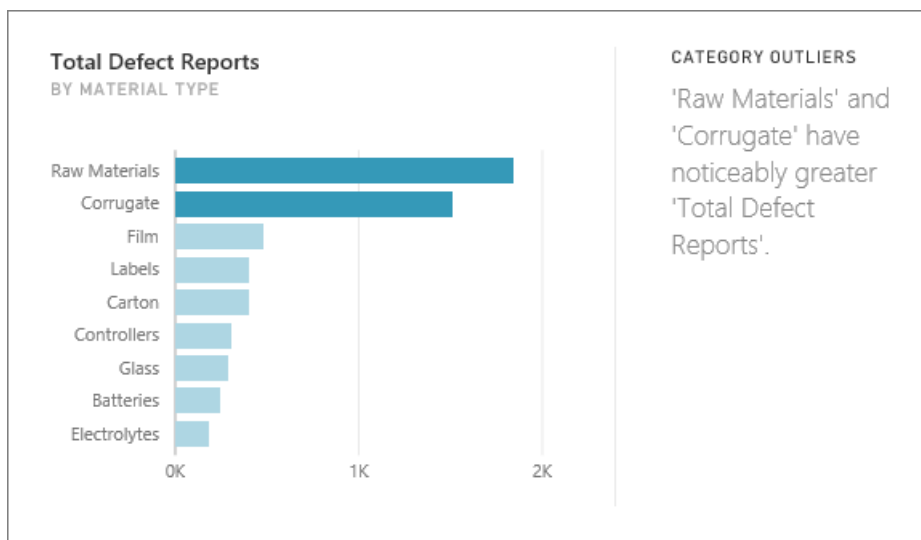
You can run insights against a dataset or dashboard tile.

What types of insights can we find?

These are some of the algorithms we use:

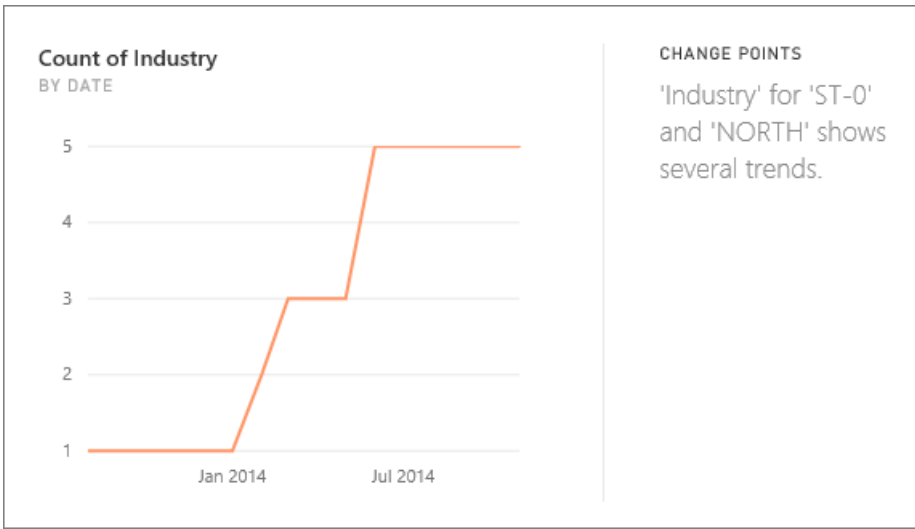
Category outliers (top/bottom)

Highlights cases where, for a measure in the model, one or two members of a dimension have much larger values than other members of the dimension.



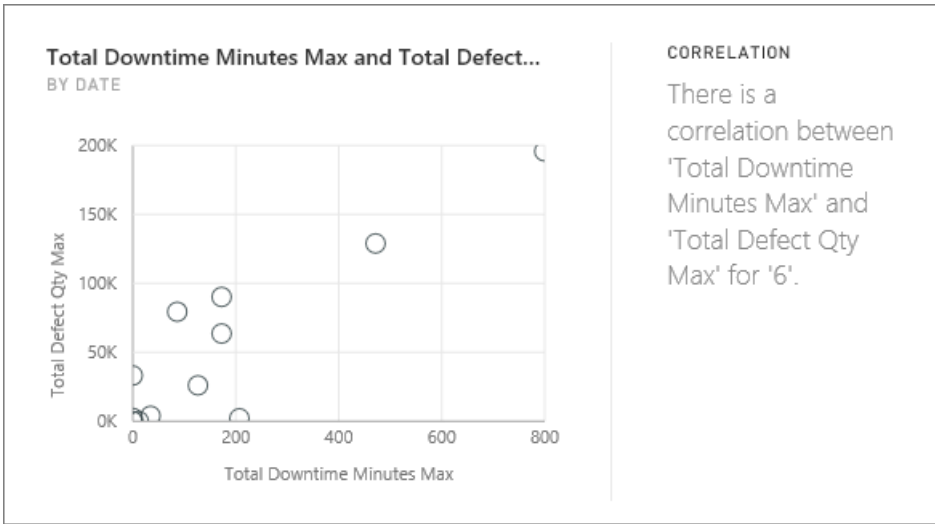
Change points in a time series

Highlights when there are significant changes in trends in a time series of data.



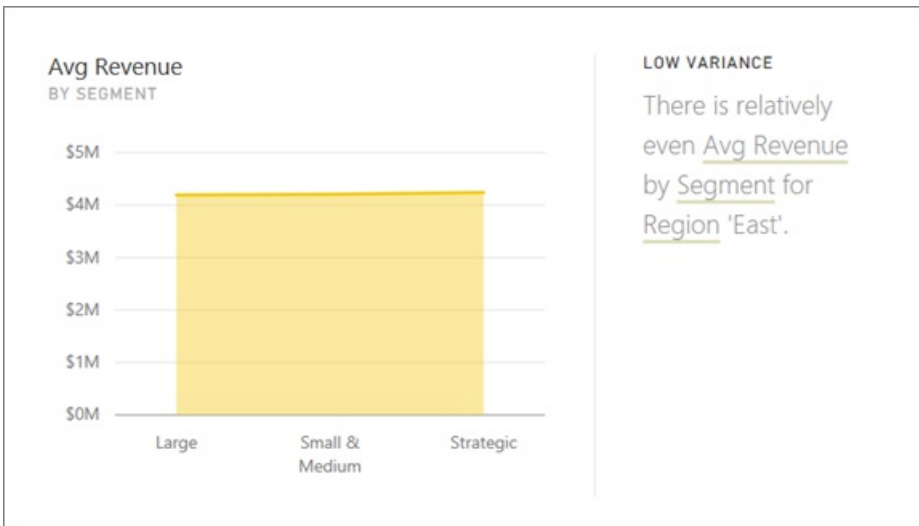
Correlation

Detects cases where multiple measures show a correlation between each other when plotted against a dimension in the dataset.



Low Variance

Detects cases where data points are not far from the mean.



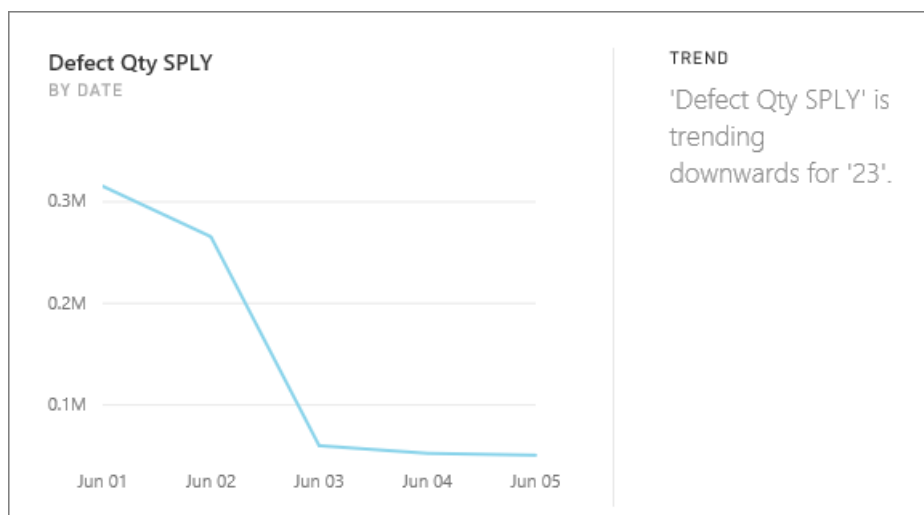
Majority (Major factors)

Finds cases where a majority of a total value can be attributed to a single factor when broken down by another dimension.



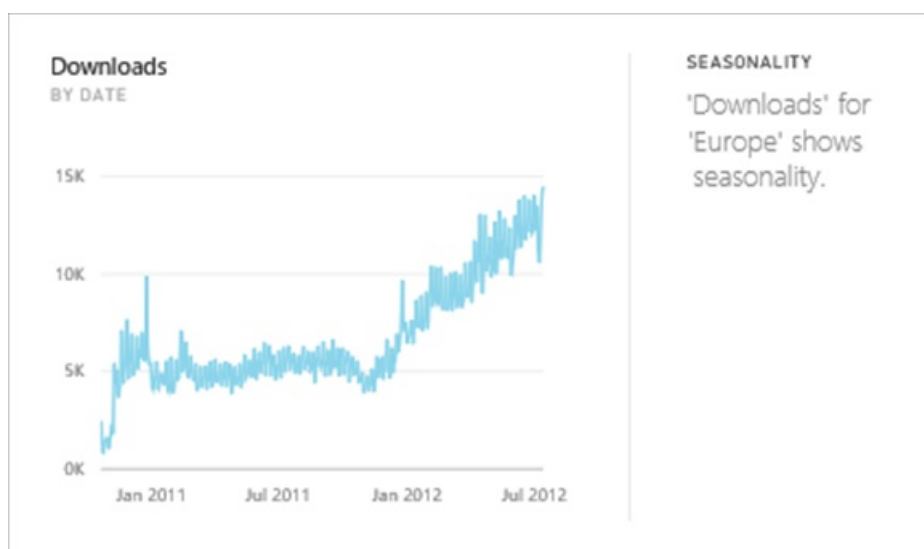
Overall trends in time series

Detects upward or downward trends in time series data.



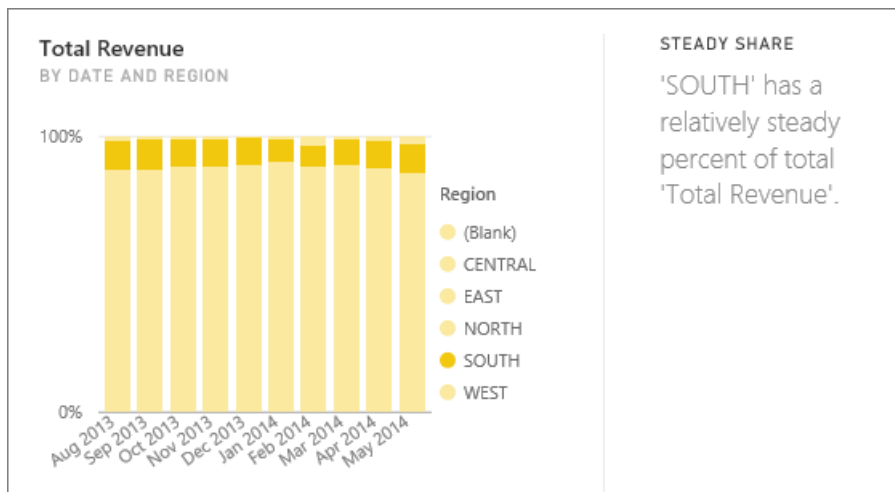
Seasonality in time series

Finds periodic patterns in time series data, such as weekly, monthly, or yearly seasonality.



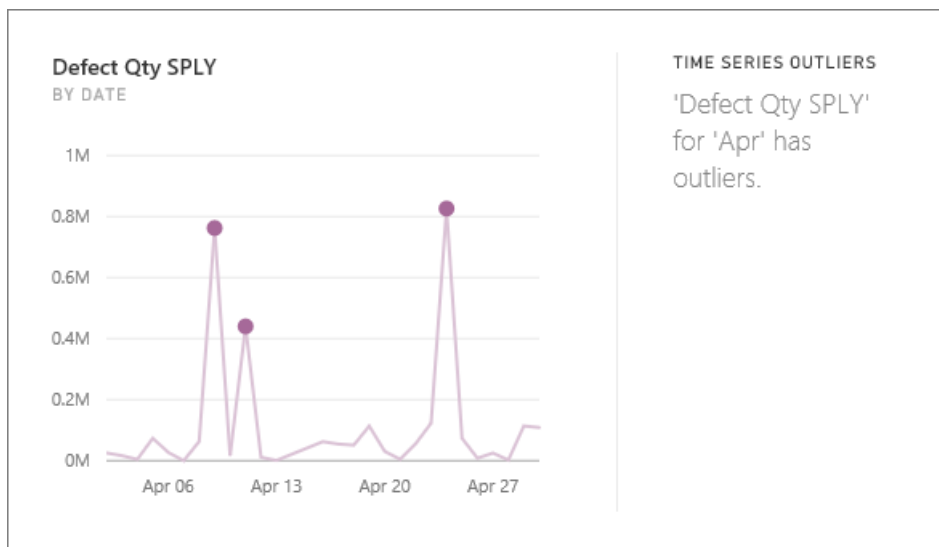
Steady share

Highlights cases where there is a parent-child correlation between the share of a child value in relation to the overall value of the parent across a continuous variable.



Time series outliers

For data across a time series, detects when there are specific dates or times with values significantly different than the other date/time values.



Next steps

[Power BI insights](#)

If you own a dataset, [optimize it for insights](#)

More questions? [Try the Power BI Community](#)

Optimize your data for Power BI Quick Insights

12/7/2017 • 1 min to read • [Edit Online](#)

Want to improve quick insights results? If you are a dataset owner, try these:

- Hide or unhide columns in your dataset. Power BI quick insights doesn't search hidden columns. So hide duplicate or unnecessary columns and unhide interesting columns.
- Use a mix of data types such as names, times, dates, and numbers.
- Avoid (or hide) columns with duplicate information. This takes valuable time away from searching for meaningful patterns. For example, one column with state names spelled out and another column with state name abbreviations.
- Do you get an error message stating that your data isn't statistically significant? This can happen with models that are very simple, or that don't have much data, or that don't have date or numeric columns. To generate insights, your dataset needs to have at least one dimension and one measure.

Next steps

[Power BI quick insights](#)

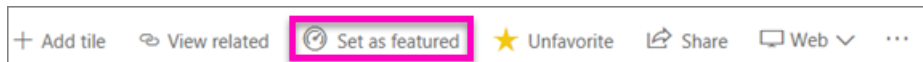
More questions? [Try the Power BI Community](#)

Featured dashboards in Power BI service

12/20/2017 • 1 min to read • [Edit Online](#)

Create a Featured dashboard

Many of us have one dashboard that we visit more than any others. It might be the dashboard we use to run our business, or it might be a dashboard that contains an aggregation of tiles from many different dashboards and reports.



When you select a dashboard as *featured*, each time you open Power BI service, it will open with that dashboard displayed.

You can also select a few dashboards and set them as *favorites*. See [Dashboard favorites](#).


NOTE

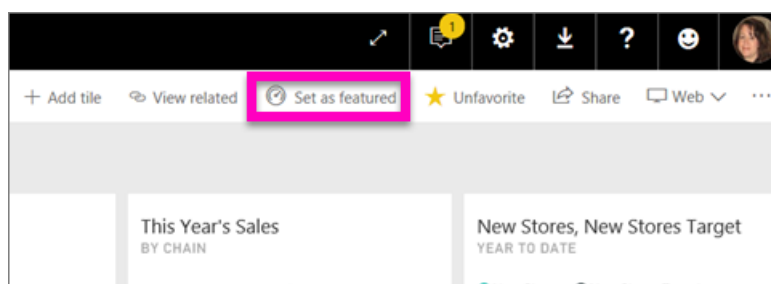
This topic applies to Power BI service, and not to Power BI Desktop.

If you haven't yet set a featured dashboard, Power BI will open to the last dashboard you used.

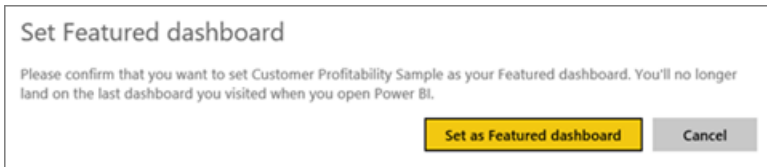
To set a dashboard as featured

Watch Amanda create a featured dashboard and then follow the instructions below the video to try it out yourself.

1. Open the dashboard that you'd like to set as *Featured*.
2. In the top navbar, you'll either see **Set as featured** or just the featured  icon. Select either one.



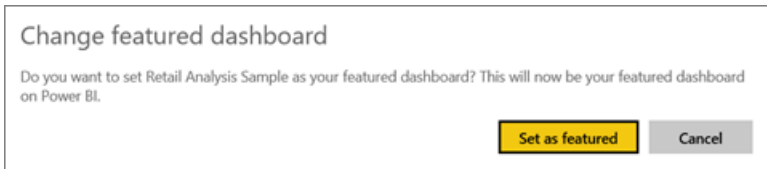
3. Confirm your selection.



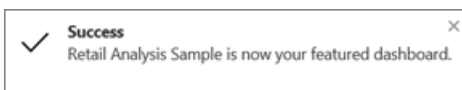
Change the featured dashboard

Of course, if you change your mind later you can set a new dashboard as the featured dashboard.

1. Follow steps 1 and 2 from above.



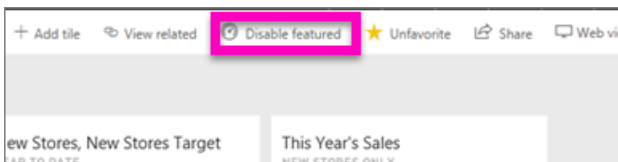
2. Select **Set as featured**. Un-featured a dashboard does not remove it from your workspace.



Remove the featured dashboard

If you decide that you don't want any dashboard to be designated as featured, here's how to un-feature a dashboard.

1. Open the currently-featured dashboard.
2. In the top menubar, select **Disable featured**.



Now Power BI will open to the last dashboard you used.

Next steps

[Favorite a dashboard](#)

More questions? [Try the Power BI Community](#)

Create a view of a Power BI dashboard optimized for mobile phones

11/9/2017 • 1 min to read • [Edit Online](#)

When you view dashboards in the Power BI mobile app on a phone, you notice the dashboard tiles are laid out one after another, all the same size. In the Power BI service, you can create a customized view of any dashboard that you own, specifically for phones.

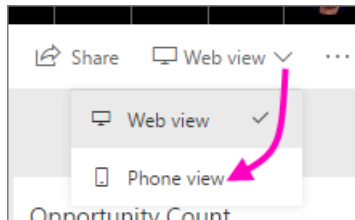
When you turn the phone sideways, then you see the dashboard as it's laid out in the service, not as you designed it for the phone.

NOTE

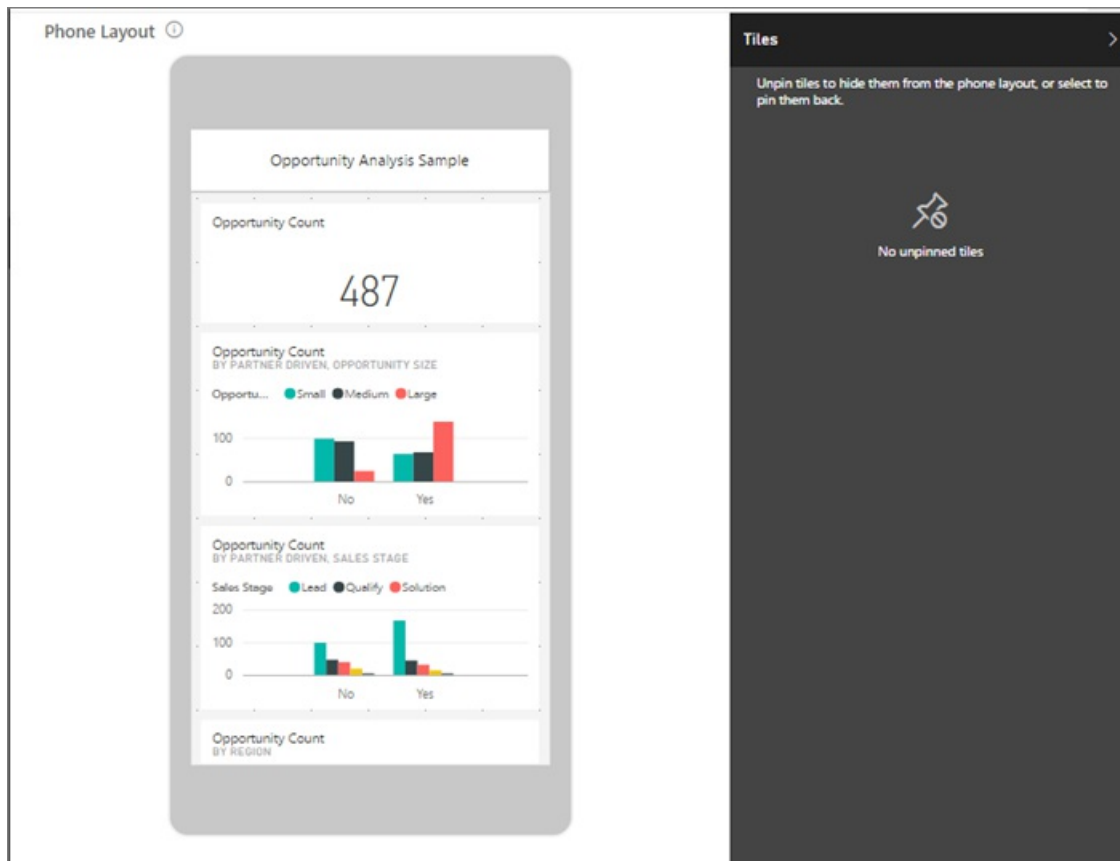
As you edit the phone view, anyone viewing the dashboard on a phone can see the changes you make in real time. For example, if you unpin all tiles on the dashboard phone view, the dashboard on the phone will suddenly have no tiles.

Create a phone view of a dashboard

1. In the Power BI service, open a dashboard.
2. Select the arrow next to **Web view** in the upper-right corner > select **Phone view**.

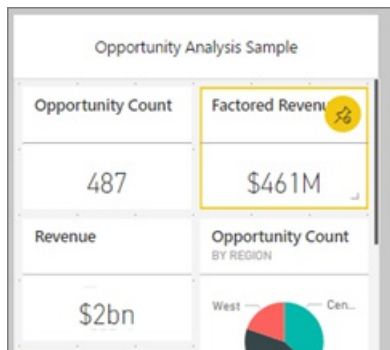


If you aren't the dashboard owner, you won't see this option.

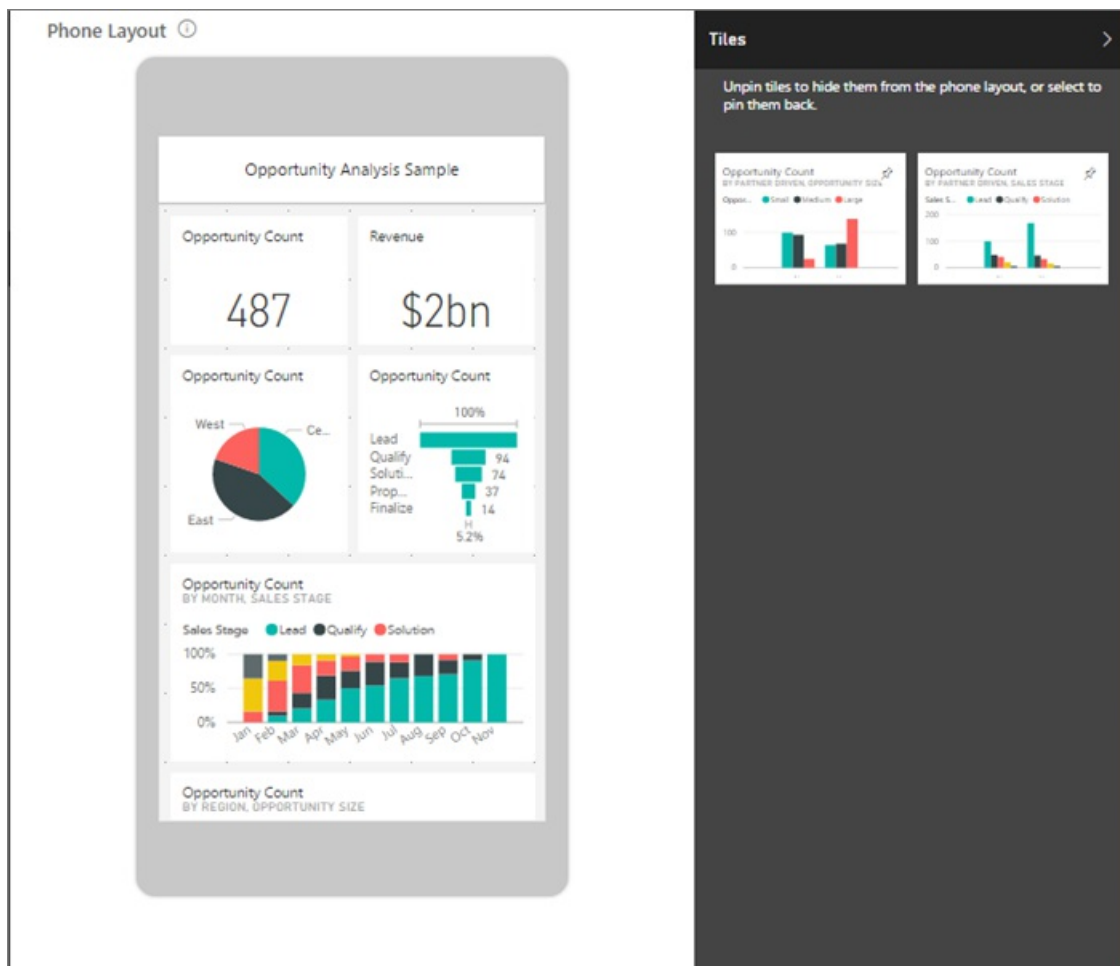


The phone dashboard edit view opens. Here you can unpin, resize, and rearrange tiles to fit the phone view. The web version of the dashboard doesn't change.

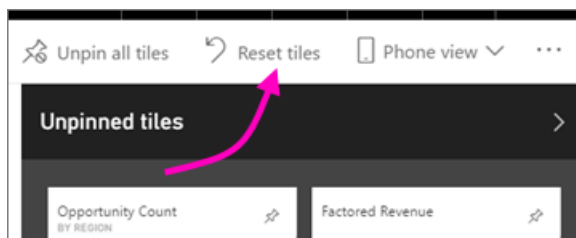
3. Select a tile to drag, resize, or unpin it. You notice the other tiles move out of the way as you drag a tile.



The unpinned tiles go in the Unpinned tiles pane, where they stay unless you add them back.



4. If you change your mind, select **Reset tiles** to put them back in the size and order they were before.



Just opening Phone Edit view in the Power BI service slightly changes the size and shape of the tiles on a phone. So to return the dashboard to its exact state before you opened it in Phone Edit view, select **Reset tiles**.

5. When you're satisfied with the phone dashboard layout, select the arrow next to **Phone view** in the upper-right corner > select **Web view**.

Power BI saves the phone layout automatically.

Next steps

- [Create reports optimized for the Power BI phone apps](#)
- [Create responsive visuals optimized for any size](#)
- More questions? [Try asking the Power BI Community](#)

Create a QR code for a tile in Power BI to use in the mobile apps


11/9/2017 • 1 min to read • [Edit Online](#)

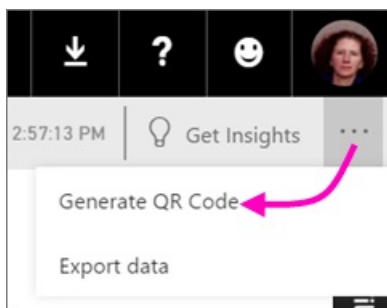
QR codes in Power BI can connect anything in the real world directly to related BI information — no navigation or search needed.

You can create a QR code in the Power BI service for tiles in any dashboard, even in dashboards you can't edit. Then place the QR code in a key location. For example, you could paste it in an email, or print it out and paste it in a specific location.

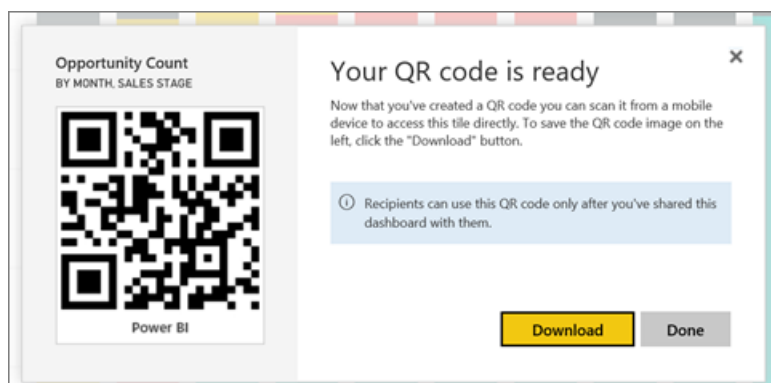
Colleagues you've shared the dashboard with can [scan the QR code for access to the tile, right from their mobile device](#). They can use either the QR code scanner located in the Power BI app, or any other QR scanner installed on their device. .

Create a QR code for a tile

1. Open a dashboard in the Power BI service.
2. Select the ellipsis (...) in the top-right corner of the tile and select **Focus mode** .
3. Select the ellipsis (...) in the top-right corner and select **Generate QR code**.



4. A dialog box with the QR code appears.



5. From here you can scan the QR code or download and save it so you can:
 - Add it to an email or other document, or
 - Print it and place it in a specific location.

Print the QR code

Power BI generates the QR code as a JPG file, ready to print.

1. Select **Download**, then open the JPG file on a computer connected to a printer.

TIP

The JPG file has the same name as the tile. For example, "Opportunity Count - by Month, Sales Stage.jpg".

2. Print the file at 100% or "actual size".
3. Cut out the QR code and glue it to a place relevant to the tile.

Next steps

- [Connect to Power BI data from the real world](#) with the mobile apps
- [Scan a Power BI QR code from your mobile device](#)
- [Create a QR code for a report](#)
- Questions? [Try asking the Power BI Community](#)

Add an image to a Power BI dashboard

12/20/2017 • 1 min to read • [Edit Online](#)

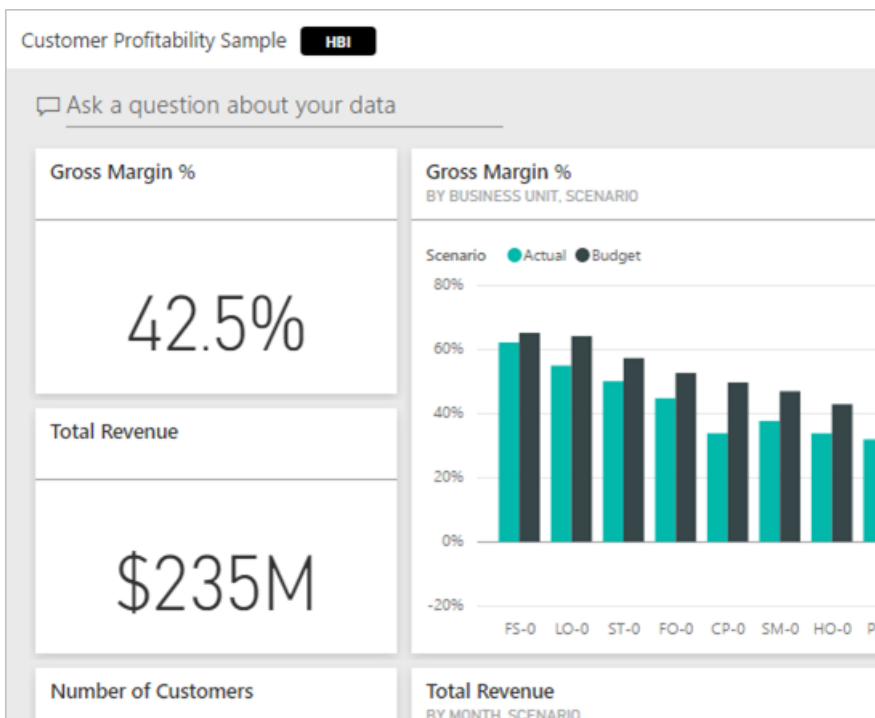
There are several ways to add a standalone image to a dashboard: one way is to pin an image from a report to a dashboard and another way is to add it directly onto the dashboard using **Add tile**. For more information, visit these articles:

- [Add dashboard tiles directly from a Power BI dashboard.](#)
- [Pin images from a Power BI report.](#)

Dashboard data classification

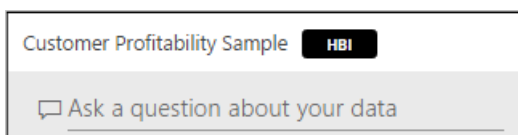
11/15/2017 • 3 min to read • [Edit Online](#)

Every dashboard is different, and depending on the data source you are connecting to, you will likely find that you and the colleagues you share with will need to take different precautions depending on the sensitivity of the data. Some dashboards should never be shared with those outside your company or printed out, while others can be shared freely. By using dashboard data classification, you will be able to raise awareness with those viewing your dashboards about what level of security should be used. You can tag your dashboards with classifications defined by your company's IT department, so everyone viewing the content will have the same level of understanding around the sensitivity of the data.

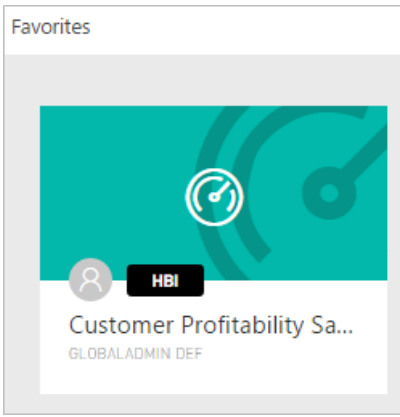


Data classification tags

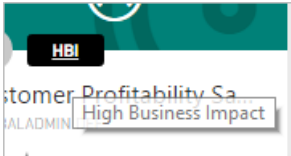
Data classification tags show up next to the dashboard name, letting anyone viewing it know the level of security that should be applied to the dashboard and the data it contains.



It will also show up next to the dashboard tile in your Favorites list.



When you hover over the tag, you will see the full name of the classification.



Admins can also set an URL for a tag to provide additional information.

NOTE

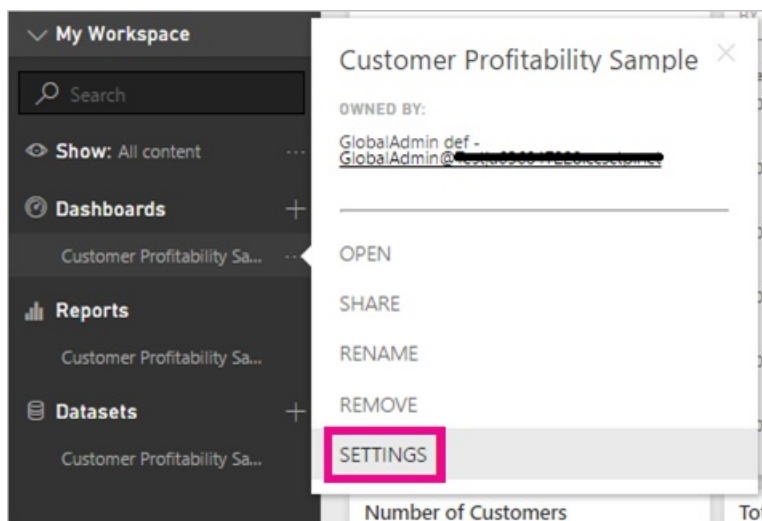
Depending the classification settings set by your admin, some classification types may not show as a tag on the dashboard. If you are a dashboard owner, you can always check your dashboard classification type under the dashboard settings.

Setting a dashboard's classification

If data classification is turned on for your company, all dashboards start out with a default classification type, but as a dashboard owner, you can change the classification to match your dashboards security level.

To change the classification type, do the following.

1. Go to the dashboard settings by selecting the **ellipsis** next to the dashboard name and select **Settings**.



2. Under Dashboard settings, you will be able to see the current classification for your dashboard and use the drop down to change the classification type.

Settings for Customer Profitability Sample

Q&A

Q&A allows users to find data and create charts using natural language from datasets used on a dashboard. [Learn more](#)

Show the Q&A search box on this dashboard

Dashboard tile flow

Tile flow automatically aligns your content to the canvas

Turn on tile flow

Data classification

Medium Business Impact ▼

Apply Discard

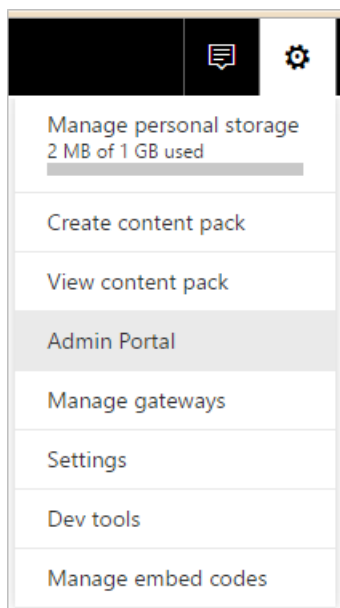
3. Select **Apply** when finished.

After you apply the change, anyone you shared with will see the update the next time they reload the dashboard.

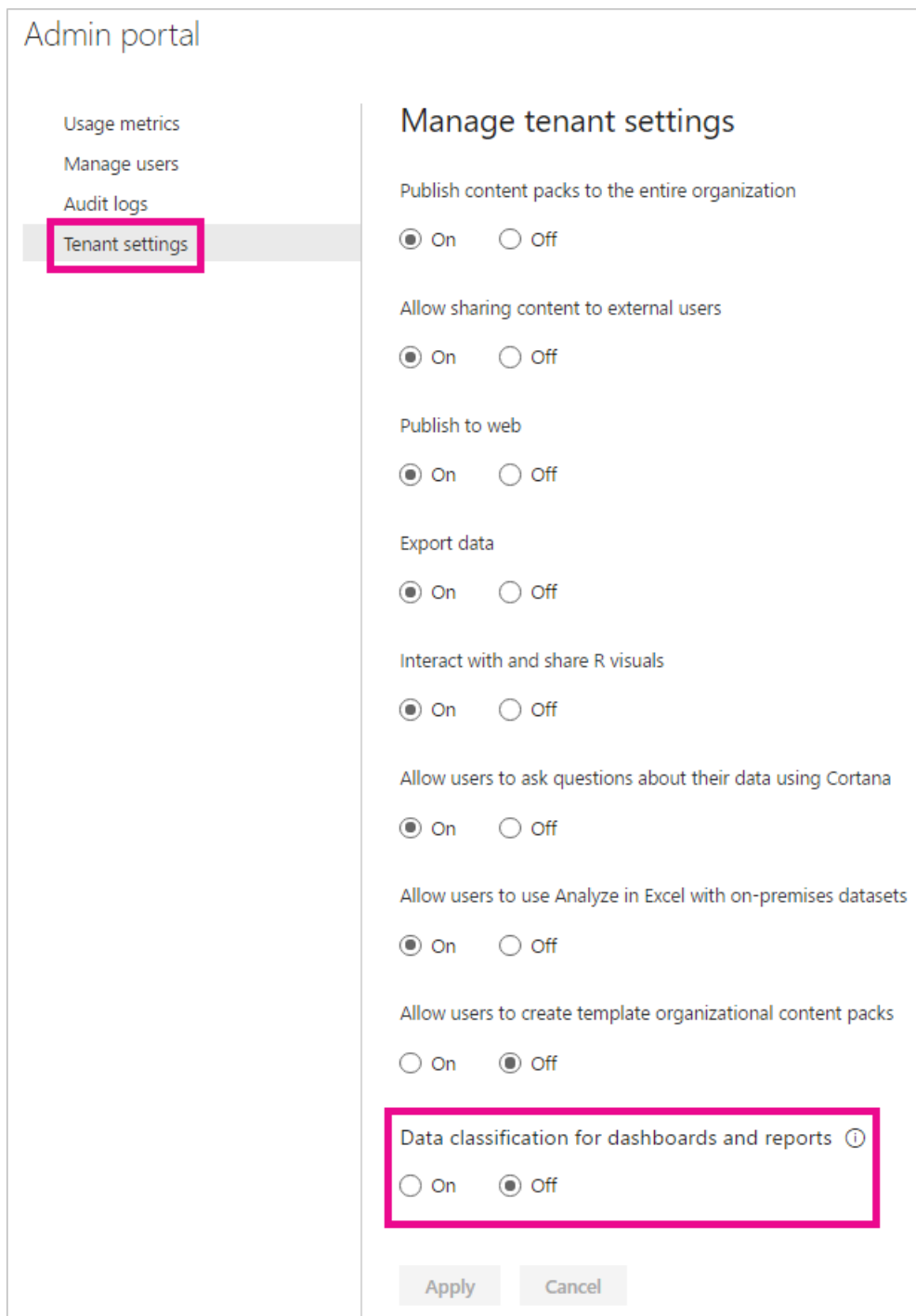
Working with data classification tags as an admin

Data classification is set up by the global admin for your organization. To turn data classification on, do the following.

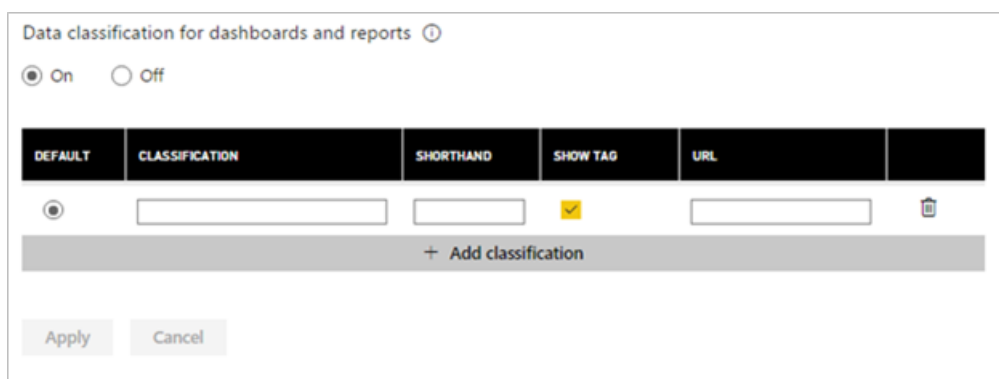
1. Select the Settings gear and select **Admin Portal**.



2. Switch **Data classification for dashboards and reports** to *on* within the **Tenant settings** tab.



Once turned on, you will be presented with a form to create the various classifications in your organization.



Each classification has a **name** and a **shorthand** which will appear on the dashboard. For each classification, you can decide if the shorthand tag will appear on the dashboard or not by selecting **Show tag**. If you decide not to show the classification type on the dashboard, the owner will still be able to see the type by checking the dashboard settings. Additionally, you can optionally add a **URL** that contains more information about your

organization's classification guidelines and usage requirements.

The last thing you need to decide is which classification type will be the default.

Once you fill in the form with your classification types, select **Apply** to save the changes.

Data classification for dashboards and reports ⓘ

On Off

DEFAULT	CLASSIFICATION	SHORTHAND	SHOW TAG	URL	
<input type="radio"/>	<input type="text" value="High Business Impact"/>	<input type="text" value="HBI"/>	<input checked="" type="checkbox"/>	<input type="text" value="https://microsoft.sharepoint"/>	
<input checked="" type="radio"/>	<input type="text" value="Medium Business Impact"/>	<input type="text" value="MBI"/>	<input type="checkbox"/>	<input type="text"/>	
<input type="radio"/>	<input type="text" value="Low Business Impact"/>	<input type="text" value="LBI"/>	<input checked="" type="checkbox"/>	<input type="text"/>	

+ Add classification

At this point, all dashboards will be assigned the default classification, and dashboard owners will now be able to update the classification type to the one appropriate for her content. You can return here in the future to add or remove classification types or change the default.

NOTE

There are a few important things to remember when you come back to make changes:

- If you turn data classification off, none of the tags are remembered. You will need to start over if you decide to turn it back on later.
- If you remove a classification type, any dashboards assigned the removed classification type will be assigned back to the default until the owner goes and sets it again.
- If you change the default, all dashboards that weren't already assigned a classification type by the owner will change to the new default.

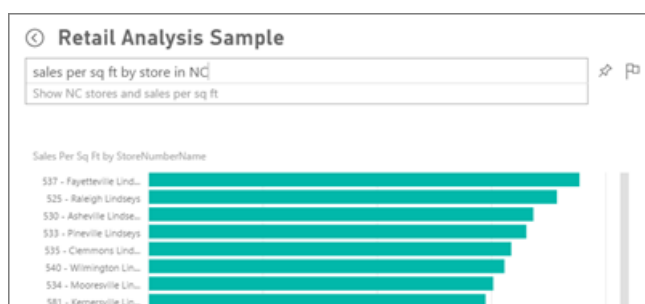
Q&A in Power BI service and Power BI Desktop

1/19/2018 • 4 min to read • [Edit Online](#)

What is Q&A?

Sometimes the fastest way to get an answer from your data is to ask a question using natural language. For example, "what were total sales last year." Use Q&A to explore your data using intuitive, natural language capabilities and receive answers in the form of charts and graphs. Q&A is different from a search engine -- Q&A only provides results about the data in Power BI.

This article is the jumping off point for all things Q&A. Select a link below to learn how Q&A works in Power BI service (dashboards and reports), Power BI Desktop (reports), Power BI Embedded, and Power BI mobile.

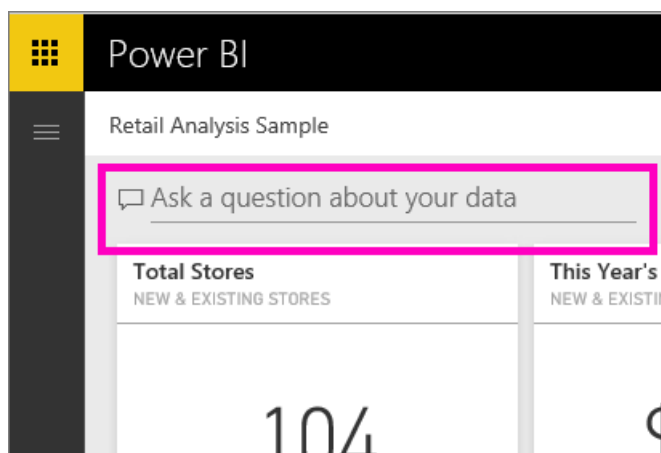


Asking the question is just the beginning. Have fun traveling through your data refining or expanding your question, uncovering trust-worthy new information, zeroing in on details and zooming out for a broader view. You'll be delighted by the insights and discoveries you make.

The experience is truly interactive...and fast! Powered by an in-memory storage, response is almost instantaneous.

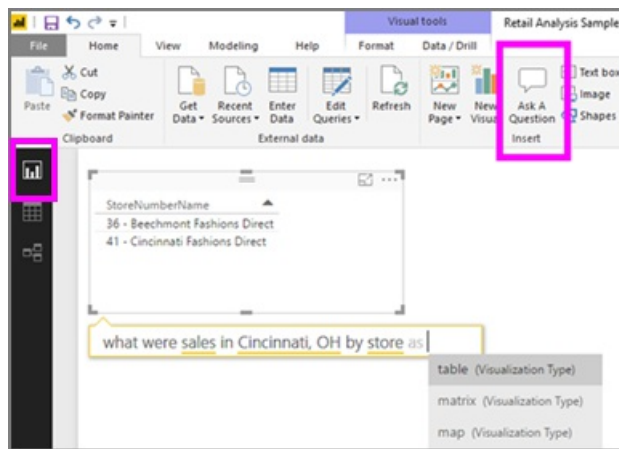
Q&A for consumers

When a colleague shares a dashboard with you, you'll find the Q&A question box on the dashboard in Power BI service (app.powerbi.com), at the bottom of the dashboard in Power BI mobile, and above the visualization in Power BI Embedded. Unless the owner has given you edit permissions, you'll be able to use Q&A to explore data but won't be able to save any visualizations created with Q&A.



Q&A for *creators*

If you're a *creator* of Power BI reports or have edit permissions to a dataset, you'll find the Q&A question box on the dashboard in Power BI service, and on each report page in Power BI service and Power BI Desktop. Any visualization you create using Q&A can be saved to a dashboard and saved in a report.



In addition to using Q&A to explore their data, creators and dataset owners can improve the Q&A experience for consumers by [modifying their datasets](#), adding [featured questions](#), and [enabling and disabling Q&A](#) for on-premises live connection datasets. In [Embedded scenarios](#), developers can choose between 2 modes: **interactive** and **result only**.

How does Q&A know how to answer questions?

Which datasets does Q&A use?

How does Q&A know how to answer data-specific questions? It relies on the names of the tables, columns, and calculated fields in the underlying dataset. So what you (or the dataset owner) call things is important!

For example, suppose you had an Excel table named "Sales", with columns titled "Product", "Month", "Units Sold", "Gross Sales", and "Profit". You could ask questions about any of those entities. You could ask "show sales", "total profit by month", "sort products by units sold", and more.

Q&A can answer questions that are based on how your dataset is organized. How would this work for data in Salesforce? When you connect to your salesforce.com account, Power BI generates a dashboard automatically. Before you start asking questions with Q&A, take a look at the data displayed in the dashboard visualizations and also at the data displayed in the Q&A dropdown.

- If the visualizations' axis labels and values include "sales", "account", "month", and "opportunities", then you can confidently ask questions such as: "Which *account* has the highest *opportunity*, or show sales by month as a bar chart."
- If the dropdown includes "salesperson", "state", and "year", then you can confidently ask questions such as: "which *salesperson* had the lowest sales in *Florida* in 2013."

If you have website performance data in Google Analytics, you could ask Q&A about time spent on a web page, number of unique page visits, and user engagement rates. Or, if you're querying demographic data, you might ask questions about age and household income by location.

Which visualization does Q&A use?

Q&A picks the best visualization based on the data being displayed. Sometimes data in the underlying dataset(s) is defined as a certain type or category and this helps Q&A know how to display it. For example, if data is defined as a date type, it is more likely to be displayed as a line

chart. Data that is categorized as a city is more likely to be displayed as a map.

You can also tell Q&A which visualization to use by adding it to your question. But keep in mind that it may not always be possible for Q&A to display the data in the visualization type you requested.

For information about keywords that Q&A recognizes, see [Tips for asking questions](#).

For more details about Power BI Q&A

[Overview: How to use Q&A in Power BI dashboards and reports](#): Step by step instructions for using Q&A and an overview of how it all works.

[Microsoft Power BI mobile app](#) For iOS on iPads, iPhones, and iPod Touch devices.

[Microsoft Power BI Embedded](#) Incorporate Q&A into an application.

[Tips for asking questions in Q&A](#): Learn how to talk to Q&A to get the best possible results.

[Add featured questions to your datasets](#) and Q&A will suggest these questions to your colleagues.

[Enable Q&A for your on-premises datasets](#) If you need a gateway to connect to the dataset, use Power BI settings to turn Q&A on and off.

[Tutorial: Use Q&A with the Retail Sales sample in Power BI service](#): Use Q&A in a realistic industry tutorial.

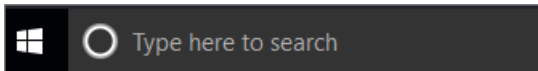
[Make your data work well with Q&A](#): Are you the person creating datasets and data models? Then this topic is for you.

More questions? [Try the Power BI Community](#)

Quickly find and view your Power BI data using Cortana for Power BI

1/19/2018 • 5 min to read • [Edit Online](#)

Use Cortana across your Windows 10 devices to get instant answers to your important business questions. By integrating with Power BI, Cortana can retrieve key information directly from Power BI dashboards and reports. All it takes is Windows 10 November 2015 version or later, Cortana, Power BI, and access to at least one dataset.



Preview the new Cortana *dashboard* search experience for Windows 10

For a while now you've been able to [use Cortana to retrieve certain types of report pages](#). Now we've added a **new experience** -- the ability to also retrieve dashboards. Try it out and please [send us feedback](#) . Eventually the *new experience* will be extended to include Cortana search for reports as well. One of the key benefits of the new experience is that you don't need to do anything special to set it up -- no enabling Cortana or configuring Windows 10 -- it just works.

NOTE

If it doesn't "just work," see the [Troubleshooting article](#) for help.

The underlying technology is using . This search service provides extra capabilities such as smart ranking, error correction, and auto complete.

Both Cortana experiences will exist side-by-side.

Cortana for Power BI documentation

We have 4 documents that guide you through setting up and using Cortana for Power BI. This series of articles will take you through the steps to

Article 1 (this article): understand how Cortana and Power BI work together

Article 2: [search Power BI reports: Enable the Cortana - Power BI - Windows integration](#)

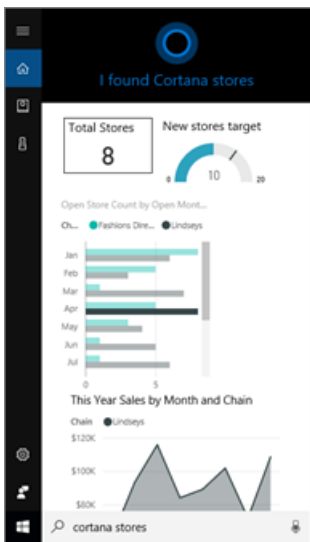
Article 3: [search Power BI reports: create special Cortana answer cards](#)

Article 4: [Troubleshoot issues](#)

How do Cortana and Power BI work together?

When you use Cortana to ask a question, Power BI can be one of the places Cortana looks for answers. In Power BI, Cortana can find rich data-driven answers from Power BI reports (that contain a special type of report page called a *Cortana answer card*) and from Power BI dashboards.

If Cortana finds a match, it displays the name of the dashboard or report page right there in your Cortana screen. The dashboard or report page can be opened in Power BI. Report pages can also be explored right in Cortana - they're interactive.



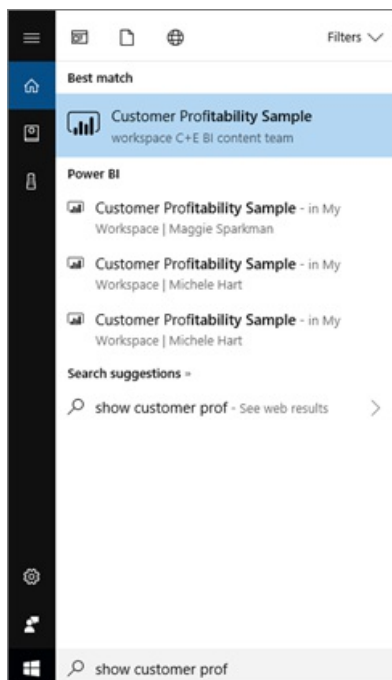
Cortana and Dashboards (the *new experience*)

Cortana can find answers in dashboards that you own and dashboards that have been shared with you. Ask Cortana questions using titles, keywords, owner names, workspace names, app names, and more.

Your question must have at least 2 words for Cortana to find an answer. So if you search on a dashboard that has a one-word name (Marketing) add the word "show" or "Power BI" or "" to your question, as in "show Marketing" and "michele hart sample".

If your dashboard has a title with more than one word, Cortana will only return that dashboard if your search matches at least two of the words or if your dashboard matches one of the words plus the owner name. For a dashboard named "Customer Profitability Sample":

- "show me customer" will *not* return a Power BI dashboard result.
- "utterances such as "show me customer profitability", "customer p", "customer s", "profitability sample", "michele hart sample", "show customer profitability sample", and "show me customer p" *will* return a Power BI result.
- Adding the word "powerbi" counts as one of the 2 required words, so "powerbi sample" *will* return a Power BI result.



Cortana and Reports

Cortana can find answers in reports that have [pages designed specifically for display by Cortana](#). Simply ask

questions using the title or keywords from one of these specialty report pages.

The underlying technology for reports is using [Microsoft's Power BI Q&A](#).

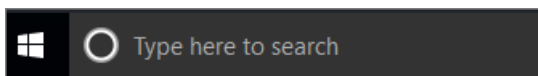
When you ask a question in Cortana, Power BI answers from report pages designed specifically for Cortana. Potential answers are determined by Cortana on the fly directly from the Cortana *answer cards* already created in Power BI. To further explore an answer, simply open a result in Power BI.

NOTE

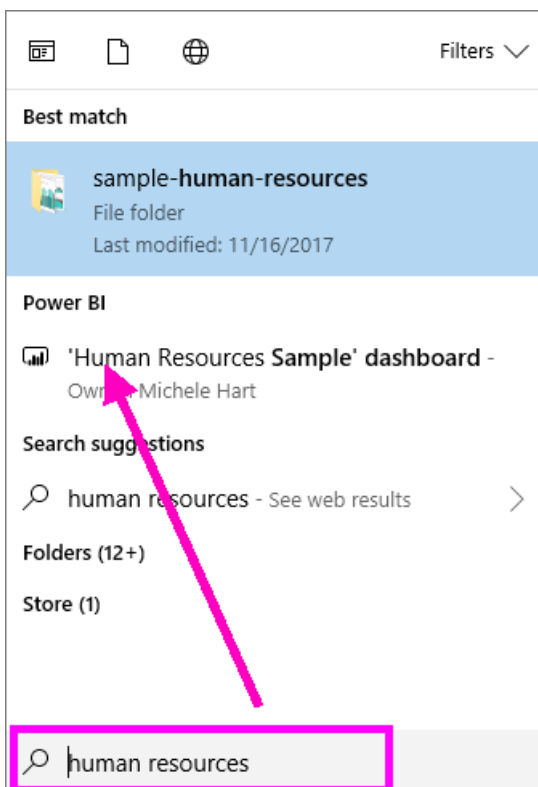
Before Cortana can look for answers in your Power BI reports, you'll need to [enable this feature using the Power BI service](#) and set up Windows to communicate with Power BI.

Using Cortana to get answers from Power BI

1. Start in Cortana. There are many different ways to *open* Cortana: select the Cortana icon in the taskbar (pictured below), use voice commands, or tap the search icon on your Windows mobile device.



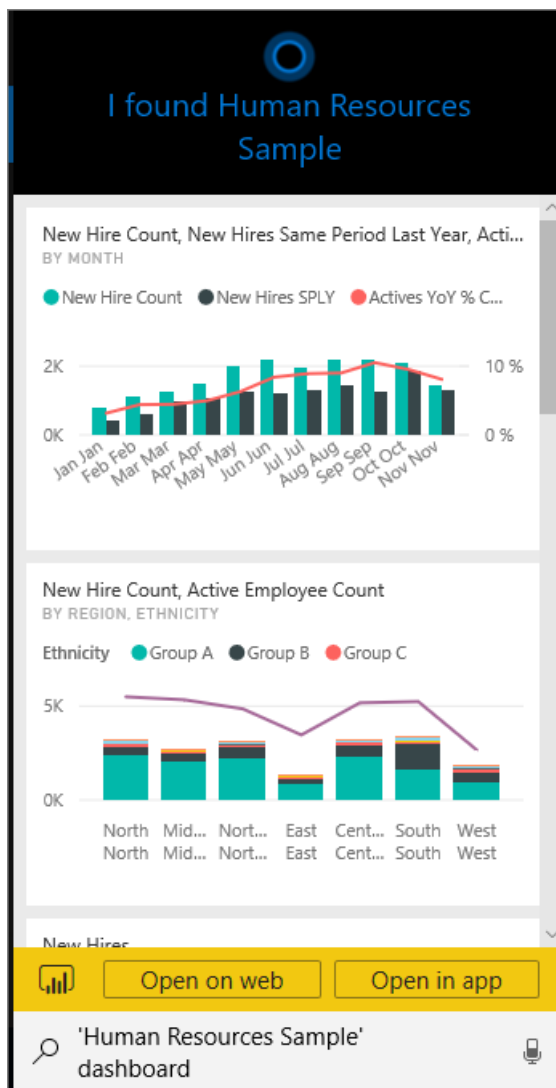
2. Once Cortana is ready, type or speak your question into the Cortana search bar. Cortana displays the available results. If there is a Power BI dashboard that matches the question, it shows up under **Best match** or **Power BI**.



NOTE

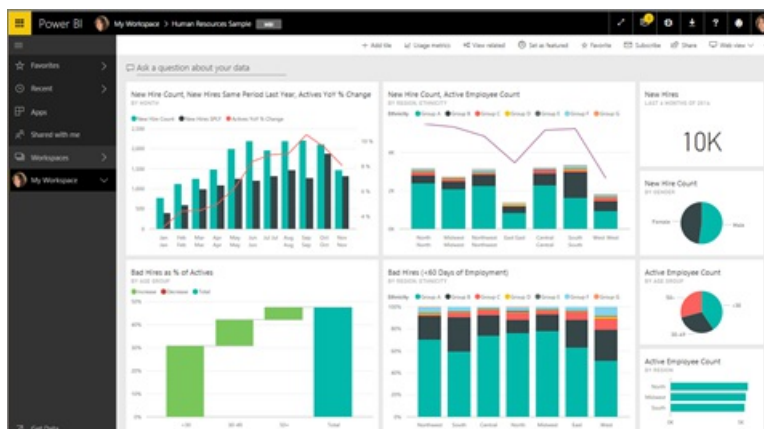
At the current time, only English is supported.

3. Select the dashboard to open it in Cortana.



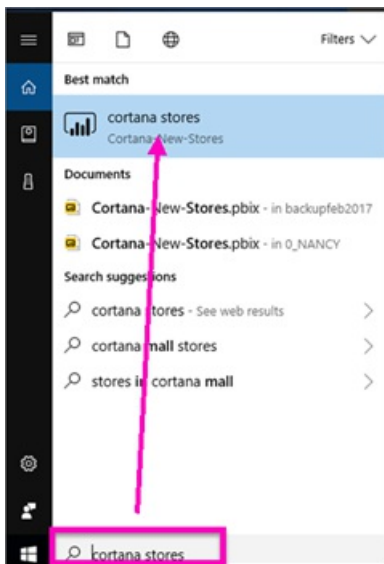
You can change the layout by [editing the phone view of the dashboard](#).

- From Cortana you also have the options to open the dashboard in Power BI service or Power BI mobile. Open the dashboard in Power BI service by selecting **Open on web**.

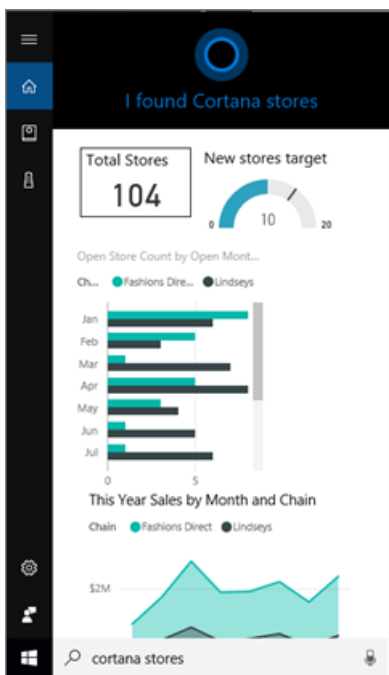


- Now let's use Cortana to search for a report. We'll need to know of a [report that has a page with a Cortana answer card](#). In this example, a report named "Cortana-New-Stores" has a Cortana answer card page named "cortana stores".

Type or speak your question into the Cortana search bar. Cortana displays the available results. If there is a Power BI report page that matches the question, it shows up under **Best match** or **Power BI**. And in this example the .pbix file (and backup) that I used to create the answer card also displays -- under **Documents**.

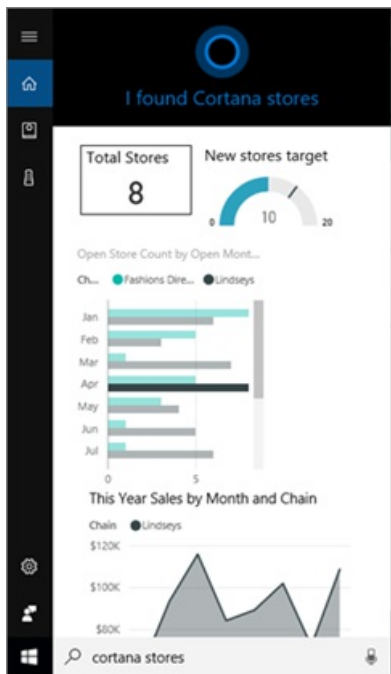


6. Select the **Cortana stores** report page to display it in the Cortana window.

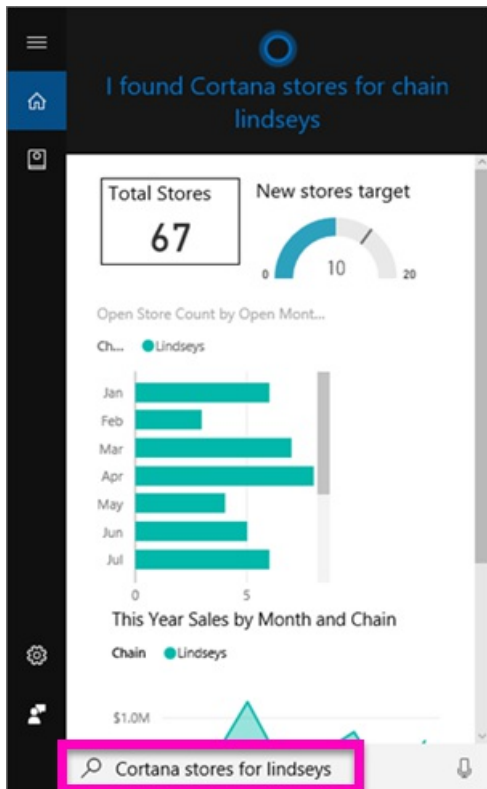


Remember, an *answer card* is a special type of Power BI report page that was created by a dataset owner. For more information, see [Create a Cortana answer card](#).

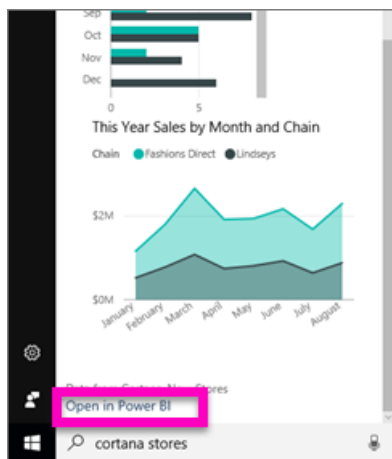
7. But that's not all. Interact with the visualizations on the answer card as you would in Power BI.
- For example, select an element on one visualization to cross-filter and highlight the other visualizations on the answer card.



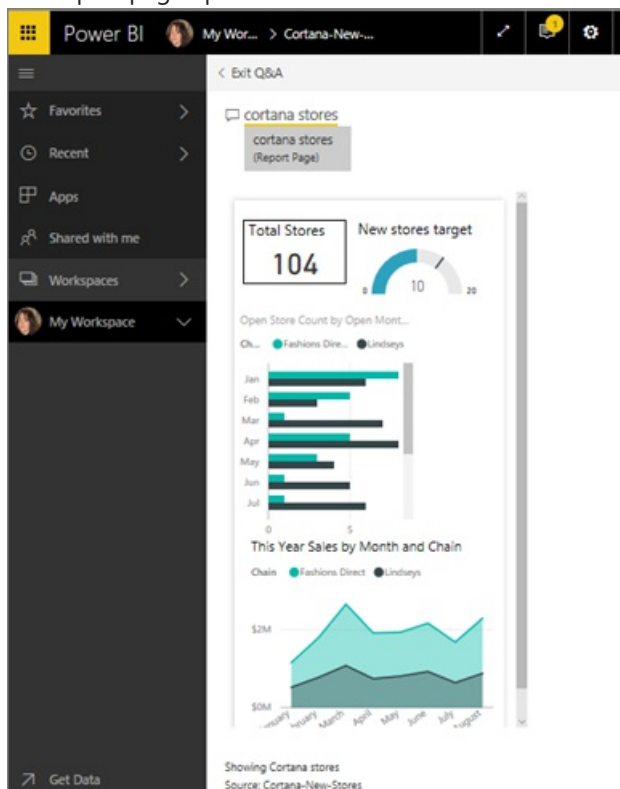
- Or, use natural language to filter the results instead. For example, ask "Cortana stores for Lindseys" and see the card filtered to only show data for the Lindseys chain.



8. Continue exploring. Scroll to the bottom of the Cortana window and select **Open in Power BI**.



9. The report page opens in Power BI.



Considerations and troubleshooting

- Cortana will not have access to any Cortana cards that have not been [enabled for Power BI](#).
- Still can't get Cortana to work with Power BI? Try the [Cortana troubleshooter](#).
- Cortana for Power BI is currently only available in English.
- Cortana for Power BI is only available on Windows mobile devices.

More questions? [Try the Power BI Community](#)

Next steps

[Enable the Cortana - Power BI - Windows integration for reports](#)

Get started with Power BI Q&A (Quickstart)

1/19/2018 • 2 min to read • [Edit Online](#)

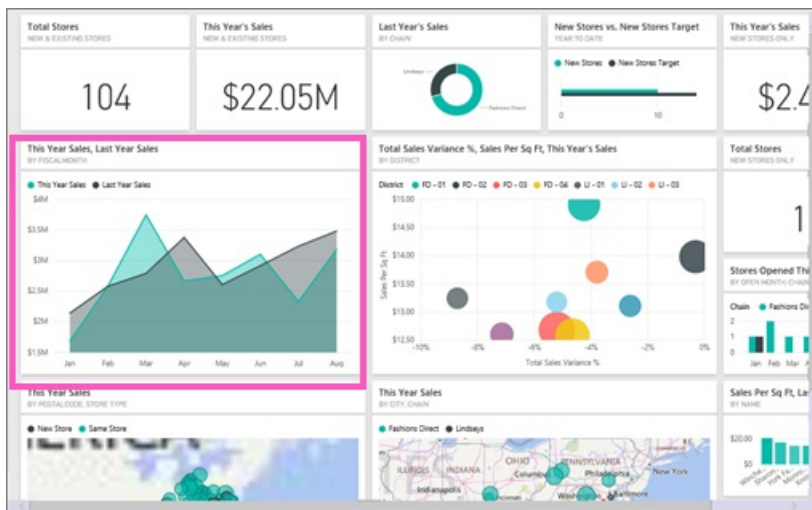
Use Power BI Q&A with the Retail Analysis sample

Sometimes the fastest way to get an answer from your data is to ask a question using natural language. In this quickstart we'll look at 2 different ways of creating the same visualization: first, building it in a report and, second, asking a question with Q&A. We'll use Power BI service, but the process is almost identical using Power BI Desktop.

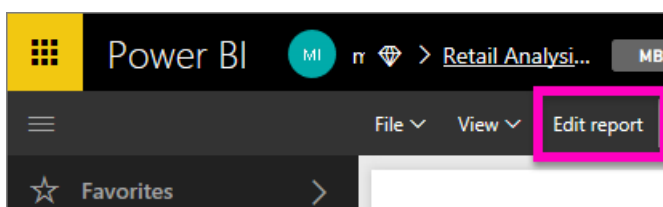
To follow along, you must use a report that you can edit, so we'll use one of the samples available with Power BI.

Method 1: using the report editor

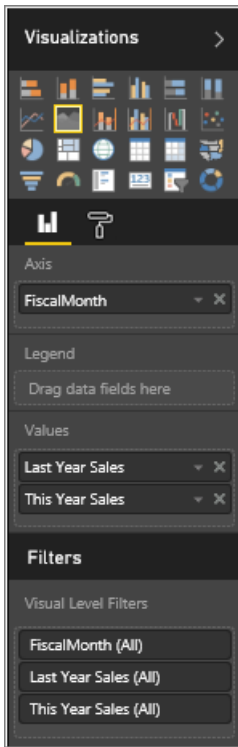
1. From your Power BI workspace, select **Get Data** > **Samples** > **Retail Analysis Sample** > **Connect**.



2. The dashboard contains an area chart tile for "Last Year Sales and This Year Sales." Select this tile.
 - If this tile was created with Q&A, selecting the tile will open Q&A.
 - But this tile was created in a report, so the report opens to the page that contains this visualization.
3. Open the report in Editing View by selecting **Edit Report**. If you are not an owner of a report, you will not have the option to open the report in Editing view.

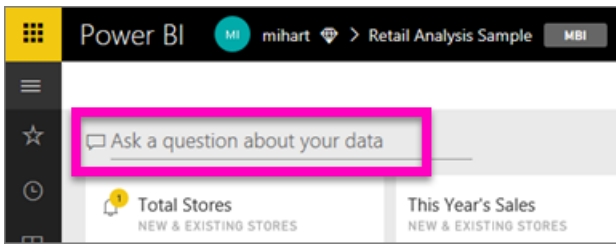


4. Select the area chart and review the settings in the **Fields** pane. The report creator built this chart by selecting these 3 values (**Time** > **FiscalMonth**, **Sales** > **This Year Sales**, **Sales** > **Last Year Sales** > **Value**) and organizing them in the **Axis** and **Values** wells.



Method 2: using Q&A

How would we go about creating this same line chart using Q&A?

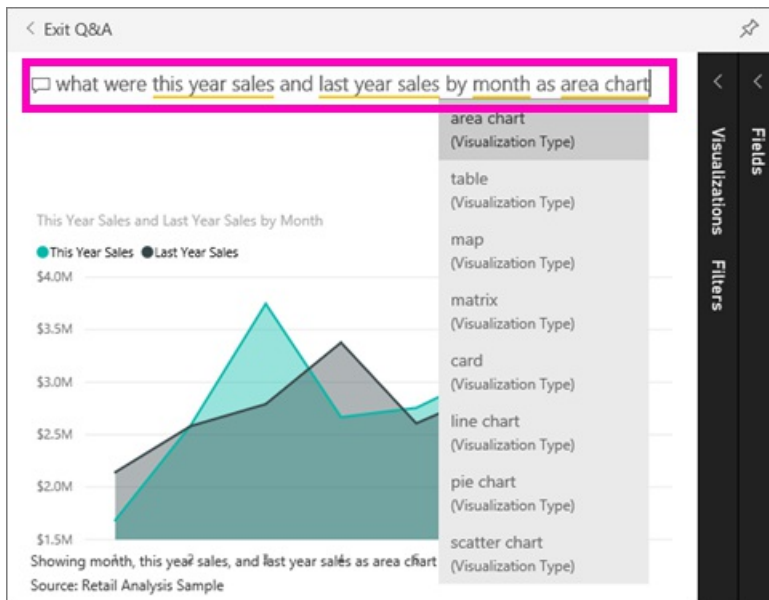


1. Navigate back to the Retail Analysis Sample dashboard.
2. Using natural language, type something like this into the question box:


what were this year sales and last year sales by month as area chart

As you type your question, Q&A picks the best visualization to display your answer; and the visualization changes dynamically as you modify the question. Also, Q&A helps you format your question with suggestions, auto-complete, and spelling corrections.

When you finish typing your question, the result is the exact same chart that we saw in the report. But creating it this way was much faster!



3. Similar to working with reports, within Q&A you have access to the Visualizations, Filters and Fields panes. Open these panes to further explore and modify your visual.

4. To pin the chart to your dashboard, select the pin icon  .

Next steps

[Q&A in Power BI](#)

[Make your data work well with Q&A in Power BI](#)

More questions? [Try the Power BI Community](#)

Tutorial: How to use Q&A to create visualizations and build reports

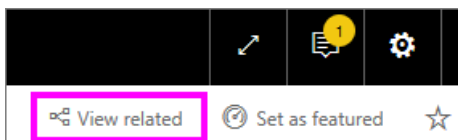
1/19/2018 • 5 min to read • [Edit Online](#)

The [Q&A overview](#) introduced you to Power BI Q&A and made the distinction between *consumers* (have dashboards and reports shared with them) and *creators* (own the underlying reports and datasets). The first part of this tutorial is designed primarily for people consuming dashboards using Power BI service. And the second part is designed for people creating reports using either Power BI service or Power BI Desktop. [Q&A and Power BI mobile](#) and [Q&A with Power BI Embedded](#) are covered in separate articles.

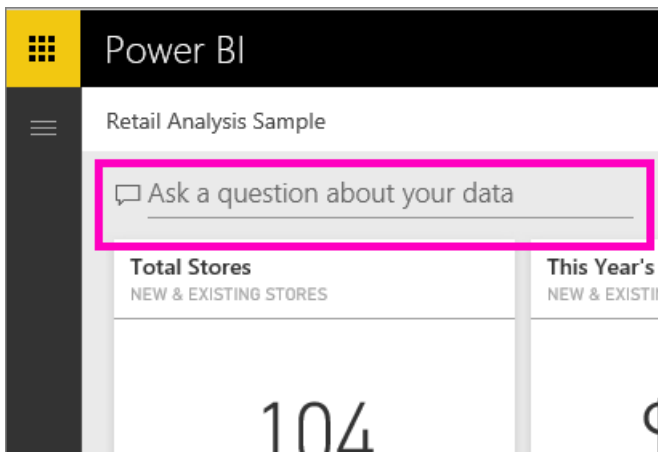
Q&A is interactive and even fun, and, more often than not, one question will lead to many others as the visualizations reveal interesting paths to pursue. Watch Amanda demonstrate using Q&A to create visualizations, dig into those visuals, and pin them to dashboards.

Part 1: Use Q&A on a dashboard in Power BI service (app.powerbi.com)

A dashboard contains tiles pinned from one or more datasets, so you can ask questions about any of the data contained in any of those datasets. To see what reports and datasets were used to create the dashboard, select **View related** from the menubar.

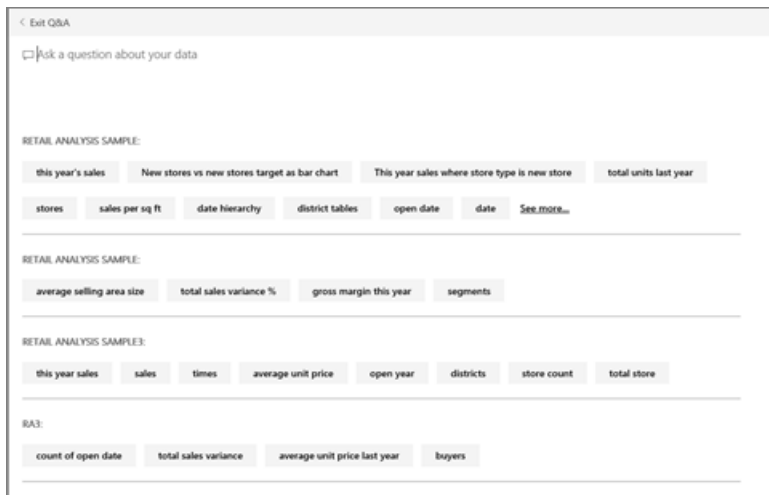


The Q&A question box is located in the upper-left corner of your dashboard, and this is where you type your question using natural language. Q&A recognizes the words you type and figures out where (which dataset) to find the answer. Q&A also helps you form your question with auto-completion, restatement, and other textual and visual aids.



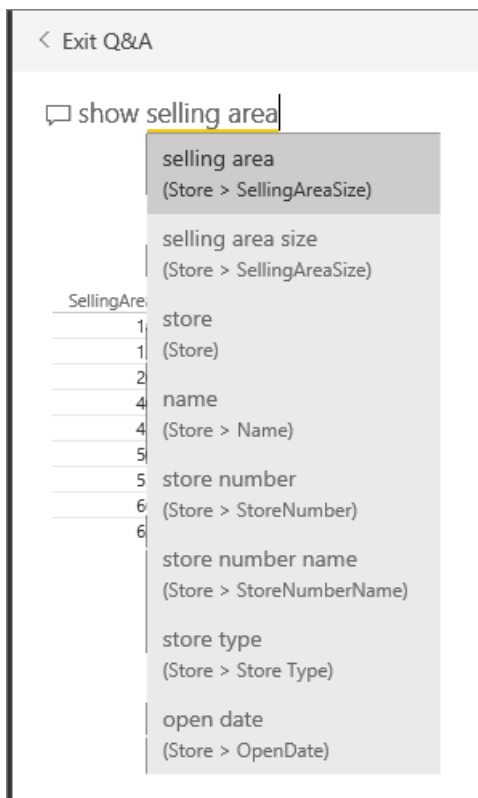
The answer to your question is displayed as an interactive visualization and updates as you modify the question.

1. Open a dashboard and place your cursor in the question box. Even before you start typing, Q&A displays a new screen with suggestions to help you form your question. You'll see the names of the tables in the [underlying dataset\(s\)](#) and may even see complete questions listed if the dataset owner has created [featured questions](#),

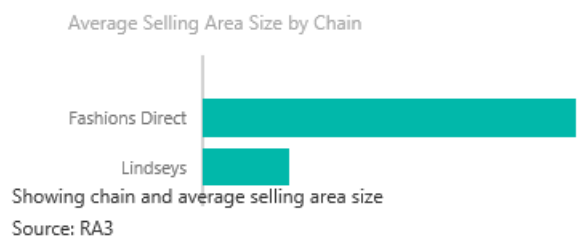
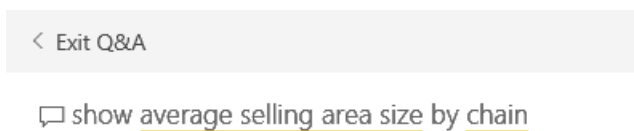


You can always choose one of these questions as a starting point and continue to refine the question to find the specific answer you are looking for. Or, use a table name to help you word a new question.

2. Select from the dataset options or begin typing your own question and select from the dropdown suggestions.



- As you type a question, Q&A picks the best [visualization](#) to display your answer; and the visualization changes dynamically as you modify the question.

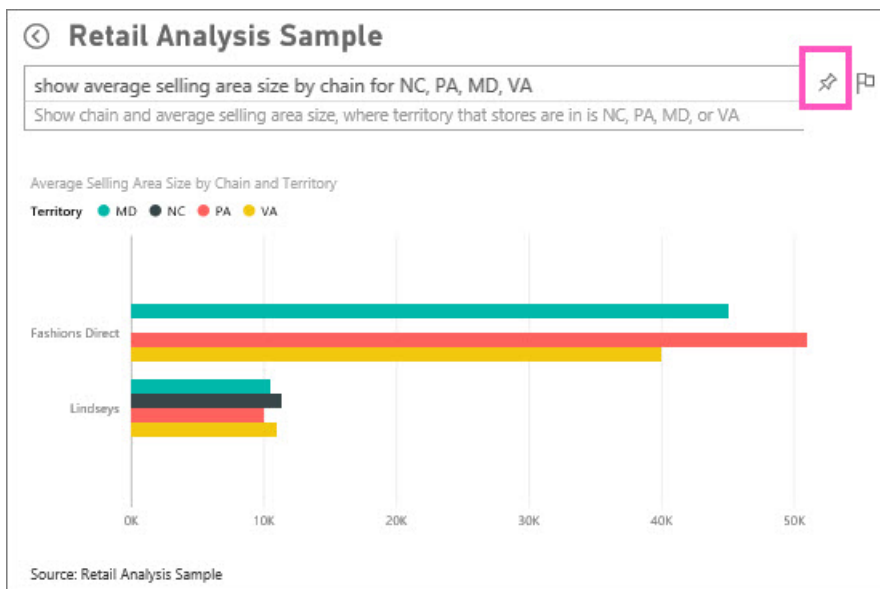


- When you type a question, Power BI looks for the best answer using any dataset that has a tile on that dashboard. If all the tiles are from *datasetA*, then your answer will come from *datasetA*. If there are tiles from *datasetA* and *datasetB*, then Q&A will search for the best answer from those 2 datasets.

TIP

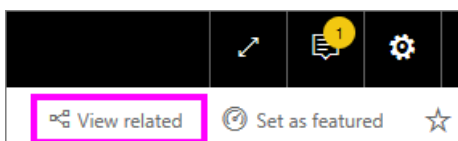
So be careful, if you only have one tile from *datasetA* and you remove it from your dashboard, Q&A will no longer have access to *datasetA*.

- When you're happy with the result, [pin the visualization to a dashboard](#) by selecting the pin icon in the top right corner. If the dashboard has been shared with you, or is part of an app, you won't be able to pin.



Part 2: Use Q&A in a report in Power BI service or Power BI Desktop

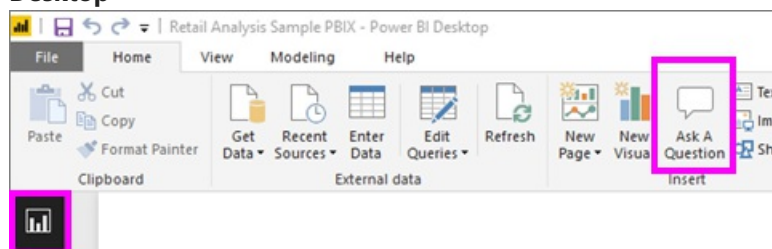
Use Q&A to explore your dataset and to add visualizations to the report and to dashboards. A report is based on a single dataset and may be completely blank or contain pages full of visualizations. But just because a report is blank, doesn't mean there isn't any data for you to explore -- the dataset is linked to the report and is waiting for you to explore and create visualizations. To see which dataset is being used to create a report, open the report in Power BI service Reading view and select **View related** from the menubar.



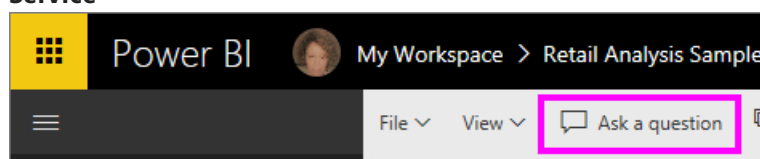
In order to use Q&A in reports, you must have edit permissions for the report and underlying dataset. In the [Q&A Overview topic](#) we referred to this as a *creator* scenario. So if you are, instead, *consuming* a report that has been shared with you, Q&A will not be available.

1. Open a report in Editing view (Power BI service) or Report view (Power BI Desktop) and select **Ask a question** from the menubar.

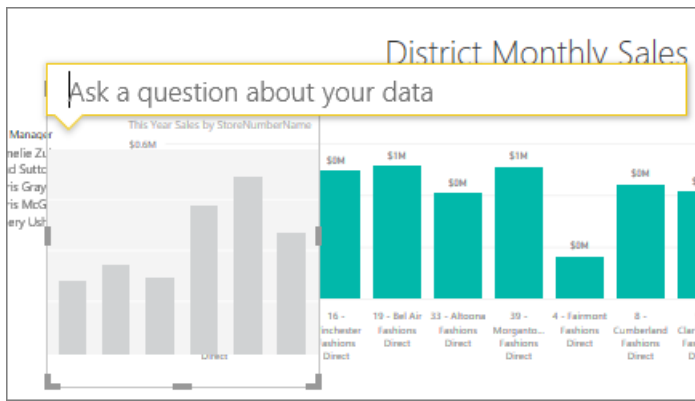
Desktop



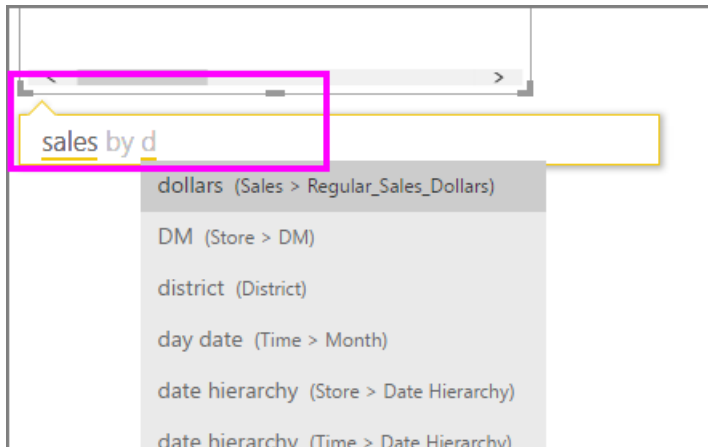
Service



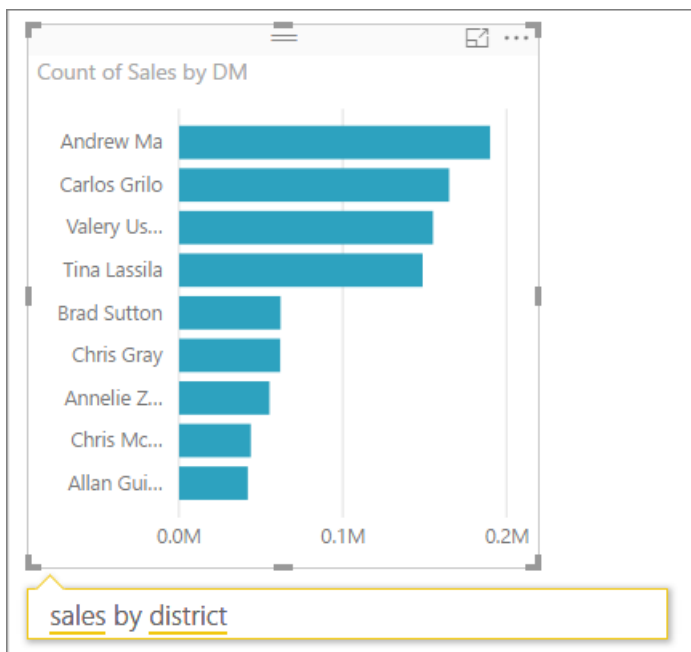
2. A Q&A question box displays on your report canvas. In the example below, the question box displays on top of another visualization. This is fine, but it might be better to [add a blank page to the report](#) before asking a question.



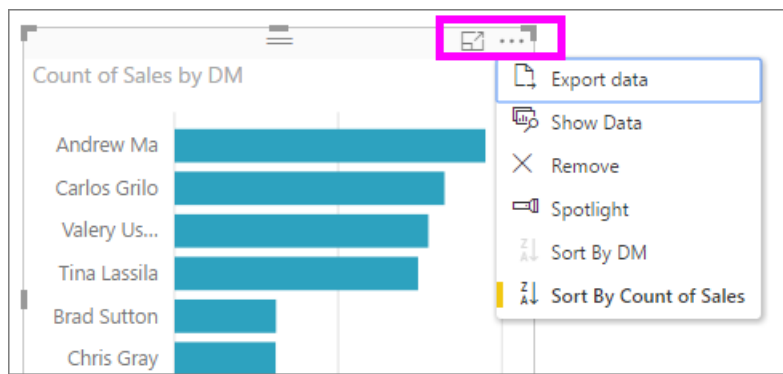
- Place your cursor in the question box. As you type, Q&A displays suggestions to help you form your question.



- As you type a question, Q&A picks the best visualization to display your answer; and the visualization changes dynamically as you modify the question.



- When you have the visualization you like, select ENTER. To save the visualization with the report, select **File > Save**.
- Interact with the new visualization. It doesn't matter how you created the visualization -- all the same interactivity, formatting, and features are available.



If you've created the visualization in Power BI service, you can even [pin it to a dashboard](#).

Tell Q&A which visualization to use.

With Q&A, not only can you ask your data to speak for itself, you can tell Power BI how to display the answer. Just add "as a " to the end of your question. For example, "show inventory volume by plant as a map" and "show total inventory as a card". Try it for yourself.

Considerations and troubleshooting

- If you've connected to a dataset using a live connection or gateway, Q&A needs to be [enabled for that dataset](#).
- You've opened a report and don't see the Q&A option. If you're using Power BI service, make sure the report is open in Editing view. If you can't open Editing view it means you don't have edit permissions for that report and won't be able to use Q&A with that specific report.

Next steps

[Back to Q&A in Power BI](#)

[Tutorial: Use Q&A with the Retail Sales sample](#)

[Tips for asking questions in Q&A](#)

[Prepare a workbook for Q&A](#)

[Prepare an on-premises dataset for Q&A Pin a tile to the dashboard from Q&A](#)

Enable Q&A for live connections

1/19/2018 • 3 min to read • [Edit Online](#)

What is on-premises data gateway? What is a live connection?

Datasets in Power BI can be imported into Power BI or you can create a live connection to them. Live connection datasets are often referred to as "on-premises". The live connections are managed using a [gateway](#) and data and inquiries are sent back and forth using live queries.

Q&A for on-premises data gateway datasets

If you'd like to use Q&A with datasets you access through a gateway, you'll need to enable them first.

Once enabled, Power BI creates an index of your data source and uploads a subset of that data to Power BI to enable asking questions. It may take several minutes to create the initial index and Power BI maintains and updates the index automatically as your data changes. Using Q&A with these datasets behaves the same as with data published to Power BI. The full set of features available in the Q&A experience is supported in both cases, including using the data source with Cortana.

As you ask questions in Power BI, Q&A determines the best visual to construct or report sheet to use to answer your question using an index of your dataset. After determining the best potential answer, Q&A uses DirectQuery to fetch live data from the data source via the gateway to populate charts and graphs. This ensures Power BI Q&A results always show the most up-to-date data directly from the underlying data source.


Since Power BI Q&A uses the text and schema values from your data source to determine how to query the underlying model for answers, searches for specific new or deleted text values (such as asking for a customer name related to a newly added text record) rely on the index being up-to-date with the latest values. Power BI automatically keeps the text and schema index up to date within a 60 minute window of changes.

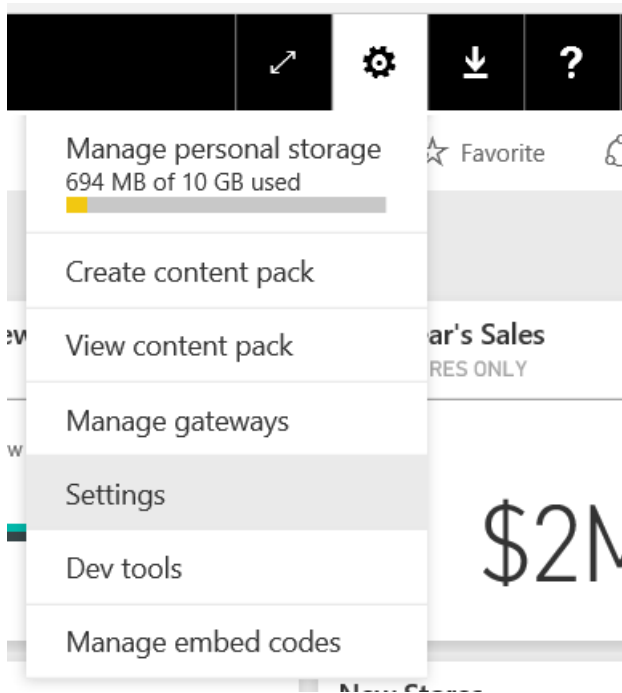
For more information, see:

- What is the [on-premises data gateway](#)?
- [Introduction to Power BI Q&A](#)

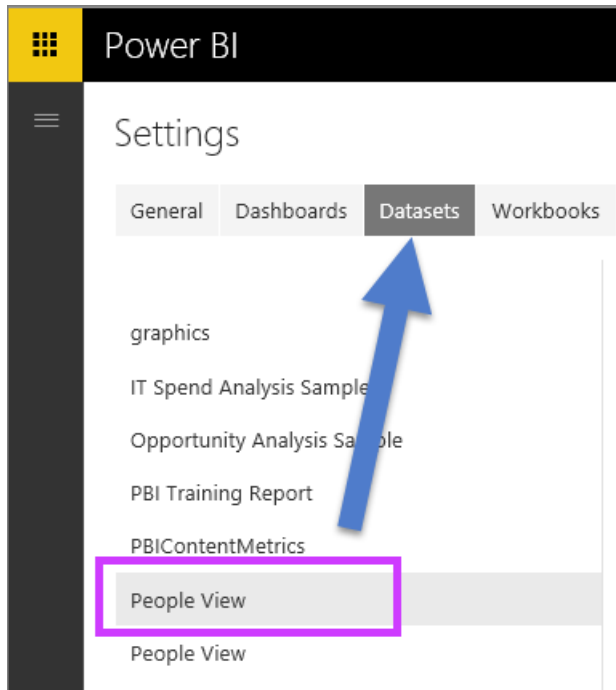
Enable Q&A

Once you have the data gateway set up, connect to your data from Power BI. Either create a dashboard using your on-premises data, or upload a .pbix file that uses on-premises data. You may also already have on-premises data in dashboards, reports, and datasets that have been shared with you.

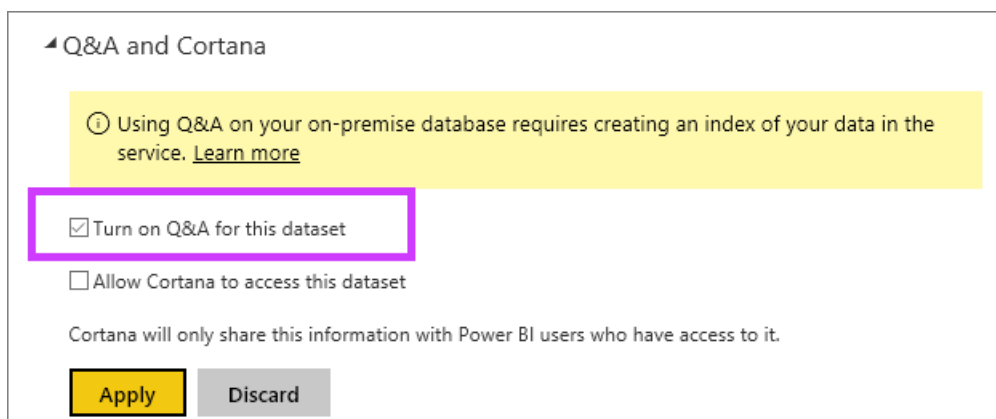
1. In the upper-right corner of Power BI, select the cog icon  and choose **Settings**.



2. Select **datasets** and choose the dataset to enable for Q&A.



3. Expand **Q&A and Cortana**, select the checkbox for **Turn on Q&A for this dataset** and choose **Apply**.



What data is cached and how is privacy protected?

When you enable Q&A for your on-premises data, a subset of your data is cached in the service. This is done to ensure that Q&A works with a reasonable performance. Power BI excludes values longer than 24 characters from caching. The cache is deleted within a few hours when you disable Q&A by unchecking **Turn on Q&A for this dataset**, or when you delete your dataset.

Considerations and troubleshooting

During the Preview phase of this feature, there are several limitations:

- Initially the feature is only available for SQL Server 2016 Analysis Services Tabular data sources. The feature is optimized to work with tabular data. Some functionality is available for multi-dimensional data sources, but the full Q&A experience is not yet supported for multi-dimensional. Additional data sources supported by the on-premises data gateway will be rolled out over time.
- Full support for row level security defined in SQL Server Analysis Services is not available initially in the public preview. While asking questions in Q&A, the "auto-complete" of questions while typing can show string values a user does not have access to. However, RLS defined in the model is respected for report and chart visuals so no underlying numerical data can be exposed. Options to control this behavior will be released in coming updates.
- Live connections are only supported with the on-premises data gateway. As a result, this cannot be used with the personal gateway.

Next steps

[On-premises data gateway](#)

[Manage your data source - Analysis Services](#)

[Power BI - Basic Concepts](#)

[Power BI Q&A Overview](#)

More questions? [Try asking the Power BI Community](#)

How to make your Excel data work well with Q&A in Power BI

1/19/2018 • 2 min to read • [Edit Online](#)

If you are a person who creates data models or builds Excel workbooks that will be used with Power BI, read on...

In Power BI, Q&A can search structured data and choose the right visualization for your question -- that's what makes it a compelling tool to use.

Q&A can work on any uploaded Excel file that has tables, ranges, or contains a PowerPivot model, but the more optimizations and data cleaning you do, the more robust Q&A performance is. If you plan on sharing reports and dashboards based on your dataset, you'll want your colleagues to have an easy time asking questions and getting quality answers.

How Q&A works with Excel

Q&A has a set of core natural language understanding abilities that work across your data. It has context-dependent keyword search for your Excel table, column, and calculated field names. It also has built-in knowledge for how to filter, sort, aggregate, group, and display data.

For example, in an Excel table named "Sales", with columns "Product", "Month", "Units Sold", "Gross Sales", and "Profit", you could ask questions about any of those entities. You could ask to show sales, total profit by month, sort products by units sold, and many others. Read more about the [kinds of questions you can ask](#), and [visualization types you can specify in a Q&A query](#).

Prepare an Excel dataset for Q&A

Q&A relies on the names of tables, columns, and calculated fields to answer data-specific questions, meaning what you call entities in your workbook is important!

Here are some tips for making the most of Q&A in your workbook.

- Make sure your data is in an Excel table. Here's [how to create an Excel table](#).
- Make sure the names of your tables, columns, and calculated field make sense in natural speech.

For example, if you have a table with sales data, call the table "Sales". Column names like "Year", "Product", "Sales Rep", and "Amount" will work well with Q&A.

- If your workbook has a Power Pivot data model, you can do even more optimizations. Read more about [Demystifying Power BI Q&A part 2](#) from our in-house team of natural language experts.
- Open the dataset in Power BI Desktop and create new columns, create calculated measures, concatenate fields to create unique values, classify data by type (e.g., dates, strings, geography, images, URLs), and more.

Next steps

Back to [Q&A in Power BI](#)

[Prepare on-premises datasets for Q&A](#)

[Q&A quickstart](#)

[Get data \(for Power BI\)](#)

More questions? [Try the Power BI Community](#)

Enable Cortana to access Power BI reports (and their underlying datasets)

12/20/2017 • 3 min to read • [Edit Online](#)

You've read the [Introduction to Cortana and Power BI](#) (if not, you might want to read that first and then come back). And now you want to try it out yourself. Before you can ask natural language questions in Cortana and find answers from data stored in Power BI **reports**, there are a few requirements. Specifically, you'll need to do the following.

NOTE

If you are trying out the Cortana and Power BI **dashboard** preview, you can skip the rest of this article. There are no setup requirements for Cortana to be able to search your Power BI dashboards.

In Power BI service

- enable one or more datasets for Cortana (reports are built on top of datasets, so Cortana needs access to those datasets)


In Microsoft Windows

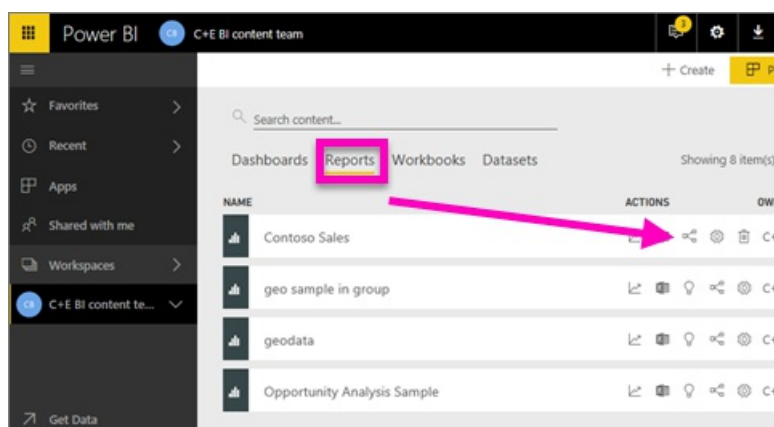
- Check that you are running Windows 10 version 1511 or later
- Make sure that Power BI and Windows can "talk" to each other. This means connecting your account to Windows.

Use Power BI service to enable Cortana to access report pages in Power BI

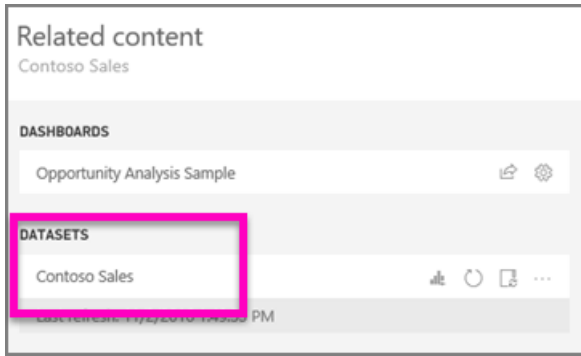
Enabling reports in Power BI to be accessed by Cortana is a simple process. In fact all you have to do is enable the report's underlying dataset by selecting "Enable Cortana to access this dataset". After that, any user who has access to the dataset in Power BI, via regular Power BI sharing, apps, and content pack features, will be able to get answers from the report in Cortana in Windows 10.

You'll need to sign in to Power BI service (not Power BI Desktop) and repeat these steps for each dataset that you want Cortana to be able to access.

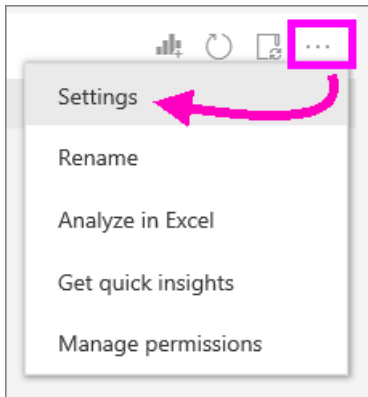
1. Determine which dataset(s) to enable. From the report content list, select the report you'd like Cortana to access and choose the **View related** icon  .



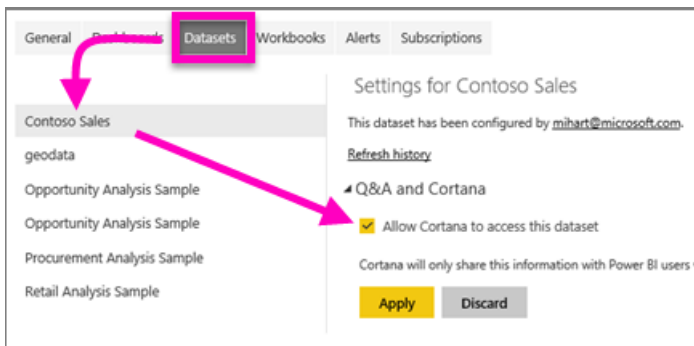
- The dataset associated with this report is **Contoso Sales**.



- To the right of the dataset name, select the **ellipses (...)** > **Settings**.



- Select **Q&A and Cortana** > **Allow Cortana to access this dataset** > **Apply**.



In this example, we're enabling Cortana on the Contoso Sales dataset.

NOTE

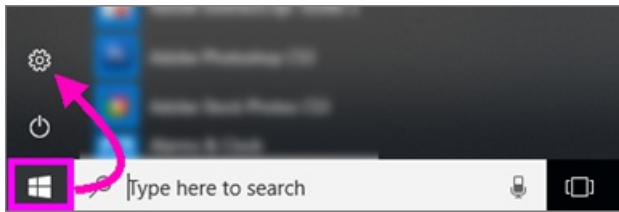
When a new dataset or Cortana answer card is added to Power BI and enabled for Cortana, it can take up to 30 minutes for results to begin appearing. Logging in and out of Windows 10, or otherwise restarting the Cortana process in Windows 10, will allow new content to appear immediately.

If you enable a dataset for Cortana, and that dataset is part of a content pack or app you own, you will need to re-publish for your colleagues to also be able to use it with Cortana.

Add your Power BI credentials to Windows

You'll need to be running Windows 10 version 1511 or higher.

- Determine which Windows 10 version you are running. Open **Settings**.

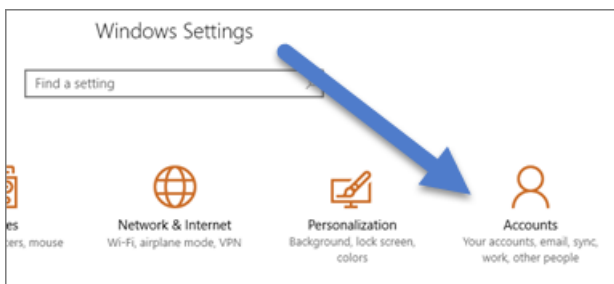


Then select **System > About**. Towards the bottom of the screen you'll see **Windows specifications > Version**

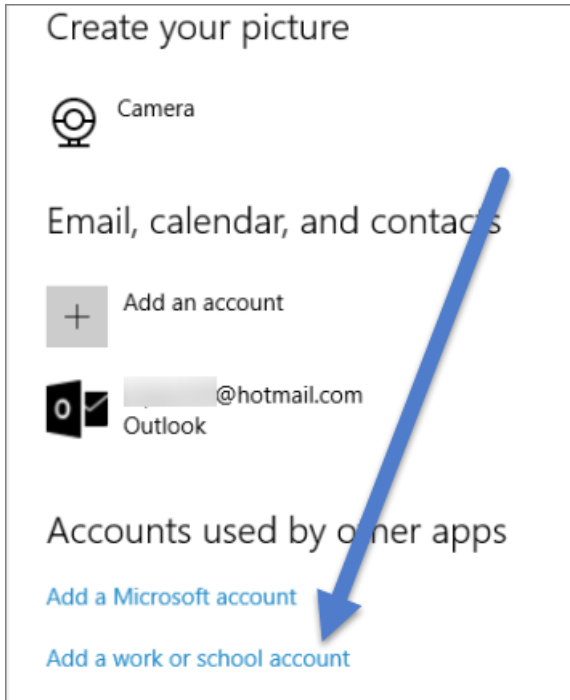
- If you have Windows 10 version 1511 (Windows 10 November 2015 Update) up until 1607, add your work or school account and Microsoft account (complete steps 2 and 3 below).
- If you have Windows 10 version 1607 (Windows 10 July 2016 update) or later, add your work or school account (complete only step 2 below).

2. Add your work or school account for Cortana.

- Open **Settings > Accounts**.



- Scroll to the bottom and select **Add a work or school account**. Or, from the **Accounts** page select **Access work or school > Connect**.



Cortana will use this work or school account to check Power BI for potential answers to your questions in Cortana.

Next steps

[Create Cortana answer cards in Power BI](#)

[Troubleshoot Cortana and Power BI integration issues](#)

More questions? [Try the Power BI Community](#)

Create featured questions for Power BI Q&A

1/19/2018 • 1 min to read • [Edit Online](#)

If you own a dataset, you can add your own featured questions to that dataset. And Power BI Q&A will show those questions to colleagues who use (*consume*) your dataset. Featured questions give your colleagues ideas about the types of questions they can ask about the dataset. The featured questions you add are up to you -- add popular questions, questions that display interesting results, or questions that may be hard to phrase.

Watch Will add some featured questions to Power BI Q&A and then use those featured questions to explore his dataset. Then follow the step-by-step instructions below the video to try it out yourself.

NOTE

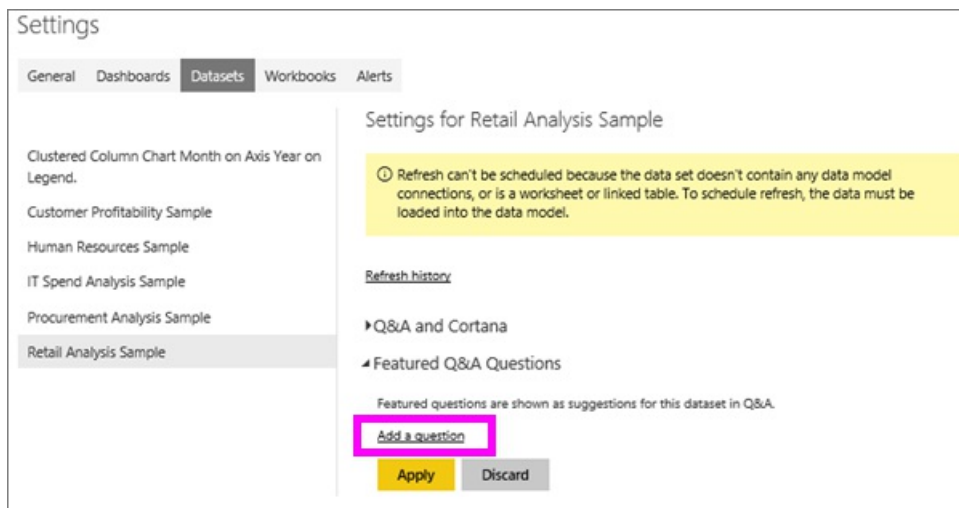
Q&A featured questions are available for use in the [Microsoft Power BI app for iOS on iPads, iPhones, and iPod Touch devices](#) and Power BI Desktop Q&A Preview. But creating the questions is only available in Power BI service (app.powerbi.com).

This article uses the [Retail Analysis Sales sample](#).

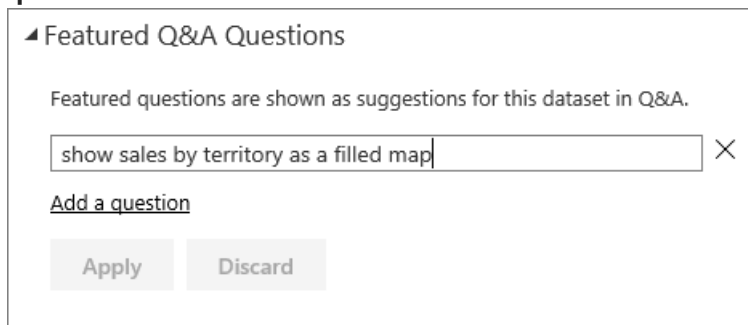
1. On the dashboard, select the Q&A question box. Notice that Q&A is already being helpful by displaying a list of terms that appear in the dataset.
2. To add to this list, select the gear icon in the top right corner of Power BI.



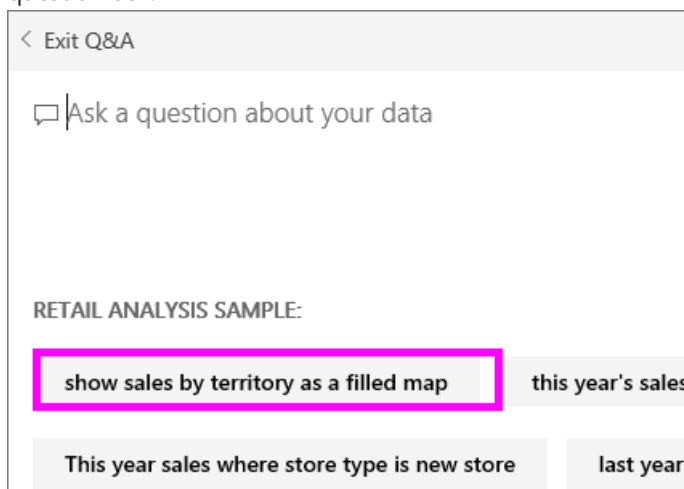
3. Select **Settings** > **Datasets** > **Retail Analysis sample** > **Featured Q&A Questions**.
4. Select **Add a question**.



5. Type your question in the text box and select **Apply**. Optionally, add another question by selecting **Add a question**.



6. Navigate back to the Power BI dashboard for Retail Analysis Sample, and place your cursor in the Q&A question box.



7. The new featured question, **Sales by territory as a map**, is first in the list. Select it.
8. The answer displays as a filled map visualization.

< Exit Q&A

show sales by territory as a filled map



Showing sales sorted by territory that stores are in as color-filled map

Source: Retail Analysis Sample

Next steps

[Q&A in Power BI](#)

[Tutorial: Introduction to Power BI Q&A](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Tips for asking questions in Power BI Q&A

1/19/2018 • 5 min to read • [Edit Online](#)

Words and terminology that Q&A recognizes

This list of keywords is not exhaustive. The best way to see if Power BI recognizes a keyword, is to try it out by typing it in the question box. If the word or term is greyed out, then Power BI does not recognize it, or doesn't recognize it in the current context.

The list below uses present tense, but all tenses are recognized in most cases. For example, "is" includes are, was, were, will be, have, has, had, will have, has got, do, does, did. And "sort" includes sorted and sorting. Also, PowerBI recognizes and includes singular and plural versions of a word. For example, Power BI recognizes "year" and "years".

NOTE

Q&A is also available in the [Microsoft Power BI app for iOS on iPads, iPhones, and iPod Touch devices](#).

If you are the owner of a dataset, add phrasings and synonyms to improve the Q&A results for your customers.

Aggregates: total, sum, amount, number, quantity, count, average, most, least, fewest, largest, smallest, highest, biggest, maximum, max, greatest, lowest, littlest, minimum, min

Articles: a, an, the

Blank and Boolean: blank, empty, null, prefixed with "non" or "non-", empty string, empty text, true, t, false, f

Comparisons: vs, versus, compared to, compared with

Conjunctions: and, or, each of, with, versus, &, and, but, nor, along with, in addition to

Contractions: Q&A recognizes almost all contractions, try it out. Here are a few examples: didn't, haven't, he'd, he's, isn't, it's, she'll, they'd, weren't, where'll, who's, won't, wouldn't.

Dates: Power BI recognizes most date terms (day, week, month, year, quarter, decade, etc...) and dates written in many different formats (see below). Power BI also recognizes the following keywords: MonthName, Days 1-31, decade.

Examples: January 3rd of 1995, January 3rd 1995, jan 03 1995, 3 Jan 1995, the 3rd of January, January 1995, 1995 January, 1995-01, 01/1995, names of months.

Relative dates: today, right now, current time, yesterday, tomorrow, the current, next, the coming, last, previous, ago, before now, sooner than, after, later than, from, at, on, from now, after now, in the future, past, last, previous, within, in, over, N days ago, N days from now, next, once, twice.

Example: count of orders in the past 6 days.

Equality (Range): in, equal to, =, after, is more than, in, between, before

Examples: Order year is before 2012? Price equals between 10 and 20? Is the age of John greater than 40? Total sales in 200-300?

Equality (Value): is, equal, equal to, in, of, for, within, is in, is on

Examples: Which products are green? Order date equals 2012. Is the age of John 40? Total sales that is not equal to

200? Order date of 1/1/2016. 10 in price? Green for color? 10 in price?

Names: If a column in the dataset contains the phrase "name" (e.g., EmployeeName), Q&A understands the values in that column are names and you can ask questions like "which employees are named robert."

Pronouns: he, him, himself, his, she, herself, her, hers, it, itself, its, they, their, them, themselves, theirs, this, these, that, those

Query commands: sorted, sort by, direction, group, group by, by, show, list, display, give me, name, just, only, arrange, rank, compare, to, with, against, alphabetically, ascending, descending, order

Range: greater, more, larger, above, over, >, less, smaller, fewer, below, under, <, at least, no less than, >=, at most, no more than, <=, in, between, in the range of, from, later, earlier, sooner, after, on, at, later than, after, since, starting with, starting from, ending with

Times: am, pm, o'clock, noon, midnight, hour, minute, second, hh:mm:ss

Examples: 10 pm, 10:35 pm, 10:35:15 pm, 10 o'clock, noon, midnight, hour, minute, second.

Top N (order, ranking): top, bottom, highest, lowest, first, last, next, earliest, newest, oldest, latest, most recent, next

Visual types: all visual types native to Power BI. If it's an option in the Visualizations pane, then you can include it in your question. The exception to this is [custom visuals](#) that you've manually added to the Visualization pane.

Example: show districts by month and sales total as bar chart

Wh (relationship, qualified): when, where, which, who, whom, how many, how much, how many times, how often, how frequently, amount, number, quantity, how long, what

Q&A helps you phrase the question

Q&A does its best to ensure that the answer accurately reflects the question being asked. It does this in several ways. For all of these, you can accept the action in full, in part, or not at all. As you type your question, Q&A:

- auto-completes words and questions. It uses various strategies, including auto-completing recognizable words, popular questions for the underlying workbooks, and previously-used questions that returned valid responses. If more than one auto-complete option is available, they are presented in a dropdown list.
- corrects spelling.
- provides a preview of the answer in the form of a visualization. The visualization updates as you type and edit the question (it doesn't wait for you to press Enter).
- auto-suggests replacement terms from the underlying dataset(s) when you move the cursor back in the question box.
- restates the question based on the data in the underlying dataset(s). This helps ensure Q&A understood your question as Q&A replaces the words you used with synonyms from the underlying dataset(s).
- dims words it does not understand.

Combine results from more than one dataset

One of Power BI's most powerful features is the ability to combine data from different datasets. So don't limit your questions to a single dataset -- ask questions that retrieve data from more than one dataset. For example, if my dashboard has tiles from the Retail Analysis Sample and a state population dataset, I can ask *show count of stores by state population as bar chart descending*.

Don't stop now

After Q&A displays your results, keep the conversation going! Use the interactive features of the visualization and of Q&A to uncover more insights.

Next steps

Back to [Q&A in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Troubleshoot Cortana for Power BI

12/20/2017 • 5 min to read • [Edit Online](#)

This article is part of a series. If you haven't already, we recommend reading the following three articles.

Article 1: [Understand how Cortana and Power BI work together to search for Power BI dashboards and reports](#)

Article 2: [For searching reports: enable the Cortana - Power BI - Windows integration](#)

Article 3: [For searching reports: create special Cortana answer cards](#)

If you're still having problems getting Cortana to integrate with Power BI, you've come to the right place. Follow the steps below to diagnose and fix the problem.

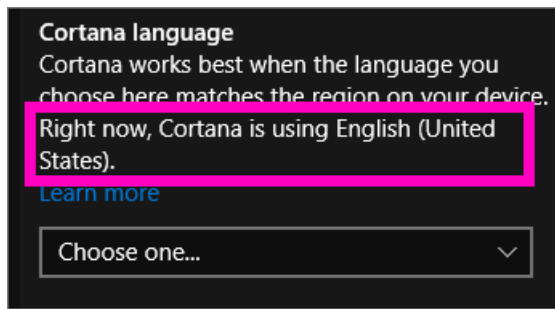
Why doesn't Cortana find answers from my Power BI reports or dashboards?

1. Do you have a Power BI account? If not, [sign up, it's free](#).
2. Is Cortana working? Do you see the Cortana icon in your taskbar?



When you select it, does Cortana open with a field in which you can type?

3. Did you use at least 2 words in your search? Cortana needs at least 2 word phrases to find answers in Power BI. Try adding "show" to the beginning of your question.
4. If your dashboard has a title with more than one word, Cortana will only return that dashboard if your search matches at least two of the words. For a dashboard named "Sales FY16":
 - "show sales" will *not* return a Power BI result.
 - "show me sales fy16", "sales fy16", "show sales fy16", and "show me sales f" *will* return a Power BI result.
 - Adding the words "powerbi" counts as one of the 2 required words, so "powerbi sales" *will* return a Power BI result.
5. Do you have access or edit permissions to any reports or dashboards? For reports, ensure the content you are attempting to search has an [answer card](#). For dashboards, ensure the content you are attempting to search is in **Shared with me**, an app workspace, or **My workspace**. [Use the troubleshooting tool](#) for help identifying the problem.
6. Are you using a mobile device? Currently we only support Power BI and Cortana integration on Windows mobile devices.
7. Is Cortana configured for English? The current Cortana-Power BI integration only supports English. Open Cortana and select the cog icon to display Settings. Scroll down to **Cortana language** and ensure it's set to one of the English options.



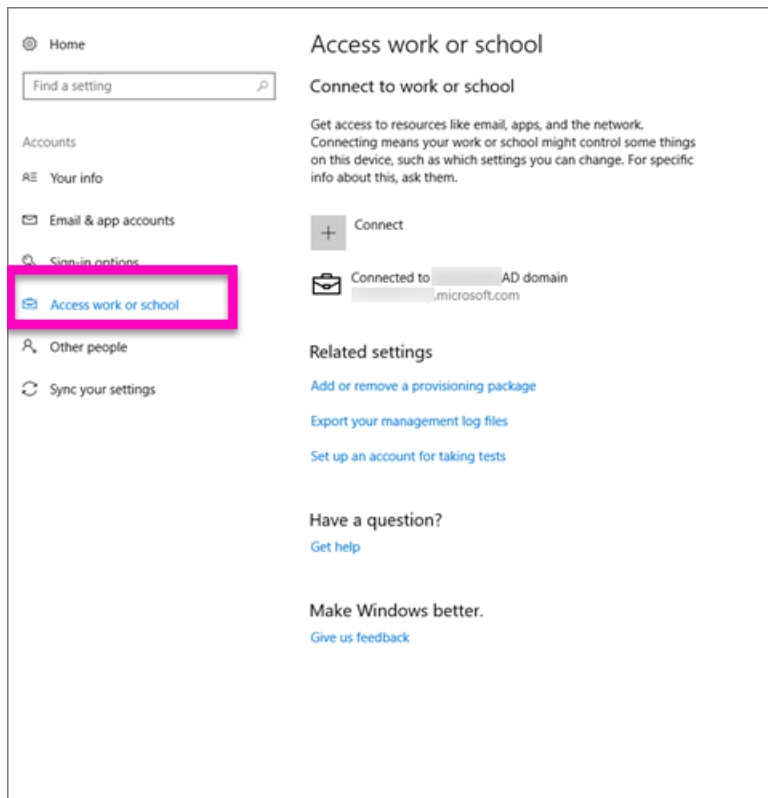
8. Do you have more than 100 reports enabled for Cortana? Cortana only searches up to 100 total. To ensure that your report is included, move or copy it to your **My Workspace** because Cortana searches there first.
9. You might just need to give it some time. The first time you type a query the model might be *cold*. Wait a few seconds so the data can be loaded into memory, and then try again.
10. For dashboards, it can take up to 24 hours for them to become accessible to Cortana.
11. For reports, when a new dataset or custom answer card is added to Power BI and enabled for Cortana it can take up to 30 minutes for results to begin appearing in Cortana. Logging in and out of Windows 10, or otherwise restarting the Cortana process in Windows 10, will allow new report content to appear immediately.
12. Your Power BI Administrator can "opt out". Check with your admin to see if this is the case.

Reports only: why doesn't Cortana find answers from my Power BI reports

1. If you're looking for answers in reports, do you have any reports with Cortana **answer cards**? Answer cards are the only way Cortana can find answers in your Power BI reports. Learn how to create an answer card by reading [Create Cortana answer cards in Power BI service and Power BI Desktop](#).
2. Are you running Windows version 1511 or later? Find out by opening Windows Settings and selecting **System > About**. If not, update your version of Windows.
3. Are your Windows and Power BI accounts connected? This can be confusing. Follow the instructions in [Enable Cortana for Power BI](#).
4. Have the underlying datasets been enabled for Cortana? Maybe a colleague has shared a dataset that she has already enabled for Cortana. But, if not, [learn how to enable datasets for Cortana yourself](#). It's quick and easy.

Dashboards only: why doesn't Cortana find answers from my Power BI dashboards

1. Ensure that you are connected to your work account. Power BI needs this connection so that it can authenticate your access permissions to data. To check that you are connected or if not, to connect your work account, use the Windows search box to navigate to "Connect to work or school".



2. Do you have access to Cortana? Select the Windows search box and provide Cortana access permissions to your information.

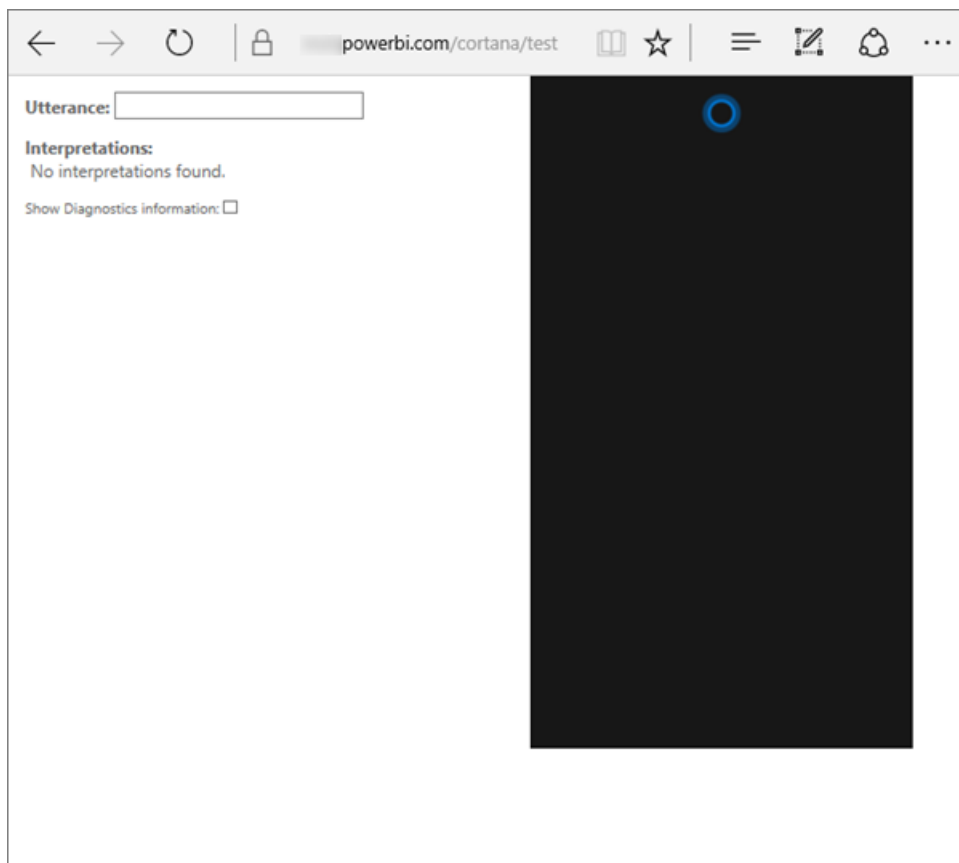
Try the Cortana troubleshooting tool

Still having trouble? Now is a good time to run the Cortana troubleshooting tool and narrow down the possible issues.

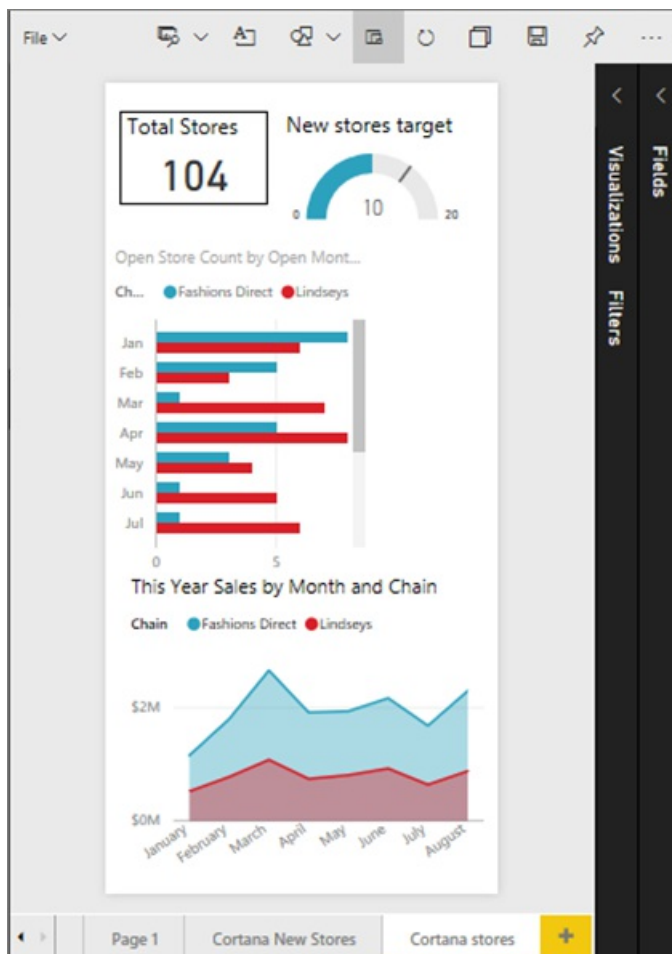
Having trouble retrieving answers from a report?

1. For reports, before running the troubleshooting tool, make sure to set the **Page level** filters on your Cortana answer cards to **Require single selection**. For help doing this see [Create Cortana answer cards](#).
2. Open the troubleshooting tool by adding "/cortana/test" to the end of your Power BI service URL. Your URL should look similar to this:

app.powerbi.com/cortana/test

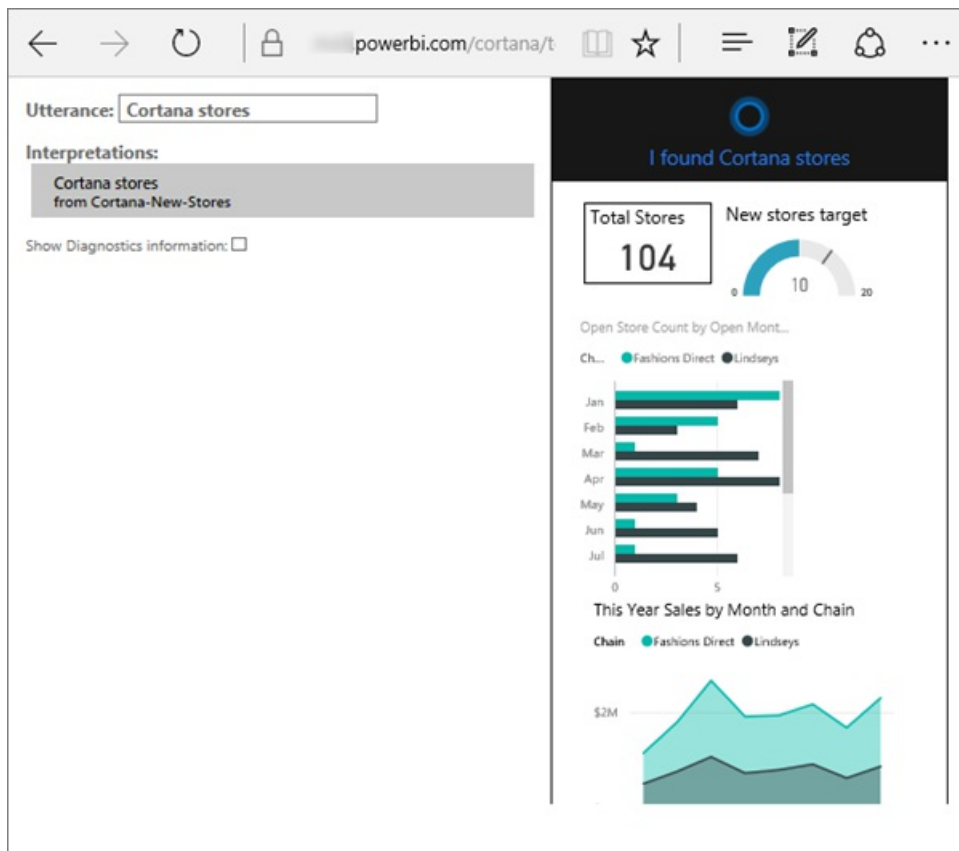


3. In the **Utterance** field, to troubleshoot reports, type the name of a Cortana answer card **exactly as it appears in the Power BI tab**.





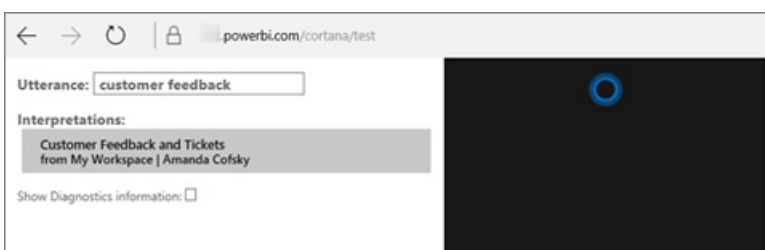
4. Sometimes, the first time you type something into the **Utterance** field, nothing happens. Think of it as priming the system; you're letting the troubleshooting tool know that it's time to turn on. Cut and paste or retype into the **Utterance** field again. In this example, the name of our answer card is **Cortana stores**. Pasting or typing **Cortana stores** into the tool produces a single result that displays in the **Interpretations** field. Click to see the answer card displayed in the Cortana window -- in this case, **Cortana stores**.



Because we got a result, we now know that Cortana **is** enabled in Power BI. That narrows down the problem to something on the Windows side or the Cortana language setting or having more than 100 datasets enabled for Cortana.

Having trouble retrieving answers from a dashboard?

Looking for a dashboard that has been shared with you? Open Power BI > **Shared with me** and locate the name of the dashboard. Then type that name into the *Utterances** field.



Troubleshooting tool known issues

- If the tool doesn't fetch the results the first time; instead paste the query into the Utterance text box.

- The query must be 2 or more words, by design. If your query is too short, add the word "show".
- Some query strings with prepositions might not work (e.g. sales by item). Try different query terms that don't use prepositions and are meaningful/unique.

More questions? [Try the Power BI Community](#)

How should I collaborate and share dashboards and reports in Power BI?

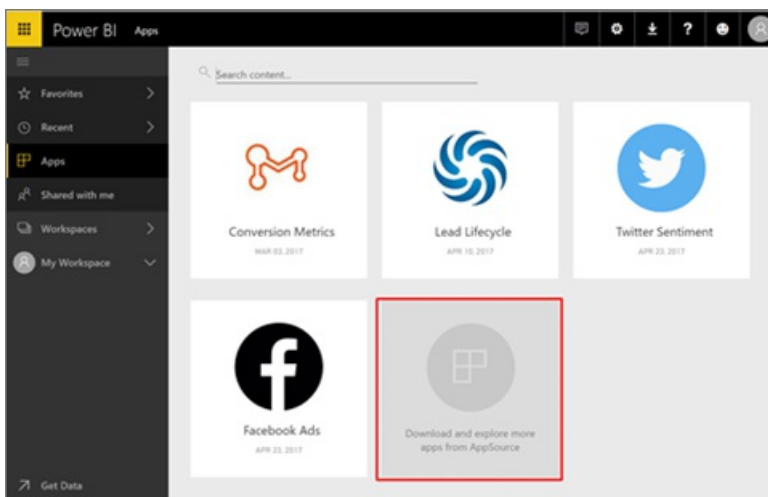
1/25/2018 • 5 min to read • [Edit Online](#)

You've created dashboards and reports. Maybe you collaborate on them with your coworkers, too. Then you want others to have access to them. What's the best way to distribute them?

In this article, we'll compare these options for collaborating and sharing in Power BI:

- Collaborating with coworkers to create meaningful reports and dashboards in *app workspaces*.
- Bundling those dashboards and reports into *apps* and publishing them to a larger group or your whole organization.
- Sharing dashboards or reports with a few people, from the service or the Power BI mobile apps.
- Publishing to the web, where anyone can see and interact with them.
- Printing.

No matter which option you choose, to share a dashboard you need a [Power BI Pro license](#), or the content needs to be in a [Premium capacity](#). License requirements vary for the colleagues who view your dashboards, depending on the option you choose. The following sections spell out details.

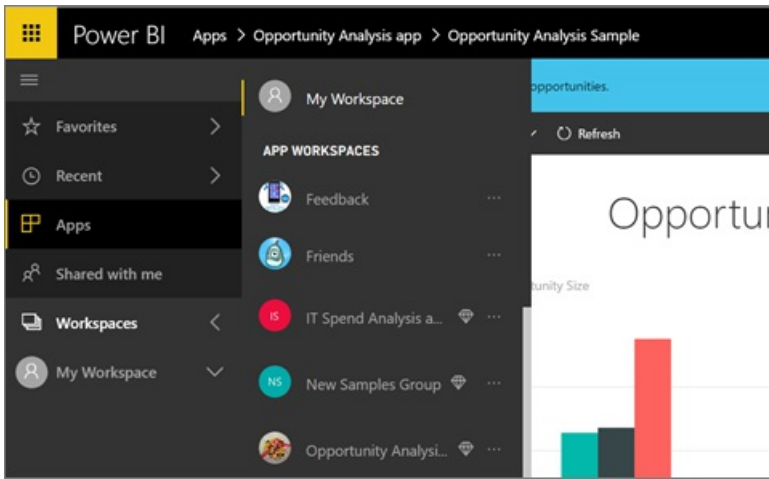


Apps in the Power BI service

Collaborate with coworkers to create an app

Say you and your teammates want to publish your Power BI insights to your organization. The best way to do that is to create an *app*. An app is a collection of dashboards and reports built to deliver key metrics for your organization.

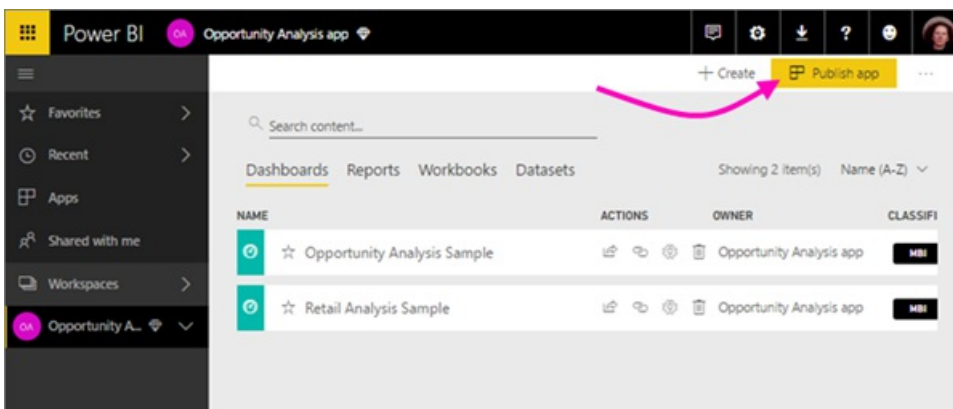
To create an app, you need a *app workspace*, with your teammates as members. Think of the app workspace as a staging area where you and they can collaborate on your Power BI dashboards and reports. All of you can create reports in Power BI Desktop and publish those reports to the app workspace, and all of you need Power BI Pro licenses.



If you just want to share a finished dashboard with colleagues, don't add them to the app workspace. Instead, [create the dashboard in an app workspace](#), and publish the app to them.

Publish your app to a broad audience

Say you want to distribute your dashboard to a broad audience. You and your coworkers have created an *app workspace*, then created and refined dashboards, reports, and datasets in the app workspace. Now you select the dashboards and reports you want and publish them as an app — either to members of a security group or distribution list, or to your whole organization.



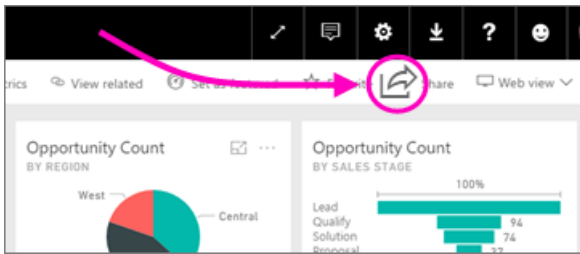
Apps are easy to find and install in the Power BI service (<https://powerbi.com>). You can send your business users a direct link to the app, or they can search for it in AppSource. If your Power BI administrator give you permissions, you can install an app automatically in your coworkers' Power BI accounts. Read more about [publishing your apps](#).

After they install an app, they can view it in their browser or mobile device.

For your users to view your app, either they need to have a Power BI Pro license, too, or the app needs to be stored in a Power BI Premium capacity. Read [What is Power BI Premium?](#) for details.

Share dashboards and reports

Let's say you've finalized a dashboard and a report in your own My Workspace or in an app workspace and you want some other people to have access to it. One way to get it to them is to *share* it.



You need a Power BI Pro license to share your content, and those you share it with do too, or the content needs to be in a [Premium capacity](#). When you share a dashboard or report, they can view it and interact with it, but can't edit it. They see the same data that you see in the dashboard and reports unless row-level security (RLS) is applied to the underlying dataset. The coworkers you share it with can share with their coworkers, if you allow them to.

You can share with people outside your organization, too. They can view and interact with the dashboard too, but can't share it.

More about [sharing dashboards and reports](#) from the Power BI service. You can also add a filter to a link and [share a filtered view of your report](#).

Annotate and share from the Power BI mobile apps

In the Power BI mobile apps for iOS and Android devices, you can annotate a tile, report, or visual and then share it with anyone via email.



You're sharing a snapshot of the tile, report, or visual, and your recipients see it exactly as it was when you sent the mail. The mail also contains a link to the dashboard or report. If they have a Power BI Pro license, or the content is in a [Premium capacity](#), and you've shared the object with them already, they can open it. You can send snapshots of tiles to anyone — not just coworkers in the same email domain.

More about [annotating and sharing tiles, reports, and visuals](#) from the iOS and Android mobile apps.

You can also [share a snapshot of a tile](#) from the Power BI app for Windows 10 devices.

Publish to the web

You can publish Power BI reports to the whole Internet by embedding interactive visualizations in blog posts, websites, social media, and other online communications on any device. Anyone on the Internet can view your reports, and you have no control over who can see what you've published. They don't need a Power BI license. Publishing to the web is available only for reports that you can edit. You can't publish reports to the web if they're shared with you or if they're in an app. More about [publishing to the web](#).

Print or save as PDF or other static file

You can print or save as PDF (or other static file format) an entire dashboard, dashboard tile, report page, or visualization from the Power BI service. Reports can only be printed one page at a time -- you can't print the entire report at once. More about [printing or saving as a static file](#).

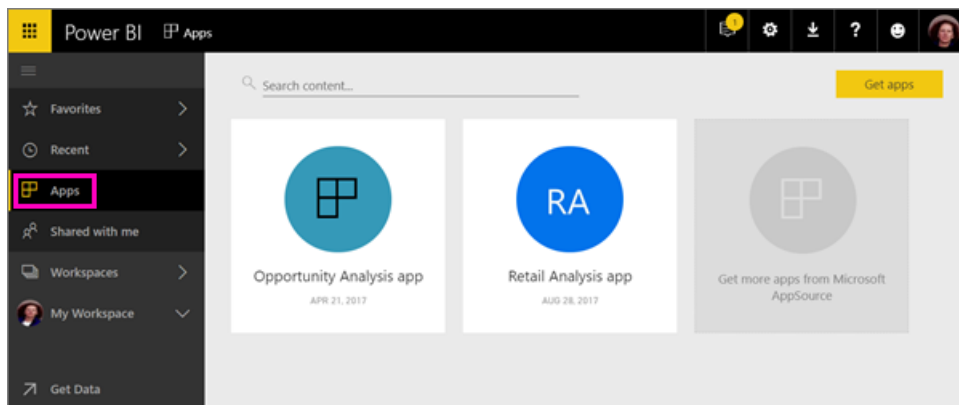
Next steps

- Have feedback? Go to the [Power BI Community site](#) with your suggestions.
- [Share dashboards with coworkers and others](#)
- [Create and publish an app in Power BI](#)
- More questions? [Try the Power BI Community](#).

Install and use apps with dashboards and reports in Power BI

1/25/2018 • 2 min to read • [Edit Online](#)

In Power BI, *apps* bring related dashboards and reports together, all in one place. People in your organization can create and distribute apps with key business information. [External services](#) you may already use, such as Google Analytics and Microsoft Dynamics CRM, also offer Power BI apps.



Apps are easy to find and install in the Power BI service (<https://powerbi.com>) and on your mobile device. After you install an app, you don't have to remember the names of a lot of different dashboards because they're all together in the app, in your browser or on your mobile device.

With apps, whenever the app author releases updates, you automatically see the changes. The author also controls how often the data is scheduled to refresh, so you don't need to worry about keeping it up to date.

Planning to author an app? See [Create and publish apps in Power BI](#) for more information.

Get a new app

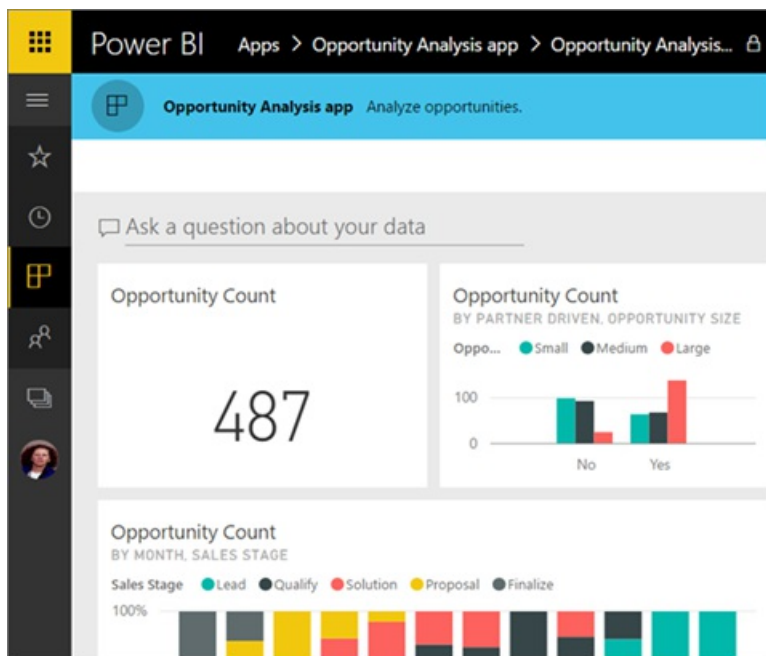
You can get apps in a few different ways. The app author can install the app automatically in your Power BI account, or send you a direct link to an app, or you can search for it in AppSource, where you see all the apps that you can access. In Power BI on your mobile device, you can only install it from a direct link, and not from AppSource. If the app author installs the app automatically, you'll see it in your list of apps.

Install an app from a direct link

The easiest way to install a new app yourself is to get a direct link from the app author. Power BI creates an installation link, which the author can send to you.

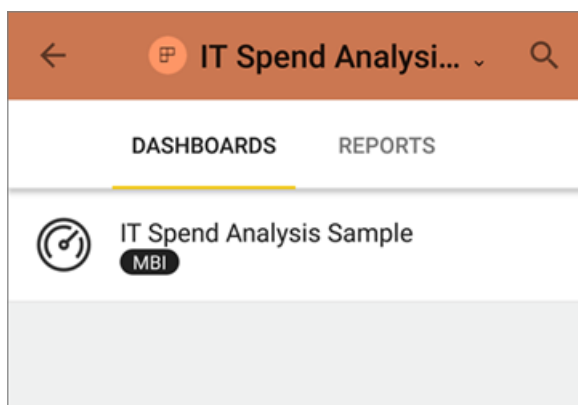
On your computer

When you click the link in email the Power BI service (<https://powerbi.com>) opens in a browser. You confirm you want to install the app and it opens to the app landing page.



On your iOS or Android mobile device

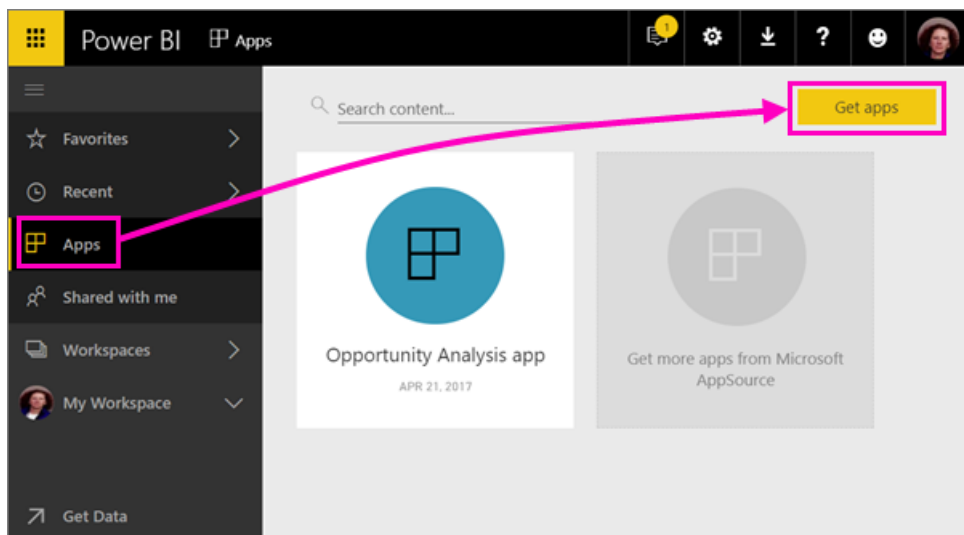
When you click the link in email on your mobile device, the app installs automatically and opens the app content list.



Get the app from Microsoft AppSource

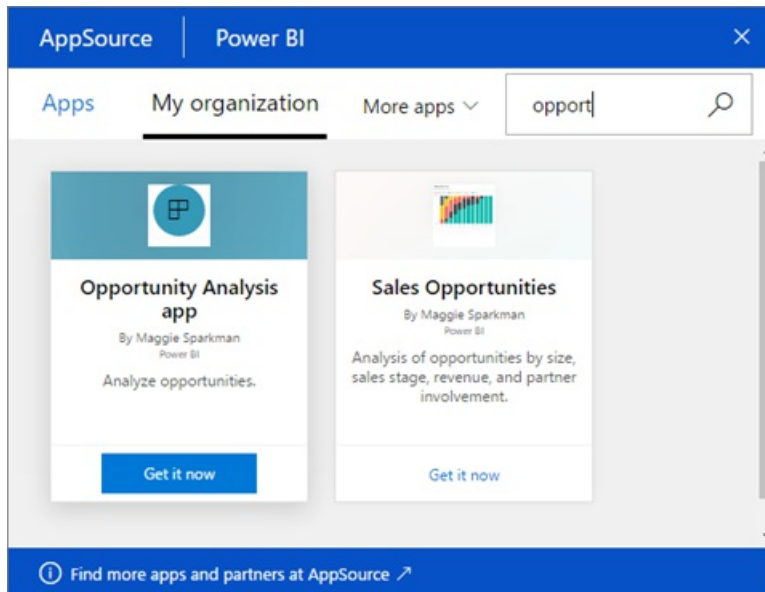
You can also find and install any apps that you have access to from Microsoft AppSource.

1. Select **Apps** > **Get apps**.



2. In AppSource under **My organization**, you can search to narrow the results and find the app you're

looking for.

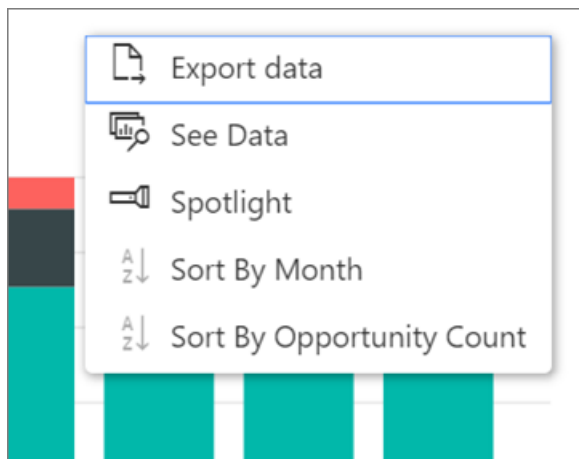


3. Select **Get it now** to add it to your Apps page.

Interact with the dashboards and reports in the app

Now you can explore the data in the dashboards and reports in the app. You have access to all the standard Power BI interactions such as filtering, highlighting, sorting, and drilling down. Read about [interacting with reports in Power BI](#).

You can't save changes you make, but you can always [export the data to Excel](#) from a table or other visual in a report.



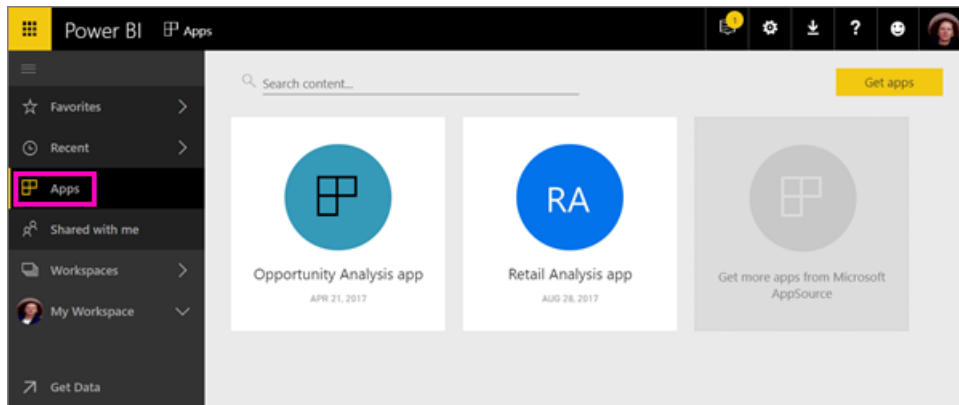
Next steps

- [Create and publish apps in Power BI](#)
- [Power BI apps for external services](#)
- Questions? [Try asking the Power BI Community](#)

Create and publish apps with dashboards and reports in Power BI

1/25/2018 • 10 min to read • [Edit Online](#)

In Power BI, you can create *apps* to bring related dashboards and reports together, all in one place, and then publish them to large groups of people in your organization. You can also connect to [Power BI apps for external services](#) such as Google Analytics and Microsoft Dynamics CRM.



Your business users often need multiple Power BI dashboards and reports to run their business. Apps bring the pieces together so they don't have to remember the names and locations of all these dashboards.

With Power BI apps, now in preview, you can create collections of dashboards and reports and publish these apps to your whole organization or to specific people or groups. For you as a report creator or admin, apps make it easier to manage permissions on collections of dashboards.

Business users get your apps in a few different ways. If the Power BI administrator gives you permission, you can install them automatically in your coworkers' Power BI accounts. Otherwise, they can install your apps from Microsoft AppSource, or you can send them a direct link. They can easily find and return to your content because it's all in one place. They get updates automatically and you can control how frequently the data refreshes. Read more about the [app experience for business users](#).

Licenses for apps

As an app creator you need a Power BI Pro license. For your app users, there are two options.

- Option 1: All business users need **Power BI Pro** licenses to view your app.
- Option 2: Free users in your organization can view app content if your app resides in a Power BI Premium capacity. Read [What is Power BI Premium?](#) for details.

Apps and organizational content packs

Apps are the evolution of organizational content packs. If you have organizational content packs already, they'll continue to work side by side with apps.

Now that you have an overview of apps, let's talk about *app workspaces*, where you create apps.

Video: Apps and app workspaces

App workspaces

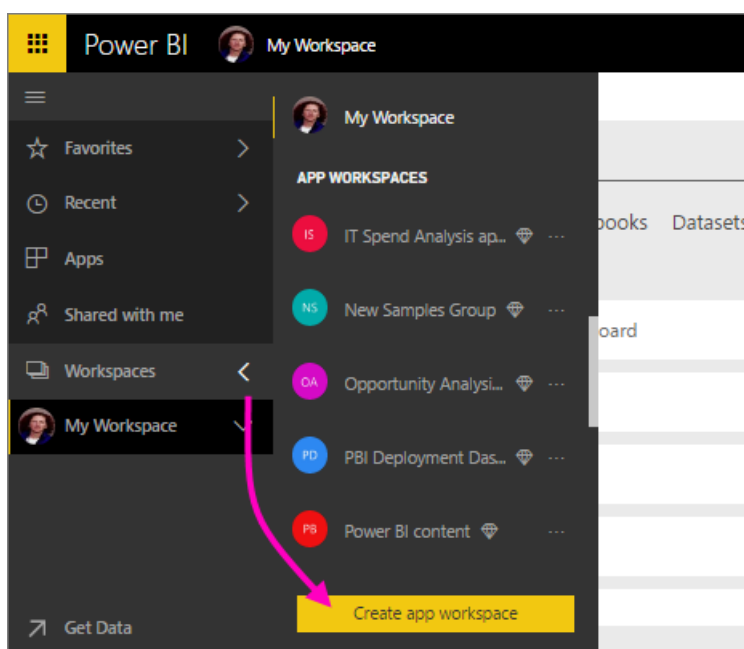
App workspaces are the places where you create apps, so you need to create an app workspace first, before you create the app. If you've ever worked in a group workspace in Power BI, then app workspaces will be familiar. They're the evolution of group workspaces – staging areas and containers for the content in the app.

You can add colleagues to these workspaces as members or admins. All app workspace members and admins need Power BI Pro licenses. In the workspace you can all collaborate on dashboards, reports, and other articles that you plan to publish to a wider audience, or even to your entire organization.

When the content is ready, you choose which dashboards and reports you want to publish, and then you publish the app. You can send a direct link to that wider audience, or they can find your app from the Apps tab by going to **Download and explore more apps from AppSource**. Those people can't modify the contents of the app, but they can interact with it either in the Power BI service, or one of the mobile apps – filtering, highlighting, and sorting the data themselves.

Create an app workspace

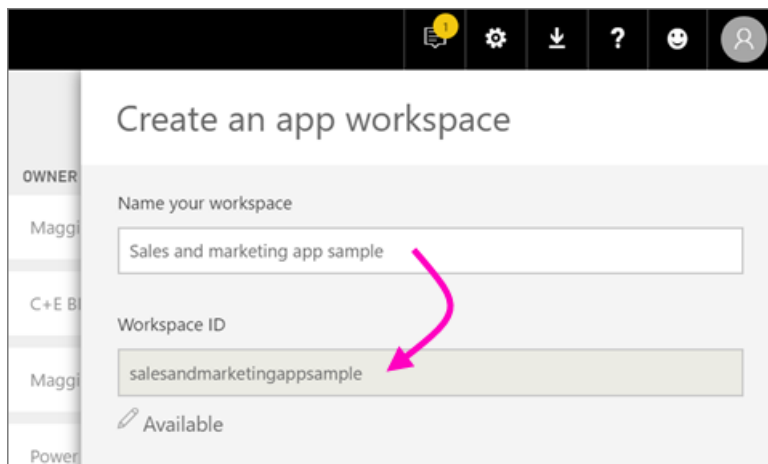
1. Start by creating the workspace. Select **Workspaces > Create app workspace**.



This will be the place to put content that you and your colleagues collaborate on.

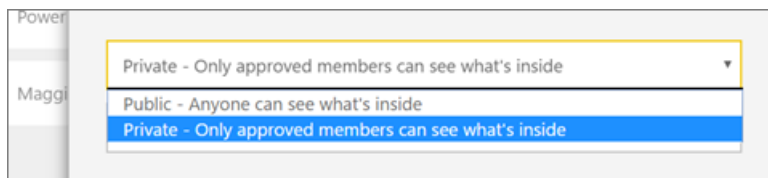
2. Give the workspace a name. If the corresponding **Workspace ID** isn't available, edit it to come up with a unique ID.

This will be the name of the app, too.



The screenshot shows the 'Create an app workspace' dialog. The 'Name your workspace' field is filled with 'Sales and marketing app sample'. Below it, the 'Workspace ID' field is filled with 'salesandmarketingappsampl'. A pink arrow points from the workspace name to the workspace ID. The 'Available' checkbox is checked.

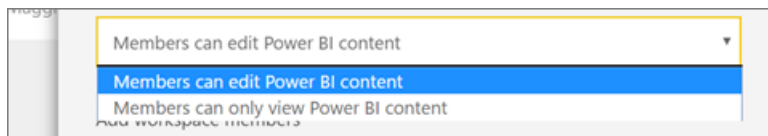
3. You have a few options to set. If you choose **Public**, anyone in your organization can see what's in the workspace. **Private**, on the other hand, means only members of the workspace can see its contents.



The screenshot shows a dropdown menu with three options: 'Private - Only approved members can see what's inside', 'Public - Anyone can see what's inside', and 'Private - Only approved members can see what's inside'. The second option is highlighted.

You can't change the Public/Private setting after you've created the group.

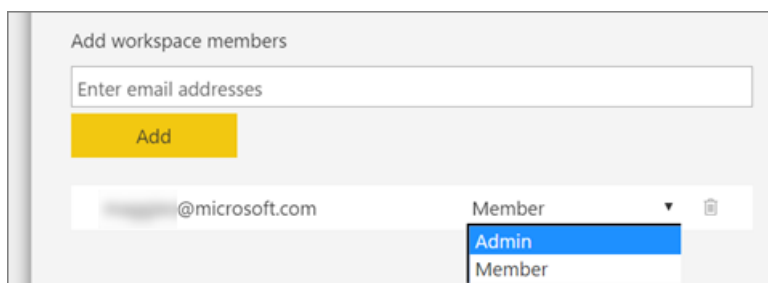
4. You can also choose if members can **edit** or have **view-only** access.



The screenshot shows a dropdown menu with three options: 'Members can edit Power BI content', 'Members can edit Power BI content', and 'Members can only view Power BI content'. The first two options are highlighted.

Only add people to the app workspace so they can edit the content. If they're only going to view the content, don't add them to the workspace. You can include them when you publish the app.

5. Add email addresses of people you want to have access to the workspace, and select **Add**. You can't add group aliases, just individuals.
6. Decide whether each person is a member or an admin.



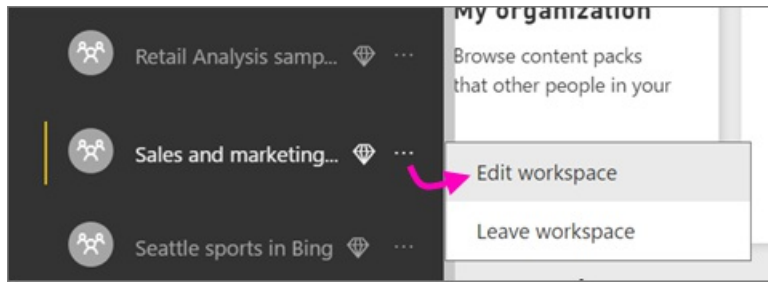
The screenshot shows the 'Add workspace members' dialog. The 'Enter email addresses' field is empty. The 'Add' button is highlighted. Below the field, there is a list of members with a dropdown menu showing 'Admin' and 'Member' options.

Admins can edit the workspace itself, including adding other members. Members can edit the content in the workspace, unless they have view-only access. Both admins and members can publish the app.

7. Select **Save**.

Power BI creates the workspace and opens it. It appears in the list of workspaces you're a member of. Because you're an admin, you can select the ellipsis (...) to go back and make changes to it, adding new members or

changing their permissions.



It's empty, so now you add content to it. Note that when you first create it, you may need to wait an hour or so for the workspace to propagate to Office 365.

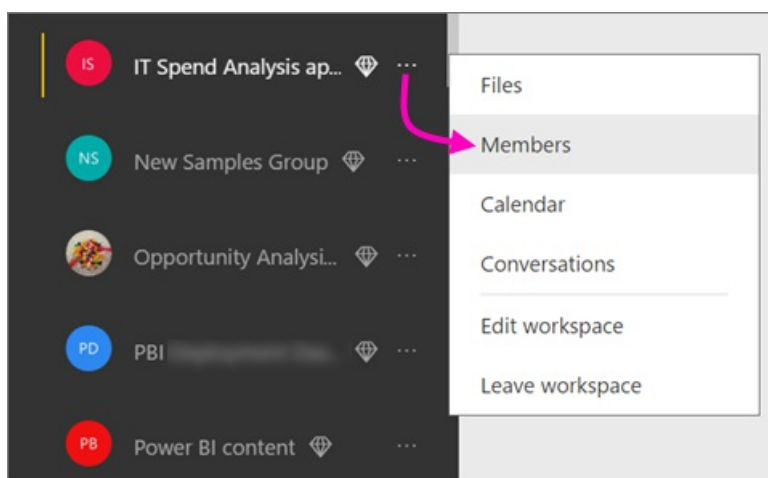
Adding content is just like adding content to your My Workspace, except the other people in the workspace can see and work on it, too. A big difference is that when you get done, you can publish the content as an app. While in the app workspace, you can upload or connect to files, or connect to third-party services, just as you would in your own My Workspace. For example:

- [Connect to services](#) such as Microsoft Dynamics CRM, Salesforce, or Google Analytics.
- [Get data from files](#) such as Excel, CSV, or Power BI Desktop (PBIX) files.

Add an image to your app (optional)

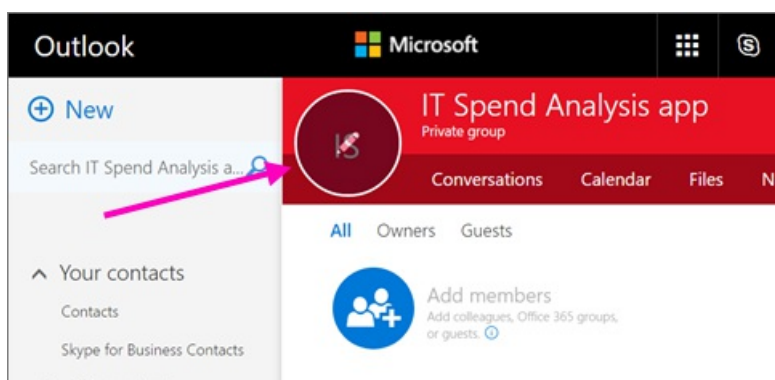
By default, Power BI creates a little colored circle for your app, with the app's initials. But maybe you want to customize it with an image. To add an image, you need an Exchange Online license.

1. Select **Workspaces**, select the ellipsis (...) next to the name of the workspace, then **Members**.

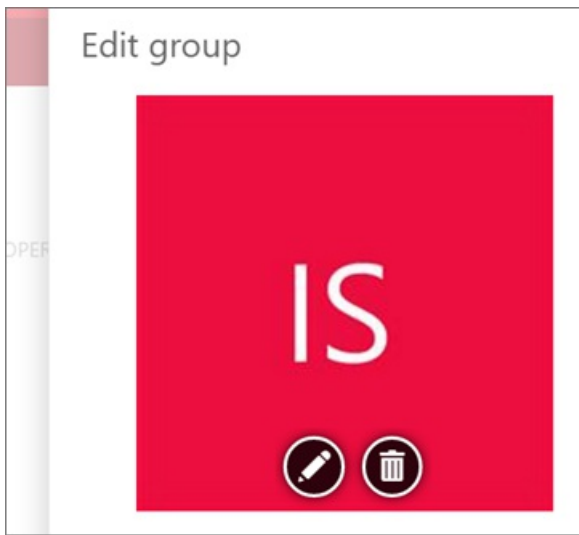


The Office 365 Outlook account for the workspace opens in a new browser window.

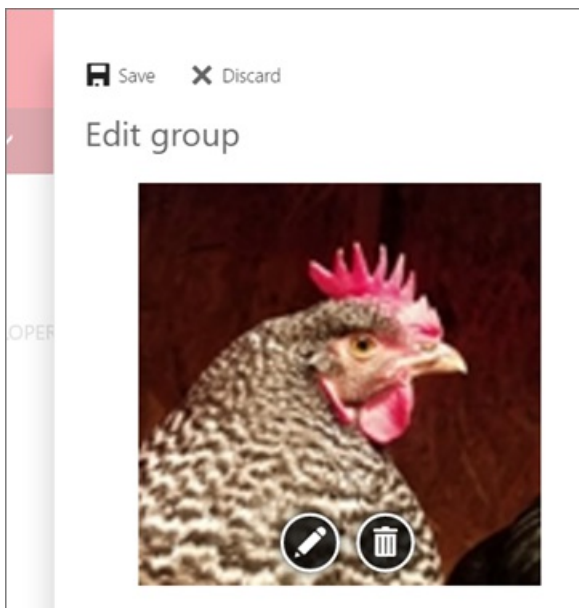
2. When you hover over the colored circle in the upper left, it turns into a pencil icon. Select it.



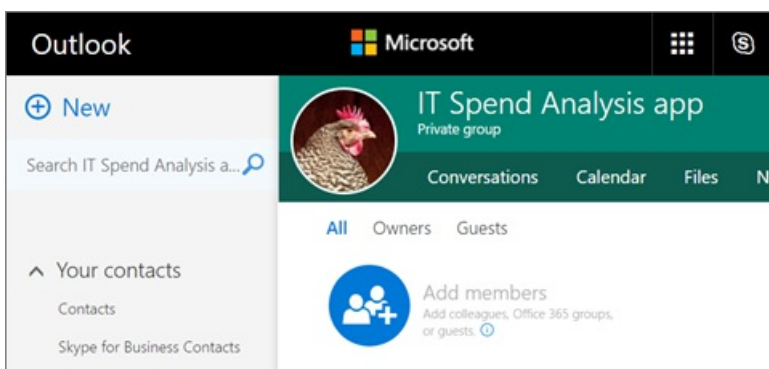
3. Select the pencil icon again, and find the image you want to use.



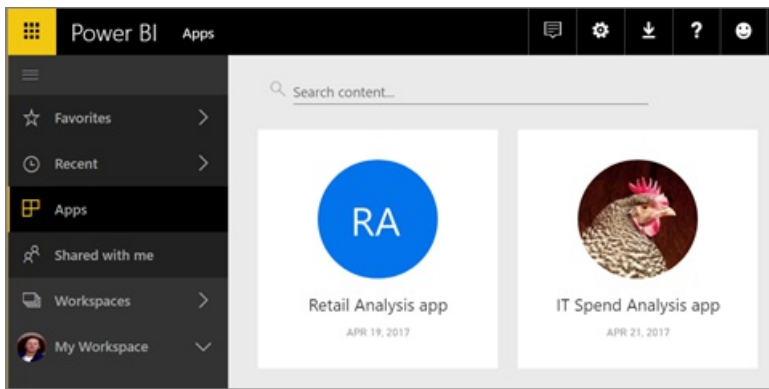
4. Select **Save**.



The image replaces the colored circle in the Office 365 Outlook window.



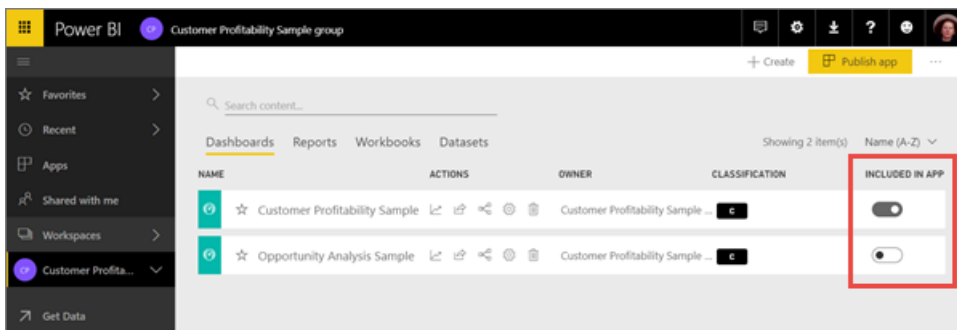
In a few minutes, it will appear in the app in Power BI, too.



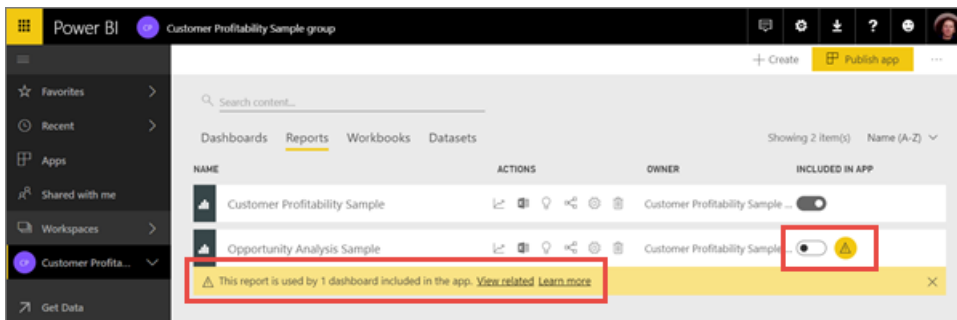
Publish your app

When the dashboards and reports in your app workspace are ready, you publish them as an app. Remember that you don't have to publish all the reports and dashboards in the workspace. You can just publish the ones that are ready.

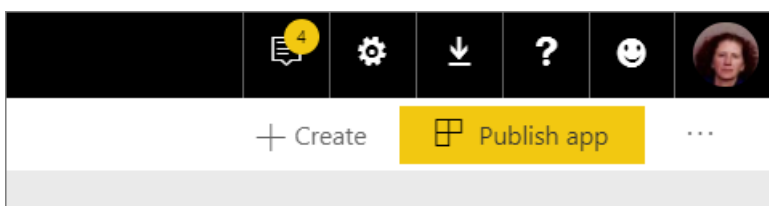
1. In the workspace list view, decide which dashboards and reports you want to include in the app.



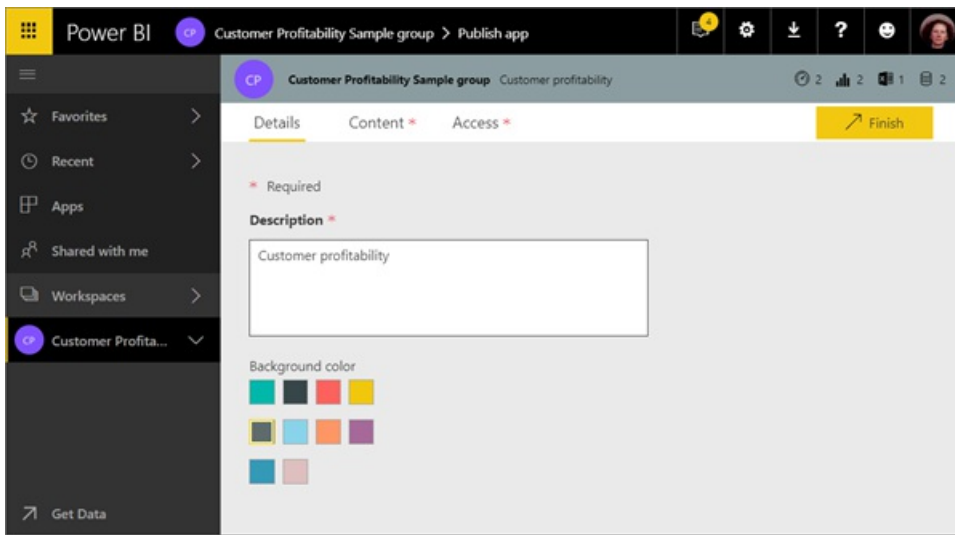
If you choose not to publish a report, you see a warning next to the report and its related dashboard. You can still publish the app, but the related dashboard will be missing the tiles from that report.



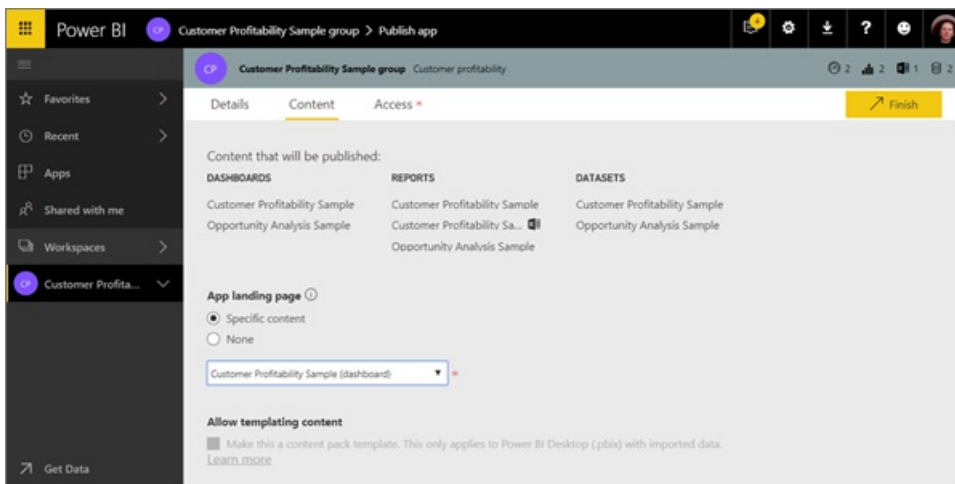
2. Select the **Publish app** button in the upper right to start the process of sharing all the content in that workspace.



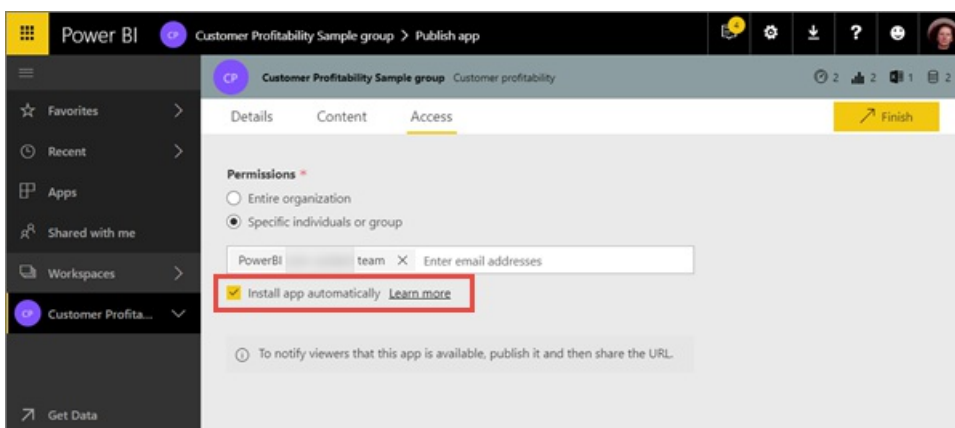
3. On **Details**, fill in the description to help people find the app. You can set a background color to personalize it.



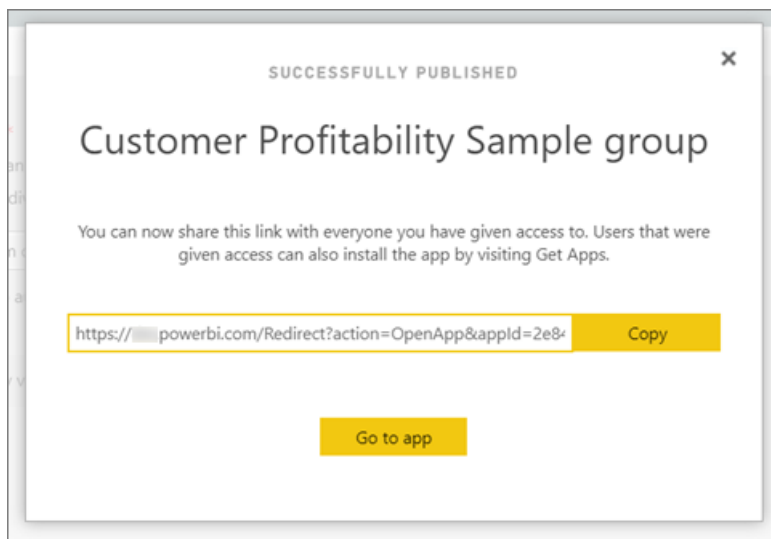
4. On **Content**, you see the content that's going to be published as part of the app – everything that you've selected in that workspace. You can also set the app landing page – the dashboard or report people will see first when they go to your app. You can choose **None**. Then they'll land on a list of all the content in the app.



5. On **Access**, decide who has access to the app: either everyone in your organization, specific people, Active Directory security groups. If you have permissions, you can decide to install the app automatically for the recipients.



6. When you select **Finish**, you see a message confirming it's ready to publish. In the success dialog box, you can copy the URL that's a direct link to this app and send it to the people you've shared it with.



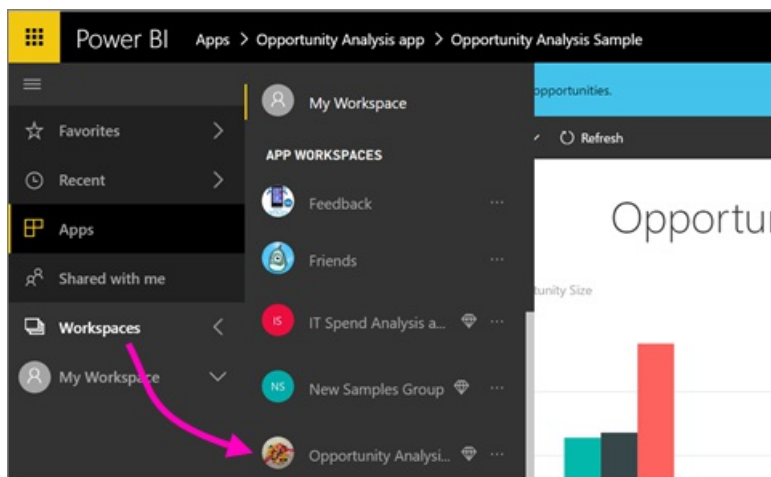
The business users that you've published the app to can find it in a few different ways. If you can install it automatically, it appears under Apps in their Power BI account. You can send them the direct link to the app, or they can search for it in Microsoft AppSource, where they see all the apps that they can access. No matter how they get it, after that whenever they go to Apps, they'll see this app in their list.

Read more about the [app experience for business users](#).

Change your published app

After you publish your app, you may want to change or update it. It's easy to update it if you're an admin or member of the app workspace.

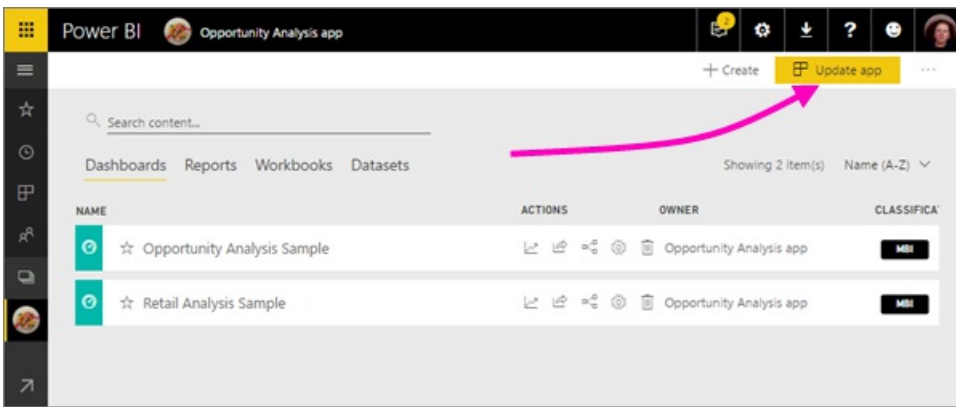
1. Open the app workspace that corresponds to the app.



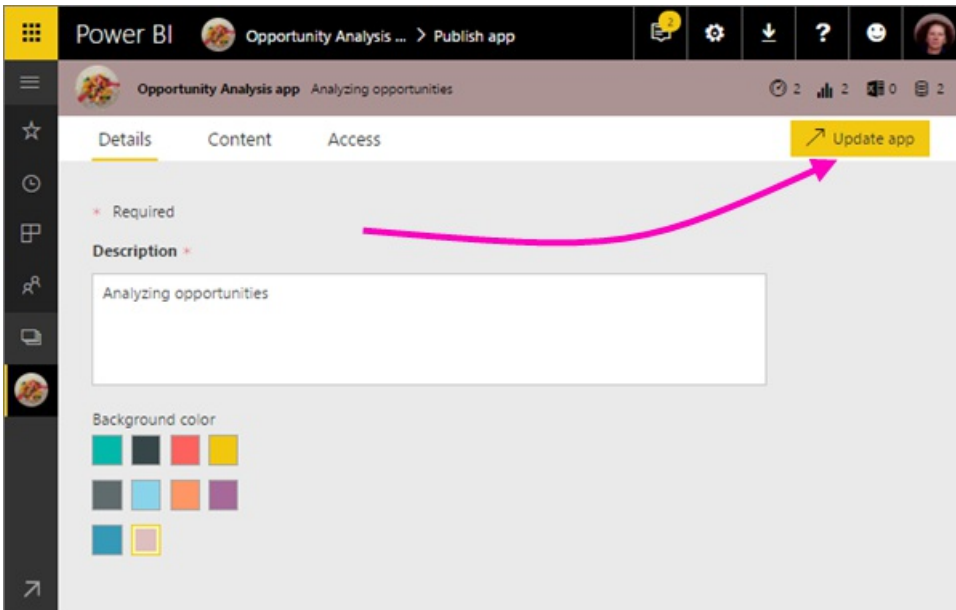
2. Open the dashboard or the report. You see that you can make any changes you want.

The app workspace is your staging area, so your changes aren't pushed live to the app until you publish again. This lets you make changes without affecting the published apps.

3. Go back to the app workspace list of contents and select **Update app**.



4. Update **Details**, **Content**, and **Access**, if you need to, then select **Update app**.

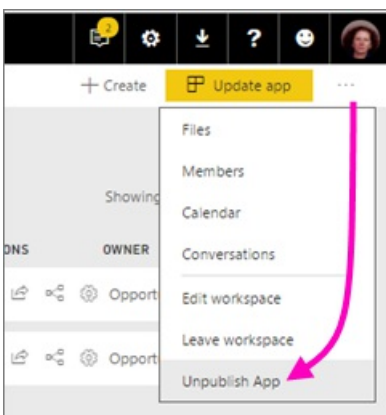


The people you've published the app to automatically see the updated version of the app.

Unpublish an app

Any member of an app workspace can unpublish the app.

- In an app workspace, select the ellipsis (...) in the upper-right corner > **Unpublish app**.



This action uninstalls the app for everyone you've published it to, and they no longer have access to it. It doesn't delete the app workspace or its contents.

Power BI apps FAQ

How are app workspaces different from group workspaces?

With this release, we have renamed all group workspaces to app workspaces. You can publish an app from any of these workspaces. The functionality remains on par with group workspaces for the most part. Over the next few months, we plan on the following enhancements to app workspaces:

- Creating app workspaces won't create corresponding entities in Office 365 like group workspaces do. So you can create any number of app workspaces without worrying about different Office 365 groups being created behind the scenes (you can still use an Office 365 group's OneDrive for Business to store your files).
- Today you can add only individuals to the members and admin lists. Soon you'll be able to add multiple AD security groups or modern groups to these lists to allow for easier management.

How are apps different from organizational content packs?

Apps are an evolution and simplification of content packs, with a few major differences.

- After business users install a content pack, it loses its grouped identity: it's just a list of dashboards and reports interspersed with other dashboards and reports. Apps, on the other hand, maintain their grouping and identity even after installation. This makes it easy for business users to continue to navigate to them over time.
- You can create multiple content packs from any workspace, but an app has a 1:1 relationship with its workspace. We believe this makes apps easier to understand and maintain over the long run. See the roadmap section of the Power BI blog for more on how we plan to improve this area.
- Over time we plan to deprecate organizational content packs, so we recommend you create apps from now on.

What about read-only members in groups?

In groups, you could add read-only members who could only view the content. The main problem with this approach was that you couldn't add security groups as members.

With apps, you can publish a read-only version of your app workspace to large audiences, including security groups. You can stage your changes to the dashboards and reports in the app without affecting end users. We recommend using apps this way in the future. Over the long run, we plan to deprecate read-only members of workspaces as well.

Next steps

- [Install and use apps in Power BI](#)
- [Power BI apps for external services](#)
- Questions? [Try asking the Power BI Community](#)

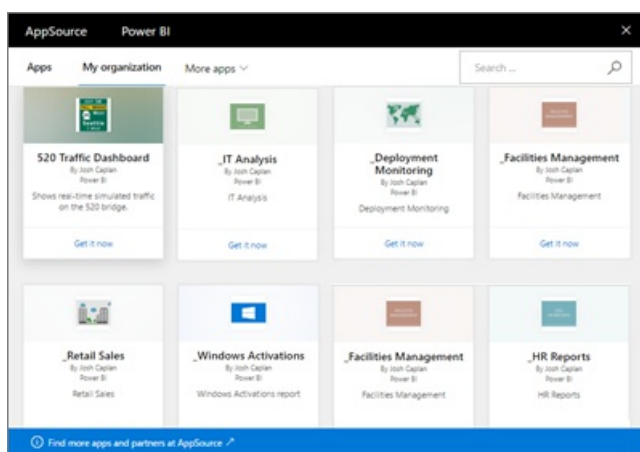
Intro to organizational content packs in Power BI

11/9/2017 • 4 min to read • [Edit Online](#)

NOTE

Have you heard about the new *apps* yet? Apps are the new way to distribute content to large audiences in Power BI. We recommend using apps instead of organizational content packs or read-only workspaces. Learn [more about apps](#).

Do you regularly distribute reports by email to your team? Try this instead: Package up your dashboards, reports, Excel workbooks, and datasets and publish them to your team as an *organizational content pack*. Content packs you create are easy for your team to find — they are all in AppSource. Because they're part of Power BI, they leverage all the features of Power BI, including interactive data exploration, new visuals, Q&A, integration with other data sources, data refresh, and more.



Creating content packs is different from sharing dashboards or collaborating on them in an app workspace. Read [How should I collaborate on and share dashboards and reports?](#) to decide on the best option for your situation.

In AppSource, you can browse or search for content packs published to the entire organization, to distribution or security groups, and to [Office 365 groups you belong to](#). If you aren't a member of a specific group, you won't see content packs shared with that group. All members of the group have the same read-only access to the content pack data, reports, workbooks, and dashboards (unless it's a SQL Server Analysis Services (SSAS) data source, in which case your privileges are inherited with the data source).

The dashboards, reports, and Excel workbooks are read-only, but you can copy and use the dashboards and reports as a starting point for creating your own personalized version of the content pack.

NOTE

Organizational content packs are only available when you and your colleagues have [Power BI Pro](#).

What is AppSource?

Publishing an organizational content pack adds it to AppSource. This centralized repository makes it easy for members to browse and discover dashboards, reports, and datasets published for them.

- To view AppSource, select **Get Data > My Organization > Get**.

Read more about [finding and opening organizational content packs](#).

The life cycle of an organizational content pack

Any Power BI Pro user can create, publish, and access organizational content packs. Only the content pack creator can modify the workbook and dataset, schedule refresh, and delete it.

The lifecycle looks something like this:

1. In Power BI Pro, Nate creates a content pack and publishes it to the Marketing distribution group. The refresh settings are inherited with the dataset and can only be changed by Nate.

NOTE

If Nate creates the content pack from within a [Power BI app workspace](#) he belongs to, then even if he leaves the workspace, others in the Power BI workspace can take over ownership.

2. Nate sends mail to the distribution group, telling them about the new content pack.
3. In Power BI Pro, Jane, a member of the Marketing distribution group, searches for and connects to this content pack in AppSource. She now has a read-only copy. She knows it's read-only because in the left Navigation Pane, there is a sharing icon to the left of the dashboard name and report name. And when she selects the dashboard, a lock icon lets Jane know she is looking at a content pack dashboard.
4. Say she decides to customize it. She now has her own copy of the dashboard and reports. Her work does not affect the source, the original content pack, or other distribution group members. She is now working on her own copy of the dashboard and report.
5. Nate makes updates to the dashboard and when it's ready, he publishes a new version of the content pack.
 - Julio, another distribution group member, didn't customize the original content pack. The new changes are automatically applied to his version of the content pack.
 - Jane did customize the content pack. She receives a notification that there's a new version. She can go to AppSource and get the updated content pack without losing her personalized version. She'll now have two versions: her personalized version and the updated content pack.
6. Say Nate changes the security settings. Julio and Jane no longer have access to the content. Or say they're removed from the Marketing distribution group.
 - Julio didn't customize the original content pack, so the content is automatically removed.
 - Jane did customize the content pack. The next time she opens the dashboard all tiles from the original content pack are gone, but tiles she pinned from other reports (that she still has permission to use) still appear. The associated reports and dataset are no longer available (and don't appear in her left navigation pane).
7. Or Nate deletes the content pack.
 - Julio didn't customize the original content pack, so the content is automatically removed.
 - Jane did customize the content pack. The next time she opens the dashboard all tiles from the original content pack are gone, but tiles she pinned from other reports still appear. The associated reports and dataset are no longer available (and don't appear in her left navigation pane).

Data security

All distribution group members have the same permissions to the data as the content pack creator. The one exception to this is SQL Server Analysis Services (SSAS) on-premises tabular datasets. Because the reports and dashboards are connecting live to the on-premises SSAS model, the credentials of each individual distribution group member are used to determine the data he or she can access.

Next steps

- [Create and publish an organizational content pack](#)
- [Create and distribute an app in Power BI](#)
- [Power BI - Basic Concepts](#)
- More questions? [Try the Power BI Community](#)

Create and publish a Power BI organizational content pack (tutorial)

11/15/2017 • 3 min to read • [Edit Online](#)

NOTE

Have you heard about the new *apps* yet? Apps are the new way to distribute content to large audiences in Power BI. We recommend using apps instead of organizational content packs or read-only workspaces. Learn [more about apps](#).

In this tutorial you create an organizational content pack, give access to a specific group, and publish it to your organization's content pack library on Power BI.


Creating content packs is different from sharing dashboards or collaborating on them in a group. Read [How should I collaborate on and share dashboards and reports?](#) to decide on the best option for your situation.

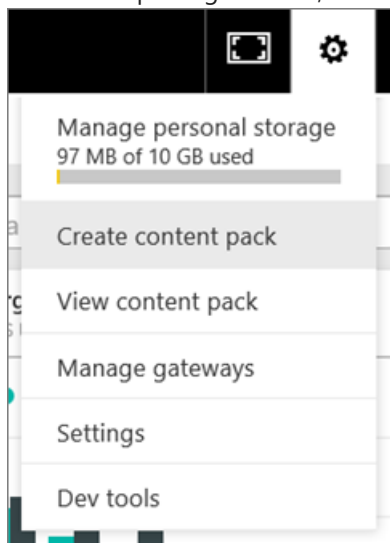
NOTE

Creating an organizational content pack requires a [Power BI Pro account](#) for you and your colleagues.

Imagine you're the Release Manager at Contoso and you're getting ready for a new product launch. You've created a dashboard with reports that you'd like to share with the other employees managing the launch. You want a way to package up the dashboard and reports as a solution for your colleagues to use.

Want to follow along? In the [Power BI service](#), go to **Get Data > Samples > Opportunity Analysis Sample > Connect** to get your own copy.

1. In the left navigation pane, select the **Opportunity Analysis Sample** dashboard.
2. From the top navigation bar, select the cog icon  > **Create content pack**.



3. In the **Create Content Pack** window, enter the following information.

Keep in mind that your organization's content pack library could end up with hundreds of content packs published for the organization or for groups. Take time to give your content pack a meaningful name, to add a good description, and to select the right audience. Use words that will make your content pack easy to find via search.

- a. Select **Specific Groups** and enter the full email addresses for individuals, [Office 365 groups](#), distribution groups, or security groups. For example:

salesmgrs@contoso.com; sales@contoso.com

For this tutorial, try using your own or your group's email address.

- b. Name the content pack **Sales Opportunities**.

TIP

Consider including the name of the dashboard in the name of the content pack. That way, your colleagues will find the dashboard more easily after they connect to your content pack.

- c. Recommended: Add a **description**. This helps coworkers more easily find the content packs that they need. Besides a description, add keywords your coworkers might use to search for this content pack. Include contact information in case your coworkers have a question or need help.
- d. **Upload an image or logo** to make it easier for group members to find the content pack — it's faster to scan for an image than it is to find text. We used an image of the Opportunity Count 100% column chart tile in the screen shot below.
- e. Select the **Opportunity Analysis Sample** dashboard to add it to the content pack. Power BI automatically adds the associated report and dataset. You can add others, if you want.

NOTE

Only the dashboards, reports, datasets, and workbooks that you can edit are listed. Thus, any that were shared with you aren't in the list.

Create Content Pack

Choose who will have access to this content pack:

Specific Groups My Entire Organization

salesmgrs@contoso.com; sales@contoso.com

Title

Sales Opportunities

Description

Analysis of opportunities by size, sales stage, revenue, and partner involvement.

Opportunity Count

Upload an image or company logo
Image size: 45 KB or less, 4:3 aspect ratio, JPG or PNG format
[Use Default](#)

Select items to publish

Dashboards	Reports	Datasets
<input type="checkbox"/> PQ_wikipedia_WrldCaps...	<input type="checkbox"/> Salesforce Sales Manager	<input type="checkbox"/> Salesforce Sales Manager
<input checked="" type="checkbox"/> Opportunity Analysis Sa...	<input type="checkbox"/> Supplier Quality Analysis	<input type="checkbox"/> Supplier Quality Analysi...
	<input type="checkbox"/> World Capitals	<input type="checkbox"/> PQ_wikipedia_WrldCaps
	<input checked="" type="checkbox"/> Opportunity Analysis Sa...	<input checked="" type="checkbox"/> Opportunity Analysis Sa...

The content pack will be available in your organization's content gallery. [Learn more](#)

Publish **Cancel**

- f. If you have Excel workbooks, you see them under Reports, with an Excel icon. You can add them to the content pack, too.



NOTE

If members of the group can't view the Excel workbook, you may need to [share the workbook with them in OneDrive for Business](#).

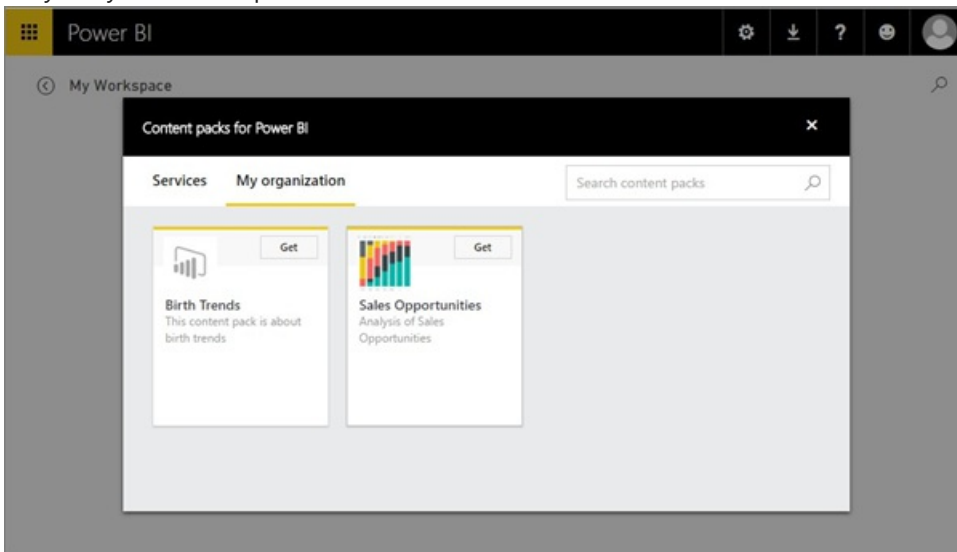
4. Select **Publish** to add the content pack to the group's organizational content pack library.

You see a success message when it publishes successfully.

5. When members of your group go to **Get Data > My Organization**, they tap in the search box and type "Sales Opportunities".



6. They see your content pack.



TIP

The URL displayed in your browser is a unique address for this content pack. Want to tell your coworkers about this new content pack? Paste the URL into an email.

7. They select **Connect**, and now they can [view and work with your content pack](#).

Next steps

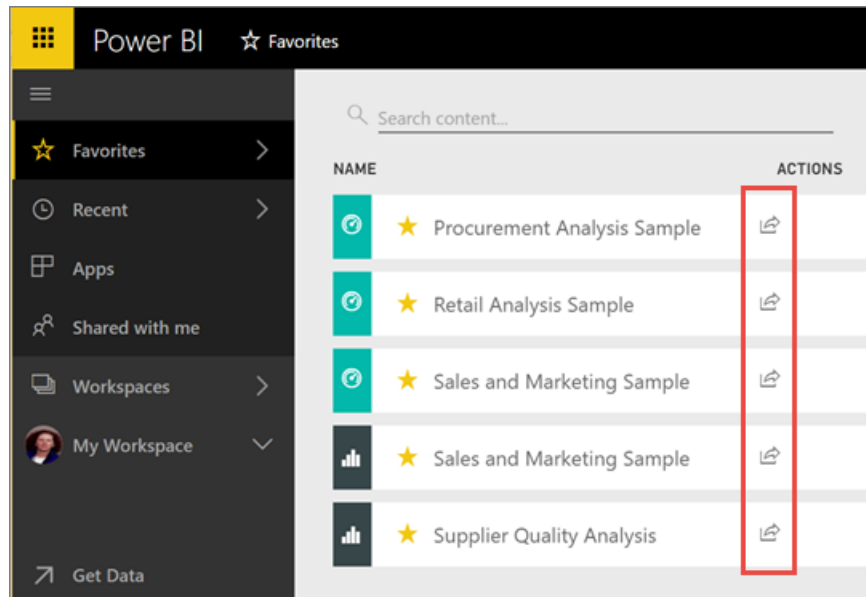
- [Intro to organizational content packs](#)
- [Manage, update, and delete organizational content packs](#)
- [Create a group in Power BI](#)
- [What is OneDrive for Business?](#)

- More questions? [Try the Power BI Community](#)

Share your Power BI dashboards and reports with coworkers and others

1/24/2018 • 7 min to read • [Edit Online](#)

Sharing is a good way to give a few people access to your dashboards and reports. Power BI also offers [several other ways to collaborate and distribute dashboards and reports](#).



With sharing, whether you share content inside or outside your organization, you need a [Power BI Pro license](#). Your recipients also need Power BI Pro licenses, or the content needs to be in a [Premium capacity](#).


You can share dashboards and reports from most places in the Power BI service: your Favorites, Recent, Shared with me (if the owner allows it), My Workspace, or other workspaces. When you share a dashboard or report, those you share it with can view it and interact with it, but can't edit it. They see the same data that you see in the dashboard or report, unless [row-level security \(RLS\)](#) is applied. The coworkers you share with can also share with their coworkers, if you allow them to. The people outside your organization can view and interact with the dashboard or report too, but can't share it.

You can also [share a dashboard from any of the Power BI mobile apps](#). You can share dashboards from the Power BI service and the Power BI mobile apps, but not from Power BI Desktop.

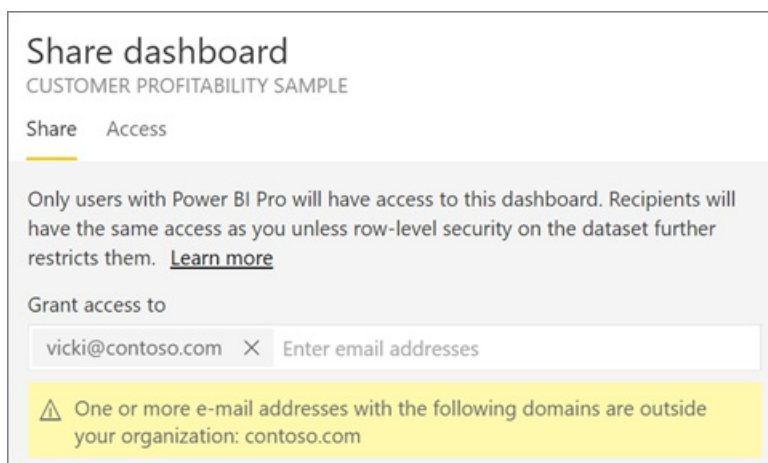
Video: Share a dashboard

Watch Amanda share her dashboard with colleagues inside and outside her company. Then follow the step-by-step instructions below the video to try it out yourself.

Share a dashboard or report

1. In a list of dashboards or reports, or in an open dashboard or report, select **Share** .
2. In the top box, enter the full email addresses for individuals, distribution groups, or security groups. You can't share with dynamic distribution lists.

You can share with people whose addresses are outside your organization, but you'll see a warning.



Share dashboard
CUSTOMER PROFITABILITY SAMPLE

Share Access

Only users with Power BI Pro will have access to this dashboard. Recipients will have the same access as you unless row-level security on the dataset further restricts them. [Learn more](#)

Grant access to

vicki@contoso.com X Enter email addresses

⚠ One or more e-mail addresses with the following domains are outside your organization: contoso.com

3. Add a message if you want. It's optional.
4. To let your coworkers share your content with others, check **Allow recipients to share your dashboard/report**.

Allowing others to share is called *resharing*. If you let them, they can reshare from the Power BI service and the mobile apps, or forward the email invitation to others in your organization. The invitation expires after one month. People outside your organization can't reshare. As the owner of the content, you can turn off resharing, or revoke resharing on an individual basis. See [Stop sharing or stop others from sharing](#), below.

5. Select **Share**.

Share dashboard

CUSTOMER PROFITABILITY SAMPLE

Share Access

Only users with Power BI Pro will have access to this dashboard. Recipients will have the same access as you unless row-level security on the dataset further restricts them. [Learn more](#)

Grant access to

vicki@contoso.com X PowerBI com content team X

Enter email addresses

⚠ One or more e-mail addresses with the following domains are outside your organization: contoso.com

Hi, check out profitability for last month|

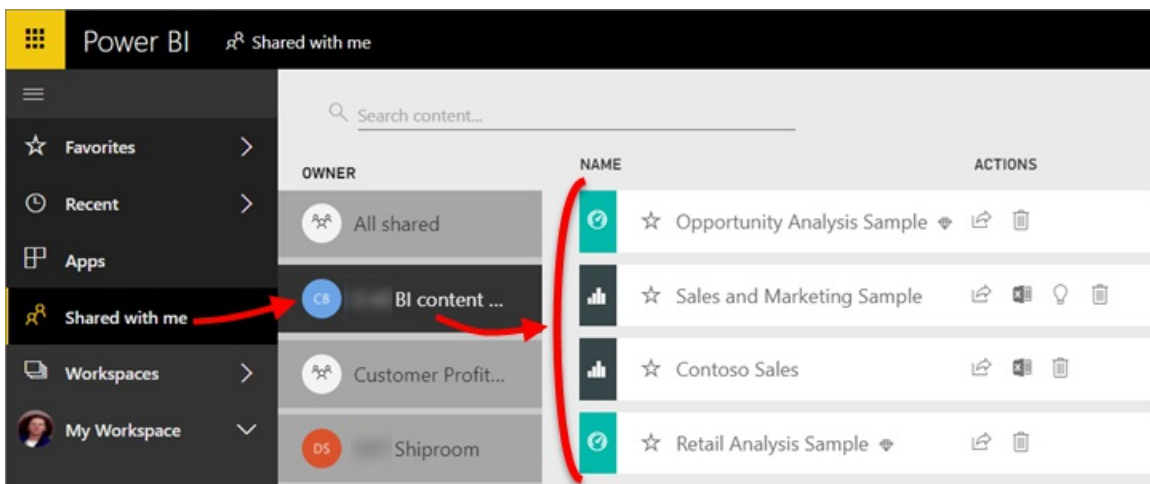
Allow recipients to share your dashboard

Send email notification to recipients

Share Cancel

Power BI sends an email invitation to the individuals but not to groups, with a link to the shared content. You see a **Success** notification.


When recipients in your organization click the link, Power BI adds the dashboard or report to their **Shared with me** list page. They can select your name to see all the content you've shared with them.

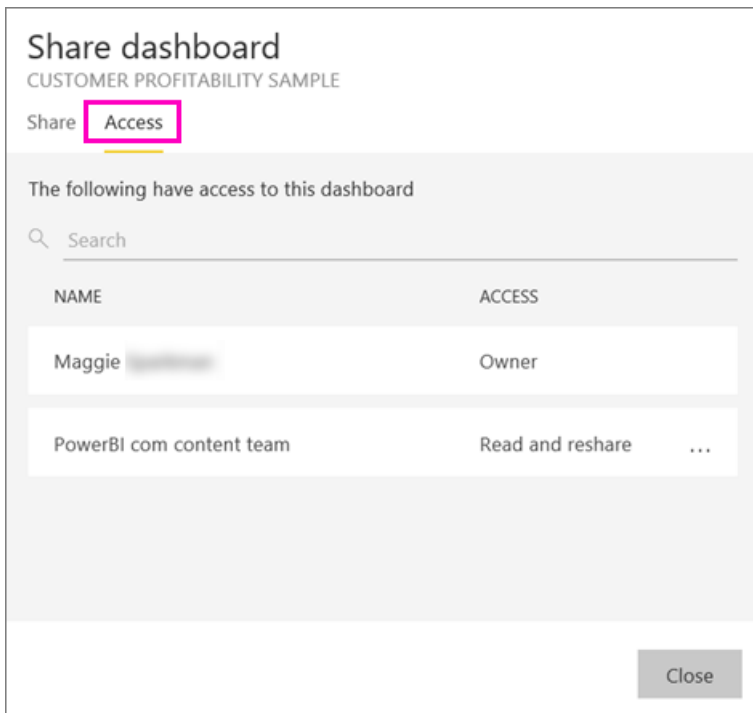


When recipients outside your organization click the link, they see the dashboard or report, but not in the usual Power BI portal. See [Share with people outside your organization](#) below for details.

Who has access to a dashboard or report you shared?

Sometimes you need to see the people you've shared with, and see who they've shared it with.

1. In the list of dashboards and report, or in the dashboard or report itself, select **Share** .
2. In the **Share dashboard/report** dialog box, select **Access**.



People outside your organization are listed as **Guest**.


Stop sharing or stop others from sharing

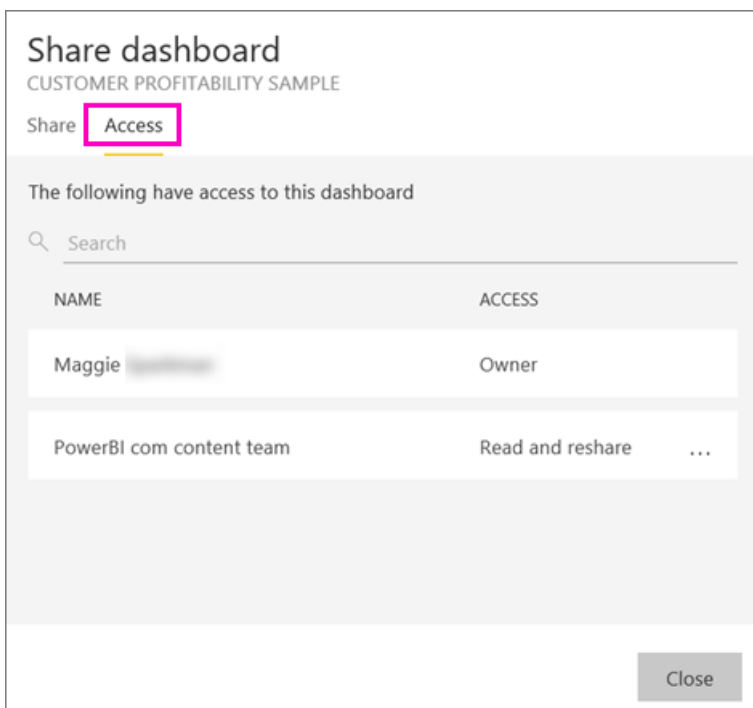
Only the dashboard or report owner can turn resharing on and off.

If you haven't sent the sharing invitation yet

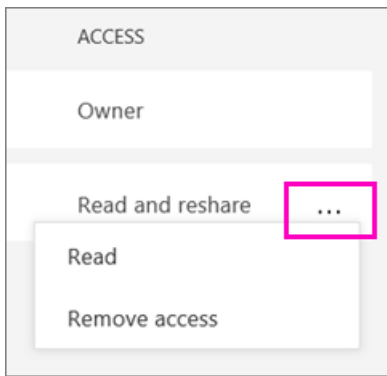
- Clear the **Allow recipients to share your dashboard/report** check box at the bottom of the invitation before you send it.


If you've already shared the dashboard or report

1. In the list of dashboards and reports, or in the dashboard or report itself, select **Share** .
2. In the **Share dashboard/report** dialog box, select **Access**.



3. Select the ellipsis (...) next to **Read and reshare** and select:



- **Read** to keep that person from sharing with anyone else.
 - **Remove access** to keep that person from seeing the shared content at all.
4. In the **Remove access** dialog box, decide if you want to remove access to related content, too, such as reports and datasets. If you remove items with a warning icon , it's best to remove related content because it won't display properly.

Share a dashboard or report with people outside your organization

When you share with people outside your organization, they get an email with a link to the shared dashboard or report, and they have to sign in to Power BI to see it. If they don't have a Power BI Pro license, they can sign up for a license after clicking the link.

After they sign in, they see the shared dashboard or report in its own browser window without the left navigation pane, not in their usual Power BI portal. They have to bookmark the link to access this dashboard or report in the future.

They can't edit any content in this dashboard or report. They can interact with the charts and change filters or slicers in the report, but can't save their changes.

Only your direct recipients can see the shared dashboard or report. For example, if you sent the email to Vicki@contoso.com, only Vicki can see the dashboard. No-one else can see that dashboard, even if they have the link, and Vicki has to use the same email address to access that dashboard. If she signs up with any other email address, she won't have access to the dashboard either.

People outside your organization can't see any data at all if role- or row-level security is implemented on on-premises Analysis Services tabular models.

If you send a link from a Power BI mobile app to people outside your organization, when they click the link the dashboard opens in a browser, not in the Power BI mobile app.

Limitations and considerations

Things to keep in mind about sharing dashboards and reports:

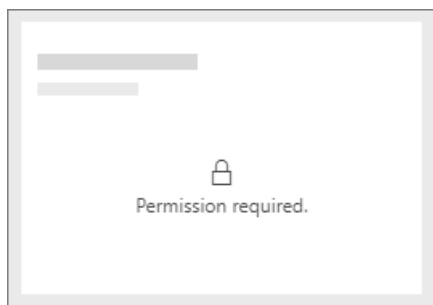
- In general, you and your colleagues see the same data in the dashboard or report. Thus, if you have permissions to see more data than they do, they'll be able to see all your data in the dashboard or report. However, if [row-level security \(RLS\)](#) is applied to the dataset underlying a dashboard or report, then the credentials of every person are used to determine which data they can access.
- Everyone you share your dashboard with can see it and interact with the related reports in [Reading View](#). They can't create reports or save changes to existing reports.
- No one can see or download the dataset.
- Everyone can manually [refresh the data](#).
- If you use Office 365 for email, you can share with members of a distribution group by entering the email address associated with the distribution group.

- Coworkers who have the same email domain as you, and coworkers whose domain is different but registered within the same tenant, can share the dashboard with others. For example, say the domains contoso.com and contoso2.com are registered in the same tenant. If your email address is konrads@contoso.com, then both ravali@contoso.com and gustav@contoso2.com can share, as long as you gave them permission to share.
- If your coworkers already have access to a specific dashboard or report, you can send a direct link just by copying the URL when you're on the dashboard or report. For example:
`https://powerbi.com/dashboards/g12466b5-a452-4e55-8634-xxxxxxxxxxxx`
- Likewise if your coworkers already have access to a specific dashboard, you can [send a direct link to the underlying report](#).

Troubleshoot sharing

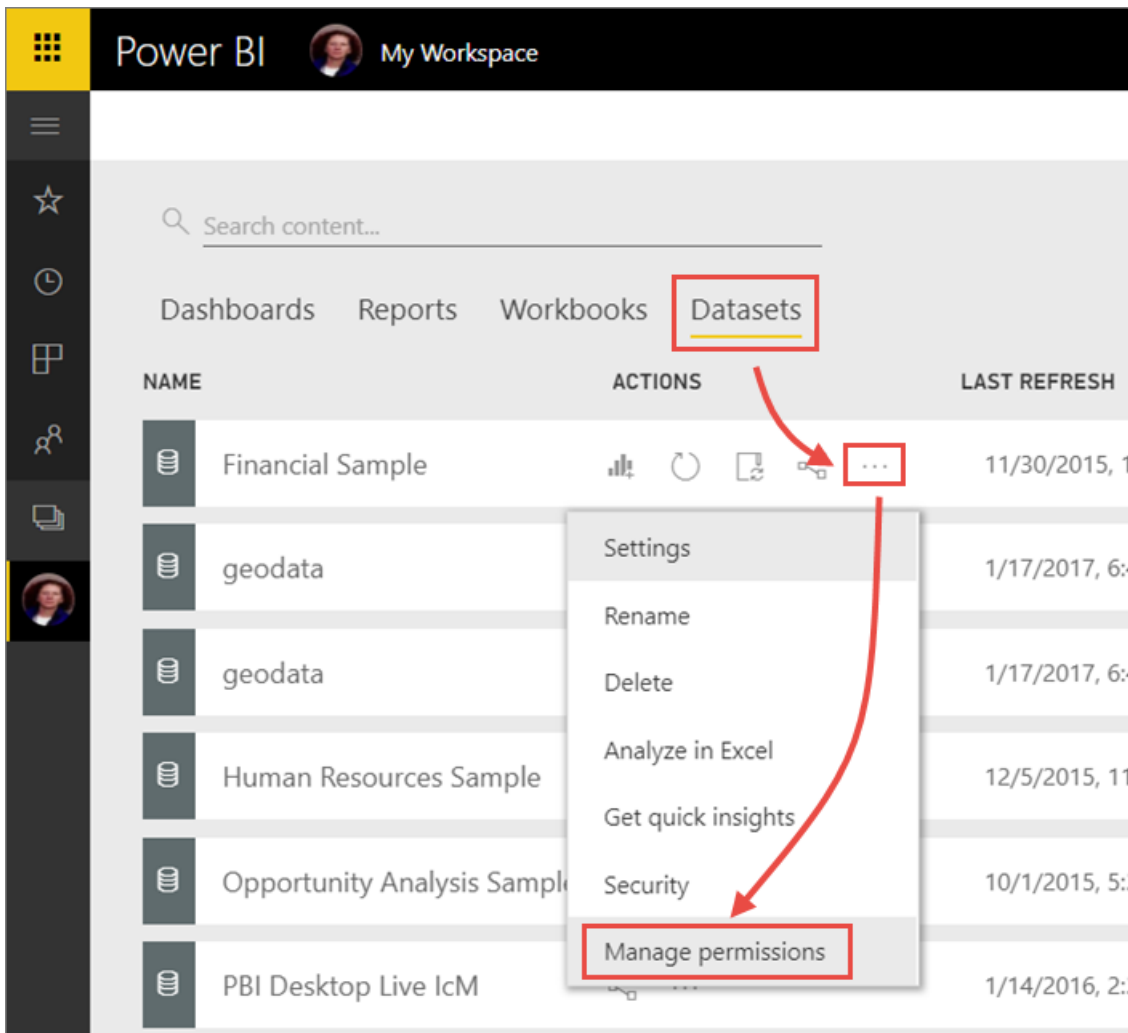
My dashboard recipients see a lock icon in a tile or a "Permission required" message

The people you share with may see a locked tile in a dashboard, or a "Permission required" message when they try to view a report.

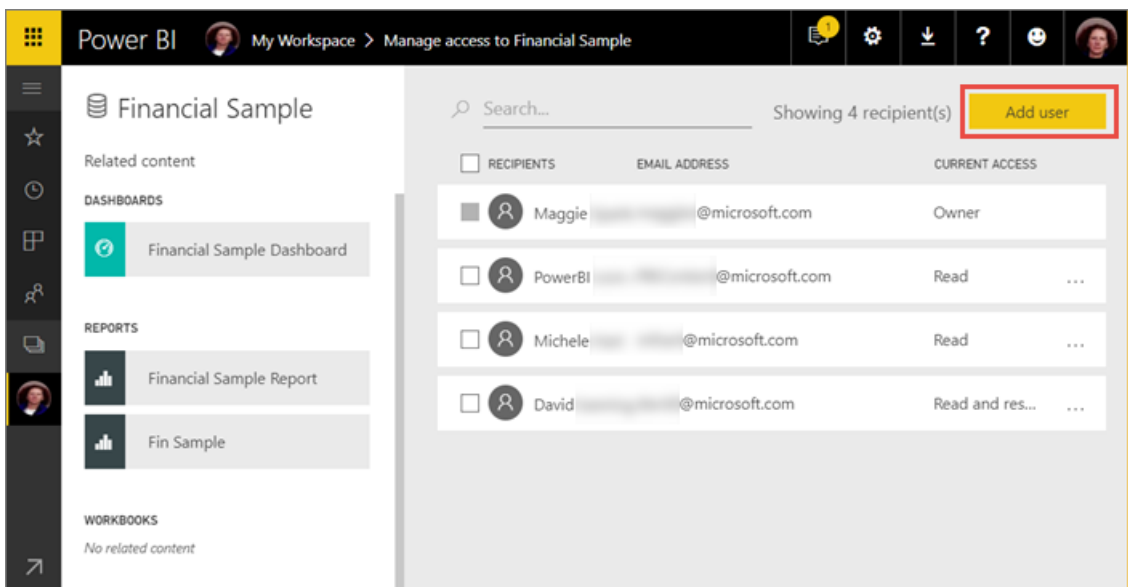


If so, you need to grant them permission to the underlying dataset. Here's how.

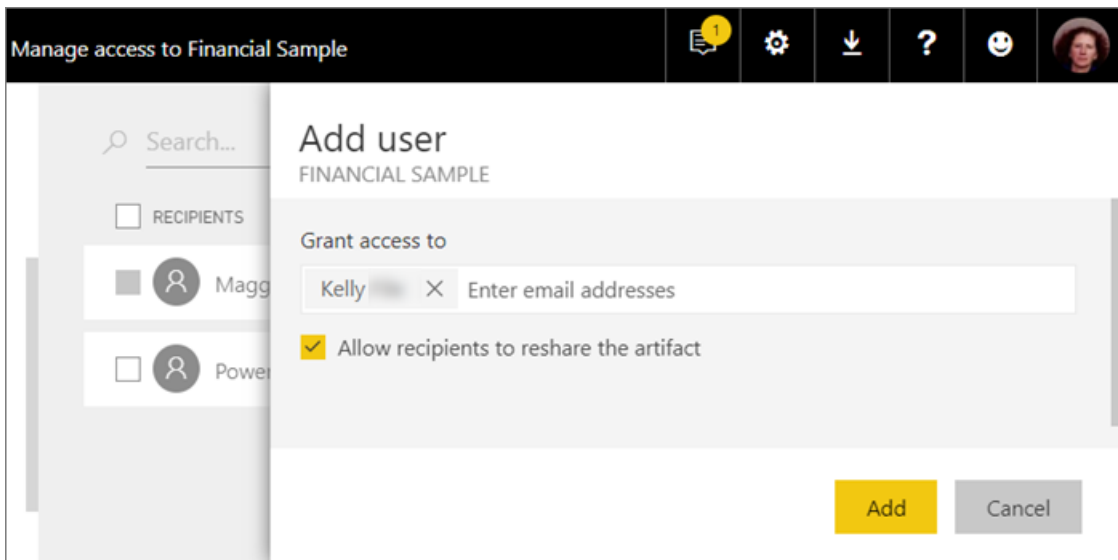
1. Go to the **Datasets** tab in your content list.
2. Select the ellipsis (...) next to the dataset > **Manage permissions**.



3. Select **Add user**.



4. Enter the full email addresses for individuals, distribution groups, or security groups. You can't share with dynamic distribution lists.



5. Select **Add**.

I can't share a dashboard or report

To share a dashboard or report, you need permission to reshare the underlying content -- any related reports and datasets. If you see a message saying you can't share, ask the report author to give you re-share permission for those reports and datasets.

Next steps

- Have feedback? Go to the [Power BI Community site](#) with your suggestions.
- [How should I collaborate on and share dashboards and reports?](#)
- [Share a filtered Power BI report](#)
- Questions? [Try the Power BI Community](#).

Share a filtered Power BI report with your coworkers

1/24/2018 • 1 min to read • [Edit Online](#)

Sharing is a good way to give a few people access to your dashboards and reports. Power BI also offers [several other ways to collaborate and distribute your reports](#).

With sharing, you and your recipients need a [Power BI Pro license](#), or the content needs to be in a [Premium capacity](#). Suggestions? The Power BI team is always interested in your feedback, so go to the [Power BI Community site](#).

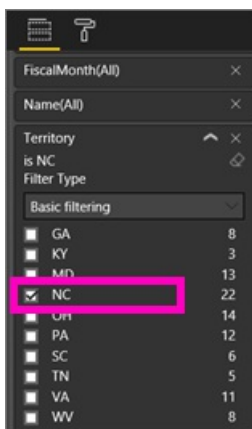
You can share a report with coworkers in the same email domain as you, from most places in the Power BI service: your Favorites, Recent, Shared with me (if the owner allows it), My Workspace, or other workspaces. When you share a report, those you share it with can view it and interact with it, but can't edit it. They see the same data that you see in the report, unless [row-level security \(RLS\)](#) is applied.

Filter and share a report

What if you want to share a filtered version of a report? Maybe a report that only shows data for a specific city or salesperson or year. You do this by creating a custom URL.

1. Open the report in [Editing view](#), apply the filter, and save the report.

In this example we're filtering the [Retail Analysis sample](#) to show only values where **Territory** equals **NC**.



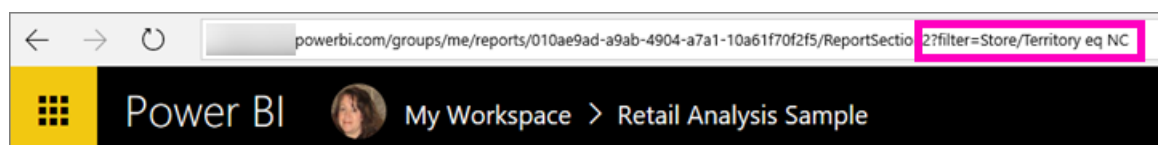
2. Add the following to the end of the report page URL:

`?filter=tablename/fieldname eq value`

The field must be of type **string** and neither *tablename* or *fieldname* can contain spaces.

In our example, the name of the table is **Store**, the name of the field is **Territory**, and the value we want to filter on is **NC**:

`?filter=Store/Territory eq 'NC'`



Your browser adds special characters to represent slashes, spaces, and apostrophes, so you end up with:

`app.powerbi.com/groups/me/reports/010ae9ad-a9ab-4904-a7a1-xxxxxxxxxx/ReportSection2?`

filter=Store%252FTerritory%20eq%20%27NC%27

3. [Share the report](#), but clear the **Send email notificaton to recipients** check box.

Share report
OPPORTUNITY ANALYSIS SAMPLE

Share Access

Only users with Power BI Pro will have access to this report. Recipients will have the same access as you unless row-level security on the dataset further restricts them. [Learn more](#)

Grant access to

David X Enter email addresses

Include an optional message...

Allow recipients to share your report

Send email notification to recipients

Report Link ⓘ

https://.../groups/me/reports/0024af09-3240-4...

Share Cancel

4. Send the link with the filter that you created earlier.

Next steps

- Have feedback? Go to the [Power BI Community site](#) with your suggestions.
- [How should I collaborate on and share dashboards and reports?](#)
- [Share a dashboard](#)
- More questions? [Try the Power BI Community](#).

Publish to web from Power BI

1/30/2018 • 9 min to read • [Edit Online](#)

With Power BI **Publish to web**, you can easily embed interactive Power BI visualizations online, such as in blog posts, websites, through emails or social media, on any device.

You can also easily edit, update, refresh or un-share your published visuals.

WARNING

When you use **Publish to web**, the report or visual you publish can be viewed by anyone on the Internet. There is no authentication used when viewing these reports. Only use Publish to web with reports and data that the anyone on the Internet (unauthenticated members of the public) should be able to see. This includes detail level data that is aggregated in your reports. Before publishing this report, ensure you have the right to share the data and visualizations publicly. Do not publish confidential or proprietary information. If in doubt, check your organization's policies before publishing.

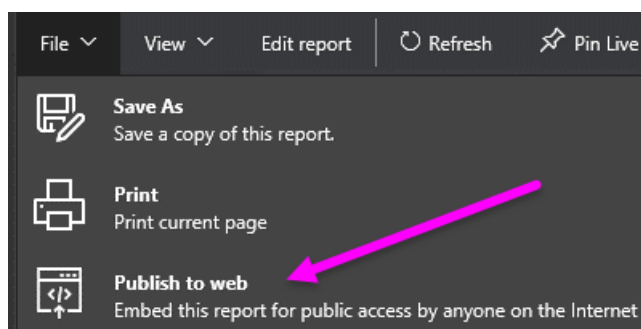
How to use Publish to Web

Publish to web is available on reports in your personal or group workspaces that you can edit. You cannot use Publish to web with reports that were shared with you, or reports that rely on row level security to secure the data. See the **Limitations** section below for a complete list of cases where Publish to web is not supported. Please review the **Warning** earlier in this article before using Publish to web.

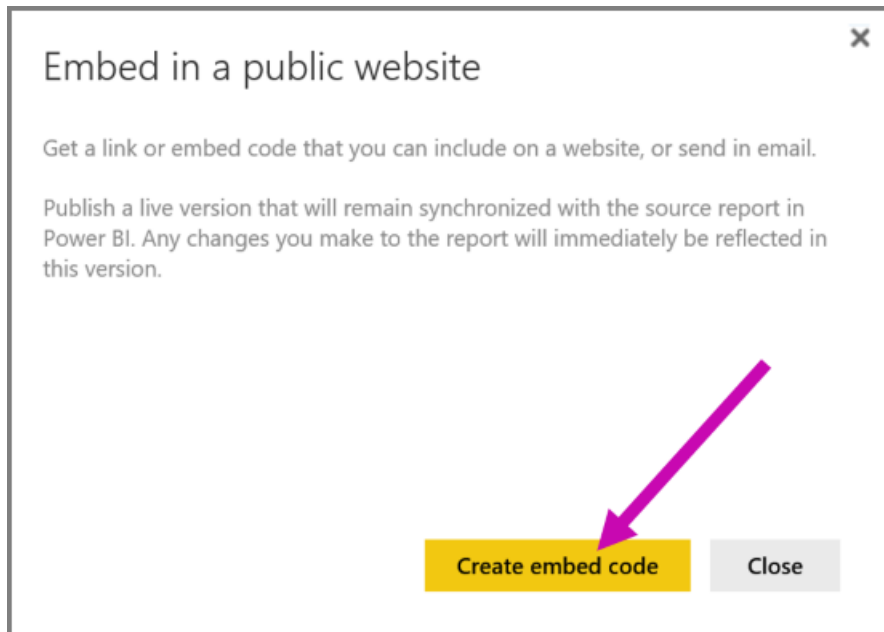
You can watch how this feature works in the following *short video*. Then, follow the steps below to try it yourself.

The following steps describe how to use **Publish to web**.

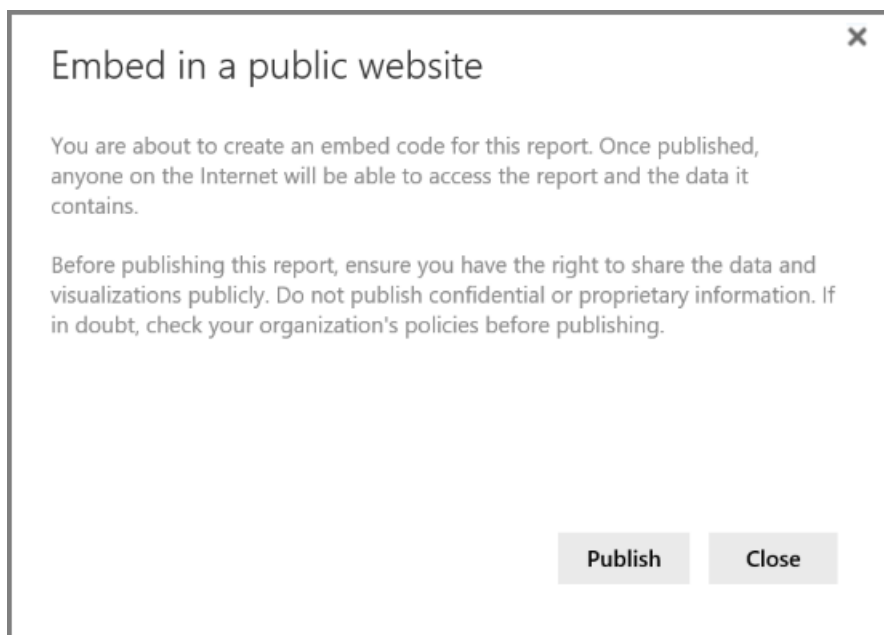
1. On a report in your workspace that you can edit, select **File > Publish to web**.



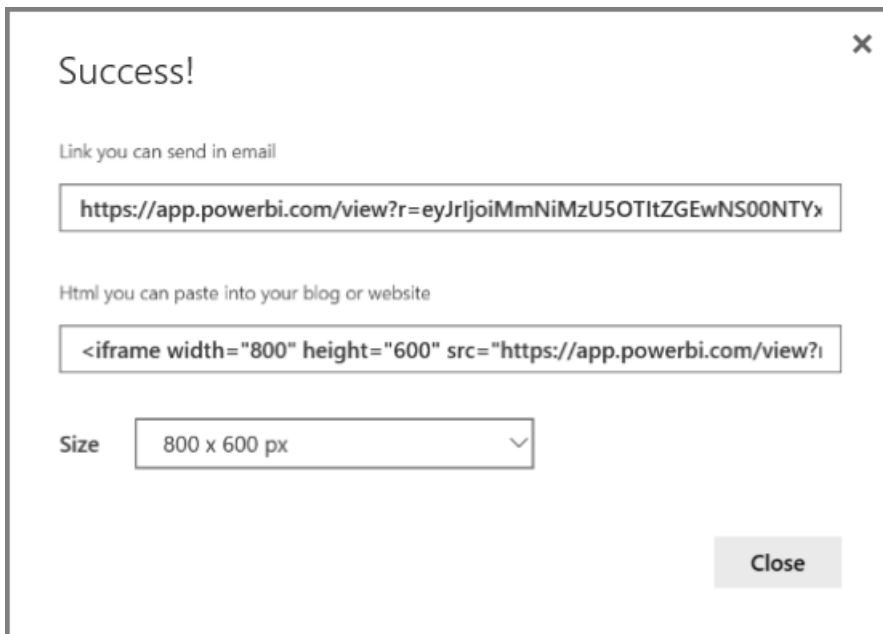
2. Review the content on the dialog, and select **Create embed code** as shown in the following dialog.



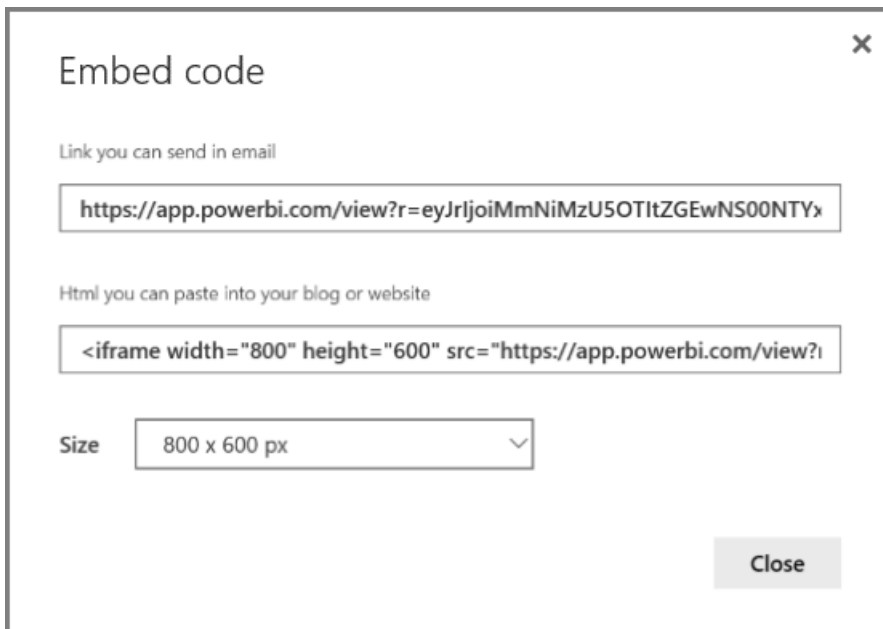
3. Review the warning, shown in the following dialog, and confirm that the data is okay to embed in a public website. If so, select **Publish**.



4. A dialog appears that provides a link that can be sent in email, embedded in code (such as an iFrame), or that you can paste directly into your web page or blog.




- If you've previously created an embed code for the report, the embed code quickly appears. You can only create one embed code for each report.





Tips and Tricks for View modes

When you embed content within a blog post, you typically need to fit it within a specific size of the screen. You can also adjust the height and the width in the iFrame tag as needed, but you may also need to ensure your report fits within the given area of the iFrame, so you also need to set an appropriate View Mode when editing the report.

The following table provides guidance about the View Mode, and how it will appear when embedded.

VIEW MODE	HOW IT LOOKS WHEN EMBEDDED
 <p>Fit to page Scale content to best fit the page</p>	<p>Fit to page will respect the page height and width of your report. If you set your page to 'Dynamic' ratios like 16:9 or 4:3 your content will scale to fit within the iFrame you provided. When embedded in an iFrame, using Fit to page can result in letterboxing, where a gray background is shown in areas of the iFrame after the content as scaled to fit within the iFrame. To minimize letterboxing, set your iFrame height/width appropriately.</p>

VIEW MODE	HOW IT LOOKS WHEN EMBEDDED
-----------	----------------------------

 <p>Actual size Display content at full size</p>	<p>Actual size will ensure the report preserves its size as set on the report page. This can result in scrollbars being present in your iFrame. Set the iFrame height and width to avoid the scrollbars.</p>
 <p>Fit to width Scale content to the width of the page</p>	<p>Fit to width ensures the content fits within the horizontal area for your iFrame. A border will still be shown, but the content will scale to use all the horizontal space available.</p>

Tips and tricks for iFrame height and width

The embed code you receive after you Publish to web will look like the following:

Html you can paste into your blog or website

```
<iframe width="800" height="600" src="https://app.powerbi.com/view?i
```

You can edit the width and height manually to ensure it is precisely how you want it to fit onto the page into which you're embedding it.

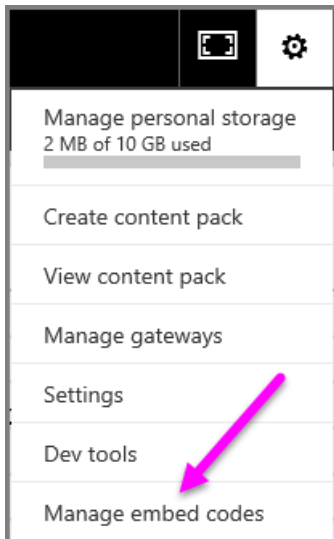
To achieve a more perfect fit, you can try adding 56 pixels to the height dimension of the iFrame. This accommodates the current size of the bottom bar. If your report page uses the Dynamic size, the table below provides some sizes you can use to achieve a fit without letterboxing.

RATIO	SIZE	DIMENSION (WIDTH X HEIGHT)
16:9	Small	640 x 416 px
16:9	Medium	800 x 506 px
16:9	Large	960 x 596 px
4:3	Small	640 x 536 px
4:3	Medium	800 x 656 px
4:3	Large	960 x 776 px

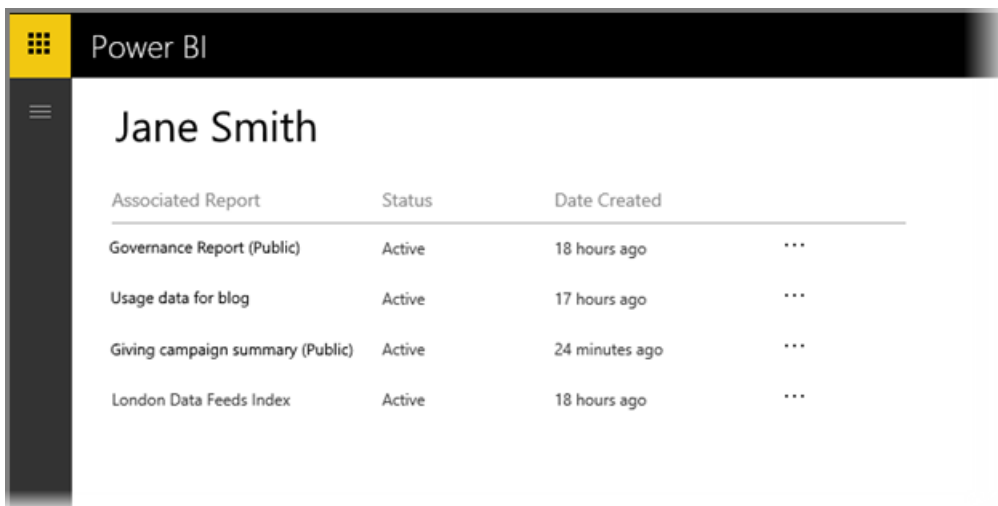
Managing embed codes

Once you create a **Publish to web** embed code, you can manage the codes you create from the **Settings** menu of the Power BI service. Managing embed codes includes the ability to remove the destination visual or report for a code (rendering the embed code unusable), or getting the embed code again.

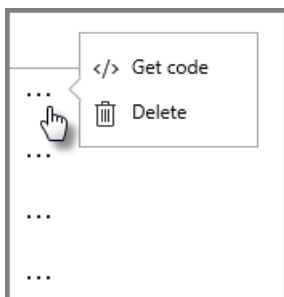
1. To manage your **Publish to web** embed codes, open the **Settings** gear and select **Manage embed codes**.



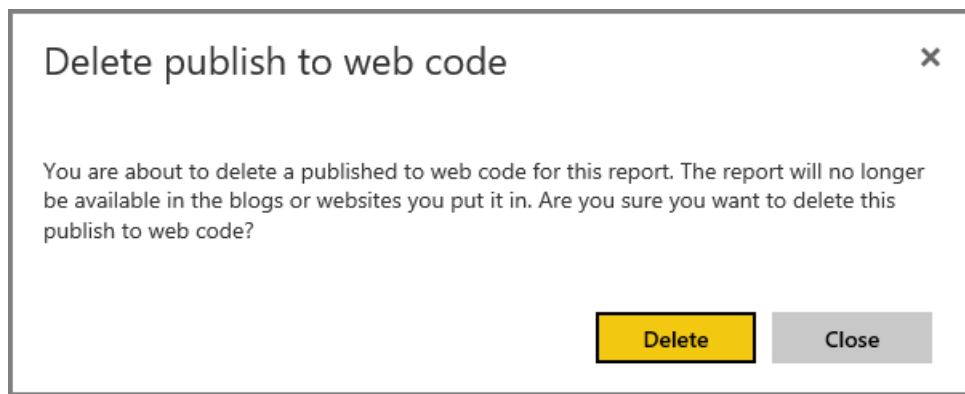
2. The list of embed codes you've created appears, as shown in the following image.



3. For each **Publish to web** embed code in the list, you can either retrieve the embed code, or delete the embed code and thus make any links to that report or visual no longer work.



4. If you select **Delete**, you're asked if you're sure you want to delete the embed code.



Updates to reports, and data refresh

After you create your **Publish to web** embed code and share it, the report is updated with any changes you make. However, it's important to know that it can take a while for update to be visible to your users. Updates to a report or visual take approximately one hour to be reflected in Publish to web embed codes.

When you initially use **Publish to web** to get an embed code, the embed code link is immediately active and can be viewed by anyone who opens the link. After the initial Publish to web action, subsequent updates to reports or visuals to which a Publish to web link points can take approximately one hour to be visible to your users.

To learn more, see the **How it works** section later in this article. If you need your updates to be immediately available, you can delete the embed code and create a new one.

Data refresh

Data refreshes are automatically reflected in your embedded report or visual. It can take approximately 1 hour for refreshed data to be visible from embed codes. You can disable automatic refresh by selecting **do not refresh** on the schedule for the dataset used by the report.

Custom visuals

Custom visuals are supported in **Publish to web**. When you use Publish to web, users with whom you share your published visual do not need to enable custom visuals to view the report.

Limitations

Publish to web is supported for the vast majority of data sources and reports in the Power BI service, however, the following are not currently supported or available with Publish to web:

1. Reports using row level security.
2. Reports using Analysis Services Tabular hosted on premises.
3. Reports shared to you directly or through an organizational content pack.
4. Reports in a group in which you are not an edit member.
5. "R" Visuals are not currently supported in Publish to web reports.

Tenant setting

Power BI administrators can enable or disable the publish to web feature. They may also restrict access to specific groups. Your ability to create an embed code changes based on this setting.

FEATURE	ENABLED FOR ENTIRE ORGANIZATION	DISABLED FOR ENTIRE ORGANIZATION	SPECIFIC SECURITY GROUPS
Publish to web under report's File menu.	Enabled for all	Not visible for all	Only visible for authorized users or groups.
Manage embed codes under Settings	Enabled for all	Enabled for all	Enabled for all * Delete option only for authorized users or groups. * Get codes enabled for all.
Embed codes within admin portal	Status will reflect one of the following: * Active * Not supported * Blocked	Status will display Disabled	Status will reflect one of the following: * Active * Not supported * Blocked If a user is not authorized based on the tenant setting, status will display as infringed .
Existing published reports	All enabled	All disabled	Reports continue to render for all.

Understanding the embed code status column

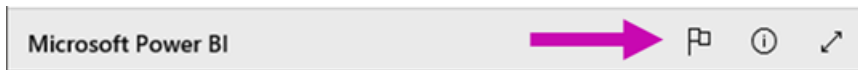
When viewing the **Manage embed codes** page for your **Publish to web** embed codes, a status column is provided. Embed codes are active by default, but you may encounter any of the states listed below.

STATUS	DESCRIPTION
Active	The report is available for Internet users to view and interact with.
Blocked	The content of the report violates the Power BI Terms of Service . It has been blocked by Microsoft. Contact support if you believe the content was blocked in error.
Not supported	The report's data set is using row level security, or another unsupported configuration. See the Limitations section for a complete list.
Infringed	The embed code is outside of the defined tenant policy. This typically occurs when an embed code was created and then the publish to web tenant setting was changed to exclude the user that owns the embed code. If the tenant setting is disabled, or the user is no longer allowed to create embed codes, existing embed codes will show the status of Infringed .

How to report a concern with Publish to web content

To report a concern related to **Publish to web** content embedded in a website or blog, use the **Flag** icon in the bottom bar, shown in the following image. You'll be asked to send an email to Microsoft explaining the concern. Microsoft will evaluate the content based on the Power BI Terms of Service, and take appropriate action.

To report a concern, select the **flag** icon in the bottom bar of the Publish to web report you see.



Licensing and Pricing

You need to be a Microsoft Power BI user to use **Publish to web**. The consumers of your report (the readers, viewers) do not need to be Power BI users.

How it works (technical details)

When you create an embed code using **Publish to web**, the report is made visible to users on the Internet. It's publicly available so you can expect viewers to easily share the report through social media in the future. As users view the report, either by opening the direct public URL or viewing it embedded in a web page or blog, Power BI caches the report definition and the results of the queries required to view the report. This approach ensures the report can be viewed by thousands of concurrent users without any impact on performance.

The cache is long-lived, so if you update the report definition (for example, if you change its View mode) or refresh the report data, it can take approximately one hour before changes are reflected in the version of the report viewed by your users. It is therefore recommended that you stage your work ahead of time, and create the **Publish to web** embed code only when you're satisfied with the settings.

More questions? [Try the Power BI Community](#)

Embed with report web part in SharePoint Online

1/30/2018 • 4 min to read • [Edit Online](#)

With Power BI's new report web part for SharePoint Online, you can easily embed interactive Power BI reports in SharePoint Online pages.

When using the new **Embed in SharePoint Online** option, the embedded reports are fully secure so you can easily create secure internal portals.

Requirements

There are a few requirements in order for **Embed in SharePoint Online** reports to work.

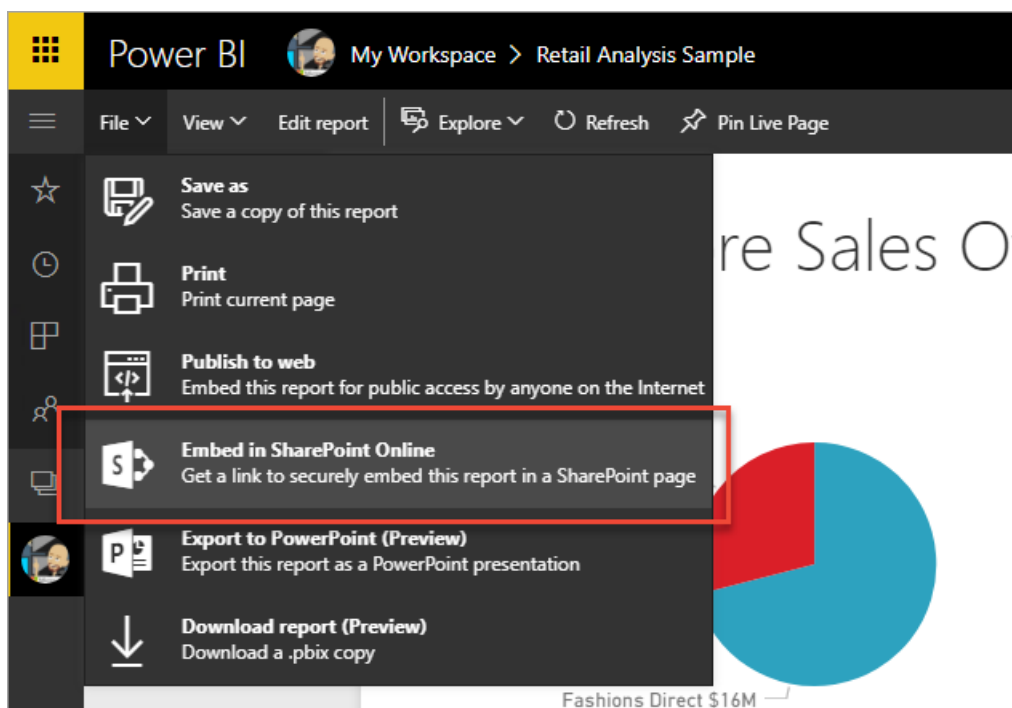
- The Power BI web part for SharePoint Online requires [Modern Pages](#).

Embed your report

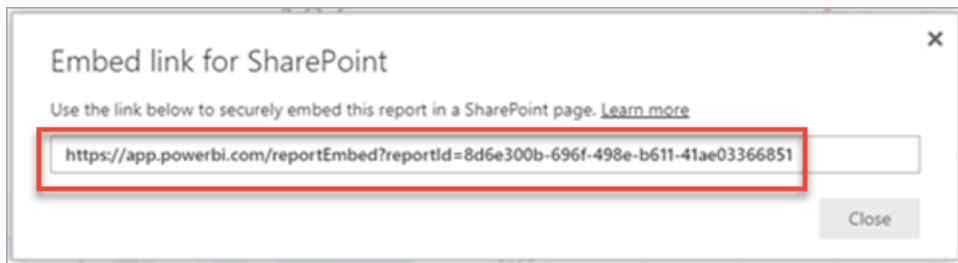
In order to embed your report into SharePoint Online, you will first need to get the URL for the report and then use that URL with the new Power BI web part within SharePoint Online.

Get a URL to your report

1. View the report within the Power BI service.
2. Select the **File** menu item.
3. Select **Embed in SharePoint Online**.



4. Copy URL from dialog.

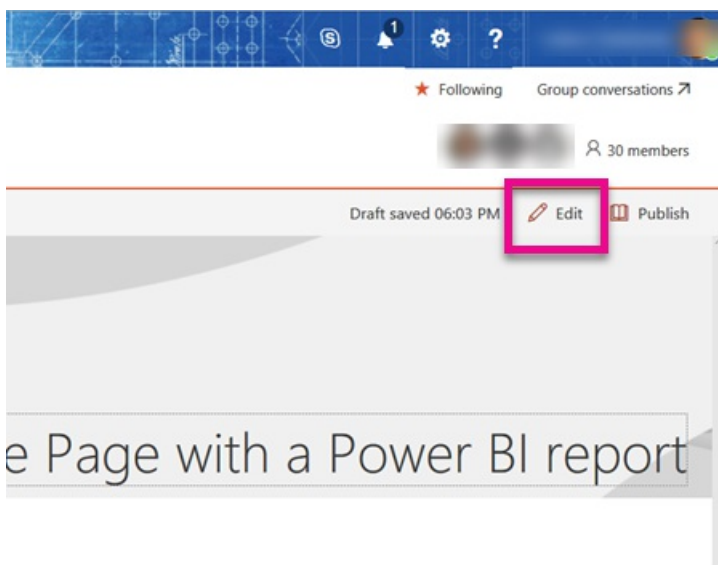


NOTE

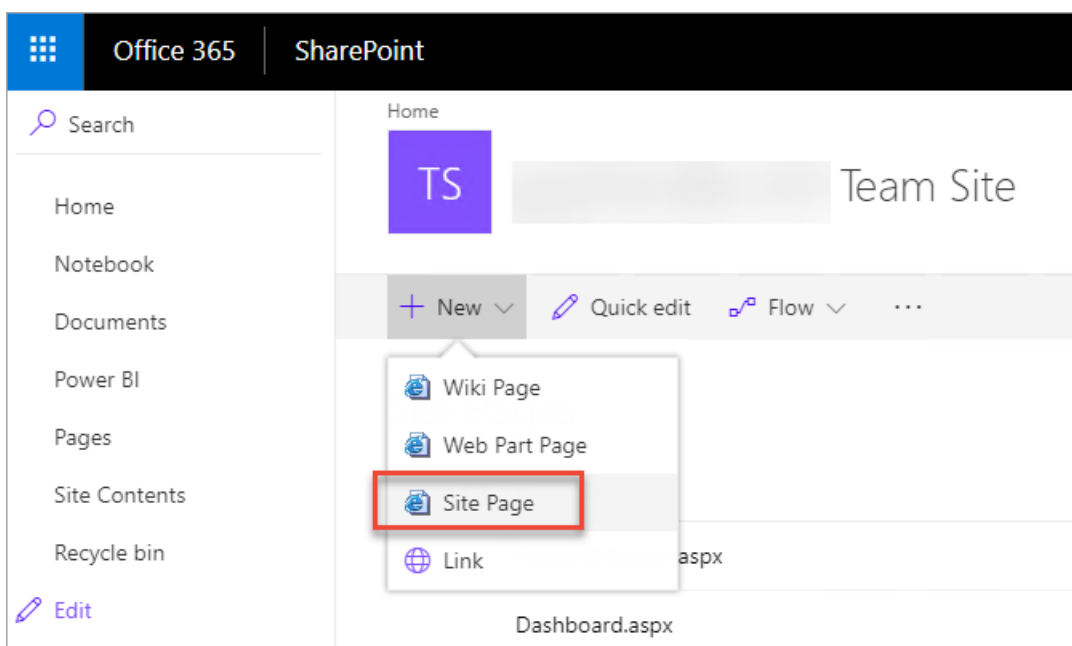
You can also use the URL that is displayed in your web browser's address bar when viewing a report. That URL will contain the report page you are currently viewing. You will need to remove the report section, from the URL, if you want to use a different page.

Add the Power BI report to a SharePoint Online page

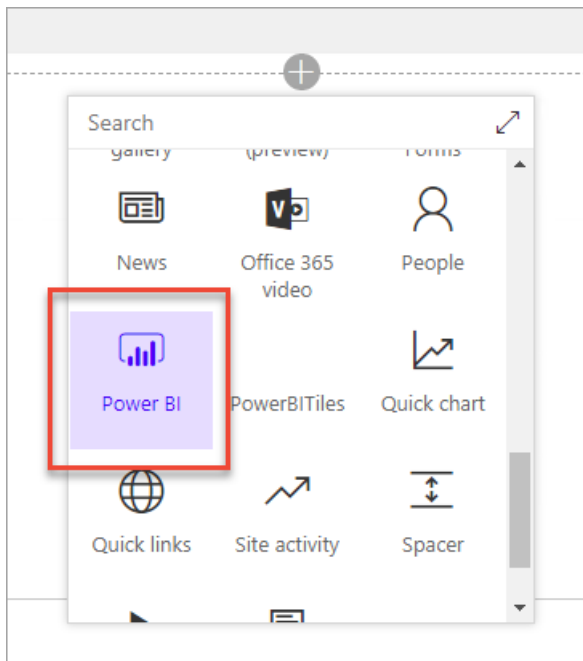
1. Open the desired page in SharePoint Online and select **Edit**.



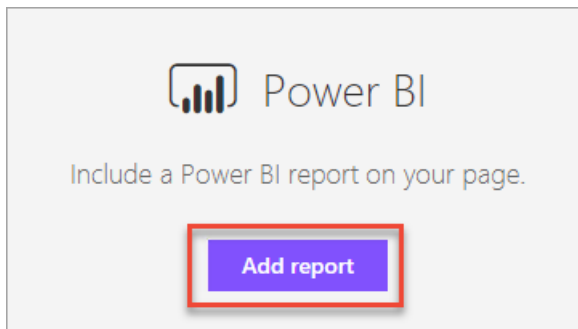
Or, create a new modern site page by selecting **+ New** within SharePoint Online.



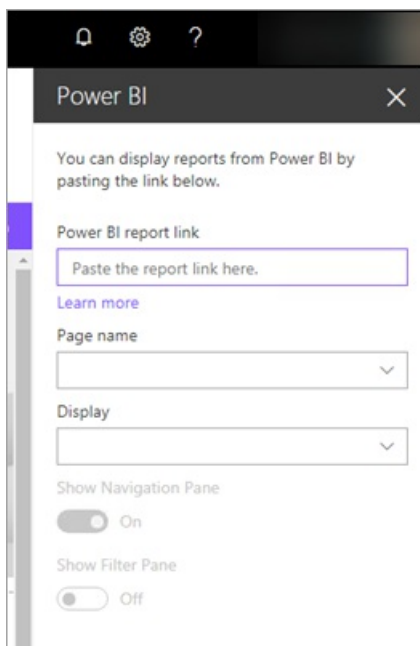
2. Select **+** and select the **Power BI** web part.



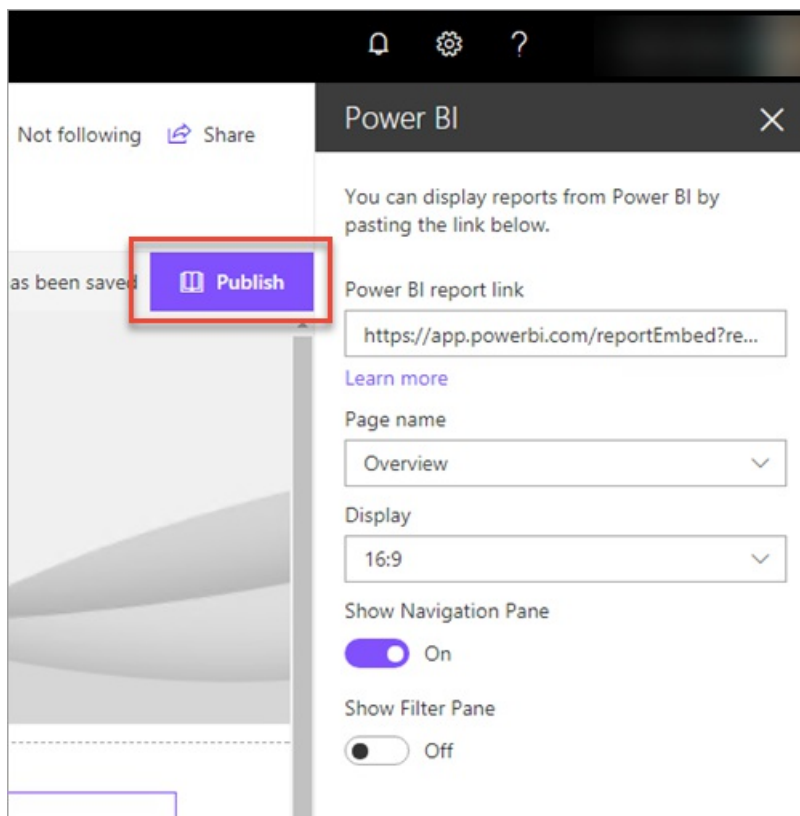
3. Select **Add report**.



4. Past the report URL into the property pane. This is the URL you copied from the steps above. The report will load automatically.



5. Select **Publish** to make the change visible to your SharePoint Online users.



Granting access to reports

Embedding a report in SharePoint Online does not automatically give users permission to view the report. The permissions to view the report are set within the Power BI service.

IMPORTANT

Make sure to review who can see the report within the Power BI service and grant access to those not listed.

There are two ways to provide access to the report within the Power BI service. If you are using an Office 365 Group to build your SharePoint Online team site, you list the user as a member of the app workspace within the Power BI service. This will make sure that users can view the contents of that group. For more information, see [Create and distribute an app in Power BI](#).

Alternatively, you can grant users access to your report by doing the following.

1. Add a tile from the report to a dashboard.
2. Share the dashboard with the users that need access to the report. For more information, see [Share a dashboard with colleagues and others](#).

Allowing Free users access to reports

Free users can view reports that are embedded with the Power BI web part for SharePoint Online. You provide access to free users in the same way you do Pro users as described in [Granting access to reports](#) above. The workspace, where the report is located, also has to be backed by Power BI Premium capacity.

For example, if you have a report, in an app workspace, you would have to assign the app workspace to a Power BI Premium capacity. You would also need to add the Free user to the list of members of that app workspace.

Web part settings

Below is a description of the settings that can be adjusted for the Power BI web part for SharePoint Online.

Power BI
✕

You can display reports from Power BI by pasting the link below.

Power BI report link

[Learn more](#)

Page name

Display

Show Navigation Pane

On

Show Filter Pane

Off

PROPERTY	DESCRIPTION
Page name	Sets the default page that is shown by the web part. Select a value from the drop down. If no pages are displayed, either your report has one page, or the URL you pasted contains a page name. Remove the report section from the URL to select a specific page.
Display	Option to adjust how the report is fit within the SharePoint Online page.
Show Navigation Pane	Shows or hides the page navigation pane.
Show Filter Pane	Shows or hides the filter pane.

Multi-factor authentication

If your Power BI environment requires you to sign-in using multi-factor authentication, you may be asked to sign-in with a security device to verify your identity. This will occur if you did not sign-in to SharePoint Online using multi-factor authentication but your Power BI environment requires an account validated by a security device.

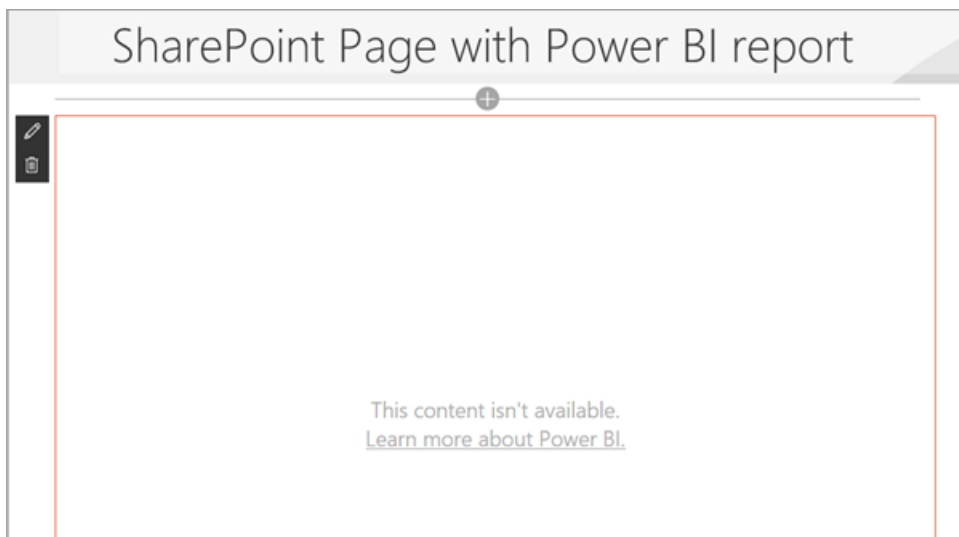
NOTE

Multi-factor authentication is not yet supported with Azure Active Directory 2.0. Users will receive a message saying *error*. If the user signs-in again to SharePoint Online using their security device, they may be able to view the report.

Reports that do not load

Your report may not load within the Power BI web part and may show the following message.

This content isn't available.



There are two common reasons for this message.

1. You do not have access to the report.
2. The report was deleted.

You should contact the owner of the SharePoint Online page to help you resolve the issue.

Known issues and limitations

- **Error: "An error occurred, please try logging out and back in and then revisiting this page. Correlation id: undefined, http response status: 400, server error code 10001, message: Missing refresh token"**

If you receive this error, please try one of the following.

1. Sign-out of SharePoint and sign back in. Be sure to close all browser windows before signing back in.
 2. If your user account requires multi-factor authentication (MFA), ensure you sign-in to SharePoint using your multi-factor authentication device (phone app, smart card, etc.)
- Power BI does not support the same localized languages that SharePoint Online does. As a result, you may not see proper localization within the embedded report.
 - You may encounter issues if using Internet Explorer 10. You can look at the [browsers support for Power BI](#) and for [Office 365](#).

Next steps

[Allow or prevent creation of modern site pages by end users](#)

[Create and distribute an app in Power BI](#)

[Share a dashboard with colleagues and others](#)

[Power BI Premium - what is it?](#)

More questions? [Try asking the Power BI Community](#)

Connect to files stored in OneDrive for your Power BI app workspace

11/9/2017 • 2 min to read • [Edit Online](#)

After you've [created an app workspace in Power BI](#), you can store your Excel, CSV, and Power BI Desktop files on the OneDrive for Business for your Power BI app workspace. You can continue updating the files you store in OneDrive, and those updates are automatically reflected in the Power BI reports and dashboards based on the files.

Adding files to your app workspace is a two-step process:

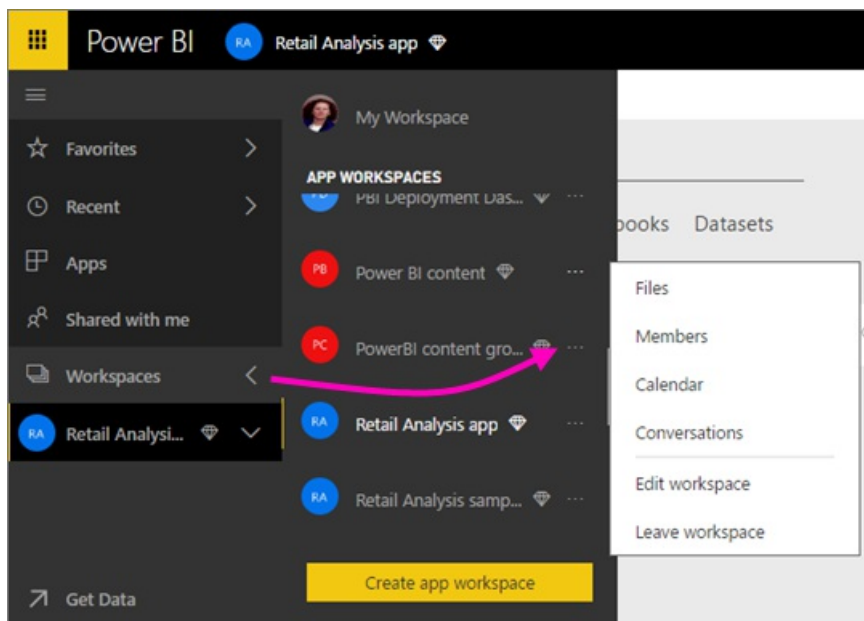
1. First you [upload files to the OneDrive for Business](#) for your app workspace.
2. Then you [connect to those files from Power BI](#).

NOTE

App workspaces are only available with [Power BI Pro](#).

1 Upload files to the OneDrive for Business for your app workspace

1. In the Power BI service, select the arrow next to Workspaces > select the ellipsis (...) next to your workspace name.

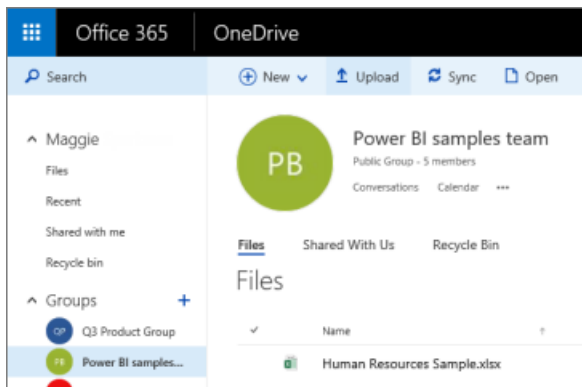


2. Select **Files** to open the OneDrive for Business for your app workspace on Office 365.

NOTE

If you don't see **Files** on the app workspace menu, select **Members** to open the OneDrive for Business for your app workspace. There, select **Files**. Office 365 sets up a OneDrive storage location for your app's group workspace files. This process may take some time.

3. Here, you can upload your files to the OneDrive for Business for your app workspace. Select **Upload**, and navigate to your files.



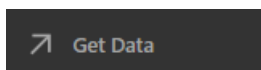
2 Import Excel files as datasets or as Excel Online workbooks

Now that your files are in the OneDrive for Business for your app workspace, you have a choice. You can:

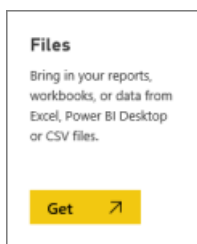
- [Import the data from the Excel workbook as a dataset](#), and use the data to build reports and dashboards you can view in a web browser and on mobile devices.
- Or [connect to a whole Excel workbook in Power BI](#) and display it exactly as it appears in Excel Online.

Import or connect to the files in your app workspace

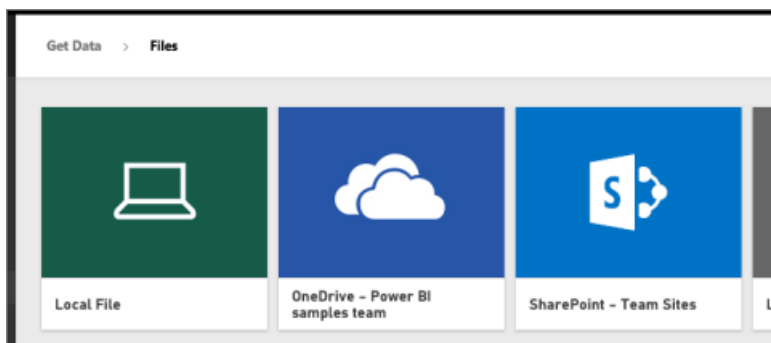
1. In Power BI, switch to the app workspace, so the app workspace name is in the top-left corner.
2. Select **Get Data** at the bottom of the left navigation pane.



3. In the **Files** box, select **Get**.



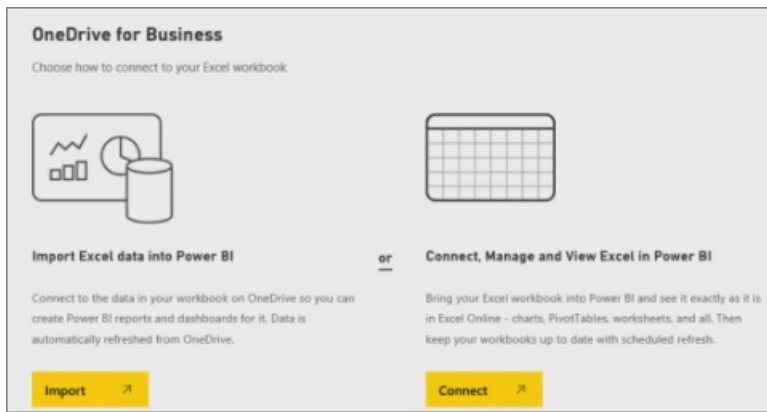
4. Select **OneDrive - Your App Workspace Name**.



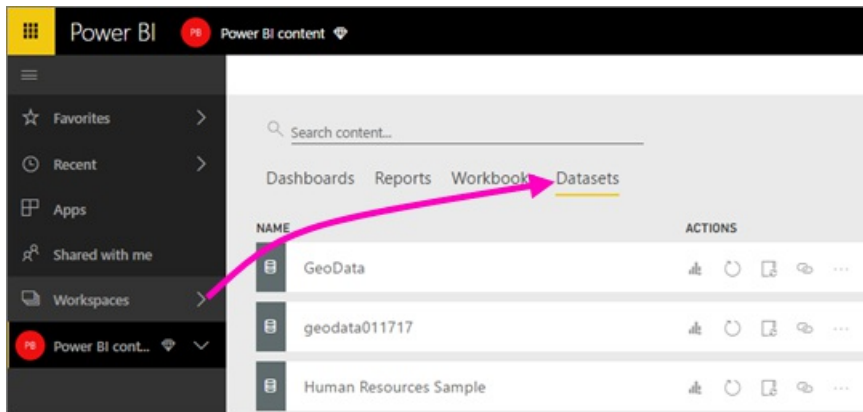
5. Select the file you want > **Connect**.

This is the point where you decide whether to [import the data from the Excel workbook](#), or [connect to the whole Excel workbooks](#).

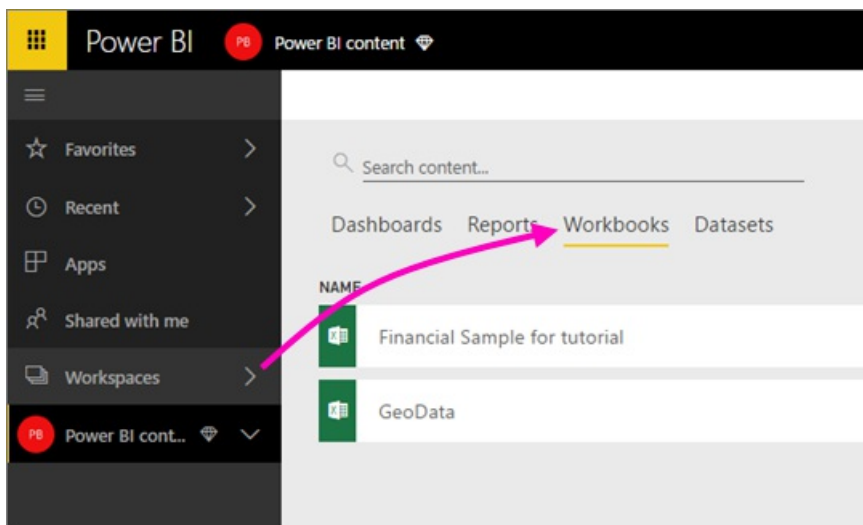
6. Select **Import** or **Connect**.



7. If you select **Import**, then the workbook appears on the **Datasets** tab.



If you select **Connect**, then the workbook is on the **Workbooks** tab.



Next steps

- [Create apps and app workspaces in Power BI](#)
- [Import data from Excel workbooks](#)
- [Connect to whole Excel workbooks](#)
- More questions? [Try the Power BI Community](#)
- Feedback? Visit [Power BI Ideas](#)

Collaborate in your Power BI app workspace

1/30/2018 • 2 min to read • [Edit Online](#)

Power BI app workspaces are great places to collaborate with your colleagues on dashboards, reports, and datasets to create *apps*. That's what workspaces are designed for -- collaboration. After you finish collaborating on your dashboards and reports with colleagues, then you package it as an app and distribute it. Read more about [creating apps and app workspaces in Power BI](#).

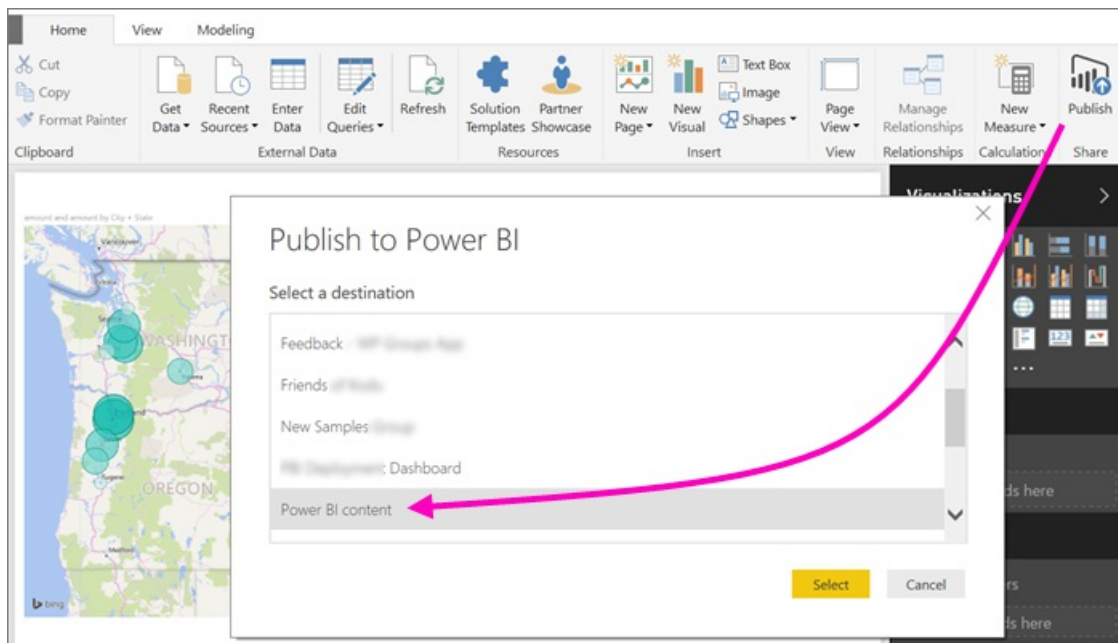
Collaboration doesn't end with workspaces in Power BI. Office 365 offers other group services such as sharing files on OneDrive for Business, conversations in Exchange, shared calendar and tasks, and so on. Read more about [groups in Office 365](#).

App workspaces are only available with [Power BI Pro](#).

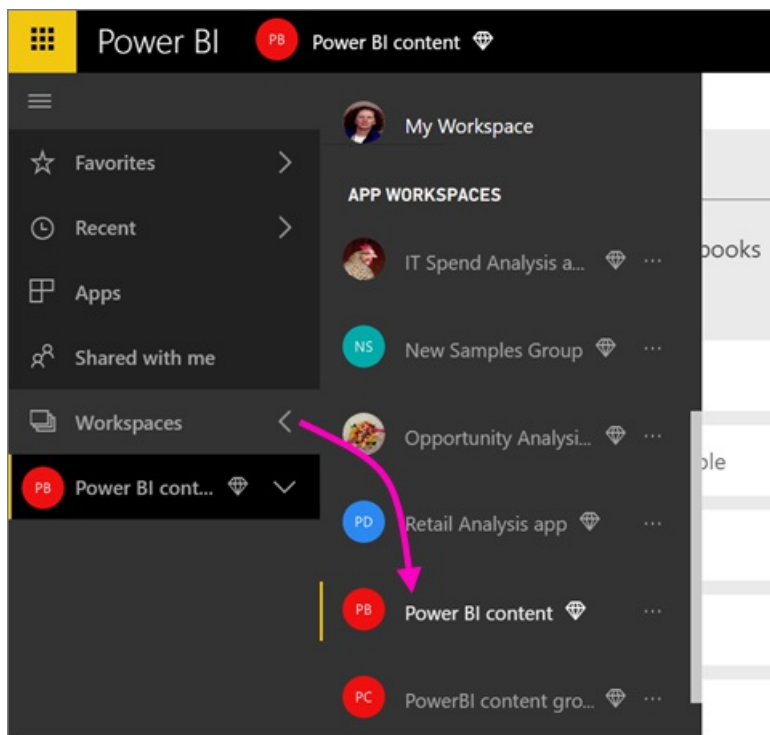
Collaborate on Power BI Desktop files in your app workspace

After you create a Power BI Desktop file, if you publish it to your Power BI app workspace, then everyone in your workspace can collaborate on it.

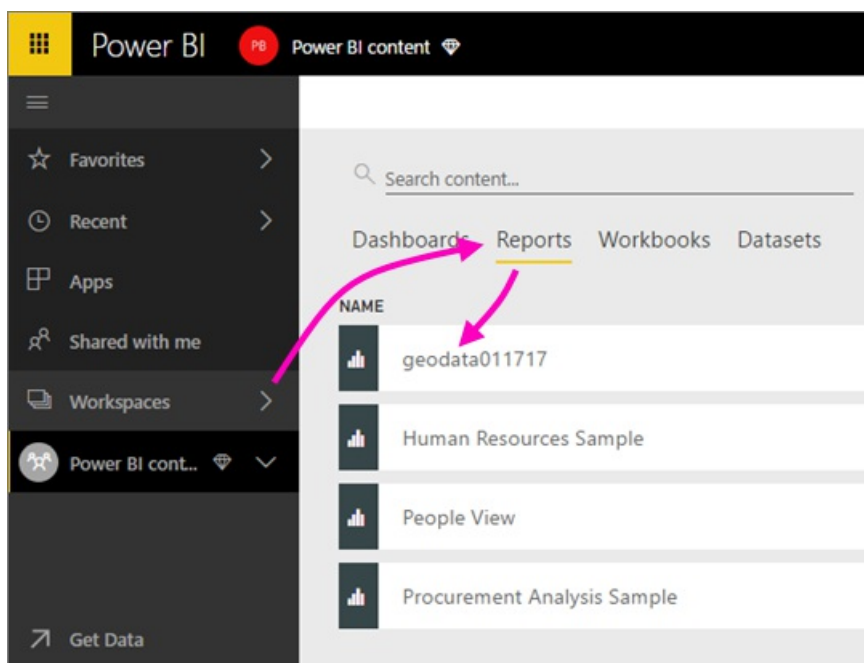
1. In Power BI Desktop, select **Publish** on the **Home** ribbon, then in the **Select a destination** box, select your app workspace.



2. In the Power BI service, select the arrow next to Workspaces > select your app workspace.



3. Select the Reports tab, then select your report.

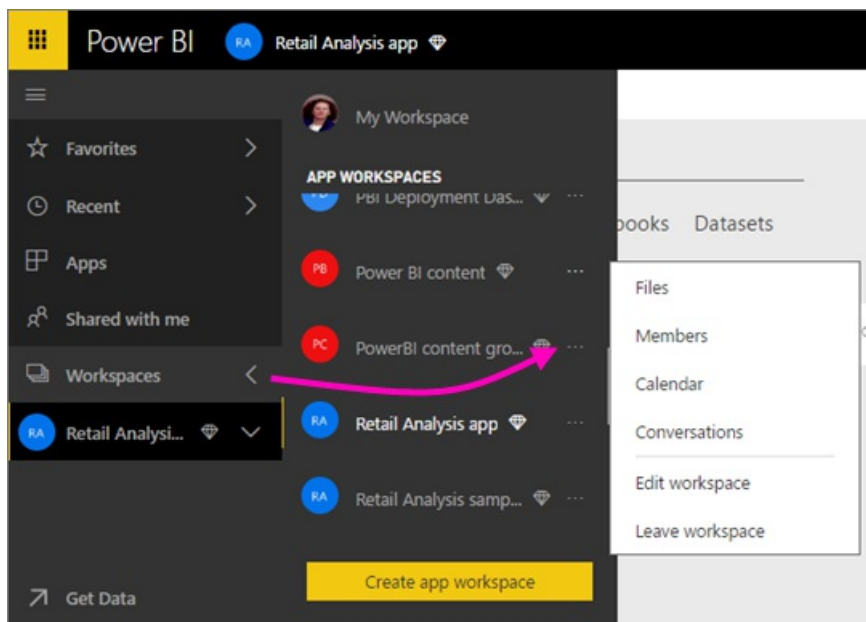


From here, it's like any other report in Power BI. You and others in your app workspace can [modify the report](#) and save tiles to a dashboard of your choosing.

Collaborate in Office 365

Collaborating in Office 365 starts from the app workspace in Power BI.

1. In the Power BI service, select the arrow next to Workspaces > select the ellipsis (...) next to your workspace name.



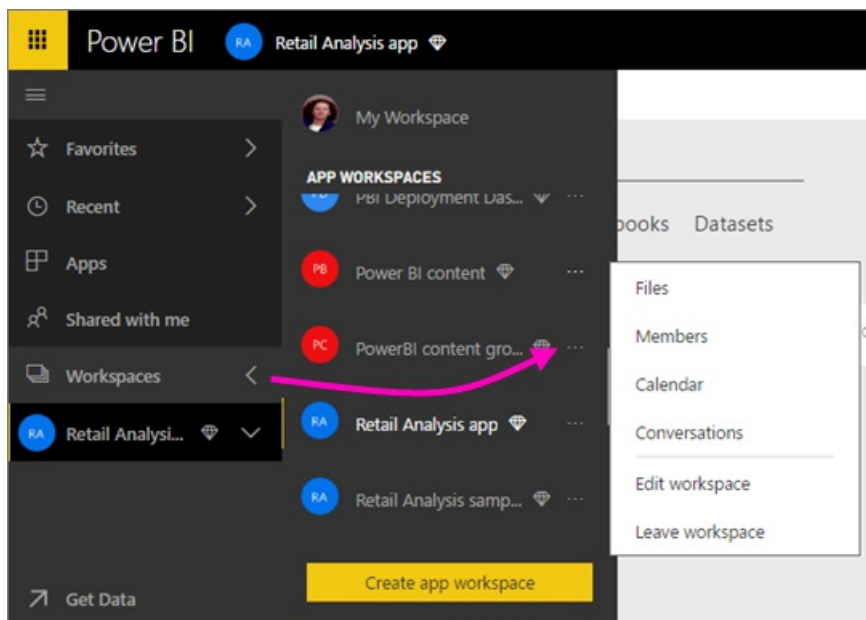
2. From this menu, you can collaborate with your group in a few ways:

- Have a [group conversation in Office 365](#).
- [Schedule an event](#) on the app's group workspace calendar.

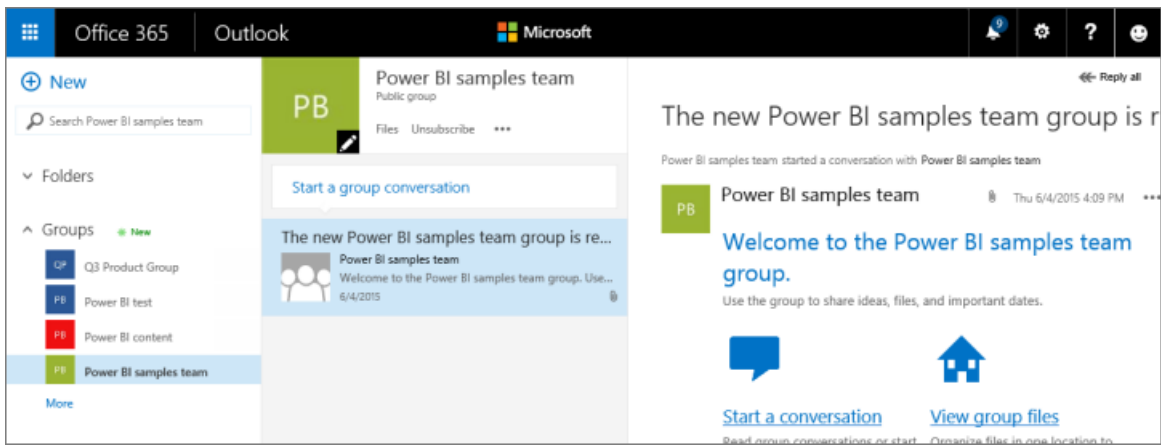
The first time you go to your app's group workspace in Office 365, it may take some time. Give it 15 to 30 minutes, then refresh your browser.

Have a group conversation in Office 365

1. Select the ellipsis (...) next to your app workspace name > **Conversations**.



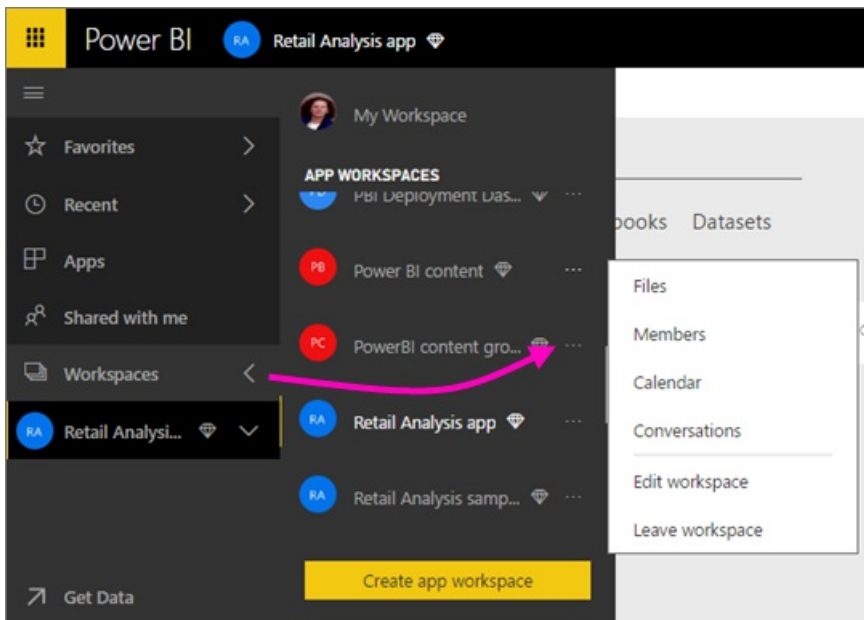
The email and conversation site for your app's group workspace opens in Outlook for Office 365.



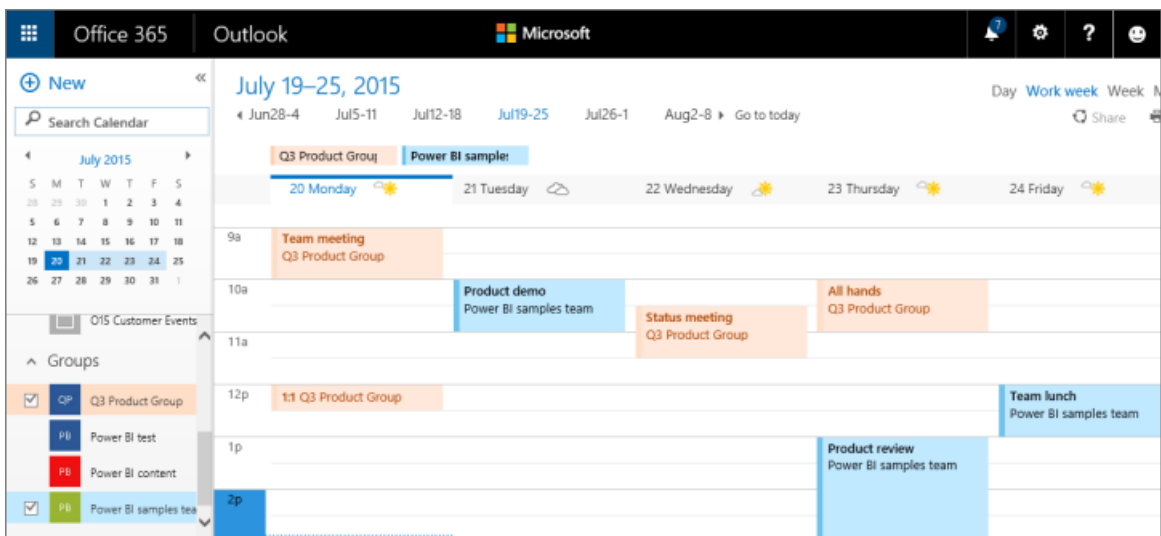
2. Read more about [group conversations in Outlook for Office 365](#).

Schedule an event on the app's group workspace calendar

1. Select the ellipsis (...) next to your app workspace name > **Calendar**.



This opens the calendar for your app's group workspace in Outlook for Office 365.



2. Read more about [group calendars in Outlook in Office 365](#).

Manage an app workspace

If you're owner or admin for an app workspace, you can also add or remove workspace members. Read more about [managing your Power BI app workspace](#).

Next steps

- [Create apps and app workspaces in Power BI](#)
- More questions? [Try the Power BI Community](#)
- Feedback? Visit [Power BI Ideas](#)

Manage your app workspace in Power BI and Office 365

11/9/2017 • 2 min to read • [Edit Online](#)

As creator or admin of an [app workspace in Power BI](#) or in Office 365, you manage some aspects of the workspace in Power BI. Other aspects you manage in Office 365.

In Power BI you can:

- Add or remove app workspace members, including making a workspace member an admin.
- Edit the app workspace name.
- Delete the app workspace.

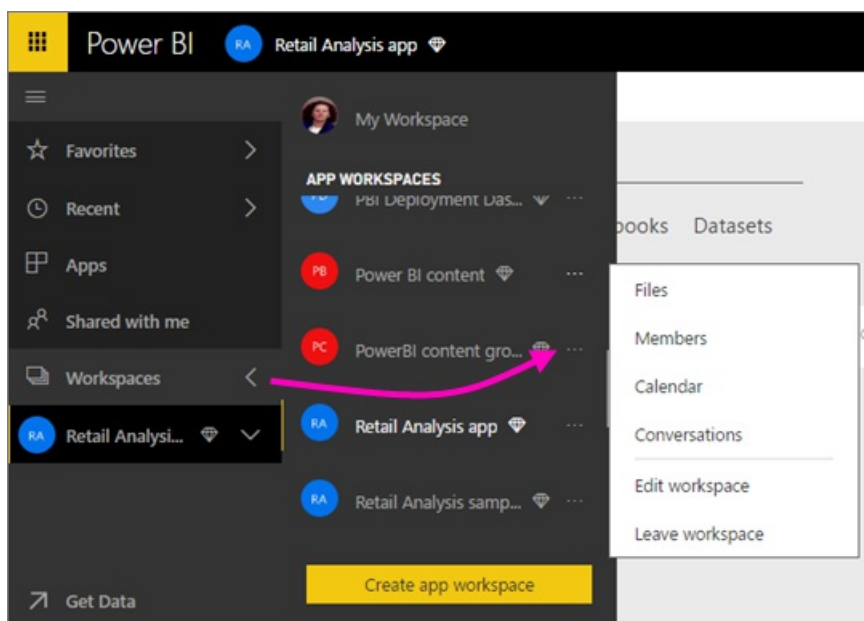
In Office 365 you can:

- Add or remove your app workspace's group members, including making a member an admin.
- Edit the group name, image, description, and other settings.
- See the group email address.
- Delete the group.

You need a [Power BI Pro](#) license to be an admin or member of an app workspace. Your app users need a Power BI Pro license, too, unless your app workspace is in a Power BI Premium capacity. Then business users can access your app with a Power BI free license instead. Read [What is Power BI Premium?](#) for details.

Edit your app workspace in Power BI

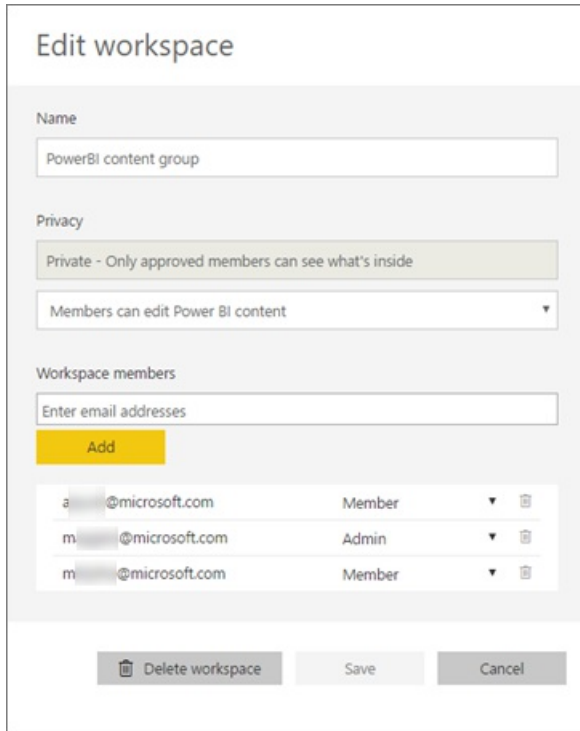
1. In the Power BI service, select the arrow next to **Workspaces** > select the ellipsis (...) next to your workspace name > **Edit workspace**.



NOTE

You only see **Edit workspace** if you're an app workspace admin.

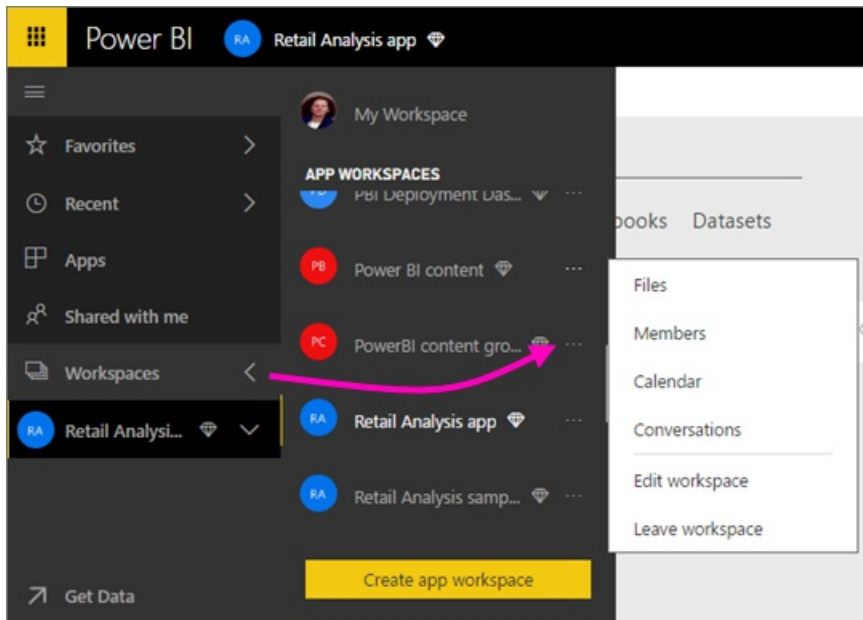
2. Here you can rename, add or remove members, or delete the app workspace.



3. Select **Save** or **Cancel**.

Edit Power BI app workspace properties in Office 365

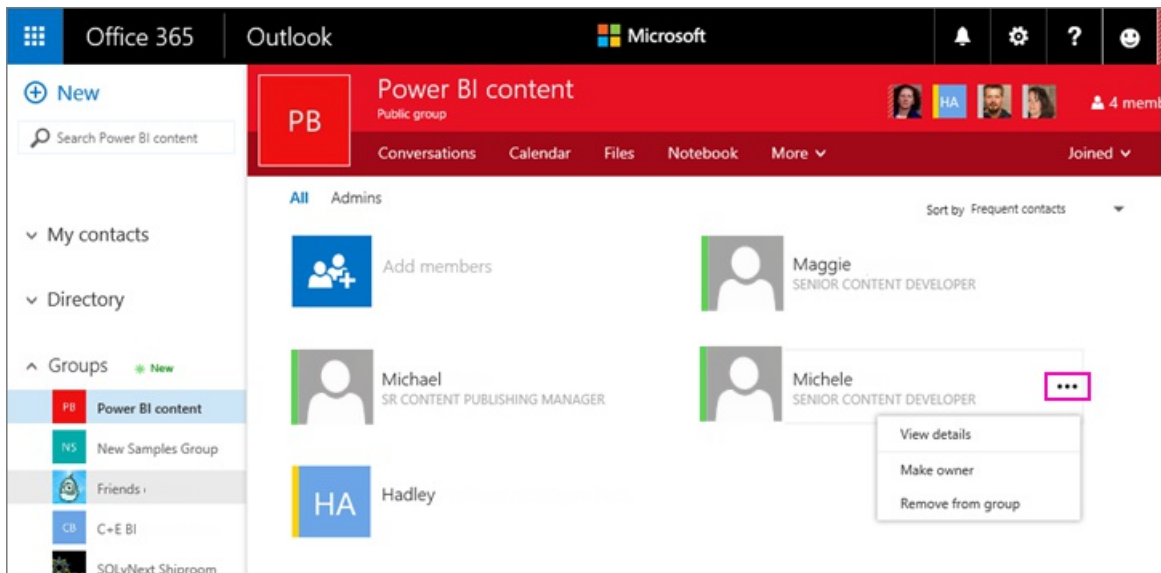
1. In the Power BI service, select the arrow next to **Workspaces** > select the ellipsis (...) next to your workspace name > **Members**.



This opens the Outlook for Office 365 group view of your app workspace.

You may need to sign into your corporate account.

2. Tap the ellipsis (...) next to a member's name to make the member an admin or delete the member from the app workspace.



Add an image and set other workspace properties in the Office 365 group

When you distribute your app from the app workspace, the image you add here will be the image for your app. See the [Add an image to your app](#) section of the article [Create and distribute an app in Power BI](#).

1. In the Outlook for Office 365 view of your app workspace, select the group image to edit group workspace properties.



2. You can edit the name, description, and language, add an image, and set other properties here.



3. Select **Save** or **Discard**.

Next steps

- [What are apps in Power BI?](#)
- [Create apps and app workspaces in Power BI](#)
- More questions? [Try the Power BI Community](#)

Manage, update, and delete organizational content packs

11/9/2017 • 4 min to read • [Edit Online](#)

NOTE

Have you heard about the new *apps* yet? Apps are the new way to distribute content to large audiences in Power BI. We recommend using apps instead of organizational content packs or read-only workspaces. Learn [more about apps](#).

You can package up and share your dashboards, reports, Excel workbooks, and datasets with your colleagues as [organizational content packs](#). Your colleagues can use them as-is, or they can create their own copies.

Creating content packs is different from sharing dashboards or collaborating on them in a group. Read [How should I collaborate on and share dashboards and reports?](#) to decide on the best option for your situation.

You can only do some organizational content pack tasks if you're the content pack creator:

- Republish.
- Restrict or expand access to the content pack.
- Set and change scheduled refresh.
- Delete the content pack.

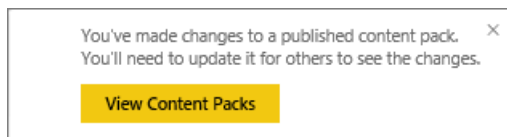
Modify and re-publish an organizational content pack


If you make changes to the original content pack dashboard, report, or Excel workbook, Power BI prompts you to republish. Additionally, as the content pack creator, you can update any of the options you selected in the Create Content Pack window when you were creating the original content pack.

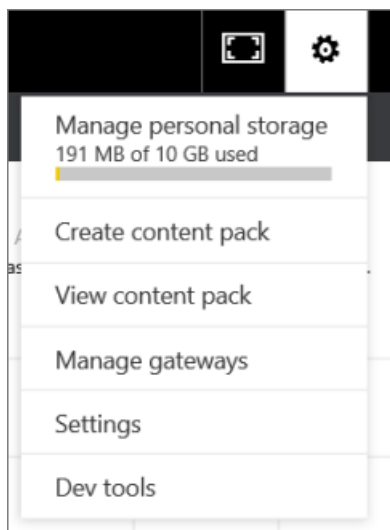
Republish with new content


When you make and save a change to the dashboard that you included in a content pack, Power BI reminds you to update it so others can see the changes. For example, if you pin a new tile or just change the name of the dashboard.

1. Select **View Content Packs** in the message.



2. Or select the cog icon in the upper-right corner  and select **View Content Pack**.




Notice the warning icon . This lets you know that you've modified the content pack in some way and it no longer matches what you published.

3. Select **Edit**.
4. Make any necessary changes in the **Update Content Pack** window and select **Update**. A **Success** message appears.
 - For group members who haven't customized the content pack, the update is automatically applied.
 - Group members who have customized the content pack receive a notification that there is a new version. They can go to AppSource and get the updated content pack without losing their personalized version. They'll now have 2 versions: the personalized version and the updated content pack. In the personalized version, all tiles from the original content pack will be gone. But tiles pinned from other reports will still render.

Update the audience: expand or restrict access

Another modification available to content pack creators is expanding and restricting access to the content pack. Perhaps you published a content pack to a broad audience and you've decided to restrict access to a smaller group.

1. Select the cog icon  and choose **View Content Packs**.
2. Select **Edit**.
3. Make any necessary changes in the **Update Content Pack** window and select **Update**. For example, delete the original distribution group in the **Specific Groups** field and replace it with a different distribution group (that has fewer members).

A Success message appears.

For any coworker who isn't part of the new alias:

- For group members who haven't customized the content pack, the dashboard and reports associated with that content pack are no longer available and the content pack doesn't appear in the Navigation Pane.
- For group members who have customized the content pack, the next time they open the customized dashboard, all tiles from the original content pack will be gone. But tiles pinned from other reports will still render. The original content pack reports and dataset are no longer available, and the content pack doesn't appear in the Navigation pane.

Refresh an organizational content pack


As the content pack creator, you can [schedule refresh of the datasets](#). When you create and upload the content pack, that refresh schedule is uploaded with the datasets. If you change the refresh schedule, you need to re-publish the content pack (see above).

Delete an organizational content pack from AppSource

You can only delete a content pack from AppSource if you created it.

TIP

You can [delete your connection to a content pack](#) you didn't create. That doesn't delete the content pack from AppSource.

1. To delete a content pack from AppSource, go to the app workspace where you created the content pack, select the cog icon  and choose **View Content Packs**.
2. Select **Delete > Delete**.
 - For group members who haven't customized the content pack, the dashboard and reports associated with that content pack are automatically removed. They're no longer available, and the content pack doesn't appear in the Navigation Pane.
 - For group members who have customized the content pack, the next time they open the customized dashboard, all tiles from the original content pack will be gone. But tiles pinned from other reports will still render. The original content pack reports and dataset are no longer available, and the content pack doesn't appear in the Navigation pane.

Next steps

- [Introduction to organizational content packs](#)
- [Create and distribute an app in Power BI](#)
- More questions? [Try the Power BI Community](#)

Find and connect to an organizational content pack

11/9/2017 • 1 min to read • [Edit Online](#)

NOTE

Have you heard about the new *apps* yet? Apps are the new way to distribute content to large audiences in Power BI. We recommend using apps instead of organizational content packs or read-only workspaces. Learn [more about apps](#).

When anyone publishes an organizational content pack to your organization, to distribution or security groups, or to [Office 365 groups](#) that you belong to, it appears in AppSource. Browse or search AppSource to find and open organizational content packs.

Creating content packs is different from sharing dashboards or collaborating on them in a group. Read [How should I collaborate on and share dashboards and reports?](#) to decide on the best option for your situation.

Find an organizational content pack

[Power BI Pro](#) users can all go to AppSource, which displays content packs shared to their entire organization, to distribution or security groups, and to Office 365 groups they belong to.

1. From the left Navigation Pane, select **Get Data > My Organization > Get**.
2. Don't see the content pack you're looking for? Tap in the search box and type keywords:



3. Select a content pack to reveal additional details.

Connect to an organizational content pack

- Select **Get it now** to connect to the the content pack and add it to your active workspace. New dashboards, reports, Excel workbooks, and datasets are starred with a yellow asterisk.

If the content pack has an Excel workbook, you may see a warning that you don't have permissions to view the workbook. If so, ask the content pack owner to [share the workbook with you in OneDrive for Business](#).

The content pack is locked. You can [save your own copy of the dashboard and reports](#).

Changes to the content pack

If the content pack owner changes the content pack, and:

- **You haven't made a copy** The content pack updates automatically.
- **You have made a copy** Your copy won't be updated.

Next steps

- [Intro to organizational content packs](#)
- [Create and distribute an app in Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Organizational content packs: Copy, refresh, and get access

11/15/2017 • 1 min to read • [Edit Online](#)

NOTE

Have you heard about the new *apps* yet? Apps are the new way to distribute content to large audiences in Power BI. You create apps in *app workspaces*, which replace groups and group workspaces. We recommend using apps instead of organizational content packs or read-only workspaces. Learn [more about apps](#).

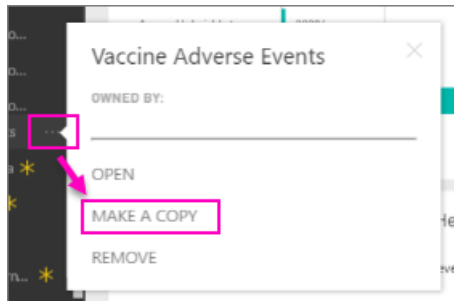
When an organizational content pack is published, all recipients see the same dashboard, reports, Excel workbooks, datasets, and data (unless it's a SQL Server Analysis Services (SSAS) data source). [Only the content pack creator can edit and republish](#) the content pack. However, all recipients can save a copy of the content pack that can live alongside the original.

Creating content packs is different from sharing dashboards or collaborating on them in a group. Read [How should I collaborate on and share dashboards and reports?](#) to decide on the best option for your situation.

Create a copy of an organizational content pack

Create your own copy of the content pack, not visible to others.

1. Select the ellipsis (...) next to the content pack dashboard > Make a copy.



2. Select **Save**.

Now you have a copy that you can change. Nobody else will see changes you make.

Help! I can no longer access the content pack

This can happen for several reasons:

- **Membership changes:** Content packs are published to email distribution groups, security groups, and [Power BI groups based on Office 365](#). If you are removed from the group, you will no longer have access to the content pack.
- **Distribution changes:** The content pack creator changes the distribution. For example, if the content pack was originally published to the entire organization but the creator republished it to a smaller audience, you may no longer be included.
- **Security settings changes:** If the dashboard and reports connect to on-premises SSAS data sources and changes are made to the security settings, your permissions to that server may be revoked.

How are organizational content packs refreshed?

When the content pack is created, the refresh settings are inherited with the dataset. When you create a copy of the content pack, the new version retains its link to the original dataset and its refresh schedule.

See [Manage, update, and delete organizational content packs](#).

Next steps

- [Introduction to organizational content packs](#)
- [Create a group in Power BI](#)
- More questions? [Try the Power BI Community](#)

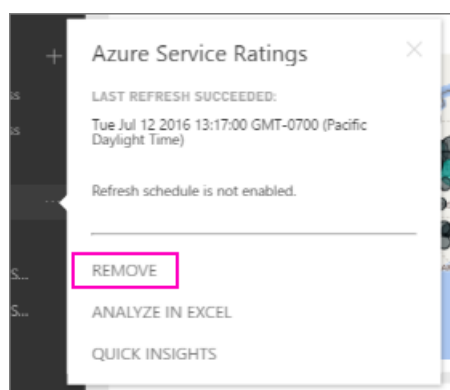
Remove your connection to a Power BI organizational content pack

11/9/2017 • 1 min to read • [Edit Online](#)

A coworker created a content pack. You discovered it in AppSource and added it to your Power BI workspace. Now you don't need it any longer. How do you remove it?

To remove a content pack, you remove its dataset.

- In the left navigation pane, select the ellipsis to the right of the dataset and select **Remove > Yes**.



Removing the dataset also removes all associated reports and dashboards. However, removing your connection to the content pack doesn't delete the content pack from your organization's AppSource. You can always return to AppSource and add the content pack back to your workspace. You can only [delete a content pack from AppSource](#) if you're the one who created it.

Next steps

- [Introduction to organizational content packs](#)
- [Create and distribute an app in Power BI](#)
- [Power BI basic concepts](#)
- More questions? [Try the Power BI Community](#)

Share a Power BI dashboard that links to an Excel file in OneDrive

11/15/2017 • 1 min to read • [Edit Online](#)

In Power BI, you can [connect to Excel workbooks on OneDrive for Business](#) and pin tiles to a dashboard from that workbook. When you share that dashboard, or create a content pack that includes that dashboard:

- Your colleagues can view the tiles without needing permissions for the workbook itself. So you can create a content pack and know that your colleagues can see the tiles created from the Excel workbook on OneDrive.
- Clicking the tile opens the workbook inside of Power BI. The workbook will only open if your colleagues have at least [read permissions](#) to the workbook on OneDrive for Business.

Share a dashboard that contains workbook tiles

To share a dashboard that links back to an Excel workbook on OneDrive for Business, see [Share a dashboard](#). The difference is that you have the option to modify the permissions for the linked Excel workbook before sharing.

Share dashboard

Not shared with anyone

Invite Shared with

guy@contoso.com X Enter email addresses

Recipients will have access to the same data and reports as you have in this dashboard. [Learn more](#)

⚠ This dashboard contains tiles linked to Excel workbooks. To view the workbooks, invitees need at least Read permissions for the workbooks in OneDrive for Business. [Learn more](#). [Set workbook permissions](#)

Allow recipients to share your dashboard

Send email notification to recipients

Share

1. Enter the email addresses for your colleagues.
2. To enable your colleagues to view the Excel workbook from Power BI, select **Go to OneDrive for Business to set workbook permissions**.
3. On OneDrive, [modify the permissions](#) as needed.
4. Select **Share**.

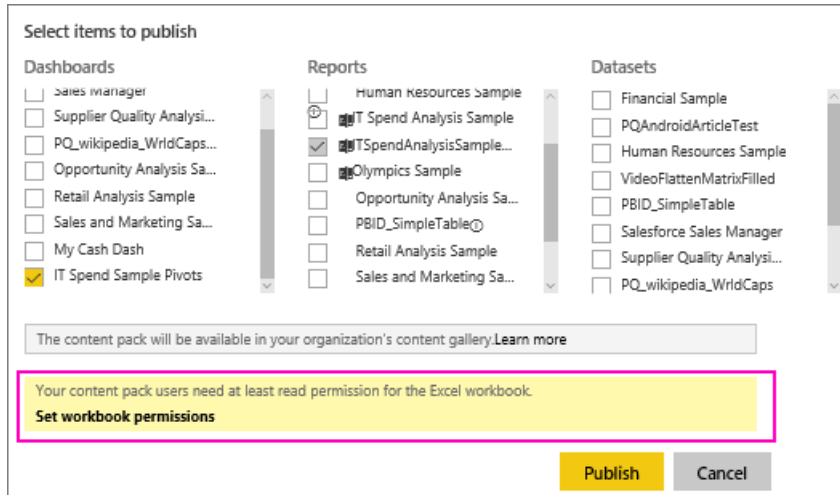
NOTE

Your colleagues won't be able to pin additional tiles from that workbook, or make changes to the Excel workbook from Power BI.

Create an organizational content pack with a dashboard that contains workbook tiles

When you [publish a content pack](#) you give access to individual colleagues or groups. When you publish a content pack that contains workbook links, you'll have the option to modify the permissions for the linked Excel workbook before publishing.

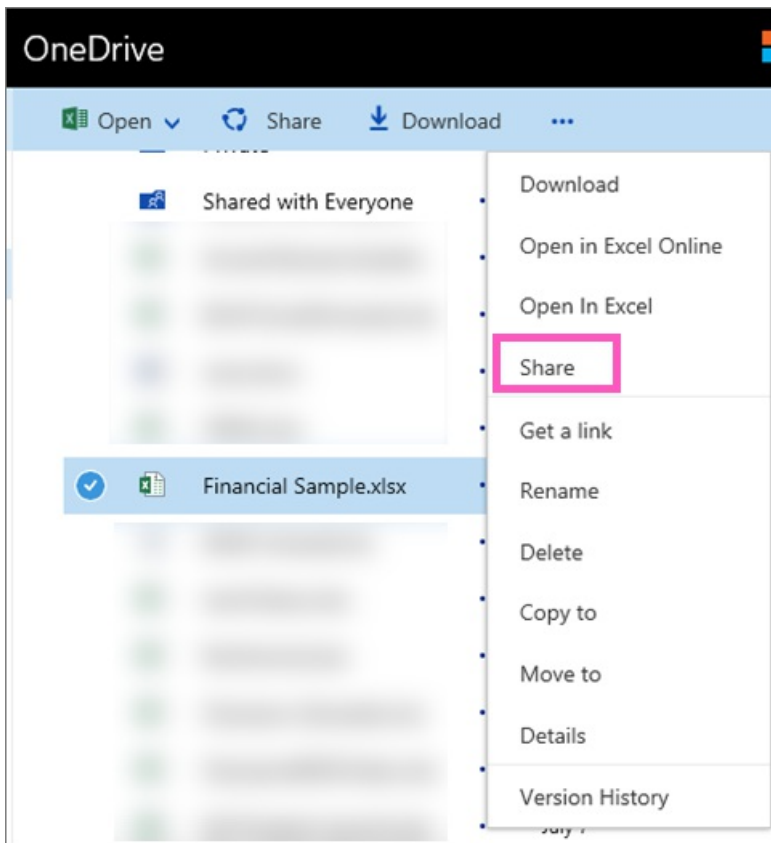
1. In the **Create content pack** screen, enter email addresses, give the content pack a title and description, and upload an image.
2. Select the dashboard and/or report that is linked to the Excel workbook on OneDrive for Business.



3. Select **Go to OneDrive for Business to set workbook permissions**.
4. On OneDrive, [modify the permissions](#) as needed.
5. Select **Publish**.

Share a dashboard from a Power BI workspace

Sharing a dashboard from a Power BI workspace is similar to sharing a dashboard from your own workspace, except that the files are located in an Office 365 workspace site, instead of your private OneDrive for Business. Modify the permissions for the Excel workbook before sharing the dashboard with people outside the workspace.



Next steps

- [Pin a tile to a Power BI dashboard from Excel](#)
- [Power BI Basic Concepts](#)
- More questions? [Try the Power BI Community](#)

Export reports from Power BI to PowerPoint (Preview)

1/25/2018 • 5 min to read • [Edit Online](#)

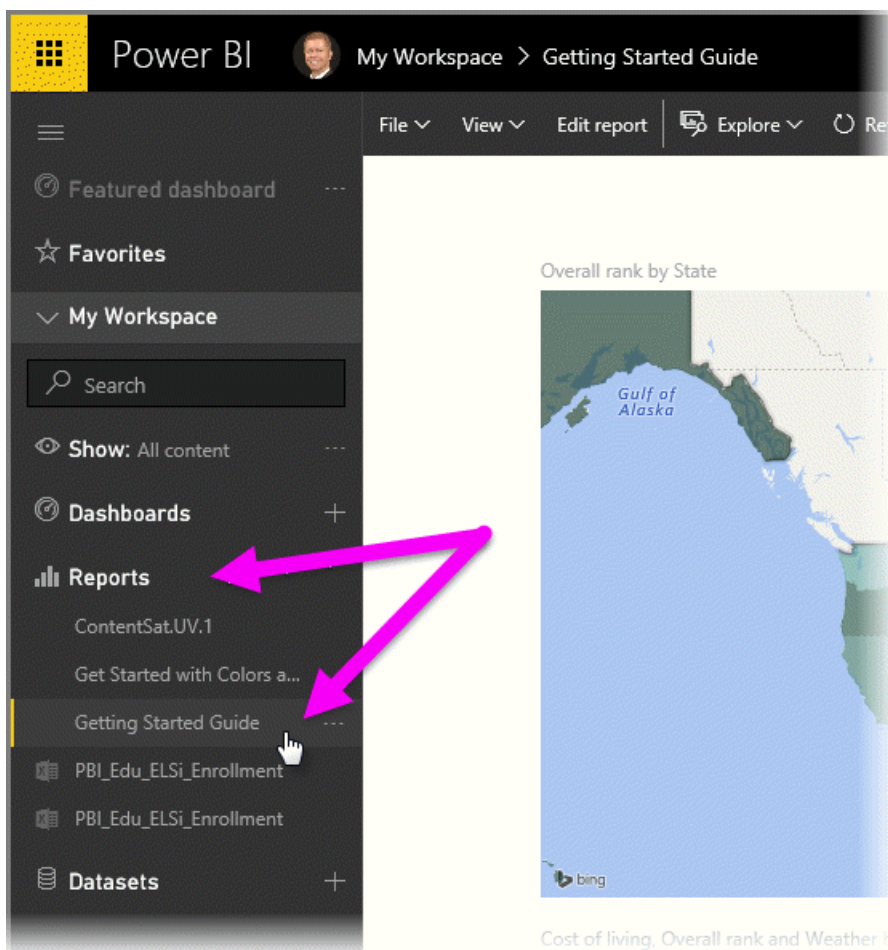
With Power BI, you can now publish your report to **Microsoft PowerPoint**, and easily create a slide deck based on your Power BI report. When you **export to PowerPoint**, the following occurs:

- Each page in the Power BI report becomes an individual slide in PowerPoint
- Each page in the Power BI report is exported as a single high resolution image in PowerPoint
- Text boxes in the Power BI report become editable text boxes in PowerPoint
- A link is created in PowerPoint that links to the Power BI report

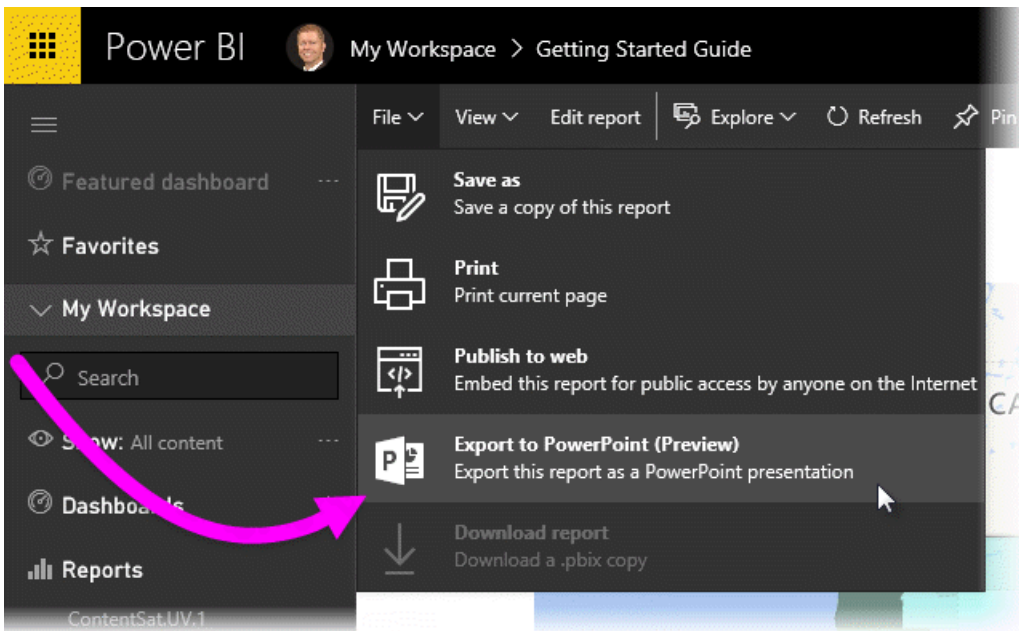
Getting your **Power BI report** exported into **PowerPoint** is easy. Just follow the steps outlined in the next section.

How to export your Power BI report to PowerPoint

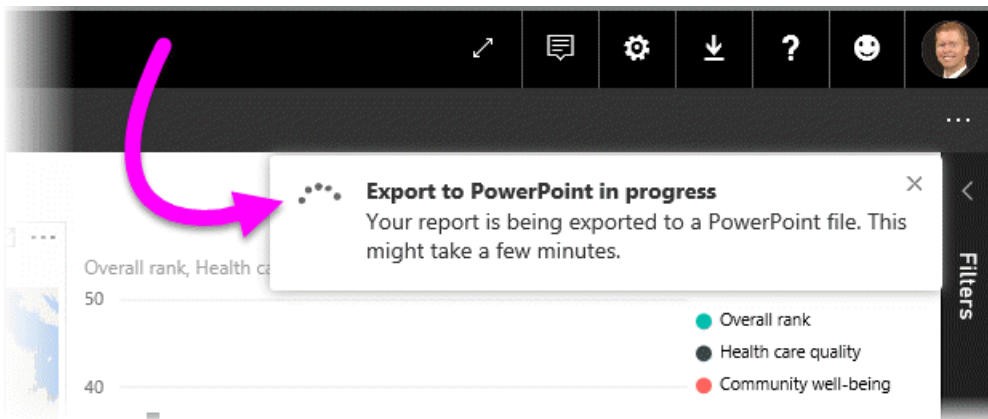
In the Power BI service, select the **Reports** section in the left navigation pane to expand that section, then select your report to display it on the canvas. You can also select a report from your **My Workspace** section, or your **Favorites**, if the report is in either of those locations.



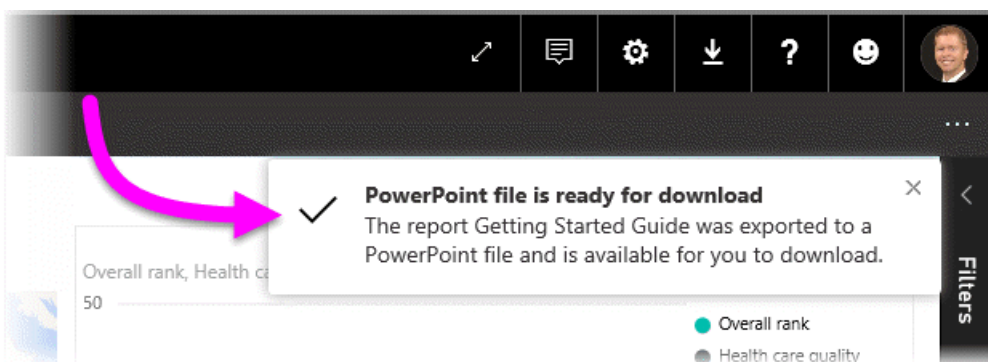
When the report you want to export to PowerPoint is displayed on the canvas, select **File > Export to PowerPoint (Preview)** from the menu bar in the Power BI service, as shown in the following image.



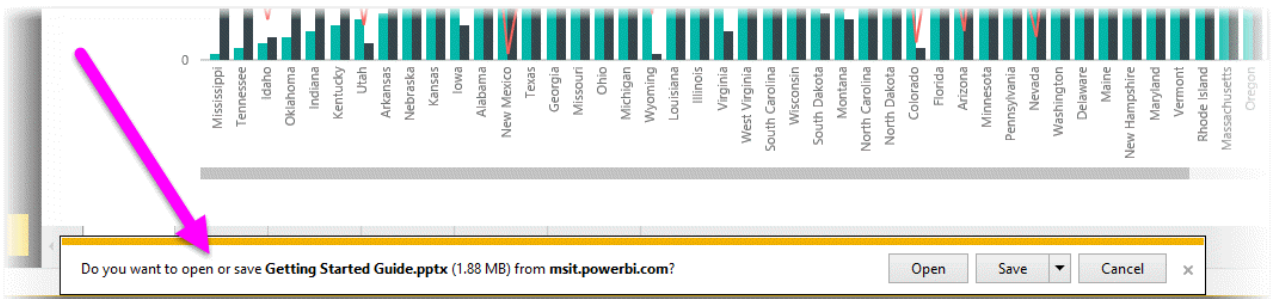
You'll see a notification banner in the upper right corner of the Power BI service browser window that the report is being exported to PowerPoint. This might take a few minutes, and you can continue to work in Power BI while the report is being exported.



Once complete, the notification banner changes to let you know that the Power BI service has finished the export process.



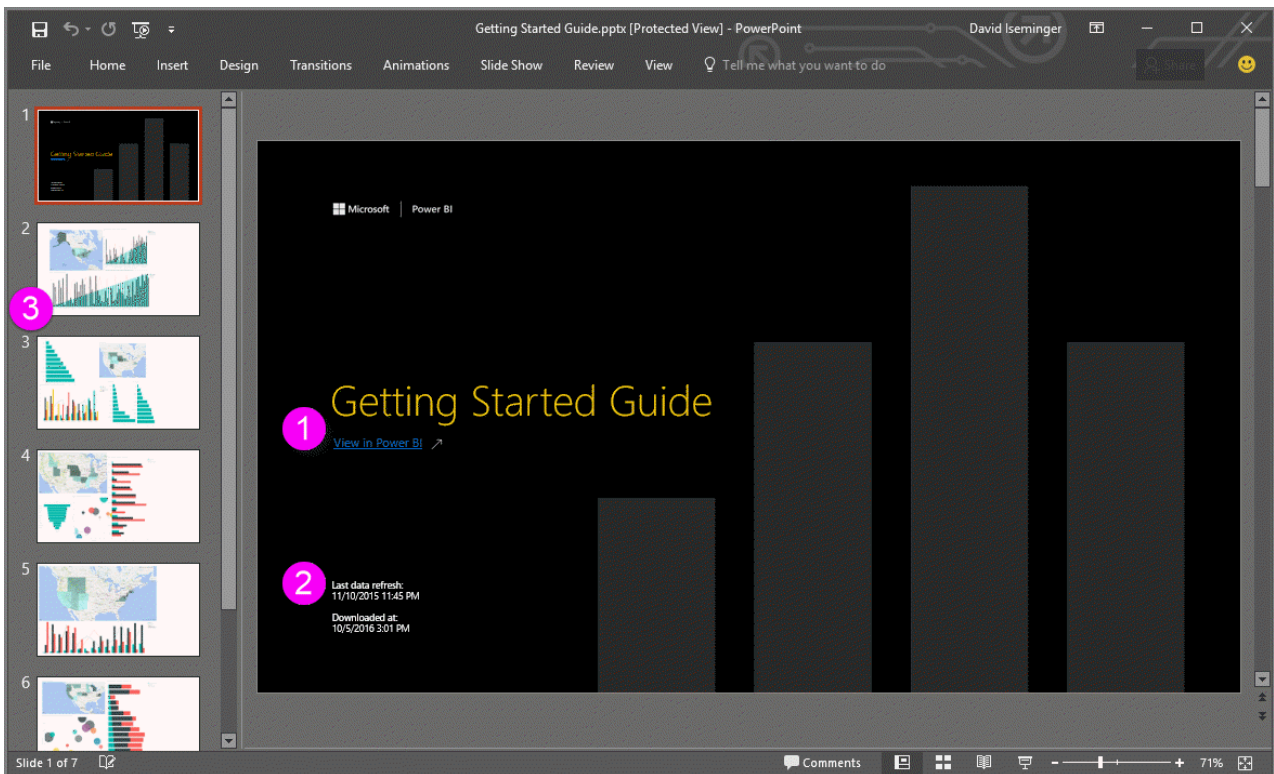
Your file is then available where your browser displays downloaded files. In the following image, it's shown as a download banner along the bottom of the browser window.



And that's all there is to it. You can download the file, open it with PowerPoint, and then modify or enhance it just like you would any other PowerPoint deck.

Checking out your exported PowerPoint file

When you open the PowerPoint file that Power BI exported, you find a few cool and useful elements. Take a look at the following image, then check out the numbered elements below that describe some of those cool features.

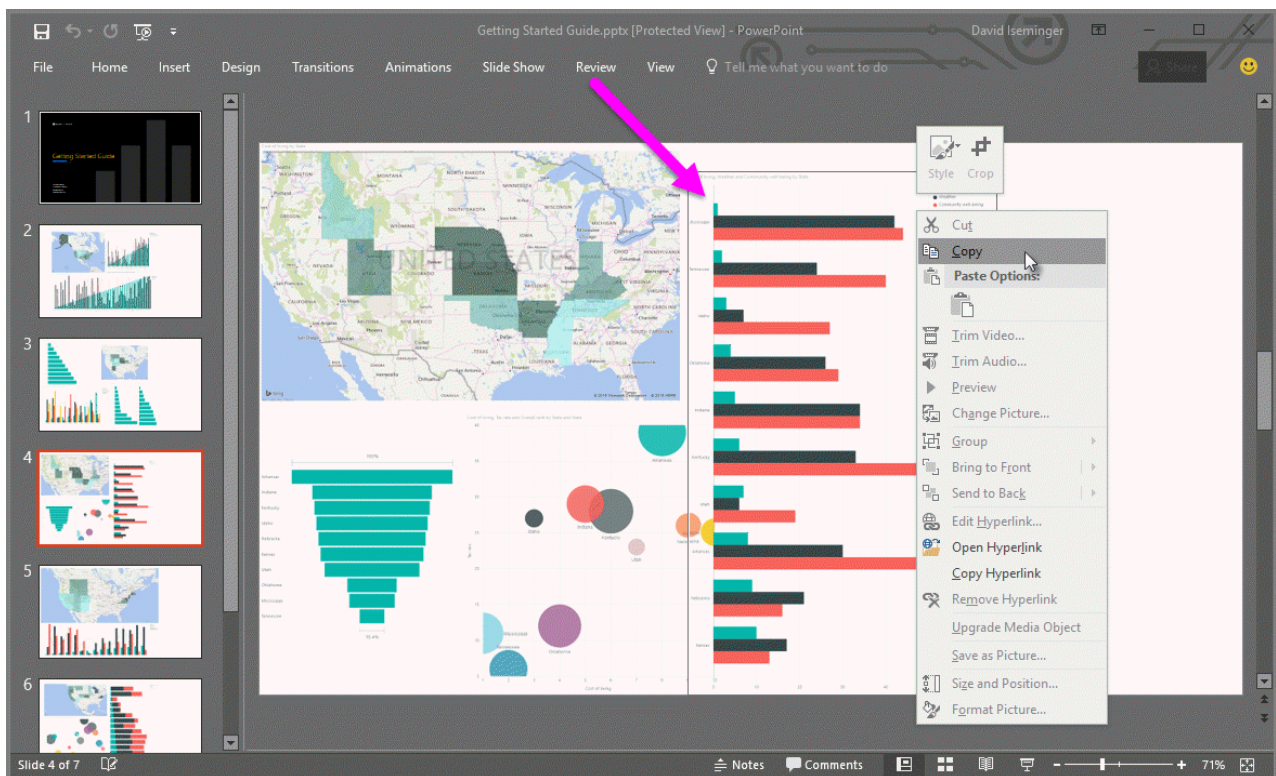


1. The first page of the slide deck includes the name of your report, and a link so that you can **View in Power BI** the report on which the slide deck is based.
2. You get some useful information about the report, too, including the *last data refresh* on which the exported report is based, and the *downloaded at* time and date, which is the time and date when the Power BI report was exported into a PowerPoint file.
3. Each report page is a separate slide, as shown in the left navigation pane.

When you go into an individual slide, you'll notice that each report page is an independent image.

NOTE

Having one visual for each report page is new behavior. The previous behavior, which provided an independent image for each visual, is no longer implemented.




What you do with your PowerPoint deck from there, or any of the high resolution images, is up to you!

Limitations

There are a few considerations and limitations to keep in mind when working with the **Export to PowerPoint** feature.

- **R visuals** are not currently supported. Any such visuals are exported as a blank image into PowerPoint with an error message that states the visual is not supported.
- **Custom visuals** that have been **certified** are supported. For more information on certified custom visuals, including how to get a custom visual certified, see [getting a custom visual certified](#). Custom visuals that have not been certified are not supported, and are exported as a blank image into PowerPoint with an error message that states the visual is not supported.
- **Certified custom visuals** are supported. A certified custom visual has been approved for use with Power BI, meets certain code requirements, and has passed strict security tests. You can [learn more about certified custom visuals](#).
- Reports with more than 15 report pages can't currently be exported.
- The process of exporting the report to PowerPoint may take a few minutes to complete, so please be patient. Factors that can impact the time required include the structure of the report, and the current load on the Power BI service.
- If the **Export to PowerPoint (Preview)** menu item isn't available in the Power BI service, it's likely because your tenant administrator has disabled the feature. Please contact your tenant administrator for details.
- Background images will be cropped with the chart's bounding area. It's highly recommended that you remove background images before exporting to PowerPoint.
- **In-session interactivity** such as highlighting and filtering, drill-down, and so on, are not yet supported when exporting to PowerPoint. The exported PowerPoint shows the original visuals as they were saved in the report.
- Pages in PowerPoint are always created in the standard 9:16 size, regardless of the original page sizes or dimensions in the Power BI report.
- Reports that are owned by a user outside your Power BI tenant domain (such as, a report owned by someone outside your organization, and shared with you) cannot be published to PowerPoint.
- If you share a dashboard with someone outside of your organization (and thereby, a user who is not in your

Power BI tenant), that user will not be able to export the shared dashboard's associated reports to PowerPoint. For example, if you are aaron@contoso.com, you can share with david@cohowinery.com. But david@cohowinery.com cannot export the associated reports to PowerPoint.

- As previously mentioned, each report page is exported as a single image in the PowerPoint file.
- The Power BI service uses your Power BI language setting as the language for the PowerPoint export. To see or set your language preference, select the cog icon  > **Settings** > **General** > **Language**.
- The **Downloaded at** time on the cover slide for the exported PowerPoint file is set to your computer's time zone at the time of the export.

Next steps

[Analyze in Excel](#)

[Excel data in Power BI](#)

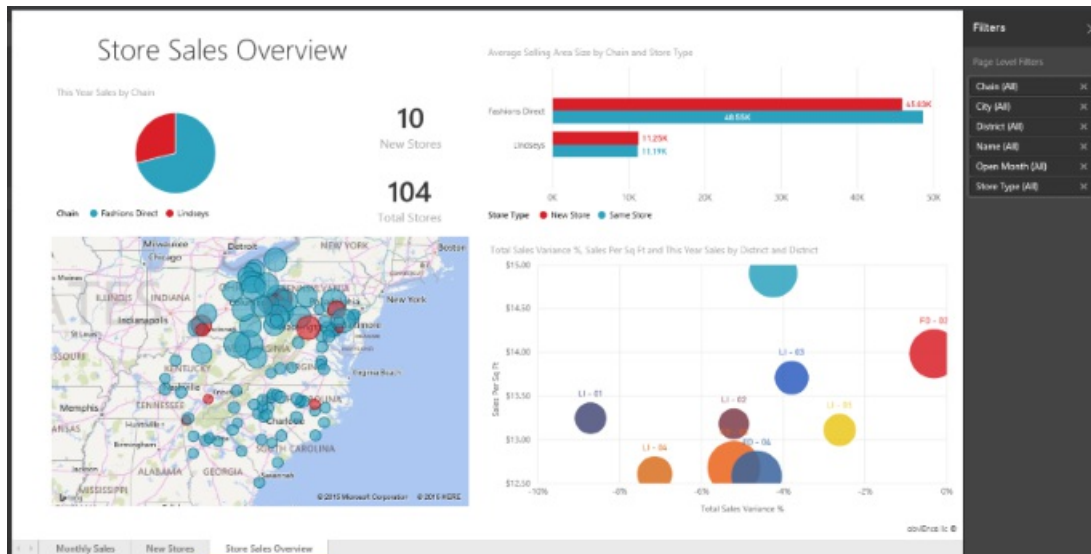
[Getting a custom visual certified](#)

Reports in Power BI

1/8/2018 • 4 min to read • [Edit Online](#)

What is a Power BI report?

A Power BI **report** is a multi-perspective view into a dataset, with visualizations that represent different findings and insights from that dataset. A report can have a single visualization or pages full of visualizations. Depending on your job role, you may be someone who *creates* reports and/or you may be someone who *consumes* or uses reports.



This report has 3 pages (or tabs) and we're currently viewing the Store Sales Overview page. On this page are 6 different visualizations and a page title. Visualizations can be *pinned* to dashboards and when that pinned visualization is selected, it opens the report it was pinned from.

If you're new to Power BI, you can get a good foundation by reading [Power BI basic concepts](#)

Reports are a feature of Power BI service and Power BI Desktop. The experience of working with reports is almost identical. However, for mobile, you can't create reports but you can [view, share, and annotate reports](#).

Advantages of reports

Reports are based on a single dataset. The visualizations in a report each represent a nugget of information. And the visualizations aren't static; you can add and remove data, change visualization types, and apply filters and slicers as you dig into the data to discover insights and look for answers. Like a dashboard, but more-so, a report is highly interactive and highly customizable and the visualizations update as the underlying data changes.

Dashboards versus reports

[Dashboards](#) are often confused with reports since they too are canvases filled with visualizations. But there are some major differences.

CAPABILITY	DASHBOARDS	REPORTS
Pages	One page	One or more pages

CAPABILITY	DASHBOARDS	REPORTS
Data sources	One or more reports and one or more datasets per dashboard	A single dataset per report
Available in Power BI Desktop	No	Yes, can create and view reports in Desktop
Pinning	Can pin existing visualizations (tiles) only from current dashboard to your other dashboards	Can pin visualizations (as tiles) to any of your dashboards. Can pin entire report pages to any of your dashboards.
Subscribe	Can't subscribe to a dashboard	Can subscribe to report pages
Filtering	Can't filter or slice	Many different ways to filter, highlight, and slice
Set alerts	Can create alerts to email you when certain conditions are met	No
Feature	Can set one dashboard as your "featured" dashboard	Cannot create a featured report
Natural language queries	Available from dashboard	Not available from reports
Can change visualization type	No. In fact, if a report owner changes the visualization type in the report, the pinned visualization on the dashboard does not update	Yes
Can see underlying dataset tables and fields	No. Can export data but can't see tables and fields in the dashboard itself.	Yes. Can see dataset tables and fields and values.
Can create visualizations	Limited to adding widgets to dashboard using "Add tile"	Can create many different types of visuals, add custom visuals, edit visuals and more with Editing permissions
Customization	Can do things with the visualizations (tiles) like move and arrange, resize, add links, rename, delete, and display full screen. But the data and visualizations themselves are read-only.	In Reading view you can publish, embed, filter, export, download as .pbix, view related content, generate QR codes, analyze in Excel, and more. In Editing view you can do everything mentioned so far and so much more.

Report *creators* and report *consumers*

Depending on your role, you may be someone who creates reports for your own use or to share with colleagues. You want to learn how to create and share reports. Or, you may be someone who receives reports from others. You want to learn how to understand and interact with the reports.

Here are some topics, by role, to help you get started.

If you will be creating and sharing reports

- Start with a [tour of Power BI service](#) so you know where to find reports and report tools.

- Take a tour of the [report editor](#).
- Learn how to [create a report from a dataset](#).
- [Learn how to use visualization, page, and report-level filters](#)
- Discover all the different ways you can [share a report with colleagues](#).

If you will be receiving and consuming reports

- Start with a [tour of Power BI service](#) so you know where to find reports and report tools.
- Learn how to [open a report](#) and all the interaction available in [Reading view](#).
- Get comfortable with reports by taking a tour of one of our [samples](#).
- Don't need the report any more? You can [remove it](#).
- To see which dataset the report is using and which dashboards have tiles pinned from the report, [view related content](#).

TIP

If you didn't find what you're looking for here, use the Table of Contents to the left to browse all *report* topics.

Next steps

[Get Started with Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Create a new Power BI report by importing a dataset

1/26/2018 • 2 min to read • [Edit Online](#)

You've read [Reports in Power BI](#) and now you want to create your own. There are many different ways to create a report, and in this article we'll start by creating a very basic report from an Excel dataset. Once you understand the basics of creating a report, the **Next steps** at the bottom will direct you to more-advanced report topics.

TIP: To create a report by copying an existing report, see [Copy a report](#)

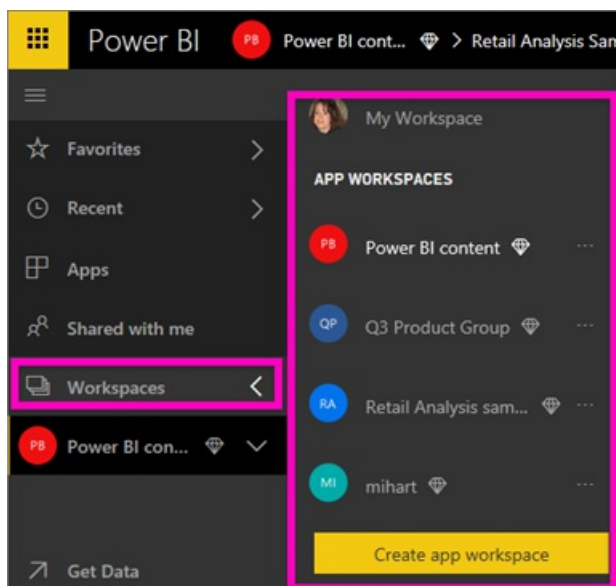
Prerequisites

- Power BI service (for creating reports using Power BI Desktop, see [Desktop report view](#))
- Retail Analysis sample dataset

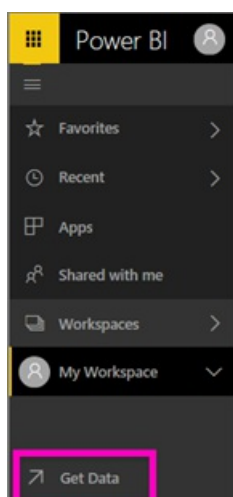
Import the dataset

This method of creating a report starts with a dataset and a blank report canvas. To follow along, [download the Retail Analysis sample Excel dataset](#) and save it to OneDrive for Business (preferred) or locally.

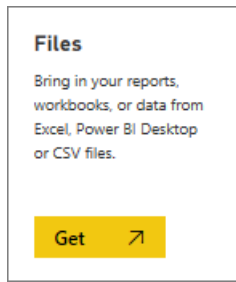
1. We'll create the report in a Power BI service workspace, so select an existing workspace or create a new one.



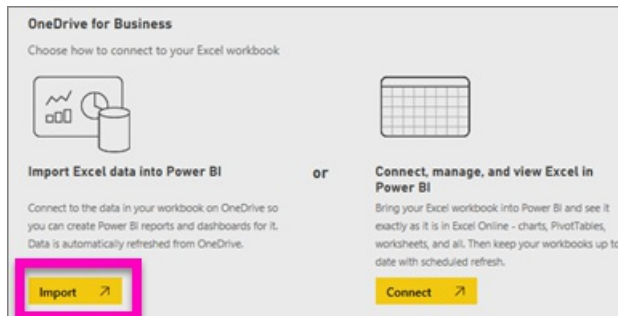
2. From the bottom of the left navpane, select **Get data**.



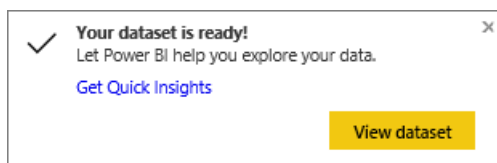
3. Select **Files** and navigate to the location where you saved the Retail Analysis sample.



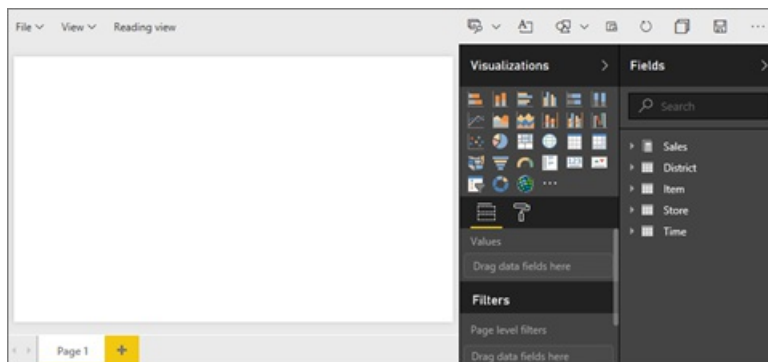
4. For this exercise, select **Import**.



5. Once the dataset is imported, select **View dataset**.



6. Viewing a dataset actually opens the report editor. You'll see a blank canvas and the report editing tools.

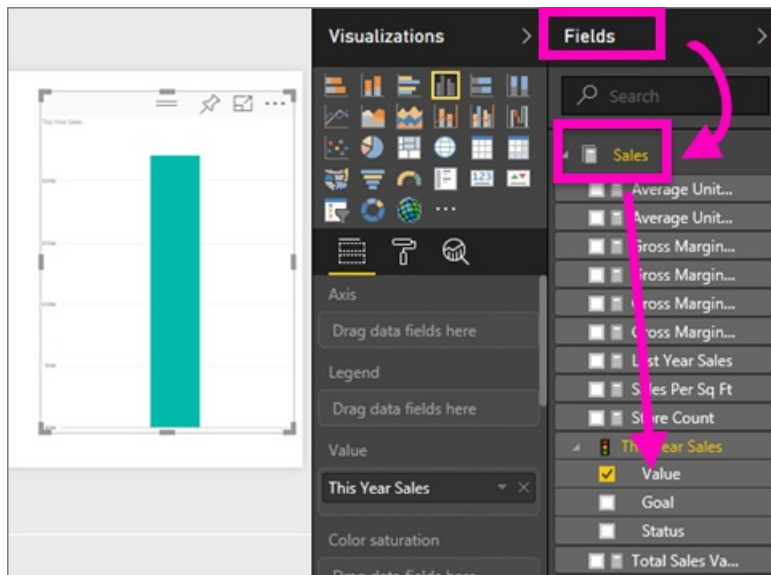


TIP: If you're unfamiliar with the report editing canvas, or need a refresher, [Take a tour of the report editor](#) before continuing.

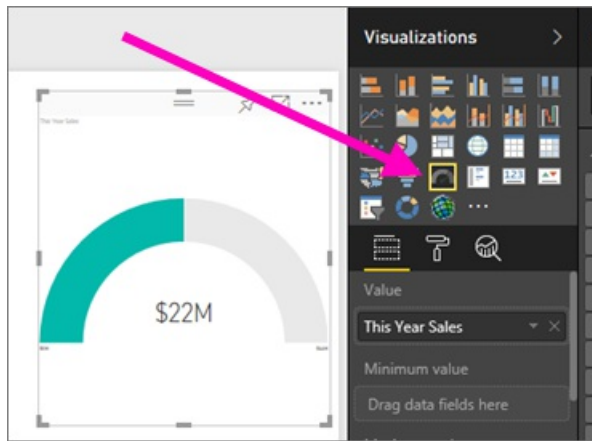
Add a Radial Gauge to the report

Now that our dataset is imported, let's start answering some questions. Our Chief Marketing Officer (CMO) wants to know how close we are to meeting this year's sales goals. A Gauge is a [good visualization choice](#) for displaying this type of information.

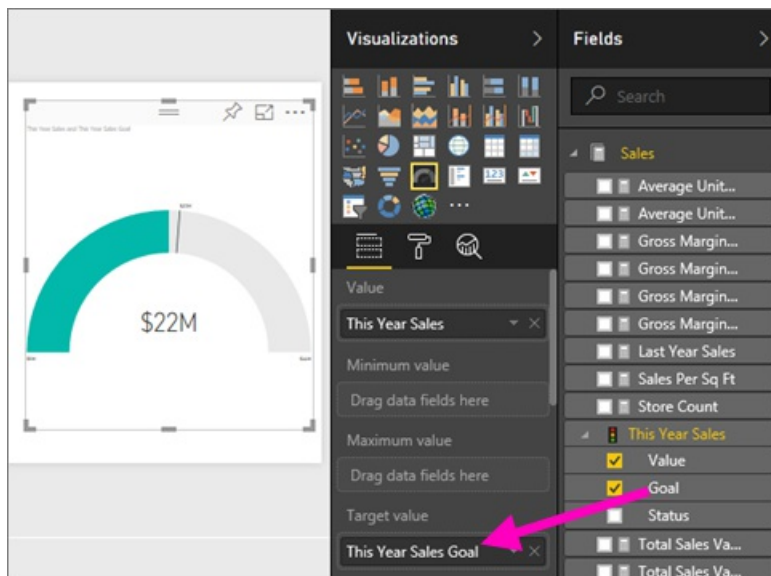
1. In the Fields pane, select **Sales > This Year Sales > Value**.



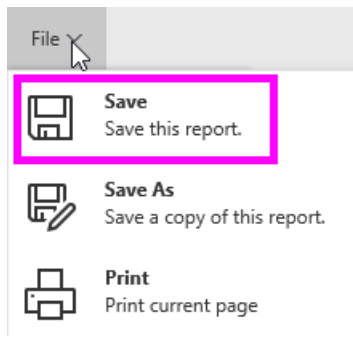
2. Convert the visual to a Gauge by selecting the Gauge template  from the **Visualizations** pane.



3. Drag **Sales** > **This Year Sales** > **Goal** to the **Target value** well. Looks like we're very close to our goal.



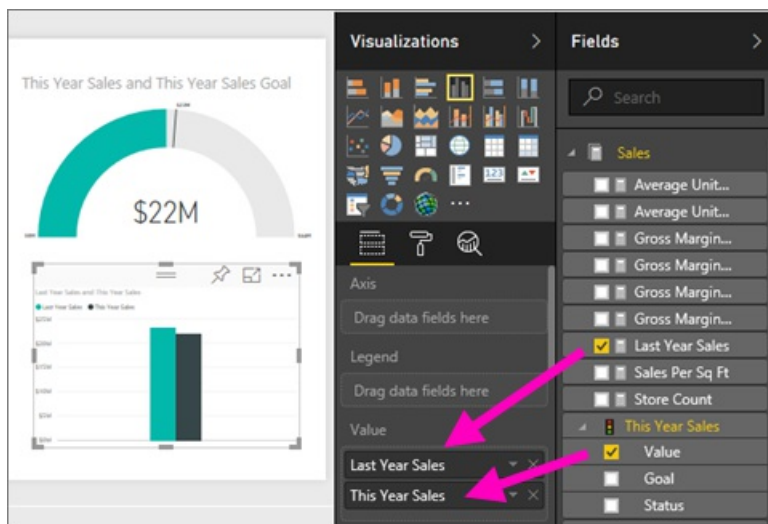
4. Now would be a good time to [save your report](#).




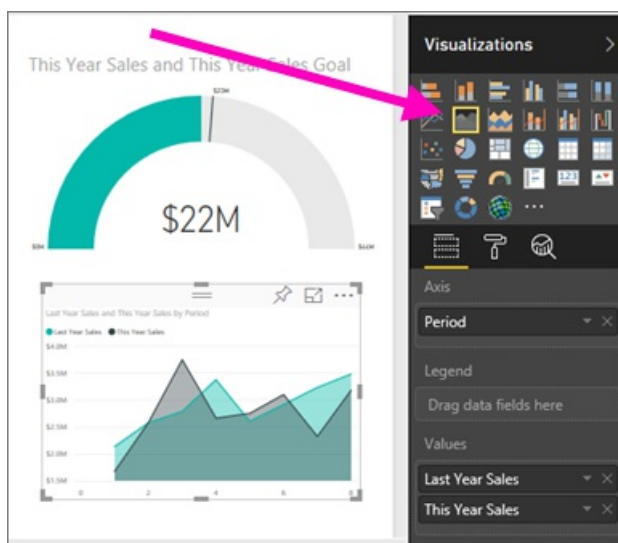
Add an area chart and slicer to the report


Our CMO has some additional questions for us to answer. She'd like to know how sales this year compare to last year. And, she'd like to see the findings by district.

1. First, let's make some room on our canvas. Select the Gauge and move it into the top-right corner. Then grab and drag one of the corners and make it smaller.
2. Deselect the gauge. In the Fields pane, select **Sales > This Year Sales > Value** and select **Sales > Last Year Sales**.



3. Convert the visual to an Area chart by selecting the Area chart template  from the **Visualizations** pane.
4. Select **Time > Period** to add it to the **Axis** well.

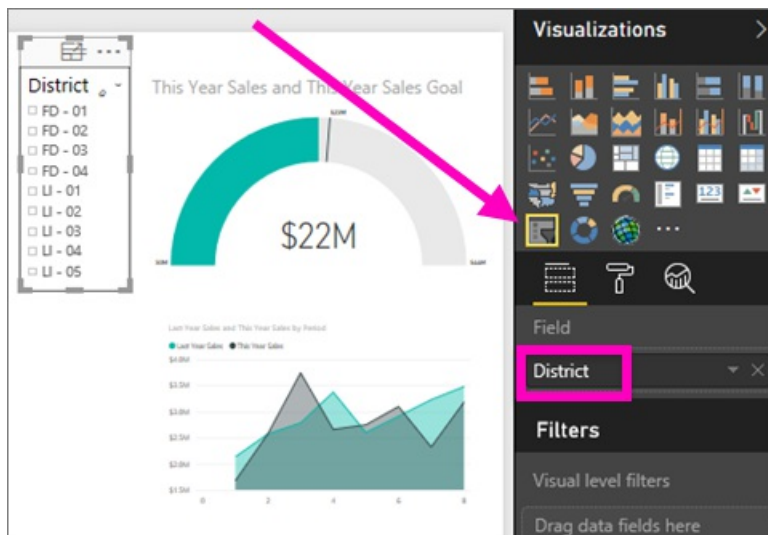


5. To sort the visualization by time period, select the ellipses and choose **Sort by Period**.
6. Now let's add the slicer. Select an empty area on the canvas and choose the Slicer  template. This adds

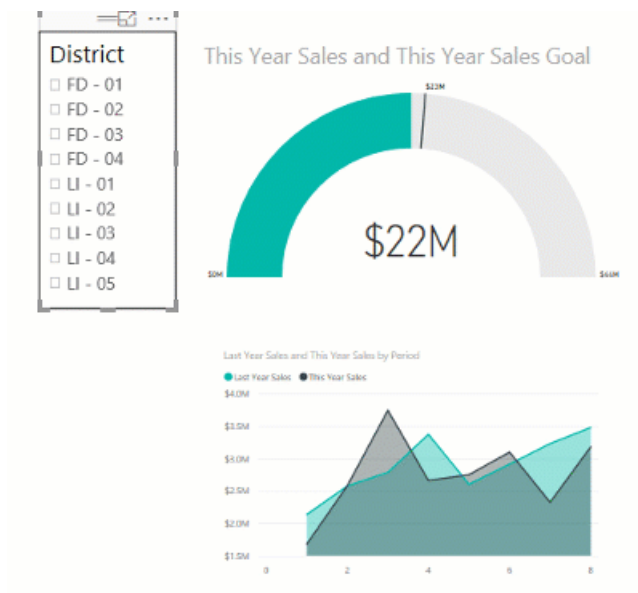
an empty slicer to our canvas.



7. From the Fields pane, select **District** > **District**. Move and resize the slicer.



8. Use the slicer to look for patterns and insights by District.



Continue exploring your data and adding visualizations. When you find especially interesting insights, [pin them to a dashboard](#).

Next steps

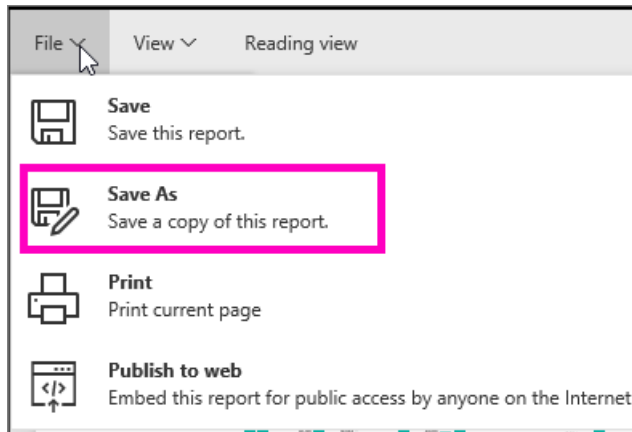
- [Add a new page to the report](#)
- Learn how to [pin visualizations to a dashboard](#)
- More questions? [Try the Power BI Community](#)

Create a new report from an existing report

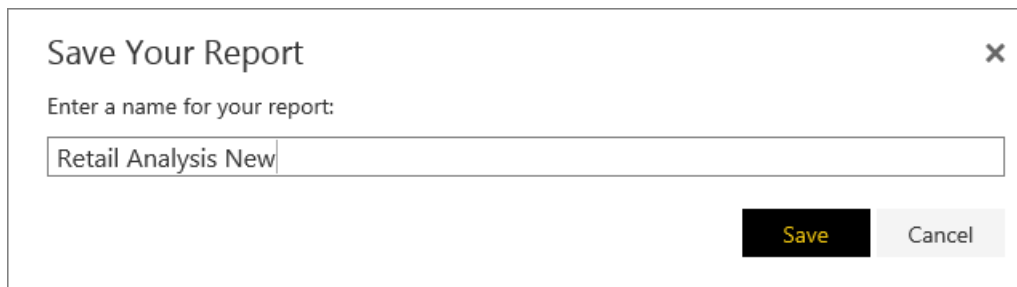
1/8/2018 • 1 min to read • [Edit Online](#)

Maybe you have a report that already connects to your dataset and has some visuals that you'd like to re-use or modify. Why not simply copy that report as a basis for a new report? To do that:

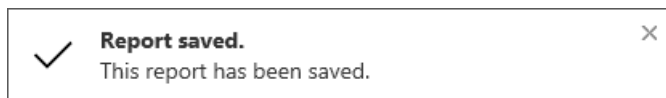
1. [Open a report](#).
2. From the **File** menu, select **Save As**.



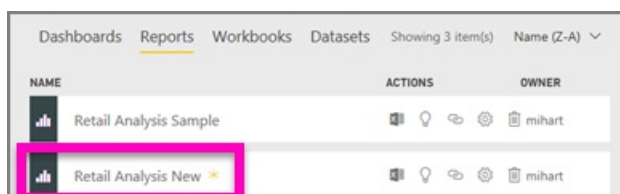
3. Type a name for the new report and select **Save**.



A Success message lets you know that the new report was saved to your current workspace in Power BI.



4. Open the **Reports** tab of your workspace and select the new report to open it. Optionally, delete visuals you don't want to keep, modify other visuals, and add new ones.



5. Have fun updating and editing your new report.

Next Steps:

[Create new visualizations](#)

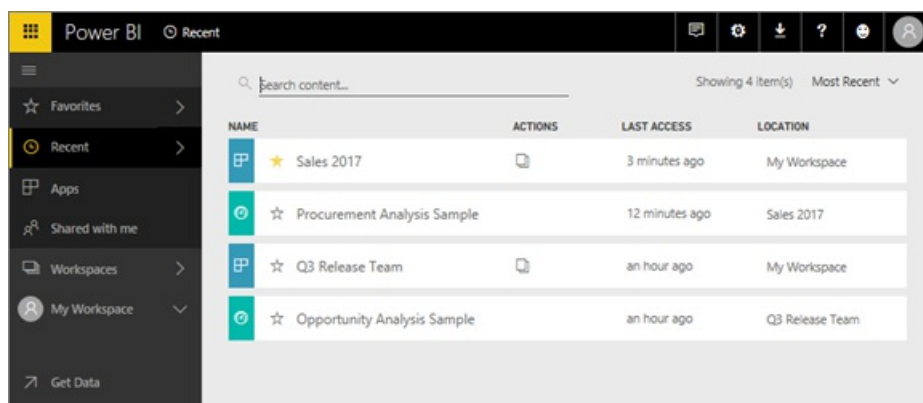
[Delete visualizations](#) you don't need

Recent content in Power BI service

12/7/2017 • 1 min to read • [Edit Online](#)

What is recent content

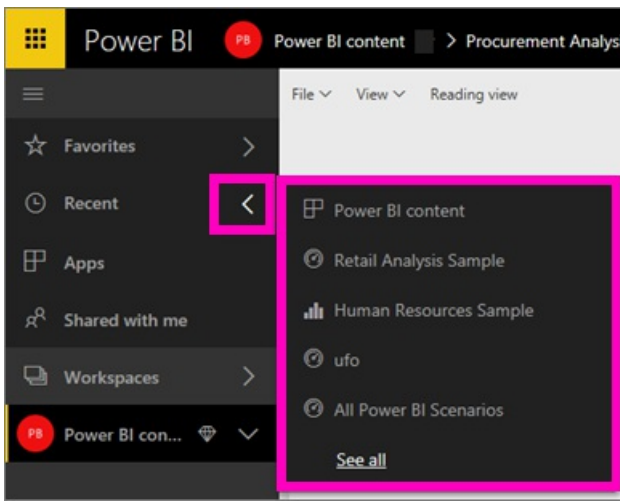
Recent content is the last items you visited, up to a maximum of 20 items. These include: dashboards, reports, apps, and workbooks across all of your workspaces.



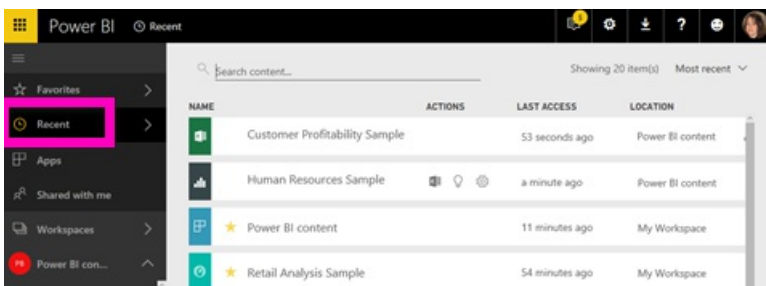
Watch Amanda demonstrate how **Recent** content lists are populated, then follow the step-by-step instructions below the video to try it out yourself.

Display recent content

To see your five most-recently visited items, from the left navigation, select the arrow to the right of **Recent**. From here you can select recent content to open it. Only the five most-recent items are listed.



If you have more than five recently-visited items, select **See all** to open the Recent screen (see below). You can also select **Recent**, or the Recent  icon, from the left nav.



From here you can interact with the content as you would on the individual **Dashboards**, **Reports**, and **Workbooks** tabs, and on the **Apps** screen.

Next steps

[Power BI service Apps](#)

More questions? [Try the Power BI Community](#)

The report editor..Take a tour

1/24/2018 • 6 min to read • [Edit Online](#)

Editing reports in Power BI service and Power BI Desktop

The report editor in Power BI service and the report editor in Power BI Desktop are very similar. The video shows the report editor in Power BI Desktop and this article shows the report editor in Power BI service.

The difference between report *creators* and report *consumers*

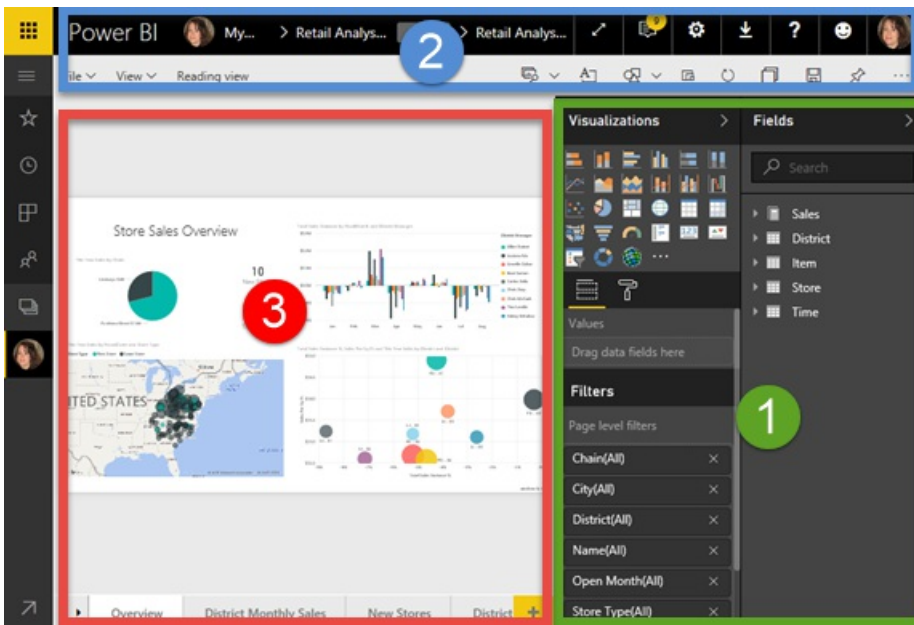
The ability to create and edit a report is restricted to report owners (aka *creators*). If you are *consuming* a report that has been shared with you, you'll still be able to open and interact with the report in Power BI service [Reading view only](#), but won't have all the robust and extensive features available to the report creator.

To learn more about report Reading view, see [Reading view and Editing view in Power BI service](#)

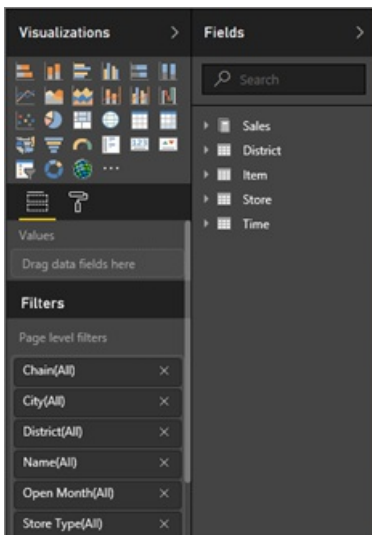
In Power BI service, the *report editor* is only available in [Editing View](#). To open a report in Editing view, you must be a report owner or creator.

The Power BI report editor is made up of 3 sections:

1. **Fields, Visualizations**, and **Filters** panes
2. top navigation bars
3. report canvas

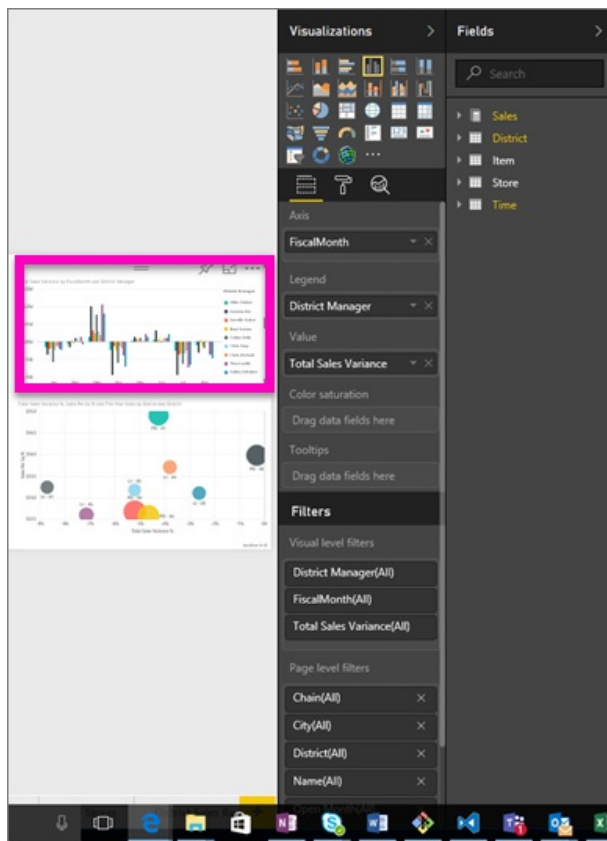




1. The report editor panes



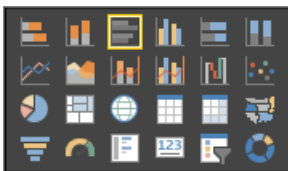
There are 3 panes visible when you first open a report: Visualizations, Filters, and Fields. The panes on the left side, Visualizations and Filters, control what your visualizations look like -- type, colors, filtering, formatting. And the pane on the right side, Fields, manages the underlying data being used in the visualizations.

The content displayed in the report editor varies by selections you make in the report canvas. For example, when you select an individual visual,



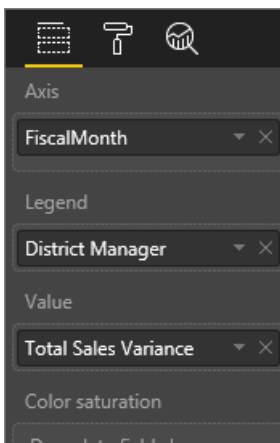
- The top of the Visualization pane identifies the type of visual in use; in this example, a Clustered column chart.
- The bottom of the Visualization pane (you may have to scroll down) displays the fields being used in the visual. This chart is using FiscalMonth, DistrictManager, and Total Sales Variance.
- The Filters pane (you may have to scroll down) displays any filters that have been applied.
- The Fields pane lists the tables available and, if you expand a table's name, the fields that make up that table. Yellow font lets you know that at least one field from that table is being used in the visualization.
-  To display the formatting pane, for the selected visualization, select the paint roller icon.
-  To display the Analytics pane, select the magnifying glass icon.

The Visualizations pane (from top to bottom)



Here is where you select a visualization type. The small pictures are called *templates*. In the image above, the Clustered bar chart is selected. If you don't select a visualization type first, but instead start building a visualization by selecting fields, Power BI will pick the visualization type for you. You can keep Power BI's selection, or change the type by selecting a different template. Switch as many times as you need to find the visualization type that best represents your data.

Manage the fields used in your visual.

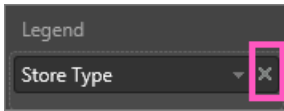


The buckets (sometimes called *wells*) shown in this pane vary depending on what type of visualization you have

selected. For example, if you've selected a bar chart, you'll see buckets for: Values, Axis, and Legend. When you select a field, or drag it onto the canvas, Power BI adds that field to one of the buckets. You can also drag fields from the Fields list directly into the buckets. Some buckets are limited to certain types of data. For example, **Values** won't accept non-numeric fields. So if you drag an **employeename** field into the **Values** bucket, Power BI changes it to **count of employeename**.

Remove a field

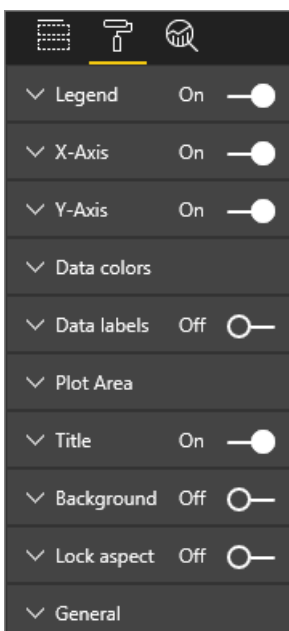
To remove a field from the visualization, select the **X** to the right of the field name.



For more information, see [Add visualizations to a Power BI report](#)

Format your visuals

Select the paint roller icon to display the Format pane. The option available depend on the type of visualization selected.

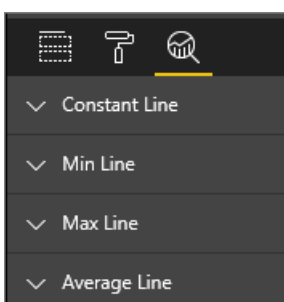


The formatting possibilities are almost endless. To learn more, explore on your own, or visit these articles:

- [Customizing visualization title, background and legend](#)
- [Color formatting](#)
- [Customizing X-axis and Y-axis properties](#)

Add analytics to your visualizations

Select the magnifying glass icon to display the Analytics pane. The option available depend on the type of visualization selected.

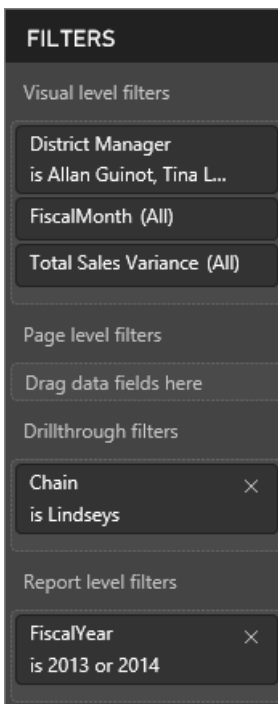


With the Analytics pane in Power BI service, you can add dynamic reference lines to visualizations, and provide focus for important trends or insights. To learn more, see [Analytics pane in Power BI service](#) or [Analytics pane in](#)

The Filters pane

Use the Filters pane to view, set, and modify persistent filters to your reports at the page, report, drillthrough, and visual-level. Yes, you can do ad-hoc filtering on report pages and visuals by selecting elements of the visuals or by using tools like slicers, but by using the Filters pane the state of the filters is saved with the report.

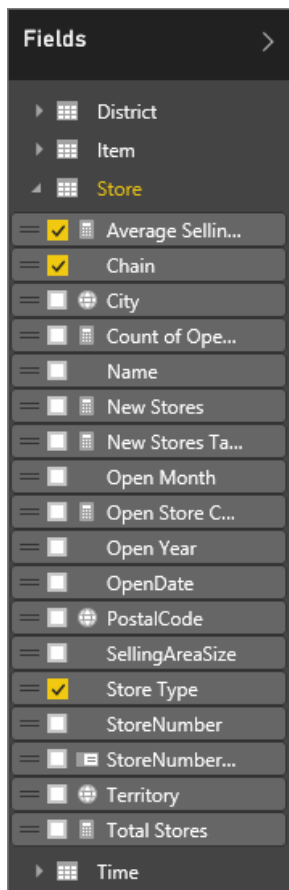
The Filters pane has one other powerful feature - the ability to filter using a field ***that is not already being used in one of the visuals in your report***. Let me explain. When you create a report page, Power BI automatically adds all the fields you use in your visualizations to the Visual level filters area of the Filters pane. But, if you want to set a visual, page, drillthrough, or report filter using a field that is not currently used in a visualization, just drag it to one of the Filters buckets.



For more information, see [Add a filter to a report](#).

The Fields pane

The Fields pane displays the tables and fields that exist in your data and are available for you to use to create visualizations.



- Drag a field onto the page to start a new visualization. You can also drag a field onto an existing visualization to add the field to that visualization.
- When you add a checkmark next to a field, Power BI adds that field to the active (or new) visualization. And it also decides which bucket to place that field into. For example, should the field be used a legend, axis, or value? Power BI makes a best-guess and you can move it from that bucket to another if necessary.
- Either way, each selected field is added to the Visualizations pane in the report editor.

NOTE: If you're using Power BI Desktop, you'll also have options to show/hide fields, add calculations etc.

What do the field icons mean?

- **Σ Aggregates** An aggregate is a numeric value that will be summed or averaged, for example. Aggregates are imported with the data (defined in the data model your report is based on). For more information, see [Aggregates in Power BI reports](#).
- **📊 Calculated measures (also called calculated fields)**
Each calculated field has its own hard-coded formula. You can't change the calculation, for example, if it's a sum, it can only be a sum. For more information, [read Understanding measures](#)
- **📄 Unique fields**
Fields with this icon were imported from Excel and are set to show all values, even if they have duplicates. For example your data might have two records for people named 'John Smith', and each will be treated as unique -- they won't be summed.
- **🌐 Geography fields**
Location fields can be used to create map visualizations.
- **📂 Hierarchy**
Select the arrow to reveal the fields that make up the hierarchy.

2. The top navigation bar

The actions available from the top navigation bar are numerous; with new actions being added all the time. For information about a particular action, use the Power BI Documentation Table of Contents or Search box.

3. The report canvas

The report canvas is where your work displays. When you use the Fields, Filters, and Visualizations panes to

create visuals, they are built and displayed on your report canvas. Each tab at the bottom of the canvas represents a page in the report. Select a tab to open that page.

Next Steps:

[Create a report](#)

Read more about reports in [Power BI service](#), [Power BI Desktop](#), and [Power BI mobile](#).

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Add a page to a Power BI report in Power BI service and Power BI Desktop

12/20/2017 • 1 min to read • [Edit Online](#)

No reason to crowd up a report page -- just add a new blank page.

Adding and duplicating report pages require edit permissions to the report. In Power BI service, this means opening the report in [Editing view](#).

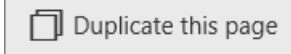
Add a new blank page

Select the yellow plus icon and then type a new name for the page.



Duplicate a page

From the top control bar, in [Editing view](#), select the **Duplicate this page** icon.



Your new page is created and becomes the active page. To rename it, double-click the name on the tab to highlight it, and type a new name. For more information, see [renaming in Power BI service](#)

Next steps

Read more about [reports in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Add a filter to a Power BI report (in Editing view)

1/8/2018 • 5 min to read • [Edit Online](#)

TIP

We recommend first reading [About filters and highlighting in Power BI reports](#).

What is the difference between report filters in Editing View versus Reading View

There are two modes for interacting with reports: [Reading View](#) and [Editing View](#). And the filtering capabilities available to you depend on which mode you're in.

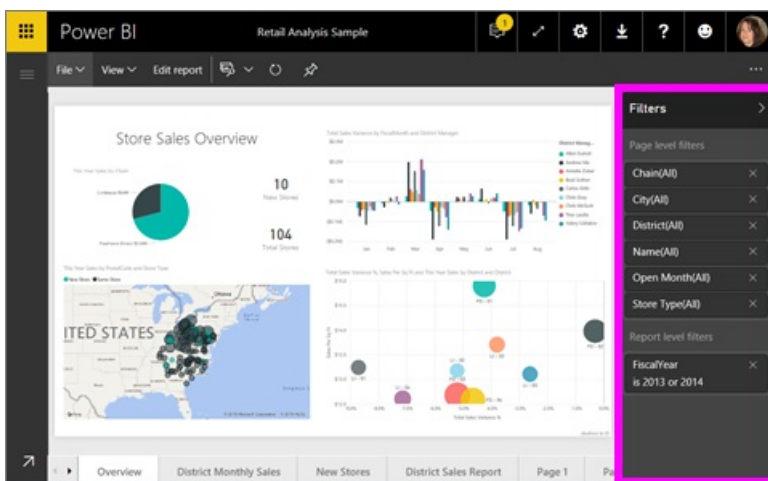
- In Editing View, you can add report, page, and visual filters. When you save the report, the filters are saved with it. People looking at the report in Reading View can interact with the filters you added, but not save their changes.
- In Reading View, you can interact with any report, page and visual filters that already exist in the report, but you won't be able to save your filter changes.

NOTE

This article describes how to create filters in report **Editing View**. For more information on filters in Reading View, see [interacting with filters in report Reading View](#).

Visual filters, page filters, drillthrough filters, and report filters

A **page filter** applies to all the visuals on the report page. A **visual filter** applies to a single visual on a report page. And a **report filter** applies to all pages in the report.



Add a filter to a specific visualization (aka visual filter)

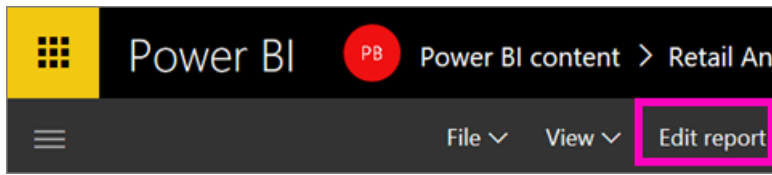
There are 2 ways to do this:

- by filtering a field that is already being used by the visualization
- by identifying a field that is not already being used by the visualization, and adding that field directly to the

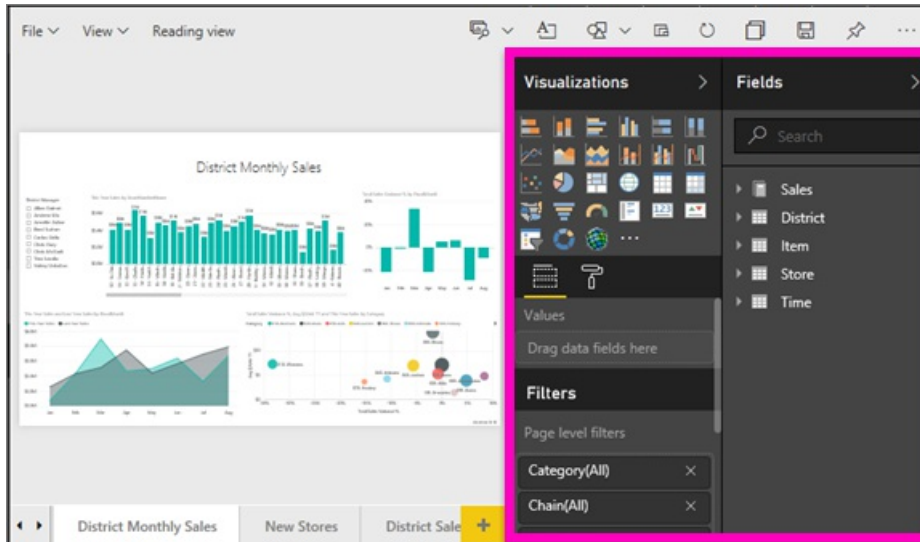
Visual level filters bucket.

By filtering the fields already in the visualization

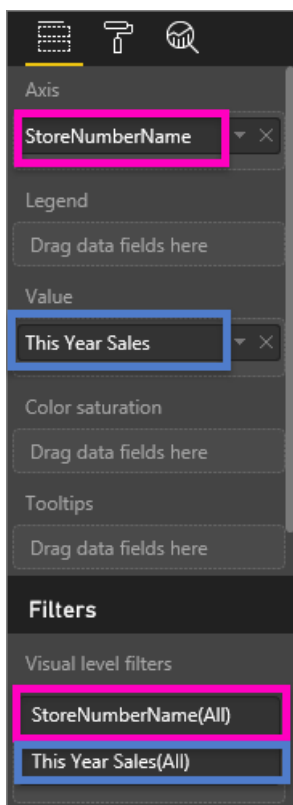
1. Open your [report in Editing View](#).



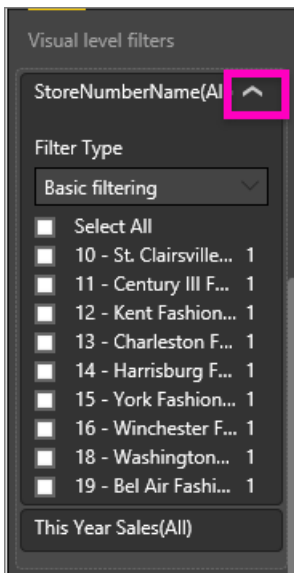
2. Open the Visualizations and Filters pane and the Fields pane (if they're not already open).



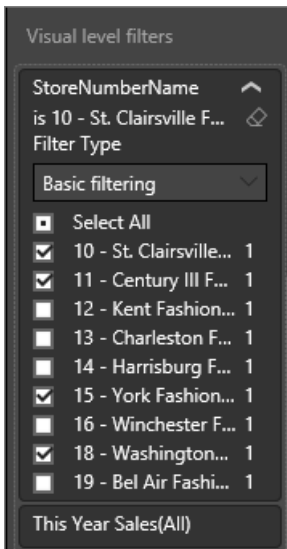
3. Select a visual to make it active. All the fields being used by the visual are identified in the **Fields** pane and also listed in the **Filters** pane, under the **Visual level filters** heading.



4. At this point we'll add a filter to a field already being used by the visualization.
 - Scroll down to the **Visual level filters** area and select the arrow to expand the field you'd like to filter. In this example we'll filter **StoreNumberName**



- Set either **Basic**, **Advanced**, or **Top N** filtering controls (see [How to use report filters](#)). In this example we'll select Basic filtering and place checkmarks next to numbers 10, 11, 15, and 18.

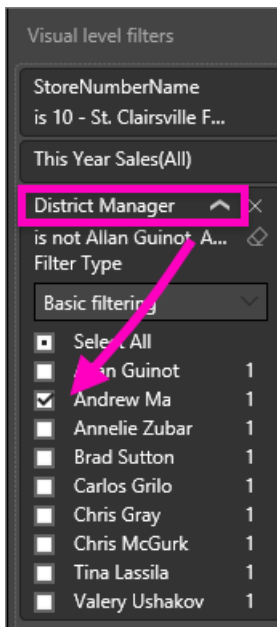


- The visual changes to reflect the new filter. If you save your report with the filter, report readers can interact with the filter in Reading View, selecting or clearing values.

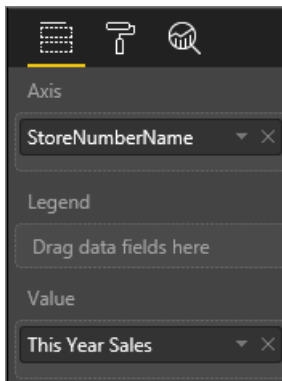


5. Now let's add a totally new field, as a Visual level filter, to our visualization.

- From the Fields pane, select the field you want to add as a new visual level filter, and drag it into the **Visual level filters area**. In this example we'll drag **District Manager** into the **Visual level filters** bucket and select only Andrew Ma.



- Notice that **District Manager** is *not* added to the visualization itself. The visualization is still composed of **StoreNumberName** as the Axis and **This Year Sales** as the Value.



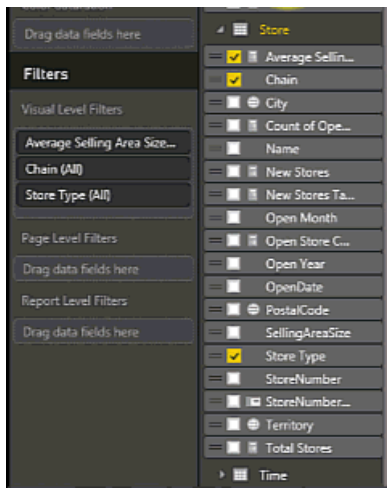
- And, the visualization itself is now filtered to show only Andrew's sales this year for the specified stores.



Add a filter to an entire page (aka page view filter)

1. Open your [report in Editing View](#).
2. Open the Visualizations and Filters pane and the Fields pane (if they're not already open).
3. From the Fields pane, select the field you want to add as a new page level filter, and drag it into the **Page level filters** area.
4. Select the values you want to filter and set either **Basic** or **Advanced** filtering controls (see [How to use report filters](#)).

All the visualization on the page, impacted by this filter, are re-drawn to reflect the change.



If you save your report with the filter, report readers can interact with the filter in Reading View, selecting or clearing values.

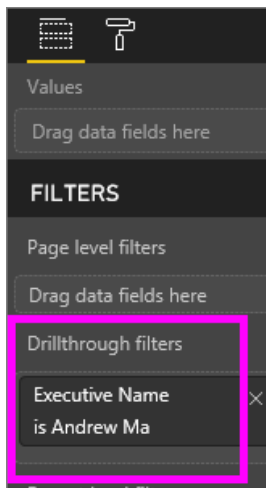
Add a drillthrough filter

With drillthrough in Power BI service and Power BI Desktop, you can create a *destination* report page that focuses on a specific entity - such as a supplier, or customer, or manufacturer. Now, from the other report pages, users can right-click on a data point for that entity and drillthrough to the focused page.

Create a drillthrough filter

To follow along, open the Customer Profitability sample in Editing view. Let's say that you want a page that focuses on Executive business areas.

1. Add a new page to the report and name it **Team Executive**. This will be the drillthrough *destination* page.
2. Add visualizations that track key metrics for the team executives' business areas.
3. Add **Executive > Executive Name** to the Drillthrough filters well.



Notice that Power BI adds a back arrow to the report page. Selecting the back arrow returns users to the *originating* report page -- the page they were on when they opted to drillthrough. The back arrow only works in Reading view.

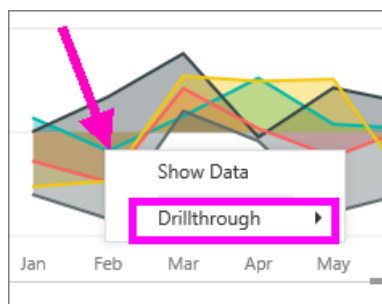


Use the drillthrough filter

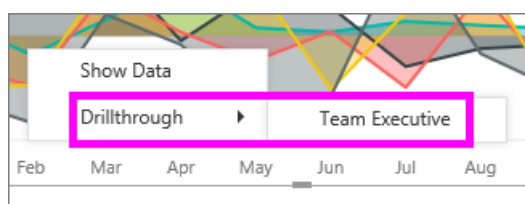
Let's see how the drillthrough filter works.

1. Start on the **Team Scorecard** report page.

- Let's say you're Andrew Ma and you want to see the Team Executive report page filtered to just your data. From the top-left area chart, right click any green data point to open the Drillthrough menu option.



- Select **Drillthrough > Team Executive** to drillthrough to the report page named **Team Executive**. The page is filtered to show information about the data point from which you right-clicked; in this case Andrew Ma. Only the field that is in the Drillthrough filters well gets passed through to the drillthrough report page.



Add a filter to an entire report (aka Report filter)

- Open your [report in Editing View](#).
- Open the Visualizations and Filters pane and the Fields pane (if they're not already open).
- From the Fields pane, select the field you want to add as a new report level filter, and drag it into the **Report level filters** area.
- Select the values you want to filter (see [How to use report filters](#)).

The visuals on the active page, and on all pages in the report, change to reflect the new filter. If you save your report with the filter, report readers can interact with the filter in Reading View, selecting or clearing values.

- Select the back arrow to return to the previous report page.

Troubleshooting

Why your visual level filter and page level filter may return different results

When you add a visual level filter, Power BI filters on the aggregated results. The default aggregation is Sum, but you can [change the aggregation type](#).

When you add a page level filter, Power BI filters without aggregating. It does this because a page can have many visuals which can each utilize different aggregation types. So the filter is applied on each data row.

If you do not see the Fields pane, make sure you're in report [Editing view](#)

Next steps

[How to use report filters](#)

[Filters and highlighting in reports](#)

[Interact with filters and highlighting in report Reading View](#)

[Change how report visuals cross-filter and cross-highlight each other](#)

More questions? [Try the Power BI Community](#)

Save a report in Power BI service and Power BI Desktop

1/8/2018 • 1 min to read • [Edit Online](#)

After you make changes to a report in Power BI, you can save it, save it with a new name, or just close it without saving your changes. Say you open the report, create a visualization, and pin it to your dashboard. If you close it now without saving your changes, the tile remains on the dashboard, but the visualization isn't saved in the report. When you click that tile on the dashboard, the report opens, but the visualization doesn't exist in the report.

TIP

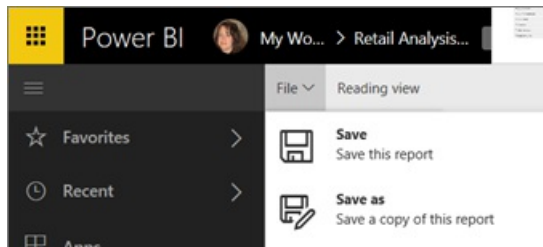
Pay attention to which workspace is active so you can find the saved report. The report is saved to the active workspace.

To save a report:

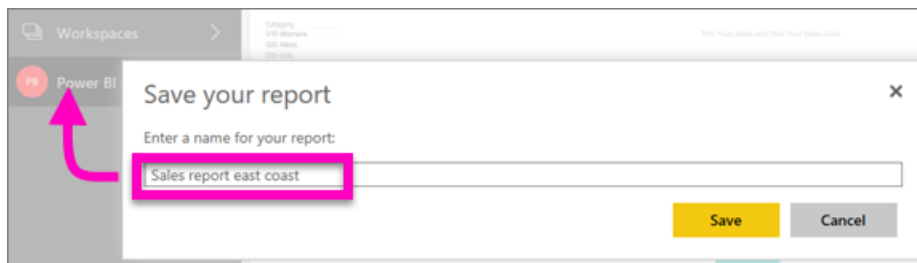
1. If you attempt to navigate away from a report, and the report has changes, Power BI will display a prompt.



2. Another way to save the report is to select **FILE** > **Save** or **Save As**. If you are in [Reading view](#) you will only see the option to Save As.



3. If this is a new report (Save), or a new version of an existing report (Save as), give it a descriptive name. **The report will be added to the active workspace.**



Next steps

Read more about [reports in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

About filters and highlighting in Power BI reports

1/8/2018 • 4 min to read • [Edit Online](#)

Filters remove all but the data you want to focus on. **Highlighting** is not filtering since it does not remove data but instead highlights a subset of the visible data; the unhighlighted data remains visible but dimmed.

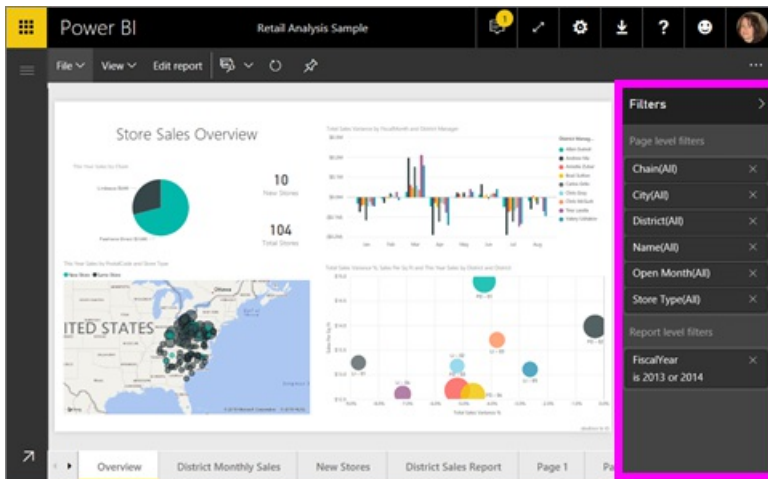
There are a lot of different ways you can filter and highlight reports in Power BI. Putting all of that information in one article would get confusing, so we've broken it down like this:

- Introduction to filters and highlighting (the article you're reading now)
- The ways you can [create and use filters and highlighting in Editing View/reports that you own](#). When you have editing permissions for a report, you can create, modify, and delete filters and highlighting in reports.
- The ways you can [use filters and highlighting in a report shared with you or in report Reading View](#). What you can do is more limited, but Power BI still gives you a wide range of filtering and highlighting options.
- [A detailed tour of the filter and highlighting controls available in Editing View](#) including an in-depth look at types of filters (e.g., date and time, numeric, text) and the difference between basic and advanced options.
- Now that you've learned how filters and highlighting work by default, [learn how to change the way visualizations on a page filter and highlight each other](#)

TIP

How does Power BI know how data is related? It uses the relationships between the different tables and fields in the underlying **data model** to make items on a report page interact with each other.

Introduction to filters and highlighting in reports using the Filters pane



Filters and highlighting can be applied using the **Filters** pane or by making selections directly on the report itself (ad-hoc, see bottom of page). The Filters pane shows the tables and fields used in the report and the filters that have been applied, if any. The filters are divided up into **Page level filters**, **Report level filters**, and **Visual level filters**. You'll only see visual level filters if you've selected a visualization on the report canvas.

TIP

If the filter has the word **All** next to it, that means that entire field is being included as a filter. For example, **Chain(All)** in the screenshot below tells us that this report page includes data about all the store chains. On the other hand, the report level filter of **FiscalYear is 2013 or 2014** tells us that the report only includes data for the fiscal years of 2013 and 2014.

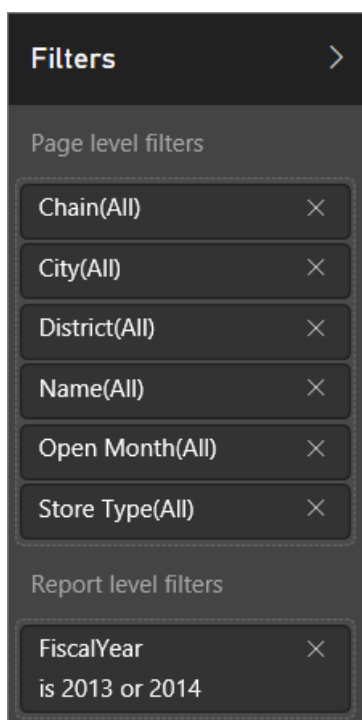
Filters in Reading View versus Editing View

There are two modes for interacting with reports: [Reading view](#) and [Editing view](#). And the filtering capabilities available to you depend on which mode you're in.

- In Editing View, you can add report, page, and visual filters. When you save the report, the filters are saved with it. People looking at the report in Reading View can interact with the filters you added, but not save their changes.
- In Reading View, you can interact with any page and visual filters that already exist in the report, but you won't be able to save your filter changes.

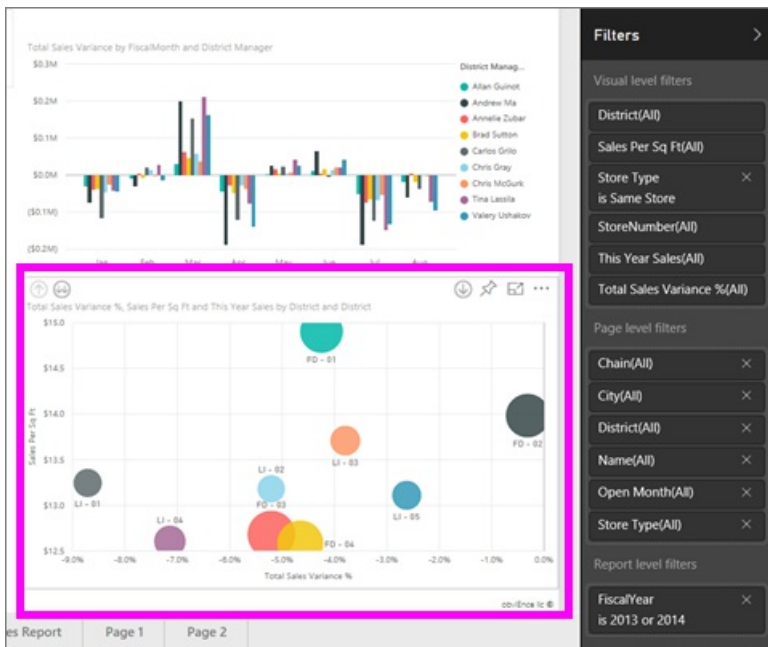
The Filters pane in Reading View

If you only have access to a report in Reading View, the Filters pane looks similar to this:



So this page of the report has 6 page level filters and 1 report level filter.

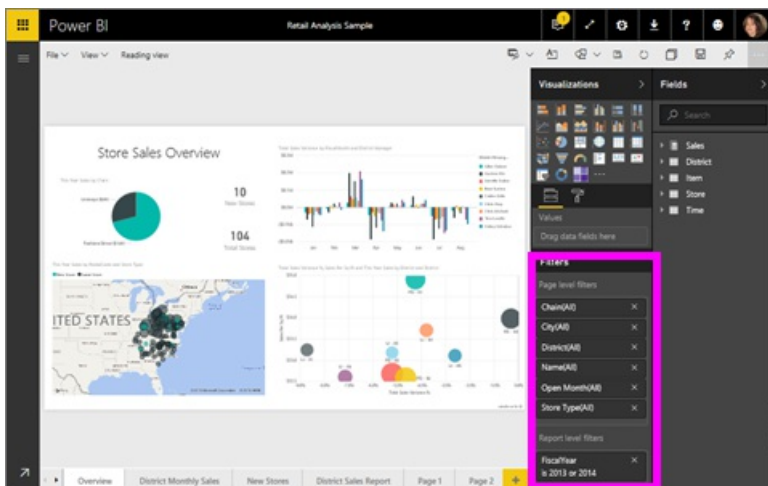
To see if any visual level filters exist, select a visual. In the image below, the bubble chart has 6 filters applied.



In Reading View, explore the data by modifying the existing filters. Learn how in the article [Interact with filters in Reading view](#)

The Filters pane in Editing View

When you have owner permissions for a report and open it in Editing View, you see that **Filters** is just one of several editing panes available.

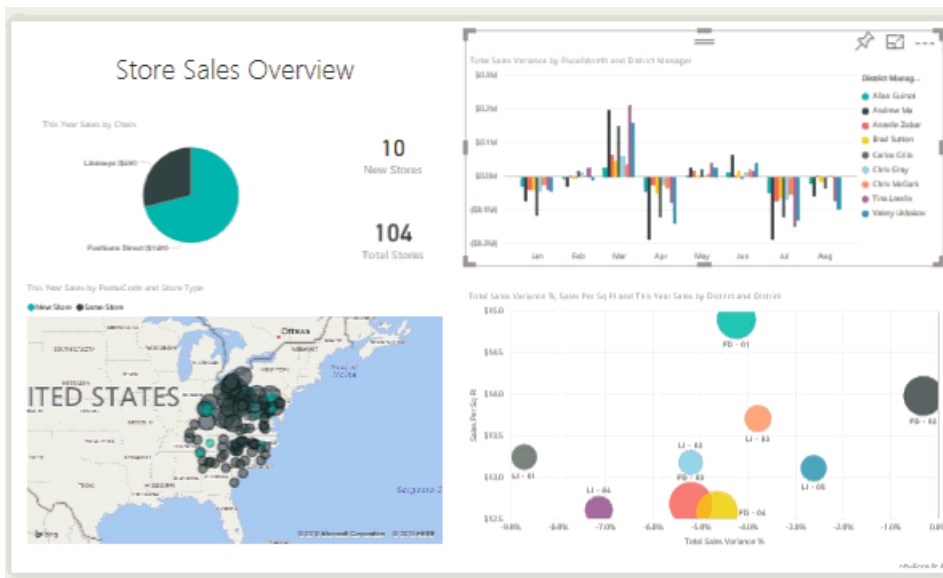


As in Reading View (above) we see that this page of the report has 6 page level filters and 1 report level filter. And by selecting the bubble chart, we'd see it has 6 visual level filters applied.

But in Editing View, there is so much more that we can do with filters and highlighting. The main difference being that we can add new filters. Learn how to do this and so much more in the article [Add a filter to a report](#)

Ad-hoc filtering and highlighting

Select a field on the report canvas to filter and highlight the rest of the page. Select any empty space in the same visual to remove it. This type of filtering and highlighting is not saved with the report but is fun way to quickly explore data impacts. To fine-tune how this type of cross-filtering and cross-highlighting works, see [Visual interactions](#)



Next steps

[Interact with filters and highlighting \(in Reading View\)](#)

[Add a filter to a report \(in Editing View\)](#)

[Take a tour of report filters](#)

[Change how report visuals cross-filter and cross-highlight each other](#)

[Read more about reports in Power BI](#)

[More questions? Try the Power BI Community](#)

Take a tour of the report Filters pane

1/26/2018 • 5 min to read • [Edit Online](#)

This article takes a deep look at the report Filters pane. You'll see the pane in [Power BI service Editing View and Reading View](#) and in [Power BI Desktop Report view](#).

There are many different ways to filter data in Power BI and we recommend first reading [About filters and highlighting](#).

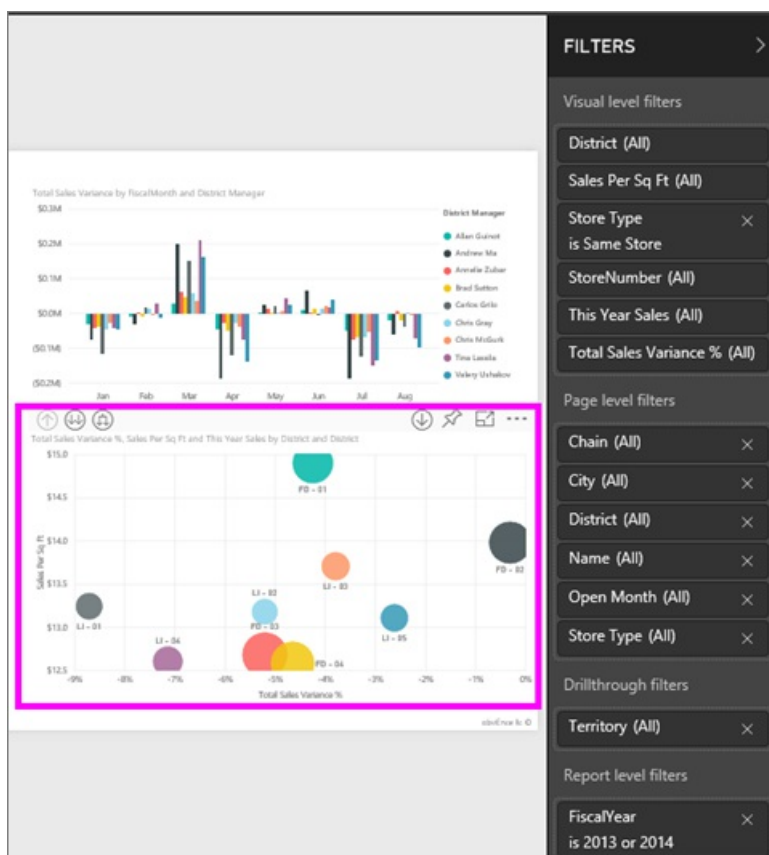
Working with filters

Reports can be opened in [Editing view or Reading view](#). In Editing View, report owners can [add filters to a report](#) and those filters are saved with the report. People viewing the report in Reading view can interact with the filters, but cannot save filter changes to the report.

Filters in Reading View

When a report is open in Reading view, the Filters pane displays along the right side of the report canvas. If you don't see the pane, select the arrow in the top-right corner to expand it.

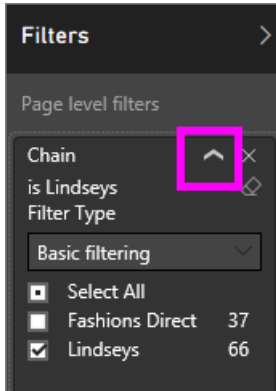
In this example, we've selected a visual that has 6 filters. The report page also has filters, listed under the **Page level filters** heading. There is one [Drillthrough filter](#), and the entire report has a filter too: **FiscalYear** is 2013 or 2014.



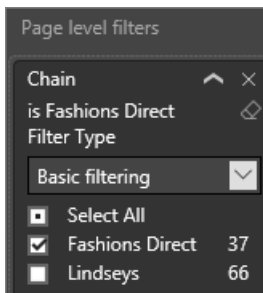
Some of the filters have the word **All** next to them and this means that all values are being included in the filter. For example, **Chain(All)** in the screenshot below tells us that this report page includes data about all the store chains. On the other hand, the report level filter of **FiscalYear is 2013 or 2014** tells us that the report only includes data for the fiscal years of 2013 and 2014.

Anyone viewing this report can interact with these filters.


- view the details of the filter by hovering and selecting the arrow next to the filter.

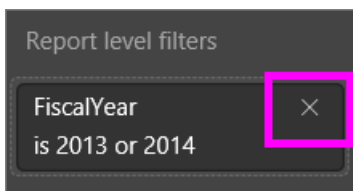


- change the filter, for example, change **Lindseys** to **Fashions Direct**.



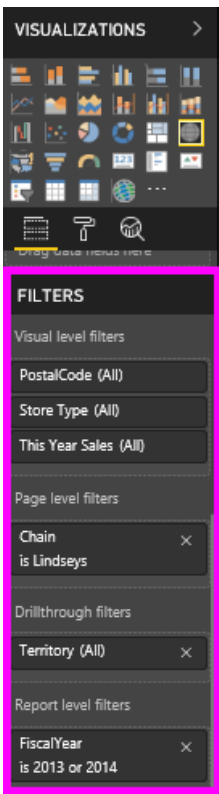
- delete the filter by selecting the **x** next to the filter name.

Deleting a filter removes it from the list but does not delete the data from the report. For example, if you delete the **FiscalYear is 2013 or 2014** filter, fiscal year data will still remain in the report but it will no longer be filtered to show only 2013 and 2014; it will show all fiscal years the data contains. However, once you delete the filter, you won't be able to modify it again since it is removed from the list. A better option is to clear the filter by selecting the eraser icon .

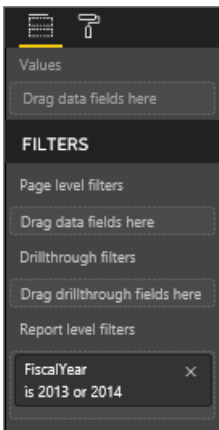


Filters in Editing View

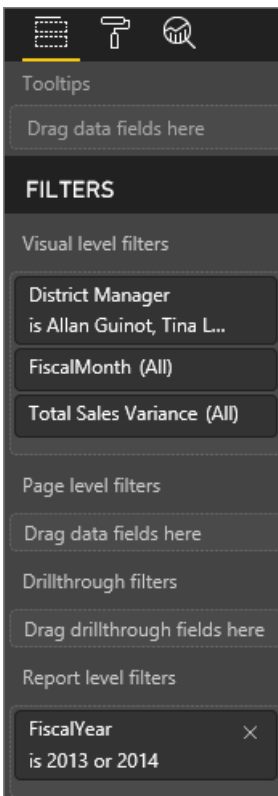
When a report is open in Editing View, the Filters pane displays along the right side of the report canvas in the bottom half of the **Visualization pane**. If you don't see the pane, select the arrow in the top-right corner to expand it.



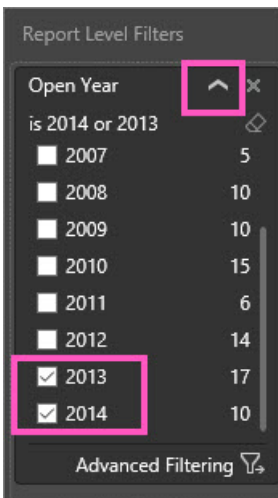
If no visual is selected in the canvas, then the Filters pane displays just the filters that apply to the entire report page or entire report, and any drillthrough filters (if any have been set). In the example below, no visual is selected and there are no page level or drillthrough filters but there is a report level filter.




If a visual is selected in the canvas, you will also see the filters that apply to just that visual:



To display options for a particular filter, select the down arrow next to the filter name. In the example below, the report level filter is set to 2013 and 2014. And this is an example of **basic filtering**. To display the advanced options, select **Advanced Filtering**.

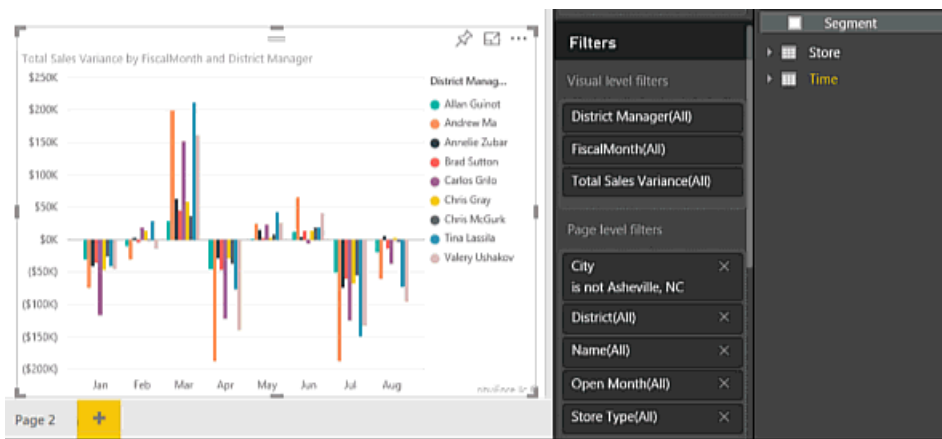


Clear a filter

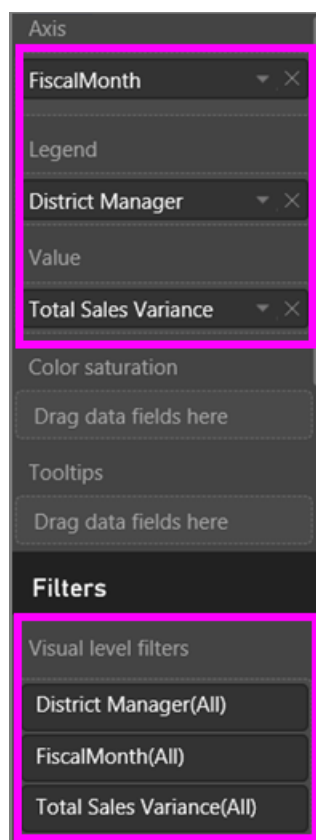
In either advanced or basic filtering mode, select the eraser icon  to reset the filter.

Add a filter

- In Editing view, add a filter to a visual, page, drillthrough, or report by selecting a field from the Fields pane and dragging it into the appropriate filter well, where you see the words **Drag fields here**. Once a field has been added as a filter, fine-tune it using the Basic filtering and Advanced filtering controls (described below).
- **Dragging a new field into the Visual level filter area does not add that field to the visual**, but it does allow you to filter the visual with this new field. In the example below, **Chain** is added as a new filter to the visual. Notice that simply adding **Chain** as a filter does not alter the visual until you use the Basic or Advanced filtering controls.



- All the fields that are used to create a visualization are also available as filters. First, select a visual to make it active. The fields that are being used in the visual are listed in the Visualizations pane (if you are in Editing view) and in the Filters pane under the **Visual level filters** heading.

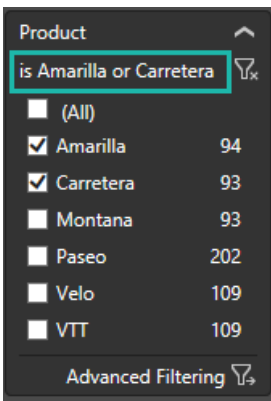


Fine-tune any of these fields using the Basic filtering and Advanced filtering controls (described below).

Types of filters: text field filters

List mode

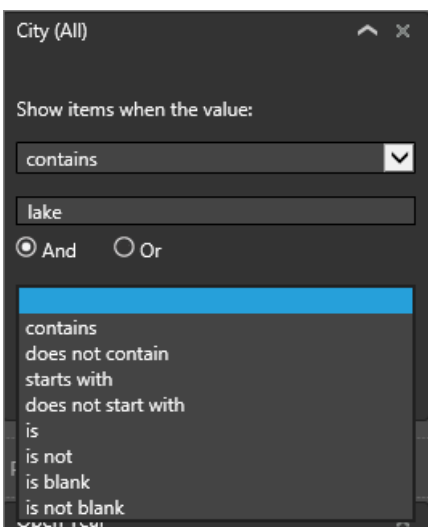
Ticking a checkbox either selects or deselects the value. The **All** checkbox can be used to toggle the state of all checkboxes on or off. The checkboxes represent all the available values for that field. As you adjust the filter, the restatement updates to reflect your choices.



Note how the restatement now says "is Amarilla or Carretera"

Advanced mode

Select **Advanced Filtering** to switch to advanced mode. Use the dropdown controls and text boxes to identify which fields to include. By choosing between **And** and **Or**, you can build complex filter expressions. Select the **Apply Filter** button when you've set the values you want.



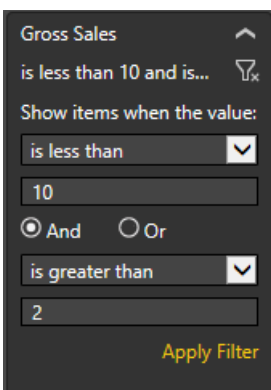
Types of filters: numeric field filters

List mode

If the values are finite, selecting the field name displays a list. See **Text field filters > List mode** above for help using checkboxes.

Advanced mode

If the values are infinite or represent a range, selecting the field name opens the advanced filter mode. Use the dropdown and text boxes to specify a range of values that you want to see.



By choosing between **And** and **Or**, you can build complex filter expressions. Select the **Apply Filter** button when

you've set the values you want.

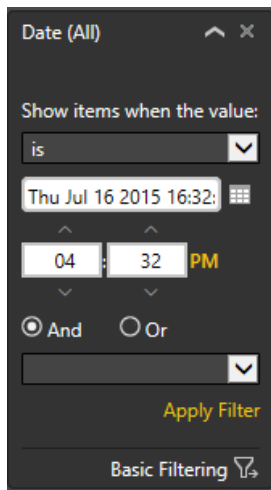
Types of filters: date and time

List mode

If the values are finite, selecting the field name displays a list. See **Text field filters > List mode** above for help using checkboxes.

Advanced mode

If the field values represent date or time, you can specify a start/end time when using Date/Time filters.



Next steps

[Filters and highlighting in reports](#)

[Interact with filters and highlighting in report Reading View](#)

[Create filters in report Editing View](#)

[Change how report visuals cross-filter and cross-highlight each other](#)

Read more about [reports in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Analyze in Excel

12/6/2017 • 5 min to read • [Edit Online](#)

There are times when you may want to use Excel to view and interact with a dataset that you have in Power BI. With **Analyze in Excel**, you can do just that, and access PivotTable, chart, and slicer features in Excel based on the dataset that exists in Power BI.

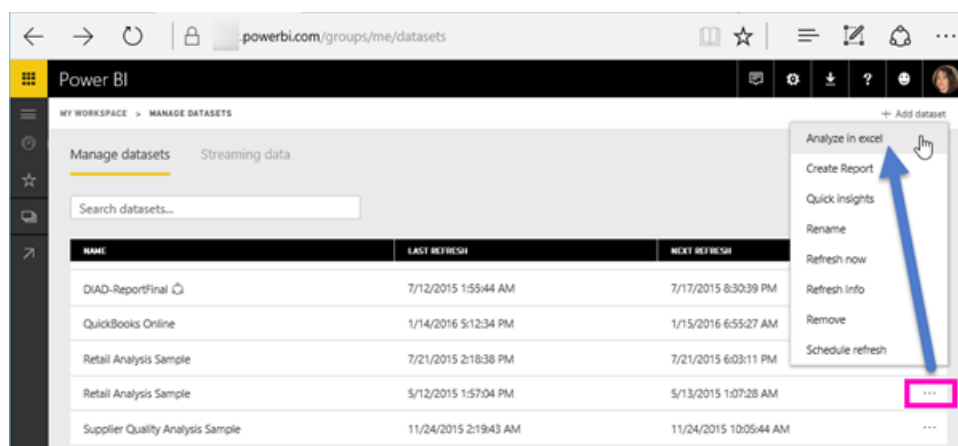
Requirements

There are a few requirements for using **Analyze in Excel**:

- **Analyze in Excel** is supported for Microsoft Excel 2010 SP1 and later.
- Excel PivotTables do not support drag-and-drop aggregation of numeric fields. Your dataset in Power BI *must have pre-defined measures*.
- Some organizations may have Group Policy rules that prevent installing the required **Analyze in Excel** updates to Excel. If you're unable to install the updates, check with your administrator.

How does it work?

When you select **Analyze in Excel** from the ellipses menu (the ...) associated with a dataset or report in **Power BI**, Power BI creates an .ODC file and downloads it from the browser to your computer.



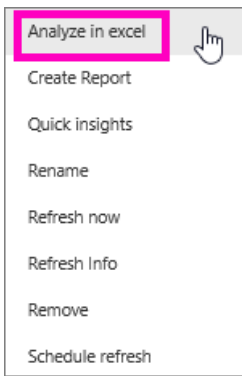
When you open the file in Excel, an empty **PivotTable** and **Fields** list appears with the tables, fields, and measures from the Power BI dataset. You can create PivotTables, charts, and analyze that dataset just as you would work with a local dataset in Excel.

The .ODC file has an MSOLAP connection string that connects to your dataset in Power BI. When you analyze or work with the data, Excel queries that dataset in Power BI and returns the results to Excel. If that dataset connects to a live data source using DirectQuery, Power BI queries the data source and returns the result to Excel.

Analyze in Excel is very useful for datasets and reports that connect to *Analysis Services Tabular* or *Multidimensional* databases, or from Power BI Desktop files or Excel workbooks with data models that have model measures created using Data Analysis Expressions (DAX).

Get started with Analyze in Excel

In Power BI, select the ellipses menu beside a report or dataset (the ... beside the report or dataset name), and from the menu that appears, select **Analyze in Excel**.

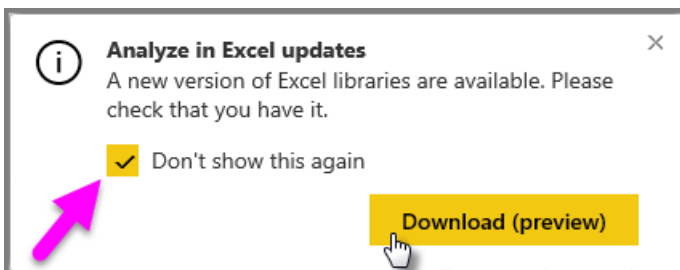


Install Excel updates

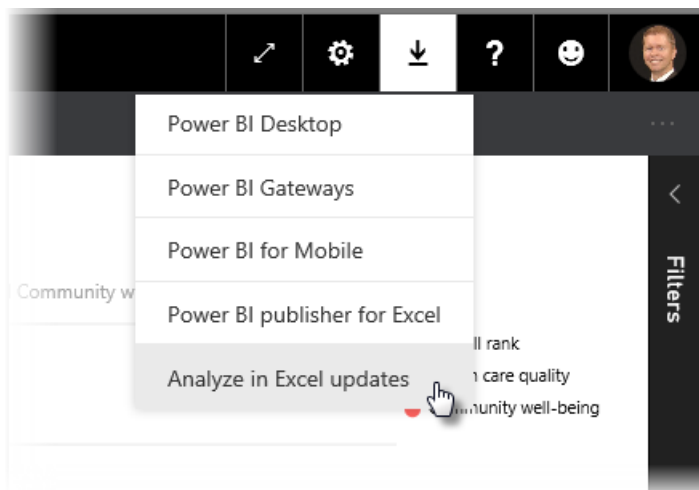
When you first use **Analyze in Excel**, you need to install updates to the Excel libraries. You'll be prompted to download and run Excel updates (this initiates installation of the *SQL_AS_OLEDB.msi* Windows installer package). This package installs **Microsoft AS OLE DB Provider for SQL Server 2016 RC0 (Preview)**.

NOTE

Be sure to check **Don't show this again** in the **Install Excel updates** dialog. You only need to install the update once.



If you do need to install the Excel updates for **Analyze in Excel** again, you can download the update from the **Download** icon in Power BI, as shown in the following image.



Sign in to Power BI

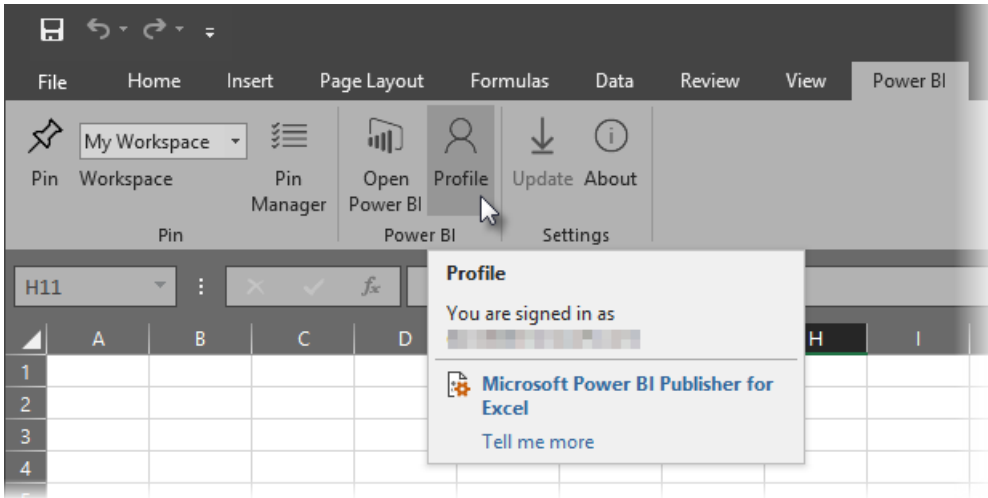
Although you're signed in to Power BI in your browser, the first time you open a new .ODC file in Excel you may be asked to sign in to Power BI with your Power BI account. This authenticates the connection from Excel to Power BI.

Users with multiple Power BI accounts

Some users have multiple Power BI accounts, and those users may encounter a situation where they're logged into Power BI with one account, but the account that has access to the dataset being used in Analyze in Excel is a different account. In those situations, you may get a **Forbidden** error or a sign-in failure when attempting to

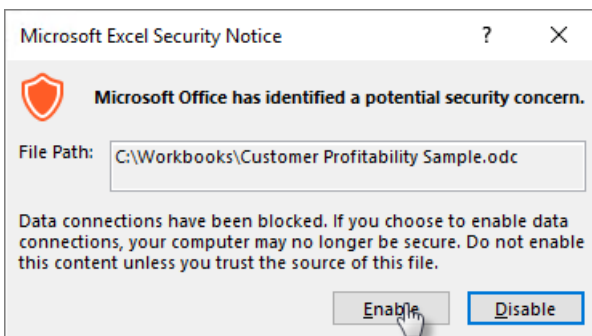
access a dataset that's being used in an Analyze in Excel workbook.

You'll be provided an opportunity to sign in again, at which time you can sign in with the Power BI account that has access to the dataset being accessed by Analyze in Excel. You can also select **Profile** from the **Power BI** ribbon tab in Excel, which identifies which account you're currently logged in with, and provides a link that lets you sign out (and subsequently, sign in with a different account).



Enable data connections

In order to analyze your Power BI data in Excel, you are prompted to verify the file name and path for the .odc file, and then select **Enable**.

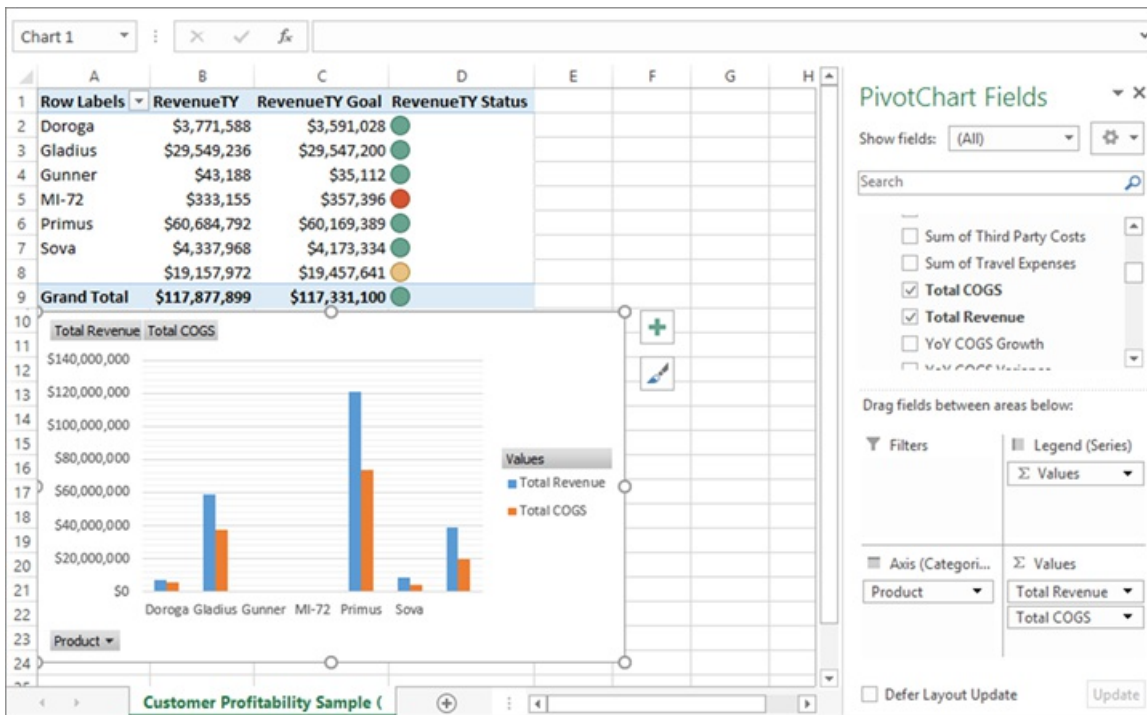


NOTE

Administrators for Power BI tenants can use the *Power BI Admin Portal* to disable the use of **Analyze in Excel** with on-premises datasets housed in Analysis Services (AS) databases. When that option is disabled, **Analyze in Excel** is disabled for AS databases, but continues to be available for use with other datasets.

Analyze away

Now that Excel has opened and you have an empty PivotTable, you're ready to do all sorts of analysis with your Power BI dataset. Just as with other local workbooks, with Analyze with Excel you can create PivotTables, charts, add data from other sources, and so on. And of course, you can create different worksheets with all sorts of views into your data.



NOTE

It's important to know that using **Analyze in Excel** exposes all detail-level data to any users with permission to the dataset.

Save

You can save this Power BI dataset connected workbook just like any other workbook. However, you cannot publish or import the workbook back into Power BI because you can only publish or import workbooks into Power BI that have data in tables, or that have a data model. Since the new workbook simply has a connection to the dataset in Power BI, publishing or importing it into Power BI would be going in circles!

Share

Once your workbook is saved, you can share it with other Power BI users in your organization.

When a user with whom you've shared your workbook opens the workbook, they'll see your PivotTables and data as they appeared when the workbook was last saved, which may not be the latest version of the data. To get the latest data, users must use the **Refresh** button on the **Data** ribbon. And since the workbook is connecting to a dataset in Power BI, users attempting to refresh the workbook must sign into Power BI and install the Excel updates the first time they attempt to update using this method.

Since users will need to refresh the dataset, and refresh for external connections is not supported in Excel Online, it's recommended that users open the workbook in the desktop version of Excel on their computer.

Visualization interactions in a Power BI report

1/10/2018 • 1 min to read • [Edit Online](#)

If you have edit permissions for a report, you can use **Visual interactions** to change how visualizations on a report page impact each other.

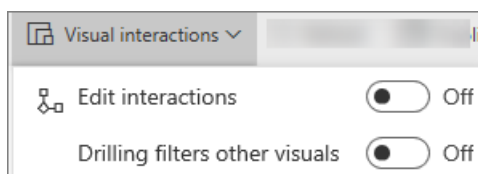
By default, visualizations on a report page can be used to cross-filter and cross-highlight the other visualizations on the page. For example, selecting a state on a map visualization highlights the column chart and filters the line chart to display only data that applies to that one state. See [About filtering and highlighting](#). And if you have a visualization that supports [drilling](#), by default, drilling one visualization has no impact on the other visualizations on the report page. But both of these default behaviors can be overridden, and interactions set, on a per-visualization basis.

This article shows you how to use **Visual interactions** in Power BI service [Editing view](#) and in Power BI Desktop. If a report has been shared with you, you will not be able to change the Visual interactions settings.

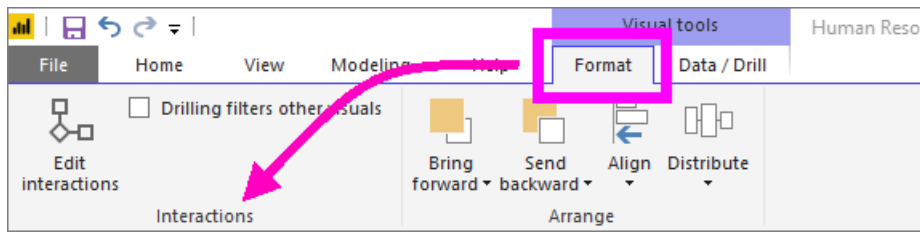
NOTE

The terms *cross-filter* and *cross-highlight* are used to distinguish the behavior described here from what happens when you use the **Filters** pane to filter and highlight visualizations.

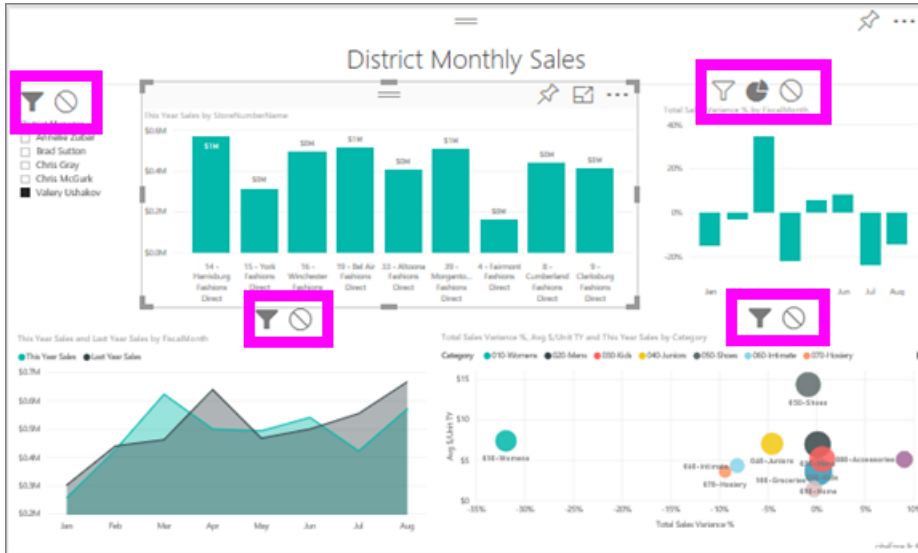
1. Select a visualization to make it active.
2. Display the **Visual Interactions** options.
 - In Power BI service, select the dropdown from the report menubar.



- In Desktop, select **Format > Interactions**.



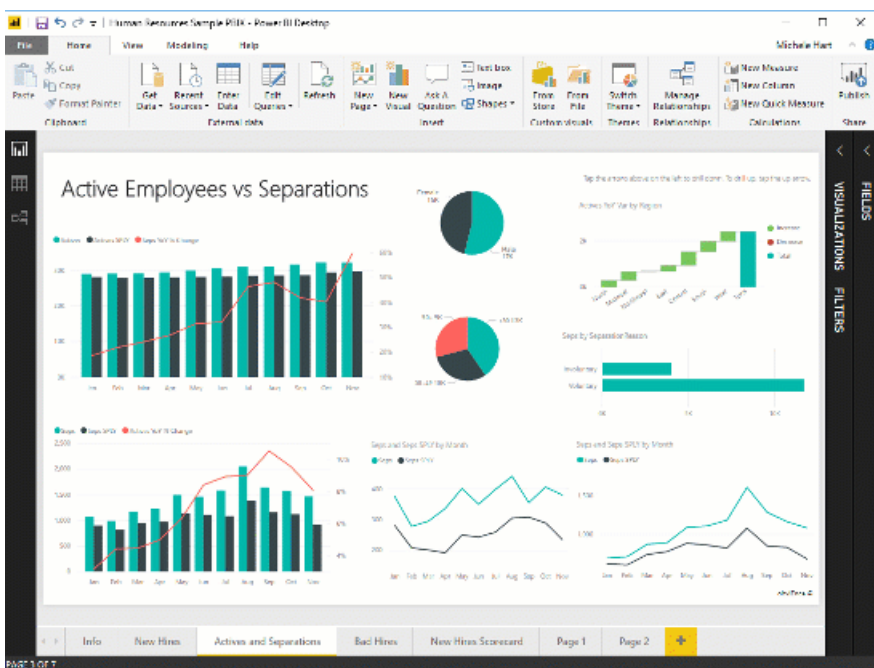
- To turn on the visualization interaction controls, select **Edit interactions**. Power BI adds cross-filter and cross-highlight icons to all of the other visualizations on the report page.



- Determine what impact the selected visualization should have on the others. And, optionally, repeat for all other visualizations on the report page.

- If it should cross-filter the visualization, select the **filter** icon
- If it should cross-highlight the visualization, select the **highlight** icon
- If it should have no impact, select the **no impact** icon

- To turn on drilling controls, select **Drilling filters other visuals**. Now when you drill down (and up) in a visualization, the other visualizations on the report page change to reflect your current drilling selection.



Next steps

[How to use report filters](#)

[Filters and highlighting in reports](#)

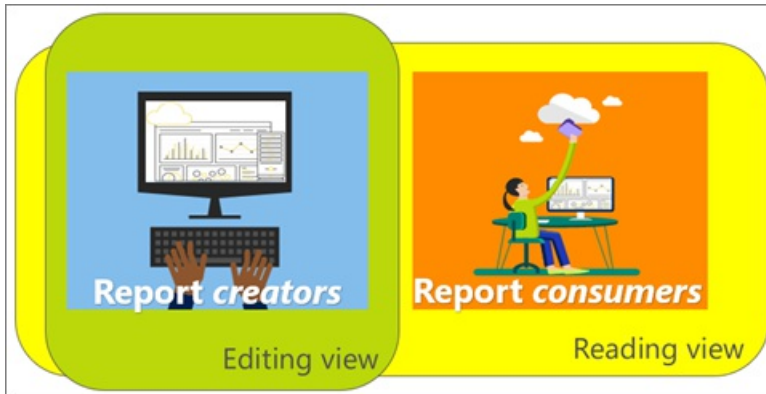
[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Reading View and Editing View in Power BI service reports

1/19/2018 • 3 min to read • [Edit Online](#)

In Power BI service (not Power BI Desktop) there are two modes for viewing and interacting with reports: Reading view and Editing view. Reading view is available to all users and is especially designed for data *consumers* while Editing view is only available to report *creators* and owners.



Report Reading view

Reading view is your way to explore and interact with the report -- it's a fun and safe way to play with and get to know your data. Reading view is designed for report *consumers*; those who open reports from Apps or who have reports [shared with them](#). Reading view ensures that every single consumer of a specific report is seeing the same report, the same visualizations, with the same filters applied. Consumers can interact with the reports, but cannot save changes.

NOTE: In certain circumstances, report consumers may see different data because of row level security and data permissions.

Report Editing view

Editing view is only available to those who created the report or who [co-own a report as a member or admin of an app workspace](#).

Editing view is designed for report *creators*. This is where creators import and connect to datasets, explore the data, and build reports and dashboards. In Editing view *creators* can dig even deeper into their data by adding and removing fields, changing visualization type, creating new visualizations, and adding and deleting visualizations and pages from the report. They can then share the reports they create with colleagues.

Reading view versus Editing view

This chart does not list all the report capabilities of Power BI service! It lists only those report tasks that are not available in **both** Reading view and Editing view.

TASK	READING VIEW	EDITING VIEW
Reports, as a whole		

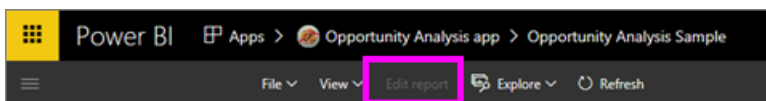
TASK	READING VIEW	EDITING VIEW
Create or edit a report	No	Yes
Share a report	Yes	Yes, and can also manage permissions, including giving others <i>owner</i> permissions.
Create persistent (permanent) visual-level, drillthrough, page-level, and report-level filters from Filters pane	No	Yes
Use report Filters pane	Yes, can use the existing filters but changes aren't saved with the report.	Yes
Use the report Analytics pane	No	Yes
Report View options	Yes, with some exceptions.	Yes, all, including gridlines, snap, and lock.
Create a refresh schedule	No	Yes
Subscribe to a report	Yes	No
Q&A - ask questions in reports	No	Yes
View Usage metrics	Yes, on the report canvas.	Yes, in the report list (content view)
View related	Yes, on the report canvas.	Yes, in the report list (content view)
Save a report	Yes, but only using Save as .	Yes
Delete a report	No	Yes
Report pages		
Add or rename a report page	No	Yes
Duplicate a report page	No	Yes
Delete report page	no	yes
Working with report visualizations		
Add visualizations to a report	No	Yes

TASK	READING VIEW	EDITING VIEW
Add text boxes, and shapes to a report	No	Yes
Use the report Formatting pane	No	Yes
Set visual interactions	No	Yes
Show data used to create the visualization	No	Yes
Configure drilling	No	Yes
Change the visualization being used	No	Yes
Delete a visualization, text box, or shape	No	Yes

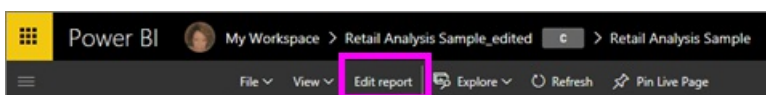
Navigating between Editing view and Reading view

Remember, only the report creator and owner(s) will be able to open a report in Editing view.

1. By default, a report usually opens in Reading view. You can tell you're in Reading view if you see an option for **Edit report**. If **Edit report** is greyed out, you do not have permissions to open the report in Editing view.

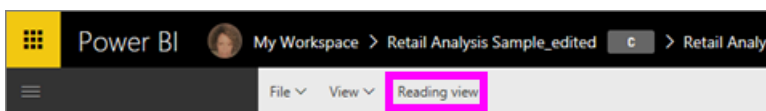


2. If **Edit Report** is not greyed out, select it to open the report in Editing view.



The report is now in Editing view and uses the same [display settings](#) you last used in Reading view.

3. To return to Reading view, select **Reading view** from the top navigation bar.



Next steps

There are so many ways to interact with a report in Reading view, slicing and dicing your data to discover insights and get answers to questions. The next topic, [Interact with a report in Reading view](#), describes some of these in detail.

Back to [reports in Power BI](#)

More questions? [Try the Power BI Community](#)

Interact with a report in Editing view in Power BI service

1/8/2018 • 1 min to read • [Edit Online](#)

Reports can be edited in Power BI service and Power BI Desktop -- if you have owner permissions. Unlike Desktop, Power BI service has two different modes for interacting with reports -- [Reading view](#) for report *consumers* and Editing view for report owners and creators. This article tutorial covers Editing view in Power BI service.

In report Editing view, you have lots of flexibility in both exploring and designing a report. All the [Reading view](#) functionality is available -- plus lots more. Editing view is only available to the person who created the report or to colleagues who [co-own a report as a member or admin of an app workspace](#).

Functionality only available in Editing view

Take a look at the list of topics under the **Reports** header in the Table of Contents to the left. It's a long list and many of the topics cover functionality *only available if you have editing permissions for a report*. To help you navigate the Table of Contents, Editing view is required for the following:

- Creating, editing, renaming, sharing, and deleting reports.
- Adding, renaming, rearranging, and deleting report pages.
- Formatting reports.
- Adding visualizations, text boxes, and shapes to a report.
- Adding visual-level, page-level, and report-level filters and setting visual interactions.
- Creating refresh schedules.
- Q&A - asking questions in reports
- Showing data used to create the visualization
- Setting up drillthrough
- Duplicating a report page

Next steps

Back to [Reading view and Editing view in Power BI service](#)

More questions? [Try the Power BI Community](#)

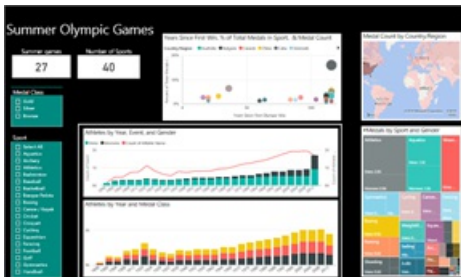
Tips for creating stunning reports

1/24/2018 • 1 min to read • [Edit Online](#)

Creating and working with reports in Power BI service and in Power BI Desktop is very similar, so most of these links apply to either.

Read the whitepaper: [Principles for designing Power BI reports](#)

This paper provides best practices for designing reports in Power BI. Starting with planning, it discusses principles of design that you can apply to your reports and to the pages and individual visuals that make up that report. Many of these best practices apply to dashboard design as well.



Watch the [Dashboard Makeover webinar](#)

See Microsoft Principal Program Manager and Power BI dashboard expert Marc Reguera [conduct dashboard makeovers](#).



Read and/or watch "How to design visually stunning reports (and dashboards) in Power BI"

Community member Miguel Myers is a Data Scientist as well as a Graphic Designer.



- [Read the blog](#)
- [Watch the webinar](#)

Next steps

[Power BI - Basic Concepts](#)

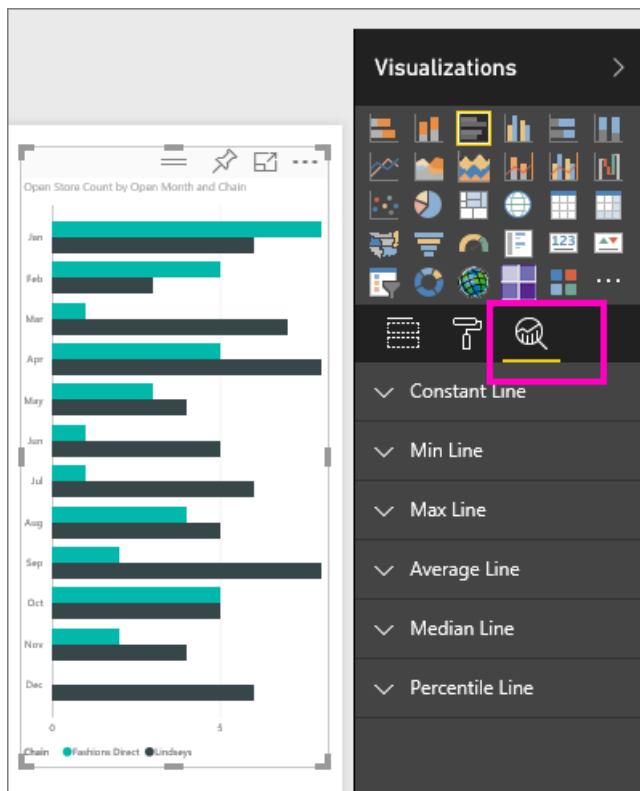
Reports in Power BI

More questions? [Try the Power BI Community](#)

Analytics pane in Power BI service

12/20/2017 • 2 min to read • [Edit Online](#)

With the **Analytics** pane in **Power BI service**, you can add dynamic *reference lines* to visualizations, and provide focus for important trends or insights.



NOTE


The **Analytics** pane only appears when you select a visual on the report canvas.

Using the Analytics pane

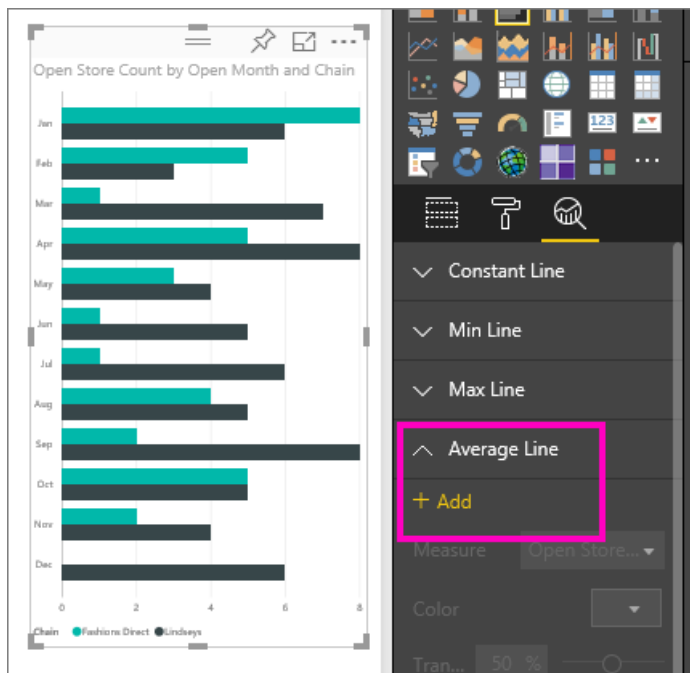
With the **Analytics** pane, you can create the following types of dynamic reference lines (not all lines are available for all visual types):

- X-Axis constant line
- Y-Axis constant line
- Min line
- Max line
- Average line
- Median line
- Percentile line

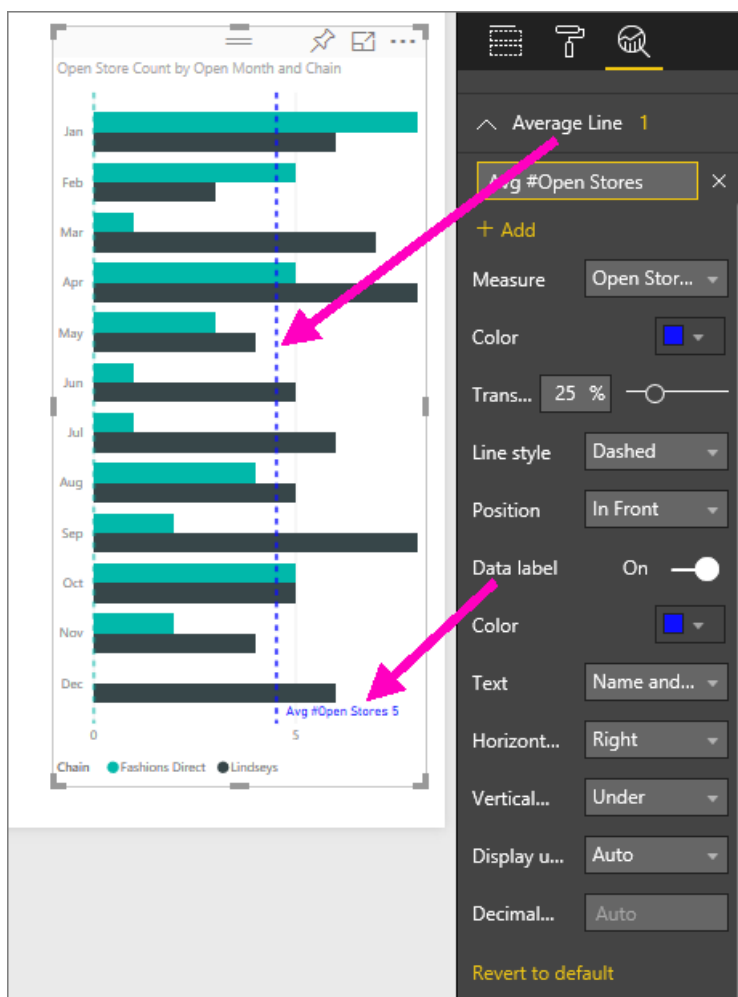
To view the available dynamic reference lines for a visual, follow these steps:

1. Select or create a visual, then select the **Analytics** icon  from the **Visualizations** pane.
2. Select the down arrow for the type of line you want to create to expand its options. In this case, we'll select

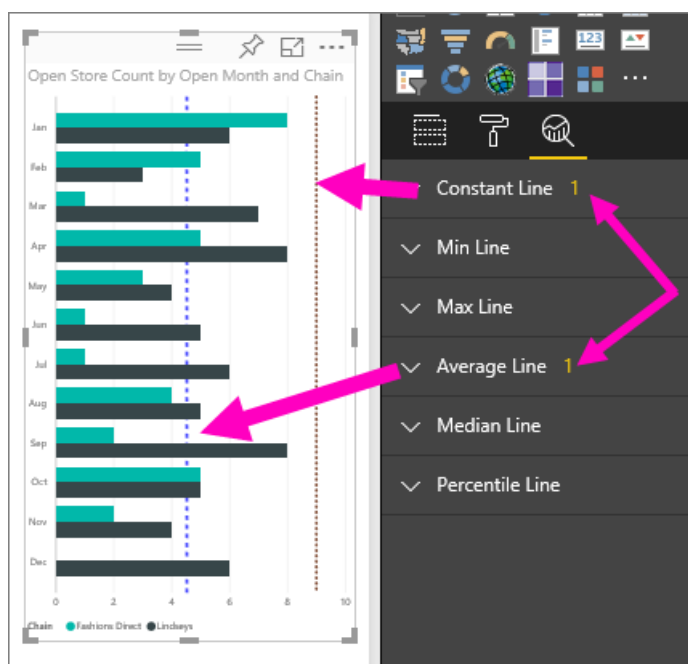
Average Line.



3. To create a new line, select **+ Add** and decide the measure that will be used to create the line. The **Measure** dropdown is automatically populated with available data from the selected visualization. Let's use **Open store count**.
4. You have all sorts of options for your line, such as color, transparency, style, and position (relative to the visual's data elements). If you want to label the line, give it a title and then move the **Data label** slider to **On**. In this case, we'll title the line *Avg # Open Stores*, and customize a few of the other options as shown below.



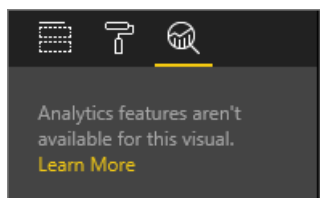
5. Notice the number that appears next to the **Average line** item in the **Analytics** pane. That tells you how many dynamic lines you currently have on your visual, and of which type. If we add a **Constant line** as a store count goal of 9, you can see that the **Analytics** pane shows that we now also have a **Constant line** reference line applied to this visual.



There are all sorts of interesting insights you can highlight by creating dynamic reference lines with the **Analytics** pane.

Considerations and troubleshooting

If the visual you've selected can't have dynamic reference lines applied to it (in this case, a **Map** visual), you'll see the following when you select the **Analytics** pane.



The ability to use dynamic reference lines is based on the type of visual being used. The following list shows which dynamic lines are currently available for which visuals:

Full use of dynamic lines are available on the following visuals:

- Area chart
- Line chart
- Scatter chart
- Clustered Column chart
- Clustered Bar chart

The following visuals can use only a *constant line* from the **Analytics** pane:

- Stacked Area
- Stacked Bar
- Stacked Column
- 100% Stacked Bar
- 100% Stacked Column

For the following visuals, a *trend line* is currently the only option:

- Non-stacked Line
- Clustered Column chart

Lastly, non-Cartesian visuals cannot currently apply dynamic lines from the **Analytics** pane, such as:

- Matrix
- Pie chart
- Donut
- Table

Next steps

[Analytics pane in Power BI Desktop](#)

More questions? [Try the Power BI Community](#)

Usage metrics for dashboards and reports

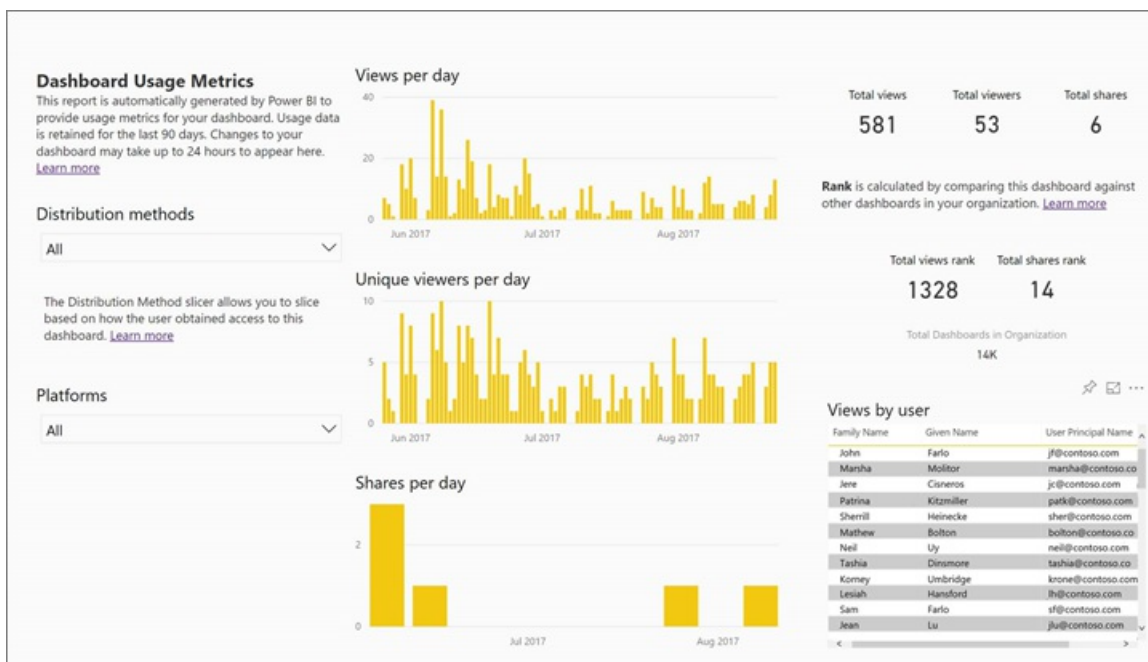
1/23/2018 • 10 min to read • [Edit Online](#)

If you create dashboards and reports, usage metrics help you understand their impact. When you run either dashboard usage metrics or report usage metrics, you discover how those dashboards and reports are being used throughout your organization; what is being used, by whom, and for what purpose.

NOTE

Usage metrics will track usage of reports that are embedded in SharePoint Online. They will also track embedding of dashboards and reports via both the "user owns credentials" and "app owns credentials" flow. Usage metrics will not track usage of reports embedding via [publish to web](#).

These usage metrics reports are read-only. However, you can personalize a usage metrics report by using "Save as." This creates a brand new dataset and converts the read-only report to a full-featured Power BI report that you can edit. Not only does the personalized report contain metrics for the selected dashboard or report, but by removing the default filter, you now have access to usage metrics for all dashboards or all reports in the selected workspace.



Why are usage metrics important to me?

Knowing how your content is being used helps you demonstrate your impact and prioritize your efforts. Your usage metrics may show that one of your reports is used daily by a huge segment of the organization and it may show that a dashboard you created isn't being viewed at all. This type of feedback is invaluable in guiding your work efforts.


Running usage metrics reports is only available in Power BI service. However, if you save a usage metrics report or pin it to a dashboard, you will be able to open and interact with that report on mobile devices.

Prerequisites

- The usage metrics feature captures usage information from all users, both Free and Pro. However, a Pro license is required to run and access the usage metrics data.

- Usage metrics are provided on dashboards or reports in the selected workspace. To access usage metrics for a particular dashboard or report, you must:
 - Have edit access to that dashboard or report
 - Have a Pro license


About the Usage Metrics report

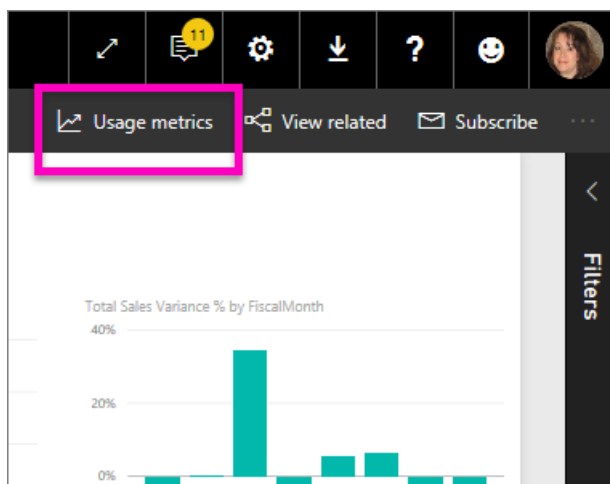
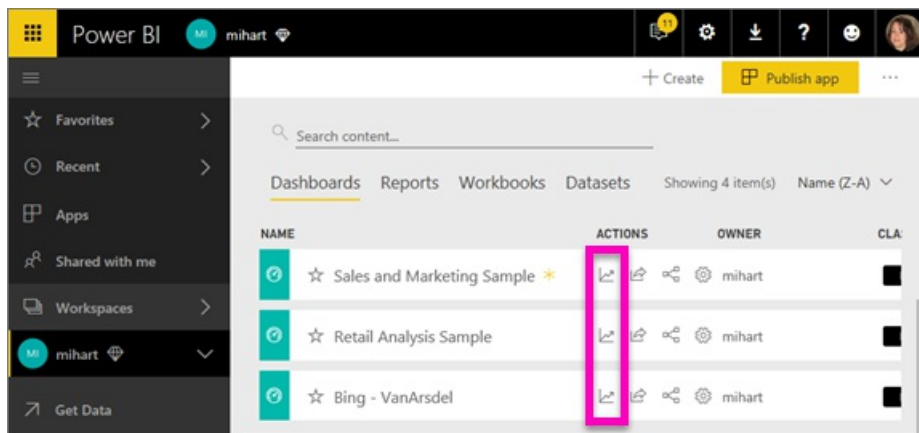
When you select **Usage metrics** or the icon , Power BI generates a pre-built report with usage metrics for that content for the last 90 days. The report looks similar to the Power BI reports you're already familiar with, but it's designed to be informational -- not interactive. You'll be able to slice based on how your end users received access, whether they were accessing via the web or mobile app, etc. As your dashboards and reports evolve, so too will the usage metrics report, which updates every day with new data.

Usage metrics reports won't show up in **Recent**, **Workspaces**, **Favorites**, or other content lists. They cannot be added to an app. If you pin a tile from a usage metrics report to a dashboard, that dashboard cannot be added to an app or content pack.

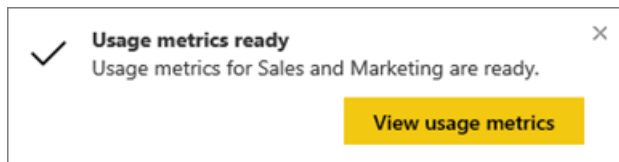
To dig down into the report data, or to build your own reports against the dataset, use **Save as** (see [Save the Usage Metrics report as a full-featured Power BI report](#)).

Open a Usage Metrics report for a dashboard or report

1. Start in the workspace that contains the dashboard or report.
2. From either the workspace content list or from the dashboard or report itself, select the icon for **Usage metrics** .



3. The first time you do this, Power BI creates the usage metrics report and lets you know when it's ready.



- To open the results, select **View usage metrics**.

Usage metrics will be a powerful ally as you work to deploy and maintain Power BI dashboards and reports. Wondering which pages of your report are most useful, and which ones you should phase out? Slice by **Report page** to find out. Wondering if you should build a mobile layout for your dashboard? Slice by **Platforms** to discover how many users are accessing your content via the mobile apps vs. via web browser.

- Optionally, hover over a visualization and select the pin icon to add the visualization to a dashboard. Or, from the top menubar, select **Pin Live Page** to add the entire page to a dashboard. From the dashboard you can monitor the usage metrics more-easily or share them with others.

NOTE: If you pin a tile from a usage metrics report to a dashboard, that dashboard cannot be added to an app or content pack.

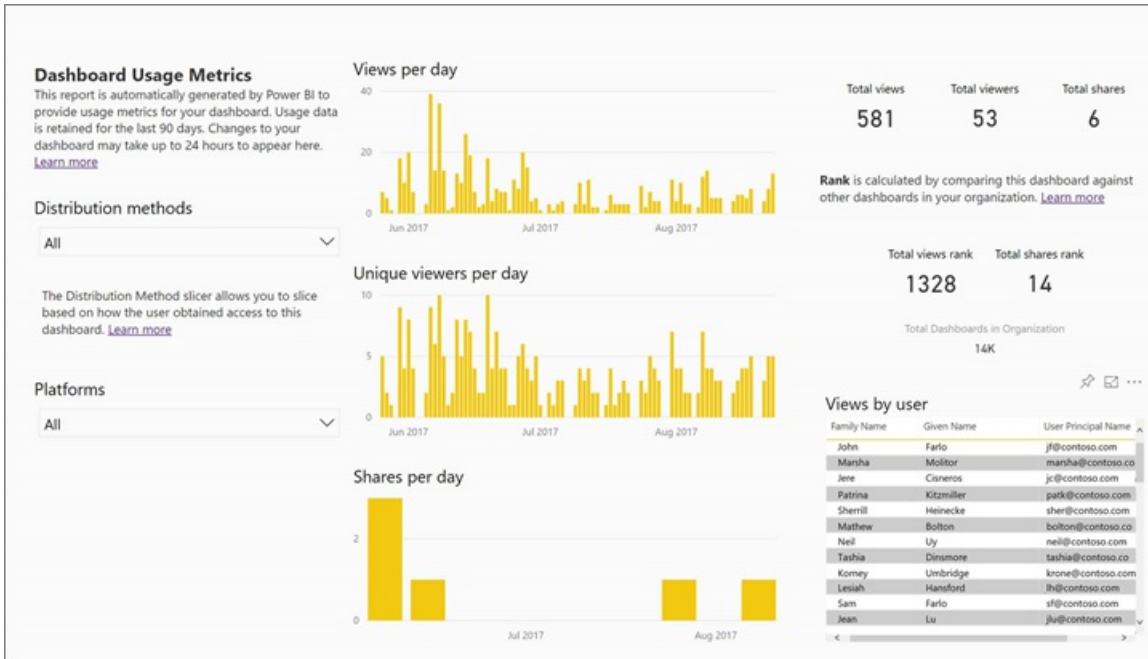
What metrics are reported?

METRIC	DASHBOARD	REPORT	DESCRIPTION
Distribution method slicer	yes	yes	How users got access to the content. There are 3 possible methods: users can access the dashboard or report by being members of an app workspace , by having the content shared with them , or by installing a content pack/app. Note that views through an app are counted as "content pack."
Platforms slicer	yes	yes	Was the dashboard or report accessed via the Power BI service (powerbi.com) or a mobile device? Mobile includes all our iOS, Android, and Windows apps.

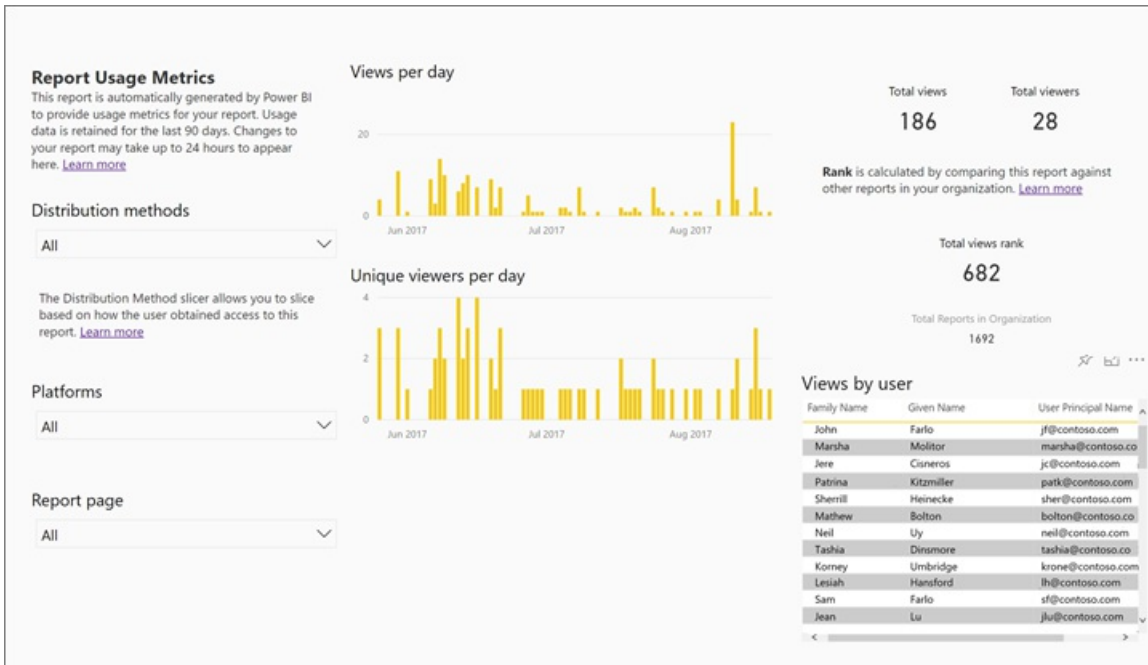
METRIC	DASHBOARD	REPORT	DESCRIPTION
Report page slicer	no	yes	If the report has more than 1 page, slice the report by the page(s) that was viewed. If you see a list option for "Blank," that means a report page was recently added (within 24 hours the actual name of the new page will appear in the slicer list) and/or report pages have been deleted. "Blank" captures these types of situations.
Views per day	yes	yes	Total number of views per day - a view is defined as a user loading a report page or dashboard.
Unique viewers per day	yes	yes	Number of <i>different</i> users who viewed the dashboard or report (based on the AAD user account).
Views per user	yes	yes	Number of views in the past 90 days, broken down by individual users.
Shares per day	yes	no	Number of times the dashboard was shared with another user or group.
Total views	yes	yes	Number of views in the past 90 days.
Total viewers	yes	yes	Number of unique viewers in the past 90 days.
Total shares	yes	no	Number of times the dashboard or report was shared in the past 90 days.
Total in organization	yes	yes	Count of all dashboards or reports in the entire organization which had at least one view in the past 90 days. Used to calculate rank.
Rank: Total views	yes	yes	For total views of all dashboards or reports in the organization over the past 90 days, where does this dashboard or report rank.

METRIC	DASHBOARD	REPORT	DESCRIPTION
Rank: Total shares	yes	no	For total shares of all dashboards in the organization over the past 90 days, where does this dashboard or report rank.

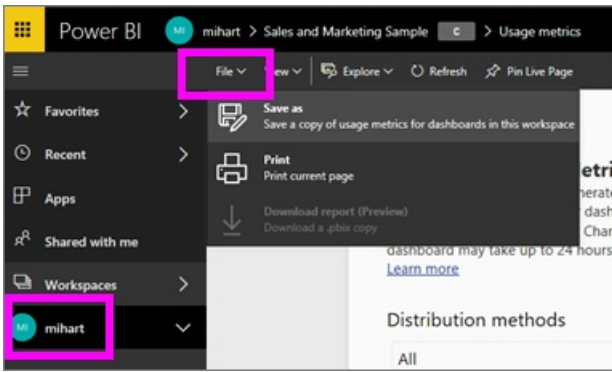
Dashboard Usage Metrics report



Report Usage Metrics report



Save the Usage Metrics report as a full-featured Power BI report (personalize)



Use **Save as** to convert the usage metrics report to a full-featured Power BI report that can be customized and shared. Once you've created a personalized copy, you'll get full access to the underlying dataset, allowing you to customize the usage metrics report to your specific needs. You can even use Power BI Desktop to build custom usage metrics reports using the [live connection to Power BI service feature](#).

Better yet, the underlying dataset includes the usage details for all dashboards or reports in the workspace. This opens up yet another world of possibilities. You could, for example, create a report which compares all dashboards in your workspace based on usage. Or, you could create a usage metrics dashboard for your Power BI app by aggregating usage across all the content distributed within that app. See [remove the Page level filter](#) below.

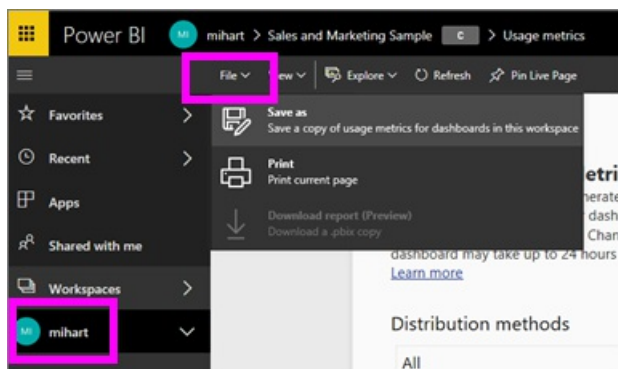
What is created when using "Save as"?

When Power BI creates the full-featured report, it also creates a new dataset **made up of all the dashboards or all the reports contained in the current workspace** that have been accessed in the last 90 days. For example, say you have a workspace named "Sales" and it contains three dashboards and two reports, and you create a usage metrics report on the "Northeast" dashboard. And then you use **Save as** to personalize and convert it to a full-featured report. The dataset for that new report contains the usage metrics *not only for that one dashboard named "Northeast"* but for all three dashboards in the "Sales" workspace. By default, the report will display data for the "Northeast" dashboard and you'll need to [remove a filter](#) (single click) to display data for all three dashboards.

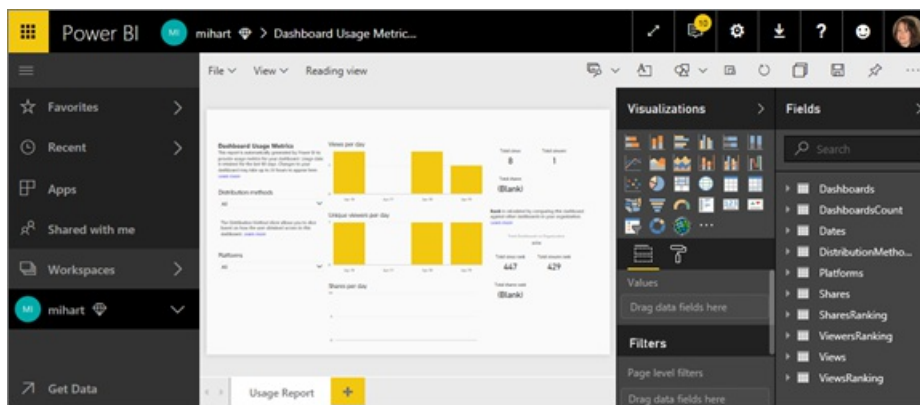
Create a copy of the usage report using "Save as"

When you create a copy using "Save as" (personalize), Power BI converts the read-only pre-built report to a full-featured report. At first glance, it looks exactly the same. However, you can now open the report in Editing view, add new visualizations, filters, and pages, modify or delete existing visualizations, and so much more. Power BI saves the brand new report and dataset in the current workspace. In the example below, the current workspace is **mihart**.

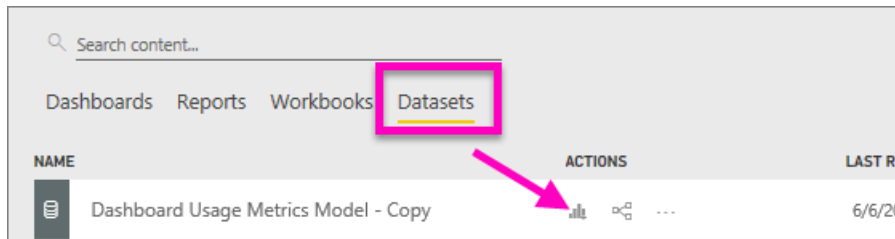
1. From the pre-built usage metrics report, select **File > Save As**. Power BI converts the usage metrics report into a full-featured Power BI report. This is called a *personalized* usage metrics report. The personalized usage report and dataset are saved in the current workspace which is named **mihart*.



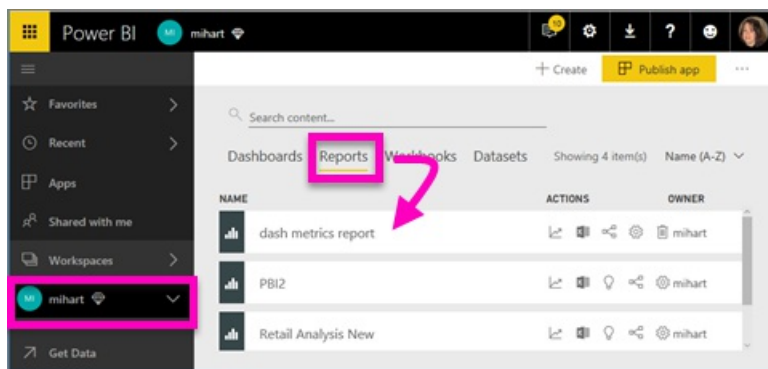
2. Open the report in Editing view and [interact with it as you would with any other Power BI report](#). For example, add new pages and build new visualizations, add filters, format the fonts and colors, etc.



3. Alternately, start with the new dataset and build a report from scratch.



4. The new report is saved in the current workspace (mihart) and also added to the **Recent** content list.

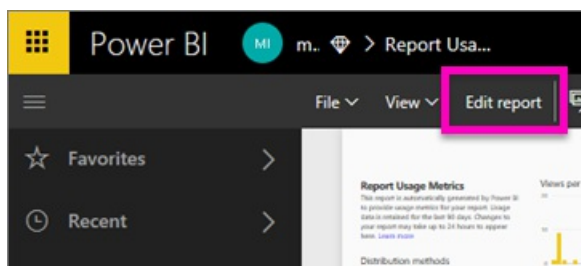


Remove the filter to see *all* the usage metrics data in the workspace

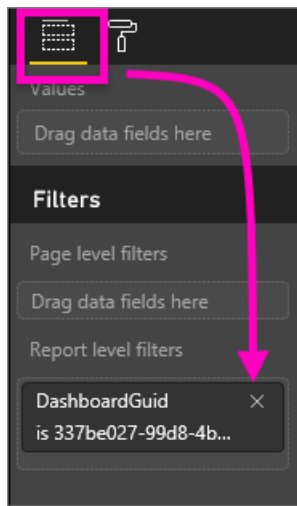
To see the metrics for all the dashboards or for all the reports in the workspace, you'll have to remove a filter. By default, the personalized report is filtered to display metrics for only the dashboard or report that was used to create it.

If, for example, you used the dashboard named "European sales" to create this new personalized report, only usage data from the "European sales" dashboard will display. To remove the filter, and enable data from all the dashboards in that workspace:

1. Open the personalized report in Editing view.



2. In the Filters pane, locate the **Report level filters** bucket and remove the filter by selecting the "x".



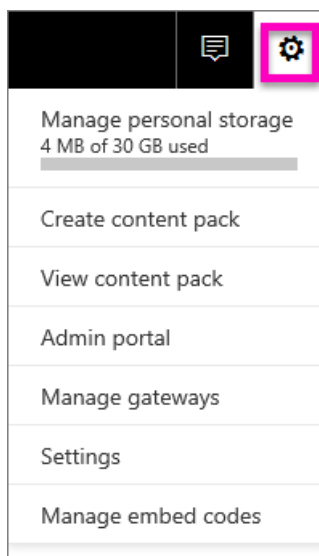
Now your personalized report displays metrics for the entire workspace.

Admin controls for usage metrics - for Power BI administrators

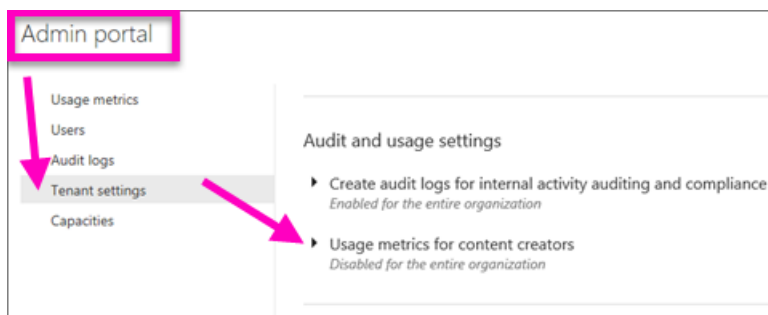
Usage metrics reports are a feature that the Power BI or Office 365 administrator can turn on or off.

Administrators have granular control over which users have access to usage metrics; they are On by default for all users in the organization.

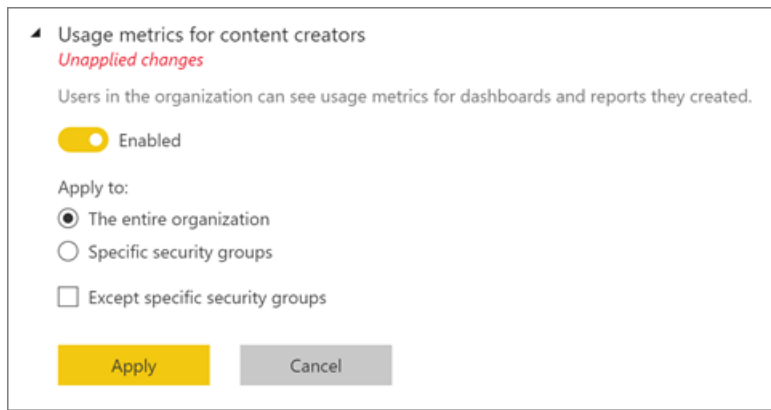
1. Open the Admin portal by selecting the gear icon in the top-right-corner of Power BI service and choosing **Admin portal**.



2. From the Admin portal, select **Tenant settings** and choose **Usage metrics for content creators**.



3. Enable (or disable) usage metrics and select **Apply**.



When disabling usage metrics for their entire organization, admins can use the **delete all existing usage metrics content** option to delete all existing reports and dashboard tiles that were built using the usage metrics reports and datasets. This option removes all access to usage metrics data for all users in the organization who may already be using it. Be careful, because deleting existing usage metrics content is irreversible.

Considerations and limitations

Q: I can't run usage metrics on a dashboard or report

A: You can only see usage metrics for content you own or have permissions to edit.

Q: Will usage metrics capture views from embedded dashboards and reports?

A: Usage metrics currently does not support capturing usage for embedded dashboards and reports, including the [user owns data](#) flow, the [app owns data](#) flow and the [publish to web](#) flow. In those cases, we recommend using existing web analytics platforms to track usage for the hosting app or portal.

Q: I can't run usage metrics on any content at all.

A1: Admins can turn off this feature for their organization. Contact your Admin to see if this is the case.

A2: Usage metrics is a Power BI Pro feature.

Q: The data doesn't seem up-to-date. For example, distribution methods don't show up, report pages are missing, etc.

A: It can take up to 24 hours for data to update.

Q: There are four reports in the workspace but the usage metrics report only displays 3.

A: The usage metrics report only includes reports (or dashboards) that have been accessed in the past 90 days. If a report (or dashboard) does not show up, likely it hasn't been used in more than 90 days.

Next steps

[Favorite a dashboard](#)

More questions? [Try the Power BI Community](#)

Create a QR code for a report in Power BI to use in the mobile apps

11/9/2017 • 1 min to read • [Edit Online](#)

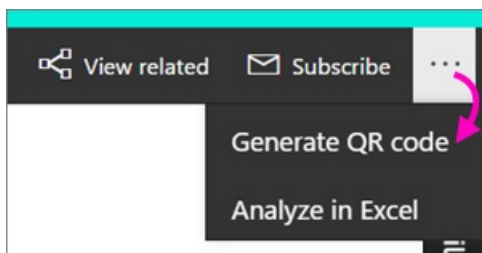
QR codes in Power BI can connect anything in the real world directly to related BI information — no navigation or search needed.

You can create a QR code in the Power BI service for any report, even for a report you can't edit. Then you place the QR code in a key location. For example, you could paste it in an email, or print it out and paste it in a specific location.

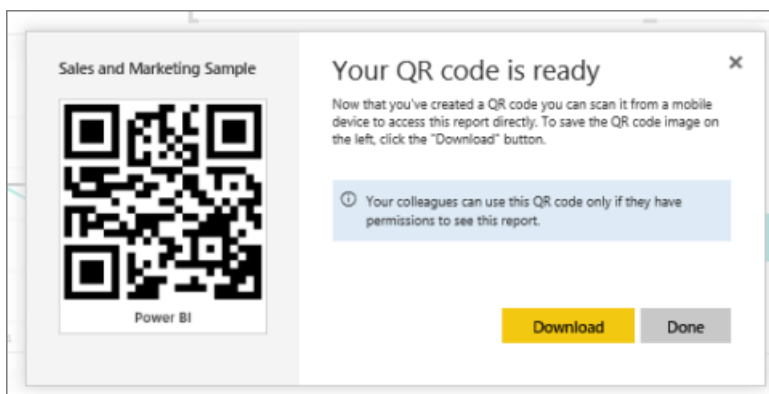
Colleagues you've shared the report with can scan the QR code for access to the report, right from [their mobile device](#). They can use either the QR code scanner located in the Power BI app, or any other QR scanner installed on their device.

Create a QR code for a report

1. Open a report in the Power BI service.
2. Select the ellipsis (...) in the top-right corner and select **Generate QR code**.



3. A dialog box with the QR code appears.



4. From here you can scan the QR code or download and save it so you can:
 - Add it to an email or other document, or
 - Print it and place it in a specific location.

Print the QR code

Power BI generates the QR code as a JPG file, ready to print.

1. Select **Download**, then open the JPG file on a computer connected to a printer.

TIP

The JPG file has the same name as the tile. For example, "Sales and Marketing Sample.jpg".

2. Print the file at 100% or "actual size".
3. Cut out the QR code along its edge and glue it to a place relevant to the report.

Next steps

- [Connect to Power BI data from the real world](#) with the mobile apps
- [Scan a Power BI QR code from your mobile device](#)
- [Create a QR code for a tile](#)
- Questions? [Try asking the Power BI Community](#)

Aggregates in Power BI visualizations

1/8/2018 • 7 min to read • [Edit Online](#)

What is an aggregate?

Sometimes you want to mathematically combine values in your data. The mathematical operation could be sum, average, maximum, count, etc. When you combine values in your data, it is called *aggregating*. The result of that mathematical operation is an *aggregate*.

When Power BI service and Power BI Desktop create visualizations, they may aggregate your data. Often the aggregate is just what you need, but other times you may want to aggregate the values in a different way. For example, a sum versus an average. There are several different ways to manage and change the aggregate being used in a visualization.

First, let's take a look at data *types* because the type of data determines how, and if, it can be aggregated.

Types of data

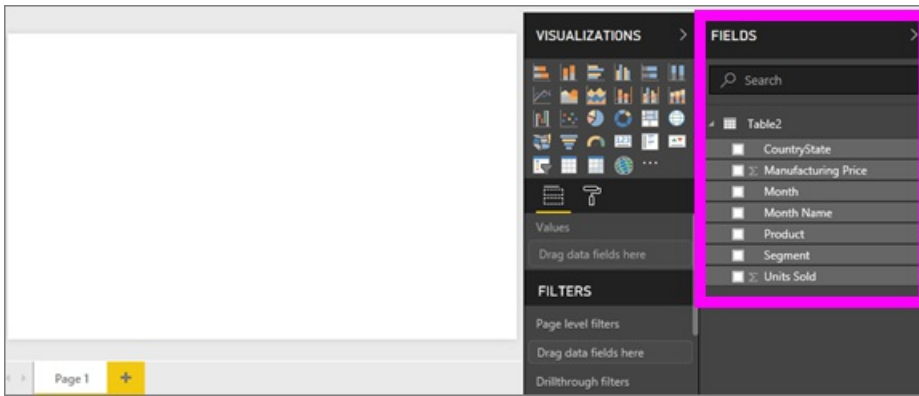
Most datasets have more than one type of data. At the most basic level, the data is either numeric or it is not. Numeric data can be aggregated using a sum, average, count, minimum, variance, and much more. Even textual data, often called *categorical* data, can be aggregated. If you try to aggregate a categorical fields (by placing it in a numeric only bucket like **Values** or **Tooltips**), Power BI will count the occurrences of each category or count the distinct occurrences of each category. And special types of data, like dates, have a few of their own aggregate options: earliest, latest, first, and last.

In the example below:

- **Units Sold** and **Manufacturing Price** are columns that contains numeric data
- **Segment**, **Country**, **Product**, **Month**, and **Month Name** contain categorical data

Segment	Country	Product	Units Sold	Manufacturing Price	Month	Month Name
Enterprise	USA	Carretera	330	\$ 3.00	9	September
Midmarket	France	Carretera	490	\$ 3.00	11	November
Government	Germany	Paseo	360	\$ 10.00	10	October
Government	Germany	VTT	360	\$ 250.00	10	October
Government	USA	Paseo	380	\$ 10.00	9	September
Midmarket	Mexico	Paseo	380	\$ 10.00	12	December
Channel Partners	USA	Amarilla	270	\$ 260.00	2	February

When creating a visualization in Power BI, numeric fields will be aggregated (the default is *sum*) over some categorical field. For example, "Units Sold **by Product**", "Units Sold **by Month**" and "Manufacturing Price **by Segment**". Some numeric fields are referred to as **measures**. It's easy to identify measures in the Power BI report editor -- measures are shown with the Σ symbol in the Fields list. For more information see [The report editor... take a tour](#).



Why don't aggregates work the way I want them to?

Working with aggregates in Power BI service can be confusing; maybe you have a numeric field and Power BI won't let you change the aggregation. Or maybe you have a field, like a year, and you don't want to aggregate it, you just want to count the number of occurrences.

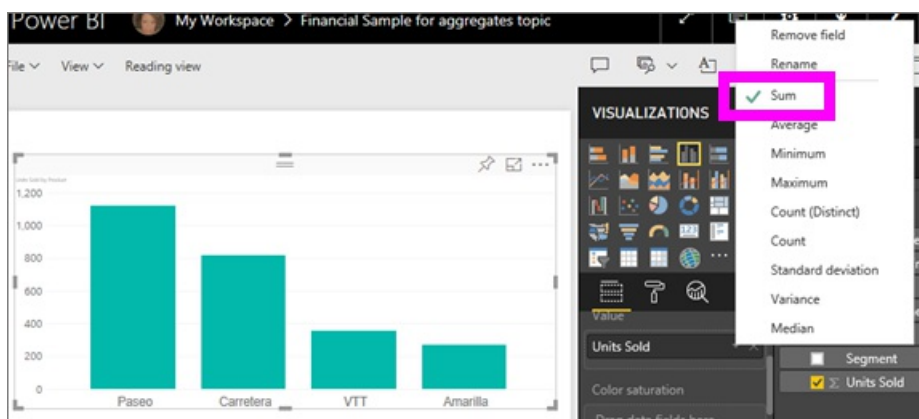
Most often, the source of the problem is how the field was defined in the dataset. Maybe the field is defined as text and that explains why it can't be summed or averaged. Unfortunately, [only the dataset owner can change the way a field is categorized](#). So if you have owner permissions to the dataset, either in Desktop or the program that was used to create the dataset (e.g., Excel), you can fix this problem. Otherwise, you'll need to contact the dataset owner for help.

To help you navigate the confusion we have a special section at the end of this article called **Considerations and troubleshooting**. If you don't find your answer there, post your question on the [Power BI Community forum](#) for a quick response directly from the Power BI team.

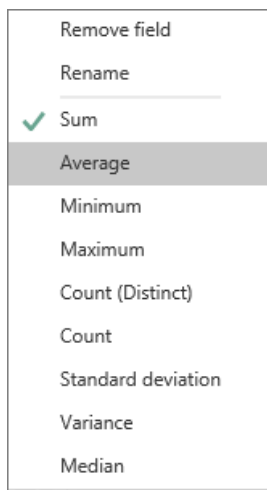
Change how a numeric field is aggregated

Say you have a chart that sums the units sold for different products, but you'd rather have the average.

1. Create a chart that uses a category and a measure. In this example we're using Units Sold by Product. By default, Power BI creates a chart that sums the units sold (measure in the Value well) for each product (category in the Axis well).



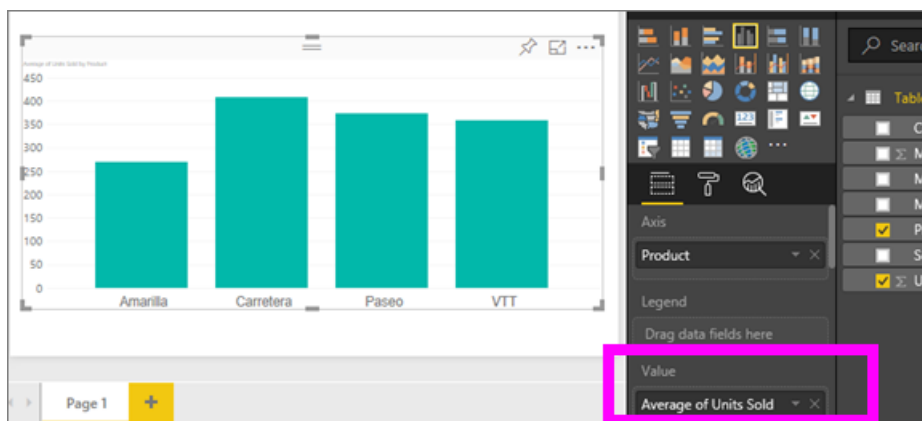
2. In the Visualizations pane, right-click the measure, and select the aggregate type you need. In this case, we're selecting Average. If you don't see the aggregation you need, see "Considerations and troubleshooting" below.



NOTE

The options available in the dropdown will vary depending on 1) the field selected and 2) the way that field was categorized by the dataset owner.

3. Your visualization is now using aggregated by average.



Ways to aggregate your data

Some of the options that may be available for aggregating a field:

- **Do Not Summarize.** With this option chosen, each value in that field is treated separately and not summarized. This is often used if you have a numeric ID column that shouldn't be summed.
- **Sum.** This adds all the values in that field up.
- **Average.** Takes an arithmetic mean of the values.
- **Minimum.** Shows the smallest value.
- **Maximum.** Shows the largest value.
- **Count (Not Blanks).** This counts the number of values in that field that are not blank.
- **Count (Distinct).** This counts the number of different values in that field.
- **Standard deviation.**
- **Variance.**
- **Median.** Shows the median (middle) value. This is the value that has the same number of items above and below. If there are 2 medians, Power BI averages them.

For example, this data:

COUNTRY	AMOUNT
USA	100
UK	150
Canada	100
Germany	125
France	
Japan	125
Australia	150

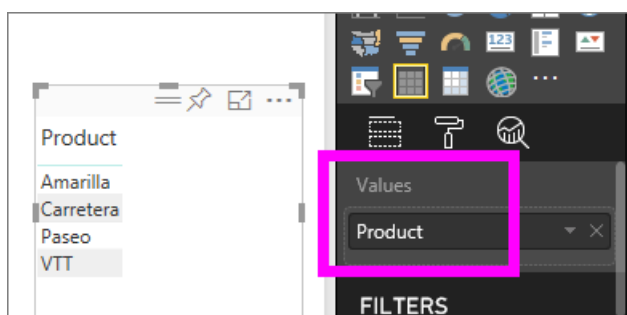
Would give the following results:

- **Do Not Summarize:** Each value is shown separately
- **Sum:** 750
- **Average:** 125
- **Maximum:** 150
- **Minimum:** 100
- **Count (Not Blanks):** 6
- **Count (Distinct):** 4
- **Standard deviation:** 20.4124145...
- **Variance:** 416.666...
- **Median:** 125

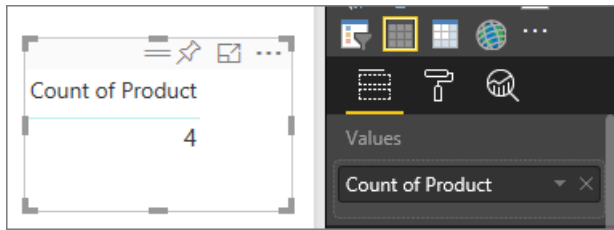
Create an aggregate using a category (text) field

You can also aggregate a non-numeric field. For example, if you have a product name field, you can add it as a value and then set it to **Count**, **Distinct count**, **First**, or **Last**.

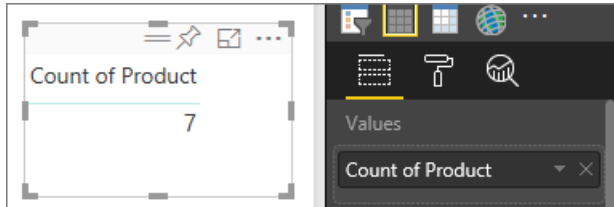
1. In this example, we've dragged the **Product** field into the Values well. The Values well is typically used for numeric fields. Power BI recognizes that this is a text field, sets the aggregate to **Do not summarize**, and presents us with a single-column table.



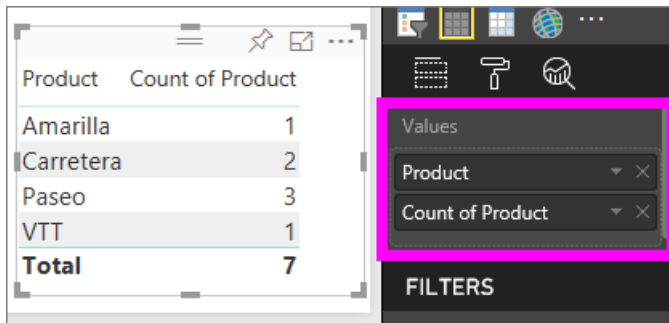
2. If we change the aggregation from the default **Do not summarize** to **Count (Distinct)**, Power BI counts the number of different products. In this case, there are 4.



3. And if we change the aggregation to **Count**, Power BI counts the total number. In this case, there are 7 entries for **Product**.



4. By dragging the same field (in this case **Product**) into the Values well, and leaving the default aggregation **Do not summarize**, Power BI breaks down the count by product.



Considerations and Troubleshooting

Q: Why don't I have a **Do not summarize** option?

A: The field you've selected is likely a calculated measure or advanced measure created in Excel or [Power BI Desktop](#). Each calculated measure has its own hard-coded formula. You can't change the aggregation being used. For example, if it's a sum, it can only be a sum. In the Fields list, *calculated measures* are shown with the calculator symbol.

Q: My field **is** numeric, why are my only choices **Count** and **Distinct count**?

A1: The likely explanation is that the dataset owner has, accidentally or intentionally, *not* classified the field as a number. For example, if a dataset has a **year** field, the dataset owner may categorize that as text because it is more likely that the **year** field will be counted (i.e., number of people born in 1974) and not that it will be summed or averaged. If you are the owner, you can open the dataset in Power BI Desktop and use the **Modeling** tab to change the data type.

A2: If the field has a calculator icon, that means it's a *calculated measure* and each calculated measure has its own hard-coded formula that can only be changed by a dataset owner. The calculation being used may be a simple aggregation like an average or sum, but it may also be something more complicated like a "percent of contribution to parent category" or "running total since start of the year". Power BI isn't going to sum or average the results but will instead just re-calculate (using the hard-coded formula) for each data point.

A3: Another possibility is that you've dropped the field into a *bucket* that only allows categorical values. In that case, your only options will be count and distinct count.

A4: And a third possibility is that you're using the field for an axis. On a bar chart axis, for example, Power BI shows one bar for each distinct value -- it doesn't aggregate the field values at all.

NOTE

The exception to this rule is scatter charts, which *require* aggregated values for the X and Y axes.

Q: I have a scatter chart and I want my field to *not* aggregate. How do I do this?

A: Add the field to the **Details** bucket and not to the X or Y axes buckets.

Q: When I add a numeric field to a visualization, most of them default to sum but some default to average or count or some other aggregation. Why isn't the default aggregation always the same?

A: Dataset owners have the option to set the default summarization for each field. If you are a dataset owner, change the default summarization in the **Modeling** tab of Power BI Desktop.

Q: I'm a dataset owner and I want to ensure that a field is never aggregated.

A: In Power BI Desktop, in the **Modeling** tab, set **Data type** to **Text**.

Q: I do not see **Do not summarize** as an option in my dropdown.

A: Try removing the field and adding it back in.

More questions? [Try the Power BI Community](#)

Page display settings in a Power BI report

1/8/2018 • 2 min to read • [Edit Online](#)

We understand it is critical to keep your report layout pixel perfect. Sometimes, it can be challenging, because you and your colleagues view those reports on screens with different aspect ratios and sizes.

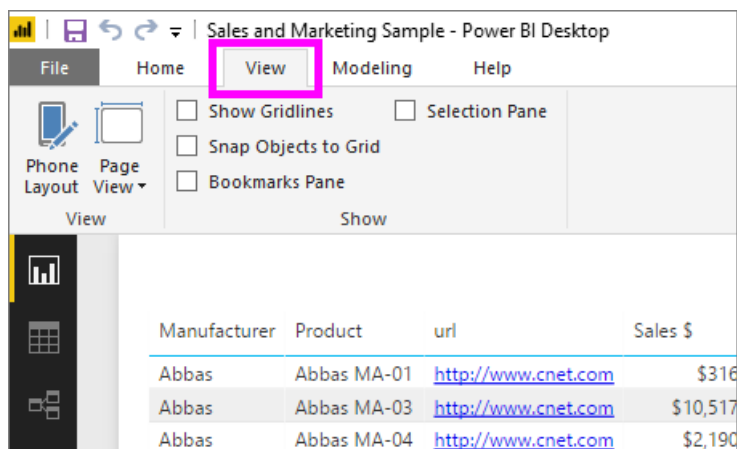
The default display view is **Fit to page** and the default display size is **16:9**. If you want to lock in a different aspect ratio, or want to fit your report in a different way, there are two tools to help you: **Page View** settings and **Page Size** settings.

Where to find Page view settings in Power BI service and Power BI Desktop

Page view settings are available in both Power BI service and Power BI Desktop but the interface is a little different. The two sections below explain where you can find View settings in each Power BI tool.

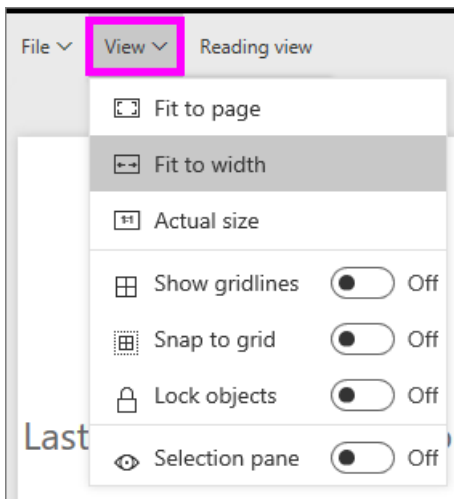
In Power BI Desktop

In Report view, select the **View** tab to open Page view settings as well as phone layout settings.



In Power BI service (app.powerbi.com)

In Power BI service, open a report and select **View** from the upper left menubar.



Page View settings are available in both [Reading view](#) and [Editing view](#). In Editing View, a report owner can assign page view settings to individual report pages, and those settings are saved with the report. When colleagues open that report in Reading view, they see the report pages display using the owner's settings. In Reading view colleagues can change *some* of the Page view settings, but the changes are not saved when they exit the report.

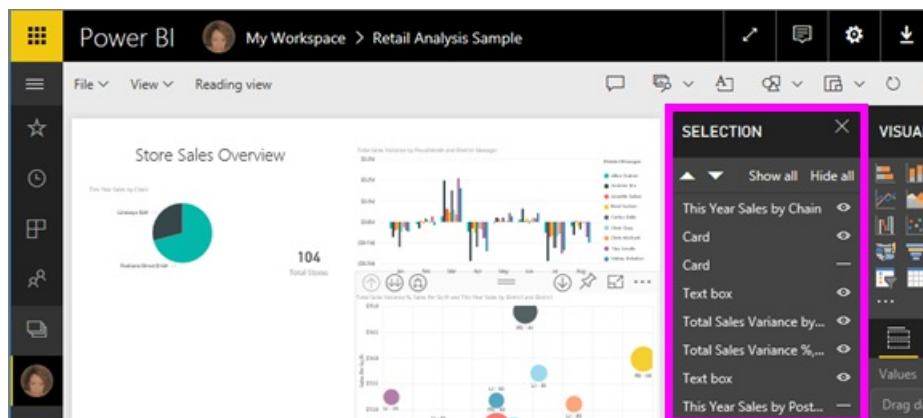
Page view settings

The first set of *Page view* settings control the display of your report page relative to the browser window. Choose between:

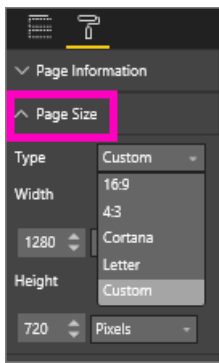
- **Fit to Page** (default): contents are scaled to best fit the page
- **Fit to Width**: contents are scaled to fit within the width of the page
- **Actual Size**: contents are displayed at full size

The second set of *Page view* settings control the positioning of objects on the report canvas

- **Show gridlines**: turn on gridlines to help you position objects on the report canvas
- **Snap to grid**: use with **Show gridlines** to precisely position and align objects on the report canvas
- **Lock objects**: lock all objects on the canvas so that they cannot be moved or resized
- **Selection pane**: the Selection pane lists all objects on the canvas and you can decide which to show and which to hide



Page Size settings



Page Size settings are only available for report owners. In Power BI service (app.powerbi.com), this means being able to open the report in [Editing view](#). These settings control the display ratio and actual size (in pixels) of the report canvas.

- 4:3 ratio
- 16:9 ratio (default)
- Cortana
- Letter
- Custom (height and width in pixels)

Next Steps

[Learn how to use Page view and Page size settings in your own Power BI reports.](#)

Read more about [reports in Power B](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Change the size of a report page (Tutorial)

1/26/2018 • 3 min to read • [Edit Online](#)

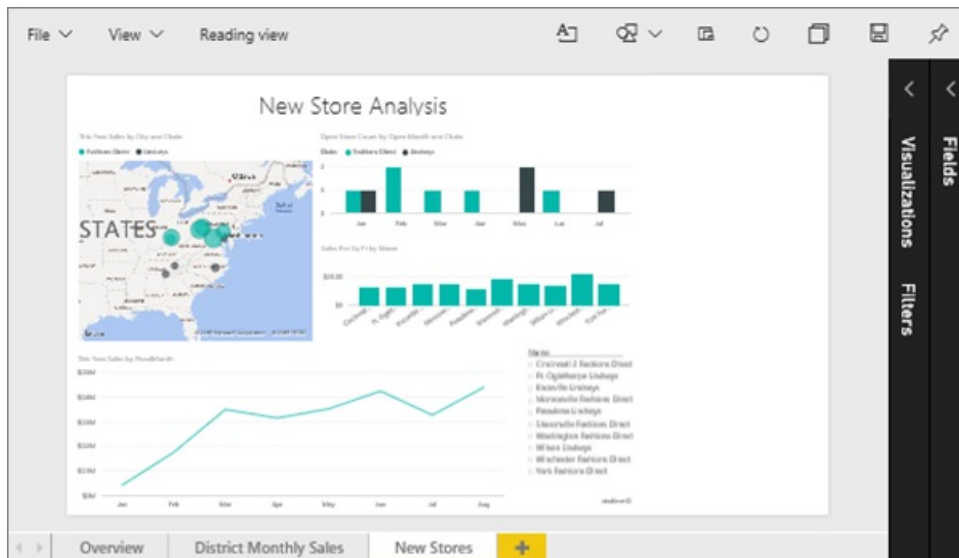
In the [previous article and video](#) you learned about two different ways to control page display in Power BI reports: **View** and **Page Size**. Page view and Page Size are available in both Power BI service and Power BI Desktop, and look and function amost the same, but for this tutorial we're using Power BI service.

Prerequisites

- Power BI service
- [Retail Analysis Sample report](#)

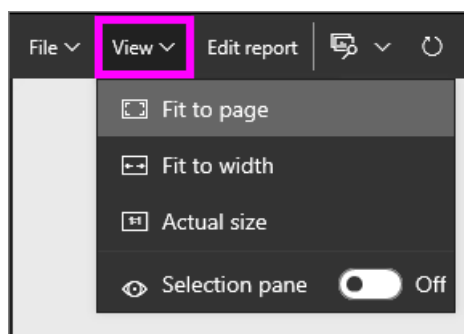
First, let's change the page View setting

1. Open the report in Reading View or Editing View and select the report tab for **New Stores**. By default, this report page is displayed using the **Fit to Page** setting. In this case, Fit to Page displays the report page without scrollbars, but some of the detail and titles are too small to read.

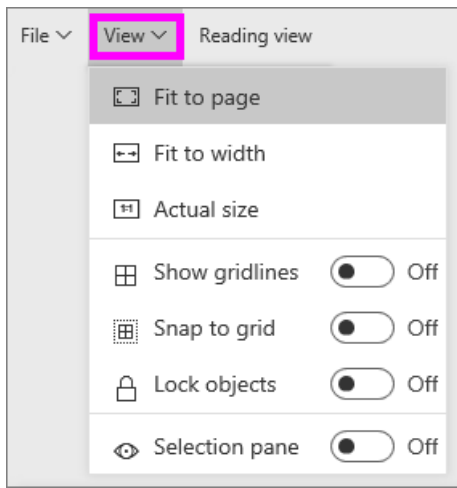


2. Make sure that no visualizations are selected on the canvas. Select **View** and review the display options.

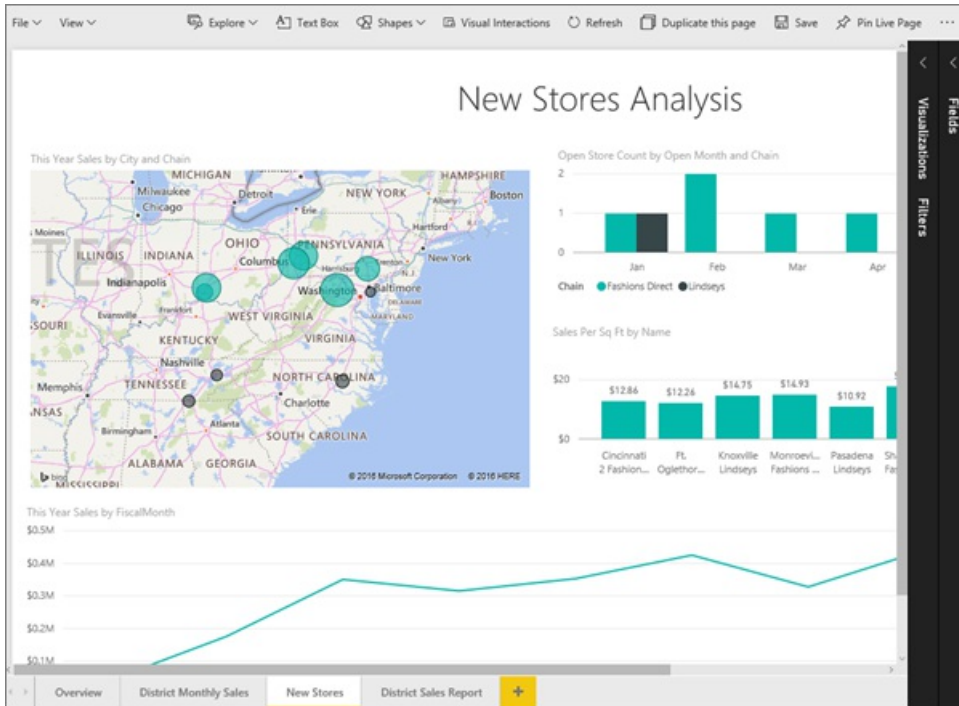
- In Reading view you'll see this.



- In Editing view you'll see this.

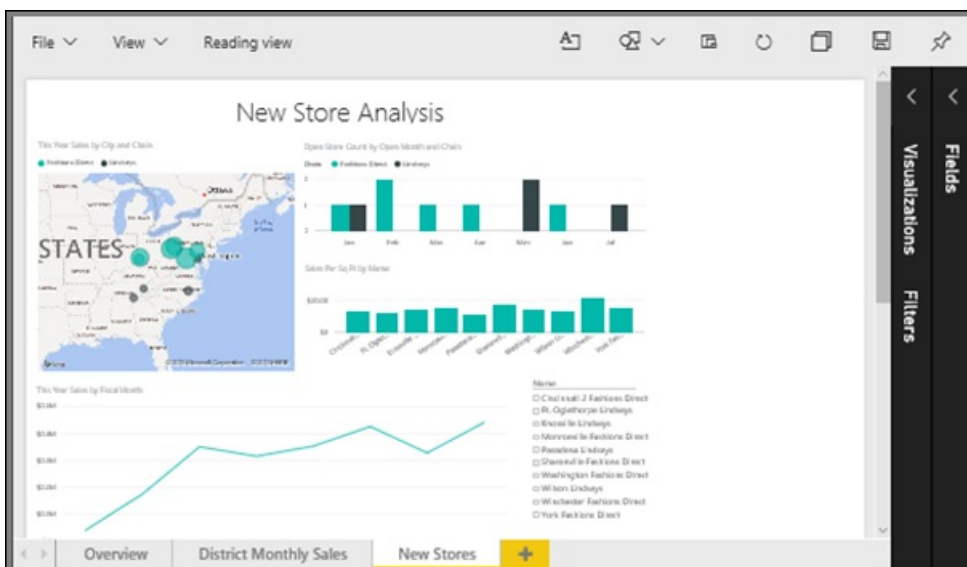


3. Let's see how the page looks using the **Actual size** setting.



Not great, the dashboard now has double scrollbars.

4. Switch to **Fit to Width**.

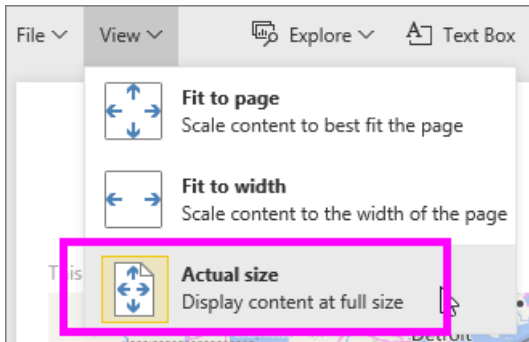


Looks better, we now have scrollbars but it's easier to read the detail.

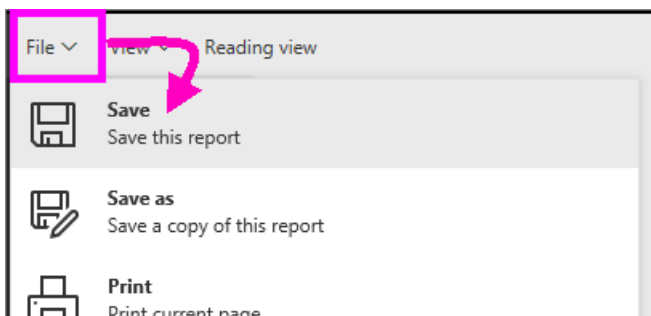
Change the default view for a report page

If you're a report *creator*, you can change the default view for your report pages. When you share your report with others, the report pages will open using the view you've set. Report *consumers* will be able to change the view, but won't be able to save their changes once they exit out of the report.

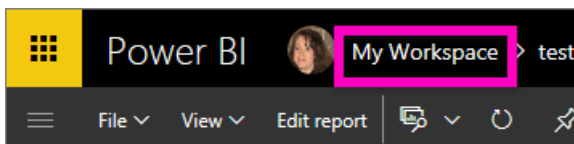
1. On the **New stores** page of the report, switch back to **Actual size** view.



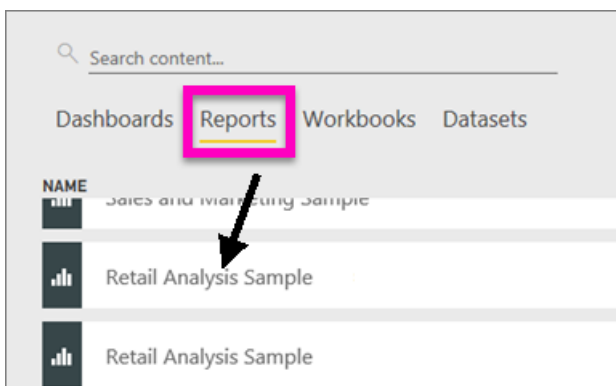
2. On the **District Monthly Sales** report page, set View to **Fit to width**.
3. On the **Overview** report page, leave the default View setting.
4. Now save the report by selecting **File > Save**. The next time you open this report, the pages will display using the new View settings. Let's go see.



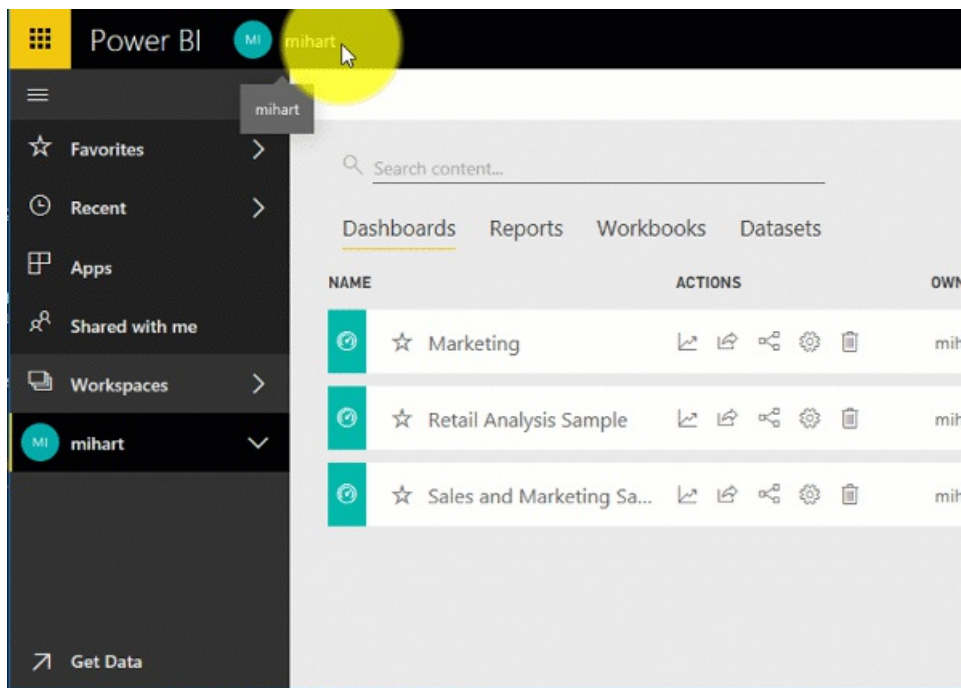
5. Select the name of the current workspace from the top navbar to return to that workspace.



6. Select the **Reports** tab and choose the same report (Retail Analysis Sample).




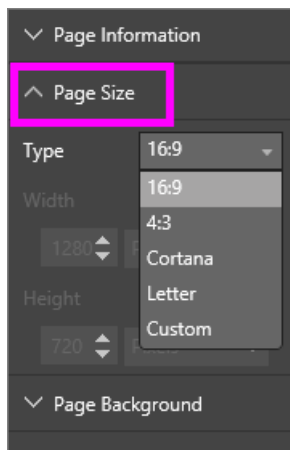
7. Open each page of the report to see the new settings.



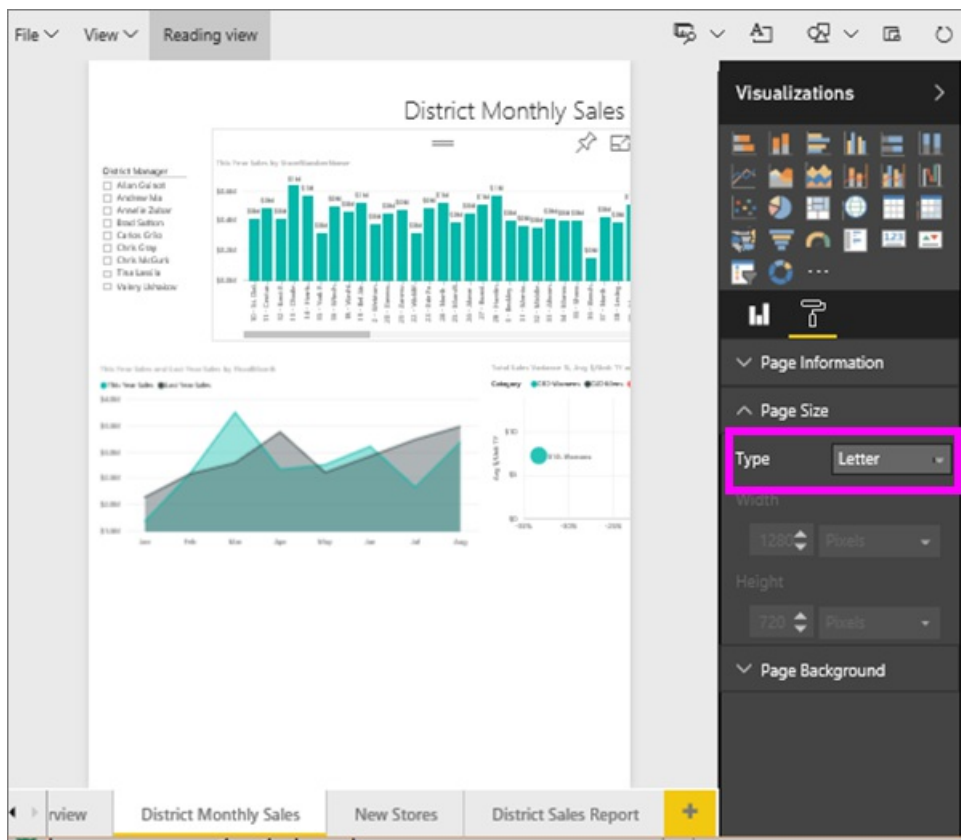
Now, let's explore the *page size* setting

The page size settings are only available in [Editing view](#), so you must have edit (*creator*) permissions to the report to change the page size settings. If you've connected to any of our [samples](#), you'll have *creator* permissions to those reports.

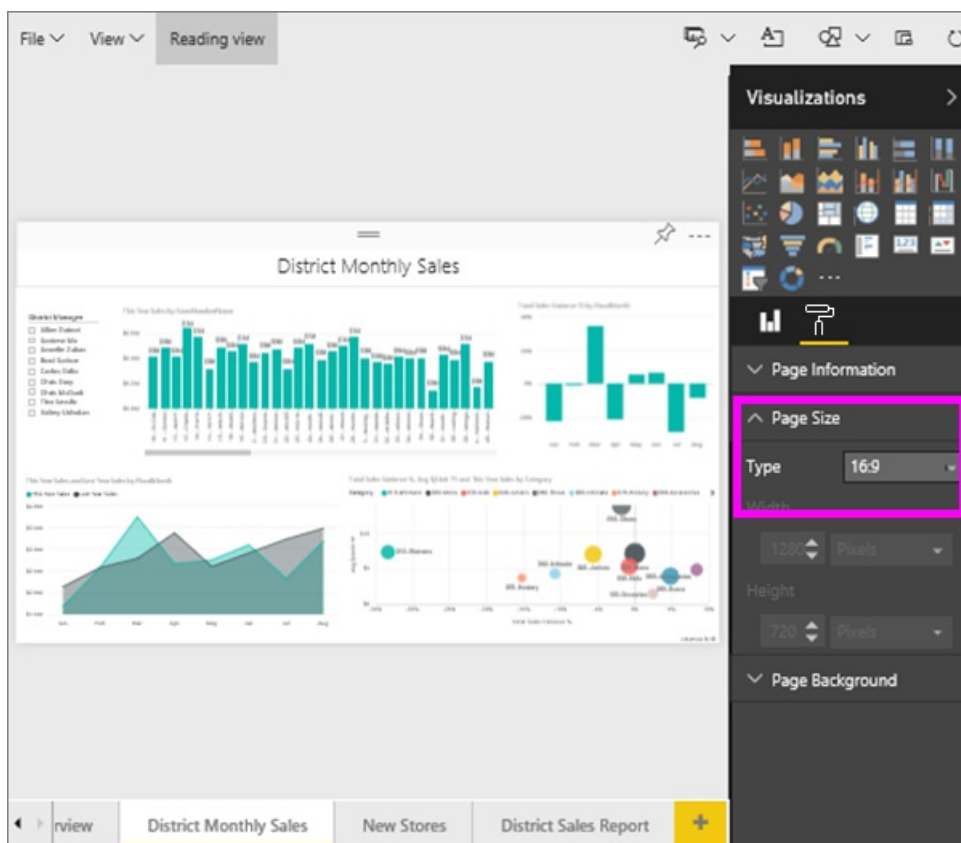
1. Open the "District monthly sales" page of the [Retail Analysis sample](#) in Editing View.
2. Make sure that no visualizations are selected on the canvas. In the **Visualizations** pane, select the paint roller icon .
3. Select **Page size** > **Type** to display the page size options.



4. Select **Letter**. On the canvas, only the contents that fit within 816 x 1056 pixels (Letter size) remain on the white portion of the canvas.



5. Select **Page size 16:9** ratio.



The report page displays using a ratio of 16 wide by 9 high. To see the actual pixel size being used, take a look at the greyed out Width and Height fields (1280x720). There is a lot of empty space around the report canvas; this is because we previously set **View** to "Fit to width".

6. Continue exploring the **Page Size** options.

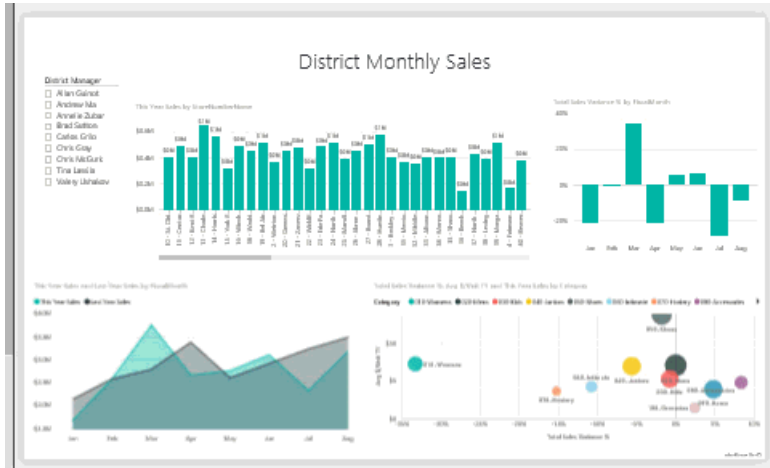
Use page View and Page Size together

Use page View and Page Size together to create a report that looks its best when shared with colleagues or embedded in another application.

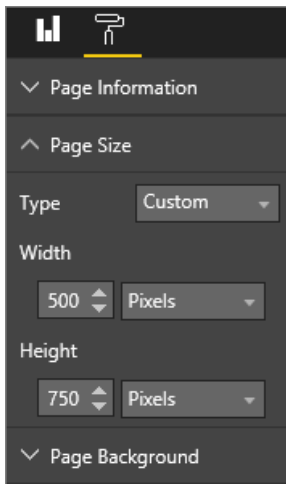
In this exercise, you'll create a report page that will display in an application that has space for 500 pixels wide by 750 pixels high.

Remember in the previous step we saw that our report page is currently displaying at 1280 wide by 720 high. So we know that we'll need to do a lot of resizing and rearranging if we want all of our visuals to fit.

1. Resize and move the visuals so that they fit in less than half of the current canvas area.



2. Select **Page Size > Custom**.
3. Set Width to 500 and set Height to 750.



4. Tweak the report page so that it looks its best. Switch between **View > Actual size** and **View > Fit to page** to make adjustments.

District Monthly Sales

District Manager

- Allan Guinot
- Andrew Ma
- Annelie Zubar
- Brad Sutton
- Carlos Grilo
- Chris Gray
- Chris McGurk
- Tina Lassila
- Valery Ushakov

This Year Sales by StoreNumberName

StoreNumberName	Sales (\$M)
501 - Fred...	\$0.12
504 - Gal...	\$0.18
507 - Col...	\$0.15
510 - Neor...	\$0.10
511 - Bow...	\$0.08
508 - Glab...	\$0.12
546 - WIL...	\$0.10
541 - Lill...	\$0.10
505 - Paas...	\$0.05
502 - Cha...	\$0.10

This Year Sales and Last Year Sales by Fiscal Mo...

Fiscal Month	This Year Sales (\$M)	Last Year Sales (\$M)
Jan	\$0.10	\$0.12
Feb	\$0.15	\$0.18
Mar	\$0.20	\$0.22
Apr	\$0.18	\$0.20
May	\$0.15	\$0.18
Jun	\$0.12	\$0.15
Jul	\$0.10	\$0.12
Aug	\$0.12	\$0.15

Total Sales Variance % by Fiscal Month

Fiscal Month	Total Sales Variance %
Jan	-10%
Feb	15%
Mar	20%
Apr	18%
May	15%
Jun	12%
Jul	10%
Aug	12%

Total Sales Variance %, Avg \$/Unit TY and This Year Sales by Category

Category	Total Sales Variance %	Avg \$/Unit TY
100-Groceries	-80%	\$2
010-Womens	-40%	\$5
060-Intimate	-30%	\$4
070-Hosiery	-20%	\$4
020-Mens	0%	\$6
030-Kids	0%	\$6
040-Juniors	0%	\$6
050-Shoes	0%	\$8
080-Accessories	10%	\$4
090-Home	40%	\$4

Visualizations

Page Information

Page Size

Type: Custom

Width: 500 Pixels

Height: 750 Pixels

Page Background

Next steps

[Create reports for Cortana](#)

Back to [Page display settings in a Power BI report](#)

More questions? [Try the Power BI Community](#)

Reorder pages in a report in Power BI

12/20/2017 • 1 min to read • [Edit Online](#)

In Power BI, a report is made up of one or more pages. Each page has a tab along the bottom. To reorder a report, simply select and drag the tab to its new location.



Next steps

Read more about [reports in Power BI](#)

[Power BI - Basic Concepts](#)

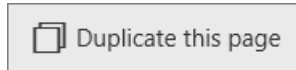
More questions? [Try the Power BI Community](#)

Duplicate a report page in Power BI

12/20/2017 • 1 min to read • [Edit Online](#)

Duplicating a report page requires edit permissions to the report. In Power BI service, this means opening the report in [Editing view](#).

1. In Power BI, open a report that has at least one page.
2. From the top control bar, select **Duplicate this page**.



Your new page is created and becomes the active page.

3. Optionally, [rename the report page](#).

Next steps

More about [Visualizations in Power BI reports](#) [Add a new page to a report](#)

[Power BI - Basic Concepts](#)

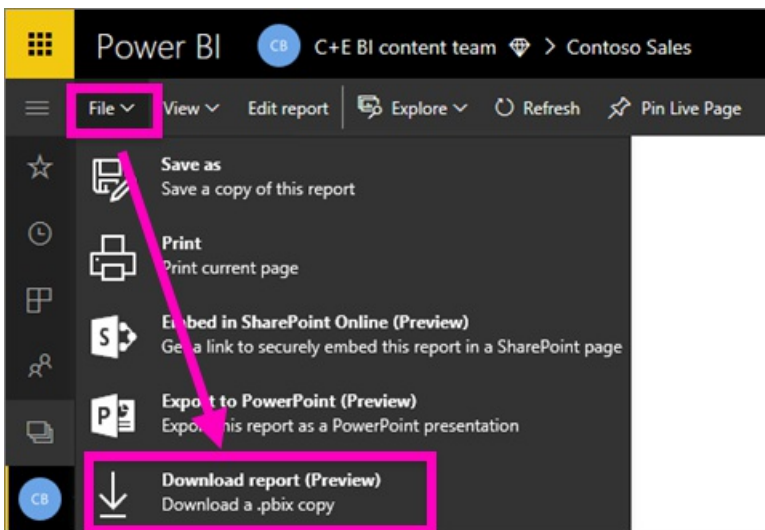
More questions? [Try the Power BI Community](#)

Export a report from Power BI service to Desktop (Preview)

1/26/2018 • 2 min to read • [Edit Online](#)

In Power BI Desktop, you can export (also referred to as *download*) a report to Power BI service by saving the report and selecting **Publish**. You can also export in the other direction as well, and download a report from Power BI service to Desktop. The extension for files being exported, in either direction, is *.pbix*.

There are a few limitations and considerations to keep in mind, which are discussed later in this article.



Download the report as a .pbix

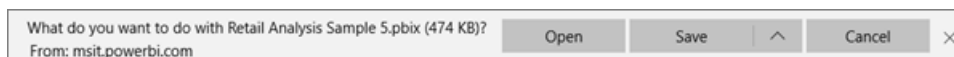
To download the .pbix file, follow these steps:

1. In **Power BI service**, open the report you want to download in [Editing view](#).
2. From the menubar, select **File > Download report**.

NOTE

The report must have been [created using Power BI Desktop](#) after November 23, 2016 - and updated since then - to be able to download the report. If it hasn't, the *Download Report* menu option in Power BI service is grayed out.

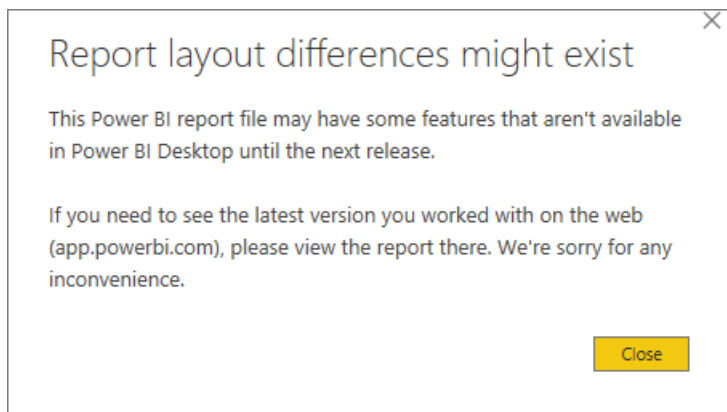
3. While the .pbix file is being created, a status banner displays the progress. When the file is ready, you'll be asked to open or save the .pbix file. The name of the file matches the title of the report.



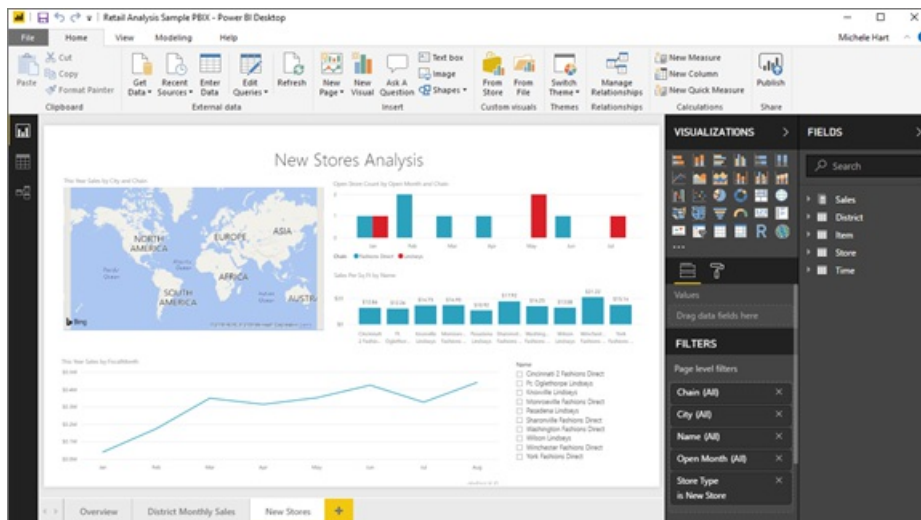
You now have the option of opening the .pbix file in either Power BI service (app.powerbi.com) or Power BI Desktop.

4. To immediately open the report in Desktop, select **Open**. To save the file to a specific location, select **Save > Save-As**. If you haven't already, [install Power BI Desktop](#).

When you open the report in Desktop, you may see a warning message letting you know that some features available in the Power BI service report may not be available in Desktop.



5. The report editor in Desktop looks very much like the report editor in Power BI service.



Considerations and troubleshooting

There are a few important considerations and limitations associated with downloading (exporting) a *.pbix* file from Power BI service.

- To download the file, you must have edit access to the report
- The report must have been created using **Power BI Desktop** and been *published* to the **Power BI service**, or the *.pbix* must have been *uploaded* to the service.
- Reports must be published or updated after November 23, 2016. Reports published prior to then are not downloadable.
- This feature will not work with reports originally created in the **Power BI service**, including content packs.
- You should always be using the latest version of **Power BI Desktop** when opening downloaded files. Downloaded *.pbix* files may not open in non-current versions of **Power BI Desktop**.
- If your administrator has turned off the ability to export data, this feature will not be visible in the **Power BI service**.

Next steps

View the **Guy in a Cube** one-minute video about this feature:

Also, here are some additional articles that can help you learn to use **Power BI service**:

- [Reports in Power BI](#)
- [Power BI - Basic Concepts](#)

Once you get **Power BI Desktop** installed, the following content can help you get up and running quickly:

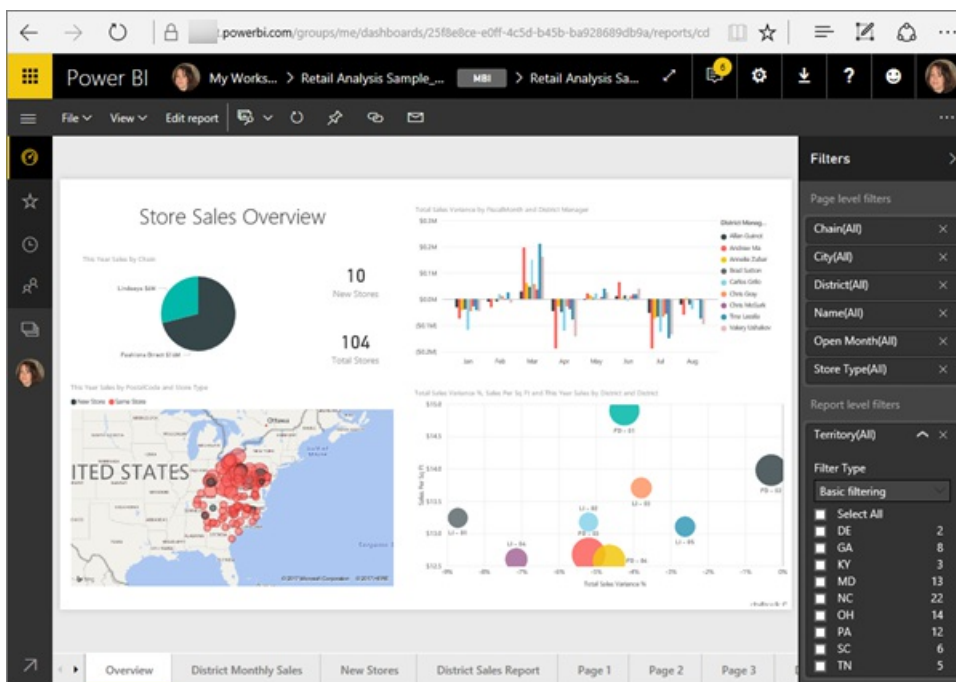
- [Getting Started with Power BI Desktop](#)

More questions? [Try the Power BI Community](#)

Filter a report using query string parameters in the URL

1/8/2018 • 3 min to read • [Edit Online](#)

When you open a report in Power BI service, each page of the report has its own unique URL. To filter that report page, you could use the Filters pane on the report canvas. Or you could add query string parameters to the URL to filter the report. Perhaps you have a report you'd like to show colleagues and you want to pre-filter it for them. One way to do this is to start with the default URL for the report, add the filter parameters to the URL, and then email them the entire URL.



Query string parameter syntax for filtering

The syntax is fairly straightforward; start with the report URL, add a question mark, and then add your filter syntax.

URL?filter=**Table/Field** eq '**value**'

<https://app.powerbi.com/groups/me/reports/cd153328-ccb5-4c1f-8539-33dec14c4d28/ReportSection3?filter=Store/Territory eq 'NC'>

- **Table** and **Field** names are case sensitive, **value** is not.
- Fields that are hidden from report view can still be filtered.
- **Value** has to be enclosed with single quotes.
- Field type has to be a number or string
- Table and field names cannot have any spaces.

If it's still confusing, continue reading and we'll break it down.

Filter on a field

Let's assume that the URL to our report is the following.

msit.powerbi.com/groups/me/reports/cd153328-ccb5-4c1f-8539-33dec14c4d28/ReportSection3

And we see in our map visualization (above) that we have stores in North Carolina.

NOTE

This example is based on the [Retail Analysis sample](#).

To filter the report to show data only for stores in "NC" (North Carolina), append the URL with the following;

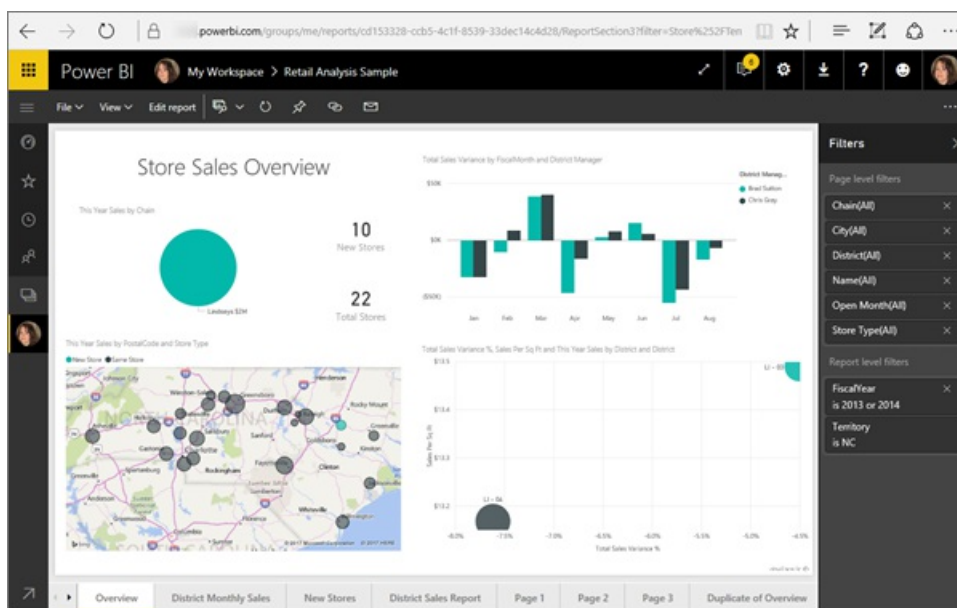
?filter=Store/Territory eq 'NC'

<https://msit.powerbi.com/groups/me/reports/cd153328-ccb5-4c1f-8539-33dec14c4d28/ReportSection3?filter=Store/Territory eq 'NC'>

NOTE

NC is a value stored in the **Territory** field of the **Store** table.

Our report is filtered for North Carolina; all the visualizations on the report page show data for only North Carolina.



Filter on multiple fields

You can also filter on multiple fields by adding additional parameters to your URL. Let's go back to our original

filter parameter.

```
?filter=Store/Territory eq 'NC'
```

To filter on additional fields, add an `and` and another field in the same format as above. Here is an example.

```
?filter=Store/Territory eq 'NC' and Store/Chain eq 'Fashions Direct'
```

Using DAX to filter on multiple values

Another way to filter on multiple fields is by creating a calculated column that concatenates two fields to a single value. Then you can filter on that value.

For example, we have two fields: Territory and Chain. In Power BI Desktop, [create a new Calculated column](#) (Field) called TerritoryChain. Remember that the **Field** name cannot have any spaces. Here is the DAX formula for that column.

```
TerritoryChain = [Territory] & " - " & [Chain]
```

Publish the report to Power BI service and then use the URL query string to filter to display data for only Lindseys stores in NC.

<https://app.powerbi.com/groups/me/reports/8d6e300b-696f-498e-b611-41ae03366851/ReportSection3?filter=Store/TerritoryChain eq 'NC-Lindseys'>

Pin a tile from a filtered report

Once you've filtered the report using query string parameters, you can pin visualizations from that report to your dashboard. The tile on the dashboard will display the filtered data and selecting that dashboard tile will open the report that was used to create it. However, the filtering you did using the URL is not saved with the report and when the dashboard tile is selected, the report opens in its unfiltered state. This means that the data displayed in the dashboard tile will not match the data displayed in the report visualization.

There may be some cases where this will be helpful when you'd like to see different results; filtered on the dashboard and unfiltered in the report.

Limitations and troubleshooting

There are a couple of things to be aware of when using the query string parameters.

- Query string filtering does not work with [Publish to web](#) or Power BI Embedded.
- Field type has to be number or string.
- Table and field names cannot have any spaces.

Next steps

[Pin a visualization to a dashboard](#)

[Try it out -- it's free!](#)

More questions? [Try asking the Power BI Community](#)

Power BI Performance Best Practices

12/12/2017 • 9 min to read • [Edit Online](#)

This article offers guidance for building fast and reliable reports in Power BI.

Use filters to limit report visuals to display only what's needed

The more data that a visual needs to display, the slower that visual will be to load. While this principle seems obvious, it can be easy to forget. For example: suppose you have a large dataset. Atop of that, you build a report with a table of the table. End users use slicers on the page to get to the rows they wanted – typically they're only interested in a few dozen rows.

A common mistake is to have the default view of the table be unfiltered - i.e. all 100M+ rows. The data for these rows must be loaded into memory and uncompressed at every refresh. This created huge memory loads. The solution: reduce the max number of items that the table displayed using the "Top N" filter. The max item can be much larger than what users would need, for example, 10,000. As a result, the end user experience was unchanged, but memory utilization of the report dropped multiple orders of magnitude, and performance improved accordingly.

A similar approach to the above is strongly suggested for all visuals on your reports. Ask yourself, is all the data in this visual needed? Are there ways to filter down the amount of data shown in the visual with minimal impact to the end user experience? Note that tables in particular can be very expensive.

Limit visuals on report pages

The above principle applies equally to the number of visuals on a particular report. It is highly recommended that you limit the number of visuals on a particular report to only what is necessary. Drill-through pages are a great way to provide additional details without jamming more visuals into the report.

Optimize your model

Some best practices:

- Tables or columns that are unused should be removed if possible.
- Avoid distinct counts on fields with high cardinality – i.e. millions of distinct values.
- Take steps to avoid fields with unnecessary precision and high cardinality. For example, you could split highly unique datetime values into separate columns – e.g. month, year, date, etc. Or, where possible, use rounding on high-precision fields to decrease cardinality – (e.g. 13.29889 -> 13.3).
- Use integers instead of strings, where possible.
- Be wary of DAX functions which need to test every row in a table – e.g. RANKX – in the worst case, these functions can exponentially increase run-time and memory requirements given linear increases in table size.
- When connecting to data sources via DirectQuery, consider indexing columns that are commonly filtered or sliced again – this will greatly improve report responsiveness.

For more guidance on optimizing data sources for DirectQuery, see [DirectQuery in SQL Server 2016 Analysis Services](#).

DirectQuery and Live connection: understand underlying data source performance

In the DirectQuery or live connection case, when users visit a Power BI report, Power BI sends queries in real-time to the underlying data source. Once the data source returns with the query data, then the report is rendered. As a result, your report performance in these cases depends largely on the performance of the underlying data source.

In these cases, it will be important to understand the performance of your underlying data source. Different data sources will have different tools for understanding query performance. For example, SQL Server and Azure SQL provide the Query Store, which captures a history of queries and their runtime statistics.

As a rule of thumb, when deploying Power BI reports built on DirectQuery and live connection, try out what your end users will do in Power BI Desktop. If the report is slow to load in Power BI Desktop, it will almost certainly be slow to load in the service for your end users.

DirectQuery best practices

The following section describes general best practices for connecting via DirectQuery.

DB design guidance

- Push calculated columns and measures to the source where possible – the closer they are to the source, the higher the likelihood of performance.
- Optimize! Understand the execution plans for your queries, add indices for commonly filtered columns, etc.

Modelling guidance

- Start in the Power BI Desktop.
- Avoid complex queries in Query Editor.
- Do not use relative date filtering in the Query Editor.
- Keep measures simple initially, and add complexity incrementally.
- Avoid relationships on calculated columns and unique identifier columns.
- Try setting "Assume Referential Integrity" on relationships – in many cases, this can significantly improve query performance.

General

- Apply filters first.
- Consider switching off interaction between visuals – this will reduce the query load when users cross-highlight.
- Limit the number of visuals and the data per visuals, as described above.
- Enabling row-level security can result in substantial changes in performance. Be sure to test the different row-level security roles that your users will assume.
- Note that there are query-level time-outs enforced by the service to ensure that long-running queries cannot monopolize system resources. Queries that take longer than 225 seconds will time out and result in a visual-level error.

Understanding dashboards and query caches

Visuals pinned to dashboards are served by the query cache when the dashboard is loaded. Conversely, when visiting a report, the queries are made on-the-fly to the data source – either the Power BI service (in the case of import) or the data source that you specify (in the case of DirectQuery or live connection).

NOTE

When you pin live report tiles a dashboard, they are not served from the query cache – instead, they behave like reports, and make queries to back-end cores on the fly.

As the name suggests, retrieving the data from the query cache provides better and more consistent performance than relying on the data source. One way to take advantage of this functionality is to have dashboards be the first

landing page for your users. Pin often used and highly requested visuals to the dashboards. In this way, dashboards become a valuable "first line of defense" which provide consistent performance with less load on the capacity. Users can still click through to the report to dig into the details.

Note that for DirectQuery and live connection, this query cache is updated on a periodic basis by querying the data source. By default, this happens every hour, though it can be configured in dataset settings. Each query cache update will send queries to the underlying data source to update the cache. The number of queries generated depends on the number of visuals pinned to dashboards relying on that data source. Notice that if row-level security is enabled, queries are generated for each different security context. For example, if you have two different roles that your users fall into, with two different views of the data, then during query cache refresh, two sets of queries are generated.

Understand custom visual performance

Be sure to put each custom visual through its paces to ensure high performance. Poorly optimized custom visuals can negatively affect the performance of the entire report.

Deep-dive into query performance with SQL Profiler and Power BI Desktop

For a deeper dive into which visuals are taking up the most time and resources, you can connect SQL Profiler to Power BI Desktop to get all full view of query performance. Instructions as follows:

1. Install SQL Server Profiler and run Power BI Desktop

SQL Server Profiler is available as part of SQL Server Management Studio.

2. Determine the port being used by Power BI Desktop

Run the command prompt or PowerShell with administrator privileges, and use netstat to find the port that Power BI Desktop is using for analysis:

```
> netstat -b -n
```

The output should be a list of applications and their open ports, for example:

```
TCP [::1]:55786 [::1]:55830 ESTABLISHED
```

```
[msmdsrv.exe]
```

Look for the port used by msmdsrv.exe, and write it for later use. In this case, you could use port 55786.

3. Connect SQL Server Profiler to Power BI Desktop

- Start SQL Server Profiler from the **Start** menu
- **File > New Trace**
- Server Type: Analysis Services
- Server name: localhost:[port number found above]
- At the next screen, select **Run**
- Now the SQL Profiler is live, and actively profiling the queries that Power BI Desktop is sending.
- As queries are executed, you can see their respective durations and CPU times – using this information, you can determine which queries are the bottlenecks.

Through the SQL Profiler, you can identify the queries which are taking up the longest CPU time, which in turn are likely the performance bottlenecks. The visuals which execute those queries should be then be a focal point of continued optimization.

Gateway best practices

The on-premises data gateway is a great tool for connecting the Power BI service with your on-premises data. At the same time, with poor planning, it can also become a bottleneck for report performance. This is especially true for DirectQuery/live connection datasets, where all queries and query responses pass through the gateway. The following are some best practices for ensuring highly performant gateways:

- **Use the Enterprise mode**, as opposed to the personal mode.
- **Recommended hardware specs for the gateway** – 8 CPU cores, 16 GB RAM.
- **Set up monitoring** – set up performance monitoring on the gateway machine understand whether the gateway is becoming overloaded and becoming a bottleneck. For more information, see [Troubleshooting the on-premises data gateway](#).
- **Scale up or scale out** – if the gateway is indeed becoming a bottleneck, then consider scaling up (that is, moving the gateway to a more powerful machine with more CPU and RAM) or scaling out (for example, splitting out datasets onto different gateways).
- **Separate import vs. DirectQuery** – if scaling out, consider separating the gateways responsible for import vs. those responsible for DirectQuery.

Network latency

Network latency can impact report performance by increasing the time required for requests to reach the Power BI service, and for responses to be delivered. Tenants in Power BI are assigned a specific region. You can view your tenant's "home" region by navigating to powerbi.com, selecting ? in the top right and then **About Power BI**. When users from a tenant access the Power BI service, their requests are always routed to this region. Once the requests reach the Power BI service, the service may then send additional requests – e.g. to the underlying data source or the gateway – which are also subject to network latency.

Tools such as [Azure Speed Test](#) can provide an indication of network latency between the client and the Azure region. In general, to minimize the impact of network latency, strive to keep data sources, gateways, and your Power BI cluster as close as possible. If network latency is an issue, you can try locating gateways and data sources closer to your Power BI cluster by placing them on virtual machines.

To further improve network latency, consider using [Azure ExpressRoute](#), which is capable of creating faster, more reliable network connections between your clients and Azure datacenters.

Next steps

- [Planning a Power BI Enterprise Deployment](#), with all-around guidance on large-scale Power BI deployments
- [DirectQuery in SQL Server 2016 Analysis Services](#)
- [\[YouTube\] Building Fast and Reliable Reports in Power BI](#)
- [\[YouTube\] Power BI Enterprise Deployments](#)

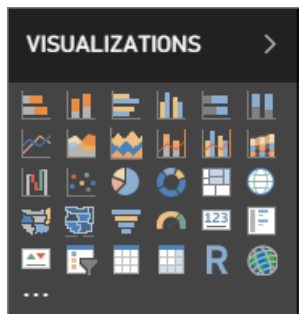
Visualizations in Power BI reports

1/23/2018 • 2 min to read • [Edit Online](#)

Visualizations (aka visuals) display insights that have been discovered in the data. A Power BI report might have a single page with one visual or it might have pages full of visuals. In Power BI service, visuals can be [pinned from reports to dashboards](#).

It's important to make the distinction between report *creators* and report *consumers*. If you are the person building or modifying the report, then you are a creator. Creators have edit permissions to the report and its underlying dataset. In Power BI Desktop, this means you can open the dataset in Data view and create visuals in Report view. In Power BI service, this means you can open the dataset or report in the report editor in [Editing view](#). If a report or dashboard has been [shared with you](#), you are a report **consumer**. You'll be able to view and interact with the report and its visuals but you won't be able to save changes.

There are many different visual types available directly from the Power BI VISUALIZATIONS pane.



And for even more choices, visit the [Microsoft AppSource community site](#) to find and download [custom visuals](#) provided by Microsoft and the community.

If you're new to Power BI, or need a refresher, use the links below to learn the basics of Power BI visualizations. Alternately, use our Table of Contents (along the left side of this article) to find even more helpful information.

Add a visualization in Power BI

[Create visualizations](#) on the pages of your reports. Browse the [list of available visualizations and available visualization tutorials](#).

Upload a custom visualization and use it in Power BI

Add a custom visualization that you created yourself or that you found in the [Microsoft AppSource community site](#). Feeling creative? Dig into our source code and use our [developer tools](#) to create a new visualization type and [share it with the community](#)

Change the visualization type

Try [changing the type of visualization](#) to see which works best with your data.

Pin the visualization

In Power BI service, when you have the visualization the way you want it, you can [pin it to a dashboard](#) as a tile. If you change the visualization being used in the report after you pin it, the tile on the dashboard doesn't change -- if it was a line chart, it stays a line chart, even if you changed it to a Donut chart in the report.

Next steps

[Visualization types in Power BI Reports in Power BI](#)

[Dashboards in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Visualization types in Power BI

1/23/2018 • 2 min to read • [Edit Online](#)

Power BI visualizations

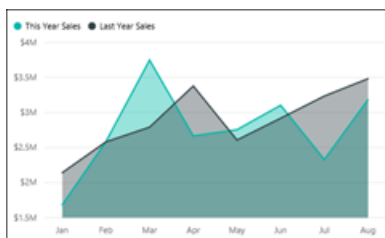
We'll be adding new visualizations, stay tuned!

And check out the [Microsoft AppSource](#), where you'll find a growing list of [custom visuals](#) you can download and use in your own dashboards and reports. Feeling creative? [Learn how to create and add your own visuals to this community site.](#)

List of visualizations available in Power BI

All of these visualizations can be added to Power BI reports, specified in Q&A, and pinned to dashboards.

Area charts: Basic (Layered) and Stacked

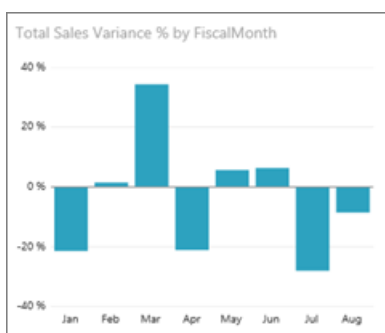


TIP

The Basic Area chart is based on the line chart with the area between the axis and line filled in.

For more information, see [Tutorial: Basic Area chart.](#)

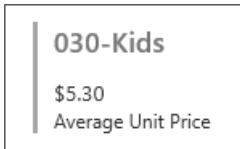
Bar and column charts



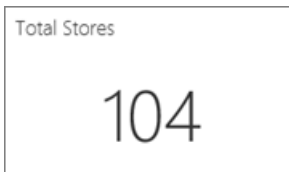
TIP

Bar charts are the standard for looking at a specific value across different categories.

Cards: Multi row



Cards: Single number



For more information, see [Create a Card \(big number tile\)](#).

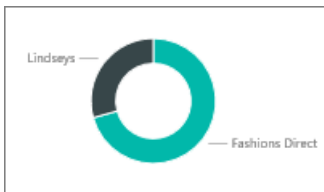
Combo charts



TIP
A Combo chart combines a column chart and a line chart. Choose from *Line and Stacked Column* and *Line and Clustered Column*.

For more information, see [Tutorial: Combo charts in Power BI](#).

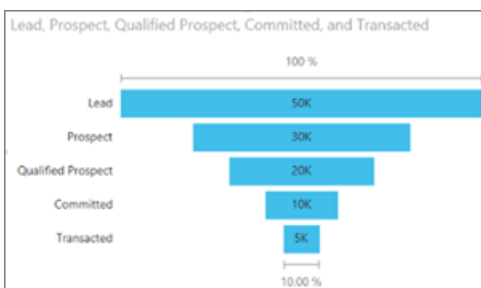
Doughnut charts



TIP
Doughnut charts are similar to Pie charts. They show the relationship of parts to a whole.

For more information, see [Tutorial: Doughnut charts in Power BI](#).

Funnel charts

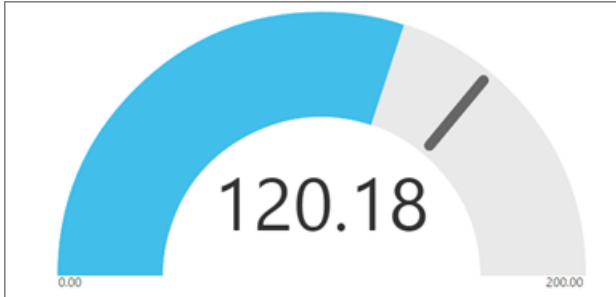


TIP

Funnels help visualize a process that has stages and items flow sequentially from one stage to the next. Use a funnel when there is a sequential flow between stages, such as a sales process that starts with leads and ends with purchase fulfillment.

For more information, see [Tutorial: Funnel Charts in Power BI](#).

Gauge charts



TIP

Displays current status in the context of a goal.

For more information, see [Tutorial: Gauge Charts in Power BI](#).

KPIs



TIP

Displays progress toward a measurable goal.

For more information, see [Tutorial: KPIs in Power BI](#).

Line charts



TIP
Emphasize the overall shape of an entire series of values, usually over time.

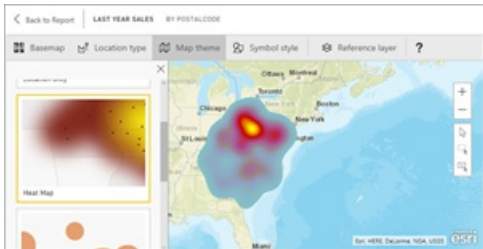
Maps: Basic maps



TIP
Used to associate both categorical and quantitative information with spatial locations.

For more information, see [Tips and tricks for map visuals](#).

Maps: ArcGIS maps



For more information, see [Tutorial: ArcGIS maps in Power BI](#).

Maps: Filled maps (Choropleth)



TIP

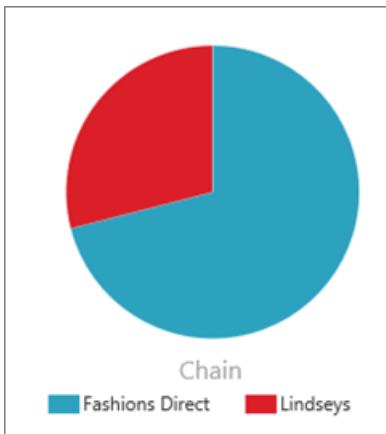
The more intense the color, the larger the value.

For more information, see [Tutorial: Filled Maps in Power BI](#).

Matrix

Quarter	Q1		Q2	
Year	Revenue	YTD Revenue	Revenue	Revenue
2010	\$45,186,241.942528	45,186,241.94	\$70,609,615.88247627	
2011	\$47,641,801.21002861	47,641,801.21	\$71,129,455.27992704	
2012	\$53,054,664.287495166	53,054,664.29	\$72,265,427.93995765	
2013	\$45,011,474.33002325	45,011,474.33	\$74,627,866.02998048	
2014	\$45,648,089.42003315	45,648,089.42	\$77,663,582.71497234	
2015	\$45,186,241.942538336	45,186,241.94	\$70,609,615.88244378	
Total	\$281,728,513.13264656	45,186,241.94	\$436,905,563.72975754	

Pie charts



Scatter and Bubble charts

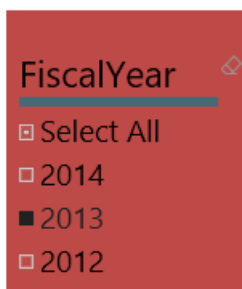


TIP

Display relationships between 2 (scatter) or 3 (bubble) quantitative measures -- whether or not, in which order, etc.

For more information, see [Tutorial: Scatter charts in Power BI](#).

Slicers



For more information, see [Tutorial: Slicers in Power BI](#).

Standalone images



For more information, see [Add an image widget to a dashboard](#).

Tables

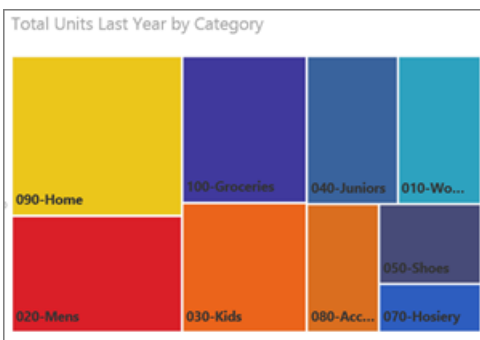
District	Count of StoreNumber	Average Selling Area Size
FD - 01	9	43,889
FD - 02	9	47,778
FD - 03	9	50,000
FD - 04	10	50,500
LI - 01	13	10,385
LI - 02	11	10,909
Total	61	33,361

TIP

Work well with quantitative comparisons among items where there are many categories.

For more information, see [Working with tables in Power BI](#).

Tree Maps



For more information, see [Tutorial: Treemaps in Power BI](#).

TIP

Are charts of colored rectangles, with size representing value. They can be hierarchical, with rectangles nested within the main rectangles.

Waterfall charts



TIP

Waterfall charts show a running total as values are added or subtracted.

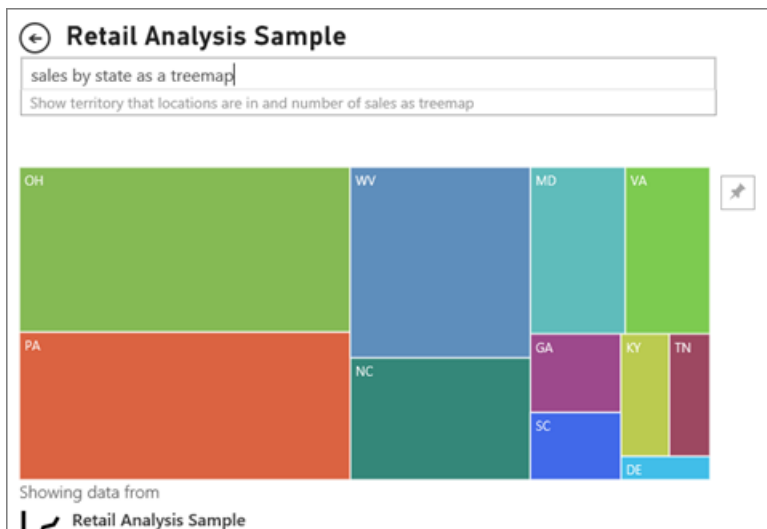
For more information, see [Tutorial Waterfall charts in Power BI](#).

Tell Q&A which visualization to use

When typing natural language queries with Power BI Q&A, you can specify the visualization type in your query.

For example:

"sales by state as a treemap"



Next steps

[Visualizations in Power BI reports](#)

[The right visual reference from sqlbi.com](#)

[Reports in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Best design practices for reports and visuals

12/20/2017 • 47 min to read • [Edit Online](#)

We've released a new and improved navigation and content experience for Power BI, and we're in the process of updating all of our documentation. The information and screenshots on this page may not match what you see on your screen. For more information see [Navigating Power BI service](#).

Introduction

This paper provides best practices for designing reports in Power BI. Starting with planning, it discusses principles of design that you can apply to your reports and to the pages and individual visuals that make up that report. Many of these best practices apply to dashboard design as well.

We hope this paper will be a jumping-off point for you and that you'll apply what you learn to your own reports and visualizations and that you'll continue the conversation on [community.powerbi.com](#). BI report design and visualization usage is a hot topic right now and there are many thought leaders, bloggers, and websites that look at this topic in breadth and depth (we've listed a few at the end).

NOTE

The recommendations made in this white paper are guidelines for you to apply when and where it makes sense. For every principle we describe below, there are usually valid reasons to "break the rule."

We are overwhelmed by information, not because there is too much, but because we don't know how to tame it. -- Stephen Few

A look at the landscape and terminology

In Power BI, a report can have one or more report pages and all the pages together are collectively referred to as the report. The basic elements of the report are visuals (aka visualizations), standalone images, and text boxes. From the individual data points, to the report elements, to the report page itself, there are innumerable formatting options.

We'll start at the report planning stage, continue on to basic report design principles, then discuss visual design principles, and finish with a discussion of best practices for individual visual types.

In-depth guidance and instructions for creating and using Power BI reports is available at [powerbi.com](#) > **Learn**.

Before you build your first visualization...focus on requirements

Creating a report starts before you build your first visual because a good report needs planning. Know what data you have to work with and write down the requirements for the report. Ask yourself "What is the business need, how is this data going to be used, and by whom?" A key question is "what decisions does the reader want to be able to make based on this report?"

The answer to those questions will drive your design. Every report tells a story. Make sure that story matches the business need. It may be tempting to add visuals that show dramatic insights, but if those insights don't match the business need, then the report won't be useful – and in fact your users might be distracted by those visuals. Also, you may find that the information needed to make that decision cannot be gleaned from this data. Can this report be used to measure what is needed?

Reports can be used to monitor, uncover, track, predict, measure, manage, test, and more. If, for example, the business need is a sales report that measures performance, then you might design a report that looks at current sales, compares it to previous sales, compares to competitors, and includes some KPIs that trigger alerts. Perhaps readers can drill down into the sales numbers to see store closures or supply chain issues that may be impacting sales. Another drilldown might be the ability to look at sales by store, region, product, season, and more.

Know the customers for the report and design a report that uses familiar terminology and provides data at a level of detail and complexity on par with the customers' level of knowledge. Have more than one type of customer? One size doesn't always fit all; design separate report pages based on expertise and be sure to label each page clearly so customers can self-identify. Another option is to use slicers so customers can tailor the page to fit them. Involve the customer in the planning stage and avoid the mistake of building what you think they need. Be prepared to start over and to iterate.

Once you've identified the business need, the customers, and the metrics you'd like to include, the next step is to pick the right visuals to tell the story and present those visuals in the most-effective way possible. That covers a lot of ground, and we'll start with some basic principles of report design.

Principles of report design

A report page has limited space and one of the hardest things is to fit all the elements you want into that space – and still have that information be easily understood. And don't underplay the value of "pretty." The key is to find the balance between pretty and useful.

Let's take a look at layout, clarity, and aesthetics.

Layout - the report canvas

The report canvas has a finite amount of space. If you can't fit all the elements on a single report page, break the report up into pages. A report page can be tailored to a specific audience (e.g., HR, IT, Sales, SLT), or to a specific business question (e.g., How are defects impacting our downtime?, What is our Marketing campaign's impact on Sentiment?) or as a progressive story (e.g. first page as overview or attention-grabbing "hook", 2nd page continues the data story, 3rd page dives deeper into the story, etc.). If your entire report fits on a single page, great. If it doesn't, create separate report pages that logically chunk the content. And don't forget to give the pages meaningful and helpful names.

Think about filling an art gallery. You wouldn't put 50 pieces of artwork into a small room, fill it with chairs and paint each wall a different color. As the curator, you'd choose just pieces that have a common theme, lay them out around the room with plenty of space for visitors to move and think, and place informational cards that describes what they're looking at. And there's a reason most modern galleries have plain walls! For this article, we'll start with a report example that needs a lot of work. As we apply our best practices and principles of design, our report will improve.

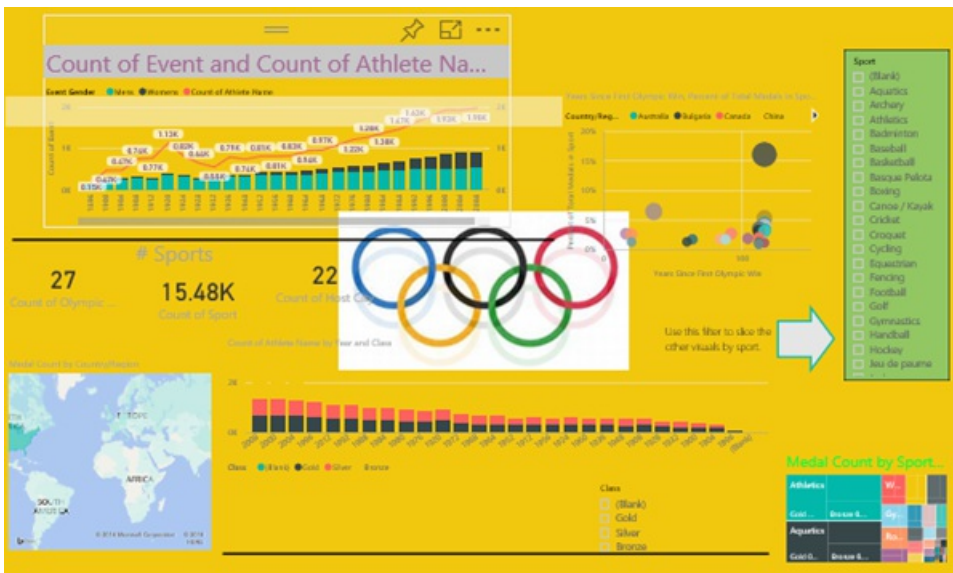


Figure 1: This ugly report page needs a lot of work

The example above has many space-related (layout) design issues that we'll discuss below:

- alignment, order, and use of proximity
- poor use of space and sorting
- clutter

Alignment, order, and proximity

The layout of your report elements impacts comprehension and guides the reader through the report page. How you place and position elements tells a story. The story might be "start here and then look here" or "these 3 elements are related to each other."

- In most cultures, people scan from left to right and top to bottom. Position the most important element in the top left corner of your report. And organize the rest of the visuals in a way that leads to logical navigation and comprehension of the information.
- Position elements that require the reader to make a choice to the left of the visualizations the choice will impact: slicers, for example.
- Position related elements close to each other; proximity implies the elements are related.
- Another way to convey relationships is to add a border or color background around related elements. Conversely, add a divider to distinguish between different sections of a report.
- Use white space to visually chunk sections of the report page.
- Fill the report page. If you find that you have a lot of extra white space, make your visualizations larger or make the canvas smaller.
- Be intentional with sizing your report elements. Don't let space availability dictate the size of a visualization.
- Make important elements larger than the others or add a visual element like an arrow to draw attention.
- Align the elements on the report page, either symmetrically or intentionally asymmetrically.

Let's take a closer look at alignment.

Alignment

Alignment doesn't mean that that the different components need to be the same size or that you must have the same number of components on each row of the report. It just means that there is a structure to the page that aids in navigation and readability.

We can see in our updated report below that the report components are now aligned on the left and right edges and each report row is aligned horizontally and vertically as well. Our slicers are to the left of the visuals they impact.

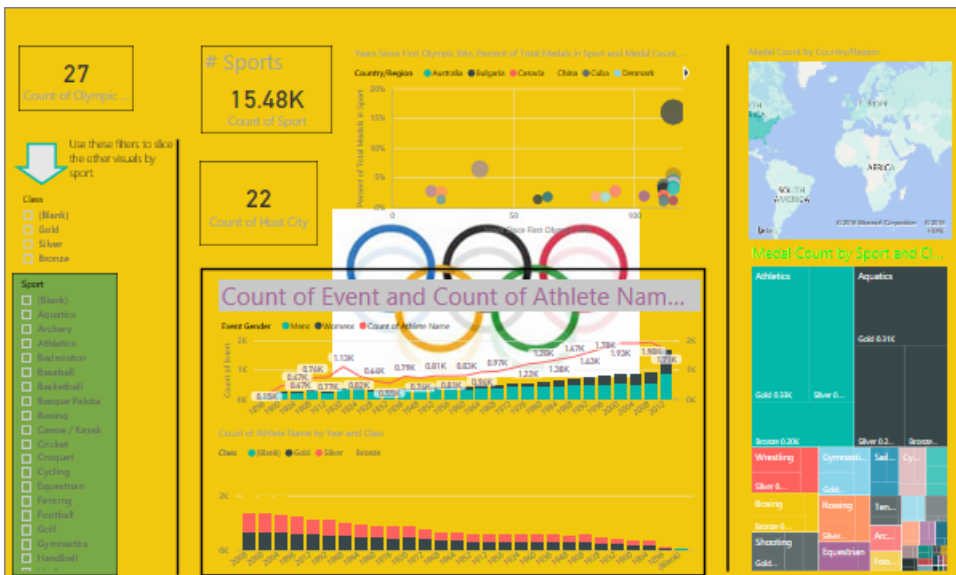


Figure 2: Our ugly report example improved with layout edits

Power BI includes tools to help you align your visuals. In Power BI Desktop, with multiple visuals selected, you can use the **Align and Distribute** options on the **Visuals** ribbon tab to match up the position of visuals.

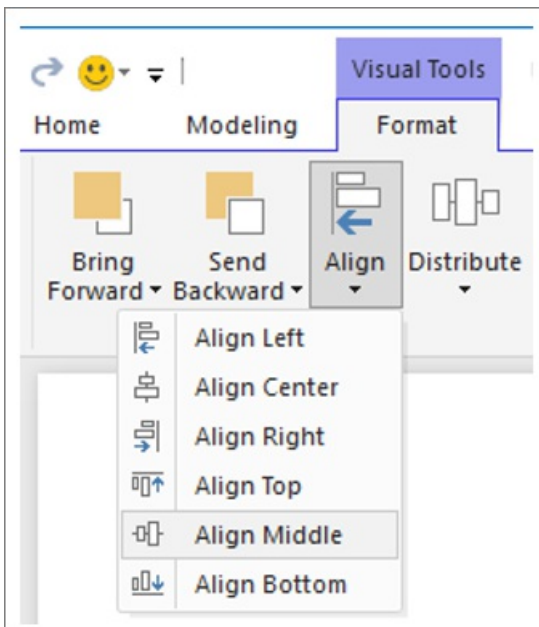


Figure 3: Align visuals in Power BI Desktop

In Power BI online and Power BI Desktop, you also have precise control over the size and position of visuals through the **General** tab on the formatting pane for all visuals:

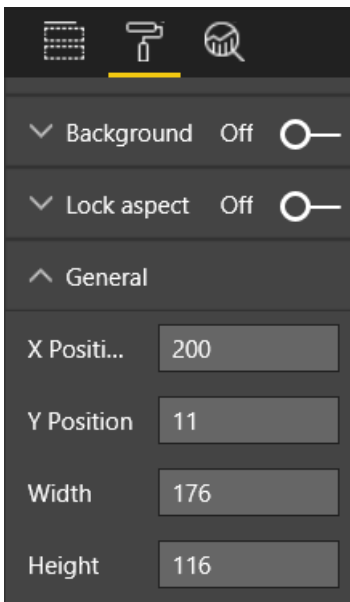


Figure 4: Set exact position for your visual

In our example report page (Figure 2), the 2 cards and large border are aligned on the **X Position** at 200.

Fit to the space

Make the best use of the space you have. If you know how the report will be viewed/displayed, design with that in mind. Reduce empty space to fill the canvas. Do all you can to eliminate the need for scrollbars on individual visuals. Fill the space without making the visuals seem cramped.

Adjust the page size

By reducing the page size, individual elements become larger relative to the overall page. Do this by deselecting any visuals on the page and using the **Page Size** tab in the formatting pane.

Here is a report page using page size 4:3 and then using 16:9. Notice how the layout suits 16:9 so much better. There is even enough room to remove the scrollbar from the second visual.

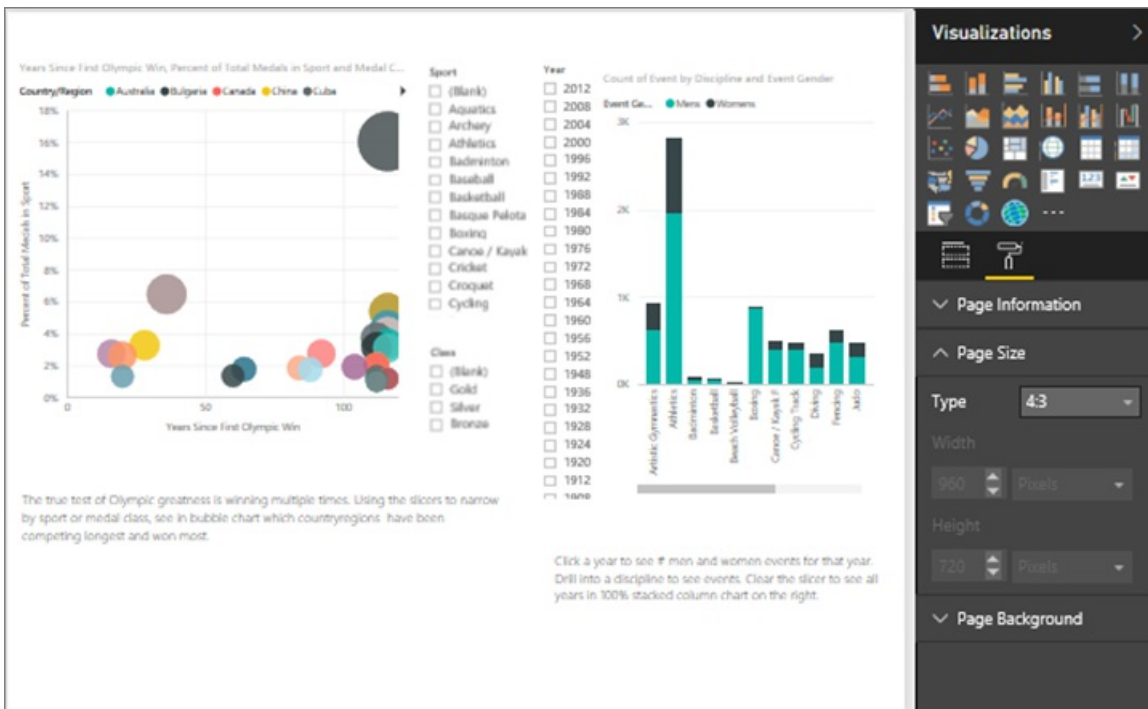


Figure 5a: The report at 4:3 page size

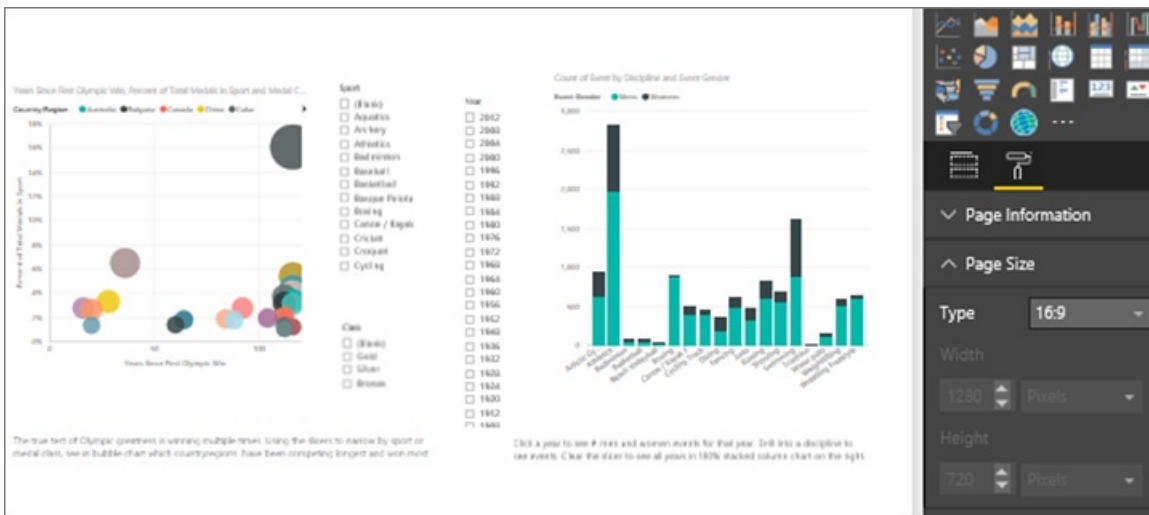


Figure 5b: The report at 16:9 page size ratio

Will your report be viewed 4:3, 16:9 or another ratio? On small screens or huge screens? Or on all possible screen ratios and sizes? Design with this in mind.

Our example report page seems a bit cramped. With no visual selected, open the formatting pane by selecting the paintroller icon. Expand **Page Size** and change **Height** to 900.

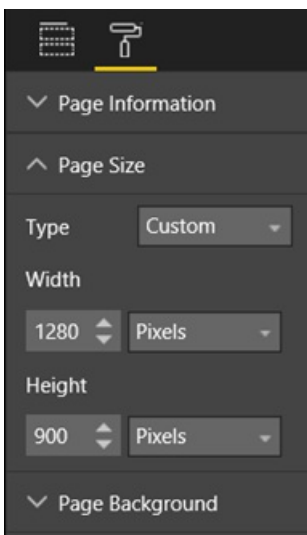


Figure 6: Increase page height

Reduce clutter

A cluttered report page will be hard to understand at-a-glance and may be so overwhelming that readers won't even try. Get rid of all report elements that aren't necessary. Don't add bells-and-whistles that don't help comprehension or navigation. Your report page needs to convey the information as clearly and quickly and cohesively as it can.

Edward Tufte calls it "data to ink ratio" in his book *The Visual Display of Quantitative Information*. Basically, remove anything that isn't essential.

The clutter you remove will increase the whitespace on your report page and give you more real estate for applying the best practices we learned about above in the "Alignment, order, and proximity" section.

Here our example is already looking better. We've removed lots of clutter and added shapes to group elements together. The background image is gone, the unnecessary arrow shape and text box are gone, one visual has been moved to another page in the report, etc. We've also lengthened the page size to increase white (yellow?) space.

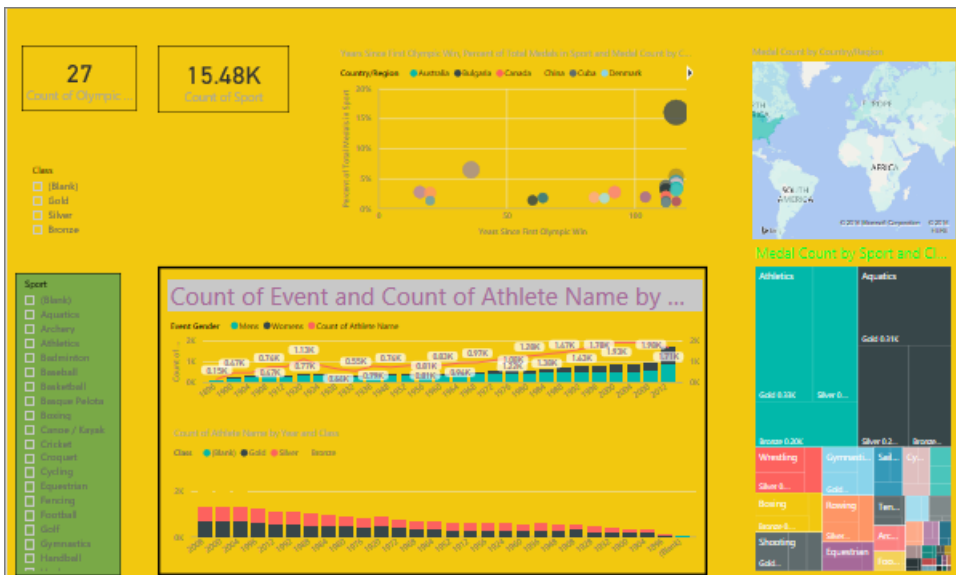


Figure 7: Our ugly report example de-cluttered

Tell a story at a glance

The overall test should be that somebody without any prior knowledge can quickly understand the report without any explanation from anybody. With a quick glance, readers should be able to quickly see what the page is about and what each chart/table is about.

When readers look at your report, their eyes should be drawn to the element you want them to look at first and their eyes will then continue left-right-top-down. Change this behavior by adding visual cues like text box labels, shapes, borders, size, and color.

Text boxes

Sometimes the titles on visualizations aren't enough to tell the story. Add text boxes to communicate with the people viewing your reports. Text boxes can describe the report page, a grouping of visuals, or describe an individual visual. They can explain results or better-define a visual, components in the visual, or relationships between visuals. Text boxes can be used to draw attention based on different criteria called out in the text box.

In Power BI service, from the top menubar, select **Text Box**. (In Power BI Desktop, select **Text Box** from the **Insert** area of the ribbon.)

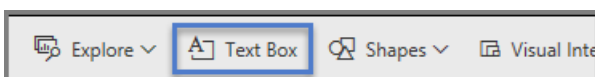


Figure 8: Add a text box

Type in the empty box and then use the controls at the bottom to set font face, size, alignment, and more. Use the handles to resize the box.

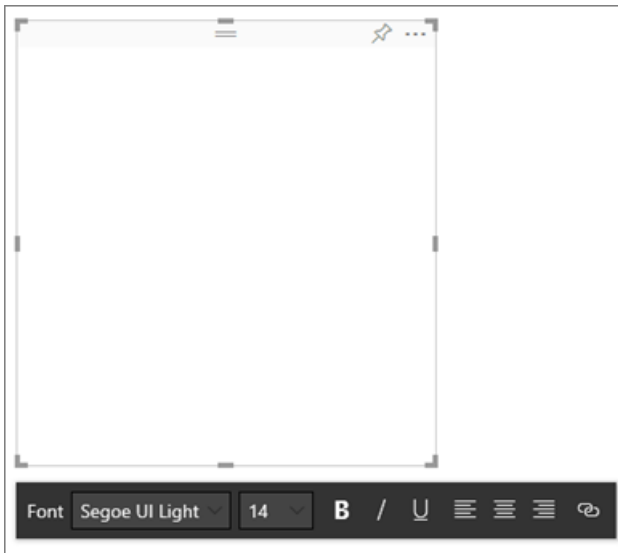


Figure 9: Format the text box

But don't overdo it! Too much text on a report is distracting and detracting from the visuals. If you find that your report page requires a ton of text to make it understandable, then start over. Can you pick a different visual that tells a better story on its own? Can you tweak the visual's native titles to make it more intelligible?

Text

Create a text style guide and apply it to all pages of your report. Pick just a few font faces, text sizes, and colors. Apply this style guide to not only textual elements but to the font choices you make within your visualizations (see Titles and labels that are part of the visualizations, below). Set rules for when you'll use bold, italics, increased font size, certain colors, and more. Try to avoid using all capitalization or underlining.

Shapes

Shapes too can aid navigation and comprehension. Use shapes to group related information together, highlight important data, and use arrows to direct the eye. Shapes help readers understand where to start and how to interpret your report. In design terms, this is often referred to as *contrast*.

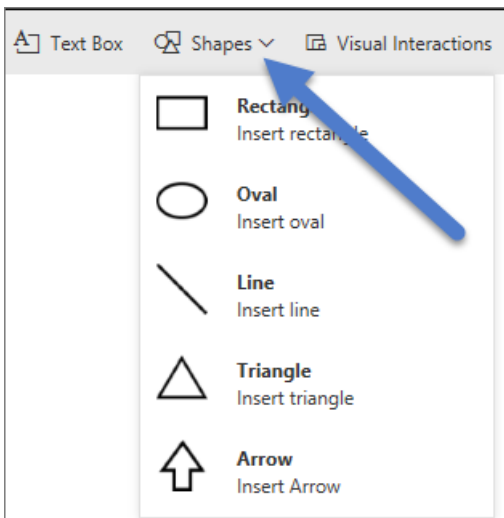


Figure 10a: Shapes in Power BI service

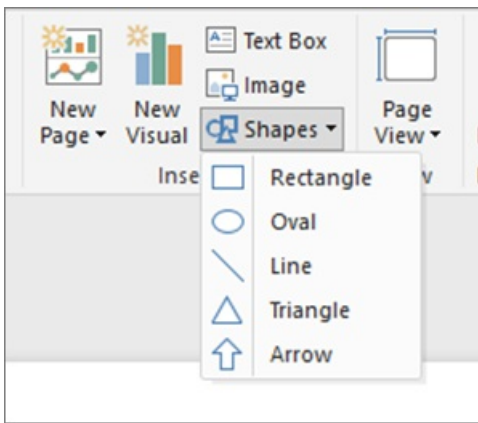


Figure 10b: Shapes in Power BI Desktop

What does our example page look like now? Figure 11 shows a cleaner, less cluttered page with a consistent use of text faces, fonts, and colors. Our page title in the top-left corner tells us what the page is all about.



Figure 11: Our report example with text guidelines applied and title added

In our example, a report page title was added in the top left corner; the first place readers look. Font size is 28 and font is Segoe Bold to help it stand out from the rest of the page. Our text style guide calls for no backgrounds, black titles, legends, and labels and that was applied to all visuals on the page, where possible (the Combo chart axes and labels are not editable). Additionally:

- Cards: **Category label** set to Off, **Title** turned On and set to 12pt black centered.
- Visual titles: if turned On, set to 12pt and left-aligned.
- Slicers: **Header** set to Off, **Title** turned On. Leave **Items** > **Text** grey and 10pt.
- Scatter and column charts: black font for X and Y axes and X and Y axes titles, if used.

Color

Use color for consistency. We'll talk more about color in Principles of visual design, below. But here we're referring to being deliberate in your selection of color so that it doesn't detract from your readers being able to quickly understand your report. Too many bright colors barrage the senses. This section is more what not to do with color.

Backgrounds

When setting backgrounds for report pages, choose colors that don't overshadow the report, clash with other

colors on the page, or generally hurt the eyes. Realize that some colors have inherent meaning. For example, in the US, red in a report is typically interpreted as “bad”.

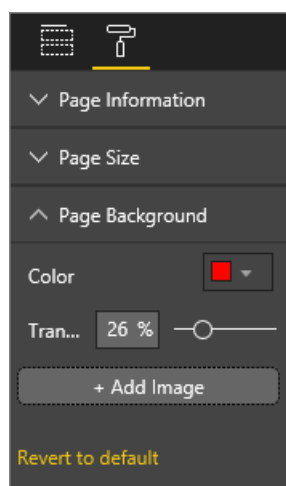


Figure 12: Set report background

You’re not creating a work of art, but a functional report. Choose a color that improves the readability and prominence of the report elements.

A study on the use of color and visualizations within Web pages found that higher contrast between colors increases the speed of comprehension (*The effect of text and background colour on visual search of Web pages** and **Determining Users' Perception of Web Page Visual Complexity and Aesthetic Characteristics.*)

We’ve applied some color best practices to our example report (Figure 20 and 21) below. The most-notable was that we changed the background color to black. The yellow was too bright and strained our eyes. Also, on the “Count of athlete name by year and class” chart, the yellow portion of the bars disappeared into the yellow background. Using a black (or white) background gives us maximum contrast and makes the visuals the focus of attention.

Here are the additional steps we took to improve the example report:

Page title

When we changed the background to black, our title disappeared because the text box field only allows black font. To fix this, add a text box title instead. With the text box selected, erase the text and in the Visualizations tab, select **Title** and turn it On. Select the arrow to expand the **Title** options, type **Summer Olympic Games** into the **Title Text** field and select white **Font color**.

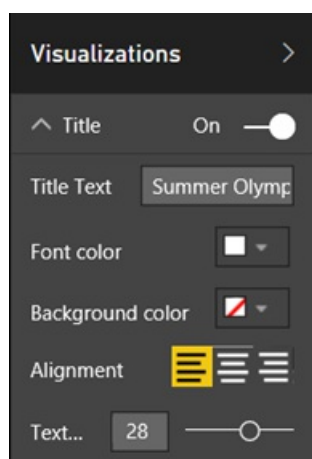


Figure 13: Add a page title

Cards

For the card visuals, open the formatting pane (paint roller icon) and turn **Background** On. Select white with a transparency of 0%. Then turn **Title** On, select **Font color** white and **Background color** black.

Slicers

Up to this point the two slicers had different formatting, which doesn't make design sense. For both slicers, change the background color to aqua. Aqua is a good choice because it is part of the page's color palette – you can see it in the filled map, tree map, and column chart.

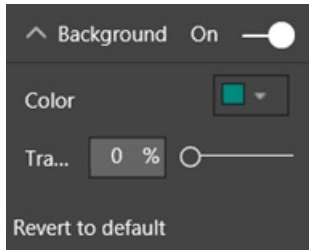


Figure 14: Change slicer background color

Add a thin white border.

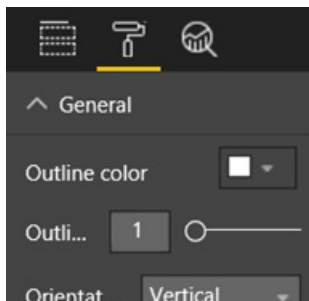


Figure 15: Add a border to the slicer

The grey font is hard to see against the aqua, so change the **Items** color to white.

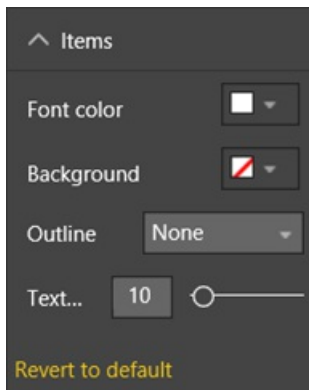


Figure 16: Change slicer font color

And, finally, under **Title**, change **Font color** to white and add a black **Background color**.

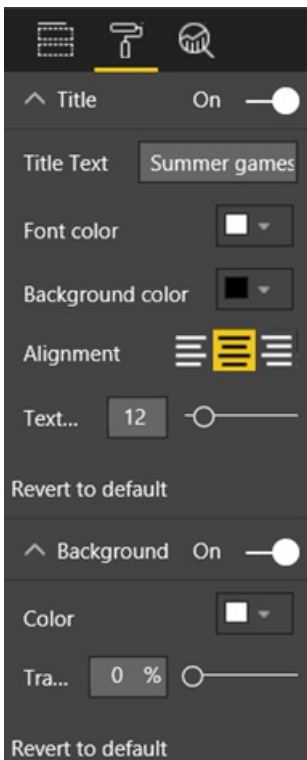


Figure 17: Format slicer title

Rectangle shape

The rectangle too has disappeared into the black background. To fix this, select the shape and in the **Format shape** pane, turn **Background** On.

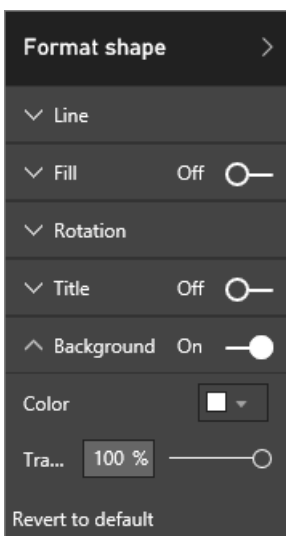


Figure 18: Format the shape

Column charts, bubble chart, filled map, and tree map

Add a white background to the remaining visuals on the report page. From the formatting pane, expand the **Line** option and set the **Line Color** to white and **Weight** to 3.

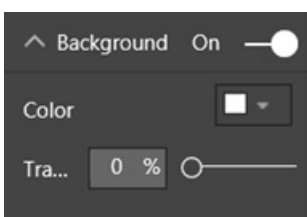


Figure 19: Add a white background to remaining visualizations

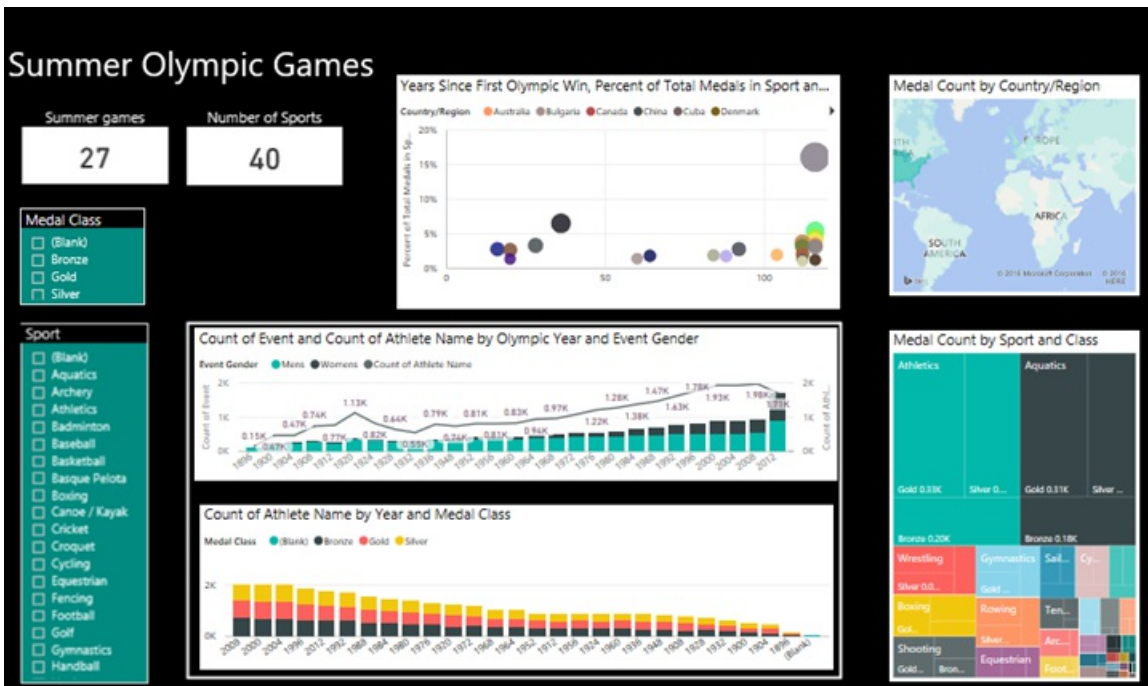


Figure 20: Report example with color best practices applied (black background)

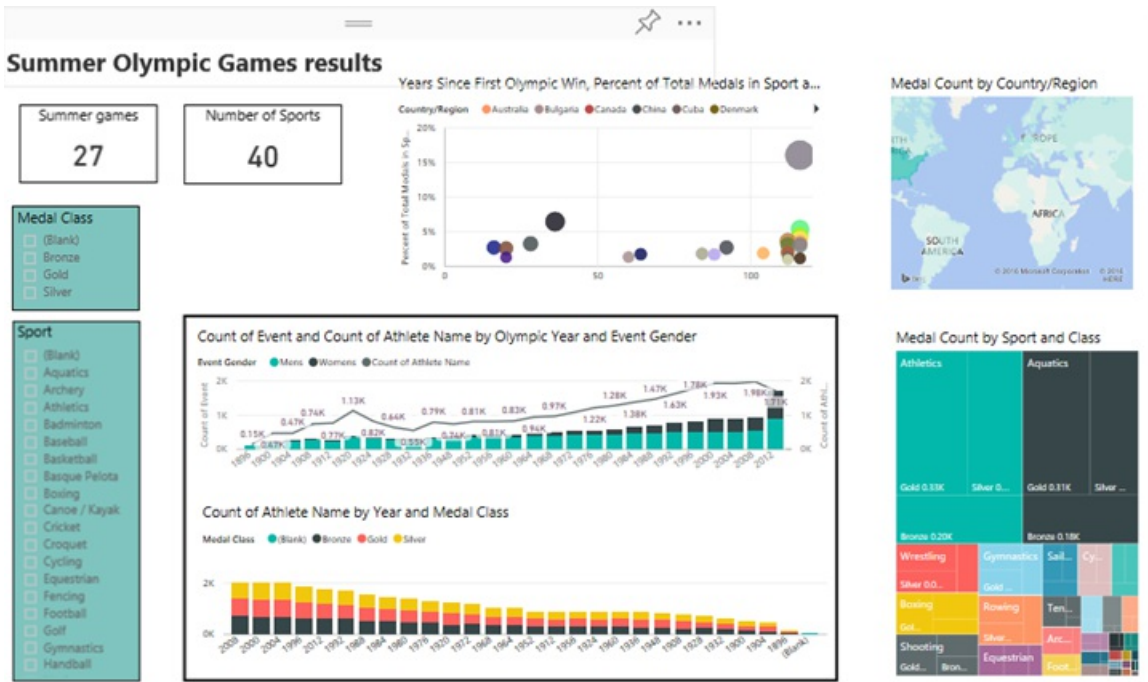


Figure 21: Report example with color best practices applied (white background)

Aesthetics

Much of what we would consider aesthetics has already been discussed above: things like alignment, color, font choices, clutter. But there are a few more best practices for report design worth discussing and these deal with the overall appearance of the report.

Remember that the function of your report is to meet a business need; not to be pretty. But some level of beauty is required, especially when it comes to first impressions. Nashville consultant Tony Bodoh explains "Emotion fires a half-second before logic can kick in." Readers will first react at an emotional level to your report page, before they take more time to dig deeper. If your page looks disorganized, confusing, unprofessional...your reader may never discover the powerful story it tells.

TDI blogger and TechTarget industry analyst Wayne Eckerson has a great analogy. Designing a report is like decorating a room. Over time you purchase a vase, a sofa, end table, a painting. Separately you like all of these elements. But although each individual selection makes sense, collectively the objects clash or compete for

attention.

Concentrate on:

- Creating a common theme or look for your report, and apply it to all pages of the report
- Using standalone images and other graphics to support and not detract from the real story
- And applying all the best practices we discussed up to this point in the article.

Principles of visual design

We've looked at the principles of report design; how to organize the report elements in a way that makes the report easy to quickly grasp. Now we'll look at design principles for visuals themselves. And, in the next section, we'll dig down into individual visuals and discuss best practices for some of the more commonly-used types.

In this section, we're going to leave our example report page alone for a while and look at other examples. After we've gone through the principles of visual design, we'll return to our example report page and apply what we've learned (with step-by-step instructions).

Planning – choose the right visual

Just as it's important to plan out your report before you start building, each visual also requires planning. Ask yourself "what story am I trying to tell with this visual?" And then figure out which visual type will tell the story best. You could show progress through a sales cycle as a bar chart but wouldn't a waterfall or funnel chart tell it better? For help with this, read the last section of this paper "Visual types and best practices" which describes best practices for some of the more-common types. Don't be surprised if the first visual type you pick doesn't end up being your best option. Try more than one visual type to see which one makes the point best.

Understand the difference between categorical and quantitative data and know which visual types work best with what type of data. Quantitative data is often referred to as measures and it's typically numeric. Categorical data is often referred to as dimensions and can be classified. This is discussed in more depth in "Choose the right measure", below.

Avoid the temptation to use fancy or more-complex visual types just to make your report look more impressive. What you want is the most-simple option for conveying your story. Horizontal bar charts and simple line charts can convey information quickly. They are familiar and comfortable and most readers can interpret them easily. An added advantage is that most people read left-to-right and top-to-bottom and these two chart types can therefore be scanned and comprehended quickly.

Does your visual require scrolling to tell the story? Avoid scrolling if you can. Try applying filters and making use of hierarchies/drilldown, and if those don't eliminate the scrollbar, consider choosing a different visual type. If you can't escape scrolling, horizontal scrolling is tolerated better than vertical scrolling.

Even when you choose the absolutely-best visual for the story, you might still need help telling the story. That's where labels, titles, menus, color, and size come in. We'll discuss these design elements later in the section titled "Design elements".

Choose the right measure

Is the story your visual telling compelling? Does it matter? Don't build visuals for the sake of building visuals. Maybe you thought the data would tell an interesting story, but it doesn't. Don't be afraid to start over and look for a more-interesting story. Or, maybe the story is there but it needs to be measured in a different way.

For example, say you want to measure the success of your sales managers. What measure would you use to do this? Would you measure that best by looking at total sales or total profit, growth over previous year or performance against a target goal? Salesperson Sally might have the largest profit, and if you showed total profit by salesperson in a bar chart, she would look like a rockstar compared to the other salespeople. But if Sally has a high cost of sales (travel expenses, shipping costs, manufacturing costs, etc.), simply looking at sales doesn't tell the best story.

Reflect reality/don't distort reality

It's possible to build a visual that distorts the truth. There's a website where data enthusiasts share "bad" visuals. And the common theme in the comments is disappointment in the company that created and distributed that visual. It sends the message that they can't be trusted.

So create visuals that don't intentionally distort reality and that aren't manipulated to tell the story you want them to tell. Here is an example:

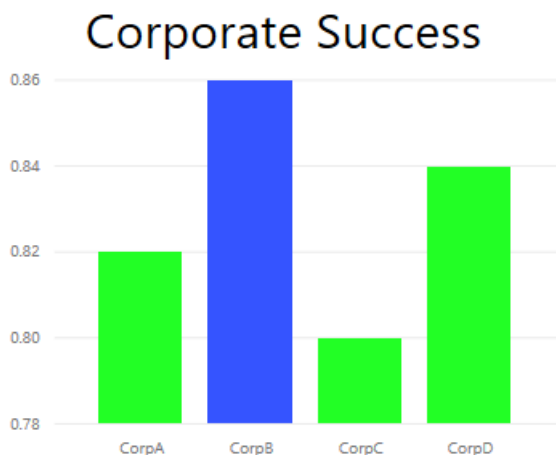


Figure 22: Distorted reality chart

In this example, it appears as if there is a big difference between the 4 companies, and that CorpB is way more successful than the other 3. But notice that the X axis doesn't start at zero and that the differences between the companies is likely within the margin of error. Here's the same data with an X axis that does start at zero.

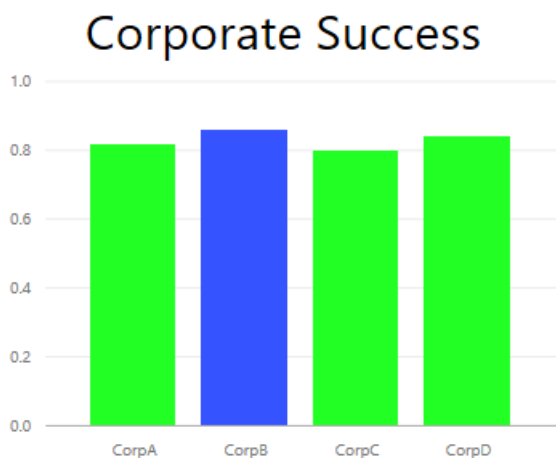


Figure 23: Realistic chart

Readers expect and often assume the X axis is starting at zero. If you decide to not start at zero, do so in a way that doesn't distort the results and consider adding a visual cue or text box to point out the deviation from the norm.

Design elements

Once you've selected a type and measure and created the visual, it's time to fine-tune the display for maximum effectiveness. This section covers:

- Layout, space, and size
- Text elements: labels, annotations, menus, titles
- Sorting
- Visual interaction
- Color

Tweaking visuals for best use of space

If you're trying to fit multiple charts into a report, maximizing your data-ink ratio will help make the story in your data stand out. As mentioned above, Edward Tufte coined 'data-ink' ratio: the goal is remove as many marks from a chart as possible without impairing a reader's ability to interpret the data.

In the first set of charts below, there are redundant axis labels (Jan 2014, Apr 2014 etc.) and titles ("by Date"). The titles for each chart also require dedicated horizontal space across each chart. By removing the chart titles and turning on individual axis labels we remove some ink and have better use of the overall space. We can remove the axis labels for the top two charts to further reduce ink and use more of the space for data.

If there were particular time periods that you wanted to call out, you could draw lines or rectangles behind all the charts to help draw the eye up and down to aid comparisons.



Figure 24: Before

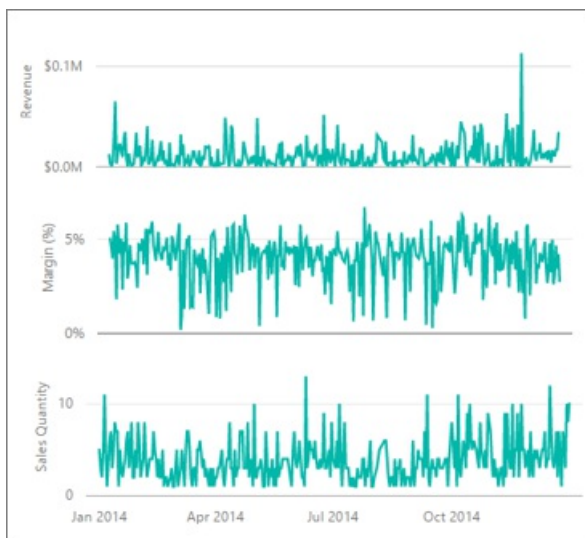


Figure 25: After

To turn axis titles on and off

Select the visual to make it active and open the Formatting pane. Expand the options for the **X-axis** or **Y-axis** and drag the slider for **Title** on or off.

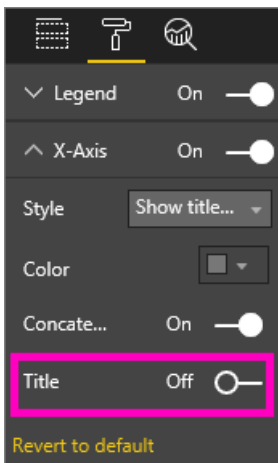


Figure 26: Turn axis titles on and off

To turn axis labels on and off

Select the visual to make it active and open the Formatting pane. Next to **X-Axis** and **Y-Axis** are sliders. Drag the slider to turn axis labels on or off.

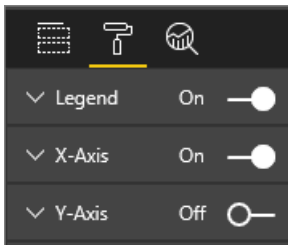


Figure 27: Turn axis labels on and off

TIP

One scenario where you might turn Y-axis labels off would be if you had **Data labels** turned on.

To remove visual titles

Select the visual to make it active and open the Formatting pane. Set the slider for **Title** to Off.



Figure 28: Remove titles from visuals

Consider how your readers will be viewing the report and ensure your visuals and text are large enough and dark enough to be read. If you have a proportionally-larger visual on the page, readers may assume it's the most important. Put enough space between the visuals that your report doesn't look cluttered and confusing. Align your visuals to help direct the eyes of your readers.

To resize a visual

Select the visual to make it active. Grab and drag one of the handles to adjust the size.

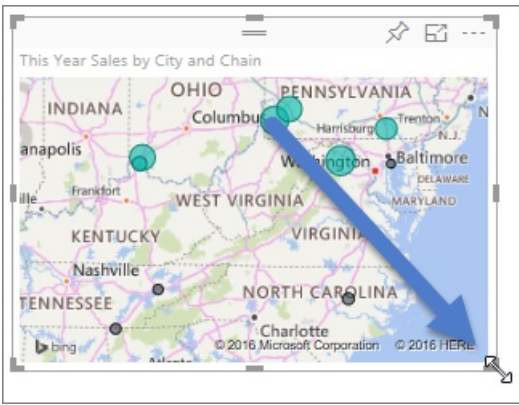


Figure 29: Resize visual

To move a visual

Select the visual to make it active. Select and hold the gripper bar at the top middle of the visual and drag the visual to its new location.

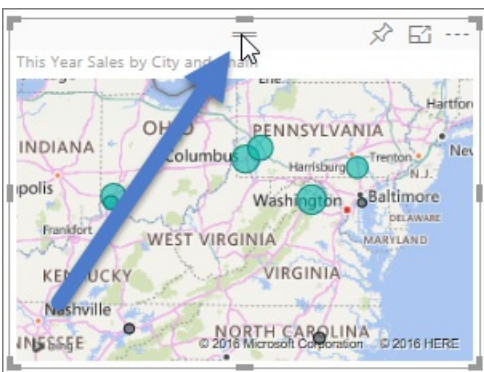


Figure 30: Move a visual

Titles and labels that are part of the visualizations

Ensure titles and labels are readable and self-explanatory. Text in titles and labels must be an optimal size with colors that stand out (such as black instead of the default grey). Remember our style guide (see "Text" above)? Limit the number of colors and sizes -- too many different font sizes and colors make the page look busy and confusing. Consider using the same font color and size for the title of all visuals on a report page and choose the same alignment for all titles on a report page.

The formatting pane

For each of the formatting adjustments listed below, select the paint roller icon to open the Formatting pane.

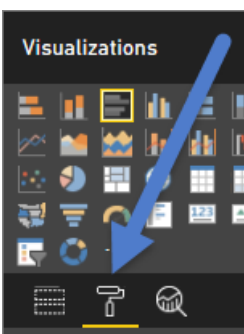


Figure 31: Open the Formatting pane

Then select the visual element to adjust and make sure it is set to On. Examples of visual elements are: **X-Axis**, **Y-Axis**, **Title**, **Data labels**, and **Legend**. The example below shows the **Title** element.

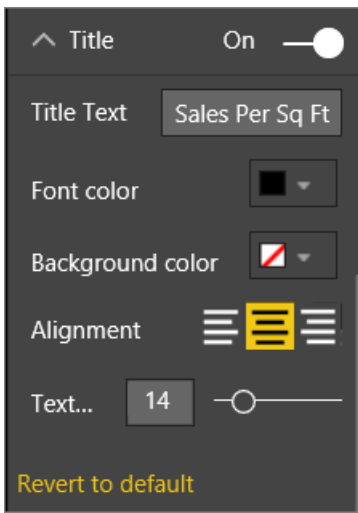


Figure 32: Format a visual title

Set the text size

Text size can be adjusted for titles and data labels, but not for X or Y axes or legends. For data labels specifically, play with the **Display units** and number of **Decimal Places** until you find the optimal level of detail for displaying on your report.

Set the text alignment

The choices for title alignment are left, right, and center. Choose one and apply that same setting to all visuals on the page.

Set the text position

Text position can be adjusted for some Y axes and for the legend. Whichever you choose, do the same for the other Y axes and any other legend on the page.

Set the title and label length

Adjust the length of titles, axes titles, data labels, and legends. If you decide to display any of these elements, adjusting the length (along with text size) ensures that nothing is truncated. For **Title** and **Legend**, the setting is **Title Text** and this is where you type in the actual title that will appear on the visual. For **X-Axis** and **Y-Axis**, the setting is **Style** and you select from a dropdown. For **Data labels**, the settings are **Display** and **Decimal**. Use the **Display** dropdown to select the units of measurement: millions, thousands, none, auto, etc. Use the **Decimal** field to tell Power BI how many decimal places to display.

Set the text color

Text color can be adjusted for titles, axes, and data labels.

Titles and labels that are not part of the visualizations

Earlier in this paper we discussed adding text boxes to report pages. Sometimes the titles on visualizations aren't enough to tell the story. Add text boxes to communicate additional information to the readers of your reports. To keep your report page from looking too confusing or too busy, be consistent in your use of text box fonts, sizes, colors, and alignment. To make an adjustment to the text in a text box, select the text box to reveal the formatting menu.

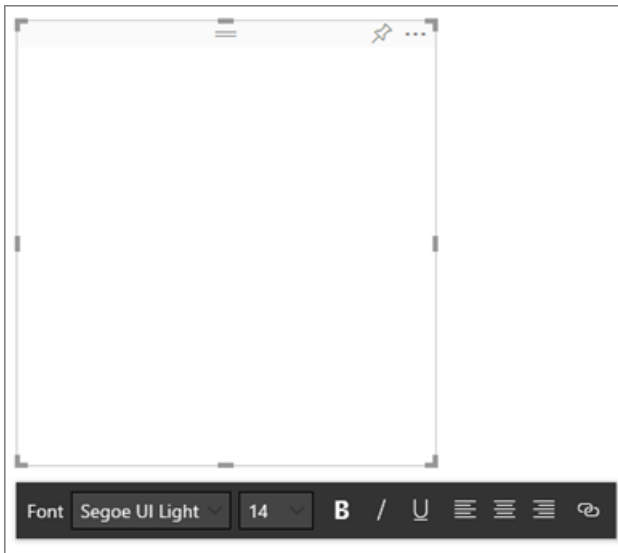


Figure 33: Format the font used in a text box

Sorting

A really simple opportunity to provide faster insight is to set the sorting of visuals. For example, sorting bar charts in descending or ascending order based on the value in the bars enables you to quickly show significant incremental information without using more real estate.

To sort a chart, select the ellipses (...) in the top right of the chart, select **Sort** and choose the field you want to sort by and the direction. For more information, see [Change how a visual is sorted](#).

Chart interaction and interplay

One of the most compelling feature of Power BI is the ability to edit the way charts interact with each other. By default, charts are cross-highlighted: when you select a data point, the related data of other charts light up and the unrelated data dims. You can override this behavior to use any chart as a true filter which saves you real estate on your page. To do this, select **Visual Interactions** from the menubar.

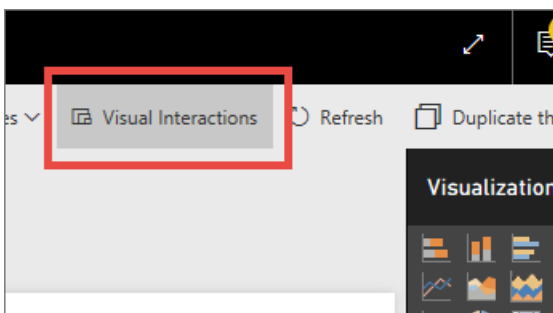


Figure 34: Visual interactions

Then, for each visual on the page, decide whether you want the selected visual to filter, highlight, or do nothing. Not all visuals can be highlighted, and for those the highlight control won't be available. For more information, see [Visual interactions in Power BI](#).

TIP

For readers who're new to Power BI, this ability to click and interact with reports may not be instantly obvious. Add text boxes to help them understand what they can click on to find more insights.

The use of color in visuals

Earlier in this paper we talked about the importance of having a plan for how you're going to use color across a report. This section will have some overlap but primarily applies to how you use color in individual visuals. And the same principles apply: use color to tie the report together, add emphasis to important data, and to improve the

reader's comprehension of the visual. Too many different colors is distracting and makes it difficult for the reader to know where to look. Don't sacrifice comprehension for beauty. Only add color if it improves comprehension.

TIP

Know your audience and any inherent color rules. For example, in the United States, green typically means "good" and red typically means "not good".

This topic is broken down to cover:

1. Data color
2. Data label color
3. Color for categorical values
4. Color for numerical values

Use colors to highlight interesting data

The simplest way to use color is by changing one or more data point's color to call attention to it. In this example, the color changes when the Olympic games moved from a 4-year cycle to a 2-year cycle of alternating Summer and Winter games.

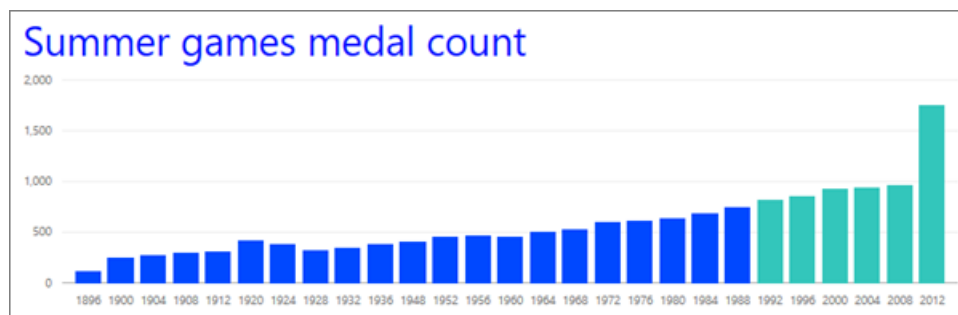


Figure 35: Use color to tell a story

You can change data point colors from the **Data colors** tab in the formatting pane. To customize each data point individually, make sure **Show all** is set to On.

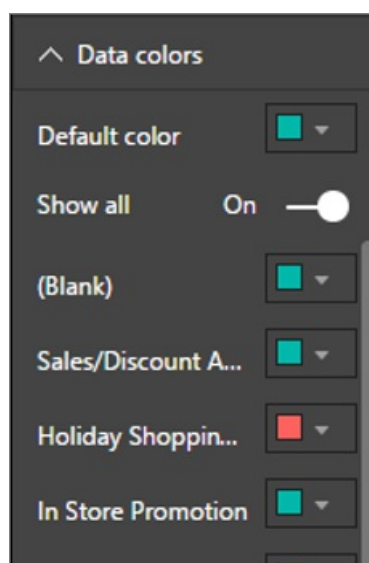


Figure 36: Set data point colors

NOTE

Power BI applies a default theme to your report visuals. The theme colors have been chosen to provide variety and contrast. To divert from the default theme palette, select **Custom color**.

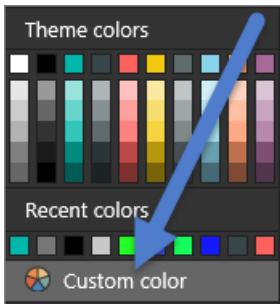


Figure 37: Choose a custom color

In Power BI Desktop, you can even highlight outliers or a section of a line by using a second series:

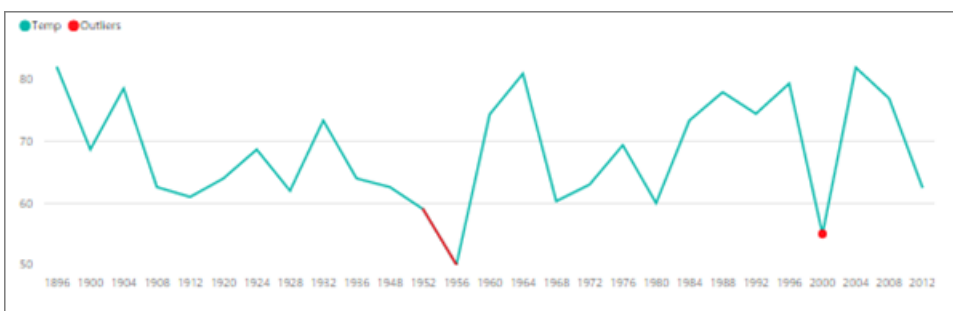


Figure 38: Using Desktop to plot outliers

Here, values in the 'Outliers' series only exist where the average August temperature drops below 60. This was done by creating a DAX calculated column using this formula:

```
Outliers = if(Editions[Temp]<60, Editions[Temp], BLANK())
```

In our example, there were 3 outliers: 1952, 1956, and 2000.

Colors for labels and titles

As you explore all the formatting options available to you, you'll find many different places to add color to titles and legends. For example, you can change the color of data labels and axes titles. Proceed with caution. Generally, you want to use a single color for all visual titles. As with all the guidelines in this paper, there are always situations and reasons to "break the rules", but if you do decide to break the rules, do it for a good reason.

Colors for categorical values

Charts with a series typically have a categorical value in the legend. For example, each color in the legend below represents a different category of Country/Region.



Figure 39: Default colors applied

The colors Power BI uses by default were chosen to provide a good color separation between categorical values so they are easy to distinguish. Sometimes people change these colors to match their corporate scheme etc. but it can lead to problems.



Figure 40: Color applied as hues of a single color

By sticking to a single hue and varying the intensity of the color, this visual has introduced a false sense of ordering between the categories. It implies the darker bubbles are higher or lower on some scale than the lighter hues. Other than alphabetical, there's normally no inherent order in this sort of categorical value. To change the default colors, open the Formatting pane, and select **Data colors**.

Colors for numerical values

For fields that do have some inherent order and numerical value, you can also color data points by the value. This can be helpful to show the spread of values across the data, and also allow for two variables to be shown on a single chart. For example this chart makes it clear that although China has the highest medal count, Japan and Thailand have participated in more Olympic games.

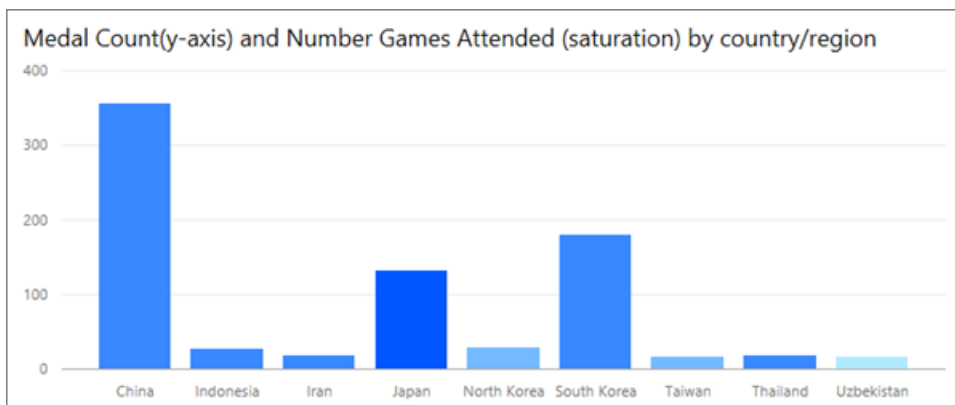


Figure 41: Color data points by the value

To create this chart, add a value to the Color saturation field and then adjust those colors in the Formatting pane.

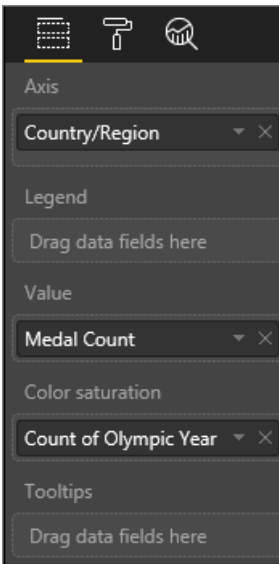


Figure 42: Add a color saturation field

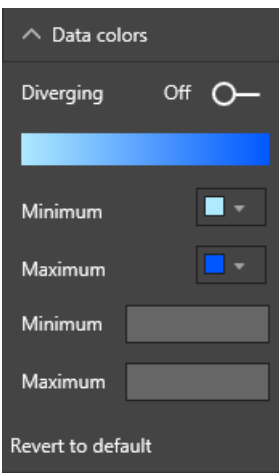


Figure 43: Adjust the colors used for saturation

Color can also be used to emphasize variance around a central value. For example, coloring positive values green and negative values red. Be aware of cultural differences when assigning colors to positive or negative values; not all cultures use red for bad and green for good!

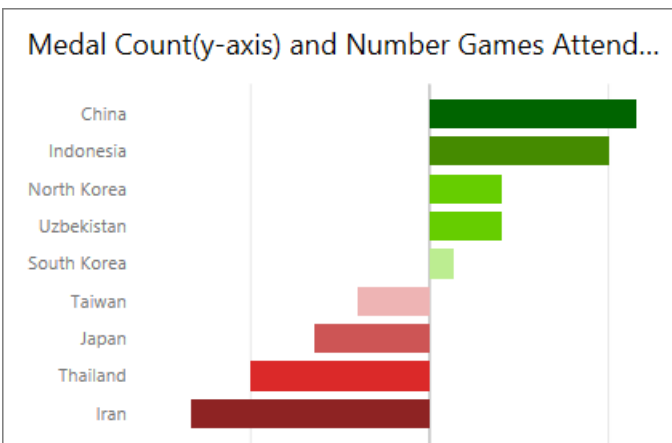


Figure 44: Color to emphasize variance around central value

Principles of visual design – applied to example report page

Now let's take the visual principles discussed above and apply them to our sample report.

Before

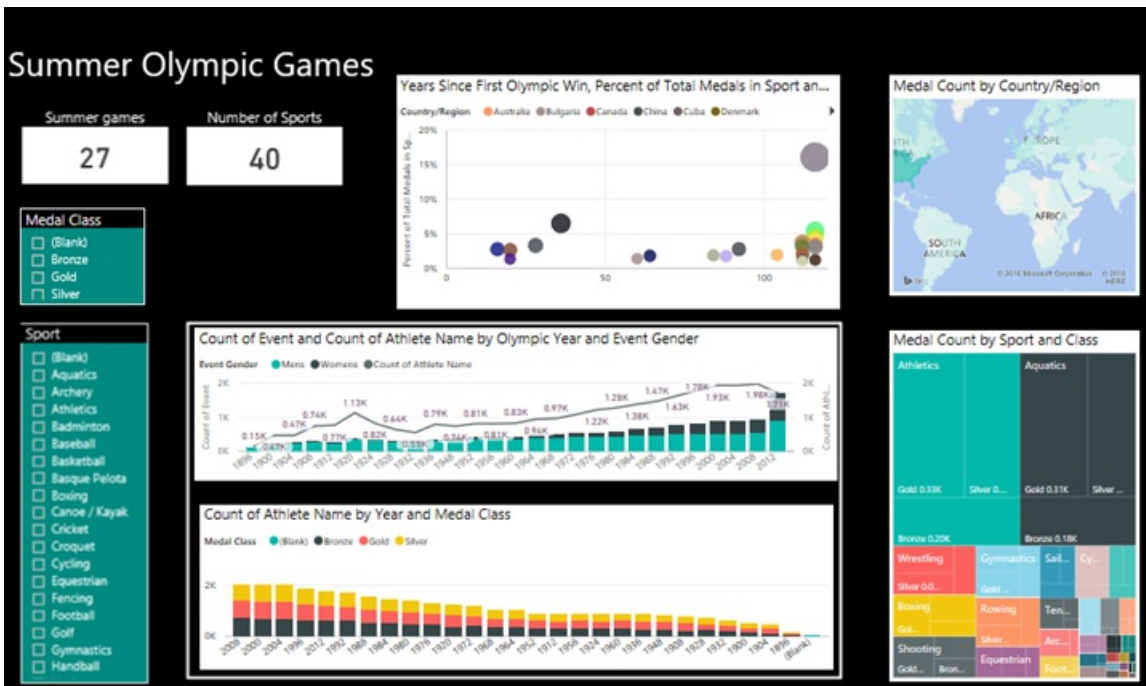


Figure 45: Our example report (before)

After

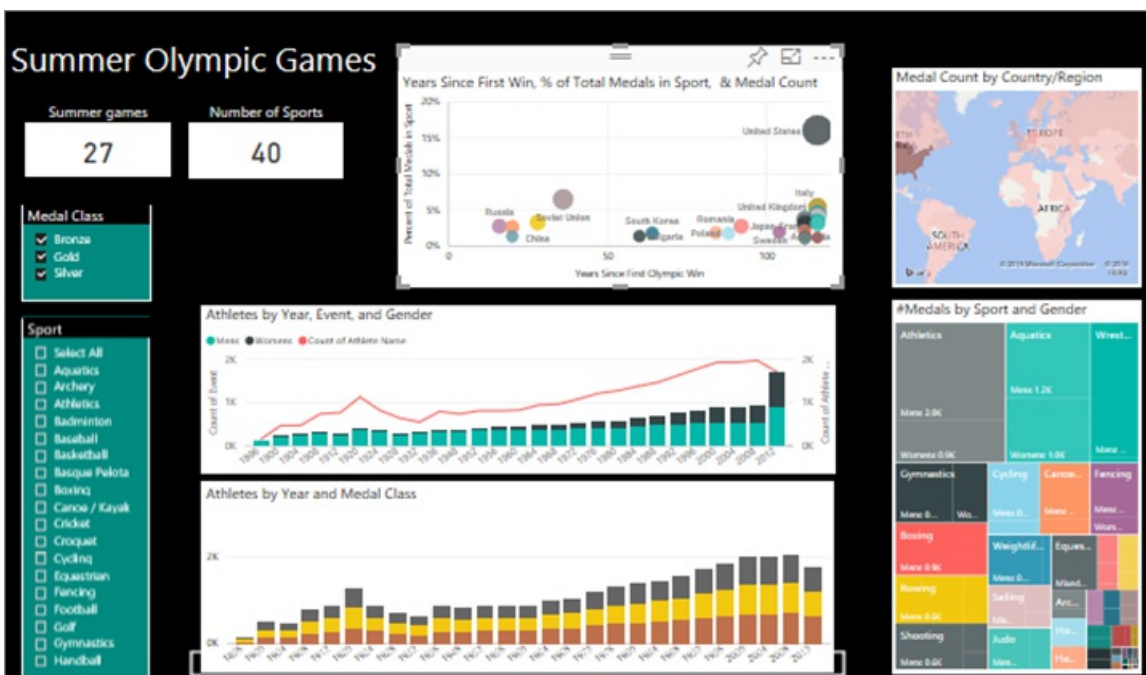


Figure 46: Our example report (after)

What did we do?

1. Slicer: removed blanks from the slicers by adding a page level filter and selecting only gold, silver, bronze. Changed **Selection Controls** to Off for **Single Select** and **Select All**.
2. Bubble: there are so many items in the legend that they scroll off the screen. Removed the legend and turned on **Category labels** instead. Customers can hover over the bubbles to see the details. Shortened the title and removed "by countryregion" since that seems self-evident. Turned axes labels On for both to make the chart easier to understand.
3. Filled map: changed the **Data colors** to make it stand out more. Turned **Diverging** on and set the **Minimum** to pink and the **Maximum** to red.
4. Tree map: removed filter which was set for only USA. Set the **Data labels** to 1 decimal place. The visual was using the Class field which isn't very useful since it will almost always be 33% (Gold/Silver/Bronze). Selected a different more-interesting field, gender. Changed Aquatics to blue and Athletics to grey for design.

5. Top bar chart: shortened the title, removed data labels, turned legend title off. Changed word order of title to match the chart below.
6. Bottom bar chart: sorted by year ascending to match chart above. Changed colors to match class. Changed title. Turned off legend for more space for data. Turned on data labels which won't show up in the report (because the visual is too small for the labels to be readable) but will show when the visual is opened in Focus mode. [Learn about Focus mode](#). Added Count of Event (Distinct) to **Tooltips** so now when you hover over a stacked column, the tooltips also tell you how many events were contested that year.
7. Visual Interactions: turned off interactions for both cards since I always want them to show total games and sports.

Visual types and best practices

Power BI provides many visual types natively. To these, add the custom visuals available from Microsoft and from the Power BI community and total visual options become too numerous to document here. But let's look at some of the most-used native visual types.

Line charts



Line charts are a powerful way to look at data over time. Looking at data in tables doesn't really take advantage of the speed in which our eyes spot peaks, valleys, cycles, and patterns.

The example below shows the trends in the number of medals awarded and the number of athletes winning those medals.

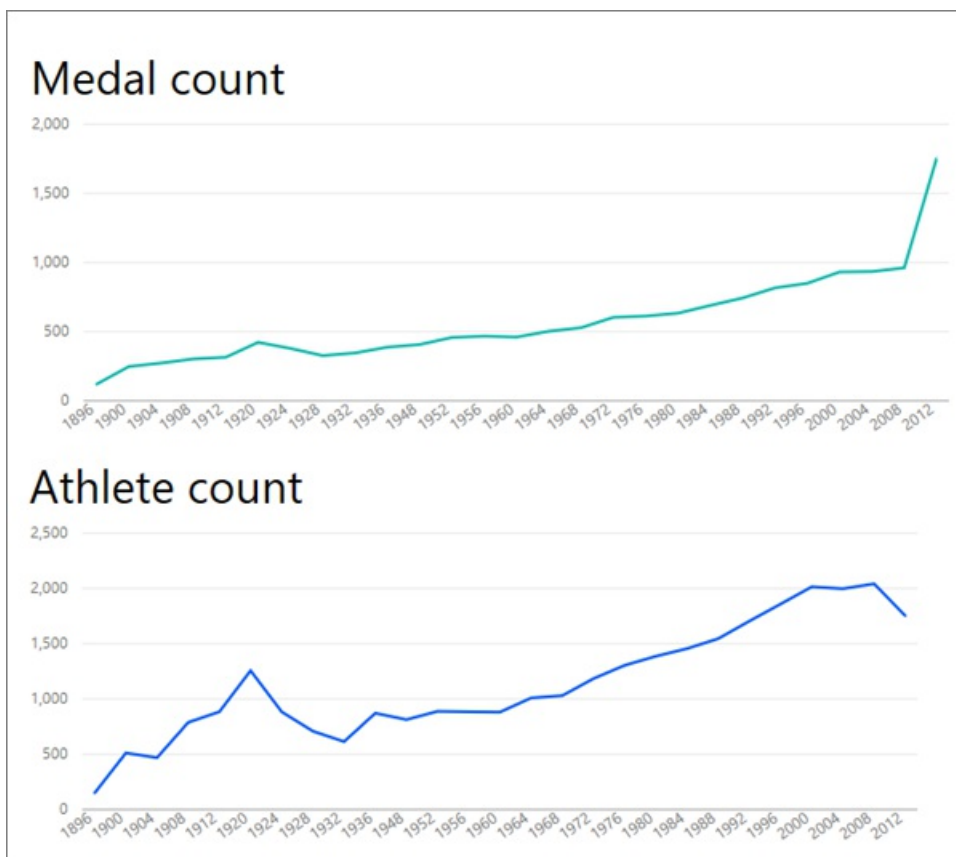


Figure 47: Line charts

Best practices

- When people look at line charts, the first thing they see is the shape of the curve. This means that you need to have an x-axis that makes the curve meaningful such a time or distribution categories. If you put categorical fields like product or geography on the x-axis, the line chart will not be interesting as the shape of the curve

would provide no meaningful information.

- If you choose to place multiple charts above and below each other like this, to make it easier to compare across series, line up the X-axis. Use filters to make sure that the same range of values is shown. For example, if you're looking at date ranges, ensure they are the same date ranges. For example, 1896 to 2012 on both charts.
- Make full use of the space. If it makes sense for your data, set the start and end points for the Y-axis to eliminate empty space at the top and bottom of your chart and to focus in on the actual data points. To do this, select the paint roller icon to open the Formatting pane. Expand the **Y-Axis** area and set the **Start** and **End** points.

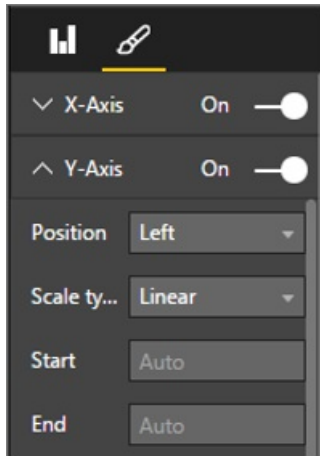


Figure 48: Set the start and end points

- Another reason to explicitly set the Start and End points is if you're comparing two or more charts on the same page using the same Y-axis field. For example, if you're looking at cumulative event counts, and the United Kingdom has counts that range from 1 to 70 and Australia has counts that range from 1 to 12, the 2 line charts will display very different Y-axes (Figure x). This makes it difficult to compare at a glance. Instead, set the charts to use the same Y-axis range (Figure x).

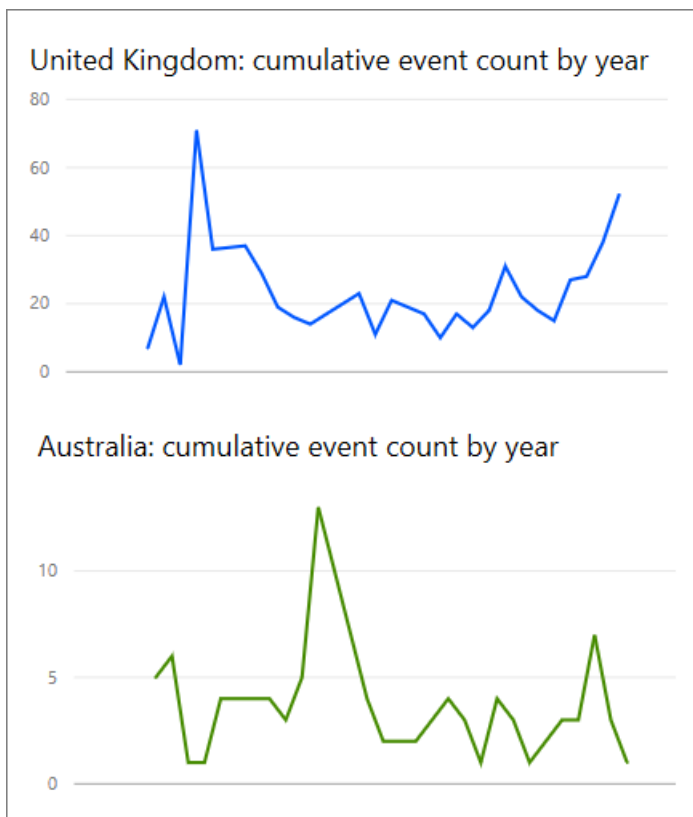


Figure 49: Line charts with different y-axes

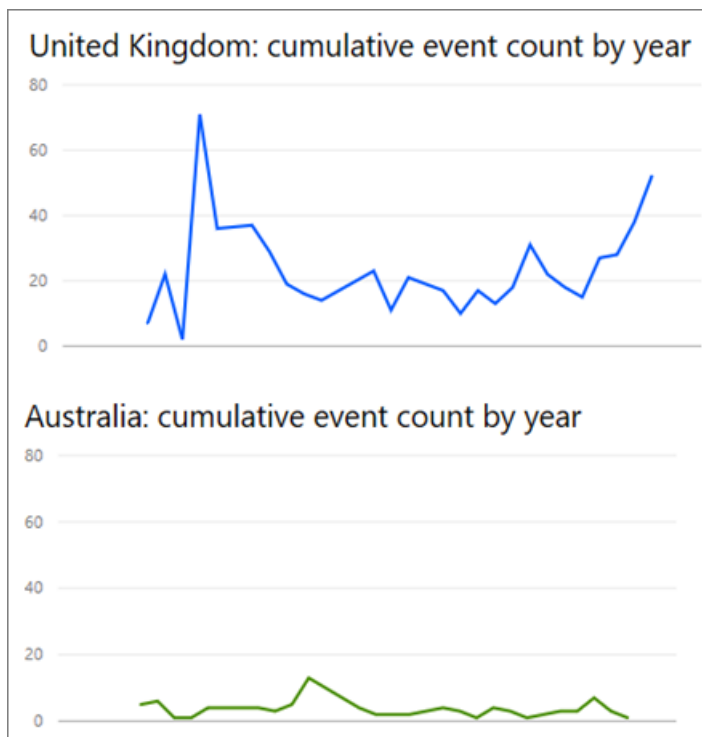


Figure 50:Line charts with matching y-axes

For more information, see:

- [Customize the X and Y axes](#)
- [Line charts and irregular intervals](#)
- [Line charts 101](#)

Bar/Column Charts



If line charts are the standard for looking at data over time, bar charts are the standard for looking at a specific value across different categories. If you sort the bars based on the number, you will instantly see the top values and distribution. Horizontal bar charts work well with long-ish labels.

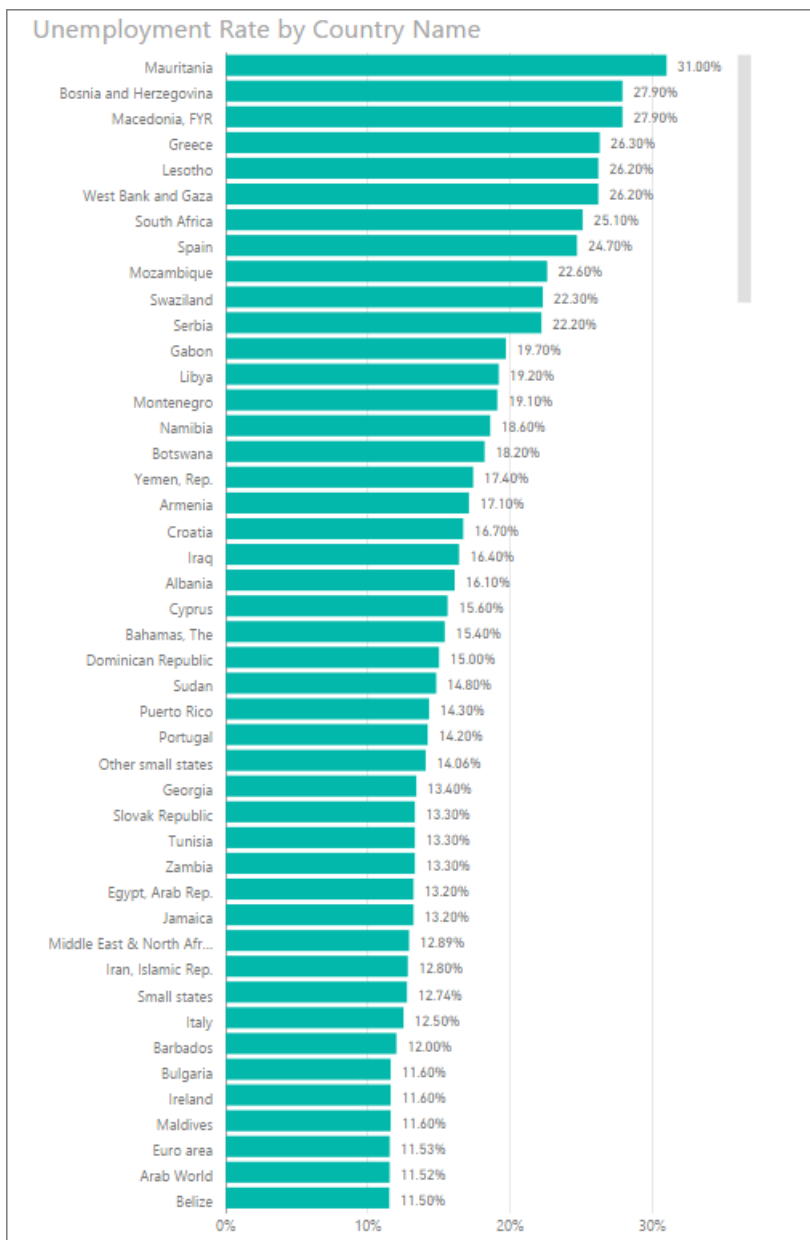


Figure 51: Horizontal bar chart

Best practices

- Display data labels for values. This makes it easier to identify specific values. To do this, open the Formatting pane, and set **Data labels** to On.

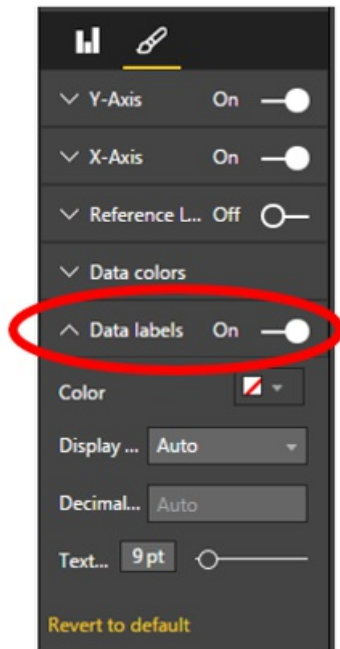


Figure 52: Turn on data labels

- The bar chart above is really useful to compare one measure against many **at a single point in time**. While the line chart above showed us the trend over time, the bar chart shows us the trend for a single category at a specific point in time. At a glance, our bar chart shows us Spain has one of the worst unemployment rates in the world, at 25%.
- When an entire Bar/Column chart doesn't fit into the allotted space, Power BI adds scrollbars. When possible, and if it makes sense, structure the visual and report to show the entire chart so the reader gets an overview of the entire distribution. Unfortunately this is not possible in our example given the significant number of countries around the world.

One way to limit the values included is to use a filter. For example, add a Visual level filter that shows the country only if unemployment rate is above 20%.

- Bar/Column charts can be drilled down (and back up again). This is a great way to pack more information into a visual without taking up more real estate. The example below has a hierarchy for Regions > Countries. Double-clicking a region bar drills down to the countries that make up that region. For more information on drill, see [Drill down in a visualization](#).

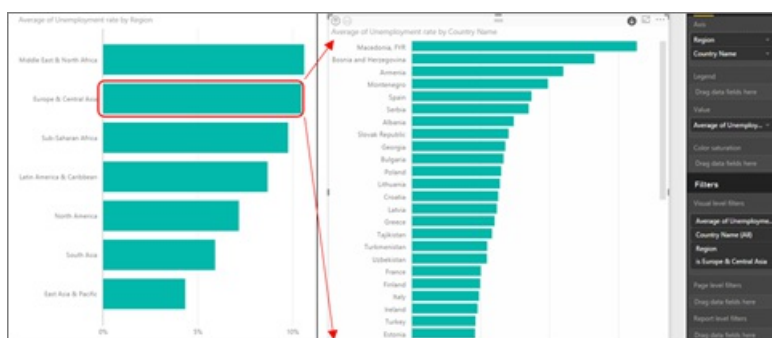


Figure 53: Drill down

For more details on Bar and Column charts:

- [Bar charts 101](#)
- [Data Visualization Catalogue: Bar Chart](#)
- [Data Visualization Catalogue: Multi-set Bar Chart](#)

Stacked Bar/Column Charts



Add another dimension to your bar/column charts by stacking different categories within the bar or column. Now the chart conveys information about one overall trend (based on height/length) but also shows the influence of the categories on that trend. The chart below shows the overall growth of Top soccer team revenue above 6 billion in 2014.

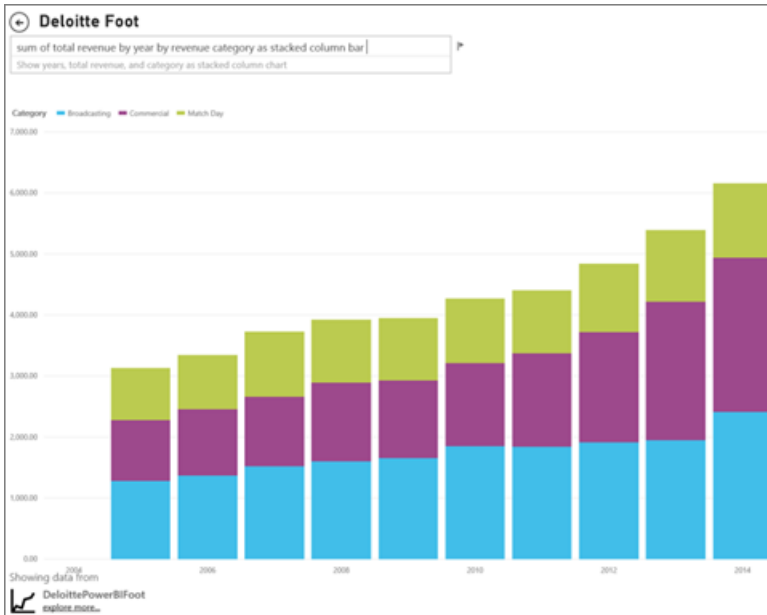


Figure 54: Stacked column chart

This stacked column chart shows us that total revenue is growing over time and that the Commercial and the Broadcasting categories are increasing steadily over time – contributing to overall revenue increase. But this chart doesn't make it easy to compare the impact each of the 3 categories has on each other. For example, how does the growth of Commercial compare to the growth of Broadcasting or Match Day? A better choice for this data, or a companion visual for this data, would be a line chart.

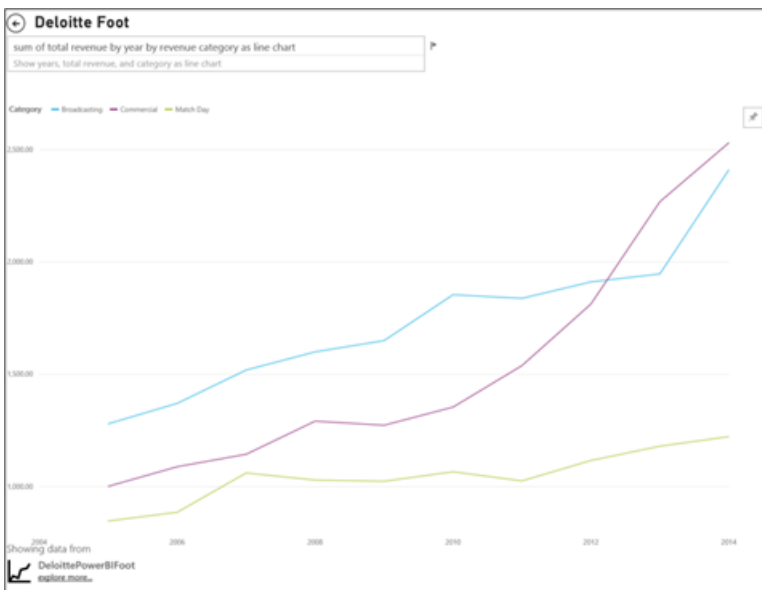


Figure 55: Convert to a line chart

In this line chart it is easier to see how commercial revenue has grown the most followed by broadcast and match day.

Best practices

- As with columns/bars, you have the option of horizontal or vertical display. Horizontal is a better choice if you

have long labels and vertical if you have time series data.

- Avoid stacked Bar/Column charts if you want to show trends and other patterns of change over time. Other charts, like Line charts, do a much better job.
- You can also have the distribution based on total volume or as a % of total.
- As Few noted it is difficult to compare the segments of a stacked bar. If the segments were arranged side-by-side and all grew upwards from the same baseline, it would be easy to compare their heights, but when stacked upon one another, the task becomes hard. Plus, although it's fairly easy to see how (revenue) changed from month to month it is quite difficult to see how (revenue) in the other (categories) changed.
- 100% Stacked charts are a good choice when using percentages that add up to 100. In the example below, we see the category distribution by team. The percentages are relative and allows us to, at a glance, see patterns. For example, Everton's revenue comes primarily from Broadcasting (over 70%) while PSG only derives 20% of its revenue from Broadcasting. The choice of a horizontal display makes it easier to fit the team labels and to see the impact of revenue type.

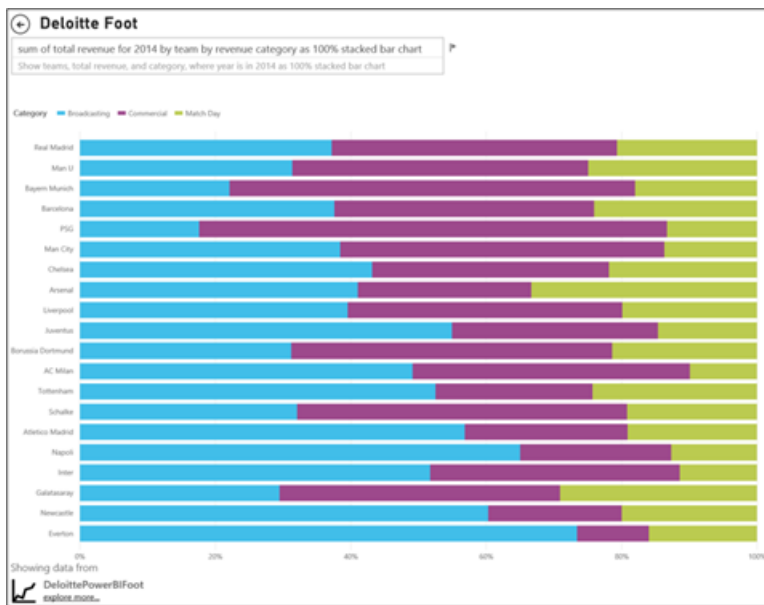
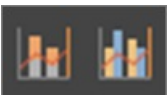


Figure 56: Horizontal stacked chart

For more information on stacked charts:

- [Data Visualization Catalogue: Stacked bar graphs](#)
- [When are 100% stacked bar graphs useful?](#)

Combo Bar/Column Charts



In Power BI, you can combine column and line charts into a combo chart. The choices are: Line and Stacked Column chart and Line and Clustered Column chart. Save valuable canvas space by combining two separate visuals into one.

The two screenshots below show a before and after. The first page has two separate visuals: a Column chart showing population over time and a Line chart showing GDP over time. These charts are a good candidate for a Combo chart because they have the same X-Axis (year) and values (2002 through 2012). Why not combine them to compare these 2 trends on a single visual? Combining these 2 charts lets you make a quicker comparison of the data.

The new report page has a single visual: a line and stacked column chart. We could've just as easily created a line and clustered column chart. It's now easier to look for a relationship between the two trends. We can see that up until 2008, population and GDP followed a similar trend. But starting in 2009, as population growth flattened, GDP

was more volatile.

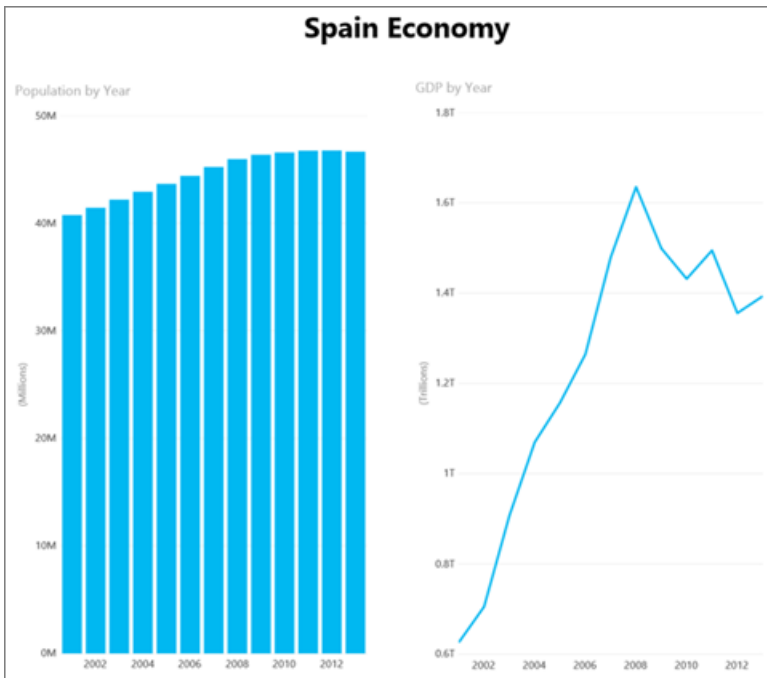


Figure 57: As two separate charts

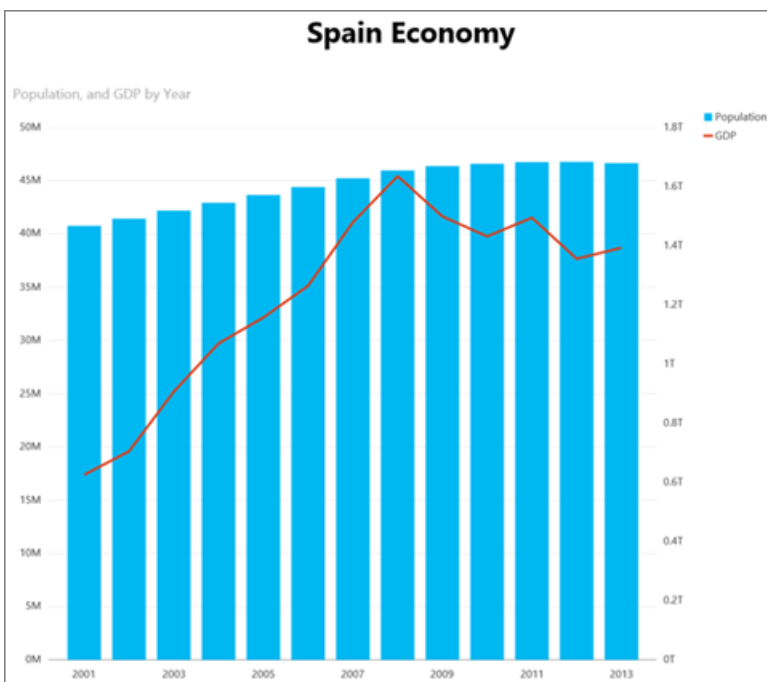


Figure 58: As a single combo chart

Best practices

Combo charts work best when both visuals have at least one axis in common.

Watch your axes! Is your Combo chart easy to read and interpret? Or does it use dissimilar ranges and values? For example, if the scale of the column chart's Y-Axis is much smaller than the scale of the line chart's Y-Axis, your combo chart won't be meaningful. For example, notice the third line (aqua color) way down at the bottom.



Figure 59: An unsuccessful line chart

So too, your combo chart won't be meaningful if your column chart and line chart use 2 different measures and you don't create dual axes. For example, dollars versus percent. Be sure to include both axes to help the reader understand the chart and consider adding axes labels as well.

To do this, open the Formatting pane, expand **Y-Axis** and set **Show Secondary** to On (if it isn't already on). This setting is sometimes difficult to find; expand **Y-Axis (Column)** and scroll down until you see **Show secondary**. Also, set the Y-Axis (Column) **Title** to On and set the Y-Axis (Line) **Title** to On.

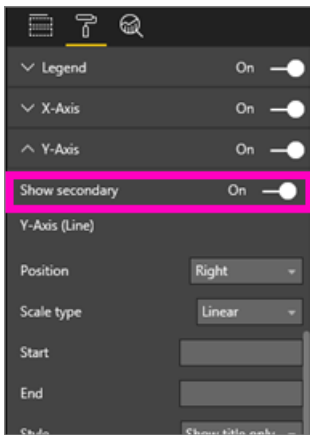


Figure 60: Show secondary axis

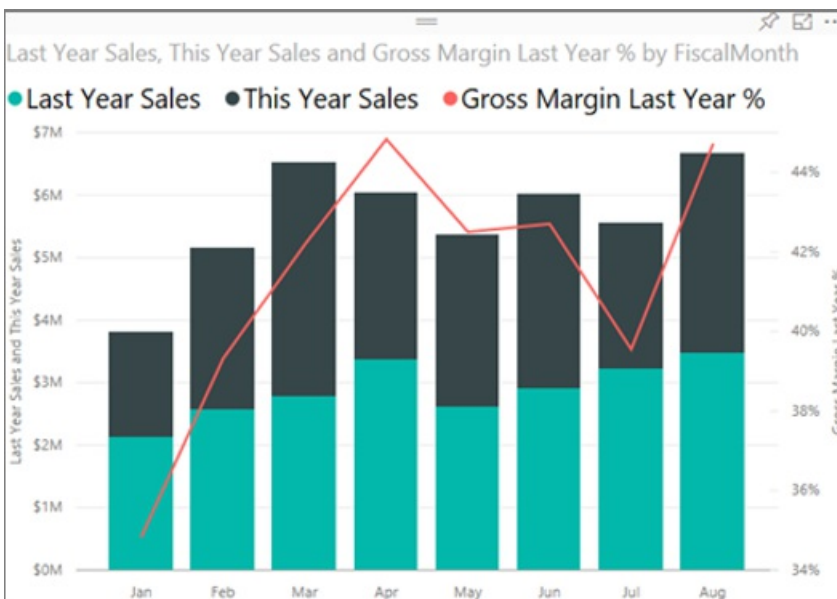


Figure 61: Create a combo chart instead

- Take advantage of dual axes. It's a great way to compare multiple measures with different value ranges. And it's a great way to illustrate the correlation between two measures in one visual.

For more information:

- [Tutorial: Combo chart in Power BI](#)
- [The danger of dual-scaled Axes in visuals](#)

Scatter Chart



Sometimes we have many variables that we want to see together, and a scatter chart can be a very useful way to get an overall picture. Scatter charts display relationships between 2 (Scatter) or 3 (Bubble) quantitative measures. A scatter chart always has two value axes to show one set of numerical data along a horizontal axis and another set of numerical values along a vertical axis. The chart displays points at the intersection of an x and y numerical value, combining these values into single data points. These data points may be distributed evenly or unevenly across the horizontal axis, depending on the data.

A bubble chart replaces the data points with bubbles, with the bubble size representing an additional dimension of the data.

The bubble chart below looks at South America and compares GDP per capita (Y-Axis) sum of GDP (X-Axis) and population by South American country. The size of the bubbles represents total population for that country. Brazil has the largest population (bubble size) and the largest share of South America's GDP (it is farthest along on the X-Axis). But notice that GDP per capita for Uruguay, Chile, and Argentina is higher than Brazil (farther up on the Y-Axis).

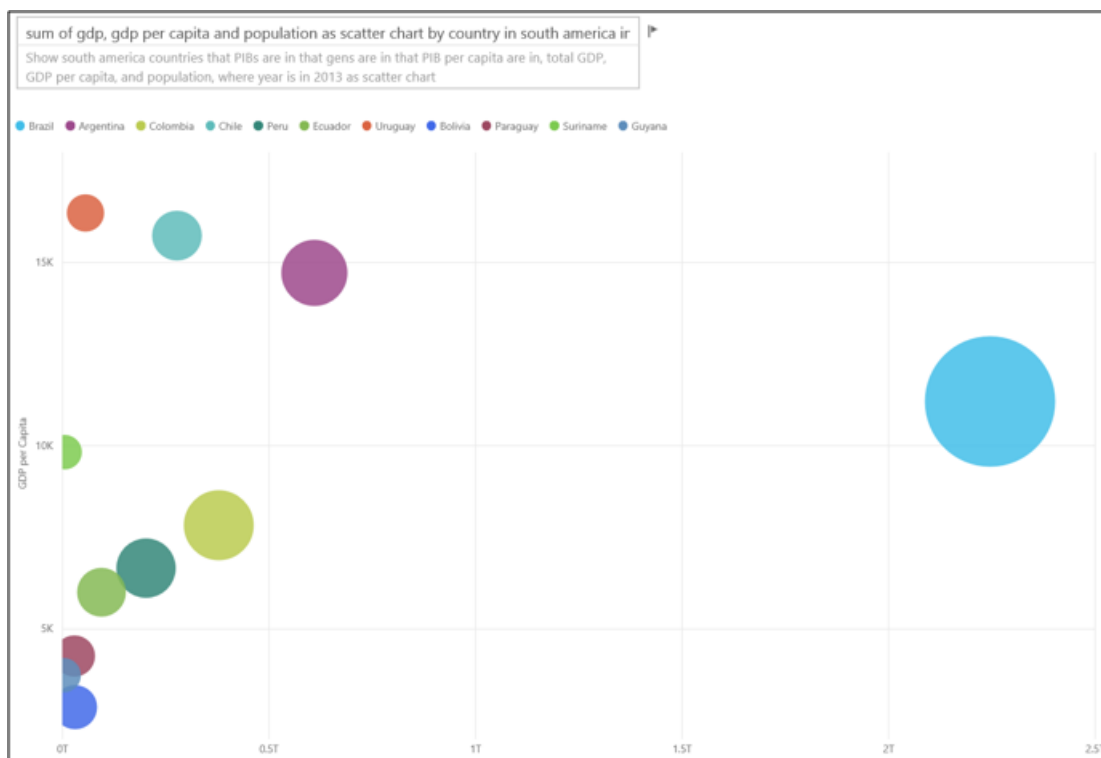


Figure 62: South America GDP and population as a bubble chart

If you add a play axis, you can pretend you are Hans Rosling and tell the story over time (<https://www.youtube.com/watch?v=PbaDBJWCeD4>). To add a play axis, drag a datetime field into the **Play Axis** well.

Best practices

- Scatter and Bubble charts are great storytellers. But they are not as useful when trying to explore data. This is what Stephen Few points out in the paragraph below *The strength of this approach is when it's used to tell a story. When Rosling narrates what's happening in the chart as the bubbles move around and change in value,*

pointing to what he wants us to see, the information comes alive. Animated bubble charts, however, are much less effective for exploring and making sense of data on our own. I doubt that Rosling uses this method to discover the stories, but only to tell them once they're known. We can't attend more than one bubble at once as they're moving around, so we're forced to run the animation over and over to try to get a sense of what's going on. We can add trails to selected bubbles, which make it possible to review the full path these bubble have taken, but if trails are used for more than a few bubbles the chart will quickly become too cluttered. Essentially, what I'm pointing out is that this is not the best way to display this information for exploration and analysis.

- Add X and Y axes labels to help tell the story. Especially with bubble charts, there are many components at play and labels help readers understand the visual.
- Add data labels to make the visual easier to interpret. Especially with bubble charts, when you have many items in the Legend, it may be difficult to distinguish between similar colors. In the visual above, the legend colors for Suriname, Columbia, and Ecuador are very similar.
- Did you create a scatter chart and see only one data point that aggregates all the values on the X and Y axes? Or, your chart aggregates all the values along a single horizontal or vertical line? To fix this, add a field to the **Details** area to tell Power BI how to group the values. The field must be unique for each point you want to plot. For help, refer to the [Power BI scatter and bubble chart tutorial](#).

Tree Map Charts



Tree maps can be very useful for giving a good overview of the relative size of different components that make up a whole -- especially when you can group them by categories. Any time I try to understand a new business, having a tree map of the main components can be very useful in knowing the overall distribution.

In the first chart below, you can see right away that Brazil makes up approximately half of South America's GDP and that Venezuela and Argentina are roughly the same size.

If you want to have broader context and still have an idea of the impact of the top contributing countries, you can create visual hierarchies with category members (countries) nested inside regions. The second tree map gives us an idea, first and foremost, of the relative size of the regions and then, within each region, we can see which individual countries contribute the most. We see that there are three massive regions (Europe, Asia & North America) and within those we can easily see the top countries/regions.

The main limitation of a tree map is the limited ability to compare the different rectangles beyond the top ones. It is a good chart for an overview but column and bar chart are probably a better choice to have more precise idea of the relative size of different components. For example, the first tree map gives a broad indication of the order of the GDP size, but it's hard to identify specific differences between countries, particularly the smaller unlabeled boxes. For this data, where a single grouping is compared, a bar or column chart might be a better choice.

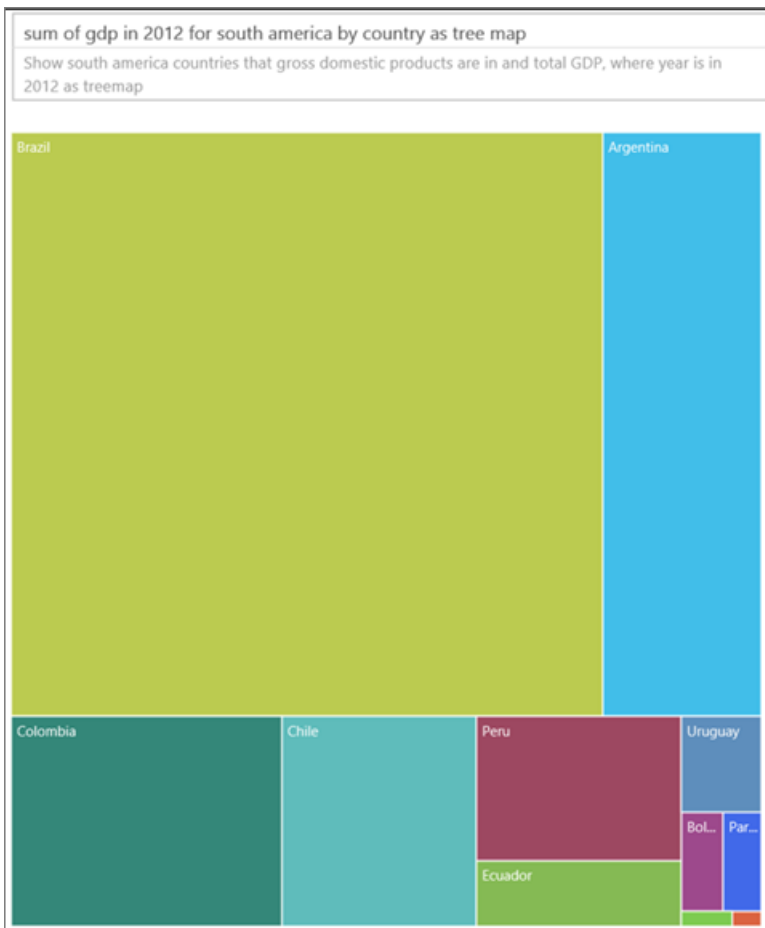


Figure 63: South America GDP comparison as a tree map

Here we've added another level of data, region, and we can see the overall contribution to GDP by regions, as well as the relative impact within the regions. Beware that doing this with non-summative measure (such as averages) that the sum of the details might not represent the actual value at the aggregate level.

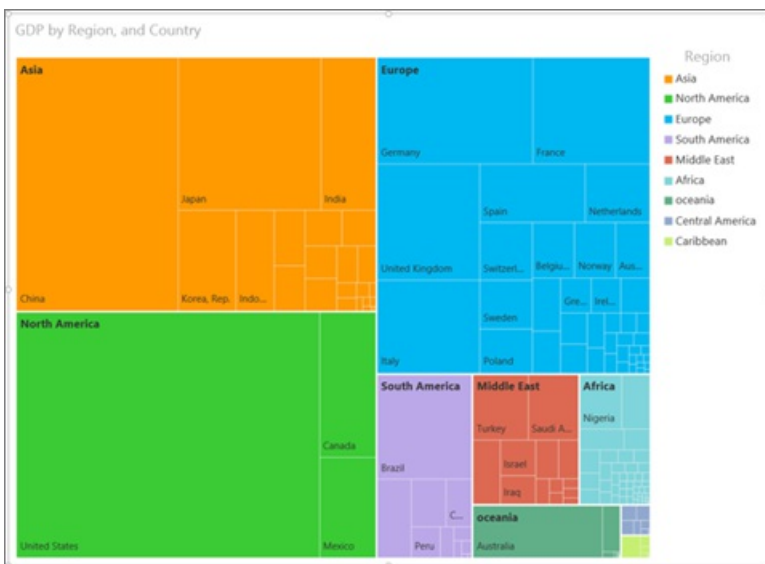


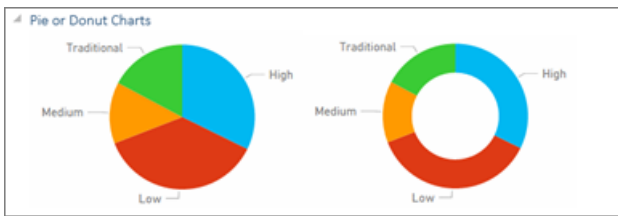
Figure 64: GDP by region and country as a tree map

For more information on tree maps, feel free to click on links below.

- [Treemaps overview](#)
- [Data Visualization Catalogue: Tree maps](#)

Other charts

Pie or Donut Charts



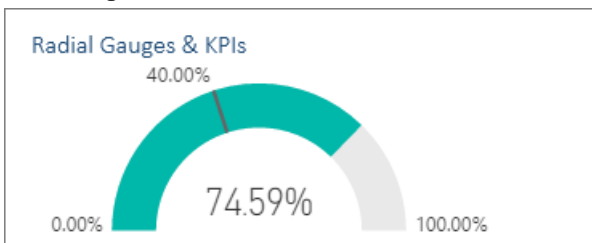
In general, bar/column/line charts will serve most purposes. It's well understood that pie and donut charts are difficult for humans to interpret correctly, and in fact can often distort data. Avoid them where possible. Stephen Few has an excellent write up on the history and dangers in [Save the Pies for Dessert] (www.percetualedge.com/articles/08-21-07.pdf)

He does explain the one time where pie charts can be useful, when comparing part-to-whole relationships. But even this is rarely significantly-better than, say, a 100% stacked bar chart.

Another fun article (and animation) about pie charts can be found on the [Darkhorse Analytics site](#).

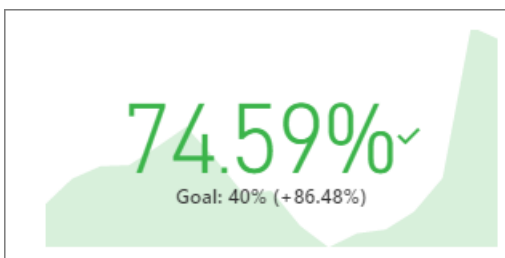
Or read an opposing point of view, [Why Tufte is flat-out wrong about pie charts](#)

Radial Gauges & KPIs



Radial gauges seem like a good visual for indicating performance against a target, and they are very popular in executive dashboards. However, they suffer in two main ways. As with pie charts, it's difficult to interpret the angle of the shaded area compared to the full 180 degree arc or target line. It also uses a lot of space to show a single metric.

A good alternative is a simple KPI visual



KPIs show the value, status, goal, variance from the goal and trend in the same amount of space. The green coloring turns red if the target isn't being met and can be yellow if some intermediate target is hit. It's much simpler to read and interpret than the gauge.

For more information, see:

- [Tutorial: Radial gauge charts in Power BI](#)
- [Tutorial: KPIs in Power BI](#)

Conclusion

Now it's time for you to put these best practices to the test. Keep in touch and share your own best practices. Don't agree with our recommendations or found a great reason to "break the rules?" We'd love to hear about those as well.

Book recommendations

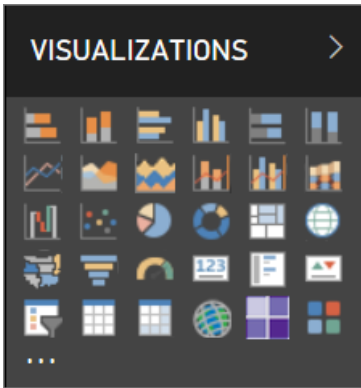
There are many good books available today to help teams bone up on visual design techniques. Stephen Few's *Information Dashboard Design* book is a must-read. He delves into greater detail in two other books, *Show Me the Numbers* and *Now You See It*. Few and others have drawn inspiration from Edward R. Tufte, whose book *The Visual Display of Quantitative Information* is considered a classic in the field. Tufte has also written *Visual Explanations*, *Envisioning Information*, and *Beautiful Evidence*. Andy Kirk's new book *Data Visualization: A Handbook for Data Driven Design* is another great option. Some other authors who have been recommended are: Lachlan James, William McKnight, and Boris Evelson (Forrester), Darkhorse Analytics.

More questions? [Try the Power BI Community](#)

Custom visuals in Power BI

11/21/2017 • 3 min to read • [Edit Online](#)

When creating or editing a Power BI report, there are many different types of visuals available for you to use. These visuals display in the **Visualizations** pane. When you download Power BI Desktop or open Power BI service (app.powerbi.com), this set of visuals comes "pre-packaged."



But you are not limited to this set of visuals, selecting the ellipses opens up another source of report visuals: *custom visuals*.

Custom visuals are created by members of the community and by Microsoft and are hosted on [AppSource](#). These visuals can be downloaded and added to Power BI reports. All of these custom visuals have been approved by Microsoft and they behave similar to the pre-packaged visualizations included with Power BI; they can be filtered, highlighted, edited, shared, etc.

What is AppSource? Simply put, it is the place to find apps, add-ins, and extensions for your Microsoft software. [AppSource](#) connects millions of users of products like Office 365, Azure, Dynamics 365, Cortana, and Power BI to solutions that help them get work done more efficiently, more insightfully, or more beautifully than before.

Two types of custom visuals

The Power BI custom visuals available from AppSource fall into 2 categories: **approved** and **certified**. *AppSource approved* visuals can be run in browsers, reports, and dashboards. *Power BI certified* visuals have passed rigorous testing, and are supported in additional scenarios, such as [email subscriptions](#), and [export to PowerPoint](#).

To see the list of certified custom visuals or to submit your own, see [Certified custom visuals](#).

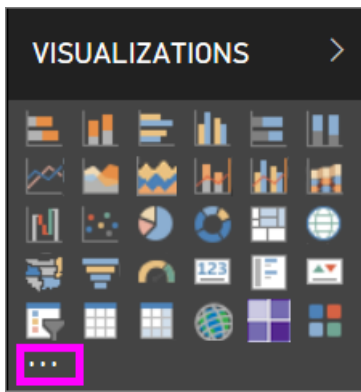
Are you a Web developer and interested in creating your own visualizations and adding them to AppSource? See [Get started with Developer Tools](#) and learn how to [publish custom visuals to AppSource](#).

Download or import custom visuals from Microsoft AppSource

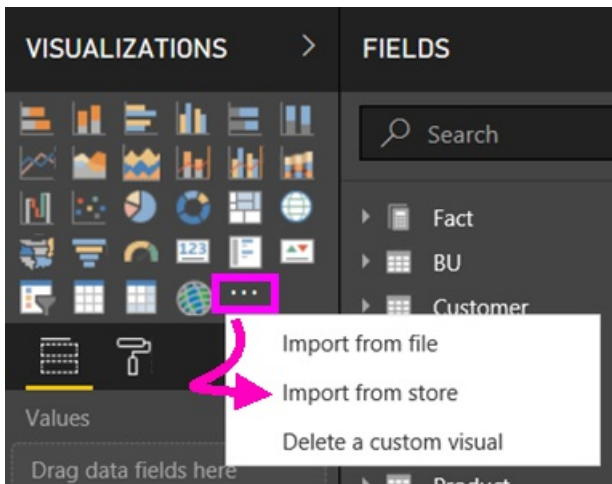
You have two options for downloading and importing custom visuals; from within Power BI and from the AppSource website.

Import custom visuals from within Power BI

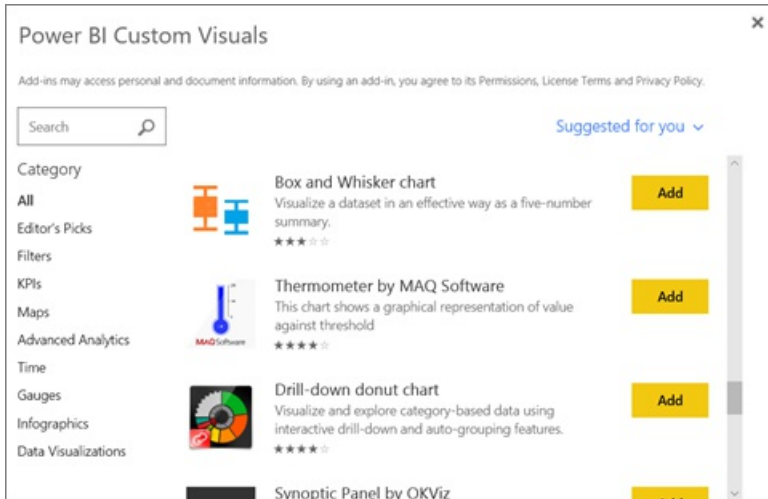
1. Select the ellipses from the bottom of the Visualizations pane.



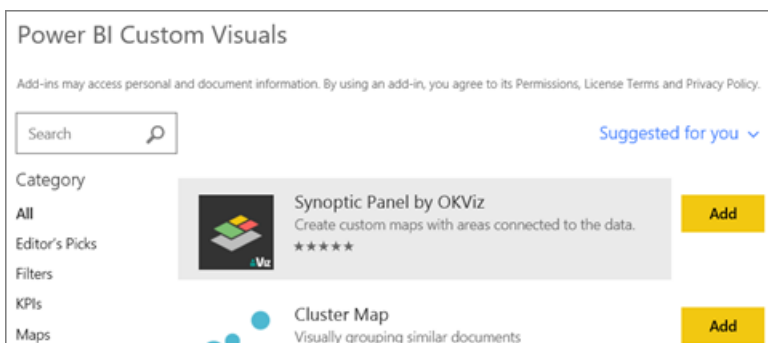
2. From the dropdown, select **Import from store**.



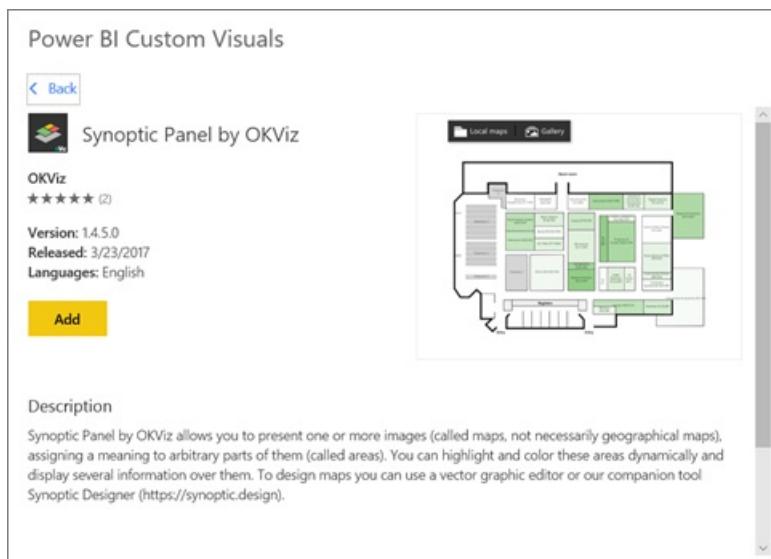
3. Scroll through the list to find the visual to import.



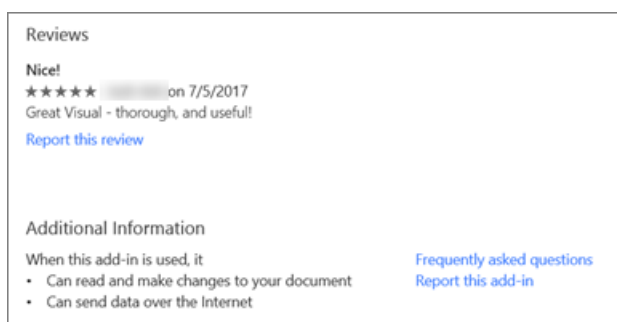
4. To learn more about one of the visuals, highlight and select it.



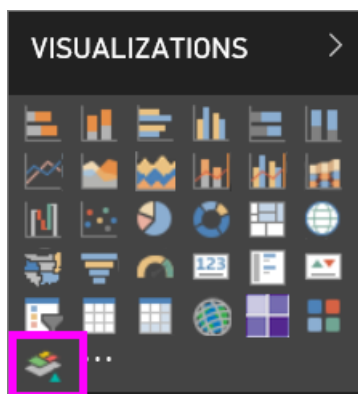
5. On the detail page you can view screenshots, videos, detailed description and more.



6. Scroll to the bottom to see reviews.

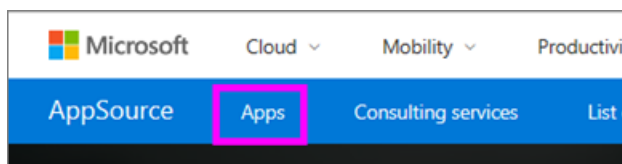


7. Import the custom visual by selecting **Add**. The icon for the custom visual is added to the bottom of your Visualizations pane and is now available for use in your report.

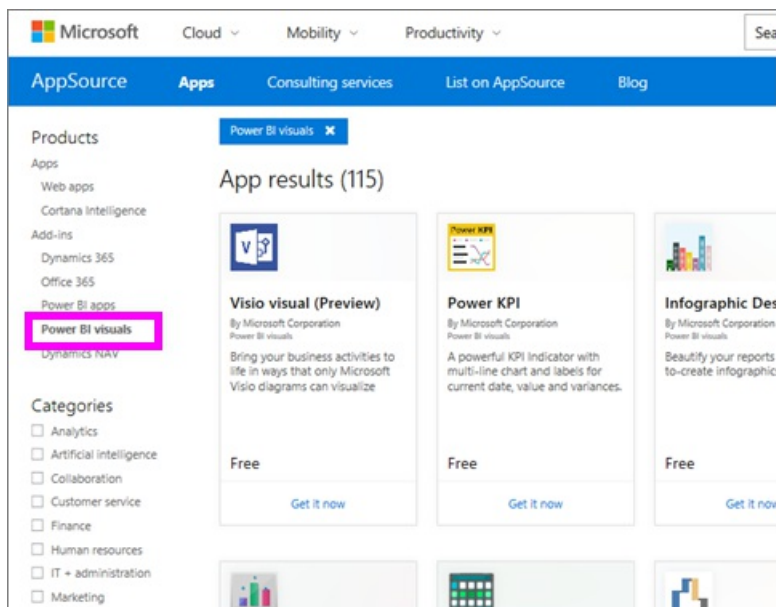


Download and import custom visuals from Microsoft AppSource

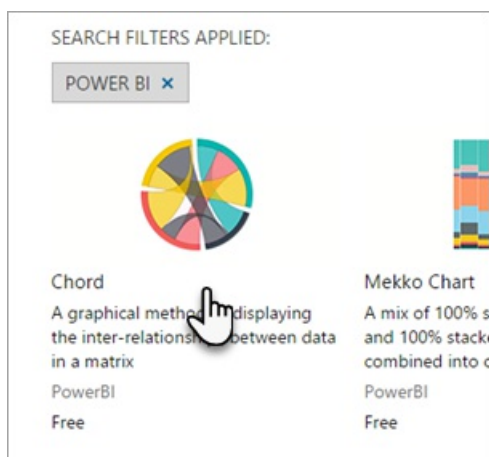
1. Start at [Microsoft AppSource](#) and select the tab for **Apps**.



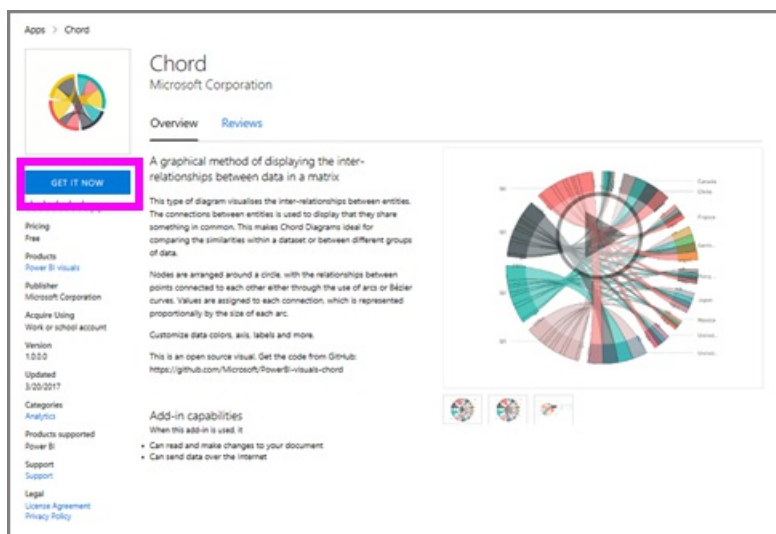
2. This takes you to the [Apps results page](#) where you can view top apps in each category, including *Power BI Apps*. But we're looking for custom visuals, so let's narrow down the results by selecting **Power BI visuals** from the left navigation list.



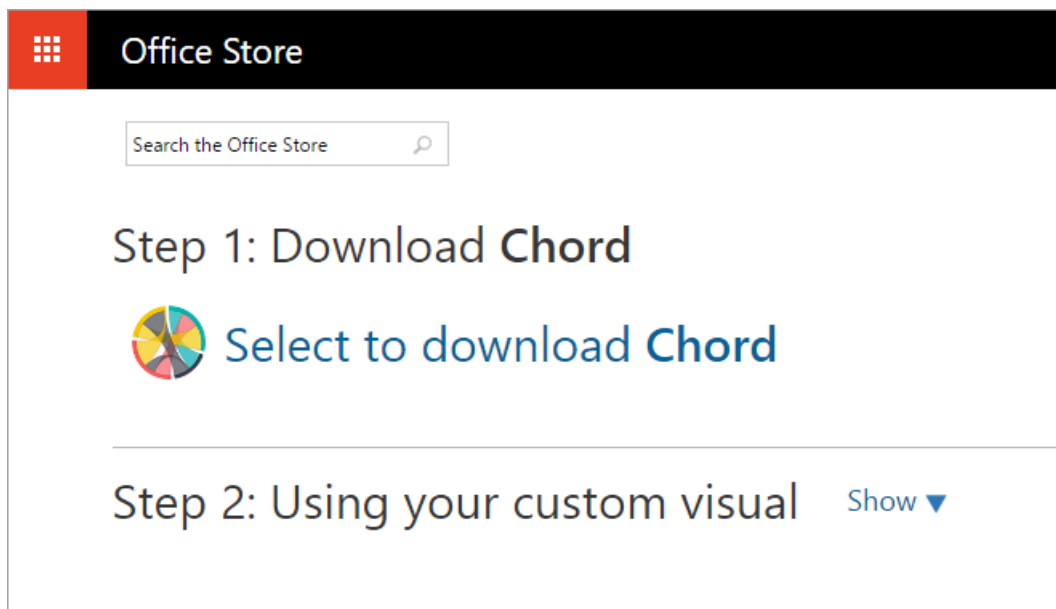
- AppSource displays a tile for each custom visual. Each tile has a snapshot of the custom visual and gives a brief description and a download link. To see more details, select the tile.



- On the detail page you can view screenshots, videos, detailed description and more. Download the custom visual by selecting **Get it now** and then agreeing to the Terms of use.

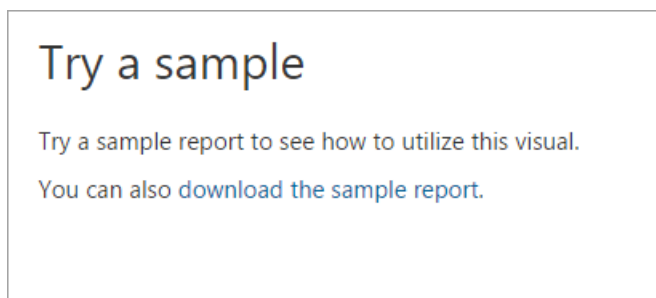


- Select the link to download the custom visual.

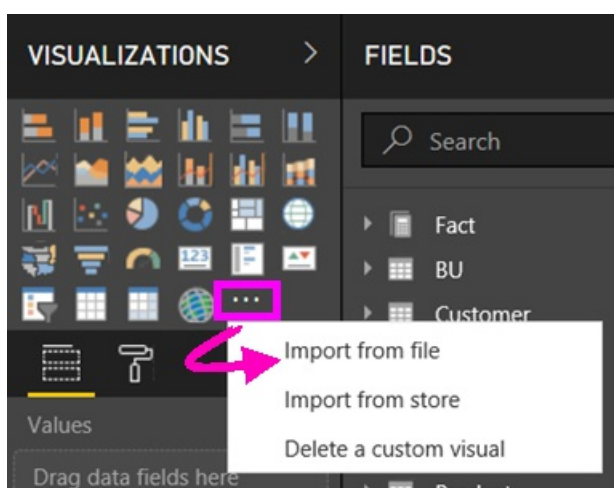


The download page also include instructions on how to import the custom visual into Power BI Desktop and Power BI service.

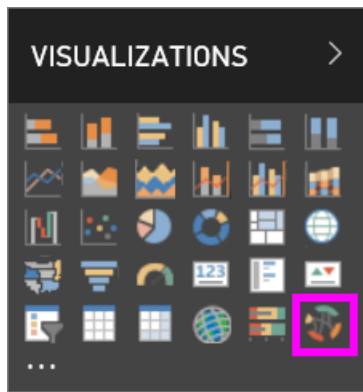
You can also download a sample report that includes the custom visual and showcases its capabilities.



6. Save the .pbviz file and then open Power BI.
7. Open the report where you'd like to add the custom visual and from the bottom of the **Visualizations** pane select the ellipses > **Import from file**.



8. Select the custom visual file to add the icon for that custom visual to the bottom of your **Visualizations** pane. The custom visual is now available for use in your report.



Considerations and troubleshooting

- A custom visual is added to a specific report when imported. If you'd like to use the visual in another report, you need to import it into that report as well. When a report with a custom visual is saved using the **Save As** option, a copy of the custom visual is saved with the new report.
- If you don't see a **Visualizations** pane, that means you do not have edit permissions for the report. You can only add custom visuals to reports you can edit, not to reports that have been shared with you.

More questions? [Try the Power BI Community](#)

Part I, Add visualizations to a Power BI report (Tutorial)

1/8/2018 • 1 min to read • [Edit Online](#)

This article gives a quick introduction to creating a visualization in a report. For more-advanced content, please [see Part II](#). Watch Amanda demonstrate a few different ways to create, edit, and format visuals on the report canvas. Then try it out yourself using the [Sales and Marketing sample](#) to create your own report.

Open a report and add a new page

1. Open a [report in Editing View](#). This tutorial uses the [Sales and Marketing sample](#).
2. If the Fields pane isn't visible, select the arrow icon to open it.

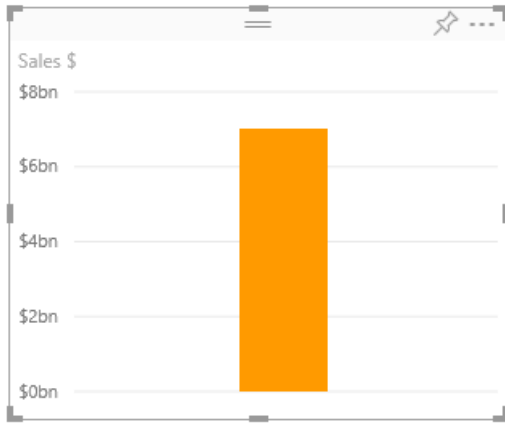


3. [Add a blank page to the report](#).

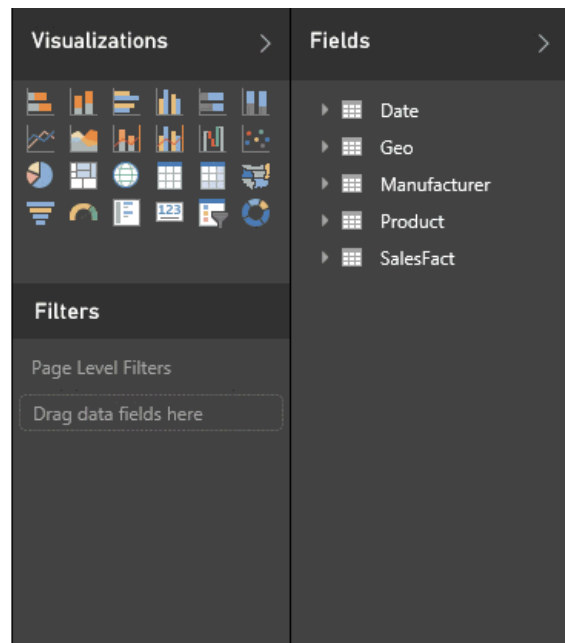
Add visualizations to the report

1. Create a visualization by selecting a field from the **Fields** pane.

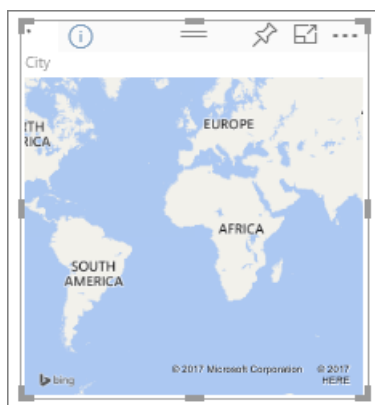
Start with a numeric field like Sales > Sales \$: Power BI creates a column chart with a single column.



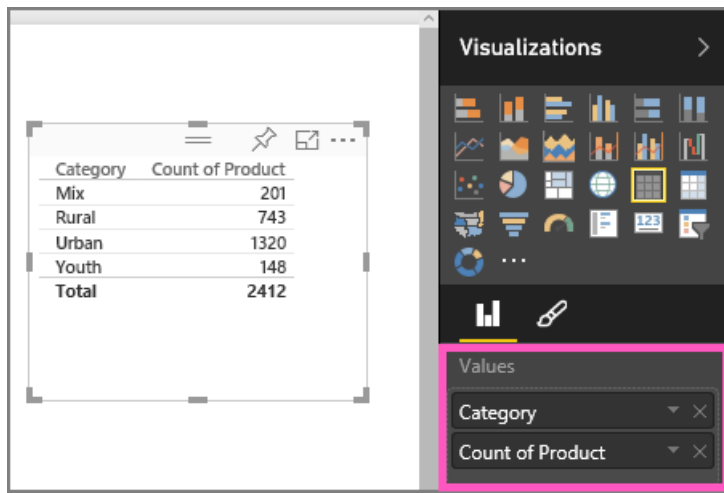
Start with a category field, such as Name or Product: Power BI creates a Table and adds that field to the **Values** well.



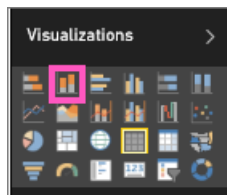
Start with a geography field, such as Geo > City. Power BI and Bing Maps create a map visualization.




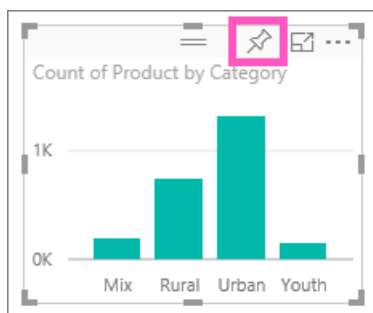
2. Create a visualization and then change its type. Select **Product > Count of Product** and **Product > Category** to add them to the **Values** well.



3. Change the visualization to a column chart by selecting the column chart icon.



4. When you create visualizations in your report, you can [pin them to your dashboard](#). To pin the visualization, select the pin icon .



5. Now you can:

Continue on to [Part 2: Add visualizations to a Power BI report](#)

[Interact with the visualizations](#) in the report.

[Do even more with visualizations.](#)

[Save your report.](#)

Next steps

More about [Visualizations in Power BI reports](#).

[Reports in Power BI](#)

More questions? [Try the Power BI Community](#)

Part 2, Add visualizations to a Power BI report (Tutorial)

1/24/2018 • 1 min to read • [Edit Online](#)

In [Part 1](#), you created a basic visualization by selecting checkboxes next to field names. In Part 2 you'll learn how to use drag-and-drop and make full use of the **Fields** and **Visualizations** panes to create and modify visualizations.

Prerequisites

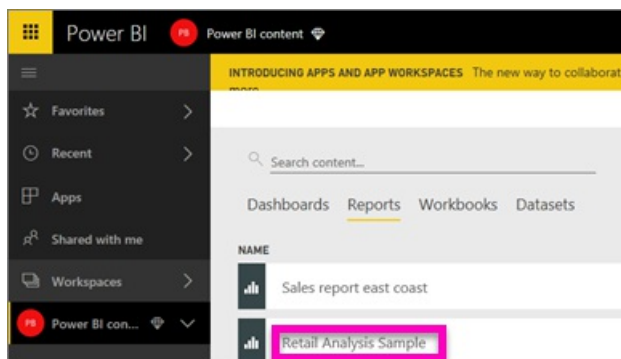
- [Part 1](#)
- Power BI service - visualizations can be added to reports using Power BI service or Power BI Desktop. This tutorial uses Power BI service.
- Retail Analysis sample

Create a new visualization

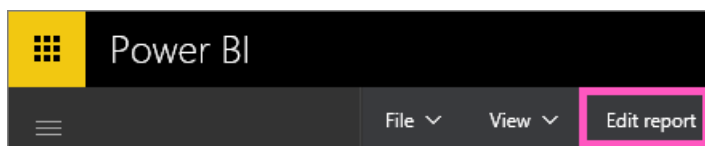
In this tutorial we'll dig into our Retail Analysis dataset and create a few key visualizations.

Open a report and add a new blank page.

1. Open the workspace where you saved the Retail Analysis sample. Select **Retail Analysis Sample** to open the report in Reading View.



2. Select **Edit Report** to open the report in Editing View.

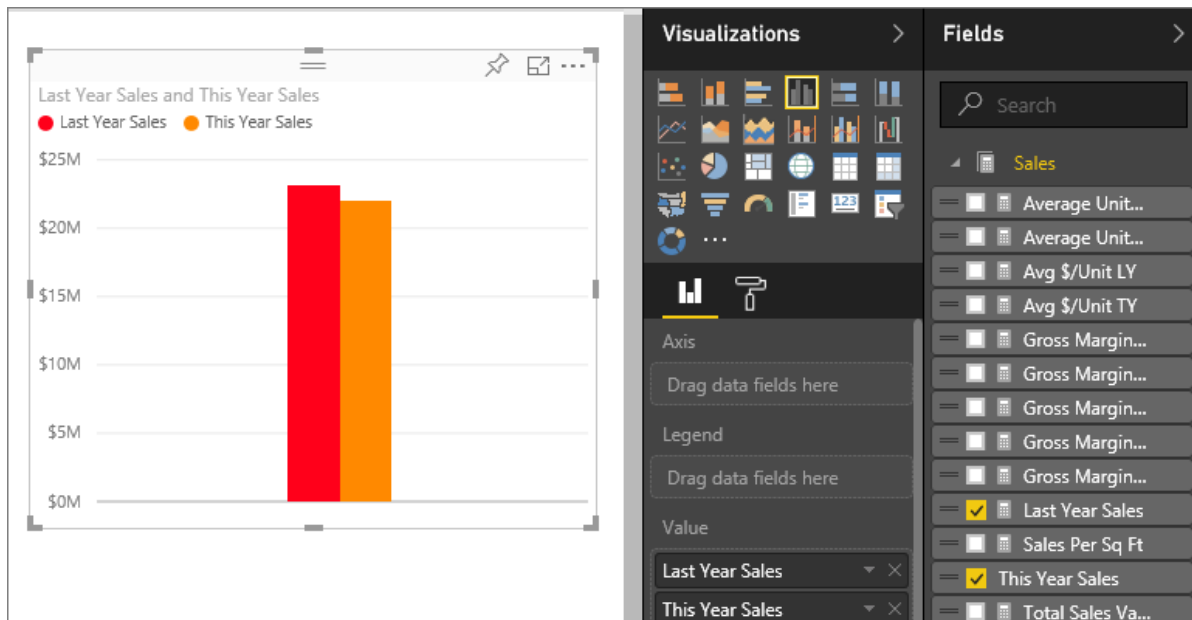


3. [Add a new page](#) by selecting the yellow plus icon at the bottom of the canvas.

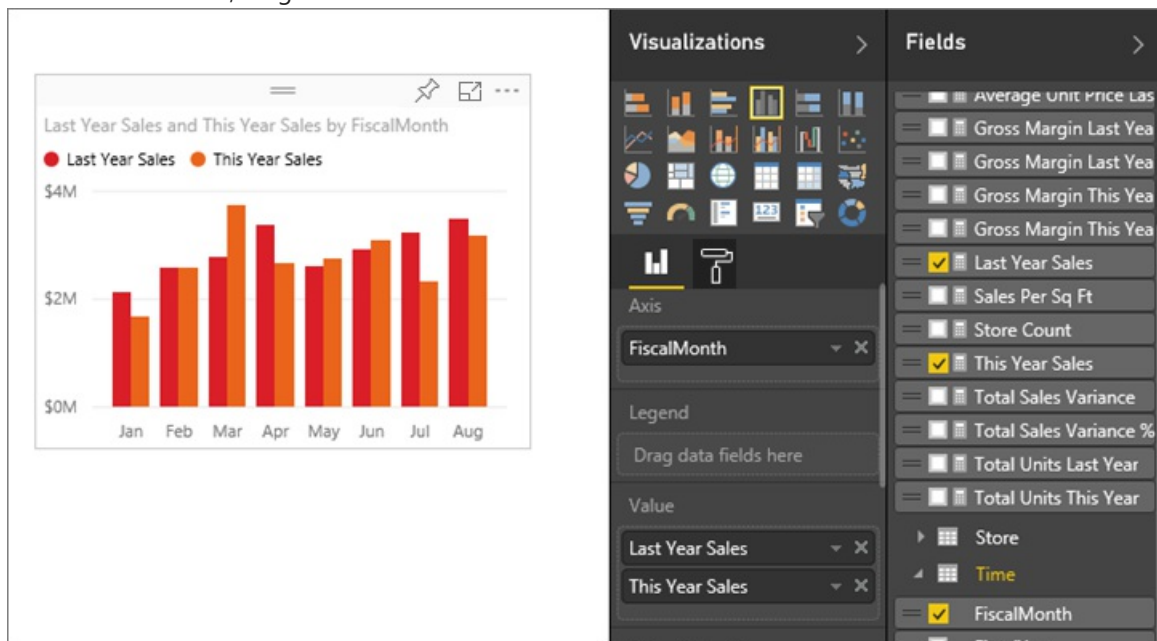


Add a visualization that looks at this year's sales compared to last year.

1. From the **Sales** table, select **This Year Sales > Value** and **Last Year Sales**. Power BI creates a column chart. This is somewhat interesting, and you want to dig deeper. What do the sales look like by month?



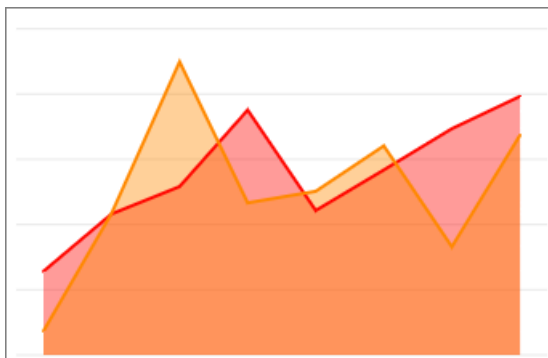
2. From the Time table, drag **Month** into the **Axis** area.



3. [Change the visualization](#) to an Area chart. There are many visualization types to choose from - see [descriptions of each](#), [tips for best practices](#), and [tutorials](#) for help deciding which type to use. From the Visualizations pane, select the Area chart icon.

4. Sort the visualization by selecting the ellipses and choosing **Sort by Month**.

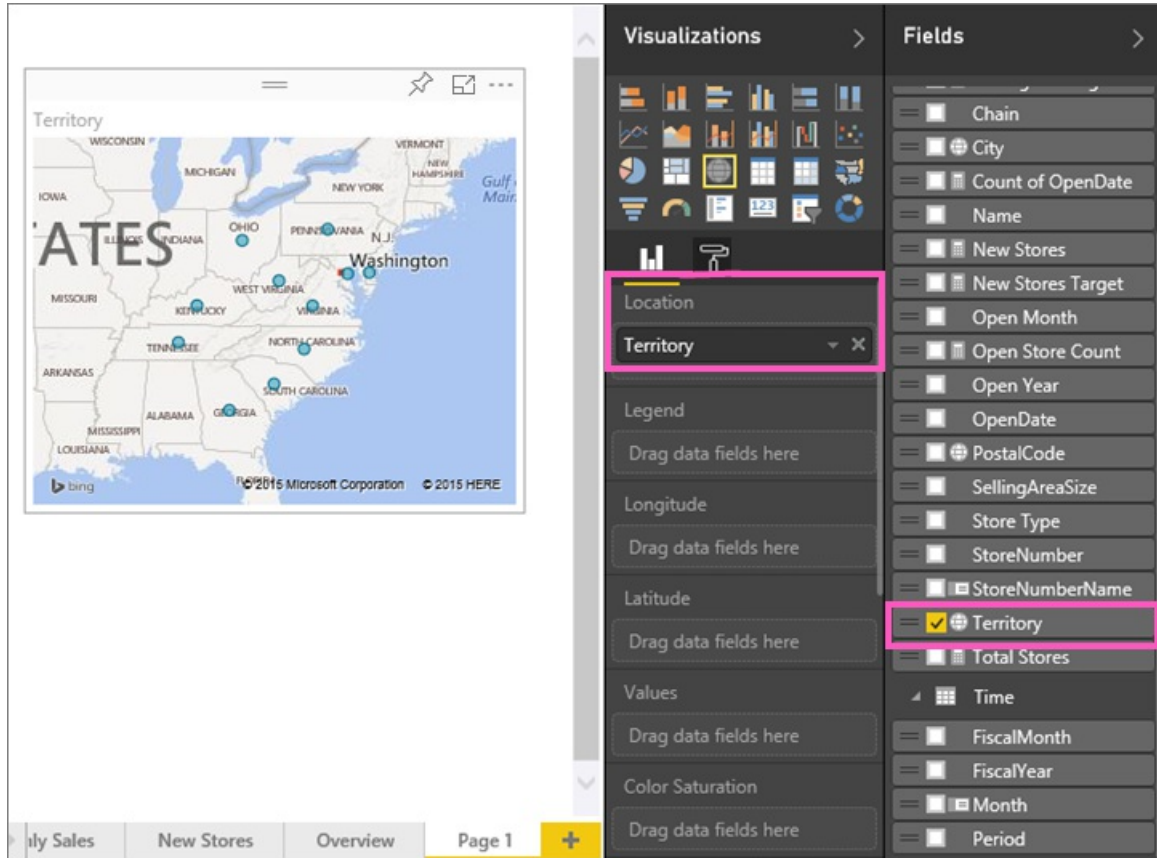
5. [Resize the visualization](#) by selecting the visualization, grabbing one of the outline circles and dragging. Make it wide enough to eliminate the scrollbar and small enough to give us enough room to add another visualization.



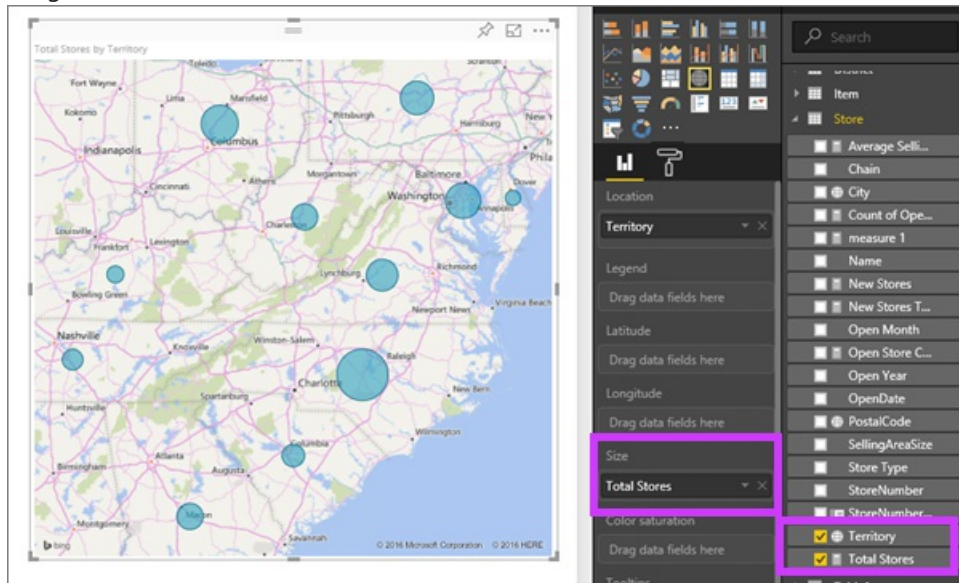
6. [Save the report](#).

Add a map visualization that looks at sales by location

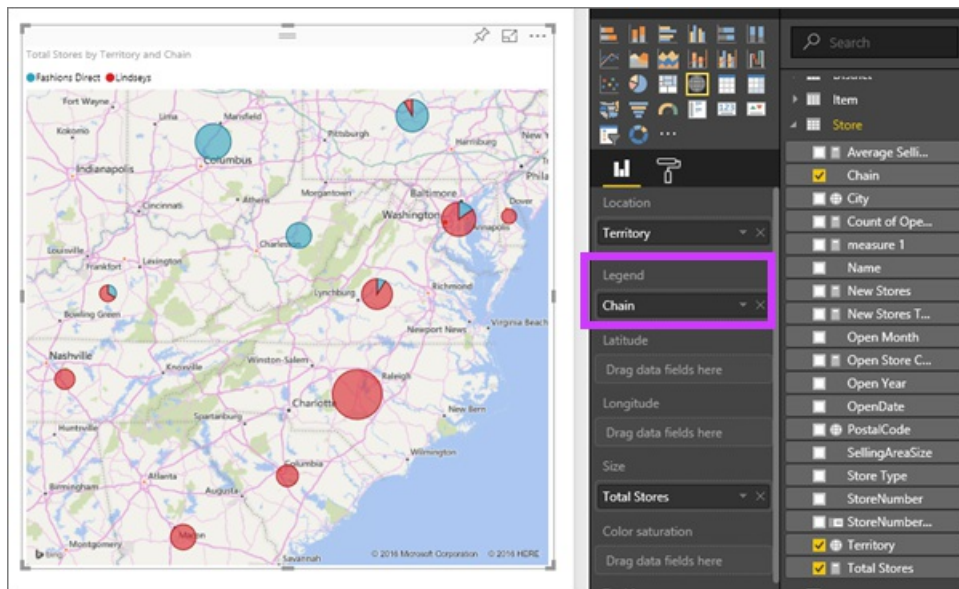
1. From the **Store** table, select **Territory**. Power BI recognizes that Territory is a location, and creates a map visualization.



2. Drag **Total Stores** into the Size area.



3. Add a legend. To see the data by store name, drag **Chain** into the Legend area.



Next steps

- For more information about the Fields pane, see [The report editor... take a tour.](#)
- To learn how to filter and highlight your visualizations, see [Filters and highlighting in Power BI reports.](#)
- More about [Visualizations in Power BI reports.](#)
- More questions? [Try the Power BI Community](#)

Show the data that was used to create the visualization

1/8/2018 • 1 min to read • [Edit Online](#)

Show Data

A Power BI visualization is constructed using data from your datasets. If you're interested in seeing behind-the-scenes, Power BI lets you *display* the data that is being used to create the visual. When you select **Show Data**, Power BI displays the data below (or next to) the visualization.

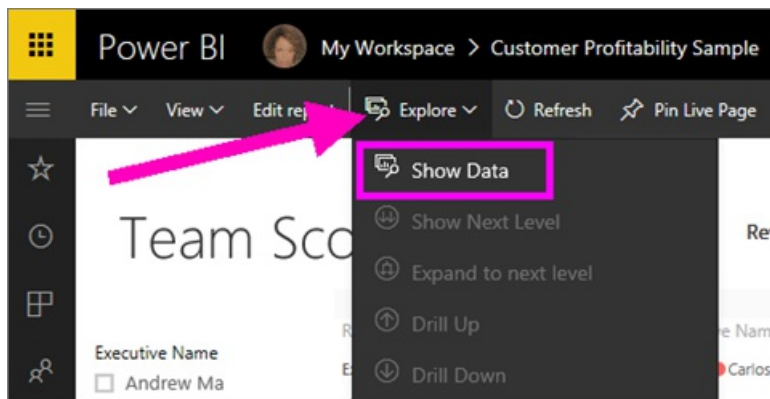
You can also export the data that is being used to create the visualization as an .xlsx or .csv file and view it in Excel. For more information, see [Export data from Power BI visualizations](#).

NOTE

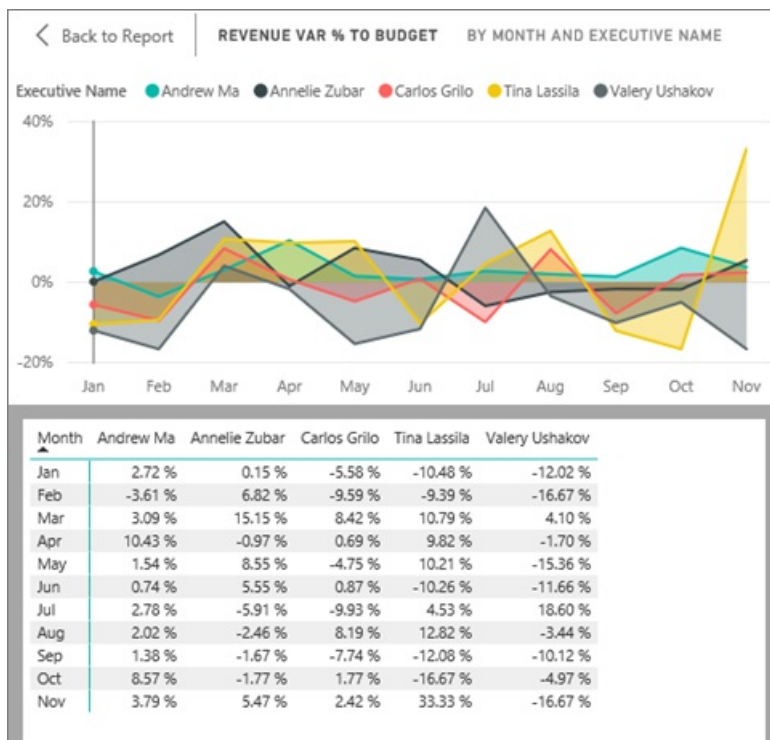
Show Data and *Export Data* are both available in Power BI service and Power BI Desktop. However, Power BI Desktop provides one additional layer of detail; *Show Records* displays the actual rows from the dataset.

Using *Show Data* in Power BI service

1. In Power BI service, open a report in [Reading view](#) or [Editing view](#), and select a visual. In Power BI Desktop, open Report view.
2. To display the data behind the visual, select **Explore** > **Show data**.



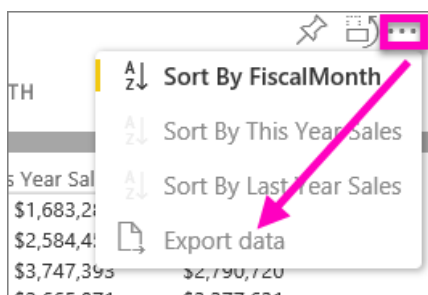
3. By default, the data displays below the visual.



4. To change the orientation, select vertical layout  from the top-right corner of the visualization.



5. To export the data to a .csv file, select the ellipses and choose **Export data**.



For more information on exporting the data to Excel, see [Export data from Power BI visualizations](#).

6. To hide the data, de-select **Explore** > **show data**.

Next steps

[Export data from Power BI visualizations](#)

[Visualizations in Power BI reports](#)

[Power BI reports](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Export data from visualizations

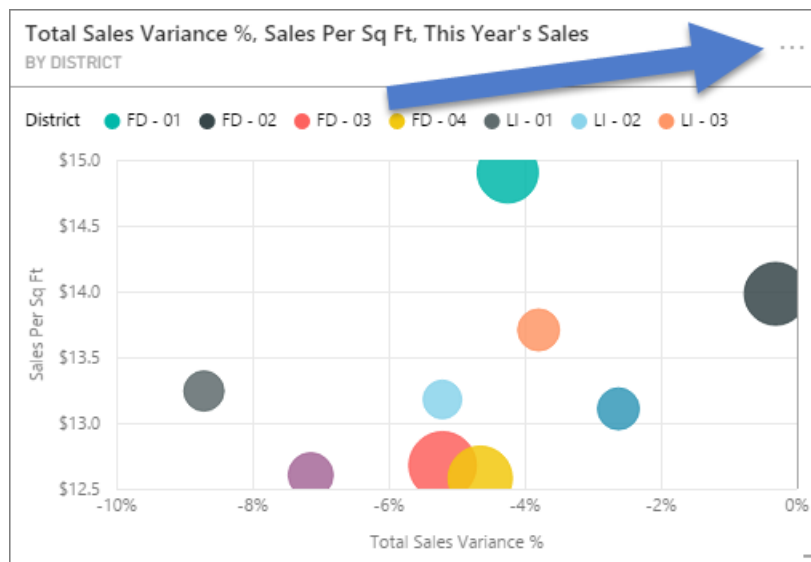
1/23/2018 • 4 min to read • [Edit Online](#)

If you'd like to see the data that is used to create a visualization, you can [display that data in Power BI](#) or export that data to Excel as an .xlsx or .csv file.

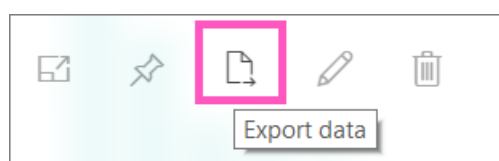
Watch Will export the data from one of the visualizations in his report, save it as an .xlsx file, and open it in Excel. Then follow the step-by-step instructions below the video to try it out yourself.

From a visualization on a Power BI dashboard

1. Select the ellipses in the top right corner of the visualization.



2. Choose the **Export data** icon.



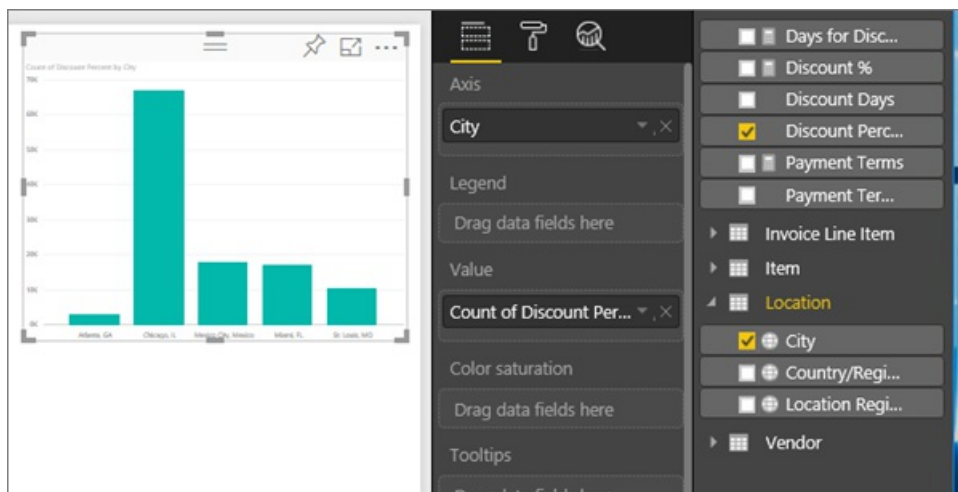
3. The data is exported to a .csv file. If the visual is filtered, then the downloaded data will also be filtered.
4. Your browser will prompt you to save the file. Once saved, open the .csv file in Excel.

	A	B	C	D	E	F	G
1	Total Sales	Sales Per S	This Year Sales	District			
2	-4.25%	\$14.90	\$3,030,612	FD - 01			
3	-0.31%	\$13.98	\$3,169,511	FD - 02			
4	-5.21%	\$12.68	\$3,804,313	FD - 03			
5	-4.65%	\$12.58	\$3,439,556	FD - 04			
6	-8.71%	\$13.25	\$1,103,802	LI - 01			
7	-5.21%	\$13.18	\$1,054,491	LI - 02			
8	-3.79%	\$13.71	\$1,325,205	LI - 03			
9	-7.14%	\$12.61	\$1,470,834	LI - 04			
10	-2.62%	\$13.11	\$1,223,655	LI - 05			
11							
12							
13							

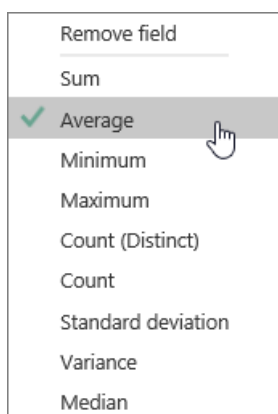
From a visualization in a report

To follow along, open the [Procurement analysis sample report](#) in [Editing view](#). Add a new blank report page. Then follow the steps below to add an aggregation and a visualization-level filter.

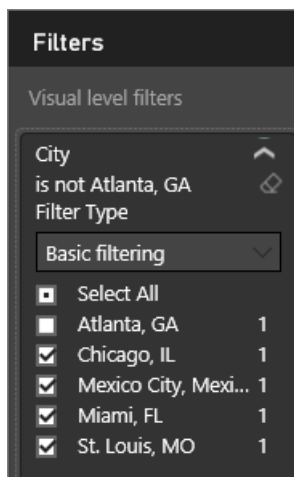
1. Create a new column chart. From the Fields pane, select **Location > City** and **Invoice > Discount Percent**. You may have to move **Discount Percent** into the Value well.



2. Change the aggregation for **Discount Percent** from **Count** to **Average**. In the Value well, select the arrow to the right of **Discount Percent** (it may say **Count of Discount Percent**), and choose **Average**.

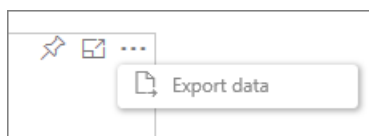


3. Add a filter to **City** to remove **Atlanta**.

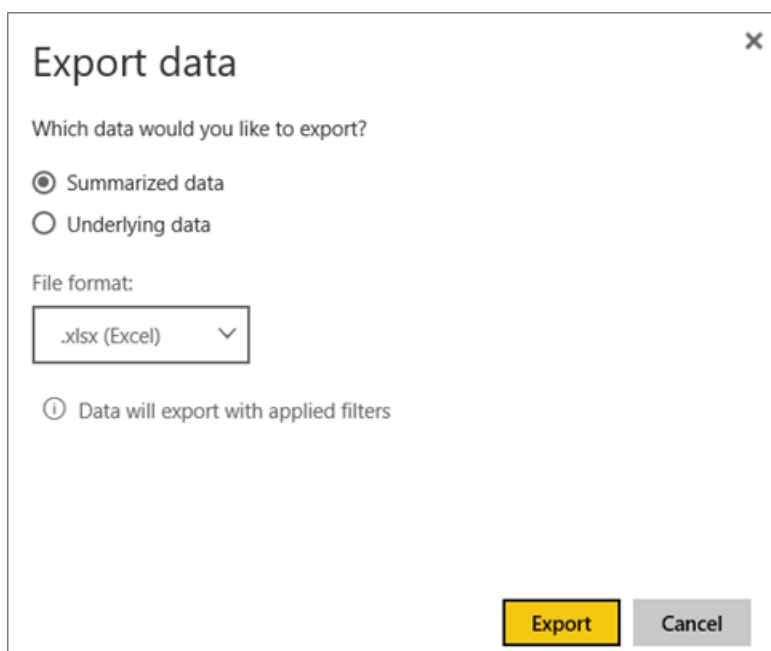


Now we're ready to try out both options for exporting data.

4. Select the ellipses in the top right corner of the visualization. Choose **Export data**.



5. If your visualization has an aggregate (one example would be if you changed **Count** to *average*, **sum** or *minimum*), you'll have two options: **Summarized data** and **Underlying data**. For help understanding aggregates, see [Aggregates in Power BI](#).



6. Select **Summarized data** > **Export** and choose either .xlsx or .csv. Power BI exports the data. If you have applied filters to the visualization, the exported data will export as filtered. When you select **Export**, your browser prompts you to save the file. Once saved, open the file in Excel.

Summarized data: select this option if you don't have an aggregate or if you do have an aggregate but don't want to see the complete breakdown. For example, if you have a bar chart showing 4 bars, you will get 4 rows of data. Summarized data is available as .xlsx and .csv.

In this example, our Excel export shows one total for each city. Since we filtered out Atlanta, it is not included in the results. The first row of our spreadsheet shows the filters that were used when extracting the data from Power BI.

	A	B
1	Applied filters:City is not Atlanta, GA	
2		
3	City	Average of Discount Percent
4	Chicago, IL	3.23 %
5	Mexico City, Mexico	9.06 %
6	Miami, FL	2.25 %
7	St. Louis, MO	2.52 %
8		

7. Now try selecting **Underlying data** > **Export** and choosing .xlsx. Power BI exports the data. If you had applied filters to the visualization, the exported data will export as filtered. When you select **Export**, your browser prompts you to save the file. Once saved, open the file in Excel.

WARNING

Exporting underlying data allows users to see all the detailed data -- every column in the data. Power BI service administrators can turn this off for their organization. If you are a dataset owner, you can set proprietary columns to "hidden" so that they don't show up in the Field list in Desktop or Power BI service.

Underlying data: select this option if your visualization does have an aggregate and you'd like to see all the underlying details. Basically, selecting *Underlying data* removes the aggregate. When you select **Export**, the data is exported to an .xlsx file and your browser prompts you to save the file. Once saved, open the file in Excel.

In this example, our Excel export shows one row for every single City row in our dataset, and the discount percent for that single entry. In other words, the data is flattened and not aggregated. The first row of our spreadsheet shows the filters that were used when extracting the data from Power BI.

	A	B
1	Applied filters:City is not Atlanta, GA	
2		
3	City	Discount Percent
4	Chicago, IL	50.00 %
5	Chicago, IL	50.00 %
6	Chicago, IL	50.00 %
7	Chicago, IL	50.00 %
8	Chicago, IL	50.00 %
9	Mexico City, Mexico	50.00 %
10	Mexico City, Mexico	50.00 %
11	Mexico City, Mexico	50.00 %
12	Mexico City, Mexico	50.00 %
13	Mexico City, Mexico	50.00 %

Limitations and considerations

- The maximum number of rows that can be exported from **Power BI Desktop** and **Power BI service** to .csv is 30,000.
- The maximum number of rows that can be exported to .xlsx is 150,000.
- Export using *Underlying data* will not work if the data source is an Analysis Services live connection and the version is older than 2016 and the tables in the model do not have a unique key.
- Export using *Underlying data* will not work if the *Show items with no data* option is enabled for the visualization being exported.
- When using DirectQuery, the maximum amount of data that can be exported is 16 MB. This may result in exporting less than the maximum number of rows, especially if there are many columns, data that is difficult to compress, and other factors that increase file size and decrease number of rows exported.
- Power BI only supports export in visuals that use basic aggregates. Export is not available for visuals using model or report measures.
- Custom visuals, and R visuals, are not currently supported.

- Export data is not available for users outside of your organization who are using a dashboard that has been shared with them.
- If there is unicode character in the .csv file, the text in Excel may not display properly. Although, opening it in Notepad will work fine. Examples of unicode characters are currency symbols and foreign words. The workaround for this is to import the csv into Excel, instead of opening the csv directly. To do this:
 1. Open Excel
 2. From the **Data** tab, select **Get external data > From text**.
- Power BI admins have the ability to disable the export of data.

Next steps

[Dashboards in Power BI](#)

[Reports in Power BI](#)

[Power BI - Basic Concepts](#)

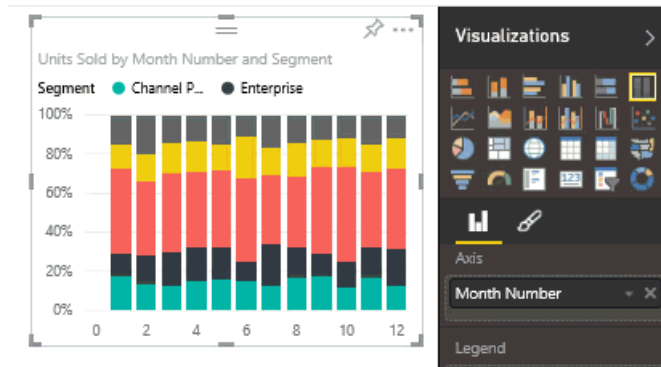
More questions? [Try asking the Power BI Community](#)

Change the type of visualization in a Power BI report

12/20/2017 • 1 min to read • [Edit Online](#)

Try different types of visualizations in Power BI service and Power BI Desktop to see which one illustrates your data best.

1. Open a report that already has at least one visualization.
2. In the Visualizations pane, select the new visualization type.



NOTE

You can [pin your visualization](#) to your dashboard as a tile.

If you changed the visualization type in the report after you pinned it to your dashboard, the tile does not automatically update. So, if you pinned the visualization as a line chart and then, in the report, changed it to a bar chart, the already-pinned version of this data will remain a line chart. Pin the bar chart to see it too on the dashboard.

Next steps

More about [Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

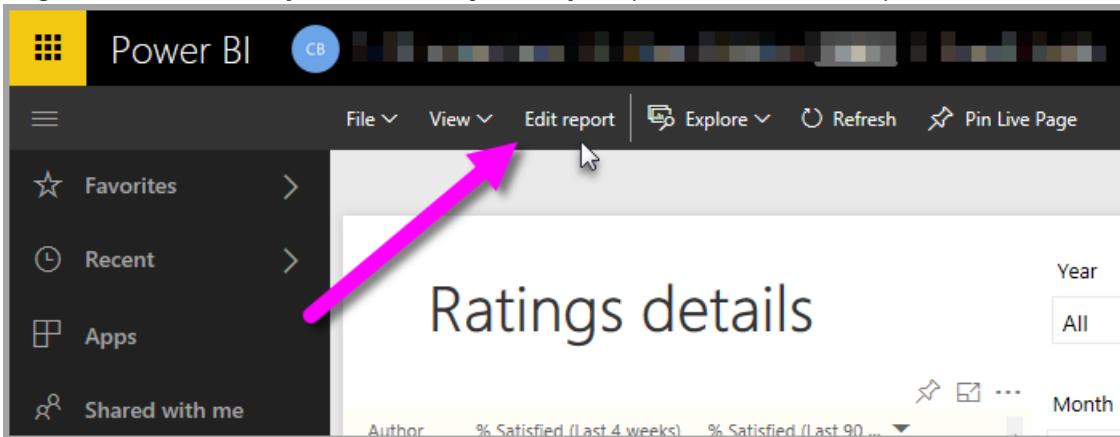
More questions? [Try the Power BI Community](#)

Getting started with color formatting and axis properties

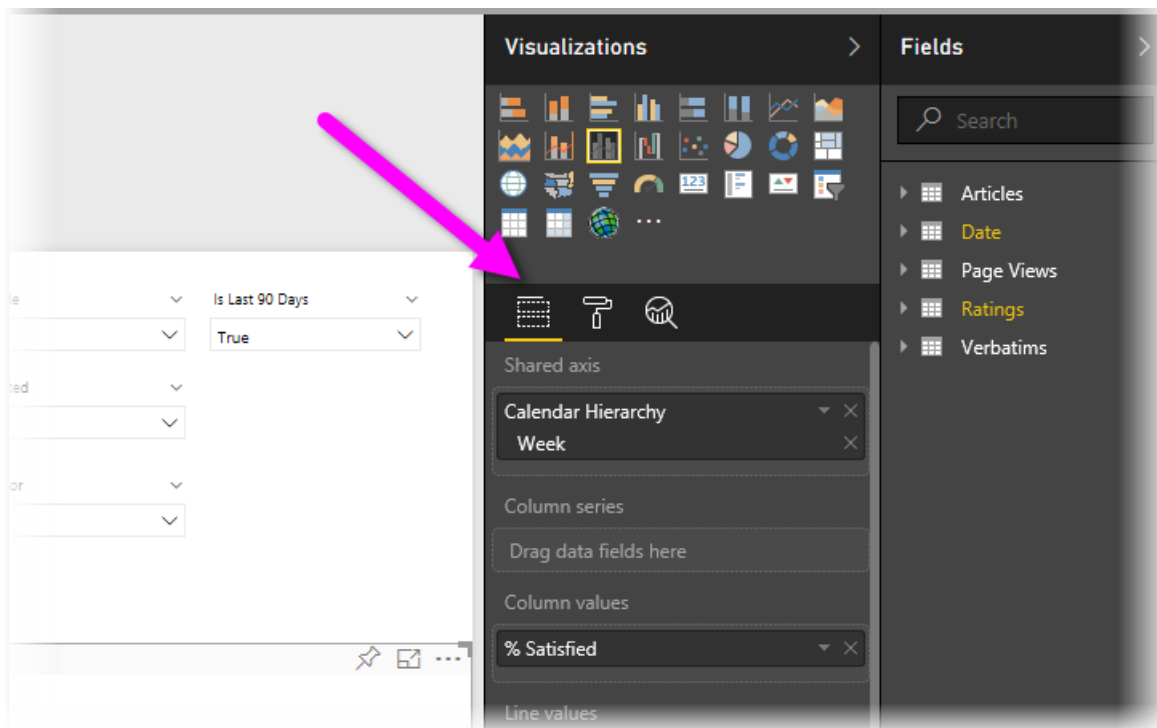
12/6/2017 • 3 min to read • [Edit Online](#)

In **Power BI**, you can change the color of data series, data points, and even the background of visualizations. You can also change how the x-axis and y-axis are presented, providing you with full control of how your dashboards and reports appear.

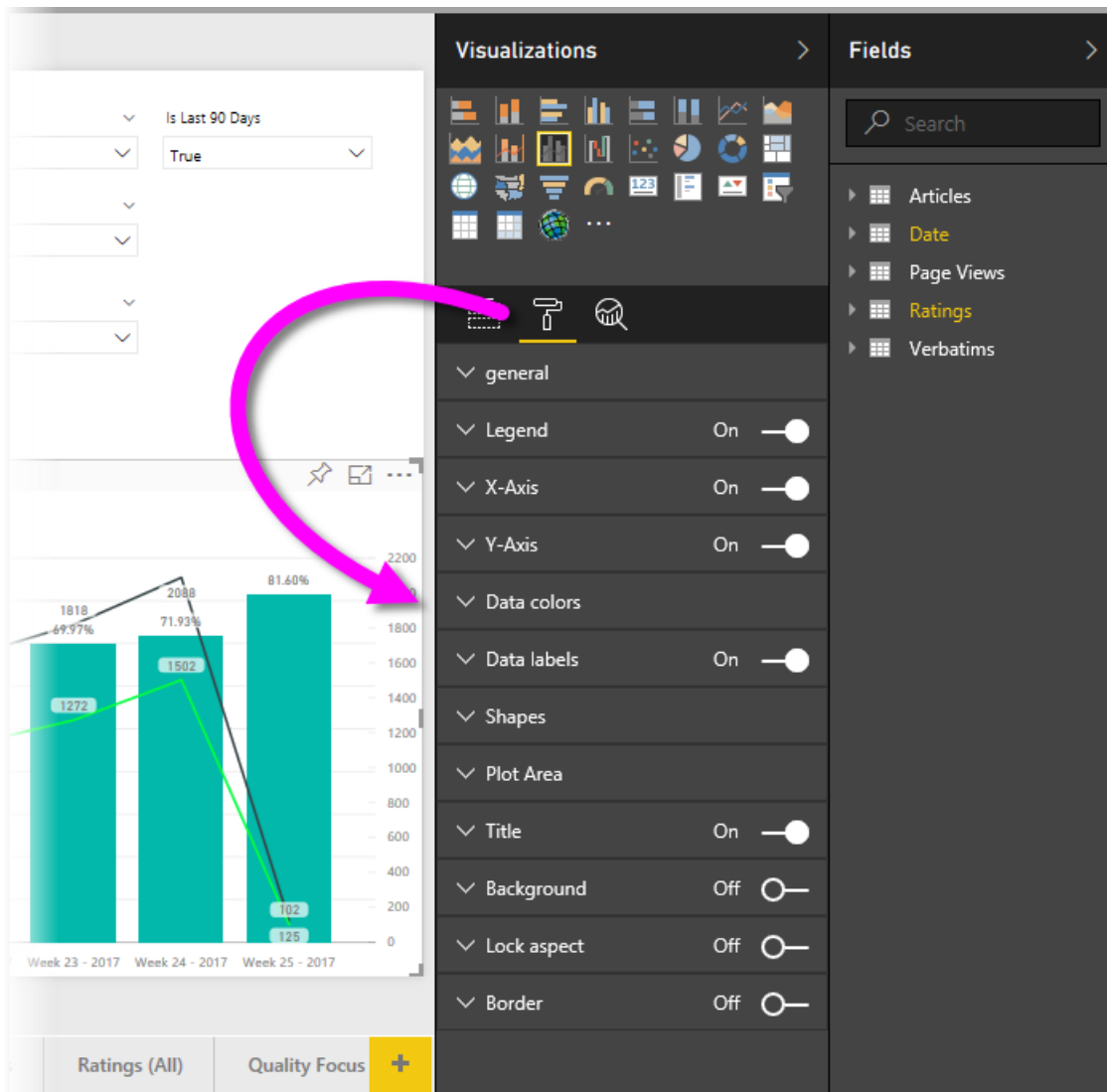
To get started, select a **Report** from the **My Workspace** pane. Then from the top menu area, select **Edit Report**.



When you're editing a report and you have a visualization selected, the **Visualizations** pane appears which lets you add or change visualizations. Directly below the available visualizations are three icons: the **Fields** icon (a stack of bars), the **Format** icon (a roller brush), and the **Analytics** icon (a magnifying glass). In the image below the **Fields** icon is selected, indicated by a yellow bar below the icon.



When you select **Format**, the area below the icon displays the color and axis customizations available for the currently selected visualization.



You can customize many elements of each visualization:

- Legend
- X-axis
- Y-axis
- Data colors
- Data labels
- Shapes
- Plot area
- Title
- Background
- Lock aspect
- Border

NOTE

You won't see all these elements with each visualization type. The visualization you select will affect which customizations are available; for example, you won't see an X-Axis if you have a pie chart selected because pie charts don't have an X-axis.

Also note that if you don't have any visualization selected, **Filters** appears in place of the icons, which lets you apply filters to all visualizations on the page.

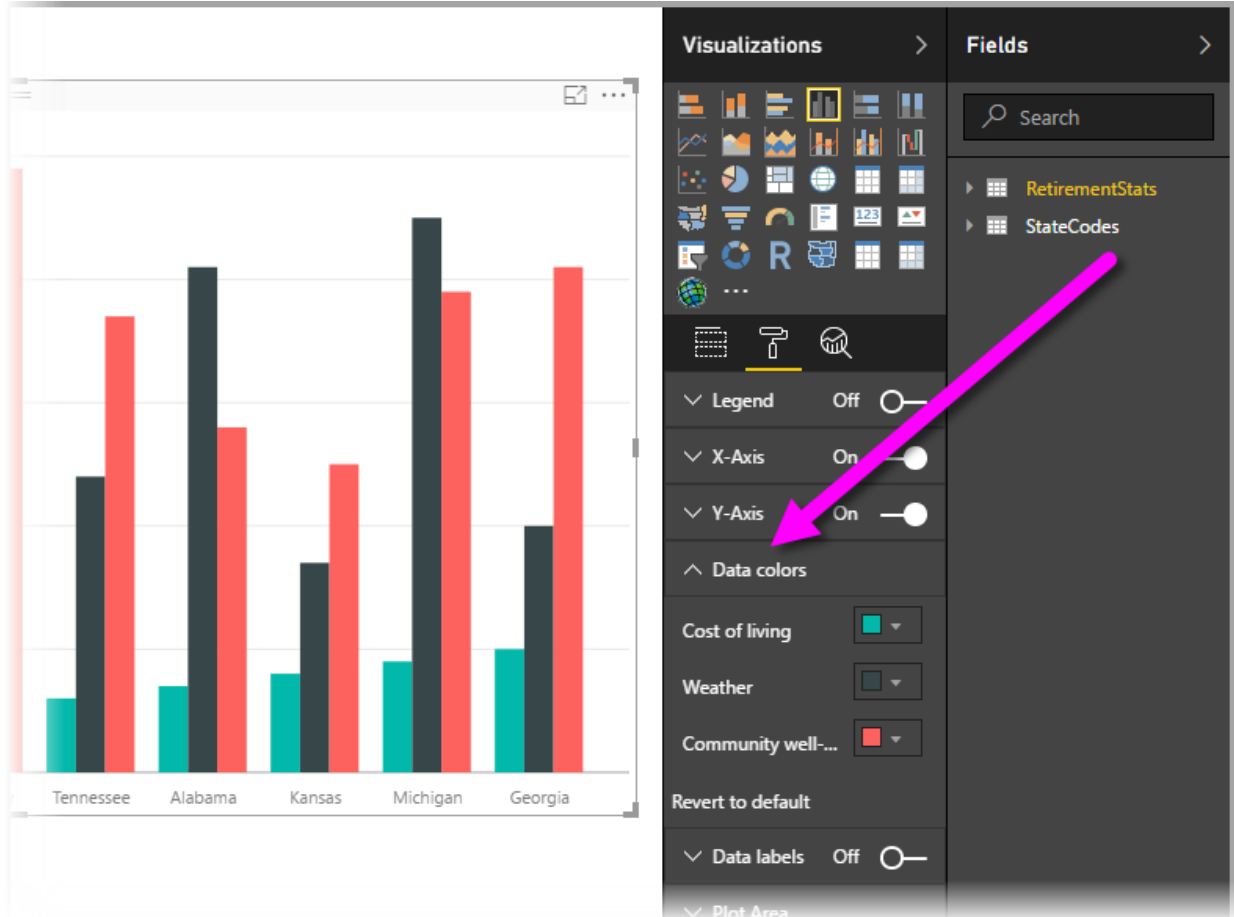
Let's show a couple examples: one working with colors, the other changing the properties of an axis. From there,

you should be ready to customize colors, axes, and labels all day long.

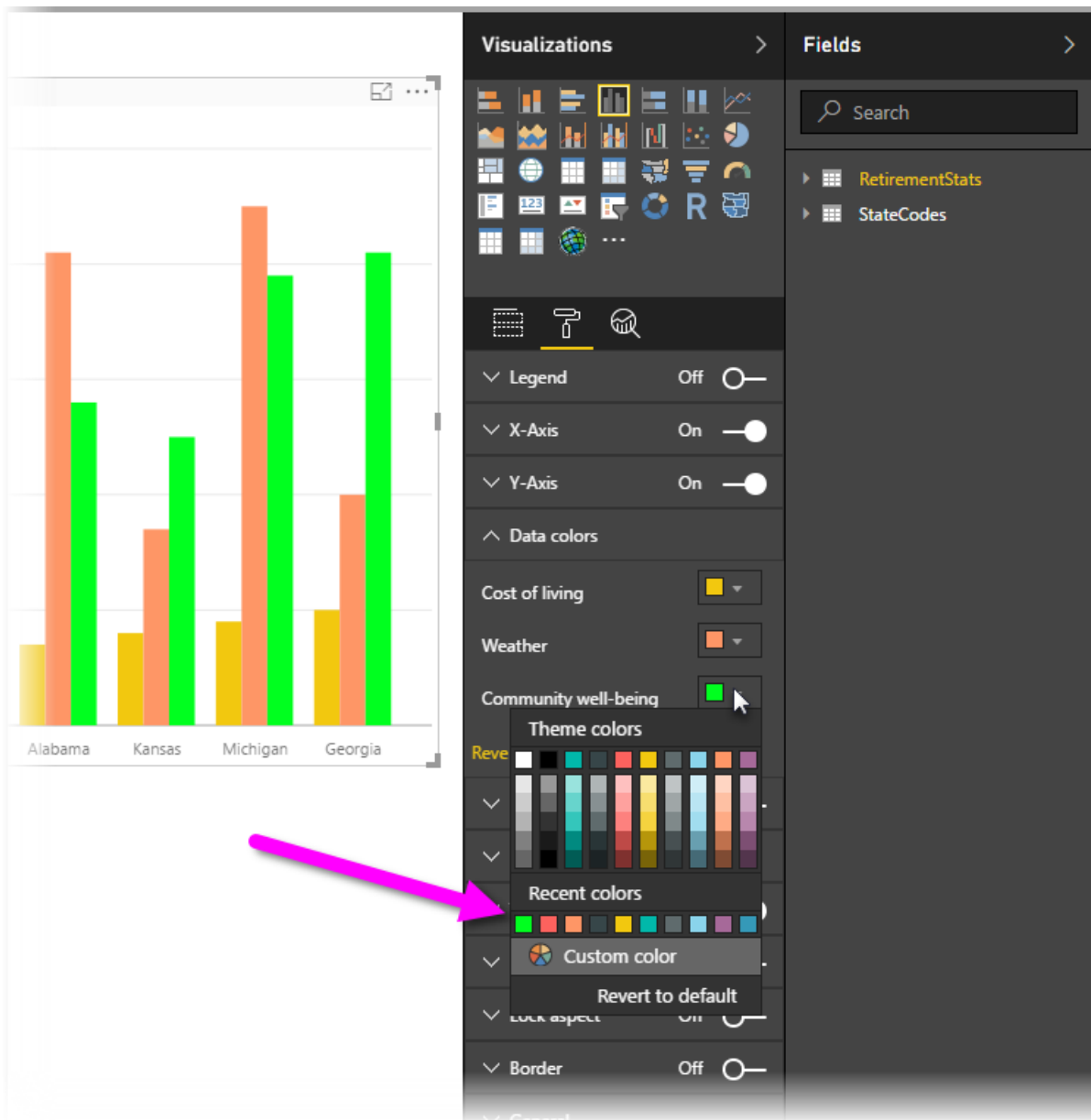
Working with colors

Let's walk through the steps necessary to customize colors on a chart.

1. I select a **Clustered Column Chart** from the report canvas.
2. Next, I choose the **Format** icon to show the available customizations.
3. Then I select the small down arrow to the left of the **Data Colors** customization. This will show how I can customize the Data Colors, with options that are specific to the visualization I've selected.
4. **Data Colors** expands downward to show its available customizations.

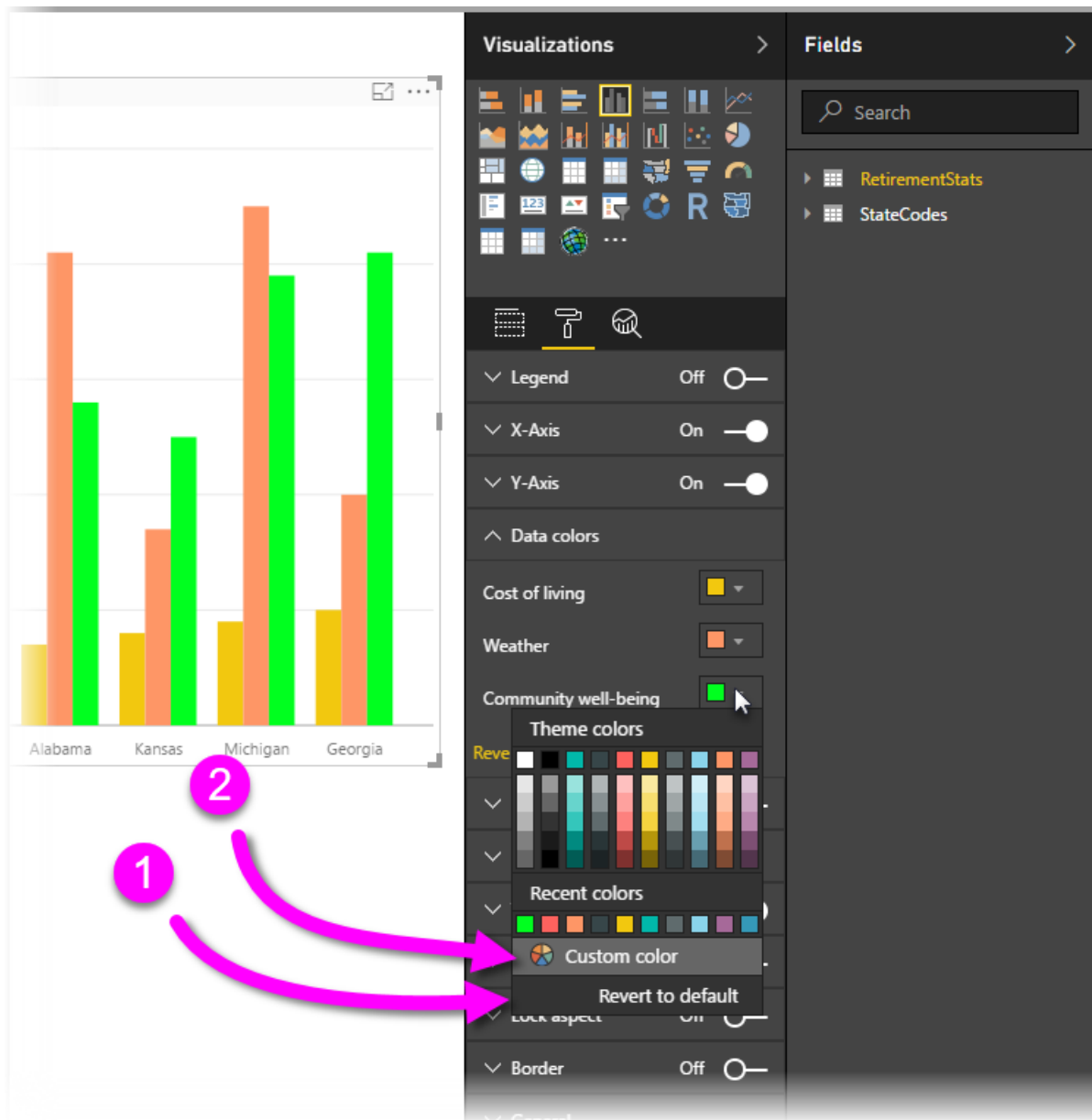


Let's make some changes. I can select the down arrow next to the color to make changes on each available data series. I'll make **Cost of living** yellow, **Weather** I'll turn orange, and **Community well-being** will be green. The following screen shows me at the last step, changing **Cost of living**.



The changes are shown in the image below. Wow, that's a bright chart. Here are a few useful elements to note about working with colors. The numbers in the following list are also shown on the following screen, indicating where these useful elements can be accessed or changed.

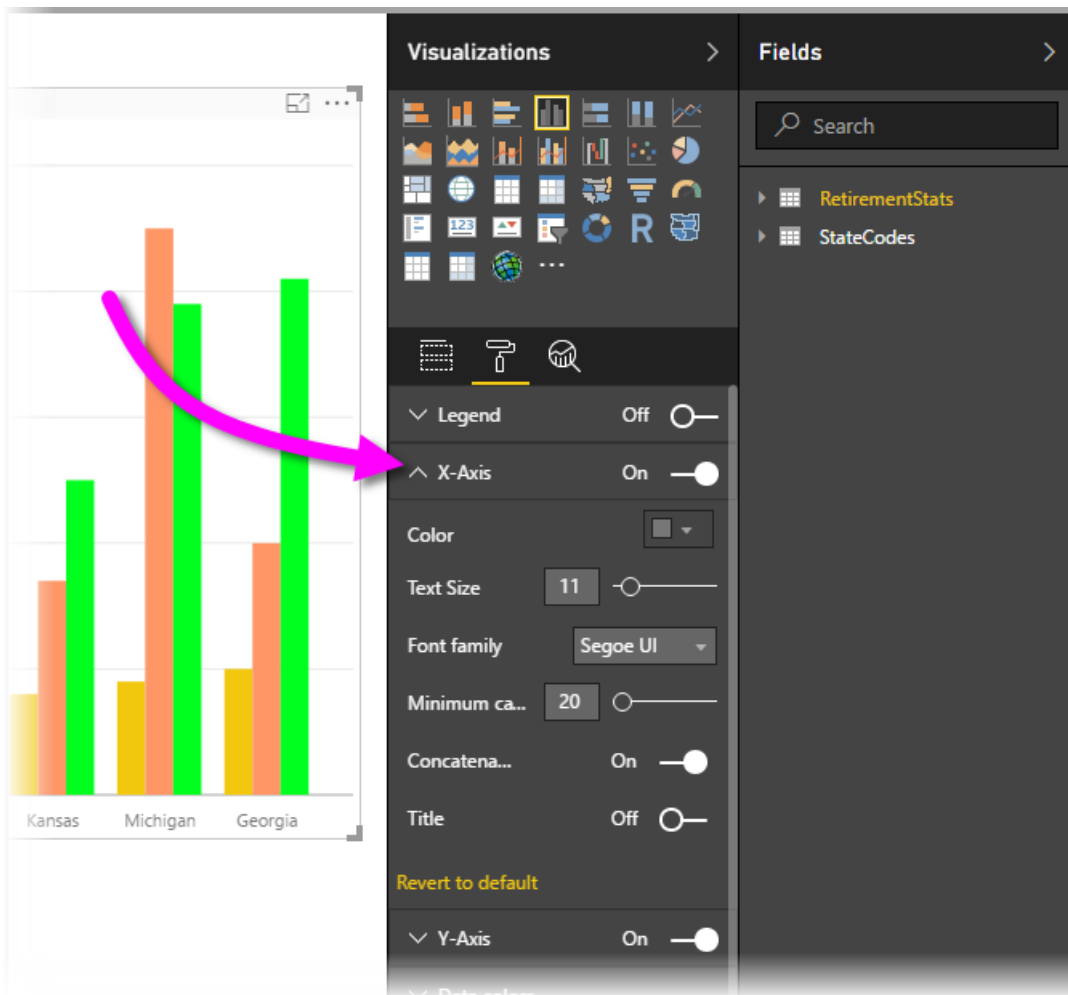
1. Don't like the colors? No problem, just select **Revert to default** and your selection reverts to the default settings. You can do that for one color, or for the entire visualization.
2. Want a color you don't see in the palette? Just select **Custom color**, and choose from the spectrum.



Not crazy about the change you just made? Use **CTRL+Z** to undo , just like you're used to doing.

Changing axis properties

It's often useful to modify the X-axis or the Y-axis. Similar to working with colors, you can modify an axis by selecting the down-arrow icon to the left of the axis you want to change, as shown in the following image.



If you want to collapse the **X-Axis** options, just select the up arrow icon beside **X-Axis**.

You can remove the X-axis labels entirely, by toggling the radio button beside **X-Axis**. You can also choose whether to turn axis titles on or off by selecting the radio button next to **Title**.

There are all sorts of colors to choose from, and many more customizations you can apply to your Power BI reports and dashboards.

NOTE

These color, axis, and related customizations available when the **Format** icon is selected are also available in Power BI Desktop.

Next step

For more information, see the following article:

- [Tips and tricks for color formatting in Power BI](#)

Tips and tricks for color formatting in Power BI

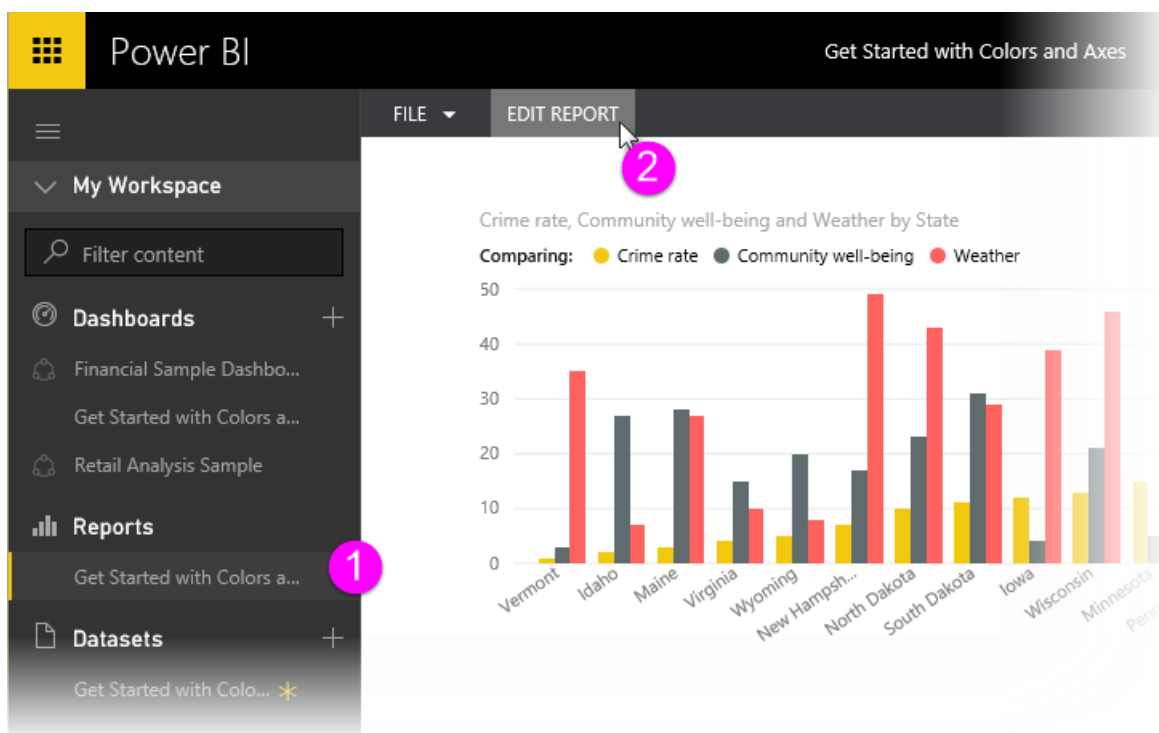
12/6/2017 • 5 min to read • [Edit Online](#)

Power BI provides many different ways to customize your dashboards and reports. This article details a collection of tips that can make your Power BI visualizations more compelling, interesting, and customized to your needs.

The following tips are provided. Have another great tip? Great! Send it our way and we'll see about adding it to this list.

- Change the color of a single data point
- Base the colors of a chart on a numeric value
- Base the color of data points on a field value
- Customize colors used in the color scale
- Use diverging color scales
- How to undo in Power BI

To make any changes, you must be editing a report: select your **Report** from the **My Workspace** pane, then select **Edit Report** from the top menu area, as shown in the following image.



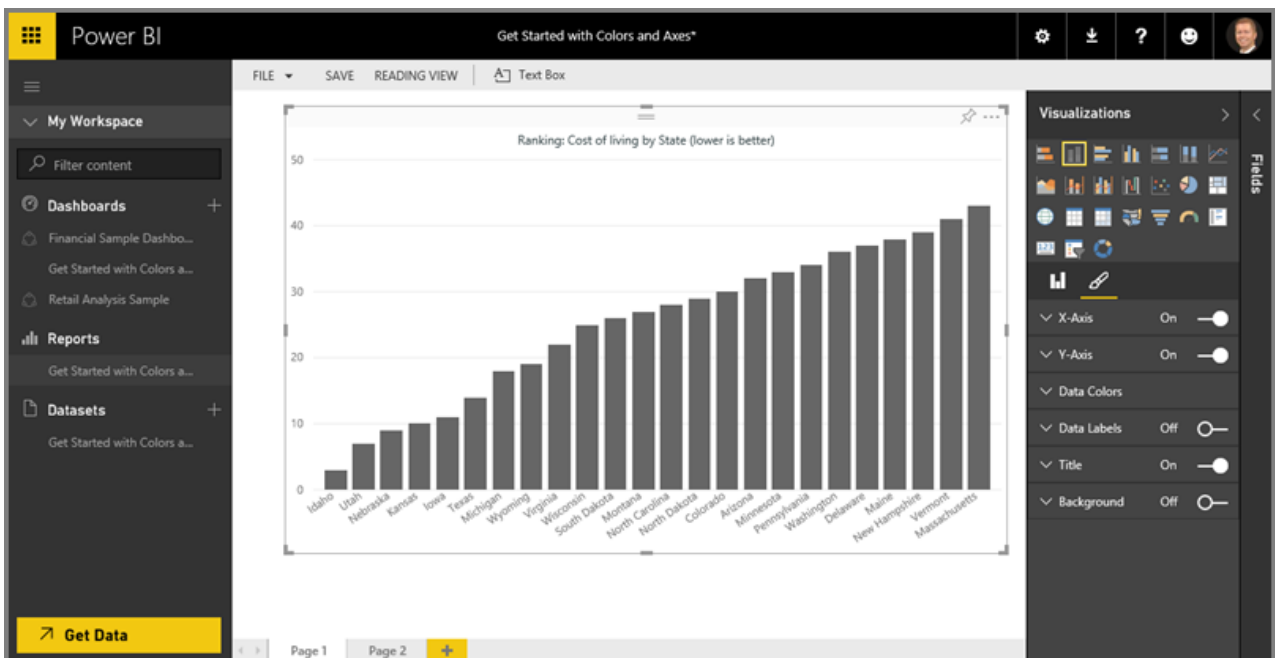
When the **Visualizations** pane appears along the right side of the **Report** canvas, you're ready to start customizing.



Change the color of a single data point

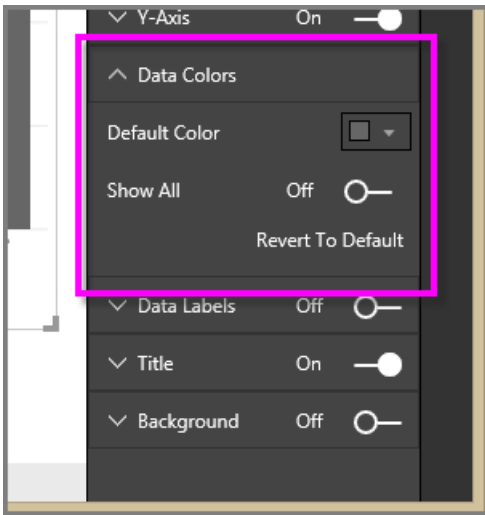
Sometimes you want to highlight one particular data point. Perhaps it's sales figures for the launch of a new product, or increased quality scores after launching a new program. With Power BI, you can highlight a particular data point by changing its color.

The following visualization ranks states in terms of cost of living.

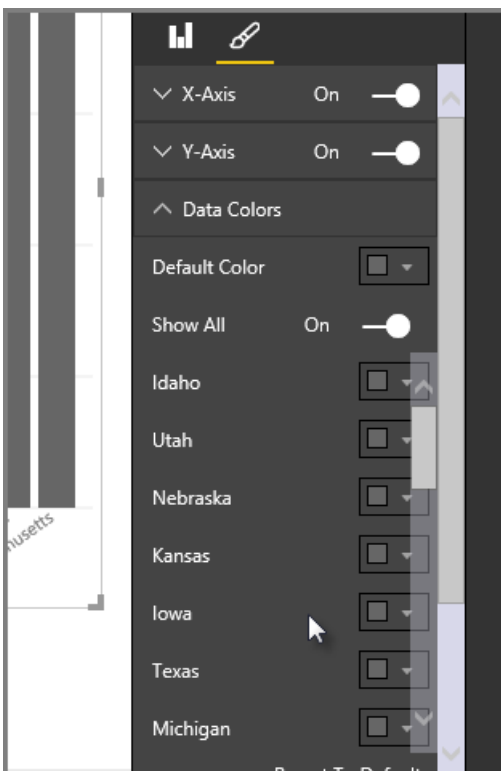


Now imagine you want to quickly show where Washington lands in that ranked list, by using color. Here are the steps:

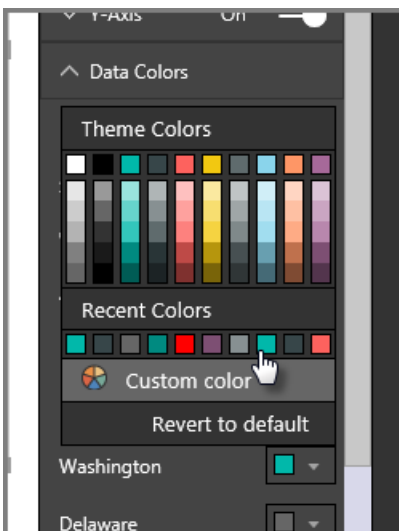
Expand the **Data Colors** section. The following appears.



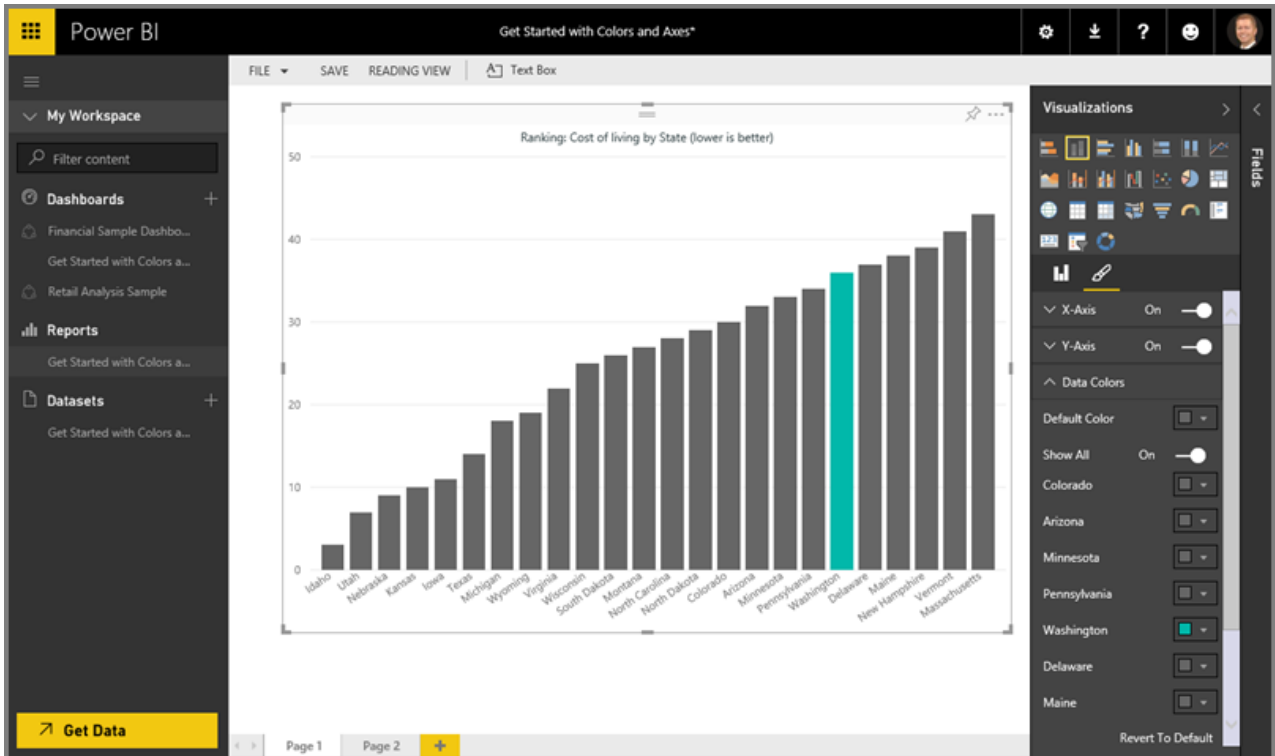
Set **Show All** to **On**. This displays the colors for each data element in the visualization. When you hover over the data points, scrolling is enabled so you can modify any of the data points.



In this case, let's change **Washington** to green. We scroll down to **Washington** and select the down arrow inside its color box, and the color selection window appears.

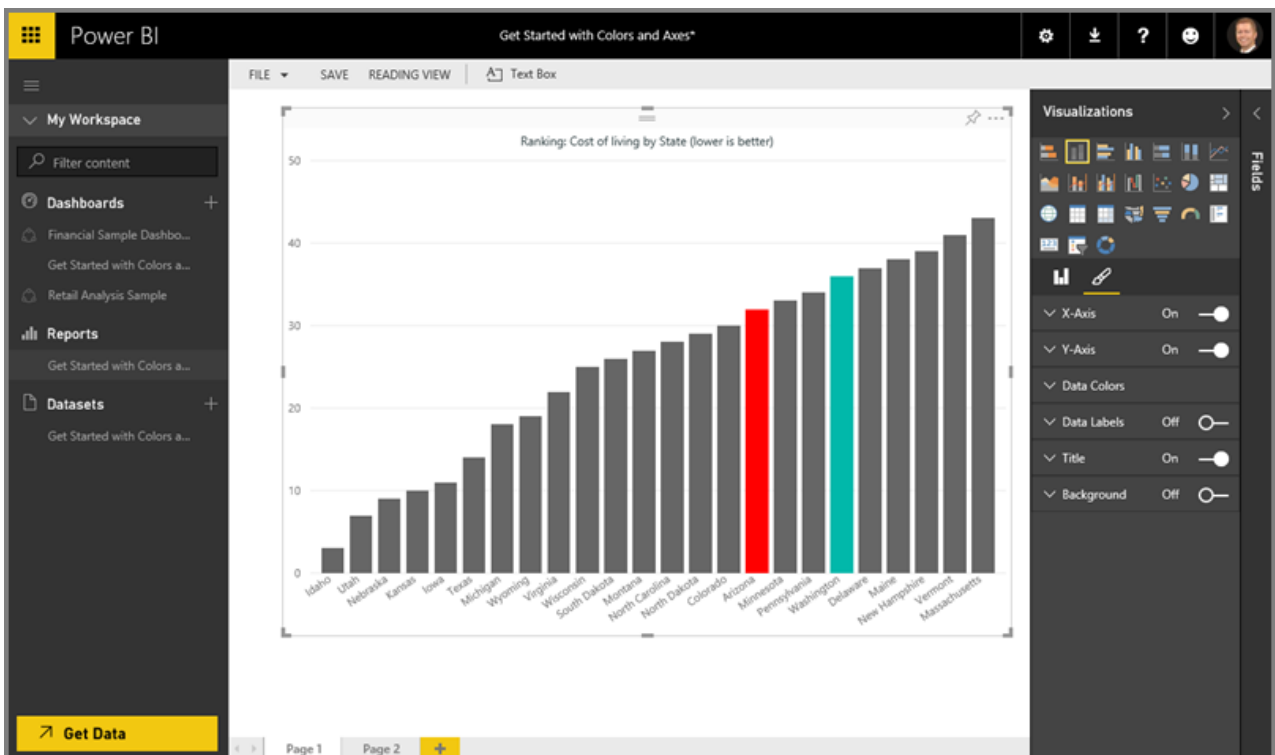


Once selected, the **Washington** data point is a nice shade of green, and certainly stands out.



Even if you change visualization types, then return, Power BI remembers your selection and keeps **Washington** green.

You can change the color of a data point for more than one data element, too. In the following image, **Arizona** is red, and **Washington** is still green.



There are all sorts of things you can do with colors. In the next section, we take a look at gradients.

Base the colors of a chart on a numeric value

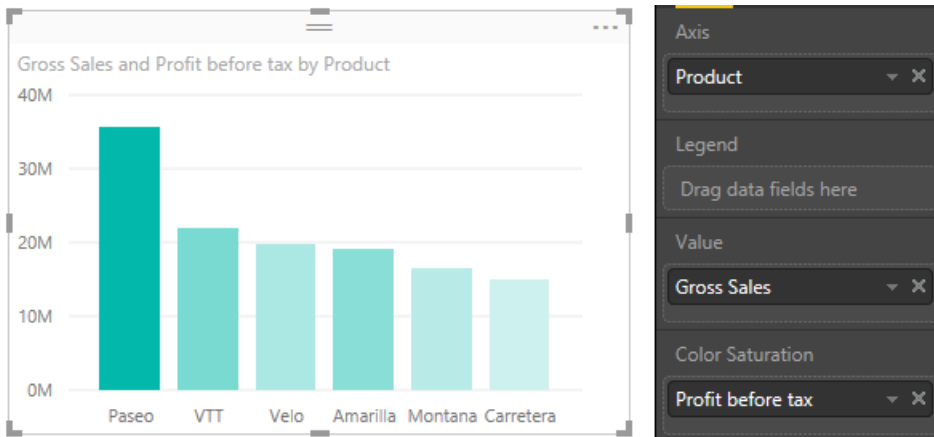
Charts often benefit from dynamically setting color based on the numeric value of a field. By doing this, you could show a different value than what's used to for the size of a bar, and show two values on a single graph. Or you can

use this to highlight data points over (or under) a certain value – perhaps highlighting areas of low profitability.

The following sections demonstrate different ways to base color on a numeric value.

Base the color of data points on a value

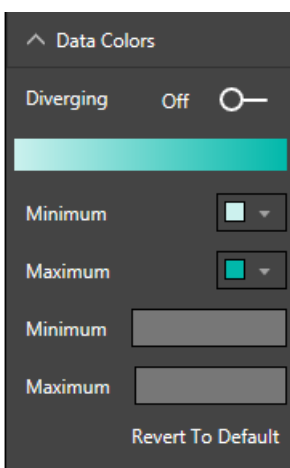
To change color based on a value, drag the field you want to base color on into the **Color Saturation** area in the **Field** pane. In the following image, **Profit before tax** has been dragged into **Color Saturation**. As can see that, although **Velo** has higher **Gross Sales** (its column is higher), **Amarilla** has a larger **Profit before tax** (its column has more color saturation).



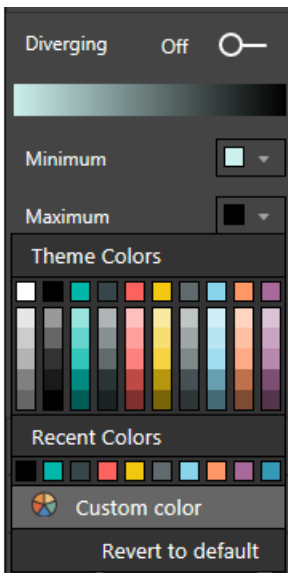
Customize the colors used in the color scale

You can customize colors used in the color scale, too. Expand **Data Colors** and you see a gradient of colors used for visualizing your data. By default, the lowest value in your data is mapped to the least saturated color, and the highest value to the most saturated color.

The color range is shown in a gradient bar that displays the spectrum between **Minimum** and **Maximum** color values, with the **Minimum** value color on the left, and **Maximum** value color to the right.

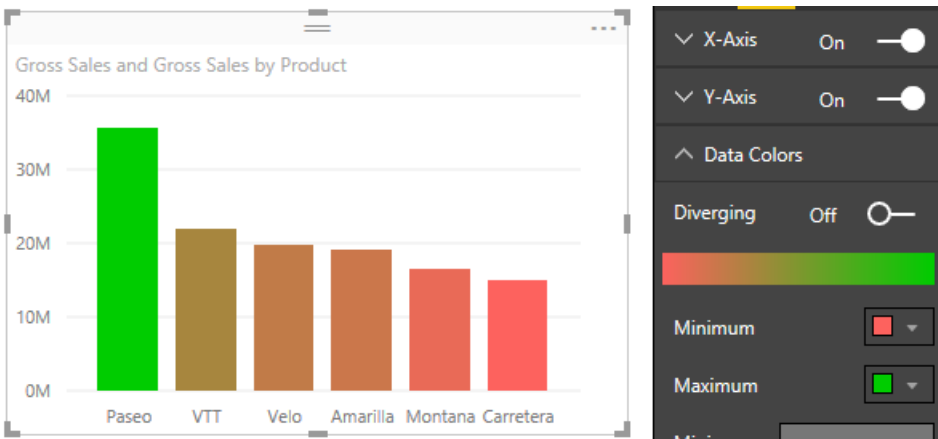


To change the scale to use a different range of colors, select the color drop-down beside **Minimum** or **Maximum**, and select a color. The following image shows the **Maximum** color changed to black, and the gradient bar shows the new color spectrum between **Minimum** and **Maximum**.



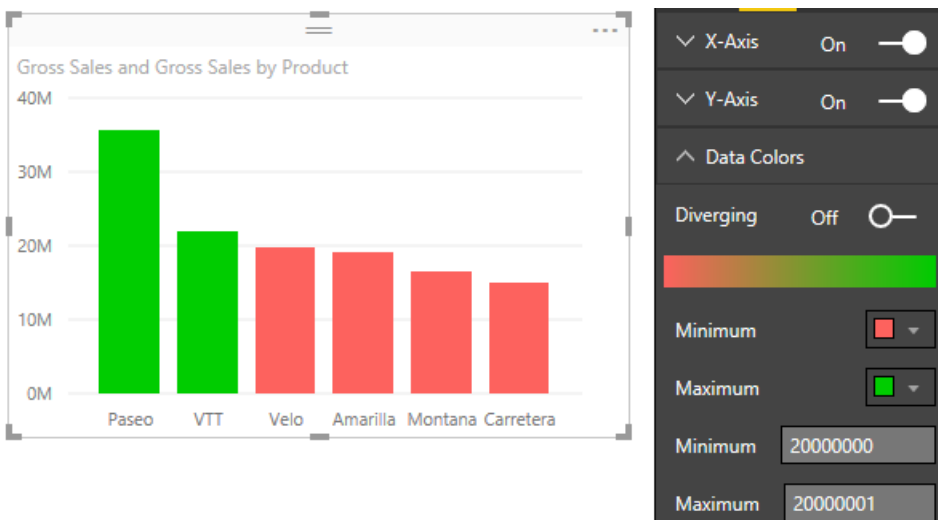
You can also change the way the values map to these colors. In the following image, the colors for **Minimum** and **Maximum** are set to orange and green, respectively.

In this first image, notice how the bars in the chart reflect the gradient shown in the bar; the highest value is green, the lowest is orange, and each bar between is colored with a shade of the spectrum between green and orange.



Now, let's see what happens if we provide numeric values in the **Minimum** and **Maximum** value boxes, which are below the **Minimum** and **Maximum** color selectors (shown in the following image). Let's set **Minimum** to 20,000,000, and set **Maximum** to 20,000,001.

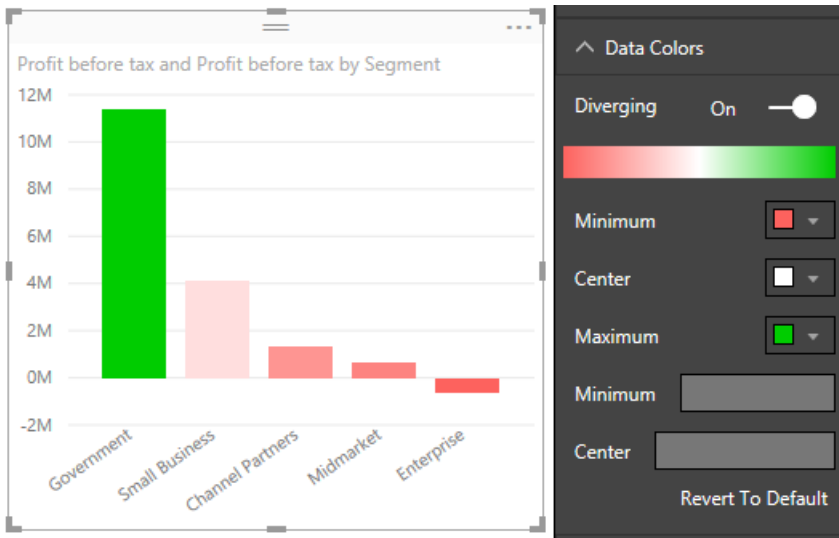
By setting those values, gradient is no longer applied to values on the chart that are below **Minimum** or above **Maximum**; any bar with a value over **Maximum** value is colored green, and any bar with a value under **Minimum** value is colored red.



Use Diverging color scales

Sometimes your data may have a naturally diverging scale. For example, a temperate range has a natural center at freezing point, and a profitability score has a natural mid-point (zero).

To use diverging color scales, slide the **Diverging** slider to **On**. When **Diverging** is turned on, an additional color selector and value box, both called **Center**, appear, as shown in the following image.



When the **Diverging** slider is on, you can set the colors for **Minimum**, **Maximum** and **Center** separately. In the following image, **Center** is set to one, so bars with values above one are a gradient shade of green, and bars below one are shades of red.

How to undo in Power BI

Like many other Microsoft services and software, Power BI provides an easy way to undo your last command. For example, let's say you change the color of a data point, or a series of data points, and you don't like the color when it appears in the visualization. You don't recall exactly which color it was before, but you know you want that color back!

To **undo** your last action, or the last few actions, all you have to do is:

- Type CTRL+Z

Feedback

Do you have a tip you'd like to share? Please send it our way, and we'll see about including it here.

NOTE

These color, axis, and related customizations, available when the **Format** icon is selected, are also available in Power BI Desktop.

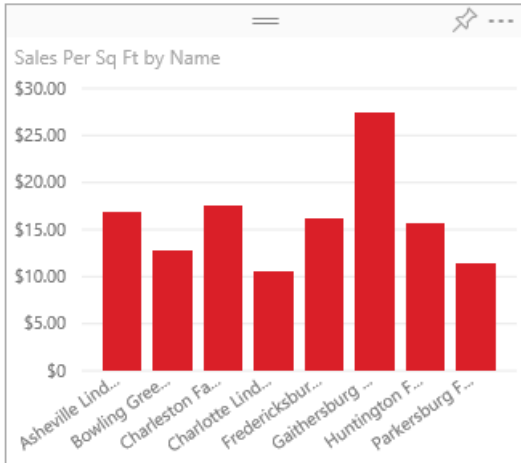
Next steps

[Getting started with color formatting and axis properties](#)


Change how a chart is sorted in a Power BI report

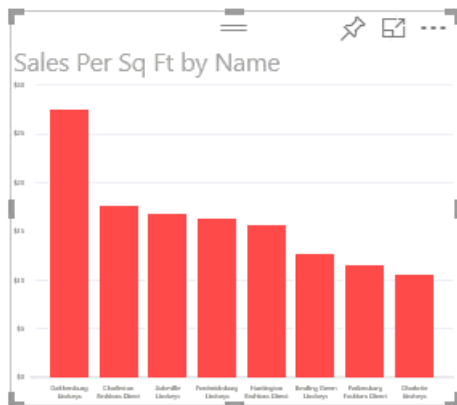
1/23/2018 • 1 min to read • [Edit Online](#)

In a Power BI report, you can sort most visualizations alphabetically by the names of the categories in the chart, or by the numeric values of each category. For example, this chart is sorted by store name.



It's easy to change the sort from a category (store name) to a value (sales per square feet) instead.

1. Select the ellipses (...) and choose **Sort by Sales Per Sq Ft**.
2. If necessary, select the sort icon  to change to **Descending**.



NOTE: Not all visuals can be sorted. For example, the following visuals cannot be sorted: Treemap, Map, Filled Map, Scatter, Gauge, Card, Multi Row Card, Waterfall.

Sorting using other criteria

Sometimes, you want to sort your visual using a different field or other criteria. For example, you might want to sort by month (and not in alphabetical order) or you might want to sort by entire numbers instead of by digit (example, 0, 1, 9, 20 and not 0, 1, 20, 9).

In some cases, you may be able to sort the visual the way you'd like, for example, by month. But if not, it may be because the dataset behind the report needs some tweaking. Here are several solutions:

- In Power BI Desktop, [use the Data Tools Modeling tab to sort by a different column](#).
- In Excel, if you own the dataset, add a new column that concatenates the month name and number. Then

refresh or re-import the dataset to see the new column in the Fields area.

- In Excel, ensure that your numerical columns are tagged as "whole number" or "decimal" and not as "text."

Next steps

More about [Visualizations in Power BI reports](#).

[Power BI - Basic Concepts](#)

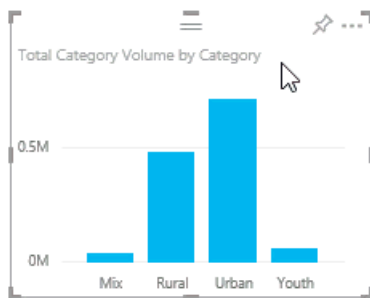
More questions? [Try the Power BI Community](#)

Copy and paste a visualization in Power BI service and Power BI Desktop

12/20/2017 • 1 min to read • [Edit Online](#)

Copying and pasting a visualization requires edit permissions to the report. In Power BI service, this means opening the report in [Editing View](#).

1. Open a report that has at least one visualization.
2. Select the visualization and use **Ctrl +C** to copy, and **Ctrl +V** to paste.



Next steps

More about [Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Move and resize a visualization in a report in Power BI service and Power BI Desktop

12/20/2017 • 1 min to read • [Edit Online](#)

Only report creators and owners can move and resize visualizations. In Power BI service (app.powerbi.com) this means opening the report in [Editing view](#).

Open the report

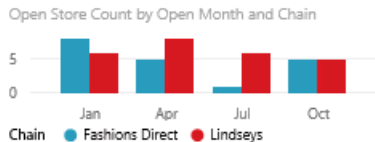
In Power BI, open a report that has at least one visualization, or [create a new visualization](#).

Move the visualization


- Select (left-click) any area of the visualization and drag to the new location.

Resize the visualization

- Select the visualization to display the border and click and drag the dark frame handles to resize.



Select Focus mode to see more detail.

- Hover over the visualization and select the Focus mode icon. 

Next steps

[Resize a visualization on a dashboard](#)

[Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Drill down in a visualization in Power BI

1/8/2018 • 4 min to read • [Edit Online](#)

Drill down requires a hierarchy

When a visual has a hierarchy, you can drill down to reveal additional details. For example, you might have a visualization that looks at Olympic medal count by a hierarchy made up of sport, discipline, and event. By default, the visualization would show medal count by sport -- gymnastics, skiing, aquatics, etc. But because it has a hierarchy, selecting one of the visual elements (such as a bar, line, or bubble), would display an increasingly more-detailed picture. Select the **aquatics** element to see data for swimming, diving, and water polo. Select the **diving** element to see details for springboard, platform, and synchronized diving events.

You can add hierarchies to reports you own but not to those shared with you. Not sure which Power BI visualizations contain a hierarchy? Hover over a visualization and if you see these drill controls in the top corners, your visualization has a hierarchy.



Dates are a unique type of hierarchy. When you add a date field to a visualization, Power BI automatically adds a time hierarchy that contains year, quarter, month, and day. For more information see [Visual hierarchies and drill-down behavior](#) or watch the video below.

NOTE

To learn how to create hierarchies using Power BI Desktop, watch the video [How to create and add hierarchies](#)

Two methods to drill down

There are two different ways to drill down (and up) in your visualization. Both are described in this article. Both methods accomplish the same thing, so use whichever one you enjoy most.

NOTE

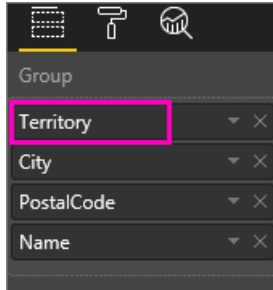
To follow along, [open the Retail Analysis sample](#) in Power BI service and create a treemap that looks at **Total Units This Year** (Values) by **Territory**, **City**, **PostalCode**, and **Name** (Group).

Method 1 for drill down

This method uses the drill icons that appear in the top corners of the visualization itself.

1. In Power BI, open a report in [Reading view](#) or [Editing view](#). Drill requires a visualization with a hierarchy.


A hierarchy is shown in the animation below. The visualization has a hierarchy made up of territory, city, postal code, and city name. Each territory has one or more cities, each city has one or more postal codes, etc. By default, the visualization displays only the territory data, because *Territory* appears first in the list.

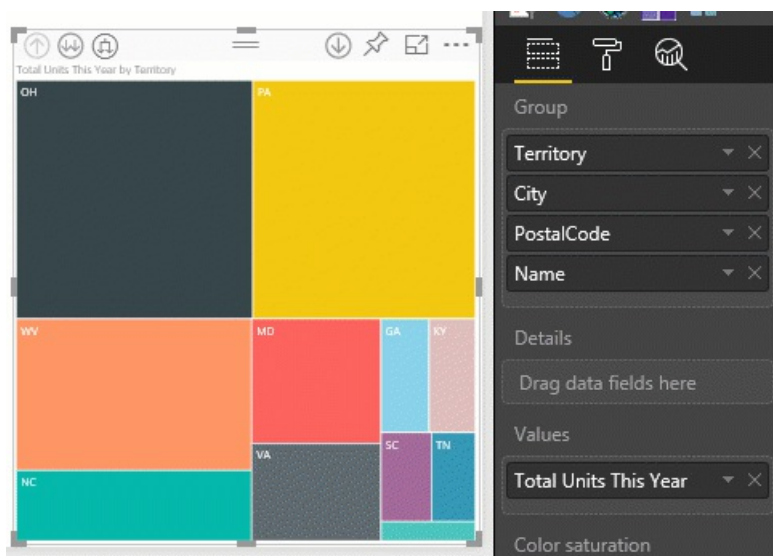


2. To enable drill down, select the arrow icon in the top right corner of the visualization. When the icon is dark, drill is enabled. If you don't turn on drill, selecting a visual element (such as a bar or bubble) will cross-filter the other charts on the report page.



3. To drill down **one field at a time**, click one of the elements in your visualization, in a bar chart this means clicking one of the bars and in a treemap, this means clicking one of the *leaves*. Notice that the title changes as you drill down and back up again. In this animation it changes from "Total Units This Year by Territory" to "Total Units This Year by Territory and City" to "Total Units This Year by Territory, City and PostalCode" to "Total Units This Year by Territory, City, PostalCode, and Name". And to drill back up, select the **Drill Up**

icon  in the top left corner of the visualization as shown below.



4. To drill down **all fields at once**, select the double arrow in the top left corner of the visualization.



5. To drill back up, select the up arrow in the top left corner of the visualization.

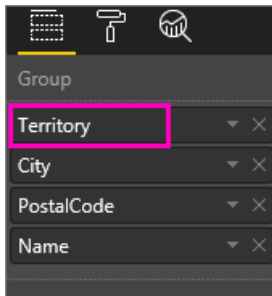


Method 2 for drill down

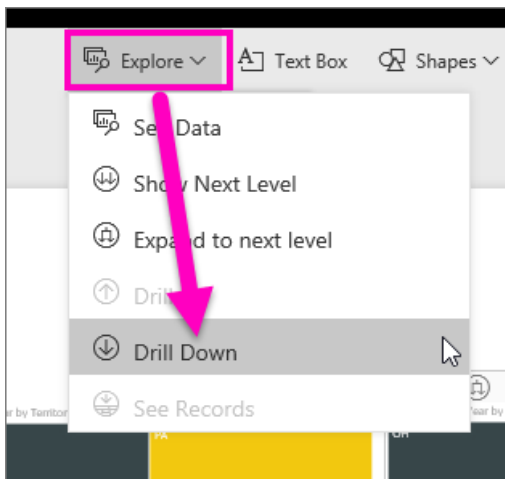
This method uses the **Explore** dropdown from the top Power BI menubar.

1. In Power BI, open a report in [Reading view](#) or [Editing view](#). Drill requires a visualization with a hierarchy.

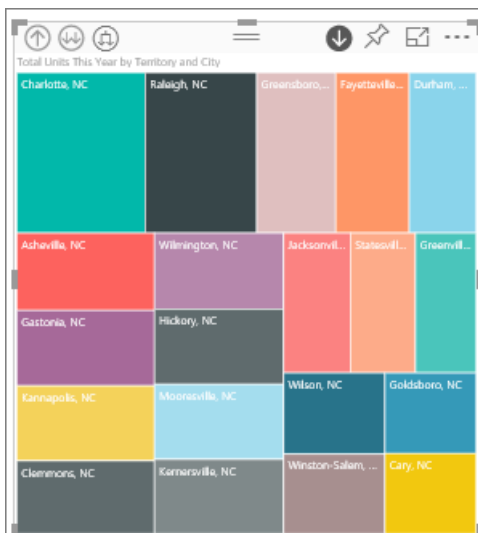
A hierarchy is shown in the image below. The visualization has a hierarchy made up of territory, city, postal code, and city name. Each territory has one or more cities, each city has one or more postal codes, etc. By default, the visualization displays only the territory data, because *Territory* appears first in the list.



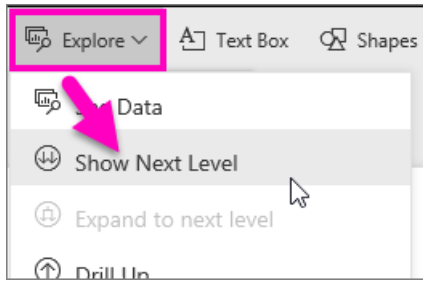
2. To enable drill down, select a visualization to make it active and from the Power BI top menubar select **Explore > Drill Down**. The drill-down icon in the top right corner of the visualization changes to a black background.



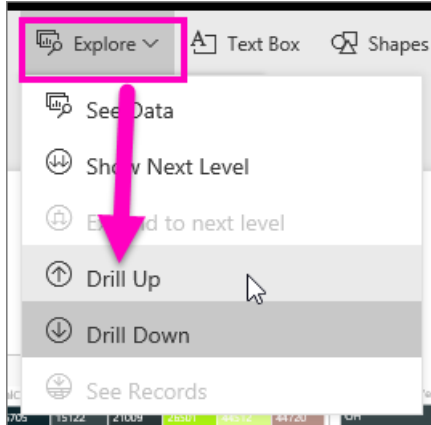
3. Once enabled, drill down one field at a time by selecting one of the treemap leaves. In this example, I've selected the territory named **NC** to see total units sold this year in North Carolina by city.



4. To drill down all fields at once, select **Explore > Show Next Level**.



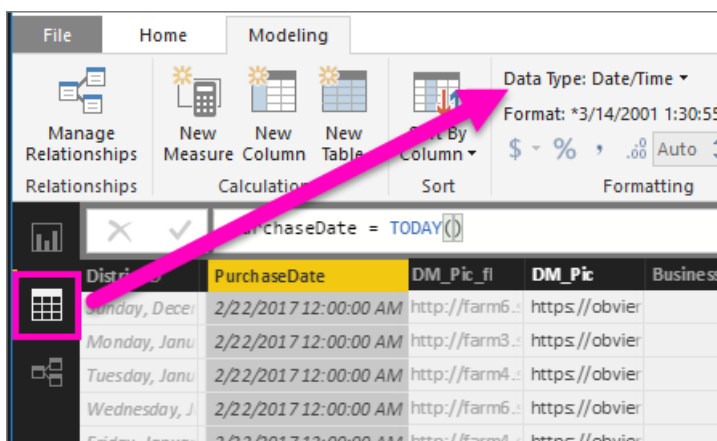
5. To drill back up, select **Explore > Drill Up**.



6. To see the data being used to create the visual, select **See data**. The data is displayed in a pane below the visual. This pane remains as you continue drilling through the visual. For more information, see [Show data used to create the visual](#).

Considerations and limitations

- If adding a date field to a visualization does not create a hierarchy, it may be that the "date" field is not actually saved as a date. If you own the dataset, open it in *Data* view in Power BI Desktop, select the column that contains the date, and in the Modeling tab change the **Data Type** to **Date** or **Date/Time**. If the report has been shared with you, contact the owner to request the change.



Next steps

[Visualizations in Power BI reports](#)

[Power BI reports](#)

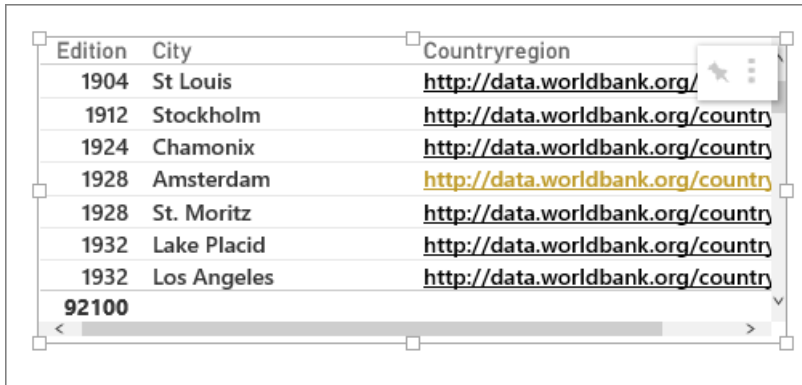
[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Hyperlinks in tables

1/24/2018 • 2 min to read • [Edit Online](#)

This topic teaches you how to use Power BI Desktop to create hyperlinks. Then, once created, use either Desktop or Power BI service to add those hyperlinks to your report tables and matrixes.



The screenshot shows a table with three columns: Edition, City, and Countryregion. The Countryregion column contains hyperlinks to data.worldbank.org for various cities. A context menu is visible over the first hyperlink, showing options like 'Add to Favorites' and 'Copy Link Address'.

Edition	City	Countryregion
1904	St Louis	http://data.worldbank.org/
1912	Stockholm	http://data.worldbank.org/country
1924	Chamonix	http://data.worldbank.org/country
1928	Amsterdam	http://data.worldbank.org/country
1928	St. Moritz	http://data.worldbank.org/country
1932	Lake Placid	http://data.worldbank.org/country
1932	Los Angeles	http://data.worldbank.org/country
92100		

NOTE: Hyperlinks in [tiles on dashboards](#) and [text boxes on dashboards](#) can be created on-the-fly using Power BI service. Hyperlinks in [text boxes in reports](#) can be created on-the-fly using Power BI service and Power BI Desktop.

To create a hyperlink in a table or matrix using Power BI Desktop

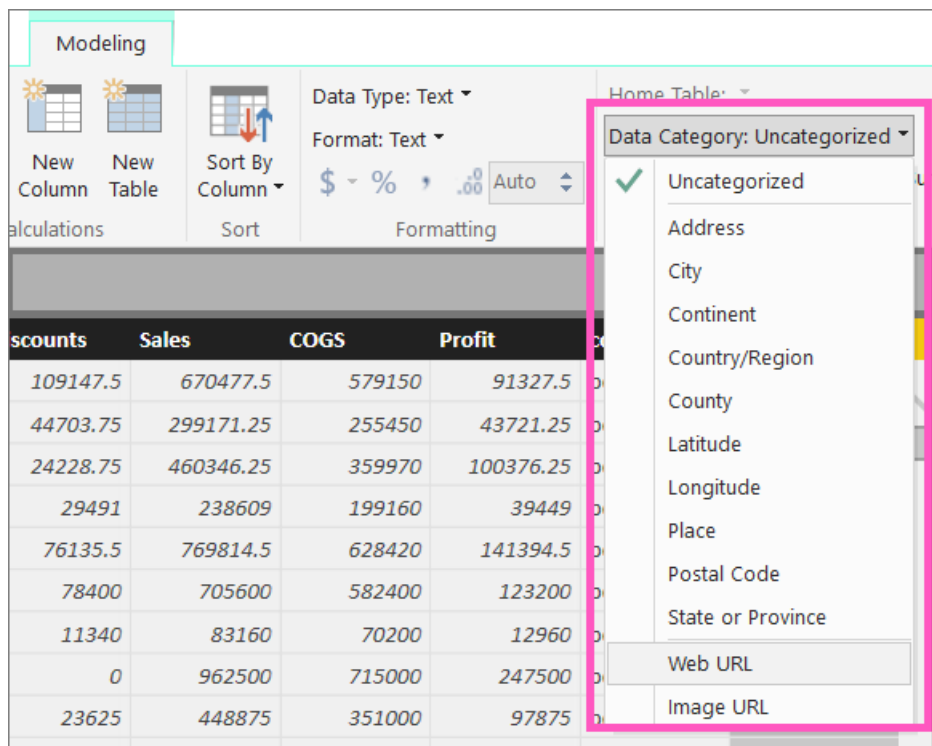
Hyperlinks in tables and matrixes can be created in Power BI Desktop, but not from Power BI Service. Hyperlinks can also be created in Excel Power Pivot before the workbook is imported into Power BI. Both methods are described below.

Create a table or matrix hyperlink in Power BI Desktop

The procedure for adding a hyperlink depends on whether you've imported the data or connected to it using DirectQuery. Both scenarios are described below.


For data imported into Power BI


1. If the hyperlink doesn't already exist as a field in your dataset, use Desktop to add it as a [custom column](#).
2. In Data view, select the column and in the **Modeling** tab choose the dropdown for **Data Category**.



3. Select **Web URL**.
4. Switch to Report view and create a table or matrix using the field categorized as a Web URL. The hyperlinks will be blue and underlined.

District	URL	DM
FD - 01	http://www	Valery Ushakov
FD - 02	http://www	Tina Lassila
FD - 03	http://www	Carlos Grilo
FD - 04	http://www	Andrew Ma
LI - 01	http://www	Allan Guinot
LI - 02	http://www	Chris McGurk
LI - 03	http://www	Chris Gray
LI - 04	http://www	Brad Sutton
LI - 05	http://www	Annelie Zubar

5. If you don't want to display a long URL in a table, you can display a hyperlink icon  instead. Note that you can't display icons in matrices.

- Select the chart to make it active.
- Select the paint roller icon  to open the Formatting tab.
- Expand **Values**, locate **URL icon** and turn it to **On**.

6. (Optional) [Publish the report from Desktop to Power BI service](#) and open the report in Power BI service. The hyperlinks will work there as well.

For data connected with DirectQuery

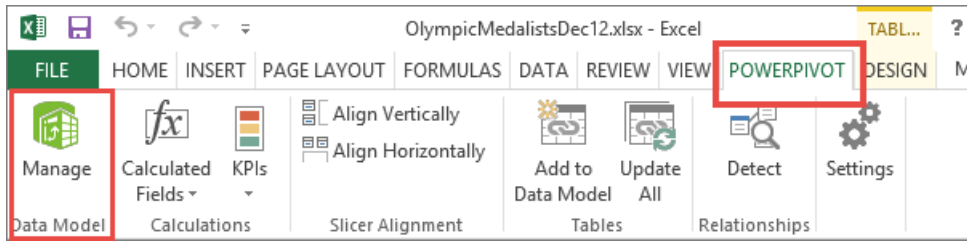
You won't be able to create a new column in DirectQuery mode. But if your data already contains URLs, you can turn those into hyperlinks.

1. In Report view, create a table using a field that contains URLs.
2. Select the column, and in the **Modeling** tab, choose the dropdown for **Data Category**.
3. Select **Web URL**. The hyperlinks will be blue and underlined.
4. (Optional) [Publish the report from Desktop to Power BI service](#) and open the report in Power BI service. The hyperlinks will work there as well.

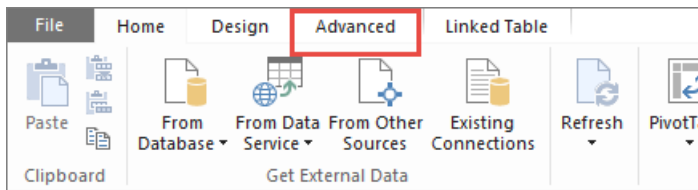
Create a table or matrix hyperlink in Excel Power Pivot

Another way to add hyperlinks to your Power BI tables and matrixes is to create the hyperlinks in the dataset before you import/connect to that dataset from Power BI. This example uses an Excel workbook.

1. Open the workbook in Excel.
2. Select the **PowerPivot** tab and then choose **Manage**.



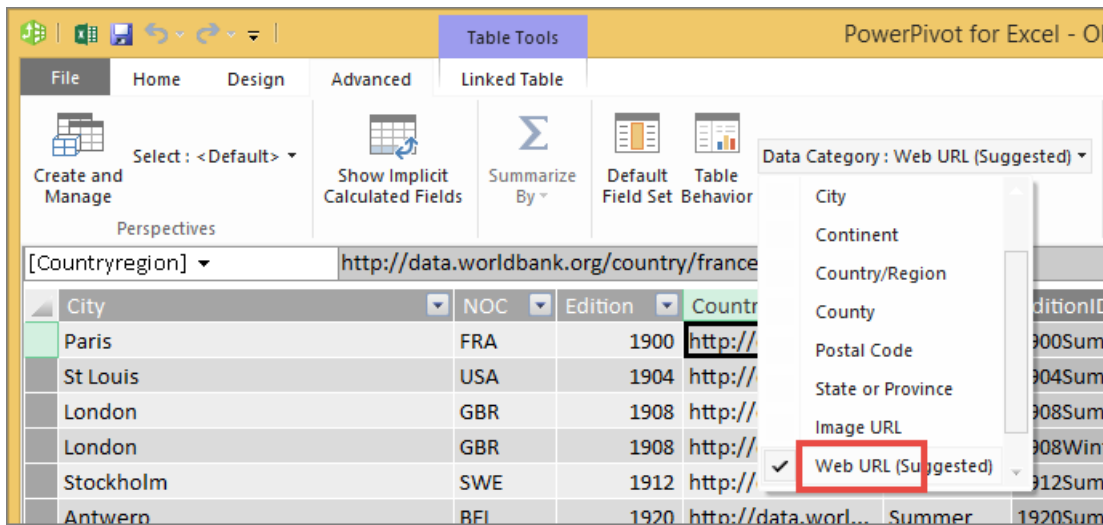
3. When PowerPivot opens, select the **Advanced** tab.



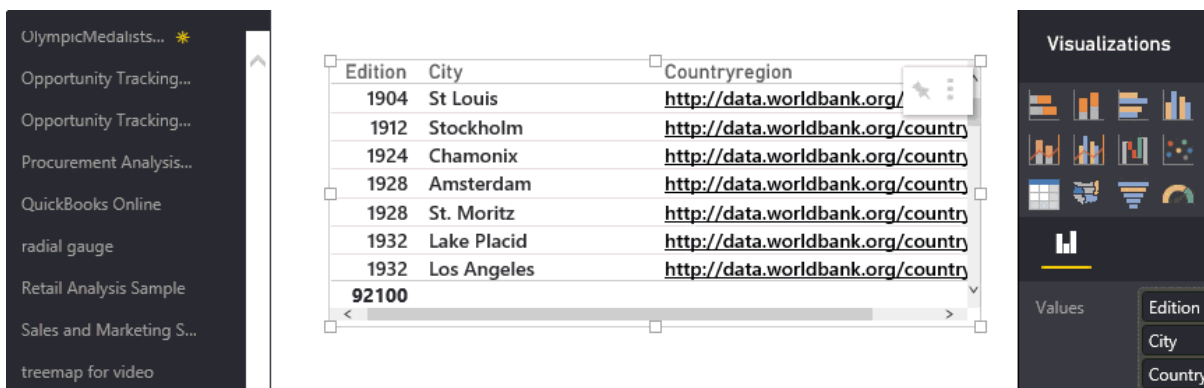
4. Place your cursor in the column that contains the URLs that you'd like to turn into hyperlinks in Power BI tables.

NOTE: The URLs must start with **http://** , **https://** or **www**.

5. In the **Reporting Properties** group, select the **Data Category** dropdown and choose **Web URL**.



6. From the Power BI service or Power BI Desktop, connect to or import this workbook.
7. Create a table visualization that includes the URL field.



Considerations and troubleshooting

Q: Can I use a custom URL as a hyperlink in a table or matrix?

A: No. You can use a link icon. If you need custom text for your hyperlinks and your list of URLs is short, consider using a text box instead.

Next steps

[Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Add a hyperlink to a text box in a report

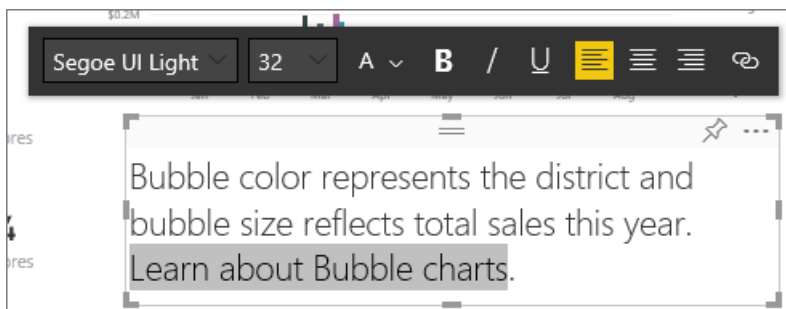
12/20/2017 • 1 min to read • [Edit Online](#)


Text boxes can be added to reports, pinned to dashboards from reports, and added directly to dashboards. Hyperlinks can be added to a text box no matter where it resides. **This topic covers text boxes in reports in Power BI service (not Power BI Desktop).**

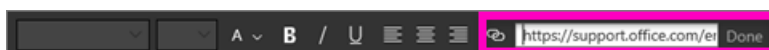
NOTE: For information on hyperlinks in Power BI tables and matrixes, see [Hyperlinks in tables](#). For information on adding text boxes to your **dashboard**, see [Add a tile directly from the dashboard](#).

To add a hyperlink to a text box in a report

1. [Create a text box and add some text.](#)
2. Highlight existing text, or add new text to use as a hyperlink.



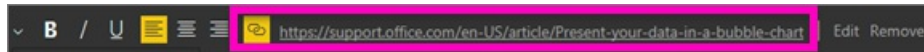
3. Select the hyperlink icon .
4. Type or paste the URL in the hyperlink field, and select **Done**.



5. Test the link.



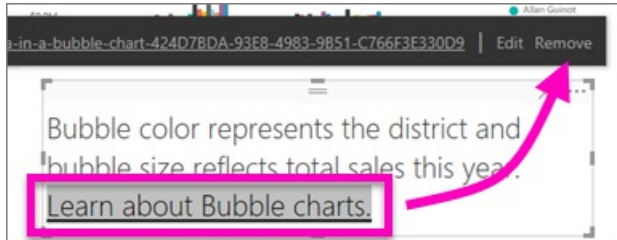
- Place your cursor anywhere in the highlighted text to display the URL.



- Select the URL to open the page in a new browser window.

To remove the hyperlink but leave the text

1. In the text box, select the hyperlink to highlight it,



2. Choose **Remove**.

Next steps

[Text boxes in Power BI reports](#)

[Add a text box to a dashboard](#)

More questions? [Try the Power BI Community](#)

Histograms

12/6/2017 • 3 min to read • [Edit Online](#)

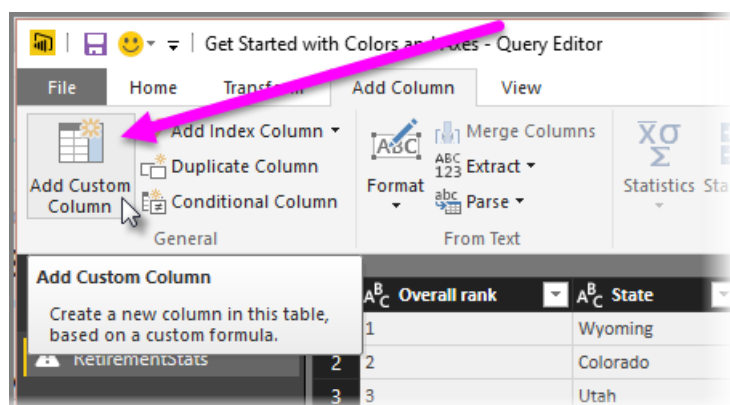
There are several ways to build histograms in Power BI. We'll start with the simplest and go from there.

Simple Histograms

To get started, determine which query has the field you want to build a histogram on. Use the *Reference* option for the query to create a new query and name it *FieldName Histogram*. Use the **Group by** option in the **Transform** ribbon and select the **count rows** aggregate. Ensure the data type is a number for the resulting aggregate column. Then you can visualize this data on the reports page. This approach is fast and easy to build, but doesn't work well if you have many data points and does not allow brushing across visuals.

Defining buckets to build a histogram

Determine which query has the field you want to build a histogram on. Use the *Reference* option for the query to create a new query and name it *FieldName*. Now define the buckets with a rule. Use the **Add Custom Column** option on the **Add Column** ribbon and build a custom rule.



Ensure the data type is a number for the resulting aggregate column. Now you can use the group by technique described in **Simple Histograms** (earlier in this article) to achieve the histogram. This option handles more data points but still does not help with brushing.

Defining a histogram that supports brushing

Brushing is when visuals are linked together so that when a user selects a data point in one visual other visuals on the report page highlight or filter data points related to the selected data point. Since we're manipulating data at query time, we will need to create a relationship between tables and ensure we know which detail item relates to the bucket in the histogram and vice-versa.

Start the process by using the *Reference* option on the query that has the field you want to build a histogram on. Name the new query *Buckets*. For this example let's call the original query *Details*. Next remove all columns except the column you'll use as the bucket for the histogram. Now use the *Remove Duplicates* feature in query, it's on the right click menu when you select the column, so the remaining values are the unique values in the column. If you have decimal numbers you can first use the tip for defining buckets to build a histogram to get a manageable set of buckets. Now, check the data shown in the query preview. If you see blank values or null you'll need to fix those up before creating a relationship. See "Creating a relationship if my data has null or blank values". Using this approach can be problematic due to the need to sort. To get the buckets to sort correctly, see "Sorting order: make categories appear in the order I want".

NOTE

It's useful to think about the sort order before building any visuals.

Next step in the process is to define a relationship between the *Buckets* and *Details* queries on the buckets column. In *Power BI Desktop*, select *Manage Relationships* in the ribbon. Create a relationship where *Buckets* is in the left table and *Details* in on the right table, and select the field you're using for the histogram.

Last step is to create the histogram. Drag the Bucket field from the *Buckets* table. Remove the default field from the resulting column chart. Now from the *Details* table drag the histogram field into the same visual. In the field well, change the default aggregate to Count. The result is the histogram. If you create another visual like a treemap from the *Details* table, select a data point in treemap to see the histogram highlight and show the histogram for the selected data point relative to the trend for the entire data set.

Tips and Tricks for Power BI Map visualizations

1/23/2018 • 6 min to read • [Edit Online](#)

Power BI integrates with Bing Maps to provide default map coordinates (a process called geo-coding) so you can create maps. Together they use algorithms to identify the correct location, but sometimes it's a best guess. If Power BI tries can't create the map visualization on its own, it enlists the help of Bing Maps.

You, or your administrator, may need to update your firewall to allow access to the URLs Bing uses for geocoding. Those URLs are:

- <https://dev.virtualearth.net/REST/V1/Locations>
- <https://platform.bing.com/geo/spatial/v1/public/Geodata>
- <https://www.bing.com/api/maps/mapcontrol>

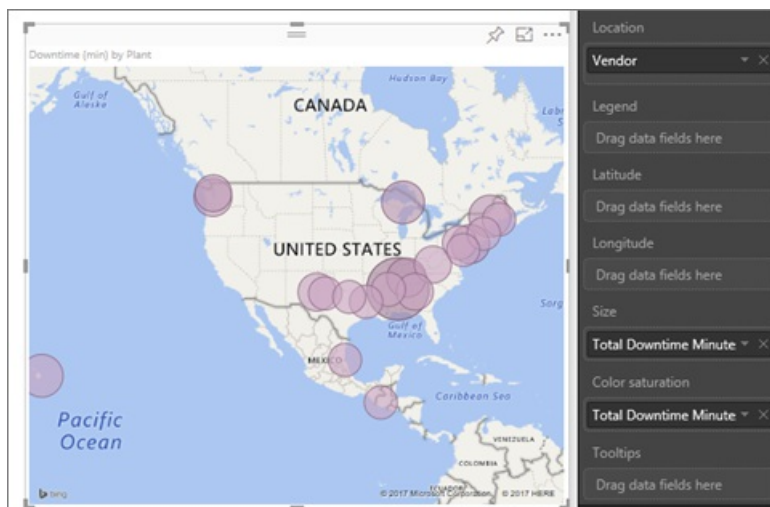
To increase the likelihood of correct geo-coding, use the following tips. The first set of tips is for you to use if you have access to the dataset itself. The second set of tips is things you can do in Power BI if you don't have access to the dataset. And the final set is a list of URLs

What is sent to Bing Maps?

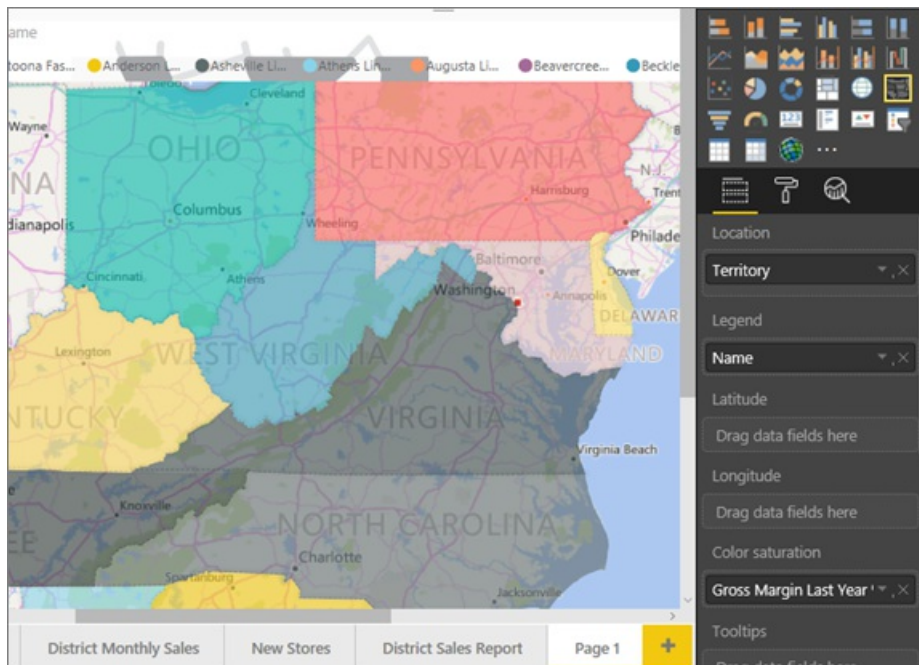
Power BI service and Power BI Desktop send Bing the geo data it needs to create the map visualization. This may include the data in the **Location**, **Latitude**, and **Longitude** buckets and geo fields in any of the **Report level**, **Page level**, or **Visual level** filter buckets. Exactly what is sent varies by map type. To learn more, see [Bing Maps privacy](#).

- For maps (bubble maps), if latitude and longitude are provided then no data is sent to Bing. Otherwise, any data in the Location (and filter) buckets is sent to Bing.
- Filled maps require a field in the Location bucket; even if latitude and longitude are provided. Whatever data is in the Location, Latitude, or Longitude buckets is sent to Bing.

In the example below, the field **Vendor** is being used for geo-coding, so all vendor data is sent to Bing. Data from the **Size** and **Color saturation** buckets is not sent to Bing.



In this second example below, the field **Territory** is being used for geo-coding, so all territory data is sent to Bing. Data from the **Legend** and **Color saturation** buckets is not sent to Bing.



In the dataset: tips to improve the underlying dataset

If you have access to the dataset that is being used to create the map visualization, there are a few things you can do to increase the likelihood of correct geo-coding.

1. Categorize geographic fields in Power BI Desktop

In Power BI Desktop, you can ensure fields are correctly geo-coded by setting the *Data Category* on the data fields. Select the desired table, go to the **Advanced** ribbon and then set the **Data Category** to **Address**, **City**, **Continent**, **Country/Region**, **County**, **Postal Code**, **State** or **Province**. These data categories help Bing correctly encode the data. To learn more, see [Data categorization in Power BI Desktop](#). If you are live connecting to SQL Server Analysis Services, you will need to set the data categorization outside of Power BI using [SQL Server Data Tools \(SSDT\)](#).

2. Use more than one location column.

Sometimes, even setting the data categories for mapping isn't enough for Bing to correctly guess your intent. Some designations are ambiguous because the location exists in multiple countries or regions. For example, there's a **Southampton** in England, Pennsylvania, and New York.

Power BI uses Bing's [unstructured URL template service](#) to get the latitude and longitude coordinates based on a set of address values for any country. If your data doesn't contain enough location data, add those columns and categorize them appropriately.

For example, if you only have a City column, Bing may have a hard time geo-coding. Add additional geo columns to make the location unambiguous. Sometimes all it takes is adding one more location column to the dataset - in this case state/province. And don't forget to categorize it properly, see #1 above.

Make sure when each field only has the specific information tied to the categorization. For example, your City location field should be **Southampton**, not **Southampton, New York**. And Address location fields should be **1 Microsoft Way** and not **1 Microsoft Way, Redmond, WA**.

3. Use specific Latitude and Longitude

Add latitude and longitude values to your dataset. This removes any ambiguity and returns results more quickly. Latitude and Longitude fields must be in *Decimal Number* format, which you can set in the data model.

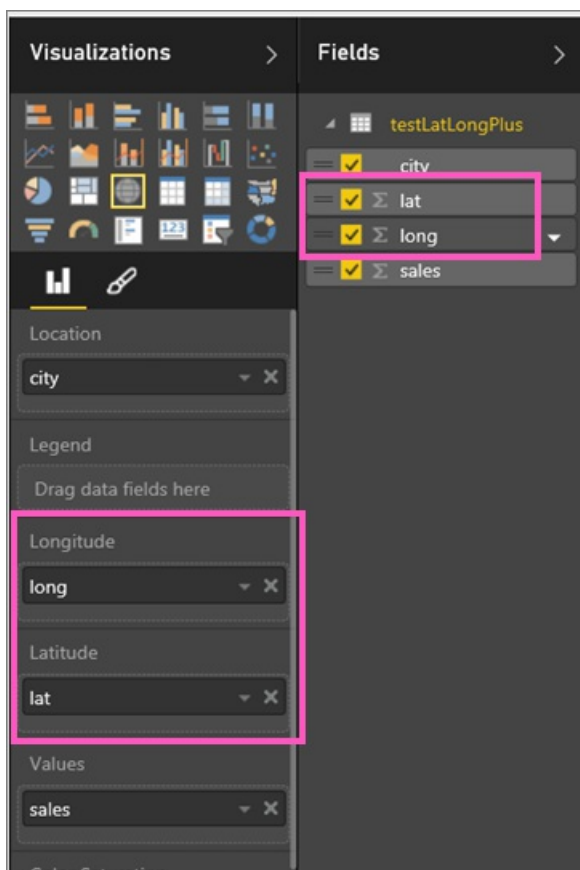
4. Use Place category for columns with full location information

While we encourage you to use geo-hierarchies in your maps, if you must use a single location column with full geographical information, you can set the data categorization to **Place**. For example, if the data in your column is full addresses, such as 1 Microsoft Way, Redmond Washington 98052, this generalized data category will work best with Bing.

In Power BI: tips to get better results when using map visualizations

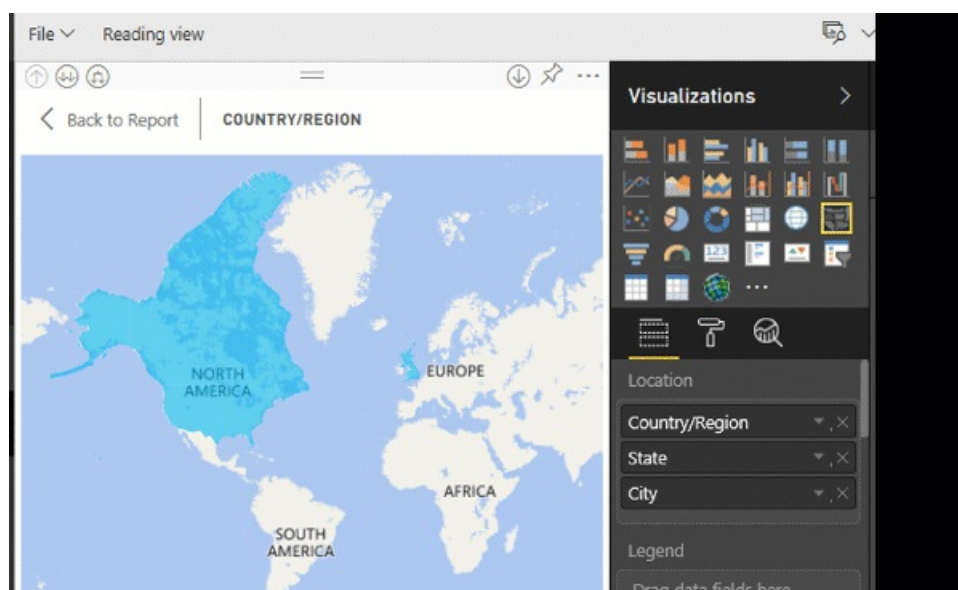
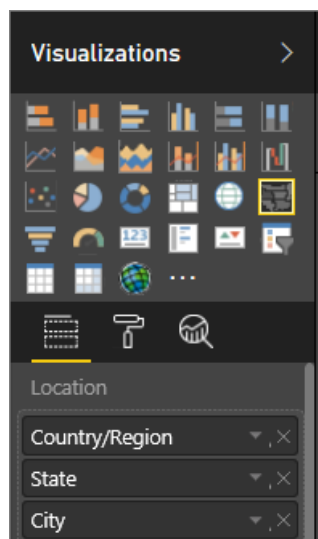
1. Use latitude and longitude fields (if they exist)

In Power BI, if the dataset you are using has fields for longitude and latitude -- use them! Power BI has special buckets to help make the map data unambiguous. Just drag the field that contains your latitude data into the **Visualizations > Latitude** area. And do the same for your longitude data. When you do this, you also need to fill the *Location* field when creating your visualizations. Otherwise, the data is aggregated by default, so for example, the latitude and longitude would be paired at the state level, not the city level.






Use geo-hierarchies so you can drill down to different "levels" of location

When your dataset already has different levels of location data, you and your colleagues can use Power BI to create *geo-hierarchies*. To do this, drag more than one field into the **Location** bucket. Used together in this way, the fields become a geo-hierarchy. In the example below we have added geo fields for: Country/Region, State, and City. In Power BI you and your colleagues can drill up and down using this geo-hierarchy.



When drilling with geo-hierarchies, it is important to know how each drill button works and what gets sent to Bing Maps.

- The drill button on the far right, called Drill Mode , allows you to select a map Location and drill down into that specific location one level at a time. For example, if you turn Drill Down on and click North America, you move down in the hierarchy to the next level -- states in North America. For geo-coding, Power BI sends Bing Maps country and state data for North America only.
- On the left there are 2 other drill options. The first option, , drills to the next level of the hierarchy for all locations at once. For example, if you are currently looking at countries and then use this option to move to the next level, states, Power BI displays state data for all countries. For geo-coding, Power BI sends Bing Maps state data (no country data) for all locations. This option is useful if each level of your hierarchy is unrelated to the level above it.
- The second option, , is similar to Drill Down, except that you don't need to click on the map. It expands down to the next level of the hierarchy remembering the current level's context. For example, if you are currently looking at countries and select this icon, you move down in the hierarchy to the next level -- states. For geo-

coding, Power BI sends data for each state and its corresponding country to help Bing Maps geocode more accurately. In most maps, you will use either this option or the Drill Down option on the far right, so you can send Bing as much information as possible to get accurate location information.

Next steps

[Drill down in a Power BI visualization](#)

[Power Bi visualizations](#)

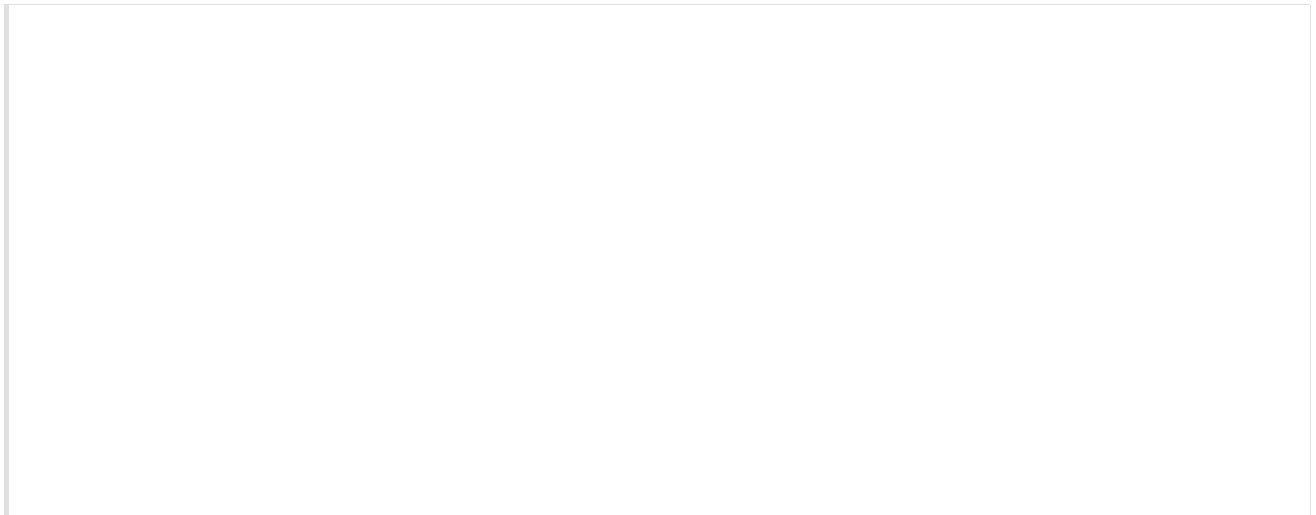
More questions? [Try the Power BI Community](#)

Static content in Power BI reports

1/24/2018 • 1 min to read • [Edit Online](#)

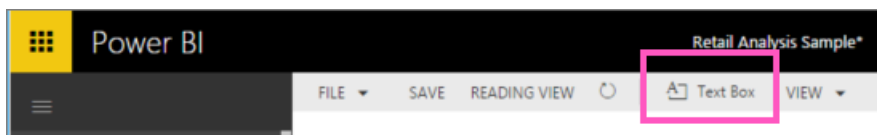
Text boxes and shapes can be added to reports using Power BI service and Power BI Desktop. In both cases, you must have editing permissions for the report. If a report has been shared with you, you will not have access to Editing view.

Watch Will use Power BI Desktop to [add static images to a report](#), and then follow the steps below to try it out yourself using Power BI service instead.

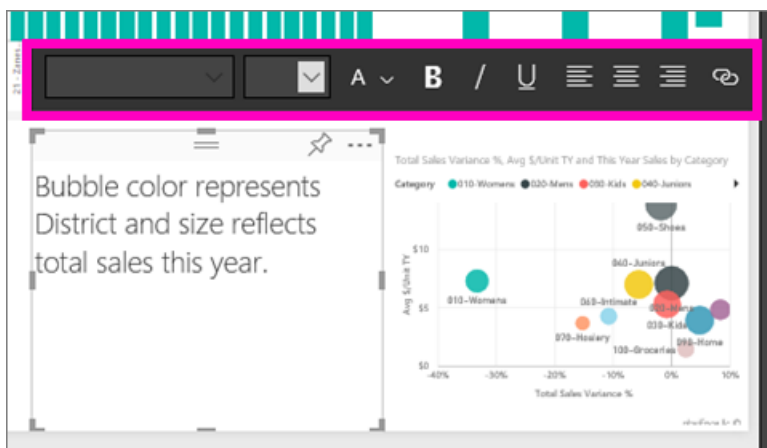


Add a text box to a report

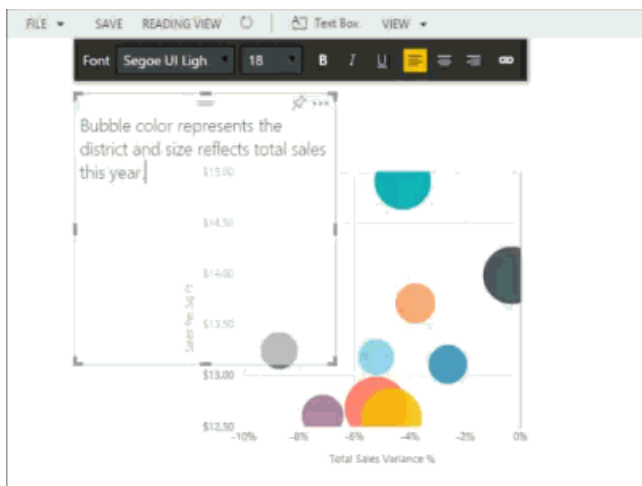
1. Open a report in Editing view.
2. Place your cursor in any blank area on the report canvas and select **Text Box**.



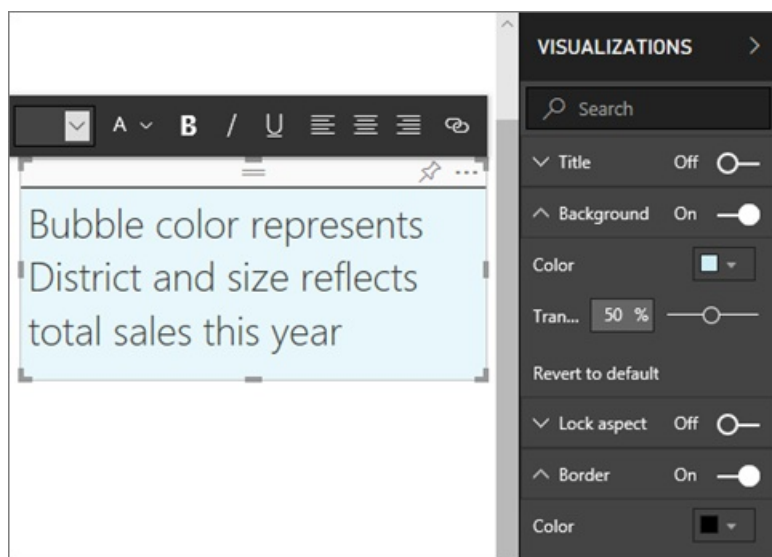
3. Type your text into the text box and, optionally, format font, color, and text alignment.




4. To position the text box, select the grey area at the top and drag. And to resize the text box, select and drag any of the outline handles.



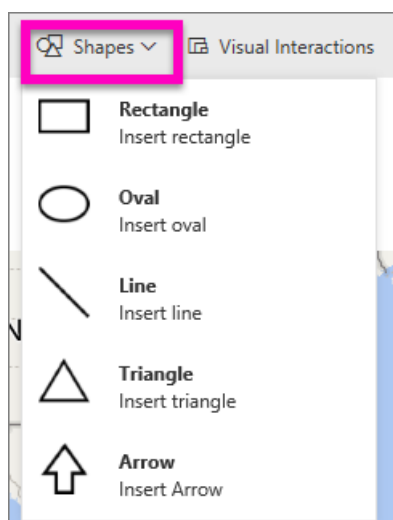
5. With the text box still selected, add additional formatting in the VISUALIZATIONS pane. In this example we've formatted the background and border. You can also create an exact size and position for a text box.



6. To close the text box, select any blank space on the report canvas.
7. Select the pin icon  to pin the text box to a dashboard.

Add a shape to a report

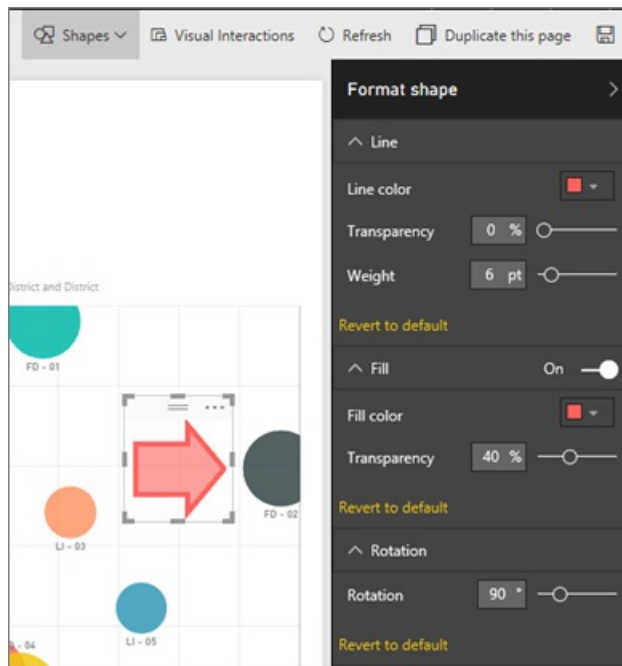
1. Place your cursor anywhere on the report canvas and select **Shapes**.



2. From the dropdown, select a shape to add it to your report canvas. Let's add an arrow to direct attention to

the bubble with the highest total sales variance.

In the **Format shape** pane, customize your shape. In this example we've created a red arrow with a dark red border, rotated 90 degrees.



3. To position the shape, select the grey area at the top and drag. And to resize the shape, select and drag any of the outline handles. As with the text box, you can also create an exact size and position for a shape.

NOTE: Shapes cannot be pinned to a dashboard, except as one of the visuals when you [pin a live page](#).

Next steps

[Add a hyperlink to a text box](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

ArcGIS maps in Power BI service and Power BI Desktop by Esri

1/8/2018 • 9 min to read • [Edit Online](#)

This tutorial is written from the point of view of a person creating an ArcGIS map. Once a creator shares an ArcGIS map with a colleague, that colleague can view and interact with the map but not save changes. To learn more about viewing an ArcGIS map, see [Interacting with ArcGIS maps](#).

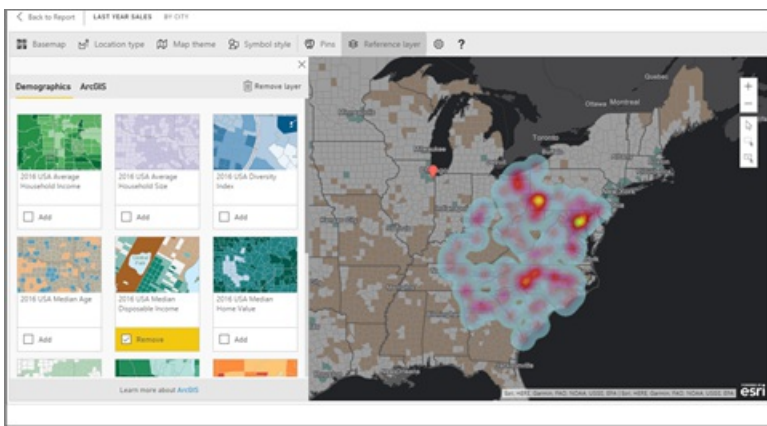
The combination of ArcGIS maps and Power BI takes mapping beyond the presentation of points on a map to a whole new level. Choose from base maps, location types, themes, symbol styles, and reference layers to create gorgeous informative map visualizations. The combination of authoritative data layers on a map with spatial analysis conveys a deeper understanding of the data in your visualization.

While you cannot create an ArcGIS maps on a mobile device, you can view and interact with it. See [Interacting with ArcGIS maps](#).

TIP

GIS stands for Geographic Information Science.

The example below uses a dark gray canvas to show regional sales as a heatmap against a demographic layer of 2016 median disposable income. As you'll see as you read on, using ArcGIS maps offers almost limitless enhanced mapping capability, demographic data, and even-more compelling map visualizations so you can tell your best story.



TIP

Visit [esri's page on Power BI](#) to see many examples and read testimonials. And then see [esri's ArcGIS Maps for Power BI Getting Started page](#).

User consent

ArcGIS Maps for Power BI is provided by [Esri](#). Your use of ArcGIS Maps for Power BI is subject by Esri's terms and privacy policy. Power BI users wishing to use the ArcGIS Maps for Power BI visuals, need to accept the consent dialog.

Resources

[Terms](#)

[Privacy Policy](#)

[ArcGIS Maps for Power BI product page](#)

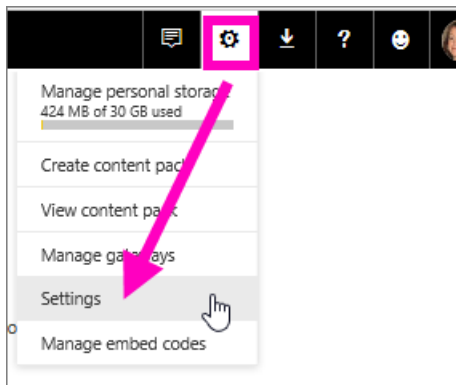
Enable ArcGIS map

ArcGIS maps are currently available in Power BI service, Power BI Desktop, and Power BI mobile. This article provides instructions for the service and for Desktop.

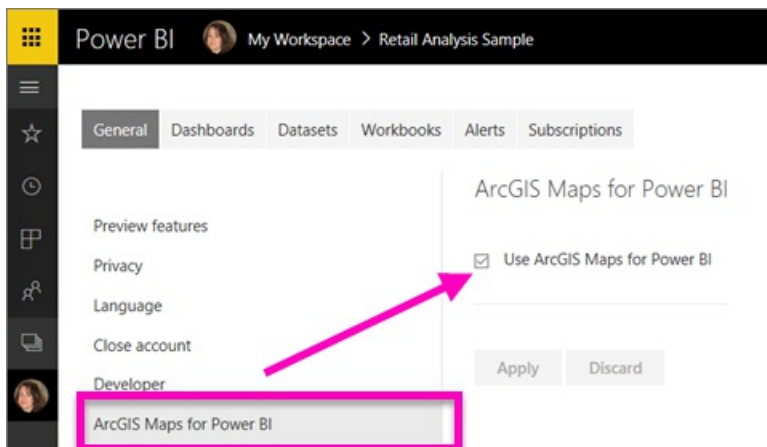
Enable the ArcGIS map in Power BI service (app.powerbi.com)

This tutorial uses the [Retail Analysis sample](#). To enable **ArcGIS Maps for Power BI**:

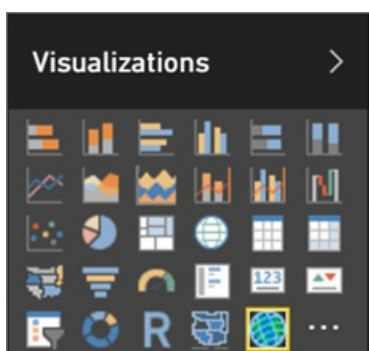
1. From the top right section of the menubar, select the cog icon and open **Settings**



2. Select the **ArcGIS Maps for Power BI** checkbox. You'll need to restart Power BI after you make the selection.



3. Open a report in **Editing view** and select the ArcGIS Maps for Power BI icon from the Visualizations pane.



4. Power BI adds an empty ArcGIS map template to the report canvas.



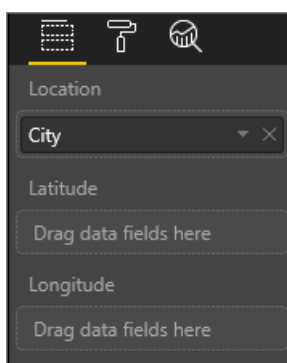
Create an ArcGIS map visual


Watch Will create a few different ArcGIS map visualizations and then use the steps below to try it out yourself using the [Retail Analysis sample](#).

1. From the **Fields** pane, drag a data field to the **Location** or **Latitude** and/or **Longitude** buckets. In this example we're using **Store > City**.

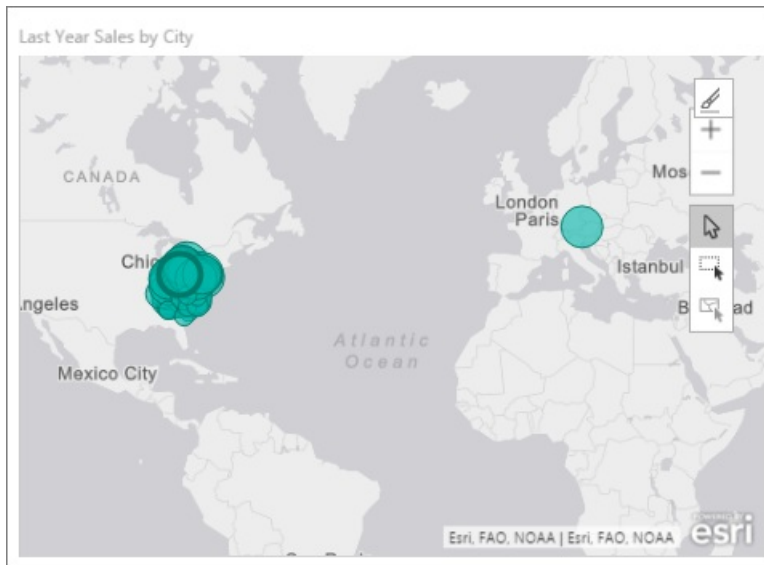
NOTE

ArcGIS Maps for Power BI will automatically detect if the fields you've selected are best viewed as a shape or a point on a map. You can adjust the default in the settings (see below).



2. Convert the visualization to an ArcGIS map by selecting the template from the Visualizations pane .
3. From the **Fields** pane, drag a measure to the **Size** bucket to adjust how the data is shown. In this example

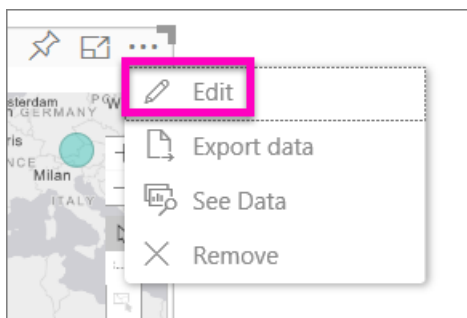
we're using **Sales > Last Year Sales**.



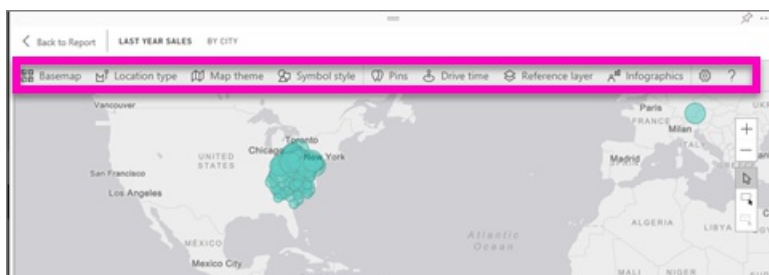
Settings and formatting for ArcGIS maps

To access **ArcGIS Maps for Power BI** formatting features:

1. Access additional features by selecting the ellipses in the top right corner of the visualization and choosing **Edit**,



The available features display across the top of the visualization. Each feature, when selected, opens a task pane that provides detailed options.



NOTE

For more information about the settings and features, see **Detailed documentation** below.

2. To return to the report, select **Back to Report** from the top-left corner of your report canvas.

Detailed documentation

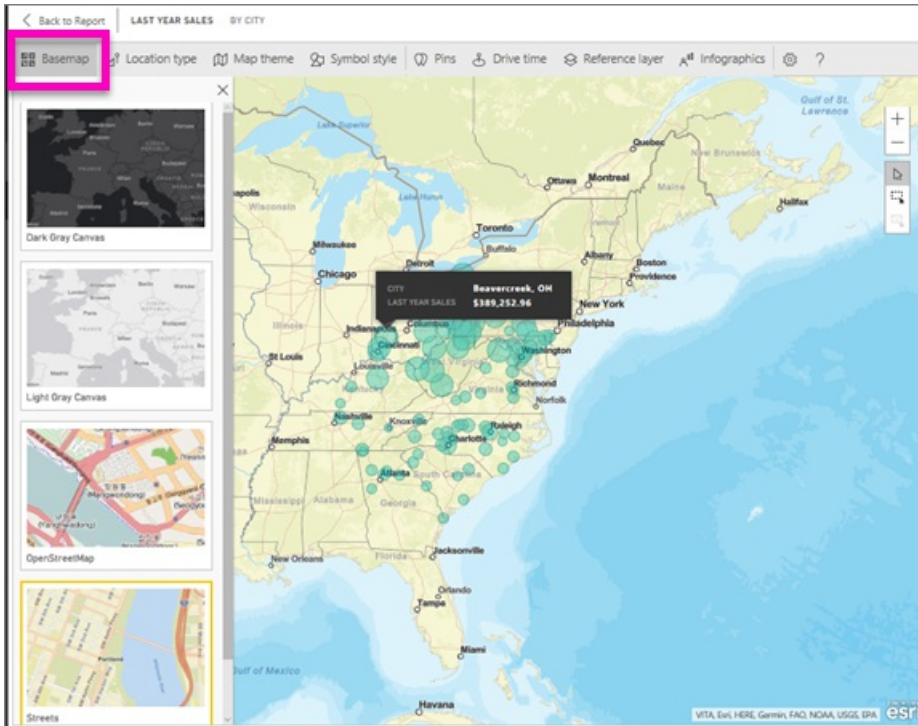
Esri provides [comprehensive documentation](#) on the feature set of **ArcGIS Maps for Power BI**.

Features overview

Base Maps

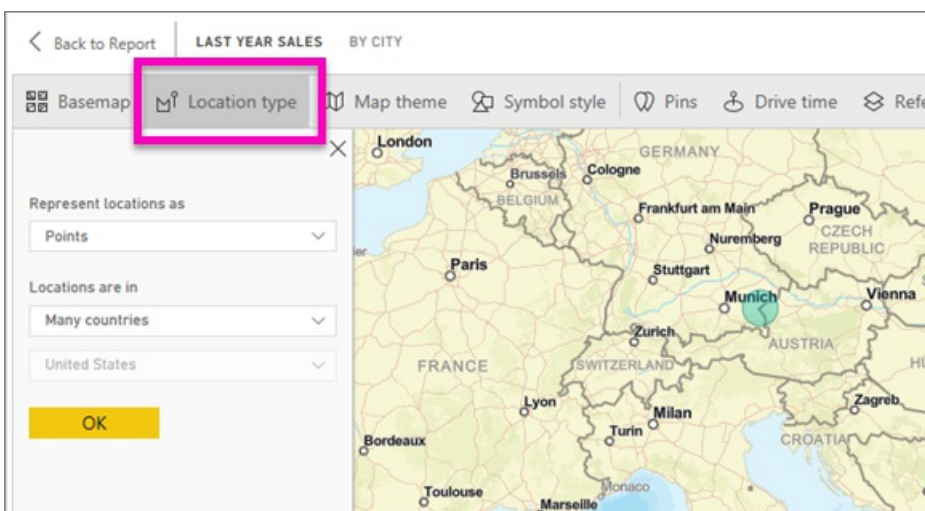
Four base maps are provided: Dark Gray Canvas, Light Gray Canvas, OpenStreetMap, and Streets. Streets is ArcGIS's standard base map.

To apply a base map select it in the task pane.



Location type

ArcGIS Maps for Power BI automatically detects the best way to show data on the map. It selects from Points or Boundaries. The Location type options allow you to fine tune these selections.

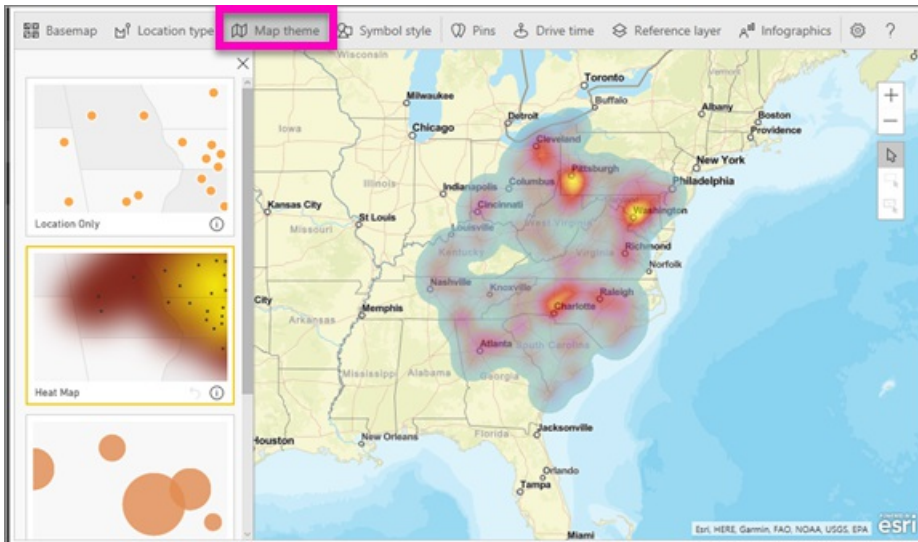


Boundaries will only work if your data contains standard geographic values. Esri automatically figures out the shape to show on the map. Standard geographic values include countries, provinces, zip codes, etc. But just like with GeoCoding, Power BI may not detect the field should be a boundary by default, or it may not have a boundary for your data.

Map theme

Four map themes are provided. Location Only and Size themes are automatically chosen based on the fields you

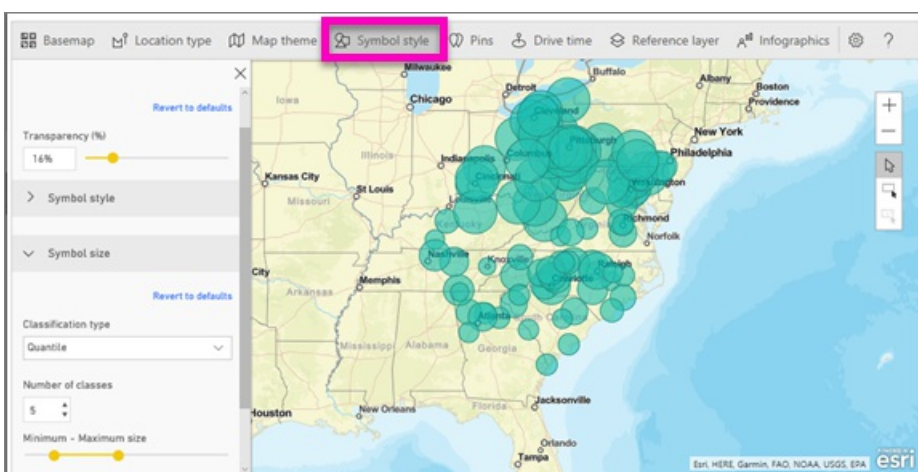
bind to the location and added to the **Size** bucket in the Power BI Fields pane. We're currently using **Size**, so let's change to **Heat map**.



THEME	DESCRIPTION
Location Only	Plots data points or filled boundaries on the map based on the settings in Location Type.
Heat Map	Plots an intensity plot of data on the map.
Size	Plots data points on the map based that are sized based on the value in the size bucket in the fields pane.
Clustering	Plot the count of data points in regions on the map.

Symbol style

Symbol styles enable you to fine tune how data is presented on the map. Symbol styles are context sensitive based on the selected Location type and Map theme. The example below shows Location type set to **Size** and several adjustments to transparency, style and size.

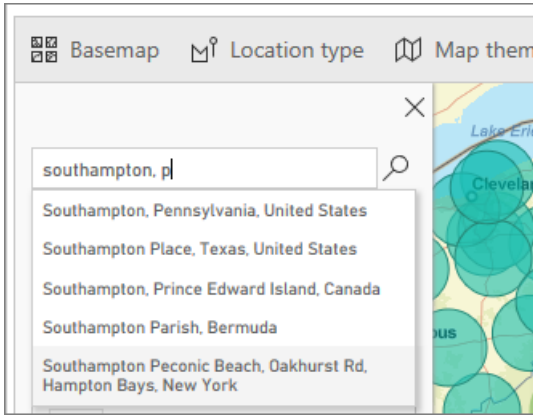


Pins

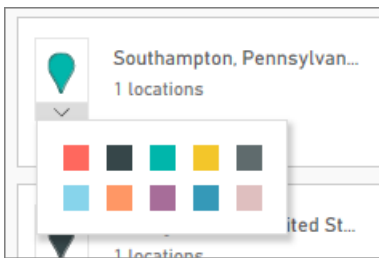
Call attention to points on your map by adding pins.

1. Select the **Pins** tab.
2. Type keywords (such as addresses, places, and point of interest), in the search box and select from the dropdown. A symbol appears on the map, and the map automatically zooms to the location. Search results

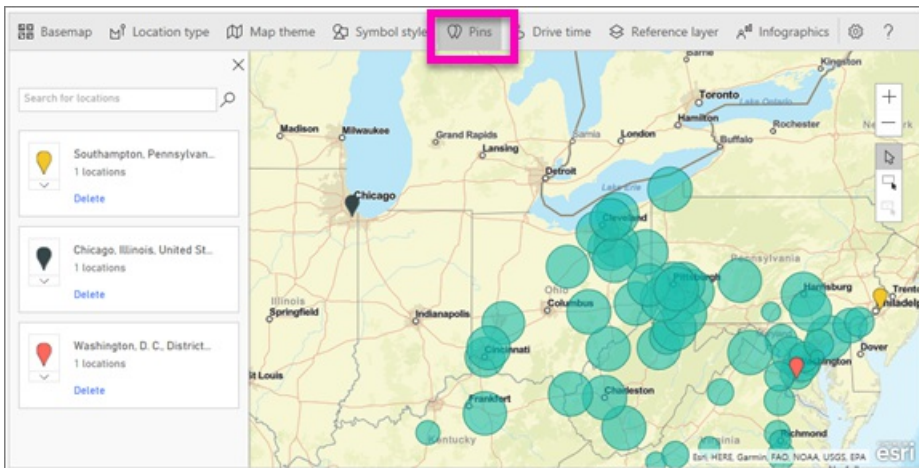
are saved as location cards in the Pins pane. You can save up to 10 location cards.



3. Power BI adds a pin to that location and you can change the color of the pin.

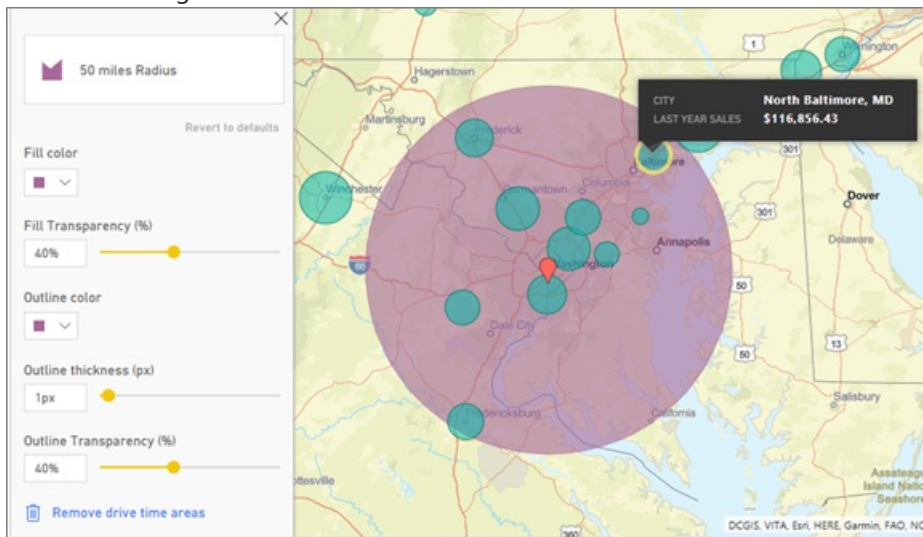


4. Add and delete pins.

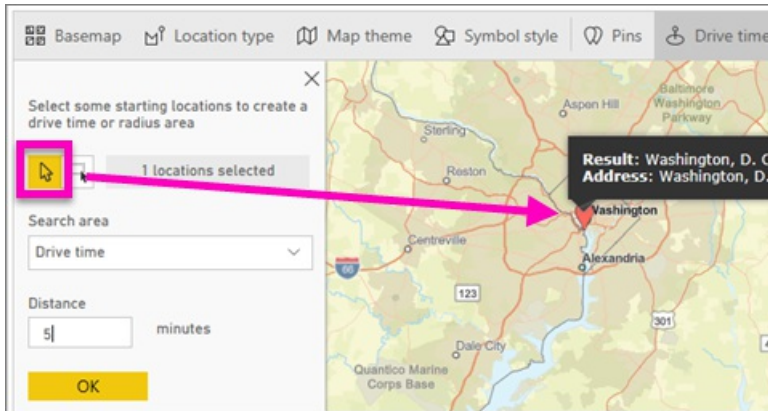


Drive time

The Drive time pane lets you select a location and then determine what other map features are within a specified radius or driving time.



1. Select the **Drive time** tab and choose the single or multi select tool. Single select the pin for Washington

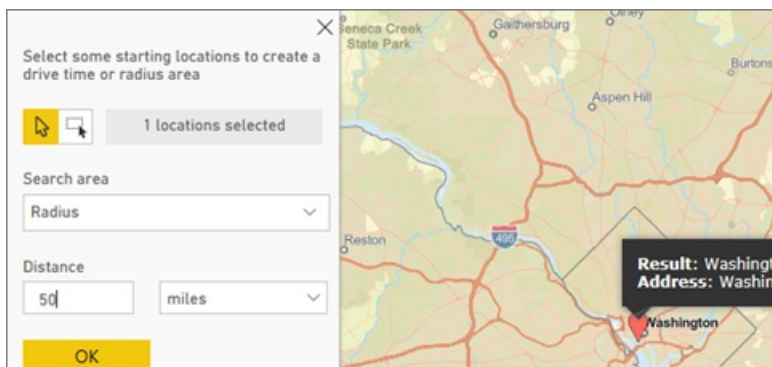


D.C.

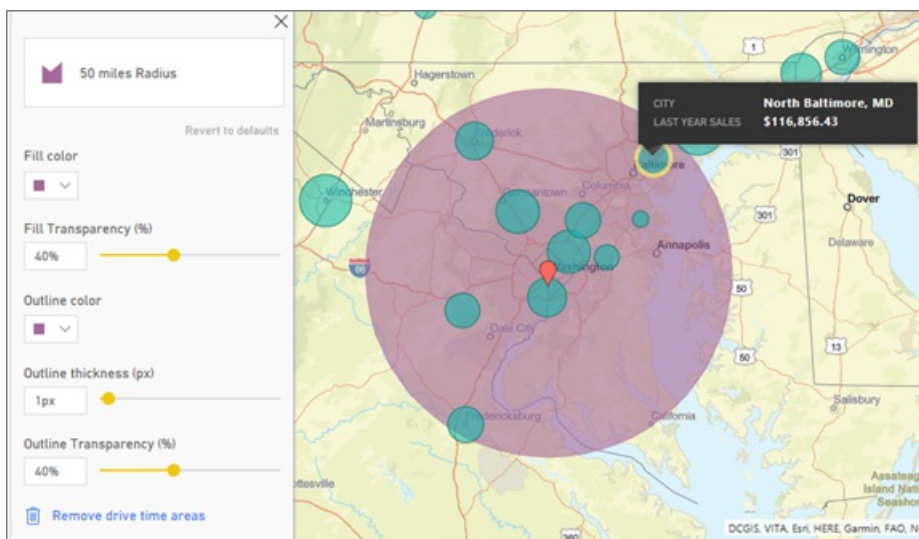
TIP

It's easier to select a location if you zoom in on the map (using the + icon).

2. Let's say you're flying into Washington D.C. for a few days and want to figure out which stores are within a reasonable driving distance. Change Search area to **Radius** and Distance to **50** miles and select OK.



3. The radius is shown in purple. Select any location to display its details. Optionally, format the radius by changing color and outline.



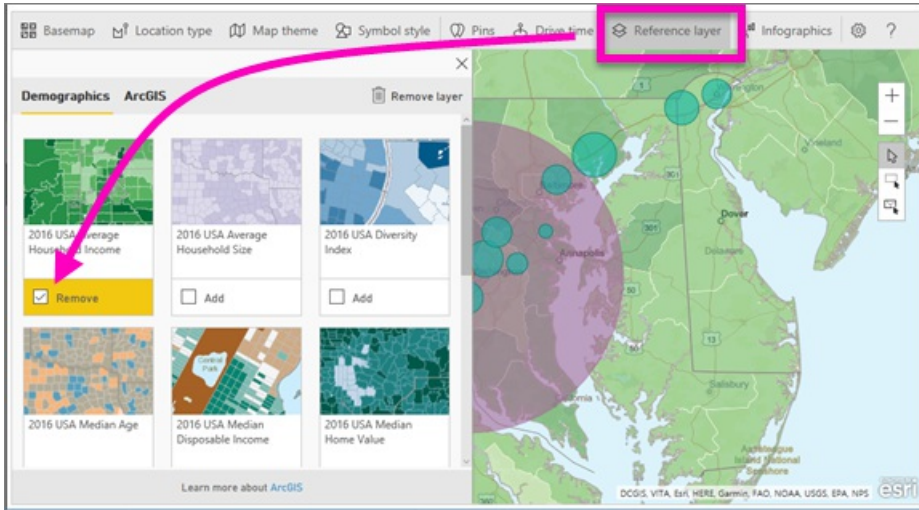
Reference Layer

Reference layer - Demographics

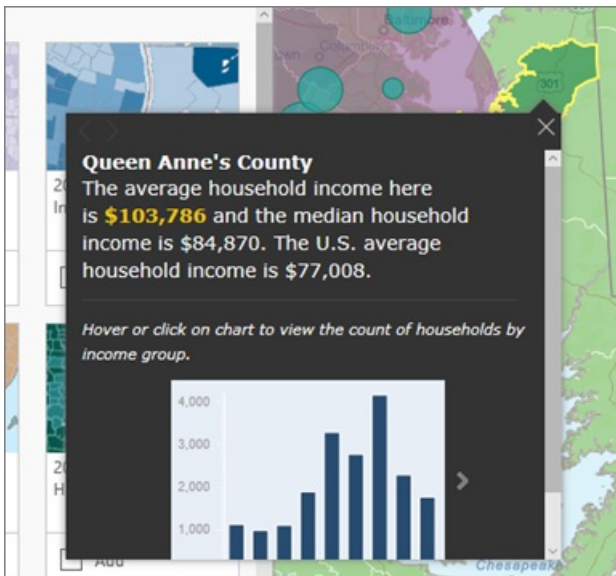
ArcGIS Maps for Power BI provides a selection of demographic layers that help contextualize data from Power BI.

1. Select the **Reference layer** tab and choose **Demographics**.
2. Each layer listed has a checkbox. Add a checkmark to add that layer to the map. In this example we've added

average household income.



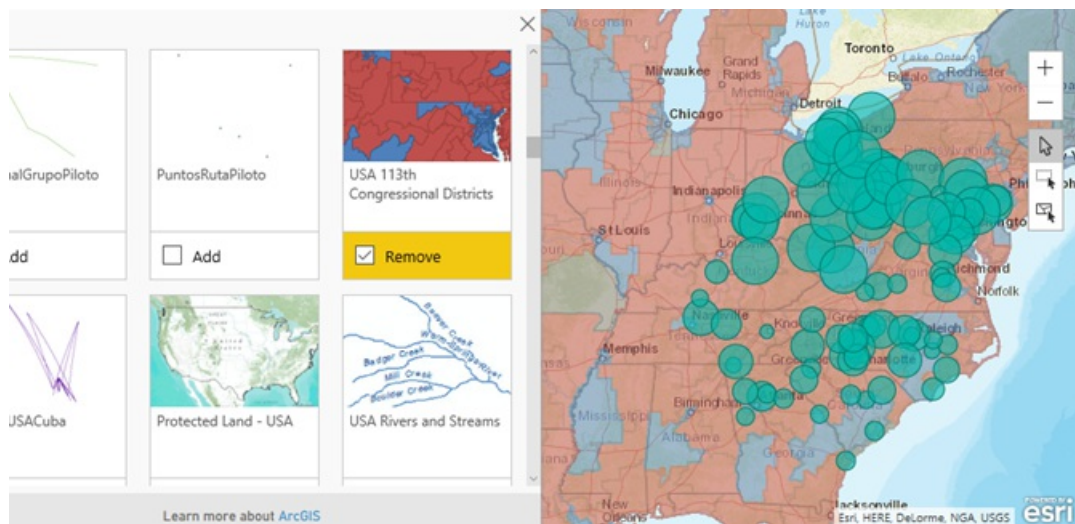
3. Each layer is interactive as well. Just as you can hover over a bubble to see the details, you can click a shaded area on the map to see the details.



Reference layer - ArcGIS

ArcGIS Online provides the ability for organizations to publish public web maps. Additionally, Esri provides a curated set of web maps through Living Atlas. In the ArcGIS tab, you can search all public web maps or Living Atlas maps, and add them to the map as reference layers.

1. Select the **Reference layer** tab and choose **ArcGIS**.
2. Enter search terms and then select a map layer. In this example we've chosen USA Congressional districts.



- To see the details, select a shaded area to open the *Select from reference layer*: Use the reference layer selection tool to selection boundaries or objects on the reference layer.

Selecting Data points

ArcGIS Maps for Power BI allows three selection modes.

Change the selection mode using switch:



Select individual data points.



Draws a rectangle on the map and selects the contained data points.



Allows boundaries or polygons within reference layers to be used to select contained data points.

NOTE

A maximum of 250 data points can be selected at a time.

Getting help

Esri provides [comprehensive documentation](#) on the feature set of **ArcGIS Maps for Power BI**.

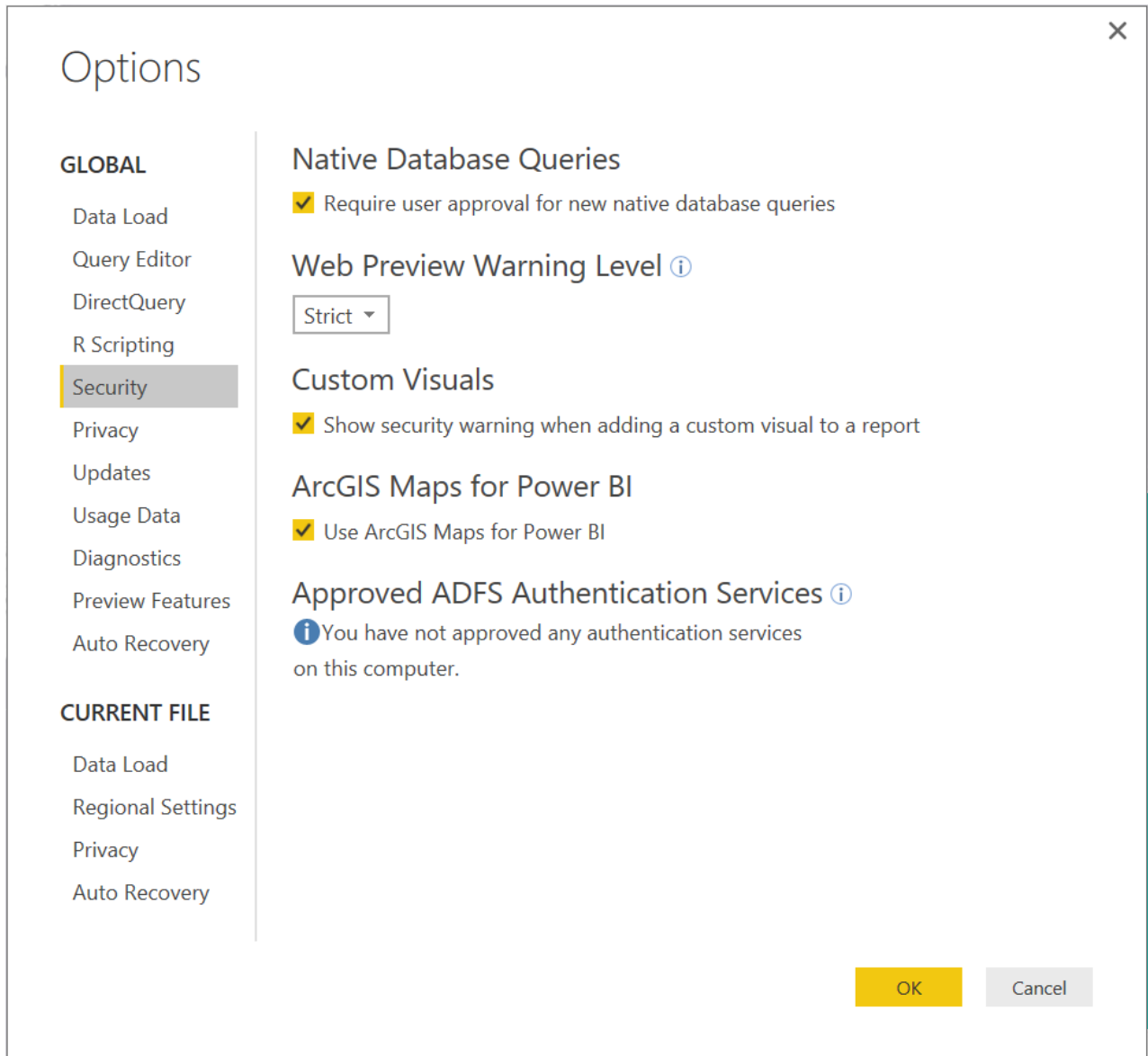
You can ask questions, find the latest information, report issues, and find answers on the Power BI [community thread related to ArcGIS Maps for Power BI](#).

If you have a suggestion for an improvement, please submit it to [Power BI's ideas list](#).

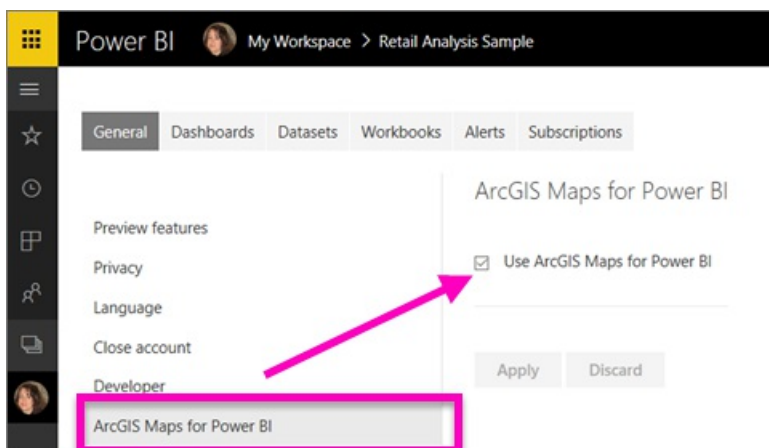
Managing use of ArcGIS Maps for Power BI within your organization

Power BI provides the ability for users, tenant administrators, and IT administrators to manage whether to use ArcGIS Maps for Power BI.

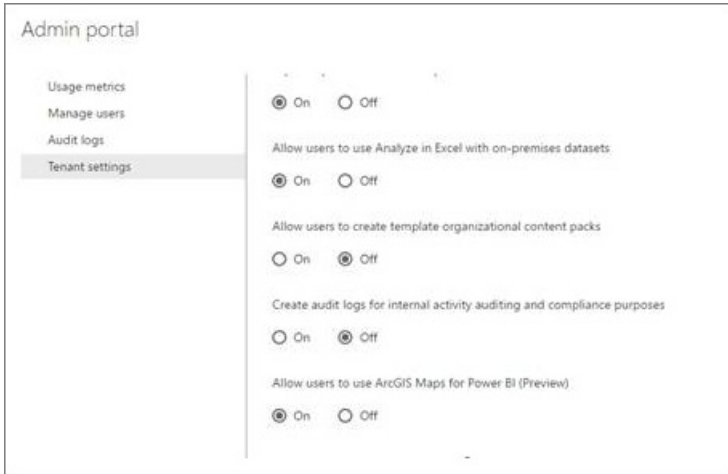
User options In Power BI Desktop, users can stop using ArcGIS Maps for Power BI by disabling it on the security tab in **Options**. When disabled, ArcGIS Maps will not load by default.



In Power BI service, users can stop using ArcGIS Maps for Power BI by disabling it on the ArcGIS Maps for Power BI tab in user Settings. When disabled, ArcGIS Maps will not load by default.



Tenant admin options In PowerBI.com, tenant administrators can prevent all tenant users from using ArcGIS Maps for Power BI by disabling. When this happens, Power BI will no longer see the ArcGIS Maps for Power BI icon in the visualizations pane.



IT Administrator options Power BI Desktop supports using **Group Policy** to disable ArcGIS Maps for Power BI across an organization's deployed computers.

ATTRIBUTE	VALUE
key	Software\Policies\Microsoft\Power BI Desktop</td>
valueName	EnableArcGISMaps

A value of 1 (decimal) enables ArcGIS Maps for Power BI.

A value of 0 (decimal) disable ArcGIS Maps for Power BI.

Considerations and Limitations

ArcGIS Maps for Power BI is available in the following services and applications:

SERVICE/APP	AVAILABILITY
Power BI Desktop	Yes
Power BI service (PowerBI.com)	Yes
Power BI mobile applications	Yes
Power BI publish to web	No
Power BI Embedded	No
Power BI service embedding (PowerBI.com)	No

In services or applications where ArcGIS Maps for Power BI is not available, the visualization will show as an empty visual with the Power BI logo.

When geocoding street addresses, only the first 1500 addresses are geocoded. Geocoding place names or countries is not subject to the 1500 address limit.

Is there any charge for using ArcGIS Maps for Power BI?

The ArcGIS Map for Power BI is available to all Power BI users at no additional cost. It is a component provided by **Esri** and your use is subject to the terms and privacy policy provided by **Esri** as noted earlier in this article.

I'm getting an error message in Power BI Desktop about my cache being full

This is a bug that is being addressed. In the meantime, to clear your cache, please try to delete files at this location: C:\Users\AppData\Local\Microsoft\Power BI Desktop\CEF and then restart Power BI.

Does ArcGIS Maps for Power BI support Esri Shapefiles?

ArcGIS Maps for Power BI automatically detects standard boundaries like countries/regions, states/provinces, and zip/postal codes. If you need to provide your own shapes you can do so using the [Shape Maps for Power BI Desktop \(Preview\)](#).

Can I view my ArcGIS maps offline?

No, Power BI needs network connectivity to display the maps.

Can I connect to my ArcGIS Online account from Power BI?

Not yet. [Vote for this idea](#) and we'll send you an email when we start working on this feature.

Next steps

[Interacting with an ArcGIS map that has been shared with you](#)

[Blog post announcing availability of ArcGIS maps for Power BI](#)

More questions? [Try asking the Power BI Community](#)

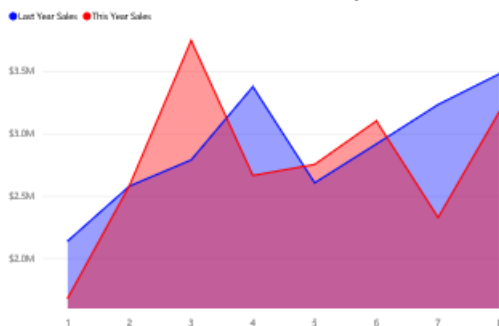
Basic Area chart (Tutorial)

1/23/2018 • 2 min to read • [Edit Online](#)

The basic area chart (aka layered area chart.) is based on the line chart. The area between axis and line is filled with colors to indicate volume.

Area charts emphasize the magnitude of change over time, and can be used to draw attention to the total value across a trend. For example, data that represents profit over time can be plotted in an area chart to emphasize the total profit.

Last Year Sales and This Year Sales by Month



When to use a basic area chart

Basic area charts are a great choice:

- to see and compare the volume trend across time series
- for individual series representing a physically countable set

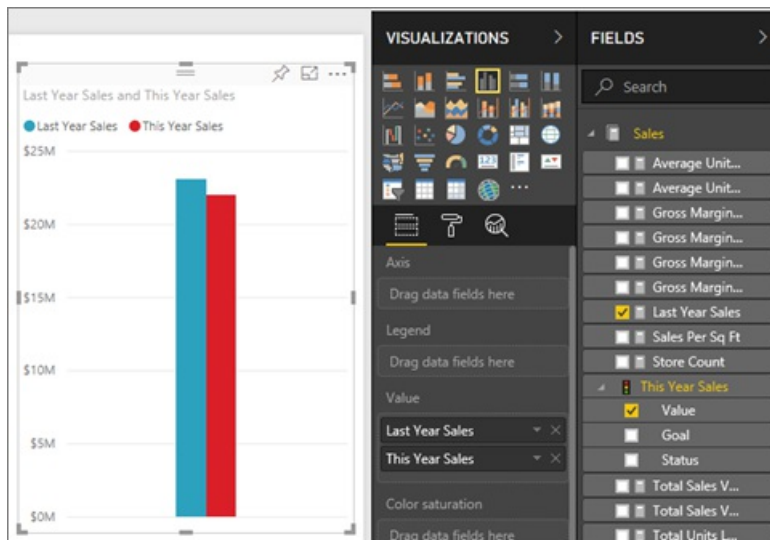
Prerequisites

- Power BI service
- Retail Analysis sample

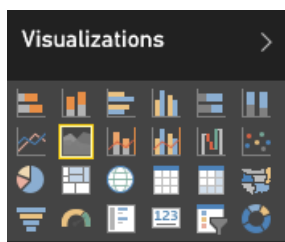
To follow along, sign in to Power BI and select **Get Data > Samples > Retail Analysis Sample > Connect** and choose **Go to dashboard**.

Create a basic area chart

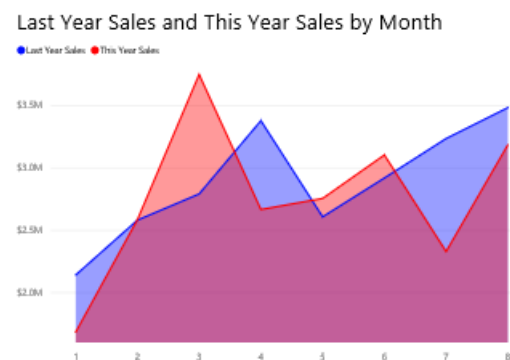
1. From the "Retail Analysis Sample" dashboard, select the **Total Stores** tile to open the "Retail Analysis Sample" report.
2. Select **Edit Report** to open the report in Editing View.
3. Add a new report page by selecting the yellow plus icon (+) at the bottom of the report.
4. Create an area chart that displays this year's sales and last year's sales by month.
 - a. From the FIELDS pane, select **Sales > Last Year Sales**, and **This Year Sales > Value**.



b. Convert the chart to a basic area chart by selecting the Area chart icon from the VISUALIZATIONS pane.



c. Select **Time > Month** to add it to the **Axis** well.



d. To display the chart by month, select the ellipses (top right corner of the visual) and choose **Sort by month**.

Highlighting and cross-filtering

For information about using the FILTERS pane, see [Add a filter to a report](#).

To highlight one particular area in your chart, select that area or its top border. Unlike other visualization types, if there are other visualizations on the same page, highlighting a basic area charts does not cross-filter the other visualizations on the report page. However, area charts are a target for cross-filtering triggered by other visualizations on the report page. To learn more, see [Visual interactions in reports](#)

Considerations and troubleshooting

- Basic area charts are not effective for comparing the values due to the occlusion on the layered areas. Power BI uses transparency to indicate the overlap of areas. However, it only works well with two or three different areas. When you need to compare trend to more than three measures, try using line charts. When you need to compare volume to more than three measures, try using treemap.

Next steps

[Reports in Power BI](#)

[Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Combo Chart in Power (Tutorial)

1/24/2018 • 3 min to read • [Edit Online](#)

In Power BI, a combo chart is a single visualization that combines a line chart and a column chart. Combining the 2 charts into one lets you make a quicker comparison of the data.

Combo charts can have one or two Y axes.

When to use a Combo Chart

Combo charts are a great choice:

- when you have a line chart and a column chart with the same X axis.
- to compare multiple measures with different value ranges.
- to illustrate the correlation between two measures in one visualization.
- to check whether one measure meet the target which is defined by another measure
- to conserve canvas space.

Prerequisites

Combo charts are available in Power BI service and Power BI Desktop. This tutorial uses Power BI service to create a Combo chart. To follow along, open Power BI service and connect to the "Retail Analysis" sample [instructions below](#)).

Create a basic, single-axis, Combo Chart

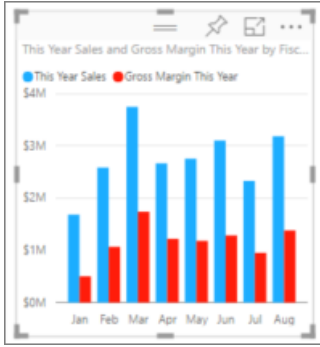
Watch Will create a combo chart using the Sales and Marketing sample.

To create your own combo chart, sign in to Power BI service and select **Get Data > Samples > Retail Analysis Sample > Connect > Go to dashboard**.

1. From the "Retail Analysis Sample" dashboard, select the **Total Stores** tile to open the "Retail Analysis Sample" report.
2. Select **Edit Report** to open the report in Editing View.
3. [Add a new report page](#).
4. Create a column chart that displays this year's sales and gross margin by month.
 - a. From the Fields pane, select **Sales > This Year Sales > Value**.

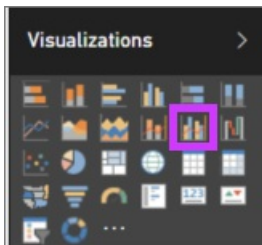
b. Drag **Sales > Gross Margin This Year** to the **Value** well.

c. Select **Time > FiscalMonth** to add it to the **Axis** well.

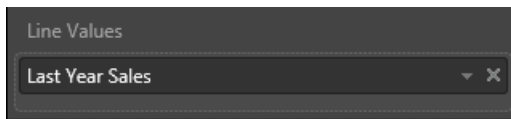


5. Select the ellipses (...) in the upper-right corner of the visualization, and select **Sort by FiscalMonth**. You may have to select it twice to sort ascending or descending.

6. Convert the column chart to a combo chart. With the column chart selected, from the **Visualizations** pane select the **Line and clustered column chart**.



7. From the **Fields** pane, drag **Sales > Last Year Sales** to the **Line Values** bucket.



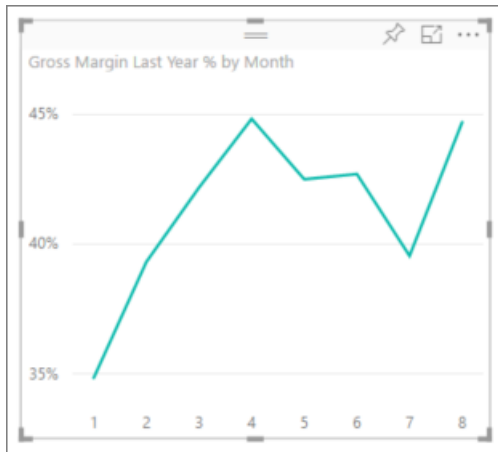
Your combo chart should look something like this:



Create a combo chart with two axes

In this task, we'll compare gross margin and sales.

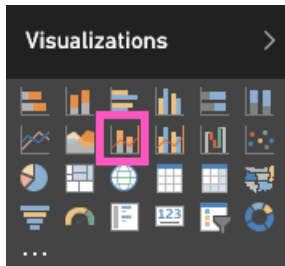
1. Create a new line chart that tracks **Gross Margin last year %** by **Month**. In January GM% was 35%, peaked at 45% in April, dropped in July and peaked again in August. Will we see a similar pattern in sales last year and this year?



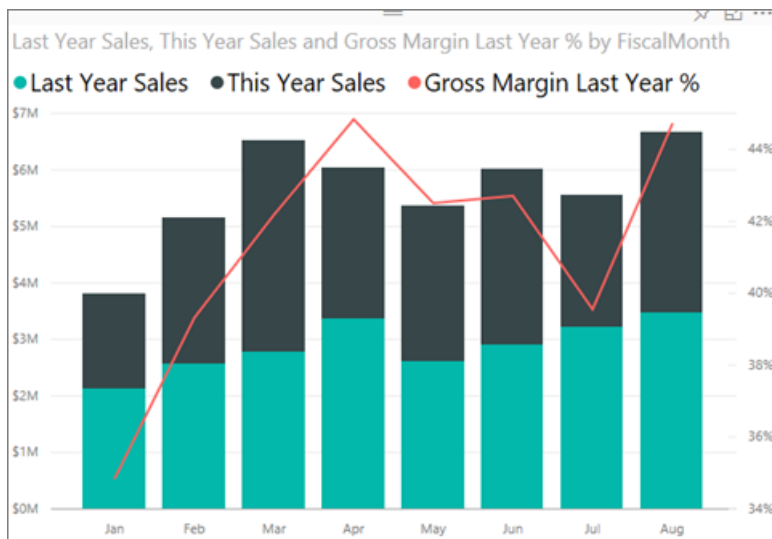
2. Add **This Year Sales > Value** and **Last Year Sales** to the line chart. The scale of **Gross Margin Last Year %** is much smaller than the scale of **Sales** which makes it difficult to compare.




3. To make the visual easier to read and interpret, convert the line chart to a Line and Stacked Column chart.

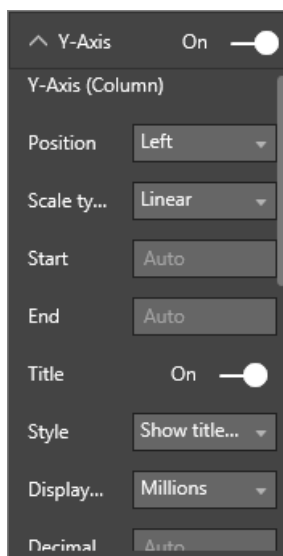


4. Drag **Gross Margin Last Year %** from **Column Values** into **Line Values**. Power BI creates two axes, thus allowing the datasets to be scaled differently; the left measures sales dollars and the right measures percentage.

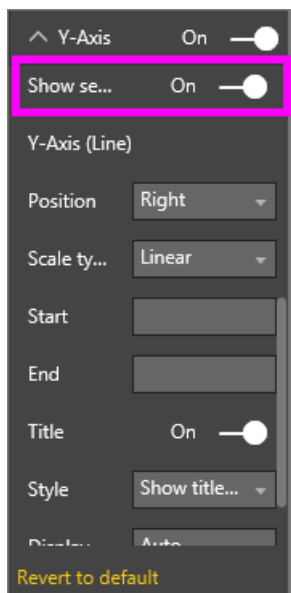


Add titles to the axes

1. Select the paint roller icon  to open the Formatting pane.
2. Select the down arrow to expand the **Y-axis** options.
3. For **Y-Axis (Column)**, set **Position** to **Left**, set **Title** to **On**, **Style** to **Show title only**, and **Display** as **Millions**.

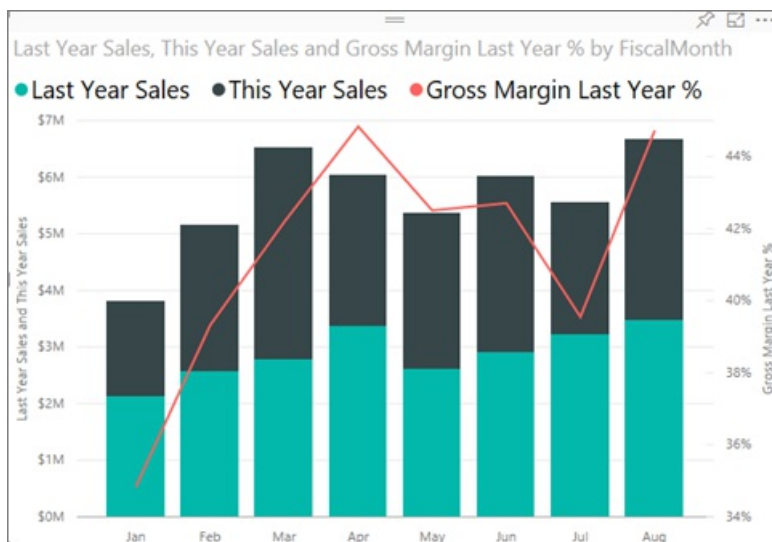


4. Under **Y-Axis (Column)**, scroll down and ensure that **Show Secondary** is set to **On**. This displays options for formatting the line chart portion of the combo chart.



- For **Y-Axis (Line)**, leave **Position** as **Right**, turn **Title** to **On**, and set **Style** to **Show title only**.

Your combo chart now displays dual axes, both with titles.



- Optionally, modify the text font, size, and color and set other formatting options to improve the display and readability of the chart.

From here you might want to:

- [Add the combo chart as a dashboard tile.](#)
- [Save the report.](#)

Cross-highlighting and cross-filtering

Highlighting a column or line in a combo chart cross-highlights and cross-filters the other visualizations on the report page... and vice versa. Use [visual interactions](#) to change this default behavior.

Next steps

[Overview of visualizations in Power BI reports](#)

[Visualization types in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Customize visualization titles, legends, and backgrounds (Tutorial)

1/24/2018 • 3 min to read • [Edit Online](#)

In this tutorial you'll learn a few different ways to customize your visualizations. There are so many options for customizing your visualizations, the best way to learn about them all is by exploring the Formatting pane (select the paintroller icon). To get you started, this article shows you how to customize a visualization title, legend, and background.

Not all visualizations can be customized, [see the complete list](#).

Watch Amanda customize visualizations in her report (fast-forward to 4:50 in the video). Then follow the instructions below the video to try it out yourself with your own data.

Prerequisites

- Power BI service or Power BI Desktop
- Retail Analysis sample

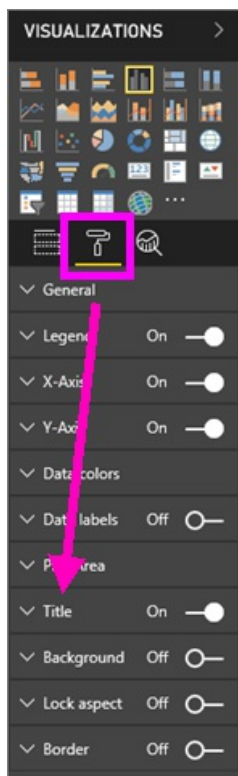
Customize visualization titles in reports

To follow along, sign into Power BI service (app.powerbi.com) and [open the Retail Analysis Sample](#) report in [Editing View](#).

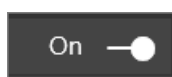
NOTE

When you pin a visualization to a dashboard, it becomes a dashboard tile. The tiles themselves can also be customized with [new titles and subtitles, hyperlinks, and resized](#).

1. Navigate to the "New Stores" page of the report and select the "Open Store Count by Open Month..." column chart.
2. In the Visualizations pane, select the paintroller icon to reveal the formatting options. and select **Title** to expand that section.



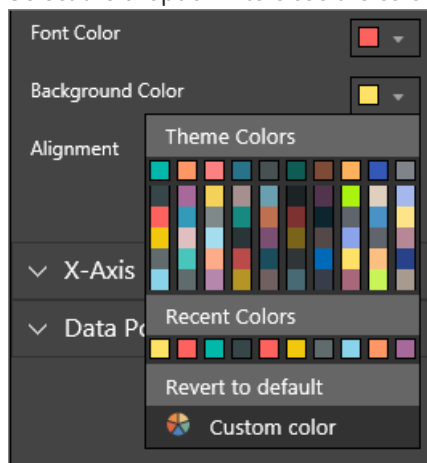
3. Turn **Title** on and off by selecting the On (or Off) slider. For now, leave it **On**.



4. Change **Title Text** by typing **Store count by month opened** in the text field.

5. Change **Font color** to orange and **Background Color** to yellow.

- Select the dropdown and choose a color from the **Theme Colors**, **Recent Colors**, or **Custom color**.
- Select the dropdown to close the color window.



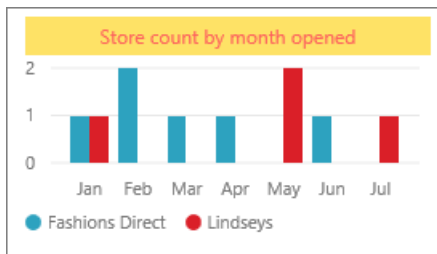
You can always revert to the default colors by selecting **Revert to default** in the color window.

6. Increase the text size to 12.

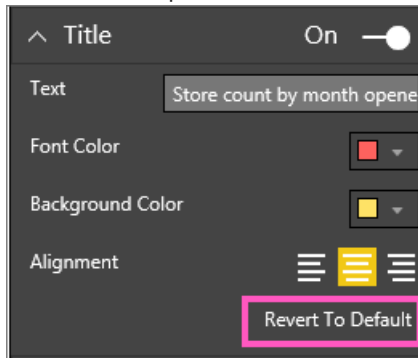
7. The last customization we'll make to the chart title is to align it in the center of the visualization. The title position defaults to left-aligned.



At this point in the tutorial, your column chart **title** should look like something like this:



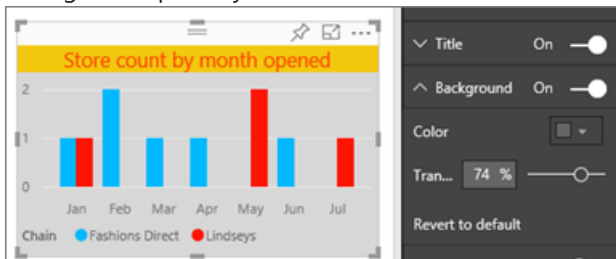
To revert all the title customization we've done so far, select **Revert To Default**, at the bottom of the **Title** customization pane.



Customize visualization backgrounds

With the same column chart selected, expand the Background options.

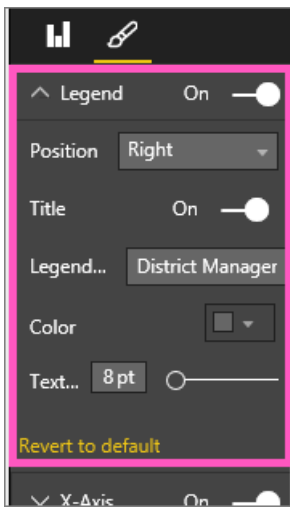
1. Turn the background on and off by selecting the On (or Off) slider. For now, leave it **On**.
2. Change the background color to 74% grey.
 - Select the dropdown and choose a grey color from the **Theme Colors**, **Recent Colors**, or **Custom color**.
 - Change Transparency to 74%.



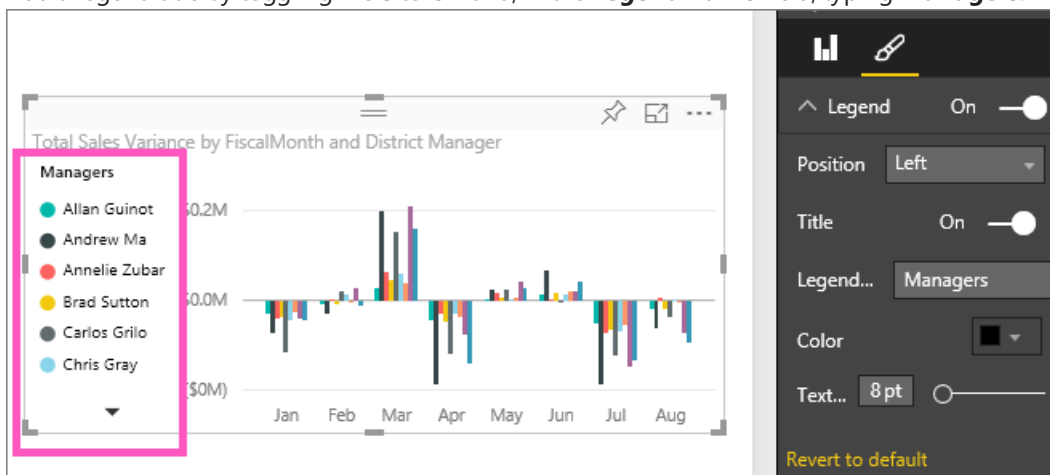
To revert all the title background customization we've done so far, select **Revert To Default**, at the bottom of the **Background** customization pane.

Customize visualization legends

1. Open the **Overview** report page and select the "Total Sales Variance by FiscalMonth and District Manager" chart.
2. In the Visualization tab, select the paintbrush icon to open the formatting pane.
3. Expand **Legend** options.



4. Turn the legend on and off by selecting the On (or Off) slider. For now, leave it **On**.
5. Move the legend to the left side of the visualization.
6. Add a legend title by toggling **Title** to **On** and, in the **Legend name** field, typing **Managers**.



To revert all the legend customization we've done so far, select **Revert To Default**, at the bottom of the **Legend** customization pane.

Visualization types that can be customized

VISUALIZATION	TITLE	BACKGROUND	LEGEND
area	yes	yes	yes
bar	yes	yes	yes
card	yes	yes	n/a
multi row card	yes	yes	n/a
column	yes	yes	yes
combo	yes	yes	yes
donut	yes	yes	yes
filled map	yes	yes	yes

VISUALIZATION	TITLE	BACKGROUND	LEGEND
funnel	yes	yes	n/a
gauge	yes	yes	n/a
kpi	yes	yes	n/a
line	yes	yes	yes
map	yes	yes	yes
matrix	yes	yes	n/a
pie	yes	yes	yes
scatter	yes	yes	yes
slicer	yes	yes	n/a
table	yes	yes	n/a
textbox	no	yes	n/a
treemap	yes	yes	yes
waterfall	yes	yes	yes

Next steps

[Customize X-axis and Y-axis](#)

[Customize colors and axis properties](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Customize X-axis and Y-axis properties (Tutorial)

1/24/2018 • 4 min to read • [Edit Online](#)

In this tutorial you'll learn many different ways to customize the X-axis and Y-axis of your visuals. Not all visuals have axes or can be customized; Pie charts, for example, don't have axes. And customization options vary from visual to visual, too many options to cover in a single article. So we'll take a look at some of the most-used axes customizations and get you comfortable using the visual formatting tab in the Power BI report canvas.

NOTE

This page applies to both Power BI service and Power BI Desktop. These customizations, which are available when the

Format (the paint roller icon ) is selected, are also available in Power BI Desktop.

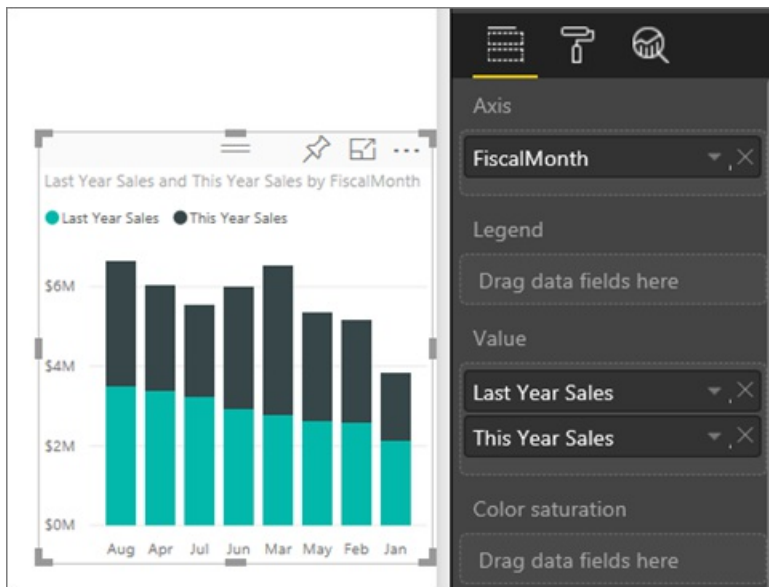
Watch Amanda customize her X and Y axes and demonstrate the various ways to control concatenation when using drill-up and drill-down. Then follow the step-by-step instructions below the video to try it out yourself using the Retail Analysis sample.

Customizing visualization X-axes in reports


Create a stacked chart visualization

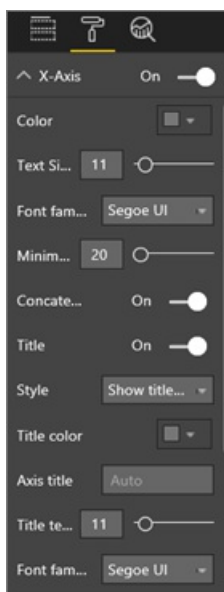
Sign in to the Power BI service and open the **Retail Analysis Sample** report in [Editing View](#). To follow along, [connect to the Retail Analysis sample](#).

1. Create a new column chart that shows this year's sales and last year's sales value by fiscal month.
2. Convert it to a Stacked column chart.



Customize the X axis

1. In the Visualizations and Filters pane, select **Format** (the paint roller icon ) to reveal the customization options.
2. Expand the X-Axis options.

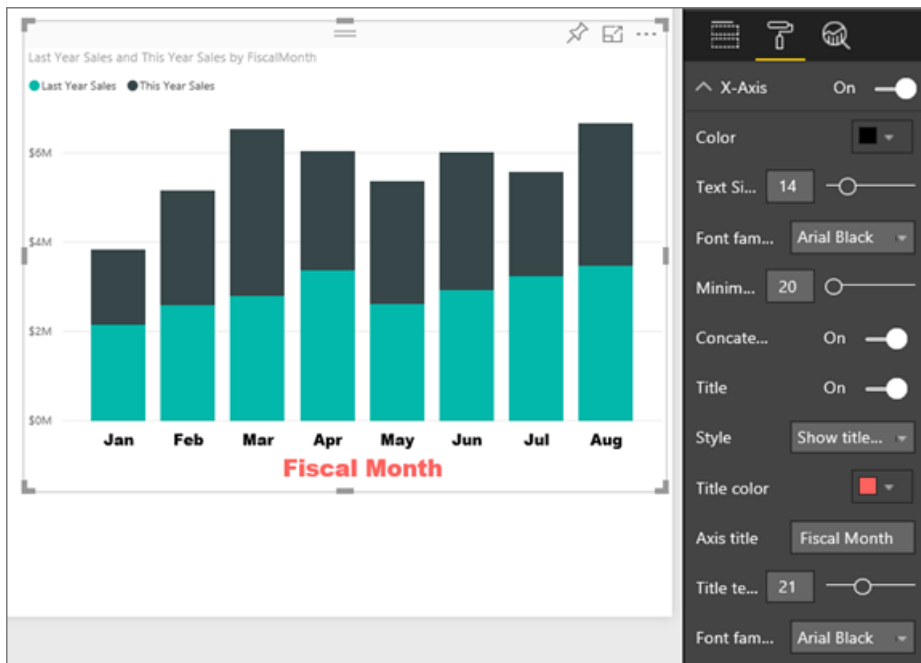


3. Turn the X-axis on and off by selecting the On (or Off) slider. For now, leave it **On**. One reason you might want to turn off the X-axis is to save space for more data.



4. Format the text color, size, and font. In this example we've set text **Color** to black, **Text Size** to 14, and **Font** to Arial Black.
5. Turn the X-axis Title **On** and display the name of the X axis -- in this case, **FiscalMonth**.
6. Format the title text color, size, and font. In this example we've set **Title color** to orange, changed **Axis title** to **Fiscal Month**, and set **Title text size** to 21.
7. To sort by FiscalMonth, select the ellipses (...) in the top-right corner of the chart and select **Sort By FiscalMonth**.

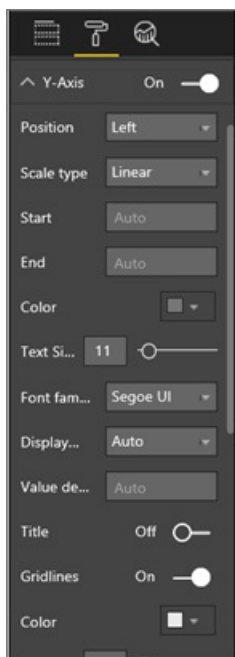
After all these customizations, your column chart should look something like this:



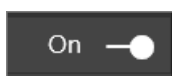
To revert all the X-axis customization you've done so far, select **Revert To Default** at the bottom of the **X-axis** customization pane.

Customize the Y axis

1. Expand the Y-Axis options.



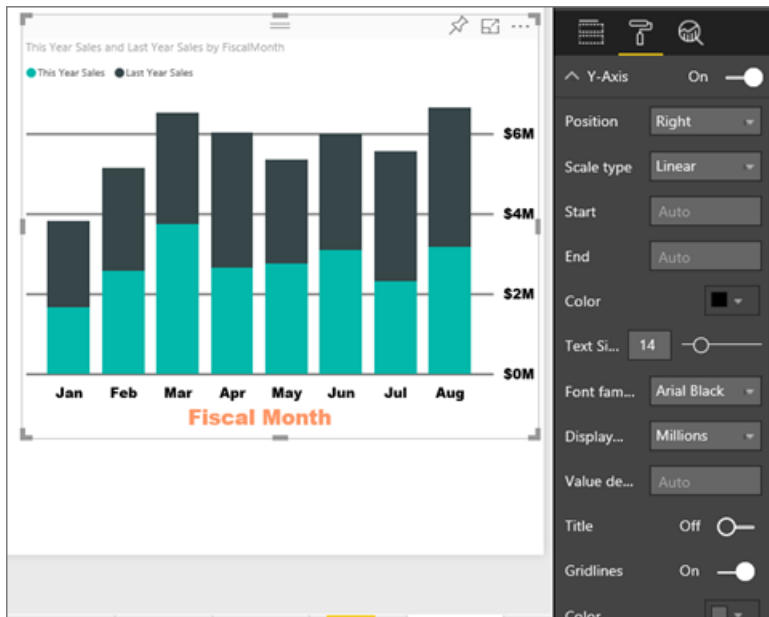
2. Turn the Y-axis on and off by selecting the On (or Off) slider. For now, leave it **On**. One reason you might want to turn off the Y-axis is to save space for more data.



3. Move the Y-Axis **Position** to the right.
4. Format the text color, size, and font. In this example we've set text **Color** to black, **Text Size** to 14, and **Font** to Arial Black.
5. Keep **Display units** set to Millions and **Value decimal places** to zero.
6. For this visualization, having a Y-axis title doesn't improve the visual, so leave **Title** turned Off.

- Let's make the gridlines stand out by changing the **Color** to a dark grey and increasing **Stroke** to 2.

After all these customizations, your column chart should look something like this:

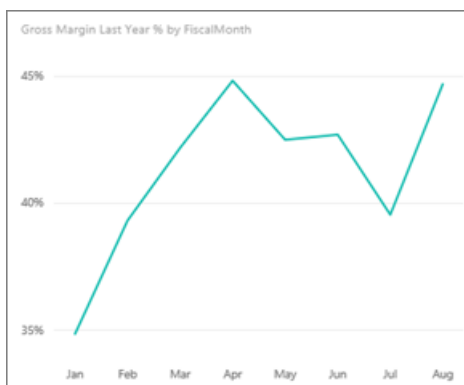


Customizing visualizations with dual Y-axes

First you'll create a Combo chart that looks at the impact store count has on sales. This is the same chart that is created in the [Combo chart Tutorial](#). Then you'll format the dual Y-axes.

Create a chart with two Y-axes

- Create a new line chart that tracks **Sales > Gross Margin last year %** by **Time > FiscalMonth**.
- Sort the visual by month by selecting the ellipses (...) and choosing **Sort by Month**

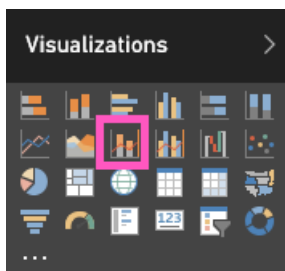


[NOTE]: For help sorting by month, see [sorting by other criteria](#)

- In January GM% was 35%, peaked at 45% in April, dropped in July and peaked again in August. Will we see a similar pattern in sales last year and this year?
- Add **This Year Sales > Value** and **Last Year Sales** to the line chart. The scale of **GM% Last Year** (the blue line running along the 0M% gridline) is much smaller than the scale of **Sales** which makes it difficult to compare. And the Y-Axis label percentages are ridiculous.

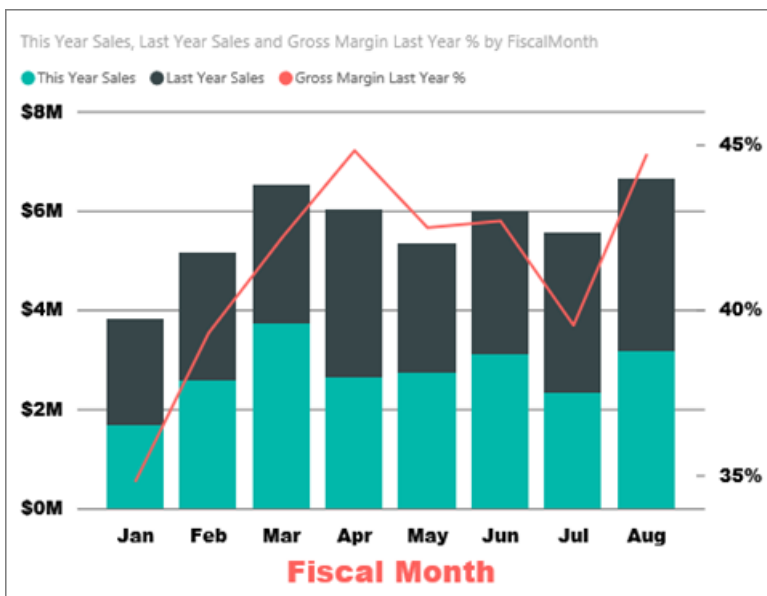


1. To make the visual easier to read and interpret, convert the line chart to a Line and Stacked Column chart.



2. Drag **Gross Margin Last Year %** from **Column Values** into **Line Values**. What we have now is the stacked column chart we created above *plus* a line chart. (Optionally, use what you learned above to format the axes font color and size.)

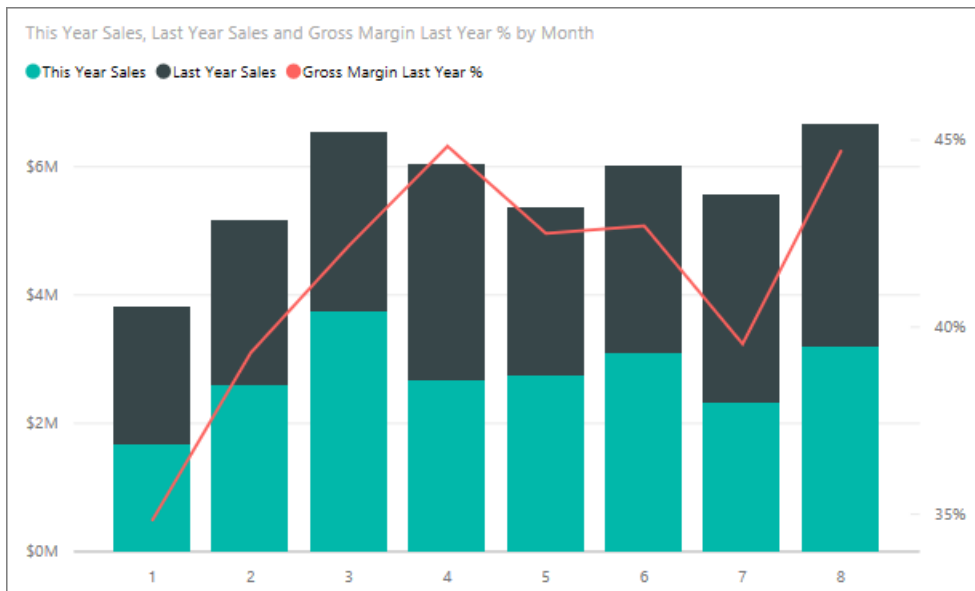
Power BI creates two axes, thus allowing the datasets to be scaled differently; the left measures dollars and the right measures percentage.



Format the secondary Y-axis

1. In the **Visualizations** pane, select the paint roller icon to display the formatting options.
2. Expand the Y-Axis options by selecting the down arrow.
3. Scroll through the list until you find the options for **Show secondary**. Toggle **Show Secondary** from **Off** to **On**.





4. (Optional) Customize the two axes. If you switch **Position** for either the column axis or the line axis, then the two axes switch sides.

Y-Axis On

Y-Axis (Column)

Position: Left

Scale type: Linear

Start: Auto

End: Auto

Title: Off

Style: Show title only

Display units: Auto

Decimal Places: Auto

Show secondary: On

Y-Axis (Line)

Position: Right

Scale type: Linear

Start:

End:

Title: Off

Style: Show title only

Display units: Auto

Decimal Places: Auto

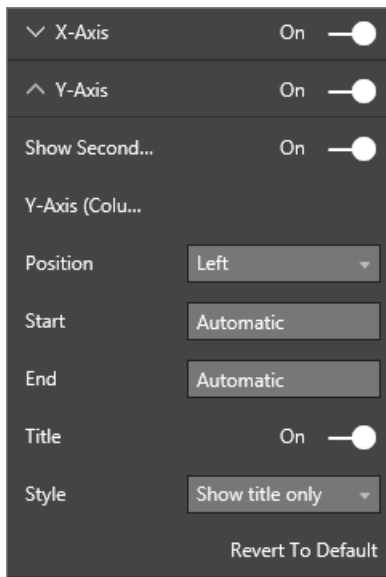
Revert to default

Data colors

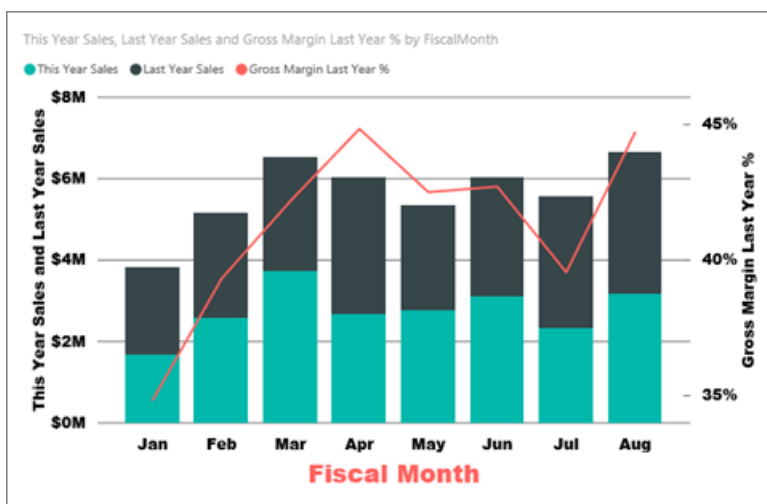
Add titles to both axes

With a visualization this complicated, it helps to add axes titles. Titles help your colleagues understand the story your visualization is telling.

1. Toggle **Title** to **On** for **Y-Axis (Column)** and the **Y-Axis (Line)**.
2. Set **Style** to **Show title only**.



3. Your Combo chart now displays dual axes, both with titles.



For more information, see [Tips and tricks for color formatting, labeling, and axis properties](#).

Considerations and troubleshooting

If the X-axis is categorized by the report owner as a date type, the **Type** option will display and you can select between continuous or categorical.

Next steps

More about [Visualizations in Power BI reports](#)

[Customize titles, backgrounds, and legends](#)

[Customize colors and axis properties](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)


Doughnut charts in Power BI (Tutorial)

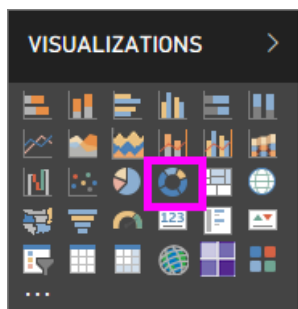
1/3/2018 • 1 min to read • [Edit Online](#)

A doughnut chart is similar to a pie chart in that it shows the relationship of parts to a whole. The only difference is that the center is blank and allows space for a label or icon.

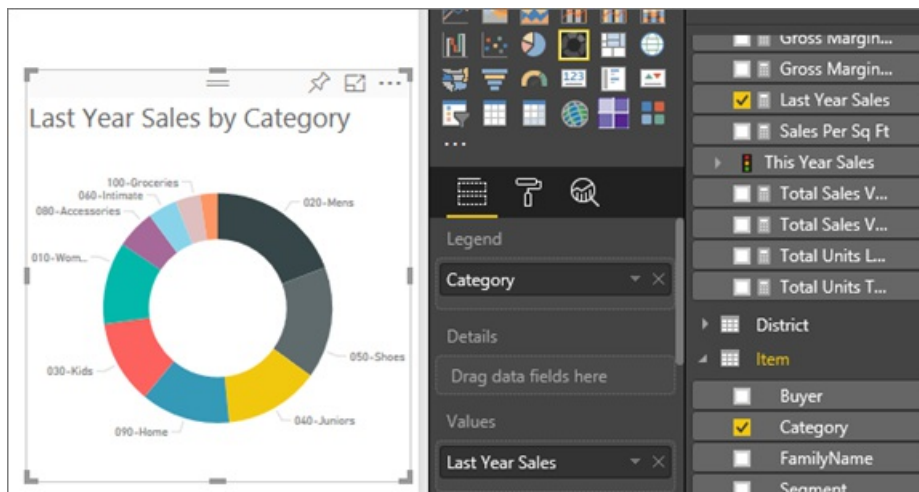
Create a doughnut chart

These instructions use the Retail Analysis Sample to create a doughnut chart that displays this year's sales by category. To follow along, [download the sample](#) for Power BI service (app.powerbi.com) or Power BI Desktop.

1. Start on a [blank report page](#) and select the **SalesStage** > **Sales Stage** field. If you're using Power BI service, make sure you open the report in [Editing View](#).
2. From the Fields pane, select **Sales** > **Last Year Sales**.
3. From the Visualizations pane, select the icon for doughnut chart  to convert your bar chart to a doughnut chart. If **Last Year Sales** is not in the **Values** area, drag it there.



4. Select **Item** > **Category** to add it to the **Legend** area.



5. Optionally, [adjust the size and color of the chart's text](#).

Considerations and troubleshooting

- The sum of the doughnut chart values must add up to 100%.
- Too many categories make it difficult to read and interpret.
- Doughnut charts are best used to compare a particular section to the whole, rather than comparing individual sections with each other.

Next steps

[Reports in Power BI](#)

[Visualization types in Power BI](#)

[Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

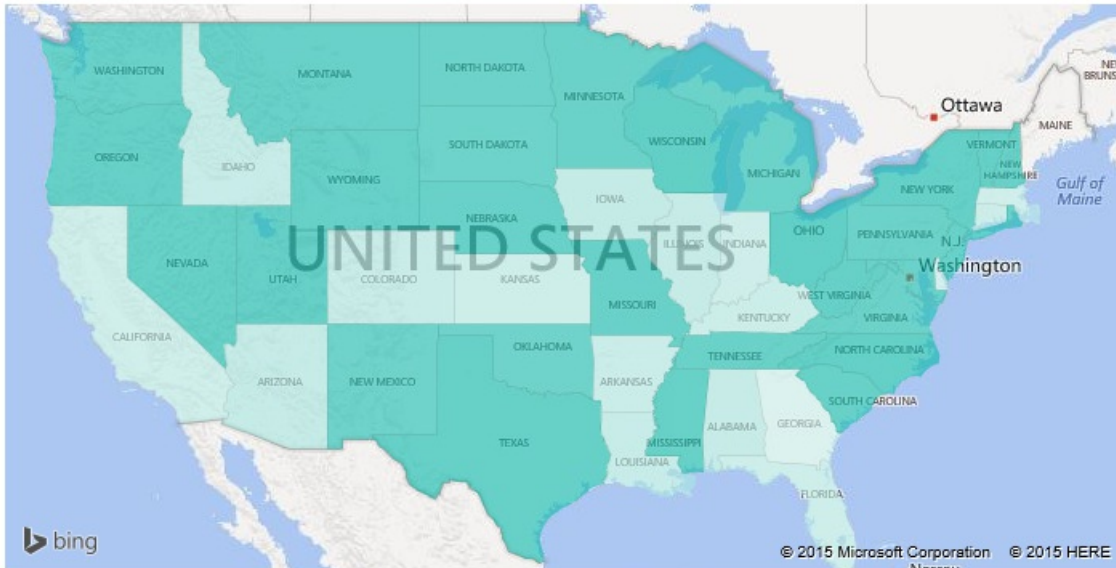
More questions? [Try the Power BI Community](#)

Filled maps (choropleths) in Power BI (Tutorial)

1/24/2018 • 3 min to read • [Edit Online](#)

A filled map uses shading or tinting or patterns to display how a value differs in proportion across a geography or region. Quickly display these relative differences with shading that ranges from light (less-frequent/lower) to dark (more-frequent/more).

Sentiment by State



What is sent to Bing

Power BI integrates with Bing to provide default map coordinates (a process called geo-coding). When you create a map visualization in Power BI service or Power BI Desktop, the data in the **Location**, **Latitude**, and **Longitude** buckets (that is being used to create that visualization) is sent to Bing.

You, or your administrator, may need to update your firewall to allow access to the URLs Bing uses for geocoding. Those URLs are:

- <https://dev.virtualearth.net/REST/V1/Locations>
- <https://platform.bing.com/geo/spatial/v1/public/Geodata>
- <https://www.bing.com/api/maps/mapcontrol>

For more information about the data being sent to Bing, and for tips to increase your geo-coding success, see [Tips and tricks for map visualizations](#).

When to use a filled map

Filled maps are a great choice:

- to display quantitative information on a map.
- to show spatial patterns and relationships.
- when your data is standardized.
- when working with socioeconomic data.
- when defined regions are important.
- to get an overview of the distribution across the geographic locations.

Prerequisites

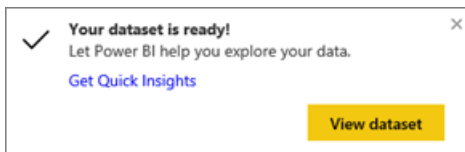
- Power BI service or Power BI Desktop
- Sales and Marketing Sample

To follow along, the tutorial uses Power BI service, not Power BI Desktop.

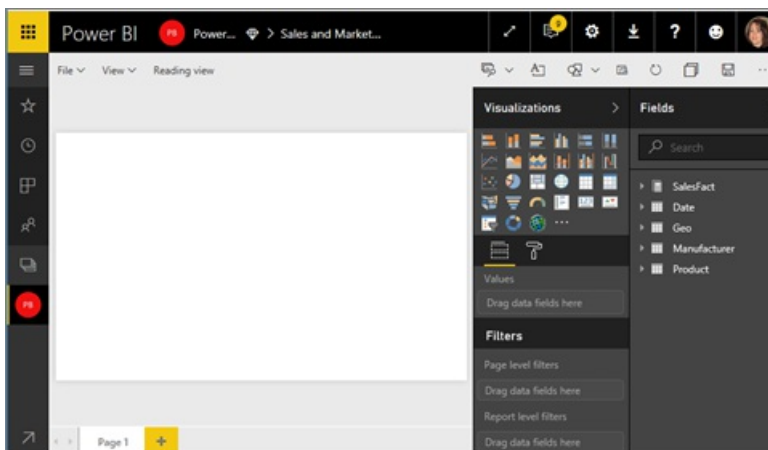
Create a basic filled map

In this video, Kim creates a basic map and converts it to a filled map.

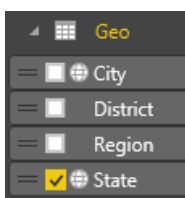
1. To create your own filled map, [download the Sales and Marketing sample](#) by signing in to Power BI and selecting **Get Data > Samples > Sales and Marketing > Connect**.
2. When the success message appears, select **View dataset**.



3. Power BI opens a blank report canvas in [Editing View](#).



4. From the Fields pane, select the **Geo > State** field.



5. [Convert the chart](#) to a filled map. Notice that **State** is now in the **Location** well. Bing Maps uses the field in

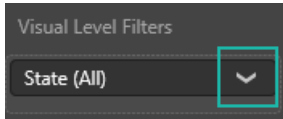
the **Location** well to create the map. The location can be a variety of valid locations: countries, states, counties, cities, zip codes or other postal codes etc. Bing Maps provides filled map shapes for locations around the world. Without a valid entry in the Location well, Power BI cannot create the filled map.



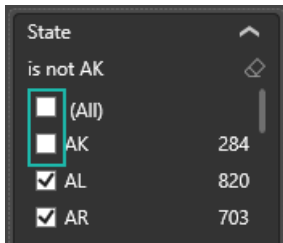
6. Filter the map to display only the continental United States.

a. At the bottom of the Visualizations pane, look for the **Filters** area.

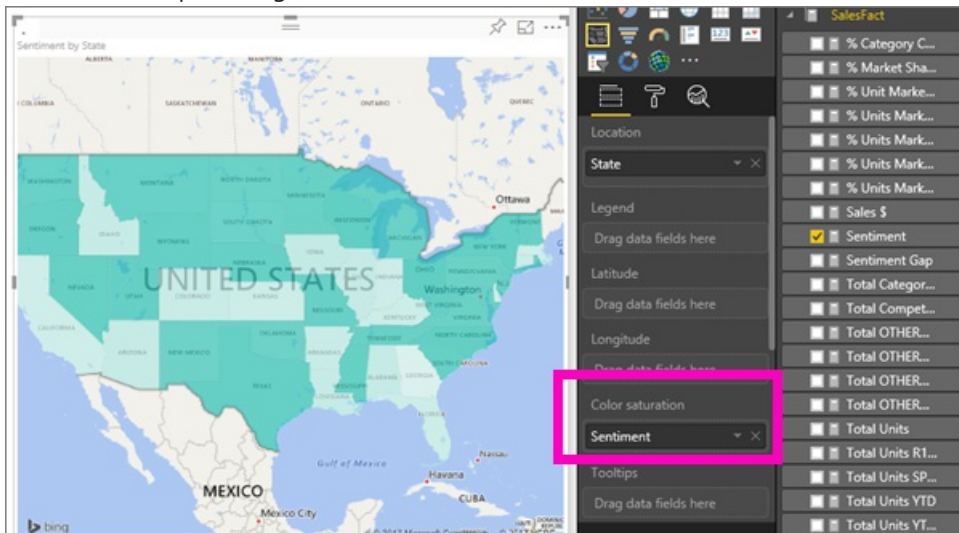
b. Hover over **State** and click the expand chevron



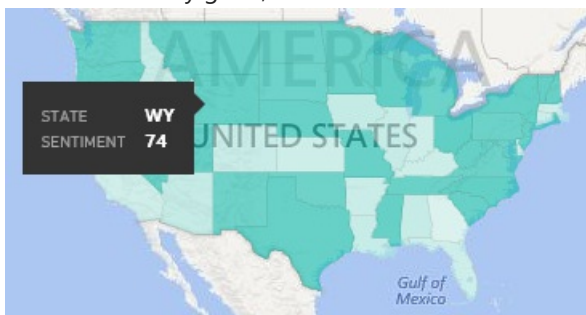
c. Place a checkmark next to **All** and remove the checkmark next to **AK**.



7. Select **SalesFact > Sentiment** to add it to the **Color saturation** well. The field in the **Color saturation** well controls the map shading.



8. The filled map is shaded in green, with light green representing the lower sentiment numbers and dark green representing the higher, more-positive sentiment. Here I've highlighted the state of Wyoming (WY) and see that Sentiment is very good, 74.



9. [Save the report.](#)

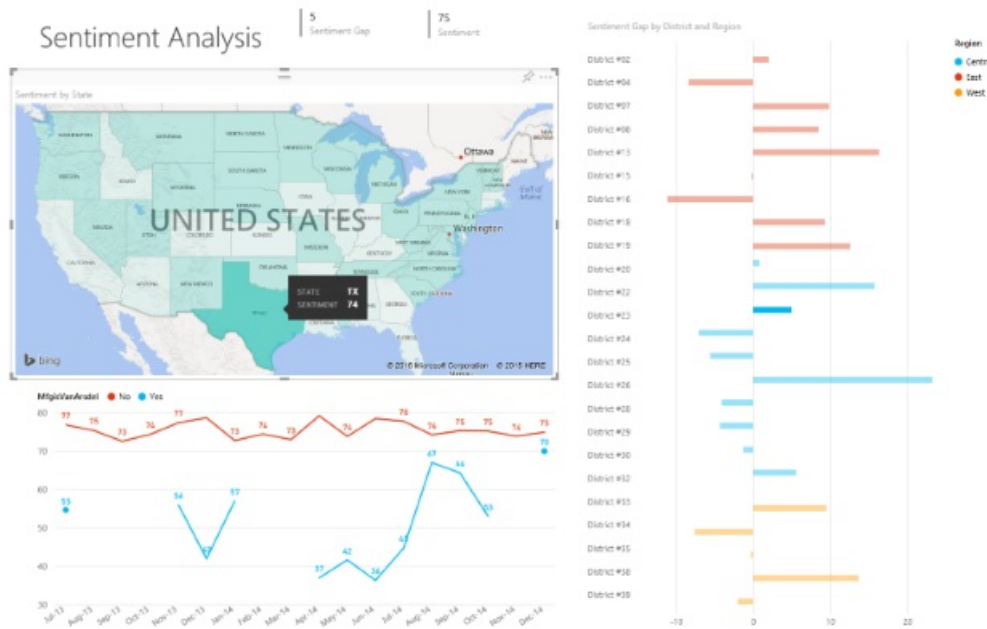
Highlighting and cross-filtering

For information about using the Filters pane, see [Add a filter to a report](#).

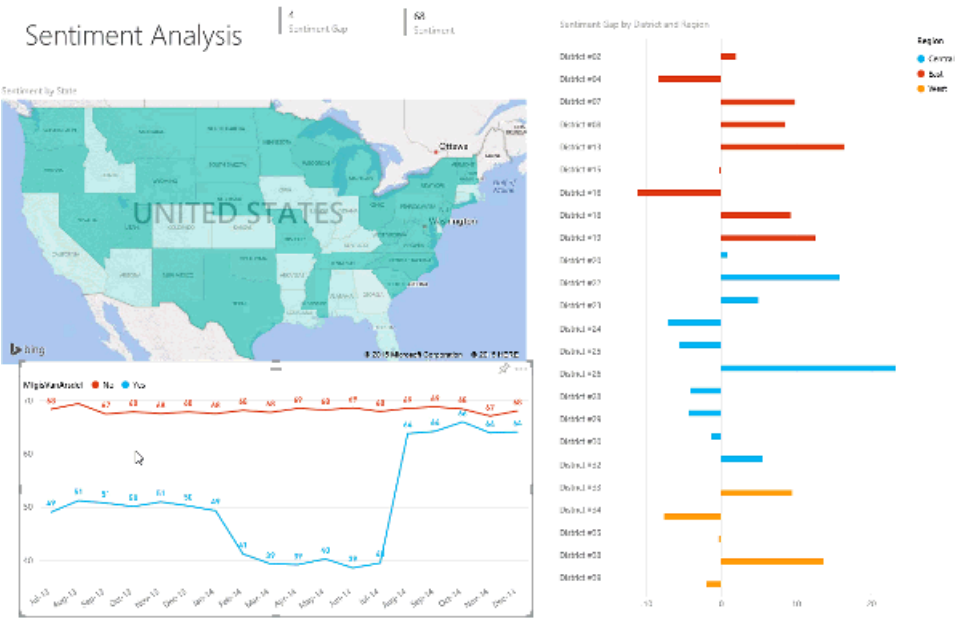
Highlighting a Location in a Filled Map cross-filters the other visualizations on the report page... and vice versa.

To follow along, copy and paste your Filled map onto the **Sentiment** page of the *Sales and Marketing* report.

1. On the filled map, select a state. This highlights the other visualizations on the page. Selecting **Texas**, for example, shows me that Sentiment is 74, Texas is in the Central District #23, and that most of the sales volume comes from the Moderation and Convenience segments.

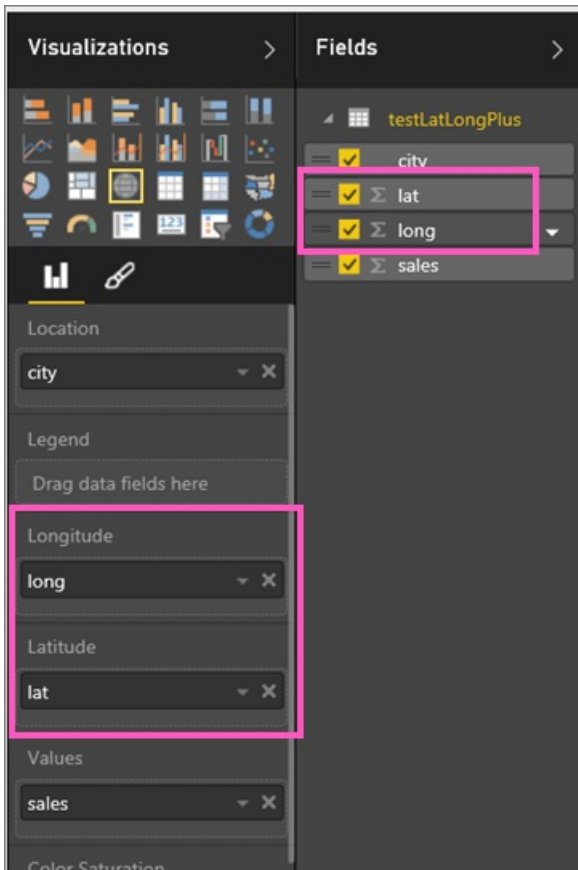


2. On the line chart, toggle between **No** and **Yes**. This filters the Filled Map to show Sentiment for VanArsdel and for VanArsdel's competition.



Considerations and troubleshooting

Map data can be ambiguous. For example, there's a Paris, France, but there's also a Paris, Texas. Your geographic data is probably stored in separate columns – a column for city names, a column for state or province names, etc. – so Bing may not be able to tell which Paris is which. If your dataset already contains latitude and longitude data, Power BI has special fields to help make the map data unambiguous. Just drag the field that contains your latitude data into the Visualizations > Latitude area. And do the same for your longitude data.



If you have permissions to edit the dataset in Power BI Desktop, watch this video for help addressing map ambiguity.

If you do not have access to latitude and longitude data, [follow these instructions to update your dataset](#).

For more help with Map visualizations, see [Tips and tricks for map visualizations](#).

Next steps

[Add the filled map as a dashboard tile \(pin the visual\)](#)

[Add a visualization to a report](#)

[Visualization types in Power BI](#)

[Change the type of visualization being used](#)

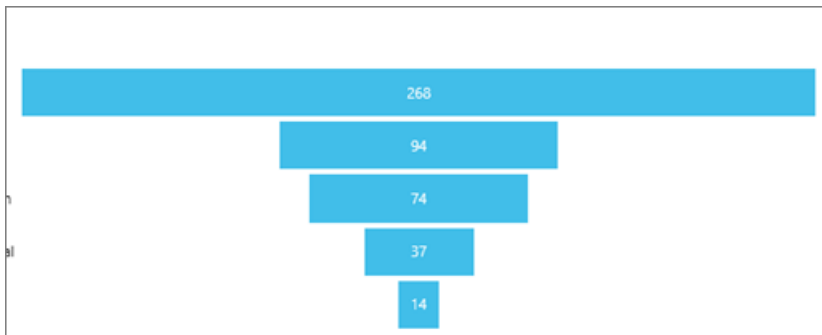
More questions? [Try the Power BI Community](#)

Funnel charts (Tutorial)

1/23/2018 • 3 min to read • [Edit Online](#)

A funnel chart helps you visualize a linear process that has sequential connected stages. For example, a sales funnel that tracks customers through stages: Lead > Qualified Lead > Prospect > Contract > Close. At a glance, the shape of the funnel conveys the health of the process you're tracking.

Each funnel stage represents a percentage of the total. So, in most cases, a funnel chart is shaped like a funnel -- with the first stage being the largest, and each subsequent stage smaller than its predecessor. A pear-shaped funnel is also useful -- it can identify a problem in the process. But typically, the first stage, the "intake" stage, is the largest.



When to use a funnel chart

Funnel charts are a great choice:

- when the data is sequential and moves through at least 4 stages.
- when the number of "items" in the first stage is expected to be greater than the number in the final stage.
- to calculate potential (revenue/sales/deals/etc.) by stages.
- to calculate and track conversion and retention rates.
- to reveal bottlenecks in a linear process.
- to track a shopping cart workflow.
- to track the progress and success of click-through advertising/marketing campaigns.

Working with funnel charts

Funnel charts:

- Can be pinned from reports and from Q&A.
- Can be sorted.
- Support multiples.
- Can be highlighted and cross-filtered by other visualizations on the same report page.
- Can be used to highlight and cross-filter other visualizations on the same report page.

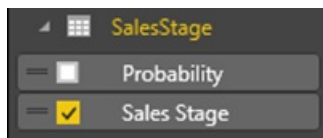
Create a basic funnel chart

Watch this video to see Will create a Funnel chart using the Sales and Marketing sample.

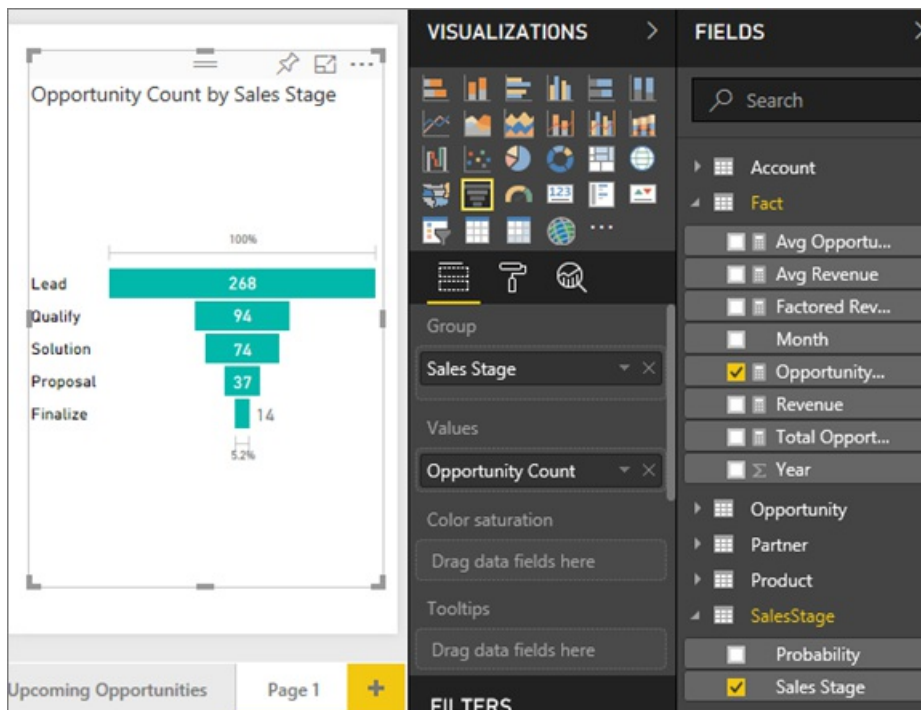
Now create your own funnel chart that shows the number of opportunities we have in each of our sales stages.

These instructions use the Opportunity Analysis Sample. To follow along, [download the sample](#) for Power BI service (app.powerbi.com) or Power BI Desktop.

1. Start on a [blank report page](#) and select the **SalesStage** > **Sales Stage** field. If you're using Power BI service, make sure you open the report in [Editing View](#).

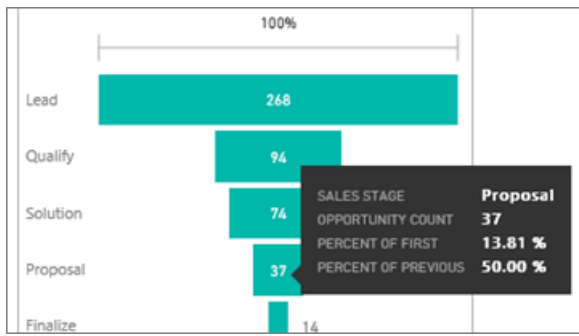


2. [Convert the chart](#) to a funnel. Notice that **Sales Stage** is in the **Group** well.
3. From the **Fields** pane, select **Fact** > **Opportunity Count**.



4. Hovering over a bar displays a wealth of information.

- The name of the stage
- Number of opportunities currently in this stage
- Overall conversion rate (% of Lead)
- Stage-to-stage (aka Drop Rate) which is the % of the previous stage (in this case, Proposal Stage/Solution Stage)



5. Add the Funnel as a dashboard tile.
6. Save the report.

Highlighting and cross-filtering

For information about using the Filters pane, see [Add a filter to a report](#).

Highlighting a bar in a funnel cross-filters the other visualizations on the report page... and vice versa. To follow along, add a few more visuals to the report page that contains the funnel chart.

1. On the funnel, select the **Proposal** bar. This cross-highlights the other visualizations on the page. Use CTRL to multi-select.

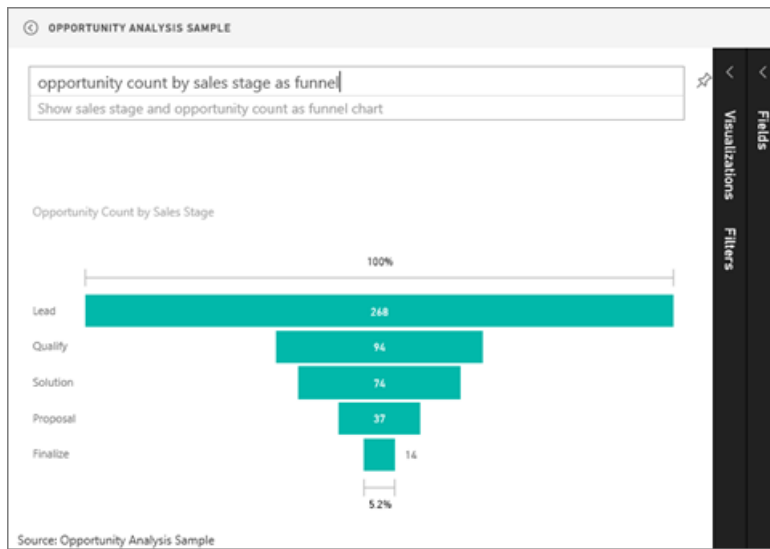


2. To set preferences for how visuals cross-highlight and cross-filter each other, see [Visual interactions in Power BI](#)

Create a funnel chart in Q&A

Open the Opportunity Analysis Sample dashboard, or any other dashboard that has at least one visualization pinned from the Opportunity Analysis Sample dataset. When you type a question in Q&A, Power BI searches for answers in all the datasets that are associated with (have tiles pinned to) the selected dashboard. For more information see, [Power BI - basic concepts](#).

1. On the Opportunity Analysis Sample dashboard, begin typing your question in the Q&A question box.



2. Be sure to add "as funnel" so Power BI knows which visualization type you'd prefer.

Next steps

[Visualization types in Power BI](#)

[Pin a visualization to a dashboard](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

KPI visuals (Tutorial)

12/20/2017 • 2 min to read • [Edit Online](#)

A Key Performance Indicator (KPI) is a visual cue that communicates the amount of progress made toward a measurable goal. For more information about KPIs, see [Microsoft Developer Network](#).

When to use a KPI

KPIs are a great choice:

- to measure progress (what am I ahead or behind on?)
- to measure distance to a goal (how far ahead or behind am I?)

KPI visual requirements

A Key Performance Indicator (KPI) is based on a specific measure and is designed to help you evaluate the current value and status of a metric against a defined target. Therefore, a KPI visual requires a *base* measure that evaluates to a value and a *target* measure or value, and a threshold or goal.

NOTE

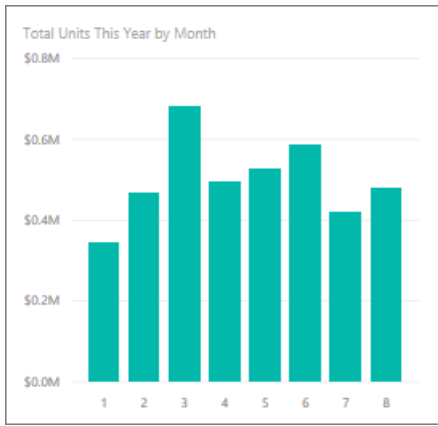
Currently, a KPI dataset needs to contain goal values for a KPI. If your dataset doesn't contain one, you can create goals by adding an Excel sheet with goals to your data model or PBIX file.

How to create a KPI

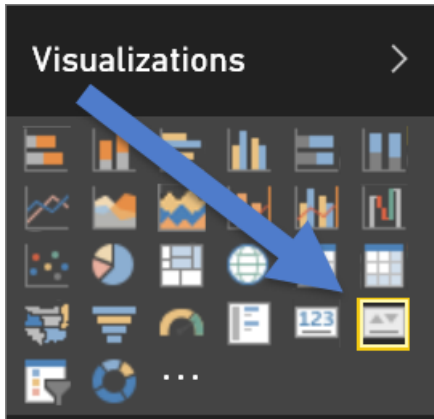
To follow along, sign in to Power BI service and select **Get Data > Samples > Retail Analysis Sample**. We'll create a KPI that measures the progress we've made toward a sales goal.

Or watch Will show you how to create single metric visuals: gauges, cards, and KPIs.

1. Open the report in [Editing view](#) and [add a new page](#).
2. Select **Sales > Total Units This Year**. This will be the indicator.
3. Add **Time > Month**. This will be represent the trend.
4. IMPORTANT: Sort the chart by **Month**. Once you convert the visualization to a KPI, there is no option to sort.



5. Convert the visual to a KPI by selecting the KPI icon from the Visualizations pane.



6. Add a goal. Add last years sales as the goal. Drag **Total Units Last Year** to the **Target goals** field.



7. Optionally, format the KPI by selecting the paint roller icon to open the Formatting pane.

- **Indicator** - controls the indicator's display units and decimal places.
- **Trend axis** - when set to **On**, the trend axis is displayed as the background of the KPI visual.
- **Goals** - when set to **On**, the visual displays the goal and the distance from the goal as a percentage.
- **Color coding > Direction** - some KPIs are considered *better* for higher values and some are considered *better* for lower values. For example, earnings versus wait time. Typically a higher value of earnings is better versus a higher value of wait time. Select **high is better** and, optionally, change the color settings.

8. When you have the KPI as you want it, [pin it to a dashboard](#).

KPIs are also available on your mobile devices – keeping you always connected to your businesses heartbeat.

Considerations and troubleshooting

- If your KPI doesn't look like the one above, it may be because you need to sort by month. Since KPIs don't have

a sort option, you'll need to sort by month *before* you convert your visualization to a KPI.

Next steps

[Reports in Power BI](#)

[Visualizations in Power BI reports](#)

[Power BI - Basic Concepts](#)

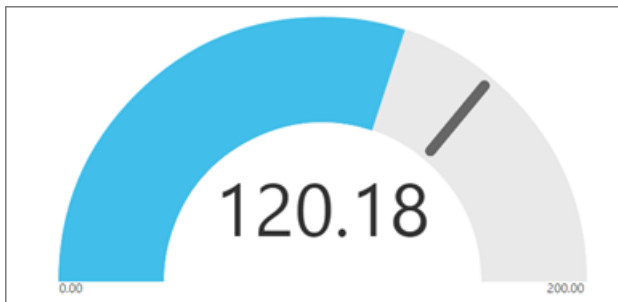
More questions? [Try the Power BI Community](#)

Radial gauge charts in Power BI (Tutorial)

1/23/2018 • 3 min to read • [Edit Online](#)

A radial gauge chart has a circular arc and displays a single value that measures progress toward a goal/KPI. The goal, or target value, is represented by the line (needle). Progress toward that goal is represented by the shading. And the value that represents that progress is shown in bold inside the arc. All possible values are spread evenly along the arc, from the minimum (left-most value) to the maximum (right-most value).

In the example below, we are a car retailer, tracking our Sales team's average sales per month. Our goal is 140 and represented by the black needle. The minimum possible average sales is 0 and we've set the maximum as 200. The blue shading shows that we're currently averaging approximately 120 sales this month. Luckily, we still have another week to reach our goal.



When to use a radial gauge

Radial gauges are a great choice to:

- show progress toward a goal.
- represent a percentile measure, like a KPI.
- show the health of a single measure.
- display information that can be quickly scanned and understood.

Prerequisites

- Power BI service or Power BI Desktop
- Financial sample Excel workbook: [download the sample directly](#).

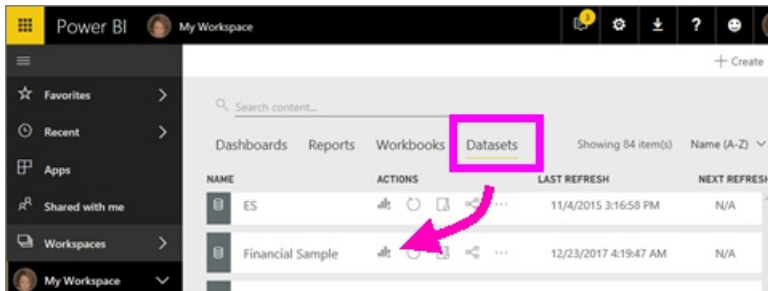
Create a basic radial gauge

These instructions use Power BI service. To follow along, sign in to Power BI and open the Excel Financial Sample file.

Or watch Will show you how to create single metric visuals: gauges, cards, and KPIs.

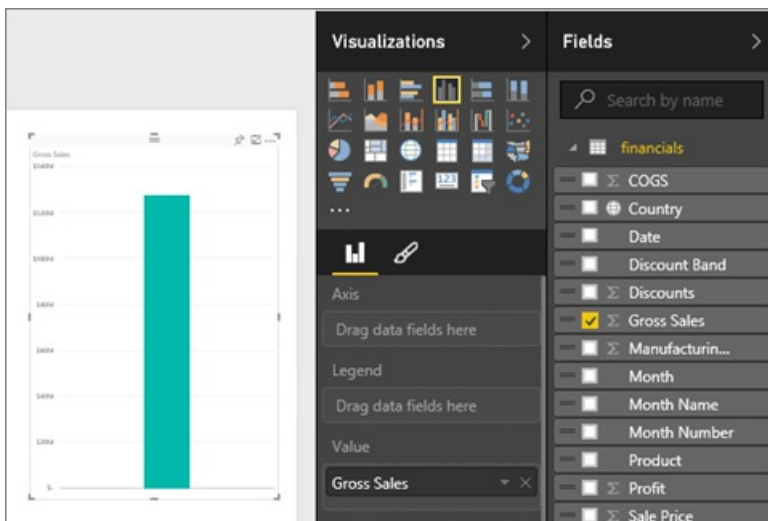
Step 1: Open the Financial Sample Excel file

1. [Download the sample Financial Excel file](#) if you haven't already. Remember where you saved it.
2. Open the file in **Power BI service** by selecting **Get Data > Files** and browsing to the location where you saved the file. Select **Import**. The Financial Sample is added to your workspace as a dataset.
3. From the **Dataset** content list, select **Financial Sample** to open it in Explore mode.

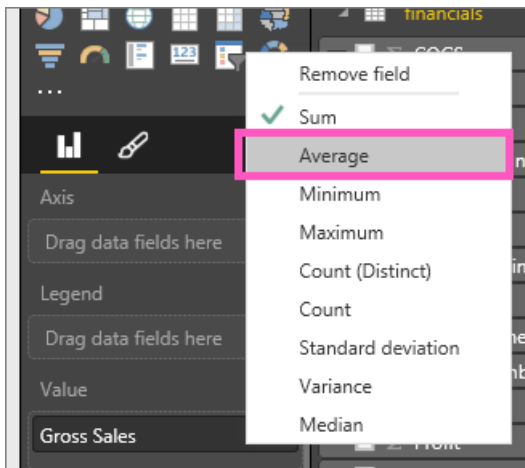


Step 2: Create a gauge to track Gross Sales

1. In the **Fields** pane, select **Gross Sales**.

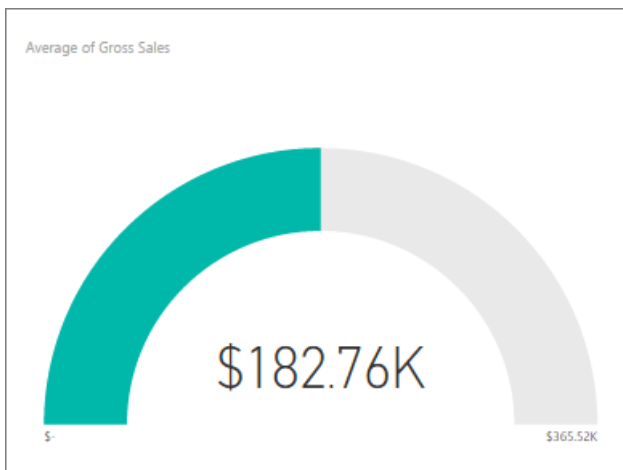


2. Change the aggregation to **Average**.



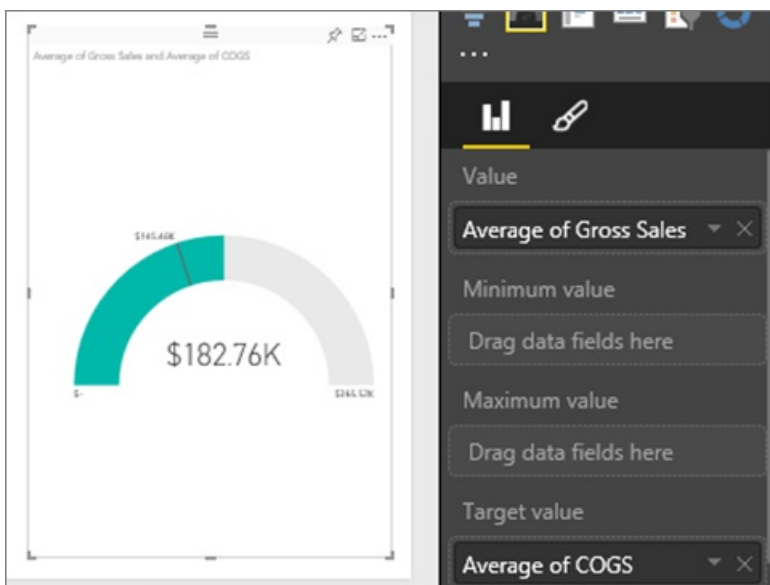
3. Select the gauge icon  to convert the Column Chart to a gauge.

By default, Power BI creates a Gauge chart where the current value (in this case, Average of Gross Sales) is assumed to be at the halfway point on the gauge. Since the Average Gross Sales is \$182.76K, the start value (Minimum) is set to 0 and the end value (Maximum) is set to double the current value.



Step 3: Set a target value

1. Drag **COGS** to the **Target value** well.
2. Change the aggregation to **Average**. Power BI adds a needle to represent our target value of **\$145.48K**. Notice that we've exceeded our target.



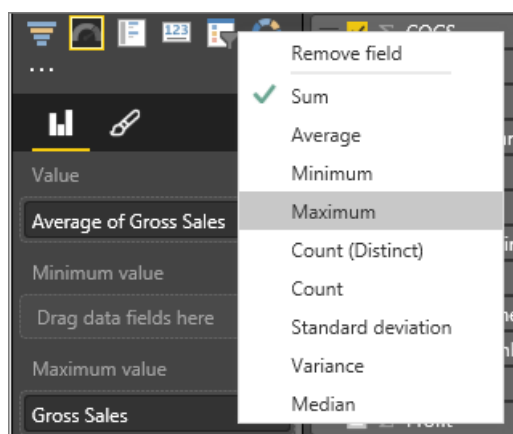
NOTE

You can also manually enter a target value. See "Use formatting options to manually set Minimum, Maximum, and Target values" below.

Step 4: Set a maximum value

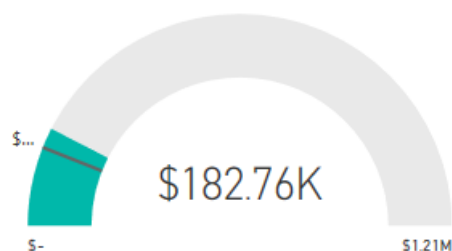
In Step 2, Power BI used the Value field to automatically set minimum (start) and maximum (end). But what if you want to set your own maximum value? Let's say that instead of using double the current value as the maximum possible value, you want to set it to the highest Gross Sales number in your dataset?

1. Drag **Gross Sales** from the **Fields** list to the **Maximum Value** well.
2. Change the aggregation to **Maximum**.



The gauge is redrawn with a new end value, 1.21 million in gross sales.

Average of Gross Sales, Max of Gross Sales and A...

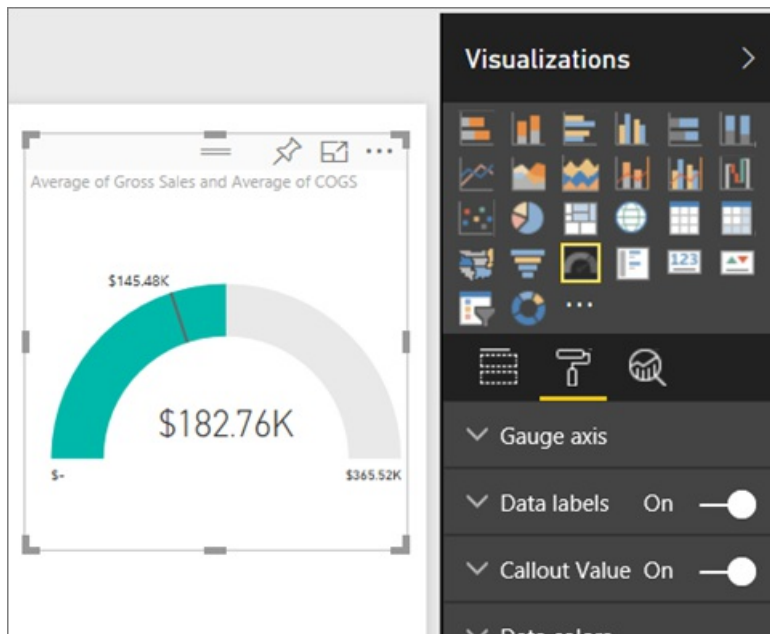


Step 5: Save your report

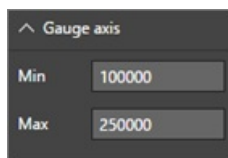
1. [Save the report.](#)
2. [Add the gauge chart as a dashboard tile.](#)

Use formatting options to manually set Minimum, Maximum, and Target values

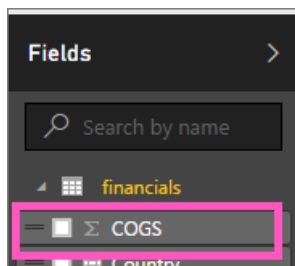
1. Remove **Max of Gross Sales** from the **Maximum value** well.
2. Open the formatting pane by selecting the paint roller icon.



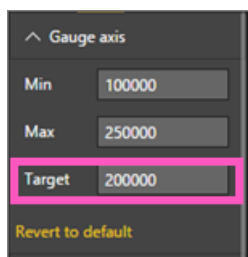
3. Expand the **Gauge axis** and enter values for **Min** and **Max**.



4. Remove the current target value by removing the checkmark next to **COGS**.



5. When the **Target** field appears under **Gauge axis**, enter a value.



6. Optionally, continue formatting your gauge chart.

Next steps

[Visualization types in Power BI](#)

[Add a visualization to a report](#)

[Pin a visualization to a dashboard](#)

[Power BI - Basic Concepts](#)

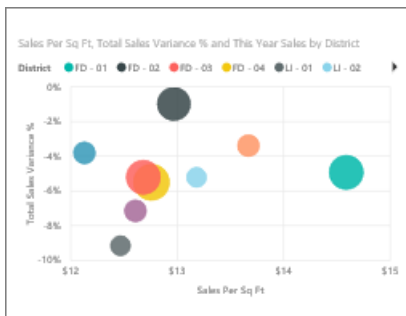
More questions? [Try the Power BI Community](#)

Scatter charts and bubble charts in Power BI (Tutorial)

1/19/2018 • 3 min to read • [Edit Online](#)

A scatter chart always has two value axes to show one set of numerical data along a horizontal axis and another set of numerical values along a vertical axis. The chart displays points at the intersection of an x and y numerical value, combining these values into single data points. These data points may be distributed evenly or unevenly across the horizontal axis, depending on the data.

A bubble chart replaces the data points with bubbles, with the bubble size representing an additional dimension of the data.



You can set the number of data points

When to use a scatter chart or bubble chart

Scatter charts are a great choice:

- to show relationships between 2 (scatter) or 3 (bubble) **numerical** values.
- to plot two groups of numbers as one series of xy coordinates.
- instead of a line chart when you want to change the scale of the horizontal axis
- to turn the horizontal axis into a logarithmic scale.
- to display worksheet data that includes pairs or grouped sets of values. In a scatter chart, you can adjust the independent scales of the axes to reveal more information about the grouped values.
- to show patterns in large sets of data, for example by showing linear or non-linear trends, clusters, and outliers.
- to compare large numbers of data points without regard to time. The more data that you include in a scatter chart, the better the comparisons that you can make.

Bubble charts are a great choice:

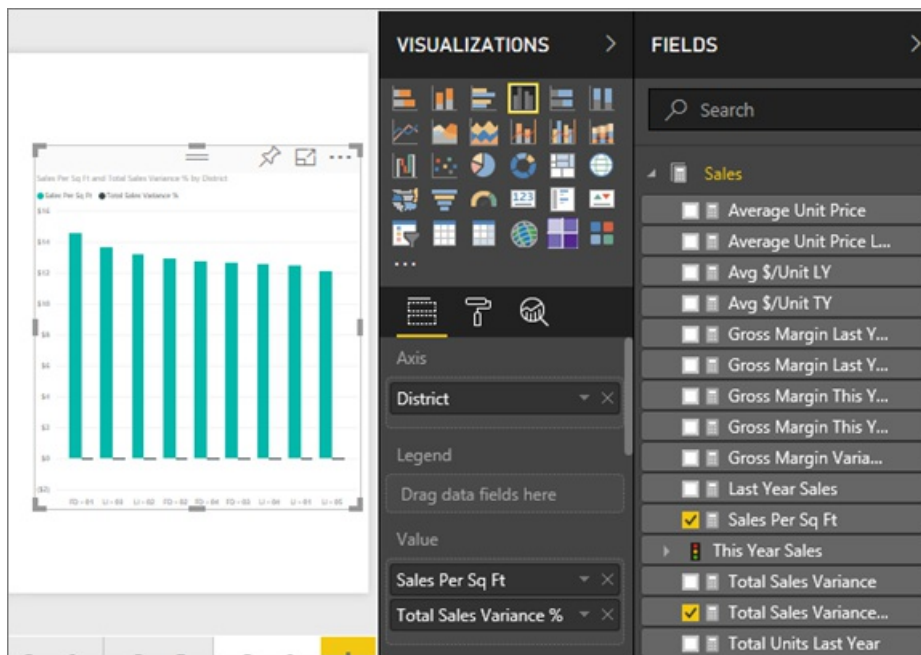
- if your data has 3 data series that each contain a set of values.
- to present financial data. Different bubble sizes are useful to visually emphasize specific values.
- to use with quadrants.


Create a scatter chart

Watch this video to see Will create a scatter chart and then follow the steps below to create one yourself.

These instructions use the Retail Analysis Sample. To follow along, [download the sample](#) for Power BI service (app.powerbi.com) or Power BI Desktop.

1. Start on a [blank report page](#) and select the **Sales > Sales Per Sq Ft** and **Sales > Total Sales Variance %** fields. If you're using Power BI service, make sure you open the report in [Editing View](#).
2. From the Fields pane, select **District > District**.



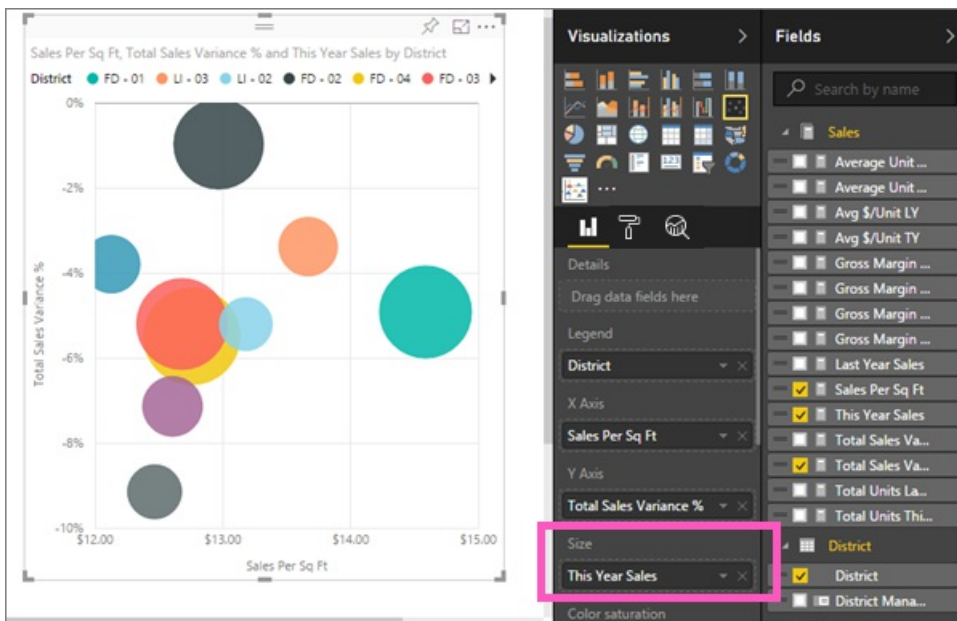
3. Convert to a scatter chart. In the Visualization pane, select the Scatter chart icon. 
4. Drag **District** from **Details** to **Legend**.



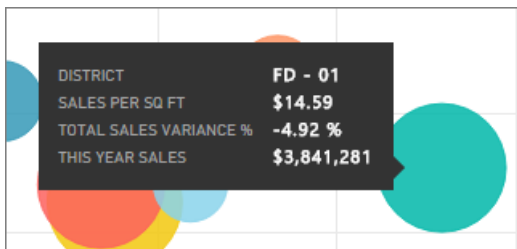
We now have a scatter chart that plots Total Sales Variance % along the Y axis, and plots Sales Per Square Feet along the X axis. The data point colors represent districts. Now let's add a third dimension.

Create a bubble chart

1. From the Fields pane, drag **Sales > This Year Sales > Value** to the **Size** area.

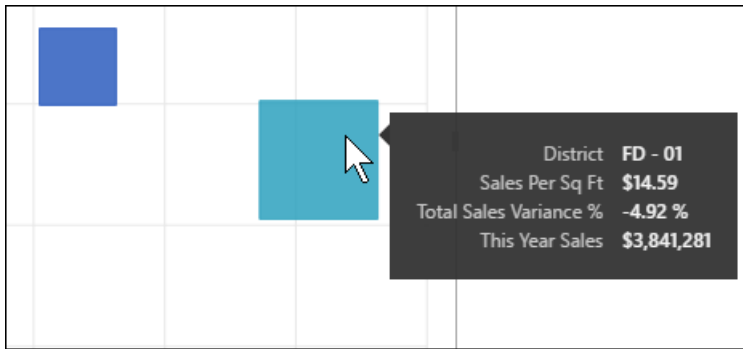


2. Hover over a bubble. The size of the bubble reflects the value of **This Year Sales**.

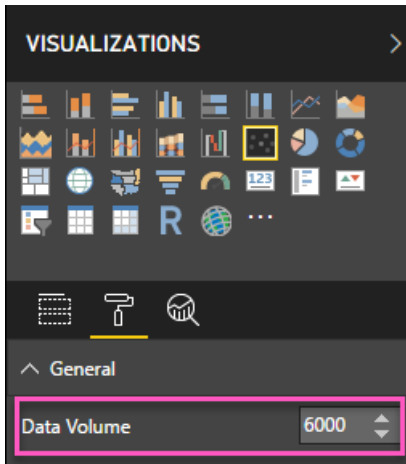


3. Optionally, format the visualization colors, labels, titles, background, and more.

You can also change the marker shape to diamond, triangle, or square:



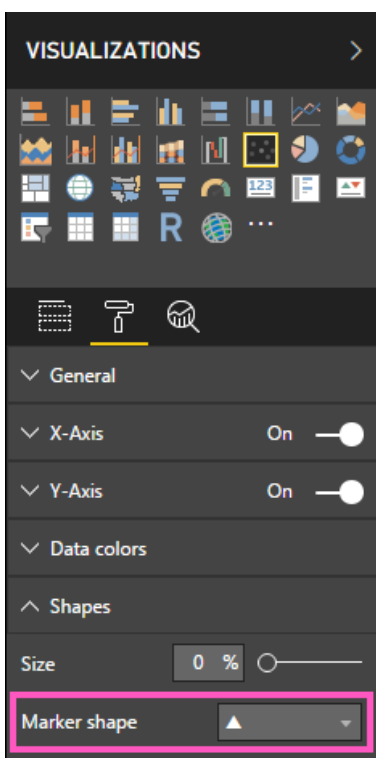
- Optionally, to set the number of data points to show in your bubble chart, in the **Format** section of the **Visualizations** pane, expand the **General** card and adjust the **Data Volume**. The default is 3500.



NOTE

Because more data points can mean a longer loading time, if you do choose to publish reports with limits at the higher end of the scale, make sure to test out your reports across the web and mobile as well to ensure performance matches your users' expectations.

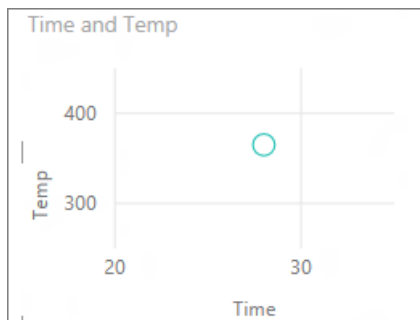
- Optionally, to select the marker shape, expand the **Shapes** card, then select a marker shape.



Considerations and Troubleshooting

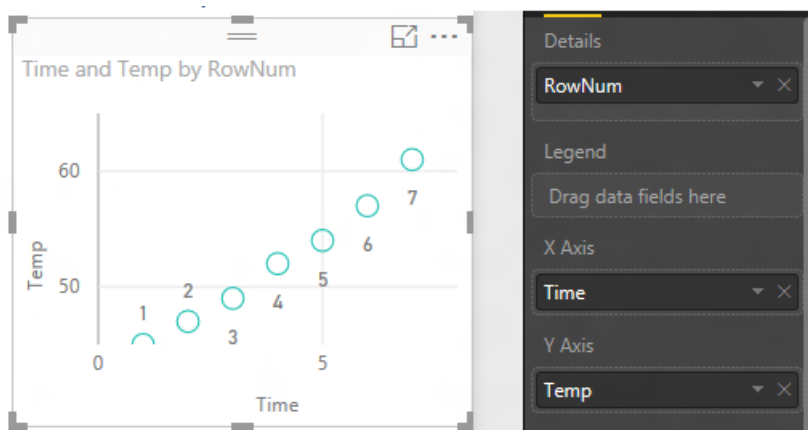
Your scatter chart has only one data point

Does your scatter chart have only one data point that aggregates all the values on the X and Y axes? Or maybe it aggregates all the values along a single horizontal or vertical line?

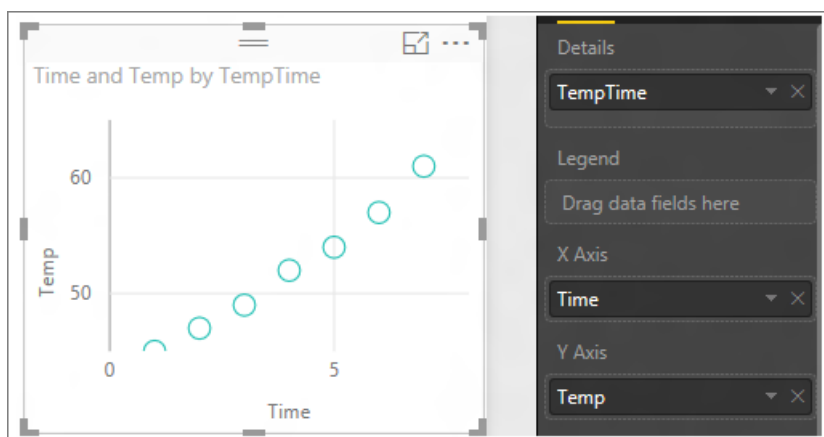


Add a field to the **Details** area to tell Power BI how to group the values. The field must be unique for each point you want to plot.

Like a simple row number or ID field:



Or if you don't have that in your data, create a field that concatenates your X and Y values together into something unique per point:



To create a new field, use the [Power BI Desktop Query Editor](#) to add an [Index Column](#) to your dataset. Then add this column to the **Details** area of your visualization.

Next steps

[Visualization types in Power BI](#)

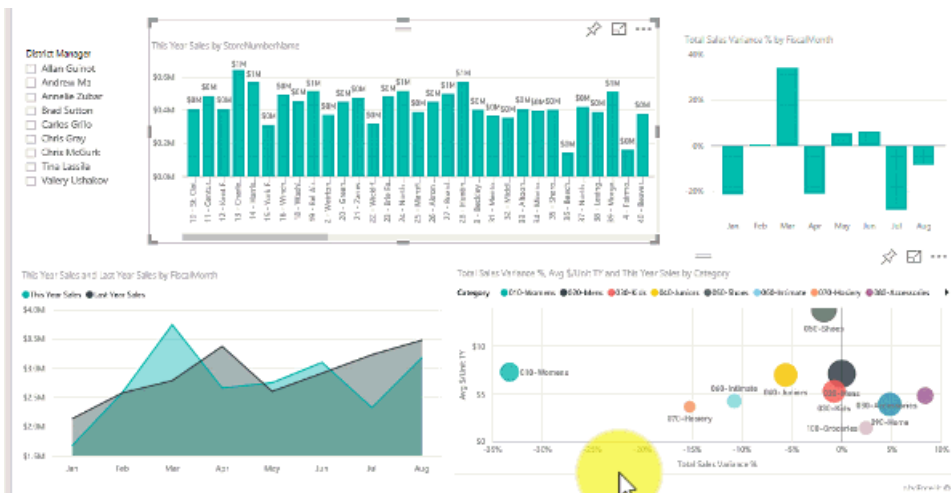
[Try it out -- it's free!](#)

More questions? [Try the Power BI Community](#)

Slicers in Power BI service (Tutorial)

11/15/2017 • 3 min to read • [Edit Online](#)

Your VP of Sales wants to be able to look at a number of metrics, for the entire division and for each individual District Manager. She could create a separate report page for each manager, or she could use a slicer. A slicer narrows the portion of the dataset shown in the other visualizations on the page. Slicers are an alternate way of filtering.



When to use a slicer

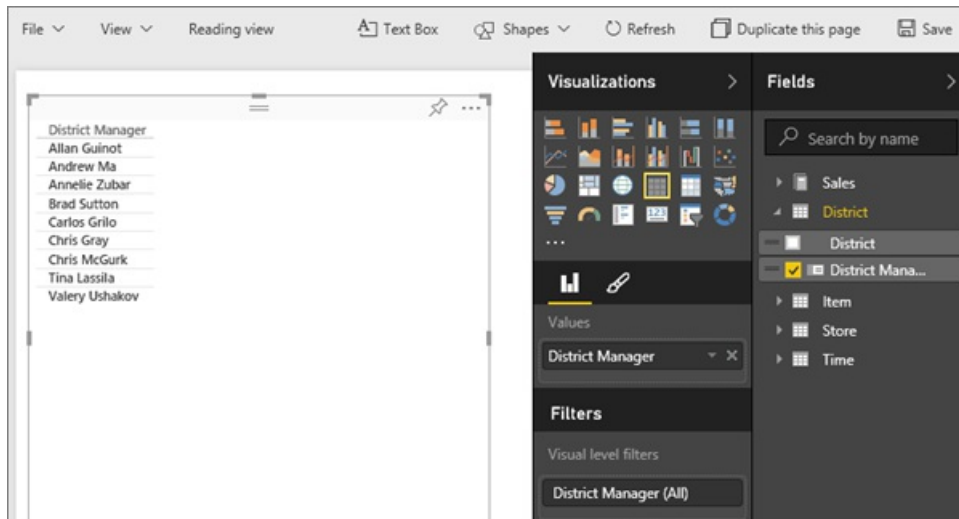
Slicers are a great choice in the following situations.

- To display commonly-used or important filters on the report canvas for easier access.
- To make it easier to see the current filtered state without having to open a drop-down list to find the filtering details.
- When you want to hide columns you don't need but still be able to use them to filter - this makes for narrower, cleaner tables.
- To create more focused reports - since slicers are floating objects you can put them next to the interesting part of the report you want your users to focus on.

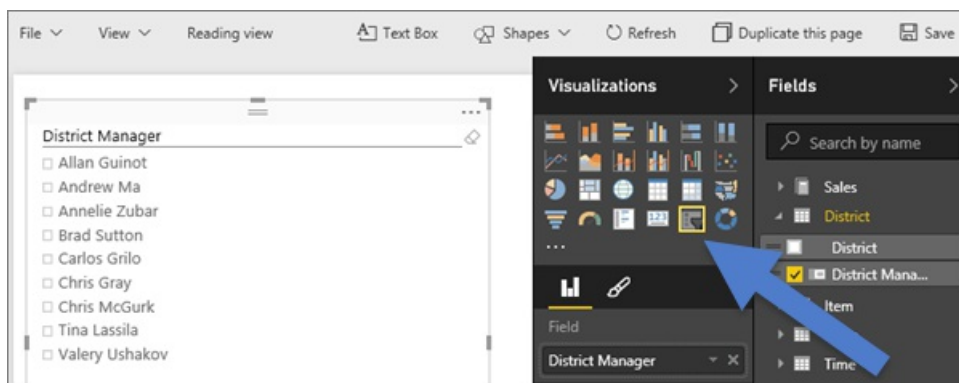
Create a slicer

1. Open the [Retail Analysis Sample](#) in [Editing View](#) and add a new report page.


- From the Fields pane, select **District > District Manager**.

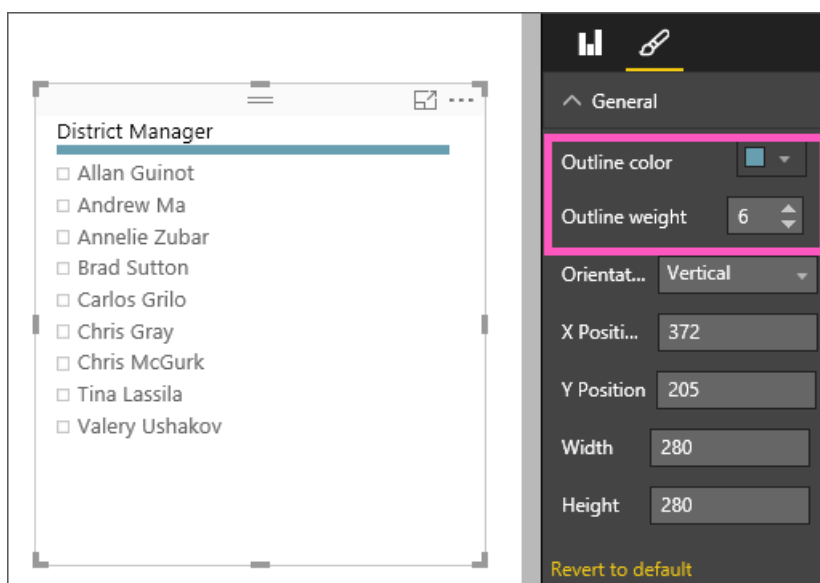


- Convert the visualization to a slicer. In the Visualizations pane, select the slicer icon.

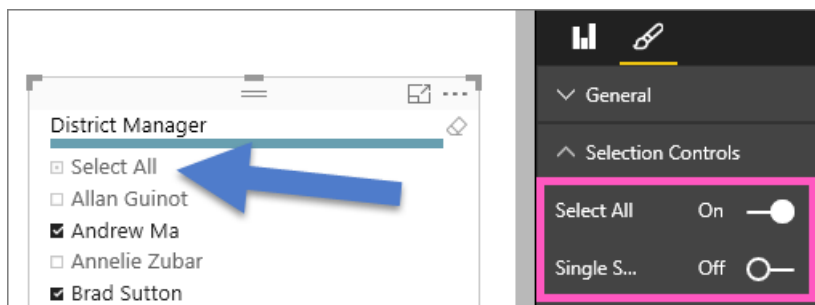


Format the slicer

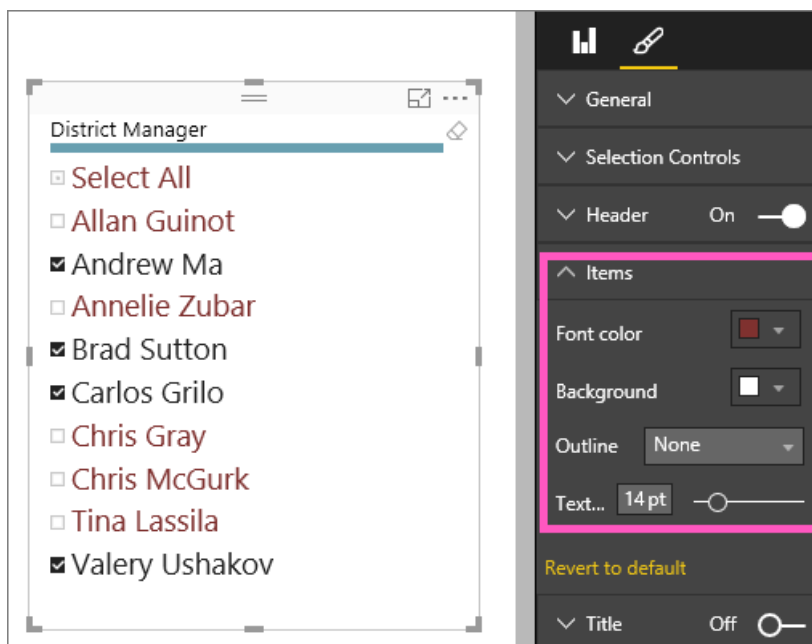
- With the slicer selected, in the Visualizations pane, select the paint roller icon  to display the Format options.
- Select **General > Outline color** and choose dark blue and change the **Weight** to **6**.



- Under **Selection Controls**, by default, **Select All** is **Off** and **Single Select** is **On**. This means that I have to use the CTRL key to select more than one name at a time. Turn **Select All** to **On** and **Single Select** to **Off**.



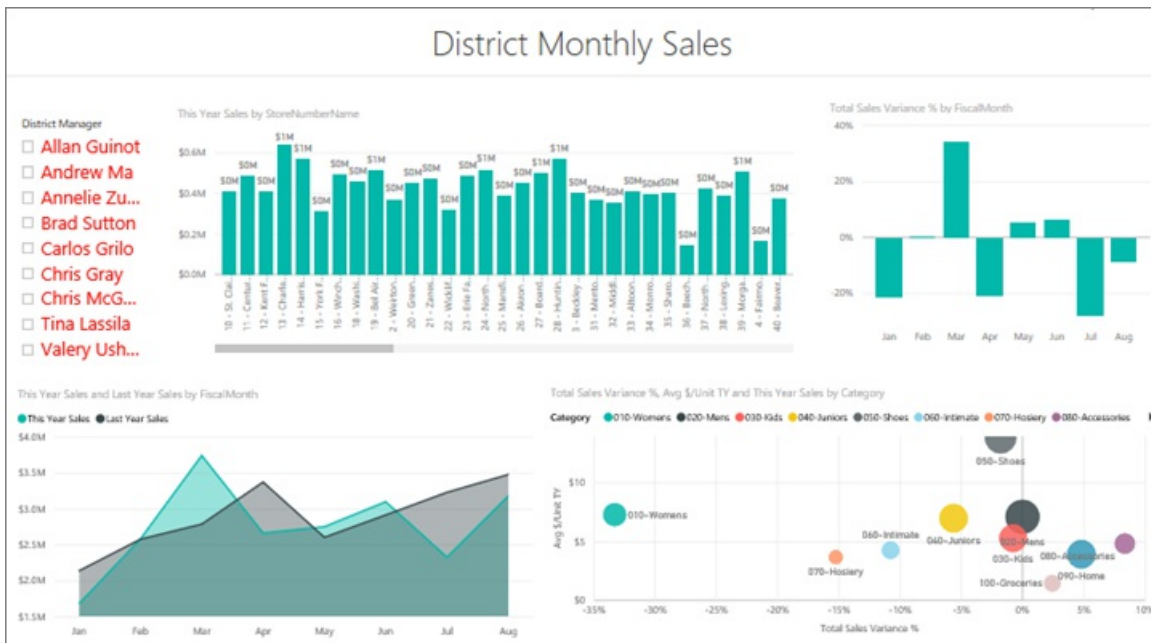
- Notice that the slicer now has a **Select All** option at the top of the list. Toggle **Select All** to select all of the names or to select none of the names.
 - And you can now select more than one name without having to use the CTRL key.
4. Under **Items**, increase the text size to 14pt. We want to be sure that our colleagues notice this slicer.
 5. Lastly, set **Font color** to a dark red. This will distinguish the selected names from the unselected names in our slicer.



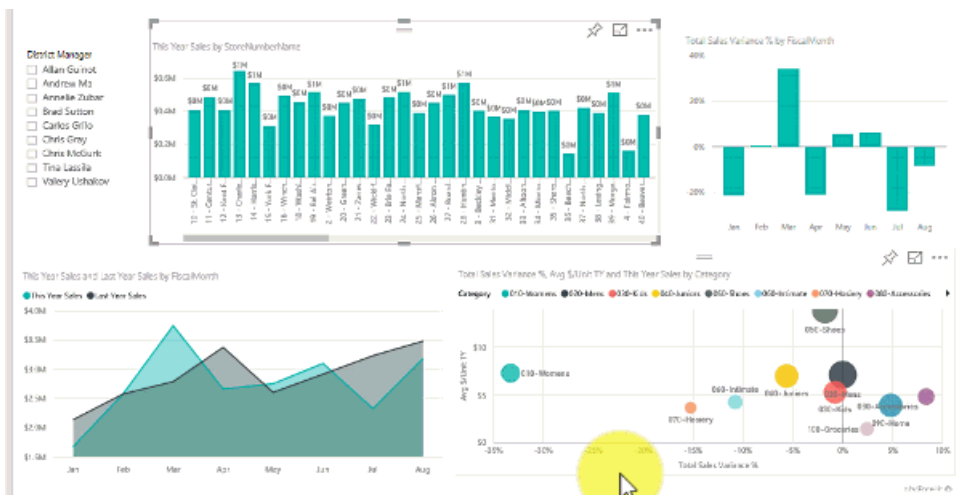
6. Have fun exploring the other options available for slicers.

Use the slicer in a report

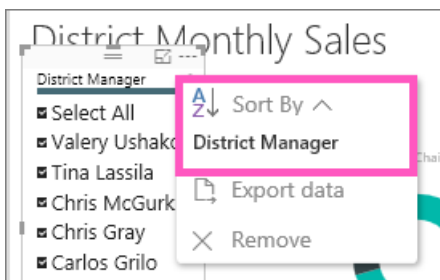
1. Add some additional visualizations to the report page or open the [Retail Analysis sample report](#) and select the **District Monthly Sales** tab.



2. Slice the report page for Carlos. Notice how the other visualizations update to reflect these selections.




3. Sort the slicer alphabetically by District Manager last name. Select the ellipses (...) in the top right corner of the slicer and choose **District Manager**.



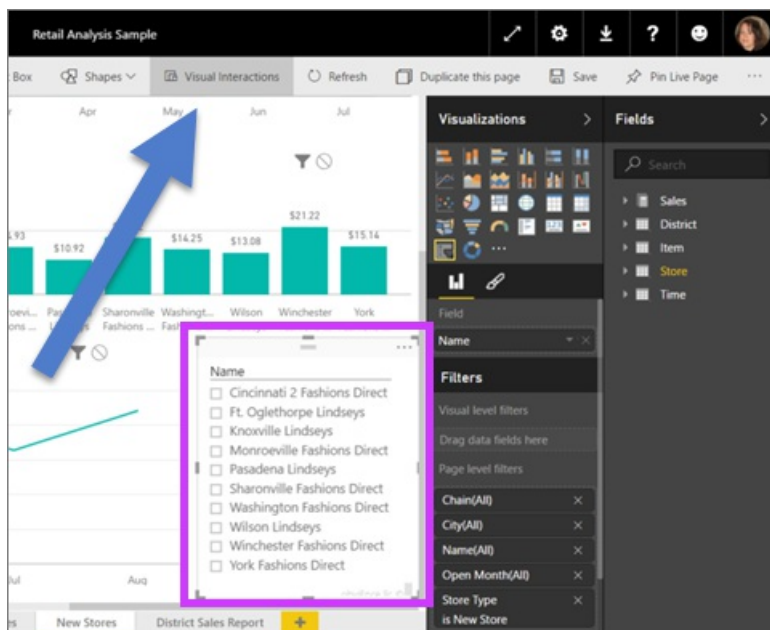


Control what effect the slicer has on other visuals on the page

Do you want the slicer to only filter some of the visuals on the report page? Use the **Visual interactions** control to set this up.

NOTE: If you don't see **Visual Interactions**, look for its icon instead . If you don't see either, make sure you are in report [Editing view](#).

1. Select the slicer to make it active and, from the menu bar, choose **Visual interactions**.



2. Filter controls will appear above all the other visuals on the page. If the slicer should filter a visual, select the **Filter** icon. If the slicer should have no effect on the visual, select the **None** icon.



For more information, see [Visual interactions in a Power BI report](#).

Considerations and troubleshooting slicers in Power BI

There are a few limitations to using slicers in Power BI, which are the following:

1. Slicers do not support input fields.
2. A single slicer cannot be used across an entire report. A slicer only impacts the current page.

3. Slicers cannot be pinned to a dashboard.
4. Drilldown is not supported for slicers.
5. Slicers do not support Visual level filters.

Do you have ideas for how to improve Power BI? [Submit an idea.](#)

Next steps

[Add a visualization to a report](#)

[Visualization types in Power BI](#)

[Power BI - Basic Concepts](#)

[Try it out -- it's free!](#)

More questions? [Try the Power BI Community](#)

Working with tables in Power BI reports and dashboards (Tutorial)

1/24/2018 • 3 min to read • [Edit Online](#)

A table is a grid that contains related data in a logical series of rows and columns. It may also contain headers and a row for totals. Tables work well with quantitative comparisons where you are looking at many values for a single category. For example, this table displays 5 different measures for **Category**.

Category	This Year S...	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	\$2,680,662
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	\$4,453,133
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	\$2,726,892
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	\$3,105,550
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	\$3,640,471
060-Intimate	●	\$4.28	\$955,370	\$852,329	\$955,370
070-Hosiery	●	\$3.69	\$573,604	\$486,106	\$573,604
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	\$1,273,096
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	\$2,913,647
100-Groceries	●	\$1.47	\$810,176	\$829,776	\$810,176
Total	●	\$5.49	\$23,132,601	\$22,051,952	\$23,132,601

When to use a table

Tables are a great choice:

- to see and compare detailed data and exact values (instead of visual representations)
- to display data in a tabular format
- to display numerical data by categories

NOTE

If a table has too many values, consider converting it to a matrix and/or using drilldown.

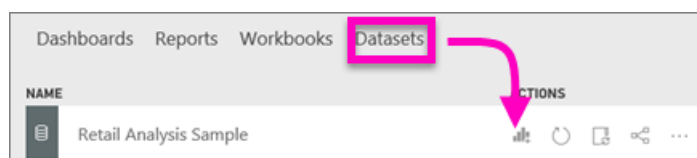
Prerequisites

- Power BI service or Power BI Desktop
- Retail Analysis sample

Create a table

We'll create the table pictured above to display sales values by item category. To follow along, sign in to Power BI service and select **Get Data > Samples > Retail Analysis Sample > Connect** and choose ****Go to dashboard**. Creating a visualization requires edit permissions to the dataset and report. Luckily, the Power BI samples are all editable. If a report has been shared with you, you won't be able to create visualizations in reports.

1. From the left navpane, select **Workspaces > My workspace**.
2. Select the Datasets tab, and scroll down to the Retail Analysis Sample dataset you just added. Select the **Create report** icon.



3. In the report editor, select **Item > Category**. Power BI automatically creates a table that lists all the

categories.

Category
010-Womens
020-Mens
030-Kids
040-Juniors
050-Shoes
060-Intimate
070-Hosiery
080-Accessories
090-Home
100-Groceries
41 - L SPECIAL SIZES
50 - JUNIORS
64 - PROMO
90 - BASICS
95 - CORPORATE BUYS
99 - MISCELLANEOUS


4. Select **Sales > Average Unit Price** and **Sales > Last Year Sales** and **Sales > This Year Sales** and choose all 3 options (Value, Goal, Status).
5. In the Visualizations pane, locate the **Values** well and drag-and-drop the values until the order of your chart columns matches the first image on this page. Your Values well should look like this.

Values
Category
This Year Sales Status
Average Unit Price
Last Year Sales
This Year Sales
This Year Sales Goal

6. Pin the table to the dashboard by selecting the pin icon



Format the table

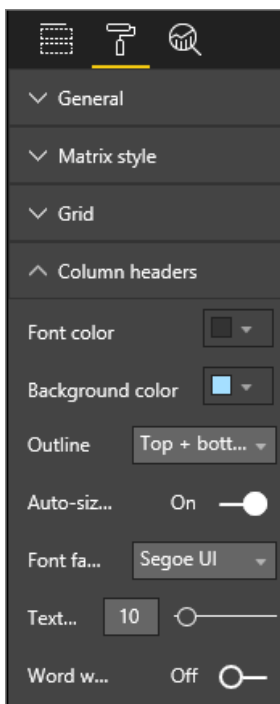
There are many many ways to format a table and we'll only cover a few of them here. A great way to learn about the other formatting options is to open the Formatting pane (paint roller icon ) and explore.

- Try formatting the table grid. Here we've added a blue vertical grid, added space to the rows, increased the outline and text size a bit.




Category	This Year Sales Status	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	\$2,680,662
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	\$4,453,133
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	\$2,726,892
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	\$3,105,550
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	\$3,640,471
060-Intimate	●	\$4.28	\$955,370	\$852,329	\$955,370
070-Hosiery	●	\$3.69	\$573,604	\$486,106	\$573,604
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	\$1,273,096
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	\$2,913,647
100-Groceries	●	\$1.47	\$810,176	\$829,776	\$810,176
Total	●	\$5.49	\$23,132,601	\$22,051,952	\$23,132,601

- For the column headers we changed the background color, added an outline, and increased the font size.



Category	This Year Sales Status	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	\$2,680,662
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	\$4,453,133
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	\$2,726,892
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	\$3,105,550
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	\$3,640,471
060-Intimate	●	\$4.28	\$955,370	\$852,329	\$955,370
070-Hosiery	●	\$3.69	\$573,604	\$486,106	\$573,604
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	\$1,273,096
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	\$2,913,647
100-Groceries	●	\$1.47	\$810,176	\$829,776	\$810,176
Total	●	\$5.49	\$23,132,601	\$22,051,952	\$23,132,601

- And after some additional formatting, here is our final table. Since there are so many formatting options, the best way to learn is to start with a plain table, open the Formatting pane , and start exploring.

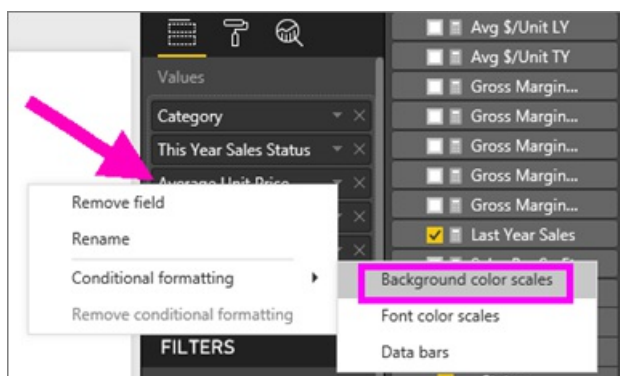
Category	This Year Sales Status	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	\$2,680,662
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	\$3,105,550
060-Intimate	●	\$4.28	\$955,370	\$852,329	\$955,370
070-Hosiery	●	\$3.69	\$573,604	\$486,106	\$573,604
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	\$4,453,133
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	\$2,726,892
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	\$3,640,471
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	\$1,273,096
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	\$2,913,647
100-Groceries	●	\$1.47	\$810,176	\$829,776	\$810,176
Total	●	\$5.49	\$23,132,601	\$22,051,952	\$23,132,601

Conditional formatting

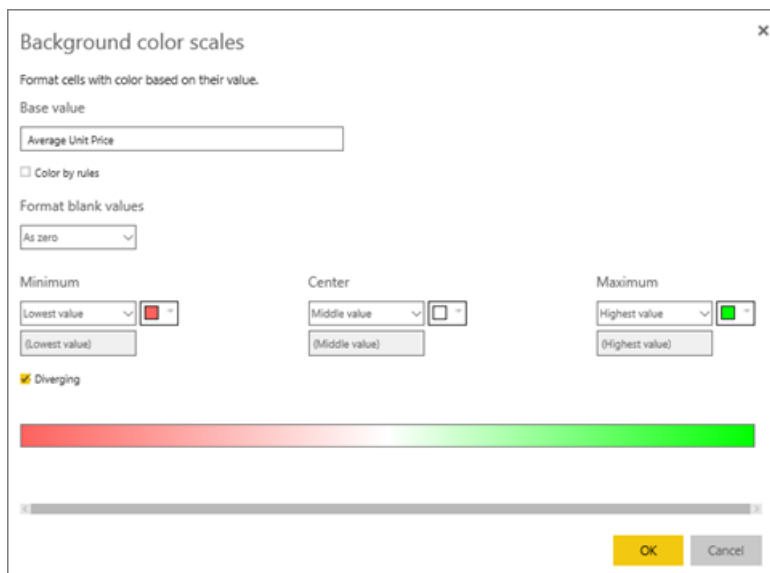
One type of formatting is referred to as *conditional formatting* and is applied to fields in the **Values** well of the **Visualizations** pane in Power BI service or Desktop.

With conditional formatting for tables, you can specify customized cell background colors and font colors based on cell values, including using gradient colors.

1. In the **Visualizations** pane in Power BI service or Desktop, select the down-arrow beside the value in the **Values** well that you want to format (or right-click the field). You can only manage conditional formatting for fields in the **Values** area of the **Fields** well.



2. Select **Background color scales**. In the dialog that appears, you can configure the color, as well as the *Minimum* and *Maximum* values. If you select the **Diverging** box, you can configure an optional *Center* value as well.



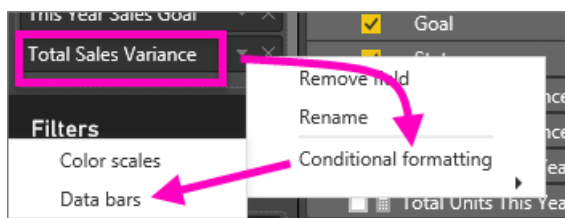
Let's apply some custom formatting to our Average Unit Price values. Select **Diverging**, add some colors, and choose **OK**.

Category	This Year Sales Status	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	\$2,680,662
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	\$4,453,133
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	\$2,726,892
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	\$3,105,550
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	\$3,640,471
060-Intimate	●	\$4.28	\$955,370	\$852,329	\$955,370
070-Hosiery	●	\$3.69	\$573,604	\$486,106	\$573,604
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	\$1,273,096
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	\$2,913,647
100-Groceries	●	\$1.47	\$810,176	\$829,776	\$810,176
Total	●	\$5.49	\$23,132,601	\$22,051,952	\$23,132,601

3. Add a new field to the table that has both positive and negative values. Select **Sales > Total Sales Variance**.

Category	This Year Sales Status	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal	Total Sales Variance
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	2,680,662.32	(\$892,704)
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	4,453,132.70	(\$711)
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	2,726,892.48	(\$21,402)
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	3,105,549.81	(\$175,164)
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	3,640,471.10	(\$65,571)
060-Intimate	●	\$4.28	\$955,370	\$852,329	955,370.35	(\$103,042)
070-Hosiery	●	\$3.69	\$573,604	\$486,106	573,603.65	(\$87,497)
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	1,273,096.07	\$106,163
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	2,913,647.26	\$139,679
100-Groceries	●	\$1.47	\$810,176	\$829,776	810,175.60	\$19,600
Total	●	\$5.49	\$23,132,601	\$22,051,952	23,132,601.34	(\$1,080,649)

4. Add data bar conditional formatting by selecting the down-arrow beside **Total Sales Variance** and choosing **Conditional formatting > Data bars**.



5. In the dialog that appears, set colors for **Positive bar**, **Negative bar**, place a checkmark next to **Show bar only**, and make any other changes you'd like.

Data bars

Format cells with bars based on their values.

Base value

Show bar only

Minimum

Maximum

Positive bar

Bar direction

Negative bar

Axis

When you select **OK**, data bars replace the numerical values in the table making it easier to scan.

Category	This Year Sales Status	Average Unit Price	Last Year Sales	This Year Sales	This Year Sales Goal	Total Sales Variance
010-Womens	●	\$7.30	\$2,680,662	\$1,787,958	2,680,662.32	
020-Mens	●	\$7.12	\$4,453,133	\$4,452,421	4,453,132.70	
030-Kids	●	\$5.30	\$2,726,892	\$2,705,490	2,726,892.48	
040-Juniors	●	\$7.00	\$3,105,550	\$2,930,385	3,105,549.81	
050-Shoes	●	\$13.84	\$3,640,471	\$3,574,900	3,640,471.10	
060-Intimate	●	\$4.28	\$955,370	\$852,329	955,370.35	
070-Hosiery	●	\$3.69	\$573,604	\$486,106	573,603.65	
080-Accessories	●	\$4.84	\$1,273,096	\$1,379,259	1,273,096.07	
090-Home	●	\$3.93	\$2,913,647	\$3,053,326	2,913,647.26	
100-Groceries	●	\$1.47	\$810,176	\$829,776	810,175.60	
Total	●	\$5.49	\$23,132,601	\$22,051,952	23,132,601.34	(\$1,080,649)

6. To remove conditional formatting from a visualization, just right-click the field again, and select **Remove Conditional Formatting**.

TIP

Conditional formatting is also available from the Formatting pane (paintroller icon). Select the value to format and then set **Color scales** or **Data bars** to On to apply the default settings or, to customize the settings, select **Advanced controls**.

Adjust the column width of a table

Sometimes Power BI will truncate a column heading in a report and on a dashboard. To show the entire column name, hover over the space to the right of the heading to reveal the double arrows, select and drag.

Payment Terms Days	Commodity Detail	Vendor Country/R...	Discount Savings
0	Wellness - Benefits	MX	\$0
	Total		\$0
	Warehouse - Fork Truck	MX	\$0
	Total		\$0
	Travel - Travel Agency	MX	\$0
	Total		\$0
	Travel - Restaurants	MX	\$0

More questions? [Try the Power BI Community](#)

Treemaps in Power BI (Tutorial)

1/24/2018 • 3 min to read • [Edit Online](#)

Treemaps display hierarchical data as a set of nested rectangles. Each level of the hierarchy is represented by a colored rectangle (often called a "branch") containing other rectangles ("leaves"). The space inside each rectangle is allocated based on the quantitative value being measured, with the rectangles arranged in size from top left (largest) to bottom right (smallest).



For example, if I'm analyzing my sales, I might have top-level rectangles (branches) for the clothing categories: **Urban**, **Rural**, **Youth**, and **Mix**. My category rectangles would contain smaller rectangles (leaves) for the clothing manufacturers within that category, and these smaller rectangles would be sized and shaded based on the number sold. In the **Urban** branch above, lots of Maximus clothing was sold, less Natura and Fama, and very little Leo. So, the **Urban** branch of my Treemap would have the largest rectangle for Maximus (in the top left corner), slightly-smaller rectangles for Natura and Fama, lots of other rectangles representing all the other clothing sold, and a tiny rectangle for Leo. And I could compare the number of items sold across the other clothing categories by comparing the size and shading of each leaf node; the larger the rectangle and the darker the shading, the higher the value.

When to use a treemap

Treemaps are a great choice:

- to display large amounts of hierarchical data.
- when a bar chart can't effectively handle the large number of values.
- to show the proportions between each part and the whole.
- to show the pattern of the distribution of the measure across each level of categories in the hierarchy.
- to show attributes using size and color coding.
- to spot patterns, outliers, most-important contributors, and exceptions.

Prerequisites

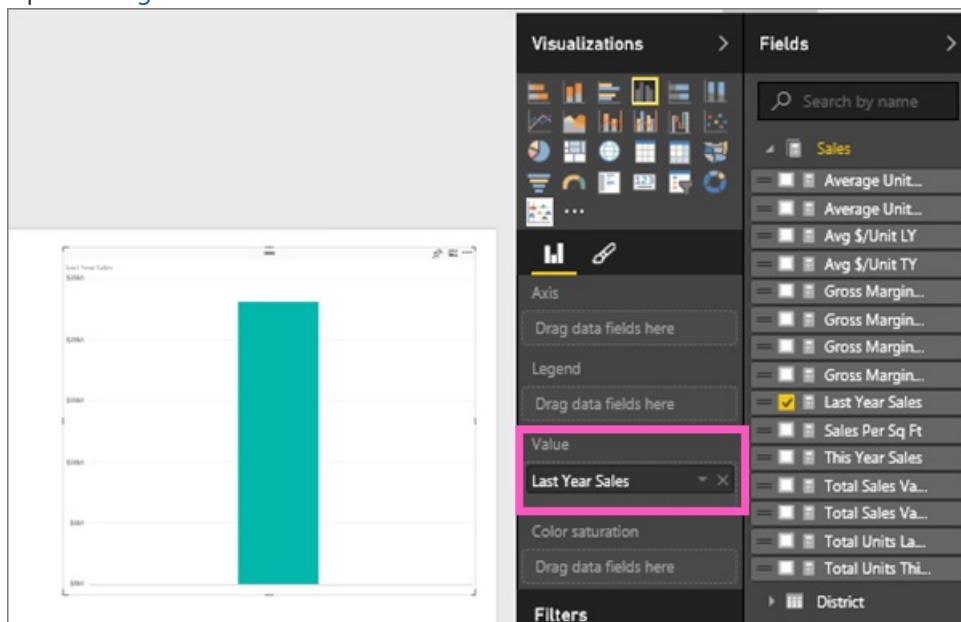
- Power BI service or Power BI Desktop
- Retail Analysis sample

Create a basic treemap

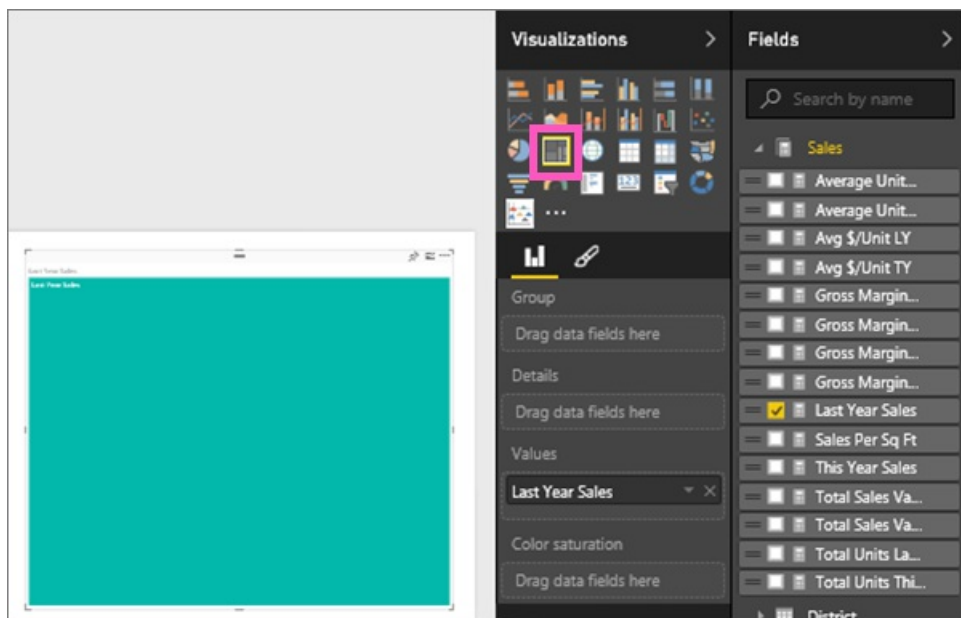
Want to watch someone else create a treemap first? Skip to 2:10 in this video to watch Amanda create a treemap.

Or, create your own treemap. These instructions use the Retail Analysis Sample. To follow along, sign in to Power BI service (not Desktop) and select **Get Data > Samples > Retail Analysis Sample > Connect > Go to dashboard**. Creating visualizations in a report requires edit permissions to the dataset and report. Luckily, the Power BI samples are editable. But if someone shares a report with you, you won't be able to add new visualizations.

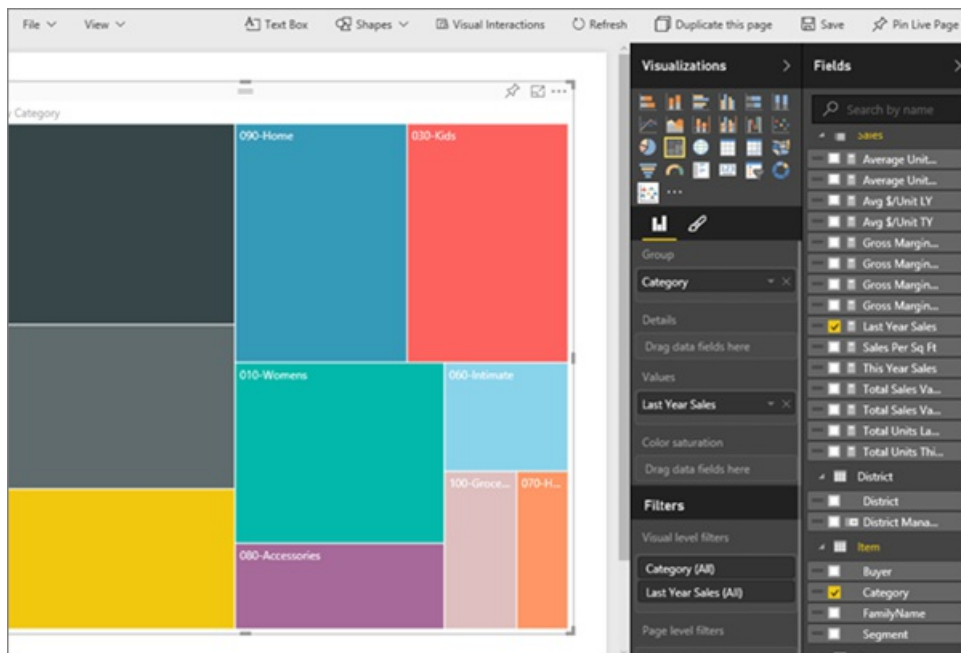
1. Select the "Total stores" tile to open the Retail Analysis sample report.
2. Open [Editing View](#) and select the **Sales > Last Years Sales** measure.



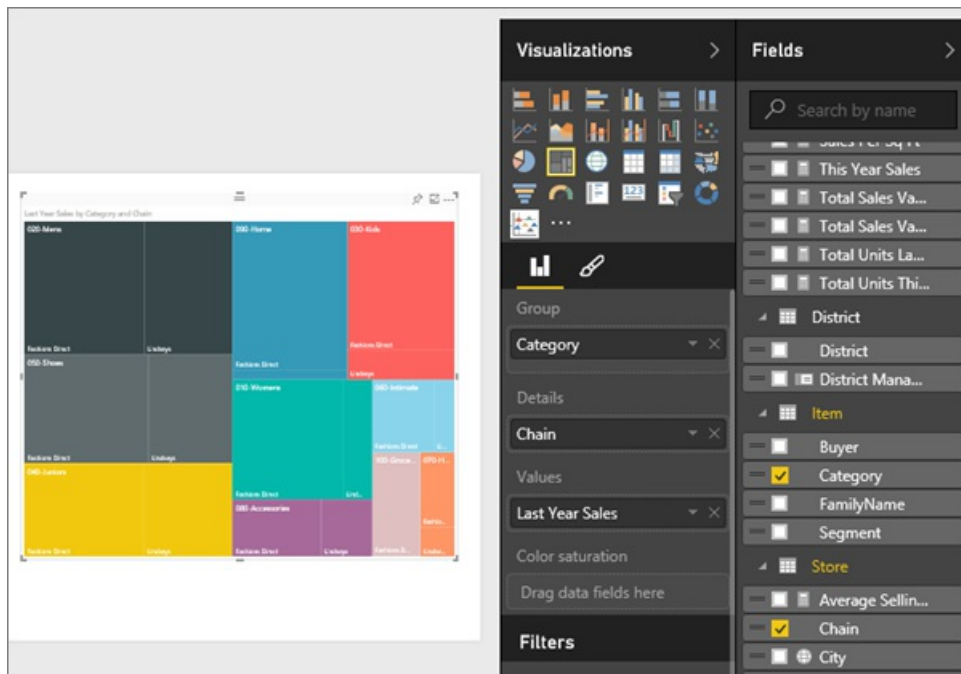
3. Convert the chart to a treemap.



4. Drag **Item** > **Category** to the **Group** well. Power BI creates a treemap where the size of the rectangles reflects total sales and the color represents the category. In essence you've created a hierarchy that visually describes the relative size of total sales by category. The **Mens** category has the highest sales and the **Hosiery** category has the lowest.



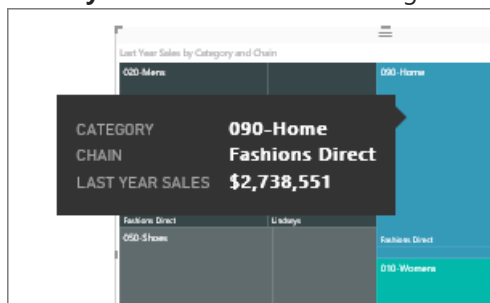
5. Drag **Store** > **Chain** to the **Details** well to complete your treemap. You can now compare last year's sales by category and chain.



NOTE

Color Saturation and Details cannot be used at the same time.

6. Hover over a **Chain** area to reveal the tooltip for that portion of the **Category**. For example, hovering over **Lindseys** in the **040-Juniors** rectangle reveals the tooltip for Lindsey's portion of the Juniors category.



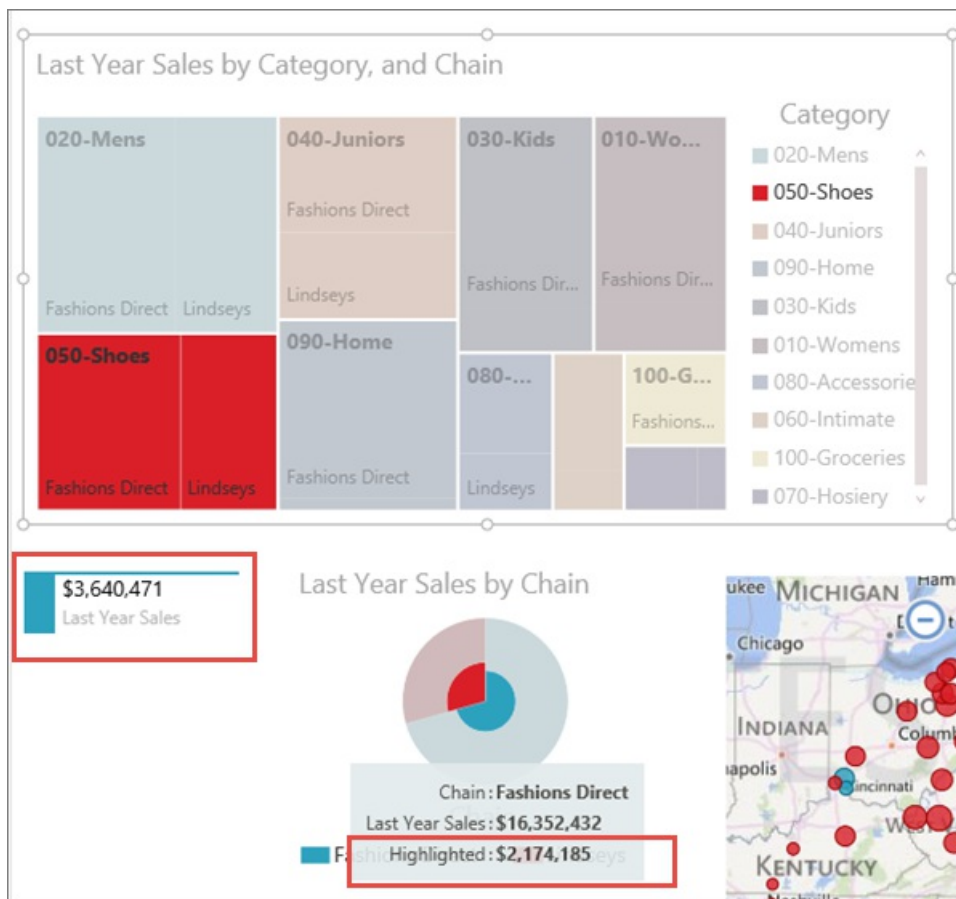
7. Add the treemap as a dashboard tile (pin the visual).
8. Save the report.

Highlighting and cross-filtering

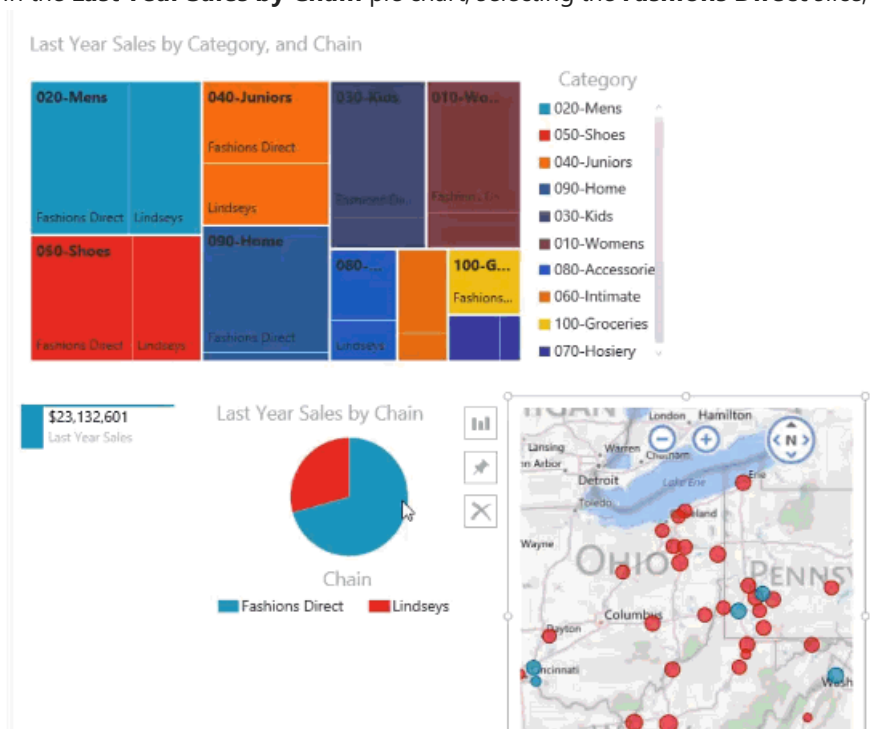
For information about using the Filters pane, see [Add a filter to a report](#).

Highlighting a Category or Details in a treemap cross-highlights and cross-filters the other visualizations on the report page... and vice versa. To follow along, either add some visuals to the same page or copy/paste the treemap to a report page that already has other visuals.

1. On the treemap, select either a Category or a Chain within a Category. This cross-highlights the other visualizations on the page. Selecting **050-Shoes**, for example, shows me that last year's sales for shoes was \$3,640,471 with \$2,174,185 of that coming from Fashions Direct.



2. In the **Last Year Sales by Chain** pie chart, selecting the **Fashions Direct** slice, cross-filters the treemap.



3. To manage how charts cross-highlight and cross-filter each other, see [Visualization interactions in a Power BI report](#)

Next steps

[Pin a visualization to a dashboard](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Waterfall charts in Power BI (Tutorial)

1/23/2018 • 2 min to read • [Edit Online](#)

A waterfall chart shows a running total as values are added or subtracted. It's useful for understanding how an initial value (for example, net income) is affected by a series of positive and negative changes.

The columns are color coded so you can quickly tell increases and decreases. The initial and the final value columns often [start on the horizontal axis](#), while the intermediate values are floating columns. Because of this "look", waterfall charts are also called bridge charts.

When to use a waterfall chart

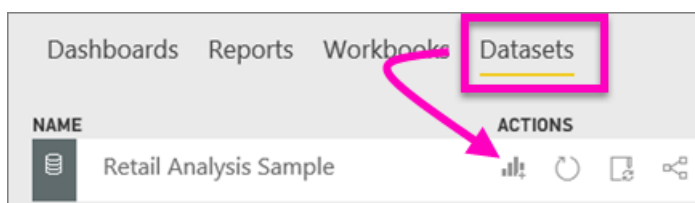
Waterfall charts are a great choice:

- when you have changes for the measure across time series or different categories
- to audit the major changes contributing to the total value
- to plot your company's annual profit by showing various sources of revenue and arrive at the total profit (or loss).
- to illustrate the beginning and the ending headcount for your company in a year
- to visualize how much money you make and spend each month, and the running balance for your account.

Create a waterfall chart

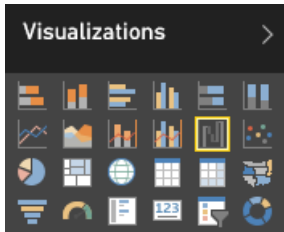
We'll create a waterfall chart that displays sales variance (estimated sales versus actual sales) by month. To follow along, sign in to Power BI and select **Get Data > Samples > Retail Analysis Sample**.

1. Select the **Datasets** tab and scroll to the new "Retail Analysis Sample" dataset. Select the **Create report** icon to open the dataset in report editing view.

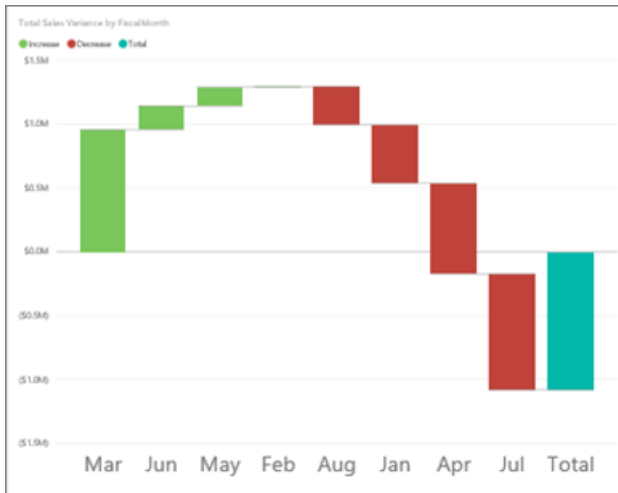


2. From the **Fields** pane, select **Sales > Total Sales Variance**. If **Total Sales Variance** isn't in the **Y Axis** area, drag it there.

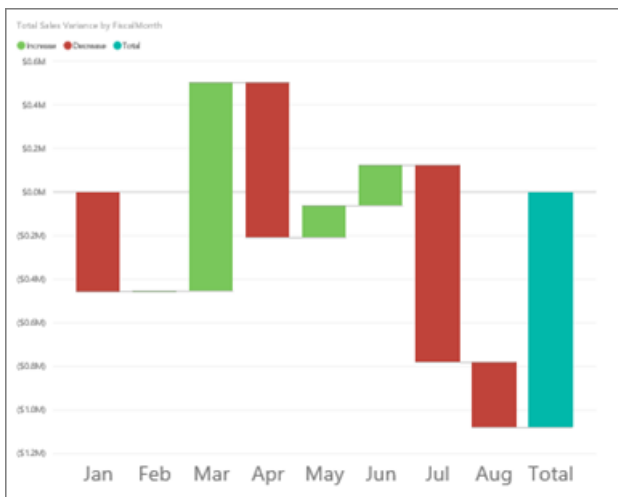
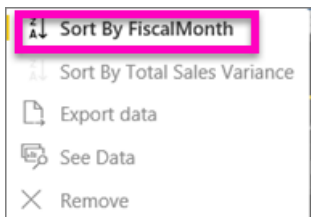
3. Convert the chart to a **Waterfall**.



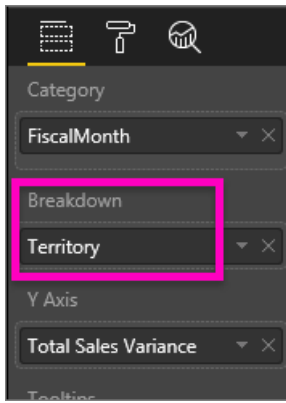
4. Select **Time** > **FiscalMonth** to add it to the **Category** well.



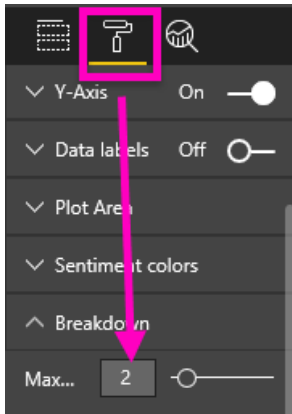
5. Sort the waterfall chart chronologically. From the top-right corner of the chart, select the ellipses (...) and choose **FiscalMonth**.



6. Dig in a little more to see what's contributing most to the changes month to month. Drag **Store** > **Territory** to the **Breakdown** bucket.



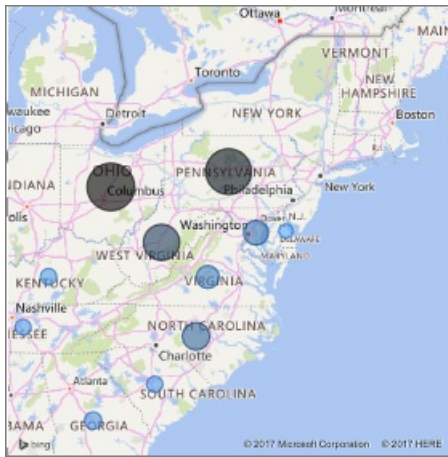
7. By default, Power BI adds the top 5 contributors to increases or decreases by month. But we're only interested in the top 2 contributors. In the Formatting pane, select **Breakdown** and set **Maximum** to 2.



A quick review reveals that the territories of Ohio and Pennsylvania are the biggest contributors to movement, negative and positive, in our waterfall chart.



8. This is an interesting finding. Do Ohio and Pennsylvania have such a significant impact because sales in these 2 territories are much higher than the other territories? We can check that. Create a map that looks at sales by territory.



Our map supports our theory. It shows that these 2 territories had the highest value of sales last year (bubble size) and this year (bubble shading).

Highlighting and cross-filtering

For information about using the Filters pane, see [Add a filter to a report](#).

Highlighting a column in a waterfall chart cross-filters the other visualizations on the report page... and vice versa. However, the Total column does not trigger highlighting or respond to cross-filtering.

Next steps

[Reports in Power BI](#)

[Visualization types in Power BI](#)

[Visualizations in Power BI reports](#)

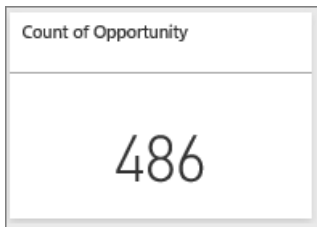
[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Card visualizations

1/3/2018 • 2 min to read • [Edit Online](#)

Sometimes a single number is the most important thing you want to track in your Power BI dashboard or report, such as total sales, market share year over year, or total opportunities. This type of visualization is called a *Card*. As with almost all of the native Power BI visualizations, Cards can be created using the report editor or Q&A.

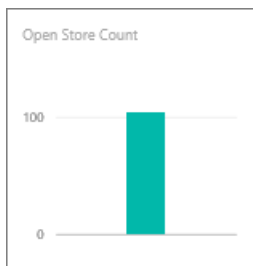


Create a card using the report editor

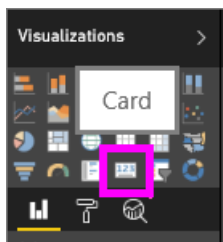
These instructions use the Retail Analysis Sample. To follow along, [download the sample](#) for Power BI service (app.powerbi.com) or Power BI Desktop.

1. Start on a [blank report page](#) and select the **Store** > **Open store count** field. If you're using Power BI service, you'll need to open the report in [Editing View](#).

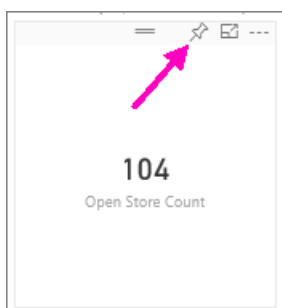
Power BI creates a column chart with the one number.



2. In the Visualizations pane, select the Card icon.

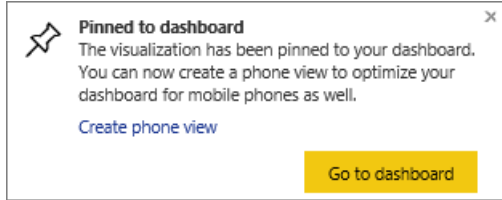


3. Hover over the card and select the pin icon  to add the visualization to the dashboard.



4. Pin the tile to an existing dashboard or to a new dashboard.
 - Existing dashboard: select the name of the dashboard from the dropdown.
 - New dashboard: type the name of the new dashboard.
5. Select **Pin**.

A Success message (near the top right corner) lets you know the visualization was added, as a tile, to your dashboard.

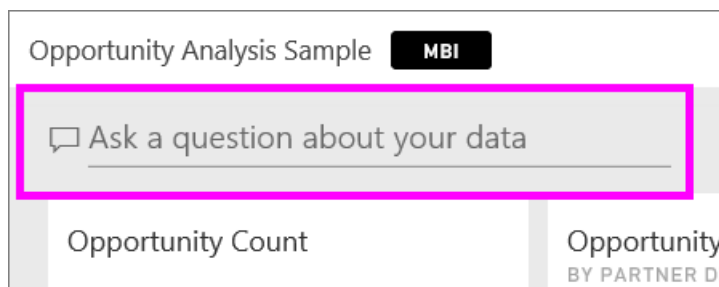


6. Select **Go to dashboard**. There, you can [edit and move](#) the pinned visualization.

Create a card from the Q&A question box

The Q&A question box is the easiest way to make a Card. The Q&A question box is available in Power BI service (app.powerbi.com) from a dashboard or report. The steps below describe creating a Card from a Power BI service dashboard. If you'd like to create a card using Q&A in Power BI Desktop, [follow these instructions](#) for the Q&A preview for Desktop reports.

1. Create a [dashboard](#) and [get data](#). This example uses the [Opportunity Analysis sample](#).
2. At the top of your dashboard, start typing what you want to know about your data in the question box.



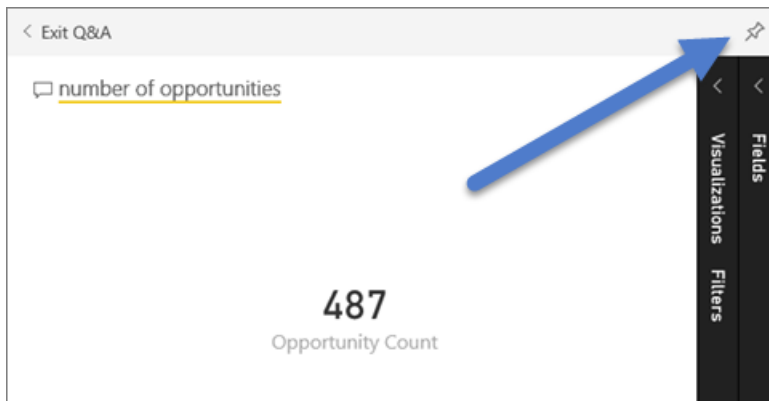
TIP: From a Power BI service report, in [Editing view](#), select **Ask a question** from the top menubar. From a Power BI Desktop report, find some open space in a report and double-click to open a question box.

1. For example, type "number of opportunities" in the question box.



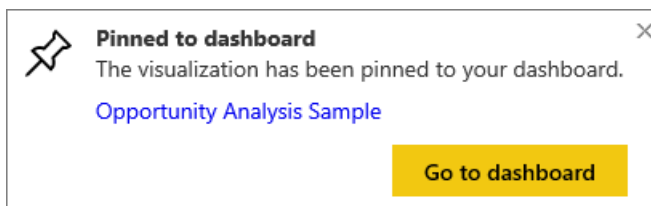
The question box helps you with suggestions and restatements, and finally displays the total number.

2. Select the pin icon  in the upper-right corner to add the card to a dashboard.

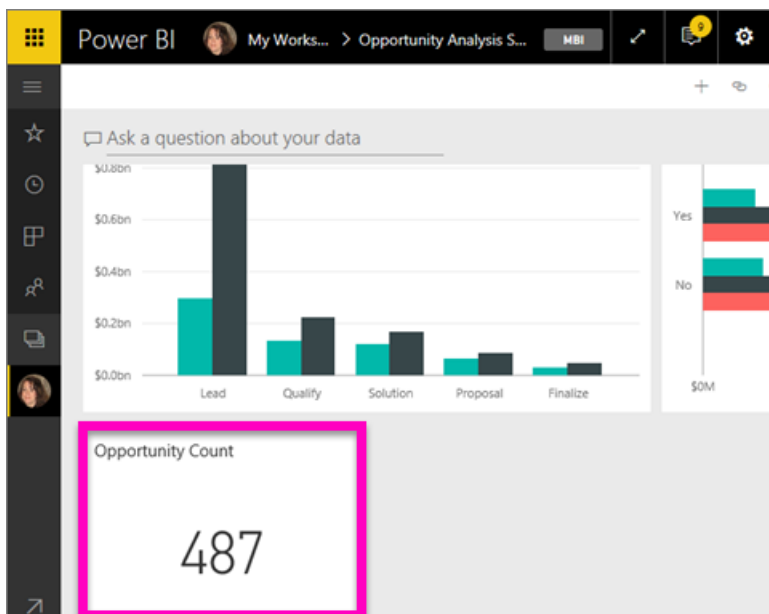


3. Pin the card, as a tile, to an existing dashboard or to a new dashboard.
 - Existing dashboard: select the name of the dashboard from the dropdown. Your choices will be limited to only those dashboards withing the current workspace.
 - New dashboard: type the name of the new dashboard and it will be added to your current workspace.
4. Select **Pin**.

A Success message (near the upper right corner) lets you know the visualization was added, as a tile, to your dashboard.



5. Select **Go to dashboard** to see the new tile. There, you can [rename](#), [resize](#), [add a hyperlink](#), and [reposition the tile](#), and [more](#) on your dashboard.



Considerations and troubleshooting

- If you do not see a question box at all, contact your system or tenant administrator.
- If you are using Desktop and double-clicking empty space in a report doesn't open Q&A, you may need to enable it. Select **File > Options and Settings > Options > Preview features > Q&A** and restart Desktop.

Next steps

[Dashboard tiles in Power BI](#)

[Dashboards in Power BI](#)

[Power BI - Basic Concepts](#)

More questions? [Try the Power BI Community](#)

Creating R visuals in the Power BI service

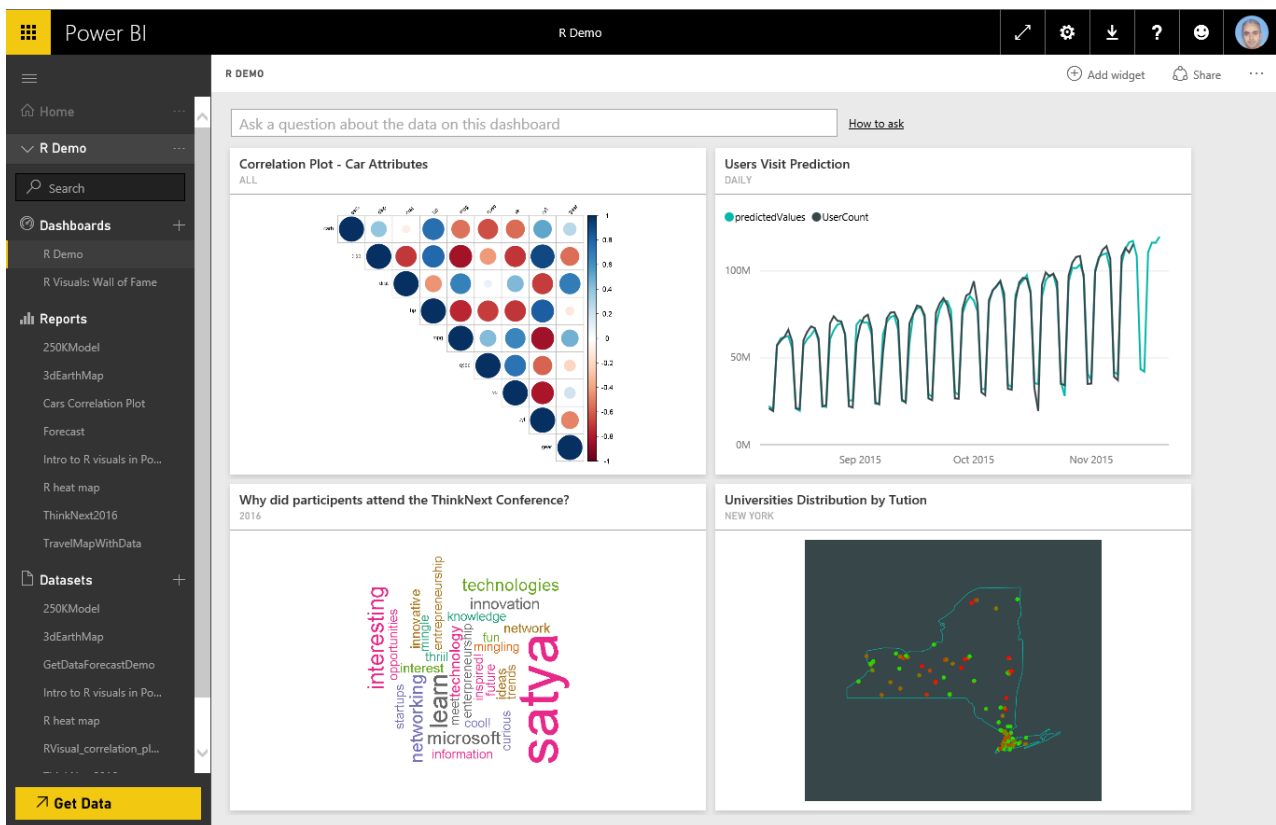
12/6/2017 • 6 min to read • [Edit Online](#)

The Power BI service supports viewing and interacting with visuals created with R scripts. Visuals created with R scripts, commonly called *R visuals*, can present advanced data shaping and analytics such as forecasting, using the rich analytics and visualization power of R.

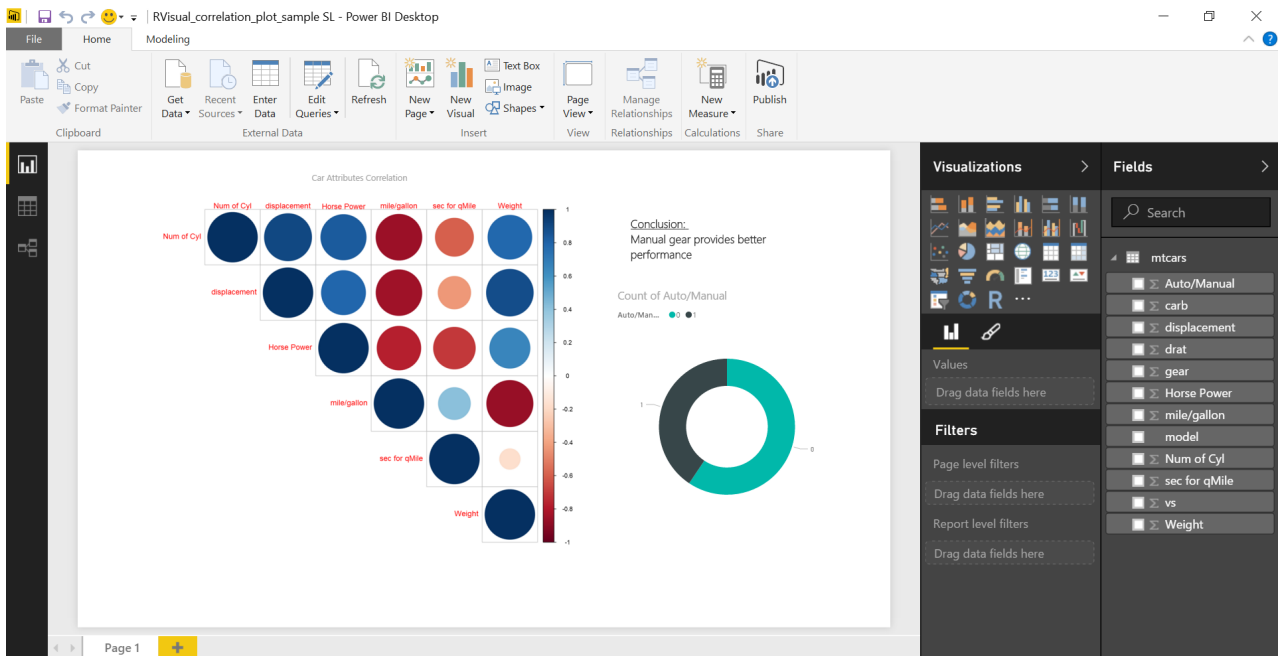
NOTE

The [R programming language](#) is among the most widely used programming languages by statisticians, data scientists, and business analysts. The R language has an open source community that offers over 7,000 add-on packages, as well as widely used [R User Groups](#). The version of R deployed in the Power BI service is *Revolution R Open 3.2.2*.

The following image shows a Power BI dashboard with a collection of R visuals used for advanced analytics.



R visuals are created in a [Power BI Desktop report](#), like the report shown in the following image.



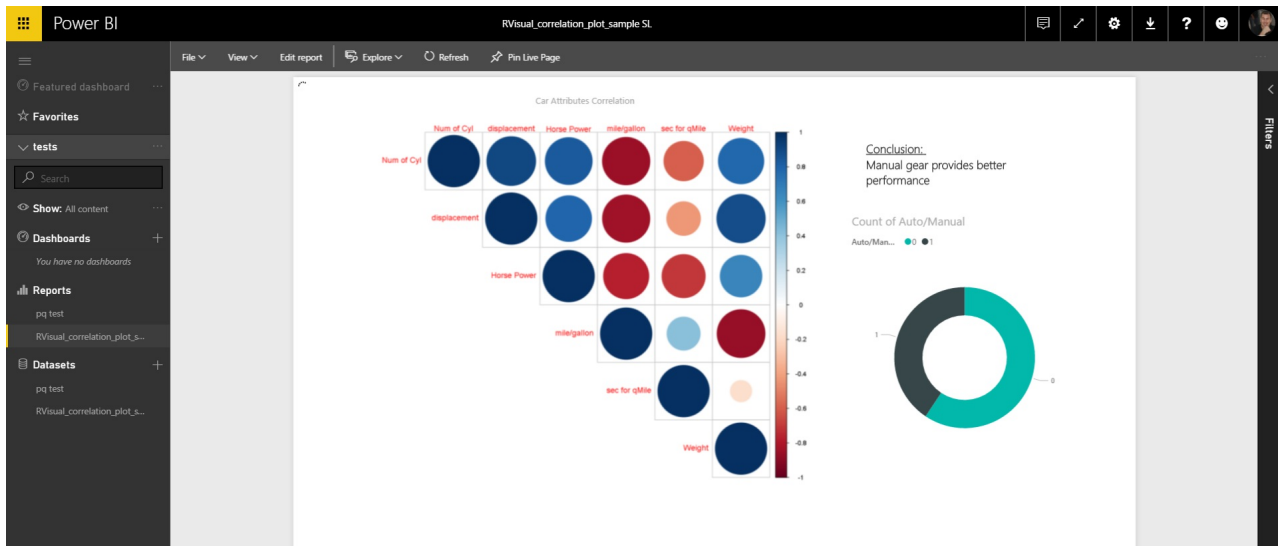
Once the report is created in **Power BI Desktop**, you can publish the report containing one or more R visuals to the Power BI service. R visuals currently can only be created in **Power BI Desktop**, and then published to the Power BI service. For more information on creating R visuals, see [Create Power BI visuals using R \(Power BI Desktop\)](#).

Note that in the service not all of the R packages are supported. See supported packages at the end of this article for the list of packages currently supported in the Power BI service.

You can download this [sample Power BI Desktop file](#) (.pbix file) that contains a few R visuals to see how this works, and to experiment.

R visuals that are created in **Power BI Desktop**, and then published to the Power BI service, for the most part behave like any other visual in the Power BI service; you can interact, filter, slice, and pin them to a dashboard, or share them with others. For more information about sharing dashboards and visuals, see [share a dashboard with colleagues and others](#). One difference from other visuals is that R visuals cannot show tool tips and cannot be used to filter other visuals.

As you can see in the following image, R visuals in the Power BI service, either in dashboards or reports, largely appear and behave like any other visual, and users don't need to be aware of the underlying R script that created the visual.



R scripts security

R visuals are created from R scripts, which could potentially contain code with security or privacy risks.

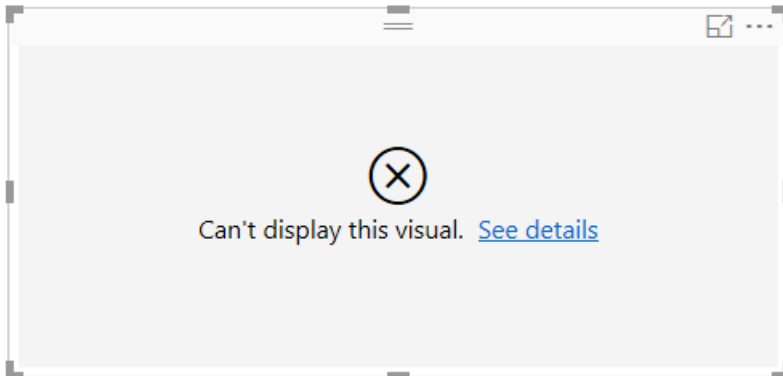
These risks mainly exist in the authoring phase when the script author runs the script on their own computer.

The Power BI service applies a *sandbox* technology to protect users and the service from security risks.

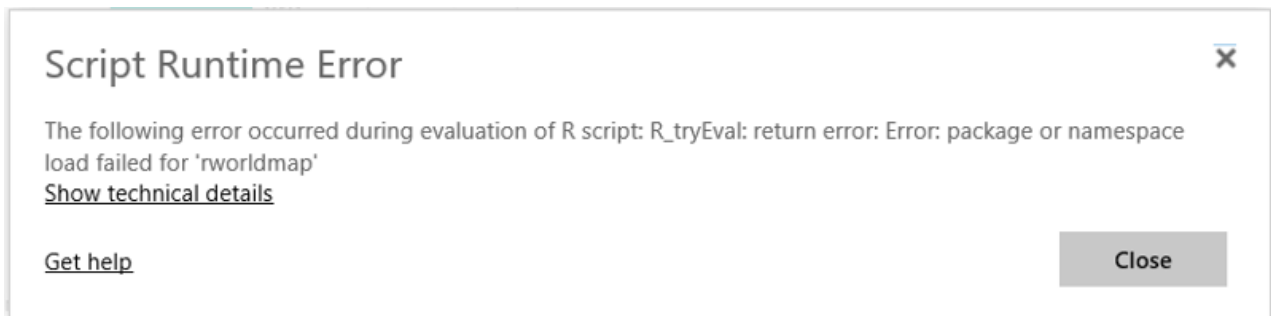
This *sandbox* approach imposes some restrictions on the R scripts running in the Power BI service, such as accessing the Internet, or accessing other resources that are not required to create the R visual.

R scripts error experience

When an R script encounters an error, the R visual is not plotted and an error message is displayed. For details on the error, select **See details** from the R visual error on the canvas, as shown in the following image.



As another example, the following image shows the error message that appears when an R script failed to run properly due to a missing R package in Azure.



Licensing

R visuals require a [Power BI Pro](#) license to render in reports, refresh, filter and cross-filter. For more information about Power BI Pro licenses, and how they differ from free licenses, see [Power BI Pro content - what is it?](#)

Free users of Power BI can only consume tiles shared with them. See [purchasing Power BI Pro](#) for more information.

The following table describes R visuals capabilities based on licensing.

	Author R visuals in Power BI desktop	Create PBI service reports with R visuals	View R visuals in reports	View R tiles in dashboards
Guest (Power BI embedded)	Not relevant	Not relevant	Not supported	Not relevant
Unmanaged tenant (domain not verified)	Supported	Not supported	Not supported	Supported (B2B scenario)
Managed tenant with free license	Supported	Not supported	Not supported	Supported
Managed tenant with Pro license	Supported	Supported	Supported	Supported

Known Limitations

R visuals in the Power BI service have a few limitations:

- R visuals support is limited to the packages identified on the following page . There currently is no support for custom packages.
- Data size limitations – data used by the R visual for plotting is limited to 150,000 rows. If more than 150,000 rows are selected, only the top 150,000 rows are used and a message is displayed on the image.
- Calculation time limitation – if an R visual calculation exceeds 60 seconds the script times out, resulting in an error.
- R visuals are refreshed upon data updates, filtering, and highlighting. However, the image itself is not interactive and does not support tool tips.
- R visuals respond to highlighting other visuals, but you cannot click on elements in the R visual in order to cross filter other elements.
- R visuals are currently not supported for the *Time* data type. Please use Date/Time instead.
- R Visuals do not display when using **Publish to web**.
- R visuals currently do not print with dashboard and reports printing
- R visuals are currently not supported in the DirectQuery mode of Analysis Services
- Chinese, Japanese and Korean fonts require all of the additional following steps to work properly in the Power BI service:
 - First, install the R package *showtext* and all of its dependencies. You can do this by running the following script:

```
*install.packages("showtext")*
```

- Next, add the following line at the beginning of the R script:

```
powerbi_rEnableShowTextForCJKLanguages = 1
```

Overview of R packages

R packages are collections of R functions, data, and compiled code that are combined in a well-defined format. When R is installed, it comes with a standard set of packages, and other packages are available for download and installation. Once installed, an R packages must be loaded into the session to be used. The primary source of free R packages is CRAN, the [Comprehensive R Archive Network](#).

Power BI Desktop can use any type of R packages without limitation. You can install R packages for use in **Power BI Desktop** on your own (using the [RStudio IDE](#), for example).

R visuals in the **Power BI service** are supported by the packages found in the **Supported Packages** section found in [this article](#). If you don't find a package you're interested in among the supported packages list, you can request the support of the package. See [R packages in the Power BI service](#) for information on how to request support.

Requirements and Limitations of R packages

There are a handful of requirements and limitations for R packages:

- The Power BI service, for the most part, supports R packages with free and open-source software licenses such as GPL-2, GPL-3, MIT+, and so on.
- The Power BI service supports packages published in CRAN. The service does not support private or custom R packages. We encourage users to make their private packages available on CRAN prior to requesting the package be available in the Power BI service.
- For **Power BI Desktop** has two variations for R packages:
 - For R visuals, you can install any package, including custom R packages
 - For Custom R visuals, only public CRAN packages are supported for auto-installation of the packages
- For security and privacy reasons, we currently don't support R packages that provide client-server queries over the World-Wide Web (such as RgoogleMaps) in the service. Networking is blocked for such attempts. See [R packages in the Power BI service](#) for a list of supported and unsupported R packages.
- The approval process for including a new R package has a tree of dependencies; some dependencies required to be installed in the service cannot be supported.

Supported Packages:

For a long list of supported R packages (and the short list of unsupported packages) please see the following article:

- [R packages in the Power BI service](#)

Get data from files

12/6/2017 • 3 min to read • [Edit Online](#)



In Power BI, you can connect to or import data and reports from three types of files.

- Microsoft Excel (.xlsx or .xlsm)
- Power BI Desktop (.pbix)
- Comma Separated Value (.csv)

What does get data from a file really mean?

In Power BI the data you explore comes from a dataset. But in order to have a dataset, you first need to get some data. For this article, we're going to focus on getting data from files.

To better understand the importance of datasets, and how we get data for them, let's look at an automobile. Take a seat in your car and look at the dashboard. That's a lot like sitting in front of your computer looking at a dashboard in Power BI. The dashboard shows you all the things your car is doing; how fast the engine is revving, temperature, what gear you're in, your speed, etc.

In Power BI, a dataset is like the engine in your car. The dataset provides the data, metrics, and information that's displayed in your Power BI dashboard. Of course your engine, or dataset, needs fuel, and in Power BI, that fuel is data. Your car has a fuel tank that provides gas to the engine. Much the same in Power BI, you need a fuel tank that has data you can feed to your dataset. In our case, that fuel tank is a Power BI Desktop file, an Excel workbook file, or a .CSV file.

We can even take it one step further. A fuel tank in a car has to be filled with gas. The gas for our Power BI Desktop, Excel, or .CSV file is data from another data source. We get data from another data source and put it into an Excel, Power BI Desktop, or .CSV file. If it's an Excel workbook or .CSV file, we can manually enter rows of data. Or, we can connect to an external data source to query and load data into our file. Once we have a file with some data, we can get it into Power BI as a dataset.

NOTE

Data in Excel workbooks must be in a table, or in the data model, to be imported by Power BI.

Where your file is saved makes a difference

Local - If you save your file to a local drive on your computer or another location in your organization, from Power BI, you can *import* your file into Power BI. Your file will actually remain on your local drive, so the whole file isn't really imported into Power BI. What really happens is a new dataset is created in your Power BI site and data, and in some cases the data model, are loaded into the dataset. If your file has any reports, those will appear in your Power BI site under Reports.

OneDrive - Business – If you have OneDrive for Business and you sign into it with the same account you sign into Power BI with, this is by-far the most effective way to keep your work in Excel Power BI Desktop, or a .CSV file

and your dataset, reports, and dashboards in Power BI in-sync. Because both Power BI and OneDrive are in the cloud, Power BI connects to your file on OneDrive about every hour. If any changes are found, your dataset, reports, and dashboards are automatically updated in Power BI.

OneDrive - Personal – If you save your files to your own OneDrive account, you'll get many of the same benefits as you would with OneDrive for Business. The biggest difference is when you first connect to your file (using Get Data > Files > OneDrive – Personal) you'll need to sign in to your OneDrive with your Microsoft account, which is usually different from what you use to sign in to Power BI. When signing in with your OneDrive with your Microsoft account, be sure to select the Keep me signed in option. This way, Power BI will be able to connect to your file about every hour and make sure your dataset in Power BI is in-sync.

SharePoint Team-Sites – Saving your Power BI Desktop files to SharePoint – Team Sites is much the same as saving to OneDrive for Business. The biggest difference is how you connect to the file from Power BI. You can specify a URL or connect to the root folder.

Ready to get started?

See the following articles to learn more about getting your file into Power BI.

- [Get data from Excel workbook files](#)
- [Get data from Power BI Desktop files](#)
- [Get data from Comma Separated Value files](#)

From Excel workbook to stunning report in no time

1/3/2018 • 3 min to read • [Edit Online](#)

Your manager wants to see a report on your latest sales figures combined with your last campaign impressions by the end of the day. But the latest data resides on various third party systems and on files in your laptop. In the past it's taken hours to create visuals and format a report. You're beginning to feel anxious.

No worries. With Power BI, you can create a stunning report in no time.

In this example, we'll upload an Excel file from a local system, create a new report, and share it with colleagues—all from within Power BI.

Prepare your data

Let's take a simple Excel file as an example. Before you can load your Excel file into Power BI, you must organize your data in a flat table. This means that each column contains the same data type--for example, text, date, number, or currency. You should have a header row, but there should not be any column or row that displays totals.

Product	Date	Units Sold	Manufacturing Cost
Carretera	1/1/2014	1618.5	\$ 3.00
Carretera	1/1/2014	1321	\$ 3.00
Carretera	6/1/2014	2178	\$ 3.00
Carretera	6/1/2014	888	\$ 3.00
Carretera	6/1/2014	2470	\$ 3.00
Carretera	12/1/2014	1513	\$ 3.00

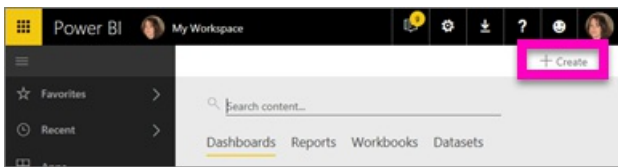
Next, format your data as a table. In Excel, on the Home tab, in the Styles group, select **Format as Table**. Select a table style to apply to your worksheet. Your Excel worksheet is now ready to load into Power BI.

Segment	Country	Product
Government	Canada	Aliqui UR
Channel Partners	Canada	Aliqui UR
Small Business	Canada	Barba UM
Midmarket	Canada	Barba UM
Enterprise	Canada	Barba UM
Government	Canada	Barba UM
Midmarket	France	Fama UE
Enterprise	France	Fama UE
Enterprise	Germany	Fama UE
Small Business	Germany	Pirum RP

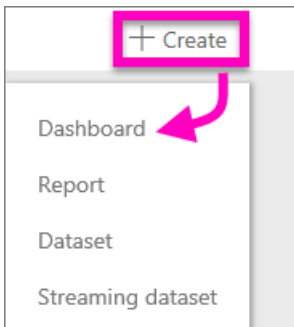
Upload your Excel file into Power BI

Power BI connects to many data sources, including Excel files that live on your computer. To get started, sign in to Power BI. If you haven't signed up, [you can do so for free](#).

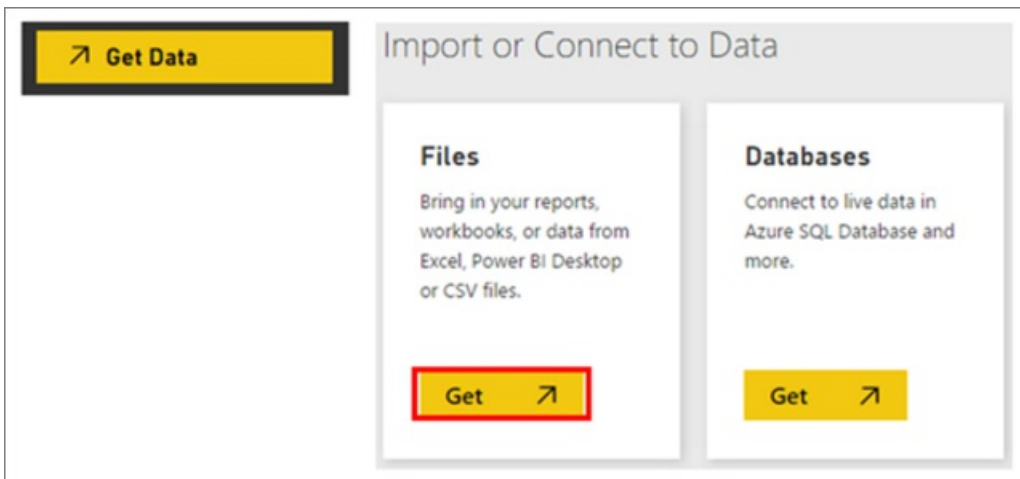
You want to create a new dashboard. Open **My workspace** and select the **+ Create** icon.



Select **Dashboard**, enter a name, and select **Create**. The new dashboard displays -- with no data.

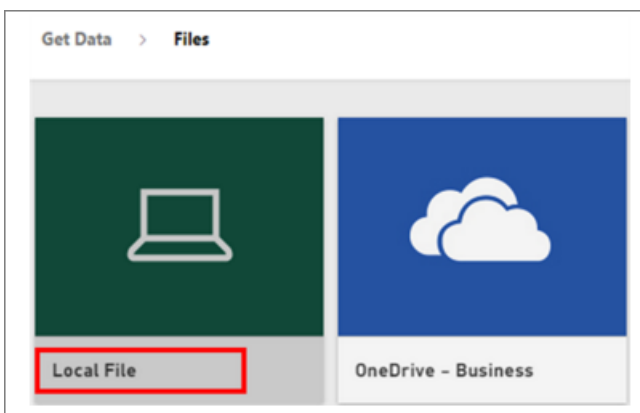


At the bottom of the left navigation pane, select **Get Data**. On the Get Data page, under Import or Connect to Data, in the Files box, select **Get**.



On the Files page, select **Local File**. Navigate to the Excel workbook file on your computer and select it to load into Power BI. Select **Import**.

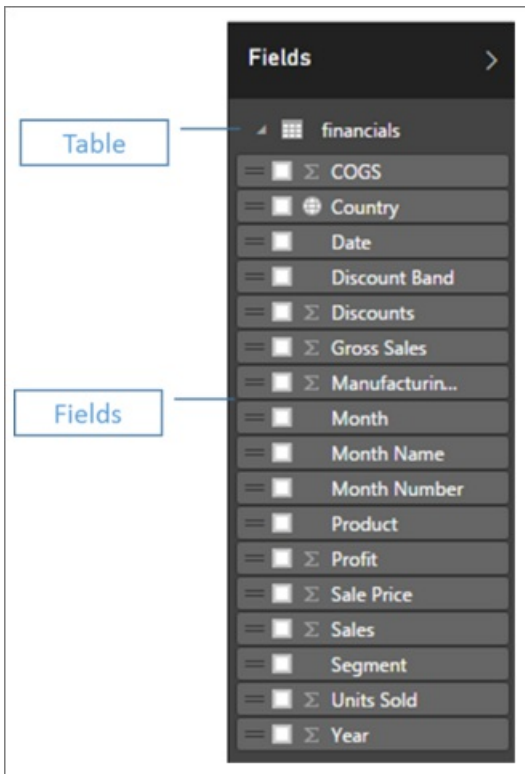
NOTE: To follow along with the rest of this tutorial, use the [Financial sample workbook](#).



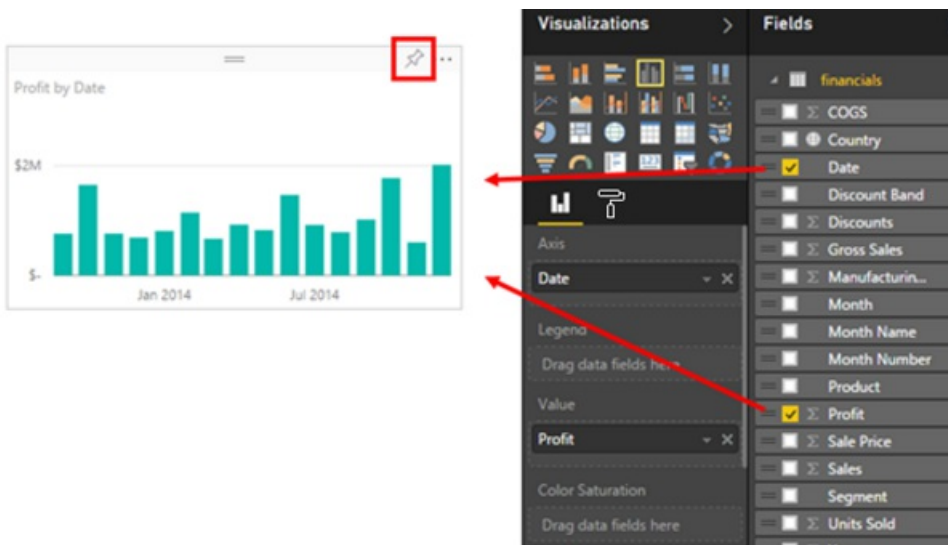
Build your report

After Power BI imports your Excel file, start building your report. When the **Your dataset is ready** message appears, select **View dataset**. Power BI opens in Editing view and displays the report canvas. On the right side are the Visualizations, Filters, and Fields panes.

Notice that your Excel workbook table data appears in the Fields pane. Under the name of the table, Power BI lists the column headings as individual fields.

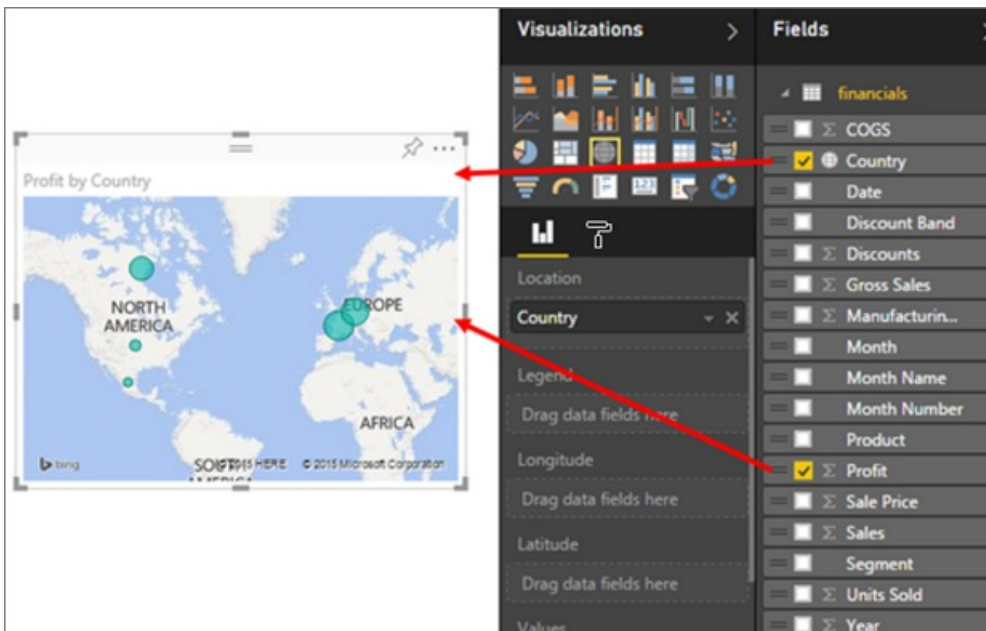


Now you can begin to create visualizations. Your manager wants to see profit over time. In the Fields pane, drag **Profit** to the report canvas. Power BI displays a bar chart by default. Next, drag **Date** to the report canvas. Power BI updates the bar chart to show profit by date.

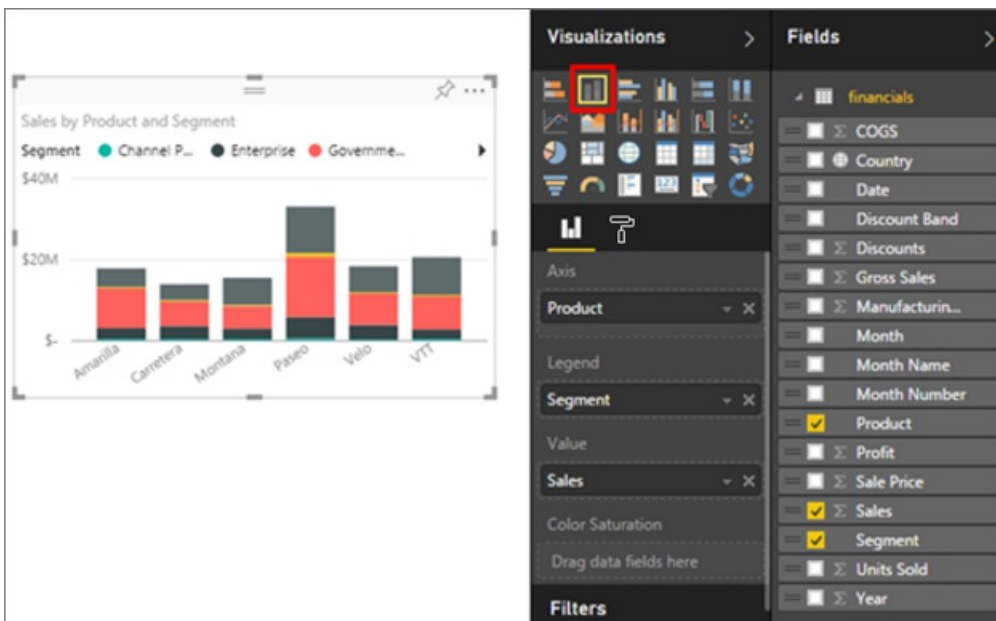


TIP: If your chart doesn't look like you expected, check your aggregations. For example, in the **Value** well, right click the field you just added and make sure the data is being aggregated the way you'd like it to be. In this example, we're using **Sum**.

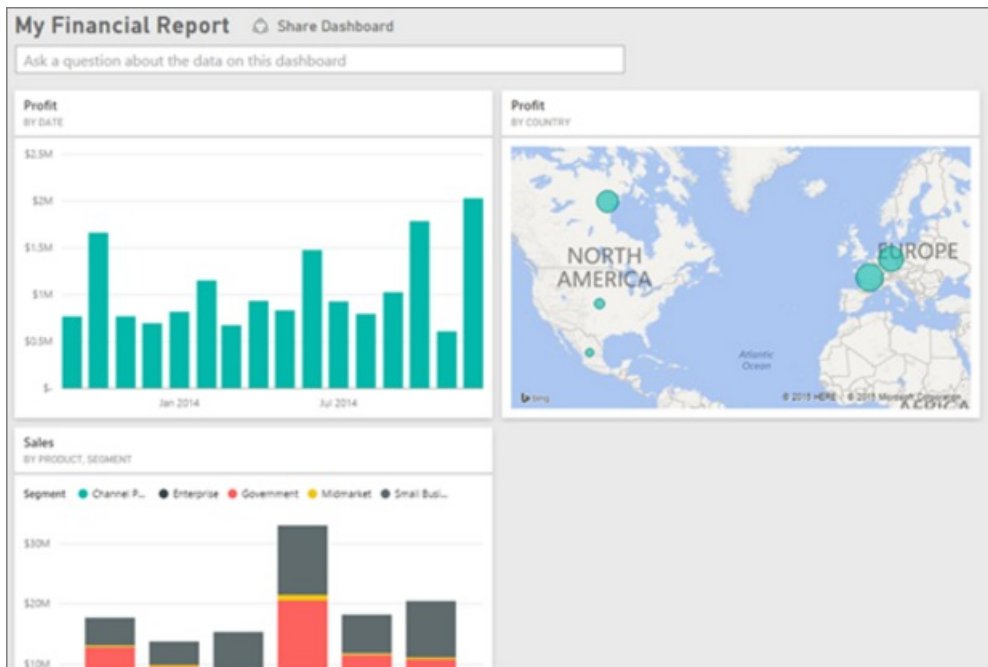
Your manager wants to know which countries are the most profitable. Impress her with a map visualization. Select a blank area on your canvas, and from the Fields pane, simply drag over the **Country** and then **Profit** fields. Power BI creates a map visual with bubbles representing the relative profit of each location.



What about displaying a visual showing sales by product and market segment? Easy. In the Fields pane, select the checkboxes next to the Sales, Product and Segment fields. Power BI creates a bar chart instantly. Change the type of chart by choosing one of the icons in the Visualizations menu. For instance, change it to a Stacked Bar chart. To sort the chart, select the ellipses (...) > **Sort by**.



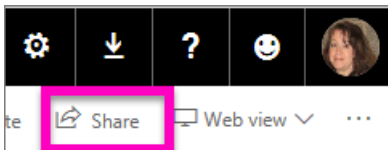
Pin all of your visuals to your Dashboard. You're ready to share it with your colleagues.



Share your dashboard

You want to share your dashboard with your manager, Paula. You can share your dashboard and underlying report with any colleague who has a Power BI account. They can interact with your report, but cannot save changes.

To share your report, at the top of the dashboard, select **Share**.



Power BI displays the Share Dashboard page. In the top area, enter the email addresses of the recipients. Add a message in the field below. To allow recipients to share your dashboard with others, select **Allow recipients to share your dashboard**. Select **Share**.


Share dashboard

Share Access

Grant access to

paula@contoso.com

Here is the report you requested...

 Recipients will have access to the same data, reports, and workbooks as you have in this dashboard, unless their access is restricted by row-level security defined for the dataset. [Learn more](#)

- Allow recipients to share your dashboard
- Send email notification to recipients

Share

Cancel

Next steps

- [Get started with Power BI service](#)
- [Get started with Power BI Desktop](#)
- [Power BI - Basic Concepts](#)
- More questions? [Try the Power BI Community](#)

Get data from Excel workbook files

12/6/2017 • 8 min to read • [Edit Online](#)



Microsoft Excel is one of the most widely used business applications around. It's also one of the most common ways to get your data into Power BI.

What types of workbooks does Power BI support?

Power BI supports importing or connecting to workbooks created in Excel 2007 and later. Workbooks must be saved as .xlsx or .xlsm file type and be under 1 GB. Some features described in this article are only available in later versions of Excel.

Workbooks with ranges or tables of data

If your workbook has simple worksheets with ranges of data, to get the most out of your data in Power BI, be sure to format those ranges as tables. This way, when creating reports in Power BI, you'll see named tables and columns in the Fields pane, making it much easier to visualize your data.

Workbooks with data models

Workbooks can contain a data model with one or more tables of data loaded into it by using linked tables, Power Query (Get & Transform in Excel 2016), or Power Pivot. Power BI supports all data model properties such as relationships, measures, hierarchies, and KPIs.

NOTE

Workbooks with data models cannot be shared across Power BI tenants. For example, a user who logs in to Power BI using a *contoso.com* account cannot share an Excel workbook with a user who logs in using a Power BI login account from *woodgrovebank.com*.

Workbooks with connections to external data sources

If you use Excel to connect to an external data source, once your workbook is in Power BI, you can create reports and dashboards based on data from that connected data source. You can also setup Scheduled Refresh to automatically connect right to the data source and get updates. You'll no longer need to refresh manually from the Data ribbon in Excel. Any visualizations in reports and tiles in dashboards based on data from that data source are updated automatically. To learn more, see [Data refresh in Power BI](#).

Workbooks with Power View sheets, PivotTables and charts

How your PowerView sheets and PivotTables and charts appear, or not appear, in Power BI depends on where your workbook file is saved and how you choose to get it into Power BI. We'll go into this more below.

Data types

Power BI supports the following data types: Whole Number, Decimal Number, Currency, Date, True/False, Text. Marking data as specific data types in Excel will improve the Power BI experience.

Prepare your workbook for Power BI

Watch this helpful video to learn more about how to make sure your Excel workbooks are ready for Power BI.

Where your workbook file is saved makes a difference

Local - If you save your workbook file to a local drive on your computer or another location in your organization, from Power BI you can load your file into Power BI. Your file will actually remain on your local drive, so the whole file isn't really imported into Power BI. What really happens is a new dataset is created in Power BI and data and the data model (if any) from the workbook are loaded into the dataset. If your workbook has any Power View sheets, those will appear in your Power BI site under Reports. Excel 2016 also has the **Publish** feature (under the **File** menu). Using **Publish** is effectively the same as using **Get Data > Files > Local File** from Power BI, but is often easier to update your dataset in Power BI if you're regularly making changes to the workbook.

OneDrive - Business – If you have OneDrive for Business and you sign into it with the same account you sign into Power BI with, this is by-far the most effective way to keep your work in Excel and your dataset, reports, and dashboards in Power BI in-sync. Because both Power BI and OneDrive are in the cloud, Power BI *connects* to your workbook file on OneDrive about every hour. If any changes are found, your dataset, reports, and dashboards are automatically updated in Power BI. Just like if you saved your workbook to a local drive, you can also use Publish to update your dataset and reports in Power BI immediately; otherwise Power BI will automatically synchronize, usually within an hour.

OneDrive - Personal – If you save your workbook files to your own OneDrive account, you'll get many of the same benefits as you would with OneDrive for Business. The biggest difference is when you first connect to your file (using Get Data > Files > OneDrive – Personal) you'll need to sign in to your OneDrive with your Microsoft account, which is usually different from what you use to sign in to Power BI. When signing in with your OneDrive with your Microsoft account, be sure to select the Keep me signed in option. This way, Power BI will be able to connect to your workbook file about every hour and make sure your dataset and reports in Power BI are in-sync.

SharePoint Team-Sites – Saving your Power BI Desktop files to SharePoint – Team Sites is much the same as saving to OneDrive for Business. The biggest difference is how you connect to the file from Power BI. You can specify a URL or connect to the root folder.

One Excel workbook – two ways to use it

If you save your workbook files to **OneDrive**, you'll have a couple of ways you can explore your data in Power BI

OneDrive for Business

Choose how to connect to your Excel workbook

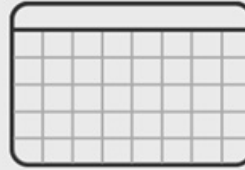


Import Excel data into Power BI

Connect to the data in your workbook on OneDrive so you can create Power BI reports and dashboards for it. Data is automatically refreshed from OneDrive.

Import ↗

or



Connect, Manage and View Excel in Power BI

Bring your Excel workbook into Power BI and see it exactly as it is in Excel Online - charts, PivotTables, worksheets, and all. Then keep your workbooks up to date with scheduled refresh.

Connect ↗

Import Excel data into Power BI

When you choose **Import**, any supported data in tables and/or a data model are imported into a new dataset in Power BI. If you have any Power View sheets, those will be re-created in Power BI as reports.

You can continue editing your workbook. When your changes are saved, they'll be synchronized with the dataset in Power BI, usually within about an hour. If you need more immediate gratification, you can just click Publish again, and your changes are exported right then and there. Any visualizations you have in reports and dashboards will be updated, too.

Choose this option if you've used Get & Transform data or Power Pivot to load data into a data model, or if your workbook has Power View sheets with visualizations you want to see in Power BI.

In Excel 2016, you can also use Publish > Export. It's pretty much the same thing. To learn more, see [Publish to Power BI from Excel 2016](#).

Connect, manage and view Excel in Power BI

When you choose **Connect**, your workbook will appear in Power BI just like it would in Excel Online. But, unlike Excel Online, you'll have some great features to help you pin elements from your worksheets right to your dashboards.

You can't edit your workbook in Power BI. But if you need to make some changes, you can click Edit, and then choose to edit your workbook in Excel Online or open it in Excel on your computer. Any changes you make are saved to the workbook on OneDrive.

When choosing this way, no dataset is created in Power BI. Your workbook will appear in your Power BI workspace navigation pane under Reports. Connected workbooks have a special Excel icon.

Choose this option if you only have data in worksheets, or you have ranges, PivotTables and charts you want to pin to dashboards.

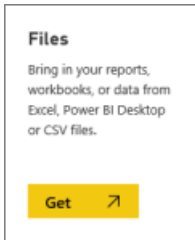
In Excel 2016, you can also use Publish > Upload. It's pretty much the same thing. To learn more, see [Publish to Power BI from Excel 2016](#).

Import or connect to an Excel workbook from Power BI

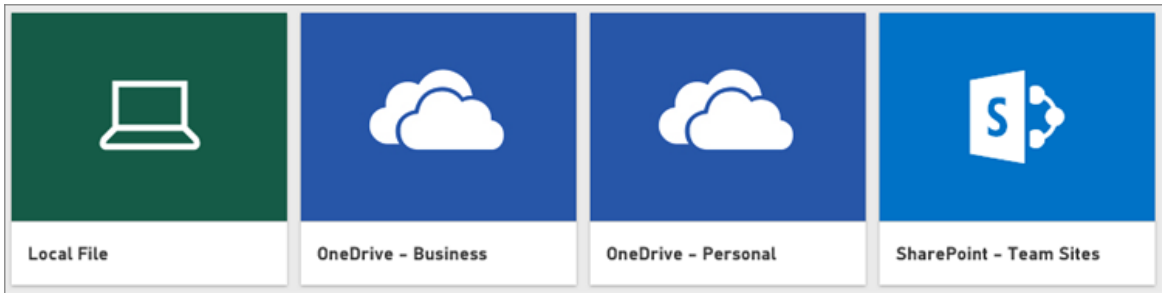
1. In Power BI, in the navigation pane, click **Get Data**.



2. In Files, click **Get**.



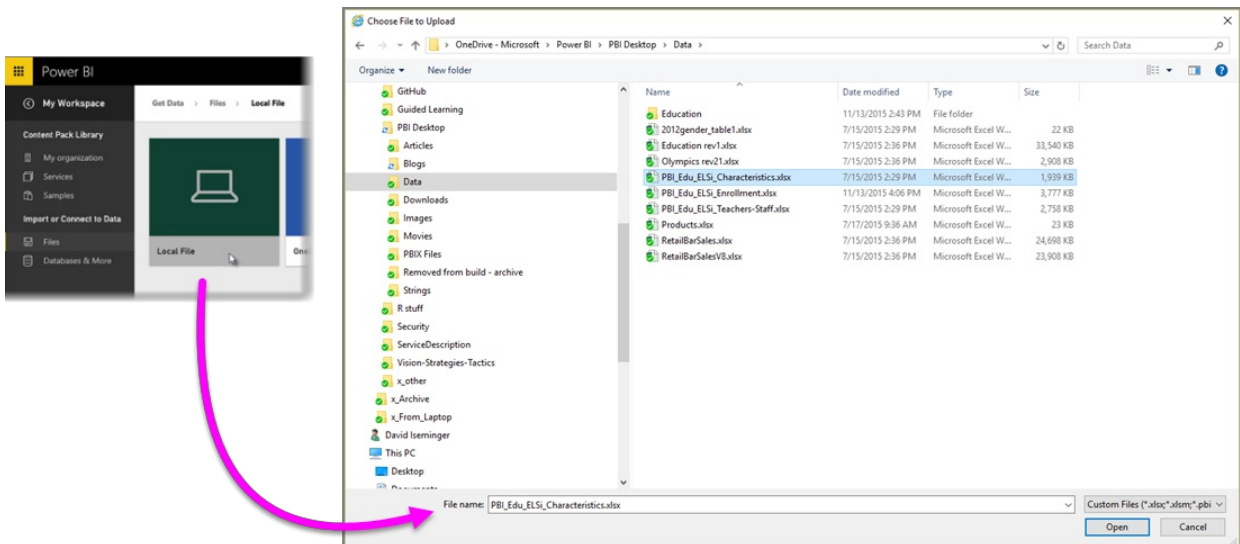
3. Find your file.



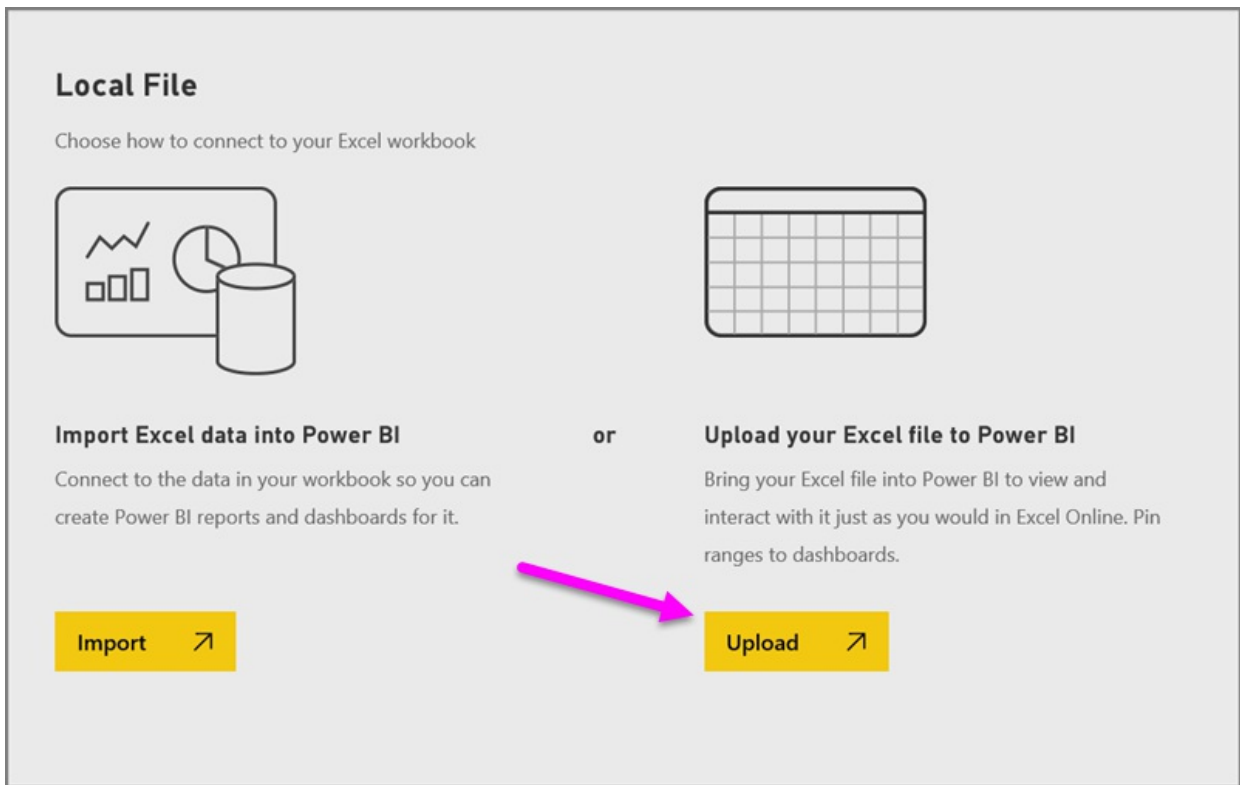
4. If your workbook file is on OneDrive or SharePoint - Team Sites, choose **Import** or **Connect**.

Local Excel workbooks

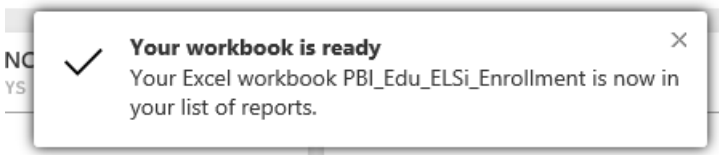
You can also use a local Excel file and upload it into Power BI. Simply select **Local File** from the previous menu, then navigate to where you have your Excel workbooks saved.



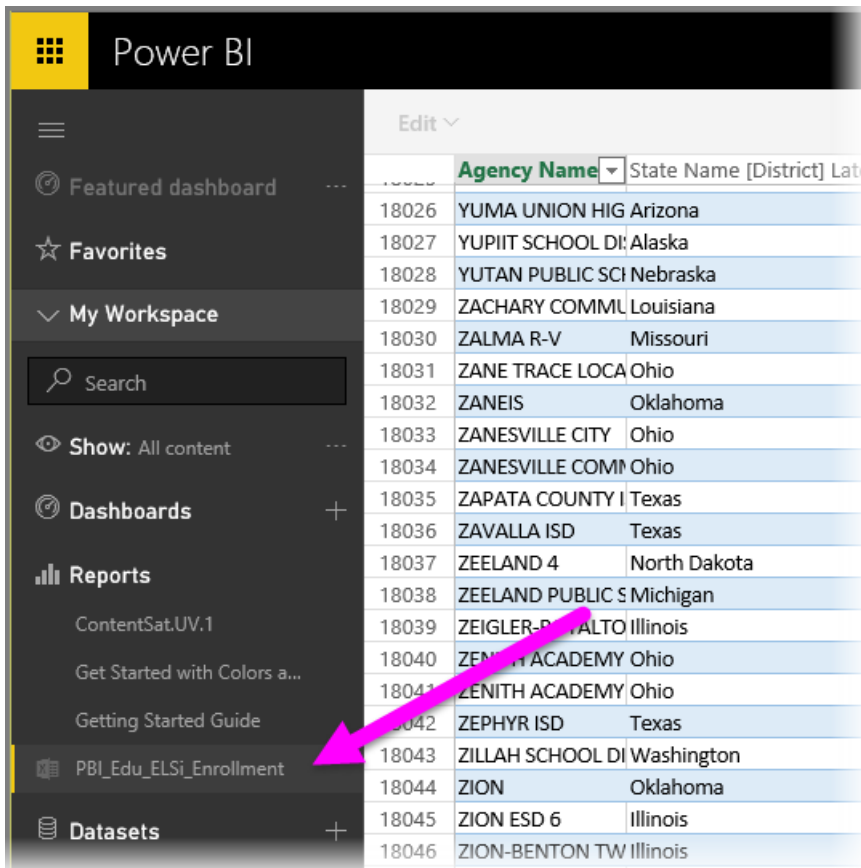
Once selected, choose to Upload your file into Power BI.



Once your workbook is uploaded, you get a notification that the workbook is ready.



Once the workbook is ready, you can find it in the **Reports** section of Power BI.



Publish from Excel 2016 to your Power BI site

Using the **Publish to Power BI** feature in Excel 2016 is effectively the same as using **Get Data** in Power BI to import or connect to your file. We won't go into the details here, but you can see [Publish to Power BI from Excel 2016](#) to learn more.

Troubleshooting

Workbook file too big? Check out [Reduce the size of an Excel workbook to view it in Power BI](#).

Currently, when you choose Import, Power BI only imports data that is part of a named table or a data model. As a result, if the workbook contains no named tables, Power View sheets, or Excel data models, you might see this error: **"We couldn't find any data in your Excel workbook"**. [This article](#) explains how to fix your workbook and re-import it.

Next steps

Explore your data - Once you get data and reports from your file into Power BI, it's time to explore. Just right-click the new dataset and then click Explore. If you chose to connect to a workbook file on OneDrive in step 4, your workbook will appear in Reports. When you click on it, it will open in Power BI, just as it would if it were in Excel Online.

Schedule refresh - If your Excel workbook file connects to external data sources, or you imported from a local drive, you can setup scheduled refresh to make sure your dataset or report is always up-to-date. In most cases, setting up scheduled refresh is quite easy to do, but going into the details is outside the scope of this article. See [Data refresh in Power BI](#) to learn more.

[Publish to Power BI from Excel 2016](#)

[Power BI publisher for Excel](#)

[Data refresh in Power BI](#)

Get data from Power BI Desktop files

12/6/2017 • 3 min to read • [Edit Online](#)



Power BI Desktop makes business intelligence and reporting easy. Whether you're connecting to a many different data sources, querying and transforming data, modeling your data, and creating powerful and dynamic reports, **Power BI Desktop** makes business intelligence tasks intuitive and fast. If you're not familiar with **Power BI Desktop**, check out [Getting started with Power BI Desktop](#).

Once you bring data into **Power BI Desktop** and create a few reports, it's time to get your saved file into the **Power BI service**.

Where your file is saved makes a difference

Local - If you save your file to a local drive on your computer or another location in your organization, you can *import* your file or you can *publish* from Power BI Desktop to get its data and reports into Power BI. Your file will actually remain on your local drive, so the whole file isn't really moved into Power BI. What really happens is a new dataset is created in Power BI and data and the data model from the Power BI Desktop file are loaded into the dataset. If your file has any reports, those will appear in your Power BI site under Reports.

OneDrive - Business – If you have OneDrive for Business and you sign into it with the same account you sign into Power BI with, this is by-far the most effective way to keep your work in Power BI Desktop and your dataset, reports, and dashboards in Power BI in-sync. Because both Power BI and OneDrive are in the cloud, Power BI *connects* to your file on OneDrive about every hour. If any changes are found, your dataset, reports, and dashboards are automatically updated in Power BI.

OneDrive - Personal – If you save your files to your own OneDrive account, you'll get many of the same benefits as you would with OneDrive for Business. The biggest difference is when you first connect to your file (using Get Data > Files > OneDrive – Personal) you'll need to sign in to your OneDrive with your Microsoft account, which is usually different from what you use to sign in to Power BI. When signing in with your OneDrive with your Microsoft account, be sure to select the Keep me signed in option. This way, Power BI will be able to connect to your file about every hour and make sure your dataset in Power BI is in-sync.

SharePoint Team-Sites – Saving your Power BI Desktop files to SharePoint – Team Sites is much the same as saving to OneDrive for Business. The biggest difference is how you connect to the file from Power BI. You can specify a URL or connect to the root folder.

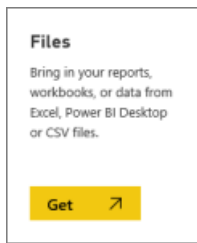
Import or connect to a Power BI Desktop file from Power BI

IMPORTANT

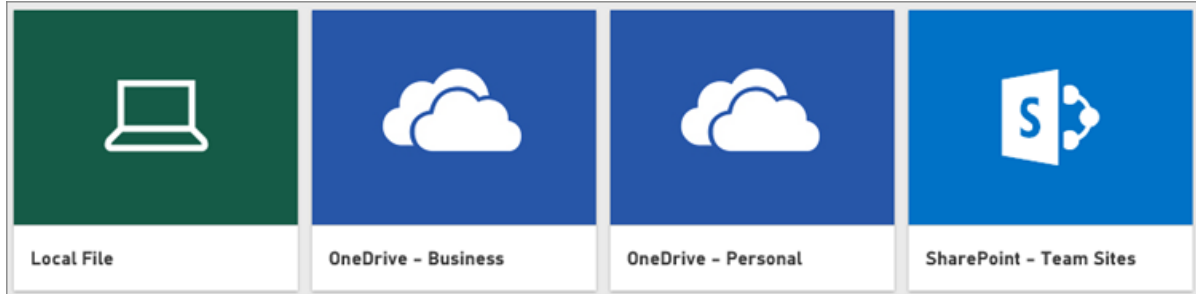
The maximum file size you can import into Power BI is 1 gigabyte.

1. In Power BI, in the navigator pane, click **Get Data**.

2. In **Files**, click **Get**.



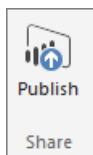
3. Find your file. Power BI Desktop files have a .PBIX extension.



Publish a file from Power BI Desktop to your Power BI site

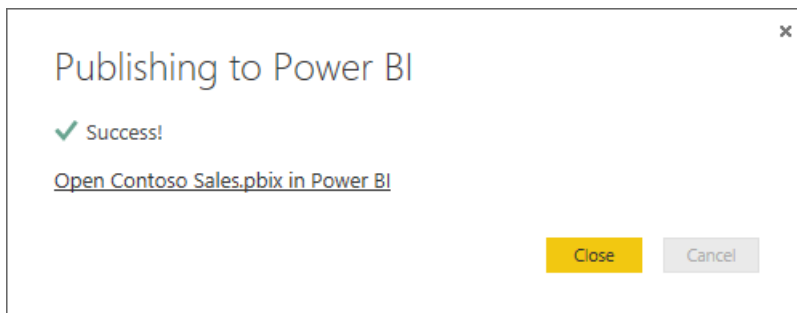
Using Publish from Power BI Desktop is effectively the same as using Get Data in Power BI to import your file from a local drive or connecting to it on OneDrive. Here's the quick how to, but you can see [Publish from Power BI Desktop](#) to learn more.

1. In Power BI Desktop, click **File** > **Publish** > **Publish to Power BI**, or click **Publish** on the ribbon.



2. Sign in to Power BI. You'll only need to do this the first time.

When complete, you'll get a link to open your report in your Power BI site.



Next steps

Explore your data - Once you get data and reports from your file into Power BI, it's time to explore. If your file already has reports in it, they'll appear in the navigator pane in **Reports**. If your file just had data, you can create new reports; just right-click the new dataset and then click **Explore**.

Refresh external data sources - If your Power BI Desktop file connects to external data sources, you can setup scheduled refresh to make sure your dataset is always up-to-date. In most cases, setting up scheduled refresh is quite easy to do, but going into the details is outside the scope of this article. See [Data refresh in Power BI](#) to learn more.

Get data from Comma Separated Value (.CSV) files

12/6/2017 • 2 min to read • [Edit Online](#)



Comma separated value files, often known as a .CSV, are simple text files with rows of data where each value is separated by a comma. These types of files can contain very large amounts of data within a relatively small file size, making them an ideal data source for Power BI. You can download a sample .CSV file [here](#).

If you have a .CSV, it's time to get it into your Power BI site as a dataset where you can begin exploring your data, create some dashboards, and share your insights with others.

TIP

Many organizations output a .CSV with updated data each day. To make sure your dataset in Power BI stays in-sync with your updated file, be sure the file is saved to OneDrive with the same name.

Where your file is saved makes a difference

Local - If you save your .CSV file to a local drive on your computer or another location in your organization, from Power BI you can *import* your file into Power BI. Your file will actually remain on your local drive, so the whole file isn't really imported into Power BI. What really happens is a new dataset is created in Power BI and data from the .CSV file is loaded into the dataset.

OneDrive - Business – If you have OneDrive for Business and you sign into it with the same account you sign into Power BI with, this is by-far the most effective way to keep your .CSV file and your dataset, reports, and dashboards in Power BI in-sync. Because both Power BI and OneDrive are in the cloud, Power BI *connects* to your file on OneDrive about every hour. If any changes are found, your dataset, reports, and dashboards are automatically updated in Power BI.

OneDrive - Personal – If you save your files to your own OneDrive account, you'll get many of the same benefits as you would with OneDrive for Business. The biggest difference is when you first connect to your file (using Get Data > Files > OneDrive – Personal) you'll need to sign in to your OneDrive with your Microsoft account, which is usually different from what you use to sign in to Power BI. When signing into your OneDrive with your Microsoft account, be sure to select the Keep me signed in option. This way, Power BI will be able to connect to your file about every hour and make sure your dataset in Power BI is in-sync.

SharePoint Team-Sites – Saving your Power BI Desktop files to SharePoint – Team Sites is much the same as saving to OneDrive for Business. The biggest difference is how you connect to the file from Power BI. You can specify a URL or connect to the root folder.

Import or connect to a .CSV file

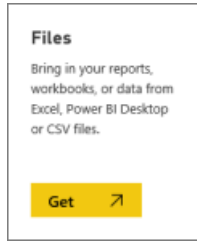
IMPORTANT

The maximum file size you can import into Power BI is 1 gigabyte.

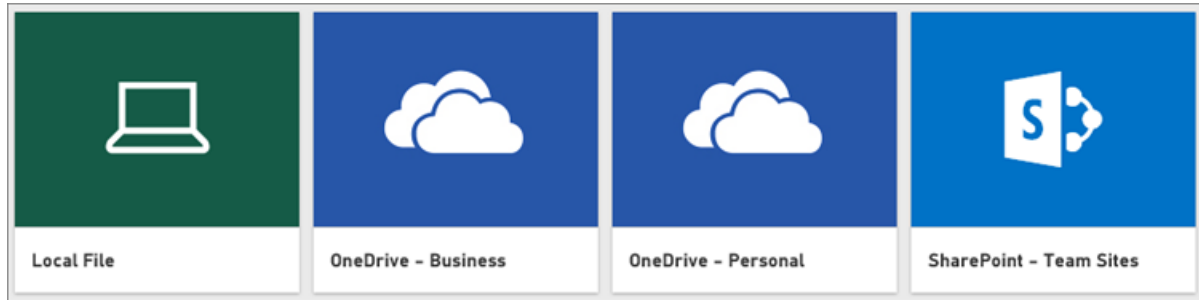
1. In Power BI, in the navigator pane, click **Get Data**.

➤ **Get Data**

2. In **Files**, click **Get**.



3. Find your file.



Next steps

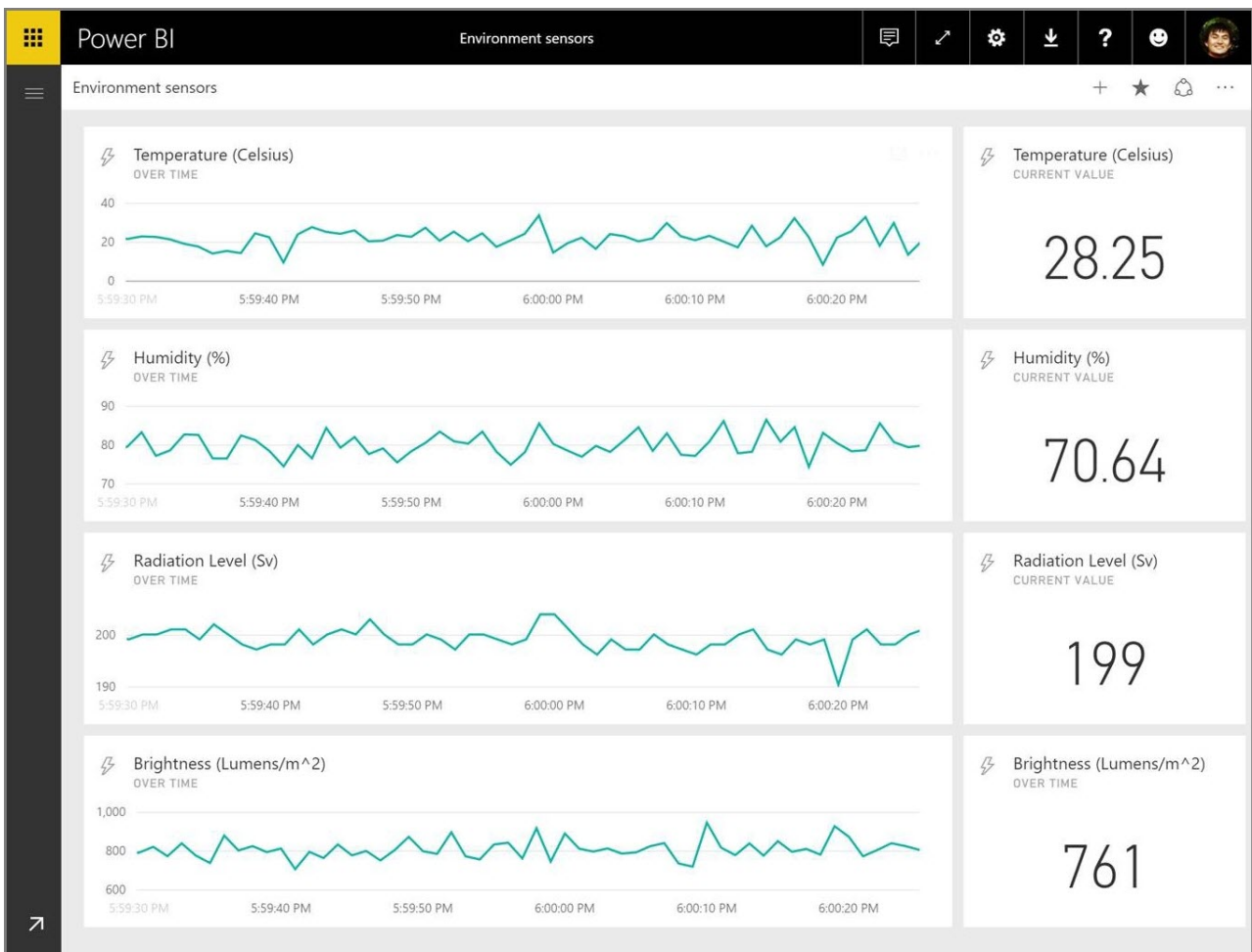
Explore your data - Once you get data from your file into Power BI, it's time to explore. Just right-click the new dataset and then click **Explore**.

Schedule refresh - If your file is saved to a local drive, you can setup scheduled refresh so your dataset and reports in Power BI stay up-to-date. To learn more, see [Data refresh in Power BI](#). If your file is saved to OneDrive, Power BI will automatically synchronize with it about every hour.

Real-time streaming in Power BI

1/25/2018 • 14 min to read • [Edit Online](#)

With Power BI real-time streaming, you can stream data and update dashboards in real-time. Any visual or dashboard that can be created in Power BI can also be created to display and update real-time data and visuals. The devices and sources of streaming data can be factory sensors, social media sources, service usage metrics, and anything else from which time-sensitive data can be collected or transmitted.



This article shows you how to set up real-time streaming dataset in Power BI. But before we get to that, it's important to understand the types of real-time datasets that are designed to display in tiles (and dashboards), and how those datasets differ.

Types of real-time datasets

There are three types of real-time datasets which are designed for display on real-time dashboards:

- Push dataset
- Streaming dataset
- PubNub streaming dataset

First let's understand how these datasets differ from one another (this section), then we discuss how to push data into those each of these datasets.

Push dataset

With a **push dataset**, data is pushed into the Power BI service. When the dataset is created, the Power BI service

automatically creates a new database in the service to store the data. Since there is an underlying database that continues to store the data as it comes in, reports can be created with the data. These reports and their visuals are just like any other report visuals, which means you can use all of Power BI's report building features to create visuals, including custom visuals, data alerts, pinned dashboard tiles, and more.

Once a report is creating using the push dataset, any of its visuals can be pinned to a dashboard. On that dashboard, visuals update in real-time whenever the data is updated. Within the service, the dashboard is triggering a tile refresh every time new data is received.

There are two considerations to note about pinned tiles from a push dataset:

- Pinning an entire report using the *pin live page* option will **not** result in the data automatically being updated.
- Once a visual is pinned to a dashboard, you can use **Q&A** to ask questions of the push dataset in natural language. Once you make a **Q&A** query, you can pin the resulting visual back to the dashboard, and that dashboard will *also* update in real-time.

Streaming dataset

With a **streaming dataset**, data is also pushed into the Power BI service, with an important difference: Power BI only stores the data into a temporary cache, which quickly expires. The temporary cache is only used to display visuals which have some transient sense of history, such as a line chart that has a time window of one hour.

With a **streaming dataset**, there is *no* underlying database, so you *cannot* build report visuals using the data that flows in from the stream. As such, you cannot make use of report functionality such as filtering, custom visuals, and other report functions.

The only way to visualize a streaming dataset is to add a tile and use the streaming dataset as a **custom streaming data** data source. The custom streaming tiles that are based on a **streaming dataset** are optimized for quickly displaying real-time data. There is very little latency between when the data is pushed into the Power BI service and when the visual is updated, since there's no need for the data to be entered into or read from a database.

In practice, streaming datasets and their accompanying streaming visuals are best used in situations when it is critical to minimize the latency between when data is pushed and when it is visualized. In addition, it's best practice to have the data pushed in a format that can be visualized as-is, without any additional aggregations. Examples of data that's ready as-is include temperatures, and pre-calculated averages.

PubNub streaming dataset

With a **PubNub** streaming dataset, the Power BI web client uses the PubNub SDK to read an existing PubNub data stream, and no data is stored by the Power BI service.

As with the **streaming dataset**, with the **PubNub streaming dataset** there is no underlying database in Power BI, so you cannot build report visuals against the data that flows in, and cannot take advantage of report functionality such as filtering, custom visuals, and so on. As such, the **PubNub streaming dataset** can also only be visualized by adding a tile to the dashboard, and configuring a PubNub data stream as the source.

Tiles based on a **PubNub streaming dataset** are optimized for quickly displaying real-time data. Since Power BI is directly connected to the PubNub data stream, there is very little latency between when the data is pushed into the Power BI service and when the visual is updated.

Streaming dataset matrix

The following table (or matrix, if you like) describes the three types of datasets for real-time streaming, and lists capabilities and limitations of each.

Capability	Push	Streaming	PubNub
Dashboard tiles update in real-time as data is pushed in	Yes. For visuals built via reports and then pinned to dashboard.	Yes. For custom streaming tiles added directly to the dashboard.	Yes. For custom streaming tiles added directly to the dashboard.
Dashboard tiles update with smooth animations	No.	Yes.	Yes.
Data stored permanently in Power BI for historic analysis	Yes.	No. Data is temporarily stored for one hour to render visuals.	No.
Build Power BI Reports atop the data	Yes.	No.	No.
Max rate of data ingestion.	1 request/s 16 MB/request	5 request/s 15 KB/request	N/A Data is not being pushed into Power BI
Limits on data throughput	1M rows/hour	None.	N/A Data is not being pushed into Power BI

NOTE

See [this MSDN article](#) for information on **Push** limits on how much data can be pushed in.

Pushing data to datasets

The previous section described the three primary types of real-time datasets you can use in real-time streaming, and how they differ. This section describes how to create and push data into those datasets.

There are three primary ways you can push data into a dataset:

- Using the Power BI REST APIs
- Using the Streaming Dataset UI
- Using Azure Stream Analytics

Let's take a look at each of those approaches in turn.

Using Power BI REST APIs to push data

Power BI REST APIs can be used to create and send data to **push** datasets and to **streaming** datasets. When you create a dataset using Power BI REST APIs, the *defaultMode* flag specifies whether the dataset is push or streaming. If no *defaultMode* flag is set, the dataset defaults to a **push** dataset.

If the *defaultMode* value is set to *pushStreaming*, the dataset is both a **push** and **streaming** dataset, providing the benefits of both dataset types. The REST API [article for Create dataset](#) demonstrates creating a streaming dataset, and shows the *defaultMode* flag in action.

NOTE

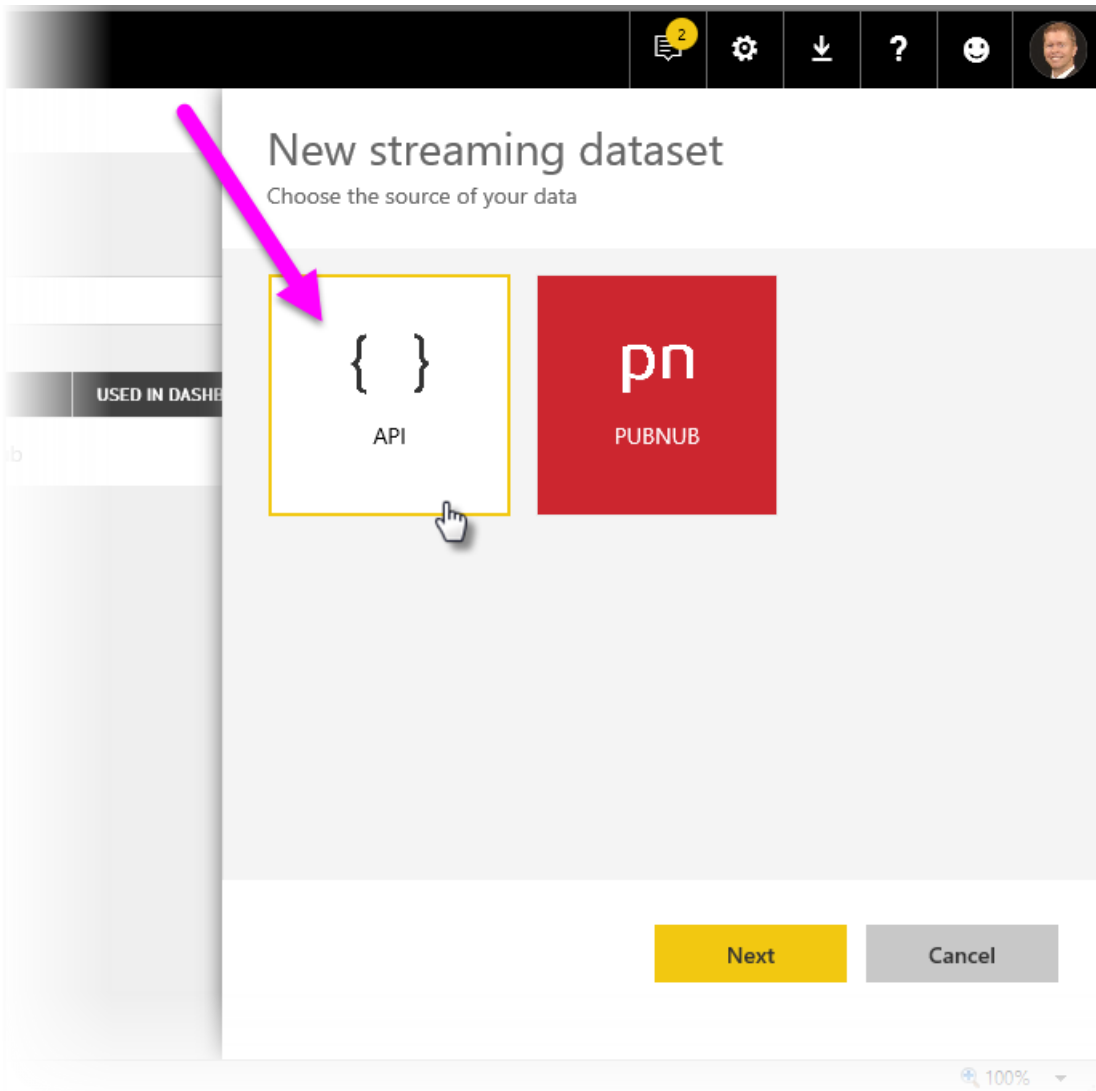
When using datasets with the *defaultMode* flag set to *pushStreaming*, if a request exceeds the 15Kb size restriction for a **streaming** dataset, but is less than the 16MB size restriction of a **push** dataset, the request will succeed and the data will be updated in the push dataset. However, any streaming tiles will temporarily fail.

Once a dataset is created, use the REST APIs to push data using the [Add rows API](#), as [demonstrated in this article](#).

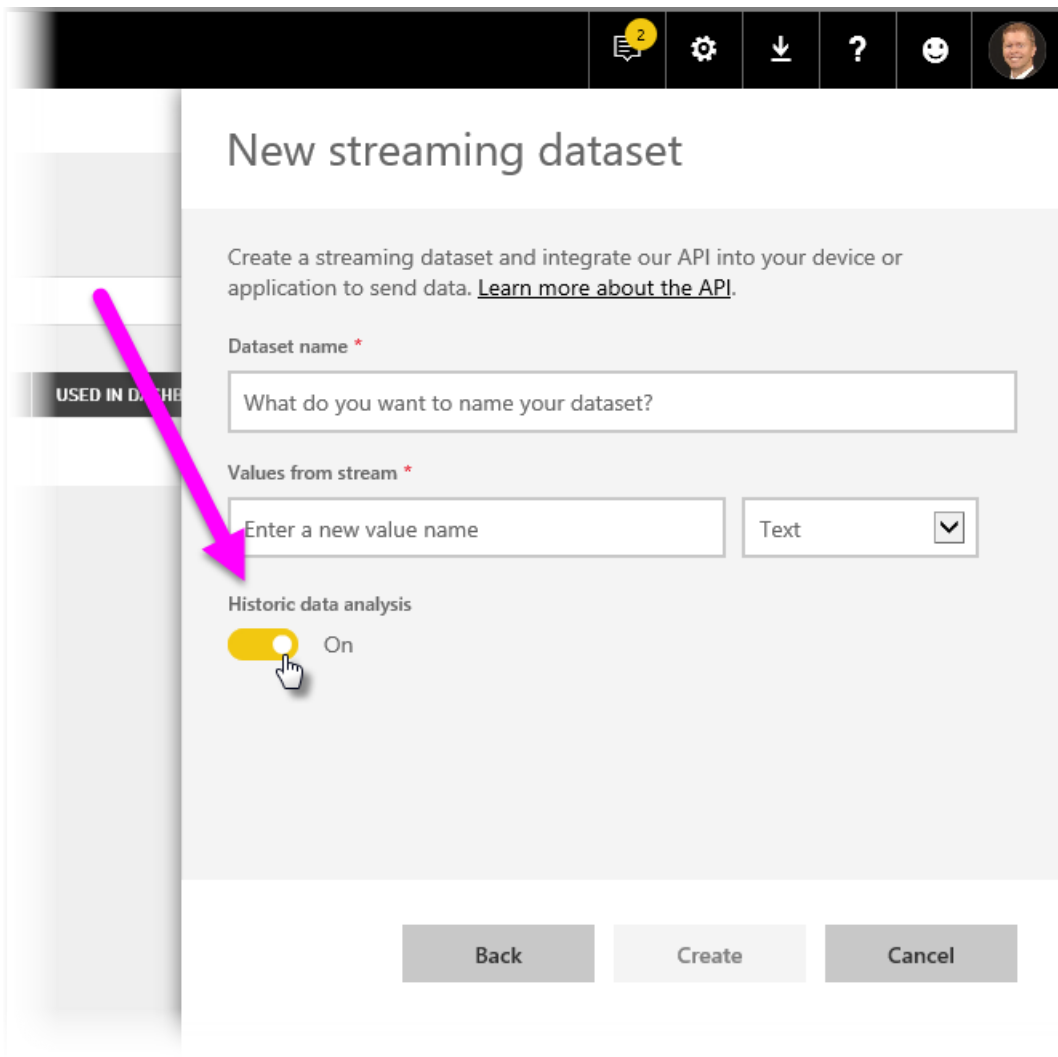
All requests to REST APIs are secured using **Azure AD OAuth**.

Using the Streaming Dataset UI to push data

In the Power BI service, you can create a dataset by selecting the **API** approach as shown in the following image.



When creating the new streaming dataset, you can select to enable **Historic data analysis** as shown below, which has a significant impact.



When **Historic data analysis** is disabled (it is disabled by default), you create a **streaming dataset** as described earlier in this article. When **Historic data analysis** is *enabled*, the dataset created becomes both a **streaming dataset** and a **push dataset**. This is equivalent to using the Power BI REST APIs to create a dataset with its *defaultMode* set to *pushStreaming*, as described earlier in this article.

NOTE

For streaming datasets created using the Power BI service UI, as described in the previous paragraph, Azure AD authentication is not required. In such datasets, the dataset owner receives a URL with a rowkey, which authorizes the requestor to push data into the dataset without using an Azure AD OAuth bearer token. Take note, however, that the Azure AD (AAD) approach still works to push data into the dataset.

Using Azure Stream Analytics to push data

You can add Power BI as an output within **Azure Stream Analytics (ASA)**, and then visualize those data streams in the Power BI service in real time. This section describes technical details about how that process occurs.

Azure Stream Analytics uses the Power BI REST APIs to create its output data stream to Power BI, with *defaultMode* set to *pushStreaming* (see earlier sections in this article for information on *defaultMode*), which results in a dataset that can take advantage of both **push** and **streaming**. During creation of the dataset, Azure Stream Analytics also sets the **retentionPolicy* flag to *basicFIFO*; with that setting, the database supporting its push dataset stores 200,000 rows, and after that limit is reached, rows are dropped in a first-in first-out (FIFO) fashion.

Caution

If your Azure Stream Analytics query results in very rapid output to Power BI (for example, once or twice per second), Azure Stream Analytics will begin batching those outputs into a single request. This may cause the request size to exceed the streaming tile limit. In that case, as mentioned in previous sections, streaming tiles will fail to

render. In such cases, the best practice is to slow the rate of data output to Power BI; for example, instead of a maximum value every second, set it to a maximum over 10 seconds.

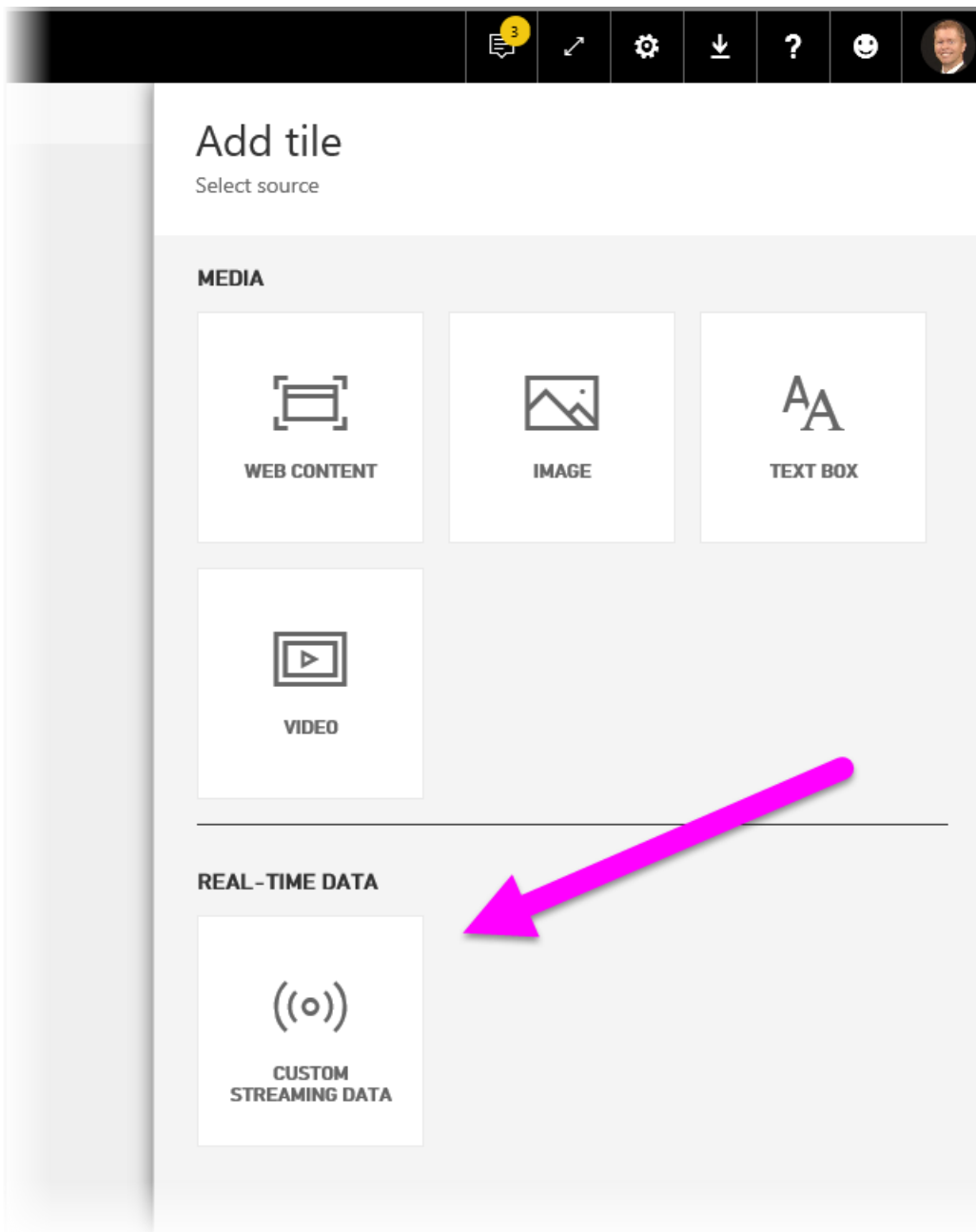
Set up your real-time streaming dataset in Power BI

Now that we've covered the three primary types of datasets for real-time streaming, and the three primary ways you can push data into a dataset, let's get your real-time streaming dataset working in Power BI.

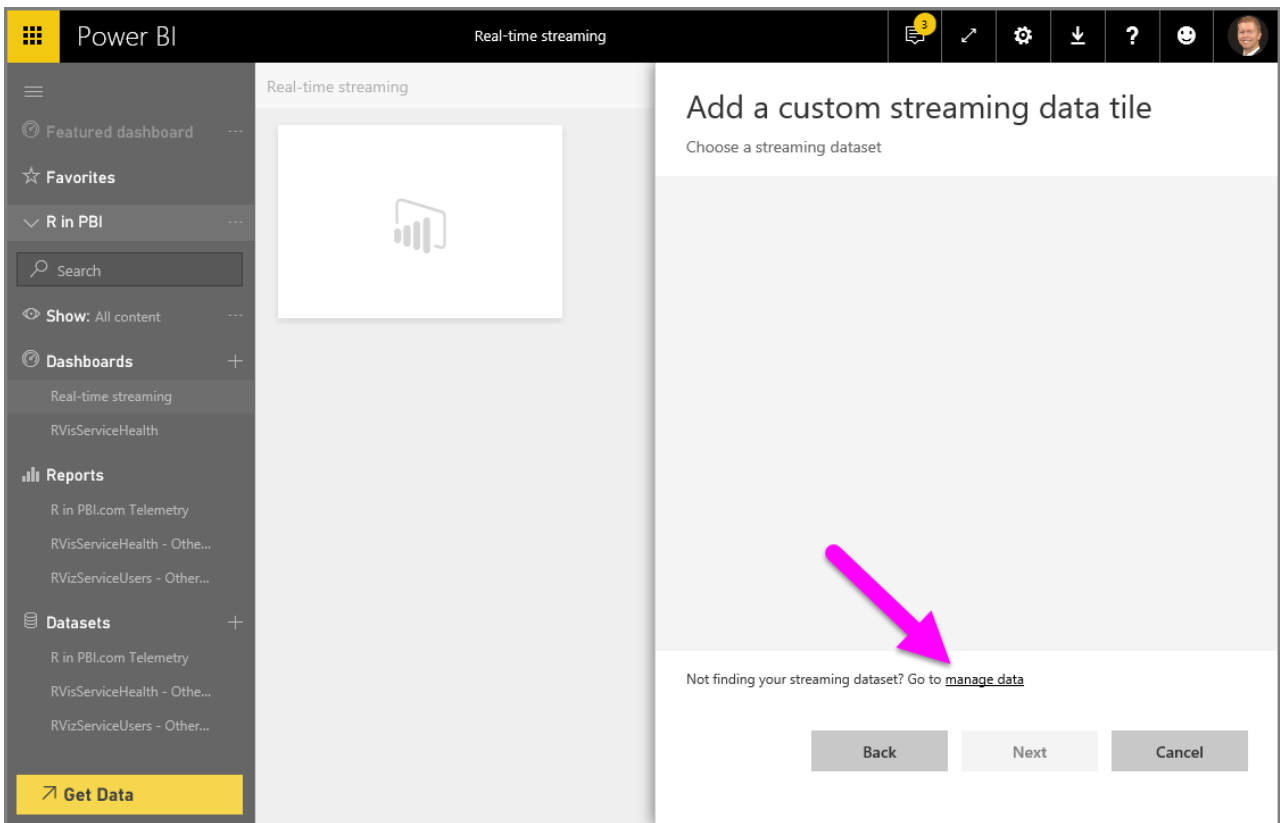
To get started with real-time streaming, you need to choose one of the two ways that streaming data can be consumed in Power BI:

- **tiles** with visuals from streaming data
- **datasets** created from streaming data that persist in Power BI

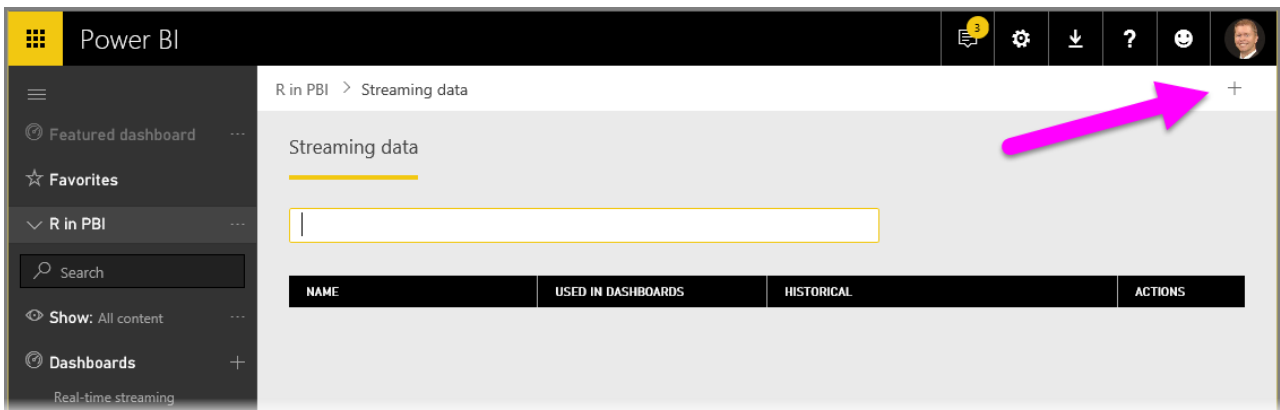
With either option, you'll need to set up **Streaming data** in Power BI. To do this, in your dashboard (either an existing dashboard, or a new one) select **Add a tile** and then select **Custom streaming data**.



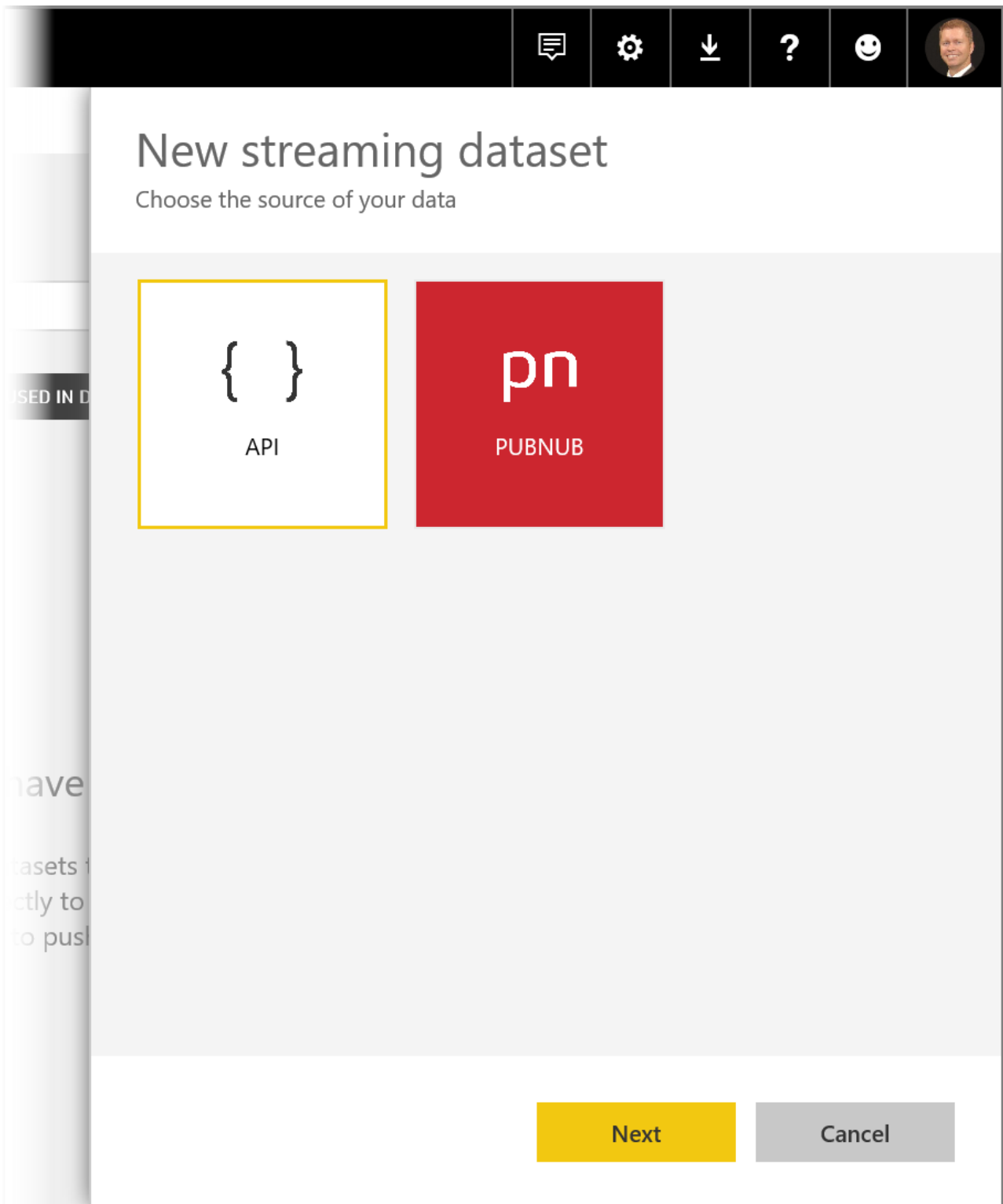
If you don't have streaming data set up yet, don't worry - you can select **manage data** to get started.



On this page, you can input the endpoint of your streaming dataset if you already have one created (into the text box). If you don't have a streaming dataset yet, select the plus icon (+) in the upper right corner to see the available options to create a streaming dataset.



When you click on the + icon, you see two options:



The next section describes these options, and goes into more detail about how to create a streaming **tile** or how to create a **dataset** from the streaming data source, which you can then use later to build reports.

Create your streaming dataset with the option you like best

There are two ways to create a real-time streaming data feed that can be consumed and visualized by Power BI:

- **Power BI REST API** using a real-time streaming endpoint
- **PubNub**

The next sections look at each option in turn.

Using the POWER BI REST API

Power BI REST API - Recent improvements to the Power BI REST API are designed to make real-time streaming

easier for developers. When you select **API** from the **New streaming dataset** window, you're presented with entries to provide that enable Power BI to connect to and use your endpoint:

The screenshot shows the 'New streaming dataset' configuration window. At the top, there is a navigation bar with icons for help, settings, download, question mark, smiley face, and a user profile. The main content area has the title 'New streaming dataset' and a sub-header 'Create a streaming dataset and integrate our API into your device or application to send data. [Learn more about the API.](#)' Below this, there are three main sections: 1. 'Dataset name *' with a text input field containing the placeholder 'What do you want to name your dataset?'. 2. 'Values from stream *' with a text input field containing 'Enter a new value name' and a dropdown menu currently set to 'Text'. 3. 'Historic data analysis' with a toggle switch that is currently turned 'Off'. At the bottom of the form, there are three buttons: 'Back', 'Create', and 'Cancel'.

If you want Power BI to store the data that's sent through this data stream, enable *Historic data analysis* and you'll be able to do reporting and analysis on the collected data stream. You can also [learn more about the API](#).

Once you successfully create your data stream, you're provided with a REST API URL endpoint, which your application can call using *POST* requests to push your data to Power BI **streaming data** dataset you created.

When making *POST* requests, you should ensure the request body matches the sample JSON provided by the Power BI user interface. For example, wrap your JSON objects in an array.

Using PubNub

With the integration of **PubNub** streaming with Power BI, you can use your low-latency **PubNub** data streams (or create new ones) and use them in Power BI. When you select **PubNub** and then select **Next**, you see the following window:

The screenshot shows a web interface for creating a new streaming dataset. At the top, there is a navigation bar with icons for help, settings, download, question mark, smiley face, and a user profile. The main heading is "New streaming dataset". Below the heading, there is a paragraph of text: "For customers of the PubNub data stream network, subscribe to a channel to display data on your dashboard. [Learn more about PubNub.](#)". The form consists of four input fields: "Dataset name *", "Sub-key *", "Channel name *", and "PAMkey token". Each field is followed by a text input box. At the bottom of the form, there are three buttons: "Back", "Next", and "Cancel". The "Next" button is highlighted in a light gray color, while the other two are in a darker gray.

WARNING

PubNub channels can be secured by using a PubNub Access Manager (PAM) authentication key. This key will be shared with all users who have access to the dashboard. You can [learn more about PubNub access control](#).

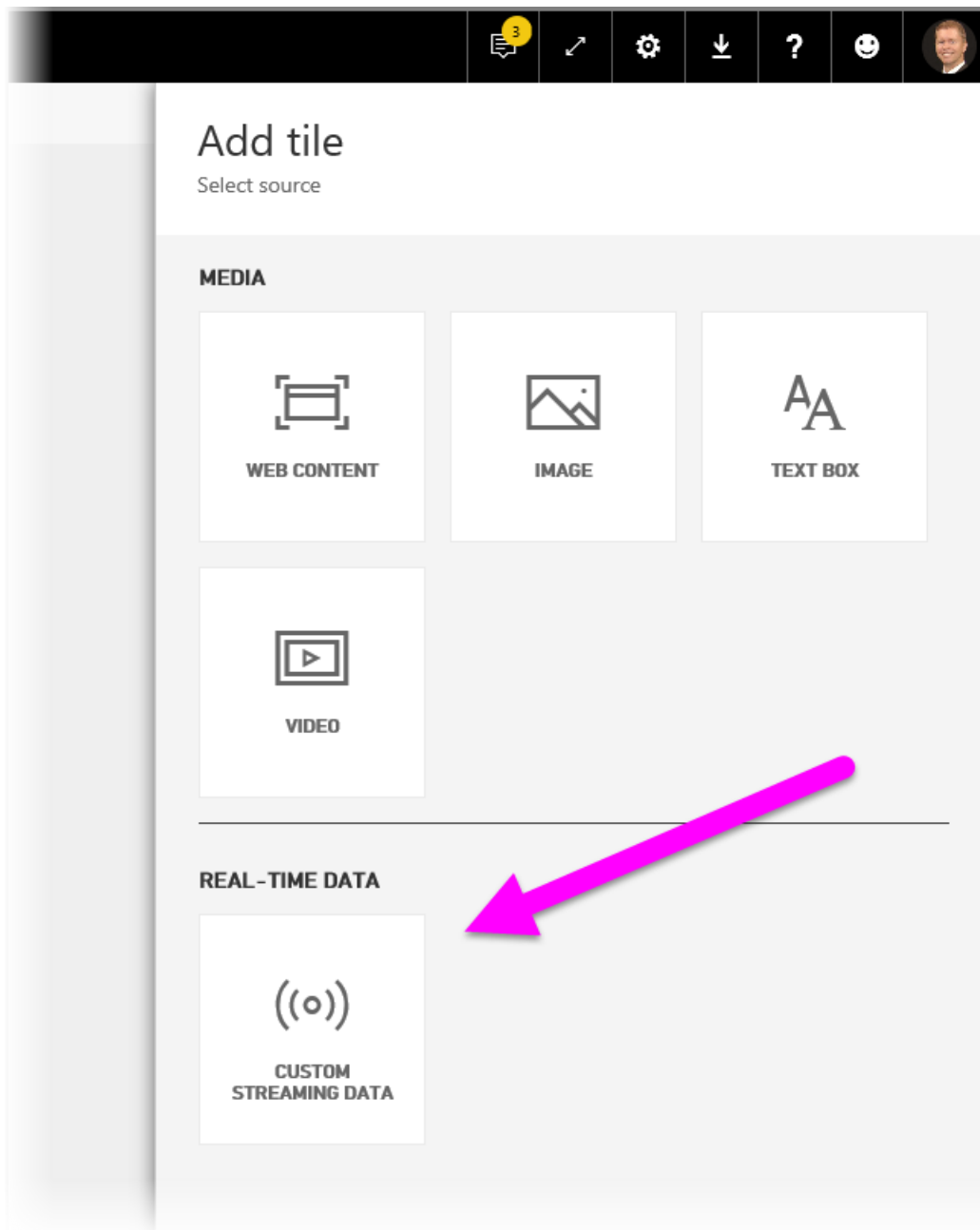
PubNub data streams are often high volume, and are not always suitable in their original form for storage and historical analysis. To use Power BI for historical analysis of PubNub data, you'll have to aggregate the raw PubNub stream and send it to Power BI. One way to do that is with [Azure Stream Analytics](#).

Example of using real time streaming in Power BI

Here's a quick example of how real time streaming in Power BI works. You can follow along with this sample to see for yourself the value of real time streaming.

In this sample, we use a publicly available stream from **PubNub**. Here are the steps:

1. In the **Power BI service**, select a dashboard (or create a new one) and select **Add tile** > **Custom Streaming Data** and then select the **Next** button.




2. If you don't have and streaming data sources yet, select the **manage data** link (just above the **Next** button), then select + **Add streaming data** from the link in the upper-right of the window. Select **PubNub** and then select **Next**.
3. Create a name for your dataset, then paste in the following values into the window that appears, then select **Next**:

Subscribe key:

sub-c-5f1b7c8e-fbee-11e3-aa40-02ee2ddab7fe

Channel:

pubnub-sensor-network



New streaming dataset

For customers of the PubNub data stream network, subscribe to a channel to display data on your dashboard. [Learn more about PubNub.](#)

Dataset name *

Sub-key *

Channel name *

PAM Auth Key

4. In the following window, just select the defaults (which are automatically populated), then select **Create**.

New streaming dataset

Dataset name *

Cool real time streaming in Power BI

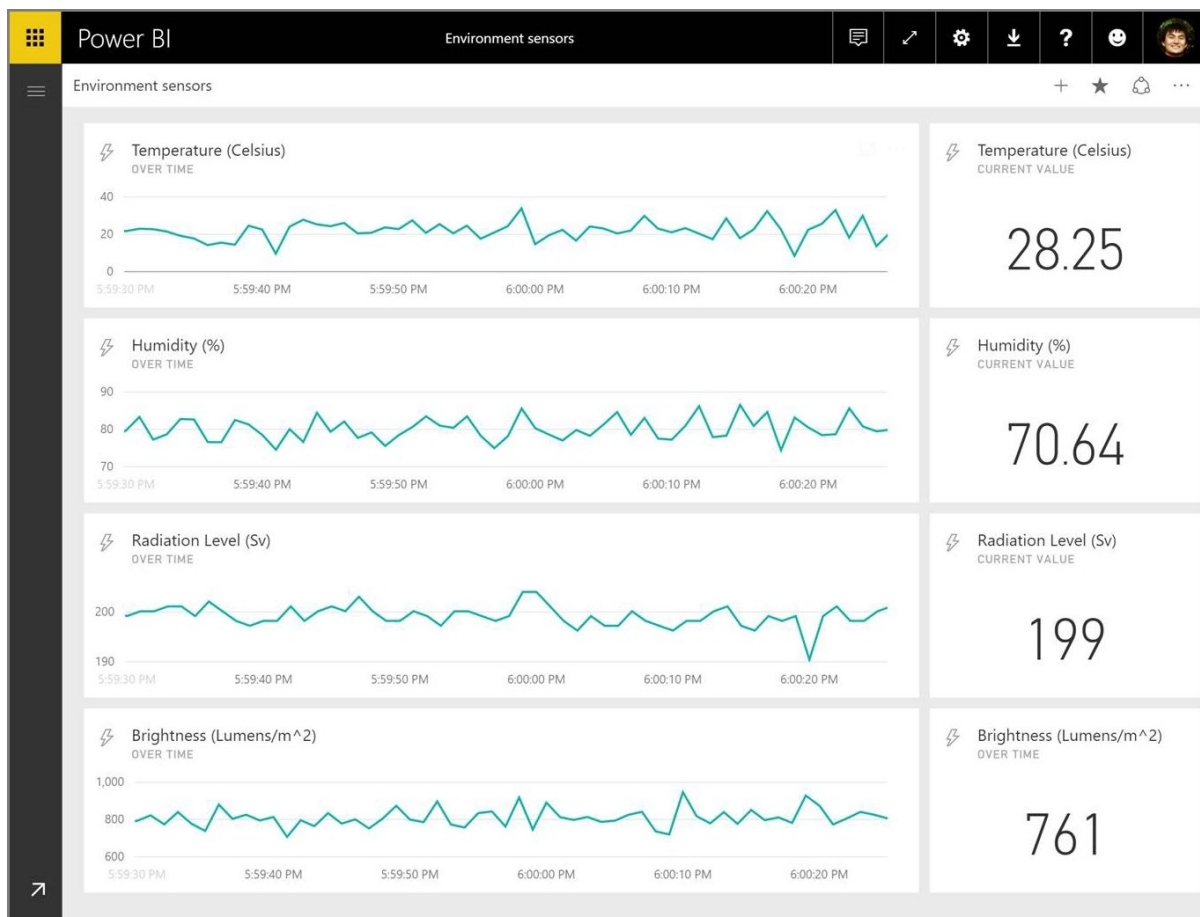
Values from stream *

ambient_temperature	Number	🗑️
sensor_uuid	Text	🗑️
timestamp	DateTime	🗑️
humidity	Number	🗑️
photosensor	Number	🗑️
radiation_level	Number	🗑️
Enter a new value name	Text	🗑️

[,

Back Create Cancel

- Back in your Power BI workspace, create a new dashboard and then add a tile (see above for steps, if you need them). This time when you create a tile and select **Custom Streaming Data**, you have a streaming data set to work with. Go ahead and play around with it. Adding the *number* fields to line charts, and then adding other tiles, you can get a real time dashboard that looks like the following:



Give it a try, and play around with the sample dataset. Then go create your own datasets, and stream live data to Power BI.

Questions and answers

Here are some common questions about real-time streaming in Power BI, and answers.

Can I use filters on push dataset? How about streaming dataset?

Unfortunately, streaming datasets do not support filtering. For push datasets, you can create a report, filter the report, and then pin the filtered visuals to a dashboard. However, there is no way to change the filter on the visual once it's on the dashboard.

Separately, you can pin the live report tile to the dashboard, in which case you can change the filters. However, live report tiles will not update in real-time as data is pushed in – you'll have to manually update the visual by using the *refresh dashboard tiles* option in the **More** menu.

When applying filters to push datasets with *Date/Time* fields with millisecond precision, *equivalence* operators are not supported. However, operators such as greater than (>) or less than (<) do operate properly.

How do I see the latest value on a push dataset? How about streaming dataset?

Streaming datasets are designed for displaying the latest data. You can use the **Card** streaming visual to easily see latest numeric values. Unfortunately, the card does not support data of type *Date/Time* or *Text*. For push datasets, assuming you have a timestamp in the schema, you can try creating a report visual with the last N filter.

Can I connect to push or streaming datasets in Power BI Desktop?

Unfortunately, this is not available at this time.

Given the previous question, how can I do any modeling on real-time datasets?

Modeling is not possible on a streaming dataset, since the data is not stored permanently. For a push dataset, you can use the update dataset/table REST APIs to add measures and relationships. You can get more information from the [Update Table Schema article](#), and the [Dataset properties article](#).

How can I clear all the values on a push dataset? How about streaming dataset?

On a push dataset, you can use the delete rows REST API call. Separately, you can also use this handy tool, which is a wrapper around the REST APIs. There is currently no way to clear data from a streaming dataset, though the data will clear itself after an hour.

I set up an Azure Stream Analytics output to Power BI, but I don't see it appearing in Power BI – what's wrong?

Here's a checklist you can use to troubleshoot the issue:

1. Restart the Azure Stream Analytics job (jobs created before the streaming GA release will require a restart)
2. Try re-authorizing your Power BI connection in Azure Stream Analytics
3. Which workspace did you specify in the Azure Stream Analytics output? In the Power BI service, are you checking in that (same) workspace?
4. Does the Azure Stream Analytics query explicitly output to the Power BI output? (using the INTO keyword)
5. Does the Azure Stream Analytics job have data flowing through it? The dataset will only get created when there is data being transmitted.
6. Can you look into the Azure Stream Analytics logs to see if there are any warnings or errors?

Next steps

Here are a few links you might find useful when working with real-time streaming in Power BI:

- [Overview of the Power BI REST API with real-time data](#)
- [Power BI REST API limitations](#)
- [REST API article for **Create dataset**](#)
- [Add Rows Power BI REST API](#)
- [Azure Stream Analytics](#)

Publish to Power BI from Excel 2016

12/6/2017 • 4 min to read • [Edit Online](#)

With Excel 2016, you can publish your Excel workbooks right to your [Power BI](#) site, where you can create highly interactive reports and dashboards based on your workbook's data. You can then share your insights with others in your organization.

Before we go any further, there are few things to keep in mind:

- Before you can publish to Power BI, your workbook must be saved to OneDrive for Business.
- The account you use to sign in to Office, OneDrive for Business, and Power BI must be the same account.
- You cannot publish an empty workbook or a workbook that doesn't have any Power BI supported content.
- You cannot publish encrypted or password protected workbooks, or workbooks with Information Protection Management.
- Publishing to Power BI requires modern authentication be enabled (default). If disabled, the Publish option is not available from the File menu.

To publish your Excel workbook

In Excel, select **File** > **Publish**.

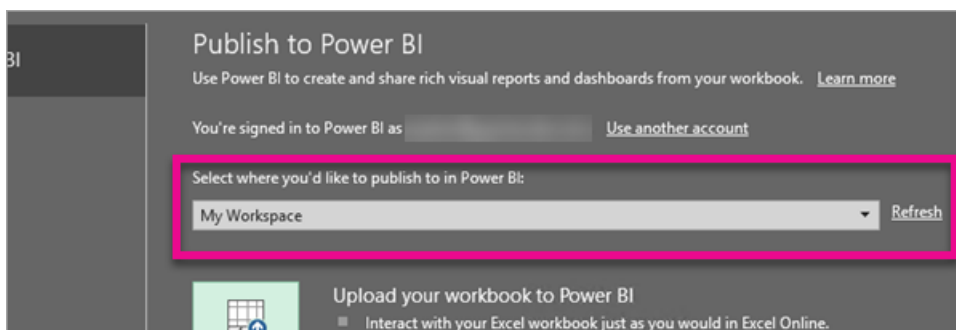
Local file publishing

Starting in the February 2017 update, Excel 2016 supports publishing of local Excel files. They do not need to be saved to OneDrive for Business or SharePoint Online.

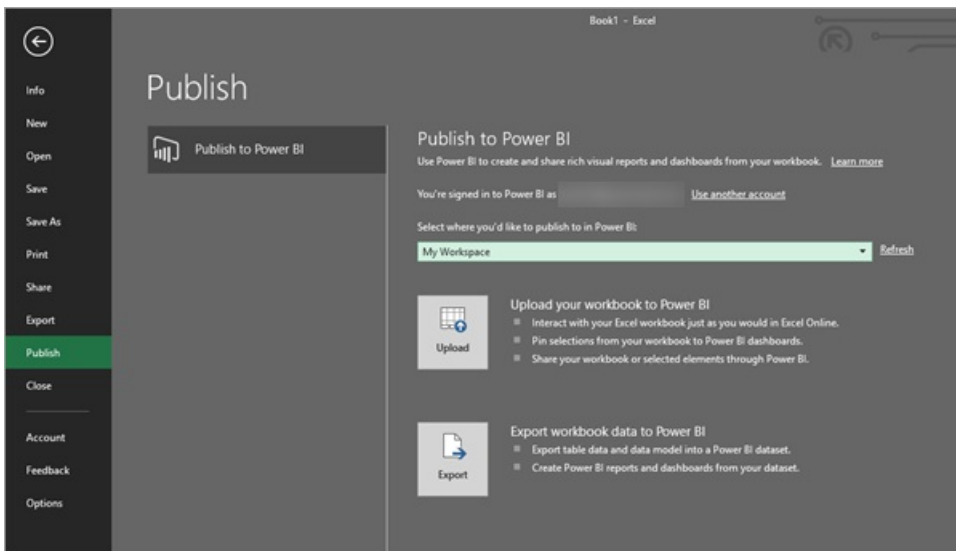
IMPORTANT

Only Excel 2016 with an Office 365 subscription will see the experience to publish with local files. Excel 2016 standalone installation will still have the "Publish" only behavior which requires the excel workbook be saved to OneDrive for Business or SharePoint Online.

When you select **Publish**, you will be able to select the workspace you want to publish to. This can be your personal or group workspace that you have access to.



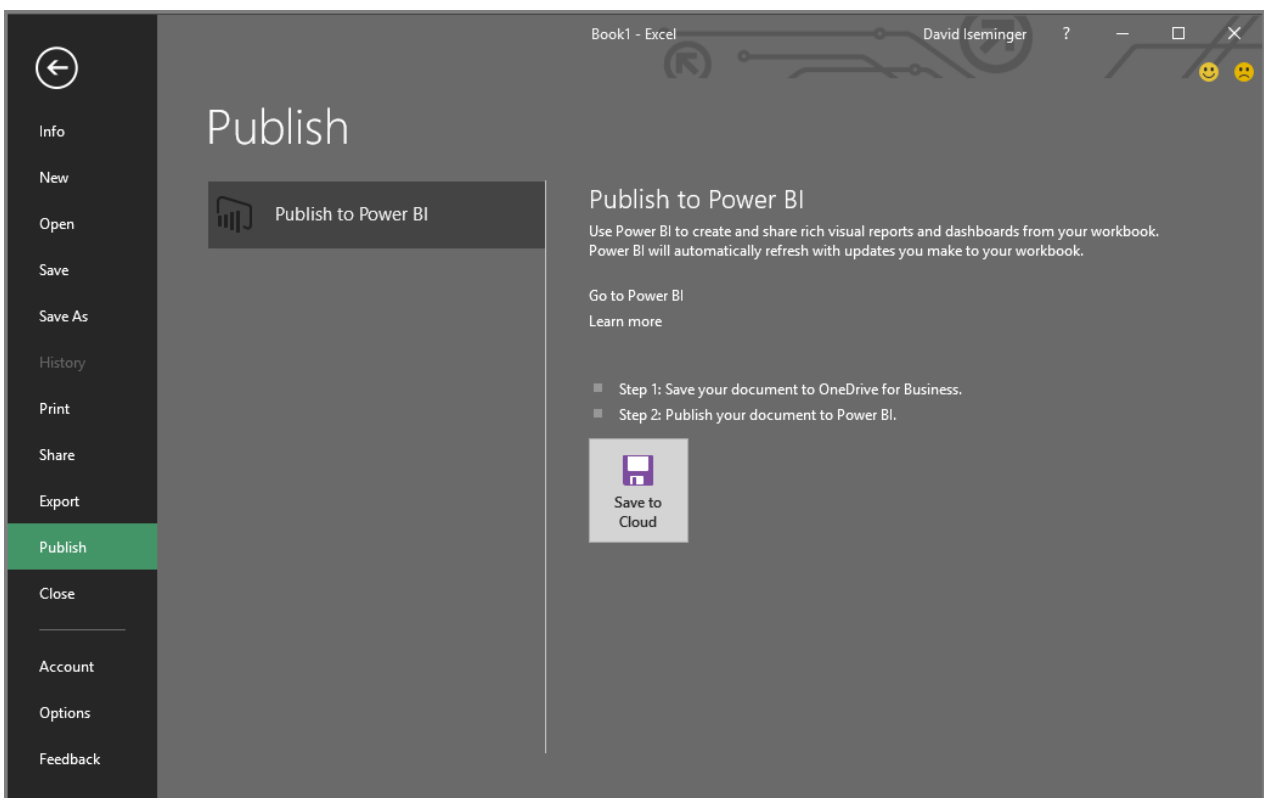
you'll get two options on how to get your workbook into Power BI.



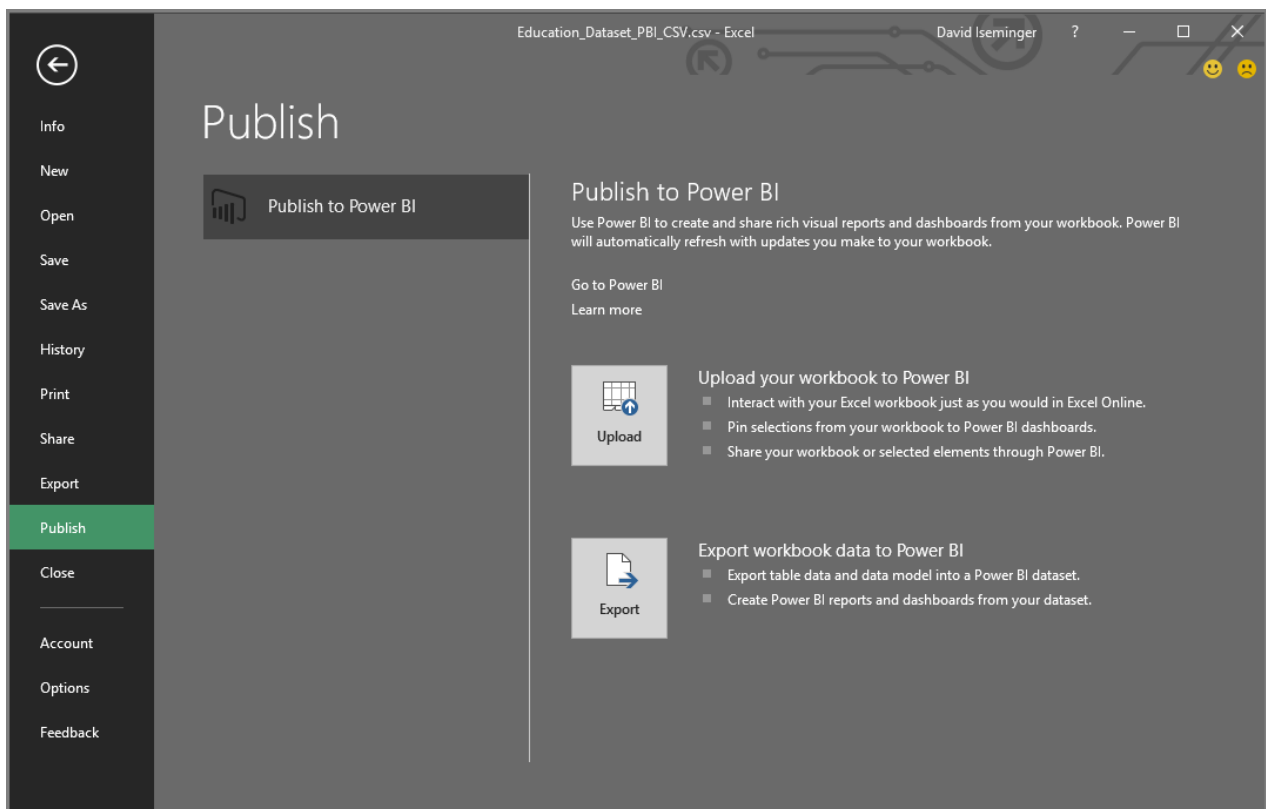
Once published, it is kept as a copy in Power BI, separate from the local file. If you want to update the file in Power BI, you need to publish the updated version again. You can refresh the data and set scheduled refresh on the workbook or the dataset in Power BI.

Publishing from Excel Standalone

If your workbook isn't already saved to OneDrive, you'll need to save it there first. Select Save to Cloud and choose a location in OneDrive for Business.



Once your workbook is saved to OneDrive, when you select **Publish**, you'll get two options on how to get your workbook into Power BI.



Upload your workbook to Power BI

When you choose this option, your workbook will appear in Power BI just like it would in Excel Online. But, unlike Excel Online, you'll have some great features to help you pin elements from your worksheets to dashboards.

You can't edit your workbook when open in Power BI, but if you need to make some changes, you can select **Edit**, and then choose to edit your workbook in Excel Online or open it in Excel on your computer. Any changes you make are saved to the workbook on OneDrive.

When you upload, no dataset is created in Power BI. Your workbook will appear in Reports, in your workspace navigation pane. Workbooks uploaded to Power BI have a special Excel icon, identifying them as Excel workbooks that have been uploaded.

Choose this option if you only have data in worksheets, or you have PivotTables and Charts you want to see in Power BI. Using Upload from Publish to Power BI in Excel is pretty much the same as using Get Data > File > OneDrive for Business > Connect, Manage and View Excel in Power BI from Power BI in your browser.

Export workbook data to Power BI

When you choose this option, any supported data in tables and/or a data model are exported into a new dataset in Power BI. If you have any Power View sheets, those will be re-created in Power BI as reports.

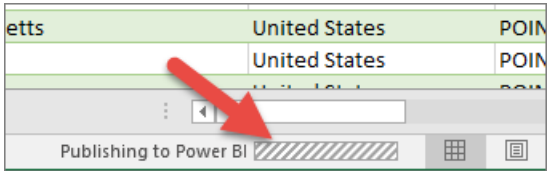
You can continue editing your workbook. When your changes are saved, they'll be synchronized with the dataset in Power BI, usually within about an hour. If you need more immediate gratification, you can just select Publish again, and your changes are exported right then and there. Any visualizations you have in reports and dashboards will be updated, too.

Choose this option if you've used Get & Transform data or Power Pivot to load data into a data model, or if your workbook has Power View sheets with visualizations you want to see in Power BI.

Using Export from Publish to Power BI in Excel is pretty much the same as using Get Data > File > OneDrive for Business > Export Excel data into Power BI from Power BI in your browser.

Publishing

When you choose either option, Excel will sign in to Power BI with your current account, and then publish your workbook to your Power BI site. Keep an eye on the status bar in Excel. It shows how things are going.



When complete, you can go to Power BI right from Excel.



Next steps

[Excel data in Power BI](#)

More questions? [Try the Power BI Community](#)

Reduce the size of an Excel workbook to view it in Power BI

12/6/2017 • 2 min to read • [Edit Online](#)

You can upload any Excel workbook smaller than 1 GB to Power BI. An Excel workbook can have two parts: a Data Model, and the rest of the report—the core worksheet contents. If the report meets the following size limits, you can save it to **OneDrive for Business**, connect to it from Power BI, and view it in Excel Online:

- The workbook as a whole can be up to 1 GB.
- The core worksheet contents can be up to 10 MB.

What makes core worksheet contents larger than 10 MB

Here are some elements that can make the core worksheet contents larger than 10 MB:

- Images.
- Shaded cells. [Remove a cell shading format.](#)
- Colored worksheets. [Remove a sheet background.](#)
- Text boxes.
- Clip art.

Consider removing these elements, if possible.

If the report has a Data Model, you have some other options:

- Remove data from Excel worksheets, and store it in the Data Model instead. See “Remove data from worksheets” below for details.
- [Create a memory-efficient Data Model](#) to reduce the overall size of the report.

To make any of these changes, you need to edit the workbook in Excel.

Read more about [file size limits for Excel workbooks in SharePoint Online](#).

Remove data from worksheets

If you import data into Excel from the Power Query tab or the Excel Data tab, the workbook might have the same data in an Excel table and in the Data Model. Large tables in Excel worksheets may make the core worksheet contents more than 10 MB. Removing the table in Excel and keeping the data in the Data Model can greatly reduce the core worksheet contents of the report.

When you import data into Excel, follow these tips:

- **In Power Query:** Clear the **Load to worksheet** box.

The data is imported only into the Data Model, with no data in Excel worksheets.

- **From the Excel Data tab**, if you previously checked **Table** in the import wizard: Go to **Existing Connections** > click the connection > **Only create connection**. Delete the original table or tables created during the initial import.
- **From the Excel Data tab:** don't check **Table** in the **Import Data** box.

Workbook Size Optimizer

If your workbook contains a data model, you can run the workbook size optimizer to reduce the size of your workbook. [Download Workbook Size Optimizer](#).

Related info

[Create a memory-efficient Data Model](#)

[Use OneDrive for Business links in Power BI Desktop](#)

Azure SQL Data Warehouse with DirectQuery

1/30/2018 • 2 min to read • [Edit Online](#)

Azure SQL Data Warehouse with DirectQuery allows you to create dynamic reports based on data and metrics you already have in Azure SQL Data Warehouse. With DirectQuery, queries are sent back to your Azure SQL Data Warehouse in real time as you explore the data. This, combined with the scale of SQL Data Warehouse enables users to create dynamic reports in minutes against terabytes of data. In addition, the introduction of the **Open in Power BI** button allows users to directly connect Power BI to their SQL Data Warehouse without having to manually specify the information.

When using the SQL Data Warehouse connector:

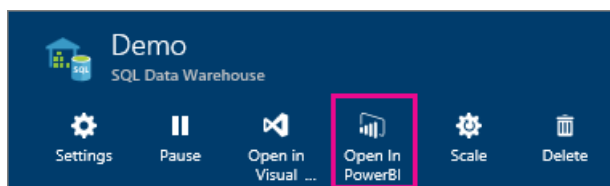
- Specify the fully qualified server name when connecting (see below for details)
- Ensure firewall rules for the server are configured to "Allow access to Azure services"
- Every action such as selecting a column or adding a filter will directly query the data warehouse
- Tiles are set to refresh approximately every 15 minutes and refresh does not need to be scheduled. This can be adjusted in the Advanced settings when you connect.
- Q&A is not available for DirectQuery datasets
- schema changes are not picked up automatically

These restrictions and notes may change as we continue to improve the experiences. The step to connect are detailed below.

Using the 'Open in Power BI' button

The easiest way to move between your SQL Data Warehouse and Power BI is with the **Open in Power BI** button within the Azure Preview Portal. This button allows you to seamlessly begin creating new dashboards in Power BI.

1. To get started, navigate to your SQL Data Warehouse instance in the Azure Preview Portal. Please note that SQL Data Warehouse only have a presence in the Azure Preview portal at this time.
2. Click the **Open in Power BI** button



3. If we are not able to sign you in directly or if you do not have a Power BI account, you will need to sign in.
4. You will be directed to the SQL Data Warehouse connection page, with the information from your SQL Data Warehouse pre-populated. Enter your credentials and hit connect to create a connection.

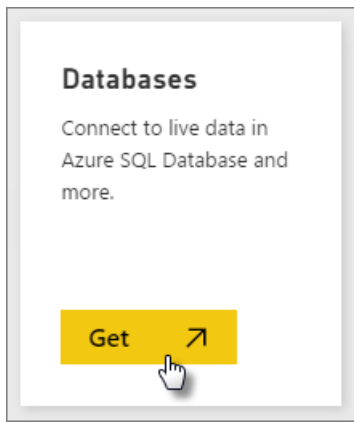
Connecting through Power BI

SQL Data Warehouse is also listed on the Power BI Get Data page.

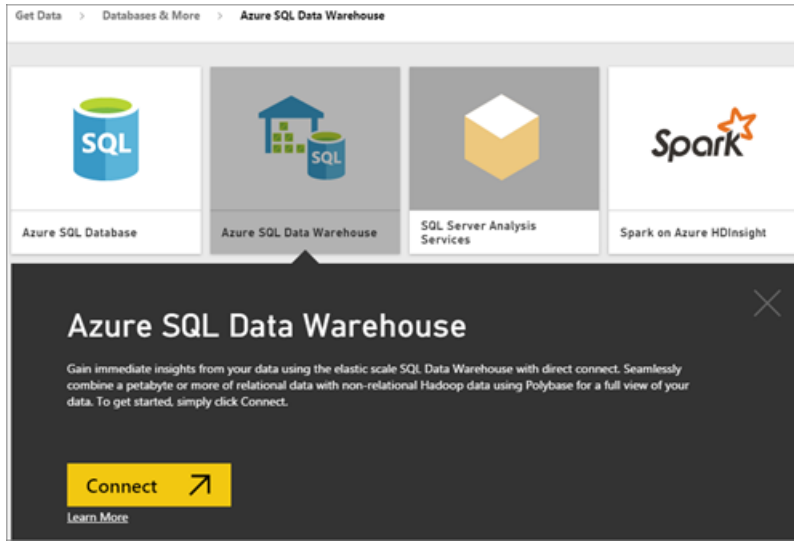
1. Select **Get Data** at the bottom of the left navigation pane.



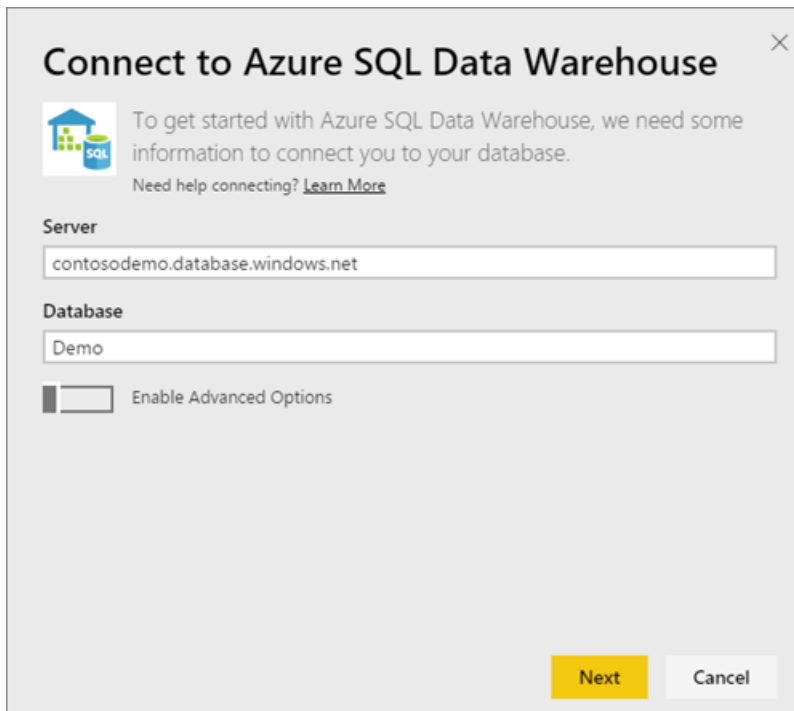
2. Within **Databases**, select **Get**.




3. Select **SQL Data Warehouse** > **Connect**.



4. Enter the necessary information to connect. The **Finding Parameters** section below shows where this data can be located in your Azure Portal.



Connect to Azure SQL Data Warehouse

 To get started with Azure SQL Data Warehouse, we need some information to connect you to your database.
Need help connecting? [Learn More](#)

Server


Database

Enable Advanced Options

Refresh Interval in

Custom Filters

Connect to Azure SQL Data Warehouse

 To get started with Azure SQL Data Warehouse, we need some information to connect you to your database.
Need help connecting? [Learn More](#)

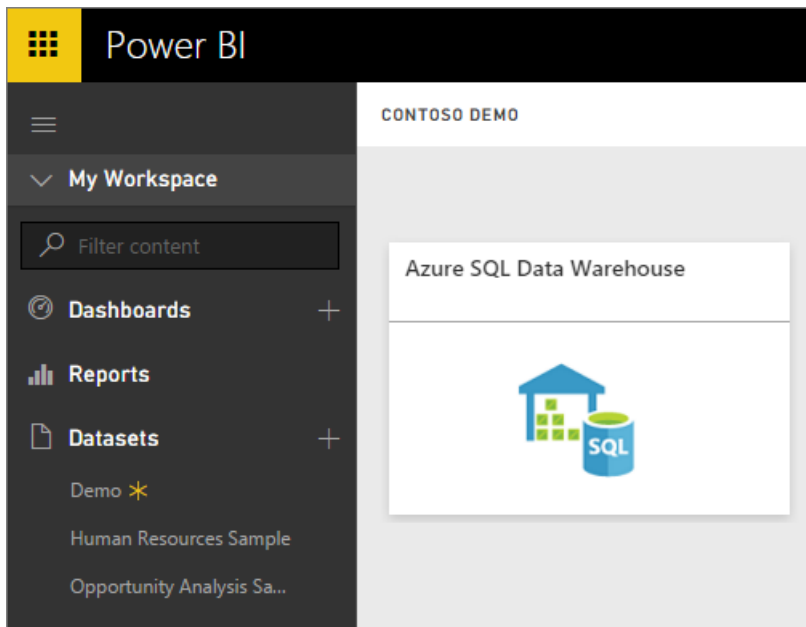
Username

Password

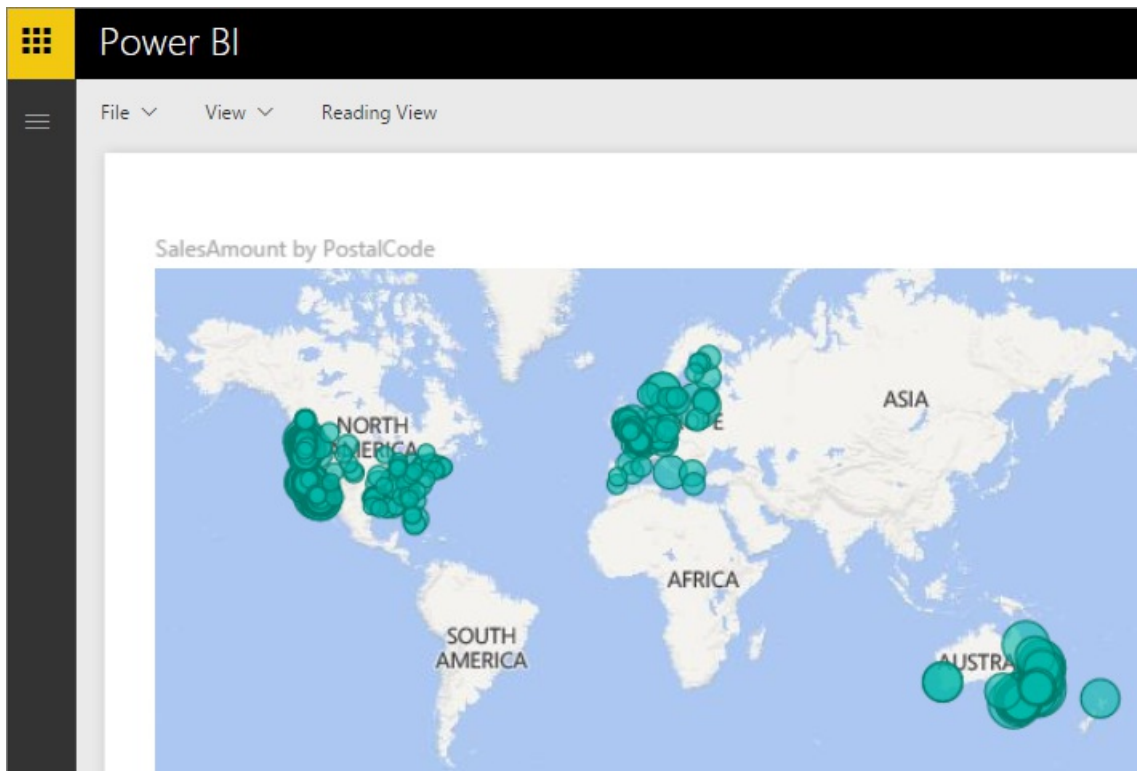
NOTE

The username will be a user that is defined in your Azure SQL Data Warehouse instance.

5. Drill into the dataset by selecting the new tile or the newly created dataset, indicated by the asterisk. This dataset will have the same name as your database.



6. You can explore all of the tables and columns. Selecting a column will send a query back to the source, dynamically creating your visual. Filters will also be translated into queries back to your data warehouse. These visuals can be saved in a new report and pinned back to your dashboard.



Finding Parameter Values

Your fully qualified server name and database name can be found in the Azure Preview Portal. Please note that SQL Data Warehouse only have a presence in the Azure Preview portal at this time.

Demo
SQL Data Warehouse

Settings Pause Open in Visual ... Open In PowerBI Scale Delete

Essentials ^

Resource group
Group-1

Location
Central US

Subscription name
Visual Studio Ultimate with MSDN

Server name
contosodemo.database.windows.net

Status
Online

Connection strings
Show database connection strings

Next steps

[Get started with Power BI](#)

[Get Data for Power BI](#)

[Azure SQL Data Warehouse](#)

More questions? [Try the Power BI Community](#)

Azure SQL Database with DirectQuery

1/30/2018 • 2 min to read • [Edit Online](#)

Learn how you can connect directly to Azure SQL Database and create reports that use live data. You can keep your data at the source and not in Power BI.

With DirectQuery, queries are sent back to your Azure SQL Database as you explore the data in the report view. This experience is suggested for users who are familiar with the databases and entities they connect to.

Notes:

- Specify the fully qualified server name when connecting (see below for more details)
- Ensure firewall rules for the database are configured to "[Allow access to Azure services](#)"
- Every action such as selecting a column or adding a filter will send a query back to the database
- Tiles are refreshed every hour (refresh does not need to be scheduled). This can be adjusted in the Advanced settings when you connect.
- Q&A is not available for DirectQuery datasets
- Schema changes are not picked up automatically

These restrictions and notes may change as we continue to improve the experiences. The steps to connect are detailed below.

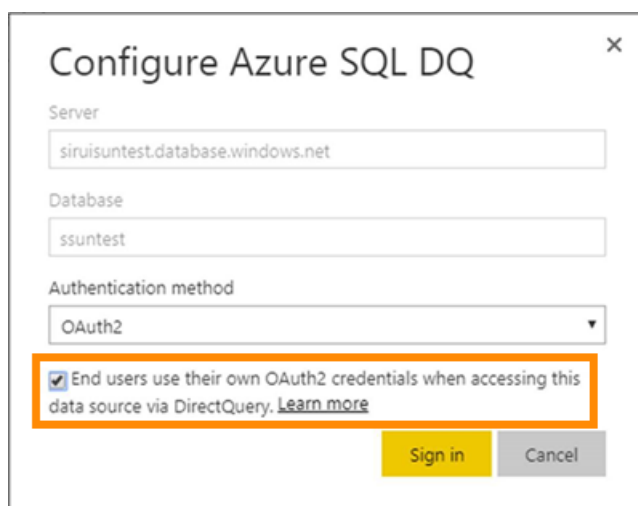
Power BI Desktop and DirectQuery

In order to connect to Azure SQL Database using DirectQuery, you will need to use Power BI Desktop. This approach provides additional flexibility and capabilities. Reports created using Power BI Desktop can then be published to the Power BI service. You can learn more about how to connect to [Azure SQL Database using DirectQuery](#) within Power BI Desktop.

Single sign-on

After you publish an Azure SQL DirectQuery dataset to the service, you can enable single sign-on (SSO) via Azure Active Directory (Azure AD) OAuth2 for your end users.

To enable SSO, go to settings for the dataset, open the **Data Sources** tab, and check the SSO box.



The screenshot shows a dialog box titled "Configure Azure SQL DQ" with a close button (X) in the top right corner. It contains the following fields and options:

- Server:** siriusuntest.database.windows.net
- Database:** ssuntest
- Authentication method:** OAuth2 (selected from a dropdown menu)
- SSO Option:** A checkbox labeled "End users use their own OAuth2 credentials when accessing this data source via DirectQuery. [Learn more](#)" is checked and highlighted with an orange border.
- Buttons:** "Sign in" (yellow) and "Cancel" (grey) buttons are located at the bottom right.

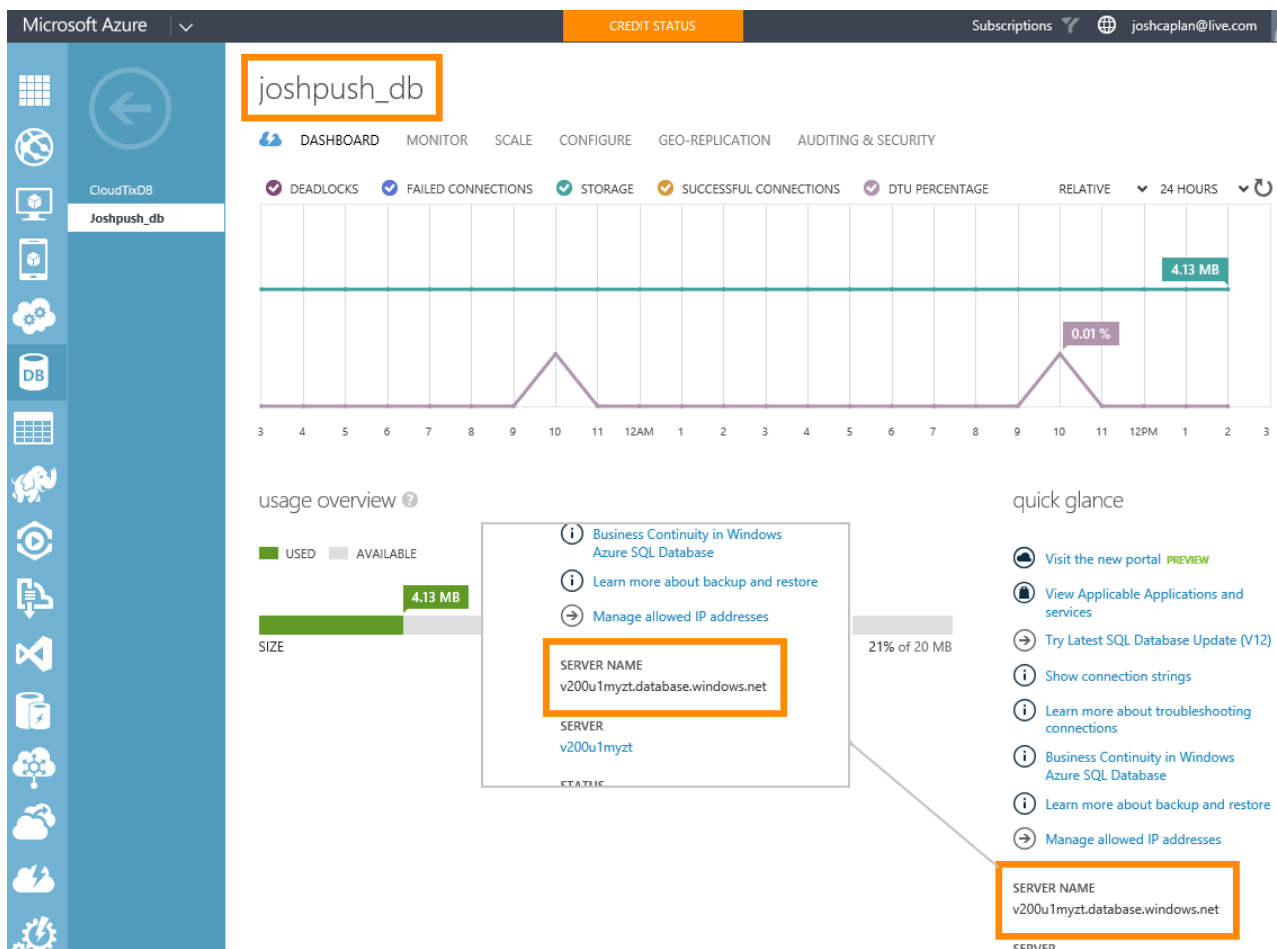
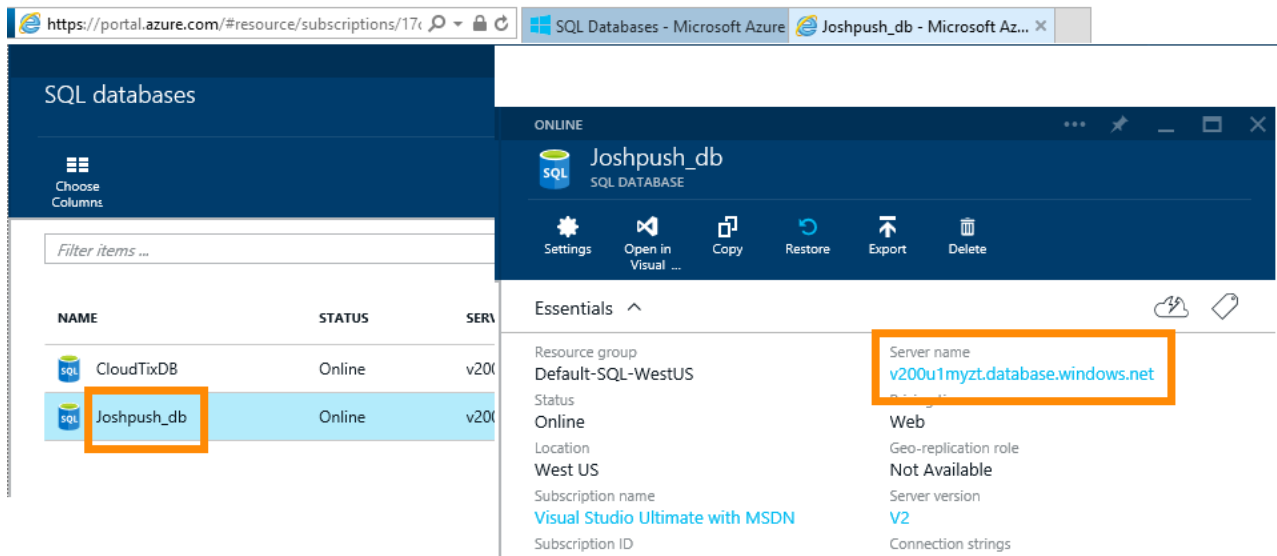
When the SSO option is enabled and your users access reports built atop the data source, Power BI sends their

authenticated Azure AD credentials in the queries to the Azure SQL database. This enables Power BI to respect the security settings that are configured at the data source level.

The SSO option takes affect across all datasets that use this data source. It does not affect the authentication method used for import scenarios.

Finding Parameter Values

Your fully qualified server name and database name can be found in the Azure Portal.



Next steps

Use DirectQuery in Power BI Desktop

[Get started with Power BI](#)

[Get Data for Power BI](#)

More questions? [Try the Power BI Community](#)

Spark on HDInsight with DirectQuery

1/30/2018 • 2 min to read • [Edit Online](#)

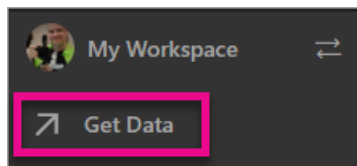
Spark on Azure HDInsight with DirectQuery allows you to create dynamic reports based on data and metric you already have in your Spark cluster. With DirectQuery, queries are sent back to your Azure HDInsight Spark cluster as you explore the data in the report view. This experience is suggested for users who are familiar with the entities they connect to.

WARNING

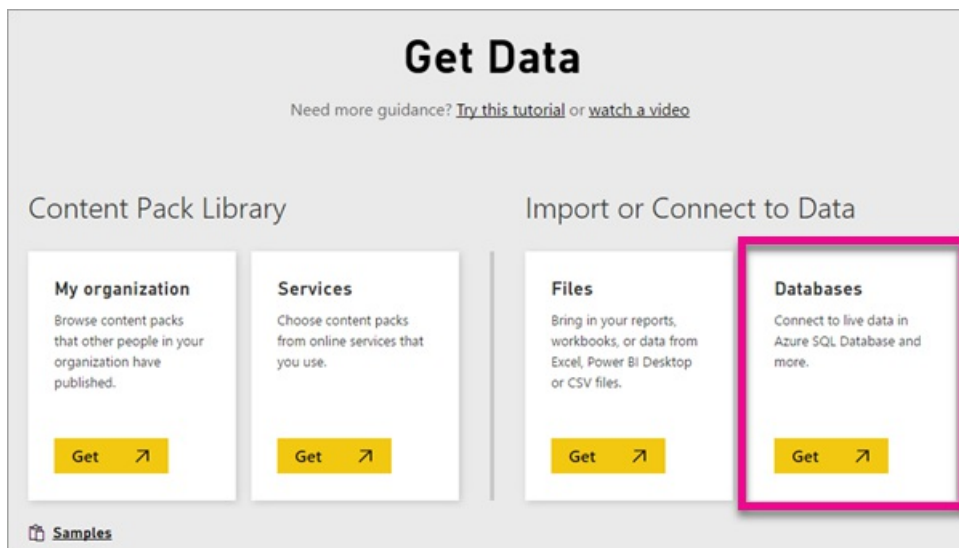
Automatic tile refresh has been disabled for dashboard tiles built on Spark based datasets. You can select **Refresh Dashboard Tiles** to refresh manually. Reports are not impacted and should remain up-to-date.

You can use the following steps to connect to your Spark on Azure HDInsight data source using DirectQuery within the Power BI service.

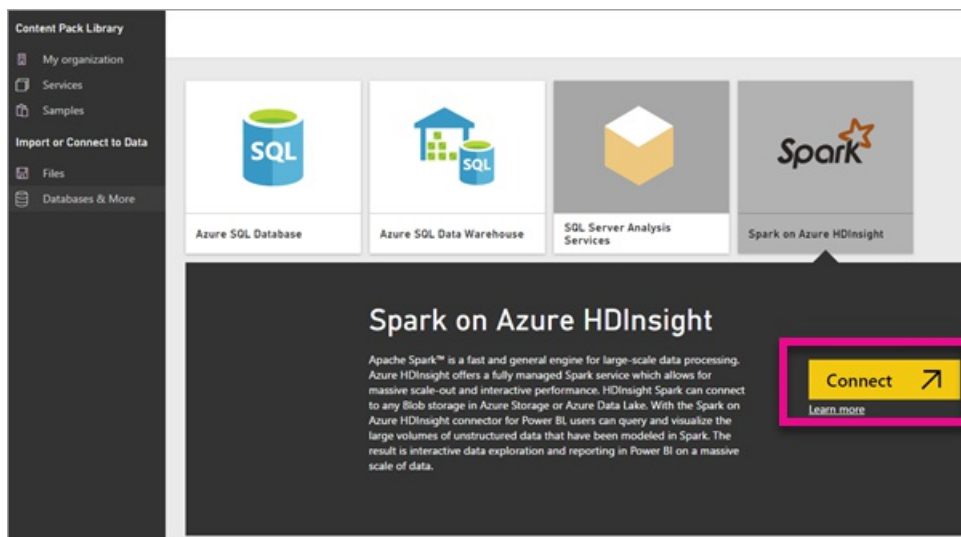
1. Select **Get Data** at the bottom of the left navigation pane.



2. Select **Databases & More**.



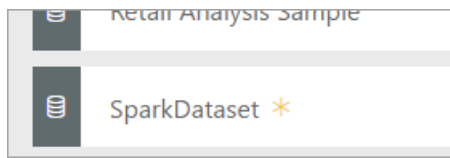
3. Select the **Spark on HDInsight** connector and choose **Connect**.



4. Enter the name of the **server** you want to connect to, as well as your **username** and **password**. The server is always in the form <clustername>.azurehdinsight.net, see more details about finding these values below.

This is a screenshot of a dialog box titled 'Connect to Spark on Azure HDInsight'. It features the Spark logo and introductory text: 'To get started with Spark on Azure HDInsight, we need some information to connect you to your database. Need help connecting? [Learn more](#)'. Below this, there is a 'Server' label and a text input field containing the value 'contoso.azurehdinsight.net'. At the bottom right, there are two buttons: 'Next' (highlighted in yellow) and 'Cancel'.This is a screenshot of the same dialog box, but at a later stage. The 'Server' field is no longer visible. Instead, there are two input fields: 'Username' with the value 'john' and 'Password' with a masked password '*****'. At the bottom right, there are two buttons: 'Sign in' (highlighted in yellow) and 'Cancel'.

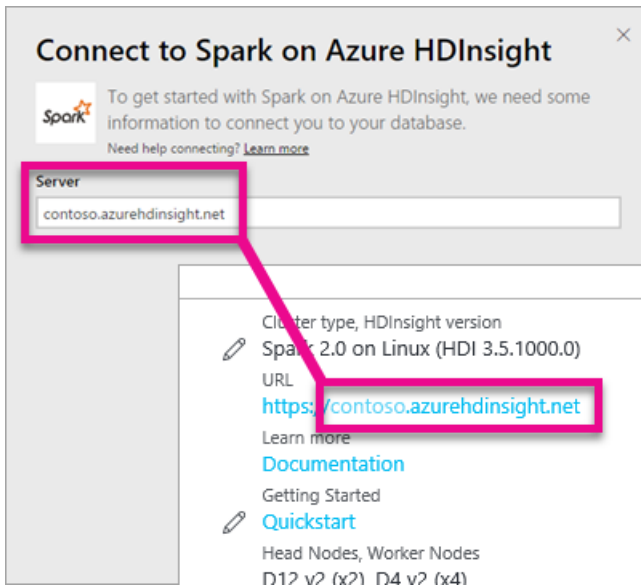
5. Once connected, you'll see a new dataset with named "SparkDataset". You can also access the dataset through the placeholder tile that is created.



6. Drilling into the dataset, you can explore all of the tables and columns in your database. Selecting a column will send a query back to the source, dynamically creating your visual. These visuals can be saved in a new report, and pinned back to your dashboard.

Finding your Spark on HDInsight parameters

The server is always in the form <clustername>.azurehdinsight.net, and can be found in the Azure portal.



The username and password can also be found in the Azure portal.

Limitations

These restrictions and notes may change as we continue to improve the experiences. Additional documentation can be found at [Use BI tools with Apache Spark on Azure HDInsight](#)

- The Power BI service only supports a configuration of Spark 2.0 and HDInsight 3.5.
- Every action such as selecting a column or adding a filter will send a query back to the database – before selecting very large fields, consider choosing an appropriate visual type.
- Q&A is not available for DirectQuery datasets.
- Schema changes are not picked up automatically.
- Power BI supports 16,000 columns **across all tables** within a dataset. Power BI also includes an internal row number column per table. This means if you have 100 tables in the dataset, the available number of columns would be 15,900. Depending on the amount of data you are working with from your Spark data source, you may encounter this limitation.

Troubleshooting

If you're hitting issues executing queries against your cluster, verify the application is still running and restart if necessary.

You can also allocate additional resources within the Azure portal under **Configuration > Scale Cluster**:

The screenshot shows the HDInsight configuration interface. On the left, under the 'CONFIGURATION' section, the 'Scale Cluster' option is selected. The main area displays the following settings:

Number of Worker nodes	4
Worker node sizes	D4 v2 (4 nodes, 32 cores)
Head node size	D12 v2 (2 nodes, 8 cores)

Next steps

[Get started: Create Apache Spark cluster on HDInsight Linux and run interactive queries using Spark SQL](#)

[Get started with Power BI](#)

[Get Data for Power BI](#)

More questions? [Try the Power BI Community](#)

SQL Server Analysis Services live data in Power BI

1/30/2018 • 1 min to read • [Edit Online](#)

In Power BI, there are two ways you can connect to a live SQL Server Analysis Services server. In **Get data**, you can connect to a SQL Server Analysis Services server, or you can connect to a [Power BI Desktop file](#), or [Excel workbook](#), that already connects to an Analysis Services server.

IMPORTANT

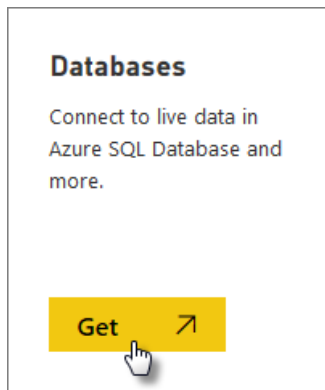
- In order to connect to a live Analysis Services server, an on-premises data gateway must be installed and configured by an administrator. For more information, see [On-premises data gateway](#).
- When you use the gateway, your data remains on-premises. The reports you create based on that data are saved in the Power BI service.
- [Q&A natural language querying](#) is in preview for Analysis Services live connections.

To connect to a model from Get data

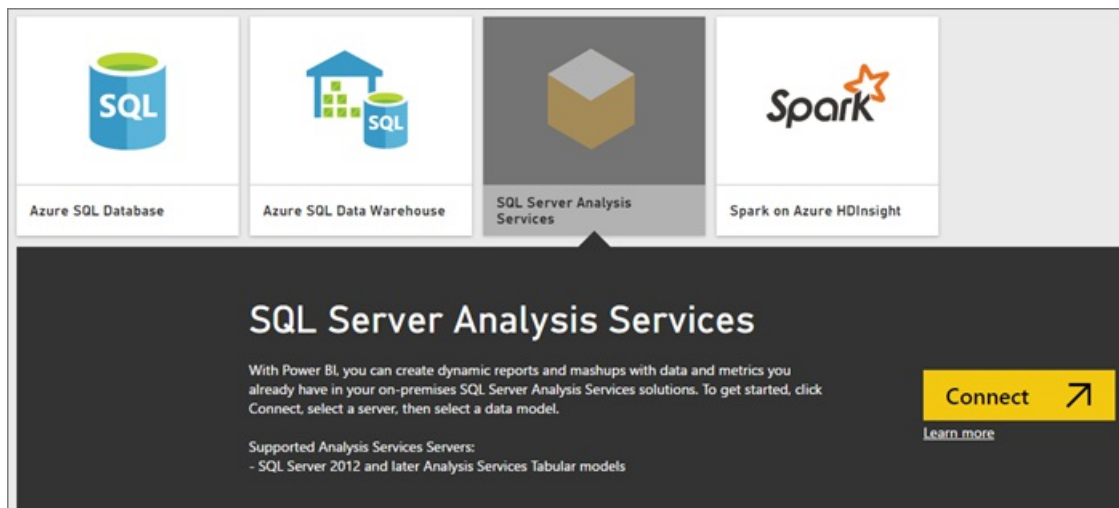
1. In **My Workspace**, select **Get data**. You can also change to a group workspace, if one is available.



2. Select **Databases & More**.

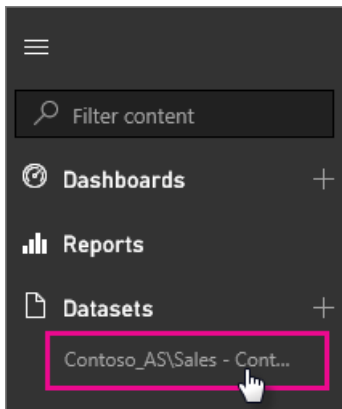


3. Select **SQL Server Analysis Services > Connect**.



4. Select a server. If you don't see any servers listed here, it means either a gateway, and data source, are not configured, or your account is not listed in the **Users** tab of the data source, in the gateway. Check with your administrator.
5. Select the model you want to connect to. This could be either Tabular or Multidimensional.

After you connect to the model, it will appear in your Power BI site in **My Workspace/Datasets**. If you were switched to a group workspace, then the dataset will appear within the group.



Dashboard tiles

If you pin visuals from a report to the dashboard, the pinned tiles are automatically refreshed every 10 minutes. If the data in your on-premises Analysis Services server is updated, the tiles will get auto-updated after 10 minutes.

Next steps

[On-premises data gateway](#)

[Manage Analysis Services data sources](#)

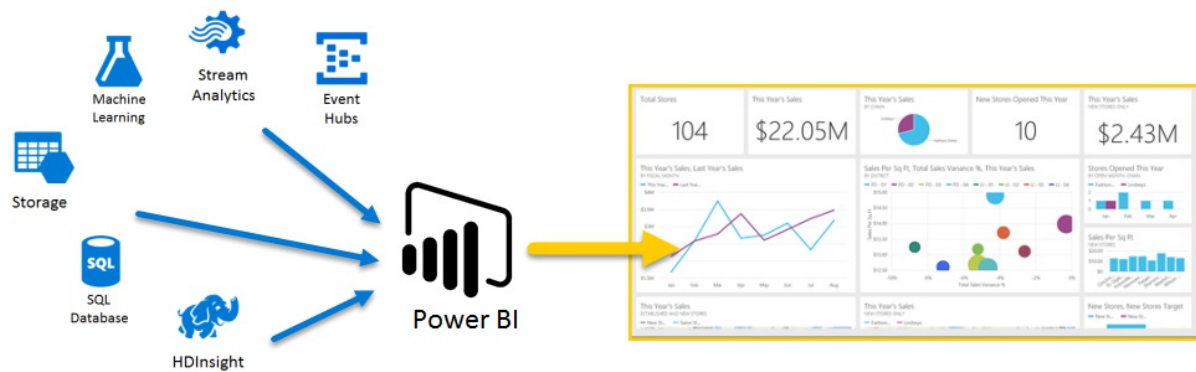
[Troubleshooting the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

Azure and Power BI

12/6/2017 • 2 min to read • [Edit Online](#)

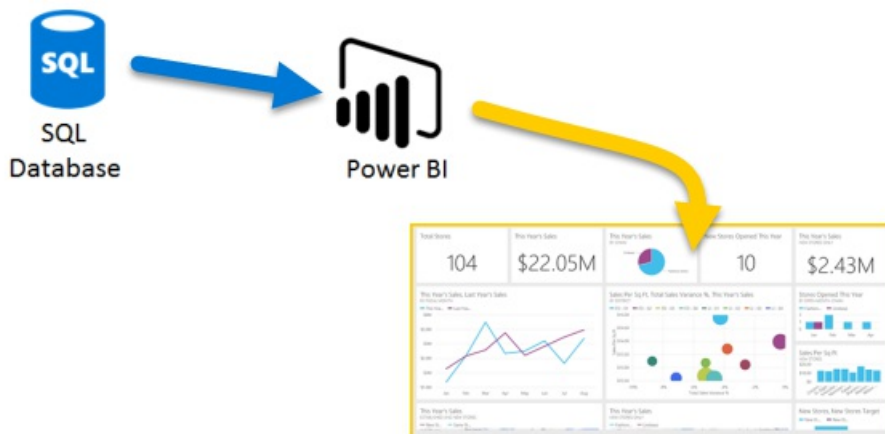
With **Azure** services and **Power BI**, you can turn your data processing efforts into analytics and reports that provide real-time insights into your business. Whether your data processing is cloud-based or on-premises, straightforward or complex, single-sourced or massively scaled, warehoused or real-time, Azure and Power BI have the built-in connectivity and integration to bring your business intelligence efforts to life.



Power BI has a multitude of Azure connections available, and the business intelligence solutions you can create with those services are as unique as your business. You can connect as few as one Azure data source, or a handful, then shape and refine your data to build customized reports.

Azure SQL Database and Power BI

You can start with a straightforward connection to an Azure SQL Database, and create reports to monitor the progress of your business. Using the [Power BI Desktop](#), you can create reports that identify trends and key performance indicators that move your business forward.

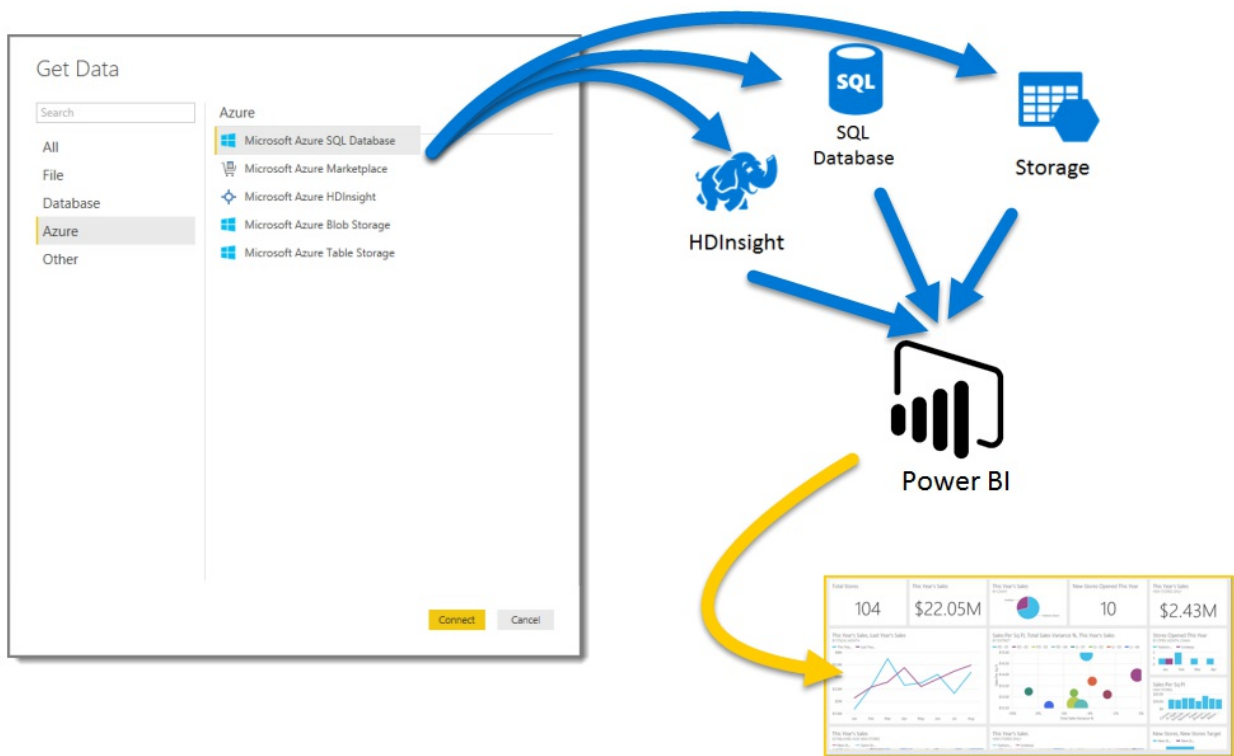


There's plenty more information for you to learn about [Azure SQL Database](#).

Transform, shape, and merge your cloud data

Do you have more complex data, and all sorts of sources? No problem. With **Power BI Desktop** and Azure services, connections are just a tap of the **Get Data** dialog away. Within the same Query you can connect to your **Azure SQL Database**, your **Azure HDInsight** data source, and your **Azure Blob Storage** (or **Azure Table Storage**), then select only the subsets within each that you need, and refine it from there.

You can create different reports for different audiences too, using the same data connections and even the same Query. Just build a new report page, refine your visualizations for each audience, and watch it keep the business in the know.

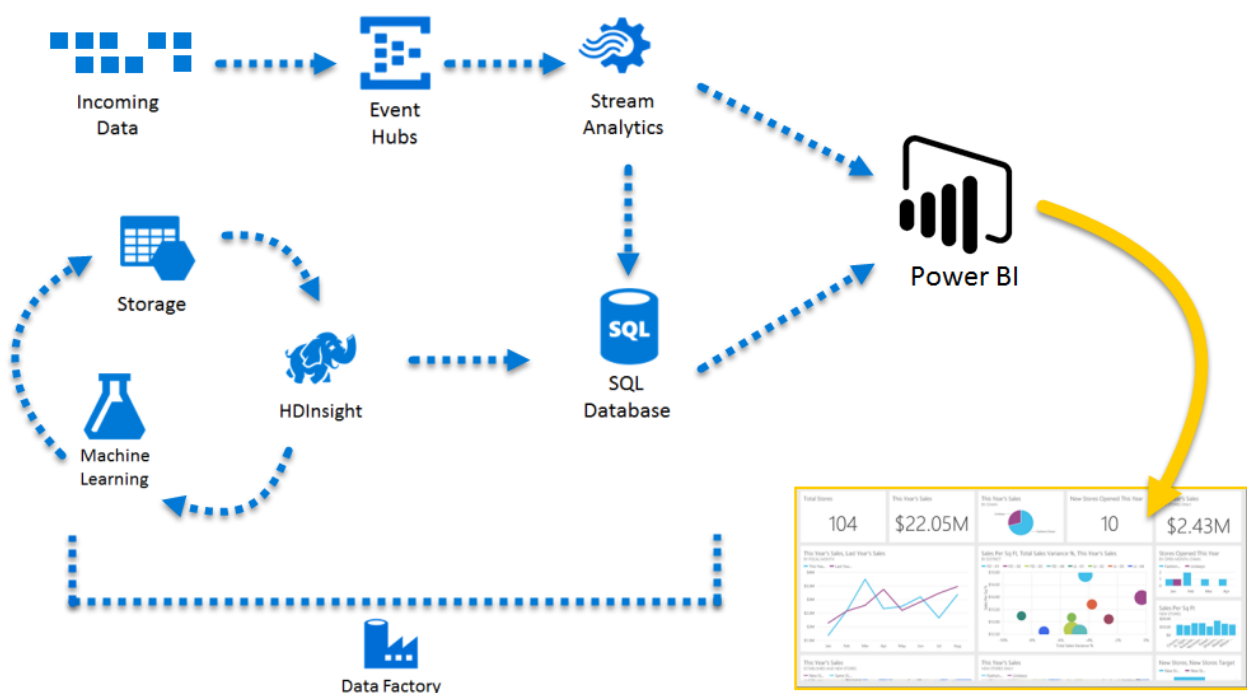


For more information, take a look at the following resources:

- [Azure SQL Database](#)
- [Azure HDInsight](#)
- [Azure Storage](#) (Blob storage and Table storage)

Get complex (and ahead) using Azure Services and Power BI

You can expand as much as you need with Azure and Power BI. Harness multi-source data processing, make use of massive real-time systems, use [Stream Analytics](#) and [Event Hubs](#), and coalesce your varied SaaS services into business intelligence reports that give your business an edge.



Connect your app data using Power BI APIs

You can use Power BI to gain insight on your existing apps, too. With the Power BI API, application developers can send entire data sets to Power BI programmatically. Need continuous updates? With the Power BI APIs, developers can send real-time data updates to get started quickly, and then grow into using Azure Stream Analytics when scale requirements merit doing so.

There's lots of information about Power BI APIs in the [Power BI Developer Portal](#). You can also learn about what others are doing programmatically with Power BI in the [Power BI developer blog](#). There's also a page dedicated to [getting you started with Power BI development](#).

What could you do with Azure and Power BI?

There are all sorts of scenarios where **Azure** and **Power BI** can be combined - the possibilities and opportunities are as unique as your business. For more information about **Azure services**, check out this [overview page](#), which describes **Data Analytics Scenarios using Azure**, and learn how to transform your data sources into intelligence that drives your business ahead.

Data refresh in Power BI

1/20/2018 • 18 min to read • [Edit Online](#)

Making sure you're always getting the latest data is often critical in making the right decisions. You've probably already used Get Data in Power BI to connect to and upload some data, created some reports and a dashboard. Now, you want to make sure your data really is the latest and greatest.

In many cases, you don't need to do anything at all. Some data, like from a Salesforce or Marketo content pack is automatically refreshed for you. If your connection makes use of a live connection or DirectQuery, the data will be update to date. But, in other cases, like with an Excel workbook or Power BI Desktop file that connects to an external online or on-premises data source, you'll need to refresh manually or setup a refresh schedule so Power BI can refresh the data in your reports and dashboards for you.

This article, along with a few others, are meant to help you understand how data refresh in Power BI really works, whether or not you need to setup a refresh schedule, and what needs to be in-place to refresh your data successfully.

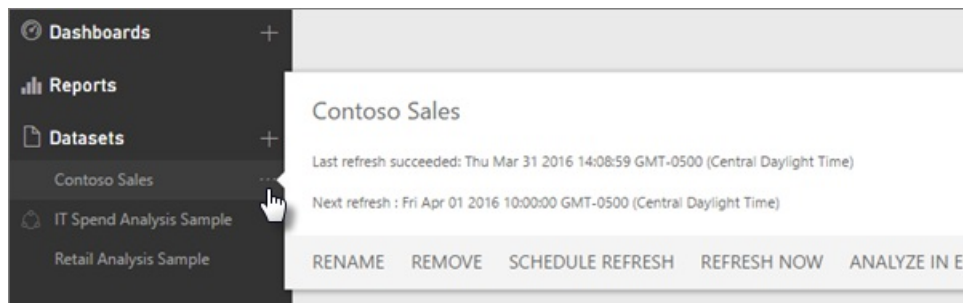
Understanding data refresh

Before setting up refresh, it's important to understand what it is you're refreshing and where you're getting your data.

A *data source* is where the data you explore in your reports and dashboards really comes from; for example, an online service like Google Analytics or QuickBooks, a database in the cloud like Azure SQL Database, or a database or file on a local computer or server in your own organization. These are all data sources. The type of data source determines how data from it is refreshed. We'll go into refresh for each type of data source a little later in the [What can be refreshed?](#) section.

A *dataset* is automatically created in Power BI when you use Get Data to connect to and upload data from a content pack, file, or you connect to a live data source. In Power BI Desktop and Excel 2016, you can also publish your file right to the Power BI service, which is just like using Get Data.

In each case, a dataset is created and appears in the My Workspace, or Group, containers in the Power BI service. When you select the **ellipse (...)** for a dataset, you can explore the data in a report, edit settings, and setup refresh.



A dataset can get data from one or more data sources. For example, you can use Power BI Desktop to get data from a SQL Database in your organization, and get other data from an OData feed online. Then, when you publish the file to Power BI, a single dataset is created, but it will have data sources for both the SQL Database and the OData feed.

A dataset contains information about the data sources, data source credentials, and in most cases, a sub-set of data copied from the data source. When you create visualizations in reports and dashboards, you're looking at

data in the dataset, or in the case of a live connection like Azure SQL Database, the dataset defines the data you see right from the data source. For a live connection to Analysis Services, the dataset definition comes from Analysis Services directly.

When you refresh data, you are updating the data in the dataset that is stored in Power BI from your data source. This refresh is a full refresh and not incremental.

Whenever you refresh data in a dataset, whether by using Refresh Now or by setting up a refresh schedule, Power BI uses information in the dataset to connect to the data sources defined for it, query for updated data, and then loads the updated data into the dataset. Any visualizations in your reports or dashboards based on the data are updated automatically.

Before we go any further, there's something else that's very important to understand:

Regardless of how often you refresh the dataset, or how often you look at live data, it is the data at the data source that must be up-to-date first.

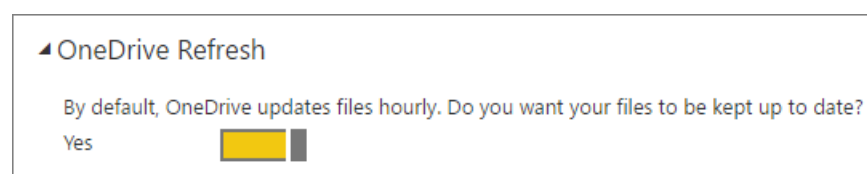
Most organizations process their data once a day, usually in the evening. If you schedule refresh for a dataset created from a Power BI Desktop file that connects to an on-premises database, and your IT department runs processing on that SQL database once in the evening, then you only need to setup scheduled refresh to run once-a-day. For example, after processing on the database happens, but before you come into work. Of course, this isn't always the case. Power BI provides many ways to connect to data sources that are updated frequently or even real-time.

Types of refresh

There are four main types of refresh that happen within Power BI. Package refresh, model/data refresh, tile refresh and visual container refresh.

Package refresh

This synchronizes your Power BI Desktop, or Excel, file between the Power BI service and OneDrive, or SharePoint Online. This does not pull data from the original data source. The dataset in Power BI will only be updated with what is in the file within OneDrive, or SharePoint Online.

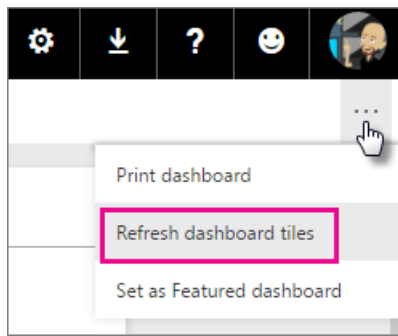


Model/data refresh

This is referring to refreshing the dataset, within the Power BI service, with data from the original data source. This is done by either using scheduled refresh, or refresh now. This requires a gateway for on-premises data sources.

Tile refresh

Tile refresh updates the cache for tile visuals, on the dashboard, once data changes. This happens about every fifteen minutes. You can also force a tile refresh by selecting the **ellipsis (...)** in the upper right of a dashboard and selecting **Refresh dashboard tiles**.



For details around common tile refresh errors, see [Troubleshooting tile errors](#).

Visual container refresh

Refreshing the visual container updates the cached report visuals, within a report, once the data changes.

What can be refreshed?

In Power BI, you'll typically use Get Data to import data from a file on a local drive, OneDrive or SharePoint Online, publish a report from Power BI Desktop, or connect directly to a database in the cloud in your own organization. Just about any data in Power BI can be refreshed, but whether or not you need to depends on how your dataset was created from and the data sources it connects to. Let's look at how each of these refresh data.

Before we go further, here are some important definitions to understand:

Automatic refresh - This means no user configuration is necessary in order for the dataset to be refreshed on a regular basis. Data refresh settings are configured for you by Power BI. For online service providers, refresh usually occurs once-a-day. For files loaded from OneDrive, automatic refresh occurs about every hour for data that does not come from an external data source. While you can configure different schedule refresh settings and manually refresh, you probably don't need to.

User configured manual or scheduled refresh – This means you can manually refresh a dataset by using Refresh Now or setup a refresh schedule by using Schedule Refresh in a dataset's settings. This type of refresh is required for Power BI Desktop files and Excel workbooks that connect to external online and on-premises data sources.

NOTE

When you configure a time for scheduled refresh, there can be a delay of up to one hour before it begins.

Live/DirectQuery – This means there is a live connection between Power BI and the data source. For on-premises data sources, Admins will need to have a data source configured within an enterprise gateway, but user interaction may not be needed.

NOTE

To enhance performance, dashboards with data connected using DirectQuery are automatically updated. You can also manually refresh a tile at any time, by using the **More** menu on the tile.

Local files and files on OneDrive or SharePoint Online

Data refresh is supported for Power BI Desktop files and Excel workbooks that connect to external online or on-premises data sources. This will only refresh the data for the dataset within the Power BI service. It will not update your local file.

Keeping your files on OneDrive, or SharePoint Online, and connecting to them from Power BI, provides a great amount of flexibility. But with all that flexibility, it also makes it one of the most challenging to understand. Scheduled refresh for files stored in OneDrive, or SharePoint Online, are different from package refresh. You can learn more in the [Types of refresh](#) section.

Power BI Desktop file

DATA SOURCE	AUTOMATIC REFRESH	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Get Data (on the ribbon) is used to connect to and query data from any listed online data source.	No	Yes	No (see below)
Get Data is used to connect to and explore a live Analysis Services database.	Yes	No	Yes
Get Data is used to connect to and explore a supported on-premises DirectQuery data source.	Yes	No	Yes
Get Data is used to connect to and query data from an Azure SQL Database, Azure SQL Data Warehouse, Azure HDInsight Spark.	Yes	Yes	No
Get Data is used to connect to and query data from any listed on-premises data source except for Hadoop file (HDFS) and Microsoft Exchange.	No	Yes	Yes

NOTE

If you are using the [Web.Page](#) function, you do need a gateway if you have republished the dataset or your report after November 18th, 2016.

For details, see [Refresh a dataset created from a Power BI Desktop file on OneDrive](#).

Excel workbook

DATA SOURCE	AUTOMATIC REFRESH	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Tables of data in a worksheet not loaded into the Excel data model.	Yes, hourly (<i>OneDrive/SharePoint Online only</i>)	Manual only (<i>OneDrive/SharePoint Online only</i>)	No

DATA SOURCE	AUTOMATIC REFRESH	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Tables of data in a worksheet linked to a table in the Excel data model (linked tables).	Yes, hourly <i>(OneDrive/SharePoint Online only)</i>	Manual only <i>(OneDrive/SharePoint Online only)</i>	No
Power Query* is used to connect to and query data from any listed online data source and load data into the Excel data model.	No	Yes	No
Power Query* is used to connect to and query data from any listed on-premises data source except for Hadoop file (HDFS) and Microsoft Exchange and load data into the Excel data model.	No	Yes	Yes
Power Pivot is used to connect to and query data from any listed online data source and load data into the Excel data model.	No	Yes	No
Power Pivot is used to connect to and query data from any listed on-premises data source and load data into the Excel data model.	No	Yes	Yes

* Power Query is known as Get & Transform Data in Excel 2016.

For more detailed information, see [Refresh a dataset created from an Excel workbook on OneDrive](#).

Comma separated value (.csv) file on OneDrive or SharePoint Online

DATA SOURCE	AUTOMATIC REFRESH	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Simple comma separated value	Yes, hourly	Manual only	No

For more detailed information, see [Refresh a dataset created from a comma separated value \(.csv\) file on OneDrive](#).

Content packs

There are two types of content packs in Power BI:

Content packs from online services: like Adobe Analytics, Salesforce, and Dynamics CRM Online. Datasets created from online services are refreshed automatically once a day. While it's probably not necessary, you can manually refresh or setup a refresh schedule. Because online services are in the cloud, a gateway is not required.

Organizational content packs: created and shared by users in your own organization. Content pack consumers cannot setup a refresh schedule or manually refresh. Only the content pack creator can setup refresh for the datasets in the content pack. Refresh settings are inherited with the dataset.

Content packs from online services

DATA SOURCE	AUTOMATIC REFRESH	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Online services in Get Data > Services	Yes	Yes	No

Organizational content packs

Refresh capabilities for a dataset included within an organization content pack depends on the dataset. See information above in relation to local files, OneDrive or SharePoint Online.

To learn more, see [Introduction to organizational content packs](#).

Live connections and DirectQuery to on-premises data sources

With the on-premises data gateway, you can issue queries from Power BI to your on-premises data sources. When you interact with a visualization, queries are sent from Power BI directly to the database. Updated data is then returned and visualizations are updated. Because there is a direct connection between Power BI and the database, there is no need to schedule refresh.

When connecting to a SQL Service Analysis Services (SSAS) data source using a Live connection, unlike DirectQuery, the Live connection to a SSAS source can run against the cache, even upon loading a report. This behavior improves load performance for the report. You can request the latest data from the SSAS data source by using the **refresh** button. Owners of SSAS data sources can configure the scheduled cache refresh frequency for the dataset to ensure reports are as up to date as they require.

When you configure a data source with the on-premises data gateway, you can use that data source as the scheduled refresh option. This would be instead of using the personal gateway.

NOTE

If your dataset is configured for a live or DirectQuery connection, datasets are refreshed approximately each hour or when interaction with the data occurs. You can manually adjust the *refresh frequency* in the *Scheduled cache refresh* option in the Power BI service.

DATA SOURCE	LIVE/DIRECTQUERY	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Analysis Services Tabular	Yes	Yes	Yes
Analysis Services Multidimensional	Yes	Yes	Yes
SQL Server	Yes	Yes	Yes
SAP HANA	Yes	Yes	Yes
Oracle	Yes	Yes	Yes
Teradata	Yes	Yes	Yes

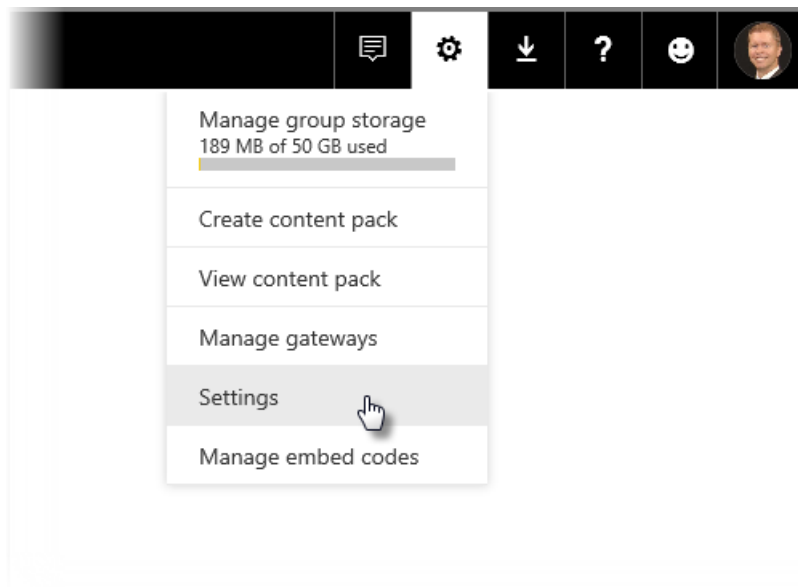
To learn more, see [On-premises data gateway](#)

Databases in the cloud

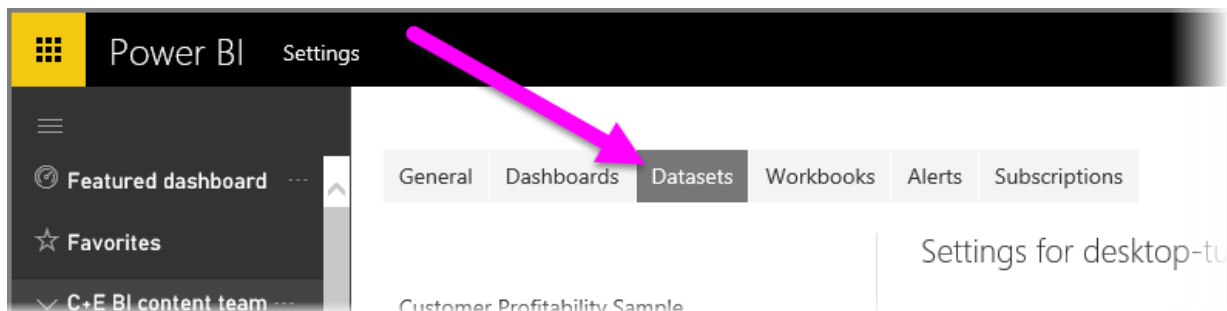
With DirectQuery, there is a direct connection between Power BI and the database in the cloud. When you interact with a visualization, queries are sent from Power BI directly to the database. Updated data is then returned and visualizations are updated. And, because both the Power BI service and the data source are in the cloud, there is no need for a Personal Gateway.

If there is no user interaction in a visualization, data is refreshed automatically approximately every hour. You can change that refresh frequency using the *Scheduled cache refresh* option, and set the refresh frequency.

To set the frequency, select the **gear** icon in the upper right corner of the Power BI service, then select **Settings**.



The **Settings** page appears, where you can select the dataset for which you want to adjust the frequency. On that page, select the **Datasets** tab along the top.



Select the dataset, and in the right pane you'll see a collection of options for that dataset. For the DirectQuery/Live connection, you can set the refresh frequency from 15 minutes to weekly using the associated drop-down menu, as shown in the following image.

Scheduled cache refresh

There is a direct connection between Power BI and the database. When you interact with a visualization, queries are sent from Power BI directly to the database. To enhance performance, dashboards tiles are cached and periodically refreshed. Change the frequency here. (You can always manually refresh a tile any time by using the option on the More menu of the tile.)

[Learn more about Direct Query refresh frequency](#)

Refresh frequency



1 hour
15 minutes
30 minutes
1 hour
2 hours
3 hours
Daily
Weekly

DATA SOURCE	LIVE/DIRECTQUERY	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
SQL Azure Data Warehouse	Yes	Yes	No
Spark on HDInsight	Yes	Yes	No

To learn more, see [Azure and Power BI](#).

Real-time dashboards

Real-time dashboards use the Microsoft Power BI REST API, or Microsoft Stream Analytics, to make sure the data is up-to-date. Since real time dashboards do not require users to configure refresh, they are outside the scope of this article.

DATA SOURCE	AUTOMATIC	USER CONFIGURED MANUAL OR SCHEDULED REFRESH	GATEWAY REQUIRED
Custom apps developed with the Power BI Rest API or Microsoft Stream Analytics	Yes, live streaming	No	No

To learn more, see [Create a real-time dashboard in Power BI](#).

Configure scheduled refresh

To learn how to configure scheduled refresh, see [Configure scheduled refresh](#)

Common data refresh scenarios

Sometimes the best way to learn about data refresh in Power BI to look at examples. Here are some of the more common data refresh scenarios:

Excel workbook with tables of data

You have an Excel workbook with several tables of data, but none of them are loaded into the Excel data model. You use Get Data to upload the workbook file from your local drive into Power BI, and create a dashboard. But, now you've made some changes to a couple of the workbook's tables on your local drive, and you want to update your dashboard in Power BI with the new data.

Unfortunately, refresh is not supported in this scenario. In order to refresh the dataset for your dashboard, you

will have to re-upload the workbook. However, there's a really great solution: Put your workbook file on OneDrive, or SharePoint Online!

When you connect to a file on OneDrive, or SharePoint Online, your reports and dashboards will show data as it is in the file. In this case, your Excel workbook. Power BI automatically checks the file, about every hour, for updates. If you make changes to the workbook (stored in OneDrive or SharePoint Online), those changes are reflected in your dashboard and reports within an hour. You don't need to setup refresh at all. However, if you need to see your updates in Power BI immediately, you can manually refresh the dataset by using Refresh Now.

To learn more, see [Excel data in Power BI](#), or [Refresh a dataset created from an Excel workbook on OneDrive](#).

Excel workbook connects to a SQL database in your company

Let's say you have an Excel workbook named SalesReport.xlsx on your local computer. Power Query in Excel was used to connect to a SQL database on a server in your company and query for sales data that is loaded into the data model. Each morning, you open the workbook and hit Refresh to update your PivotTables.

Now you want to explore your sales data in Power BI, so you use Get Data to connect to and upload the SalesReport.xlsx workbook from your local drive.

In this case, you can manually refresh the data in the SalesReport.xlsx dataset or setup a refresh schedule. Because the data really comes from the SQL database in your company, you'll need to download and install a gateway. Once you've installed and configured the gateway, you'll need to go into the SalesReport dataset's settings and sign in to the data source; but you'll only have to do this once. You can then setup a refresh schedule so Power BI automatically connects to the SQL database and gets updated data. Your reports and dashboards will also be updated automatically.

NOTE

This will only update the data within the dataset in the Power BI service. Your local file will not be updated as part of the refresh.

To learn more, see [Excel data in Power BI](#), [Power BI Gateway - Personal, On-premises data gateway](#), [Refresh a dataset created from an Excel workbook on a local drive](#).

Power BI Desktop file with data from an OData feed

In this case, you use Get Data in Power BI Desktop to connect to and import census data from an OData feed. You create several reports in Power BI Desktop, then name the file WACensus and save it on a share in your company. You then publish the file to the Power BI service.

In this case, you can manually refresh the data in the WACensus dataset or setup a refresh schedule. Because the data in the data source comes from an OData feed online, you do not need to install a gateway, but you will need to go into the WACensus dataset's settings and sign in to the OData data source. You can then setup a refresh schedule so Power BI automatically connects to the OData feed and gets updated data. Your reports and dashboards will also be updated automatically.

To learn more, see [Publish from Power BI Desktop](#), [Refresh a dataset created from a Power BI Desktop file on a local drive](#), [Refresh a dataset created from a Power BI Desktop file on OneDrive](#).

Shared content pack from another user in your organization

You've connected to an organizational content pack. It includes a dashboard, several reports, and a dataset.

In this scenario, you cannot setup refresh for the dataset. The data analyst who created the content pack is responsible for making sure the dataset is refreshed, depending on the data sources used.

If your dashboards and reports from the content pack aren't updating, you'll want to talk to the data analyst

who created the content pack.

To learn more, see [Introduction to organizational content packs](#), [Work with organizational content packs](#).

Content pack from an online service provider like Salesforce

In Power BI you used Get Data to connect to and import your data from an online service provider like Salesforce. Well, not much to do here. Your Salesforce data set is automatically scheduled to refresh once a day.

Like most online service providers, Salesforce updates data once a day, usually at night. You can manually refresh your Salesforce dataset, or setup a refresh schedule, but it's not necessary because Power BI will automatically refresh the dataset and your reports and dashboards will be updated too.

To learn more, see [Salesforce content pack for Power BI](#).

Troubleshooting

When things go wrong, it's usually because Power BI can't sign into data sources, or the dataset connects to an on-premises data source and the gateway is offline. Make sure Power BI can sign into data sources. If a password you use to sign into a data source changes, or Power BI gets signed out from a data source, be sure to try signing into your data sources again in Data Source Credentials.

For more information about troubleshooting, see [Tools for troubleshooting refresh issues](#) and [Troubleshooting refresh scenarios](#).

Next steps

[Tools for troubleshooting refresh issues](#)

[Troubleshooting refresh scenarios](#)

[Power BI Gateway - Personal](#)

[On-premises data gateway](#)

More questions? [Try asking the Power BI Community](#)

Configuring scheduled refresh

12/6/2017 • 4 min to read • [Edit Online](#)

NOTE

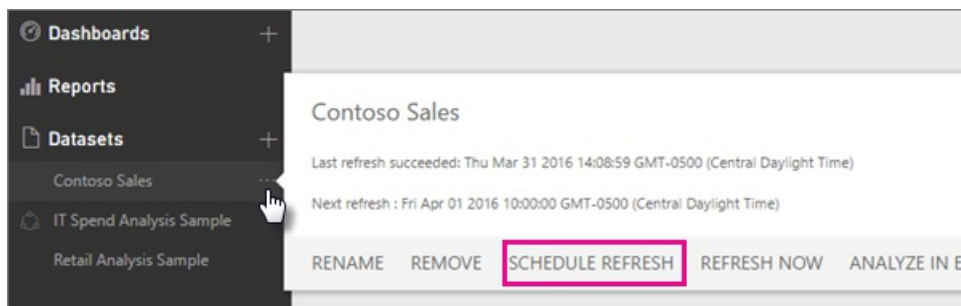
After two months of inactivity, scheduled refresh on your dataset is paused. See the [Schedule refresh](#) section later in this article for more information.

If your dataset supports scheduled refresh, by using Refresh Now and Schedule Refresh, there are a few requirements and settings important for refresh to be successful. These are **Gateway connection**, **Data Source Credentials**, and **Schedule Refresh**. Let's take a closer look at each.

This will describe the options available for both the [Power BI Gateway – Personal](#) and the [on-premises data gateway](#).

To get to the schedule refresh screen, you can do the following.

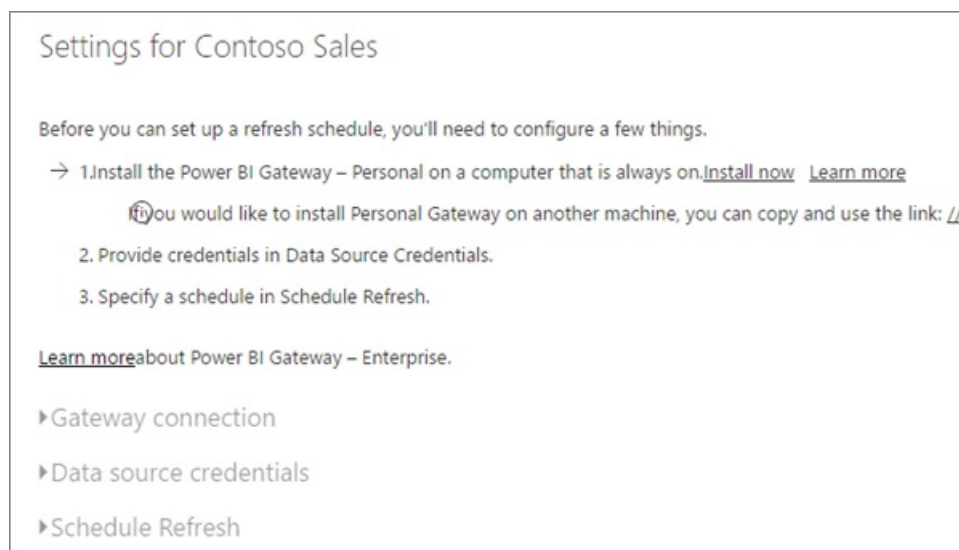
1. Select the **ellipsis (...)** next to a dataset listed under **Datasets**.
2. Select **Schedule Refresh**.



Gateway connection

You will see different options here depending on whether you have a personal, or enterprise, gateway online and available.

If no gateway is available, you will see **Gateway settings** disabled. You will also see a message indicating how to install the personal gateway.



If you have a personal gateway configured, it will be available to select, if it is online. It will show offline if it is not available.

▲ Gateway connection

Use your personal gateway (online)

Use an enterprise gateway

Status	Department	Gateway	Contact information	Description
online		Contoso Gatew...		

Apply Discard

You can also select the enterprise gateway if one is available for you. You will only see an enterprise gateway available if your account is listed in the Users tab of the data source configured for a given gateway.

Data source credentials

Power BI Gateway - Personal

If you are using the personal gateway to refresh data, you will need to supply the credentials used to connect to the back end data source. If you connected to a content pack, from an online service, the credentials you entered to connect will be carried over for scheduled refresh.

▲ Data source credentials

ContosoRetailDW-10.0.0.10 [Edit credentials](#)

You're only required to sign in to data sources the first time you use refresh on that dataset. Once entered, those credentials are retained with the dataset.

NOTE

For some authentication methods, if the password you use to sign into a data source expires or is changed, you'll need to change it for the data source in Data Source Credentials too.

When things go wrong, the problem usually has something to do with either the gateway being offline because it could not sign in to Windows and start the service, or Power BI could not sign in to the data sources in order to query for updated data. If refresh fails, check the dataset's settings. If the gateway service is offline, Gateway Status is where you'll see the error. If Power BI cannot sign into the data sources, you'll see an error in Data Source Credentials.

On-premises data gateway

If you are using the on-premises data gateway to refresh data, you do not need to supply credentials as they are defined for the data source by the gateway administrator.

▶ Data source credentials (admin has granted access, credentials are not required)

▶ Schedule Refresh

NOTE

When connecting to on-premises SharePoint for data refresh, Power BI supports only *Anonymous*, *Basic*, and *Windows (NTLM/Kerberos)* authentication mechanisms. Power BI does not support *ADFS* or any *Forms-Based Authentication* mechanisms for data refresh of on-premises SharePoint data sources.

Schedule refresh

The scheduled refresh section is where you define the frequency and time slots to refresh the dataset. Some data sources do not require a gateway present in order to be available to configure. Others will require a gateway.

You must set the **Keep your data up to date** slider to **Yes** in order to configure the settings.

NOTE

The Power BI service targets initiating the refresh of your data within **15 minutes** of your scheduled refresh time.

Schedule Refresh

Keep your data up to date
Yes

Refresh frequency
Daily ▼

Time zone
(UTC-06:00) Central Time (US and Canada) ▼

Time
10 ▼ 00 ▼ AM ▼ ✕

[Add another time](#)

Send refresh failure notification email to me

Apply Discard

NOTE

After two months of inactivity, scheduled refresh on your dataset is paused. A dataset is considered inactive when no user has visited any dashboard or report built on the dataset. At that time, the dataset owner is sent an email indicating the scheduled refresh is paused, and the refresh schedule for the dataset is displayed as **disabled**. To resume scheduled refresh, simply revisit any dashboard or report built on the dataset.

What's supported?

Certain datasets are supported against different gateways for scheduled refresh. Here is a reference to understand what is available.

Power BI Gateway - Personal

Power BI Desktop

- All online data sources shown in Power BI Desktop's Get Data and Query Editor.

- All on-premises data sources shown in Power BI Desktop's Get Data and Query Editor except for Hadoop file (HDFS) and Microsoft Exchange.

Excel

NOTE

In Excel 2016, and later, Power Query is now listed on the Data section of the ribbon, under Get & Transform data.

- All online data sources shown in Power Query.
- All on-premises data sources shown in Power Query except for Hadoop file (HDFS) and Microsoft Exchange.
- All online data sources shown in Power Pivot.*
- All on-premises data sources shown in Power Pivot except for Hadoop file (HDFS) and Microsoft Exchange.

On-premises data gateway

DATA SOURCE
Analysis Services Tabular
Analysis Services Multidimensional
SQL Server
SAP HANA
Oracle
Teradata
File
Folder
SharePoint list (on-premises)
Web
OData
IBM DB2
MySQL
Sybase
SAP BW
IBM Informix Database
ODBC

Troubleshooting

Sometimes refreshing data may not go as expected. Typically this will be an issue connected with a gateway. Take a look at the gateway troubleshooting articles for tools and known issues.

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

Next steps

[Data refresh in Power BI](#)

[Power BI Gateway - Personal](#)

[On-premises data gateway](#)

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

More questions? [Try asking the Power BI Community](#)

Refresh a dataset created from a Power BI Desktop file on a local drive

12/6/2017 • 2 min to read • [Edit Online](#)

What's supported?

In Power BI, Refresh Now and Schedule Refresh is supported for datasets created from Power BI Desktop files imported from a local drive where Get Data/Query Editor is used to connect to and load data from any of the following data sources:

Power BI Gateway - Personal

- All online data sources shown in Power BI Desktop's Get Data and Query Editor.
- All on-premises data sources shown in Power BI Desktop's Get Data and Query Editor except for Hadoop file (HDFS) and Microsoft Exchange.

On-premises data gateway

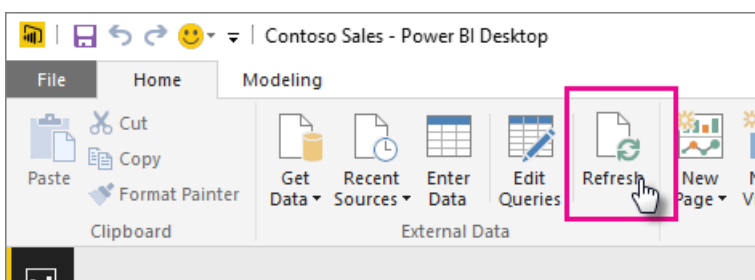
DATA SOURCE
Analysis Services Tabular
Analysis Services Multidimensional
SQL Server
SAP HANA
Oracle
Teradata
File
Folder
SharePoint list (on-premises)
Web
OData
IBM DB2
MySQL
Sybase
SAP BW

DATA SOURCE
IBM Informix Database
ODBC

NOTE

A gateway must be installed and running in order for Power BI to connect to on-premises data sources and refresh the dataset.

You can perform a one-time, manual refresh right in Power BI Desktop by selecting Refresh on the Home ribbon. When you select Refresh here, the data in the *file's* model is refreshed with updated data from the original data source. This kind of refresh, entirely from within the Power BI Desktop application itself, is different from manual or scheduled refresh in Power BI, and it's important to understand the distinction.



When you import your Power BI Desktop file from a local drive, data, along with other information about the model is loaded into a dataset in the Power BI service. In the Power BI service, not Power BI Desktop, you want to refresh data in the dataset because that is what your reports, in the Power BI service, are based on. Because the data sources are external, you can manually refresh the dataset by using **Refresh now** or you can setup a refresh schedule by using **Schedule Refresh**.

When you refresh the dataset, Power BI does not connect to the file on the local drive to query for updated data. It uses information in the dataset to connect directly to the data sources to query for updated data it then loads into the dataset.

NOTE

Refreshed data in the dataset is not synchronized back to the file on the local drive.

How do I schedule refresh?

When you setup a refresh schedule, Power BI will connect directly to the data sources using connection information and credentials in the dataset to query for updated data, then load the updated data into the dataset. Any visualizations in reports and dashboards based on that dataset in the Power BI service are also updated.

For details on how to setup schedule refresh, see [Configure Schedule Refresh](#).

When things go wrong

When things go wrong, it's usually because Power BI can't sign into data sources, or if the dataset connects to an on-premises data source, the gateway is offline. Make sure Power BI can sign into data sources. If a password you use to sign into a data source changes, or Power BI gets signed out from a data source, be sure to try signing into your data sources again in Data Source Credentials.

Be sure to leave the **Send refresh failure notification email to me** checked. You'll want to know right away if a scheduled refresh fails.

Troubleshooting

Sometimes refreshing data may not go as expected. Typically this will be an issue connected with a gateway. Take a look at the gateway troubleshooting articles for tools and known issues.

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

More questions? [Try asking the Power BI Community](#)

Refresh a dataset stored on OneDrive or SharePoint Online

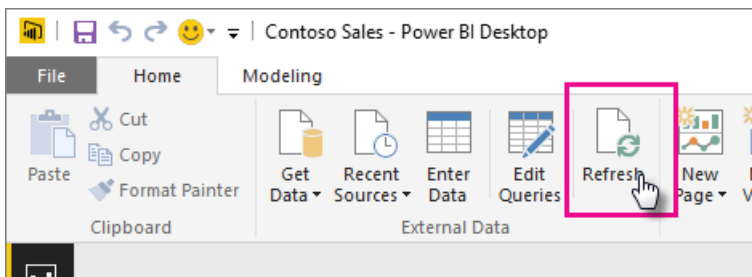
12/6/2017 • 4 min to read • [Edit Online](#)

Importing files from OneDrive, or SharePoint Online, into the Power BI service is a great way to make sure the work you're doing in **Power BI Desktop** stays in sync with the Power BI service.

Advantages of storing a Power BI Desktop file on OneDrive or SharePoint Online

When you store a **Power BI Desktop** file on OneDrive or SharePoint Online, any data you've loaded into your file's model is imported into the dataset, and any reports you've created in the file are loaded into **Reports** in the Power BI service. When you make changes to your file on OneDrive or SharePoint Online, such as adding new measures, changing column names, or editing visualizations, once you save the file those changes will be updated in the Power BI service too, usually within about an hour.

You can perform a one-time, manual refresh right in Power BI Desktop by selecting Refresh on the Home ribbon. When you select Refresh here, the data in the *file's* model is refreshed with updated data from the original data source. This kind of refresh, entirely from within the Power BI Desktop application itself, is different from manual or scheduled refresh in Power BI, and it's important to understand the distinction.



When you import your Power BI Desktop file from OneDrive, or SharePoint Online, data, along with other information about the model is loaded into a dataset in Power BI. In the Power BI service, not Power BI Desktop, you want to refresh data in the dataset because that is what your reports, in the Power BI service, are based on. Because the data sources are external, you can manually refresh the dataset by using **Refresh now** or you can setup a refresh schedule by using **Schedule Refresh**.

When you refresh the dataset, Power BI does not connect to the file on OneDrive, or SharePoint Online, to query for updated data. It uses information in the dataset to connect directly to the data sources to query for updated data it then loads into the dataset. This refreshed data in the dataset is not synchronized back to the file on OneDrive, or SharePoint Online.

What's supported?

In Power BI, Refresh Now and Schedule Refresh is supported for datasets created from Power BI Desktop files imported from a local drive where Get Data/Query Editor is used to connect to and load data from any of the following data sources:

Power BI Gateway - Personal

- All online data sources shown in Power BI Desktop's Get Data and Query Editor.
- All on-premises data sources shown in Power BI Desktop's Get Data and Query Editor except for Hadoop file (HDFS) and Microsoft Exchange.

On-premises data gateway

DATA SOURCE
Analysis Services Tabular
Analysis Services Multidimensional
SQL Server
SAP HANA
Oracle
Teradata
File
Folder
SharePoint list (on-premises)
Web
OData
IBM DB2
MySQL
Sybase
SAP BW
IBM Informix Database
ODBC

NOTE

A gateway must be installed and running in order for Power BI to connect to on-premises data sources and refresh the dataset.

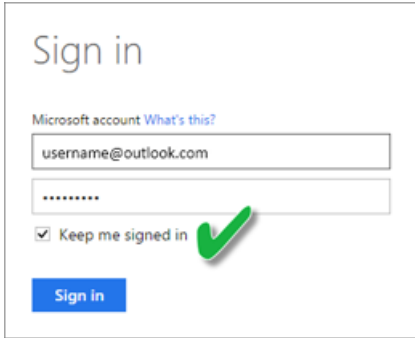
OneDrive or OneDrive for Business. What's the difference?

If you have both a personal OneDrive and OneDrive for Business, it's recommended you keep any files you want to import into Power BI in OneDrive for Business. Here's why: You likely use two different accounts to sign into them.

Connecting to OneDrive for Business in Power BI is typically seamless because the same account you use to sign into Power BI with is often the same account used to sign into OneDrive for Business. But, with personal OneDrive, you likely sign in with a different [Microsoft account](#).

When you sign in with your Microsoft account, be sure to select Keep me signed in. Power BI can then synchronize

any updates you make in the file in Power BI Desktop with datasets in Power BI



If you make changes to your file on OneDrive that cannot be synchronized with the dataset or reports in Power BI, because your Microsoft account credentials might have changed, you'll need to connect to and import your file again from your personal OneDrive.

How do I schedule refresh?

When you setup a refresh schedule, Power BI will connect directly to the data sources using connection information and credentials in the dataset to query for updated data, then load the updated data into the dataset. Any visualizations in reports and dashboards based on that dataset in the Power BI service are also updated.

For details on how to setup schedule refresh, see [Configure Schedule Refresh](#).

When things go wrong

When things go wrong, it's usually because Power BI can't sign into data sources, or if the dataset connects to an on-premises data source, the gateway is offline. Make sure Power BI can sign into data sources. If a password you use to sign into a data source changes, or Power BI gets signed out from a data source, be sure to try signing into your data sources again in Data Source Credentials.

If you're making changes to the Power BI Desktop file on OneDrive and saving, and those changes aren't being reflected in Power BI within an hour or so, it could be because Power BI cannot connect to your OneDrive. Try connecting to the file on OneDrive again. If you're prompted to sign in, make sure you select Keep me signed in. Because Power BI was not able to connect to your OneDrive to synchronize with the file, you'll need to import your file again.

Be sure to leave the **Send refresh failure notification email to me** checked. You'll want to know right away if a scheduled refresh fails.

Troubleshooting

Sometimes refreshing data may not go as expected. Typically this will be an issue connected with a gateway. Take a look at the gateway troubleshooting articles for tools and known issues.

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

More questions? [Try asking the Power BI Community](#)

Refresh a dataset created from an Excel workbook on a local drive

12/6/2017 • 3 min to read • [Edit Online](#)

What's supported?

In Power BI, Refresh Now and Schedule Refresh is supported for datasets created from Excel workbooks imported from a local drive where Power Query (Get & Transform data in Excel 2016) or Power Pivot is used to connect to any of the following data sources and load data into the Excel data model:

Power BI Gateway - Personal

- All online data sources shown in Power Query.
- All on-premises data sources shown in Power Query except for Hadoop file (HDFS) and Microsoft Exchange.
- All online data sources shown in Power Pivot.*
- All on-premises data sources shown in Power Pivot except for Hadoop file (HDFS) and Microsoft Exchange.

On-premises data gateway

DATA SOURCE
Analysis Services Tabular
Analysis Services Multidimensional
SQL Server
SAP HANA
Oracle
Teradata
File
Folder
SharePoint list (on-premises)
Web
OData
IBM DB2
MySQL
Sybase

DATA SOURCE
SAP BW
IBM Informix Database
ODBC

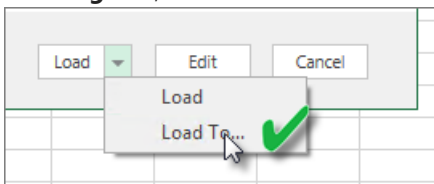
- Notes:**
- A gateway must be installed and running in order for Power BI to connect to on-premises data sources and refresh the dataset.
 - When using Excel 2013, make sure you've updated Power Query to the latest version.
 - Refresh is not supported for Excel workbooks imported from a local drive where data exists only in worksheets or linked tables. Refresh is supported for worksheet data if it is stored and imported from OneDrive. To learn more, see [Refresh a dataset created from an Excel workbook on OneDrive, or SharePoint Online](#).
 - When you refresh a dataset created from an Excel workbook imported from a local drive, only the data queried from data sources is refreshed. If you change the structure of the data model in Excel or Power Pivot; for example, create a new measure or change the name of a column, those changes will not be copied to the dataset. If you make such changes, you'll need to re-upload or re-publish the workbook. If you expect to make regular changes to the structure of your workbook and you want those to be reflected in the dataset in Power BI without having to re-upload, consider putting your workbook on OneDrive. Power BI automatically refreshes both the structure and worksheet data from workbooks stored and imported from OneDrive.

How do I make sure data is loaded to the Excel data model?

When you use Power Query (Get & Transform data in Excel 2016) to connect to a data source, you have several options where to load the data. To make sure you load data into the data model, you must select the **Add this data to the Data Model** option in the **Load To** dialog box.

NOTE
The images here show Excel 2016.

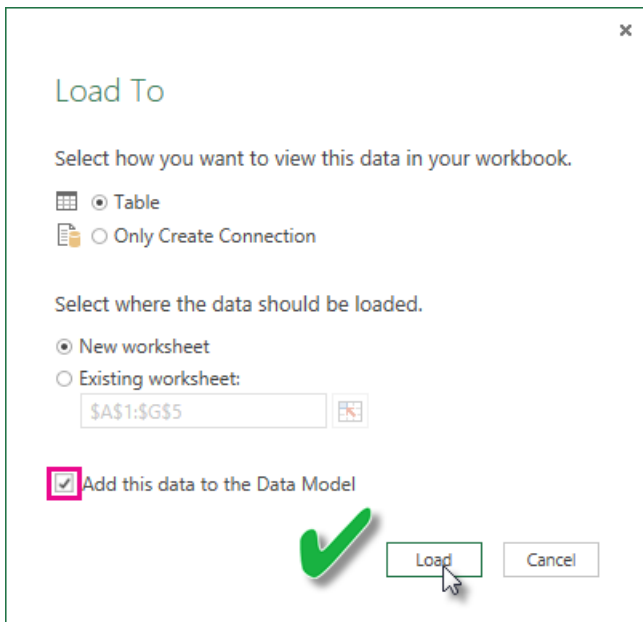
In **Navigator**, click **Load To...**



Or, if you click **Edit** in Navigator, you'll open the Query Editor. There you can click **Close & Load To...**



Then in **Load To**, make sure you select **Add this data to the Data Model**.



What if I use Get External Data in Power Pivot?

No problem. Whenever you use Power Pivot to connect to and query data from an on-premises or online data source, the data is automatically loaded to the data model.

How do I schedule refresh?

When you setup a refresh schedule, Power BI will connect directly to the data sources using connection information and credentials in the dataset to query for updated data, then load the updated data into the dataset. Any visualizations in reports and dashboards based on that dataset in the Power BI service are also updated.

For details on how to setup schedule refresh, see [Configure Schedule Refresh](#).

When things go wrong

When things go wrong, it's usually because Power BI can't sign into data sources, or if the dataset connects to an on-premises data source, the gateway is offline. Make sure Power BI can sign into data sources. If a password you use to sign into a data source changes, or Power BI gets signed out from a data source, be sure to try signing into your data sources again in Data Source Credentials.

Be sure to leave the **Send refresh failure notification email to me checked**. You'll want to know right away if a scheduled refresh fails.

IMPORTANT

Refresh is not supported for OData feeds connected to and queried from Power Pivot. When using an OData feed as a data source, use Power Query.

Troubleshooting

Sometimes refreshing data may not go as expected. Typically this will be an issue connected with a gateway. Take a look at the gateway troubleshooting articles for tools and known issues.

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

Next steps

More questions? [Try the Power BI Community](#)

Refresh a dataset created from an Excel workbook on OneDrive, or SharePoint Online

12/6/2017 • 6 min to read • [Edit Online](#)

You can import Excel workbooks that are stored on your local machine, or in cloud storage such as OneDrive for Business or SharePoint Online. We will look at the advantages of using cloud storage for your excel files. For more information on how to import Excel files into Power BI, see [Get data from Excel workbook files](#).

What are the advantages?

Importing files from OneDrive, or SharePoint Online, is a great way to make sure the work you're doing in Excel stays in-sync with the Power BI service. Any data you've loaded into your file's model is imported into the dataset and any reports you've created in the file are loaded into Reports in Power BI. If you make changes to your file on OneDrive, or SharePoint Online, like add new measures, change column names, or edit visualizations, once you save, those changes will be updated in Power BI too, usually within about an hour.

When you import an Excel workbook from your personal OneDrive, any data in the workbook, like tables in worksheets and/or data that is loaded into the Excel data model and the structure of the data model, are imported into a new dataset in Power BI. Any Power View visualizations are re-created in Reports. Power BI automatically connects to the workbook on OneDrive, or SharePoint Online, about every hour to check for updates. If the workbook has changed, Power BI will refresh the dataset and reports in the Power BI service.

You can refresh on the dataset in the Power BI service. When you manually refresh, or schedule refresh, on the dataset, Power BI connects directly to the external data sources to query for updated data it then loads into the dataset. Refreshing a dataset from within Power BI does not refresh the data in the workbook on OneDrive, or SharePoint Online.

What's supported?

In Power BI, Refresh Now and Schedule Refresh is supported for datasets created from Power BI Desktop files imported from a local drive where Get Data/Query Editor is used to connect to and load data from any of the following data sources:

Power BI Gateway - Personal

- All online data sources shown in Power BI Desktop's Get Data and Query Editor.
- All on-premises data sources shown in Power BI Desktop's Get Data and Query Editor except for Hadoop file (HDFS) and Microsoft Exchange.

On-premises data gateway

DATA SOURCE
Analysis Services Tabular
Analysis Services Multidimensional
SQL Server
SAP HANA

DATA SOURCE
Oracle
Teradata
File
Folder
SharePoint list (on-premises)
Web
OData
IBM DB2
MySQL
Sybase
SAP BW
IBM Informix Database
ODBC

NOTE

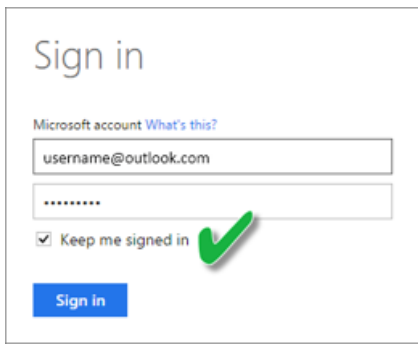
A gateway must be installed and running in order for Power BI to connect to on-premises data sources and refresh the dataset.

OneDrive or OneDrive for Business. What's the difference?

If you have both a personal OneDrive and OneDrive for Business, it's recommended you keep any files you want to import into Power BI in OneDrive for Business. Here's why: You likely use two different accounts to sign into them.

Connecting to OneDrive for Business in Power BI is typically seamless because the same account you use to sign into Power BI with is often the same account used to sign into OneDrive for Business. But, with personal OneDrive, you likely sign in with a different [Microsoft account](#).

When you sign in with your Microsoft account, be sure to select Keep me signed in. Power BI can then synchronize any updates you make in the file in Power BI Desktop with datasets in Power BI



If you make changes to your file on OneDrive that cannot be synchronized with the dataset or reports in Power BI, because your Microsoft account credentials might have changed, you'll need to connect to and import your file again from your personal OneDrive.

Options for connecting to Excel file

When you connect to an Excel workbook in OneDrive for Business, or SharePoint Online, you'll have two options on how to get what's in your workbook into Power BI.

Import Excel data into Power BI – When you import an Excel workbook from your OneDrive for Business, or SharePoint Online, it works as described above.

Connect, Manage, and View Excel in Power BI – When using this option, you create a connection from Power BI right to your workbook on OneDrive for Business, or SharePoint Online.

When you connect to an Excel workbook this way, a dataset is not created in Power BI. However, the workbook will appear in the Power BI service under Reports with an Excel icon next to the name. Unlike with Excel Online, when you connect to your workbook from Power BI, if your workbook has connections to external data sources that load data into the Excel data model, you can setup a refresh schedule.

When you setup a refresh schedule this way, the only difference is refreshed data goes into the workbook's data model on OneDrive, or SharePoint Online, rather than a dataset in Power BI.

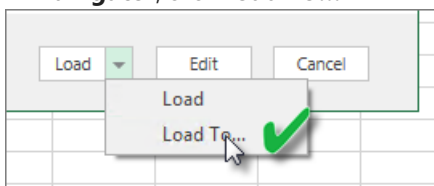
How do I make sure data is loaded to the Excel data model?

When you use Power Query (Get & Transform data in Excel 2016) to connect to a data source, you have several options where to load the data. To make sure you load data into the data model, you must select the **Add this data to the Data Model** option in the **Load To** dialog box.

NOTE

The images here show Excel 2016.

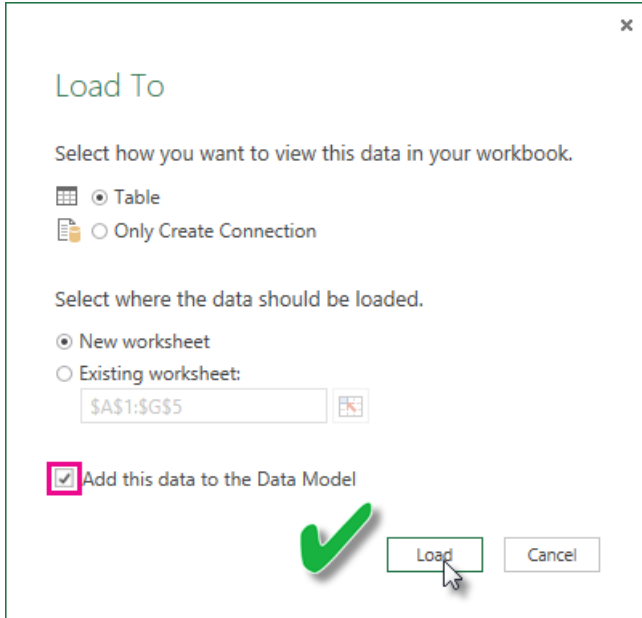
In **Navigator**, click **Load To...**



Or, if you click **Edit** in Navigator, you'll open the Query Editor. There you can click **Close & Load To...**



Then in **Load To**, make sure you select **Add this data to the Data Model**.



What if I use Get External Data in Power Pivot?

No problem. Whenever you use Power Pivot to connect to and query data from an on-premises or online data source, the data is automatically loaded to the data model.

How do I schedule refresh?

When you setup a refresh schedule, Power BI will connect directly to the data sources using connection information and credentials in the dataset to query for updated data, then load the updated data into the dataset. Any visualizations in reports and dashboards based on that dataset in the Power BI service are also updated.

For details on how to setup schedule refresh, see [Configure Schedule Refresh](#).

When things go wrong

When things go wrong, it's usually because Power BI can't sign into data sources, or if the dataset connects to an on-premises data source, the gateway is offline. Make sure Power BI can sign into data sources. If a password you use to sign into a data source changes, or Power BI gets signed out from a data source, be sure to try signing into your data sources again in Data Source Credentials.

Be sure to leave the **Send refresh failure notification email to me checked**. You'll want to know right away if a scheduled refresh fails.

Important notes

* Refresh is not supported for OData feeds connected to and queried from Power Pivot. When using an OData feed as a data source, use Power Query.

Troubleshooting

Sometimes refreshing data may not go as expected. Typically this will be an issue connected with a gateway. Take a look at the gateway troubleshooting articles for tools and known issues.

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

More questions? [Try the Power BI Community](#)

Refresh a dataset created from a .CSV file on OneDrive or SharePoint Online

12/6/2017 • 2 min to read • [Edit Online](#)

What are the advantages?

When you connect to a .csv file on OneDrive or SharePoint Online, a dataset is created in Power BI. Data from the .csv file is then imported into the dataset in Power BI. Power BI then automatically connects to the file and refreshes any changes with the dataset in Power BI. If you edit the .csv file in OneDrive, or SharePoint Online, once you save, those changes will appear in Power BI, usually within about an hour. Any visualizations in Power BI based on the dataset are automatically updated too.

If your files are in a shared folder on OneDrive for Business, or SharePoint Online, other users can work on the same file. Once saved, any changes made are automatically updated in Power BI, usually within an hour.

Many organizations run processes that automatically query databases for data that is then saved to a .csv file each day. If the file is stored on OneDrive, or SharePoint Online, and the same file is overwritten each day, as opposed to a new file with a different name being created each day, you can connect to that file in Power BI. Your dataset that connects to the file will be synchronized soon after the file on OneDrive, or SharePoint Online, is updated. Any visualizations based on the dataset are automatically updated too.

What's supported?

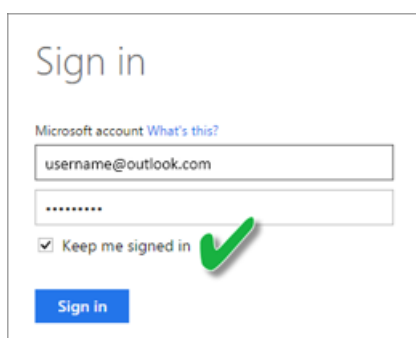
Comma separated value files are simple text files, so connections to external data sources and reports are not supported. You cannot schedule refresh on a dataset created from a comma delimited file. However, when the file is on OneDrive, or SharePoint Online, Power BI will synchronize any changes to the file with the dataset automatically about every hour.

OneDrive or OneDrive for Business. What's the difference?

If you have both a personal OneDrive and OneDrive for Business, it's recommended you keep any files you want to connect to in Power BI on OneDrive for Business. Here's why: You likely use two different accounts to sign into them.

Connecting to OneDrive for Business in Power BI is typically seamless because the same account you use to sign into Power BI with is often the same account used to sign into OneDrive for Business. But, with personal OneDrive, you likely sign in with a different [Microsoft account](#).

When you sign into your Microsoft account, be sure to select Keep me signed in. Power BI can then synchronize any updates with datasets in Power BI



The image shows a sign-in form for a Microsoft account. At the top, it says "Sign in". Below that, it says "Microsoft account [What's this?](#)". There are two input fields: the first contains "username@outlook.com" and the second contains "*****". Below the second field, there is a checkbox labeled "Keep me signed in" with a green checkmark next to it. At the bottom, there is a blue button labeled "Sign in".

If you make changes to your .csv file on OneDrive that cannot be synchronized with the dataset in Power BI because your Microsoft account credentials might have changed, you'll need to connect to the file and import it again from your personal OneDrive.

When things go wrong

If data in the .csv file on OneDrive is changing and those changes aren't being reflected in Power BI, it's most likely because Power BI cannot connect to your OneDrive. Try connecting to the file and importing it again. If you're prompted to sign in, make sure you select **Keep me signed in**.

Next steps

[Tools for troubleshooting refresh issues](#) [Troubleshooting refresh scenarios](#)

More questions? [Try asking the Power BI Community](#)

Troubleshooting refresh scenarios

1/25/2018 • 3 min to read • [Edit Online](#)

Here you can find information regarding different scenarios you may face when refreshing data within the Power BI service.

NOTE

If you encounter a scenario that is not listed below, and it is causing you issues, you can ask for further assistance on the [community site](#), or you can create a [support ticket](#).

Refresh using Web connector doesn't work properly

If you have a web connector script that's using the [Web.Page](#) function, and you have updated your dataset or report after November 18th, 2016, you need to use a gateway in order for refresh to work properly.

Unsupported data source for refresh

When configuring a dataset, you may get an error indicating the dataset uses an unsupported data source for refresh. For details, see [Troubleshooting unsupported data source for refresh](#)

Dashboard doesn't reflect changes after refresh

Please wait about 10-15 minutes for refresh to be reflected in the dashboard tiles. If it is still not showing up, re-pin the visualization to the dashboard.

GatewayNotReachable when setting credentials

You may encounter GatewayNotReachable when trying to set credentials for a data source. This could be the result of an outdated gateway. Install the latest gateway and try again.

Processing Error: The following system error occurred: Type Mismatch

This could be an issue with your M script within your Power BI Desktop file or Excel Workbook. It could also be due to an out of date Power BI Desktop version.

Tile refresh errors

For a list of errors you may encounter with dashboard tiles, and explanations, see [Troubleshooting tile errors](#).

Refresh fails when updating data from sources that use AAD OAuth

The Azure Active Director (**AAD**) OAuth token, used by many different data sources, expires in approximately one hour. You can run into situations where loading data takes longer than the token expiration (more than one hour), since the Power BI service waits for up to two hours when loading data. In that situation, the data loading process can fail with a credentials error.

Data sources that use AAD OAuth include **Microsoft Dynamics CRM Online**, **SharePoint Online** (SPO), and others. If you're connecting to such data sources, and get a credentials failure when loading data takes more than an hour, this may be the reason.

Microsoft is investigating a solution that allows the data loading process to refresh the token and continue. However, if your Dynamics CRM Online or SharePoint Online instance (or other AAD OAuth data source) is so large that it could run into the two-hour data-load threshold, you may experience a data load timeout from the Power BI service as well.

Also note that, for refresh to work properly, when connecting to a **SharePoint Online** data source using AAD OAuth, you must use the same account that you use to sign in to the **Power BI service**.

Uncompressed data limits for refresh

The maximum size for datasets imported into the **Power BI service** is 1 GB. These datasets are heavily compressed to ensure high performance. In addition, in shared capacity, the service places a limit on the amount of uncompressed data that is processed during refresh to 10 GB. This limit accounts for the compression, and therefore is much higher than 1 GB. Datasets in Power BI Premium are not subject to this limit. If refresh in the Power BI service fails for this reason, please reduce the amount of data being imported to Power BI and try again.

Scheduled refresh timeout

Scheduled refresh for imported datasets timeout after two hours. This timeout is increased to five hours for datasets in **Premium** workspaces. If you are encountering this limit, you can consider reducing the size or complexity of your dataset, or consider breaking the dataset into smaller pieces.

Next steps

[Data Refresh](#)

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

More questions? [Try asking the Power BI Community](#)

Disable privacy setting in Power BI Gateway - Personal

12/21/2017 • 2 min to read • [Edit Online](#)

NOTE

There is a new version of the personal gateway for Power BI called the **on-premises data gateway (personal mode)**. The following article describes the previous version of the personal gateway, called **Power BI Gateway - Personal**, which will be retired and stop working after July 31, 2017. For information about the new version of the personal gateway, including how to install the new version, see the **On-premises data gateway (personal mode) article**. Fast combine is also available in the new version of the personal gateway, and is described in that article, too.

You may receive the following error based on the privacy settings for your data sources when used with the personal gateway.

An error occurred while processing the data in the dataset.

[Unable to combine data] <query part>/<...>/<...> is accessing data sources that have privacy levels which cannot be used together. Please rebuild this data combination.

To work around this error, you can turn on **Fast Combine**. **Fast Combine** will ignore the privacy settings allowing the different data sources to be combined.

NOTE

Privacy levels are not considered when combining data. This could expose sensitive or confidential data to another data source when combining data.

What is Fast Combine?

To learn more about privacy levels and Fast Combine, you can look at [Privacy Levels](#). By default, the privacy level will be set to private which could result in the error mentioned above. This is because a setting of private will isolate the data source from other sources. An example of where this would be a problem would be a parameterized query getting inputs from another data source.

Turning Fast Combine on will ignore the private setting and allow the execution to occur.

Turn on Fast Combine

You can use the following steps to enable Fast Combine for your personal gateway. The on-premises data gateway does not have this setting.

1. Open **ConnectorConfig.xml**. This may be in one of two locations on your machine. If you are an administrator on the computer, it will be the following.

```
C:\Program Files\Power BI Personal Gateway\1.0\Configurator\Connector
```

If you are not an administrator, the location will be the following.

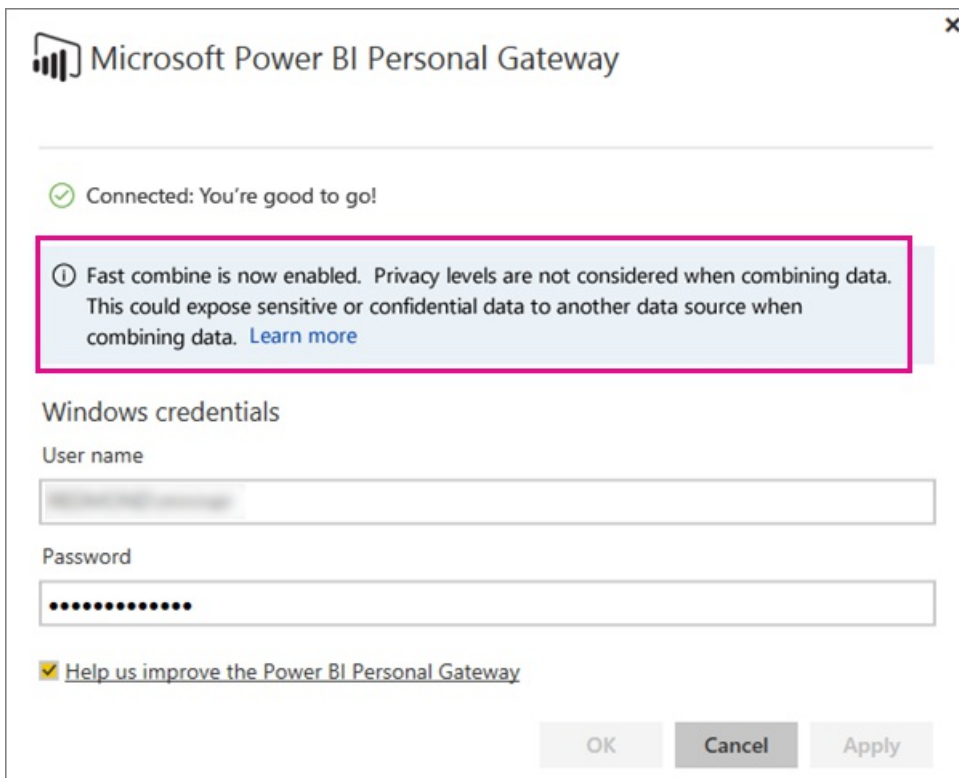
```
C:\Users\[username]\AppData\Local\Power BI Personal Gateway\1.0\Configurator\Connector
```

2. Add the **<EnableFastCombine>** element with a value of true to the config file. Adding this element will turn **Fast Combine** on.

```
<EnableFastCombine>true</EnableFastCombine>
```

```
<?xml version="1.0" encoding="utf-8"?>
<AgentConfiguration xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <AzureActiveDirectoryConfiguration>
    <AuthorityAddress>https://login.windows.net/common/oauth2/authorize</AuthorityAddress>
    <ResourceAddress>https://analysis.windows.net/powerbi/api</ResourceAddress>
  </AzureActiveDirectoryConfiguration>
  <PowerBIConfiguration>
    <GlobalServiceEndpoint>https://api.powerbi.com</GlobalServiceEndpoint>
  </PowerBIConfiguration>
  <MicrosoftDownloadCenterConfiguration>
    <DownloadUri>http://go.microsoft.com/fwlink/?LinkID=522228</DownloadUri>
  </MicrosoftDownloadCenterConfiguration>
  <AgentInstallationConfiguration>
    <AgentType>PowerBIPersonalGateway</AgentType>
    <AgentInstallationMode>PerMachineMode</AgentInstallationMode>
  </AgentInstallationConfiguration>
  <EnableFastCombine>true</EnableFastCombine>
</AgentConfiguration>
```

3. Exit and re-launch the gateway configuration screen.
4. You will see a status letting you know that Fast Combine is enabled.



Turn off Fast Combine

1. Open **ConnectorConfig.xml**. This may be in one of two locations on your machine. If you are an administrator on the computer, it will be the following.

```
C:\Program Files\Power BI Personal Gateway\1.0\Configurator\Connector
```

If you are not an administrator, the location will be the following.

```
C:\Users\[username]\AppData\Local\Power BI Personal Gateway\1.0\Configurator\Connector
```

2. Remove the **<EnableFastCombine>** element from the config file. Removing this element will turn **Fast Combine** off.
3. Exit and re-launch the gateway configuration screen.
4. You will no longer see a status telling you know that **Fast Combine** is enabled.

Next steps

[On-premises data gateway \(personal mode\) - the new version of the personal gateway Privacy Levels](#)

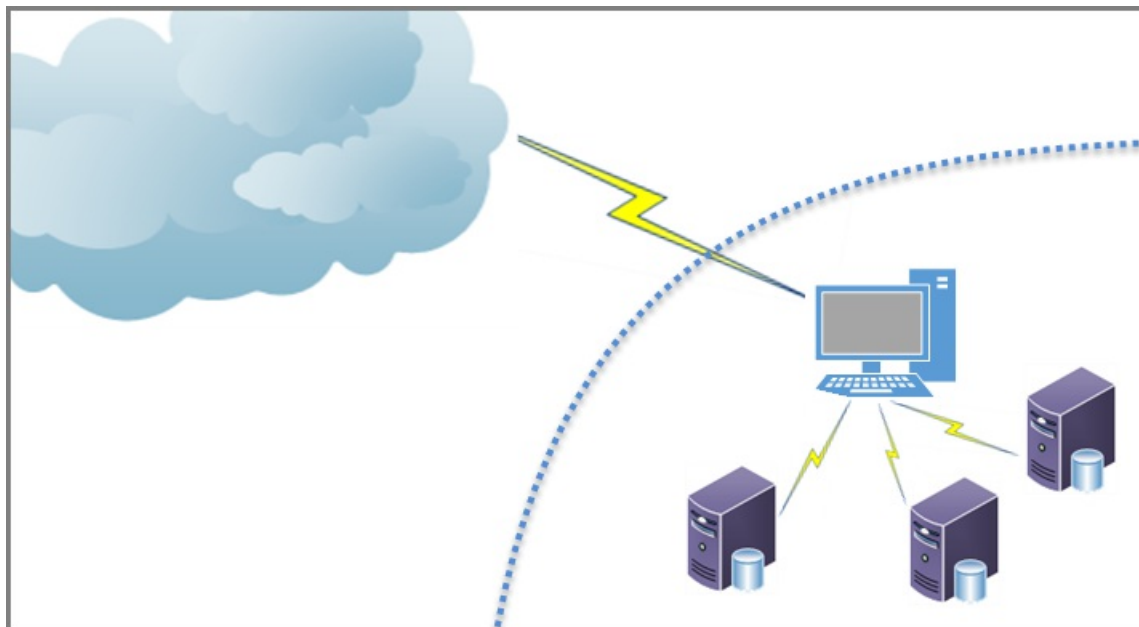
[Common query tasks in Power BI Desktop](#)

More questions? [Try the Power BI Community](#)

Getting started with Power BI gateways

1/25/2018 • 9 min to read • [Edit Online](#)

Welcome to the **Getting started with Power BI gateways** guide. This short walk-through gets you acquainted with what a gateway does, how it works, and how to get your own gateway installed, configured, and running.



Gateways can be a technical subject, and since every network and enterprise is different, the complexity of gateways can be significant. To keep that complexity at bay, let's start with the basics.

How Power BI gateways work

A **gateway** is software that facilitates access to data that resides on a private, on-premises network, for subsequent use in a cloud service like Power BI. It's like a gatekeeper that listens for connection requests, and grants them only when a users' requests meet certain criteria (such as whether they're allowed to use the gateway). This lets organizations leave databases and warehouses on their on-premises networks, yet securely use subsets of that data to create compelling reports and dashboards in Power BI.

A gateway also secures access and data by encrypting and compressing all data that passes through it, as well as any passwords used to connect to data sources. All this sounds straightforward I'm sure, but there are many details to consider.

Sometimes you want a gateway just for you – maybe you have a big Excel workbook plus three SQL databases with years of running sales and marketing data, and you want to create a Power BI dashboard that shows those sales from every angle. You're the only person who creates reports, it's your Excel workbook, and only you use those databases to create Power BI reports. You just need a gateway for your personal use, not to share those data sources with everyone else.

Other times, you might be in an organization with all sorts of databases from different vendors, including Analysis Services, SAP, Oracle, IBM, and various other data sources, and you need lots of people to access them, so they can create multitudes of reports. In this case, you need a gateway that lets you configure access to all those sources, and then you need to share it with many people in your organization. That's a different kind of gateway altogether.

Fortunately, Power BI offers two gateways, fitting each of those scenarios well. These two gateway offerings from Power BI are the following:

- **On-premises data gateway (personal mode)** – allows one user to connect to sources, and can't be shared with others. Can only be used with Power BI.
- **On-premises data gateway** – allows multiple users to connect to multiple on-premises data sources, and can be used by Power BI, PowerApps, Flow, and Azure Logic apps, all with a single gateway installation.

Both gateways perform a similar function – they facilitate access to data residing on a private on-premises network, so that data can be used in cloud-based services like Power BI. The personal gateway can be used by one person and only by Power BI, the **on-premises data gateway** can be used by many users, and many services.

There are three parts, or stages, to putting a gateway to work:

- Install the gateway
- Add users to the gateway (let them use the gateway)
- Connect to data sources

In addition, using a gateway lets you do something else that can be important:

- Refresh on-premises data, so Power BI reports can be updated with fresh data

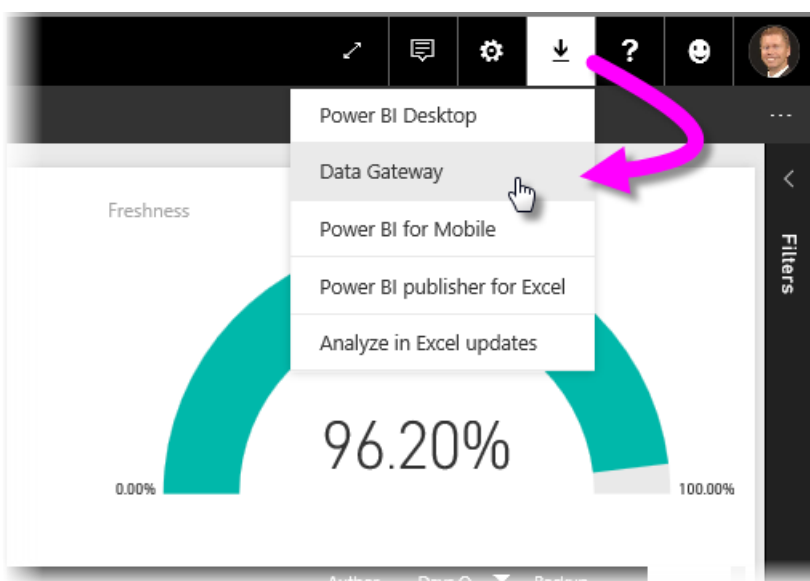
Refreshing data means your Power BI dashboards and reports look fresh, and reflect the latest data. So when someone views a report you created with on-premises data, that report can use show the latest information, even if you created the report a while ago.

The first part, installing a gateway, is easy. Allowing users to access the gateway is easy too – you just add them in a dialog within Power BI and they're good. Connecting to data sources can get complex, because there are so many data sources and each has its own connection requirements and nuances. And we'll handle refresh in another guide, to keep things in this article focused on the gateway.

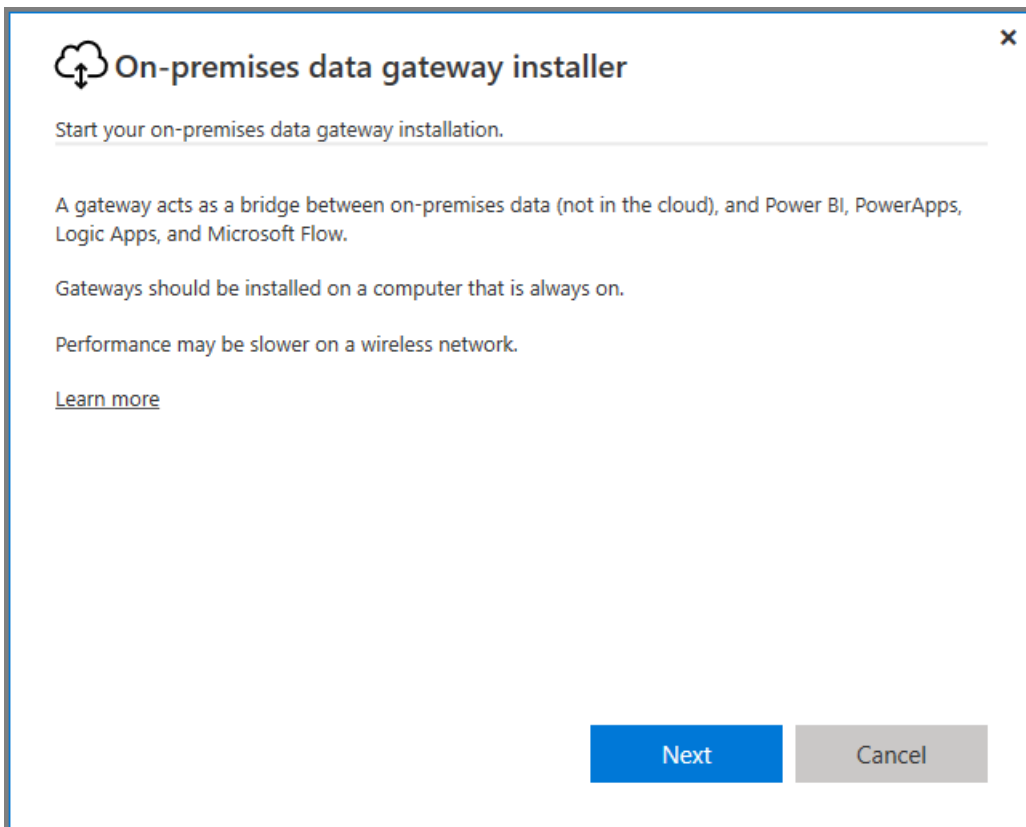
So let's take the easy thing first, and walk through installing a gateway.

Install the gateway

To install a gateway, open the Power BI service (you can use this link to launch the Power BI service in your browser, and log on) and log in with your Power BI account. In the Power BI service, select the **download icon** in the upper right corner, as shown in the following image, and select **Data Gateway**.

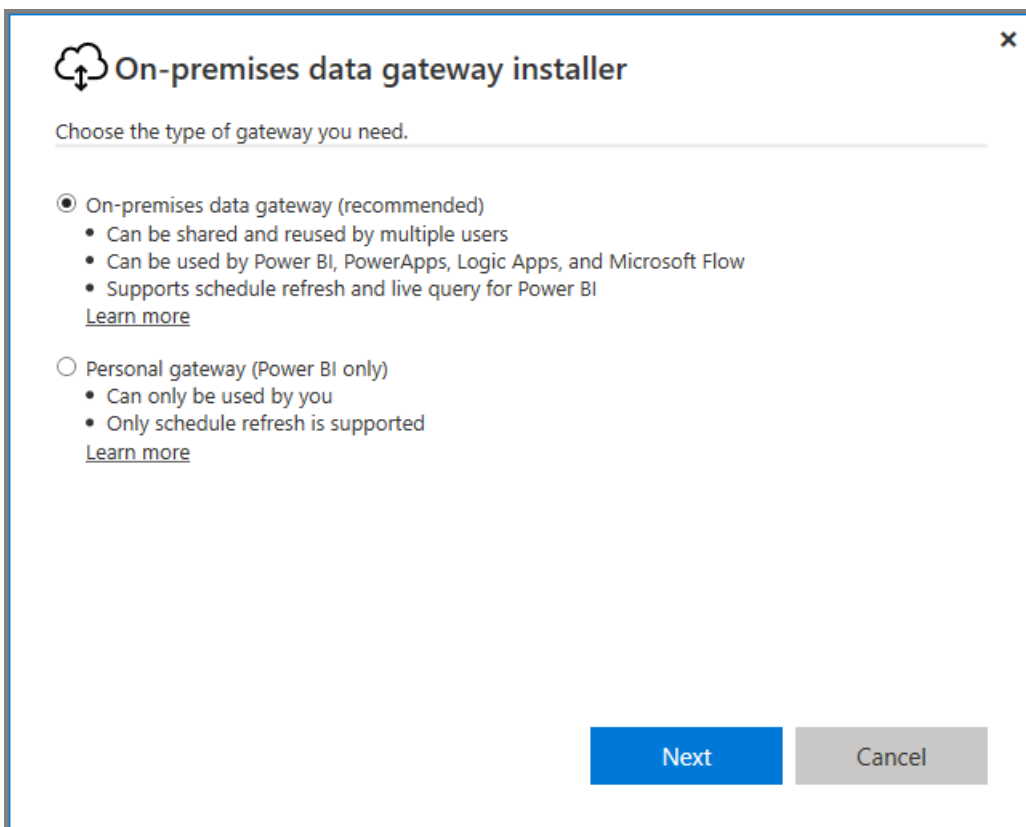


That takes you to a download page, where you click the **Download gateway** button to initiate the download.



This screen gives you the ultra-condensed explanation of what a gateway does. It also provides a couple important **warnings** – when you install a gateway, it actually runs on the computer on which you perform the installation. And if that computer is turned off, so is the gateway (so it won't work when it's not running). Also, installing on a computer using a wireless network is not best, so you should use a computer connected to a wired network.

When you're ready, select **Next** to continue with the setup.

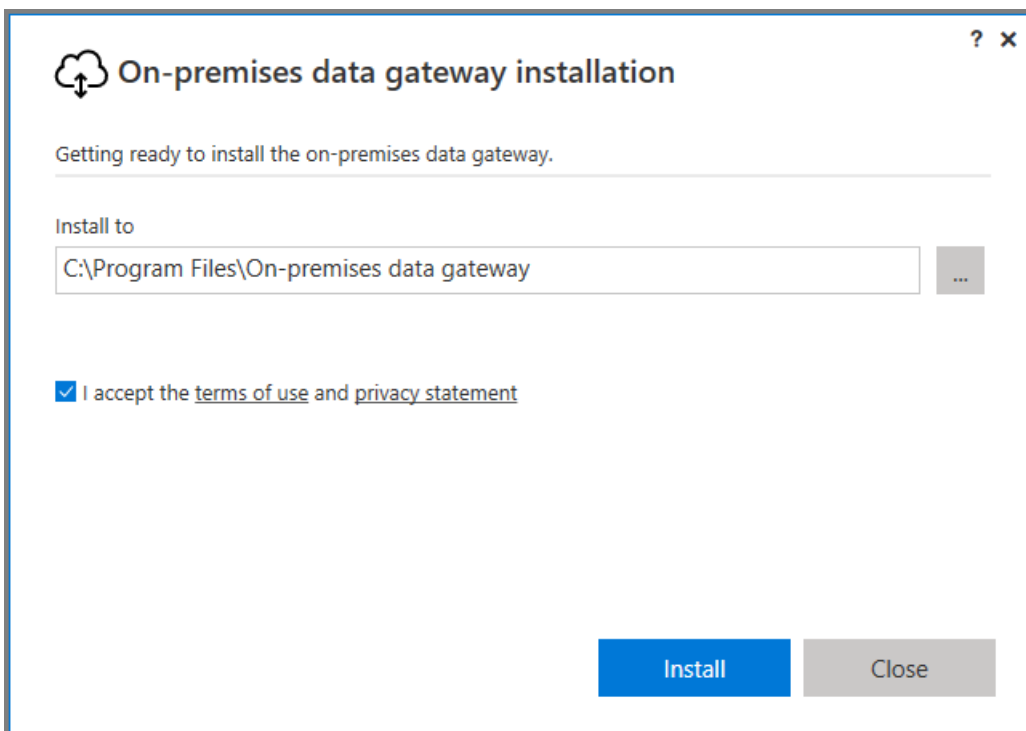


Here's where you decide which gateway you'll install – on-premises gateway, or a personal gateway. In this guide, we'll install the **On-premises data gateway**.

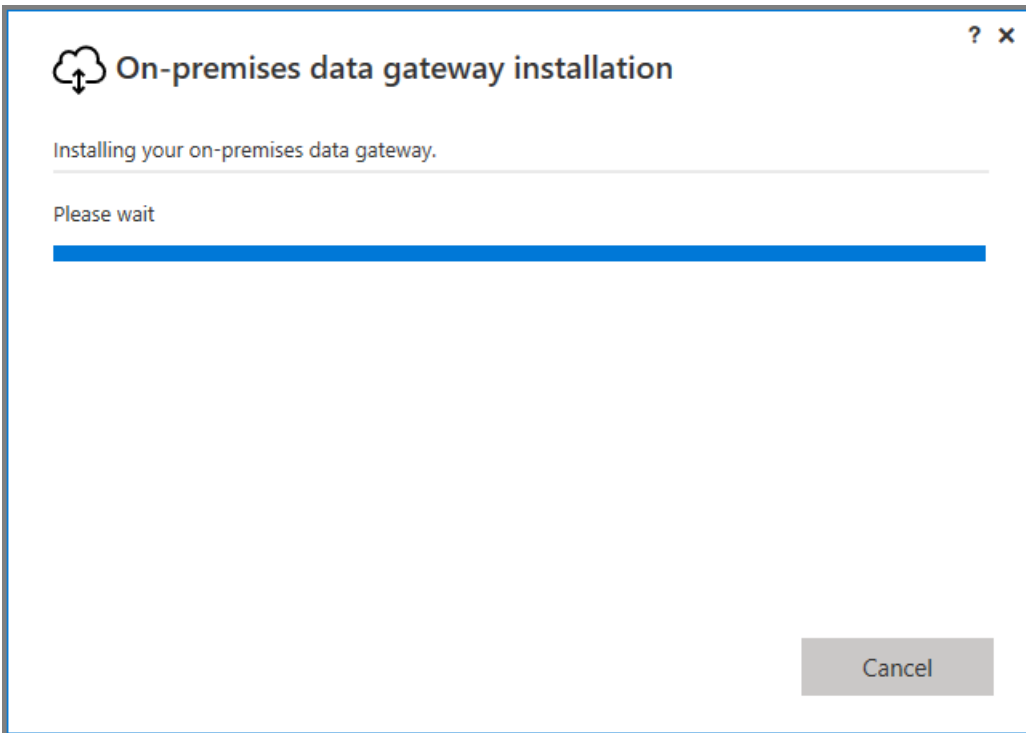
There are a few things to note at this decision point:

- Both gateways require 64-bit Windows operating systems.
- Gateways can't be installed on a domain controller.
- You can install up to two on-premises data gateways on the same computer, one running in each mode (personal and standard).
- You cannot have more than one gateway running in the same mode on the same computer.
- You can install multiple on-premises data gateways on different computers, and manage them all from the same Power BI gateway management interface (excluding personal, see the following bullet point).
- You can only have one personal mode gateway running for each Power BI user. If you install another personal mode gateway for the same user, even on a different computer, the most recent installation replaces the existing previous installation.

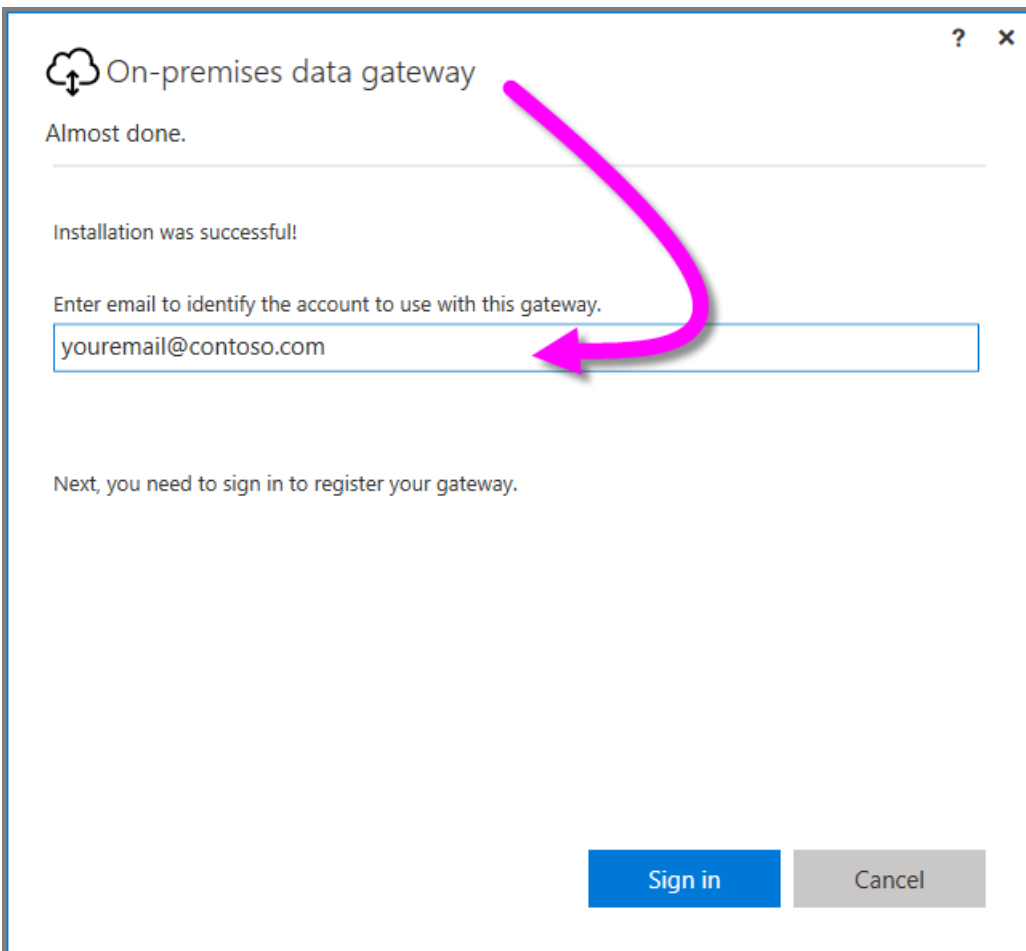
When we select **Next**, the gateway installation begins. You need to specify where it will be installed, and the default location is usually best.



The installation process goes quickly, and you're provided with a status bar.



Once you're almost complete, you need to identify the account to use with the gateway. This should be the account (the username and password) you use to log on to Power BI; the gateway is associated with your Power BI account, and you configure gateways from within the Power BI service.



You'll be signed in, as shown in the following image.

Microsoft Azure



David Iseminger

Connected to Windows



Use another account

© 2017 Microsoft

[Terms of use](#) [Privacy & Cookies](#)



Once you're signed in, you need to create a **Recovery key**. We'll discuss those more in depth in another article, but for now, know that you'll need it to recover or move your gateway.

On-premises data gateway

You are signed in as [redacted]@microsoft.com and are ready to register the gateway.

New on-premises data gateway name
Getting_Started_GW

Recovery key (8 character minimum)
[redacted]

i This key is needed to restore the gateway and can't be changed. Record it in a safe place.

Confirm recovery key
[redacted]

<< Back **Configure** Cancel

When all goes well, you'll see a window that tells you that your gateway is ready.

On-premises data gateway

Your gateway is ready.

✓ Connected: Getting_Started_GW is good to go.

i For Power BI, you need to add your data sources to this gateway.
For PowerApps, Logic Apps, and Microsoft Flow, this gateway is ready to use.

Help improve the on-premises data gateway by sending usage information to Microsoft.
[Read the privacy statement online](#)

[Configuration log directory](#)
[Gateway service log directory](#)

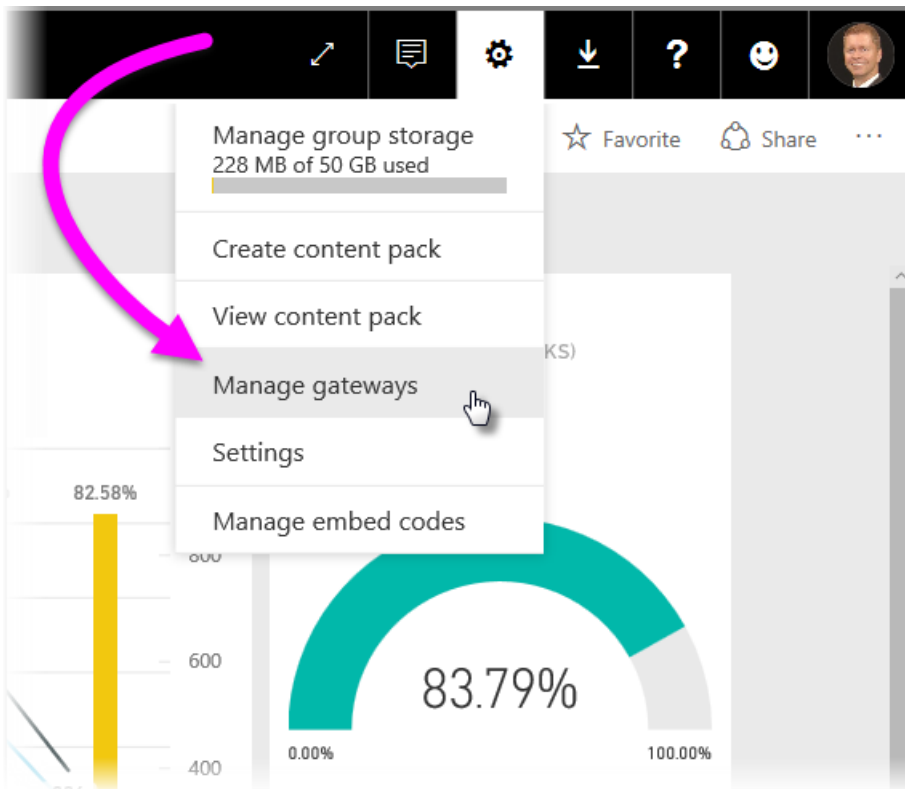
Export logs Close

That's it for the installation of an on-premises gateway. As promised, it was a pretty easy process. The next step, then, is to either **add users** or **add data sources** – you can do either first, and add either after your initial configuration.

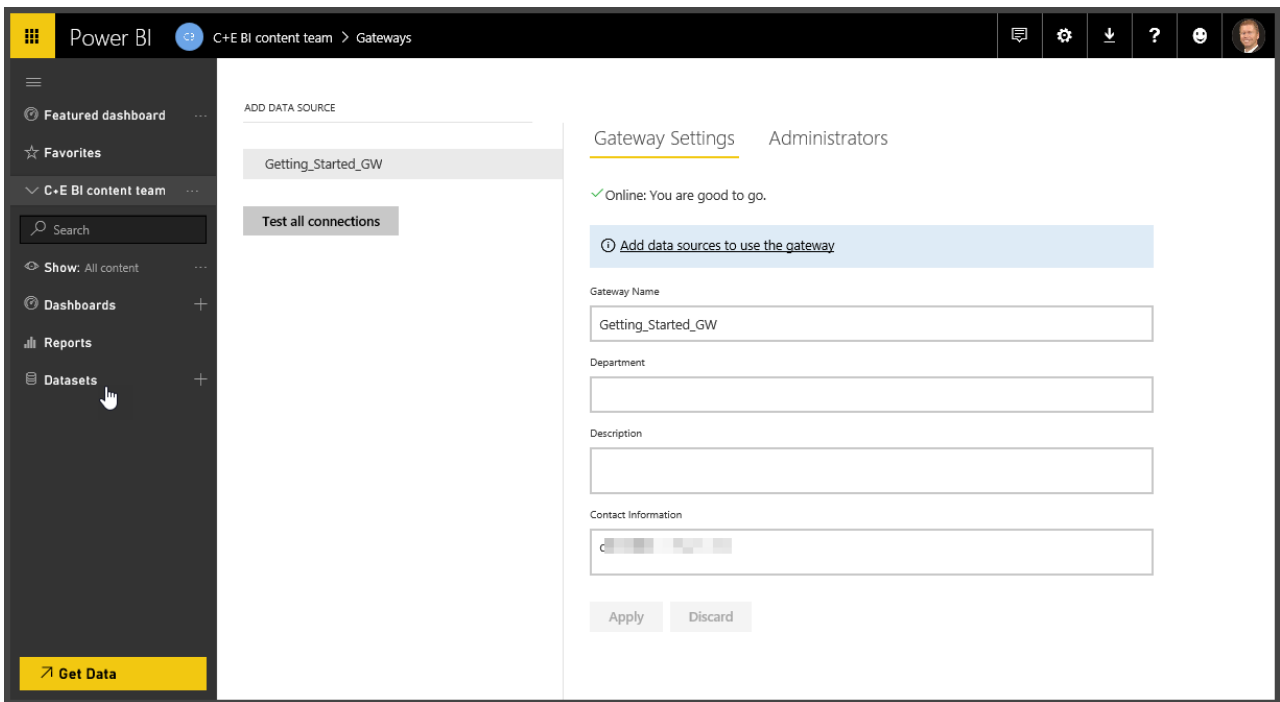
The next section describes adding users to the gateway, and after that, we'll discuss where to go next to add data sources to the gateway.

Add users to a gateway

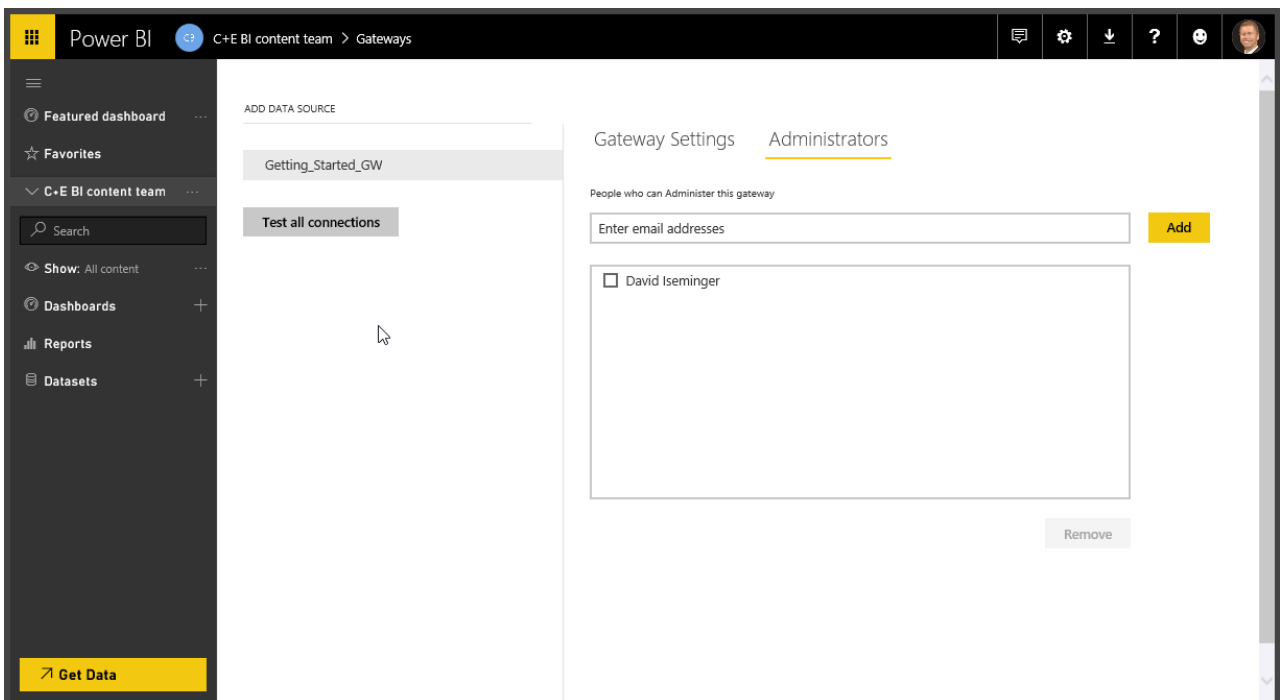
Now that we have a gateway installed, we manage the gateway from the **Power BI service**. To get to the management screen for gateways, in the Power BI service select the Gear icon in the upper-right corner, then select **Manage gateways**.



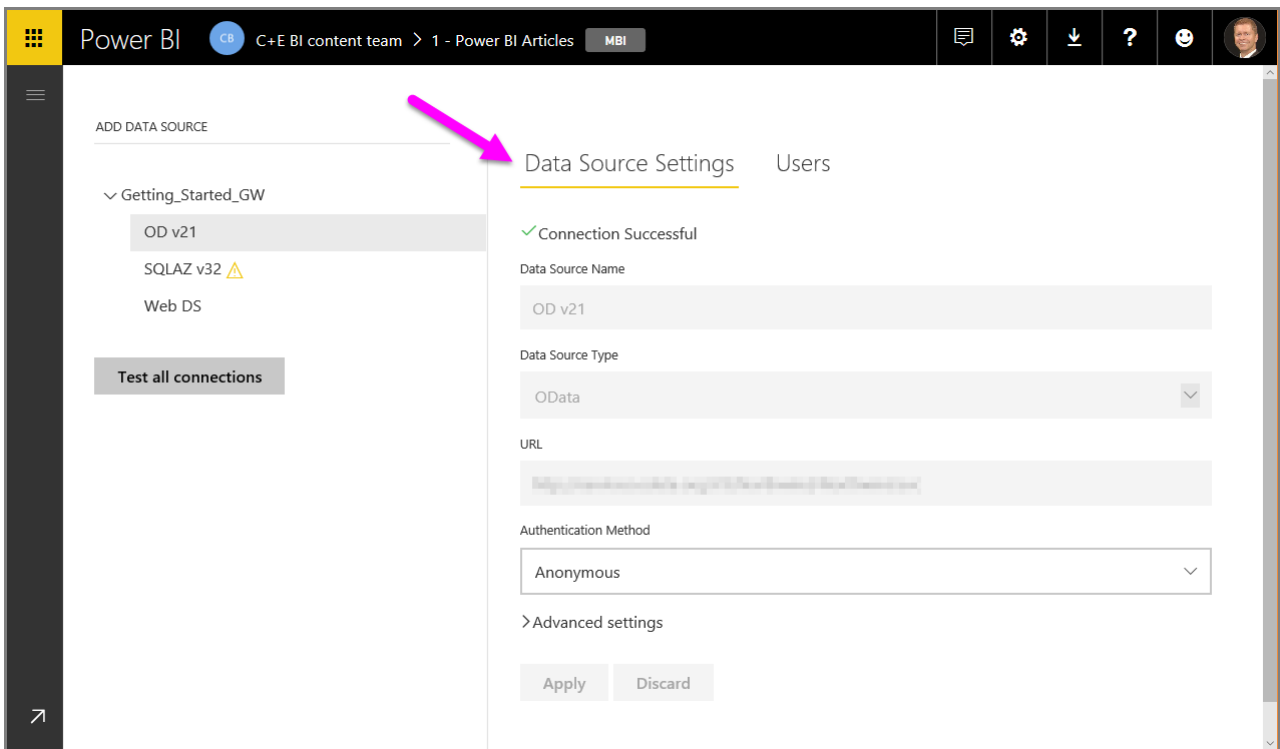
A page inside the Power BI service canvas appears, where you can manage your gateways. The **Gateway Settings** page looks like the following.



If you tap or click on **Administrators**, you see the following administrators' management page. Note that this is just which users can *administer* the gateway, and that users of the gateway are added (or removed) from each individual data source, using a different page – which we review in the next few paragraphs.



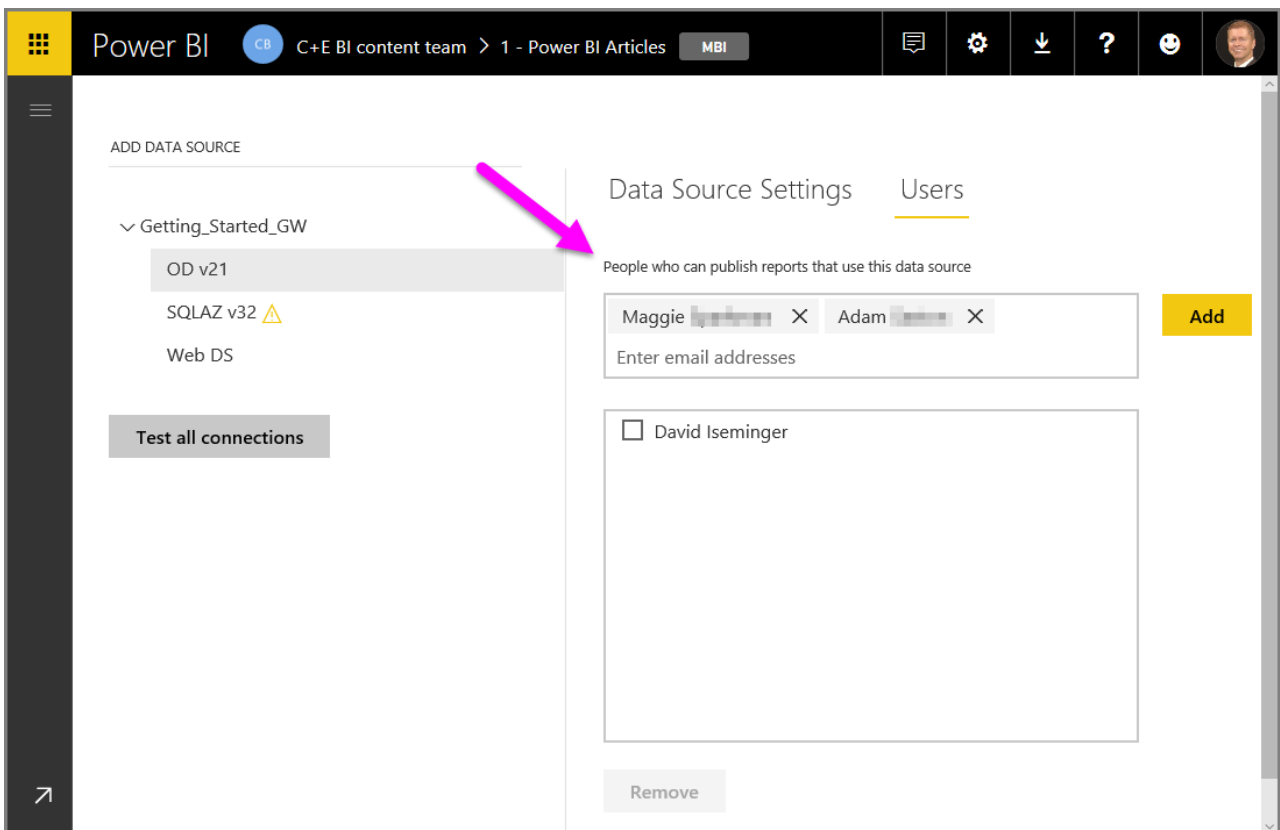
Once you install and validate (successfully connect to) a data source, it shows up under its associated gateway in the left side of this **Manage gateways** screen, as shown in the following image. Notice that in the right pane, there are two sections you can toggle between: **Data Source Settings** and **Users**. The screen directly following is the **Data Source Settings** section.



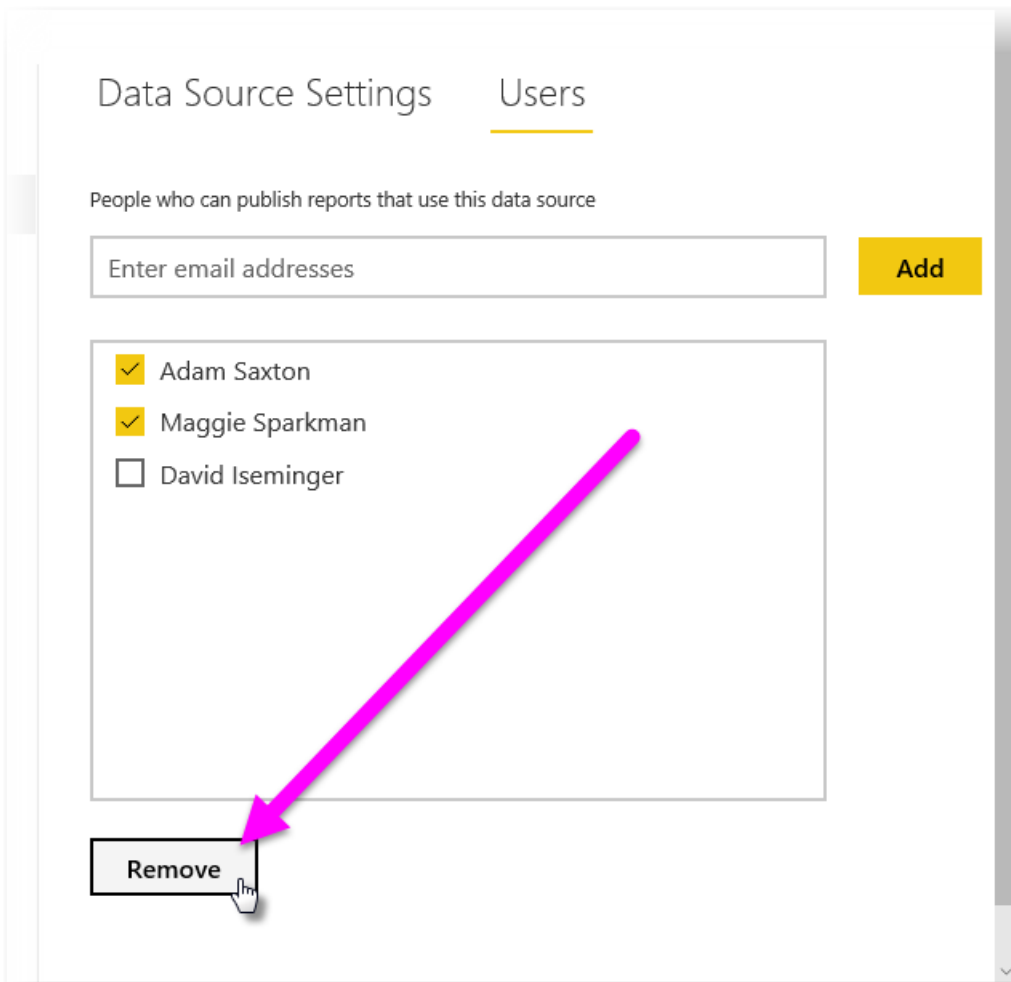
When you select **Users**, you get a text box into which you can type users from your organization who you want to grant access to the selected data source. In the following screen, you can see that I've added Maggie and Adam.

When you begin typing an email address into the text box, Power BI shows a list of users whose email matches what you're typing, enabling you to click the name and add them to the list.

You can also add email groups (aliases) to allow groups of people access, as well as individuals.



Once you select **Add**, the added members show up in the box, and you can add more if you want. Removing users is just as easy. Simply check the checkbox next to their name, and then select the **Remove** button below the box.



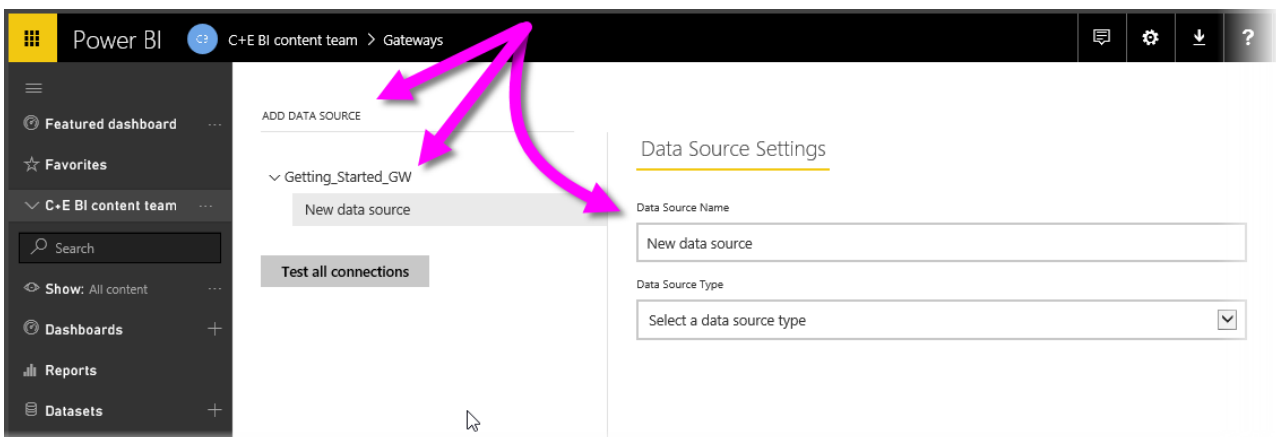
And that's all there is to it. Remember that you need to add users to each data source to which you want to grant access. Each data source has a separate list of users, and you must add users to each data source separately.

Adding data sources

Of course, to make your gateway useful you'll want to add data sources. This is where some of the complexity of Power BI gateways is introduced – there are many different data sources available, and each has its own requirements (and often, its own required driver).

But before we send you off to another article, here's a look at how you go about adding a data source. While you're in the **Manage gateways** page of the **Power BI service**, select the gateway to which you want to add a data source, and select **Add Data Source** in the upper-left corner of the page, just above the list of your gateways.

When you do, the **Data Source Settings** panel appears in the right pane, as shown in the following image. There, you can name your data source (entered in the **Data Source Name** text box), and select its type from the **Data Source Type** drop-down list.



Okay, you now have a gateway installed, and you're ready to add data sources. Great! See the resources in the following section for information about data sources, more details about using gateways, and other useful information.

Next steps

[Using the on-premises data gateway](#)

[On-premises data gateway in-depth](#)

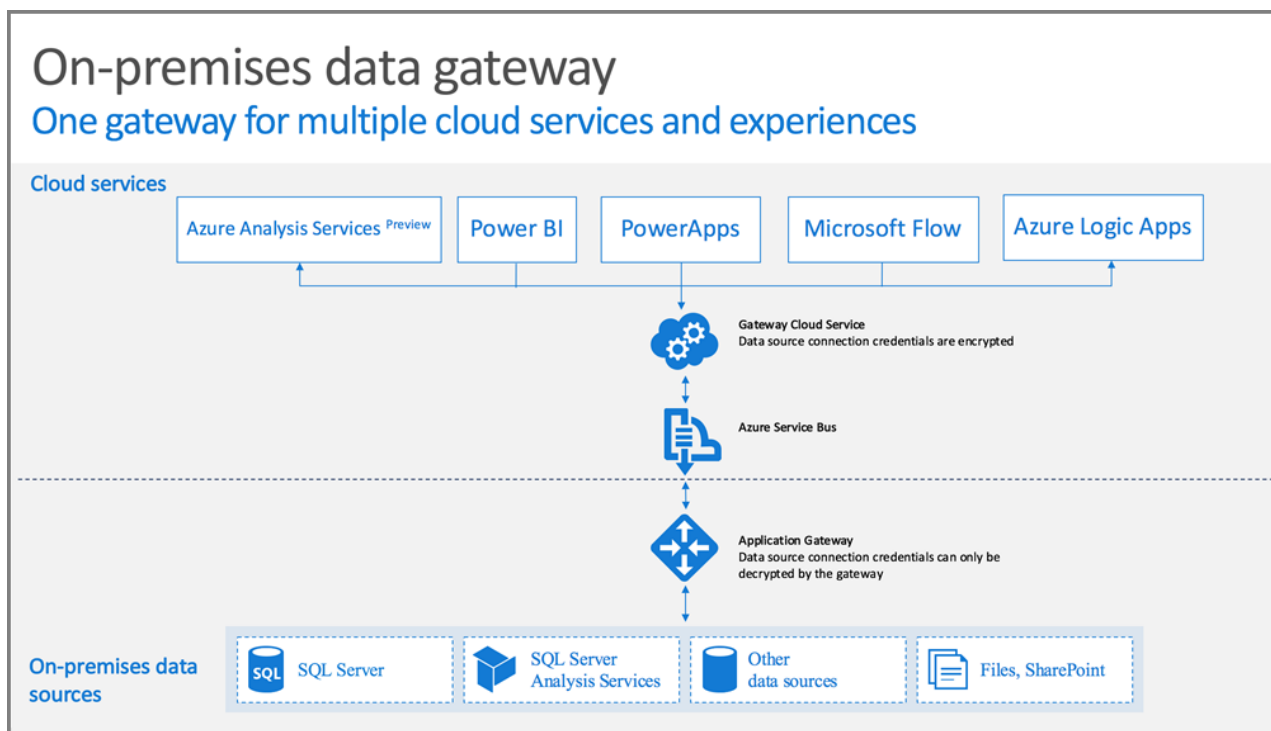
[On-premises data gateway \(personal mode\)](#) [Troubleshooting the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

Guidance for deploying a data gateway for Power BI

12/6/2017 • 8 min to read • [Edit Online](#)

This article provides guidance and considerations for deploying a data gateway in your network environment. A **gateway** is software that facilitates access to data that resides on a private, on-premises network, for subsequent use in a cloud service like Power BI. This article walks you through the deployment, and provides guidance for, the **on-premises data gateway** setup.



For more about **on-premises data gateway**, including a link to install it, take a look at the [blog post](#).

Installation considerations for the on-premises data gateway

Before getting too far into the details of installation and deployment, there are a handful of considerations you should keep in mind. The following sections describe important things to keep in mind.

Number of users

The number of users consuming a report that's using the gateway is an important metric in deciding where to install the gateway. Here are some questions to consider:

- Are users using these reports at different times of the day?
- What types of connections are they using (DirectQuery or Import)?
- Are all users using the same report?

If users are all accessing a given report at the same time each day, you'll want to make sure you install the gateway on a machine that's capable of handling all those requests (see following sections for performance counters and minimum requirements that can help you determine this).

There is a constraint in **Power BI** that allows only *one* gateway per *report*, so even if a report is based on multiple data sources, all such data sources must go through a single gateway. However, if a dashboard is based on *multiple* reports, you can use a dedicated gateway for each contributing report, and thereby distribute the gateway load among those multiple reports that contribute to that single dashboard.

Connection type

Power BI offers two types of connections, **DirectQuery** and **Import**. Not all data sources support both connection types, and many reasons may contribute to choosing one over the other, such as security requirements, performance, data limits, and data model sizes. You can learn more about connection type and supported data sources in the *list of available data source types* section of the [On-premises data gateway article](#).

Depending on which type of connection are use, gateway usage can be different. For example, you should try to separate **DirectQuery** data sources from **Scheduled Refresh** data sources whenever possible (assuming they're in different reports and can be separated). Doing so prevents the gateway from having thousands of DirectQuery requests queued up, at the same time as the morning's scheduled refresh of a large size data model that's used for the company's main dashboard. Here's what to consider for each:

- For **Scheduled Refresh**: depending on your query size and the number of refreshes occurring per day, you can choose to stay between the recommended minimum hardware requirements or upgrade to a higher performance machine. If a given query is not folded, transformations occur on the gateway machine, and as such, the gateway machine benefits from having more available RAM.
- For **DirectQuery**: a query is be sent each time any user opens the report or looks at data. So if you anticipate more than 1,000 users accessing the data concurrently, you'll want to make sure your computer has robust and capable hardware components. More CPU cores will result in better throughput for a **DirectQuery** connection.

The requirements for a machine on which you install an **on-premises data gateway** are the following:

Minimum:

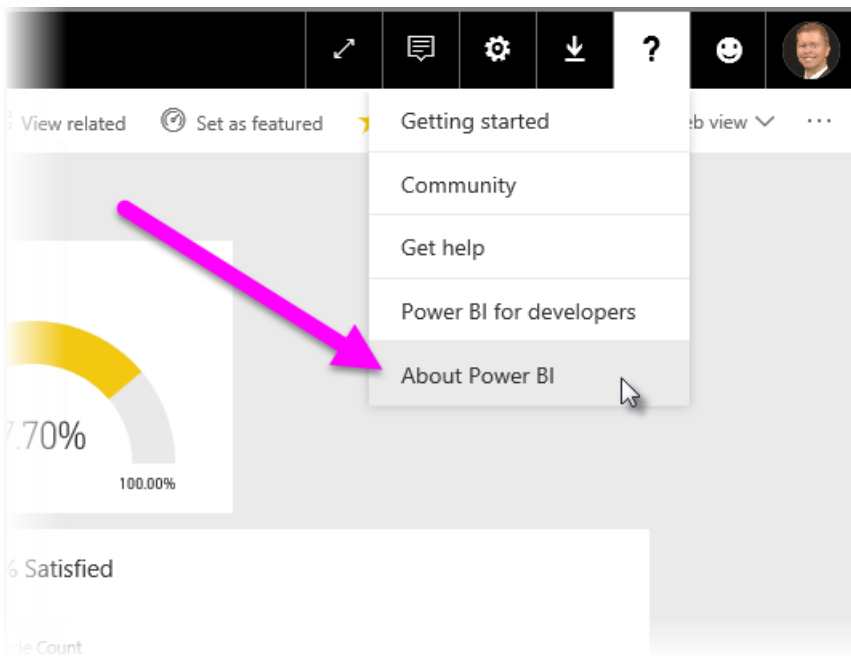
- .NET 4.5 Framework
- 64-bit version of Windows 7 / Windows Server 2008 R2 (or later)

Recommended:

- 8 Core CPU
- 8 GB Memory
- 64-bit version of Windows 2012 R2 (or later)

Location

The location of the gateway installation can have significant impact on your query performance, so try to make sure your gateway, data source locations, and the Power BI tenant are as close as possible to each other to minimize network latency. To determine your Power BI tenant location, in the Power BI service select the **?** icon in the upper-right corner, and then select **About Power BI**.



Monitoring gateways

There are a few tools that you can use to monitor the use and performance of your installed gateways.

Performance counters

There are many performance counters that can be used to evaluate and assess activity occurring on the gateway. The counters can help you understand whether you have large volume of activities by the specific type, which may prompt you to deploy a new gateway.

NOTE

These counters will not capture specific task duration time.

The *gateway counter*, in addition to your machine's counters, provide you with an idea of how much load your machine is handling, and can provide an indication of whether the server resource capacity is becoming stretched or exceeded.

These counters can be accessed from **Windows Performance Monitor**, and can be consumed by any reporting tools you use for this purpose. For a detailed walk-through of how to use the gateway performance monitor with Power BI, take a look at the following community-create blog post.

- [Monitor on-premises data gateways](#)

Logs

Configuration and service logs provide another dimension on what's happening with your gateway. Always check your gateway logs when your connection is not working as expected, as not all error messages are surfaced on the Power BI service.

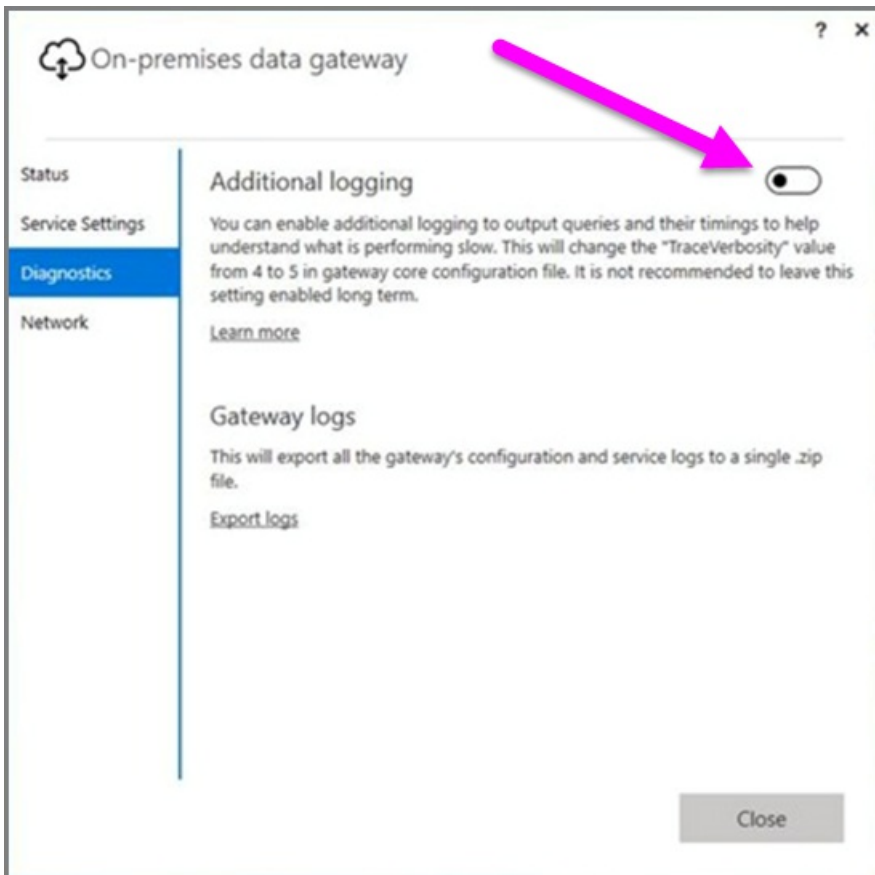
An easy way to view all the log files on your local machine is to use the *Export Logs* button on the **on-premises data gateway** when you re-open the gateway after the initial installation is complete, and then select **Diagnostics > Export Logs**.

Additional logging

By default the gateway performs basic logging. If you're investigating gateway issues, and need more information about query connection details, you can temporarily enable *verbose logging* to gather additional log information. To do this, in the installed gateway select **Diagnostics > Additional logging**.

Enabling this setting likely will increase the log size significantly, based on gateway usage. It's recommended that once you're done reviewing the logs, you disable **Additional logging**. It's not recommended to leave this setting

enabled during normal gateway usage.



Network configuration

The gateway creates an outbound connection to the **Azure Service Bus**. The gateway communicates on the following outbound ports:

- TCP 443 (default)
- 5671
- 5672
- 9350 thru 9354

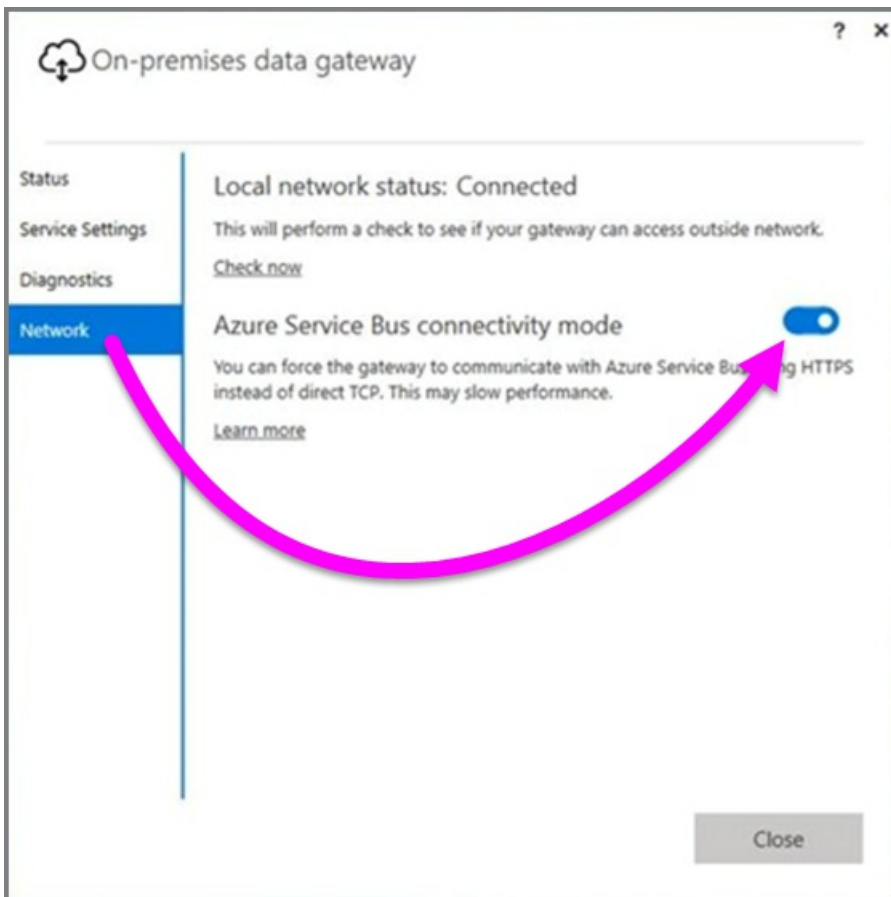
The gateway does *not* require inbound ports. All required ports are listed in the above list.

It is recommended that you whitelist the IP addresses, for your data region, in your firewall. You can download list of IP addresses, which are found in the [Microsoft Azure Datacenter IP list](#). That list is updated weekly. The gateway will communicate with **Azure Service Bus** using the specified IP address, along with the fully qualified domain name (FQDN). If you're forcing the gateway to communicate using HTTPS, the gateway strictly uses FQDN only, and no communication will occur using IP addresses.

Forcing HTTPS communication with Azure Service Bus

You can force the gateway to communicate with the **Azure Service Bus** by using HTTPS, instead of direct TCP. Doing so will slightly reduce performance. You can also force the gateway to communicate with the **Azure Service Bus** by using HTTPS by using the gateway's user interface (beginning with the March 2017 release of the gateway).

To do so, in the gateway select **Network**, then turn the **Azure Service Bus connectivity mode On**.



Additional guidance

This section provides additional guidance for deploying and managing gateways.

- Avoid having a single point of failure. If possible, distribute your on-premises data sources across several gateways; in this case, if one machine becomes unavailable, you'll still be able to refresh portions of your data, and not lose that functionality completely.
- The gateway cannot be installed on a domain controller, so don't plan or try to do so.
- Don't install a gateway on a computer that may be turned off, go into the sleep mode, or not be connected to the Internet (for example, a laptop computer), because the gateway can't run under any of those circumstances.
- Avoid installing a gateway on a wireless network, since performance might suffer over a wireless network.

Gateway Recovery

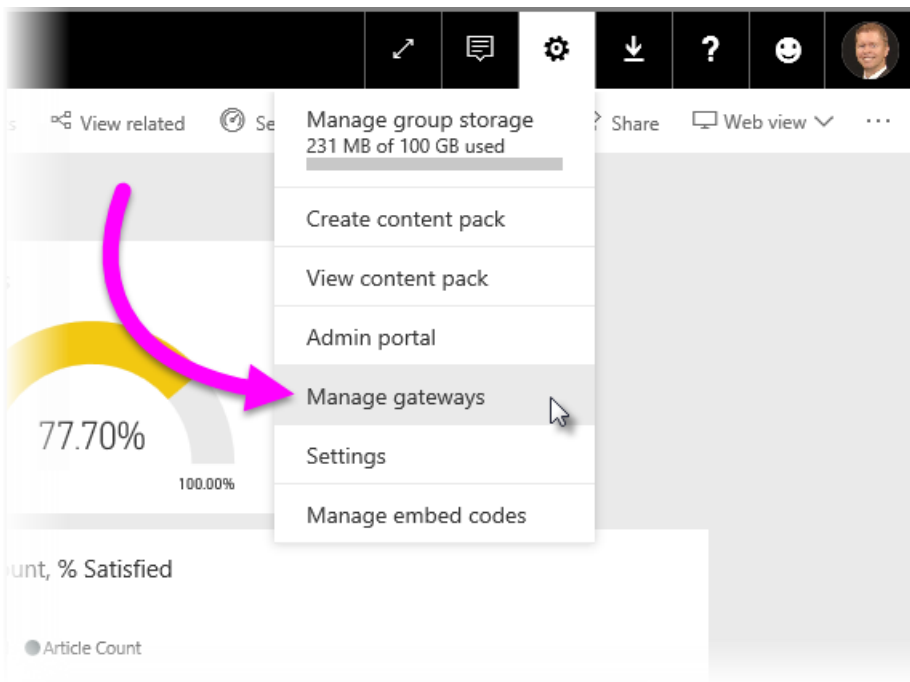
You can recover your existing gateway, or move it to a new machine, using the **recovery key**. The recovery key is provided to the user who installs the gateway, and it *cannot* be changed later. The recovery key is used for both data encryption and gateway recovery.

To recover your gateway, make sure you're an admin on the gateway, make sure you know the gateway name, ensure you have the correct recovery key, and that you have a new machine available with similar performance characteristics.

After you sign in, select the **Migrate an existing gateway** option. Next, you need to choose the gateway you'd like to recover or migrate, and finally provide the recovery key and hit configure. Once that step is done, the old gateway will be replaced by the new gateway, and the new gateway will inherit its name and all data sources previously configured. All data sources will now go through the new machine, without the need to re-publish anything. Automatic failover is not yet supported, but it is a feature that the gateway team is actively considering.

Administrators

You can find a list of gateway administrators in the **Power BI service**. When signed into the **Power BI service**, select **Settings** (the gear icon) > **Manage Gateways** > **Gateway UI**.



From there, you can select a gateway and see the list of gateway administrators. The administrators listed can access, recover, and delete the gateway. They can also add and delete data sources in the gateway. To make sure all administrators in the organization have access to all gateways in their group, the following is recommended:

- Create an **AAD** security group and add other users to it, then add this security group to the list of the respective gateway administrators. This ensures that more than one person has access to the gateway in case of a failure, or when you need to recover or migrate the gateway. This also gives other administrators a view of what gateways are being used in their groups, and which data sources exist on each gateway.

Next steps

[Configuring proxy settings](#)

[Troubleshooting the on-premises data gateway](#)

[On-premises data gateway FAQ](#)

More questions? [Try the Power BI Community](#)

On-premises data gateway

1/10/2018 • 11 min to read • [Edit Online](#)

The on-premises data gateway acts as a bridge, providing quick and secure data transfer between on-premises data (data that is not in the cloud) and the Power BI, Microsoft Flow, Logic Apps, and PowerApps services.

You can use a single gateway with different services at the same time. If you are using Power BI as well as PowerApps, a single gateway can be used for both. It is dependent on the account you sign in with.

NOTE

The on-premises data gateway implements data compression, and transport encryption, in all modes.

Requirements

Minimum Requirements:

- .NET 4.6 Framework
- 64-bit version of Windows 7 / Windows Server 2008 R2 (or later)

Recommended:

- 8 Core CPU
- 8 GB Memory
- 64-bit version of Windows 2012 R2 (or later)

Related Considerations:

- The gateway cannot be installed on a domain controller
- You shouldn't install a gateway on a computer, such as a laptop, that may be turned off, asleep, or not connected to the Internet because the gateway can't run under any of those circumstances. In addition, gateway performance might suffer over a wireless network.
- Analysis Services is not required to use the gateway. You can use the gateway to connect to an Analysis Services data source.

Limitations of Analysis Services live connections

You can use a live connection against tabular or multidimensional instances.

SERVER VERSION	REQUIRED SKU
2012 SP1 CU4 or later	Business Intelligence and Enterprise SKU
2014	Business Intelligence and Enterprise SKU
2016	Standard SKU or higher

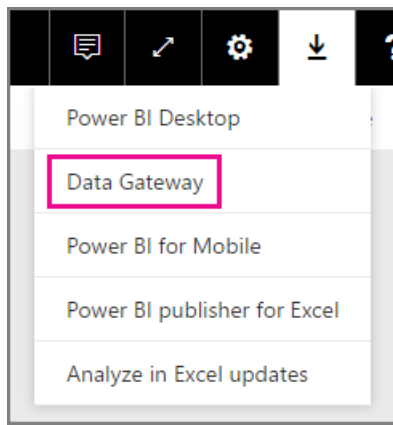
- Cell level Formatting and translation features are not supported.
- Actions and Named Sets are not exposed to Power BI, but you can still connect to multidimensional cubes that also contain Actions or Named sets and create visuals and reports.

List of available data source types

DATA SOURCE	LIVE/DIRECTQUERY	USER CONFIGURED MANUAL OR SCHEDULED REFRESH
Analysis Services Tabular	Yes	Yes
Analysis Services Multidimensional	Yes	Yes
File	No	Yes
Folder	No	Yes
IBM DB2	No	Yes
IBM Informix Database	No	Yes
Impala	Yes	Yes
MySQL	No	Yes
OData	No	Yes
ODBC	No	Yes
Oledb	No	Yes
Oracle	Yes	Yes
PostgresSQL	No	Yes
SAP BW	Yes	Yes
SAP HANA	Yes	Yes
SharePoint list (on-premises)	No	Yes
Snowflake	Yes	Yes
SQL Server	Yes	Yes
Sybase	No	Yes
Teradata	Yes	Yes
Web	No	Yes

Download and install the on-premises data gateway

To download the gateway, select **Data Gateway** under the Downloads menu. Download the [on-premises data gateway](#).



Install the on-premises data gateway

The data gateway installs and runs on your computer. It is best to install the gateway on a machine that can be left running all the time.

NOTE

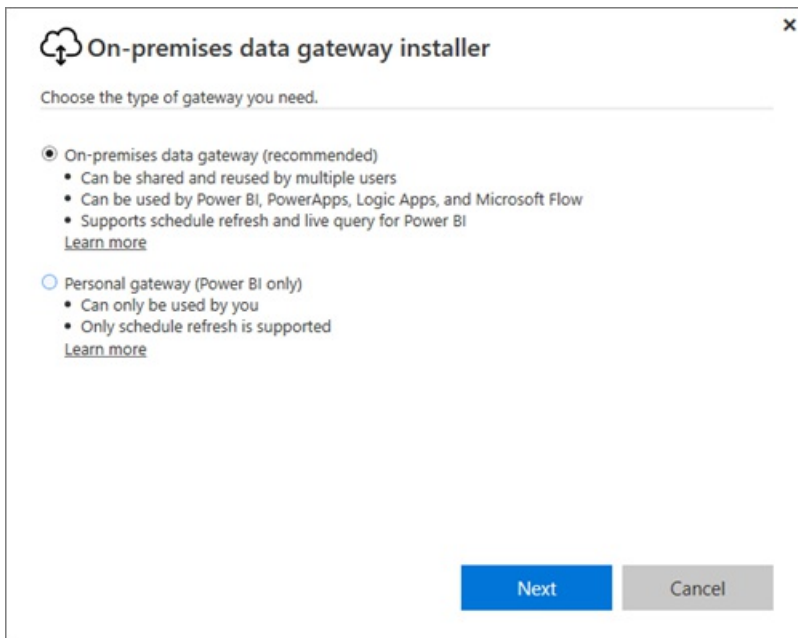
The gateway is supported only on 64-bit Windows operating systems.

For Power BI, the first choice you have to make is the mode of the gateway.

- **On-premises data gateway:** Multiple users can share and reuse a gateway in this mode. This gateway can be used by Power BI, PowerApps, Flow or Logic Apps. For Power BI, this includes support for both schedule refresh and DirectQuery
- **Personal:** This is for Power BI only and can be used as an individual without any administrator configuration. This can only be used for on-demand refresh and schedule refresh. This selection launches installation of the personal gateway.

There are a few things to note about installing either mode of the gateway:

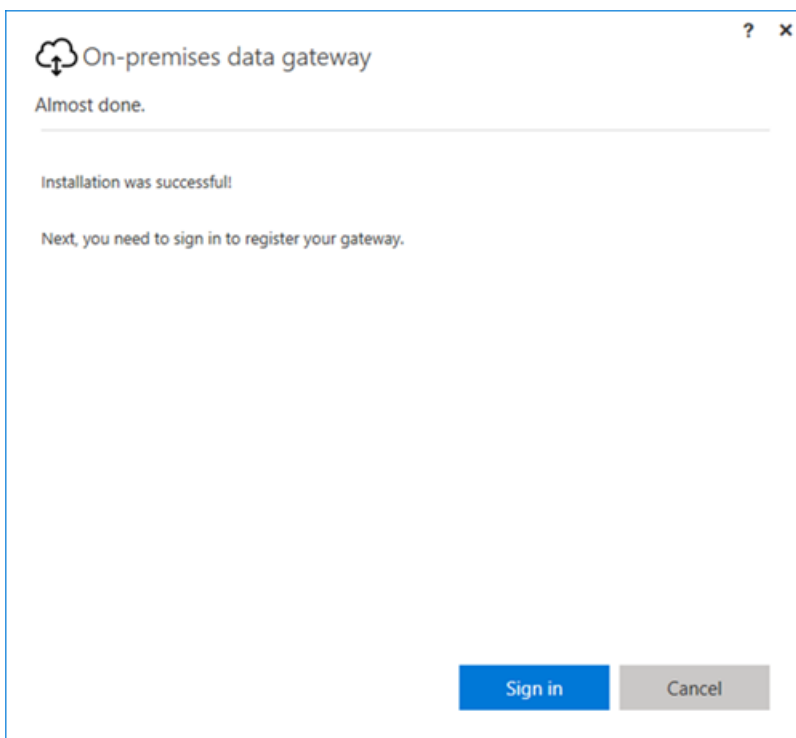
- both gateways require 64-bit Windows operating systems
- gateways can't be installed on a domain controller
- you can install up to two on-premises data gateways on the same computer, one running in each mode (personal and standard).
- you cannot have more than one gateway running in the same mode on the same computer.
- you can install multiple on-premises data gateways on different computers, and manage them all from the same Power BI gateway management interface (excluding personal, see the following bullet point)
- You can only have one Personal mode gateway running for each Power BI user. If you install another Personal mode gateway for the same user, even on a different computer, the most recent installation replaces the existing previous installation.



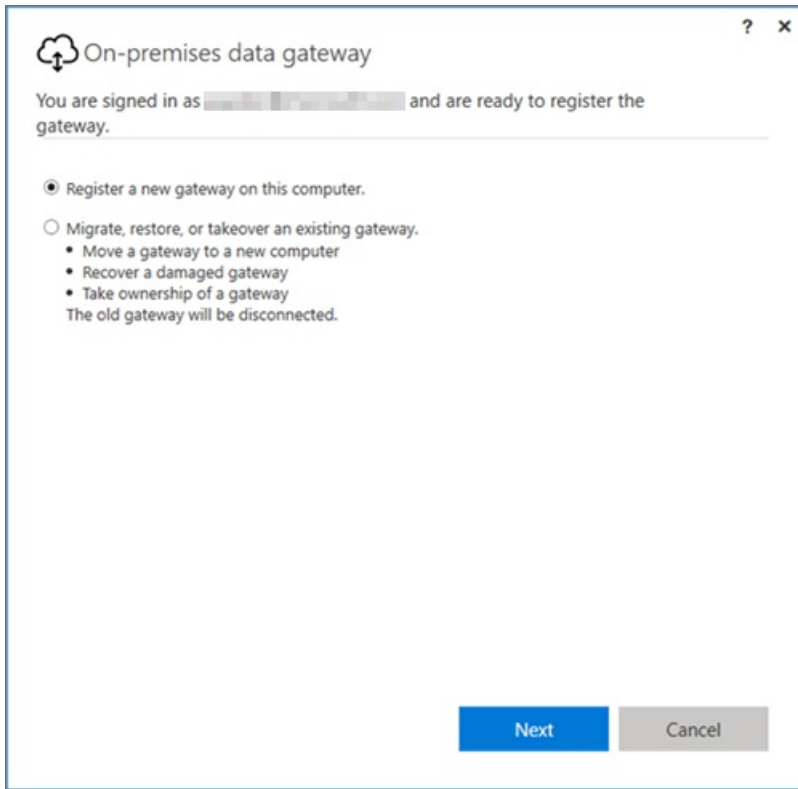
Here are a few things to consider before installing the gateway.

- If you are installing on a laptop, and your laptop is turned off, not connected to the internet, or asleep the gateway won't work and the data in the cloud service will not be synchronized with your on-premises data.
- If your machine is connected to a wireless network, the gateway may perform more slowly which will cause it to take longer to synchronize the data in the cloud service with your on-premises data.

Once the gateway is installed, you will need to sign in with your work or school account.



After you are signed in, you will have the option to configure a new gateway, or to migrate, restore, or take over an existing gateway.

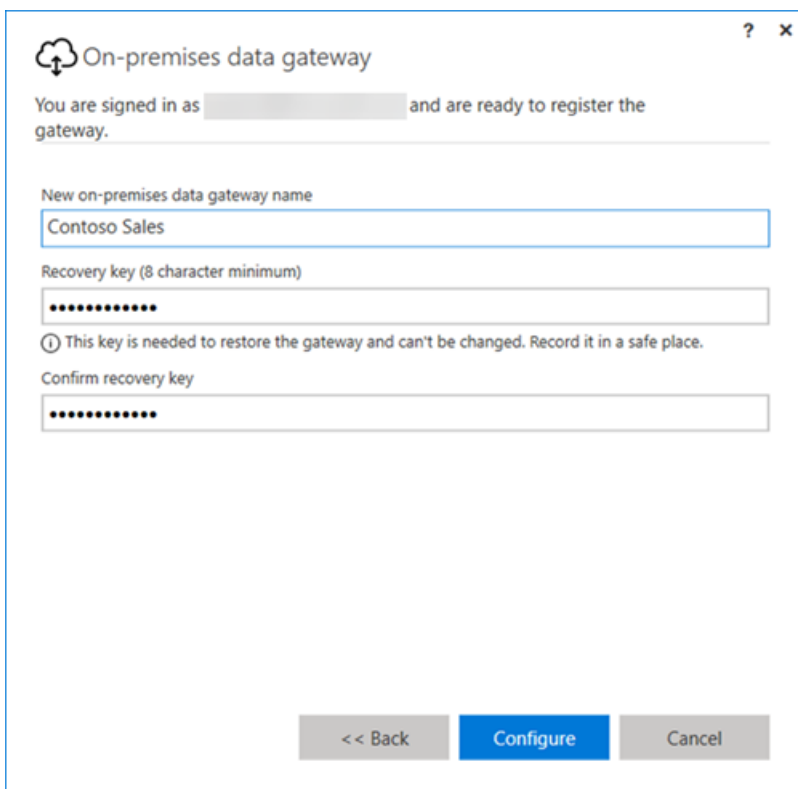


Configure a new gateway

1. Enter a **name** for the gateway
2. Enter a **recovery key**. This has to be a minimum of 8 characters.
3. Select **Configure**.

NOTE

The recovery key will be needed if you ever need to migrate, restore or take over a gateway. Be sure to keep this key in a safe place.



Migrate, restore or take over an existing gateway

You will need to select the gateway you want to recover and supply the recovery key that was used to first create the gateway.

On-premises data gateway connected

Once the gateway is configured, you will be able to make use of it to connect to on-premises data sources.

If the gateway is for Power BI, you will need to add your data sources to the gateway within the Power BI service. This is done within the **Manage gateways** area. You can refer to the manage data sources articles for more information.

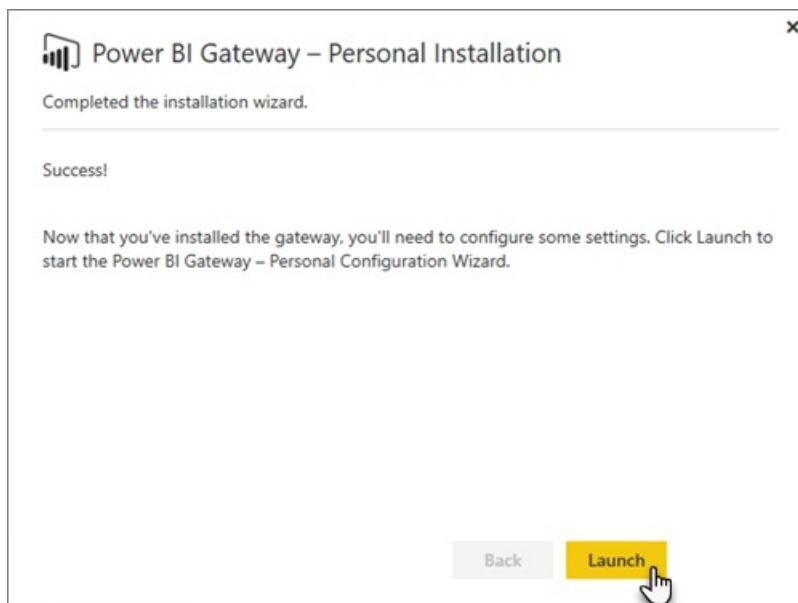
For PowerApps, you will need to select a gateway for a defined connection for supported data sources. For Flow and Logic Apps, this gateway is ready to be used with your on-premises connections.

Install the gateway in personal mode

NOTE

Personal will only work with Power BI.

After the personal gateway is installed, you will need to launch the **Power BI Gateway - Personal Configuration Wizard**.



You will then need to sign into Power BI to register the gateway with the cloud service.

Please [Sign in to PowerBI.com](#) The gateway can't be configured unless you are signed in.



You will also need to supply the windows user name and password that the windows service will run as. You can specify a different Windows account from your own. The gateway service will run using this account.

We're almost done. You just need to enter your Windows credentials.

1. You're signed in to PowerBI.com.

2. Enter your Windows user name and password. The service will run using this account.

User name

CONTOSO\johndoe

Password

.....



After the installation is complete, you will need to go to your datasets within Power BI and make sure credentials are entered for your on-premises data sources.

Storing encrypted credentials in the cloud

When you add a data source to the gateway, you need to provide credentials for that data source. All queries to the data source will run using these credentials. The credentials are encrypted securely, using asymmetric encryption so that they cannot be decrypted in the cloud, before they are stored in the cloud. The credentials are sent to the machine, running the gateway, on-premises where they are decrypted when the data sources are accessed.

Sign in account

Users will sign in with either a work or school account. This is your organization account. If you signed up for an Office 365 offering and didn't supply your actual work email, it may look like nancy@contoso.onmicrosoft.com. Your account, within a cloud service, is stored within a tenant in Azure Active Directory (AAD). In most cases, your AAD account's UPN will match the email address.

Windows Service account

The on-premises data gateway is configured to use `NT SERVICE\PBIEgwService` for the Windows service logon credential. By default, it has the right of Log on as a service. This is in the context of the machine that you are installing the gateway on.

NOTE

If you selected personal mode, you configure the Windows service account separately.

This is not the account used to connect to on-premises data sources. This is also not your work or school account that you sign into cloud services with.

If you encounter issues with your proxy server, due to authentication, you may want to change the Windows service account to a domain user or managed service account. You can learn how to change the account in [proxy configuration](#).

Ports

The gateway creates an outbound connection to Azure Service Bus. It communicates on outbound ports: TCP 443 (default), 5671, 5672, 9350 thru 9354. The gateway does not require inbound ports. [Learn more](#)

It is recommended that you whitelist the IP addresses, for your data region, in your firewall. You can download the [Microsoft Azure Datacenter IP list](#). This list is updated weekly. The gateway will communicate with Azure Service Bus using the IP address along with the fully qualified domain name (FQDN). If you are forcing the gateway to communicate using HTTPS it will strictly use FQDN only, and no communication will happen using IP addresses.

NOTE

The IP Addresses listed in the Azure Datacenter IP list are in CIDR notation. For example, 10.0.0.0/24 does not mean 10.0.0.0 thru 10.0.0.24. Learn more about the [CIDR notation](#).

Here is a listing of the fully qualified domain names used by the gateway.

DOMAIN NAMES	OUTBOUND PORTS	DESCRIPTION
*.download.microsoft.com	80	HTTP used to download the installer.
*.powerbi.com	443	HTTPS
*.analysis.windows.net	443	HTTPS
*.login.windows.net	443	HTTPS
*.servicebus.windows.net	5671-5672	Advanced Message Queuing Protocol (AMQP)
*.servicebus.windows.net	443, 9350-9354	Listeners on Service Bus Relay over TCP (requires 443 for Access Control token acquisition)
*.frontend.clouddatahub.net	443	HTTPS

DOMAIN NAMES	OUTBOUND PORTS	DESCRIPTION
*.core.windows.net	443	HTTPS
login.microsoftonline.com	443	HTTPS
*.msftncsi.com	443	Used to test internet connectivity if the gateway is unreachable by the Power BI service.
*.microsoftonline-p.com	443	Used for authentication depending on configuration.

NOTE

Traffic going to visualstudio.com or visualstudioonline.com are for app insights and are not required for the gateway to function.

Forcing HTTPS communication with Azure Service Bus

You can force the gateway to communicate with Azure Service Bus using HTTPS instead of direct TCP. This may have an impact on performance. To do so, modify the

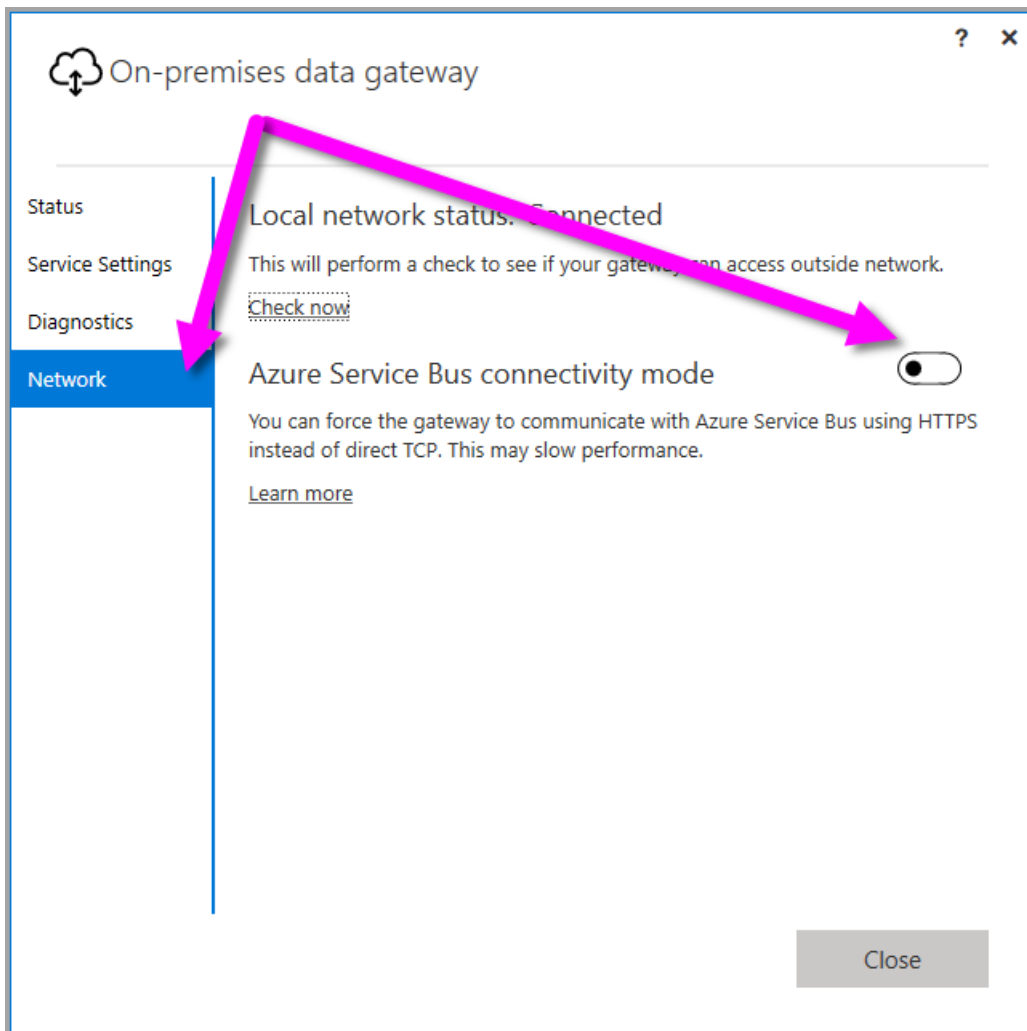
Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config file by changing the value from

`AutoDetect` to `Https`, as shown in the code snippet directly following this paragraph. That file is located (by default) at `C:\Program Files\On-premises data gateway`.

```
<setting name="ServiceBusSystemConnectivityModeString" serializeAs="String">
  <value>Https</value>
</setting>
```

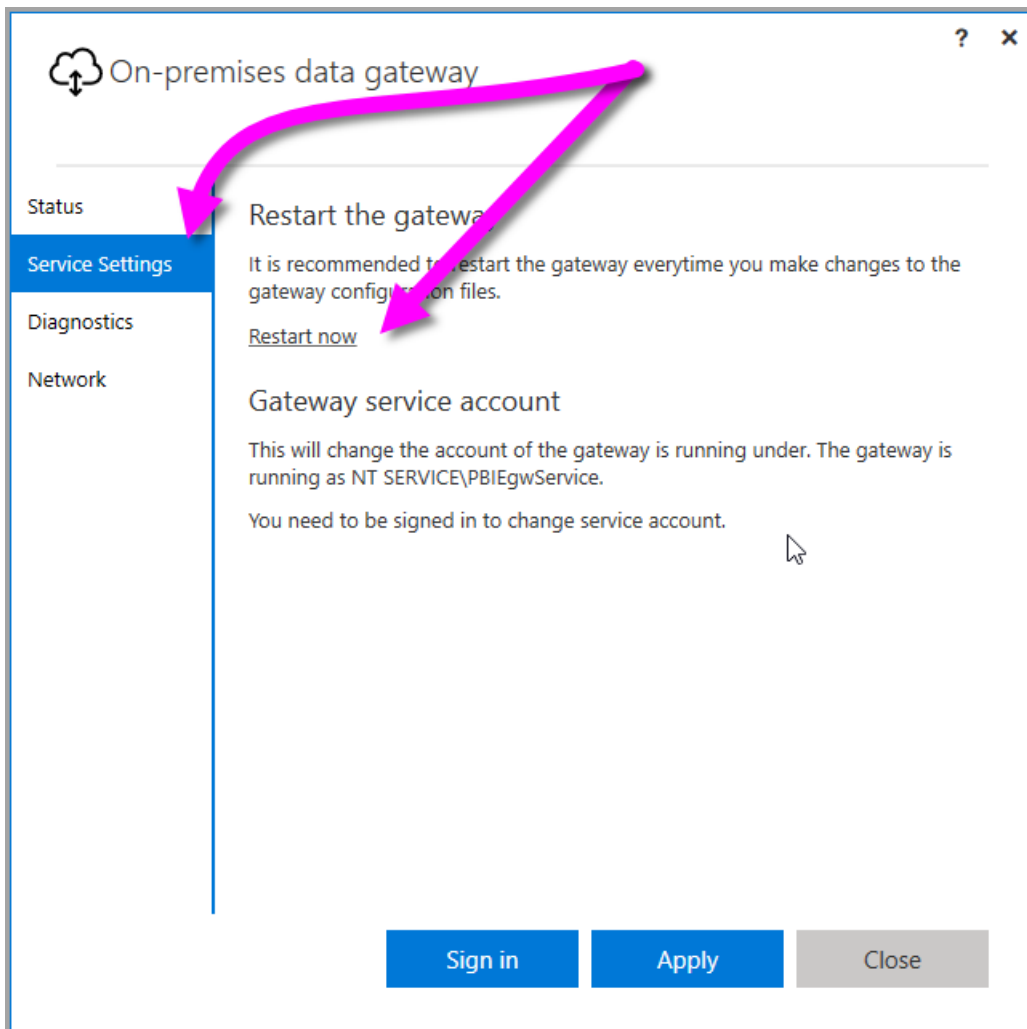
The value for the *ServiceBusSystemConnectivityModeString* parameter is case sensitive. Valid values are *AutoDetect* and *Https*.

Alternatively, you can force the gateway to adopt this behavior using the gateway user interface, beginning with the [March 2017](#) release. In the gateway user interface select **Network**, then toggle the **Azure Service Bus connectivity mode** to **On**.



Once changed, when you select **Apply** (a button that only appears when you make a change), the *gateway Windows service* restarts automatically, so the change can take effect.

For future reference, you can restart the *gateway Windows service* from the user interface dialog by selecting **Service Settings** then select *Restart Now*.



Support for TLS 1.1/1.2

With the August 2017 update and beyond, the on-premises data gateway uses Transport Layer Security (TLS) 1.1 or 1.2 to communicate with the **Power BI service** by default. Previous versions of the on-premises data gateway use TLS 1.0 by default. On March 15th 2018, support for TLS 1.0 will end, including the gateway's ability to interact with the **Power BI service** using TLS 1.0, so by then you must upgrade your on-premises data gateway installations to the August 2017 release or newer to ensure your gateways continue to operate.

It's important to note that TLS 1.0 is still supported by the on-premises data gateway prior to November 1st, and is used by the gateway as a fallback mechanism. To ensure all gateway traffic uses TLS 1.1 or 1.2 (and to prevent the use of TLS 1.0 on your gateway), you must add or modify the following registry keys on the machine running the gateway service:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001
```

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001
```

NOTE

Adding or modifying these registry keys applies the change to all .NET applications. For information about registry changes that affect TLS for other applications, see [Transport Layer Security \(TLS\) registry settings](#).

How to restart the gateway

The gateway runs as a windows service. You can start and stop it like any windows service. There are multiple ways to do this. Here is how you can do it from the command prompt.

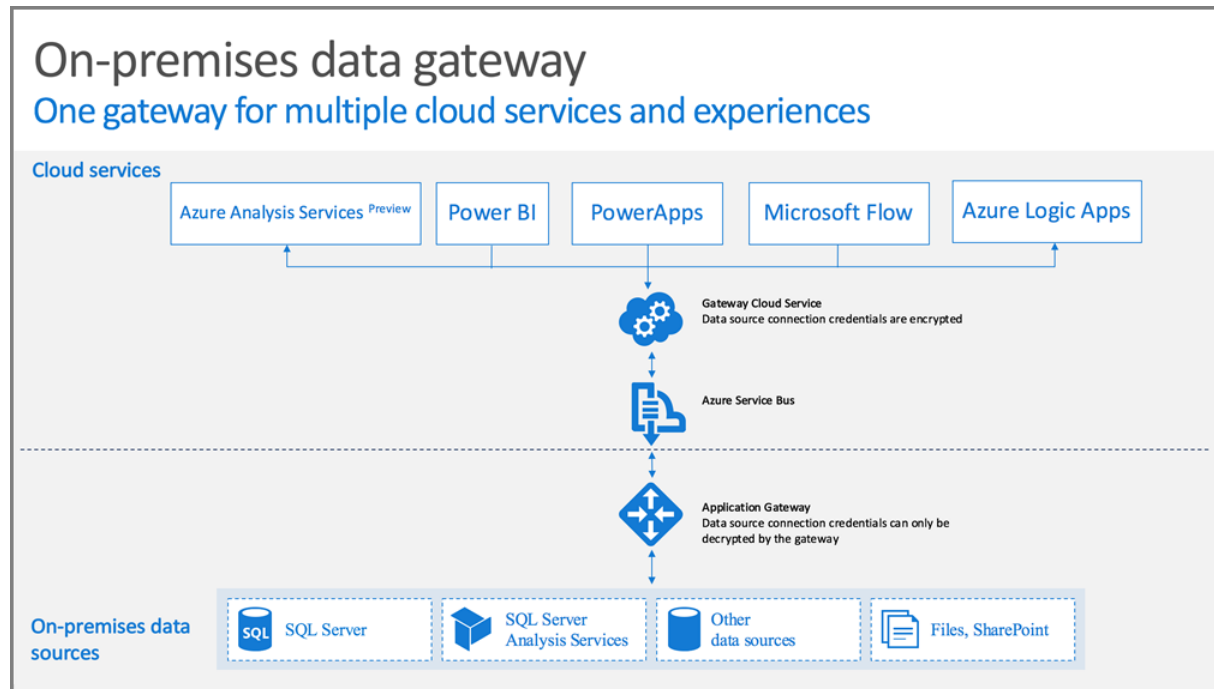
1. On the machine where the gateway is running, launch an admin command prompt.
2. Use the following command to stop the service.

```
net stop PBIEgwService
```

3. Use the following command to start the service.

```
net start PBIEgwService
```

How the gateway works



Let's first look at what happens when a user interacts with an element connected to an on-premises data source.

NOTE

For Power BI, you will need to configure a data source for the gateway.

1. A query will be created by the cloud service, along with the encrypted credentials for the on-premises data source, and sent to the queue for the gateway to process.
2. The gateway cloud service will analyze the query and will push the request to the [Azure Service Bus](#).
3. The on-premises data gateway polls the [Azure Service Bus](#) for pending requests.
4. The gateway gets the query, decrypts the credentials and connects to the data source(s) with those credentials.
5. The gateway sends the query to the data source for execution.
6. The results are sent from the data source, back to the gateway, and then onto the cloud service. The service then uses the results.

Troubleshooting

If you're having trouble when installing and configuring a gateway, be sure to see [Troubleshooting the on-premises data gateway](#). If you think you are having an issue with your firewall, see the [firewall or proxy](#)

section in the troubleshooting article.

If you think you are encountering proxy issues, with the gateway, see [Configuring proxy settings for the Power BI gateways](#).

Next steps

[Manage your data source - Analysis Services](#)

[Manage your data source - SAP HANA](#)

[Manage your data source - SQL Server](#)

[Manage your data source - Oracle](#)

[Manage your data source - Import/Scheduled refresh](#)

[On-premises data gateway in-depth](#)

[On-premises data gateway \(personal mode\) - the new version of the personal gateway](#) [Configuring proxy settings for the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

On-premises data gateway in-depth

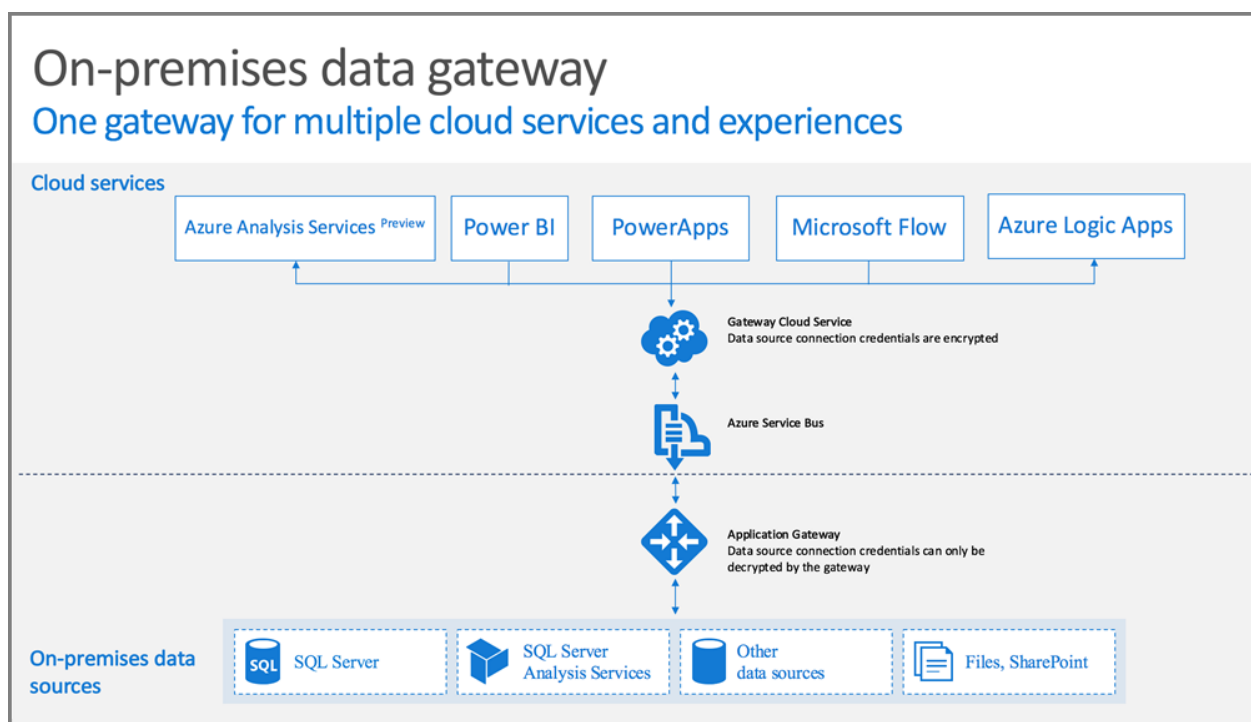
12/6/2017 • 14 min to read • [Edit Online](#)

It's possible for users in your organization to access on-premises data (to which they already have access authorization), but before those users can connect to your on-premises data source, an on-premises data gateway needs to be installed and configured. The gateway facilitates quick and secure behind-the-scenes communication between a user in the cloud, to your on-premises data source, and then back to the cloud.

Installing and configuring a gateway is usually done by an administrator. It may require special knowledge of your on-premises servers and in some cases may require Server Administrator permissions.

This article doesn't provide step-by-step guidance on how to install and configure the gateway. For that, be sure to see [On-premises data gateway](#). This article is meant to provide you with an in-depth understanding of how the gateway works. We'll also go into some detail about usernames and security in both Azure Active Directory and Analysis Services, and how the cloud service uses the e-mail address a user sign in with, the gateway, and Active Directory to securely connect to and query your on-premises data.

How the gateway works



Let's first look at what happens when a user interacts with an element connected to an on-premises data source.

NOTE

For Power BI, you will need to configure a data source for the gateway.

1. A query will be created by the cloud service, along with the encrypted credentials for the on-premises data source, and sent to the queue for the gateway to process.
2. The gateway cloud service will analyze the query and will push the request to the [Azure Service Bus](#).
3. The on-premises data gateway polls the [Azure Service Bus](#) for pending requests.
4. The gateway gets the query, decrypts the credentials and connects to the data source(s) with those credentials.

5. The gateway sends the query to the data source for execution.
6. The results are sent from the data source, back to the gateway, and then onto the cloud service. The service then uses the results.

List of available data source types

DATA SOURCE	LIVE/DIRECTQUERY	USER CONFIGURED MANUAL OR SCHEDULED REFRESH
Analysis Services Tabular	Yes	Yes
Analysis Services Multidimensional	Yes	Yes
File	No	Yes
Folder	No	Yes
IBM DB2	No	Yes
IBM Informix Database	No	Yes
Impala	Yes	Yes
MySQL	No	Yes
OData	No	Yes
ODBC	No	Yes
Oledb	No	Yes
Oracle	Yes	Yes
PostgresSQL	No	Yes
SAP BW	Yes	Yes
SAP HANA	Yes	Yes
SharePoint list (on-premises)	No	Yes
Snowflake	Yes	Yes
SQL Server	Yes	Yes
Sybase	No	Yes
Teradata	Yes	Yes
Web	No	Yes

[Sign in account](#)

Users will sign in with either a work or school account. This is your organization account. If you signed up for an Office 365 offering and didn't supply your actual work email, it may look like nancy@contoso.onmicrosoft.com. Your account, within a cloud service, is stored within a tenant in Azure Active Directory (AAD). In most cases, your AAD account's UPN will match the email address.

Authentication to on-premises data sources

A stored credential will be used to connect to on-premises data sources from the gateway except Analysis Services. Regardless of the individual user, the gateway uses the stored credential to connect.

Authentication to a live Analysis Services data source

Each time a user interacts with Analysis Services, the effective username is passed to the gateway and then onto your on-premises Analysis Services server. The user principal name (UPN), typically the email address you sign into the cloud with, is what we will pass to Analysis Services as the effective user. The UPN is passed in the connection property EffectiveUserName. This email address should match a defined UPN within the local Active Directory domain. The UPN is a property of an Active Directory account. That Windows account then needs to be present in an Analysis Services role to have access to the server. The login will not be successful if no match is found in Active Directory.

Analysis Services can also provide filtering based on this account. The filtering can occur with either role based security, or row-level security.

Role-based security

Models provide security based on user roles. Roles are defined for a particular model project during authoring in SQL Server Data Tools – Business Intelligence (SSDT-BI), or after a model is deployed, by using SQL Server Management Studio (SSMS). Roles contain members by Windows username or by Windows group. Roles define permissions a user has to query or perform actions on the model. Most users will belong to a role with Read permissions. Other roles are meant for administrators with permissions to process items, manage database functions, and manage other roles.

Row-level security

Row-level security is specific to Analysis Services row-level security. Models can provide dynamic, row-level security. Unlike having at least one role in which users belong to, dynamic security is not required for any tabular model. At a high-level, dynamic security defines a user's read access to data right down to a particular row in a particular table. Similar to roles, dynamic row-level security relies on a user's Windows username.

A user's ability to query and view model data are determined first by the roles their Windows user account are a member of and second, by dynamic row-level security, if configured.

Implementing role and dynamic row-level security in models are beyond the scope of this article. You can learn more at [Roles \(SSAS Tabular\)](#) and [Security Roles \(Analysis Services - Multidimensional Data\)](#) on MSDN. And, for the most in-depth understanding of tabular model security, download and read the [Securing the Tabular BI Semantic Model whitepaper](#).

What about Azure Active Directory?

Microsoft cloud services use [Azure Active Directory](#) to take care of authenticating users. Azure Active Directory is the tenant that contains usernames and security groups. Typically, the email address a user signs in with is the same as the UPN of the account.

What is my local Active Directory's role?

For Analysis Services to determine if a user connecting to it belongs to a role with permissions to read data, the server needs to convert the effective username passed from AAD to the gateway, and onto the Analysis Services server. The Analysis Services server passes the effective username to a Windows Active Directory domain controller (DC). The Active Directory DC then validates the effective username is a valid UPN, on a local account, and returns that user's Windows username back to the Analysis Services server.

EffectiveUserName cannot be used on a non-domain joined Analysis Services server. The Analysis Services server must be joined to a domain to avoid any login errors.

How do I tell what my UPN is?

You may not know what your UPN is, and you may not be a domain administrator. You can use the following command from your workstation to find out the UPN for your account.

```
whoami /upn
```

The result will look similar to an email address, but this is the UPN that is on your local domain account. If you are using an Analysis Services data source for live connections, this must match what was passed to EffectiveUserName from the gateway.

Mapping usernames for Analysis Services data sources

Power BI allows for mapping usernames for Analysis Services data sources. You can configure rules to map a username logged in with Power BI to a name that is passed for EffectiveUserName on the Analysis Services connection. The map user names feature is a great way to work around when your username in AAD doesn't match a UPN in your local Active Directory. For example, if your email address is nancy@contoso.onmicrosoft.com, you could map it to nancy@contoso.com, and that value would be passed to the gateway. You can learn more about how to [map user names](#).

Synchronize an on-premises Active Directory with Azure Active Directory

You would want your local Active Directory accounts to match Azure Active Directory if you are going to be using Analysis Services live connections. As the UPN has to match between the accounts.

The cloud services only know about accounts within Azure Active Directory. It doesn't matter if you added an account in your local Active Directory, if it doesn't exist in AAD, it cannot be used. There are different ways that you can match your local Active Directory accounts with Azure Active Directory.

1. You can add accounts manually to Azure Active Directory.

You can create an account on the Azure portal, or within the Office 365 Admin Portal, and the account name matches the UPN of the local Active Directory account.

2. You can use the [Azure AD Connect](#) tool to synchronize local accounts to your Azure Active Directory tenant.

The Azure AD Connect tool provides options for directory and password synchronization. If you are not a tenant admin or a local domain administrator, you will need to contact your IT admin to get this configured.

3. You can configure Active Directory Federation Services (ADFS).

You can associate your ADFS server to your AAD tenant with the [Azure AD Connect](#) tool. ADFS makes use of the directory synchronization discussed above but allows for a single sign-on (SSO) experience. For

example, if you are within your work network, when you to a cloud service, and go to sign in, you may not be prompted to enter a username or password. You will need to discuss with your IT Admin if this is available for your organization.

Using Azure AD Connect ensures that the UPN will match between AAD and your local Active Directory.

NOTE

Synchronizing accounts with the Azure AD Connect tool will create new accounts within your AAD tenant.

Now, this is where the gateway comes in

The gateway acts as a bridge between the cloud and your on-premises server. Data transfer between the cloud and the gateway is secured through [Azure Service Bus](#). The Service Bus creates a secure channel between the cloud and your on-premises server through an outbound connection on the gateway. There are no inbound connections that you need to open on your on-premises firewall.

If you have an Analysis Services data source, you'll need to install the gateway on a computer joined to the same forest/domain as your Analysis Services server.

The closer the gateway is to the server, the faster the connection will be. If you can get the gateway on the same server as the data source, that is best to avoid network latency between the gateway and the server.

What to do next?

After you get the gateway installed, you will want to create data sources for that gateway. You can add data sources within the **Manage gateways** screen. For more information, see the manage data sources articles.

[Manage your data source - Analysis Services](#)

[Manage your data source - SAP HANA](#)

[Manage your data source - SQL Server](#)

[Manage your data source - Oracle](#)

[Manage your data source - Import/Scheduled refresh](#)

Where things can go wrong

Sometimes installing the gateway fails. Or, maybe the gateway seems to install ok, but the service is still unable to work with it. In many cases, it's something simple, like the password for the credentials the gateway uses to sign into the data source.

In other cases, there might be issues with the type of e-mail address users sign in with, or Analysis Services' inability to resolve an effective username. If you have multiple domains with trusts between them, and your gateway is in one and Analysis Services in another, this sometimes can cause some problems.

Rather than go into troubleshooting gateway issues here, we've put a series of troubleshooting steps into another article; [Troubleshooting the on-premises data gateway](#). Hopefully, you won't have any problems. But if you do, understanding how all of this works and the troubleshooting article should help.

Sign in account

Users will sign in with either a work or school account. This is your organization account. If you signed up for an Office 365 offering and didn't supply your actual work email, it may look like nancy@contoso.onmicrosoft.com. Your account, within a cloud service, is stored within a tenant in Azure Active Directory (AAD). In most cases, your AAD account's UPN will match the email address.

Windows Service account

The on-premises data gateway is configured to use `NT SERVICE\PBIEgwService` for the Windows service logon credential. By default, it has the right of Log on as a service. This is in the context of the machine that you are installing the gateway on.

NOTE

If you selected personal mode, you configure the Windows service account separately.

This is not the account used to connect to on-premises data sources. This is also not your work or school account that you sign into cloud services with.

If you encounter issues with your proxy server, due to authentication, you may want to change the Windows service account to a domain user or managed service account. You can learn how to change the account in [proxy configuration](#).

Ports

The gateway creates an outbound connection to Azure Service Bus. It communicates on outbound ports: TCP 443 (default), 5671, 5672, 9350 thru 9354. The gateway does not require inbound ports. [Learn more](#)

It is recommended that you whitelist the IP addresses, for your data region, in your firewall. You can download the [Microsoft Azure Datacenter IP list](#). This list is updated weekly. The gateway will communicate with Azure Service Bus using the IP address along with the fully qualified domain name (FQDN). If you are forcing the gateway to communicate using HTTPS it will strictly use FQDN only, and no communication will happen using IP addresses.

NOTE

The IP Addresses listed in the Azure Datacenter IP list are in CIDR notation. For example, 10.0.0.0/24 does not mean 10.0.0.0 thru 10.0.0.24. Learn more about the [CIDR notation](#).

Here is a listing of the fully qualified domain names used by the gateway.

DOMAIN NAMES	OUTBOUND PORTS	DESCRIPTION
*.download.microsoft.com	80	HTTP used to download the installer.
*.powerbi.com	443	HTTPS
*.analysis.windows.net	443	HTTPS
*.login.windows.net	443	HTTPS
*.servicebus.windows.net	5671-5672	Advanced Message Queuing Protocol (AMQP)
*.servicebus.windows.net	443, 9350-9354	Listeners on Service Bus Relay over TCP (requires 443 for Access Control token acquisition)
*.frontend.clouddatahub.net	443	HTTPS

DOMAIN NAMES	OUTBOUND PORTS	DESCRIPTION
*.core.windows.net	443	HTTPS
login.microsoftonline.com	443	HTTPS
*.msftncsi.com	443	Used to test internet connectivity if the gateway is unreachable by the Power BI service.
*.microsoftonline-p.com	443	Used for authentication depending on configuration.

NOTE

Traffic going to visualstudio.com or visualstudioonline.com are for app insights and are not required for the gateway to function.

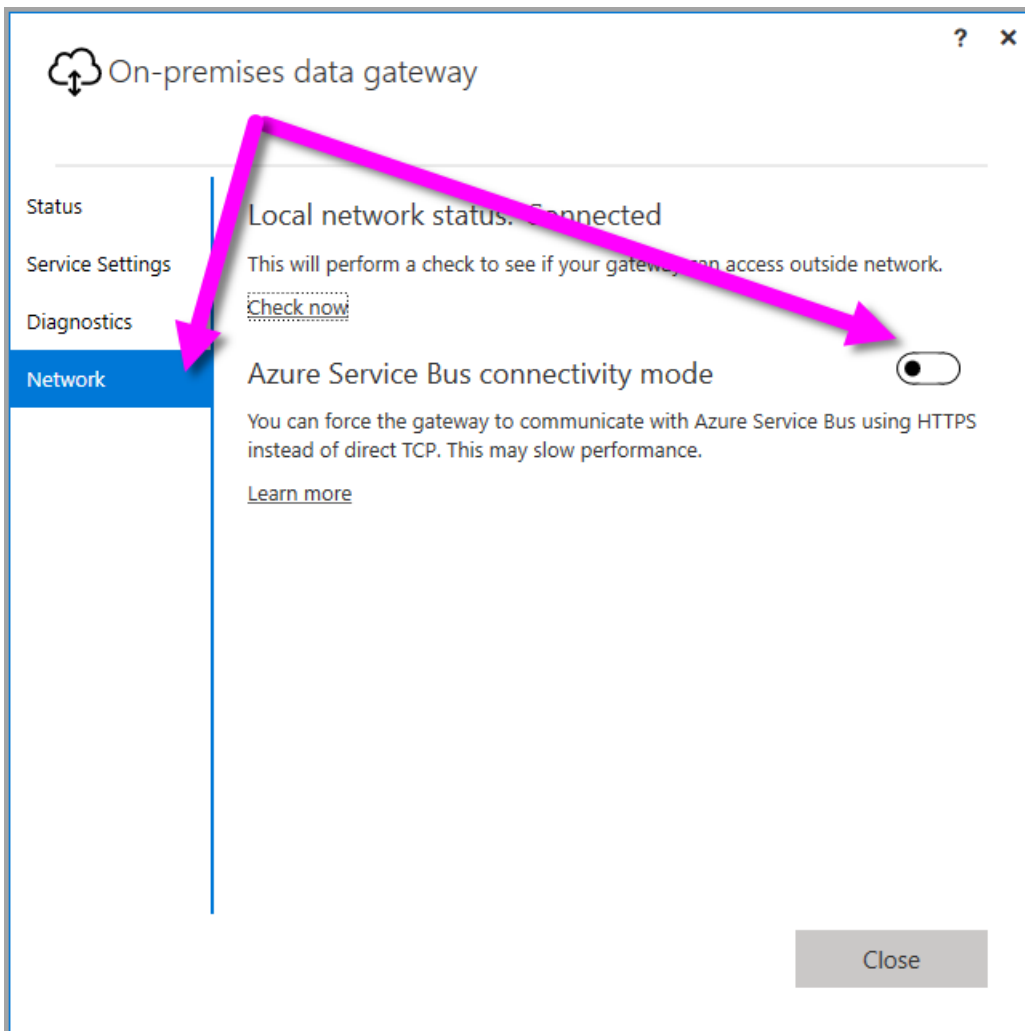
Forcing HTTPS communication with Azure Service Bus

You can force the gateway to communicate with Azure Service Bus using HTTPS instead of direct TCP. This may have an impact on performance. To do so, modify the *Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config* file by changing the value from `AutoDetect` to `Https`, as shown in the code snippet directly following this paragraph. That file is located (by default) at *C:\Program Files\On-premises data gateway*.

```
<setting name="ServiceBusSystemConnectivityModeString" serializeAs="String">
  <value>Https</value>
</setting>
```

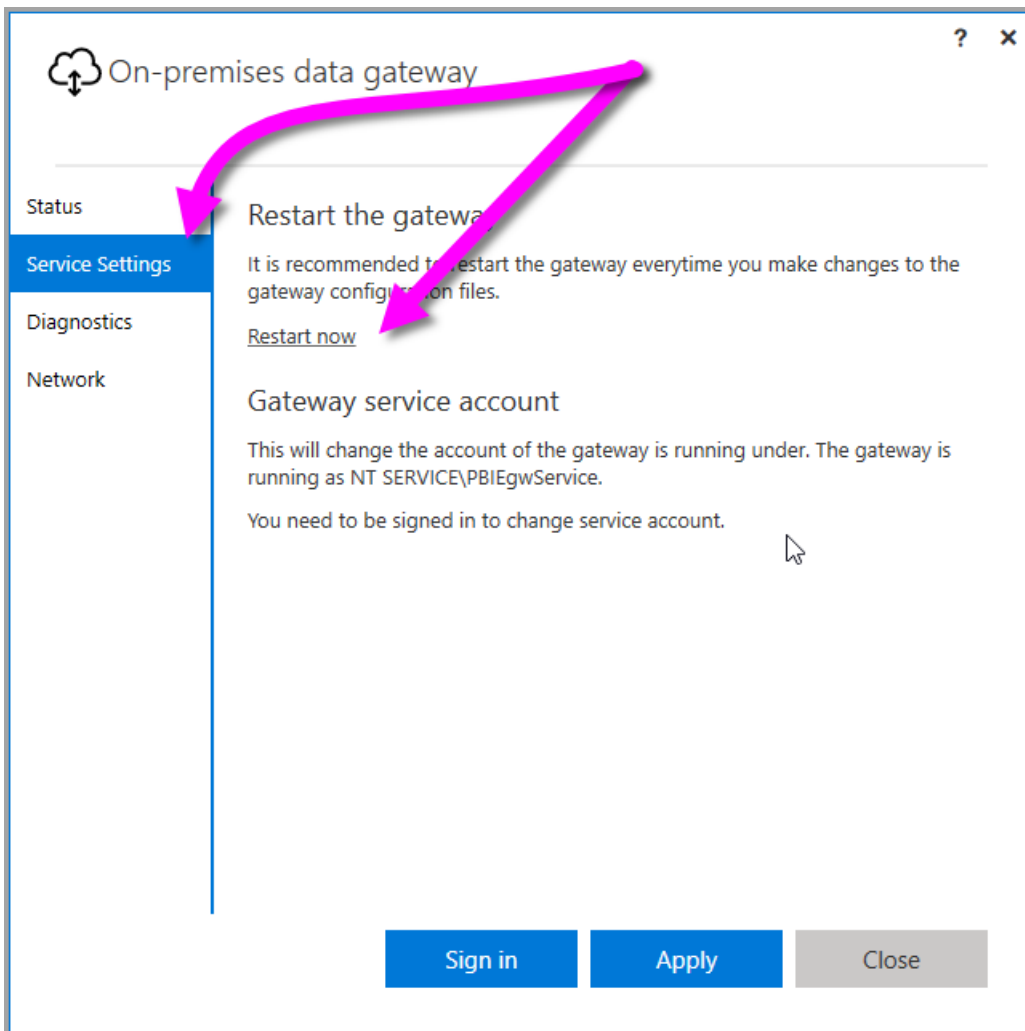
The value for the *ServiceBusSystemConnectivityModeString* parameter is case sensitive. Valid values are *AutoDetect* and *Https*.

Alternatively, you can force the gateway to adopt this behavior using the gateway user interface, beginning with the [March 2017](#) release. In the gateway user interface select **Network**, then toggle the **Azure Service Bus connectivity mode** to **On**.



Once changed, when you select **Apply** (a button that only appears when you make a change), the *gateway Windows service* restarts automatically, so the change can take effect.

For future reference, you can restart the *gateway Windows service* from the user interface dialog by selecting **Service Settings** then select *Restart Now*.



Support for TLS 1.1/1.2

With the August 2017 update and beyond, the on-premises data gateway uses Transport Layer Security (TLS) 1.1 or 1.2 to communicate with the **Power BI service** by default. Previous versions of the on-premises data gateway use TLS 1.0 by default. On March 15th 2018, support for TLS 1.0 will end, including the gateway's ability to interact with the **Power BI service** using TLS 1.0, so by then you must upgrade your on-premises data gateway installations to the August 2017 release or newer to ensure your gateways continue to operate.

It's important to note that TLS 1.0 is still supported by the on-premises data gateway prior to November 1st, and is used by the gateway as a fallback mechanism. To ensure all gateway traffic uses TLS 1.1 or 1.2 (and to prevent the use of TLS 1.0 on your gateway), you must add or modify the following registry keys on the machine running the gateway service:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001
```

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001
```

NOTE

Adding or modifying these registry keys applies the change to all .NET applications. For information about registry changes that affect TLS for other applications, see [Transport Layer Security \(TLS\) registry settings](#).

How to restart the gateway

The gateway runs as a windows service. You can start and stop it like any windows service. There are multiple ways to do this. Here is how you can do it from the command prompt.

1. On the machine where the gateway is running, launch an admin command prompt.
2. Use the following command to stop the service.

```
net stop PBIEgwService
```

3. Use the following command to start the service.

```
net start PBIEgwService
```

Next steps

[Troubleshooting the on-premises data gateway](#)

[Azure Service Bus](#)

[Azure AD Connect](#)

More questions? [Try the Power BI Community](#)

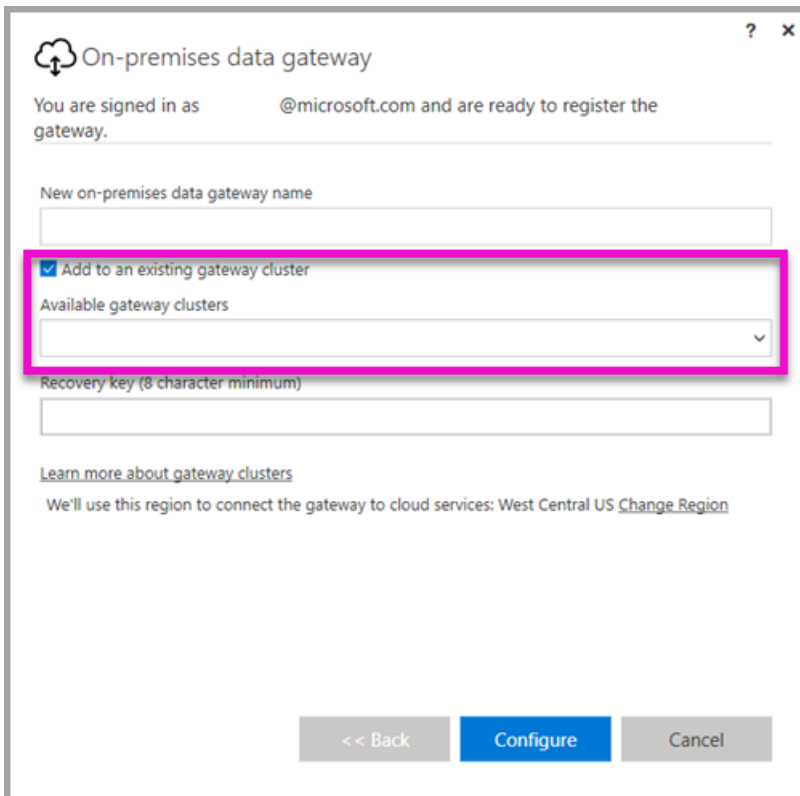
High availability clusters for on-premises data gateway

12/6/2017 • 4 min to read • [Edit Online](#)

You can create **high availability clusters** of **on-premises data gateway** installations, to ensure your organization can access on-premises data resources used in Power BI reports and dashboards. Such clusters allow gateway administrators to group gateways to avoid single points of failure in accessing on-premises data resources. This article describes the steps you can take to create a high availability cluster of on-premises data gateways, and shares best practices when setting them up. High availability gateway clusters require the November 2017 update to on-premises data gateway, or later.

Setting up high availability clusters of gateways

During the **on-premises data gateway** installation process, you can specify whether the gateway should be added to an existing gateway cluster.



On-premises data gateway

You are signed in as @microsoft.com and are ready to register the gateway.

New on-premises data gateway name

Add to an existing gateway cluster

Available gateway clusters

Recovery key (8 character minimum)

[Learn more about gateway clusters](#)

We'll use this region to connect the gateway to cloud services: West Central US [Change Region](#)

<< Back Configure Cancel

In order to add a gateway to an existing cluster, you must provide the *Recovery key* for the primary gateway instance for the cluster you want the new gateway to join. The primary gateway for the cluster must be running the gateway update from November 2017 or later.

Managing a gateway cluster

Once a gateway cluster consists of two or more gateways, all gateway management operations, such as adding a data source or granting administrative permissions to a gateway, apply to all gateways that are part of the cluster.

When administrators use the **Manage gateways** menu item, found under the gear icon in the **Power BI service**, they see the list of registered clusters or individual gateways, but do not see the individual gateway instances that are members of the cluster.

All new **Scheduled Refresh** requests and DirectQuery operations are automatically routed to the primary instance of a given gateway cluster. If the primary gateway instance is not online, the request is routed to another gateway instance in the cluster.

PowerShell support for gateway clusters

PowerShell scripts are available in the on-premises data gateway installation folder. By default, that folder is `C:\Program Files\On-premises data gateway`. You must be using PowerShell version 5 or newer for these scripts to work properly. The PowerShell scripts let users perform the following operations:

- Retrieve the list of gateway clusters available for a user
- Retrieve the list of gateway instances registered in a cluster, as well as their online or offline status
- Modify the enable/disable status for a gateway instance within a cluster, as well as other gateway properties
- Delete a gateway

In order to run the PowerShell commands in the table, you first need to take the following steps: :

1. Open a PowerShell command window, as an Administrator
2. Then run the following one-time PowerShell command (this presumes you've never run PowerShell commands on the current machine):

```
Set-ExecutionPolicy -ExecutionPolicy Unrestricted -Force
```

3. Next, navigate to the on-premises data gateway installation folder in the PowerShell window, and import the necessary module using the following command:

```
Import-Module .\OnPremisesDataGatewayHAMgmt.psm1
```

Once those steps are complete, you can use the commands in the following table to manage your gateway clusters

COMMAND	DESCRIPTION	PARAMETERS
<i>Login-OnPremisesDataGateway</i>	This command allows a user to log in to manage his or her on-premises data gateway clusters. You must run this command and log in <i>before</i> other high availability commands can work properly. Note: the AAD auth token acquired as part of a Login call is only valid for 1 hour, after which it expires. You can re-run the Login command to acquire a new token.	AAD username and password (provided as part of the command execution, not initial invocation)
<i>Get-OnPremisesDataGatewayClusters</i>	Retrieves the list of gateway clusters for the logged in user.	Optionally, you can pass formatting parameters to this command for better readability, such as: <i>Format-Table -AutoSize -Wrap</i>
<i>Get-OnPremisesDataClusterGateways</i>	Retrieves the list of gateways within the specified cluster, as well as additional information for each gateway (online/offline status, machine name, so on)	<i>-ClusterObjectID xyz</i> (where <i>xyz</i> is replaced with an actual cluster object ID value, which can be retrieved using the <i>Get-OnPremisesDataGatewayClusters</i> command)

COMMAND	DESCRIPTION	PARAMETERS
<i>Set-OnPremisesDataGateway</i>	Lets you set property values for a given gateway within a cluster, including the ability to Enable/Disable a specific gateway instance	- <i>ClusterObjectID xyz</i> (xyz should be replaced with an actual cluster object ID value, which can be retrieved using the <i>Get-OnPremisesDataGatewayClusters</i> command) - <i>GatewayObjectID abc</i> (abc should be replaced with an actual gateway object ID value, which can be retrieved using the <i>Get-OnPremisesDataClusterGateways</i> command, given a cluster object ID)
<i>Get-OnPremisesDataGatewayStatus</i>	Lets you retrieve the status for a given gateway instance within a cluster	- <i>ClusterObjectID xyz</i> (xyz should be replaced with an actual cluster object ID value, which can be retrieved using the <i>Get-OnPremisesDataGatewayClusters</i> command) - <i>GatewayObjectID abc</i> (abc should be replaced with an actual gateway object ID value, which can be retrieved using the <i>Get-OnPremisesDataClusterGateways</i> command, given a cluster object ID)
<i>Remove-OnPremisesDataGateway</i>	Lets you remove a gateway instance from a cluster - note that the primary gateway in the cluster cannot be removed until all other gateways in the cluster have been removed.	- <i>ClusterObjectID xyz</i> (xyz should be replaced with an actual cluster object ID value, which can be retrieved using the <i>Get-OnPremisesDataGatewayClusters</i> command) - <i>GatewayObjectID abc</i> (abc should be replaced with an actual gateway object ID value, which can be retrieved using the <i>Get-OnPremisesDataClusterGateways</i> command, given a cluster object ID)

Next steps

- [Manage your data source - Analysis Services](#)
- [Manage your data source - SAP HANA](#)
- [Manage your data source - SQL Server](#)
- [Manage your data source - Oracle](#)
- [Manage your data source - Import/Scheduled refresh](#)
- [On-premises data gateway in-depth](#)
- [On-premises data gateway \(personal mode\)](#)
- [Configuring proxy settings for the on-premises data gateway](#)
- [Use Kerberos for SSO \(single sign-on\) from Power BI to on-premises data sources](#)

More questions? [Try the Power BI Community](#)

On-premises data gateway FAQ

1/25/2018 • 7 min to read • [Edit Online](#)

General

Question: What is the actual Windows service called?

Answer: The gateway is called on-premises data gateway service in Services

Question: What are the requirements for the gateway?

Answer: Take a look at the requirements section of the main [gateway article](#).

Question: What data sources are supported with the gateway?

Answer: See the data sources table in the main [gateway article](#).

Question: Do I need a gateway for cloud data sources like Azure SQL Database?

Answer: No! The service will be able to connect to that data source without a gateway.

Question: Are there any inbound connections to the gateway from the cloud?

Answer: No. The gateway uses outbound connections to Azure Service Bus.

Question: What if I block outbound connections? What do I need to open?

Answer: See the [list of ports](#) and hosts that the gateway uses.

Question: Does the gateway have to be installed on the same machine as the data source?

Answer: No. The gateway will connect to the data source using the connection information that was provided. Think of the gateway as a client application in this sense. It will just need to be able to connect to the server name that was provided.

Question: What is the latency for running queries to a data source from the gateway? What is the best architecture?

Answer: It is recommended to have the gateway as close to the data source as possible to avoid network latency. If you can install the gateway on the actual data source, it will minimize the latency introduced. Consider the data centers as well. For example, if your service is making use of the West US data center, and you have SQL Server hosted in an Azure VM, you will want to have the Azure VM in West US as well. This will minimize latency and avoid egress charges on the Azure VM.

Question: Are there any requirements for network bandwidth?

Answer: It is recommended to have good throughput for your network connection. Every environment is different and this is also dependent on the amount of data being sent. Using ExpressRoute could help to guarantee a level of throughput between on-premises and the Azure data centers.

You can use the 3rd party [Azure Speed Test app](#) to help gauge what your throughput is.

Question: Can the gateway Windows service run with an Azure Active Directory account?

Answer: No. The Windows service needs to have a valid Windows account. By default it will run with the Service SID, `NT SERVICE\PBIEgwService`.

Question: How are results sent back to the cloud?

Answer: This is done by way of the Azure Service Bus. For more information, see [how it works](#).

Question: Where are my credentials stored?

Answer: The credentials you enter for a data source are stored encrypted in the gateway cloud service. The credentials are decrypted at the gateway on-premises.

Question: Can I place the gateway in a perimeter network (also known as DMZ, demilitarized zone, and screened subnet)?

Answer: The gateway requires connectivity to the data source. If the data source is not accessible in your perimeter network, the gateway may not be able to connect to it. For example, your SQL Server may not be in your perimeter network. And, you cannot connect to your SQL Server from the perimeter network. If you placed the gateway in your perimeter network, it would not be able to reach the SQL Server.

Question: Is it possible to force the gateway to use HTTPS traffic with Azure Service Bus instead of TCP?

Answer: Yes. Although, this will greatly reduce performance. You will want to modify the *Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config* file. You will want to change the value from `AutoDetect` to `Https`. This file is located, by default, at `C:\Program Files\On-premises data gateway`.

Question: Do I need to whitelist the Azure Datacenter IP list? Where do I get the list?

Answer: If you are blocking outbound IP traffic, you may need to whitelist the Azure Datacenter IP list. Currently, the gateway will communicate with Azure Service Bus using the IP address in addition to the fully qualified domain name. The Azure Datacenter IP list is updated weekly. You can download the [Microsoft Azure Datacenter IP list](#).

```
<setting name="ServiceBusSystemConnectivityModeString" serializeAs="String">
  <value>Https</value>
</setting>
```

High Availability/Disaster Recovery

Question: Are there any plans for enabling high availability scenarios with the gateway?

Answer: Yes, this is an area of active investment for the Power BI team. Please stay tuned to the [Power BI blog](#) for further updates about this feature.

Question: What options are available for disaster recovery?

Answer: You can use the recovery key to restore or move a gateway. When you install the gateway, supply the recovery key.

Question: What is the benefit of the recovery key?

Answer: It provides a way to migrate or recover your gateway settings. This is also used for disaster recovery.

Troubleshooting

Question: Where are the gateway logs located?

Answer: See the tools section of the [troubleshooting article](#).

Question: How can I see what queries are being sent to the on-premises data source?

Answer: You can enable query tracing. This will include the queries being sent. Remember to change it back to the original value when done troubleshooting. Having query tracing enabled will cause the logs to be larger.

You can also look at tools your data source has for tracing queries. For example, for SQL Server and Analysis Services you can use Extended Events or SQL Profiler.

Analysis Services

Question: Can I use msdmpump.dll to create custom effective username mappings for Analysis Services?

Answer: No. This is not supported at this time.

Question: Can I use the gateway to connect to a multidimensional (OLAP) instance.

Answer: Yes! The on-premises data gateway supports live connections to both Analysis Services Tabular and Multidimensional models.

Question: What if I install the gateway on a computer in a different domain from my on-premises server that uses

Windows authentication?

Answer: No guarantees here. It all depends on the trust relationship between the two domains. If the two different domains are in a trusted domain model, then the gateway might be able to connect to the Analysis Services server and the effective user name can be resolved. If not, you may encounter a login failure.

Question: How can I find out what effective username is being passed to my on-premises Analysis Services server?

Answer: We answer this in the [troubleshooting article](#).

Question: I have 25 databases in Analysis Services, is there a way to have them all enabled for the gateway at once?

Answer: No. This is on the roadmap, but we don't have a timeframe.

Administration

Question: Can I have more than one admin for a gateway?

Answer: Yes! When you manage a gateway, you can go to the administrator's tab to add additional admins.

Question: Does the gateway admin need to be an admin on the machine where the gateway is installed?

Answer: No. The gateway admin is used to manage the gateway from within the service.

Question: Can I prevent users in my organization from creating a gateway?

Answer: No. This is on the roadmap, but we don't have a timeframe.

Question: Can I get usage and statistics information of the gateways in my organization?

Answer: No. This is on the roadmap, but we don't have a timeframe.

Power BI

Question: Do I need to upgrade the personal gateway? **Answer:** No, you can keep using the personal gateway for Power BI.

Question: How often are tiles in a dashboard, in Power BI, refreshed when connected through the on-premises data gateway?

Answer: About ten minutes. DirectQuery connections are just that. This doesn't mean that a tile issues a query to your on-premises server, and shows new data, every ten minutes.

Question: Can I upload Excel workbooks with Power Pivot data models that connect to on-premises data sources? Do I need a gateway for this scenario?

Answer: Yes, you can upload the workbook. And, no, you don't need a gateway. But, because the data will reside in the Excel data model, reports in Power BI based on the Excel workbook will not be live. In order to refresh reports in Power BI, you'd have to re-upload an updated workbook each time. Or, use the gateway with scheduled refresh.

Question: If users share dashboards that has a DirectQuery connection, will those other users be able to see the data even though they might not have the same permissions.

Answer: For a dashboard connected to Analysis Services, users will only see the data they have access to. If the users do not have the same permissions, they will not be able to see any data. For other data sources, all users will share the credentials entered by the admin for that data source.

Question: Why can't I connect to my Oracle server?

Answer: You may need to install the Oracle client and configure the tnsnames.ora file with the proper server information in order to connect to your Oracle server. This is a separate install outside of the gateway. For more information, see [Installing the Oracle Client](#).

Question: Will the gateway work with ExpressRoute?

Answer: Yes. For more information about ExpressRoute and Power BI, see [Power BI and ExpressRoute](#).

Next steps

[On-premises data gateway](#)

[On-premises data gateway in-depth](#)

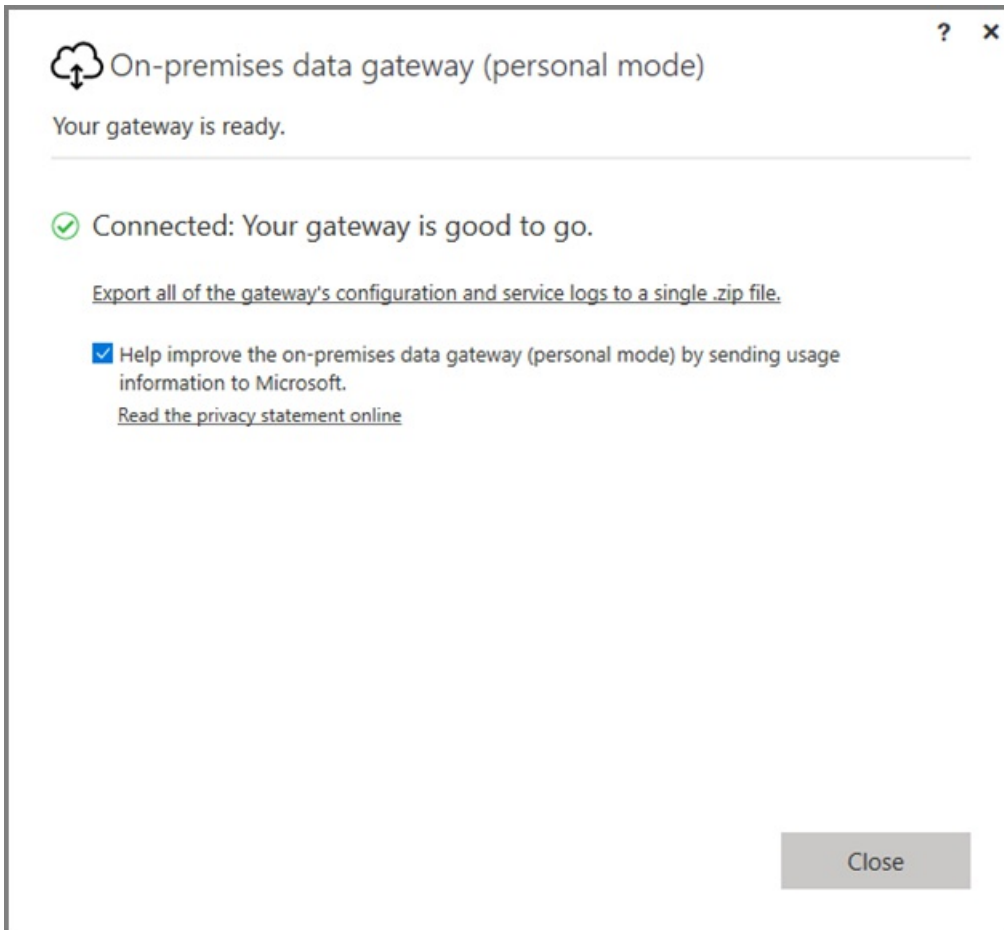
[Troubleshooting the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

On-premises data gateway (personal mode)

12/6/2017 • 7 min to read • [Edit Online](#)

You can use on-premises data sources, and create Power BI reports and dashboards, using a gateway. A **gateway** is software that facilitates access to data that is stored on a private, on-premises network, then enables you to use that data in online services like the **Power BI service**. The **on-premises data gateway (personal mode)** is a recently released update to the Power BI gateway that allows individuals to install a gateway on their own computer, and gain access to on-premises data.



NOTE

The **on-premises data gateway (personal mode)** replaces the previously supported version of the personal gateway, which is called **Power BI Gateway - Personal**. The previous personal gateway will continue working only until July 31, 2017. See the sections below for information on how to update to the new version.

Features of the on-premises data gateway (personal mode)

With the release of the **on-premises data gateway (personal mode)**, a collection of improvements and features are now available. In the previous version of the personal gateway (which is called **Power BI Gateway - Personal**), its implementation imposed some limitations. As with many Power BI products, we listened to customer needs, requests, and how they used the product. As a result, the **on-premises data gateway (personal mode)** has been redesigned from the ground up, and includes the following features and improvements:

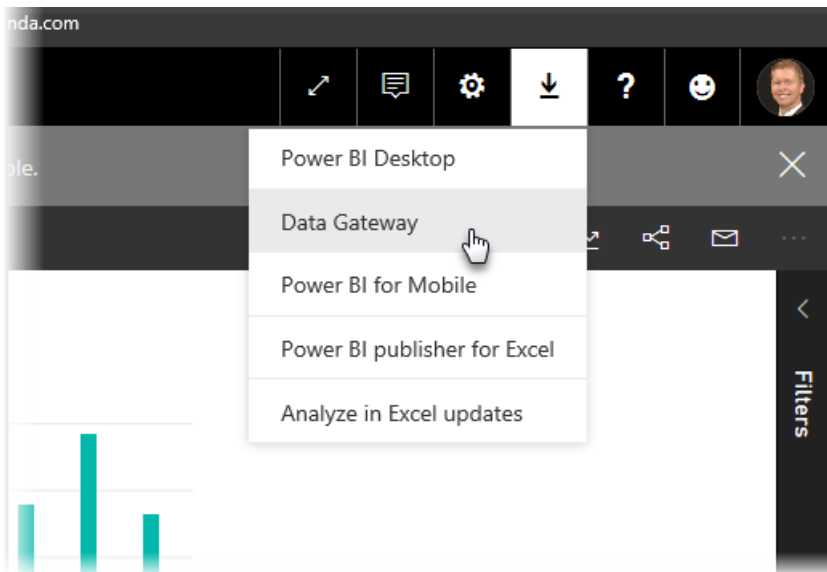
- **Improved reliability** - the new version of the personal gateway has improved reliability over the previous

version, due to code and structural software improvements.

- **Enhanced extensibility** - as part of the structural software improvements, additional features can easily be added to the personal gateway as they become available.
- **Delete personal gateway from the Power BI service** - with the new version, you can now delete your personal gateway from within the **Power BI service**.
- **Configuration and service logs** - the new version lets you easily export configuration and service logs to a .zip file, with a single click.

Installing on-premises data gateway (personal mode)

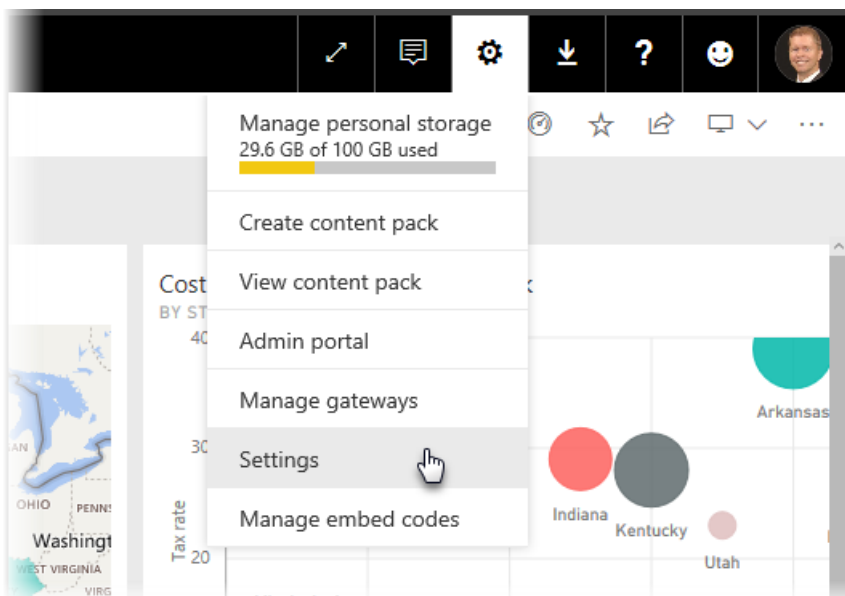
To install the **on-premises data gateway (personal mode)** without having the previous version of the gateway installed, select the gear icon in the **Power BI service** and select **Data Gateway**.



You can also download the gateway from [this location](#). You can follow the installation steps, and since the installation process allows you to install either version of the gateway (the standard gateway, which can be shared with others, or personal mode), make sure you select **on-premises data gateway (personal mode)** when prompted for which version of the gateway you want to install.

Updating from the previous personal gateway

If you already have the **Power BI Gateway - personal** gateway installed, you'll be prompted to install the new and enhanced version of the personal gateway when you view **Datasets** under **Settings** in the **Power BI service**.



When you select a dataset, and then select **Gateway connection** you're notified that the new and enhanced version of the personal gateway is available. When you do, select **Install now**.

Settings for Electronics Categories and Sales

⚠ You don't have any gateway installed or configured for the data sources in this dataset. Please install a new personal gateway or configure the data source for an existing data gateway.

[Refresh history](#)

Gateway connection

To use a data gateway, make sure the computer is online and the data source is added in [Manage Gateways](#). [Learn more](#)

A new and enhanced version of the personal gateway is available. [Install now](#) [Learn more](#)

Use your data gateway (Power BI – personal)

Use a data gateway

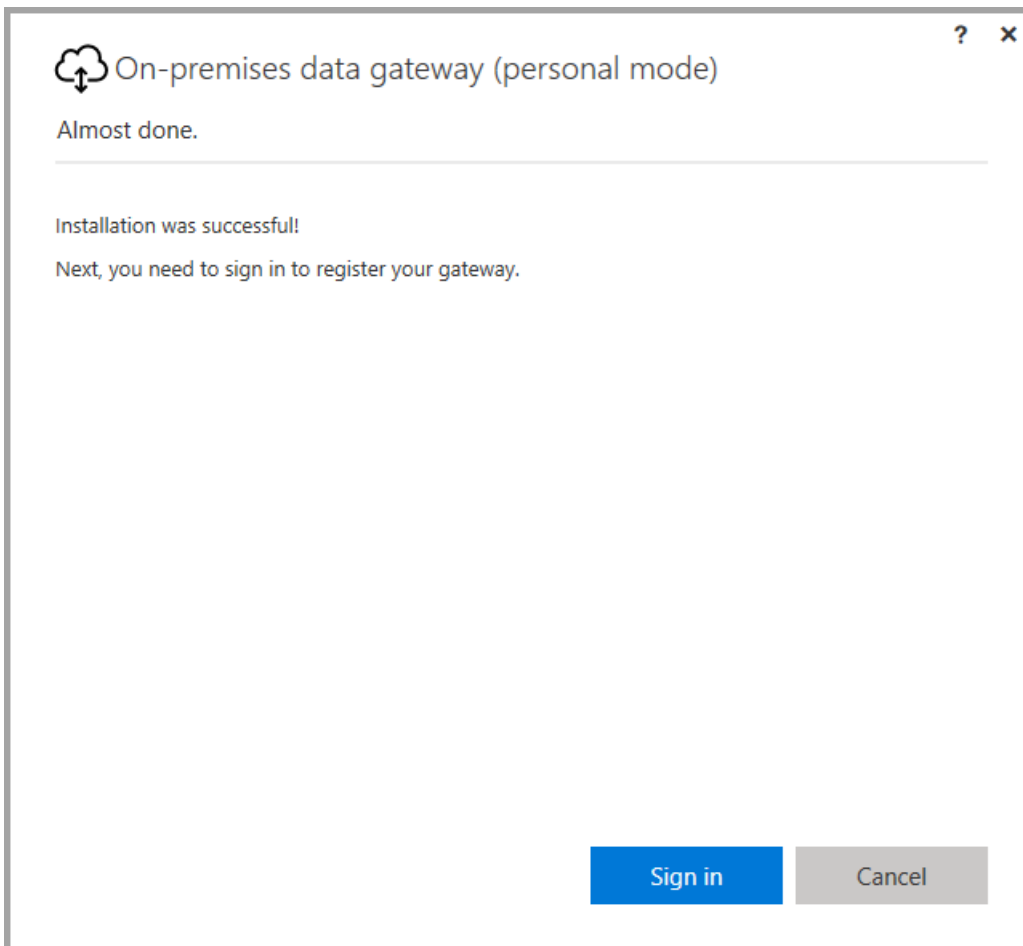
[Apply](#) [Discard](#)

Data source credentials

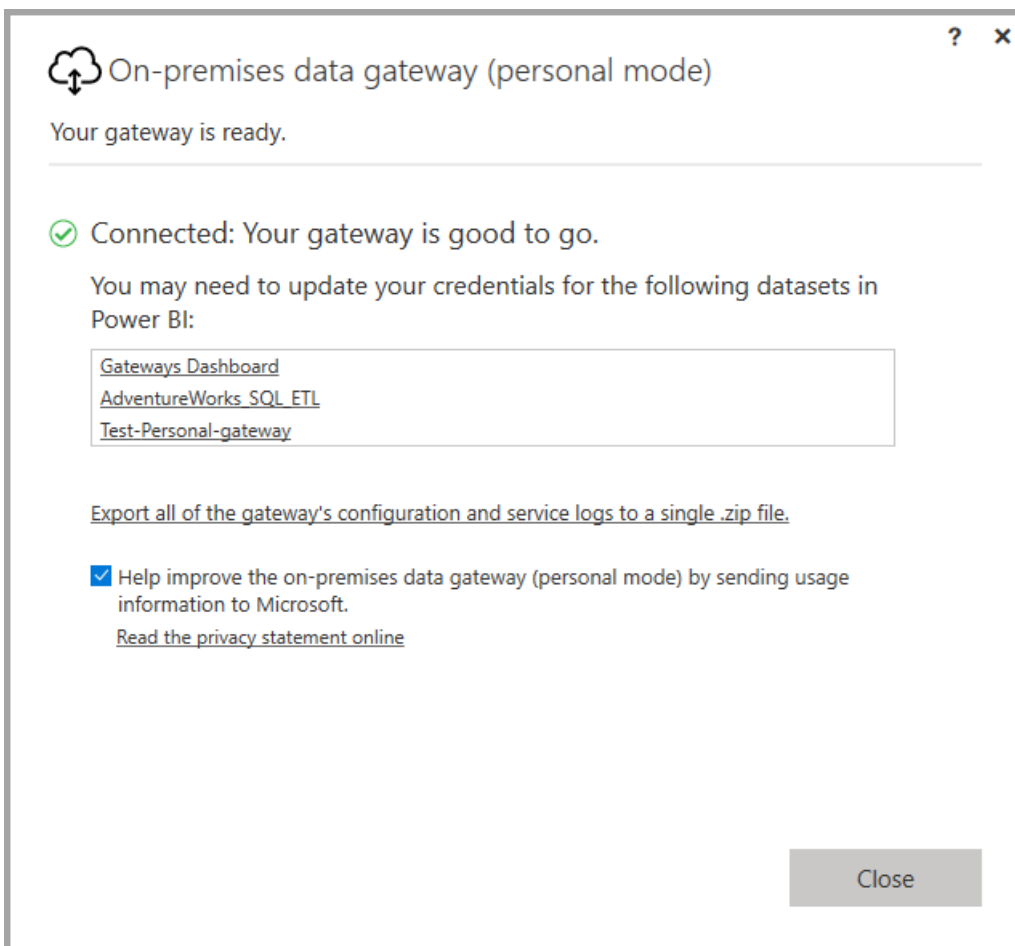
NOTE

If you're running the previous version of **Power BI Gateway - personal** as an elevated process, make sure you start the new gateway installation process elevated as well, so your dataset credentials can be automatically updated. Otherwise, you'll have to update dataset credentials manually.

You'll be taken through the update process, after which you'll see that the installation was successful. Don't close things out yet, there's one last step.



Here's the last step. Once the new personal gateway is installed (and the last installation screen still visible), sign in to the **Power BI service**, and wait until you see that the gateway is online, as shown in the following image.



If you've updated the personal gateway on the same machine as the previous gateway is installed, your credentials will update automatically, and all refresh activities will go through the new gateway. If the previous gateway was installed on a different machine, you'll be asked to update your credentials on certain datasets. In the previous image, notice the list of datasets in the window; the list will show datasets that might require updated credentials. Each dataset listed is a direct link that you simply click on to easily update your credentials.

That's it - almost. With the new gateway installed, you no longer need to previous version installed on your machine, so you should uninstall it. You can do this by searching for **Power BI Gateway - personal** on your machine, and uninstalling it.

Determining which version of the personal gateway you have installed

To determine which version of the personal gateway you currently have installed, you can do the following:

- The previous version of the personal gateway is called **Power BI Gateway - Personal** and uses the Power BI icon in its installation dialog.
- The new version of the personal gateway is called **on-premises data gateway (personal mode)** and uses the gateway icon (a cloud with an up-and-down arrow along the bottom).

You can go to **Add/Remove Programs** and see whether **Power BI Gateway - Personal** appears on the list, and if so, you have the previous version of the personal gateway installed.

Using Fast Combine with the personal gateway

If you were using **Fast Combine** with the previous gateway, you'll need to take the following steps to re-enable **Fast Combine** to work with the **on-premises data gateway (personal mode)**:

1. Using File Explorer, open the following file:

```
%localappdata%\Microsoft\on-premises data gateway (personal mode)\Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config
```

2. At the bottom of the file, add the following text:

```
...  
<setting name="EnableFastCombine" serializeAs="String">```  
<value>>true</value>  
</setting>  
...
```

3. Once complete, the setting will take effect in approximately one minute. To check that it's working properly, try an on-demand refresh in the **Power BI service** to confirm that **Fast Combine** is working.

Limitations and considerations

There are a few things to consider when using the **on-premises data gateway (personal mode)**, as described in the following list.

- If you're using **Windows Hello** or a pin to sign in to Windows, you might run into the following error:
 - *The user account you selected does not match the requirements of the application. Please use a different account.*
 - To remedy that error, select *Use a different account* and sign in again.

The following data sources are currently not supported for the **on-premises data gateway (personal mode)**:

- ADO.NET

- CurrentWorkbook
- FTP
- HDFS
- SAP BusinessObjects
- Spark

Support for Spark is planned for the second half of the 2017 calendar year.

Frequently Asked Questions (FAQ)

- Can I run the **on-premises data gateway (personal mode)** side by side with the **on-premises data gateway** (previously known as the Enterprise version of the gateway)?
 - **Answer:** Yes, with the new version, both can run simultaneously.
- Can I run the **on-premises data gateway (personal mode)** as a service?
 - **Answer:** No, the **on-premises data gateway (personal mode)** can only run as an application. If you need to run the gateway as a service and/or in admin mode, you'll need to consider the **on-premises data gateway** (previously known as the Enterprise gateway).
- How often is the **on-premises data gateway (personal mode)** updated?
 - **Answer:** We plan to update the personal gateway monthly.
- Why am I asked to update my credentials?
 - **Answer:** Many situations can trigger a request for credentials. The most common is that you've re-installed the **on-premises data gateway (personal mode)** on a different machine than your **Power BI - personal** gateway. It could also be an issue in the data source, and Power BI failed to perform a test connection, or a timeout or a system error occurred. You can update your credentials in the **Power BI service** by going to the **gear icon** and selecting **Settings** then **Datasets**, and finding the dataset in question and clicking on *update credentials*.
- How much time will my previous personal gateway be offline during the upgrade?
 - **Answer:** Upgrading the personal gateway to the new version should only take few minutes.
- What happens if I don't migrate to the new personal gateway by July 31st, 2017?
 - **Answer:** If you're refreshing your reports with the current gateway, your refreshes will stop. The only way to set up a new refresh schedule will be by installing and configuring the new gateway.
- I'm using R script. Is that supported?
 - **Answer:** We anticipating adding support for R scripts soon.
- Why am I not seeing the message to update my gateway in the **Power BI service**?
 - **Answer:** Most likely, this is because you have one or more datasets that include a data source that is still currently not supported.

Next steps

[Configuring proxy settings for the Power BI Gateways](#)

More questions? [Try the Power BI Community](#)

Troubleshooting the on-premises data gateway

11/27/2017 • 20 min to read • [Edit Online](#)

This article discusses some common issues you may encounter when using the **on-premises data gateway**.

NOTE

If you encounter an issue that is not listed below, you can ask for further assistance in the following locations.

- For Power BI, you can use the [communities](#) site or you can create a [support ticket](#).
- For PowerApps, you can use the [communities](#) site or you can create a [support ticket](#).
- For Microsoft Flow, you can use the [communities](#) site or you can create a [support ticket](#).
- For Logic Apps, you can submit a support ticket through the Azure portal.

Update to the latest version

A lot of issues can surface when the gateway version is out of date. It is a good general practice to make sure you are on the latest version. If you haven't updated the gateway for a month, or longer, you may want to consider installing the latest version of the gateway and see if you can reproduce the issue.

Common issues

Here are a few common issues and resolutions that have helped a number of customers in environments that restrict internet access.

Authentication to proxy server

Your proxy may require authentication from a domain user account. By default, the gateway uses a Service SID for the windows service log on user. Changing the log on user to a domain user can help with this. For more information, see [Changing the gateway service account to a domain user](#).

Your proxy only allows ports 80 and 443 traffic

Some proxies restrict traffic to only ports 80 and 443. By default, communication to Azure Service Bus will occur on ports other than 443.

You can force the gateway to communicate with Azure Service Bus using HTTPS instead of direct TCP. You will need to modify the *Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config* file. Change the value from

AutoDetect to `Https`. This file is located, by default, at `C:\Program Files\On-premises data gateway`.

```
<setting name="ServiceBusSystemConnectivityModeString" serializeAs="String">
  <value>Https</value>
</setting>
```

Installation

Error: Failed to add user to group. (-2147463168 PBIEgwService Performance Log Users)

You may receive this error if you are trying to install the gateway on a domain controller. Deploying on a domain controller is not supported. You will need to deploy the gateway on a machine that is not a domain controller.

Configuration

How to restart the gateway

The gateway runs as a Windows service, so you can start and stop it in multiple ways. For example, you can open a command prompt with elevated permissions on the machine where the gateway is running and then run either of these commands:

- To stop the service, run this command:

```
"" net stop PBIEgwService ""
```

- To start the service, run this command:

```
"" net start PBIEgwService ""
```

Error: Failed to create gateway. Please try again.

All of the details are available, but the call to the Power BI service returned an error. The error, and an activity id, will be displayed. This could happen for different reasons. You can collect, and review, the logs, as mentioned below, to get more details.

This could also be due to proxy configuration issues. The user interface does now allow for proxy configuration. You can learn more about making [proxy configuration changes](#)

Error: Failed to update gateway details. Please try again.

Information was received from the Power BI service, to the gateway. The information was passed onto the local windows service, but it failed to return. Or, a symmetric key generation failed. The inner exception will be displayed under **Show details**. You can collect, and review, the logs, as mentioned below, to get more details.

Error: Power BI service reported local gateway as unreachable. Please restart the gateway and try again.

At the end of configuration, the Power BI service will be called again to validate the gateway. The Power BI service does not report the gateway as *live*. Restarting the windows service may allow the communication to be successful. You can collect, and review, the logs, as mentioned below, to get more details.

Script error during sign into Power BI

You may receive a script error when signing into Power BI as part of the on-premises data gateway configuration. Installing the following security update should resolve the issue. This can be installed via Windows Update.

[MS16-051: Security update for Internet Explorer: May 10, 2016 \(KB 3154070\)](#)

Gateway configuration failed with a null reference exception

You may encounter an error similar to the following.

```
Failed to update gateway details. Please try again.  
Error updating gateway configuration.
```

This will include a stack trace, and that stack trace will may include the following.

```
Microsoft.PowerBI.DataMovement.Pipeline.Diagnostics.CouldNotUpdateGatewayConfigurationException: Error  
updating gateway configuration. ----> System.ArgumentNullException: Value cannot be null.  
Parameter name: serviceSection
```

If you are upgrading from an older gateway, we preserve the config file. There may be a section that is missing. When the gateway tries to read it, we will get the above null reference exception.

To correct this, do the following.

1. Uninstall the gateway.
2. Delete the following folder.

```
c:\Program Files\on-premises data gateway
```

3. Reinstall the gateway.
4. Optionally apply the recovery key to restore an existing gateway.

Support for TLS 1.1/1.2

With the August 2017 update and beyond, the on-premises data gateway uses Transport Layer Security (TLS) 1.1 or 1.2 to communicate with the **Power BI service** by default. Previous versions of the on-premises data gateway use TLS 1.0 by default. On November 1st 2017 support for TLS 1.0 will end, so by then you must upgrade your on-premises data gateway installations to the August 2017 release or newer to ensure your gateways continue to operate.

It's important to note that TLS 1.0 is still supported by the on-premises data gateway prior to November 1st, and is used by the gateway as a fallback mechanism. To ensure all gateway traffic uses TLS 1.1 or 1.2 (and to prevent the use of TLS 1.0 on your gateway), you must add or modify the following registry keys on the machine running the gateway service:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001  
  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001
```

NOTE

Adding or modifying these registry keys applies the change to all .NET applications. For information about registry changes that affect TLS for other applications, see [Transport Layer Security \(TLS\) registry settings](#).

Data sources

Error: Unable to Connect. Details: "Invalid connection credentials"

Within **Show details**, it should display the error message received from the data source. For SQL Server, you should see something like the following.

```
Login failed for user 'username'.
```

Verify that you have the correct username and password. Also verify that those credentials can successfully connect to the data source. Make sure the account being used matches the **Authentication Method**.

Error: Unable to Connect. Details: "Cannot connect to the database"

We were able to connect to the server, but not to the database supplied. Verify the name of the database, and that the user credential has the proper permission to access that database.

Within **Show details**, it should display the error message received from the data source. For SQL Server, you should see something like the following.

```
Cannot open database "AdventureWorks" requested by the login. The login failed. Login failed for user 'username'.
```

Error: Unable to Connect. Details: "Unknown error in data gateway"

This error could occur for different reasons. Be sure to validate that you can connect to the data source from the machine hosting the gateway. This could be the result of the server not being accessible.

Within **Show details**, you will see an error code of **DM_GWPipeline_UnknownError**.

You can also look in the Event Logs > **Applications and Services Logs** > **on-premises data gateway Service** for more details.

Error: We encountered an error while trying to connect to . Details: "We reached the data gateway, but the gateway can't access the on-premises data source."

We were unable to connect to the specified data source. Be sure to validate the information provided for that data source.

Within **Show details**, you will see an error code of **DM_GWPipeline_Gateway_DataSourceAccessError**.

If the underlying error message is similar to the following, this means that the account you are using for the data source is not a server admin for that Analysis Services instance. [Learn more](#)

```
The 'CONTOSO\account' value of the 'EffectiveUserName' XML for Analysis property is not valid.
```

If the underlying error message is similar to the following, it could mean that the service account for Analysis Services may be missing the [token-groups-global-and-universal](#) (TGGAU) directory attribute.

```
The user name or password is incorrect.
```

Domains with Pre-Windows 2000 compatibility access will have the TGGAU attribute enabled. However, most newly created domains will not enable this attribute by default. You can read more about this [here](#).

You can confirm this by doing the following.

1. Connect to the Analysis Services machine within SQL Server Management Studio. Within the Advanced connection properties, include EffectiveUserName for the user in question and see if this reproduces the error.
2. You can use the dsacIs Active Directory tool to validate whether the attribute is listed. This tool is normally found on a domain controller. You will need to know what the distinguished domain name is for the account and pass that to the tool.

```
dsacIs "CN=John Doe,CN=UserAccounts,DC=contoso,DC=com"
```

You want to see something similar to the following in the results.

```
Allow BUILTIN\Windows Authorization Access Group
SPECIAL ACCESS for tokenGroupsGlobalAndUniversal
READ PROPERTY
```

To correct this issue, you will need to enable TGGAU on account used for the Analysis Services windows service.

Another possibility for user name or password incorrect

This error could also be caused if the Analysis Services server is in a different domain than the users and there is not a two-way trust established.

You will need to work with your domain administrators to verify the trust relationship between domains.

Unable to see the data gateway data sources in the 'Get Data' experience for Analysis Services from the Power BI service

Make sure that your account is listed in the **Users** tab of the data source within the gateway configuration. If you don't have access to the gateway, check with the administrator of the gateway and ask them to verify. Only accounts in the **Users** list will see the data source listed in the Analysis Services list.

Datasets

Error: There is not enough space for this row.

This will occur if you have a single row greater than 4 MB in size. You will need to determine what the row is from your data source and attempt to filter it out or reduce the size for that row.

Error: The server name provided doesn't match the server name on the SQL Server SSL Certificate.

This can occur when the certificate CN is for the servers fully qualified domain name (FQDN) but you only supplied the netbios name for the server. This will cause a mismatch for the certificate. To resolve this issue, you will need to make the server name within the gateway data source, and the PBIX file, to use the FQDN of the server.

I don't see the on-premises data gateway present when configuring scheduled refresh.

This could be because of a few different scenarios.

1. The server and database name don't match between what was entered in Power BI Desktop and the data source configured for the gateway. These need to be the same values. They are not case sensitive.
2. Your account is not listed in the **Users** tab of the data source within the gateway configuration. You will need to get with the administrator of the gateway to be added to that list.
3. Your Power BI Desktop file has multiple data sources within it and not all of those data sources are configured with the gateway. You will need to have each data source defined with the gateway for the gateway to show up within Scheduled Refresh.

Error: The received uncompressed data on the gateway client has exceeded limit.

The exact limitation is 10 GB of uncompressed data per table. If you are hitting this issue, there are good options to optimize and avoid the issue. In particular, reducing the use of highly repetitive, long string values and instead using a normalized key or removing the column (if not in use) will help.

Reports

Report could not access the data source because you do not have access to our data source via an on-premises data gateway.

This is usually caused by one of the following.

1. The data source information does not match what is in the underlying dataset. The server and database name need to match between the data source defined for the on-premises data gateway and what you supply within

Power BI Desktop. If you use an IP Address in Power BI Desktop, the data source, for the on-premises data gateway, needs to use an IP Address as well.

2. There is not a data source available on any gateway within your organization. You can configure the data source on a new, or existing, on-premises data gateway.

Error: Data source access error. Please contact the gateway administrator.

If this report is making use of a live Analysis Services connection, you could be encountering an issue with a value being passed to EffectiveUserName that is either not valid, or doesn't have permissions on the Analysis Services machine. Typically, an authentication issue is due to the fact that the value being passed for EffectiveUserName doesn't match a local user principal name (UPN).

To confirm this, you can do the following.

1. Find the effective username within the [gateway logs](#).
2. Once you have the value being passed, validate that it is correct. If it is your user, you can use the following command from a command prompt to see what the UPN should be. The UPN will look like an email address.

```
whoami /upn
```

Optionally, you can see what Power BI gets from Azure Active Directory.

1. Browse to <https://graphexplorer.cloudapp.net>.
2. Select **Sign in** in the upper right.
3. Run the following query. You will see a rather large JSON response.

```
https://graph.windows.net/me?api-version=1.5
```

4. Look for **userPrincipalName**.

If your Azure Active Directory UPN doesn't match your local Active Directory UPN, you can use the [Map user names](#) feature to replace it with a valid value. Or you can work with either your tenant admin, or local Active Directory admin, to get your UPN changed.

Firewall or Proxy

For information on providing proxy information for your gateway, see [Configuring proxy settings for the Power BI gateways](#).

You can test to see if your firewall, or proxy, may be blocking connections by running [Test-NetConnection](#) from a PowerShell prompt. This will test connectivity to the Azure Service Bus. This only tests network connectivity and doesn't have anything to do with the cloud server service or the gateway. It helps to determine if your machine can actually get out to the internet.

```
Test-NetConnection -ComputerName watchdog.servicebus.windows.net -Port 9350
```

NOTE

Test-NetConnection is only available on Windows Server 2012 R2 and later. It is also available on Windows 8.1 and later. On earlier OS versions, you can use Telnet to test port connectivity.

The results should look similar to the following. The difference will be with TcpTestSucceeded. If **TcpTestSucceeded** is not *true*, then you may be blocked by a firewall.

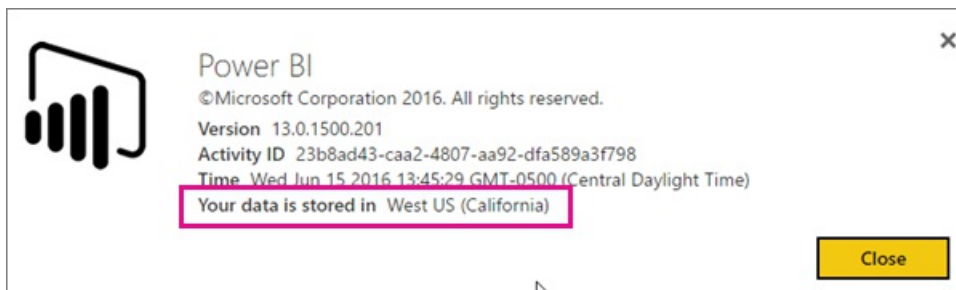
```
ComputerName      : watchdog.servicebus.windows.net
RemoteAddress     : 70.37.104.240
RemotePort        : 5672
InterfaceAlias    : vEthernet (Broadcom NetXtreme Gigabit Ethernet - Virtual Switch)
SourceAddress     : 10.120.60.105
PingSucceeded     : False
PingReplyDetails (RTT) : 0 ms
TcpTestSucceeded  : True
```

If you want to be exhaustive, substitute the **ComputerName** and **Port** values with those listed for [ports](#)

The firewall may also be blocking the connections that the Azure Service Bus makes to the Azure data centers. If that is the case, you will want to whitelist (unblock) the IP addresses for your region for those data centers. You can get a list of Azure IP addresses [here](#).

You can find the data center region you are in by doing the following:

1. Select the **?** in the upper right of the Power BI service.
2. Select **About Power BI**.
3. Your data region will be listed in **Your data is stored in**.



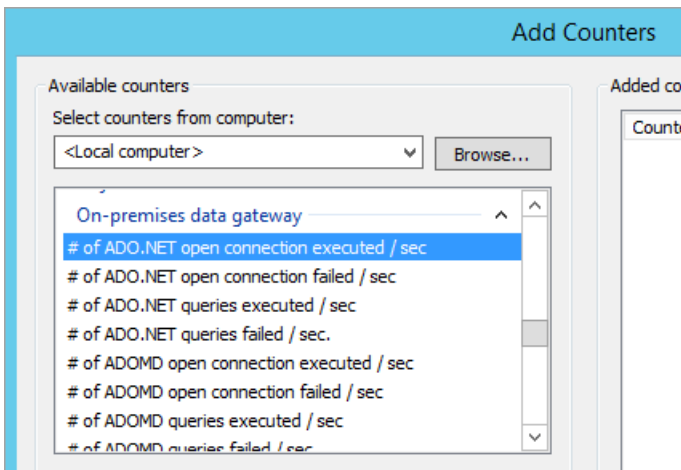
If you are still not getting anywhere, you could try getting a network trace using a tool like [fiddler](#) or netsh, although these are advanced collection methods and you may need assistance in analyzing the collected data. You can contact [support](#) for assistance.

Performance

Performance Counters

There are a number of performance counters that can be used to gauge the activities for the gateway. These can be helpful to understanding if we have a large load of activity and may need to make a new gateway. These counters will not reflect how long something takes.

These counters can be access through the Windows Performance Monitor tool.



There are general groupings of these counters.

COUNTER TYPE	DESCRIPTION
ADO.NET	This is used for any DirectQuery connection.
ADOMD	This is used for Analysis Services 2014 and earlier.
OLEDB	This is used by certain data sources. This includes SAP HANA and Analysis Service 2016 or later.
Mashup	This includes any imported data source. If you are scheduling refresh or doing an on-demand refresh, it will go through the mashup engine.

Here is a listing of the available performance counters.

COUNTER	DESCRIPTION
# of ADO.NET open connection executed / sec	Number of ADO.NET open connection actions executed per second (succeeded or failed).
# of ADO.NET open connection failed / sec	Number of ADO.NET open connections actions failed per second.
# of ADO.NET queries executed / sec	Number of ADO.NET queries executed per second (succeeded or failed).
# of ADO.NET queries failed / sec	Number of ADO.NET failed queries executed per second.
# of ADOMD open connection executed / sec	Number of ADOMD open connection actions executed per second (succeeded or failed).
# of ADOMD open connection failed / sec	Number of ADOMD open connection actions failed per second.
# of ADOMD queries executed / sec	Number of ADOMD queries executed per second (succeeded or failed).
# of ADOMD queries failed / sec	Number of ADOMD failed queries executed per second.

COUNTER	DESCRIPTION
# of all open connection executed / sec	Number of open connection actions executed per second (succeeded or failed).
# of all open connection failed / sec	Number of failed open connection actions executed per second.
# of all queries executed / sec	Number of queries executed per second (succeeded or failed).
# of items in the ADO.NET connection pool	Number of items in the ADO.NET connection pool.
# of items in the OLEDB connection pool	Number of items in the OLEDB connection pool.
# of items in the Service Bus pool	Number of items in the Service Bus pool.
# of Mashup open connection executed / sec	Number of Mashup open connection actions executed per second (succeeded or failed).
# of Mashup open connection failed / sec	Number of Mashup open connection actions failed per second.
# of Mashup queries executed / sec	Number of Mashup queries executed per second (succeeded or failed).
# of Mashup queries failed / sec	Number of Mashup failed queries executed per second
# of multiple result set OLEDB queries failed / sec	Number of multiple resultset OLEDB failed queries executed per second.
# of OLEDB multiple resultset queries executed / sec	Number of OLEDB multiple resultset queries executed per second (succeeded or failed).
# of OLEDB open connection executed / sec	Number of OLEDB open connection actions executed per second (succeeded or failed).
# of OLEDB open connection failed / sec	Number of OLEDB open connection actions failed per second.
# of OLEDB queries executed / sec	Number of OLEDB multiple resultset queries executed per second (succeeded or failed).
# of OLEDB queries failed / sec	Number of OLEDB mutiple resultset failed queries executed per second.
# of OLEDB single resultset queries executed / sec	Number of OLEDB single resultset queries executed per second (succeeded or failed).
# of queries failed / sec	Number of failed queries executed per second.
# of single result set OLEDB queries failed / sec	Number of single resultset OLEDB failed queries executed per second.

Reviewing slow performing queries

You may find that response through the gateway is slow. This could be for DirectQuery queries or when refreshing

your imported dataset. You can enable additional logging to output queries and their timings to help understand what is performing slow. When you find a long running query, it may require additional modification on your data source to tune query performance. For example, adjusting indexes for a SQL Server query.

You will need to modify two configuration files to determine the duration of a query.

Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config

Within the *Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config* file, change the `EmitQueryTraces` value from `False` to `True`. This file is located, by default, at `C:\Program Files\On-premises data gateway`. Enabling `EmitQueryTraces` will begin to log queries that are sent from the gateway to a data source.

IMPORTANT

Enabling `EmitQueryTraces` could increase the log size significantly depending on gateway usage. Once you are done reviewing the logs, you will want to set `EmitQueryTraces` to `False`. It is not recommended to leave this setting enabled long term.

```
<setting name="EmitQueryTraces" serializeAs="String">
  <value>True</value>
</setting>
```

Example query entry

```
DM.EnterpriseGateway Information: 0 : 2016-09-15T16:09:27.2664967Z DM.EnterpriseGateway 4af2c279-1f91-4c33-ae5e-b3c863946c41 d1c77e9e-3858-4b21-3e62-1b6eaf28b176 MGEQ c32f15e3-699c-4360-9e61-2cc03e8c8f4c FF59BC20 [DM.GatewayCore] Executing query (timeout=224) "<pi>
SELECT
TOP (1000001) [t0].[ProductCategoryName],[t0].[FiscalYear],SUM([t0].[Amount])
AS [a0]
FROM
(
(select [Table].[ProductCategoryName] as [ProductCategoryName],
[Table].[ProductSubcategory] as [ProductSubcategory],
[Table].[Product] as [Product],
[Table].[CustomerKey] as [CustomerKey],
[Table].[Region] as [Region],
[Table].[Age] as [Age],
[Table].[IncomeGroup] as [IncomeGroup],
[Table].[CalendarYear] as [CalendarYear],
[Table].[FiscalYear] as [FiscalYear],
[Table].[Month] as [Month],
[Table].[OrderNumber] as [OrderNumber],
[Table].[LineNumber] as [LineNumber],
[Table].[Quantity] as [Quantity],
[Table].[Amount] as [Amount]
from [dbo].[V_CustomerOrders] as [Table])
)
AS [t0]
GROUP BY [t0].[ProductCategoryName],[t0].[FiscalYear] </pi>"
```

Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config

Within the *Microsoft.PowerBI.DataMovement.Pipeline.Diagnostics.dll.config* file, change the `TraceVerbosity` value from `4` to `5`. This file is located, by default, at `C:\Program Files\On-premises data gateway`. Changing this setting will begin to log verbose entries to the gateway log. This includes entries that show duration.

IMPORTANT

Enabling TraceVerbosity to `5` could increase the log size significantly depending on gateway usage. Once you are done reviewing the logs, you will want to set TraceVerbosity to `4`. It is not recommended to leave this setting enabled long term.

```
<setting name="TracingVerbosity" serializeAs="String">  
  <value>5</value>  
</setting>
```

Activity Types

ACTIVITY TYPE	DESCRIPTION
MGEQ	Queries executed over ADO.NET. This includes DirectQuery data sources.
MGEO	Queries executed over OLEDB. This includes SAP HANA and Analysis Services 2016.
MGEM	Queries executed from the Mashup engine. This is used with imported datasets that use scheduled refresh or refresh on-demand.

Determine the duration of a query

To determine the time it took to query the data source, you can do the following.

1. Open the gateway log.
2. Search for an [Activity Type](#) to find the query. An example of this would be MGEQ.
3. Make note of the second GUID as this is the request id.
4. Continue to search for MGEQ until you find the `FireActivityCompletedSuccessfullyEvent` entry with the duration. You can verify the entry has the same request id. Duration will be in milliseconds.

```
DM.EnterpriseGateway Verbose: 0 : 2016-09-26T23:08:56.7940067Z DM.EnterpriseGateway baf40f21-2eb4-  
4af1-9c59-0950ef11ec4a 5f99f566-106d-c8ac-c864-c0808c41a606 MGEQ 21f96cc4-7496-bfdd-748c-  
b4915cb4b70c B8DFCF12 [DM.Pipeline.Common.TracingTelemetryService] Event:  
FireActivityCompletedSuccessfullyEvent (duration=5004)
```

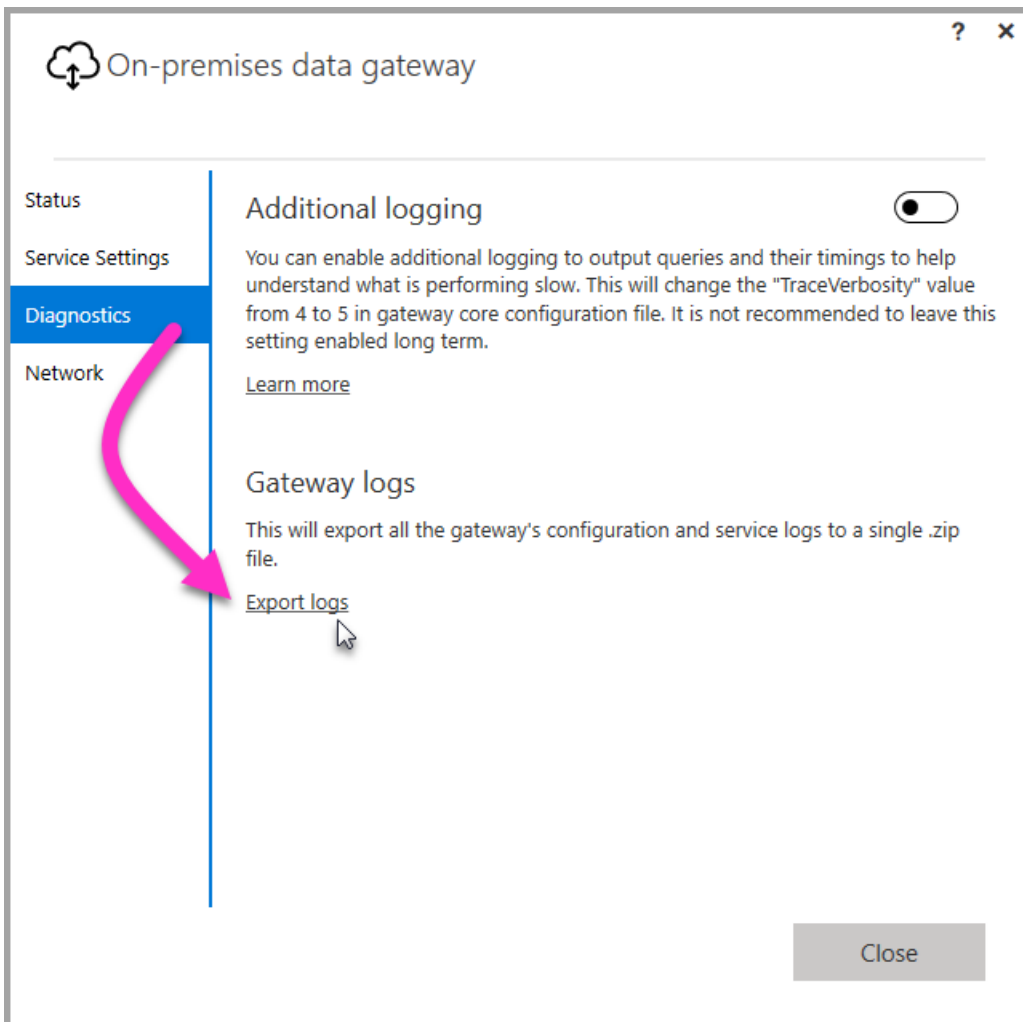
NOTE

`FireActivityCompletedSuccessfullyEvent` is a verbose entry. This entry will not be logged unless TraceVerbosity is at level 5.

Tools for troubleshooting

Collecting logs from the gateway configurator

There are several logs you can collect for the gateway, and you should always start with the logs. The simplest way to collect logs after installing the gateway is through the user interface. In the **On-premises data gateway** user interface, select **Diagnostics** and then select the **Export logs** link near the bottom of the page, as shown in the following image.



Installer logs

%localappdata%\Temp\On-premises_data_gateway_*.log

Configuration logs

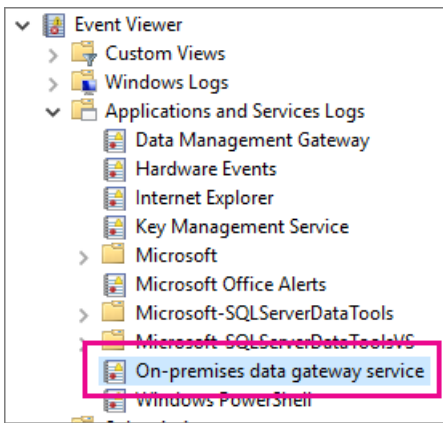
%localappdata%\Microsoft\On-premises Data Gateway\GatewayConfigurator*.log

On-premises data gateway service logs

C:\Users\PBIEgwService\AppData\Local\Microsoft\On-premises Data Gateway\Gateway*.log

Event Logs

The **On-premises data gateway service** event logs are present under **Application and Services Logs**.



Fiddler Trace

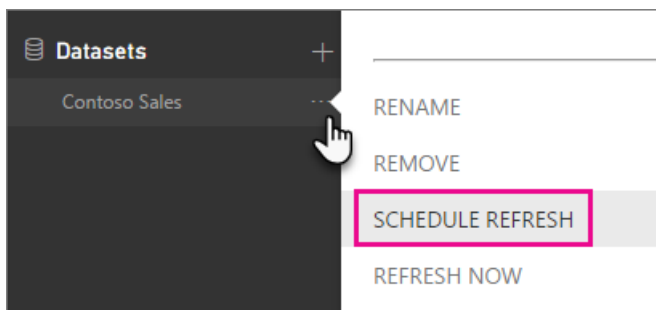
Fiddler is a free tool from Telerik that monitors HTTP traffic. You can see the back and forth with the Power BI service from the client machine. This may show errors and other related information.

8	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/gateways/discover
9	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/aggregateDataSource/147516?testConnection=true
11	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/content/packages/147029/refresh/
13	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
14	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe
16	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/dashboard/95433/tiles
17	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
18	-	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe

Refresh History

When using the gateway for scheduled refresh, **Refresh History** can help you see what errors have occurred, as well as provide useful data if you should need to create a support request. You can view both scheduled, as well as on demand, refreshes. Here is how you can get to the **Refresh History**.

1. In the Power BI navigation pane, in **Datasets**, select a dataset > Open Menu > **Schedule Refresh**.



2. In **Settings for...** > **Schedule Refresh**, select **Refresh History**.



Refresh history

Scheduled OneDrive

Details	Type	Start	End	Status	Failure message
	On demand	7/5/2016, 5:30:12 PM	7/5/2016, 5:30:51 PM	Completed	

For additional information about troubleshooting refresh scenarios, take a look at the [Troubleshooting Refresh Scenarios](#) article.

Next steps

[Configuring proxy settings for the Power BI gateways](#)

[On-premises data gateway](#)

[On-premises data gateway - in-depth](#)

[Manage your data source - Analysis Services](#)

[Manage your data source - SAP HANA](#)

[Manage your data source - SQL Server](#)

[Manage your data source - Import/Scheduled refresh](#)

More questions? [Try the Power BI Community](#)

Power BI Gateway - Personal

12/6/2017 • 11 min to read • [Edit Online](#)

NOTE

There is a new version of the personal gateway for Power BI called the **on-premises data gateway (personal mode)**. The following article describes the previous version of the personal gateway, called **Power BI Gateway - Personal**, which will be retired and stop working after July 31, 2017. For information about the new version of the personal gateway, including how to install the new version, see the [On-premises data gateway \(personal mode\) article](#).

The **Power BI Gateway - Personal** acts as a bridge, providing quick and secure data transfer between the Power BI service and on-premises data sources that support [refresh](#). This article is meant to provide you with an in-depth understanding of how the gateway works and whether or not a gateway is necessary for you. We've also put together this [helpful video](#) about the personal gateway.

It installs and runs as a service on your computer. As a service, it runs using a Windows account you specify during configuration. In some cases, the Gateway runs as an application. We'll go into more about that later.

When Power BI refreshes data from an on-premises data source, the gateway assures your Power BI account has the right permissions to connect to and query data from the source.

Data transfer between Power BI and the gateway is secured through [Azure Service Bus](#). The Service Bus creates a secure channel between the Power BI service and your computer. Because the gateway provides this secure connection, there's usually no need to open a port in your firewall.

Before we go into details about the gateway, let's look at some terms used in Power BI:

A *dataset* is data uploaded into the Power BI service from an online or on-premises data source. You create a dataset when you use Get Data to connect to and upload data. Datasets appear in the My Workspace pane of your Power BI Workspace in your browser. When you create reports and pin tiles to your dashboards, you're looking at data from your datasets.

A *data source* is where the data you upload into a dataset really comes from. It can be just about anything; a database, Excel worksheet, Web service, etc. With Excel workbooks, you can create a simple worksheet with rows of data, and that is considered a data source. You can also use Power Query or Power Pivot in Excel to connect to and query data from both online and on-premises data sources, all in the same workbook. With Power BI Desktop, you use Get Data to connect to and query data from both online and on-premises data sources.

The personal gateway is installed through the on-premises data gateway. You can download it on the [Power BI Gateway page](#).

Do I need a gateway?

Before you install a gateway, it's important to know whether or not you really need one. It really depends on your data sources:

On-premises data sources

A personal gateway *is required* in order to refresh datasets that get data from a supported on-premises data source in your organization.

With a gateway, REFRESH NOW and SCHEDULE REFRESH are supported for datasets uploaded from:

- Microsoft Excel 2013 (or later) workbooks where Power Query or Power Pivot is used to connect to and query data from a supported on-premises data source. All on-premises data sources shown in Get External Data in Power Query or Power Pivot support refresh except for Hadoop file (HDFS) and Microsoft Exchange.
- Microsoft Power BI Desktop files where Get Data is used to connect to and query data from a supported on-premises data source. All on-premises data sources shown in Get Data support refresh except for Hadoop file (HDFS) and Microsoft Exchange.

Online data sources

A gateway *is only required* if you are using the [Web.Page](#) function. In other cases, a gateway is *not* required in order to refresh datasets that get data only from an online data source.

NOTE

If you are using the [Web.Page](#) function, you only need a gateway if you have republished the dataset or your report after November 18th, 2016.

REFRESH NOW and SCHEDULE REFRESH are supported without a gateway for datasets uploaded from:

- Content packs from online data sources (content packs\services). By default, datasets from content packs are automatically updated once a day, but you can also refresh manually or setup a refresh schedule.
- Microsoft Excel 2013 (or later) workbooks where Power Query or Power Pivot is used to connect to and query data from an online data source.
- Microsoft Power BI Desktop files where Get Data is used to connect to and query data from an online data source.

Question: What if my Excel workbook or Power BI Desktop file gets data from both online and on-premises data sources?

Answer: A gateway *is* required. You will need to install and configure a gateway in order to refresh data from your on-premises data sources.

Question: What if my Excel workbook just has rows of data I typed in?*

Answer: A gateway *is not* required. You only need to install and configure a gateway if your workbook uses Power Query or Power Pivot to query and load data to the data model from a supported on-premises data source

Setting up a gateway for the first time

Setting up a gateway for the first time is a three step process:

1. Download and install a gateway
2. Configure the gateway
3. Sign in to data sources in Power BI

Let's take a closer look at each step.

Download and install a gateway

NOTE

There is a new version of the personal gateway for Power BI, called the **on-premises data gateway (personal mode)**. This article describes the previous version of the personal gateway, called **Power BI Gateway - Personal**, which will be retired and stop working after July 31, 2017. For information about the new version of the personal gateway, including how to install the new version, see the [On-premises data gateway \(personal mode\) article](#).

You'll be prompted to install a gateway when you click on **REFRESH NOW** or **SCHEDULE REFRESH** for a supported dataset for the first time. Or, to download the gateway, select **Data Gateway** under the Downloads menu. Download the [on-premises data gateway](#).

You will want to select **Personal Gateway** instead of **On-premises data gateway** to have a gateway that is for yourself.

There's really not much to installing a gateway. You'll select a location to install to, and read and accept the license agreement just like any other application. There are however some important things to know. In particular, the type of computer you install the gateway on and the type of account you're logged in to Windows with on that computer.

NOTE

The gateway needs to have access to the data source. If your personal machine cannot connect to the data source, you may want to consider installing an [on-premises data gateway](#) on a machine that does have access to the data source. An example of this would be SQL Server installed on a virtual machine (VM) hosted in Azure. Your personal machine may not have access to the VM. You could install the on-premises data gateway on the VM instead, and configure the a data source within the Power BI service.

Computer type

The type of computer you install the gateway on is important.

NOTE

The personal gateway is supported only on 64-bit Windows operating systems.

On a laptop computer - In order for a scheduled refresh to occur, the gateway needs to be up and running. Laptop computers are usually shut down or asleep more than they're running. If you install your gateway on a laptop, be sure to set your scheduled refresh times for when the laptop will be running. If it isn't, the refresh will not be attempted again until the next scheduled refresh time.

On a desktop computer – Not many issues here. Just make sure the computer and the gateway is running at your scheduled refresh times. Many desktop computers go to sleep, scheduled refresh cannot occur if it's asleep.

Once you install a gateway, you won't have to install another. One gateway will work for any number of supported datasets. You also don't have to install the gateway on the same computer you upload your workbook and Power BI Desktop files from. Here's an example: Let's say you have an Excel workbook that connects to a SQL Server data source in your organization. You used Get Data in Power BI to upload the workbook from your laptop computer. You also have a desktop computer you leave running all the time, and you've installed and configured a gateway on that computer. In Power BI, you've signed in to your data sources, and you've setup a refresh schedule for the dataset. When a scheduled refresh time comes, Power BI makes a secure connection to the gateway installed on your desktop computer. It then securely connects to the data sources to get updates. For refresh, there's no communication with the original workbook you uploaded from your laptop computer.

NOTE

You can install the personal and enterprise gateways on the same computer.

Windows account

When you install the gateway, you'll be logged in to your computer using your Windows account. The type of permissions your Windows account has will have an effect on how the gateway is installed and how it is run in Windows.

When you're logged into Windows:

	WITH ADMINISTRATOR PERMISSIONS	WITHOUT ADMINISTRATOR PERMISSIONS
Power BI Gateway - Personal runs as a	Service	Application
Scheduled Refresh	As long as your computer and the gateway service is running, you do not have to be logged in at the scheduled refresh time.	You must be logged in to your computer at the scheduled refresh time.
Change Windows account password	You must change your Password in the gateway service. If the account password used by the gateway is no longer valid, refresh will fail.	The gateway will always run using the account and password you are currently logged in with. If you aren't logged in to Windows, the gateway will not be running and refresh will fail.

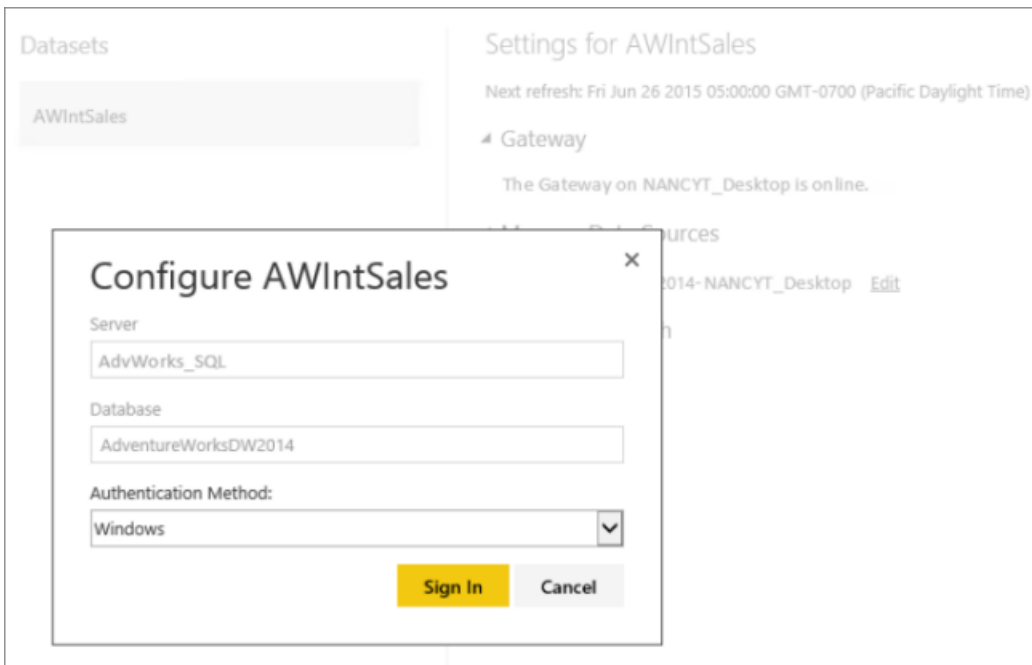
Configure the gateway

When the Installation Wizard finishes, you'll be prompted to launch the Configuration Wizard. There's really not much to configuring a gateway. You'll need to sign in to Power BI from the Wizard. This is necessary for the Wizard to establish a connection with your Power BI account in the Power BI service.

If you're logged in to Windows with an account with Administrator permissions, you'll be asked to enter your Windows account credentials. You can specify a different Windows account, but remember the permissions determine how the gateway is run. The gateway service will run using this account.

Sign in to data sources

Once the Configuration Wizard finishes and your gateway is up and running, you'll have to specify an Authentication type and sign in to each of your dataset's data sources. You'll complete this step in Power BI.



You only need to specify an authentication type and sign in to a data source once. You sign in from the **Manage Data Sources** section in a dataset's Settings screen. If you have multiple data sources, you'll have to sign in to each one. The gateway determines a default Authentication type depending on the data source. In most cases, it's Windows authentication; however, in some cases, your data source might require a different authentication type. If you're unsure, check with your data source administrator.

Up and running!

When your gateway is up and running, you can click SCHEDULE REFRESH for a dataset where you'll see your dataset's Settings page.

Settings for AWIntSales 1

Last refresh succeeded : Wed Jun 17 2015 10:12:56 GMT-0700 (Pacific Daylight Time)
Next refresh: Thu Jun 18 2015 05:00:00 GMT-0700 (Pacific Daylight Time)

Gateway 2

The on-premise Gateway on NANCTT_LT is online.

Manage Data Sources 3

AdventureWorksDW2014- AdvWorks_AS ! [Edit](#)

Schedule Refresh

Keep your data up-to-date 4

Yes

Refresh frequency

Daily

Time Zone

(UTC) Coordinated Universal Time

Time

12 00 PM —

[Add another time](#)

Send refresh failure notification email to me 5

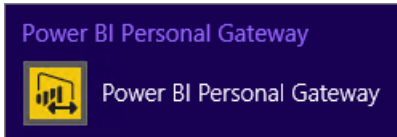
This page shows:

1. Refresh status – Shows refresh success and next scheduled refresh time.
2. **Gateway** - Shows whether or not a gateway is installed and online. If a gateway is installed but not online, Manage Data Sources and Schedule Refresh settings are disabled.
3. **Manage Data Sources** - Shows data sources the dataset connects to. You can Sign in or change the authentication type. You'll only need to Sign in to each data source once.
4. **Schedule Refresh** – You can configure a refresh schedule settings here. If the gateway isn't online, these settings will be disabled.
5. Refresh failure notifications – This option, selected by default, will send an e-mail to you if a scheduled refresh fails.

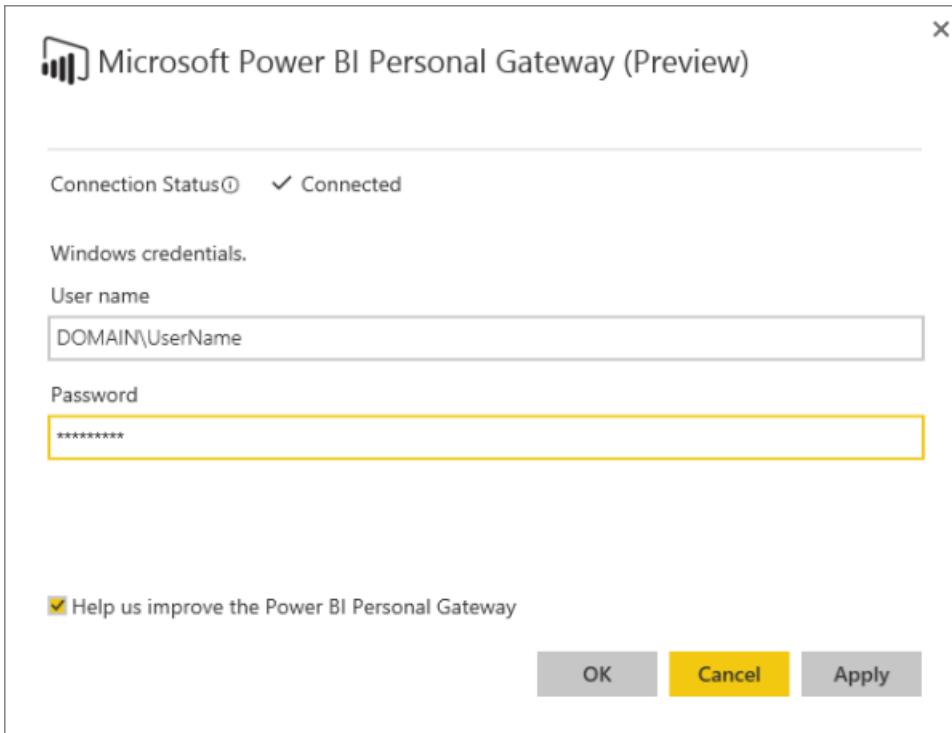
Updating your Windows account password

If you were logged into your computer with a Windows account with administrator privileges when you installed your gateway, it runs as a service using the Windows account you specified in the Configuration Wizard. Most often, this will be the same Windows account you log in to your computer with. When you change your Windows account password, you'll also need to change it in the gateway, otherwise the service might not be running and refresh will fail. To change your Windows account password for the gateway, select the personal gateway icon on

your Windows Desktop Taskbar, or in Apps.



From here, you can update your password and check your gateway's connection status.



Ports

The gateway communicates on outbound ports: TCP 443 (default), 5671, 5672, 9350 thru 9354. The gateway does not require inbound ports.

DOMAIN NAMES	OUTBOUND PORTS	DESCRIPTION
*.powerbi.com	443	HTTPS
*.analysis.windows.net	443	HTTPS
*.login.windows.net	443	HTTPS
*.servicebus.windows.net	5671-5672	Advanced Message Queuing Protocol (AMQP)
*.servicebus.windows.net	443, 9350-9354	Listeners on Service Bus Relay over TCP (requires 443 for Access Control token acquisition)
*.frontend.clouddatahub.net	443	HTTPS
*.core.windows.net	443	HTTPS
login.microsoftonline.com	443	HTTPS

DOMAIN NAMES	OUTBOUND PORTS	DESCRIPTION
login.windows.net	443	HTTPS

If you need to white list IP addresses instead of the domains, you can download and use the Microsoft Azure Datacenter IP ranges list. [Download](#)

Next steps

[On-premises data gateway \(personal mode\) - the new version of the personal gateway](#) [Configuring proxy settings for the Power BI Gateways](#)
[Power BI Premium](#)

More questions? [Try asking the Power BI Community](#)

Use Kerberos for SSO (single sign-on) from Power BI to on-premises data sources

1/10/2018 • 10 min to read • [Edit Online](#)

You can get seamless single sign-on connectivity, enabling Power BI reports and dashboards to update from on-premises data, by configuring your on-premises data gateway with Kerberos. The on-premises data gateway facilitates single sign-on (SSO) using DirectQuery, which it uses to connect to on-premises data sources.

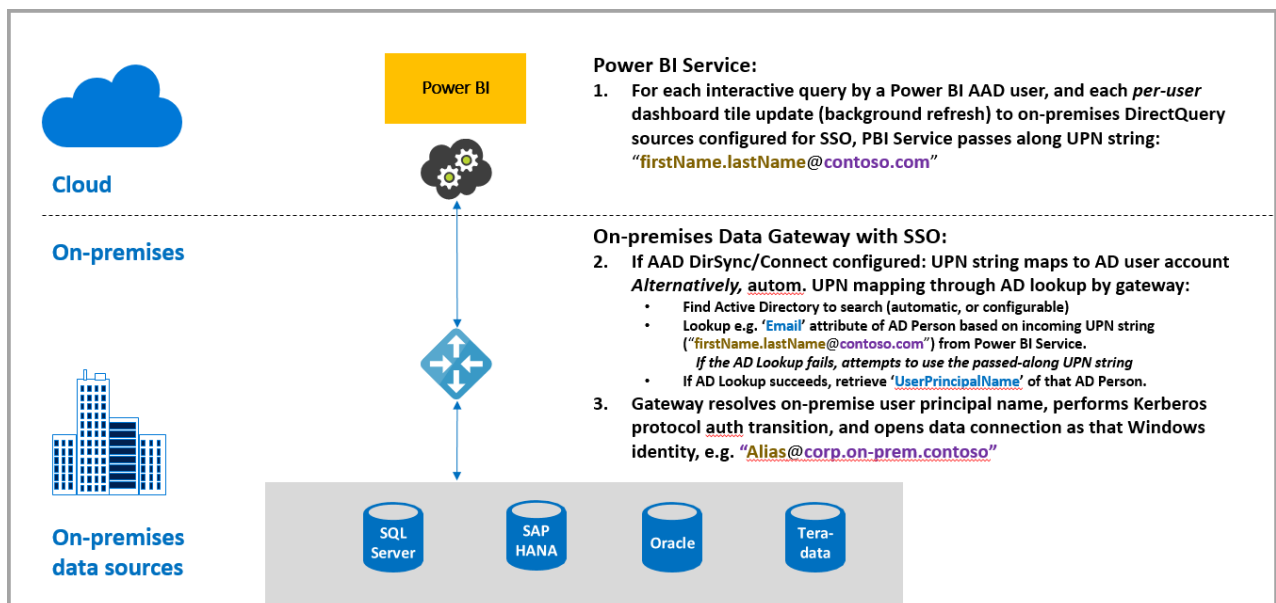
The following data sources are currently supported, SQL Server, SAP HANA, and Teradata, all based on [Kerberos Constrained Delegation](#).

- SQL Server
- SAP HANA
- Teradata

When a user interacts with a DirectQuery report in the Power BI Service, each cross-filter, slice, sorting, and report editing operation can result in queries executing live against the underlying on-premises data source. When single sign-on is configured for the data source, queries execute under the identity of the user interacting with Power BI (that is, through the web experience or Power BI mobile apps). Thereby, each user sees precisely the data for which they have permissions in the underlying data source – with single sign-on configured, there is no shared data caching across different users.

Running a query with SSO - steps that occur

A query that runs with SSO consists of three steps, as shown in the following diagram.



NOTE

SSO for Oracle is not enabled yet, but is under development and coming soon.

Here are additional details about those steps:

1. For each query, the **Power BI service** includes the *user principal name* (UPN) when sending a query request to

the configured gateway.

2. The gateway needs to map the Azure Active Directory UPN to a local Active Directory identity.
 - a. If AAD DirSync (also known as *AAD Connect*) is configured, then the mapping works automatically in the gateway.
 - b. Otherwise, the gateway can look up and map the Azure AD UPN to a local user by performing a lookup against the local Active Directory domain.
3. The gateway service process impersonates the mapped local user, opens the connection to the underlying database and sends the query. The gateway does not need to be installed on the same machine as the database.
 - The user impersonation and connection to the database is only successful if the gateway service account is a domain account (or service SID), and if Kerberos constrained delegation was configured for the database to accept Kerberos tickets from the gateway service account.

NOTE

Regarding the service sid, if AAD DirSync / Connect is configured and user accounts are synchronized, the gateway service does not need perform local AD lookups at runtime, and you can use the local Service SID (instead of requiring a domain account) for the gateway service. The Kerberos constrained delegation configuration steps outlined in this document are the same (just applied based on the service SID, instead of domain account).

NOTE

To enable SSO for SAP HANA, you need to ensure the following HANA-specific configurations are met for SAP:

1. Ensure the SAP HANA server is running version 2.00.022* or higher / later.
2. On the gateway machine, install SAP's latest HANA ODBC driver. The minimum version is HANA ODBC version 2.00.020.00 from August 2017.

The following links to patches and upgrades from SAP may be useful. Note that you must log in to the following resources using your SAP Support account, and that SAP may change or update these links.

- [HANA 2 SPS 01 Rev 012.03](#)
- [HANA 2 SPS 02 Rev 22](#)
- [HANA 1 SP 12 Rev 122.13](#)

Errors from an insufficient Kerberos configuration

If the underlying database server and gateway are not configured properly for **Kerberos Constrained Delegation**, you may receive the following error message:

Couldn't load the data for this visual

Cannot connect to the server.
Please try again later or contact support. If you contact support, please provide these details.

And the technical details associated with the error message may look like the following:

Error Code DM_GWPipeline_Gateway_ServerUnreachable
Underlying error code -2146232060
Correlation ID aa2870df-95fc-cb70-97d1-1c5b0d440f77
Underlying error message A network-related or instance-specific error occurred while establishing a connection to SQL Server. The server was not found or was not accessible. Verify that the instance name is correct and that SQL Server is configured to allow remote connections. (provider: Named Pipes Provider, error: 40 - Could not open a connection to SQL Server)

The result is that because of insufficient Kerberos configuration, the gateway could not impersonate the originating user properly, and the database connection attempt failed.

Preparing for Kerberos Constrained Delegation

Several items must be configured in order for Kerberos Constrained Delegation to work properly, including *Service Principal Names* (SPN) and delegation settings on service accounts.

Prerequisite 1: Install & configure the on-premises data gateway

This release of the on-premises data gateway supports an in-place upgrade, as well as settings take-over of existing gateways.

Prerequisite 2: Run the gateway Windows service as a domain account

In a standard installation, the gateway runs as a machine-local service account (specifically, *NT Service\PBIEgwService*) such as what's shown in the following image:

Name	Description	Status	Startup Type	Log On As
On-premises data gateway service	The on-premises data ...	Running	Automatic	NT SERVICE\PBIEgwService

To enable **Kerberos Constrained Delegation**, the gateway must run as a domain account, unless your AAD is already synchronized with your local Active Directory (using AAD DirSync/Connect). For this account change to work correctly, you have two options:

- If you started with a previous version of the on-premises data gateway, follow precisely all five steps in sequence (including running the gateway configurator in step 3) described in the following article:
 - [Changing the gateway service account to a domain user](#)
 - If you already installed the Preview version of the on-premises data gateway, there is a new UI-guided approach to switch service accounts directly from within the gateway's configurator. See the **Switching the gateway to a domain account** section near the end of this article.

NOTE

If AAD DirSync / Connect is configured and user accounts are synchronized, the gateway service does not need to perform local AD lookups at runtime, and you can use the local Service SID (instead of requiring a domain account) for the gateway service. The Kerberos Constrained Delegation configuration steps outlined in this article are the same as that configuration (they are simply applied based on the service SID, instead of domain account).

Prerequisite 3: Have domain admin rights to configure SPNs (SetSPN) and Kerberos Constrained Delegation settings

While it is technically possible for a domain administrator to temporarily or permanently allow rights to someone else to configure SPNs and Kerberos delegation, without requiring domain admin rights, that's not the recommended approach. In the following section, the configuration steps necessary for **Pre-requisite 3** in detail.

Configuring Kerberos Constrained Delegation for the gateway and

data source

To properly configure the system, we need to configure or validate the following two items:

1. If needed, configure an SPN for the gateway service domain account (if none are created yet).
2. Configure delegation settings on the gateway service domain account.

Note that you must be a domain administrator to perform those two configuration steps.

The following sections describe these steps in turn.

Configure an SPN for the gateway service account

First, determine whether an SPN was already created for the domain account used as the gateway service account, but following these steps:

1. As a domain administrator, launch **Active Directory Users and Computers**
2. Right-click on the domain, select **Find**, and type in the account name of the gateway service account
3. In the search result, right-click on the gateway service account and select **Properties**.
 - If the **Delegation** tab is visible on the **Properties** dialog, then an SPN was already created and you can jump ahead to the next subsection about configuring Delegation settings.

If there is no **Delegation** tab on the **Properties** dialog, you can manually create an SPN on that account which adds the **Delegation** tab (that is the easiest way to configure delegation settings). Creating an SPN can be done using the [setspn tool](#) that comes with Windows (you need domain admin rights to create the SPN).

For example, imagine the gateway service account is "PBIegwTest\GatewaySvc", and the machine name with the gateway service running is called **Machine1**. To set the SPN for the gateway service account for that machine in this example, you would run the following command:

```
setspn -a gateway/machine1 PBIegwTest\GatewaySvc
```

With that step completed, we can move on to configuring delegation settings.

Configure delegation settings on the gateway service account

The second configuration requirement is the delegation settings on the gateway service account. There are multiple tools you can use to perform these steps. In this article, we'll use **Active Directory Users and Computers**, which is a Microsoft Management Console (MMC) snap-in that you can use to administer and publish information in the directory, and available on domain controllers by default. You can also enable it through **Windows Feature** configuration on other machines.

We need to configure **Kerberos Constrained Delegation** with protocol transiting. With constrained delegation, you must be explicit with which services you want to delegate to – for example, only your SQL Server or your SAP HANA server will accept delegation calls from the gateway service account.

This section assumes you have already configured SPNs for your underlying data sources (such as SQL Server, SAP HANA, Teradata, so on). To learn how to configure those data source server SPNs, please refer to technical documentation for the respective database server. You can also look at the blog post that describes [What SPN does your app require?](#)

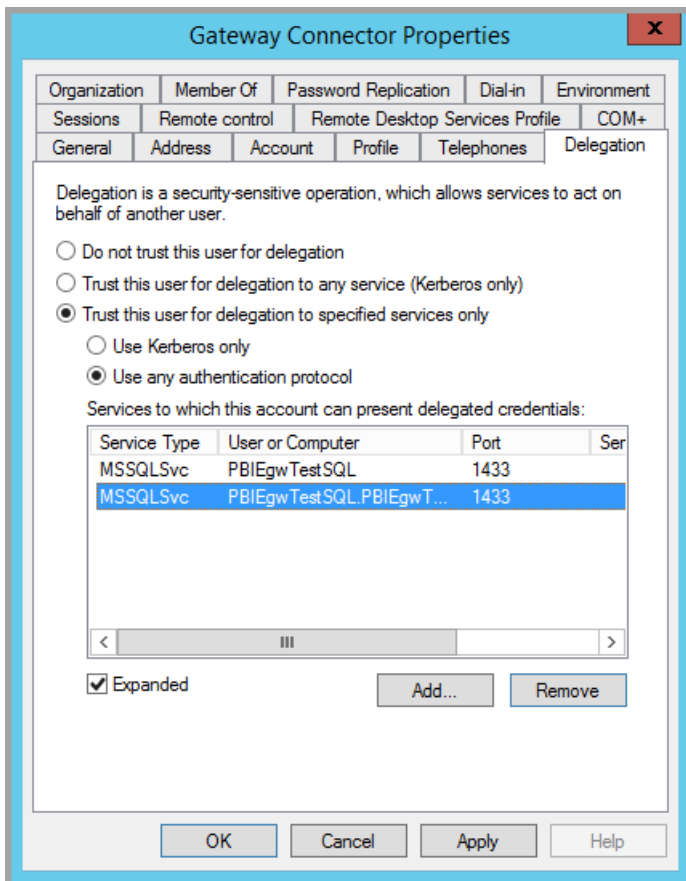
In the following steps we assume an on-premises environment with two machines: a gateway machine and a database server (SQL Server database), and for the sake of this example we'll also assume the following settings and names:

- Gateway machine name: **PBIegwTestGW**
- Gateway service account: **PBIegwTest\GatewaySvc** (account display name: Gateway Connector)

- SQL Server data source machine name: **PBIEgwTestSQL**
- SQL Server data source service account: **PBIEgwTest\SQLService**

Given those example names and settings, the configuration steps are the following:

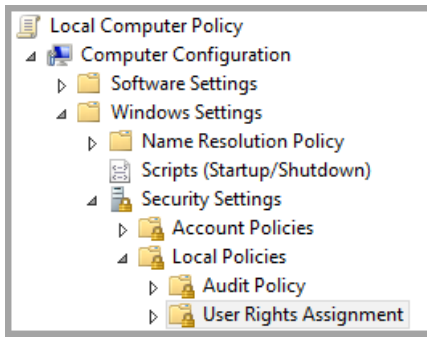
1. With domain administrator rights, launch **Active Directory Users and Computers**.
2. Right-click on the gateway service account (**PBIEgwTest\GatewaySvc**) and select **Properties**.
3. Select the **Delegation** tab.
4. Select **Trust this computer for delegation to specified services only**.
5. Select **Use any authentication protocol**.
6. Under the **Services to which this account can present delegated credentials**: select **Add**.
7. In the new dialog, select **Users or Computers**.
8. Enter the service account for the SQL Server Database service (**PBIEgwTest\SQLService**) and select **OK**.
9. Select the SPN that you created for the database server. In our example, the SPN will begin with **MSSQLSvc**. If you added both the FQDN and the NetBIOS SPN for your database service, select both. You may only see one.
10. Select **OK**. You should see the SPN in the list now.
11. Optionally, you can select **Expanded** to show both the FQDN and NetBIOS SPN in
12. The dialog will look similar to the following if you checked **Expanded**.



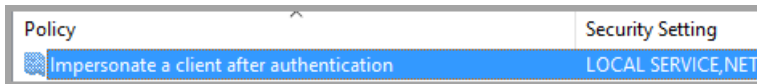
13. Select **OK**.

Finally, on the machine running the gateway service (**PBIEgwTestGW** in our example), the gateway service account must be granted the local policy "Impersonate a client after authentication". You can perform/verify this with the Local Group Policy Editor (**gpedit**).

14. On the gateway machine, run: `gpedit.msc`
15. Navigate to **Local Computer Policy > Computer Configuration > Windows Settings > Security Settings > Local Policies > User Rights Assignment**, as shown in the following image.



16. From the list of policies under **User Rights Assignment**, select **Impersonate a client after authentication**.



Right-click and open the **Properties** for **Impersonate a client after authentication** and check the list of accounts. It must include the gateway service account (**PBIEgwTest\GatewaySvc**).

17. From the list of policies under **User Rights Assignment**, select **Act as part of the operating system (SeTcbPrivilege)**. Ensure that the gateway service account is included in the list of accounts as well.
18. Restart the **on-premises data gateway** service process.

Running a Power BI report

After all the configuration steps outlined earlier in this article have been completed, you can use the **Manage Gateway** page in Power BI to configure the data source, and under its **Advanced Settings**, enable SSO, then publish reports and datasets binding to that data source.

Data Source Name
PBIEgwTestSQL.ContosoRetailDW

Data Source Type
SQL Server

Server
PBIEgwTestSQL

Database
ContosoRetailDW

Authentication Method
Windows

The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Username
.....

Password
.....

Advanced settings

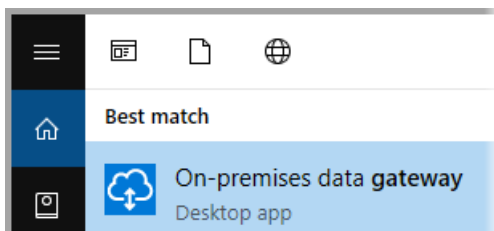
Use SSO via Kerberos for DirectQuery queries
This will only be applied for DirectQuery queries. Import will use the Username and Password specified in the data source details [Learn more](#)

This configuration will work in most cases. However, with Kerberos there can be different configurations depending on your environment. If the report still won't load, you'll need to contact your domain administrator to investigate further.

Switching the gateway to a domain account

Earlier in this article, we discussed switching the gateway from a local service account to run as a domain account, using the **on-premises data gateway** user interface. Here are the steps necessary to do so.

1. Launch the **on-premises data gateway** configuration tool.



2. Select the **Sign-in** button on the main page, and sign in with your Power BI account.
3. After sign-in is completed, select the **Service Settings** tab.
4. Click **Change account** to start the guided walk-through, as shown in the following figure.

On-premises data gateway

Status

Service Settings

Diagnostics

Network

Restart the gateway

It is recommended to restart the gateway everytime you make changes to the gateway configuration files.

[Restart now](#)

Gateway service account

This will change the account of the gateway is running under. The gateway is running as NT SERVICE\PBIEgwService.

[Change account](#)

Next steps

For more information about the **on-premises data gateway** and **DirectQuery**, check out the following resources:

- [On-premises data gateway](#)
- [DirectQuery in Power BI](#)
- [Data sources supported by DirectQuery](#)
- [DirectQuery and SAP BW](#)
- [DirectQuery and SAP HANA](#)

Configuring proxy settings for the on-premises data gateway

11/22/2017 • 2 min to read • [Edit Online](#)

Your work environment may require that you go through a proxy to access the internet. This could prevent the on-premises data gateway from connecting to the service.

Does your network use a proxy?

The following post on superuser.com discusses how you can try to determine if you have a proxy on your network.

[How do I know what proxy server I'm using? \(SuperUser.com\)](#)

Configuration file location and default configuration

Proxy information is configured within a .NET configuration file. The location, and file names, will be different depending on the gateway you are using.

On-premises data gateway

There are two main configuration files that are involved with the on-premises data gateway.

Configuration

The first is for the configuration screens that actually configure the gateway. If you are having issues configuring the gateway, this is the file you will want to look at.

```
C:\Program Files\On-premises data gateway\enterprisegatewayconfigurator.exe.config
```

Windows Service

The second is for the actual windows service that interacts with the Power BI service, and handles the requests.

```
C:\Program Files\On-premises data gateway\Microsoft.PowerBI.EnterpriseGateway.exe.config
```

Configuring proxy settings

The default proxy configuration is the following.

```
<system.net>
  <defaultProxy useDefaultCredentials="true" />
</system.net>
```

The default configuration works with Windows authentication. If your proxy uses another form of authentication, you will need to change the settings. If you are not sure, you should contact your network administrator.

To learn more about the configuration of the proxy elements for .NET configuration files, see [defaultProxy Element \(Network Settings\)](#).

Changing the gateway service account to a domain user

When configuring the proxy settings to use default credentials, as explained above, you may encounter authentication issues with your proxy. This is because the default service account is the Service SID and not an authenticated domain user. You can change the service account of the gateway to allow proper authentication with your proxy.

NOTE

It is recommended that you use a managed service account to avoid having to reset passwords. Learn how to create a [managed service account](#) within Active Directory.

Change the on-premises data gateway service account

1. Change the Windows service account for the **on-premises data gateway service**.

The default account for this service is *NT SERVICE\PBIEgwService*. You will want to change this to a domain user account within your Active Directory domain. Or, you will want to use a managed service account to avoid having to change the password.

You will want to change the account on the **Log On** tab within the properties of the Windows service.

2. Restart the **on-premises data gateway service**.

From an admin command prompt, issue the following commands.

```
net stop PBIEgwService  
  
net start PBIEgwService
```

3. Start the **on-premises data gateway configurator**. You can select the windows start button and search for *on-premises data gateway*.
4. Sign in to Power BI.
5. Restore the gateway using your recovery key.

This will allow the new service account to be able to decrypt stored credentials for data sources.

Next steps

[On-premises data gateway \(personal mode\) Firewall information](#)

More questions? [Try the Power BI Community](#)

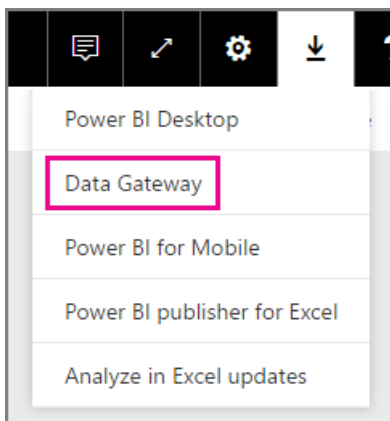
Manage your data source - Analysis Services

1/25/2018 • 11 min to read • [Edit Online](#)

Once you have installed the on-premises data gateway, you will need to add data sources that can be used with the gateway. This article will look at how to work with gateways and data sources. You can use the Analysis Services data source either for scheduled refresh or for live connections.

Download and install the gateway

You can download the gateway from the Power BI service. Select **Downloads** > **Data Gateway**, or by going to the [gateway download page](#).



Limitations of Analysis Services live connections

You can use a live connection against tabular or multidimensional instances.

SERVER VERSION	REQUIRED SKU
2012 SP1 CU4 or later	Business Intelligence and Enterprise SKU
2014	Business Intelligence and Enterprise SKU
2016	Standard SKU or higher

- Cell level Formatting and translation features are not supported.
- Actions and Named Sets are not exposed to Power BI, but you can still connect to multidimensional cubes that also contain Actions or Named sets and create visuals and reports.

Add a gateway


To add a gateway, simply [download](#) and install the gateway on a server in your environment. After you have installed the gateway, it will show in the lists of gateways under **Manage gateways**.

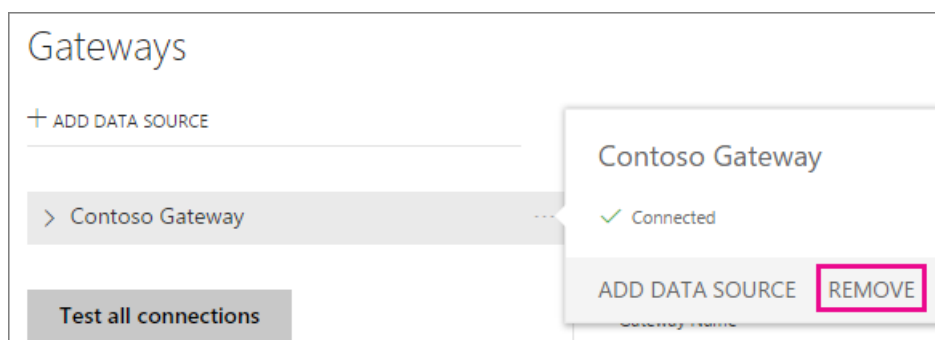
NOTE

Manage gateways will not show up until you are the admin of at least one gateway. This can happen either by being added as an admin or you installing and configuring a gateway.

Remove a gateway

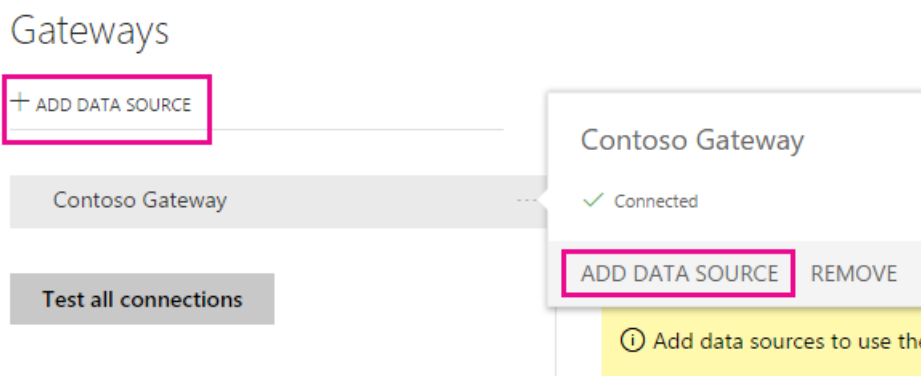
Removing a gateway will also delete any data sources under that gateway. This will also break any dashboards and reports that rely on those data sources.

1. Select the gear icon  in the upper-right corner > **Manage gateways**.
2. Gateway > **Remove**

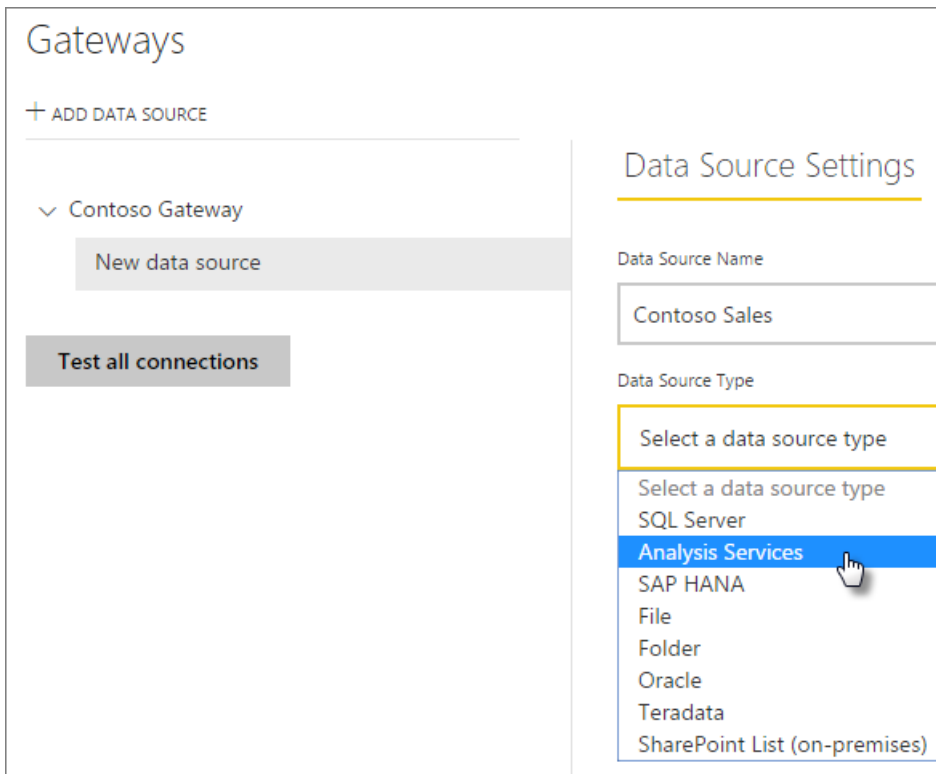


Add a data source

You can add a data source by either selecting a gateway and click **Add data source**, or go to Gateway > **Add data source**.



You can then select the **Data Source Type** from the list. Select Analysis Services if you are connecting to either a Multidimensional or Tabular server.



You will then want to fill in the information for the data source which includes the **Server** and the **Database**.

The **Username** and **Password** that you enter will be used by the gateway to connect to the Analysis Services instance.

NOTE

The Windows account you enter must have Server Administrator permissions for the instance you are connecting to. If this account's password is set to expire, users could get a connection error if the password isn't updated for the data source. For more information, see the main on-premises data gateway article to learn more about how [credentials](#) are stored.

Data Source Settings

Data Source Name

Data Source Type

Server

Database

The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Username

Password

> Advanced settings

Add Discard

You can click **Add** after you have everything filled in. You can now use this data source for scheduled refresh, or live connections, against an Analysis Services instance that is on premises. You will see *Connection Successful* if it succeeded.

Data Source Settings

Users

✓ Connection Successful

i Next Step: Go to the Users tab above and add users to this Data Source

Data Source Name

Advanced settings

You can configure the privacy level for your data source. This controls how data can be mashed up. This is only used for scheduled refresh. It does not apply to live connections. [Learn more](#)

∨ Advanced settings

Privacy Level setting for this data source

None

Private

Organizational

Public

'Get Data' experience for Analysis Services in Power BI site

A unique option for Analysis Services is to use Get Data within the Power BI service directly. You can connect to a live Analysis Services data source that is configured within the gateway without needing Power BI Desktop. Your account needs to be listed in the **Users** tab for the data source, under the gateway, for it to show up in the list. To connect to the data source, you can do the following.

1. Within the Power BI service, select **Get Data**.
2. Select **Databases**.
3. Select **SQL Server Analysis Services > Connect**.
4. Select a data source from the list. Any Analysis Services data source that you have access to will be listed here.
5. Select the model that you want to connect to. Then select **Connect**.

You will see a dataset show up with the name of the server. You can then select that dataset and begin to create reports on it. This will be working against live data.

Usernames with Analysis Services

Each time a user interacts with a report connected to Analysis Services, the effective username is passed to the gateway and then onto your on-premises Analysis Services server. The email address, that you sign into Power BI with, is what we will pass to Analysis Services as the effective user. This is passed in the connection property [EffectiveUserName](#). This email address should match a defined UPN within the local Active Directory Domain. The UPN is a property of an Active Directory account. That Windows account then needs to be present in an Analysis Services role. If a match cannot be found, in Active Directory, the login will not be successful. [Learn more](#)

You can also map your Power BI sign in name with a local directory UPN. [Learn more](#)

How do I tell what my UPN is?

You may not know what your UPN is, and you may not be a domain administrator. You can use the following command from your workstation to find out the UPN for your account.

```
whoami /upn
```

The result will look similar to an email address, but this is the UPN that is on your domain account. If you are using an Analysis Services data source for live connections, and if this doesn't match the email address you sign into Power BI with, you may want to look at how to [Map user names](#).

Map user names

You can map user names for Analysis Services in two different ways:

1. Manual user re-mapping
2. On-premises Active Directory Property Lookup to remap AAD UPNs to Active Directory users (AD Lookup mapping)

While it's possible to perform manual mapping using the second approach, doing so would be time consuming and difficult to maintain; it's especially difficult when pattern matching doesn't suffice--such as when domain names are different between AAD and on-premises AD, or when user account names are different between AAD and AD. As such, manual mapping with the second approach is not recommended.

We describe these two approaches, in order, in the following two sections

Manual user name re-mapping

For Analysis Services data sources, you can configure custom User Principal Name (UPN) rules. This will help you if your Power BI service login names do not match your local directory UPN. For example, if you sign into Power BI with john@contoso.com, but your local directory UPN is john@contoso.local, you can configure a mapping rule to have john@contoso.local passed to Analysis Services.

To get to the UPN Mapping screen, do the following.

1. Go to the **gear icon** and select **Manage Gateways**.
2. Expand the gateway that contains the Analysis Services data source. Or, if you haven't created the Analysis Services data source, you can do that at this point.
3. Select the data source and then select the **Users** tab.
4. Select **Map user names**.

Map user names

Create rules to map user names to Analysis Services server user names or associate custom data with user names. [Learn more](#)

Select the type of rule for this data source

- Effective user names
 CustomData

	Replace	With
1	Original name	New name

Add

Delete

Enter user name to see how the mapping rule will change it.

Original name

Test rule

After rule applied

Result of applying mapping rule will appear here

OK

Cancel

You will then see options to add rules as well as test for a given user.

NOTE

You may inadvertently change a user that you didn't intend to. For example, if your **Replace (original value)** is *@contoso.com* and your **With (New name)** is *@contoso.local*, all users with a sign in that contains *@contoso.com* will then be replaced with *@contoso.local*. Also, if your **Replace (Original name)** is *dave@contoso.com* and your **With (New name)** is *dave@contoso.local*, a user with the sign in of *v-dave@contoso.com* would be sent as *v-dave@contoso.local*.

AD lookup mapping

To perform on-premises AD property lookup to re-map AAD UPNs to Active Directory users, follow the steps in this section. To begin with, let's review how this works.

In the **Power BI service** the following occurs:

- For each query by a Power BI AAD user to an on-premises SSAS server, a UPN string is passed along, such as: `firstName.lastName@contoso.com`

NOTE

Any manual UPN user mappings defined in the Power BI data source configuration are still applied *before* sending the user name string to the on-premises data gateway.

On the on-premises data gateway with configurable Custom User Mapping, do the following:

1. Find Active Directory to search (automatic, or configurable)
2. Look up the attribute of the AD Person (such as *Email*) based on incoming UPN string ("firstName.lastName@contoso.com") from the **Power BI service**.
3. If the AD Lookup fails, it attempts to use the passed-along UPN as *EffectiveUser* to SSAS.
4. If the AD Lookup succeeds, it retrieves *UserPrincipalName* of that AD Person.
5. It passes the *UserPrincipalName* email as *EffectiveUser* to SSAS, such as: *Alias@corp.on-prem.contoso*

How to configure your gateway to perform the AD Lookup:

1. Download and install the latest gateway
2. In the gateway, you need to change the **on-premises data gateway service** to run with a domain account (instead of a local service account – otherwise the AD lookup won't work properly at runtime). You'll need to restart the gateway service for the change to take effect. Go to the gateway app on your machine (search for "on-premises data gateway"). To do this, go to **Service settings > Change service account**. Make sure you have the recovery key for this gateway, since you'll need to restore it on the same machine unless you want to create a new gateway instead.
3. Navigate to the gateway's installation folder, *C:\Program Files\On-premises data gateway* as an administrator, to ensure that you have write-permissions, and edit the following file:

```
Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config
```

4. Edit the following two configuration values according to *your* Active Directory attribute configurations of your AD users. The configuration values shown below are just examples – you need to specify them based on your Active Directory configuration.

```
<setting name="ADUserNameLookupProperty" serializeAs="String">  
  <value>AADEmail</value>  
</setting>  
<setting name="ADUserNameReplacementProperty" serializeAs="String">  
  <value>UserPrincipalName</value>  
</setting>
```

5. Restart the **on-premises data gateway** service for the configuration change to take effect.

Working with mapping rules

To create a mapping rule, enter a value for **Original name** and **New Name** and then select **Add**.

FIELD	DESCRIPTION
Replace (Original name)	The email address that you signed into Power BI with.
With (New Name)	The value you want to replace it with. The result of the replacement is what will be passed to the <i>EffectiveUserName</i> property for the Analysis Services connection.

Select the type of rule for this data source

Effective user names
 CustomData (coming soon)

	Replace	With
1	@contoso.com	@contoso.local
2	john@us.contoso.com	john@us.contoso.local
3	Original name	New name


Add Delete

When you select an item in the list, you can choose to re-order it by using the **chevron icons**, or **Delete** the entry.

Select the type of rule for this data source

Effective user names
 CustomData (coming soon)

	Replace	With
1	@contoso.com	@contoso.local
2	john@us.contoso.com	john@us.contoso.local
3	Original name	New name


Add **Delete** 

Using wildcard (*)

You can use a wildcard for your **Replace (Original name)** string. It can only be used on its own and not with any other string part. This will allow you to take all users and pass a single value to the data source. This is useful when you want all users in your organization to use the same user in your local environment.

Test a mapping rule

You can validate what an original name will be replaced with by entering a value for **Original name** and selecting **Test rule**.

Add Delete 

Enter user name to see how the mapping rule will change it.

Original name

Test rule

After rule applied

NOTE

Rules that are saved will take a few minutes for the service to start using them. Within the browser, the rule will work immediately.

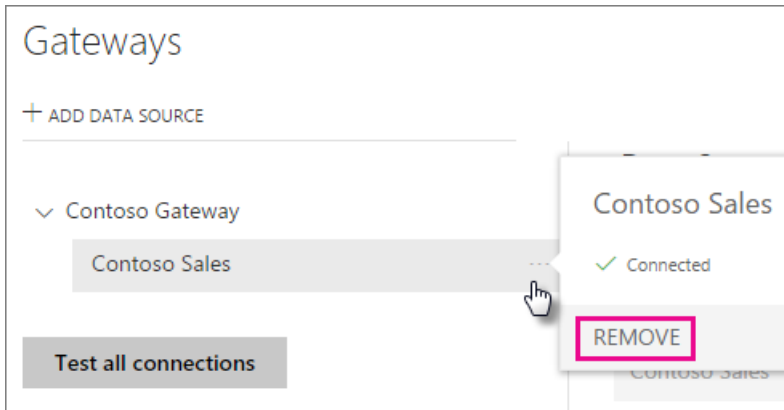
Limitations for mapping rules

- Mapping is for the specific data source that is being configured. It is not a global settings. If you have multiple Analysis Services data sources, you will have to map the users for each data source.

Remove a data source

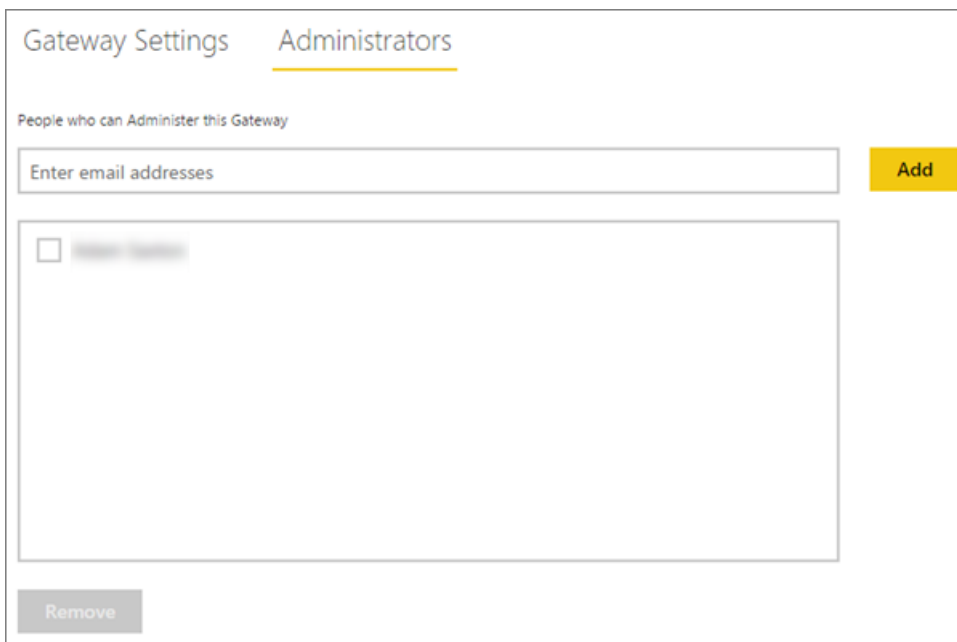
Removing a data source will break any dashboards or reports that rely on the given data source.

To remove a data source, go to Data Source > **Remove**.



Manage administrators

On the Administrators tab for the gateway, you can add and remove users (or security groups) that can administer the gateway.



Manage users

On the Users tab for the data source, you can add, and remove, users, or security groups, that can use this data source.

NOTE

The users list only controls who are allowed to publish reports. The report owners can create dashboards, or content packs, and share those with other users.

Data Source Settings **Users**

People who can publish reports that use this data source

Enter email addresses Add

Adam Saxton

Remove

Using the data source

After you have created the data source, it will be available to use with either live connections, or through scheduled refresh.

NOTE

Server and database name have to match between Power BI Desktop and the data source within the on-premises data gateway!

The link between your dataset and the data source within the gateway is based on your server name and database name. These have to match. For example, if you supply an IP Address for the server name, within Power BI Desktop, you will need to use the IP Address for the data source within the gateway configuration. If you use *SERVER\INSTANCE*, in Power BI Desktop, you will need to use the same within the data source configured for the gateway.

This is the case for both live connections and scheduled refresh.

Using the data source with live connections

You will need to make sure the server and database name matches between Power BI Desktop and the configured data source for the gateway. You will also need to make sure your user is listed in the **Users** tab of the data source in order to publish live connection datasets. The selection, for live connections, occurs within Power BI Desktop when you first import data.

After you publish, either from Power BI Desktop or **Get Data**, your reports should start working. It may take several minutes, after creating the data source within the gateway, for the connection to be usable.

Using the data source with scheduled refresh

If you are listed in the **Users** tab of the data source configured within the gateway, and the server and database name match, you will see the gateway as an option to use with scheduled refresh.

Gateway connection

Use your personal gateway (online, running on)

Use an enterprise gateway

Status	Department	Gateway	Contact information	Description
online		Contoso Gatew...	john@contoso.com	

Apply

Discard

▶ Data source credentials (admin has granted access, credentials are not required)

Next steps

[On-premises data gateway](#)

[On-premises data gateway - in-depth](#)

[Troubleshooting the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

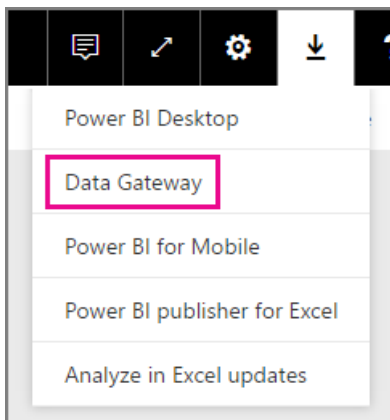
Manage your SAP HANA data source

1/25/2018 • 3 min to read • [Edit Online](#)

Once you have installed the on-premises data gateway, you will need to add data sources that can be used with the gateway. This article will look at how to work with gateways and data sources. You can use the SAP HANA data source either for scheduled refresh or for DirectQuery.

Download and install the gateway

You can download the gateway from the Power BI service. Select **Downloads** > **Data Gateway**, or by going to the [gateway download page](#).



Add a gateway


To add a Gateway, simply [download](#) and install the gateway on a server in your environment. After you have installed the gateway, it will show in the lists of gateways under **Manage gateways**.

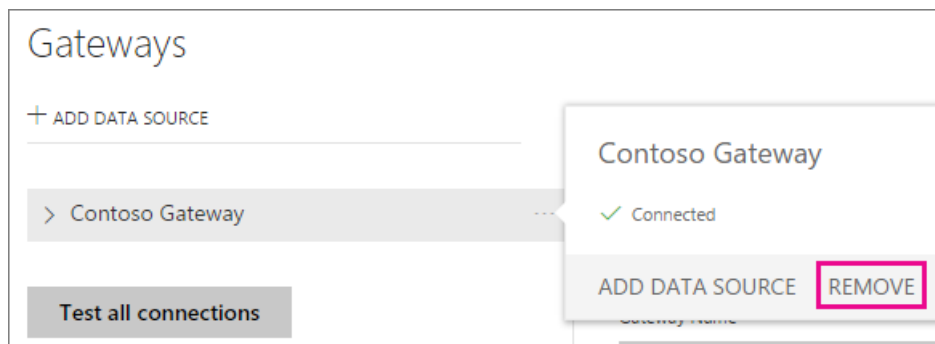
NOTE

Manage gateways will not show up until you are the admin of at least one gateway. This can happen either by being added as an admin or you installing and configuring a gateway.

Remove a gateway

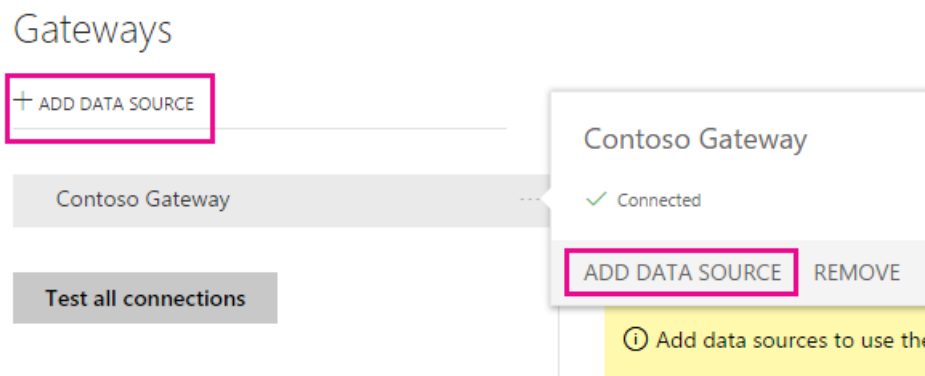
Removing a gateway will also delete any data sources under that gateway. This will also break any dashboards and reports that rely on those data sources.

1. Select the gear icon  in the upper-right corner > **Manage gateways**.
2. Gateway > **Remove**

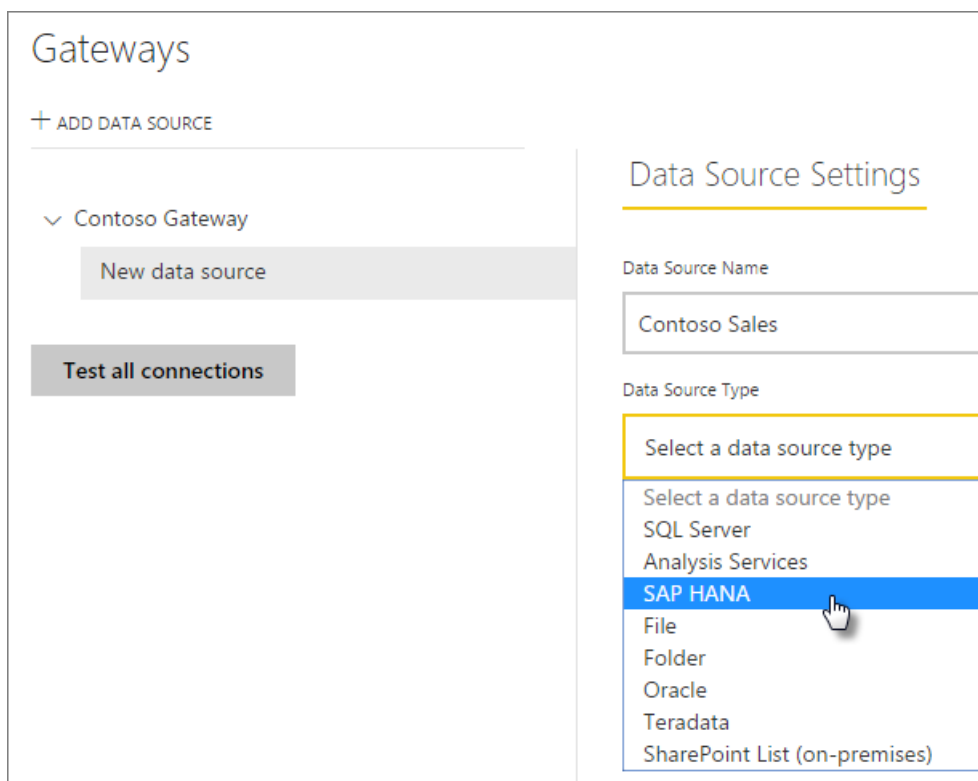


Add a data source

You can add a data source by either selecting a gateway and click **Add data source**, or go to Gateway > **Add data source**.



You can then select the **Data Source Type** from the list.



You will then want to fill in the information for the data source which includes the **Server**, **Username** and **Password**.

NOTE

All queries to the data source will run using these credentials. For more information, see the main on-premises data gateway article to learn more about how [credentials](#) are stored.

Data Source Settings

Data Source Name

Data Source Type

Server

The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Username

Password

> Advanced settings

Add Discard

You can click **Add** after you have everything filled in. You can now use this data source for scheduled refresh, or DirectQuery, against a SAP HANA server that is on-premises. You will see *Connection Successful* if it succeeded.

Data Source Settings

Users

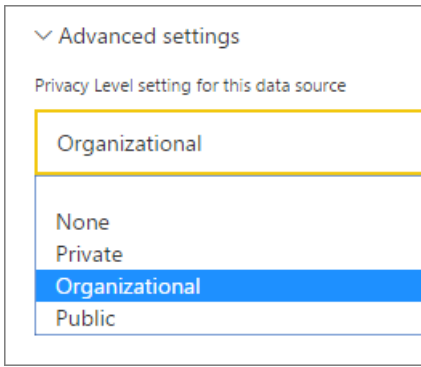
✓ Connection Successful

🕒 Next Step: Go to the Users tab above and add users to this Data Source

Data Source Name

Advanced settings

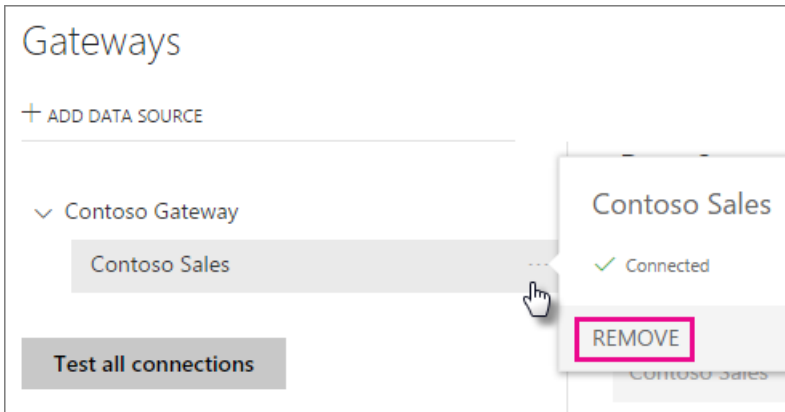
You can configure the privacy level for your data source. This controls how data can be mashed up. This is only used for scheduled refreshes. It does not apply to DirectQuery. [Learn more](#)



Remove a data source

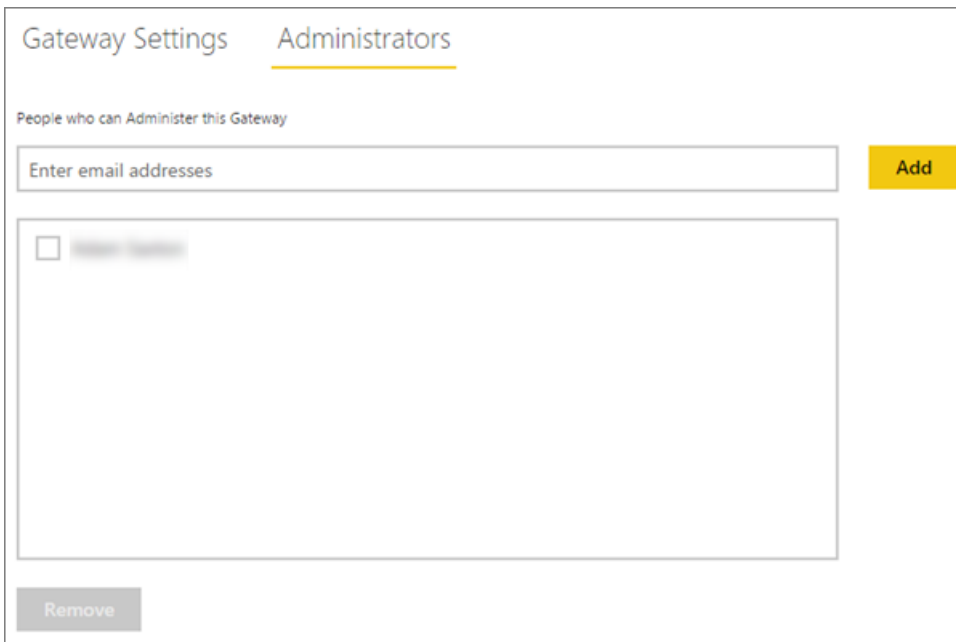
Removing a data source will break any dashboards or reports that rely on the given data source.

To remove a Data Source, go to the Data Source > **Remove**.



Manage administrators

On the Administrators tab for the gateway, you can add and remove users (or security groups) that can administer the gateway.



Manage users

On the Users tab, for the data source, you can add, and remove, users, or security groups, that can use this data source.

NOTE

The users list only controls who are allowed to publish reports. The report owners can create dashboards, or content packs, and share those with other users.

Data Source Settings **Users**

People who can publish reports that use this data source

Enter email addresses Add

Adam Saxton

Remove

Using the data source

After you have created the data source, it will be available to use with either DirectQuery connections, or through scheduled refresh.

NOTE

Server and database name have to match between Power BI Desktop and the data source within the on-premises data gateway!

The link between your dataset and the data source within the gateway is based on your server name and database name. These have to match. For example, if you supply an IP Address for the server name, within Power BI Desktop, you will need to use the IP Address for the data source within the gateway configuration. If you use *SERVER\INSTANCE*, in Power BI Desktop, you will need to use the same within the data source configured for the gateway.

This is the case for both DirectQuery and scheduled refresh.

Using the data source with DirectQuery connections

You will need to make sure the server and database name matches between Power BI Desktop and the configured data source for the gateway. You will also need to make sure your user is listed in the **Users** tab of the data source in order to publish DirectQuery datasets. The selection for DirectQuery occurs within Power BI Desktop when you first import data. [Learn more](#)

After you publish, either from Power BI Desktop or **Get Data**, your reports should start working. It may take several minutes, after creating the data source within the gateway, for the connection to be usable.

Using the data source with scheduled refresh

If you are listed in the **Users** tab of the data source configured within the gateway, and the server and database name match, you will see the gateway as an option to use with scheduled refresh.

▲ Gateway connection

Use your personal gateway (online, running on)

Use an enterprise gateway

Status	Department	Gateway	Contact information	Description
online		Contoso Gatew...	john@contoso.com	

▶ Data source credentials (admin has granted access, credentials are not required)

Next steps

[On-premises data gateway](#)

[On-premises data gateway - in-depth](#)

[Troubleshooting the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

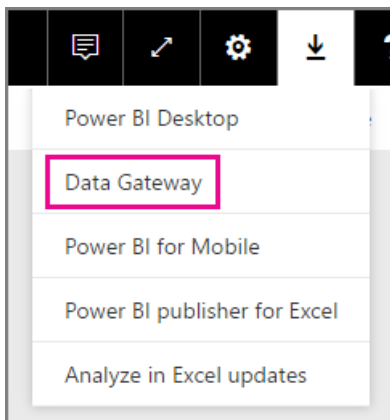
Manage your data source - SQL Server

1/25/2018 • 4 min to read • [Edit Online](#)

Once you have installed the on-premises data gateway, you can add data sources that can be used with the gateway. This article will look at how to work with gateways and data sources. You can use the SQL Server data source either for scheduled refresh or for DirectQuery.

Download and install the gateway

You can download the gateway from the Power BI service. Select **Downloads** > **Data Gateway**, or by going to the [gateway download page](#).



Add a gateway


To add a gateway, simply [download](#) and install the gateway on a server in your environment. After you have installed the gateway, it will show in the lists of gateways under **Manage gateways**.

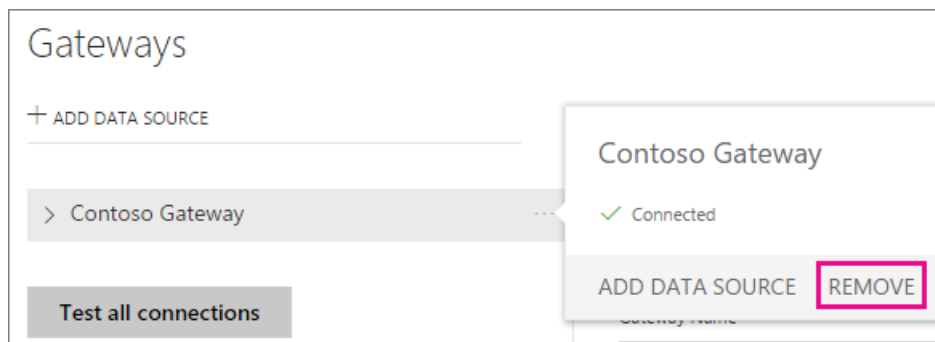
NOTE

Manage gateways will not show up until you are the admin of at least one gateway. This occurs when you are added as an admin to a gateway, or you install and configur a gateway yourself.

Remove a gateway

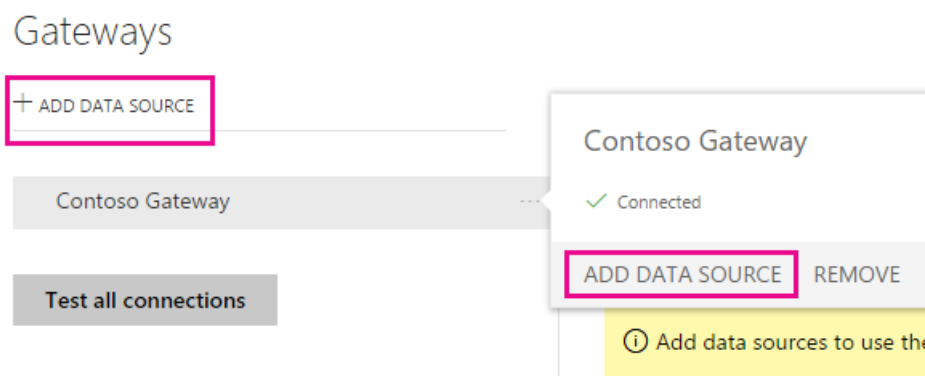
Removing a gateway will also delete any data sources under that gateway. This will also break any dashboards and reports that rely on those data sources.

1. Select the gear icon  in the upper-right corner > **Manage gateways**.
2. Gateway > **Remove**

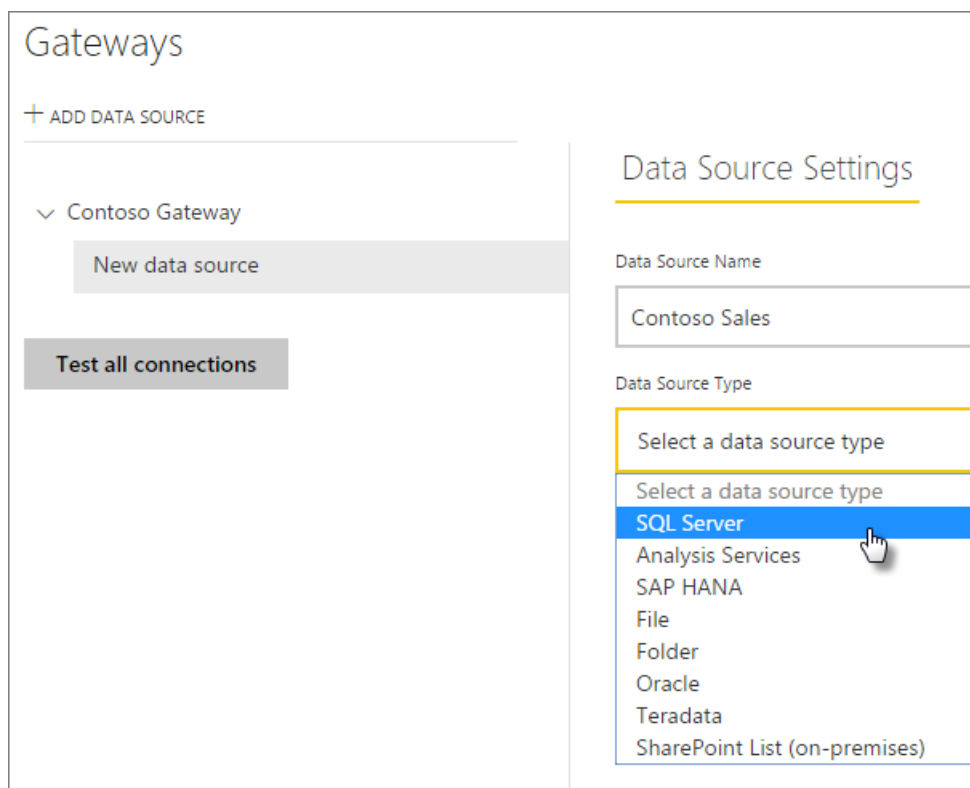


Add a data source

You can add a data source by either selecting a gateway and click **Add data source**, or go to Gateway > **Add data source**.



You can then select the **Data Source Type** from the list.



NOTE

When using DirectQuery, the gateway only supports **SQL Server 2012 SP1** and subsequent versions.

You will then want to fill in the information for the data source which includes the **Server** and the **Database**.

You will also need to choose an **Authentication Method**. This can either be **Windows** or **Basic**. You would want to choose **Basic** if you are going to use SQL Authentication instead of Windows Authentication. Then enter the credentials that will be used for this data source.

NOTE

All queries to the data source will run using these credentials, unless Kerberos Single Sign On (SSO) is configured and enabled for the data source. With SSO, import datasets use the stored credentials, but DirectQuery datasets use the current Power BI user to execute the queries using SSO. For more information, see the main on-premises data gateway article to learn more about how [credentials](#) are stored, or the article describing how to [use Kerberos for SSO \(single sign-on\) from Power BI to on-premises data sources](#).

Data Source Settings

Data Source Name

Data Source Type

Server

Database

Authentication Method

The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Username

Password

> Advanced settings

Add Discard

You can click **Add** after you have everything filled in. You can now use this data source for scheduled refresh, or DirectQuery, against a SQL Server that is on-premises. You will see *Connection Successful* if it succeeded.

Data Source Settings

Users

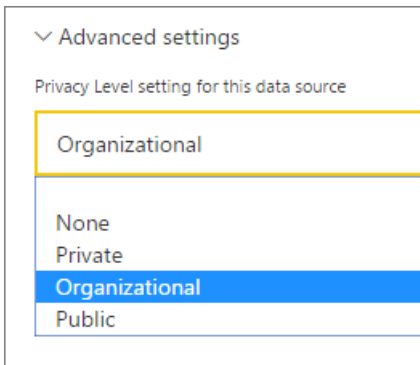
✓ Connection Successful

① Next Step: Go to the Users tab above and add users to this Data Source

Data Source Name
Contoso Sales

Advanced settings

You can configure the privacy level for your data source. This controls how data can be mashed up. This is only used for scheduled refresh. It does not apply to DirectQuery. [Learn more](#)

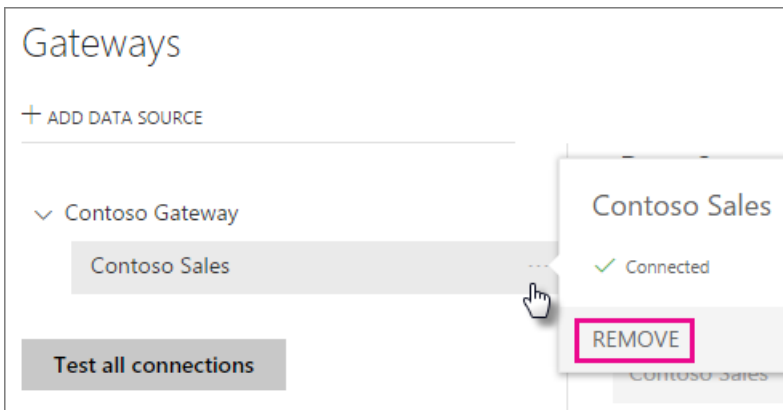


The screenshot shows a dropdown menu titled "Advanced settings" with the subtitle "Privacy Level setting for this data source". The menu is open, showing four options: "Organizational" (highlighted with a yellow border), "None", "Private", and "Public". The "Organizational" option is also highlighted with a blue background.

Remove a data source

Removing a data source will break any dashboards or reports that rely on the given data source.

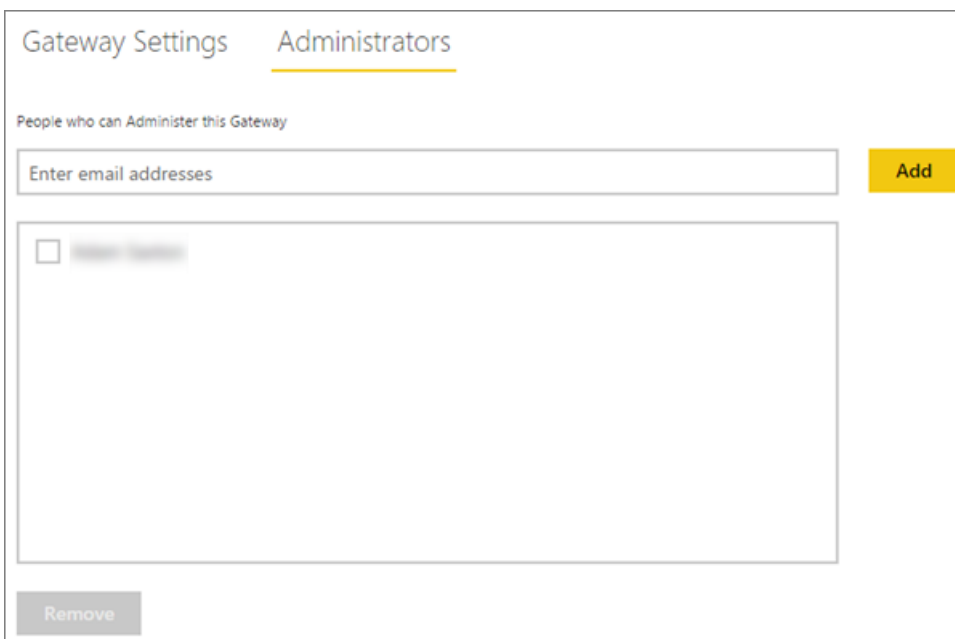
To remove a Data Source, go to the Data Source > **Remove**.



The screenshot shows the "Gateways" page with a "+ ADD DATA SOURCE" button. Under "Contoso Gateway", there is a "Contoso Sales" data source. A context menu is open over the "Contoso Sales" data source, showing "Contoso Sales", "✓ Connected", and a "REMOVE" button highlighted with a pink border. A "Test all connections" button is visible at the bottom left.

Manage administrators

On the Administrators tab for the gateway, you can add and remove users (or security groups) that can administer the gateway.



The screenshot shows the "Gateway Settings" page with the "Administrators" tab selected. The page title is "People who can Administer this Gateway". There is an input field labeled "Enter email addresses" and an "Add" button. Below the input field is a list of administrators, currently empty, with a "Remove" button at the bottom left.

Manage users

On the Users tab, for the data source, you can add, and remove, users, or security groups, that can use this data source.

NOTE

The users list only controls who are allowed to publish reports. The report owners can create dashboards, or content packs, and share those with other users.

Data Source Settings Users

People who can publish reports that use this data source

Enter email addresses Add

Adam Saxton

Remove

Using the data source

After you have created the data source, it will be available to use with either DirectQuery connections, or through scheduled refresh.

NOTE

Server and database name have to match between Power BI Desktop and the data source within the on-premises data gateway!

The link between your dataset and the data source within the gateway is based on your server name and database name. These have to match. For example, if you supply an IP Address for the server name, within **Power BI Desktop**, you will need to use the IP Address for the data source within the gateway configuration. If you use *SERVER\INSTANCE*, in Power BI Desktop, you will need to use the same within the data source configured for the gateway.

This is the case for both DirectQuery and scheduled refresh.

Using the data source with DirectQuery connections

You will need to make sure the server and database name matches between **Power BI Desktop** and the configured data source for the gateway. You will also need to make sure your user is listed in the **Users** tab of the data source in order to publish DirectQuery datasets. The selection, for DirectQuery, occurs within Power BI Desktop when you first import data. [Learn more](#)

After you publish, either from Power BI Desktop or **Get Data**, your reports should start working. It may take several minutes, after creating the data source within the gateway, for the connection to be usable.

Using the data source with scheduled refresh

If you are listed in the **Users** tab of the data source configured within the gateway, and the server and database name match, you will see the gateway as an option to use with scheduled refresh.

▲ Gateway connection

Use your personal gateway (online, running on)

Use an enterprise gateway

Status	Department	Gateway	Contact information	Description
online		Contoso Gatew...	john@contoso.com	

▶ Data source credentials (admin has granted access, credentials are not required)

Next steps

- [On-premises data gateway](#)
- [On-premises data gateway - in-depth](#)
- [Troubleshooting the on-premises data gateway](#)
- [Use Kerberos for SSO \(single sign-on\) from Power BI to on-premises data sources.](#)
- More questions? [Try the Power BI Community](#)

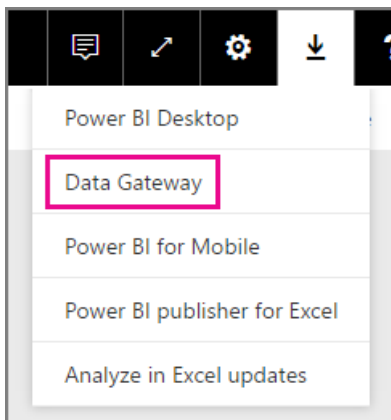
Manage your data source - Oracle

1/25/2018 • 6 min to read • [Edit Online](#)

Once you have installed the on-premises data gateway, you will need to add data sources that can be used with the gateway. This article will look at how to work with gateways and data sources. You can use the Oracle data source either for scheduled refresh or for DirectQuery.

Download and install the gateway

You can download the gateway from the Power BI service. Select **Downloads** > **Data Gateway**, or by going to the [gateway download page](#).



WARNING

In order for the gateway to be able to connect to your Oracle server, the Oracle Data Provider for .NET (ODP.NET) needs to be installed and configured. This is part of the Oracle Data Access Components (ODAC). For more information on how to download the Oracle provider, see [Installing the Oracle Client](#) below.

Installing the Oracle client

For **32-bit** versions of Power BI Desktop, use the following link to download and install the **32-bit** Oracle client:

- [32-bit Oracle Data Access Components \(ODAC\) with Oracle Developer Tools for Visual Studio \(12.1.0.2.4\)](#)

For **64-bit** versions of Power BI Desktop, or for the on-premises data gateway, use the following link to download and install the **64-bit** Oracle client:

- [64-bit ODAC 12.2c Release 1 \(12.2.0.1.0\) for Windows x64](#)

Once that is installed, you will need to configure your tnsnames.ora file with the proper information for your database. Power BI Desktop and the gateway will go off of the net_service_name defined in the tnsnames.ora file. If it isn't configured, you will not be able to connect. The default path for tnsnames.ora is the following:

[Oracle Home Directory]\Network\Admin\tnsnames.ora. For more information about how to configure tnsnames.ora files, see [Oracle: Local Naming Parameters \(tnsnames.ora\)](#).

Example tnsnames.ora file entry

The basic format of an entry in tnsname.ora is the following.

```
net_service_name=  
(DESCRIPTION=  
  (ADDRESS=(protocol_address_information))  
  (CONNECT_DATA=  
    (SERVICE_NAME=service_name)))
```

Here is an example of the server and port information filled in.

```
CONTOSO =  
  (DESCRIPTION =  
    (ADDRESS = (PROTOCOL = TCP)(HOST = oracleserver.contoso.com)(PORT = 1521))  
    (CONNECT_DATA =  
      (SERVER = DEDICATED)  
      (SERVICE_NAME = CONTOSO)  
    )  
  )
```

Add a gateway


To add a gateway, simply [download](#) and install the gateway on a server in your environment. After you have installed the gateway, it will show in the lists of gateways under **Manage gateways**.

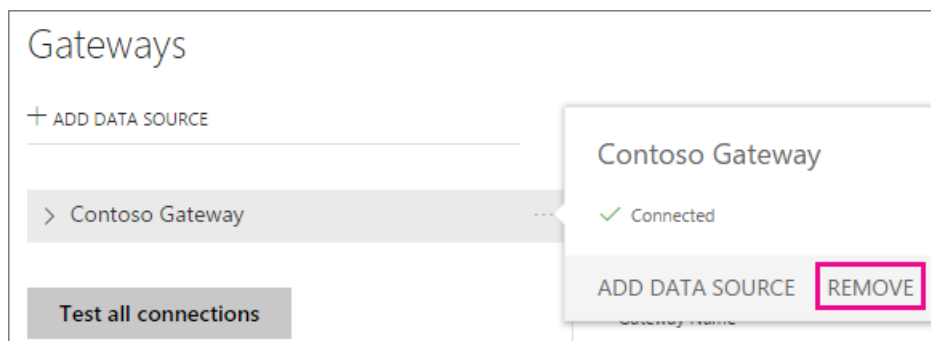
NOTE

Manage gateways will not show up until you are the admin of at least one gateway. This can happen either by being added as an admin or you installing and configuring a gateway.

Remove a gateway

Removing a gateway will also delete any data sources under that gateway. This will also break any dashboards and reports that rely on those data sources.

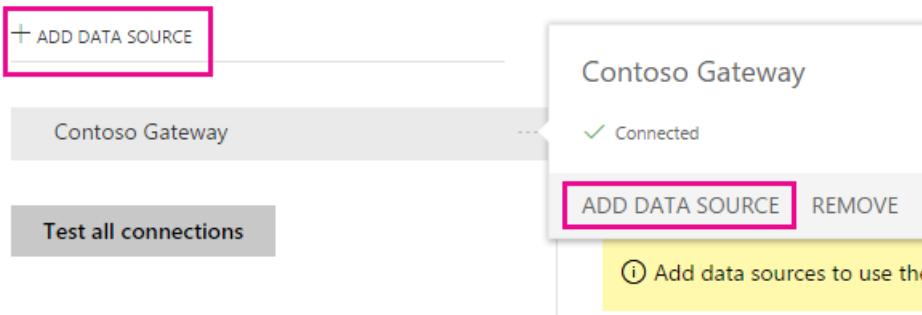
1. Select the gear icon  in the upper-right corner > **Manage gateways**.
2. Gateway > **Remove**



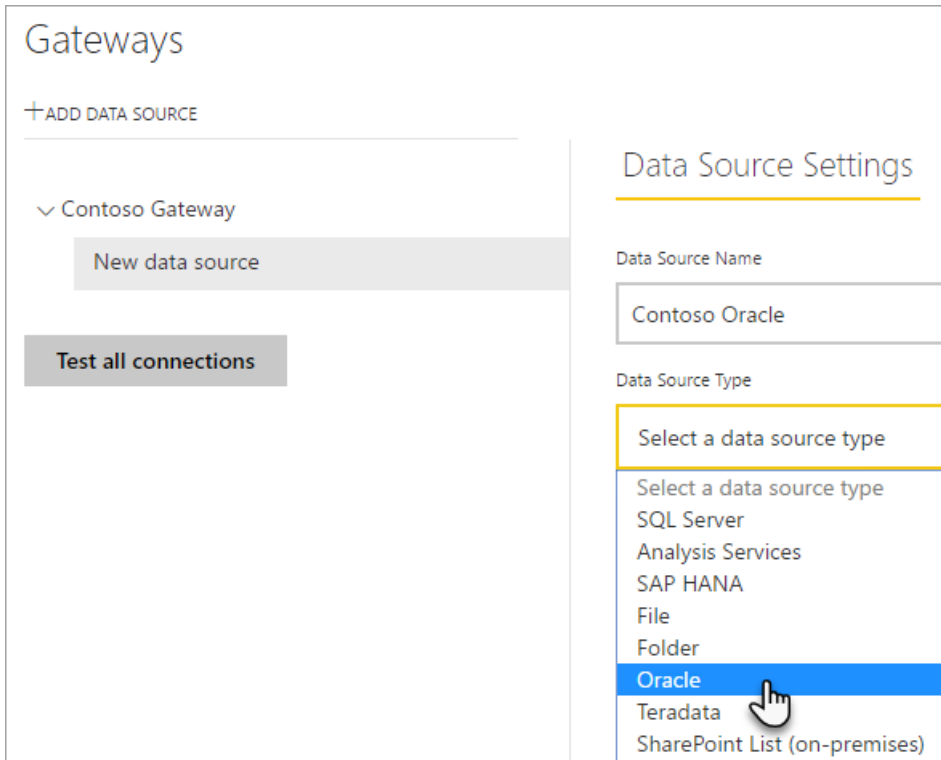
Add a data source

You can add a data source by either selecting a gateway and click **Add data source**, or go to Gateway > **Add data source**.

Gateways



You can then select the **Data Source Type** from the list.



You will then want to fill in the information for the data source which includes the **Server** and the **Database**.

You will also need to choose an **Authentication Method**. This can either be **Windows** or **Basic**. You would want to choose **Basic** if you are going to use an account that is created within Oracle instead of Windows Authentication. Then enter the credentials that will be used for this data source.

NOTE

All queries to the data source will run using these credentials. For more information, see the main on-premises data gateway article to learn more about how [credentials](#) are stored.

Data Source Settings

Data Source Name

Data Source Type

Server

Authentication Method

The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Username

Password

> Advanced settings

Add Discard

You can click **Add** after you have everything filled in. You can now use this data source for scheduled refresh, or DirectQuery, against an Oracle server that is on-premises. You will see *Connection Successful* if it succeeded.

Data Source Settings

Users

✓ Connection Successful

ⓘ Next Step: Go to the Users tab above and add users to this Data Source

Data Source Name

Contoso Sales

Advanced settings

You can configure the privacy level for your data source. This controls how data can be mashed up. This is only used for scheduled refresh. It does not apply to DirectQuery. [Learn more](#)

∨ Advanced settings

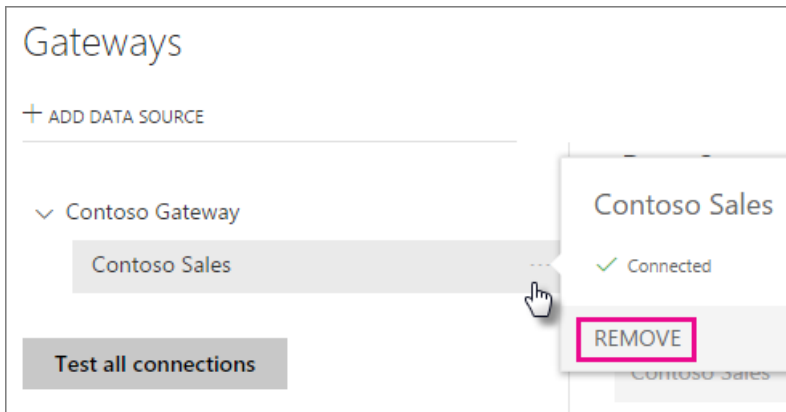
Privacy Level setting for this data source

- Organizational
- None
- Private
- Organizational**
- Public

Remove a data source

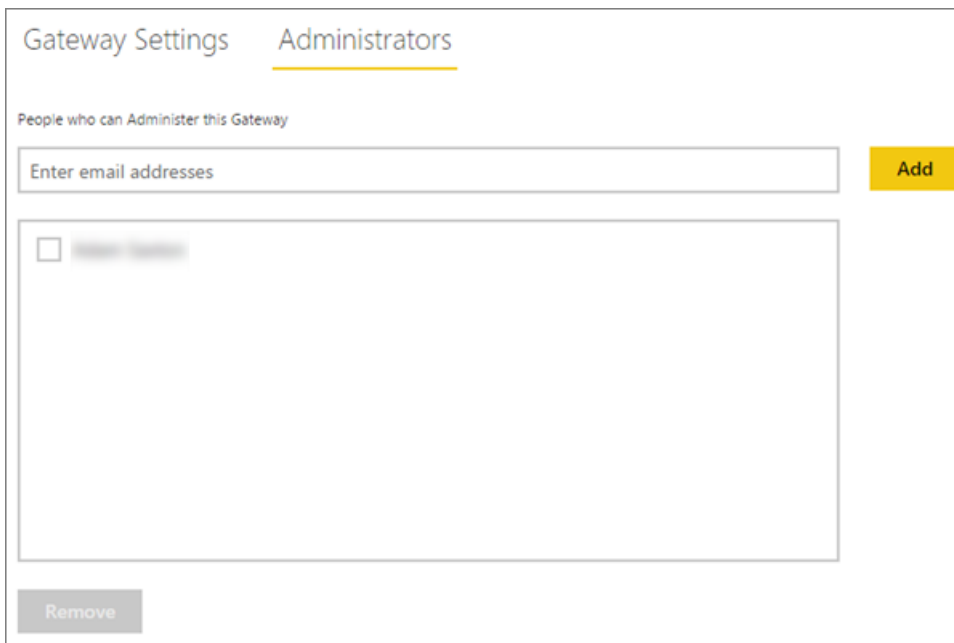
Removing a data source will break any dashboards or reports that rely on the given data source.

To remove a Data Source, go to the Data Source > **Remove**.



Manage administrators

On the Administrators tab for the gateway, you can add and remove users (or security groups) that can administer the gateway.



Manage users

On the Users tab, for the data source, you can add, and remove, users, or security groups, that can use this data source.

NOTE

The users list only controls who are allowed to publish reports. The report owners can create dashboards, or content packs, and share those with other users. Users that are consuming the report or dashboard do not need to be in the users list.

Data Source Settings **Users**

People who can publish reports that use this data source

Enter email addresses Add

Adam Saxton

Remove

Using the data source

After you have created the data source, it will be available to use with either DirectQuery connections, or through scheduled refresh.

WARNING

Server and database name have to match between Power BI Desktop and the data source within the on-premises data gateway!

The link between your dataset and the data source within the gateway is based on your server name and database name. These have to match! For example, if you supply an IP Address for the server name, within Power BI Desktop, you will need to use the IP Address for the data source within the gateway configuration. This name also has to match an alias defined within the tnsnames.ora file. For more information about the tnsnames.ora file, see [Installing the Oracle Client](#).

This is the case for both DirectQuery and scheduled refresh.

Using the data source with DirectQuery connections

You will need to make sure the server and database name matches between Power BI Desktop and the configured data source for the gateway. You will also need to make sure your user is listed in the **Users** tab of the data source in order to publish DirectQuery datasets. The selection, for DirectQuery, occurs within Power BI Desktop when you first import data. [Learn more](#)

After you publish, either from Power BI Desktop or **Get Data**, your reports should start working. It may take several minutes, after creating the data source within the gateway, for the connection to be usable.

Using the data source with scheduled refresh

If you are listed in the **Users** tab of the data source configured within the gateway, and the server and database name match, you will see the gateway as an option to use with scheduled refresh.

▲ Gateway connection

Use your personal gateway (online, running on)

Use an enterprise gateway

Status	Department	Gateway	Contact information	Description
online		Contoso Gatew...	john@contoso.com	

▶ Data source credentials (admin has granted access, credentials are not required)

Troubleshooting

You may encounter several errors from Oracle when the naming syntax is either incorrect or not configured properly.

- ORA-12154: TNS: could not resolve the connect identifier specified
- ORA-12514: TNS listener does not currently know of service requested in connect descriptor
- ORA-12541: TNS: no listener
- ORA-12170: TNS:Connect timeout occurred
- ORA-12504: TNS listener was not given the SERVICE_NAME in CONNECT_DATA

These errors could occur if either the Oracle client is not installed, or if it is not configured properly. If it is installed, you will want to verify the tnsnames.ora file is properly configured and you are using the proper net_service_name. You will also need to make sure that the net_service_name is the same between the machine using Power BI Desktop and the machine that is running the gateway. For more information, see [Installing the Oracle Client](#).

NOTE

You may also be hitting an issue due to compatibility between the Oracle server version and the Oracle client version. Typically you want these to match.

For additional troubleshooting information relating to the gateway, see [Troubleshooting the on-premises data gateway](#).

Next steps

[On-premises data gateway](#)

[On-premises data gateway - in-depth](#)

[Troubleshooting the on-premises data gateway](#)

[Power BI Premium](#)

More questions? [Try asking the Power BI Community](#)

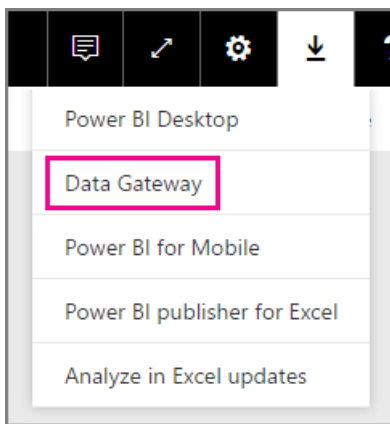
Manage your data source - Import/Scheduled Refresh

12/6/2017 • 4 min to read • [Edit Online](#)

Once you have installed the on-premises data gateway, you will need to add data sources that can be used with the gateway. This article will look at how to work with gateways and data sources that are used for scheduled refresh as opposed to DirectQuery or live connections.

Download and install the gateway

You can download the gateway from the Power BI service. Select **Downloads** > **Data Gateway**, or by going to the [gateway download page](#).



Add a gateway


To add a gateway, simply [download](#) and install the enterprise gateway on a server in your environment. After you have installed the gateway, it will show in the lists of gateways under **Manage gateways**.

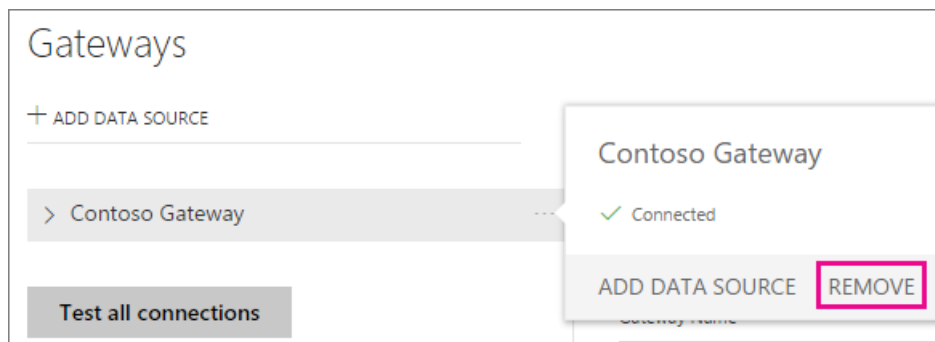
NOTE

Manage gateways will not show up until you are the admin of at least one gateway. This can happen either by being added as an admin or you installing and configuring a gateway.

Remove a gateway

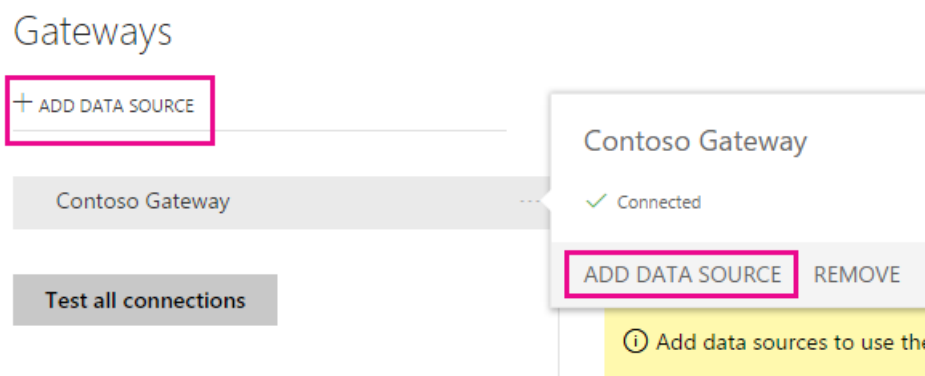
Removing a gateway will also delete any data sources under that gateway. This will also break any dashboards and reports that rely on those data sources.

1. Select the gear icon  in the upper-right corner > **Manage gateways**.
2. Gateway > **Remove**

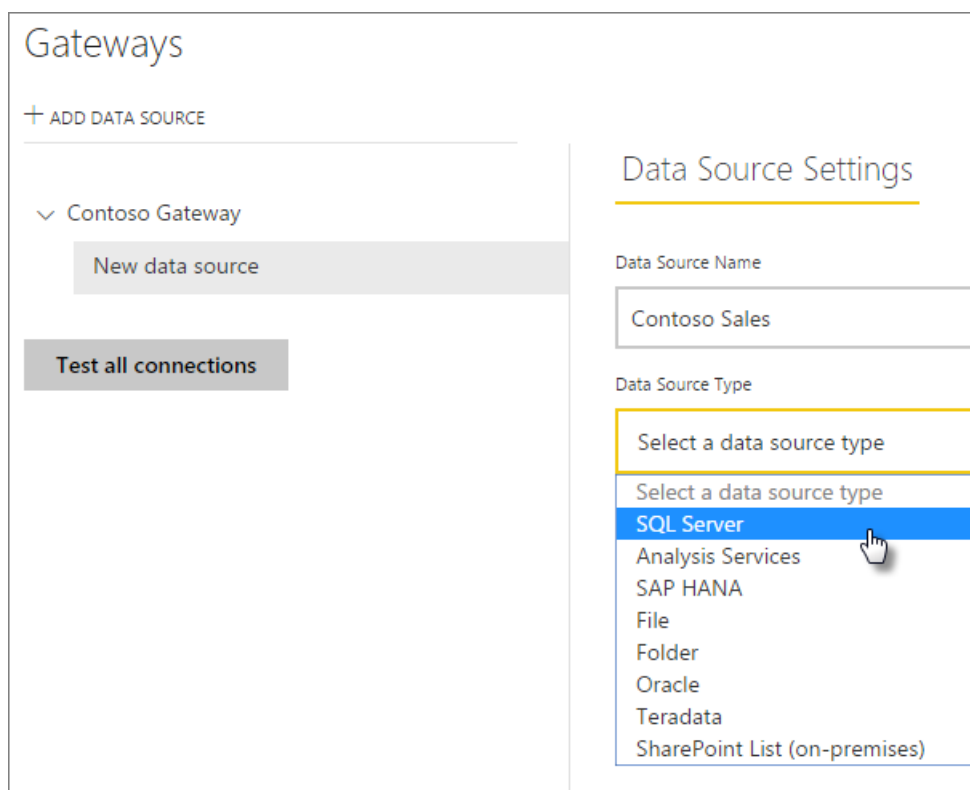


Add a data source

You can add a data source by either selecting a gateway and click **Add data source**, or go to Gateway > **Add data source**.



You can then select the **Data Source Type** from the list. All of the data sources listed can be used for scheduled refresh with the enterprise gateway. Analysis Services, SQL Server and SAP HANA can be used for either scheduled refresh, or DirectQuery/live connections.



You will then want to fill in the information for the data source which includes the source information and credentials used to access the data source.

NOTE

All queries to the data source will run using these credentials. For more information, see the main on-premises data gateway article to learn more about how [credentials](#) are stored.

Data Source Settings

Data Source Name

Data Source Type

Server

Authentication Method

The credentials are encrypted using the key stored on-premises on the gateway server. [Learn more](#)

Username

Password

> Advanced settings

Add Discard

You can click **Add** after you have everything filled in. You can now use this data source for scheduled refresh with your on-premises data. You will see *Connection Successful* if it succeeded.

Data Source Settings

Users

✓ Connection Successful

🕒 Next Step: Go to the Users tab above and add users to this Data Source

Data Source Name
Contoso Sales

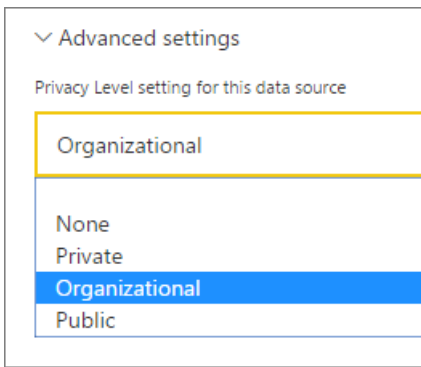
List of available data source types

DATA SOURCE	LIVE/DIRECTQUERY	USER CONFIGURED MANUAL OR SCHEDULED REFRESH
Analysis Services Tabular	Yes	Yes
Analysis Services Multidimensional	Yes	Yes

DATA SOURCE	LIVE/DIRECTQUERY	USER CONFIGURED MANUAL OR SCHEDULED REFRESH
File	No	Yes
Folder	No	Yes
IBM DB2	No	Yes
IBM Informix Database	No	Yes
Impala	Yes	Yes
MySQL	No	Yes
OData	No	Yes
ODBC	No	Yes
Oledb	No	Yes
Oracle	Yes	Yes
PostgresSQL	No	Yes
SAP BW	Yes	Yes
SAP HANA	Yes	Yes
SharePoint list (on-premises)	No	Yes
Snowflake	Yes	Yes
SQL Server	Yes	Yes
Sybase	No	Yes
Teradata	Yes	Yes
Web	No	Yes

Advanced settings

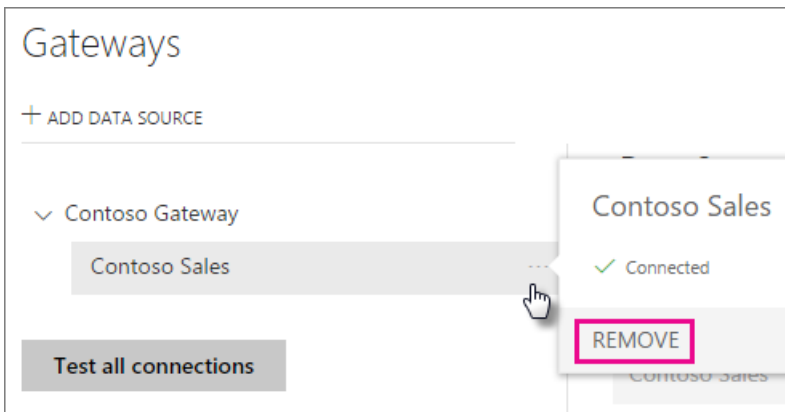
You can configure the privacy level for your data source. This controls how data can be mashed up. This is only used for scheduled refresh. [Learn more](#)



Remove a data source

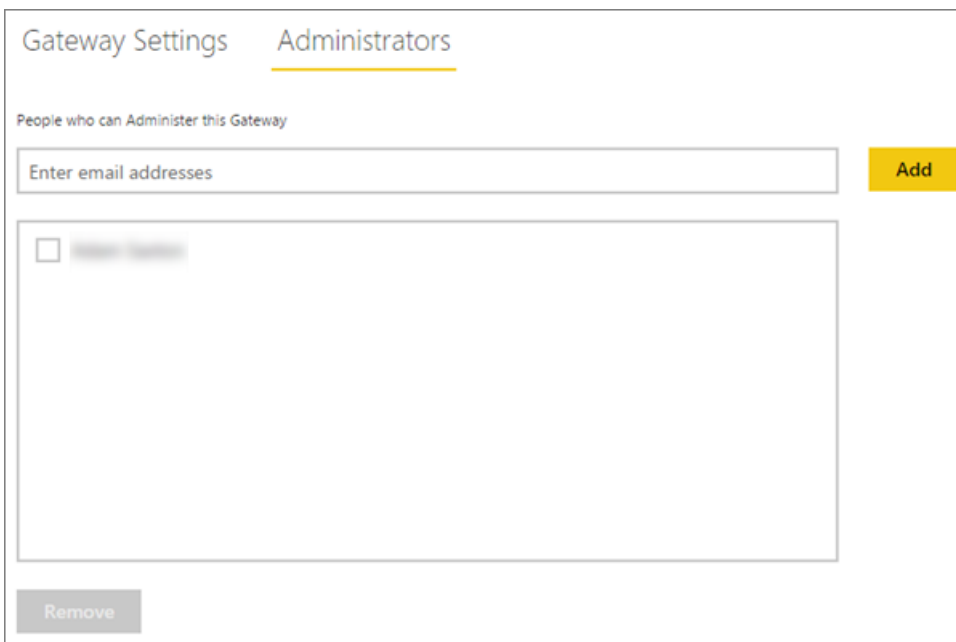
Removing a data source will break any dashboards or reports that rely on the given data source.

To remove a Data Source, go to the Data Source > **Remove**.



Manage administrators

On the Administrators tab, for the gateway, you can add, and remove, users that can administer the gateway. You can only add users at this time. Security groups cannot be added.



Manage users

On the Users tab, for the data source, you can add, and remove, users, or security groups, that can use this data source.

NOTE

The users list only controls who are allowed to publish reports. The report owners can create dashboards, or content packs, and share those with other users.

Data Source Settings Users

People who can publish reports that use this data source

Enter email addresses Add

Adam Saxton

Remove

Using the data source for scheduled refresh

After you have created the data source, it will be available to use with either DirectQuery connections, or through scheduled refresh.

NOTE

Server and database name have to match between Power BI Desktop and the data source within the on-premises data gateway!

The link between your dataset and the data source within the gateway is based on your server name and database name. These have to match. For example, if you supply an IP Address for the server name, within Power BI Desktop, you will need to use the IP Address for the data source within the gateway configuration. If you use *SERVER\INSTANCE*, in Power BI Desktop, you will need to use the same within the data source configured for the gateway.

If you are listed in the **Users** tab of the data source configured within the gateway, and the server and database name match, you will see the gateway as an option to use with scheduled refresh.

▲ Gateway connection

Use your personal gateway (online, running on)

Use an enterprise gateway

Status	Department	Gateway	Contact information	Description
online		Contoso Gatew...	john@contoso.com	

▶ Data source credentials (admin has granted access, credentials are not required)

WARNING

If your dataset contains multiple data sources, each data source must be added within the gateway. If one or more data sources are not added to the gateway, you will not see the gateway as available for scheduled refresh.

Limitations

- OAuth is not a supported authentication scheme with the on-premises data gateway. You cannot add data sources that require OAuth. If your dataset has a data source requiring OAuth, you will not be able to use the gateway for scheduled refresh.

Next steps

[On-premises data gateway](#)

[On-premises data gateway - in-depth](#)

[Troubleshooting the on-premises data gateway](#)

More questions? [Try the Power BI Community](#)

Administering Power BI in your organization

1/30/2018 • 13 min to read • [Edit Online](#)

Microsoft Power BI enables users to visualize data, share discoveries, and collaborate in intuitive new ways. To learn more, see [Get started with Power BI](#).

Administration of Power BI can occur in several locations. Here are two common locations.

NOTE

Your account needs to be marked as a **Global Admin**, within Office 365 or Azure Active Directory, or have been assigned the Power BI service administrator role, to get access to the Power BI admin portal. For more information about the Power BI service administrator role, see [Understanding the Power BI admin role](#).

- [Power BI Admin portal](#)
- [Office 365 Admin Center](#)

For more information regarding the Power BI service administrator role, see [Understanding the Power BI admin role](#).

What's in this article

Sign up for Power BI

- [How do users sign up for Power BI?](#)
- [How do individual users in my organization sign up?](#)
- [How can I prevent users from joining my existing Office 365 tenant?](#)
- [How can I allow users to join my existing Office 365 tenant?](#)
- [How do I verify if I have the block on in the tenant?](#)
- [How can I prevent my existing users from starting to use Power BI?](#)
- [How can I allow my existing users to sign up for Power BI?](#)

Administration of Power BI

- [How will this change the way I manage identities for users in my organization today?](#)
- [How do we manage Power BI?](#)
- [What is the process to manage a tenant created by Microsoft for my users?](#)
- [If I have multiple domains, can I control the Office 365 tenant that users are added to?](#)
- [How do I remove Power BI for users that already signed up?](#)
- [How do I know when new users have joined my tenant?](#)
- [Are there any additional things I should be prepared for?](#)
- [Is this free? Will I be charged for these licenses?](#)
- [Where is my Power BI tenant located?](#)
- [What is the Power BI SLA \(Service Level Agreement\)?](#)

Security in Power BI

- [Does Power BI meet national, regional, and industry-specific compliance requirements?](#)
- -----

Sign up for Power BI

How do users sign up for Power BI?

You can sign up for Power BI through the [Power BI web site](#). You can also sign up through the purchase services page on the Office 365 admin center. When an administrator signs up for Power BI, they can assign user licenses to users who should have access.

Additionally, individual users in your organization may be able to sign up for Power BI through the [Power BI web site](#). When a user in your organization signs up for Power BI, that user is assigned a Power BI license automatically. [Learn more](#)

How do individual users in my organization sign up?

There are three scenarios that might apply to users in your organization:

Scenario 1: Your organization already has an existing Office 365 environment and the user signing up for Power BI already has an Office 365 account. In this scenario, if a user already has a work or school account in the tenant (for example, contoso.com) but does not yet have Power BI, Microsoft will simply activate the plan for that account, and the user will automatically be notified of how to use the Power BI service.

Scenario 2: Your organization has an existing Office 365 environment and the user signing up for Power BI doesn't have an Office 365 account. In this scenario, the user has an email address in your organization's domain (for example, contoso.com) but does not yet have an Office 365 account. In this case, the user can sign up for Power BI and will automatically be given an account. This lets the user access the Power BI service. For example, if an employee named Nancy uses her work email address (for example, Nancy@contoso.com) to sign up, Microsoft will automatically add Nancy as a user in Contoso's Office 365 environment and activate Power BI for that account.

Scenario 3: Your organization does not have an Office 365 environment connected to your email domain. There are no administrative actions your organization needs to take to take advantage of Power BI. Users will be added to a new, cloud-only user directory, and you will have the option to elect to take over as the tenant admin and manage them.

IMPORTANT

If your organization has multiple email domains and you prefer all email address extensions to be in the same tenant, add all email address domains to an Azure Active Directory tenant before any users sign up. There is no automated mechanism to move users across tenants after they have been created. For more information on this process, see [If I have multiple domains, can I control the Office 365 tenant that users are added to?](#) later in this article and [Add your domain to Office 365](#) online.

How can I prevent users from joining my existing Office 365 tenant?

There are steps you can take, as an admin, to prevent users from joining your existing Office 365 tenant. If you do block this, users' attempts to sign up will fail and they will be directed to contact their organization's admin. You do not need to repeat this process if you have already disabled automatic license distribution (e.g. Office 365 for Education for Students, Faculty, and Staff).

These steps require the use of Windows PowerShell. To get started with Windows PowerShell, see the [PowerShell getting started guide](#).

To perform the following steps, you must install the latest 64-bit version of the [Azure Active Directory Module for Windows PowerShell](#).

After you select the link, select **Run** to run the installer package.

Disable automatic tenant join: Use this Windows PowerShell command to prevent new users from joining a managed tenant:

- To disable automatic tenant join for new users:

```
$msolcred = get-credential connect-msolservice -credential $msolcred
```

```
Set-MsolCompanySettings -AllowEmailVerifiedUsers $false
```

- To enable automatic tenant join for new users:

```
$msolcred = get-credential connect-msolservice -credential $msolcred
```

```
Set-MsolCompanySettings -AllowEmailVerifiedUsers $true
```

NOTE

This blocking prevents new users in your organization from signing up for Power BI. Users that sign up for Power BI prior to disabling new signups for your organization will still retain their licenses. See the [How Can I Remove Licenses?] section for instructions on how you can remove access to Power BI for users that had previously signed up for the service.

How can I allow users to join my existing Office 365 tenant?

To allow users to join your tenant, run the opposite command as described in the question above.

To perform the following steps, you must install the latest 64-bit version of the [Azure Active Directory Module for Windows PowerShell](#).

```
$msolcred = get-credential  
connect-msolservice -credential $msolcred  
  
Set-MsolCompanySettings -AllowEmailVerifiedUsers $true
```

How do I verify if I have the block on in the tenant?

Use the following PowerShell script.

To perform the following steps, you must install the latest 64-bit version of the [Azure Active Directory Module for Windows PowerShell](#).

```
$msolcred = get-credential  
connect-msolservice -credential $msolcred  
  
Get-MsolCompanyInformation | fl allow*
```

How can I prevent my existing users from starting to use Power BI?

There are steps you can take, as an admin, to prevent users from signing up for Power BI. If you do block this, users' attempts to sign up will fail and they will be directed to contact their organization's admin. You do not need to repeat this process if you have already disabled automatic license distribution (e.g. Office 365 for Education for Students, Faculty, and Staff). [Learn more](#)

The AAD setting that controls this is **AllowAdHocSubscriptions**. Most tenants will have this setting set to true, which means it is enabled. If you acquired Power BI through a partner, this may be set to false by default, which means it is disabled.

To perform the following steps, you must install the latest 64-bit version of the [Azure Active Directory Module for Windows PowerShell](#).

1. You need to first sign into Azure Active Directory using your Office 365 credential. The first line will prompt you for your credentials. The second line connects to Azure Active Directory.

```
$msolcred = get-credential connect-msolservice -credential $msolcred
```

2. Once you are signed in, you can issue the following command to see what your tenant is currently configured for.

```
Get-MsolCompanyInformation | fl AllowAdHocSubscriptions
```

3. You can this command to enable (\$true) or disable (\$false) AllowAdHocSubscriptions.

```
Set-MsolCompanySettings -AllowAdHocSubscriptions $true
```

NOTE

The AllowAdHocSubscriptions flag is used to control several user capabilities in your organization, including the ability for users to sign up for the Azure Rights Management Service. Changing this flag will affect all of these capabilities.

How can I allow my existing users to sign up for Power BI?

To allow your existing users to sign up for Power BI, run the command listed for the above question, but pass true instead of false.

To perform the following steps, you must install the latest 64-bit version of the [Azure Active Directory Module for Windows PowerShell](#).

1. You need to first sign into Azure Active Directory using your Office 365 credential. The first line will prompt you for your credentials. The second line connects to Azure Active Directory.

```
$msolcred = get-credential connect-msolservice -credential $msolcred
```

2. Once you are signed in, you can issue the following command to see what your tenant is currently configured for.

```
Get-MsolCompanyInformation | fl AllowAdHocSubscriptions
```

3. You can this command to enable (\$true) or disable (\$false) AllowAdHocSubscriptions.

```
Set-MsolCompanySettings -AllowAdHocSubscriptions $true
```

NOTE

The AllowAdHocSubscriptions flag is used to control several user capabilities in your organization, including the ability for users to sign up for the Azure Rights Management Service. Changing this flag will affect all of these capabilities.

Administration of Power BI

How will this change the way I manage identities for users in my organization today?

If your organization already has an existing Office 365 environment and all users in your organization have Office 365 accounts, identity management will not change.

If your organization already has an existing Office 365 environment but not all users in your organization have Office 365 accounts, we will create a user in the tenant and assign licenses based on the user's work, or school, email address. This means that the number of users you are managing at any particular time will grow as users in your organization sign up for the service.

If you are managing your directory on-premises, and use Active Directory Federation Services (AD FS), Microsoft will not add users to your tenant, and users attempting to join your tenant will receive a message to contact their organization's admin.

If your organization does not have an Office 365 environment connected to your email domain, there will be no change in how you manage identity. Users will be added to a new, cloud-only user directory, and you will have the

option to elect to take over as the tenant admin and manage them.

How do we manage Power BI?

Power BI provides an admin portal that allows you to view usage statistics, provides a link to the Office 365 admin center to manage users and groups, and the ability to control tenant wide settings.

NOTE

Your account needs to be marked as a **Global Admin**, within Office 365 or Azure Active Directory, to get access to the Power BI admin portal.

For more information, see [Power BI Admin Portal](#).

What is the process to manage a tenant created by Microsoft for my users?

If a tenant was created by Microsoft, you can claim and manage that tenant by following these steps:

1. Join the tenant, by signing up for Power BI, using an email address domain that matches the tenant domain you want to manage. For example, if Microsoft created the contoso.com tenant, you will need to join the tenant with an email address ending with @contoso.com.
2. Claim admin control by verifying domain ownership: once you are in the tenant, you can promote yourself to a *Global Admin* role by verifying domain ownership. To do so, follow these steps:
 - a. Go to <https://portal.office.com>.
 - b. Select the app launcher icon in the upper-left and choose **Admin**.
 - c. Read the instructions on the **Become the admin** page and then choose **Yes, I want to be the admin**.

NOTE

If this option doesn't appear, there is already an Office 365 administrator in place.

If I have multiple domains, can I control the Office 365 tenant that users are added to?

If you do nothing, a tenant will be created for each user email domain and subdomain.

If you want all users to be in the same tenant regardless of their email address extensions:

- Create a target tenant ahead of time, or use an existing tenant, and add all the existing domains and subdomains that you want consolidated within that tenant. Then all the users with email addresses ending in those domains and subdomains will automatically join the target tenant when they sign up.

IMPORTANT

There is no supported automated mechanism to move users across tenants once they have been created. To learn about adding domains to a single Office 365 tenant, see [Add your users and domain to Office 365](#).

How do I remove Power BI for users that already signed up?

If a user signed up for Power BI, but you no longer want them to have access to Power BI, you can remove the Power BI license for that user.

1. Navigate to the Office 365 admin center.
2. In the left navigation bar, select **Users** > **Active Users**.
3. Find the user you want to remove the license for, then select their name > **Edit**.
4. On the user details page, select **Licenses** in the left navigation bar.

5. Uncheck **Power BI (free)**, or **Power BI Pro**, depending on what license is applied to their account.
6. Select **Save**.

NOTE

You can perform bulk license management to users as well. To do that, select multiple users and select **Edit**.

How do I know when new users have joined my tenant?

Users who have joined your tenant as part of this program are assigned a unique license that you can filter on within your active user pane in the admin dashboard.

To create this new view, in the Office 365 admin center, go to **Users > Active Users**, and on the **Select a View** menu, select **New View**. Name your new view, and under **Assigned license**, select **Power BI (free)** or **Power BI Pro**. You can only have one license selected per view. If you have both **Power BI (free)** and **Power BI Pro** licenses in your organization, you would need to create two views. Once the new view has been created, you will be able to see all the users in your tenant who have enrolled in this program.

Are there any additional things I should be prepared for?

You might experience an increase in password reset requests. For information about this process, see [Reset a user's password](#).

You can remove a user from your tenant via the standard process in the Office 365 admin center. However, if the user still has an active email address from your organization, they will be able to rejoin unless you block all users from joining.

Is this free? Will I be charged for these licenses?

The **Power BI (free)** licenses are for the free version of Power BI. If you're interested in additional capabilities, take a look at the [Power BI Pro version](#).

Where is my Power BI tenant located?

To learn how to find where your Power BI tenant is located, also known as a data region, see [Where is my Power BI tenant located?](#)

What is the Power BI SLA?

For information about the Power BI SLA (Service Level Agreement), consult the [Licensing Terms and Documentation](#) article in the **Licensing** section of the Microsoft Licensing website.

Security in Power BI

Does Power BI meet national, regional, and industry-specific compliance requirements?

To learn more about Power BI compliance, see the [Microsoft Trust Center](#).

How does security work in Power BI?

Power BI is built on the foundation of Office 365, which in turn builds on Azure services like Azure Active Directory. For an overview of Power BI architecture, see [Power BI Security](#).

Next steps

[Power BI admin portal](#)

[Understanding the Power BI admin role](#)

[Self-service sign up for Power BI](#)

[Power BI \(free\) in your organization](#)

[Purchasing Power BI Pro](#)

[Power BI Premium - what is it?](#)

[How to purchase Power BI Premium](#)

[Office 365 user account management](#)

[Office 365 group management](#)

[Manage your group in Power BI and Office 365](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Power BI (free) in your organization

1/30/2018 • 3 min to read • [Edit Online](#)

This will look at how the Power BI (free) offering can be used within your organization. An organization means that you have a tenant and can manage users and services within that tenant. As an administrator, you can control license assignment, or you can allow users to sign up as an individual. We will look at the Power BI (free) license and how you can control individual sign up.

Individual sign up versus license assignment

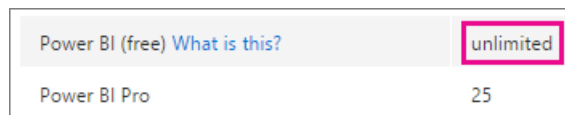
Users within your organization can gain access to Power BI in two different ways. They can individually sign up for Power BI, or you can assign a Power BI license to them within the Office 365 admin portal.

Allowing individual sign up reduces the burden, from the organization administrators, by allowing the users that are interested in Power BI to sign up for free.

For more control, you can block individual sign up and assign Power BI licenses yourself within the Office 365 admin center. This allows you to be specific of who can access what services within your organization. This is also a great option if you have to deal with auditing and need to know exactly who can use what.

How to get the unlimited license block

Within the Office 365 admin center, under **Billing** > **Licenses**, you may or may not see Power BI (free) with unlimited licenses.



Power BI (free) What is this?	unlimited
Power BI Pro	25

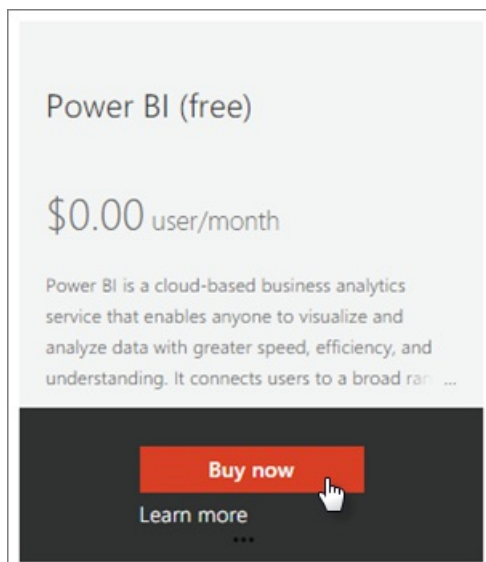
This block of licenses will show up after the first time someone signs up for Power BI as an individual. During that process, this license block gets attached to your organization and a license is assigned to the user that is signing up.

If you are blocking individual user sign up, and no one has signed up, you will not see this license block. You can either allow individual user sign ups and have one user sign up, or you can get free licenses through the add subscription Office 365 flow which will be talked about next.

Once the Power BI (free) license block is available, you can assign those licenses to your users. For more information about how to assign licenses, see [Assign licenses to users in Office 365](#).

Getting free licenses via add subscription within Office 365

1. Navigate to the [Office 365 admin center](#).
2. On the left navigation pane, select **Billing** > **Subscriptions**.
3. Select **Add subscriptions +** on the right side.
4. Under Other Plans, hover over the **ellipsis (...)** for Power BI (free) and select **Buy now**.



5. Enter the number of licenses you would like to add and select **Check out now** or **Add to cart**.

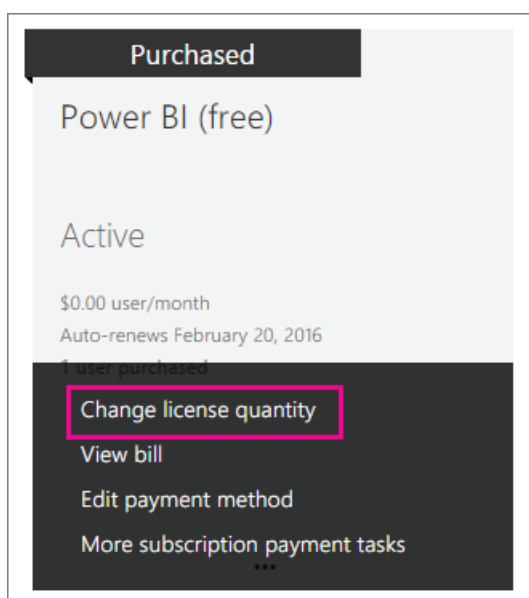
NOTE

You can add more at a later date if needed.

6. Enter the needed information in the check out flow.

There is no purchase when using this approach, although you will need to either enter your credit card information for billing, or choose to be invoiced.

If you decide later that you want to add more licenses, you can go back to **Add subscriptions**, and select **Change license quantity** for Power BI (free).



You can now assign those licenses to your users. For more information about how to assign licenses, see [Assign licenses to users in Office 365](#).

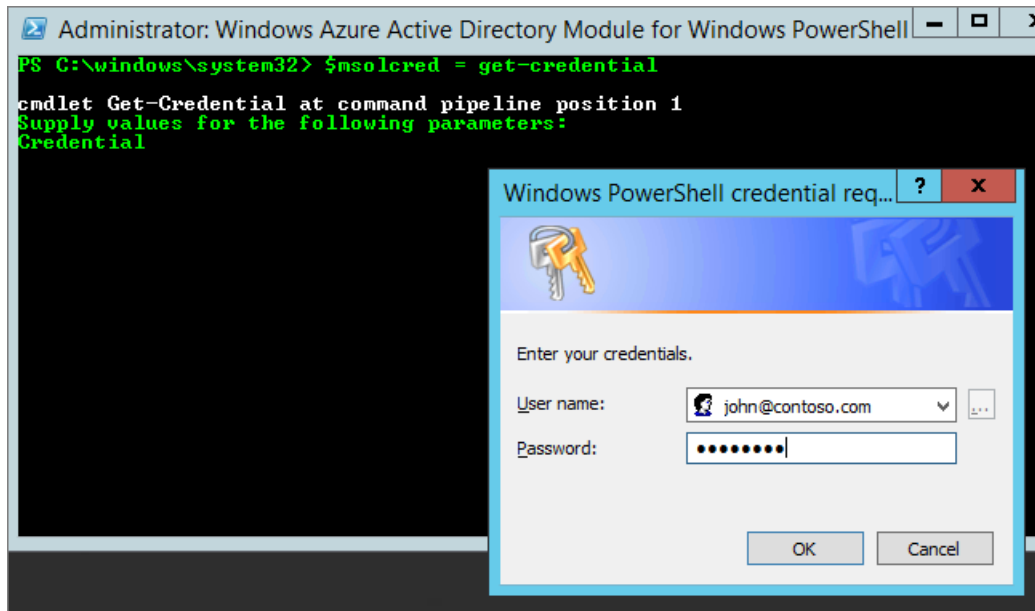
Enable, or disable, individual user sign up in Azure Active Directory

As an administrator, you can choose to enable, or disable, individual user sign ups as part of Azure Active Directory (AAD). If you know how to leverage the AAD PowerShell commands, you can enable, or disable, ad-hoc subscriptions yourself. [Learn more](#)

The AAD setting that controls this is **AllowAdHocSubscriptions**. Most tenants will have this setting set to true, which means it is enabled. If you acquired Power BI through a partner, this may be set to false by default, which means it is disabled.

1. You need to first sign into Azure Active Directory using your Office 365 credential. The first line will prompt you for your credentials. The second line connects to Azure Active Directory.

```
$msolcred = get-credential connect-msolservice -credential $msolcred
```



2. Once you are signed in, you can issue the following command to see what your tenant is currently configured for.

```
Get-MsolCompanyInformation | fl AllowAdHocSubscriptions
```

3. You can this command to enable (\$true) or disable (\$false) AllowAdHocSubscriptions.

```
Set-MsolCompanySettings -AllowAdHocSubscriptions $true
```

NOTE

This blocking prevents new users in your organization from signing up for Power BI. Users that sign up for Power BI prior to disabling new signups for your organization will still retain their licenses.

Next steps

[Self-service sign up for Power BI](#)

[Purchasing Power BI Pro](#)

[Sign up for Power BI \(free\) with a custom Azure Active Directory tenant](#)

[Power BI Premium - what is it?](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Purchasing Power BI Pro

1/30/2018 • 5 min to read • [Edit Online](#)

Power BI Pro is for those users publishing reports, sharing dashboards, collaborating with colleagues in workspaces and engaging in other related activities – such as the ability to:

- Analyze data in Excel or Power BI Desktop
- Share with Excel Web App support
- Share dashboards and collaborate with app workspaces
- View shared content
- Integrate content with Microsoft Teams

IT Admins have a few options to use Power BI Pro within your organization. You can purchase Power BI Pro through the Office 365 admin center or through your Microsoft representative or partner. This article will look at the two trial options available for Power BI Pro, and then how to purchase as an organization.

For more information about Power BI Premium, and how Power BI Pro fits into the Premium offering, see [Power BI Premium - what is it?](#)

Pricing

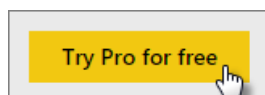
For the latest pricing information of Power BI Pro and a table listing of included features, see [Power BI Pricing](#).

In-service Power BI Pro 60 day trial for individuals

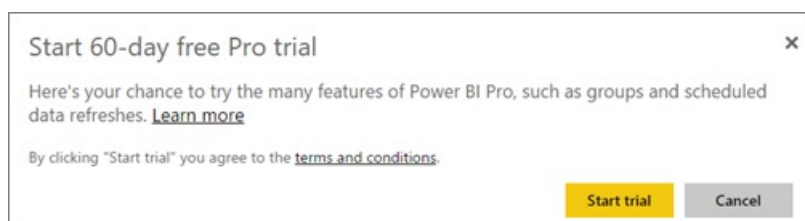
After you have signed up for your free account, you can optionally choose to try Pro free for 60 days. You will have access to all of the Pro features for the duration of the trial. Power BI Pro has all the features of the free version of Power BI, and additional sharing and collaboration features. For more information, see [Power BI Pricing](#). To try a 60-day free trial of Power BI Pro, sign into Power BI, and try one of these Power BI Pro features:

- [Create an app workspace](#)
- [Share a dashboard](#)

When you try any of these features, you will be prompted to start your free trial. You can also choose to make use of it by going to the gear icon and selecting **Manage personal storage**. Then select **Try Pro for free** on the right.



Then you can select **Start trial**.



NOTE

Users taking advantage of this in-product Power BI Pro trial do not appear in the Office 365 admin portal as Power BI Pro Trial users (they appear as Power BI free users). They will, however, show up as Power BI Pro Trial users in the **manage storage** page in Power BI.

NOTE

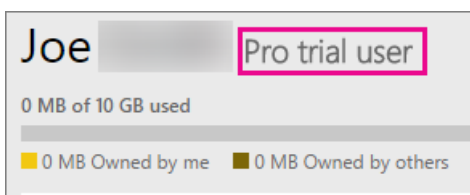
If you are an IT Administrator wishing to acquire and deploy Power BI trial licenses to multiple users in your organization without having individual users accept trial terms individually, you can sign up for a [Power BI Pro subscription trial](#). You will need to be an Office 365 Global or Billing Admin or create a new tenant to sign up for an admin trial. For more information, see [Purchasing Power BI Pro](#).

NOTE

With the availability of Power BI Premium, and the changes to the Power BI Free offering on June 1, 2017, you may be eligible for an Extended Pro Trial. For more information, see [Extended Pro Trial activation](#).

What this looks like within the service

When you are in the service, you can verify that you have a Pro trial account by going to the **gear* icon and selecting **Manage personal storage**.



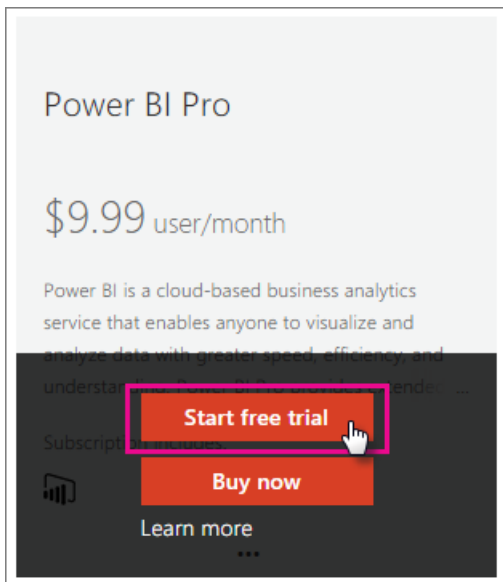
Subscription trial in Office 365

You can get Power BI Pro as a trial for your organization. Once you have the subscription, you can assign Power BI Pro licenses to your users. For more information about how to assign licenses, see [Assign licenses to users in Office 365](#).

NOTE

There is a limit of one organizational trial per tenant. This means that if someone has already applied the Power BI Pro Trial to your tenant, you cannot do it again. If you need assistance with this, you can contact [Office 365 Billing support](#).

1. Navigate to the [Office 365 admin center](#).
2. On the left navigation pane, select Billing > Subscriptions.
3. Select Add subscriptions + on the right side.
4. Under Other Plans, hover over the ellipsis (...) for Power BI Pro and select Start free trial.

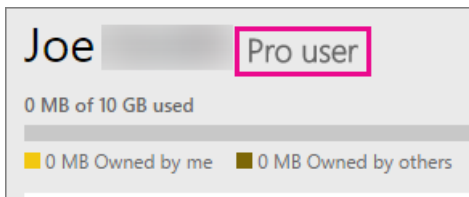


5. On the confirm your order screen, select Try now.
6. Select Continue on the order receipt.

Under **Billing** > **Subscriptions**, you will see **Power BI Pro Trial** listed with 25 licenses available. This is a one month trial.

What this looks like within the service

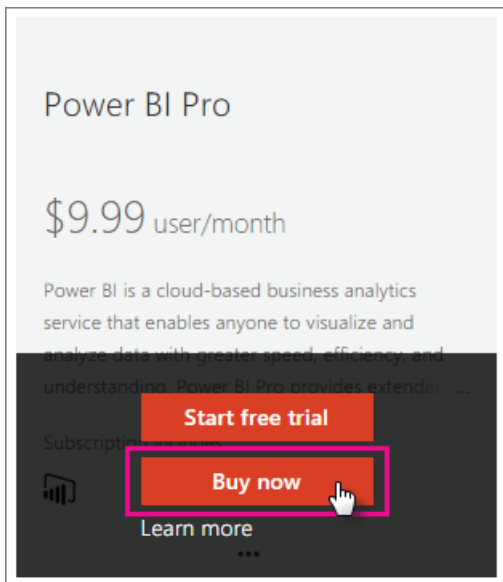
When you are in the service, you can verify that you have a Pro account by going to the **gear** icon and selecting **Manage personal storage**. There will be no indication that this is a trial user.



Purchase subscription in Office 365

You can purchase Power BI Pro for your organization through the Office 365 admin center. Once you have the subscription, you can assign Power BI Pro licenses to your users. For more information about how to assign licenses, see [Assign licenses to users in Office 365](#) .

1. Navigate to the [Office 365 admin center](#).
2. On the left navigation pane, select Billing > Subscriptions.
3. Select Add subscriptions + on the right side.
4. Under Other Plans, hover over the ellipse (...) for Power BI Pro and select Buy now.



5. Enter the number of licenses you would like to add and select Check out now or Add to cart.

NOTE

You can add more at a later date if needed.

6. Enter the needed information in the check out flow.

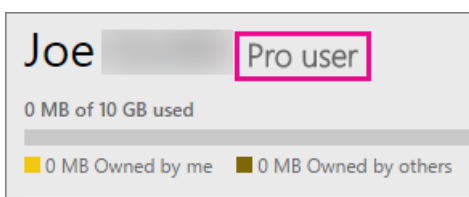
NOTE

If you already had the Power BI Pro Trial, it will go directly to the checkout screen asking to input the number of licenses you want.

Under **Billing** > **Subscriptions**, you will see **Power BI Pro** listed. If you decide later that you want to add more licenses, you can go back to **Add subscriptions**, and select **Change license quantity**.

What this looks like within the service

When you are in the service, you can verify that you have a Pro account by going to the **gear** icon and selecting **Manage personal storage**.



Grace period

There is a 30-day grace period after a Power BI Pro license expires.

Power BI Pro has the same subscription lifecycle as Office 365. For more information, see [What happens to my data and access when my Office 365 for business subscription ends?](#)

Next steps

- [Self-service sign up for Power BI](#)
- [Power BI \(free\) in your organization](#)
- [Extended Pro Trial activation](#)

[Power BI Premium - what is it?](#)

[How to purchase Power BI Premium](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Governance and deployment approaches

1/30/2018 • 1 min to read • [Edit Online](#)

Over the last few decades companies have become increasingly aware of the need to strategically leverage data assets to profit from market opportunities. Either by performing competitive analysis or by understanding operational patterns, many organizations now understand they can benefit from having a data strategy as a way to stay ahead of their competition.

This whitepaper provides a framework for increasing the return on investment related to Power BI as companies seek to increasingly become more data-savvy.

Business Intelligence practitioners typically define data-savvy companies as those that benefit from the use of factual information to support decision making. We even describe certain organizations as having a “data culture.” Whether at the organizational level, or at a departmental level, a data culture can positively alter a company’s ability to adapt and thrive. Data insights must not always be of enterprise scope to be far-reaching: small operational insights that can alter day-to-day operations can be transformational as well.

For these companies, there is an understanding that facts – and fact analysis – must drive how business processes are defined. Team members attempt to seek data, identify patterns, and share findings with others.

This approach can be useful regardless of if the analysis is done over external or internal business factors. It is first and foremost a perspective, not a process.

Read [Power BI Governance and Deployment Approaches](#) to learn about concepts, options and suggestions for governance within the Power BI ecosystem.

Power BI Security

12/6/2017 • 4 min to read • [Edit Online](#)

For a detailed explanation of Power BI security, please [download the Power BI Security whitepaper](#):

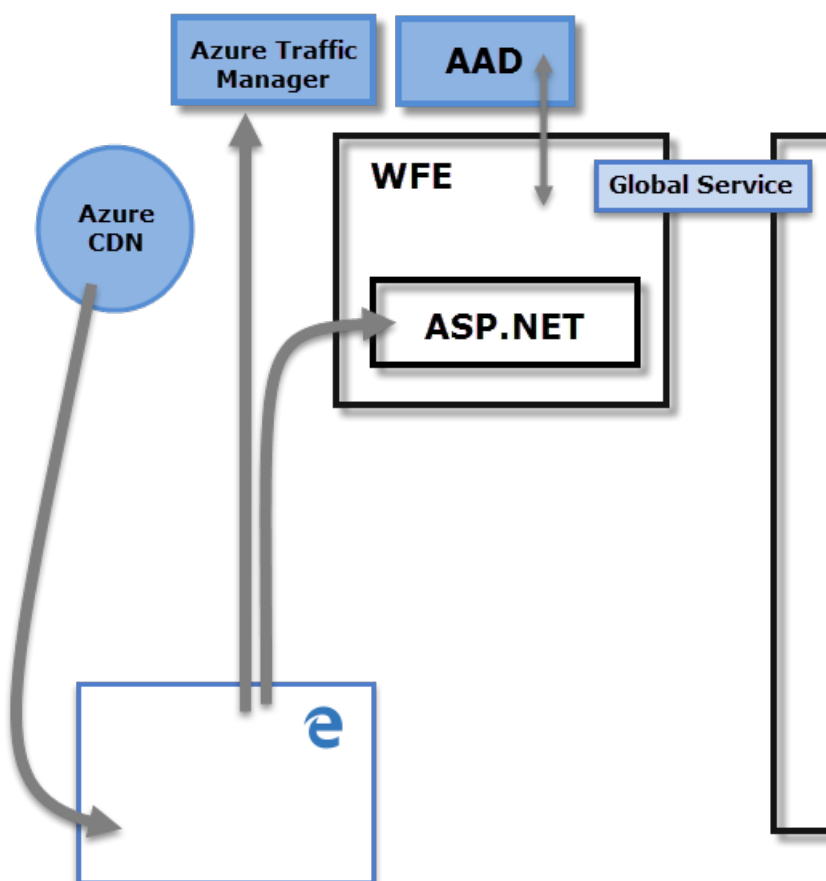
[Download](#)

The Power BI service is built on **Azure**, which is Microsoft's cloud computing infrastructure and platform. The Power BI service architecture is based on two clusters – the Web Front End (**WFE**) cluster and the **Back End** cluster. The WFE cluster is responsible for initial connection and authentication to the Power BI service, and once authenticated, the Back End handles all subsequent user interactions. Power BI uses Azure Active Directory (AAD) to store and manage user identities, and manages the storage of data and metadata using Azure BLOB and Azure SQL Database, respectively.

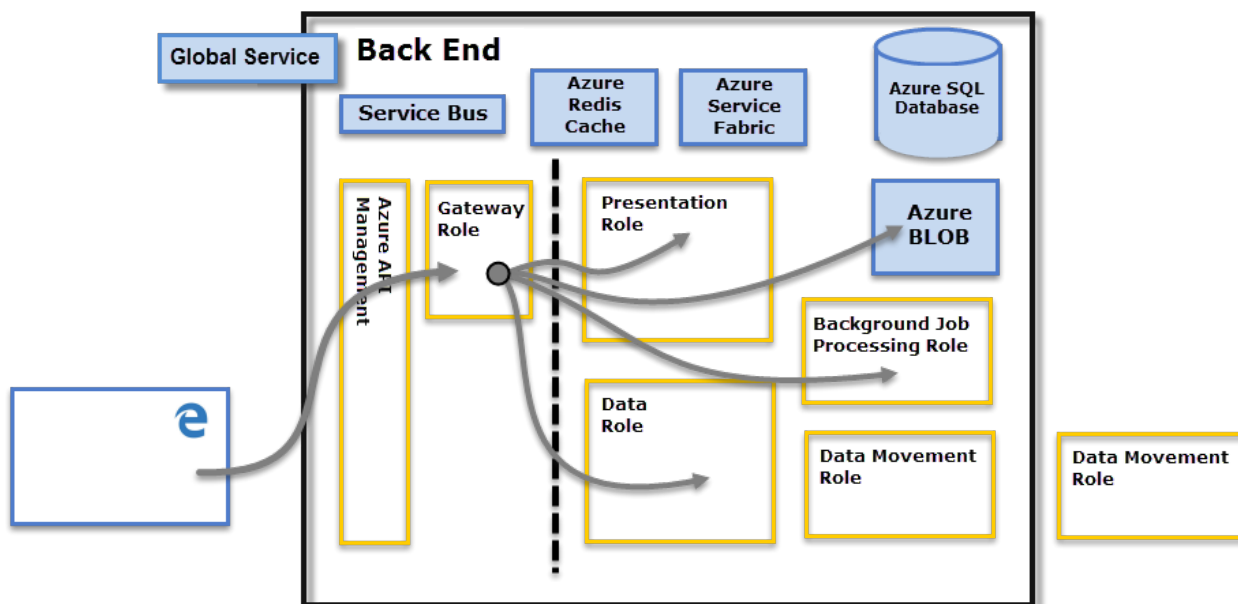
Power BI Architecture

Each Power BI deployment consists of two clusters – a Web Front End (**WFE**) cluster, and a **Back End** cluster.

The **WFE** cluster manages the initial connection and authentication process for Power BI, using AAD to authenticate clients and provide tokens for subsequent client connections to the Power BI service. Power BI also uses the **Azure Traffic Manager** (ATM) to direct user traffic to the nearest datacenter, determined by the DNS record of the client attempting to connect, for the authentication process and to download static content and files. Power BI uses the **Azure Content Delivery Network** (CDN) to efficiently distribute the necessary static content and files to users based on geographical locale.



The **Back End** cluster is how authenticated clients interact with the Power BI service. The **Back End** cluster manages visualizations, user dashboards, datasets, reports, data storage, data connections, data refresh, and other aspects of interacting with the Power BI service. The **Gateway Role** acts as a gateway between user requests and the Power BI service. Users do not interact directly with any roles other than the **Gateway Role**. **Azure API Management** will eventually handle the **Gateway Role**.



IMPORTANT

It is imperative to note that only **Azure API Management** (APIM) and **Gateway** (GW) roles are accessible through the public Internet. They provide authentication, authorization, DDoS protection, Throttling, Load Balancing, Routing, and other capabilities.

Data Storage Security

Power BI uses two primary repositories for storing and managing data: data that is uploaded from users is typically sent to **Azure BLOB** storage, and all metadata as well as artifacts for the system itself are stored in **Azure SQL Database**.

The dotted line in the **Back End** cluster image, above, clarifies the boundary between the only two components that are accessible by users (left of the dotted line), and roles that are only accessible by the system. When an authenticated user connects to the Power BI Service, the connection and any request by the client is accepted and managed by the **Gateway Role** (eventually to be handled by **Azure API Management**), which then interacts on the user's behalf with the rest of the Power BI Service. For example, when a client attempts to view a dashboard, the **Gateway Role** accepts that request then separately sends a request to the **Presentation Role** to retrieve the data needed by the browser to render the dashboard.

User Authentication

Power BI uses Azure Active Directory (AAD) to authenticate users who login to the Power BI service, and in turn, uses the Power BI login credentials whenever a user attempt to resources that require authentication. Users login to the Power BI service using the email address used to establish their Power BI account; Power BI uses the that login email as the *effective username*, which is passed to resources whenever a user attempts to connect to data. The *effective username* is then mapped to a *User Principal Name* (UPN) and resolved to the associated Windows domain account, against which authentication is applied.

For organizations that used work emails for Power BI login (such as *david@contoso.com*), the *effective username*

to UPN mapping is straightforward. For organizations that did not use work emails for Power BI login (such as *david@contoso.onmicrosoft.com*), mapping between AAD and on-premises credentials will require [directory synchronization](#) to work properly.

Platform security for Power BI also includes multi-tenant environment security, networking security, and the ability to add additional AAD-based security measures.

Data and Service Security

For more information, please visit the [Microsoft Trust Center](#).

As described earlier in this article, a user's Power BI login is used by on-premises Active Directory servers to map to a UPN for credentials. However, it's **important** to note that users are responsible for the data they share: if a user connects to data sources using her credentials, then shares a report (or dashboard, or dataset) based on that data, users with whom the dashboard is shared are not authenticated against the original data source, and will be granted access to the report.

An exception is connections to **SQL Server Analysis Services** using the **on-premises data gateway**; dashboards are cached in Power BI, but access to underlying reports or datasets initiate authentication for the user attempting to access the report (or dataset), and access will only be granted if the user has sufficient credentials to access the data. For more information, see [On-premises data gateway deep dive](#).

Signing up for Power BI with a new Office 365 Trial

1/30/2018 • 1 min to read • [Edit Online](#)

If you are having problems signing up for Power BI with your work email address, one potential workaround is to sign up for an Office 365 trial first and then signing up for Power BI. You will be able to use Power BI even after the Office 365 trial expires.

NOTE

You cannot use personal email addresses such as @live.com or @gmail.com with Office 365 or Power BI. For more information, see [What email address can be used with Power BI](#)

1. Sign up for an Office 365 trial [on the Office 365 web site](#).
2. When you complete that signup process, you will be given a new sign in name that looks like you@yourcompany.onmicrosoft.com. This will be the sign in name you will use for Power BI as well.
3. Sign up for Power BI [using this link](#). If you are prompted, sign in using the sign in name and password you selected for Office 365 in Step 1.

NOTE

If you already sign into Power BI or Office 365 with an organization login, you may want to use an InPrivate browser session to log in with the new account you created.

4. That's it! When you're finished, you will be redirected to Power BI.

Important considerations

By using this signup method you are creating a new organizational tenant and you will become the administrator of the tenant. Because sharing in Power BI is only allowed within a single tenant, you will not be able to share with users outside this tenant. For example, if you create the tenant yourcompany.onmicrosoft.com in Step 2, you will not be able to share with users at yourcompany.com. You can add new users to your tenant, then share with them, as described in [this help topic](#).

Next steps

[Administering Power BI in your organization](#)

[Power BI Premium - what is it?](#)

More questions? [Try asking the Power BI Community](#)

Where is my Power BI tenant located?

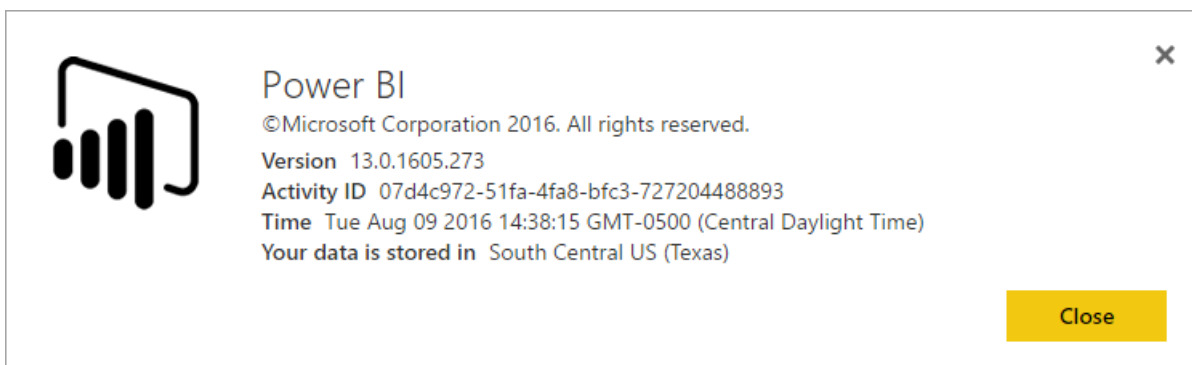
1/30/2018 • 1 min to read • [Edit Online](#)

Learn where your Power BI tenant is located and how that location is selected. This is important to understand as it can impact interactions you have with the service.

How to determine where your Power BI tenant is located

To find the region your tenant is in, you can do the following.

1. Select the ? within the Power BI service.
2. Select **About Power BI**.
3. Look for the value next to **Your data is stored in**. This is the region you are located in.



How the data region is selected

The data region is based on the country that was selected when the tenant was first created. This applies to sign up for Office 365 in addition to Power BI as this information is shared. If this is a new tenant, when you sign up, you will see a country drop down.

Create your account



Not you?

Adam

.....

.....

Where's your company located?

Where's your company located?

Afghanistan

Albania

Algeria

Angola

Argentina

Armenia

and understand that your name and email
Microsoft Privacy Policy

This selection is what drives the location of where your data will be stored. Power BI will pick a data region closest to this selection.

WARNING

This selection cannot be changed!

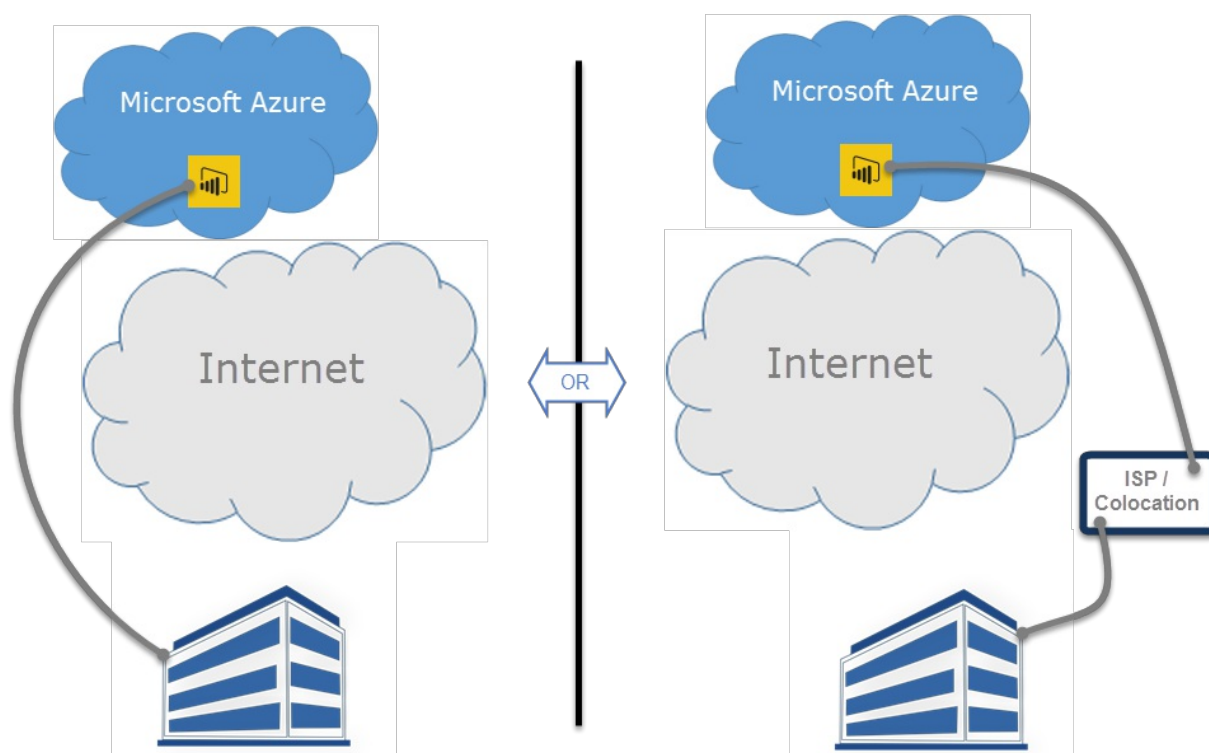
More questions? [Try the Power BI Community](#)

Power BI and ExpressRoute

12/6/2017 • 4 min to read • [Edit Online](#)

With **Power BI** and **ExpressRoute**, you can create a private network connection from your organization to Power BI (or using an ISP's colocation facility), bypassing the Internet to better secure your sensitive Power BI data and connections.

ExpressRoute is an Azure service that lets you create private connections between Azure datacenters (where Power BI resides) and your on-premises infrastructure, or create private connections between Azure datacenters and your colocation environment.



You can get [more information about ExpressRoute](#) or learn [how to sign up](#).

NOTE

Power BI is supported in Public peering mode, as described in [this FAQ](#).

Power BI ExpressRoute Exceptions

Power BI is compliant with ExpressRoute, with a few exceptions where Power BI gets or sends data over the public Internet. These specific exceptions often include static data, such as browser configuration files that are downloaded from the nearest **Content Delivery Network (CDN)** node. There are some broad exceptions which apply to all of Power BI, and there are some service- or feature-specific exceptions, each of which are documented in the following sections.

Overall Exceptions to Power BI and ExpressRoute

An exception to **Power BI** and **ExpressRoute** means that the data being transmitted to or from Power BI goes over the public Internet, rather than being transmitted over the private ExpressRoute link.

The two overall exceptions to Power BI using ExpressRoute are:

- Static files downloaded from the **Content Delivery Network (CDN)** and websites
- **Telemetry** data sent over the public Internet

Power BI uses multiple **Content Delivery Networks (CDNs)** or web sites to efficiently distribute the necessary static content and files to users based on geographical locale through the public Internet. These static files include product downloads (such as **Power BI Desktop, on-premises data gateway, or Power BI Content Packs** from various independent service providers), browser configuration files that are used to initiate and establish any subsequent connections with Power BI, as well as the initial secure Power BI login page – the actual credentials are only sent over ExpressRoute.

Certain **telemetry data** is also sent over the public Internet and over ExpressRoute. Telemetry data includes usage statistics and similar data, which is transmitted to services that are used to monitor usage and activity.

Power BI SaaS Application and ExpressRoute

When a user initiates a connection to the Power BI service (powerbi.com or through Cortana), the Power BI Landing Page, the login page, and static files that prepare the browser to connect and interact with Power BI are retrieved from a CDN or websites, which connects over the public Internet.

Once the login is established, subsequent Power BI data interactions occur over ExpressRoute, with the exception of certain features and services that depend on public Internet data:

- **Map visuals** require connection and data transmission to the Bing Virtual Earth service or the Bing geocoding service, each of which is established over the public Internet.
- Power BI integration with **Cortana** requires access to Bing over the public Internet.
- When **custom links** are added by a user, such as an image widget or a video, Power BI requests data based on the link provided by the user, which may or may not use ExpressRoute.
- Users can send **feedback to Power BI** in text (and optionally images) over the User Voice feedback mechanism, which uses the public Internet for transmission.
- The **Bing News content provider** downloads content from Bing using the public Internet.
- When connecting to **apps** (for example, content packs), users are often required to enter credentials and settings using pages provided by the SaaS provider. Such pages may or may not use ExpressRoute.

USER ACTIVITY	DESTINATION
Landing page (prior to login)	maxcdn.bootstrapcdn.com ; ajax.aspnetcdn.com ; netdna.bootstrapcdn.com ; cdn.optimizely.com; google-analytics.com
Login	*.mktosp.com ; *.aadcdn.microsoftonline-p.com ; *.msecnd.com ; *.localytics.com ; ajax.aspnetcdn.com
Dashboard, report, dataset management (includes maps and geocoding)	*.localytics.com ; *.virtualearth.net ; platform.bing.com; powerbi.microsoft.com; c.microsoft.com; app.powerbi.com; *.powerbi.com; dc.services.visualstudio.com
Support	support.powerbi.com ; powerbi.uservoice.com ; go.microsoft.com

Power BI Desktop and ExpressRoute

Power BI Desktop is also ExpressRoute compliant, with a few exceptions that are described in the following list:

- **Update notifications**, used to detect whether users have the most recent version of Power BI Desktop, go over the public Internet.
- Certain **telemetry data** goes over the public Internet.
- **Map visuals** require connection and data transmission to the **Bing Virtual Earth** service or the **Bing**

geocoding service, each of which is established over the public Internet.

- **Get Data** from several data sources such as **Web** or third party SaaS providers go over the public Internet.

Power BI PaaS and ExpressRoute

Power BI offers APIs and other platform-based features that enable developers to create customized Power BI solutions and apps. The following services, in addition to telemetry and CDN data discussed earlier in this topic, are used when transmitting Power BI PaaS data over the public Internet:

PAAS ACTIVITY	ADDITIONAL DESTINATIONS USED
Public embed (telemetry)	<code>c1.microsoft.com</code>
Custom visuals (CDN)	<code>*.azureedge.net</code>

Some **custom visuals** are created by third-parties, some are created by Microsoft. These may or may not use ExpressRoute.

Power BI Mobile and ExpressRoute

This document does not cover the use of Power BI Mobile apps.

On-premises data gateway and ExpressRoute

When an **on-premises data gateway** is used with Power BI, transmissions are ExpressRoute compliant, with the exception of the user activities documented in the **Power BI SaaS Application and ExpressRoute** section found earlier in this topic.

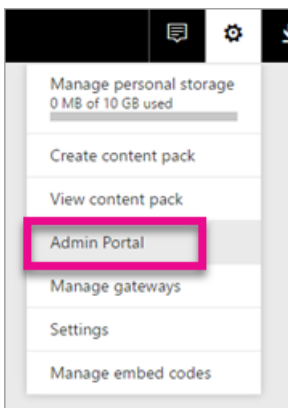
Understanding the Power BI admin role

1/30/2018 • 2 min to read • [Edit Online](#)

Learn how you can use the Power BI admin role within your organization.

The Power BI Service Administrator role can be assigned to users who should have access to the Power BI Admin Portal without also granting them other Office 365 administrative access. For example, the Global Admin role. It is meant for those tasked with administering Power BI for their organization.

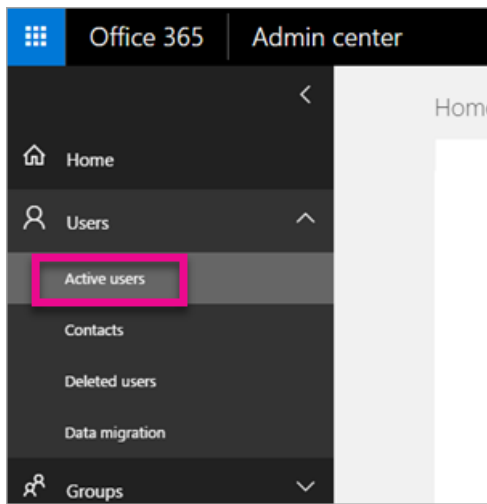
Office 365 user admins can assign users to be Power BI admins within the Office 365 Admin center, or via PowerShell script. Once a user is assigned, they'll be able to access the [Power BI admin portal](#). There, they will have access to tenant-wide usage metrics, and can control tenant-wide usage of Power BI features.



Using the Office 365 Admin Center to assign a role

To assign users to the Power BI Administrator role within the Office 365 Admin Center, you can do the following.

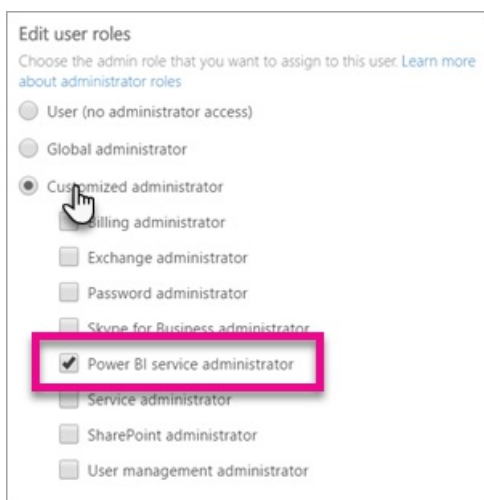
1. Browse to the Office 365 Admin Center and select **Users** > **Active Users**.



2. Select the user that you want to assign the role to.
3. Select **Edit** for roles.

Product licenses	Power BI Pro Power BI (free)	Edit
Group memberships (0)	No groups for the user. Click edit to change group membership.	Edit
Sign-in status	Sign-in allowed	Edit
Roles	User (no admin access)	Edit

4. Select **Customized administrator** > **Power BI service administrator**



5. Select **Save**.

You should see **Power BI service administrator** listed for the role of that user. They will now have access to the [Power BI admin portal](#).

Product licenses	Power BI Pro Power BI (free)	Edit
Group memberships (0)	No groups for the user. Click edit to change group membership.	Edit
Sign-in status	Sign-in allowed	Edit
Roles	Power BI service administrator	Edit

Using PowerShell to assign a role

To run the PowerShell command, you must have the Azure Active Directory PowerShell Module installed.

Download Azure AD PowerShell module

[Download Azure Active Directory PowerShell Version 2](#)

[Download Azure Active Directory PowerShell Version 1.1.166.0 GA](#)

Command to add role to member

Azure AD PowerShell v2 Command

You will need to get the **ObjectId** for the **Power BI Service Administrator** role. You can run [Get-AzureADDirectoryRole](#) to get the **ObjectId**

```
PS C:\Windows\system32> Get-AzureADDirectoryRole

ObjectId                               DisplayName                             Description
-----
00f79122-c45d-436d-8d4a-2c0c6ca246bf Power BI Service Administrator         Full access in the Power BI Service.
250d1222-4bc0-4b4b-8466-5d5765d14af9 Helpdesk Administrator                 Helpdesk Administrator has access to
perform..
3ddec257-efdc-423d-9d24-b7cf29e0c86b Directory Synchronization Accounts    Directory Synchronization Accounts
50daa576-896c-4bf3-a84e-1d9d1875c7a7 Company Administrator                 Company Administrator role has full
access t..
6a452384-6eb9-4793-8782-f4e7313b4dfd Device Administrators                 Device Administrators
9900b7db-35d9-4e56-a8e3-c5026cac3a11 AdHoc License Administrator           Allows access manage AdHoc license.
a3631cce-16ce-47a3-bbe1-79b9774a0570 Directory Readers                     Allows access to various read only
tasks in ..
f727e2f3-0829-41a7-8c5c-5af83c37f57b Email Verified User Creator           Allows creation of new email verified
users.
```

In this case, the role objectId is 00f79122-c45d-436d-8d4a-2c0c6ca246bf.

You will also need to know the users **ObjectID**. You can find that by running [Get-AzureADUser](#).

```
PS C:\Windows\system32> Get-AzureADUser -SearchString 'tim@contoso.com'

ObjectId                               DisplayName UserPrincipalName  UserType
-----
6a2bfca2-98ba-413a-be61-6e4bbb8b8a4c Tim        tim@contoso.com      Member
```

To add the member to the role, run [Add-AzureADDirectoryRoleMember](#).

PARAMETER	DESCRIPTION
ObjectId	The Role ObjectId.
RefObjectId	The members ObjectId.

```
Add-AzureADDirectoryRoleMember -ObjectId 00f79122-c45d-436d-8d4a-2c0c6ca246bf -RefObjectId 6a2bfca2-98ba-413a-be61-6e4bbb8b8a4c
```

Azure AD PowerShell v1 Command

To add a member to a role using the Azure AD v1 cmdlets, you will want to run the [Add-MsolRoleMember](#) command.

```
Add-MsolRoleMember -RoleMemberEmailAddress "tim@contoso.com" -RoleName "Power BI Service Administrator"
```

Limitations and considerations

The Power BI service administrator role does not provide access to the following.

- Ability to modify users and licenses within the Office 365 Admin Center
- Access to the audit logs. For more information, see [Using auditing within your organization](#).

Next steps

[Power BI admin portal](#)

[Add-AzureADDirectoryRoleMember](#)

[Add-MsolRoleMember](#)

[Auditing Power BI in your organization](#)

[Administering Power BI in your Organization](#)

More questions? [Try asking the Power BI Community](#)

Power BI admin portal

1/30/2018 • 8 min to read • [Edit Online](#)

The admin portal allows for tenant management of Power BI in your organization. It includes items such as usage metrics, access to the Office 365 admin center, and settings.

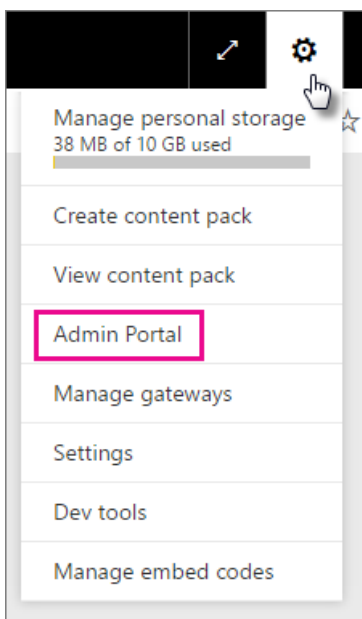
Tenant management of Power BI for your company is done through the Power BI admin portal. The admin portal is accessible to all users who are Global Admins in Office 365 or have been assigned the Power BI service administrator role. For more information about the Power BI service administrator role, see [Understanding the Power BI admin role](#).

All users will see **Admin portal** under the gear icon. If they are not an admin, they will only see the **Premium settings** section, and they will only see the capacities they have rights to manage.

How to get to the admin portal

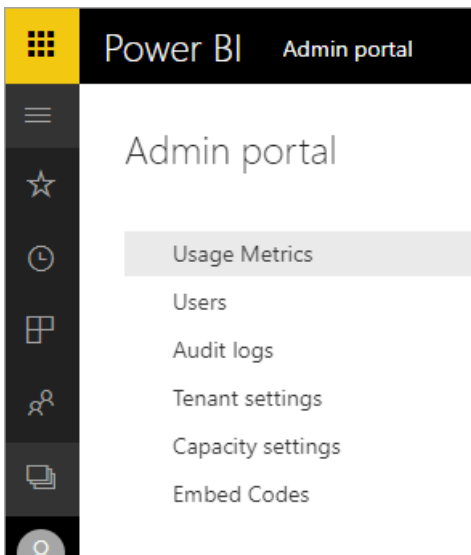
Your account needs to be marked as a **Global Admin**, within Office 365 or Azure Active Directory, or have been assigned the Power BI service administrator role, to get access to the Power BI admin portal. For more information about the Power BI service administrator role, see [Understanding the Power BI admin role](#). To get to the Power BI admin portal, do the following.

1. Select the settings gear in the top right of the Power BI service.
2. Select **Admin Portal**.



Within the portal, there are five tabs. These are described below.

- [Usage metrics](#)
- [Users](#)
- [Audit logs](#)
- [Tenant settings](#)
- [Premium settings](#)
- [Embed codes](#)



Usage metrics

The first tab, in the admin portal, is **Usage metrics**. The usage metrics report gives you the ability to monitor usage within Power BI for your organization. It also provides the ability to see which users, and groups, are the most active within Power BI for your organization.

NOTE

The first time you access the dashboard, or after you visit again after a long period of not viewing the dashboard, you'll likely see a loading screen while we load the dashboard.

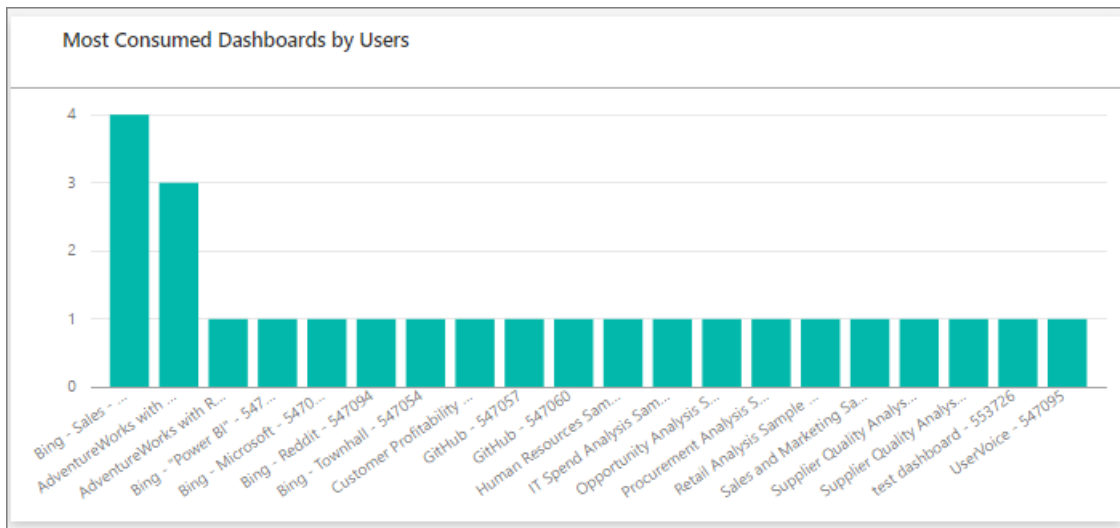
Once the dashboard loads, you will see two sections of tiles. The first section includes usage data for individual users and the second section has similar information for groups in your organization.

Here's a breakdown of what you will see in each tile:

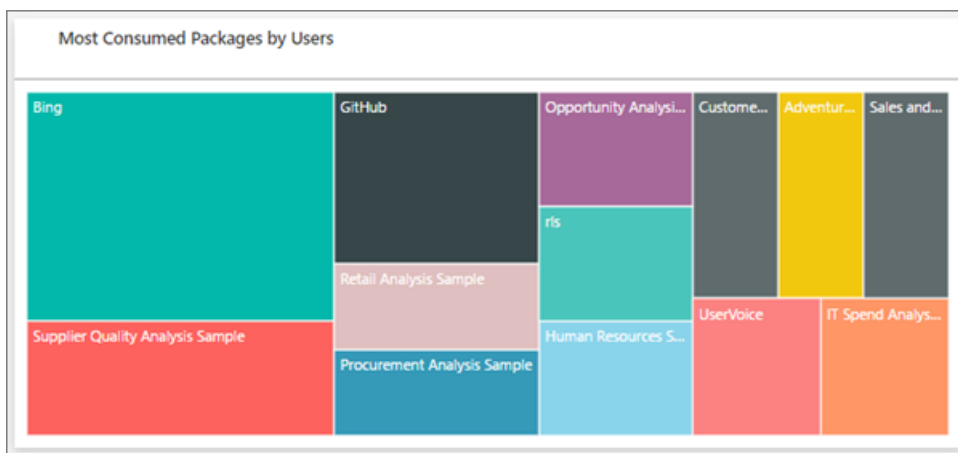
- Distinct count of all dashboards, reports, and datasets in the user workspace

Number of User Dashboards	Number of User Reports	Number of User Datasets
15	21	23

- Most consumed dashboard by number of users who can access it. For example, if you have a dashboard that you shared with 3 users, and you also added it to a content pack two different users connected to, its count would be 6 (1 + 3 + 2)



- The most popular content users connected to. This would be anything the users could reach through the Get Data process, so SaaS content packs, Organizational content packs, files or databases.



- A view of your top users based on how many dashboards they have, both dashboards they created themselves and dashboards shared to them.

Top Users with Most Dashboards		
GivenName	FamilyName	Count of DashboardId
Amanda	Cofsky	10
Julie	Zhu	9
Ajay	Anandan	4
Fetiye	Karabay	1
Lorissa	Horton	1

- A view of your top users based on how many reports they have

Top Users with Most Reports		
GivenName	FamilyName	Count of Id
Amanda	Cofsky	7
Julie	Zhu	5
Ajay	Anandan	1
Fetiye	Karabay	1

The second section shows the same type of information, but based on groups. This will let you see which groups in your organization are most active and what kind of information they are using.

With this information, you will be able to get real insights into how people are using Power BI across your

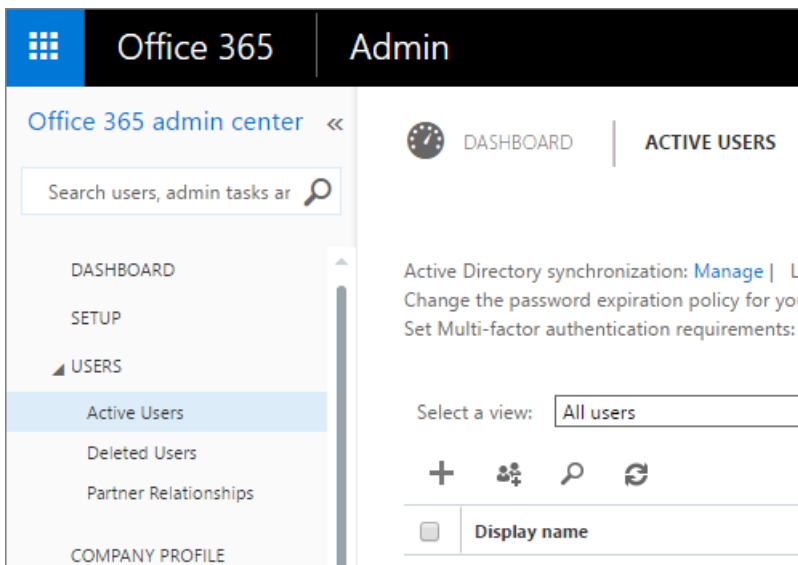
organization, and be able to recognize those users, and groups, who are very active in your organization.

Users

The second tab, in the admin portal, is **Manage Users**. User management, for Power BI, is done in the Office 365 admin center, so this section allows you to quickly reach the area to manage users, admins, and groups within Office 365.



When you click **Go to O365 Admin Center**, you go directly to the Office 365 admin center landing page, to manage the users of your tenant.



Audit logs

The third tab, in the admin portal, is **Audit logs**. The logs are located within the Office 365 Security & Compliance center. This section allows you to quickly access that area within Office 365.

For more information about audit logs, see [Auditing Power BI in your organization](#)

Tenant settings

The third tab, in the admin portal, is **Tenant settings**. Tenant settings give you more control over what features are made available to your organization. If you have concerns around sensitive data, some of our features may not be right for your organization, or you may only want a given feature to be available to a specific group. If this is the case, you can switch it off in your tenant.

Export and sharing settings

- ▶ Share content to external users
Disabled for the entire organization
- ▶ Publish to web
Enabled for the entire organization
- ▶ Export data
Disabled for the entire organization
- ▶ Export reports as PowerPoint presentations
Enabled for a subset of the organization
- ▶ Print dashboards and reports
Enabled for a subset of the organization

Content pack settings

- ▶ Publish content packs to the entire organization

NOTE
It can take up to 10 minutes for the setting to take effect for everyone in your tenant.

Settings can have three states based on the settings that you supplied.

Disabled for the entire organization

You can disable a feature and make it so users will not be able to use it.

Export data
Disabled for the entire organization

Users in the organization can export data from a tile or visualization.

Disabled

Apply Cancel

Enabled for the entire organization

You can enable a feature for the entire organization which will let all users have access to that feature.

Create template organizational content packs
Enabled for the entire organization

Users in the organization can create template content packs that use datasets by

Enabled

Apply to:

- The entire organization
- Specific security groups
- Except specific security groups

Apply Cancel

Enabled for a subset of the organization

You can also enable a feature for a portion of your organization. This can happen in a few different ways. You can enable it for your entire organization except for a specific group of users.

▲ **Export reports as PowerPoint presentations**
Enabled for a subset of the organization
 Users in the organization can export Power BI reports as PowerPoint files.

Enabled

Apply to:

The entire organization
 Specific security groups

Except specific security groups

Allowed X Enter security groups

Apply Cancel

You could also enable the feature only for a specific group of users and also disable it for a group of users. This would make sure that certain users do not have access to the feature even if they are in the allowed group.

▲ **Publish content packs to the entire organization**
Enabled for a subset of the organization
 Users in the organization can publish content packs to the entire organization.

Enabled

Apply to:

The entire organization
 Specific security groups

Allowed X Enter security groups

Except specific security groups

Denied X Enter security groups

Apply Cancel

Export and sharing settings

Share content to external users

Users in the organization can share dashboards with users outside the organization.

Share dashboard

Share Access

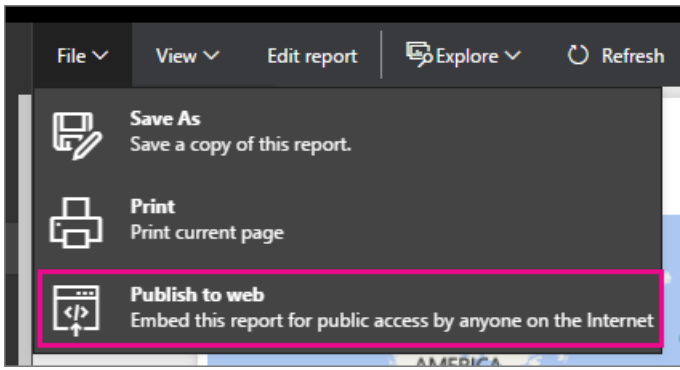
Grant access to

john@contoso.com X Enter email addresses

⚠ One or more e-mail addresses with the following domains are outside your organization: contoso.com

Publish to web

Users in the organization can publish reports to the web. [Learn more](#)

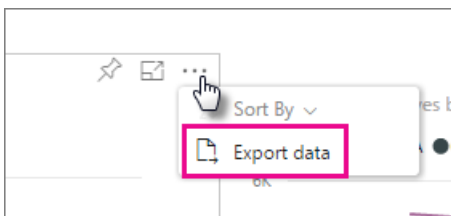


Users will see different options in the UI based on what the publish to web setting is.

FEATURE	ENABLED FOR ENTIRE ORGANIZATION	DISABLED FOR ENTIRE ORGANIZATION	SPECIFIC SECURITY GROUPS
Publish to web under report's File menu.	Enabled for all	Not visible for all	Only visible for authorized users or groups.
Manage embed codes under Settings	Enabled for all	Enabled for all	Enabled for all * Delete option only for authorized users or groups. * Get codes enabled for all.
Embed codes within admin portal	Status will reflect one of the following: * Active * Not supported * Blocked	Status will display Disabled	Status will reflect one of the following: * Active * Not supported * Blocked If a user is not authorized based on the tenant setting, status will display as infringed .
Existing published reports	All enabled	All disabled	Reports continue to render for all.

Export data

Users in the organization can export data from a tile or visualization. [Learn more](#)

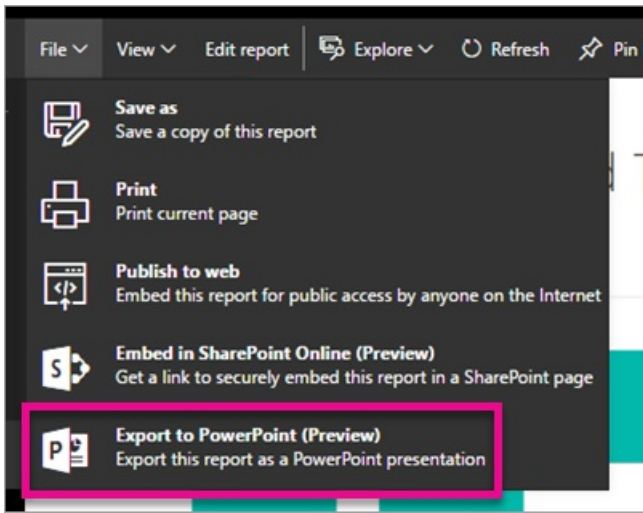


NOTE

Disabling **Export Data** will also prevent users from using the **Analyze in Excel** feature, as well as using the Power BI service live connection.

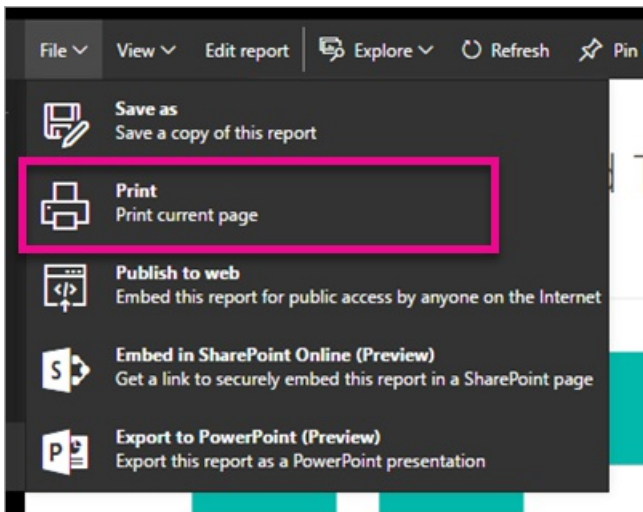
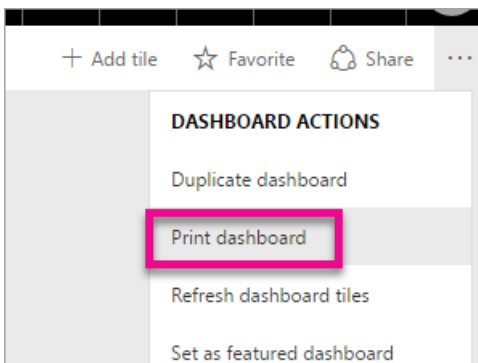
Export reports as PowerPoint presentations

Users in the organization can export Power BI reports as PowerPoint files. [Learn more](#)



Print dashboards and reports

Users in the organization can print dashboards and reports. [Learn more](#)



Content pack settings

Publish content packs to the entire organization

Users in the organization can publish content packs to the entire organization.

Create content pack

Choose who will have access to this content pack:

Specific groups My entire organization

Enter email addresses

Title

Create template organizational content packs

Users in the organization can create template content packs that use datasets built on one data source in Power BI Desktop.

Integration settings

Ask questions about data using Cortana

Users in the organization can ask questions about their data using Cortana.

NOTE

This settings applies to the entire organization and cannot be limited to specific groups.

Use Analyze in Excel with on-premises datasets

Users in the organization can use Excel to view and interact with on-premises Power BI datasets. [Learn more](#)

NOTE

Disabling **Export Data** will also prevent users from using the **Analyze in Excel** feature.

User ArcGIS Maps for Power BI (Preview)

Users in the organization can use the ArcGIS Maps for Power BI (Preview) visualization provided by Esri. [Learn more](#)

Custom visuals settings

Enable custom visuals for the entire organization

Users in the organization can interact with and share custom visuals. [Learn more](#)

Custom visuals settings

Custom Visuals
Enabled for the entire organization

Users in the organization can add, view, share, and interact with custom visuals.

Enabled

Apply Cancel

i This setting applies to the entire organization

NOTE

This setting applies to the entire organization and cannot be limited to specific groups.

R visuals settings

Interact with an dshare R visuals

Users in the organization can interact with and share visuals created with R scripts. [Learn more](#)

NOTE

This settings applies to the entire organization and cannot be limited to specific groups.

Audit settings

Create audit logs for internal activity auditing and compliance

Users in the organization can use auditing to monitor actions taken in Power BI by other users in the organization. [Learn more](#)

This setting needs to be enabled for audit log entries to be recorded.

NOTE

This settings applies to the entire organization and cannot be limited to specific groups.

Dashboard settings

Data classification for dashboards

Users in the organization can tag dashboards with classifications indicating dashboard security levels. [Learn more](#)

NOTE

This settings applies to the entire organization and cannot be limited to specific groups.

Developer settings

Embed content in apps

Users in the organization can embed Power BI dashboards and reports in Software as a Service (SaaS) applications. Disabling this setting will prevent users from being able to use the REST APIs to embed Power BI content within their application.

Premium settings

The Premium settings tab allows you to manage any Power BI Premium capacity that has been purchased for your organization. All users within your organization will see the Premium settings tab, but will only see contents within it, if they are assigned as either **Capacity admin** or a user that has assignment permissions. If a user does not have any permissions, they will see the following message.



Need more control over performance and scale?

Purchase Premium capacity, an add-on to Power BI Pro, to scale your BI solutions and easily share content with everyone in your organization.

[Learn more](#)

For more information about to manage Premium settings, see [Manage Power BI Premium](#).

Embed codes

Embed Codes

View embed codes that have been created by your organization. To change users ability to use publish to web, see [Tenant settings](#).

Report name	Workspace name	Published by	Status	Actions
Customer Profitability ...			Active	↗ 🗑️

As an administrator, you can view the embed codes that are generated for your tenant. You have the actions of viewing the report and deleting the embed code to revoke it.

Next steps

[Understanding the Power BI admin role](#)

[Auditing Power BI in your organization](#)

[Manage Power BI Premium](#)

[Administering Power BI in your Organization](#)

More questions? [Try asking the Power BI Community](#)

Using auditing within your organization

1/30/2018 • 10 min to read • [Edit Online](#)

Learn how you can use auditing with Power BI to monitor and investigate actions taken. You can use the Security and Compliance Center or use PowerShell.

Knowing who is taking what action on which item in your Power BI tenant can be critical in helping your organization fulfill its requirements, such as meeting regulatory compliance and records management.

You can filter the audit data by date range, user, dashboard, report, dataset and activity type. You can also download the activities in a csv (comma separated value) file to analyze offline.

NOTE

The auditing feature in Power BI is in preview and is available in all data regions.

Requirements

You must meet these requirements to access audit logs:

- To access the auditing section of the Office 365 Security & Compliance Center, you must have an Exchange Online license (included with Office 365 Enterprise E3 and E5 subscriptions).
- You must either be a global admin or have an Exchange admin role that provides access to the audit log.

Exchange admin roles are controlled through the Exchange admin center. For more information, see [Permissions in Exchange Online](#).

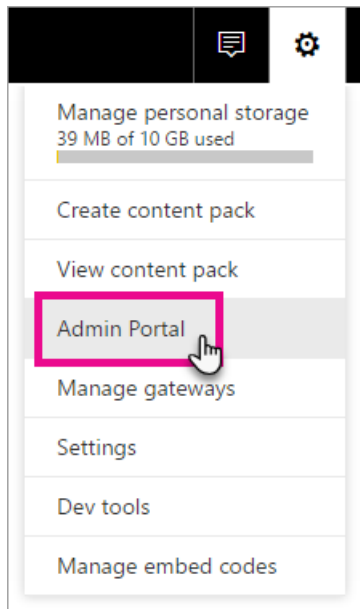
- If you have access to the audit log but are not a global admin or Power BI Service admin, you will not have access to the Power BI Admin portal. In this case, you must get a direct link to the Office 365 Security & Compliance Center.

Enabling auditing functionality in the Power BI admin portal

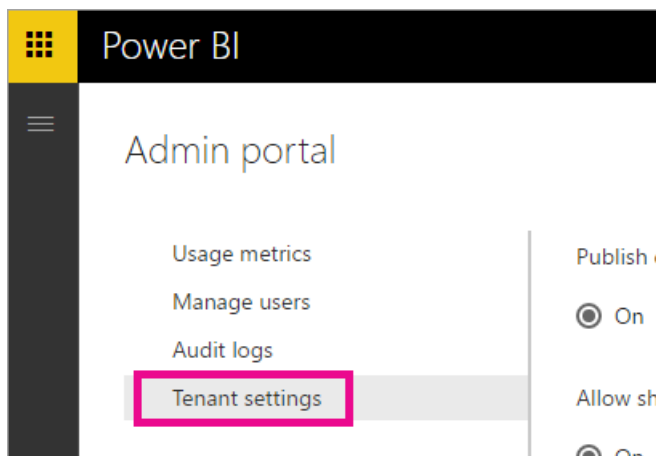
You will need to enable auditing for your organization in order to work with the reports. You can do this within the tenant settings of the admin portal.

1. Select the **gear icon** in the upper right.

2. Select **Admin Portal**.



3. Select **Tenant settings**.



4. Switch on **Create audit logs for internal activity auditing and compliance purposes**.

5. Select **Apply**.

Power BI will start logging various activities that your users perform in Power BI. The logs take up to 48 hours to show up in the O365 Security & Compliance Center. For more information about what activities are logged, see [List of activities audited by Power BI](#).

NOTE

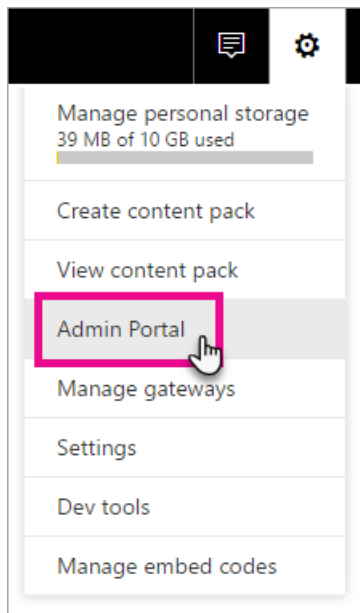
To enable auditing for Power BI in your tenant, you need at least one exchange mailbox license in your tenant.

Accessing your audit logs

To audit your Power BI logs, you must visit the O365 Security & Compliance Center.

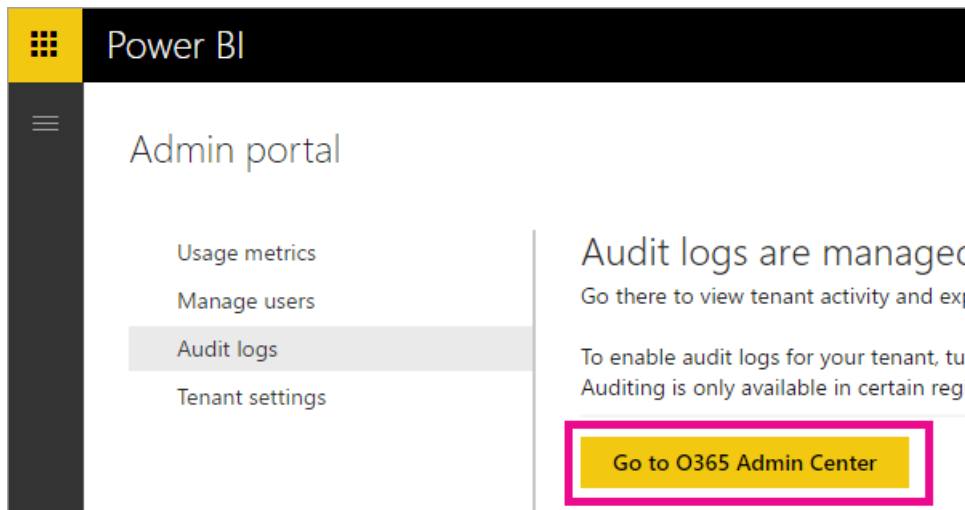
1. Select the **gear icon** in the upper right.

2. Select **Admin Portal**.



3. Select **Audit logs**.

4. Select **Go to O365 Admin Center**.



Alternatively, you can browse to [Office 365 | Security & Compliance](#).

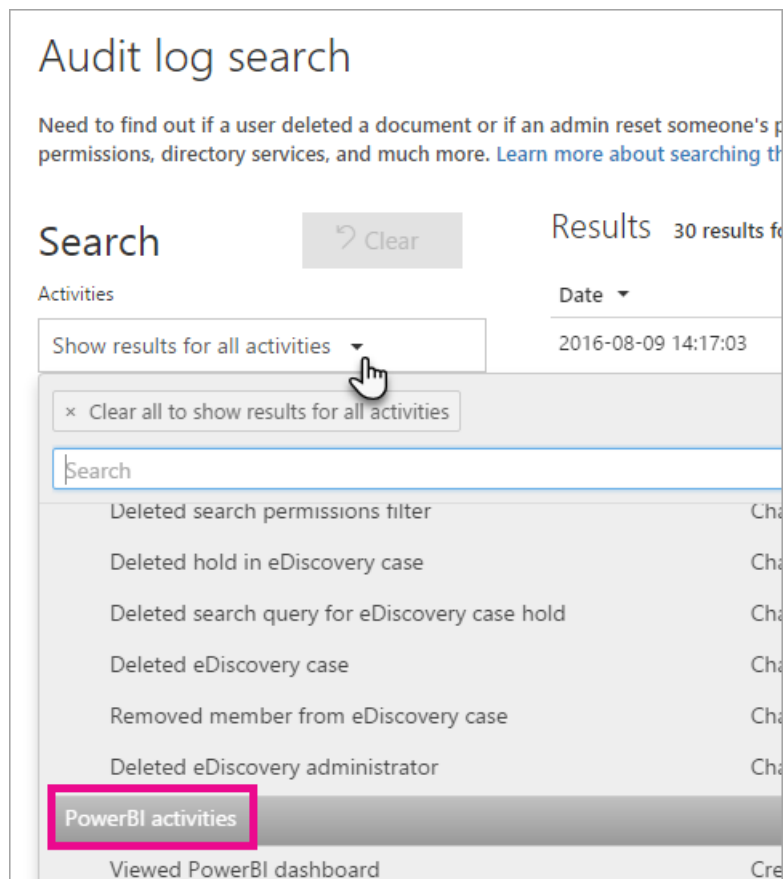
NOTE

To provide non-administrator accounts with access to the audit log, you will need to assign permissions within the Exchange Online Admin Center. For example, you could assign a user to an existing role group, such as Organization Management, or you could create a new role group with the Audit Logs role. For more information, see [Permissions in Exchange Online](#).

Search only Power BI activities

You can restrict results to only Power BI activities by doing the following.

1. On the **Audit log search** page, select the drop down for **Activities** under **Search**.
2. Select **PowerBI activities**.



3. Select anywhere outside of the selection box to close it.

Your searches will now be filtered to only Power BI activities.

Search the audit logs by date

You can search the logs by date range using the "Start date" and "End date" field. The last seven days are selected by default. The date and time are presented in Coordinated Universal Time (UTC) format. The maximum date range that you can specify is 90 days. An error is displayed if the selected date range is greater than 90 days.

NOTE

If you're using the maximum date range of 90 days, select the current time for the Start date. Otherwise, you'll receive an error saying that the start date is earlier than the end date. If you've turned on auditing within the last 90 days, the maximum date range can't start before the date that auditing was turned on.

Search ↶ Clear

Activities

Viewed PowerBI dashboard, ... (10) ▾

Start date

2016-08-08 📅 00:00 ▾

End date

2016-08-16 📅 00:00 ▾

Users

Leave blank to show results for all users

File, folder, or site

Add all or part of a file name, folder name, or site URL

🔍 Search + Add an alert

Search the audit logs by users

You can search for audit log entries for activities performed by specific users. To do this, enter one or more user names in the "Users" field. This would be the username that they sign into Power BI with. It looks like an email address. Leave this box blank to return entries for all users (and service accounts) in your organization.

Search ↶ Clear

Activities

Viewed PowerBI dashboard, ... (10) ▾

Start date

2016-08-08 📅 00:00 ▾

End date

2016-08-16 📅 00:00 ▾

Users

john@contoso.com|

File, folder, or site

Add all or part of a file name, folder name, or site URL

🔍 Search + Add an alert

Viewing search results

Once you hit the search button, the search results are loaded and after a few moments they are displayed under Results. When the search is finished, the number of results found is displayed.

NOTE

A maximum of 1000 events will be displayed; if more than 1000 events meet the search criteria, the newest 1000 events are displayed.

The results contain the following information about each event returned by the search.

COLUMN	DEFINITION
Date	The date and time (in UTC format) when the event occurred.
IP address	The IP address of the device that was used when the activity was logged. The IP address is displayed in either an IPv4 or IPv6 address format.
User	The user (or service account) who performed the action that triggered the event.
Activity	The activity performed by the user. This value corresponds to the activities that you selected in the Activities drop down list. For an event from the Exchange admin audit log, the value in this column is an Exchange cmdlet.
Item	The object that was created or modified as a result of the corresponding activity. For example, the file that was viewed or modified or the user account that was updated. Not all activities have a value in this column.
Detail	Additional detail about an activity. Again, not all activities will have a value.

NOTE

Select a column header under Results to sort the results. You can sort the results from A to Z or Z to A. Click the Date header to sort the results from oldest to newest or newest to oldest.

View the details for an event

You can view more details about an event by selecting the event record in the list of search results. A details page is displayed that contains the detailed properties from the event record. The properties that are displayed depend on the Office 365 service in which the event occurs. To display additional details, select **More information**.

The following table provides details on that you may see displayed.

PARAMETER OR EVENT	DESCRIPTION	ADDITIONAL DETAILS
Downloaded Power BI report	This activity is logged every time a report is downloaded	Report Name, Dataset Name
Create report	This activity is logged every time a new report is created.	Report Name, Dataset Name

PARAMETER OR EVENT	DESCRIPTION	ADDITIONAL DETAILS
Edit Report	This activity is logged every time a report is edited.	Report Name, Dataset Name
Create dataset	This activity is logged every time a dataset is created.	Dataset Name, DataConnectivityMode
Delete Dataset	This activity is logged every time a dataset is deleted.	Dataset Name, DataConnectivityMode
Create Power BI app	This activity is logged every time a Power BI app is created	App name, Permissions, Workspace Name
Install Power BI app	This activity is logged every time a Power BI app installed	App name
Update Power BI app	This activity is logged every time a Power app in updated	App name, Permissions, Workspace Name
Started Power BI extended trial	This activity is logged every time an user accepts the extended pro trial that runs until May 31 2018	
Analyzed Power BI dataset	This activity is logged every time a Power BI dataset is analyzed in Excel.	
Created Power BI gateway	This activity is logged every time a new gateway is created.	Gateway Name, Gateway Type
Deleted Power BI gateway	This activity is logged every time a gateway is deleted.	Gateway Name, Gateway Type
Added Data source to Power BI gateway	This activity is logged every time a data source in added to the gateway	Gateway Name, Gateway Type, Datasource Name, Datasource Type
Removed data source from Power BI gateway	This activity is logged every time a data source is removed from a gateway	Gateway Name, Gateway Type, Datasource Name, Datasource Type
Changed Power BI gateway admins	This activity is logged every time the admins of a gateway are changed (added/removed)	Gateway Name, Users Added, Users Removed
Changed Power BI gateway data source users	This activity is logged every time the users of a gateway are changed (added/removed)	Gateway Name, Users Added, Users Removed
SetScheduledRefresh	This activity is logged every time a new refresh is scheduled for a dataset	Dataset Name, Refresh Frequency (in minutes)

Using PowerShell to search

You can use PowerShell to access the audit logs based on your login. This is done by accessing Exchange Online. Here is an example of a command to pull Power BI audit log entries.

NOTE

In order to use the New-PSSession command, your account needs to have an Exchange Online license assigned to it and you need access to the audit log for your tenant.

```
Set-ExecutionPolicy RemoteSigned

$UserCredential = Get-Credential

$Session = New-PSSession -ConfigurationName Microsoft.Exchange -ConnectionUri
https://outlook.office365.com/powershell-liveid/ -Credential $UserCredential -Authentication Basic -
AllowRedirection

Import-PSSession $Session
Search-UnifiedAuditLog -StartDate 9/11/2016 -EndDate 9/15/2016 -RecordType PowerBI -ResultSize 1000 | Format-
Table | More
```

For more information on connecting to Exchange Online, see [Connect to Exchange Online PowerShell](#).

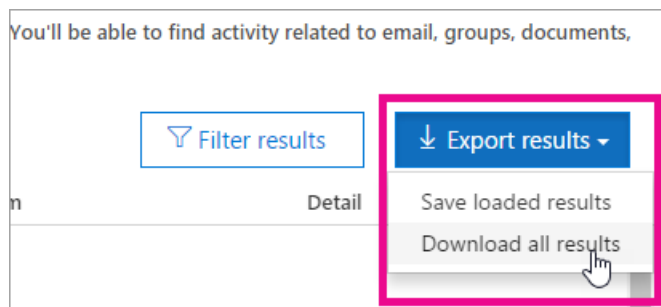
For more information about parameters and usage of the Search-UnifiedAuditLog command, see [Search-UnifiedAuditLog](#).

To see an example of using PowerShell to search the audit log and then assign Power BI Pro licenses based on entries, see [Using Power BI audit log and PowerShell to assign Power BI Pro licenses](#).

Export the Power BI audit log

You can export the Power BI audit log to a csv file.

1. Select **Export results**.
2. Select either **Save loaded results** or **Download all results**.



Record and user types

Audit log entries will have a RecordType and UserType as part of the details for the entry. All Power BI entries will have a RecordType of 20.

For a full listing, see [Detailed properties in the Office 365 audit log](#)

List of activities audited by Power BI

ACTIVITY	DESCRIPTION	ADDITIONAL DETAILS
CreateDashboard	This activity is logged every time a new dashboard is created.	- Dashboard name.

ACTIVITY	DESCRIPTION	ADDITIONAL DETAILS
EditDashboard	This activity is logged every time a dashboard is renamed.	- Dashboard name.
DeleteDashboard	This activity is logged every time a dashboard is deleted.	- Dashboard name.
PrintDashboard	This event is logged every time that a dashboard is printed.	- Dashboard name. - Dataset name
ShareDashboard	This activity is logged every time a dashboard is shared.	- Dashboard name. - Recipient Email. - Dataset name. - Reshare permissions.
ViewDashboard	This activity is logged every time a dashboard is viewed.	- Dashboard name.
ExportTile	This event is logged every time data is exported from a dashboard tile.	- Tile name. - Dataset name.
DeleteReport	This activity is logged every time a report is deleted.	- Report name.
ExportReport	This event is logged every time data is exported from a report tile.	- Report name. - Dataset name.
PrintReport	This event is logged every time that a report is printed.	- Report name. - Dataset name.
PublishToWebReport	This event is logged every time that a report is Published To Web.	- Report Name. - Dataset name.
ViewReport	This activity is logged every time a report is viewed.	- Report name.
ExploreDataset	This event is logged every time you explore a dataset by selected it.	- Dataset name
DeleteDataset	This event is logged every time a dataset is deleted.	- Dataset name.
CreateOrgApp	This activity is logged every time an organizational content pack is created.	- Organizational Content Pack name. - Dashbaord names. - Report names. - Dataset names.
CreateGroup	This activity is fired every time a group is created.	- Group name.
AddGroupMembers	This activity is logged every time a member is added to a Power BI group workspace.	- Group name. - Email addresses.

ACTIVITY	DESCRIPTION	ADDITIONAL DETAILS
UpdatedAdminFeatureSwitch	This event is logged every time an admin feature switch is changed.	- Switch name. - New switch state.
OptInForProTrial	This event is logged when a user chooses to try Power BI Pro within the service.	- email address

Next steps

[Power BI Admin Portal](#)

[Power BI Premium - what is it?](#)

[Purchasing Power BI Pro](#)

[Permissions in Exchange Online](#)

[Connect to Exchange Online PowerShell](#)

[Search-UnifiedAuditLog](#)

[Detailed properties in the Office 365 audit log](#)

More questions? [Try asking the Power BI Community](#)

Distribute Power BI content to external guest users with Azure AD B2B

1/30/2018 • 2 min to read • [Edit Online](#)

Power BI integrates with Azure Active Directory Business-to-business (Azure AD B2B) to allow secure distribution of Power BI content to guest users outside the organization, while still maintaining control over the internal data.

NOTE

This feature is not currently available with the Power BI mobile apps. On a mobile device, you can view Power BI content shared using Azure AD B2B in a browser.

Invite guest users

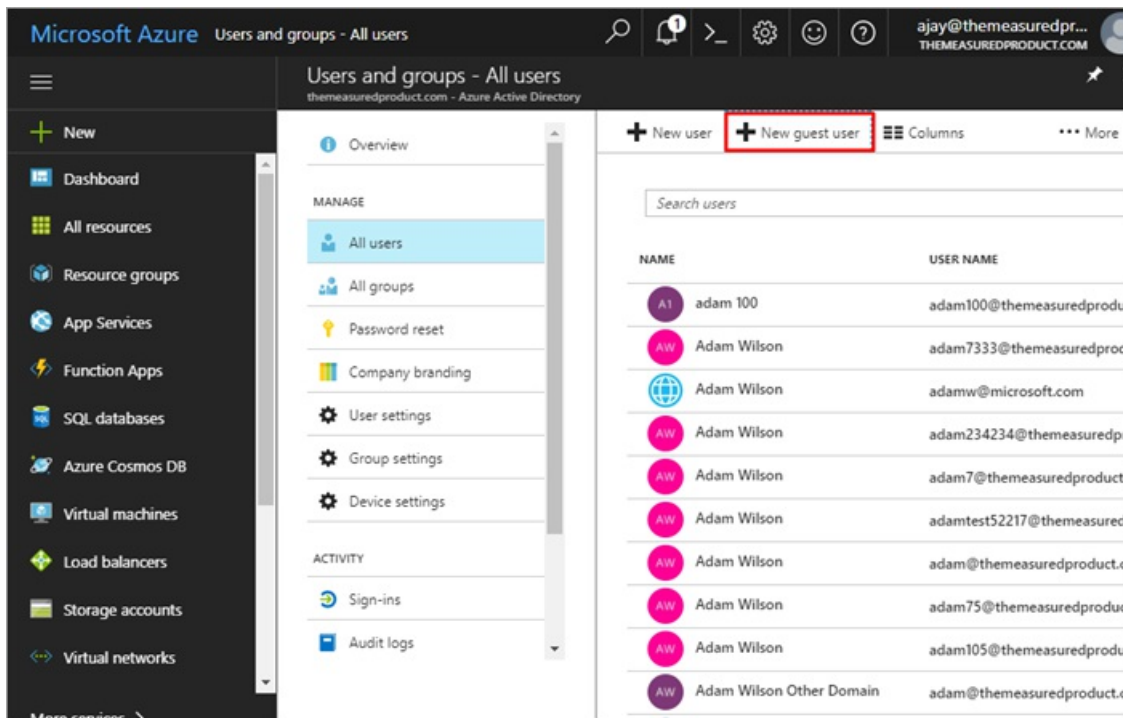
There are two ways to invite guest users to your Power BI tenant: planned invites or ad-hoc invites. Invitations are only needed the first time an external user is invited to your organization.

Planned invites

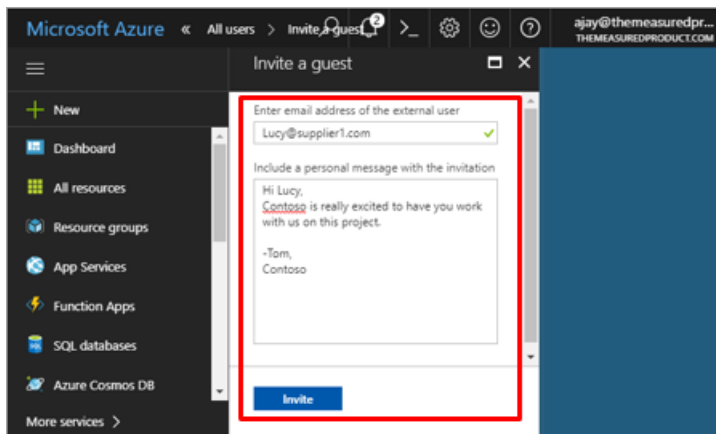
A planned invite is performed within the Microsoft Azure Portal in Azure AD or using PowerShell. This is the option to use if you know which users must be invited.

Creating the guest users in the Azure AD portal requires that you be a tenant admin.

1. Navigate to the [Azure Portal](#) and select **Azure Active Directory**.
2. Navigate to **Users and groups > All users > New guest user**.



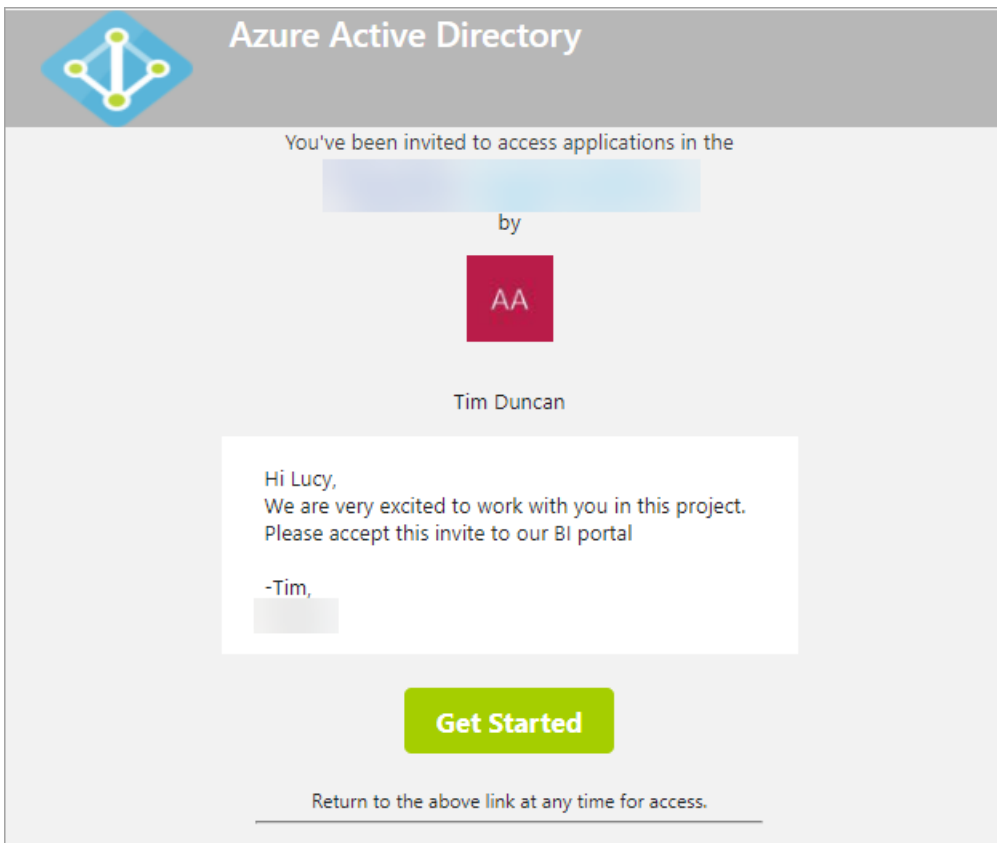
3. Enter the **email address** and **personal message**.



4. Select **Invite**.

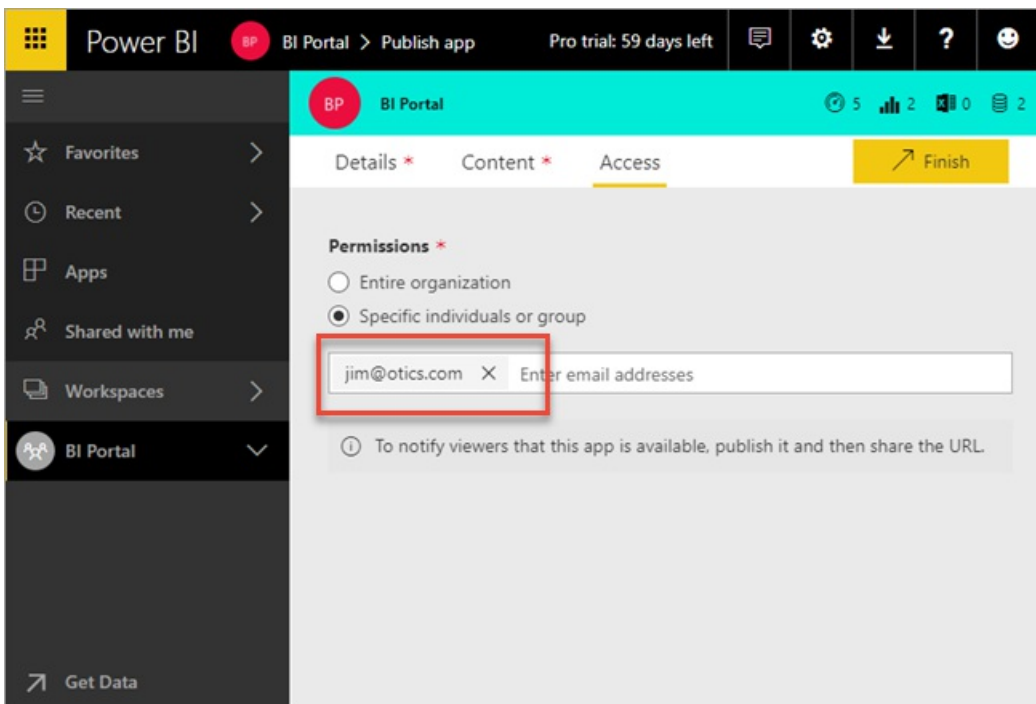
To invite more than one guest user, use PowerShell. For more information, see [Azure Active Directory B2B collaboration code and PowerShell samples](#).

The guest user needs to select **Get Started** in the email invitation they receive. The guest user is then added to the tenant.

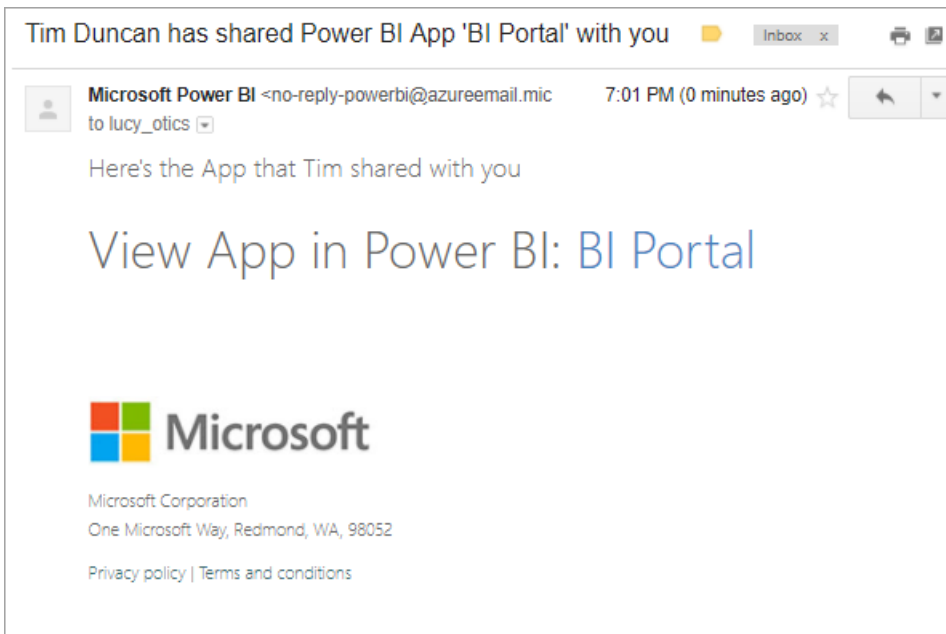


Ad-hoc invites

To perform an invite at anytime, add the external user to the access list of an app when publishing it.



The guest user will receive an email indicating the app has been shared with them.



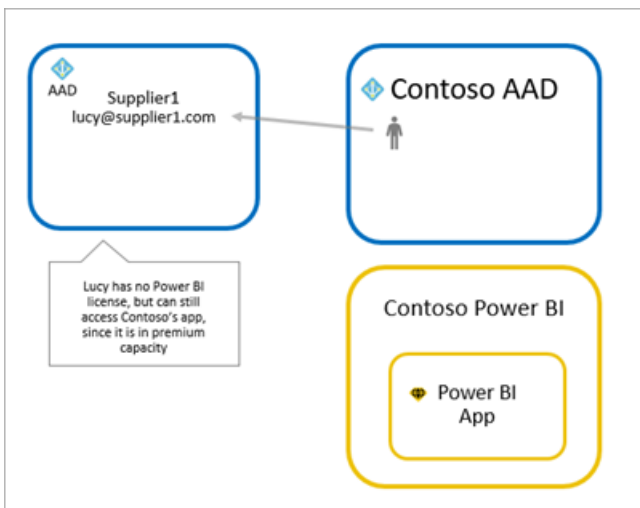
The guest user must sign in with their organization email address. They will be prompted to accept the invitation after signing in. After sign in, the guest user is redirected to the app content. To return to the app, bookmark the link, or save the email.

Licensing

The guest user will need to have the proper licensing in place to view the app that was shared. There are three options to accomplish this.

Use Power BI Premium

Assigning the app workspace to Power BI Premium capacity will allow the guest user to use the app without requiring a Power BI Pro license. Power BI Premium also allows for apps to take advantage of other capabilities like increased refresh rates, dedicated capacity and large model sizes.

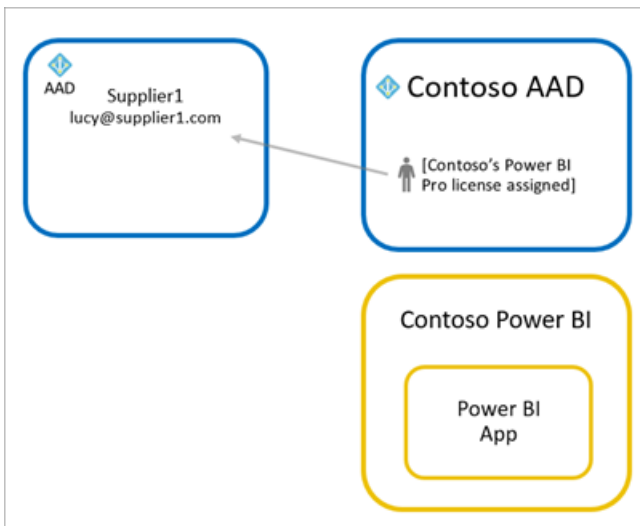


Assign Power BI Pro license to guest user

Assigning a Power BI Pro license to the guest user, within your tenant, allows that guest user to view the content.

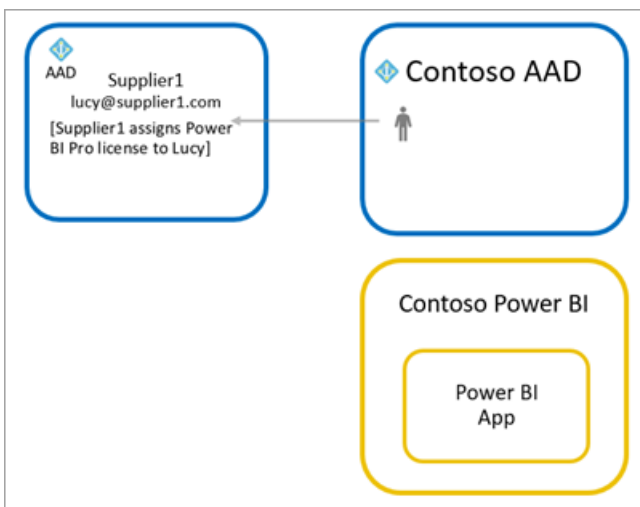
NOTE

A Power BI Pro license from your tenant applies to guest users only when they access content within your tenant.



Guest user brings their own Power BI Pro license

The guest user already has a Power BI Pro license assigned within their tenant.



Limitations

- External B2B guests are limited to consumption of content only. External B2B guests can view apps, dashboards, reports, export data and create email subscriptions for dashboards and reports. They can't access workspaces or publish their own content.
- This feature is not currently available with the Power BI mobile apps. On a mobile device, you can view Power BI content shared using Azure AD B2B in a browser.
- Using guest users with Power BI is not supported within sovereign clouds (government).

Next steps

For more detailed information, including how row-level security works, check out the [whitepaper](#).

For information regarding Azure Active Directory B2B, see [What is Azure AD B2B collaboration?](#)

Find Power BI users that have signed in

1/30/2018 • 1 min to read • [Edit Online](#)

If you are a tenant admin, and want to see who has signed into Power BI, you can use the Azure Active Directory access and usage reports to gain visibility.

You can access the activity report within the [new](#) and the [classic](#) Azure Active Directory (Azure AD) portals. While the video above uses the classic portal as an example, this article will highlight the new portal.

NOTE

This activity report includes both Power BI (Free) and Pro users but does not identify them by which license they have.

Requirements

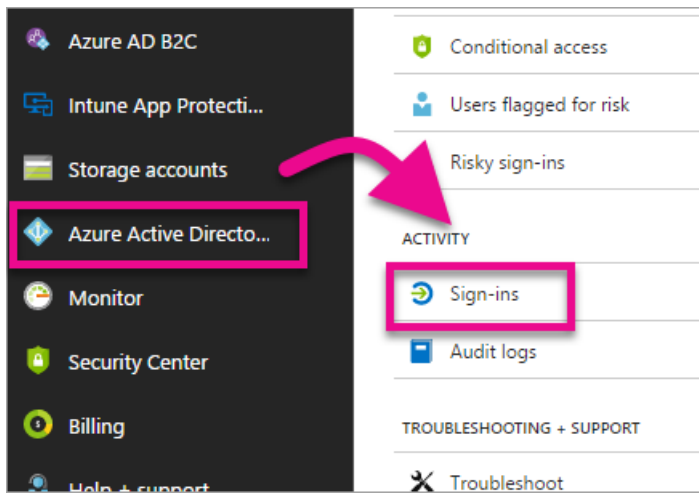
The following are requirements to view the sign-in activity report.

- Users in the Global Admin, Security Admin or Security Reader role can access the access the data.
- Any user (non-admins) can access their own sign-ins.
- Your tenant must have an Azure AD Premium license associated with it to see the all up sign-in activity report.

Using the Azure portal to view sign-ins

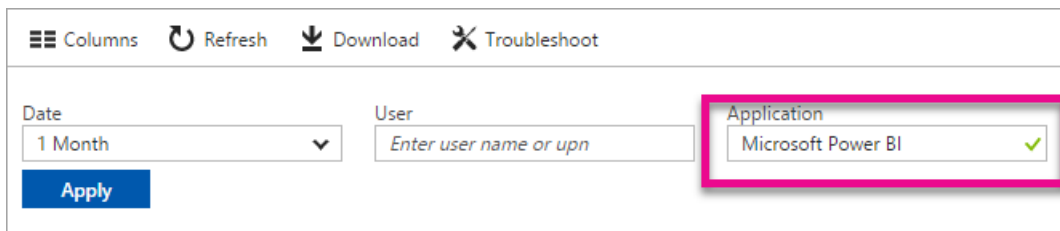
You can use the Azure AD portal to view sign-in activity.

1. Browse to the **Azure portal** and select **Azure Active Directory**.
2. Under **Activity**, select **Sign-ins**.



3. Filter the application by either **Microsoft Power BI** or **Power BI Gateway** and select **Apply**.

Microsoft Power BI is for sign-in activity related to the service whereas **Power BI Gateway** are specific sign-ins for the on-premises data gateway.

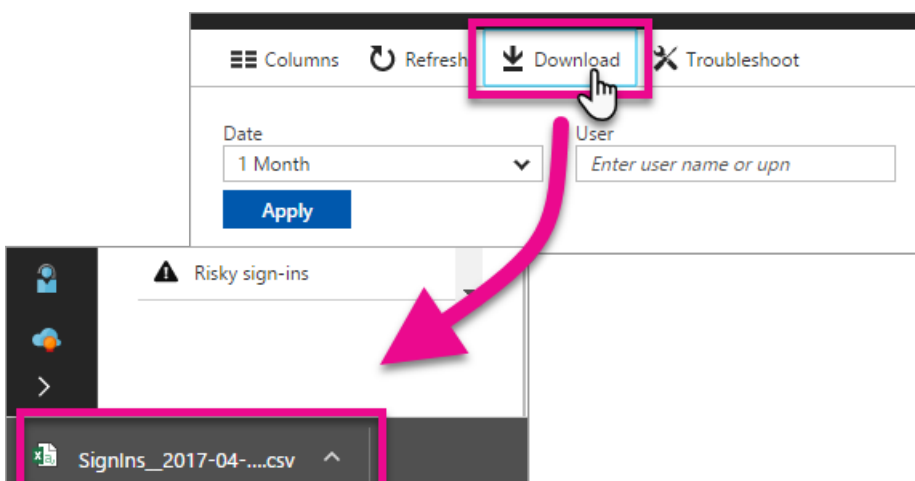


Export the data

You have two options to export the sign-in data. This can be done by either downloading a csv file or you can use PowerShell.

Download csv

Within the Activity screen, you can select **Download** in the toolbar. This will download a csv file for the currently filtered data.



PowerShell

You can use PowerShell to export the sign-in data. A [sample](#) is available within the Azure AD documentation.

NOTE

For the PowerShell sample to work, be sure to follow the [prerequisites to access the Azure AD reporting API](#).

Data retention

Sign-in related data can be available for up to 30 days. For more information, see [Azure Active Directory report retention policies](#).

Next steps

[Sign-in activity reports in the Azure Active Directory portal \(New Portal\)](#)

[View your access and usage reports \(Classic Portal\)](#)

[Sign-in sample PowerShell script](#)

[Azure Active Directory report retention policies](#)

[Using auditing within your organization](#)

[Extended Pro Trial activation](#)

More questions? [Try asking the Power BI Community](#)

Row-level security (RLS) with Power BI

1/30/2018 • 7 min to read • [Edit Online](#)

Row-level security (RLS) with Power BI can be used to restrict data access for given users. Filters restrict data at the row level. You can define filters within roles.

You can configure RLS for data models imported into Power BI with Power BI Desktop. You can also configure RLS on datasets that are using DirectQuery, such as SQL Server. Previously, you were only able to implement RLS within on-premises Analysis Services models outside of Power BI. For Analysis Services live connections, you configure Row-level security on the on-premises model. The security option will not show up for live connection datasets.

Define roles and rules within Power BI Desktop

You can define roles and rules within Power BI Desktop. When you publish to Power BI, it will also publish the role definitions.

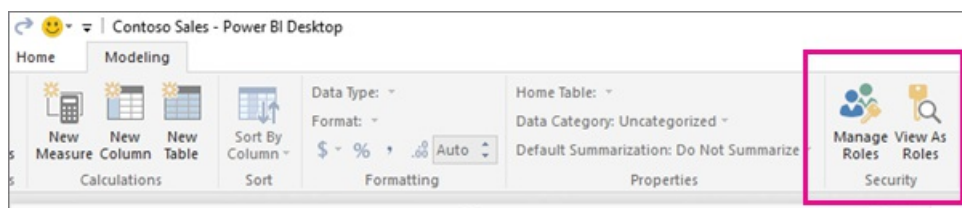
To define security roles, you can do the following.

1. Import data into your Power BI Desktop report, or configure a DirectQuery connection.

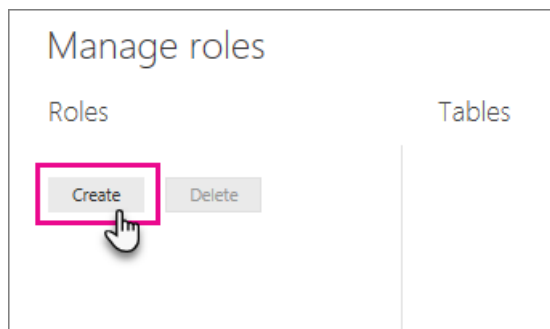
NOTE

You cannot define roles within Power BI Desktop for Analysis Services live connections. You will need to do that within the Analysis Services model.

2. Select the **Modeling** tab.
3. Select **Manage Roles**.



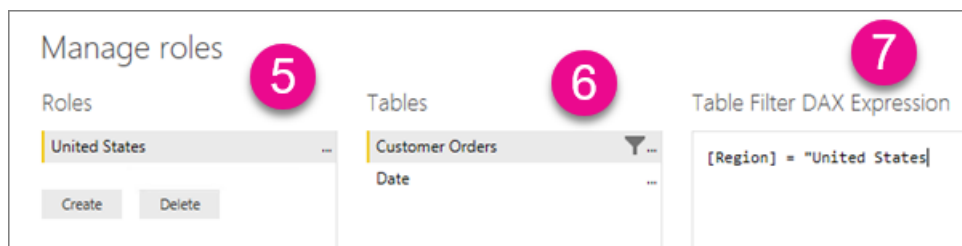
4. Select **Create**.



5. Provide a name for the role.
6. Select the table that you want to apply a DAX rule.
7. Enter the DAX expressions. This expression should return a true or false. For example: [Entity ID] = "Value".

NOTE

You can use `username()` within this expression. Be aware that `username()` will have the format of `DOMAIN\username` within Power BI Desktop. Within the Power BI service, it will be in the format of the user's UPN. Alternatively, you can use `userprincipalname()` which will always return the user in the format of their user principal name.



8. After you have created the DAX expression, you can select the check above the expression box to validate the expression.



9. Select **Save**.

You cannot assign users to a role within Power BI Desktop. This is done within the Power BI service. You can enable dynamic security within Power BI Desktop by making use of the `username()` or `userprincipalname()` DAX functions and having the proper relationships configured.

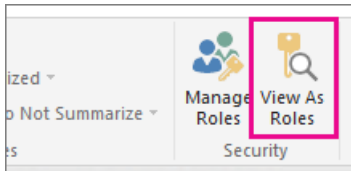
By default, row-level security filtering uses single-directional filters, regardless of whether the relationships are set to single direction or bi-directional. You can manually enable bi-directional cross-filter with row-level security by selecting the relationship and checking the **Apply security filter in both directions** checkbox. You should check this box when implementing [dynamic row-level security](#), wherein you provide row-level security based on user name or login ID.

For more information, see [Bidirectional cross-filtering using DirectQuery in Power BI Desktop](#) and the [Securing the Tabular BI Semantic Model](#) technical article.

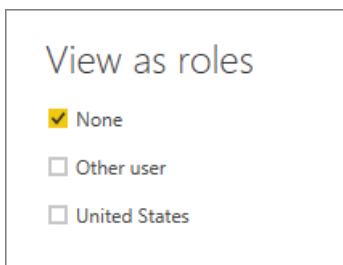
Cardinality	Cross filter direction
Many to one (*:1)	Both
<input checked="" type="checkbox"/> Make this relationship active	<input checked="" type="checkbox"/> Apply security filter in both directions
<input type="checkbox"/> Assume referential integrity	

Validating the role within Power BI Desktop

After you have created your role, you can test the results of the role within Power BI Desktop. To do this, select **View As Roles**.



The **View as roles** dialog allows you to change the view of what you are seeing for that specific user or role. You will see the roles you have created.



You select the role you created and then select **OK** to apply that role to what you are viewing. The reports will only render the data relevant for that role.

You can also select **Other user** and supply a given user. It is best to supply the User Principal Name (UPN) as that is what the Power BI service will use. Select **OK** and the reports will render based on what that user can see.



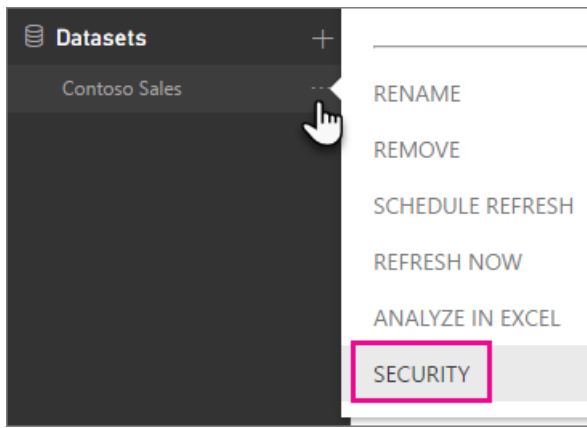
NOTE

Within Power BI Desktop, this will only display different results if you are using dynamic security based on your DAX expressions.

Manage security on your model

To manage security on your data model, you will want to do the following.

1. Select the **ellipse (...)** for a dataset.
2. Select **Security**.



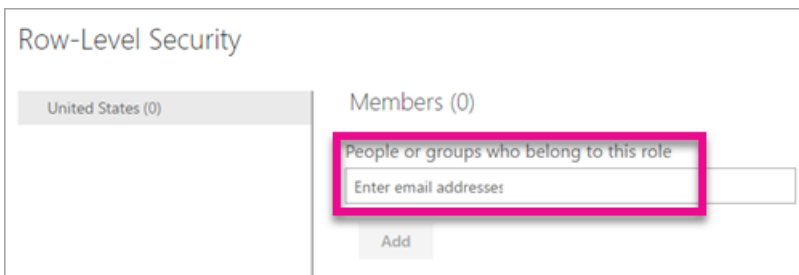
This will take you to the RLS page for you to add members to a role you created in Power BI Desktop. Only the owners of the dataset will see Security available. If the dataset is in a Group, only Administrators of the group will see the security option.

You can only create or modify roles within Power BI Desktop.

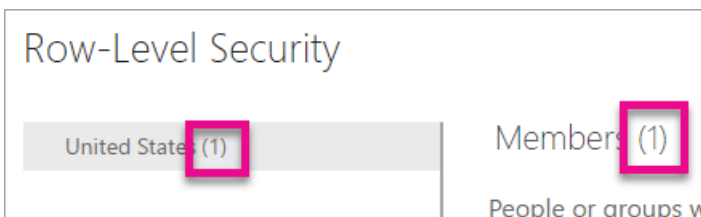
Working with members

Add members

You can add a member to the role by typing in the email address, or name, of the user, security group or distribution list you want to add. This member has to be within your organization. You cannot add Groups created within Power BI.

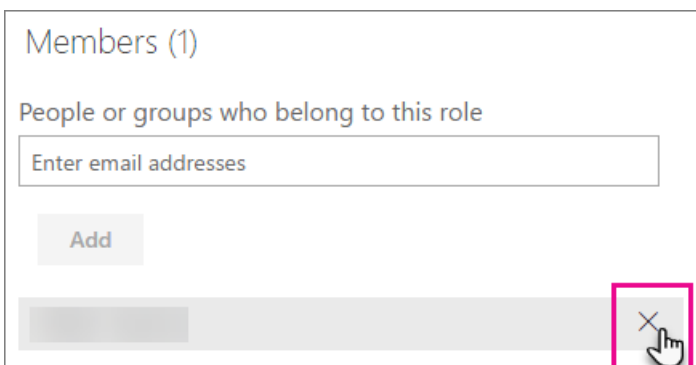


You can also see how many members are part of the role by the number in parenthesis next to the role name, or next to Members.



Remove members

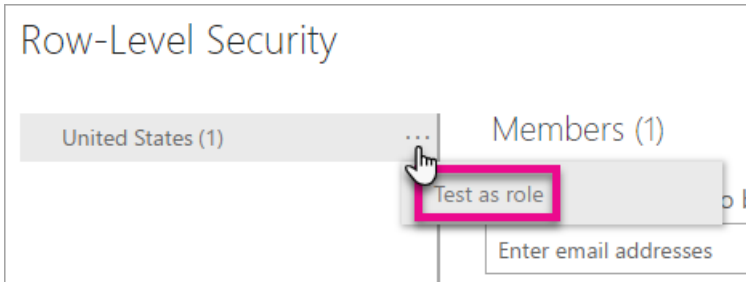
You can remove members by selecting the X next to their name.



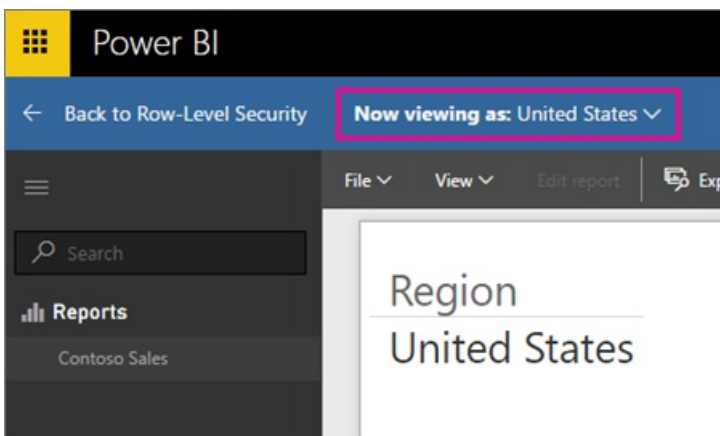
Validating the role within the Power BI service

You can validate that the role you defined is working correctly by testing the role.

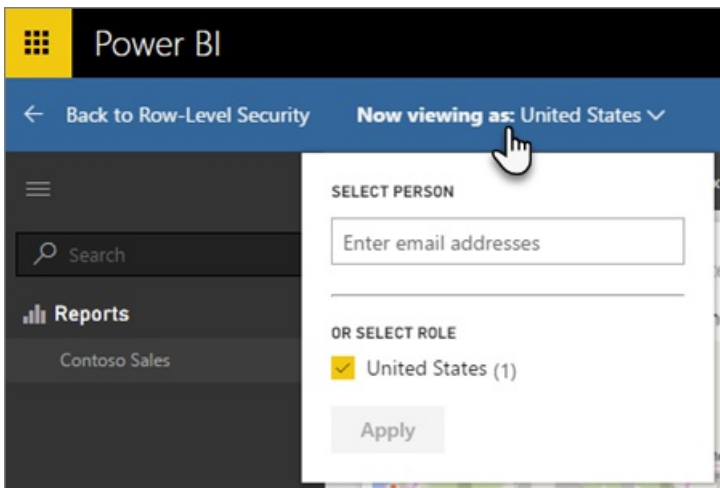
1. Select the **ellipsis (...)** next to the role.
2. Select **Test data as role**



You will then see reports that are available for this role. Dashboards are not presented in this view. In the blue bar above, you will see what is being applied.



You can test other roles, or combination of roles, by selecting **Now viewing as**.



You can choose to view data as a specific person, or you can select a combination of available roles to validate they are working.

To return to normal viewing, select **Back to Row-Level Security**.

Using the `username()` or `userprincipalname()` DAX function

You can take advantage of the DAX functions `username()` or `userprincipalname()` within your dataset. You can use them within expressions in Power BI Desktop. When you publish your model, it will be used within the Power BI service.

Within Power BI Desktop, `username()` will return a user in the format of `DOMAIN\User` and `userprincipalname()` will return a user in the format of `user@contoso.com`.

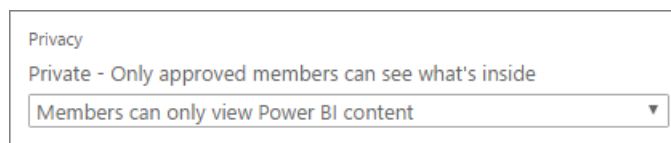
Within the Power BI service, `username()` and `userprincipalname()` will both return the user's User Principal Name (UPN). This looks similar to an email address.

Using RLS with app workspaces in Power BI

If you publish your Power BI Desktop report to an app workspace within the Power BI service, the roles will be applied to read-only members. You will need to indicate that members can only view Power BI content within the app workspace settings.

WARNING

If you have configured the app workspace so that members have edit permissions, the RLS roles will not be applied to them. Users will be able to see all of the data.



Limitations

Here is a list of the current limitations for row-level security on cloud models.

- If you previously had roles/rules defined within the Power BI service, you will need to recreate them within Power BI Desktop.
- You can define RLS only on the datasets created using Power BI Desktop client. If you want to enable RLS for datasets created with Excel, you will need to convert your files into PBIX files first. [Learn more](#)
- Only ETL, and DirectQuery connections are supported. Live connections to Analysis Services are handled in the on-premises model.
- Q&A and Cortana is not supported with RLS at this time. You will not see the Q&A input box for dashboards if all models have RLS configured. This is on the roadmap, but a timeline is not available.
- External sharing is not currently supported with datasets that use RLS.
- For any given model, the maximum number of Azure AD principals (i.e. individual users or security groups) that can be assigned to security roles is 1,000. To assign large numbers of users to roles, be sure to assign security groups, rather than individual users.

Known issues

There is a known issue where you will receive an error message when trying to publish from Power BI Desktop if it was previously published. The scenario is as follows.

1. Anna has a dataset that is published to the Power BI service and has configured RLS.
2. Anna updates the report in Power BI Desktop and re-publishes.
3. Anna will receive an error.

Workaround: Re-publish the Power BI Desktop file from the Power BI service until this issue is resolved. You can do that by select **Get Data** > **Files**.

FAQ

Question: What if I had previously created roles/rules for a dataset in the Power BI service? Will they still work if I

do nothing?

Answer: No. Visuals will not render properly. You will have to re-create the roles/rules within Power BI Desktop and then published to the Power BI service.

Question: Can I create these roles for Analysis Services data sources?

Answer: You can if you imported the data into Power BI Desktop. If you are using a live connection, you will not be able to configure RLS within the Power BI service. This is defined within the Analysis Services model on-premises.

Question: Can I use RLS to limit the columns or measures accessible by my users?

Answer: No. If a user has access to a particular row of data, they can see all the columns of data for that row.

Question: Does RLS allow me to hide detailed data but give access to data summarized in visuals?

Answer: No, you secure individual rows of data but users can always see either the details or summarized data.

Next steps

[Row-level security \(RLS\) with Power BI Desktop](#)

More questions? [Try asking the Power BI Community](#)

Manage your data storage

1/30/2018 • 3 min to read • [Edit Online](#)

Learn how you can manage your individual, or app workspace, data storage to make sure you can continue to publish reports and datasets.

Users and app workspaces have their own data capacities

- Free and Pro users have a maximum 10 GB data storage.
- Pro users can create app workspaces, with a maximum 10 GB data storage each.

At the tenant level, total usage can't exceed 10 GB per Pro user across all Pro users and app workspaces in the tenant.

Read about other features of the [Power BI pricing model](#).

Included in your data storage are your own datasets and Excel reports, and those that someone has shared with you. Datasets are any of the data sources you've uploaded or connected to, including Power BI Desktop files and Excel workbooks you're using. The following are also included in your data capacity.

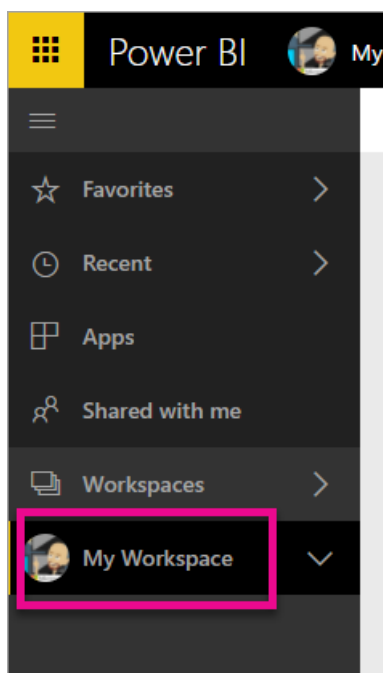
- Excel ranges pinned to dashboard.
- Reporting Services on-premises visualizations pinned to a Power BI dashboard.
- Uploaded images.

The size of a dashboard that you share will vary depending on what is pinned to it. For example, if you pin items from two reports that are part of two different datasets, the size will include both datasets.

Manage items owned by you

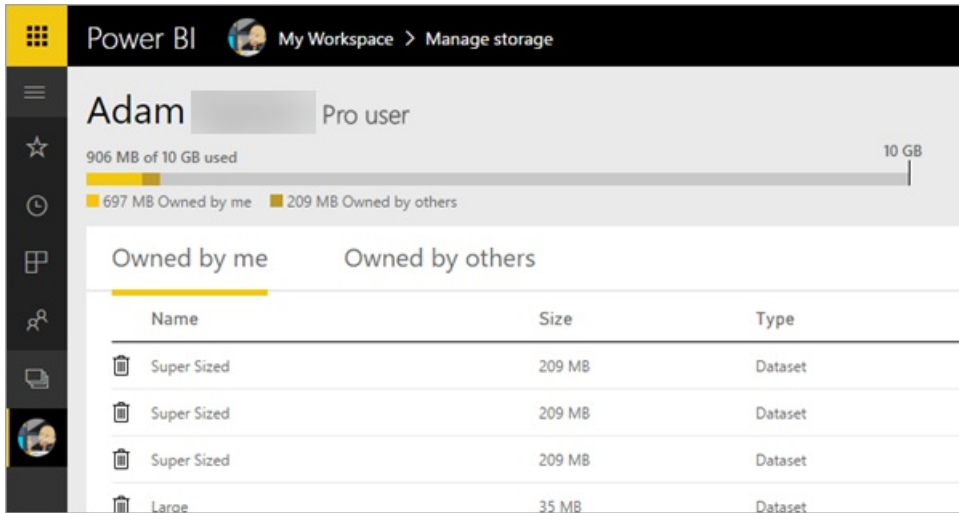
See how much data storage you're using in your Power BI account, and manage your account.

1. To manage your own storage, go to **My Workspace** on the left navigation pane.



2. Select the gear icon  in the upper-right corner > **Manage personal storage**.


The top bar shows how much of your storage limit you've used.



The datasets and reports are separated onto two tabs:

Owned by Me: These are reports and datasets you've uploaded to your Power BI account, including service datasets such as Salesforce and Dynamics CRM.

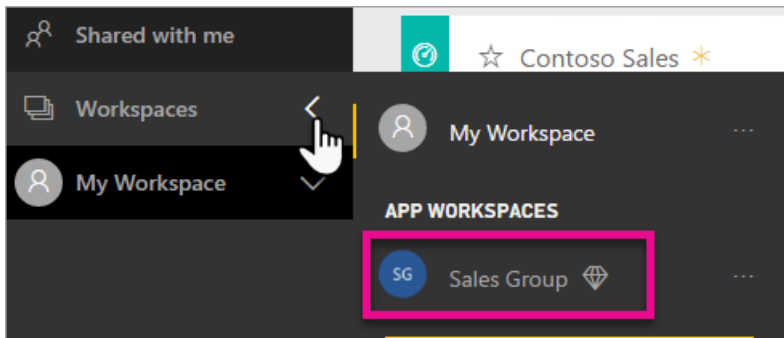
Owned by Others: Others have shared these reports and datasets with you.


3. To delete a dataset or report, select the trash can icon .

Keep in mind that you or someone else may have reports and dashboards based on a dataset. If you delete the dataset, those reports and dashboards won't work anymore.

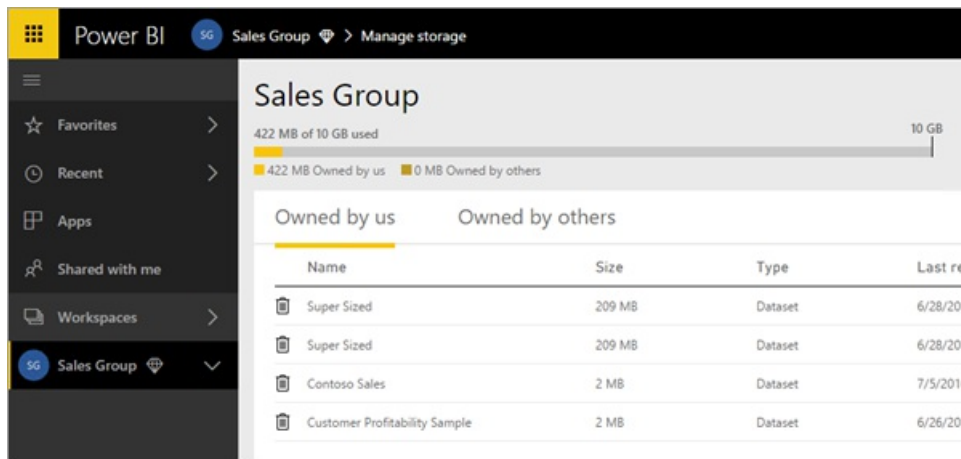
Manage your app workspace

1. Select the arrow next to **Workspaces** > select the name of the app workspace.




2. Select the gear icon  in the upper-right corner > **Manage group storage**.

The top bar shows how much of the group's storage limit is used.



The datasets and reports are separated onto two tabs:

Owned by Us: These are reports and datasets you or someone else has uploaded to the group's Power BI account, including service datasets such as Salesforce and Dynamics CRM. **Owned by Others:** Others have shared these reports and datasets with your group.

- To delete a dataset or report, select the trash can icon .

NOTE

Any member, with edit permissions, of an app workspace has permissions to delete datasets and reports from the app workspace.

Keep in mind that you or someone else in the group may have reports and dashboards based on a dataset. If you delete the dataset, those reports and dashboards won't work anymore.

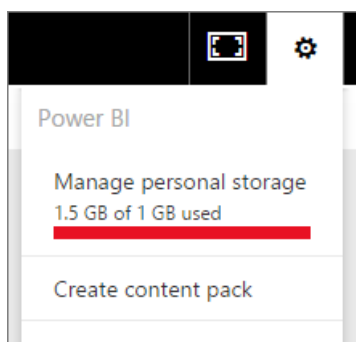
Dataset limits

There is a 1 GB limit, per dataset, that is imported into Power BI. If you have chosen to keep the Excel experience, instead of importing the data, you will be limited to 250 MB for the dataset.

What happens when you hit a limit

When you hit the data capacity limit of what you can do, you will see prompts within the service.

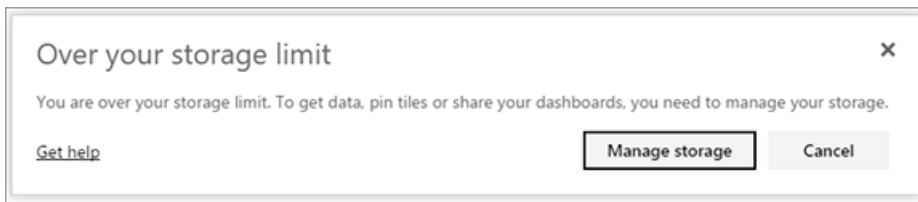
When you select the gear icon , you will see a red bar indicating you are over your data capacity limit.



You will also see this indicated within **Manage personal storage**.



When you try to perform an action that will hit one of the limits, you will see a prompt indicating you are over the limit. You will be able to [manage](#) your storage to reduce your storage amount and get past the limit.



More questions? [Try asking the Power BI Community](#)

Power BI Archived Workspace

1/30/2018 • 3 min to read • [Edit Online](#)

With Power BI, anyone can sign up and start using the service in a few minutes. Later, your organization's IT department may choose to take over managing Power BI for users in your organization. If this takeover occurs, you will benefit from central management of users and permissions in your organization and you may be able to take advantage of streamlined sign-in using the same username and password you use for other services in your organization.

Any content you created before your IT department started managing Power BI will be placed in a Power BI Archived Workspace, which is accessible from the left navigation of [Power BI](#). You should start creating new Power BI content in My Workspace, which is secured and managed by your organization's IT department. Your Archived Workspace will continue to exist, but there are restrictions on actions you can perform on content in your Archived Workspace. To remove these restrictions, you will need to migrate the content from your Archived Workspace to your My Workspace, managed by your IT department.

Restrictions in your Archived Workspace

No content will be deleted from your Archived Workspace. You can continue to get data, create reports and dashboards, and refresh datasets. Existing users you have shared content with will still be able to view the content in their Archived Workspace too.

However, there are some restrictions on content in your Archived Workspace:

- **OneDrive for Business.** You will no longer be able to get data or refresh from OneDrive for Business for datasets in your Archived Workspace. If you try to connect to this source, you will receive a warning.
- **Sharing dashboards.** You can't share dashboards with other users from your Archived Workspace. Any users that already have access will continue to be able to view shared dashboards by accessing their Archived Workspace.
- **Creating groups.** You can't create groups in your Archived Workspace.
- **Access on Power BI mobile apps.** While you can still view content on the web in your Archived Workspace, this content will no longer appear in the Power BI mobile apps.

Migrating Content in your Archived Workspace

To continue to use Power BI, you should create new content in your My Workspace, managed by your IT department. You should also plan to migrate any content in your Archived Workspace to your My Workspace. How you migrate content depends on the kind of content:

- **Excel or Power BI Desktop Datasets.** Migrate these datasets by switching from your Archived Workspace to My Workspace and re-uploading the Excel or Power BI Desktop file by clicking the "My Data" button. If you set up scheduled refresh, you will need to reconfigure those settings for the new dataset in My Workspace.
- **Other Datasets.** Switch to My Workspace and then click the Get Data button to reconnect to any other datasets you created in your Archived Workspace. You may need to re-enter security or connection information.
- **Reports.** Reports that were contained in Excel or Power BI Desktop files or reports installed as part of content packs will be automatically recreated once you re-upload the corresponding Excel or Power BI Desktop file or reconnect to the content pack. If you created your own reports through the Power BI service, you will need to recreate those reports in your My Workspace.
- **Dashboards.** Dashboards installed as part of content packs will be automatically recreated when you reconnect to the content pack in My Workspace. If you created your own dashboards through the Power BI

service, you will need to recreate those dashboards in your My Workspace.

More questions? [Try asking the Power BI Community](#)

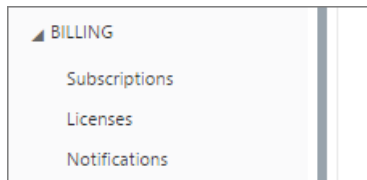
Unable to add Power BI to Office 365 partner subscription

1/30/2018 • 2 min to read • [Edit Online](#)

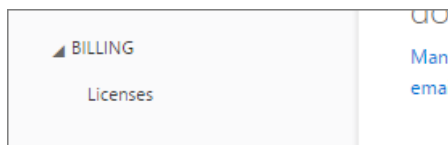
Office 365 allows companies to resell Office 365 bundled and integrated with their own solutions, providing end-customers with a single point of contact for purchasing, billing, and support.

If you are interested in acquiring Power BI, alongside your Office 365 subscription, we recommend you contact your partner to do so. If your partner does not offer Power BI, you have different options you can consider.

1. You are able to buy the service from another channel, either directly from Microsoft or another partner. This option is not available to all customers depending on their relationship with the partner. You can verify this by going to the **Office 365 Admin Portal > Billing > Subscriptions**. If you do see **Subscriptions**, you can acquire the service from Microsoft directly, or you can also contact a partner that is offering Power BI.



2. If you do not see **Subscriptions** listed under **Billing**, you cannot buy from Microsoft directly or another partner.



If you are not able to purchase Power BI directly, and depending on what type of Power BI subscription you are interested in, you still have some options.

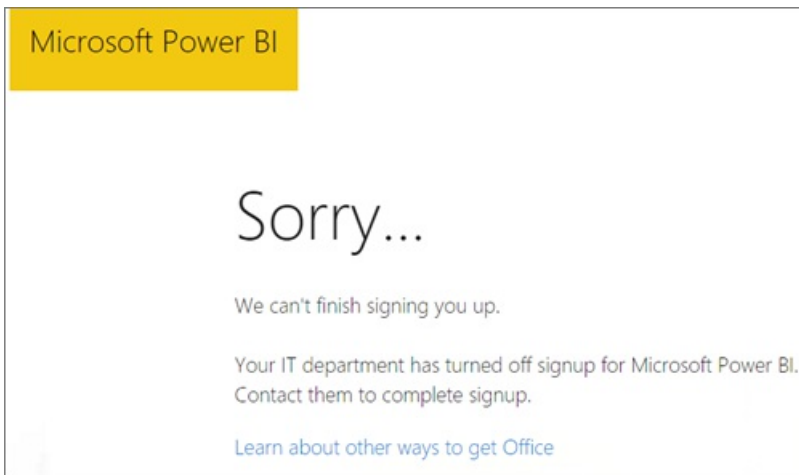
[Power BI \(free\)](#)

[Power BI Pro and Premium](#)

Power BI (free)

If you are happy with the free offering for Power BI, you can sign up for the free service. By default, individual sign-ups, also known as ad-hoc subscriptions, are disabled. When you try to sign up for Power BI, you will see a message indicating that your IT department has turned off sign up for Microsoft Power BI.

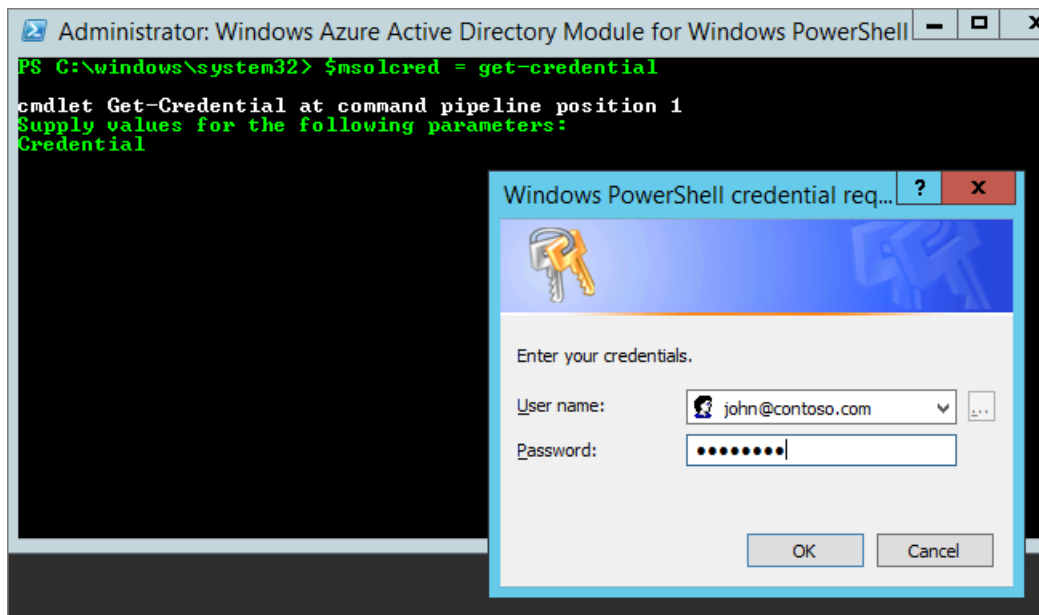
Your IT department has turned off signup for Microsoft Power BI.



To enable ad-hoc subscriptions, you can contact your partner and request that they turn it on. If you are an Administrator of your tenant, and know how to leverage Azure Active Directory PowerShell commands, you can enable ad-hoc subscriptions yourself. [Learn more](#)

1. You need to first sign into Azure Active Directory using your Office 365 credential. The first line will prompt you for your credentials. The second line connects to Azure Active Directory.

```
$msolcred = get-credential  
connect-msolservice -credential $msolcred
```



2. Once you are signed in, you can issue the following command to enable free sign ups.

```
Set-MsolCompanySettings -AllowAdHocSubscriptions $true
```

Power BI Pro and Premium

If you want to buy a subscription to Power BI Pro or Power BI Premium, you will have to work with your partner to consider what options you have.

- Your partner agrees to add Power BI to their portfolio so that you can purchase from them.
- Your partner is able to transition you to a model where you can buy Power BI directly from Microsoft or another partner who offers Power BI.

This video looks at Office 365 syndication and purchasing Power BI:

Next steps

[Manage Azure AD using Windows PowerShell](#)

[Power BI Premium - what is it?](#)

More questions? [Try asking the Power BI Community](#)


Closing your Power BI Account

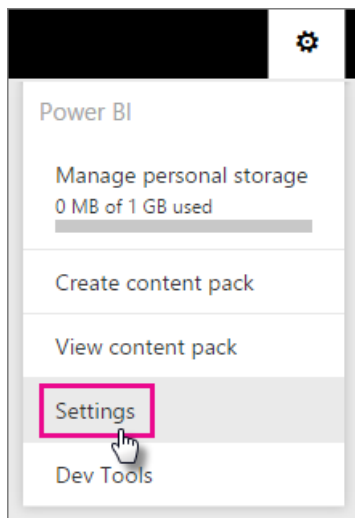
1/30/2018 • 1 min to read • [Edit Online](#)

If you don't want to use Power BI any longer, you can ask us to close your Power BI account. After your account is closed, you can no longer sign in to Power BI. Also, any customer data you uploaded, or created, in Power BI is deleted according to the data retention policy in the Power BI Terms of Service.

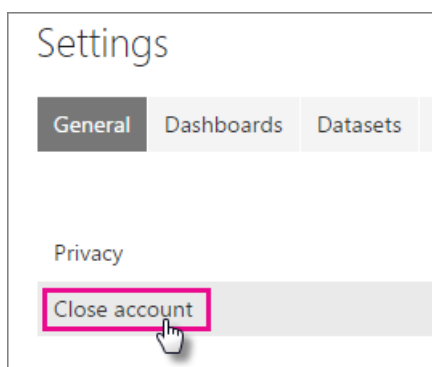
Individual Power BI users

You can close your account from the settings screen.

1. Select the gear  in the upper right.
2. Select **Settings**.



3. **General > Close Account**



4. Select a reason from the **Why are you closing your account?** (1) dropdown. You can optionally provide further information (2). Then select **Close account**.

Close account

You can close your Power BI account. You will no longer be able to access Power BI and any content you created will be deleted.

Why are you closing your account?

Select a reason (optional) **1**

Anything else you would like to tell us?

2

Close account

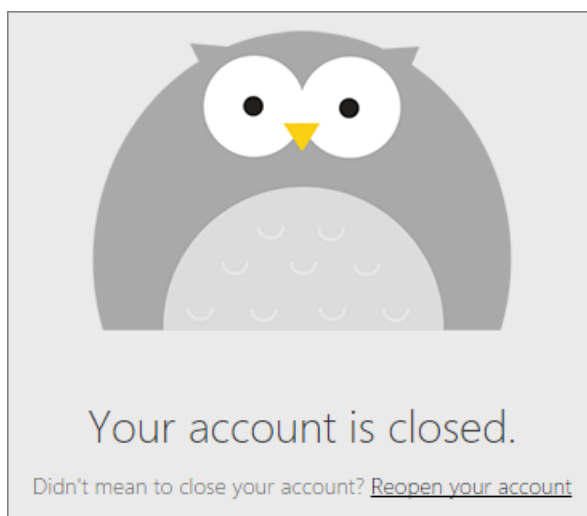
5. Confirm that you want to close your account.

Close account ×

Are you sure you want to close your account?

Yes No

6. You will see a confirmation that your account is closed. You will also be given a link to reopen your account.



Managed tenant users

You will need to contact your tenant admin and ask them to unassign the license from your account.

Close account

i Your account is managed by your organization's IT department. Please contact your administrator to request changes.

Close account

More questions? [Try asking the Power BI Community](#)

Configure mobile apps with Microsoft Intune

1/30/2018 • 6 min to read • [Edit Online](#)

Microsoft Intune enables organizations to manage devices and applications. The Power BI mobile applications, for iOS and Android, integrate with Intune to allow you to manage the application on your devices, and to control security. Through configuration policies, you can control items like requiring an access pin, controlling how data is handled by the application and even encrypting application data when the app is not in use.

General mobile device management configuration

This article is not meant as full configuration guide for Microsoft Intune. If you are just now integrating with Intune, there are a few things you will want to make sure you have setup. [Learn more](#)

Microsoft Intune can co-exist with Mobile Device Management (MDM) within Office 365. [Learn more](#)

This article assumes that Intune is configured properly and you have devices enrolled with Intune. If you are co-existing with MDM, the device will show enrolled within MDM, but is available to manage within Intune.

NOTE

After your organization has configured Microsoft Intune MAM, if you use the Power BI mobile app on an iOS or Android device, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

Step 1: Get the url for the application

Before we create the application within Intune, we need to get the urls for the apps. For iOS, we will get this from iTunes. For Android, you can get it from the Power BI mobile page.

Save the url, as you will need it when we create the application.

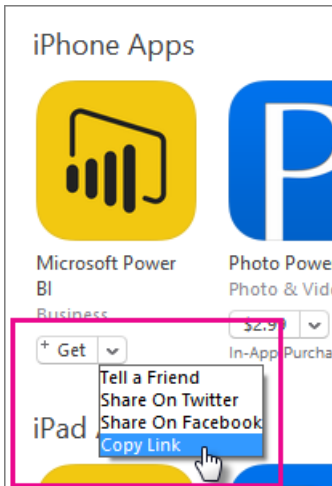
iOS

To get the app url for iOS, we will need to get it from iTunes.

1. Open iTunes.
2. Search for *Power BI*.
3. You should see **Microsoft Power BI** listed under **iPhone Apps** and **iPad Apps**. You can use either, as you will

get the same url.

4. Select the **Get** drop down and select **Copy Link**.



It should look similar to the following.

```
https://itunes.apple.com/us/app/microsoft-power-bi/id929738808?mt=8
```

Android

You can get the url to Google Play from the [Power BI mobile page](#). Clicking on the **Download from Google Play** icon will take you to the app page. You can copy the URL from the browser address bar. It should look similar to the following.

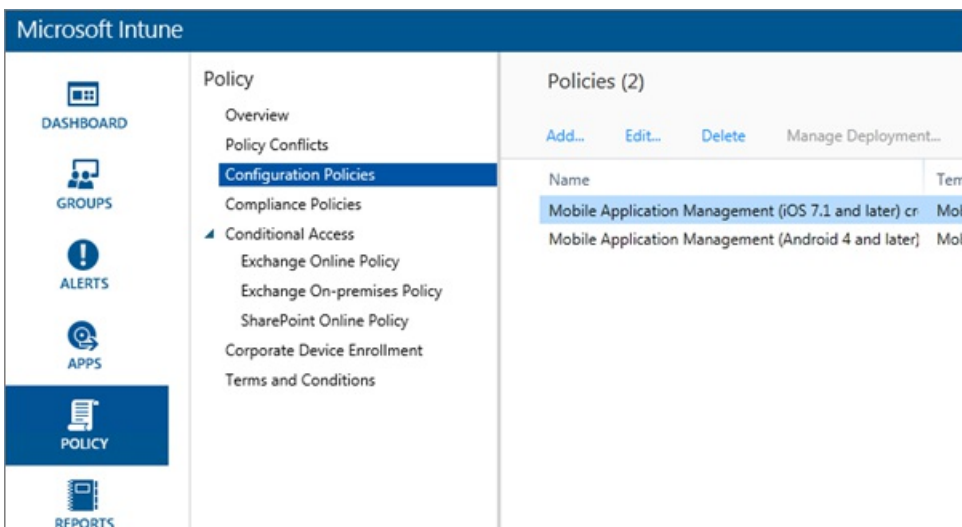
```
https://play.google.com/store/apps/details?id=com.microsoft.powerbim
```

Step 2: Create a mobile application management policy

The mobile application management policy allows you to enforce items like an access pin. You can create one within the Intune portal.

You can create the application, or the policy first. The order in which they are added doesn't matter. They will just need to both exist for the deploy step.

1. Select **Policy** > **Configuration Policies**.



2. Select **Add...**

3. Under **Software** you can select Mobile Application Management for either Android or iOS. To get started quickly, you can select **Create a policy with the recommended settings**, or you can create a custom policy.
4. Edit the policy to configure the restrictions you want on the application.

Step 3: Create the application

The application is a reference, or package, that is saved into Intune for deployment. We will need to create an application and reference the app url that we got from either Google Play or iTunes.

You can create the application, or the policy first. The order in which they are added doesn't matter. They will just need to both exist for the deploy step.

1. Go to the Intune portal and select **Apps** from the left menu.
2. Select **Add App**. This will launch the **Add Software** application.

iOS

1. Select **Managed iOS App from the App Store** from the drop down.
2. Enter the app url, that we got from [Step 1](#), and select **Next**.

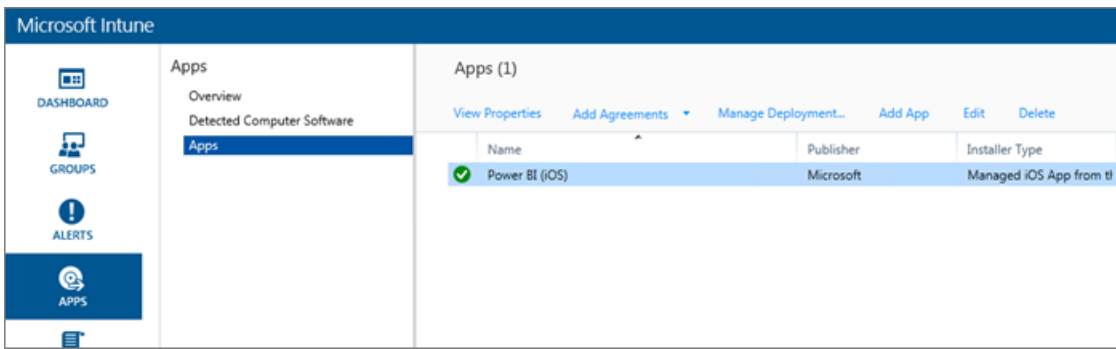
1

2

3. Provide a **Publisher, Name** and **Description**. You can optionally provide an **Icon**. The **Category** is for the Company Portal app. Once you are done, select **Next**.
4. You can decide if you want to publish the app as **Any** (default), **iPad** or **iPhone**. By default it will show **Any** and will work for both device types. The Power BI app is the same url for both iPhone and iPad. Select **Next**.
5. Select **Upload**.

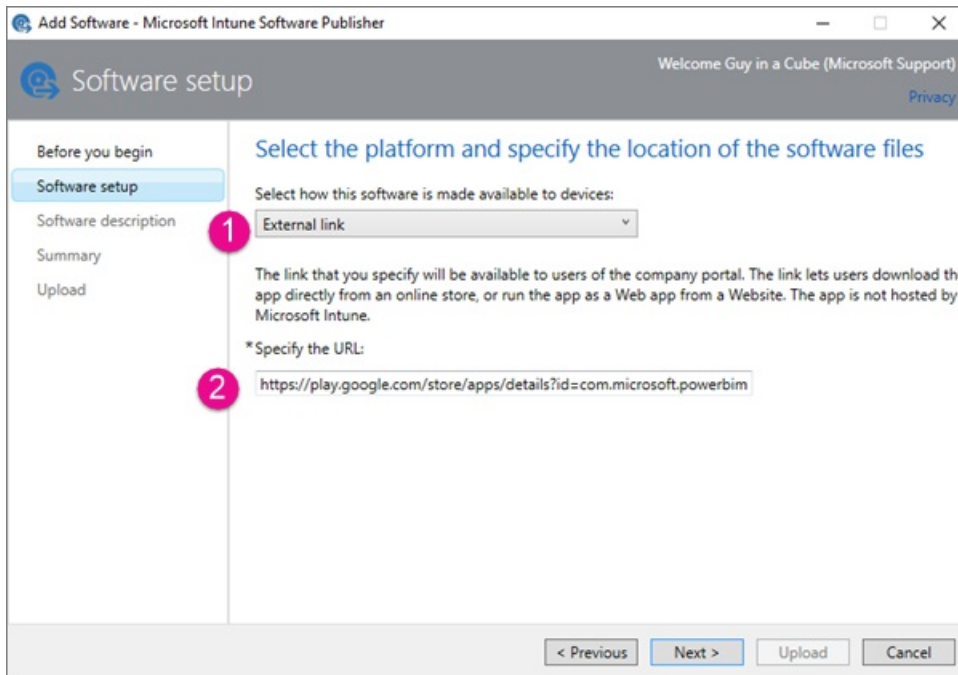
NOTE

You may not see it show up in the app list until you refresh the page. You can click on **Overview** and back to **Apps** to get the page to reload.



Android

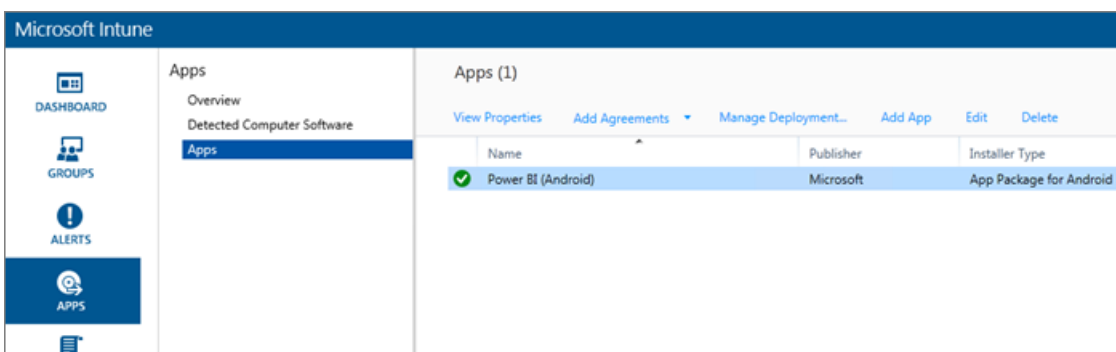
1. Select **External Link** from the drop down.
2. Enter the app url, that we got from [Step 1](#), and select **Next**.



3. Provide a **Publisher, Name** and **Description**. You can optionally provide an **Icon**. The **Category** is for the Company Portal app. Once you are done, select **Next**.
4. Select **Upload**.

NOTE

You may not see it show up in the app list until you refresh the page. You can click on **Overview** and back to **Apps** to get the page to reload.

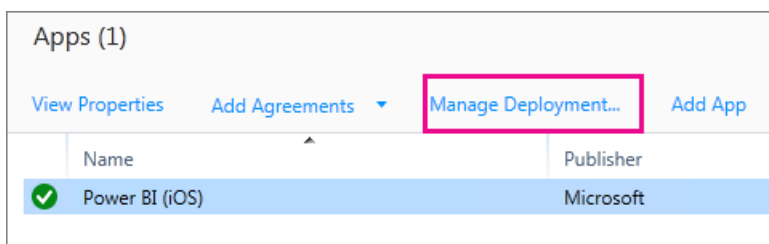


Step 4: Deploy the application

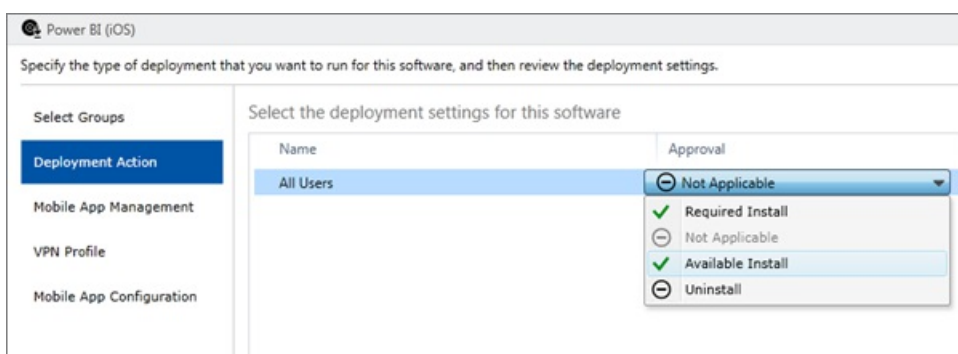
After you have added the application, you will need to deploy it so that it is available to your end users. This is the step where you will bind the policy you created with the app.

iOS

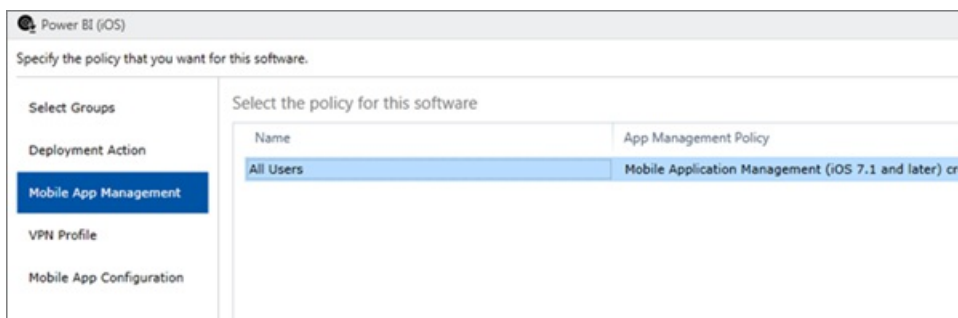
1. On the apps screen, select the app you created. Then select the **Manage Deployment...** link.



2. In the **Select Groups** screen, you can choose which groups you want to deploy this app to. Select **Next**.
3. In the **Deployment Action** screen, you can choose how you want to deploy this app. Selecting **Available Install**, or **Required Install**, will make the app available in the Company Portal for users to install on-demand. After you are done making your selection, select **Next**.



4. In the **Mobile App Management** screen, you can select the Mobile App Management policy that we created in [Step 2](#). It will default to the policy you made, if that is the only iOS policy available. Select **Next**.

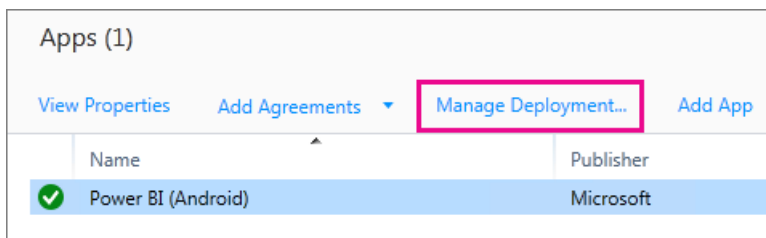


5. In the **VPN Profile** screen, you can select a policy if you have one for your organization. It defaults to **None**. Select **Next**.
6. In the **Mobile App Configuration** screen, you can select an **App Configuration Policy** if you created one. It defaults to **None**. This is not required. Select **Finish**.

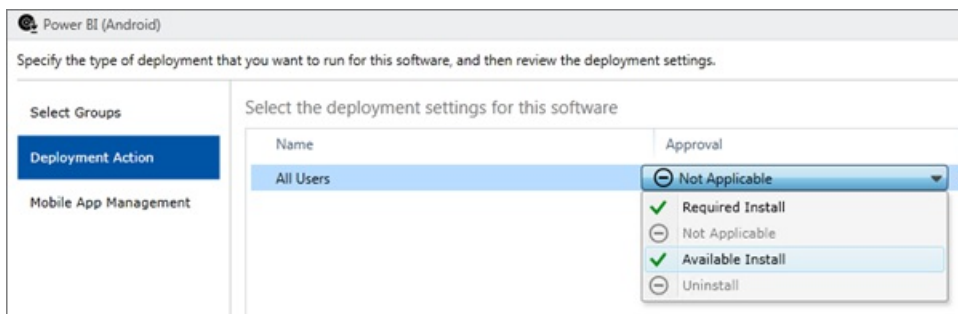
After you have deployed the app, it should show **Yes** for deployed, in the apps page.

Android

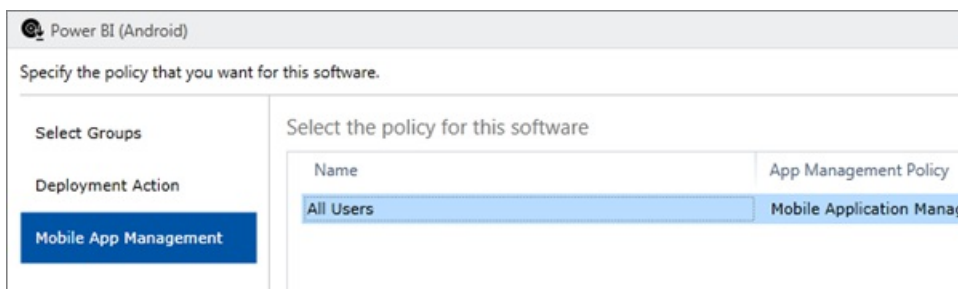
1. On the apps screen, select the app you created. Then select the **Manage Deployment...** link.



2. In the **Select Groups** screen, you can choose which groups you want to deploy this app to. Select **Next**.
3. In the **Deployment Action** screen, you can choose how you want to deploy this app. Selecting **Available Install**, or **Required Install**, will make the app available in the Company Portal for users to install on-demand. After you are done making your selection, select **Next**.



4. In the **Mobile App Management** screen, you can select the Mobile App Management policy that we created in [Step 2](#). It will default to the policy you made, if that is the only Android policy available. Select **Finish**.

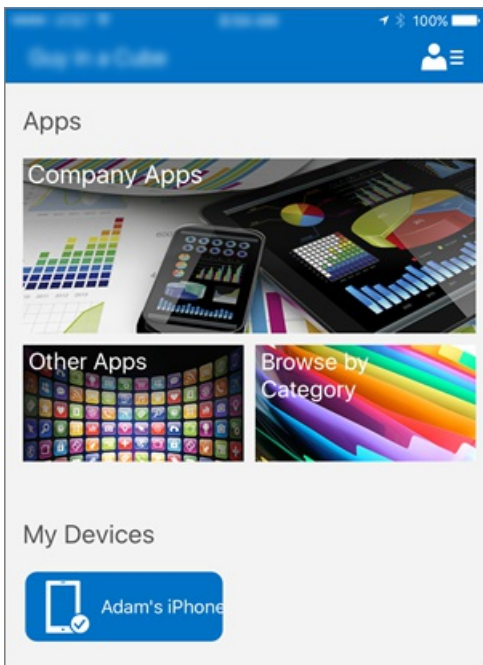


After you have deployed the app, it should show **Yes** for deployed, in the apps page.

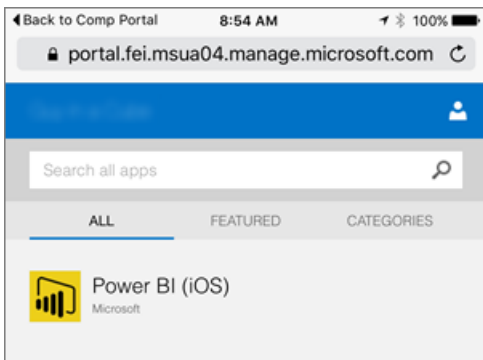
Step 5: Install the application on a device

You will install the application through the Company Portal app. If you haven't installed the Company Portal, you can get it through the app store on either iOS or Android platforms. You will sign into the Company Portal with your organizational login.

1. Open the Company Portal app.
2. If you don't see the Power BI app listed as a featured app, select **Company Apps**.



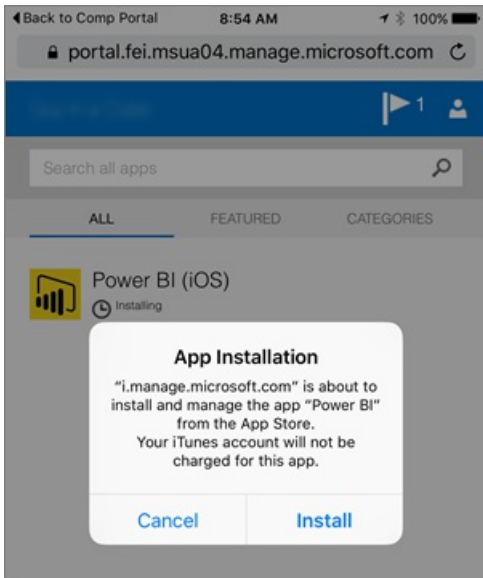
3. Select the Power BI app that you deployed.



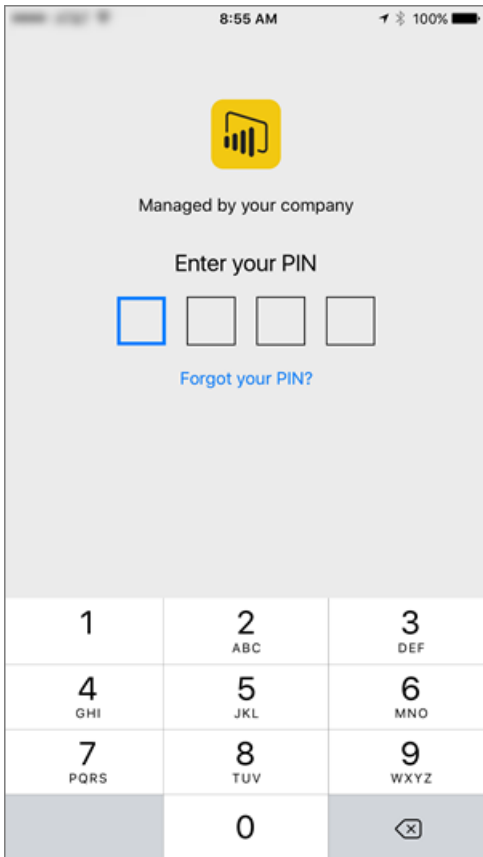
4. Select **Install**.



5. If you are on iOS, it will push the app to you. Select **Install** on the push dialog.



After it is installed, you will see that it is **Managed by your company**. If you enabled access with a pin, in the policy, you will see the following.



Next steps

[Configure and deploy mobile application management policies in the Microsoft Intune console](#)
[Power BI apps for mobile devices](#)

More questions? [Try asking the Power BI Community](#)

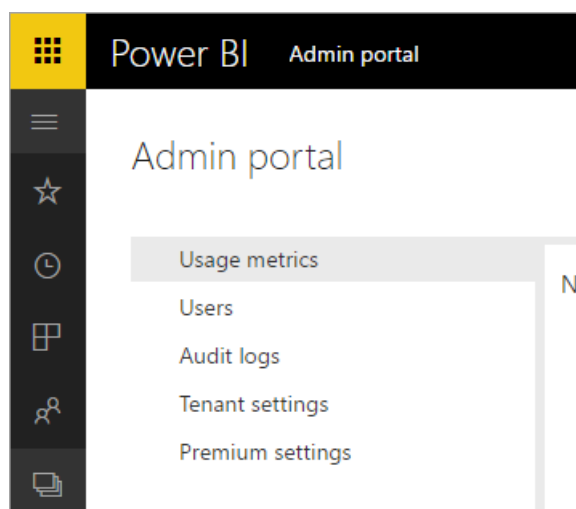
Power BI for Office 365 is retired

12/6/2017 • 1 min to read • [Edit Online](#)

Power BI for Office 365, a previous version of Power BI, has been transitioned to the current version of [Power BI](#). Users who once used **Power BI for Office 365** can use the current version of Power BI. You can [learn more about Power BI](#).

The Admin portal

Access to the **Power BI for Office 365** Admin portal is no longer available. Administrators can use the new [Admin portal](#) to manage their organization's Power BI subscription.



For more information, see [Power BI admin portal](#).

Next steps

[Get started with Power BI](#)

[Getting started with Power BI Desktop](#)

[Administering Power BI in your Organization](#)

Forgot your password for Power BI?

1/30/2018 • 1 min to read • [Edit Online](#)

If you've forgotten your password, you can use the following link to request a password reset.

<https://passwordreset.microsoftonline.com>

If you're told that your account is not enabled for password reset, you'll need to contact your Office 365 administrator. If you're using the free trial, the administrator is the first person in your organization who signed up.

If you are still having issues accessing your account you can try contacting the support team for password resets. This is not the support number for the Power BI service!

1-800-642-7676

NOTE

Please note, support is provided during the eastern standard time (EST) time zone. Support is provided during business hours and currently only supported in English.

More questions? [Try asking the Power BI Community](#)

Capturing additional diagnostic information

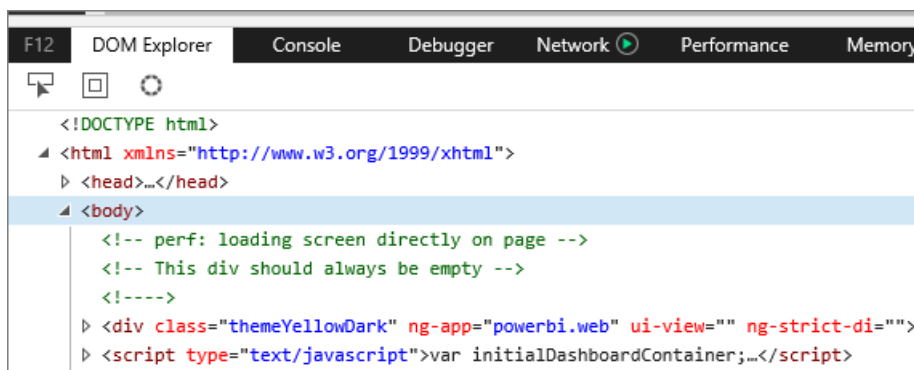
1/30/2018 • 1 min to read • [Edit Online](#)

Capturing Additional Diagnostic Information for Power BI

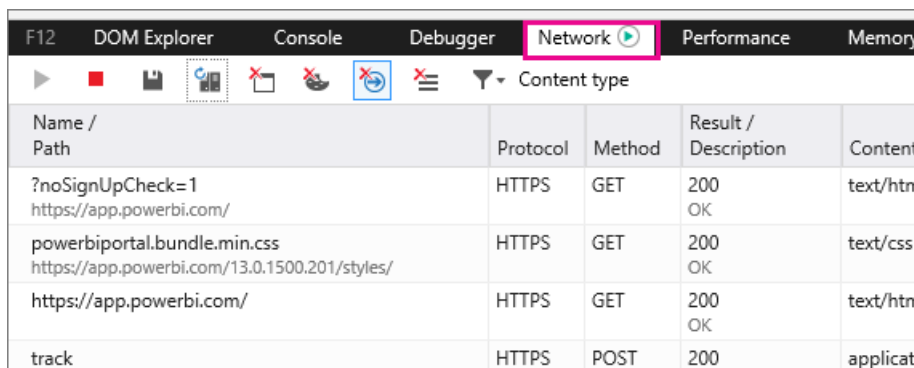
These instructions provide two potential options for manually collecting additional diagnostic information from the Power BI web client. Only one of these options needs to be followed.

Network Capture - Edge & Internet Explorer

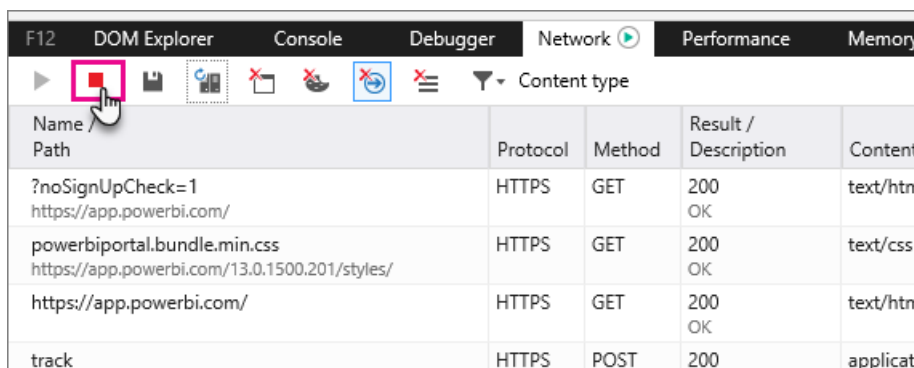
1. Browse to [Power BI](#) with Edge or Internet Explorer.
2. Open the Edge developer tools by pressing F12.
3. That will bring up the Developer Tools window:



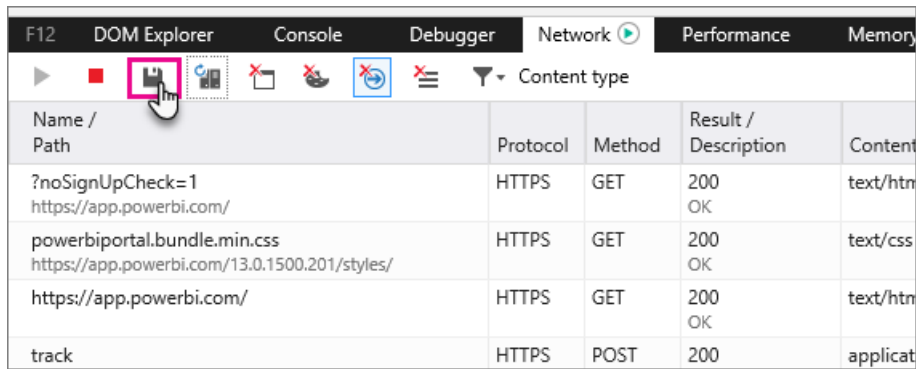
4. Switch to the Network tab. It will list traffic it has already captured.



5. You can browse within the window and reproduce any problem you may be encountering. You can hide and show the developer tools window at any time during the session by pressing F12.
6. To stop the capture, you can select the red square on the network tab of the developer tools area.



7. Select on the diskette icon to **Export as HAR**



Name / Path	Protocol	Method	Result / Description	Content
?noSignUpCheck=1 https://app.powerbi.com/	HTTPS	GET	200 OK	text/html
powerbiportal.bundle.min.css https://app.powerbi.com/13.0.1500.201/styles/	HTTPS	GET	200 OK	text/css
https://app.powerbi.com/	HTTPS	GET	200 OK	text/html
track	HTTPS	POST	200	applicat

8. Provide a file name and save the HAR file.

The HAR file will contain all the information about network requests between the browser window and Power BI. This will include the activity IDs for each request, the precise timestamp for each request, and any error information returned to the client. This trace will also contain the data used to populate the visuals shown on the screen.

9. You can provide the HAR file to support for review.

More questions? [Try asking the Power BI Community](#)

Using an alternate Email Address

1/30/2018 • 1 min to read • [Edit Online](#)

By default, the email address you used to sign up to Power BI with is used to send you updates about activity in Power BI. For example, when someone sends you a sharing invitation it will go to this address.

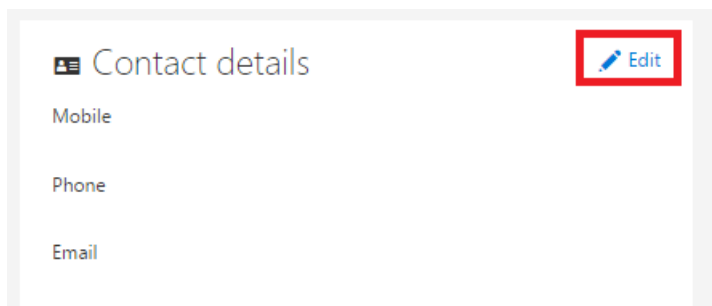
Sometimes you may want these emails delivered to an alternate email address rather than the one you originally used to sign up for Power BI with.

Updating through Office 365 personal info page

1. Go to your [Office 365 personal info page](#). If you are prompted to, sign in with the email address and password you use for Power BI.
2. Slick the edit link in the Contact details section.

NOTE

If you do not see an Edit link, this means your email address is managed by your Office 365 administrator and you will need to contact them to update your email address.



3. In the Alternate email field, enter the email address you would like Power BI updates to be sent to.

NOTE

Changing this setting will not affect what email address is used to send service updates, newsletters, and other promotional communications. Those will always be sent to the email address you originally used when registering for Power BI.

Updating with PowerShell

You can alternatively update the alternate email address via PowerShell for Azure Active Directory. This is done with the [Set-AzureADUser](#) command.

```
Set-AzureADUser -ObjectId john@contoso.com -OtherMails "otheremail@somedomain.com"
```

For more information, see [Azure Active Directory PowerShell Version 2](#).

More questions? [Try the Power BI Community](#)

Using the same account for Power BI and Azure

1/30/2018 • 1 min to read • [Edit Online](#)

If you are a user of both Power BI and Azure, you may want to use the same login for both services so that you don't need to type in your password twice.

Power BI signs you in with your organizational account, associated with your work or school email address. Azure signs you in with either a Microsoft Account or your organizational account.

If you want to use the same login for both Azure and Power BI, be sure to sign in to Azure with your organizational account.

What if I already sign in to Azure with my Microsoft Account?

You can add your organizational account as a co-administrator in Azure. Here's how:

1. Sign in to the [Azure Management Portal](#). If you are a user in multiple Azure directories, click **Subscriptions** and then filter to view only the directory and subscriptions you want to edit.
2. In the navigation pane, click **Settings**, click **Administrators**, and then click **Add**.
3. Enter the email address associated with your organizational account.
4. Select the subscriptions you want to access with your organizational account and then click the check mark.

Next time you sign in to the Azure Management Portal, use your organizational email address.

More questions? [Try the Power BI Community](#)

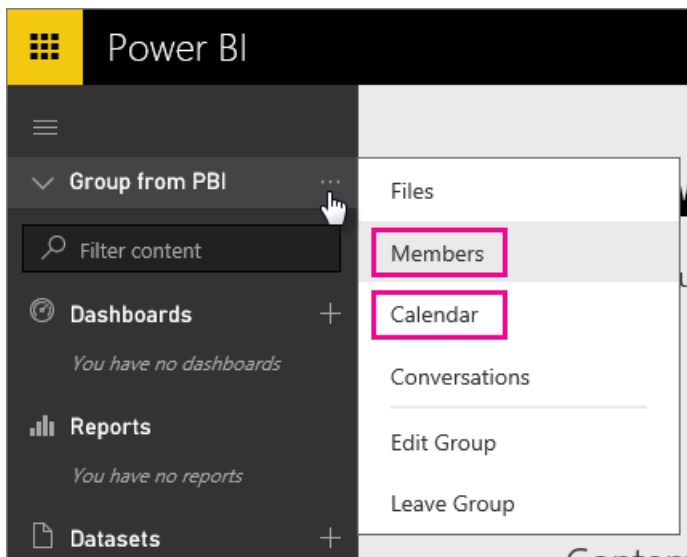
Office 365 dedicated customers - known issues

1/30/2018 • 1 min to read • [Edit Online](#)

Power BI is now supported for Office 365 Dedicated customers. If you are an O365 Dedicated customer, you can sign in with an account from that tenant and use Power BI. There are two known issues currently.

Groups

When selecting **Members** or **Calendar** in the Group context menu, you will be redirected to the Mail app instead. **Files** and **Conversations** work as expected.



iPhone App - sign in with vanity domain leads to error

When you sign in, on the iPhone app, using a login with a vanity domain, you may encounter an error.

Sign In error

An unexpected internal error occurred. Please try again.

To work around this issue, sign in with the email address listed when you click on the user icon within the Power BI service instead of with the vanity domain.



More questions? [Try the Power BI Community](#)

Troubleshooting Analyze in Excel

1/25/2018 • 5 min to read • [Edit Online](#)

There may be times when using Analyze in Excel that you get an unexpected result, or the feature doesn't work as you expected. This page provides solutions for common issues when using Analyze in Excel.

NOTE

There's a separate page dedicated to describing and enabling [Analyze in Excel](#).

If you encounter a scenario that is not listed below, and it is causing you issues, you can ask for further assistance on the [community site](#), or you can create a [support ticket](#).

This article contains the following troubleshooting sections:

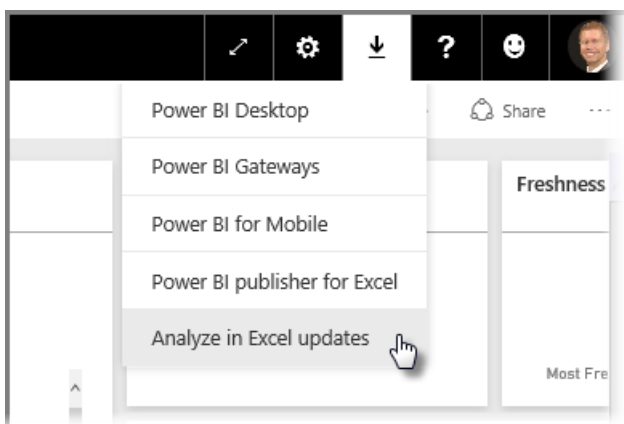
- Update Excel libraries for the OLE DB provider
- Determining whether you need to update your Excel libraries
- Connection cannot be made error
- Forbidden error
- No data models
- Token expired error
- Unable to access on-premises Analysis services
- Can't drag anything to the PivotTable Values area (no measures)

Update Excel libraries for the OLE DB provider

To use **Analyze in Excel**, your computer must have a current AS OLE DB provider installed. This [community post](#) is a great source to verify your installation of the OLE DB provider, or to download a recent version.

The Excel libraries need to match your version of Windows in terms of its bit-level. If you have 64-bit Windows installed, you need to install the 64-bit OLE DB provider.

To download the latest Excel libraries, visit Power BI and select the **down arrow** in the upper right corner of the Power BI service, then select **Analyze in Excel updates**.



In the dialog that appears, select **Download (preview)**.

Analyze in Excel updates

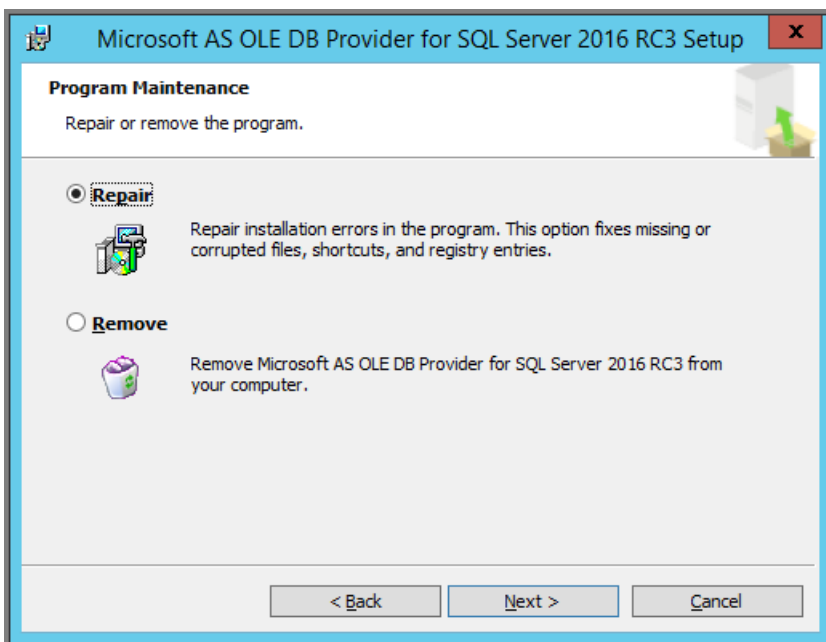
With Analyze in Excel, use Pivot Table, Chart, and Slicer features in Excel just like you are used to, all while connected to your data in Power BI. Download the latest update to get started.

Download (preview)
Learn more

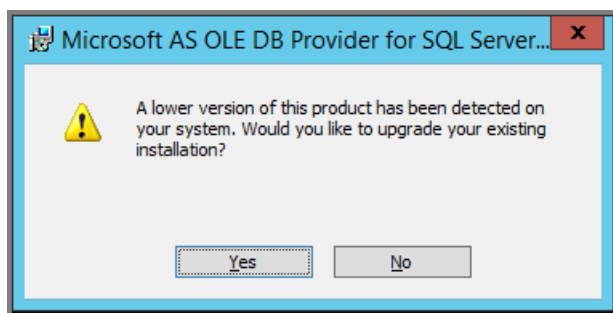
Determining whether you need to update your Excel libraries

You can download the most recent version of the Excel OLE DB provider libraries from the links in the previous section. Once you download the appropriate OLD DB provider library and begin installation, checks are performed against your current installed version.

If your Excel OLE DB provider client libraries are up to date, you'll be presented with a dialog that looks like the following:



Alternatively, if the new version you are installing is newer than the version on your computer, the following dialog appears:



If you see the dialog prompting you to upgrade, you should continue with the installation to get the most recent version of the OLE DB provider installed in your computer.

Connection cannot be made error

The primary cause for a *connection cannot be made* error is that your computer's OLE DB provider client libraries are not current. For information about how to determine the correct update, and for download links, see **Update Excel libraries for the OLE DB provider** earlier in this article.

Forbidden error

Some users have more than one Power BI account, and when Excel attempts to connect to Power BI using existing credentials, it may use credentials that do not have access to the dataset or report you want to access.

When this occurs, you may receive an error titled **Forbidden**, which means you may be signed into Power BI with credentials that do not have permissions to the dataset. After encountering the **forbidden** error, when prompted to enter your credentials, use the credentials that have permission to access the dataset you're trying to use.

If you still run into errors, log into Power BI with the account that has permission, and verify that you can view and access the dataset in Power BI that you're attempting to access in Excel.

No data models

If you encounter an error that states **Can't find OLAP cube model**, then the dataset you're trying to access has no data model, and therefore cannot be analyzed in Excel.

Token expired error

If you receive a **token expired** error, it means you haven't recently used the **Analyze in Excel** feature on the computer you're using. Simply re-enter your credentials, or reopen the file, and the error should go away.

Unable to access on-premises Analysis Services

If you're trying to access a dataset that has connections to on-premises Analysis Services data, you may receive an error message. **Analyze in Excel** does support connecting to datasets and reports on on-premises **Analysis Services** with a connection string, as long as your computer is on the same domain as the **Analysis Services** server, and your account has access to that **Analysis Services** server.

Can't drag anything to the PivotTable Values area (no measures)

When **Analyze in Excel** connects to an external OLAP model (which is how Excel connects to Power BI), the *PivotTable* requires **measures to be defined in the external model**, since all calculations are performed on the server. This is different than when you work with a local data source (such as tables in Excel, or when you're

working with datasets in **Power BI Desktop** or the **Power BI service**), in which case the tabular model is available locally, and [you can use implicit measures](#), which are measures that are generated dynamically and are not stored in the data model. In these cases, the behavior in Excel is different from the behavior in **Power BI Desktop** or the **Power BI service**: there may be columns in the data that can be treated as measures in Power BI, but can't be used as values (measures) in Excel.

To address this issue, you have a few options:

1. Create [measures in your data model in Power BI Desktop](#), then publish the data model to the **Power BI service** and access that published dataset from Excel.
2. Create [measures in your data model from Excel PowerPivot](#).
3. If you imported data from an Excel workbook that had only tables (and no data model), then you can [add the tables to the data model](#), then follow the steps in option 2, directly above, to create measures in your data model.

Once your measures are defined in the model in the Power BI service, you'll be able to use them in the **Values** area in Excel PivotTables.

Next steps

[Analyze in Excel](#)

[Tutorial: Create your own measures in Power BI Desktop](#)

[Measures in PowerPivot](#)

[Create a Measure in PowerPivot](#)

[Add worksheet data to a Data Model using a linked table](#)

[Differences between OLAP and non-OLAP PivotTables in Excel](#)

Troubleshooting the on-premises data gateway

11/27/2017 • 20 min to read • [Edit Online](#)

This article discusses some common issues you may encounter when using the **on-premises data gateway**.

NOTE

If you encounter an issue that is not listed below, you can ask for further assistance in the following locations.

- For Power BI, you can use the [communities](#) site or you can create a [support ticket](#).
- For PowerApps, you can use the [communities](#) site or you can create a [support ticket](#).
- For Microsoft Flow, you can use the [communities](#) site or you can create a [support ticket](#).
- For Logic Apps, you can submit a support ticket through the Azure portal.

Update to the latest version

A lot of issues can surface when the gateway version is out of date. It is a good general practice to make sure you are on the latest version. If you haven't updated the gateway for a month, or longer, you may want to consider installing the latest version of the gateway and see if you can reproduce the issue.

Common issues

Here are a few common issues and resolutions that have helped a number of customers in environments that restrict internet access.

Authentication to proxy server

Your proxy may require authentication from a domain user account. By default, the gateway uses a Service SID for the windows service log on user. Changing the log on user to a domain user can help with this. For more information, see [Changing the gateway service account to a domain user](#).

Your proxy only allows ports 80 and 443 traffic

Some proxies restrict traffic to only ports 80 and 443. By default, communication to Azure Service Bus will occur on ports other than 443.

You can force the gateway to communicate with Azure Service Bus using HTTPS instead of direct TCP. You

will need to modify the *Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config* file. Change the value from `AutoDetect` to `Https`. This file is located, by default, at `C:\Program Files\On-premises data gateway`.

```
<setting name="ServiceBusSystemConnectivityModeString" serializeAs="String">
  <value>Https</value>
</setting>
```

Installation

Error: Failed to add user to group. (-2147463168 PBIegwService Performance Log Users)

You may receive this error if you are trying to install the gateway on a domain controller. Deploying on a domain controller is not supported. You will need to deploy the gateway on a machine that is not a domain controller.

Configuration

How to restart the gateway

The gateway runs as a Windows service, so you can start and stop it in multiple ways. For example, you can open a command prompt with elevated permissions on the machine where the gateway is running and then run either of these commands:

- To stop the service, run this command:

```
"" net stop PBIegwService ""
```

- To start the service, run this command:

```
"" net start PBIegwService ""
```

Error: Failed to create gateway. Please try again.

All of the details are available, but the call to the Power BI service returned an error. The error, and an activity id, will be displayed. This could happen for different reasons. You can collect, and review, the logs, as mentioned below, to get more details.

This could also be due to proxy configuration issues. The user interface does now allow for proxy configuration. You can learn more about making [proxy configuration changes](#)

Error: Failed to update gateway details. Please try again.

Information was received from the Power BI service, to the gateway. The information was passed onto the local windows service, but it failed to return. Or, a symmetric key generation failed. The inner exception will be displayed under **Show details**. You can collect, and review, the logs, as mentioned below, to get more details.

Error: Power BI service reported local gateway as unreachable. Please restart the gateway and try again.

At the end of configuration, the Power BI service will be called again to validate the gateway. The Power BI service does not report the gateway as *live*. Restarting the windows service may allow the communication to be successful. You can collect, and review, the logs, as mentioned below, to get more details.

Script error during sign into Power BI

You may receive a script error when signing into Power BI as part of the on-premises data gateway configuration. Installing the following security update should resolve the issue. This can be installed via Windows Update.

[MS16-051: Security update for Internet Explorer: May 10, 2016 \(KB 3154070\)](#)

Gateway configuration failed with a null reference exception

You may encounter an error similar to the following.

```
Failed to update gateway details. Please try again.  
Error updating gateway configuration.
```

This will include a stack trace, and that stack trace will may include the following.

```
Microsoft.PowerBI.DataMovement.Pipeline.Diagnostics.CouldNotUpdateGatewayConfigurationException:  
Error updating gateway configuration. ----> System.ArgumentNullException: Value cannot be null.  
Parameter name: serviceSection
```

If you are upgrading from an older gateway, we preserve the config file. There may be a section that is missing. When the gateway tries to read it, we will get the above null reference exception.

To correct this, do the following.

1. Uninstall the gateway.
2. Delete the following folder.

```
c:\Program Files\on-premises data gateway
```

3. Reinstall the gateway.
4. Optionally apply the recovery key to restore an existing gateway.

Support for TLS 1.1/1.2

With the August 2017 update and beyond, the on-premises data gateway uses Transport Layer Security (TLS) 1.1 or 1.2 to communicate with the **Power BI service** by default. Previous versions of the on-premises data gateway use TLS 1.0 by default. On November 1st 2017 support for TLS 1.0 will end, so by then you must upgrade your on-premises data gateway installations to the August 2017 release or newer to ensure your gateways continue to operate.

It's important to note that TLS 1.0 is still supported by the on-premises data gateway prior to November 1st, and is used by the gateway as a fallback mechanism. To ensure all gateway traffic uses TLS 1.1 or 1.2 (and to prevent the use of TLS 1.0 on your gateway), you must add or modify the following registry keys on the machine running the gateway service:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:00000001  
  
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\.NETFramework\v4.0.30319]"SchUseStrongCrypto"=dword:  
00000001
```

NOTE

Adding or modifying these registry keys applies the change to all .NET applications. For information about registry changes that affect TLS for other applications, see [Transport Layer Security \(TLS\) registry settings](#).

Data sources

Error: Unable to Connect. Details: "Invalid connection credentials"

Within **Show details**, it should display the error message received from the data source. For SQL Server, you should see something like the following.

```
Login failed for user 'username'.
```

Verify that you have the correct username and password. Also verify that those credentials can successfully connect to the data source. Make sure the account being used matches the **Authentication Method**.

Error: Unable to Connect. Details: "Cannot connect to the database"

We were able to connect to the server, but not to the database supplied. Verify the name of the database, and that the user credential has the proper permission to access that database.

Within **Show details**, it should display the error message received from the data source. For SQL Server, you should see something like the following.

```
Cannot open database "AdventureWorks" requested by the login. The login failed. Login failed for user 'username'.
```

Error: Unable to Connect. Details: "Unknown error in data gateway"

This error could occur for different reasons. Be sure to validate that you can connect to the data source from the machine hosting the gateway. This could be the result of the server not being accessible.

Within **Show details**, you will see an error code of **DM_GWPipeline_UnknownError**.

You can also look in the Event Logs > **Applications and Services Logs** > **on-premises data gateway Service** for more details.

Error: We encountered an error while trying to connect to . Details: "We reached the data gateway, but the gateway can't access the on-premises data source."

We were unable to connect to the specified data source. Be sure to validate the information provided for that data source.

Within **Show details**, you will see an error code of **DM_GWPipeline_Gateway_DataSourceAccessError**.

If the underlying error message is similar to the following, this means that the account you are using for the data source is not a server admin for that Analysis Services instance. [Learn more](#)

```
The 'CONTOSO\account' value of the 'EffectiveUserName' XML for Analysis property is not valid.
```

If the underlying error message is similar to the following, it could mean that the service account for Analysis Services may be missing the [token-groups-global-and-universal](#) (TGGAU) directory attribute.

```
The user name or password is incorrect.
```

Domains with Pre-Windows 2000 compatibility access will have the TGGAU attribute enabled. However, most newly created domains will not enable this attribute by default. You can read more about this [here](#).

You can confirm this by doing the following.

1. Connect to the Analysis Services machine within SQL Server Management Studio. Within the Advanced connection properties, include EffectiveUserName for the user in question and see if this reproduces the error.
2. You can use the dscls Active Directory tool to validate whether the attribute is listed. This tool is normally found on a domain controller. You will need to know what the distinguished domain name is for the account and pass that to the tool.

```
dsac1s "CN=John Doe,CN=UserAccounts,DC=contoso,DC=com"
```

You want to see something similar to the following in the results.

```
Allow BUILTIN\Windows Authorization Access Group
SPECIAL ACCESS for tokenGroupsGlobalAndUniversal
READ PROPERTY
```

To correct this issue, you will need to enable TGGAU on account used for the Analysis Services windows service.

Another possibility for user name or password incorrect

This error could also be caused if the Analysis Services server is in a different domain than the users and there is not a two-way trust established.

You will need to work with your domain administrators to verify the trust relationship between domains.

Unable to see the data gateway data sources in the 'Get Data' experience for Analysis Services from the Power BI service

Make sure that your account is listed in the **Users** tab of the data source within the gateway configuration. If you don't have access to the gateway, check with the administrator of the gateway and ask them to verify. Only accounts in the **Users** list will see the data source listed in the Analysis Services list.

Datasets

Error: There is not enough space for this row.

This will occur if you have a single row greater than 4 MB in size. You will need to determine what the row is from your data source and attempt to filter it out or reduce the size for that row.

Error: The server name provided doesn't match the server name on the SQL Server SSL Certificate.

This can occur when the certificate CN is for the servers fully qualified domain name (FQDN) but you only supplied the netbios name for the server. This will cause a mismatch for the certificate. To resolve this issue, you will need to make the server name within the gateway data source, and the PBIX file, to use the FQDN of the server.

I don't see the on-premises data gateway percent when configuring scheduled refresh.

This could be because of a few different scenarios.

1. The server and database name don't match between what was entered in Power BI Desktop and the data source configured for the gateway. These need to be the same values. They are not case sensitive.
2. Your account is not listed in the **Users** tab of the data source within the gateway configuration. You will need to get with the administrator of the gateway to be added to that list.
3. Your Power BI Desktop file has multiple data sources within it and not all of those data sources are configured with the gateway. You will need to have each data source defined with the gateway for the gateway to show up within Scheduled Refresh.

Error: The received uncompressed data on the gateway client has exceeded limit.

The exact limitation is 10 GB of uncompressed data per table. If you are hitting this issue, there are good options to optimize and avoid the issue. In particular, reducing the use of highly repetitive, long string values and instead using a normalized key or removing the column (if not in use) will help.

Reports

Report could not access the data source because you do not have access to our data source via an on-premises data gateway.

This is usually caused by one of the following.

1. The data source information does not match what is in the underlying dataset. The server and database name need to match between the data source defined for the on-premises data gateway and what you supply within Power BI Desktop. If you use an IP Address in Power BI Desktop, the data source, for the on-premises data gateway, needs to use an IP Address as well.
2. There is not a data source available on any gateway within your organization. You can configure the data source on a new, or existing, on-premises data gateway.

Error: Data source access error. Please contact the gateway administrator.

If this report is making use of a live Analysis Services connection, you could be encountering an issue with a value being passed to EffectiveUserName that is either not valid, or doesn't have permissions on the Analysis Services machine. Typically, an authentication issue is due to the fact that the value being passed for EffectiveUserName doesn't match a local user principal name (UPN).

To confirm this, you can do the following.

1. Find the effective username within the [gateway logs](#).
2. Once you have the value being passed, validate that it is correct. If it is your user, you can use the following command from a command prompt to see what the UPN should be. The UPN will look like an email address.

```
whoami /upn
```

Optionally, you can see what Power BI gets from Azure Active Directory.

1. Browse to <https://graphexplorer.cloudapp.net>.
2. Select **Sign in** in the upper right.
3. Run the following query. You will see a rather large JSON response.

```
https://graph.windows.net/me?api-version=1.5
```

4. Look for **userPrincipalName**.

If your Azure Active Directory UPN doesn't match your local Active Directory UPN, you can use the [Map user names](#) feature to replace it with a valid value. Or you can work with either your tenant admin, or local Active Directory admin, to get your UPN changed.

Firewall or Proxy

For information on providing proxy information for your gateway, see [Configuring proxy settings for the Power BI gateways](#).

You can test to see if your firewall, or proxy, may be blocking connections by running [Test-NetConnection](#) from a PowerShell prompt. This will test connectivity to the Azure Service Bus. This only tests network connectivity and doesn't have anything to do with the cloud server service or the gateway. It helps to determine if your machine can actually get out to the internet.

```
Test-NetConnection -ComputerName watchdog.servicebus.windows.net -Port 9350
```

NOTE

Test-NetConnection is only available on Windows Server 2012 R2 and later. It is also available on Windows 8.1 and later. On earlier OS versions, you can use Telnet to test port connectivity.

The results should look similar to the following. The difference will be with `TcpTestSucceeded`. If **TcpTestSucceeded** is not `true`, then you may be blocked by a firewall.

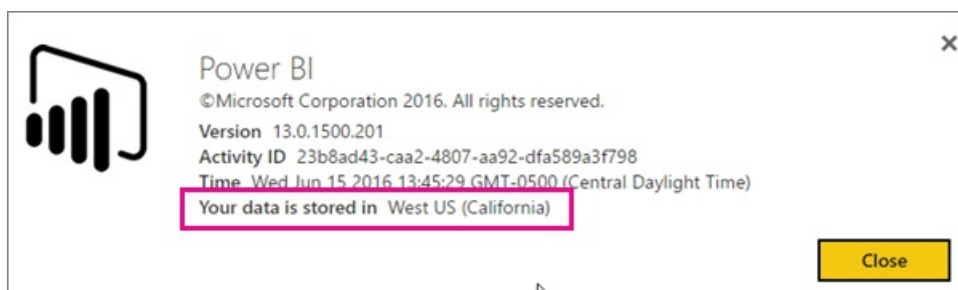
```
ComputerName      : watchdog.servicebus.windows.net
RemoteAddress     : 70.37.104.240
RemotePort        : 5672
InterfaceAlias    : vEthernet (Broadcom NetXtreme Gigabit Ethernet - Virtual Switch)
SourceAddress     : 10.120.60.105
PingSucceeded     : False
PingReplyDetails (RTT) : 0 ms
TcpTestSucceeded : True
```

If you want to be exhaustive, substitute the **ComputerName** and **Port** values with those listed for [ports](#)

The firewall may also be blocking the connections that the Azure Service Bus makes to the Azure data centers. If that is the case, you will want to whitelist (unblock) the IP addresses for your region for those data centers. You can get a list of Azure IP addresses [here](#).

You can find the data center region you are in by doing the following:

1. Select the **?** in the upper right of the Power BI service.
2. Select **About Power BI**.
3. Your data region will be listed in **Your data is stored in**.



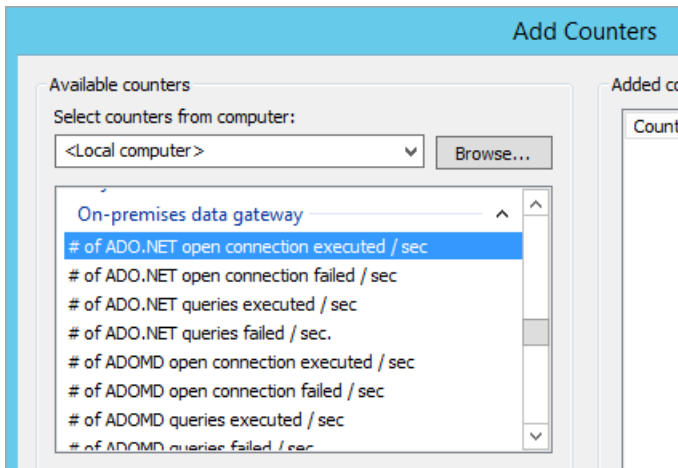
If you are still not getting anywhere, you could try getting a network trace using a tool like [fiddler](#) or `netsh`, although these are advanced collection methods and you may need assistance in analyzing the collected data. You can contact [support](#) for assistance.

Performance

Performance Counters

There are a number of performance counters that can be used to gauge the activities for the gateway. These can be helpful to understanding if we have a large load of activity and may need to make a new gateway. These counters will not reflect how long something takes.

These counters can be access through the Windows Performance Monitor tool.



There are general groupings of these counters.

COUNTER TYPE	DESCRIPTION
ADO.NET	This is used for any DirectQuery connection.
ADOMD	This is used for Analysis Services 2014 and earlier.
OLEDB	This is used by certain data sources. This includes SAP HANA and Analysis Service 2016 or later.
Mashup	This includes any imported data source. If you are scheduling refresh or doing an on-demand refresh, it will go through the mashup engine.

Here is a listing of the available performance counters.

COUNTER	DESCRIPTION
# of ADO.NET open connection executed / sec	Number of ADO.NET open connection actions executed per second (succeeded or failed).

COUNTER	DESCRIPTION
# of ADO.NET open connection failed / sec	Number of ADO.NET open connections actions failed per second.
# of ADO.NET queries executed / sec	Number of ADO.NET queries executed per second (succeeded or failed).
# of ADO.NET queries failed / sec	Number of ADO.NET failed queries executed per second.
# of ADOMD open connection executed / sec	Number of ADOMD open connection actions executed per second (succeeded or failed).
# of ADOMD open connection failed / sec	Number of ADOMD open connection actions failed per second.
# of ADOMD queries executed / sec	Number of ADOMD queries executed per second (succeeded or failed).
# of ADOMD queries failed / sec	Number of ADOMD failed queries executed per second.
# of all open connection executed / sec	Number of open connection actions executed per second (succeeded or failed).
# of all open connection failed / sec	Number of failed open connection actions executed per second.
# of all queries executed / sec	Number of queries executed per second (succeeded or failed).
# of items in the ADO.NET connection pool	Number of items in the ADO.NET connection pool.
# of items in the OLEDB connection pool	Number of items in the OLEDB connection pool.
# of items in the Service Bus pool	Number of items in the Service Bus pool.
# of Mashup open connection executed / sec	Number of Mashup open connection actions executed per second (succeeded or failed).
# of Mashup open connection failed / sec	Number of Mashup open connection actions failed per second.
# of Mashup queries executed / sec	Number of Mashup queries executed per second (succeeded or failed).
# of Mashup queries failed / sec	Number of Mashup failed queries executed per second
# of multiple result set OLEDB queries failed / sec	Number of multiple resultset OLEDB failed queries executed per second.
# of OLEDB multiple resultset queries executed / sec	Number of OLEDB multiple resultset queries executed per second (succeeded or failed).
# of OLEDB open connection executed / sec	Number of OLEDB open connection actions executed per second (succeeded or failed).

COUNTER	DESCRIPTION
# of OLEDB open connection failed / sec	Number of OLEDB open connection actions failed per second.
# of OLEDB queries executed / sec	Number of OLEDB multiple resultset queries executed per second (succeeded or failed).
# of OLEDB queries failed / sec	Number of OLEDB multiple resultset failed queries executed per second.
# of OLEDB single resultset queries executed / sec	Number of OLEDB single resultset queries executed per second (succeeded or failed).
# of queries failed / sec	Number of failed queries executed per second.
# of single result set OLEDB queries failed / sec	Number of single resultset OLEDB failed queries executed per second.

Reviewing slow performing queries

You may find that response through the gateway is slow. This could be for DirectQuery queries or when refreshing your imported dataset. You can enable additional logging to output queries and their timings to help understand what is performing slow. When you find a long running query, it may require additional modification on your data source to tune query performance. For example, adjusting indexes for a SQL Server query.

You will need to modify two configuration files to determine the duration of a query.

Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config

Within the *Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config* file, change the `EmitQueryTraces` value from `False` to `True`. This file is located, by default, at `C:\Program Files\On-premises data gateway`. Enabling `EmitQueryTraces` will begin to log queries that are sent from the gateway to a data source.

IMPORTANT

Enabling `EmitQueryTraces` could increase the log size significantly depending on gateway usage. Once you are done reviewing the logs, you will want to set `EmitQueryTraces` to `False`. It is not recommended to leave this setting enabled long term.

```
<setting name="EmitQueryTraces" serializeAs="String">
  <value>True</value>
</setting>
```

Example query entry

```

DM.EnterpriseGateway Information: 0 : 2016-09-15T16:09:27.2664967Z DM.EnterpriseGateway 4af2c279-
1f91-4c33-ae5e-b3c863946c41 d1c77e9e-3858-4b21-3e62-1b6eaf28b176 MGEQ c32f15e3-699c-4360-9e61-
2cc03e8c8f4c FF59BC20 [DM.GatewayCore] Executing query (timeout=224) "<pi>
SELECT
TOP (1000001) [t0].[ProductCategoryName],[t0].[FiscalYear],SUM([t0].[Amount])
AS [a0]
FROM
(
(select [Table].[ProductCategoryName] as [ProductCategoryName],
[Table].[ProductSubcategory] as [ProductSubcategory],
[Table].[Product] as [Product],
[Table].[CustomerKey] as [CustomerKey],
[Table].[Region] as [Region],
[Table].[Age] as [Age],
[Table].[IncomeGroup] as [IncomeGroup],
[Table].[CalendarYear] as [CalendarYear],
[Table].[FiscalYear] as [FiscalYear],
[Table].[Month] as [Month],
[Table].[OrderNumber] as [OrderNumber],
[Table].[LineNumber] as [LineNumber],
[Table].[Quantity] as [Quantity],
[Table].[Amount] as [Amount]
from [dbo].[V_CustomerOrders] as [Table])
)
AS [t0]
GROUP BY [t0].[ProductCategoryName],[t0].[FiscalYear] </pi>"

```

Microsoft.PowerBI.DataMovement.Pipeline.GatewayCore.dll.config

Within the *Microsoft.PowerBI.DataMovement.Pipeline.Diagnostics.dll.config* file, change the `TraceVerbosity` value from `4` to `5`. This file is located, by default, at `C:\Program Files\On-premises data gateway`. Changing this setting will begin to log verbose entries to the gateway log. This includes entries that show duration.

IMPORTANT

Enabling `TraceVerbosity` to `5` could increase the log size significantly depending on gateway usage. Once you are done reviewing the logs, you will want to set `TraceVerbosity` to `4`. It is not recommended to leave this setting enabled long term.

```

<setting name="TracingVerbosity" serializeAs="String">
  <value>5</value>
</setting>

```

Activity Types

ACTIVITY TYPE	DESCRIPTION
MGEQ	Queries executed over ADO.NET. This includes DirectQuery data sources.
MGEO	Queries executed over OLEDB. This includes SAP HANA and Analysis Services 2016.
MGEM	Queries executed from the Mashup engine. This is used with imported datasets that use scheduled refresh or refresh on-demand.

Determine the duration of a query

To determine the time it took to query the data source, you can do the following.

1. Open the gateway log.
2. Search for an [Activity Type](#) to find the query. An example of this would be MGEQ.
3. Make note of the second GUID as this is the request id.
4. Continue to search for MGEQ until you find the `FireActivityCompletedSuccessfullyEvent` entry with the duration. You can verify the entry has the same request id. Duration will be in milliseconds.

```
DM.EnterpriseGateway Verbose: 0 : 2016-09-26T23:08:56.7940067Z DM.EnterpriseGateway baf40f21-2eb4-4af1-9c59-0950ef11ec4a 5f99f566-106d-c8ac-c864-c0808c41a606 MGEQ 21f96cc4-7496-bfdd-748c-b4915cb4b70c B8DFCF12 [DM.Pipeline.Common.TracingTelemetryService] Event: FireActivityCompletedSuccessfullyEvent (duration=5004)
```

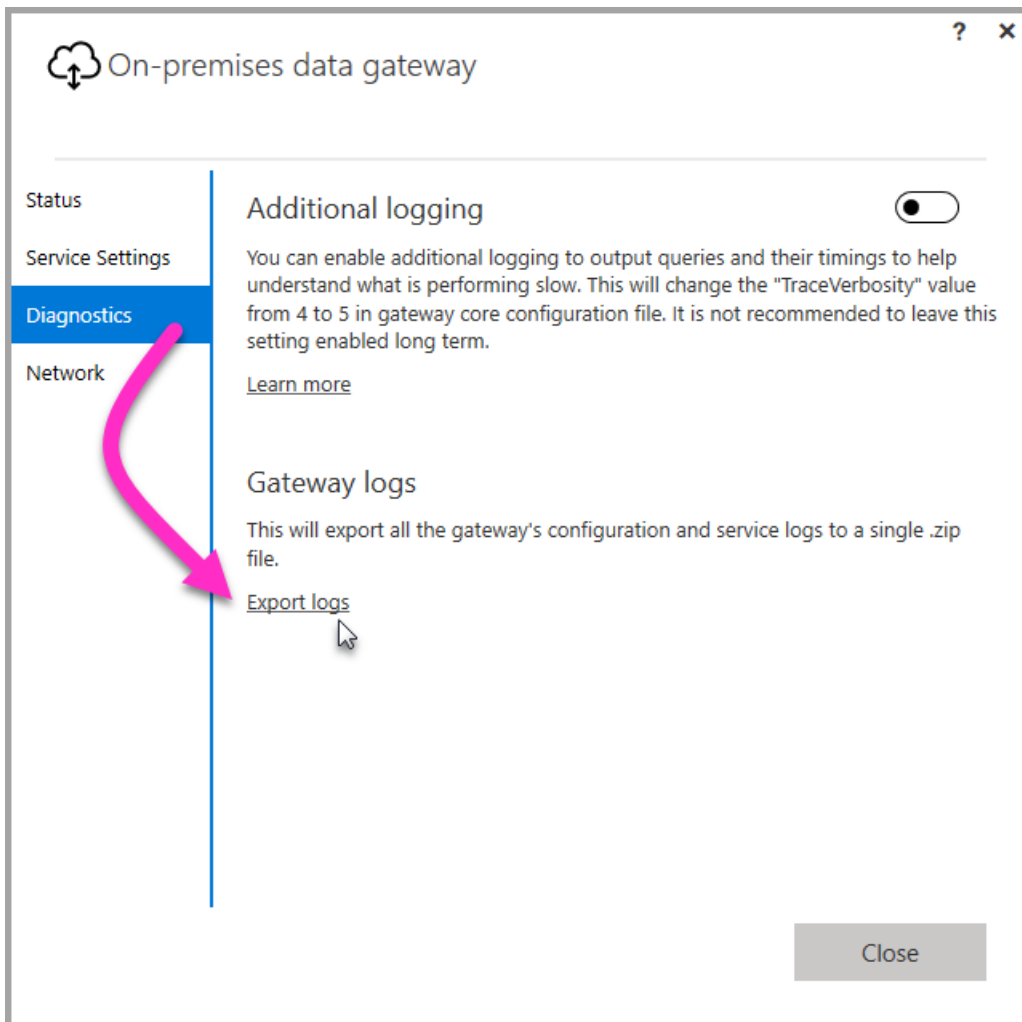
NOTE

`FireActivityCompletedSuccessfullyEvent` is a verbose entry. This entry will not be logged unless `TraceVerbosity` is at level 5.

Tools for troubleshooting

Collecting logs from the gateway configurator

There are several logs you can collect for the gateway, and you should always start with the logs. The simplest way to collect logs after installing the gateway is through the user interface. In the **On-premises data gateway** user interface, select **Diagnostics** and then select the **Export logs** link near the bottom of the page, as shown in the following image.



Installer logs

%localappdata%\Temp\On-premises_data_gateway_*.log

Configuration logs

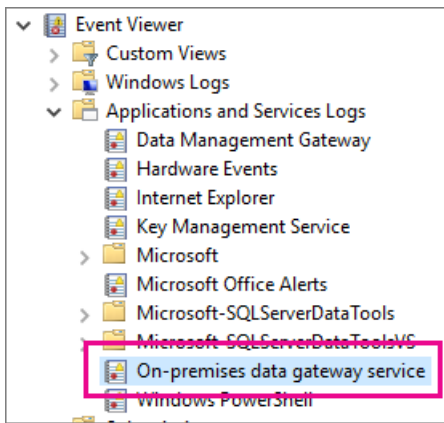
%localappdata%\Microsoft\On-premises Data Gateway\GatewayConfigurator*.log

On-premises data gateway service logs

C:\Users\PBIEgwService\AppData\Local\Microsoft\On-premises Data Gateway\Gateway*.log

Event Logs

The **On-premises data gateway service** event logs are present under **Application and Services Logs**.



Fiddler Trace

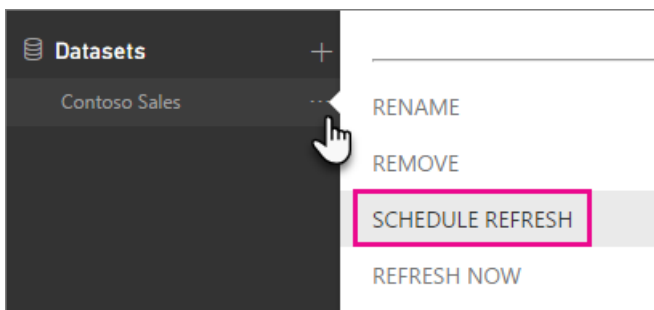
Fiddler is a free tool from Telerik that monitors HTTP traffic. You can see the back and forth with the Power BI service from the client machine. This may show errors and other related information.

8	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/gateways/discover
9	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/aggregateDataSource/147516?testConnection=true
11	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/content/packages/147029/refresh/
13	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
14	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe
16	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/dashboard/95433/tiles
17	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
18	-	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe

Refresh History

When using the gateway for scheduled refresh, **Refresh History** can help you see what errors have occurred, as well as provide useful data if you should need to create a support request. You can view both scheduled, as well as on demand, refreshes. Here is how you can get to the **Refresh History**.

1. In the Power BI navigation pane, in **Datasets**, select a dataset > Open Menu > **Schedule Refresh**.



2. In **Settings for...** > **Schedule Refresh**, select **Refresh History**.



Refresh history

Scheduled OneDrive

Details	Type	Start	End	Status	Failure message
	On demand	7/5/2016, 5:30:12 PM	7/5/2016, 5:30:51 PM	Completed	

For additional information about troubleshooting refresh scenarios, take a look at the [Troubleshooting Refresh Scenarios](#) article.

Next steps

[Configuring proxy settings for the Power BI gateways](#)

[On-premises data gateway](#)

[On-premises data gateway - in-depth](#)

[Manage your data source - Analysis Services](#)

[Manage your data source - SAP HANA](#)

[Manage your data source - SQL Server](#)

[Manage your data source - Import/Scheduled refresh](#)

More questions? [Try the Power BI Community](#)

Troubleshooting Power BI Gateway - Personal

12/6/2017 • 7 min to read • [Edit Online](#)

The following goes through some common issues you may encounter when using the Power BI Gateway - Personal.

NOTE

The current version of the gateway for personal use is the **On-premises data gateway (personal)**. Please update your installation to use that version.

Update to the latest version

A lot of issues can surface when the gateway version is out of date. It is a good general practice to make sure you are on the latest version. If you haven't updated the gateway for a month, or longer, you may want to consider installing the latest version of the gateway and see if you can reproduce the issue.

Installation

Personal gateway is 64bit - If your machine is 32bit, you will not be able to install the personal gateway. Your operating system needs to be 64bit. You will need to install a 64bit version of Windows, or install the personal gateway on a 64bit machine.

Personal gateway fails to install as a service even though you are a local administrator for the computer - Installation can fail if the user is in the computer's local Administrator group, but group policy does not allow that username to log on as a service. At the moment, ensure the group policy allows a user to log on as a service. We're working on a fix for this issue. [Learn more](#)

Operation timed out - This is common if the computer (physical machine or VM) on which you're installing the personal gateway has a single core processor. Close any applications and turn off any non-essential processes and try installing again.

Data Management Gateway or Analysis Services Connector cannot be installed on the same computer as personal gateway - If you already have an Analysis Services Connector or Data Management Gateway installed, you must first uninstall the Connector or the gateway and then try installing the personal gateway.

NOTE

If you encounter an issue during installation, the setup logs could provide information to help you resolve the issue. See [Setup Logs](#) for more information.

Proxy configuration You may encounter issues with configuring the personal gateway if your environment needs the use of a proxy. To learn more about how to configure proxy information, see [Configuring proxy settings for the Power BI Gateways](#)

Schedule refresh

Error: The credential stored in the cloud is missing.

You could get this error in Settings for <dataset> if you have a scheduled refresh and then uninstalled and re-

installed the personal gateway. When you uninstall a personal gateway, data source credentials for a dataset that has been configured for refresh are removed from the Power BI service.

Solution: In Power BI, go to the refresh settings for a dataset. In Manage Data Sources, for any data source with an error, click Edit credentials and sign in to the data source again.

Error: The credentials provided for the dataset are invalid. Please update the credentials through a refresh or in the Data Source Settings dialog to continue.

Solution: If you get a credentials message, it could mean:

- Make sure usernames and passwords used to sign into data sources are up to date. In Power BI, go to refresh settings for the dataset. In Manage Data Sources, click Edit credentials to update the credentials for the data source.
- Mashups between a cloud source and an on-premises source, in a single query, will fail to refresh in the personal gateway if one of the sources is using OAuth for authentication. An example of this is a mashup between CRM Online and a local SQL Server. This will fail because CRM Online requires OAuth.

This is a known issue, and being looked at. To work around the problem, have a separate query for the cloud source and the on-premises source and use a merge or append query to combine them.

Error: Unsupported data source.

Solution: If you get an unsupported data source message in Schedule Refresh settings, it could mean:

- The data source is not currently supported for refresh in Power BI.
- The Excel workbook does not contain a data model, only worksheet data. Power BI currently only supports refresh if the uploaded Excel workbook contains a data model. When you import data using Power Query in Excel, be sure to choose the option to Load data to data model. This ensures data is imported into a data model.

Error: [Unable to combine data] <query part>/<...>/<...> is accessing data sources that have privacy levels which cannot be used together. Please rebuild this data combination.

Solution: This error is due to the privacy level restrictions and the types of data sources you are using. [Learn more](#)

Error: Data source error: We cannot convert the value "[Table]" to type Table.

Solution: This error is due to the privacy level restrictions and the types of data sources you are using. [Learn more](#)

Error: There is not enough space for this row.

This will occur if you have a single row greater than 4 MB in size. You will need to determine what the row is from your data source and attempt to filter it out or reduce the size for that row.

Data sources

Missing data provider – The personal gateway is 64-bit only. It requires a 64-bit version of the data providers to be installed on the same computer where the personal gateway is installed. For example, if the data source in the dataset is Microsoft Access, you must install the 64-bit ACE provider on the same computer where you installed the personal gateway.

NOTE

If you have 32 bit Excel, you cannot install a 64-bit ACE provider on the same computer.

Windows authentication is not supported for Access database - Power BI currently only supports anonymous for Access database. We are working on enabling Windows authentication for Access database.

Sign in error when entering credentials for a datasource - If you get an error similar to this when entering Windows credentials for a data source, you might still be on an older version of the personal gateway. [Install the latest version of Power BI Gateway - Personal](#).

Configure <ComputerName>

ⓘ Login failed. [Hide details](#)

Activity Id: 1b1bf3ab-0abc-488e-904a-0a96150e473c
Request Id: e683453d-8e3d-ddaf-b389-6d5a4cc40578
Status Code: 400
Time: Mon Jul 27 14:35:44 PDT 2015
Version: 11.0.9167.497

Server

Database

Authentication Method:

Sign In **Cancel**

Error: Sign in error when selecting Windows authentication for a data source using ACE OLEDB - If you get the following error when entering data source credentials for a data source using ACE OLEDB provider:

ⓘ Failed to update data source credentials: The credentials you provided for the data source are invalid. Please ensure the credentials you have provided for all the data sources are valid.
[Hide details](#)

Activity Id: 6edb9b25-c65b-4136-90c6-15e0be0d5f88
Request Id: f270f4fa-6428-b3bb-8ae0-c06cea0bd2d3
Status Code: 400
Time: Thu Aug 20 2015 18:28:52 GMT-0700 (Pacific Daylight Time)
Version: 11.0.9167.799
Cluster URI: https://business-int-edlog-redirect.analysis-07.windows.net
Details: [Permission Error] Driver 'Microsoft.ACE.OLEDB.12.0' doesn't support Windows credentials.

Power BI does not currently support Windows authentication for a data source using ACE OLEDB provider.

Solution: To work around this error, you can select Anonymous authentication. For legacy ACE OLEDB provider, Anonymous credentials are equivalent to Windows credentials.

Tile refresh

If you are receiving an error with dashboard tiles refreshing, please refer to the following article.

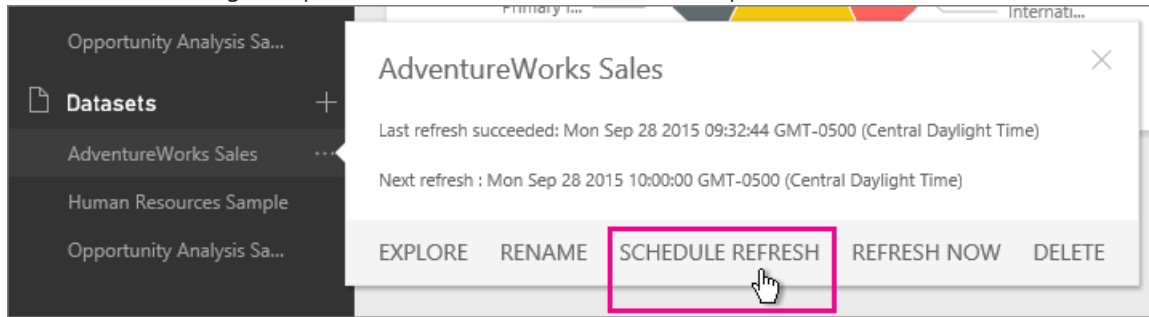
[Troubleshooting tile errors](#)

Tools for troubleshooting

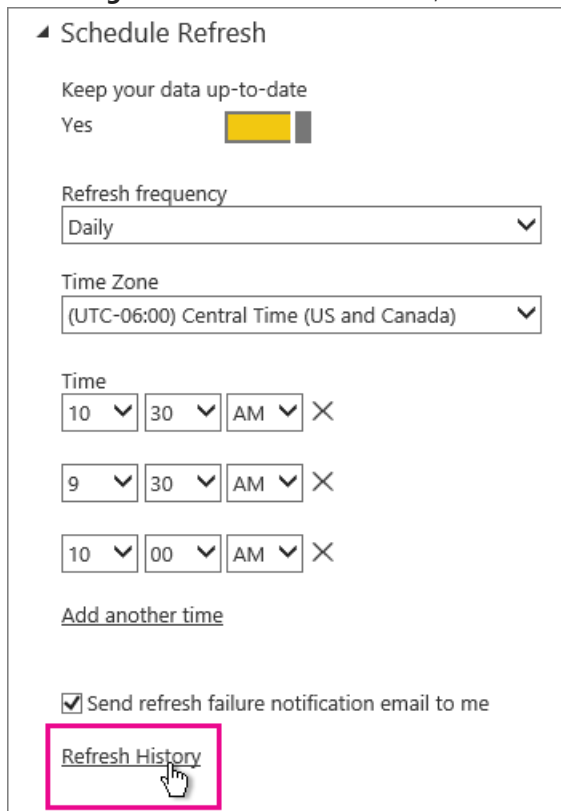
Refresh History

Refresh History can help you see what errors have occurred, as well as provide useful data if you should need to create a support request. You can view both scheduled, as well as on demand, refreshes. Here is how you can get to the **Refresh History**.

1. In the Power BI navigation pane, in **Datasets**, select a dataset > Open Menu > **Schedule Refresh**.



2. In **Settings for...** > **Schedule Refresh**, select **Refresh History**.



The screenshot shows the 'Refresh History' dialog box with a table of refresh events. The table has columns: Details, Type, Start, End, Status, and Fail Message.

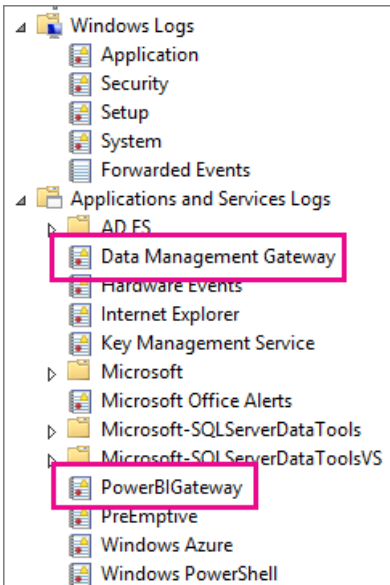
Details	Type	Start	End	Status	Fail Message
	On demand	9/28/2015 9:32:23 AM	9/28/2015 9:32:44 AM	Completed	
Hide	On demand	9/28/2015 9:17:03 AM	9/28/2015 9:17:14 AM	Failed	An error occurred while processing the data in the dataset.
Data Source Error: [Expression error] The name 'Table.TransformColumnNames' wasn't recognized. Make sure it's spelled correctly.					
Cluster URI: WABI-WEST-US-redirect.analysis.windows.net					
Activity Id: 0ec24881-ec30-470c-98a0-1109aa2036ae					
Request Id: 14aaf406-6d1e-32b0-0ad5-4370766897c3					
Time: 2015-09-28 14:17:14Z					
Show	On demand	9/28/2015 9:17:04 AM	9/28/2015 9:17:14 AM	Failed	An error occurred while processing the data in the dataset.

Event logs

There are several event logs that can provide information. The first two, **Data Management Gateway** and **PowerBIGateway**, are present if you are an admin on the machine. If you are not an admin, and you are using the Personal Gateway, you will see the log entries within the **Application** log.

The **Data Management Gateway** and **PowerBIGateway** logs are present under **Application and Services**

Logs.



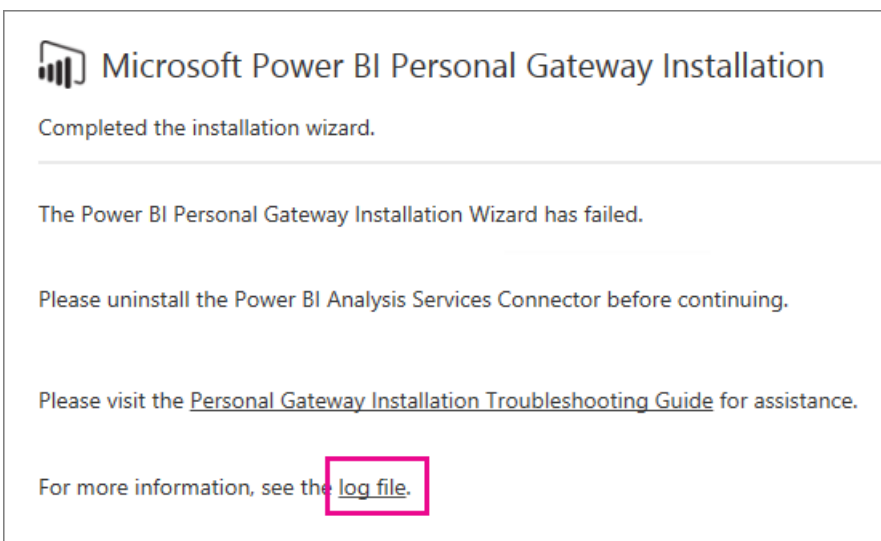
Fiddler trace

Fiddler is a free tool from Telerik that monitors HTTP traffic. You can see the back and forth with the Power BI service from the client machine. This may show errors and other related information.

8	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/gateways/discover
9	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/aggregateDataSource/147516?testConnection=true
11	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/content/packages/147029/refresh/
13	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
14	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe
16	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/dashboard/95433/tiles
17	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
18	-	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe

Setup Logs

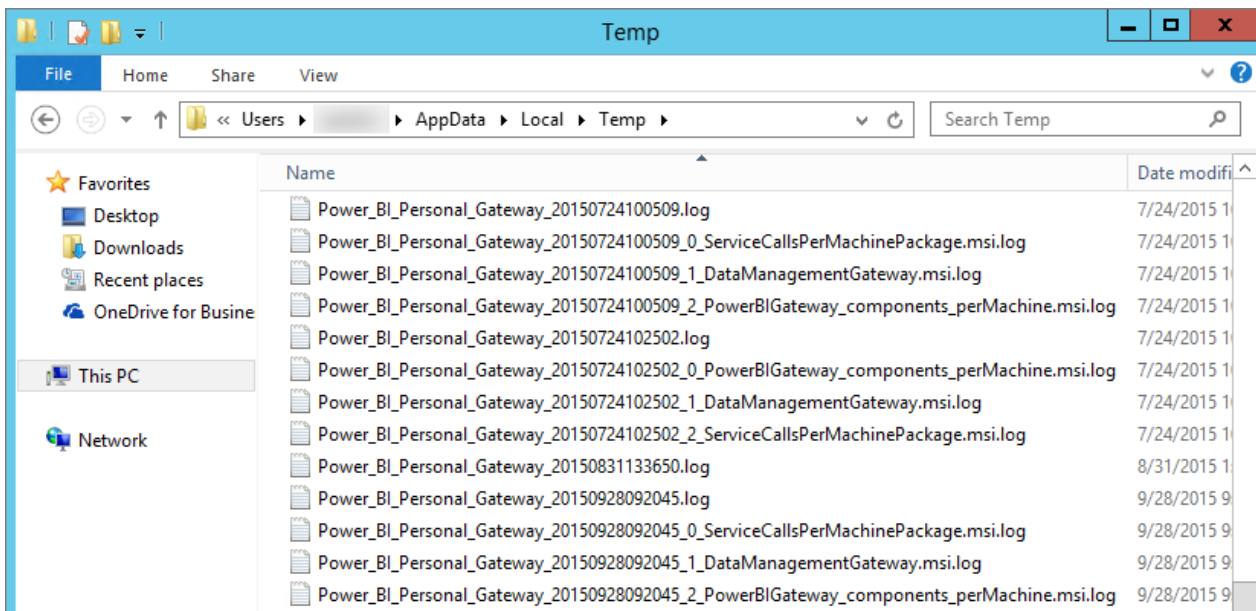
If the **Personal Gateway**, fails to install, you will see a link to show the setup log. This could show you details about the failure. These are Windows Install logs, or also known as MSI logs. They can be fairly complex and hard to read. Typically the resulting error will be at the bottom, but determining the cause of the error is not trivial. It could be a result of errors in a different log, or be a result of an error higher up in the log.



Alternatively, you can go to your **Temp folder** (%temp%) and look for files that start with **Power_BI_**.

NOTE

Going to %temp% may take you to a subfolder of temp. The **Power_BI_** files will be in the root of the temp directory. You may need to go up a level or two.



Next steps

[Configuring proxy settings for the Power BI Gateways](#)

[Data Refresh](#)

[Power BI Gateway - Personal](#)

[Troubleshooting tile errors](#)

[Troubleshooting the on-premises data gateway](#)

[More questions? Try the Power BI Community](#)

Troubleshooting unsupported data source for refresh

12/6/2017 • 1 min to read • [Edit Online](#)

You may see an error when trying to configured a dataset for scheduled refresh.

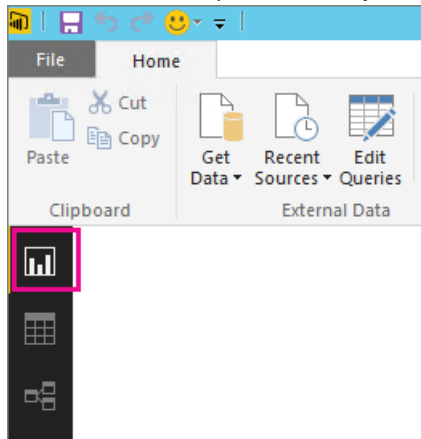
You cannot schedule refresh for this dataset because it gets data from sources that currently don't support refresh.

This happens when the data source you used, within Power BI Desktop, isn't supported for refresh. You will need to find the data source that you are using and compare that against the list of supported data sources at [Refresh data in Power BI](#).

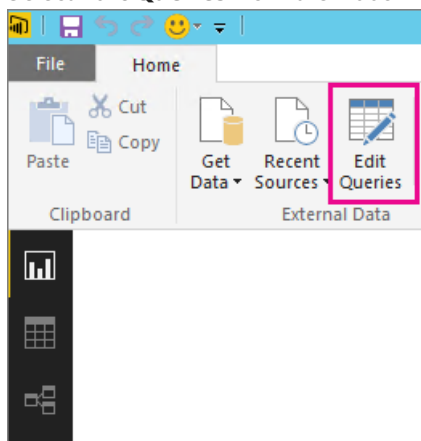
Find the data source

If you aren't sure what data source was used, you can find that using the following steps within Power BI Desktop.

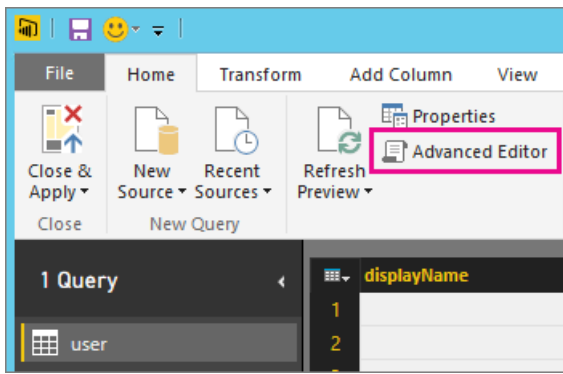
1. In Power BI Desktop, make sure you are on the **Report** pane.



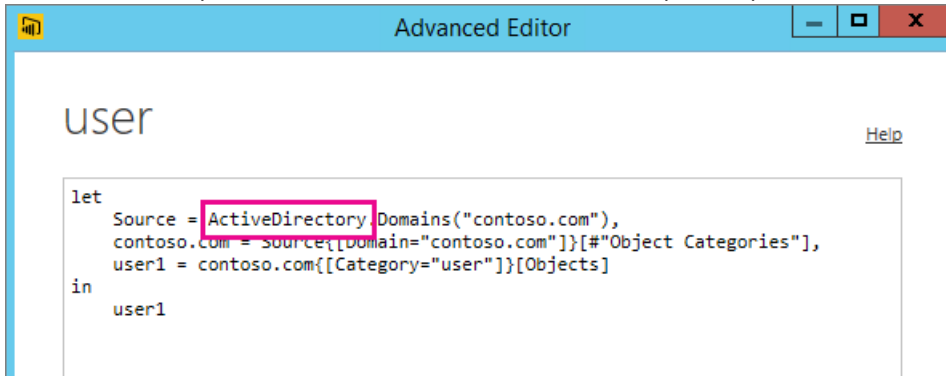
2. Select **Edit Queries** from the ribbon bar.



3. Select **Advanced Editor**.



4. Make note of the provider listed for the source. In this example, the provider is ActiveDirectory.



5. Compare the provider with the list of supported data sources found within [Refresh data in Power BI](#). You will find that Active Directory is not a supported data source for refresh.

Next steps

[Data Refresh](#)

[Power BI Gateway - Personal](#)

[On-premises data gateway](#)

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting the Power BI Gateway - Personal](#)

More questions? [Try asking the Power BI Community](#)

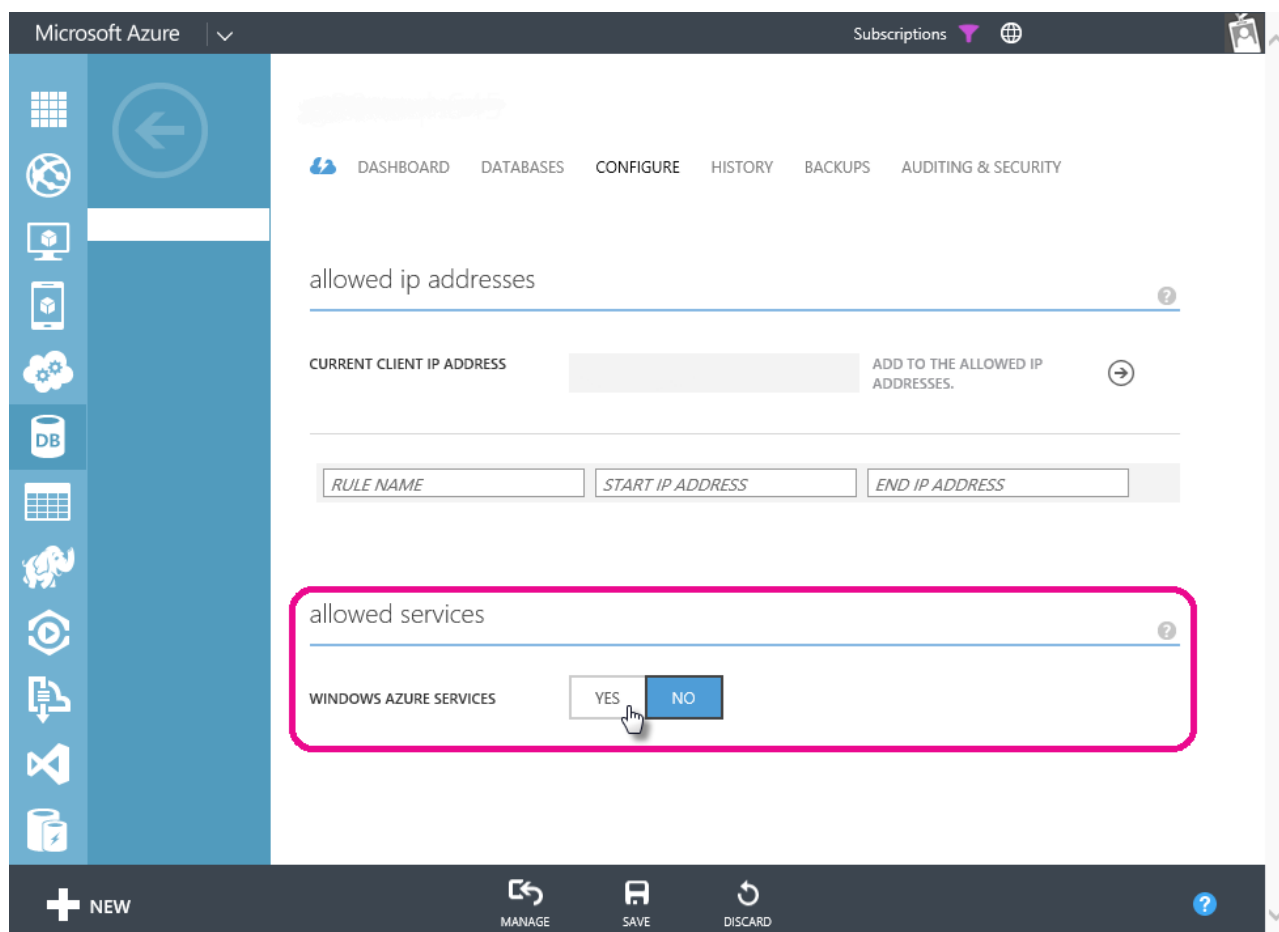
Troubleshooting scheduled refresh for Azure SQL Databases in Power BI

1/30/2018 • 1 min to read • [Edit Online](#)

For detailed steps on setting up scheduled refresh, be sure to see [Refresh data in Power BI](#).

While setting up scheduled refresh for Azure SQL Database, if you get an error with error code 400 during editing the credentials, try the following to set up the appropriate firewall rule:

1. Log into your Azure management portal
2. Go to the Azure SQL server you are configuring refresh for
3. Turn on 'Windows Azure Services' in the allowed services section



More questions? [Try the Power BI Community](#)

Error: We couldn't find any data in your Excel workbook

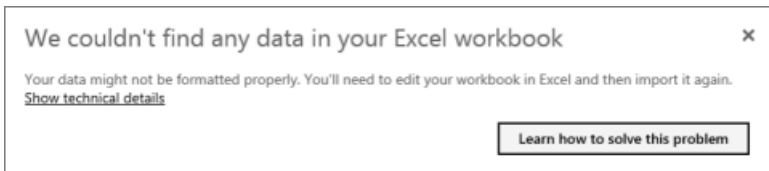
12/6/2017 • 1 min to read • [Edit Online](#)

NOTE

This article applies to Excel 2007 and later.

When you import an Excel workbook into Power BI, you may see the following error:

Error: We couldn't find any data in your Excel workbook. Your data might not be formatted properly. You'll need to edit your workbook in Excel and then import it again.



Quick solution

1. Edit your workbook in Excel.
2. Select the range of cells that contain your data. The first row should contain your column headers (the column names).
3. Press **Ctrl + T** to create a table.
4. Save your workbook.
5. Return to Power BI and import your workbook again, or if you're working in Excel 2016 and you've saved your workbook to OneDrive for Business, in Excel, click File > Publish.

Details

Cause

In Excel, you can create a **table** out of a range of cells, which makes it easier to sort, filter, and format data.

When you import an Excel workbook, Power BI looks for these tables and imports them into a dataset; if it doesn't find any tables, you'll see this error message.

Solution

1. Open your workbook in Excel.

NOTE

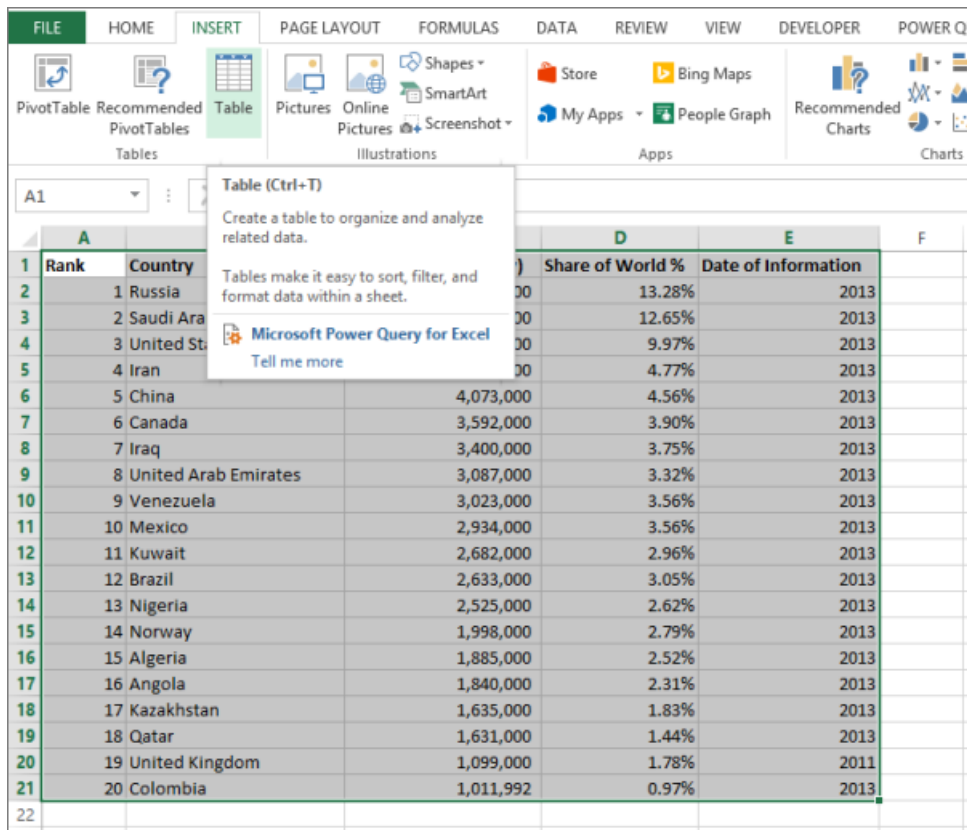
The pictures here are of Excel 2013. If you're using a different version, things may look a little different, but the steps are the same.

Rank	Country	Production (bbl/day)	Share of World %	Date of Information
1	Russia	10,900,000	13.28%	2013
2	Saudi Arabia	9,900,000	12.65%	2013
3	United States	8,453,000	9.97%	2013
4	Iran	4,231,000	4.77%	2013
5	China	4,073,000	4.56%	2013
6	Canada	3,592,000	3.90%	2013
7	Iraq	3,400,000	3.75%	2013
8	United Arab Emirates	3,087,000	3.32%	2013
9	Venezuela	3,023,000	3.56%	2013
10	Mexico	2,934,000	3.56%	2013
11	Kuwait	2,682,000	2.96%	2013
12	Brazil	2,633,000	3.05%	2013
13	Nigeria	2,525,000	2.62%	2013
14	Norway	1,998,000	2.79%	2013
15	Algeria	1,885,000	2.52%	2013
16	Angola	1,840,000	2.31%	2013
17	Kazakhstan	1,635,000	1.83%	2013
18	Qatar	1,631,000	1.44%	2013
19	United Kingdom	1,099,000	1.78%	2011
20	Colombia	1,011,992	0.97%	2013

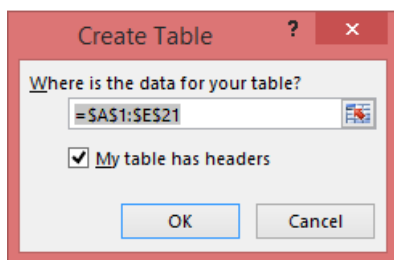
2. Select the range of cells that contain your data. The first row should contain your column headers (the column names):

Rank	Country	Production (bbl/day)	Share of World %	Date of Information
1	Russia	10,900,000	13.28%	2013
2	Saudi Arabia	9,900,000	12.65%	2013
3	United States	8,453,000	9.97%	2013
4	Iran	4,231,000	4.77%	2013
5	China	4,073,000	4.56%	2013
6	Canada	3,592,000	3.90%	2013
7	Iraq	3,400,000	3.75%	2013
8	United Arab Emirates	3,087,000	3.32%	2013
9	Venezuela	3,023,000	3.56%	2013
10	Mexico	2,934,000	3.56%	2013
11	Kuwait	2,682,000	2.96%	2013
12	Brazil	2,633,000	3.05%	2013
13	Nigeria	2,525,000	2.62%	2013
14	Norway	1,998,000	2.79%	2013
15	Algeria	1,885,000	2.52%	2013
16	Angola	1,840,000	2.31%	2013
17	Kazakhstan	1,635,000	1.83%	2013
18	Qatar	1,631,000	1.44%	2013
19	United Kingdom	1,099,000	1.78%	2011
20	Colombia	1,011,992	0.97%	2013

3. In the ribbon on the **INSERT** tab, click **Table**. (Or, as a shortcut, press **Ctrl + T**.)



4. You'll see the following dialog. Make sure **My table has headers** is checked, and select **OK**:



5. Now your data is formatted as a table:

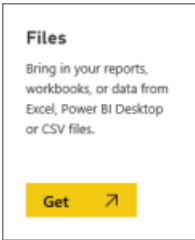
Rank	Country	Production (bbl/day)	Share of World %	Date of Information
1	Russia	10,900,000	13.28%	2013
2	Saudi Arabia	9,900,000	12.65%	2013
3	United States	8,453,000	9.97%	2013
4	Iran	4,231,000	4.77%	2013
5	China	4,073,000	4.56%	2013
6	Canada	3,592,000	3.90%	2013
7	Iraq	3,400,000	3.75%	2013
8	United Arab Emirates	3,087,000	3.32%	2013
9	Venezuela	3,023,000	3.56%	2013
10	Mexico	2,934,000	3.56%	2013
11	Kuwait	2,682,000	2.96%	2013
12	Brazil	2,633,000	3.05%	2013
13	Nigeria	2,525,000	2.62%	2013
14	Norway	1,998,000	2.79%	2013
15	Algeria	1,885,000	2.52%	2013
16	Angola	1,840,000	2.31%	2013
17	Kazakhstan	1,635,000	1.83%	2013
18	Qatar	1,631,000	1.44%	2013
19	United Kingdom	1,099,000	1.78%	2011
20	Colombia	1,011,992	0.97%	2013

6. Save your workbook.

7. Return to Power BI. Select Get Data at the bottom of the left navigation pane.

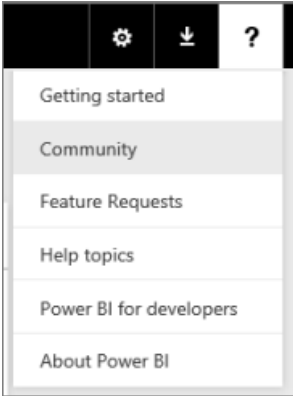


8. In the **Files** box, select **Get**.



9. Import your Excel workbook again. This time, the import should find the table and succeed.

If the import still fails, let us know by clicking **Community** in the help menu:



Troubleshooting tile errors

12/6/2017 • 2 min to read • [Edit Online](#)

Below are the common errors you may encounter with tiles along with an explanation.

NOTE

If you encounter an error that is not listed below, and it is causing you issues, you can ask for further assistance on the [community site](#), or you can create a [support ticket](#).

Errors

Power BI encountered an unexpected error while loading the model. Please try again later. or Couldn't retrieve the data model. Please contact the dashboard owner to make sure the data sources and model exist and are accessible.

We weren't able to access your data because the data source wasn't reachable. This could happen if the data source was removed, renamed, moved, offline, or permissions have changed. Check that the source is still in the location we are pointing to and you still have permission to access it. If that isn't the issue, the source may be slow. Try again later during a time when the load on the source is smaller. If it is an on-premises source, the data source owner may be able to provide more information.

You don't have permission to view this tile or open the workbook.

Please contact the dashboard owner to make sure the data sources and model exist and are accessible for your account.

Data shapes must contain at least one group or calculation that outputs data. Please contact the dashboard owner.

We don't have any data to display because the query is empty. Try adding some fields from the field list to your visual and repinning it.

Can't display the data because Power BI can't determine the relationship between two or more fields.

You are trying to use two or more fields from tables that are not related. You need to remove the unrelated fields from the visual and then create a relationship between the tables. Once you have done this, you can add the fields back to the visual. This can be done in Power BI Desktop or Power Pivot for Excel. [Learn more](#)

The groups in the primary axis and the secondary axis overlap. Groups in the primary axis can't have the same keys as groups in the secondary axis.

This is usually a transient issue. This will typically happen when you are moving groups from rows to columns. In this case, the error should disappear when you finish moving all the groups. If you still see the message, try switching fields between the rows and columns or the axis legend or removing fields from the visual.

This visual has exceeded the available resources. Try filtering to decrease the amount of data displayed.

Your visual has attempted to query too much data for us to complete the result with the available resources. Try filtering the visual to reduce the amount of data in the result.

We are not able to identify the following fields: {0}. Please update the visual with fields that exist in the dataset.

The field was likely deleted or renamed. You can remove the broken field from the visual, add a different field, and repin it.

Couldn't retrieve the data for this visual. Please try again later.

This is usually a transient issue. If you try again later and you still see this message, please contact support.

Contact support

If you are still having an issue, please [contact support](#) to investigate further.

Next steps

[Troubleshooting the on-premises data gateway](#)

[Troubleshooting Power BI Personal Gateway](#)

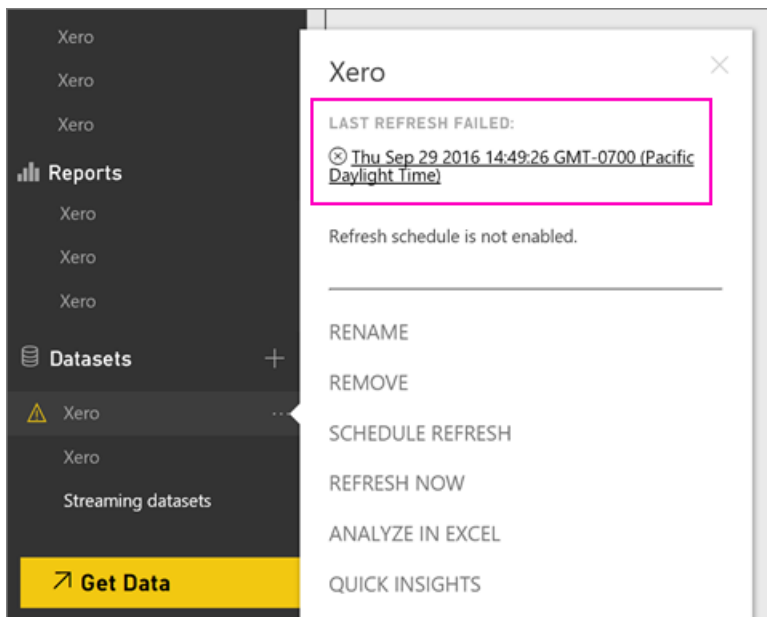
More questions? [Try the Power BI Community](#)

How to refresh your Xero content pack credentials if refresh failed

11/15/2017 • 1 min to read • [Edit Online](#)

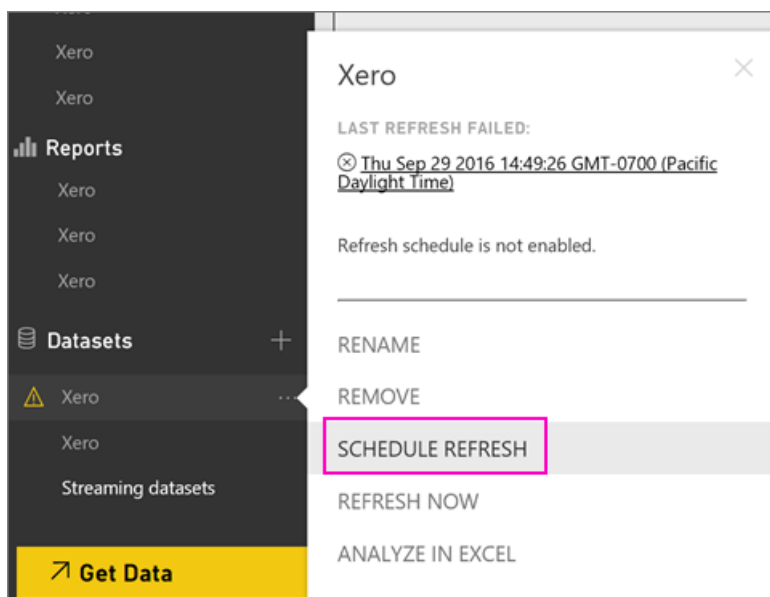
If you use the Xero Power BI content pack, you may have experienced some problems with the content pack's daily refresh due to a recent Power BI service incident.

You can see if your content pack refreshed successfully by checking the last refresh status for your Xero dataset as shown in the screenshot below.



If you do see that refresh failed as shown above, please follow these steps to renew your content pack credentials.

1. Click the ellipsis (...) next to your Xero dataset, then click **Schedule refresh**. This opens the settings page for the Xero content pack.



2. In the **Settings for Xero** page, select **Data source credentials** > **Edit credentials**.

Settings for Xero

⊗ Last refresh failed: Sat Oct 01 2016 18:47:31 GMT-0700 (Pacific Daylight Time)
Can't connect to the data source. [Show details](#)

[Refresh history](#)

- ▶ Gateway connection
- ◀ Data source credentials
 - Xero [Edit credentials](#)
- ▶ Schedule Refresh
- ▶ Q&A and Cortana
- ▶ Featured Q&A Questions

3. Enter your organization's name > **Next**.

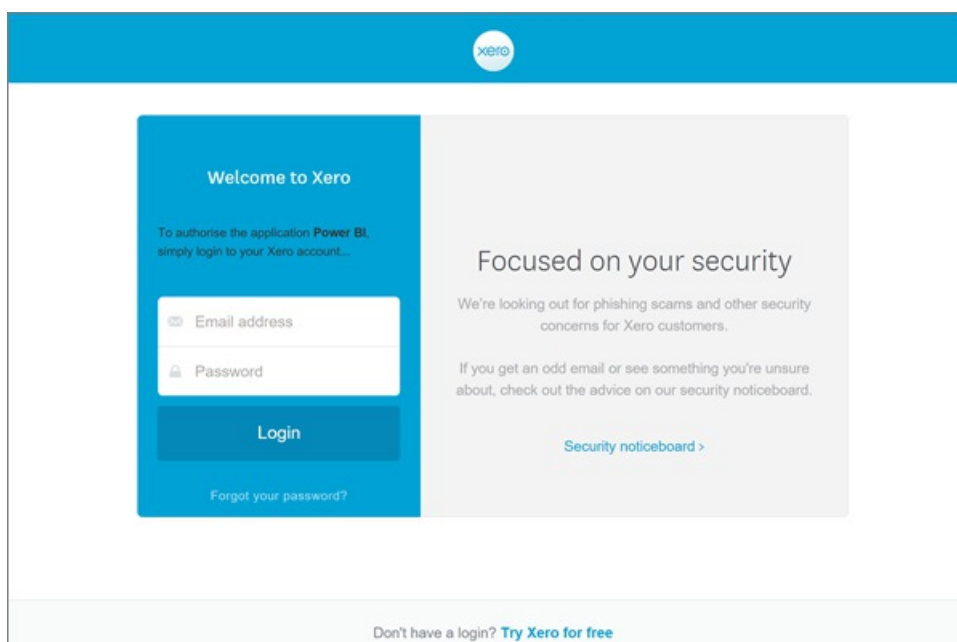
Configure Xero

Need help entering this information? [Learn more](#)

Organisation Nickname Enter a nickname for the organisation associated with your Xero account. Anything will do. This is mostly just important to help users with multiple Xero organisations keep them all straight.

Next Cancel

4. Sign in with your Xero account.



The image shows the Xero login page. At the top, there is a blue header with the Xero logo. Below the header, the page is split into two main sections. On the left, there is a blue box with the text "Welcome to Xero" and "To authorise the application Power BI, simply login to your Xero account...". Below this text are two input fields: "Email address" and "Password", followed by a "Login" button. At the bottom of this blue box is a link "Forgot your password?". On the right, there is a grey box with the text "Focused on your security" and "We're looking out for phishing scams and other security concerns for Xero customers." Below this text is another link "If you get an odd email or see something you're unsure about, check out the advice on our security noticeboard." and a link "Security noticeboard >". At the bottom of the page, there is a footer with the text "Don't have a login? [Try Xero for free](#)".

5. Now that your credentials are updated, let's make sure the refresh schedule is set to run daily. Check that by clicking the ellipsis (...) next to your Xero dataset, then clicking **Schedule refresh** again.

◀ Schedule Refresh

Keep your data up to date

Yes

Refresh frequency

Daily

Time zone

(UTC) Coordinated Universal Time

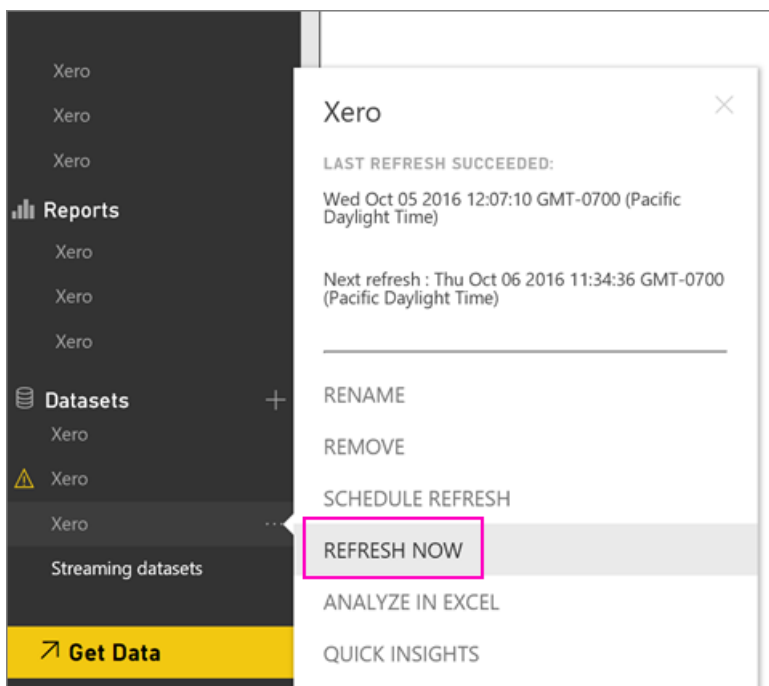
Time

[Add another time](#)

Send refresh failure notification email to me

Apply Discard

6. You can also choose to refresh the dataset immediately. Click the ellipsis (...) next to your Xero dataset, then click **Refresh now**.



If you are still having refresh issues, please don't hesitate to reach out to us at <http://support.powerbi.com>

To learn more about the Xero content pack for Power BI, please visit the [Xero content pack help page](#).

Next steps

- More questions? [Try the Power BI Community](#)

Get Power BI Desktop

1/25/2018 • 4 min to read • [Edit Online](#)

Power BI Desktop lets you build advanced queries, models, and reports that visualize data. With **Power BI Desktop**, you can build data models, create reports, and share your work by publishing to the Power BI service. **Power BI Desktop** is a free download.

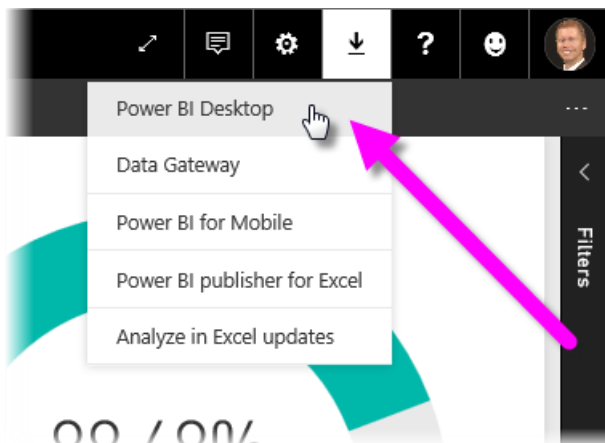
You can get **Power BI Desktop** in two ways, each of which is described in the following sections:

- **Download** directly (an MSI package you download and install on your computer)
- Install as an app from the **Windows Store**

Either approach will get the latest version of **Power BI Desktop** onto your computer, but there are a few differences worth noting, which are described in the following sections.

Download Power BI Desktop

To download the most recent version of **Power BI Desktop**, you can select the download icon from the upper right corner of the Power BI service, and select **Power BI Desktop**.

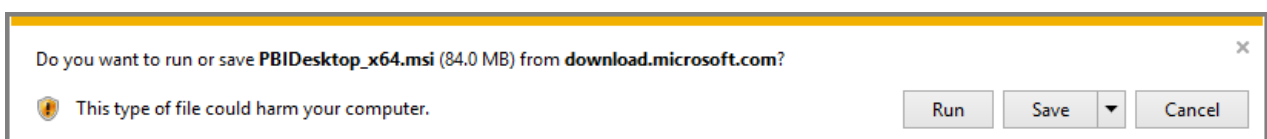


You can also download the latest version of Power BI Desktop from the following download page:

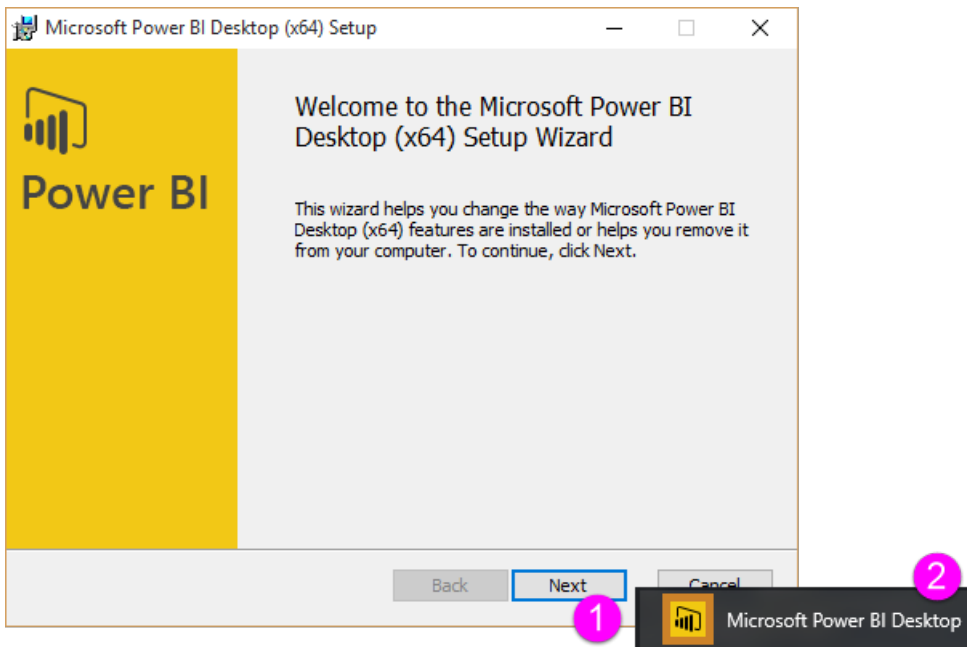
- [Power BI Desktop download](#) (both 32- and 64-bit versions).

Download

Regardless of which way you choose to download, once **Power BI Desktop** is downloaded you're prompted to run the installation file:



Power BI Desktop is installed as an application, and runs on your desktop.



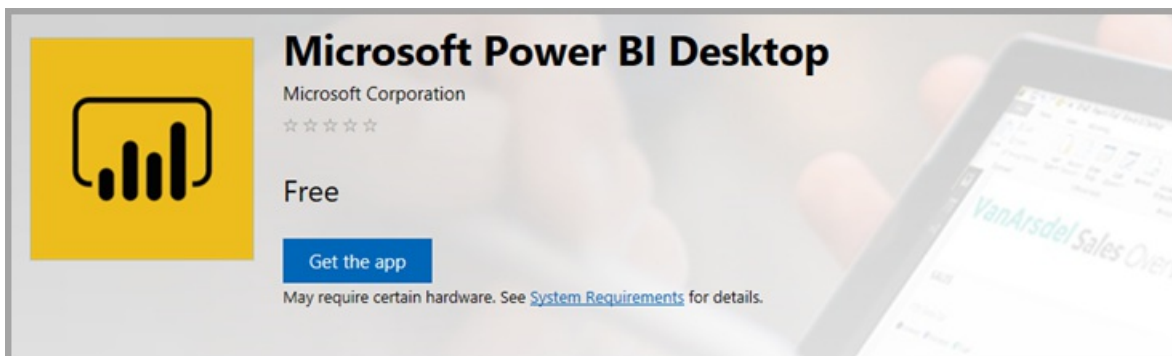
NOTE

Installing the downloaded (MSI) version, and the **Windows Store** version of **Power BI Desktop** on the same computer (sometimes referred to as a *side-by-side* installation) is not supported.

Install as an app from the Windows Store

You can also get **Power BI Desktop** from the Windows Store, using the following link:

- Install **Power BI Desktop** from the **Windows Store**



There are a few advantages to getting **Power BI Desktop** from the Windows Store:

- **Automatic updates** - Windows downloads the latest version automatically in the background as soon as it's available, so your version will always be up to date.
- **Smaller downloads** - The **Windows Store** ensures only components that have changed in each update are downloaded to your machine, resulting in smaller downloads for each update.
- **Admin privilege is not required** - when you download the MSI directly and install, you must be an administrator for the installation to complete successfully. When you get **Power BI Desktop** from the Windows Store, admin privilege is *not* required.
- **IT roll-out enabled** - the **Windows Store** version can more easily be deployed, or *rolled-out*, to everyone in your organization, and can make **Power BI Desktop** available through the **Microsoft Store for Business**.
- **Language detection** - the **Windows Store** version includes all supported languages, and checks which language is being used on the computer each time it is launched. This also affects the localization of models created in **Power BI Desktop**; for example, built-in date hierarchies will match the language that **Power BI**

Desktop was using when the .pbix file was created.

There are a few consideration and limitations for installing **Power BI Desktop** from the Windows Store, which include the following:

- If you use the SAP connector, you may need to move your SAP driver files to the `Windows\System32` folder.

NOTE

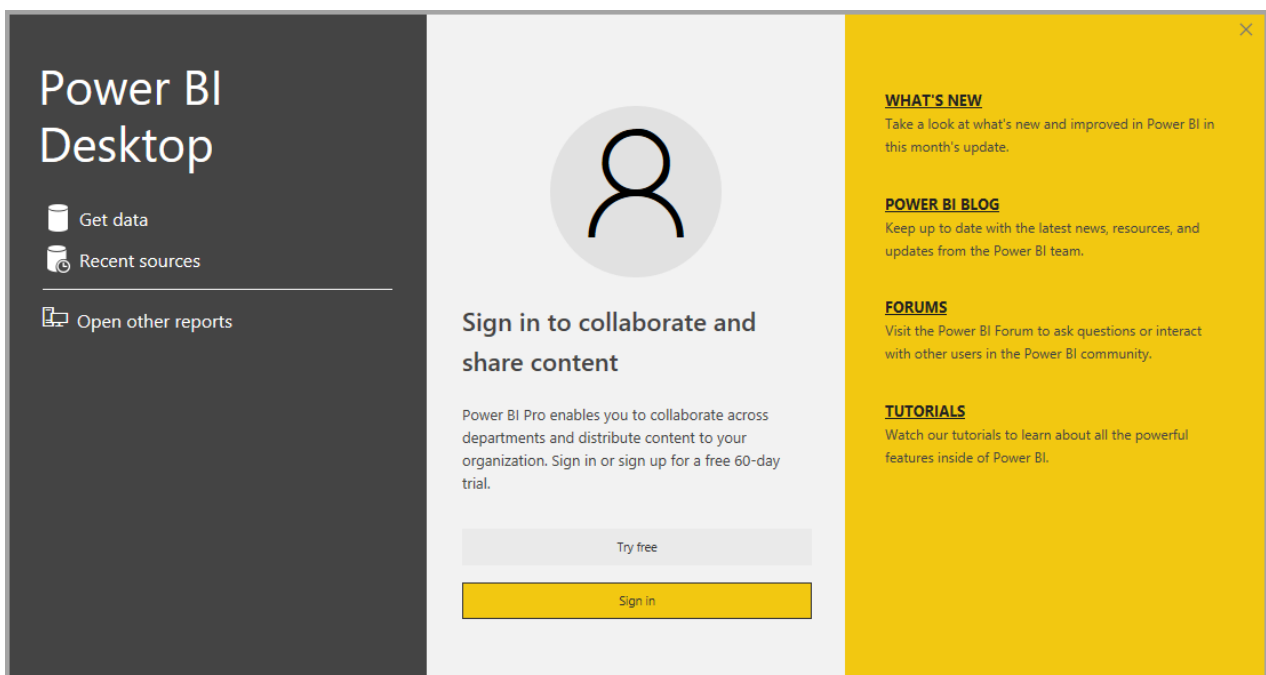
Installing the downloaded (MSI) version, and the **Windows Store** version of **Power BI Desktop** on the same computer (sometimes referred to as a *side-by-side* installation) is not supported.

NOTE

The Power BI Report Server version of **Power BI Desktop** is a separate and different installation from the versions discussed in this article. For information about the Report Server version of **Power BI Desktop**, see the [Quickstart: Create a Power BI report for Power BI Report Server](#) article.

Using Power BI Desktop

When you launch **Power BI Desktop**, a *Welcome* screen is displayed.



If this is your first time using **Power BI Desktop** (if the installation is not an upgrade), you'll be prompted to fill out a form and answer a few questions, or sign in to the **Power BI service** before you'll be able to proceed.

From there, you can begin creating data models or reports, then share them with others on the Power BI service. Check out the **More information** links at the end of this article for links to guides that can help you get started using **Power BI Desktop**.

Minimum requirements

The following list provides the minimum requirements to run **Power BI Desktop**:

- Windows 7 / Windows Server 2008 R2, or later
- .NET 4.5
- Internet Explorer 9 or later

- **Memory (RAM):** At least 1 GB available, 1.5 GB or more recommended.
- **Display:** At least 1440x900 or 1600x900 (16:9) recommended. Lower resolutions such as 1024x768 or 1280x800 are not recommended, as certain controls (such as closing the startup screen) display beyond those resolutions.
- **Windows Display settings:** If your display settings are set to change the size of text, apps, and other items to more than 100%, you may not be able to see certain dialogs that must be closed or responded to in order to proceed using **Power BI Desktop**. If you encounter this issue, check your **Display settings** by going to **Settings > System > Display** in Windows, and use the slider to return display settings to 100%.
- **CPU:** 1 gigahertz (GHz) or faster x86- or x64-bit processor recommended.

Next steps

Once you get **Power BI Desktop** installed, the following content can help you get up and running quickly:

- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

Getting started with Power BI Desktop

12/6/2017 • 18 min to read • [Edit Online](#)

Welcome to the **Power BI Desktop Getting Started Guide**. This short tour of Power BI Desktop gets you acquainted with how it works, demonstrates what it can do, and accelerates your ability to build robust data models — along with amazing reports — that amplify your business intelligence efforts.

Prefer to watch instead of read? Feel free to [take a look at our getting started video](#). And if you want to follow along with the video with matching sample data, you can [download this sample Excel workbook](#).



Power BI Desktop lets you create a collection of queries, data connections, and reports that can easily be shared with others. Power BI Desktop integrates proven Microsoft technologies – the powerful Query engine, data modeling, and visualizations – and works seamlessly with the online **Power BI service**.

With the combination of **Power BI Desktop** (where analysts and others can create powerful data connections, models and reports) and the **Power BI service** (where Power BI Desktop reports can be shared so users can view and interact with them), new insights from the world of data are easier to model, build, share, and extend.

Data analysts will find Power BI Desktop a powerful, flexible, and a highly accessible tool to connect with and shape the world of data, build robust models, and craft well-structured reports.

How to use this guide

You can use this guide in a couple of ways – scan it for a quick overview, or read through each section for a strong understanding of how Power BI Desktop works.

If you're in a hurry you can do a visual sweep of this guide in just a couple minutes, and come away with a good sense of how Power BI Desktop operates, and how to use it. Most of this guide consists of screens that visually show how Power BI Desktop works.

For a more thorough understanding you can read through each section, perform the steps, and walk away with your own Power BI Desktop file that's ready to post onto the **Power BI** service, and share with others.

NOTE

There is also a separate and specialized version of **Power BI** called **Power BI Report Server**, which is for customers who need their data and reporting to remain on-premises. For use with that specialized version, there's also a separate and specialized version of **Power BI Desktop** called **Power BI Desktop for Power BI Report Server**, which works only with the Report Server version of Power BI. This article describes the standard **Power BI Desktop**.

How Power BI Desktop works

With Power BI Desktop, you *connect to data* (usually multiple data sources), *shape that data* (with queries that build insightful, compelling data models), and use that model to *create reports* (which others can leverage, build upon, and share).

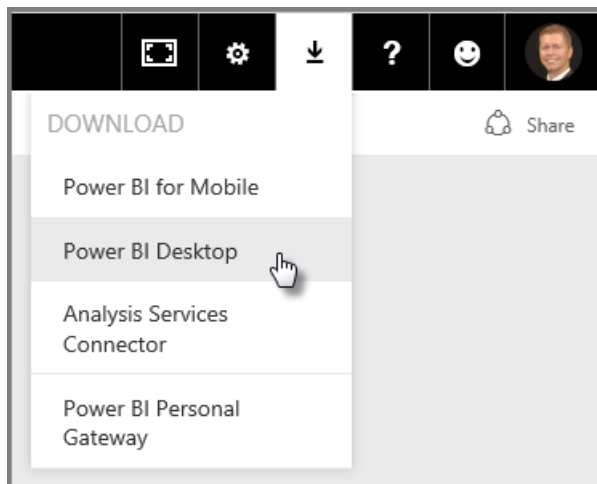
When the steps are completed to your satisfaction – connect, shape, and report – you can save that work in Power BI Desktop file format, which is the .pbix extension. Power BI Desktop files can be shared like any other file, but the most compelling way to share Power BI Desktop files is to upload them (share them) on the **Power BI service**.

Power BI Desktop centralizes, simplifies, and streamlines what can otherwise be a scattered, disconnected, and arduous process of designing and creating business intelligence repositories and reports.

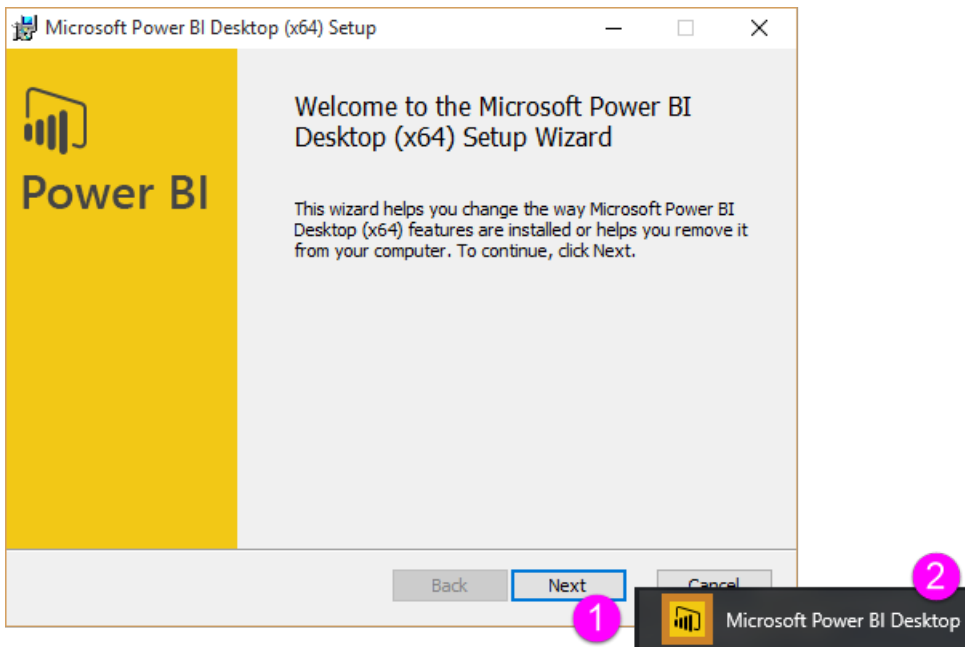
Ready to give it a try? Let's get started.

Install and run Power BI Desktop

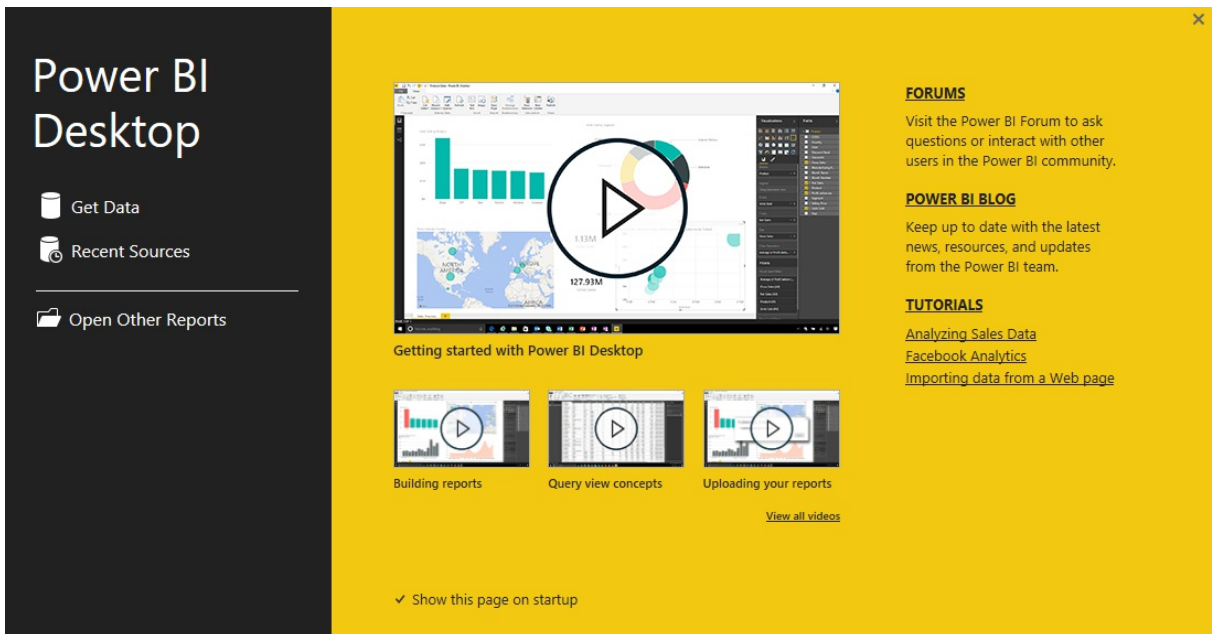
You can download Power BI Desktop from the **Power BI** service, by selecting the **gear** icon, then select **Power BI Desktop**.



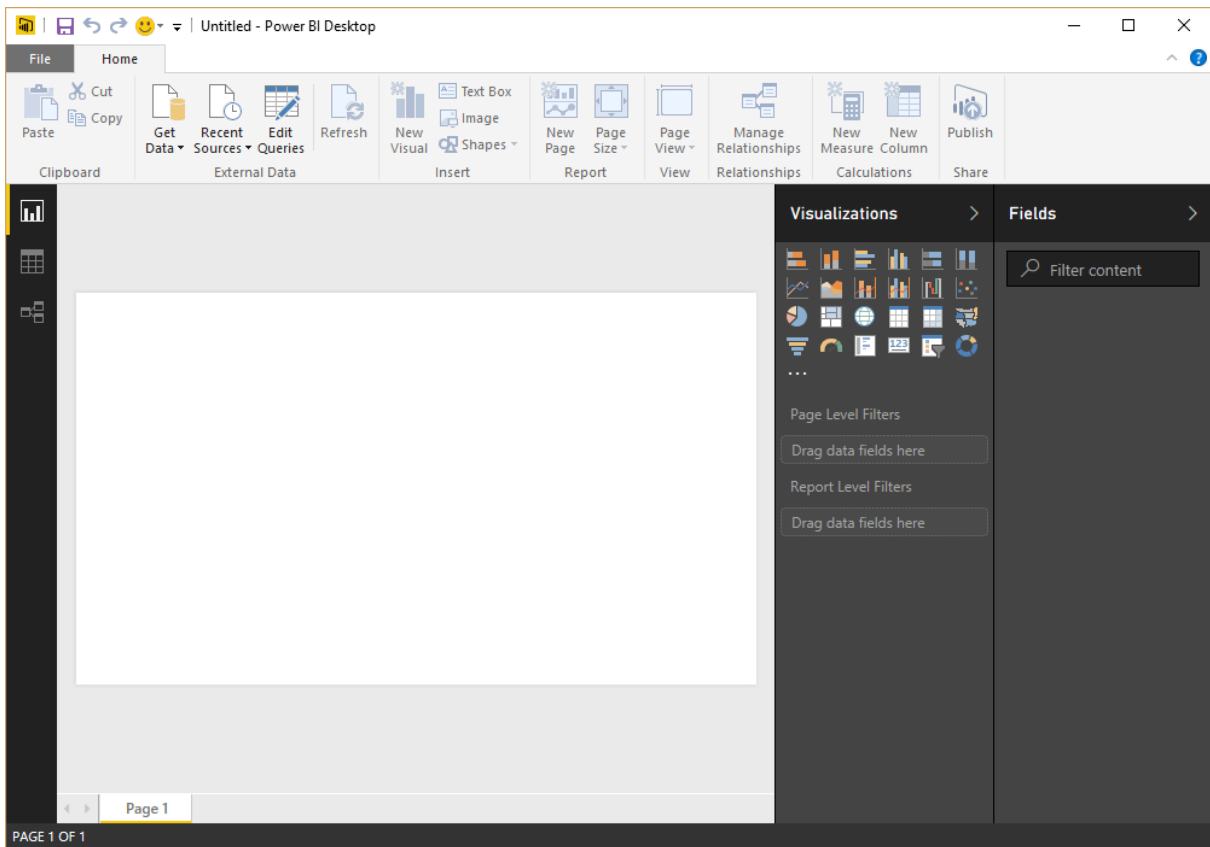
Power BI Desktop is installed as an application, and runs on your desktop.



When you run Power BI Desktop, a *Welcome* screen is displayed.

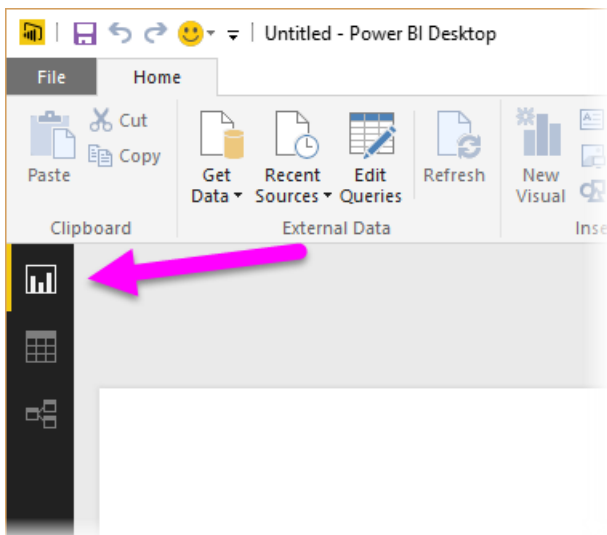


You can **Get Data**, see **Recent Sources**, or **Open Other Reports** directly from the *Welcome* screen (from the links in the left pane). If you close the screen (select the **x** in the top right corner), the **Report** view of Power BI Desktop is displayed.



There are three views in Power BI Desktop: **Report** view, **Data** view, and **Relationships** view. Power BI Desktop also includes **Query Editor**, which opens in a separate window. In **Query Editor**, you can build queries and transform data, then load that refined data model into Power BI Desktop, and create reports.

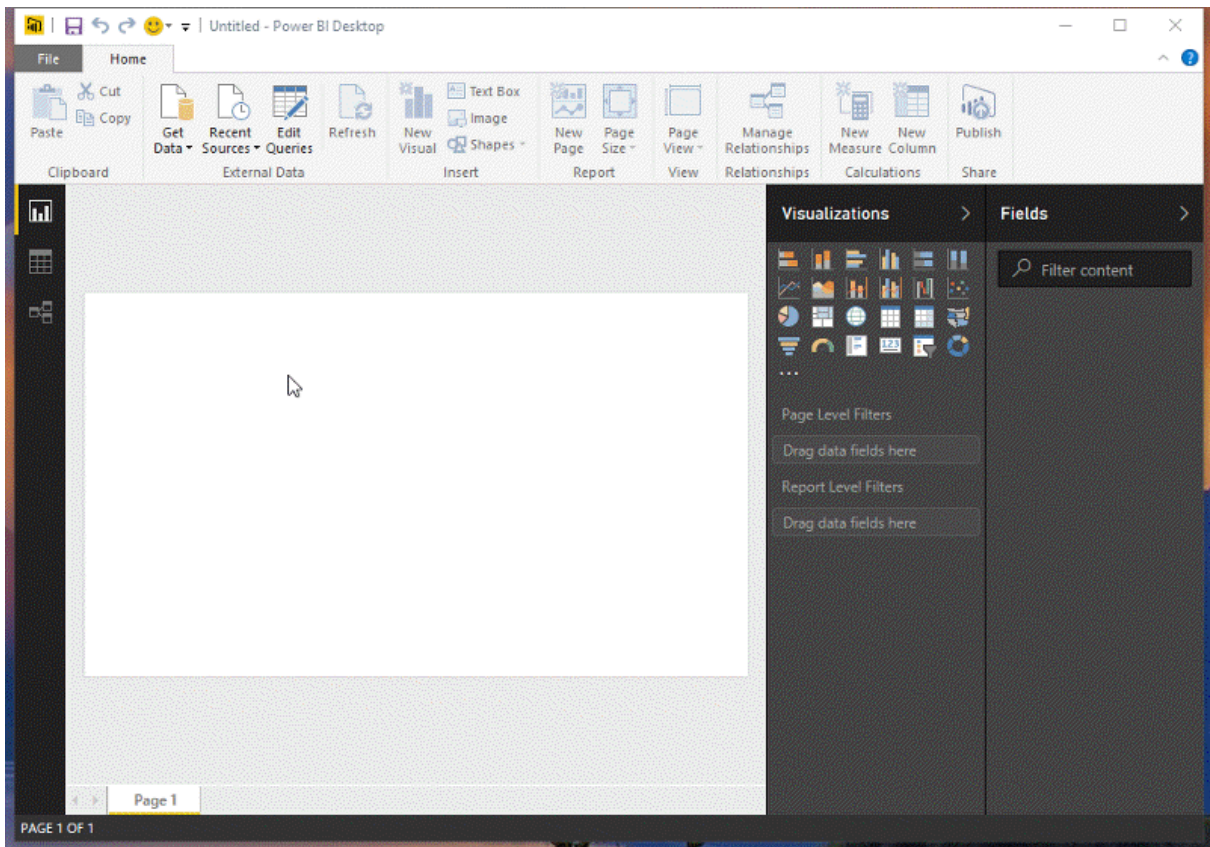
The following screen shows the three view icons along the left of Power BI Desktop: **Report**, **Data**, and **Relationships**, from top to bottom. The currently displayed view is indicated by the yellow bar along the left. In this case, **Report** view is currently displayed. You can change views by selecting any of those three icons.



With Power BI Desktop installed you're ready to connect to data, shape data, and build reports (usually in that order). In the next few sections, we take a tour through each in turn.

Connect to data

With Power BI Desktop installed, you're ready to connect to the ever expanding world of data. There are *all sorts* of data sources available in the Query window. The following image shows how to connect to data, by selecting the **Home** ribbon, then **Get Data > More**.



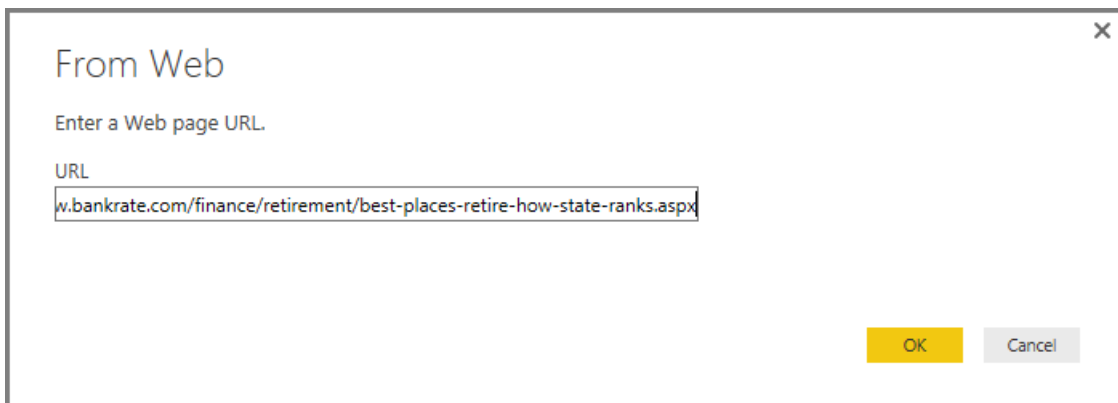
For this quick tour, we'll connect to a couple different **Web** data sources.

Imagine you're retiring – you want to live where there's lots of sunshine, preferable taxes, and good health care – or perhaps you're a data analyst, and you want that information to help your customers. For example, perhaps you want to help your sunglasses retailer target sales where the sun shines most frequently.

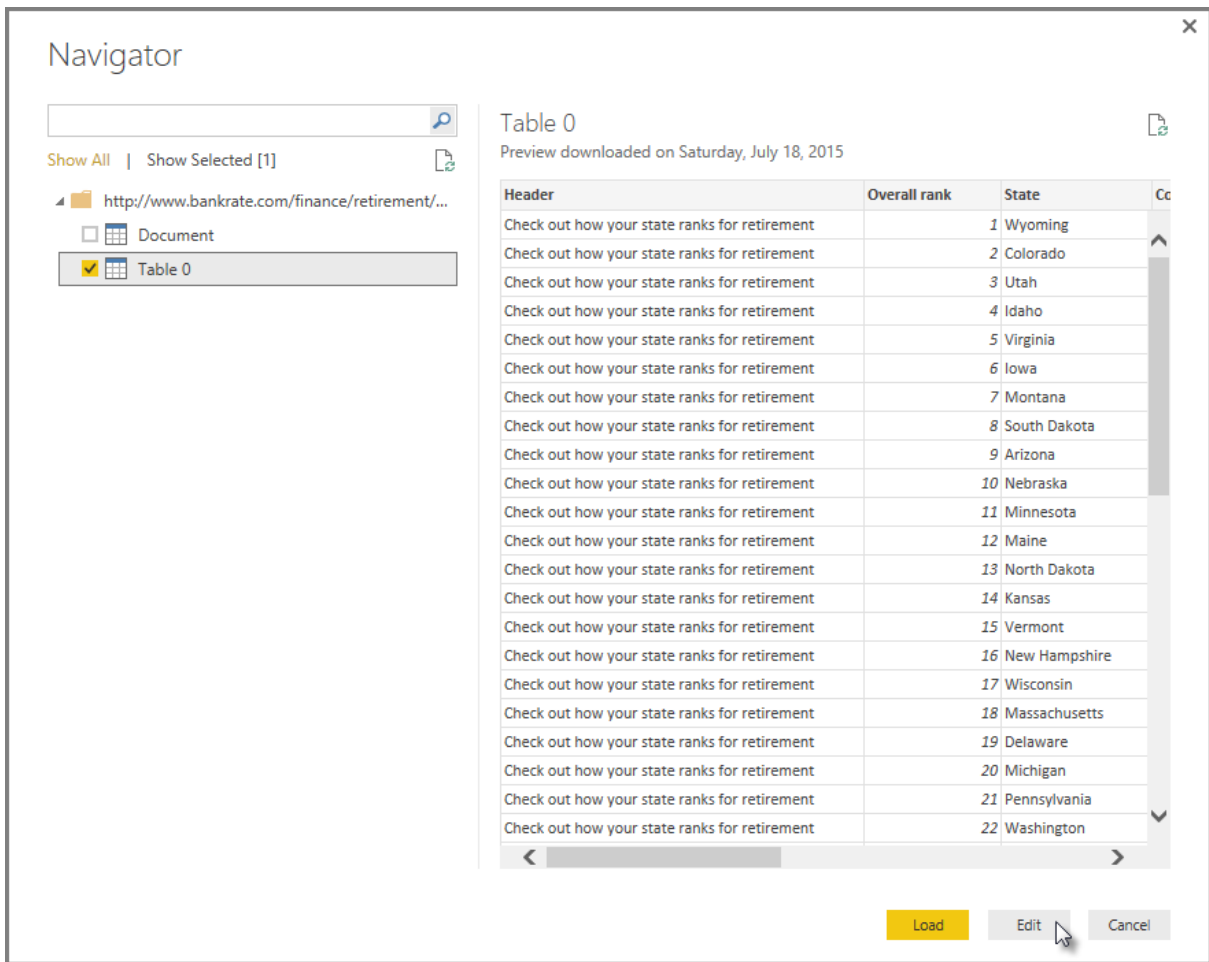
Either way, the following Web resource has interesting data about those topics, and more:

<http://www.bankrate.com/finance/retirement/best-places-retire-how-state-ranks.aspx>

Select **Get Data** > **Web** and paste the address.

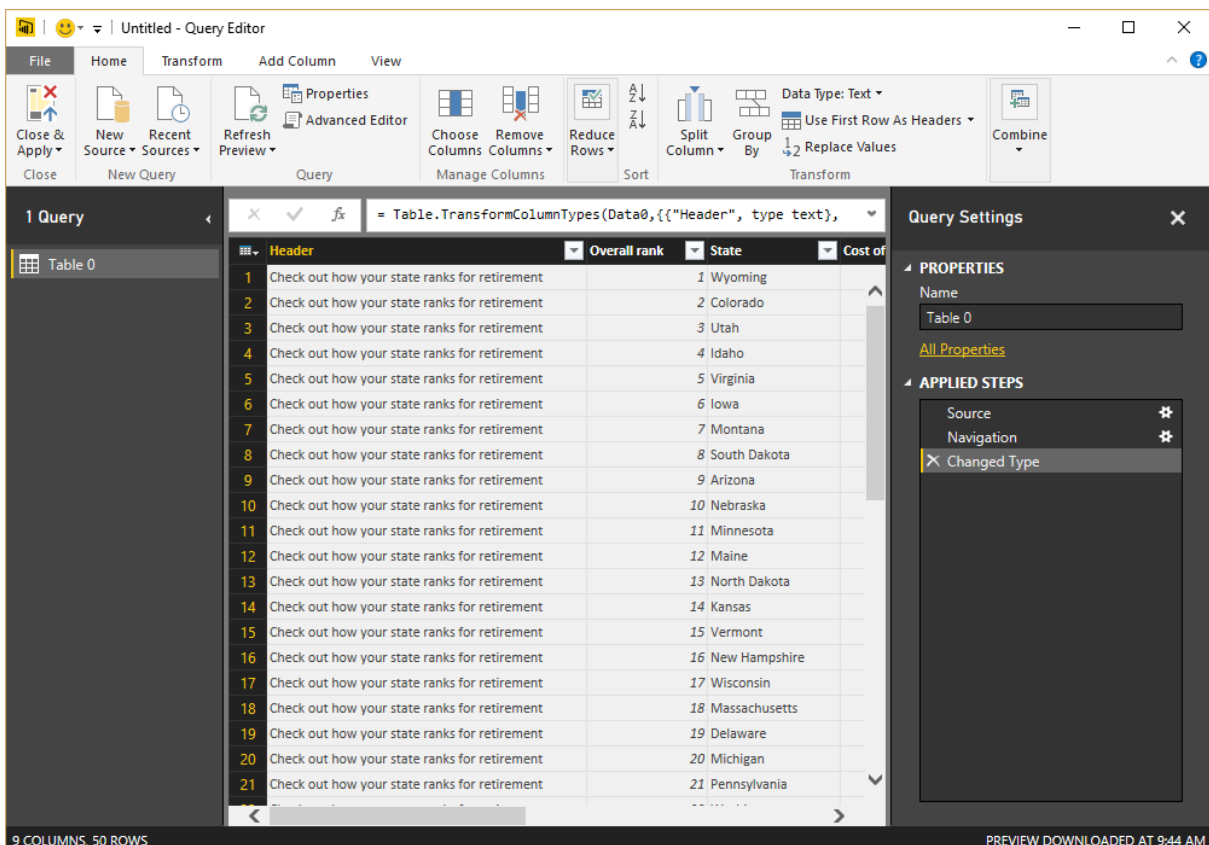


When you select **OK**, the **Query** functionality of Power BI Desktop goes to work. Query contacts the Web resource, and the **Navigator** window returns what it found on that Web page. In this case, it found a table (*Table 0*) and the overall Web Document. We're interested in the table, so we select it from the list. The **Navigator** window displays a preview.



At this point we can edit the query before loading the table, by selecting **Edit** from the bottom of the window, or we can load the table.

When we select **Edit**, Query Editor launches and a representative view of the table is presented. The **Query Settings** pane is displayed (if it's not, you can select **View** from the ribbon, then **Show > Query Settings** to display the **Query Settings** pane). Here's what that looks like.



For more information about connecting to data, see [Connect to Data in Power BI Desktop](#).

In the next section, we adjust the data so it meets our needs. The process of adjusting connected data is called *shaping* data.

Shape and combine data

Now that we've connected to a data source, we need to adjust the data to meet our needs. Sometimes adjusting means *transforming* the data – such as renaming columns or tables, changing text to numbers, removing rows, setting the first row as headers, and so on.

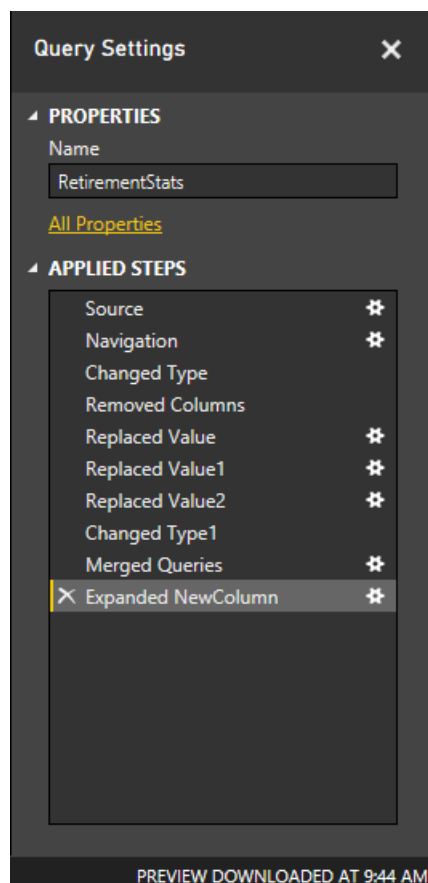
The Query editor in Power BI Desktop makes ample use of right-click menus, in addition to having tasks available on the ribbon. Most of what you can select in the **Transform** ribbon is also available by right-clicking an item (such as a column) and choosing from the menu that appears.

Shape data

When you shape data in the **Query Editor**, you're providing step-by-step instructions (that **Query Editor** carries out for you) to adjust the data as **Query Editor** loads and presents it. The original data source is not affected; only this particular view of the data is adjusted, or *shaped*.

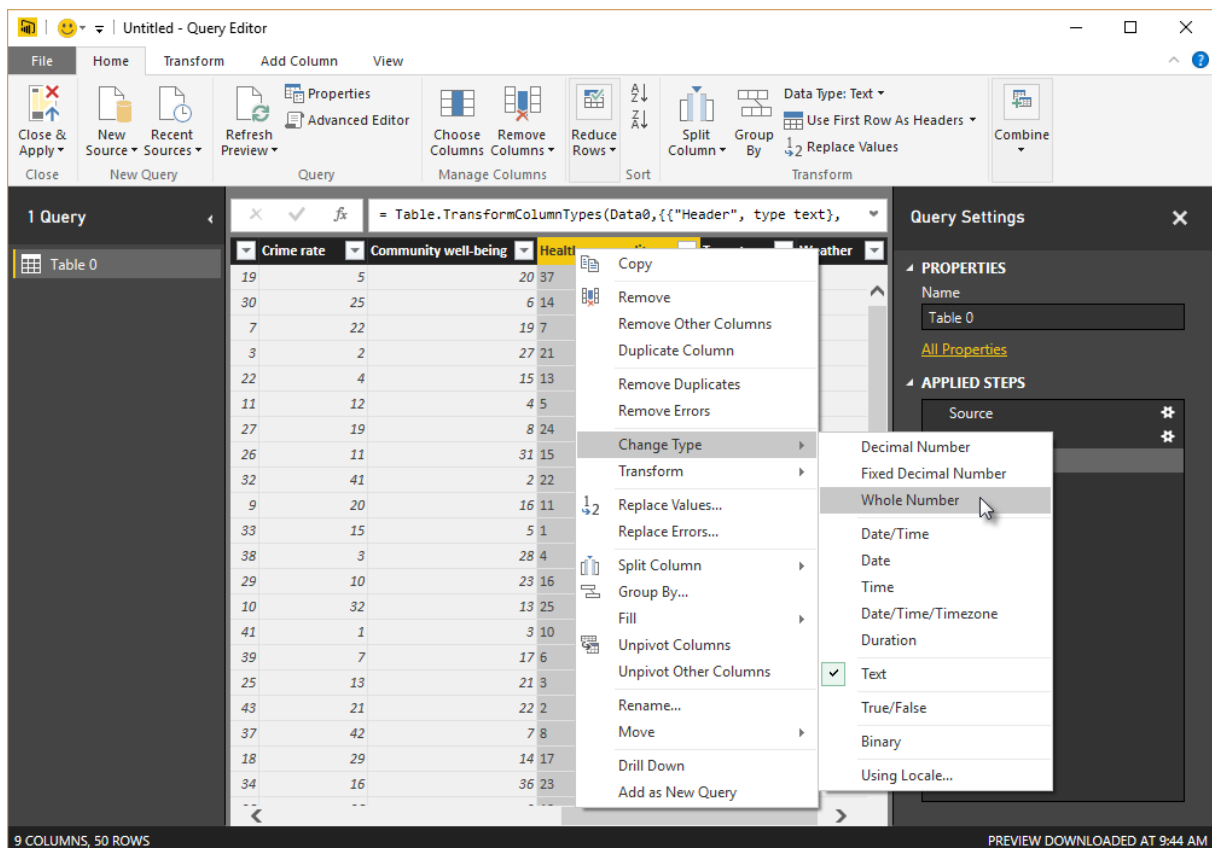
The steps you specify (such as rename a table, transform a data type, or delete columns) are recorded by **Query Editor**, and each time this query connects to the data source those steps are carried out so that the data is always shaped the way you specify. This process occurs whenever you use the query in Power BI Desktop, or for anyone who uses your shared query, such as in the **Power BI** service. Those steps are captured, sequentially, in the **Query Settings** pane under **Applied Steps**.

The following image shows the **Query Settings** pane for a query that has been shaped – we'll go through each of those steps in the next few paragraphs.

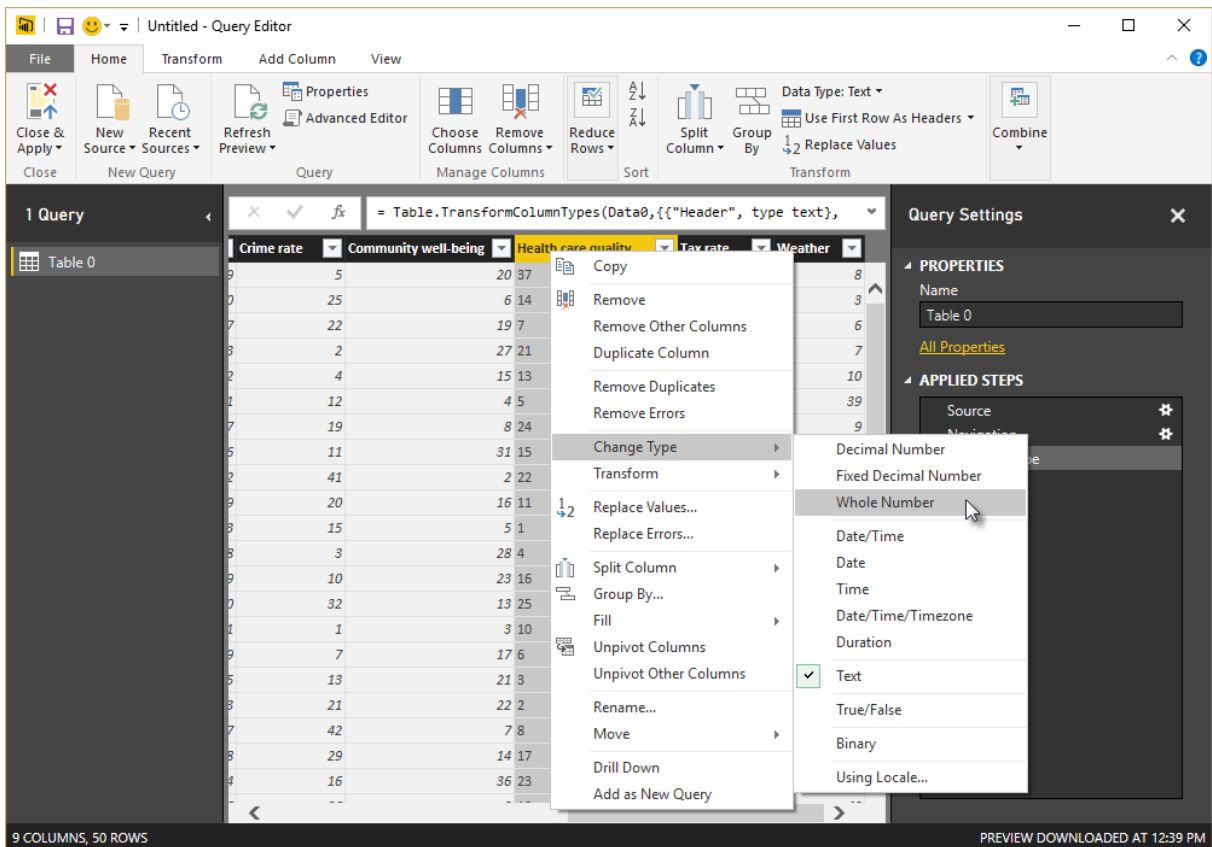


Let's get back to our retirement data, which we found by connecting to a Web data source, and shape that data to fit our needs.

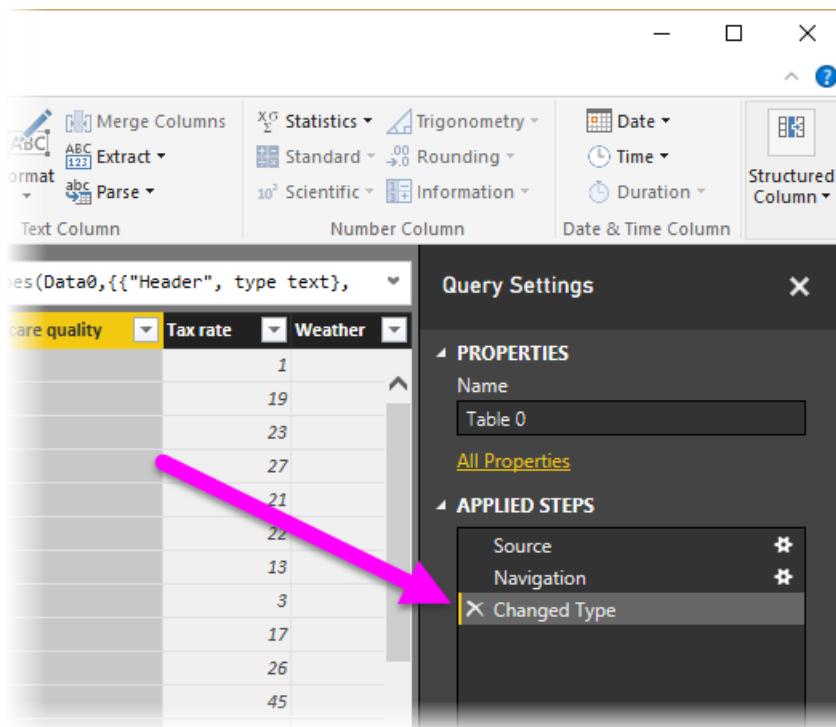
For starters, most ratings were brought into **Query Editor** as whole numbers, but not all of them (one column contained text and numbers, so it wasn't automatically converted). We need the data to be numbers. No problem – just right-click the column header, and select **Change Type > Whole Number** to change the data type. If we needed to choose more than one column, we could first select a column then hold down **SHIFT**, select additional adjacent columns, and then right-click a column header to change all selected columns. You can also use **CTRL** to select non-adjacent columns.



You can also change, or *transform*, those columns from text to header by using the **Transform** ribbon. Here's the **Transform** ribbon, with an arrow pointing toward the **Data Type** button, which lets you transform the current data type to another.



Note that in **Query Settings**, the **Applied Steps** reflect the changes that were made. If I want to remove any step from the shaping process, I simply select that step, and then select the **X** to the left of the step.



We need to make a few more changes to get the query where we want it:

- *Remove the first column* – we don't need it, it just includes redundant rows that say "Check out how your state ranks for retirement" which is an artifact of this being a Web based table
- *Fix a few Errors* – on the Web page, one column had text mixed in with the numbers (some states tied in one category). That works well in the website, but not for our data analysis. It's easy (in this case) to fix, and shows some cool features and capabilities of **Query Editor** and its **Applied Steps**
- *Change the Table Name* – that **Table 0** is not a useful descriptor, but changing it simple

Each of these steps is demonstrated in [Shape and Combine Data in Power BI Desktop](#). Feel free to check out that page, or keep going in this document to see what you would do next. The next section picks up after the changes above are applied.

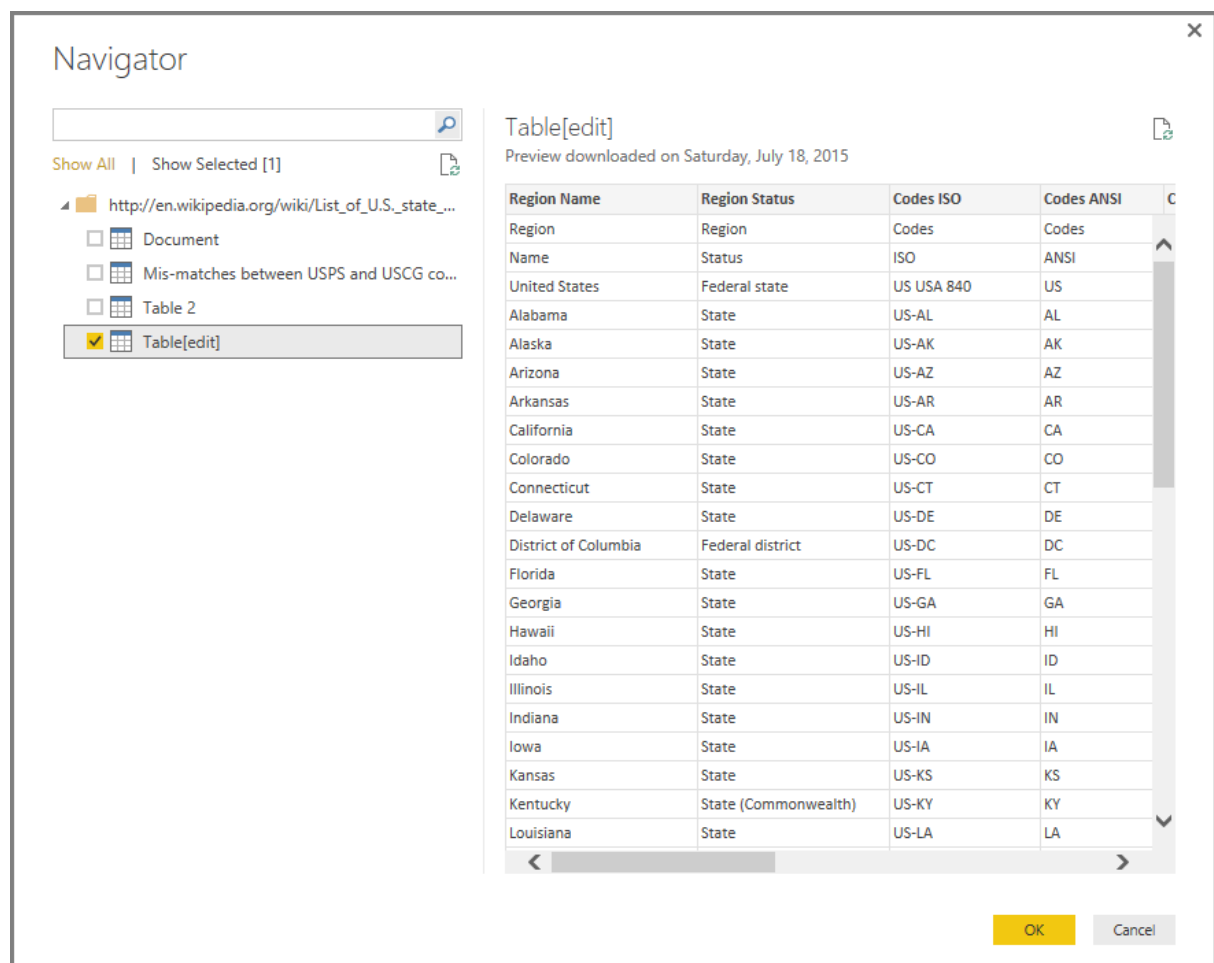
Combine data

That data about various states is interesting, and will be useful for building additional analysis efforts and queries. But there's one problem: most data out there uses a two-letter abbreviation for state codes, not the full name of the state. We need some way to associate state names with their abbreviations.

We're in luck: there's another public data source that does just that, but it needs a fair amount of shaping before we can connect it to our retirement table. Here's the Web resource for state abbreviations:

http://en.wikipedia.org/wiki/List_of_U.S._state_abbreviations

From the **Home** ribbon in **Query Editor**, we select **Get Data > Web** and type the address, select **OK**, and the **Navigator** window shows what it found on that Web page.



The screenshot shows the Power BI Navigator window. On the left, a search bar contains the URL http://en.wikipedia.org/wiki/List_of_U.S._state_abbreviations. Below the search bar, there are four items listed: "Document", "Mis-matches between USPS and USCG co...", "Table 2", and "Table[edit]". The "Table[edit]" item is selected with a checkmark. On the right, the "Table[edit]" preview is shown, displaying a table of US state abbreviations. The table has five columns: "Region Name", "Region Status", "Codes ISO", "Codes ANSI", and "C". The data rows list states from "United States" down to "Louisiana".

Region Name	Region Status	Codes ISO	Codes ANSI	C
Region	Region	Codes	Codes	
Name	Status	ISO	ANSI	
United States	Federal state	US USA 840	US	
Alabama	State	US-AL	AL	
Alaska	State	US-AK	AK	
Arizona	State	US-AZ	AZ	
Arkansas	State	US-AR	AR	
California	State	US-CA	CA	
Colorado	State	US-CO	CO	
Connecticut	State	US-CT	CT	
Delaware	State	US-DE	DE	
District of Columbia	Federal district	US-DC	DC	
Florida	State	US-FL	FL	
Georgia	State	US-GA	GA	
Hawaii	State	US-HI	HI	
Idaho	State	US-ID	ID	
Illinois	State	US-IL	IL	
Indiana	State	US-IN	IN	
Iowa	State	US-IA	IA	
Kansas	State	US-KS	KS	
Kentucky	State (Commonwealth)	US-KY	KY	
Louisiana	State	US-LA	LA	

We select **Table[edit]** because it includes the data we want, but it's going to take quite a bit of shaping to pare that table's data down. Each of these steps is also demonstrated in [Shape and Combine Data in Power BI Desktop](#). To summarize those steps, here's what we do:

We select **Edit**, then:

- *Remove the top two rows* – they're a result of the way that Web page's table was created, and we don't need them.
- *Remove the bottom 26 rows* – they're all the territories, which we don't need to include.
- *Filter out Washington DC* – the retirement stats table doesn't include DC, so we'll exclude it from our list.

- *Remove a few unneeded columns* – we only need the mapping of state to its official two-letter abbreviation, so we can remove the other columns.
- *Use the first row as headers* – since we removed the top three rows, the current top row is the header we want.

NOTE

This is a good time to point out that the *sequence* of applied steps in **Query Editor** is important, and can affect how the data is shaped. It's also important to consider how one step may impact another subsequent step; if you remove a step from the **Applied Steps**, subsequent steps may not behave as originally intended, because of the impact of the query's sequence of steps.

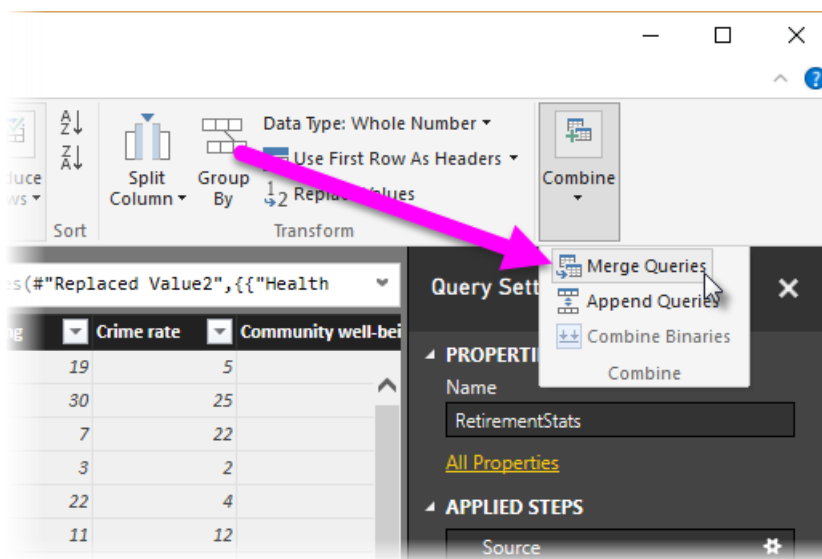
- *Rename the columns, and the table itself* – as usual, there are a couple ways to rename a column, you can choose whichever you prefer.

With the *StateCodes* table shaped, we can combine these two tables, or queries, into one; since the tables we now have are a result of the queries we applied to the data, they're often referred to as *queries*.

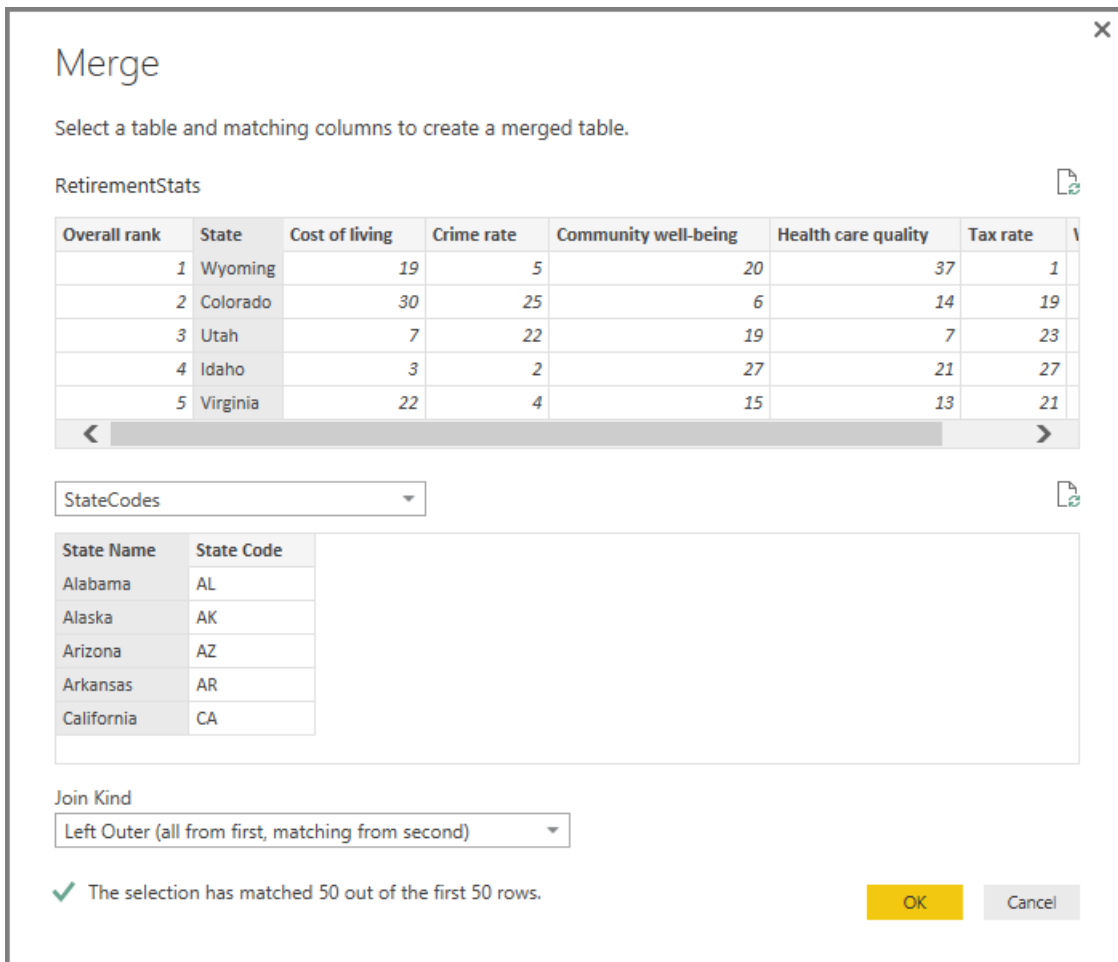
There are two primary ways of combining queries – *merging* and *appending*.

When you have one or more columns that you'd like to add to another query, you **merge** the queries. When you have additional rows of data that you'd like to add to an existing query, you **append** the query.

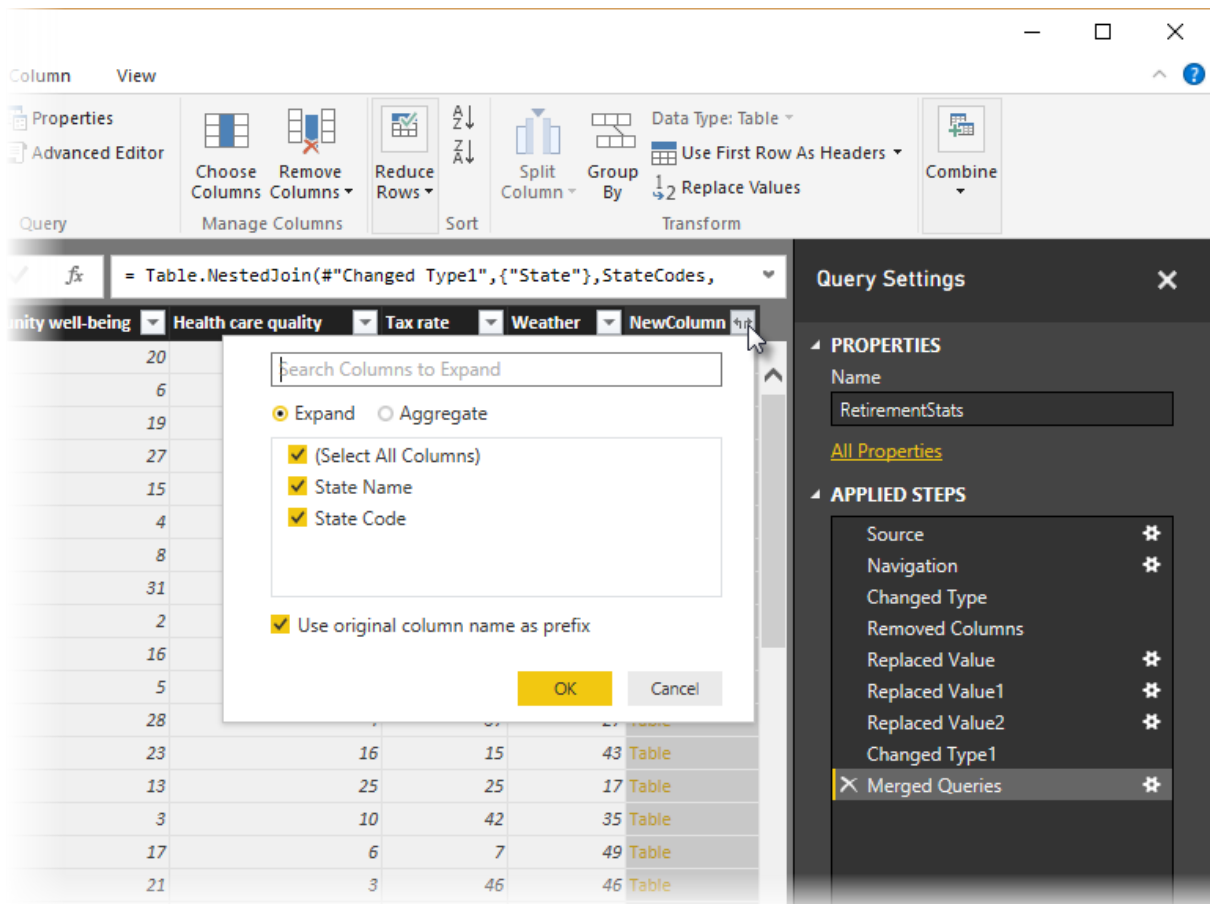
In this case we want to merge queries. To get started, we select the query *into which* we want the other query to merge, then select **Merge Queries** from the **Home** tab on the ribbon.



The **Merge** window appears, prompting us to select which table we'd like merged into the selected table, and then, the matching columns to use for the merge. Select *State* from the *RetirementStats* table (query), then select the *StateCodes* query (easy in this case, since there's only one other query – when you connect to many data sources, there are many queries to choose from). When we select the correct matching columns – *State* from *RetirementStats*, and *State Name* from *StateCodes* – the **Merge** window looks like the following, and the **OK** button is enabled.



A **NewColumn** is created at the end of the query, which is the contents of the table (query) that was merged with the existing query. All columns from the merged query are condensed into the **NewColumn**, but you can select to **Expand** the table, and include whichever columns you want. To expand the merged table, and select which columns to include, select the expand icon (⌵). The **Expand** window appears.



In this case, we only want the *State Code* column, so we select only that column and then select **OK**. We clear the checkbox from **Use original column name as prefix** because we don't need or want that; if we leave that selected, the merged column would be named *NewColumn.State Code* (the original column name, or *NewColumn*, then a dot, then the name of the column being brought into the query).

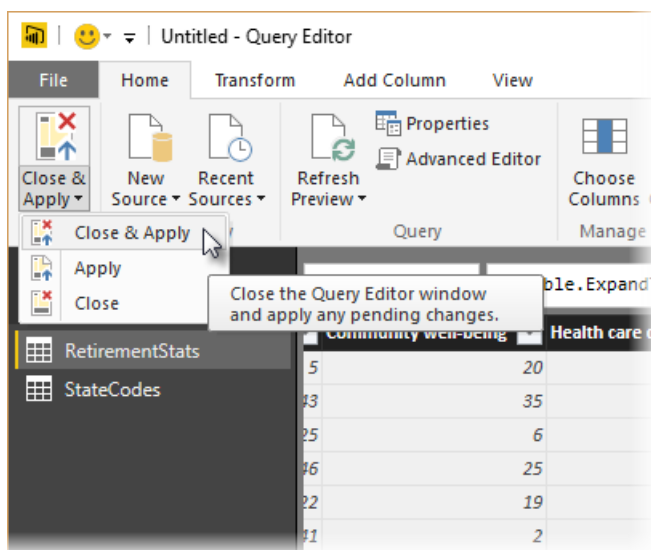
NOTE

Want to play around with how to bring in that *NewColumn* table? You can experiment a bit, and if you don't like the results, just delete that step from the **Applied Steps** list in the **Query Settings** pane; your query returns to the state prior to applying that **Expand** step. It's like a free do-over, which you can do as many times as you like until the expand process looks the way you want it.

We now have a single query (table) that combined two data sources, each of which has been shaped to meet our needs. This query can serve as a basis for lots of additional, interesting data connections – such as housing cost statistics, demographics, or job opportunities in any state.

For a more complete description of each of these shape and combine data steps, see [Shape and Combine Data in Power BI Desktop](#).

For now, we have enough data to create a few interesting reports, all within Power BI Desktop. Since this is a milestone let's save this Power BI Desktop file – we'll call it **Getting Started with Power BI Desktop**. To apply the changes in **Query Editor** and load them into Power BI Desktop, select **Close & Apply** from the **Home** ribbon.

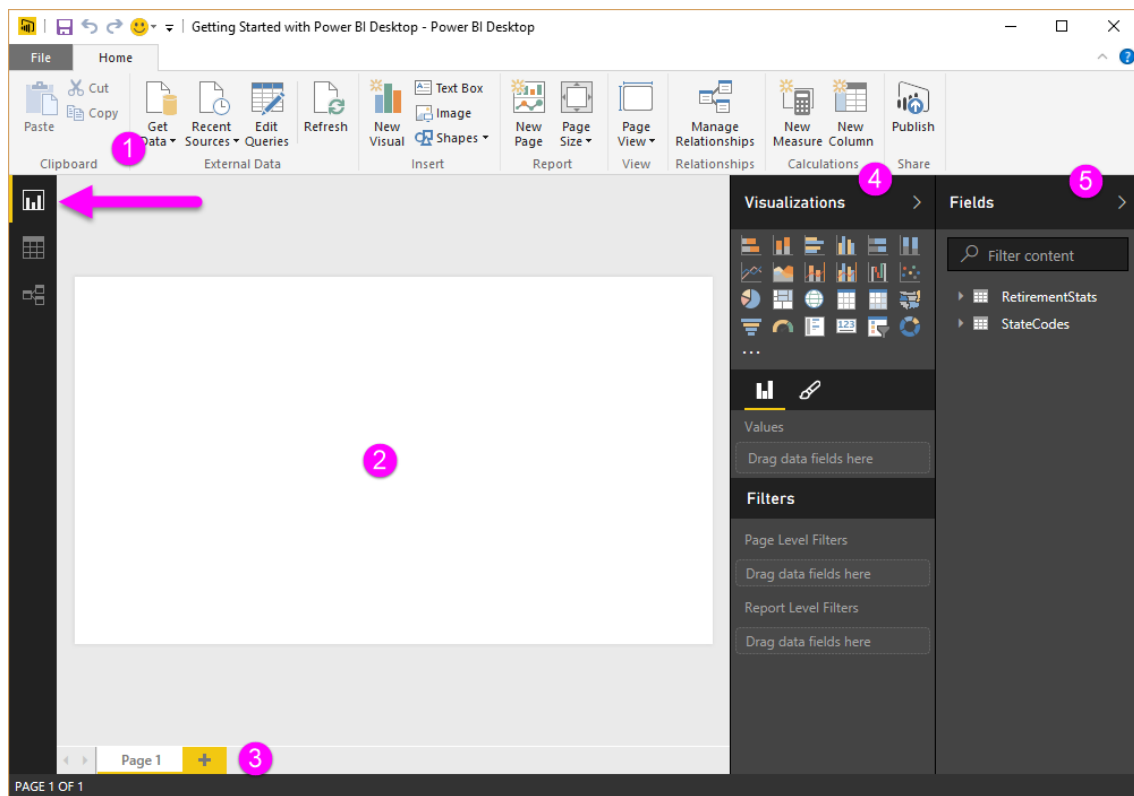


Build reports

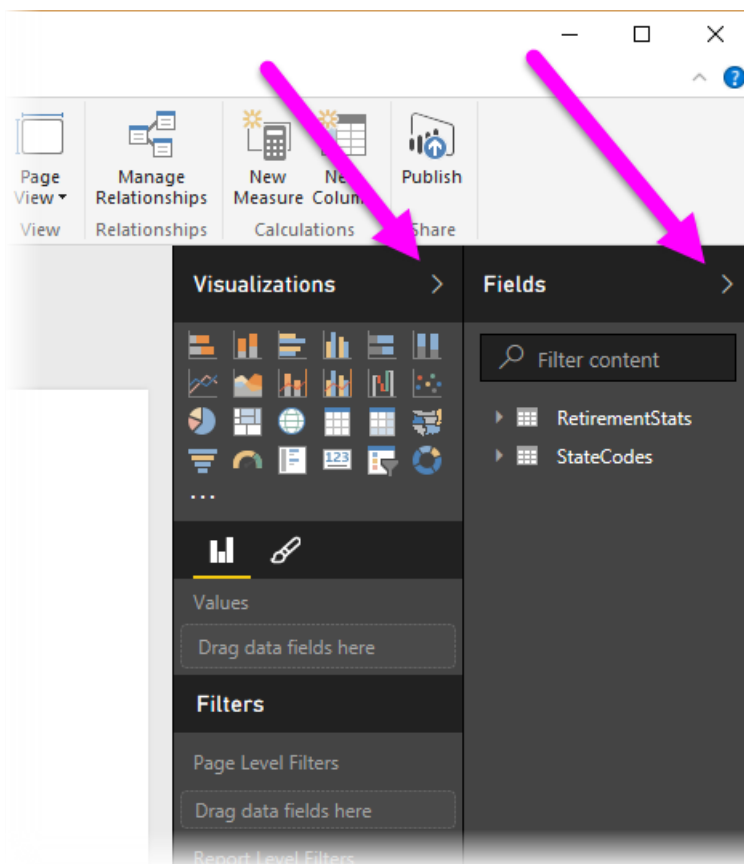
Additional changes can be made after the table is loaded, and you can reload a model to apply any changes you make. But for now this will do. In Power BI Desktop **Report** view, you can begin to build reports.

The **Report** view has five main areas:

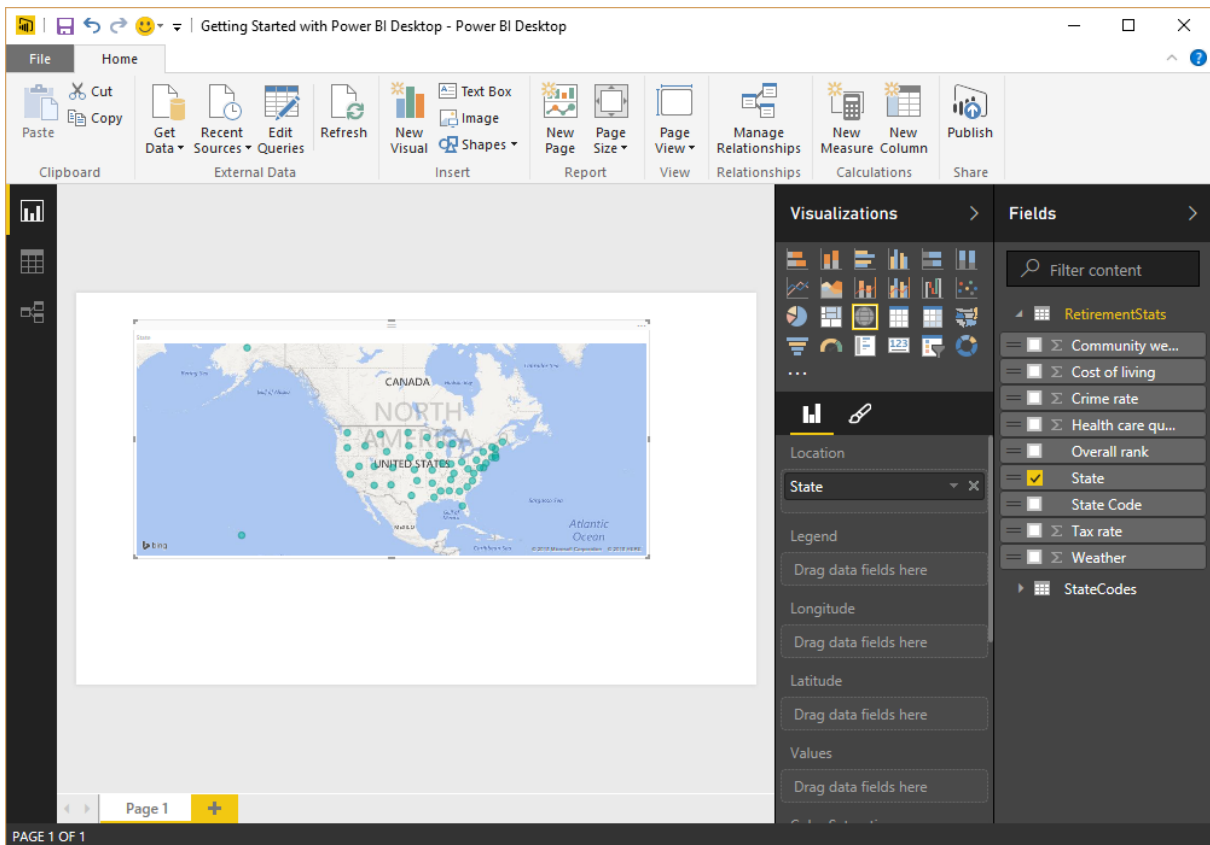
1. The ribbon, which displays common tasks associated with reports and visualizations
2. The **Report** view, or canvas, where visualizations are created and arranged
3. The **Pages** tab area along the bottom, which lets you select or add a report page
4. The **Visualizations** pane, where you can change visualizations, customize colors or axes, apply filters, drag fields, and more
5. The **Fields** pane, where query elements and filters can be dragged onto the **Report** view, or dragged to the **Filters** area of the **Visualizations** pane



The **Visualizations** and **Fields** pane can be collapsed by selecting the small arrow along the edge, providing more space in the **Report** view to build cool visualizations. When modifying visualizations, you'll also see these arrows pointing up or down, which means you can expand or collapse that section, accordingly.

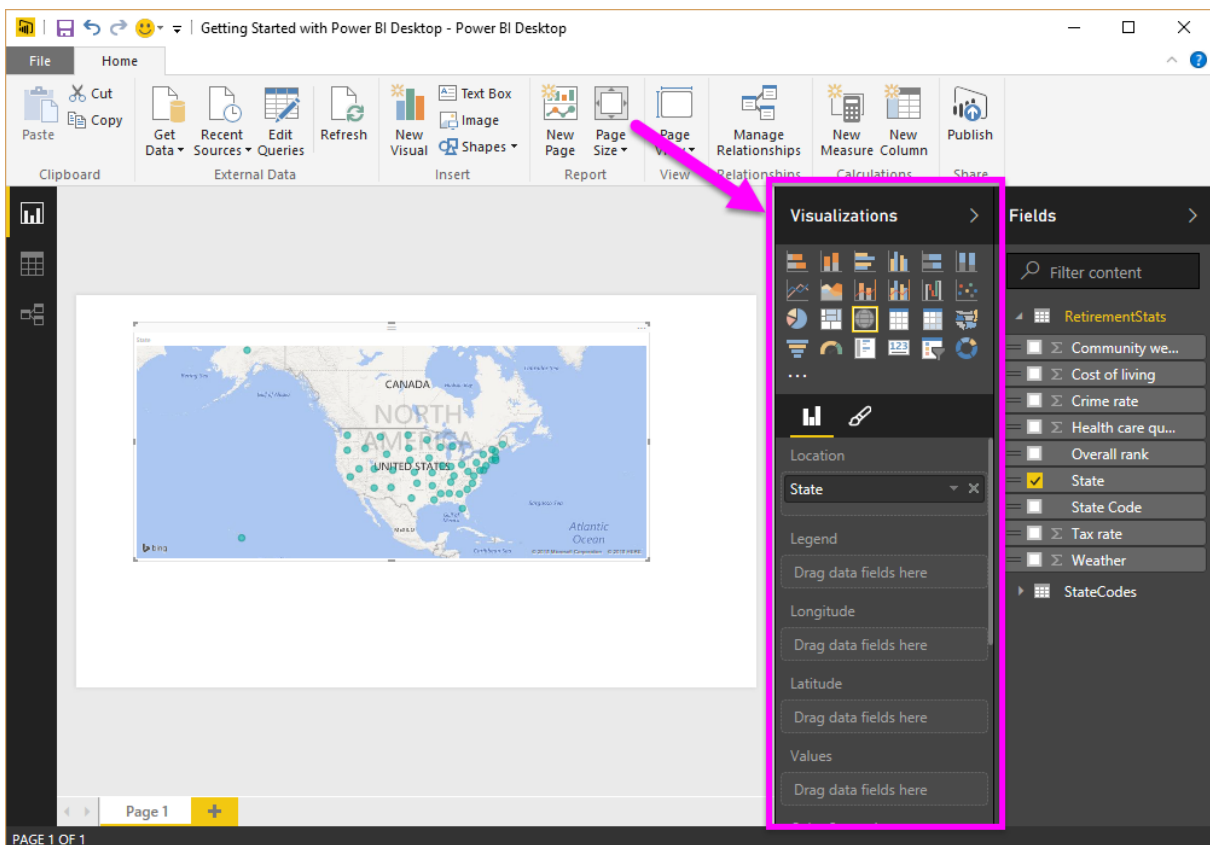


To create a visualization, just drag a field from the **Fields** list onto the **Report** view. In this case, let's drag the *State* field from *RetirementStats*, and see what happens.



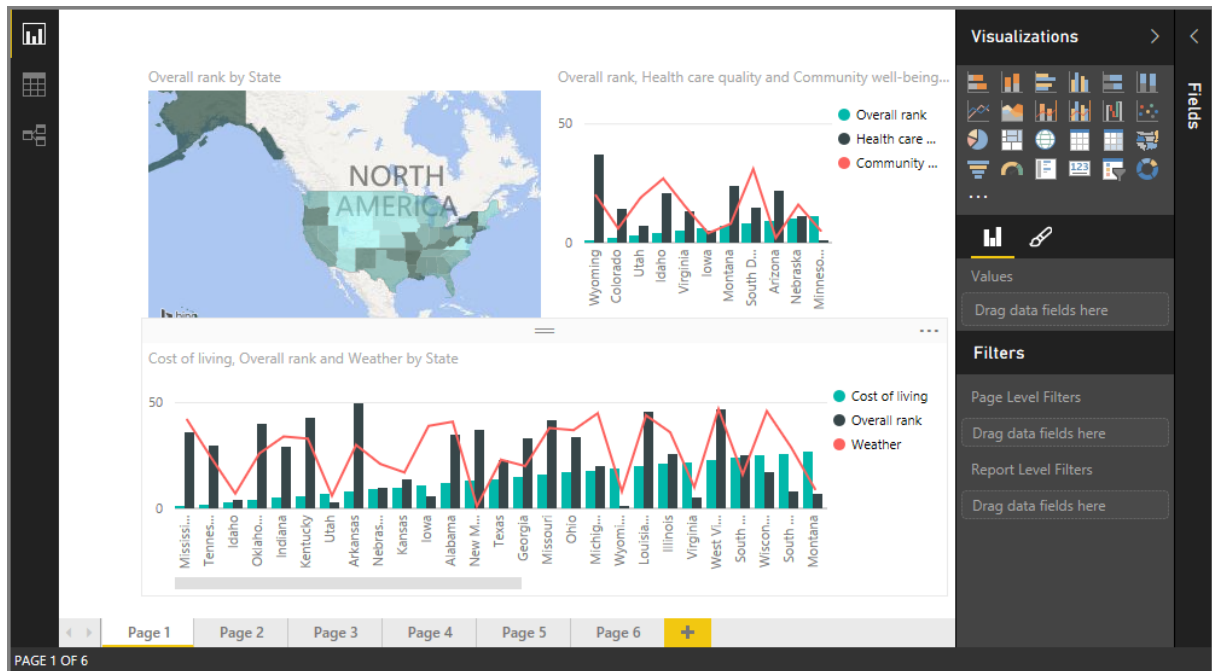
Look at that... Power BI Desktop automatically created a map-based visualization, because it recognized that the *State* field contained geolocation data.

Notice that in the **Visualizations** pane, I can select different types of visualizations, and in the area below those icons, I can drag fields to different areas to apply a Legend, or otherwise modify the visualization.



Let's fast-forward a bit, and see what the **Report** view looks like after a handful of visualizations have been added, as well as a few new Report pages. For more information about reports, see [Report View in Power BI Desktop](#).

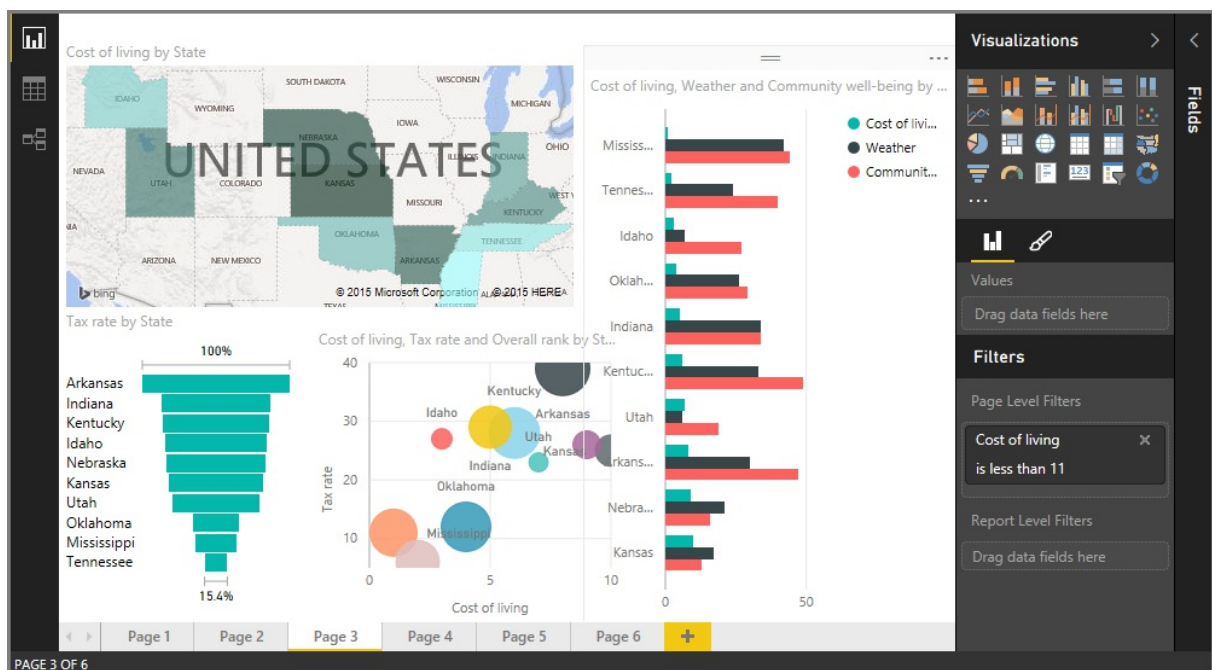
The first Report page provides a perspective of the data based on *Overall rank*. When we select one of the visualizations, the **Fields and Filters** pane shows which fields are selected, and the structure of the visualization (which fields are applied to the **Shared Axis**, **Column Values**, and **Line Values**).



There are six **Pages** in this Report, each visualizing certain elements of our data.

1. The first page, shown above, shows all states based on *Overall rank*.
2. The second page focuses on the top ten states based on *Overall rank*.
3. For the third page, the best 10 states for cost of living (and associated data) are visualized.
4. Weather is the focus of the fourth page, filtered to the 15 sunniest states.
5. On the fifth page, Community well-being is charted and visualized for the top 15 states.
6. Lastly, crime statistics are visualized, showing the best (and well, the last) ten states.

Here's what the cost of living-focused Report page looks like.

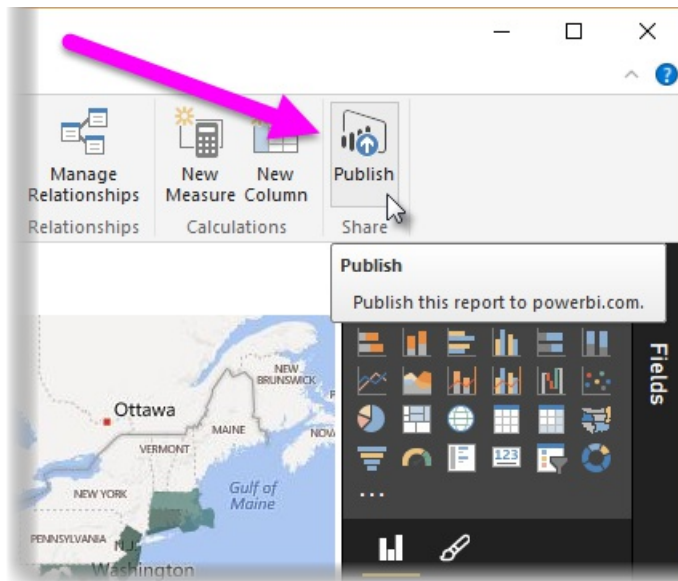


There are all sorts of interesting reports and visualizations you can create.

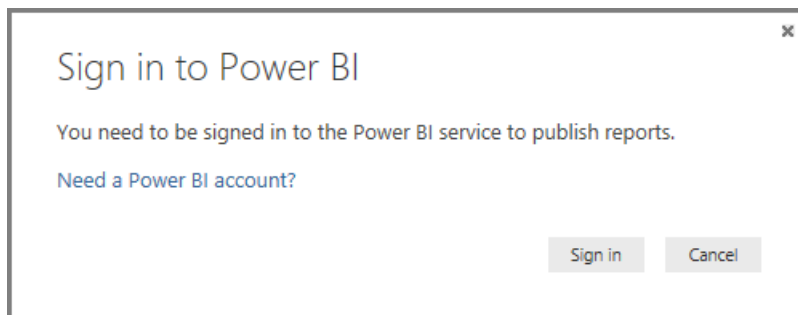
Share your work

Now that we have a Power BI Desktop report that's reasonably complete, we can share it with others on the **Power BI** service. There are a few ways to share your work in Power BI Desktop. You can publish to the **Power BI** service, you can upload the .pbix file directly from the Power BI service, or you can save the .pbix file and send it like any other file.

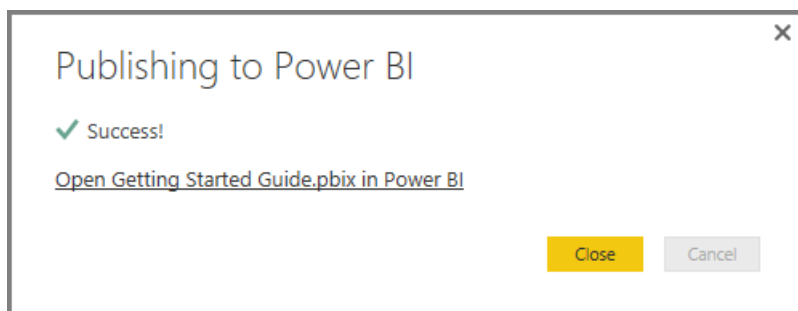
First, let's look at publishing to the **Power BI** service directly from Power BI Desktop. On the **Home** ribbon, select **Publish**.



You may be prompted to sign in to Power BI.



When you've signed in and the publish process is complete, you see the following dialog.

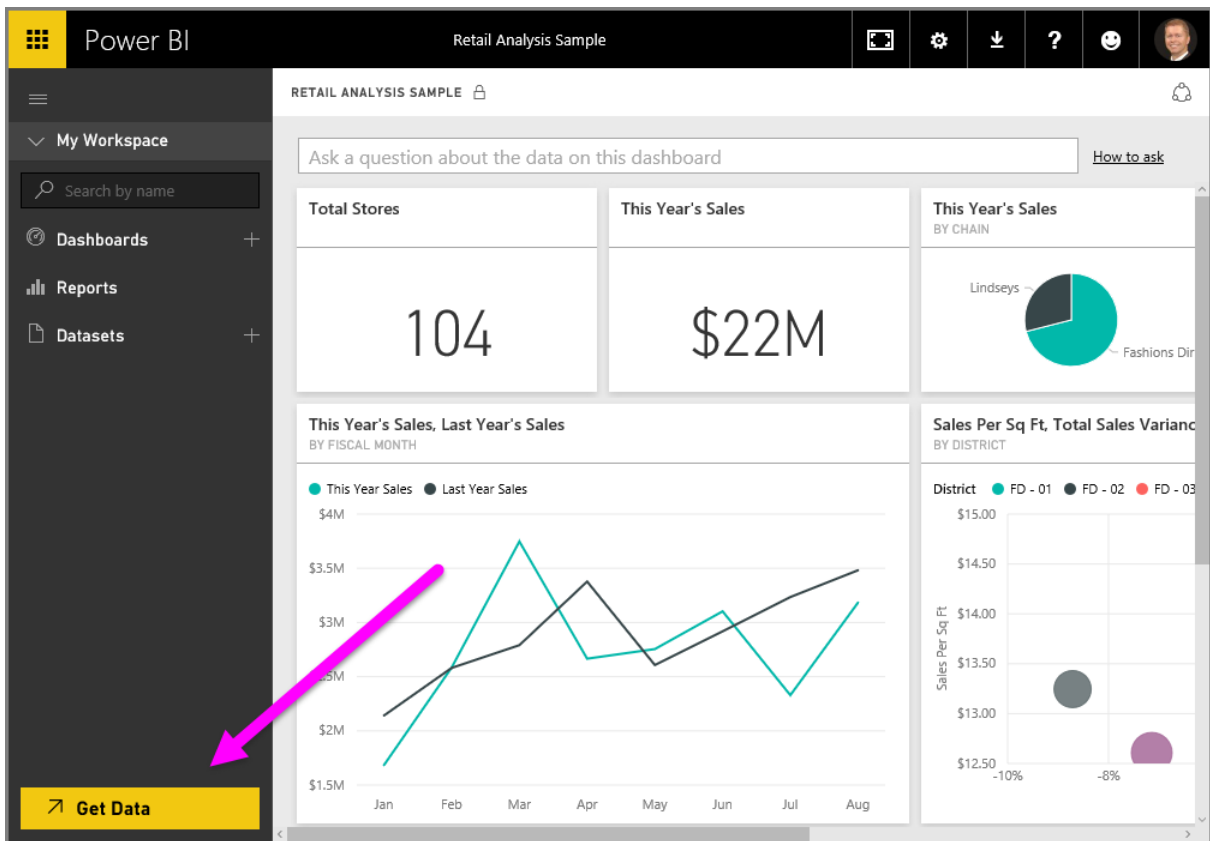


When you sign in to Power BI, you'll see Power BI Desktop file you just loaded in the **Dashboards, Reports,** and **Datasets** sections of the service.

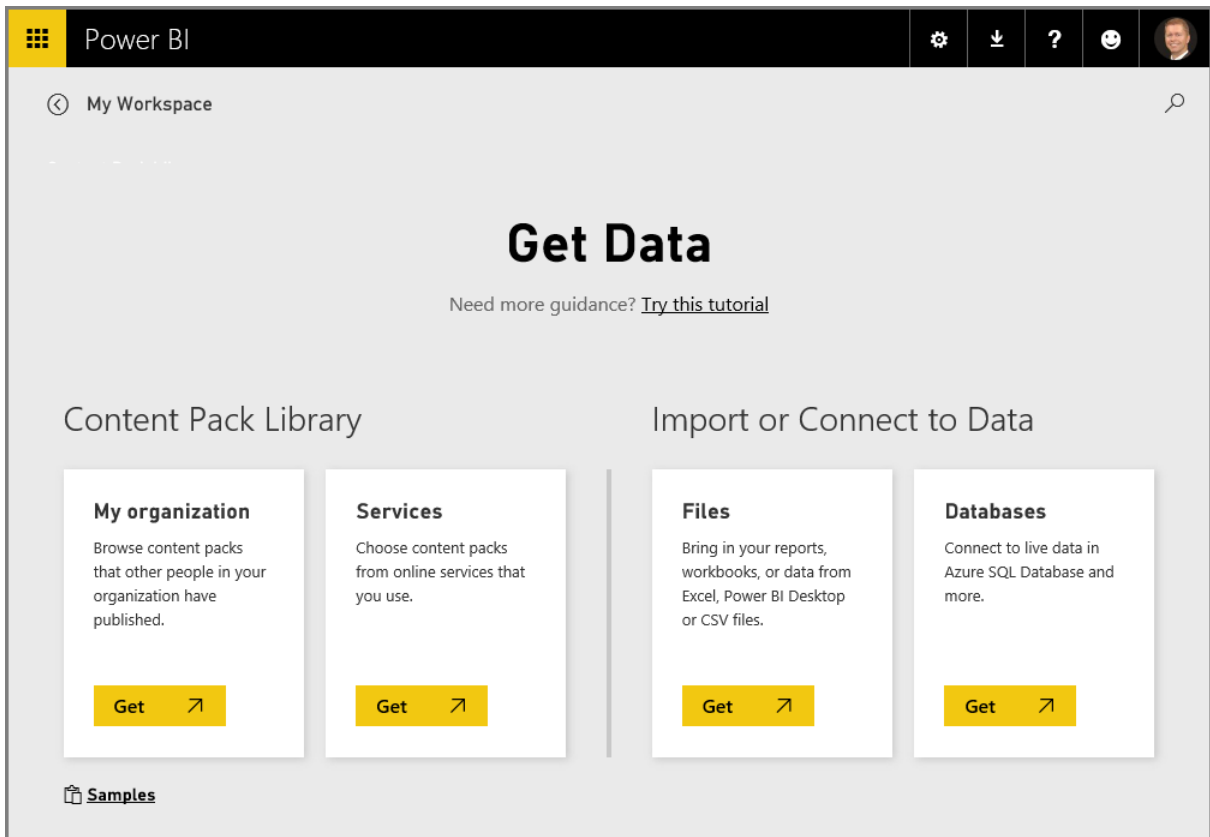
Another way to share your work is to load it from within the **Power BI** service. The following link brings up the **Power BI** service in a browser:

<https://app.powerbi.com>

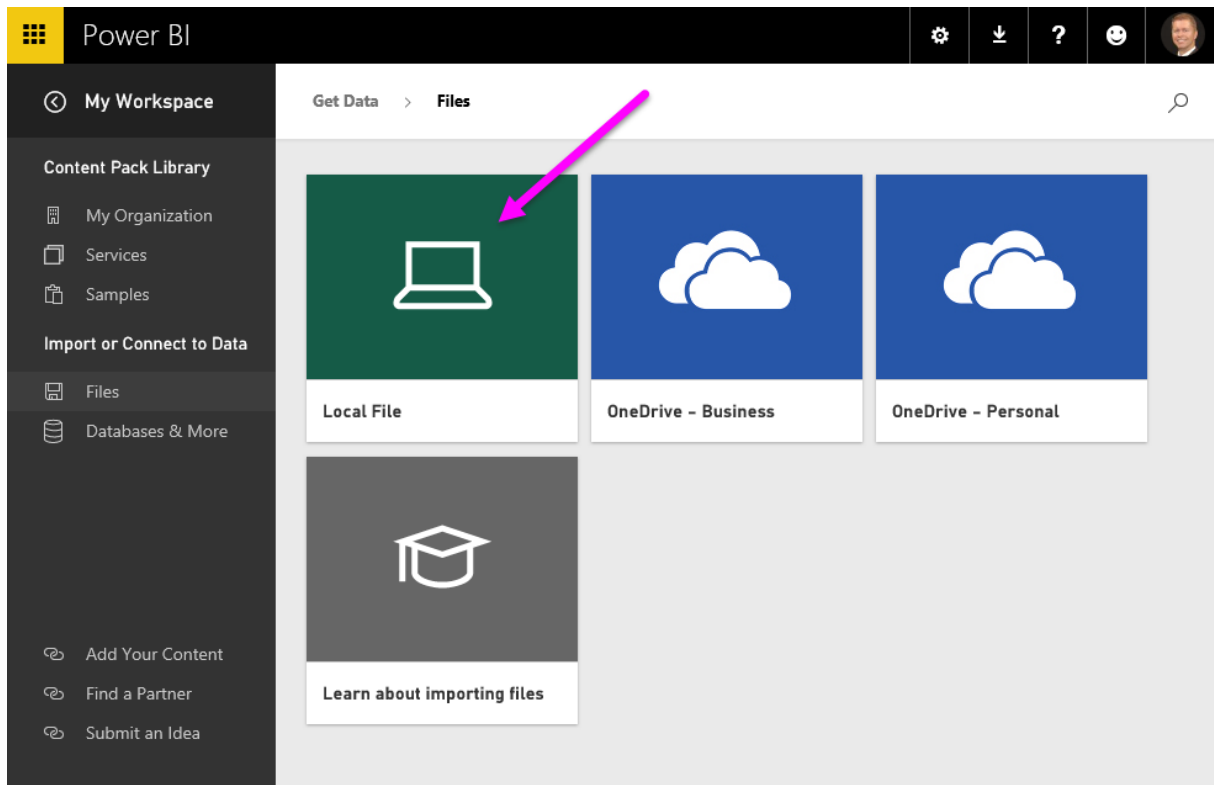
Select **Get Data** to start the process of loading your Power BI Desktop report.



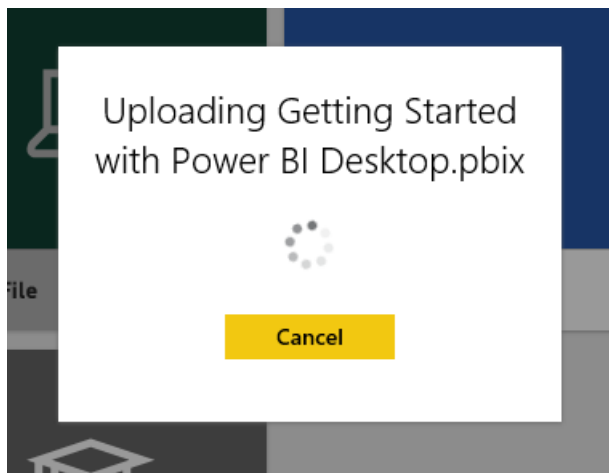
The **Get Data** page appears, from which you can select where to get your data from. In this case, we select **Get** from the **Files** box.



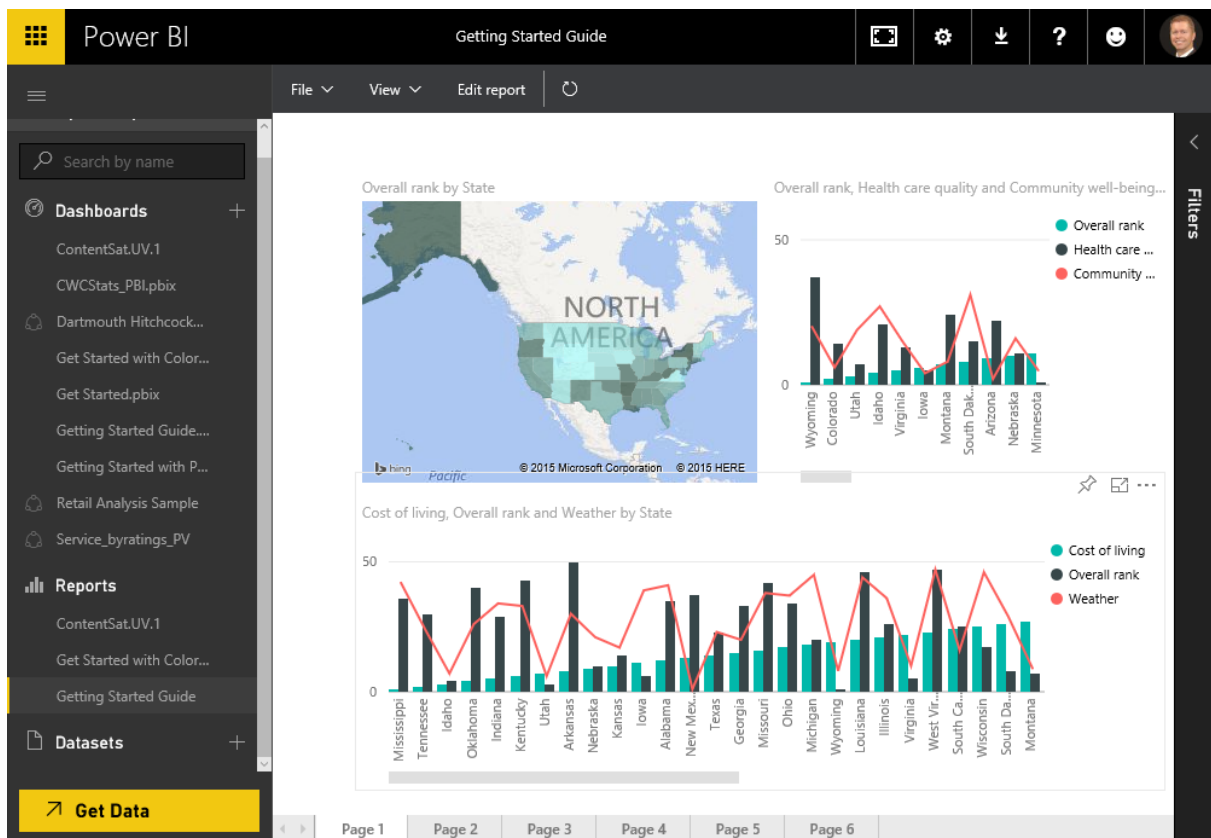
The **Files** view appears. In this case, we select **Local File**.



When you select the file, Power BI uploads the file.



Once the file is uploaded, you can select the file from the **Reports** in the left pane of the Power BI service.

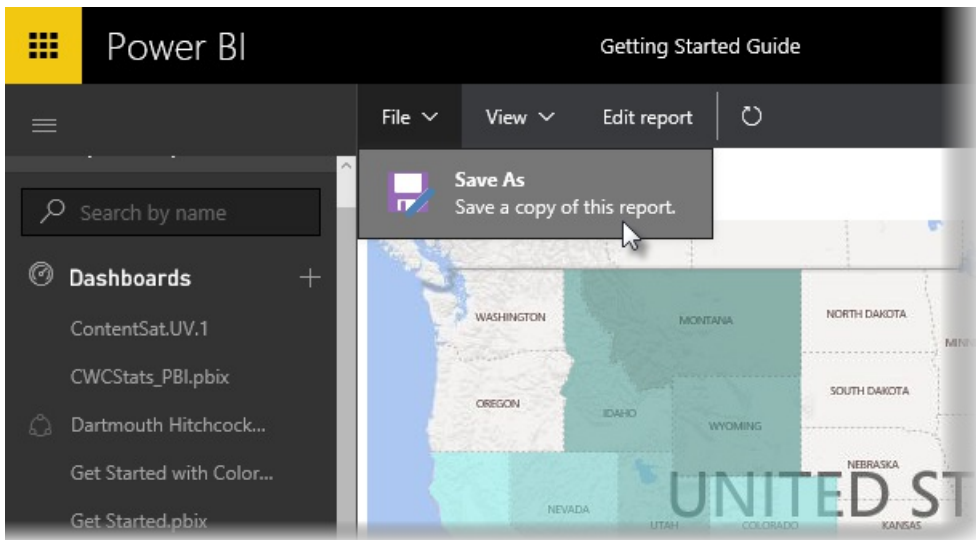


The **Power BI** service displays the first page of the report. Along the bottom of the page, you can select any tab to display that page of the report.

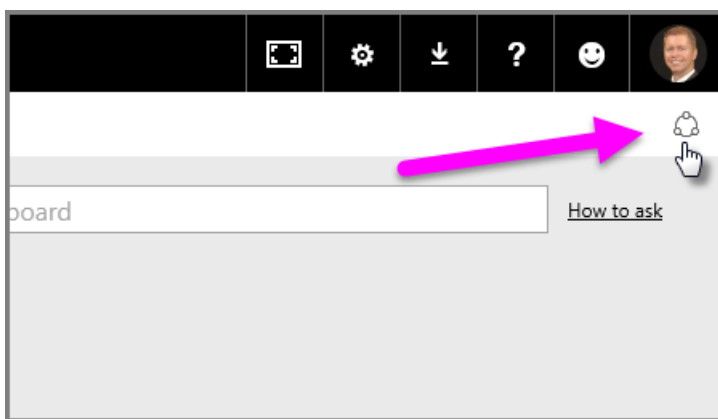


You can make changes to a report in the **Power BI** service by selecting **Edit Report** from the top of the report canvas.

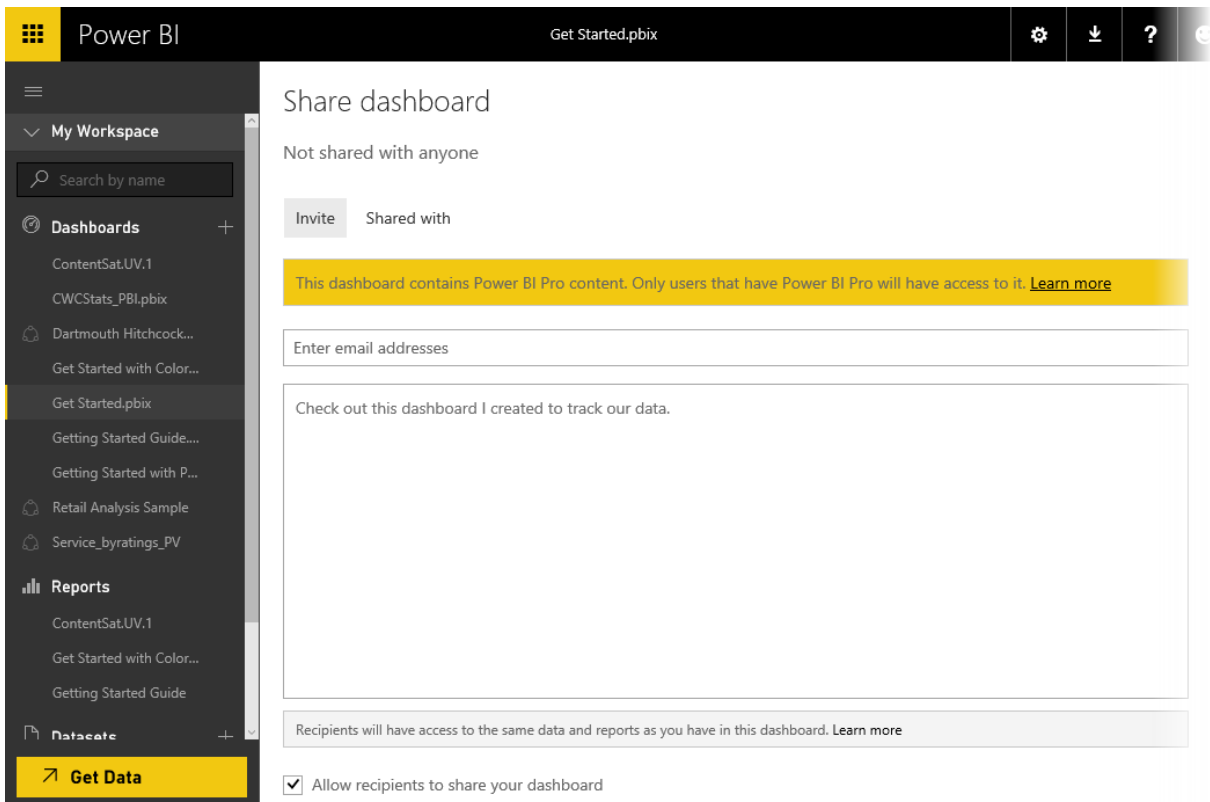
To save your report, select **File > Save As** from the service. There are all sorts of interesting visuals you can create in the **Power BI** service from your report, which you can pin to a *dashboard*. To learn about dashboards in the **Power BI** service, see [Tips for designing a great dashboard](#).



Once saved, select the **Share** icon on the main page.



From here, you can send an email to colleagues with whom you'd like to share the dashboard.



For more information about creating, sharing, and modifying dashboards, see [Share a dashboard](#).

There are all sorts of compelling data-related mash-ups and visualizations you can do with Power BI Desktop,

and with the Power BI service. Check out the next section for more information.

Next steps

There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

What's new in the latest Power BI Desktop update?

1/11/2018 • 2 min to read • [Edit Online](#)

January 2018 Update (2.54.4970.761)

You can now [download the latest version of Power BI Desktop](#). If you're running Windows 10, you can also get **Power BI Desktop** from the Windows Store. The monthly versions are the same, regardless of which way you install **Power BI Desktop**. See [this article](#) for more information.

We're ringing in the new year with a collection of updates to **Power BI Desktop**, and our new year's resolution is to keep them coming.

The links beside each update mean the following:

- **[video]** excerpts play in a new browser tab, when the feature is being discussed.
- Some features have an **[article]** that provides more detail.
- Most features are explained in the monthly update **[blog]** post.
- Lastly, some features are self-explanatory and don't need an article or video.

You can also watch the **Latest Updates** video from the beginning, right inside this article, by clicking on the **play** icon on the video image found below the list of updates.

The following updates are new to **Power BI Desktop** this month:

Reporting

- Show and hide pages [\[video\]](#) [\[blog\]](#)
- Control data label background color for Cartesian and maps visuals [\[video\]](#) [\[blog\]](#)
- Increase the area used for axis labels in charts [\[video\]](#) [\[blog\]](#)
- Bar / column padding control [\[video\]](#) [\[blog\]](#)
- Show dates as a hierarchy (preview) [\[video\]](#) [\[blog\]](#)
- Add an anchor date for a relative date slicer [\[video\]](#) [\[blog\]](#)
- Top N selection in Q&A [\[blog\]](#)
- Many new custom visuals [\[video\]](#) [\[blog\]](#)

Analytics

- Correlation coefficient quick measure [\[blog\]](#)

Data connectivity

- Support for Azure Active Directory authentication for Azure SQL Database and Data Warehouse connectors [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

More videos

Like learning about Power BI through videos and other engaging content? Check out the following collection of video sources and content.

- [Power BI channel](#) - Power BI on YouTube
- [Guy in a Cube channel](#) - fresh videos on Power BI features and capabilities
- [Guided Learning for Power BI](#) - a sequential learning tour of Power BI, in bite-size pieces

Previous months' updates

Looking for previous months' updates? You can find them in the [Power BI Desktop Monthly Updates archive](#) article.

Power BI Desktop videos

12/6/2017 • 1 min to read • [Edit Online](#)

We have a [YouTube channel for Power BI!](#)

The following list describes all available videos about Power BI Desktop. Select any of the links below to view the associated video.

- [High-level overview of Power BI Desktop](#), from getting data and building a report to uploading this report to Power BI so it can be refreshed and shared with other users.

- Learn [how to build stunning reports](#) using Power BI Desktop.

- Understand how to [import, reshape and transform data using Query Editor](#) in the Power BI Desktop.

Previous monthly updates to Power BI Desktop

1/11/2018 • 40 min to read • [Edit Online](#)

This article describes previous updates to **Power BI Desktop**. For the most current month's release, check out [Power BI Desktop latest updates](#).

The following sections describe previous months' updates to **Power BI Desktop**.

You can always [download the latest version of Power BI Desktop](#). If you're running Windows 10, you can also get **Power BI Desktop** from the Windows Store. The monthly versions are the same, regardless of which way you install **Power BI Desktop**. See [this article](#) for more information.

December 2017 Update (2.53.4954.481)

December brought a Ho-Ho-Whole lot of updates to **Power BI Desktop**, chock full of features gifts for all business intelligence minded kids (and adults) to enjoy.

The links beside each update mean the following:

- **[video]** excerpts play in a new browser tab, when the feature is being discussed.
- Some features have an **[article]** that provides more detail.
- Most features are explained in the monthly update **[blog]** post.
- Lastly, some features are self-explanatory and don't need an article or video.

You can also watch the **Latest Updates** video from the beginning, right inside this article, by clicking on the **play** icon on the video image found below the list of updates.

The following updates were new to **Power BI Desktop** in December:

Reporting

- Q&A for report creation [\[video\]](#) [\[blog\]](#)
- Cross-highlighting for bookmarks [\[video\]](#) [\[blog\]](#)
- More bookmark flexibility [\[video\]](#) [\[blog\]](#)
- Field properties pane and field descriptions [\[video\]](#) [\[blog\]](#)
- Scatter visual from x- and y-axis groupings [\[video\]](#) [\[blog\]](#)
- High density sampling for maps based on latitude and longitude [\[video\]](#) [\[blog\]](#)
- Responsive slicers [\[video\]](#) [\[blog\]](#)
- Recently released custom visuals [\[video\]](#) [\[blog\]](#)

Analytics

- Drill filters other visuals [\[video\]](#) [\[blog\]](#)

Data connectivity

- Adobe Analytics connector [\[video\]](#) [\[blog\]](#)
- HDInsight Interactive Query connector [\[video\]](#) [\[blog\]](#)
- Data.World connector [\[video\]](#) [\[blog\]](#)
- SAP BW connector improvements [\[video\]](#) [\[blog\]](#)
- IBM Netezza connector now generally available [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

November 2017 Update (2.52.4921.202)

November brought a whole harvest worth of updates to **Power BI Desktop**.

The links beside each update mean the following:

- **[video]** excerpts play in a new browser tab, when the feature is being discussed.
- Some features have an **[article]** that provides more detail.
- Most features are explained in the monthly update **[blog]** post.
- Lastly, some features are self-explanatory and don't need an article or video.

You can also watch the **Latest Updates** video from the beginning, right inside this article, by clicking on the **play** icon on the video image found below the list of updates.

The following updates were new to **Power BI Desktop** in November:

Reporting

- Rule-based conditional formatting for Table and Matrix visuals [\[video\]](#) [\[blog\]](#)
- Cell alignment for Table and Matrix visuals [\[video\]](#) [\[blog\]](#)
- Control visual ordering through the selection pane [\[video\]](#) [\[blog\]](#)
- Lock objects on your report [\[video\]](#) [\[blog\]](#)
- Esri Plus Subscription is available for ArcGIS Maps for Power BI [\[video\]](#) [\[blog\]](#)
- Report options for slow data sources [\[video\]](#) [\[blog\]](#)
- Filtering performance improvements [\[video\]](#) [\[blog\]](#)
- Recently released custom visuals [\[video\]](#) [\[blog\]](#)

Analytics

- Cell-level formatting for multidimensional AS models for multi-row card [\[video\]](#) [\[blog\]](#)

Data connectivity

- Impala connector - support for Windows Authentication [\[video\]](#) [\[blog\]](#)

Other

- Query editing - Add Column from Example improvements [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

October 2017 Update (2.51.4885.543)

October brought a frighteningly compelling group of useful updates to **Power BI Desktop**.

The links beside each update mean the following:

- **[video]** excerpts play in a new browser tab, when the feature is being discussed.
- Some features have an **[article]** that provides more detail.
- Most features are explained in the monthly update **[blog]** post.
- Lastly, some features are self-explanatory and don't need an article or video.

You can also watch the **Latest Updates** video from the beginning, right inside this article, by clicking on the **play** icon on the video image found below the list of updates.

The following updates are new to **Power BI Desktop** this month:

Reporting:

- Bookmarking (preview) [\[video\]](#) [\[blog\]](#) [\[article\]](#)

- Selection pane and visual display controls [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Bookmark links for shapes and images [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Spotlight [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Scatter and Bubble markers [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Increase the number of data points displayed in Scatter visuals [\[video\]](#) [\[blog\]](#)

Analytics:

- Quick measures for SSAS live connections [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Sales from new customers quick measure [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Cell-level formatting for multi-dimensional Analysis Services (AS) models [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- Vertica connector (beta) [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- SAP BW connector - support for additional member properties [\[video\]](#) [\[blog\]](#)

Other:

- Get **Power BI Desktop** from the Windows Store [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Improved access to help content [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

September 2017 Update (2.50.4859.502)

The following updates are new to **Power BI Desktop** in September:

Report View:

- Drillthrough to another report page [\[video\]](#) [\[blog\]](#) [\[article\]](#)

- Ribbon chart [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Insights about Explain the increase / Explain the decrease [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Theming preview update - chart style controls [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Accessibility improvements [\[video\]](#) [\[blog\]](#) [\[article\]](#)
 - Accessible See data [\[video\]](#) [\[blog\]](#) [\[article\]](#)
 - Keyboard shortcut helper dialog [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- High density scatter chart sampling [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Gridline style control [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- New custom visuals [\[video\]](#) [\[blog\]](#)
 - Calendar by Tallan [\[video\]](#) [\[blog\]](#)
 - Enlighten Aquarium [\[video\]](#) [\[blog\]](#)
 - Visio visual (preview) [\[video\]](#) [\[blog\]](#)
 - Impact bubble chart [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- Azure Consumption Insights connector [\[video\]](#) [\[blog\]](#) [\[article\]](#)
- Improvements to the Dynamics 365 for Financials connector [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

August 2017 Update (2.49.4831.222)

The following updates were new to **Power BI Desktop** in August:

Report View:

- Show values on rows for matrix [\[video\]](#) [\[blog\]](#)

- Color scales on font colors for table and matrix [\[video\]](#) [\[blog\]](#)
- Custom subtotal settings per level of matrix [\[video\]](#) [\[blog\]](#)
- Line styles and legend options [\[video\]](#) [\[blog\]](#)
- Scatter chart performance improvements [\[video\]](#) [\[blog\]](#)
- New custom visuals [\[video\]](#) [\[blog\]](#)
 - Dot Plot by MAQ Software [\[video\]](#) [\[blog\]](#)
 - Power KPI [\[video\]](#) [\[blog\]](#)
 - Funnel plot [\[video\]](#) [\[blog\]](#)
 - Beyondsoft Calendar [\[video\]](#) [\[blog\]](#)

Analytics & Modeling:

- What if parameters [\[video\]](#) [\[blog\]](#)
- New scatter chart analytics features [\[video\]](#) [\[blog\]](#)
 - Symmetry shading [\[video\]](#) [\[blog\]](#)
 - Ratio lines [\[video\]](#) [\[blog\]](#)
- New quick measure: weighted average [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- Live connect to the Power BI service is generally available [\[video\]](#) [\[blog\]](#)
- Google BigQuery connector (beta) [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

July 2017 Update (2.48.4792.321)

The following updates were new to **Power BI Desktop** in July:

Report View:

- New table & matrix visuals are now generally available [\[video\]](#) [\[blog\]](#)
- Renaming fields in visuals [\[video\]](#) [\[blog\]](#)
- Custom visuals store integration [\[video\]](#) [\[blog\]](#)
- Relative date filters [\[video\]](#) [\[blog\]](#)
- Responsive layout for visuals (preview) [\[video\]](#) [\[blog\]](#)
- New waterfall chart option - breakdown [\[video\]](#) [\[blog\]](#)
- Custom visual updates [\[video\]](#) [\[blog\]](#)
 - Drilldown Choropleth [\[video\]](#) [\[blog\]](#)
 - Drilldown Cartogram [\[video\]](#) [\[blog\]](#)
 - Drilldown Player [\[video\]](#) [\[blog\]](#)
 - Certified custom visuals [\[blog\]](#)

Analytics & Modeling:

- Quick measures from the community [\[video\]](#) [\[blog\]](#)
 - Star rating [\[video\]](#) [\[blog\]](#)
 - Concatenated list of values [\[video\]](#) [\[blog\]](#)
- Bidirectional cross filtering for DirectQuery is now generally available [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- Snowflake connector general availability [\[video\]](#) [\[blog\]](#)

Query Editing:

- *Add Column from Examples* enhancements [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post references in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

June 2017 Update (2.47.4766.542)

The following updates were new to **Power BI Desktop** in June:

Report View:

- Data bars for new table and matrix visuals (Preview) [\[video\]](#) [\[blog\]](#)
- Markers on line, area, and combo visuals (Preview) [\[video\]](#) [\[blog\]](#)
- Visual font family setting [\[video\]](#) [\[blog\]](#)
- Horizontal image slicer [\[video\]](#) [\[blog\]](#)
- Combo chart formatting updates [\[video\]](#) [\[blog\]](#)
- Bing maps improvements [\[video\]](#) [\[article\]](#) [\[blog\]](#)
- High density line sampling [\[video\]](#) [\[article\]](#) [\[blog\]](#)
- Accessible reports [\[video\]](#) [\[article\]](#) [\[blog\]](#)

Data Connectivity:

- Custom Data Connectors support [\[video\]](#) [\[blog\]](#)
- **Power BI service** Live Connect to on-premises and push streaming datasets [\[video\]](#) [\[blog\]](#)
- Impala connector is now generally available [\[video\]](#) [\[blog\]](#)
- Amazon Redshift connector is now generally available [\[video\]](#) [\[blog\]](#)
- SAP BW connector - DirectQuery support [\[video\]](#) [\[blog\]](#)
- IBM Netezza connector (beta) [\[video\]](#) [\[blog\]](#)

Query Editing:

- *Add Column from Examples* enhancements [\[video\]](#) [\[article\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

May 2017 Update (2.46.4732.461)

The following updates were new to **Power BI Desktop** in May:

Report View:

- Relative date slicer (Preview) [\[video\]](#) [\[blog\]](#)
- New table visual (Preview) [\[video\]](#) [\[blog\]](#)
- Combo chart data label enhancements [\[video\]](#) [\[blog\]](#)
- More URL support in table and matrix visuals [\[video\]](#) [\[blog\]](#)
- mailto links in textbox [\[video\]](#) [\[blog\]](#)

Analytics:

- Report level measures for live connections to Analysis Services tabular models and Power BI service datasets [\[video\]](#) [\[blog\]](#)
- Two new quick measures (Preview) [\[video\]](#) [\[blog\]](#)
- Bin by count [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- Combine files - ability to reference *First File* as example [\[video\]](#) [\[blog\]](#)
- New data connectors:
 - Dynamics 365 for Customer Insights [\[video\]](#) [\[blog\]](#)

Query Editing:

- Two new transforms:
 - Extract text before/after/between delimiters [\[video\]](#) [\[blog\]](#)
 - Unpivot only selected columns [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

April 2017 Update (2.45.4704.442)

The following updates were new to Power BI Desktop in April 2017:

Report View:

- Rename axis titles [\[video\]](#) [\[blog\]](#)
- New matrix visual enhancements: column sorting, column resizing, and word wrap (Preview) [\[video\]](#) [\[article\]](#) [\[blog\]](#)

Analytics:

- Quick measures [\[video\]](#) [\[blog\]](#) [\[in-depth blog\]](#) [\[article\]](#)
- Show value as [\[video\]](#) [\[blog\]](#)
- Q&A in Spanish (Preview) [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- Connect to datasets in the Power BI service (Preview) [\[video\]](#) [\[article\]](#) [\[blog\]](#)
- New or enhanced data connectors:
 - Redshift Connector: beta support, and Publish to Power BI service [\[video\]](#) [\[blog\]](#)
 - SAP HANA and BW: enhancements to parameter input experience [\[video\]](#) [\[blog\]](#)

Query Editing:

- Add Column from Example [\[video\]](#) [\[article\]](#) [\[blog\]](#) [\[another blog\]](#)
- Split column (by delimiter/number of characters) into rows [\[video\]](#) [\[blog\]](#)
- Group by: basic mode [\[video\]](#) [\[blog\]](#)
- Go to column [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

March 2017 Update (2.44.4675.422)

The following updates were new to Power BI Desktop in March 2017:

Report View:

- New matrix visual (Preview) [\[video\]](#) [\[article\]](#) [\[blog\]](#)
- Numeric range slicer (Preview) [\[video\]](#) [\[article\]](#) [\[blog\]](#)
- Data labels on pie and donut visuals - percent of total [\[video\]](#) [\[blog\]](#)
- Cross-highlight using multiple series [\[video\]](#) [\[blog\]](#)
- Textbox - ability to choose font color [\[video\]](#) [\[blog\]](#)
- Report theming (Preview) [\[video\]](#) [\[article\]](#) [\[blog\]](#)

Analytics:

- Clustering - now generally available [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- New or enhanced data connectors [\[video\]](#):
 - Azure Analysis Services database (Beta) [\[blog\]](#)
 - Azure Data Lake Store - now generally available [\[blog\]](#)
 - DB2 connector - option to specify package collection [\[video\]](#) [\[blog\]](#)
 - Combine binaries - specify a sample file to use [\[video\]](#) [\[blog\]](#)

Query Editing improvements

- Split column by delimiter - automatic detection of delimiter character [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

February 2017 Update (2.43.4647.541)

The following updates were new to Power BI Desktop in February:

Report View:

- Word wrap on matrix row headers [\[video\]](#) [\[blog\]](#)
- X- and Y-axis font size control [\[video\]](#) [\[blog\]](#)
- Cartesian chart minimum category width [\[video\]](#) [\[blog\]](#)
- Line chart line thickness and join type controls [\[video\]](#) [\[blog\]](#)

Analytics:

- Two new Quick Calcs: Percent of row total, and percent of column total [\[video\]](#) [\[blog\]](#)

Data Connectivity:

- New or enhanced data connectors [\[video\]](#):
 - ODBC and OLE DB connectors - support for *Select related tables* [\[blog\]](#)
 - Enhanced Folder connector - support for combining binaries from the Preview dialog [\[video\]](#) [\[blog\]](#)
 - Unified Text and CSV connectors [\[video\]](#) [\[blog\]](#)
 - **New** - PowerApps Common Data Service connector [\[blog\]](#)

Query Editing improvements

- Quickly change a column's data type and locale with the new *Using locale* option in the *Column headers type* menu [\[video\]](#) [\[blog\]](#)
- Easily insert steps into existing queries, using the new *Insert Step After* option [\[video\]](#) [\[blog\]](#)

Other improvements

- Solutions Templates and Partner Showcase quick access [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed

information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

January 2017 Update (2.42.4611.482)

The following updates are new to Power BI Desktop in January:

Report View:

- Table and matrix conditional formatting improvement - blank formatting [\[video\]](#) [\[blog\]](#)
- New aggregations for string and dateTime columns [\[video\]](#) [\[blog\]](#)
- Table header word wrap [\[video\]](#) [\[blog\]](#)
- General Availability (GA) of Phone reports [\[video\]](#) [\[blog\]](#)

Data Connectors:

- New or enhanced data connectors [\[video\]](#):
 - Visual Studio Team Services connector (Beta) [\[video\]](#) [\[blog\]](#)
 - Enhanced SQL Server connector - support for SQL Failover option [\[video\]](#) [\[blog\]](#)

Query Editing improvements

- New transform: extract values from a nested list [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

November 2016 Update (2.41.4581.301)

The following updates were new to Power BI Desktop in November:

Report View:

- Hierarchical axis [\[video\]](#) [\[blog\]](#)
- Axis label and title color control [\[video\]](#) [\[blog\]](#)
- Matrix conditional formatting [\[video\]](#) [\[blog\]](#)
- Table and matrix column formatting [\[video\]](#) [\[blog\]](#)
- Drop-down slicer [\[video\]](#) [\[blog\]](#)
- Mobile reports scrolling [\[video\]](#) [\[blog\]](#)

Analytics

- Clustering (preview) [\[video\]](#) [\[blog\]](#)
- Forecasting (now in the **Power BI service**) [\[blog\]](#)
- Groups (now on the ribbon) [\[video\]](#) [\[blog\]](#)

Data Connectors:

- New data connectors [\[video\]](#):
 - Spark DirectQuery [\[video\]](#) [\[blog\]](#)
 - OData connector improvements [\[video\]](#) [\[blog\]](#)
 - Enhanced *combine binaries* experience [\[video\]](#) [\[blog\]](#)
 - Azure Analysis Services [\[video\]](#) [\[blog\]](#)

Query Editing improvements

- Improved *function authoring* experience [\[video\]](#) [\[blog\]](#)
- Support for *percentage* data type [\[video\]](#) [\[blog\]](#)
- Added **Maximize** and **Restore** buttons in **Navigator** and **Query Dependencies** [\[video\]](#) [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

October 2016 Update (2.40.4554.361)

The following updates were new to Power BI Desktop in October:

Report View:

- Improved date axis range formatting [\[video\]](#)
- Date slicer [\[blog\]](#) [\[video\]](#)
- Report gridlines and snap to grid (Preview) [\[article\]](#) [\[blog\]](#) [\[video\]](#)
- Data label improvements [\[blog\]](#) [\[video\]](#)
- Map formatting options [\[blog\]](#) [\[video\]](#)
- Improved date axis range formatting [\[blog\]](#)

Analytics

- Grouping [\[blog\]](#) [\[video\]](#)
- Binning [\[blog\]](#) [\[video\]](#)
- Top-N filter [\[blog\]](#) [\[video\]](#)
- Include/exclude data points [\[blog\]](#) [\[video\]](#)
- R-powered custom visuals [\[blog\]](#)

Data Connectors:

- New data connectors [\[video\]](#):
 - Microsoft Dynamics 365 for Financials (Beta) [\[blog\]](#)
 - OLE DB [\[blog\]](#)
 - Mixpanel [\[blog\]](#)

Query Editing improvements

- Support for *table parameters* in the **Invoke Function** dialog [\[blog\]](#) [\[video\]](#)

Other improvements

- Diagnostics information in the **About** dialog [\[blog\]](#) [\[video\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

September 2016 Update (2.39.4526.362)

The following updates were new to Power BI Desktop in September:

Report View:

- ArcGIS Maps for Power BI (Preview) [\[blog\]](#) [\[video\]](#)
- Mobile report layout (Preview) [\[blog\]](#) [\[video\]](#)
- Updated drill behavior [\[article\]](#) [\[blog\]](#) [\[video\]](#)

Analytics

- Forecasting (Preview) [\[article\]](#) [\[blog\]](#) [\[video\]](#)
- Use your own R IDE [\[blog\]](#) [\[video\]](#)

Data Connectors:

- New data connectors:
 - Snowflake connector DirectQuery support [\[blog\]](#)
 - ProjectPlace connector [\[article\]](#) [\[blog\]](#)
- Improvements to existing connectors:
 - Oracle connector - improved Navigator previews performance [\[blog\]](#)
 - OData connector - support for *Select Related Tables* option [\[blog\]](#)
 - SAP Business Warehouse and SAP HANA connectors - enhancements to parameter input interface [\[article\]](#) [\[blog\]](#)

- Web connector - support for specifying HTTP request headers within the dialog [\[blog\]](#) [\[video\]](#)

Query Editor improvements:

- Query Dependencies view [\[blog\]](#) [\[video\]](#)
- Show Errors experience [\[blog\]](#)
- Query Editor ribbon support for scalar values [\[blog\]](#)
- Add function invocation column [\[blog\]](#)
- Expand & Aggregate columns - support for *Load More* values [\[blog\]](#)
- New transform - convert Table Column to a list [\[blog\]](#)
- Keyboarding - support for *smart typing* in drop-down menus [\[blog\]](#)

Other improvements

- In-product links to the **Power BI Community** [\[blog\]](#) [\[video\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

August 2016 Update (2.37.4464.321)

August introduced a full harvest of new features for Power BI Desktop:

- **[video]** excerpts play in a new browser tab, when the feature is being discussed.
- Some features have an **[article]** that provides more detail.
- Most features are explained in the monthly update **[blog]** post.
- Lastly, some features are self-explanatory and don't need an article or video.

You can also watch the **Latest Updates** video from the beginning, right inside this article, by clicking on the **play** icon on the video image found below the list of updates.

The following updates are new to Power BI Desktop this month:

Report View:

- Drill-down (or back up) on line charts [\[blog\]](#) [\[video\]](#)
- Continuous axis for the Date axis [\[blog\]](#) [\[video\]](#)
- General availability of Inline Hierarchies [\[article\]](#) [\[blog\]](#) [\[video\]](#)
- Predefined matrix styles (similar to table formatting in Excel) [\[blog\]](#) [\[video\]](#)
- Reorder fields, in charts and tooltips [\[blog\]](#) [\[video\]](#)
- Color formatting for KPI visuals [\[blog\]](#) [\[video\]](#)

Analytics (New!)

- The all-new **Analytics** pane [\[article\]](#) [\[blog\]](#) [\[video\]](#)
- Dynamic reference lines [\[blog\]](#) [\[video\]](#)

Data Connectors:

- New data connectors:
 - Snowflake connector (Preview) [\[blog\]](#)
- Improvements to existing connectors:
 - Impala connector - DirectQuery support [\[article\]](#) [\[blog\]](#)
 - Web connector - Web page previews [\[blog\]](#) [\[video\]](#)
 - General availability for the SAP Business Warehouse connector [\[article\]](#) [\[blog\]](#)

Query Editor improvements:

- Option to Merge/Append as New Query [\[blog\]](#) [\[video\]](#)

Other improvements

- Auto-recover Desktop files [\[blog\]](#) [\[video\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

July 2016 Update (2.37.4464.321)

You can always [download the latest version of Power BI Desktop](#).

July brought another great collection of new features and highly anticipated data connectors to Power BI Desktop. The following enhancements were new to Power BI Desktop in July:

Report View:

- Predefined table styles [\[blog\]](#) [\[video\]](#)
- Shape Maps update - use custom maps [\[article\]](#) [\[blog\]](#) [\[video\]](#)

Data Connectors:

- New data connectors:
 - Amazon Redshift [\[article\]](#) [\[blog\]](#)
 - Impala [\[article\]](#) [\[blog\]](#)
- Improvements to existing connectors:
 - Web connector - support for specifying a connection timeout [\[blog\]](#)
 - CSV and Text - support for fixed-width delimited files [\[blog\]](#)
 - Improvements and changes to the SAP Business Warehouse connector [\[article\]](#) [\[blog\]](#)

Query Editor improvements:

- Use **R** script in Query Editor [\[article\]](#) [\[blog\]](#)
- Query parameter enhancements:
 - List query output as *allowed values* for a parameter [\[blog\]](#)
- Overwrite existing user-defined functions [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these features (this is the same blog post referenced in the list above).

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

June 2016 Update (2.36.4434.362)

You can always [download the latest version of Power BI Desktop](#).

June provided a shining collection of interesting updates for Power BI Desktop.

Report View:

- New visual - Shape Maps [\[video\]](#) [\[article\]](#)
- Searchable slicers [\[video\]](#) [\[blog\]](#)
- Configurable line chart labels [\[video\]](#) [\[blog\]](#)
- New sign-in entry points [\[video\]](#) [\[blog\]](#)

Data Access:

- Row Level Security [\[blog\]](#) [\[article\]](#)

Data Connectors:

- New data connector: [\[blog\]](#)
 - Azure Enterprise
- Enhanced SAP BW and HANA connectors: [\[blog\]](#)
 - Allow multi-select of values for Variables/Parameters
 - Support for Hierarchies in SAP BW
- Enhanced OData connector - imports Open Type columns [\[blog\]](#)
- Enhanced Access DB connector - button to **Select Related Tables** in **Navigator** dialog [\[blog\]](#)

Data Connectors:

- Templates - option to **Load** or **Edit** [\[blog\]](#)
- Query parameter enhancements: [\[blog\]](#)
 - Option to always allow Parameter specification
 - Create new parameter directly in context
- Option to generate Step Names in English [\[blog\]](#)
- Descriptions for Query Steps [\[video\]](#) [\[blog\]](#)
- New Data Transformations: [\[blog\]](#)
 - Extract Week Day and Month Name from a DateTime column

- Merging dates and Times into a DateTime column
- Extract Time.Start/End of Hour/Minute/Second

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

May 2016 Update (2.35.4399.381)

You can always [download the latest version of Power BI Desktop](#).

May brought another large collection of compelling updates for Power BI Desktop:

Report View:

- Customizable tooltips [\[video\]](#) [\[article\]](#)
- Conditional formatting in tables [\[video\]](#) [\[article\]](#)
- Publish to Pyramid server [\[blog\]](#)
- Scrolling loads more data in charts [\[video\]](#) [\[blog\]](#)
- Keyboard nudging for visuals [\[blog\]](#)

Analytics

- Quick Calcs - % of grand total [\[blog\]](#)

Data Connectivity:

- New data connectors: [\[blog\]](#)
 - Informix
 - comScore Digital Analytix
 - Troux
 - Planview Enterprise

- Improved DB2 connector [\[blog\]](#)
- Text/CSV connector exposes editable settings in preview dialog [\[blog\]](#)
- Improved relational database connectors with Display Schema information
- Data Source Settings enhancements [\[blog\]](#)
- Advanced **Filter Rows** dialog mode [\[blog\]](#)
- Inline Input controls for Function invocation within **Query Editor** [\[blog\]](#)
- Query Parameters: [\[blog\]](#)
 - Ability to convert queries to parameters (and vice versa)
 - Support for URL parameterization and multi-part URLs in **Web** connector
 - Support for parameterization in **Conditional Columns** dialog
- Ability to **Save As** a Power BI Template [\[blog\]](#)
- Support for reordering Query Steps using drag-and-drop [\[blog\]](#)
- Date picker support in **Conditional Columns** dialog input Date fields [\[blog\]](#)
- New context menu entry to create new queries from the **Queries** pane [\[blog\]](#)

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

April 2016 Update (2.34.4372.322)

You can always [download the latest version of Power BI Desktop](#).

In April, we showered our great Power BI customers with another collection of compelling updates for Power BI Desktop. The following enhancements are new to Power BI Desktop this month:

Report View:

- Additional styles on a table, matrix, and multi-row card

- Trend lines on single visuals
- New drill action – **See Records**
- Map auto-zoom during drill/filter
- In-line hierarchy labels for expanded view (Preview - [see the article](#))

Data Modeling:

- Modelling operations are no longer blocked while visuals are refreshing
- Time Intelligence with built-in date hierarchy fields (Preview)
- Data model synonyms

Data Connectivity:

- Query Parameters
- Power BI Template files
- New *Online Services* category in Get Data dialog
- New Connectors:
 - SharePoint Folder
 - Webtrends
 - SparkPost
 - tyGraph
- Conditional Columns
- DirectQuery – Specify DirectQuery vs. Import mode in data source dialogs
- Column type indicator in Query Editor preview column headers
- Reorder Queries and Query Groups using Drag & Drop gestures
- Query Management menu in the ribbon

NOTE

You can also [check out all the data sources available to Power BI Desktop](#); our list is always growing, so check back often.

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

March 2016 Update (2.33.4337.281)

You can now [download the latest version of Power BI Desktop](#).

March brings all sorts of renewal and freshness, including another round of Power BI Desktop additions. The following enhancements are new to Power BI Desktop this month:

Report View:

- Publish reports to a Group Space in the Power BI service
- Reports with KPI trends now respect *Do Not Summarize* model settings from SSAS MD
- Data Point warnings are now non-intrusive

Data Modeling:

- You can now change the data type of a column when using DirectQuery mode
- Ability to assume Referential Integrity on relationships (for those imported, and created) in DirectQuery
- DirectQuery for Oracle and Teradata is now part of Power BI Desktop (no long a preview feature)

Data Connectivity:

- A new SAP BW Connector (preview feature)
- Support for Command Timeout in the user interface (UI)
- There's a setting available to disable Privacy Level prompts at the machine level (including a registry key)
- Query Group Management enhancements:
 - Expand/Collapse All
 - Retain Query Group expansion state
- New Transformations:
 - Remove Blanks using the Column Filter menu
 - Convert Duration values to Years
 - Keep Duplicates
- Support for whitespace and line feeds in Query Editor preview
- Include hints for *sample input values* in the **Change Type with Locale** dialog
- Enhancements to the **Navigator** window:
 - Add schema information to navigation hierarchy for ODBC sources
 - Ability to disable preview from **Navigator**
 - Technical name support
- Load: Auto-step to disambiguate conflicting column names (case-insensitive comparison)
- You can now rename queries directly from the **Queries** pane

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

February 2016 Update (2.32.4307.362)

You can now [download the latest version of Power BI Desktop](#).

We're leaping ahead with more updates this month! February brings 29 days to the month (it's a leap year), and with it, 29 improvements to this monthly update of Power BI Desktop. The following enhancements are new to Power BI Desktop this month:

Report View:

- See Data Behind a Visual (including *Export Data to CSV*)
- Map improvements – plot map with latitude/longitude only
- KPI consumption release support (including navigation hierarchy support and KPI trend for SSAS MD)
- SSAS Exploration Mode: Support for **Display** folders in the **Fields** pane
- Ribbon layout improvements: Contextual ribbon tab for **Report Tools**
- New KPI visual
- Get reports opened to the same page that was visible when they were saved
- **Edit Query** option in table context menu in the Fields pane (**Report** & **Data** views)
- **Duplicate Page** from the ribbon

Data Modeling:

- Ability to define hierarchies
- Performance Improvement: Table & Column rename optimizations

Data Connectivity:

- **DirectQuery** support for Oracle and Teradata databases
- **DirectQuery** – support for creating Calculated Columns
- Support for publishing Analysis Services Live reports
- JSON File connector
- SQL Sentry connector
- Support for jagged CSV files
- Exchange Connector – OAuth support
- SharePoint List Connector – URL validation

- Database Connectors – ability to disable Navigation Columns in Query previews (Performance optimization)
- Web Connector – fine-grained scoping of Credentials
- **Enter Data** dialog UX enhancements
- SAP HANA – Support for single sign-on with Windows Authentication (Power BI Desktop only)
- SAP HANA – Support for **Field** labels
- Alphabetical sort of columns in **Choose Columns** builder
- Improved performance of renaming/removing/reordering columns
- Virtualized Preview in **Query Editor**
- Visual indicator for unloaded queries in **Query Editor**
- 1-click Percentage transform

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

NOTE

You might also be interested in learning [what's new in the Power BI service](#), and also check out [what's new in the mobile apps for Power BI](#).

January 2016 Update (2.31.4280.361)

You can now [download the latest version of Power BI Desktop](#).

Ring in the new year with another collection of improvements and enhancements to Power BI Desktop. The following enhancements are new to Power BI Desktop this month:

Report View:

- Add borders to a visual
- Add an image background to a visual

Data Connectivity:

- DirectQuery: you can now create measures when using DirectQuery mode
- You can now refresh data for individual tables from the Field List (in **Report** view and **Data** view), rather than (and in addition to) just being able to **refresh all** from the ribbon
- General Availability (GA) for SQL Server Analysis Services Multidimensional models Exploration mode (no longer a preview feature)
- Enhancements to hierarchy support

- General Availability (GA) for the SAP HANA connector (no longer a preview feature)
- Ability to append multiple tables within a single Append operation
- Option to disable data previews to download in the background (performance optimization)

Other Improvements:

- Support for Internet Explorer 9 (IE9) browser
- Performance improvements for report rendering, cross-highlighting, and otherwise
- Improvements to R integration in Power BI Desktop

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

December 2015 Update (2.30.4246.181)

December is a month for giving, and the Power BI team is following suit with more updates, features, and more functionality in this month's Power BI Desktop update. The following enhancements are new to Power BI Desktop this month:

Report Authoring:

- Formatting Pane and Ribbon:
 - Format data labels per category services
 - Change the number of decimal places shown in visuals
 - Change text size in visuals
 - Ability to layout visuals accurately: alignment, distribute, size, position
 - Set styles across multiple visuals through **Format Painter**
 - Optimized **Home** ribbon layout
- Enhancements to Visualizations:
 - Visual cue for sort state in **Table** visual
 - New visual: **Stacked Area** chart
 - Smart tooltips for **Area** and **Line** charts on hover
 - Ability to create reference line/region for a **Cartesian** visual
 - Improved data labels for **Pie** and **Scatter** charts
- [R Visuals integration in Power BI Desktop \(Preview feature\)](#)
- Suggested table-to-table relationships when trying to create visuals involving two tables which are not

related

Data Modeling:

- Relationships View
 - Zooming slider
 - Fit Zoom to screen
 - Reset layout
 - Ability to zoom in CTRL+(mouse selection range)

Data Connectivity:

- [SSAS Multidimensional support - hierarchies support](#)
- Stripe Connector
- Smartsheet Connector
- **Enter Data:** paste or enter data to create a table
- DirectQuery improvements: support for all data types of T-SQL and SAP HANA, resulting in performance improvements
- ODBC Connector: support for selecting User/System DSNs
- CSV Connector: ability to specify Column Delimiter in the Source dialog

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

November 2015 Update (2.29.4217.221)

You can now [download the latest version of Power BI Desktop](#).

Another month, another big collection of new features and improvements for Power BI Desktop. Improvements range from new data connectors to new modeling capabilities. Here are 26 new features and improvements:

Report Authoring:

- Play Axis for Scatter Chart
- Horizontal Slicers
- Slicer Selection Behaviors (single vs. multi-select)
- Control Z-order
- Background Colors for Slides
- Interactions between Visuals – Subview (tile by)
- Duplicate Pages
- Support for KPIs and Images in Tables, Matrices and Cards

- Better Tooltips on Area Charts & Line Charts
- Ability to change Text size in Cards & Tables/Matrix
- Improved tooltips and labels in Field Well and Formatting panes
- Ability to see Categories with no data
- Improved Default Sort behaviors for visuals
- Ability to control Axis Scale display units
- Visuals Refresh Optimizations when applying basic modeling operations

Data Modeling:

- Basic Automatic Date Features

Data Connectivity:

- [SSAS Multidimensional support](#)
- [SAP Hana](#)
- [R Script](#)
- DirectQuery for SQL Server, Azure SQL Database and Azure SQL Data Warehouse
- Azure Data Lake
- Marketo

Data Transformations:

- Improved Function Invocation experience
- Option to set Credentials at Server vs. Database level
- Add Prefix/Suffix to a Text column

Other Improvements:

- New Documentation Website, now also including localized content

Want more information about these updates? Take a look at the [blog post](#), where you can get more detailed information about each of these new features.

The following video describes and shows each of these updates. You can also see the video from the blog post.

October 2015 Update (2.28.4190.122)

October brings another large collection of updates to Power BI Desktop:

Report Authoring:

- Custom Visualizations
- Insert Visual from the Ribbon
- Improved Default Sorting

- Tooltips & Data Labels on Funnel Charts
- Slicer Improvements:
 - Ability to Sort items
 - Ability to change Font Size
- Additional Formatting Options for Gauges
- Data Point Label layout improvements
- KPI Consumption (Preview Feature)

Data Modeling:

- Semi-Select support for DAX formulas in Data view

Data Connectivity:

- Azure Document DB connector
- Mailchimp connector
- DirectQuery for SQL Server and Azure SQL Database (Preview Feature)

Data Transformations:

- Filter by "not earliest/latest date"
- Filter by "is in previous N minutes/hours/seconds"
- Copy/Paste Queries between Power BI Desktop and Excel
- Support for Special Characters in Split Column
- Refresh Previews in Merge Queries dialog
- Monospaced font for Query Editor Preview

Other Improvements:

- Refresh Single Table (vs. All) from Report & Data Views
- Option to enable Preview features
- In-Product Ratings experience

You can view a video of all these updates, too.

For more information, [check out the blog announcement](#) that describes more details about each update.

September 2015 Update (2.27.4163.351)

The following massive collection of 44 features has been added to this update:

Report Authoring

- Report-level filters
- Drill Up/Down for column and scatter charts

- New Page Size and Page View options
- Support for inserting Shapes in the Report canvas
- Fields pane improvements
 - Search Box to make it easier to find fields by name
 - "Expand/Collapse All" to improve navigation when there are multiple tables in the Fields pane
 - Field well cardinality support, drag-replace for buckets with 1 item
 - Additional Data Labels formatting options
 - Chart Cartesian Axis Improvements:
 - X-Axis label direction (horizontal / diagonal)
 - Support for Logarithmic & Linear scales for values in Y-axis
 - Display Text for hyperlinks in text boxes
 - Improvements to existing visualizations: Table, Matrix, Slicer, Scatter Chart, Single Cards, Combo Charts and Gauges
 - Support for displaying Color Saturation values in tooltips
 - Ability to resize images and apply additional formatting options

Data Modeling

- Calculated Tables.
- Relationships view:
 - Create relationships via drag/drop between two tables in the diagram.
 - Delete relationships in relationship view by selecting and hitting the Delete key.
 - Rename/delete tables and columns
- Data view:
 - Copy Table contents to clipboard.
- Field Summarization:
 - Support for additional operations in the Fields pane: median, standard deviation, and variance
 - Default summarization: Users can now customize the default summarization operation for any given field in their model

Data Connectivity

- Support for on-premises Spark distributions
- Support for SharePoint lists from non-English sites
- Exchange connector - Enhanced support, now allowing connections to multiple mailboxes
- Excel Workbook Connector – Automatic Column Type detection when importing .XLS files
- "Select Related Tables" option when connecting to database sources
- Enhanced Active Directory connector credentials, allowing alternate Windows Credentials
- Improved Function Invocation experience when loading functions from a data source (such as a database)
- "Import Excel Workbook Contents" feature released last month now also supports external connections to Analysis Services tabular models
- New option to "Delete All" entries in the Data Source Settings dialog
- Option to "Enable Relationship Import during Refresh operations"

Data Transformations and Query Editor Improvements

- Copy to clipboard (available for cells/columns/tables)
- Filter date columns by earliest/latest date (dynamic filter)
- Extract min/max date/time value from a column
- Replace Values - Provision for specifying special characters
- "Detect Column Types" option to trigger type detection on demand

- “Refresh All Previews” to refresh all Query Editor previews with a single click
- Performance Improvements:
 - Choose Columns dialog: Faster user experience for dealing with wide tables
 - Auto-filter & Expand/Aggregate popups: Faster for large number of values/fields

The following video covers these features in more detail.

For more information about this update, [check out the blog announcement](#) that describes more details about each update.

August 2015 Update (2.26.4128.403)

The following features have been added to this update:

Overall Improvements:

- Import Excel Power BI artifacts (Data Model, Queries, Power View) into a new Power BI Desktop file
- HDInsight Spark connector
- Azure SQL Data Warehouse connector
- Support for custom MDX/DAQ queries when importing data from SSAS
- Live Analysis Services Connections: ability to change the database from **Edit Queries** dialog

Navigator dialog improvements:

- Resizable Navigator dialog
- Ability to multi-select items in Navigator (CTRL+click, SHIFT+click, etc)

Query Editor improvements:

- Query Group creation/deletion improvements (multi-select, etc.)
- Ability to Split Query (i.e. refactor common base steps into a new query)
- Query Icons to reflect type of query in Queries navigator pane

Data Modeling improvements:

- Resizing of columns in Data View
- Moving Measures from one table to another

Take a look at the following video for more details about this update:

July 2015 Update (2.25.4095.554)

The following features have been added in this update:

- **New Data Connectors:** appFigures, Quickbooks Online, Zendesk, Github, Twilio and SweetIQ.
- **New Transformations:** Extract First/Last/Range of characters from a Text Column; Option to specify Join Type in the Merge Queries dialog; Ability to customize Quote Style in Split Column by Delimiter dialog.
- **Report Authoring Improvements:** New visualizations (Area Chart, Waterfall, Donut & Matrix); New visual formatting and customization options (labels, titles, background, legend, colors, etc.); Insert Textbox and Picture in your report; Support for hyperlinks in reports and report tables; Undo/Redo actions.
- **Direct Report Exploration** over Analysis Services Tabular Models.
- **Data Modeling:** New Data View & Relationships views.
- Publish reports to PowerBI.com, directly from Power BI Desktop.
- Support for opening Recent Files in Start Page and "File -> Open" menu.
- Support for Exchange UPN Credentials in the Exchange connector.

In addition to all these new features, we're also making **Power BI Desktop available in 42 different languages**. Get the full list of languages and install the one you want from [our official download page](#).

Take a look at the following video for more details:

May 2015 Update (2.23.4036.161)

The following features have been added in this update:

Modeling Features

- Calculated Columns
- Data Categorization
- Sort By Another Column
- Improved DAX Formula Editor: Function Help and Prototype

Get Data & Query

- New **ODBC Tables** connector (Beta)
- Improved to the **Excel Workbook** connector: better column type inference and faster load for data previews
- New Text Column Filters - **Does Not Begin With** and **Does Not End With**
- Enhanced Privacy Levels dialog

Take a look at the following video for details:

April 2015 Update (2.22.4009.122)

You can now [download the latest version of Power BI Desktop](#).

The following features have been added in this update:

Modeling Features

- Initial support for DAX Measures
- New DAX functions
- Data Types & Formatting options in Report view
- Rename & Delete fields in Report view

Get Data & Query

- OData V4 support
- Support for Custom ADFS Authentication Services
- Updated Facebook connector due to Facebook API changes
- Unified Options dialog
- Option to disable Native Database query prompts

- Support for **Fixed Decimal Number** type
- Alternate Windows Credentials
- Remove Blank Rows
- Median Operation available for **Group By** and **Aggregate Column**
- Convert **DateTimeZone** value to **Local Time**

Performance Improvements

- Faster load of medium & large datasets by about 20%
- Improved time to open an existing PBIX file by about 50%

You can watch the following video for details:

March 2015 Update (2.21.3975.261)

The following features have been added in this update:

- **Google Analytics** connector
- Additional operators for **date filtering in Query view**
- **Automatic Model Relationship Detection**
- Enhanced **Add Relationship** dialog
- **Report Pages Re-ordering** (drag & drop)
- ~40-50% **Performance Improvement** filling database tables without filters/transforms
- Lots of bug fixes

You can watch the following video for more details:

February 2015 Update (2.20.3945.102)

The following features have been added or improved in this update:

- Performance improvements
- Dynamics CRM Online connector > [!NOTE] > Currently, only URLs within the crm.microsoft.com domain are accepted by this dialog. This does not include non-production tenants. We'll fix this issue in our March update. The temporary workaround is to connect to this feed using "From OData".*
- Navigator Dialog improvements
 - Better preview experience for multi-dimensional sources (Analysis Services and SAP BusinessObjects)
 - Show Selected Items option
 - Improved Search capabilities in the Navigator tree
- New Transformations
 - Age and Subtract operations for Date/Time columns
 - Aggregate Columns: Option to disable new columns' prefix
- Field List improvements
 - Expand/Collapse tables
 - Hide/Unhide fields
 - Optimized layout (spacing, margins, and fonts)
- Report Pages Navigation - Keyboarding support
- Lots of bug fixes

January 2015 Update (2.19.3923.101)

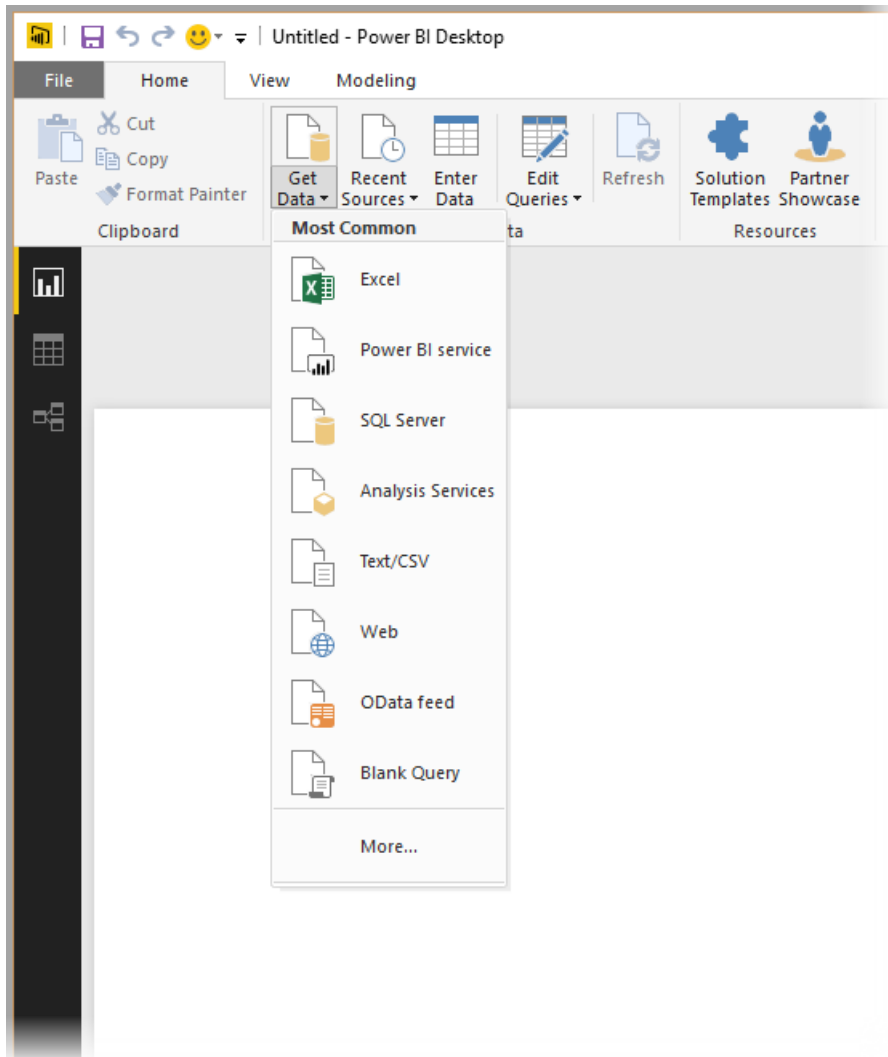
This month we've made a number of improvements and bug fixes under the covers. Please try out the new version and continue to send us feedback if you find any issues!

Data sources in Power BI Desktop

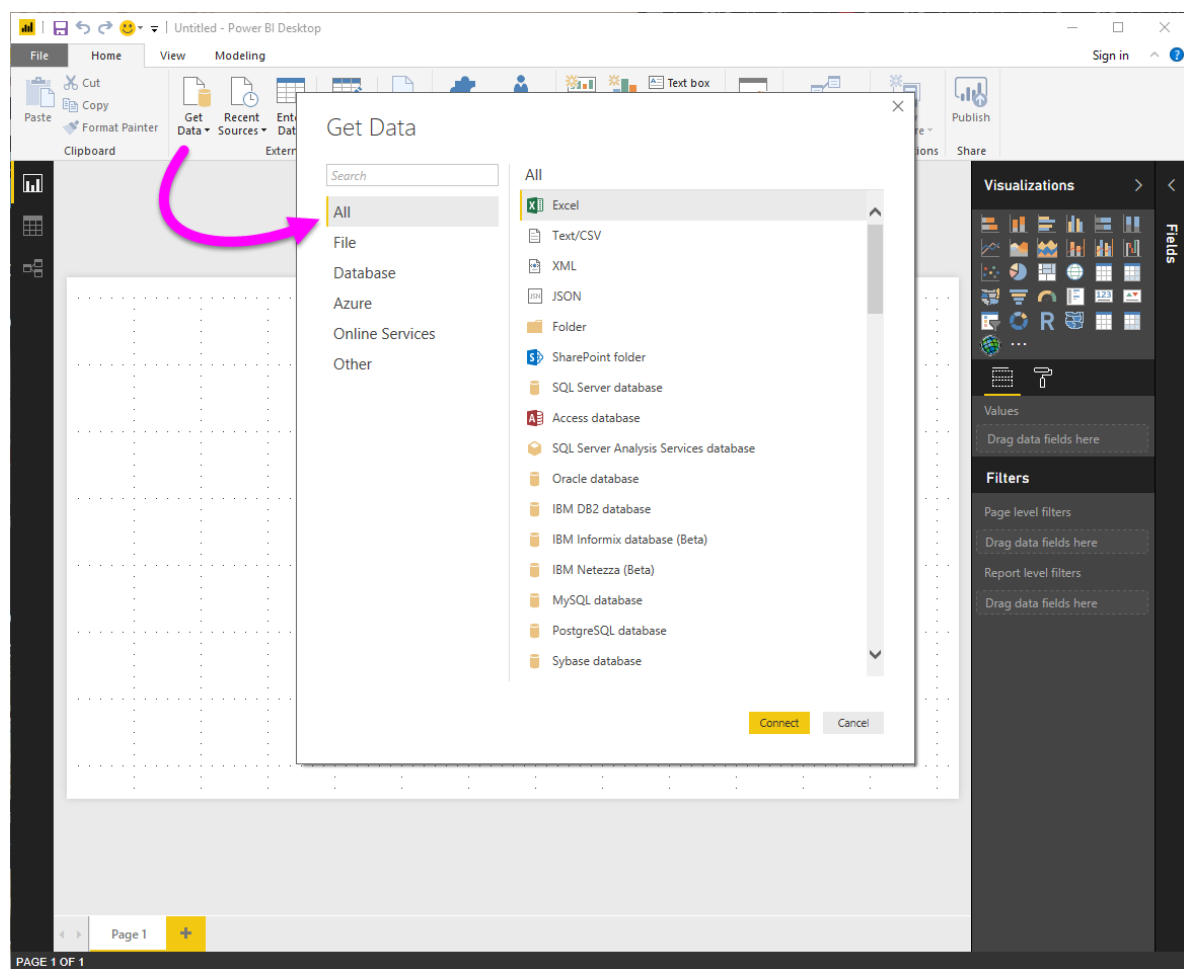
1/25/2018 • 4 min to read • [Edit Online](#)

With Power BI Desktop, you can connect to data from many different sources. A full list of available data sources is at the bottom of this page.

To connect to data, select **Get Data** from the **Home** ribbon. Selecting the down arrow, or the **Get Data** text on the button, shows the **Most Common** data types menu shown in the following image.



Selecting **More...** from the **Most Common** menu displays the **Get Data** window. You can also bring up the **Get Data** window (and bypass the **Most Common** menu) by selecting the **Get Data icon button** directly.



NOTE

The Power BI team is continually expanding the data sources available to **Power BI Desktop** and the **Power BI service**. As such, you'll often see early versions of work-in-progress data sources marked as *Beta* or *Preview*. Any data source marked as *Beta* or *Preview* has limited support and functionality, and should not be used in production environments.

Data Sources

Data types are organized in the following categories:

- All
- File
- Database
- Azure
- Online Services
- Other

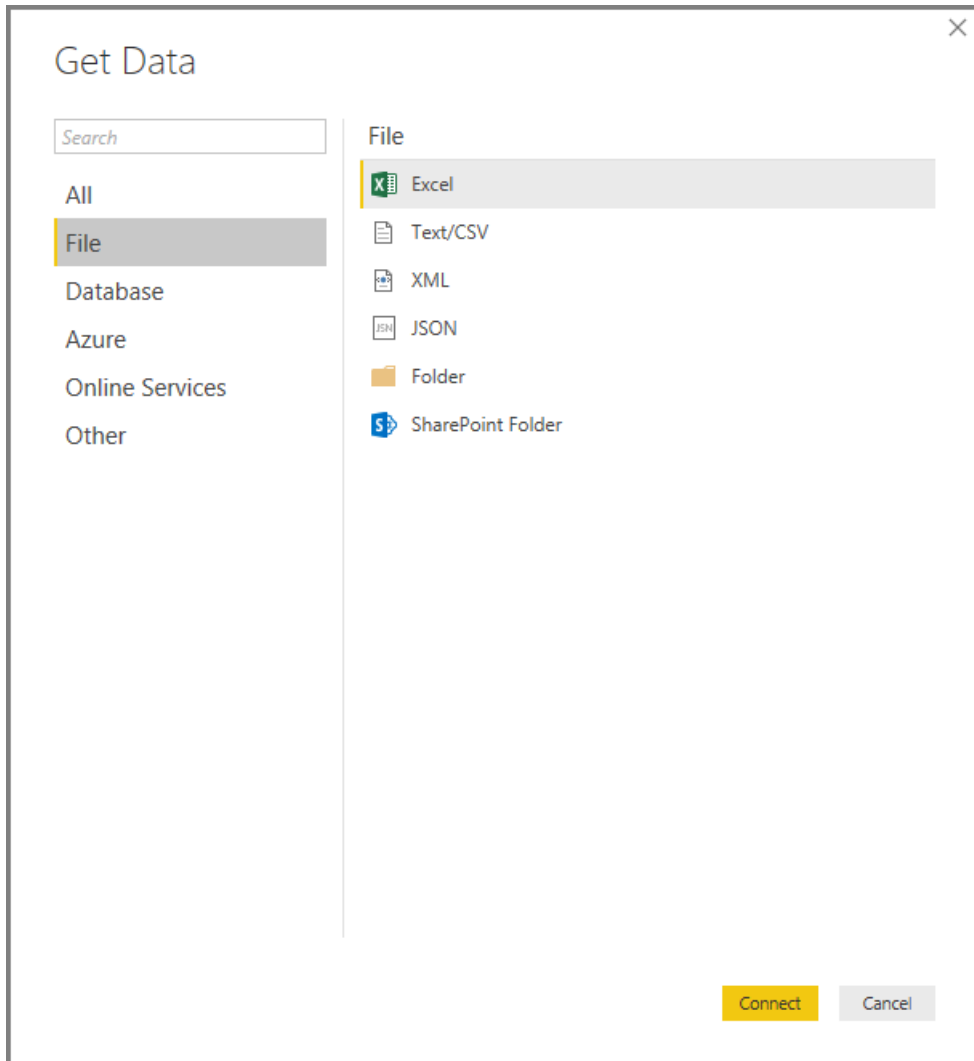
The **All** category includes all data connection types from all categories.

The **File** category provides the following data connections:

- Excel
- Text/CSV
- XML
- JSON
- Folder

- SharePoint Folder

The following image shows the **Get Data** window for **File**.



NOTE

In previous versions of Power BI Desktop, **CSV** and **Text** were separate data connection types. Those data connectors have been combined into **CSV/Text**.

The **Database** category provides the following data connections:

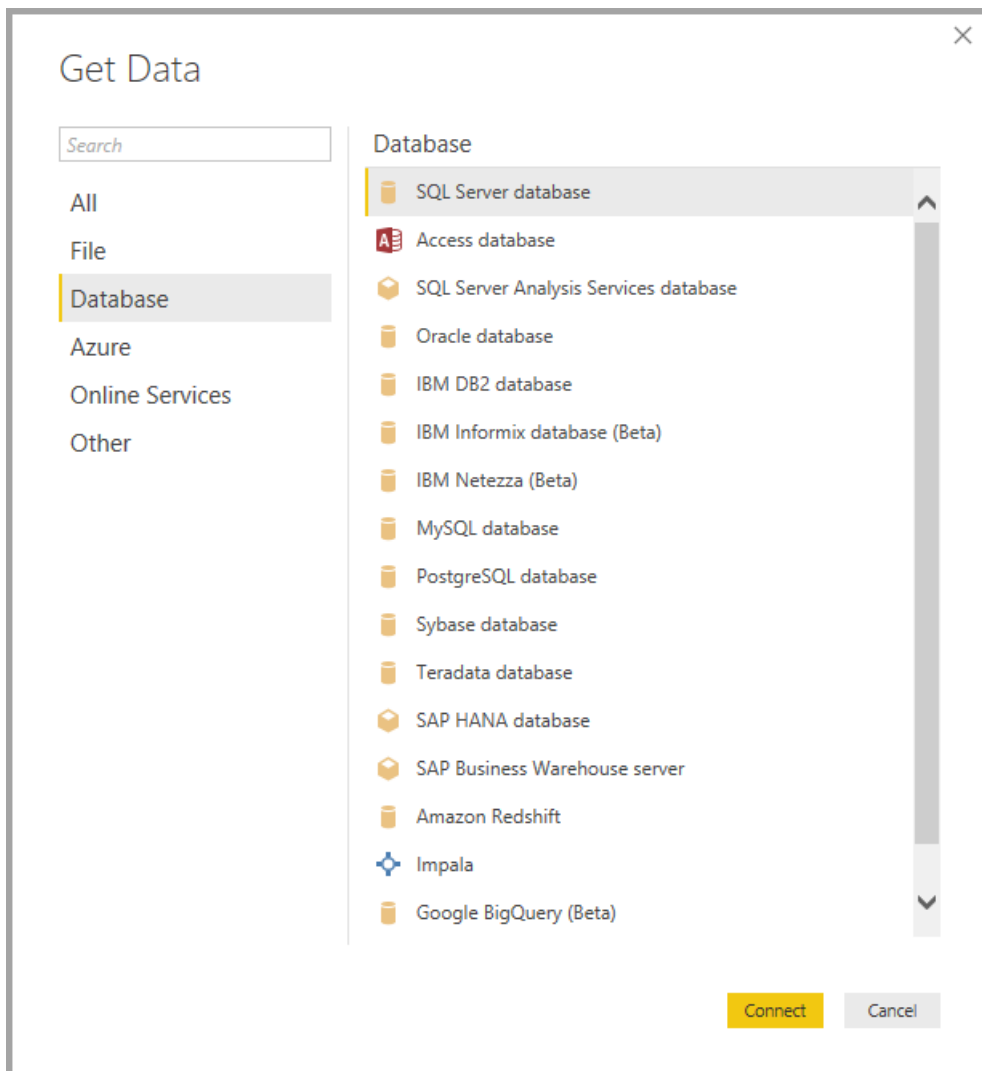
- SQL Server Database
- Access Database
- SQL Server Analysis Services Database
- Oracle Database
- IBM DB2 Database
- IBM Informix database (Beta)
- IBM Netezza (Beta)
- MySQL Database
- PostgreSQL Database
- Sybase Database
- Teradata Database
- SAP HANA Database
- SAP Business Warehouse server

- Amazon Redshift
- Impala
- Google BigQuery (Beta)
- Snowflake

NOTE

Some database connectors require that you enable them by selecting **File > Options and settings > Options** then selecting **Preview Features** and enabling the connector. If you don't see some of the connectors mentioned above and want to use them, check your **Preview Features** settings. Also note that any data source marked as *Beta* or *Preview* has limited support and functionality, and should not be used in production environments.

The following image shows the **Get Data** window for **Database**.

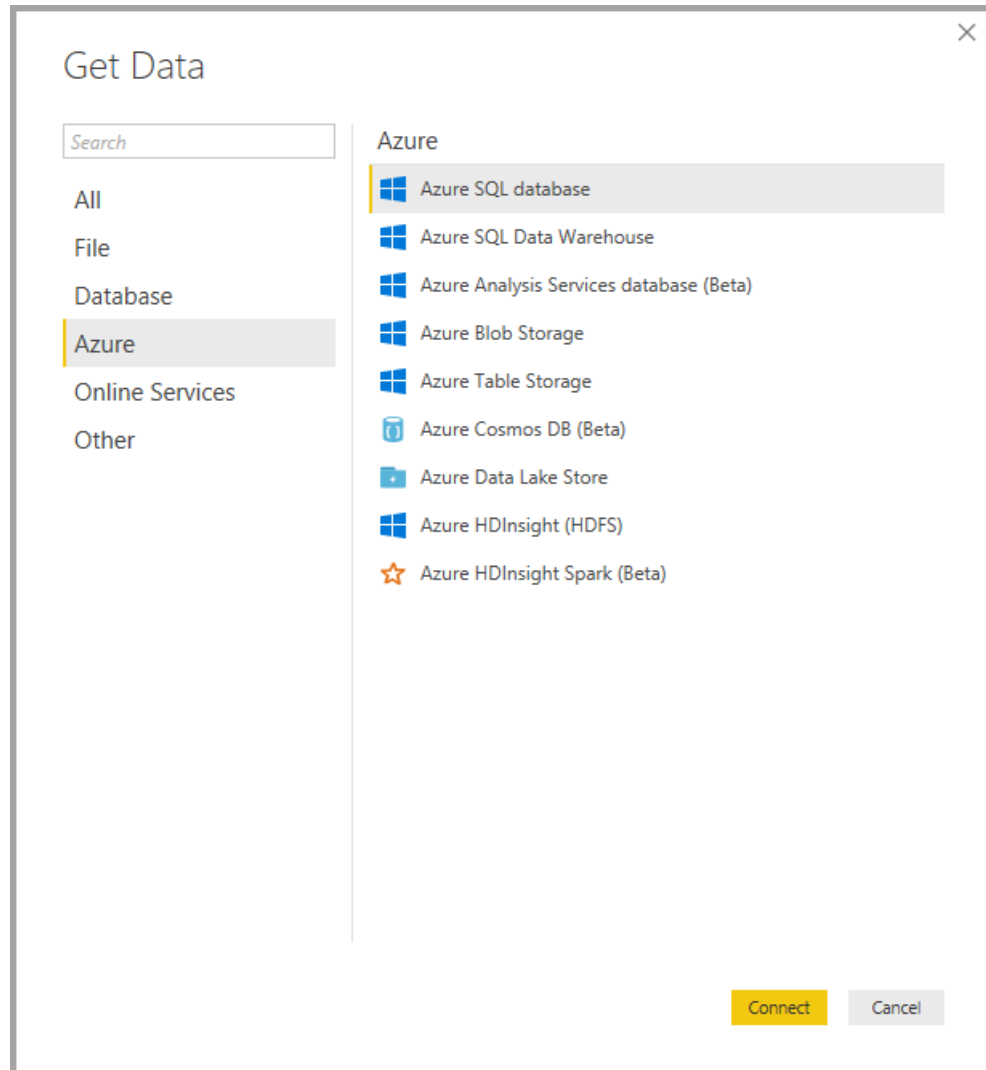


The **Azure** category provides the following data connections:

- Azure SQL Database
- Azure SQL Data Warehouse
- Azure Analysis Services database (Beta)
- Azure Blob Storage
- Azure Table Storage
- Azure Cosmos DB (Beta)
- Azure Data Lake Store
- Azure HDInsight (HDFS)

- Azure HDInsight Spark (Beta)

The following image shows the **Get Data** window for **Azure**.

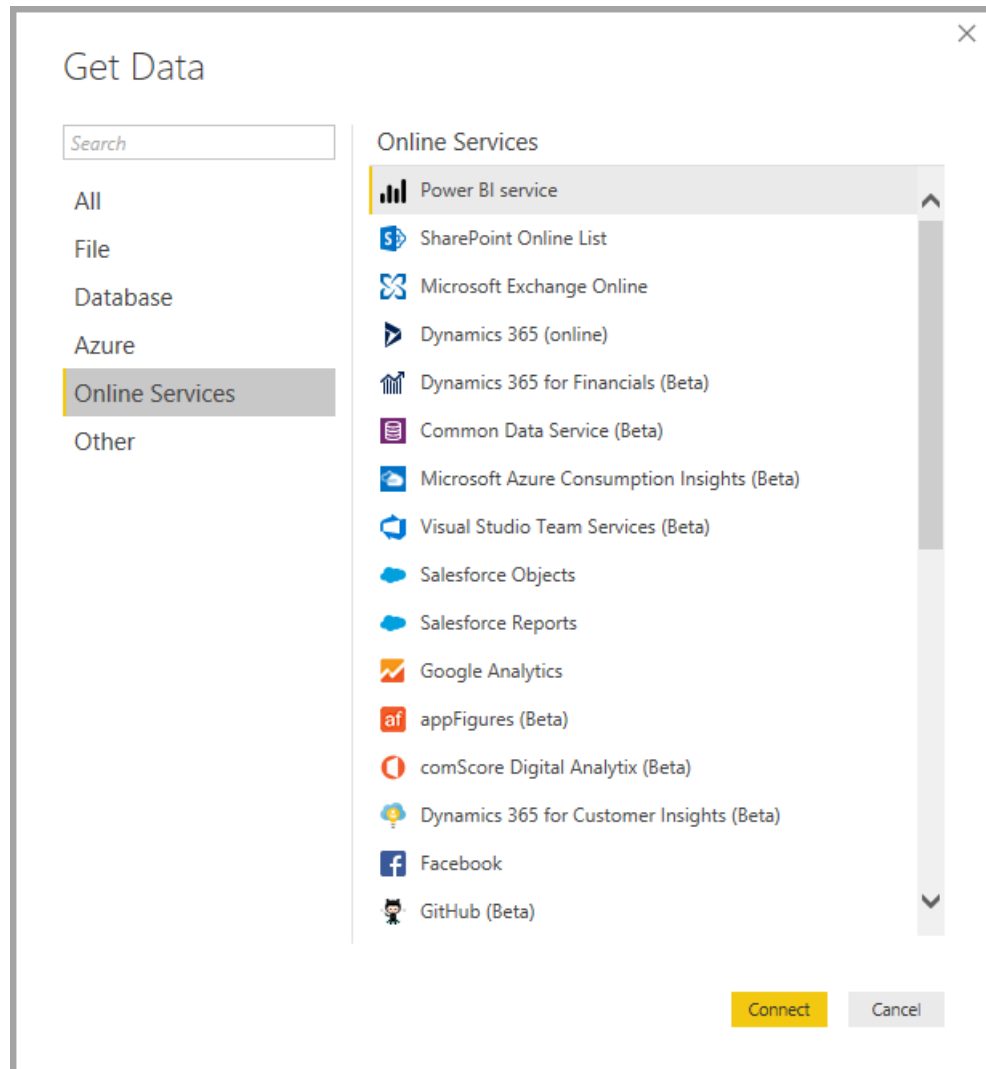


The **Online Services** category provides the following data connections:

- Power BI service
- SharePoint Online List
- Microsoft Exchange Online
- Dynamics 365 (online)
- Dynamics 365 for Financials (Beta)
- Common Data Service (Beta)
- Microsoft Azure Consumption Insights (Beta)
- Visual Studio Team Services (Beta)
- Salesforce Objects
- Salesforce Reports
- Google Analytics
- appFigures (Beta)
- comScore Digital Analytix (Beta)
- Dynamics 365 for Customer Insights (Beta)
- Facebook
- GitHub (Beta)
- Kusto (Beta)
- MailChimp (Beta)

- Mixpanel (Beta)
- Planview Enterprise (Beta)
- Projectplace (Beta)
- QuickBooks Online (Beta)
- Smartsheet
- SparkPost (Beta)
- SQL Sentry (Beta)
- Stripe (Beta)
- SweetIQ (Beta)
- Troux (Beta)
- Twilio (Beta)
- tyGraph (Beta)
- Webtrends (Beta)
- Zendesk (Beta)

The following image shows the **Get Data** window for **Online Services**.

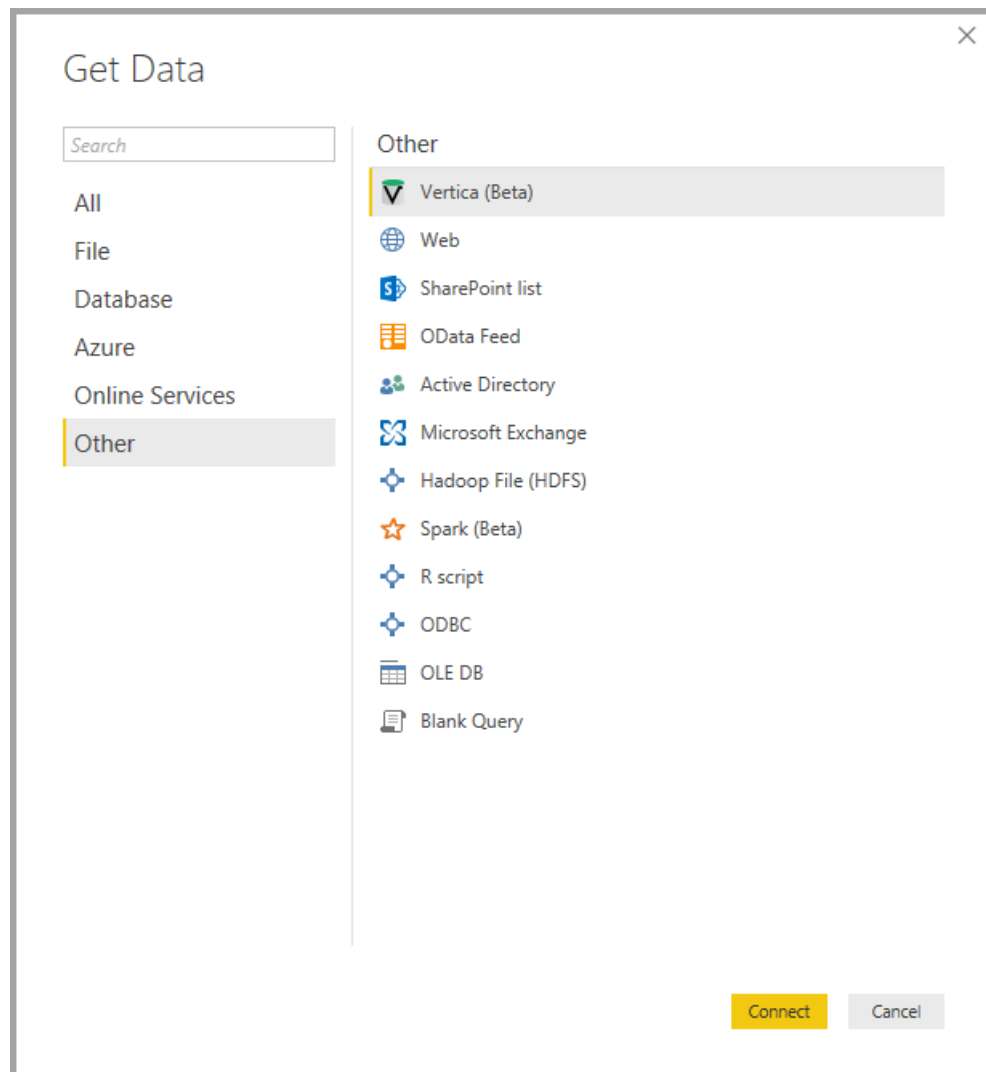


The **Other** category provides the following data connections:

- Vertica (Beta)
- Web
- SharePoint List
- OData Feed

- Active Directory
- Microsoft Exchange
- Hadoop File (HDFS)
- Spark (Beta)
- R Script
- ODBC
- OLE DB
- Blank Query

The following image shows the **Get Data** window for **Other**.

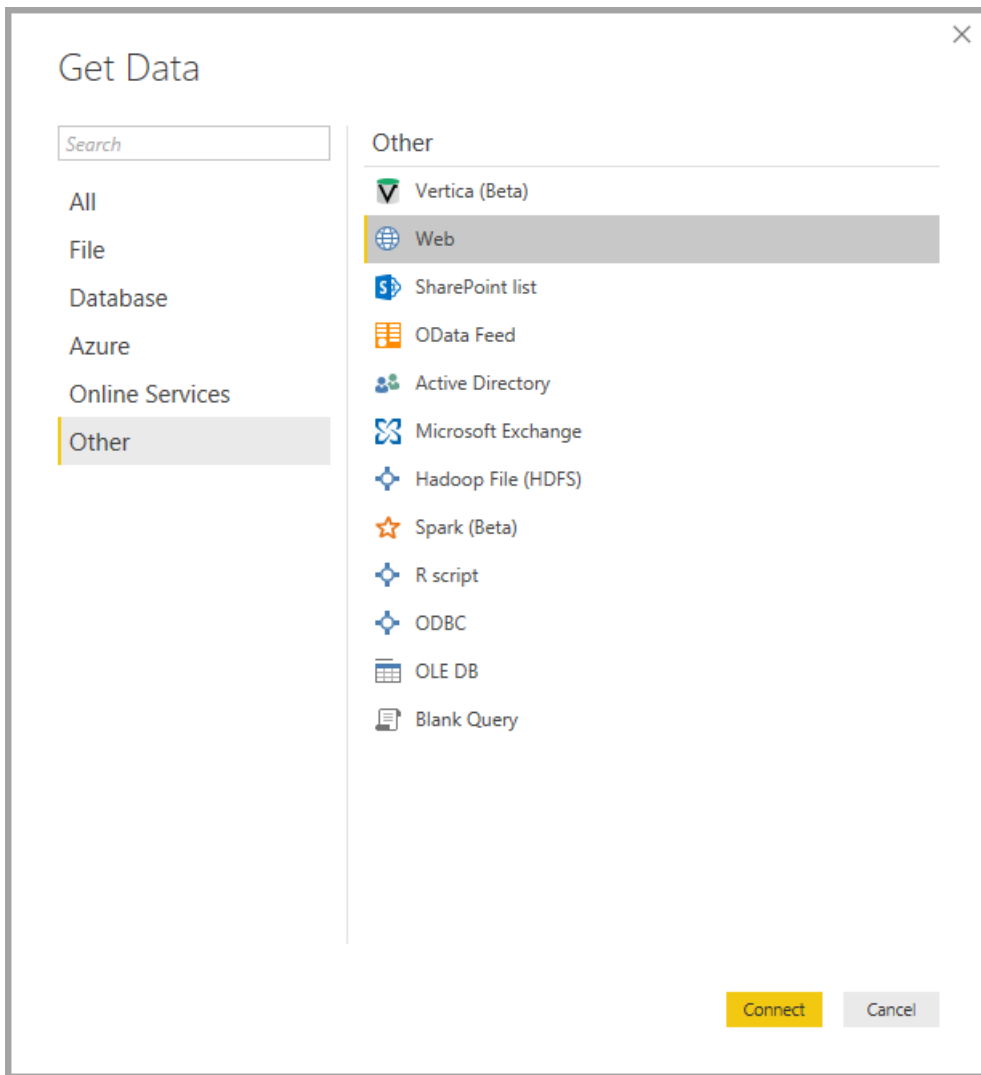


NOTE

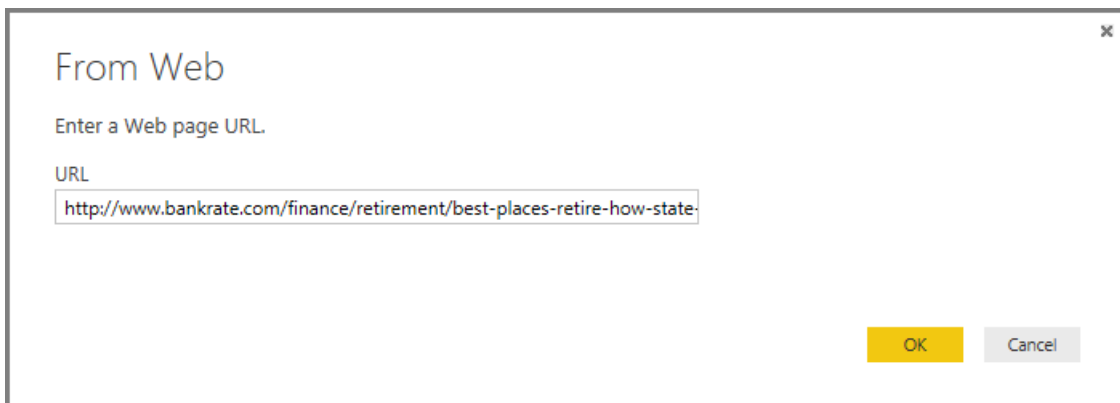
At this time, it's not possible to connect to custom data sources secured using Azure Active Directory.

Connecting to a Data Source

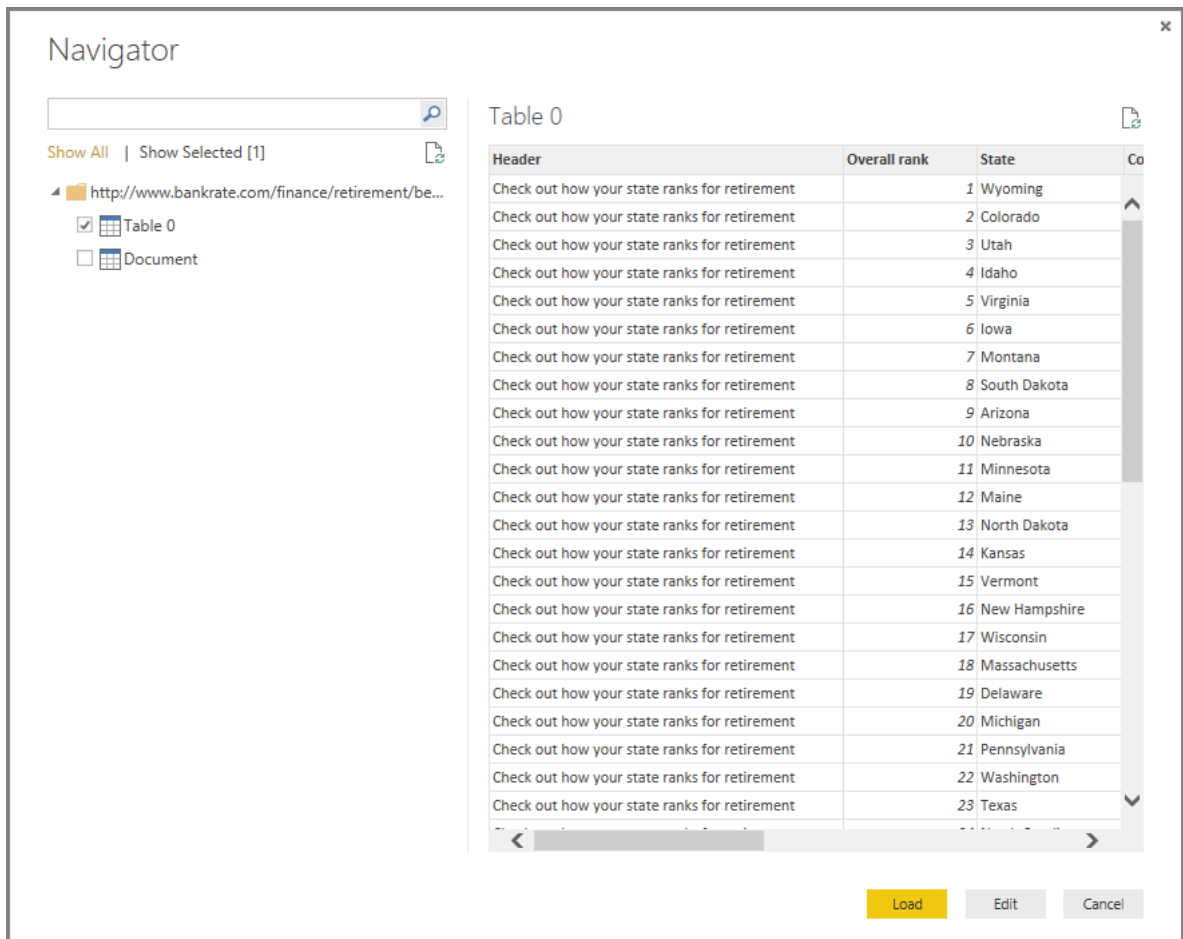
To connect to a data source, select the data source from the **Get Data** window and select **Connect**. In the following image, **Web** is selected from the **Other** data connection category.



A connection window is displayed, specific to the type of data connection. If credentials are required, you'll be prompted to provide them. The following image shows a URL being entered to connect to a Web data source.



When the URL or resource connection information is entered, select **OK**. Power BI Desktop makes the connection to the data source, and presents the available data sources in the **Navigator**.



You can either load the data by selecting the **Load** button at the bottom of the **Navigator** pane, or edit the query before loading data by selecting the **Edit** button.

That's all there is to connecting to data sources in Power BI Desktop! Try connecting to data from our growing list of data sources, and check back often - we continue to add to this list all the time.

Next steps

There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

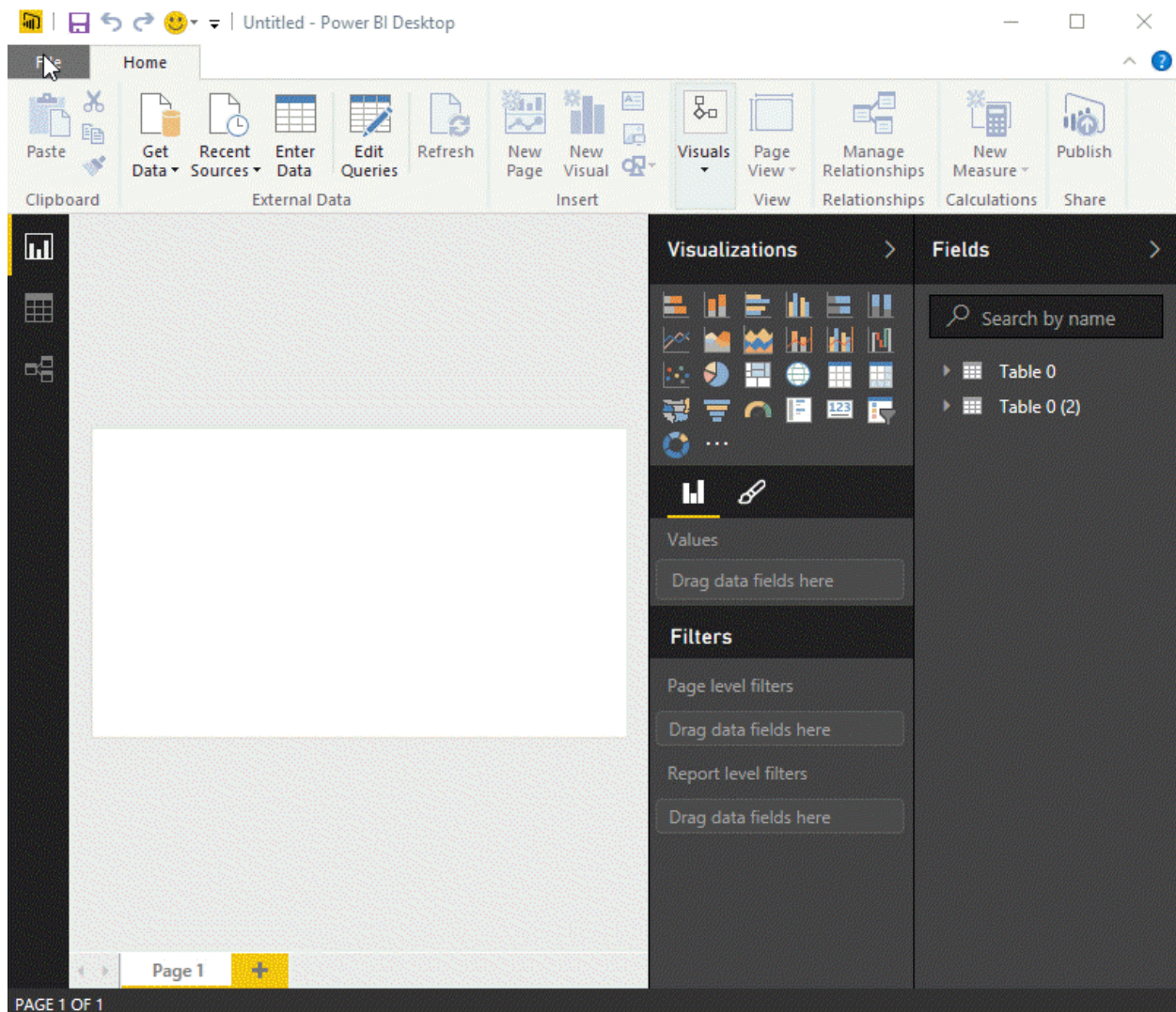
- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Types in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

Connect to data in Power BI Desktop

12/6/2017 • 2 min to read • [Edit Online](#)

With Power BI Desktop you can easily connect to the ever expanding world of data. If you don't have Power BI Desktop, you can [download](#) and install it.

There are *all sorts* of data sources available in Power BI Desktop. The following image shows how to connect to data, by selecting the **File** ribbon, then **Get Data > More**.



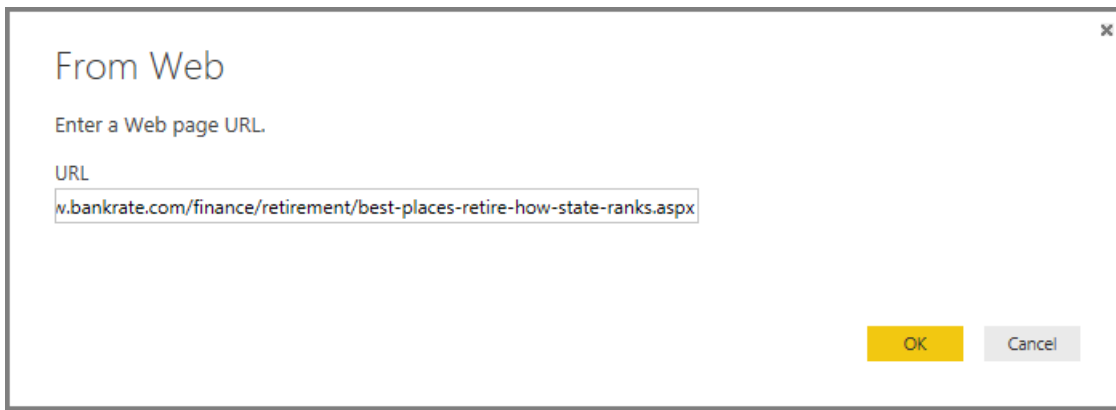
For this example, we'll connect to a **Web** data source.

Imagine you're retiring – you want to live where there's lots of sunshine, preferable taxes, and good health care. Or... perhaps you're a data analyst, and you want that information to help your customers – as in, help your raincoat manufacturing client target sales where it rains a *lot*.

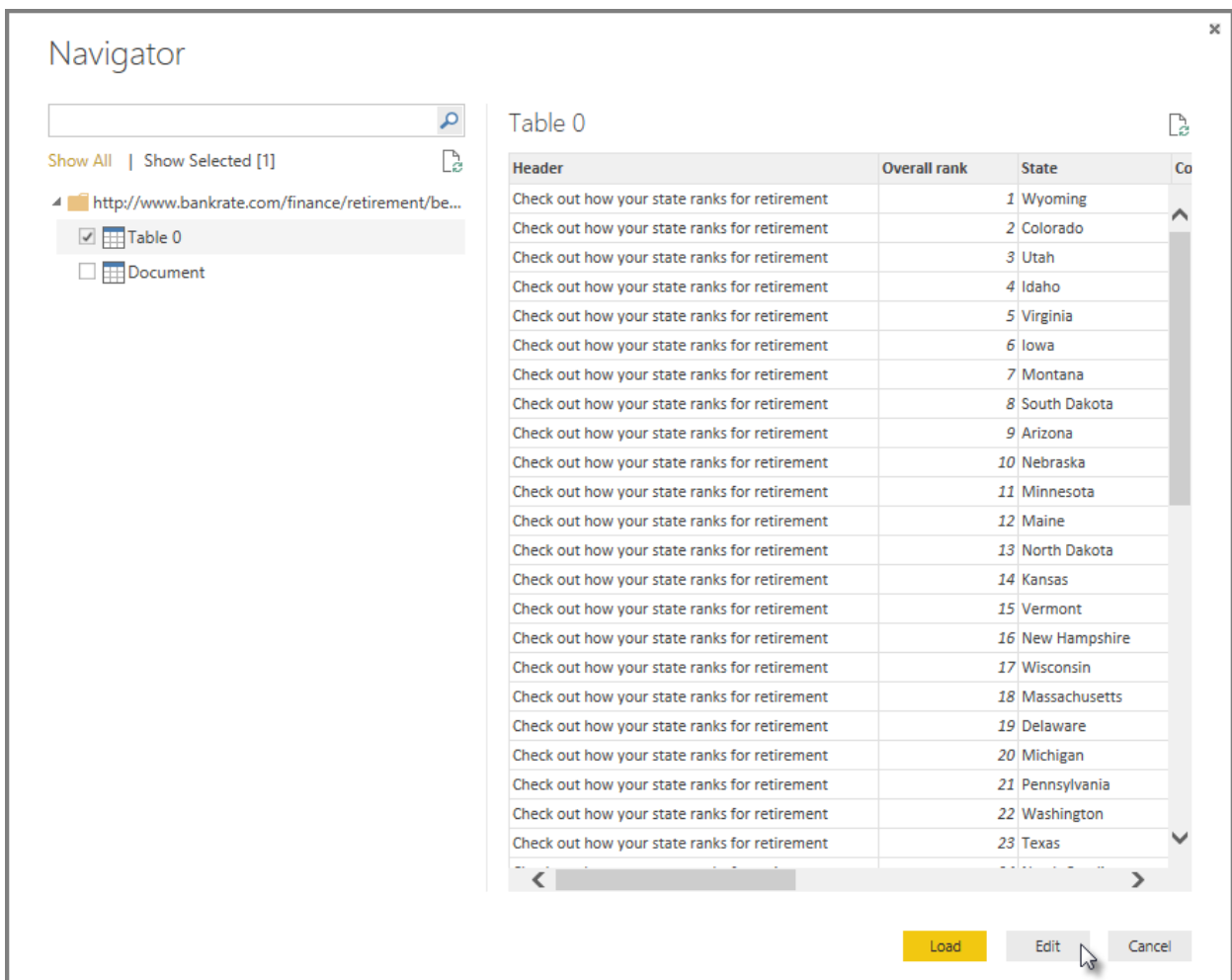
Either way, you find a Web resource that has interesting data about those topics, and more:

<http://www.bankrate.com/finance/retirement/best-places-retire-how-state-ranks.aspx>

You select **Get Data > Web** and type the address.

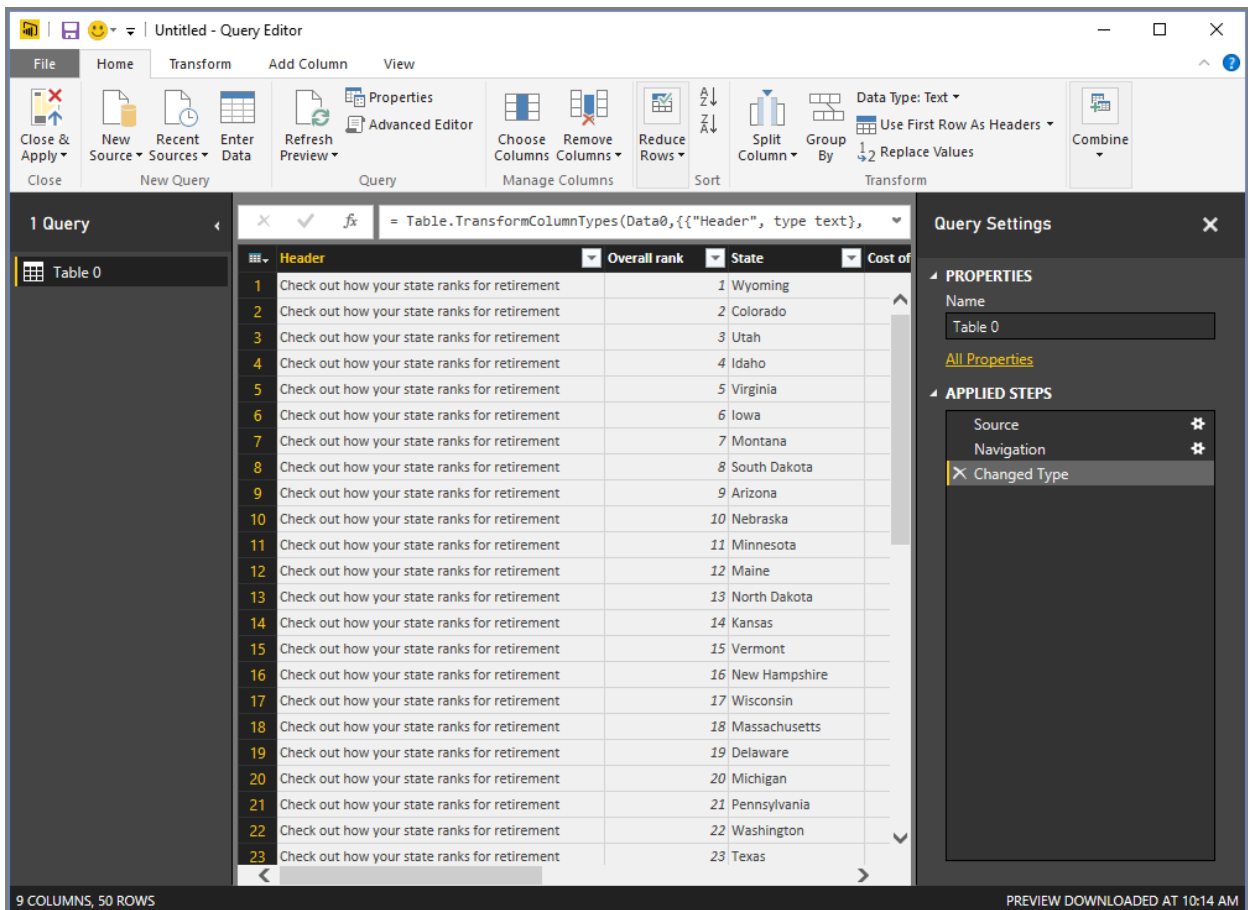


When you select **OK**, the **Query** functionality of Power BI Desktop goes to work. Power BI Desktop contacts the Web resource, and the **Navigator** window returns the results of what it found on that Web page. In this case, it found a table (Table 0) and the overall Document. We're interested in the table, so we select it from the list. The **Navigator** window displays a preview.

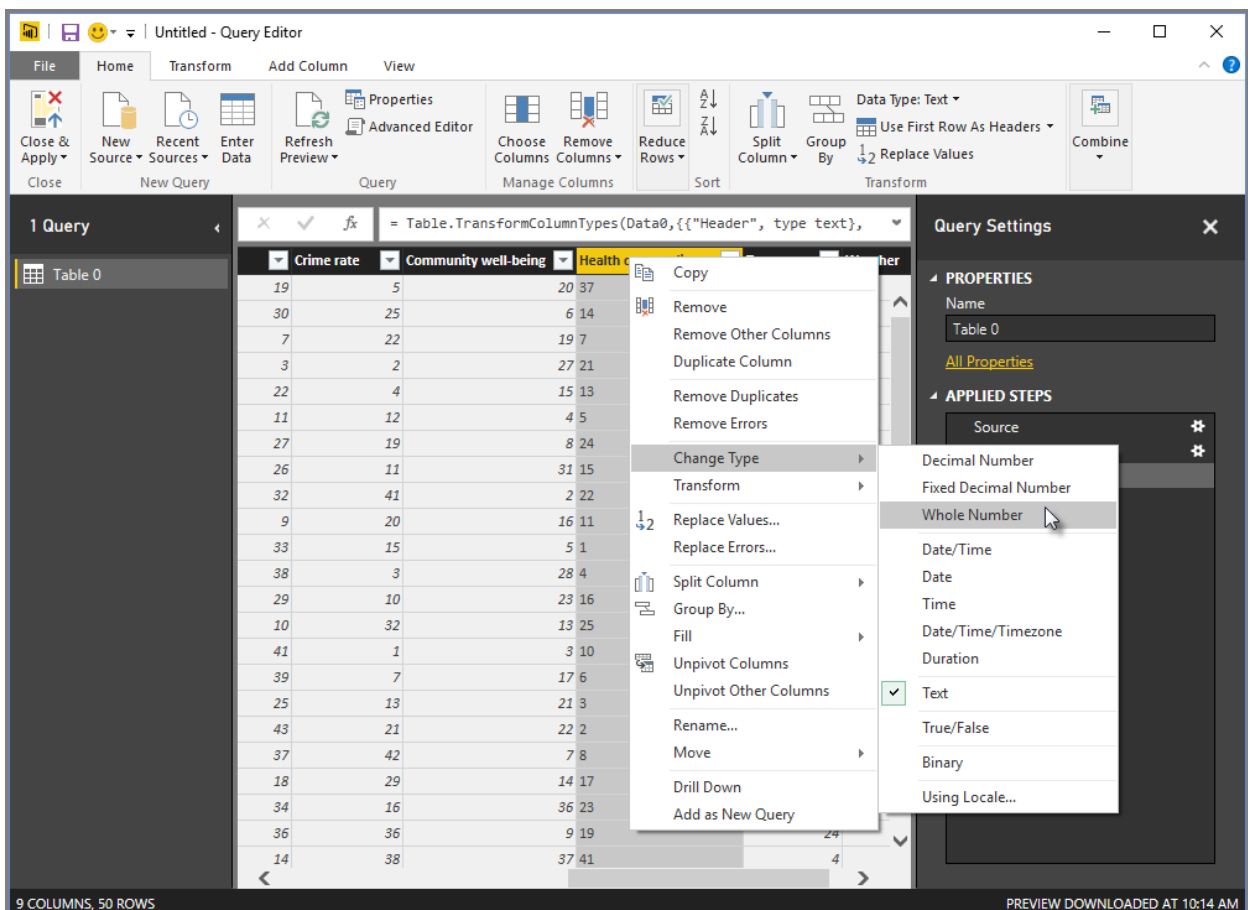


At this point we can edit the query before loading the table, by selecting **Edit** from the bottom of the window, or we can load the table.

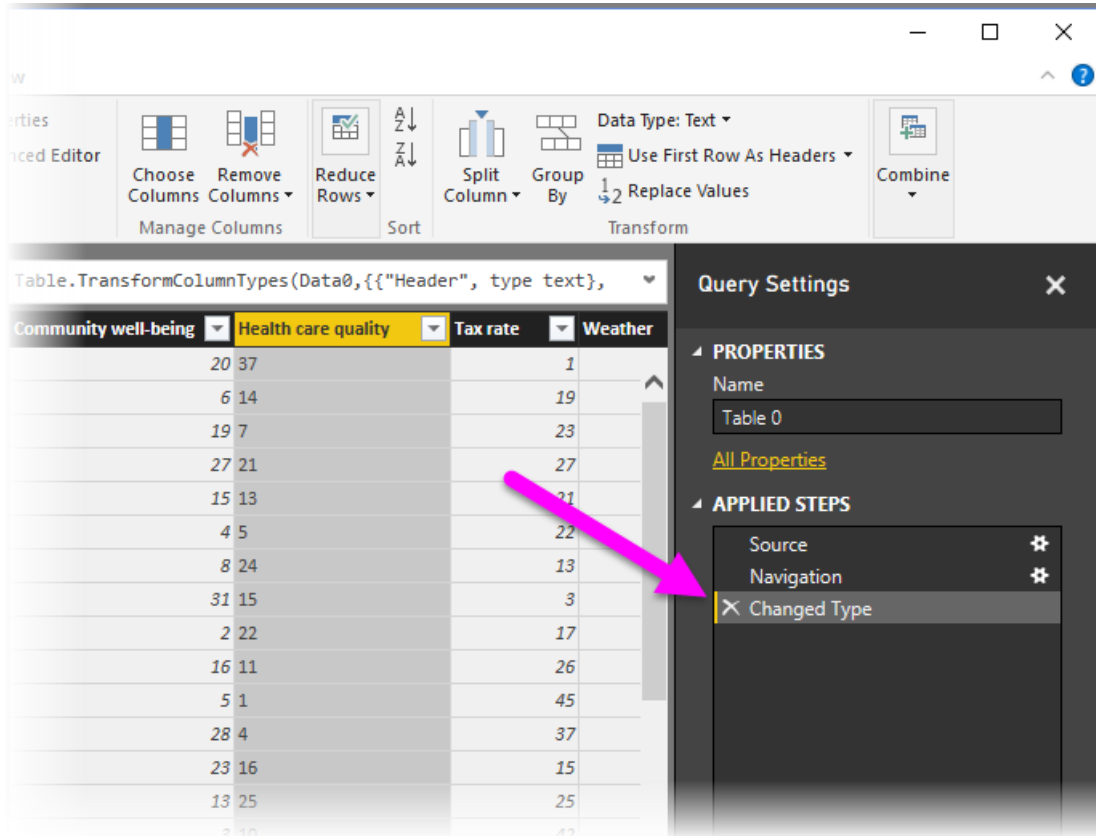
If we select **Edit**, the table is loaded and Query Editor is launched. The **Query Settings** pane is displayed (if it's not, you can select **View** from the ribbon, then **Show > Query Settings** to display the **Query Settings** pane). Here's what that looks like.



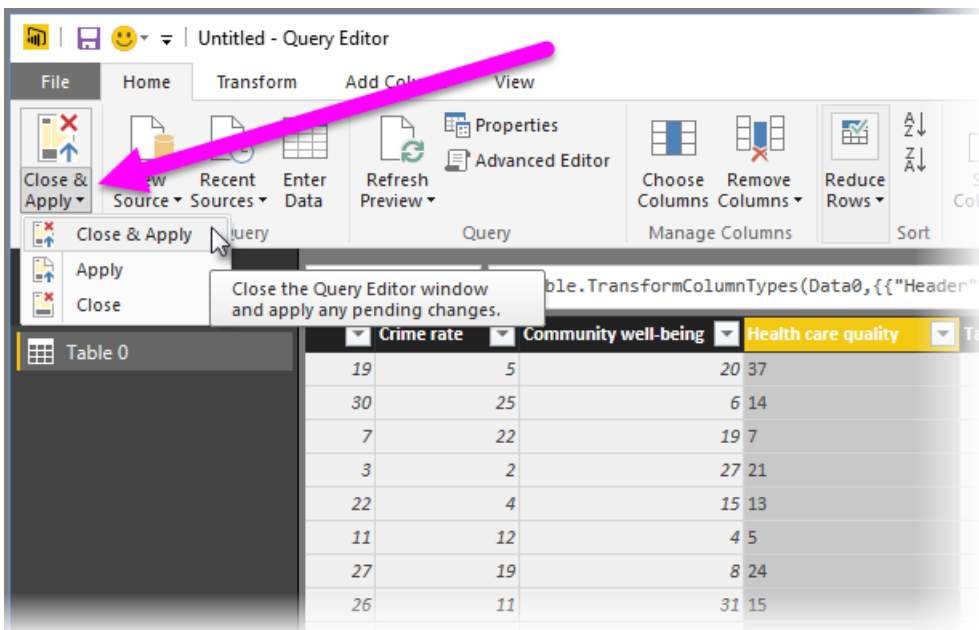
All those scores are text rather than numbers, and we need them to be numbers. No problem – just right-click the column header, and select **Change Type > Whole Number** to change them. To choose more than one column, first select a column then hold down **SHIFT**, select additional adjacent columns, and then right-click a column header to change all selected columns. Use **CTRL** to choose columns that are not adjacent.



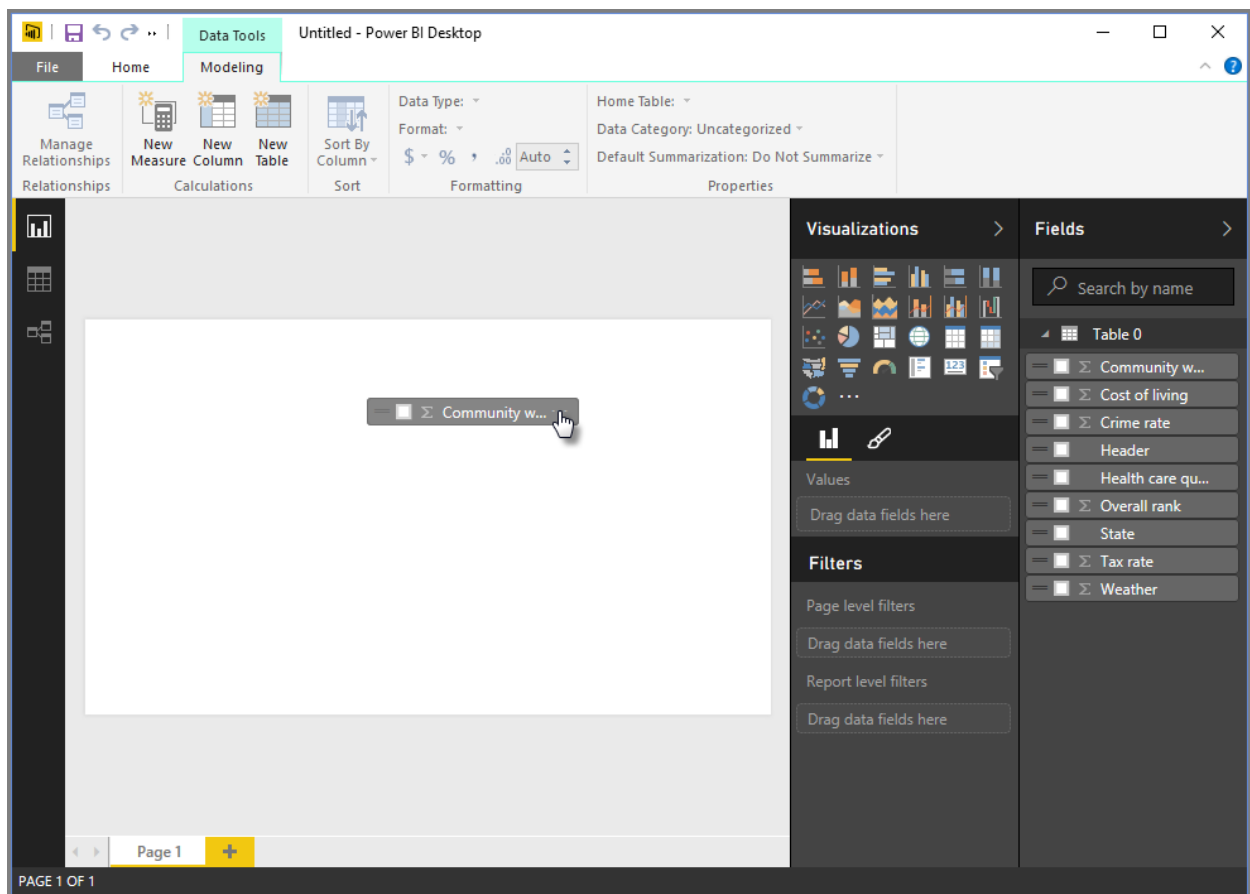
In **Query Settings**, the **Applied Steps** will reflect any changes that were made. As you make additional changes to the data, Query Editor will record those changes in the **Applied Steps** section, which you can adjust, revisit, rearrange, or delete as necessary.



Additional changes to the table can still be made after it's loaded, but for now this will do. When we're done we select **Close & Apply** from the **Home** ribbon, and Power BI Desktop applies our changes and closes Query Editor.



With the data model loaded, in **Report** view in Power BI Desktop, we can begin creating visualizations by dragging fields onto the canvas.



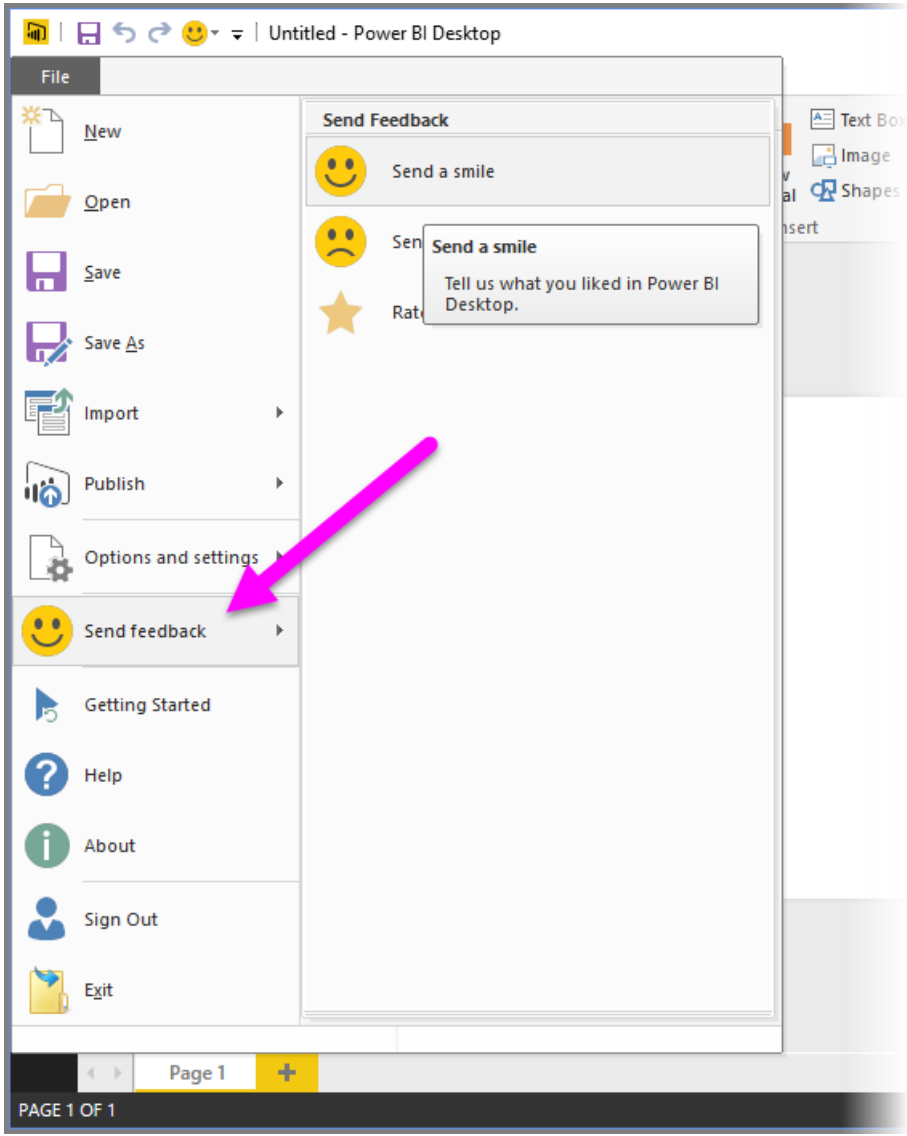
Of course, this is a simple model with a single data connection; most Power BI Desktop reports will have connections to different data sources, shaped to meet your needs, with relationships that produce a rich data model.

Next steps

There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

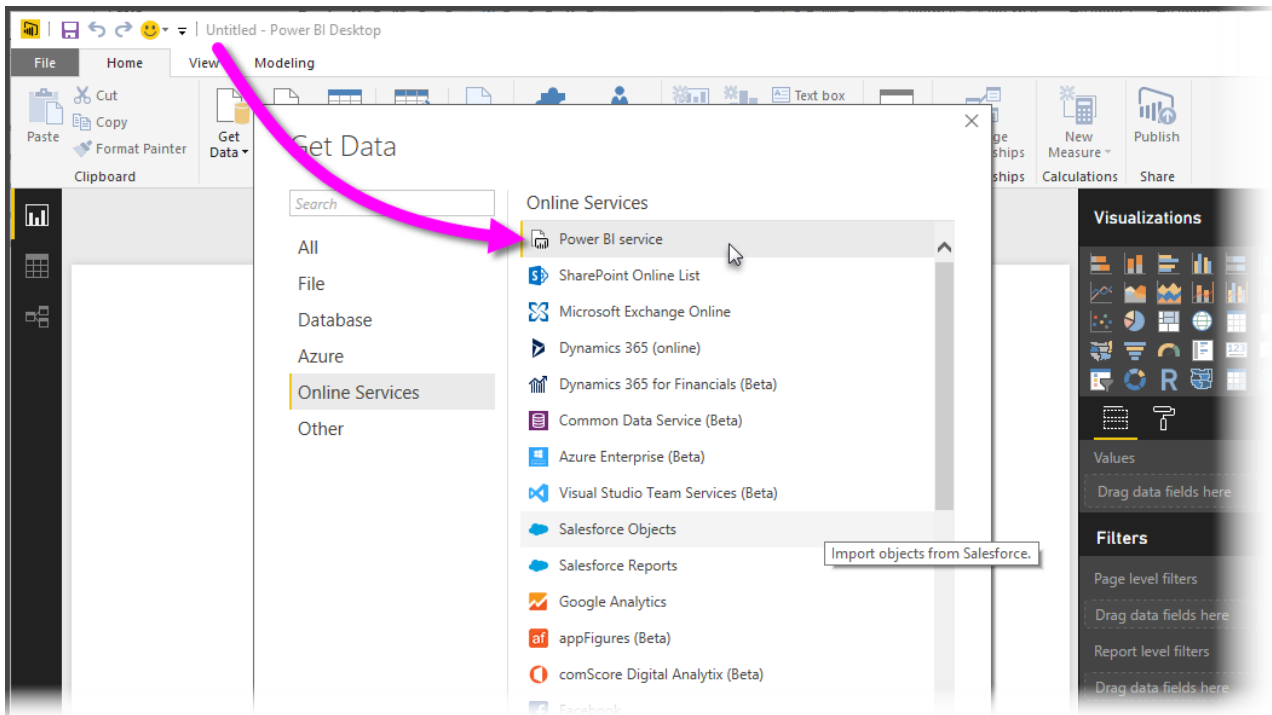
Want to give us feedback? Great – use the **Send Feedback** menu item in Power BI Desktop. We look forward to hearing from you!



Connect to datasets in the Power BI service from Power BI Desktop

1/25/2018 • 7 min to read • [Edit Online](#)

You can establish a live connection to a shared dataset in the Power BI service, and create many different reports from the same dataset. This means you can create your perfect data model in Power BI Desktop, publish it to the Power BI service, then you and others can create multiple different reports (in separate .pbix files) from that same, common data model. This feature is called **Power BI service Live connection**.



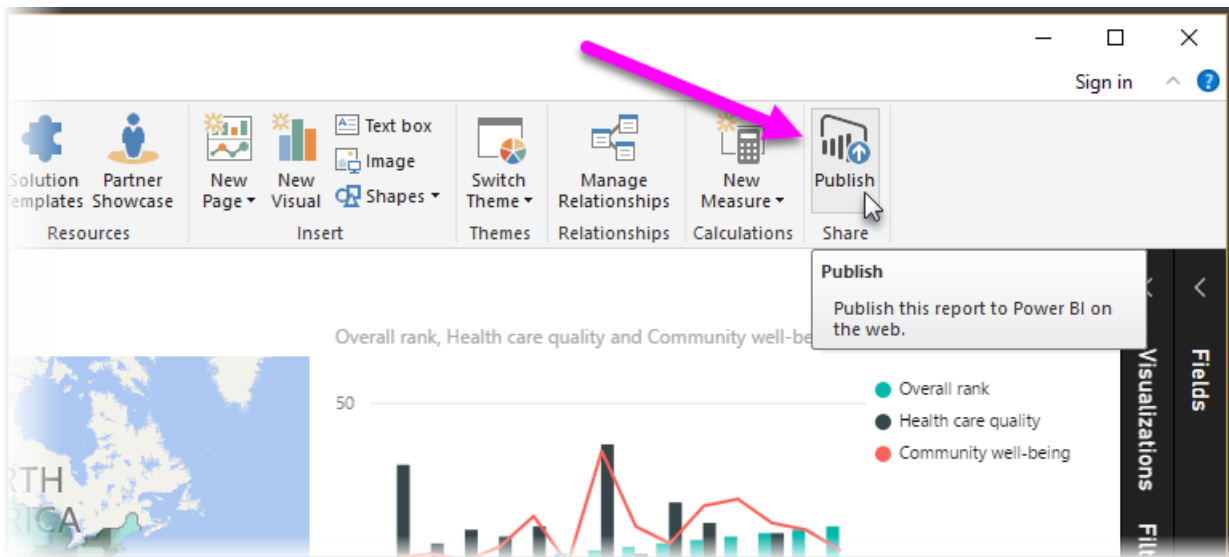
There are all sorts of benefits of this feature, including best practices, which we'll discuss during this article. There are also a few considerations and limitations, so please make sure you read through those - they're found at the end of this article.

Using a Power BI service live connection for report lifecycle management

One challenge with the popularity of Power BI is the proliferation of reports, dashboards, and their underlying data models. Here's why: it's easy to create compelling reports in **Power BI Desktop**, then share ([publish](#)) those reports in the **Power BI service**, and to create great dashboards from those datasets. Since so many people were doing so, often using the same (or nearly the same) datasets, knowing which report was based on which dataset - and how fresh each dataset might be - became a challenge. The **Power BI service Live Connection** addresses that challenge, and makes creating, sharing, and expanding upon common-dataset reports and dashboards easier and consistent.

Create a dataset everyone can use, then share it

Let's say Anna (a business analyst) is on your team, and she's great at creating good data models (often called datasets). With Anna's expertise, she can create a dataset and report, and then share that report in the **Power BI service**.



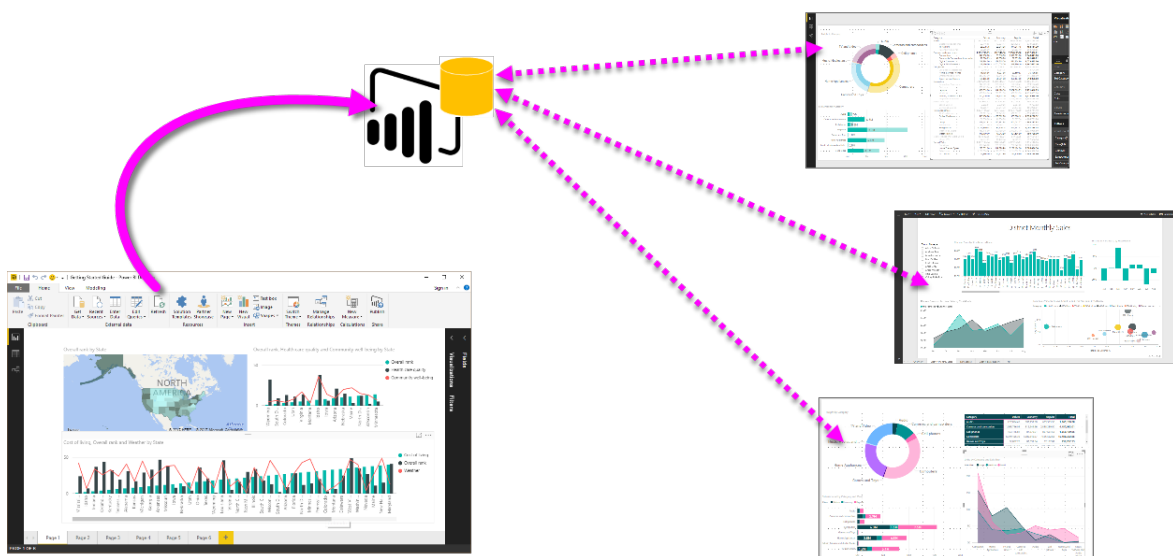
Everyone loves her report, and her dataset, and that's where the trouble would begin - everyone on her team would attempt to create *their own version* of that dataset, then share their own reports with the team. All of the sudden there was a multitude of reports (from different datasets) in your team's workspace in the **Power BI service**. Which was the most recent? Were the datasets the same, or only almost? What were the differences? With the **Power BI service Live Connection** feature, all that can change for the better. In the next section, we see how others can use Anna's published dataset for their own reports, and enable everyone to use the same solid, vetted, published dataset to build their unique reports.

Connect to a Power BI service dataset using a live connection

Once Anna creates her report (and creates the dataset it's based upon), she publishes it to the **Power BI service**, it shows up in her team's workspace in the Power BI service. Now it's available for everyone in her workspace to see and use.

Other members of her workspace can now establish a live connection to Anna's shared data model (using the **Power BI service live connection** feature), and create their own unique reports, from *her original dataset*.

In the following image, you see how Anna creates one **Power BI Desktop** report, and publishes it (which includes its data model) to the **Power BI service**. Then others in her workspace can connect to her data model using the **Power BI service live connection**, and create their own unique reports based on her dataset.



NOTE

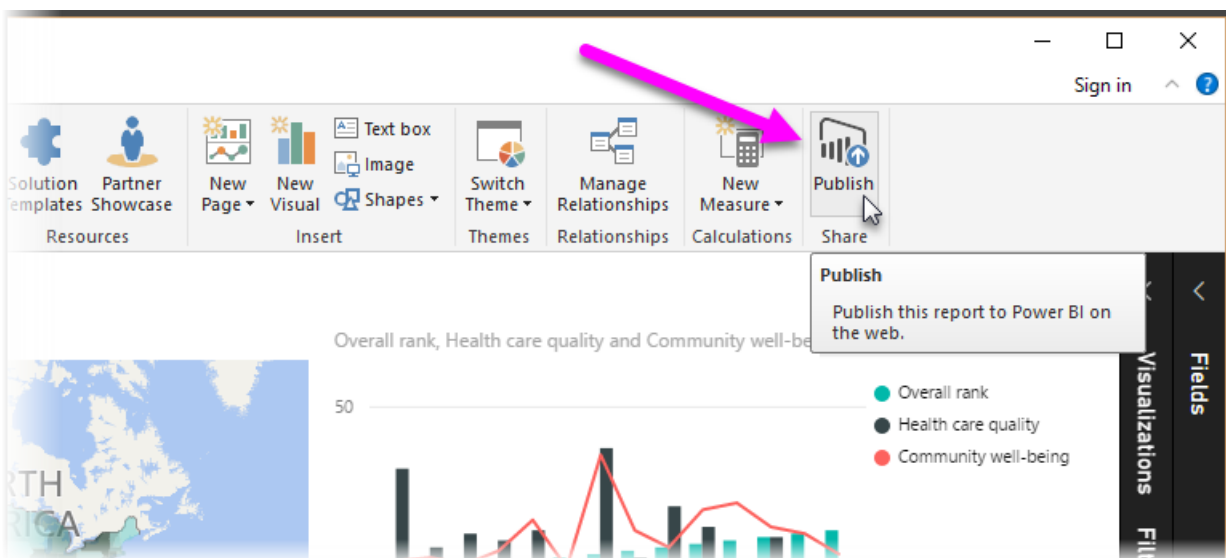
Datasets are only shared in one workspace. To establish a Power BI service live connection, the dataset to which you connect must be in a shared workspace of which you are a member.

Step-by-step for using the Power BI service live connection

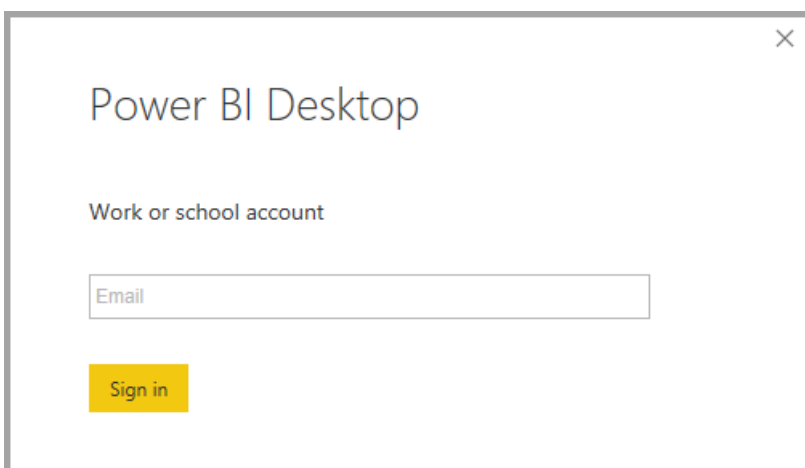
Now that we know how useful the **Power BI service live connection** is, and how you can use it as a best practice approach to report lifecycle management, let's walk through the steps that get us from Anna's great report (and dataset) to a shared dataset that teammates in her Power BI workspace can use.

Publish a Power BI report and dataset

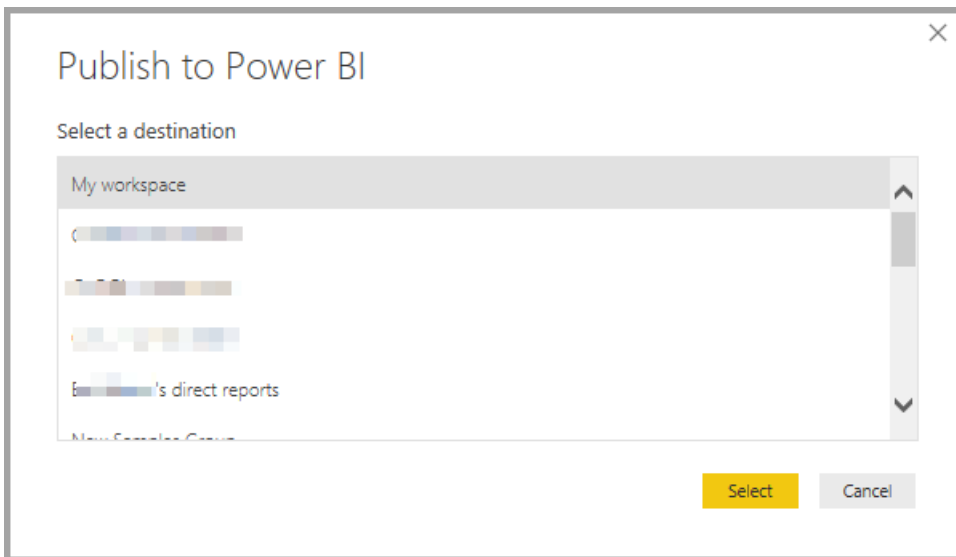
The first step in managing the report lifecycle using a **Power BI service live connection** is to have a report (and dataset) that teammates want to use. So Anna must first **publish** her report from **Power BI Desktop**. She does this by selecting **Publish** from the **Home** ribbon in Power BI Desktop.



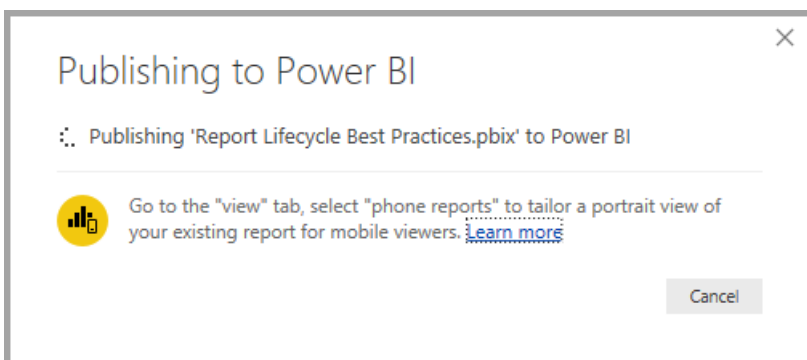
If she isn't signed in to her Power BI service account, she's prompted to do so.



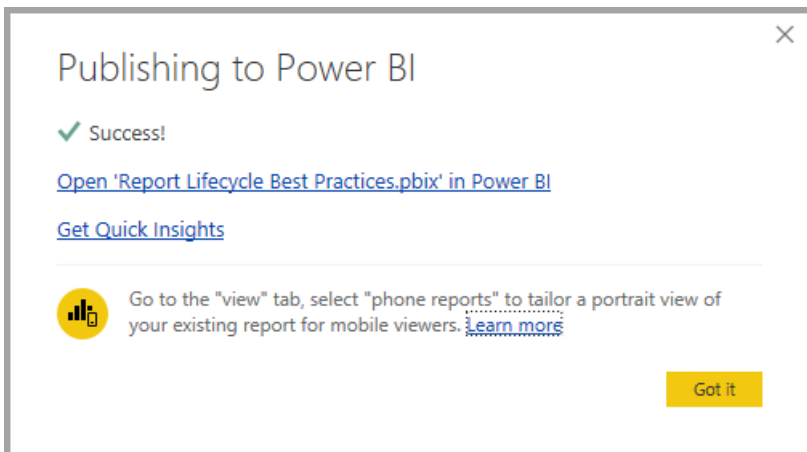
From there, she can choose the workspace destination to which the report and dataset will be published. Remember, only members who have access to the workspace where a report is published can access its dataset using a **Power BI service live connection**.



The publishing process begins, and **Power BI Desktop** shows the progress.



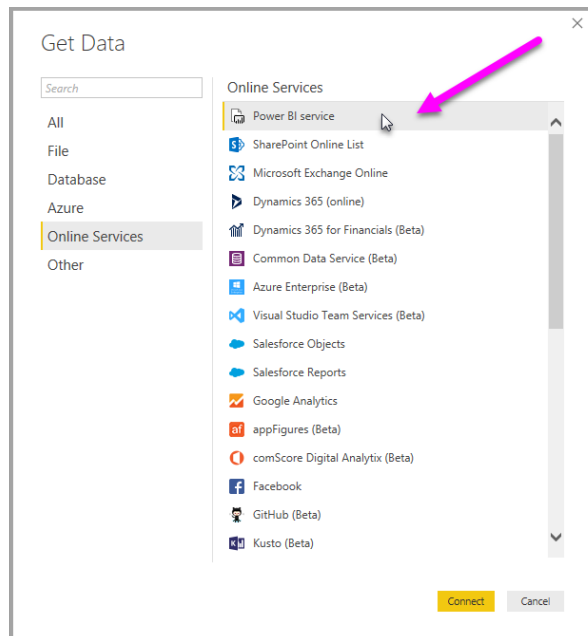
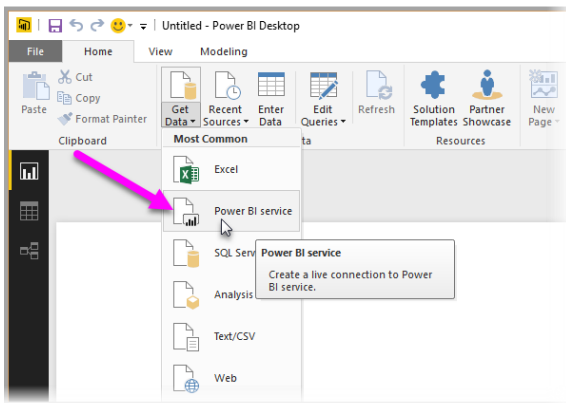
Once complete, **Power BI Desktop** shows you success, and provides a couple links to get you to the report itself in the **Power BI service**, and a link to get **Quick Insights** on the report.



Next, let's see how other teammates who have access to the workspace where the report (and dataset) were published can connect to the dataset and build our own reports.

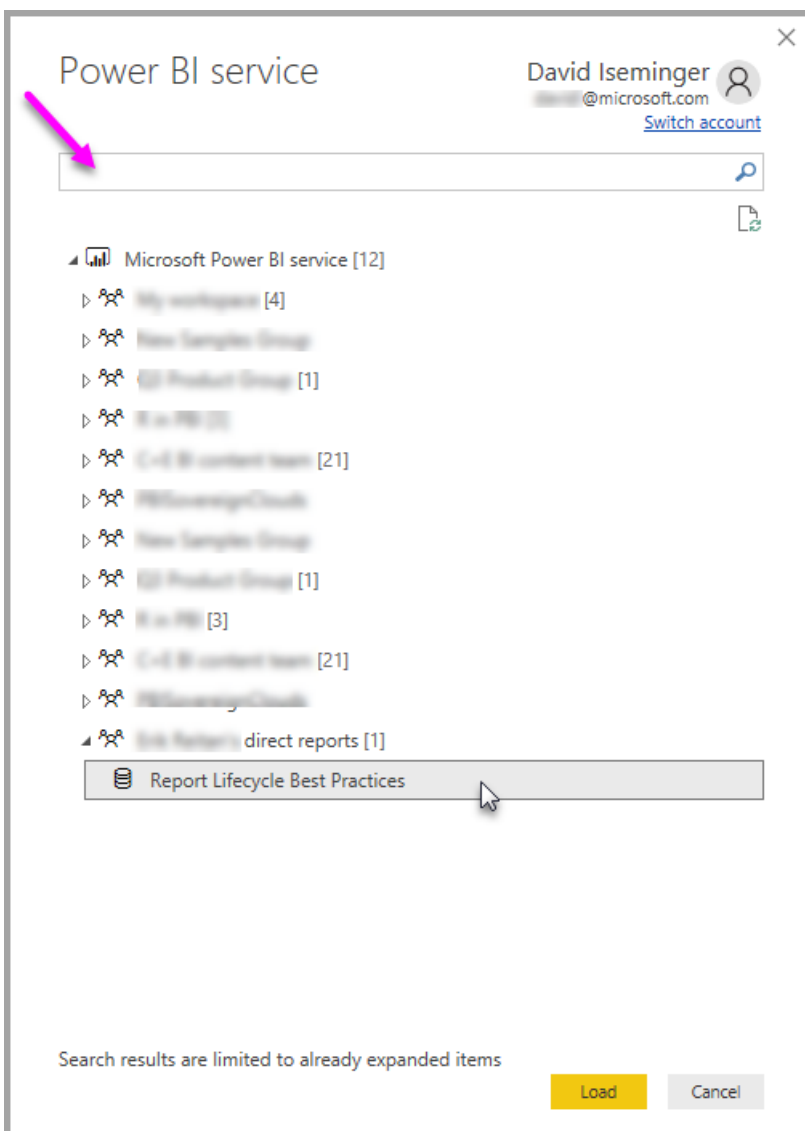
Establish a Power BI service live connection to the published dataset

To establish a connection to the published report, and create your own report based on the published dataset, select **Get Data** from the **Home** ribbon in **Power BI Desktop**, and select **Power BI service**. You can also select it from **Get Data > Online Services > Power BI service**.



If you're not signed in to Power BI, you'll be prompted to do so. Once logged in, you're presented with a window that shows which workspaces you're a member of, and you can select which workspace contains the dataset to which you want to establish a **Power BI service live connection**.

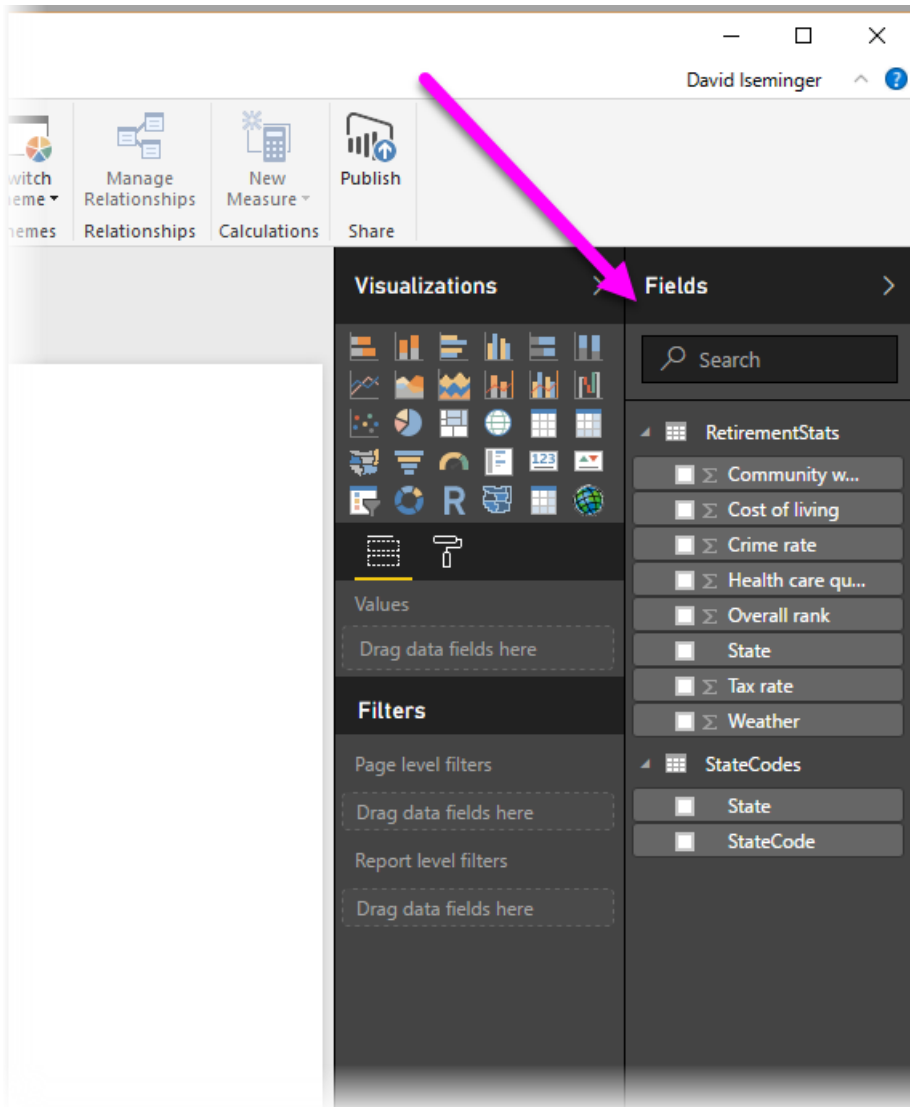
The number in brackets beside the workspace shows how many shared datasets are available in that workgroup, and selecting the triangle to the left expands the workspace, allowing you to select the shared dataset.



There are a few items to note from the previous **Power BI service** live connection window:

- You can search for a shared dataset, but the search results are limited to the expanded items, and won't include any workspaces that you have not expanded.
- You can expand more than one workspace to expand your search.

When you select **Load** from the window, you establish a live connection to the selected dataset, which means the data you see (the fields, and their values) are loaded into **Power BI Desktop** in real time.



Now you (and others) can create and share custom reports and share them, all from the same dataset. This is a great way to have one knowledgeable person create a well-formed dataset (such as what Anna does), and allow many teammates use that shared dataset to create their own reports.

NOTE

When you create reports based on dataset using a live connection to the **Power BI service**, you can only publish that report to the same Power BI service workspace that contains the dataset being used.

Limitations and considerations

When using the **Power BI service live connection**, there are a few limitations and considerations to keep in mind.

- Read-only members of a workspace cannot connect to datasets from **Power BI Desktop**.
- Only users who are part of the same **Power BI service** workspace can connect to a published dataset using the

Power BI service live connection. Users can (and often do) belong to more than one workspace.

- Since this is a live connection, left-navigation and modeling are disabled, similar to the behavior when connected to **SQL Server Analysis Services**.
- Since this is a live connection, RLS (row- and role-level security), OneDrive for Business, and other such connection behaviors are enforced, just as they are when connected to **SQL Server Analysis Services**.
- When selecting which dataset to connect to in the **Power BI service**, the search box only applies to workspaces that have been expanded.
- If you modify the original shared .pbix file, the dataset and report that is shared in the **Power BI service** is overwritten.
- You cannot replace the originally shared report. Attempts to do so result in a warning that prompts you to rename the file, and publish.
- If you delete the shared dataset in the **Power BI service**, then other **Power BI Desktop** (.pbix files) will no longer work properly or display their visuals.
- For Content Packs, you must first create a copy of a content pack before using it as a basis for sharing a .pbix report and dataset to the **Power BI service**.
- For Content Packs from *My Organization*, once copied, you cannot replace the report created on the service and/or a report created as part of copying a Content Pack with a live connection. Attempts to do so result in a warning that prompts you to rename the file, and publish. In this situation, you can only replace published live connected reports.
- When you create a report based on dataset using a live connection to the **Power BI service**, you can only publish that report to the same Power BI service workspace that contains the dataset being used.
- Deleting a shared dataset in the **Power BI service** means you can no longer access that dataset from **Power BI Desktop**.

Import Excel workbooks into Power BI Desktop

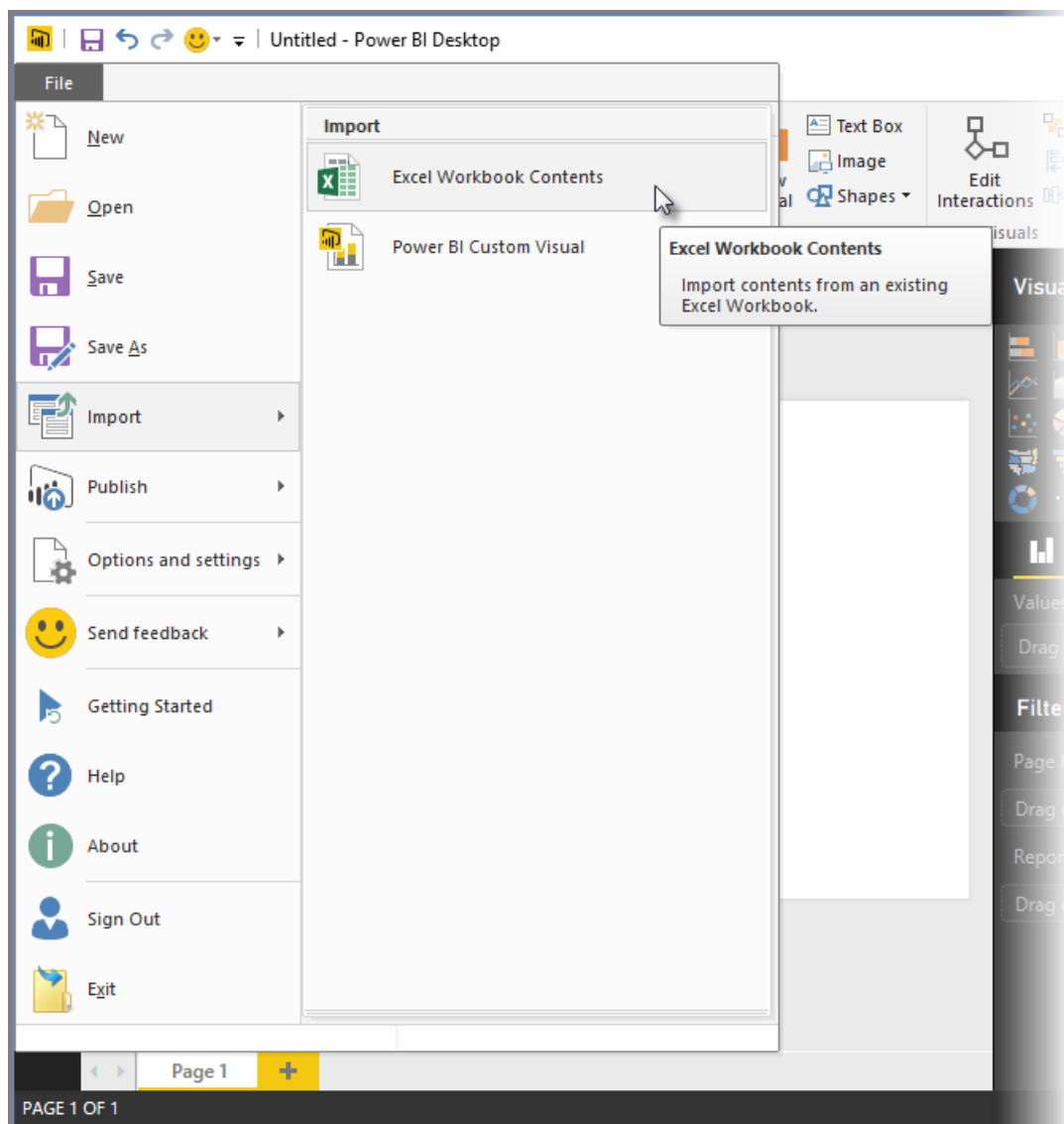
12/6/2017 • 5 min to read • [Edit Online](#)

With **Power BI Desktop**, you can easily import Excel workbooks that contain Power Query queries, Power Pivot models and Power View worksheets into Power BI Desktop. Reports and visualizations are automatically created based on the Excel workbook, and once imported, you can continue to improve and refine those reports using Power BI Desktop, using the existing features and new features released with each Power BI Desktop monthly update.

In the future we plan to provide additional communication between Excel and Power BI Desktop (such as import/export); this current ability to import workbooks into Power BI Desktop lets existing Excel users get started with Power BI Desktop.

How do I import an Excel workbook?

To import a workbook, from Power BI Desktop select **File -> Import -> Excel Workbook Contents**.

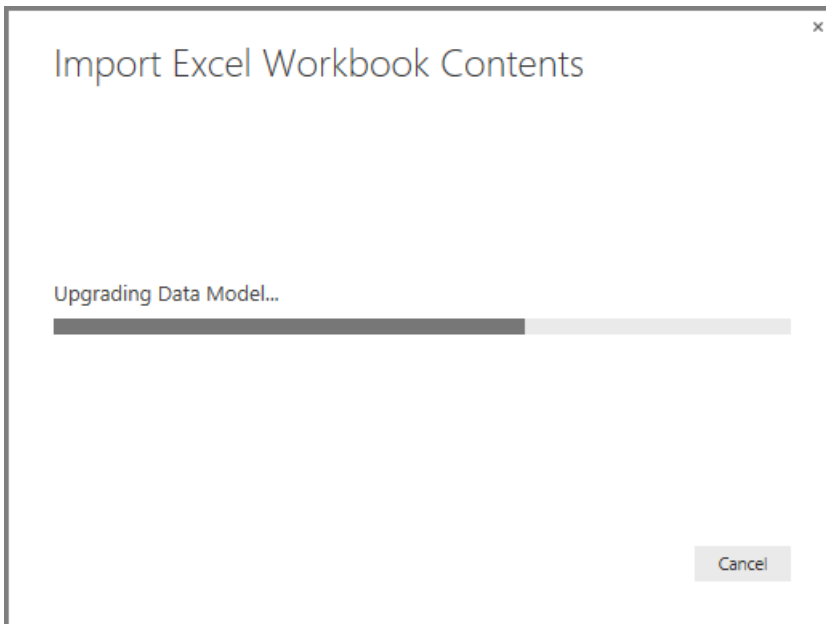


A window appears, letting you select the workbook to import. There is currently no limitation on the size or number of objects in the workbook, but larger workbooks take longer for Power BI Desktop to analyze and import.

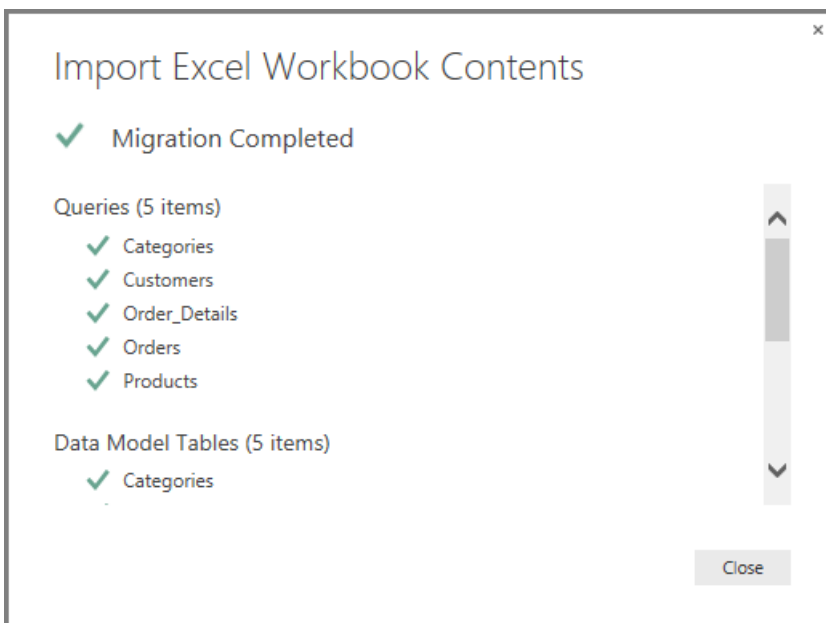
NOTE

To load or import Excel files from **shared OneDrive for Business** folders or from **Office 365 group** folders, use the URL of the Excel file, and input it into the **Web** data source in Power BI Desktop. There are a few steps you need to follow to properly format the **OneDrive for Business** URL, so check out [Use OneDrive for Business links in Power BI Desktop](#) for more information and the correct series of steps.

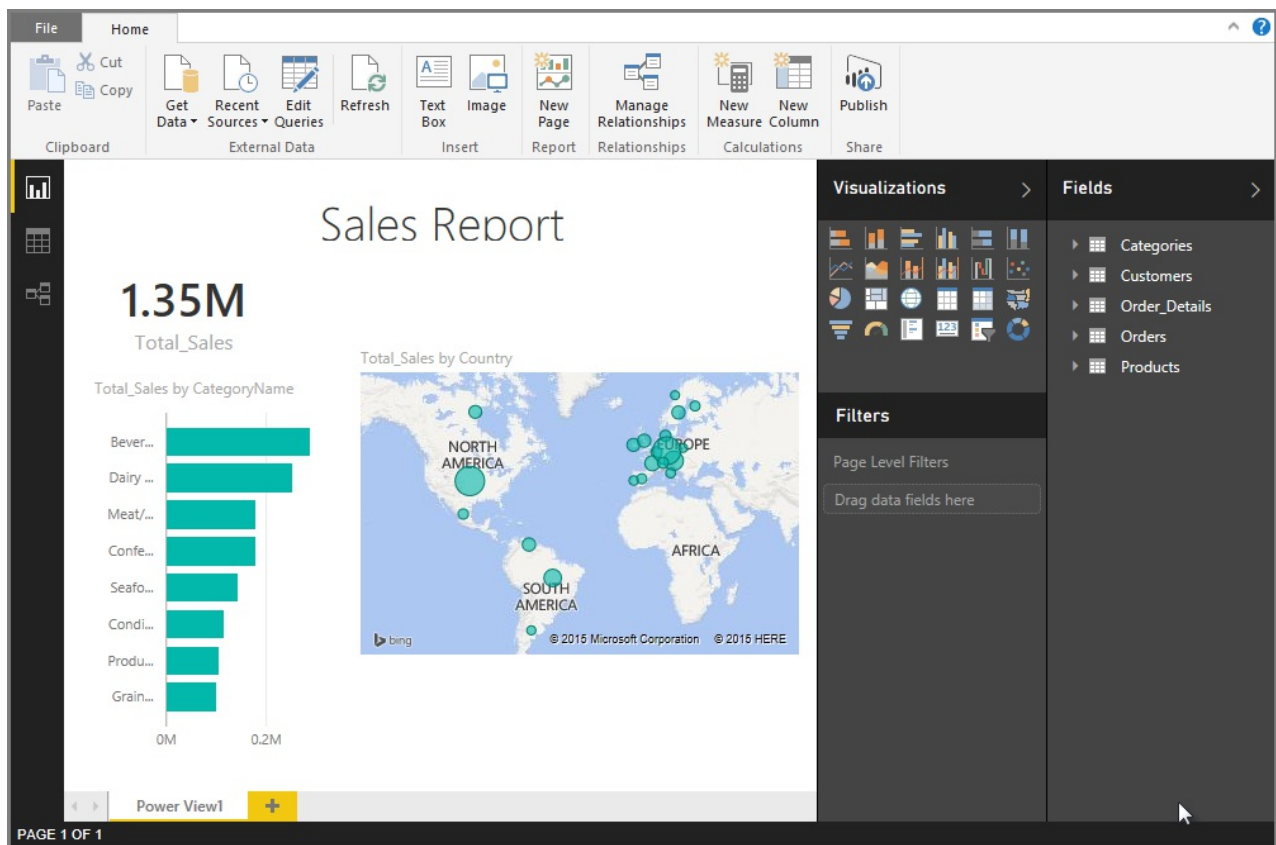
Once a workbook is selected, Power BI Desktop analyzes the workbook and converts it into a Power BI Desktop file (.pbix). Note that this is a one-time event; once the Power BI Desktop file is created with these steps, the Power BI Desktop file has no dependence on the original Excel workbook, and can be modified or changed (and saved, and shared) without affecting the original workbook.



Once the import is finished, a **Summary** page is displayed that describes the items that were converted, and also lists any items that were not able to be imported.



When you select **Close**, the report is loaded in Power BI Desktop. The following image shows Power BI Desktop after an Excel workbook was imported: Power BI Desktop automatically loaded the report based on the workbook contents.



Now that the workbook is imported, you can continue working on the report – such as creating new visualizations, adding data, or creating new report pages – using any of the features and capabilities included in Power BI Desktop.

Which workbook elements are imported?

Power BI Desktop can import the following elements, commonly referred to as *objects*, in Excel.

OBJECT IN EXCEL WORKBOOK	FINAL RESULT IN POWER BI DESKTOP FILE
Power Query queries	All Power Query queries from Excel are converted to queries in Power BI Desktop. If there were Query Groups defined in the Excel Workbook, the same organization will be replicated in Power BI Desktop. All queries are loaded unless they were set to "Only Create Connection" in Excel. The Load behavior can be customized from the Properties dialog in the Home tab of Query Editor in Power BI Desktop.
Power Pivot External Data Connections	All Power Pivot External Data Connections will be converted to queries in Power BI Desktop.
Linked Tables or Current Workbook tables	If there is a worksheet table in Excel linked to the Data Model, or linked to a query (by using <i>From Table</i> or the <i>Excel.CurrentWorkbook()</i> function in M), the following options are presented 1. Import the table to the Power BI Desktop file. This is a one-time snapshot of the data, after which you cannot edit the data in the table in Power BI Desktop. There is a size limitation of 1 million characters (total, combining all column headers and cells) for tables created using this option. 2. Keep a connection to the original workbook. Alternatively, you can keep a connection to the original Excel Workbook and Power BI Desktop retrieves the latest content in this table with each refresh, just like any other query created against an Excel workbook in Power BI Desktop.

OBJECT IN EXCEL WORKBOOK	FINAL RESULT IN POWER BI DESKTOP FILE
Data Model Calculated Columns, Measures, Data Categories and Relationships	These Data Model objects are converted to the equivalent objects in Power BI Desktop. Note that there are certain Data Categories that are not available in Power BI Desktop yet, such as Image . In these cases, the Data Category information will be reset for the columns in question.
Power View Worksheets	A new report page is created for each Power View worksheet in Excel. The name and order of these report pages match the original Excel workbook.

Are there any limitations to importing a workbook?

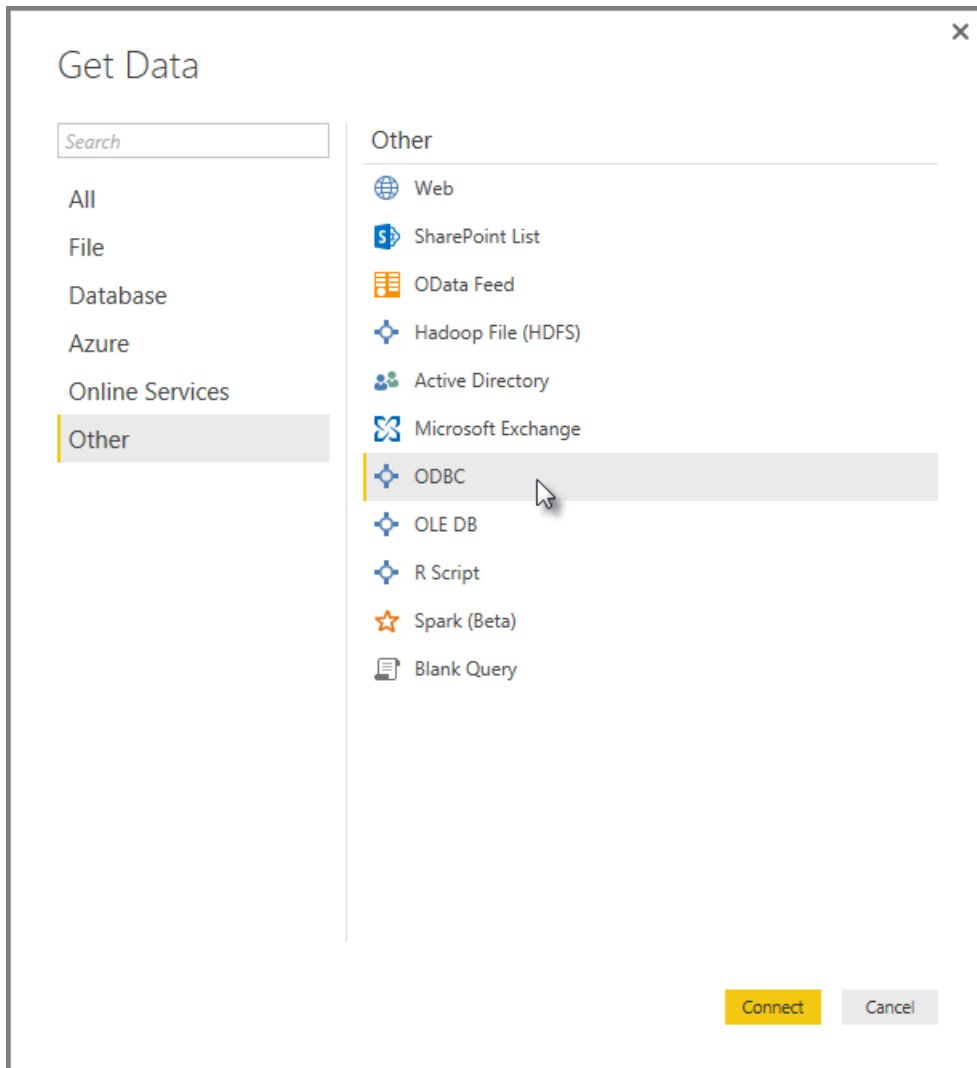
There are a few limitations to importing a workbook into Power BI Desktop, which are the following:

1. **External Connections to Analysis Services Tabular Models:** In Excel 2013, it is possible to create a connection to SQL Server Analysis Services Tabular models and create Power View reports on top of these models without the need to import the data. This type of connection is currently not supported as part of importing Excel Workbooks into Power BI Desktop, but will be available in an upcoming update. In the meantime, you must recreate these external connections in Power BI Desktop.
2. **KPIs:** This type of Data Model object is currently not supported in Power BI Desktop. As such, KPIs are skipped as part of importing an Excel workbook into Power BI Desktop.
3. **Hierarchies:** This type of Data Model object is currently not supported in Power BI Desktop. As such, hierarchies are skipped as part of importing an Excel Workbook into Power BI Desktop.
4. **Binary data columns:** This type of Data Model column is currently not supported in Power BI Desktop. Binary Data columns are removed from the resulting table in Power BI Desktop.
5. **Unsupported Power View elements:** There are a few features in Power View that are not yet available in Power BI Desktop, such as Themes or certain types of visualizations (Scatter Chart with Play Axis, Drill-Down behaviors, etc.). These unsupported visualizations result in *Unsupported Visualization* messages on their corresponding locations in the Power BI Desktop report, which you can delete or reconfigure as needed.
6. **Named Ranges using *From Table in Power Query*, or using *Excel.CurrentWorkbook in M*:** Importing this named range data into Power BI Desktop is not currently supported, but it is a planned update for Power BI Desktop. Currently, these named ranges are loaded into Power BI Desktop as a connection to the external Excel workbook.
7. **PowerPivot to SSRS:** PowerPivot external connections to SQL Server Reporting Services (SSRS) are not currently supported, since that data source is not currently available in Power BI Desktop.

Connect to data using generic interfaces in Power BI Desktop

1/25/2018 • 4 min to read • [Edit Online](#)

You can connect to a multitude of different data sources in **Power BI Desktop**, using built-in data connectors that range from **Access databases** to **Zendesk** resources, as shown in the **Get Data** window. You can also connect to all sorts of *other* data sources, which even further expands your connectivity options, by using the generic interfaces (such as **ODBC** or **REST APIs**) built into **Power BI Desktop**.



Power BI Desktop data interfaces

Power BI Desktop includes an ever-growing collection of data connectors that are built to connect to a specific data source. For example, the **SharePoint List** data connector provides specific fields and supporting information during the connection sequence that are designed for **SharePoint Lists**, which is the case with other data sources found in the window that appears when you select **Get Data > More...** (shown in the previous image).

In addition, **Power BI Desktop** lets you connect to data sources that aren't specifically identified in the **Get Data** lists, by using one of the following generic data interfaces:

- **ODBC**
- **OLE DB**

- **OData**
- **REST APIs**
- **R Scripts**

By providing the appropriate parameters in the connection windows that these generic interfaces provide, the world of data sources you can access and use in **Power BI Desktop** grows significantly.

In the following sections, you can find lists of data sources that can be accessed by these generic interfaces.

Can't find the data source you wanted to use with **Power BI Desktop**? Please [let us know](#) so we can add it to our list of ideas and requests.

Data sources accessible through ODBC

The **ODBC** connector in **Power BI Desktop** lets you import data from any third-party ODBC driver simply by specifying a **Data Source Name (DSN)** or a *connection string*. As an option, you can also specify a SQL statement to execute against the ODBC driver.

The following list details a few examples of data sources to which **Power BI Desktop** can connect by using the generic **ODBC** interface.

POWER BI DESKTOP GENERIC CONNECTOR	EXTERNAL DATA SOURCE	LINK FOR MORE INFORMATION
ODBC	Cassandra	Cassandra ODBC driver
ODBC	Couchbase DB	Couchbase and Power BI
ODBC	DynamoDB	DynamoDB ODBC driver
ODBC	Google BigQuery	BigQuery ODBC driver
ODBC	Hbase	Hbase ODBC driver

POWER BI DESKTOP GENERIC CONNECTOR	EXTERNAL DATA SOURCE	LINK FOR MORE INFORMATION
ODBC	Hive	Hive ODBC driver
ODBC	IBM Netezza	IBM Netezza information
ODBC	Presto	Presto ODBC driver
ODBC	Project Online	Project Online article
ODBC	Progress OpenEdge	Progress OpenEdge ODBC driver blog post

Data sources accessible through OLE DB

The **OLE DB** connector in **Power BI Desktop** lets you import data from any third-party OLE DB driver simply by specifying a *connection string*. As an option, you can also specify a SQL statement to execute against the OLE DB driver.

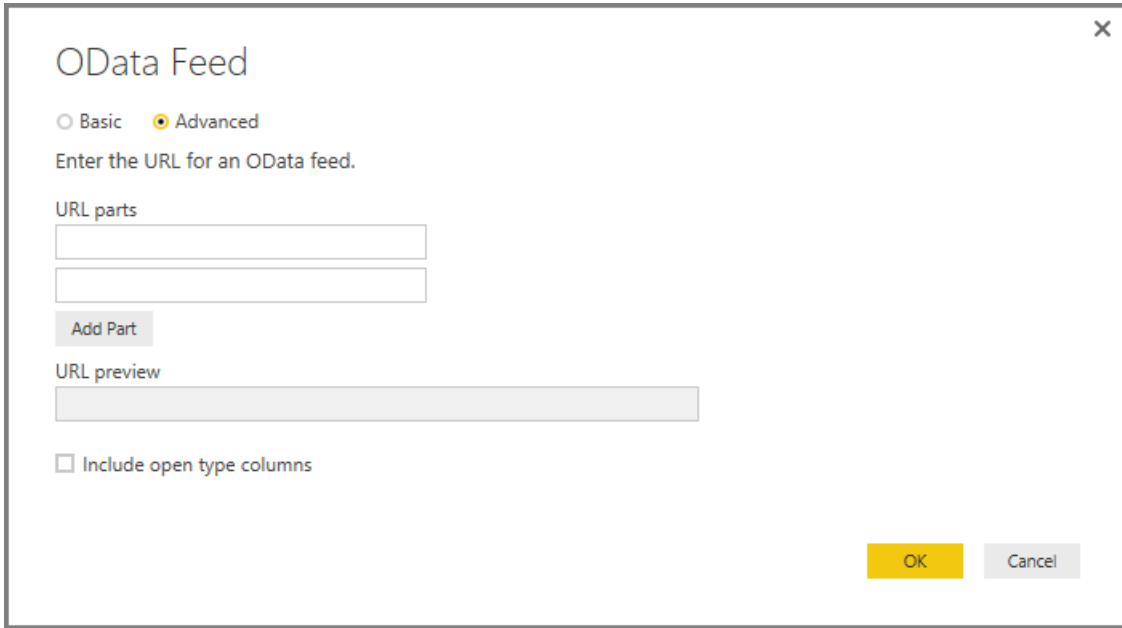
The following list details a few examples of the data sources to which **Power BI Desktop** can connect by using the generic **OLE DB** interface.

POWER BI DESKTOP GENERIC CONNECTOR	EXTERNAL DATA SOURCE	LINK FOR MORE INFORMATION
OLE DB	SAS OLE DB	SAS provider for OLE DB
OLE DB	Sybase OLE DB	Sybase provider for OLE DB

Data sources accessible through OData

The **OData** connector in **Power BI Desktop** lets you import data from any **OData** URL simply by typing in or pasting the **OData** URL. You can add multiple URL parts by typing or pasting those links in the text boxes provided

in the **OData Feed** window.

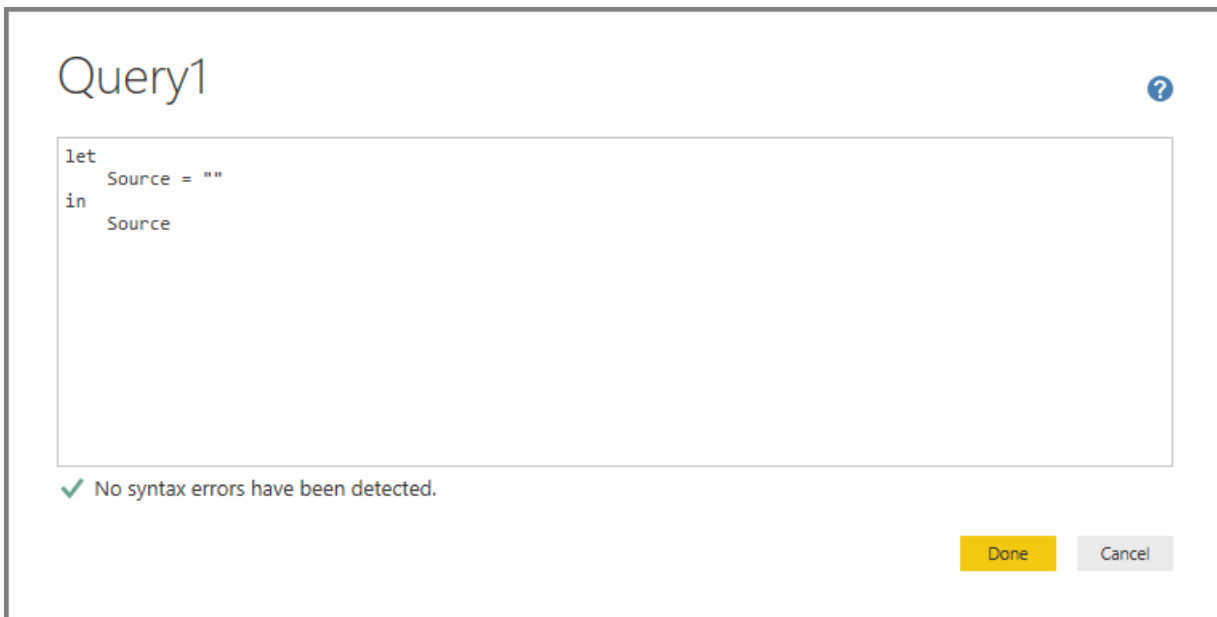


The following list details a few examples of the data sources to which **Power BI Desktop** can connect by using the generic **OData** interface.

POWER BI DESKTOP GENERIC CONNECTOR	EXTERNAL DATA SOURCE	LINK FOR MORE INFORMATION
OData	Coming soon	Check back soon for OData data sources

Data sources accessible through REST APIs

You can connect to data sources using the **REST APIs** and thereby use data from all sorts of data sources that support **REST**.

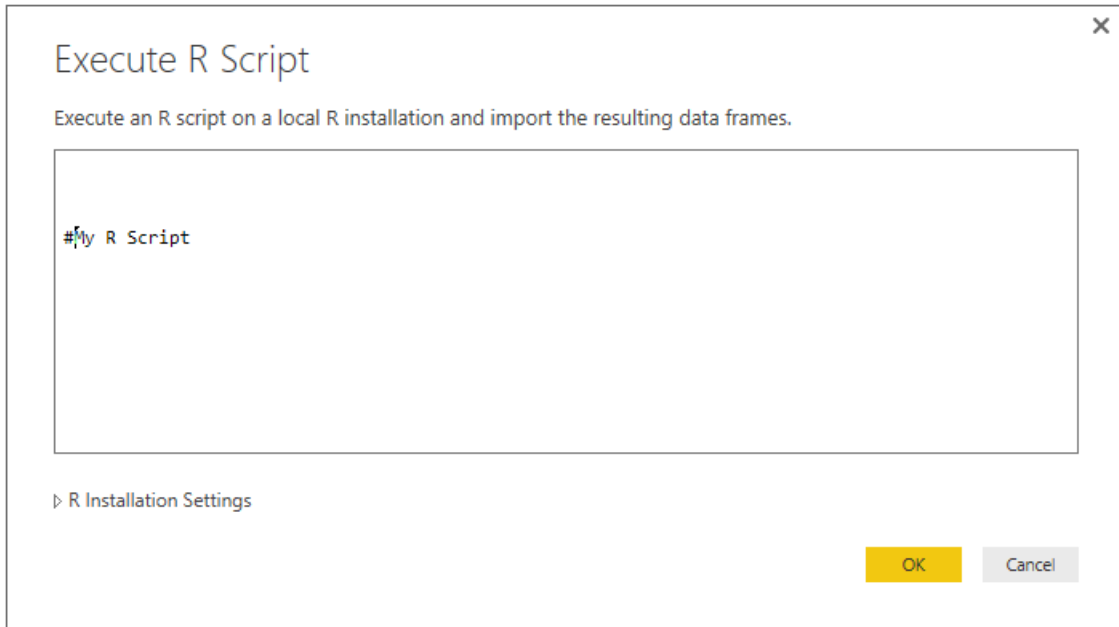


The following list details a few examples of the data sources to which **Power BI Desktop** can connect by using the generic **REST APIs** interface.

POWER BI DESKTOP GENERIC CONNECTOR	EXTERNAL DATA SOURCE	LINK FOR MORE INFORMATION
REST APIs	Couchbase DB	Couchbase REST API information

Data sources accessible through R Script

You can use **R scripts** to access data sources, and use that data in **Power BI Desktop**.



The following list details a few examples of the data sources to which **Power BI Desktop** can connect by using the generic **R scripts** interface.

POWER BI DESKTOP GENERIC CONNECTOR	EXTERNAL DATA SOURCE	LINK FOR MORE INFORMATION
R Script	SAS Files	R script guidance from CRAN
R Script	SPSS Files	R script guidance from CRAN
R Script	R Statistical Files	R script guidance from CRAN

Next steps

There are all sorts of data sources you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Connect to an Oracle database

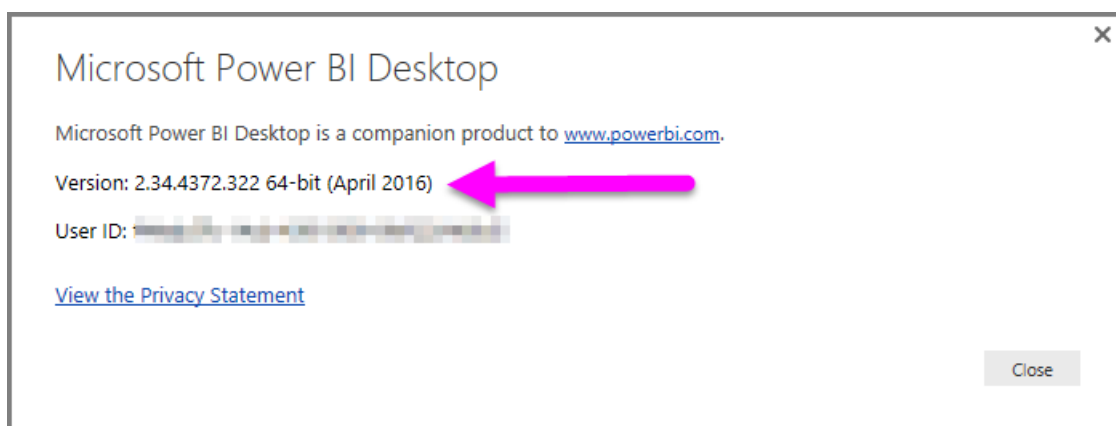
12/6/2017 • 1 min to read • [Edit Online](#)

In order to connect to an Oracle database with **Power BI Desktop**, the correct Oracle client software must be installed on the computer running Power BI Desktop. Which Oracle client software you use depends on which version of Power BI Desktop you have installed - the **32-bit** version or the **64-bit** version.

Supported versions: Oracle 9 and later, Oracle client software 8.1.7 and later.

Determining which version of Power BI Desktop is installed

To determine which version of Power BI Desktop is installed, select **File > About** then check the **Version:** line. In the following image, a 64-bit version of Power BI Desktop is installed:



Installing the Oracle client

For **32-bit** versions of Power BI Desktop, use the following link to download and install the **32-bit** Oracle client:

- [32-bit Oracle Data Access Components \(ODAC\) with Oracle Developer Tools for Visual Studio \(12.1.0.2.4\)](#)

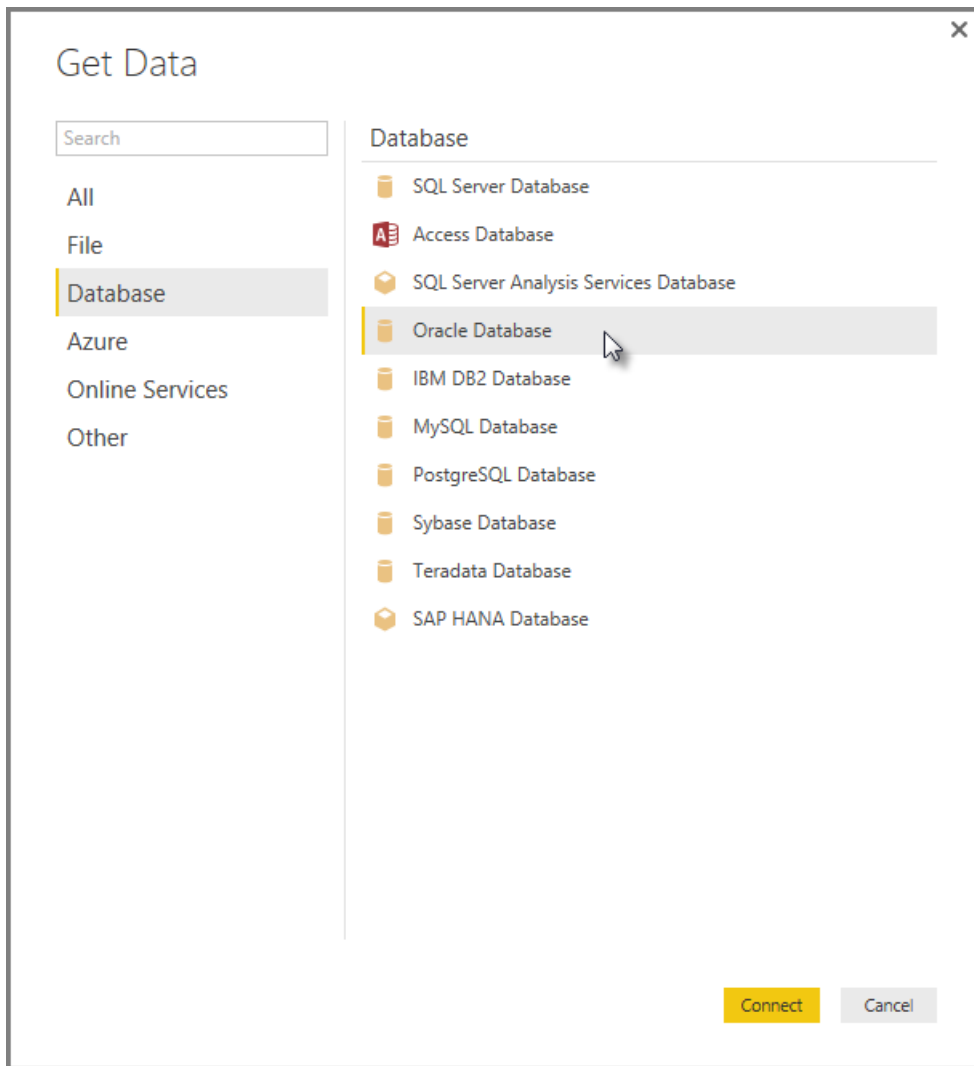
For **64-bit** versions of Power BI Desktop, use the following link to download and install the **64-bit** Oracle client:

- [64-bit ODAC 12c Release 4 \(12.1.0.2.4\) for Windows x64](#)

Connect to an Oracle database

Once the matching Oracle client driver is installed, you can connect to an Oracle database. Take the following steps to make the connection.

1. From the Get Data window, select **Database > Oracle Database**



2. In the **Oracle Database** dialog that appears, provide the name of the server, and select **Connect**. If a SID is required, you can specify that using the format: *ServerName/SID*.




3. If you want to import data using a native database query, you can put your query in the **SQL Statement** box, available by expanding the **Advanced options** section of the **Oracle Database** dialog.

Oracle Database ✕

Enter the name of the server to access.

Server

Import
 DirectQuery

▲ Advanced options 

Command timeout in minutes (optional)

SQL statement (optional)

Include relationship columns

4. Once your Oracle database information is entered into the Oracle Database dialog (including any optional information such as a SID or a native database query), select **OK** to connect.
5. If the Oracle database requires database user credentials, input those credentials in the dialog when prompted.

Run R scripts in Power BI Desktop

12/6/2017 • 3 min to read • [Edit Online](#)

You can run R scripts directly in **Power BI Desktop**, and import the resulting datasets into a Power BI Desktop data model.

Install R

To run R scripts in Power BI Desktop, you need to install **R** on your local machine. You can download and install **R** for free from many locations, including the [Revolution Open download page](#), and the [CRAN Repository](#). The current release of R scripting in Power BI Desktop supports Unicode characters as well as spaces (empty characters) in the installation path.

Run R scripts

With just a few steps in Power BI Desktop you can run R scripts and create a data model, from which you can create reports, and share them on the Power BI service. R scripting in Power BI Desktop now supports number formats that contain decimals (.) and commas (,).

Prepare an R script

To run an R script in Power BI Desktop, create the script in your local R development environment, and make sure it runs successfully.

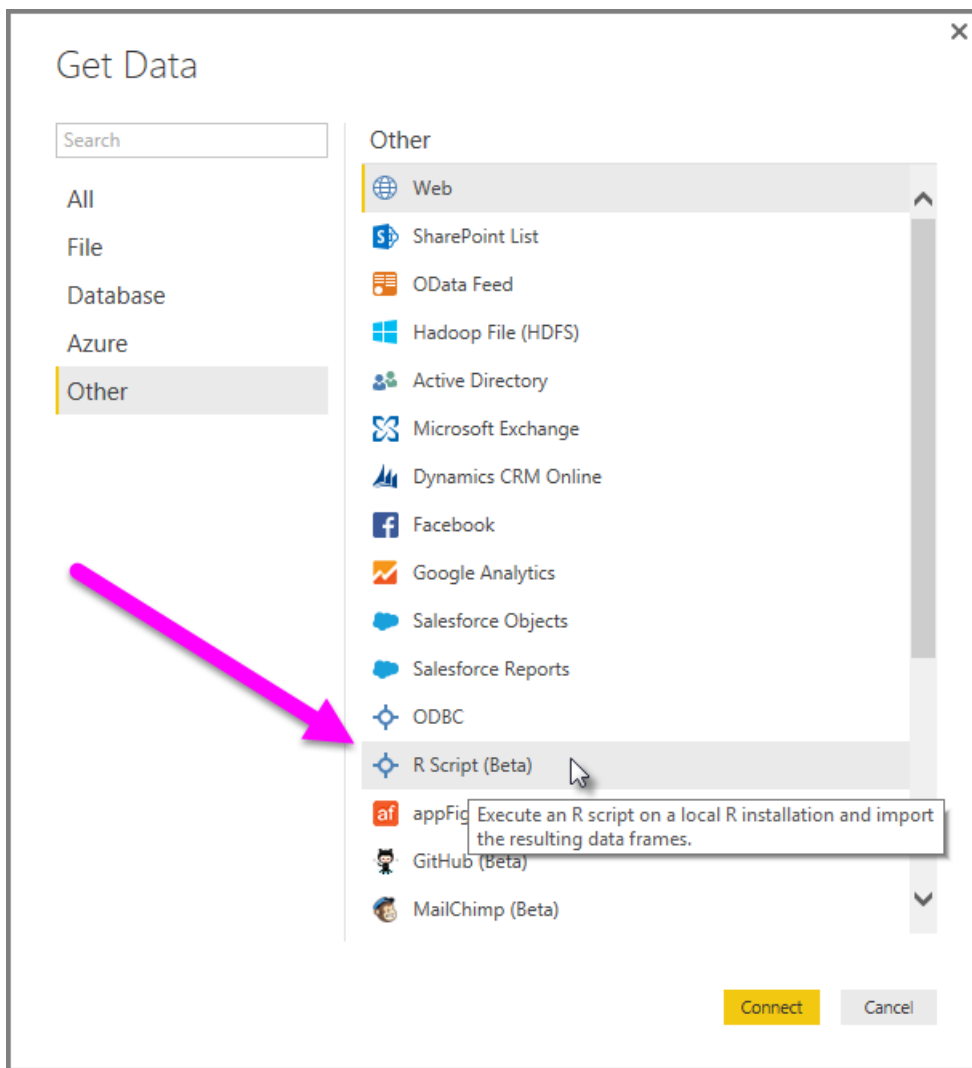
To run the script in Power BI Desktop, make sure the script runs successfully in a new and unmodified workspace. This means that all packages and dependencies must be explicitly loaded and run. You can use `source()` to run dependent scripts.

When preparing and running an R script in Power BI Desktop, there are a few limitations:

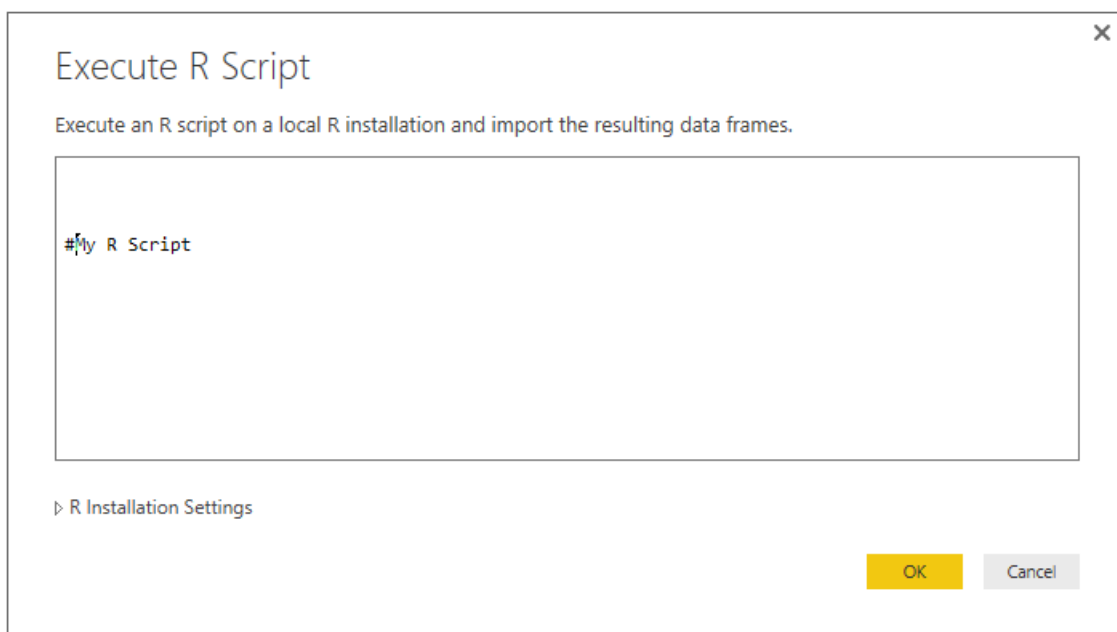
- Only data frames are imported, so make sure the data you want to import to Power BI is represented in a data frame
- Columns that are typed as Complex and Vector are not imported, and are replaced with error values in the created table.
- Values that are N/A are translated to NULL values in Power BI Desktop
- Any R script that runs longer than 30 minutes times out
- Interactive calls in the R script, such as waiting for user input, halts the script's execution
- When setting the working directory within the R script, you *must* define a full path to the working directory, rather than a relative path

Run your R script and import data

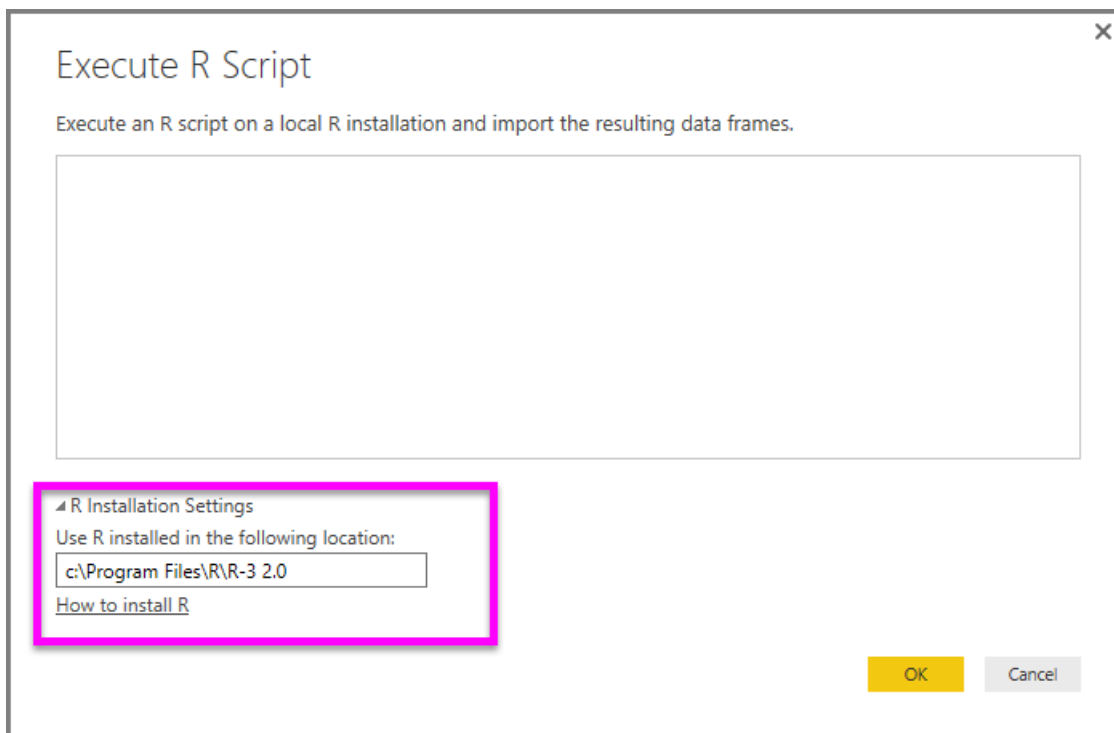
1. In Power BI Desktop, the R Script data connector is found in **Get Data**. To run your R Script, select **Get Data** > **More...**, then select **Other** > **R Script** as shown in the following image.



2. If R is installed on your local machine, the latest installed version is selected as your R engine. Simply copy your script into the script window and select **OK**.

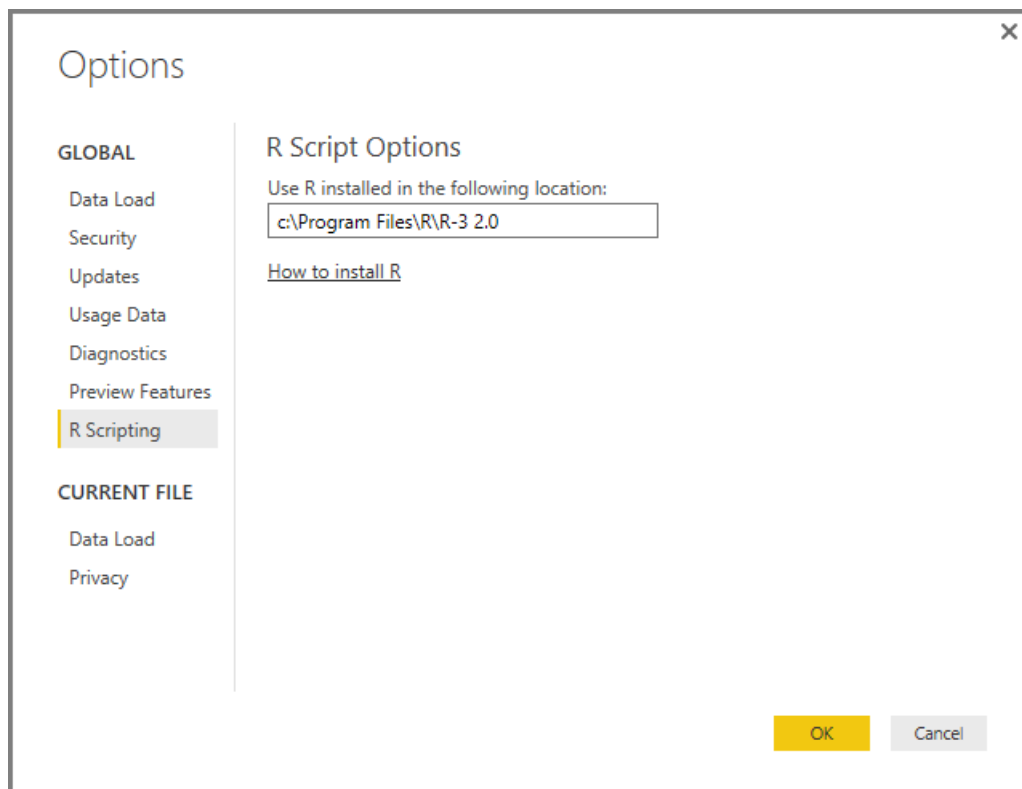


3. If R is not installed, is not identified, or if there are multiple installations on your local machine, expand **R Installation Settings** to display installation options, or to select which installation you want to run the R script.



If R is installed is not identified, you can explicitly provide its location in the text box provided when you expand **R Installation Settings**. In the above image, the path *C:\Program Files\R\R-3.2.0* is explicitly provided in the text box.

R installation settings are centrally located in the R Scripting section of the Options dialog. To specify your R installation settings, select **File > Options and settings** and then **Options > R Scripting**. If multiple installations of R are available, a drop-down menu appears that allows you to select which installation to use.



4. Select **OK** to run the R Script. When the script runs successfully, you can then choose the resulting data frames to add to the Power BI model.

Refresh

You can refresh an R script in Power BI Desktop. When you refresh an R script, Power BI Desktop runs the R script again in the Power BI Desktop environment.

Next steps

Take a look at the following additional information about R in Power BI.

- [Create R Visuals in Power BI Desktop](#)
- [Use an external R IDE with Power BI](#)

Using R in Query Editor

1/25/2018 • 4 min to read • [Edit Online](#)

You can use **R**, a programming language widely used by statisticians, data scientists, and data analysts, in the Power BI Desktop **Query Editor**. This integration of **R** into **Query Editor** lets you perform data cleansing using **R**, and perform advanced data shaping and analytics in datasets, including completion of missing data, predictions, and clustering, just to name a few. **R** is a powerful language, and can be used in **Query Editor** to prepare your data model and create reports.

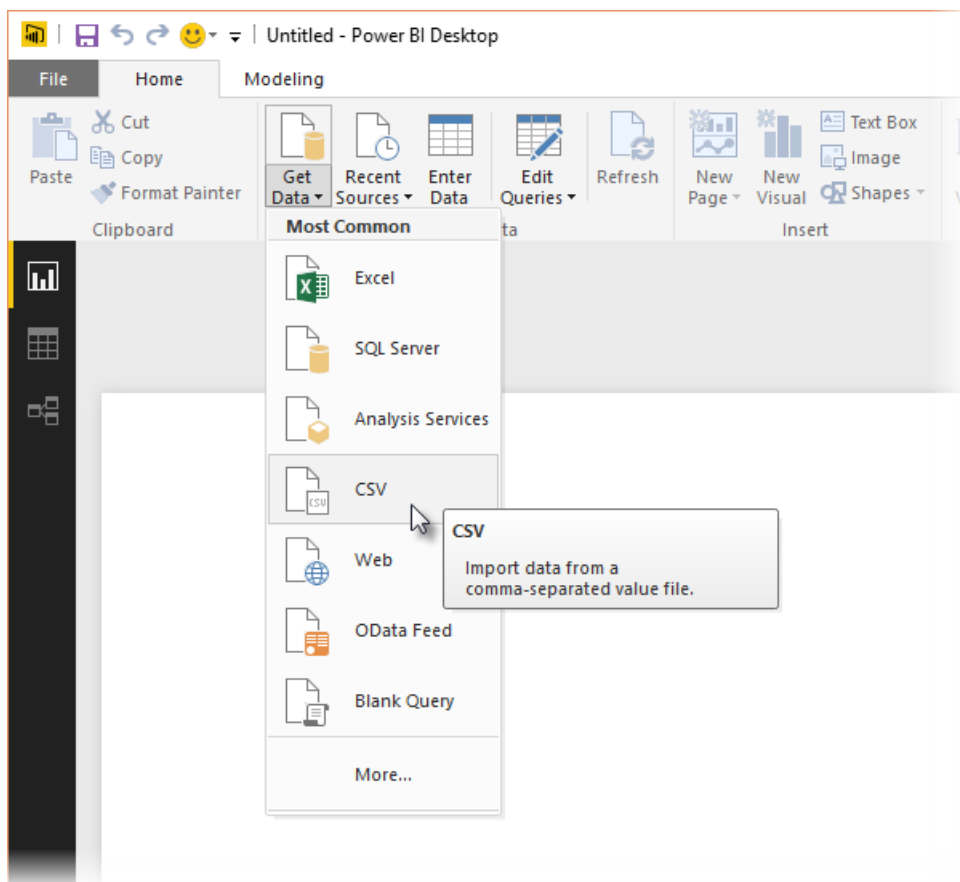
Installing R

To use **R** in Power BI Desktop's **Query Editor**, you need to install **R** on your local machine. You can download and install **R** for free from many locations, including the [Revolution Open download page](#), and the [CRAN Repository](#).

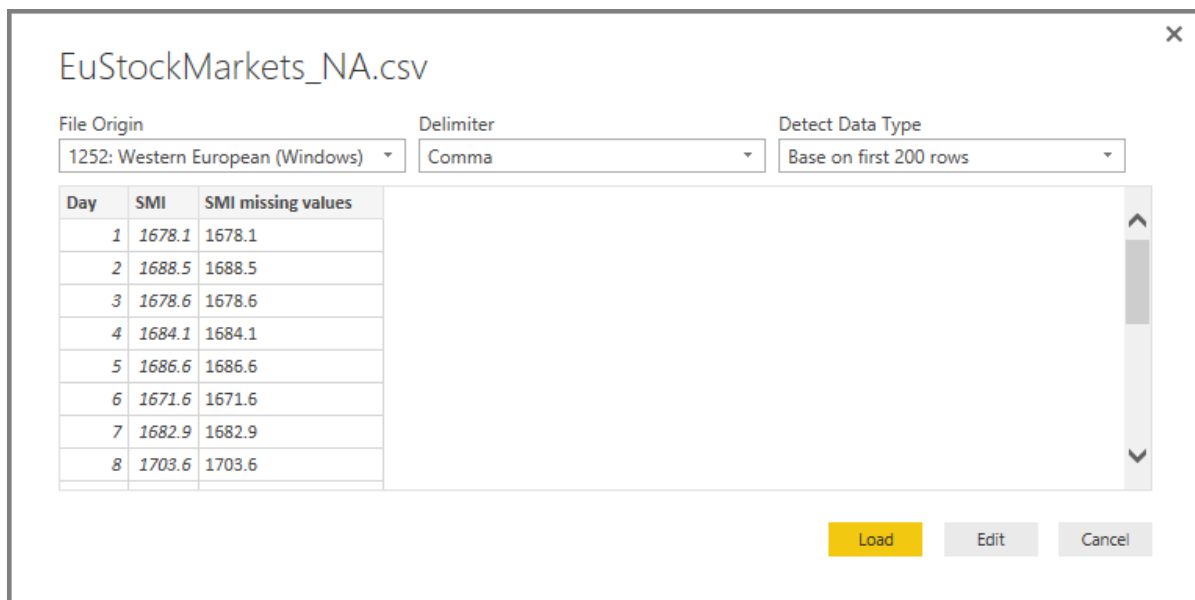
Using R in Query Editor

To show how to use **R** in **Query Editor**, we'll use an example from a stock market dataset, based on a .CSV file that you can [download from here](#) and follow along. The steps for this example are the following:

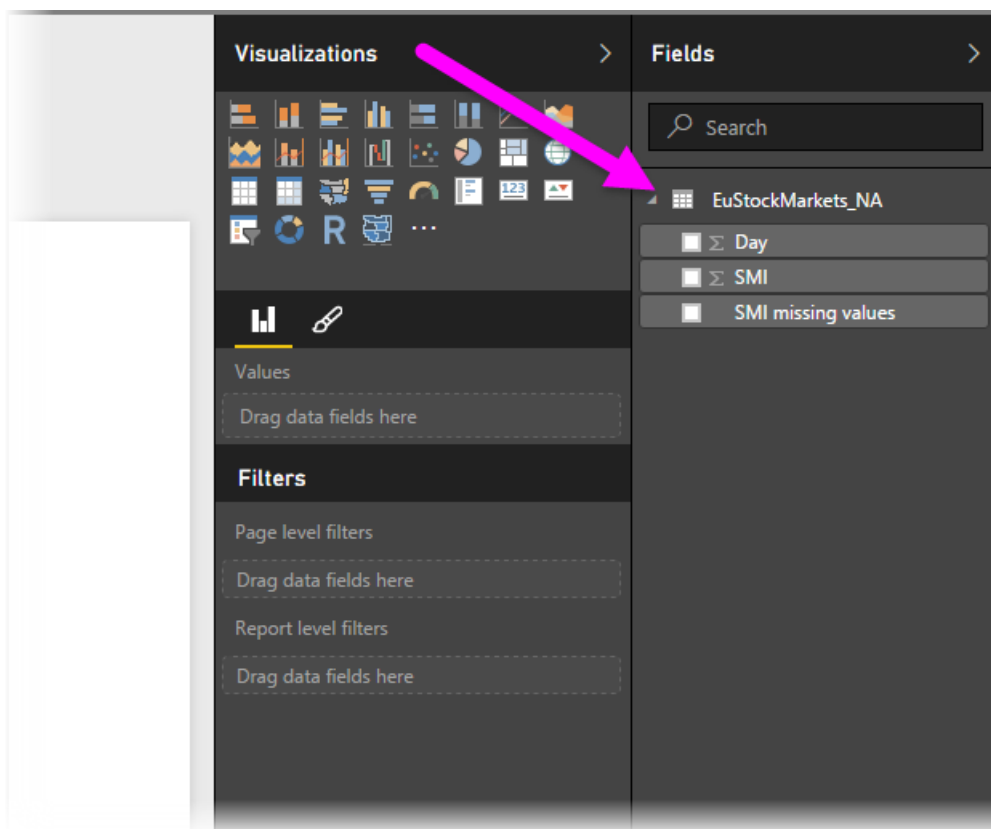
1. First, load your data into **Power BI Desktop**. In this example we'll load the *EuStockMarkets_NA.csv* file. Select **Get Data > CSV** from the **Home** ribbon in **Power BI Desktop**.



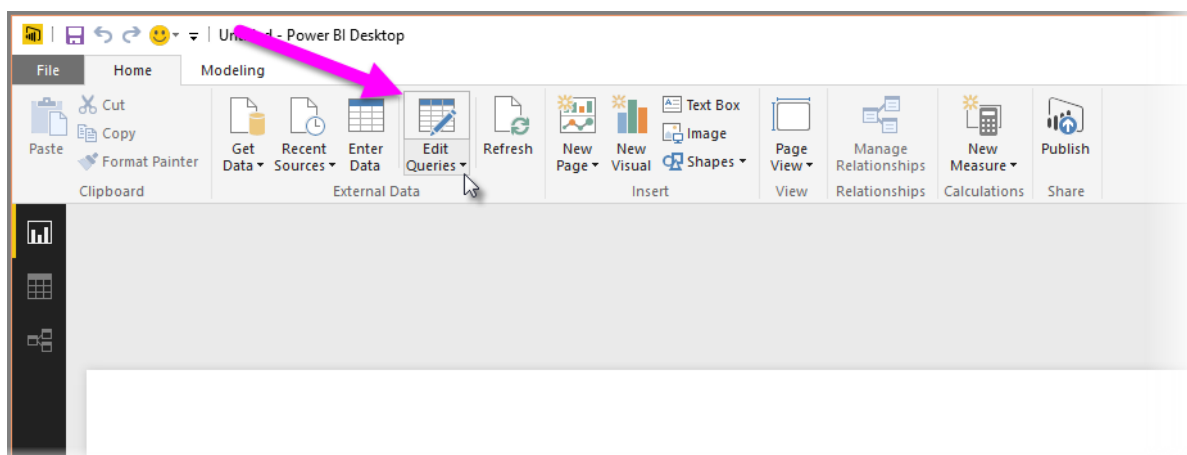
2. Select the file and select **Open**, and the CSV is displayed in the **CSV file** dialog.



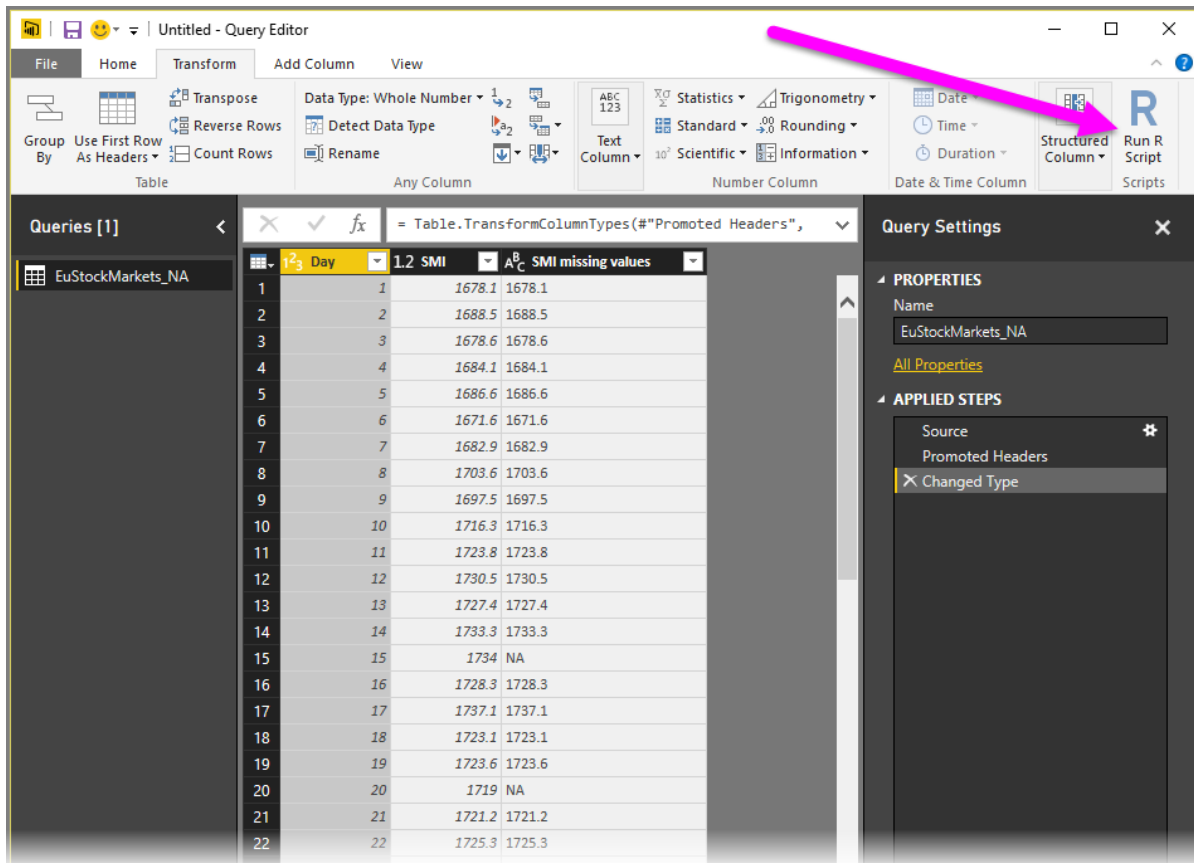
3. Once the data is loaded, you'll see it in the **Fields** pane in Power BI Desktop.



4. Open **Query Editor** by selecting **Edit Queries** from the **Home** tab in **Power BI Desktop**.



5. In the **Transform** tab, select **Run R Script** and the **Run R Script** editor appears (shown in the next step). Notice that rows 15 and 20 suffer from missing data, as do other rows you can't see in the following image. The steps below show how R can (and will) complete those rows for you.

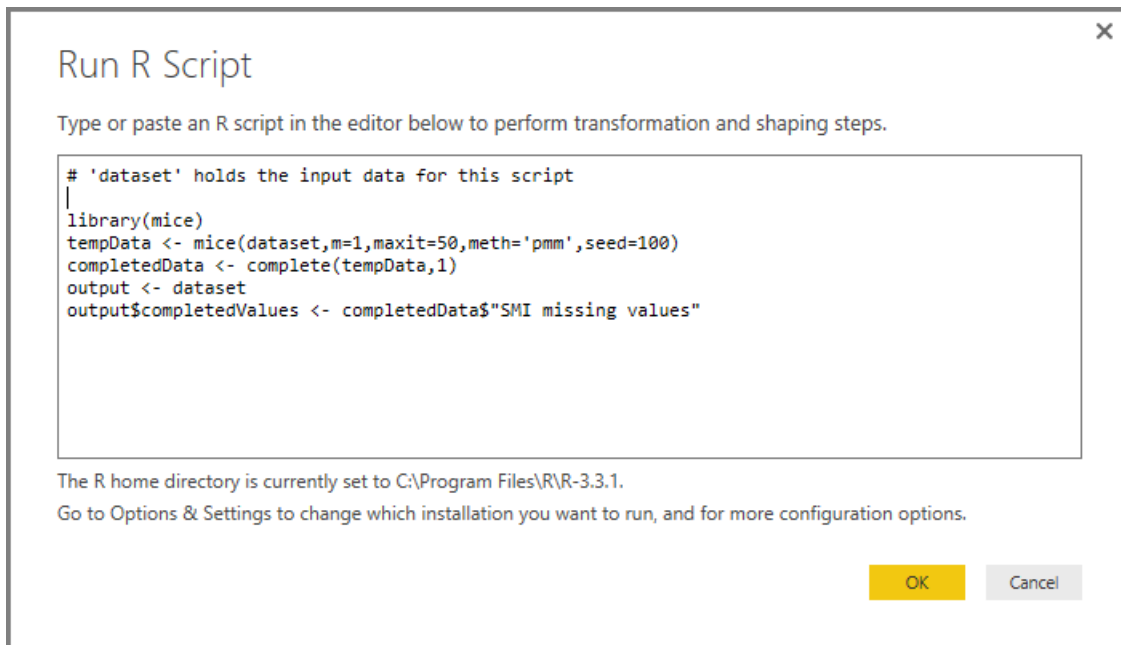


6. For this example, we'll enter the following script code:

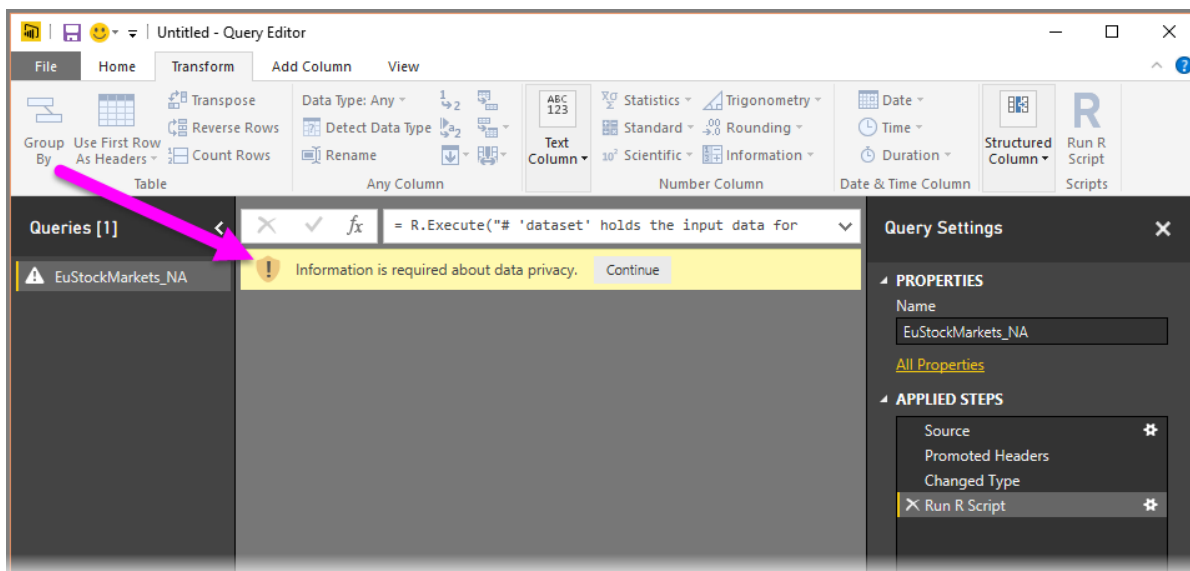
```
library(mice)
tempData <- mice(dataset,m=1,maxit=50,meth='pmm',seed=100)
completedData <- complete(tempData,1)
output <- dataset
output$completedValues <- completedData$"SMI missing values"
```

NOTE
 You'll need to have the *mice* library installed in your R environment for the previous script code to work properly. To install mice, run the following in your R installation: | > install.packages('mice')

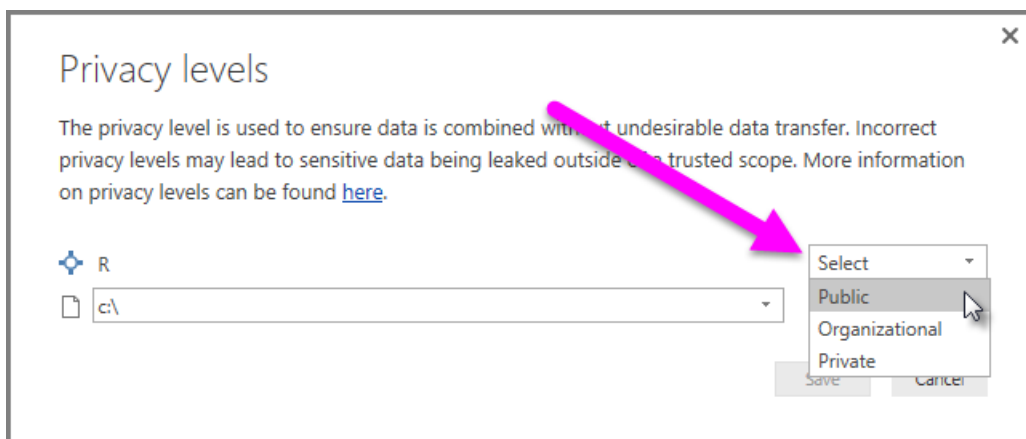
When put into the **Run R Script** dialog, the code looks like the following:



7. When we select **OK**, **Query Editor** displays a warning about data privacy.



8. For the R scripts to work properly in the Power BI service, all data sources need to be set to *public*. For more information about privacy settings and their implications, see [Privacy Levels](#).

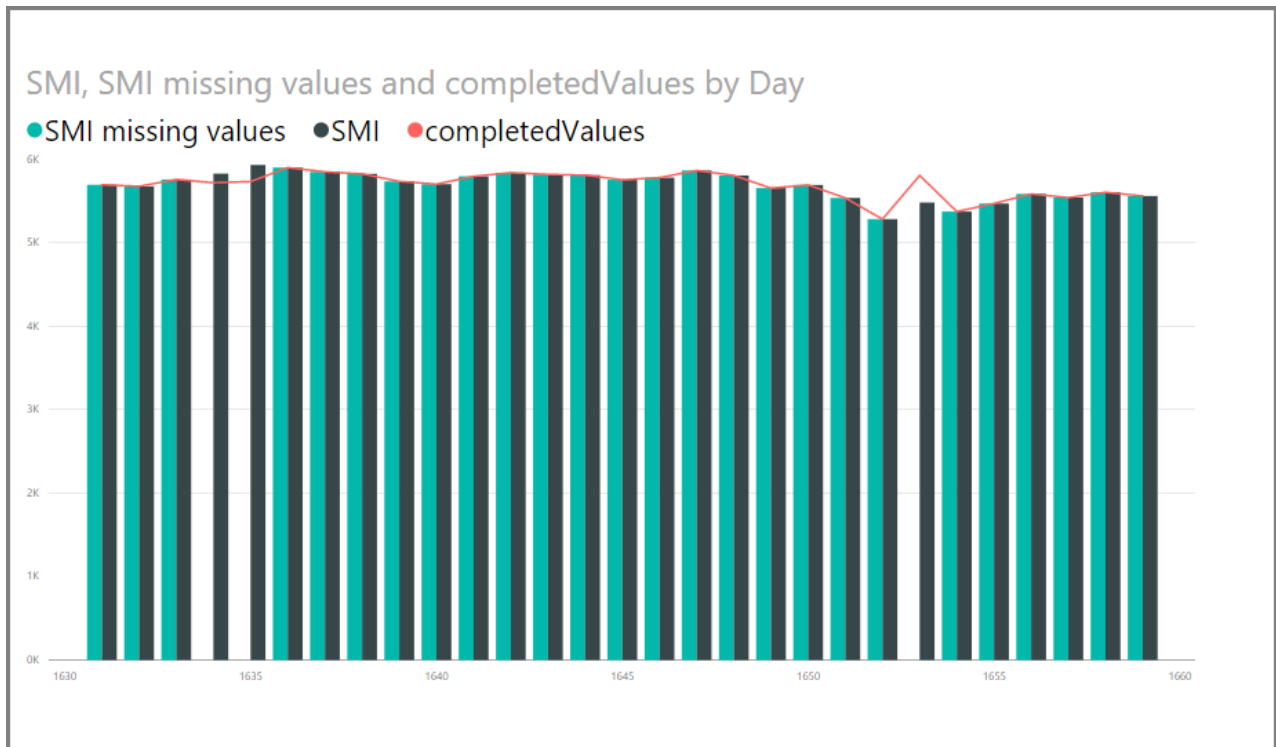


Once we do so, we see a new column in the **Fields** well called *completedValues*. Notice there are a few missing data elements, such as on row 15 and 18. We'll see how R handles that in the next section.

With just five lines of R script, **Query Editor** filled in the missing values with a predictive model.

Creating visuals from R script data

Now we can create a visual to see how the R script code using the *mice* library completed the missing values, as shown in the following image.



Once that visual is complete, and any other visuals we might want to create using **Power BI Desktop**, we can save the **Power BI Desktop** file (which saves as a .pbix file) and then use the data model, including the R scripts that are part of it, in the Power BI service.

NOTE

Want to see a completed .pbix file with these steps completed? You're in luck - you can download the completed **Power BI Desktop** file used in these examples [right here](#).

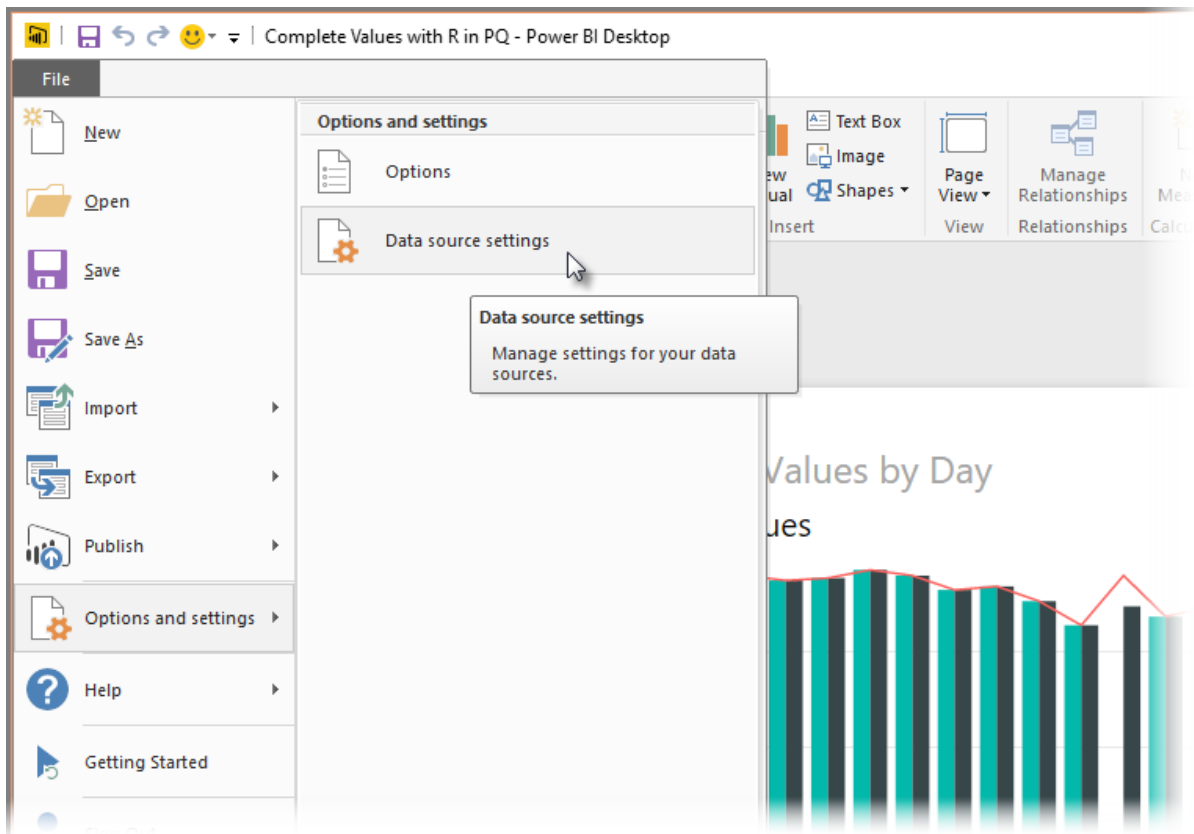
Once you've uploaded the .pbix file to the Power BI service, a couple more steps are necessary to enable data refresh (in the service) and to enable visuals to be updated in the service (the data needs access to R for visuals to be updated). The additional steps are the following:

- **Enable scheduled refresh for the dataset** - to enable scheduled refresh for the workbook that contains your dataset with R scripts, see [Configuring scheduled refresh](#), which also includes information about **Personal Gateway**.
- **Install the Personal Gateway** - you need a **Personal Gateway** installed on the machine where the file is located, and where R is installed; the Power BI service must access that workbook and re-render any updated visuals. You can get more information on how to [install and configure Personal Gateway](#).

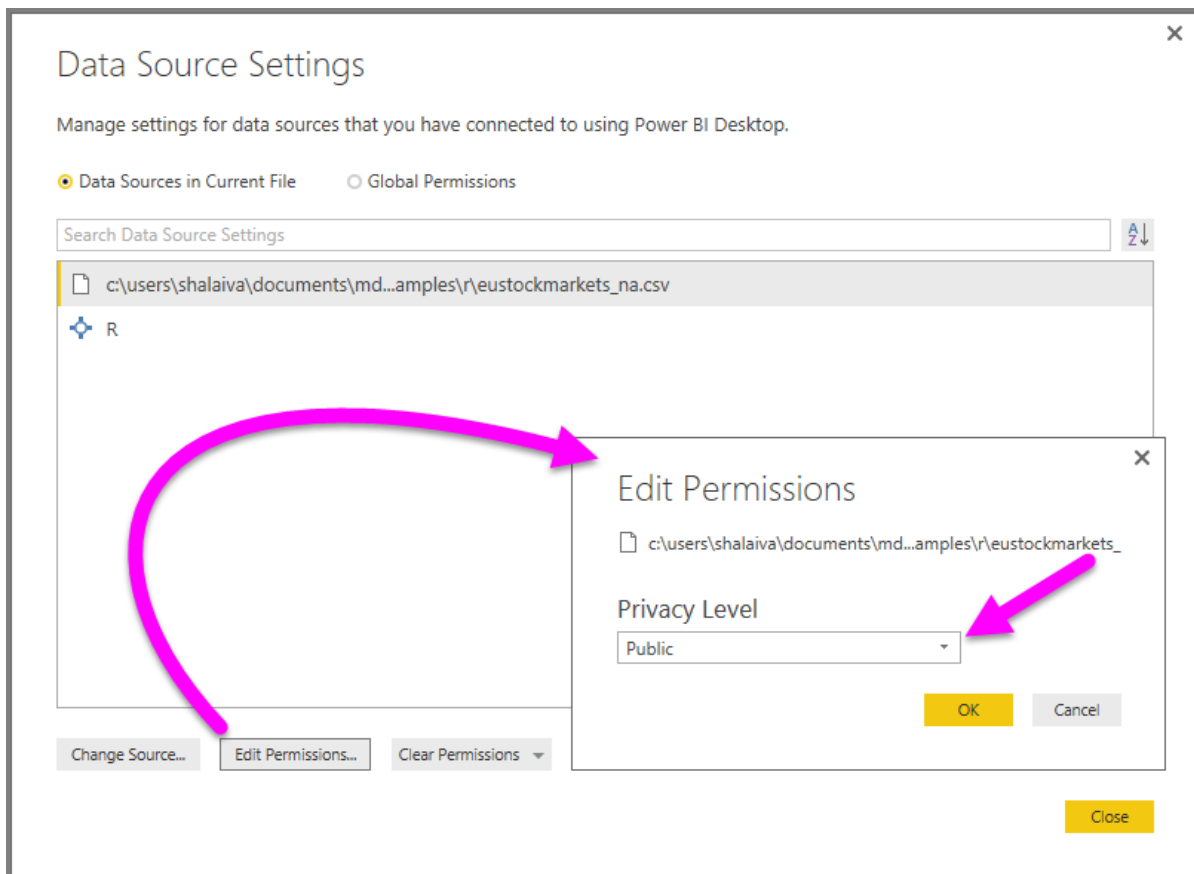
Limitations

There are some limitations to queries that include R scripts created in **Query Editor**:

- All R data source settings must be set to *Public*, and all other steps in a query created in **Query Editor** must also be public. To get to data source settings, in **Power BI Desktop** select **File > Options and settings > Data source settings**.



From the **Data Source Settings** dialog, select the the data source(s) and then select **Edit Permissions...** and ensure that the **Privacy Level** is set to *Public*.



- To enable scheduled refresh of your R visuals or dataset, you need to enable **Scheduled refresh** and have a **Personal Gateway** installed on the computer that houses the workbook and the R installation. For more information on both, see the previous section in this article, which provides links to learn more about each.

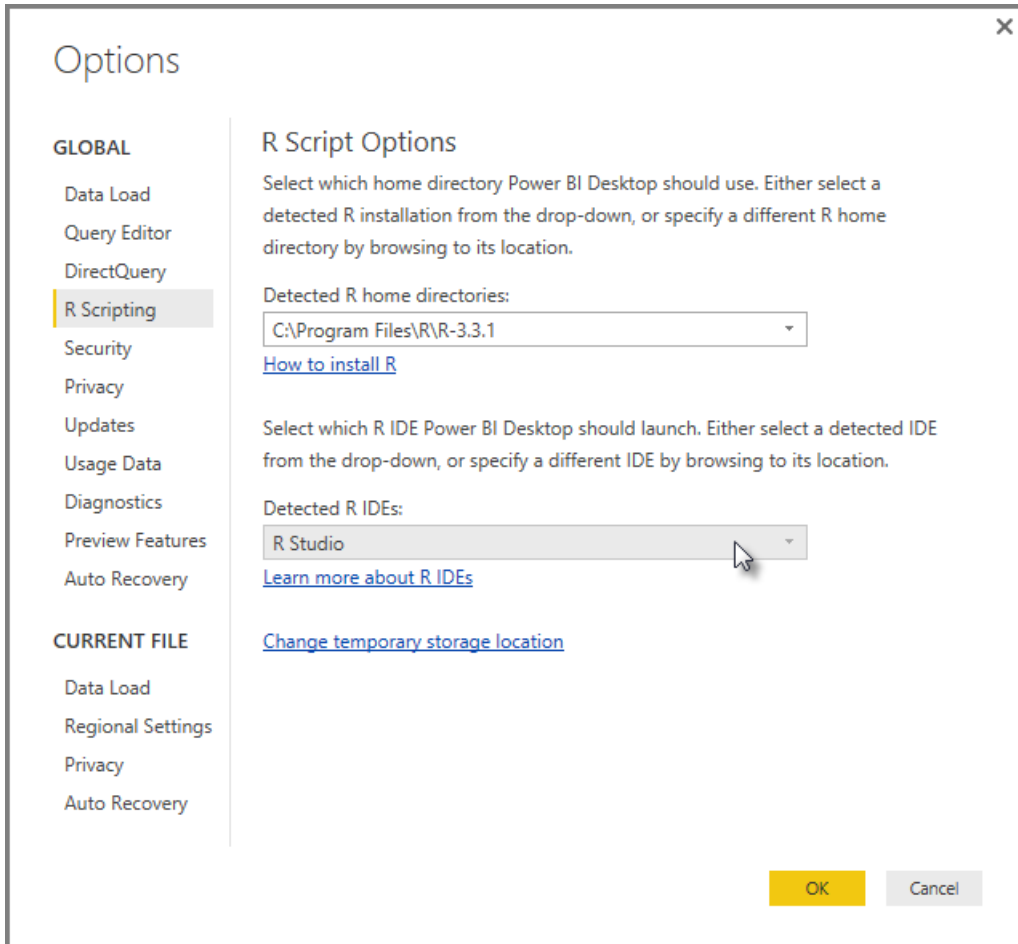
There are all sorts of things you can do with R and custom queries, so explore and shape your data just the way

you want it to appear.

Use an external R IDE with Power BI

12/6/2017 • 4 min to read • [Edit Online](#)

With **Power BI Desktop**, you can use your external R IDE (Integrated Development Environment) to create and refine R scripts, then use those scripts in Power BI.



Enable an external R IDE

Previously, you had to use the R script editor in **Power BI Desktop** to create and run R scripts. With this release, you can launch your external R IDE from **Power BI Desktop** and have your data automatically imported and displayed in the R IDE. From there, you can modify the script in that external R IDE, then paste it back into **Power BI Desktop** to create Power BI visuals and reports.

Beginning with the September 2016 release of **Power BI Desktop** (version 2.39.4526.362), you can specify which R IDE you would like to use, and have it launch automatically from within **Power BI Desktop**.

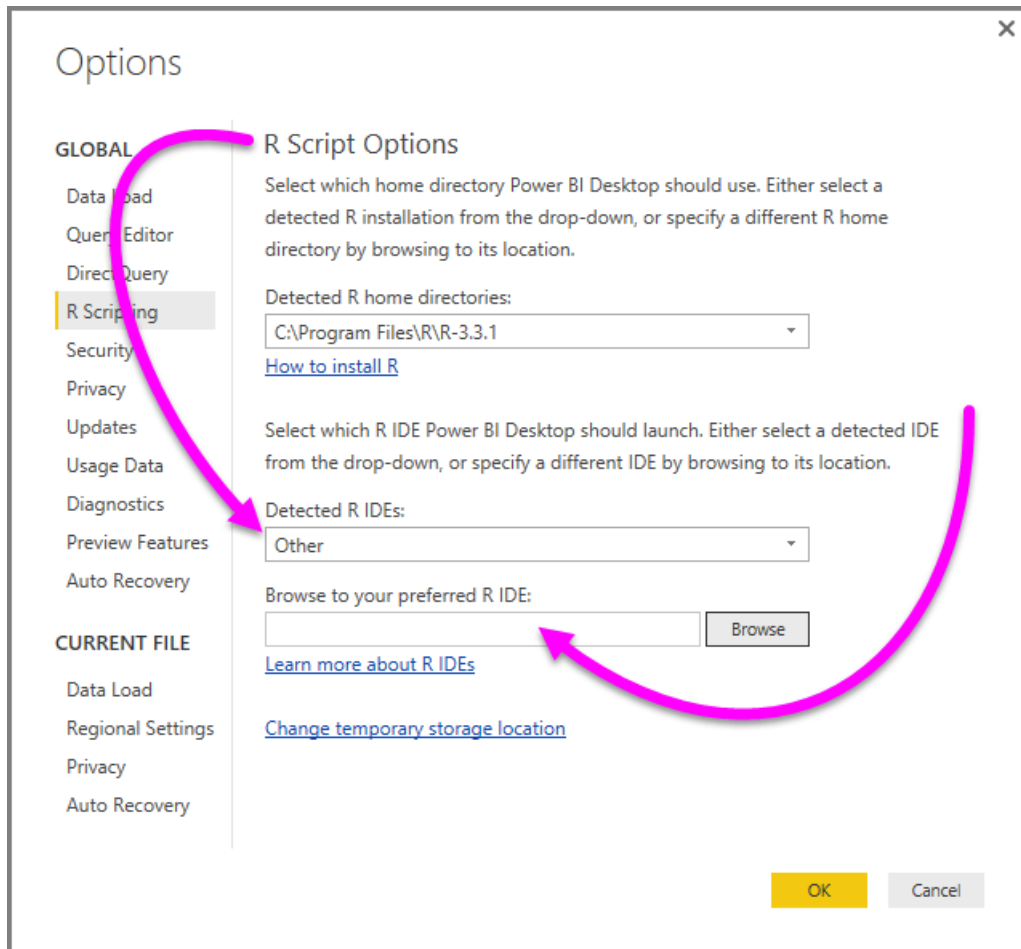
Requirements

To use this feature, you need to install an **R IDE** on your local computer. **Power BI Desktop** does not include, deploy or install the R engine, so you must separately install **R** on your local computer. You can choose which R IDE to use, with the following options:

- You can install your favorite R IDE, many of which are available for free, such as the [Revolution Open download page](#), and the [CRAN Repository](#).
- **Power BI Desktop** also supports **R Studio** and **Visual Studio 2015** with *R Tools for Visual Studio* editors.
- You can also install a different R IDE and have **Power BI Desktop** launch that **R IDE** by doing one of the

following:

- You can associate **.R** files with the external IDE you want **Power BI Desktop** to launch.
- You can specify the **.exe** that **Power BI Desktop** should launch by selecting *Other* from the **R Script Options** section of the **Options** dialog. You can bring up the **Options** dialog by going to **File > Options and settings > Options**.



If you have multiple R IDEs installed, you can specify which will be launched by selecting it from the *Detected R IDEs* drop-down in the **Options** dialog.

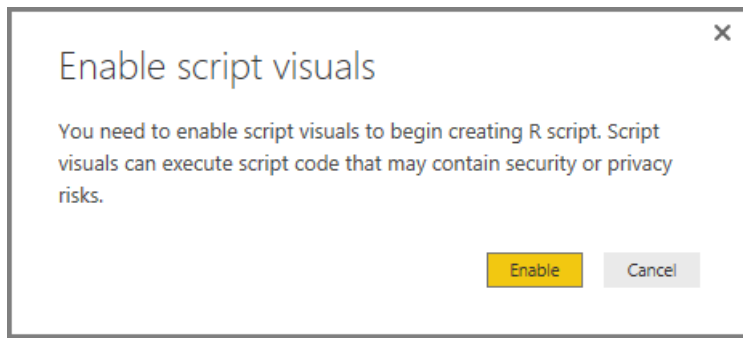
By default, **Power BI Desktop** will launch **R Studio** as the external R IDE if it's installed on your local computer; if **R Studio** is not installed and you have **Visual Studio 2015** with **R Tools for Visual Studio**, that will be launched instead. If neither of those R IDEs is installed, the application associated with **.R** files is launched.

And if no **.R** file association exists, it's possible to specify a path to a custom IDE in the *Browse to your preferred R IDE* section of the **Options** dialog. You can also launch a different R IDE by selecting the **Settings** gear icon beside the **Launch R IDE** arrow icon, in **Power BI Desktop**.

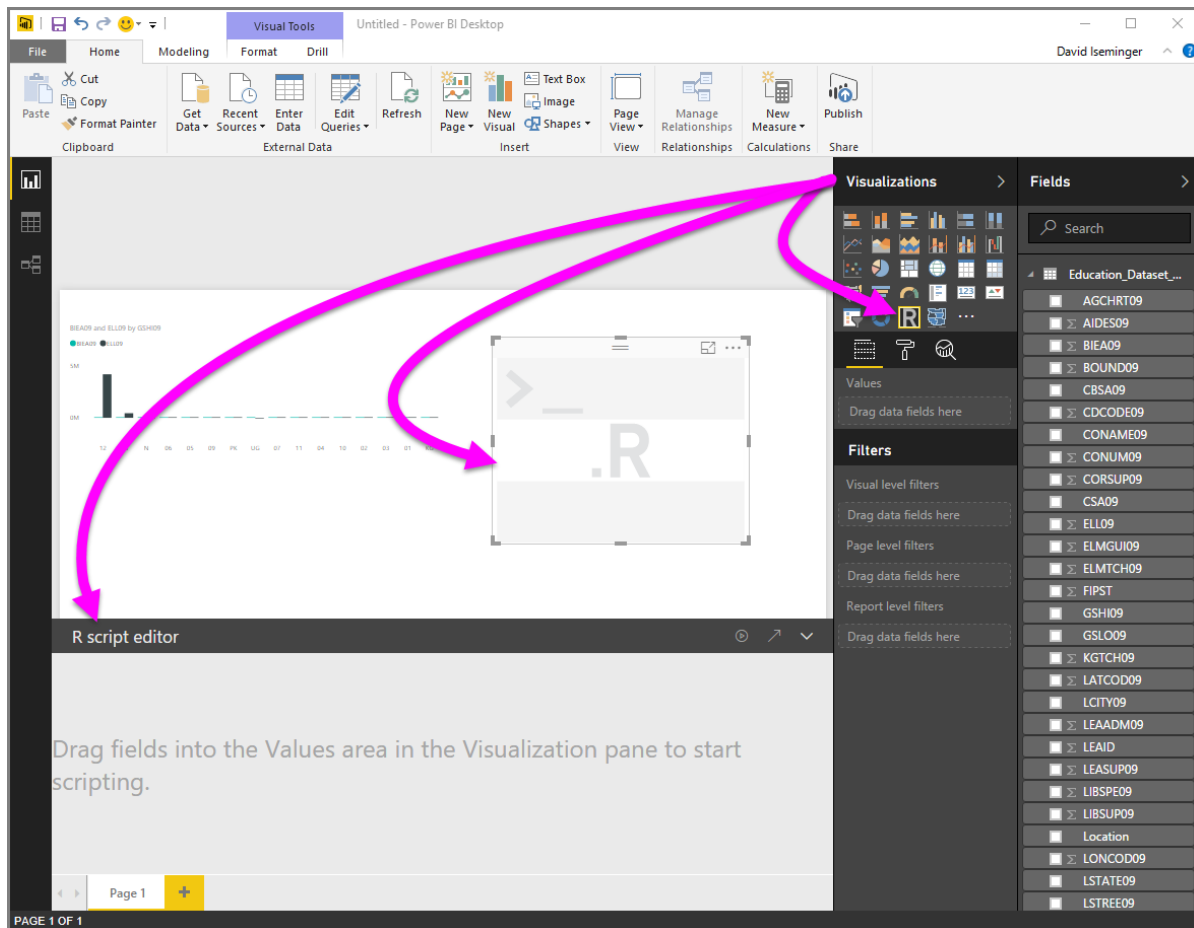
Launch an R IDE from Power BI Desktop

To launch an R IDE from **Power BI Desktop**, take the following steps.

1. Load data into **Power BI Desktop**.
2. Select some fields from the **Fields** pane that you want to work with. If you haven't enabled script visuals yet, you'll be prompted to do so.



- When script visuals are enabled, you can select an R visual from the **Visualizations** pane, which creates a blank R visual that's ready to display the results of your script. The **R script editor** pane also appears.



- Now you can select the fields you want to use in your R script. When you select a field, the **R script editor** field automatically creates script code based on the field or fields you select. You can either create (or paste) your R script directly in the **R script editor** pane, your you can leave it empty.

The screenshot shows the Power BI Desktop interface. On the left, a visualization titled 'BIEA09 and ELL09 by GSHI09' is displayed. Below it, the 'R script editor' is open, showing the following code:

```
# Duplicate rows were removed from the data.
# Create dataframe
# dataset <- data.frame(ELMGUI09, CSA09)

# Remove duplicated rows
# dataset <- unique(dataset)
Paste or type your R-script code here
```

On the right, the 'Fields' pane is visible, showing a list of fields under the 'Education_Dataset_...' table. The 'Visual level filters' section contains the following filters:

- CSA09(All)
- ELMGUI09(All)

A pink arrow points from the 'Visual level filters' section to the R script code.

NOTE

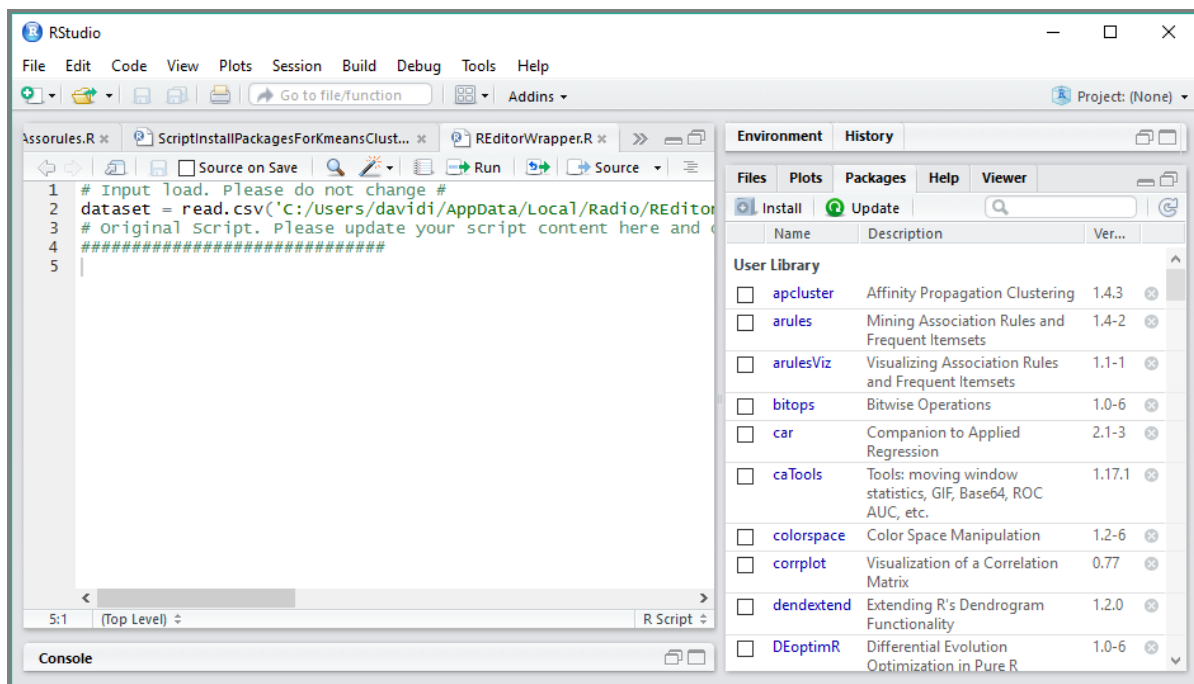
The default aggregation type for R visuals is *do not summarize*.

- You can now launch your R IDE directly from **Power BI Desktop**. Select the **Launch R IDE** button, found on the right side of the **R script editor** title bar, as shown below.

The screenshot shows the Power BI Desktop interface. The 'R script editor' is open, and a pink arrow points to the 'Launch R IDE' button in the title bar. The 'Filters' pane on the right shows the following filters:

- CSA09(All)
- ELMGUI09(All)

- Your specified R IDE is launched by Power BI Desktop, as shown in the following image (in this image, **RStudio** is the default R IDE).



NOTE

Power BI Desktop adds the first three lines of the script so it can import your data from **Power BI Desktop** once you run the script.

- Any script you created in the **R script editor pane** of **Power BI Desktop** appears starting in line 4 in your R IDE. At this point you can create your R script in the R IDE. Once your R script is complete in your R IDE, you need to copy and paste it back into the **R script editor** pane in **Power BI Desktop**, *excluding* the first three lines of the script that **Power BI Desktop** automatically generated. Do not copy the first three lines of script back into **Power BI Desktop**, those lines were only used to import your data to your R IDE from **Power BI Desktop**.

Known limitations

Launching an R IDE directly from Power BI Desktop has a few limitations:

- Automatically exporting your script from your R IDE into **Power BI Desktop** is not supported.
- R Client** editor (RGui.exe) is not supported, because the editor itself does not support opening files.

Next steps

Take a look at the following additional information about R in Power BI.

- [Running R Scripts in Power BI Desktop](#)
- [Create Power BI visuals using R](#)

R packages in the Power BI service

12/6/2017 • 7 min to read • [Edit Online](#)

You can use the powerful [R programming language](#) to create visuals in the Power BI service. Many R packages are supported in the Power BI service (and more are being supported all the time), and some packages are not.

The following sections provide an alphabetical table of which R packages are supported in Power BI, and which are not. For more information about R in Power BI, see the [R visuals](#) article.

Request support for a new R package

Supported R packages for the **Power BI service** are found in the following section, titled **Supported Packages**. If you would like to request support of an R package not found in that list, you can send an email with your request to the [R in Power BI Feedback Team](#).

Requirements and Limitations of R packages

There are a handful of requirements and limitations for R packages:

- The Power BI service, for the most part, supports R packages with free and open-source software licenses such as GPL-2, GPL-3, MIT+, and so on.
- The Power BI service supports packages published in CRAN. The service does not support private or custom R packages. We encourage users to make their private packages available on CRAN prior to requesting the package be available in the Power BI service.
- For **Power BI Desktop** has two variations for R packages:
 - For R visuals, you can install any package, including custom R packages
 - For Custom R visuals, only public CRAN packages are supported for auto-installation of the packages
- For security and privacy reasons, we currently don't support R packages that provide client-server queries over the World-Wide Web (such as RgoogleMaps) in the service. Networking is blocked for such attempts. See the following section for a list of supported and unsupported R packages.
- The approval process for including a new R package has a tree of dependencies; some dependencies required to be installed in the service cannot be supported.

R packages that are supported in Power BI

The following table shows which packages **are supported** in the Power BI service.

PACKAGE	VERSION	LINK
abc	2.1	https://cran.r-project.org/web/packages/abc/index.html
abc.data	1	https://cran.r-project.org/web/packages/abc.data/index.html
acepack	1.3-3.3	https://cran.r-project.org/web/packages/acepack/index.html

PACKAGE	VERSION	LINK
actuar	1.2-0	https://cran.r-project.org/web/packages/actuar/index.html
ade4	1.7-4	https://cran.r-project.org/web/packages/ade4/index.html
AdMit	2.0.1	https://cran.r-project.org/web/packages/AdMit/index.html
andrews	1	https://cran.r-project.org/web/packages/andrews/index.html
aod	1.3	https://cran.r-project.org/web/packages/aod/index.html
apcluster	1.4.3	https://cran.r-project.org/web/packages/apcluster/index.html
ape	3.4	https://cran.r-project.org/web/packages/ape/index.html
aplpack	1.3.0	https://cran.r-project.org/web/packages/aplpack/index.html
approximator	1.2-6	https://cran.r-project.org/web/packages/approximator/index.html
arm	1.8-6	https://cran.r-project.org/web/packages/arm/index.html
arules	1.4-0	https://cran.r-project.org/web/packages/arules/index.html
arulesViz	1.1-0	https://cran.r-project.org/web/packages/arulesViz/index.html
assertthat	0.1	https://cran.r-project.org/web/packages/assertthat/index.html
BACCO	2.0-9	https://cran.r-project.org/web/packages/BACCO/index.html

PACKAGE	VERSION	LINK
BaM	0.99	https://cran.r-project.org/web/packages/BaM/index.html
BAS	1.1.0	https://cran.r-project.org/web/packages/BAS/index.html
base64enc	0.1-3	https://cran.r-project.org/web/packages/base64enc/index.html
bayesm	3.0-2	https://cran.r-project.org/web/packages/bayesm/index.html
bayesQR	2.2	https://cran.r-project.org/web/packages/bayesQR/index.html
bayesSurv	2.6	https://cran.r-project.org/web/packages/bayesSurv/index.html
BayesTree	0.3-1.3	https://cran.r-project.org/web/packages/BayesTree/index.html
BayHaz	0.1-3	https://cran.r-project.org/web/packages/BayHaz/index.html
bbemkr	2	https://cran.r-project.org/web/packages/bbemkr/index.html
BCBCSF	1.0-1	https://cran.r-project.org/web/packages/BCBCSF/index.html
BCE	2.1	https://cran.r-project.org/web/packages/BCE/index.html
bclust	1.5	https://cran.r-project.org/web/packages/bclust/index.html
BenfordTests	1.2.0	https://cran.r-project.org/web/packages/BenfordTests/index.html
bisoreg	1.4	https://cran.r-project.org/web/packages/bisoreg/index.html

PACKAGE	VERSION	LINK
bit	1.1-12	https://cran.r-project.org/web/packages/bit/index.html
bit64	0.9-5	https://cran.r-project.org/web/packages/bit64/index.html
bitops	1.0-6	https://cran.r-project.org/web/packages/bitops/index.html
BMA	3.18.6	https://cran.r-project.org/web/packages/BMA/index.html
Bmix	0.6	https://cran.r-project.org/web/packages/Bmix/index.html
bnlearn	3.9	https://cran.r-project.org/web/packages/bnlearn/index.html
boa	1.1.8-1	https://cran.r-project.org/web/packages/boa/index.html
boot	1.3-18	https://cran.r-project.org/web/packages/boot/index.html
bootstrap	2015.2	https://cran.r-project.org/web/packages/bootstrap/index.html
bqtl	1.0-32	https://cran.r-project.org/web/packages/bqtl/index.html
BradleyTerry2	1.0-6	https://cran.r-project.org/web/packages/BradleyTerry2/index.html
brew	1.0-6	https://cran.r-project.org/web/packages/brew/index.html
brglm	0.5-9	https://cran.r-project.org/web/packages/brglm/index.html
bspec	1.5	https://cran.r-project.org/web/packages/bspec/index.html

PACKAGE	VERSION	LINK
bspmma	0.1-1	https://cran.r-project.org/web/packages/bspmma/index.html
BVS	4.12.1	https://cran.r-project.org/web/packages/BVS/index.html
C50	0.1.0-24	https://cran.r-project.org/web/packages/C50/index.html
calibrator	1.2-6	https://cran.r-project.org/web/packages/calibrator/index.html
car	2.1-2	https://cran.r-project.org/web/packages/car/index.html
caret	6.0-64	https://cran.r-project.org/web/packages/caret/index.html
catnet	1.14.8	https://cran.r-project.org/web/packages/catnet/index.html
caTools	1.17.1	https://cran.r-project.org/web/packages/caTools/index.html
cclust	0.6-20	https://cran.r-project.org/web/packages/cclust/index.html
class	7.3-14	https://cran.r-project.org/web/packages/class/index.html
clue	0.3-51	https://cran.r-project.org/web/packages/clue/index.html
cluster	2.0.3	https://cran.r-project.org/web/packages/cluster/index.html
coda	0.18-1	https://cran.r-project.org/web/packages/coda/index.html
coin	1.1-2	https://cran.r-project.org/web/packages/coin/index.html

PACKAGE	VERSION	LINK
CORElearn	1.47.1	https://cran.r-project.org/web/packages/CORElearn/index.html
corpcor	1.6.8	https://cran.r-project.org/web/packages/corpcor/index.html
corrplot	0.73	https://cran.r-project.org/web/packages/corrplot/index.html
crayon	1.3.1	https://cran.r-project.org/web/packages/crayon/index.html
cslogistic	0.1-3	https://cran.r-project.org/web/packages/cslogistic/index.html
cubature	1.1-2	https://cran.r-project.org/web/packages/cubature/index.html
cvTools	0.3.2	https://cran.r-project.org/web/packages/cvTools/index.html
data.table	1.9.6	https://cran.r-project.org/web/packages/data.table/index.html
Data.tree	0.7.0	https://cran.r-project.org/web/packages/data.tree/index.html
date	1.2-34	https://cran.r-project.org/web/packages/date/index.html
dbscan	0.9-7	https://cran.r-project.org/web/packages/dbscan/index.html
deal	1.2-37	https://cran.r-project.org/web/packages/deal/index.html
deepnet	0.2	https://cran.r-project.org/web/packages/deepnet/index.html
deldir	0.1-12	https://cran.r-project.org/web/packages/deldir/index.html

PACKAGE	VERSION	LINK
dendextend	1.1.8	https://cran.r-project.org/web/packages/dendextend/index.html
DEoptimR	1.0-4	https://cran.r-project.org/web/packages/DEoptimR/index.html
deSolve	1.13	https://cran.r-project.org/web/packages/deSolve/index.html
DiagrammeR	0.8.2	https://cran.r-project.org/web/packages/DiagrammeR/index.html
dichromat	2.0-0	https://cran.r-project.org/web/packages/dichromat/index.html
digest	0.6.9	https://cran.r-project.org/web/packages/digest/index.html
dlm	1.1-4	https://cran.r-project.org/web/packages/dlm/index.html
DMwR	0.4.1	https://cran.r-project.org/web/packages/DMwR/index.html
dplyr	0.4.3	https://cran.r-project.org/web/packages/dplyr/index.html
DPpackage	1.1-6	https://cran.r-project.org/web/packages/DPpackage/index.html
dse	2015.12-1	https://cran.r-project.org/web/packages/dse/index.html
DT	0.2	https://cran.r-project.org/web/packages/DT/index.html
dtw	1.18-1	https://cran.r-project.org/web/packages/dtw/index.html
e1071	1.6-7	https://cran.r-project.org/web/packages/e1071/index.html

PACKAGE	VERSION	LINK
earth	4.4.4	https://cran.r-project.org/web/packages/earth/index.html
EbayesThresh	1.3.2	https://cran.r-project.org/web/packages/EbayesThresh/index.html
ebdbNet	1.2.3	https://cran.r-project.org/web/packages/ebdbNet/index.html
ellipse	0.3-8	https://cran.r-project.org/web/packages/ellipse/index.html
emulator	1.2-15	https://cran.r-project.org/web/packages/emulator/index.html
ensembleBMA	5.1.2	https://cran.r-project.org/web/packages/ensembleBMA/index.html
entropy	1.2.1	https://cran.r-project.org/web/packages/entropy/index.html
EvalEst	2015.4-2	https://cran.r-project.org/web/packages/EvalEst/index.html
evaluate	0.8.3	https://cran.r-project.org/web/packages/evaluate/index.html
evdbayes	1.1-1	https://cran.r-project.org/web/packages/evdbayes/index.html
exactLoglinTest	1.4.2	https://cran.r-project.org/web/packages/exactLoglinTest/index.html
expm	0.999-0	https://cran.r-project.org/web/packages/expm/index.html
extremevalues	2.3.2	https://cran.r-project.org/web/packages/extremevalues/index.html
FactoMineR	1.32	https://cran.r-project.org/web/packages/FactoMineR/index.html

PACKAGE	VERSION	LINK
factorQR	0.1-4	https://cran.r-project.org/web/packages/factorQR/index.html
faoutlier	0.6.1	https://cran.r-project.org/web/packages/faoutlier/index.html
fBasics	3011.87	https://cran.r-project.org/web/packages/fBasics/index.html
fields	8.3-6	https://cran.r-project.org/web/packages/fields/index.html
filehash	2.3	https://cran.r-project.org/web/packages/filehash/index.html
fitdistrplus	1.0-6	https://cran.r-project.org/web/packages/fitdistrplus/index.html
flashClust	1.01-2	https://cran.r-project.org/web/packages/flashClust/index.html
FME	1.3.2	https://cran.r-project.org/web/packages/FME/index.html
fmsb	0.5.2	https://cran.r-project.org/web/packages/fmsb/index.html
foreach	1.4.3	https://cran.r-project.org/web/packages/foreach/index.html
forecast	7	https://cran.r-project.org/web/packages/forecast/index.html
forecastHybrid	0.3.0	https://cran.r-project.org/web/packages/forecastHybrid/index.html
Formula	1.2-1	https://cran.r-project.org/web/packages/Formula/index.html
fracdiff	1.4-2	https://cran.r-project.org/web/packages/fracdiff/index.html

PACKAGE	VERSION	LINK
fTrading	3010.78	https://cran.r-project.org/web/packages/fTrading/index.html
futile.logger	1.4.3	https://cran.r-project.org/web/packages/futile.logger/index.html
gam	1.12	https://cran.r-project.org/web/packages/gam/index.html
gamlr	1.13-3	https://cran.r-project.org/web/packages/gamlr/index.html
gclus	1.3.1	https://cran.r-project.org/web/packages/gclus/index.html
gdata	2.17.0	https://cran.r-project.org/web/packages/gdata/index.html
gee	4.13-19	https://cran.r-project.org/web/packages/gee/index.html
genetics	1.3.8.1	https://cran.r-project.org/web/packages/genetics/index.html
geoRglm	0.9-8	https://cran.r-project.org/web/packages/geoRglm/index.html
geosphere	1.5-1	https://cran.r-project.org/web/packages/geosphere/index.html
ggdendro	0.1-18	https://cran.r-project.org/web/packages/ggdendro/index.html
ggmap	2.6.1	https://cran.r-project.org/web/packages/ggmap/index.html
ggmcmc	0.8	https://cran.r-project.org/web/packages/ggmcmc/index.html
ggplot2	2.1.0	https://cran.r-project.org/web/packages/ggplot2/index.html

PACKAGE	VERSION	LINK
ggrepel	0.5	https://cran.r-project.org/web/packages/ggrepel/index.html
ggthemes	3.0.2	https://cran.r-project.org/web/packages/ggthemes/index.html
glmmBUGS	2.3	https://cran.r-project.org/web/packages/glmmBUGS/index.html
glmnet	2.0-5	https://cran.r-project.org/web/packages/glmnet/index.html
gmodels	2.16.2	https://cran.r-project.org/web/packages/gmodels/index.html
gmp	0.5-12	https://cran.r-project.org/web/packages/gmp/index.html
gnm	1.0-8	https://cran.r-project.org/web/packages/gnm/index.html
GPArotation	2014.11-1	https://cran.r-project.org/web/packages/GPArotation/index.html
gridBase	0.4-7	https://cran.r-project.org/web/packages/gridBase/index.html
gridExtra	2.2.1	https://cran.r-project.org/web/packages/gridExtra/index.html
growcurves	0.2.4.0	https://cran.r-project.org/web/packages/growcurves/index.html
grpreg	2.8-1	https://cran.r-project.org/web/packages/grpreg/index.html
gss	2.1-5	https://cran.r-project.org/web/packages/gss/index.html
gsubfn	0.6-6	https://cran.r-project.org/web/packages/gsubfn/index.html

PACKAGE	VERSION	LINK
gtable	0.2.0	https://cran.r-project.org/web/packages/gtable/index.html
ggtern	2.2.0	https://cran.r-project.org/web/packages/ggtern/index.html
gtools	3.5.0	https://cran.r-project.org/web/packages/gtools/index.html
haplo.stats	1.7.6	https://cran.r-project.org/web/packages/haplo.stats/index.html
hash	2.2.6	https://cran.r-project.org/web/packages/hash/index.html
hbsae	1	https://cran.r-project.org/web/packages/hbsae/index.html
hdcrcde	3.1	https://cran.r-project.org/web/packages/hdcrcde/index.html
heavy	0.3	https://cran.r-project.org/web/packages/heavy/index.html
HH	3.1-25	https://cran.r-project.org/web/packages/HH/index.html
HI	0.4	https://cran.r-project.org/web/packages/HI/index.html
Highcharter	0.5.0	https://cran.r-project.org/web/packages/highcharter/index.html
Hmisc	3.17-3	https://cran.r-project.org/web/packages/Hmisc/index.html
HSAUR	1.3-7	https://cran.r-project.org/web/packages/HSAUR/index.html
ifultools	2.0-1	https://cran.r-project.org/web/packages/ifultools/index.html

PACKAGE	VERSION	LINK
intervals	0.15.1	https://cran.r-project.org/web/packages/intervals/index.html
ipred	0.9-5	https://cran.r-project.org/web/packages/ipred/index.html
irlba	2.0.0	https://cran.r-project.org/web/packages/irlba/index.html
irr	0.84	https://cran.r-project.org/web/packages/irr/index.html
iterators	1.0.8	https://cran.r-project.org/web/packages/iterators/index.html
jpeg	0.1-8	https://cran.r-project.org/web/packages/jpeg/index.html
kernlab	0.9-24	https://cran.r-project.org/web/packages/kernlab/index.html
KernSmooth	2.23-15	https://cran.r-project.org/web/packages/KernSmooth/index.html
KFKSDS	1.6	https://cran.r-project.org/web/packages/KFKSDS/index.html
kinship2	1.6.4	https://cran.r-project.org/web/packages/kinship2/index.html
kknn	1.3.1	https://cran.r-project.org/web/packages/kknn/index.html
klaR	0.6-12	https://cran.r-project.org/web/packages/klaR/index.html
knitr	1.12.3	https://cran.r-project.org/web/packages/knitr/index.html
labeling	0.3	https://cran.r-project.org/web/packages/labeling/index.html

PACKAGE	VERSION	LINK
lars	1.2	https://cran.r-project.org/web/packages/lars/index.html
lattice	0.20-33	https://cran.r-project.org/web/packages/lattice/index.html
latticeExtra	0.6-28	https://cran.r-project.org/web/packages/latticeExtra/index.html
lava	1.4.1	https://cran.r-project.org/web/packages/lava/index.html
lavaan	0.5-20	https://cran.r-project.org/web/packages/lavaan/index.html
lazyeval	0.1.10	https://cran.r-project.org/web/packages/lazyeval/index.html
leaps	2.9	https://cran.r-project.org/web/packages/leaps/index.html
LearnBayes	2.15	https://cran.r-project.org/web/packages/LearnBayes/index.html
LiblineaR	1.94-2	https://cran.r-project.org/web/packages/LiblineaR/index.html
LICORS	0.2.0	https://cran.r-project.org/web/packages/LICORS/index.html
limSolve	1.5.5.1	https://cran.r-project.org/web/packages/limSolve/index.html
lme4	1.1-11	https://cran.r-project.org/web/packages/lme4/index.html
Imm	1	https://cran.r-project.org/web/packages/Imm/index.html
lmtest	0.9-34	https://cran.r-project.org/web/packages/lmtest/index.html

PACKAGE	VERSION	LINK
locfit	1.5-9.1	https://cran.r-project.org/web/packages/locfit/index.html
locpol	0.6-0	https://cran.r-project.org/web/packages/locpol/index.html
LogicReg	1.5.8	https://cran.r-project.org/web/packages/LogicReg/index.html
lsa	0.73.1	https://cran.r-project.org/web/packages/lsa/index.html
lubridate	1.5.0	https://cran.r-project.org/web/packages/lubridate/index.html
magic	1.5-6	https://cran.r-project.org/web/packages/magic/index.html
magrittr	1.5	https://cran.r-project.org/web/packages/magrittr/index.html
mapdata	2.2-6	https://cran.r-project.org/web/packages/mapdata/index.html
mapproj	1.2-4	https://cran.r-project.org/web/packages/mapproj/index.html
maps	3.1.0	https://cran.r-project.org/web/packages/maps/index.html
maptree	1.4-7	https://cran.r-project.org/web/packages/maptree/index.html
MASS	7.3-45	https://cran.r-project.org/web/packages/MASS/index.html
MasterBayes	2.52	https://cran.r-project.org/web/packages/MasterBayes/index.html
Matrix	1.2-4	https://cran.r-project.org/web/packages/Matrix/index.html

PACKAGE	VERSION	LINK
matrixcalc	1.0-3	https://cran.r-project.org/web/packages/matrixcalc/index.html
MatrixModels	0.4-1	https://cran.r-project.org/web/packages/MatrixModels/index.html
maxent	1.3.3.1	https://cran.r-project.org/web/packages/maxent/index.html
maxLik	1.3-4	https://cran.r-project.org/web/packages/maxLik/index.html
mboost	2.6-0	https://cran.r-project.org/web/packages/mboost/index.html
mda	0.4-8	https://cran.r-project.org/web/packages/mda/index.html
memoise	1.0.0	https://cran.r-project.org/web/packages/memoise/index.html
mi	1	https://cran.r-project.org/web/packages/mi/index.html
mice	2.25	https://cran.r-project.org/web/packages/mice/index.html
microbenchmark	1.4-2.1	https://cran.r-project.org/web/packages/microbenchmark/index.html
mime	0.4	https://cran.r-project.org/web/packages/mime/index.html
misc3d	0.8-4	https://cran.r-project.org/web/packages/misc3d/index.html
miscTools	0.6-16	https://cran.r-project.org/web/packages/miscTools/index.html
mitools	2.3	https://cran.r-project.org/web/packages/mitools/index.html

PACKAGE	VERSION	LINK
mixtools	1.0.4	https://cran.r-project.org/web/packages/mixtools/index.html
mlbench	2.1-1	https://cran.r-project.org/web/packages/mlbench/index.html
mnormt	1.5-4	https://cran.r-project.org/web/packages/mnormt/index.html
MNP	2.6-4	https://cran.r-project.org/web/packages/MNP/index.html
modeltools	0.2-21	https://cran.r-project.org/web/packages/modeltools/index.html
mombf	1.6.1	https://cran.r-project.org/web/packages/mombf/index.html
monomvn	1.9-6	https://cran.r-project.org/web/packages/monomvn/index.html
MSBVAR	0.9-2	https://cran.r-project.org/web/packages/MSBVAR/index.html
msm	1.6.1	https://cran.r-project.org/web/packages/msm/index.html
multcomp	1.4-4	https://cran.r-project.org/web/packages/multcomp/index.html
munsell	0.4.3	https://cran.r-project.org/web/packages/munsell/index.html
mvtnorm	1.0-5	https://cran.r-project.org/web/packages/mvtnorm/index.html
NbClust	3	https://cran.r-project.org/web/packages/NbClust/index.html
ncvreg	3.5-1	https://cran.r-project.org/web/packages/ncvreg/index.html

PACKAGE	VERSION	LINK
networkD3	0.2.13	https://cran.r-project.org/web/packages/networkD3/index.html
neuralnet	1.33	https://cran.r-project.org/web/packages/neuralnet/index.html
nlme	3.1-126	https://cran.r-project.org/web/packages/nlme/index.html
nloptr	1.0.4	https://cran.r-project.org/web/packages/nloptr/index.html
NLP	0.1-9	https://cran.r-project.org/web/packages/NLP/index.html
NMF	0.20.6	https://cran.r-project.org/web/packages/NMF/index.html
nnet	7.3-12	https://cran.r-project.org/web/packages/nnet/index.html
npls	1.4	https://cran.r-project.org/web/packages/npls/index.html
nortest	1.0-4	https://cran.r-project.org/web/packages/nortest/index.html
numbers	0.6-1	https://cran.r-project.org/web/packages/numbers/index.html
numDeriv	2014.2-1	https://cran.r-project.org/web/packages/numDeriv/index.html
OutlierDC	0.3-0	https://cran.r-project.org/web/packages/OutlierDC/index.html
pacbpred	0.92.2	https://cran.r-project.org/web/packages/pacbpred/index.html
party	1.0-25	https://cran.r-project.org/web/packages/party/index.html

PACKAGE	VERSION	LINK
partykit	1.0-5	https://cran.r-project.org/web/packages/partykit/index.html
PAWL	0.5	https://cran.r-project.org/web/packages/PAWL/index.html
pbivnorm	0.6.0	https://cran.r-project.org/web/packages/pbivnorm/index.html
pcaPP	1.9-60	https://cran.r-project.org/web/packages/pcaPP/index.html
pdcc	1.0.3	https://cran.r-project.org/web/packages/pdccc/index.html
PerformanceAnalytics	1.4.3541	https://cran.r-project.org/web/packages/PerformanceAnalytics/index.html
Plotly	4.5.6	https://cran.r-project.org/web/packages/plotly/index.html
plotmo	3.1.4	https://cran.r-project.org/web/packages/plotmo/index.html
plotrix	3.6-1	https://cran.r-project.org/web/packages/plotrix/index.html
pls	2.5-0	https://cran.r-project.org/web/packages/pls/index.html
plyr	1.8.3	https://cran.r-project.org/web/packages/plyr/index.html
png	0.1-7	https://cran.r-project.org/web/packages/png/index.html
polynom	1.3-8	https://cran.r-project.org/web/packages/polynom/index.html
predmixcor	1.1-1	https://cran.r-project.org/web/packages/predmixcor/index.html

PACKAGE	VERSION	LINK
PresenceAbsence	1.1.9	https://cran.r-project.org/web/packages/PresenceAbsence/index.html
profdpm	3.3	https://cran.r-project.org/web/packages/profdpm/index.html
proto	0.3-10	https://cran.r-project.org/web/packages/proto/index.html
proxy	0.4-15	https://cran.r-project.org/web/packages/proxy/index.html
pryr	0.1.2	https://cran.r-project.org/web/packages/pryr/index.html
pscl	1.4.9	https://cran.r-project.org/web/packages/pscl/index.html
psych	1.5.8	https://cran.r-project.org/web/packages/psych/index.html
qap	0.1-0	https://cran.r-project.org/web/packages/qap/index.html
qdapRegex	0.6.0	https://cran.r-project.org/web/packages/qdapRegex/index.html
qcc	2.6	https://cran.r-project.org/web/packages/qcc/index.html
quadprog	1.5-5	https://cran.r-project.org/web/packages/quadprog/index.html
quantreg	5.21	https://cran.r-project.org/web/packages/quantreg/index.html
qvcalc	0.9-0	https://cran.r-project.org/web/packages/qvcalc/index.html
R.oo	1.20.0	https://cran.r-project.org/web/packages/R.oo/index.html

PACKAGE	VERSION	LINK
ramps	0.6-13	https://cran.r-project.org/web/packages/ramps/index.html
RandomFieldsUtils	0.0.14	https://cran.r-project.org/web/packages/RandomFieldsUtils/index.html
Rblpapi	0.3.5	https://cran.r-project.org/web/packages/Rblpapi/index.html
RColorBrewer	1.1-2	https://cran.r-project.org/web/packages/RColorBrewer/index.html
Rcpp	0.12.3	https://cran.r-project.org/web/packages/Rcpp/index.html
RcppArmadillo	0.6.600.4.0	https://cran.r-project.org/web/packages/RcppArmadillo/index.html
RcppEigen	0.3.2.8.1	https://cran.r-project.org/web/packages/RcppEigen/index.html
redmonder	0.2.0	https://cran.r-project.org/web/packages/Redmonder/index.html
registry	0.3	https://cran.r-project.org/web/packages/registry/index.html
relimp	1.0-5	https://cran.r-project.org/web/packages/relimp/index.html
reshape	0.8.5	https://cran.r-project.org/web/packages/reshape/index.html
reshape2	1.4.1	https://cran.r-project.org/web/packages/reshape2/index.html
RGraphics	2.0-14	https://cran.r-project.org/web/packages/RGraphics/index.html
rjson	0.2.15	https://cran.r-project.org/web/packages/rjson/index.html

PACKAGE	VERSION	LINK
RJSONIO	1.3-0	https://cran.r-project.org/web/packages/RJSONIO/index.html
Rmpfr	0.6-0	https://cran.r-project.org/web/packages/Rmpfr/index.html
rms	4.4-2	https://cran.r-project.org/web/packages/rms/index.html
robustbase	0.92-5	https://cran.r-project.org/web/packages/robustbase/index.html
ROCR	1.0-7	https://cran.r-project.org/web/packages/ROCR/index.html
rpart.plot	1.5.3	https://cran.r-project.org/web/packages/rpart.plot/index.html
rrcov	1.3-11	https://cran.r-project.org/web/packages/rrcov/index.html
rscproxy	2.0-5	https://cran.r-project.org/web/packages/rscproxy/index.html
RSGHB	1.1.2	https://cran.r-project.org/web/packages/RSGHB/index.html
RTextTools	1.4.2	https://cran.r-project.org/web/packages/RTextTools/index.html
rworldmap	1.3-6	https://cran.r-project.org/web/packages/rworldmap/index.html
SampleSizeMeans	1.1	https://cran.r-project.org/web/packages/SampleSizeMeans/index.html
SampleSizeProportions	1	https://cran.r-project.org/web/packages/SampleSizeProportions/index.html
sbgcop	0.975	https://cran.r-project.org/web/packages/sbgcop/index.html

PACKAGE	VERSION	LINK
scales	0.4.0	https://cran.r-project.org/web/packages/scales/index.html
scatterplot3d	0.3-36	https://cran.r-project.org/web/packages/scatterplot3d/index.html
sciplot	1.1-0	https://cran.r-project.org/web/packages/sciplot/index.html
segmented	0.5-1.4	https://cran.r-project.org/web/packages/segmented/index.html
seriation	1.2-0	https://cran.r-project.org/web/packages/seriation/index.html
setRNG	2013.9-1	https://cran.r-project.org/web/packages/setRNG/index.html
sfsmisc	1.1-0	https://cran.r-project.org/web/packages/sfsmisc/index.html
SIS	0.7-6	https://cran.r-project.org/web/packages/SIS/index.html
SixSigma	0.9-3	https://cran.r-project.org/web/packages/SixSigma/index.html
skmeans	0.2-8	https://cran.r-project.org/web/packages/skmeans/index.html
slam	0.1-32	https://cran.r-project.org/web/packages/slam/index.html
smoothSurv	1.6	https://cran.r-project.org/web/packages/smoothSurv/index.html
sna	2.3-2	https://cran.r-project.org/web/packages/sna/index.html
snow	0.4-1	https://cran.r-project.org/web/packages/snow/index.html

PACKAGE	VERSION	LINK
SnowballC	0.5.1	https://cran.r-project.org/web/packages/SnowballC/index.html
snowFT	1.4-0	https://cran.r-project.org/web/packages/snowFT/index.html
sp	1.2-2	https://cran.r-project.org/web/packages/sp/index.html
spacetime	1.1-5	https://cran.r-project.org/web/packages/spacetime/index.html
spam	1.3-0	https://cran.r-project.org/web/packages/spam/index.html
SparseM	1.7	https://cran.r-project.org/web/packages/SparseM/index.html
spatial	7.3-11	https://cran.r-project.org/web/packages/spatial/index.html
spBayes	0.3-9	https://cran.r-project.org/web/packages/spBayes/index.html
spikeslab	1.1.5	https://cran.r-project.org/web/packages/spikeslab/index.html
splancs	2.01-38	https://cran.r-project.org/web/packages/splancs/index.html
spls	2.2-1	https://cran.r-project.org/web/packages/spls/index.html
spTimer	2.0-1	https://cran.r-project.org/web/packages/spTimer/index.html
sqldf	0.4-10	https://cran.r-project.org/web/packages/sqldf/index.html
sROC	0.1-2	https://cran.r-project.org/web/packages/sROC/index.html

PACKAGE	VERSION	LINK
stabledist	0.7-0	https://cran.r-project.org/web/packages/stabledist/index.html
stabs	0.5-1	https://cran.r-project.org/web/packages/stabs/index.html
stepPlr	0.92	https://cran.r-project.org/web/packages/stepPlr/index.html
stringdist	0.9.4.1	https://cran.r-project.org/web/packages/stringdist/index.html
stringr	1.0.0	https://cran.r-project.org/web/packages/stringr/index.html
stsm	1.7	https://cran.r-project.org/web/packages/stsm/index.html
stsm.class	1.3	https://cran.r-project.org/web/packages/stsm.class/index.html
survival	2.38-3	https://cran.r-project.org/web/packages/survival/index.html
tau	0.0-18	https://cran.r-project.org/web/packages/tau/index.html
tcltk2	1.2-11	https://cran.r-project.org/web/packages/tcltk2/index.html
tensorA	0.36	https://cran.r-project.org/web/packages/tensorA/index.html
textcat	1.0-4	https://cran.r-project.org/web/packages/textcat/index.html
textir	2.0-4	https://cran.r-project.org/web/packages/textir/index.html
tfplot	2015.12-1	https://cran.r-project.org/web/packages/tfplot/index.html

PACKAGE	VERSION	LINK
TH.data	1.0-7	https://cran.r-project.org/web/packages/TH.data/index.html
tidyr	0.4.1	https://cran.r-project.org/web/packages/tidyr/index.html
timeDate	3012.1	https://cran.r-project.org/web/packages/timeDate/index.html
timeSeries	3022.101.2	https://cran.r-project.org/web/packages/timeSeries/index.html
timevis	0.4	https://cran.r-project.org/web/packages/timevis/index.html
tm	0.6-2	https://cran.r-project.org/web/packages/tm/index.html
topicmodels	0.2-3	https://cran.r-project.org/web/packages/topicmodels/index.html
tree	1.0-37	https://cran.r-project.org/web/packages/tree/index.html
Treemap	2.4-2	https://cran.r-project.org/web/packages/treemap/index.html
tseries	0.10-34	https://cran.r-project.org/web/packages/tseries/index.html
tsfa	2014.10-1	https://cran.r-project.org/web/packages/tsfa/index.html
tsoutliers	0.6	https://cran.r-project.org/web/packages/tsoutliers/index.html
TSP	1.1-4	https://cran.r-project.org/web/packages/TSP/index.html
vcd	1.4-1	https://cran.r-project.org/web/packages/vcd/index.html

PACKAGE	VERSION	LINK
VennDiagram	1.6.17	https://cran.r-project.org/web/packages/VennDiagram/index.html
VGAM	1.0-1	https://cran.r-project.org/web/packages/VGAM/index.html
VIM	4.4.1	https://cran.r-project.org/web/packages/VIM/index.html
whisker	0.3-2	https://cran.r-project.org/web/packages/whisker/index.html
wordcloud	2.5	https://cran.r-project.org/web/packages/wordcloud/index.html
xgboost	0.4-3	https://cran.r-project.org/web/packages/xgboost/index.html
XML	3.98-1.4	https://cran.r-project.org/web/packages/XML/index.html
xts	0.9-7	https://cran.r-project.org/web/packages/xts/index.html
yaml	2.1.13	https://cran.r-project.org/web/packages/yaml/index.html
zipfR	0.6-6	https://cran.r-project.org/web/packages/zipfR/index.html
zoo	1.7-12	https://cran.r-project.org/web/packages/zoo/index.html

R scripts that are not supported in Power BI

The following table shows which packages are **not supported** in the Power BI service.

PACKAGE	REQUEST DATE	REASON
RgoogleMaps	10/05/2016	Networking is blocked
mailR	10/03/2016	Networking is blocked

PACKAGE	REQUEST DATE	REASON
RevoScaleR	8/30/2016	ships only with Microsoft R Server

Next steps

For more information about R in Power BI, take a look at the following articles:

- [Creating R visuals in the Power BI service](#)
- [Create Power BI visuals using R](#)
- [Running R scripts in Power BI Desktop](#)
- [Using R in Query Editor](#)

Data types in Power BI Desktop

12/6/2017 • 9 min to read • [Edit Online](#)

This article describes data types supported in Power BI Desktop and Data Analysis Expressions (DAX).

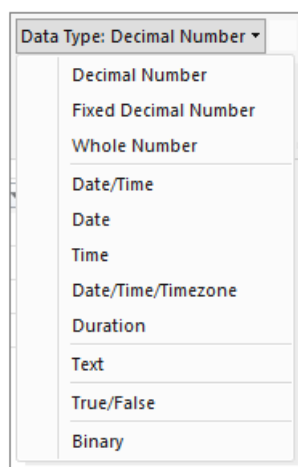
When you load data into Power BI Desktop, it will attempt to convert the data type of the source column into a data type that better supports more efficient storage, calculations, and data visualization. For example, if a column of values you import from Excel has no fractional values, Power BI Desktop will convert the entire column of data to a Whole Number data type, which is better suited for storing integers.

This is important because some DAX functions have special data type requirements. While in many cases DAX will implicitly convert a data type for you, there are some cases where it will not. For instance, if a DAX function requires a Date data type and the data type for your column is Text, the DAX function will not work correctly. So, it's both important and useful to get the correct data type for a column. Implicit conversions are described later in this article.

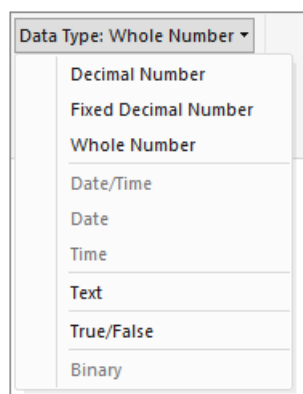
Determine and specify a column's data type

In Power BI Desktop, you can determine and specify a column's data type in the Query Editor, or in Data View or Report View:

Data types in Query Editor



Data types in Data View or Report View



The Data Type drop down in Query Editor has two data types not currently present in Data or Report View: **Date/Time/Timezone** and **Duration**. When a column with these data types are loaded into the model and

viewed in Data or Report view, a column with a Date/Time/Timezone data type will be converted into a Date/Time, and a column with a Duration data type is converted into a Decimal Number.

Number types

Power BI Desktop supports three number types:

Decimal Number – Represents a 64 bit (eight-byte) floating point number. It's the most common number type and corresponds to numbers as you usually think of them. Although designed to handle numbers with fractional values, it also handles whole numbers. The Decimal Number type can handle negative values from $-1.79E +308$ through $-2.23E -308$, 0, and positive values from $2.23E -308$ through $1.79E + 308$. For example, numbers like 34, 34.01, and 34.000367063 are valid decimal numbers. The largest value that can be represented in a Decimal Number type is 15 digits long. The decimal separator can occur anywhere in the number. The Decimal Number type corresponds to how Excel stores its numbers.

Fixed Decimal Number – Has a fixed location for the decimal separator. The decimal separator always has four digits to its right and allows for 19 digits of significance. The largest value it can represent is 922,337,203,685,477.5807 (positive or negative). The Fixed Decimal Number type is useful in cases where rounding might introduce errors. When you work with many numbers that have small fractional values they can sometimes accumulate and force a number to be just slightly off. Since the values past the four digits to the right of decimal separator are truncated, the Fixed Decimal type can help you avoid these kinds of errors. If you're familiar with SQL Server, this data type corresponds to SQL Server's Decimal (19,4), or the Currency Data type in Power Pivot.

Whole Number – Represents a 64 bit (eight-byte) integer value. Because it's an integer, it has no digits to the right of the decimal place. It allows for 19 digits; positive or negative whole numbers between $-9,223,372,036,854,775,808$ (-2^{63}) and $9,223,372,036,854,775,807$ ($2^{63}-1$). It can represent the largest possible number of the various numeric data types. As with the Fixed Decimal type, the Whole Number type can be useful in cases where you need to control rounding.

Date/time types

Power BI Desktop supports five Date/Time data types in Query View and three in the Report View and model. Both Date/Time/Timezone and Duration are converted during load into the model.

Date/Time – Represents both a date and time value. Underneath the covers, the Date/Time value is stored as a Decimal Number Type. So you can actually convert between the two. The time portion of a date is stored as a fraction to whole multiples of $1/300$ seconds (3.33ms). Dates between years 1900 and 9999 are supported.

Date – Represents just a Date (no time portion). When converted into the model, a Date is the same as a Date/Time value with zero for the fractional value.

Time – Represents just Time (no Date portion). When converted into the model, a Time value is the same as a Date/Time value with no digits to the left of the decimal place.

Date/Time/Timezone – Represents a UTC Date/Time. Currently, it's converted into Date/Time when loaded into the model.

Duration – Represents a length of time. It's converted into a Decimal Number Type when loaded into the model. As a Decimal Number type it can be added or subtracted from a Date/Time field with correct results. As a Decimal Number type, you can easily use it in visualizations that show magnitude.

Text type

Text - A Unicode character data string. Can be strings, numbers or dates represented in a text format. Maximum string length is 268,435,456 Unicode characters (256 mega characters) or 536,870,912 bytes.

True/false type

True/False – A Boolean value of either a True or False.

Blanks/nulls type

Blank - Is a data type in DAX that represents and replaces SQL nulls. You can create a blank by using the [BLANK](#) function, and test for blanks by using the [ISBLANK](#) logical function.

Table data type

DAX uses a table data type in many functions, such as aggregations and time intelligence calculations. Some functions require a reference to a table; other functions return a table that can then be used as input to other functions. In some functions that require a table as input, you can specify an expression that evaluates to a table; for some functions, a reference to a base table is required. For information about the requirements of specific functions, see [DAX Function Reference](#).

Implicit and explicit data type conversion in DAX formulas

Each DAX function has specific requirements as to the types of data that are used as inputs and outputs. For example, some functions require integers for some arguments and dates for others; other functions require text or tables.

If the data in the column you specify as an argument is incompatible with the data type required by the function, DAX in many cases will return an error. However, wherever possible DAX will attempt to implicitly convert the data to the required data type. For example:

- You can type a date as a string, and DAX will parse the string and attempt to cast it as one of the Windows date and time formats.
- You can add TRUE + 1 and get the result 2, because TRUE is implicitly converted to the number 1 and the operation 1+1 is performed.
- If you add values in two columns, and one value happens to be represented as text ("12") and the other as a number (12), DAX implicitly converts the string to a number and then does the addition for a numeric result. The following expression returns 44: = "22" + 22.
- If you attempt to concatenate two numbers, Excel will present them as strings and then concatenate. The following expression returns "1234": = 12 & 34.

Table of implicit data conversions

The type of conversion that is performed is determined by the operator, which casts the values it requires before performing the requested operation. These tables list the operators, and indicate the conversion that is performed on each data type in the column when it is paired with the data type in the intersecting row.

NOTE

Text data types are not included in these tables. When a number is represented as in a text format, in some cases Power BI will attempt to determine the number type and represent it as a number.

Addition (+)

OPERATOR(+)	INTEGER	CURRENCY	REAL	DATE/TIME
INTEGER	INTEGER	CURRENCY	REAL	Date/time
CURRENCY	CURRENCY	CURRENCY	REAL	Date/time
REAL	REAL	REAL	REAL	Date/time
Date/time	Date/time	Date/time	Date/time	Date/time

For example, if a real number is used in an addition operation in combination with currency data, both values are converted to REAL, and the result is returned as REAL.

Subtraction (-)

In the following table the row header is the minuend (left side) and the column header is the subtrahend (right side).

OPERATOR(-)	INTEGER	CURRENCY	REAL	DATE/TIME
INTEGER	INTEGER	CURRENCY	REAL	REAL
CURRENCY	CURRENCY	CURRENCY	REAL	REAL
REAL	REAL	REAL	REAL	REAL
Date/time	Date/time	Date/time	Date/time	Date/time

For example, if a date is used in a subtraction operation with any other data type, both values are converted to dates, and the return value is also a date.

NOTE

Data models also support the unary operator, - (negative), but this operator does not change the data type of the operand.

Multiplication(*)

OPERATOR(*)	INTEGER	CURRENCY	REAL	DATE/TIME
INTEGER	INTEGER	CURRENCY	REAL	INTEGER
CURRENCY	CURRENCY	REAL	CURRENCY	CURRENCY
REAL	REAL	CURRENCY	REAL	REAL

For example, if an integer is combined with a real number in a multiplication operation, both numbers are converted to real numbers, and the return value is also REAL.

Division (/)

In the following table, the row header is the numerator and the column header is the denominator.

OPERATOR(/) (ROW/COLUMN)	INTEGER	CURRENCY	REAL	DATE/TIME
INTEGER	REAL	CURRENCY	REAL	REAL
CURRENCY	CURRENCY	REAL	CURRENCY	REAL
REAL	REAL	REAL	REAL	REAL
Date/time	REAL	REAL	REAL	REAL

For example, if an integer is combined with a currency value in a division operation, both values are converted to real numbers, and the result is also a real number.

Comparison operators

In comparison expressions, Boolean values are considered greater than string values and string values are considered greater than numeric or date/time values; numbers and date/time values are considered to have the same rank. No implicit conversions are performed for Boolean or string values; BLANK or a blank value is converted to 0/"/false depending on the data type of the other compared value.

The following DAX expressions illustrate this behavior:

=IF(FALSE())>"true","Expression is true", "Expression is false"), returns "Expression is true"

=IF("12">12,"Expression is true", "Expression is false"), returns "Expression is true".

=IF("12"=12,"Expression is true", "Expression is false"), returns "Expression is false"

Conversions are performed implicitly for numeric or date/time types as described in the following table:

COMPARISON OPERATOR	INTEGER	CURRENCY	REAL	DATE/TIME
INTEGER	INTEGER	CURRENCY	REAL	REAL
CURRENCY	CURRENCY	CURRENCY	REAL	REAL
REAL	REAL	REAL	REAL	REAL
Date/time	REAL	REAL	REAL	Date/Time

Handling blanks, empty strings, and zero values

In DAX, a null, blank value, empty cell, or a missing value are all represented by the same new value type, a BLANK. You can also generate blanks by using the BLANK function, or test for blanks by using the ISBLANK function.

How blanks are handled in operations such as addition or concatenation depends on the individual function. The following table summarizes the differences between DAX and Microsoft Excel formulas, in the way that blanks are handled.

EXPRESSION	DAX	EXCEL
BLANK + BLANK	BLANK	0(zero)
BLANK + 5	5	5
BLANK * 5	BLANK	0(zero)
5/BLANK	Infinity	Error
0/BLANK	NaN	Error
BLANK/BLANK	BLANK	Error
FALSE OR BLANK	FALSE	FALSE
FALSE AND BLANK	FALSE	FALSE
TRUE OR BLANK	TRUE	TRUE

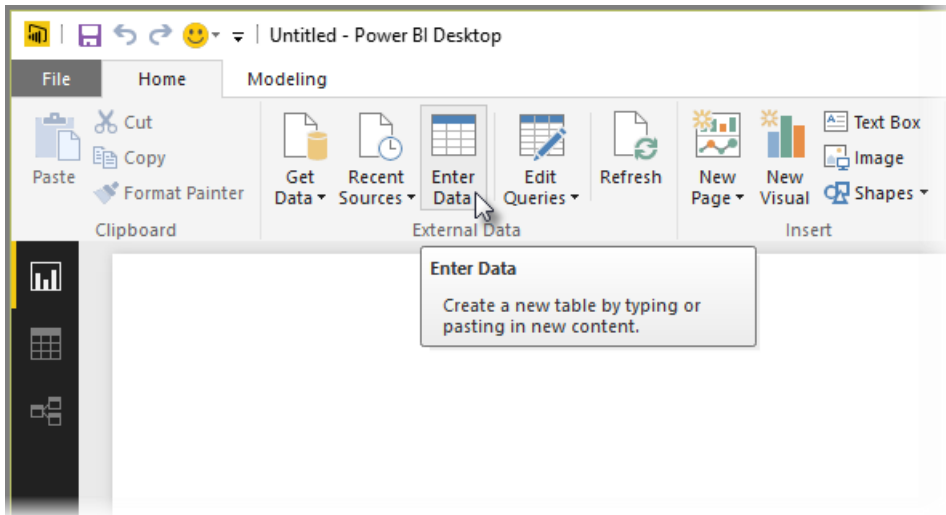
EXPRESSION	DAX	EXCEL
TRUE AND BLANK	FALSE	TRUE
BLANK OR BLANK	BLANK	Error
BLANK AND BLANK	BLANK	Error

Enter data directly into Power BI Desktop

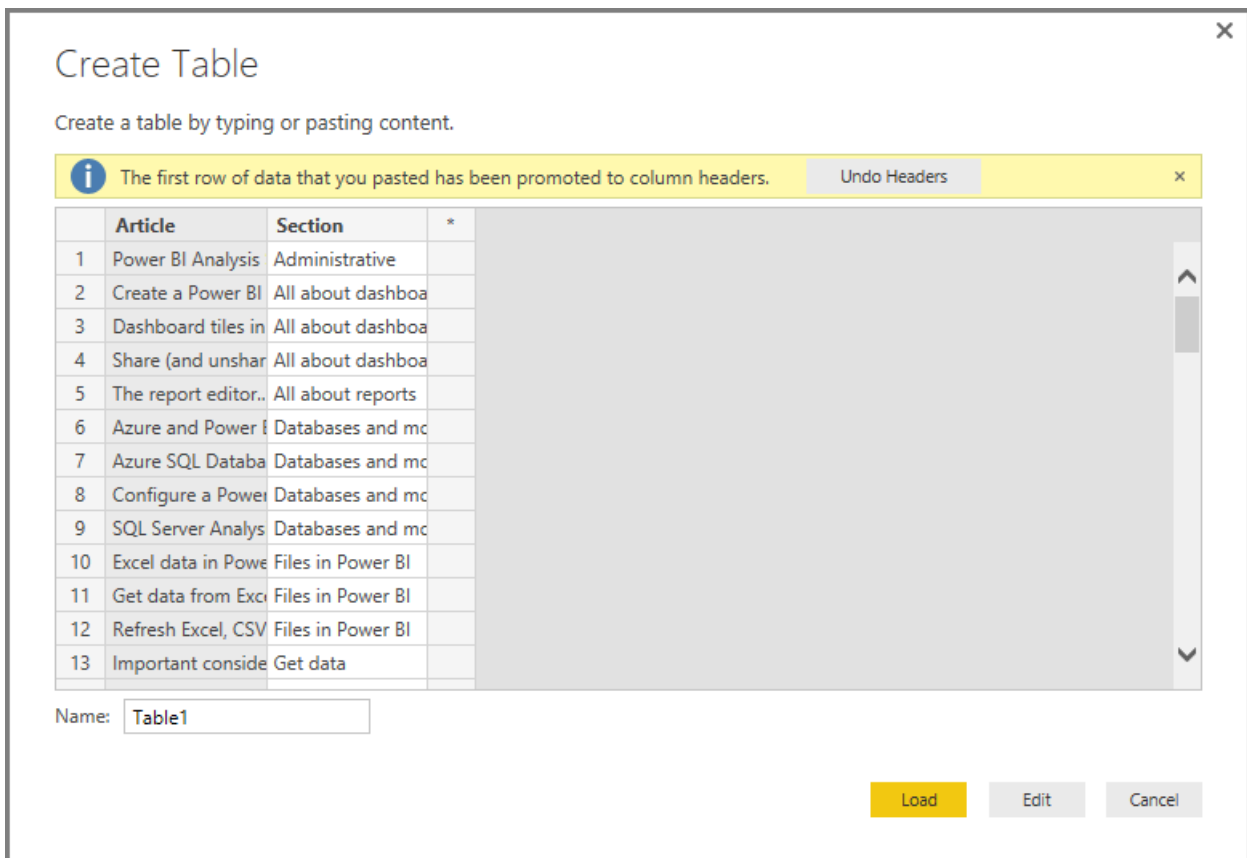
12/6/2017 • 1 min to read • [Edit Online](#)

With Power BI Desktop, you can enter data directly and use that data in your reports and visualizations. For example, you can copy portions of a workbook or web page, then paste it into Power BI Desktop.

To enter data directly, select **Enter Data** from the **Home** ribbon.

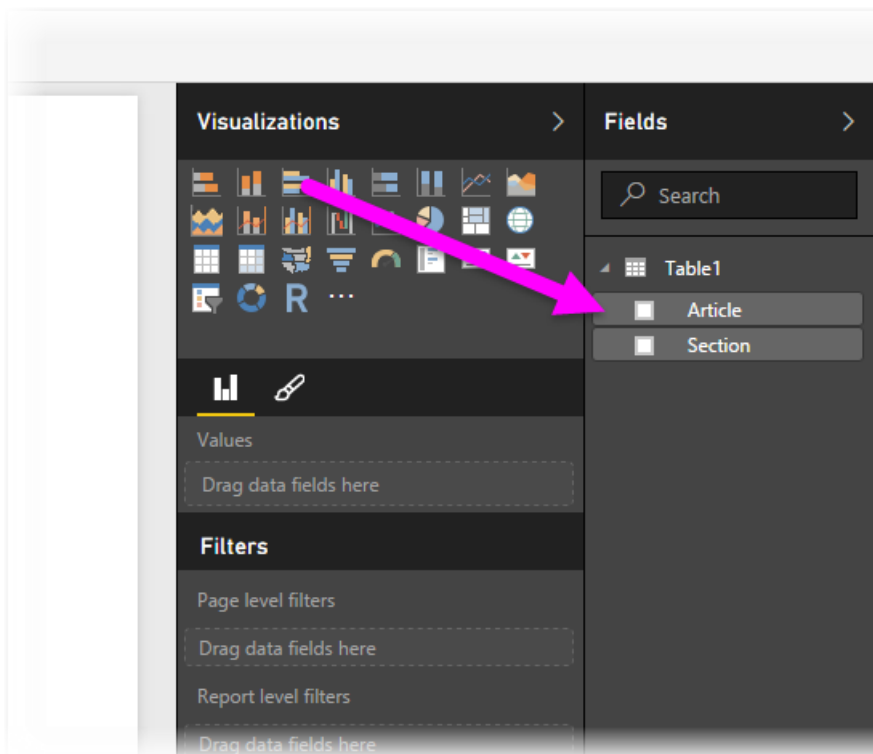


Power BI Desktop may attempt to make minor transformations on the data, if appropriate, just like it does when you load data from any source. For example, in the following case it promoted the first row of data to headers.



If you want to shape the data you entered (or pasted), you can select the Edit button to bring up **Query Editor**, where you can shape and transform the data before bringing it into Power BI Desktop. Or you can select the **Load** button to import the data as it appears.

When you select **Load**, Power BI Desktop creates a new table from your data, and makes it available in the **Fields** pane. In the following image, Power BI Desktop shows my new table, called *Table1* by default, and the two fields within that table that were created.



And that's it – it's that easy to enter data into Power BI Desktop.

You're now ready to use the data in Power BI Desktop to create visuals, reports, or interact with any other data you might want to connect with and import, such as Excel workbooks, databases, or any other data source.

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

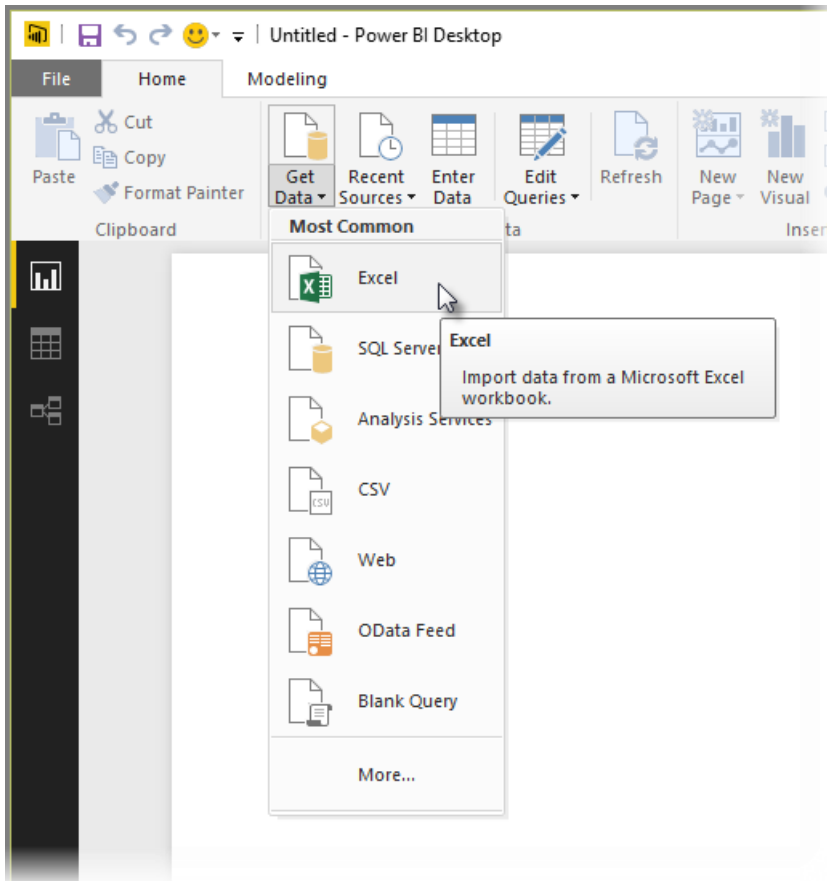
- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Connect to CSV files in Power BI Desktop](#)

Connect to Excel in Power BI Desktop

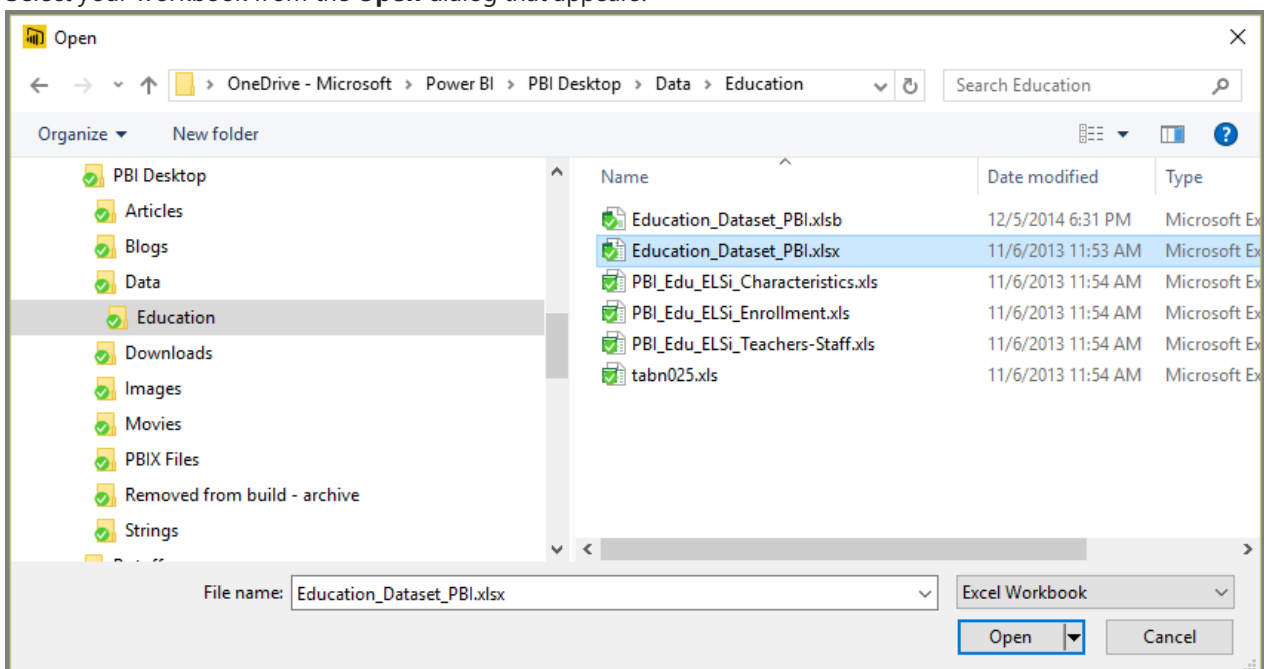
12/6/2017 • 1 min to read • [Edit Online](#)

Connecting to an Excel workbook from Power BI Desktop is straightforward, and this article walks you through the steps.

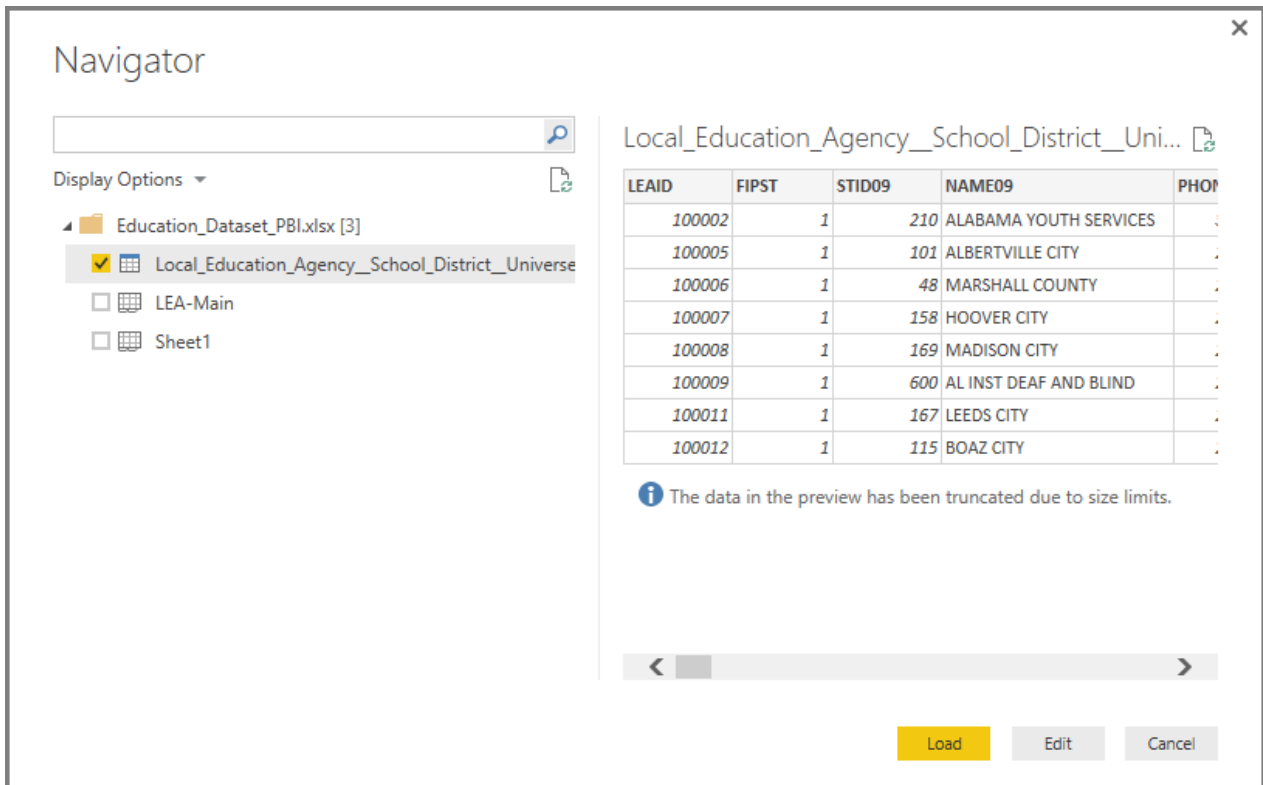
In Power BI Desktop, select **Get Data > Excel** from the **Home** ribbon.



Select your workbook from the **Open** dialog that appears.



Power BI Desktop presents the tables on other data elements from the workbook in the **Navigator** window. When you select a table in the left pane, a preview of the data appears in the right pane.

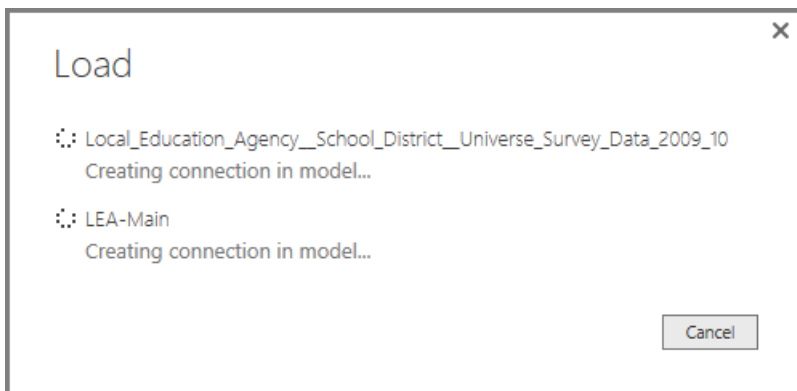


The screenshot shows the Power BI Navigator window. On the left, under 'Display Options', there is a tree view showing a folder 'Education_Dataset_PBI.xlsx [3]' with a sub-item 'Local_Education_Agency_School_District_Universe' selected. Below it are 'LEA-Main' and 'Sheet1'. On the right, a table preview is shown for 'Local_Education_Agency_School_District_Uni...'. The table has five columns: LEAID, FIPST, STID09, NAME09, and PHON. Below the table, an information icon and text state: 'The data in the preview has been truncated due to size limits.' At the bottom right, there are three buttons: 'Load' (yellow), 'Edit' (grey), and 'Cancel' (grey).

LEAID	FIPST	STID09	NAME09	PHON
100002	1	210	ALABAMA YOUTH SERVICES	
100005	1	101	ALBERTVILLE CITY	
100006	1	48	MARSHALL COUNTY	
100007	1	158	HOOVER CITY	
100008	1	169	MADISON CITY	
100009	1	600	AL INST DEAF AND BLIND	
100011	1	167	LEEDS CITY	
100012	1	115	BOAZ CITY	

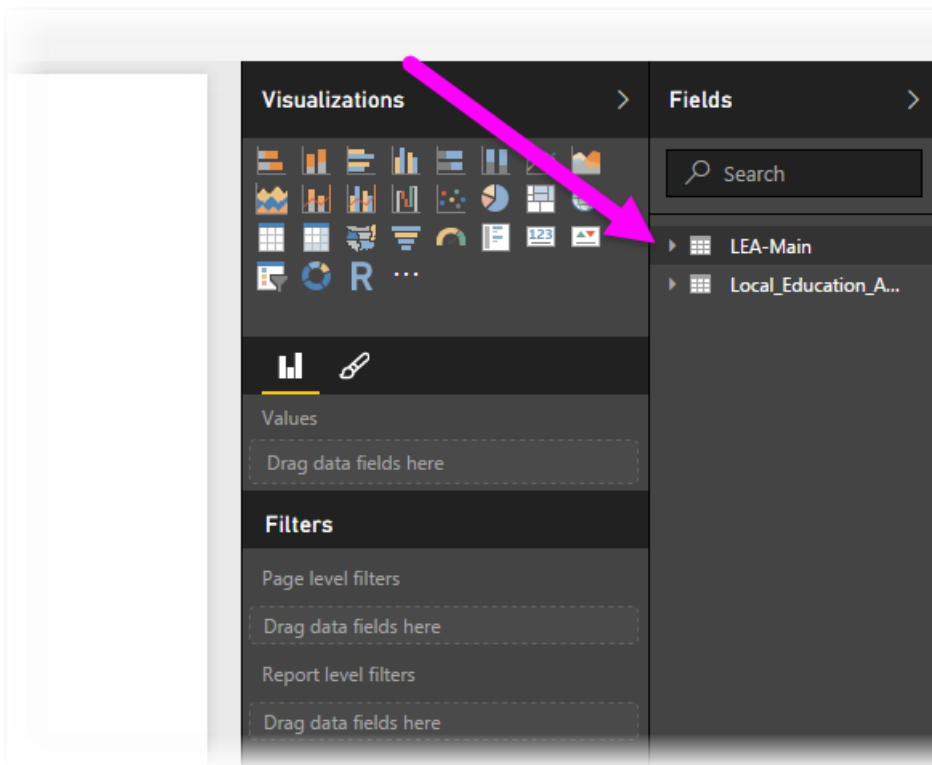
You can select the Load button to import the data, or if you want to edit the data using **Query Editor** before bringing it into Power BI Desktop, select the **Edit** button.

When you load the data, Power BI Desktop displays the **Load** window and displays the activity associated with loading the data.



The screenshot shows the 'Load' window. It contains two entries with a refresh icon and a status message: 'Local_Education_Agency_School_District_Universe_Survey_Data_2009_10' with 'Creating connection in model...' and 'LEA-Main' with 'Creating connection in model...'. A 'Cancel' button is located at the bottom right.

When complete, Power BI Desktop displays the tables and fields it imported from your Excel workbook in the **Fields** pane, on the right side of the Desktop.



And that's it!

You're now ready to use the imported data from your Excel workbook in Power BI Desktop to create visuals, reports, or interact with any other data you might want to connect with and import, such as other Excel workbooks, databases, or any other data source.

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

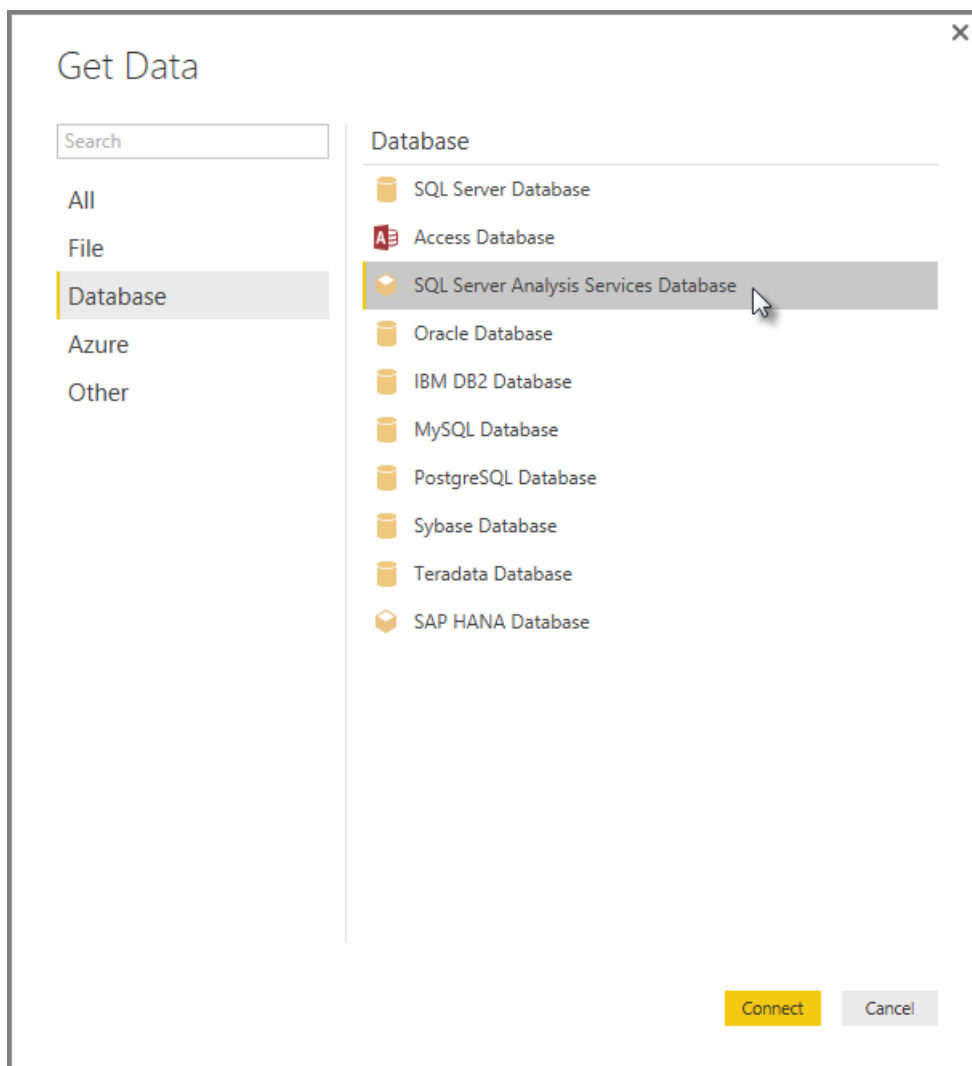
- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to CSV files in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Connect to SSAS Multidimensional Models in Power BI Desktop

1/25/2018 • 4 min to read • [Edit Online](#)

With Power BI Desktop, you can access **SSAS Multidimensional models**, commonly referred to as **SSAS MD**.

To connect to an **SSAS MD** database, select **Get Data > Database > SQL Server Analysis Services Database** as shown in the following image.



SSAS Multidimensional models in Live connection mode are supported in both the Power BI service and in Power BI Desktop. You can also publish and upload reports that use **SSAS Multidimensional models** in Live mode to the Power BI service.

Capabilities and features of SSAS MD

The following sections describe features and capabilities of Power BI and SSAS MD connections.

Tabular metadata of multidimensional models

The following table shows the correspondence between multidimensional objects and the tabular metadata that's returned to Power BI Desktop. Power BI queries the model for tabular metadata, and based on the returned metadata, runs appropriate DAX queries against Analysis Services when you create a visualization such as a table, matrix, chart or slicer.

BISM-MULTIDIMENSIONAL OBJECT	TABULAR METADATA
Cube	Model
Cube dimension	Table
Dimension attributes (Keys), Name)	Columns
Measure group	Table
Measure	Measure
Measures without associated Measure Group	Within table called <i>Measures</i>
Measure group -> Cube dimension relationship	Relationship
Perspective	Perspective
KPI	KPI
User/Parent-Child hierarchies	Hierarchies

Measures, measure groups and KPIs

Measure groups in a multidimensional cube are exposed in Power BI as tables with the Σ sign beside them in the **Fields** pane. Calculated measures that don't have an associated measure group are grouped under a special table called *Measures* in the tabular metadata.

In a multidimensional model, you can define a set of measures or KPIs in a cube to be located within a *Display folder*, which can help simplify complex models. Power BI recognizes Display folders in tabular metadata, and shows measures and KPIs within the Display folders. KPIs in multidimensional databases support *Value*, *Goal*, *Status Graphic* and *Trend Graphic*.

Dimension attribute type

Multidimensional models also support associating dimension attributes with specific dimension attribute types. For example, a **Geography** dimension where the *City*, *State-Province*, *Country* and *Postal Code* dimension attributes have appropriate geography types associated with them are exposed in the tabular metadata. Power BI recognizes the metadata, enabling you to create map visualizations. You'll recognize these associations by the *map* icon next to element in the **Field** pane in Power BI.

Power BI can also render images when you provide a field containing URLs (Uniform Resource Locator) of the images. You can specify these fields as *ImageURL* type in SQL Server Data Tools (or subsequently in Power BI), and its type information is provided to Power BI in the tabular metadata. Power BI can then retrieve those images from the URL, and display them in visuals.

Parent-child hierarchies

Multidimensional models support Parent-child hierarchies, which are presented as a *hierarchy* in the tabular metadata. Each level of the Parent-child hierarchy is exposed as a hidden column in the tabular metadata. The key attribute of the Parent-child dimension is not exposed in the tabular metadata.

Dimension calculated members

Multidimensional models support creation of various types of *calculated members*. The two most common types of calculated members are the following:

- Calculated members on attribute hierarchies and not sibling of *All*
- Calculated members on user hierarchies

Multidimensional model expose *calculated members on attribute hierarchies* as values of a column. There are a few additional options and constraints while exposing this type of calculated member:

- Dimension attribute can have an optional *UnknownMember*
- An attribute containing calculated members cannot be the key attribute of the dimension, unless it is the only attribute of the dimension
- An attribute containing calculated members cannot be a parent-child attribute

The calculated members of user hierarchies are not exposed in Power BI. Rather, you will be able to connect to a cube containing calculated members on user hierarchies, but you won't be able to see calculated members if they do not meet the constraints mentioned in the previous bulleted list.

Security

Multidimensional models support dimension and cell level security by way of *Roles*. When you connect to a cube with Power BI, you are authenticated and evaluated for appropriate permissions. When a user has *dimension security* applied, the respective dimension members are not seen by the user in Power BI. However, when a user has a *cell security* permission defined, where certain cells are restricted, then that user cannot connect to the cube using Power BI.

Limitations of SSAS Multidimensional Models in Power BI Desktop

There are certain limitations to using **SSAS MD**:

- Servers must be running SQL Server 2012 SP1 CU4 or later versions of Analysis Services for the Power BI Desktop SSAS MD connector to work properly
- *Actions* and *Named Sets* are not exposed to Power BI, but you can still connect to cubes that also contain *Actions* or *Named sets* and create visuals and reports.

Supported Features of SSAS MD in Power BI Desktop

The following features of SSAS MD are supported in Power BI Desktop:

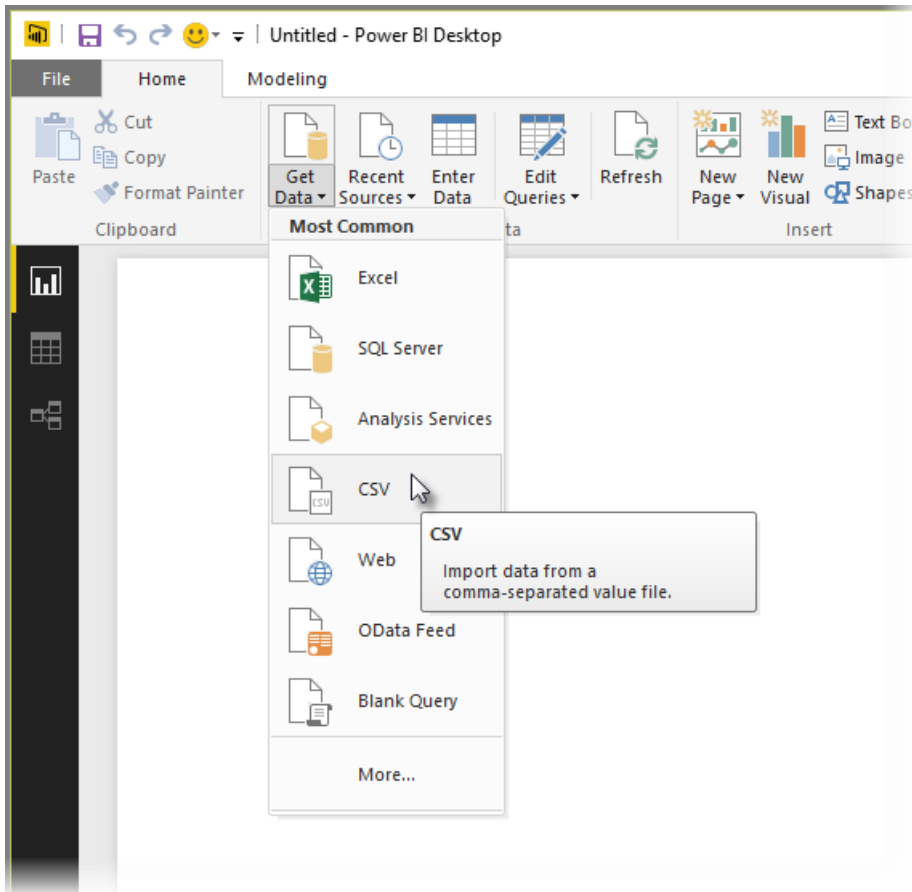
- Consumption of the following elements are supported in this release of **SSAS MD** (you can get [more information](#) about these features):
 - Display folders
 - KPI Trends
 - Default Members
 - Dimension Attributes
 - Dimension Calculated Members (must be a single real member when the dimension has more than one attribute, it cannot be the key attribute of the dimension unless it is the only attribute, and it cannot be a parent-child attribute)
 - Dimension Attribute types
 - Hierarchies
 - Measures (with or without Measure groups)
 - Measures as Variant
 - KPIs
 - ImageUrls
 - Dimension security

Connect to CSV files in Power BI Desktop

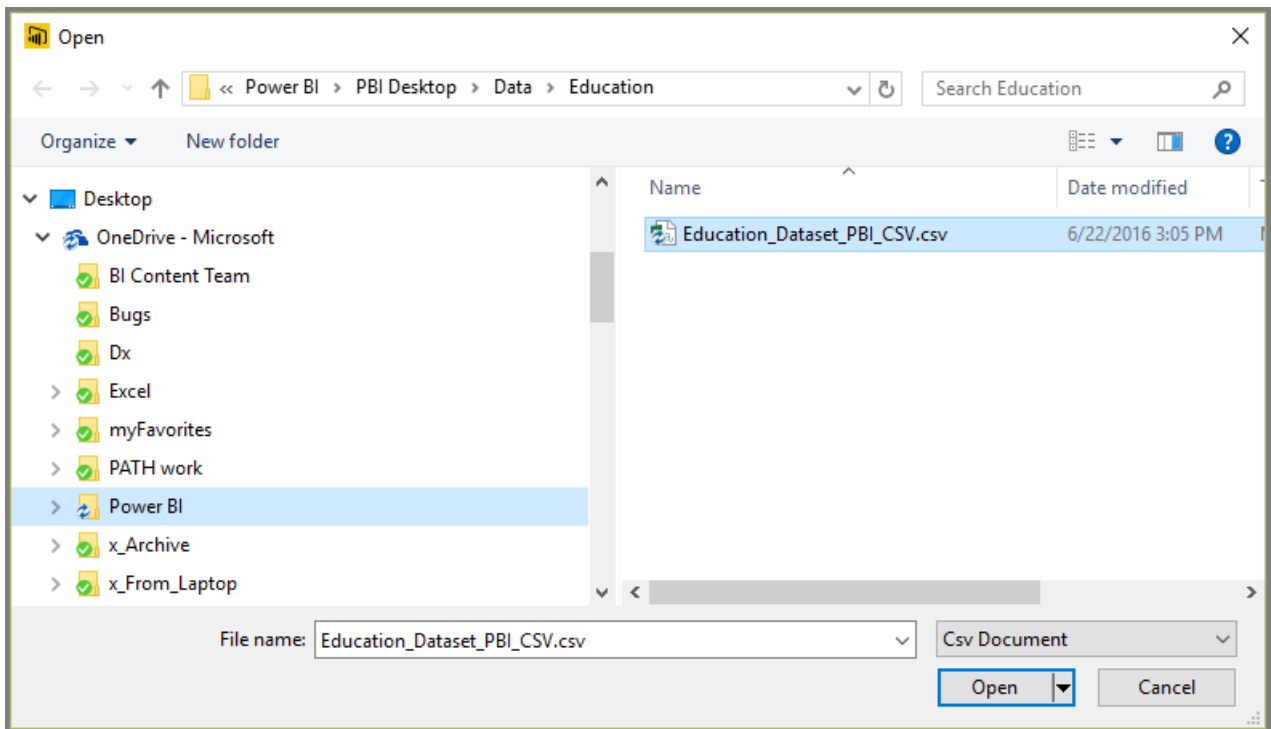
12/6/2017 • 1 min to read • [Edit Online](#)

Connecting to a comma-separated value (CSV) file from Power BI Desktop is a lot like connecting to an Excel workbook. Both are easy, and this article steps you through how to connect to any CSV file to which you have access.

To start with, from Power BI Desktop select **Get Data** > **CSV** from the **Home** ribbon.

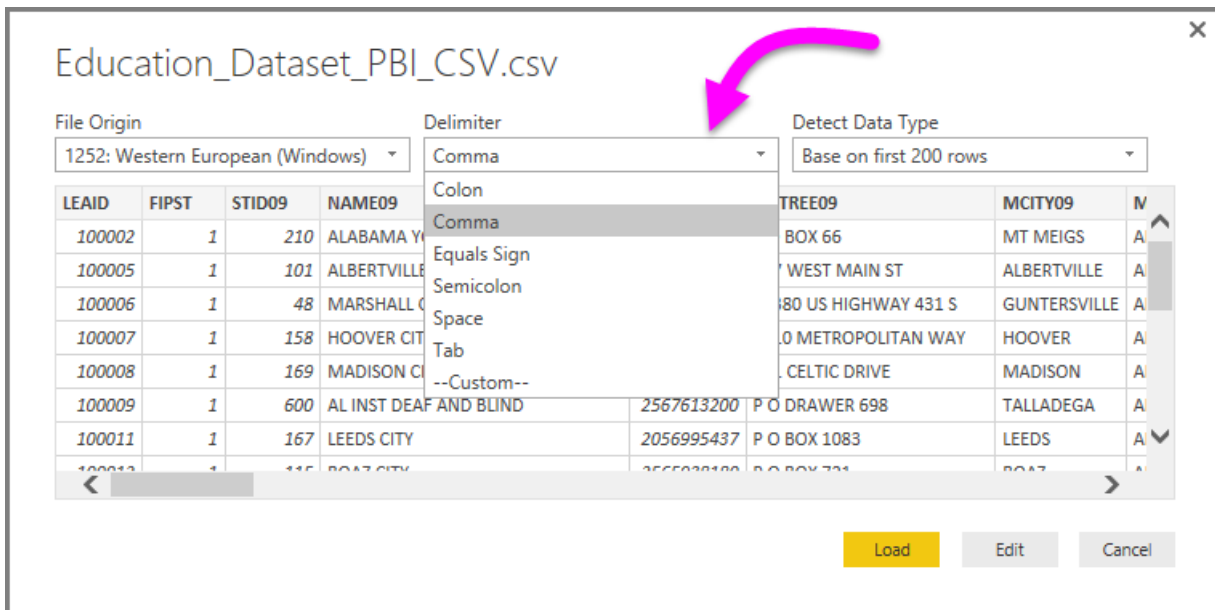


Select your CSV file from the **Open** dialog that appears.



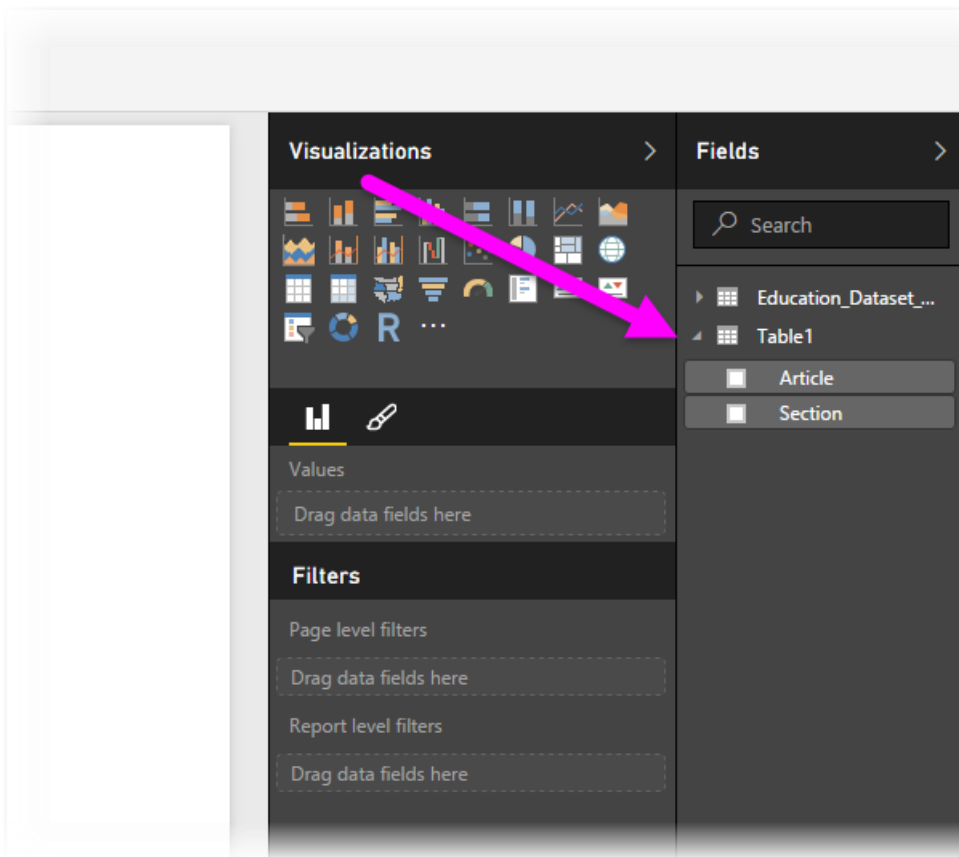
When you select **Open**, Power BI Desktop accesses the file and determines certain file attributes, such as the file origin, delimiter type, and how many rows should be used to detect the data types in the file.

These file attributes and options are shown in the drop-down selections at the top of the **CSV import** dialog window, shown below. You can change any of these detected settings manually, by choosing another option from any of the drop-down selectors.



When you're satisfied with the selections, you can select **Load** to import the file into Power BI Desktop, or you can select **Edit** to open **Query Editor** and further shape or transform the data before importing it.

Once you load the data into Power BI Desktop, you see the table and its columns (which are presented as Fields in Power BI Desktop) in the **Fields** pane, along the right of the Report view in Power BI Desktop.



That's all you have to do – the data from your CSV file is now in Power BI Desktop.

You can use that data in Power BI Desktop to create visuals, reports, or interact with any other data you might want to connect with and import, such as Excel workbooks, databases, or any other data source.

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

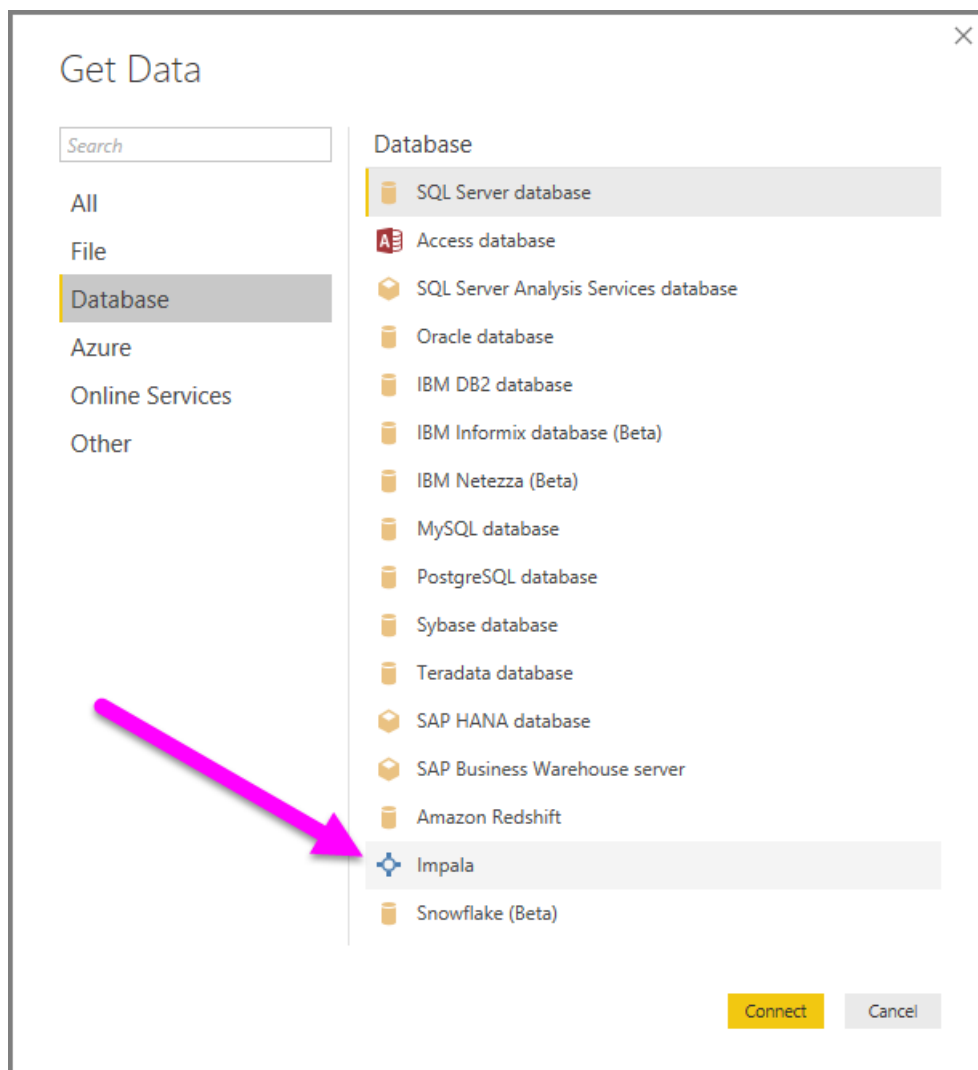
Connect to an Impala database in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

In Power BI Desktop, you can connect to an **Impala** database and use the underlying data just like any other data source in Power BI Desktop.

Connect to an Impala database

To connect to an **Impala** database select **Get Data** from the **Home** ribbon in Power BI Desktop. Select **Database** from the categories on the left, and you see **Impala**.

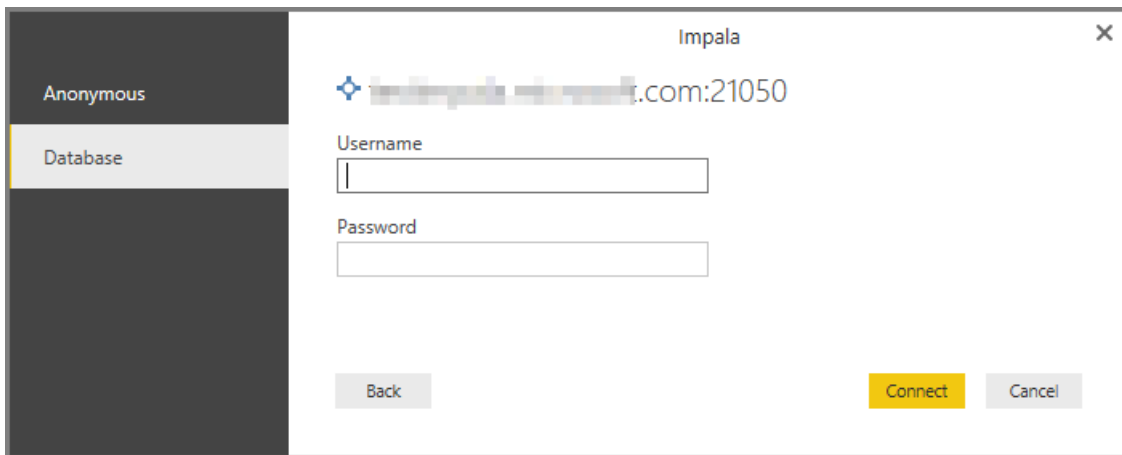


In the **Impala** window that appears, type or paste the name of your Impala server into the box, and select **OK**. Note that you can choose to **Import** data directly into Power BI, or you can use **DirectQuery**. You can learn more about [using DirectQuery](#).



The image shows a dialog box titled "Impala" with a close button (X) in the top right corner. Below the title is the text "Import data from an Impala cluster". Underneath, there is a "Server" label followed by a text input field containing the placeholder text "Example: hostname:port". Below the input field are two radio button options: "Import" (which is selected) and "DirectQuery". At the bottom right of the dialog are two buttons: "OK" (highlighted in yellow) and "Cancel" (greyed out).

When prompted, put in your username and password, or connect anonymously - either is supported.

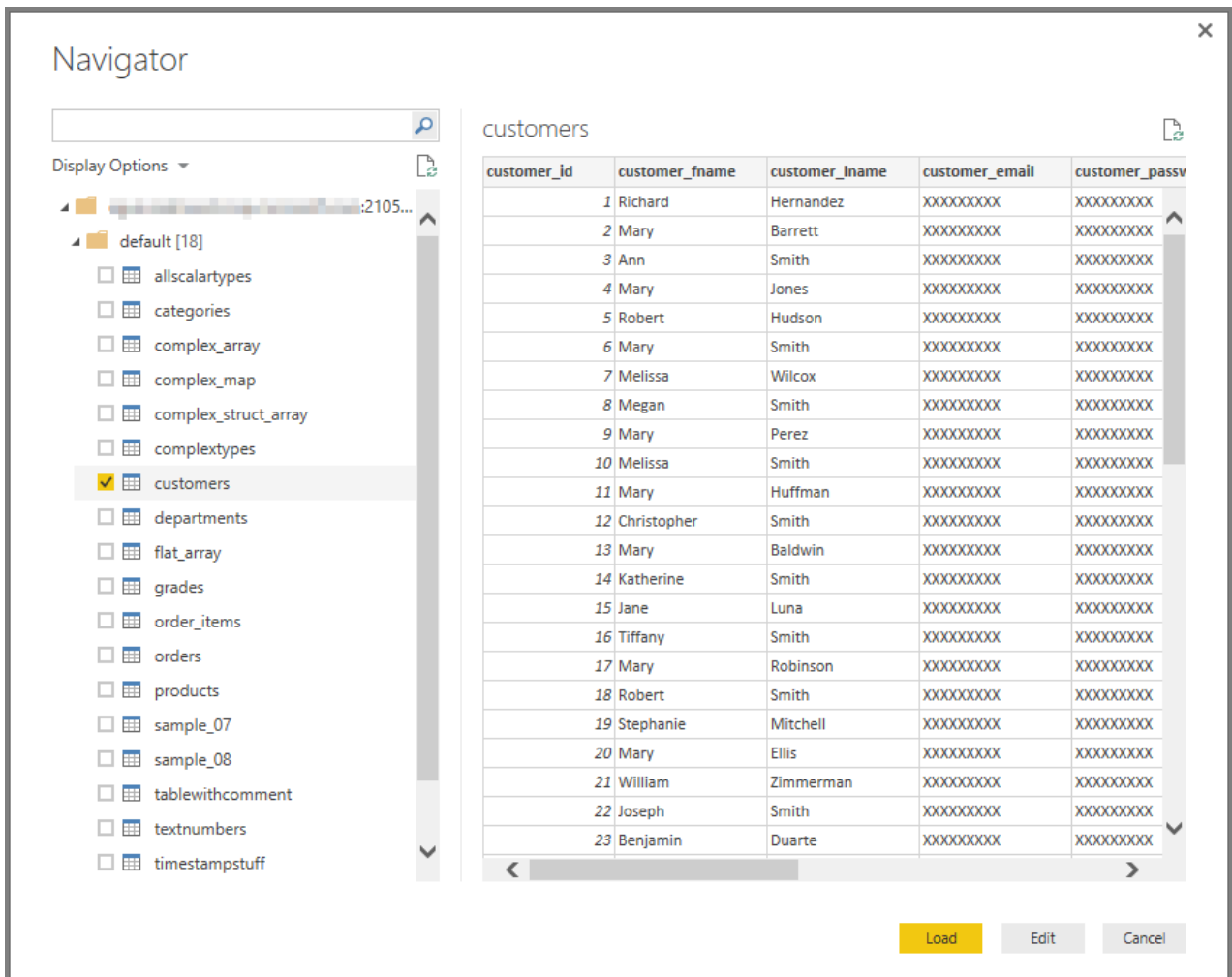


The image shows a more detailed "Impala" dialog box. On the left is a dark sidebar with two options: "Anonymous" and "Database" (which is highlighted with a yellow bar). The main area of the dialog shows a server address field with a plus icon on the left and a close icon on the right, containing a blurred IP address followed by ".com:21050". Below this are two text input fields labeled "Username" and "Password". At the bottom are three buttons: "Back" (greyed out), "Connect" (highlighted in yellow), and "Cancel" (greyed out).

NOTE

Once you put in your username and password for a particular **Impala** server, Power BI Desktop uses those same credentials in subsequent connection attempts. You can modify those credentials by going to **File > Options and settings > Data source settings**.

Once you successfully connect, a **Navigator** window appears and displays the data available on the server, from which you can select one or multiple elements to import and use in **Power BI Desktop**.



Considerations and Limitations

There are a few limits and considerations to keep in mind with the **Impala** connector:

- Future plans include enabling refresh support using the **Power BI Gateway**.

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

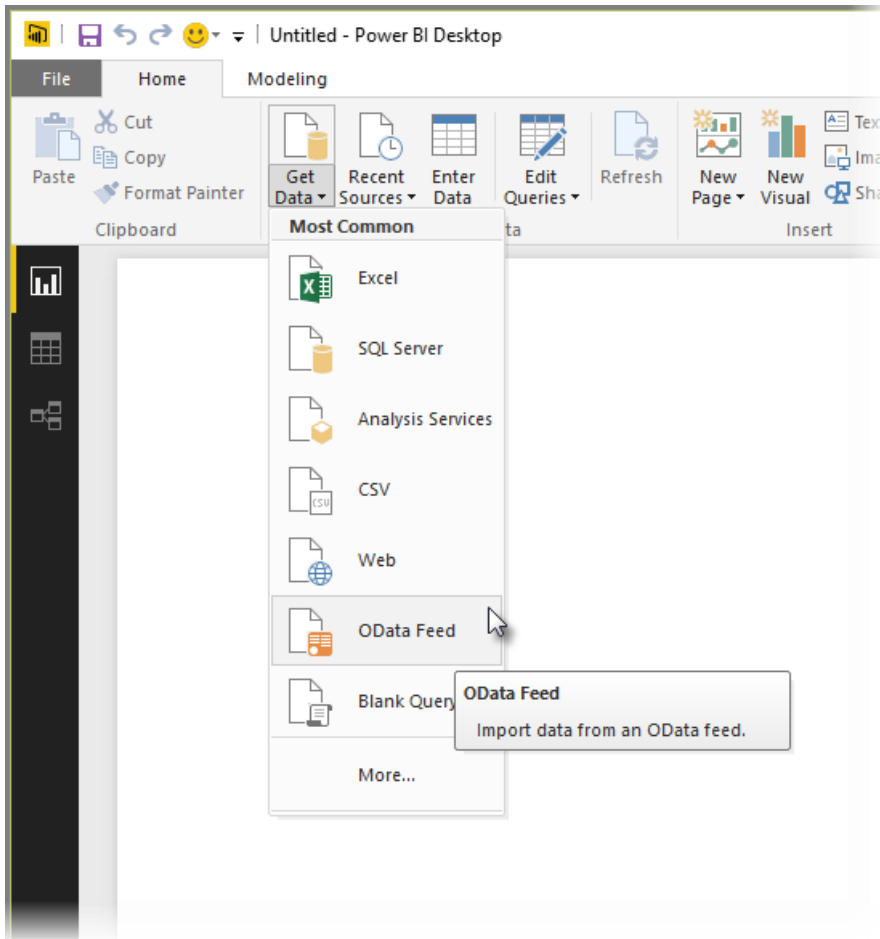
- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Connect to OData feeds in Power BI Desktop

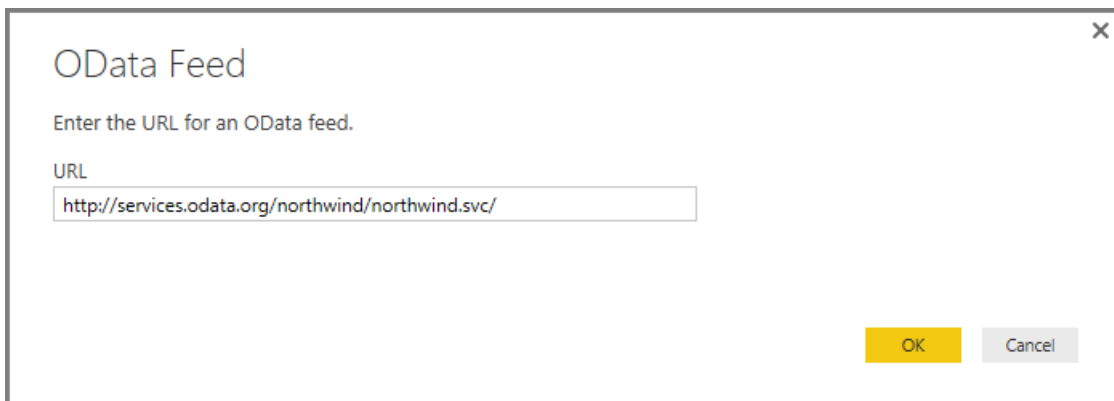
12/6/2017 • 1 min to read • [Edit Online](#)

In Power BI Desktop, you can connect to an **OData feed** and use the underlying data just like any other data source in Power BI Desktop.

To connect to an OData feed, select **Get Data > OData Feed** from the **Home** ribbon in Power BI Desktop.



In the **OData Feed** window that appears, type or paste your OData feed URL into the box, and select **OK**.



Power BI Desktop connects to the OData feed, and displays the available tables and other data elements in the **Navigator** window. When you select an element, the right pane of the **Navigator** window displays a preview of the data. You can select as many tables as you want to import. The **Navigator** window shows a preview of the currently selected table.

Navigator

Order_Details_Extendeds
Preview downloaded on Friday, July 17, 2015

OrderID	ProductID	ProductName	UnitPrice
10248	11	Queso Cabrales	13.5
10248	42	Singaporean Hokkien Fried Mee	9.9
10248	72	Mozzarella di Giovanni	34.5
10249	14	Tofu	18.5
10249	51	Manjimup Dried Apples	42.5
10250	41	Jack's New England Clam Chowder	7.5
10251	65	Louisiana Fiery Hot Pepper Sauce	16.5
10252	60	Camembert Pierrot	27.5
10253	31	Gorgonzola Telino	12.5
10253	39	Chartreuse verte	14.5
10253	49	Maxilaku	11.5
10254	74	Longlife Tofu	10.5
10255	2	Chang	15.5
10255	16	Pavlova	13.5
10255	36	Inlagd Sill	15.5
10255	59	Raclette Courdavault	4.5
10256	53	Perth Pasties	26.5
10256	77	Original Frankfurter grüne Soße	10.5
10257	27	Schoggi Schokolade	35.5
10257	39	Chartreuse verte	14.5
10257	77	Original Frankfurter grüne Soße	10.5
10259	21	Sir Rodney's Scones	15.5

Load Edit Cancel

You can choose the **Edit** button, which launches **Query Editor**, where you can shape and transform the data from the OData feed before importing it into Power BI Desktop. Or you can select the **Load** button, and import all of the data elements you selected in the left pane.

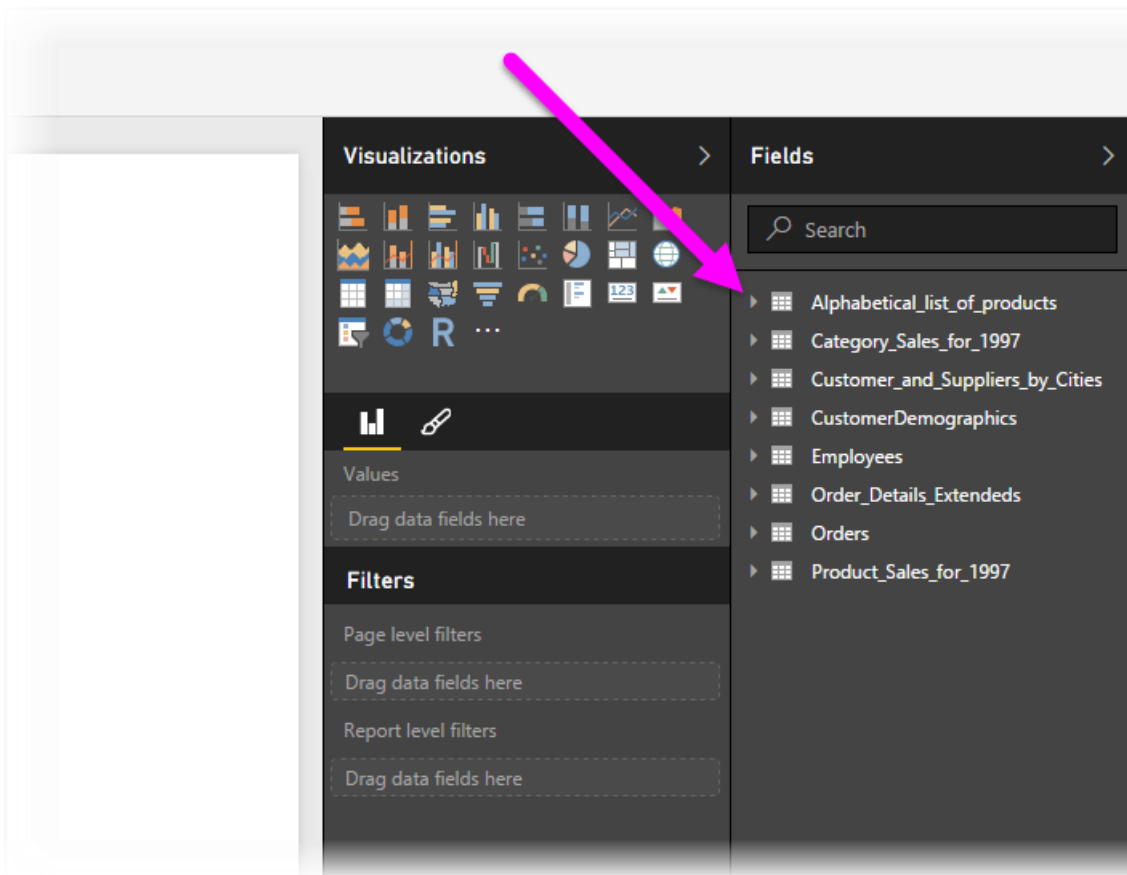
When we select **Load**, Power BI Desktop imports the selected items, and displays a **Load** window of the import progress.

Load

- Alphabetical_list_of_products
16.4 KB from services.odata.org
- Category_Sales_for_1997
592 bytes from services.odata.org
- Customer_and_Suppliers_by_Cities
14 KB from services.odata.org
- Employees
260 KB from services.odata.org
- CustomerDemographics
148 bytes from services.odata.org

Cancel

Once complete, Power BI Desktop makes the selected tables and other data elements available in the **Fields** pane, found on the right side of the *Reports* view in Power BI Desktop.



And that's it!

You're now ready to use the imported data from the OData feed in Power BI Desktop to create visuals, reports, or interact with any other data you might want to connect with and import, such as other Excel workbooks, databases, or any other data source.

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

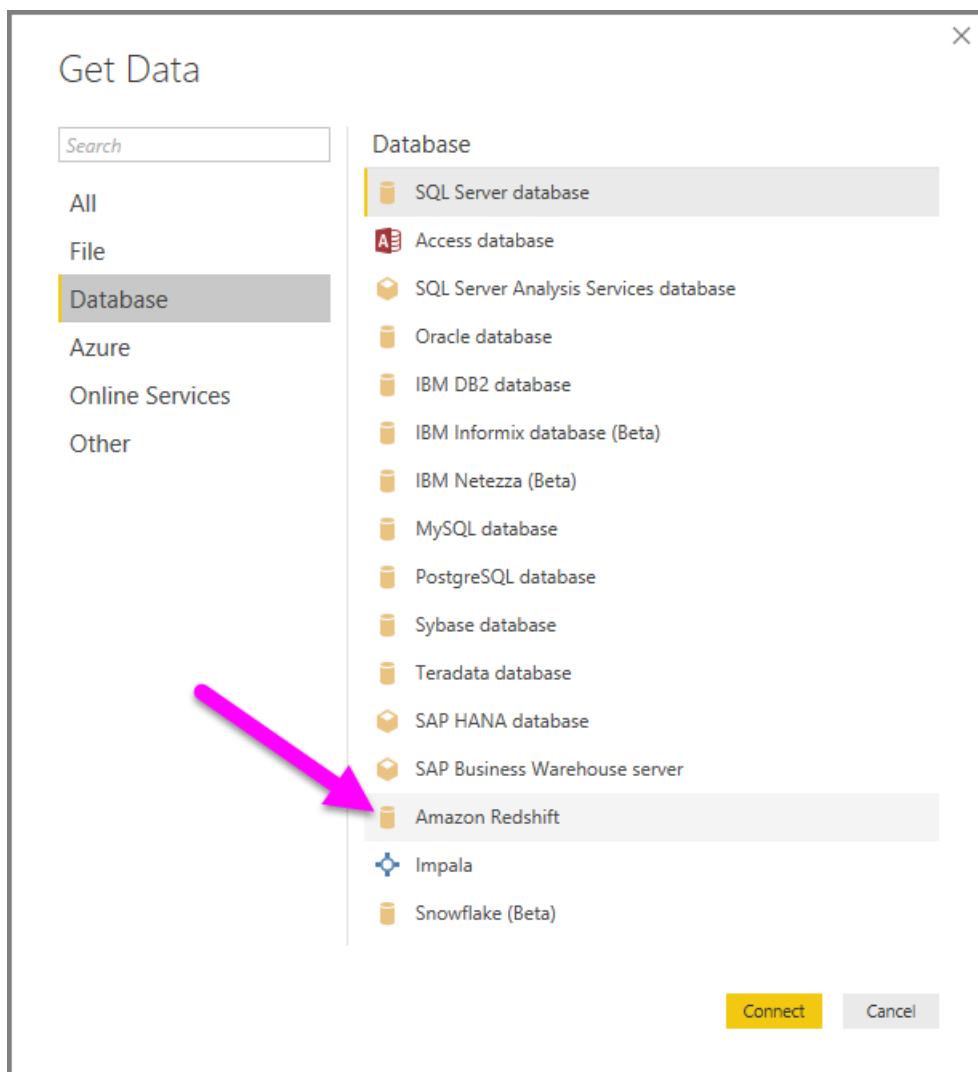
Connect to Amazon Redshift in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

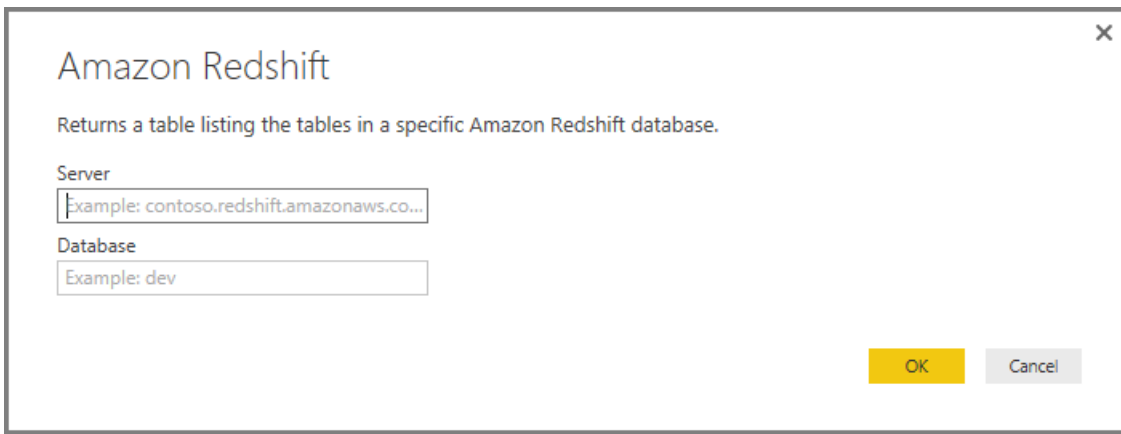
In **Power BI Desktop**, you can connect to an **Amazon Redshift** database and use the underlying data just like any other data source in Power BI Desktop.

Connect to an Amazon Redshift database

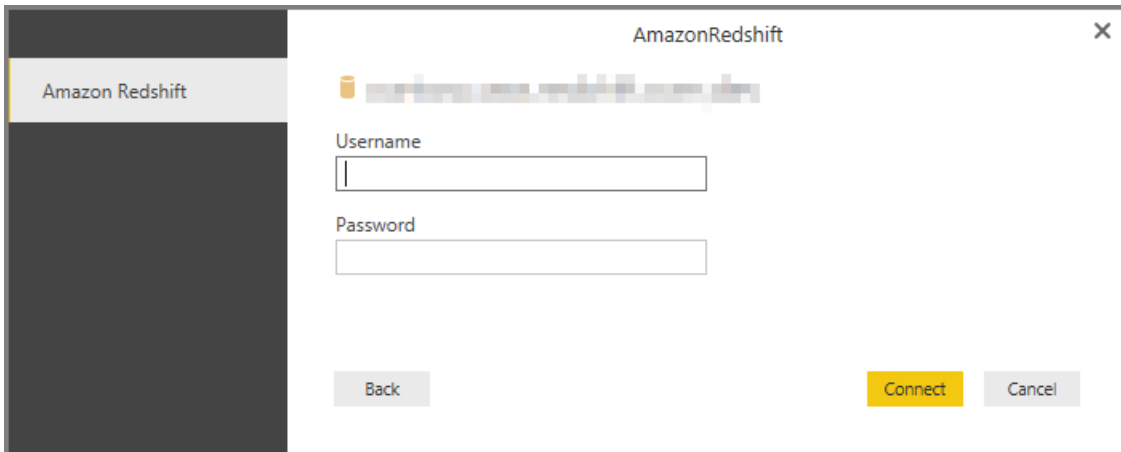
To connect to an **Amazon Redshift** database select **Get Data** from the **Home** ribbon in Power BI Desktop. Select **Database** from the categories on the left, and you see **Amazon Redshift**.



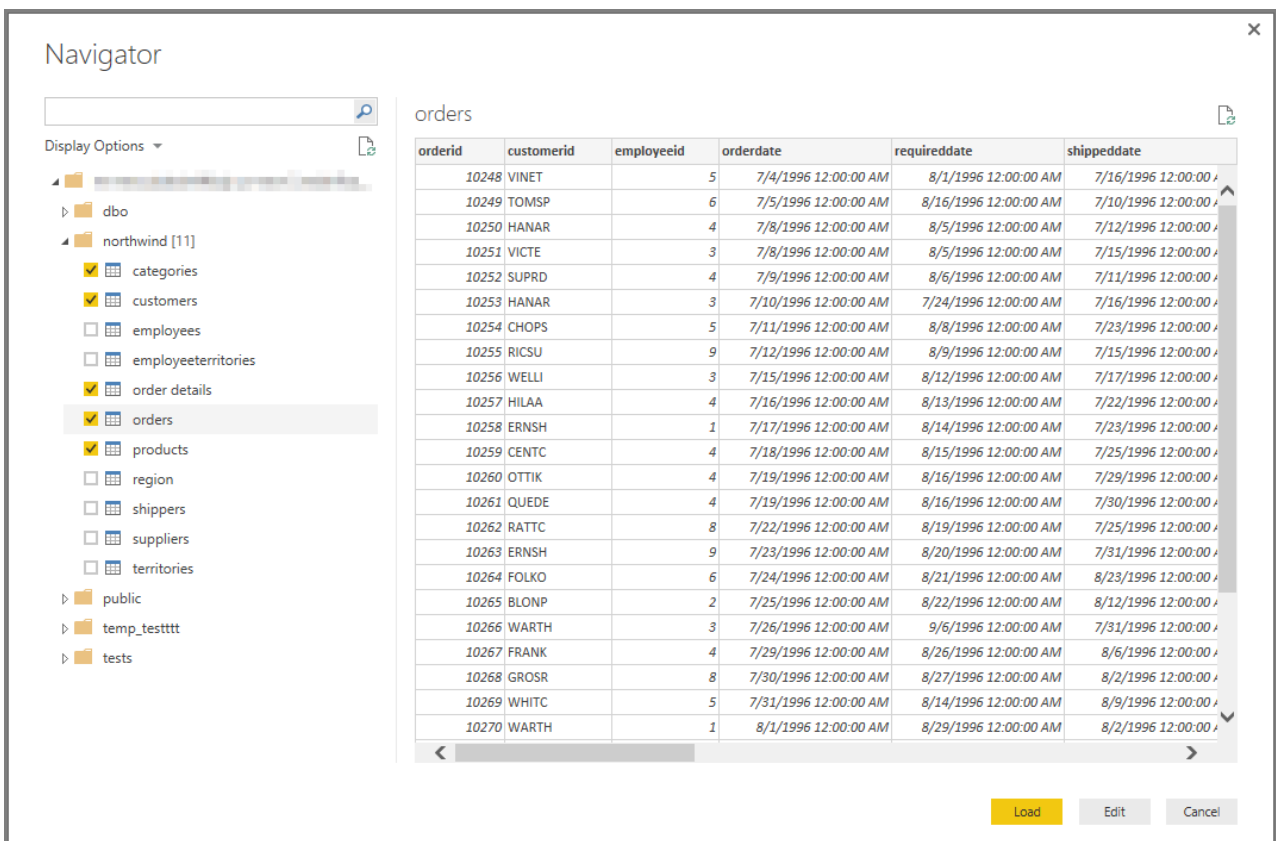
In the **Amazon Redshift** window that appears, type or paste the name of your **Amazon Redshift** server and database into the box. As part of the *Server* field, users can specify a port in the following format: *ServerURL:Port*



When prompted, put in your username and password.



Once you successfully connect, a **Navigator** window appears and displays the data available on the server, from which you can select one or multiple elements to import and use in **Power BI Desktop**.



Once you make selections from the **Navigator** window, you can either **Load** or **Edit** the data.

- If you choose to **Load** data, you'll be prompted whether to use *Import* or *DirectQuery* mode to load the data. For

more information, check out this [article that explains DirectQuery](#).

- If you select to **Edit** the data, **Query Editor** appears where you can apply all sorts of transformations and filters to the data, many of which are applied to the underlying **Amazon Redshift** database itself (if supported).

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

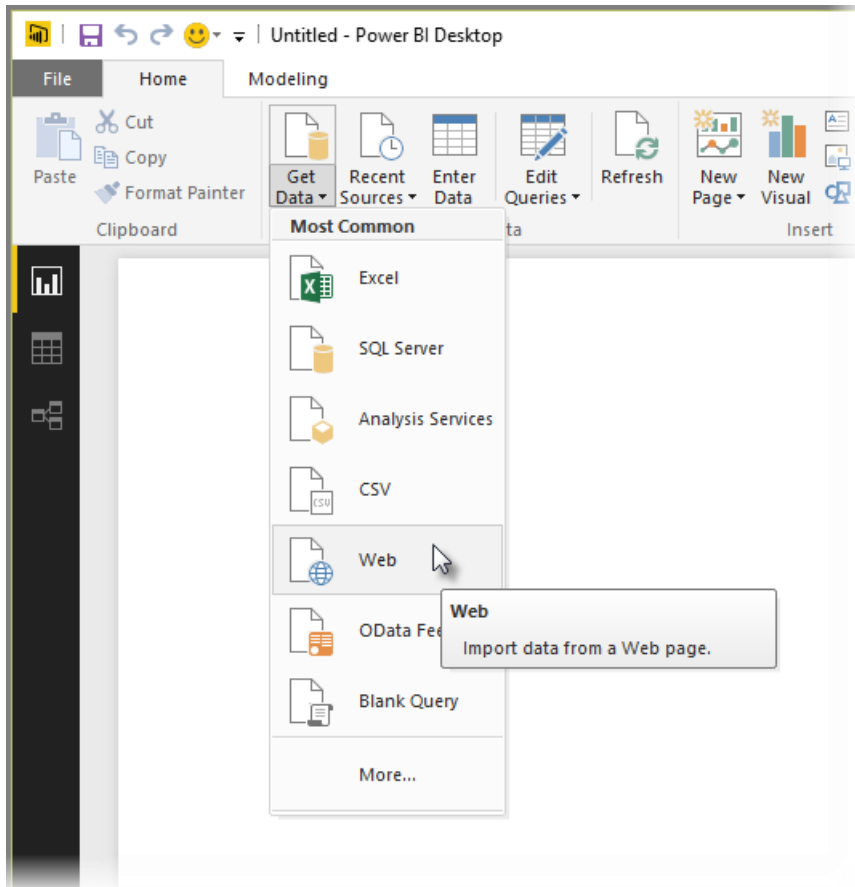
- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Connect to a web page from Power BI Desktop

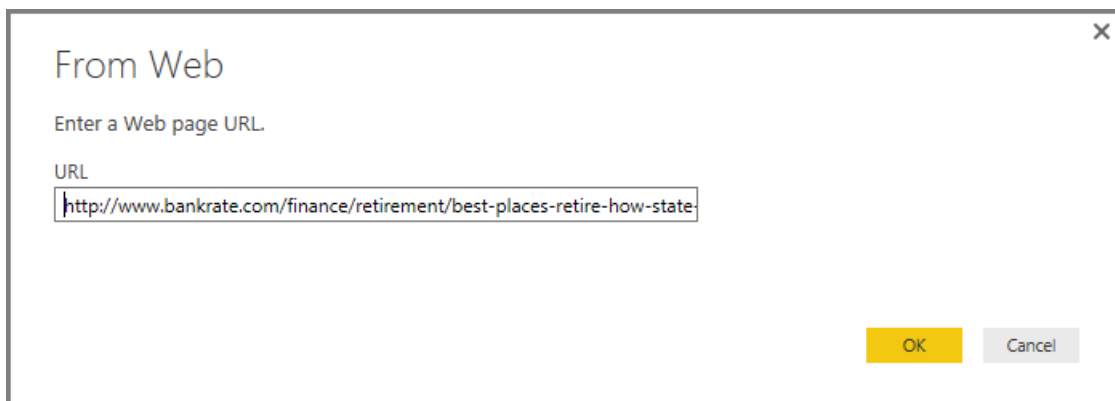
12/6/2017 • 1 min to read • [Edit Online](#)

You can connect to a web page, and import its data into Power BI Desktop, to use in your visuals and in your data models.

In Power BI Desktop, select **Get Data** > **Web** from the **Home** ribbon.



A dialog appears, asking for the URL of the web page from which you want to import data.



Once you've typed in (or pasted) the URL, select **OK**. Power BI Desktop connects to that page, then presents the page's available data in the **Navigator** window. When you select one of the available data elements, such as a table of the entire page, the **Navigator** window displays a preview of that data on the right side of the window.

Navigator

Display Options

http://www.bankrate.com/finance/retirement/best-place

- Document
- Table 0

Table 0
Preview downloaded on Monday, June 6, 2016

Header	Overall rank	State
Check out how your state ranks for retirement	1	Wyoming
Check out how your state ranks for retirement	2	South Dakota
Check out how your state ranks for retirement	3	Colorado
Check out how your state ranks for retirement	4	Utah
Check out how your state ranks for retirement	5	Virginia
Check out how your state ranks for retirement	6	Montana
Check out how your state ranks for retirement	7	Idaho
Check out how your state ranks for retirement	8	Iowa
Check out how your state ranks for retirement	9	Arizona
Check out how your state ranks for retirement	10	Nebraska
Check out how your state ranks for retirement	11	Maine
Check out how your state ranks for retirement	12	North Dakota
Check out how your state ranks for retirement	13	Wisconsin
Check out how your state ranks for retirement	14	Minnesota
Check out how your state ranks for retirement	15	New Hampsh
Check out how your state ranks for retirement	16	North Carolin
Check out how your state ranks for retirement	17	Kansas
Check out how your state ranks for retirement	18	South Carolin
Check out how your state ranks for retirement	19	Tennessee
Check out how your state ranks for retirement	20	Pennsylvania
Check out how your state ranks for retirement	21	Texas
Check out how your state ranks for retirement	22	Rhode Island

Load Edit Cancel

You can choose the **Edit** button, which launches **Query Editor**, where you can shape and transform the data on that Web page before importing it into Power BI Desktop. Or you can select the **Load** button, and import all of the data elements you selected in the left pane.

When we select **Load**, Power BI Desktop imports the selected items, and makes them available in the **Fields** pane, found on the right side of the Reports view in Power BI Desktop.

The screenshot shows the Power BI Desktop interface. On the left, the 'Visualizations' pane contains various chart and table icons. A pink arrow points from the 'Table 0' icon in the 'Visualizations' pane to the 'Table 0' entry in the 'Fields' pane on the right. The 'Fields' pane is expanded to show the columns of the table: Community w..., Cost of living, Crime rate, Header, Health care qu..., Overall rank, State, Tax rate, and Weather. Below the 'Fields' pane are sections for 'Values', 'Filters', and 'Report level filters', each with a 'Drag data fields here' instruction.

That's all there is to connecting to a web page and bringing its data into Power BI Desktop.

From there, you can drag those fields onto the Report canvas and create all the visualizations you want. You can also work with the data from that Web page just like you would any other data – you can shape it, you can create relationships between it and other data sources in your model, and otherwise do what you'd like to create just the Power BI report you want.

To see connecting to a Web page in more depth and action, take a look at the [Power BI Desktop Getting Started Guide](#).

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Connect to CSV files in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Connect to Snowflake in Power BI Desktop

1/25/2018 • 1 min to read • [Edit Online](#)

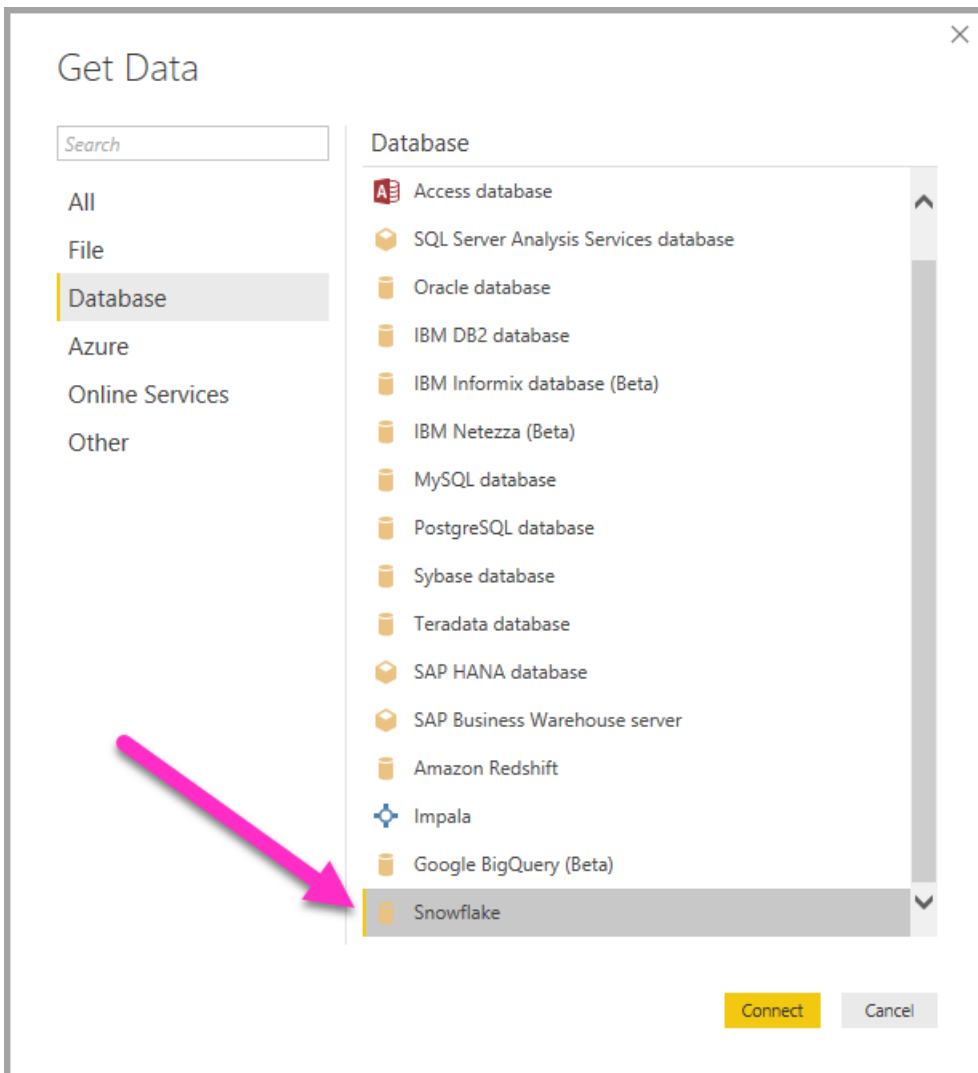
In Power BI Desktop, you can connect to a **Snowflake** computing warehouse and use the underlying data just like any other data source in Power BI Desktop.

NOTE

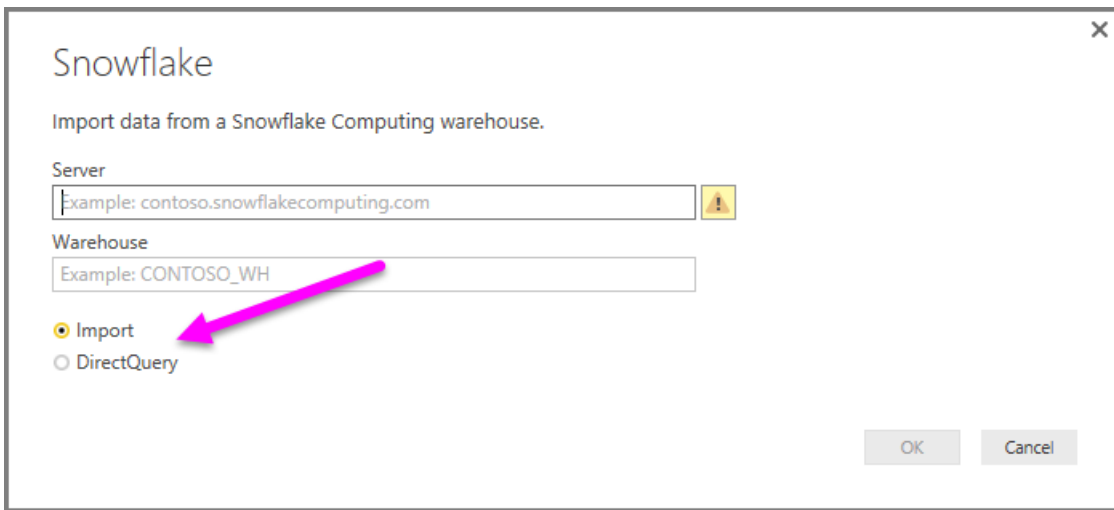
You also *must* install the **Snowflake ODBC driver** on computers that use the **Snowflake** connector, using the architecture that matches the installation of **Power BI Desktop**, either 32-bit or 64-bit. Just follow the following link and [download the appropriate Snowflake ODBC driver](#).

Connect to a Snowflake computing warehouse

To connect to a **Snowflake** computing warehouse select **Get Data** from the **Home** ribbon in Power BI Desktop. Select **Database** from the categories on the left, and you see **Snowflake**.



In the **Snowflake** window that appears, type or paste the name of your Snowflake computing warehouse into the box and select **OK**. Note that you can choose to **Import** data directly into Power BI, or you can use **DirectQuery**. You can learn more about [using DirectQuery](#).



Snowflake

Import data from a Snowflake Computing warehouse.

Server
Example: contoso.snowflakecomputing.com

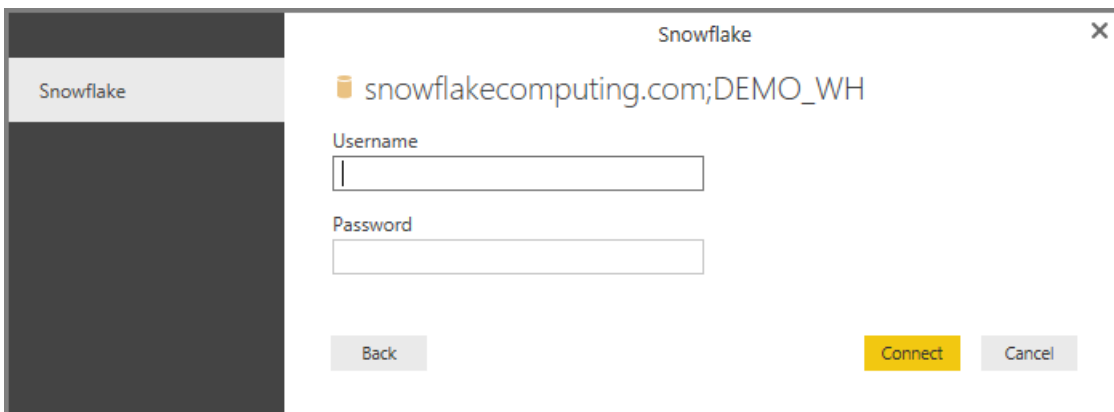
Warehouse
Example: CONTOSO_WH

Import
 DirectQuery

OK Cancel

A pink arrow points to the 'Import' radio button.

When prompted, put in your username and password.



Snowflake

snowflakecomputing.com;DEMO_WH

Username
[]

Password
[]

Back Connect Cancel

NOTE

Once you put in your username and password for a particular **Snowflake** server, Power BI Desktop uses those same credentials in subsequent connection attempts. You can modify those credentials by going to **File > Options and settings > Data source settings**.

Once you successfully connect, a **Navigator** window appears and displays the data available on the server, from which you can select one or multiple elements to import and use in **Power BI Desktop**.

The screenshot shows the Power BI Navigator interface. On the left, a tree view displays the database structure: powerbi.snowflakecomputing.com: DEMO_WH... > DEMO_DB [1] > PUBLIC [3] > DEMO_TABLE (selected). The main area displays a table titled DEMO_TABLE with the following data:

PRODUCTKEY	ENGLISHPRODUCTNAME	COLOR	CLASS
1	P1	Red	CatA
2	P2	Blue	CatA
3	P3	Blue	CatB
23	P6	Pink	CatF
231	P6	Pink	
1	L	U	null
17	A	G	null
16	H	U	null
15	E	U	null
14	L	U	null
13	S	U	null
12	S	U	null
11	F	G	null
10	P	U	null
9	S	U	null
8	N	U	null
7	H	G	null
6	B	U	null
5	P	F	null
4	A	U	null
3	A	N	null
2	G	U	null

At the bottom right of the window, there are three buttons: Load (yellow), Edit (grey), and Cancel (grey).

You can **Load** the selected table, which brings the entire table into **Power BI Desktop**, or you can **Edit** the query, which opens **Query Editor** so you can filter and refine the set of data you want to use, and then load that refined set of data into **Power BI Desktop**.

Next steps

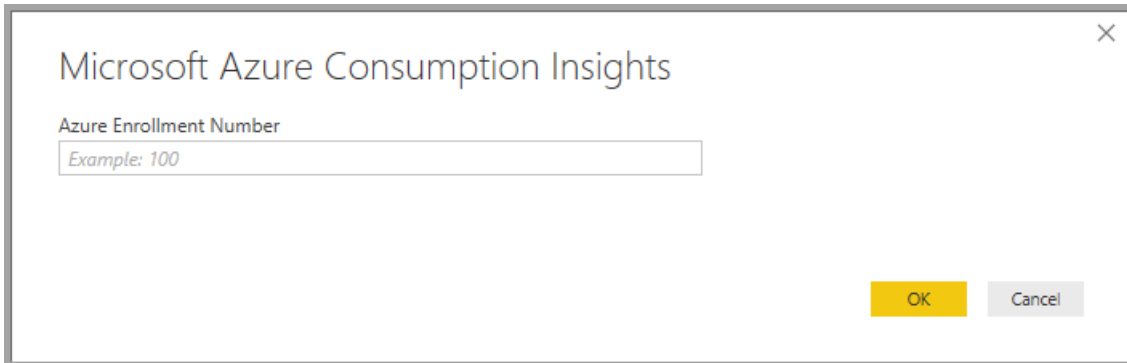
There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Connect to Azure Consumption Insights in Power BI Desktop (Beta)

12/6/2017 • 7 min to read • [Edit Online](#)

With the **Azure Consumption Insights** connector, you can use **Power BI Desktop** to connect to Azure and get in-depth data and information about your organization's Azure services usage. You can also create measures, custom columns, and visuals to report and share about your organization's Azure usage. This release of the **Azure Consumption and Insights** connector is in Beta, and is subject to change.



Microsoft Azure Consumption Insights

Azure Enrollment Number

Example: 100

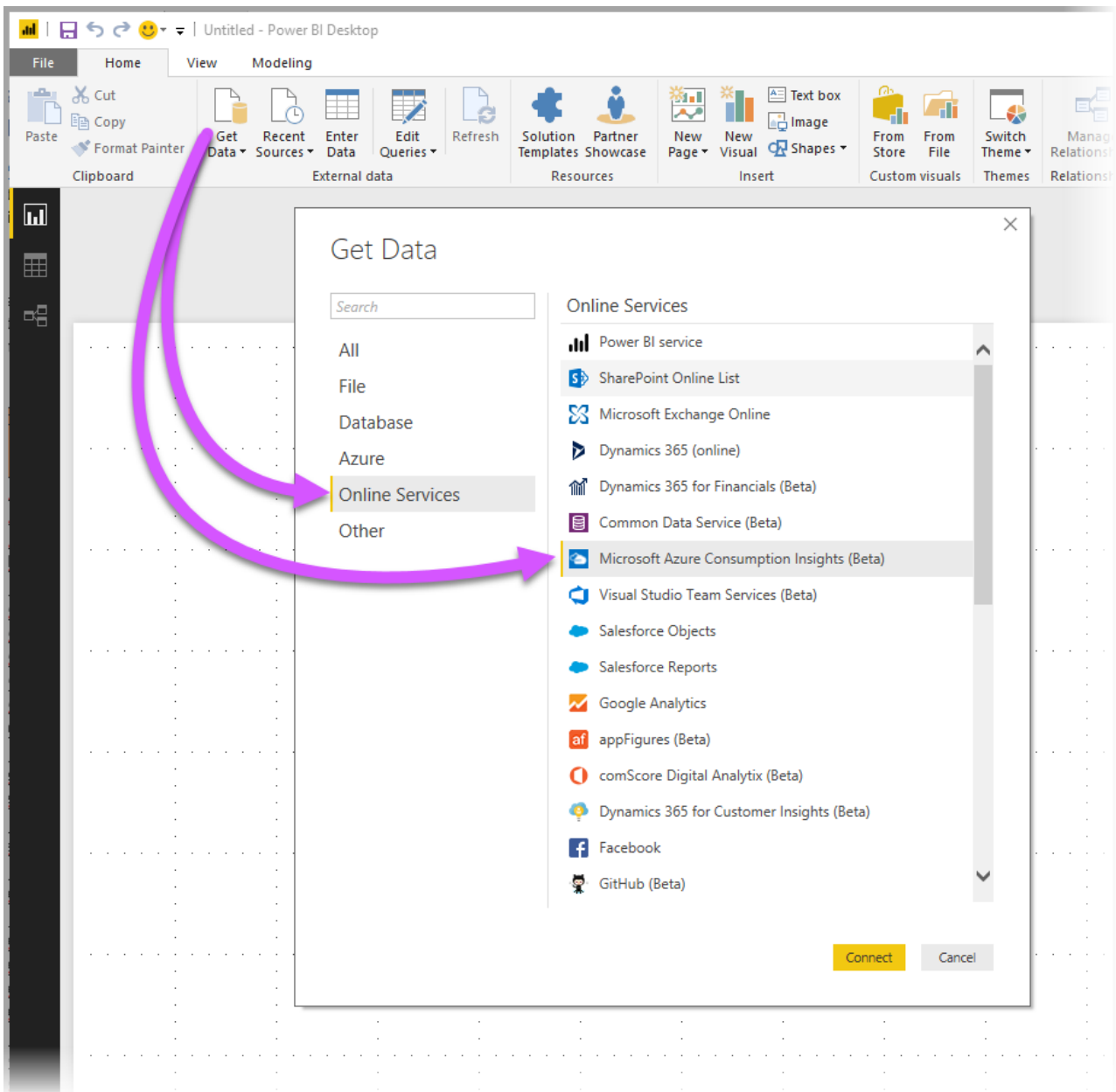
OK Cancel

In this article you learn how to connect using the **Azure Consumption Insights** connector and get the data you need, how to migrate from using the Azure Enterprise Connector, and you'll find a mapping of *usage details columns* available in the **ACI** (Azure Consumption Insights) API.

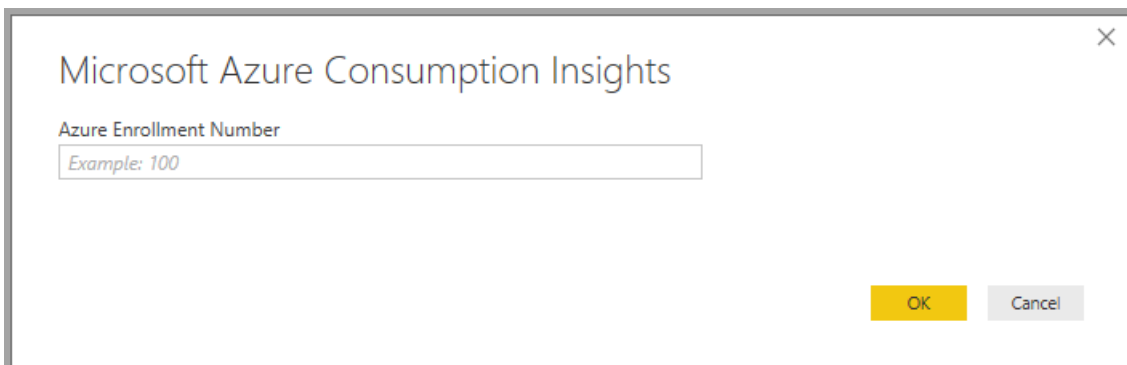
Connect to Azure Consumption Insights

To successfully connect using the **Azure Consumption Insights** connector, you need to have access to the Enterprise features within the Azure portal.

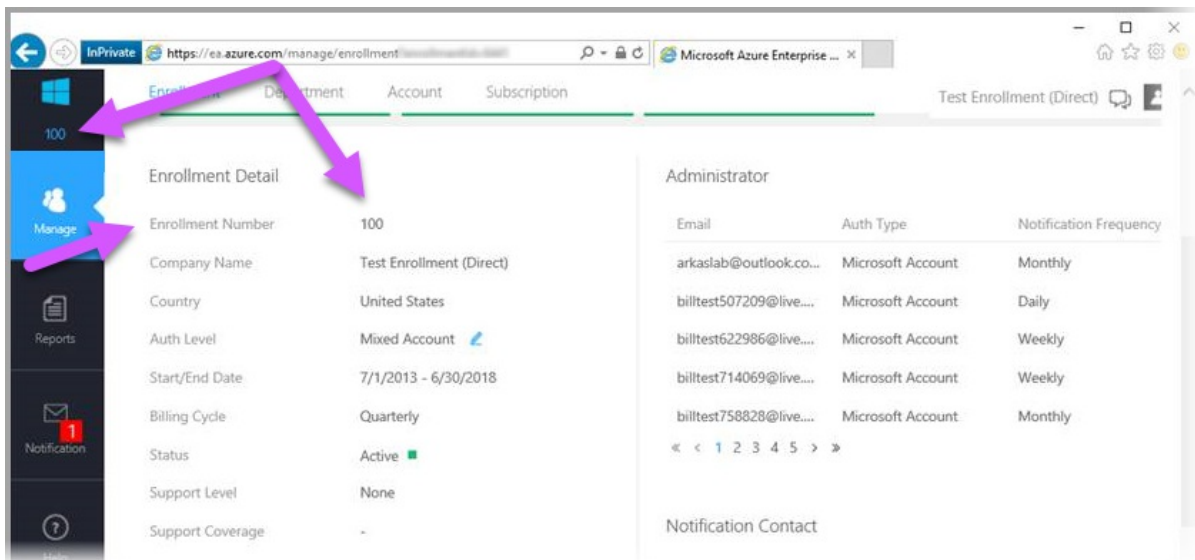
To connect to using the **Azure Consumption Insights** connector, select **Get Data** from the **Home** ribbon in **Power BI Desktop**. Select **Online Services** from the categories on the left, and you see **Microsoft Azure Consumption Insights (Beta)**. Select **Connect**.



In the dialog that appears, provide your *Enrollment Number*.

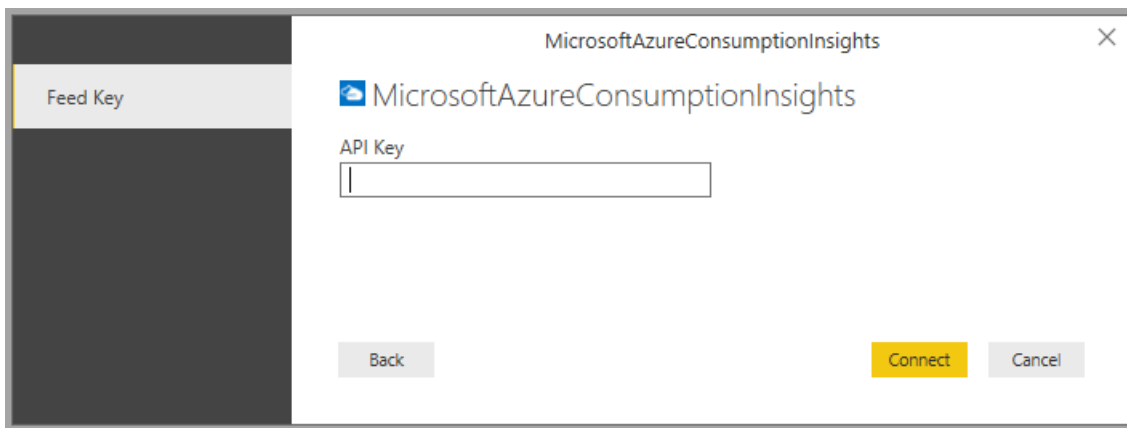


- You can get your enrollment number from the [Azure Enterprise Portal](#), in the location shown in the following image.

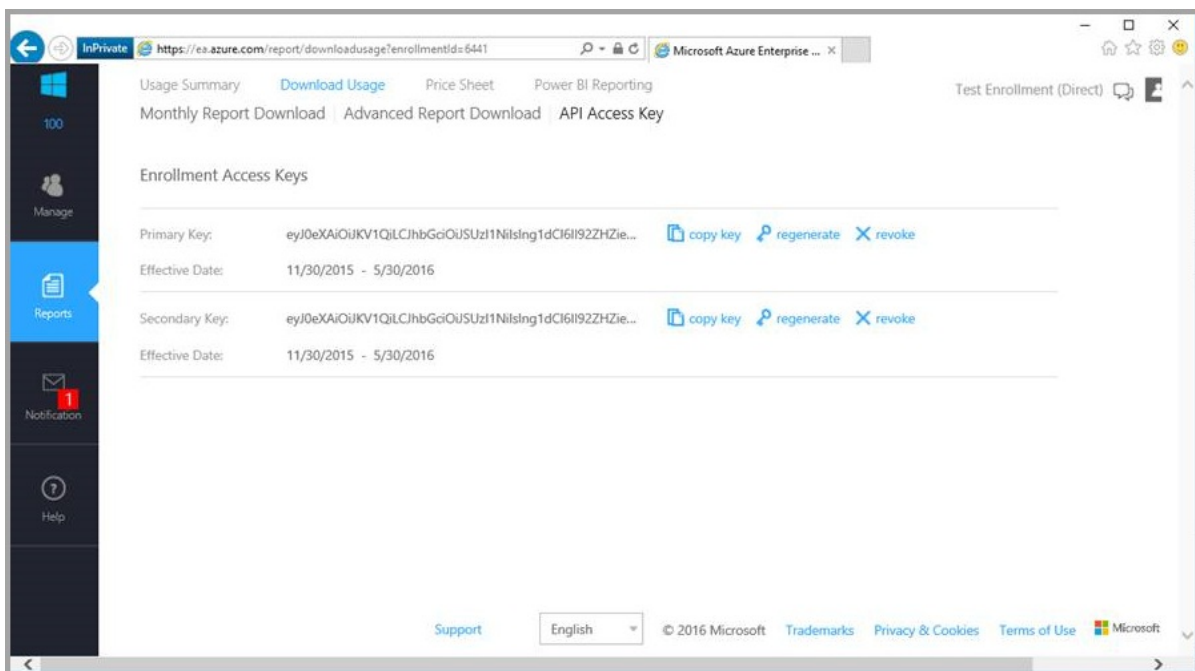


This version of the connector only supports enterprise enrollments from <https://ea.azure.com>. China enrollments are not currently supported.

Next, provide your Access key to connect.



- Your Access key for enrollment can be found on the [Azure Enterprise Portal](#).



Once you provide your Access key and select **Connect**, a **Navigator** window appears and shows the four tables available to you: *Summary*, *Usage*, *PriceSheet*, and *MarketPlace*. You can select a checkbox beside any table to see a

preview. You can select one or more tables by checking the box beside their name, then select **Load**.

Navigator

UsageDetails

AccountOwnerId	Account Name	ServiceAdministratorId
stahlkopfdirect@outlook.com	DaviSt Test Account	
stahlkopfdirect@outlook.com	DaviSt Test Account	
azurebilltestea@outlook.com	Azure Billing Portal test	
markmyd@hotmail.com	markmyd@hotmail.com	
markmyd@hotmail.com	markmyd@hotmail.com	
markmyd@hotmail.com	markmyd@hotmail.com	
markmyd@hotmail.com	markmyd@hotmail.com	
markmyd@hotmail.com	markmyd@hotmail.com	
markmyd@hotmail.com	markmyd@hotmail.com	
markmyd@hotmail.com	markmyd@hotmail.com	
billtest234225@live.com	billtest234225@live.com	
stahlkopfdirect@outlook.com	DaviSt Test Account	

i The data in the preview has been truncated due to size limits.

Load Edit Cancel

NOTE

The *Summary* and **PriceSheet* tables are only available for the enrollment-level API Key. Also, the data in these tables has, by default, the current month's data for *Usage* and *PriceSheet*. The *Summary* and *MarketPlace* tables are not constrained to the current month.

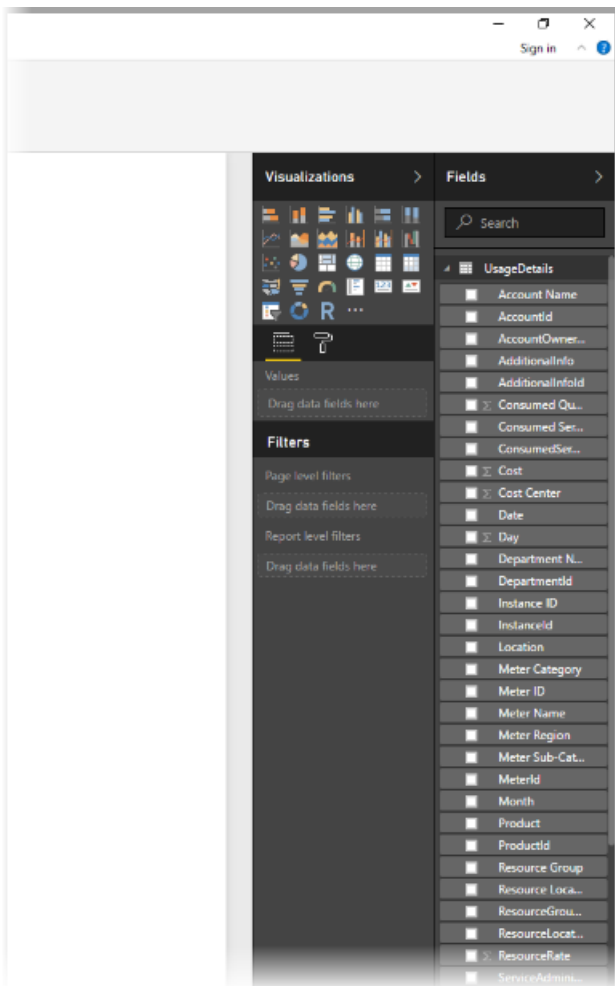
When you select **Load** the data is loaded into **Power BI Desktop**.

Load

UsageDetails
Evaluating...

Cancel

Once the data you selected is loaded, the tables and fields you selected can be seen in the **Fields** pane.



Using Azure Consumption Insights

To use the **Azure Consumption Insights** connector, you need to have access to the Enterprise features within the Azure portal.

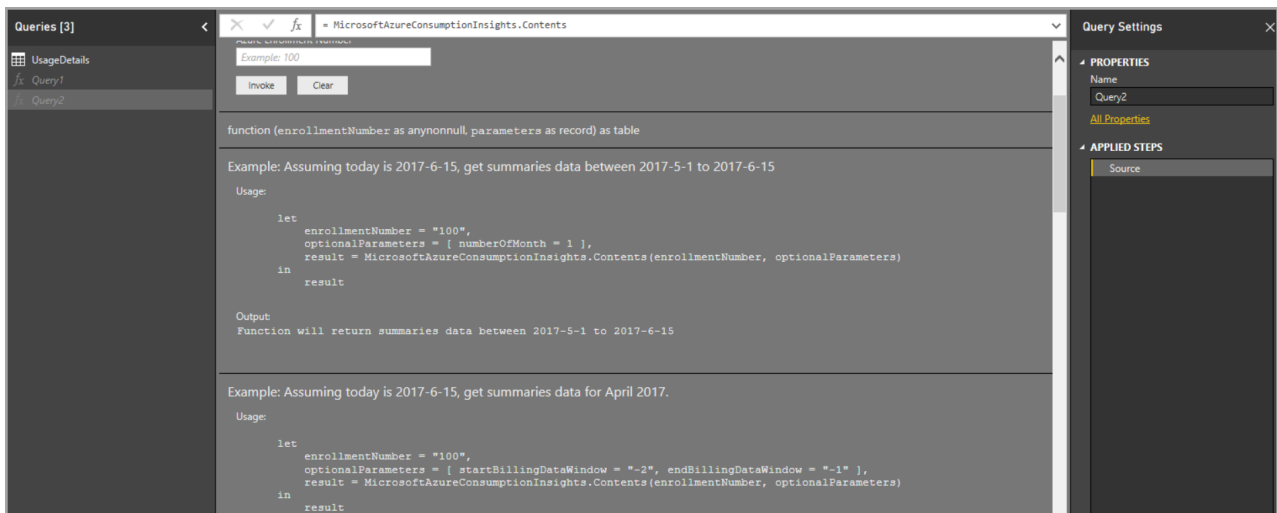
Once you successfully load data using the **Azure Consumption Insights** connector, you can create your own custom measures and columns using **Query Editor**, and you can create visuals, reports, and dashboards that you can share in the **Power BI service**.

Azure also includes a collection of sample custom queries that you can retrieve using a blank query. To do so, in the **Home** ribbon of **Power BI Desktop**, select the drop down arrow in **Get Data** and then select **Blank Query**. You can also do this in **Query Editor** by right-clicking in the **Queries** pane along the left, and selecting **New Query > Blank Query** from the menu that appears.

In the **Formula bar** type the following:

```
= MicrosoftAzureConsumptionInsights.Contents
```

A collection of samples appear, as shown in the following image.



When working with reports and creating queries, use the following:

- To define the number of months starting from the current date, use *noOfMonths*
 - Use a value between one and 36 to represent the number of months, from the current date, you want to import. We recommend getting no more than 12 months of data to avoid thresholds with import constraints and the volume of data allowed for queries in Power BI.
- To define a period of months in a historical time window, use *startBillingDataWindow* and *endBillingDataWindow*
- Do not use *noOfMonths* together with *startBillingDataWindow* or *endBillingDataWindow*

Migrating from the Azure Enterprise Connector

Some customers created visuals using the *Azure Enterprise Connector (Beta)*, which will eventually be discontinued, and is being replaced by the **Azure Consumption Insights** connector. The **Azure Consumption Insights** connector has features and enhancements that include the following:

- Additional data sources available for *Balance Summary* and *Marketplace Purchases*
- New and advanced parameters, such as *startBillingDataWindow* and *endBillingDataWindow*
- Better performance and responsiveness

To help customers transition to the newer **Azure Consumption Insights** connector, and to preserve the work they've done in creating custom dashboards or reports, the following steps show how to move to the new connector.

Step 1: Connect to Azure using the new connector

The first step is to connect using the **Azure Consumption Insights** connector, which was described earlier in this article in detail. In this step, select **Get Data > Blank Query** from the **Home** ribbon in **Power BI Desktop**.

Step 2: Use the Advanced Editor to create a query

In **Query Editor**, select **Advanced Editor** from the **Query** section of the **Home** ribbon. In the **Advanced Editor** window that appears, enter the following query.

```
let
    enrollmentNumber = "100",
    optionalParameters = [ numberOfMonth = 6, dataType="DetailCharges" ],
    data = MicrosoftAzureConsumptionInsights.Contents(enrollmentNumber, optionalParameters)
in
    data
```



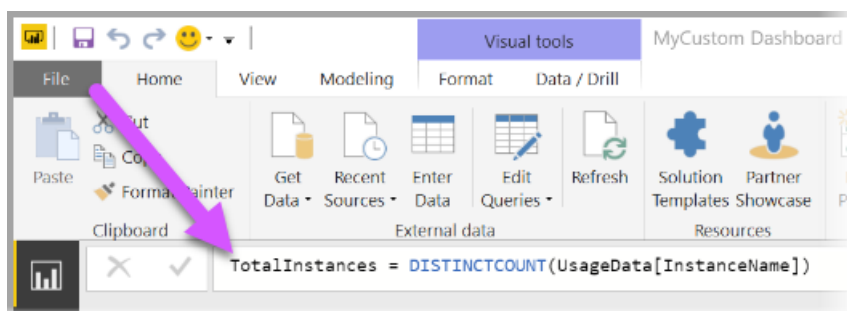
Of course, you'll need to replace the value of *enrollmentNumber* with your own enrollment number, which you can get from the [Azure Enterprise Portal](#). The *numberOfMonth* parameter is how many months of data you want going back, from the current data. Use zero (0) for the current month.

Once you select **Done** in the **Advanced Editor** window, the preview refreshes and you'll see data from the specified month range in the table. Select **Close & Apply** and return.

Step 3: Move measures and custom columns to the new report

Next you'll need to move any custom columns or measures you created into the new details table. Here are the steps.

1. Open Notepad (or another text editor).
2. Select the measure you want to move, and copy the text from the *Formula* field, and place it in Notepad.



3. Rename *Query1* to the original details table name.
4. Create new measures and custom columns in your table by right-clicking on your table, and choosing **New Measure**, then cut and paste your store measures and columns until they're all done.

Step 4: Re-link tables that had relationships

Many dashboards have additional tables that are used for lookup or filtering, such date tables or tables used for custom projects. Reestablishing those relationships resolves most remaining issues. Here's how to do it.

- In the **Modeling** tab in **Power BI Desktop**, select **Manage Relationships** to bring up a window that lets you manage relationships within the model. Re-link your tables, as needed.

Create relationship ✕

Select tables and columns that are related.

UsageData

	Subscription Name	Date	Month	Day	Year	Product
-3feb4ed8d4cd	Microsoft Azure Enterprise	Thursday, June 1, 2017	2017-06	1	2017	Data Management Geo Redur
-3feb4ed8d4cd	Microsoft Azure Enterprise	Thursday, June 1, 2017	2017-06	1	2017	Data Management Geo Redur
-3feb4ed8d4cd	Microsoft Azure Enterprise	Thursday, June 1, 2017	2017-06	1	2017	Data Management Geo Redur

DateKey

Date	Year	MonthNumber	MonthName	Day	Week	Quarter	MonthInCalendar	Day number
01/01/12	2012	1	Jan	Sun	1	Q1	Jan 2012	
01/02/12	2012	1	Jan	Mon	1	Q1	Jan 2012	
01/03/12	2012	1	Jan	Tue	1	Q1	Jan 2012	

Cardinality: Many to one (*:1)

Cross filter direction: Both

Make this relationship active

Assume referential integrity

Apply security filter in both directions

OK
Cancel

Step 5: Verify your visuals, and adjust field formatting as needed

Once you get this far, most of your original visuals, tables, and drill-downs should be working as expected. However, there may be some minor tweaks necessary for formatting, to get things looking just how you want them. Take a bit of time to look over each of your dashboards and visuals, to ensure they look how you want them.

Using the Azure Consumption and Insights (ACI) API to get consumption data

Azure also provides the [Azure Consumption and Insights \(ACI\) API](#). You can create your own custom solutions to gathering, reporting, and visualizing Azure consumption information using the ACI API.

Mapping names and usage details between the portal, the connector, and the API

The columns and names of details in the Azure Portal are similar in the API and the connector, but they're not always identical. To help clarify, the following table provides a mapping between the API, the connector, and columns you see in the Azure Portal. Also indicated is whether the column is obsolete. For more information and definitions of these terms, take a look at the [Azure billing data dictionary](#).

ACI CONNECTOR / CONTENTPACK COLUMNNAME	ACI API COLUMN NAME	EA COLUMN NAME	OBSOLETE / PRESENT FOR BACKWARD COMPATIBILITY
AccountName	accountName	Account Name	No
AccountId	accountId		Yes
AccountOwnerId	accountOwnerEmail	AccountOwnerId	No
AdditionalInfo	additionalInfo	AdditionalInfo	No

ACI CONNECTOR / CONTENTPACK COLUMNNAME	ACI API COLUMN NAME	EA COLUMN NAME	OBSOLETE / PRESENT FOR BACKWARD COMPATIBILITY
AdditionalInfold			Yes
Consumed Quantity	consumedQuantity	Consumed Quantity	No
Consumed Service	consumedService	Consumed Service	No
ConsumedServiceId	consumedServiceId		Yes
Cost	cost	ExtendedCost	No
Cost Center	costCenter	Cost Center	No
Date	date	Date	No
Day		Day	No
DepartmentName	departmentName	Department Name	No
DepartmentID	departmentId		Yes
Instance ID			Yes
InstanceId	instanceId	Instance ID	No
Location			Yes
Meter Category	meterCategory	Meter Category	No
Meter ID			Yes
Meter Name	meterName	Meter Name	No
Meter Region	meterRegion	Meter Region	No
Meter Sub-Category	meterSubCategory	Meter Sub-Category	No
MeterId	meterId	Meter ID	No
Month		Month	No
Product	product	Product	No
ProductId	productId		Yes
Resource Group	resourceGroup	Resource Group	No
Resource Location	resourceLocation	Resource Location	No
ResourceGroupId			Yes

ACI CONNECTOR / CONTENTPACK COLUMNNAME	ACI API COLUMN NAME	EA COLUMN NAME	OBSOLETE / PRESENT FOR BACKWARD COMPATIBILITY
ResourceLocationId	resourceLocationId		Yes
ResourceRate	resourceRate	ResourceRate	No
ServiceAdministratorId	serviceAdministratorId	ServiceAdministratorId	No
ServiceInfo1	serviceInfo1	ServiceInfo1	No
ServiceInfo1Id			Yes
ServiceInfo2	serviceInfo2	ServiceInfo2	No
ServiceInfo2Id			Yes
Store Service Identifier	storeServiceIdentifier	Store Service Identifier	No
StoreServiceIdentifierId			Yes
Subscription Name	subscriptionName	Subscription Name	No
Tags	tags	Tags	No
TagsId			Yes
Unit Of Measure	unitOfMeasure	Unit Of Measure	No
Year		Year	No
SubscriptionId	subscriptionId	SubscriptionId	Yes
SubscriptionGuid	subscriptionGuid	SubscriptionGuid	No

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

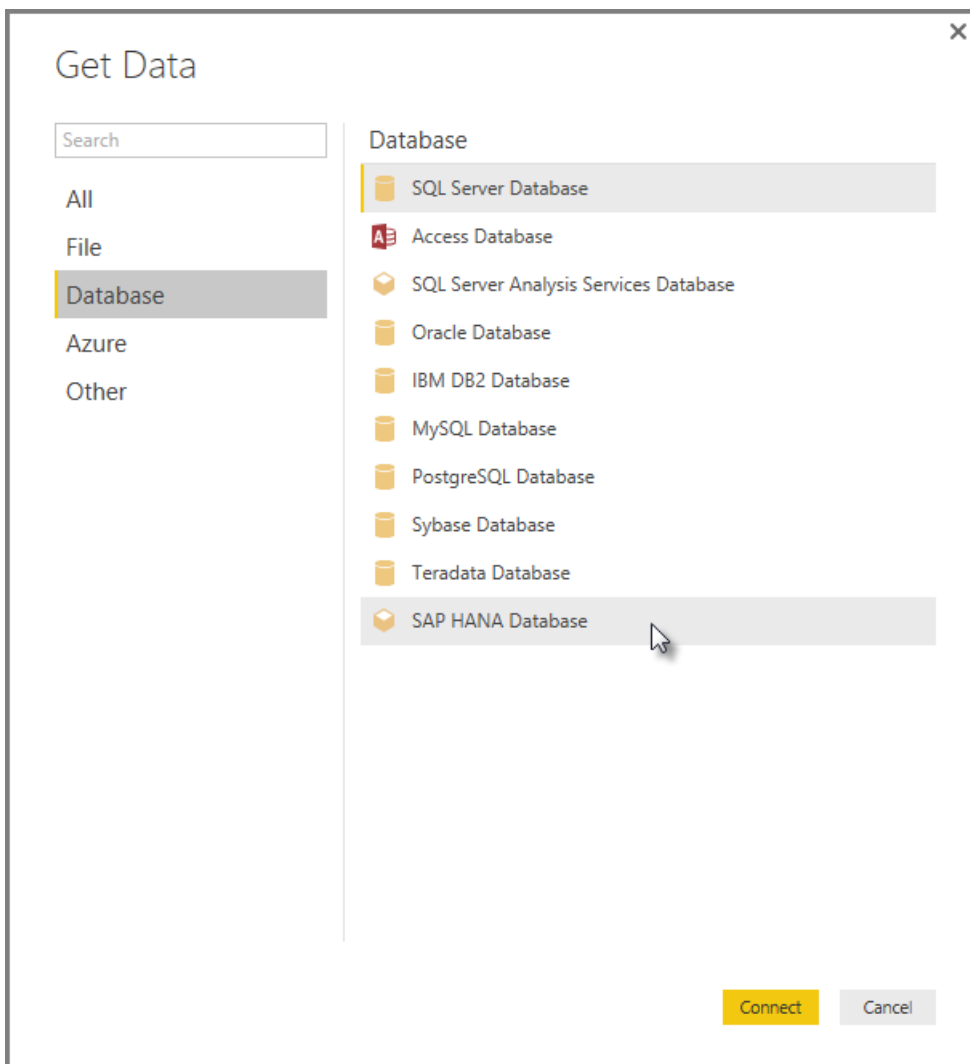
- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to Excel workbooks in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Use SAP HANA in Power BI Desktop

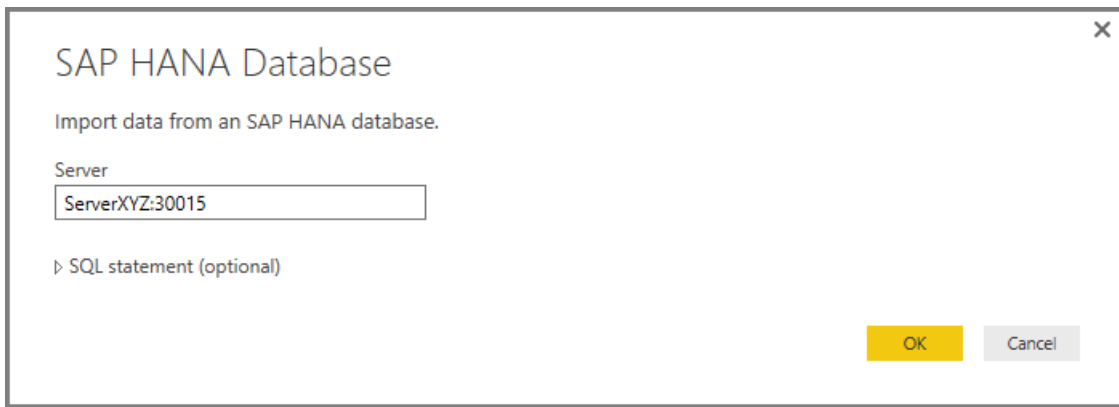
12/6/2017 • 1 min to read • [Edit Online](#)

With Power BI Desktop, you can now access **SAP HANA** databases. To use **SAP HANA**, the SAP HANA ODBC driver must be installed on the local client computer in order for the Power BI Desktop **SAP HANA** data connection to work properly. You can download the SAP HANA ODBC driver from the [SAP Software Download Center](#). From there, search for the SAP HANA CLIENT for Windows computers. Since the **SAP Software Download Center** changes its structure frequently, more specific guidance for navigating that site is not available.

To connect to a **SAP HANA** database, select **Get Data > Database > SAP HANA Database** as shown in the following image.



When connecting to a SAP HANA database, specify the server name and the port in the format *server:port* - the following image shows an example with a server named *ServerXYZ* and port *30015*.



In this release **SAP HANA** in [DirectQuery](#) mode is supported in Power BI Desktop and the Power BI Service, and you can publish and upload reports that use **SAP HANA** in DirectQuery mode to the Power BI service. You can also publish and upload reports to the Power BI Service when not using **SAP HANA** in DirectQuery mode.

Supported features for SAP HANA

This release has many capabilities for **SAP HANA**, as shown in the following list:

- The Power BI connector for **SAP HANA** uses the SAP ODBC driver, to provide the best use experience
- **SAP HANA** supports both DirectQuery and Import options
- Power BI supports HANA information models (such as Analytic and Calc views) and has optimized navigation
- With **SAP HANA** you can also use the direct SQL feature to connect to Row and Column Tables
- Includes Optimized Navigation for HANA Models
- Power BI supports **SAP HANA** Variables and Input parameters

Installing the SAP HANA ODBC driver

Limitations of SAP HANA

There are also a few limitations to using **SAP HANA**, shown below:

- NVARCHAR strings are truncated to maximum length of 4000 Unicode characters
- SMALLDECIMAL is not supported
- VARBINARY is not supported
- Valid Dates are between 1899/12/30 and 9999/12/31

Using Analysis Services Tabular data in Power BI Desktop

1/25/2018 • 4 min to read • [Edit Online](#)

With Power BI Desktop, there are two ways you can connect to and get data from your SQL Server Analysis Services Tabular models: Explore by using a live connection or Select items and import into Power BI Desktop.

Let's take a closer look.

Explore by using a live connection – When using a live connection, items in your Tabular model or perspective, like tables, columns, and measures appear in your Power BI Desktop Fields list. You can use Power BI Desktop's advanced visualization and report tools to explore your Tabular model in new, highly interactive ways.

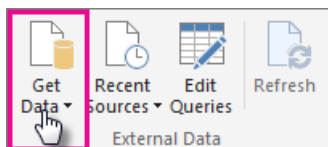
When connecting live, no data from the Tabular model is imported into Power BI Desktop. Each time you interact with a visualization, Power BI Desktop queries the Tabular model and calculates the results you see. You're always looking at the latest data. Keep in-mind, Tabular models are highly secure. Items that appear in Power BI Desktop depend on your permissions for the Tabular model you're connected to.

When you've created dynamic reports in Power BI Desktop, you can share them by publishing to your Power BI site. When you publish a Power BI Desktop file with a live connection to a Tabular model to your Power BI site, an on-premises data gateway must be installed and configured by an administrator. To learn more, see [On-premises data gateway](#).

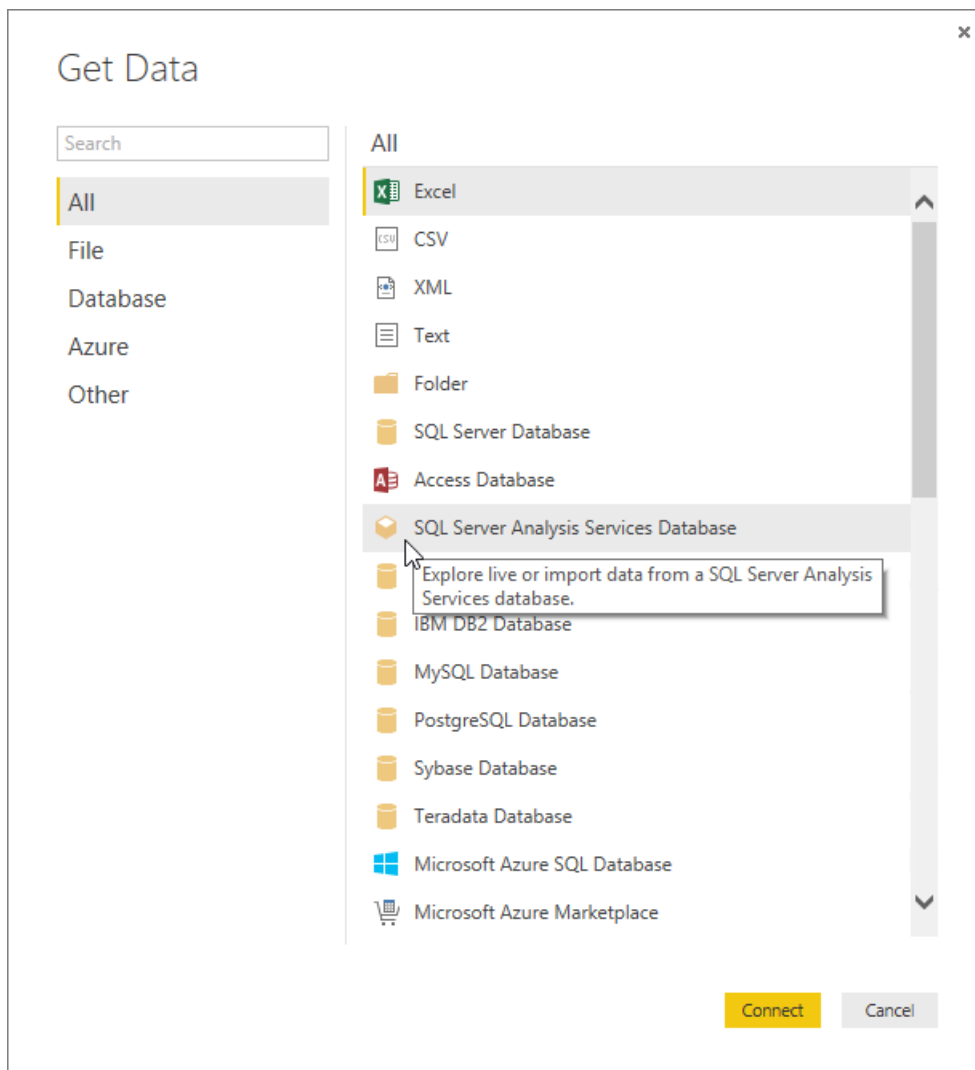
Select items and import into Power BI Desktop – When you connect with this option, you can select items like tables, columns, and measures in your Tabular model or perspective and load them into a Power BI Desktop model. You can use Power BI Desktop's advanced Query Editor to further shape what you want. You can use Power BI Desktop's modeling features to further model the data. No live connection between Power BI Desktop and the Tabular model is maintained. You can then explore your Power BI Desktop model offline or publish to your Power BI site.

To connect to a Tabular model

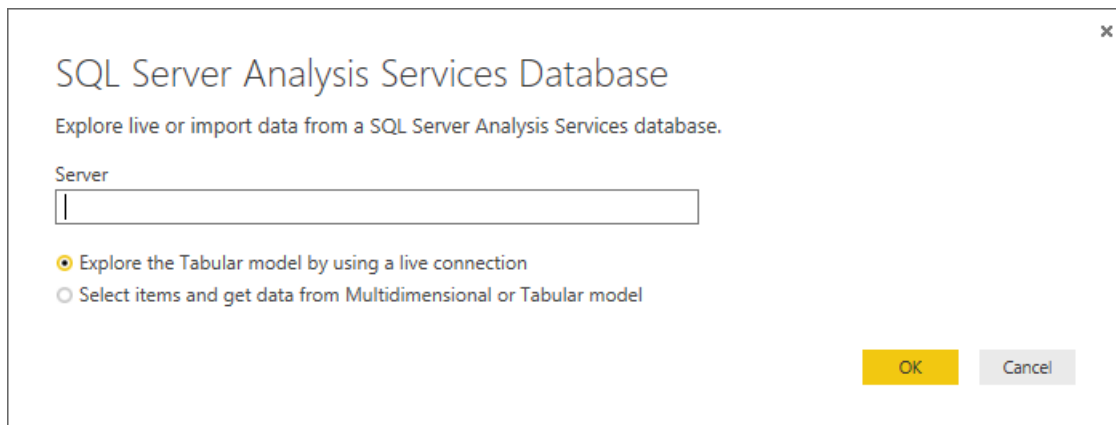
1. In Power BI Desktop, on the **Home** tab, click **Get Data**.



2. Click **SQL Server Analysis Services Database**, then click **Connect**.

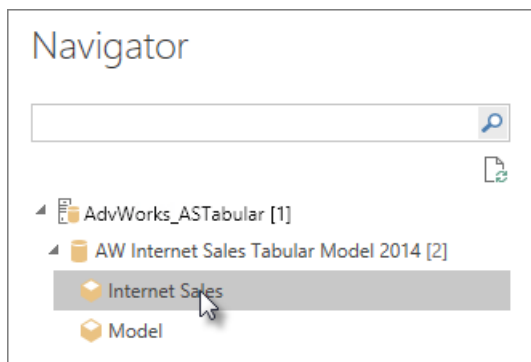


3. Enter the Server name and select a connection mode.

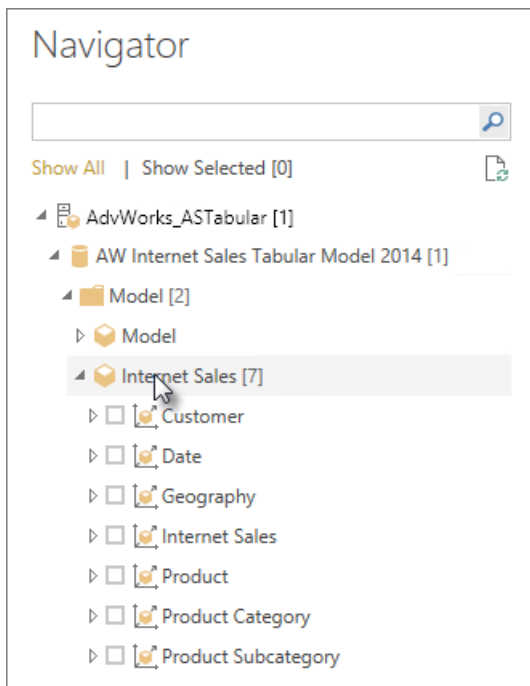


4. This step depends on the connection mode you selected:

- If you're connecting live, in Navigator, select a Tabular model or perspective.



- If you chose Select items and get data, in Navigator, select a Tabular model or perspective. You can further select only particular tables or columns to load. To shape your data before loading, click Edit to open Query Editor. When you're ready, click Load to import the data into Power BI Desktop.



Frequently Asked Questions

Question: Do I need an on-premises data gateway?

Answer: It depends. If you use Power BI Desktop to connect live to a Tabular model, but have no intention on publishing to your Power BI site, you do not need a gateway. On the other hand, if you do intend on publishing to your Power BI site, a data gateway is necessary to ensure secure communication between the Power BI service and your on-premises Analysis Services server. Be sure to talk to your Analysis Services server administrator before installing a data gateway.

If you choose select items and get data, you're importing Tabular model data right into your Power BI Desktop file, so no gateway is necessary.

Question: What's the difference between connecting live to a Tabular model from the Power BI service versus connecting live from Power BI Desktop?

Answer: When connecting live to a Tabular model from your site in the Power BI service to an Analysis Services database on-premises in your organization, an on-premises data gateway is required to secure communications between them. When connecting live to a Tabular model from Power BI Desktop, a gateway is not required because both Power BI Desktop and the Analysis Services server you're connecting to are both running on-premises in your organization. However, if you publish your Power BI Desktop file to your Power BI site, a gateway is required.

Question: If I created a live connection, can I connect to another data source in the same Power BI Desktop file?

Answer: No. You cannot explore live data and connect to another type of data source in the same file. If you've already imported data or connected to a different data source in a Power BI Desktop file, you'll need to create a new file to explore live.

Question: If I created a live connection, can I edit the model or query in Power BI Desktop?

Answer: You can create report level measures in the Power BI Desktop, but all other query and modelling features are disabled when exploring live data.

Question: If I created a live connection, is it secure?

Answer: Yes. Your current Windows credentials are used to connect to the Analysis Services server. You cannot use Basic or stored credentials in either the Power BI service or Power BI Desktop when exploring live.

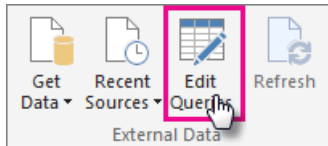
Question: In Navigator, I see a model and a perspective. What's the difference?

Answer: A perspective is a particular view of a Tabular model. It might include only particular tables, columns, or measures depending on a unique data analysis need. A Tabular model always contains at least one perspective, which could include everything in the model. If you're unsure which you should select, check with your administrator.

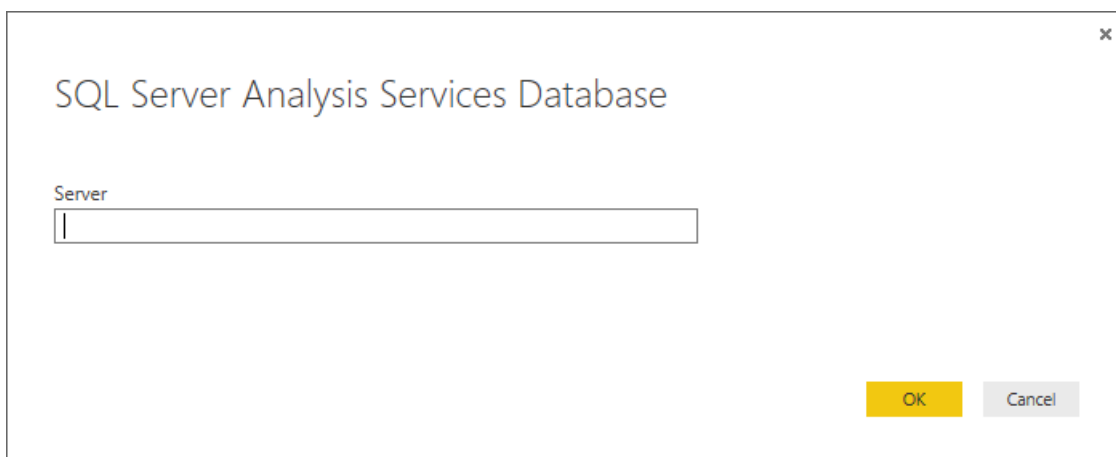
To change the server name after initial connection

Once you create a Power BI Desktop file with an explore live connection, there might be some cases where you want to switch the connection to a different server. For example, if you created your Power BI Desktop file when connecting to a development server, and before publishing to the Power BI service, you want to switch the connection to production server.

1. Select **Edit Queries** from the Ribbon.



2. Enter the new server name.



Use DirectQuery in Power BI Desktop

1/31/2018 • 7 min to read • [Edit Online](#)

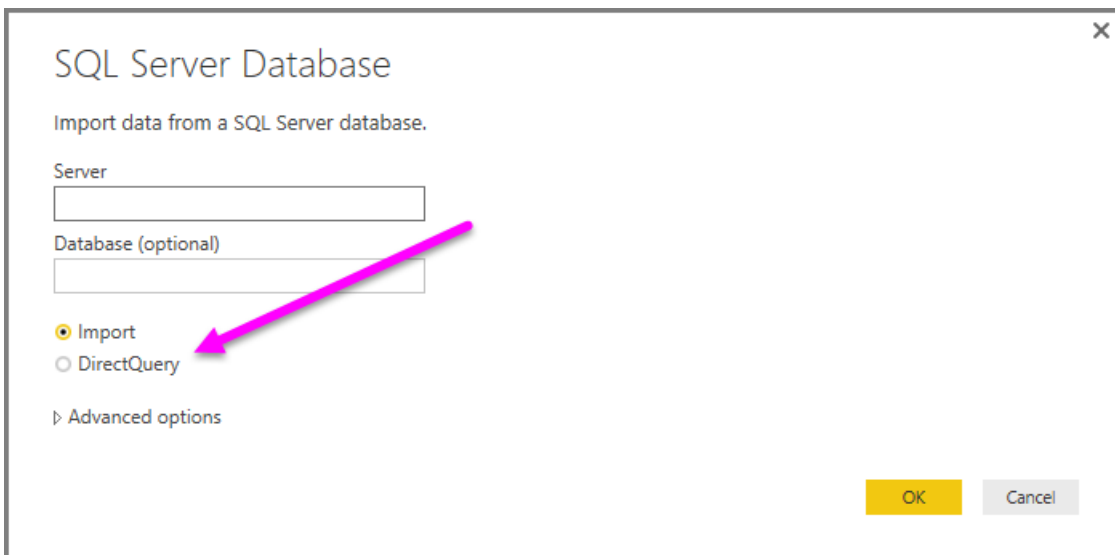
With **Power BI Desktop**, when you connect to your data source, it is always possible to import a copy of the data into the **Power BI Desktop**. For some data sources, an alternative approach is available: connect directly to the data source using **DirectQuery**.

Supported Data Sources

For a full listing of data sources that support **DirectQuery**, see [Data sources supported by DirectQuery](#).

How to Connect using DirectQuery

When you use **Get Data** to connect to a data source supported by **DirectQuery**, the connection window lets you select how you want to connect.



The differences between selecting **Import** and **DirectQuery** are the following:

Import – the selected tables and columns are imported into **Power BI Desktop**. As you create or interact with a visualization, **Power BI Desktop** uses the imported data. You must refresh the data, which imports the full data set again, to see any changes that occurred to the underlying data since the initial import or the most recent refresh.

DirectQuery – no data is imported or copied into **Power BI Desktop**. For relational sources, the selected tables and columns appear in the **Fields** list. For multi-dimensional sources like SAP Business Warehouse, the dimensions and measures of the selected cube appear in the **Fields** list. As you create or interact with a visualization, **Power BI Desktop** queries the underlying data source, which means you're always viewing current data.

Many data modeling and data transformations are available when using **DirectQuery**, though with some limitations. When creating or interacting with a visualization, the underlying source must be queried and the time necessary to refresh the visualization is dependent on the performance of the underlying data source. When the data necessary to service the request has recently been requested, Power BI Desktop uses recent data to reduce the time required to display the visualization. Selecting **Refresh** from the **Home** ribbon will ensure all visualizations are refreshed with current data.

The [Power BI and DirectQuery](#) article describes **DirectQuery** in detail. Also, see the following sections for more information about benefits, limitations, and important considerations when using **DirectQuery**.

Benefits of using DirectQuery

There are a few benefits to using **DirectQuery**:

- **DirectQuery** lets you build visualizations over very large datasets, where it otherwise would be unfeasible to first import all of the data with pre-aggregation
- Underlying data changes can require a refresh of data, and for some reports, the need to display current data can require large data transfers, making re-importing data unfeasible. By contrast, **DirectQuery** reports always use current data
- The 1 GB dataset limitation does *not* apply to **DirectQuery**

Limitations of DirectQuery

There are currently a few limitations to using **DirectQuery**:

- All tables must come from a single database
- If the **Query Editor** query is overly complex, an error will occur. To remedy the error you must either delete the problematic step in **Query Editor**, or *Import* the data instead of using **DirectQuery**. For multi-dimensional sources like SAP Business Warehouse, there is no **Query Editor**
- Relationship filtering is limited to a single direction, rather than both directions (though it is possible to enable cross filtering in both directions for **DirectQuery** as a Preview feature). For multi-dimensional sources like SAP Business Warehouse, there are no relationships defined in the model
- Time intelligence capabilities are not available in **DirectQuery**. For example, special treatment of date columns (year, quarter, month, day, so on) are not supported in **DirectQuery** mode.
- By default, limitations are placed on DAX expressions allowed in measures; see the following paragraph (after this bulleted list) for more information
- There is a 1 million row limit for returning data when using **DirectQuery**. This does not affect aggregations or calculations used to create the dataset returned using **DirectQuery**, only the rows returned. For example, you can aggregate 10 million rows with your query that runs on the data source, and accurately return the results of that aggregation to Power BI using **DirectQuery** as long as the data returned to Power BI is less than 1 million rows. If more than 1 million rows would be returned from **DirectQuery**, Power BI returns an error.

To ensure that queries sent to the underlying data source have acceptable performance, limitations are imposed on measures by default. Advanced users can choose to bypass this limitation by selecting **File > Options** and then **Settings > Options and settings > DirectQuery**, then selecting the option *Allow unrestricted measures in DirectQuery mode*. When that option is selected, any DAX expression that is valid for a measure can be used. Users must be aware, however, that some expressions that perform very well when the data is imported may result in very slow queries to the backend source when in DirectQuery mode.

Important considerations when using DirectQuery

The following three points should be taken into consideration when using **DirectQuery**:

- **Performance and load** - All **DirectQuery** requests are sent to the source database, so the time required to refresh a visual is dependent on how long that back-end source takes to respond with the results from the query (or queries). The recommended response time (with requested data being returned) for using **DirectQuery** for visuals is five seconds or less, with a maximum recommended results response time of 30 seconds. Any longer, and the experience of a user consuming the report becomes unacceptably poor. In addition, once a report is published to the Power BI service, any query that takes longer than a few

minutes will timeout, and the user will receive an error.

Load on the source database should also be considered, based on the number of Power BI users who will consume the published report. Using *Row Level Security* (RLS) can have a significant impact as well; a non-RLS dashboard tile shared by multiple users results in a single query to the database, but using RLS on a dashboard tile usually means the refresh of a tile requires one query *per user*, thus significantly increasing load on the source database and potentially impacting performance.

Power BI creates queries that are as efficient as possible. Under certain situations however, the generated query may not be efficient enough to avoid refresh that would fail. One example of this situation is when a generated query would retrieve an excessively large number of rows (more than 1 million) from the back-end data source, in which case the following error occurs:

```
The resultset of a query to external data source has exceeded
the maximum allowed size of '1000000' rows.
```

This situation can occur with a simple chart that includes a very high cardinality column, with the aggregation option set to *Don't Summarize*. The visual needs to only have columns with a cardinality below 1 million, or must have appropriate filters applied.

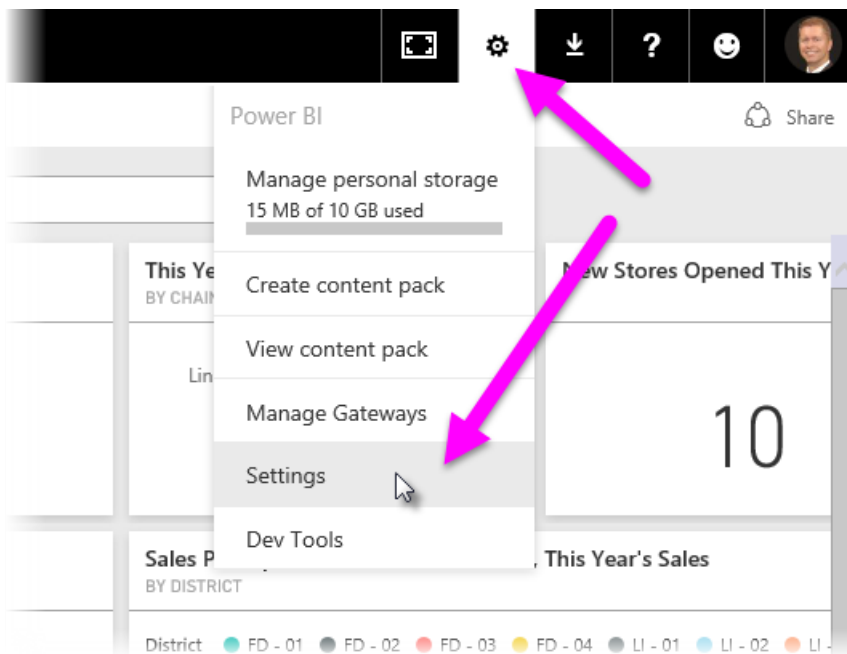
- **Security** - All users who consume a published report connect to the back-end data source using the credentials entered after publication to the Power BI service. This is the same situation as data that is imported: all users see the same data, irrespective of any security rules defined in the backend source. Customers who want per-user security implement with **DirectQuery** sources and use RLS. [Learn more about RLS](#).
- **Supported features** - Not all features in **Power BI Desktop** are supported in **DirectQuery** mode, or have some limitations. In addition, there are some capabilities in the Power BI service (such as *Quick Insights*) that are not available for datasets using **DirectQuery**. As such, the limitation of such features when using **DirectQuery** should be taken into consideration when determining whether to use **DirectQuery**.

Publish to the Power BI service

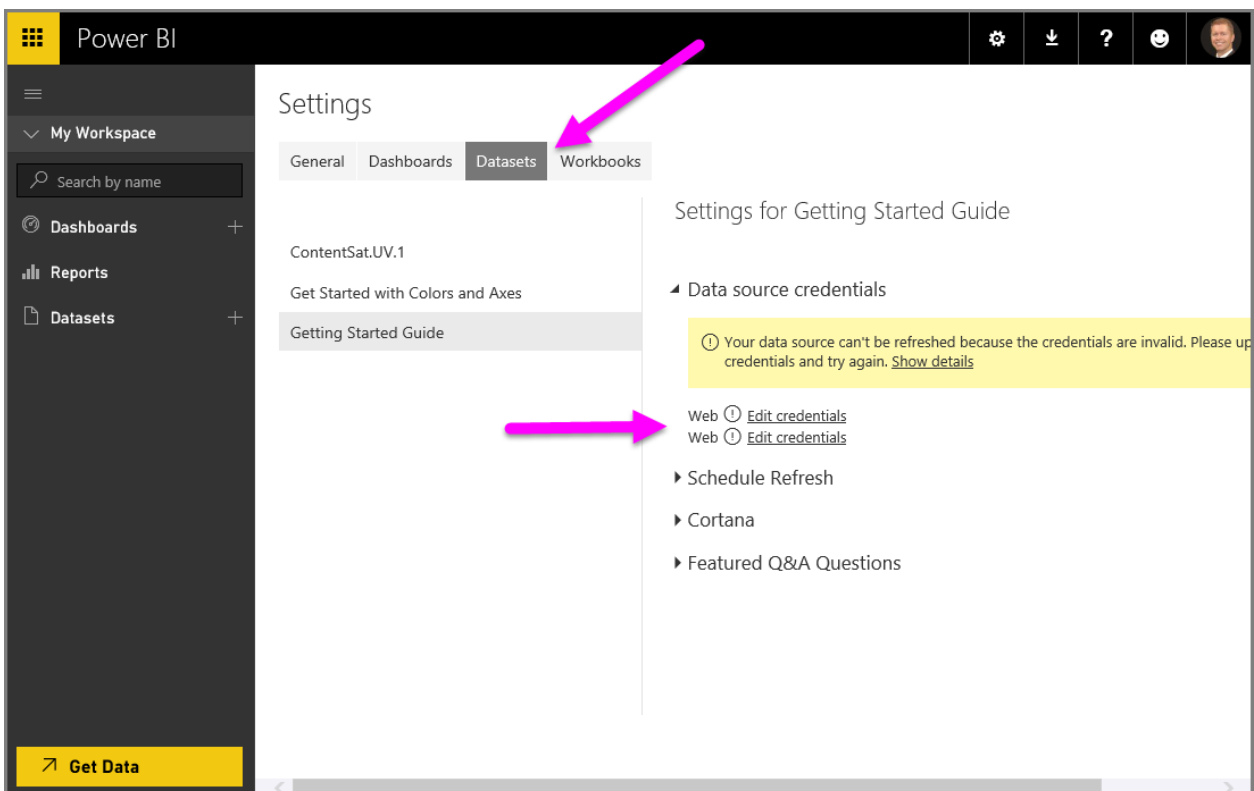
Reports created using **DirectQuery** can be published to the Power BI Service.

If the data source used does not need the **on-premises data gateway** (**Azure SQL Database**, **Azure SQL Data Warehouse**, or **Redshift**), credentials must be provided before the published report will be displayed in the Power BI Service.

You can provide credentials by selecting the **Settings** gear icon in Power BI, then select **Settings**.



Power BI displays the **Settings** window. From there, select the **Datasets** tab and choose the dataset that uses **DirectQuery**, and select **Edit credentials**.



Until credentials are supplied, opening a published report or exploring a dataset created with a **DirectQuery** connection to such data sources results in an error.

For data sources other than **Azure SQL Database**, **Azure SQL Data Warehouse** and **Redshift** that use DirectQuery, an **on-premises data gateway** must be installed and the data source must be registered to establish a data connection. You can [learn more about on-premises data gateway](#).

Next steps

For more information about **DirectQuery**, check out the following resources:

- [DirectQuery in Power BI](#)
- [Data sources supported by DirectQuery](#)

- DirectQuery and SAP BW
- DirectQuery and SAP HANA
- On-premises data gateway

Using DirectQuery in Power BI

1/25/2018 • 42 min to read • [Edit Online](#)

You can connect to all sorts of different data sources when using **Power BI Desktop** or the **Power BI service**, and you can make those data connections in different ways. You can either *import* data to Power BI, which is the most common way to get data, or you can connect directly to data in its original source repository, which is known as **DirectQuery**. This article describes **DirectQuery** and its capabilities, including the following topics:

- Different connectivity options for DirectQuery
- Guidance for when you should consider using DirectQuery rather than import
- Drawbacks of using DirectQuery
- Best practice for using DirectQuery

In short, the best practice for using import versus DirectQuery is the following:

- You should **import** data to Power BI wherever possible. This takes advantage of the high performance query engine of Power BI, and provides a highly interactive and fully featured experience over your data.
- If your goals can't be met by importing data, then consider using **DirectQuery**. For example, if the data is changing frequently and reports must reflect the latest data, DirectQuery may be best. However, using DirectQuery is generally only be feasible when the underlying data source can provide interactive queries (less than 5 seconds) for the typical aggregate query, and is able to handle the query load that will be generated. Additionally, the list of limitations that accompany use of DirectQuery should be considered carefully, to ensure your goals can still be met.

The set of capabilities offered by Power BI for both connectivity modes – import and DirectQuery - will evolve over time. This will include providing more flexibility when using imported data, such that import can be used in more cases, as well as eliminating some of the drawbacks of using DirectQuery. Regardless of improvements, when using DirectQuery the performance of the underlying data source will always remain a major consideration. If that underlying data source is slow, then using DirectQuery for that source it will remain unfeasible.

This topic covers DirectQuery with Power BI, and not SQL Server Analysis Services. DirectQuery is also a feature of **SQL Server Analysis Services**, and many of the details described below apply to its use, there are also important differences. For information about using DirectQuery with SQL Server Analysis Services, see [the whitepaper that details DirectQuery in SQL Server Analysis Services 2016](#).

This article focuses on the recommended workflow for DirectQuery, where the report is created in **Power BI Desktop**, but also covers connecting directly in the **Power BI service**.

Power BI connectivity modes

Power BI connects to a very large number of varied data sources, encompassing:

- Online services (Salesforce, Dynamics 365, others)
- Databases (SQL Server, Access, Amazon Redshift, others)
- Simple files (Excel, JSON, others)
- Other data sources (Spark, Web sites, Microsoft Exchange, others)

For these sources, it's usually possible to import the data to Power BI. For some it is also possible to connect using DirectQuery. The exact set of sources that support DirectQuery is described in the [Data Sources supported by DirectQuery](#) article. More sources will be DirectQuery enabled in the future, focusing primarily on sources that can be expected to deliver good interactive query performance.

SQL Server Analysis Services is a special case. When connecting to SQL Server Analysis Services, you can choose to import the data, or use a *live connection*. Using a live connection is similar to DirectQuery, in that no data is imported, and the underlying data source is always queried to refresh a visual, but a *live connection* is different in many other regards, so a different term (*live* versus *DirectQuery*) is used.

These three options for connecting to data – **import**, **DirectQuery**, and **live connection** – are explained in detail in the following sections.

Import connections

When using **Get Data** in **Power BI Desktop** to connect to a data source like SQL Server, and you choose **Import**, the behavior of that connection is as follows:

- During the initial **Get Data** experience, the set of tables selected each define a query that will return a set of data (those queries can be edited prior to loading the data, for example to apply filters, or aggregate the data, or join different tables).
- Upon load, all of the data defined by those queries will be imported into the Power BI cache.
- Upon building a visual within **Power BI Desktop**, the imported data will be queried. The Power BI store ensures the query will be very fast, hence all changes to the visual will be reflected immediately.
- Any changes to the underlying data will not be reflected in any visuals. It is necessary to *Refresh*, whereupon the data will be re-imported.
- Upon publishing the report (the .pbix file) to the **Power BI service**, a dataset is created and uploaded to the Power BI service. The imported data is included with that dataset. It is then possible to set up scheduled refresh of that data, for example, to re-import the data every day. Depending upon the location of the original data source, it might be necessary to configure an on-premises data gateway.
- When opening an existing report in the **Power BI service**, or authoring a new report, the imported data is queried again, ensuring interactivity.
- Visuals, or entire report pages, can be pinned as dashboard tiles. The tiles will be automatically refreshed whenever the underlying dataset is refreshed.

DirectQuery connections

When using **Get Data** in **Power BI Desktop** to connect to a data source, and you choose **DirectQuery**, the behavior of that connection is as follows:

- During the initial **Get Data** experience, the source is selected. For relational sources, this means a set of tables are selected and each still define a query that logically returns a set of data. For multidimensional sources like SAP BW, only the source is selected.
- However, upon load, no data will actually be imported into the Power BI store. Instead, upon building a visual within **Power BI Desktop**, queries will be sent to the underlying data source to retrieve the necessary data. The time then taken to refresh the visual will depend on the performance of the underlying data source.
- Any changes to the underlying data will not be immediately reflected in any existing visuals. It is still necessary to Refresh, whereupon the necessary queries will be resent for each visual, and the visual updated as necessary.
- Upon publishing the report to the **Power BI service**, it will again result in a Dataset in the Power BI service, just as for import. However, *no data* is included with that dataset.
- When opening an existing report in the **Power BI service**, or authoring a new one, the underlying data source is again queried to retrieve the necessary data. Depending upon the location of the original data source, it might be necessary to configure an on-premises data gateway, just as is needed for Import mode if the data is refreshed.
- Visuals, or entire report pages, can be pinned as Dashboard tiles. To ensure that opening a dashboard will be fast, the tiles are automatically refreshed on a schedule (for example, every hour). The frequency of this refresh can be controlled, to reflect how frequently the data is changing, and how important it is to see the very latest data. Thus, when opening a dashboard, the tiles will reflect the data as of the time of the last refresh, and not

necessarily the very latest changes made to the underlying source. An open dashboard can always be Refreshed to ensure it is up-to-date.

Live connections

When connecting to **SQL Server Analysis Services (SSAS)**, there is an option to either import data from, or connect live to, the selected data model. If you select **import**, then you define a query against that external SSAS source, and the data is imported as normal. If you select to **connect live** then there is no query defined, and the entire external model is shown in the field list. If you select **DirectQuery**, as visuals are built, queries are sent to the external SSAS source. However, unlike DirectQuery, there is no sense in which a new *model* is being created; in other words, it's not possible to define new calculated columns, hierarchies, relationships, and so on. Instead you are simply connecting directly to the external SSAS model.

The situation described in the previous paragraph applies to connecting to the following sources as well, except that there is no option to import the data:

- Power BI datasets (for example, when connecting to a Power BI dataset that has previously been created and published to the service, to author a new report over it)
- Common Data Services

The behavior of reports over SSAS, upon publishing to the **Power BI service**, is similar to DirectQuery reports in the following ways:

- When opening an existing report in the **Power BI service** or authoring a new report, the underlying SSAS source is queried (possibly requiring an on-premises data gateway)
- Dashboard tiles are automatically refreshed on a schedule (such as every hour, or whatever frequency is defined)

However, there are also important differences, including that for live connections the identity of the user opening the report will always be passed to the underlying SSAS source.

With these comparisons out of the way, let's focus solely on **DirectQuery** for the rest of this article.

When is DirectQuery useful?

The following table describes scenarios where connecting with DirectQuery could be especially useful, including cases where leaving the data in the original source would be considered beneficial. The description includes a discussion about whether the specified scenario is available in Power BI.

LIMITATION	DESCRIPTION
Data is changing frequently, and near 'real-time' reporting is needed	<p>Models with Imported data can be refreshed at most once per hour. Hence, if the data is continually changing, and it is necessary for reports to show the latest data, then using Import with scheduled refresh might simply not meet those needs. Note also that it is also possible to stream data directly into Power BI, though there are limits on the data volumes supported for this case.</p> <p>Using DirectQuery, by contrast, means that opening or refreshing a report or dashboard will always show the latest data in the source. Additionally, the dashboard tiles can be updated more frequently (as often as every 15 mins).</p>

LIMITATION	DESCRIPTION
Data is very large	<p>If the data is very large, then it certainly would not be feasible to import it all. DirectQuery, by contrast, requires no large transfer of data, as it is queried in place.</p> <p>However, large data might also imply that the performance of the queries against that underlying source are too slow (as discussed in <i>Implications of using DirectQuery</i> section, later in this article). And of course it is not always necessary to import the full detailed data. Instead the data can be pre-aggregated during import (and Query Editor makes it easy to do exactly this). In the extreme it would be possible to import exactly the aggregate data needed for each visual. So while DirectQuery is the simplest approach to large data, you should always keep in mind that importing aggregate data might offer a solution if the underlying source is too slow.</p>
Security rules are defined in the underlying source	<p>When the data is imported, Power BI will connect to the data source using the current users credentials (from Power BI Desktop), or the credentials defined as part of configuring scheduled refresh (from the Power BI service). Thus, in publishing and sharing such a report, care must be taken to only share with users allowed to see the same data, or to define Row Level Security as part of the dataset.</p> <p>Ideally, because DirectQuery always queries the underlying source, this would allow any security in that underlying source to be applied. However, today Power BI will always connect to the underlying source using the same credentials as would be used for Import.</p> <p>Thus, until Power BI allows for the identity of the report consumer to pass through to the underlying source, DirectQuery offers no advantages with regard to data source security.</p>
Data sovereignty restrictions apply	<p>Some organizations have policies around data sovereignty, meaning that data cannot leave the organization premises. A solution based on import would clearly present issues. By contrast, with DirectQuery that data remains in the underlying source.</p> <p>However, it should be noted that even with DirectQuery, some caches of data at the visual level are retained in the Power BI service (due to scheduled refresh of tiles).</p>

LIMITATION	DESCRIPTION
Underlying data source is an OLAP source, containing measures	<p>If the underlying data source contains *measures *(such as SAP HANA or SAP Business Warehouse) then importing the data brings other issues. It means that the data imported is at a particular level of aggregation, as defined by the query. For example, measure TotalSales by Class, Year, and City. Then if a visual is built asking for data at a higher level aggregate (such as TotalSales by Year) it is further aggregating the aggregate value. This is fine for additive measures (such as Sum, Min) but it's an issue for non-additive (such as Average, DistinctCount).</p> <p>To make it easy to get the correct aggregate data (as needed for the particular visual) directly from the source, it would be necessary to send queries per visual, as in DirectQuery.</p> <p>When connecting to SAP Business Warehouse (BW), choosing DirectQuery allows for this treatment of measures. Support for SAP BW is covered further in DirectQuery and SAP BW.</p> <p>However, currently DirectQuery over SAP HANA treats it the same as a relational source, and hence provides similar behavior to import. This is covered further in DirectQuery and SAP HANA.</p>

So in summary, given the current capabilities of DirectQuery in Power BI, the scenarios where it offers benefits are the following:

- Data is changing frequently, and near 'real-time' reporting is needed
- Handling very large data, without the need to pre-aggregate
- Data sovereignty restrictions apply
- The source is a multi dimensional source containing measures (such as SAP BW)

Note that the details in the previous list relate to the use of Power BI alone. There is always the option of instead using an external SQL Server Analysis Services (or Azure Analysis Services) model to import data, and then using Power BI to connect to that model. While that approach would require additional skills, it does provide greater flexibility. For example, much larger volumes of data can be imported, and there is no restriction on how frequently the data can be refreshed.

Implications of using DirectQuery

Use of **DirectQuery** does have potentially negative implications, as detailed in this section. Some of those limitations are slightly different depending upon the exact source that is being used. This will be called out where applicable, and separate topics cover those sources that are substantially different.

Performance and load on the underlying source

When using **DirectQuery**, the overall experience depends very much on the performance of the underlying data source. If refreshing each visual (for example, after changing a slicer value) takes a few seconds (<5s) then the experience would be reasonable, yet might still feel sluggish compared to the immediate response we are used to when importing the data to Power BI. If instead the slowness of the source means that individual visuals take longer than that (tens of seconds), then the experience becomes extremely poor, possibly even to the point of queries timing out.

Along with the performance of the underlying source, careful consideration should be paid to the load that will be placed upon it (that of course then often impacts the performance). As discussed further below, each user that opens a shared report, and each dashboard tile that is periodically refreshed, will be sending at least one query

per visual to the underlying source. This fact requires that the source be able to handle such a query load, while still maintaining reasonable performance.

Limited to a single source

When importing data, it is possible to combine data from multiple sources into a single model, for example, to easily join some data from a corporate SQL Server database with some local data maintained in an Excel file. This is not possible when using DirectQuery. When selecting DirectQuery for a source, it will then only be possible to use data from that single source (such as a single SQL Server database).

Limited data transformations

Similarly, there are limitations in the data transformations that can be applied within **Query Editor**. With imported data, a sophisticated set of transformations can easily be applied to clean and re-shape the data before using it to create visuals (such as parsing JSON documents, or pivoting data from a column to a row orientated form). Those transformations are more limited in DirectQuery. First, when connecting to an OLAP source like SAP Business Warehouse, no transformations can be defined at all, and the entire external 'model' is taken from the source. For relational sources like SQL Server, it is still possible to define a set of transformations per query, but those transformations are limited, for performance reasons. Any such transformation will need to be applied on every query to the underlying source, rather than once on data refresh, so they are limited to those transformations that can reasonably be translated into a single native query. If you use a transformation that is too complex, then you will receive an error that either it must be deleted, or the model switched to Import mode.

Additionally, the query that results from the **Get Data** dialog or **Query Editor** will be used in a subselect within the queries generated and sent to retrieve the necessary data for a visual. Thus the query defined in Query Editor must be valid within this context. In particular this means it is not possible to use a query using Common Table Expressions, nor that invokes Stored Procedures.

Modelling limitations

The term *modelling* in this context means the act of refining and enriching the raw data, as part of authoring a report using it. Examples include:

- Defining relationships between tables
- Adding new calculations (calculated columns and measures)
- Renaming and hiding columns and measures
- Defining hierarchies
- Defining the formatting, default summarization and sort order for a column
- Grouping or clustering values

When using **DirectQuery**, many of these model enrichments can still be made, and certainly there is still the principle that the raw data is being enriched, so as to improve later consumption. However, there some modeling capabilities are not available, or are limited, when using DirectQuery. The limitations are generally applied to avoid performance issues. The set of limitations that are common to all DirectQuery sources are listed in the following bulleted list. Additional limitations might apply to individual sources, as described in *Data source specific details* found near the end of this article.

- **No Built in-date hierarchy:** When importing data, then by default every date/datetime column will also have a built-in date hierarchy available by default. For example, if importing a table of sales orders including a column OrderDate, then upon using OrderDate in a visual, it will be possible to choose the appropriate level (Year, Month, Day) to use. This built-in date hierarchy is not available when using DirectQuery mode. Note however that if there is Date table available in the underlying source (as is common in many data warehouses) then the DAX Time Intelligence functions can be used as normal.
- **Limitations in calculated columns:** Calculated columns are limited to being intra-row, as in, they can only refer to values of other columns of the same table, without the use of any aggregate functions. Additionally, the DAX scalar functions (such as LEFT()) that are allowed will be limited to those which can simply be pushed to the underlying source, hence will vary depending upon the exact capabilities of the source. Functions that are

not supported will not be listed in autocomplete when authoring the DAX for a calculated column, and would result in an error if used.

- **No support for parent-child DAX functions:** When in DirectQuery model, it is not possible to use the family of DAX PATH() functions, that generally handle Parent-Child structures (such as chart of accounts, or employee hierarchies).
- **Limitations (by default) for measures:** By default, the DAX functions and expressions that can be used in measures is restricted. Again, autocomplete will restrict the functions listed, and an error will occur if an invalid function or expression is used. The reason is simply to ensure that, by default, measures are restricted to simple measures that are unlikely by themselves cause any performance issues. Advanced users can choose to bypass this limitation by selecting **File > Options** and then **Settings > Options > DirectQuery**, then selecting the option *Allow unrestricted measures in DirectQuery mode*. When that option is selected, any DAX expression that is valid for a measure can be used. Users must be aware, however, that some expressions that perform well when the data is imported may result in very slow queries to the backend source when in DirectQuery mode.
 - For example, by default:
 - It would be possible to author a measure that simply summed the sales amount:

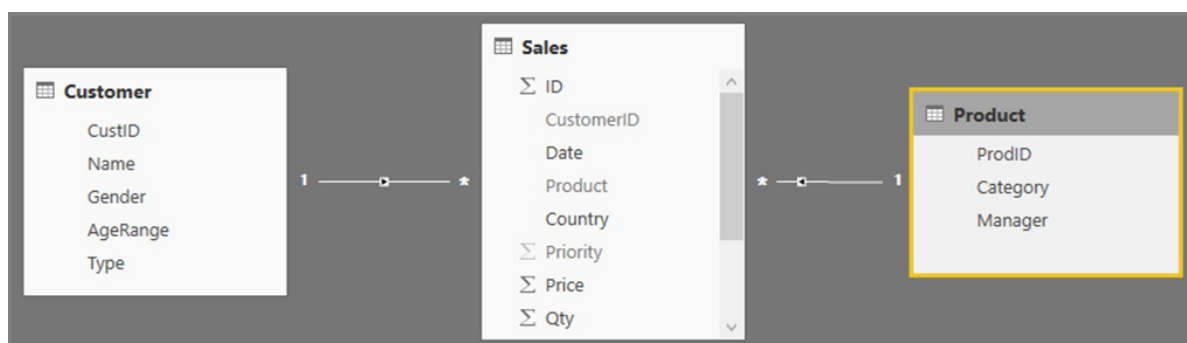
```
SalesAmount = SUMX(Web_Sales, [ws_sales_price]* [ws_quantity])
```

- It would *not* be possible to author a measure that then averaged that SalesAmount over all of the Items:

```
AverageItemSalesAmount = AVERAGEX('Item', [SalesAmount])
```

The reason is that such a measure could result in poor performance if there were a very large number of items.

- **Calculated tables are not supported:** The ability to define a calculated table using a DAX expression is not supported in DirectQuery mode.
- **Relationship filtering is limited to a single direction:** When using DirectQuery, it is not possible to set the Cross Filter direction on a relationship to "Both". For example, with the three tables below, it would not be possible to build a visual showing each Customer[Gender], and the number of Product[Category] bought by each. Use of such bi-directional filtering is described [in this detailed whitepaper](#) (the paper presents examples in the context of SQL Server Analysis Services, but the fundamental points apply equally to Power BI).



Again, the limitation is imposed due to the performance implications. One particularly important application of this is when defining Row Level Security as part of the report, as a common pattern is to have a many-many relationship between the users and the entities they are allowed access to, and use of bi-directional filtering is necessary to enforce this. However, use of bi-directional filtering for DirectQuery models should be used judiciously, with careful attention paid to any detrimental impact on performance.

- **No Clustering:** When using DirectQuery, it is not possible to use the Clustering capability, to automatically find groups

Reporting limitations

Almost all reporting capabilities are supported for DirectQuery models. As such, so long as the underlying source offers a suitable level of performance, the same set of visualizations can be used. However, there are some important limitations in some of the other capabilities offered in the **Power BI service** after a report is published, as described in the following bullets:

- **Quick Insights is not supported:** Power BI Quick Insights searches different subsets of your dataset while applying a set of sophisticated algorithms to discover potentially-interesting insights. Given the need for very high performance queries, this capability is not available on datasets using DirectQuery.
- **Q&A is not supported:** Power BI Q&A enables you to explore your data using intuitive, natural language capabilities and receive answers in the form of charts and graphs. However, it is currently not supported on datasets using DirectQuery.
- **Using Explore in Excel will likely result in poorer performance:** It is possible to explore your data by using the "Explore in Excel" capability on a dataset. This will allow Pivot Tables and Pivot Charts to be created in Excel. While this capability is supported on datasets using DirectQuery, the performance is generally slower than creating visuals in Power BI, and therefore if the use of Excel is important for your scenarios, this should be accounted for in your decision to use DirectQuery.

Security

As discussed earlier in this article, a report using **DirectQuery** will always use the same fixed credentials to connect to the underlying data source, after publish to the **Power BI service**. Again, note this refers specifically to DirectQuery, not to live connections to SQL Server Analysis Services, which is different in this respect. Hence immediately after publish of a DirectQuery report, it is necessary to configure the credentials of the user that will be used. Until this is done, opening the report on the Power BI service would result in an error.

Once the user credentials are provided, then those credentials will be used, *irrespective of the user who opens the report*. In this regard it is exactly like imported data, in that every user will see the same data, unless Row Level Security has been defined as part of the report. Hence the same attention must be paid to sharing the report, if there are any security rules defined in the underlying source.

Behavior in the Power BI service

This section describes the behavior of a **DirectQuery** report in the **Power BI service**, primarily so as to be able to understand the degree of load that will be placed on the back end data source, given the number of users that the report and dashboard will be shared with, the complexity of the report, and whether Row Level Security has been defined in the report.

Reports – opening, interacting with, editing

When a report is opened, then all the visuals on the currently visible page will refresh. Each visual will generally require at least one query to the underlying data source. Some visuals might require more than one query (for example, if it showed aggregate values from two different fact tables, or contained a more complex measure, or contained totals of a non-additive measure like Count Distinct). Moving to a new page will result in those visuals being refreshed, resulting in a new set of queries to the underlying source.

Every user interaction on the report might result in visuals being refreshed. For example, selecting a different value on a slicer will require sending a new set of queries to refresh all of the effected visuals. The same is true for clicking on a visual to cross-highlight other visuals, or changing a filter.

Similarly of course, editing a new report with require queries to be sent for each step on the path to produce the final desired visual.

There is some caching of results, so that the refresh of a visual will be instantaneous if the exact same results have recently been obtained. Such caches are not shared across users, if there is any Row Level Security defined as part

of the report.

Dashboard Refresh

Individual visuals, or entire pages, can be pinned to dashboard as tiles. Tiles based on **DirectQuery** datasets are then refreshed automatically according to a schedule, resulting in queries being sent to the backend data source. By default, this occurs every hour, but can be configured as part of Dataset settings to be between weekly, and every 15 minutes.

If no Row Level Security is defined in the model, this means that each tile would be refreshed once, and the results shared across all users. If Row Level Security is defined, then there can be a large multiplier effect – each tile requires separate queries per user to be sent to the underlying source.

Hence a dashboard with ten tiles, shared with 100 users, created on a dataset using **DirectQuery** with Row Level Security, and configured to refresh every 15 minutes, would result in at least 1000 queries being sent every 15 minutes to the back end source.

Hence careful consideration must be paid to the use of Row Level Security, and the configuring of the refresh schedule.

Timeouts

A timeout of four minutes is applied to individual queries in the **Power BI service**, and queries taking longer than that will simply fail. As stressed earlier, it is recommended that DirectQuery be used for sources that provide near interactive query performance, so this limit is intended to prevent issues from overly long execution times.

Other implications

Some other general implications of using **DirectQuery** are the following:

- **If data is changing, it is necessary to Refresh to ensure the latest data is shown:** Given the use of caches, there is no guarantee that the visual is always showing the latest data. For example, a visual might show the transactions in the last day. Then due to a slicer being changed, it might refresh to show the transactions for the last two days, including some very recent, newly arrived transactions. Returning the slicer to its original value would result in it again showing the cached value previously obtained, that would not include the newly arrived transaction seen before.

Selecting Refresh will clear any caches, and refresh all the visuals on the page to show the latest data.

- **If data is changing, there is no guarantee of consistency between visuals:** Different visuals, whether on the same page or on different pages, might be refreshed at different times. Thus if the data in the underlying source is changing, there is no guarantee that each visual will be showing the data at the exact same point of time. Indeed, given that sometimes more than one query is required for a single visual (for example, to obtain the details and the totals) then consistency even within a single visual is not guaranteed. To guarantee this would require the overhead of refreshing all visuals whenever any visual refreshed, in tandem with the use of costly features like Snapshot Isolation in the underlying data source.

This issue can be mitigated to a large extent by again selecting Refresh, to will refresh all of the visuals on the page. And it should be noted that even if using Import mode, there is a similar problem of guaranteeing consistency if importing data from more than one table.

- **Refresh in Power BI Desktop is needed to reflect any metadata changes:** After a report is published, Refresh will simply refresh the visuals in the report. If the schema of the underlying source has changed, then those changes are not automatically applied to change the available fields in the field list. Thus if tables or columns have been removed from the underlying source, it might result in query failure upon refresh. Opening the report in Power BI Desktop, and choosing Refresh, will update the fields in the model to reflect the changes.
- **Limit of one million rows returned on any query:** There is a fixed limit of one million rows placed on the number of rows that can be returned in any single query to the underlying source. This generally has no practical implications, and visuals themselves aren't going to display that many points. However, the limit can occur in cases where Power BI is not fully optimizing the queries sent, and there is some

intermediate result being requested that exceeds the limit. It can also occur whilst building a visual, on the path to a more reasonable final state. For example, including Customer and TotalSalesQuantity would hit this limit if there were more than 1m customers, until some filter were applied.

The error that would be returned would be "The resultset of a query to external data source has exceeded the maximum allowed size of '1000000' rows."

- **Cannot change from import to DirectQuery mode:** Note that while it's generally possible to switch a model from DirectQuery mode to use import mode, this means all the necessary data must be imported. It is also not possible to switch back (primarily due to the set of features not supported in DirectQuery mode). DirectQuery models over multidimensional sources like SAP BW also cannot be switched from DirectQuery to import, due to the completely different treatment of external measures.

DirectQuery in the Power BI service

All sources are supported from **Power BI Desktop**. Some sources are also available directly from within the **Power BI service**. For example, it is possible for a business user to use Power BI to connect to their data in Salesforce, and immediately get a dashboard, without use of **Power BI Desktop**.

Only two of the DirectQuery enabled-sources are available directly in the service:

- Spark
- Azure SQL Data Warehouse

However, it is strongly recommended that any use of **DirectQuery** over those two sources start within **Power BI Desktop**. The reason is that when the connection is initially made in the **Power BI service**, many key limitations will apply, meaning that while the start point was easy (starting in the Power BI service), there are limitations on enhancing the resulting report any further (for example, it's not possible then to create any calculations, or use many analytical features, or even refresh the metadata to reflect any changes to the underlying schema).

Guidance for using DirectQuery successfully

If you're going to use **DirectQuery**, then this section provides you with some high level guidance on how to ensure success. The guidance in this section is derived from the implications of using DirectQuery that have been described in this article.

Backend data source performance

It is strongly recommended to validate that simple visuals will be able to refresh in a reasonable time. This should be within 5 seconds to have a reasonable interactive experience. Certainly if visuals are taking longer than 30 seconds, then it's highly likely that further issues will occur following publication of the report, which will make the solution unworkable.

If queries are slow, then the first point of investigation is to examine the queries being sent to the underlying source, and the reason for the query performance being observed. This topic doesn't cover the wide range of database optimization best practices across the full set of potential underlying sources, but it does apply to the standard database practices that apply to most situations:

- Relationships based on integer columns generally perform better than joins on columns of other data types
- The appropriate indexes should be created, which generally means the use of column store indexes in those sources that support them (for example, SQL Server).
- Any necessary statistics in the source should be updated

Model Design Guidance

When defining the model, consider doing the following:

- **Avoid complex queries in Query Editor.** The query that's defined in the Query Editor will be translated into

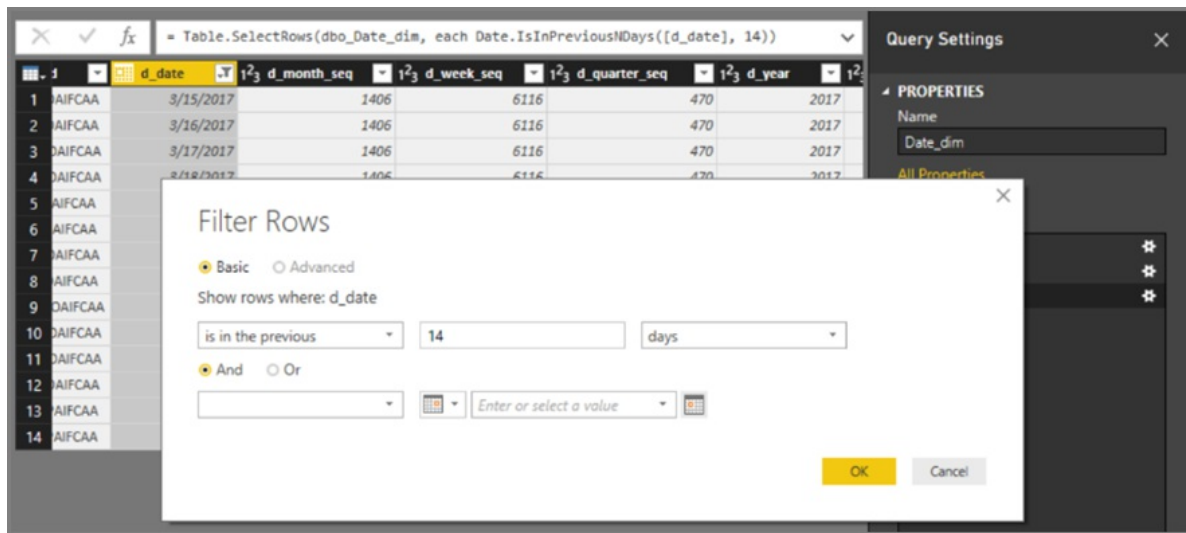
a single SQL query, that will then be included in the subselect of every query sent to that table. If that query is complex, it might result in performance issues on every query sent. The actual SQL query for a set of steps can be obtained by selecting the last step in Query Editor, and choosing *View Native Query* from the context menu.

- **Keep measures simple.** At least initially, it is recommended to limit measures to simple aggregates. Then if those perform in a satisfactory manner, more complex measures can be defined, but paying attention to the performance for each.
- **Avoid relationships on calculated columns.** This is particularly relevant to databases where it is necessary to perform multi-column joins. Power BI today does not allow a relationship to be based on multiple columns as the FK/PK. The common workaround is to concatenate the columns together using a calculated column, and base the join on that. While this workaround is reasonable for imported data, in the case of **DirectQuery** it results in a join on an expression, that commonly prevents use of any indexes, and leads to poor performance. The only workaround is to actually materialize the multiple columns into a single column in the underlying database.
- **Avoid relationships on uniqueidentifier columns.** Power BI does not natively support a datatype of uniqueidentifier. Hence defining a relationship between columns of type uniqueidentifier column will result in a query with a join involving a Cast. Again, this commonly leads to poor performance. Until this case is specifically optimized, the only workaround is to materialize columns of an alternative type in the underlying database.
- **Hide the to column on relationships.** The *to* column on relationships (commonly the primary key on the *to* table) should be hidden, so that it does not appear in the field list, and therefore cannot be used in visuals. Often the columns on which relationships are based are in fact *system columns* (for example, surrogate keys in a data warehouse) and hiding such columns is good practice anyway. If the column does have meaning, then introduce a calculated column that is visible, and that has a simple expression of being equal to the primary key. For example:

```
ProductKey_PK (Destination of a relationship, hidden)
ProductKey (= [ProductKey_PK], visible)
ProductName
...
```

The reason for doing this is simply to avoid a performance issue that can occur otherwise if a visual includes the primary key column.

- **Examine all uses of calculated columns and data type changes.** Use of these capabilities are not necessarily harmful, they result in the queries sent to the underlying source containing expressions rather than simple references to columns, that again might result in indexes not being used.
- **Avoid use of the (preview) bi-directional cross filtering on relationships.**
- **Experiment with setting *Assume referential integrity*.** The *Assume Referential Integrity* setting on relationships enables queries to use INNER JOIN statements rather than OUTER JOIN. This generally improves query performance, though it does depend on the specifics of the data source.
- **Do not use the relative data filtering in Query Editor.** It's possible to define relative date filtering in Query Editor. For example, to filter to the rows where the date is in the last 14 days.



However, this will be translated into a filter based on the fixed date, as at the time the query was authored. This can be seen from viewing the native query.

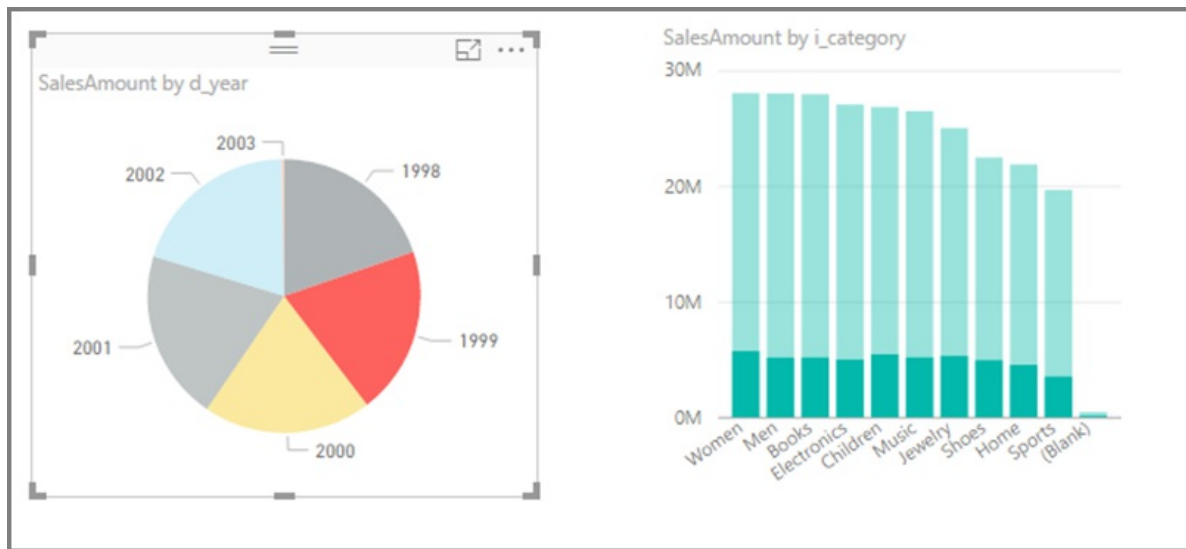
```
select [].[d_date_sk], [].[d_date_id], [].[d_date], ... [].[d_current_year]
from [dbo].[Date_dim] as [ ]
where convert(date, [].[d_date]) >= convert(datetime2, '2017-03-15 00:00:00') and
convert(date, [].[d_date]) < convert(datetime2, '2017-03-29 00:00:00')
```

This is almost certainly not what was wanted. To ensure the filter is applied based upon the date as at the time the report is executed then instead apply the filter in the report as a Report Filter. Currently this would be done by creating a calculated column calculating the number of days ago (using the DAX DATE() function), and then using that calculated column in a filter.

Report Design Guidance

When creating a report using a DirectQuery connection, adhere to the following guidance:

- **Apply filters first:** Always apply any applicable filters at the start of building a visual. For example, rather than drag in the TotalSalesAmount, and ProductName, then filter to a particular year, apply the filter on Year at the very start. This is because each step of building a visual will send a query, and whilst it is possible to then make another change before the first query has completed, this still leaves unnecessary load on the underlying source. By applying filters early, it generally makes those intermediate queries less costly. Also, failing to apply filters early can result in hitting the 1m row limit above.
- **Limit the number of visuals on a page:** When a page is opened (or some page level slicer or filter changed) then all of the visuals on a page are refreshed. There is also a limit on the number of queries that are sent in parallel, hence as the number of visuals increases, some of the visuals will be refreshed in a serial manner, increasing the time taken to refresh the entire page. For this reason it's recommended to limit the number of visuals on a single page, and instead have more, simpler pages.
- **Consider switching off interaction between visuals:** By default, visualizations on a report page can be used to cross-filter and cross-highlight the other visualizations on the page. For example, having selected "1999" on the pie chart, the column chart is cross highlighted to show the sales by category for "1999".

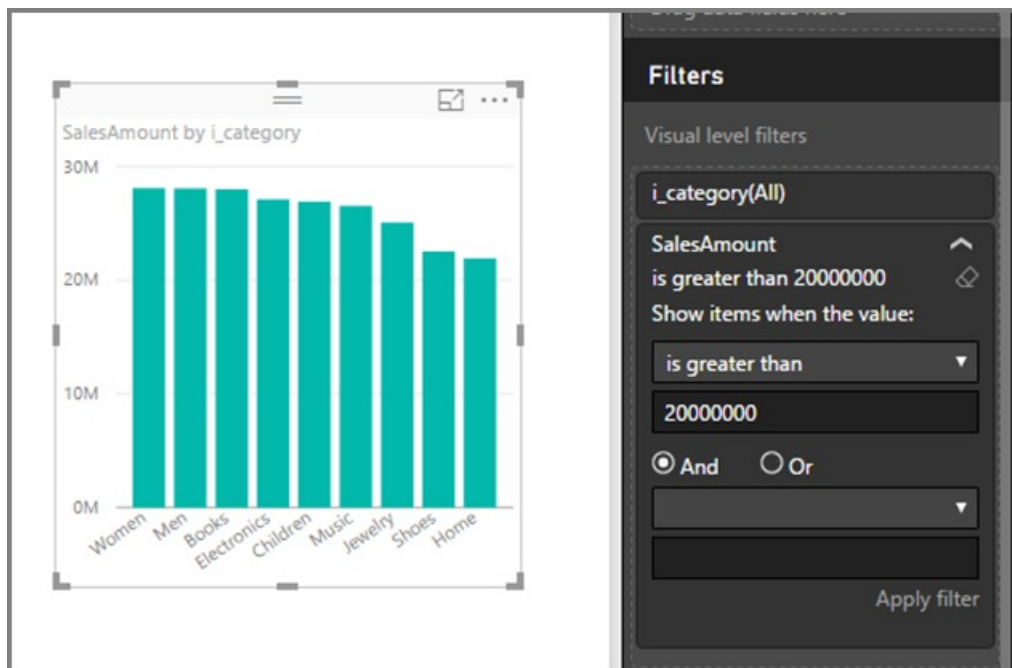


However, this interaction can be controlled as described [in this article](#). In DirectQuery such cross-filtering and cross-highlighting requires queries to be sent to the underlying source, so the interaction should be switched off if the time taken to respond to users' selections would be unreasonably long.

- **Consider sharing the report only:** There are different ways of sharing content after publishing to the **Power BI service**. In the case of DirectQuery, it's advisable to only considering sharing the finished report, rather than allow other users to author new reports (and potentially encounter performance issues for the particular visuals that they build).

In addition to the above list of suggestions, note that each of the following reporting capabilities can cause performance issues:

- **Measure filters:** Visuals containing measures (or aggregates of columns) can contain filters in those measures. For example, the visual below shows SalesAmount by Category, but only including those Categories with more than 20M of sales.



This will result in two queries being sent to the underlying source:

- The first query will retrieve the Categories meeting the condition (Sales > 20M)
- The second query will then retrieve the necessary data for the visual, including the Categories that met the condition in the WHERE clause.

This generally performs just fine if there are hundreds or thousands of categories, as in this example.

Performance can degrade if the number of categories is much larger (and indeed, the query will fail if there were more than a million categories meeting the condition, due to the one million row limit discussed earlier).

- **TopN filters:** Advanced filters can be defined to filter on only the Top (or Bottom) N values ranked by some measure, for example, to only include the Top 10 Categories in the visual above. This will again result in two queries being sent to the underlying source. However, the first query will return all categories from the underlying source, and then the TopN are determined based on the returned results. Depending on the cardinality of the column involved, this can lead to performance issues (or query failures due to the 1m row limit).
- **Median:** Generally, any aggregation (Sum, Count Distinct, so on) is pushed to the underlying source. However, this is not true for Median, as this aggregate is generally not supported by the underlying source. In such cases, the detail data is retrieved from the underlying source, and the Median calculated from the returned results. This is reasonable when the median is to be calculated over a relatively small number of results, but performance issues (or query failures due to the 1m row limit) will occur if the cardinality is large. For example, Median Country Population might be reasonable, but Median Sales Price might not be.
- **Advanced text filters ('contains' and similar):** When filtering on a text column, the advanced filtering allows filters like 'contains' and 'begins with' and so on. These filters can certainly result in degraded performance for some data sources. In particular, the default 'contains' filter should not be used if what is really required is an exact match ('is' or 'is not'). Although the results might be the same, depending on the actual data, the performance might be drastically different due to the use of indexes.
- **Multi select slicers:** By default, slicers only allow a single selection to be made. Allowing multi selection in filters can cause some performance issues, because as the user selects a set of items in the slicer (for example, the ten products they are interested in), then each new selection will result in queries being sent to the backend source. Whilst the user can select the next item prior to the query completing, this does result in extra load on the underlying source.

Diagnosing performance issues

This section describes how to diagnose performance issues, or how to get more detailed information to allow the reports to be optimized.

It's strongly recommended that any diagnosis of performance issues starts in **Power BI Desktop**, rather than in the **Power BI service**. It's commonly the case that performance issues are simply based on the level of performance of the underlying source, and these are more easily identified and diagnosed in the much more isolated environment of **Power BI Desktop**, and initially eliminates certain components (such as the Power BI gateway). Only if the performance issues are found to not be present with Power BI Desktop should investigation focus on the specifics of the report in the Power BI service.

Similarly, it is recommended to first try to isolate any issues to an individual visual, rather than many visuals on a page.

So, let's say those steps (in the previous paragraphs in this section) have been taken - we now have a single visual on a page in **Power BI Desktop** that is still sluggish. To determine the queries that are sent to the underlying source by Power BI Desktop, it's possible to view traces/diagnostic information that might be emitted by that source. Such traces might also contain useful information about the details of how the query was executed, and how it can be improved.

Further, even in the absence of such traces from the source, it's possible to view the queries sent by Power BI, along with their execution times, as described next.

Determining the queries sent by Power BI Desktop

By default, **Power BI Desktop** logs events during a given session to a trace file called FlightRecorderCurrent.trc.

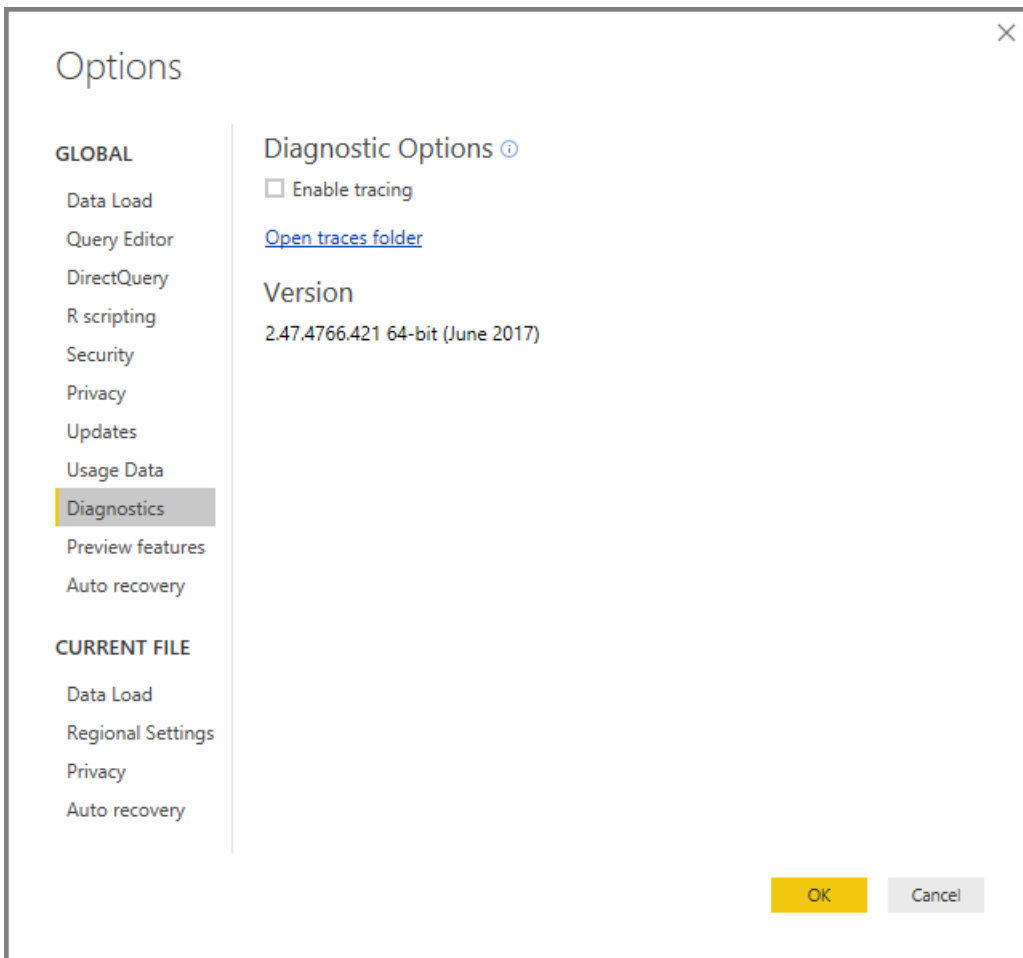
For some **DirectQuery** sources, this log includes all queries sent to the underlying data source (the remaining DirectQuery sources will be included in the future). The sources that send queries to the log are the following:

- SQL Server
- Azure SQL Database
- Azure SQL Data warehouse
- Oracle
- Teradata
- SAP HANA

The trace file can be found in the **AppData** folder for the current user:

```
\<User>\AppData\Local\Microsoft\Power BI Desktop\AnalysisServicesWorkspaces
```

Here's an easy way to get to this folder: In **Power BI Desktop** select **File > Options and settings > Options**, and then select **Diagnostics**. The following dialog window appears:



When you select the *Open traces folder* link, under **Diagnostic Options**, the following folder opens:

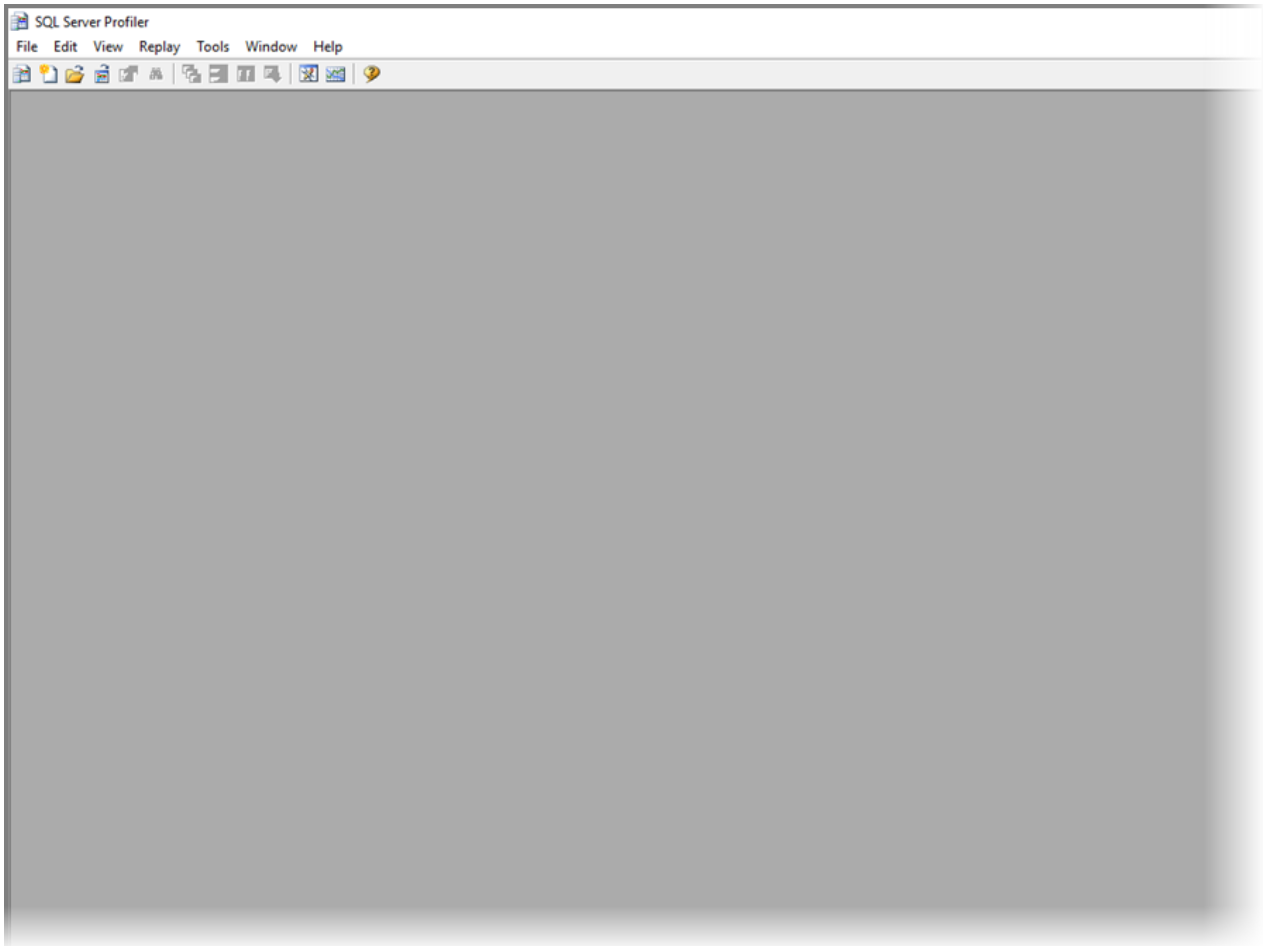
```
\<User>\AppData\Local\Microsoft\Power BI Desktop\Traces
```

Navigating to that folder's parent folder displays the folder containing *AnalysisServicesWorkspaces*, which will contain one workspace subfolder for every open instance of **Power BI Desktop**. These subfolders are named with an integer suffix, such as *AnalysisServicesWorkspace2058279583*.

Inside that folder is a *\Data* subfolder that contains the trace file *FlightRecorderCurrent.trc* for the current Power BI session. The corresponding workspace folder is deleted when the associated Power BI Desktop session ends.

The trace files can be read using the **SQL Server Profiler** tool, which is available as a free download as part of **SQL Server Management Studio**. You can get that from [this location](#).

Once you download and install **SQL Server Management Studio**, run **SQL Server Profiler**.



To open the trace file, take the following steps:

1. In **SQL Server Profiler**, select **File > Open > Trace file**
2. Enter the path to the trace file for the currently open Power BI session, such as:

```
C:\Users\\AppData\Local\Microsoft\Power BI  
Desktop\AnalysisServicesWorkspaces\AnalysisServicesWorkspace2058279583\Data
```

3. Open FlightRecorderCurrent.trc

All events from the current session are displayed. An annotated example is shown below, which highlights groups of events. Each group has the following:

- A *Query Begin* and *Query End* event, which represent the start and end of a DAX query generated by the UI (for example, from a visual, or from populating a list of values in the filter UI)
- One or more pairs of *DirectQuery Begin* and *DirectQuery End* events, which represent a query sent to the underlying data source, as part of evaluating the DAX query.

Note that multiple DAX queries can be executed in parallel, so events from different groups can be interleaved. The value of the ActivityID can be used to determine which events belong to the same group.

EventClass	EventSubclass	CurrentTime	StartTime	EndTime	TextData	ServerName	RequestParam	RequestProperties	ActivityID	RequestID	EndTime	Duration	CPUTime
Command Begin	11	2017-04-02 10:09:42...	2017-04-02 10:09:42...		<begin transaction xmlns="http://schemas...	PAULSA420...			2837075-EF68-4A...	3187AC...	2017-04-02 10:09:42...	0	0
Command End	12	2017-04-02 10:09:42...	2017-04-02 10:09:42...		<batch transaction="true" xmlns="http://schemas...	PAULSA420...			2837075-EF68-4A...	C8555F...	2017-04-02 10:09:42...	16	16
Command Begin	14	2017-04-02 10:09:42...	2017-04-02 10:09:42...		<commit transaction xmlns="http://schemas...	PAULSA420...			2837075-EF68-4A...	673263...	2017-04-02 10:09:42...	0	0
Command End	14	2017-04-02 10:09:42...	2017-04-02 10:09:42...		<commit transaction xmlns="http://schemas...	PAULSA420...			2837075-EF68-4A...	673263...	2017-04-02 10:09:42...	0	0
Query Begin	3	2017-04-02 10:09:49...	2017-04-02 10:09:49...		DEFINE VAR _dsofiltertable = F...	PAULSA420...			8275F077-E990-44...	7C55F4...	2017-04-02 10:09:49...	1000	1000
DirectQuery Begin	3	2017-04-02 10:10:16...	2017-04-02 10:10:16...		SELECT TOP (1000000) [c13],SUM([a...	PAULSA420...			8275F077-E990-44...	7C55F4...	2017-04-02 10:10:16...	26639	1078
Query End	3	2017-04-02 10:10:17...	2017-04-02 10:10:17...		SELECT TOP (1000000) [c13],SUM([a...	PAULSA420...			8275F077-E990-44...	7C55F4...	2017-04-02 10:10:17...	27681	1109
Command Begin	12	2017-04-02 10:19:43...	2017-04-02 10:19:43...		<batch transaction="false" xmlns="http://schemas...	PAULSA420...			492EA779-568E-40...	04C8E4...	2017-04-02 10:19:43...	7	0
Command End	12	2017-04-02 10:19:43...	2017-04-02 10:19:43...		<batch transaction="false" xmlns="http://schemas...	PAULSA420...			492EA779-568E-40...	04C8E4...	2017-04-02 10:19:43...	7	0
Query Begin	3	2017-04-02 10:31:02...	2017-04-02 10:31:02...		DEFINE VAR _dsofiltertable = F...	PAULSA420...			78F6B0FC-41C3-49...	C48E43...	2017-04-02 10:31:02...	16	16
DirectQuery Begin	3	2017-04-02 10:31:02...	2017-04-02 10:31:02...		SELECT TOP (1000000) [t0],[l_colo...	PAULSA420...			78F6B0FC-41C3-49...	C48E43...	2017-04-02 10:31:02...	53	16
DirectQuery End	3	2017-04-02 10:31:02...	2017-04-02 10:31:02...		SELECT TOP (1000000) [t0],[l_colo...	PAULSA420...			78F6B0FC-41C3-49...	C48E43...	2017-04-02 10:31:02...	29	16
Query End	3	2017-04-02 10:31:02...	2017-04-02 10:31:02...		DEFINE VAR _dsofiltertable = F...	PAULSA420...			78F6B0FC-41C3-49...	C48E43...	2017-04-02 10:31:02...	100	16
Query Begin	3	2017-04-02 10:31:07...	2017-04-02 10:31:07...		DEFINE VAR _dsofiltertable = F...	PAULSA420...			3AB80BES-1192-43...	49445A...	2017-04-02 10:31:07...	0	0
DirectQuery Begin	3	2017-04-02 10:31:07...	2017-04-02 10:31:07...		SELECT TOP (1000000) [c13],SUM([a...	PAULSA420...			3AB80BES-1192-43...	49445A...	2017-04-02 10:31:07...	860	0
DirectQuery End	3	2017-04-02 10:31:08...	2017-04-02 10:31:08...		SELECT TOP (1000000) [c13],SUM([a...	PAULSA420...			3AB80BES-1192-43...	49445A...	2017-04-02 10:31:08...	860	0
Query End	3	2017-04-02 10:31:08...	2017-04-02 10:31:08...		SELECT TOP (1000000) [c13],SUM([a...	PAULSA420...			3AB80BES-1192-43...	49445A...	2017-04-02 10:31:08...	860	0

```

SELECT TOP (1000000) [c13],SUM([a0]) AS [a0] FROM [dbo].[Sales] AS [Sales] WHERE ([Sales].[Category] AS [c13],[Sales].[Quantity] AS [c40],[Sales].[SalesPrice] AS [c43],[Sales].[Year] AS [c72],[Sales].[SalesPrice] AS [c13],[Sales].[Quantity] AS [a0]) FROM (select [t0] as [ws_dttm_date_sk] as [ws_dttm_date_sk], [t1] as [ws_dttm_time_sk] as [ws_dttm_time_sk], [t2] as [ws_ship_date_sk] as [ws_ship_date_sk], [t3] as [ws_item_sk] as [ws_item_sk], [t4] as [ws_bill_customer_sk] as [ws_bill_customer_sk], [t5] as [ws_bill_demo_sk] as [ws_bill_demo_sk], [t6] as [ws_bill_addr_sk] as [ws_bill_addr_sk], [t7] as [ws_bill_customer_sk] as [ws_bill_customer_sk], [t8] as [ws_ship_demo_sk] as [ws_ship_demo_sk], [t9] as [ws_ship_demo_sk] as [ws_ship_demo_sk], [t10] as [ws_web_page_sk] as [ws_web_page_sk], [t11] as [ws_web_page_sk] as [ws_web_page_sk])

```

Other columns of interest are the following:

- **TextData:** The textual detail of the event. For "Query Begin/End" events this will be the DAX query. For "DirectQuery Begin/End" events this will be the SQL query sent to the underlying source. The TextData for the currently selected event is also displayed in the region at the bottom.
- **EndTime:** When the event completed.
- **Duration:** The duration, in milliseconds, taken to execute the DAX or SQL query.
- **Error:** Indicates if an error occurred (in which case the event is also displayed in red).

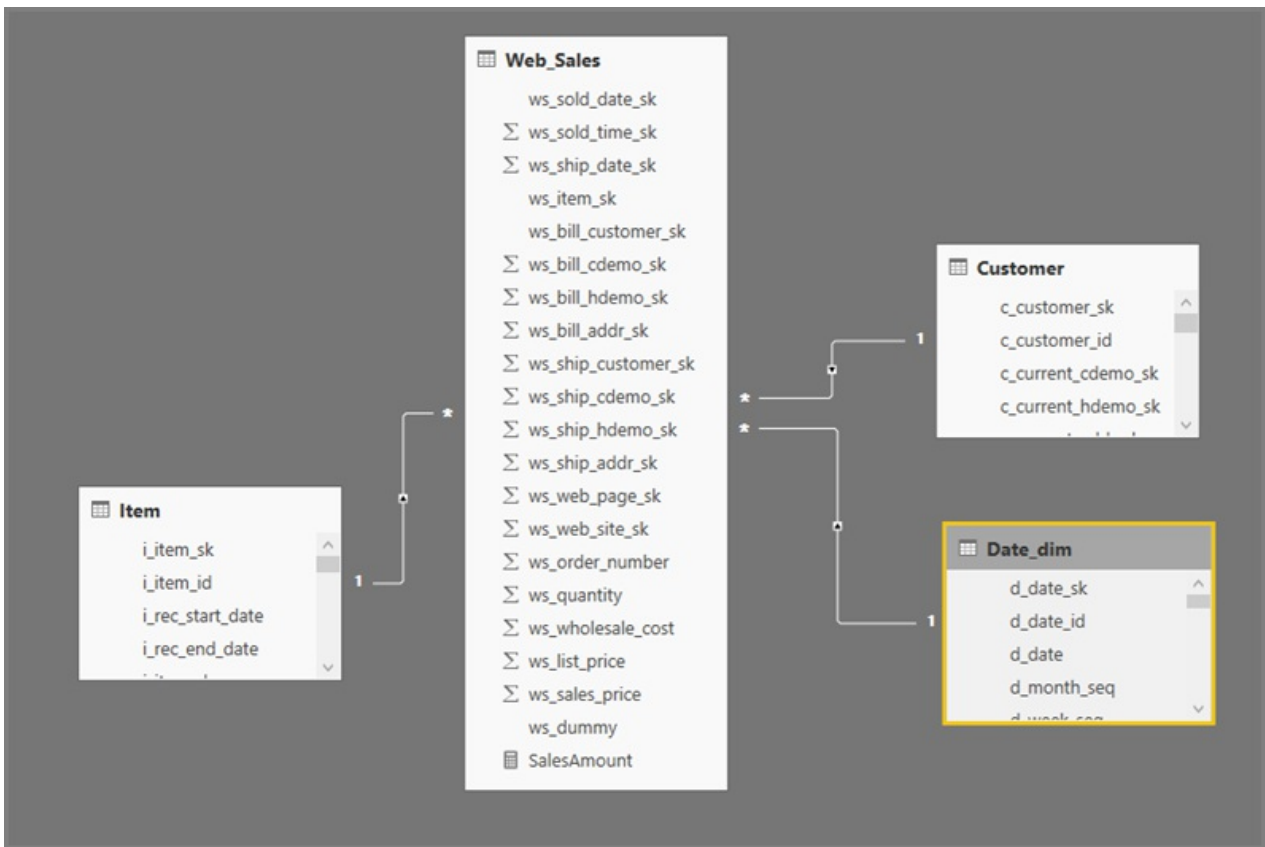
Note that in the image above, some of the less interesting columns have narrowed, to allow the interesting columns to be seen more easily.

The recommended approach to capturing a trace to help diagnose a potential performance issue is the following:

- Open a single **Power BI Desktop** session (to avoid the confusion of multiple workspace folders)
- Perform the set of actions of interest in **Power BI Desktop**. Include a few additional actions beyond that, to ensure that the events of interest are flushed into the trace file.
- Open **SQL Server Profiler** and examine the trace, as described earlier. Remember that the trace file will be deleted upon closing **Power BI Desktop**. Also, further actions in Power BI Desktop will not immediately appear – the trace file should be closed and re-opened to see the new events.
- Keep individual sessions reasonably small (ten seconds of actions, not hundreds) to make it easier to interpret the trace file (and because there is a limit on the size of the trace file, thus for very long sessions there is a chance of early events being dropped).

Understanding the form of query sent by Power BI Desktop

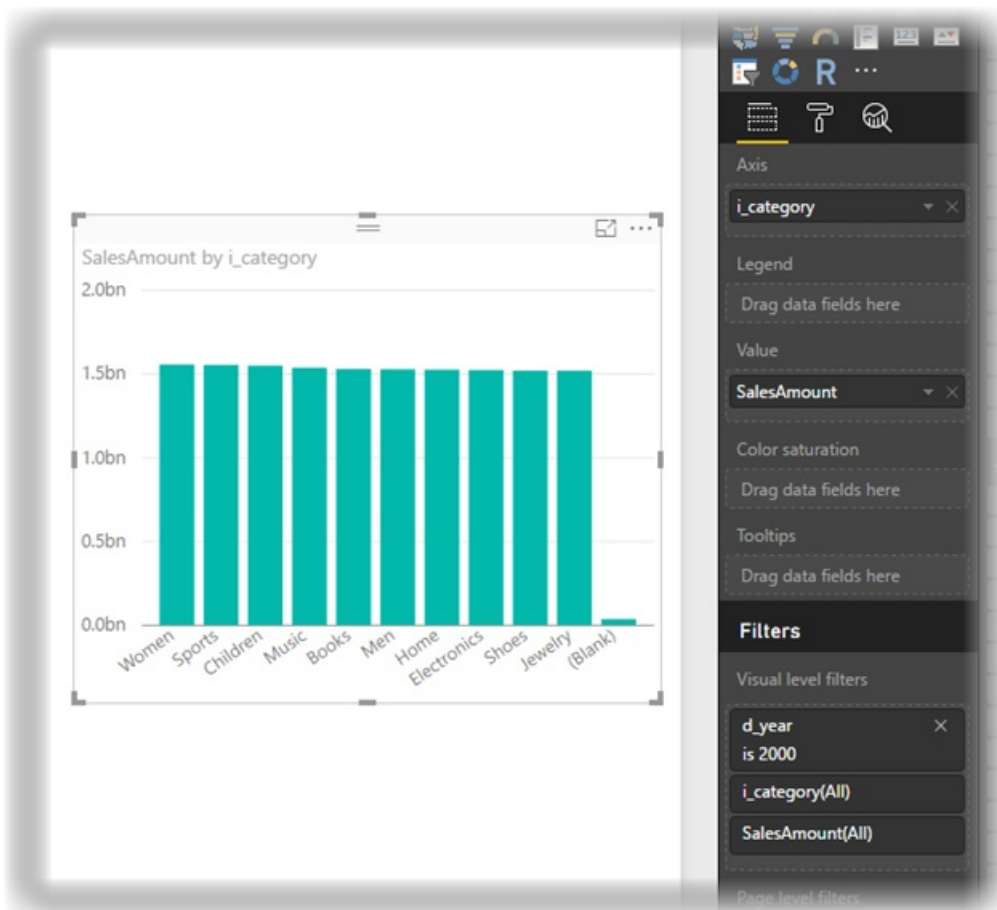
The general format of queries created and sent by **Power BI Desktop** use subselects for each of the tables referenced, where the subselect is as defined by the query defined in **Query Editor**. For example, assume the following TPC-DS tables in SQL Server:



Consider the following query:

```
SalesAmount (SUMX(Web_Sales, [ws_sales_price]* [ws_quantity]))
by Item[i_category]
for Date_dim[d_year] = 2000
```

That query results in the following visual:



Refreshing that visual will result in the SQL query shown below the next paragraph. As you can tell, there are three subselects for Web Sales, Item, and Date_dim, that each return all the columns on the respective table, even though only four columns are actually referenced by the visual. These queries in the subselects (they're shaded) are exactly the result of the queries defined in **Query editor**. Use of subselects in this manner has not been found to impact performance, for the data sources so far supported for DirectQuery. Data sources like SQL Server simply optimize away the references to the other columns.

One reason Power BI employs this pattern is because the SQL query used can be provided directly by the analyst, so it's used "as provided", without an attempt to rewrite it.


```

SELECT
TOP (1000001) [c13],SUM([a0])
AS [a0]
FROM
(
SELECT [t0].[i_category] AS [c13],[t1].[ws_quantity] AS [c40],[t1].[ws_sales_price] AS
[c43],[t3].[d_year] AS [c72],
([t1].[ws_sales_price] * [t1].[ws_quantity])
AS [a0]
FROM
(
(select [Table].[ws_sold_date_sk] as [ws_sold_date_sk],
[Table].[ws_sold_time_sk] as [ws_sold_time_sk],
[Table].[ws_ship_date_sk] as [ws_ship_date_sk],
[Table].[ws_item_sk] as [ws_item_sk],
[Table].[ws_bill_customer_sk] as [ws_bill_customer_sk],
[Table].[ws_bill_cdemo_sk] as [ws_bill_cdemo_sk],
[Table].[ws_bill_hdemo_sk] as [ws_bill_hdemo_sk],
... 8 other columns
[Table].[ws_quantity] as [ws_quantity],
[Table].[ws_wholesale_cost] as [ws_wholesale_cost],
[Table].[ws_list_price] as [ws_list_price],
[Table].[ws_sales_price] as [ws_sales_price],
[Table].[ws_dummy] as [ws_dummy]
from [dbo].[Web_Sales] as [Table]) AS [t1]

left outer join

(select [Table].[i_item_sk] as [i_item_sk],
[Table].[i_item_id] as [i_item_id],
[Table].[i_rec_start_date] as [i_rec_start_date],
[Table].[i_rec_end_date] as [i_rec_end_date],
[Table].[i_item_desc] as [i_item_desc],
[Table].[i_current_price] as [i_current_price],
[Table].[i_wholesale_cost] as [i_wholesale cost],
[Table].[i_brand id] as [i_brand id],
[Table].[i_brand] as [i_brand],
[Table].[i_class id] as [i_class id],
[Table].[i_class] as [i_class],
[Table].[i_category id] as [i_category id],
[Table].[i_category] as [i_category],
... 8 other columns
[Table].[i_product name] as [i_product name],
[Table].[i_dummy] as [i_dummy]
from [dbo].[Item] as [Table]) AS [t0] on
(
[t1].[ws_item_sk] = [t0].[i_item_sk]
)
)

left outer join
(select [Table].[d_date_sk] as [d_date_sk],
[Table].[d_date_id] as [d_date_id],
[Table].[d_date] as [d_date],
[Table].[d_month seq] as [d_month seq],
[Table].[d_week seq] as [d_week seq],
[Table].[d_quarter seq] as [d_quarter seq],
[Table].[d_year] as [d_year],
[Table].[d_dow] as [d_dow],
[Table].[d_moy] as [d_moy],
[Table].[d_dom] as [d_dom],
[Table].[d_qoy] as [d_qoy],
... 16 other columns
[Table].[d_current_year] as [d_current_year],
[Table].[d_dummy] as [d_dummy]
from [dbo].[Date_dim] as [Table]) AS [t3] on
(
[t1].[ws_sold_date_sk] = [t3].[d_date_sk]
)
)
)
AS [t0]
WHERE
(
[c72] = 2000
)
GROUP BY [c13]

```

Next steps

This article describes aspects of **DirectQuery** that are common across all data sources. There are certain details that are specific to individual sources. See the following topics covering specific sources:

- [DirectQuery and SAP HANA](#)
- [DirectQuery and SAP BW](#)

For more information about **DirectQuery**, check out the following resources:

- [Data Sources supported by DirectQuery](#)

Data sources supported by DirectQuery in Power BI

1/25/2018 • 1 min to read • [Edit Online](#)

Power BI Desktop and the **Power BI service** have many data sources to which you can connect and get access to data. This article describes which data sources for Power BI support the connection method known as **DirectQuery**. For more information about DirectQuery, see [DirectQuery in Power BI](#).

The following data sources support DirectQuery in Power BI:

- Amazon Redshift
- Azure HDInsight Spark (Beta)
- Azure SQL Database
- Azure SQL Data Warehouse
- Google BigQuery (Beta)
- IBM Netezza (Beta)
- Impala (version 2.x)
- Oracle Database (version 12 and above)
- SAP Business Warehouse (Beta)
- SAP HANA
- Snowflake
- Spark (Beta) (version 0.9 and above)
- SQL Server
- Teradata Database
- Vertica (Beta)

Data sources that are have **(Beta)** or **(Preview)** after their name are subject to change, and are not supported for production use. They might also not be supported after publishing a report to the **Power BI service**, which means that that opening a published report or exploring the dataset can result in an error.

The only difference between **(Beta)** and **(Preview)** data sources is that **(Preview)** sources must be enabled as a Preview feature before they become available for use. To enable a **(Preview)** data connector, in **Power BI Desktop** go to **File > Options and Settings**, and then **Settings > Options > Preview features**.

On-premises gateway requirements

The following table specifies whether an **on-premises data gateway** is required to connect to the specified data source, after publishing a report to the **Power BI service**.

SOURCE	GATEWAY REQUIRED?
SQL Server	Yes
Azure SQL Database	No
Azure SQL Data Warehouse	No
SAP HANA	Yes

SOURCE	GATEWAY REQUIRED?
Oracle Database	Yes
Teradata Database	Yes
Amazon Redshift	No
Impala (version 2.x)	Yes
Snowflake (Preview)	Not yet supported in the Power BI service
Spark (beta), version 0.9 and later	Not yet supported in the Power BI service
Azure HDInsight Spark (Beta)	Not yet supported in the Power BI service
IBM Netezza (Beta)	Not yet supported in the Power BI service
SAP Business Warehouse (Beta)	Not yet supported in the Power BI service

Next steps

For more information about DirectQuery, check out the following resources:

- [DirectQuery in Power BI](#)
- [DirectQuery and SAP HANA](#)
- [DirectQuery and SAP BW](#)
- [On-premises data gateway](#)

DirectQuery for Oracle and Teradata Databases

1/25/2018 • 1 min to read • [Edit Online](#)

Please see [DirectQuery Data Sources](#) for information about data sources and DirectQuery.

DirectQuery and SAP Business Warehouse (BW)

1/25/2018 • 8 min to read • [Edit Online](#)

You can connect to **SAP Business Warehouse (BW)** data sources directly using **DirectQuery**. Given the OLAP/multidimensional nature of SAP BW, there are many important differences between DirectQuery over SAP BW versus relational sources like SQL Server. These differences are summarized as follows:

- In **DirectQuery** over relational sources there are a set of queries (as defined in the **Get Data** or **Query Editor** dialog) that logically define the data that is available in the field list. This is *not* the case when connecting to an OLAP source such as SAP BW. Instead, when connecting to the SAP server using **Get Data**, just the Infocube or BEx Query is selected. Then all the Key Figures and dimensions of the selected Infocube/BEx Query will be available in the field list.
- Similarly, there is no **Query Editor** when connecting to SAP BW. The data source settings (for example, server name) can be changed by selecting **Edit Queries > Data source settings**. The settings for any Variables can be changed by selecting **Edit Queries > Edit Variables**.
- Given the unique nature of OLAP sources, there are additional restrictions (for both modelling and visualizations) that apply, in addition to the normal restrictions imposed for DirectQuery. These restrictions are described later in this article.

In addition, it is *extremely important* to understand that there are many features of SAP BW that are not supported in Power BI, and that because of the nature of the public interface to SAP BW, there are important cases where the results seen through Power BI will not match those seen when using an SAP tool. These limitations are described later in this article. These limitations and behavior differences should be carefully reviewed, to ensure that the results seen through Power BI, as returned by the SAP public interface, are interpreted correctly.

Additional Modelling Restrictions

The primary additional modelling restrictions when connecting to SAP BW using DirectQuery in Power BI are the following:

- **No support for calculated columns:** The ability to create calculated columns is disabled. This also means that Grouping and Clustering, which create calculated columns, are not available.
- **Additional limitations for measures:** There are additional limitations imposed on the DAX expressions that can be used in measures, to reflect the level of support offered by SAP BW.
- **No support for defining relationships:** The relationships are inherent in the external SAP source, and additional relationships cannot be defined in the model.
- **No Data View:** The **Data View** normally displays the detail level data in the tables. Given the nature of OLAP sources like SAP BW, this view is not available over SAP BW.
- **Column and measure details are fixed:** The list of columns and measures seen in the field list are fixed by the underlying source, and cannot be modified. For example, it is not possible to delete a column, nor change its datatype (it can, however, be renamed).
- **Additional limitations in DAX:** There are additional limitations on the DAX that can be used in measure definitions, to reflect limitations in the source. For example, it is not possible to use an aggregate function over a table.

Additional Visualization Restrictions

The primary additional restrictions in visualizations when connecting to SAP BW using DirectQuery in Power BI are the following:

- **No aggregation of columns:** It is not possible to change the aggregation for a column on a visual; it is always *Do Not Summarize*
- **Measure filtering is disabled:** Measure filtering is disabled to reflect the support offered by SAP BW.
- **Multi-select and include/exclude:** The ability to multi-select data points on a visual is disabled if the points represent values from more than one column. For example, given a bar chart showing Sales by Country, with Category on the Legend, it would not be possible to select the point for (USA, Bikes) and (France, Clothes). Similarly, it would not be possible to select the point for (USA, Bikes) and exclude it from the visual. Both limitations are imposed to reflect the support offered by SAP BW.

Support for SAP BW features

The following table lists all SAP BW features that are not fully supported, or will behave differently when using Power BI.

FEATURE	DESCRIPTION
Local calculations	<p>Local calculations defined in a BEX Query will change the numbers as displayed through tools like Bex Analyzer. However, they are not reflected in the numbers returned from SAP, through the public MDX interface.</p> <p>As such, the numbers seen in a Power BI visual will not necessarily match those for a corresponding visual in an SAP tool.</p> <p>For example, when connecting to a query cube from a BEx query that sets the aggregation to be Cumulated (i.e. running sum), Power BI would get back the base numbers, ignoring that setting. An analyst could certainly then apply a running sum calculation locally in Power BI, but would need to exercise caution in how the numbers are interpreted if this is not done.</p>
Aggregations	<p>In some cases (particularly when dealing with multiple currencies), the aggregate numbers returned by the SAP public interface do not match those shown by SAP tools.</p> <p>As such, the numbers seen in a Power BI visual will not necessarily match those for a corresponding visual in an SAP tool.</p> <p>For example, totals over different currencies would show as "*" in Bex Analyzer, but the total would get returned by the SAP public interface, without any information that such an aggregate number is meaningless. Thus the number (aggregating, say, \$, EUR, and AUD) would get displayed by Power BI.</p>
Currency formatting	Any currency formatting (for example, \$2,300 or 4000 AUD) is not reflected in Power BI.
Units of measure	Units of measure (for example, 230 KG) are not reflected in Power BI.

FEATURE	DESCRIPTION
Key versus text (short, medium, long)	<p>For an SAP BW characteristic like CostCenter, the field list will show a single column Cost Center. Using that column will display the default text. By showing hidden fields, it will also be possible to see the unique name column (that returns the unique name assigned by SP BW, and is the basis of uniqueness).</p> <p>The key and other text fields are not available.</p>
Multiple hierarchies of a characteristic	<p>In SAP, a characteristic can have multiple hierarchies. Then in tools like BEx Analyzer, when a characteristic is included in a query, the user can select the hierarchy to use.</p> <p>In Power BI, the various hierarchies can be seen in the field list as different hierarchies on the same dimension. However, selecting multiple levels from two different hierarchies on the same dimension will result in empty data being returned by SAP.</p>
Treatment of ragged hierarchies	<p>SAP BW supports ragged hierarchies, where levels can be missed e.g.</p> <pre> Continent Americas Canada USA Not Assigned Australia </pre> <p>In Power BI, this appears with (Blank) at the missing level</p> <pre> Continent Americas Canada USA Not Assigned (Blank) Australia </pre>
Scaling factor/reverse sign	<p>In SAP a key figure can have a scaling factor (for example, 1000) defined as a formatting option, meaning that all display will be scaled by that factor.</p> <p>It can similarly have a property set that reverses the sign. Use of such a key figure in Power BI (in a visual, or as part of a calculation) will result in the unscaled number being used (and the sign is not reversed). The underlying scaling factor is not available. In Power BI visuals, the scale units shown on the axis (K,M,B) can be controlled as part of the visual formatting.</p>
Hierarchies where levels appear/disappear dynamically	<p>Initially when connecting to SAP BW, the information on the levels of a hierarchy will be retrieved, resulting in a set of fields in the field list. This is cached, and if the set of levels changes, then the set of fields do not change until Refresh is invoked.</p> <p>This is only possible in Power BI Desktop. Such Refresh to reflect changes to the levels cannot be invoked in the Power BI service after Publish.</p>

FEATURE	DESCRIPTION
Default filter	A BEX query can include Default Filters, which will be applied automatically by SAP Bex Analyzer. These are not exposed, and hence the equivalent usage in Power BI will not apply the same filters by default.
Hidden Key figures	A BEX query can control visibility of Key Figures, and those that are hidden will not appear in SAP BEx Analyzer. This is not reflected through the public API, and hence such hidden key figures will still appear in the field list. However, they can then be hidden within Power BI.
Numeric formatting	Any numeric formatting (number of decimal positions, decimal point etc.) will not automatically be reflected in Power BI. However, it is possible to then control such formatting within Power BI.
Hierarchy versioning	SAP BW allows different versions of a hierarchy to be maintained, for example, the cost center hierarchy in 2007 versus 2008. Only the latest version will be available in Power BI, as information on versions is not exposed by the public API.
Time dependent hierarchies	When using Power BI, time dependent hierarchies are evaluated at the current date.
Currency conversion	SAP BW supports currency conversion, based on rates held in the cube. Such capabilities are not exposed by the public API, and are therefore not available in Power BI.
Sort Order	<p>The sort order (by Text, or by Key) for a characteristic can be defined in SAP. This sort order is not reflected in Power BI. For example, months might appear as "April", "Aug", and so on.</p> <p>It is not possible to change this sort order in Power BI.</p>
Technical names	In Get Data , the characteristic/measure names (descriptions) and technical names can both be seen. The field list will contain just the characteristic/measure names (descriptions).
Attributes	It is not possible to access the attributes of a characteristic within Power BI.
End user language setting	The locale used to connect to SAP BW is set as part of the connection details, and does not reflect the locale of the final report consumer.
Text Variables	<p>SAP BW allows field names to contain placeholders for variables (for example, "\$YEAR\$ Actuals") that would then get replaced by the selected value. For example, the field appears as "2016 Actuals" in BEX tools, if the year 2016 were selected for the variable.</p> <p>The column name in Power BI will not be changed depending on the variable value, and therefore would appear as "\$YEAR\$ Actuals". However, the column name can then be changed in Power BI.</p>

Limitations and considerations

The following table lists limitations of the beta release of the SAP BW connector.

LIMITATION	DESCRIPTION
No Refresh	The Refresh button is disabled, and visuals/metadata cannot be refreshed.

Next steps

For more information about DirectQuery, check out the following resources:

- [DirectQuery in Power BI](#)
- [Data Sources supported by DirectQuery](#)
- [DirectQuery and SAP HANA](#)

DirectQuery and SAP HANA

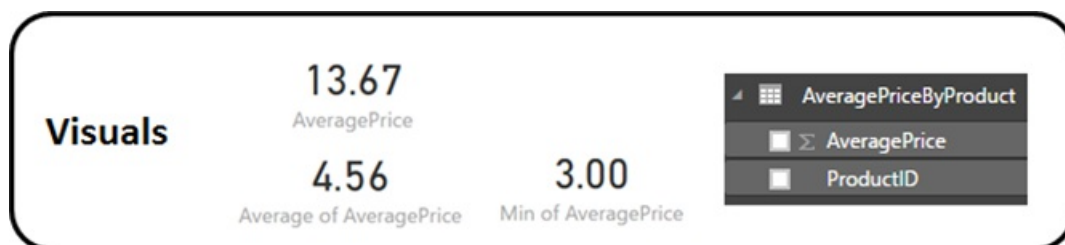
1/25/2018 • 4 min to read • [Edit Online](#)

You can connect to **SAP HANA** data sources directly using **DirectQuery**.

When using **SAP HANA** it is important to understand some aspects of how connections to it are treated, to ensure that:

- The results are as expected, when the SAP HANA view contains non-additive measures (for example, distinct counts, or averages, rather than simple sums)
- The resulting queries are efficient

It's useful to start by taking a moment to clarify the behavior of a relational source such as **SQL Server**, when the query defined in **Get Data** or **Query Editor** performs an aggregation. In the example that follows, a query defined in **Query Editor** returns the average price by **ProductID**.



Query Editor

```
SELECT ProductID, AVG(Price) As  
AveragePrice  
FROM Sales  
GROUP BY ProductID
```

ProductID	AveragePrice
ProductA	6.666666
ProductB	4
ProductC	3

ID	ProductID	DepotID	CustomerID	Qty	Price
1	ProductA		CustA	10	3
2	ProductB	DepotA	CustC	20	6
3	ProductC	DepotB	CustB	10	3
4	ProductA	DepotA	CustC	50	16
5	ProductA	DepotA	CustD	3	1
6	ProductB	DepotA	CustE	6	2

If the data is being imported into Power BI (versus using DirectQuery), the following would result:

- The data is imported at the level of aggregation defined by the query created in **Query Editor**. For example, average price by product. This results in a table with the two columns *ProductID* and *AveragePrice* that can be used in visuals.
- In a visual, any subsequent aggregation (such as *Sum*, *Average*, *Min*, others) is performed over that imported data. For example, including *AveragePrice* on a visual will use the *Sum* aggregate by default, and would return the sum over the *AveragePrice* for each *ProductID* – which in this case would be 13.67. The same applies to any alternative aggregate function (such as *Min*, *Average*, so on) used on the visual. For example, *Average of*

AveragePrice returns the average of 6.66, 4 and 3, which equates to 4.56, and *not* the average of *Price* on the 6 records in the underlying table, which is 5.17.

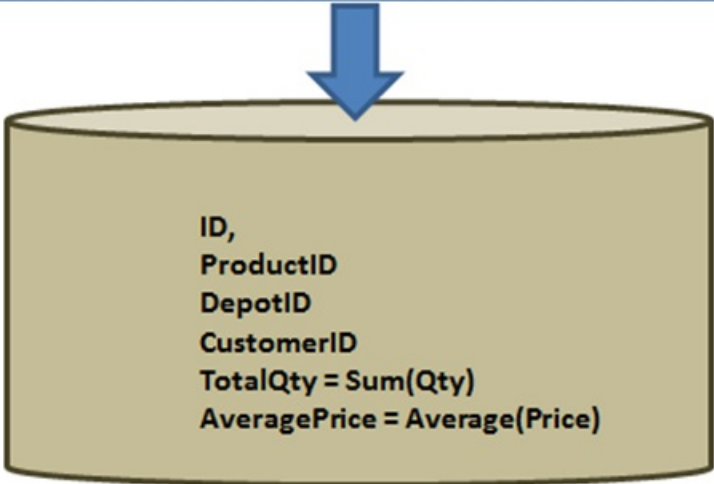
If **DirectQuery** is being used instead of Import, the same semantics apply and the results would be exactly the same:

- Given the same query, logically exactly the same data is presented to the reporting layer – even though the data is not actually imported.
- In a visual, any subsequent aggregation (*Sum, Average, Min, others*) is again performed over that logical table from the query. And again, a visual containing *Average of AveragePrice* returns the same 4.56.

So now let's consider **SAP HANA**. Power BI can work with both *Analytic Views* and *Calculation Views* in SAP HANA, both of which can contain measures. Yet today the approach for SAP HANA follows the same principles as described previously: the query defined in **Get Data** or **Query Editor** will determine the data available, and then any subsequent aggregation in a visual is over that data, and the same applies for both Import and DirectQuery.

However, given the nature of HANA, the query defined in the initial **Get Data** dialog or **Query Editor** is always an aggregate query, and generally will include measures where the actual aggregation that will be used is defined by the HANA view.

The equivalent of the SQL Server example above is that there is a HANA view containing **ID, ProductID, DepotID**, and measures including **AveragePrice**, defined in the view as **Average of Price**.



If, in the **Get Data** experience, the selections made were for **ProductID** and the **AveragePrice** measure, then that is defining a query over the view, requesting that aggregate data (in the example above, for simplicity pseudo-SQL is used that doesn't match the exact syntax of HANA SQL). Then any further aggregations defined in a visual

are further aggregating the results of such a query. Again, as described above for **SQL Server**, this applies both for the Import and DirectQuery case. Note that in the DirectQuery case, the query from **Get Data** or **Query Editor** will be used in a subselect within a single query sent to HANA, and thus it is not actually the case that all the data would be read in, prior to aggregating further.

This gives rise to the following important considerations when using DirectQuery over HANA:

- Attention must be paid to any further aggregation performed in visuals, whenever the measure in HANA is non-additive (for example, not a simple *Sum*, *Min*, or *Max*).
- In **Get Data** or **Query Editor**, only the required columns should be included to retrieve the necessary data, reflecting the fact that the result will be a query, that must be a reasonable query that can be sent to HANA. For example, if dozens of columns were selected, with the thought that they might be needed on subsequent visuals, then even for DirectQuery a simple visual will mean the aggregate query used in the subselect will contain those dozens of columns, which will generally perform very poorly.

Let's look at an example. In the following example, selecting five columns (CalendarQuarter, Color, LastName, ProductLine, SalesOrderNumber) in the **Get Data** dialog, along with the measure OrderQuantity, will mean that later creating a simple visual containing the Min OrderQuantity will result in the following SQL query to HANA. The shaded portion is the subselect, containing the query from **Get Data / Query Editor**. If this subselect gives a very high cardinality result, then it is likely the resulting HANA performance will be poor.

```
SELECT MIN("t0"."OrderQuantity")
AS "a0"
FROM
(
(select "CalendarQuarter",
"Color",
"LastName",
"ProductLine",
"SalesOrderNumber",
sum(cast("OrderQuantity" as DOUBLE)) as "OrderQuantity"
from "_SYS_BIC"."ADVENTUREWORKS/AN_RESELLERSALES"
group by "CalendarQuarter",
"Color",
"LastName",
"ProductLine",
"SalesOrderNumber")
)
AS "t0"
```

Because of this, it is recommended that the items selected in **Get Data** or **Query Editor** should be limited to those items that are needed, while still resulting in a reasonable query for HANA.

Next steps

For more information about DirectQuery, check out the following resources:

- [DirectQuery in Power BI](#)
- [Data sources supported by DirectQuery](#)
- [DirectQuery and SAP BW](#)
- [On-premises data gateway](#)

Assume referential integrity settings in Power BI Desktop

1/25/2018 • 2 min to read • [Edit Online](#)

When connecting to a data source using **DirectQuery**, you can use the **Assume Referential Integrity** selection to enable running more efficient queries against your data source. This feature has a few requirements of the underlying data, and it is only available when using **DirectQuery**.

Setting **Assume referential integrity** enables queries on the data source to use **INNER JOIN** statements rather than **OUTER JOIN**, which improves query efficiency.

Edit Relationship

Select tables and columns that relate to one another.

Orders

ID	ProductID	DepotID	CustomerID	Qty
1	ProductA	null	CustA	10
2	ProductB	DepotA	CustX	20
3	ProductC	DepotB	CustB	10

Products

ProductID	Price	Color
ProductA	9.99	null
ProductB	10	Blue
ProductC	20	Red

Cardinality: Many to One (*:1) | Cross filter direction: Single

Make this relationship active

Assume Referential Integrity [Learn More](#)

OK Cancel

Requirements for using Assume referential integrity

This is an advanced setting, and is only enabled when connecting to data using **DirectQuery**. The following requirements are necessary for **Assume referential integrity** to work properly:

- Data in the **From** column in the relationship is never *Null* or *blank*
- For each value in the **From** column, there is a corresponding value in the **To** column

In this context, the **From** column is the *Many* in a *One-to-Many* relationship, or it is the column in the first table in a *One-to-One* relationship.

Example of using Assume referential integrity

The following example demonstrates how **Assume referential integrity** behaves when used in data connections. The example connects to a data source that includes an **Orders** table, a **Products** table, and a **Depots** table.

1. In the following image that shows the **Orders** table and the **Products** table, note that referential integrity

exists between **Orders[ProductID]** and **Products[ProductID]**. The **[ProductID]** column in the **Orders** table is never *Null*, and every value also appears in the **Products** table. As such, **Assume Referential Integrity** should be set to get more efficient queries (using this setting does not change the values shown in visuals).

Orders table				
ID	ProductID	DepotID	CustomerID	Qty
1	ProductA	<i>null</i>	CustA	10
2	ProductB	DepotA	CustX	20
3	ProductC	DepotB	CustB	10

Products table		
ProductID	Price	Color
ProductA	9.99	<i>null</i>
ProductB	10	Blue
ProductC	20	Red

2. In the next image, notice that no referential integrity exists between **Orders[DepotID]** and **Depots[DepotID]**, because the **DepotID** is *Null* for some *Orders*. As such, **Assume Referential Integrity** should *not* be set.

Orders table				
ID	ProductID	DepotID	CustomerID	Qty
1	ProductA	<i>null</i>	CustA	10
2	ProductB	DepotA	CustX	20
3	ProductC	DepotB	CustB	10

Depots table	
DepotID	City
DepotA	Seattle
DepotB	New York

3. Finally, no referential integrity between **Orders[CustomerID]** and **Customers[CustID]** in the following tables; the **CustomerID** contains some values (in this case, *CustX*) that do not exist in the *Customers* table. As such, **Assume Referential Integrity** should *not* be set.

Orders table				
ID	ProductID	DepotID	CustomerID	Qty
1	ProductA	<i>null</i>	CustA	10
2	ProductB	DepotA	CustX	20
3	ProductC	DepotB	CustB	10

Customers table	
CustID	Name
CustA	John Doe
CustB	Jack Smith

Setting Assume referential integrity

To enable this feature, select the checkbox next to **Assume Referential Integrity** as shown in the following image.

Edit Relationship ✕

Select tables and columns that relate to one another.

Orders ▼

ID	ProductID	DepotID	CustomerID	Qty
1	ProductA	null	CustA	10
2	ProductB	DepotA	CustX	20
3	ProductC	DepotB	CustB	10

Products ▼

ProductID	Price	Color
ProductA	9.99	null
ProductB	10	Blue
ProductC	20	Red

Cardinality Cross filter direction

Many to One (*:1) Single

Make this relationship active

Assume Referential Integrity [Learn More](#)

OK Cancel

When selected, the setting is validated against the data to ensure there are no *Null* or mismatched rows. *However*, for cases with a very large number of values, the validation is not a guarantee that there are no referential integrity issues.

In addition, the validation occurs at the time of editing the relationship, and does *not* reflect any subsequent changes to the data.

What happens if you incorrectly set Assume referential integrity?

If you set **Assume Referential Integrity** when there are referential integrity issues in the data will not result in errors. However, it will result in apparent inconsistencies in the data. For example, in the case of the relationship to the **Depots** table described above, it would result in the following:

- A visual showing the total *Order Qty* would show a value of 40
- A visual showing the total *Order Qty by Depot City* would show a total value of only 30, because it would not include Order ID 1, where **DepotID** is *Null*.

Next steps

Learn more about [DirectQuery](#)

Get more information about [Relationships in Power BI](#)

Learn more about [Relationship View in Power BI Desktop](#).

Tutorial: Dynamic row level security with Analysis services tabular model

11/22/2017 • 8 min to read • [Edit Online](#)

This tutorial demonstrates the steps necessary to implement **row level security** within your **Analysis Services Tabular Model**, and shows how to use it in a Power BI report. The steps in this tutorial are designed to let you follow along and learn the steps necessary by completing on a sample dataset.

During this tutorial, the following steps are described in detail, helping you understand what you need to do to implement dynamic row level security with Analysis Services tabular model:

- Create a new security table in the **AdventureworksDW2012** database
- Build the tabular model with necessary fact and dimension tables
- Define the roles and permissions for the users
- Deploy the model to an **Analysis Services tabular** instance
- Use Power BI Desktop to build a report that displays the data corresponding to the user accessing the report
- Deploy the report to **Power BI service**
- Create a new dashboard based on the report, and finally,
- Share the dashboard with your coworkers

To follow the steps in this tutorial you need the **AdventureworksDW2012** database, which you can download [here](#).

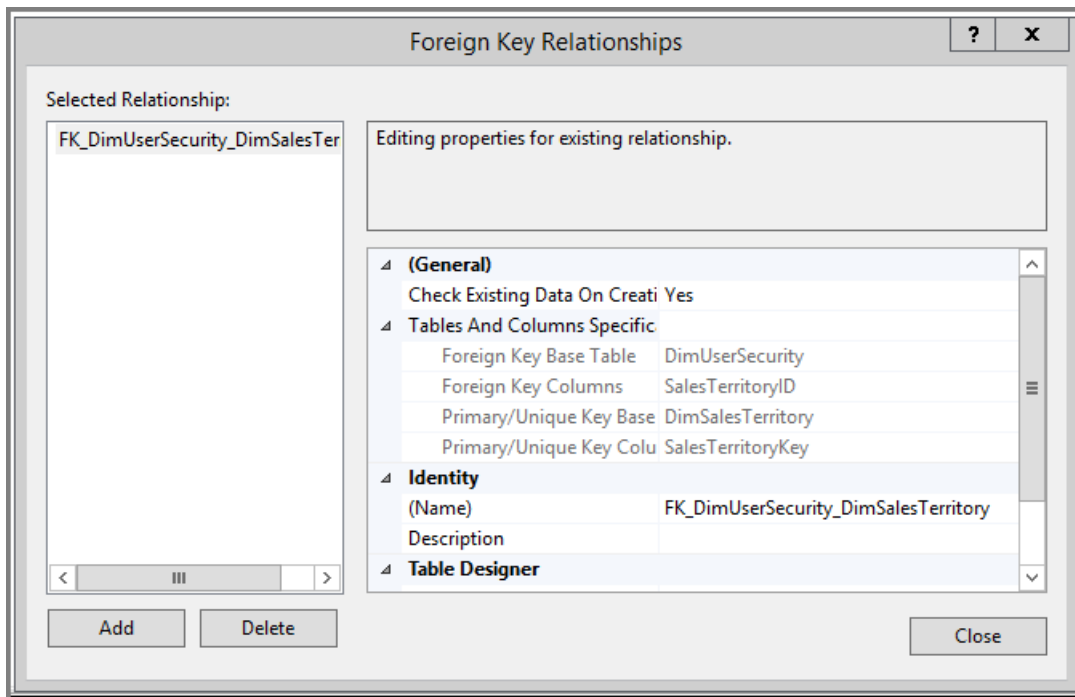
Task 1: Create the user security table and define data relationship

There are many published articles describing how to define row level dynamic security with **SQL Server Analysis Services (SSAS) tabular** model. [For our sample we follow this article](#). The following steps walk you through the first task in this tutorial.

1. For our sample, we're using **AdventureworksDW2012** relational database. In that database, create the **DimUserSecurity** table, as shown in the following image. For this sample, we're using SQL Server Management Studio (SSMS) to create the table.

Column Name	Data Type	Allow Nulls
EmployeeID	int	<input type="checkbox"/>
SalesTerritoryID	int	<input type="checkbox"/>
FirstName	varchar(50)	<input type="checkbox"/>
LastName	varchar(50)	<input type="checkbox"/>
UserName	nvarchar(50)	<input type="checkbox"/>

2. Once the table is created and saved, we need to create the relationship between the **DimUserSecurity** table's **SalesTerritoryID** column and **DimSalesTerritory** table's **SalesTerritoryKey** column, as shown in the following image. This can be done from **SSMS** by right-clicking on the **DimUserSecurity** table, and selecting **Edit**.



- Save the table, then add few rows of user information in to the table by again right clicking on the **DimUserSecurity** table and then selecting **Edit top 200 rows**. Once you've added those users, the rows of the **DimUserSecurity** table look like they do in the following image:

EmployeeID	SalesTerritoryID	FirstName	LastName	UserName
1	1	Sumit	Ghosh	moonneo\sughos
2	2	Kane	Conway	moonneo\kaneco
3	9	Jon	Doe	moonneo\iondoe

We'll come back to these users in upcoming tasks.

- Next we do an *inner join* with the **DimSalesTerritory** table, which shows the region details associated with the user. The following code performs the *inner join*, and the image that follows shows how the table appears once the *inner join* is successful.

```
**select b.SalesTerritoryCountry, b.SalesTerritoryRegion, a.EmployeeKey, a.FirstName, a.LastName,
a.UserName from [dbo].[DimUserSecurity] as a join [dbo].[DimSalesTerritory] as b on a.
[SalesTerritoryKey] = b.[SalesTerritoryKey]**
```

	SalesTerritoryCountry	SalesTerritoryRegion	EmployeeKey	FirstName	LastName	UserName
1	United States	Northwest	1	Sumit	Ghosh	moonneo\sughos
2	United States	Northeast	2	Kane	Conway	moonneo\kaneco
3	Australia	Australia	3	Jon	Doe	moonneo\iondoe

- Notice that the above image shows information such as which user is responsible for which sales region. That data is displayed because of the relationship that we created in **Step 2**. Also, note that the user **Jon Doe is part of the Australia sales region**. We'll revisit John Doe in upcoming steps and tasks.

Task 2: Create the tabular model with facts and dimension tables

- Once your relational data warehouse is in place, it's time to define your tabular model. The model can be created using **SQL Server Data Tools (SSDT)**. To get more information about how to define a tabular model, please

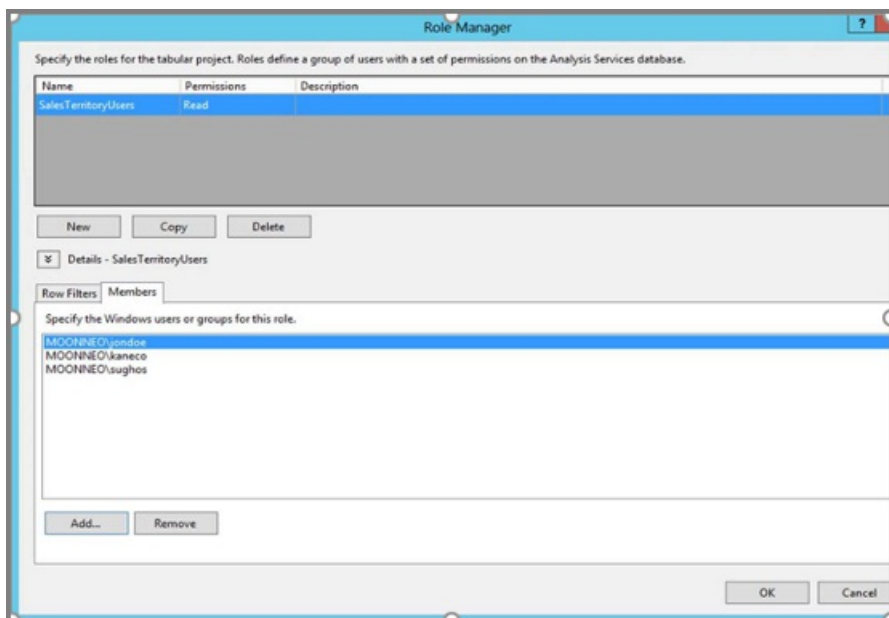
[refer this article.](#)

2. Import all the necessary tables in to the model as shown below.

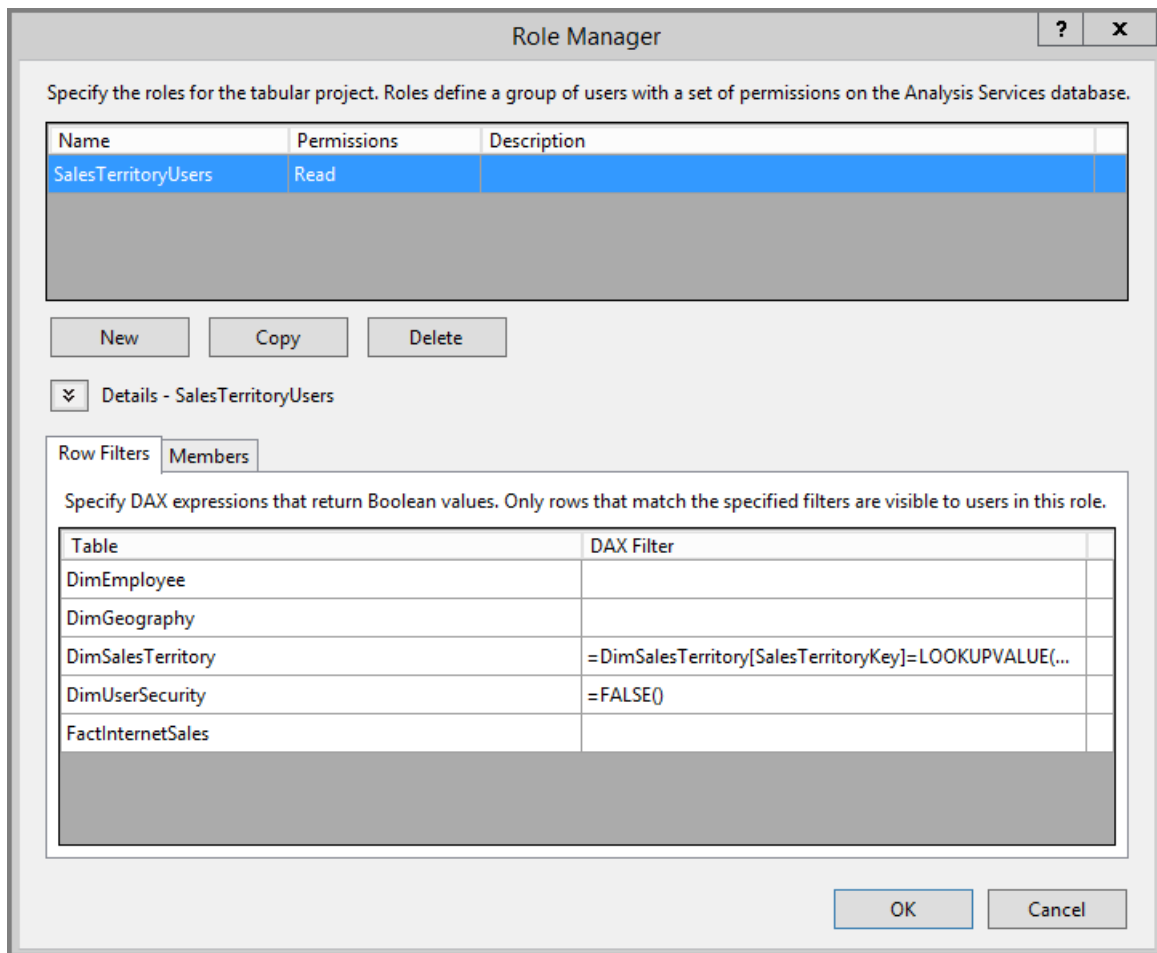


3. Once you've imported the necessary tables, you need to define a role called **SalesTerritoryUsers** with **Read** permission. This can be achieved by clicking on the **Model** menu in SQL Server Data Tools, and then clicking **Roles**. In the **Role Manager** dialog box, click **New**.

4. Under **Members** tab in the **Role Manager**, add the users that we defined in the **DimUserSecurity** table in **Task 1 - step 3**.



- Next, add the proper functions for both **DimSalesTerritory** and **DimUserSecurity** tables, as shown below under **Row Filters** tab.



- In this step, we use the **LOOKUPVALUE** function to return values for a column in which the Windows user name is the same as the user name returned by the **USERNAME** function. Queries can then be restricted where the values returned by **LOOKUPVALUE** match values in the same or related table. In the **DAX Filter** column, type the following formula:

```
=DimSalesTerritory[SalesTerritoryKey]=LOOKUPVALUE(DimUserSecurity[SalesTerritoryID],
DimUserSecurity[UserName], USERNAME(), DimUserSecurity[SalesTerritoryID],
DimSalesTerritory[SalesTerritoryKey])
```

- In this formula, the **LOOKUPVALUE** function returns all values for the **DimUserSecurity[SalesTerritoryID]** column, where the **DimUserSecurity[UserName]** is the same as the current logged on Windows user name, and **DimUserSecurity[SalesTerritoryID]** is the same as the **DimSalesTerritory[SalesTerritoryKey]**.

The set of Sales SalesTerritoryKey's returned by **LOOKUPVALUE** is then used to restrict the rows shown in the **DimSalesTerritory**. Only rows where the **SalesTerritoryKey** for the row is in the set of IDs returned by the **LOOKUPVALUE** function are displayed.

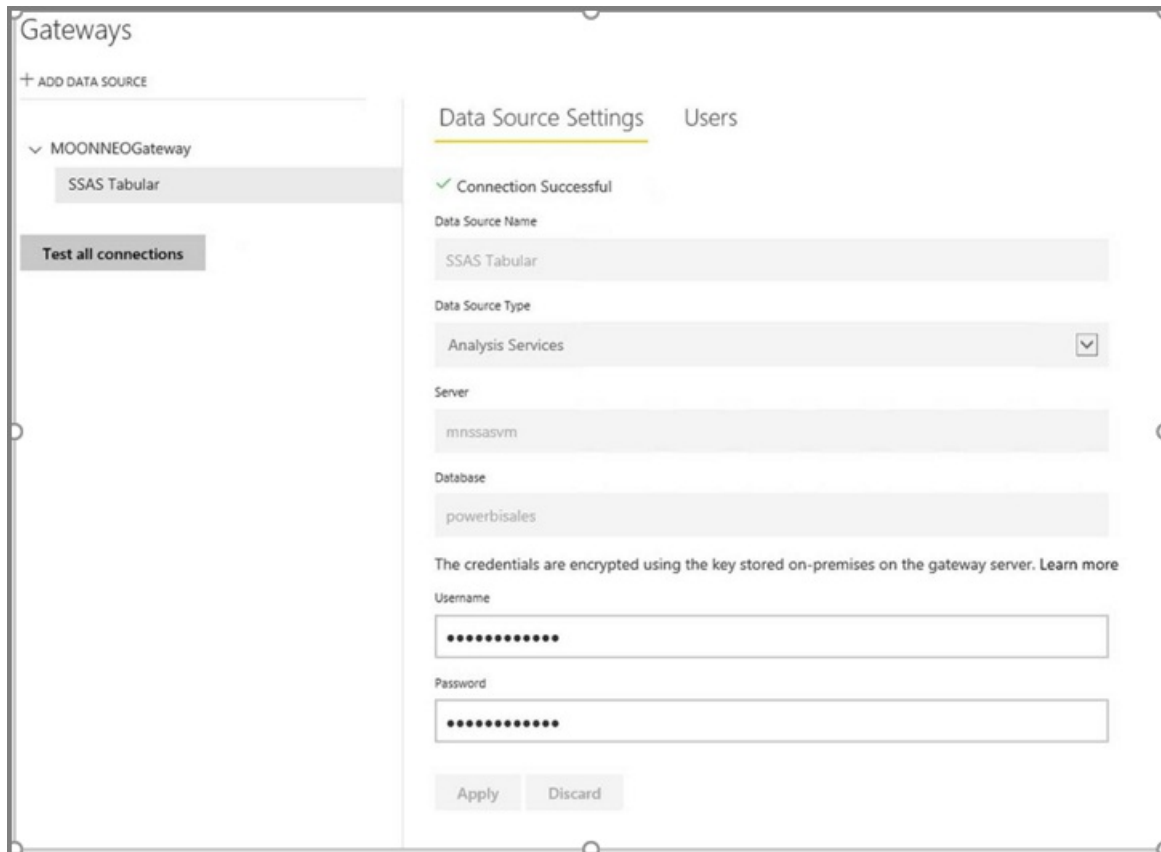
- For the **DimUserSecurity** table, in the **DAX Filter** column, type the following formula.

```
=FALSE()
```

- This formula specifies that all columns resolve to the false Boolean condition; therefore, no columns for the **DimUserSecurity** table can be queried.
- Now we need to process and deploy the model. You can refer [this article](#) for assistance in deploying the model.

Task 3: Adding Data Sources within your on-premises data gateway

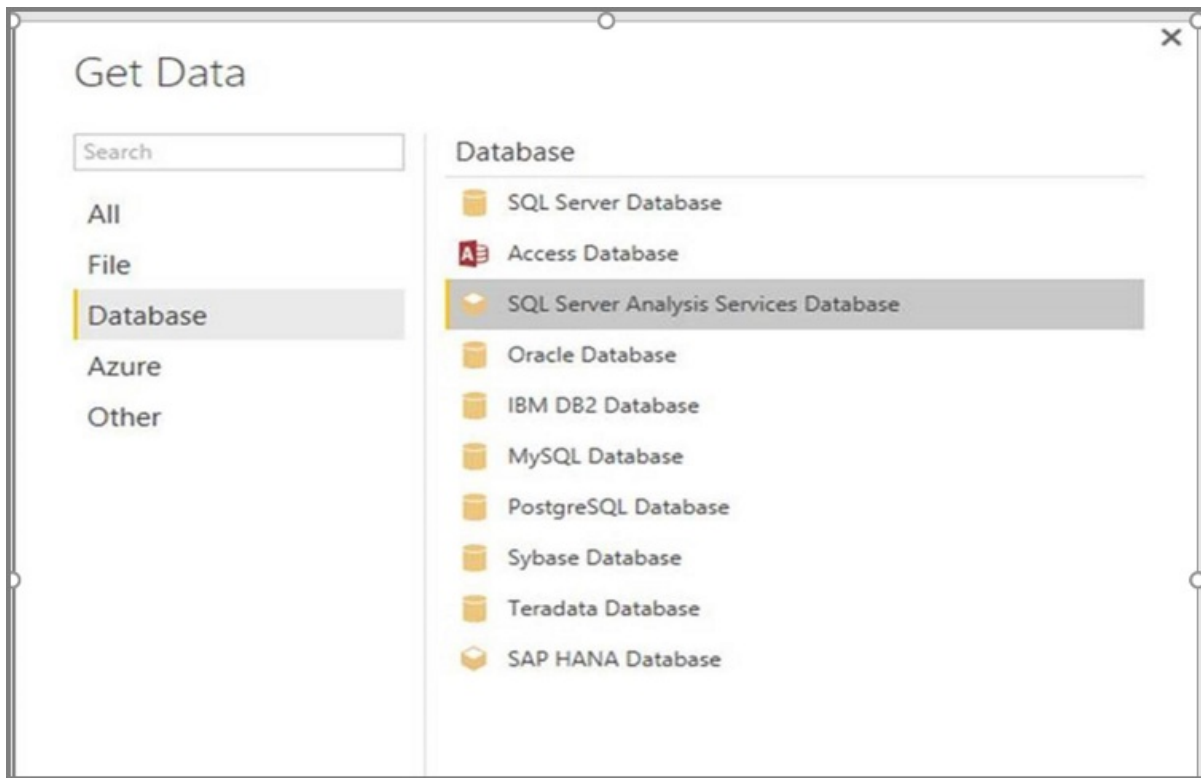
1. Once your tabular model is deployed and ready for consumption, you need to add a data source connection to your on-premises Analysis Services tabular server with in your Power BI portal.
2. To allow the **Power BI service** access your on-premises analysis service, you need to have an **on-premises data gateway** installed and configured in your environment.
3. Once the gateway is correctly configured, you need to create a data source connection for your **Analysis Services** tabular instance. This article will help you with [adding data source within the Power BI portal](#).



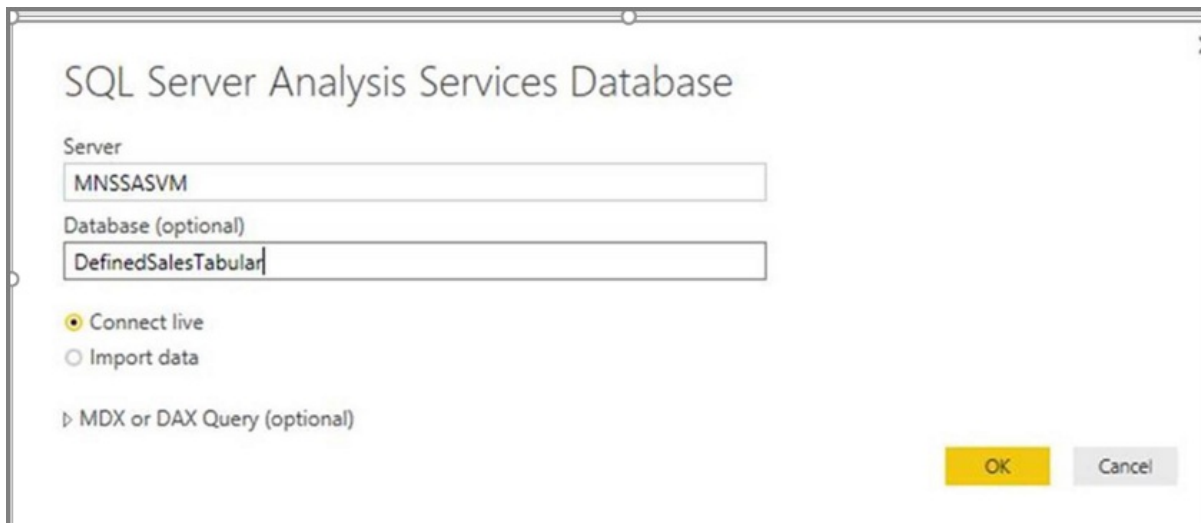
4. With the previous step complete, the gateway is configured and ready interact with your on-premises **Analysis Services** data source.

Task 4: Creating report based on analysis services tabular model using Power BI desktop

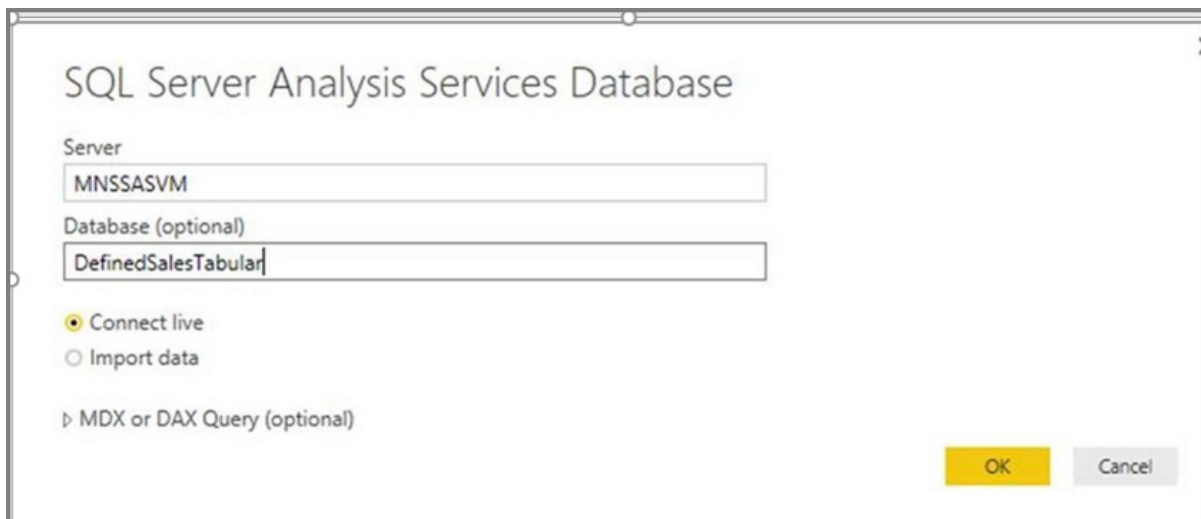
1. Launch **Power BI Desktop** and select **Get Data > Database**.
2. From the list of data sources, select the **SQL Server Analysis Services Database** and select **connect**.



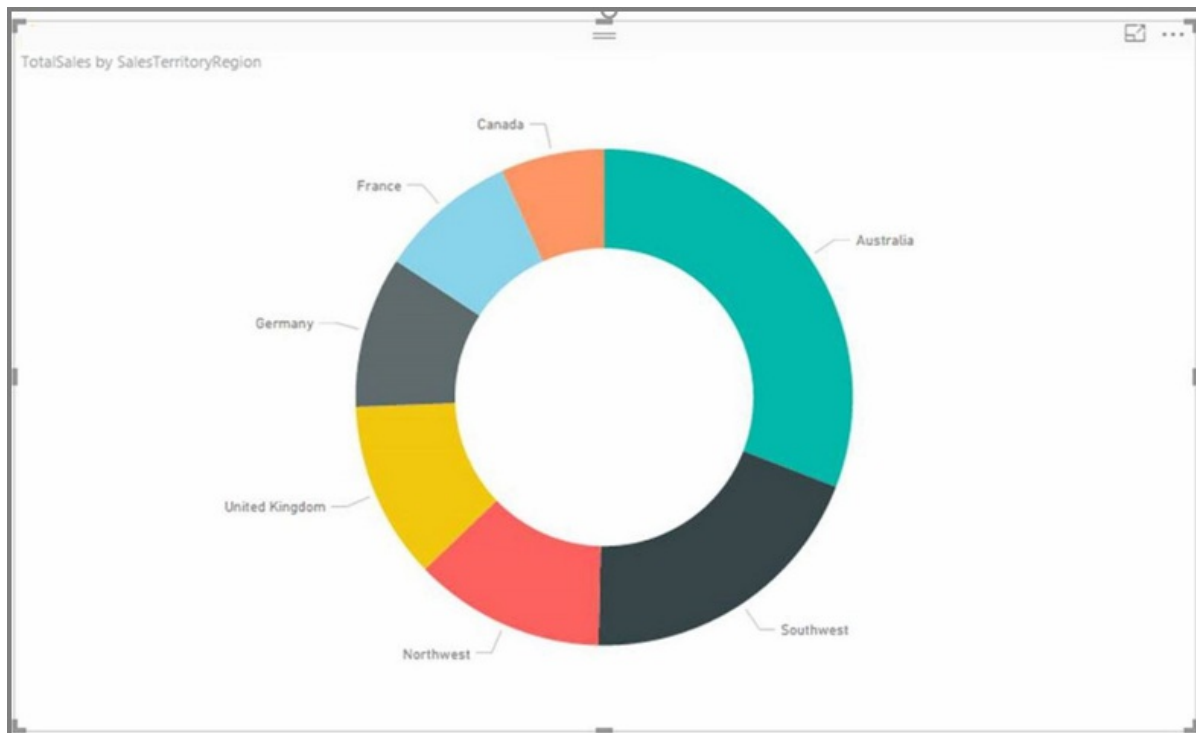
3. Fill in your **Analysis Services** tabular instance details and select **Connect Live**. Select OK. With **Power BI**, dynamic security works only with **Live connection**.



4. You'll see that the model that was deployed in the **Analysis Services** instance. Select the respective model and select **OK**.



5. **Power BI Desktop** now displays all the available fields, to the right of the canvas in the **Fields** pane.
6. In the **Fields** pane on the right, select the **SalesAmount** measure from **FactInternetSales** table and **SalesTerritoryRegion** dimension from **SalesTerritory** table.
7. We'll keep this report simple, so right now we won't add any more columns. To have more meaningful representation of the data, we'll change the visualization to **Donut chart**.



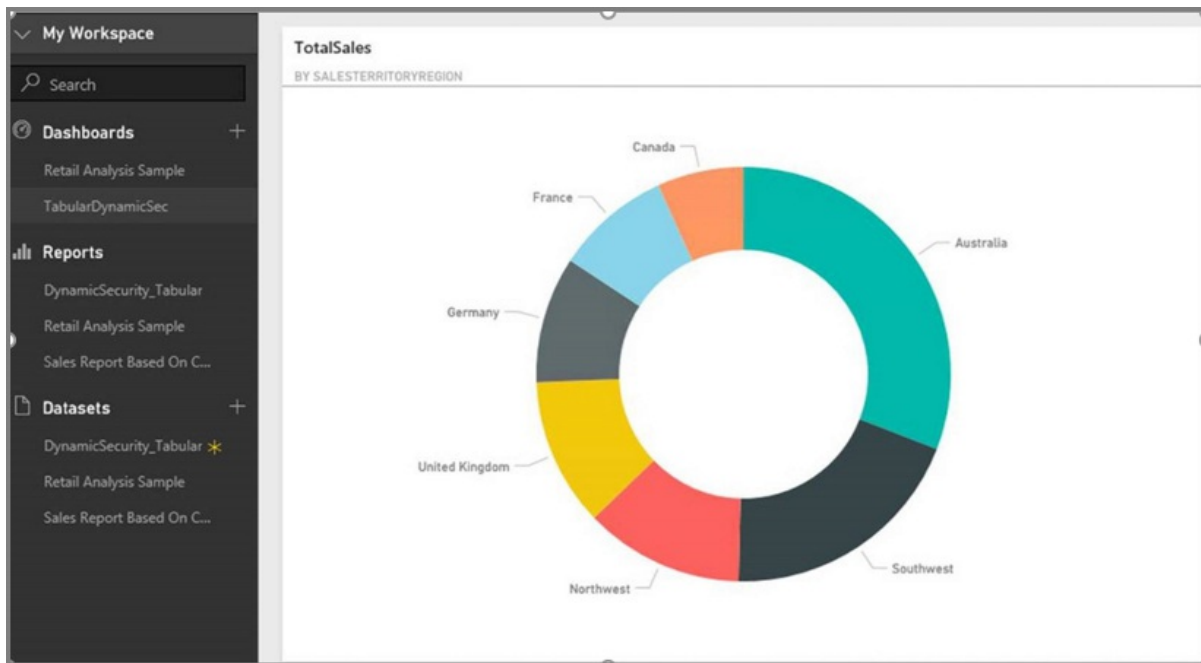
8. Once your report is ready, you can directly publish it to the Power BI portal. From the **Home** ribbon in **Power BI Desktop**, select **Publish**.

Task 5: Creating and sharing a dashboard

1. You've created the report and clicked **Publish** in **Power BI Desktop**, so the report is published to the **Power BI** service. Now that it's in the service, our model security scenario can be demonstrated by using the example we created in the previous steps.

In his role, **Sales Manager - Sumit** can see data from all the different sales regions. So he creates this report (the report created in the previous task steps) and publishes it to the Power BI service.

Once he publishes the report, he creates a dashboard in the Power BI service called **TabularDynamicSec** based on that report. In the following image, notice that the sales Manager (Sumit) is able to see the data corresponding to all the sales region.



2. Now Sumit shares the dashboard with his colleague, Jon Doe, who is responsible for sales in Australia region.

3	Australia	Australia	3	Jon	Doe	moonneo\jondoe
---	-----------	-----------	---	-----	-----	----------------

Share dashboard

Shared with Sumit Ghosh and 1 others

Invite Shared with

This dashboard contains Power BI Pro content. Only users that have Power BI Pro will have access to it. [Learn more](#)

jondoe

Jon Doe. jondoe@moonneo.com

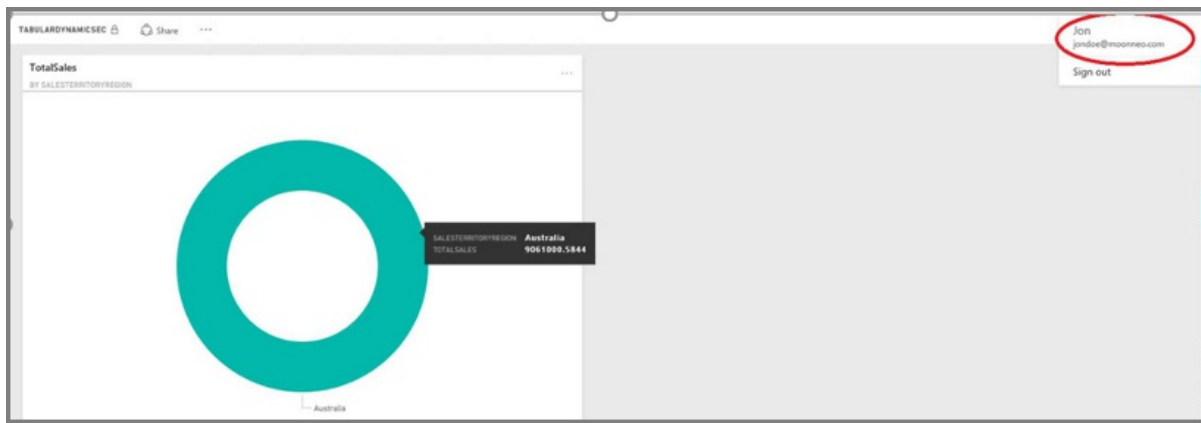
Hi Jon,
Check out the sales from your region.
Thanks.
Sales Manager

Recipients will have access to the same data and reports as you have in this dashboard. [Learn more](#)

Allow recipients to share your dashboard
 Send email notification to recipients

Share

3. When Jon Doe logs in to the **Power BI** service and views the shared dashboard that Sumit created, Jon Doe should see **only** the sales from his region for which he is responsible. So Jon Doe logs in, accesses the dashboard that Sumit shared with him, and Jon Doe sees **only** the sales from the Australia region.



4. Congratulations! The dynamic row level security that was defined in the on-premises **Analysis Services** tabular model has been successfully reflected and observed in the **Power BI** service. Power BI uses the **effectiveusername** property to send the current Power BI user credential to the on-premises data source to run the queries.

Task 6: Understanding what happens behind the scenes

1. This task assumes you're familiar with SQL Profiler, since you need to capture a SQL Server profiler trace on your on-premises SSAS tabular instance.
2. The session gets initialized as soon as the user (Jon Doe, in this case) accesses the dashboard in the Power BI service. You can see that the **salesterritoryusers** role takes an immediate effect with the effective user name as **jondoe@moonneo.com**

```
<PropertyList><Catalog>DefinedSalesTabular</Catalog><Timeout>600</Timeout><Content>SchemaData</Content>
<Format>Tabular</Format><AxisFormat>TupleFormat</AxisFormat><BeginRange>-1</BeginRange><EndRange>-
1</EndRange><ShowHiddenCubes>false</ShowHiddenCubes><VisualMode>0</VisualMode>
<DbpropMsmfFlattened2>true</DbpropMsmfFlattened2><SspropInitAppName>PowerBI</SspropInitAppName>
<SecuredCellValue>0</SecuredCellValue><ImpactAnalysis>false</ImpactAnalysis>
<SQLQueryMode>Calculated</SQLQueryMode><ClientProcessID>6408</ClientProcessID><Cube>Model</Cube>
<ReturnCellProperties>true</ReturnCellProperties><CommitTimeout>0</CommitTimeout>
<ForceCommitTimeout>0</ForceCommitTimeout><ExecutionMode>Execute</ExecutionMode>
<RealTimeOlap>false</RealTimeOlap><MdxMissingMemberMode>Default</MdxMissingMemberMode>
<DisablePrefetchFacts>false</DisablePrefetchFacts><UpdateIsolationLevel>2</UpdateIsolationLevel>
<DbpropMsmfOptimizeResponse>0</DbpropMsmfOptimizeResponse><ResponseEncoding>Default</ResponseEncoding>
<DirectQueryMode>Default</DirectQueryMode><DbpropMsmfActivityID>4ea2a372-dd2f-4edd-a8ca-
1b909b4165b5</DbpropMsmfActivityID><DbpropMsmfRequestID>2313cf77-b881-015d-e6da-
eda9846d42db</DbpropMsmfRequestID><LocaleIdentifier>1033</LocaleIdentifier>
<EffectiveUserName>jondoe@moonneo.com</EffectiveUserName></PropertyList>
```

3. Based on the effective user name request, Analysis Services converts the request to the actual moonneo\jondoe credential after querying the local Active Directory. Once **Analysis Services** gets the actual credential from Active Directory, then based on the access the user has permissions for on the data, **Analysis Services** returns the only the data for which he or she has permission.
4. If more activity occurs with the dashboard, for example, if Jon Doe goes from the dashboard to the underlying report, with SQL Profiler you would see a specific query coming back to the Analysis Services tabular model as a DAX query.

Event	Time	Source	Message	Property Name	Value
Discover End	26	DISCO...	<RestrictionList xmlns="urn:schemas-microsoft-com:xml-analysis">	<PropertyName>DBMSVersion</PropertyName>	</R
Session Initialize	27	DISCO...	salesterritoryusers		
Query Begin	3	DAXQuery	EVALUATE ROW("SumEmployeeKey", CALCULATE(SUM('Employee'[EmployeeKey])))		
DAX Query Plan	1	DAX Ve...	AdgColumns: RelLogop DependOnCols(0) 0-0 RequiredCols(0)(''[SumEmployeeKey]) SumVert1paq: Scalogop DependOnCols(0) Integer		
Vert1Paq SE Query Begin	0	Vert1P...	SET DC_KIND="AUTO"; SELECT SUM([Employee_S39e28fd-f21d-44ba-838b-afb38f0d9e5d].[EmployeeKey]) FROM [Employee_S39e28fd-f21d-44ba-838b-afb38f0d9e5d].[EmployeeKey]		
Vert1Paq SE Query Cache H...	0	Vert1P...	SET DC_KIND="AUTO"; SELECT SUM([Employee_S39e28fd-f21d-44ba-838b-afb38f0d9e5d].[EmployeeKey]) FROM [Employee_S39e28fd-f21d-44ba-838b-afb38f0d9e5d].[EmployeeKey]		
Vert1Paq SE Query End	0	Vert1P...	SET DC_KIND="AUTO"; SELECT SUM([Employee_S39e28fd-f21d-44ba-838b-afb38f0d9e5d].[EmployeeKey]) FROM [Employee_S39e28fd-f21d-44ba-838b-afb38f0d9e5d].[EmployeeKey]		
DAX Query Plan	2	DAX Ve...	AdgColumns: IterPhyOp IterCols(0)(''[SumEmployeeKey]) SingletonTable: IterPhyOp IterCols(0)(''[SumEmployeeKey]) Spool: Lookup		

5. You can also see below the DAX query that is getting executed to populate the data for the report.

```
EVALUATE
ROW(
    "SumEmployeeKey", CALCULATE(SUM(Employee[EmployeeKey]))
)

<PropertyList xmlns="urn:schemas-microsoft-com:xml-analysis">`
    <Catalog>DefinedSalesTabular</Catalog>
    <Cube>Model</Cube>
    <SspropInitAppName>PowerBI</SspropInitAppName>
    <EffectiveUserName>jondoe@moonneo.com</EffectiveUserName>
    <LocaleIdentifier>1033</LocaleIdentifier>
    <ClientProcessID>6408</ClientProcessID>
    <Format>Tabular</Format>
    <Content>SchemaData</Content>
    <Timeout>600</Timeout>
    <DbpropMsmdRequestID>8510d758-f07b-a025-8fb3-a0540189ff79</DbpropMsmdRequestID>
    <DbPropMsmdActivityID>f2dbe8a3-ef51-4d70-a879-5f02a502b2c3</DbPropMsmdActivityID>
    <ReturnCellProperties>>true</ReturnCellProperties>
    <DbpropMsmdFlattened2>>true</DbpropMsmdFlattened2>
    <DbpropMsmdActivityID>f2dbe8a3-ef51-4d70-a879-5f02a502b2c3</DbpropMsmdActivityID>
</PropertyList>
```

Considerations

There are a few considerations to keep in mind when working with row level security, SSAS and Power BI.

1. On-premises row level security with Power BI is only available with Live Connection.
2. Any changes in the data after processing the model would be immediately available for the users who are accessing the report is based on **live connection** from the Power BI service.

DirectQuery for Oracle and Teradata Databases

1/25/2018 • 1 min to read • [Edit Online](#)

Please see [DirectQuery Data Sources](#) for information about data sources and DirectQuery.

Use the SAP BW Connector in Power BI Desktop

12/6/2017 • 4 min to read • [Edit Online](#)

With Power BI Desktop, you can access **SAP BusinessWarehouse (BW)** data.

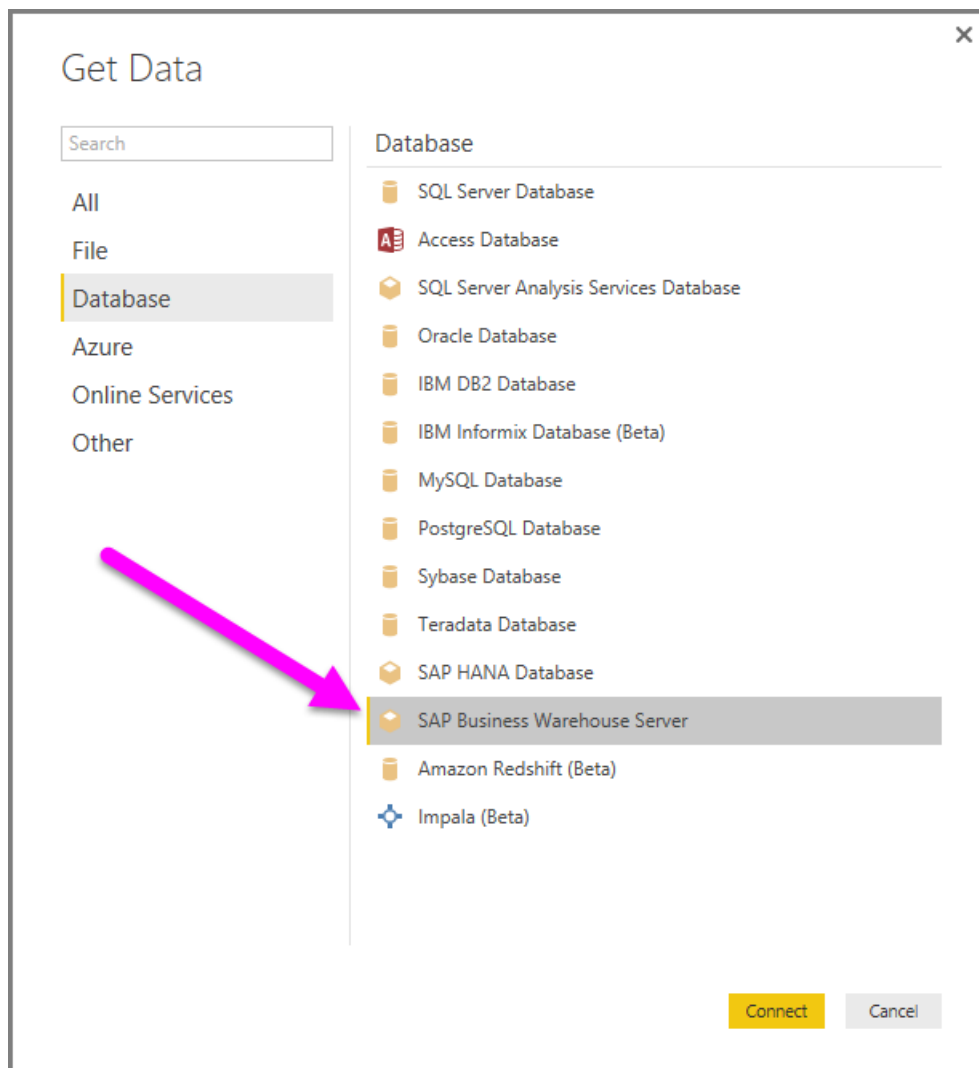
Installation of SAP BW Connector

To use the **SAP BW Connector**, go through the following installation steps:

1. Install the **SAP NetWeaver** library on your local machine. You can get the **SAP Netweaver** library from your SAP administrator, or directly from the [SAP Software Download Center](#). Since the **SAP Software Download Center** changes its structure frequently, more specific guidance for navigating that site is not available. The **SAP NetWeaver** library is usually included also in the SAP Client Tools installation.

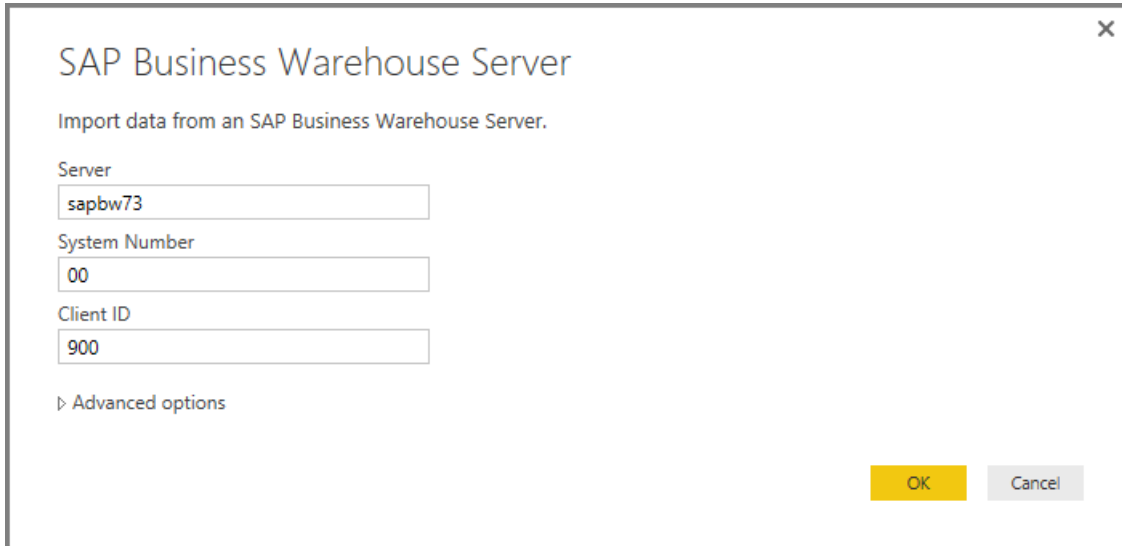
You may be able to search for *SAP Note #1025361* to get the download location for the most recent version. Make sure the architecture for the **SAP NetWeaver** library (32-bit or 64-bit) matches your **Power BI Desktop** installation, then install all files included in the **SAP NetWeaver RFC SDK** according to the SAP Note.

2. The **Get Data** dialog includes an entry for **SAP Business Warehouse Server** in the **Database** category.



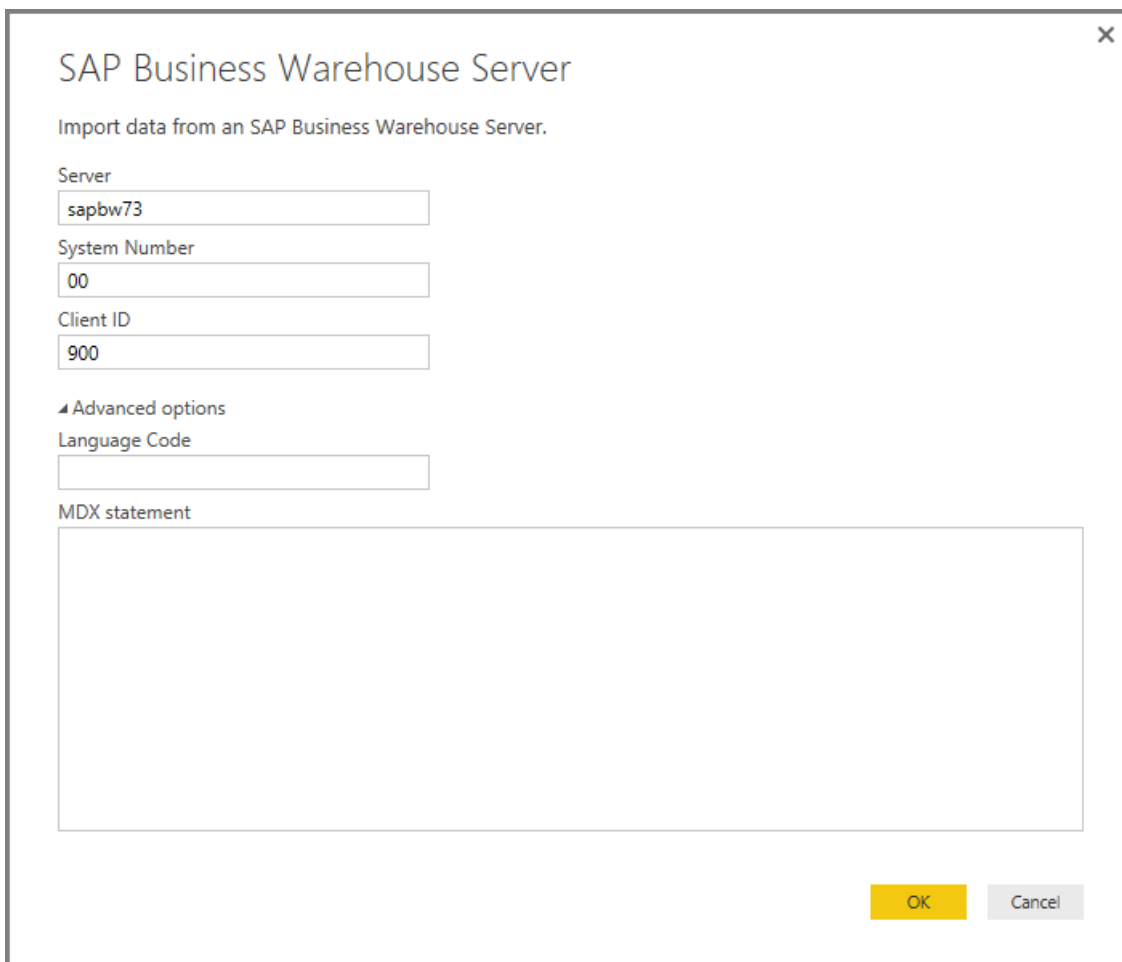
SAP BW Connector features

The **SAP BW Connector** preview in Power BI Desktop lets users import data from their **SAP Business Warehouse Server** cubes. You can also use DirectQuery with the **SAP BW Connector**. You must specify a *Server*, *System Number* and *Client ID* to establish the connection.



The screenshot shows a dialog box titled "SAP Business Warehouse Server" with a close button (X) in the top right corner. Below the title is the instruction "Import data from an SAP Business Warehouse Server." There are three input fields: "Server" containing "sapbw73", "System Number" containing "00", and "Client ID" containing "900". Below these fields is a collapsed section labeled "Advanced options" with a right-pointing chevron. At the bottom right are two buttons: "OK" (yellow) and "Cancel" (grey).

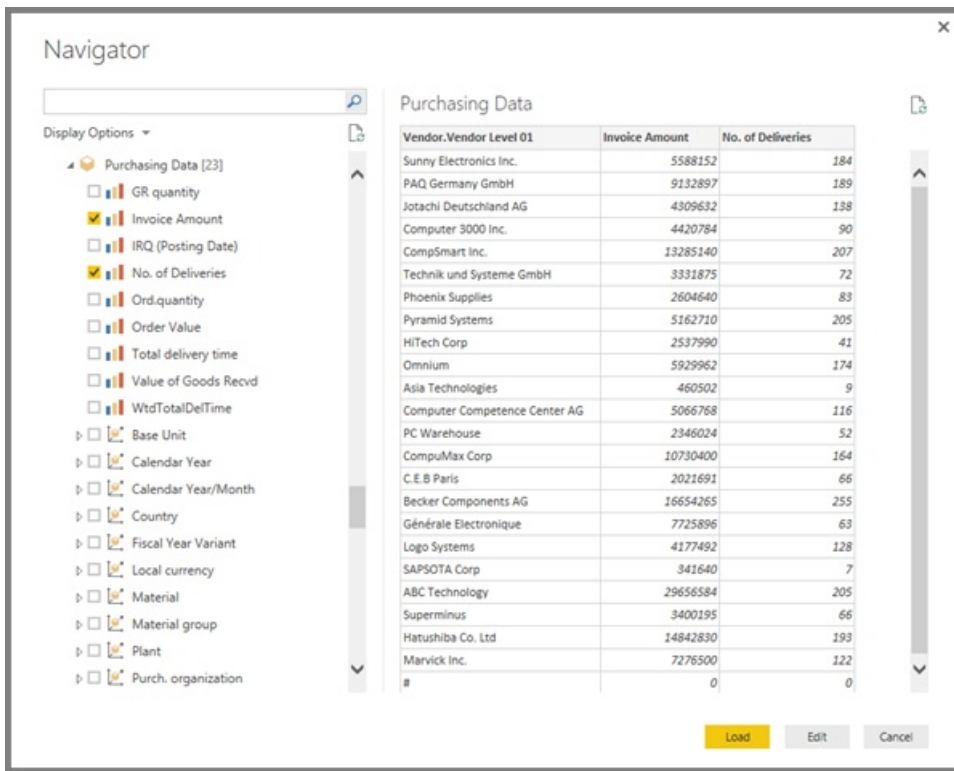
You can also specify two additional **Advanced options**: Language code, and a custom MDX statement to run against the specified server.



This screenshot shows the same dialog box as above, but with the "Advanced options" section expanded, indicated by a downward-pointing chevron. It now includes two additional input fields: "Language Code" (empty) and "MDX statement" (a large empty text area). The "OK" and "Cancel" buttons remain at the bottom right.

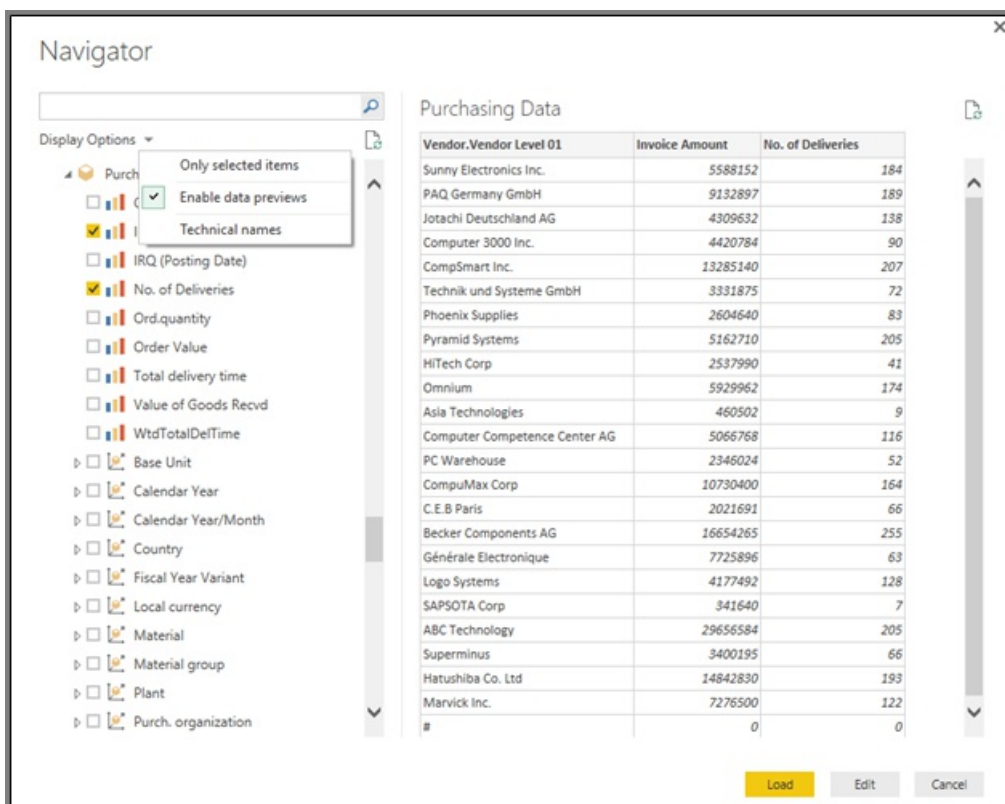
If no MDX statement was specified you are presented with the **Navigator** window, which displays the list of cubes available in the server, the option to drill down and select items from the available cubes, including dimensions and measures. Power BI exposes queries and cubes exposed by the [BW Open Analysis Interface OLAP BAPIs](#).

When you select one or more items from the server, a preview of the output table is created, based on their selection.



The **Navigator** window also provides a few **Display Options** that allow you to do the following:

- **Display Only Selected Items versus All Items (default view):** This option is useful for verifying the final set of items selected. An alternative approach to viewing this is to select the *Column Names* in the *Preview* area.
- **Enable Data Previews (default behavior):** You can also control whether data previews should be displayed in this dialog. Disabling data previews reduces the amount of server calls, since it no longer requests data for the previews.
- **Technical Names:** SAP BW supports the notion of *technical names* for objects within a cube. Technical names allow a cube owner to expose *user friendly* names for cube objects, as opposed to only exposing the *physical names* for those objects in the cube.



After selecting all necessary objects in the **Navigator**, you can decide what to do next, by selecting one of the

following buttons on the bottom of the **Navigator** window:

- Selecting **Load** triggers loading the entire set of rows for the output table into the Power BI Desktop data model, then takes you to **Report** view where you can begin visualizing the data or making further modifications using the **Data** or **Relationships** views.
- Selecting **Edit** brings up **Query Editor**, where you can perform additional data transformation and filtering steps before the entire set of rows is brought into the Power BI Desktop data model.

In addition to importing data from **SAP BW** cubes, remember that you can also import data from a wide range of other data sources in Power BI Desktop, and then you can combine them into a single report. This presents all sorts of interesting scenarios for reporting and analytics on top of **SAP BW** data.

Troubleshooting

This section provides troubleshooting situations (and solutions) for working with this preview version of the **SAP BW** connector.

1. Numeric data from **SAP BW** returns decimal points instead of commas. For example, 1,000,000 is returned as 1.000.000.

SAP BW returns decimal data with either a , (comma) or a . (dot) as the decimal separator. To specify which of those **SAP BW** should use for the decimal separator, the driver used by **Power BI Desktop** makes a call to *BAPI_USER_GET_DETAIL*. This call returns a structure called **DEFAULTS**, which has a field called *DCPFM* that stores *Decimal Format Notation*. It takes one of the following three values:

```
' ' (space) = Decimal point is comma: N.NNN,NN  
'X' = Decimal point is period: N,NNN.NN  
'Y' = Decimal point is N NNN NNN,NN
```

Customers who have reported this issue found that the call to *BAPI_USER_GET_DETAIL* is failing for a particular user (the user who is showing the incorrect data), with an error message similar to the following:

```
You are not authorized to display users in group TI:  
<item>  
  <TYPE>E</TYPE>  
  <ID>01</ID>  
  <NUMBER>512</NUMBER>  
  <MESSAGE>You are not authorized to display users in group TI</MESSAGE>  
  <LOG_NO/>  
  <LOG_MSG_NO>000000</LOG_MSG_NO>  
  <MESSAGE_V1>TI</MESSAGE_V1>  
  <MESSAGE_V2/>  
  <MESSAGE_V3/>  
  <MESSAGE_V4/>  
  <PARAMETER/>  
  <ROW>0</ROW>  
  <FIELD>BNAME</FIELD>  
  <SYSTEM>CLNTPW1400</SYSTEM>  
</item>
```




To solve this error, users must ask their SAP admin to grant the SAPBW user being used in Power BI the right to execute *BAPI_USER_GET_DETAIL*. It's also worth verifying that the user has the required *DCPFM* value, as described earlier in this troubleshooting solution.

2. Connectivity for SAP BEx queries

You can perform **BEx** queries in Power BI Desktop by enabling a specific property, as shown in the following image:

Properties

Variables (Query) ▾

   ▾

General | Variable Sequence | Display |
Rows/Columns | Value Display | Planning |
Extended |

Enterprise ID

Release for External Access


Allow External Access to this Query

By OLE DB for OLAP

Light weight consumption


By Easy Query

Requeststatus

0 ▾  ▾



Use InfoProvider default



Nearline-Storage

Do Not Read Near-Line Storage ▾  ▾

Use InfoProvider default

< >

 Properties  Tasks

  3

Use OneDrive for Business links in Power BI Desktop

12/6/2017 • 2 min to read • [Edit Online](#)

Many people have Excel workbooks stored on their OneDrive for Business drive that would be great for use with Power BI Desktop. With **Power BI Desktop**, you can use online links for **Excel** files stored in **OneDrive for Business** to create reports and visuals. You can use a **OneDrive for Business** group account, or your individual **OneDrive for Business** account.

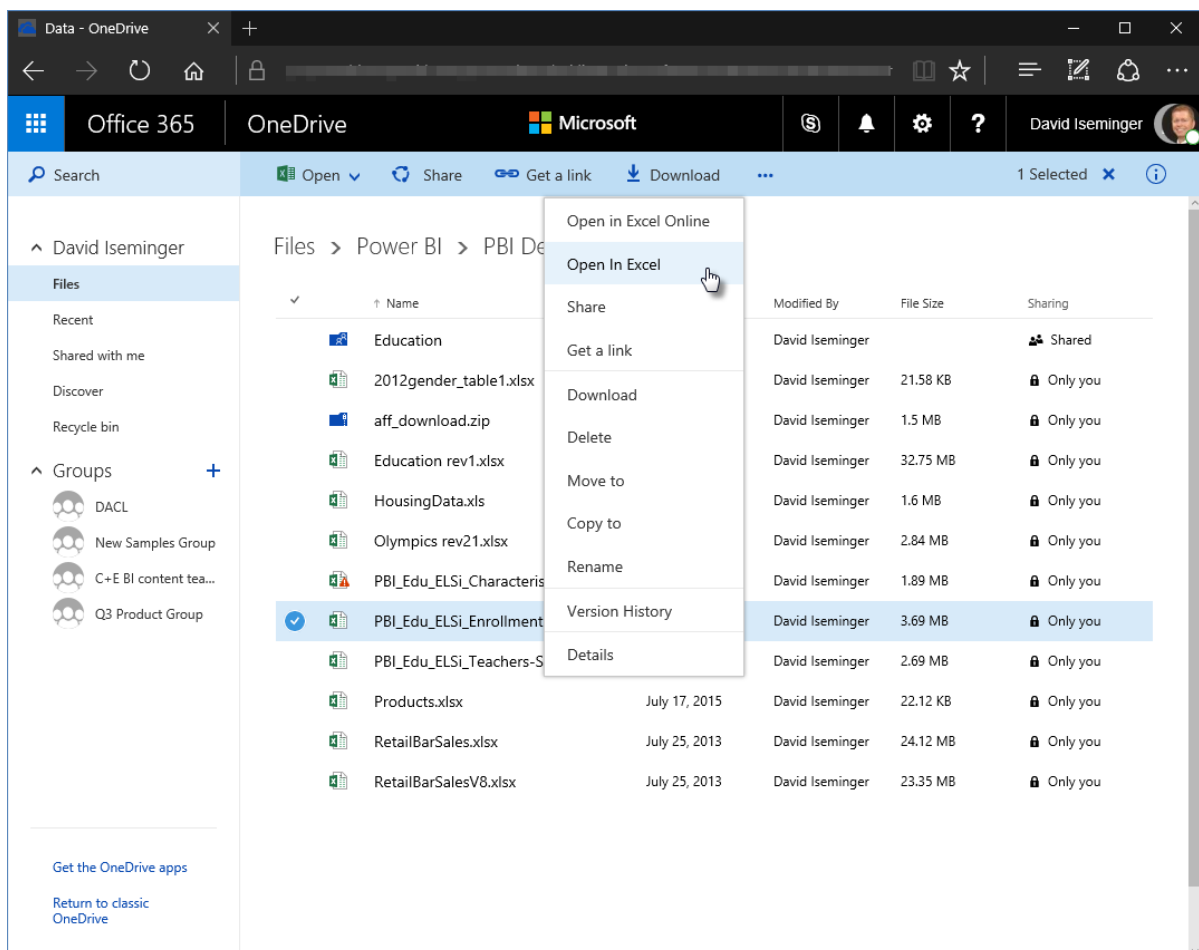
Getting an online link from **OneDrive for Business** does require a few specific steps. The following sections explain those steps, which let you share the file link among groups, across different machines, and with your coworkers.

Get a link from Excel, starting in the browser

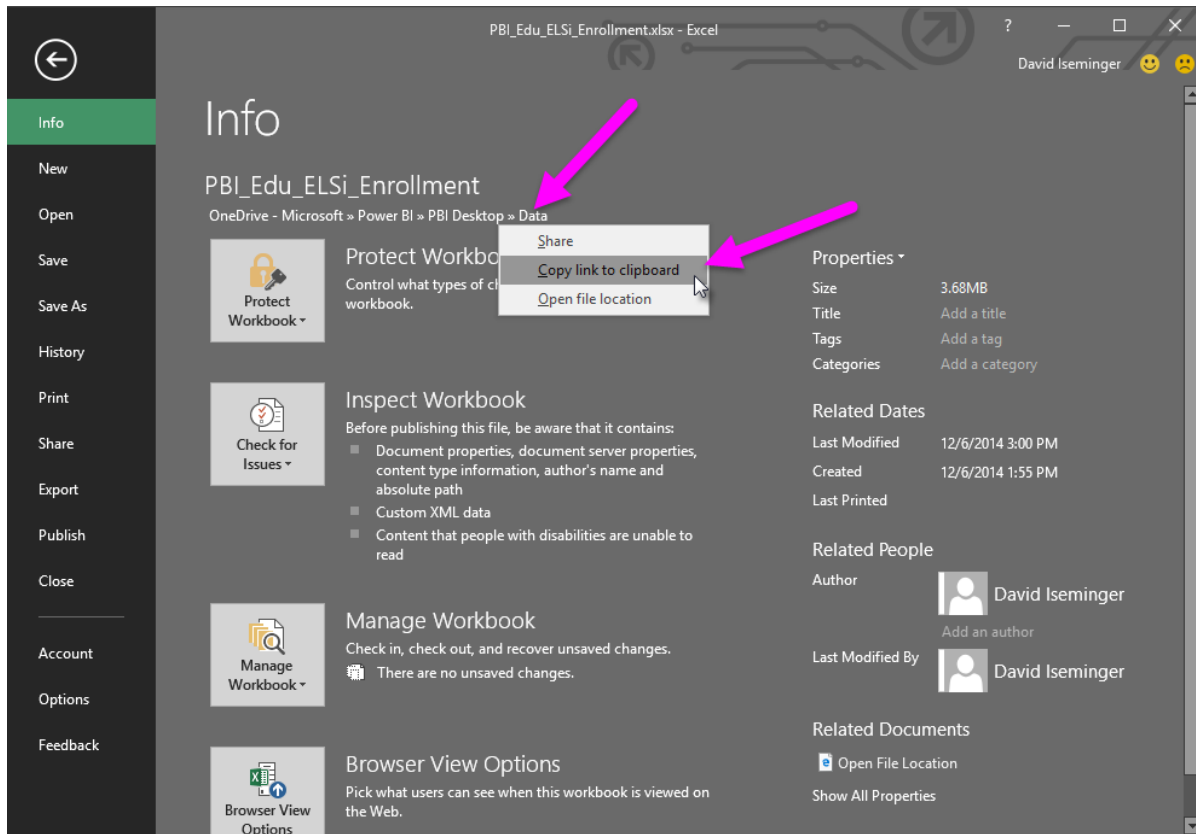
1. Navigate to your OneDrive for Business location using a browser. Right-click the file you want to use, and select **Open in Excel**.

NOTE

Your browser interface might not look exactly like the following image. There are many ways to select **Open in Excel** for files in your **OneDrive for Business** browser interface. You can use any option that allows you to open the file in Excel.



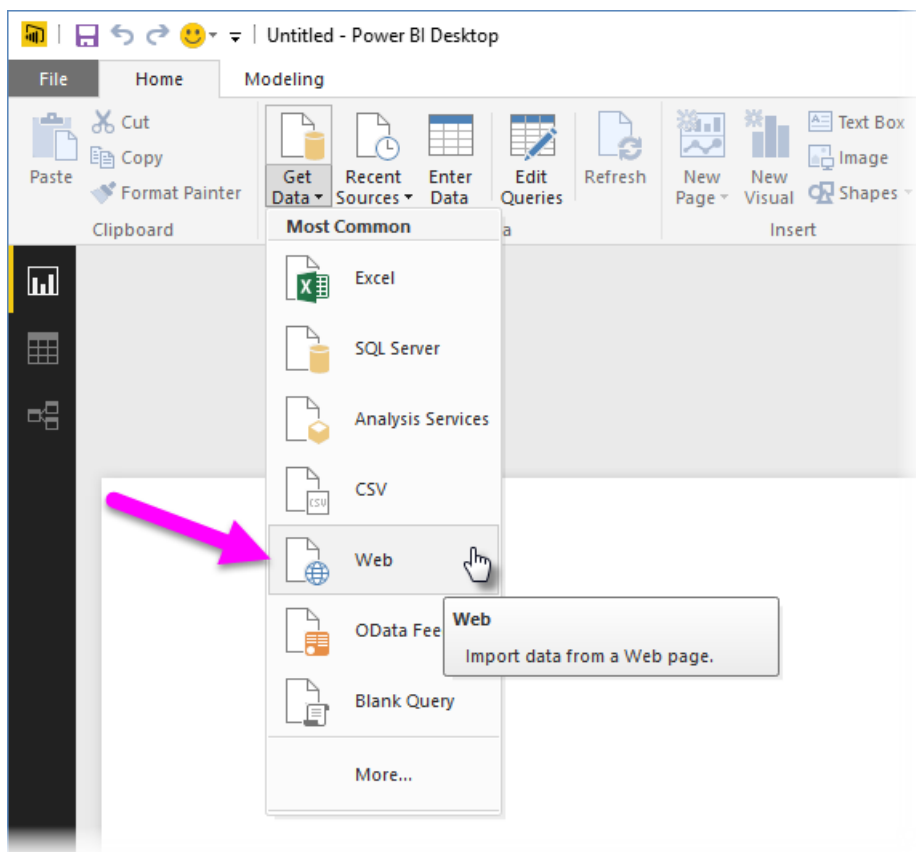
2. In **Excel**, select **File > Info** and select the link above the **Protect Workbook** button. Select **Copy link to clipboard** (your version might say **Copy path to clipboard**).



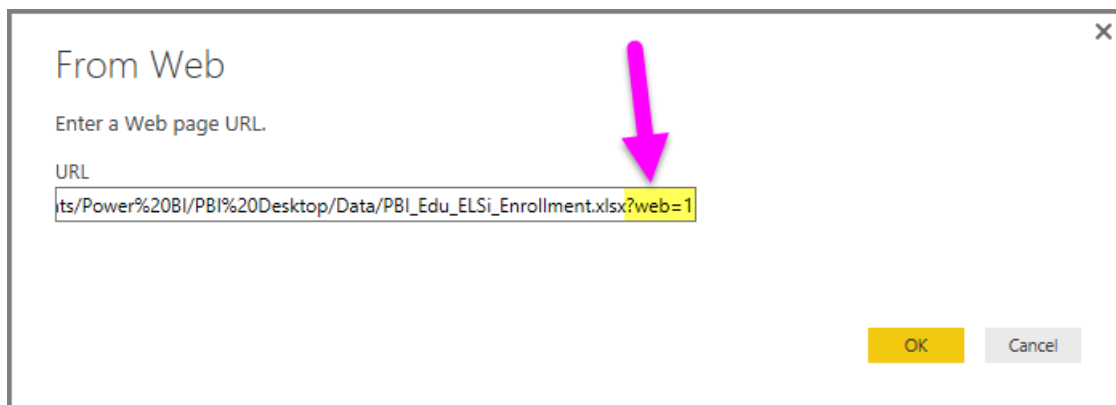
Use the link in Power BI Desktop

In Power BI Desktop, you can use the link you just copied to the clipboard. Take the following steps:

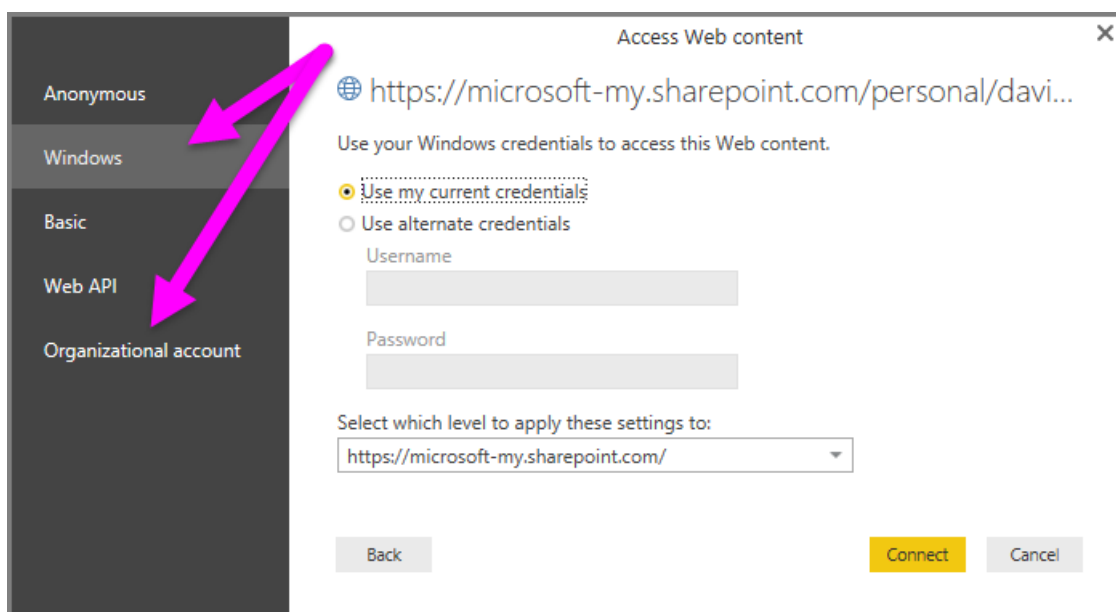
1. In Power BI Desktop, select **Get Data > Web**.



2. Paste the link into the **From Web** dialog (do **not** select OK yet).



3. Notice the `?web=1` string at the end of the link - you must *remove that portion of the Web URL string* **before** selecting **OK**, in order for **Power BI Desktop** to properly navigate to your file.
4. If **Power BI Desktop** prompts you for credentials, choose either **Windows** (for on-premises SharePoint sites) or **Organizational Account** (for Office 365 or OneDrive for Business sites).



A **Navigator** window appears, allowing you to select from the list of tables, sheets, and ranges found in the Excel workbook. From there, you can use the OneDrive for Business file just like any other Excel file, and create reports and use it in datasets like you would with any other data source.

NOTE

To use **OneDrive for Business** file as a data source in the Power BI service, with **Service Refresh** enabled for that file, make sure you select **OAuth2** as the **Authentication method** when configuring your refresh settings. Otherwise you may encounter an error (such as *Failed to update data source credentials*) when you attempt to connect or to refresh. Selecting **OAuth2** as the authentication method remedies that credentials error.

Power BI Data Source Prerequisites

12/6/2017 • 1 min to read • [Edit Online](#)

For each data provider, Power BI supports a specific provider version on objects. For more information about data sources available to Power BI, see [Data Sources](#). The following table describes these requirements.

DATA SOURCE	PROVIDER	MINIMUM PROVIDER VERSION	MINIMUM DATA SOURCE VERSION	SUPPORTED DATA SOURCE OBJECTS	DOWNLOAD LINK
SQL Server	ADO.net (built into .Net Framework)	.Net Framework 3.5 (only)	SQL Server 2005+	Tables/Views, Scalar functions, Table functions	Included in .NET Framework 3.5 or above
Access	Microsoft Access Database Engine (ACE)	ACE 2010 SP1	No restriction	Tables/Views	Download link
Excel (.xls files only) (see note 1)	Microsoft Access Database Engine (ACE)	ACE 2010 SP1	No restriction	Tables, Sheets	Download link
Oracle (see note 2)	ODP.NET	ODAC 11.2 Release 5 (11.2.0.3.20)	9.x+	Tables/Views	Download link
System.Data.OracleClient (Built in .Net Framework)	.NET Framework 3.5	9.x+	Tables/Views	Included in .NET Framework 3.5 or above	
IBM DB2	ADO.Net client from IBM (part of the IBM data server driver package)	10.1	9.1+	Tables/Views	Download link
MySQL	Connector/Net	6.6.5	5.1	Tables/Views, Scalar functions	Download link
PostgreSQL	NPGSQL ADO.NET provider	2.0.12	7.4	Tables/Views	Download link
Teradata	.NET Data Provider for Teradata	14+	12+	Tables/Views	Download link
SAP Sybase SQL Anywhere	iAnywhere.Data.SQAnywhere for .NET 3.5	16+	16+	Tables/Views	Download link

NOTE

Excel files that have an .xlsx extension do not require a separate provider installation.

NOTE

The Oracle providers also require Oracle client software (version 8.1.7+).

Bidirectional cross-filtering using DirectQuery in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

When filtering tables to create the appropriate view of data, report creators (and data modelers) face challenges when determining how filtering is applied to a report; the filter context of a table was held on one side of the relationship, but not the other, often requiring complex DAX formulas to get the desired results.

With bidirectional cross-filtering, report creators (and data modelers) now have more control over how filters are applied when working with related tables, enabling those filters to be applied on *both* sides of a table relationship. This is accomplished by having the filter context propagated to a second related table on the other side of a table relationship.

A [detailed whitepaper](#) is available that explains bidirectional cross-filtering in Power BI Desktop (the whitepaper also covers SQL Server Analysis Services 2016, both have the same behavior).

- Download the [Bidirectional cross-filtering for Power BI Desktop](#) whitepaper

Enabling bidirectional cross-filtering for DirectQuery

To enable cross-filtering, in the **Edit Relationship** dialog for a relationship, the following must be selected:

- The **Cross filter direction** must be set to **Both**
- The **Apply security filter in both directions** must also be selected

Edit Relationship

Select tables and columns that relate to one another.

Articles

CategoryID	SectionID	Source	Author	ArticleDate	Section	Category	Days Old	Fresh
4	12	Power BI	mihart	4/19/2016	Get started	Power BI Service	73	
4	26	Power BI	mihart	4/6/2016	Visualizations	Power BI Service	86	
t-i	4	Power BI	mihart	1/21/2016	Visualizations	Power BI Service	162	

Categories

CategoryID	Category
1	Power BI Desktop
2	Power BI Developer
3	Power BI Mobile Apps

Cardinality: Many to One (*:1)

Cross filter direction: Both

Make this relationship active

Assume Referential Integrity

Apply security filter in both directions

OK Cancel

NOTE

When creating cross filtering DAX formulas in Power BI Desktop, use *UserPrincipalName* (which is often the same as a user's login, such as *joe@contoso.com*) instead of *UserName*. As such, you may need to create a related table that maps *UserName* (or *EmployeeID*, for example) to *UserPrincipalName*.

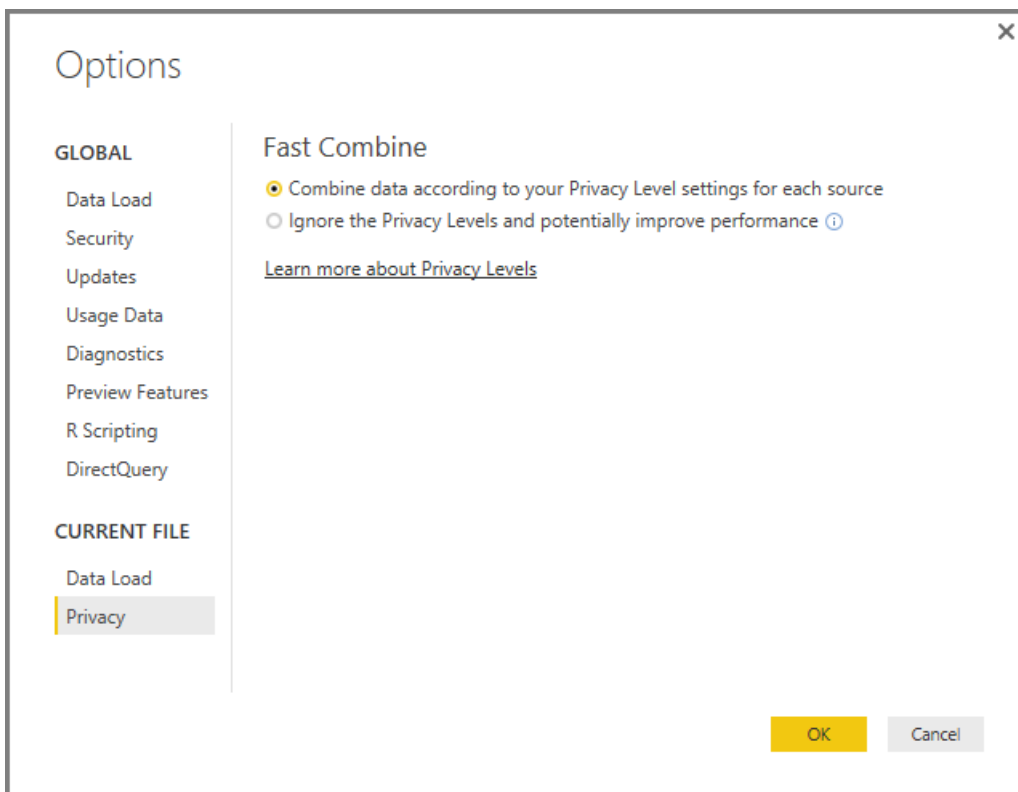
For more information, and for examples of how bidirectional cross-filtering works, check out the [whitepaper](#) mentioned earlier in this article.

Power BI Desktop privacy levels

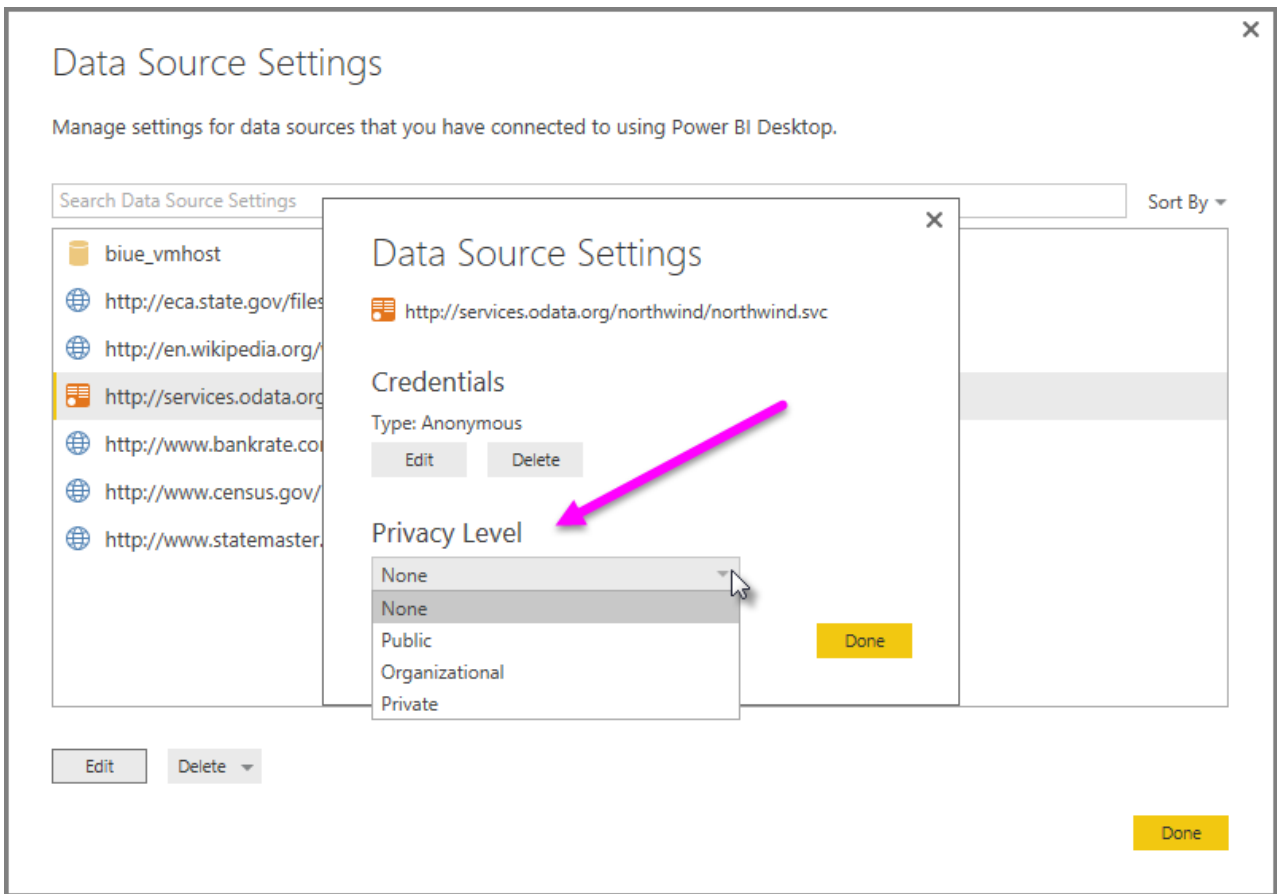
1/20/2018 • 3 min to read • [Edit Online](#)

In **Power BI Desktop**, privacy levels specify an isolation level that defines the degree that one data source will be isolated from other data sources. Although a restrictive isolation level blocks information from being exchanged between data sources, it may reduce functionality and impact performance.

The **Privacy Levels** setting, found in **File > Options and settings > Options** and then **Current File > Privacy** determines whether Power BI Desktop uses your Privacy Level settings while combining data. This dialog includes a link to Power BI Desktop documentation about Privacy Levels and Privacy Levels (this article).



The **Privacy** settings dialog for each data source is found **File > Options and settings > Data source settings**. Select the data source, then select **Edit**. The **Data Source Settings** dialog appears, from which you can select the appropriate privacy level from the drop-down menu at the bottom of the dialog, as shown in the following image.



Caution

You should configure a data source containing highly sensitive or confidential data as **Private**.

Configure a privacy level

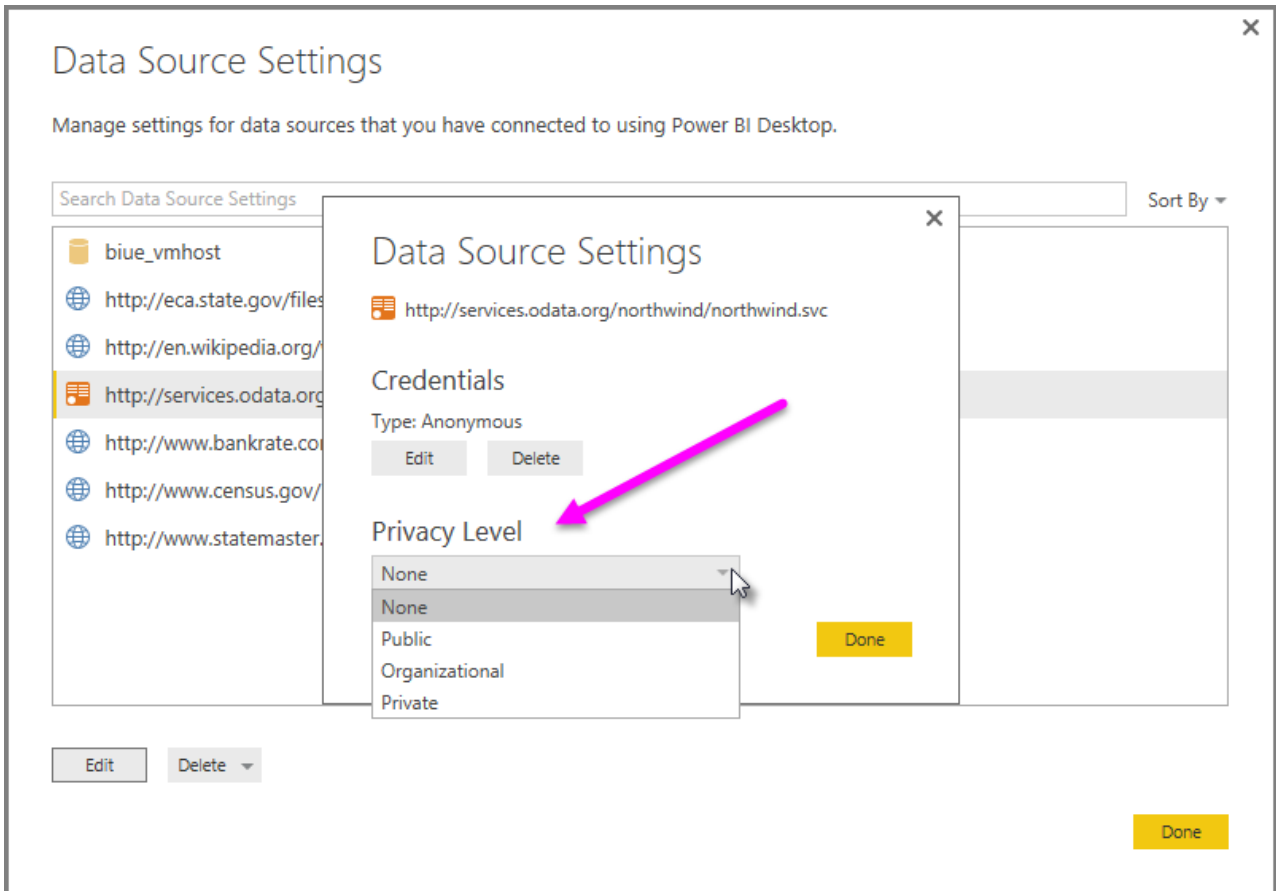
With privacy level settings, you can specify an isolation level that defines the degree that one data source must be isolated from other data sources.

SETTING	DESCRIPTION	EXAMPLE DATA SOURCES
Private data source	A Private data source contains sensitive or confidential information, and the visibility of the data source may be restricted to authorized users. A private data source is completely isolated from other data sources.	Facebook data, a text file containing stock awards, or a workbook containing employee review information.
Organizational data source	An Organizational data source limits the visibility of a data source to a trusted group of people. An Organizational data source is isolated from all Public data sources, but is visible to other Organizational data sources.	A Microsoft Word document on an intranet SharePoint site with permissions enabled for a trusted group.
Public data source	A Public data source gives everyone visibility to the data contained in the data source. Only files, internet data sources or workbook data can be marked Public .	Free data from the Microsoft Azure Marketplace, data from a Wikipedia page, or a local file containing data copied from a public web page

Configure privacy level settings

The **Privacy** settings dialog for each data source is found **File > Options and settings > Data source settings**.

To configure a data source privacy level, select the data source, then select **Edit**. The **Data Source Settings** dialog appears, from which you can select the appropriate privacy level from the drop-down menu at the bottom of the dialog, as shown in the following image.



Caution

You should configure a data source containing highly sensitive or confidential data as **Private**.

Configure Privacy Levels

Privacy Levels is a setting that is set to **Combine data according to your Privacy Level settings for each source** by default, which means that **Privacy Levels** is not enabled.

SETTING	DESCRIPTION
Combine data according to your Privacy Level settings for each source (on, and the default setting)	Privacy level settings are used to determine the level of isolation between data sources when combining data.
Ignore the Privacy levels and potentially improve performance (off)	Privacy levels are not considered when combining data, however; performance and functionality of the data may increase.

Security Note: Enabling **Privacy Levels** by selecting **Ignore the Privacy levels and potentially improve performance** in the **Privacy Levels** dialog could expose sensitive or confidential data to an unauthorized person. Do not enable **Privacy Levels** unless you are confident that the data source does not contain sensitive or confidential data.

Caution

The **Ignore the Privacy levels and potentially improve performance** does not work in the Power BI service. As such, Power BI Desktop reports with this setting enabled, which are then published to the Power BI service, do *not*

reflect this behavior when used in the service.

Configure Privacy Levels

In Power BI Desktop or in Query Editor, select **File > Options and settings > Options** and then **Current File > Privacy**.

- a. When **Combine data according to your Privacy Level settings for each source** is selected, data will be combined according to your Privacy Levels setting. Merging data across Privacy isolation zones will result in some data buffering.
- b. When **Ignore the Privacy levels and potentially improve performance** is selected, the data will be combined ignoring your Privacy Levels which could reveal sensitive or confidential data to an unauthorized user. The setting may improve performance and functionality.

Security Note: Selecting **Ignore the Privacy levels and potentially improve performance** may improve performance; however, Power BI Desktop cannot ensure the privacy of data merged into the Power BI Desktop file.

Facebook connector for Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

The Facebook connector in **Power BI Desktop** relies on the Facebook Graph API. As such, features and availability may vary over time.

You can see a [tutorial about the Facebook Connector for Power BI Desktop](#).

Facebook expired v1.0 of its Graph API on April 30th 2015. Power BI uses the Graph API behind the scenes for the Facebook connector, allowing you to connect to your data and analyze it.

Queries that were built before April 30th 2015 may no longer work or return less data. Subsequent to April 30th 2015, Power BI leverages v2.2 in all calls to the Facebook API. If your query was built prior to April 30, 2015 and you have not used it since, you'll likely need to authenticate again, to approve the new set of permissions that we'll ask for.

Although we attempt to release updates in accordance with any changes, the API may change in a way that affects the results of the queries we generate. In some cases, certain queries may no longer be supported. Due to this dependency we cannot guarantee the results of your queries when using this connector.

More details on the change in the Facebook API are available [here](#).

Google Analytics connector for Power BI Desktop

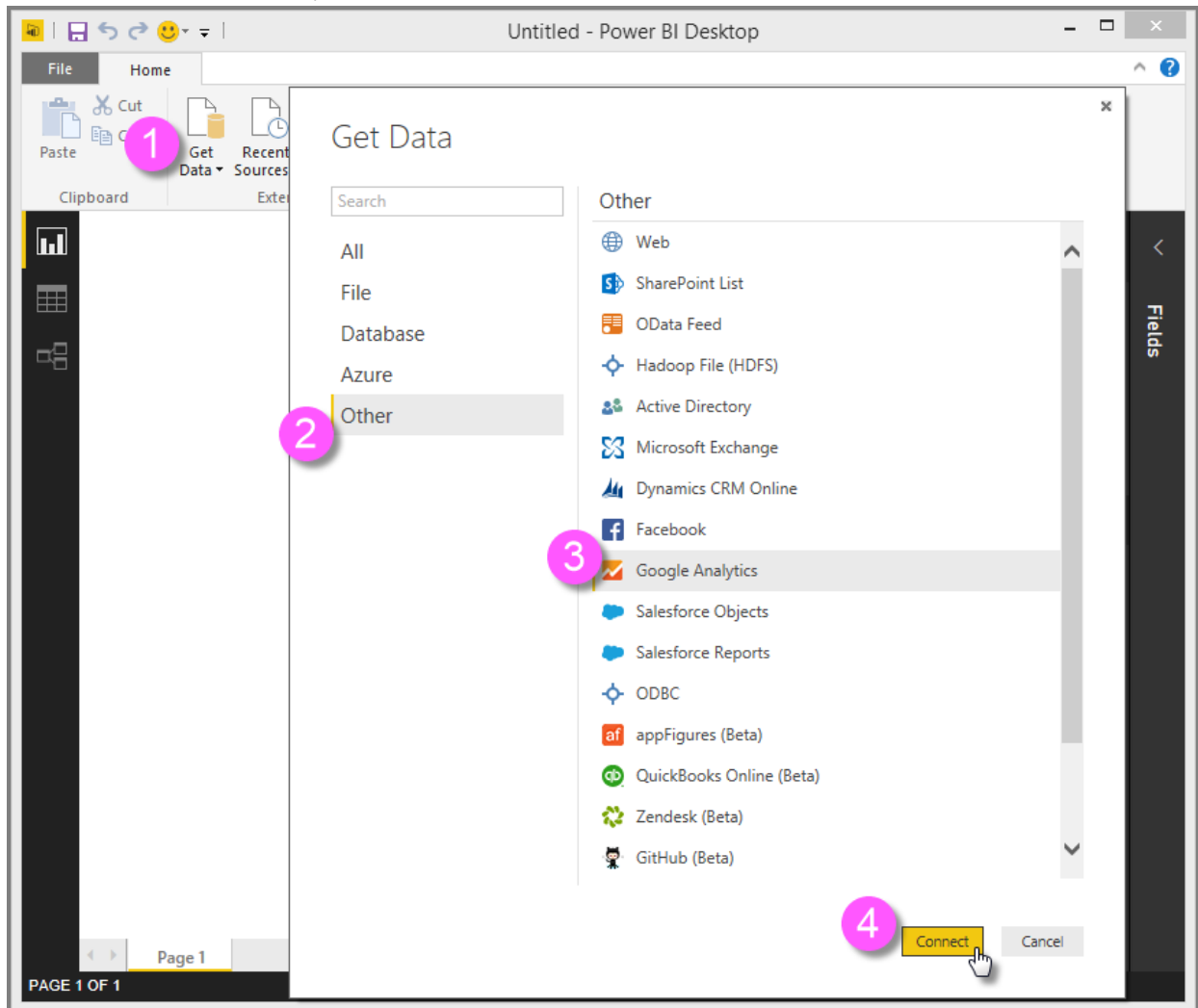
12/6/2017 • 1 min to read • [Edit Online](#)

NOTE

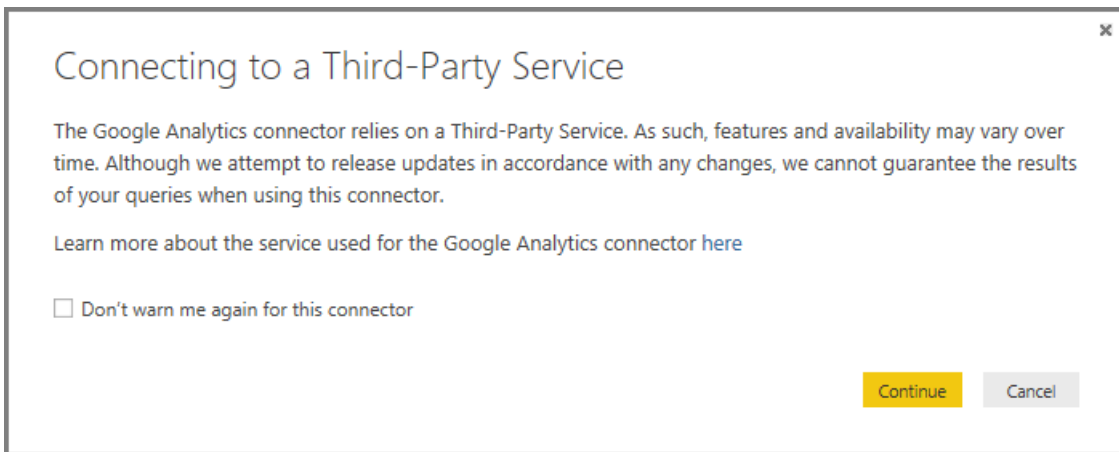
The Google Analytics content pack and the connector in Power BI Desktop rely on the Google Analytics Core Reporting API. As such, features and availability may vary over time.

You can connect to Google Analytics data using the **Google Analytics** connector. To connect, follow these steps:

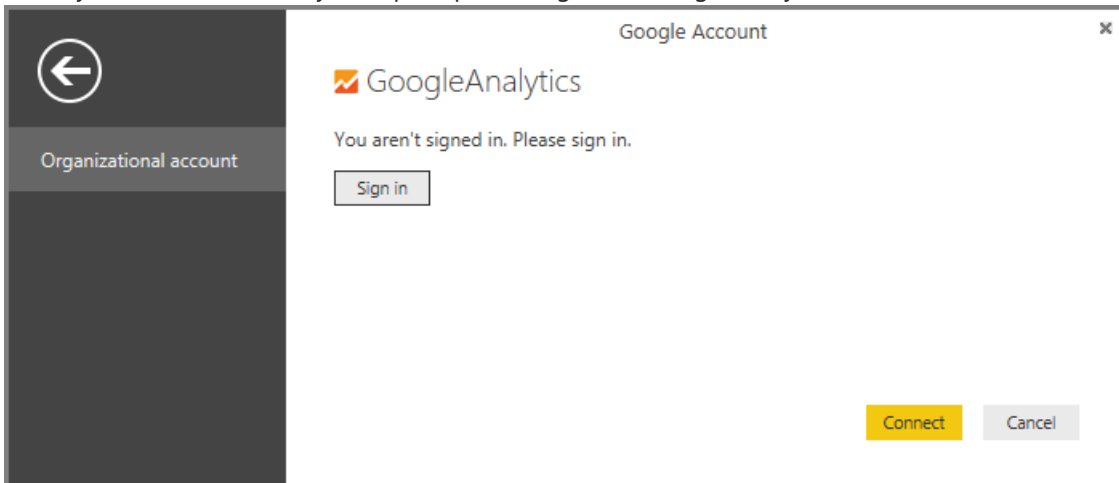
1. In **Power BI Desktop**, select **Get Data** from the **Home** ribbon tab.
2. In the **Get Data** window, select **Other** from the categories in the left pane.
3. Select **Google Analytics** from the selections in the right pane.
4. At the bottom of the window, select **Connect**.



You're prompted with a dialog that explains that the connector is a Third-Party Service, and warns about how features and availability may change over time, and other clarifications.

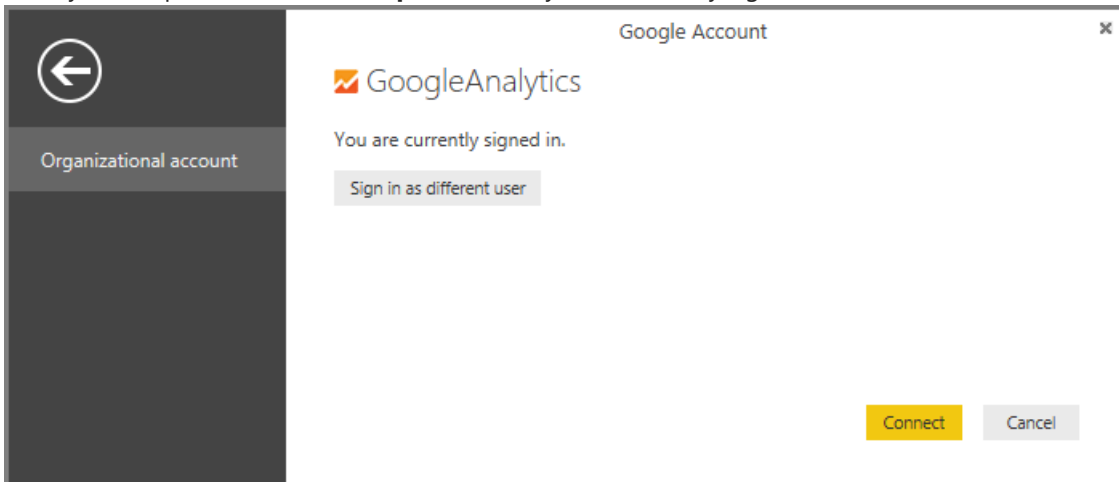


When you select **Continue**, you're prompted to sign in to Google Analytics.

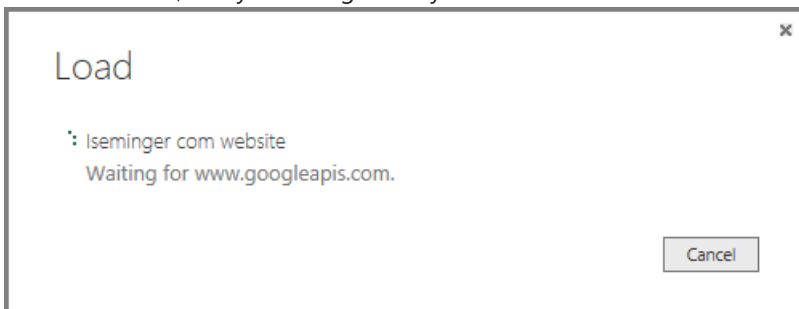


When you enter your credentials, you're prompted that Power BI would like to have offline access. This is how you use **Power BI Desktop** to access your Google Analytics data.

Once you accept, **Power BI Desktop** shows that you're currently signed in.



Select **Connect**, and your Google Analytics data is connected to **Power BI Desktop**, and loads the data.



Changes to the API

Although we attempt to release updates in accordance with any changes, the API may change in a way that affects the results of the queries we generate. In some cases, certain queries may no longer be supported. Due to this dependency we cannot guarantee the results of your queries when using this connector.

More details on changes to the Google Analytics API can be found in their [changelog](#).

Project Online: connect to data through Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

You can connect to data in Project Online through Power BI Desktop.

Step 1: Download Power BI Desktop

1. [Download Power BI Desktop](#), then run the installer to get **Power BI Desktop** on your computer.

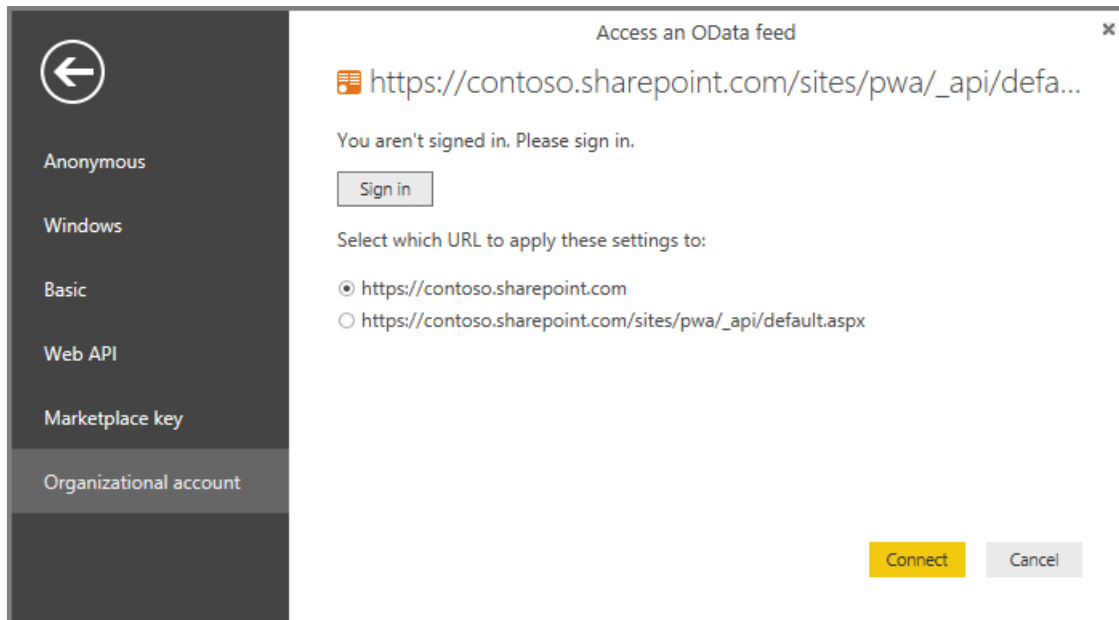
Step 2: Connect to Project Online with OData

1. Open **Power BI Desktop**.
2. On the *Welcome* screen, select **Get Data**.
3. Choose **OData feed** and select **Connect**.
4. Enter the address for your OData feed in the URL box, and then click OK.

If the address for your Project Web App site resembles <https://<tenantname>.sharepoint.com/sites/pwa>, the address you'll enter for your OData Feed is https://<tenantname>.sharepoint.com/sites/pwa/_api/Projectdata.

For our example, we're using <https://contoso.sharepoint.com/sites/pwa/default.aspx>

5. Power BI Desktop will prompt you to authenticate with your Office 365 account. Select Organizational account and then enter your credentials.



From here, you can choose which tables you would like to connect to and build a query. Want an idea of how to get started? The following blog post shows how to build a burndown chart from your Project Online data. The blog post refers to using Power Query to connect to Project Online, but this applies to Power BI Desktop as well.

[Creating burndown charts for Project using Power Pivot and Power Query](#)

Query overview in Power BI Desktop

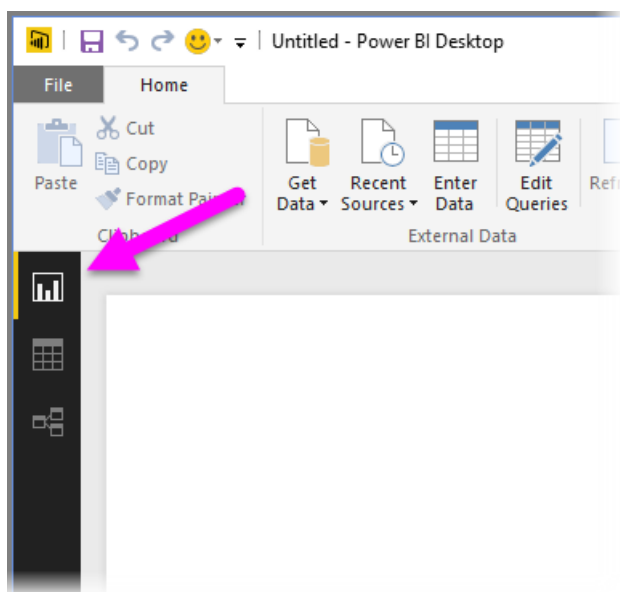
12/6/2017 • 6 min to read • [Edit Online](#)

With **Power BI Desktop** you can connect to the world of data, create compelling and foundational reports, and share your efforts with others – who can then build on your work, and expand their business intelligence efforts.

Power BI Desktop has three views:

- **Report** view – where you use queries you create to build compelling visualizations, arranged as you want them to appear, and with multiple pages, that you can share with others
- **Data** view – see the data in your report in data model format, where you can add measures, create new columns, and manage relationships
- **Relationships** view – get a graphical representation of the relationships that have been established in your data model, and manage or modify them as needed.

These views are accessed by selecting one of the three icons along the left side of Power BI Desktop. In the following image, Report view is selected, indicated by the yellow band beside the icon.



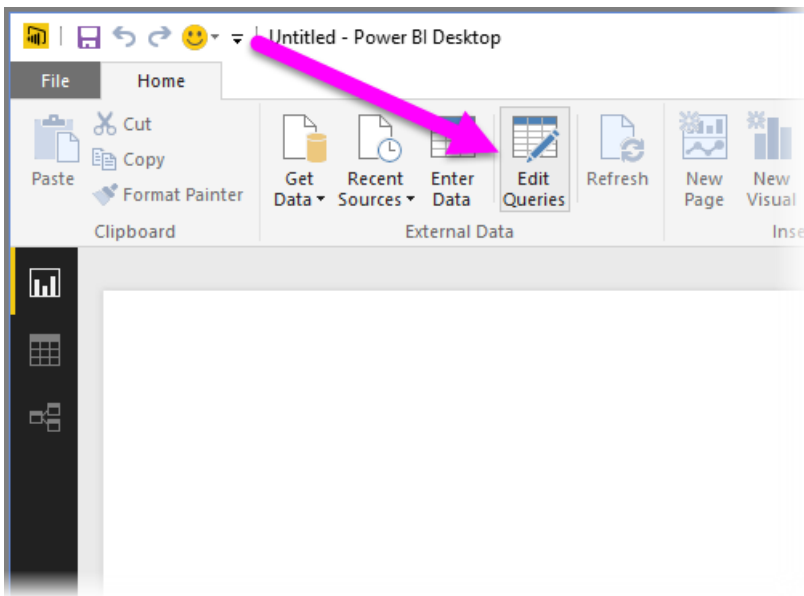
Power BI Desktop also comes with **Query Editor**, where you can connect to one or many data sources, shape and transform the data to meet your needs, then load that model into Power BI Desktop.

This document provides an overview of the work with data in the **Query Editor**. There's more to learn, of course, so at the end of this document you'll find links to detailed guidance about supported data types, connecting to data, shaping data, creating relationships, and how to get started.

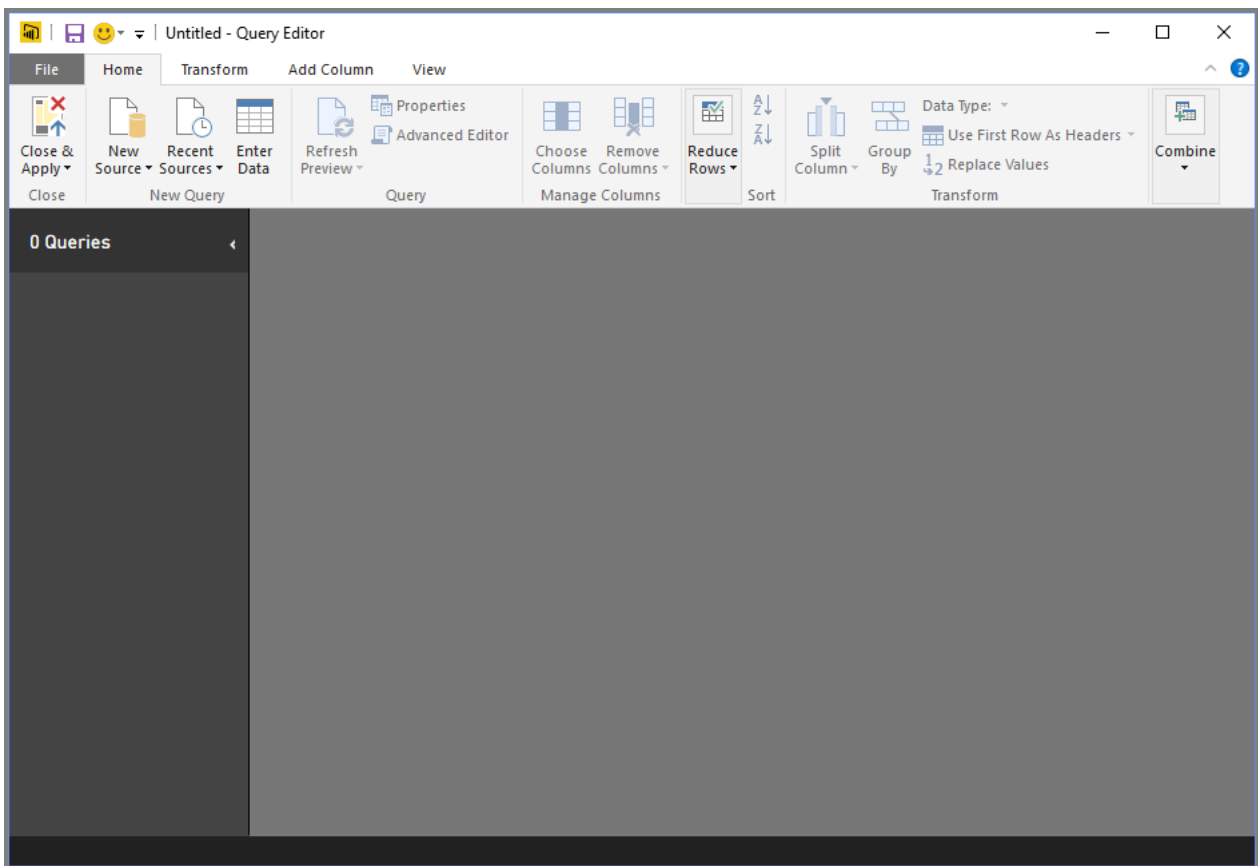
But first, let's see get acquainted with **Query Editor**.

The Query Editor

To get to **Query Editor**, select **Edit Queries** from the **Home** tab of Power BI Desktop.



With no data connections, **Query Editor** appears as a blank pane, ready for data.

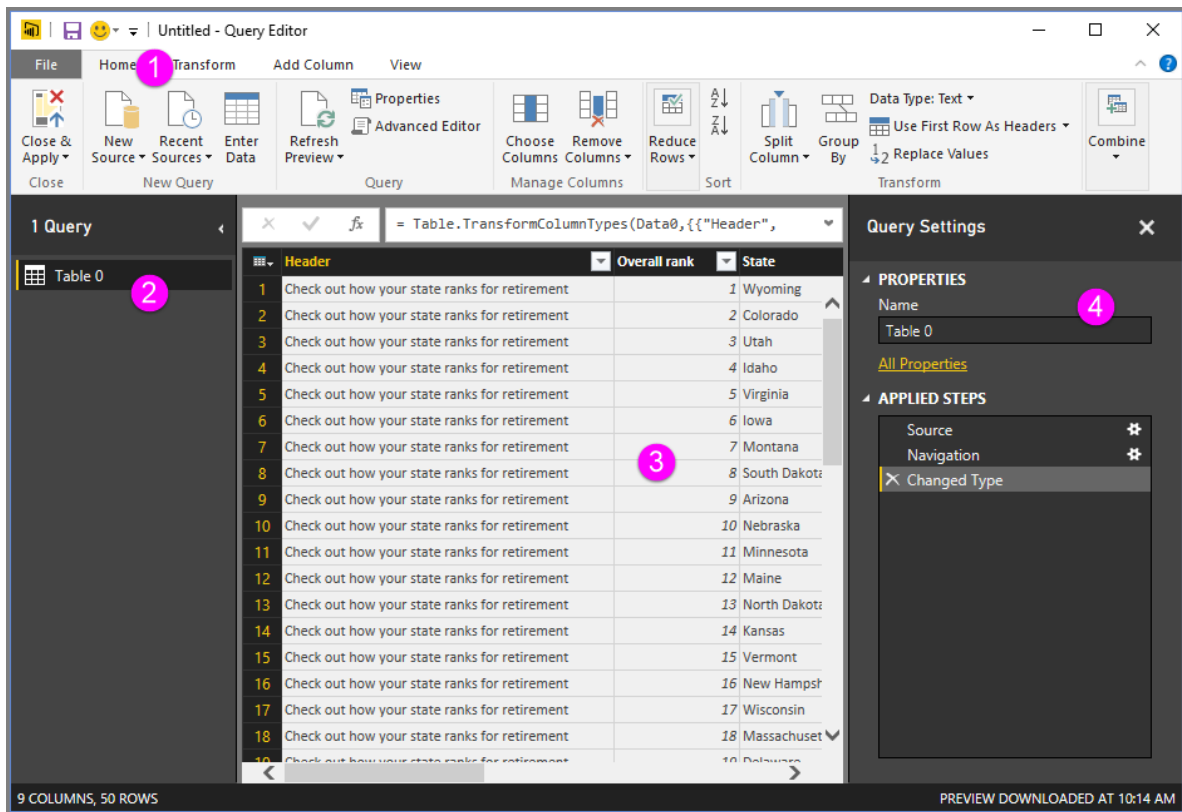


Once a query is loaded, **Query Editor** view becomes more interesting. If we connect to the following Web data source, **Query Editor** loads information about the data, which you can then begin to shape.

<http://www.bankrate.com/finance/retirement/best-places-retire-how-state-ranks.aspx>

Here's how **Query Editor** appears once a data connection is established:

1. In the ribbon, many buttons are now active to interact with the data in the query
2. In the left pane, queries are listed and available for selection, viewing, and shaping
3. In the center pane, data from the selected query is displayed and available for shaping
4. The **Query Settings** window appears, listing the query's properties and applied steps

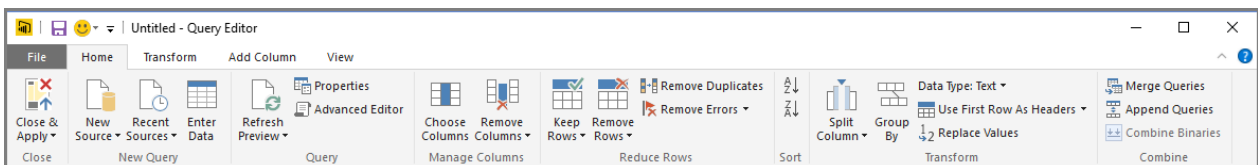


We'll look at each of these four areas – the ribbon, the queries pane, the data view, and the Query Settings pane – in the following sections.

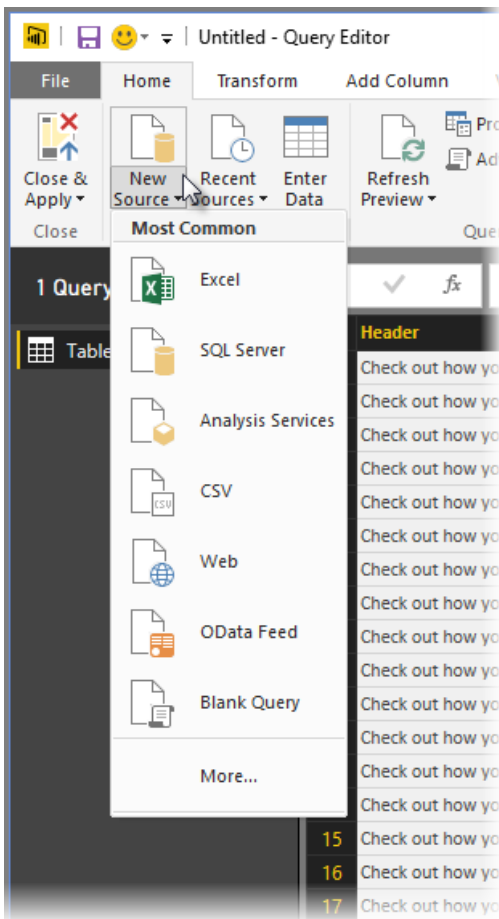
The query ribbon

The ribbon in **Query Editor** consists of four tabs – **Home**, **Transform**, **Add Column**, and **View**.

The **Home** tab contains the common query tasks, including the first step in any query, which is **Get Data**. The following image shows the **Home** ribbon.

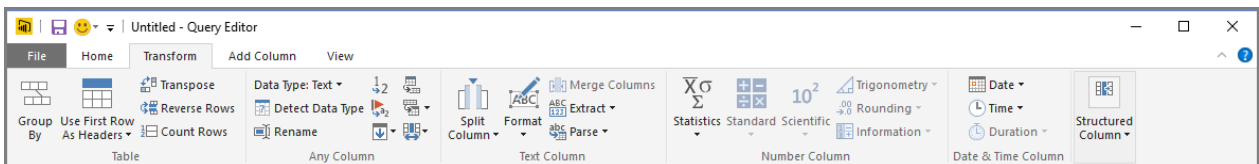


To connect to data and begin the query building process, select the **Get Data** button. A menu appears, providing the most common data sources.



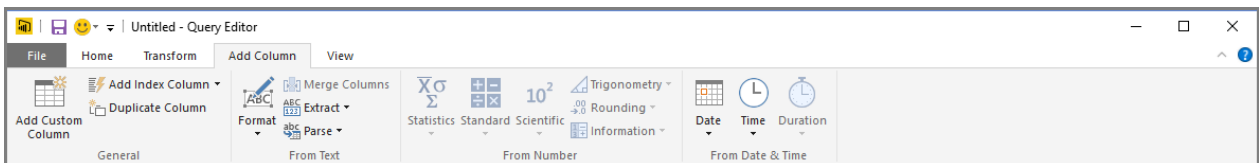
For more information about available data sources, see **Data Sources**. For information about connecting to data, including examples and steps, see **Connect to Data**.

The **Transform** tab provides access to common data transformation tasks, such as adding or removing columns, changing data types, splitting columns, and other data-driven tasks. The following image shows the **Transform** tab.

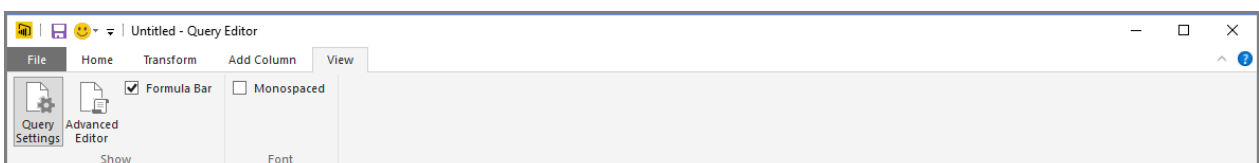


For more information about transforming data, including examples, see **Combine and Shape Data**.

The **Add Column** tab provides additional tasks associated with adding a column, formatting column data, and adding custom columns. The following image shows the **Add Column** tab.



The **View** tab on the ribbon is used to toggle whether certain panes or windows are displayed. It's also used to display the Advanced Editor. The following image shows the **View** tab.

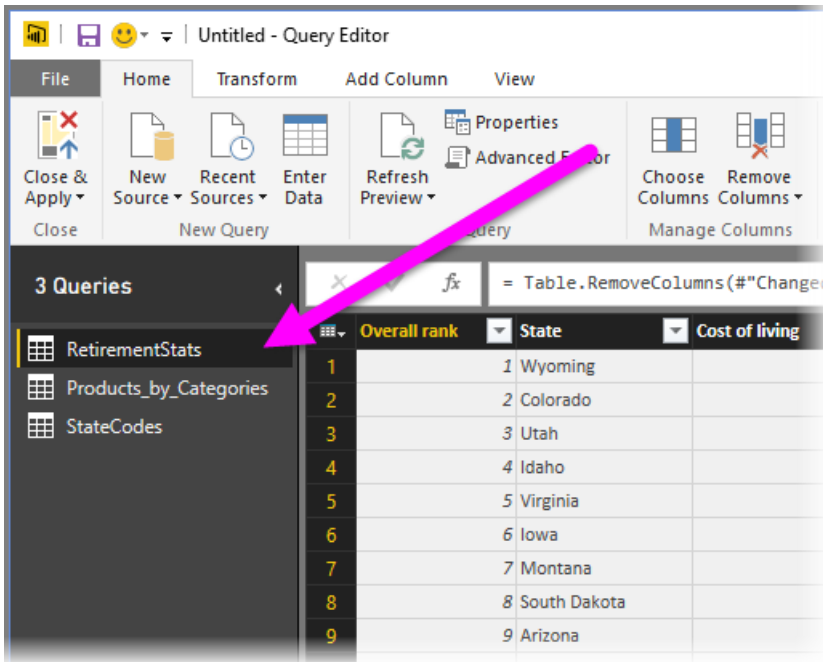


It's useful to know that many of the tasks available from the ribbon are also available by right-clicking a column,

or other data, in the center pane.

The left pane

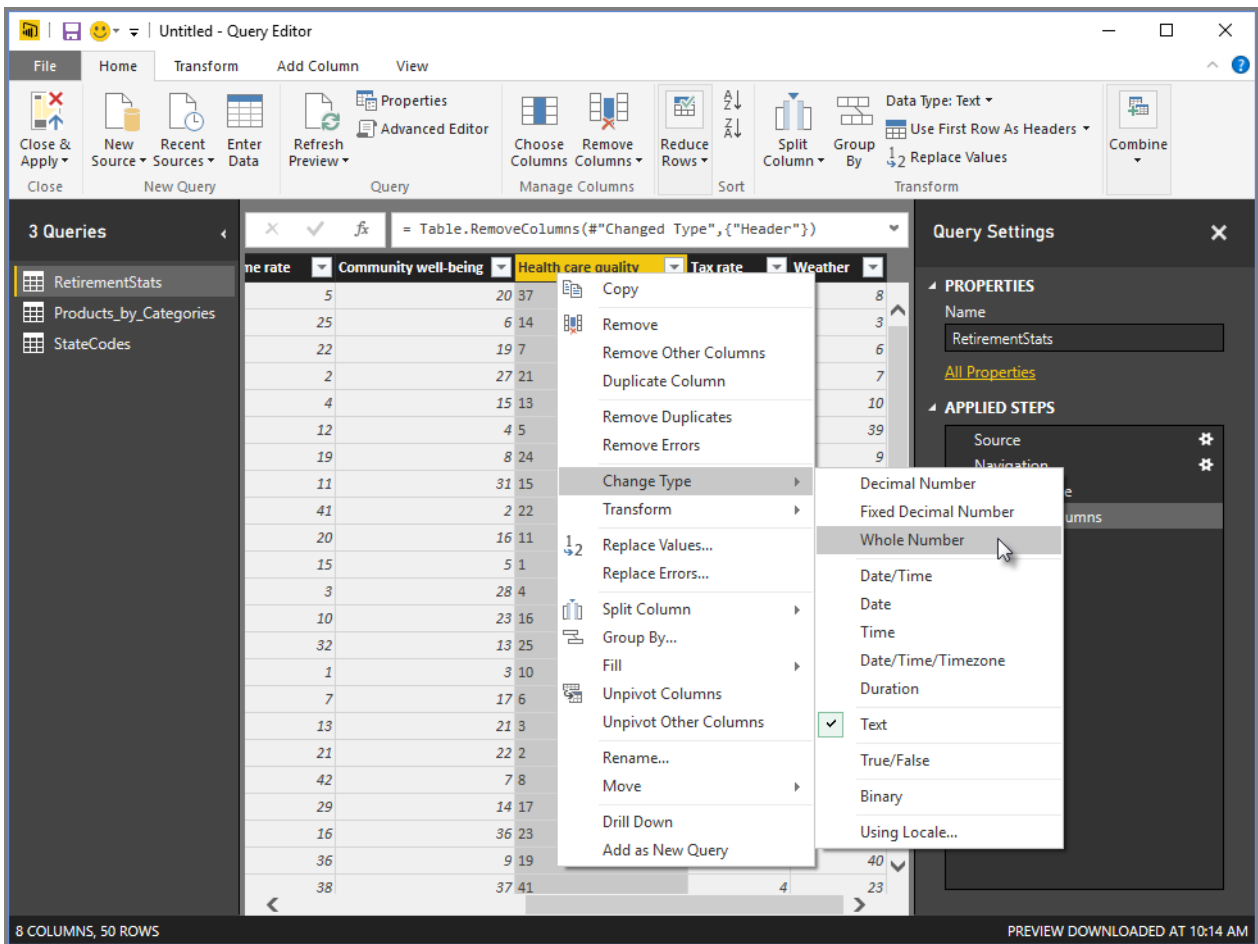
The left pane displays the number of active queries, as well as the name of the query. When you select a query from the left pane, its data is displayed in the center pane, where you can shape and transform the data to meet your needs. The following image shows the left pane with multiple queries.



The center (data) pane

In the center pane, or Data pane, data from the selected query is displayed. This is where much of the work of the Query view is accomplished.

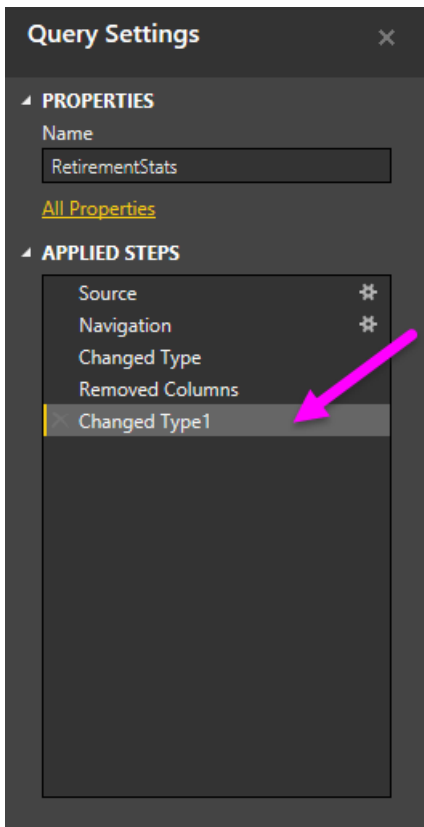
In the following image, the Web data connection established earlier is displayed, the **Overall score** column is selected, and its header is right-clicked to show the available menu items. Notice that many of these right-click menu items are the same as buttons in the ribbon tabs.



When you select a right-click menu item (or a ribbon button), Query applies the step to the data, and saves it as part of the query itself. The steps are recorded in the **Query Settings** pane in sequential order, as described in the next section.

The query settings pane

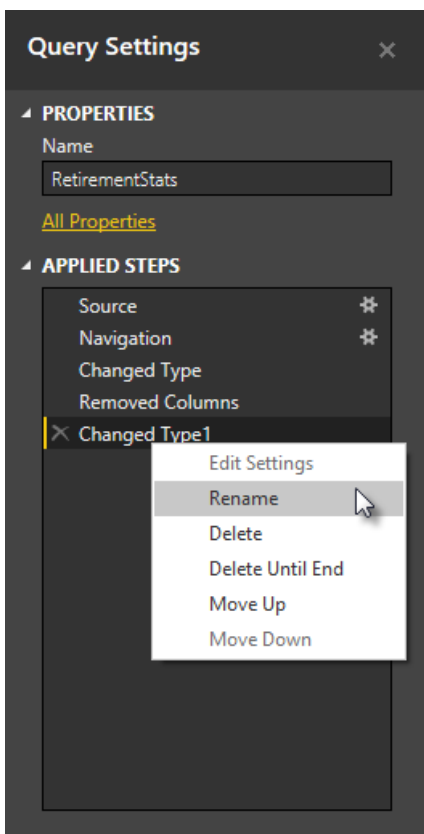
The **Query Settings** pane is where all steps associated with a query are displayed. For example, in the following image, the **Applied Steps** section of the **Query Settings** pane reflects the fact that we just changed the type of the **Overall score** column.



As additional shaping steps are applied to the query, they are captured in the **Applied Steps** section.

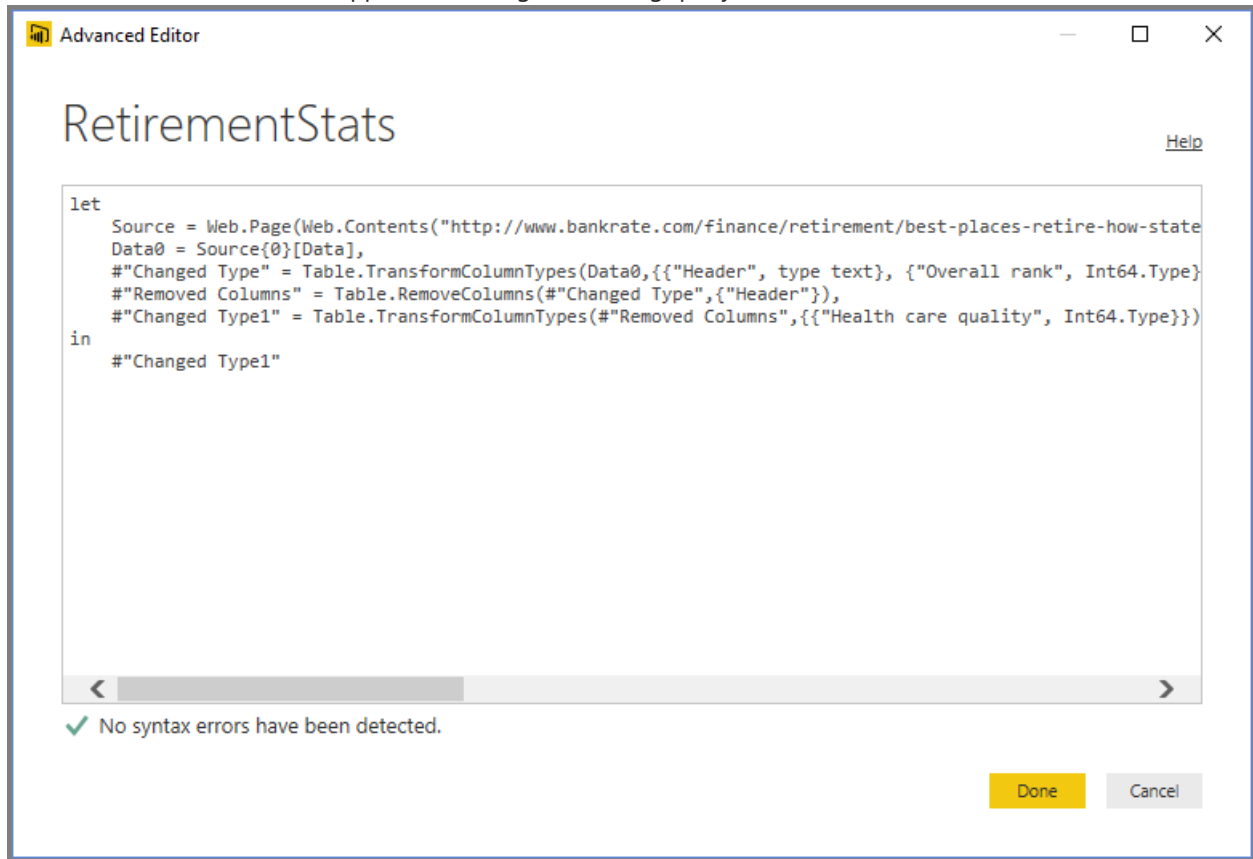
It's important to know that the underlying data is *not* changed; rather, Query Editor adjusts and shapes its view of the data, and any interaction with the underlying data occurs based on Query Editor's shaped and modified view of that data.

In the **Query Settings** pane, you can rename steps, delete steps, or reorder the steps as you see fit. To do so, right-click the step in the **Applied Steps** section, and choose from the menu that appears. All query steps are carried out in the order they appear in the **Applied Steps** pane.



The Advanced Editor

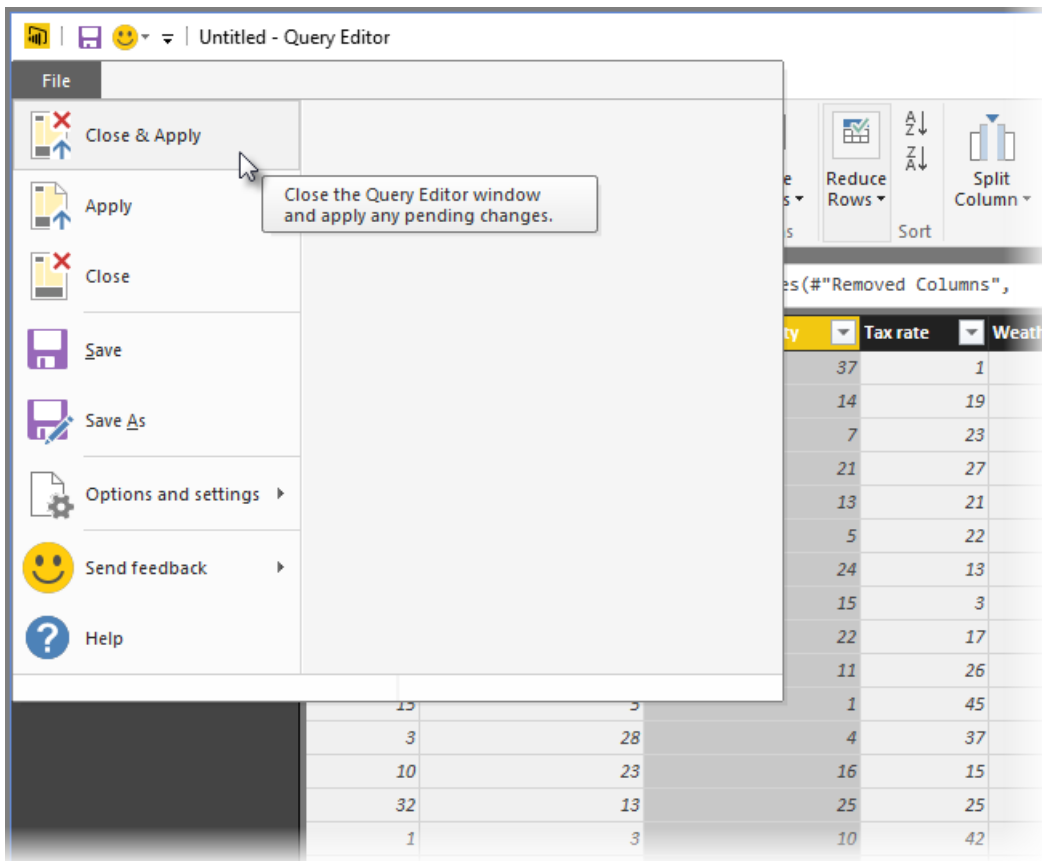
If you want to see the code that Query Editor is creating with each step, or want to create your own shaping code, you can use the **Advanced Editor**. To launch the advanced editor, select **View** from the ribbon, then select **Advanced Editor**. A window appears, showing the existing query code.



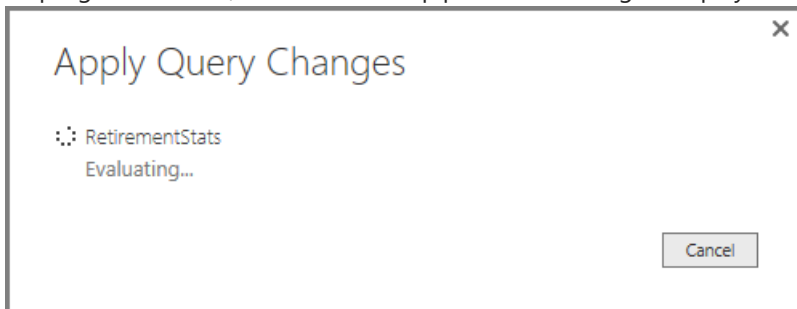
You can directly edit the code in the **Advanced Editor** window. To close the window, select the **Done** or **Cancel** button.

Saving your work

When your query is where you want it, you can have Query Editor apply the changes to the data model into Power BI Desktop, and close Query Editor. To do that, select **Close & Apply** from Query Editor's **File** menu.

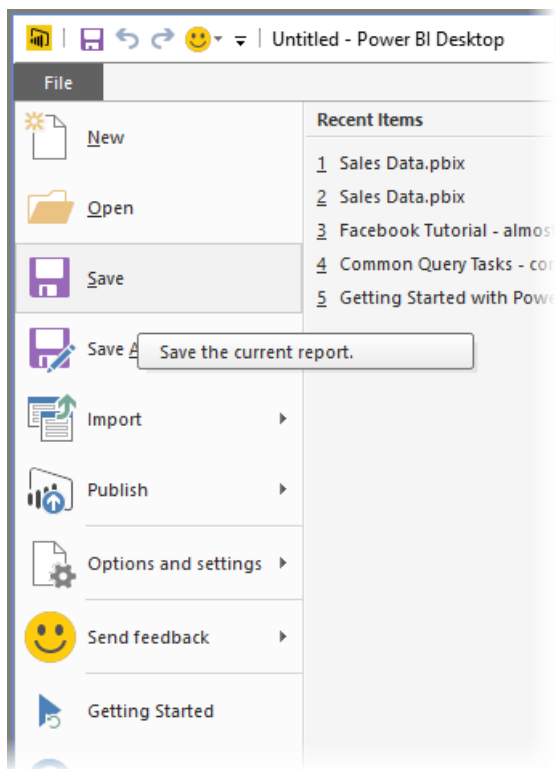


As progress is made, Power BI Desktop provides a dialog to display its status.



Once you have your query where you want it, or if you just want to make sure your work is saved, Power BI Desktop can save your work in the form of a .pbix file.

To save your work, select **File > Save** (or **File > Save As**), as shown in the following image.



Next steps

There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

-- title: Shape and combine data in Power BI Desktop description: Shape and combine data in Power BI Desktop services: powerbi documentationcenter: " author: davidiseminger manager: kfile backup: " editor: " tags: " qualityfocus: no qualitydate: "

ms.service: powerbi ms.devlang: NA ms.topic: article ms.tgt_pltfrm: NA ms.workload: powerbi ms.date: 01/30/2018 ms.author: davidi

Shape and combine data in Power BI Desktop

With **Power BI Desktop**, you can connect to many different types of data sources, then shape the data to meet your needs. *Shaping* data means transforming the data – such as renaming columns or tables, changing text to numbers, removing rows, setting the first row as headers, and so on. *Combining* data means connecting to two or more data sources, shaping them as needed, then consolidating them into one useful query.

This document demonstrates how to shape a query using Power BI Desktop, highlighting some of the most common tasks. The query used here is described in more detail, including how to create the query from scratch, in [Getting Started with Power BI Desktop](#).

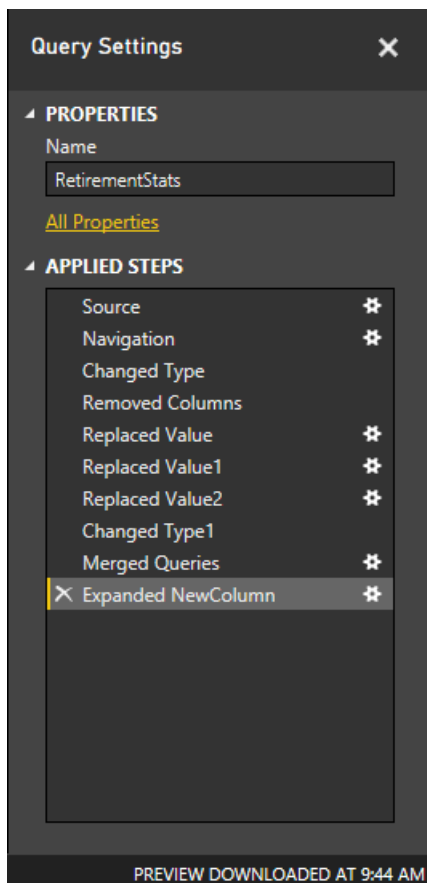
It's useful to know that the **Query Editor** in Power BI Desktop makes ample use of right-click menus, as well as the ribbon. Most of what you can select in the **Transform** ribbon is also available by right-clicking an item (such as a column) and choosing from the menu that appears.

Shape data

When you shape data in the Query Editor, you're providing step-by-step instructions (that Query Editor carries out for you) to adjust the data as Query Editor loads and presents it. The original data source is not affected; only this particular view of the data is adjusted, or *shaped*.

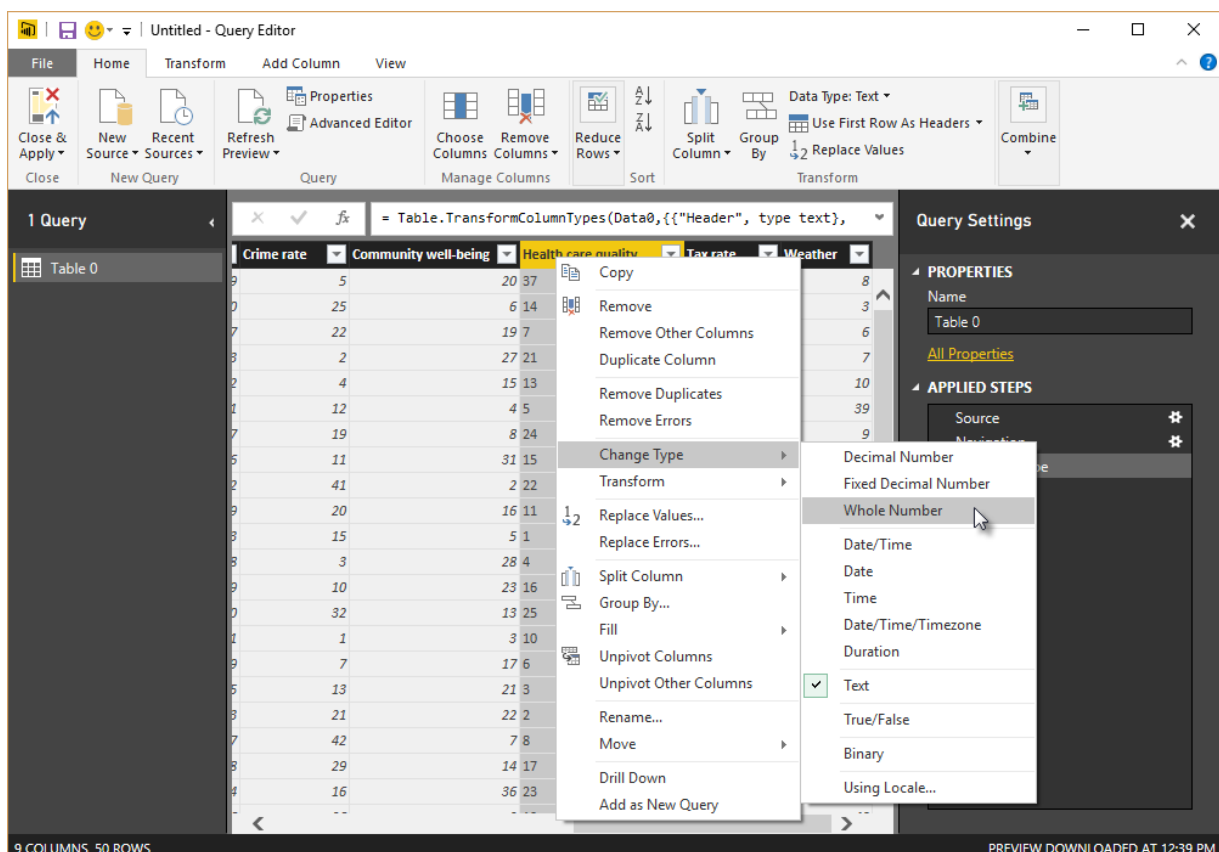
The steps you specify (such as rename a table, transform a data type, or delete columns) are recorded by Query Editor, and each time this query connects to the data source those steps are carried out so that the data is always shaped the way you specify. This process occurs whenever you use the Query Editor feature of Power BI Desktop, or for anyone who uses your shared query, such as on the **Power BI** service. Those steps are captured, sequentially, in the **Query Settings** pane under **Applied Steps**.

The following image shows the **Query Settings** pane for a query that has been shaped – we'll go through each of those steps in the next few paragraphs.

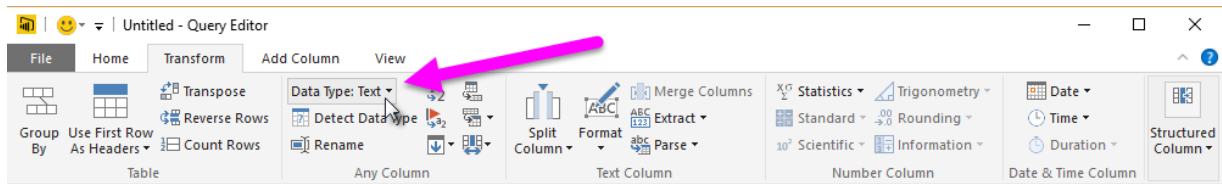


Using the retirement data from [Getting Started with Power BI Desktop](#), which we found by connecting to a Web data source, let's shape that data to fit our needs.

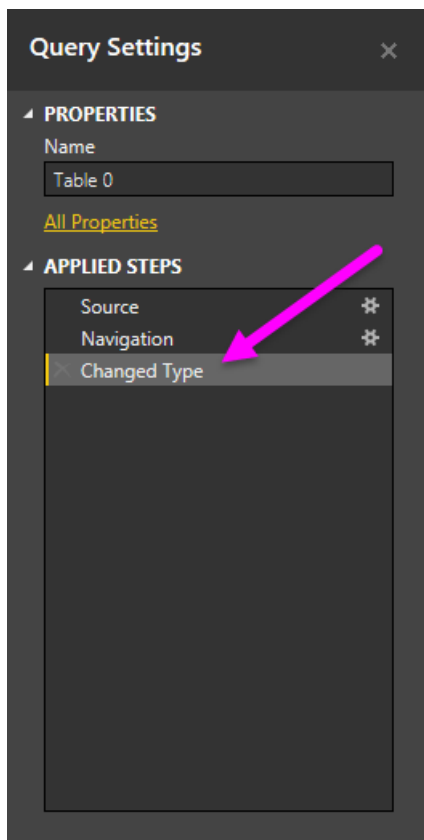
For starters, one column's scores were not automatically transformed from text to numbers when Query Editor loaded the table, and we need them to be numbers. No problem – just right-click the column header, and select **Change Type > Whole Number** to change them. To choose more than one column, first select a column then hold down **SHIFT**, select additional adjacent columns, and then right-click a column header to change all selected columns. You can also use the **CTRL** key to choose non-adjacent columns.



You can also *transform* those columns from text to header from the **Transform** ribbon. Here's the **Transform** ribbon, with an arrow pointing toward the **Data Type** button, which lets you transform the current data type to another.



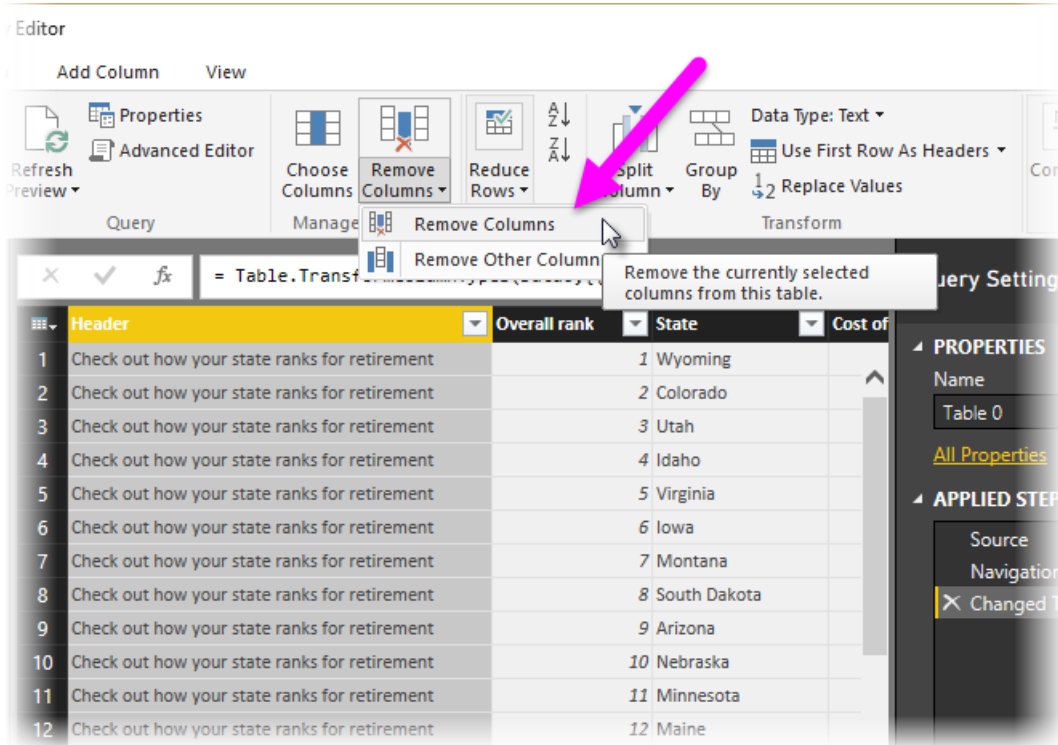
Note that in **Query Settings**, the **Applied Steps** reflect any shaping steps applied to the data. If I want to remove any step from the shaping process, I simply select the **X** to the left of the step. In the following image, **Applied Steps** reflects the steps so far: connecting to the website (**Source**); selecting the table (**Navigation**); and while loading the table, Query Editor automatically changed text-based number columns from *Text* to *Whole Number* (**Changed Type**). One column of rankings was not automatically changed to a number-based type, and we'll find out why in the next few paragraphs.



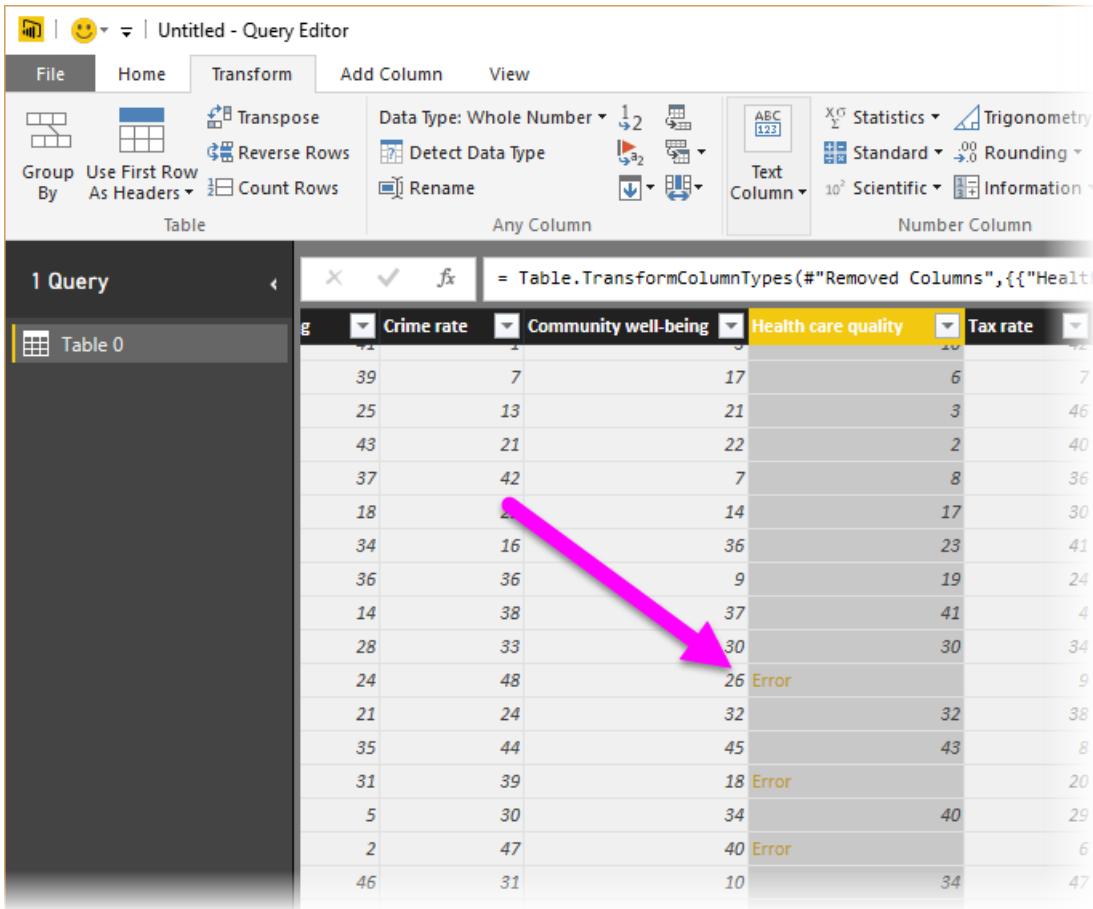
Before we can work with this query, we need to make a few changes to get its data where we want it:

- *Remove the first column* – we don't need it, it just includes redundant rows that say "Check out how your state ranks for retirement" which is an artifact of this data source being a Web-based table
- *Fix a few Errors* – one of the columns, **Health care quality**, contains a few ties in states' rankings, which was noted on the website by having the text (*tie*) after their numbers. That works well on the website, but it requires that we transform the column from text to data manually. It's easy to fix this using Power BI Desktop, and doing so demonstrates a cool feature of **Applied Steps** in Query
- *Change the Table Name* – that **Table 0** is not a useful descriptor, but changing it simple

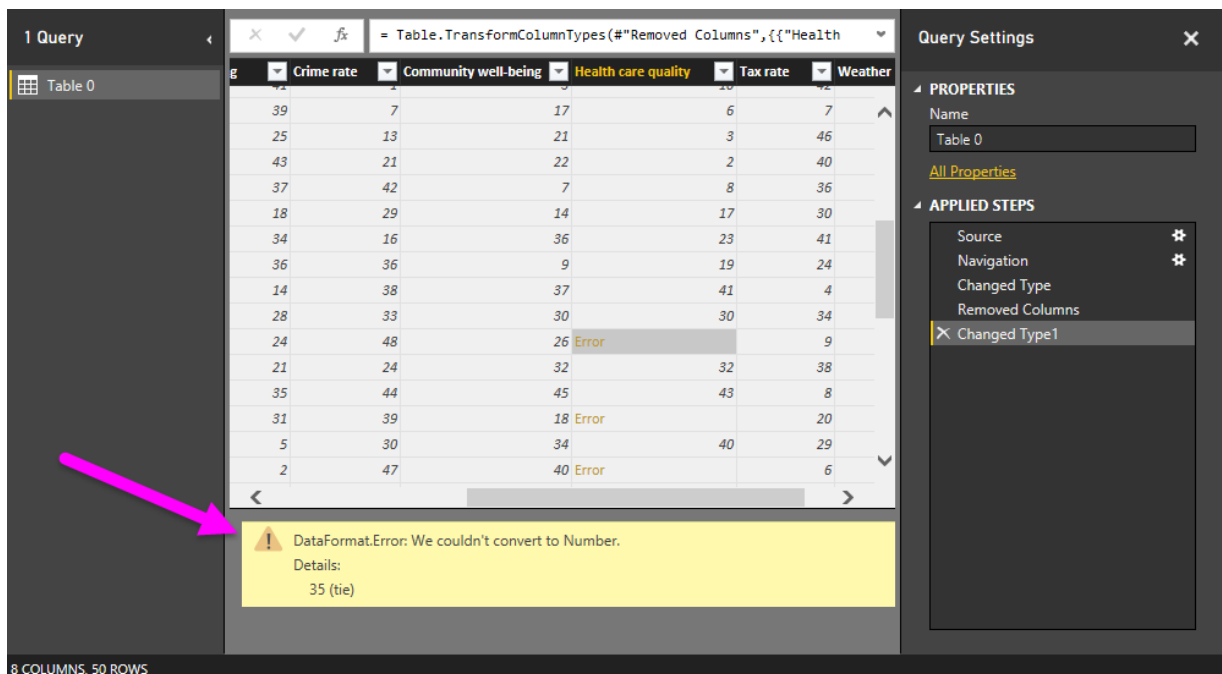
To remove the first column, simply select the column and choose the **Home** tab from the ribbon, then **Remove Columns** as shown in the following figure.



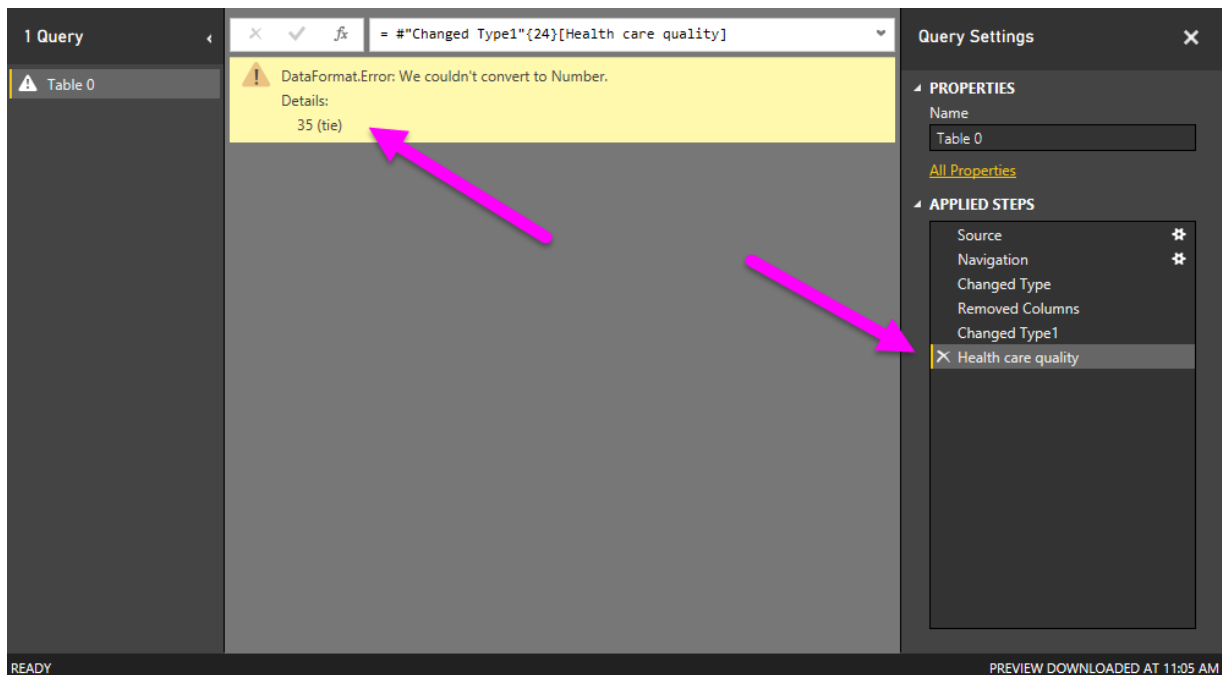
Next we need to address the text column, and transform it into numbers. At first it seems straightforward, that we can just change the type of the **Health care quality** column from text to number (such as *Whole Number*, or *Decimal Number*). But when we change the type from **Text** to **Whole Number**, then look through the values in that column, we find that Query Editor reports a few errors.



There are a few ways to get more information about each error. You can select the cell (without clicking on the word **Error**), or click the word **Error** directly. If you select the cell *without* clicking directly on the word **Error**, Query Editor displays the error information on the bottom of the window.



If you click the word *Error* directly, Query creates an **Applied Step** in the **Query Settings** pane and displays information about the error.



To get back to the Query Editor, you have to remove that step by selecting the **X** next to it.

When we select the most recent **Applied Step**, we see the error just described, as shown in the following image.

1 Query

Table 0

Cost of living Crime rate Community well-being Health care quality Tax rate

25	13	21	3
43	21	22	2
37	42	7	8
18	29	14	17
34	16	36	23
36	36	9	19
14	38	37	41
28	33	70	30
24	48	26 Error	32
21	24	32	32
35	44	45	43
31	39	18 Error	34
5	30	34	40
2	47	40 Error	34
46	31	10	27
40	34	11	42
15	35	33	31
17	27	41	33
12	43	35	47
1	23	44	48
13	50	38	

8 COLUMNS, 50 ROWS

PREVIEW DOWNLOADED AT 9:44 AM

Query Settings

PROPERTIES

Name

Table 0

All Properties

APPLIED STEPS

- Source
- Navigation
- Changed Type
- Removed Columns
- Changed Type1

Since Query Editor records steps sequentially, we can select the step prior to changing the type, in **Applied Steps**, and see what the value of that cell is prior to the transformation, as shown in the following image.

1 Query

Table 0

Cost of living Crime rate Community well-being Health care quality Tax rate

25	13	21	3
43	21	22	2
37	42	7	8
18	29	14	17
34	16	36	23
36	36	9	19
14	38	37	41
28	33	70	30
24	48	26 35 (tie)	32
21	24	32	32
35	44	45	43
31	39	18 35 (tie)	34
5	30	34	40
2	47	40 38 (tie)	34
46	31	10	27
40	34	11	42
15	35	33	31
17	27	41	33
12	43	35	47
1	23	44	48
13	50	38	

8 COLUMNS, 50 ROWS

PREVIEW DOWNLOADED AT 9:44 AM

Query Settings

PROPERTIES

Name

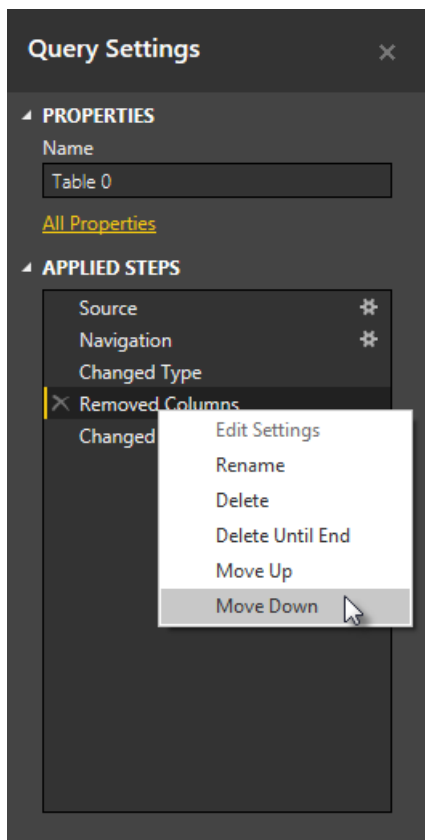
Table 0

All Properties

APPLIED STEPS

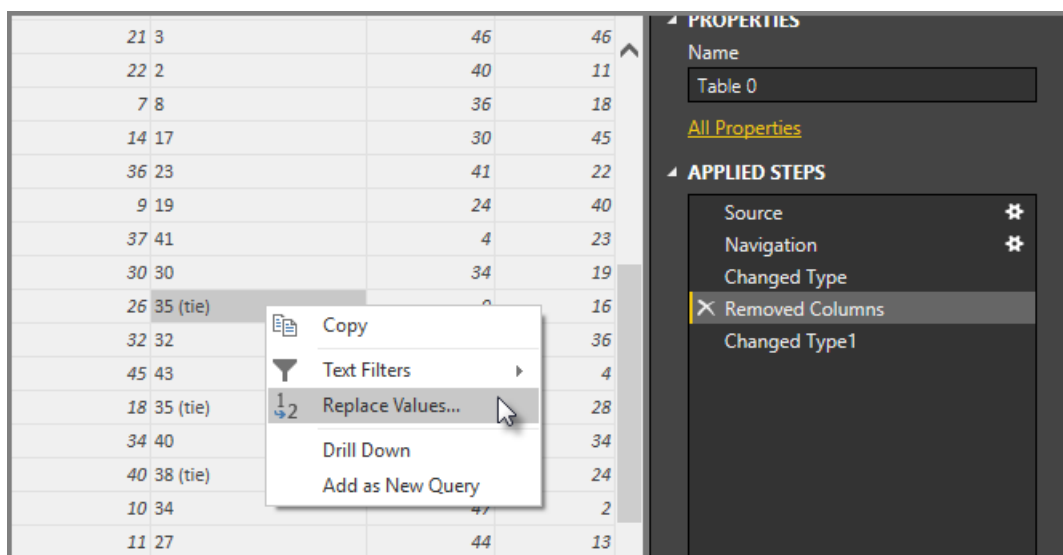
- Source
- Navigation
- Changed Type
- Removed Columns
- Changed Type1

Okay, now we can fix those values, and *then* change the type. Since Query Editor records the steps sequentially, yet independently of each other, you can move each **Applied Step** up or down in the sequence. Just right-click any step, and Query Editor provides a menu that lets you do the following: **Rename**, **Delete**, **Delete Until End** (remove the current step, and all subsequent steps too), **Move Up**, or **Move Down**.

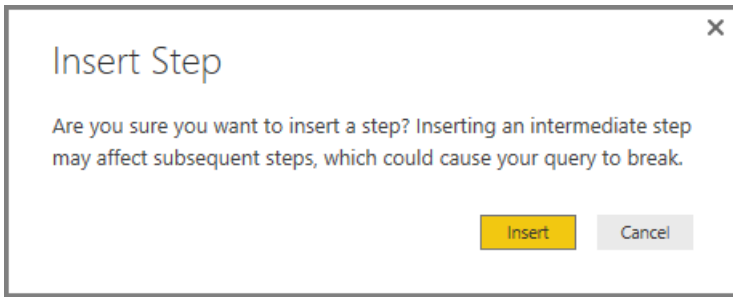


In addition, you can select an **Applied Step** anywhere in the list, and continue shaping the data at that point in the sequence. Query Editor will automatically insert a new step directly after the currently selected **Applied Step**. Let's give that a try.

First, we select the **Applied Step** prior to changing the type of the **Health care quality** column. Then we replace the values that have the text "(tie)" in the cell so that only the number remains. Right-click the cell that contains "35 (tie)" and select *Replace Values...* from the menu that appears. Note which **Applied Step** is currently selected (the step prior to changing the type).



Since we're inserting a step, Query Editor warns us about the danger of doing so - subsequent steps could cause the query to break. We need to be careful, and thoughtful! Since this is a tutorial, and we're highlighting a really cool feature of Query Editor to demonstrate how you can create, delete, insert, and reorder steps, we'll push ahead and select **Insert**.



There are three ties, so we replace the values for each. When you create a new Applied Step, Query Editor names it based on the action - in this case, **Replaced Value**. When you have more than one step with the same name in your query, Query Editor adds a number (in sequence) to each subsequent **Applied Step** to differentiate between them.

The following screen shows the three **Replaced Value** steps in **Query Settings**, but it also shows something else that's even more interesting: since we removed each instance of the text "(tie)" from the **Health care quality** column, the **Changed Type** step now completes *with no errors*.

The screenshot shows a data table with 15 rows and 4 columns. Two rows (row 5 and row 6) have pink arrows pointing to the second column. To the right is the "APPLIED STEPS" pane, which lists several steps: Source, Navigation, Changed Type, Removed Columns, Replaced Value, Replaced Value1, Replaced Value2, and Changed Type1. The "Changed Type1" step is highlighted with a yellow bar and a small 'X' icon next to it.

36	23	41	22
9	19	24	40
37	41	4	23
30	30	34	19
26	35	9	16
32	32	38	36
45	43	8	4
18	35	20	28
34	40	29	34
40	38	6	24
10	34	47	2
11	27	44	13

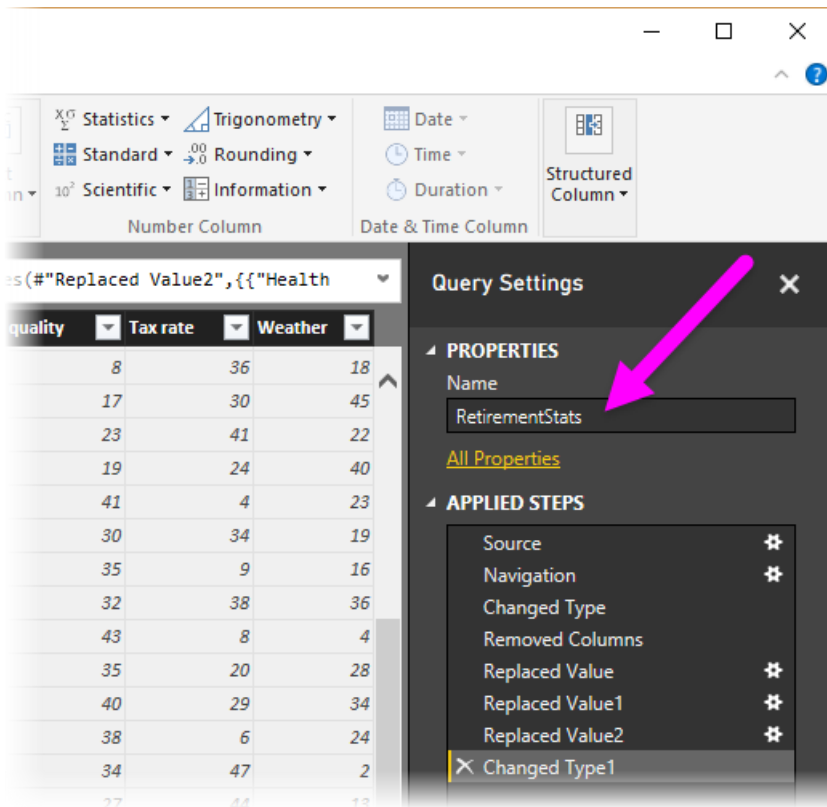
NOTE

You can also **Remove Errors** (using the ribbon or the right-click menu), which removes any rows that have errors. In this case it would've removed all the states that had "(tie)" from our data, and we didn't want to do that - we like all the states, and want to keep them in the table.

Okay that was a little involved, but it was a good example of how powerful and versatile Query Editor can be.

Lastly, we want to change the name of that table to something descriptive. When we get to creating reports, it's especially useful to have descriptive table names, especially when we connect to multiple data sources, and they're all listed in the **Fields** pane of the **Report** view.

Changing the table name is easy: in the **Query Settings** pane, under **Properties**, simply type in the new name of the table, as shown in the following image, and hit **Enter**. Let's call this table *RetirementStats*.



Okay, we've shaped that data to the extent we need to. Next let's connect to another data source, and combine data.

Combine data

That data about various states is interesting, and will be useful for building additional analysis efforts and queries. But there's one problem: most data out there uses a two-letter abbreviation for state codes, not the full name of the state. We need some way to associate state names with their abbreviations.

We're in luck: there's another public data source that does just that, but it needs a fair amount of shaping before we can connect it to our retirement table. Here's the Web resource for state abbreviations:

http://en.wikipedia.org/wiki/List_of_U.S._state_abbreviations

From the **Home** ribbon in Query Editor, we select **New Source > Web** and type the address, select OK, and the Navigator shows what it found on that Web page.

Navigator

Table[edit]
Preview downloaded on Saturday, July 18, 2015

Show All | Show Selected [1]

- http://en.wikipedia.org/wiki/List_of_U.S._state_...
 - Document
 - Mis-matches between USPS and USCG co...
 - Table 2
 - Table[edit]

Region Name	Region Status	Codes ISO	Codes ANSI
Region	Region	Codes	Codes
Name	Status	ISO	ANSI
United States	Federal state	US USA 840	US
Alabama	State	US-AL	AL
Alaska	State	US-AK	AK
Arizona	State	US-AZ	AZ
Arkansas	State	US-AR	AR
California	State	US-CA	CA
Colorado	State	US-CO	CO
Connecticut	State	US-CT	CT
Delaware	State	US-DE	DE
District of Columbia	Federal district	US-DC	DC
Florida	State	US-FL	FL
Georgia	State	US-GA	GA
Hawaii	State	US-HI	HI
Idaho	State	US-ID	ID
Illinois	State	US-IL	IL
Indiana	State	US-IN	IN
Iowa	State	US-IA	IA
Kansas	State	US-KS	KS
Kentucky	State (Commonwealth)	US-KY	KY
Louisiana	State	US-LA	LA

OK Cancel

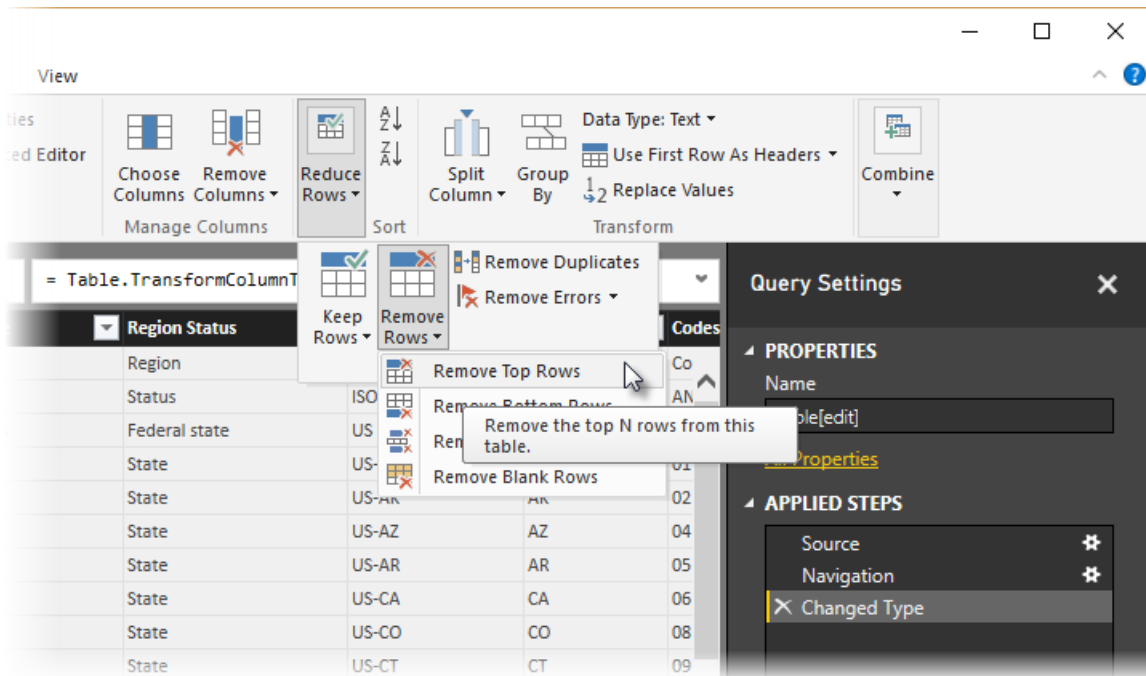
We select **Table[edit]** because that includes the data we want, but it's going to take quite a bit of shaping to pare that table's data down to what we want.

TIP

Is there a faster or easier way to accomplish the steps below? Yes, we could create a *relationship* between the two tables, and shape the data based on that relationship. The following steps are still good to learn for working with tables, just know that relationships can help you quickly use data from multiple tables.

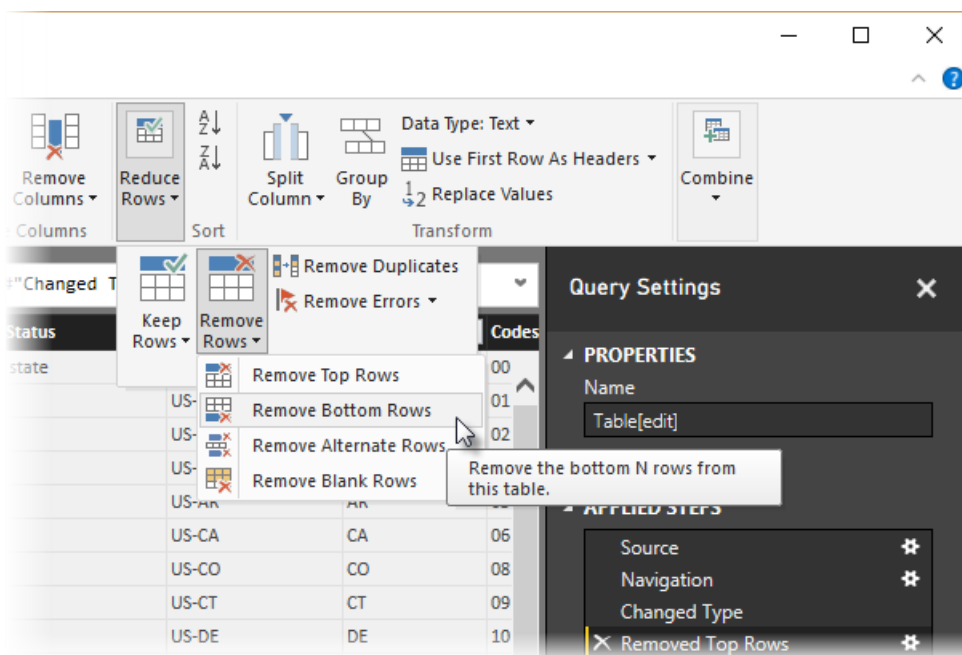
To get this data into shape, we take the following steps:

- Remove the top two rows – they're a result of the way that Web page's table was created, and we don't need them. From the **Home** ribbon, select **Reduce Rows > Remove Rows > Remove Top Rows**.

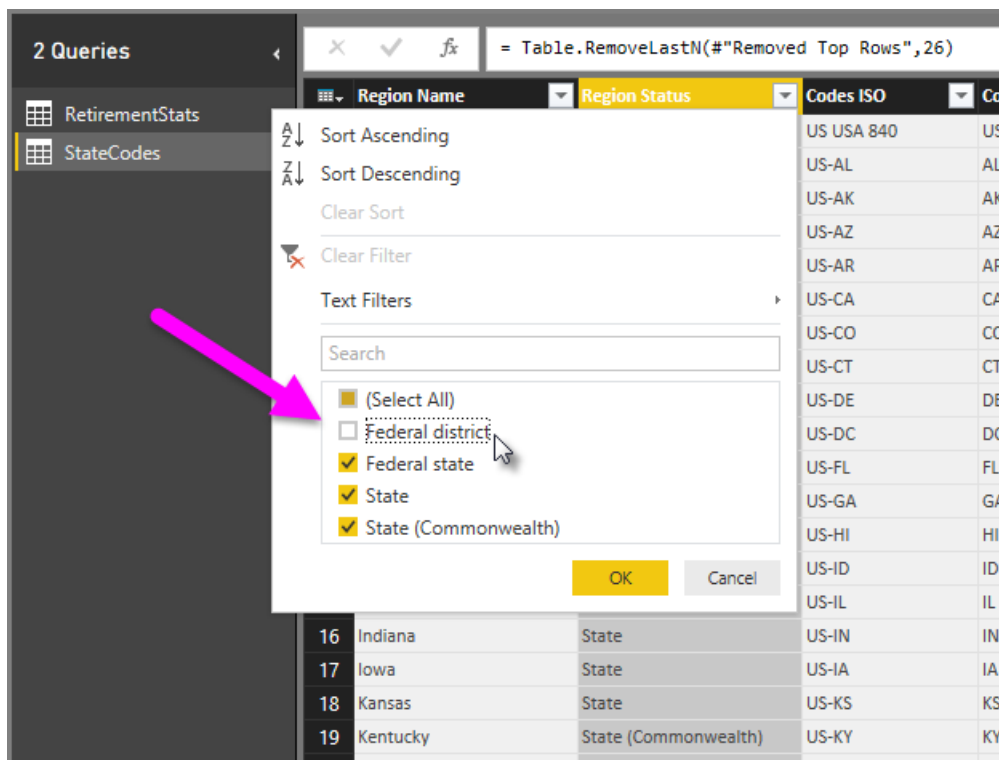


The **Remove Top Rows** window appears, letting you specify how many rows you want to remove.

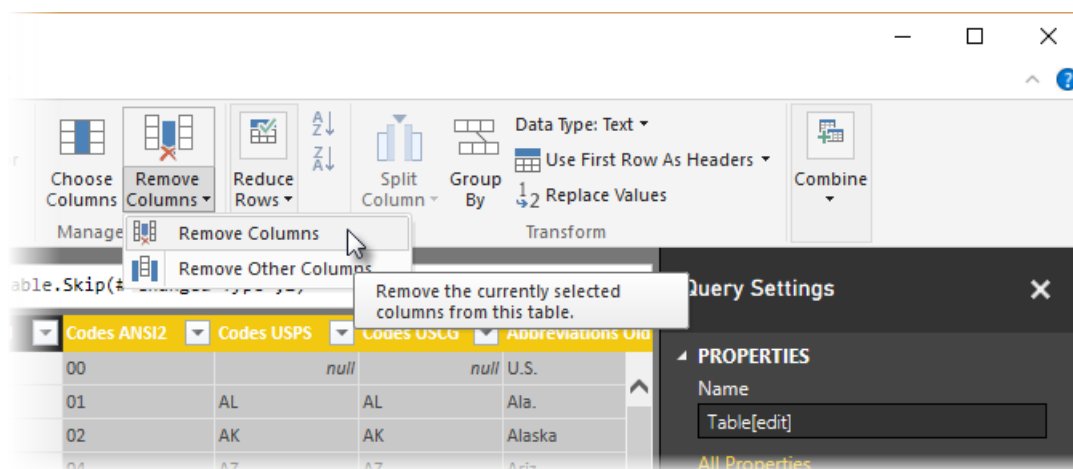
- Remove the bottom 26 rows – they’re all the territories, which we don’t need to include. From the **Home** ribbon, select **Reduce Rows > Remove Rows > Remove Bottom Rows**.



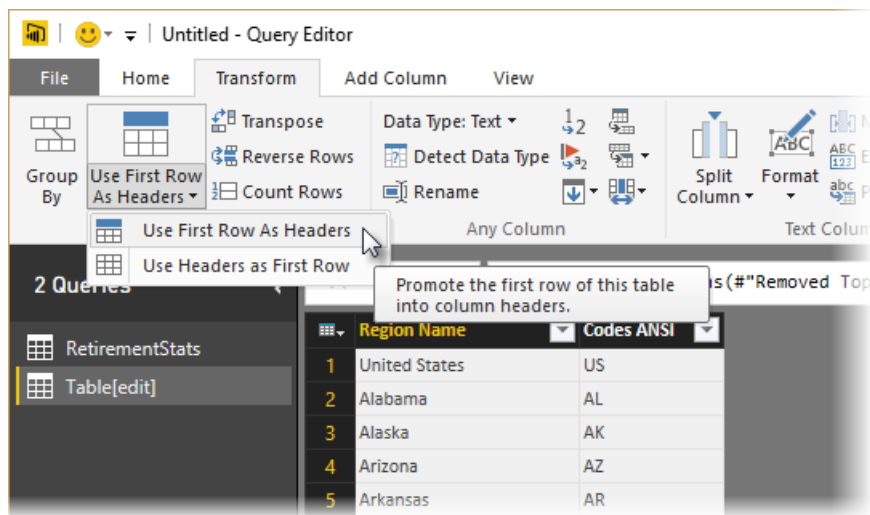
- Since the RetirementStats table doesn't have information for Washington DC, we need to filter it from our list. Select the drop-down arrow beside the Region Status column, then clear the checkbox beside **Federal district**.



- Remove a few unneeded columns – we only need the mapping of state to its official two-letter abbreviation, so we can remove the following columns: **Column2**, **Column3**, and then **Column5** through **Column10**. First select Column2, then hold down the **CTRL** key and select the other columns to be removed (this lets you select multiple, non-contiguous columns). From the Home tab on the ribbon, select **Remove Columns > Remove Columns**.



- Use the first row as headers – since we removed the top three rows, the current top row is the header we want. You can select **Use First Row As Headers** from the **Home** tab, or from the **Transform** tab in the ribbon.



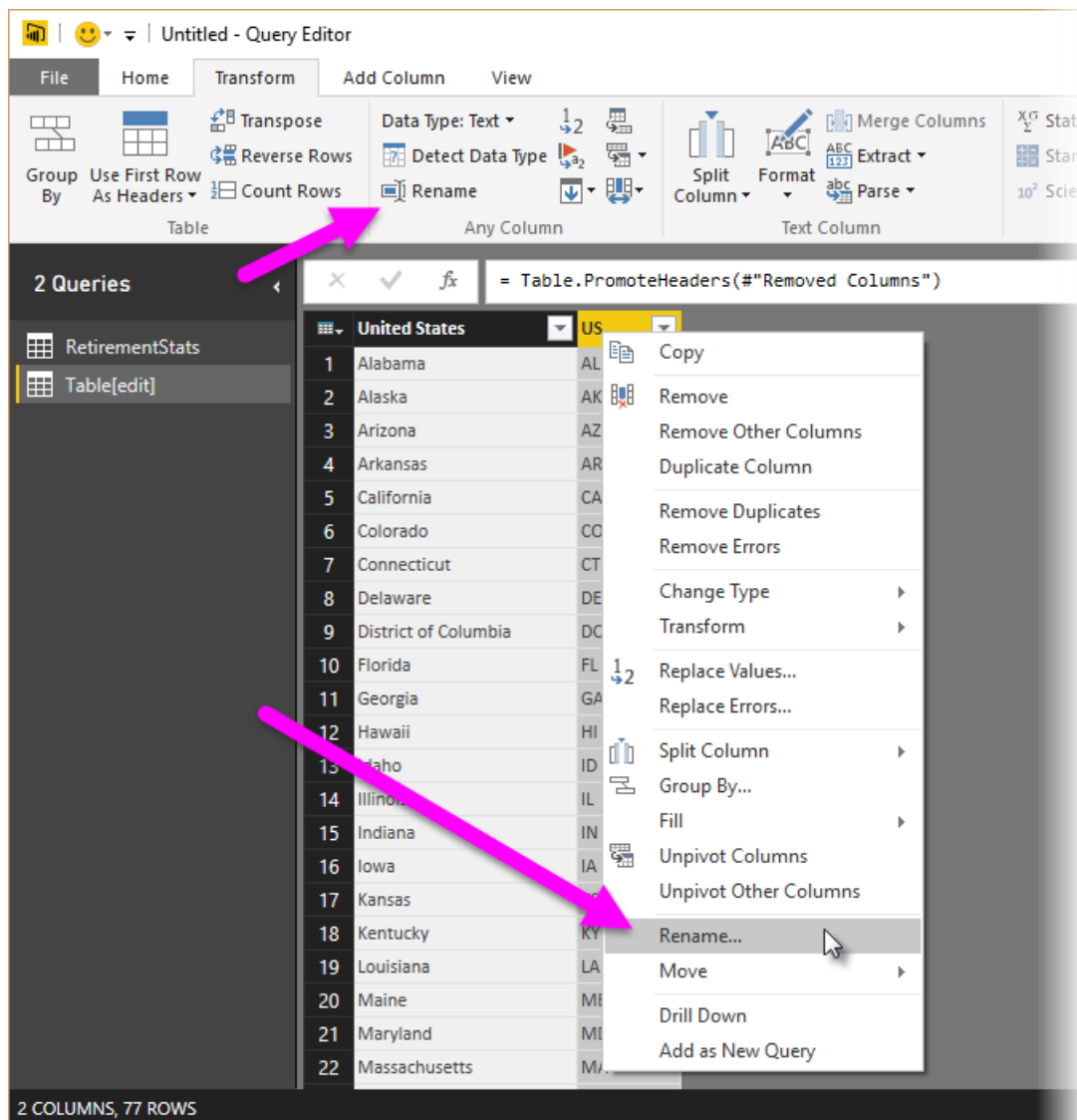
NOTE

This is a good time to point out that the *sequence* of applied steps in Query Editor is important, and can affect how the data is shaped. It's also important to consider how one step may impact another subsequent step; if you remove a step from the Applied Steps, subsequent steps may not behave as originally intended, because of the impact of the query's sequence of steps.

NOTE

When you resize the Query Editor window to make the width smaller, some ribbon items are condensed to make the best use of visible space. When you increase the width of the Query Editor window, the ribbon items expand to make the most use of the increased ribbon area.

- Rename the columns, and the table itself – as usual, there are a few ways to rename a column; first select the column, then either select **Rename** from the **Transform** tab on the ribbon, or right-click and select **Rename...** from the menu that appears. The following image has arrows pointing to both options; you only need to choose one.



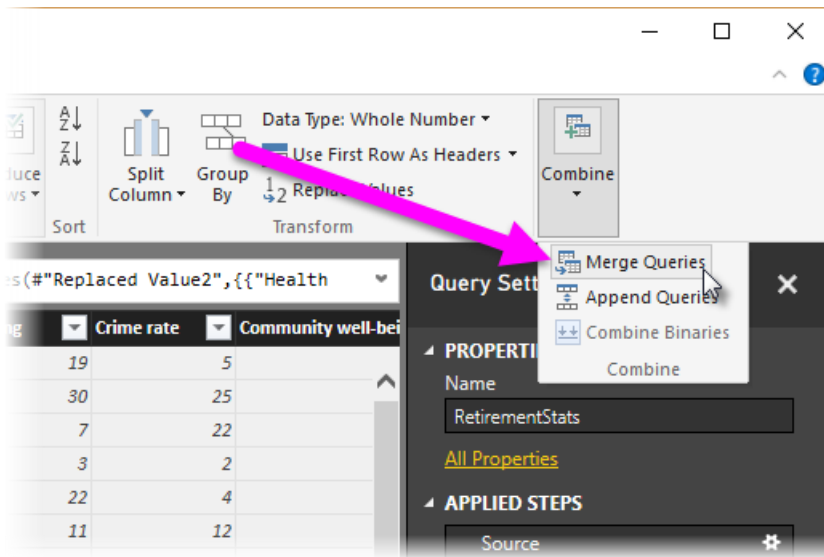
Let's rename them to *State Name* and *State Code*. To rename the table, just type the name into the **Name** box in the **Query Settings** pane. Let's call this table *StateCodes*.

Now that we've shaped the *StateCodes* table the way we want, let's combine these two tables, or queries, into one; since the tables we now have are a result of the queries we applied to the data, they're often referred to as *queries*.

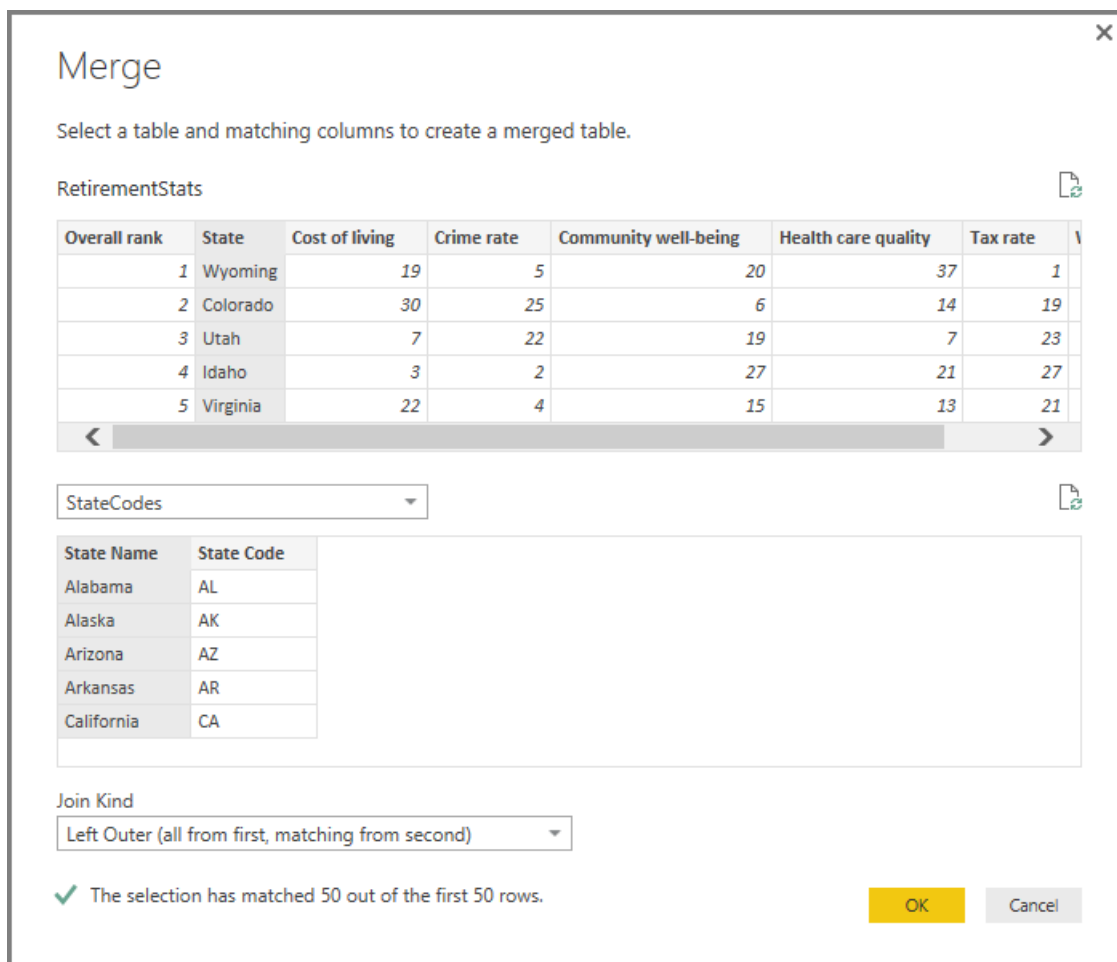
There are two primary ways of combining queries – *merging* and *appending*.

When you have one or more columns that you'd like to add to another query, you **merge** the queries. When you have additional rows of data that you'd like to add to an existing query, you **append** the query.

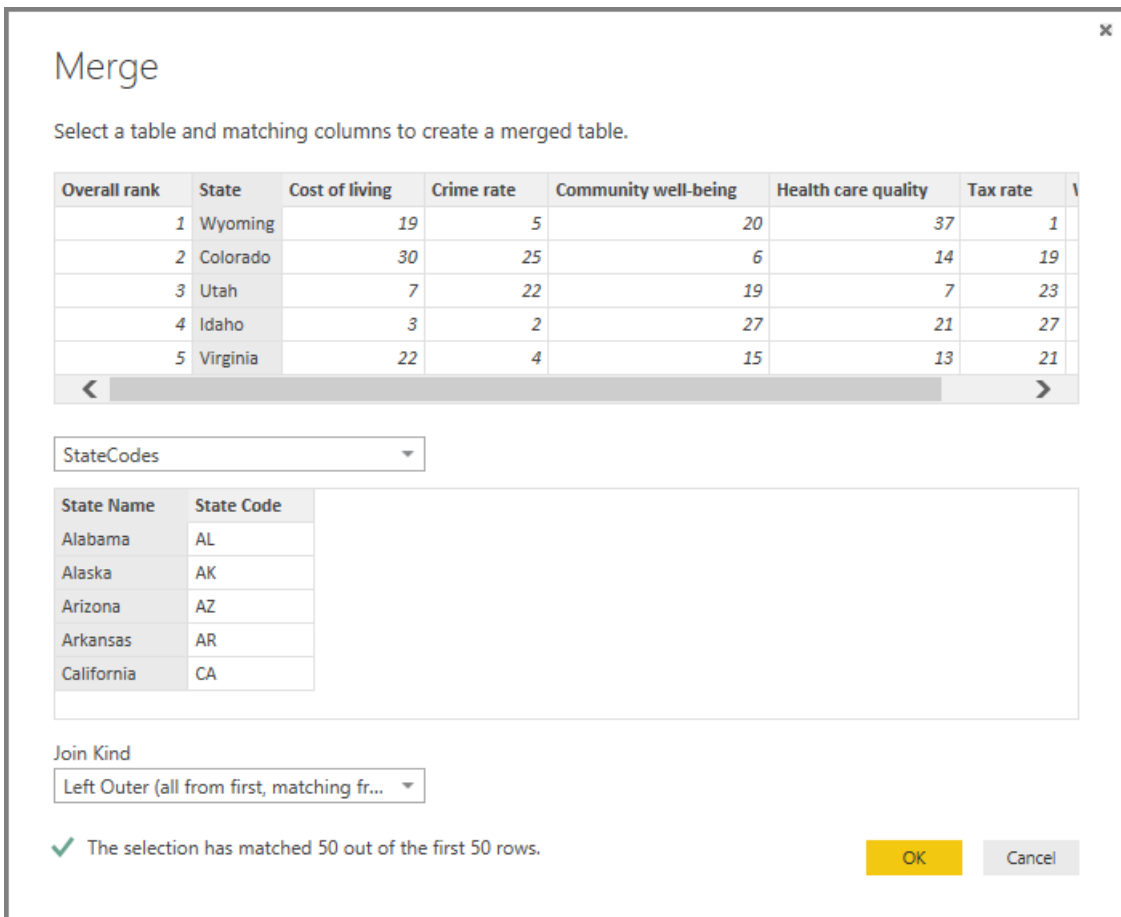
In this case we want to merge queries. To get started, from the left pane of Query Editor we select the query *into which* we want the other query to merge, which in this case is *RetirementStats*. Then select **Combine > Merge Queries** from the **Home** tab on the ribbon.



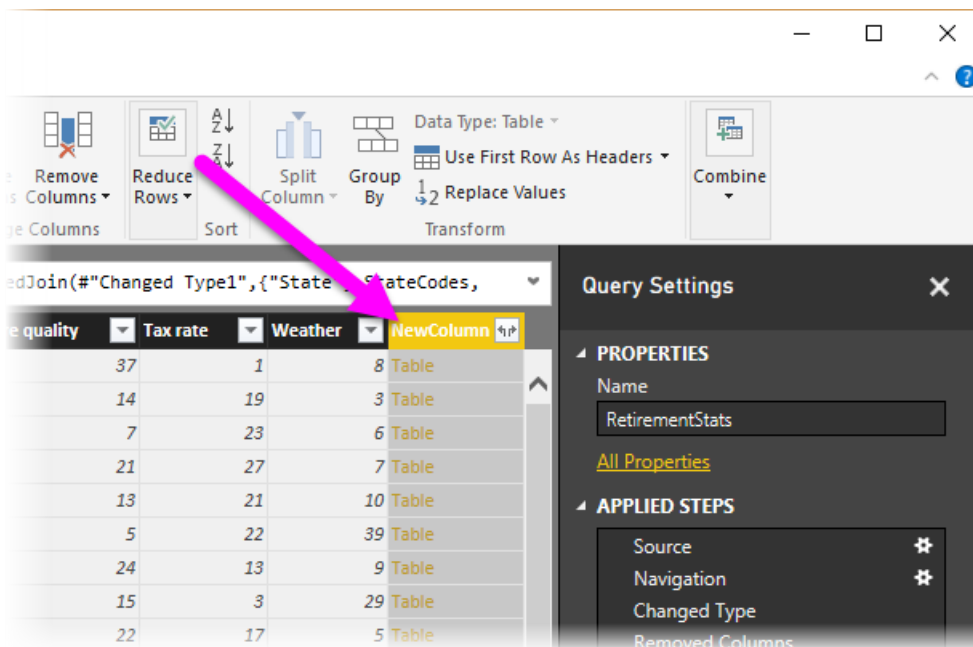
You may be prompted to set the privacy levels, to ensure the data is combined without including or transferring data you didn't want transferred.



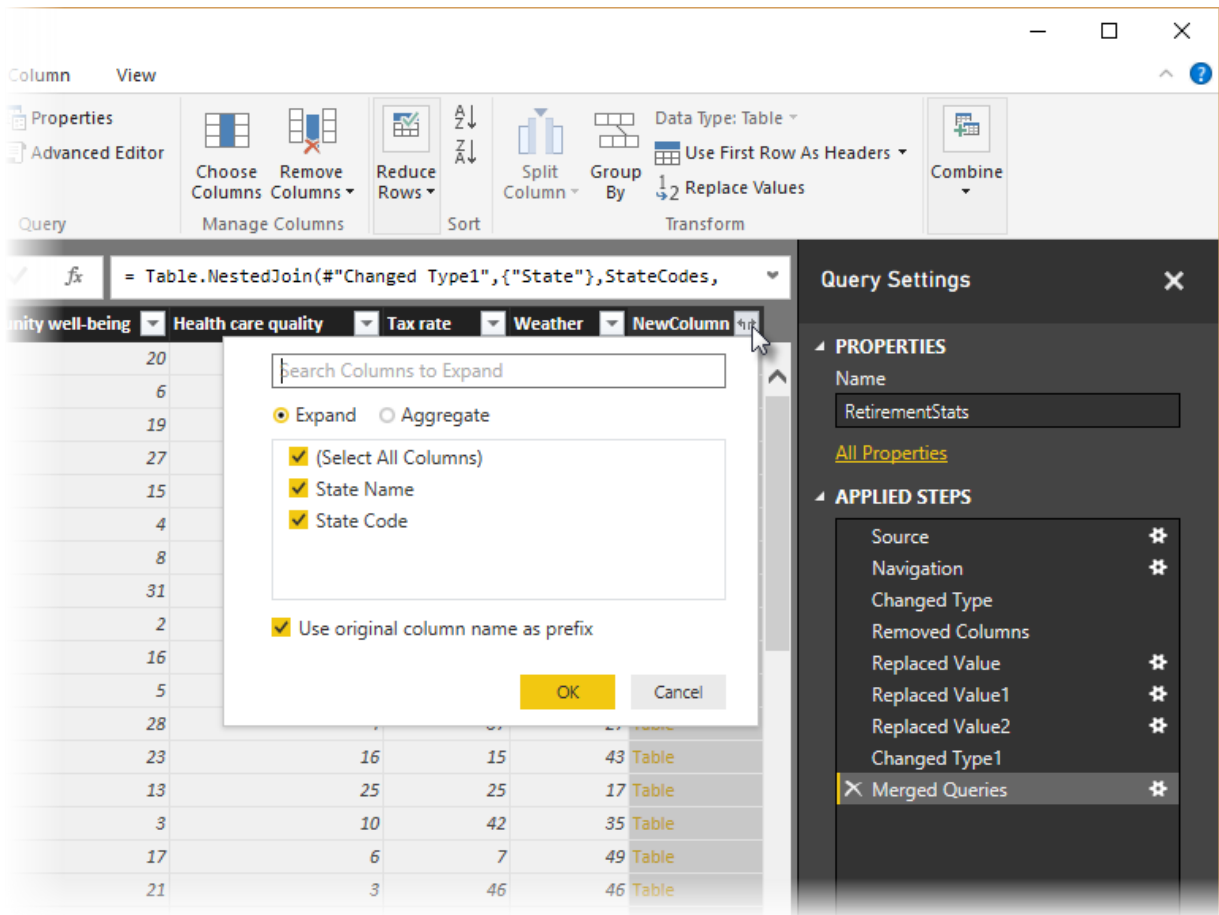
Next the **Merge** window appears, prompting us to select which table we'd like merged into the selected table, and then, the matching columns to use for the merge. Select *State* from the *RetirementStats* table (query), then select the *StateCodes* query (easy in this case, since there's only one other query – when you connect to many data sources, there are many queries to choose from). When we select the correct matching columns – **State** from *RetirementStats*, and **State Name** from *StateCodes* – the **Merge** window looks like the following, and the **OK** button is enabled.



A **NewColumn** is created at the end of the query, which is the contents of the table (query) that was merged with the existing query. All columns from the merged query are condensed into the **NewColumn**, but you can select to **Expand** the table, and include whichever columns you want.



To Expand the merged table, and select which columns to include, select the expand icon (☰). The **Expand** window appears.



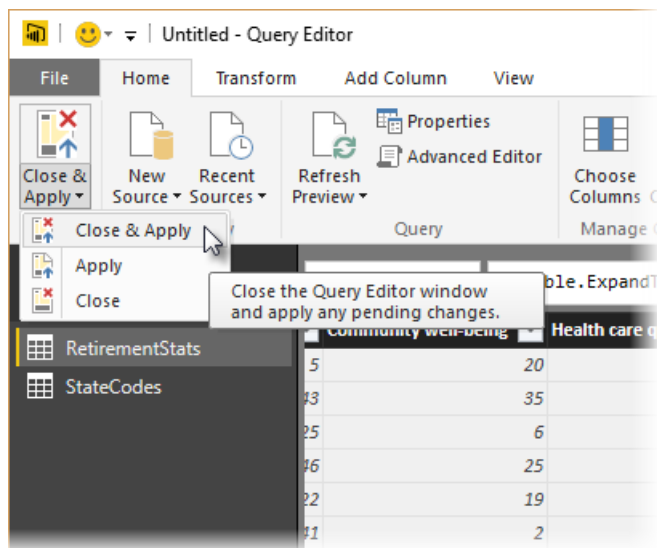
In this case, we only want the **State Code** column, so we select only that column and then select **OK**. We clear the checkbox from **Use original column name as prefix** because we don't need or want that; if we leave that selected, the merged column would be named **NewColumn.State Code** (the original column name, or **NewColumn**, then a dot, then the name of the column being brought into the query).

NOTE

Want to play around with how to bring in that **NewColumn** table? You can experiment a bit, and if you don't like the results, just delete that step from the **Applied Steps** list in the **Query Settings** pane; your query returns to the state prior to applying that **Expand** step. It's like a free do-over, which you can do as many times as you like until the expand process looks the way you want it.

We now have a single query (table) that combined two data sources, each of which has been shaped to meet our needs. This query can serve as a basis for lots of additional, interesting data connections – such as housing cost statistics, demographics, or job opportunities in any state.

To apply changes and close Query Editor, select **Close & Apply** from the **Home** ribbon tab. The transformed dataset appears in Power BI Desktop, ready to be used for creating reports.



Next steps

There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

Common query tasks in Power BI Desktop

1/30/2018 • 8 min to read • [Edit Online](#)

When working in the **Query Editor** window of Power BI Desktop, there are a handful of commonly used tasks. This document demonstrates those common tasks, and provides links for additional information.

The common query tasks demonstrated here are the following:

- Connect to data
- Shape and combine data
- Group rows
- Pivot columns
- Create custom columns
- Query formulas

We'll use a few data connections to complete these tasks. The data is available for you to download or connect to, in case you want to step through these tasks yourself.

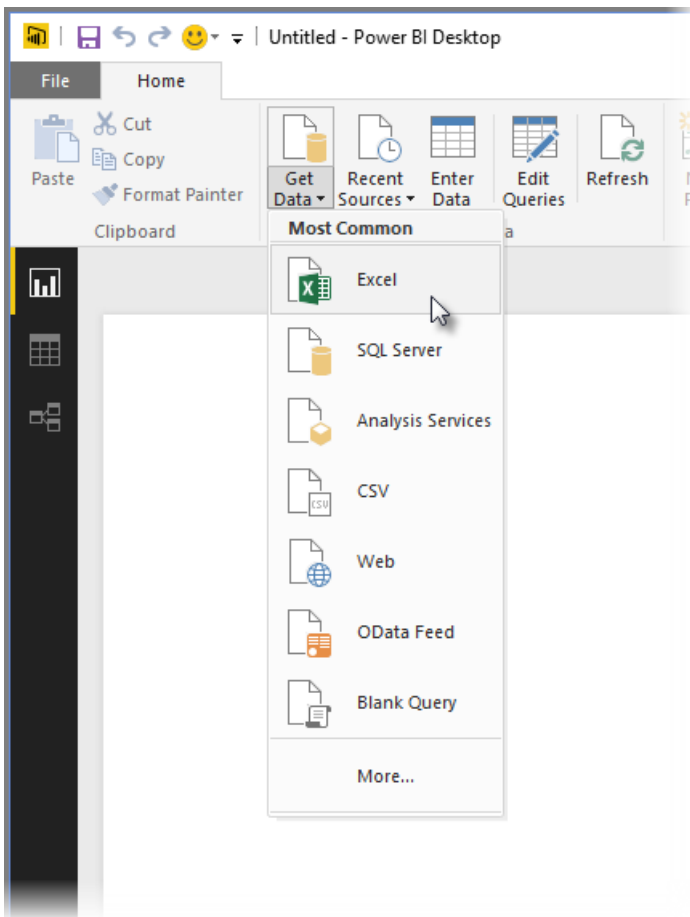
The first data connection is an Excel workbook. The other is a Web resource (which is also used in other Power BI Desktop help content) which can be accessed from here:

<http://www.bankrate.com/finance/retirement/best-places-retire-how-state-ranks.aspx>

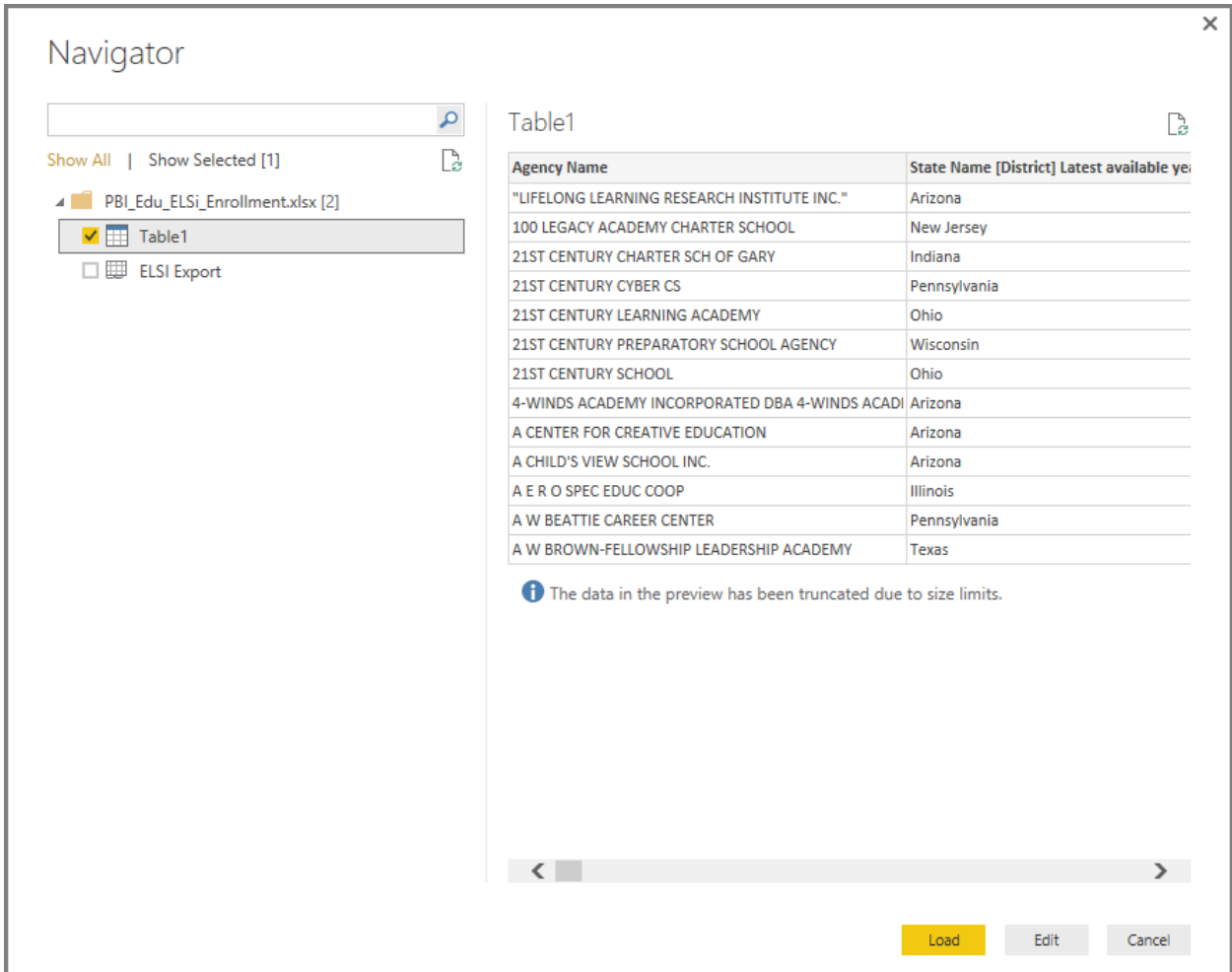
The steps necessary to connect to both of those data sources is where the common Query tasks begin.

Connect to data

To connect to data in Power BI Desktop, select the **Get Data** button from the **Home** tab on the ribbon. Power BI Desktop presents a menu with the most common data sources. For a complete list of data sources to which Power BI Desktop can connect, select the **More...** button at the bottom of the menu. For more information, see [Data Sources in Power BI Desktop](#).

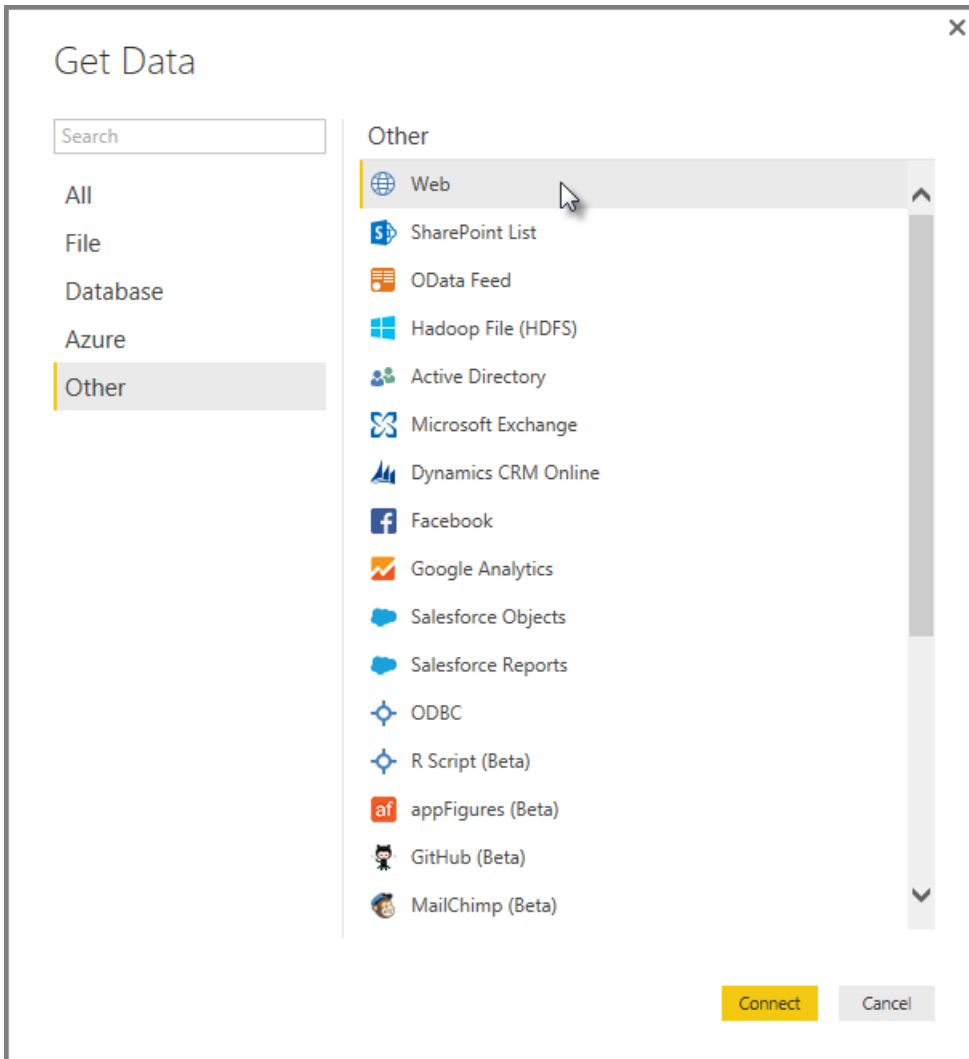


To start with, select **Excel** and navigate to the workbook, then select it. Query inspects the workbook, then presents the data it found in the **Navigator** window.

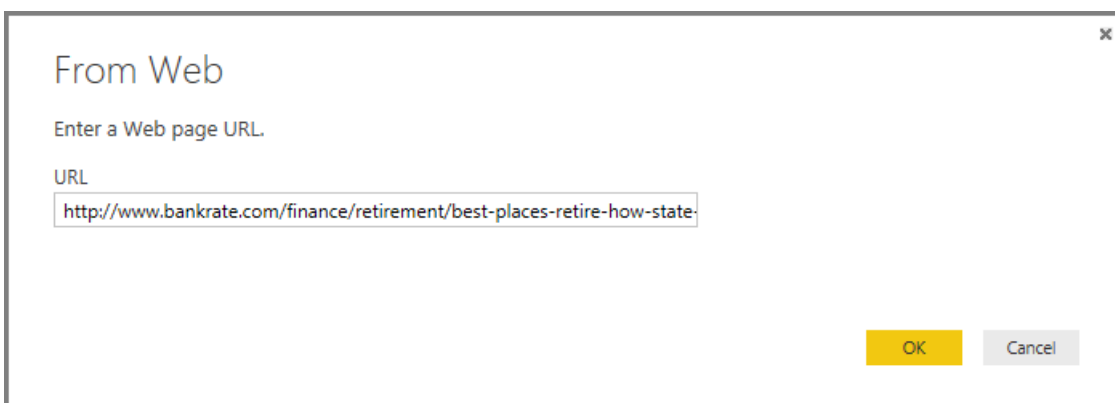


You can select **Edit** to adjust, or *shape*, the data before loading it into Power BI Desktop. Editing a query before loading is especially useful when working with large data sets that you intend to pare down before loading. We want to do that, so we select **Edit**.

Connecting to different types of data is just as easy. We also want to connect to a Web resource. Select **Get Data** > **More...** and then select **Other** > **Web**.



The **From Web** window appears, where you can type in the URL of the Web page.



Select **OK**, and like before, Power BI Desktop inspects the workbook and presents the data it finds in the **Navigator** window.

Other data connections are similar. If authentication is required to make a data connection, Power BI Desktop prompts you for the appropriate credentials.

For a step-by-step demonstration of connecting to data in Power BI Desktop, see [Connect to Data in Power BI](#)

Shape and combine data

You can easily shape and combine data with Query Editor. This section includes a few examples of how you can shape data. For a more complete demonstration of shaping and combining data, see [Shape and Combine Data with Power BI Desktop](#).

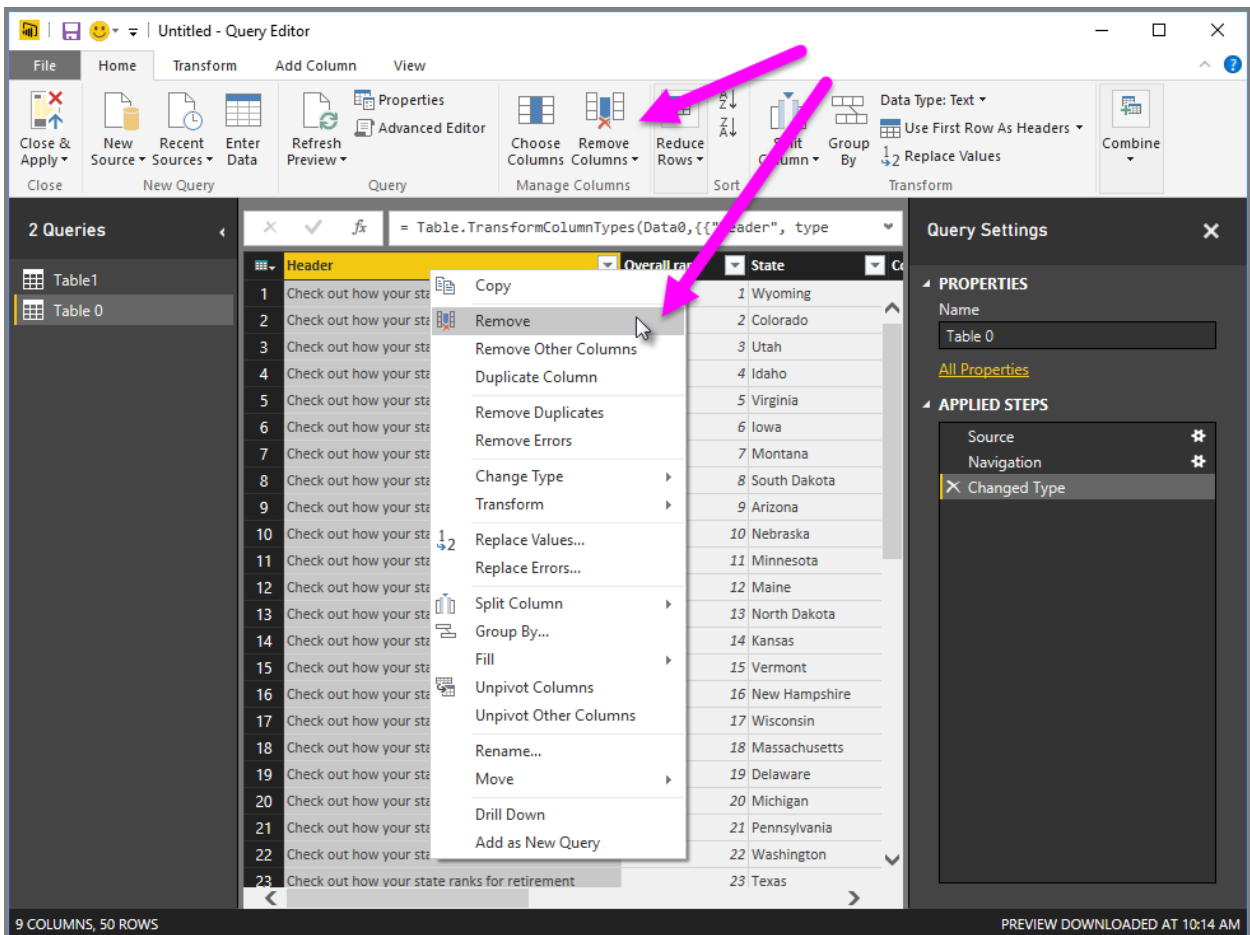
In the previous section we connected to two sets of data – an Excel workbook, and a Web resource. Once loaded in Query Editor we see the following, with the query from the Web page selected (from the available queries listed in the **Queries** pane, on the left side of the Query Editor window).

The screenshot shows the Microsoft Query Editor window titled "Untitled - Query Editor". The ribbon includes tabs for File, Home, Transform, Add Column, and View. The Transform tab is active, showing options like Choose Columns, Remove Columns, Reduce Rows, Sort, Split Column, Group By, and Replace Values. The main area displays a table with 9 columns and 50 rows. The first column is titled "Header" and contains the text "Check out how your state ranks for retirement". The second column is "Overall rank" and the third is "State". The states listed are Wyoming, Colorado, Utah, Idaho, Virginia, Iowa, Montana, South Dakota, Arizona, Nebraska, Minnesota, Maine, North Dakota, Kansas, Vermont, New Hampshire, Wisconsin, Massachusetts, Delaware, Michigan, Pennsylvania, Washington, and Texas. The bottom status bar indicates "9 COLUMNS, 50 ROWS" and "PREVIEW DOWNLOADED AT 10:14 AM".

Header	Overall rank	State
1	1	Wyoming
2	2	Colorado
3	3	Utah
4	4	Idaho
5	5	Virginia
6	6	Iowa
7	7	Montana
8	8	South Dakota
9	9	Arizona
10	10	Nebraska
11	11	Minnesota
12	12	Maine
13	13	North Dakota
14	14	Kansas
15	15	Vermont
16	16	New Hampshire
17	17	Wisconsin
18	18	Massachusetts
19	19	Delaware
20	20	Michigan
21	21	Pennsylvania
22	22	Washington
23	23	Texas

When you shape data, you transform a data source into the form and format that meets your needs. In this case, we don't need that first column, titled *Header*, so we'll remove it.

In **Query Editor**, many commands can be found in the ribbon, and in a context-sensitive right-click menu. For example, when I right-click on the *Header* column, the menu that appears lets me remove the column. I could also select the column and then select the **Remove Columns** button from the ribbon.



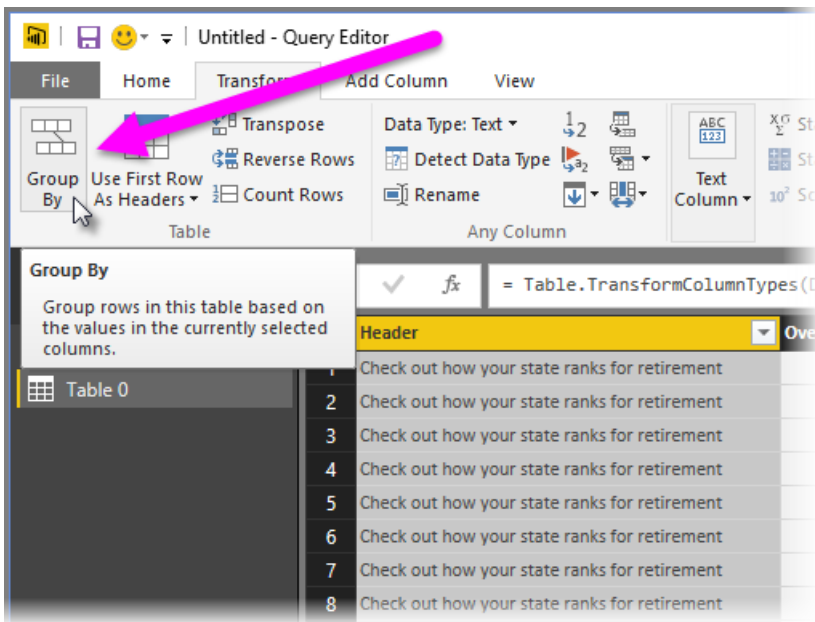
There are many other ways I could shape the data in this query; I could remove any number of rows from the top, or from the bottom; I could add columns, split columns, replace values, and perform other shaping tasks to direct Query Editor to get the data how I want it.

Group rows

In Query Editor, you can group the values in multiple rows into a single value. This can be useful when summarizing the number of products offered, the total sales, or the count of students.

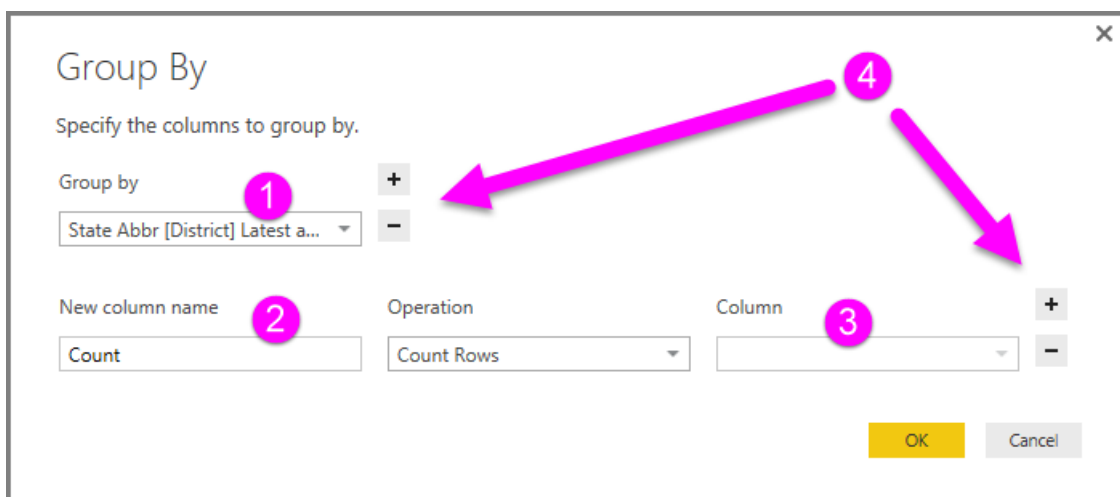
In this example, we group rows in an education enrollment data set. The data is from an Excel workbook, and has been shaped in Query Editor to get just the columns we need, renamed the table, and performed a few other transforms.

Let's find out how many Agencies (this includes school districts, and other education agencies such as regional service districts, and so on) each state has. We select the *State Abbr* column then select the **Group By** button in the **Transform** tab or the **Home** tab of the ribbon (**Group By** is available in both tabs).

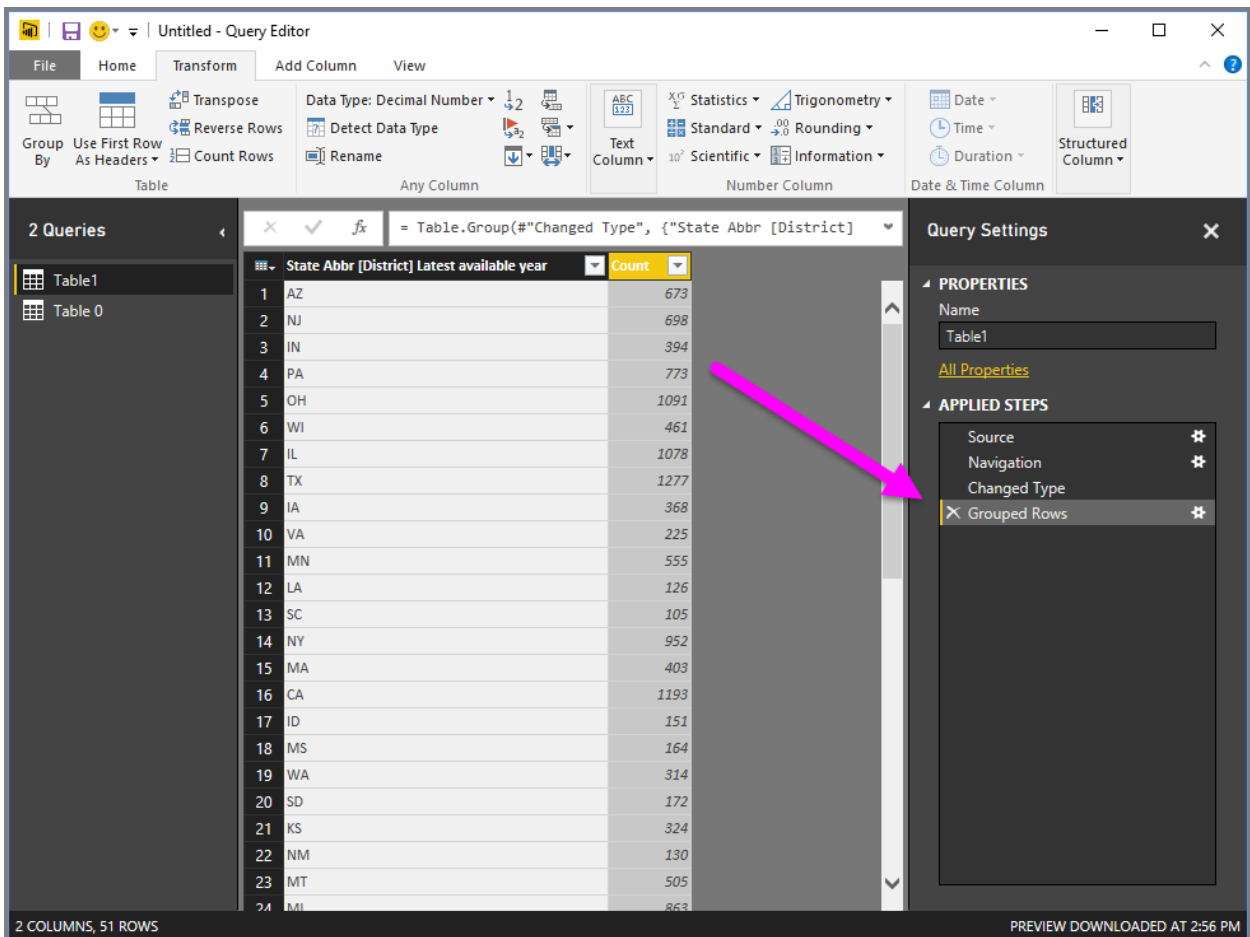


The **Group By...** window appears. When Query Editor groups rows, it creates a new column into which it places the **Group By** results. You can adjust the **Group By** operation in the following ways:

1. *Group by* – this is the column to be grouped; Query Editor chooses the selected column, but you can change that in this window to any column in the table.
2. *New column name* – Query Editor suggests a name for the new column, based on the operation it applies to the column being grouped, but you can name the new column anything you want.
3. *Operation* – here you specify the operation that Query Editor applies.
4. *The +/- signs* – you can perform aggregation operations (**Group By** actions) on multiple columns, and perform multiple aggregations, all within the **Group By** window, and all in one operation. Query Editor creates a new column (based on your selections in this window) that operate on multiple columns. Select the + button to add more columns or aggregations to a **Group By** operation. You can remove a column or aggregation by selecting the – icon, so go ahead and try it, and see what it looks like.



When we select **OK**, Query performs the **Group By** operation, and returns the results. Whew, look at that – Ohio, Texas, Illinois, and California each have over a thousand agencies!

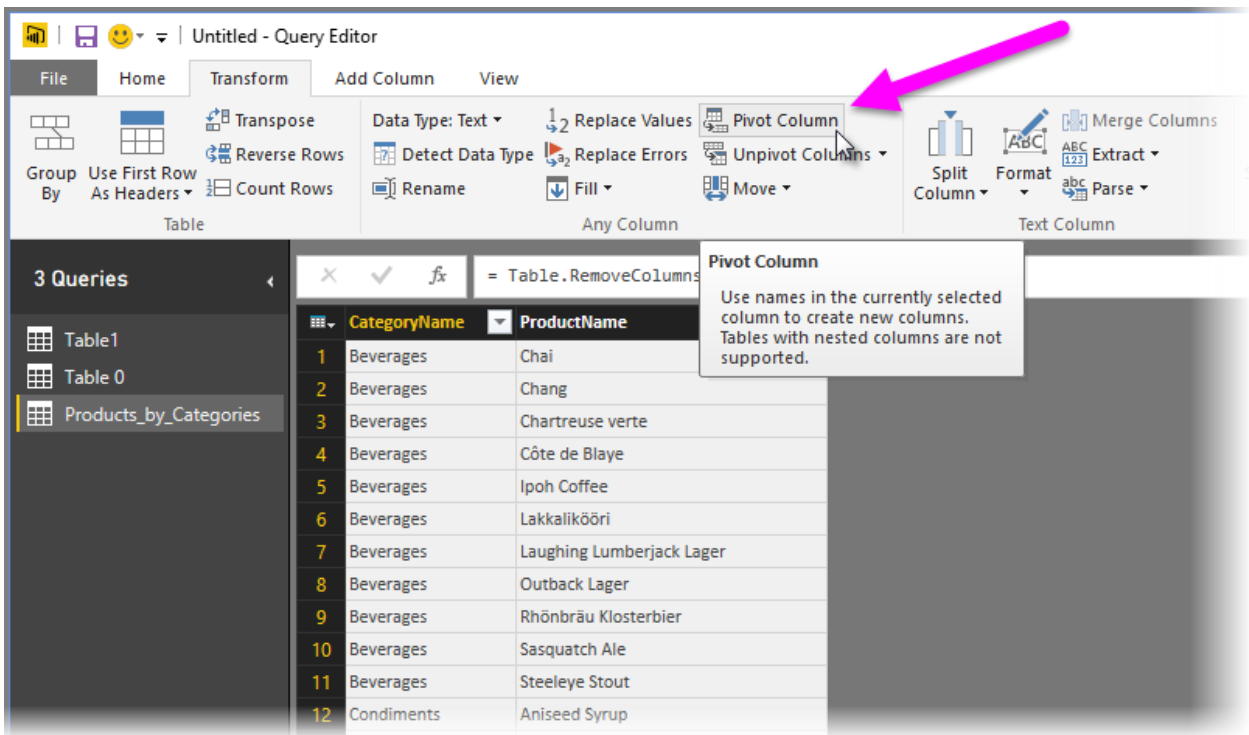


And with Query Editor, you can always remove the last shaping operation by selecting the **X** next to the step just completed. So go ahead and experiment, redo the step if you don't like the results, until Query Editor shapes your data just the way you want it.

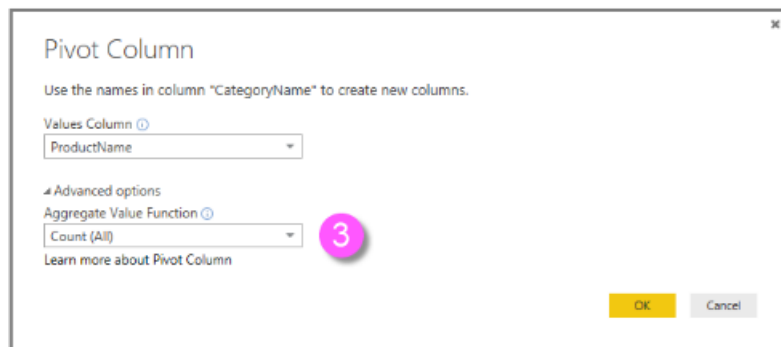
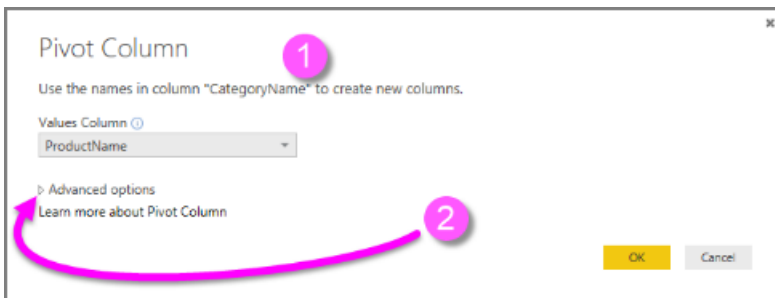
Pivot columns

With Power BI Desktop, you can pivot columns, and create a table that contains aggregated values for each unique value in a column. For example, if you need to know how many different products you have in each product category, you can quickly create a table that does precisely that.

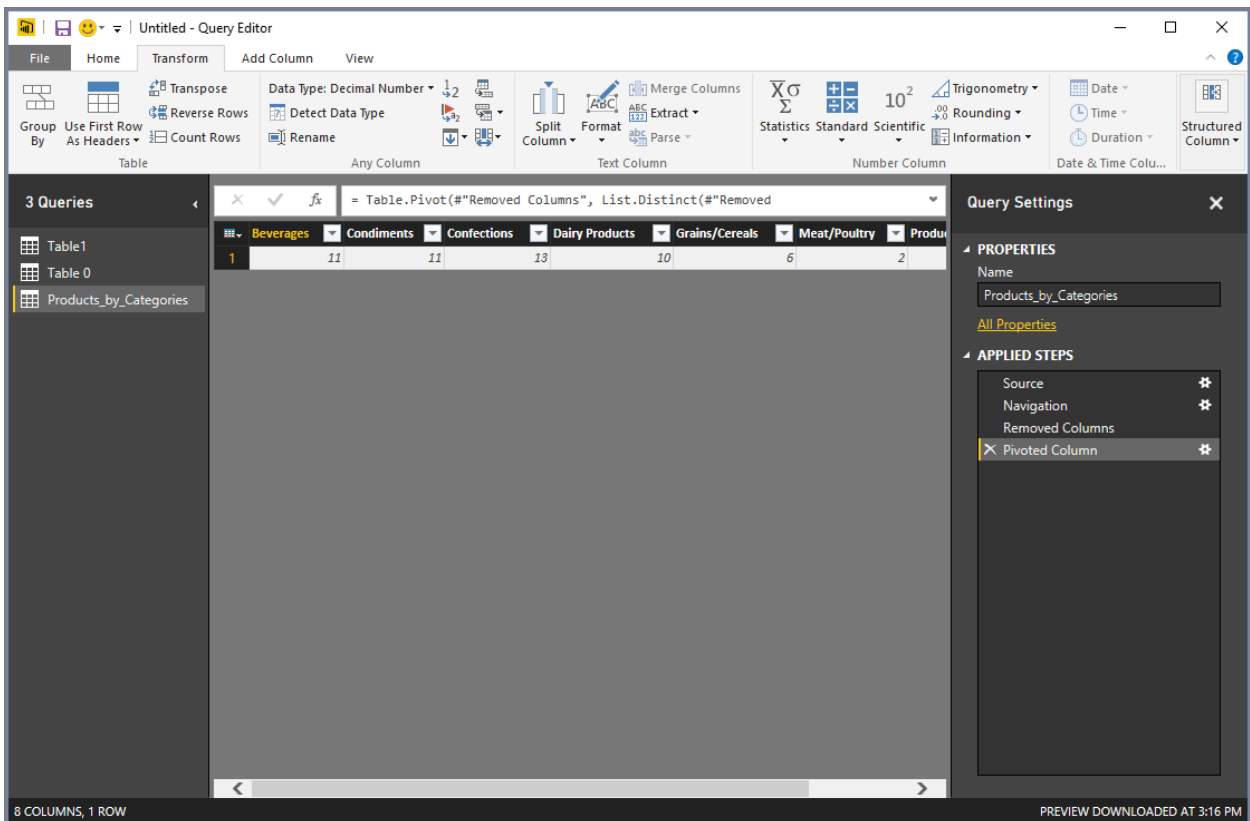
Let's look at an example. The following **Products** table has been shaped to only show each unique product (by name), and which category each product falls under. To create a new table that shows a count of products for each category (based on the *CategoryName* column), select the column, then select **Pivot Column** from the **Transform** tab on the ribbon.



The **Pivot Column** window appears, letting you know which column's values will be used to create new columns (1), and when you expand **Advanced option** (2), you can select the function that will be applied to the aggregated values (3).



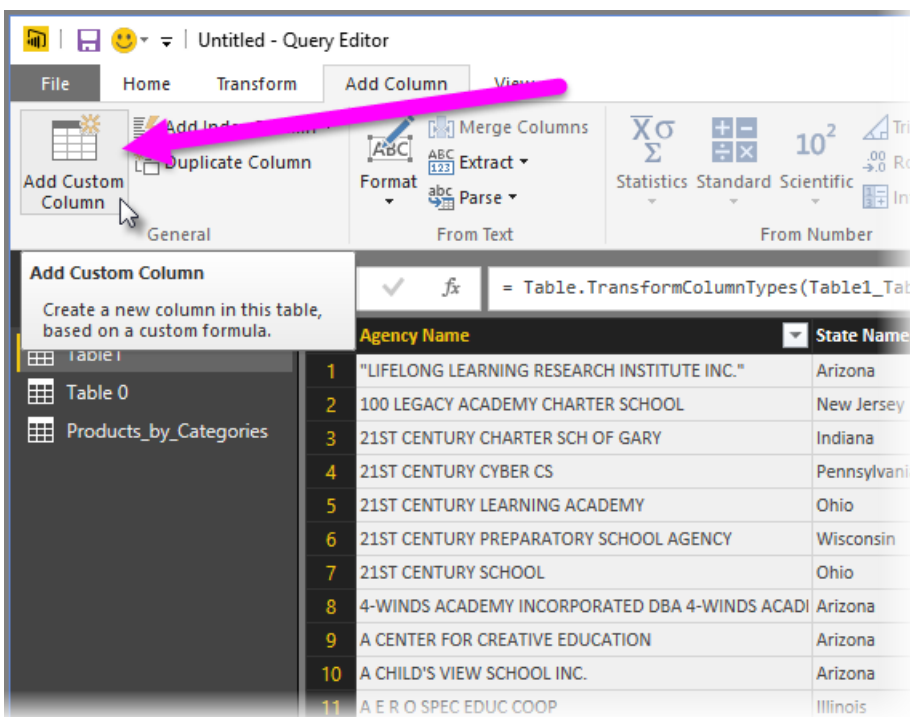
When you select **OK**, Query displays the table according to the transform instructions provided in the **Pivot Column** window.



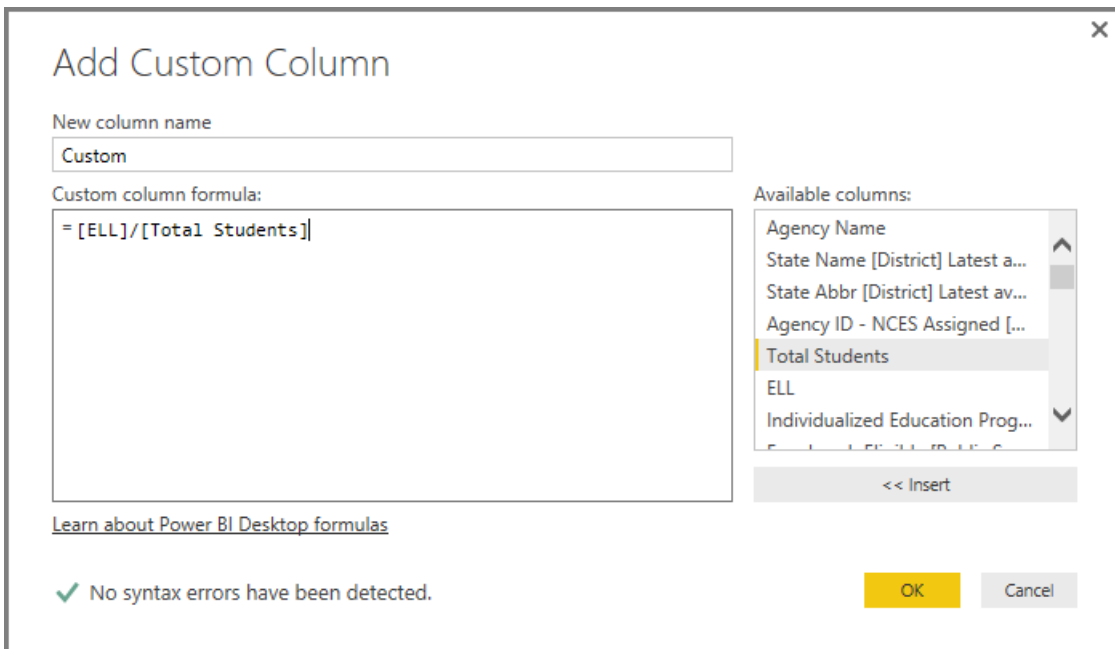
Create custom columns

In Query Editor you can create custom formulas that operate on multiple columns in your table, then place the results of such formulas into a new (custom) column. Query Editor makes it easy to create custom columns.

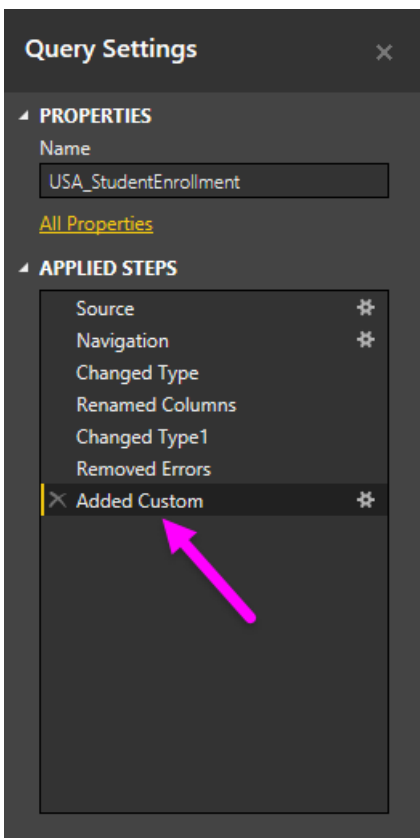
In Query Editor, select **Add Custom Column** from the **Add Column** tab on the ribbon.



The following window appears. In the following example, we create a custom column called *Percent ELL* that calculates the percentage of total students that are English Language Learners (ELL).

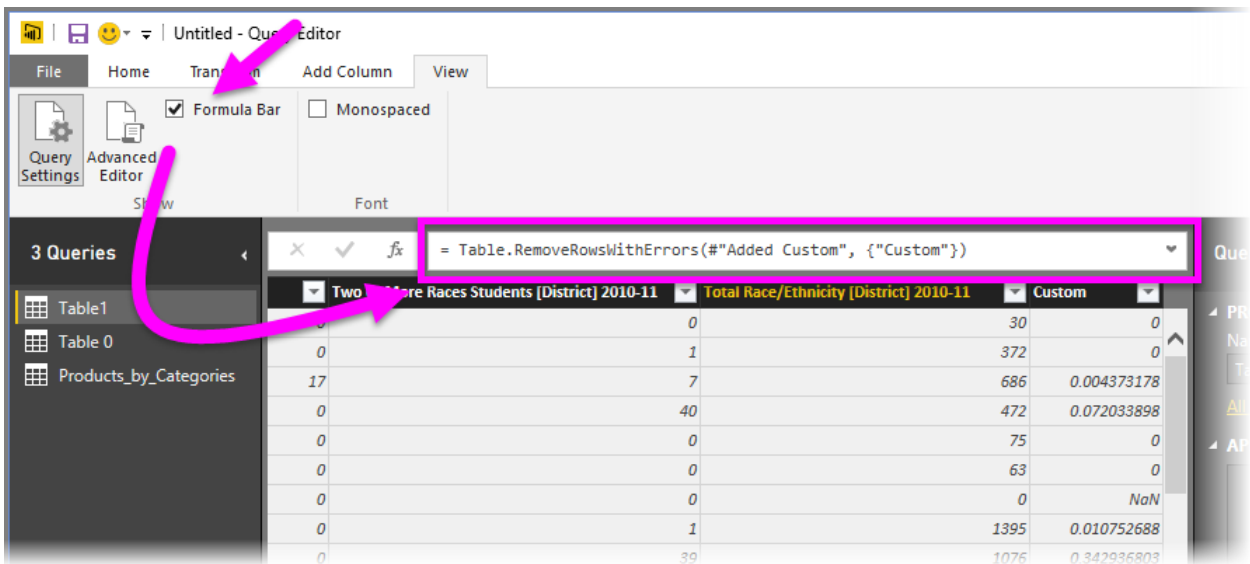


Like any other applied step in Query Editor, if the new custom column doesn't provide the data you're looking for, you can simply delete the step from the **Applied Steps** section of the **Query Settings** pane by selecting the **X** next to the **Added Custom** step.

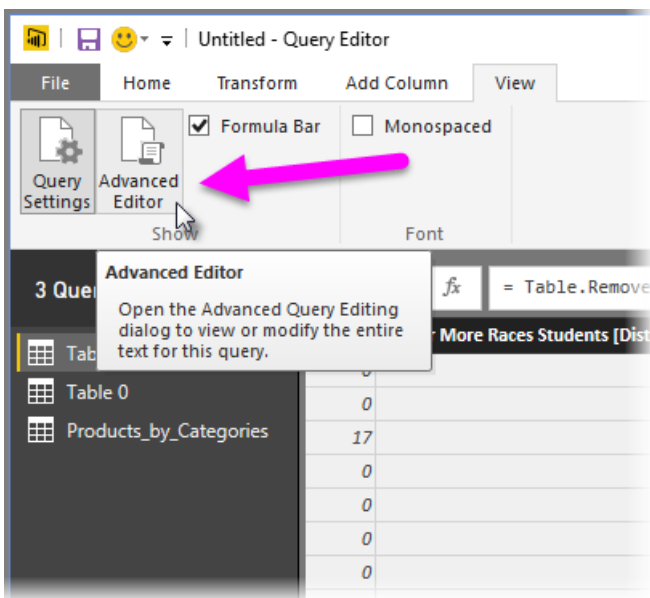


Query formulas

You can edit the steps that Query Editor generates, and you can create custom formulas to get precise control over connecting to and shaping your data. Whenever Query Editor performs an action on data, the formula associated with the action is displayed in the **Formula Bar**. To view the **Formula Bar**, select the checkbox next to **Formula Bar** in the **View** tab of the ribbon.



Query Editor keeps all applied steps for each query as text that you can view or modify. You can view or modify the text for any query using the **Advanced Editor**, which is displayed when you select **Advanced Editor** from the **View** tab of the ribbon.



Here's a look at the **Advanced Editor**, with the query steps associated with the **USA_StudentEnrollment** query displayed. These steps are created in the Power Query Formula Language, often referred to as **M**. For information, see [Learn about Power Query formulas](#). To view the language specification itself, download the [Microsoft Power Query for Excel Formula Language Specification](#).



Power BI Desktop provides an extensive set of formula categories. For more information, and a complete reference of all Query Editor formulas, visit [Power Query Formula Categories](#).

The formula categories for Query Editor are the following:

- Number
 - Constants
 - Information
 - Conversion and formatting
 - Format
 - Rounding
 - Operations
 - Random
 - Trigonometry
 - Bytes
- Text
 - Information
 - Text comparisons
 - Extraction
 - Modification
 - Membership
 - Transformations
- Logical
- Date
- Time
- DateTime
- DateTimeZone
- Duration
- Record
 - Information
 - Transformations

- Selection
- Serialization
- List
 - Information
 - Selection
 - Transformation
 - Membership
 - Set operations
 - Ordering
 - Averages
 - Addition
 - Numerics
 - Generators
- Table
 - Table construction
 - Conversions
 - Information
 - Row operations
 - Column operations
 - Membership
- Values
- Arithmetic operations
- Parameter Types
- Metadata
- Accessing data
- URI
- Binary formats
 - Reading numbers
- Binary
- Lines
- Expression
- Function
- Error
- Comparer
- Splitter
- Combiner
- Replacer
- Type

Next steps

There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)

- [Shape and Combine Data with Power BI Desktop](#)

Shape Maps in Power BI Desktop (Preview)

1/17/2018 • 9 min to read • [Edit Online](#)

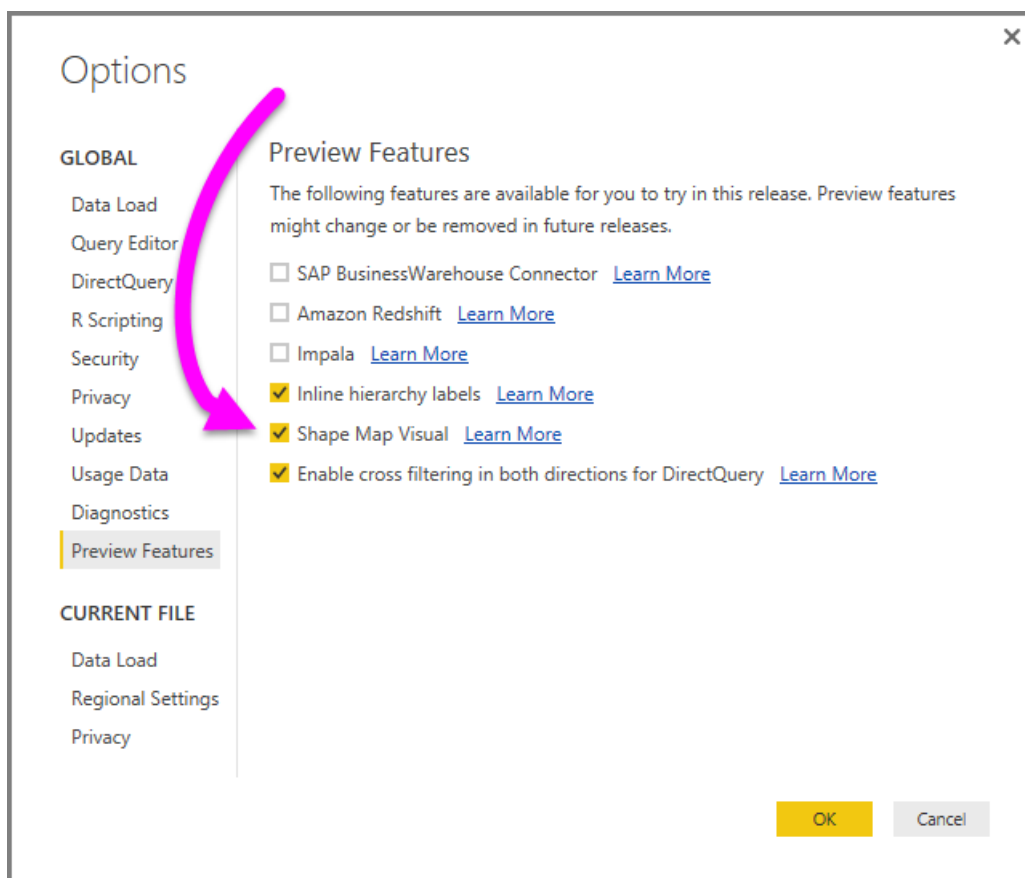
In Power BI Desktop, you create a **Shape Map** visual to show relative comparisons of regions on a map by applying different colors to different regions. In contrast to the **Map** visual, **Shape Map** cannot show precise geographical locations of data points on a map; instead, its main purpose is to show relative comparisons of regions on a map by coloring them differently.

Shape Map visuals are based on ESRI/TopoJSON maps which have the compelling ability to use custom maps that you can create, such as geographical, seating arrangements, floor plans, and others. The ability to use custom maps is not available in this Preview release of **Shape Map**.

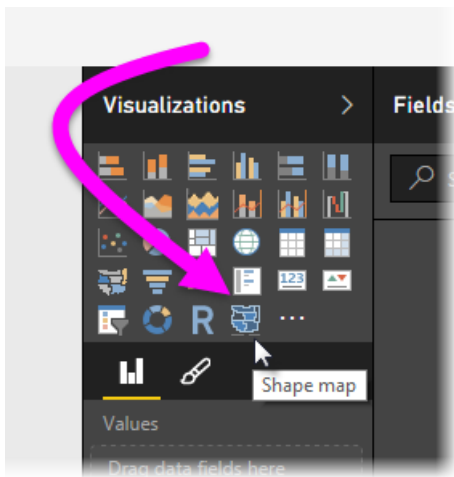
Creating Shape Maps

You can test the **Shape Map** control with the maps that are shipping with this Preview release, or you can use your own custom map as long as it meets the requirements outlined in the following section called **Use Custom Maps**.

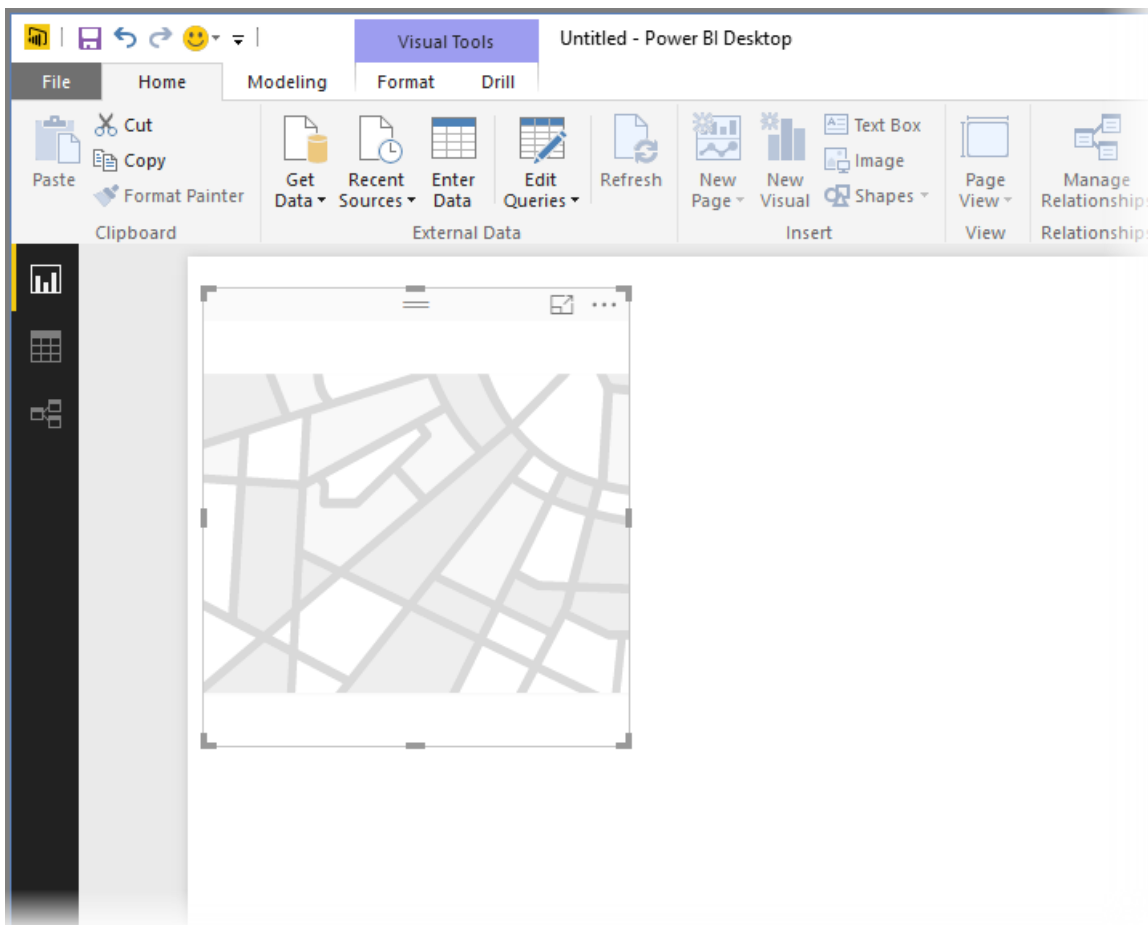
The **Shape Map** visual is in Preview, and must be enabled in Power BI Desktop. To enable **Shape Map**, select **File > Options and Settings > Options > Preview Features**, then select the **Shape Map** checkbox. You'll need to restart Power BI Desktop after you make the selection.



Once **Shape Map** is enabled, click the **Shape Map** control from the **Visualizations** pane.



Power BI Desktop creates an empty **Shape Map** visual design canvas.

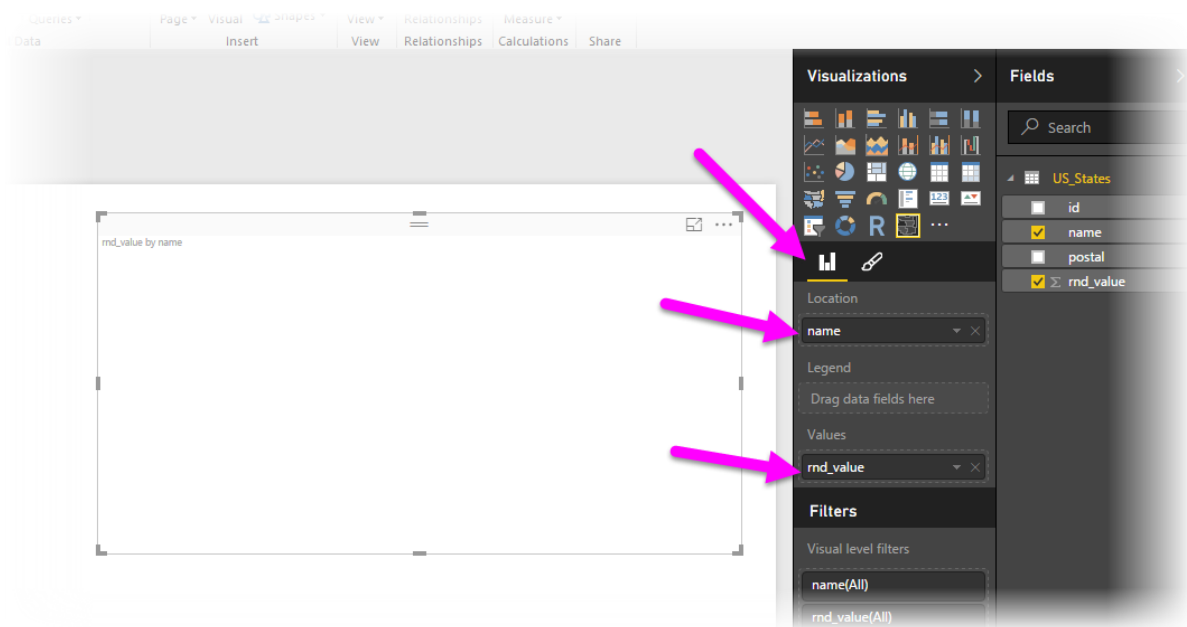


Take the following steps to create a **Shape Map**:

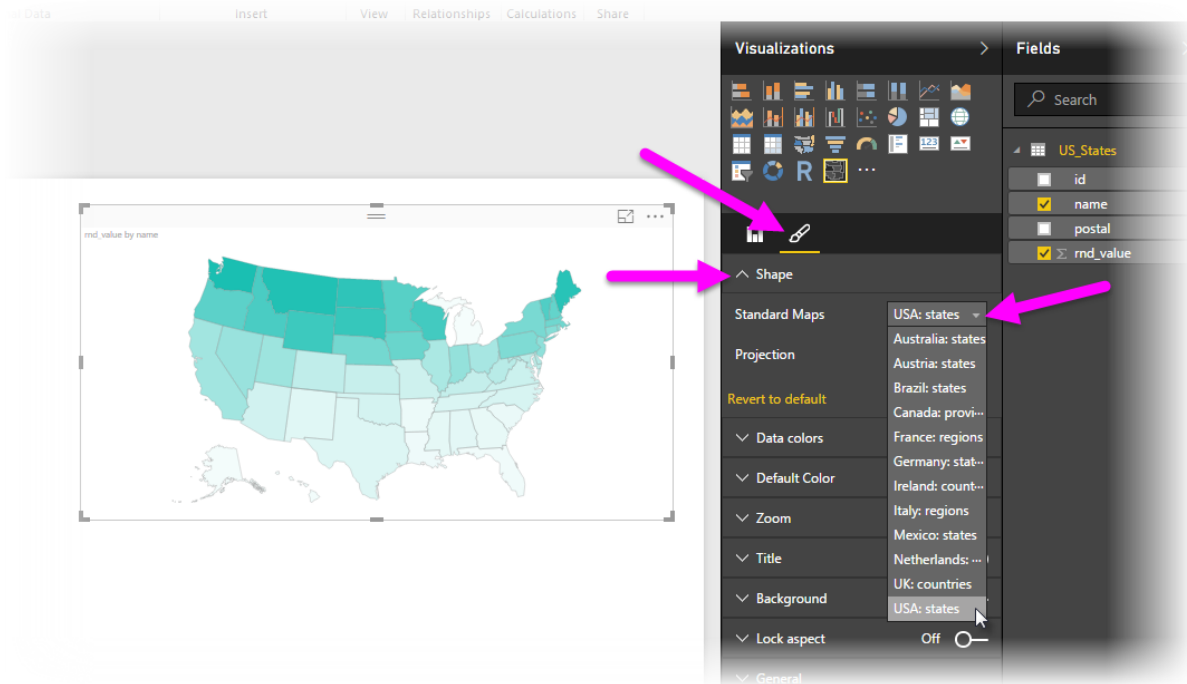
1. In the **Fields** pane, drag a data field that has the region names (or abbreviations) onto the **Location** bucket, and a data measure field into the **Values** bucket (you won't see a map yet).

NOTE

See the section titled **Getting Map Data**, below, for information on how to quickly get map data to test **Shape Map**.



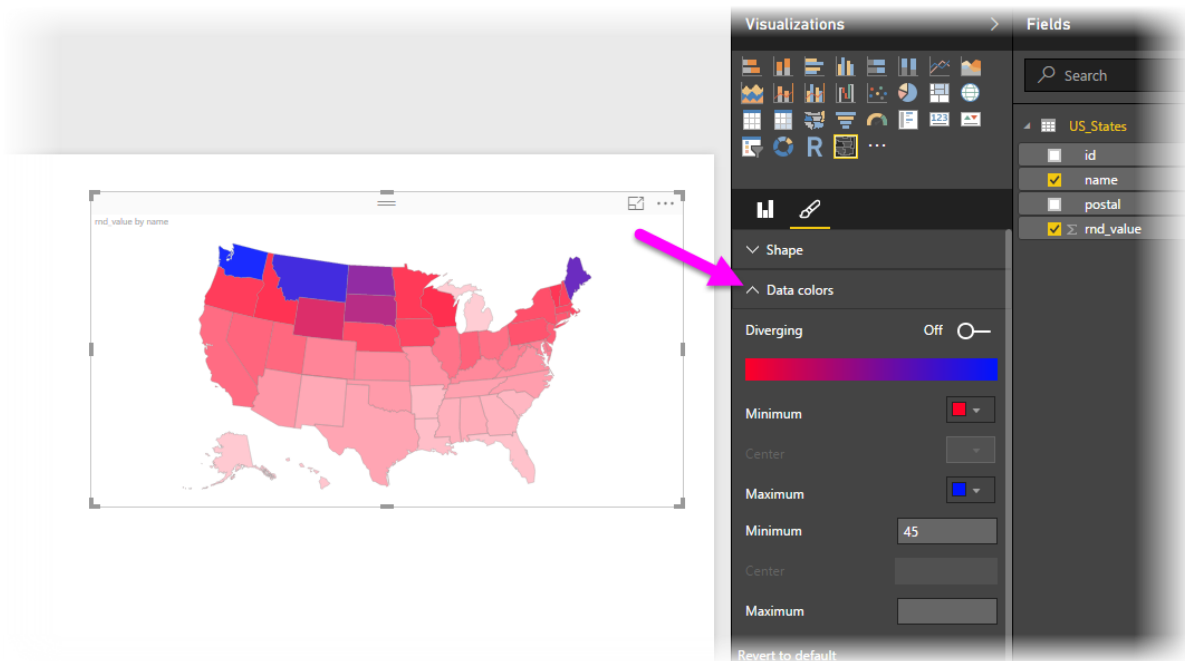
2. In the **Format** settings pane, expand **Shape**, and select from the **Standard Maps** drop-down to show your data. At this point the rendering appears, as shown in the following image.



NOTE

In the **Region Keys** section at the end of this article is a collection of tables that have map regions keys you can use to test the **Shape Map** visual.

3. You can then modify the map projection and zooming settings, as well as the colors of data points, from the **Format** settings pane. You can also modify zoom settings. For example, you can change colors, set maximums and minimums, and so on.

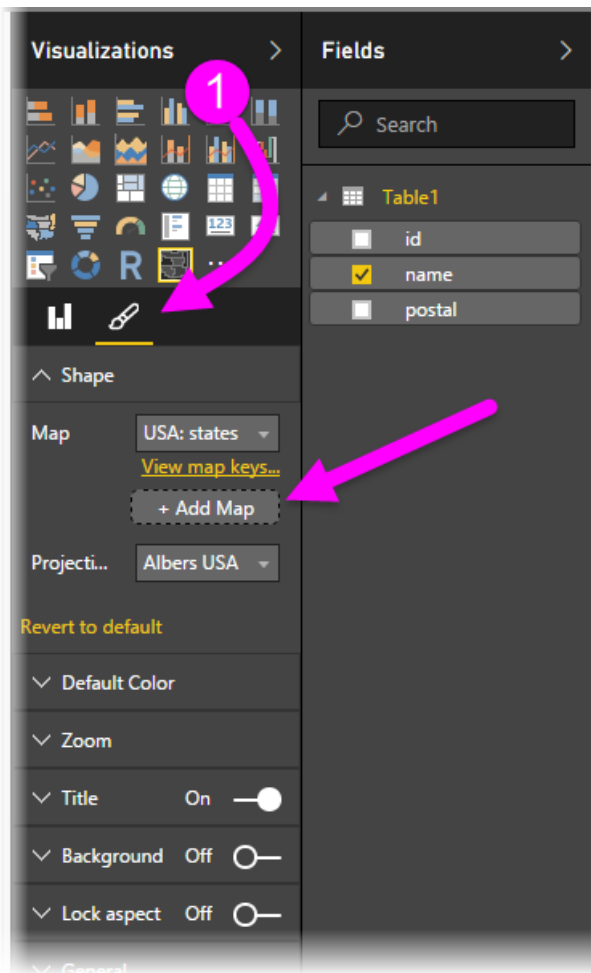


4. You can also add a category data column to the **Legend** bucket, and classify the map regions based on categories.

Use custom maps

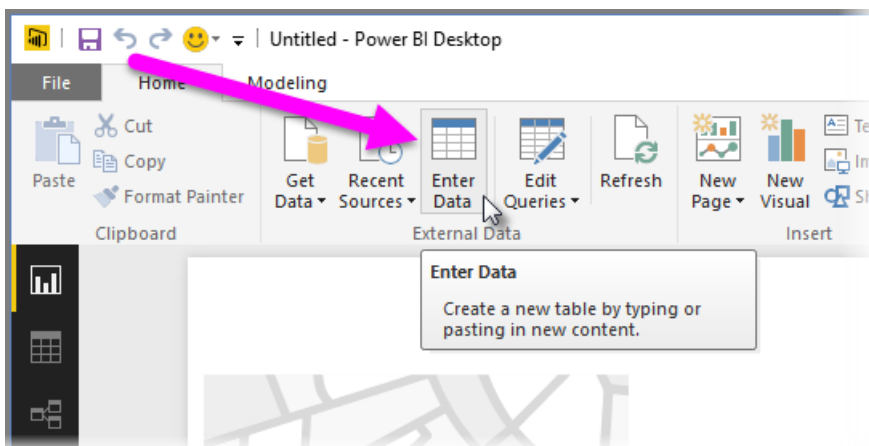
You can use custom maps with **Shape Map** as long as they are in the **TopoJSON** format. If your map is in another format, you can use online tools such as [Map Shaper](#) to convert your *shapefiles* or your *GeoJSON* maps into the **TopoJSON** format.

To use your **TopoJSON** map file, add a ShapeMap visual to your report and add some data to the *Location* and *Values* buckets. Then, in the **Visualizations** pane with the **Format** section selected (the paintbrush icon, shown as (1) in the following image), expand the **Shape** section and select **+ Add Map**.



Getting map data

To quickly get data into a model so you can test **Shape Map**, you can copy one of the tables at the end of this article, then select **Enter Data** from the **Home** ribbon.



You can then paste the table into Power BI Desktop. The top row is automatically identified as a header.

Create Table

Create a table by typing or pasting content.

The first row of data that you pasted has been promoted to column headers. Undo Headers

	id	name	postal	*
1	us-mi	Michigan	MI	
2	us-ak	Alaska	AK	
3	us-hi	Hawaii	HI	
4	us-fl	Florida	FL	
5	us-la	Louisiana	LA	
6	us-ar	Arkansas	AR	
7	us-sc	South Carolina	SC	
8	us-ga	Georgia	GA	
9	us-ms	Mississippi	MS	
10	us-al	Alabama	AL	
11	us-nm	New Mexico	NM	
12	us-tx	Texas	TX	
13	us-tn	Tennessee	TN	
14	us-nc	North Carolina	NC	
15	us-ok	Oklahoma	OK	
16	us-az	Arizona	AZ	
17	us-mo	Missouri	MO	
18	us-va	Virginia	VA	
19	us-ks	Kansas	KS	
20	us-ky	Kentucky	KY	
21	us-co	Colorado	CO	

Name:

Load Edit Cancel

You can enter a new column simply by typing a new column name (in the blank column to the right), then add values in each cell, just like you can do in Excel. When finished, select **Load** and the table is added to the data model for Power BI Desktop.

NOTE

When working with countries or regions, use the three-letter abbreviation to ensure that geocoding works properly in map visualizations. Do *not* use two-letter abbreviations, as some countries or regions may not be properly recognized.

If you only have two-letter abbreviations, check out [this external blog post](#) for steps on how to associate your two-letter country/region abbreviations with three-letter country/region abbreviations.

Preview behavior and requirements

There are a few considerations and requirements for this Preview release of **Shape Map**:

- The **Shape Map** visual is in Preview, and must be enabled in Power BI Desktop. To enable **Shape Map**, select **File > Options and Settings > Options > Preview Features**, then select the **Shape Map** checkbox.
- Currently, you must also have the **Values** bucket set in order for the **Legend** classification to work properly
- The final release version of **Shape Map** will have a user interface that shows the map keys of the currently selected map (there is no date set for final release, and **Shape Map** is still in Preview); in this Preview release, you can reference the map region keys in the tables found in the following **Region Keys** section of this article.
- The **Shape Map** visual will plot up to a maximum of 1,000 data points.

Region keys

Use the following **Region Keys** in this Preview release to test **Shape Map**.

Australia: States

ID	ABBR	ISO	NAME	POSTAL
au-wa	WA	AU-WA	Western Australia	WA
au-vic	Vic	AU-VIC	Victoria	VIC
au-tas	Tas	AU-TAS	Tasmania	TAS
au-sa	SA	AU-SA	South Australia	SA
au-qld	Qld	AU-QLD	Queensland	QLD
au-nt	NT	AU-NT	Northern Territory	NT
au-nsw	NSW	AU-NSW	New South Wales	NSW
au-act	ACT	AU-ACT	Australian Capital Territory	ACT

Austria: States

ID	ISO	NAME	NAME-EN	POSTAL
at-wi	AT-9	Wien	Vienna	WI
at-vo	AT-8	Vorarlberg	Vorarlberg	VO
at-tr	AT-7	Tirol	Tyrol	TR
at-st	AT-6	Steiermark	Styria	ST
at-sz	AT-5	Salzburg	Salzburg	SZ
at-oo	AT-4	Oberösterreich	Upper Austria	OO
at-no	AT-3	Niederösterreich	Lower Austria	NO
at-ka	AT-2	Kärnten	Carinthia	KA
at-bu	AT-1	Burgenland	Burgenland	BU

Brazil: States

ID
Tocantins
Pernambuco
Goiás

ID
Sergipe
Sao Paulo
Santa Catarina
Roraima
Rondonia
Rio Grande do Sul
Rio Grande do Norte
Rio de Janeiro
Piaui
Parana
Paraiba
Para
Minas Gerais
Mato Grosso
Maranhao
Mato Grosso do Sul
Distrito Federal
Ceara
Espirito Santo
Bahia
Amazonas
Amapa
Alagoas
Acre
Litigated Zone 1

ID
Litigated Zone 2
Litigated Zone 3
Litigated Zone 4

Canada: Provinces

ID	ISO	NAME	POSTAL
ca-nu	CA-NU	Nunavut	NU
ca-nt	CA-NT	Northwest Territories	NT
ca-yt	CA-YT	Yukon	YT
ca-sk	CA-SK	Saskatchewan	SK
ca-qc	CA-QC	Quebec	QC
ca-pe	CA-PE	Prince Edward Island	PE
ca-on	CA-ON	Ontario	ON
ca-ns	CA-NS	Nova Scotia	NS
ca-nl	CA-NL	Newfoundland and Labrador	NL
ca-nb	CA-NB	New Brunswick	NB
ca-mb	CA-MB	Manitoba	MB
ca-bc	CA-BC	British Columbia	BC
ca-ab	CA-AB	Alberta	AB

France: Regions

ID	NAME	NAME-EN
Alsace	Alsace	Alsace
Rhone-Alpes	Rhône-Alpes	Rhone-Alpes
Provence-Alpes-Cote d'Azur	Provence-Alpes-Côte d'Azur	Provence-Alpes-Cote d'Azur
Poitou-Charentes	Poitou-Charentes	Poitou-Charentes
Picardie	Picardie	Picardy
Pays de la Loire	Pays de la Loire	Pays de la Loire

ID	NAME	NAME-EN
Nord-Pas-de-Calais	Nord-Pas-de-Calais	Nord-Pas-de-Calais
Midi-Pyrenees	Midi-Pyrénées	Midi-Pyrenees
Lorraine	Lorraine	Lorraine
Limousin	Limousin	Limousin
Languedoc-Roussillon	Languedoc-Roussillon	Languedoc-Roussillon
Ile-del-France	Île-de-France	Ile-de-France
Haute-Normandie	Haute-Normandie	Upper Normandy
Franche-Comte	Franche-Comté	Franche-Comte
Corse	Corse	Corsica
Champagne-Ardenne	Champagne-Ardenne	Champagne-Ardenne
Centre-Val de Loire	Centre-Val de Loire	Centre-Val de Loire
Bretagne	Bretagne	Brittany
Bourgogne	Bourgogne	Burgundy
Basse-Normandie	Basse-Normandie	Lower Normandy
Auvergne	Auvergne	Auvergne
Aquitaine	Aquitaine	Aquitaine

Germany: States

ID	ISO	NAME	NAME-EN	POSTAL
de-be	DE-BE	Berlin	Berlin	BE
de-th	DE-TH	Thüringen	Thuringia	TH
de-st	DE-ST	Sachsen-Anhalt	Saxony-Anhalt	ST
de-sn	DE-SN	Sachsen	Saxony	SN
de-mv	DE-MV	Mecklenburg-Vorpommern	Mecklenburg-Vorpommern	MV
de-bb	DE-BB	Brandenburg	Brandenburg	BB
de-sh	DE-SH	Schleswig-Holstein	Schleswig-Holstein	SH

ID	ISO	NAME	NAME-EN	POSTAL
de-sl	DE-SL	Saarland	Saarland	SL
de-rp	DE-RP	Rheinland-Pfalz	Rhineland-Palatinate	RP
de-nw	DE-NW	Nordrhein-Westfalen	North Rhine-Westphalia	NW
de-ni	DE-NI	Niedersachsen	Lower Saxony	NI
de-he	DE-HE	Hessen	Hesse	HE
de-hh	DE-HH	Hamburg	Hamburg	HH
de-hb	DE-HB	Bremen	Bremen	HB
de-by	DE-BY	Bayern	Bavaria	BY
de-bw	DE-BW	Baden-Württemberg	Baden-Wurttemberg	BW

Ireland: Counties

ID
Wicklow
Wexford
Westmeath
Waterford
Sligo
Tipperary
Roscommon
Offaly
Monaghan
Meath
Mayo
Louth
Longford
Limerick

ID
Leitrim
Laoighis
Kilkenny
Kildare
Kerry
Galway
Dublin
Donegal
Cork
Clare
Cavan
Carlow

Italy: Regions

ID	ISO	NAME	NAME-EN	POSTAL
it-vn	IT-34	Veneto	Veneto	VN
it-vd	IT-23	Valle d'Aosta	Aosta Valley	VD
it-um	IT-55	Umbria	Umbria	UM
it-tt	IT-32	Trentino-Alto Adige	Trentino-South Tyrol	TT
it-tc	IT-52	Toscana	Tuscany	TC
it-sc	IT-82	Sicilia	Sicily	SC
it-sd	IT-88	Sardegna	Sardinia	SD
it-pm	IT-21	Piemonte	Piedmont	PM
it-ml	IT-67	Molise	Molise	ML
it-mh	IT-57	Marche	Marche	MH
it-lm	IT-25	Lombardia	Lombardy	LM

ID	ISO	NAME	NAME-EN	POSTAL
it-lg	IT-42	Liguria	Liguria	LG
it-lz	IT-62	Lazio	Lazio	LZ
it-fv	IT-36	Friuli-Venezia Giulia	Friuli-Venezia Giulia	FV
it-er	IT-45	Emilia-Romagna	Emilia-Romagna	ER
it-cm	IT-72	Campania	Campania	CM
it-lb	IT-78	Calabria	Calabria	LB
it-bc	IT-77	Basilicata	Basilicata	BC
it-pu	IT-75	Apulia	Puglia	PU
it-ab	IT-65	Abruzzo	Abruzzo	AB

Mexico: States

ID	ABREVIATURA	ISO	NAME	NAME-EN	POSTAL
mx-zac	Zac.	MX-ZAC	Zacatecas	Zacatecas	ZA
mx-yuc	Yuc.	MX-YUC	Yucatán	Yucatan	YU
mx-ver	Ver.	MX-VER	Veracruz	Veracruz	VE
mx-tla	Tlax.	MX-TLA	Tlaxcala	Tlaxcala	TL
mx-tam	Tamps.	MX-TAM	Tamaulipas	Tamaulipas	TM
mx-tab	Tab.	MX-TAB	Tabasco	Tabasco	TB
mx-son	Son.	MX-SON	Sonora	Sonora	SO
mx-sin	Sin.	MX-SIN	Sinaloa	Sinaloa	SI
mx-slp	S.L.P.	MX-SLP	San Luis Potosí	San Luis Potosi	SL
mx-roo	Q.R.	MX-ROO	Quintana Roo	Quintana Roo	QR
mx-que	Qro.	MX-QUE	Querétaro	Queretaro	QE
mx-pue	Pue.	MX-PUE	Puebla	Puebla	PU
mx-oax	Oax.	MX-OAX	Oaxaca	Oaxaca	OA
mx-nle	N.L.	MX-NLE	Nuevo León	Nuevo Leon	NL

ID	ABREVIATURA	ISO	NAME	NAME-EN	POSTAL
mx-nay	Nay.	MX-NAY	Nayarit	Nayarit	NA
mx-mor	Mor.	MX-MOR	Morelos	Morelos	MR
mx-mic	Mich.	MX-MIC	Michoacán	Michoacan	MC
mx-mex	Méx.	MX-MEX	Estado de México	Mexico State	MX
mx-jal	Jal.	MX-JAL	Jalisco	Jalisco	JA
mx-hid	Hgo.	MX-HID	Hidalgo	Hidalgo	HI
mx-gro	Gro.	MX-GRO	Guerrero	Guerrero	GR
mx-gua	Gto.	MX-GUA	Guanajuato	Guanajuato	GT
mx-dur	Dgo.	MX-DUR	Durango	Durango	DU
mx-dif	Col.	MX-DIF	Ciudad de México	Mexico City	DF
mx-col	Coah.	MX-COL	Colima	Colima	CL
mx-coa	Chis.	MX-COA	Coahuila	Coahuila	CA
mx-chh	Chih.	MX-CHH	Chihuahua	Chihuahua	CH
mx-chp	CDMX.	MX-CHP	Chiapas	Chiapas	CP
mx-cam	Camp.	MX-CAM	Campeche	Campeche	CM
mx-bcs	B.C.S.	MX-BCS	Baja California Sur	Baja California Sur	BS
mx-bcn	B.C.	MX-BCN	Baja California	Baja California	BN
mx-agu	Ags.	MX-AGU	Aguascalientes	Aguascalientes	AG

Netherlands: Provinces

ID	ISO	NAME	NAME-EN
nl-zh	NL-ZH	Zuid-Holland	South Holland
nl-ze	NL-ZE	Zeeland	Zeeland
nl-ut	NL-UT	Utrecht	Utrecht
nl-ov	NL-OV	Overijssel	Overijssel
nl-nh	NL-NH	Noord-Holland	North Holland

ID	ISO	NAME	NAME-EN
nl-nb	NL-NB	Noord-Brabant	North Brabant
nl-li	NL-LI	Limburg	Limburg
nl-gr	NL-GR	Groningen	Groningen
nl-ge	NL-GE	Gelderland	Gelderland
nl-fr	NL-FR	Fryslân	Friesland
nl-fl	NL-FL	Flevoland	Flevoland
nl-dr	NL-DR	Drenthe	Drenthe

UK: Countries

ID	ISO	NAME
gb-wls	GB-WLS	Wales
gb-sct	GB-SCT	Scotland
gb-nir	GB-NIR	Northern Ireland
gb-eng	GB-ENG	England

USA: States

ID	NAME	POSTAL
us-mi	Michigan	MI
us-ak	Alaska	AK
us-hi	Hawaii	HI
us-fl	Florida	FL
us-la	Louisiana	LA
us-ar	Arkansas	AR
us-sc	South Carolina	SC
us-ga	Georgia	GA
us-ms	Mississippi	MS
us-al	Alabama	AL
us-nm	New Mexico	NM

ID	NAME	POSTAL
us-tx	Texas	TX
us-tn	Tennessee	TN
us-nc	North Carolina	NC
us-ok	Oklahoma	OK
us-az	Arizona	AZ
us-mo	Missouri	MO
us-va	Virginia	VA
us-ks	Kansas	KS
us-ky	Kentucky	KY
us-co	Colorado	CO
us-md	Maryland	MD
us-wv	West Virginia	WV
us-de	Delaware	DE
us-dc	District of Columbia	DC
us-il	Illinois	IL
us-oh	Ohio	OH
us-ca	California	CA
us-ut	Utah	UT
us-nv	Nevada	NV
us-in	Indiana	IN
us-nj	New Jersey	NJ
us-ri	Rhode Island	RI
us-ct	Connecticut	CT
us-pa	Pennsylvania	PA
us-ny	New York	NY

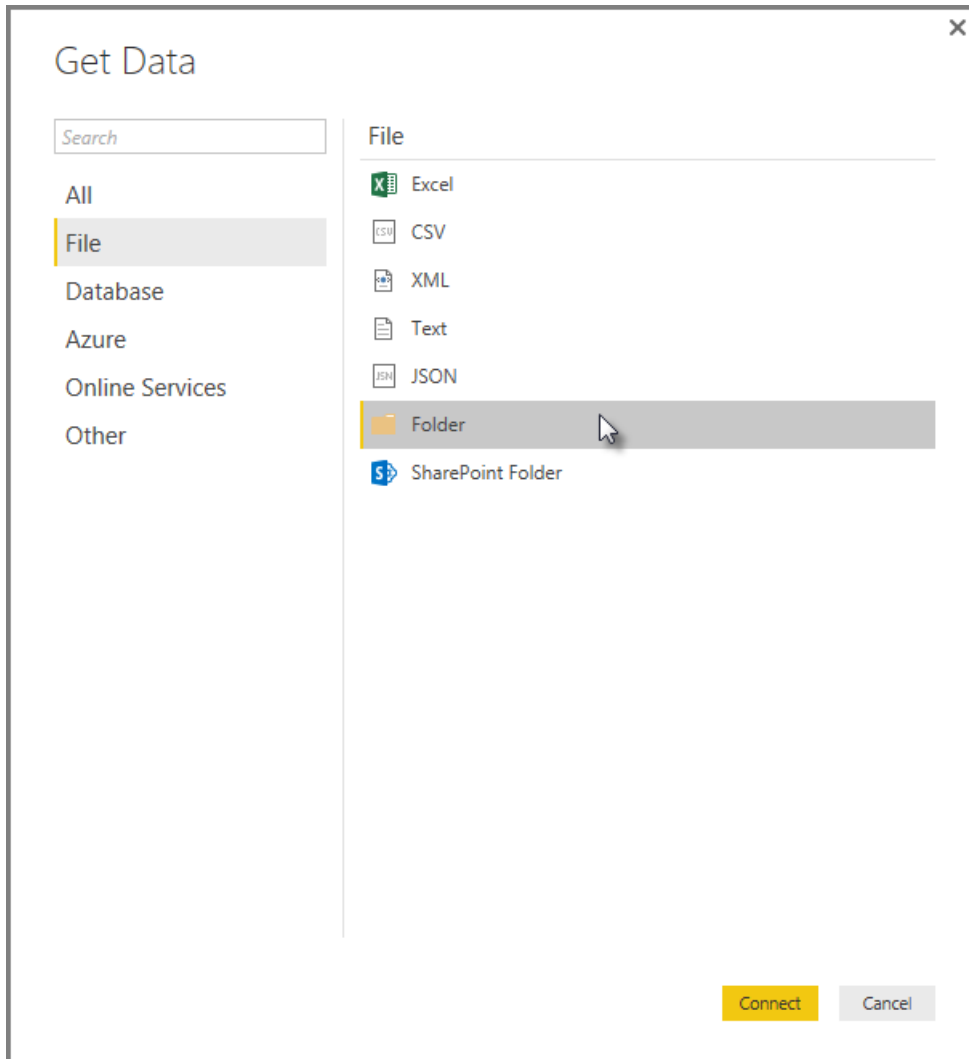
ID	NAME	POSTAL
us-ne	Nebraska	NE
us-ma	Massachusetts	MA
us-ia	Iowa	IA
us-nh	New Hampshire	NH
us-or	Oregon	OR
us-mn	Minnesota	MN
us-vt	Vermont	VT
us-id	Idaho	ID
us-wi	Wisconsin	WI
us-wy	Wyoming	WY
us-sd	South Dakota	SD
us-nd	North Dakota	ND
us-me	Maine	ME
us-mt	Montana	MT
us-wa	Washington	WA

Combine binaries in Power BI Desktop

12/6/2017 • 2 min to read • [Edit Online](#)

One powerful approach to importing data into **Power BI Desktop** is to combine multiple files, which have the same schema, into a single logical table. With the November 2016 release of **Power BI Desktop** (and subsequent releases), this convenient and popular approach has been made more convenient and more expansive, as described in this article.

To start the process of combining binaries from the same folder, select **Get Data > File > Folder**.



Previous combine binaries behavior

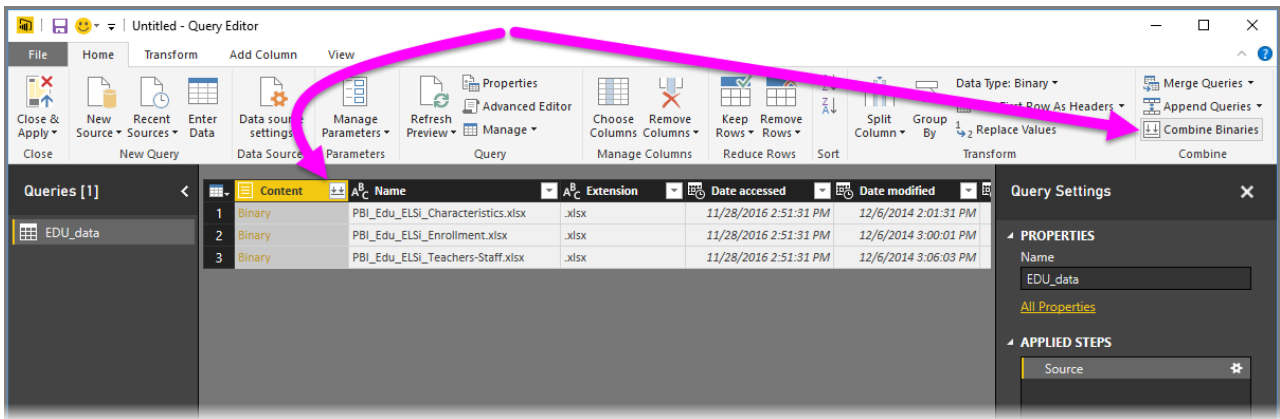
Prior to the November 2016 release of **Power BI Desktop**, you could combine certain file types with the **combine binaries** transform, but there were limitations:

- Transformations were not considered for each individual file before the files were combined into a single table. As such, you often had to combine files, then filter out *header values* by filtering rows as part of the edit process.
- The **Combine binaries** transform only worked for *text* or CSV files, and didn't work on other supported file formats such as Excel workbooks, JSON files, and others.

Customers asked for more intuitive operation of the **combine binaries** operation, so the transform was enhanced.

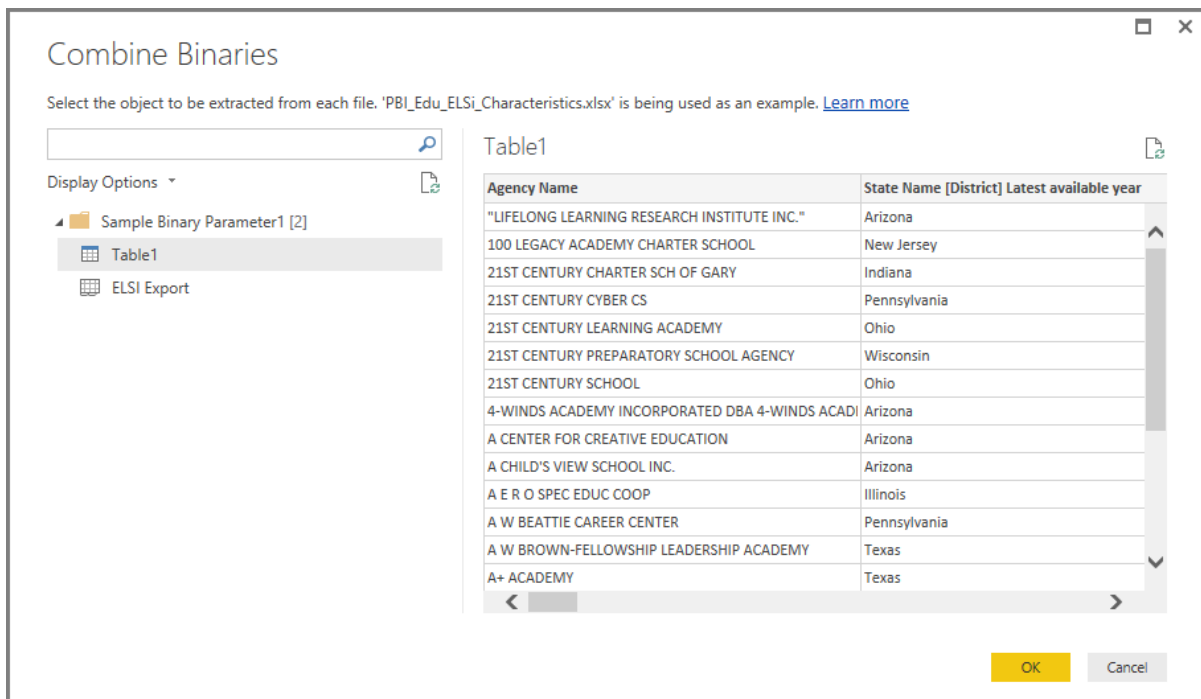
Current combine binaries behavior

Power BI Desktop now handles the **combine binaries** more effectively. You start by selecting **combine binaries**, either from the **Home** ribbon tab in **Query Editor**, or from the column itself.

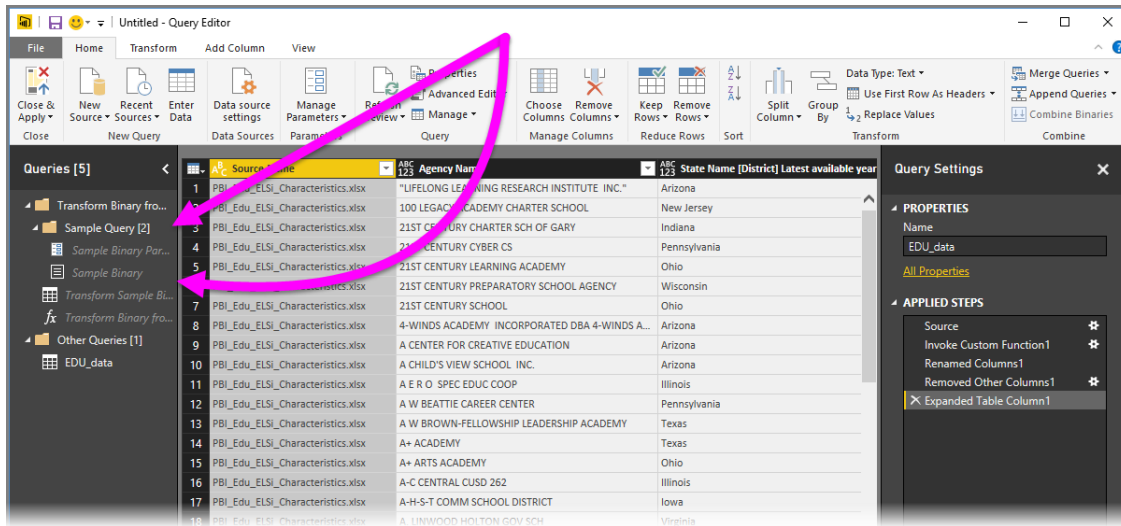


The **combine binaries** transform now behaves as follows:

- The **combine binaries** transform analyzes each input file, and determines the correct file format to use, such as *text* or *Excel workbook* or *JSON* file.
- The transform allows you to select a specific object from the first file, for example, an *Excel workbook*, to extract.



- The **combine binaries** then automatically does the following:
 - Creates an example query that performs all the required extraction steps in a single file.
 - Creates a *function query* that parameterizes the file/binary input to the *exemplar query*. The exemplar query and the function query are linked, so that changes to the exemplar query are reflected in the function query.
 - Applies the *function query* to the original query with input binaries (for example, the *Folder* query) so it applies the function query for binary inputs on each row, then expands the resulting data extraction as top-level columns.



With the new behavior of **combine binaries**, you can easily combine all binaries within a given folder as long as they have the same file type and structure (as in, the same columns).

In addition, you can easily apply additional transformation or extraction steps by modifying the automatically created *exemplar query*, without having to worry about modifying or creating additional *function query* steps; any changes to the *exemplar query* are automatically generated in the linked *function query*.

Next steps

There are all sorts of data you can connect to using Power BI Desktop. For more information on data sources, check out the following resources:

- [Getting Started with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Connect to CSV files in Power BI Desktop](#)
- [Enter data directly into Power BI Desktop](#)

Data View in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

Data View helps you inspect, explore, and understand data in your Power BI Desktop model. It's different from how you view tables, columns, and data in **Query Editor**. With Data View, you're looking at your data *after* it has been loaded into the model.

When you're modeling your data, sometimes you want to see what's actually in a table or column without creating a visual on the report canvas, often right down to the row level. This is especially true when you're creating measures and calculated columns, or you need to identify a data type or data category.

Let's take a closer look.

The screenshot shows the Power BI Desktop interface in Data View. The ribbon at the top includes 'Data Tools' and 'Modeling' tabs. The 'Modeling' ribbon has sections for 'Relationships', 'Calculations', 'Sort', 'Formatting', and 'Properties'. A data grid is displayed in the center, showing columns for Agency Name, State Name, Agency ID, Total Students, ELL, and Individual. A search bar is located in the top right of the data grid area. On the right side, there is a 'Fields' pane showing a list of tables and columns. Numbered callouts (1-6) point to specific UI elements: 1. Data View icon in the left sidebar; 2. A cell in the data grid; 3. The Modeling ribbon; 4. The formula bar above the data grid; 5. The search bar; 6. A table in the Fields list.

Agency Name	State Name [District] Lat...	Agency ID - NCE...	Total Students	ELL	Individu...
ACHIEVEMENT PREPARATORY ACADEMY PCS	District of Columbia	1100072	138	0	10
DEL SD 21	Oregon	4100990	9	0	1
ALBANY COMMUNITY CHARTER SCHOOL	New York	3600162	296	0	0
ALBANY SCHOOL DISTRICT	Vermont	5001740	91	0	0
ALLIANCE FOR PROGRESS CS	Pennsylvania	4200039	328	0	39
ALMIRA SCHOOL DISTRICT	Washington	5300090	93	0	9
ALTENBURG 48	Missouri	2903040	158	0	17
AROCK SD 81	Oregon	4101500	11	0	-
ARVON TOWNSHIP SCHOOL DISTRICT	Michigan	2603270	6	0	0
ASHWOOD SD 8	Oregon	4101590	5	0	-
ASPIRE CHARTER ACADEMY	Indiana	1800071	598	0	49
ATHENS/GRAFTON CONTRACT SCHOOL DISTR	Vermont	5000026	72	0	0
BAKKER 10	North Dakota	3802240	7	0	0
BALDWIN 29	North Dakota	3802320	12	0	4
BANGOR TOWNSHIP S/D #8	Michigan	2603960	25	0	0
BEATRICE MAYES INSTITUTE CHARTER SCHOC	Texas	4800190	430	0	28
BEN ROSS PUBLIC SCHOOL ACADEMY	Michigan	2600309	344	0	37
BERLIN TOWNSHIP S/D #3	Michigan	2605100	39	0	3
BOIS BLANC PINES SCHOOL DISTRICT	Michigan	2606300	2	0	0
BRIGHTER CHOICE CHARTER MIDDLE SCHOOL	New York	3601021	42	0	0
BRONX ACADEMY OF PROMISE CHARTER SCH	New York	3600956	314	0	0
BROOKFIELD SCHOOL DISTRICT	Vermont	5002670	80	0	0
BROOKLYN EAST COLLEGIATE CHARTER SCHO	New York	3601033	80	0	0

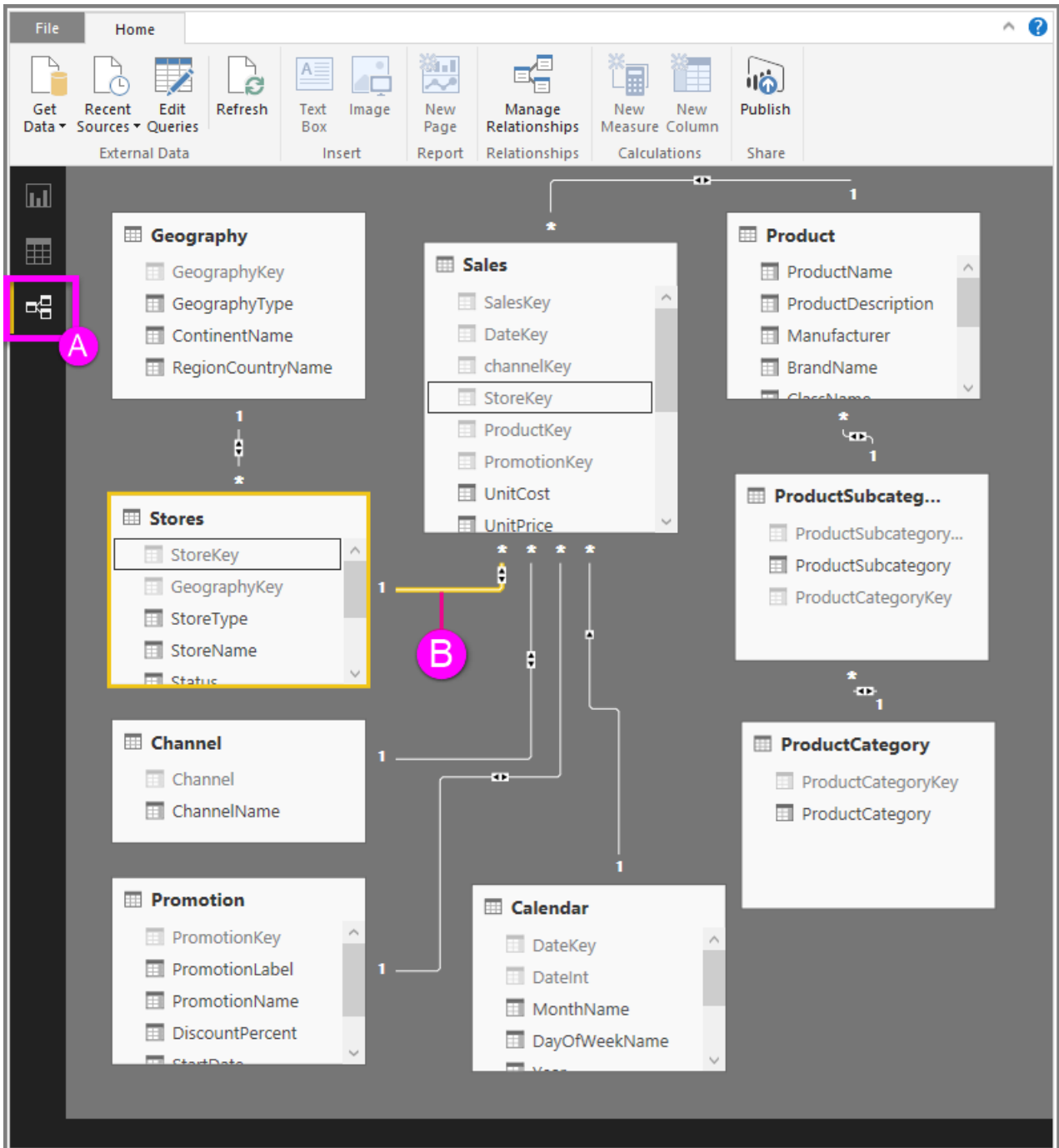
1. Data View icon – Click to enter Data View.
2. Data Grid – Shows the selected table and all columns and rows in it. Columns hidden from Report View are greyed out. You can right-click on a column for options.
3. Modeling ribbon – Manage relationships, create calculations, change data type, format, data category for a column.
4. Formula bar – Enter DAX formulas for Measures and Calculated columns.
5. Search – Search for a table or column in your model.
6. Fields list – Select a table or column to view in the data grid.

Relationship View in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

Relationship View shows all of the tables, columns, and relationships in your model. This can be especially helpful when your model has complex relationships between many tables.

Let's take a look.



A. Relationship View icon – Click to show your model in Relationship View

B. Relationship – You can hover your cursor over a relationship to show the columns used. Double-click on a relationship to open it in the **Edit Relationship** dialog box.

In the figure above, you can see the *Stores* table has a *StoreKey* column that's related to the *Sales* table, which also has a *StoreKey* column. We see it's a *Many to One* (*:1) relationship, and the icon in the middle of the line shows

the Cross filter direction set to *Both*. The arrow on the icon shows the direction of the filter context flow.

To learn more about relationships, see [Create and manage relationships in Power BI Desktop](#).

Create and manage relationships in Power BI Desktop

12/6/2017 • 15 min to read • [Edit Online](#)

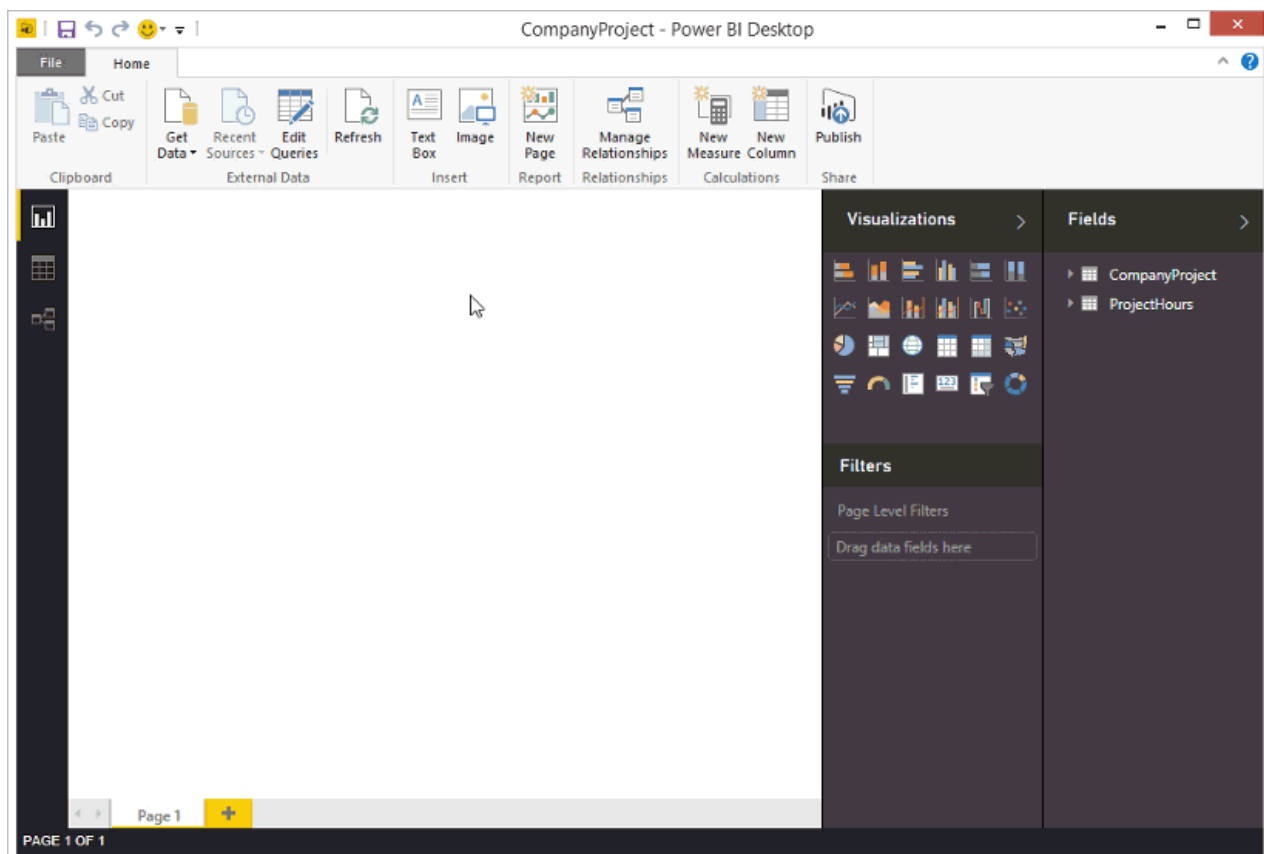
When you import multiple tables, chances are you're going to do some analysis using data from all those tables. Relationships between those tables are necessary in order to accurately calculate results and display the correct information in your reports. Power BI Desktop makes creating those relationships easy. In fact, in most cases you won't have to do anything, the Autodetect feature can do it for you. However, in some cases you might have to create relationships yourself, or you might need to make some changes to a relationship. Either way, it's important to understand relationships in Power BI Desktop and how to create and edit them.

Autodetect during load

If you query two or more tables at the same time, when the data is loaded, Power BI Desktop will attempt to find and create relationships for you. Cardinality, Cross filter direction, and Active properties are automatically set. Power BI Desktop looks at column names in the tables you are querying to determine if there are any potential relationships. If there are, those relationships are created automatically. If Power BI Desktop cannot determine with a high-level of confidence there is a match, it will not automatically create the relationship. You can still use the Manage Relationships dialog to create or edit relationships.

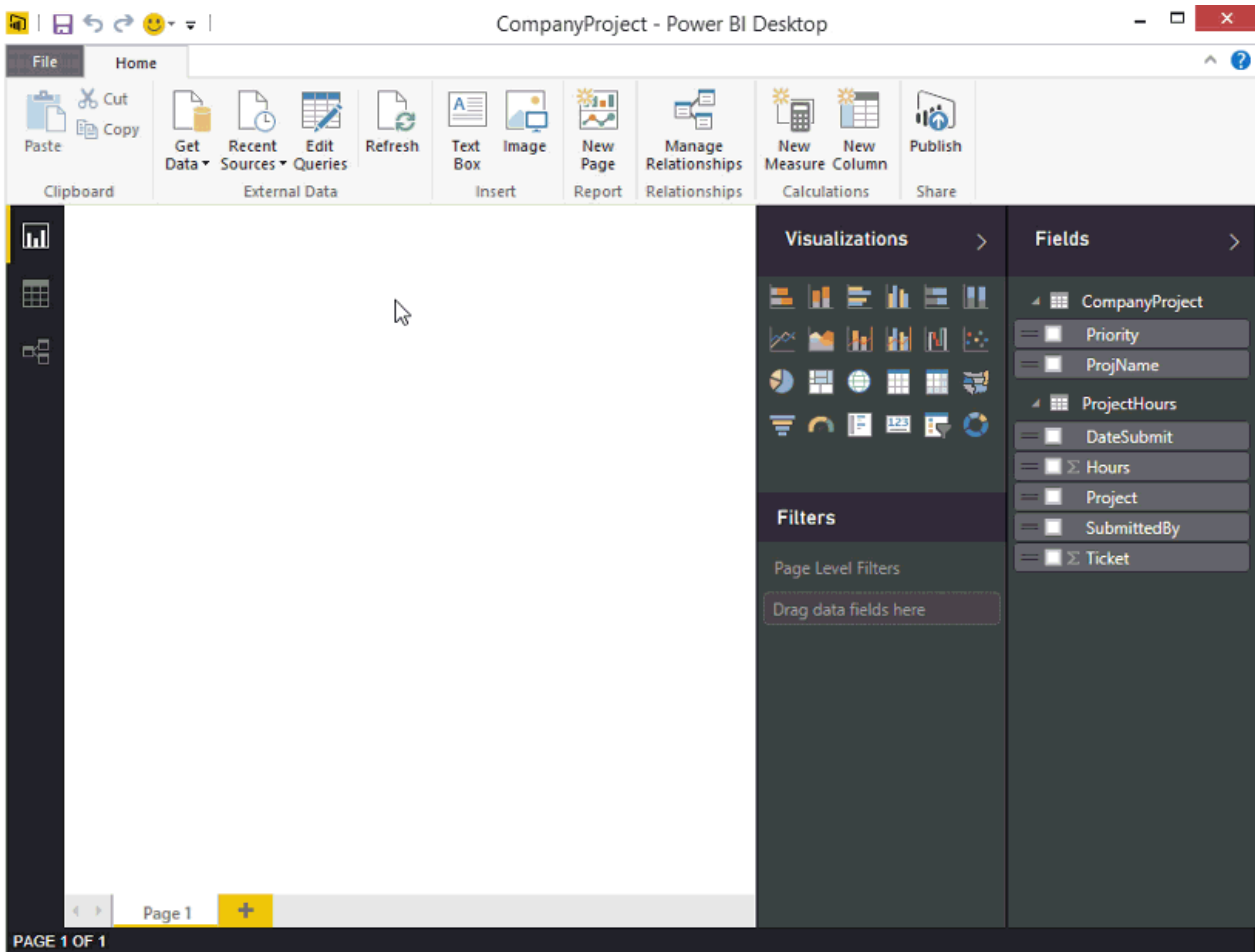
Create a relationship by using Autodetect

On the **Home** tab, click **Manage Relationships** > **AutoDetect**.



Create a relationship manually

1. On the **Home** tab, click **Manage Relationships** > **New**.
2. In the **Create Relationship** dialog, in the first table drop-down list, select a table, and then select the column you want to use in the relationship.
3. In the to second table drop-down list, select the other table you want in the relationship, then select the other column you want to use, and then click **OK**.



By default, Power BI Desktop will automatically configure the Cardinality (direction), Cross filter direction, and Active properties for your new relationship; however, you can change these if necessary in Advanced options. To learn more, see the Understanding advanced options section later in this article.

Edit a relationship

1. On the **Home** tab, click **Manage Relationships**.
2. In the **Manage Relationships** dialog, select the relationship, then click **Edit**.

Configure advanced options

When you create or edit a relationship, you can configure advanced options. By default, advanced options are automatically configured based on a best guess. This can be different for each relationship based on the data in the columns.

Cardinality

Many to One (*:1) - This is the most common, default type. This means the column in one table can have more than one instance of a value, and the other related table, often know as the Lookup table, has only one instance of a value.

One to One (1:1) - This means the column in one table has only one instance of a particular value, and the other

related table has only one instance of a particular value.

See the Understanding advanced options section later in this article for more details about when to change cardinality.

Cross filter direction

Both - This is the most common, default direction. This means for filtering purposes, both tables are treated as if they're a single table. This works well with a single table that has a number of lookup tables that surround it. An example is a Sales actuals table with a lookup table for department. This is often called a Star schema configuration (a central table with several Lookup tables.) However, if you have two or more tables that also have lookup tables (with some in common) then you wouldn't want to use the Both setting. To continue the previous example, in this case, you also have a budget sales table that records target budget for each department. And, the department table is connected to both the sales and the budget table. Avoid the Both setting for this kind of configuration.

Single - This means that filtering choices in connected tables work on the table where values are being aggregated. If you import a Power Pivot in Excel 2013 or earlier data model, all relationships will have a single direction.

See the Understanding advanced options section later in this article for more details about when to change cross filter direction.

Make this relationship active

When checked, this means the relationship serves as the active, default relationship. In cases where there are more than one relationship between two tables, the active relationship provides a way for Power BI Desktop to automatically create visualizations that include both tables.

See the Understanding advanced options section later in this article for more details about when to make a particular relationship active.

Understanding relationships

Once you have connected two tables together with a relationship, you can work with the data in both tables as if they were a single table, freeing you from having to worry about relationship details, or flattening those tables into a single table before importing them. In many situations, Power BI Desktop can automatically create relationships for you, so creating those relationships yourself might not even be needed. However, if Power BI Desktop can't determine with a high-degree of certainty that a relationship between two tables should exist, it will not automatically create the relationship. In that case, you will need to create the relationship.

Let's do a little tutorial, to better show you how relationships work in Power BI Desktop.

TIP

You can complete this lesson yourself. Copy the ProjectHours table below into an Excel worksheet, select all of the cells, click **INSERT > Table**. In the **Create Table** dialog, just click **OK**. Then in **Table Name**, type **ProjectHours**. Do the same for the CompanyProject table. You can then import the data by using **Get Data** in Power BI Desktop. Select your workbook and tables as a data source.

This first table, ProjectHours, is a record of work tickets that record the number of hours a person has worked on a particular project.

ProjectHours

TICKET	SUBMITTEDBY	HOURS	PROJECT	DATESUBMIT
1001	Brewer, Alan	22	Blue	1/1/2013
1002	Brewer, Alan	26	Red	2/1/2013
1003	Ito, Shu	34	Yellow	12/4/2012
1004	Brewer, Alan	13	Orange	1/2/2012
1005	Bowen, Eli	29	Purple	10/1/2013
1006	Bento, Nuno	35	Green	2/1/2013
1007	Hamilton, David	10	Yellow	10/1/2013
1008	Han, Mu	28	Orange	1/2/2012
1009	Ito, Shu	22	Purple	2/1/2013
1010	Bowen, Eli	28	Green	10/1/2013
1011	Bowen, Eli	9	Blue	10/15/2013

This second table, CompanyProject, is a list of projects with an assigned priority, A, B, or C.

CompanyProject

PROJNAME	PRIORITY
Blue	A
Red	B
Green	C
Yellow	C
Purple	B
Orange	C

Notice that each table has a project column. Each are named slightly different, but the values look like they're the same. That's important, and we'll get back to it in a little bit.

Now that we have our two tables imported into a model, let's create a report. The first thing we want to get is the number of hours submitted by project priority, so we select **Priority** and **Hours** from Fields.

Priority	Hours
A	256
B	256
C	256
Total	256

Fields

- CompanyProject
 - Priority
 - ProjName
- ProjectHours
 - DateSubmit
 - Hours
 - Project
 - SubmittedBy
 - Ticket

If we look at our table in the Report canvas, you'll see the number of hours is **256.00** for each project, and it's also the total. Clearly this isn't correct. Why? It's because we can't calculate a sum total of values from one table (Hours in the Project table), sliced by values in another table (Priority in the CompanyProject table) without a relationship between these two tables.

So, let's create a relationship between these two tables.

Remember those columns we saw in both tables with a project name, but with values that look alike? We're going to use these two columns to create a relationship between our tables.

Why these columns? Well, if we look at the Project column in the ProjectHours table, we see values like Blue, Red, Yellow, Orange, and so on. In fact, we see several rows that have the same value. In-effect, we have many color values for Project.

If we look at the ProjName column in the CompanyProject table, we see there's only one of each of the color values for project. Each color value in this table is unique, and that's important, because we can create a relationship between these two tables. In this case, a many-to-one relationship. In a many-to-one relationship, at least one column in one of the tables must contain unique values. There are some advanced options for some relationships, and we'll look at those later, but for now, let's create a relationship between the Project columns in each of our two tables.

To create the new relationship

1. Click **Manage Relationships**.
2. In **Manage Relationships**, click **New**. This opens the **Create Relationship** dialog, where we can select the tables, columns, and any advanced settings we want for our relationship.
3. In the first table, select **ProjectHours**, then select the **Project** column. This is the many side of our relationship.
4. In the second table, select **CompanyProject**, then select the **ProjName** column. This is the one side of our relationship.
5. Go ahead and click **OK** in both the **Create Relationship** dialog and the **Manage Relationships** dialog.

Create Relationship

Select tables and columns that relate to one another.

ProjectHours

Ticket	SubmittedBy	Hours	Project	DateSubmit
1001	Brewer, Alan	22	Blue	Tuesday, January 1, 2013
1002	Brewer, Alan	26	Red	Friday, February 1, 2013
1003	Ito, Shu	34	Yellow	Tuesday, December 4, 2012
1004	Brewer, Alan	13	Orange	Monday, January 2, 2012
1005	Bowen, Eli	29	Purple	Tuesday, October 1, 2013

CompanyProject

ProjName	Priority
Blue	A
Red	B
Green	C
Yellow	C
Purple	B

Advanced options

Cardinality: Many to One (*:1)

Cross filter direction: Both

Make this relationship active

OK Cancel

In the interest of full disclosure, you really just created this relationship the hard way. You could've just clicked on the Autodetect button in the Manage Relationships dialog. In-fact, Autodetect would have already done it for you when you loaded the data if both columns had the same name. But, what's the challenge in that?

Now, let's look at the table in our Report canvas again.

Priority	Hours
A	31
B	77
C	148
Total	256

Visualizations

Filters

Fields

- CompanyProject
 - Priority
 - ProjName
- ProjectHours
 - DateSubmit
 - Hours
 - Project
 - SubmittedBy
 - Ticket

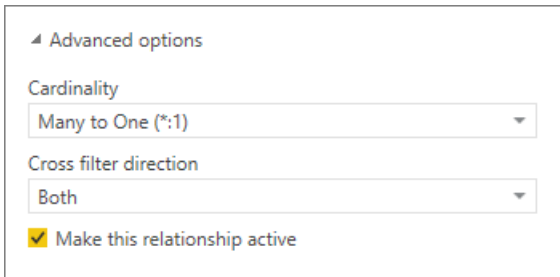
Now that looks a whole lot better, doesn't it?

When we sum up hours by Priority, Power BI Desktop will look for every instance of the unique color values in the CompanyProject lookup table, and then look for every instance of each of those values in the CompanyProject table, and calculate a sum total for each unique value.

That was pretty easy, in-fact, with Autodetect, you might not even have to do this much.

Understanding advanced options

When a relationship is created, either with Autodetect or one you create manually, Power BI Desktop will automatically configure advanced options based on the data in your tables. You can configure advanced relationship properties by expanding Advanced options in the Create/Edit relationship dialog.



Advanced options

Cardinality
Many to One (*:1)

Cross filter direction
Both

Make this relationship active

As we said, these are usually set automatically and you won't need to mess with them; however, there are several situations where you might want to configure advanced options yourself.

Future updates to the data require a different cardinality

Normally, Power BI Desktop can automatically determine the best cardinality for the relationship. If you do need to override the automatic setting, because you know the data will change in the future, you can select it in the Cardinality control. Let's look at an example where we need to select a different cardinality.

The CompanyProjectPriority table below is a list of all company projects and their priority. The ProjectBudget table is the set of projects for which budget has been approved.

ProjectBudget

APPROVED PROJECTS	BUDGETALLOCATION	ALLOCATIONDATE
Blue	40,000	12/1/2012
Red	100,000	12/1/2012
Green	50,000	12/1/2012

CompanyProjectPriority

PROJECT	PRIORITY
Blue	A
Red	B
Green	C
Yellow	C
Purple	B
Orange	C

If we create a relationship between the Project column in the CompanyProjectPriority table and ApprovedProjects

column in the ProjectBudget table, like this:

Create Relationship ✕

Select tables and columns that relate to one another.

ProjectBudget

Approved Projects	BudgetAllocation	AllocationDate
Blue	40000	Saturday, December 1, 2012
Red	100000	Saturday, December 1, 2012
Green	50000	Saturday, December 1, 2012

CompanyProjectPriority

Project	Priority
Blue	A
Red	B
Green	C
Yellow	C
Purple	B

Advanced options

Cardinality: One to One (1:1)

Cross filter direction: Both

Make this relationship active

OK
Cancel

Cardinality is automatically set to One-to-One (1:1), and cross filtering to be Both (as shown). This is because to Power BI Desktop, the best combination of the two tables really looks like this:

PROJECT	PRIORITY	BUDGETALLOCATION	ALLOCATIONDATE
Blue	A	40,000	12/1/2012
Red	B	100,000	12/1/2012
Green	C	50,000	12/1/2012
Yellow	C		
Purple	B		
Orange	C		

There is a one-to-one relationship between our two tables because there are no repeating values in the combined table's Project column. The Project column is unique, because each value occurs only once, so, the rows from the two tables can be combined directly without any duplication.

But, let's say you know the data will change the next time you refresh it. A refreshed version of the ProjectBudget table now has additional rows for Blue and Red:

ProjectBudget

APPROVED PROJECTS	BUDGETALLOCATION	ALLOCATIONDATE
Blue	40,000	12/1/2012
Red	100,000	12/1/2012
Green	50,000	12/1/2012
Blue	80,000	6/1/2013
Red	90,000	6/1/2013

This means the best combination of the two tables now really looks like this:

PROJECT	PRIORITY	BUDGETALLOCATION	ALLOCATIONDATE
Blue	A	40,000	12/1/2012
Red	B	100,000	12/1/2012
Green	C	50,000	12/1/2012
Yellow	C		
Purple	B		
Orange	C		
Blue	A	80000	6/1/2013
Red	B	90000	6/1/2013

In this new combined table, the Project column has repeating values. The two original tables won't have a one-to-one relationship once the table is refreshed. In this case, because we know those future updates will cause the Project column to have duplicates, we want to set the Cardinality to be Many-to-One (*:1), with the Many on the ProjectBudget side and the One on the CompanyProject side.

Adjusting cross filter direction for a complex set of tables of relationships

For most relationships, the cross filter direction is set to 'Both'. There are, however, some more uncommon circumstances where you might need to set this different from the default, like if you're importing a model from an older version of Power Pivot, where every relationship is set to a single direction.

The Both setting enables Power BI Desktop to treat all aspects of connected tables as if they are a single table. There are some situations, however, where Power BI Desktop cannot set a relationship's cross filter direction to 'Both' and also keep an unambiguous set of defaults available for reporting purposes. If a relationship cross filter direction isn't set to Both, then it's usually because it would create ambiguity. If the default cross filter setting isn't working for you, try setting it to a particular table or Both.

Single direction cross filtering works for many situations. In fact, if you've imported a model from Power Pivot in Excel 2013 or earlier, all of the relationships will be set to single direction. Single direction means that filtering choices in connected tables work on the table where aggregation work is happening. Sometimes, understanding cross filtering can be a little difficult, so let's look at an example.

CompanyEmployee		
Emplo	Tenure	City
Brewer, A	15	Redmond
Bowen, Eli	10	San Jose
Bento, Nu	15	Redmond
Hamilton,	3	San Jose
Han, Mu	1	San Jose
Ito, Shu	1	Redmond

ProjectHours				
Ticket	SubmittedBy	Hours	Project	Date Submit
1001	Brewer, Alan	22	Blue	1/1/2013
1002	Brewer, Alan	26	Red	2/1/2013
1003	Ito, Shu	34	Yellow	12/4/2012
1004	Brewer, Alan	13	Orange	1/2/2012
1005	Bowen, Eli	29	Purple	10/1/2013
1006	Bento, Nuno	35	Green	2/1/2013
1007	Hamilton, David	10	Yellow	10/1/2013
1008	Han, Mu	28	Orange	1/2/2012
1009	Ito, Shu	22	Purple	2/1/2013
1010	Bowen, Eli	28	Green	10/1/2013
1011	Bowen, Eli	9	Blue	10/15/2013

CompanyProject	
Project	Priority
Blue	A
Red	B
Green	C
Yellow	C
Purple	B
Orange	C

With single direction cross filtering, if you create a report that summarizes the project hours and then you can choose to summarize (or filter) by CompanyProject, Priority or CompanyEmployee, City. If however, you want to count the number of employee per projects (a less common question), it won't work. You'll get a column of values that are all the same. In the example below, both relationships cross filtering direction is set to a single direction – towards the ProjectHours table:

Employee	Count of Project
Bento, Nuno	6
Bowen, Eli	6
Brewer, Alan	6
Hamilton, David	6
Han, Mu	6
Ito, Shu	6
Total	6

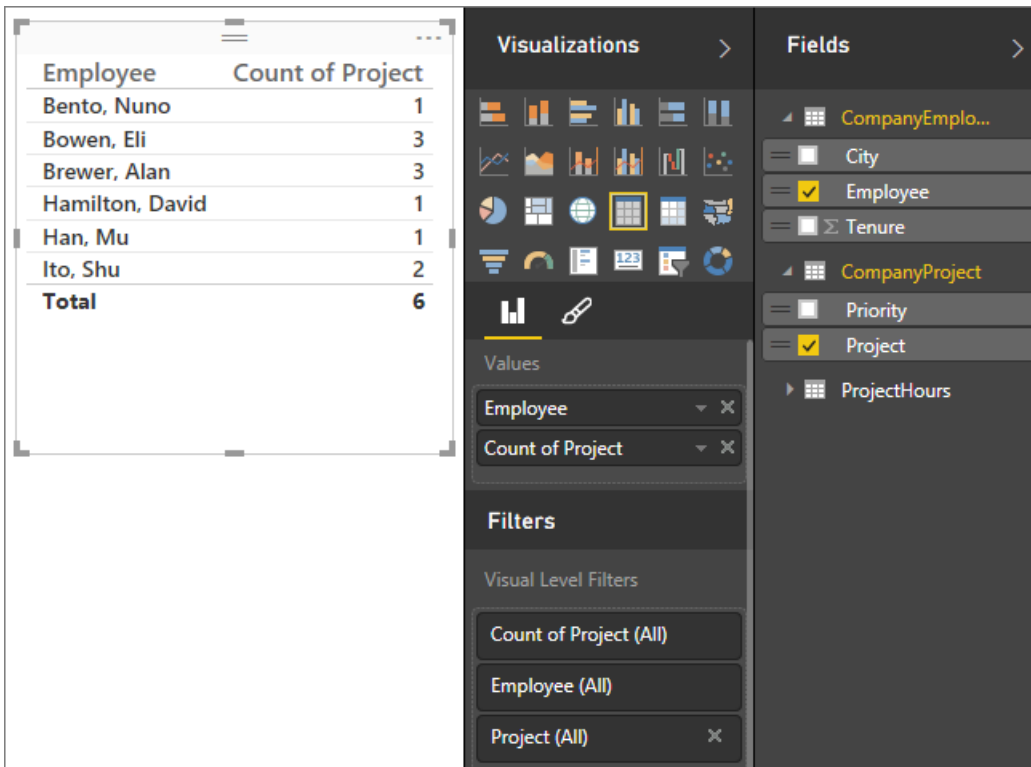
Filter specification will flow from CompanyProject to CompanyEmployee (as shown in the image below) but, it won't flow up to CompanyEmployee. However, if you set the cross filtering direction to Both it will work. The Both setting allows the filter specification to flow up to Employee.

CompanyEmployee		
Emplo	Tenure	City
Brewer, A	15	Redmond
Bowen, Eli	10	San Jose
Bento, Nu	15	Redmond
Hamilton,	3	San Jose
Han, Mu	1	San Jose
Ito, Shu	1	Redmond

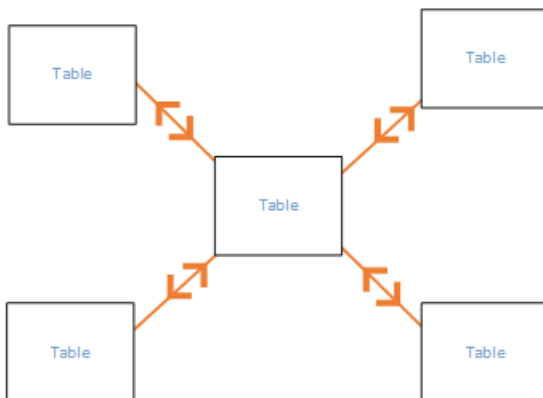
CompanyProject	
Project	Priority
Blue	A
Red	B
Green	C
Yellow	C
Purple	B
Orange	C

ProjectHours				
Ticket	SubmittedBy	Hours	Project	Date Submit
1001	Brewer, Alan	22	Blue	1/1/2013
1002	Brewer, Alan	26	Red	2/1/2013
1003	Ito, Shu	34	Yellow	12/4/2012
1004	Brewer, Alan	13	Orange	1/2/2012
1005	Bowen, Eli	29	Purple	10/1/2013
1006	Bento, Nuno	35	Green	2/1/2013
1007	Hamilton, David	10	Yellow	10/1/2013
1008	Han, Mu	28	Orange	1/2/2012
1009	Ito, Shu	22	Purple	2/1/2013
1010	Bowen, Eli	28	Green	10/1/2013
1011	Bowen, Eli	9	Blue	10/15/2013

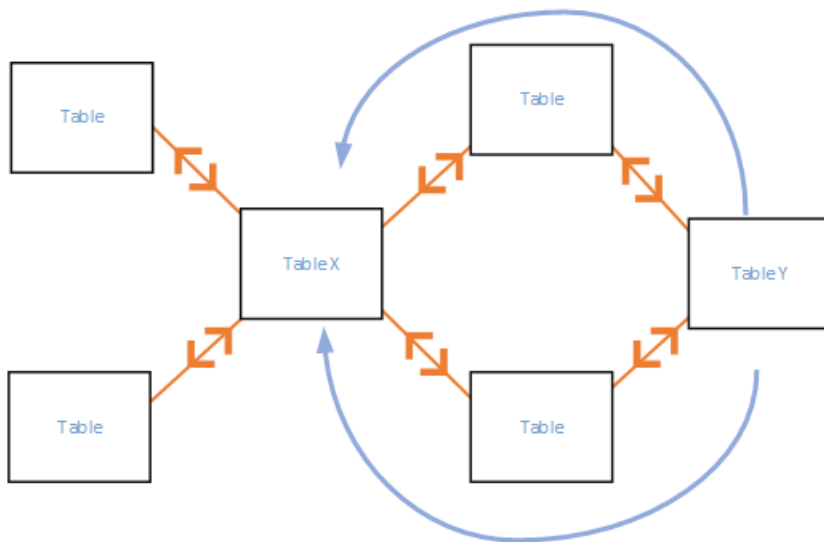
With the cross filtering direction set to Both, our report now appears correct:



Cross filtering both directions works well for a pattern of table relationships that look like the pattern above. This is most commonly called a star schema, like this:



Cross filtering direction does not work well with a more general pattern often found in databases, like in this diagram:



If you have a table pattern like this, with loops, then cross filtering can create an ambiguous set of relationships. For instance, if you sum up a field from TableX and then choose to filter by a field on TableY, then it's not clear how the filter should travel, through the top table or the bottom table. A common example for this kind of pattern is TableX to be a Sales table with actuals data and for TableY to be budget data. Then, the tables in the middle are lookup tables that both tables use, such as Division or Region.

Just like with active/inactive relationships, Power BI Desktop won't allow a relationship to be set as Both if it will create ambiguity in reports. There are several different ways you can deal with this, here are the two most common:

- Delete or mark relationships as inactive to reduce ambiguity. Then you might be able to set a relationship cross filtering as Both.
- Bring in a table twice (with a different name the second time) to eliminate loops. This makes the pattern of relationships like a star schema. With a star schema all of the relationships can be set to Both.

Wrong active relationship

When Power BI Desktop automatically creates relationships, it sometimes encounters more than one relationship between two tables. When this happens only one of the relationships is set to be active. The active relationship serves as the default relationship so that when you choose fields from two different tables, Power BI Desktop can automatically create a visualization for you. However, in some cases the automatically selected relationship can be wrong. You can use the Manage Relationships dialog to set a relationship as active or inactive, or you can set the active relationship in the Edit relationship dialog.

To ensure there's a default relationship, Power BI Desktop only allows a single active relationship between two tables at a given time. So, you must first set the current relationship as inactive and then set the relationship you want to be active.

Let's look at an example. This first table is ProjectTickets, and the next table is EmployeeRole.

ProjectTickets

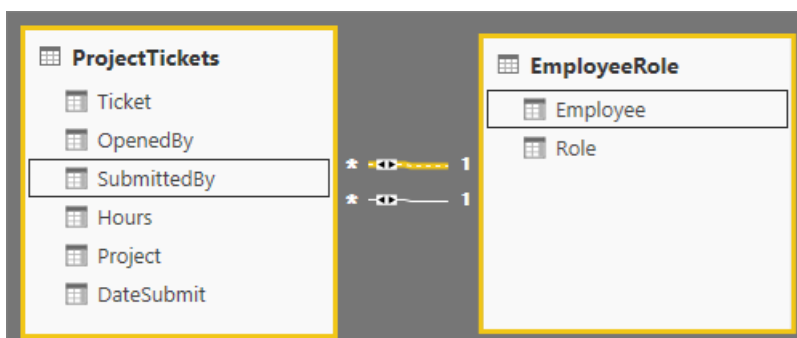
TICKET	OPENEDBY	SUBMITTEDBY	HOURS	PROJECT	DATESUBMIT
1001	Perham, Tom	Brewer, Alan	22	Blue	1/1/2013
1002	Roman, Daniel	Brewer, Alan	26	Red	2/1/2013
1003	Roth, Daniel	Ito, Shu	34	Yellow	12/4/2012

TICKET	OPENEDBY	SUBMITTEDBY	HOURS	PROJECT	DATESUBMIT
1004	Perham, Tom	Brewer, Alan	13	Orange	1/2/2012
1005	Roman, Daniel	Bowen, Eli	29	Purple	10/1/2013
1006	Roth, Daniel	Bento, Nuno	35	Green	2/1/2013
1007	Roth, Daniel	Hamilton, David	10	Yellow	10/1/2013
1008	Perham, Tom	Han, Mu	28	Orange	1/2/2012
1009	Roman, Daniel	Ito, Shu	22	Purple	2/1/2013
1010	Roth, Daniel	Bowen, Eli	28	Green	10/1/2013
1011	Perham, Tom	Bowen, Eli	9	Blue	10/15/2013

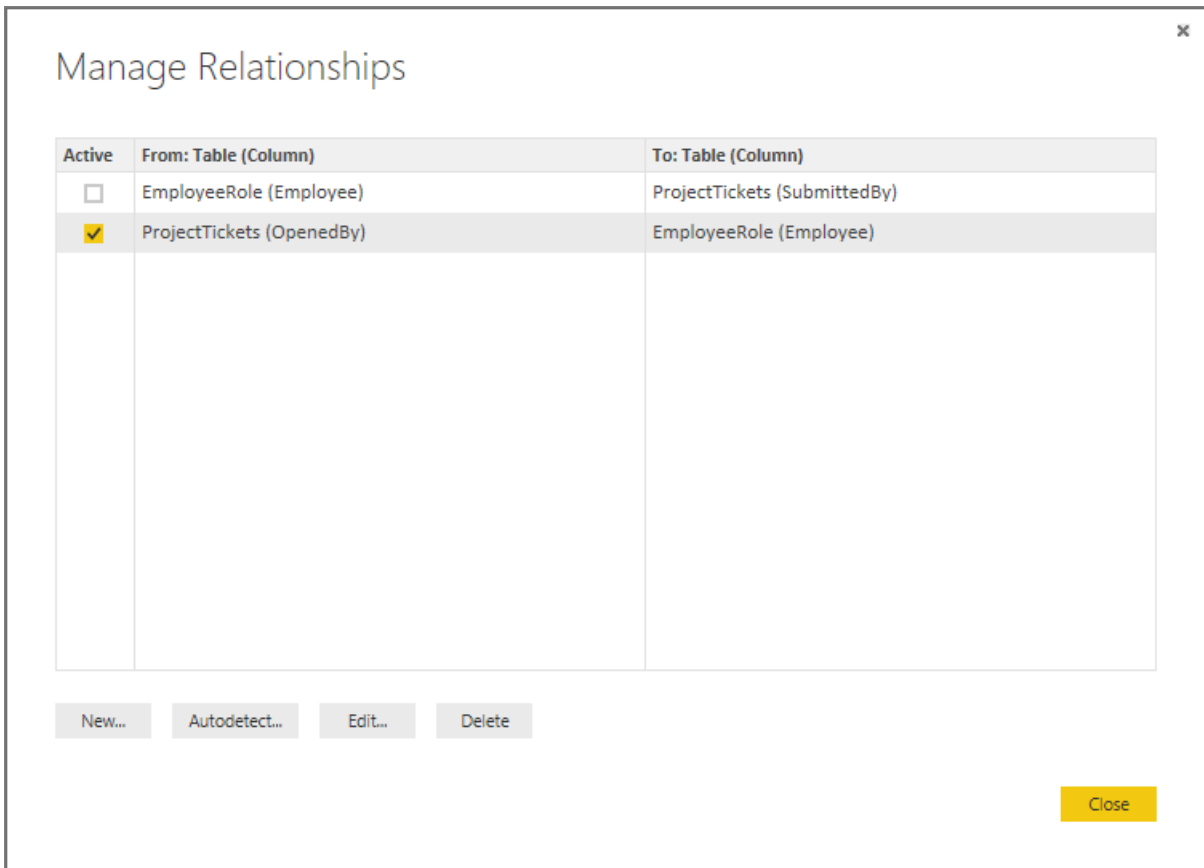
EmployeeRole

EMPLOYEE	ROLE
Bento, Nuno	Project Manager
Bowen, Eli	Project Lead
Brewer, Alan	Project Manager
Hamilton, David	Project Lead
Han, Mu	Project Lead
Ito, Shu	Project Lead
Perham, Tom	Project Sponsor
Roman, Daniel	Project Sponsor
Roth, Daniel	Project Sponsor

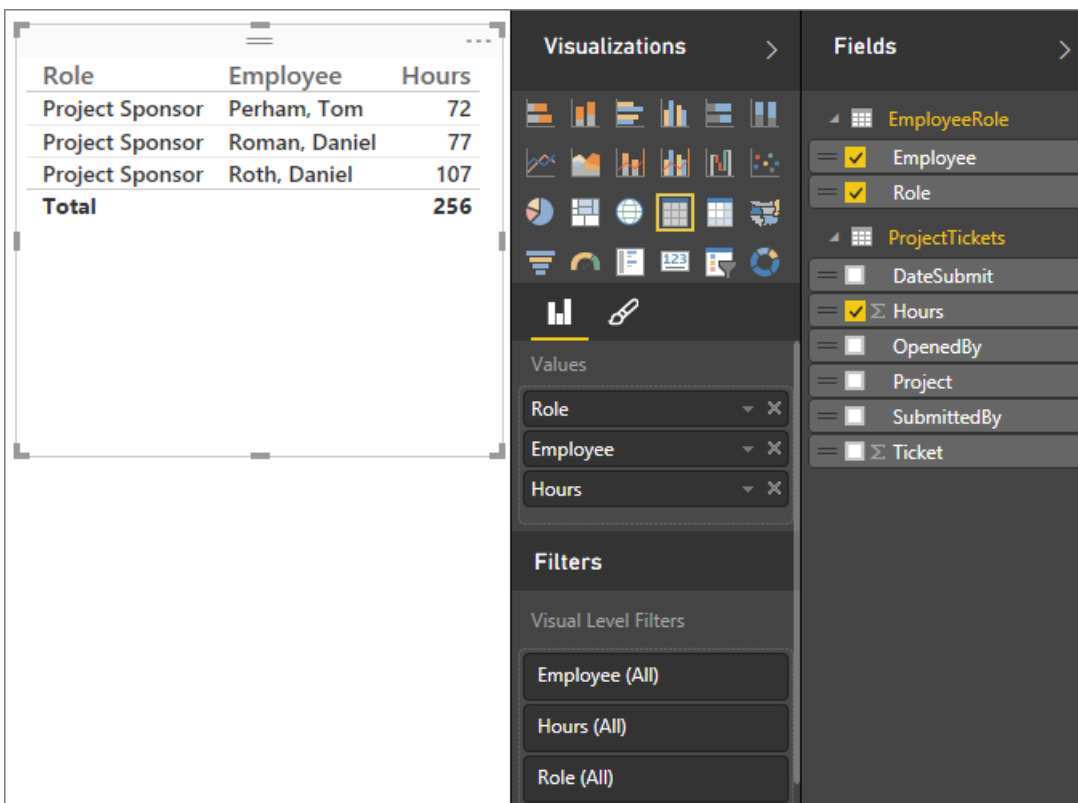
There are actually two relationships here. One is between SubmittedBy in the ProjectTickets table and Employee in the EmployeeRole table, and the other is between OpenedBy in the ProjectTickets table and Employee in the EmployeeRole table.



If we add both relationships to the model (OpenedBy first), then the Manage Relationships dialog will show that OpenedBy is active:

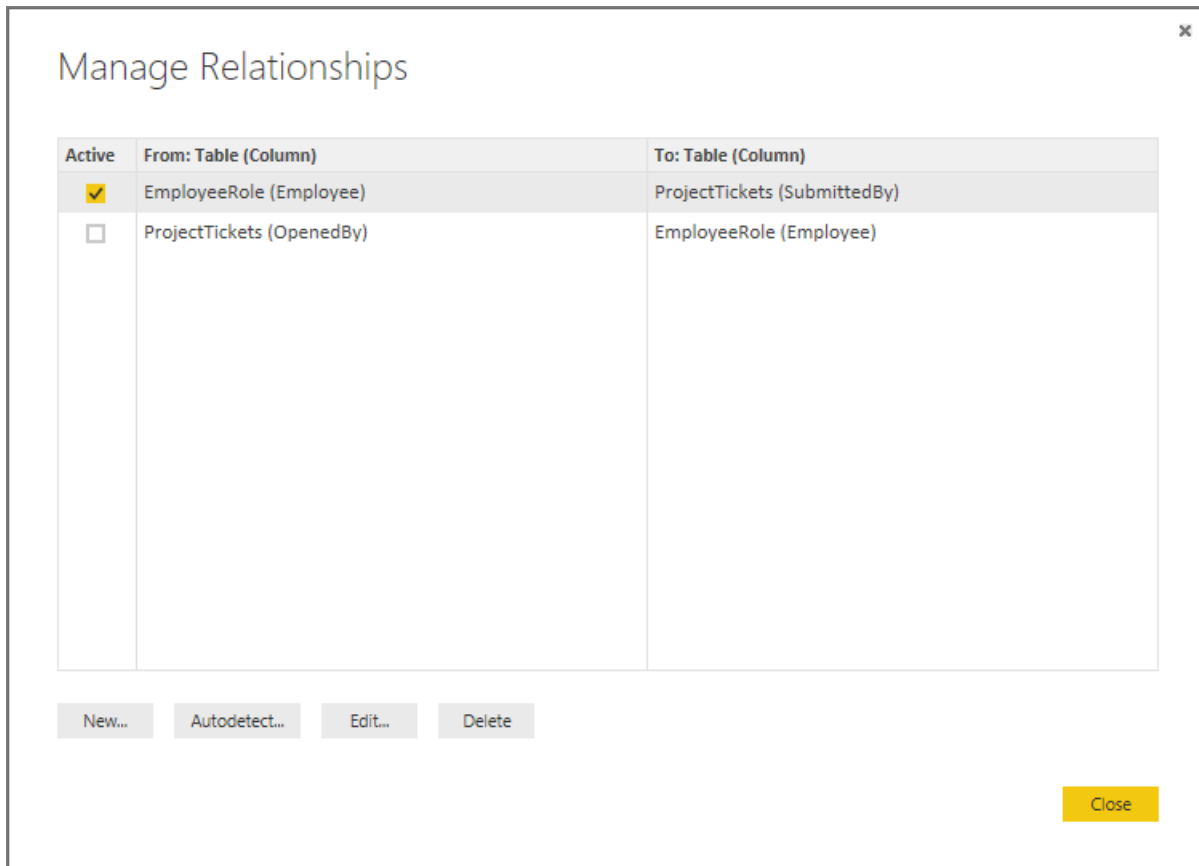


Now, if we create a report that uses Role and Employee fields from EmployeeRole, and the Hours field from ProjectTickets in a table visualization in the Report canvas, we'll see only project sponsors because they're the only ones that opened a project ticket.



We can change the active relationship and get SubmittedBy instead of OpenedBy. In Manage Relationships, we uncheck the ProjectTickets(OpenedBy) to EmployeeRole(Employee) relationship, and then we check the Project

Tickets(SubmittedBy) to EmployeeRole(Employee) relationship.



See all of your relationships in Relationship View

Sometimes your model has multiple tables and complex relationships between them. Relationship View in Power BI Desktop shows all of the relationships in your model, their direction, and cardinality in an easy to understand and customizable diagram. To learn more, see [Relationship View in Power BI Desktop](#).

DAX basics in Power BI Desktop

12/6/2017 • 13 min to read • [Edit Online](#)

This article is for users new to Power BI Desktop. It's meant to give you a quick and easy introduction on how you can use Data Analysis Expressions (DAX) to solve a number of basic calculation and data analysis problems. We'll go over some conceptual information, a series of tasks you can complete, and a few quizzes to test what you've learned. After completing this article, you should have a good understanding of the most important fundamental concepts in DAX.

What is DAX?

DAX is a collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values. Stated more simply, DAX helps you create new information from data already in your model.

Why is DAX so important?

It's quite easy to create a new Power BI Desktop file and import some data into it. You can even create reports that show valuable insights without using any DAX formulas at all. But, what if you need to analyze growth percentage across product categories and for different date ranges? Or, you need calculate year-over-year growth compared to market trends? DAX formulas provide this capability and many other important capabilities as well. Learning how to create effective DAX formulas will help you get the most out of your data. When you get the information you need, you can begin to solve real business problems that affect your bottom line. This is the power in Power BI, and DAX will help you get there.

Prerequisites

You might already be familiar with creating formulas in Microsoft Excel. That knowledge will be helpful in understanding DAX, but even if you have no experience with Excel formulas, the concepts described here will help you get started creating DAX formulas and solving real-world BI problems right away.

We're going to focus on understanding DAX formulas used in calculations, more specifically, in measures and calculated columns. You should already be familiar with Power BI Desktop, importing data, adding fields to a report, and you should also be familiar with fundamental concepts of [Measures](#) and [Calculated columns](#).

Example Workbook

The best way to learn DAX is to create some basic formulas, use it with some actual data, and see the results for yourself. The examples and tasks here use the Contoso Sales Sample for Power BI Desktop Preview file. This is the same sample file used in the Tutorial: Create your own measures in Power BI Desktop article. You can download it [here](#).

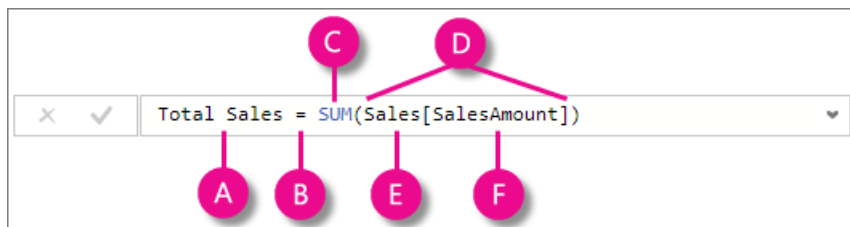
Let's begin!

We will frame our understanding of DAX around three fundamental concepts: *Syntax*, *Functions*, and *Context*. Of course, there are other important concepts in DAX, but understanding these three concepts will provide the best foundation on which to build your DAX skills.

Syntax

Before you create your own formulas, let's take a look at DAX formula syntax. Syntax includes the various elements that make up a formula, or more simply, how the formula is written. For example, let's look at a simple DAX

formula for a measure.



This formula includes the following syntax elements:

- A.** The measure name **Total Sales**.
- B.** The equals sign operator (=) indicates the beginning of the formula. When calculated, it will return a result.
- C.** The DAX function **SUM** adds up all of the numbers in the **Sales[SalesAmount]** column. You'll learn more about functions later.
- D.** Parenthesis () surround an expression containing one or more arguments. All functions require at least one argument. An argument passes a value to a function.
- E.** The referenced table **Sales**.
- F.** The referenced column **[SalesAmount]** in the Sales table. With this argument, the SUM function knows on which column to aggregate a SUM.

When trying to understand a DAX formula, it is often helpful to break down each of the elements into a language you think and speak every day. For example, you can read this formula as:

For the measure named Total Sales, calculate (=) the SUM of values in the [SalesAmount] column in the Sales table.

When added to a report, this measure calculates and returns values by summing up sales amounts for each of the other fields we include, for example, Cell Phones in the USA.

You might be thinking 'Isn't this measure doing the same thing as if I were to just add the SalesAmount field to my report?' Well, yes. But, there's a good reason to create our own measure that sums up values from the SalesAmount field: We can use it as an argument in other formulas. This may seem a little confusing now, but as your DAX formula skills grow, knowing this will make your formulas and your model more efficient. In-fact, you'll see the Total Sales measure showing up as an argument in other formulas later on.

Let's go over a few more things about this formula. In particular, we introduced a function, [SUM](#). Functions are pre-written formulas that make it easier to do complex calculations and manipulations with numbers, dates, time, text, and more. You will learn more about functions later.

You also see the column [SalesAmount] was preceded by the table Sales in which the column belongs. This is known as a fully qualified column name in that it includes the column name preceded by the table name. Columns referenced in the same table do not require the table name be included in the formula. This can make long formulas that reference many columns shorter and easier to read. However, it's good practice to include the table name in your measure formulas, even when in the same table.

NOTE

If a table name contains spaces, reserved keywords, or disallowed characters, you'll need to enclose the table name in single quotation marks. You'll also need to enclose table names in quotation marks if the name contains any characters outside the ANSI alphanumeric character range, regardless of whether your locale supports the character set or not.

It's important your formulas have the correct syntax. In most cases, if the syntax is not correct, a syntax error will be returned. In other cases, the syntax may be correct, but the values returned might not be what you are expecting. The DAX editor in Power BI Desktop includes suggestions; a feature used to create syntactically correct formulas by helping you select the correct elements.

Let's create a simple formula. This task will help you further understand formula syntax and how the suggestions feature in the formula bar can help you.

Task: Create a measure formula

To complete this task, you'll need to open the Contoso Sales Sample Power BI Desktop file.

1. In Report view, in the field list, right-click on the **Sales** table, and then click **New Measure**.
2. In the formula bar, replace **Measure** by typing a new measure name, **Previous Quarter Sales**.
3. After the equals sign, type **SUM** followed by an opening parenthesis.

Rather than type a column name to sum up right away, we're going to enter another function, to *filter* the data we want to sum up.

4. Between the parentheses, type **CALCULATE**, followed by an opening parenthesis.

You'll use the CALCULATE function to filter the amounts we want to sum by an argument we pass to the CALCULATE function. This is what's referred to as nesting functions. The CALCULATE function has at least two arguments. The first is the expression to be evaluated, and second, a filter.

5. Between the parenthesis **()** for the **CALCULATE** function, type **Sales[SalesAmount]**. This is the first expression argument for our CALCULATE function.
6. Type a comma (,) to specify the first filter, then type **PREVIOUSQUARTER** followed by an opening parenthesis..

You'll use the PREVIOUSQUARTER time intelligence function to filter our SUM results by the previous quarter.

7. Between the parenthesis **()** for the PREVIOUSQUARTER function, type **Calendar[DateKey]**.

The PREVIOUSQUARTER function has one argument, a column containing a contiguous range of dates. >

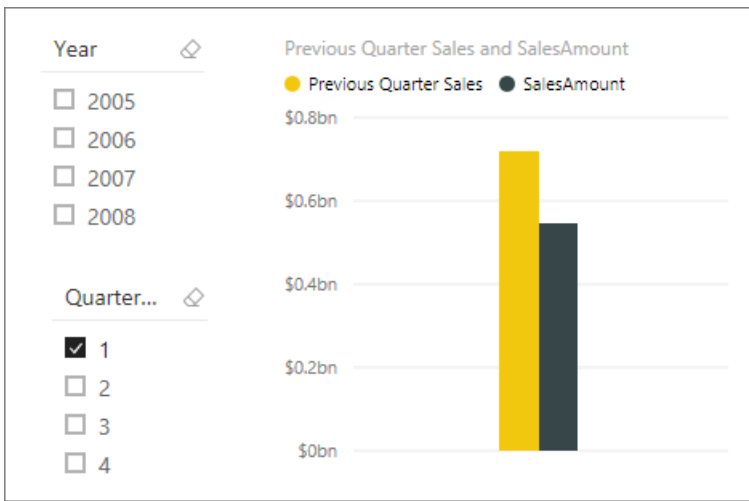
8. Make sure both the arguments being passed to the PREVIOUSQUARTER function and the CALCULATE function are closed by two closing parentheses **)**).

Your formula should now look like this:

```
Previous Quarter Sales = CALCULATE(SUM(Sales[SalesAmount]),  
PREVIOUSQUARTER(Calendar[DateKey]))
```

9. Click the checkmark ✓ in the formula bar or press Enter to validate the formula and add it to the model.

You did it! You just created a measure using DAX, and not an easy one at that. What this formula will do is calculate the total sales for the previous quarter, depending on the filters applied in a report. For example, if we put SalesAmount and our new Previous Quarter Sales measure in a chart, and then added Year and QuarterOfYear as Slicers, we'd get something like this:



You were just introduced to several important aspects of DAX formulas. First, this formula included two functions. Notice [PREVIOUSQUARTER](#), a time intelligence, function is nested as an argument passed to [CALCULATE](#), a filter function. DAX formulas can contain up to 64 nested functions. It's unlikely a formula would ever contain so many nested functions. In fact, such a formula would be very difficult to create and debug, and it probably wouldn't be very fast either.

In this formula, you also used filters. Filters narrow down what will be calculated. In this case, you selected one filter as an argument, which is actually the result of another function. You will learn more about filters later.

Finally, you used the [CALCULATE](#) function. This is one of the most powerful functions in DAX. As you author models and create more complex formulas, you will likely use this function many times. Discussing the [CALCULATE](#) function is outside the scope of this article, but as your knowledge of DAX grows, pay special attention to this one.

Syntax QuickQuiz

1. What does this button on the formula bar do?



2. What always surrounds a column name in a DAX formula?

Answers are provided at the end of this article.

Functions

Functions are predefined formulas that perform calculations by using specific values, called arguments, in a particular order or structure. Arguments can be other functions, another formula, expression, column references, numbers, text, logical values such as TRUE or FALSE, or constants.

DAX includes the following categories of functions: [Date and Time](#), [Time Intelligence](#), [Information](#), [Logical](#), [Mathematical](#), [Statistical](#), [Text](#), [Parent/Child](#) and [Other](#) functions. If you're familiar with functions in Excel formulas, many of the functions in DAX will appear similar to you; however, DAX functions are unique in the following ways:

- A DAX function always references a complete column or a table. If you want to use only particular values from a table or column, you can add filters to the formula.
- If you need to customize calculations on a row-by-row basis, DAX provides functions that let you use the current row value or a related value as a kind of argument, to perform calculations that vary by context. You will learn more about context later.
- DAX includes many functions that return a table rather than a value. The table is not displayed, but is used to provide input to other functions. For example, you can retrieve a table and then count the distinct values in it, or calculate dynamic sums across filtered tables or columns.

- DAX includes a variety of time intelligence functions. These functions let you define or select date ranges, and perform dynamic calculations based on them. For example, you can compare sums across parallel periods.
- Excel has a very popular function, VLOOKUP. DAX functions don't take a cell or cell range as a reference like VLOOKUP does in Excel. DAX functions take a column or a table as a reference. Keep in-mind, in Power BI Desktop, you're working with a relational data model. Looking up values in another table is really quite easy, and in most cases you don't need to create any formula at all.

As you can see, functions in DAX can help you create very powerful formulas. We really only touched on the basics of functions. As your DAX skills grow, you'll create formulas using many different functions. One of the best places to learn details about each of DAX functions is in the [DAX Function Reference](#).

Functions QuickQuiz

1. What does a function always reference?
2. Can a formula contain more than one function?
3. What category of functions would you use to concatenate two text strings into one string?

Answers are provided at the end of this article.

Context

Context is one of the most important DAX concepts to understand. There are two types of context in DAX; row context and filter context. We'll first look at row context.

Row context

Row context is most easily thought of as the current row. It applies whenever a formula has a function that applies filters to identify a single row in a table. The function will inherently apply a row context for each row of the table over which it is filtering. This type of row context most often applies to measures.

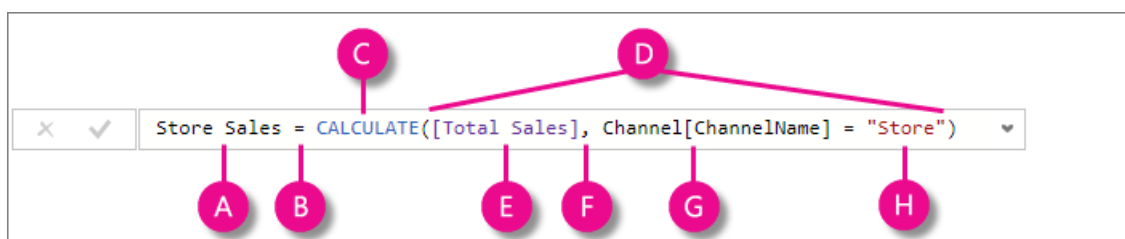
Filter context

Filter context is a little more difficult to understand than row context. You can most easily think of filter context as: One or more filters applied in a calculation that determines a result or value.

Filter context doesn't exist in-place of row context; rather, it applies in addition to row context. For example, to further narrow down the values to include in a calculation, you can apply a filter context which not only specifies the row context, but also specifies only a particular value (filter) in that row context.

Filter context is easily seen in your reports. For example, when you add TotalCost to a visualization, and then add Year and Region, you are defining a filter context that selects a subset of data based on a given year and region.

Why is filter context so important to DAX? Because while filter context can most easily be applied by adding fields to a visualization, filter context can also be applied in a DAX formula by defining a filter using functions such as ALL, RELATED, FILTER, CALCULATE, by relationships, and by other measures and columns. For example, let's look at the following formula in a measure named Store Sales:



To better understand this formula, we can break it down, much like with other formulas.

This formula includes the following syntax elements:

- A.** The measure name **Store Sales**.

- B.** The equals sign operator (=) indicates the beginning of the formula.
- C.** The **CALCULATE** function evaluates an expression, as an argument, in a context that is modified by the specified filters.
- D.** Parenthesis () surround an expression containing one or more arguments.
- E.** A measure [**Total Sales**] in the same table as an expression. The Total Sales measure has the formula: =SUM(Sales[SalesAmount]).
- F.** A comma (,) separates the first expression argument from the filter argument.
- G.** The fully qualified referenced column, **Channel[ChannelName]**. This is our row context. Each row in this column specifies a channel: Store, Online, etc.
- H.** The particular value, **Store** as a filter. This is our filter context.

This formula ensures only sales values defined by the Total Sales measure are calculated only for rows in the Channel[ChannelName] column with the value "Store", as a filter.

As you can imagine, being able to define filter context within a formula has immense and powerful capabilities. Being able to reference only a particular value in a related table is just one such example. Don't worry if you do not completely understand context right away. As you create your own formulas, you will better understand context and why it's so important in DAX.

Context QuickQuiz

1. What are the two types of context?
2. What is filter context?
3. What is row context?

Answers are provided at the end of this article.

Summary

Now that you have a basic understanding of the most important concepts in DAX, you can begin creating DAX formulas for measures on your own. DAX can indeed be a little tricky to learn, but there are many resources available to you. After reading through this article and experimenting with a few of your own formulas, you can learn more about other DAX concepts and formulas that can help you solve your own business problems. There are many DAX resources available to you; most important is the [Data Analysis Expressions \(DAX\) Reference](#).

DAX has been around for several years in other Microsoft BI tools such as Power Pivot and Analysis Services Tabular models, so there's a lot of great information out there. You can find more information in books, whitepapers, and blogs from both Microsoft and leading BI professionals. The [DAX Resource Center Wiki on TechNet](#) is also a great place to start.

QuickQuiz answers

Syntax:

1. Validates and enters the measure into the model.
2. Brackets [].

Functions:

1. A table and a column.
2. Yes. A formula can contain up to 64 nested functions.
3. [Text functions](#).

Context:

1. Row context and filter context.
2. One or more filters in a calculation that determines a single value.
3. The current row.

Data categorization in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

In **Power BI Desktop**, you can specify the Data Category for a column so Power BI Desktop knows how it should treat its values when in a visualization.

When Power BI Desktop imports data, not only does it get the data itself, it also gets information such as the table and column names, whether it's a primary key, etc. With that information, Power BI Desktop makes some assumptions about how to give you a good default experience when creating a visualization.

Here's an example: When Power BI Desktop detects a column has numeric values, you'll probably want to aggregate it in some way, so it's placed in the Values area. Or, for a column with date time values, it assumes you'll probably use it as a time hierarchy axis on a line chart.

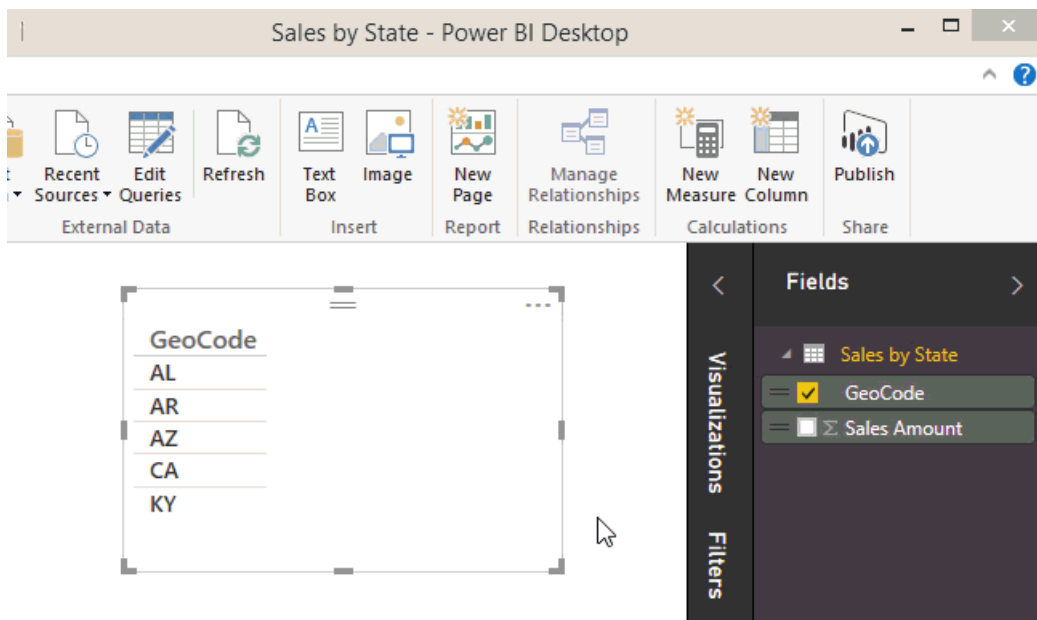
But, there are some cases that are a bit more challenging, like geography. Consider the following table from an Excel worksheet:

GeoCode	Sales Amount
AL	\$ 10,175,870.00
AR	\$ 4,351,530.00
AZ	\$ 6,114,241.00
CA	\$ 6,688,589.00
KY	\$ 53,832,611.00

Should Power BI Desktop treat the codes in the GeoCode column as an abbreviation for a Country or a US State? It's not clear because a code like this can mean either one. For instance, AL can mean Alabama or Albania, AR can mean Arkansas or Argentina, or CA can mean California or Canada. It makes a difference when we go to chart our GeoCode field on a map. Should Power BI Desktop show a picture of the world with countries highlighted or a picture of the United States with states highlighted? You can specify a Data Category for data just like this. Data categorization further refines the information Power BI Desktop can use to provide the best visualizations.

To specify a Data Category

1. In Report View or Data View, in the **Fields** list, select the field you want to be sorted by a different categorization.
2. On the ribbon, in the **Data Tools Modeling** tab, click on the **Data Category:** drop down list. This shows the list of possible data categories you can choose for your column. Some selections might be disabled if they won't work with the current data type of your column. For example, if a column is a binary data type, Power BI Desktop won't let you choose geographic data categories.



And that's it! Any behavior that normally accrues to a visual will now work automatically.

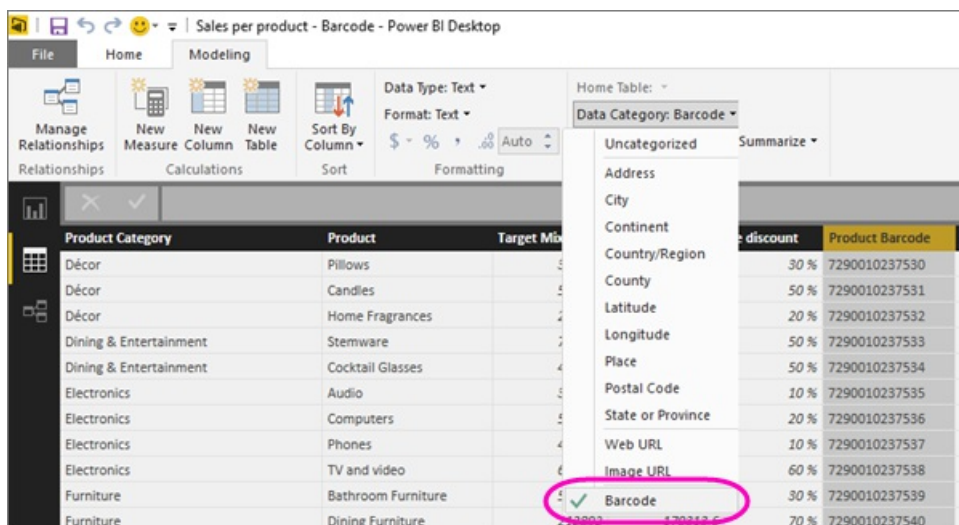
You might also be interested in learning about [geographic filtering for Power BI mobile apps](#).

Tag barcodes in Power BI Desktop for the mobile apps

1/17/2018 • 1 min to read • [Edit Online](#)

In Power BI Desktop, you can [categorize data](#) in a column, so Power BI Desktop knows how to treat values in visuals in a report. You can also categorize a column as **Barcode**. When you or your colleagues [scan a barcode on a product with the Power BI app](#) on the iPhone, you see any report that includes that barcode. When you open the report in the mobile app, Power BI automatically filters the report to data related to that barcode.

1. In Power BI Desktop, switch to Data View.
2. Select a column with barcode data. See the list of [supported barcode formats](#) below.
3. On the **Modeling** tab, select **Data Category** > **Barcode**.



4. In Report view, add this field to the visuals you want filtered by the barcode.
5. Save the report and publish it to the Power BI service.

Now when you open the scanner on the [Power BI app for iPhone](#) and scan a barcode, you see this report in the list of reports. When you open the report, its visuals are filtered by the product barcode you scanned.

Supported barcode formats

These are the barcodes Power BI recognizes if you can tag them in a Power BI report:

- UPECECode
- Code39Code
- A39Mod43Code
- EAN13Code
- EAN8Code
- 93Code
- 128Code
- PDF417Code
- Interleaved2of5Code
- ITF14Code

Next steps

- [Scan a barcode from the Power BI app on your iPhone](#)
- [Issue with scanning barcodes on an iPhone](#)
- [Data categorization in Power BI Desktop](#)
- Questions? [Try asking the Power BI Community](#)

Set geographic filters in Power BI Desktop for the mobile apps

1/17/2018 • 1 min to read • [Edit Online](#)


In Power BI Desktop, you can [categorize geographical data](#) for a column, so Power BI Desktop knows how to treat values in visuals in a report. As an added benefit, when you or your colleagues view that report in the Power BI mobile apps, Power BI automatically provides geographical filters that match where you are.

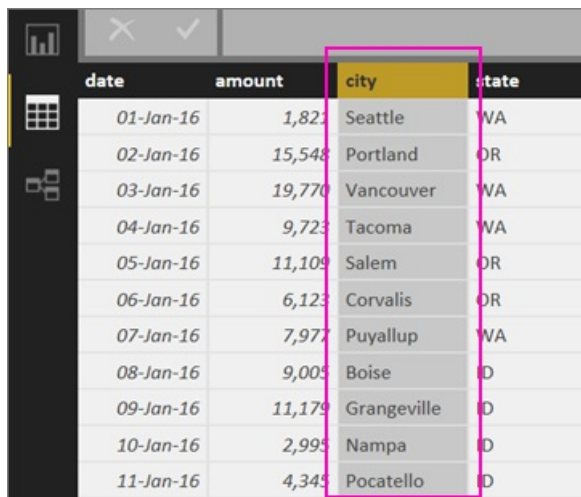
For example, say you're a sales manager traveling to meet customers, and you'd like to quickly filter the total sales and revenue for the specific customer you're planning to visit. You want to break out the data for your current location, whether by state, city, or an actual address. Later, if you have time left, you'd like to visit other customers located nearby. You can [filter the report by your location to find those customers](#).

NOTE

You can only filter by location in the mobile app if the geographic names in the report are in English – for example, "New York City" or "Germany".

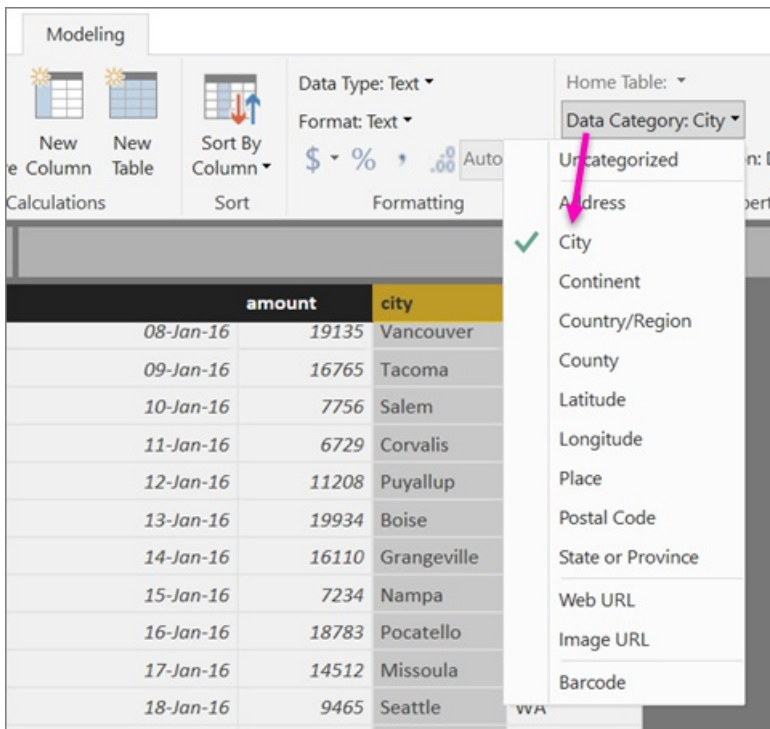
Identify geographic data in your report

1. In Power BI Desktop, switch to Data View .
2. Select a column with geographic data — for example, a City column.



date	amount	city	state
01-Jan-16	1,823	Seattle	WA
02-Jan-16	15,548	Portland	OR
03-Jan-16	19,770	Vancouver	WA
04-Jan-16	9,723	Tacoma	WA
05-Jan-16	11,109	Salem	OR
06-Jan-16	6,123	Corvallis	OR
07-Jan-16	7,977	Puyallup	WA
08-Jan-16	9,005	Boise	ID
09-Jan-16	11,179	Grangeville	ID
10-Jan-16	2,995	Nampa	ID
11-Jan-16	4,345	Pocatello	ID

3. On the **Modeling** tab, select **Data Category**, then the correct category — in this example, **City**.



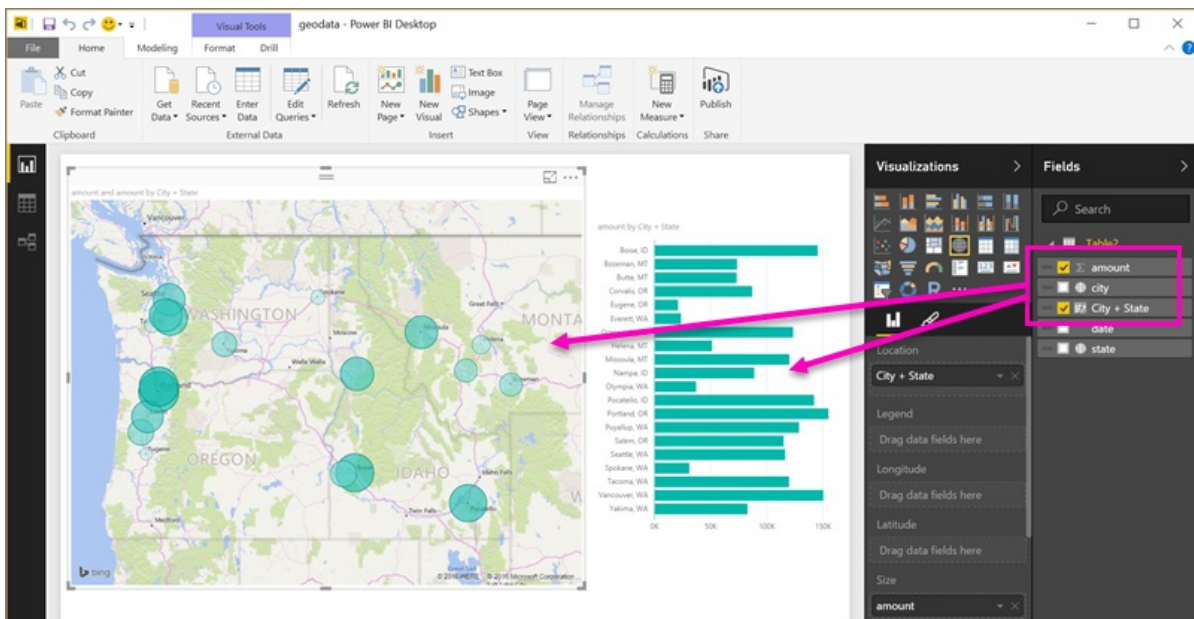
4. Continue setting geographic data categories for any other fields in the model.

NOTE

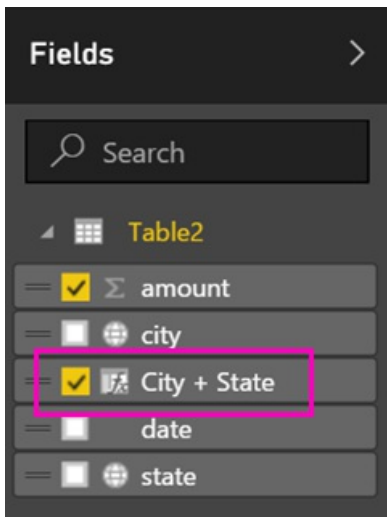
You can set multiple columns for each data category in a model, but if you do the model can't filter for geography in the Power BI mobile app. To use geographic filtering in the mobile apps, set only one column for each data category — for example, only one **City** column, one **State or Province** column, and one **Country** column.

Create visuals with your geographic data

1. Switch to Report view , and create visuals that use the geographic fields in your data.



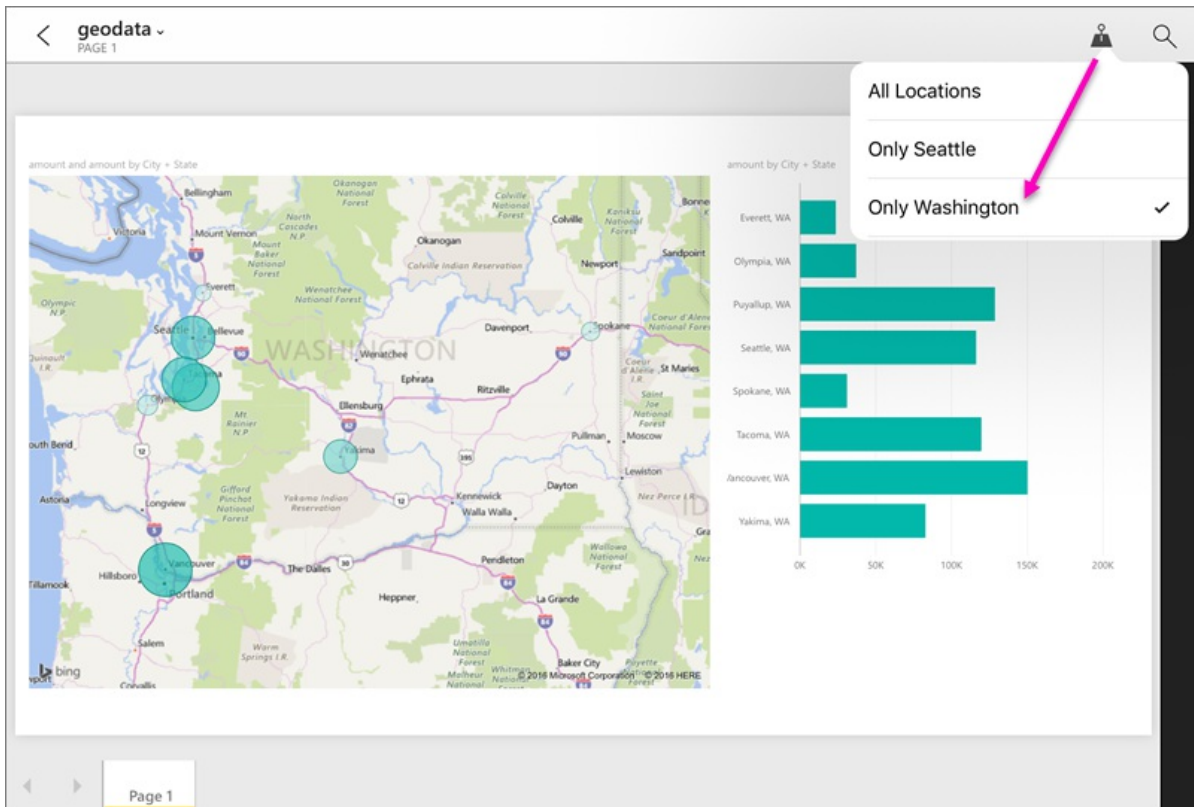
In this example, the model also contains a calculated column that brings city and state together in one column. Read about [creating calculated columns in Power BI Desktop](#).



2. Publish the report to the Power BI service.

View the report in Power BI mobile app

1. Open the report in any of the [Power BI mobile apps](#).
2. If you're in a geographic location with data in the report, you can filter it automatically to your location.



Read more about [filtering a report by location in the Power BI mobile apps](#).

Next steps

- [Data categorization in Power BI Desktop](#)
- Questions? [Try asking the Power BI Community](#)

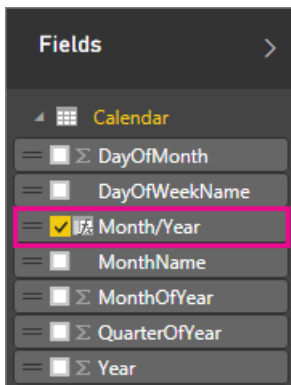
Using calculated columns in Power BI Desktop

1/25/2018 • 3 min to read • [Edit Online](#)

With calculated columns, you can add new data to a table already in your model. But instead of querying and loading values into your new column from a data source, you create a Data Analysis Expressions (DAX) formula that defines the column's values. In Power BI Desktop, calculated columns are created by using the New Column feature in Report View.

Unlike custom columns created as part of a query by using Add Custom Column in Query Editor, calculated columns created in Report View or Data View are based on data you've already loaded into the model. For example, you might choose to concatenate values from two different columns in two different but related tables, perform addition, or extract sub-strings.

Calculated columns you create appear in the Fields list just like any other field, but they'll have a special icon showing its values are the result of a formula. You can name your columns whatever you want, and add them to a report visualization just like other fields.

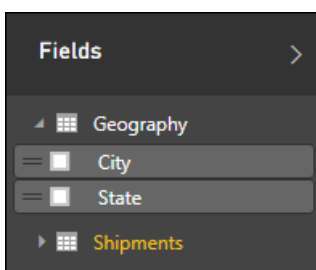


Calculated columns calculate results by using [Data Analysis Expressions \(DAX\)](#), a formula language meant to work with relational data like in Power BI Desktop. DAX includes a library of over 200 functions, operators, and constructs, providing immense flexibility in creating formulas to calculate results for just about any data analysis need. To learn more about DAX, see the Learn more section at the end of this article.

DAX formulas are similar to Excel formulas. In fact, DAX has many of the same functions as Excel. DAX functions, however, are meant to work over data interactively sliced or filtered in a report, like in Power BI Desktop. Unlike Excel, where you can have a different formula for each row in a table, when you create a DAX formula for a new column, it will calculate a result for every row in the table. Column values are recalculated as necessary, like when the underlying data is refreshed and values have changed.

Let's look at an example

Jeff is a shipping manager at Contoso. He wants to create a report showing the number of shipments to different cities. He has a Geography table with separate fields for city and state. But, Jeff wants his reports to show City, State as a single value on the same row. Right now, Jeff's Geography table doesn't have the field he wants.



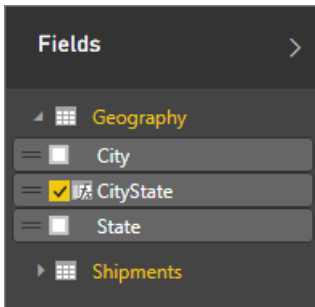
But with a calculated column, Jeff can simply put together, or concatenate, the cities from the City column with the states from the State column.

Jeff right clicks on the Geography table and then clicks New Column. He then enters the following DAX formula into the formula bar:

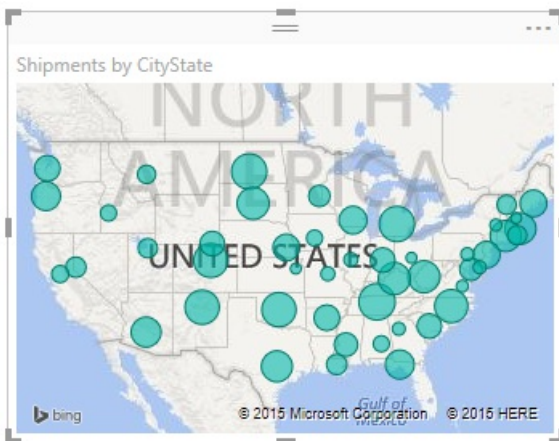
```
CityState = [City] & ", " & [State]
```

This formula simply creates a new column named CityState, and for each row in the Geography table, it takes values from the City column, adds a comma and a space, and then concatenates values from the State column.

Now Jeff has the field he wants.



He can add it to his report canvas along with the number of shipments. Very quickly and with minimal effort, Jeff now has a City, State field. He can add to just about any type of visualization. Jeff even sees that when he creates a map visualization, Power BI Desktop even knows how to read the City, State values in his new column.



Learn more

We've only provided a quick introduction to calculated columns here. Be sure to see the [Create calculated columns in Power BI Desktop](#) tutorial, where you can download a sample file and get step-by-step lessons on how to create more columns.

To learn more about DAX, see [DAX basics in Power BI Desktop](#).

To learn more about columns you create as part of a query, see the Create custom columns section in [Common query tasks in Power BI Desktop](#).

Using calculated tables in Power BI Desktop

1/25/2018 • 2 min to read • [Edit Online](#)

With calculated tables, you can add a new table to the model. But instead of querying and loading values into your new table's columns from a data source, you create a Data Analysis Expressions (DAX) formula that defines the table's values. In Power BI Desktop, calculated tables are created by using the New Table feature in Report View or Data View.

Most of the time, you import data into your model from an external data source. However, calculated tables provide certain advantages. Calculated tables are generally best for intermediate calculations and data you want stored as part of the model rather than calculated on the fly or as part of a query.

Unlike tables created as part of a query, calculated tables created in Report View or Data View are based on data you've already loaded into the model. For example, you might choose to union or cross join two tables.

Just like normal tables, calculated tables can have relationships with other tables. The columns in your calculated table have data types, formatting, and can belong to a data category. You can name your columns whatever you want, and add them to a report visualization just like other fields. Calculated tables are re-calculated if any of the tables it pulls data from are refreshed or updated in any way.

Calculated tables calculate results by using [Data Analysis Expressions \(DAX\)](#), a formula language meant to work with relational data like in Power BI Desktop. DAX includes a library of over 200 functions, operators, and constructs, providing immense flexibility in creating formulas to calculate results for just about any data analysis need.

Let's look at an example

Jeff, a project manager at Contoso, has a table with employees on the in Northwest and another table with employees in the Southwest. Jeff wants to put the two tables together into a single table.

NorthwestEmployees

Employee	City	State	Tenure
Brewer, Alan	Redmond	WA	15
Bento, Nuno	Redmond	WA	10
Ito, Shu	Redmond	WA	15
Han, Mu	Portland	OR	3
Hamilton, David	Eugene	OR	1
Bowen, Eli	Portland	OR	15

SouthwestEmployees

Employee	City	State	Tenure
Brady,Mouton	Los Angeles	CA	3
Colleen,Marquez	San Diego	CA	10
Wendi,Conner	Los Angeles	CA	2
Ward,Cage	Phoenix	AZ	3

Putting these two tables together with a calculated table is quite easy. While Jeff can create a calculated table in either Report View or Data View, it's a bit easier to do it in Data View because he can immediately see his new calculated table.

In **Data View**, on the **Modeling** tab, Jeff clicks **New Table**. A formula bar appears.

Table =

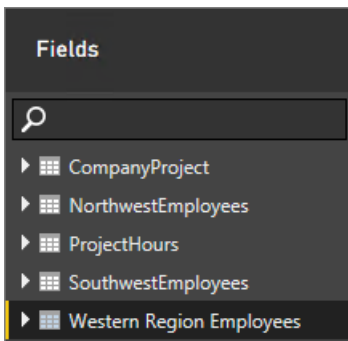
Jeff then enters the following formula:

Western Region Employees = UNION(NorthwestEmployees, SouthwestEmployees)

A new table named Western Region Employees is created.

Employee	City	State	Tenure
Brewer, Alan	Redmond	WA	15
Bento, Nuno	Redmond	WA	10
Ito, Shu	Redmond	WA	15
Han, Mu	Portland	OR	3
Hamilton, David	Eugene	OR	1
Bowen, Eli	Portland	OR	15
Brady, Mouton	Los Angeles	CA	3
Colleen, Marquez	San Diego	CA	10
Wendi, Conner	Los Angeles	CA	2
Ward, Cage	Phoenix	AZ	3

Jeff's new Western Region Employees table appears just like any other table in the Fields list. He can create relationships to other tables, add calculated columns and measures, and add any of its fields to reports just like any other table.



Functions for calculated tables

Calculated tables can be defined by any DAX expression that returns a table, including a simple reference to another table. For example:

CompanyProject 2 = CompanyProject

You can use calculated tables with DAX to solve many analytical problems. We've only provided a quick introduction to calculated tables here. As you start working with calculated tables, here are some of the more common DAX table functions you might find useful:

<TABLE> DISTINCT VALUES CROSSJOIN UNION NATURALINNERJOIN NATURALLEFTOUTERJOIN INTERSECT
CALENDAR CALENDARAUTO

See the [DAX Function Reference](#) for these and other table returning DAX functions.

Measures in Power BI Desktop

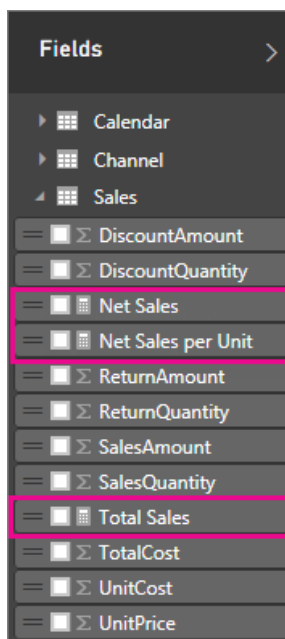
1/25/2018 • 3 min to read • [Edit Online](#)

Power BI Desktop helps you create insights into your data with just a few clicks. But sometimes that data just doesn't include everything you need to answer some of your most important questions. Measures can help you get there.

Measures are used in some of the most common data analysis; for example, sums, averages, minimum or maximum values, counts, or more advanced calculations you create yourself using a DAX formula. The calculated results of measures are always changing in response to your interaction with your reports, allowing for fast and dynamic ad-hoc data exploration. Let's take a closer look.

Understanding measures

In **Power BI Desktop**, measures are created and used in **Report View** or **Data View**. Measures you create yourself appear in the Fields list with a calculator icon. You can name measures whatever you want, and add them to a new or existing visualization just like any other field.



NOTE

You might also be interested in **quick measures**, which are ready-made measures you can select from dialog boxes. They're a good way to quickly create measures, and also a good way to learn DAX syntax, since their automatically created DAX formulas are available to review. Check out the article: [quick measures](#).

Data Analysis Expressions

Measures calculate a result from an expression formula. When you create your own measures, you'll use the [Data Analysis Expressions](#) (DAX) formula language. DAX includes a library of over 200 functions, operators, and constructs, providing immense flexibility in creating measures to calculate results for just about any data analysis need.

DAX formulas are a lot like Excel formulas. DAX even has many of the same functions like DATE, SUM, and LEFT. But, DAX's functions are meant to work with relational data like we have in Power BI Desktop.

Let's look at an example

Jan is a sales manager at Contoso. She's been asked to provide reseller sales projections over the next fiscal year. She decides to base her estimates on last year's sales amounts, with a six percent annual increase resulting from various promotions that are scheduled over the next six months.

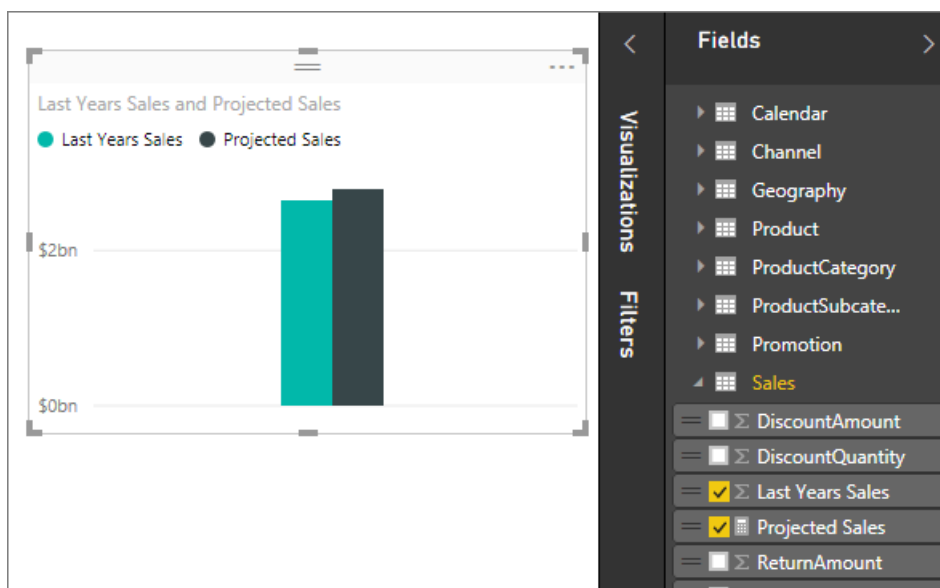
To report the estimates, she imports last year's sales data into Power BI Desktop. She finds the SalesAmount field in the Reseller Sales table. Because the data she imported only contains sales amounts for last year, she renames the SalesAmount field to Last Years Sales. She then drag Last Years Sales onto the report canvas. It appears in a chart visualization as single value that is the sum of all reseller sales from last year.

She notices that even though she did not specify a calculation herself, one has been provided automatically. Power BI Desktop created its own measure by summing up all of the values in Last Years Sales.

But, Jan needs a measure to calculate sales projections for the coming year, which will be based on last year's sales multiplied by 1.06 to account for the expected 6 percent increase in business. For this calculation, she'll create her own measure. Using the New Measure feature, she creates a new measure, then enters the following DAX formula:

```
Projected Sales = SUM('Sales'[Last Years Sales])*1.06
```

Jan then drags her new Projected Sales measure into the chart.



Very quickly and with minimal effort, Jan now has a measure to calculate projected sales. She can further analyze her projections by filtering on specific resellers or by adding other fields to her report.

Learn more

We've only provided you with a quick introduction to measures here, but there's a lot more to help you learn how to create your own. Be sure to see the [Tutorial: Create your own measures in Power BI Desktop](#), where you can download a sample file and get step-by-step lessons on how to create more measures.

To dive a little deeper into DAX, be sure to check out [DAX basics in Power BI Desktop](#). The [Data Analysis Expressions Reference](#) provides detailed articles on each of the functions, syntax, operators, and naming conventions. DAX has been around for several years in Power Pivot in Excel and SQL Server Analysis Services, so there are a lot of other great resources available, too. Be sure to check out the [DAX Resource Center Wiki](#), where influential members of the BI community share their knowledge of DAX.

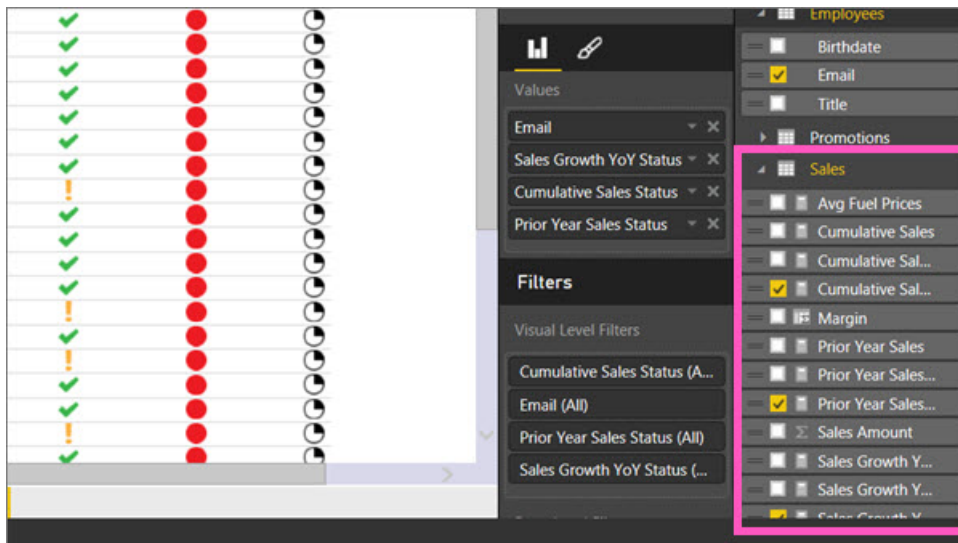
Import and display KPIs in Power BI

1/25/2018 • 1 min to read • [Edit Online](#)

With **Power BI Desktop**, you can import and display KPIs in tables, matrixes, and cards.

Follow these steps to import and display KPIs.

1. Start with an Excel workbook that has a Power Pivot model and KPIs. This exercise uses a workbook named *KPIs*. You can also [learn how to import workbooks](#).
2. Open the report and select the **Top Performers** tab. The *Top Performers* matrix contains KPIs for three different sales measures by employee email address.



That's all there is to it. You can use KPIs to highlight important trends, progress, or other important indicators.

Report View in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

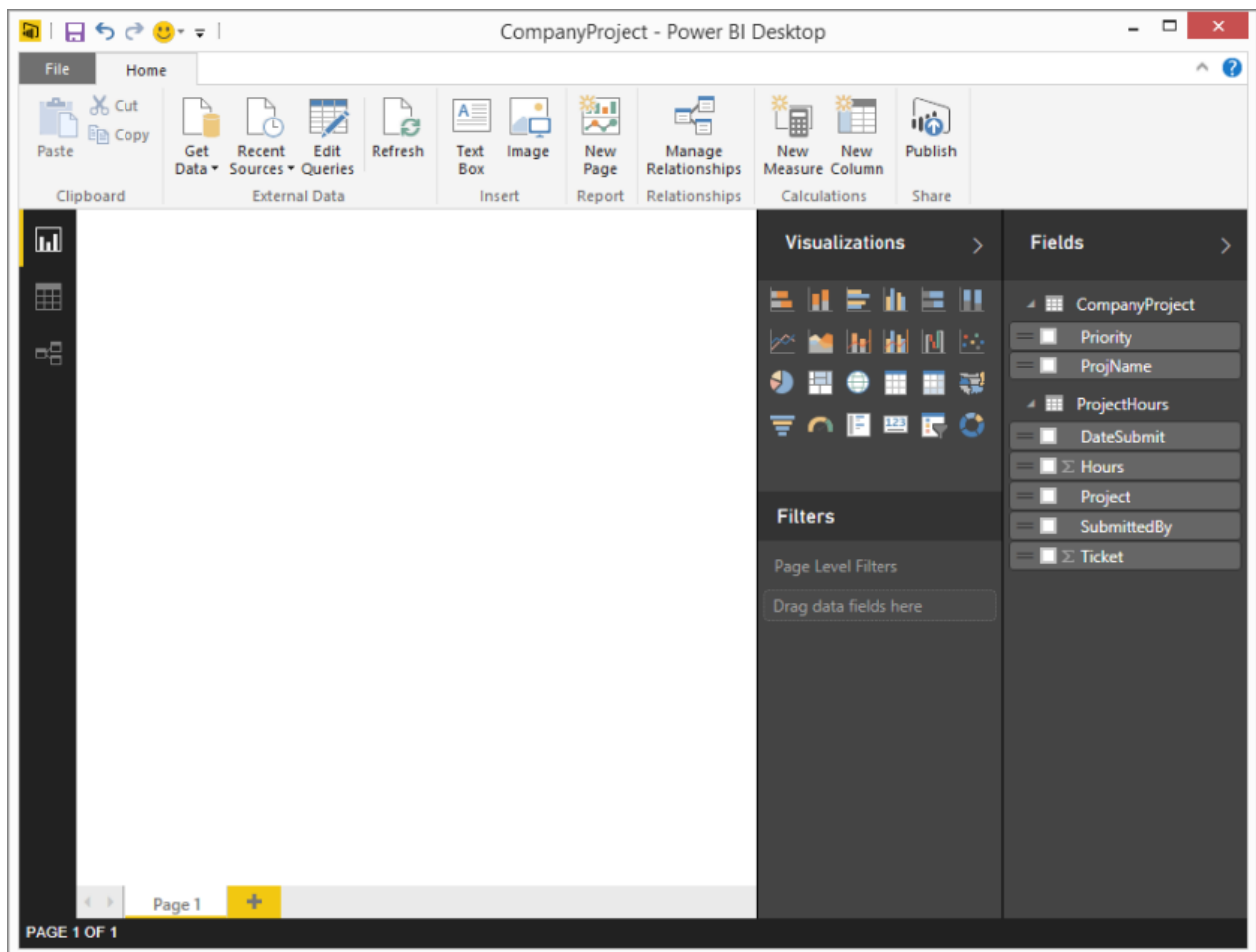
If you've been working with Power BI, you know how easy it is to create reports providing dynamic perspectives and insights into your data. Power BI also has more advanced features in Power BI Desktop. With Power BI Desktop, you can create advanced queries, mashup data from multiple sources, create relationships between tables, and more.

Power BI Desktop includes **Report View**, where you can create any number of report pages with visualizations. Report View in provides pretty much the same design experience as a report's Editing View in the Power BI service. You can move visualizations around, copy and paste, merge, etc.

The difference between them is when using Power BI Desktop, you can work with your queries and model your data to make sure your data supports the best insights in your reports. You can then save your Power BI Desktop file wherever you like, whether it's your local drive or to the cloud.

Let's take a look!

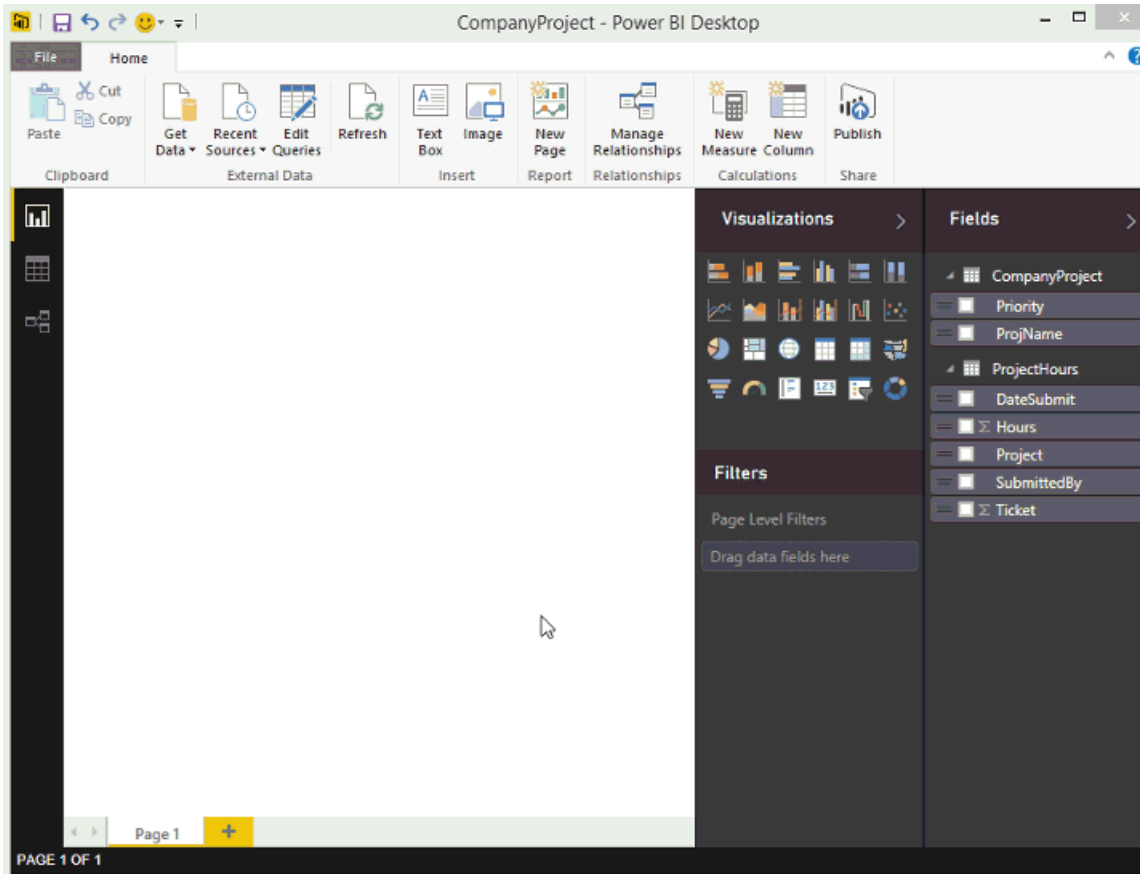
When you first load data in Power BI Desktop, you'll see **Report View** with a blank canvas.



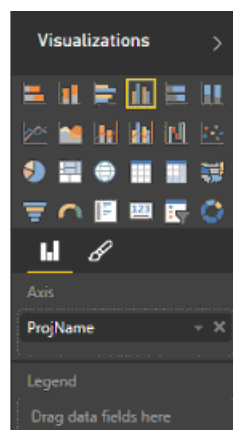
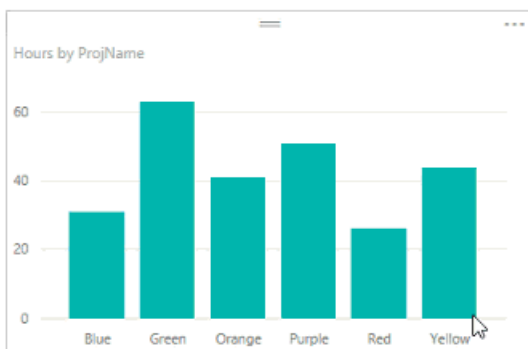
You can switch between **Report View**, **Data View**, and **Relationship View** by selecting the icons in the left hand navigation bar:



Once you've added some data, you can add fields to a new visualization in the canvas.



To change the type of visualization, you can select it from the **Visualization** group in the ribbon or you can right click and select a different it from the **Change visualization type** icon.

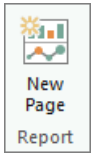


TIP

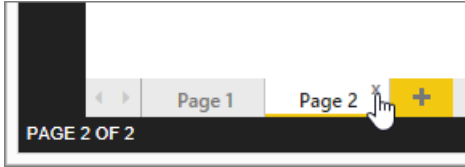
Be sure to experiment with different visualization types. It's important your visualization convey information in your data clearly.

A report will have at least one blank page to start. Pages appear in the navigator pane just to the left of the canvas. You can add all sorts of visualizations to a page, but it's important not to overdo it. Too many

visualizations on a page will make it look busy and difficult to find the right information. You can add new pages to your report, just click **New Page** on the ribbon.



To delete a page, click the **X** on the page's tab at the bottom of the Report View.



NOTE

Reports and visualizations can't be pinned to a dashboard from Power BI Desktop. To do that, you'll need to [Publish from Power BI Desktop](#) to your Power BI site.

Use Q&A in Power BI Desktop for natural language queries

12/12/2017 • 10 min to read • [Edit Online](#)

Using common phrases and natural language to ask questions of your data is powerful. Even more powerful is when your data answers, which is what Q&A in **Power BI Desktop** lets you do.

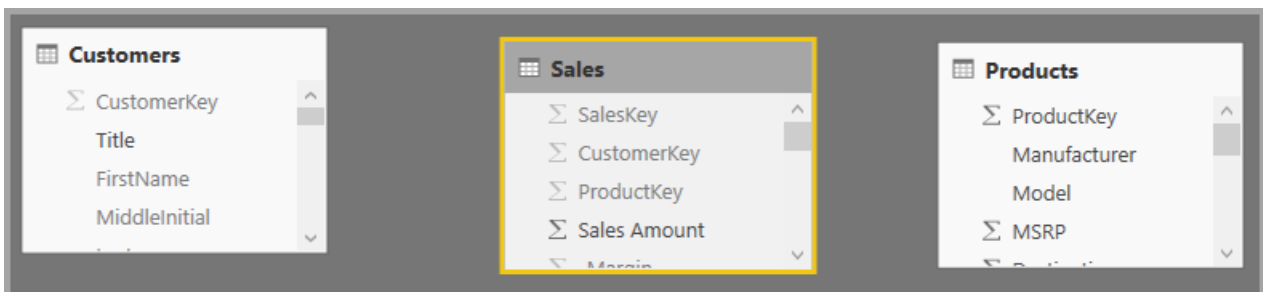
To enable Q&A to successfully interpret the large collection of questions it's capable of responding to, Q&A must make assumptions about the model. If the structure of your model doesn't meet one or more of these assumptions, you'll need to adjust your model. Those adjustments for Q&A are the same best-practice optimizations for any model in Power BI, regardless whether you use Q&A.

In the following sections, we describe how to adjust your model so it works well with Q&A in Power BI.

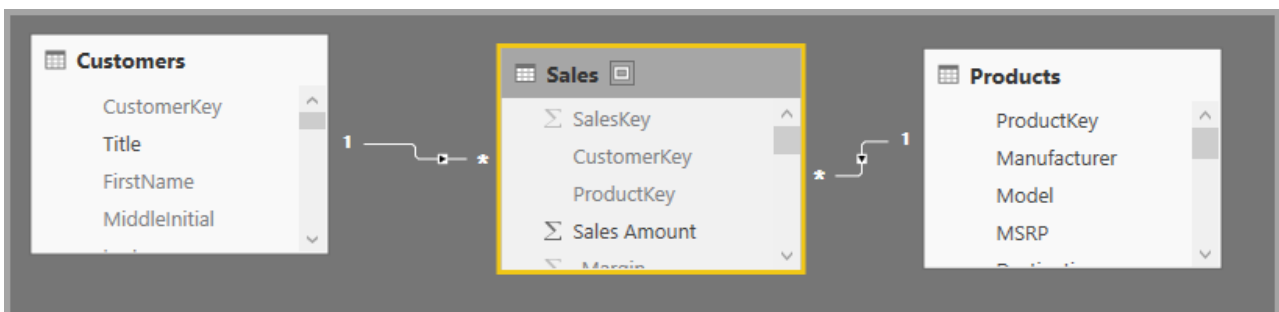
Add missing relationships

If your model is missing relationships between tables, neither Power BI reports nor Q&A can interpret how to join those tables if you ask a questions about them. Relationships are the cornerstone of a good model. For example, you cannot ask for the "total sales for Seattle customers" if the relationship between the *orders* table and the *customers* table is missing. The following images show you examples of a model that needs work, and a model that is ready for Q&A.

Needs work



Ready for Q&A



Rename tables and columns

The choice of tables and columns is very important for Q&A. For example, if you have a table named *CustomerSummary* that contains a list of your customers, you would need to ask questions like "List the customer summaries in Chicago" rather than "List the customers in Chicago".

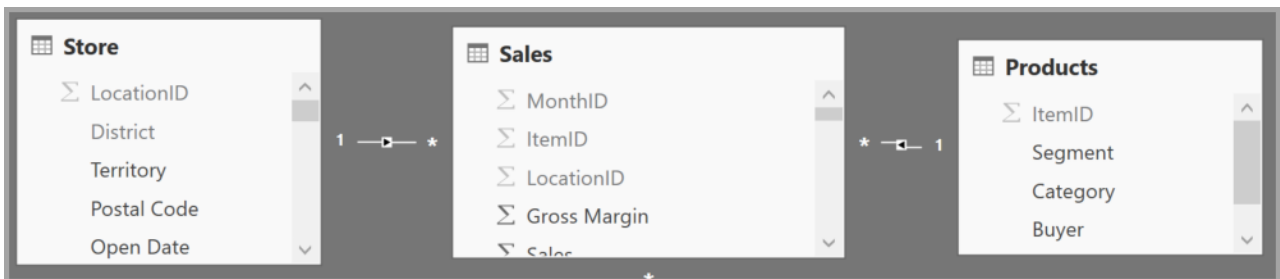
While Q&A can do some basic word breaking and detection of plurals, Q&A assumes that your table and column names accurately reflect their content.

Consider another example. Imagine you have a table named *Headcount* that contains first and last names and employee numbers, and you have another table named *Employees* contains employee numbers, job numbers and start dates. While this might be understood by people who are familiar with the model, someone else who asks “count the employees” is going to get a count of the rows from the “Employees” table, which is probably not what they had in mind, since that’s a count of every job each employee has ever had. It would be much better to rename those tables to truly reflect what they contain.

Needs work

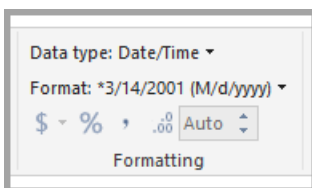


Ready for Q&A



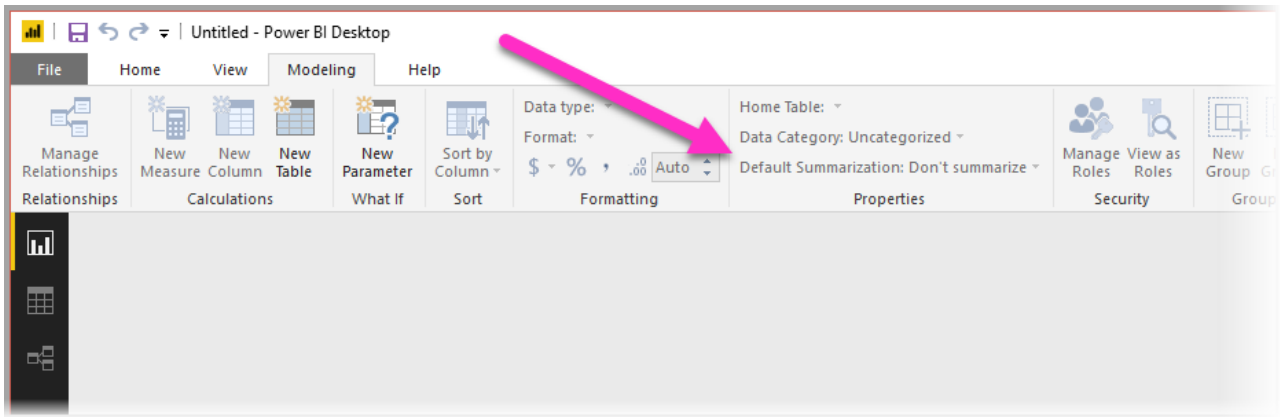
Fix incorrect data types

Imported data can have incorrect data types. In particular, *date* and *number* columns that are imported as *strings* will not be interpreted by Q&A as dates and numbers. You should make sure you select the correct data type in your Power BI model.



Mark year and identifier columns as Don't Summarize

Power BI aggressively aggregates numeric columns by default, so questions like “total sales by year” can sometimes result in a grand total of sales alongside a grand total of years. If you have specific columns where you don't want Power BI to exhibit this behavior, set the **Summarize By** property on the column to **Don't Summarize**. Be mindful of **year**, **month**, **day**, and **ID** columns, as those columns are the most frequent problems. Other columns that aren't sensible to sum, such as *age*, could also benefit from setting **Summarize By** to **Don't Summarize** or to **Average**. You'll find this setting in the **Modeling** tab.

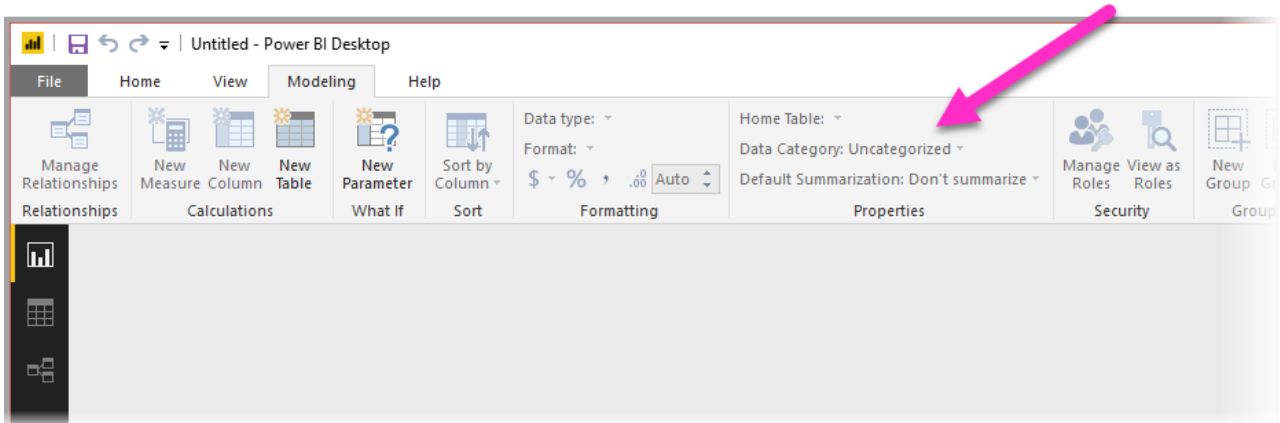


Choose a Data Category for each date and geography column

The **Data Category** provides additional semantic knowledge about the content of a column beyond its data type. For example, an integer column might be marked as a Zip Code, a string column might be marked as a City, Country, Region, and so on. This information is used by Q&A in two important ways: For visualization selection and for language biases.

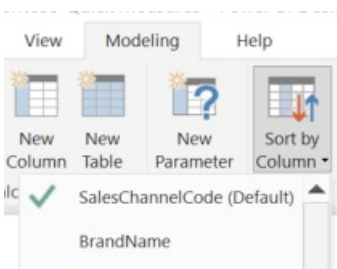
First, Q&A uses the **Data Category** information to help make choices about what kind of visual display to use. For example, it recognizes that columns with date or time **Data Categories** are typically a good choice for the horizontal axis of a line chart or the play axis of a bubble chart. And it assumes that results containing columns with geographical **Data Categories** may look good on a map.

Second, Q&A makes some educated guesses about how users are likely to talk about date and geography columns, to help it understand certain types of questions. For example, the “when” in “When was John Smith hired?” is almost certain to map to a date column, and the “Brown” in “Count customers in Brown” is more likely to be a city than a hair color.



Choose a Sort By Column for relevant columns

The **Sort By Column** property allows sorting on one column to automatically sort by a different column instead. For example, when you ask “sort customers by shirt size”, you probably want your Shirt Size column to sort by the underlying size number (XS, S, M, L, XL) rather than alphabetically (L, M, S, XL, XS).



Normalize your model

Rest assured that we're not suggesting you need to reshape your entire model. However, there are certain structures that are simply so difficult that Q&A isn't going to handle them well. If you perform some basic normalization of the structure of your model, the usability of Power BI reports will increase significantly, as will the accuracy of Q&A results.

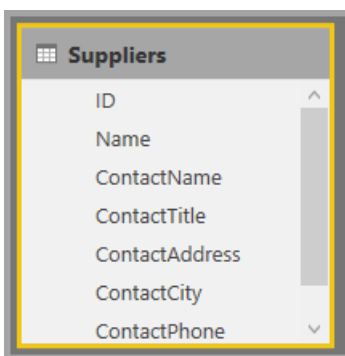
The general rule you should follow is this: Each unique "thing" the user talks about should be represented by exactly one model object (table or column). So if your users talk about customers, there should be one *customer* object. And if your users talk about sales, there should be a one *sales* object. Sounds simple, doesn't it? Depending on the shape of the data you're starting with, it can be. There are rich data shaping capabilities available in **Query Editor** if you need them, while many of the more straightforward transformations can happen simply using calculations in the Power BI model.

The following sections contain some common transformations you might need to perform.

Create new tables for multi-column entities

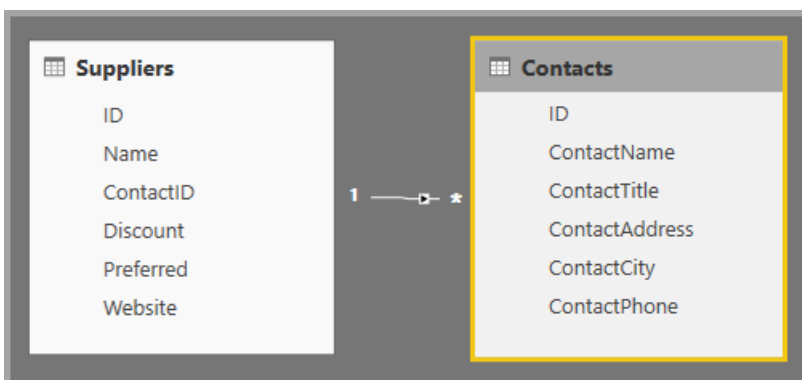
If you have multiple columns that act as a single distinct unit within a larger table, those columns should be split out into their own table. For example, if you have a Contact Name, Contact Title, and Contact Phone column within your *Companies* table, a better design would be to have a separate *Contacts* table to contain the Name, Title, and Phone and a link back to the *Companies* table. That makes it significantly easier to ask questions about contacts independently of questions about companies for which they are the contact, and improves display flexibility.

Needs work



Suppliers	
ID	
Name	
ContactName	
ContactTitle	
ContactAddress	
ContactCity	
ContactPhone	

Ready for Q&A



Suppliers	
ID	
Name	
ContactID	
Discount	
Preferred	
Website	

Contacts	
ID	
ContactName	
ContactTitle	
ContactAddress	
ContactCity	
ContactPhone	

Pivot to eliminate property bags

If you have property bags in your model, they should be restructured to have a single column per property. Property bags, while convenient for managing large numbers of properties, suffer from a number of inherent limitations that neither Power BI reports nor Q&A are designed to work around.

For example, consider a *CustomerDemographics* table with CustomerID, Property, and Value columns, where each row represents a different property of the customer (for examples, age, marital status, city, etc). By overloading the meaning of the Value column based on the content of the Property column, it becomes impossible for Q&A to

interpret most queries which reference it. A simple question such as “show the age of each customer” might happen to work, since it could be interpreted as “show the customers and customer demographics where property is age”. However, the structure of the model simply doesn’t support slightly more complex questions like “average age of customers in Chicago.” While users who directly author Power BI reports reports can sometimes find clever ways to get the data they are looking for, Q&A only works when each column has only a single meaning.

Needs work

CustomerID	Property	Value
1	Age	42
1	Marital Sta...	Married
1	City	Chicago
1	Gender	Male
2	Age	25
2	Marital Sta...	Single
2	City	Seattle
2	Gender	Female

Ready for Q&A

CustomerID	Age	MaritalStatus	City	Gender
1	42	Married	Chicago	Male
2	25	Single	Seattle	Female
3	37	Single	Boston	Male

Union to eliminate partitioning

If you've partitioned your data across multiple table, or have pivoted values across multiple columns, a number of common operations will be difficult or impossible for your users to achieve. Consider first a typical table partitioning: a *Sales2000-2010* table and a *Sales2011-2020* table. If all of your important reports are restricted to a specific decade, you could probably leave it this way for Power BI reports. However, the flexibility of Q&A will lead your users to expect answers to questions like “total sales by year.” For this to work, you’ll need to union the data into a single Power BI model table.

Similarly, consider a typical pivoted value column: a *BookTour* table containing Author, Book, City1, City2, and City3 columns. With a structure like this, even simple questions like “count books by city” cannot be interpreted correctly. For this to work, you should create a separate *BookTourCities* table, which unions the city values into a single column.

Needs work

TourID	BookName	AuthorName	City1	City2	City3
45	Recreational Ontology	Christopher Rei	Spokane	Palo Alto	Miami
46	Advanced Violin Acoustics	Maria Dawn	Warsaw	New York	San Francisco
47	Language Explosion	David Cunning	Santa Cruz	Berkeley	Seattle

Ready for Q&A

TourID	BookName	AuthorName
45	Recreational Ontology	Christopher Rei
46	Advanced Violin Acoustics	Maria Dawn
47	Language Explosion	David Cunning

TourID	City
45	Spokane
45	Palo Alto
45	Miami
46	Warsaw
46	New York
46	San Francisco

Split formatted columns

If the source from which you're importing your data contains formatted columns, Power BI reports (and Q&A) will not reach inside the column to parse its contents. So if you have, for example, a **Full Address** column that contains the address, city and country, you should also split it into Address, City and Country columns so your users can query against them individually.

Needs work

Customer	Full Address
E Rigby	3 Abbey Road, London, England
S Holmes	221 B Baker Street, London, England
D Cameron	10 Downing Street, London, England

Ready for Q&A

Customer	Full Address	Address	City	Country
E Rigby	3 Abbey Road, London, England	3 Abbey Road	London	England
S Holmes	221 B Baker Street, London, England	221 B Baker Street	London	England
D Cameron	10 Downing Street, London, England	10 Downing Street	London	England

Similarly, if you have any full name columns for a person, you'll want to add **First Name** and **Last Name** columns, just in case someone wants to ask questions using partial names.

Create new tables for multi-value columns

Also a similar situation, if the source from which you're importing your data contains multi-value columns, Power BI reports (and Q&A) will not reach inside the column to parse out the contents. So if you have, for example, a **Composer** column that contains the names of multiple composers for a song, you should split it into multiple rows in a separate *Composers* table.

Needs work

ID	Name	Genre	Composers
425	Symphony No. 37	Classical	Joseph Haydn, Wolfgang Mozart
426	Revolution 9	Pop	John Lennon, Paul McCartney
427	Summer of '69	Rock	Bryan Adams, Jim Vallance

Ready for Q&A

ID	Name	Genre
425	Symphony No. 37	Classical
426	Revolution 9	Pop
427	Summer of '69	Rock

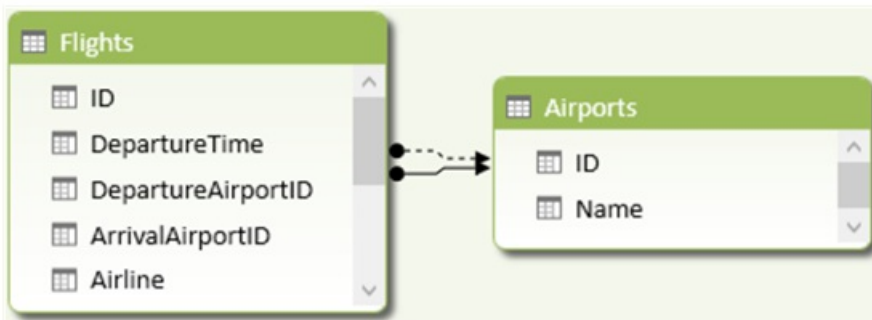
ID	Composer
425	Joseph Haydn
425	Wolfgang Mozart
426	John Lennon
426	Paul McCartney
427	Bryan Adams
427	Jim Vallance

Denormalize to eliminate inactive relationships

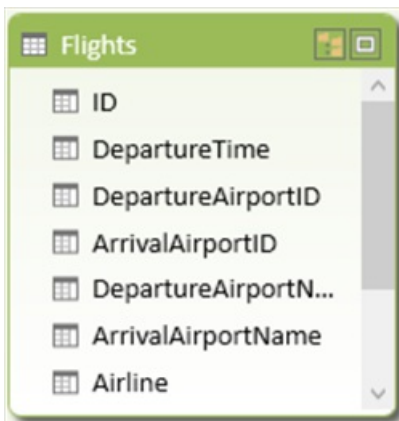
The one exception to the "normalization is better" rule occurs when there is more than one path to get from one table to another. For example, if you have a *Flights* table with both *SourceCityID* and *DestinationCityID* columns, each of which are related to the *Cities* table, one of those relationships will have to be marked as inactive. Since

Q&A can only use active relationships, you would be unable to ask questions about either source or destination, depending on which you chose. If you instead denormalize the city name columns into the *Flights* table, you'll be able to ask questions like: "list the flights for tomorrow with a source city of Seattle and a destination city of San Francisco."

Needs work



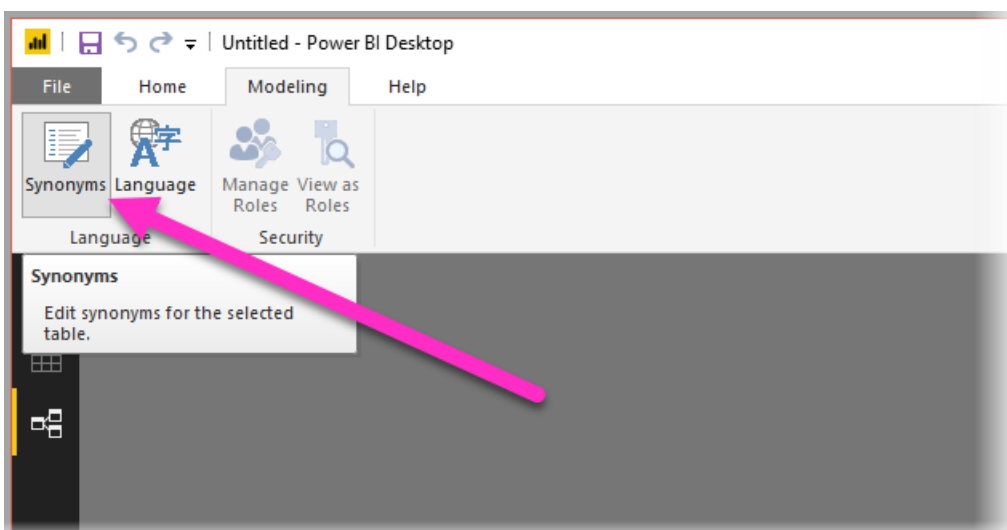
Ready for Q&A



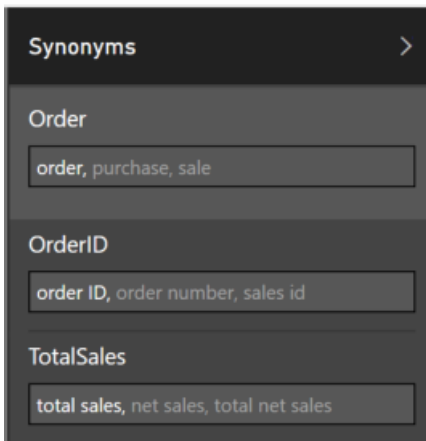
Add synonyms to tables and columns

This step applies specifically to Q&A (and not to Power BI reports in general). Users often have a variety of terms they use to refer to the same thing, such as total sales, net sales, total net sales. Power BI's model allows these synonyms to be added to tables and columns within the model.

This can be a very important step. Even with straightforward table and column names, users of Q&A ask questions using the vocabulary that first comes to them, and are not choosing from a predefined list of columns. The more sensible synonyms you can add, the better your users' experience will be with your report. To add Synonyms, in **Relationships** view select the Synonyms button in the ribbon, as shown in the following image.



The **Synonyms** field appears on the right side of **Power BI Desktop**, where you can add your synonyms, as shown in the following image.



Be careful when adding synonyms, since adding the same synonym to more than one column or table will introduce ambiguity. Q&A utilizes context where possible to choose between ambiguous synonyms, but not all questions have sufficient context. For example, when your user asks “count the customers”, if you have three things with the synonym “customer” in your model, they might not get the answer they are looking for. In these cases, make sure the primary synonym is unique, as that is what is used in the restatement. It can alert the user to the ambiguity (for example, a restatement of “show the number of archived customer records”), hinting they might want to ask it differently.

Next steps

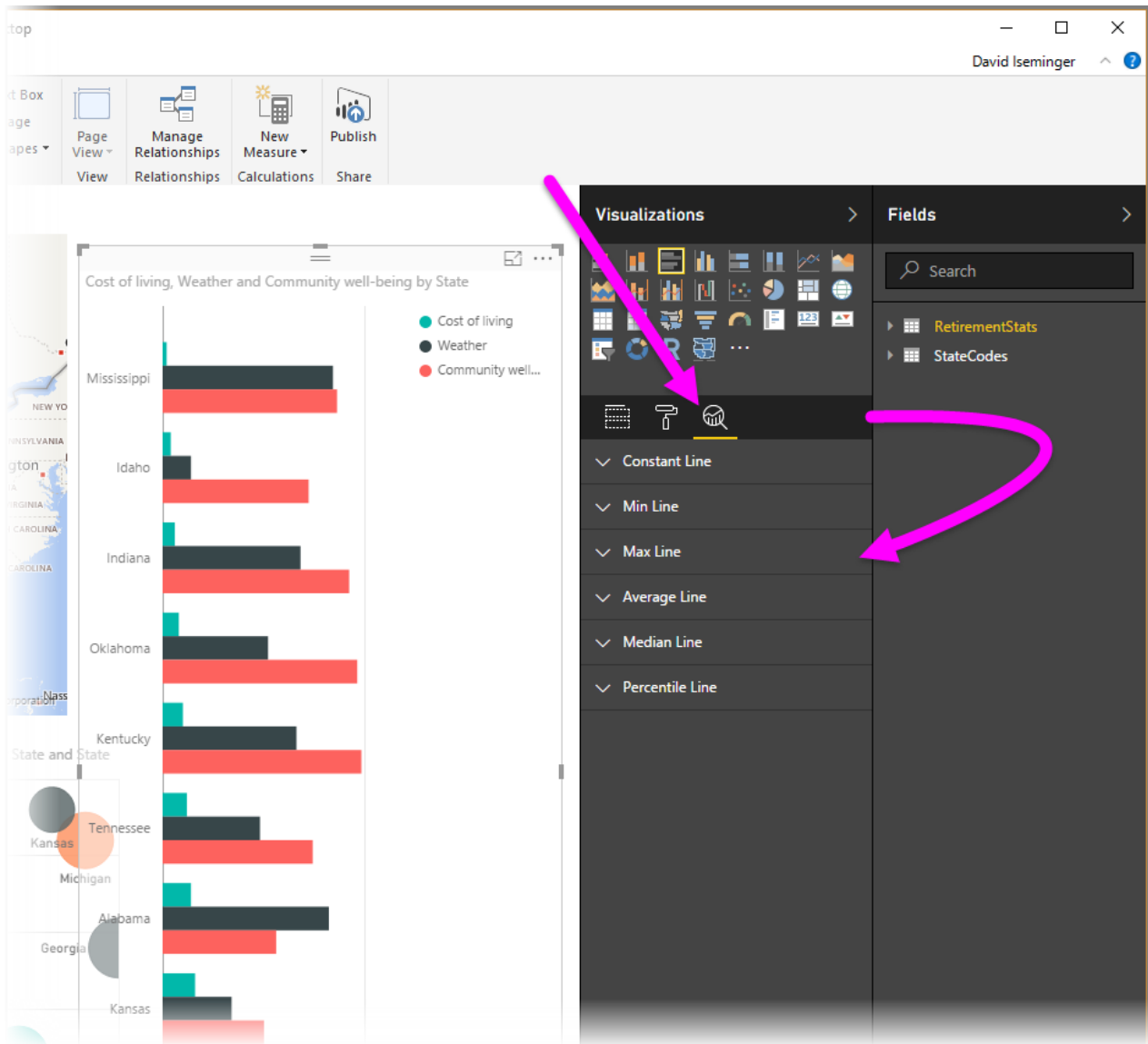
For more information about features that are in Power BI Desktop, take a look at the following articles:

- [Use drillthrough in Power BI Desktop](#)
- [Display a dashboard tile or report visual in Focus mode](#)

Using the Analytics pane in Power BI Desktop

11/15/2017 • 4 min to read • [Edit Online](#)

With the **Analytics** pane in **Power BI Desktop**, you can add dynamic *reference lines* to visuals, and provide focus for important trends or insights. The **Analytics** pane is found in the **Visualizations** area of Power BI Desktop, beginning with the August 2016 release (version 2.37.4464.321 or later), as shown below.

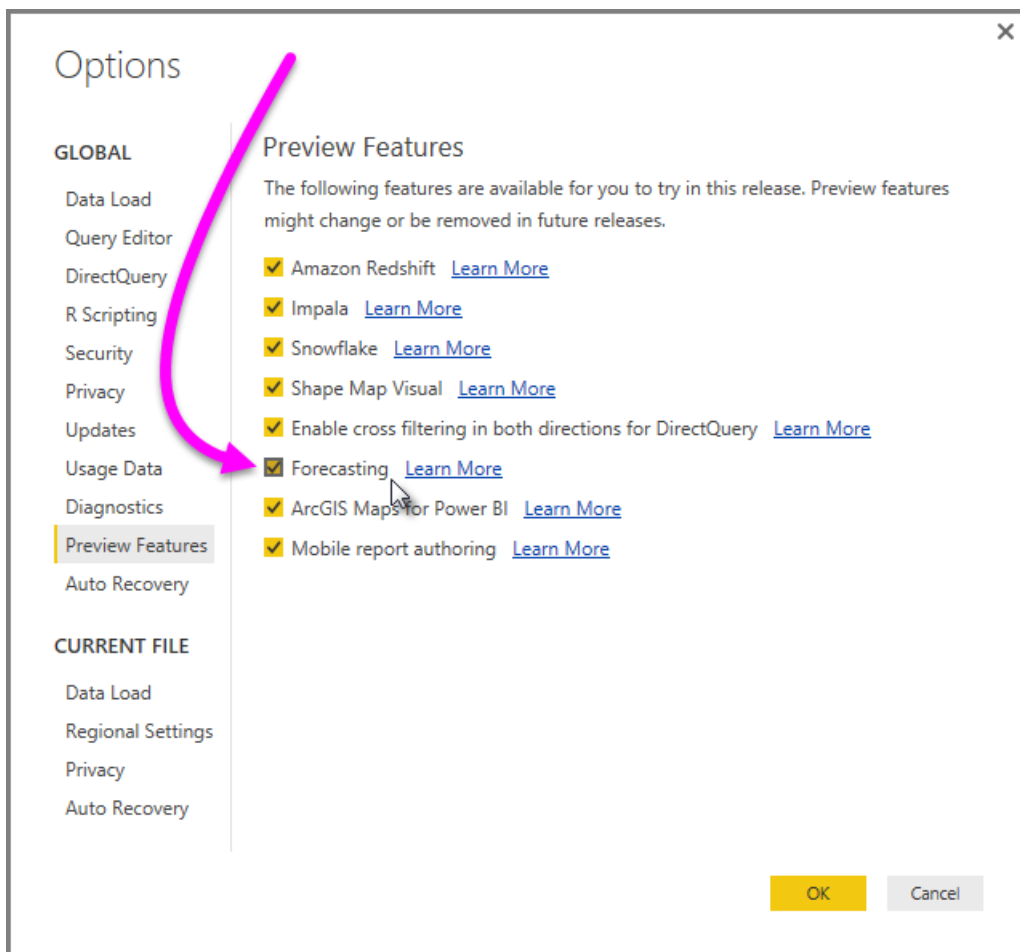


NOTE

The **Analytics** pane only appears when you select a visual on the Power BI Desktop canvas.

Enable Forecasting (Preview)

In addition, with the September 2016 release of **Power BI Desktop** (version 2.39.4526.362 or later), you can also perform *forecasting* from the **Analytics** pane. You must enable this preview feature, by going to **File > Options and settings > Options** then selecting **Preview Features** from the left pane. Select the checkbox next to **Forecasting** to enable the feature, as shown in the following image. You'll need to restart **Power BI Desktop** for your changes to take effect.



Using the Analytics pane

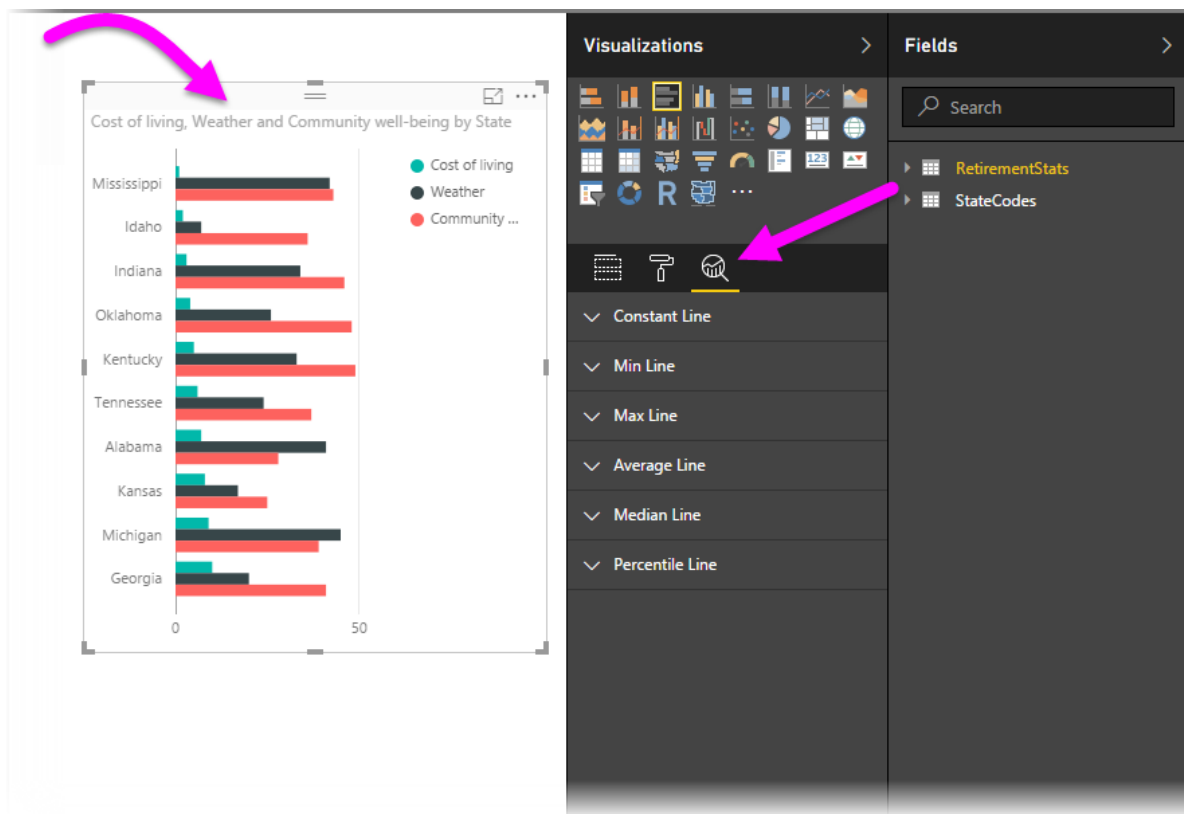
With the **Analytics** pane, you can create the following types of dynamic reference lines (not all lines are available for all visual types):

- X-Axis constant line
- Y-Axis constant line
- Min line
- Max line
- Average line
- Median line
- Percentile line

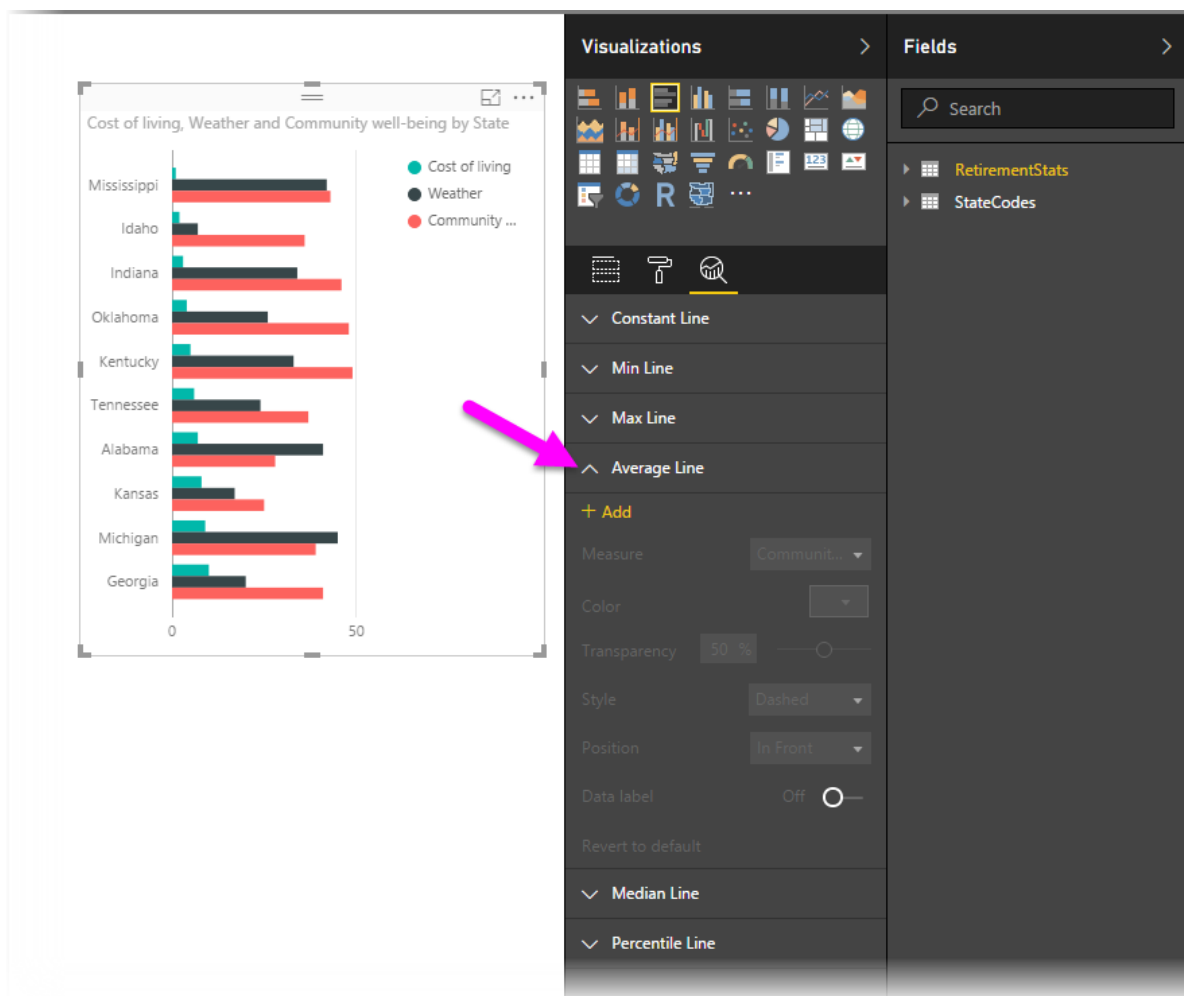
The following sections show how you can use the **Analytics** pane and dynamic reference lines in your visualizations.

To view the available dynamic reference lines for a visual, follow these steps:

1. Select or create a visual, then select the **Analytics** icon from the **Visualizations** section.

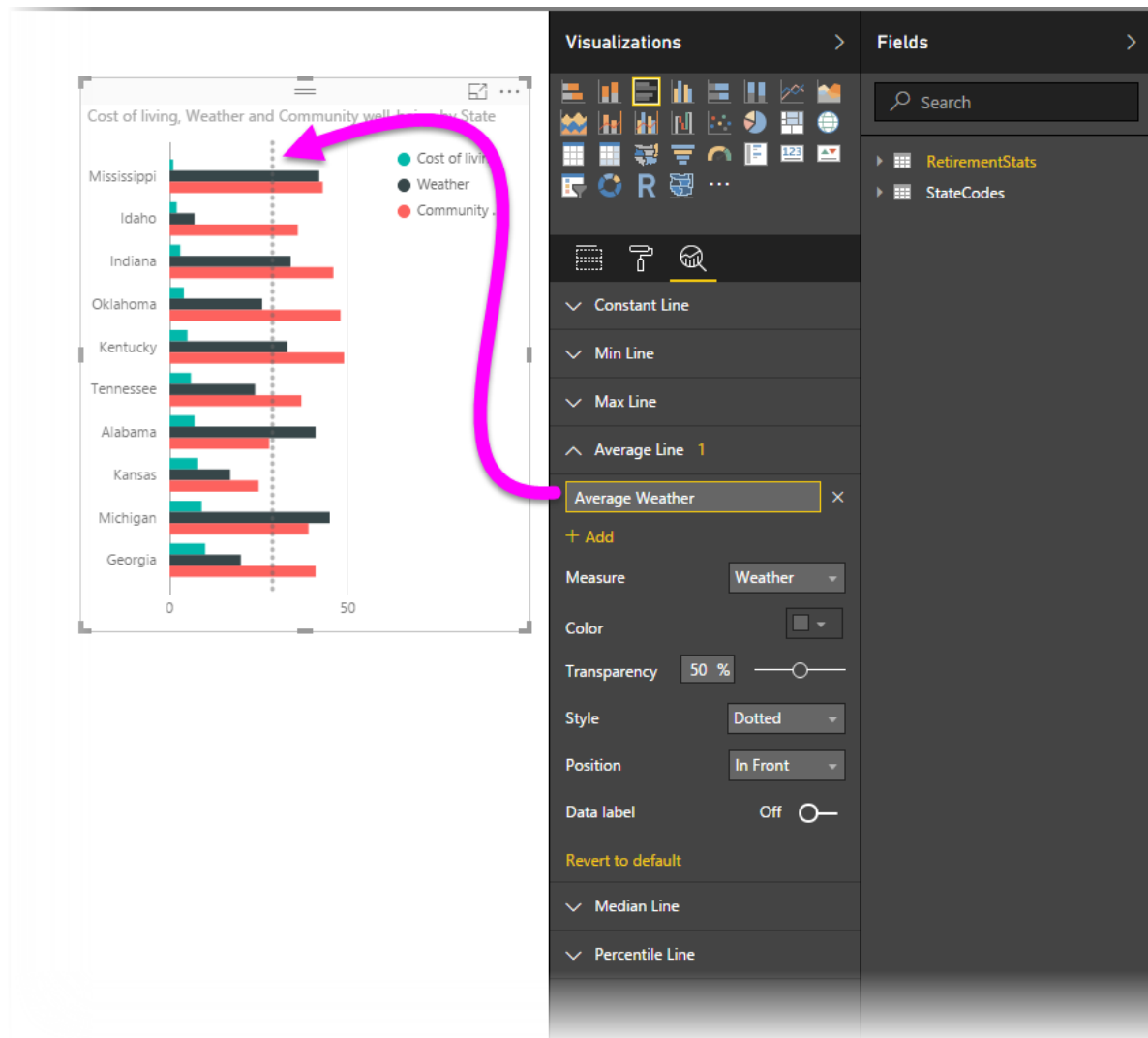


2. Select the down arrow for the type of line you want to create to expand its options. In this case, we'll select **Average Line**.

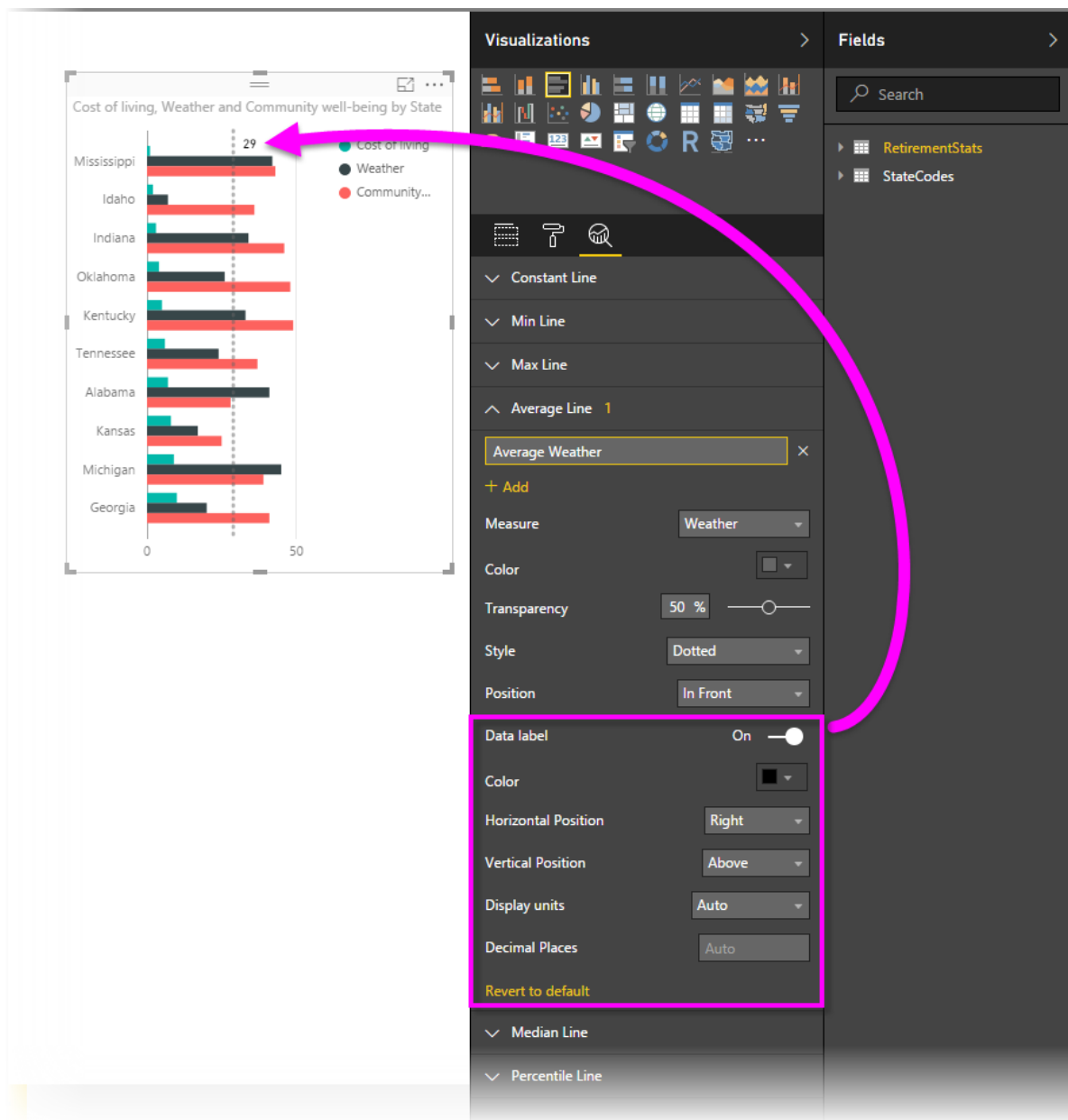


3. To create a new line, select **+ Add**. You can then specify a name for the line by double-clicking the text box, then typing in your name.

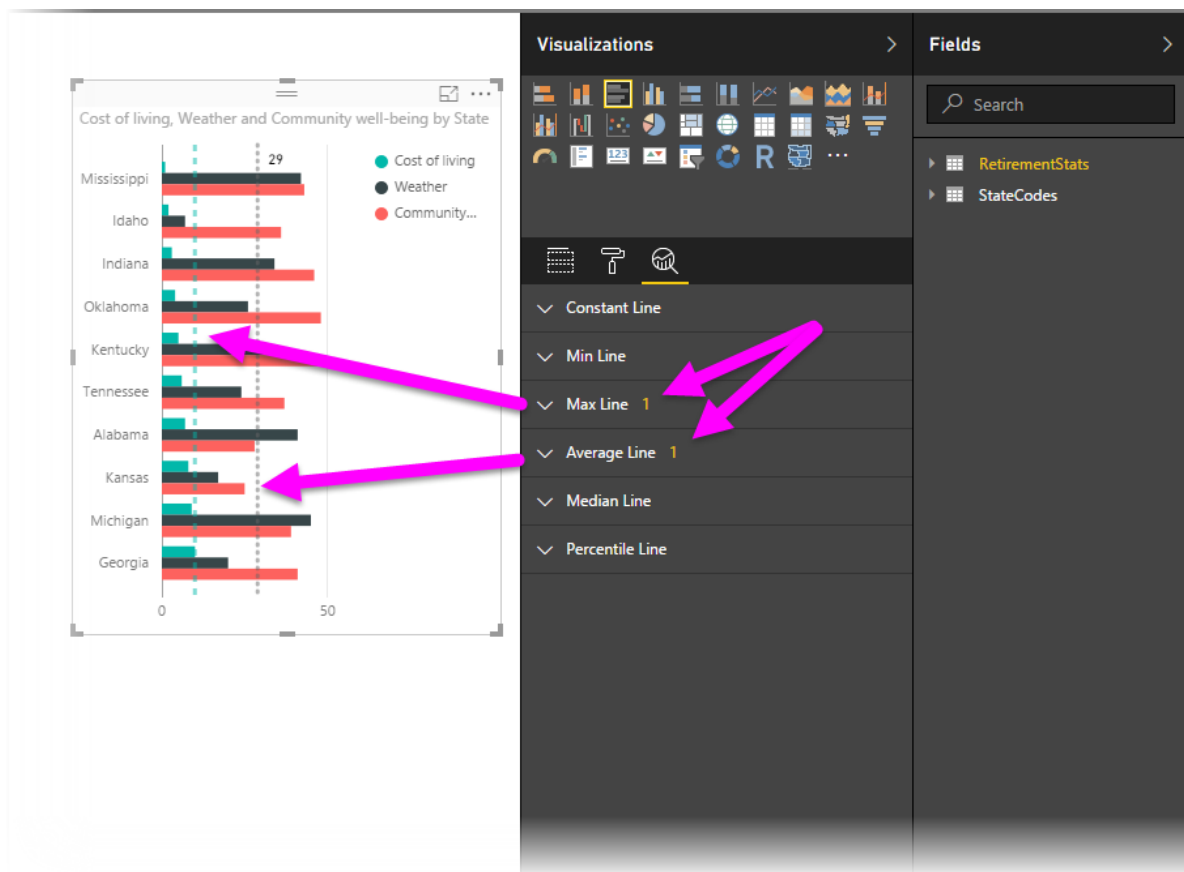
You have all sorts of options for your line, such as selecting its *color*, *transparency*, *style* and *position* (relative to the visual's data elements), and whether to include the label. And importantly, you can select which **Measure** in the visual you want your line to be based upon by selecting the **Measure** drop down, which is automatically populated with data elements from the visual. In this case, we'll select *Weather* as the measure, label it *Average Weather*, and customize a few of the other options as shown below.



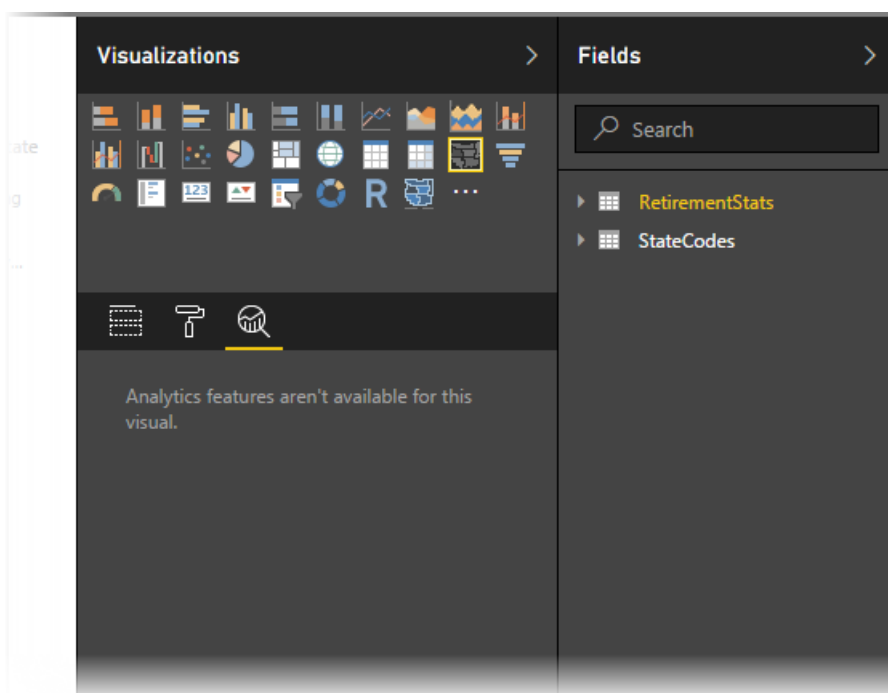
4. If you want to have a data label appear, move the **Data label** slider on. When you do so, you get a whole host of additional options for your data label, as shown in the following image.



5. Notice the number that appears next to the **Average line** item in the **Analytics** pane. That tells you how many dynamic lines you currently have on your visual, and of which type. If we add a **Max line** for *Cost of Living*, you can see that the **Analytics** pane shows that we now also have a **Max line** dynamic reference line applied to this visual.



If the visual you've selected can't have dynamic reference lines applied to it (in this case, a **Map** visual), you'll see the following when you select the **Analytics** pane.



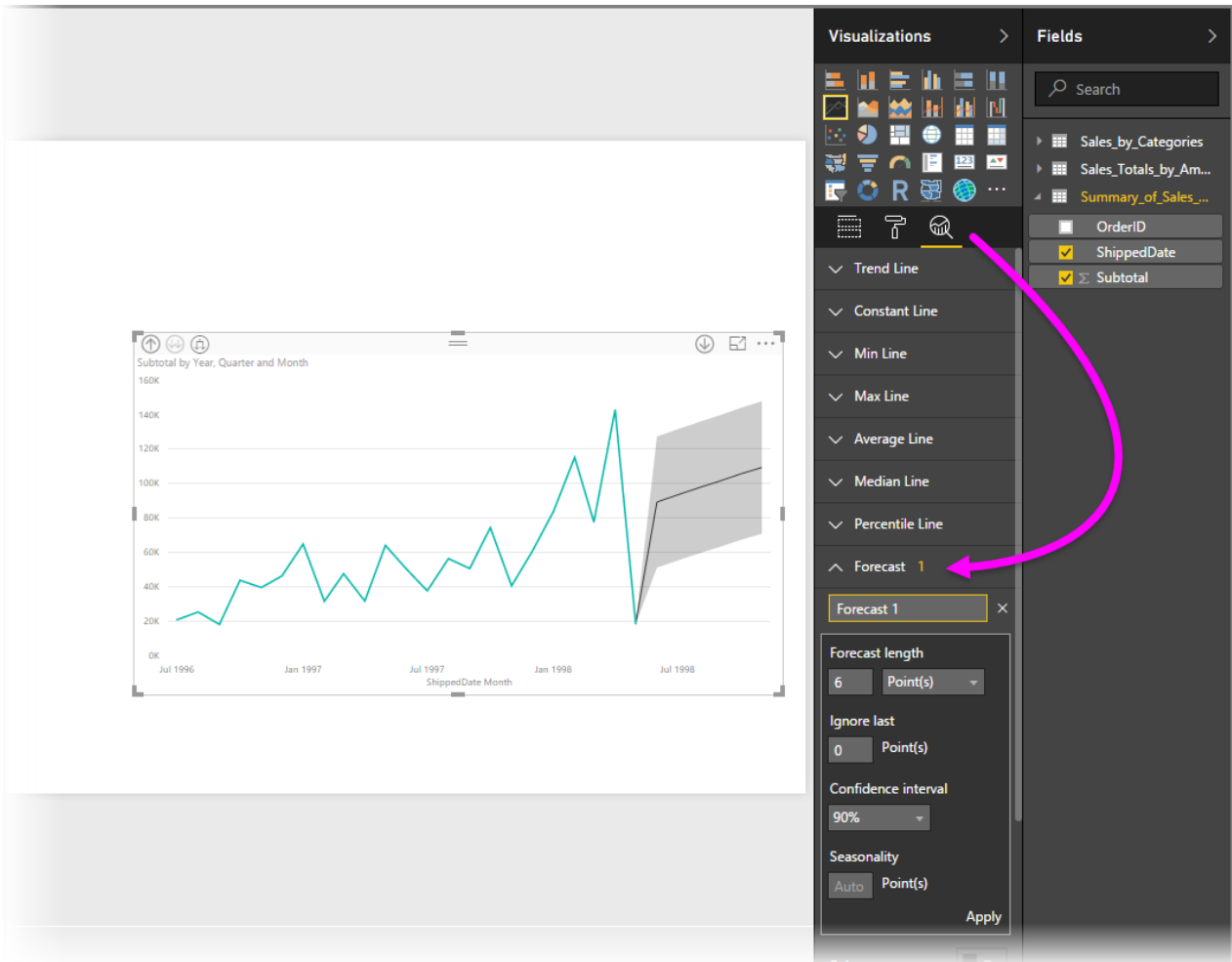
There are all sorts of interesting insights you can highlight by creating dynamic reference lines with the **Analytics** pane.

We're planning more features and capabilities, including expanding which visuals can have dynamic reference lines applied to them, so check back often for what's new.

Apply Forecasting

You can use the **Forecast** feature by selecting a visual, then expanding the **Forecast** section of the **Analytics**

pane. You can specify many inputs to modify the forecast, such as the *Forecast length*, the *Confidence interval*, and others. The following image shows a basic line visual with forecasting applied, but you can use your imagination (and play around with the *forecasting* feature) to see how it can apply to your models.



Limitations

The ability to use dynamic reference lines is based on the type of visual being used. The following list shows which dynamic lines are currently available for which visuals:

Full use of dynamic lines are available on the following visuals:

- Area chart
- Line chart
- Scatter chart
- Clustered Column chart
- Clustered Bar chart

The following visuals can use only a *constant line* from the **Analytics** pane:

- Stacked Area
- Stacked Bar
- Stacked Column
- 100% Stacked Bar
- 100% Stacked Column

For the following visuals, a *trend line* is currently the only option:

- Non-stacked Line

- Clustered Column chart

Lastly, non-Cartesian visuals cannot currently apply dynamic lines from the **Analytics** pane, such as:

- Matrix
- Pie chart
- Donut
- Table

Next steps

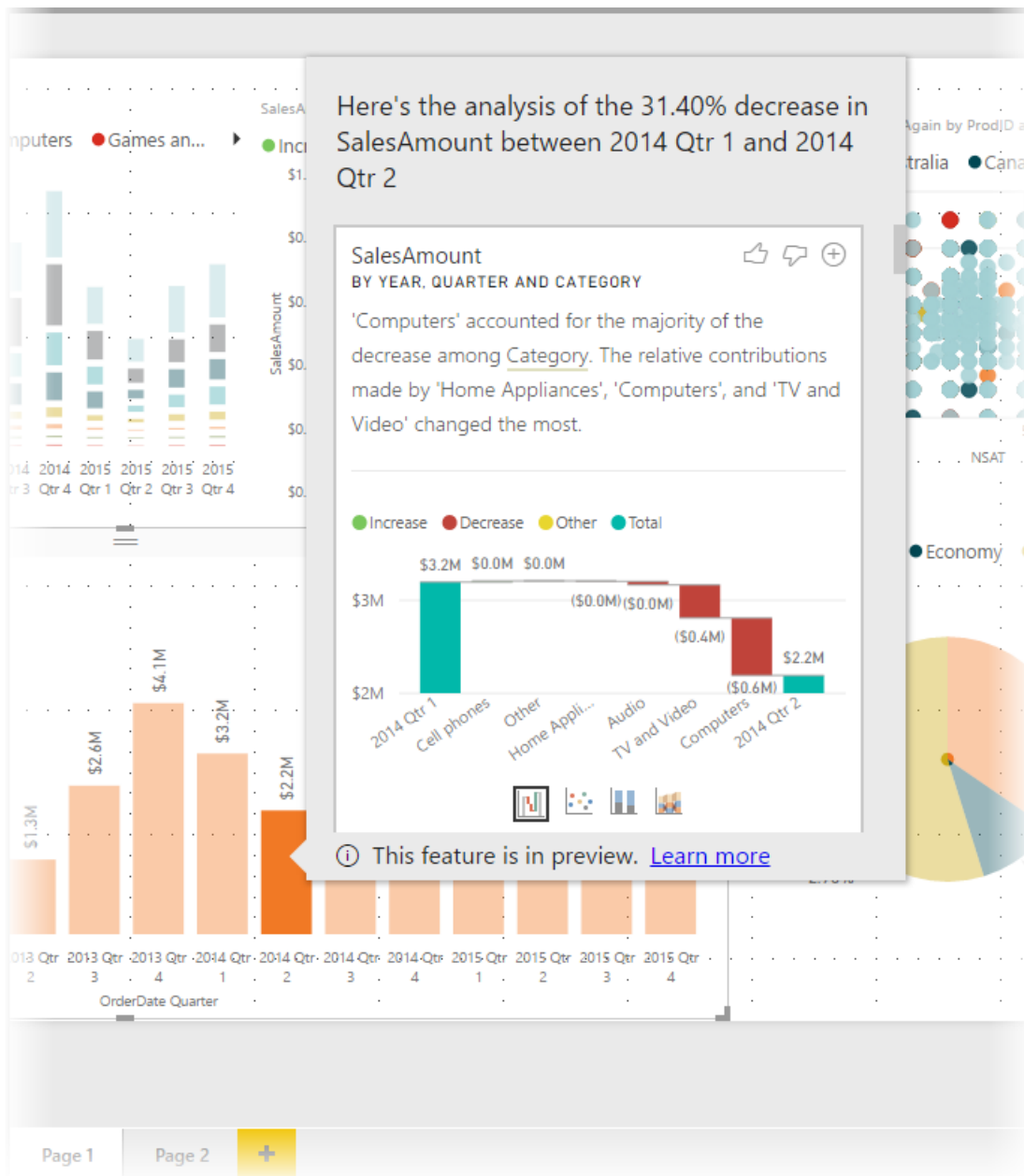
There are all sorts of things you can do with Power BI Desktop. For more information on its capabilities, check out the following resources:

- [What's New in Power BI Desktop](#)
- [Download Power BI Desktop](#)
- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Types in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

Use insights in Power BI Desktop (Preview)

12/6/2017 • 2 min to read • [Edit Online](#)

You can tell **Power BI Desktop** to explain increases or decreases in charts, and get fast, automated, insightful analysis about your data. Simply right-click on a data point, and select **Analyze > Explain the decrease** (or increase, if the previous bar was lower), and insight is delivered to you in an easy-to-use window.



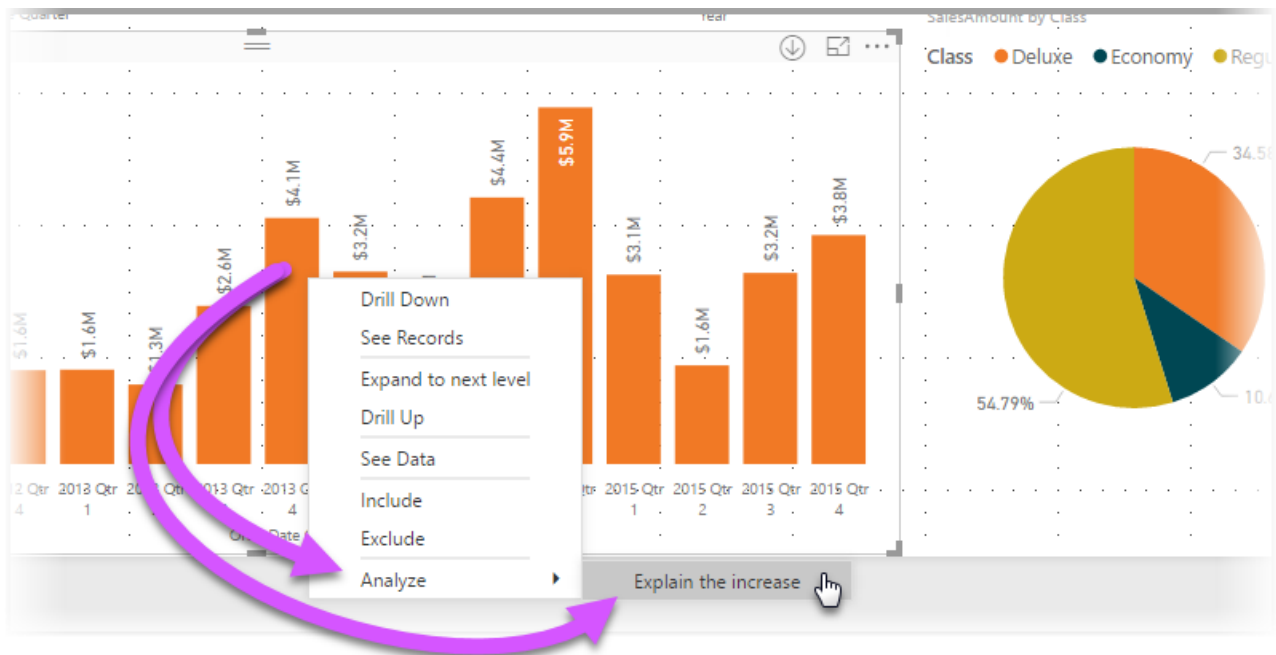
The insights feature is contextual, and is based on the immediately previous data point - such as the previous bar, or column.

NOTE

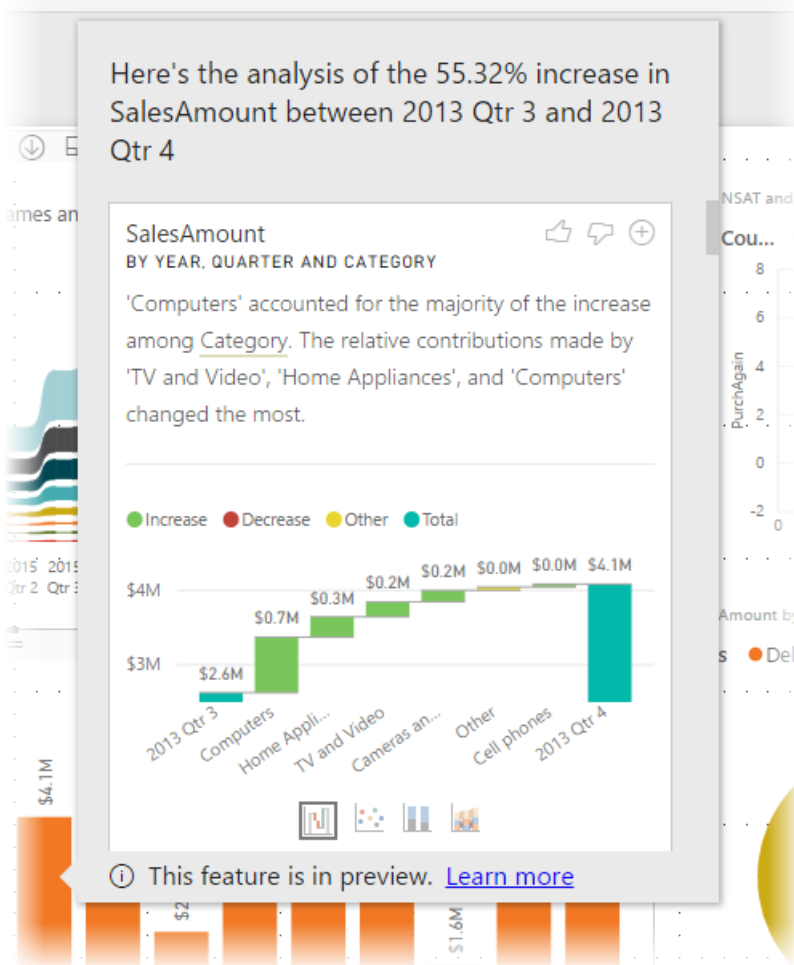
This feature is in preview, and is subject to change. The insight feature is enabled and on by default (you don't need to check a Preview box to enable it) beginning with the September 2017 version of **Power BI Desktop**.

Using insights

To use insights, just right-click on any data point in a bar or line visual, and select **Analyze > Explain the increase** (or *Explain the decrease*, since all insights are based on the change from the previous data point).






Power BI Desktop then runs its machine learning algorithms over the data, and populates a window with a visual and a description that describes which categories most influenced the increase or decrease. By default, insights are provided as a *waterfall* visual, as shown in the following image.

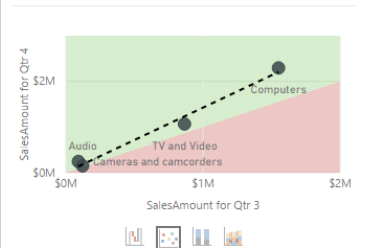



By selecting the small icons at the bottom of the waterfall visual, you can choose to have insights display a scatter chart, stacked column chart, or a ribbon chart.

Here's the analysis of the 55.32% increase in SalesAmount between 2013 Qtr 3 and 2013 Qtr 4




SalesAmount for Qtr 3 and SalesAmo...   
BY CATEGORY

'Computers' accounted for the majority of the increase among Category. The relative contributions made by 'TV and Video', 'Home Appliances', and 'Computers' changed the most.

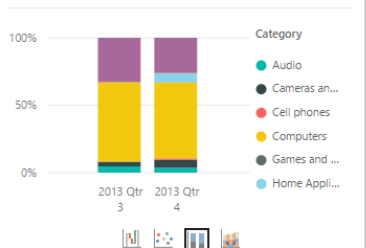



 This feature is in preview. [Learn more](#)

Here's the analysis of the 55.32% increase in SalesAmount between 2013 Qtr 3 and 2013 Qtr 4




SalesAmount   
BY YEAR, QUARTER AND CATEGORY

'Computers' accounted for the majority of the increase among Category. The relative contributions made by 'TV and Video', 'Home Appliances', and 'Computers' changed the most.

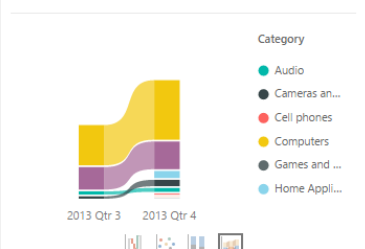



 This feature is in preview. [Learn more](#)

Here's the analysis of the 55.32% increase in SalesAmount between 2013 Qtr 3 and 2013 Qtr 4

SalesAmount   
BY YEAR, QUARTER AND CATEGORY

'Computers' accounted for the majority of the increase among Category. The relative contributions made by 'TV and Video', 'Home Appliances', and 'Computers' changed the most.



 This feature is in preview. [Learn more](#)

The *thumbs up* and *thumbs down* icons at the top of the page are provided so you can provide feedback about the visual and the feature.

And importantly, the + button at the top of the visual lets you add the selected visual to your report, just as if you created the visual manually. You can then format or otherwise adjust the added visual just as you would to any other visual on your report. You can only add a selected insight visual when you're editing a report in **Power BI Desktop**.

You can use insights when your report is in reading or editing mode, making it versatile for both analyzing data, and for creating visuals you can easily add to your reports.

Considerations and limitations

Since insights are based on the change from the previous data point, they aren't available when you select the first data point in a visual.

The following list is the collection of currently unsupported scenarios for **insights**:

- TopN filters
- Include/exclude filters
- Measure filters
- Non-additive measures and aggregates
- Show value as
- Filtered measures (it's the new thing we use for scatter chart in insights)
- Categorical columns on X-axis unless it defines a sort by column that is scalar. If using a hierarchy, then every column in the active hierarchy has to match this condition
- Non-numeric measures

In addition, the following model types and data sources are currently not supported for insights:

- DirectQuery
- Live connect
- On-premises Reporting Services
- Embedding

Next steps

For more information about **Power BI Desktop**, and how to get started, check out the following articles.

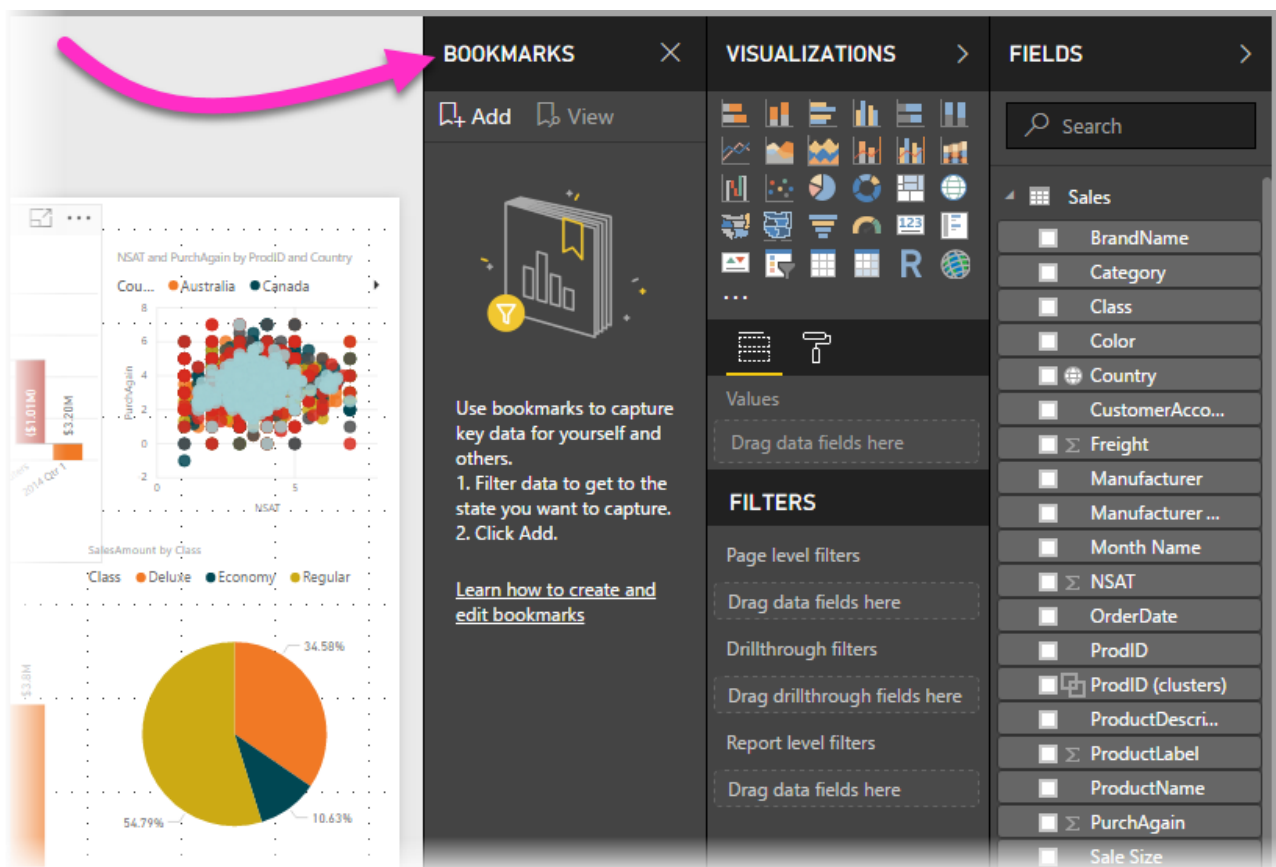
- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

Use bookmarks to share insights and build stories in Power BI (Preview)

1/25/2018 • 7 min to read • [Edit Online](#)

Using **bookmarks** in Power BI you can capture the currently configured view of a report page, including filtering and the state of visuals, and later go back to that state by simply selecting that saved bookmark.

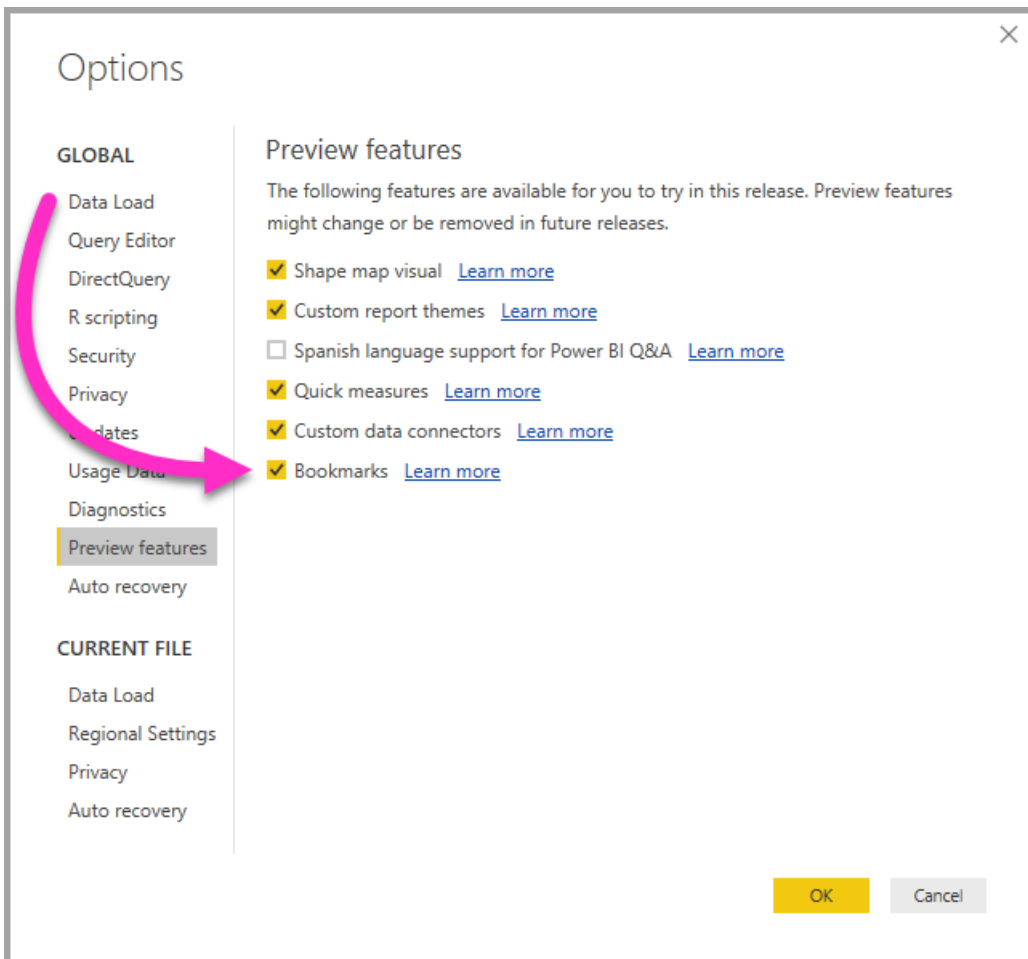
You can also create a collection of bookmarks, arrange them in the order you want, and subsequently step through each bookmark in a presentation to highlight a series of insights, or the story you want to tell with your visuals and reports.



There are many uses for bookmarking. You can use them to keep track of your own progress in creating reports (bookmarks are easy to add, delete, and rename), and you can create bookmarks to build a PowerPoint-like presentation that steps through bookmarks in order, thereby telling a story with your report. There may be other uses, too, based on how you think bookmarks could best be used.

Enable the bookmarks preview

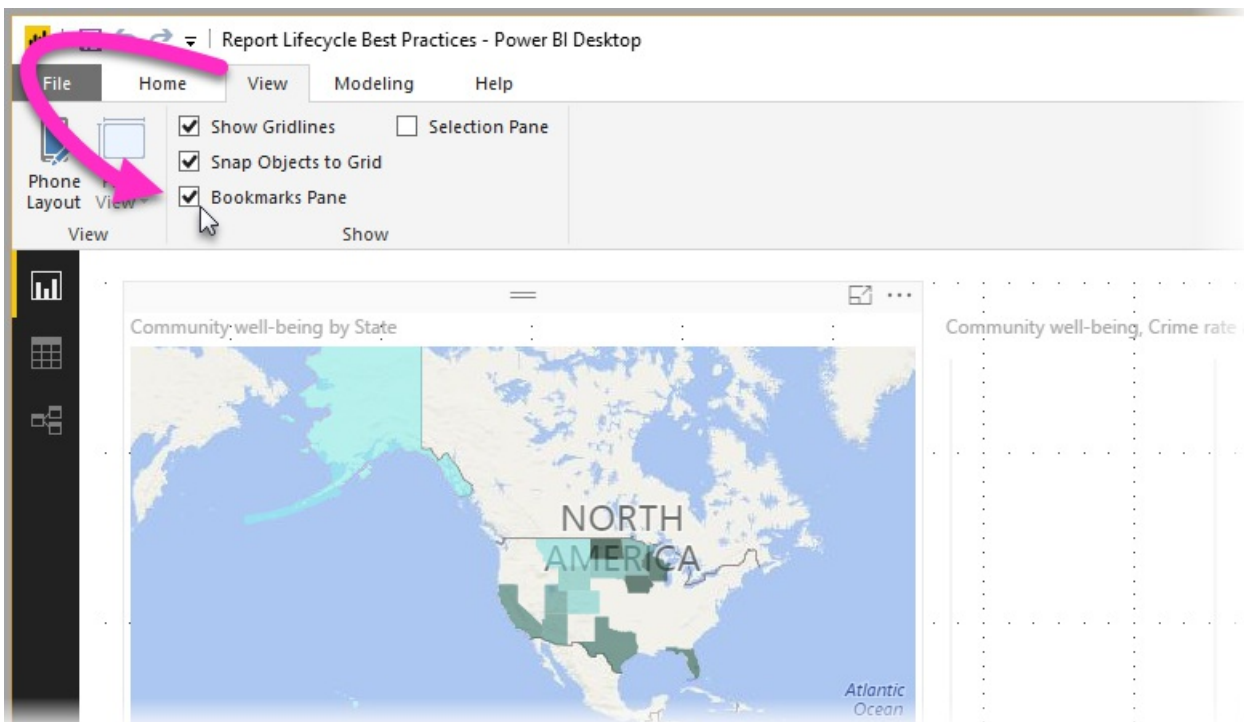
You can try the new **bookmarks** feature beginning with the **October 2017** release of **Power BI Desktop**, and for bookmark-enabled reports, in the **Power BI service** as well. To enable this preview feature, select **File > Options and Settings > Options > Preview Features**, then select the checkbox beside **Bookmarks**. You'll need to restart Power BI Desktop after you make the selection.



You'll need to restart **Power BI Desktop** after you make the selection.

Using bookmarks

To use bookmarks, select the **View** ribbon, then select the box for **Bookmarks Pane**.



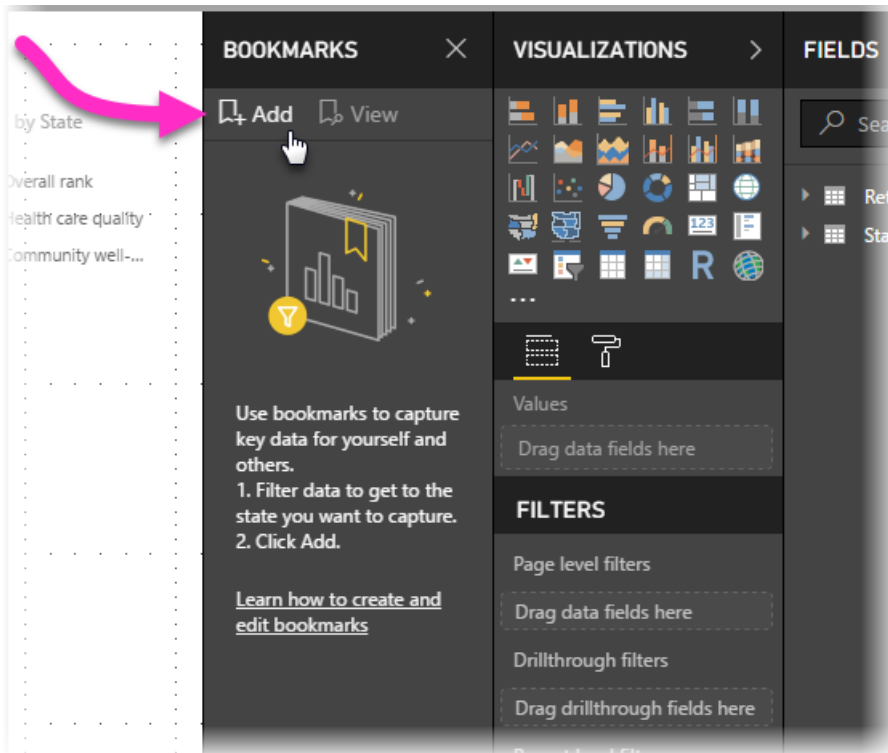
When you create a bookmark, the following elements are saved with the bookmark:

- The current page

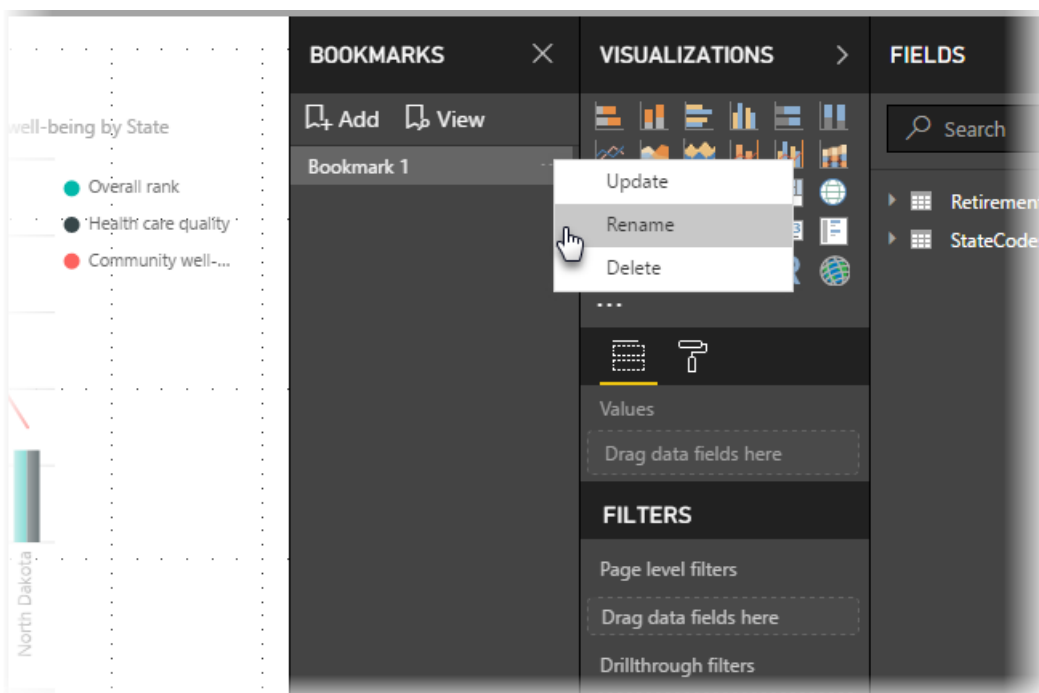
- Filters
- Slicers
- Sort order
- Drill location
- Visibility (of an object, using the **Selection** pane)
- The focus or **Spotlight** modes of any visible object

Bookmarks do not currently save the cross-highlighting state.

Configure a report page the way you want it to appear in the bookmark. Once your report page and visuals are arranged how you want them, select **Add** from the **Bookmarks** pane to add a bookmark.



Power BI Desktop create a bookmark and gives it a generic name. You can easily *rename* a bookmark, *delete* it, or *update* a bookmark by selecting the elipses next to the bookmark's name, then selecting an action from the menu that appears.

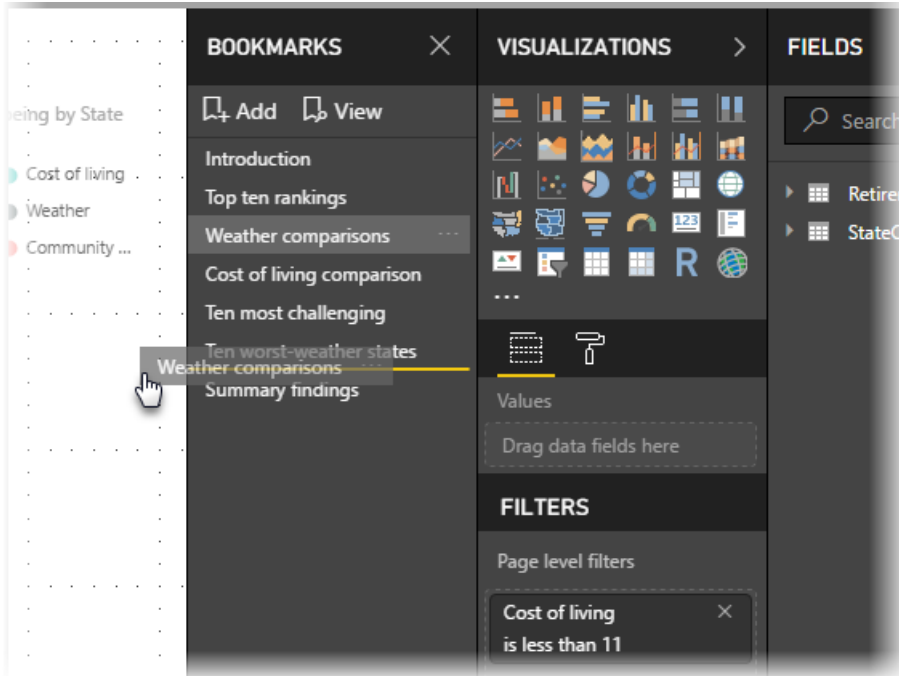


Once you have a bookmark, you can display it by simply clicking on the bookmark in the **Bookmarks** pane.

Arranging bookmarks

As you create bookmarks, you might find that the order in which you create them isn't necessarily the same order you'd like to present them to your audience. No problem, you can easily rearrange the order of bookmarks.

In the **Bookmarks** pane, simply drag-and-drop bookmarks to change their order, as shown in the following image. The yellow bar between bookmarks designates where the dragged bookmark will be placed.



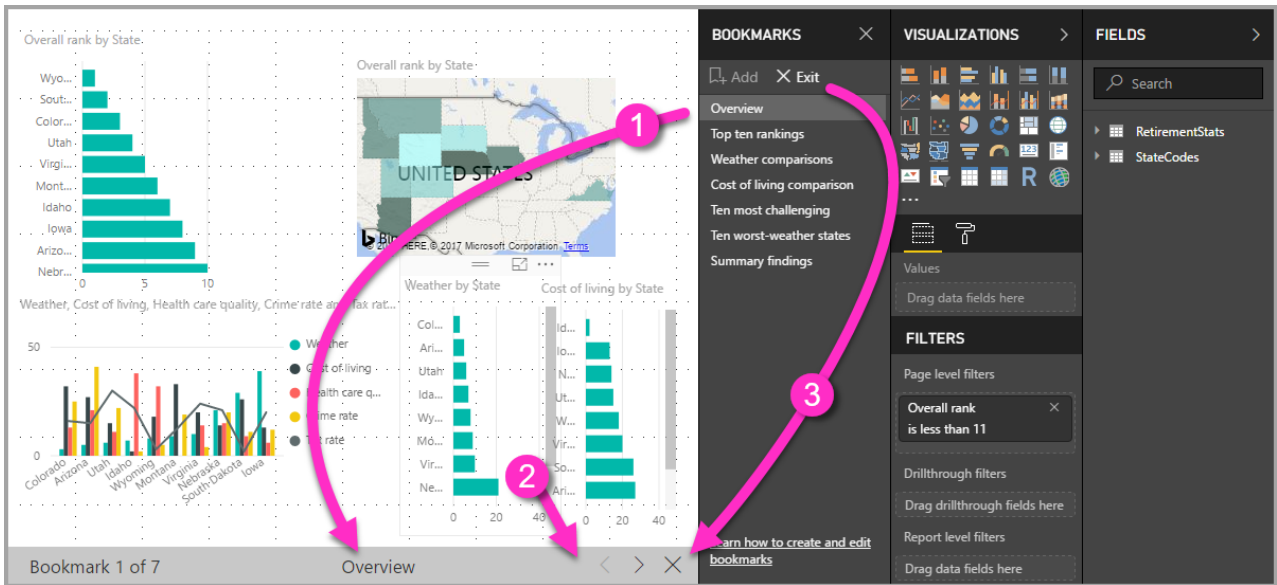
The order of your bookmarks can become important when you use the **View** feature of bookmarks, as described in the next section.

Bookmarks as a slide show

When you have a collection of bookmarks you would like to present, in order, you can select **View** from the **Bookmarks** pane to begin a slideshow.

When in **View** mode, there are a few features to notice:

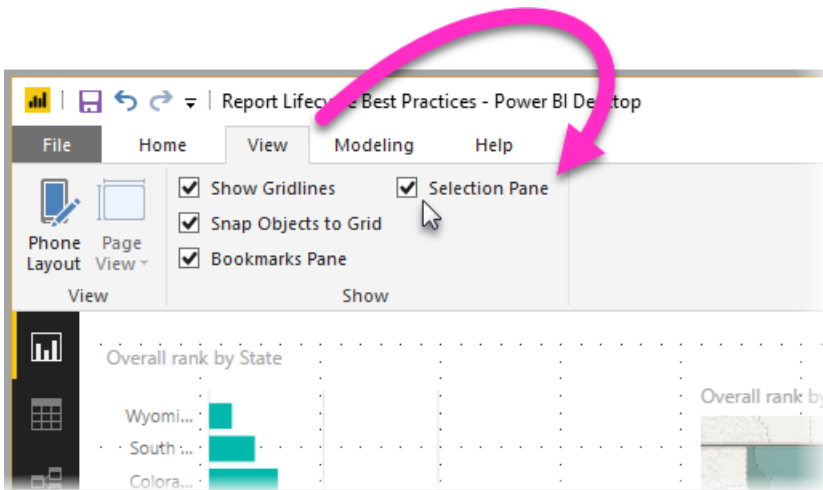
1. The name of the bookmark appears in the bookmark title bar, which appears at the bottom of the canvas.
2. The bookmark title bar has arrows that let you move to the next or previous bookmark
3. You can exit **View** mode by selecting **Exit** from the **Bookmarks** pane, or by selecting the **X** found in the bookmark title bar.



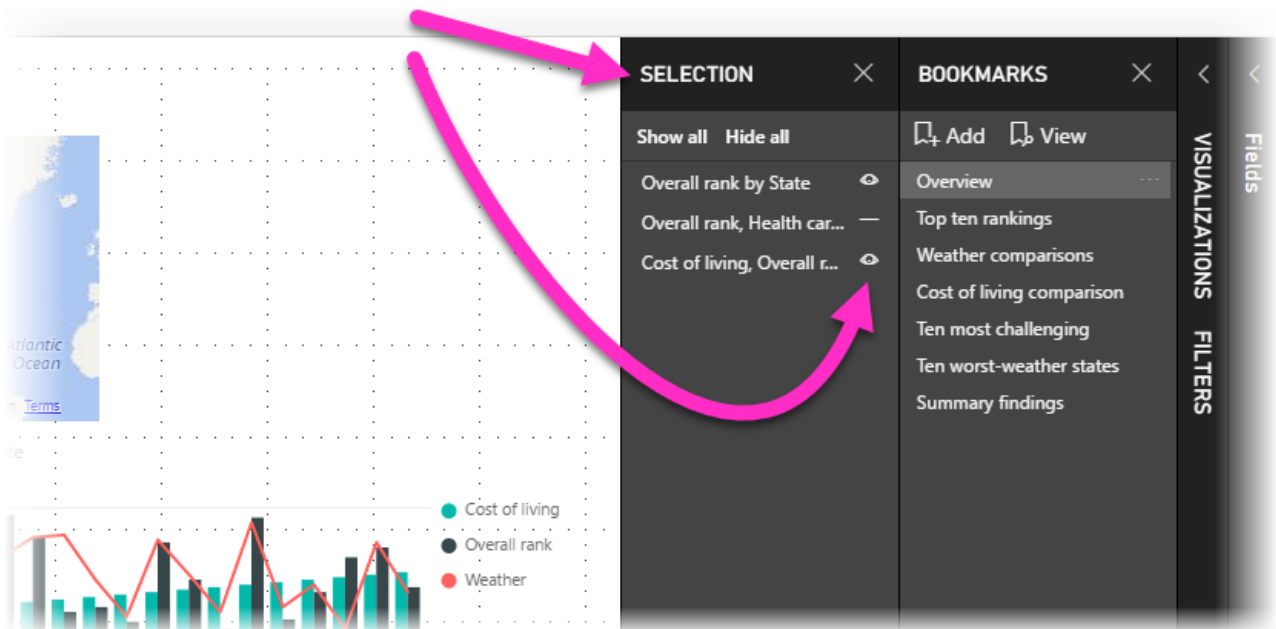
When you're in **View** mode, you can close the **Bookmarks** pane (by clicking the X on that pane) to provide more space for your presentation. And while in **View** mode, all visuals are interactive and available for cross-highlighting, just as they would otherwise be when interacting with them.

Visibility - using the Selection pane

With the release of bookmarks, the new **Selection** pane is also introduced. The **Selection** pane provides a list of all objects on the current page, and allows you to select the object and specify whether a given object is visible.



You can select an object using the **Selection** pane. Also, you can toggle whether the object is currently visible by clicking the eye icon to the right of the visual.



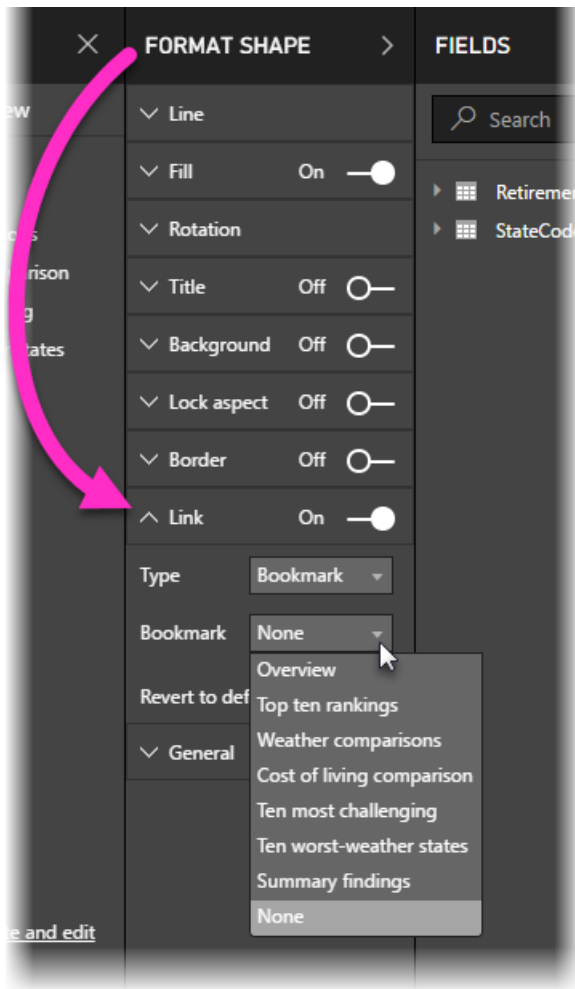
When a bookmark is added, the visible status of each object is also saved based on its setting in the **Selection** pane.

It's important to note that **slicers** continue to filter a report page, regardless of whether they are visible. As such, you can create many different bookmarks, with different slicer settings, and make a single report page appear very different (and highlight different insights) in various bookmarks.

Bookmarks for shapes and images

You can also link shapes and images to bookmarks. With this feature, when you click on an object, it will show the bookmark associated with that object.

To assign a bookmark to an object, select the object, then select **Link** from the **Format Shape** pane, as shown in the following image.



Once you turn the **Link** slider to **On** you can select whether the object is a link, or a bookmark. If you select bookmark, you can then select which of your bookmarks the object is linked to.

There are all sorts of interesting things you can do with object-linked bookmarking. You can create a visual table of contents on your report page, or you can provide different views (such as visual types) of the same information, just by clicking on an object.

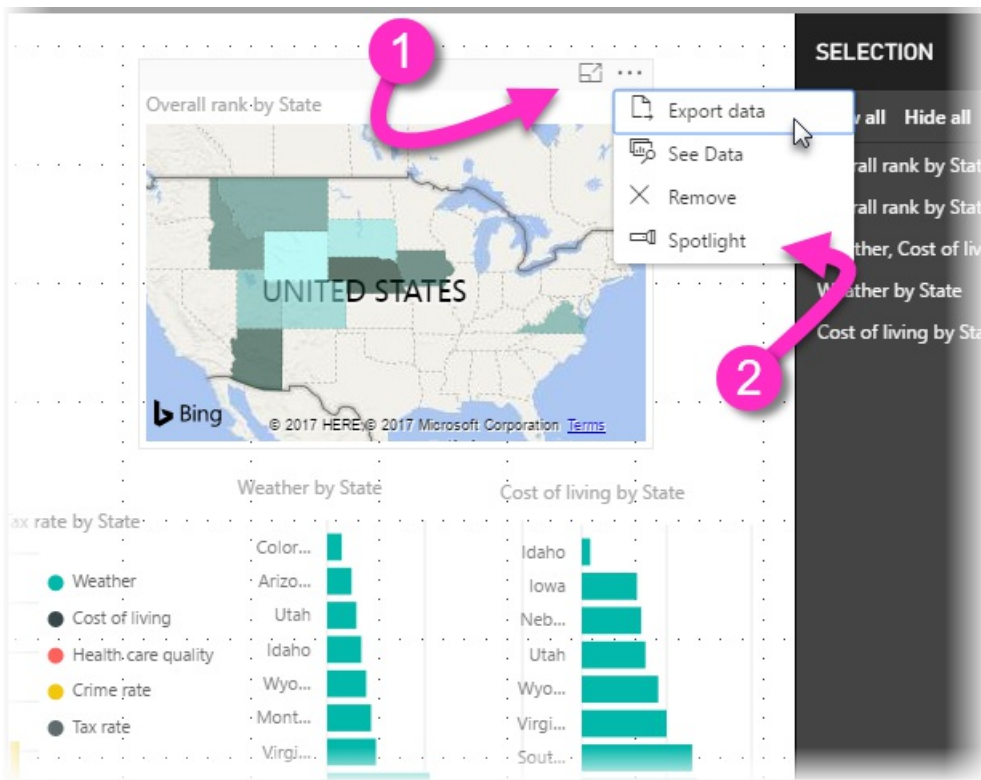
When you are in editing mode you can use ctrl+click to follow the link, and when not in edit mode, simply click the object to follow the link.

Using Spotlight

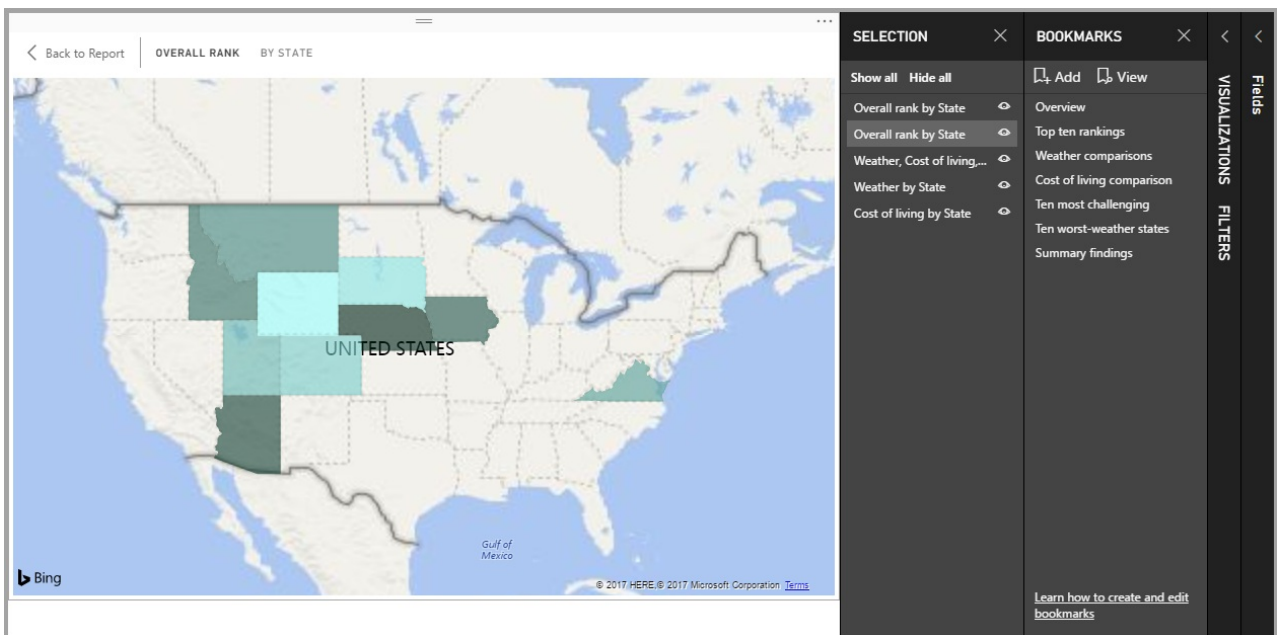
Another feature released with bookmarks is **Spotlight**. With **Spotlight** you can draw attention to a specific chart, for example, when presenting your bookmarks in **View** mode.

Let's compare **Spotlight** to **focus** mode to see how they differ.

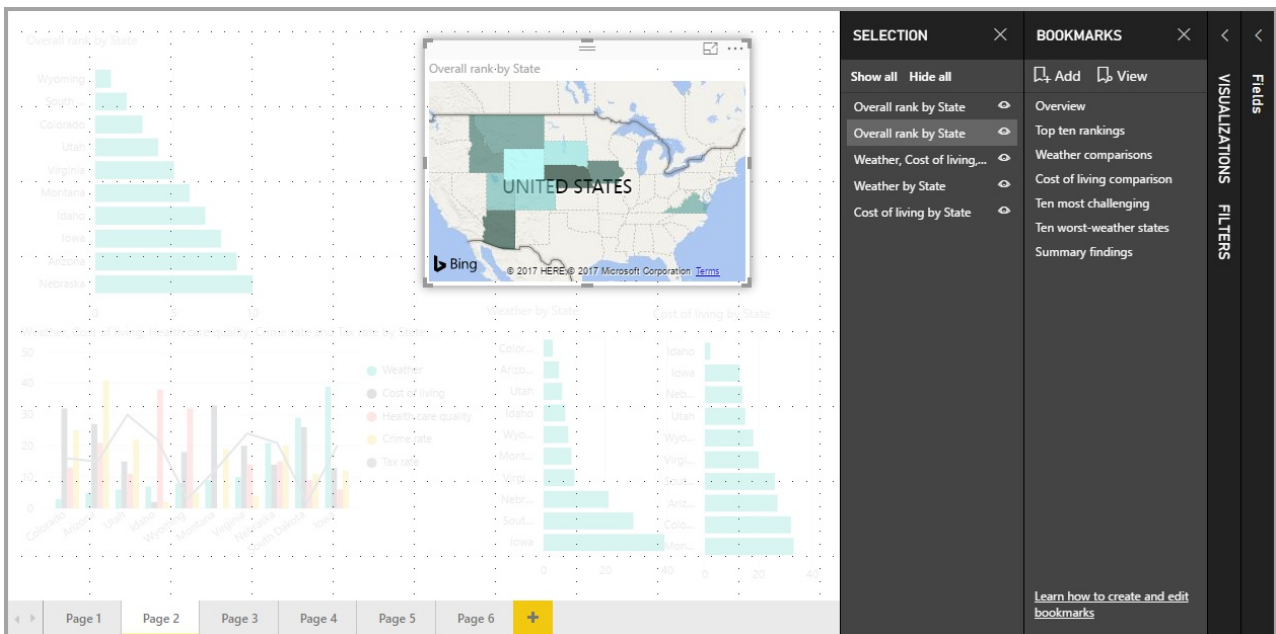
1. In **focus** mode, you can have one visual fill the entire canvas by selecting the **focus mode** icon.
2. Using **Spotlight**, you can highlight one visual in its original size, by making all other visuals on the page fade to near transparency.



When the visual in the previous image has its **focus** icon clicked, the page looks like the following:



In contrast, when **Spotlight** is selected from the visual's ellipses menu, the page looks like what you seen here:

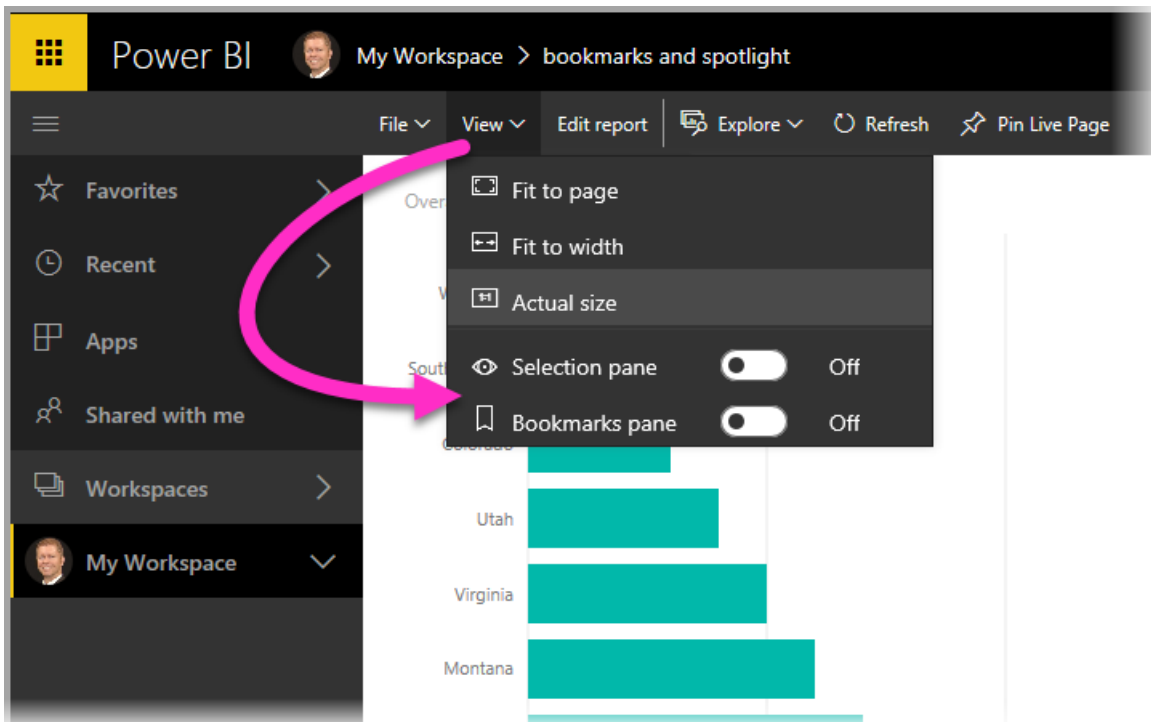


If either mode is selected when a bookmark is added, that mode (focus or Spotlight) is retained in the bookmark.

Bookmarks in the Power BI service

When you publish a report to the **Power BI service** with at least one bookmark, you can view and interact with those bookmarks in the **Power BI service**. For each report you publish, you must have at least one bookmark created in the report, before you publish, for the bookmark feature to be available in the **Power BI service**.

When bookmarks are available in a report, you can select **View > Selection pane** or **View > Bookmarks pane** to show each of those panes.



In the **Power BI service** the **Bookmarks pane** operates just as it does in **Power BI Desktop**, including the ability to select **View** to show your bookmarks in order, like a slide show.

Note that you must use the gray bookmark title bar to navigate through the bookmarks, and not the black arrows (the black arrows move you through report pages, not bookmarks).

Limitations and considerations

In this preview release of the **bookmarks**, there are a few limitations and considerations to keep in mind.

- Custom visuals do not work with bookmarking if they are the *source* of the filter. If you're using custom visuals to filter elements on a page (for example, the chiclet slicer) and return to that page using a bookmark, the page may be filtered but the custom visual won't be updated to show how the page is being filtered.
- Cross-highlighting status for a report pane is *not* saved when you create a bookmark.
- If you add a visual on a report page after creating a bookmark, the visual will be displayed in its default state. This also means that if you introduce a slicer into a page where you previously created bookmarks, the slicer will behave in its default state.
- Moving around visuals after a bookmark has been created will be reflected in the bookmark.
- You *must* have at least one bookmark in your report, when you publish it to the **Power BI service**, in order for bookmarks to be available in the service. This is a requirement for each report you publish.
- Since bookmarks are currently a Preview feature, they're not yet available in **Power BI Desktop for Report Server**.

Next steps

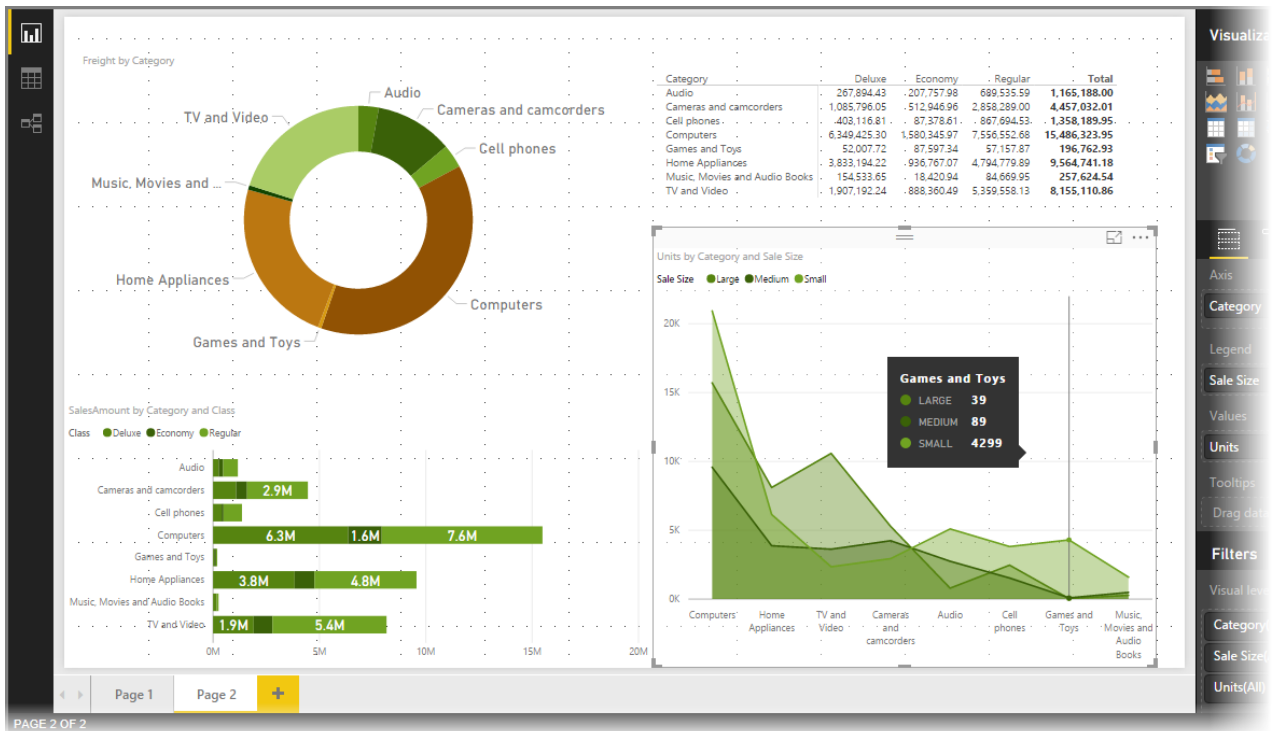
For more information about features that are similar or interact with bookmarks, take a look at the following articles:

- [Use drillthrough in Power BI Desktop](#)
- [Display a dashboard tile or report visual in Focus mode](#)

Use Report Themes in Power BI Desktop (Preview)

1/25/2018 • 33 min to read • [Edit Online](#)

With **Report Themes** you can apply a color theme to your entire report, such as corporate colors, seasonal coloring, or any other color theme you might want to apply a report. When you apply a **Report Theme**, all visuals in your report use the colors from your selected theme (a few exceptions apply, described later in this article).

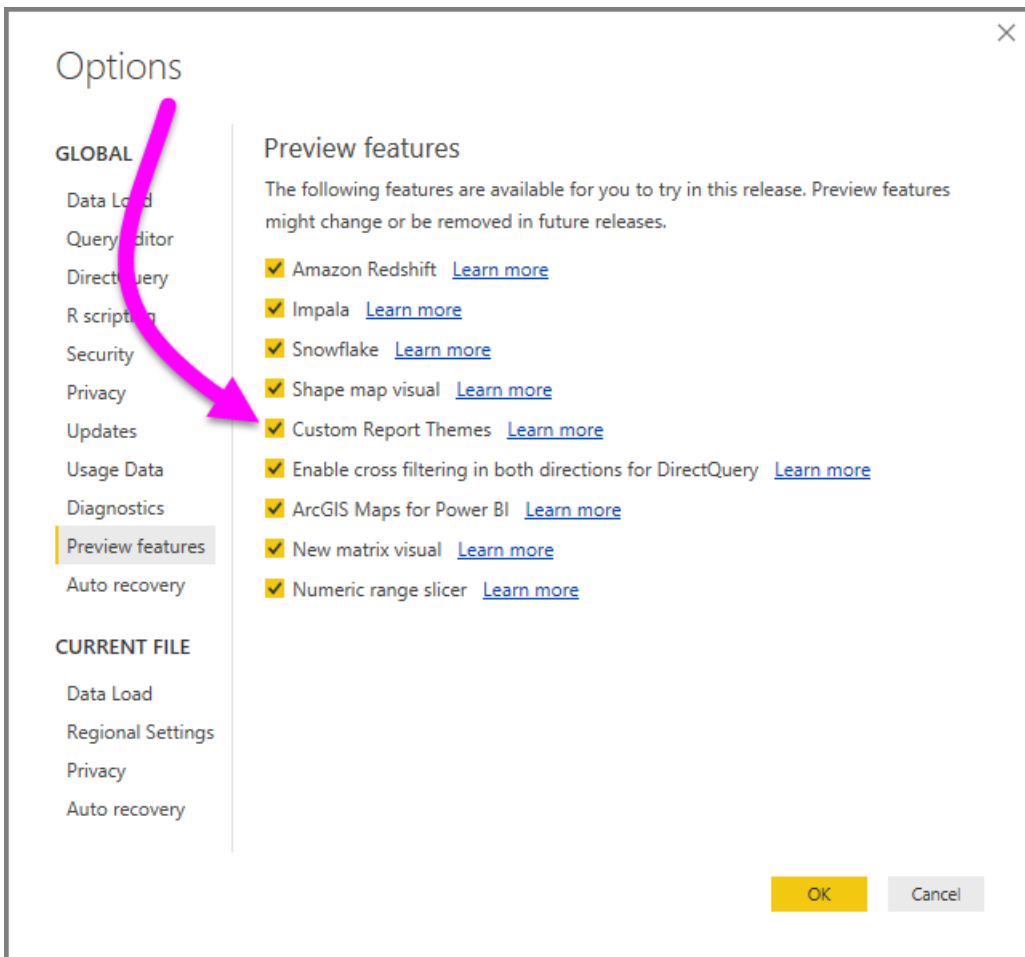


Applying a **Report Theme** requires a JSON file, using a basic structure, which you can then import into Power BI Desktop and apply to your report. The JSON file structure, and the process of importing (it's just a few button clicks) are quick and easy.

Beginning with the September 2017 release of **Power BI Desktop**, you can define even more report theme elements using a JSON file, and customize (and standardize) nearly all elements using the JSON file that you can manually adjust in the **Formatting** pane. The goal with the September 2017 release (and later) is to enable full control over how your reports look and feel, to a granular level.

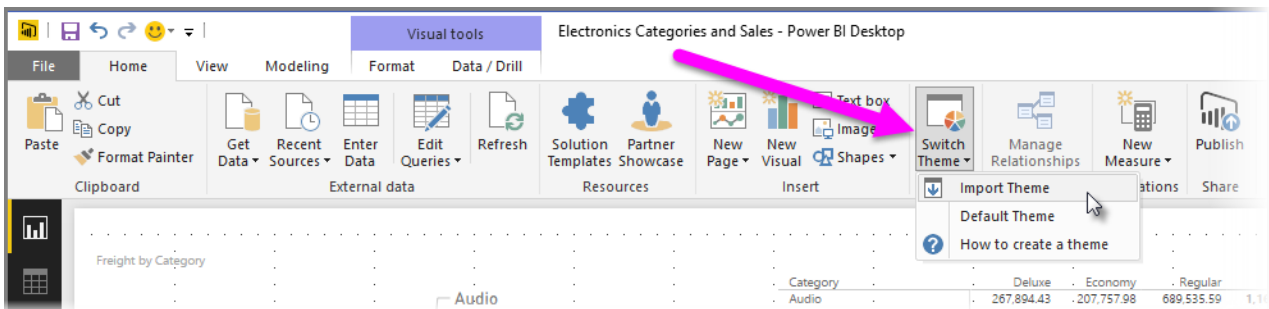
Enable Report Themes in Preview

You can try the new **Report Themes** feature beginning with the **March 2017** release of **Power BI Desktop**. To enable this preview feature, select **File > Options and Settings > Options > Preview Features**, then select the checkbox beside **Custom Report Themes**. You'll need to restart **Power BI Desktop** after you make the selection.

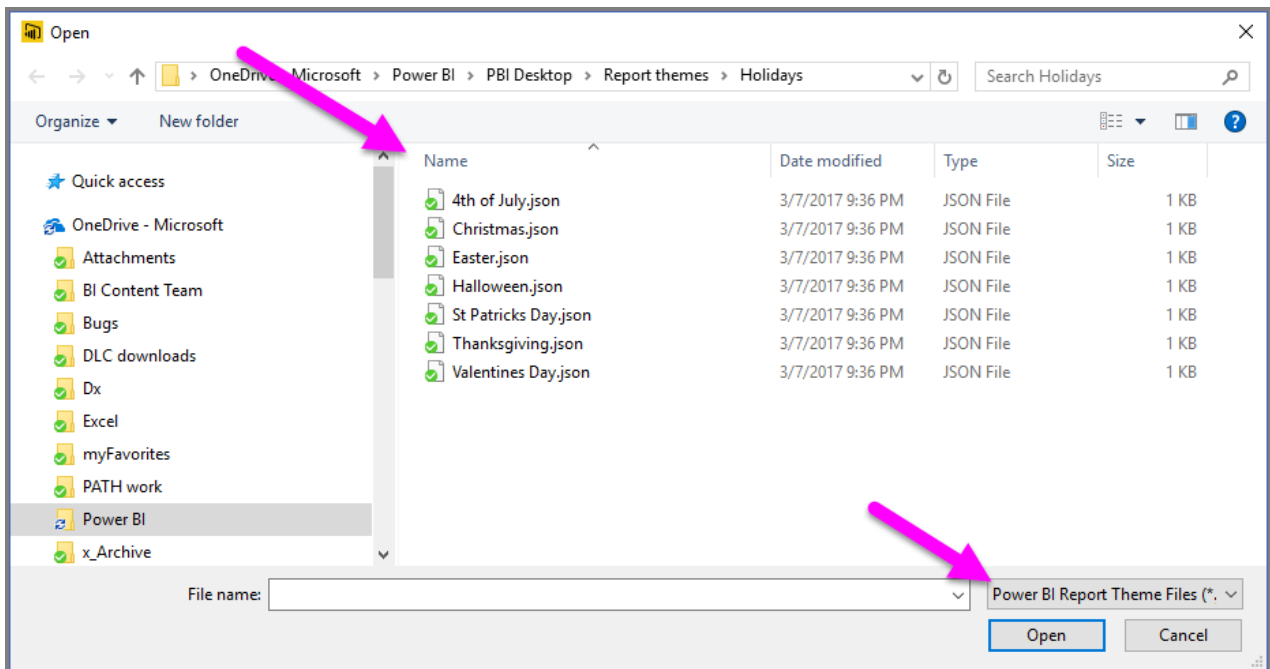


How Report Themes work

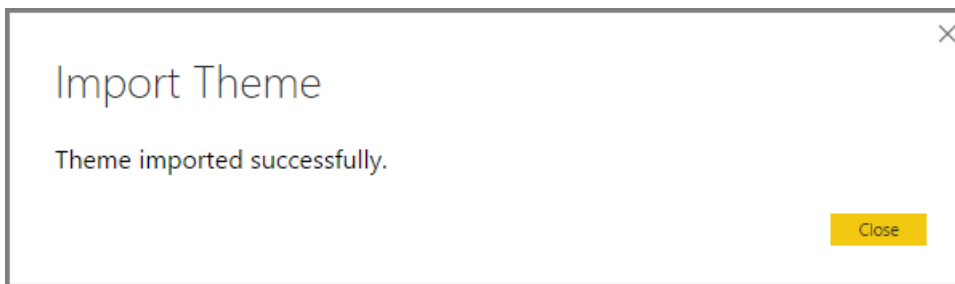
To apply a Report Theme to a Power BI Desktop report, select **Switch Theme** button from the **Home** ribbon, then select **Import Theme** from the drop-down.



A window appears that lets you navigate to the location of the JSON theme file. Power BI Desktop looks for JSON files, which is the Power BI Report Theme File type. In the following image, a handful of holiday theme files are available. We'll choose a holiday theme that happens in March.



When the theme file is successfully loaded, Power BI Desktop lets you know.



Now that we've imported a theme file, let's take a look at the simple and straightforward JSON file structure.

Structure of a Report Theme JSON file

The basic JSON file selected in the previous section (the *St Patricks Day.json* file), when opened in an editor, looks like the following.

```

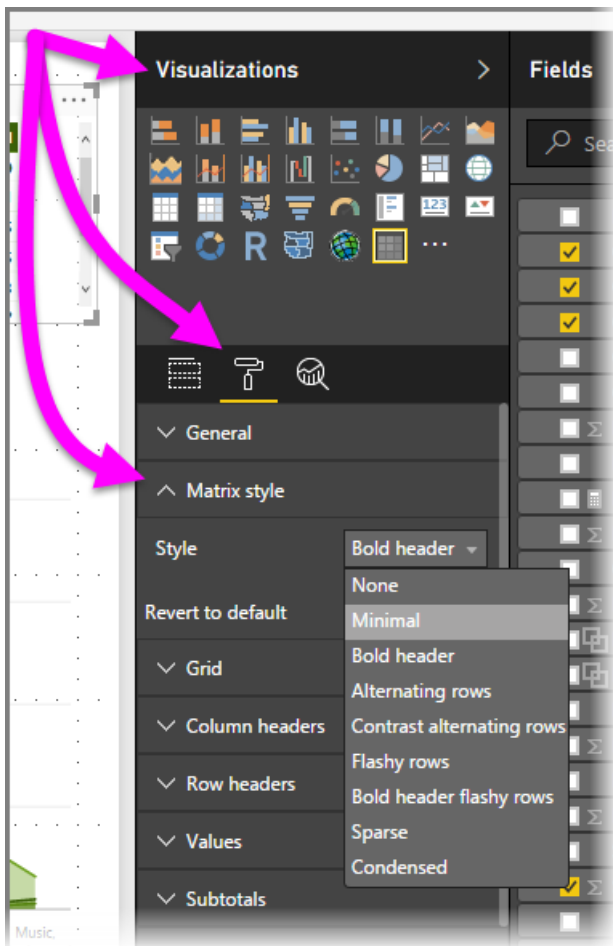
1 {
2   "name": "St Patricks Day",
3   "dataColors": ["#568410", "#3A6108", "#70A322", "#915203", "#D79A12", "#bb7711", "#114400", "#aacc66"],
4   "background": "#FFFFFF",
5   "foreground": "#3A6108",
6   "tableAccent": "#568410"
7 }

```

That JSON file has the following required lines:

- **name** - this is the theme name, which is the only required field
- **dataColors** - A list of hexcode color codes to use for data in Power BI Desktop visuals. The list can contain as many or as few colors as desired
- **background, foreground** and **tableAccent** - These values are colors that should be used in **table** and **matrix** visuals. How these colors are used depends on the specific table or matrix style applied. The **table** and **matrix** visuals apply these styles by default.

To apply a style to a **table** or **matrix** visual, select the visual and in the **Visualizations** pane select the **Format** section, then expand **Matrix style** and select a style from the **Style** drop-down.



For easy cut-and-paste to create your own JSON file, here's the text of the *St Patricks Day.json* file:

```
{
  "name": "St Patricks Day",
  "dataColors": ["#568410", "#3A6108", "#70A322", "#915203", "#D79A12", "#bb7711", "#114400", "#aacc66"],
  "background": "#FFFFFF",
  "foreground": "#3A6108",
  "tableAccent": "#568410"
}
```

From there you can enter your own color hexcode for your selected colors.

Beginning with the September 2017 release of **Power BI Desktop**, the JSON file can be much more elaborate. In the JSON file, you only define the formatting that you want to affect, and anything *not* specified in your JSON file simply reverts to the Power BI default settings.

The advantages of creating a JSON file are many. For example, you can specify that all charts use a font size of 12, or that certain visuals use a particular font family, or turn off data labels for specific chart types.

With the ability to use a granular JSON file, you can create a theme file that standardizes your charts and reports, making it easy for your organization reports to be consistent.

For information about the format of the detailed JSON file, see the **Report theme JSON file format** section at the end of this article.

How Report Theme colors stick to your reports

When you publish your report to the **Power BI service**, your Report Theme colors stay with it.

In addition, the **Data colors** section of the **Format** panel reflect your Report Theme. For example, after applying the multitude of green and brown colors from the **St. Patrick's Day** theme, when we select a visual and go to

Format > Data colors we see the following.

The screenshot displays a Power BI interface. On the left, a table shows sales data for different categories (Deluxe, Economy, Regular, Total) across various product types. Below the table is a line chart with a green area fill. On the right, the 'Visualizations' pane is open, showing the 'Data colors' settings. A pink arrow points to the 'Theme colors' section, which includes a 'Revert to default' button and a color palette.

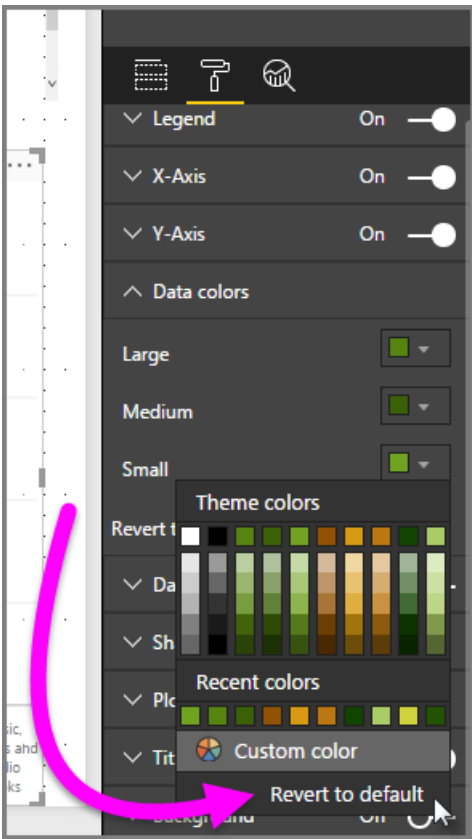
Deluxe	Economy	Regular	Total
267,894.43	207,757.98	689,535.59	1,165,188.00
1,085,796.05	512,946.96	2,858,289.00	4,457,032.01
403,116.81	87,378.61	867,694.53	1,358,189.95
6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
52,007.72	87,597.34	57,157.87	196,762.93
2,922,104.22	826,767.07	4,704,770.90	9,564,741.19

See all that green? That's because those colors were part of the **Report Theme** we imported and applied.

Situations when Report Theme colors won't stick to your reports

If you apply a custom color set (or individual color) to a particular data point in a visual, applying a Report Theme will *not* override that customized data point color.

In addition, if you've manually set a data point's color using the Theme colors section of the color palette, that (or those) colors will *not* be updated when you apply a new Report Theme. To get your default colors back (so they'll update when you apply a new Report Theme), you can select **Revert to default** in the **Theme colors** palette.

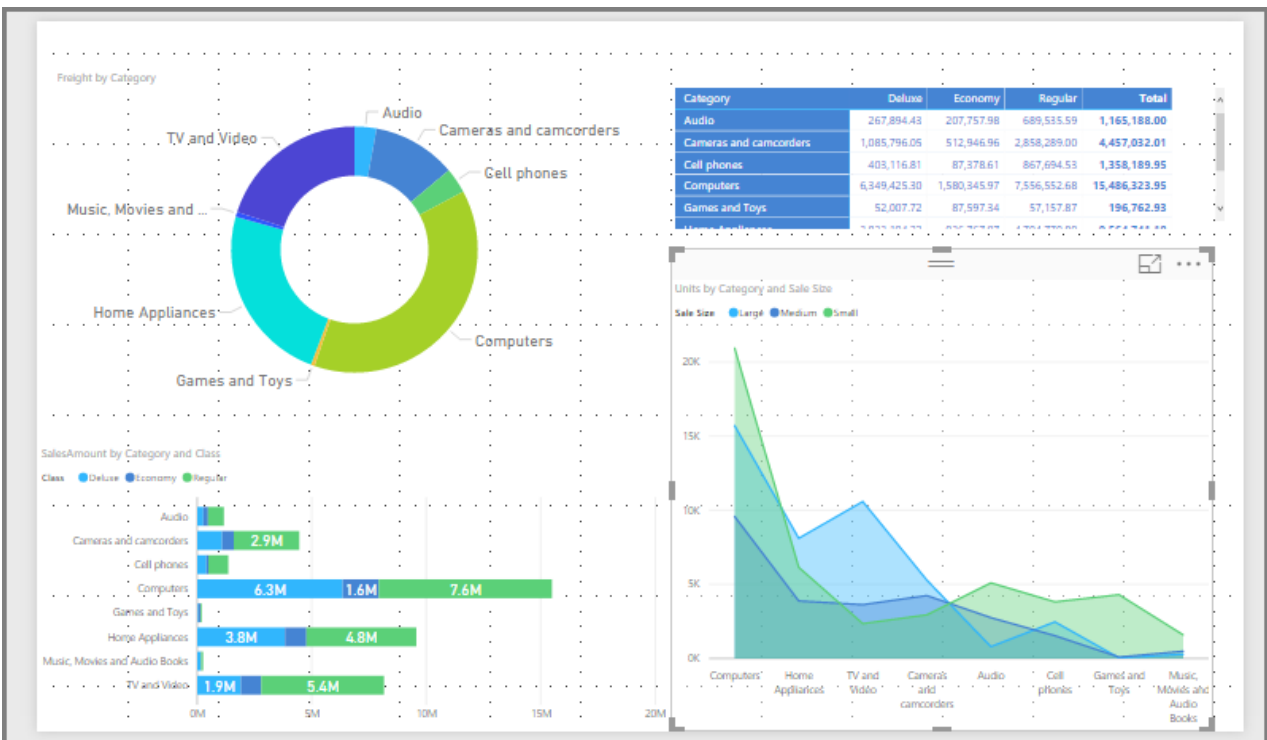


Also, many **Custom Visuals** will not apply Report Themes.

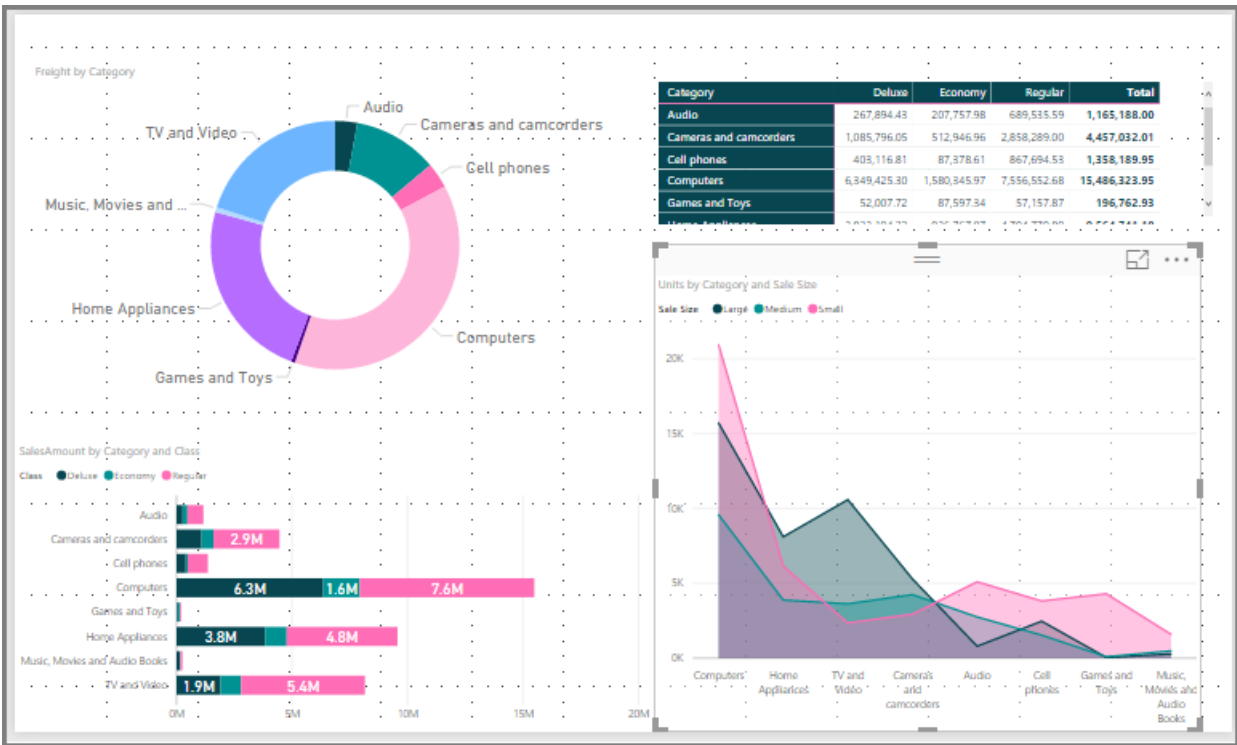
Report Theme files you can use right now

Want to get started with **Report Themes**? Great! Here are a handful of ready-made Report Theme JSON files that you can download and import into your **Power BI Desktop** report, along with an image of that Report Theme applied to the report used in this article.

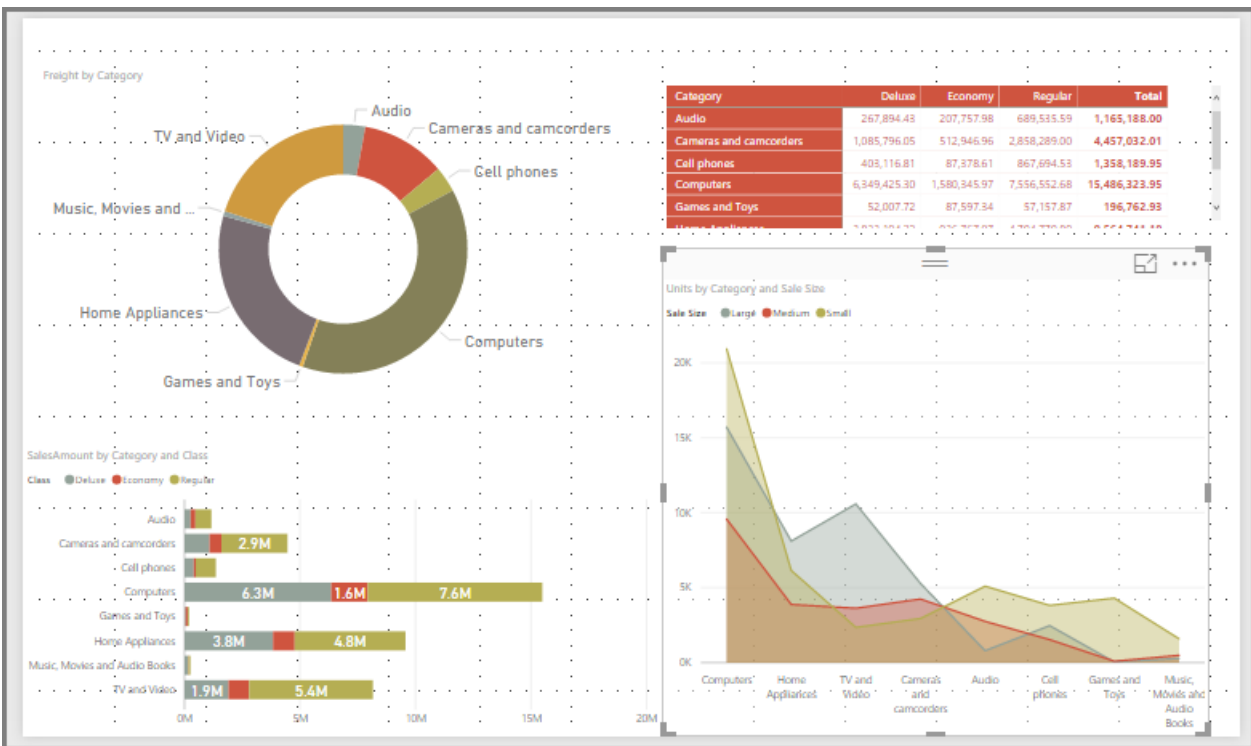
- The [theme](#) used in the [blog post](#) that announced the first release of **Report Themes**, called *waveform.json*.



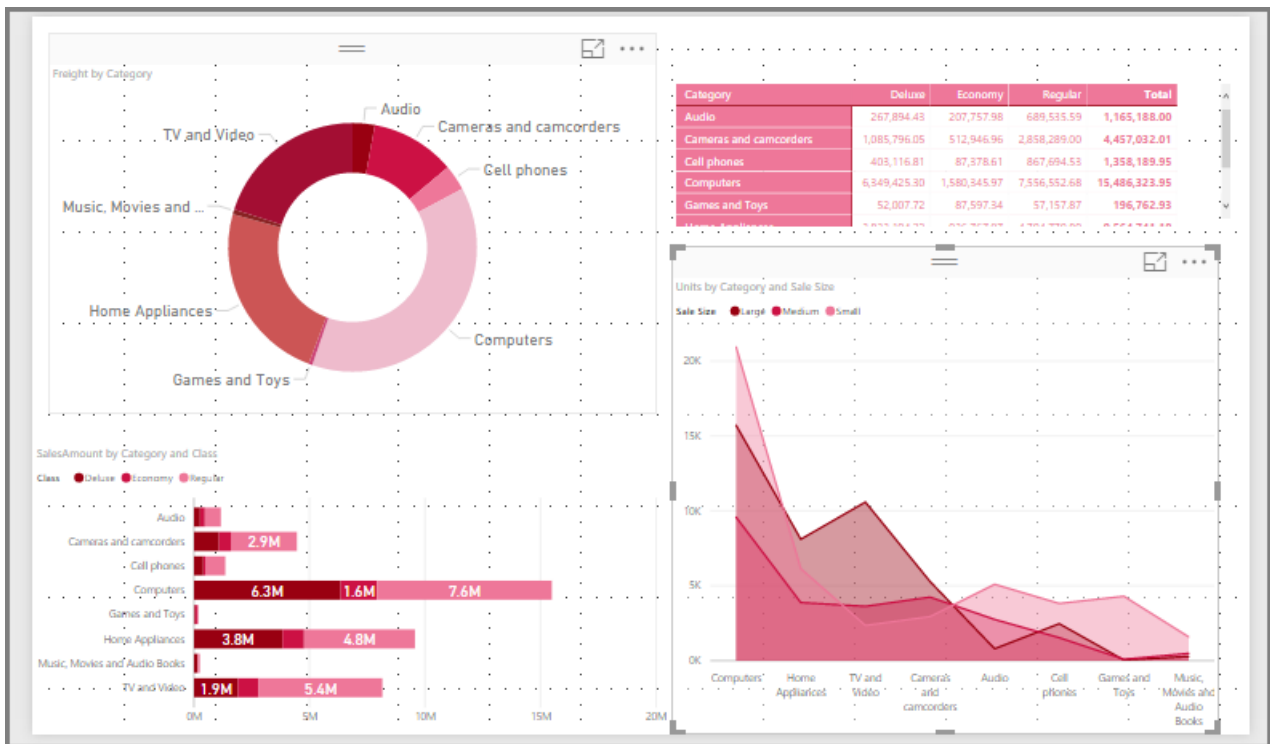
- The [theme](#) that's more visually impaired friendly than the default color theme, called *ColorblindSafe-Longer.json*.



- A whole bunch of [Power View themes](#) wrapped in a zip file, including one called *Apothecary.json* shown below.



- Lastly, here's one that is love-ly (the *Valentine's Day* theme) and sure to get your attention.



Rather than a download, here's the code for the Valentine's day JSON file:

```
{
  "name": "Valentine's Day",
  "dataColors": ["#990011", "#cc1144", "#ee7799", "#eebbcc", "#cc4477", "#cc5555", "#882222", "#A30E33"],
  "background": "#FFFFFF",
  "foreground": "#ee7799",
  "tableAccent": "#990011"
}
```

Report Themes can make your Power BI Desktop reports a colorful reflection of you, your organization, or even the current season or holiday. Enjoy them, they're easy!

Here are a few more report themes you can use as starting points, too:

- [Sunflower-twilight](#)
- [Plum](#)
- [Autumn](#)
- [High contrast](#)

Report theme JSON file format

The basic JSON file has five required lines:

- **name** - this is the theme name, which is the only required field
- **dataColors** - A list of hexcode color codes to use for data in Power BI Desktop visuals. The list can contain as many or as few colors as desired
- **background**, **foreground** and **tableAccent** - These values are colors that should be used in **table** and **matrix** visuals. How these colors are used depends on the specific table or matrix style applied. The **table** and **matrix** visuals apply these styles by default.

To create an extended format JSON file, with more detailed and granular control over formatting, you need to add a **visualStyles** section to the JSON file, and nest formatting specifics in that section. The format of the **visualStyles** section looks like the following:

```

visualStyles: {
  visualName: {
    styleName: {
      cardName: [{
        propertyName: propertyValue
      }]
    }
  }
}

```

For the **visualName** and **cardName** sections, you can list a specific visual and cardName, or you can use an asterisk ("") *if you want that setting to apply to all visuals or all cards that contain a property for a specific visual.* You can use the asterisk ("") when you want to apply a setting globally in your report, such as a font size or specific font family that should be used throughout all visuals in your report.

NOTE

You only need to specify the formatting elements you want to affect. Any formatting elements that are not included in the JSON file simply revert to their default values and settings.

JSON file element definitions

The tables in this section define visual names (*visualName*), card names (*cardName*), and the enumerations necessary to create your JSON file.

When using *dateTime*, the date must be an ISO date in single quotes, with datetime at the beginning, like the following:

```
"datetime' 2011-10-05T14:48:00.000Z'"
```

Booleans are either *true* or *false*. Strings must be in double quotes, as in "this is a string".

VISUALNAME
areaChart
barChart
basicShape
card
clusteredBarChart
clusteredColumnChart
columnChart
comboChart
donutChart
filledMap

VISUALNAME
funnel
gauge
hundredPercentStackedBarChart
hundredPercentStackedColumnChart
image
kpi
lineChart
lineClusteredColumnComboChart
lineStackedColumnComboChart
map
multiRowCard
pieChart
pivotTable
ribbonChart
scatterChart
shapeMap
slicer
stackedAreaChart
tableEx
treemap
waterfallChart

The following table defines *cardName* values. The first value in each cell is the JSON file term, the second value is the name of the card as seen in the **Power BI Desktop** user interface.

CARDNAME
axis: Gauge axis
breakdown: Breakdown

CARDNAME

bubbles: Bubbles

calloutValue: Callout Value

card: Card

cardTitle: Card Title

categoryAxis: X-Axis

categoryLabels: Category labels

columnFormatting: Field formatting

columnHeaders: Column headers

dataLabels: Data labels

fill: Fill

fillPoint: Fill point

forecast: Forecast

general: General

goals: Goals

grid: Grid

header: Header

imageScaling: Scaling

indicator: Indicator

items: Items

labels: Data labels

legend: Legend

lineStyles: Shapes

mapControls: Map controls

mapStyles: Map styles

numericInputStyle: Numeric inputs

CARDNAME
percentBarLabel: Conversion Rate Label
plotArea: Plot Area
plotAreaShading: Symmetry shading
ratioLine: Ratio line
referenceLine: Constant Line
ribbonChart: Ribbons
rotation: Rotation
rowHeaders: Row headers
selection: Selection Controls
sentimentColors: Sentiment colors
shape: Shape
slider: Slider
status: Color coding
subTotals: Subtotals
target: Target
total: Grand total
trend: Trend Line
trendline: Trend axis
valueAxis: Y-Axis
values: Values
wordWrap: Word wrap
xAxisReferenceLine: X-Axis Constant Line
y1AxisReferenceLine: Constant Line
zoom: Zoom

Properties within each card

The following section defines the properties within each card.

```
"general":
  "responsive": {
    "type": [
      "bool"
    ],
    "displayName": [
      "(Preview) Responsive"
    ],
    "description": [
      "The visual will adapt to size changes"
    ]
  }
  "legend": {
    "show": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Show"
      ]
    },
    "position": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Position"
      ],
      "description": [
        "Select the location for the legend"
      ]
    },
    "showTitle": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Title"
      ],
      "description": [
        "Display a title for legend symbols"
      ]
    },
    "labelColor": {
      "type": [
        "fill"
      ],
      "displayName": [
        "Color"
      ]
    },
    "fontFamily": {
      "type": [
        "formatting"
      ],
      "displayName": [
        "Font family"
      ]
    },
    "fontSize": {
      "type": [
        "formatting"
      ],
      "displayName": [
        "Text Size"
      ]
    }
  },
}
```

```
"categoryAxis": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "axisScale": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Scale type"
    ]
  },
  "start": {
    "type": [
      "numeric",
      "dateTime"
    ],
    "displayName": [
      "Start"
    ],
    "description": [
      "Enter a starting value (optional)"
    ]
  },
  "end": {
    "type": [
      "numeric",
      "dateTime"
    ],
    "displayName": [
      "End"
    ],
    "description": [
      "Enter an ending value (optional)"
    ]
  },
  "axisType": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Type"
    ]
  },
  "showAxisTitle": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Title"
    ],
    "description": [
      "Title for the X-axis",
      "Title for the Y-axis"
    ]
  },
  "axisStyle": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Style"
    ]
  },
}
```

```
"labelColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Color"
  ]
},
"fontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font family"
  ]
},
"fontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Text Size"
  ]
},
"labelDisplayUnits": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Display units"
  ],
  "description": [
    "Select the units (millions, billions, etc.)"
  ]
},
"labelPrecision": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Value decimal places"
  ],
  "description": [
    "Select the number of decimal places to display for the values"
  ]
},
"concatenateLabels": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Concatenate labels"
  ],
  "description": [
    "Always concatenate levels of the hierarchy instead of drawing the hierarchy."
  ]
},
"preferredCategoryWidth": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Minimum category width"
  ]
},
"titleColor": {
  "type": [
    "fill"
  ],
  ],
```

```
    "displayName": [
      "Title color"
    ]
  },
  "titleFontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  },
  "titleFontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Title text size"
    ]
  },
  "position": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Position"
    ],
    "description": [
      "Select left or right"
    ]
  },
  "color": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Select color for data labels"
    ]
  },
  "duration": {
    "type": [
      "numeric"
    ]
  }
},
"valueAxis": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "position": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Position"
    ],
    "description": [
      "Select left or right"
    ]
  },
  "axisScale": {
```

```
axisScale: {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Scale type"
  ]
},
"start": {
  "type": [
    "numeric",
    "dateTime"
  ],
  "displayName": [
    "Start"
  ],
  "description": [
    "Enter a starting value (optional)"
  ]
},
"end": {
  "type": [
    "numeric",
    "dateTime"
  ],
  "displayName": [
    "End"
  ],
  "description": [
    "Enter an ending value (optional)"
  ]
},
"showAxisTitle": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Title"
  ],
  "description": [
    "Title for the Y-axis",
    "Title for the X-axis"
  ]
},
"axisStyle": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Style"
  ]
},
"labelColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Color"
  ]
},
"fontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font family"
  ]
},
"fontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font size"
  ]
}
```

```
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "labelDisplayUnits": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Display units"
    ],
    "description": [
      "Select the units (millions, billions, etc.)"
    ]
  },
  "labelPrecision": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Value decimal places"
    ],
    "description": [
      "Select the number of decimal places to display for the values"
    ]
  },
  "titleColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Title color"
    ]
  },
  "titleFontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  },
  "titleFontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Title text size"
    ]
  },
  "axisLabel": {
    "type": [
      "none"
    ],
    "displayName": [
      "Y-Axis (Column)"
    ]
  },
  "secShow": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show secondary"
    ]
  },
}
```



```
"alignZeros": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Align zeros"
  ],
  "description": [
    "Align the zero tick marks for both value axes"
  ]
},
"secAxisLabel": {
  "type": [
    "none"
  ],
  "displayName": [
    "Y-Axis (Line)"
  ]
},
"secPosition": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Position"
  ],
  "description": [
    "Select left or right"
  ]
},
"secAxisScale": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Scale type"
  ]
},
"secStart": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Start"
  ],
  "description": [
    "Enter a starting value (optional)"
  ]
},
"secEnd": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "End"
  ],
  "description": [
    "Enter an ending value (optional)"
  ]
},
"secShowAxisTitle": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Title"
  ],
  "description": [
    "Title for the Y-axis"
  ]
}
```

```
]
},
"secAxisStyle": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Style"
  ]
},
"secLabelColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Color"
  ]
},
"secFontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font family"
  ]
},
"secFontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Text Size"
  ]
},
"secLabelDisplayUnits": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Display units"
  ],
  "description": [
    "Select the units (millions, billions, etc.)"
  ]
},
"secLabelPrecision": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Value decimal places"
  ],
  "description": [
    "Select the number of decimal places to display for the values"
  ]
},
"secTitleColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Title color"
  ]
},
"secTitleFontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
```

```
    "Font family"
  ]
},
"secTitleFontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Title text size"
  ]
}
},
"dataPoint": {
  "defaultColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Default color",
      "Default Column Color"
    ]
  },
  "fill": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Fill"
    ]
  },
},
"defaultCategoryColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Default color",
    "Default Column Color"
  ]
},
"showAllDataPoints": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Show all"
  ]
}
},
"labels": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
},
"showSeries": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Show"
  ]
},
"color": {
  "type": [
    "fill"
  ],
},
```

```
    "displayName": [
      "Color"
    ],
    "description": [
      "Select color for data labels"
    ]
  },
  "labelDisplayUnits": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Display units"
    ],
    "description": [
      "Select the units (millions, billions, etc.)"
    ]
  },
  "labelPrecision": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Value decimal places"
    ],
    "description": [
      "Select the number of decimal places to display for the values"
    ]
  },
  "showAll": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Customize series"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  },
  "labelDensity": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Label density"
    ]
  },
  "labelOrientation": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Orientation"
    ]
  }
}
```

```
    },
    "labelPosition": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Position"
      ]
    },
    "percentageLabelPrecision": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "% decimal places"
      ],
      "description": [
        "Select the number of decimal places to display for the percentages"
      ]
    },
    "labelStyle": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Label style"
      ]
    }
  },
  "lineStyles": {
    "strokeWidth": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Stroke width"
      ]
    },
    "strokeLineJoin": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Join type"
      ]
    },
    "lineStyle": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Line style"
      ]
    },
    "showMarker": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Show marker"
      ]
    },
    "markerShape": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Marker shape"
      ]
    }
  }
}
```

```
    },
    "markerSize": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Marker size"
      ]
    },
    "markerColor": {
      "type": [
        "fill"
      ],
      "displayName": [
        "Marker color"
      ]
    },
    "showSeries": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Customize series",
        "Show"
      ]
    },
    "shadeArea": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Shade area"
      ]
    }
  },
  "plotArea": {
    "transparency": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Transparency"
      ],
      "description": [
        "Set transparency for background color"
      ]
    }
  },
  "trend": {
    "show": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Show"
      ]
    },
    "displayName": {
      "type": [
        "text"
      ],
      "displayName": [
        "Name"
      ],
      "description": [
        "Set trend line name"
      ]
    }
  },
  "lineColor": {
```

```

    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Set trend line color"
    ]
  },
  "transparency": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Transparency"
    ],
    "description": [
      "Set transparency for trend line color"
    ]
  },
  "style": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Style"
    ],
    "description": [
      "Set trend line style"
    ]
  },
  "combineSeries": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Combine Series"
    ],
    "description": [
      "Show one trend line per series or combine"
    ]
  }
},
"y1AxisReferenceLine": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "value": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Value"
    ],
    "description": [
      "Set reference line numeric value "
    ]
  }
},
"lineColor": {
  "type": [
    "fill"
  ],
  "displayName": [

```

```
    "Color"
  ],
  "description": [
    "Set reference line color"
  ]
},
"transparency": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Transparency"
  ],
  "description": [
    "Set transparency for reference line color"
  ]
},
"style": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Line style"
  ]
},
"position": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Position"
  ],
  "description": [
    "Arrange relative to chart data points"
  ]
},
"dataLabelShow": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Data label"
  ],
  "description": [
    "Display a data label for the reference line"
  ]
},
"dataLabelColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Color"
  ],
  "description": [
    "Set the reference line data label color"
  ]
},
"dataLabelDecimalPoints": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Decimal Places"
  ]
},
"dataLabelHorizontalPosition": {
  "type": [
    "enumeration"
  ]
}
```



```

    ],
    "displayName": [
      "Horizontal Position"
    ],
    "description": [
      "Set the horizontal position for the reference line data label"
    ]
  },
  "dataLabelVerticalPosition": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Vertical Position"
    ],
    "description": [
      "Set the vertical position for the reference line data label"
    ]
  },
  "dataLabelDisplayUnits": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Display units"
    ],
    "description": [
      "Select the units (millions, billions, etc.)"
    ]
  }
},
"referenceLine": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "displayName": {
    "type": [
      "text"
    ],
    "displayName": [
      "Name"
    ],
    "description": [
      "Set reference line name"
    ]
  },
  "value": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Value"
    ],
    "description": [
      "Set reference line numeric value "
    ]
  },
  "lineColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
  },

```

```
-
  "description": [
    "Set reference line color"
  ]
},
"transparency": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Transparency"
  ],
  "description": [
    "Set transparency for reference line color"
  ]
},
"style": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Line style"
  ]
},
"position": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Position"
  ],
  "description": [
    "Arrange relative to chart data points"
  ]
},
"dataLabelShow": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Data label"
  ],
  "description": [
    "Display a data label for the reference line"
  ]
},
"dataLabelColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Color"
  ],
  "description": [
    "Set the reference line data label color"
  ]
},
"dataLabelDecimalPoints": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Decimal Places"
  ]
},
"dataLabelHorizontalPosition": {
  "type": [
    "enumeration"
  ],
  "displaylavName": [
```

```

    "Horizontal Position"
  ],
  "description": [
    "Set the horizontal position for the reference line data label"
  ]
},
"dataLabelVerticalPosition": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Vertical Position"
  ],
  "description": [
    "Set the vertical position for the reference line data label"
  ]
},
"dataLabelDisplayUnits": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Display units"
  ],
  "description": [
    "Select the units (millions, billions, etc.)"
  ]
}
},
"line": {
  "lineColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Line color"
    ]
  },
  "transparency": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Transparency"
    ],
    "description": [
      "Set transparency for background color"
    ]
  },
  "weight": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Weight"
    ]
  },
  "roundEdge": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Round edges"
    ]
  }
},
"fill": {
  "show": {
    "type": [

```

```
    type: [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "fillColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Fill color"
    ]
  },
  "transparency": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Transparency"
    ],
    "description": [
      "Set transparency for background color"
    ]
  }
},
"rotation": {
  "angle": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Rotation"
    ]
  }
},
"categoryLabels": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "color": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Select color for data labels"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Font"
    ]
  }
}
```

```
    "displayName": [
      "Font family"
    ]
  },
},
"wordWrap": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  }
},
"dataLabels": {
  "color": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Select color for data labels"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  }
},
"cardTitle": {
  "color": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Select color for data labels"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
```

```
    "Font family"
  ]
}
},
"card": {
  "outline": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Outline"
    ]
  },
  "outlineColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Outline color"
    ],
    "description": [
      "Color of the outline"
    ]
  },
  "outlineWeight": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Outline weight"
    ],
    "description": [
      "Thickness of the outline in pixels"
    ]
  },
  "barShow": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show bar"
    ],
    "description": [
      "Display a bar to the left side of the card as an accent"
    ]
  },
  "barColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Bar color"
    ]
  },
  "barWeight": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Bar thickness"
    ],
    "description": [
      "Thickness of the bar in pixels"
    ]
  },
  "cardPadding": {
    "type": [
      "numeric"
    ],
  },
}
```

```
    "displayName": [
      "Padding"
    ],
    "description": [
      "Background"
    ]
  },
  "cardBackground": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Background"
    ]
  }
},
"percentBarLabel": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "color": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Select color for data labels"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  }
},
"axis": {
  "min": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Min"
    ]
  },
  "max": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Max"
    ]
  }
}
```

```

    },
    "target": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Target"
      ]
    }
  },
  "target": {
    "show": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Show"
      ]
    },
    "color": {
      "type": [
        "fill"
      ],
      "displayName": [
        "Color"
      ],
      "description": [
        "Select color for data labels"
      ]
    },
  },
  "labelDisplayUnits": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Display units"
    ],
    "description": [
      "Select the units (millions, billions, etc.)"
    ]
  },
  "labelPrecision": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Value decimal places"
    ],
    "description": [
      "Select the number of decimal places to display for the values"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  }
},

```



```
    "calloutValue": {
      "show": {
        "type": [
          "bool"
        ],
        "displayName": [
          "Show"
        ]
      },
      "color": {
        "type": [
          "fill"
        ],
        "displayName": [
          "Color"
        ],
        "description": [
          "Select color for data labels"
        ]
      },
      "labelDisplayUnits": {
        "type": [
          "formatting"
        ],
        "displayName": [
          "Display units"
        ],
        "description": [
          "Select the units (millions, billions, etc.)"
        ]
      },
      "labelPrecision": {
        "type": [
          "numeric"
        ],
        "displayName": [
          "Value decimal places"
        ],
        "description": [
          "Select the number of decimal places to display for the values"
        ]
      }
    },
    "forecast": {
      "show": {
        "type": [
          "bool"
        ],
        "displayName": [
          "Show"
        ]
      },
      "displayName": {
        "type": [
          "text"
        ],
        "displayName": [
          "Name"
        ],
        "description": [
          "Set forecast name"
        ]
      },
      "confidenceBandStyle": {
        "type": [
          "enumeration"
        ],
        "displayName": [
          "Confidence band style"
        ]
      }
    }
  }
}
```

```

    confidenceBandStyle
  ],
  "description": [
    "Set forecast confidence band style"
  ]
},
"lineColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Color"
  ],
  "description": [
    "Set forecast line color"
  ]
},
"transparency": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Transparency"
  ],
  "description": [
    "Set transparency for background color"
  ]
},
"style": {
  "type": [
    "enumeration"
  ],
  "displayName": [
    "Line style"
  ]
},
"transform": {
  "type": [
    "queryTransform"
  ]
}
},
"bubbles": {
  "bubbleSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Size"
    ]
  }
},
"mapControls": {
  "autoZoom": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Auto zoom"
    ]
  },
  "zoomLevel": {
    "type": [
      "numeric"
    ]
  },
  "centerLatitude": {
    "type": [
      "numeric"
    ]
  },

```

```
    ],
    "centerLongitude": {
      "type": [
        "numeric"
      ]
    }
  },
  "mapStyles": {
    "mapTheme": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Theme"
      ]
    }
  },
  "shape": {
    "map": {
      "type": [
        "geoJson"
      ]
    },
    "projectionEnum": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Projection"
      ],
      "description": [
        "Projection"
      ]
    }
  },
  "zoom": {
    "autoZoom": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Auto zoom"
      ],
      "description": [
        "Zoom in on shapes with available data"
      ]
    },
    "selectionZoom": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Selection zoom"
      ],
      "description": [
        "Zoom in on selected shapes"
      ]
    },
    "manualZoom": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Manual zoom"
      ],
      "description": [
        "Allow user to zoom and pan"
      ]
    }
  }
}
```

```
    }
  },
  "xAxisReferenceLine": {
    "show": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Show"
      ]
    },
    "value": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Value"
      ],
      "description": [
        "Set reference line numeric value "
      ]
    },
    "lineColor": {
      "type": [
        "fill"
      ],
      "displayName": [
        "Color"
      ],
      "description": [
        "Set reference line color"
      ]
    },
    "transparency": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Transparency"
      ],
      "description": [
        "Set transparency for reference line color"
      ]
    },
    "style": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Line style"
      ]
    },
    "position": {
      "type": [
        "enumeration"
      ],
      "displayName": [
        "Position"
      ],
      "description": [
        "Arrange relative to chart data points"
      ]
    },
    "dataLabelShow": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Data label"
      ]
    }
  }
}
```

```

    ],
    "description": [
      "Display a data label for the reference line"
    ]
  },
  "dataLabelColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
      "Set the reference line data label color"
    ]
  },
  "dataLabelDecimalPoints": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Decimal Places"
    ]
  },
  "dataLabelHorizontalPosition": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Horizontal Position"
    ],
    "description": [
      "Set the horizontal position for the reference line data label"
    ]
  },
  "dataLabelVerticalPosition": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Vertical Position"
    ],
    "description": [
      "Set the vertical position for the reference line data label"
    ]
  },
  "dataLabelDisplayUnits": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Display units"
    ],
    "description": [
      "Select the units (millions, billions, etc.)"
    ]
  }
},
"fillPoint": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  }
},
"colorByCategory": {

```

```
"show": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Show"
  ]
},
"plotAreaShading": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "upperShadingColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Upper shading"
    ],
    "description": [
      "Shading color of the upper region"
    ]
  },
  "lowerShadingColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Lower shading"
    ],
    "description": [
      "Shading color of the lower region"
    ]
  },
  "transparency": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Transparency"
    ],
    "description": [
      "Set transparency for background color"
    ]
  }
},
"ratioLine": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "lineColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ],
    "description": [
```

```

        "Set reference line color"
    ]
},
"transparency": {
    "type": [
        "numeric"
    ],
    "displayName": [
        "Transparency"
    ],
    "description": [
        "Set transparency for line color"
    ]
},
"style": {
    "type": [
        "enumeration"
    ],
    "displayName": [
        "Line style"
    ]
}
},
"grid": {
    "outlineColor": {
        "type": [
            "fill"
        ],
        "displayName": [
            "Outline color"
        ],
        "description": [
            "Color of the outline"
        ]
    },
    "outlineWeight": {
        "type": [
            "numeric"
        ],
        "displayName": [
            "Outline weight"
        ],
        "description": [
            "Thickness of the outline in pixels"
        ]
    },
    "gridVertical": {
        "type": [
            "bool"
        ],
        "displayName": [
            "Vert grid"
        ],
        "description": [
            "Show/Hide the vertical gridlines"
        ]
    },
    "gridVerticalColor": {
        "type": [
            "fill"
        ],
        "displayName": [
            "Vert grid color"
        ],
        "description": [
            "Color for the vertical gridlines"
        ]
    },
    "gridVerticalWeight": {

```

```
    "type": [
      "numeric"
    ],
    "displayName": [
      "Vert grid thickness"
    ],
    "description": [
      "Thickness of the vertical gridlines in pixels"
    ]
  },
  "gridHorizontal": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Horiz grid"
    ],
    "description": [
      "Show/Hide the horizontal gridlines"
    ]
  },
  "gridHorizontalColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Horiz grid color"
    ],
    "description": [
      "Color for the horizontal gridlines"
    ]
  },
  "gridHorizontalWeight": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Horiz grid thickness"
    ],
    "description": [
      "Thickness of the horizontal gridlines in pixels"
    ]
  },
  "rowPadding": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Row padding"
    ],
    "description": [
      "Padding in pixels applied to top and bottom of every row"
    ]
  },
  "imageHeight": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Image height"
    ],
    "description": [
      "The height of images in pixels"
    ]
  },
  "textSize": {
    "type": [
      "numeric"
    ]
  }
}
```



```
    ],
    "displayName": [
      "Text Size"
    ]
  }
},
"columnHeaders": {
  "outline": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Outline"
    ]
  },
  "fontColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Font color"
    ],
    "description": [
      "Font color of the cells"
    ]
  },
  "backColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Background color"
    ],
    "description": [
      "Background color of the cells"
    ]
  },
  "wordWrap": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Word wrap"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "autoSizeColumnWidth": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Auto-size column width"
    ]
  },

```

```
"urlIcon": {
  "type": [
    "bool"
  ],
  "displayName": [
    "URL icon"
  ],
  "description": [
    "Show an icon instead of the full URL"
  ]
},
"values": {
  "outline": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Outline"
    ]
  },
  "backColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color scales"
    ]
  },
  "fontColorPrimary": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Font color"
    ],
    "description": [
      "Font color of the odd rows"
    ]
  },
  "backColorPrimary": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Background color"
    ],
    "description": [
      "Background color of the odd rows"
    ]
  },
  "fontColorSecondary": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Alternate font color"
    ],
    "description": [
      "Font color of the even rows"
    ]
  },
  "backColorSecondary": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Alternate background color"
    ]
  },
```

```
"description": [
  "Background color of the even rows"
]
},
"urlIcon": {
  "type": [
    "bool"
  ],
  "displayName": [
    "URL icon"
  ],
  "description": [
    "Show an icon instead of the full URL"
  ]
},
"fontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font family"
  ]
},
"fontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Text Size"
  ]
},
"wordWrap": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Word wrap"
  ]
},
"bandedRowHeaders": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Banded row style"
  ],
  "description": [
    "Apply banded row style to the last level of the row group headers, using the colors of the values."
  ]
},
"valuesOnRow": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Show on rows"
  ],
  "description": [
    "Show values in row groups rather than columns"
  ]
}
},
"total": {
  "outline": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Outline"
    ]
  }
}
```

```
]
},
"fontColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Font color"
  ],
  "description": [
    "Font color of the cells"
  ]
},
"backColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Background color"
  ],
  "description": [
    "Background color of the cells"
  ]
},
"applyToHeaders": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Apply to labels"
  ]
},
"totals": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Totals"
  ]
},
"fontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font family"
  ]
},
"fontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Text Size"
  ]
}
},
"columnFormatting": {
  "fontColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Font color"
    ],
    "description": [
      "Font color of the cells"
    ]
  ]
},
}
```

```

"backColor": {
  "type": [
    "fill"
  ],
  "displayName": [
    "Background color"
  ],
  "description": [
    "Background color of the cells"
  ]
},
"styleHeader": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Color header"
  ]
},
"styleValues": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Color values"
  ]
},
"styleTotal": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Color total"
  ]
},
"styleSubtotals": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Color subtotals"
  ]
}
},
"rowHeaders": {
  "outline": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Outline"
    ]
  },
  "fontColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Font color"
    ],
    "description": [
      "Font color of the cells"
    ]
  },
  "backColor": {
    "type": [
      "fill"
    ],
    "displaylavName": [

```

```

    "Background color"
  ],
  "description": [
    "Background color of the cells"
  ]
},
"wordWrap": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Word wrap"
  ]
},
"fontFamily": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Font family"
  ]
},
"fontSize": {
  "type": [
    "formatting"
  ],
  "displayName": [
    "Text Size"
  ]
},
"stepped": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Stepped layout"
  ],
  "description": [
    "Render row headers with stepped layout"
  ]
},
"steppedLayoutIndentation": {
  "type": [
    "numeric"
  ],
  "displayName": [
    "Stepped layout indentation"
  ],
  "description": [
    "Set the indentation, in pixels, applied to row headers"
  ]
},
"urlIcon": {
  "type": [
    "bool"
  ],
  "displayName": [
    "URL icon"
  ],
  "description": [
    "Show an icon instead of the full URL"
  ]
}
},
"subTotals": {
  "outline": {
    "type": [
      "enumeration"
    ]
  ]
}
}

```

```
    ],
    "displayName": [
      "Outline"
    ]
  },
  "fontColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Font color"
    ],
    "description": [
      "Font color of the cells"
    ]
  },
  "backColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Background color"
    ],
    "description": [
      "Background color of the cells"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  },
  "fontSize": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "rowSubtotals": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Total row"
    ]
  },
  "columnSubtotals": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Total column"
    ]
  },
  "applyToHeaders": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Apply to labels"
    ]
  }
},
"selection": {
```

```
"selectAllCheckboxEnabled": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Select All"
  ]
},
"singleSelect": {
  "type": [
    "bool"
  ],
  "displayName": [
    "Single Select"
  ]
}
},
"header": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "fontColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Font color"
    ],
    "description": [
      "Font color of the cells"
    ]
  },
  "background": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Background"
    ]
  },
  "outline": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Outline"
    ]
  },
  "textSize": {
    "type": [
      "numeric"
    ],
    "displayName": [
      "Text Size"
    ]
  },
  "fontFamily": {
    "type": [
      "formatting"
    ],
    "displayName": [
      "Font family"
    ]
  }
}
```



```
    },
    "items": {
      "fontColor": {
        "type": [
          "fill"
        ],
        "displayName": [
          "Font color"
        ],
        "description": [
          "Font color of the cells"
        ]
      },
      "background": {
        "type": [
          "fill"
        ],
        "displayName": [
          "Background"
        ]
      },
      "outline": {
        "type": [
          "enumeration"
        ],
        "displayName": [
          "Outline"
        ]
      },
      "textSize": {
        "type": [
          "numeric"
        ],
        "displayName": [
          "Text Size"
        ]
      },
      "fontFamily": {
        "type": [
          "formatting"
        ],
        "displayName": [
          "Font family"
        ]
      }
    },
    "numericInputStyle": {
      "fontColor": {
        "type": [
          "fill"
        ],
        "displayName": [
          "Font color"
        ],
        "description": [
          "Font color of the cells"
        ]
      },
      "textSize": {
        "type": [
          "numeric"
        ],
        "displayName": [
          "Text Size"
        ]
      },
      "fontFamily": {
        "type": [
          "formatting"
        ]
      }
    }
  }
}
```

```
    ],
    "displayName": [
      "Font family"
    ]
  },
  "background": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Background"
    ]
  }
},
"slider": {
  "show": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Show"
    ]
  },
  "color": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Color"
    ]
  }
},
"dateRange": {
  "includeToday": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Include today"
    ]
  }
},
"sentimentColors": {
  "increaseFill": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Increase"
    ]
  },
  "decreaseFill": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Decrease"
    ]
  },
  "totalFill": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Total"
    ]
  },
  "otherFill": {
    "type": [
```

```
        "fill"
      ],
      "displayName": [
        "Other"
      ]
    }
  },
  "breakdown": {
    "maxBreakdowns": {
      "type": [
        "integer"
      ],
      "displayName": [
        "Max breakdowns"
      ],
      "description": [
        "The number of individual breakdowns to show (rest grouped into Other)"
      ]
    }
  },
  "indicator": {
    "indicatorDisplayUnits": {
      "type": [
        "formatting"
      ],
      "displayName": [
        "Display units"
      ],
      "description": [
        "Select the units (millions, billions, etc.)"
      ]
    },
    "indicatorPrecision": {
      "type": [
        "numeric"
      ],
      "displayName": [
        "Value decimal places"
      ],
      "description": [
        "Select the number of decimal places to display for the values"
      ]
    },
    "kpiFormat": {
      "type": [
        "text"
      ],
      "displayName": [
        "Format"
      ]
    }
  },
  "trendline": {
    "show": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Show"
      ]
    }
  },
  "goals": {
    "showGoal": {
      "type": [
        "bool"
      ],
      "displayName": [
        "Goal"
      ]
    }
  }
}
```

```

    ]
  },
  "showDistance": {
    "type": [
      "bool"
    ],
    "displayName": [
      "Distance"
    ]
  }
},
"status": {
  "direction": {
    "type": [
      "enumeration"
    ],
    "displayName": [
      "Direction"
    ]
  },
  "goodColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Good Color"
    ]
  },
  "neutralColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Neutral Color"
    ]
  },
  "badColor": {
    "type": [
      "fill"
    ],
    "displayName": [
      "Bad Color"
    ]
  }
}
}

```

Enumerations in the JSON file

The following section defines the enumerations you can use in the JSON file.

```

{
  "legend": {
    "position": [
      {
        "value": "Top",
        "displayName": "Top"
      },
      {
        "value": "Bottom",
        "displayName": "Bottom"
      },
      {
        "value": "Left",
        "displayName": "Left"
      },
      {
        "value": "Right",

```

```

        "displayName": "Right"
    },
    {
        "value": "TopCenter",
        "displayName": "Top Center"
    },
    {
        "value": "BottomCenter",
        "displayName": "Bottom Center"
    },
    {
        "value": "LeftCenter",
        "displayName": "Left Center"
    },
    {
        "value": "RightCenter",
        "displayName": "Right center"
    }
],
"legendMarkerRendering": [
    {
        "value": "markerOnly",
        "displayName": "Markers only"
    },
    {
        "value": "lineAndMarker",
        "displayName": "Line and markers"
    },
    {
        "value": "lineOnly",
        "displayName": "Line only"
    }
]
},
"categoryAxis": {
    "axisScale": [
        {
            "value": "linear",
            "displayName": "Linear"
        },
        {
            "value": "log",
            "displayName": "Log"
        }
    ],
    "axisType": [
        {
            "value": "Scalar",
            "displayName": "Continuous"
        },
        {
            "value": "Categorical",
            "displayName": "Categorical"
        }
    ],
    "axisStyle": [
        {
            "value": "showTitleOnly",
            "displayName": "Show title only"
        },
        {
            "value": "showUnitOnly",
            "displayName": "Show unit only"
        },
        {
            "value": "showBoth",
            "displayName": "Show both"
        }
    ],
},

```

```
"gridLineStyle": [
  {
    "value": "dashed",
    "displayName": "Dashed"
  },
  {
    "value": "solid",
    "displayName": "Solid"
  },
  {
    "value": "dotted",
    "displayName": "Dotted"
  }
],
"position": [
  {
    "value": "Left",
    "displayName": "Left"
  },
  {
    "value": "Right",
    "displayName": "Right"
  }
]
},
"valueAxis": {
  "position": [
    {
      "value": "Left",
      "displayName": "Left"
    },
    {
      "value": "Right",
      "displayName": "Right"
    }
  ],
  "axisScale": [
    {
      "value": "linear",
      "displayName": "Linear"
    },
    {
      "value": "log",
      "displayName": "Log"
    }
  ],
  "axisStyle": [
    {
      "value": "showTitleOnly",
      "displayName": "Show title only"
    },
    {
      "value": "showUnitOnly",
      "displayName": "Show unit only"
    },
    {
      "value": "showBoth",
      "displayName": "Show both"
    }
  ],
  "gridLineStyle": [
    {
      "value": "dashed",
      "displayName": "Dashed"
    },
    {
      "value": "solid",
      "displayName": "Solid"
    }
  ],
}
```

```

    {
      "value": "dotted",
      "displayName": "Dotted"
    }
  ],
  "secPosition": [
    {
      "value": "Left",
      "displayName": "Left"
    },
    {
      "value": "Right",
      "displayName": "Right"
    }
  ],
  "secAxisScale": [
    {
      "value": "linear",
      "displayName": "Linear"
    },
    {
      "value": "log",
      "displayName": "Log"
    }
  ],
  "secAxisStyle": [
    {
      "value": "showTitleOnly",
      "displayName": "Show title only"
    },
    {
      "value": "showUnitOnly",
      "displayName": "Show unit only"
    },
    {
      "value": "showBoth",
      "displayName": "Show both"
    }
  ]
},
"lineStyles": {
  "strokeLineJoin": [
    {
      "value": "miter",
      "displayName": "Miter"
    },
    {
      "value": "round",
      "displayName": "Round"
    },
    {
      "value": "bevel",
      "displayName": "Bevel"
    }
  ],
  "lineStyle": [
    {
      "value": "dashed",
      "displayName": "Dashed"
    },
    {
      "value": "solid",
      "displayName": "Solid"
    },
    {
      "value": "dotted",
      "displayName": "Dotted"
    }
  ]
}

```

```

    },
    "markerShape": [
      {
        "value": "circle",
        "displayName": "●"
      },
      {
        "value": "square",
        "displayName": "■"
      },
      {
        "value": "diamond",
        "displayName": "◆"
      },
      {
        "value": "triangle",
        "displayName": "▲"
      },
      {
        "value": "x",
        "displayName": "×"
      },
      {
        "value": "shortDash",
        "displayName": "- -"
      },
      {
        "value": "longDash",
        "displayName": "-"
      },
      {
        "value": "plus",
        "displayName": "+"
      }
    ]
  },
  "trend": {
    "style": [
      {
        "value": "dashed",
        "displayName": "Dashed"
      },
      {
        "value": "solid",
        "displayName": "Solid"
      },
      {
        "value": "dotted",
        "displayName": "Dotted"
      }
    ]
  }
],
"y1AxisReferenceline": {
  "style": [
    {
      "value": "dashed",
      "displayName": "Dashed"
    },
    {
      "value": "solid",
      "displayName": "Solid"
    },
    {
      "value": "dotted",
      "displayName": "Dotted"
    }
  ]
},
"position": [
  {
    "value": "back"
  }
]

```



```

        value : back ,
        "displayName": "Behind"
    },
    {
        "value": "front",
        "displayName": "In Front"
    }
],
"dataLabelText": [
    {
        "value": "Value",
        "displayName": "Value"
    },
    {
        "value": "Name",
        "displayName": "Name"
    },
    {
        "value": "ValueAndName",
        "displayName": "Name and Value"
    }
],
"dataLabelHorizontalPosition": [
    {
        "value": "left",
        "displayName": "Left"
    },
    {
        "value": "right",
        "displayName": "Right"
    }
],
"dataLabelVerticalPosition": [
    {
        "value": "above",
        "displayName": "Above"
    },
    {
        "value": "under",
        "displayName": "Under"
    }
]
},
"referenceLine": {
    "style": [
        {
            "value": "dashed",
            "displayName": "Dashed"
        },
        {
            "value": "solid",
            "displayName": "Solid"
        },
        {
            "value": "dotted",
            "displayName": "Dotted"
        }
    ],
    "position": [
        {
            "value": "back",
            "displayName": "Behind"
        },
        {
            "value": "front",
            "displayName": "In Front"
        }
    ],
    "dataLabelText": [

```

```
{
  "value": "Value",
  "displayName": "Value"
},
{
  "value": "Name",
  "displayName": "Name"
},
{
  "value": "ValueAndName",
  "displayName": "Name and Value"
}
],
"dataLabelHorizontalPosition": [
  {
    "value": "left",
    "displayName": "Left"
  },
  {
    "value": "right",
    "displayName": "Right"
  }
],
"dataLabelVerticalPosition": [
  {
    "value": "above",
    "displayName": "Above"
  },
  {
    "value": "under",
    "displayName": "Under"
  }
]
},
"labels": {
"labelOrientation": [
  {
    "value": "vertical",
    "displayName": "Vertical"
  },
  {
    "value": "horizontal",
    "displayName": "Horizontal"
  }
],
"labelPosition": [
  {
    "value": "Auto",
    "displayName": "Auto"
  },
  {
    "value": "InsideEnd",
    "displayName": "Inside End"
  },
  {
    "value": "OutsideEnd",
    "displayName": "Outside End"
  },
  {
    "value": "InsideCenter",
    "displayName": "Inside Center"
  },
  {
    "value": "InsideBase",
    "displayName": "Inside Base"
  }
],
"labelStyle": [
  {
```

```

    "value": "Category",
    "displayName": "Category"
  },
  {
    "value": "Data",
    "displayName": "Data value"
  },
  {
    "value": "Percent of total",
    "displayName": "Percent of total"
  },
  {
    "value": "Both",
    "displayName": "Category, data value"
  },
  {
    "value": "Category, percent of total",
    "displayName": "Category, percent of total"
  },
  {
    "value": "Data value, percent of total",
    "displayName": "Data value, percent of total"
  },
  {
    "value": "Category, data value, percent of total",
    "displayName": "All detail labels"
  }
]
},
"card": {
  "outline": [
    {
      "value": "None",
      "displayName": "None"
    },
    {
      "value": "BottomOnly",
      "displayName": "Bottom only"
    },
    {
      "value": "TopOnly",
      "displayName": "Top only"
    },
    {
      "value": "LeftOnly",
      "displayName": "Left only"
    },
    {
      "value": "RightOnly",
      "displayName": "Right only"
    },
    {
      "value": "TopBottom",
      "displayName": "Top + bottom"
    },
    {
      "value": "LeftRight",
      "displayName": "Left + right"
    },
    {
      "value": "Frame",
      "displayName": "Frame"
    }
  ]
},
"imageScaling": {
  "imageScalingType": [
    {
      "value": "Normal",

```

```
    "displayName": "Normal"
  },
  {
    "value": "Fit",
    "displayName": "Fit"
  },
  {
    "value": "Fill",
    "displayName": "Fill"
  }
]
},
"forecast": {
  "confidenceBandStyle": [
    {
      "value": "fill",
      "displayName": "Fill"
    },
    {
      "value": "line",
      "displayName": "Line"
    },
    {
      "value": "none",
      "displayName": "None"
    }
  ],
  "style": [
    {
      "value": "dashed",
      "displayName": "Dashed"
    },
    {
      "value": "solid",
      "displayName": "Solid"
    },
    {
      "value": "dotted",
      "displayName": "Dotted"
    }
  ]
},
"mapStyles": {
  "mapTheme": [
    {
      "value": "aerial",
      "displayName": "Aerial"
    },
    {
      "value": "canvasDark",
      "displayName": "Dark"
    },
    {
      "value": "canvasLight",
      "displayName": "Light"
    },
    {
      "value": "grayscale",
      "displayName": "Grayscale"
    },
    {
      "value": "road",
      "displayName": "Road"
    }
  ]
},
"shape": {
  "projectionEnum": [
    {
```

```
    "value": "albersUsa",
    "displayName": "Albers USA"
  },
  {
    "value": "equirectangular",
    "displayName": "Equirectangular"
  },
  {
    "value": "mercator",
    "displayName": "Mercator"
  },
  {
    "value": "orthographic",
    "displayName": "Orthographic"
  }
]
},
"xAxisReferenceLine": {
"style": [
  {
    "value": "dashed",
    "displayName": "Dashed"
  },
  {
    "value": "solid",
    "displayName": "Solid"
  },
  {
    "value": "dotted",
    "displayName": "Dotted"
  }
],
"position": [
  {
    "value": "back",
    "displayName": "Behind"
  },
  {
    "value": "front",
    "displayName": "In Front"
  }
],
"dataLabelText": [
  {
    "value": "Value",
    "displayName": "Value"
  },
  {
    "value": "Name",
    "displayName": "Name"
  },
  {
    "value": "ValueAndName",
    "displayName": "Name and Value"
  }
],
"dataLabelHorizontalPosition": [
  {
    "value": "left",
    "displayName": "Left"
  },
  {
    "value": "right",
    "displayName": "Right"
  }
],
"dataLabelVerticalPosition": [
  {
    "value": "above".
```

```

    "value": "above",
    "displayName": "Above"
  },
  {
    "value": "under",
    "displayName": "Under"
  }
]
},
"ratioLine": {
"style": [
  {
    "value": "dashed",
    "displayName": "Dashed"
  },
  {
    "value": "solid",
    "displayName": "Solid"
  },
  {
    "value": "dotted",
    "displayName": "Dotted"
  }
]
},
"columnHeaders": {
"outline": [
  {
    "value": "None",
    "displayName": "None"
  },
  {
    "value": "BottomOnly",
    "displayName": "Bottom only"
  },
  {
    "value": "TopOnly",
    "displayName": "Top only"
  },
  {
    "value": "LeftOnly",
    "displayName": "Left only"
  },
  {
    "value": "RightOnly",
    "displayName": "Right only"
  },
  {
    "value": "TopBottom",
    "displayName": "Top + bottom"
  },
  {
    "value": "LeftRight",
    "displayName": "Left + right"
  },
  {
    "value": "Frame",
    "displayName": "Frame"
  }
]
},
"values": {
"outline": [
  {
    "value": "None",
    "displayName": "None"
  },
  {
    "value": "BottomOnly",
    "displayName": "Bottom only"
  }
]
}

```

```

        displayName: "Bottom only"
    },
    {
        "value": "TopOnly",
        "displayName": "Top only"
    },
    {
        "value": "LeftOnly",
        "displayName": "Left only"
    },
    {
        "value": "RightOnly",
        "displayName": "Right only"
    },
    {
        "value": "TopBottom",
        "displayName": "Top + bottom"
    },
    {
        "value": "LeftRight",
        "displayName": "Left + right"
    },
    {
        "value": "Frame",
        "displayName": "Frame"
    }
}
],
},
"total": {
"outline": [
    {
        "value": "None",
        "displayName": "None"
    },
    {
        "value": "BottomOnly",
        "displayName": "Bottom only"
    },
    {
        "value": "TopOnly",
        "displayName": "Top only"
    },
    {
        "value": "LeftOnly",
        "displayName": "Left only"
    },
    {
        "value": "RightOnly",
        "displayName": "Right only"
    },
    {
        "value": "TopBottom",
        "displayName": "Top + bottom"
    },
    {
        "value": "LeftRight",
        "displayName": "Left + right"
    },
    {
        "value": "Frame",
        "displayName": "Frame"
    }
}
],
},
"rowHeaders": {
"outline": [
    {
        "value": "None",
        "displayName": "None"
    },

```

```

    },
    {
      "value": "BottomOnly",
      "displayName": "Bottom only"
    },
    {
      "value": "TopOnly",
      "displayName": "Top only"
    },
    {
      "value": "LeftOnly",
      "displayName": "Left only"
    },
    {
      "value": "RightOnly",
      "displayName": "Right only"
    },
    {
      "value": "TopBottom",
      "displayName": "Top + bottom"
    },
    {
      "value": "LeftRight",
      "displayName": "Left + right"
    },
    {
      "value": "Frame",
      "displayName": "Frame"
    }
  ]
},
"subTotals": {
"outline": [
  {
    "value": "None",
    "displayName": "None"
  },
  {
    "value": "BottomOnly",
    "displayName": "Bottom only"
  },
  {
    "value": "TopOnly",
    "displayName": "Top only"
  },
  {
    "value": "LeftOnly",
    "displayName": "Left only"
  },
  {
    "value": "RightOnly",
    "displayName": "Right only"
  },
  {
    "value": "TopBottom",
    "displayName": "Top + bottom"
  },
  {
    "value": "LeftRight",
    "displayName": "Left + right"
  },
  {
    "value": "Frame",
    "displayName": "Frame"
  }
],
"rowSubtotalsPosition": [
  {
    "value": "Top",

```



```
    "displayName": "Top"
  },
  {
    "value": "Bottom",
    "displayName": "Bottom"
  }
]
},
"general": {
"orientation": [
  {
    "value": "vertical",
    "displayName": "Vertical"
  },
  {
    "value": "horizontal",
    "displayName": "Horizontal"
  }
]
},
"data": {
"relativeRange": [
  {
    "value": "Last",
    "displayName": "Last"
  },
  {
    "value": "Next",
    "displayName": "Next"
  },
  {
    "value": "This",
    "displayName": "This"
  }
],
"relativePeriod": [
  {
    "value": "None",
    "displayName": "Select"
  },
  {
    "value": "Days",
    "displayName": "Days"
  },
  {
    "value": "Weeks",
    "displayName": "Weeks"
  },
  {
    "value": "Calendar Weeks",
    "displayName": "Weeks (Calendar)"
  },
  {
    "value": "Months",
    "displayName": "Months"
  },
  {
    "value": "Calendar Months",
    "displayName": "Months (Calendar)"
  },
  {
    "value": "Years",
    "displayName": "Years"
  },
  {
    "value": "Calendar Years",
    "displayName": "Years (Calendar)"
  }
],
}
```

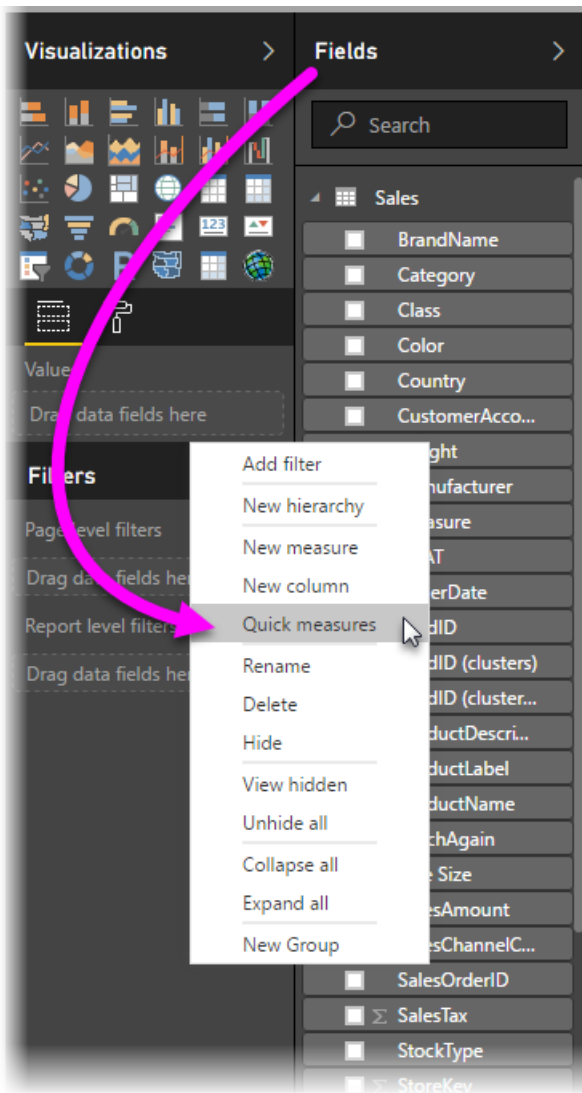
```
"mode": [
  {
    "value": "Between",
    "displayName": "Between"
  },
  {
    "value": "Before",
    "displayName": "Before"
  },
  {
    "value": "After",
    "displayName": "After"
  },
  {
    "value": "Basic",
    "displayName": "List"
  },
  {
    "value": "Dropdown",
    "displayName": "Dropdown"
  },
  {
    "value": "Relative",
    "displayName": "Relative"
  },
  {
    "value": "Single",
    "displayName": "Single Value"
  }
],
},
"header": {
"outline": [
  {
    "value": "None",
    "displayName": "None"
  },
  {
    "value": "BottomOnly",
    "displayName": "Bottom only"
  },
  {
    "value": "TopOnly",
    "displayName": "Top only"
  },
  {
    "value": "LeftOnly",
    "displayName": "Left only"
  },
  {
    "value": "RightOnly",
    "displayName": "Right only"
  },
  {
    "value": "TopBottom",
    "displayName": "Top + bottom"
  },
  {
    "value": "LeftRight",
    "displayName": "Left + right"
  },
  {
    "value": "Frame",
    "displayName": "Frame"
  }
]
},
"items": {
"outline": [
```

```
{
  "value": "None",
  "displayName": "None"
},
{
  "value": "BottomOnly",
  "displayName": "Bottom only"
},
{
  "value": "TopOnly",
  "displayName": "Top only"
},
{
  "value": "LeftOnly",
  "displayName": "Left only"
},
{
  "value": "RightOnly",
  "displayName": "Right only"
},
{
  "value": "TopBottom",
  "displayName": "Top + bottom"
},
{
  "value": "LeftRight",
  "displayName": "Left + right"
},
{
  "value": "Frame",
  "displayName": "Frame"
}
]
},
"status": {
"direction": [
  {
    "value": "Positive",
    "displayName": "High is good"
  },
  {
    "value": "Negative",
    "displayName": "Low is good"
  }
]
}
}
```

Use Quick measures to easily perform common and powerful calculations (Preview)

1/25/2018 • 7 min to read • [Edit Online](#)

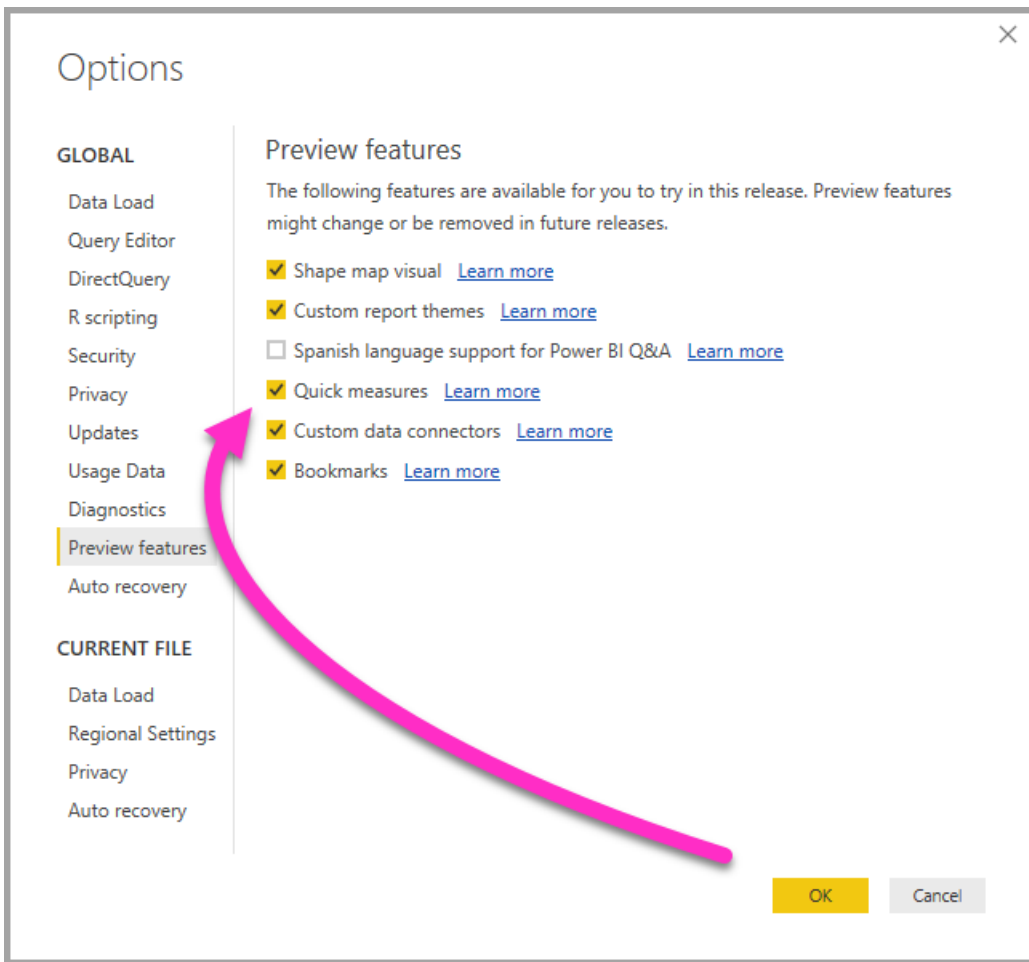
Starting with the April 2017 release of **Power BI Desktop**, you can use **Quick measures** to quickly and easily perform common, powerful calculations. A **Quick measure** runs a set of DAX commands behind the scenes (you don't have to write the DAX – it's done for you) based input you provide in a dialog box, then presents the results for you to use in your report. Best of all, you can see the DAX that's executed by the Quick measure, and jump-start or expand your own DAX knowledge.



You create **Quick measures** by right-clicking a field in the **Fields** well, then selecting **Quick measures** from the menu that appears. You can also right-click any value in the **Values** pane of an existing visual (such as the *Values* field in a *Bar chart* visual). There are many available categories of calculations, and ways to modify each calculation to fit your needs.

Enable the Quick measures preview

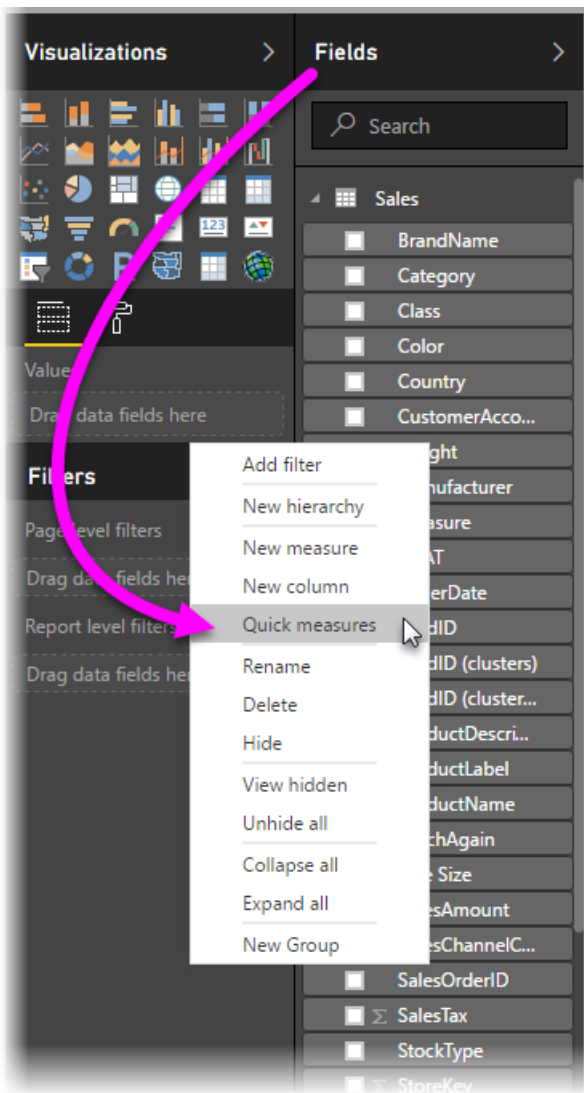
You can try the new **Quick measures** feature beginning with the **April 2017** release of **Power BI Desktop**. To enable this preview feature, select **File > Options and Settings > Options > Preview Features**, then select the checkbox beside **Quick measures**. You'll need to restart Power BI Desktop after you make the selection.



You'll need to restart **Power BI Desktop** after you make the selection.

Using Quick measures

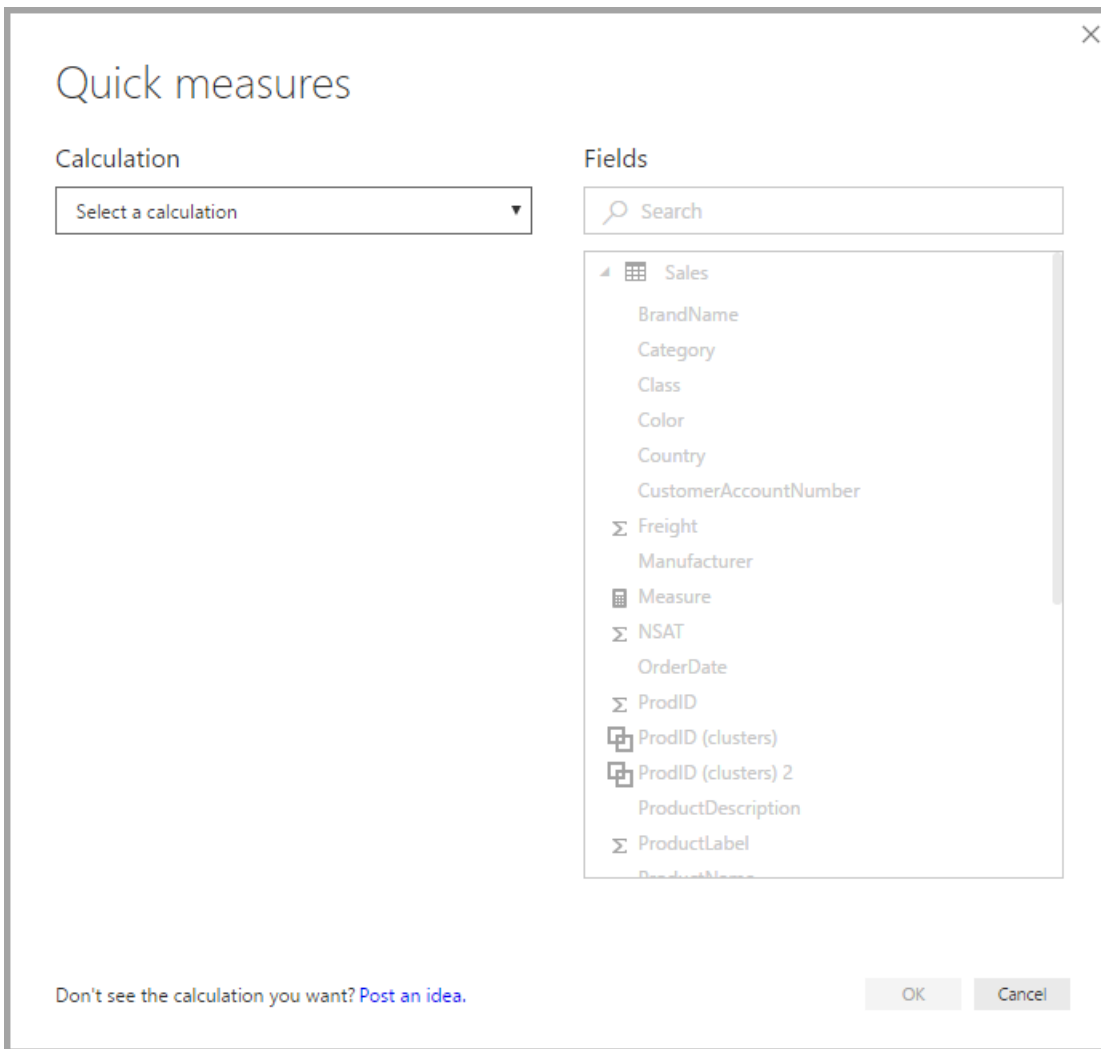
To create a **Quick measure**, right-click on a field (any field) in the **Fields** well in **Power BI Desktop** and select **Quick measure** from the menu that appears.



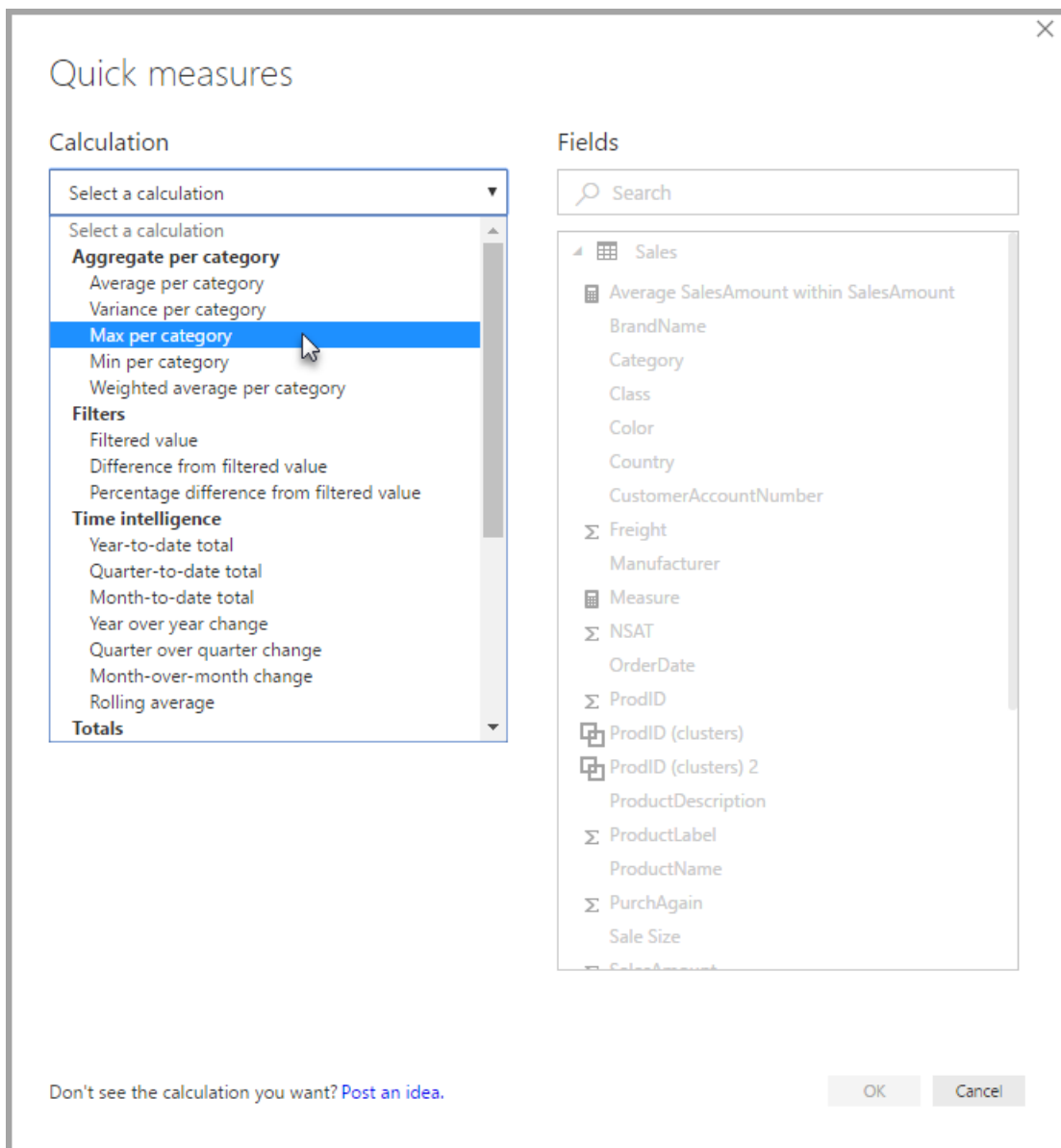
Modeling must be available on the dataset currently loaded in order for **Quick measures** to be available. As such, live connections (such as a connection to a Power BI service dataset) will not display the **Quick measures** menu item when the **Fields** list is right-clicked, with the exception of SSAS live connections.

When using SQL Server Analysis Services (SSAS) live connections, some **Quick measures** are available. **Power BI Desktop** displays only the collection of **Quick measures** that are supported for the version of SSAS to which the connection is made. So if you are connected to a SSAS live data source, and you do not see certain **Quick measures** in the list, it's because the SSAS version to which you are connected does not support the DAX measure used to implement that **Quick measure**.

When selected from the right-click menu, the following **Quick measures** window appears, allowing you to select the calculation you want, and the fields against which you want to calculation to be run.



When you select the drop-down menu, you're presented with the long list of available **Quick measures**.



There are five distinct groups of Quick measure calculation types, each with a collection of calculations. Those groups and calculations are the following:

- **Aggregate within a category**
 - Average within category
 - Variance within category
 - Max within category
 - Min within category
 - Weighted average per category
- **Filters and baselines**
 - Filtered measure
 - Difference from baseline
 - Percentage difference from baseline
 - Totals from new categories
- **Time intelligence**
 - Year-to-date total
 - Quarter-to-date total
 - Month-to-date total
 - Year over year change
 - Quarter over quarter change

- Month-over-month change
- Rolling average
- **Totals**
 - Running total
 - Total for category (filters applied)
 - Total for category (filters not applied)
- **Mathematical operations**
 - Addition
 - Subtraction
 - Multiplication
 - Division
 - Percentage difference
- **Text**
 - Star rating
 - Concatenated list of values

We anticipate adding to these calculations, and want to hear from you about which **Quick measures** you'd like to see, and if you have ideas (including underlying DAX formulas) for **Quick measures** that you'd like to submit for consideration. More on that at the end of this article.

Example of Quick measures

Let's take a look at an example of these **Quick measures** in action.

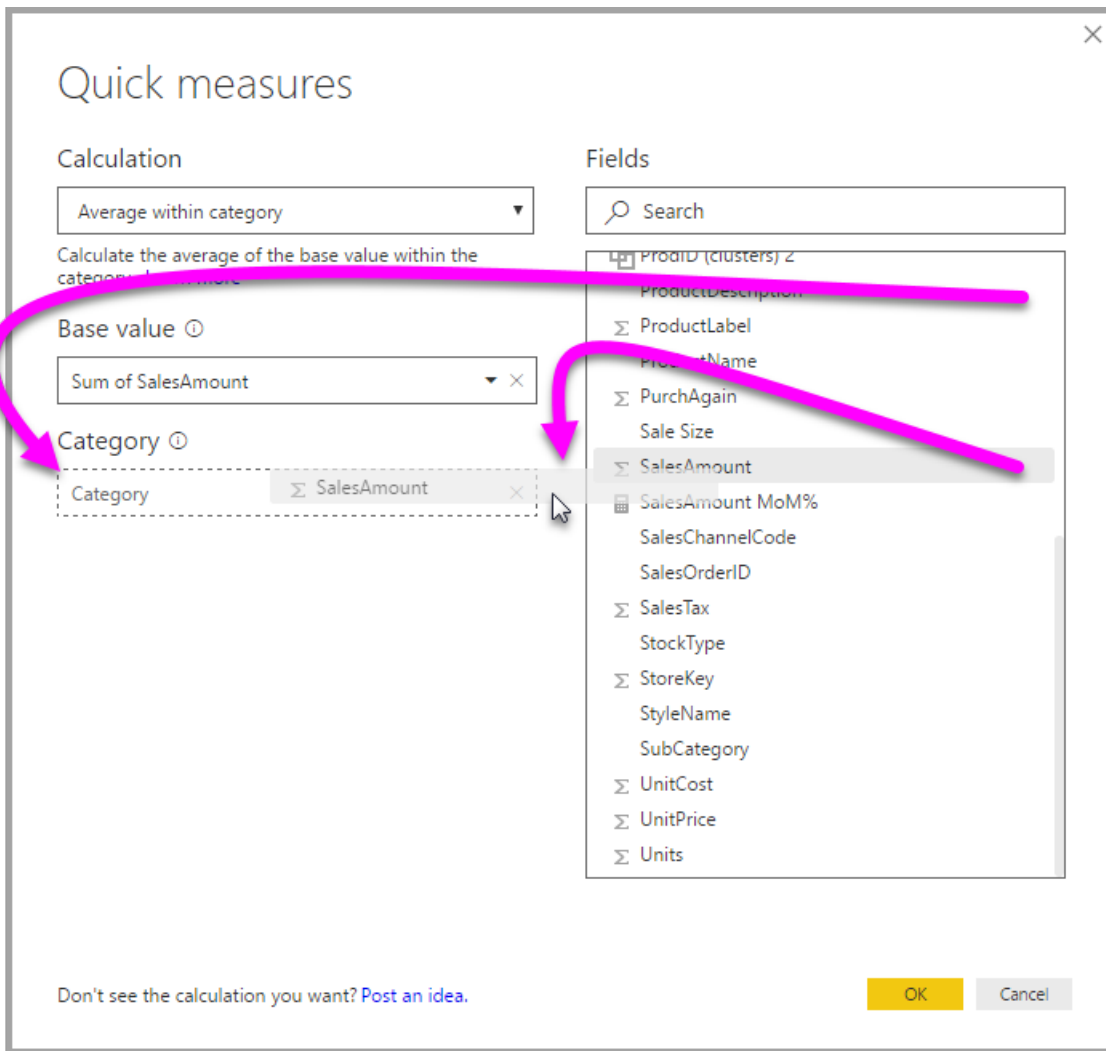
The following **Matrix** visual shows a table of sales for various electronics products. It's a basic table that includes the total for each category.

The screenshot shows the Power BI Desktop interface. The main area displays a Matrix visual with the following data:

Category	Deluxe	Economy	Regular	Total
Audio	267,894.43	207,757.98	689,535.59	1,165,188.00
Cameras and camcorders	1,085,796.05	512,946.96	2,858,289.00	4,457,032.01
Cell phones	403,116.81	87,378.61	867,694.53	1,358,189.95
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
Games and Toys	52,007.72	87,597.34	57,157.87	196,762.93
Home Appliances	3,833,194.22	936,767.07	4,794,779.89	9,564,741.18
Music, Movies and Audio Books	154,533.65	18,420.94	84,669.95	257,624.54
TV and Video	1,907,192.24	888,360.49	5,359,558.13	8,155,110.86
Total	14,053,160.42	4,319,575.36	22,268,237.64	40,640,973.42

The right-hand pane shows the 'Fields' task pane with the 'Sales' table selected. The 'Rows' section contains 'Category'. The 'Columns' section contains 'Class'. The 'Values' section contains 'SalesAmount'. The 'Filters' section contains 'Category(All)', 'Class(All)', and 'SalesAmount(All)'. The 'Fields' list on the right includes 'Average Sales...', 'BrandName', 'Category', 'Class', 'Color', 'Country', 'CustomerAcco...', 'Freight', 'Manufacturer', 'Measure', 'NSAT', 'OrderDate', 'ProdID', 'ProdID (clusters)', 'ProdID (cluster...', 'ProductDescri...', 'ProductLabel', 'ProductName', and 'PurchAgain'.

When we right-click the **Values** field well and select **Quick measures**, we can select *Average within category* as the *Calculation*, then select *Sum of SalesAmount* as the *Base value*, then specify *SalesAmount* by dragging that field from the *Fields* box on the right pane, into the *Category* section on the left.



When we select **OK**, we see a few interesting things occur, as shown in the image following this list:

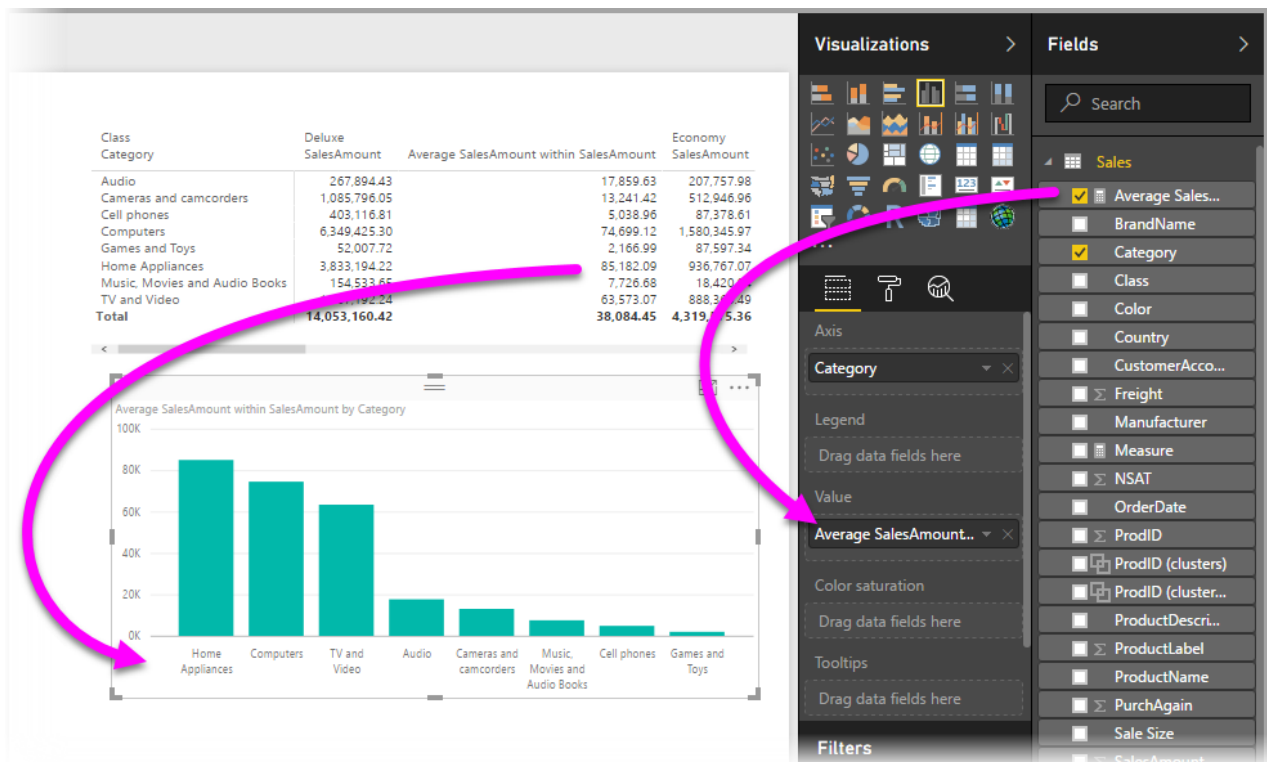
1. The **Matrix** visual now has a new column that shows our calculation (in this case, *Average SalesAmount within SalesAmount*).
2. A new **measure** has been created and is available in the **Fields** well, and it's highlighted (Power BI puts a yellow box around it). This measure is available to any other visual in the report, not just the visual for which it was originally created.
3. The DAX formula that was created for the **Quick measure** is displayed in the Formula bar.

Category	SalesAmount	Average SalesAmount within SalesAmount	SalesAmount
Audio	267,894.43	17,859.63	207,757.98
Cameras and camcorders	1,085,796.05	13,241.42	512,946.96
Cell phones	403,116.81	5,038.96	87,378.61
Computers	6,349,823.30	74,699.12	1,590,345.97
Games and Toys	52,007.72	2,166.99	87,597.34
Home Appliances	3,833,194.22	85,182.09	936,767.07
Music, Movies and Audio Books	154,533.65	7,726.68	18,420.94
TV and Video	1,907,192.24	63,573.07	888,360.49
Total	14,053,160.42	38,084.45	4,319,575.36

To start with the first item, notice that the **Quick measure** was applied to the visual. There's a new column and associated value, both of which are based on the **Quick measure** that was created.

Class Category	Deluxe SalesAmount	Average SalesAmount within SalesAmount	Economy SalesAmount
Audio	267,894.43	17,859.63	207,757.98
Cameras and camcorders	1,085,796.05	13,241.42	512,946.96
Cell phones	403,116.81	5,038.96	87,378.61
Computers	6,349,425.30	74,699.12	1,580,345.97
Games and Toys	52,007.72	2,166.99	87,597.34
Home Appliances	3,833,194.22	85,182.09	936,767.07
Music, Movies and Audio Books	154,533.65	7,726.68	18,420.94
TV and Video	1,907,192.24	63,573.07	888,360.49
Total	14,053,160.42	38,084.45	4,319,575.36

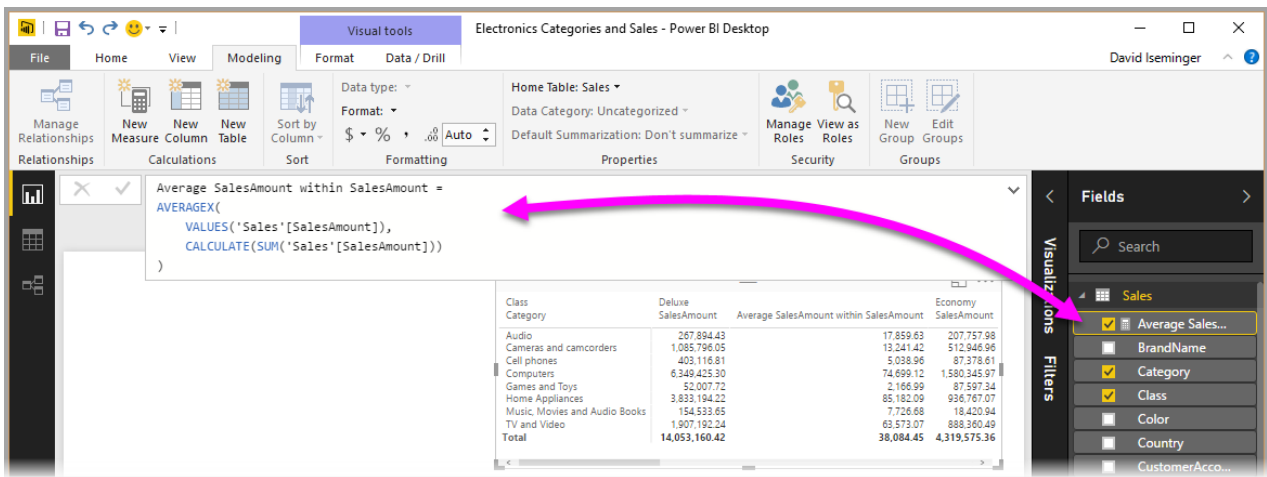
Second, the **Quick measure** shows up in the **Fields** well of the data model, and can be used like any other field in the model, for any other visual. In the following image, a quick **bar chart** visual was created by using the new field created by the **Quick measure**.



Let's head to the next section to discuss that third item, DAX formulas.

Learn DAX using Quick measures

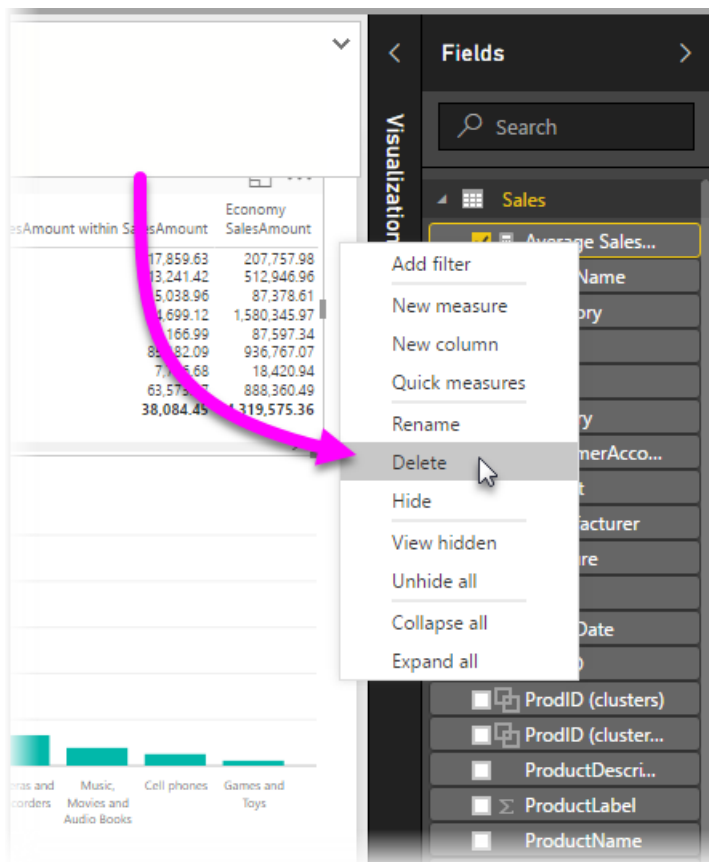
Another great advantage of the **Quick measures** feature is that it directly shows you the DAX formula that was created to implement the measure. In the following image, we've selected the measure that was created by the **Quick measure** (it's now in the **Fields** well, so we just have to click it). When we do so, the **Formula bar** appears, showing the DAX formula that Power BI created to implement the measure.



This is nice by itself, since it shows you the formula behind the measure. But more importantly, perhaps, it lets you use **Quick measures** to see how the underlying DAX formulas should be created.

Imagine you need to do a year-over-year calculation, but you're not quite sure how to structure the DAX formula (or, you have no idea where to start!). Instead of banging your head on the desk, you could create a **Quick measure** using the **Year over year change** calculation, and see what happens. As in, create the **Quick measure** and see how it appears in your visual, see how the DAX formula worked, then make changes either directly to the DAX, or create another measure, until the calculations meet your needs or expectations.

It's like having a quick teacher that immediately responds to your what-if questions by a few clicks. You can always delete those measures from your model if you don't like them - that's as easy as right-clicking the measure and selecting **delete**.



And once you do have the measure perfected, you can rename it however you'd like, using the same right-click menu.

Limitations and considerations

In this preview release of the **Quick measures**, there are a few limitations and considerations to keep in mind.

- **Quick measures** are only available if you can modify the model, which isn't the case when you're working with DirectQuery or most Live connections (SSAS live connections are supported, as previously explained).
- The measure that's added to the **Fields** well can be used with any visual in the report.
- You can always see the DAX associated with a **Quick measure** by selecting the created measure in the **Fields** well, then looking at the formula in the **Formula bar**.

WARNING

Quick measures currently *only* generate DAX statements with commas for argument separators. If your version of **Power BI Desktop** is localized to a language that uses commas as decimal separators, quick measures will not operate properly.

Time intelligence and Quick measures

Beginning with the October 2017 update to **Power BI Desktop**, you can use your own custom date tables with time intelligence **Quick measures**. If your data model has a custom date table, you can use the primary date column in that table for time intelligence quick measures. You *must* ensure that when the model was built, that primary date column in that table was marked as a Date table, as described in [this article](#).

Additional information and examples

We anticipate providing examples and guidance for each of the **Quick measures** calculations, so please check back soon for updates on that focused article.

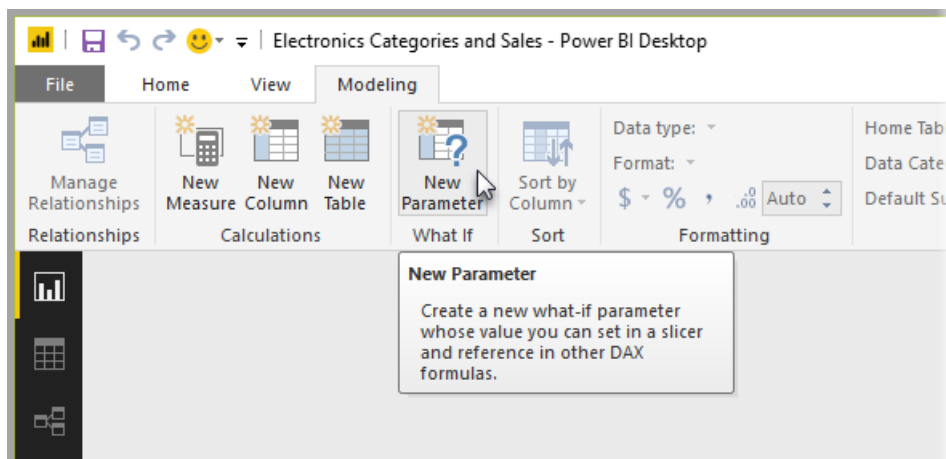
Since this is a **Preview** feature, we're especially interested in your feedback and your ideas.

Have an idea for a **Quick measure** that isn't already provided? Great! Check out [this page](#) and submit your ideas (and DAX formula) for the **Quick measure** you'd like to see in **Power BI Desktop**, and we'll consider adding it to the provided list of **Quick measures** in a future release.

Create and use a What if parameter to visualize variables in Power BI Desktop

1/25/2018 • 2 min to read • [Edit Online](#)

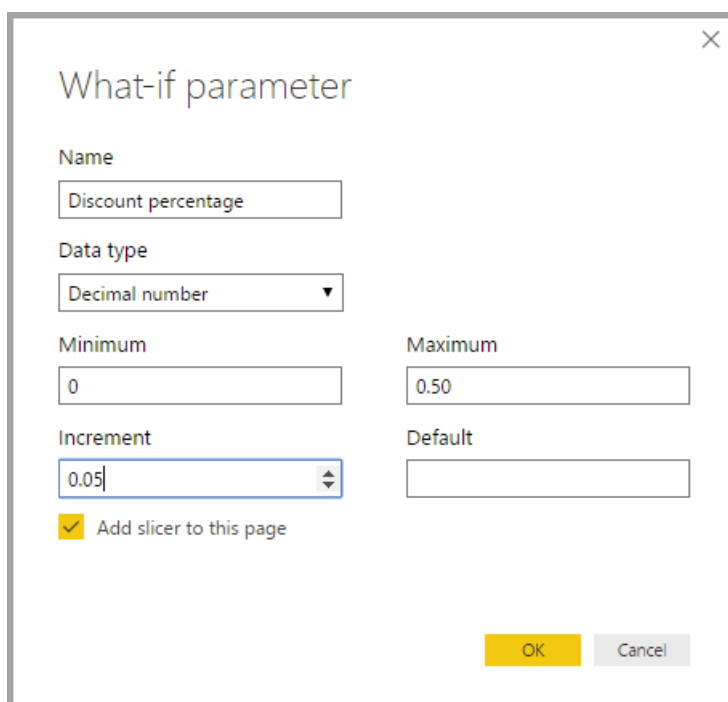
Starting with the August 2017 release of **Power BI Desktop**, you can create **What if** variables for your reports, interact with the variable as a slicer, and thereby visualize and quantify different key values in your reports.



The **What if** parameter is found on the **Modeling** tab in **Power BI Desktop**. When you do so, a dialog appears where you can configure the parameter.

Creating a What if parameter

To create a **What if** parameter, select the **What if** button from the **Modeling** tab in **Power BI Desktop**. In the following image, we've created a parameter called *Discount percentage* and set its data type to *Decimal number*. The *Minimum* value is zero, the *Maximum* is 0.50 (fifty percent). We've also set the *Increment* to 0.05, or five percent. That's how much the parameter will adjust when interacted with in a report.



NOTE

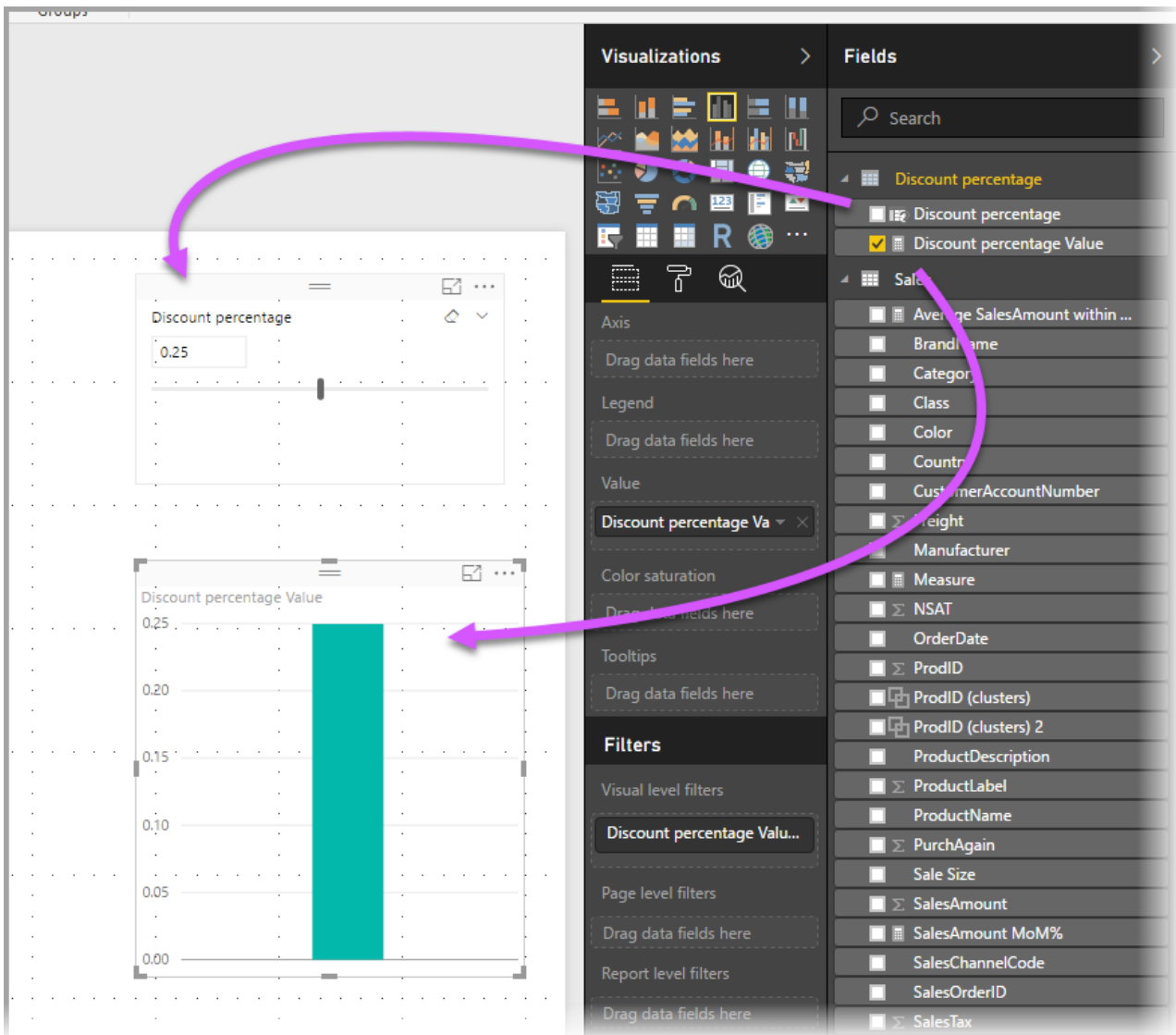
For decimal numbers, make sure you precede it with a zero, as in 0.50 versus just .50 in that box. Otherwise the number won't validate and the **OK** button will not be selectable.

For your convenience, the **Add slicer to this page** checkbox automatically puts a slicer with your **What if** parameter onto the current report page.

is and camcorders	1,085,796.05	13,241.42	512,946.96
ones	403,116.81	5,038.96	87,378.61
ters	6,349,425.30	74,699.12	1,580,345.97
and Toys	52,007.72	2,166.99	87,597.34
Appliances	3,833,194.22	85,182.09	936,767.07
Movies and Audio Books	154,533.65	7,726.68	18,420.94
Video	1,907,192.24	63,573.07	888,360.49
	14,053,160.42	38,084.45	4,319,575.36

The image shows a report page with a table of sales data and a 'Discount percentage' slicer. The slicer is currently set to 0.05. A purple arrow points to the slicer. To the right of the report is a 'Filters' pane with three filter levels: Visual level, Page level, and Report level. Each level has a 'Drag data' button.

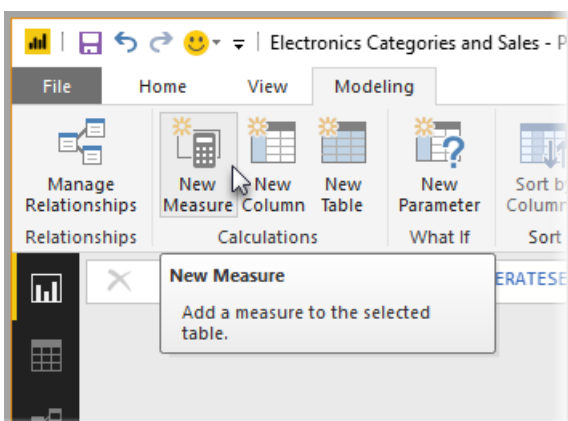
In addition to creating the parameter, creating a **What if** parameter also creates a measure, which you can use to visualize the current value of the **What if** parameter.



It's important and useful to note that once you create a **What if** parameter, both the parameter and the measure become part of your model. So they're available throughout the report, and can be used on other report pages. And since they're part of the model, you can delete the slicer from the report page, and if you want it back, just grab the **What if** parameter from the **Fields** list and drag it onto the canvas (then change the visual to a slicer) to easily get the **What if** parameter back into your report.

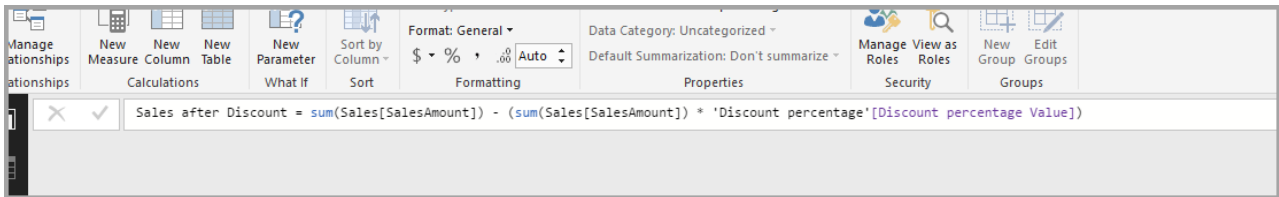
Using a What if parameter

Let's create a simple example of using a **What if** parameter. We created the **What if** parameter in the previous section, now we'll put it to use by creating a new measure whose value adjusts with the slider. To accomplish this, we create a new measure.

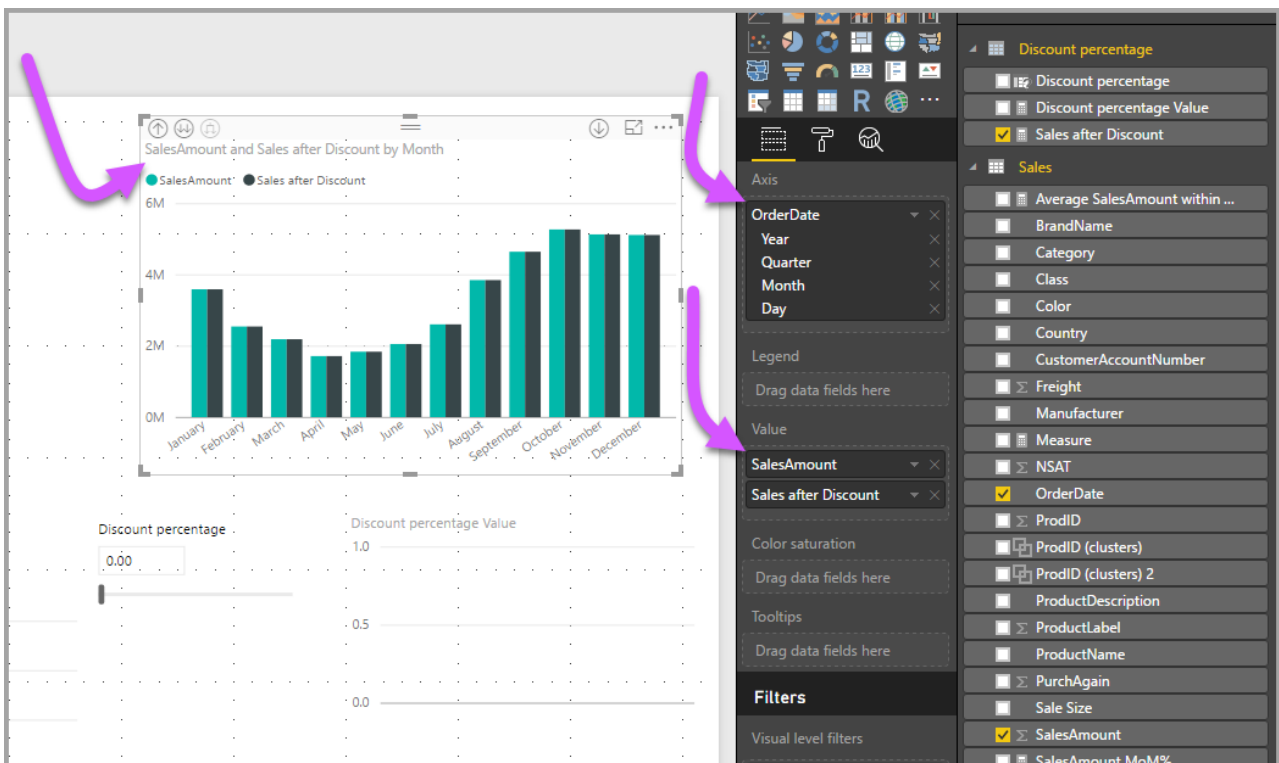


The new measure is simply going to be the total sales amount, with the discount rate applied. You can create complex and interesting measures, of course, that let the consumers of your reports visualize the variable of your **What if** parameter. For example, you could create a report that let sales people see their compensation if they meet certain sales goals or percentages, or see the affect of increased sales to deeper discounts.

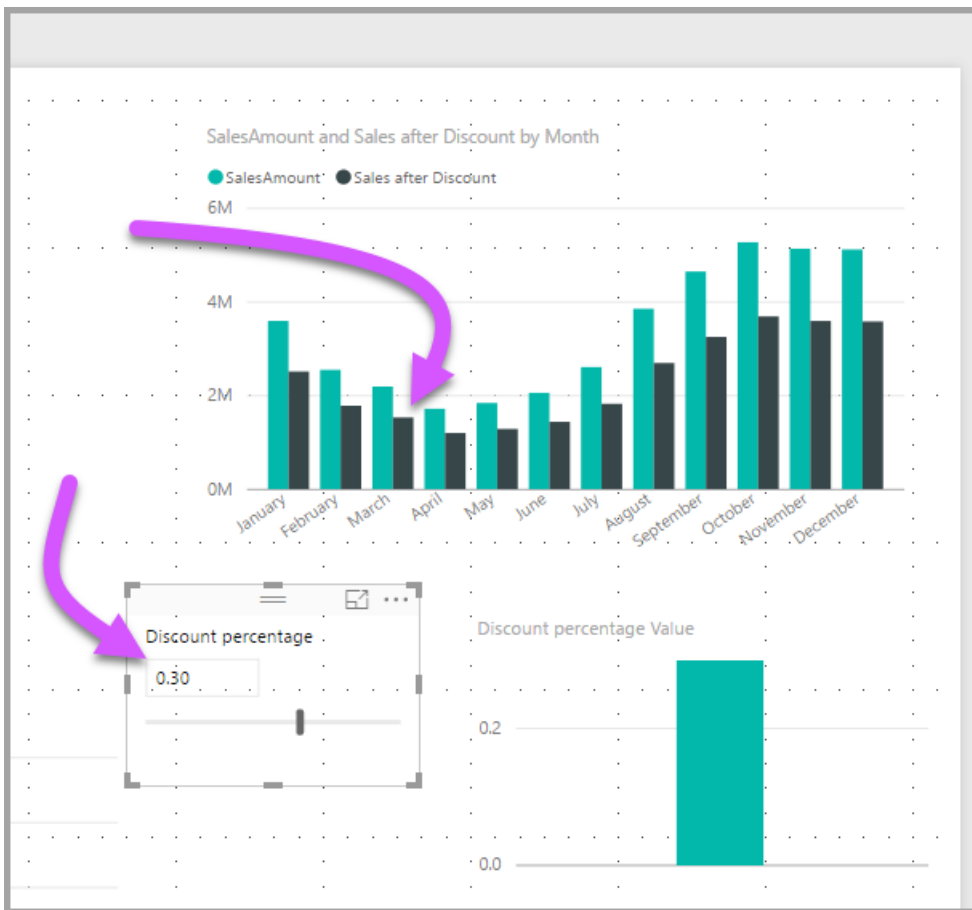
Once we type the measure formula into the formula bar, and name it **Sales after Discount**, we see its result:



Then we create a column visual with *OrderDate* on the on the axis, and both *SalesAmount* and the just-created measure *Sales after Discount* as the values.



Then, as we move the slider, we see that the *Sales after Discount* column reflects the discounted sales amount.

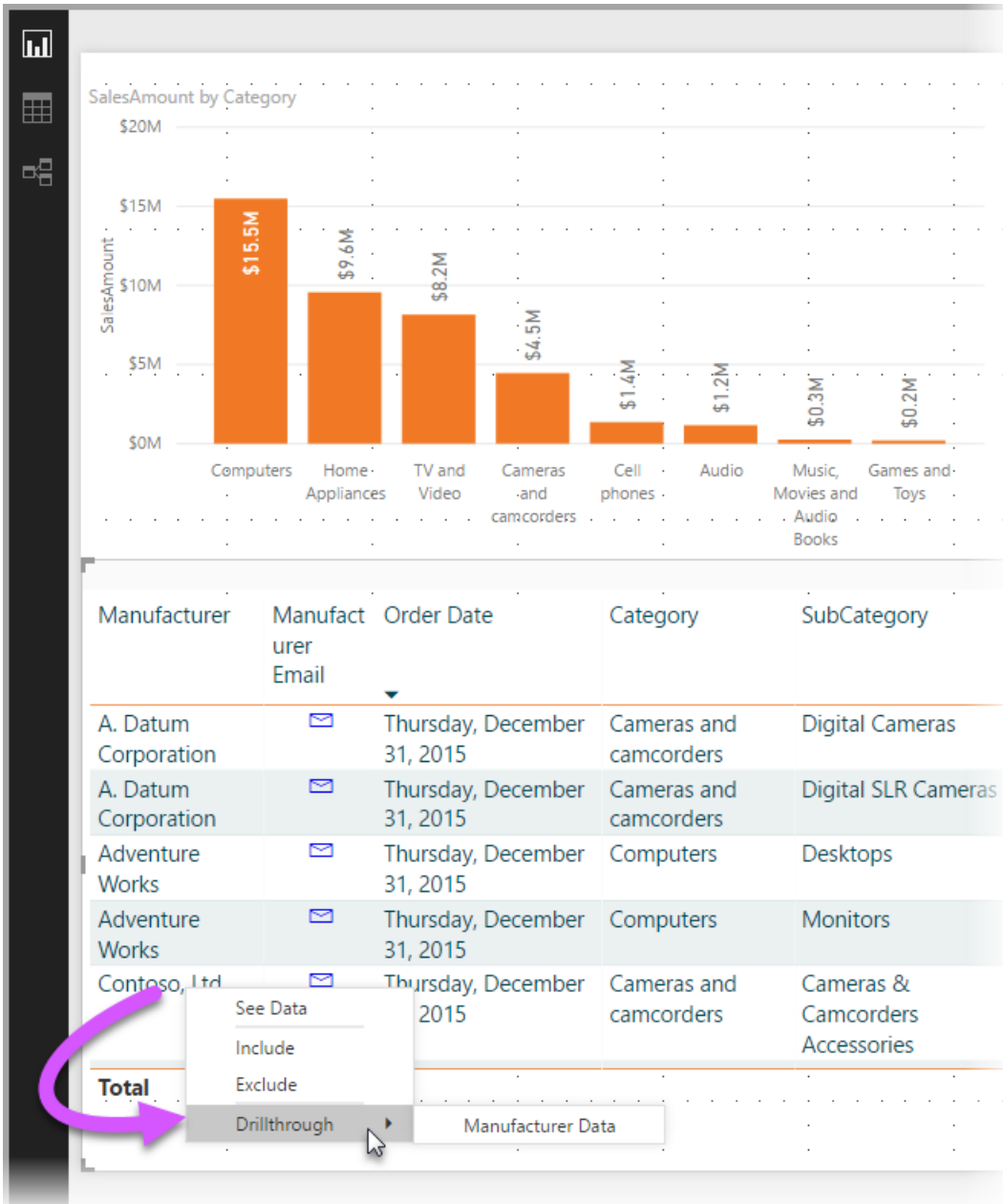


And that's all there is to it. You can use **What if** parameters in all sorts of situations, to enable the consumers of reports to interact with different scenarios that you create in your reports.

Use drillthrough in Power BI Desktop

12/6/2017 • 2 min to read • [Edit Online](#)

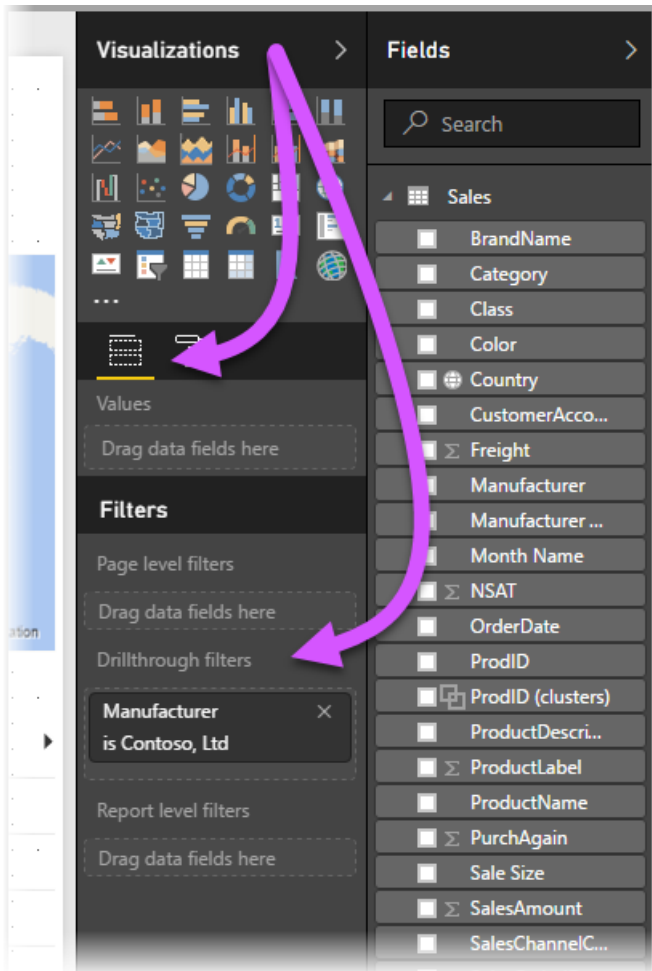
With **drillthrough** in **Power BI Desktop**, you can create a page in your report that focuses on a specific entity - such as a supplier, or customer, or manufacturer. With that focused report page, users can right-click on a data point in other report pages, and drillthrough to the focused page to get details that are filtered to that context.



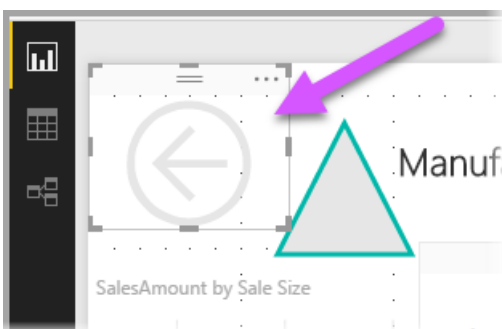
Using drillthrough

To use **drillthrough**, create a report page that has visuals you'd like to see about the type of entity for which you'll provide drillthrough. For example, if you're interested in providing drillthrough for manufacturers, you might create a drillthrough page with visuals that show total sales, total units shipped, sales by category, sales by region, and so on. That way, when you drillthrough to that page, the visuals will be specific to the manufacturer you clicked on and selected to drillthrough about.

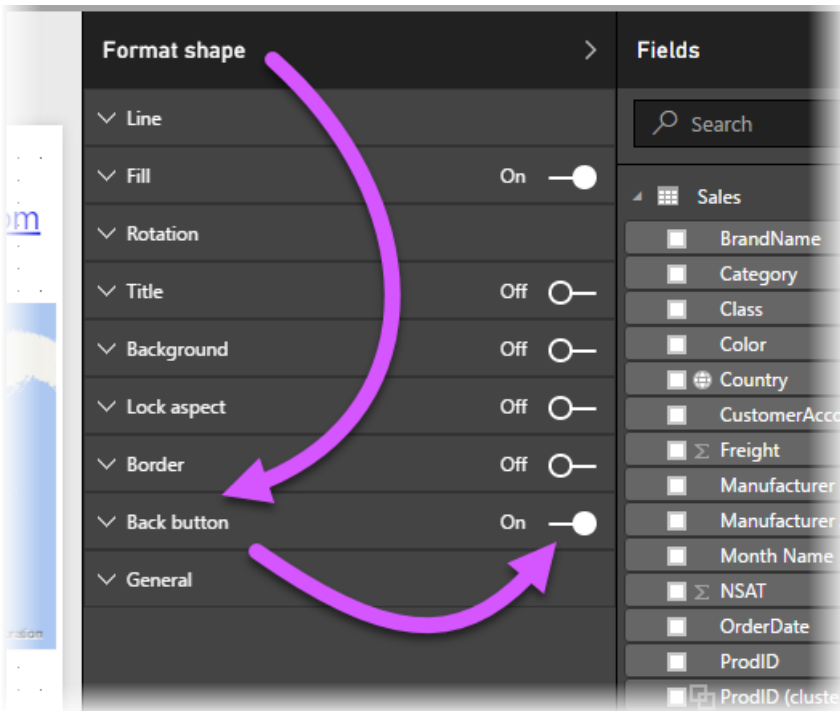
Then on that drillthrough page, in the **Fields** section of **Visualizations** pane, drag the field you want to drillthrough about into the **Drillthrough filters** well.



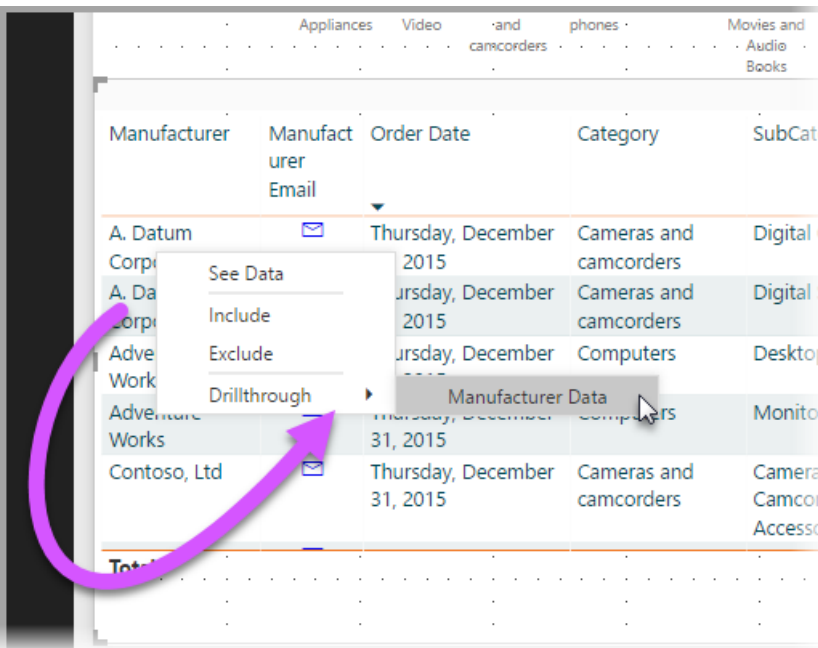
When you add a field to the **Drillthrough filters** well, **Power BI Desktop** automatically creates a *back* button visual. That visual becomes a button in published reports, and lets users who are consuming your report in the **Power BI service** easily get back to the report page from which they came (the page from which they selected to drillthrough).



Since the *back* button is an image, you can replace the image of that visual with any image you want, and it will still operate properly as the button to get report consumers back to their original page. To use your own image for a back button just place an image visual on the drillthrough page, then select the visual, and put the *Back button* slider to on. That makes your image function as a *back* button.



When your **drillthrough** page is complete, when users right-click on a data point in your report that uses the field you put into the **Drillthrough filters** well on your drillthrough page, a context menu appears, letting the users drillthrough to that page.



When they choose to drillthrough, the page is filtered to show information about the data point from which they right-clicked. For example, if they right-clicked on a data point about Contoso (a manufacturer), and selected to drillthrough, the drillthrough page they were taken to would be filtered to Contoso.

NOTE

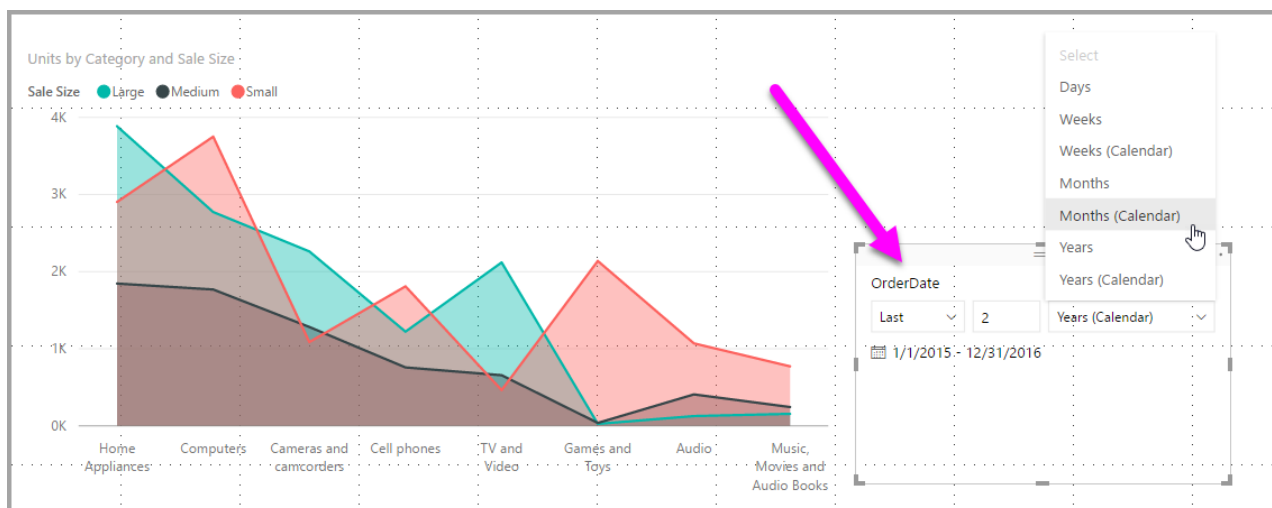
Only the field that is in the **Drillthrough filters** well gets passed through to the drillthrough report page. No other contextual information is passed.

And that's all there is to using **drillthrough** in your reports. It's a great way to get an expanded view on the entity information you select for your drillthrough filter.

Use a relative date slicer and filter in Power BI Desktop

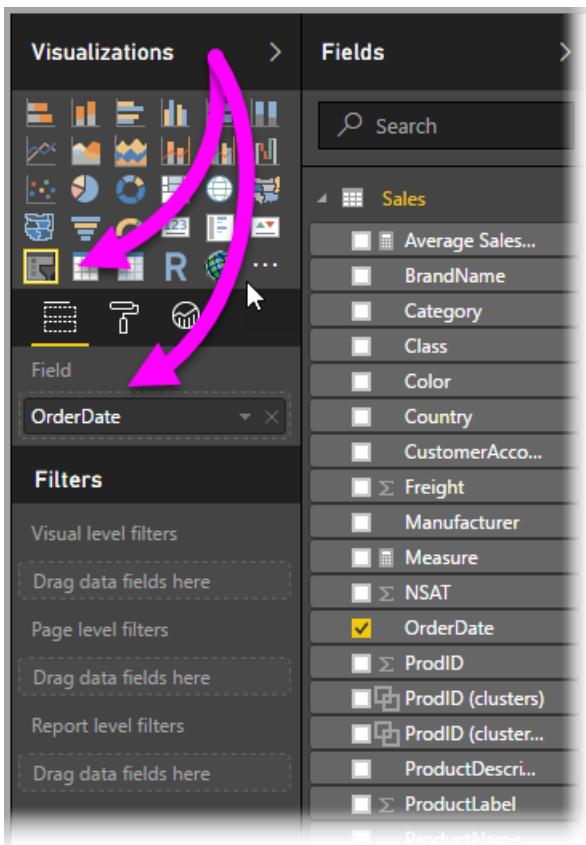
12/6/2017 • 2 min to read • [Edit Online](#)

With the **relative date slicer** or **relative date filter**, you can apply time-based filters to any date column in your data model. For example, you can use the **relative date slicer** to show only sales data that's happened within the last thirty days (or month, or calendar months, and so on). And when you refresh the data, the relative time period automatically applies the appropriate relative date constraint.

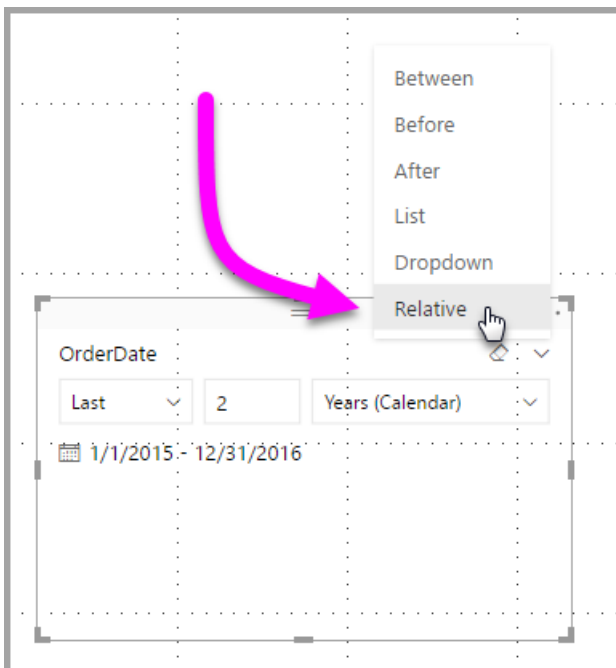


Using the relative date range slicer

You can use the relative date slicer just like any other slicer. Simply create a **slicer** visual for your report, and then select a date value for the **Field** value. In the following image, the *OrderDate* field is selected.



Select the carat in the upper-right corner of the **relative date slicer** and a menu appears.

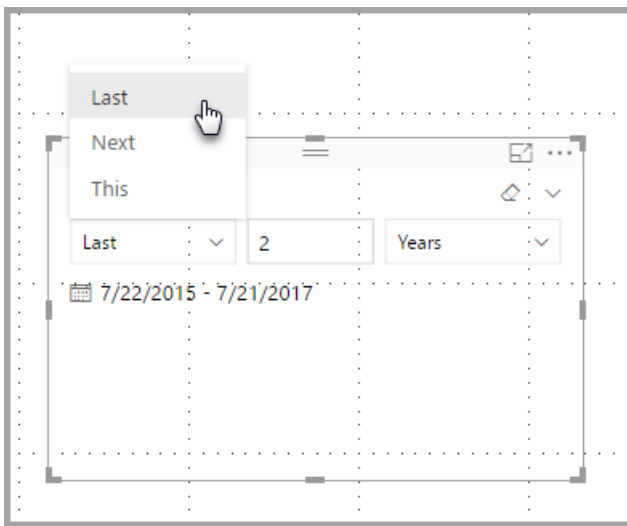


For the relative date slicer, select *Relative*.

You then can select the settings. For the first drop-down in the *relative date slicer*, you can select from the following choices:

- Last
- Next
- This

These selections are shown in the following image.

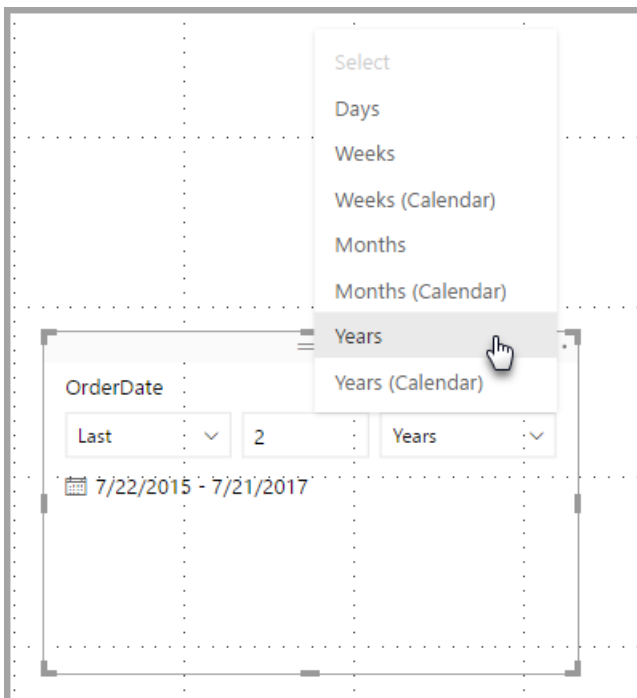


The next (middle) setting in the *relative date slicer* allows you to type in a number, to define the relative date range.

The third setting allows you to select the date measurement, and you can select from the following choices:

- Days
- Weeks
- Weeks (Calendar)
- Months
- Months (Calendar)
- Years
- Years (Calendar)

These selections are shown in the following image.

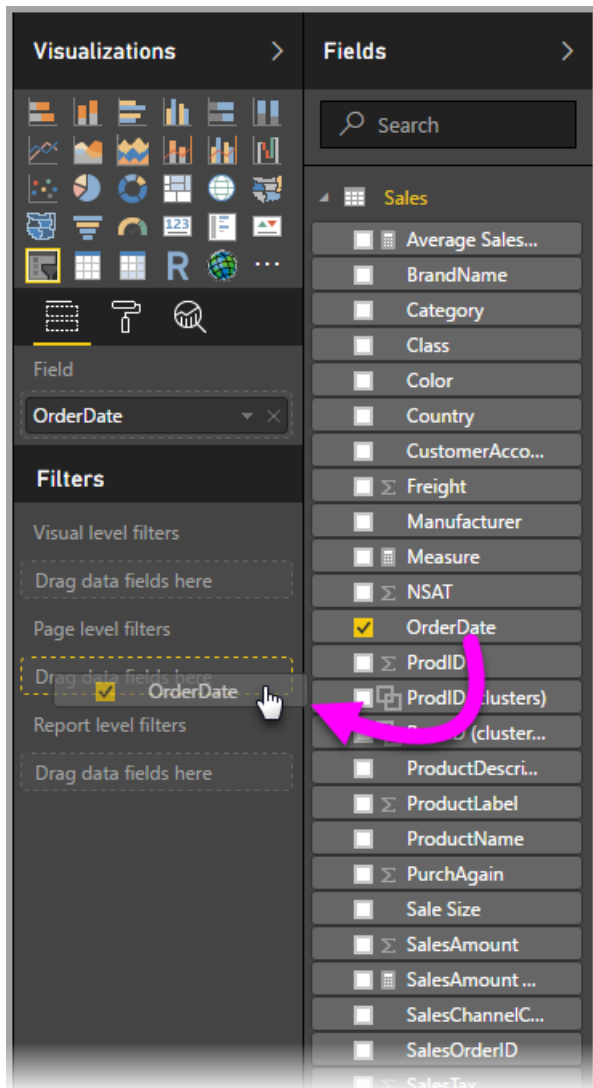


If you select *Months* from that list, and input 2 in the middle setting. The following would happen: if today is July 20th, the data included in visuals constrained by the slicer would show data for the previous two months, starting on May 20th and going through July 20th (today's date).

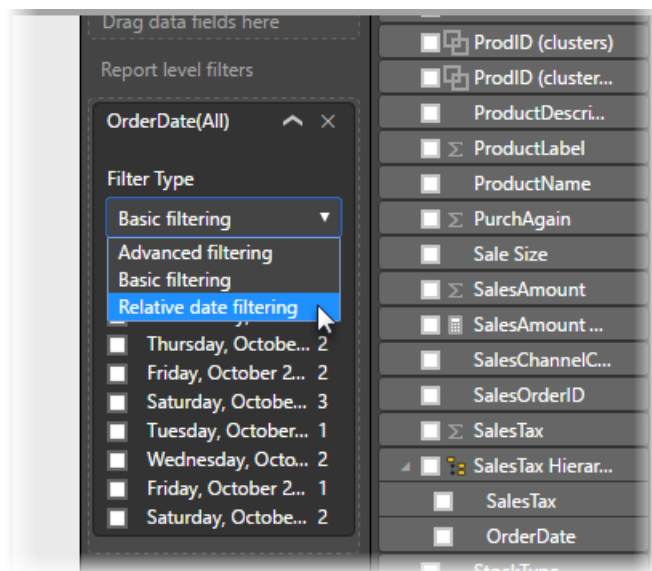
In comparison, if you selected *Months (Calendar)*, the visuals constrained would show data from May 1st through June 30th (the last two complete calendar months).

Using the relative date range filter

You can also create a relative date range filter for your report page, or your entire report. To do so, simply drag a date field into the **Page level filters** or the **Report level filters** areas in the **Field** pane, as shown in the following image.

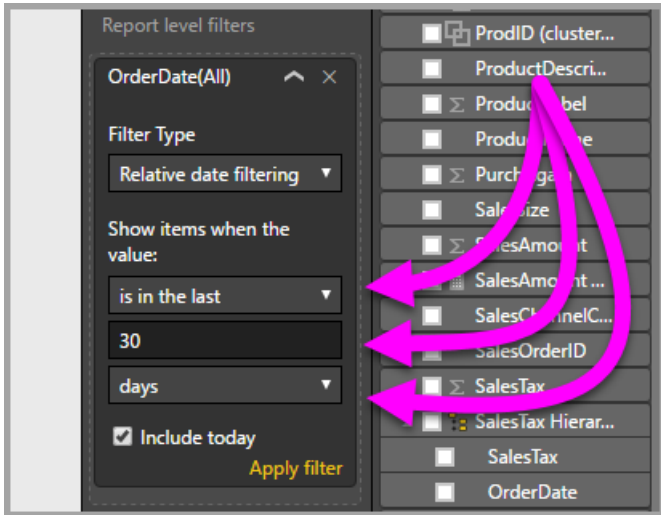


Once there, you can modify the relative date range in similar fashion to how the **relative date slicer** is customized. Select **Relative date filtering** from the **Filter Type** drop down.



Once **Relative date filtering** is selected, you see three sections to modify, including a middle numeric box, just like

the slicer.



And that's all there is to using these relative date constraints in your reports.

Limitations and considerations

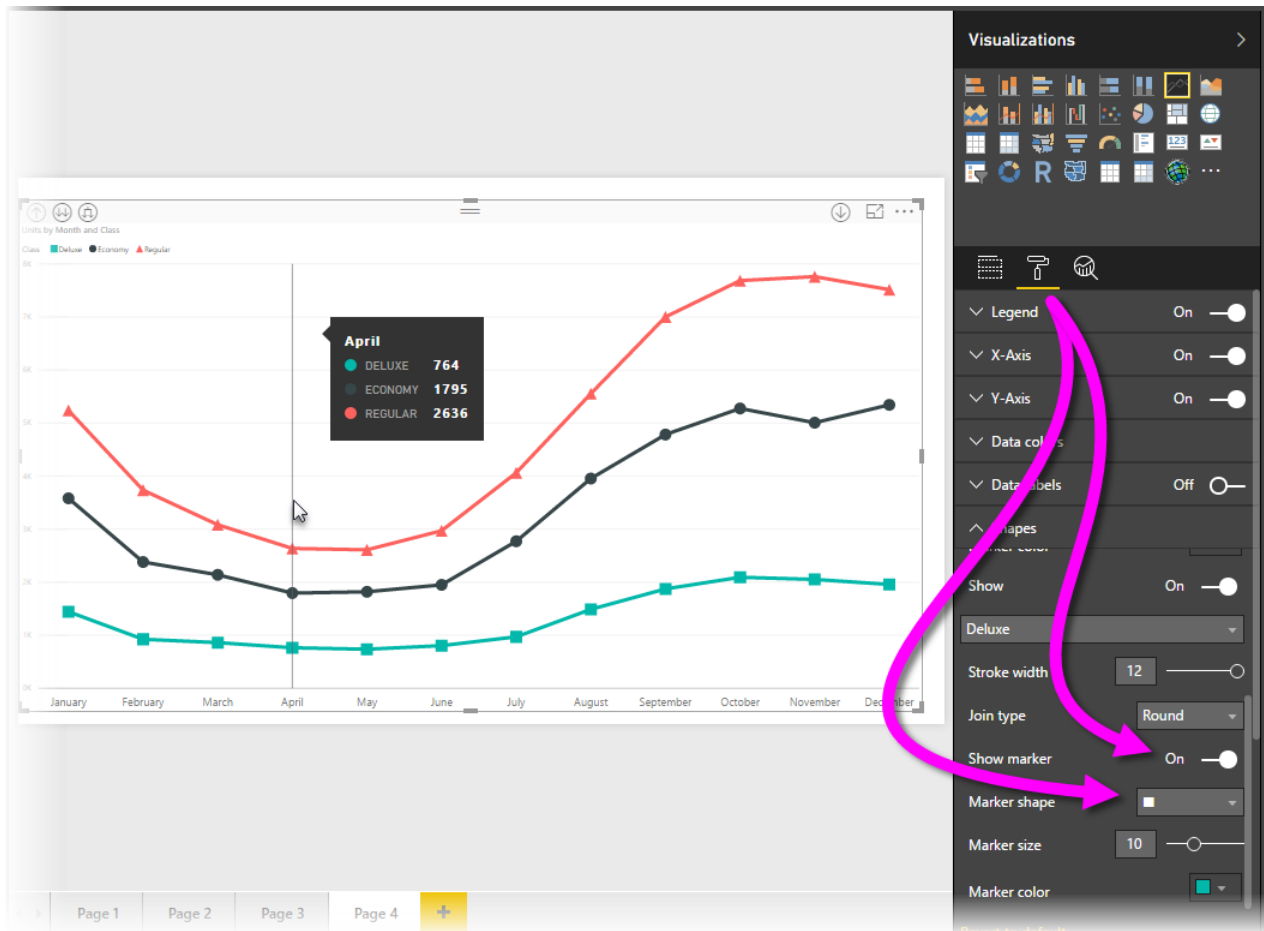
The following limitations and considerations currently apply to the **relative date range slicer** and filter.

- Data models in **Power BI** do not include time zone information. The models can store times, but there's no indication of the time zone they're in.
- The slicer and filter are always based on the time in UTC, so if you configure a filter in a report and send it to a colleague in a different time zone, you'll both see the same data. However, if you aren't in the UTC time zone you might see data for a different time offset than you expect.
- Data captured in a local time zone can be converted to UTC using the **Query Editor**.

Accessibility in Power BI Desktop reports

11/22/2017 • 3 min to read • [Edit Online](#)

Power BI Desktop has features that enable people with disabilities to more easily consume and interact with **Power BI Desktop** reports. These features include the ability to consume a report using the keyboard or a screen reader, tabbing to focus on various objects on a page, and thoughtful use of markers in visualizations.

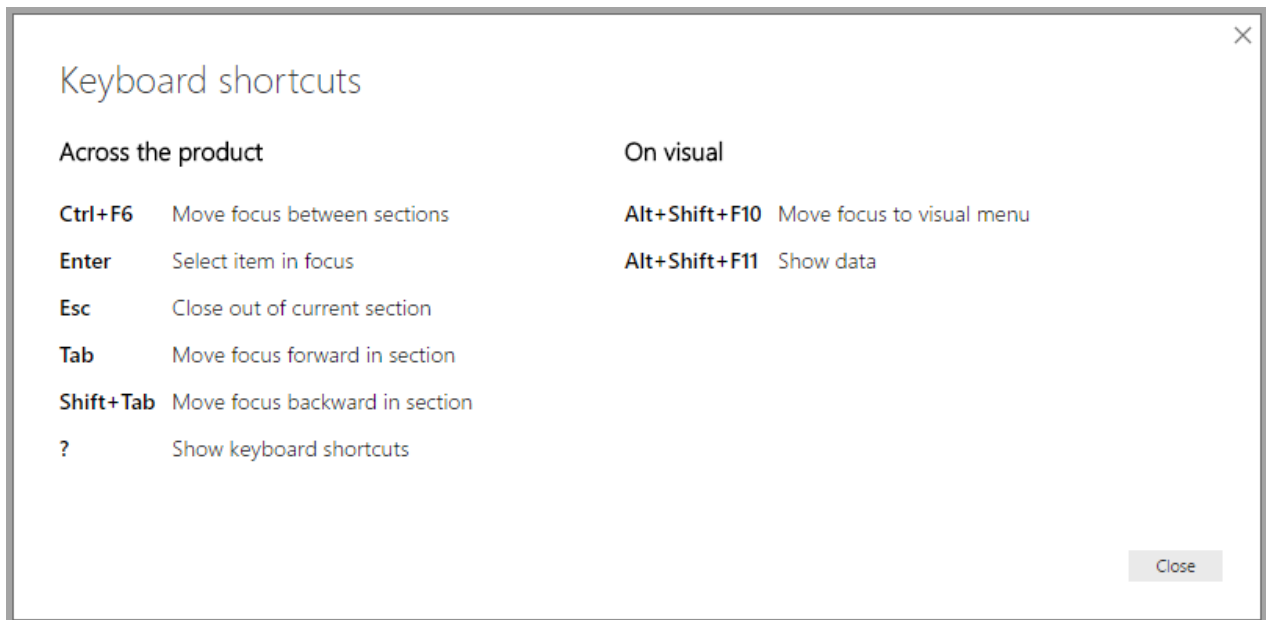


NOTE

These accessibility features are available with the June 2017 **Power BI Desktop** and later releases. Additional accessibility functionality is planned for future releases as well.

Consuming a Power BI Desktop report with a keyboard or screen reader

Beginning with the September 2017 release of **Power BI Desktop**, you can press the **?** key to show a window that describes the accessibility keyboard shortcuts available in **Power BI Desktop**.



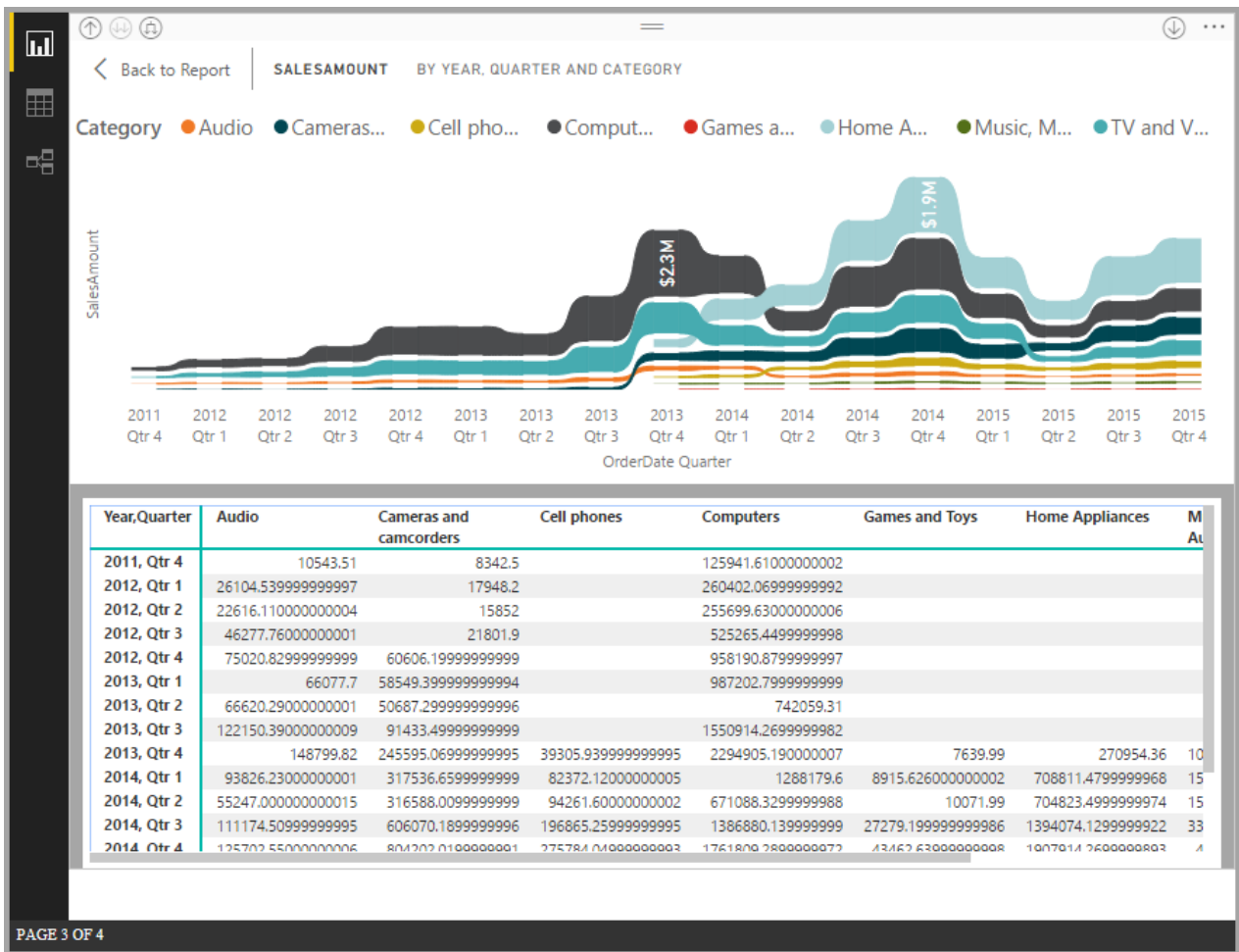
With the accessibility enhancements, you can consume a **Power BI Desktop** report with a keyboard or a screen reader with the following techniques:

You can **switch focus** between the report page tabs, or objects on a given report page, using **Ctrl+F6**.

- When focus is on *report page tabs*, use the *Tab* or *Arrow* keys to move focus from one report page to the next. The title of the report page, and whether it is currently selected, is read out by the screen reader. To load the report page currently under focus, use the *Enter* or *Space* key.
- When focus is on a loaded *report page*, use the *Tab* key to shift focus to each object on the page, which includes all textboxes, images, shapes, and charts. The screen reader reads the type of object, and a description of that object that's provided by its author.

You can press **Alt+Shift+F10** to move focus to a visual menu.

You can press **Alt+Shift+F11** to present an accessible version of the *See data* window.

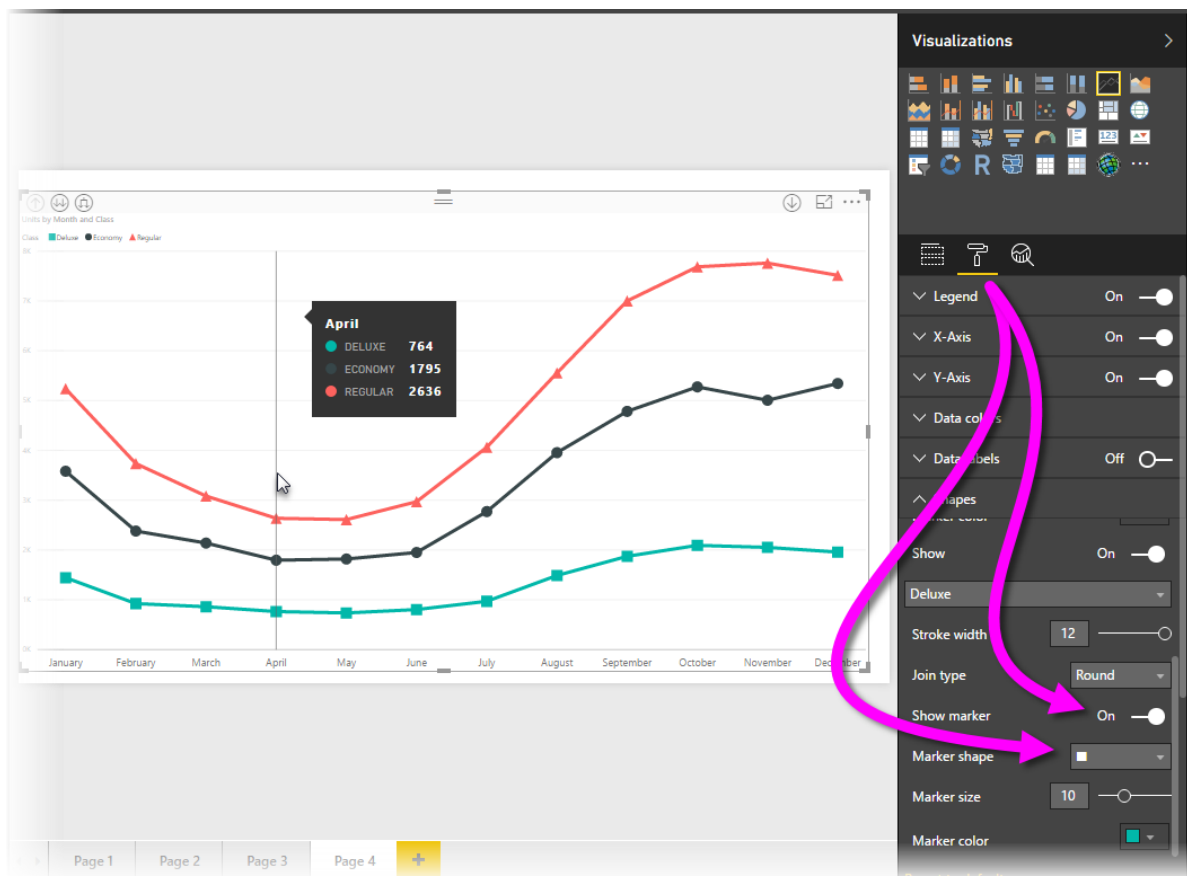


These accessibility additions were created to let users fully consume **Power BI Desktop** reports using a screen reader and keyboard navigation.

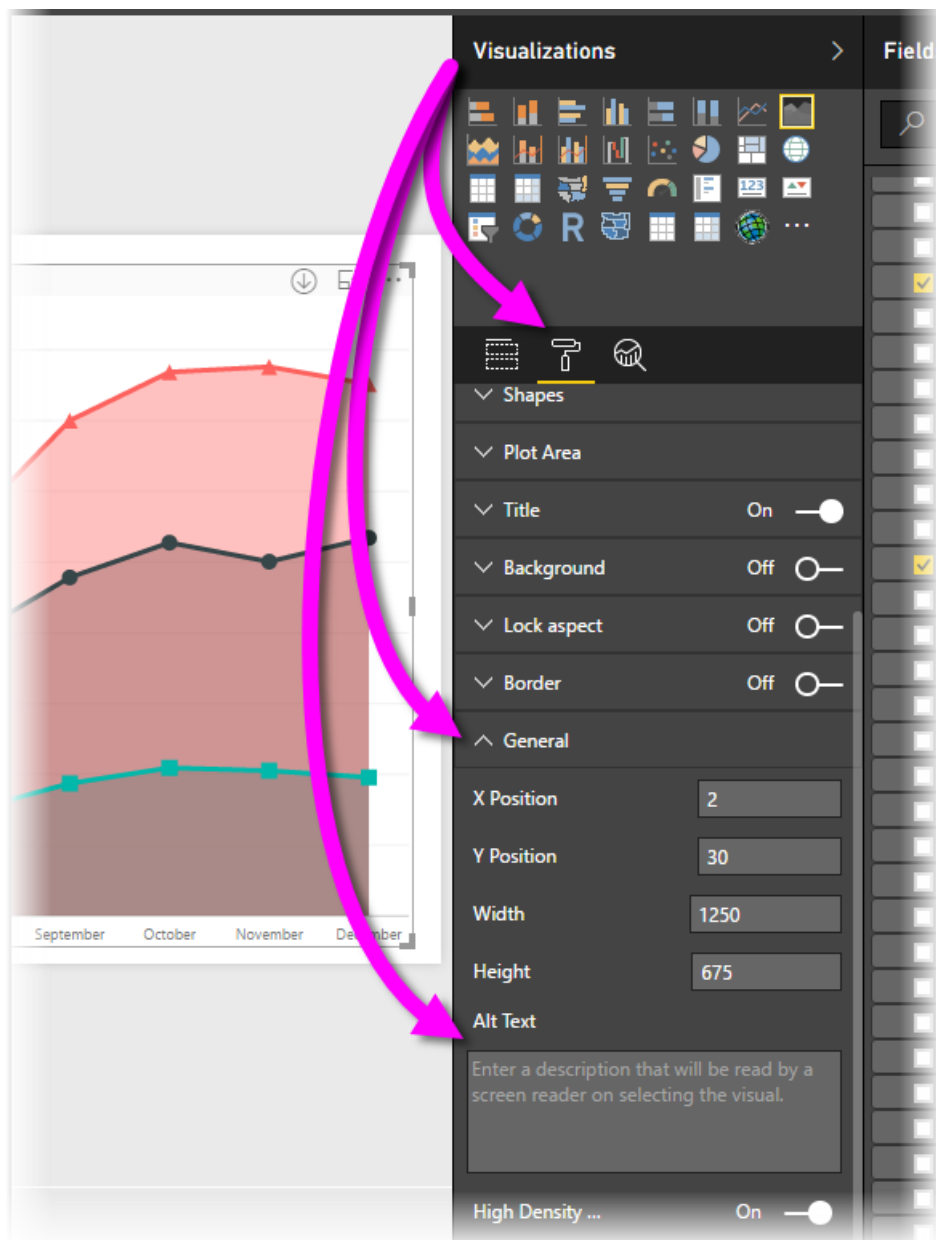
Tips for creating accessible reports

The following tips can help you create **Power BI Desktop** reports that are more accessible.

- For **Line**, **Area**, and **Combo** visuals, as well as for **Scatter** and **Bubble** visuals, turn markers on, and use a different *Marker shape* for each line.
 - To turn *Markers* on, select the **Format** section in the **Visualizations** pane, expand the **Shapes** section, then scroll down to find the **Markers** toggle and turn it to *On*.
 - Then, select the name of each line (or area, if using an **Area** chart) from the drop-down box in that **Shapes** section. Below the drop-down, you can then adjust many aspects of the marker used for the selected line, including its shape, color, and size.



- Using a different *Marker shape* for each line makes it easier for report consumers to differentiate lines (or areas) from each other.
- As a follow on to the previous bullet, don't rely on color to convey information. Using shapes on lines (markers, as described in the previous bullets) is helpful.
- Select a *theme* that is high contrast and color blind friendly from the theme gallery, and import it using the [Theming preview feature](#).
- For every object on a report, provide *Alt Text*. Doing so ensures that consumers of your report understand what you are trying to communicate with a visual, even if they cannot see the visual, image, shape, or textbox. You can provide *Alt Text* for any object on a **Power BI Desktop** report by selecting the object (such as a visual, shape, etc.) and in the **Visualizations** pane, select the **Format** section, expand **General**, then scroll to the bottom and fill in the **Alt Text** textbox.



- Make sure your reports have sufficient contrast between text and any background colors.
- Use text sizes and fonts that are easily readable. Small text size, or fonts that might be difficult to read, are unhelpful for accessibility.
- Include a title, axis labels, and data labels in all visuals.

Considerations and limitations

There are a few known issues and limitations to the accessibility features, described in the following list:

- JAWS is supported in reports that are viewed in the **Power BI service**, including any embedded reports. JAWS is also supported in **Power BI Desktop**, however you must open the screen reader before opening any **Power BI Desktop** files, in order for screen reading to work properly.

Next steps

- [Use Report Themes in Power BI Desktop \(Preview\)](#)

Use grouping and binning in Power BI Desktop

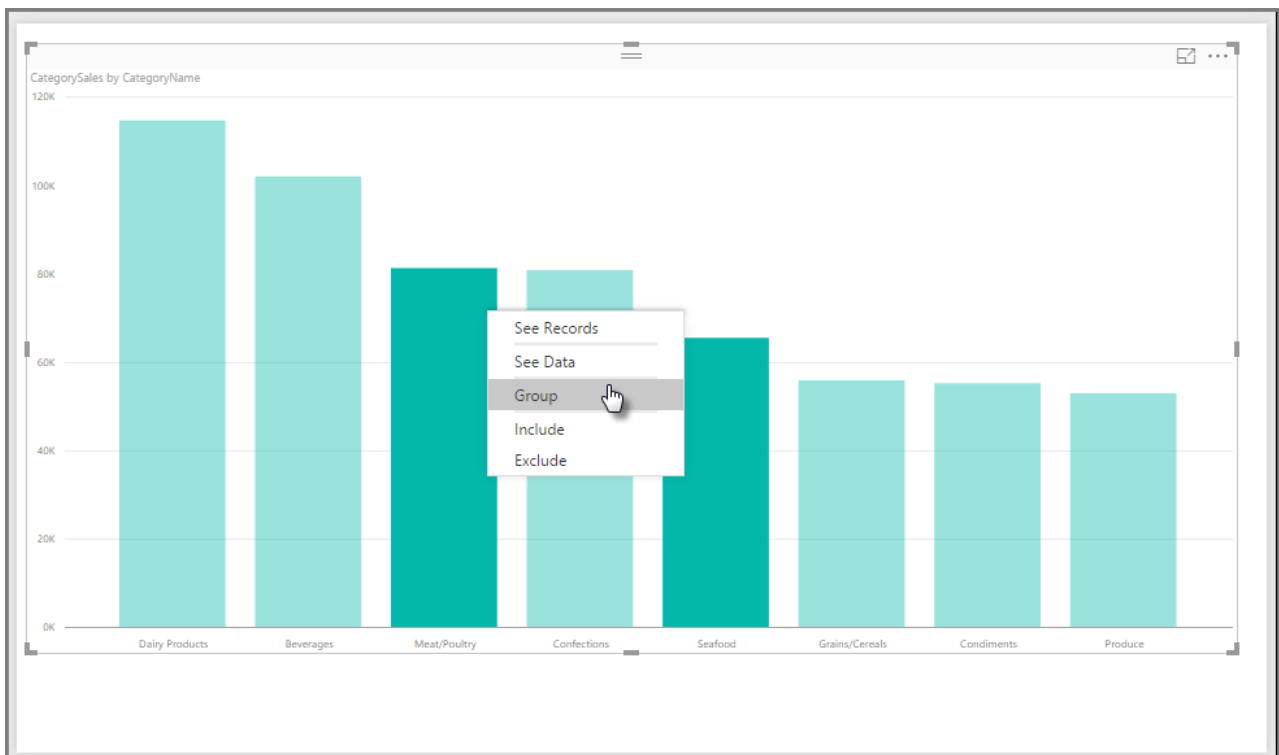
1/20/2018 • 2 min to read • [Edit Online](#)

When **Power BI Desktop** creates visuals, it aggregates your data into chunks (or **groups**) based on values found in the underlying data. Often that's fine, but there may be times when you want to refine how those chunks are presented. For example, you might want to place three categories of products in one larger category (one *group*). Or you might want to see sales figures put into bin-sizes of 1,000,000 dollars, instead of evenly-divided 923,983 dollars.

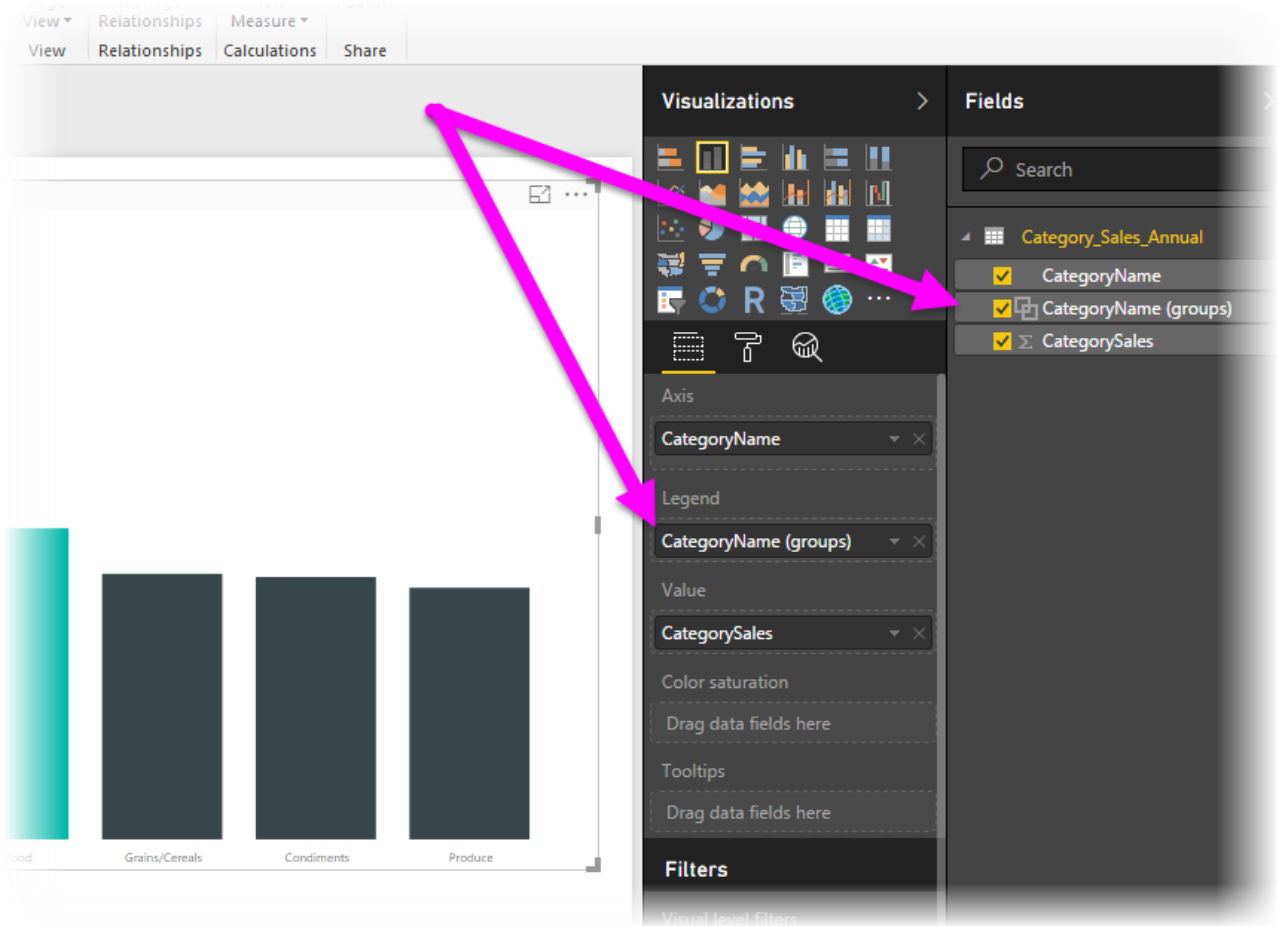
In Power BI Desktop, you can **group** data points to help you more clearly view, analyze, and explore data and trends in your visuals. You can also define the **bin size**, often called **binning**, to put values into equally sized groups that better enable you to visualize data in ways that are meaningful.

Using grouping

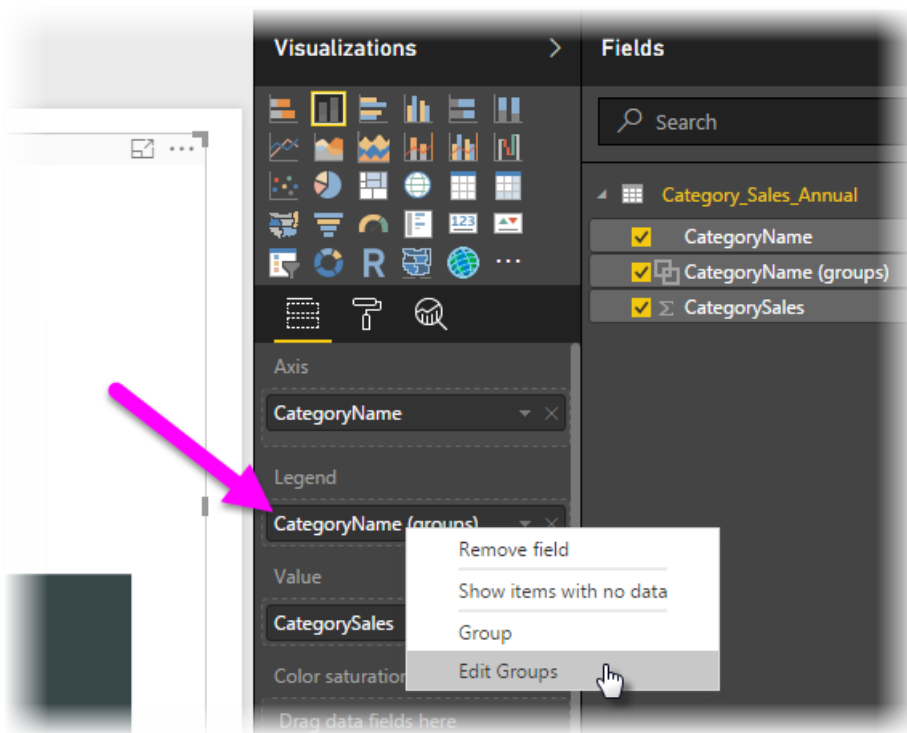
To use **grouping**, select two or more elements on a visual by using CTRL+CLICK to multi-select elements. Then right-click one of the multi-select elements, and select *Group* from the menu that appears.



Once created, the group is added to the **Legend** bucket for the visual, and also appears in the **Fields** list.



Once you have a group, you can easily edit the members of that group by right-clicking the field from the **Legend** bucket or from the **Fields** list, and selecting *Edit Groups*.



In the **Groups** window that appears you can create new groups, or modify existing groups. You can also *rename* any group by double-clicking on the **Group** title in the **Groups and members** box, and typing a new name.

There are all sorts of things you can do with groups in this window. You can add items from the **Ungrouped values** list into a new group, or into one of the existing groups. To create a new group, select two or more items (using CTRL+click) from the **Ungrouped values** box and then click the **Group** button below that box.

You can add an ungrouped value into an existing group: just select the Ungrouped value, then select the existing group to which you want to add it, and click the **Group** button. To remove an item from a group, select it from the **Groups and members** box and then click **Ungroup**. You can also select whether ungrouped categories should be placed into the **Other** group, or should remain ungrouped.

The screenshot shows the 'Groups' dialog box. At the top, there is a title bar with a close button. Below the title bar, there are two input fields: 'Name' with the value 'CategoryName (groups)' and 'Field' with the value 'CategoryName'. Below these is a 'Group type' dropdown menu set to 'List'. The main area is divided into two panes. The left pane, titled 'Ungrouped values', contains a list of categories: Beverages, Condiments, Confections, Dairy Products, Grains/Cereals, and Produce. The right pane, titled 'Groups and members', shows a tree view. It has two main groups: 'Meat/Poultry & Seafood' and 'Other'. Under 'Meat/Poultry & Seafood', there are sub-items 'Meat/Poultry' and 'Seafood'. Under 'Other', there is a sub-item 'Contains all ungrouped values'. At the bottom of the dialog, there are two buttons: 'Group' and 'Ungroup'. To the right of these buttons is a checkbox labeled 'Include Other group' which is checked. At the bottom right, there are two buttons: 'OK' and 'Cancel'.

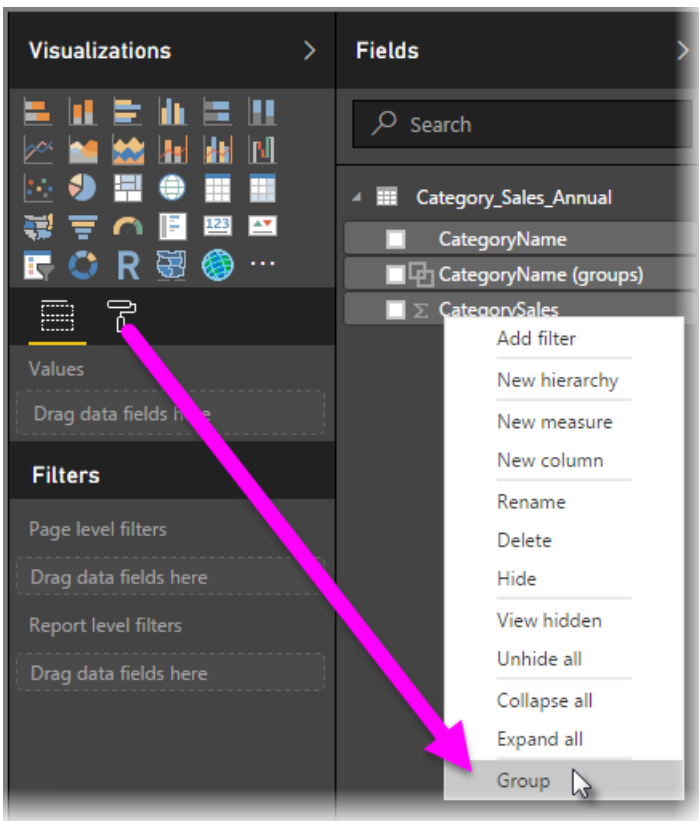
NOTE

You can create groups for any field in the **Fields** well, without having to multi-select from an existing visual. Just right-click the field, and select **Group** from the menu that appears.

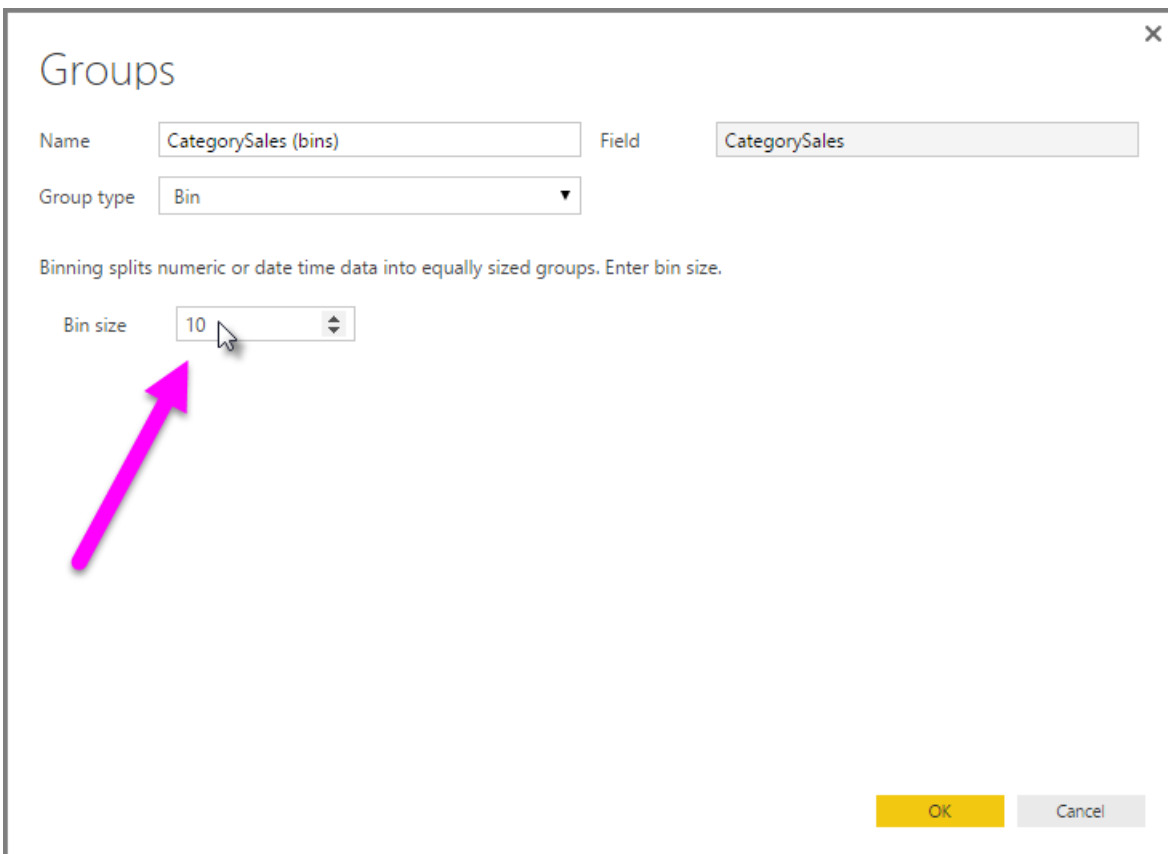
Using binning

You can set the bin size for numerical and time fields in **Power BI Desktop**. You can use binning to right-size the data that **Power BI Desktop** displays.

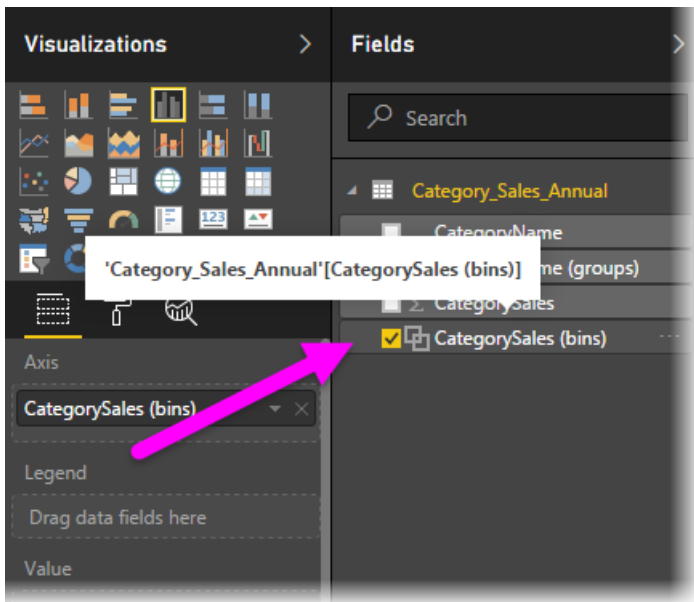
To apply a bin size, right-click a **Field** and select **Groups**.



From the **Groups** window, set the **Bin size** to the size you want.



When you select **OK**, you'll notice that a new field appears in the **Fields** pane with *(bins)* appended. You can then drag that field onto the canvas to use the bin size in a visual.



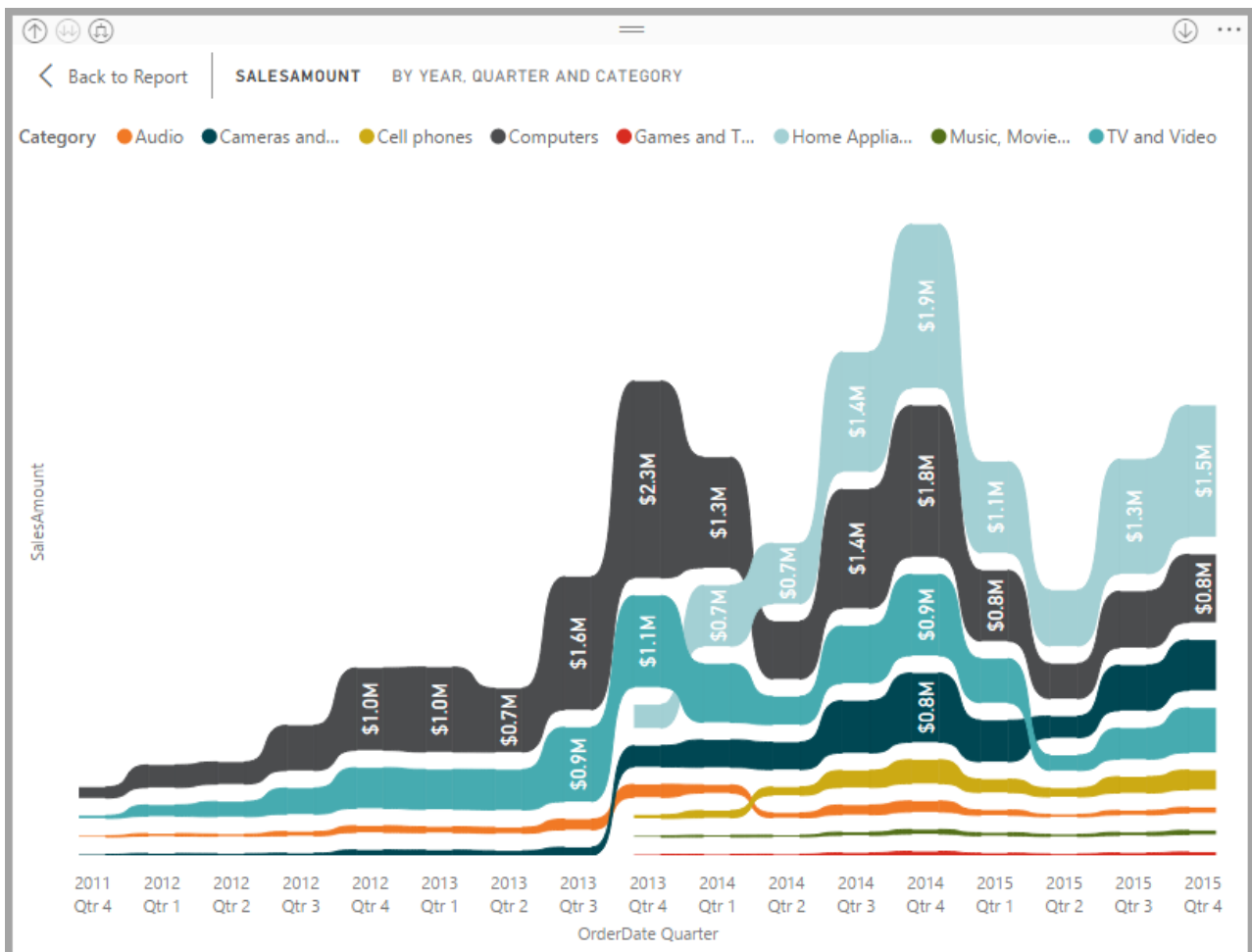
To see **binning** in action, take a look at this [video](#).

And that's all there is to using **grouping** and **binning** to ensure the visuals in your reports show your data just the way you want them to.

Use ribbon charts in Power BI

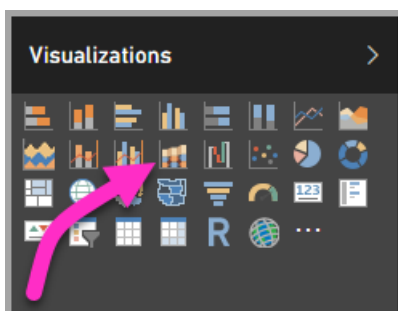
12/6/2017 • 1 min to read • [Edit Online](#)

You can use **ribbon charts** in **Power BI** to visualize data, and quickly determine which category of data has the highest rank (largest value). Ribbon charts are effective at showing rank change, with the highest rank (value) always displayed on top for each time period. Ribbon charts are available in **Power BI Desktop** starting with the September 2017 release, and in subsequent updates to the **Power BI service**.



Create a ribbon chart

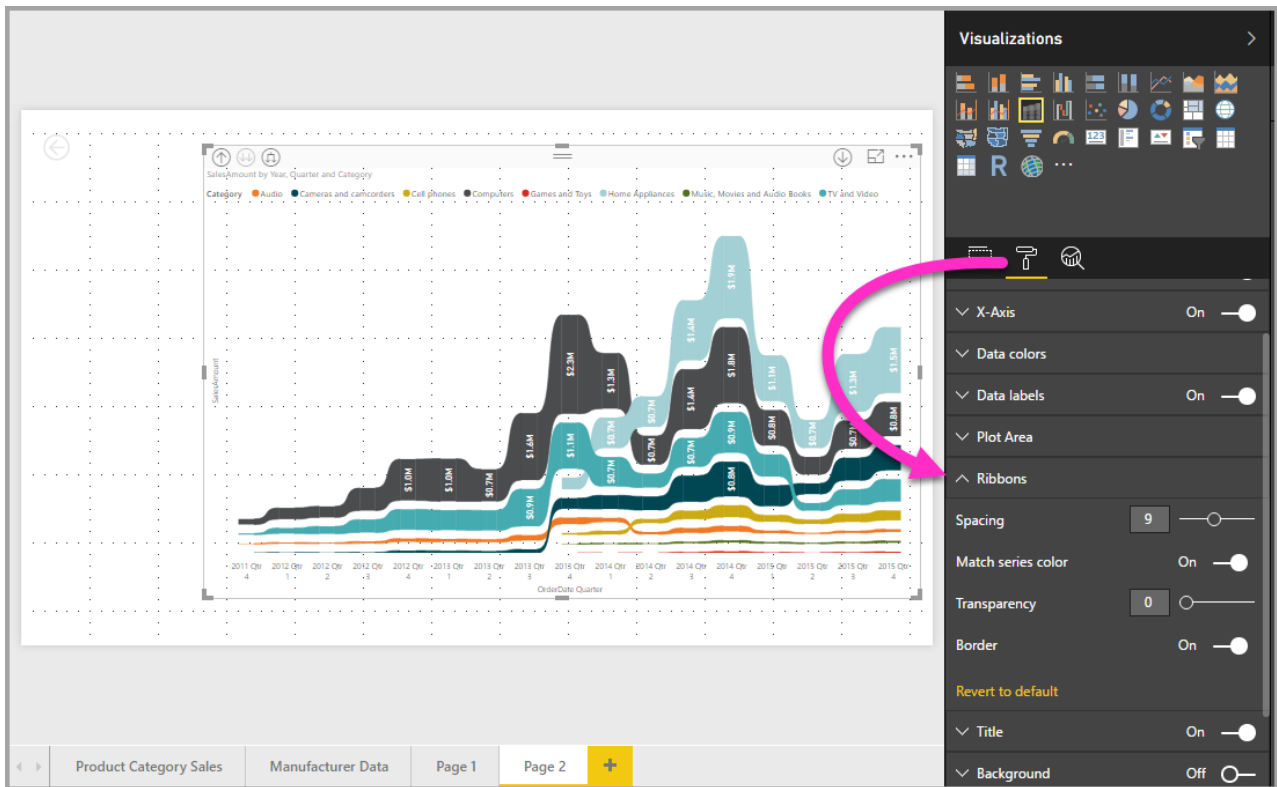
To create a ribbon chart, select **ribbon chart** from the **Visualizations** panel.



Ribbon charts connect a category of data over the visualized time continuum using ribbons, thereby enabling you to see how a given category ranks throughout the span of the chart's x-axis (usually the timeline).

Format a ribbon chart

When you create a ribbon chart, you have formatting options available in the **Format** section of the **Visualizations** pane. The formatting options for ribbon charts are similar to those for a stacked column chart, with additional formatting options that are specific to the ribbons.



These formatting options for ribbon charts let you adjust the following:

- **Spacing** lets you adjust how much space appears between ribbons. The number is the percentage of the column's maximum height.
- **Match series color** allows you to match the color of the ribbons with the series color. When off, ribbons are gray.
- **Transparency** specifies how transparent the ribbons are, with the default set to 30.
- **Border** lets you place a dark border on the top and bottom of the ribbons. By default, borders are off.

Next steps

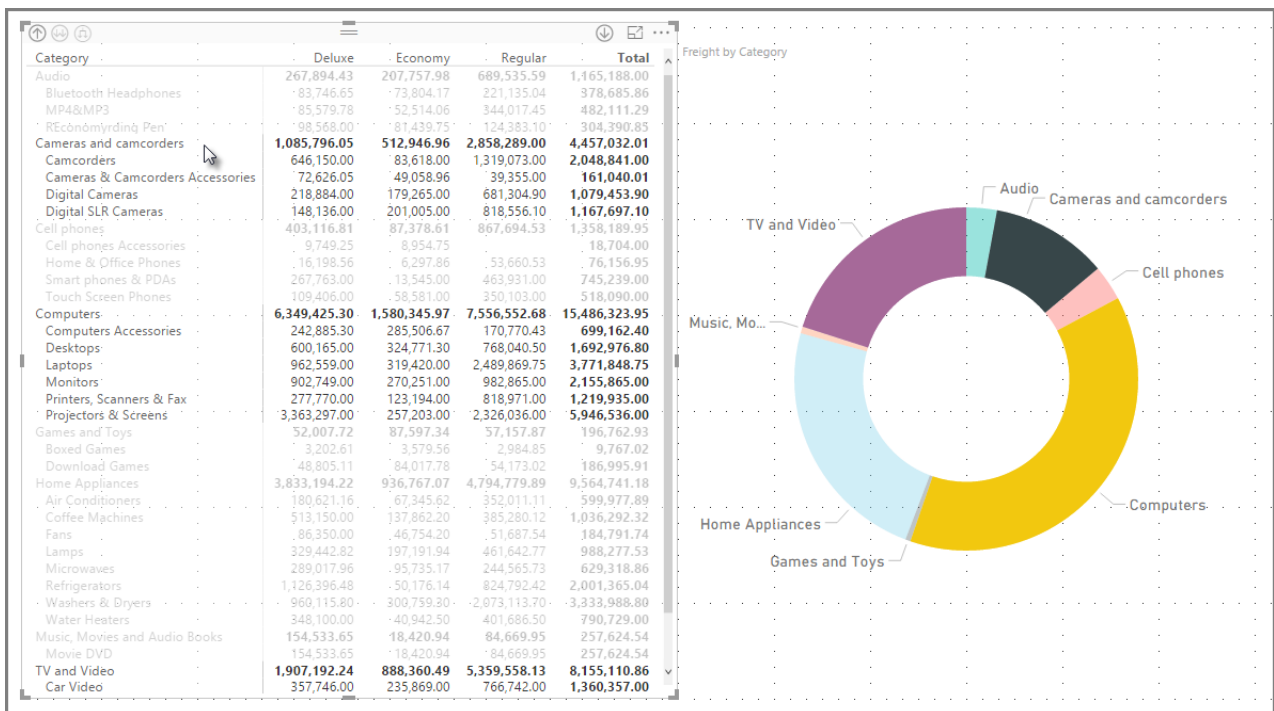
For more information about **Power BI Desktop**, and how to get started, check out the following articles.

- [Getting Started with Power BI Desktop](#)
- [Query Overview with Power BI Desktop](#)
- [Data Sources in Power BI Desktop](#)
- [Connect to Data in Power BI Desktop](#)
- [Shape and Combine Data with Power BI Desktop](#)
- [Common Query Tasks in Power BI Desktop](#)

Use the Matrix visual in Power BI Desktop

1/25/2018 • 6 min to read • [Edit Online](#)

With the **Matrix** visual, you can create matrix visuals (sometimes also referred to as *tables*) in **Power BI Desktop** reports, and cross-highlight elements within the matrix with other visuals. In addition, you can select rows, columns, and even individual cells and cross-highlight. Lastly, to make better use of layout space, the matrix visual supports a stepped layout.



There are many features associated with the matrix, and we'll go through them in the following sections of this article.

NOTE

Beginning with the July 2017 release of **Power BI Desktop**, matrix and table visuals reflect styling (including colors) from the applied **Report Theme**. These may not be the colors you expect for your matrix visual, which you can change in your **Report Theme** configuration. See [Use Report Themes in Power BI Desktop](#) for more information about themes.

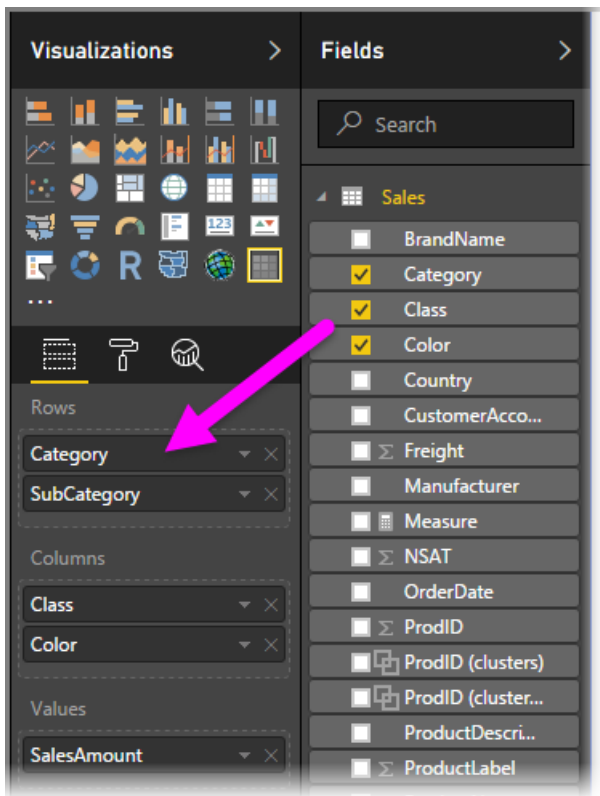
Using drill-down with the Matrix visual

With the **Matrix** visual, you can do all sorts of interesting drill-down activities that weren't available before. This includes the ability to drill-down using rows, columns, and even into individual sections and cells. Let's take a look at how each of these work.

Drill-down on row headers

In the **Visualizations** pane, when you add multiple fields to the **Rows** section of the **Fields** well, you enable drill-down on the rows of the matrix visual. This is similar to creating a hierarchy, which then allows you to drill-down (and then back up) through that hierarchy, and analyze the data at each level.

In the following image, the **Rows** section contains *Category* and *SubCategory*, creating a grouping (or hierarchy) in the rows that we can drill through.



When the visual has grouping created in the **Rows** section, the visual itself displays the *drill* and *expand* icons in the top-left corner of the visual.

Category.	Deluxe	Economy	Regular	Total
Audio	267,894.43	207,757.98	689,535.59	1,165,188.00
Cameras and camcorders	1,085,796.05	512,946.96	2,858,289.00	4,457,032.01
Cell phones	403,116.81	87,378.61	867,694.53	1,358,189.95
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
Games and Toys	52,007.72	87,597.34	57,157.87	196,762.93
Home Appliances	3,833,194.22	936,767.07	4,794,779.89	9,564,741.18
Music, Movies and Audio Books	154,533.65	18,420.94	84,669.95	257,624.54
TV and Video	1,907,192.24	888,360.49	5,359,558.13	8,155,110.86

Similar to the drill and expand behavior in other visuals, selecting those buttons lets us drill-down (or back up) through the hierarchy. In this case we can drill down from *Category* to *SubCategory*, as shown in the following image, where the drill-down one level icon (the pitchfork) has been selected.

Category	Deluxe	Economy	Regular	Total
Audio	267,894.43	207,757.98	689,535.59	1,165,188.00
Bluetooth Headphones	83,746.65	73,804.17	221,135.04	378,685.86
MP4&MP3	85,579.78	52,514.06	344,017.45	482,111.29
REconomyrding Pen	98,568.00	81,439.75	124,383.10	304,390.85
Cameras and camcorders	1,085,796.05	512,946.96	2,858,289.00	4,457,032.01
Camcorders	646,150.00	83,618.00	1,319,073.00	2,048,841.00
Cameras & Camcorders Accessories	72,626.05	49,058.96	39,355.00	161,040.01
Digital Cameras	218,884.00	179,265.00	681,304.90	1,079,453.90
Digital SLR Cameras	148,136.00	201,005.00	818,556.10	1,167,697.10
Cell phones	403,116.81	87,378.61	867,694.53	1,358,189.95
Cell phones Accessories	9,749.25	8,954.75		18,704.00
Home & Office Phones	16,198.56	6,297.86	53,660.53	76,156.95
Smart phones & PDAs	267,763.00	13,545.00	463,931.00	745,239.00
Touch Screen Phones	109,406.00	58,581.00	350,103.00	518,090.00
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
Computers Accessories	242,885.30	285,506.67	170,770.43	699,162.40
Desktops	300,165.00	324,771.30	768,040.50	1,692,976.80
Laptops	362,559.00	319,420.00	2,489,869.75	3,771,848.75
Monitors	902,749.00	270,251.00	982,865.00	2,155,865.00

In addition to using those icons, you can right-click on any of those row headers, and drill down by selecting from the menu that appears.

Category	Deluxe	Economy	Regular	Total
Audio	267,894.43	207,757.98	689,535.59	1,165,188.00
Cameras and camcorders	1,085,796.05	512,946.96	2,858,289.00	4,457,032.01
Cell phones	403,116.81	87,378.61	867,694.53	1,358,189.95
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
Games and	07.72	87,597.34	57,157.87	196,762.93
Home Appl	94.22	936,767.07	4,794,779.89	9,564,741.18
Music, Mov	33.65	18,420.94	84,669.95	257,624.54
TV and Vide	92.24	888,360.49	5,359,558.13	8,155,110.86

Notice there are a few options from the menu that appears, which generates different results:

Selecting **Drill Down** expands the matrix for *that* row level, *excluding* all other row headings except the row header that was right-clicked. In the following image, *Computers* was right-clicked, and **Drill Down** was selected. Notice that other top-level rows no longer appear in the matrix. This is a useful feature, and becomes especially cool when we get to the **cross-highlighting** section.

Category	Deluxe	Economy	Regular	Total
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
Computers Accessories	242,885.30	285,506.67	170,770.43	699,162.40
Desktops	600,165.00	324,771.30	768,040.50	1,692,976.80
Laptops	962,559.00	319,420.00	2,489,869.75	3,771,848.75
Monitors	902,749.00	270,251.00	982,865.00	2,155,865.00
Printers, Scanners & Fax	277,770.00	123,194.00	818,971.00	1,219,935.00
Projectors & Screens	3,363,297.00	257,203.00	2,326,036.00	5,946,536.00

We can click the **Drill up** icon to get back to the previous top-level view. If we then select **Show Next Level** from the right-click menu, we get an alphabetical listing of all the next-level items (in this case, the *SubCategory* field), without the higher-level hierarchy categorization.

SubCategory	Deluxe	Economy	Regular	Total
Air Conditioners	180,621.16	67,345.62	352,011.11	599,977.89
Bluetooth Headphones	83,746.65	73,804.17	221,135.04	378,685.86
Boxed Games	3,202.61	3,579.56	2,984.85	9,767.02
Camcorders	646,150.00	83,618.00	1,319,073.00	2,048,841.00
Cameras & Camcorders Accessories	72,626.05	49,058.96	39,355.00	161,040.01
Car Video	357,746.00	235,869.00	766,742.00	1,360,357.00
Cell phones Accessories	9,749.25	8,954.75		18,704.00
Coffee Machines	513,150.00	137,862.20	385,280.12	1,036,292.32
Computers Accessories	242,885.30	285,506.67	170,770.43	699,162.40
Desktops	600,165.00	324,771.30	768,040.50	1,692,976.80
Digital Cameras	218,884.00	179,265.00	681,304.90	1,079,453.90
Digital SLR Cameras	148,136.00	201,005.00	818,556.10	1,167,697.10
Download Games	48,805.11	84,017.78	54,173.02	186,995.91
Fans	86,350.00	46,754.20	51,687.54	184,791.74
Home & Office Phones	16,198.56	6,297.86	53,660.53	76,156.95
Home Theater System	275,032.00	419,320.90	3,232,484.00	3,926,836.90
Lamps	329,442.82	197,191.94	461,642.77	988,277.53
Laptops	962,559.00	319,420.00	2,489,869.75	3,771,848.75
Microwaves	289,017.96	95,735.17	244,565.73	629,318.86

When we click on the **Drill up** icon in the upper-left corner to have the matrix show all top-level categories, then right-click again and select **Expand to next level**, we see the following:

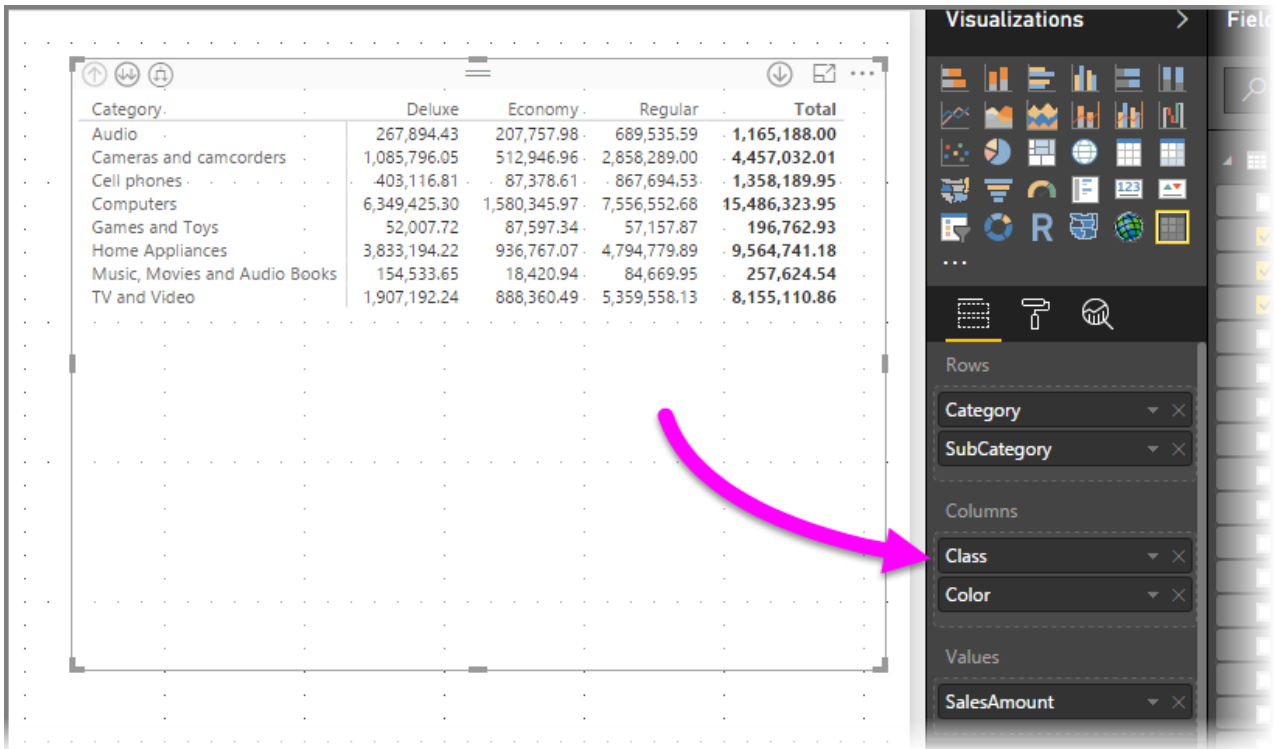
Category	Deluxe	Economy	Regular	Total
Audio	267,894.43	207,757.98	689,535.59	1,165,188.00
Cameras and camcorders	1,085,796.05	512,946.96	2,858,289.00	4,457,032.01
Cell phones	403,116.81	87,378.61	867,694.53	1,358,189.95
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95
Games and Toys	87,597.34	57,157.87		196,762.93
Home Appliances	936,767.07	4,794,779.89		9,564,741.18
Music, Movies and TV and Video	18,420.94	84,669.95		257,624.54
	888,360.49	5,359,558.13		8,155,110.86

You can also use the **Include** and **Exclude** menu items to keep (or remove, respectively) the right-clicked row (and any subcategories) from the matrix.

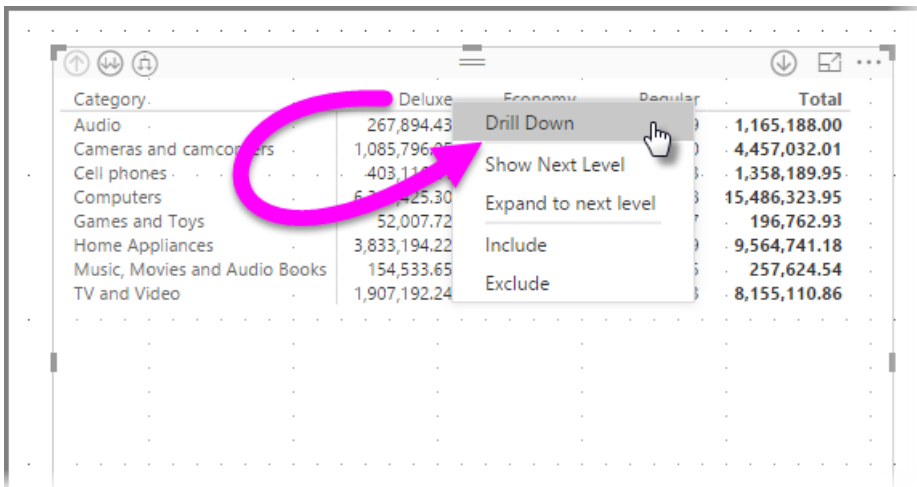
Drill-down on column headers

Similar to the ability to drill-down on Rows, you can also drill-down on **Columns**. In the following image, you can

see that there are two fields in the **Columns** field well, creating a hierarchy similar to what we used for the rows earlier in this article. In the **Columns** field well, we have *Class* and *Color*.



In the **Matrix** visual, when we right-click a column, we see the option to drill-down. In the following image, we right-click on *Deluxe* and select **Drill Down**.



When **Drill Down** is selected, the next level of the column hierarchy for *Deluxe* is displayed, which in this case is *Color*.

Class	Deluxe	Azure	Black	Blue	Brown	Gold
Audio		67,221.01		37,441.65		
Cameras and camcorders	3,668.00	278,474.80		151,482.00		35,157.00
Cell phones		142,796.92				53,266.00
Computers		2,087,994.80		198,663.15	181,590.60	
Games and Toys		5,485.30		31,416.40		
Home Appliances		209,196.43		522,115.00	169,599.47	
Music, Movies and Audio Books		50,955.11				8,322.00
TV and Video		538,392.43			538,269.82	

The rest of the right-click menu items work on Columns in the same way they do for rows (see the previous section, **Drill-down on row headers**). You can **Show Next Level**, **Expand to next level**, and **Include** or **Exclude** your columns just as you can with rows.

NOTE

The icons drill-down and drill-up icons in the upper left of the matrix visual only apply to rows. In order to drill-down on columns, you must use the right-click menu.

Stepped layout with matrix visuals

The **Matrix** visual automatically indents subcategories in a hierarchy beneath each parent, which is called a **stepped layout**.

In the *original* version of the matrix visual, subcategories were shown in an entirely different column, taking up much more space in the visual. The following image shows the table in original **matrix** visual; notice the subcategories in a completely separate column.

Home & Office Phones	3,501.00
Smart phones & PDAs	102,441.00
Touch Screen Phones	31,015.00
Total	142,796.92
Computers	2,087,994.80
Computers Accessories	57,207.00
Desktops	186,762.00
Laptops	311,760.00
Monitors	442,913.00
Printers, Scanners & Fax	62,824.00
Projectors & Screens	1,026,528.00
Total	2,087,994.80

In the following image, you see a **Matrix** visual, with **stepped layout** in action. Notice the category *Computers* has its subcategories (Computers Accessories, Desktops, Laptops, Monitors, and so on) slightly indented, providing a cleaner and much more condensed visual.

Home & Office Phones	16,198.56	6,297.86	53,660.53	76,157.95
Smart phones & PDAs	267,763.00	13,545.00	463,931.00	745,240.00
Touch Screen Phones	109,406.00	58,581.00	350,103.00	518,090.00
Computers	6,349,425.30	1,580,345.97	7,556,552.68	15,486,324.95
Computers Accessories	242,885.30	285,506.67	170,770.43	699,162.40
Desktops	600,165.00	324,771.30	768,040.50	1,692,976.80
Laptops	962,559.00	319,420.00	2,489,869.75	3,771,848.75
Monitors	902,749.00	270,251.00	982,865.00	2,155,865.00
Printers, Scanners & Fax	277,770.00	123,194.00	818,971.00	1,219,935.00
Projectors & Screens	3,363,297.00	257,203.00	2,326,036.00	5,946,536.00
Games and Toys	52,007.72	87,597.34	57,157.87	196,762.93
Boxed Games	3,202.61	3,579.56	2,984.85	9,767.02

You can easily adjust the **stepped layout** settings. With the **Matrix** visual selected, in the **Format** section (the paint roller icon) of the **Visualizations** pane, expand the **Row headers** section. In there are two options: the **Stepped layout** toggle (which turns it off or on), and the **Stepped layout indentation** (specifies the indentation amount, in pixels).

The image shows a screenshot of the Power BI Visualizations pane. The 'Matrix style' section is expanded, and the 'Row headers' section is also expanded. The 'Stepped layout' toggle is set to 'On', and the 'Stepped layout indentation' is set to 10 pixels. A pink arrow points to the 'Stepped layout' toggle, and another pink arrow points to the 'Stepped layout indentation' slider. The background shows a matrix visual with row headers and data values.

If you turn off **Stepped layout**, the subcategories are shown in another column rather than indented beneath the parent category.

Subtotals with matrix visuals

You can turn subtotals on or off in matrix visuals, for both rows and columns. In the following image, you can see that the row subtotals are set to **on**.

Category	SubCategory	Deluxe	Economy	Regular	Total
Audio	Bluetooth Headphones	83,746.65	73,804.17	221,135.04	378,685.86
	MP4&MP3	85,579.78	52,514.06	344,017.45	482,111.29
	REconomyrding Pen	98,568.00	81,439.75	124,383.10	304,390.85
	Total	267,894.43	207,757.98	689,535.59	1,165,188.00
Cameras and camcorders	Camcorders	646,150.00	83,618.00	1,319,073.00	2,048,841.00
	Cameras & Camcorders Accessories	72,626.05	49,058.96	39,355.00	161,040.01
	Digital Cameras	218,884.00	179,265.00	681,304.90	1,079,453.90
	Digital SLR Cameras	148,136.00	201,005.00	818,556.10	1,167,697.10
Total	1,085,796.05	512,946.96	2,858,289.00	4,457,032.01	
Cell phones	Cell phones Accessories	9,749.25	8,954.75		18,704.00
	Home & Office Phones	16,198.56	6,297.86	53,660.53	76,156.95
	Smart phones & PDAs	267,763.00	13,545.00	463,931.00	745,239.00
	Touch Screen Phones	109,406.00	58,581.00	350,103.00	518,090.00
Total	403,116.81	87,378.61	867,694.53	1,358,189.95	
Computers	Computers Accessories	242,885.30	285,506.67	170,770.43	699,162.40
	Desktops	600,165.00	324,771.30	768,040.50	1,692,976.80
	Laptops	962,559.00	319,420.00	2,489,869.75	3,771,848.75
	Monitors	902,749.00	270,251.00	982,865.00	2,155,865.00
	Printers, Scanners & Fax	277,770.00	123,194.00	818,971.00	1,219,935.00
	Projectors & Screens	3,363,297.00	257,203.00	2,326,036.00	5,946,536.00
Total	6,349,425.30	1,580,345.97	7,556,552.68	15,486,323.95	
Games and Toys	Boxed Games	3,202.61	3,579.56	2,984.85	9,767.02
	Download Games	48,805.11	84,017.78	54,173.02	186,995.91
	Total	52,007.72	87,597.34	57,157.87	196,762.93

In the **Format** section of the **Visualizations** pane, expand the **Subtotals** card and turn the **Row subtotals** slider to **Off**. When you do so, the subtotals are not shown.

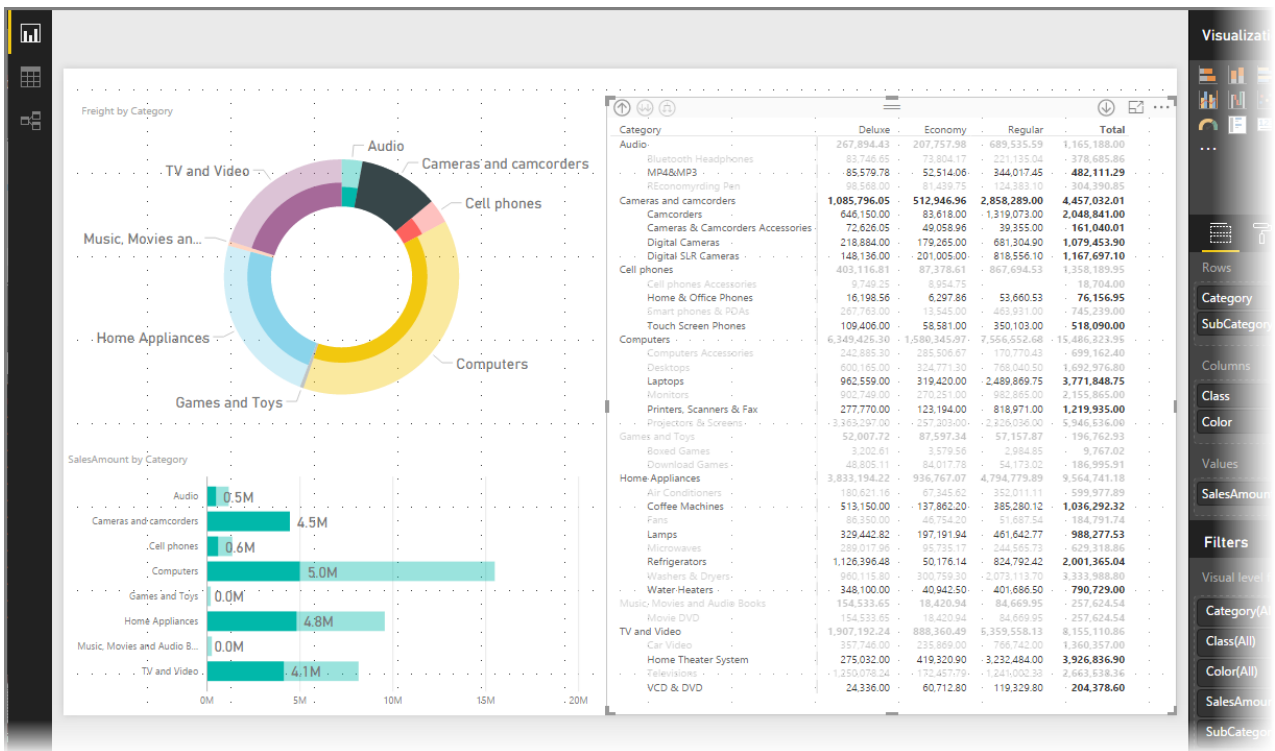
Category	SubCategory	Deluxe	Economy	Regular	Total
Audio	Bluetooth Headphones	83,746.65	73,804.17	221,135.04	378,685.86
	MP4&MP3	85,579.78	52,514.06	344,017.45	482,111.29
	REconomyrding Pen	98,568.00	81,439.75	124,383.10	304,390.85
Cameras and camcorders	Camcorders	646,150.00	83,618.00	1,319,073.00	2,048,841.00
	Cameras & Camcorders Accessories	72,626.05	49,058.96	39,355.00	161,040.01
	Digital Cameras	218,884.00	179,265.00	681,304.90	1,079,453.90
	Digital SLR Cameras	148,136.00	201,005.00	818,556.10	1,167,697.10
Cell phones	Cell phones Accessories	9,749.25	8,954.75		18,704.00
	Home & Office Phones	16,198.56	6,297.86	53,660.53	76,156.95
	Smart phones & PDAs	267,763.00	13,545.00	463,931.00	745,239.00
	Touch Screen Phones	109,406.00	58,581.00	350,103.00	518,090.00
Computers	Computers Accessories	242,885.30	285,506.67	170,770.43	699,162.40
	Desktops	600,165.00	324,771.30	768,040.50	1,692,976.80
	Laptops	962,559.00	319,420.00	2,489,869.75	3,771,848.75
	Monitors	902,749.00	270,251.00	982,865.00	2,155,865.00
	Printers, Scanners & Fax	277,770.00	123,194.00	818,971.00	1,219,935.00
	Projectors & Screens	3,363,297.00	257,203.00	2,326,036.00	5,946,536.00
Games and Toys	Boxed Games	3,202.61	3,579.56	2,984.85	9,767.02
	Download Games	48,805.11	84,017.78	54,173.02	186,995.91
	Home Appliances				
Home Appliances	Air Conditioners	180,621.16	67,345.62	352,011.11	599,977.89
	Coffee Machines	513,150.00	137,862.20	385,280.12	1,036,292.32
	Fans	86,350.00	46,754.20	51,687.54	184,791.74
	Lamps	329,442.82	197,191.94	461,642.77	988,277.53
	Microwaves	289,017.96	95,735.17	244,565.73	629,318.86

The same process applies for column subtotals.

Cross-highlighting with matrix visuals

With the **Matrix** visual, any elements in the matrix can be selected as the basis for cross-highlighting. Select a column in a **Matrix** and that column is highlighted, as are any other visuals on the report page. This has been a common feature of other visuals and the selection of a data point, and now the **Matrix** visual can participate.

In addition, using CTRL+Click also works for cross-highlighting. For example, in the following image a collection of subcategories were selected from the **Matrix** visual. Notice how items that weren't selected from the visual are grayed out, and how the other visuals on the page reflect the selections made in the **Matrix** visual.

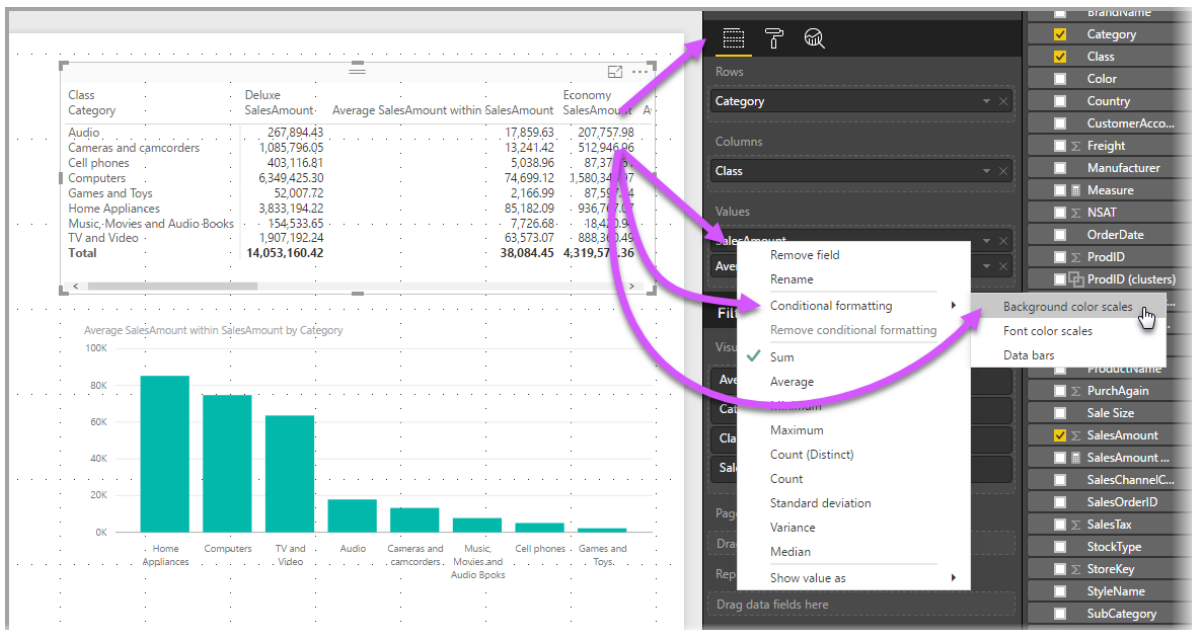


Shading and font colors with matrix visuals

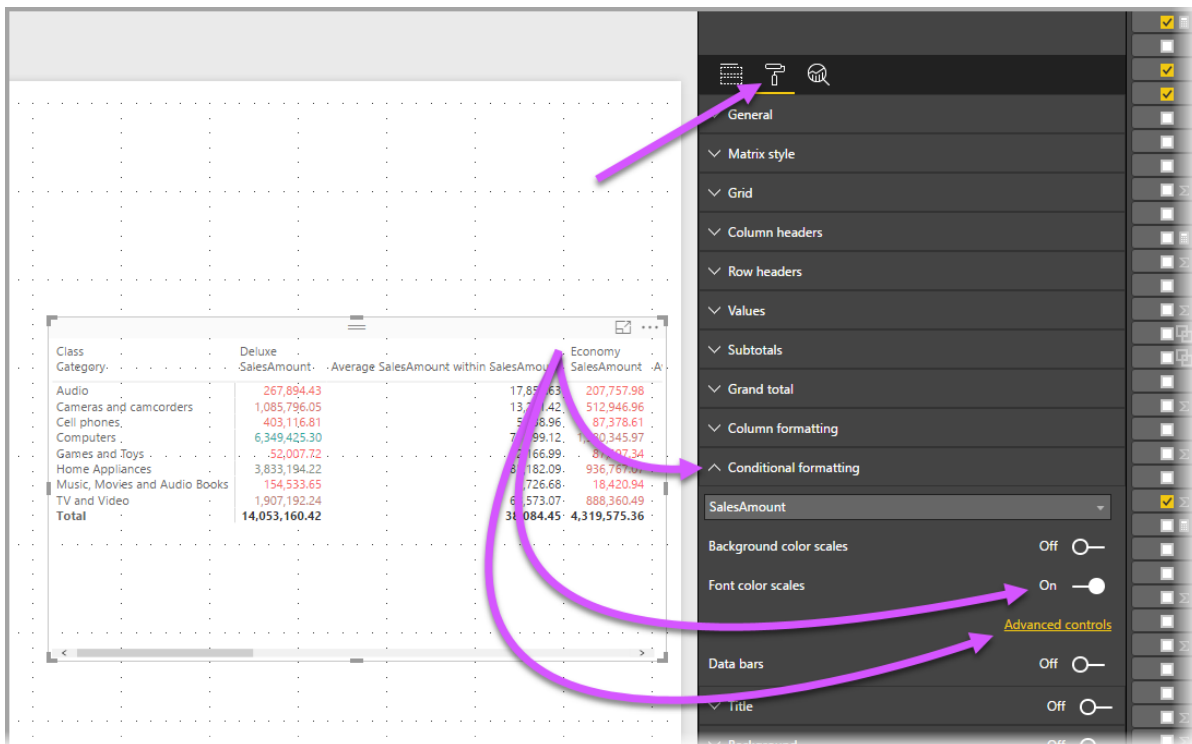
With the **Matrix** visual, you can apply **conditional formatting** (colors and shading) to the background of cells within the matrix, and you can apply conditional formatting to the text and values themselves.

To apply conditional formatting, you can do either of the following when a matrix visual is selected:

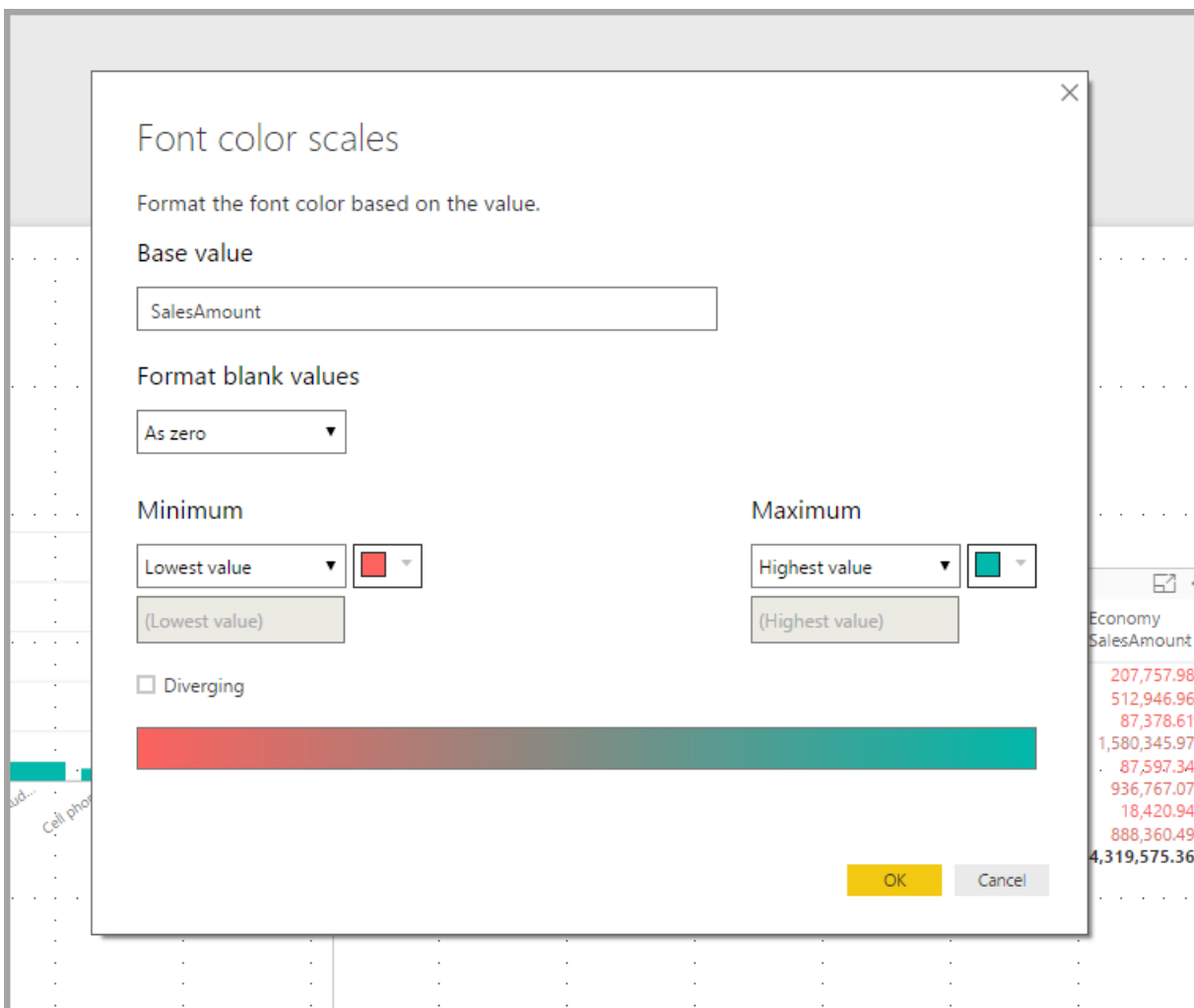
- In the **Fields** pane, right-click the Field, and select **Conditional formatting** from the menu.



- Or, in the **Format** pane, expand the **Conditional formatting** card and for either **Background color scales** or **Font color scales**, turn the slider to **On**. Turning either on displays a link for *Advanced controls*, which allows you to customize the colors and values for the color formatting.



Either approach achieves the same result. Selecting *Advanced controls* displays the following dialog, which lets you make adjustments:



Limitations and considerations

In this release of the **Matrix** visual, there are a few limitations and considerations to keep in mind.

- Drill on columns can only be done by using the right-click menu, and there's currently no indication on the visual that you can drill into row or column groups
- You can only expand all items in a level at once, rather than expanding one category at a time
- **See Records** may appear on a menu when right-clicking a column headers, but it is not operational
- There currently is no *Grand total* row
- Turning off the subtotal row in stepped layout doesn't have any effect
- Column headers may be truncated if inner groups have shorter text than the outer group
- Changing the stepped layout indentation shouldn't indent the outermost row group's indent

We're always eager to hear your thoughts. We're currently conducting a **survey** on this **Matrix** visual, so if you have a few minutes, please [take the survey](#).

Create Power BI visuals using R

12/6/2017 • 5 min to read • [Edit Online](#)

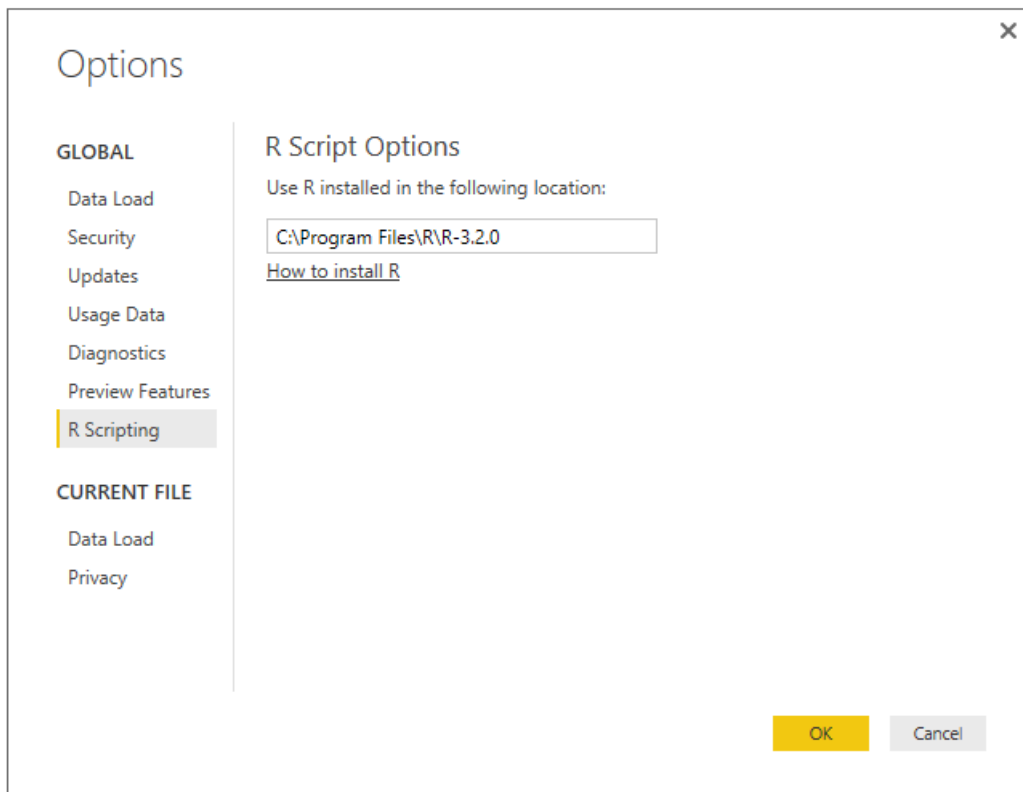
With **Power BI Desktop**, you can use **R** to visualize your data.

Install R

Power BI Desktop does not include, deploy or install the **R** engine. To run R scripts in **Power BI Desktop**, you must separately install **R** on your local computer. You can download and install **R** for free from many locations, including the [Revolution Open download page](#), and the [CRAN Repository](#). The current release of R scripting in **Power BI Desktop** supports Unicode characters as well as spaces (empty characters) in the installation path.

Enable R visuals

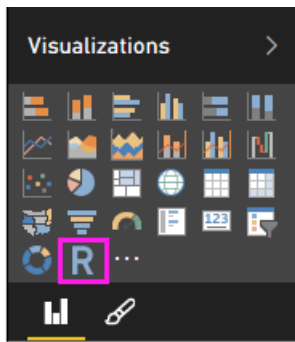
To enable R visuals, select **File > Options and settings > Options** and in the **Options** page that appears, make sure your local R installation is specified in the **R Scripting** section of the **Options** window, as shown in the following image. In the following image, the path local installation of R is **C:\Program Files\R\R-3.2.0** and that path is explicitly provided in the text box. Make sure the path it displays properly reflects the local R installation you want **Power BI Desktop** to use.



Once you specify your R installation, you're ready to begin creating R visuals.

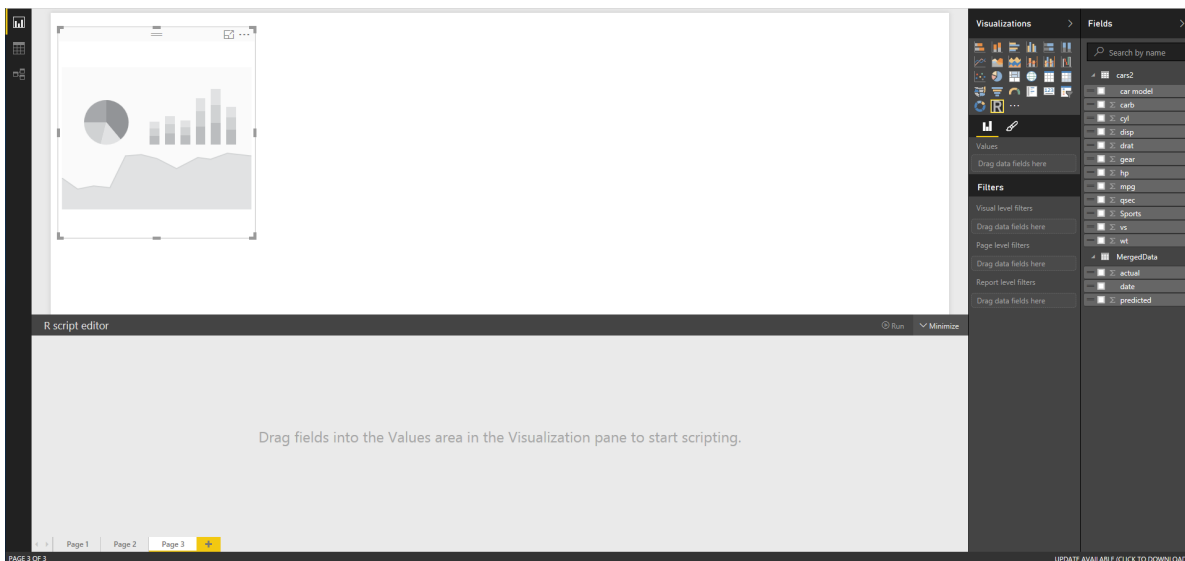
Create R visuals in Power BI Desktop

1. Select the **R Visual** icon in the **Visualization** pane, as shown in the following image, to add an R visual.



2. When you add an R visual to a report, **Power BI Desktop** does the following:

- A placeholder R visual image appears on the report canvas.
- The **R script editor** appears along the bottom of the center pane.



3. Next, add fields you want to consume in your R script to the **Values** section in the **Fields** well, just as you would with any other **Power BI Desktop** visual. Only fields that have been added to the **Fields** well are available to your R script, and you can add new fields, or remove unneeded fields from the **Fields** well while working on your R script in the **Power BI Desktop R script editor**. **Power BI Desktop** automatically detects which fields you have added or removed.

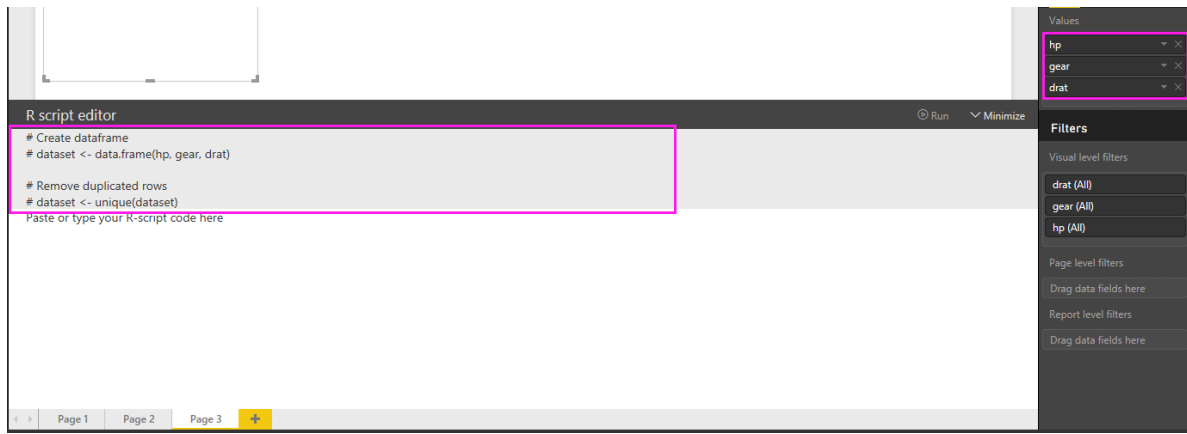
NOTE

The default aggregation type for R visuals is *do not summarize*.

4. Now you can use the data you selected to create a plot. As you select fields, the **R script editor** generates supporting R script binding code based on your selections in the gray section along the top of the editor pane. As you select or remove additional fields, supporting code in the R script editor is automatically generated or removed accordingly.

In the example shown in the following image, three fields were selected: hp, gear, and drat. As a result of those selections, the R script editor generated the following binding code:

- A dataframe called **dataset** was created
 - That dataframe is comprised of the different fields selected by the user
- The default aggregation is *do not summarize*
- Similar to table visuals, fields are grouped and duplicate rows only appear once



TIP

In certain cases you may not want automatic grouping to occur, or you may want all rows to appear, including duplicates. In that case you can add an index field to your dataset which causes all rows to be considered unique, and prevents grouping.

The generated dataframe is called **dataset**, and selected columns can be accessed by their respective names. For example, the gear field can be accessed by writing `dataset$gear` in your R script. For fields with spaces or special characters, use single quotes.

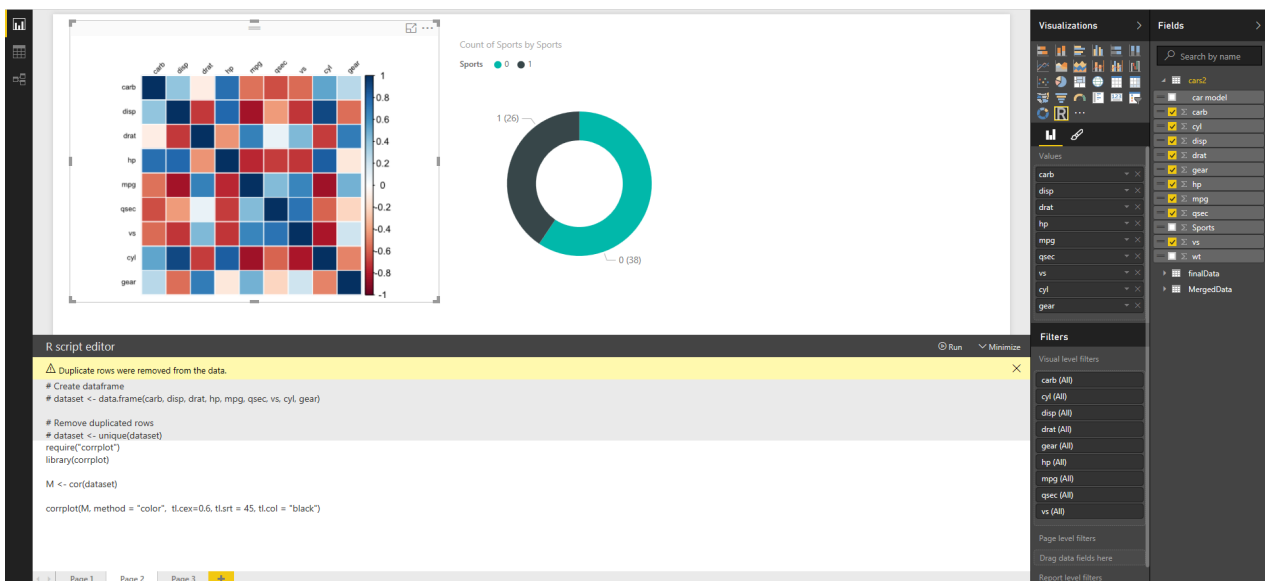
- With the dataframe automatically generated by the fields you selected, you're ready to write R script that results in plotting to the R default device. When the script is complete, select **Run** from the **R script editor** title bar (**Run** is on the right side of the title bar).

When **Run** is selected, **Power BI Desktop** identifies the plot and present it on the canvas. Since the process is executed on your local R installation, make sure required packages are installed.

Power BI Desktop replots the visual when any of the following events occur:

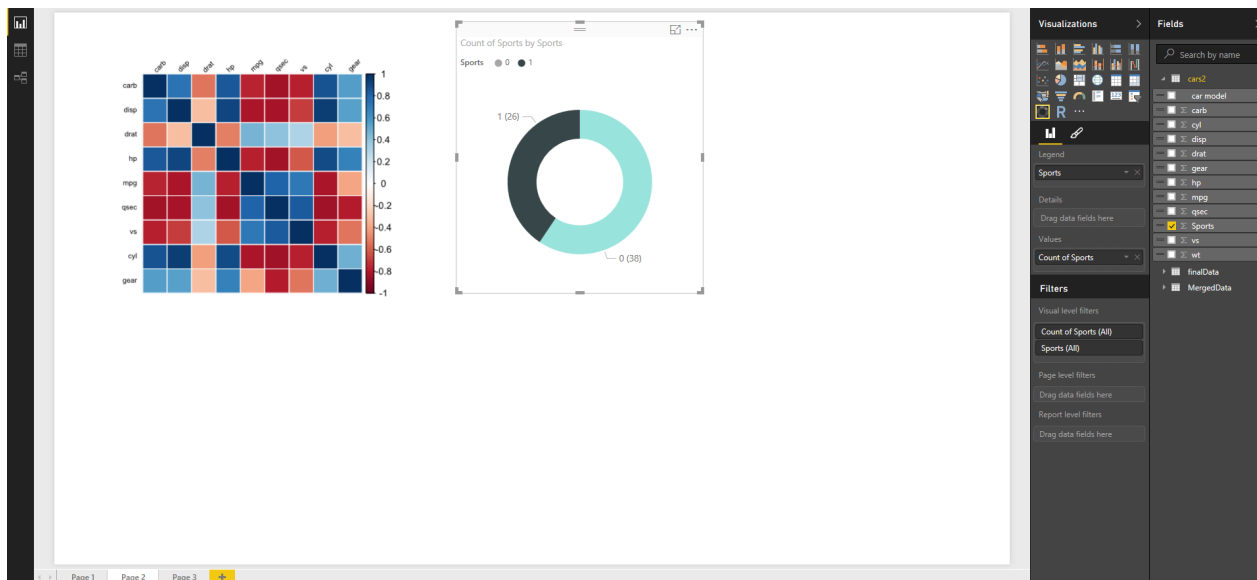
- Run** is selected from the **R script editor** title bar
- Whenever a data change occurs, due to data refresh, filtering, or highlighting

The following image shows an example of the correlation plot code, and plots the correlations between attributes of different types of cars.



To get a larger view of the visualizations, you can minimize the **R script editor**. And of course, like other visuals in **Power BI Desktop**, you can cross filter the correlation plot by selecting only sport cars in the donut visual (the

round visual on the right, in the above example image).



You can also modify the R script to customize the visual, and take advantage of the power of R by adding parameters to the plotting command.

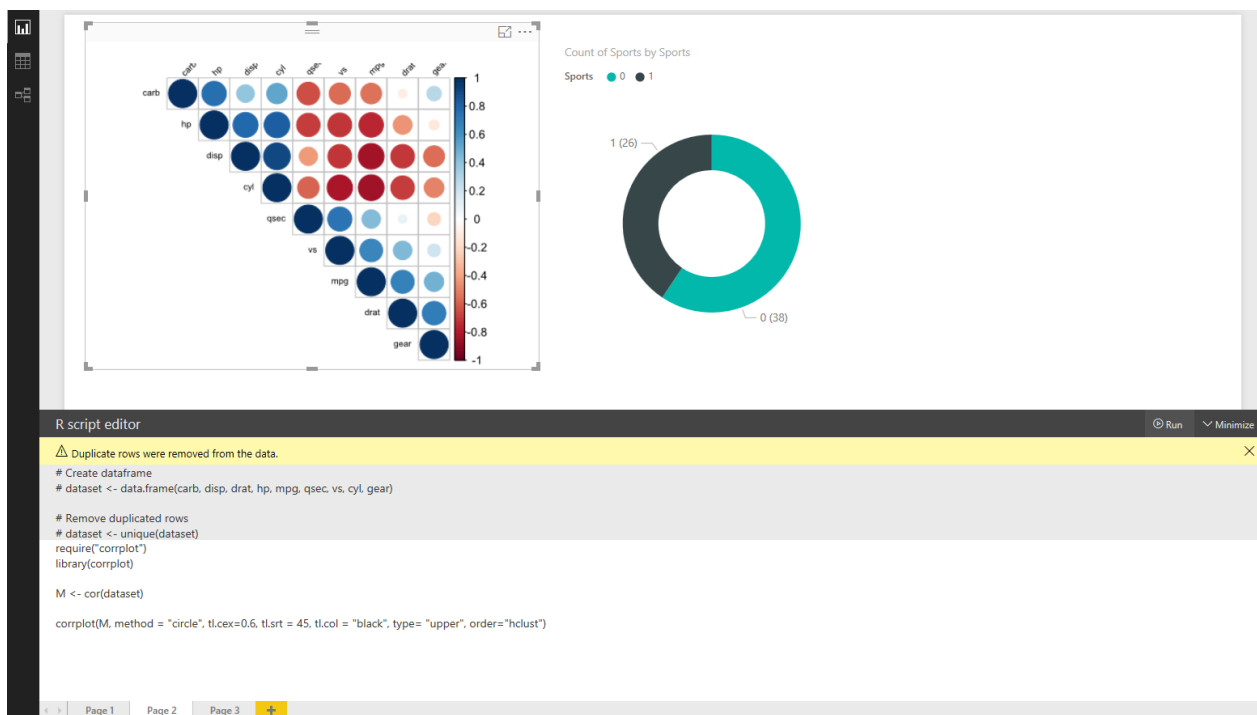
The original plotting command was the following:

```
corrplot(M, method = "color", t1.cex=0.6, t1.srt = 45, t1.col = "black")
```

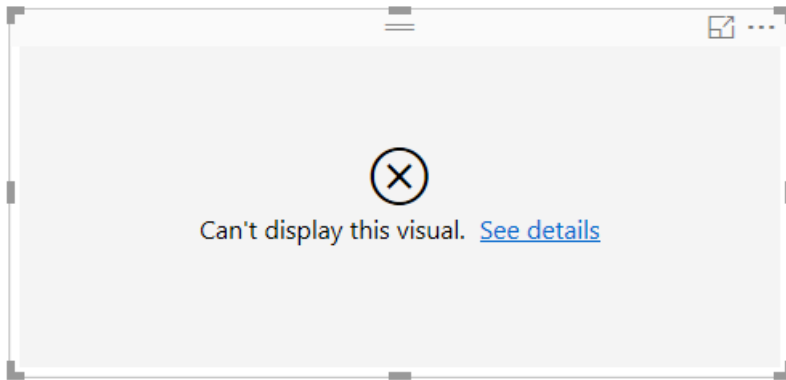
With a few changes in the R script, the command is now the following:

```
corrplot(M, method = "circle", t1.cex=0.6, t1.srt = 45, t1.col = "black", type= "upper", order="hclust")
```

As a result, the R visual now plots circles, only considers at the upper half, and reorders the matrix to cluster correlated attributes, as shown in the following image.



When executing a R script that results in an error, the R visual is not plotted and an error message is displayed on the canvas. For details on the error, select **See details** from the R visual error on the canvas.



R scripts security: R visuals are created from R scripts, which could contain code with security or privacy risks. When attempting to view or interact with an R visual the first time, a user is presented with a security warning message. Only enable R visuals if you trust the author and source, or after you review and understand the R script.

Known limitations

R visuals in **Power BI Desktop** has a few limitations:

- Data size limitations – data used by the R visual for plotting is limited to 150,000 rows. If more than 150,000 rows are selected, only the top 150,000 rows are used and a message is displayed on the image.
- Calculation time limitation – if an R visual calculation exceeds 5 minutes the execution times out, resulting in an error.
- Relationships – as with other Power BI Desktop visuals, if data fields from different tables with no defined relationship between them are selected, an error occurs.
- R visuals are refreshed upon data updates, filtering, and highlighting. However, the image itself is not interactive and cannot be the source of cross-filtering.
- R visuals respond to highlighting other visuals, but you cannot click on elements in the R visual in order to cross filter other elements.
- Only plots that are plotted to the R default display device are displayed correctly on the canvas. Avoid explicitly using a different R display device.
- In this release, RRO installations are not automatically identified by the 32-bit version of Power BI Desktop, so you must manually provide the path to the R installation directory in **Options and settings > Options > R Scripting**.

Next steps

Take a look at the following additional information about R in Power BI.

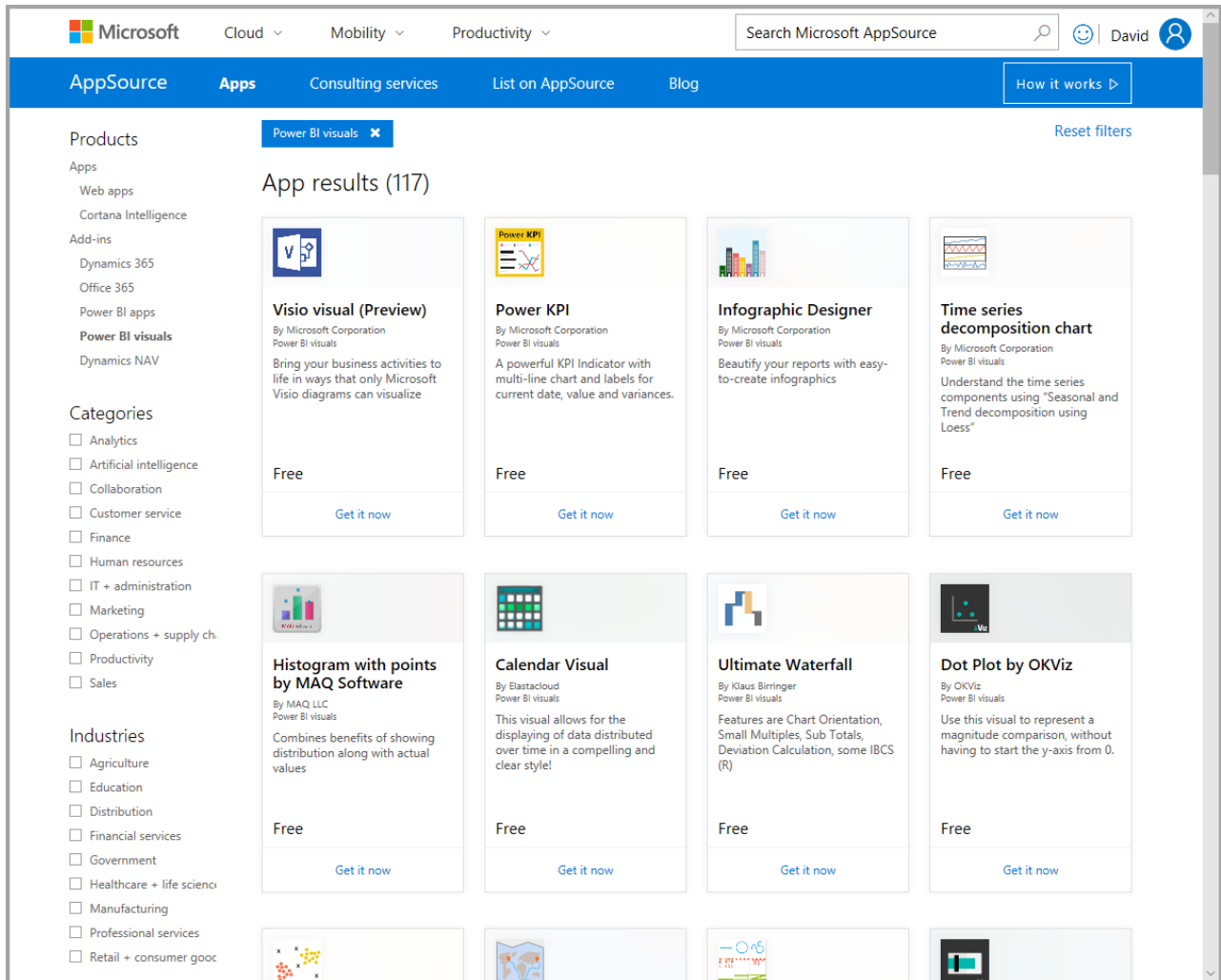
- [Running R Scripts in Power BI Desktop](#)
- [Use an external R IDE with Power BI](#)

Use R-powered custom visuals in Power BI

12/6/2017 • 5 min to read • [Edit Online](#)

In **Power BI Desktop** and the **Power BI service**, you can use R-powered custom visuals without any knowledge of R, and without any R scripting. This enables you to harness the analytic and visual power of R visuals, and R scripts, without learning R or doing any programming yourself.

To use R-powered custom visuals, you first select and download the R custom visual you're interested in using from the **AppSource** gallery of **custom visuals** for Power BI.



The following sections describe how to select, load, and use R-powered visuals in **Power BI Desktop**.

Use R custom visuals

To use R-powered custom visuals, you need to download each visual from the **custom visuals** library, then you can use the visual like any other type of visual in **Power BI Desktop**. There are two ways to get custom visuals - you can download them from the online **AppSource** site, or you browse and get them from within **Power BI Desktop**.

Get custom visuals from AppSource

Here are the steps to browse and select visuals from the online **AppSource** site:

1. Navigate to the **Power BI visuals** library, found at <https://appsource.microsoft.com>. Select the **Power BI apps** checkbox under *Refine by product*, then select the **See all** link.

Search Microsoft AppSource

David

AppSource Blog How it works

Right app for your business needs

to your industry that work with the products you already use

Microsoft AppSource

Refine by industry

<input type="checkbox"/> Agriculture	9
<input type="checkbox"/> Education	14
<input type="checkbox"/> Distribution	41
<input type="checkbox"/> Financial services	63
<input type="checkbox"/> Government	24
<input type="checkbox"/> Healthcare + life sciences	51
<input type="checkbox"/> Manufacturing	66
<input type="checkbox"/> Professional services	35
<input type="checkbox"/> Retail + consumer goods	68

Refine by product

<input type="checkbox"/> Cloud solutions	300
<input type="checkbox"/> Dynamics 365	601
<input type="checkbox"/> Office 365	2419
<input checked="" type="checkbox"/> Power BI apps	194

See all (113)

Google Analytics Microsoft Dynamics Microsoft Azure Salesforce

2. Select **Power BI visuals** from the list of Add-ins in the left pane.

The screenshot shows the Microsoft AppSource website for Power BI visuals. At the top, there are navigation links for 'Microsoft', 'Cloud', 'Mobility', and 'Productivity'. Below that, a blue header contains 'AppSource', 'Apps', 'Consulting services', 'List on AppSource', and 'Blog'. The main content area is divided into a left sidebar and a main gallery. The sidebar has 'Products' and 'Categories' sections. A pink arrow points to 'Power BI visuals' in the 'Products' list. The main gallery is titled 'App results (117)' and displays a grid of visual cards. Each card has a thumbnail, a title, the author's name, a brief description, and a 'Free' price tag with a 'Get it now' button.

1. Select the **visual** you're interested in using from the gallery, and you're taken to a page that describes the visual. Select the **Get it now** button to download.

NOTE

For authoring in **Power BI Desktop**, you need to have R installed on your local machine. But when users want to view an R-powered visual in the **Power BI service** they do *not* need R installed locally.

Microsoft Cloud Mobility Productivity Search Microsoft AppSource David

AppSource Apps Consulting services List on AppSource Blog How it works

Apps > Forecasting with ARIMA

Forecasting with ARIMA

Microsoft Corporation

Overview Reviews

Predict future values based on historical data using Autoregressive Integrated Moving Avg (ARIMA)

Use forecasting today to optimize for tomorrow! Time series forecasting is the use of a model to predict future values based on previously observed values.

It is one of the prime tools of any business analyst used to predict demand and inventory, budgeting, sales quotas, marketing campaigns and procurement. Accurate forecasts lead to better decisions. Current visual implements well known Autoregressive Integrated Moving Average (ARIMA) method for the forecasting. ARIMA models are general class of models for forecasting a time series which can be made to be "stationary". While exponential smoothing models are based on a description of trend and seasonality in the data, ARIMA models aim to describe the autocorrelations in the data. Both seasonal and non-seasonal modeling is supported. You can control the algorithm parameters and the visual attributes to suit your needs.

Highlighted features:

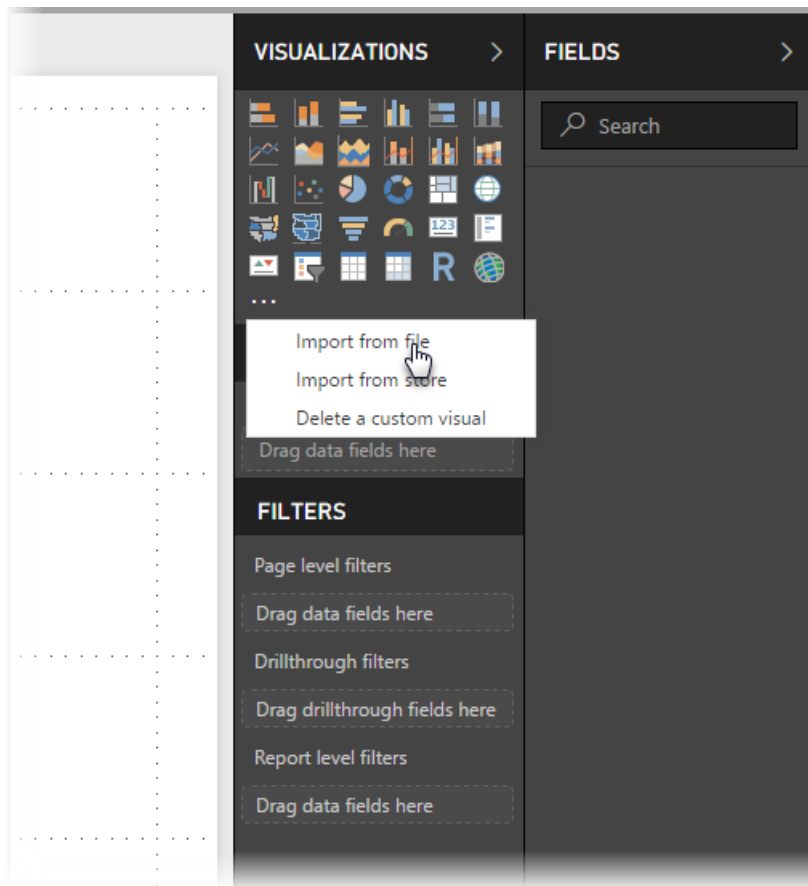
- NEW: support for tooltips on hover and selection
- The underlying algorithm requires the input data to be equally spaced time series
- Seasonal factor can be found automatically or set by user
- By default, algorithm will optimize for all the parameters of the model based on certain information criteria
- Advanced user can control all the inner parameters of the model

R package dependencies(auto-installed): proto, zoo

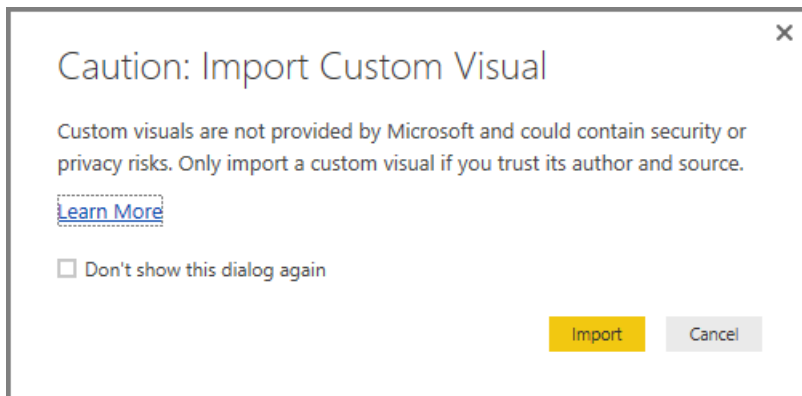
You do not need to install R to use R-powered custom visuals in the **Power BI service**, however, if you want to use R-powered custom visuals in **Power BI Desktop** you *must* install R on the local machine. You can download R from the following locations:

- [CRAN](#)
- [MRO](#)

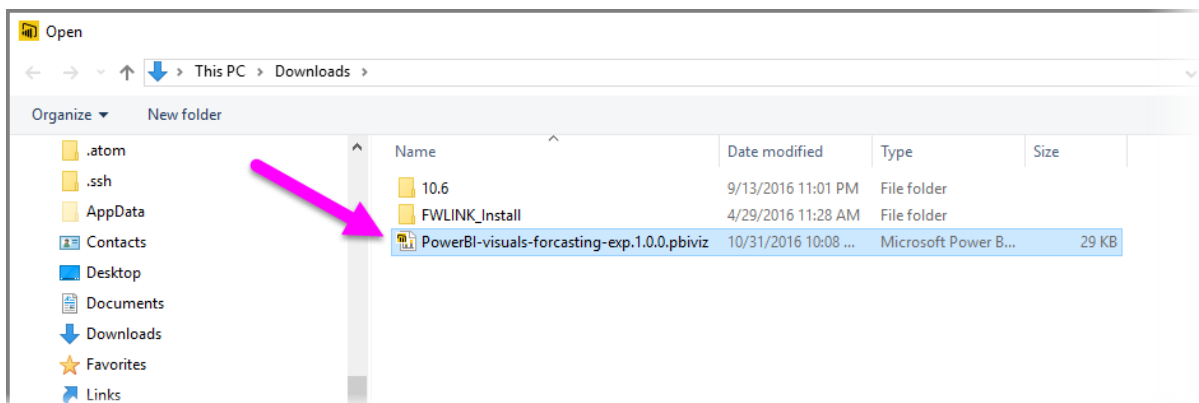
2. Once the visual is downloaded (which is like downloading any file from your browser), go to **Power BI Desktop** and right-click the ellipsis (the ...) in the **Visualizations** pane, and select **Import from file**.



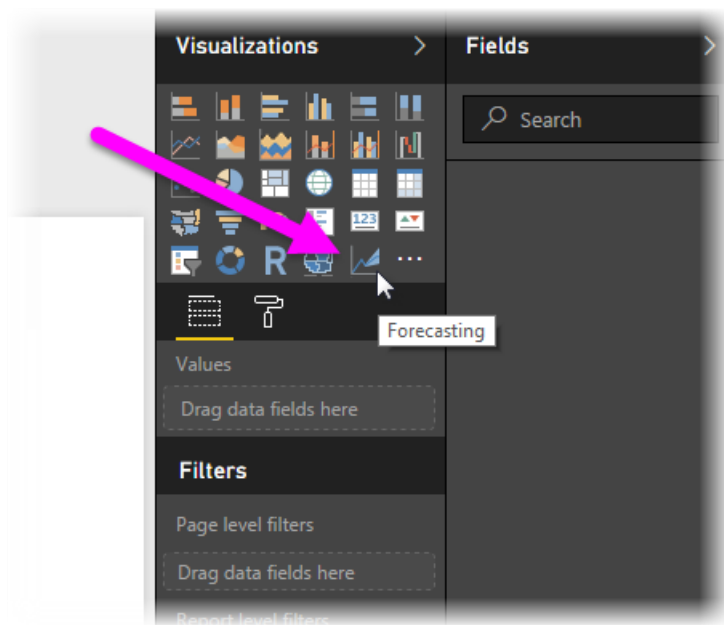
3. You're cautioned about importing a custom visual, as shown in the following image:



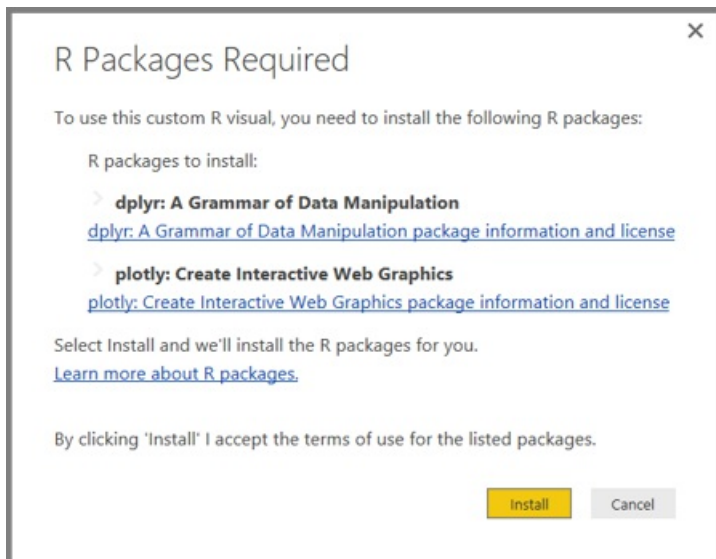
4. Navigate to where the visual file was saved, then select the file. **Power BI Desktop** custom visualizations have the .pbviz extension.



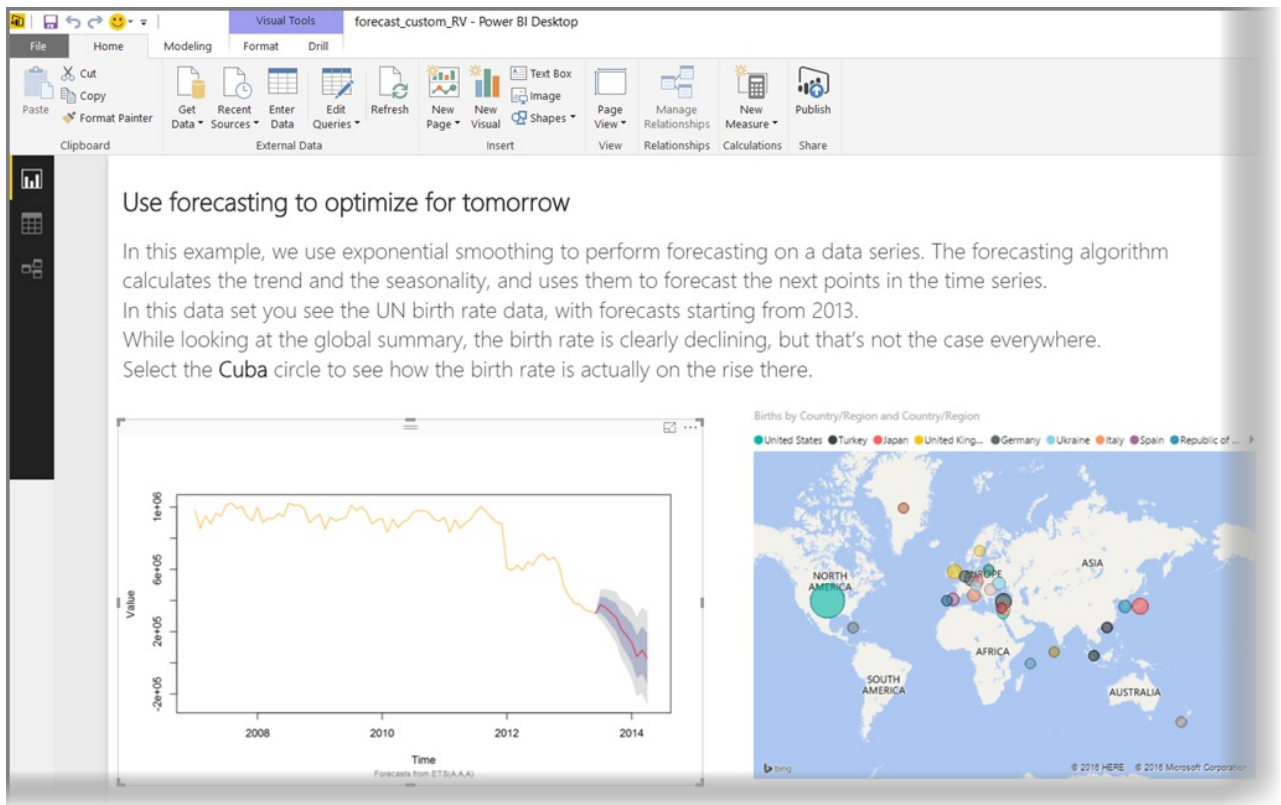
5. When you return to Power BI Desktop, you can see the new visual type in the **Visualizations** pane.



- When you import the new visual (or open a report that contains a R-powered custom visual), **Power BI Desktop** installs the required R packages.



From there, you can add data to the visual just as you would any other **Power BI Desktop** visual. When complete, you can see your finished visual on the canvas. In the following visual, the **Forecasting** R-powered visual was used with United Nations (UN) birth rate projections (the visual on the left).

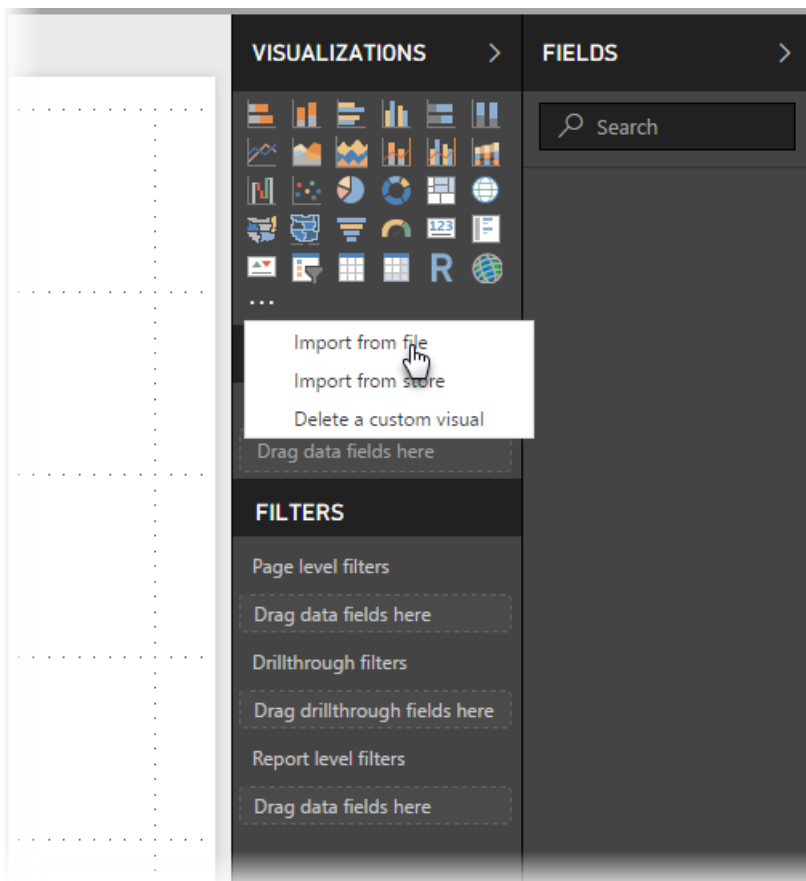


Like any other **Power BI Desktop** visual, you can publish this report with its R-powered visuals to the **Power BI service** and share it with others.

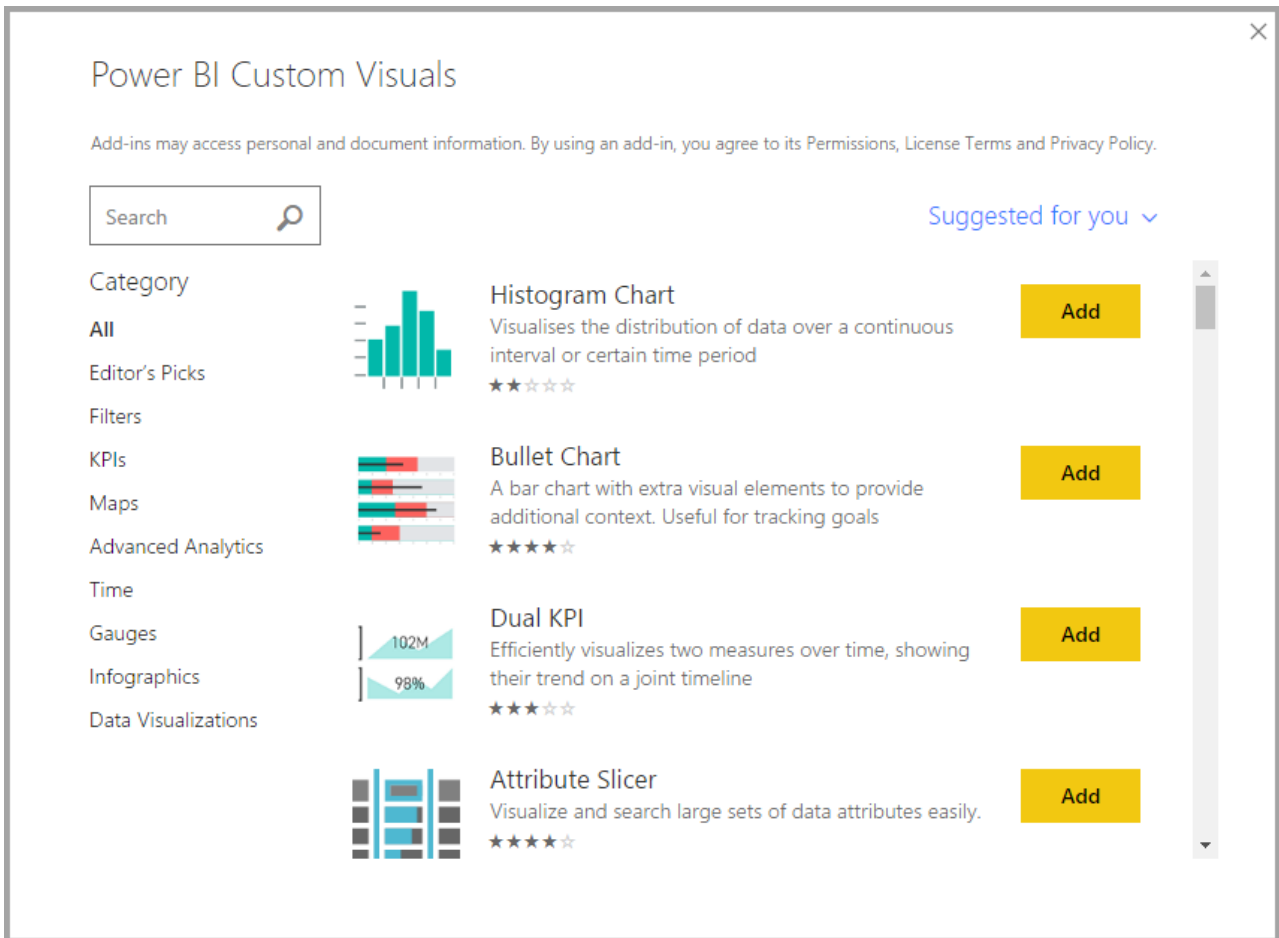
Check the library often, since new visuals are being added all the time.

Get custom visuals from within Power BI Desktop

You can also get custom visuals from within **Power BI Desktop**. In **Power BI Desktop** right-click the ellipsis (the ...) in the **Visualizations** pane, and select **Import from store**.



When you do so, the **Power BI Custom Visuals** dialog appears, where you can scroll through the available custom visuals and select what you would like. You can search by name, select a category, or just scroll through the available visuals. When you're ready, just select **Add** to add the custom visual to **Power BI Desktop**.



Contribute R-powered custom visuals

If you create your own R visuals for use in your reports, you can share those visual with the world by contributing your custom visual to the **custom visuals gallery**. Contributions are made through GitHub, and the process is outlined in the following location:

- [Contributing to the R-powered custom visuals gallery](#)

Troubleshoot R-powered custom visuals

R-powered custom visuals have certain dependencies that must be met for the visuals to work properly. When R-powered custom visuals don't run or load properly, the problem is usually one of the following:

- The R engine is missing
- Errors in the R script on which the visual is based
- R packages are missing or out of date

The following section describes troubleshooting steps you can take to help address trouble you run into.

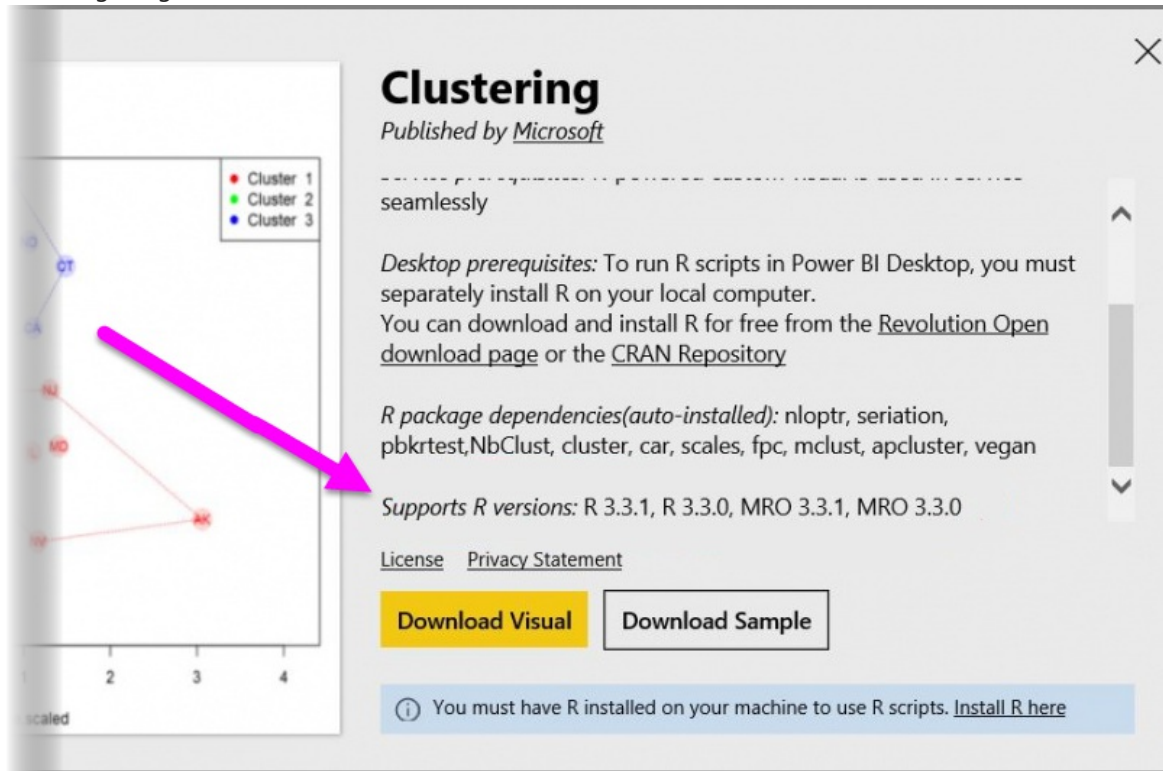
Missing or outdated R packages

When attempting to install an R-powered custom visual, you can run into errors when there are missing or outdated R packages; this is usually due to one of the following reasons:

- The R installation is incompatible with the R package,
- A firewall, anti-virus software, or proxy settings are preventing R from connecting to the Internet
- The Internet connection is slow, or there's an Internet connection problem

The Power BI team is actively working on mitigating these issues before they reach you, and the next Power BI Desktop will incorporate updates to address these problems. Until then, you can take one or more of the following steps to mitigate the issues:

1. Remove the custom visual, then install it again. This initiates a re-installation of the R packages.
 2. If your installation of R is not current, upgrade your R installation, then remove/re-install the custom visual as described in the previous step.
- Supported R versions are listed in the description of each R-powered custom visual, as shown in the following image.



> [!NOTE] > You can keep the original R installation, and only associate Power BI Desktop with the current version you install. Go to **File > Options and settings > Options > R scripting**.

3. Install R packages manually, using any R console. The steps for this approach are the following:
 - a. Download the R-powered visual installation script, and save that file to a local drive.
 - b. From the R console, run the following:

```
> source("C:/Users/david/Downloads/ScriptInstallPackagesForForecastWithWorkarounds.R")
```

Typical default installation locations are the following:

```
c:\Program Files\R\R-3.3.x\bin\x64\Rterm.exe (for CRAN-R)
c:\Program Files\R\R-3.3.x\bin\x64\Rgui.exe (for CRAN-R)
c:\Program Files\R\R-3.3.x\bin\R.exe (for CRAN-R)
c:\Program Files\Microsoft\MRO-3.3.x\bin\R.exe (for MRO)
c:\Program Files\Microsoft\MRO-3.3.x\bin\x64\Rgui.exe (for MRO)
c:\Program Files\RStudio\bin\rstudio.exe (for RStudio)
```

4. If the previous steps don't work, try the following:
 - a. Use **R Studio** and follow the step outlined in 3.b. above (run the script line from the R console).
 - b. If the previous step doesn't work, change **Tools > Global Options > Packages** in **R Studio**, and enable the checkbox for **Use Internet Explorer library/proxy for HTTP**, then repeat step 3.b. from the above

steps.

Next steps

Take a look at the following additional information about R in Power BI.

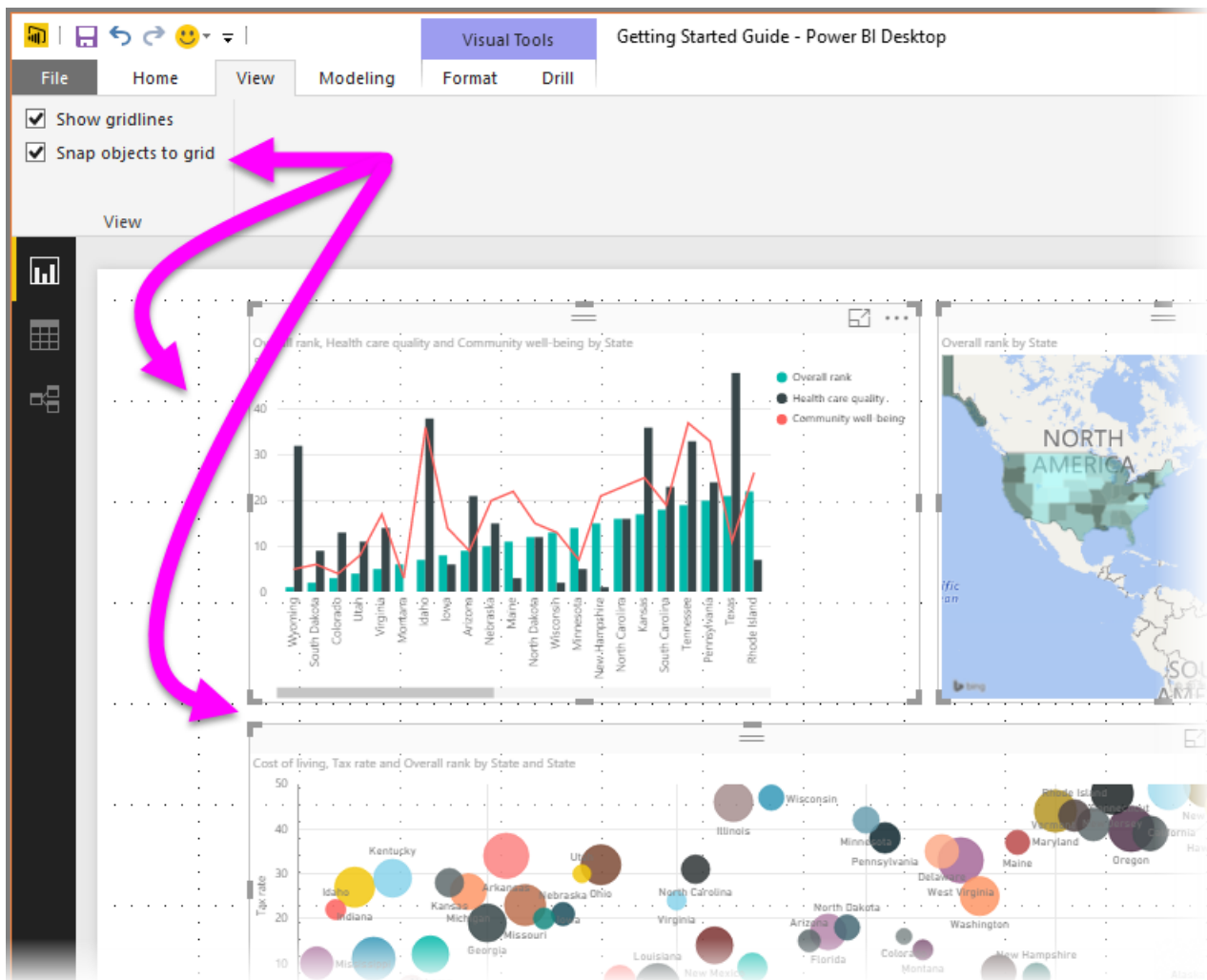
- [Power BI custom visuals gallery](#)
- [Running R Scripts in Power BI Desktop](#)
- [Create R visuals in Power BI Desktop](#)
- [Use an external R IDE with Power BI](#)

Use gridlines and snap-to-grid in Power BI Desktop reports

12/6/2017 • 3 min to read • [Edit Online](#)

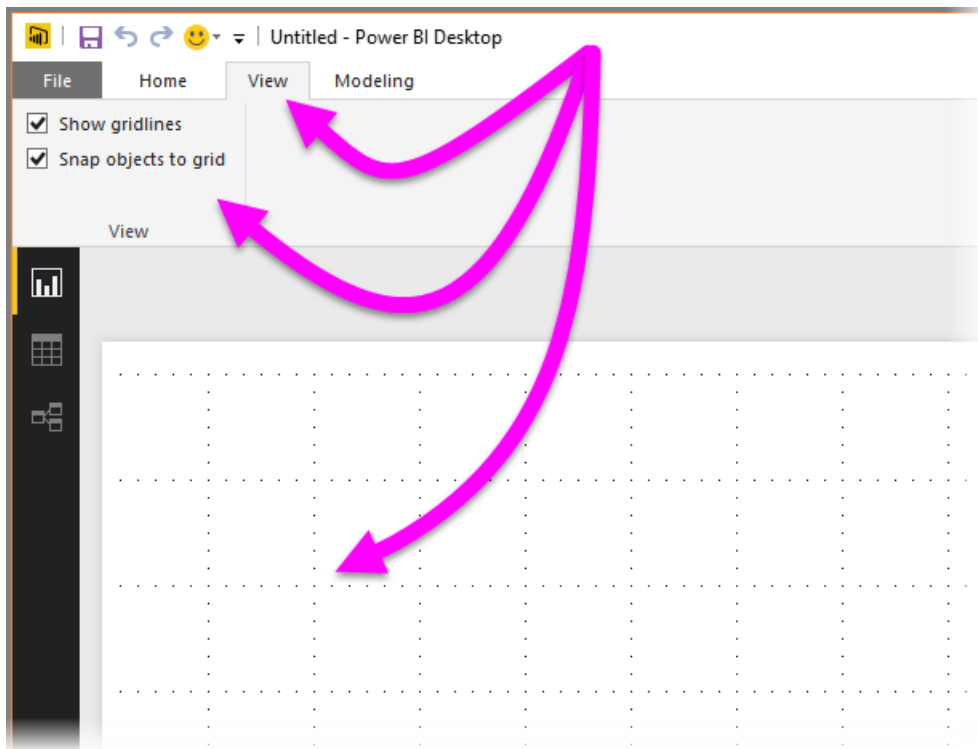
The **Power BI Desktop** report canvas provides gridlines that let you neatly align visuals on a report page, and also provides snap-to-grid functionality so visuals in your reports look clean, aligned, and evenly spaced.

In **Power BI Desktop** you can also adjust the z-order (bring forward, send backward) of objects on a report, as well as align or evenly distribute selected visuals on the canvas.



Enabling gridlines and snap-to-grid

To enable gridlines and snap-to-grid, select the **View** ribbon, then enable the checkboxes for **Show gridlines** and **Snap objects to grid**. You can select one or both boxes; they operate independently.



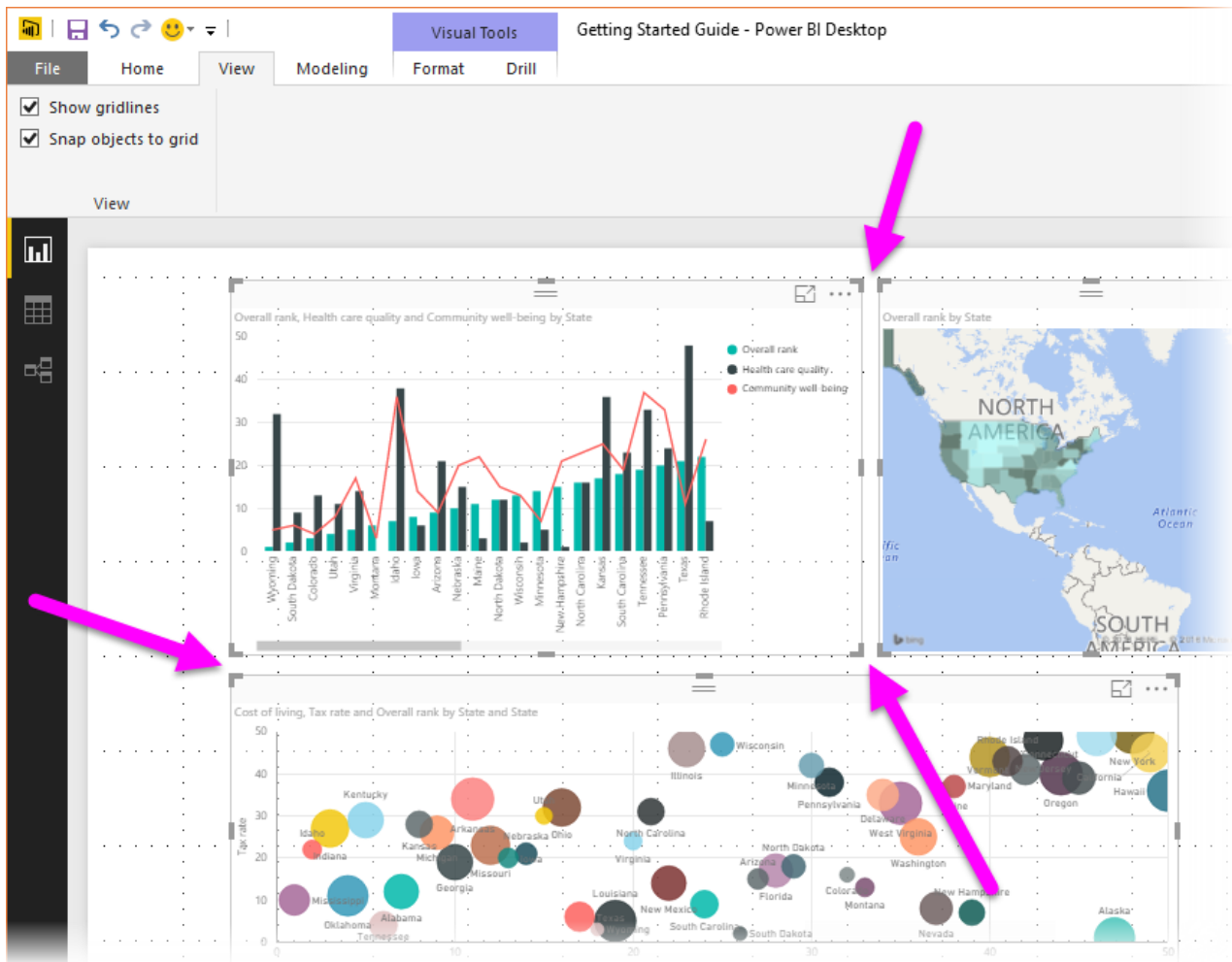
NOTE

If **Show gridlines** and **Snap objects to grid** are disabled, connect to any data source and they become enabled.

Using gridlines

Gridlines are visual guides that let you see whether two or more visuals are properly aligned. When you're trying to determine whether two (or more) visuals are aligned horizontally or vertically, you use the gridlines to visually determine whether their borders align.

You can use *CTRL+Click* to select more than one visual at a time, which displays all selected visuals' borders, easily letting you see whether the visuals are properly aligned.

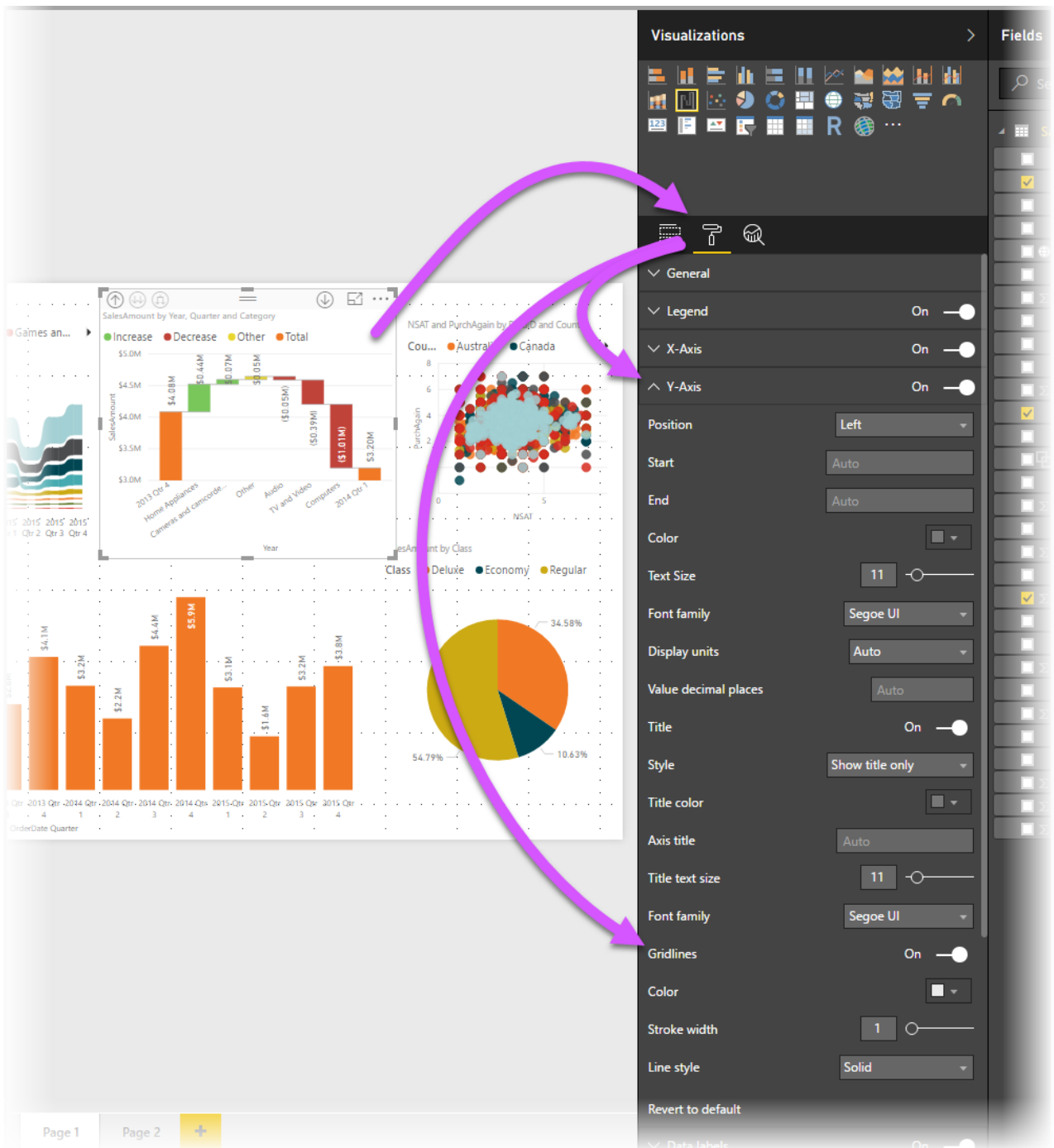


Using gridlines inside visuals

In Power BI there are also gridlines inside visuals, which provide visual guides for comparing data points and values. Beginning with the September 2017 release of **Power BI Desktop**, you can now manage the gridlines within visuals using the **X-Axis** or **Y-Axis** card (as appropriate based on visual type), found in the **Format** section of the **Visualizations** pane. You can manage the following elements of gridlines within a visual:

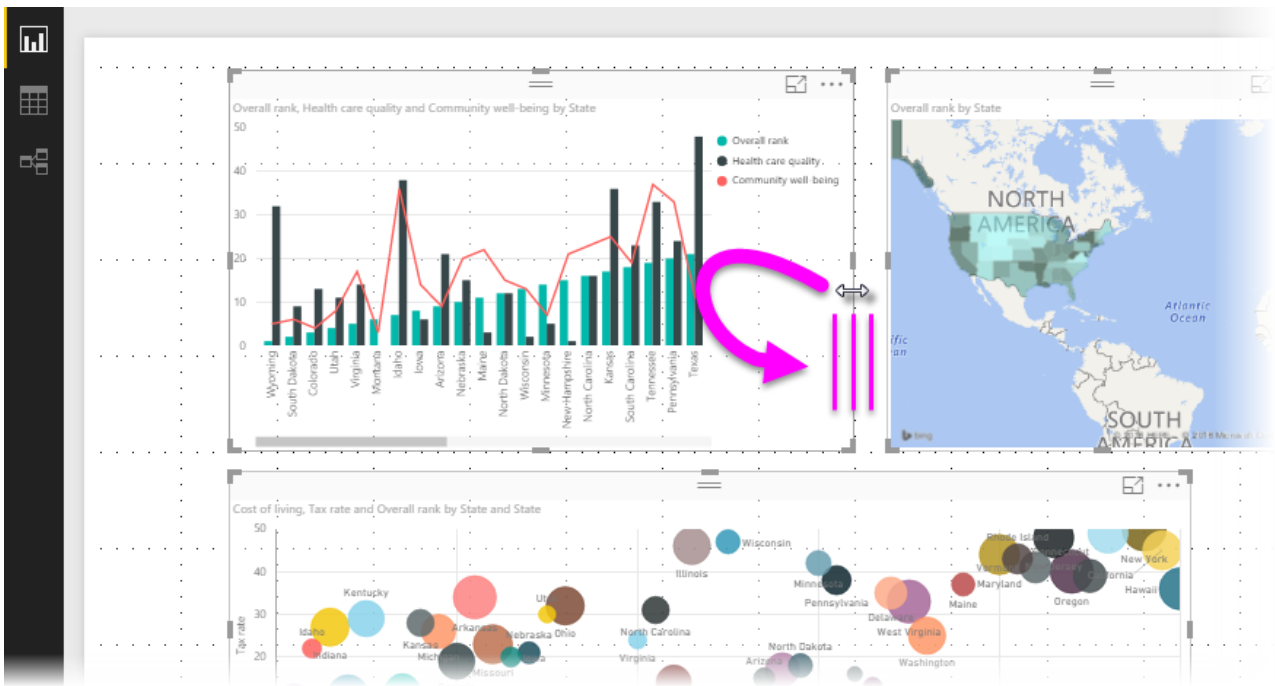
- Turn gridlines on or off
- Change the color of gridlines
- Adjust the stroke (the width) of gridlines
- Select the line style of the gridlines in the visual, such as solid, dashed, or dotted

Modifying certain elements of gridlines can be especially useful in reports where dark backgrounds are used for visuals. The following image shows the *Gridlines* section in the **X-Axis** card.



Using snap-to-grid

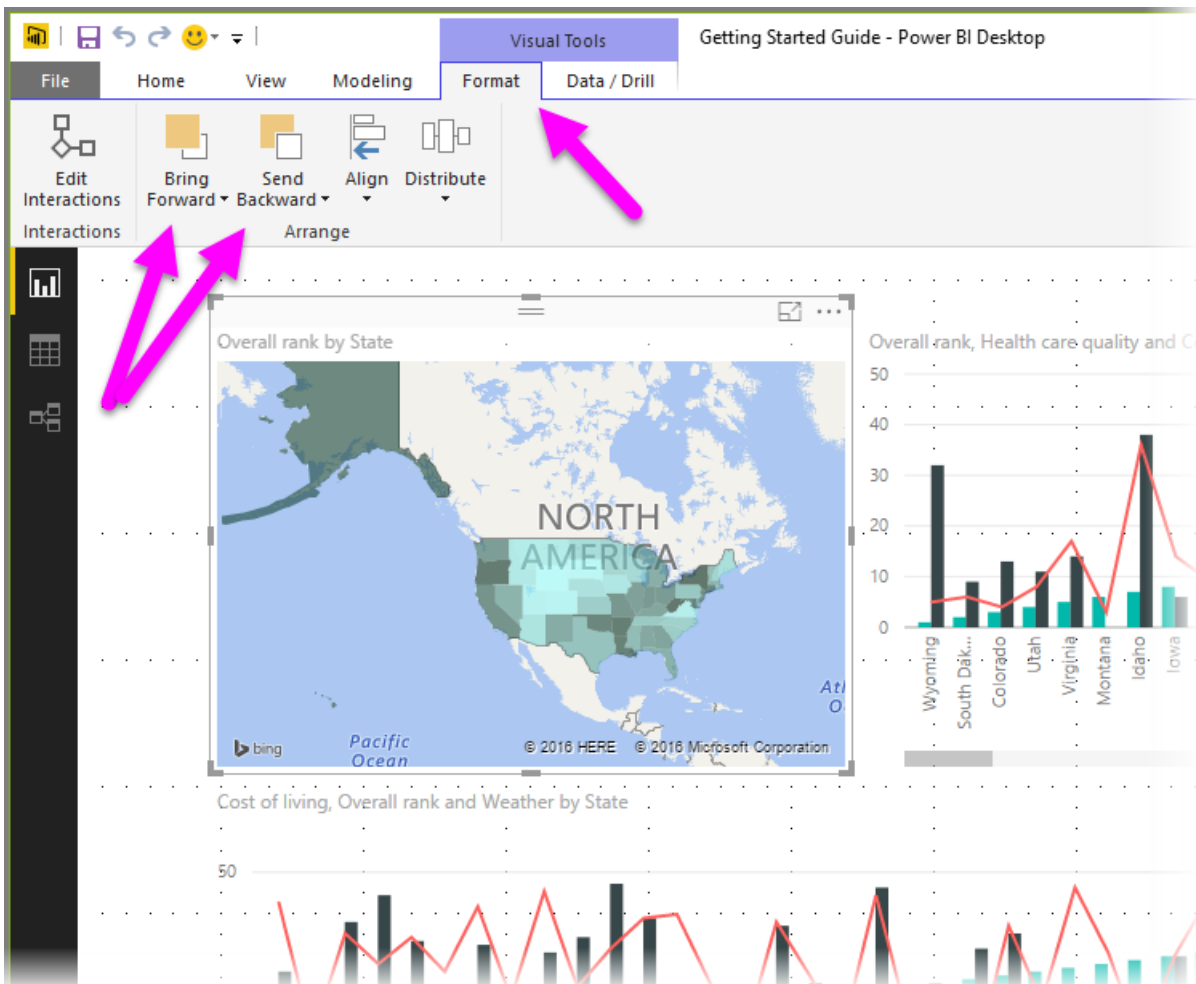
When you enable **Snap objects to grid**, all visuals on the **Power BI Desktop** canvas that you move (or resize) are automatically aligned to the nearest grid axis, making it much easier to ensure two or more visuals align to the same horizontal or vertical location or size.



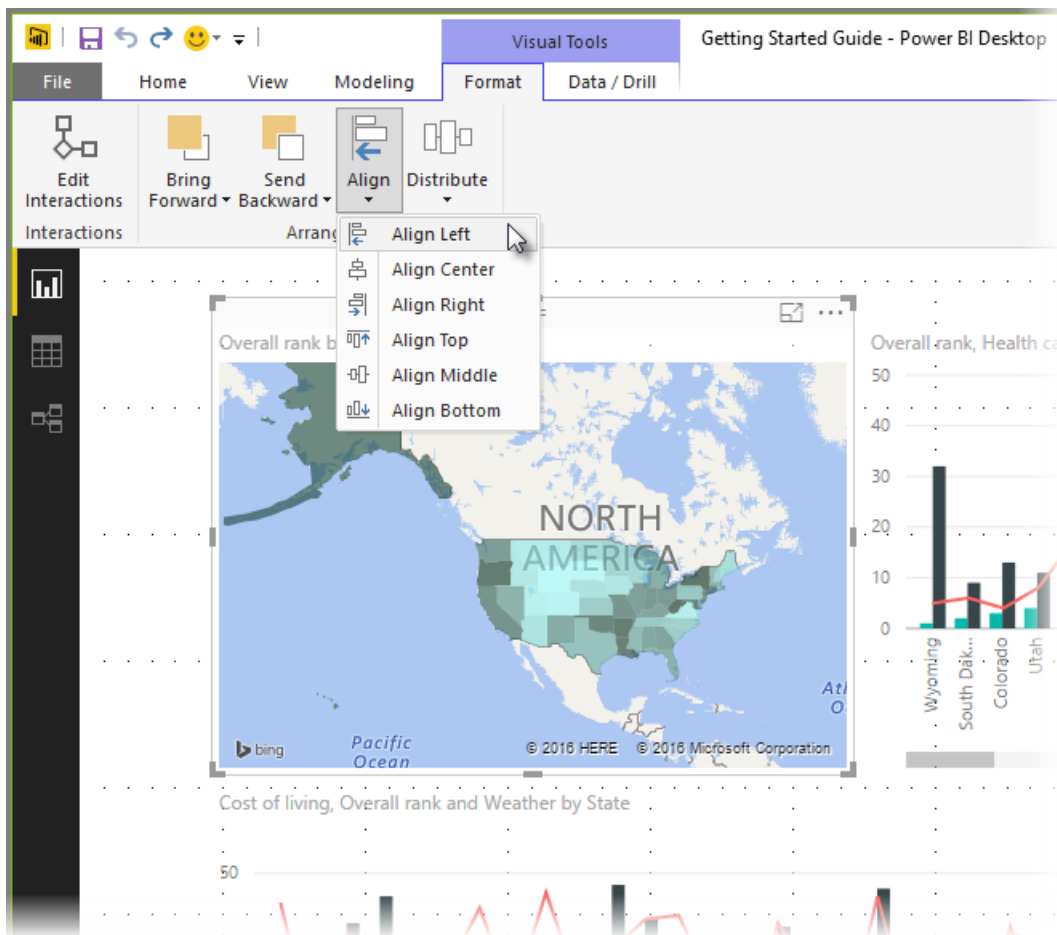
And that's all there is to using **gridlines** and **snap-to-grid** to easily ensure the visuals in your reports are neatly aligned.

Using z-order, align, and distribute

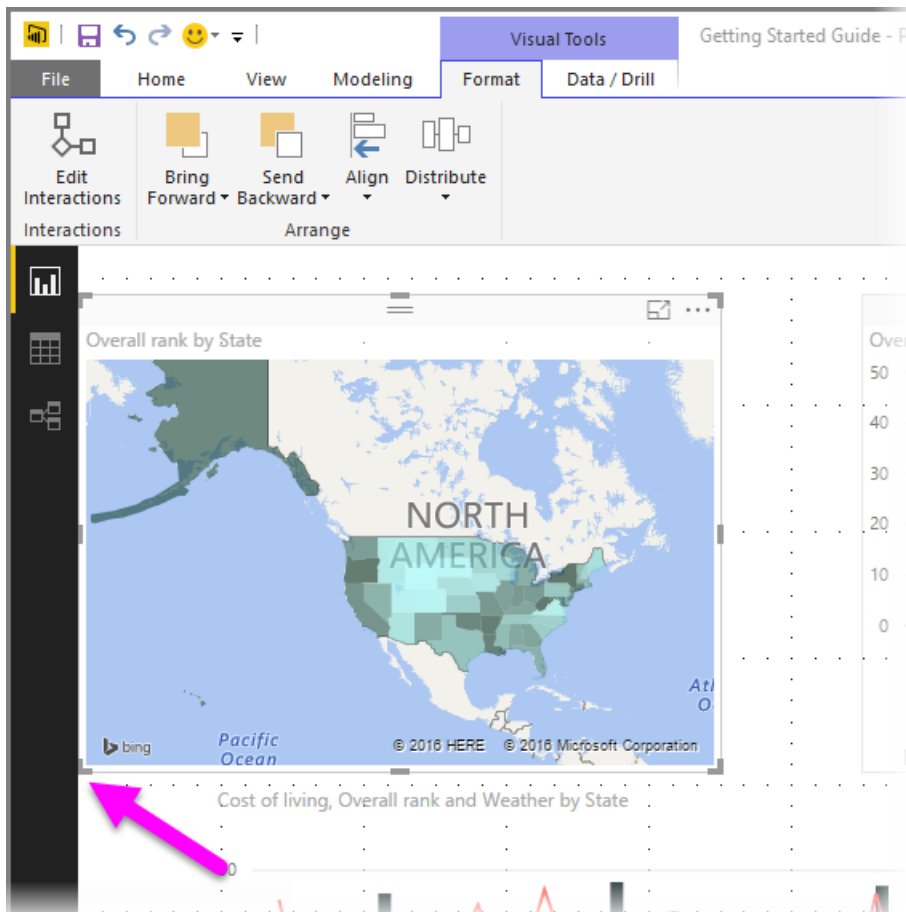
You can also manage the front-to-back order of visuals in a report, often referred to as the *z-order* of elements. This allows you to overlap visuals in any way you want, then adjust the front-to-back order of each visual. This ordering is done using the **Bring Forward** and **Send Backward** buttons, found in the **Arrange** section of **Format** ribbon, which appears as soon as you select on or more visuals on the page (and is not available if no visual is selected).



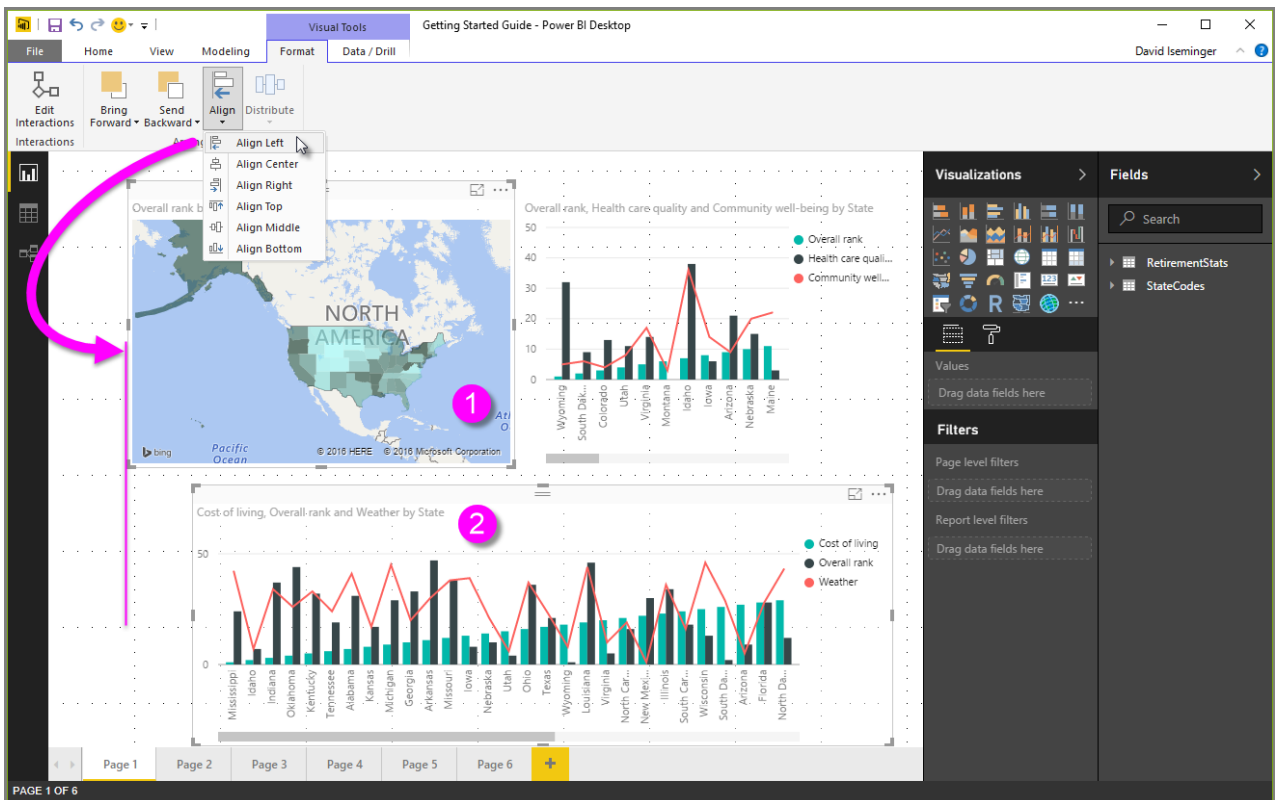
The **Format** ribbon also allows you to align your visuals in many different ways. This allows you to ensure your visuals appear on the page in the alignment that you believe looks and works best.



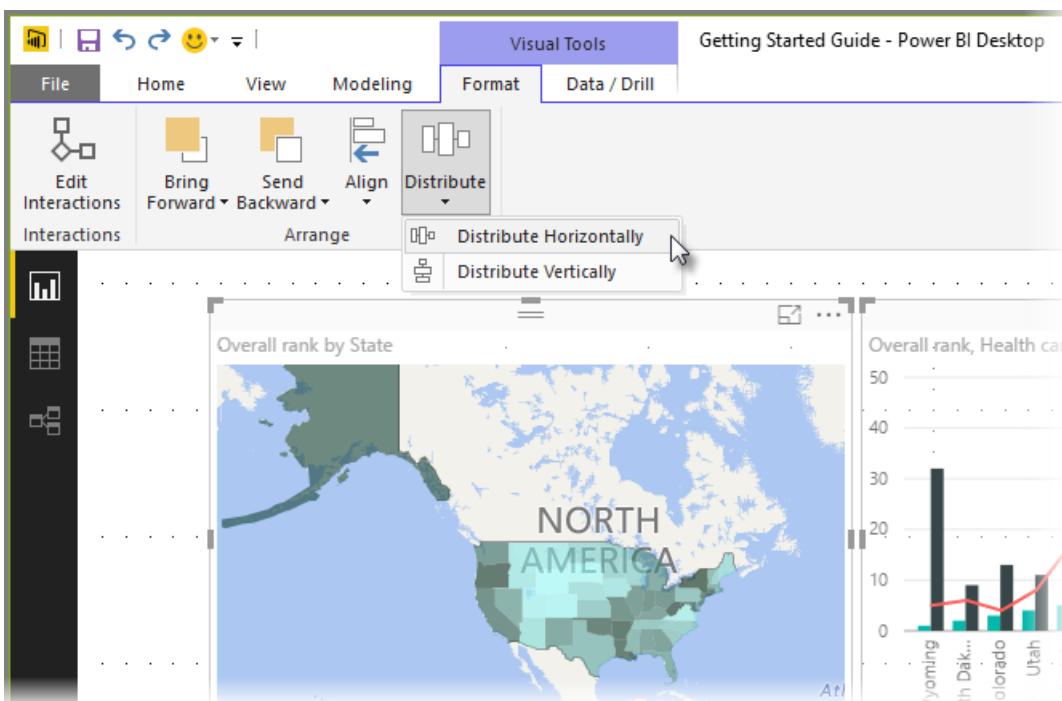
When one visual is selected, using the **Align** button aligns that visual to the edge (or center) of the report canvas, as shown in the following image.



When two or more visuals are selected, they are aligned together and use the existing aligned boundary of the visuals for alignment. For example, with two visuals selected and the *Align Left* button selected, the visuals will align to the left-most boundary of all selected visuals.



You can also distribute your visuals evenly across the report canvas, either vertically or horizontally. Just use the **Distribute** button from the **Format** ribbon.

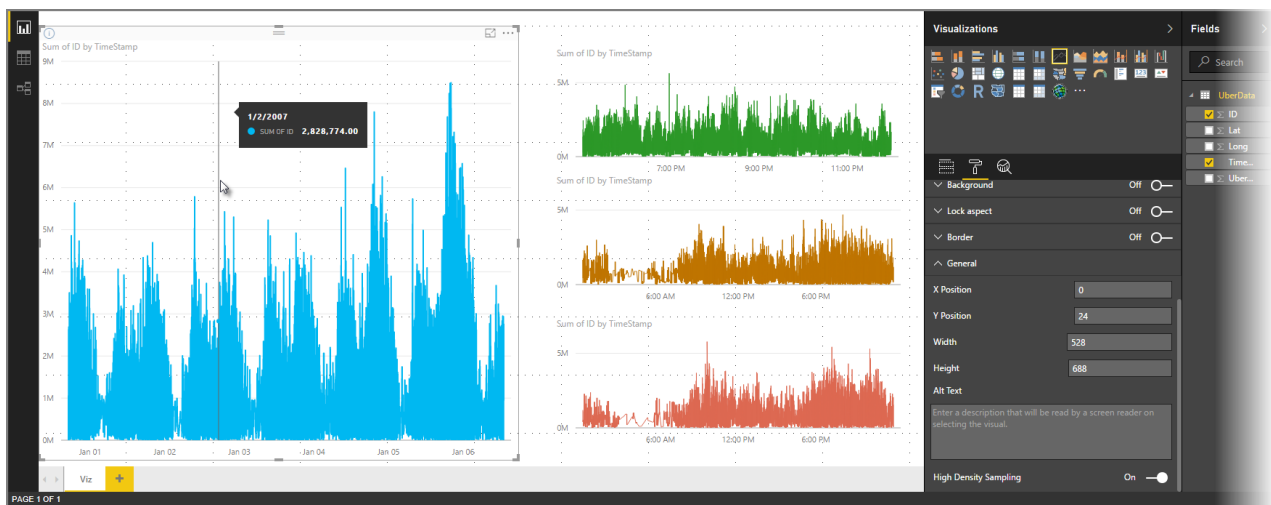


With a few selections from these gridlines, alignment, and distribution tools, your reports will look just how you want them.

High density line sampling in Power BI

1/20/2018 • 8 min to read • [Edit Online](#)

Beginning with the June 2017 release of the **Power BI Desktop** and updates to the **Power BI service**, a new sampling algorithm is available that improves visuals that sample high density data. For example, you might create a line chart from your retail stores' sales results, each store having more than ten thousand sales receipts each year. A line chart of such sales information would sample data (select a meaningful representation of that data, to illustrate how sales varies over time) from the data for each store, and create a multi-series line chart that thereby represents underlying data. This is common practice in visualizing high density data, and Power BI Desktop has improved its sampling of high density data, the details of which are described in this article.



NOTE

The **high density sampling** algorithm described in this article applies to, and is available in, both **Power BI Desktop** and the **Power BI service**.

How high density line sampling works

Previously, **Power BI** selected a collection of sample data points in the full range of underlying data in a deterministic fashion. For example, for high density data on a visual spanning one calendar year, there might be 350 sample data points displayed in the visual, each of which was selected to ensure the full range of data (the overall series of underlying data) was represented in the visual. To help understand how this happens, imagine we were plotting stock price over a one-year period, and selected 365 data points to create a line chart visual (that's one data point for each day).

In that situation, there are many values for a stock price within each day. Of course there is a daily high and low, but those could occur at any time during the day when the stock market is open. For high density line sampling, if the underlying data sample was taken at 10:30am and 12:00pm each day, you would get a representative snapshot of the underlying data (the price at 10:30am and 12:00pm), but it might not capture the actual high and low of the stock price for that representative data point (that day). In that situation – and others – the sampling is representative of the underlying data, but it doesn't always capture important points, which in this case would be daily stock price highs and lows.

By definition, high density data is sampled to enable visualizations that can be created reasonably quickly, are responsive to interactivity (too many data points on a visual can bog it down, and can detract from the visibility of trends). How such data is sampled, to provide the best visualization experience, is what drives the creation of the

sampling algorithm. In Power BI Desktop, the algorithm has been improved to provide the best combination of responsiveness, representation, and clear preservation of important points in each time slice.

How the new line sampling algorithm works

The new algorithm for high density line sampling is available for line chart and area chart visuals with a continuous x axis.

For a high density visual, **Power BI** intelligently slices your data into high resolution chunks, and then picks important points to represent each chunk. That process of slicing high resolution data is specifically tuned to ensure that the resulting chart is visually indistinguishable from rendering all of the underlying data points, but much faster and more interactive.

Minimum and maximum values for high density line visuals

For any given visualization, the following visual limitations apply:

- **3,500** is the maximum number data points *displayed* on the visual, regardless of the number of underlying data points or series. As such, if you have 10 series with 350 data points each, the visual has reached its maximum overall data points limit. If you have one series, it may have up to 3,500 data points if the new algorithm deems that the best sampling for the underlying data.
- There is a maximum of **60 series** for any visual. If you have more than 60 series, break up the data and create multiple visuals with 60 or less series each. It's good practice to use a **slicer** to show only segments of the data (only certain series). For example, if you're displaying all subcategories in the legend, you could use a slicer to filter by the overall category on the same report page.

These parameters ensure that visuals in Power BI Desktop render very quickly, and are responsive to interaction with users, and do not result in undue computational overhead on the computer rendering the visual.

Evaluating representative data points for high density line visuals

When the number of underlying data points exceeds the data points that can be represented in the visual (exceeds 3,500), a process called *binning* begins, which chunks the underlying data into groups called *bins*, and then iteratively refines those bins.

The algorithm creates as many bins as possible to create the greatest granularity for the visual. Within each bin, the algorithm finds the minimum and maximum data value, to ensure that important and significant values (for example, outliers) are captured and displayed in the visual. Based on the results of the binning and subsequent evaluation of the data by Power BI, the minimum resolution for the x axis for the visual is determined – to ensure maximum granularity for the visual.

As mentioned previously, the minimum granularity for each series is 350 points, the maximum is 3,500.

Each bin is represented by two data points, which become the bin's representative data points in the visual. The data points are simply the high and low value for that bin, and by selecting the high and low, the binning process ensures any important high value, or significant low value, is captured and rendered in the visual.

If that sounds like a lot of analysis to ensure the occasional outlier is captured, and is properly displayed in the visual, then you are correct – and that's exactly the reason behind the new algorithm and binning process.

Tooltips and high density line sampling

It's important to note that this binning process, which results in the minimum and maximum value in a given bin being captured and displayed in the visual, may affect how tooltips display data when you hover over data points. To explain how and why this occurs, let's revisit our example about stock prices from earlier in this article.

Let's say you're creating a visual based on stock price, and you're comparing two different stocks, both of which are using **High Density Sampling**. The underlying data for each series has lots of data points (maybe you capture

the stock price each second of the day). The high density line sampling algorithm will perform binning for each series independently of the other.

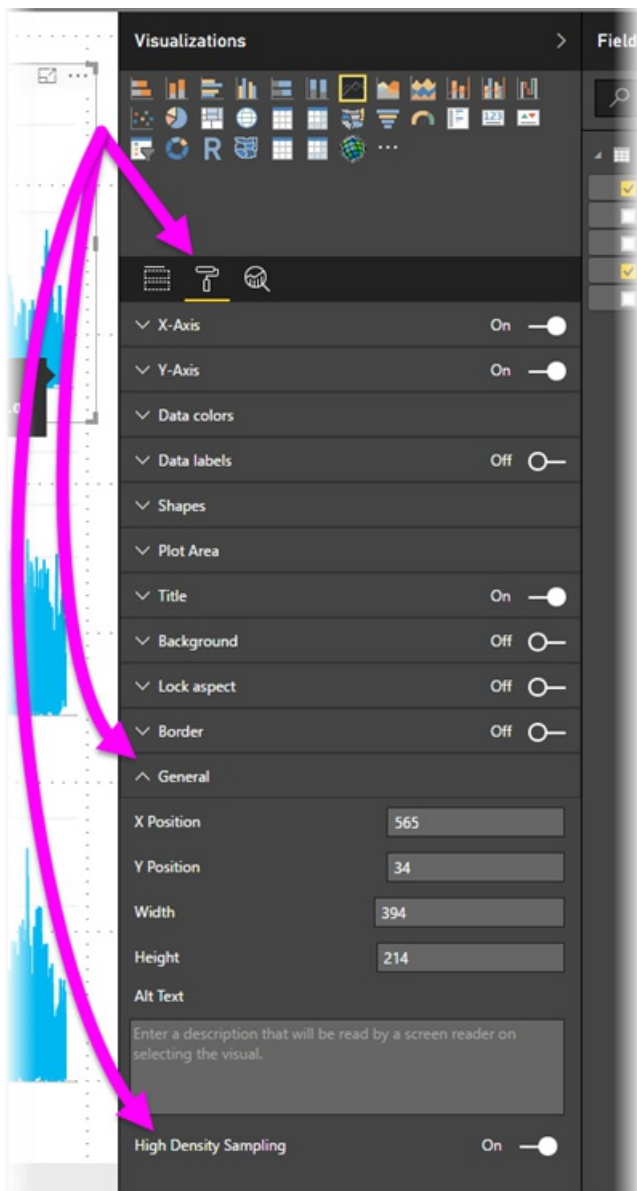
Now let's say the first stock jumps up in price at 12:02, then quickly comes back down ten seconds later – that's an important data point. When binning occurs for that stock, the high at 12:02 will be a representative data point for that bin.

But for the second stock, 12:02 was neither a high nor a low in the bin that included that time - maybe the high and low for the bin that includes 12:02 occurred three minutes later. In that situation, when the line chart is created and you hover over 12:02, you will see a value in the tooltip for the first stock (because it jumped at 12:02 and that value was selected as that bin's high data point), but you will *not* see any value in the tooltip at 12:02 for the second stock. That's because the second stock had neither a high, nor a low, for the bin that included 12:02. So there's no data to show for the second stock at 12:02, and thus, no tooltip data is displayed.

This situation will happen frequently with tooltips. The high and low values for a given bin might not match perfectly with the evenly scaled x-axis value points, and as such the tooltip will not display the value.

How to turn on high density line sampling

By default, the new algorithm is turned **on**. To change this setting, go to the **Formatting** pane, in the **General** card, and along the bottom you see a toggle slider called **High Density Sampling**. To turn it off, slide it to **Off**.



Considerations and limitations

The new algorithm for high density line sampling is an important improvement to Power BI, but there are a few considerations you need to know when working with high density values and data.

- Because of increased granularity and the binning process, **Tooltips** may only show a value if the representative data is aligned with your cursor. See the section earlier in this article on **Tooltips** for more information.
- When the size of an overall data source is too big, the new algorithm eliminates series (legend elements) to accommodate the data import maximum constraint.
 - In this situation, the new algorithm orders legend series alphabetically, and starts down the list of legend elements in alphabetical order, until the data import maximum is reached, and does not import additional series.
- When an underlying data set has more than 60 series (the maximum number of series, as described earlier), the new algorithm orders the series alphabetically, and eliminates series beyond the 60th alphabetically-ordered series.
- If the values in the data are not of type *numeric* or *date/time*, Power BI will not use the new algorithm, and will revert to the previous (non-High Density Sampling) algorithm.
- The **Show items with no data** setting is not supported with the new algorithm.
- The new algorithm is not supported when using a live connection to a model hosted in SQL Server Analysis Services (version 2016 or earlier). It is supported in models hosted in **Power BI** or Azure Analysis Services.

Next steps

For information about high density sampling in scatter charts, see the following article.

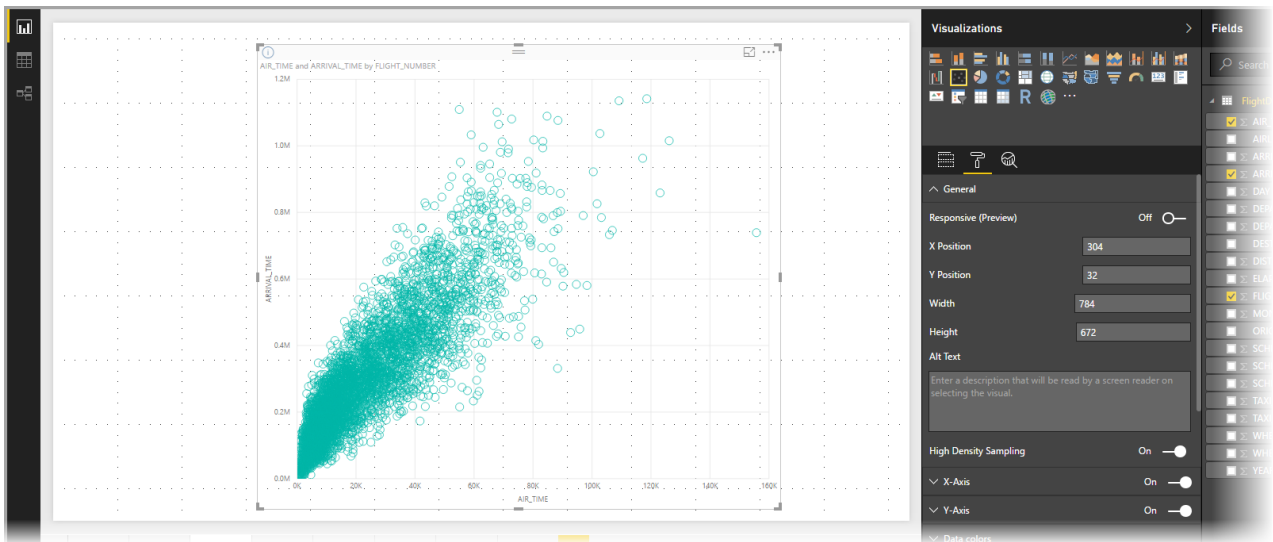
- [High Density Sampling in Power BI scatter charts](#)

High density sampling in Power BI scatter charts

12/6/2017 • 5 min to read • [Edit Online](#)

Beginning with the September 2017 release of the **Power BI Desktop** and updates to the **Power BI service**, a new sampling algorithm is available that improves how scatter charts represent high density data.

For example, you might create a scatter chart from your organization's sales activity, each store having tens of thousands of data points each year. A scatter chart of such information would sample data (select a meaningful representation of that data, to illustrate how sales occurred over time) from the available data, and create a scatter chart that represents the underlying data. This is common practice in high density scatter charts, and Power BI has improved its sampling of high density data, the details of which are described in this article.



NOTE

The **high density sampling** algorithm described in this article applies to, and is available in, scatter charts in both **Power BI Desktop** and the **Power BI service**.

How high density scatter charts work

Previously, **Power BI** selected a collection of sample data points in the full range of underlying data in a deterministic fashion to create a scatter chart. Specifically, Power BI would select the first and last rows of data in the scatter chart series, then would divide the remaining rows evenly so that 3,500 data points total would be plotted on the scatter chart. For example, if the sample had 35,000 rows, then the first and last rows would be selected for plotting, then every tenth row would also be plotted ($35,000 / 10 =$ every tenth row = 3,500 data points). Also previously, null values or points that could not be plotted (such as text values) in data series weren't shown, and thus were not considered when generating the visual. And with such sampling, the perceived density of the scatter chart was also based on the representative data points, and thus the implied visual density was a circumstance of the sampled points, and not the full collection of the underlying data.

When you enable **High Density Sampling**, Power BI implements an algorithm that eliminates overlapping points, and ensures that the points on the visual can be reached when interacting with the visual. It also ensures that all points in data set are represented in the visual, providing context to the meaning of selected points, rather than just plotting a representative sample.

By definition, high density data is sampled to enable visualizations that can be created reasonably quickly, and are

responsive to interactivity (too many data points on a visual can bog it down, and can detract from the visibility of trends). How such data is sampled, to provide the best visualization experience and ensure all data is represented, is what drives the creation of the sampling algorithm. In Power BI, the algorithm has been improved to provide the best combination of responsiveness, representation, and clear preservation of important points in the overall data set.

NOTE

Scatter charts using the **high density sampling** algorithm are best plotted on square visuals, as with all scatter charts.

How the new scatter chart sampling algorithm works

The new algorithm for **High Density Sampling** for scatter charts employs methods that capture and represent the underlying data more effectively, and eliminate overlapping points. It does this by starting with a small radius for each data point (the visual circle size for a given point on the visualization). It then increases the radius of all data points; when two (or more) data points overlap, a single circle (of the increased radius size) represents those overlapped data points. The algorithm continues to increase the radius of data points, until that radius value results in a reasonable number of data points - 3,500 - being displayed in the scatter chart.

The methods in this algorithm ensure that outliers are represented in the resulting visual. The algorithm respects scale when determining overlap, too, such that exponential scales are visualized with fidelity to the underlying visualized points.

The algorithm also preserves the overall shape of the scatter chart.

NOTE

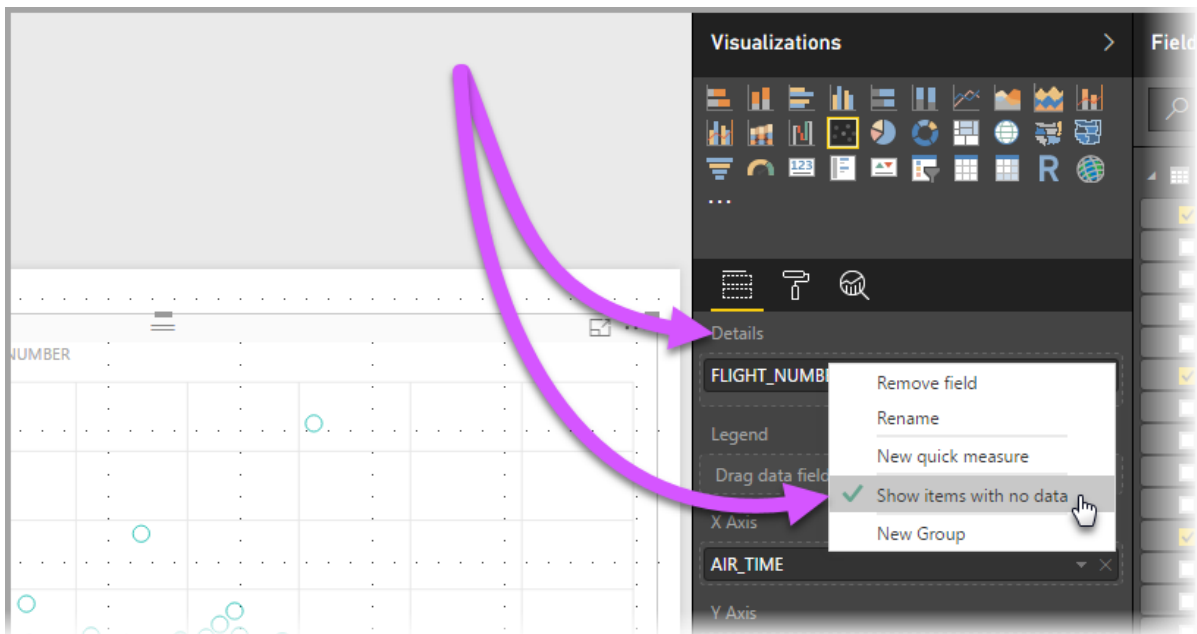
When using the **High Density Sampling** algorithm for scatter charts, *accurate distribution* of the data is the goal, and implied visual density is *not* the goal. For example, you might see a scatter chart with lots of circles that overlap (density) in a certain area, and imagine many data points must be clustered there; since the **High Density Sampling** algorithm can use one circle to represent many data points, such implied visual density (or "clustering") will not show up. To get more detail in a given area, you can use slicers to zoom in.

In addition, data points that cannot be plotted (such as nulls or text values) are ignored, so another value that can be plotted is selected, further ensuring the true shape of the scatter chart is maintained.

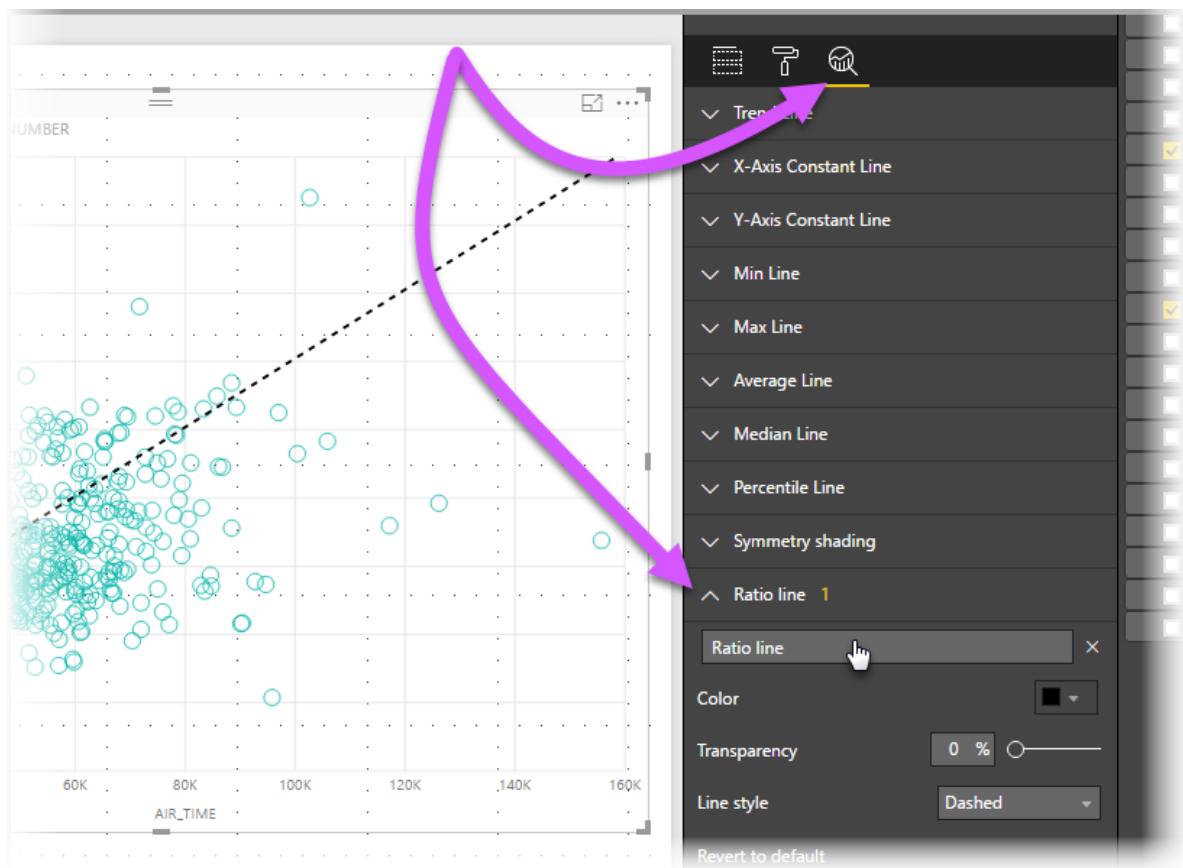
When the standard algorithm for scatter charts is used

There are circumstances under which **High Density Sampling** cannot be applied to a scatter chart, and the original algorithm is used. Those circumstances are the following:

- If you right-click on **Details**, then select **Show items with no data** from the menu that appears, the scatter chart will revert to the original algorithm.

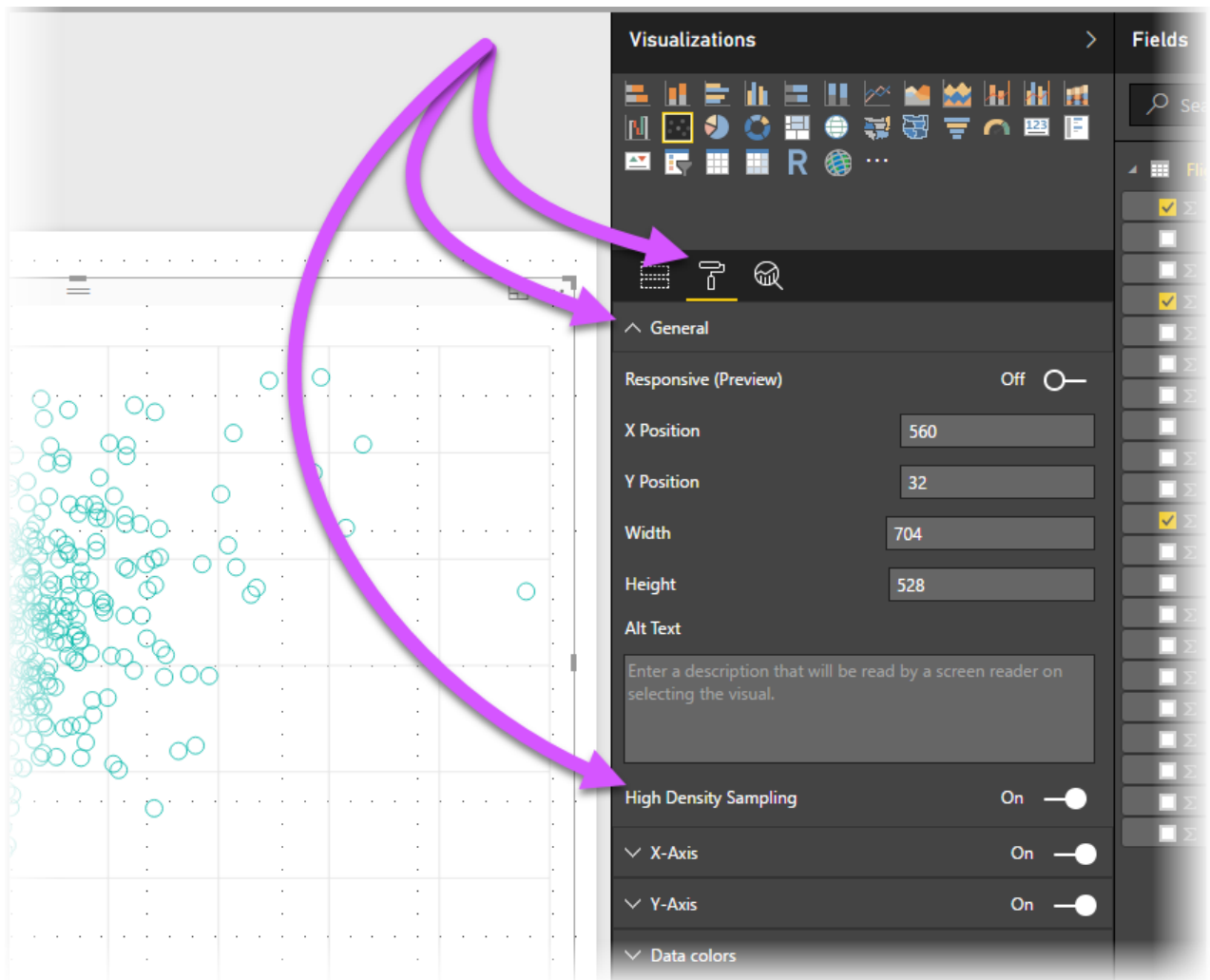


- Any values in the **Play** axis will result in the scatter chart reverting to the original algorithm.
- If both X and Y axes are missing on a scatter chart, the chart reverts to the original algorithm.
- Using a **Ratio line** in the **Analytics** pane results in the chart reverting to the original algorithm.



How to turn on high density sampling for a scatter chart

To turn on **High Density Sampling**, select a scatter chart and then go to the **Formatting** pane, and expand the **General** card. Near the bottom of that card, a toggle slider called **High Density Sampling** is available. To turn it on, slide it to **On**.



NOTE

Once the slider is turned on, Power BI will attempt to use the **High Density Sampling** algorithm whenever possible. When the algorithm cannot be used (for example, you place a value in the *Play* axis), the slider stays in the **On** position even though the chart has reverted to the standard algorithm. If you then remove a value from the *Play* axis (or conditions change to enable use of the high density sampling algorithm), since the slider is on the chart will automatically use high density sampling for that chart.

NOTE

Data points are grouped and/or selected by the index. Having a legend does not affect sampling for the algorithm, it only affects the ordering of the visual.

Considerations and limitations

The high density sampling algorithm is an important improvement to Power BI, but there are a few considerations you need to know when working with high density values and scatter charts.

- The **High Density Sampling** algorithm only works with live connections to Power BI service-based models, imported models, or DirectQuery.

Next steps

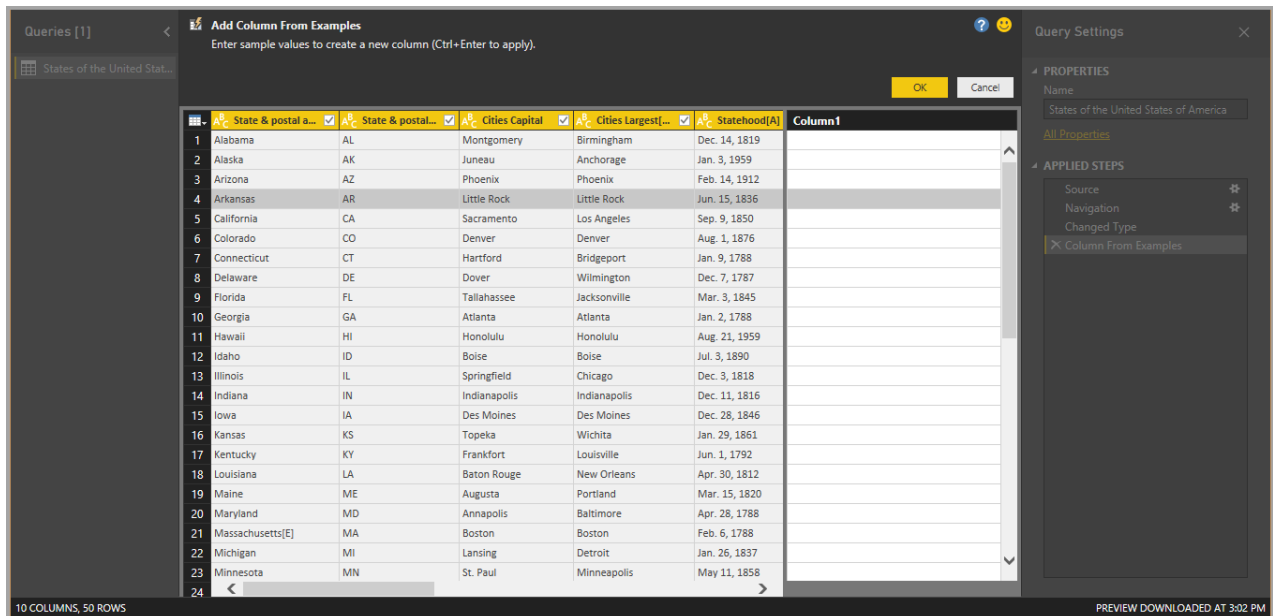
For more information about high density sampling in other charts, see the following article.

- [High density line sampling in Power BI](#)

Add a column from an example in Power BI Desktop

11/22/2017 • 4 min to read • [Edit Online](#)

Starting with the April 2017 release of **Power BI Desktop**, you can add new columns of data to your model using **Query Editor** by simply providing one or more sample values for your new column. You can create a new column example from a current selection, or from providing input based on all (or selected) columns in a given table.



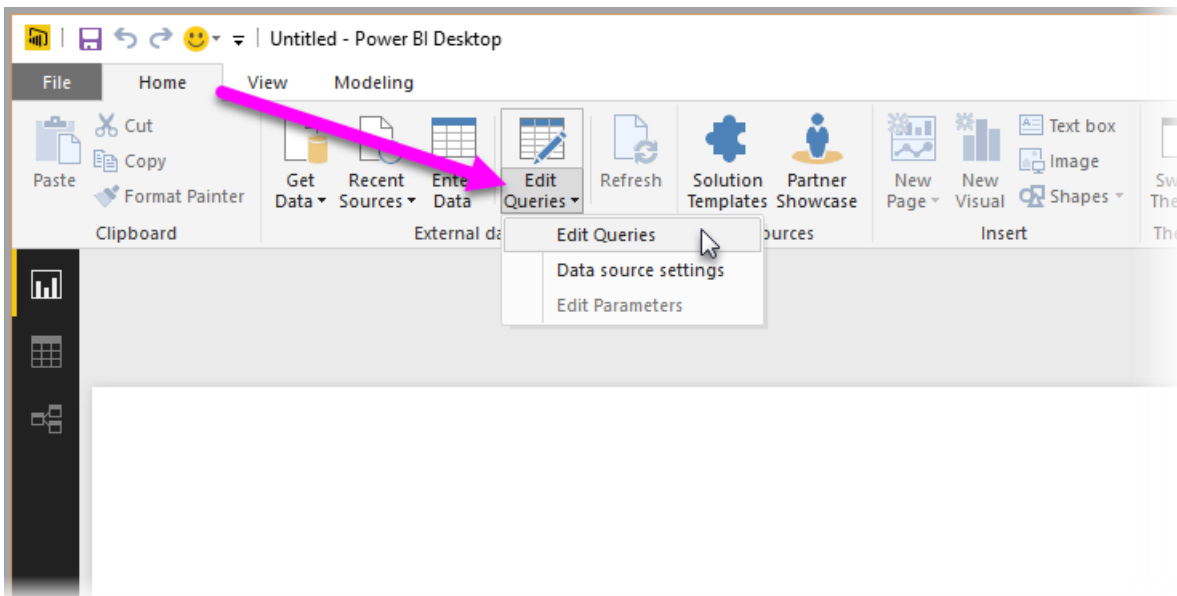
This approach helps you quickly and easily create new columns, and is great for the following situations:

- You know the data result you want in your new column, but you're not sure which transformation (or collection of transformations) will get you there.
- You already know which transformations you need, but you're not sure where to click or select in the UI to make them happen.
- You know all about the transformations you need using a *Custom Column* expression in **M**, but one (or more) of those expressions aren't available to click or add in the UI.

Using the **add column from example** feature is easy and straightforward. In the next few sections, we see just how easy it is.

Use Query Editor to add a new column from examples

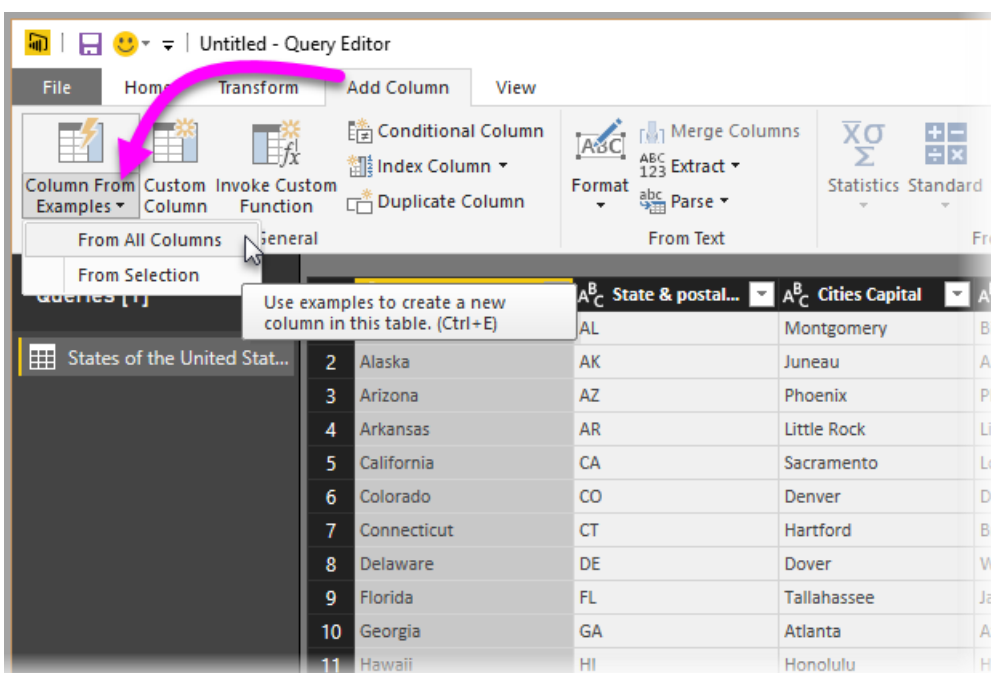
To create a new column from an example, launch **Query Editor**. You can do this by selecting **Edit Queries** from the **Home** ribbon in **Power BI Desktop**.



In this article, we'll use data from the following Wikipedia article (it's a link, so you can click it to get the data for yourself and follow along):

- [List of states and territories of the United States](#)

Once **Query Editor** is launched and you have some data loaded, you can get started adding a column from examples. To add a new column, in **Query Editor** select the **Add Column** tab on the ribbon and select **Column from Examples**. If you choose the drop-down, you can select either **From All Columns** (the default, if you just select the button instead of the drop-down) or select **From Selection**. In this article, we'll walk through selecting **From All Columns**.

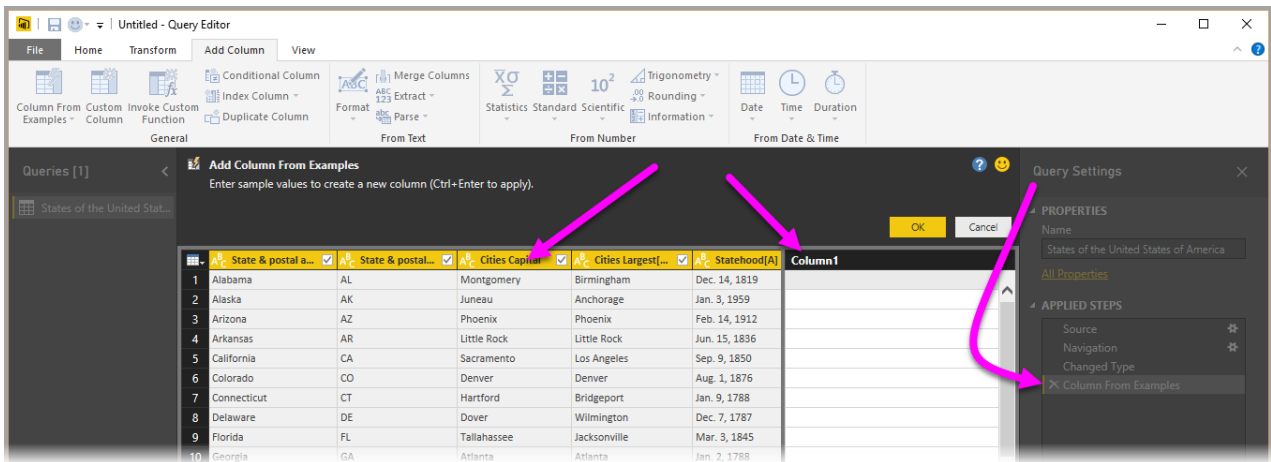


The Add Column From Examples pane

Once you make a selection to add a new column from examples, a new pane appears that shows the columns in the current table (you may need to scroll to see them all). The new **Column1** is also shown to the right, which is the column that **Power BI Desktop** will create based on your examples. Below the new **Column1** header are blank cells, where you can type in your examples that Power BI uses to create rules and transformations to match your example.

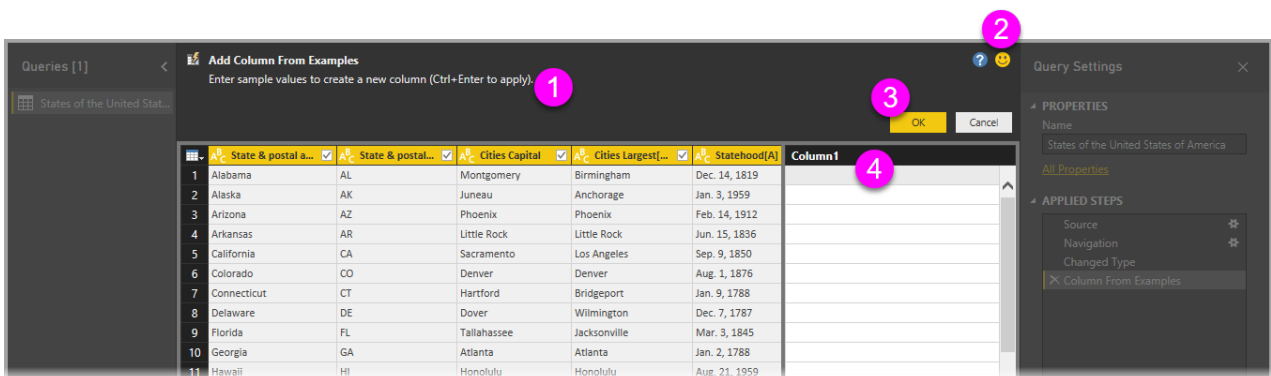
Notice too that this is an **Applied Step** in the **Query Settings** pane. As always, **Query Editor** will record your

transformation steps and apply them to the query, in order.



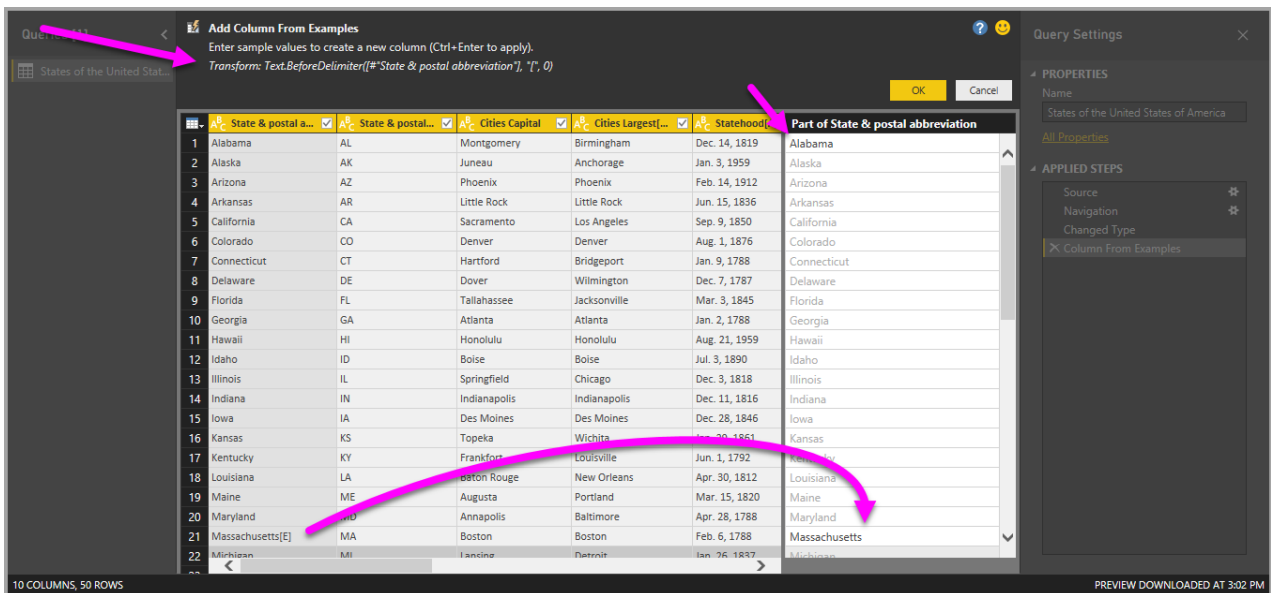
This is called the **Add Columns From Examples** pane, and it consists of four primary areas:

1. The **Command bar** which includes a brief description of the feature, or the transformation.
2. The **Send Feedback** option to help Power BI improve this feature.
3. The **OK** and **Cancel** buttons, which lets you commit your transformations and add the column, or cancel.
4. The new column area, where you can type your sample values in any of the rows (to provide Power BI with your example), relating to other columns in that row.



As you type your example in the new column, Power BI gives you a preview of how the column it's creating will appear, based on the transformations it detects. For example, we typed *Alabama* in the first row, corresponding to the *Alabama* value in the first column of the table. As soon as we hit *Enter* Power BI fills in the column based on that value.

But then we went to the row that included *Massachusetts[E]* and deleted that last *[E]* portion (because we didn't want it) and Power BI detected the change, and used the example to create a transformation. Notice the explanation of the transform in the upper middle pane.



As you continue to provide examples, **Query Editor** adds to the transformations. When you're satisfied, you can select **OK** to commit your changes.

See Add Column from Examples in action

Want to see this working? The following video shows this feature being put to use, using the data source provided earlier in this example. Take a look, and follow along for yourself!

Considerations and limitations

There are many transformations that are available when using **Add column from Examples**, but not every transformation is included. The following list provides all the transformations that *are* supported.

- **Reference**

- Reference to a specific column (including trim, clean, and case transformations)

- **Text transformations**

- Combine (supports combination of literal strings and entire column values)
- Replace
- Length
- Extract
 - First Characters
 - Last Characters

- Range
 - Text before Delimiter
 - Text after Delimiter
 - Text between Delimiters
 - Length
- The following supported **text transformations** are available beginning with the November 2017 release of **Power BI Desktop**:
 - Remove Characters
 - Keep Characters

NOTE

All *Text* transformations take into account the potential need to trim, clean, or apply a case transformation to the column value.

- **Date transformations**

- Day
- Day of Week
- Day of Week Name
- Day of Year
- Month
- Month Name
- Quarter of Year
- Week of Month
- Week of Year
- Year
- Age
- Start of Year
- End of Year
- Start of Month
- End of Month
- Start of Quarter
- Days in Month
- End of Quarter
- Start of Week
- End of Week
- Day of Month
- Start of Day
- End of Day

- **Time transformations**

- Hour
- Minute
- Second
- To Local Time

NOTE

All *Date* and *Time* transformations take into account the potential need to convert the column value to *Date* or *Time* or *DateTime*.

• Number transformations

- Absolute Value
- Arccosine
- Arcsine
- Arctangent
- Convert to Number
- Cosine
- Cube
- Divide
- Exponent
- Factorial
- Integer Divide
- Is Even
- Is Odd
- Ln
- Base-10 Logarithm
- Modulo
- Multiply
- Round Down
- Round Up
- Sign
- Sin
- Square Root
- Square
- Subtract
- Sum
- Tangent

- The following supported **number transformation** is available beginning with the November 2017 release of **Power BI Desktop**:

- Bucketing/Ranges

• General

- Conditional Column

Add a custom column in Power BI Desktop

1/25/2018 • 2 min to read • [Edit Online](#)

You can easily add a new custom column of data to your model using **Query Editor** in **Power BI Desktop**. You can create and rename your custom column using easy buttons to create [M formulas](#) that define your custom column. The M formula has a [comprehensive function reference content set](#).

The screenshot shows the Power BI Desktop Query Editor interface. The main window displays a data table with the following columns: State, Cost of living, Weather, Health care quality, and Crime. The data rows are as follows:

State	Cost of living	Weather	Health care quality	Crime
1 Hampshire	40	45	4	3
2 do	33	20	7	26
3	38	44	1	2
4	14			
5 ota	30			
6	31			
7 husetts	45			
8 akota	26			
9 sin	24			
10	5			
11	16			
12	28			
13 ka	12			
14 nt	43			
15 nylvania	35			
16 akota	25			
17	27			
18 re	34			
19 island	42			
20 arolina	19			
21 ng	15			
22 an	18			
23	11			
24				

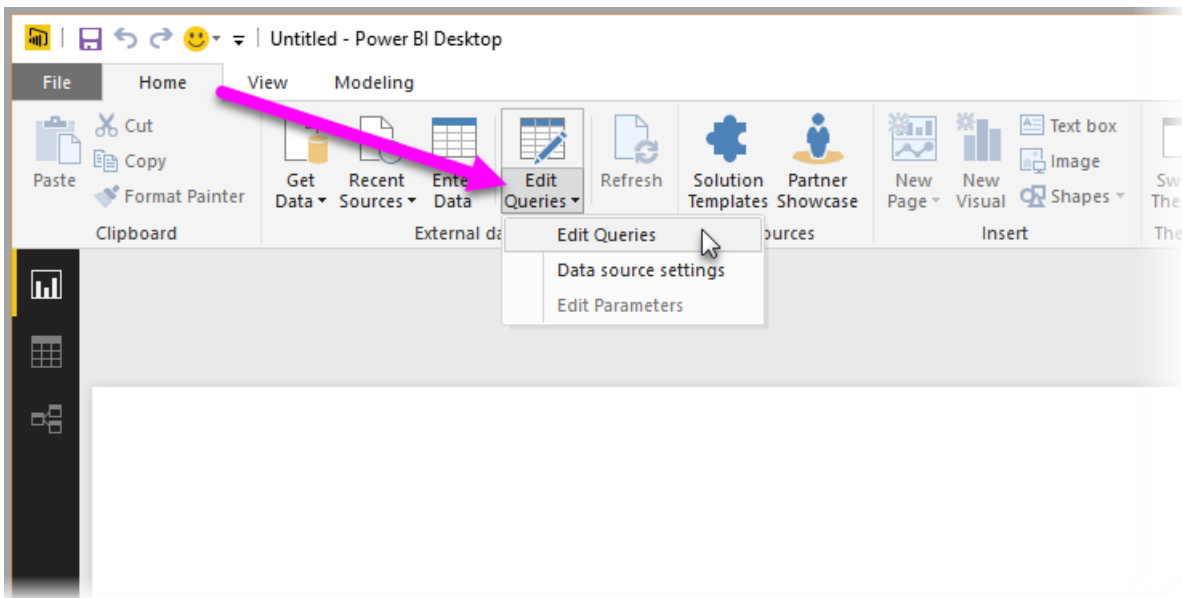
The 'Add Custom Column' dialog box is open, showing the following details:

- New column name:** Custom
- Custom column formula:** `=[Weather]+[Health care quality]+[Crime]+[Tax])/4`
- Available columns:** Cost of living, Weather, Health care quality, Crime, Tax, Culture, Senior. The 'Tax' column is highlighted.
- Message:** No syntax errors have been detected.
- Buttons:** OK, Cancel

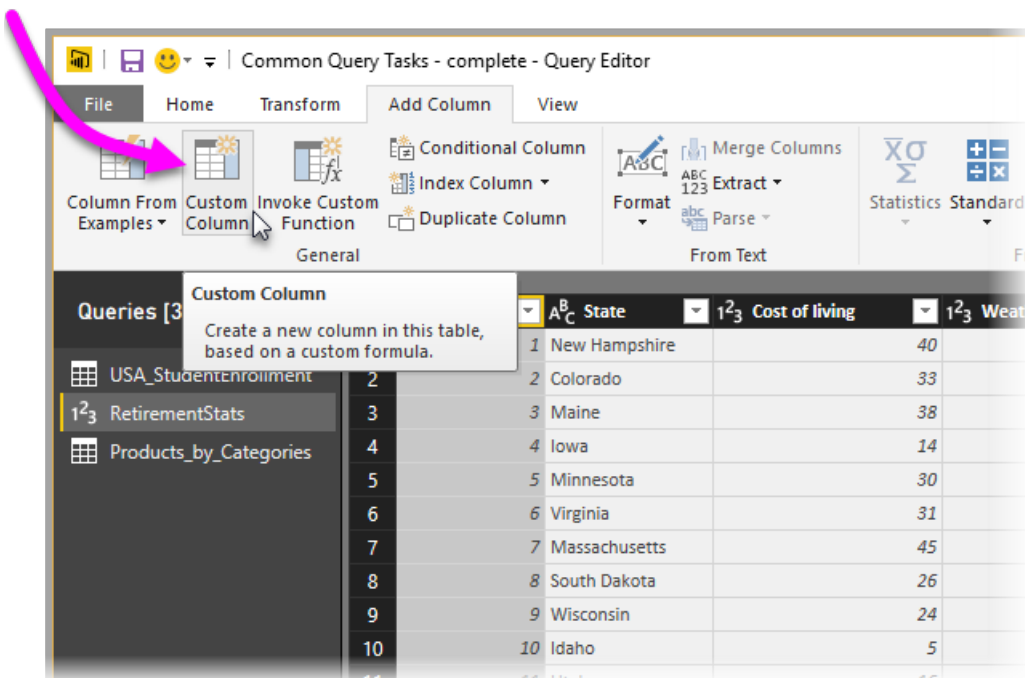
Creating a custom column is another **Applied Step** to the query you create in **Query Editor**, which means it can be changed, moved earlier or later, or modified at any time.

Use Query Editor to add a new custom column

To create a new custom column, launch **Query Editor**. You can do this by selecting **Edit Queries** from the **Home** ribbon in **Power BI Desktop**.



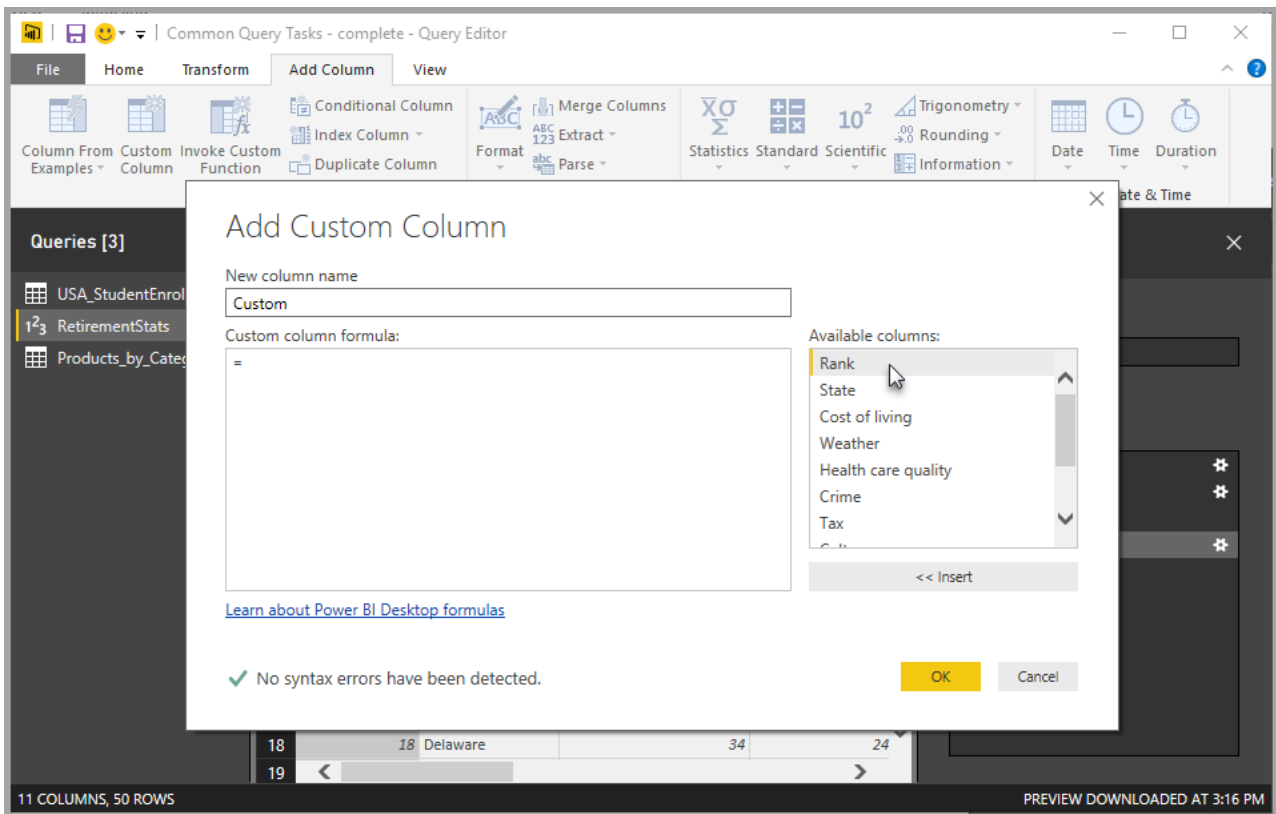
Once **Query Editor** is launched and you have some data loaded, you can add a custom column by selecting the **Add Column** tab on the ribbon, and then selecting **Custom Column**.



When you do so, the **Add Custom Column** window appears, which we discuss in the following section.

The Add Custom Column window

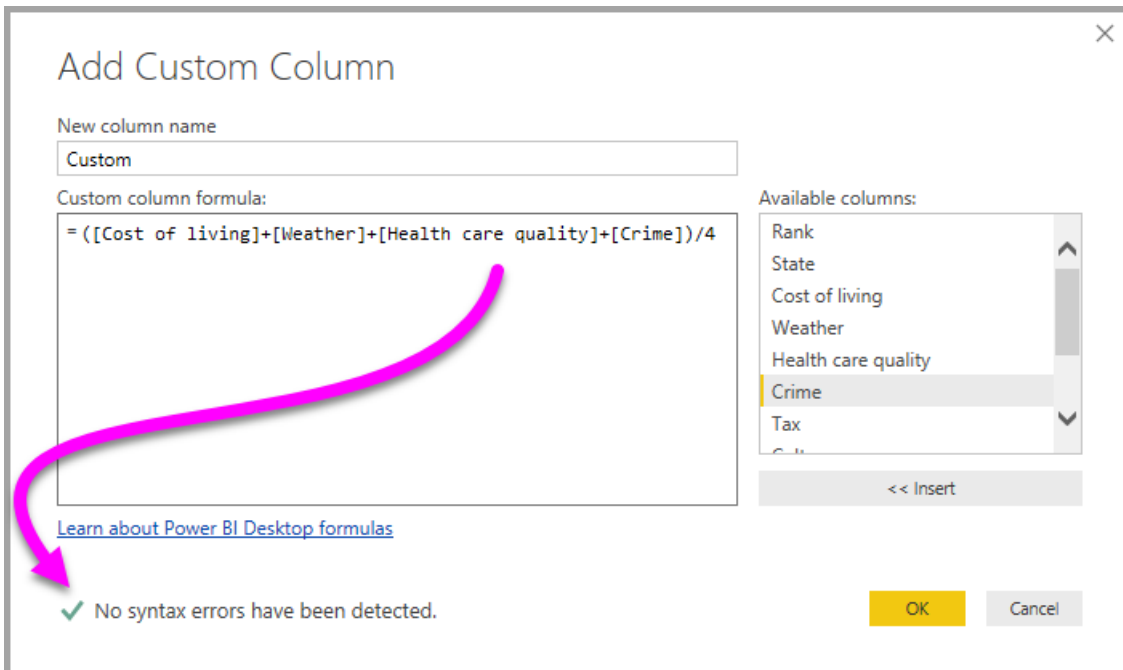
In the **Add Custom Column** window, you see the list of available fields in the pane on the right, the name of your custom column on the top (you can rename it just by typing a new name in that text box), and the **M formula** that you create (or write) based on inserting fields from the right, adding operators, and otherwise building the formula on which your new custom column will be defined.



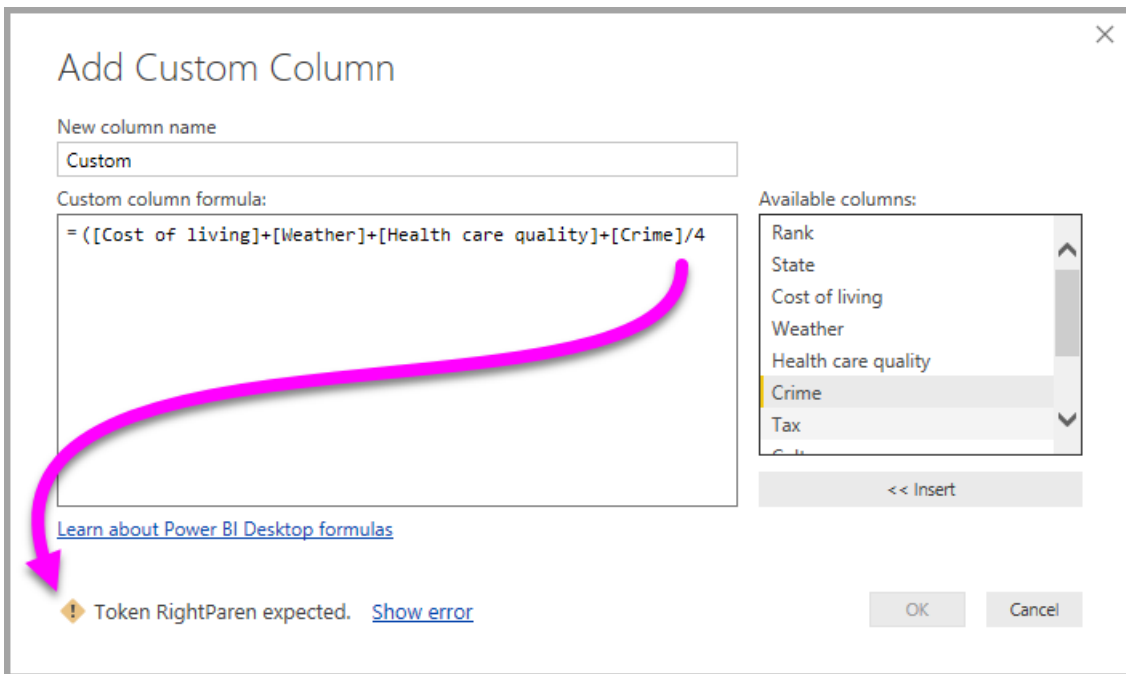
Create formulas for your custom column

You can select a field from the **Available columns:** list on the right, and select **<< Insert** to add them to the custom column formula. You can simply double-click on a column in the list to add it, too.

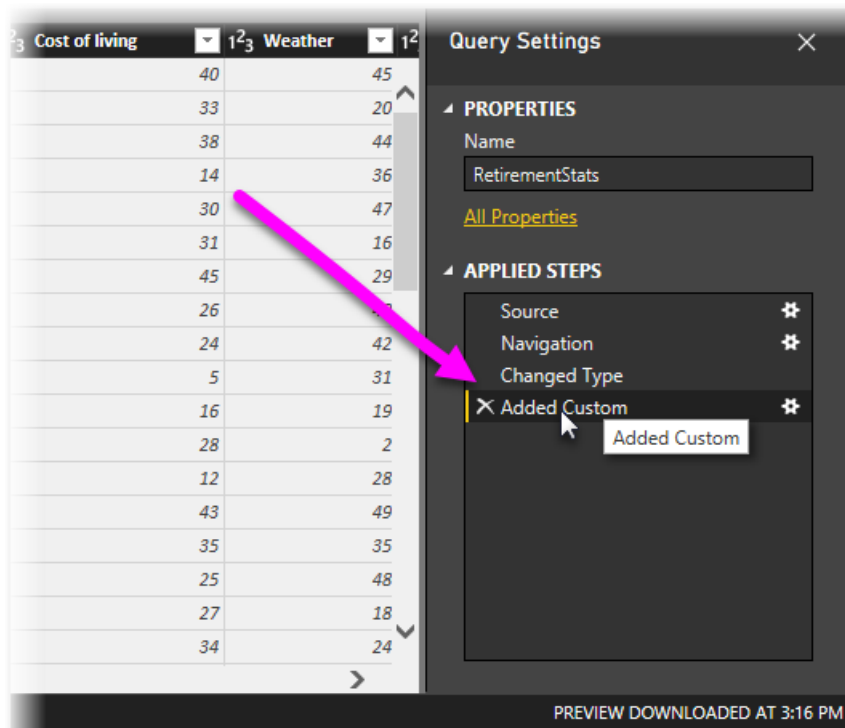
As you type the formula and build your column, in the bottom of the window you'll see an indicator telling you, in real time (as you type) whether any syntax errors are detected. If all is good, you'll see a green checkmark.



But if you have some sort of error in your syntax, you get a yellow warning icon, along with the error detected, and a link that puts the cursor (in your formula) where the error is detected.



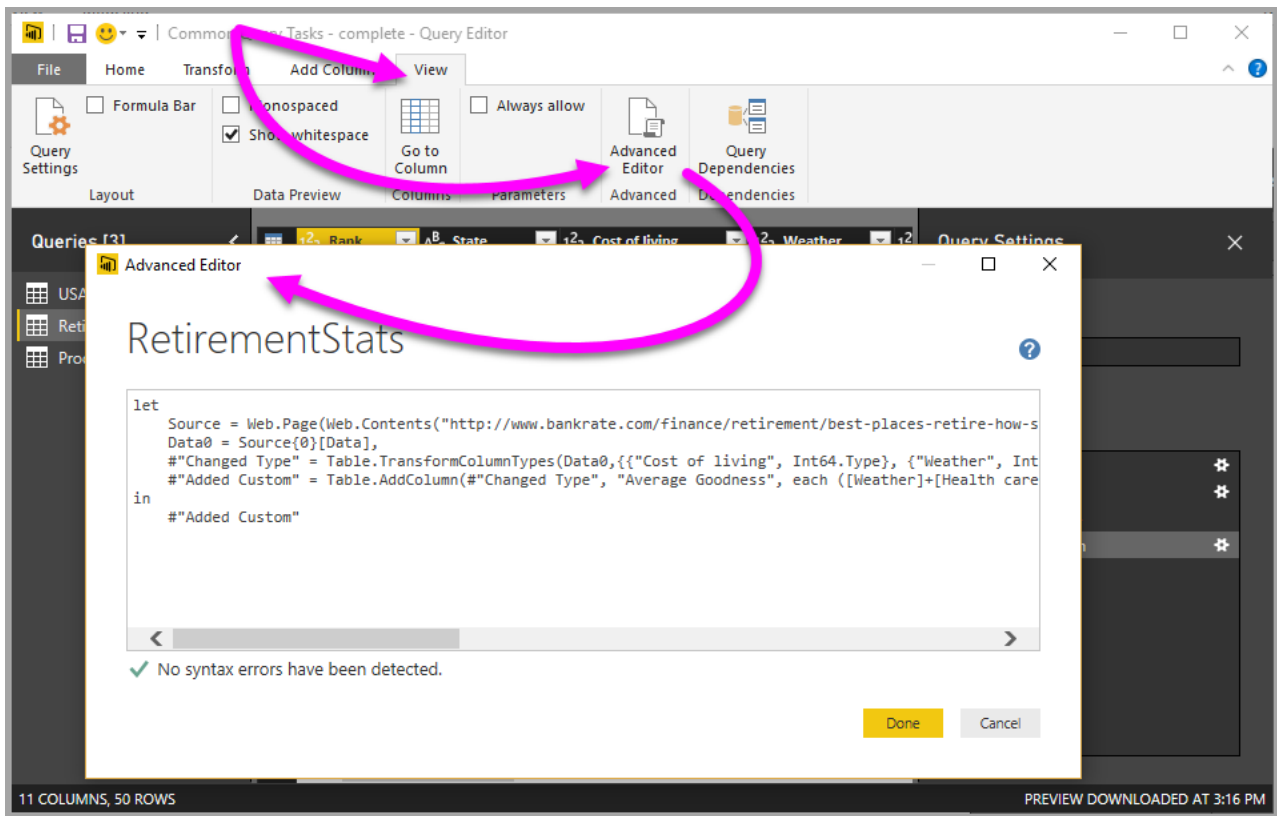
When you select **OK**, your custom column is added to the model, and the **Added Custom** step is added to your query's **Applied Steps**.



If you double-click the **Added Custom** step in the **Applied Steps** pane, the **Add Custom Column** window appears again, with the custom column formula you created already loaded, and ready for you to modify if necessary.

Using the Advanced Editor for Custom Columns

You can also create a custom column (and modify any step of your query, for that matter) using the **Advanced Editor**. In **Query Editor** select the **View** tab and then select **Advanced Editor** to display the **Advanced Editor**.



The **Advanced Editor** gives you full control over your query.

Next steps

There are other ways to create a custom column, including creating a column based on examples you provide to **Query Editor**. See the following article for more information on creating custom columns from examples:

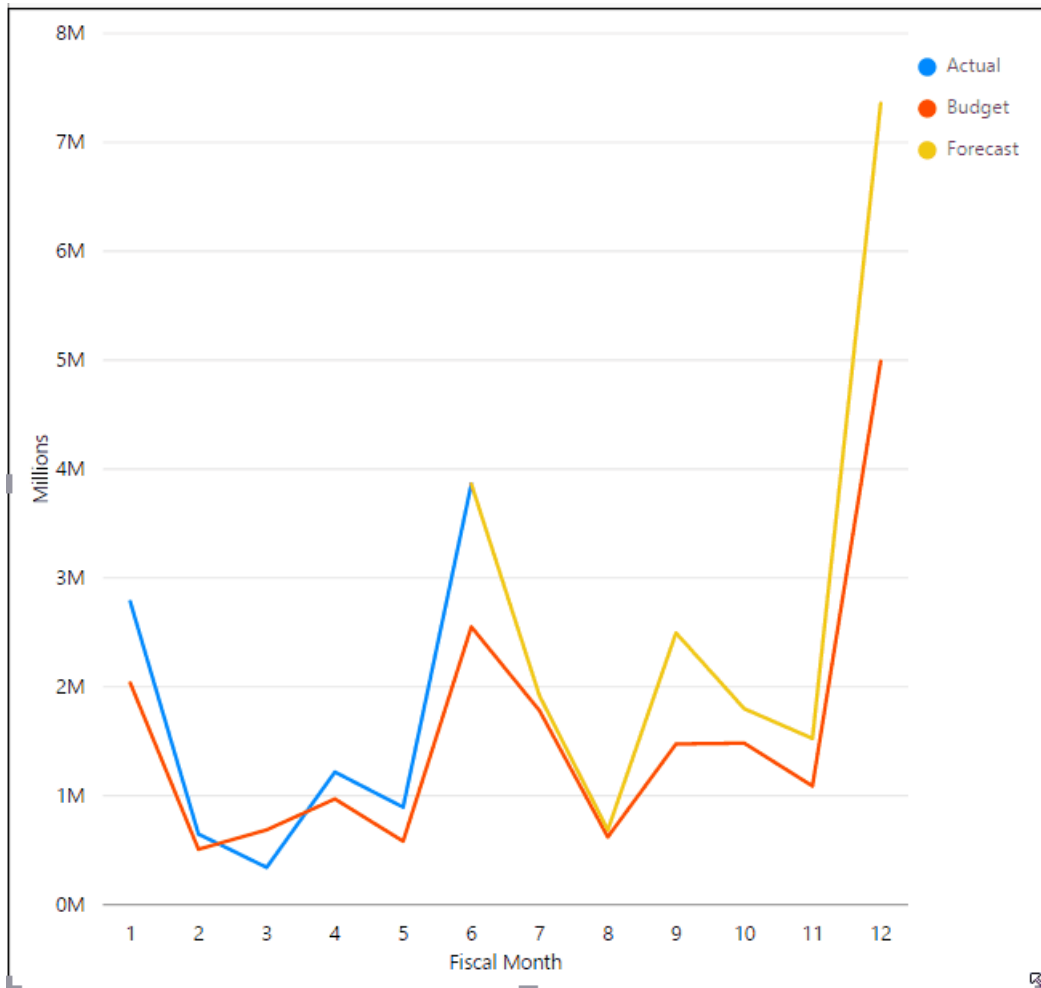
- [Add a column from an example in Power BI Desktop](#)
- [Introduction to M formula language](#)
- [M function reference](#)

Optimize a Power BI visual for any size

11/9/2017 • 1 min to read • [Edit Online](#)

You can set the visuals in your dashboard or report to be *responsive*, to change dynamically to display the maximum amount of data and insight, no matter the screen size.

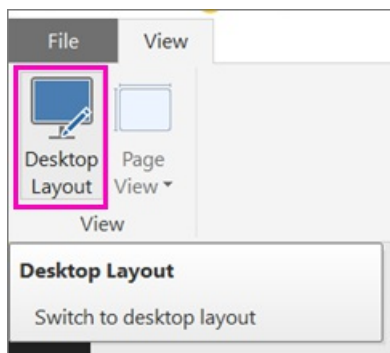
As a visual changes size, Power BI prioritizes the data view, for example removing padding and moving the legend to the top of the visual automatically, so the visual remains informative even as it gets smaller. Responsiveness is especially useful in visuals in the Power BI mobile app on phones.



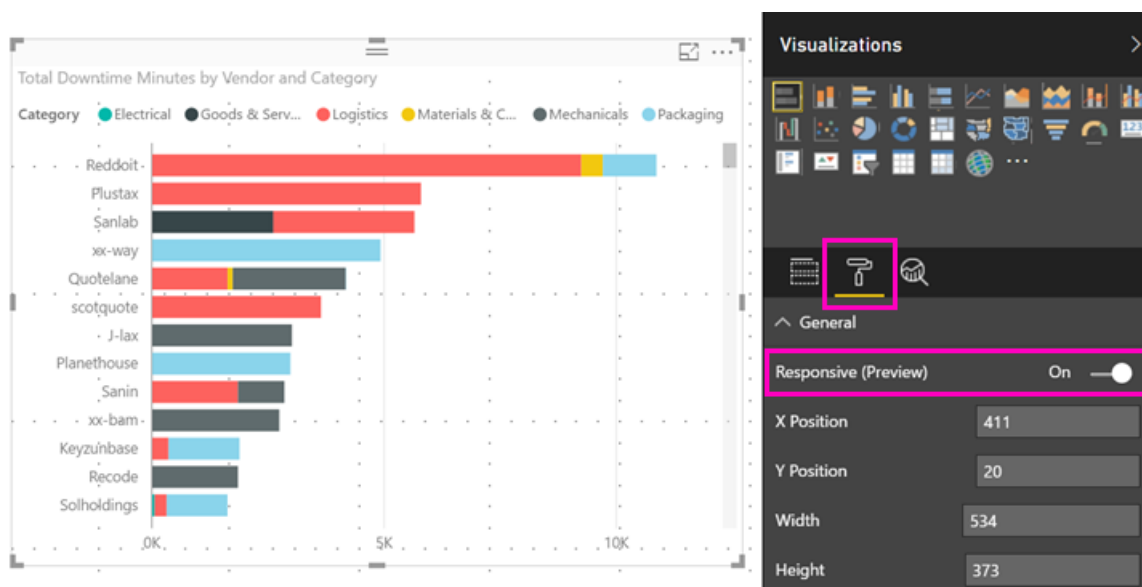
You can turn on responsiveness for any visual with X and Y axes, and slicers.

Turn on responsiveness in Power BI Desktop

1. In Power BI Desktop, on the **View** tab, make sure you're in **Desktop Layout**.



2. Select a visual, and in the **Visualizations** pane select the **Format** section.
3. Expand **General** > slide **Responsive** to **On**.

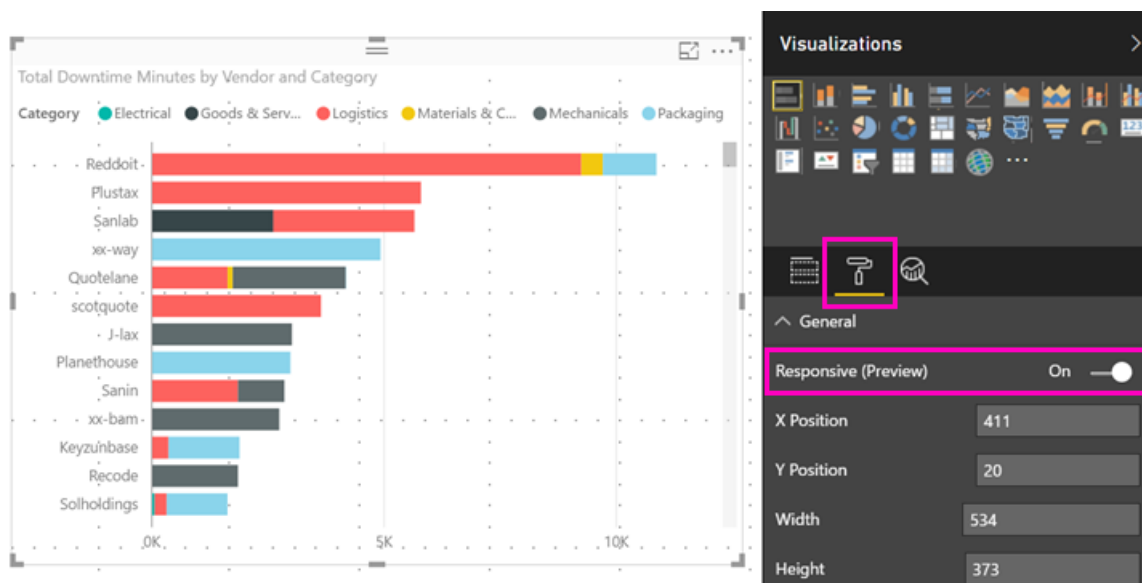


Now when you [create a report optimized for the phone](#) and add this visual, it will resize gracefully.

Turn on responsiveness in the Power BI service

You turn on responsiveness for a visual in a report in the Power BI service. You need to be able to edit the report.

1. In a report in the Power BI service (<https://powerbi.com>), select **Edit Report**.
2. Select a visual, and in the **Visualizations** pane select the **Format** section.
3. Expand **General** > slide **Responsive** to **On**.



Now when you [create a phone view of a dashboard](#) and add this visual, it will resize gracefully.

Next steps

- [Create reports optimized for the Power BI phone apps](#)
- [Create a phone view of a dashboard in Power BI](#)
- [View Power BI reports optimized for your phone](#)
- More questions? [Try asking the Power BI Community](#)

Use inline hierarchy labels in Power BI Desktop

12/6/2017 • 2 min to read • [Edit Online](#)

Power BI Desktop supports the use of **inline hierarchy labels**, which is the first of two features intended to enhance hierarchical drilling. The second feature, which is currently in development, is the ability to use nested hierarchy labels (stay tuned for that - our updates happen frequently).

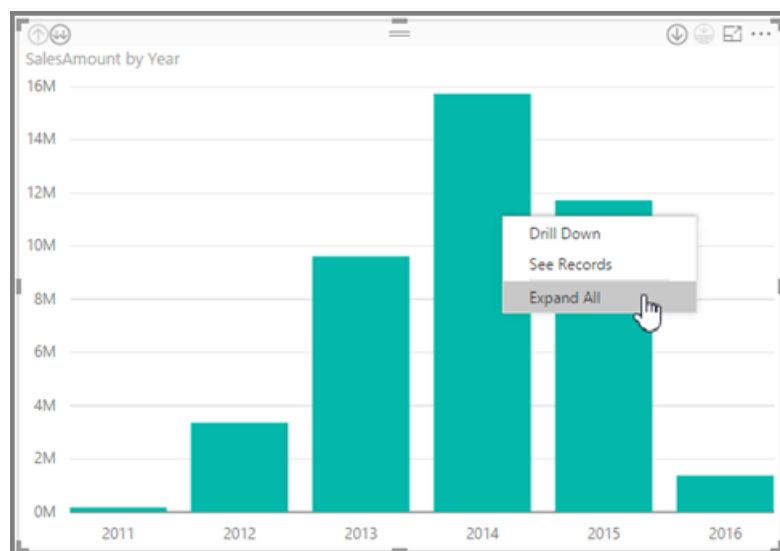
How inline hierarchy labels work

With inline hierarchy labels, you can see hierarchy labels as you expand visuals using the **Expand All** feature. One great benefit to seeing these hierarchy labels is that you can also choose to **sort** by these different hierarchy labels as you expand your hierarchical data.

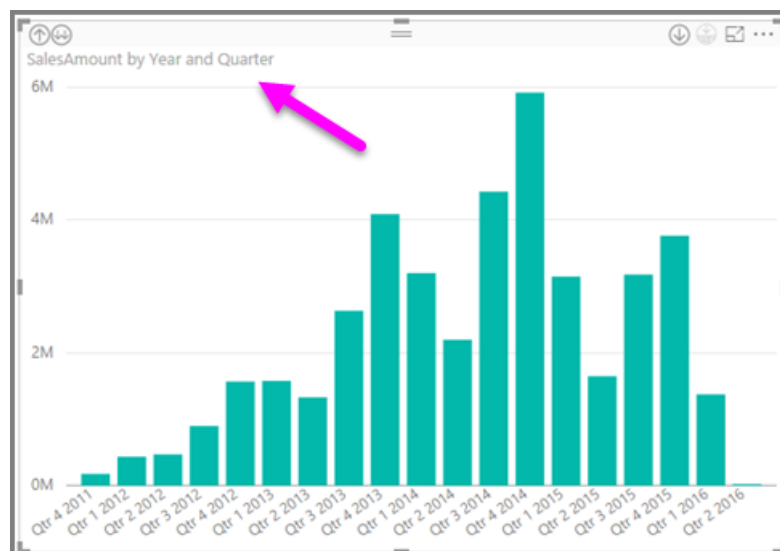
Using the built-in Expand All feature (without sorting by hierarchy labels)

Before we see inline hierarchy labels in action, let's review how the default **Expand All** feature behavior. Doing so will help us understand (and appreciate) how useful inline hierarchy labels can be.

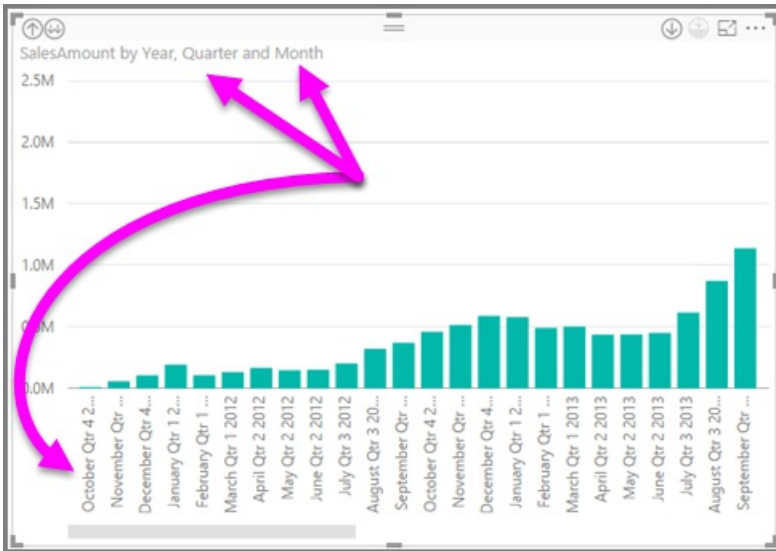
The following image shows a bar chart visual for annual sales. When you right-click, you can choose **Expand All**.



Once **Expand All** is selected, the visual expands the date hierarchy from *Year* to *Quarter*, as shown in the following image.



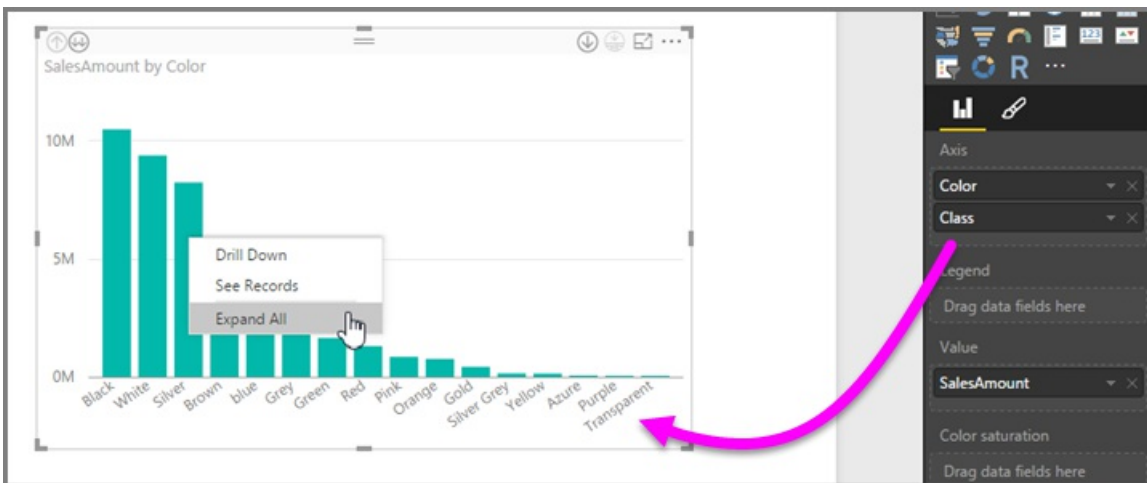
Notice that the *Year* and *Quarter* labels are shown inline together... this labeling scheme continues as you **Expand All** down to the bottom of the hierarchy.



This is how the built-in *Date* hierarchy, associated with fields that have a *date/time* data type, behaves. Let's head to the next section, and see how the new inline hierarchy labels feature is different.

Using inline hierarchy labels

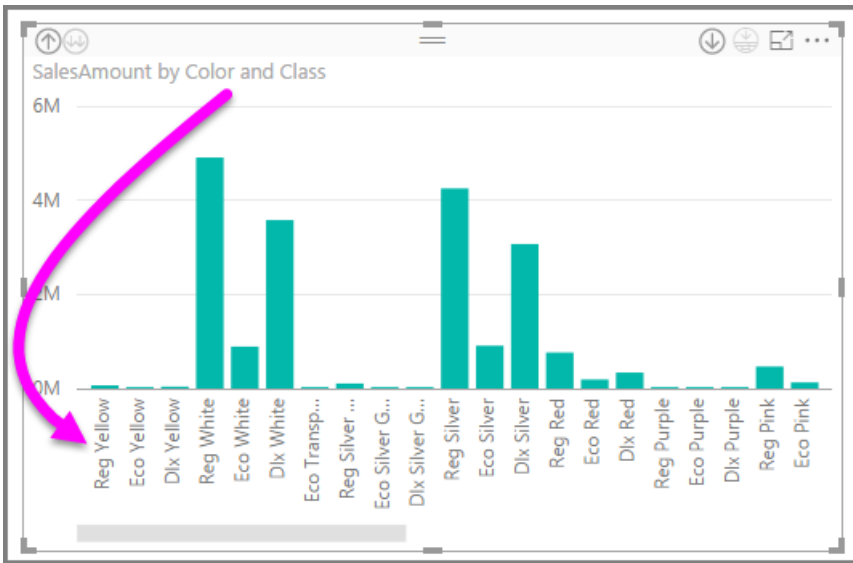
Now let's look at a different chart - using data that has informal hierarchies. In the following visual, we have a bar chart with **Sales Amount**, using *Color* as the axis. In this data, *Color* and *Class* form an informal hierarchy. From here, you can again select *Expand All* to drill down into the hierarchy.



Selecting **Expand All** shows the next level with the inline display of hierarchy labels. By default, inline hierarchies are sorted by the measure value – in this case, **SalesAmount**. With inline hierarchy labels enabled, you can choose to sort this data by the hierarchy too, by selecting the ellipses in the upper right corner (the ...), then selecting **Sort By > Color Class** as shown in the following image.



Once **Color Class** is selected, the data is sorted based on the informal hierarchy selection, as shown in the following image.



NOTE

The inline hierarchy label feature doesn't yet allow for the built-in time hierarchy to be sorted by value; it's only sorted by hierarchy order.

Troubleshooting

It's possible for your visuals to get stuck in an expanded inline hierarchy level state. In some cases, you might find that some of your visuals are stuck in the mode where they were expanded, in which case drilling up doesn't work. This can happen if you happened to take the following steps (the fix for this is *below* these steps):

Steps that might get your visuals stuck in an expanded state:

1. You enable the **inline hierarchy label** feature
2. You create some visuals with hierarchies
3. Then you **Expand All** and save your file
4. You then *disable* the **inline hierarchy label** feature, and restart Power BI Desktop
5. Then you re-open your file

If you happen to take those steps, and your visuals are stuck in expanded mode, you can do the following to troubleshoot them:

1. Re-enable the **inline hierarchy label** feature, then restart Power BI Desktop

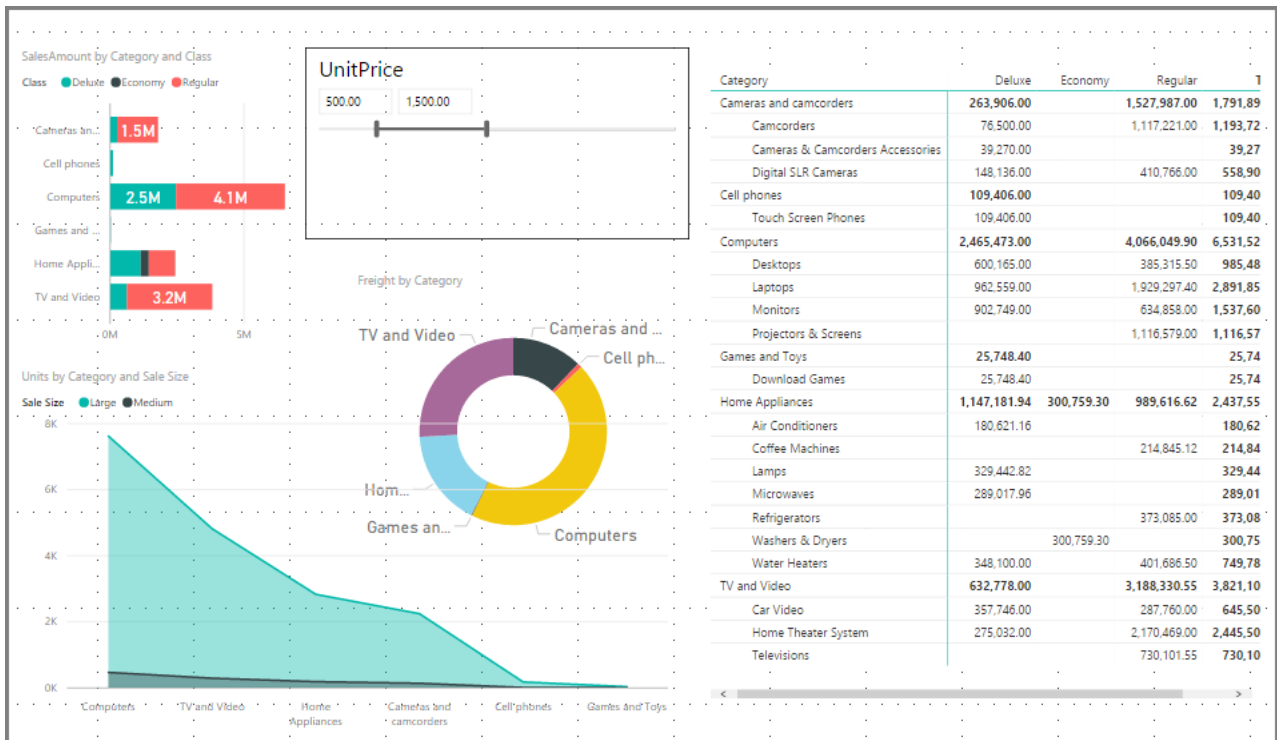
2. Re-open your file, and drill back up to top of your affected visual(s)
3. Save your file
4. Disable the **inline hierarchy label** feature, then restart Power BI Desktop
5. Re-open your file

Alternatively, you can just delete your visual and recreate it.

Use the numeric range slicer in Power BI Desktop

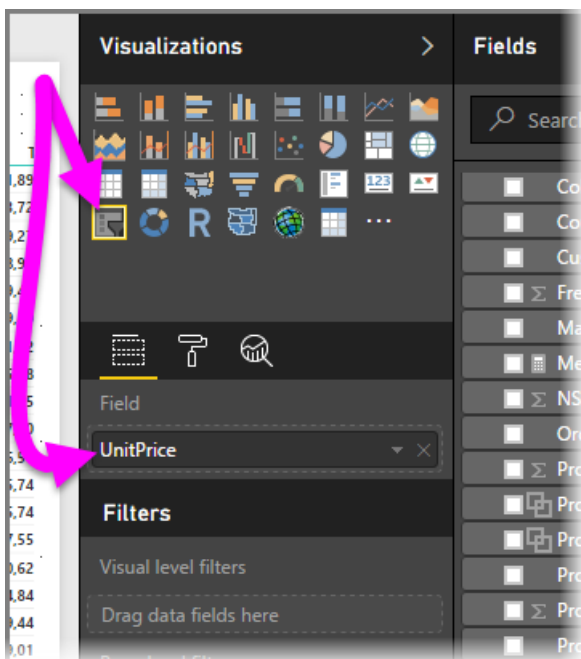
1/25/2018 • 2 min to read • [Edit Online](#)

With the **numeric range slicer**, you can apply all sorts of filters to any numeric column in your data model. You can choose to filter **between** numbers, **less than or equal** to a number, or **more than or equal** to a number. While this may sound straightforward, it's a very powerful way to filter your data.

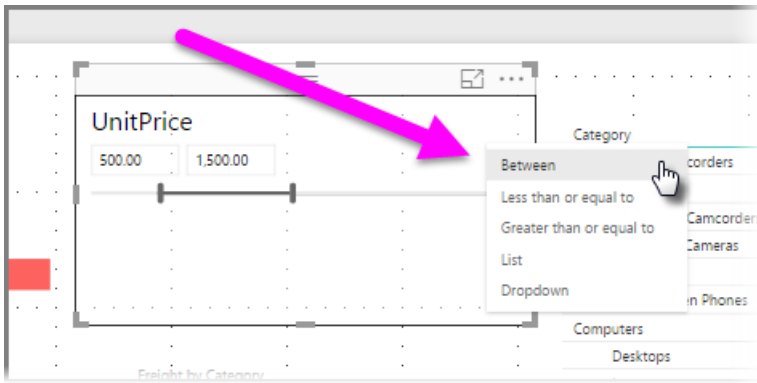


Using the numeric range slicer

You can use the numeric range slicer just like any other slicer. Simply create a **slicer** visual for your report, and then select a numeric value for the **Field** value. In the following image, the *UnitPrice* field is selected.



Select the carat in the upper-right corner of the **numeric range slicer** and a menu appears.

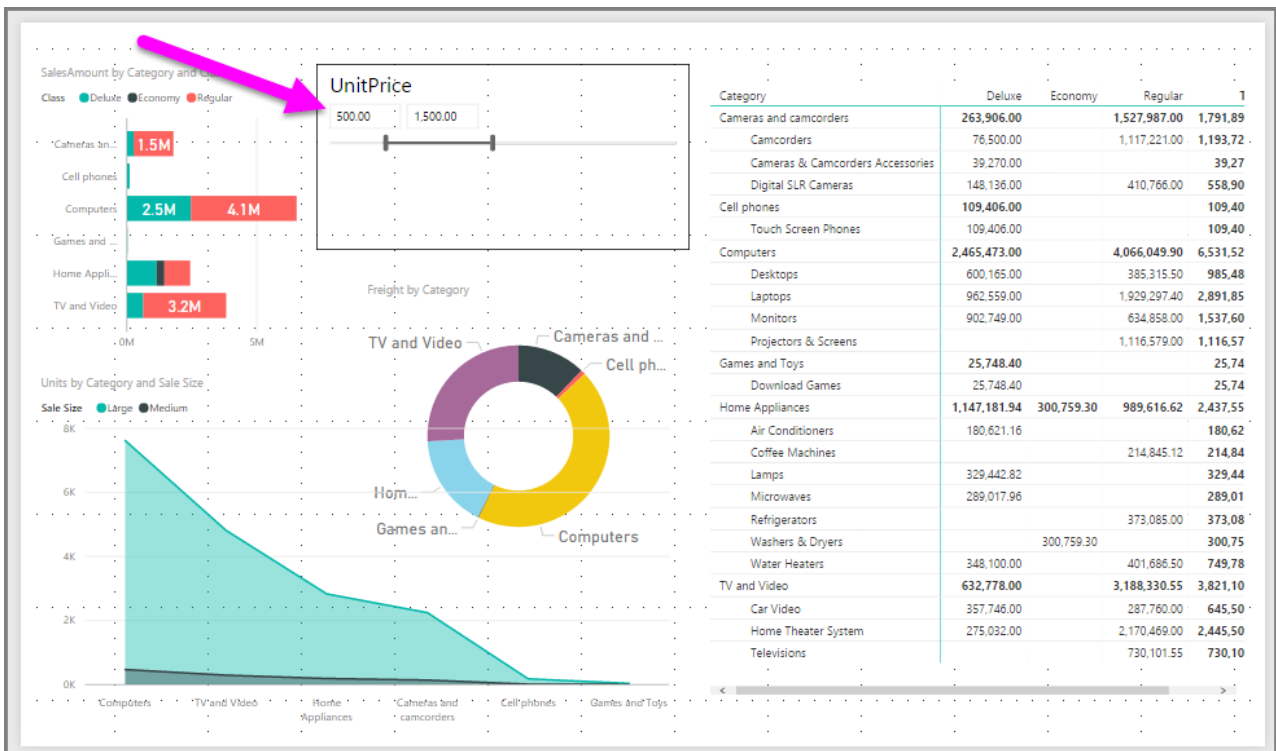


For the numeric range, you can select from the following three selections:

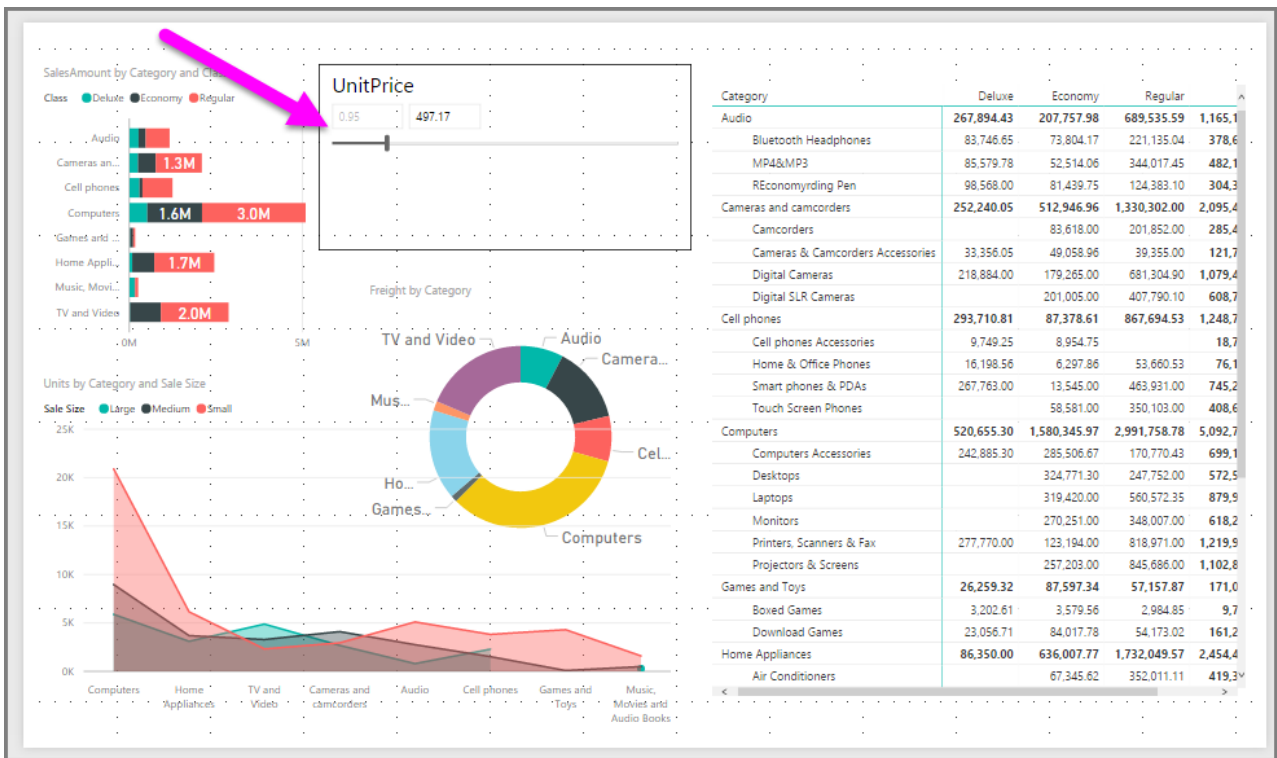
- Between
- Less than or equal to
- Greater than or equal to

When you select **Between** from the menu, a slider appears and you can filter for numeric values that fall between the numbers. In addition to using the slider bar itself, you can click in either box and type in the values. This is convenient when you want to slice on specific whole numbers, yet the granularity of moving the slicer bar makes it difficult to land exactly on that number.

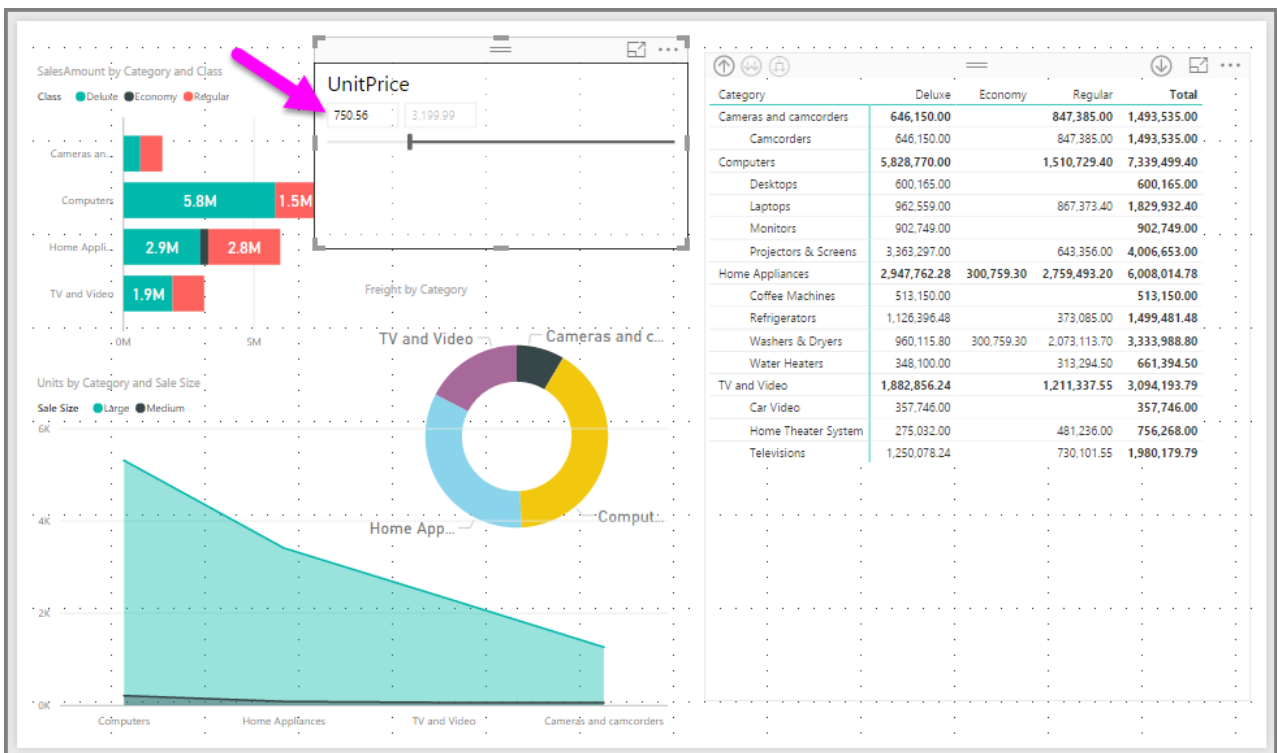
In the following image, the report page is filtered for *UnitPrice* values that range between 500 and 1500.



When we select **Less than or equal to**, the left (lower value) handle of the slider bar disappears, and we can adjust only the upper bound of the slider bar. In the following image, we set the slider bar to 497.17.



Lastly, if we select **Greater than or equal to**, then the right (highest value) slider bar handle disappears, and we can adjust the lower value, as seen in the following image. Now only items with a *UnitPrice* greater than or equal to 750.56 are displayed in the visuals on the report page.



Limitations and considerations

The following limitations and considerations currently apply to the **numeric range slicer**

- The **numeric range slicer** currently filters every underlying row in the data, not any aggregated value. For example, if a *Sales Amount* field is used, each transaction based on *Sales Amount* would be filtered upon, not the sum of *Sales Amount* for each data point of a visual.
- It does not currently work with Measures
- Currently the **numeric range slicer** is only available in **Power BI Desktop**. If a report that uses the **numeric**

range slicer is published to the **Power BI service**, the filter will still be applied but it will appear as a list slicer.

Create a responsive slicer you can resize in Power BI (Preview)


12/9/2017 • 2 min to read • [Edit Online](#)

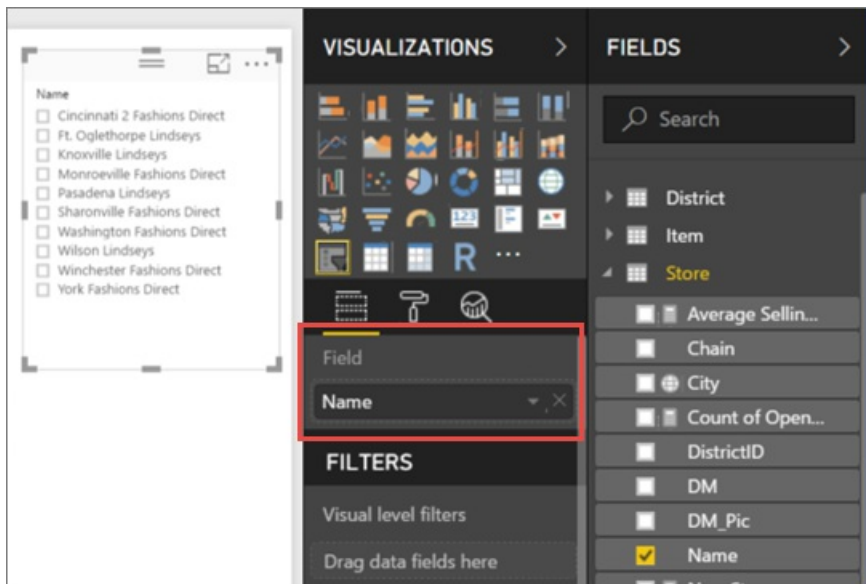
Responsive slicers resize to fit any space on your report. With responsive slicers, you can resize them to different sizes and shapes, from horizontal to square to vertical, and the values in the slicer rearrange themselves as you do. In Power BI Desktop and in the Power BI service, you can make horizontal slicers and date/range slicers responsive. Date/range slicers also have improved touch areas so it's easier to change them with a fingertip. You can make responsive slicers as small or as large as you want; they also resize automatically to fit well on reports in the Power BI service and also in the Power BI mobile apps.



Create a slicer

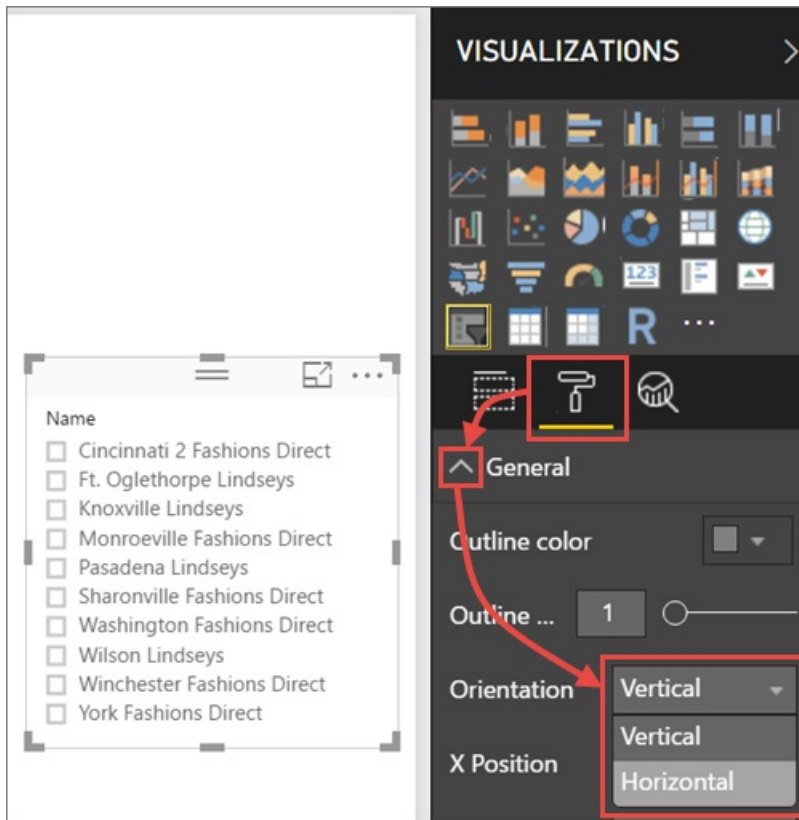
The first step to creating a dynamic slicer is to create a basic slicer.

1. Select the **Slicer** icon  in the **Visualizations** pane.
2. Drag the field you want to filter on to **Field**.

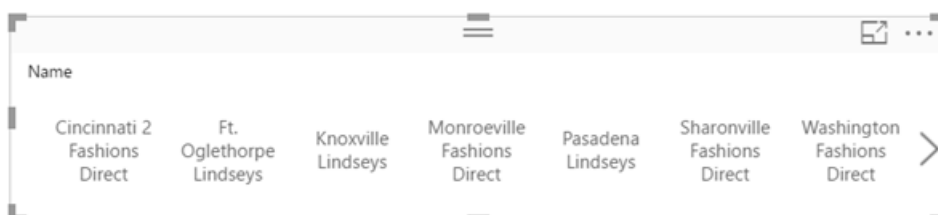


Convert to a horizontal slicer

1. With the slicer selected, in the **Visualizations** pane select the **Format** tab.
2. Expand the **General** section, then for **Orientation**, select **Horizontal**.



3. You'll probably want to make it wider, to show more values.



Make it responsive and experiment with it

This step is easy.

1. Right under **Orientation** in the **General** section of the **Format** tab, slide **Responsive (Preview)** to **On**.



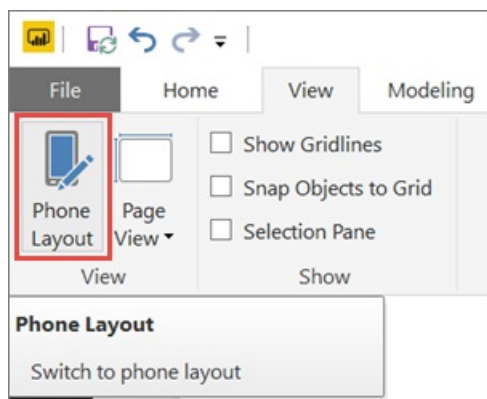
2. Now you can play with it. Drag the corners to make it short, tall, wide, and narrow. If you make it small enough, it becomes just a filter icon.



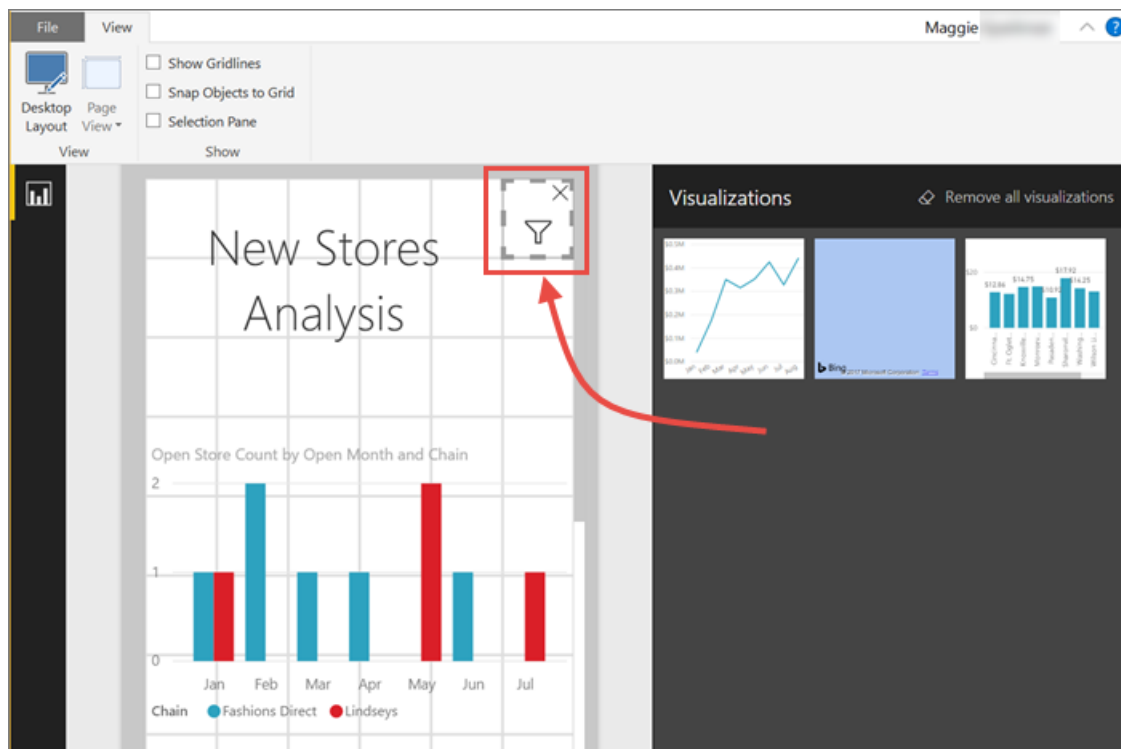
Add it to a phone report layout

In Power BI Desktop, you can create a phone layout for each page of a report. If a page has a phone layout, it displays on a mobile phone in portrait view. Otherwise, you need to view it in landscape view.

1. On the **View** menu, select **Phone Layout**.



2. Drag all the visuals you want in the phone report to the grid. When you drag the responsive slicer, make it the size you want -- in this case, just a filter icon.



Read more about creating [reports optimized for the Power BI mobile apps](#).

Make a time or range slicer responsive

You can follow the same steps to make a tile or range slicer responsive. After you set **Responsive** to **On**, you notice a few things:

- Visuals optimize the order of input boxes depending on the size allowed on the canvas.
- Data-element display is optimized to make the slicer as usable as possible, based on the size it's allowed on the canvas.
- New round handlebars on the sliders optimize touch interactions.
- When a visual becomes too small to be useful, it becomes an icon representing the visual type in its place. To interact with it, just double-tap to open it in focus mode. This saves valuable space on the report page without losing the functionality.

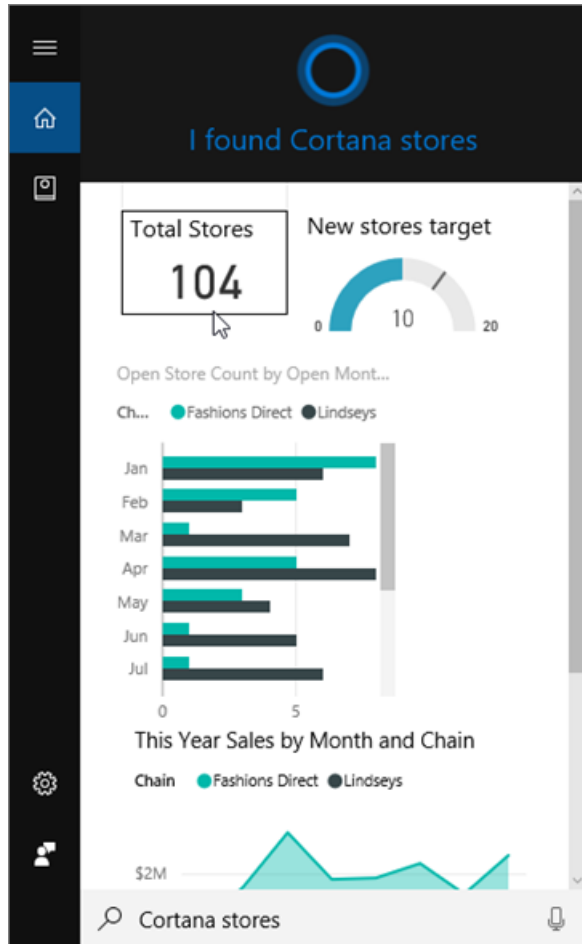
Next steps

- [Tutorial: Slicers in the Power BI service](#)
- More questions? [Try asking the Power BI Community](#)

Use Power BI service or Power BI Desktop to create a custom Answer Page for Cortana

12/20/2017 • 3 min to read • [Edit Online](#)

Use the full capabilities of Power BI to create special report pages, called *Cortana answer pages* (and sometimes called "Cortana answer cards") designed specifically to answer Cortana questions.



IMPORTANT

If you are trying out the Cortana and Power BI **dashboard** preview, you can skip the rest of this article. There are no setup requirements for Cortana to be able to search your Power BI dashboards.

Before you begin

We have 4 documents that guide you through setting up and using Cortana for Power BI. If you haven't already, we recommend that you start by reading article 1. And article 2 is especially important because it describes some steps you'll need to take before you can begin using Cortana answer pages.

Article 1 [Learn how Cortana and Power BI work together](#)

Article 2: [For searching Power BI reports: Enable the Cortana - Power BI - Windows integration](#)

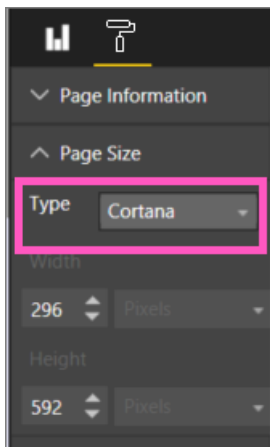
Article 3: This article

Article 4: [Troubleshoot issues](#)

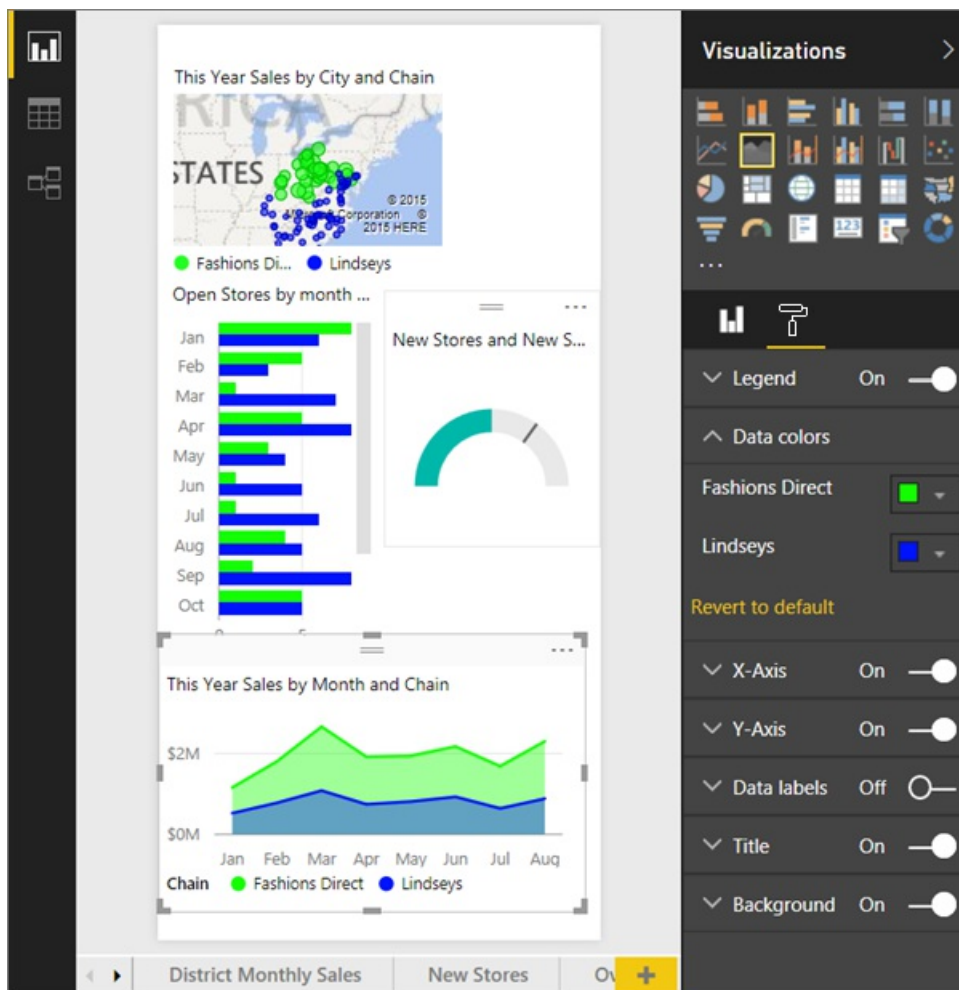
Create a Cortana answer page designed specifically for Cortana

A *Cortana answer page* in a report is sized specifically for Cortana so that Cortana can display it in-screen as an answer to a question. To create an answer page for Cortana:

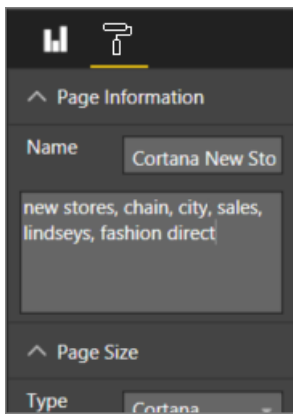
1. We recommend starting with a [blank report page](#).
2. In the **Visualizations** pane, select the paint roller icon and choose **Page Size > Type > Cortana**.



3. Create a visual or a set of visuals that you want to appear in Cortana in response to a particular question (or set of questions).
4. Ensure that all visuals fit within the page borders. Optionally, modify display settings, data labels, colors, and backgrounds.



5. Name the page and add alternate names. Cortana uses these names when it searches for results. In the **Visualizations** pane, select the paintbrush icon and choose **Page Information**. Enable Q&A for this visual by moving the slider to **On**.



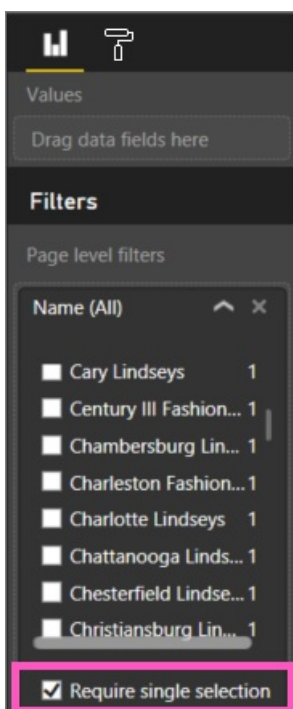
TIP

To improve results, avoid using words that are also column names.

6. Optionally, if your report has page level filters, you may want to set **Require single selection**. Cortana will only display this report as an answer if one, and only one, of the filter items is specified in the question. **Require single selection** can be found at the bottom of the **Filters** pane.

NOTE

You don't have to set **Require single selection** to ask Cortana to display a report with page level filters. For example "show sales for Charlotte Lindseys" will display the answer page regardless of the Require Single Selection setting.



For example, if you ask Cortana:

- "show sales by store name," this answer page will not appear because you did not include any of the items in the required page level filter.
 - "show sales for Cary Lindseys and Charlotte Lindseys," this answer page will not appear because you specified more than one item from the required page level filter.
 - "show sales for Charlotte Lindseys," this answer page will display.
- = "show sales" this answer page will not appear because you didn't include any of the items in the

required page level filter.

IMPORTANT

Before your Cortana answer page can be accessed by Cortana, you will need to [Enable the dataset for Cortana](#).

How does Cortana order the results?

Results with high scoring answers (such as a complete match of a specified page name) will appear first as a *best match* in Cortana. Multiple best matches can appear if there are multiple Cortana answer pages in Power BI. Medium or lower scoring answers, such as answers not based on the name of an answer page or a question with words not understood by Power BI, are listed as links below best matches in Cortana.

NOTE

When a new dataset or custom Cortana answer page is added to Power BI and enabled for Cortana it can take up to 30 minutes for results to begin appearing in Cortana. Logging in and out of Windows 10, or otherwise restarting the Cortana process in Windows 10, will allow new content to appear immediately.

Next steps

[Using Cortana with Power BI](#)

Still can't get Cortana to work with Power BI? Try the [Cortana troubleshooter](#).

More questions? [Try the Power BI Community](#)

Row-level security (RLS) with Power BI Desktop

1/30/2018 • 5 min to read • [Edit Online](#)

Row-level security (RLS) with Power BI Desktop can be used to restrict data access for given users. Filters restrict data at the row level. You can define filters within roles.

You can now configure RLS for data models imported into Power BI with Power BI Desktop. You can also configure RLS on datasets that are using DirectQuery, such as SQL Server. Previously, you were only able to implement RLS within on-premises Analysis Services models outside of Power BI. For Analysis Services live connections, you configure Row-level security on the on-premises model. The security option will not show up for live connection datasets.

IMPORTANT

If you defined roles/rules within the Power BI service, you will need to recreate those roles within Power BI Desktop and publish the report to the service.

Learn more about options for [RLS within the Power BI Service](#).

Define roles and rules within Power BI Desktop

You can define roles and rules within Power BI Desktop. When you publish to Power BI, it will also publish the role definitions.

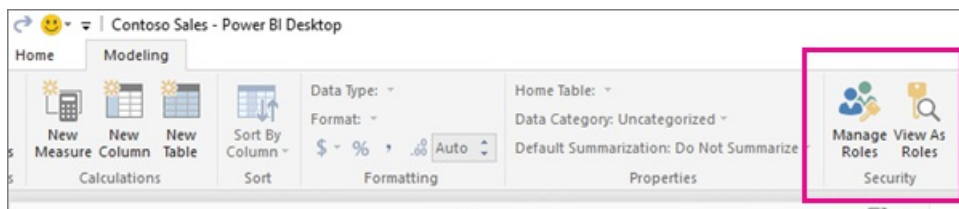
To define security roles, you can do the following.

1. Import data into your Power BI Desktop report, or configure a DirectQuery connection.

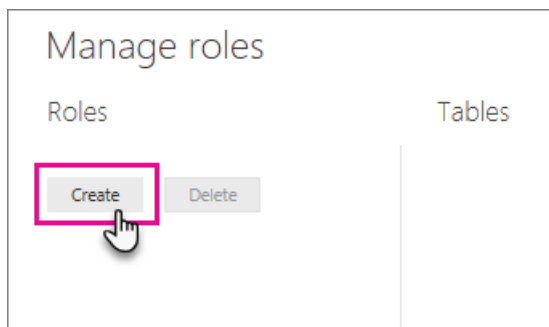
NOTE

You cannot define roles within Power BI Desktop for Analysis Services live connections. You will need to do that within the Analysis Services model.

2. Select the **Modeling** tab.
3. Select **Manage Roles**.



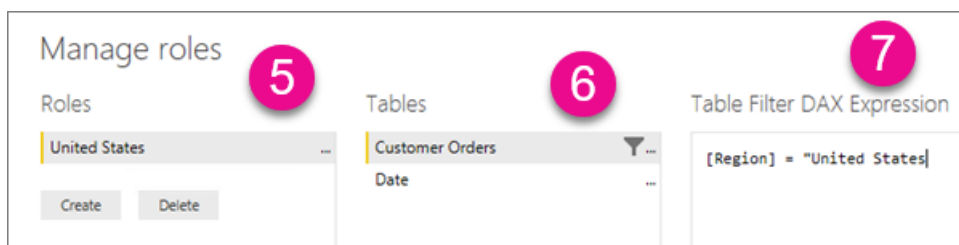
4. Select **Create**.



5. Provide a name for the role.
6. Select the table that you want to apply a DAX rule.
7. Enter the DAX expressions. This expression should return a true or false. For example: [Entity ID] = "Value".

NOTE

You can use `username()` within this expression. Be aware that `username()` will have the format of `DOMAIN\username` within Power BI Desktop. Within the Power BI service, it will be in the format of the user's UPN. Alternatively, you can use `userprincipalname()` which will always return the user in the format of their user principal name.



8. After you have created the DAX expression, you can select the check above the expression box to validate the expression.

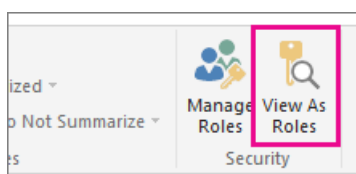


9. Select **Save**.

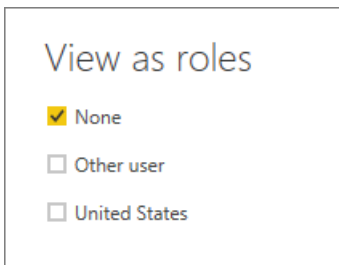
You cannot assign users to a role within Power BI Desktop. This is done within the Power BI service. You can enable dynamic security within Power BI Desktop by making use of the `username()` or `userprincipalname()` DAX functions and having the proper relationships configured.

Validating the role within Power BI Desktop

After you have created your role, you can test the results of the role within Power BI Desktop. To do this, select **View As Roles**.



The **View as roles** dialog allows you to change the view of what you are seeing for that specific user or role. You will see the roles you have created.



View as roles

None

Other user

United States

You select the role you created and then select **OK** to apply that role to what you are viewing. The reports will only render the data relevant for that role.

You can also select Other user and supply a given user. It is best to supply the User Principal Name (UPN) as that is what the Power BI service will use. Select **OK** and the reports will render based on what that user can see.



View as roles

None

Other user

United States

NOTE

Within Power BI Desktop, this will only display different results if you are using dynamic security based on your DAX expressions.

Limitations

Here is a list of the current limitations for row-level security on cloud models.

- If you previously had roles/rules defined within the Power BI service, you will need to recreate them within Power BI Desktop.
- You can define RLS only on the datasets created using Power BI Desktop client. If you want to enable RLS for datasets created with Excel, you will need to convert your files into PBIX files first. [Learn more](#)
- Only ETL, and DirectQuery connections are supported. Live connections to Analysis Services are handled in the on-premises model.
- Q&A and Cortana is not supported with RLS at this time. You will not see the Q&A input box for dashboards if all models have RLS configured. This is on the roadmap, but a timeline is not available.
- External sharing is not currently supported with datasets that use RLS.
- For any given model, the maximum number of Azure AD principals (i.e. individual users or security groups) that can be assigned to security roles is 1,000. To assign large numbers of users to roles, be sure to assign security groups, rather than individual users.

Known issues

There is a known issue where you will receive an error message when trying to publish from Power BI Desktop if it was previously published. The scenario is as follows.

1. Anna has a dataset that is published to the Power BI service and has configured RLS.
2. Anna updates the report in Power BI Desktop and re-publishes.
3. Anna will receive an error.

Workaround: Re-publish the Power BI Desktop file from the Power BI service until this issue is resolved. You can

do that by select **Get Data > Files**.

FAQ

Question: What if I had previously created roles/rules for a dataset in the Power BI service? Will they still work if I do nothing?

Answer: No. Visuals will not render properly. You will have to re-create the roles/rules within Power BI Desktop and then published to the Power BI service.

Question: Can I creates these roles for Analysis Services data sources?

Answer: You can if you imported the data into Power BI Desktop. If you are using a live connection, you will not be able to configure RLS within the Power BI service. This is defined within the Analysis Services model on-premises.

Question: Can I use RLS to limit the columns or measures accessible by my users?

Answer: No. If a user has access to a particular row of data, they can see all the columns of data for that row.

Question: Does RLS allow me to hide detailed data but give access to data summarized in visuals?

Answer: No, you secure individual rows of data but users can always see either the details or summarized data.

Next steps

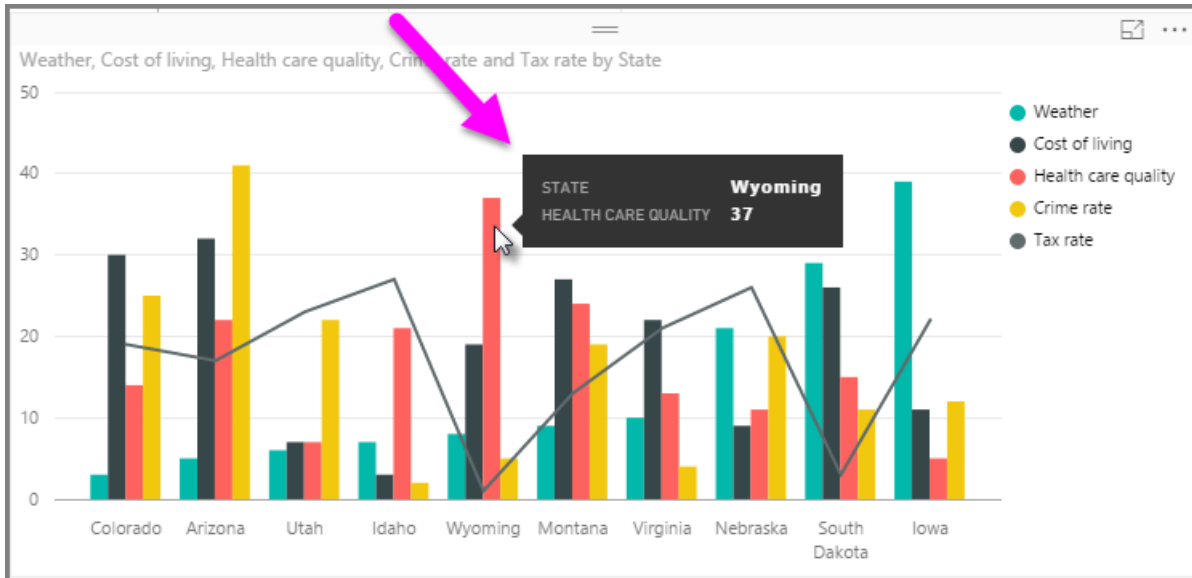
[Row-level security \(RLS\) with the Power BI service](#)

More questions? [Try asking the Power BI Community](#)

Customizing Tooltips in Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

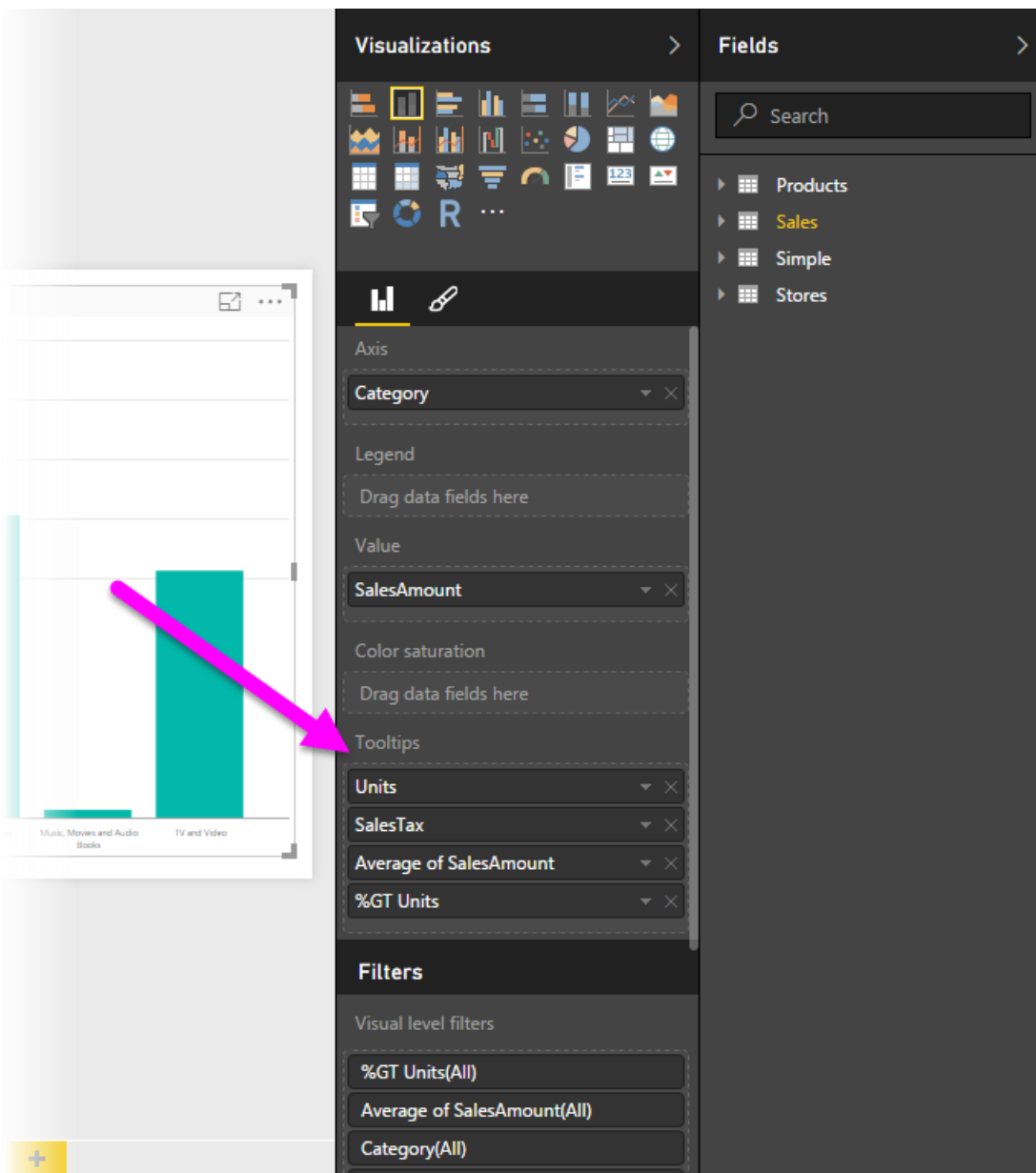
Tooltips are an elegant way of providing more contextual information and detail to data points on a visual. The following image shows a tooltip applied to a chart in Power BI Desktop.



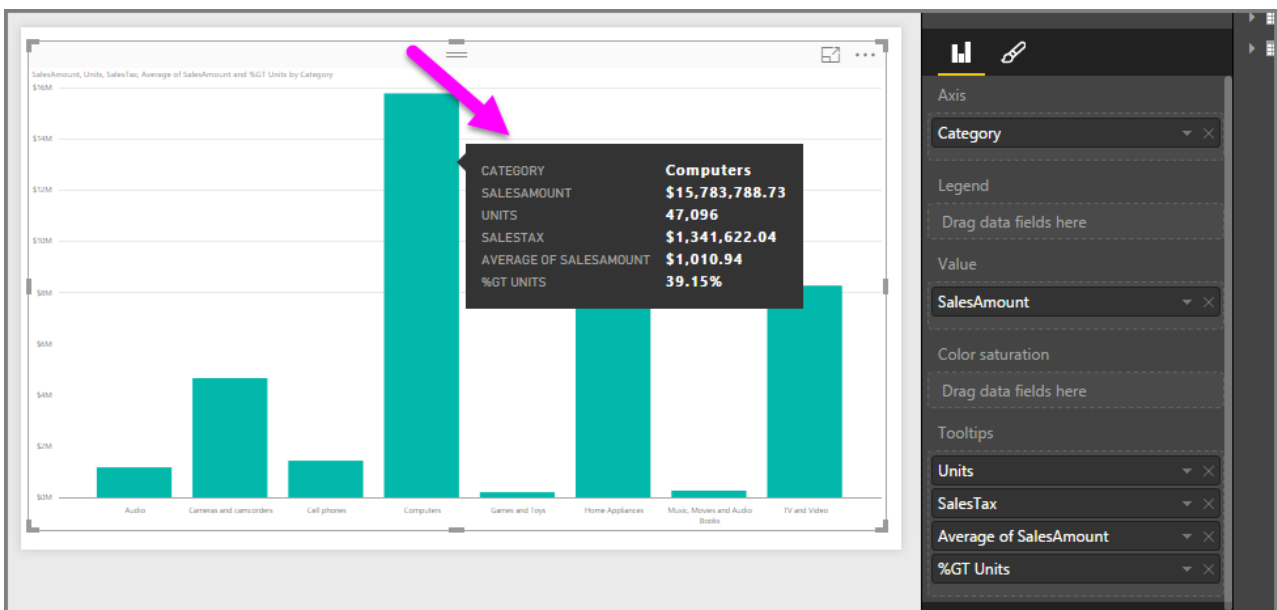
When a visualization is created, the default tooltip displays the data point's value and category. There are many instances when being able to customize the tooltip information would be useful, and would provide additional context and information for users viewing the visual. Custom tooltips enable you to specify additional data points that display as part of the tooltip.

How to customize tooltips

To create a customized tooltip, in the **Fields** well of the **Visualizations** pane, simply drag a field into the **Tooltips** bucket, shown in the following image. In the following image, four fields have been placed into the **Tooltips** bucket.

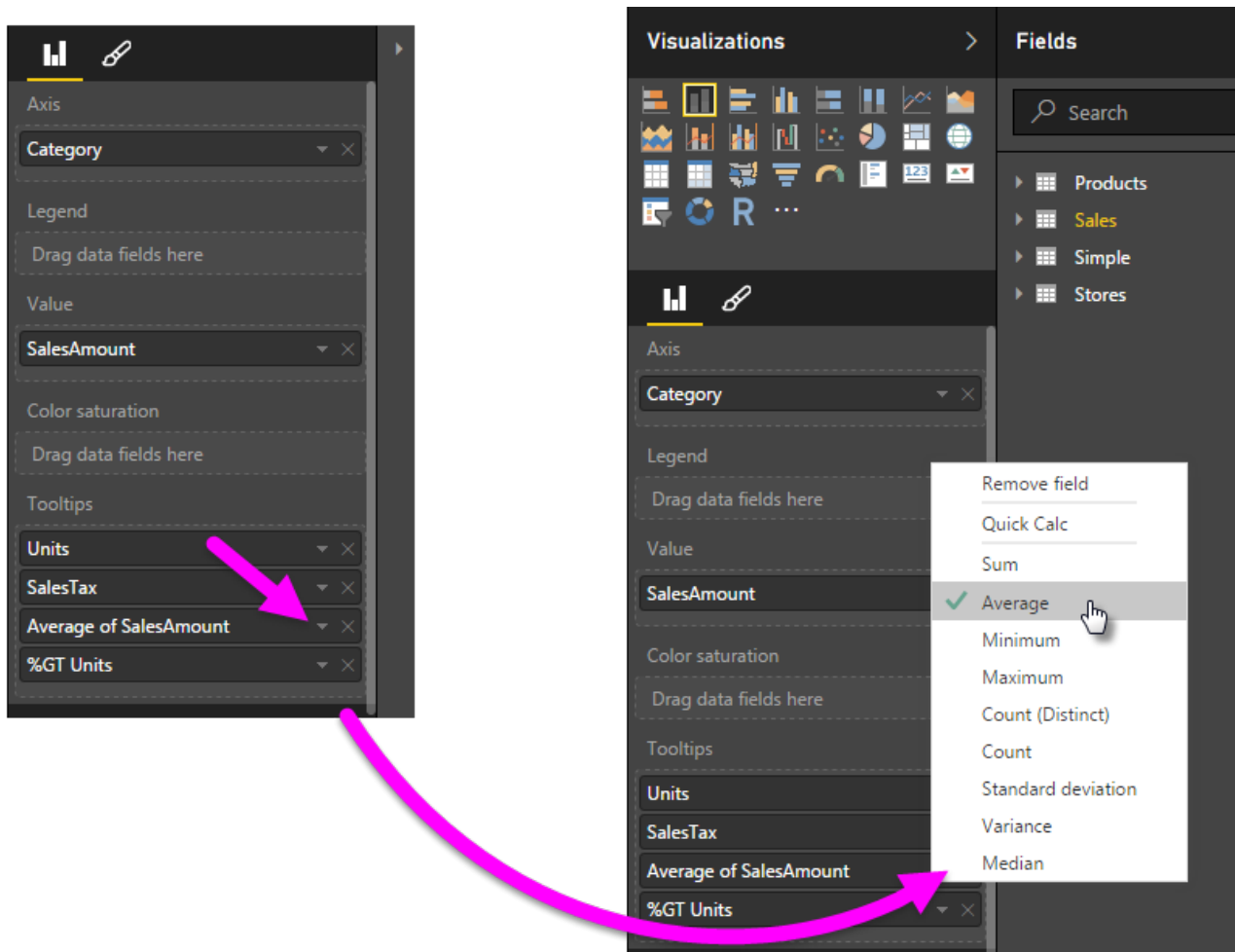


Once Tooltips are added to the field well, hovering over a data point on the visualization shows the values for those fields in the tooltip.



Customizing tooltips with aggregation or Quick Calcs

You can further customize a tooltip by selecting an aggregation function or a *Quick Calc* by selecting the arrow beside the field in the **Tooltips** bucket, and selecting from the available options.

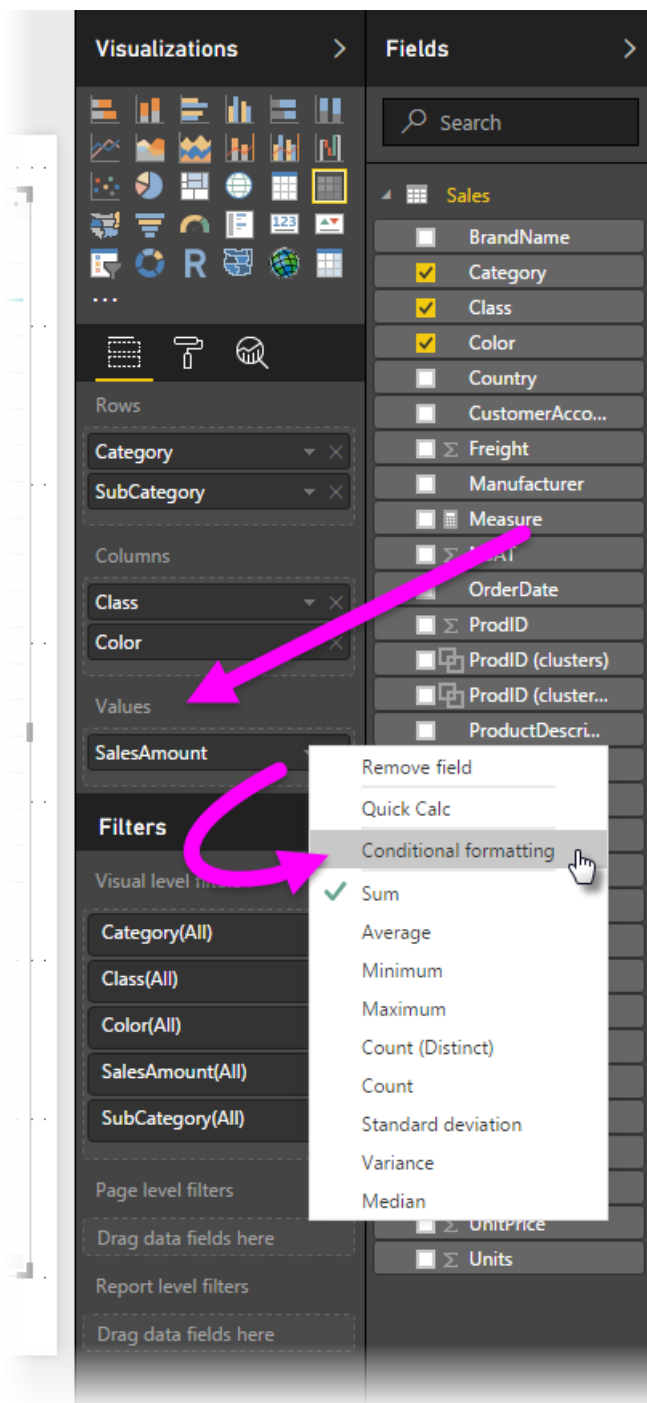


There are many ways to customize **Tooltips**, using any field available in your dataset, to convey quick information and insights to users viewing your dashboards or reports.

Conditional formatting in tables

12/6/2017 • 1 min to read • [Edit Online](#)

With conditional formatting for tables, you can specify customized cell background colors based on cell values, including using gradient colors. To access conditional formatting, in the **Fields** well of the **Visualizations** pane in Power BI Desktop, select the down-arrow beside the value in the **Values** well that you want to format (or right-click the field). You can only manage conditional formatting for fields in the **Values** area of the **Fields** well.



In the dialog that appears, you can configure the color, as well as the *Minimum* and *Maximum* values. If you select the **Diverging** box, you can configure an optional *Center* value as well.

Conditional formatting

Format cells based on their values.

Base value

SalesAmount

Format blank values

As zero

Minimum **Center** **Maximum**

Lowest value Middle value Highest value

(Lowest value) (Middle value) (Highest value)

Diverging

OK Cancel

When applied to a table, the customized formatting applied using the steps outlined above overrides any custom table styles applied to the conditionally formatted cells.

Category	Average of UnitCost	Units	SalesAmount
Audio	96.86	8,794	\$1,181,315.02
Cameras and camcorders	144.35	13,002	\$4,665,554.15
Cell phones	74.42	8,280	\$1,439,902.20
Computers	135.09	47,096	\$15,783,788.73
Games and Toys	20.12	4,718	\$210,418.88
Home Appliances	225.45	19,129	\$10,140,836.87
Music, Movies and Audio Books	41.78	2,490	\$271,596.16
TV and Video	211.99	16,785	\$8,278,676.42
Total	145.02	120,294	\$41,972,088.43

To remove conditional formatting from a visualization, just right-click the field again, and select **Remove Conditional Formatting**.

The image shows a screenshot of the Microsoft Power BI Desktop interface. On the left, a PivotTable is displayed with columns for 'Brown' and 'Green'. The 'SalesAmount' field is summarized by 'Sum' and is color-coded: red for values below 100,000 and green for values above 100,000. The 'Filters' pane on the right shows 'Category', 'Class', 'Color', 'SalesAmount(A)', and 'SubCategory(A)' are applied. A context menu is open over the PivotTable, listing options such as 'Remove field', 'Quick Calc', 'Conditional formatting', and 'Remove conditional formatting'. A mouse cursor is pointing at 'Remove conditional formatting'.

	Brown	Green
	6,813.00	
	6,813.00	
	9,599.47	195,199.39
	7,630.00	198,919.80
	9,599.47	444,269.19
	6,366.00	
	7,630.00	
	74,273.82	
	8,269.82	
	4,682.29	444,269.19

Fields List:

- Category
- Class
- Color
- Country
- CustomerAcco...
- Freight
- Manufacturer
- Measure
- NSAT
- OrderDate
- ProdID
- ProdID (clusters)
- ProdID (cluster...)
- ProductDescri...

Rows:

- Category
- SubCategory

Columns:

- Class
- Color

Values:

- SalesAmount

Filters:

- Category(All)
- Class(All)
- Color(All)
- SalesAmount(A)
- SubCategory(A)

Visual level filters:

- Drag data fields here

Report level filters:

- Drag data fields here

Context Menu:

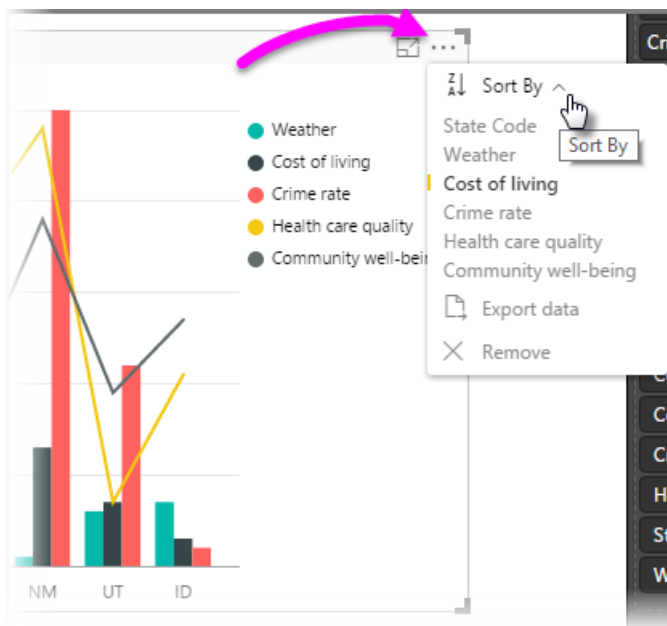
- Remove field
- Quick Calc
- Conditional formatting
- Remove conditional formatting
- Sum
- Average
- Minimum
- Maximum
- Count (Distinct)
- Count
- Standard deviation
- Variance
- Median

Sort by column in Power BI Desktop

12/6/2017 • 5 min to read • [Edit Online](#)

In **Power BI Desktop** and the **Power BI service**, you can change how a visual looks by sorting it by different data fields. By changing how you sort a visual, you can highlight the information you want to convey, and ensure the visual reflects whatever trend (or emphasis) you want to convey.

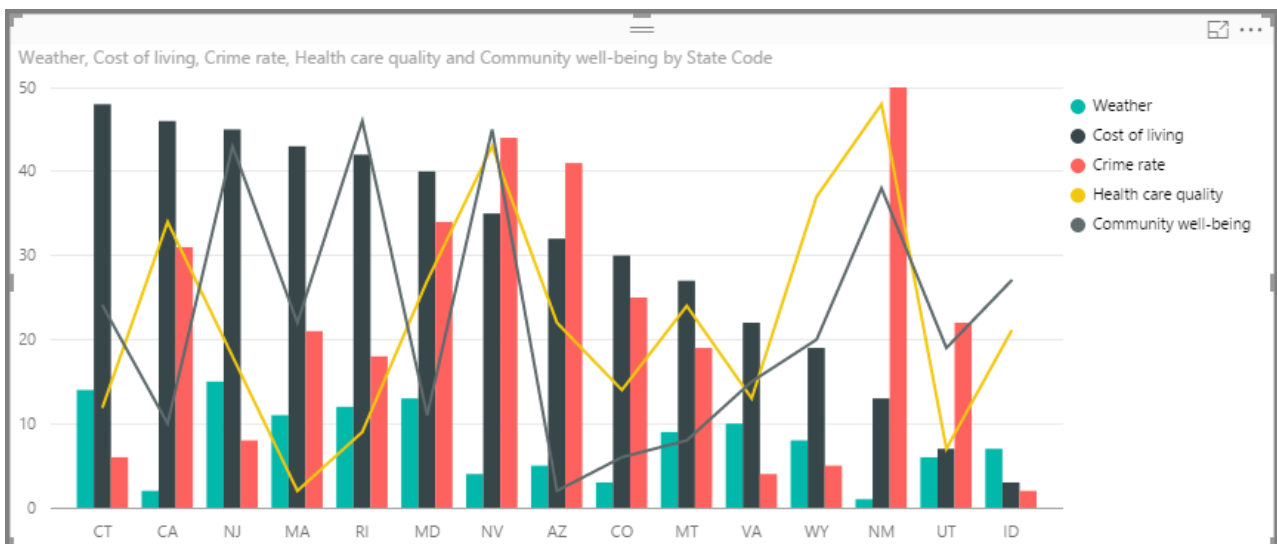
Whether you're using numeric data (such as sales figures) or text data (such as state names), you can sort your visualizations however you want, and make them look like you want them to. **Power BI** provides lots of flexibility for sorting, and quick menus for you to use. On any visual, select the ellipses menu (...) and then **Sort By**, then select the field by which you want to sort, as shown in the following image.



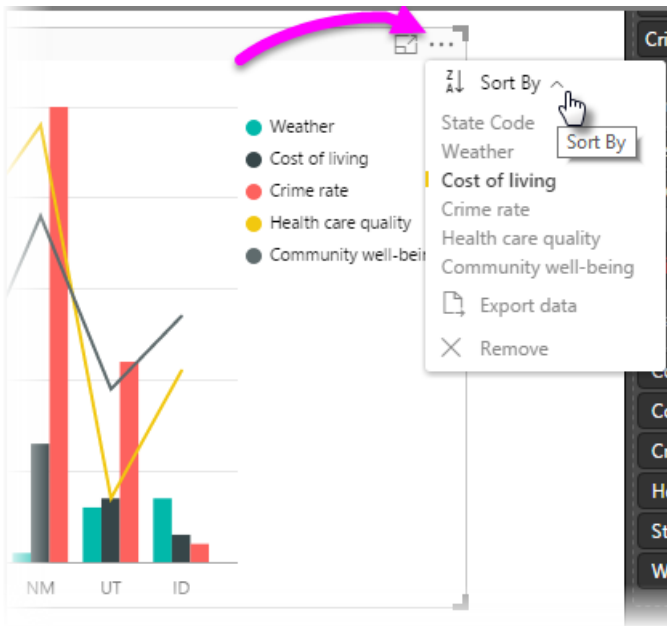
More depth, and an example

Let's take an example that has more depth, and see how it works in **Power BI Desktop**.

The following visualization lists the top 15 states in terms of weather (most sunny days, ranked from 1 to 50, with 1 having the most sunny days). Here's the visualization as it looks before we do any sorting.



The visual is currently sorted by **Cost of living** - we can tell that by matching the color of the descending bars to the legend, but there's a better way to determine the current sort column: the **Sort by** dialog, available from the ellipses menu (...) in the upper right corner of the visual. When we select the ellipses, we see the following:



There are a couple items to notice in the menu that appears when you select the ellipses:

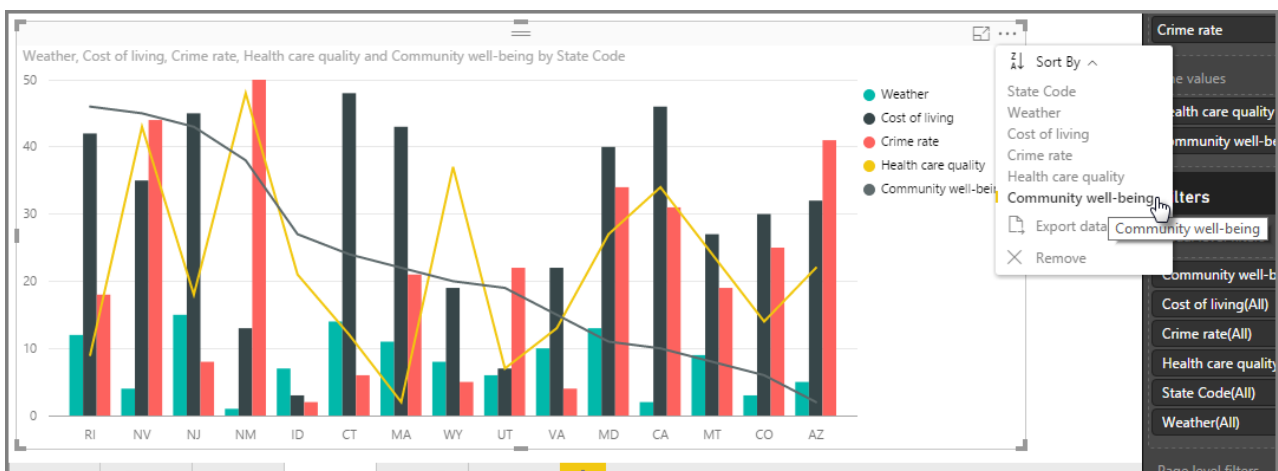
- The yellow bar next to **Cost of living**, and the fact that **Cost of living** is in bold
- The little icon beside the words **Sort By**, which shows **Z/A** (Z above A) and a down arrow.

We'll look at each of those independently in the next two sections.

Selecting which column to use for sorting

You noticed the yellow bar beside **Cost of living** in the **Sort By** menu, which indicated that the visual was using the **Cost of living** column to sort the visual. Sorting by another column is easy - just select the ellipses to show the **Sort by** menu, then select another column. It's that easy.

In the following image, we selected **Community well-being** as the column by which we want to sort. That column happens to be one of the lines on the visual, rather than one of the bars. Here's what it looks like after we select **Community well-being**.

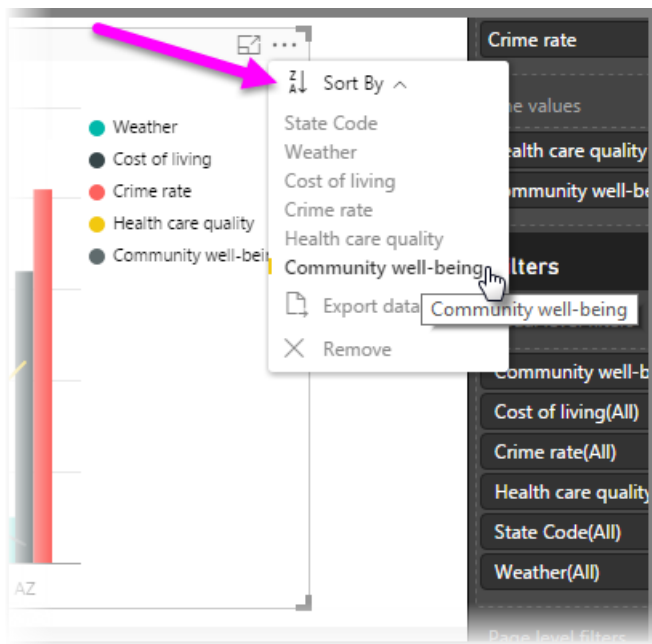


Notice how the visual has changed. The values now are ordered from highest "Community well-being" value (in this case RI for Rhode Island) for those states included in this visual, down to AZ (for Arizona) which has the lowest value. Remember that the overall chart still only includes the 15 states with the most sunny days - we've just ordered them based on another column included in the visual.

But what if we want to sort ascending, instead of descending? The next section shows just how easy that is.

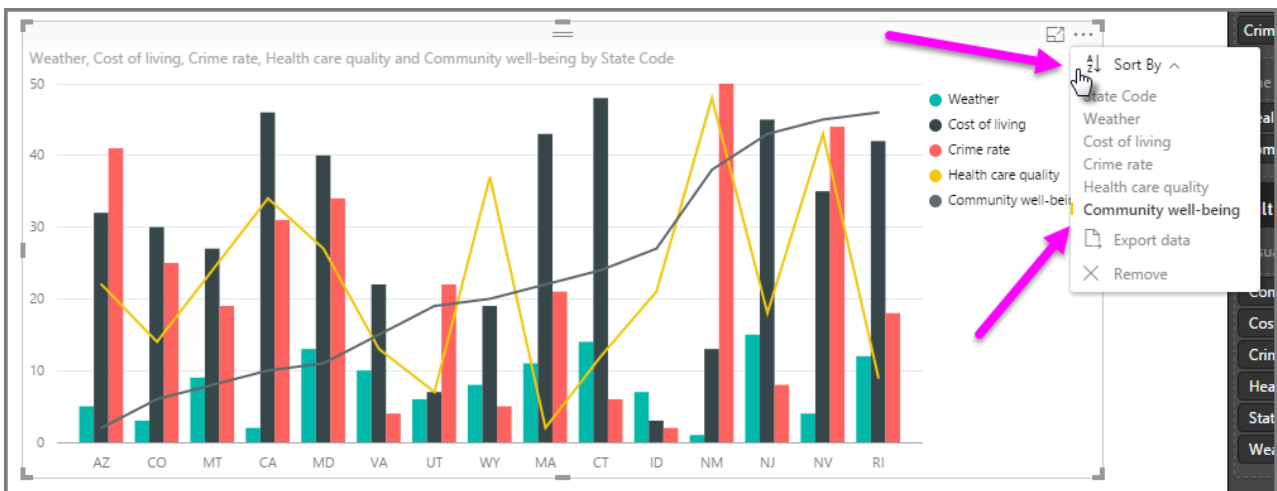
Selecting the sort order - smallest to largest, largest to smallest

When we take a closer look at the **Sort By** menu from the previous image, we see that the icon next to **Sort By** shows **Z/A** (Z above A). Take a look:

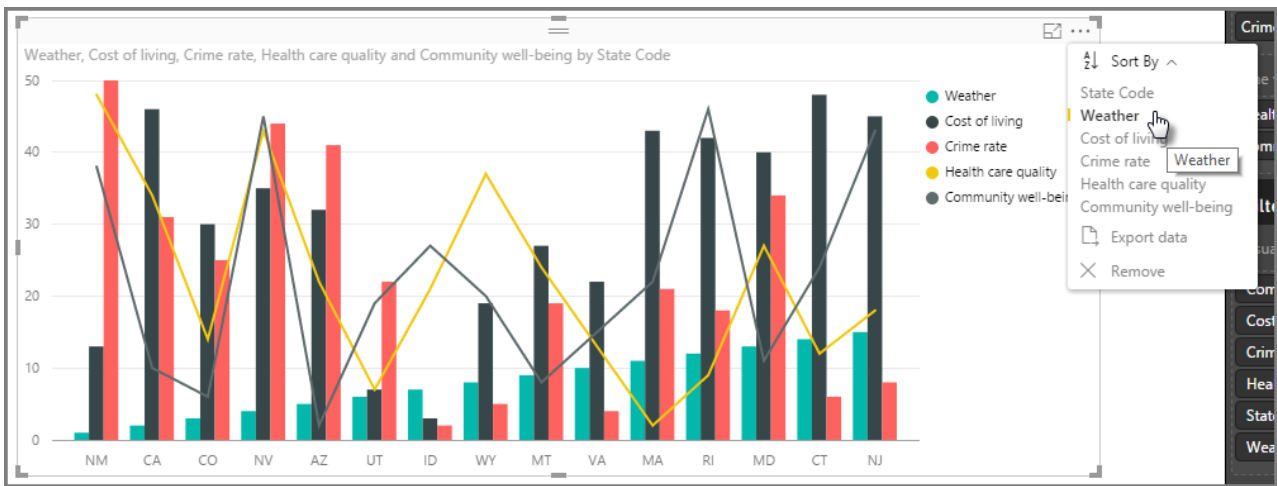


When **Z/A** is displayed, it means the visual is being sorted by the selected column in order of greatest value to smallest value. Want to change that? No problem - just tap or click that **Z/A** icon, and it changes the sort order to **A/Z** and sorts the visual (based on the selected column) from smallest to greatest value.

Here's our same visual, this time after tapping the **Z/A** icon on the **Sort By** menu to change its ordering. Notice that AZ (Arizona) is now the first state listed, and RI (Rhode Island) is the last - the opposite sorting from before.

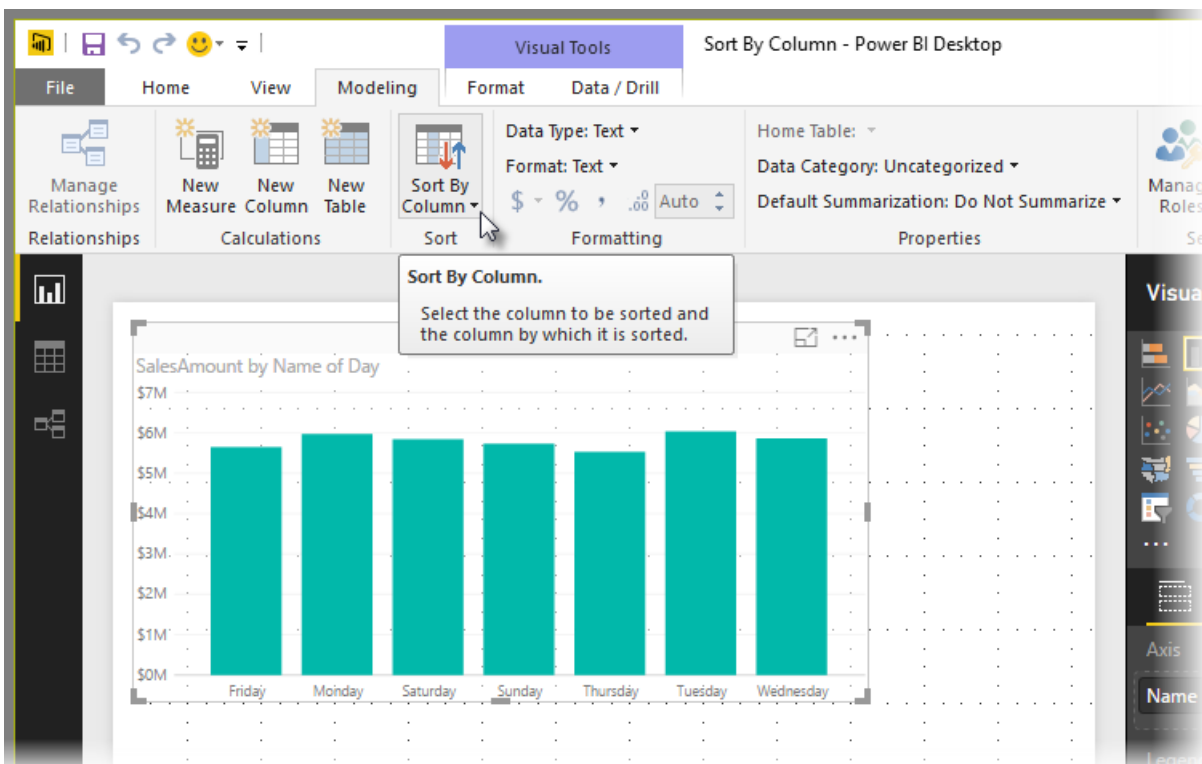


You can sort by any column included in the visual - we could easily select **Weather** as the column by which we want to sort, and select **Z/A** from the **Sort By** menu, to show the states with the most sun first (highest value - Weather equates to days of sunshine in this data model), and still retain the other columns in the visual however they happen to apply to that state. Here's a look at the visual with those settings.



Sort using the Sort by Column button

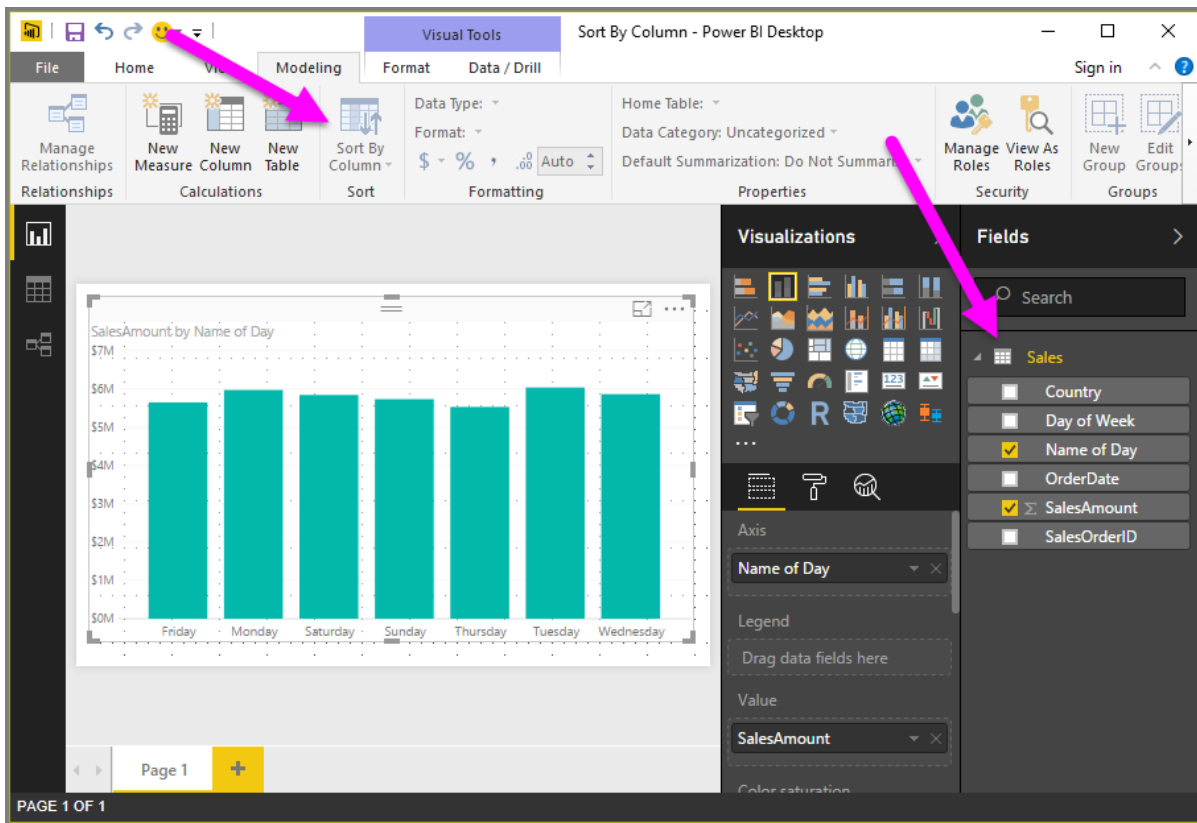
There's another way to sort your data, and that's by using the **Sort by Column** button in the **Modeling** ribbon.



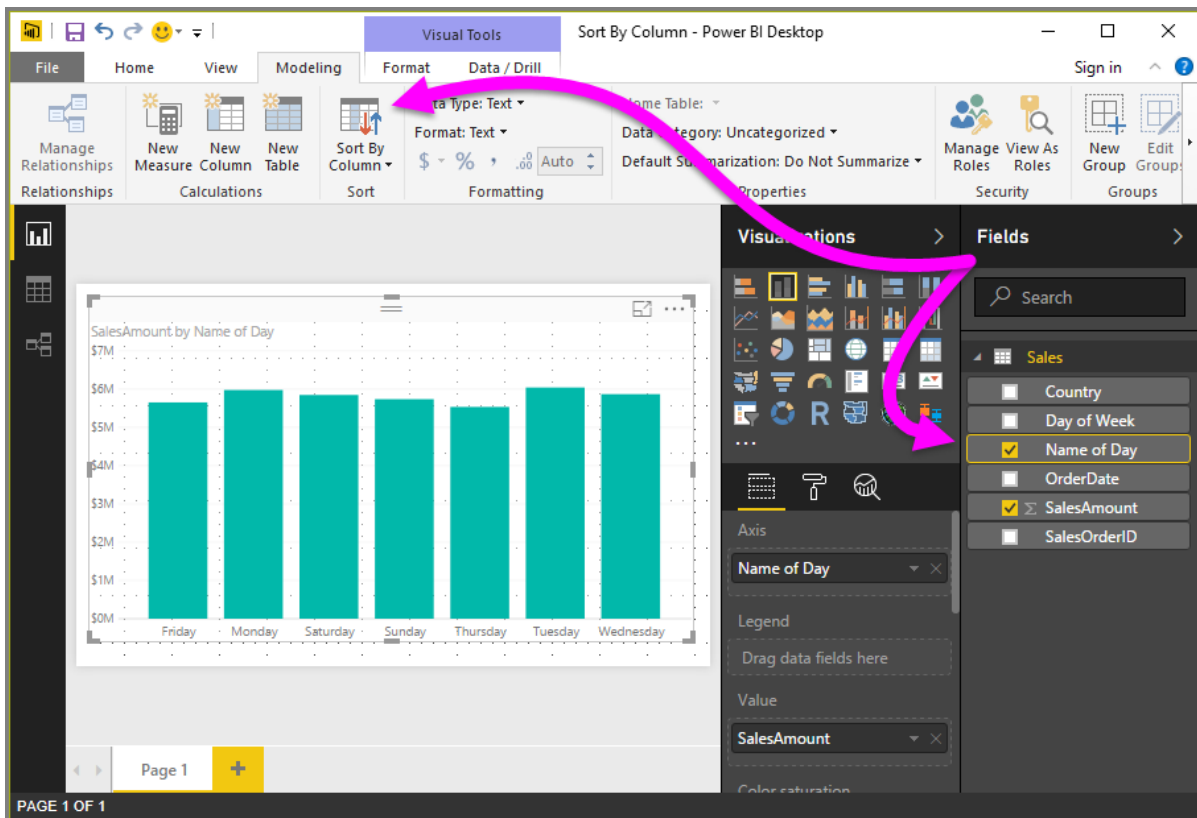
This approach to sorting requires that you select a column from the **Fields** pane, and then select the **Sort by Column** button to choose how (by which column) you want to sort your visual. You have to select the column (field) you want to sort from the **Fields** pane in order to enable the **Sort by Column** button - otherwise the button is inactive.

Let's look at a common example: you have data from each day of the week, and you want to sort it based on chronological order. The following steps show you how.

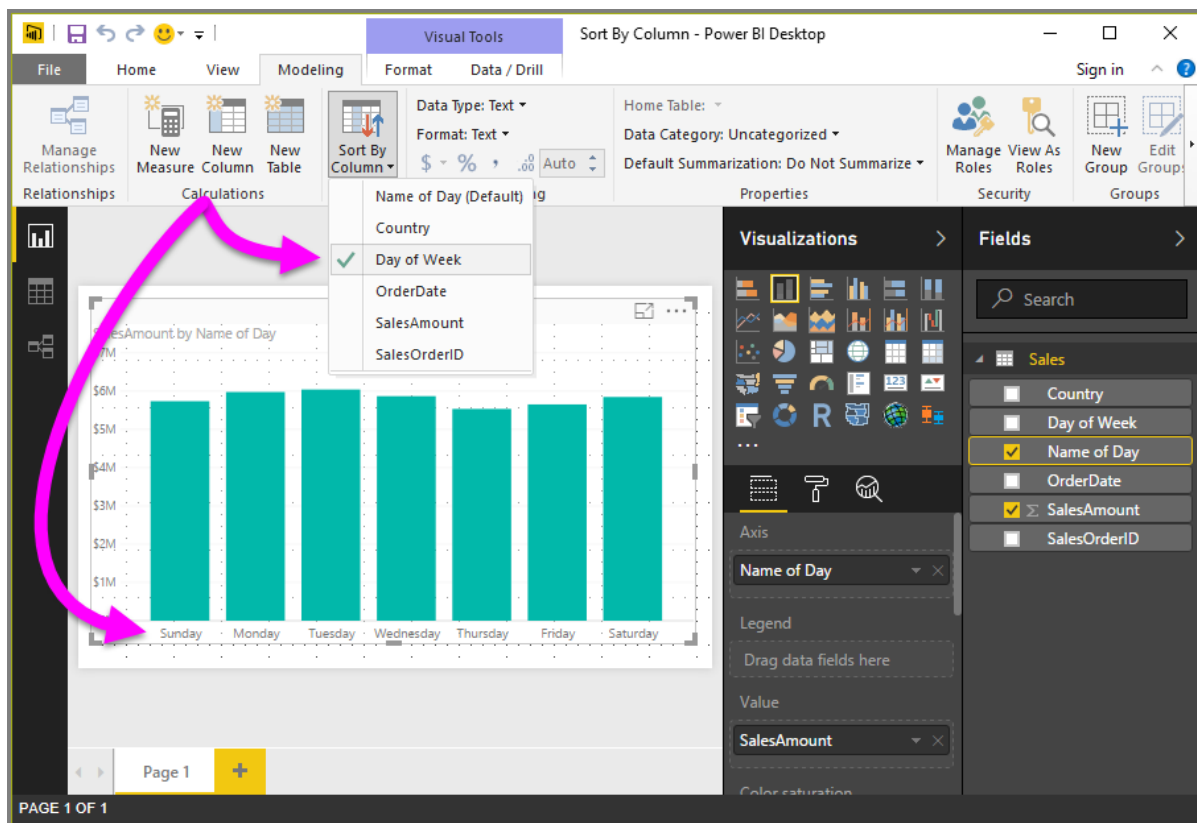
1. First, notice that when the visual is selected but no column is selected in the **Fields** pane, the **Sort by Column** button is inactive (grayed out).



- When we select the column by which we want to sort, in the **Fields** pane, the **Sort by Column** button becomes active.



- Now, with the visual selected, we can select *Day of Week*, instead of the default (*Name of Day*), and the visual now sorts in the order we want: by the day of the week.



And that's it. Remember that you must select a column in the **Fields** pane for the **Sort by Column** button to become active.

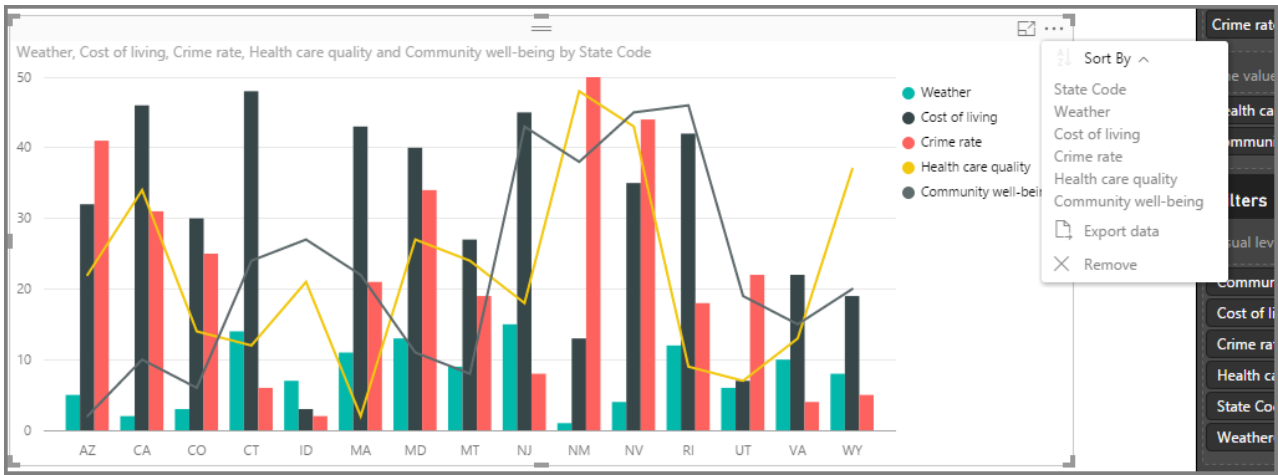
Getting back to default column for sorting

You can sort by any column you'd like, but there may be times when you want the visual to return to its default sorting column. No problem. For a visual that has a sort column selected (a selected sort column has a yellow bar beside it in the **Sort By** menu, as we learned), simply open the **Sort By** menu and select that column again, and the visualization returns to its default sort column.

For example, here's our previous chart:



When we go back to the menu and select **Weather** again, the visual defaults to being ordered alphabetically by **State Code**, as shown in the following image.

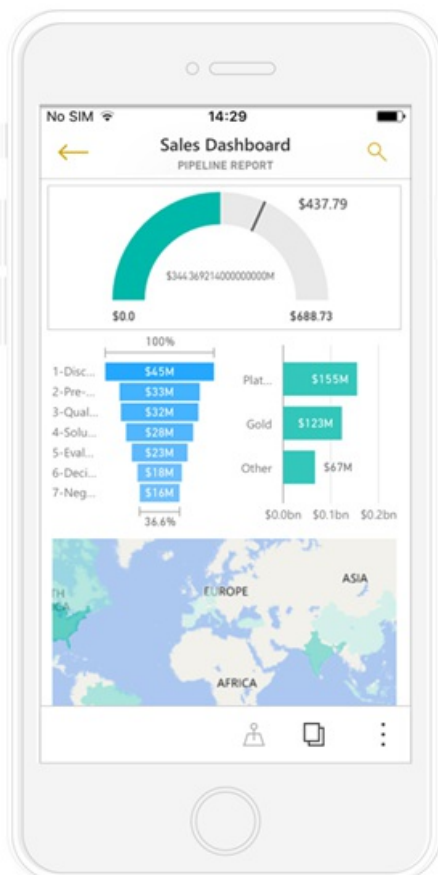


With so many options for sorting your visuals, creating just the chart or image you want is easy.

Create reports optimized for the Power BI phone apps

12/9/2017 • 4 min to read • [Edit Online](#)

When you [create a report in Power BI Desktop](#), you can improve the experience of using it in the mobile apps on phones by creating a version of the report specifically for the phone. You adapt your report for the phone by rearranging and resizing visuals, maybe not including all of them, for an optimal experience. Plus you can create [responsive visuals](#) and [responsive slicers](#) that resize well for viewing on a phone. Also, if you add filters to your report, those filters show up automatically in the phone report. Your report readers can see them and filter the report with them.



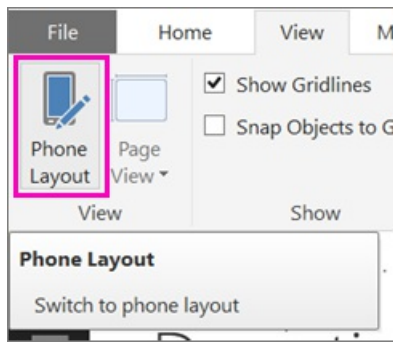
Lay out a report page for the phone in Power BI Desktop

After you [create a report in Power BI Desktop](#), you can optimize it for phones.

1. In Power BI Desktop, select **Report View** in the left navigation bar.



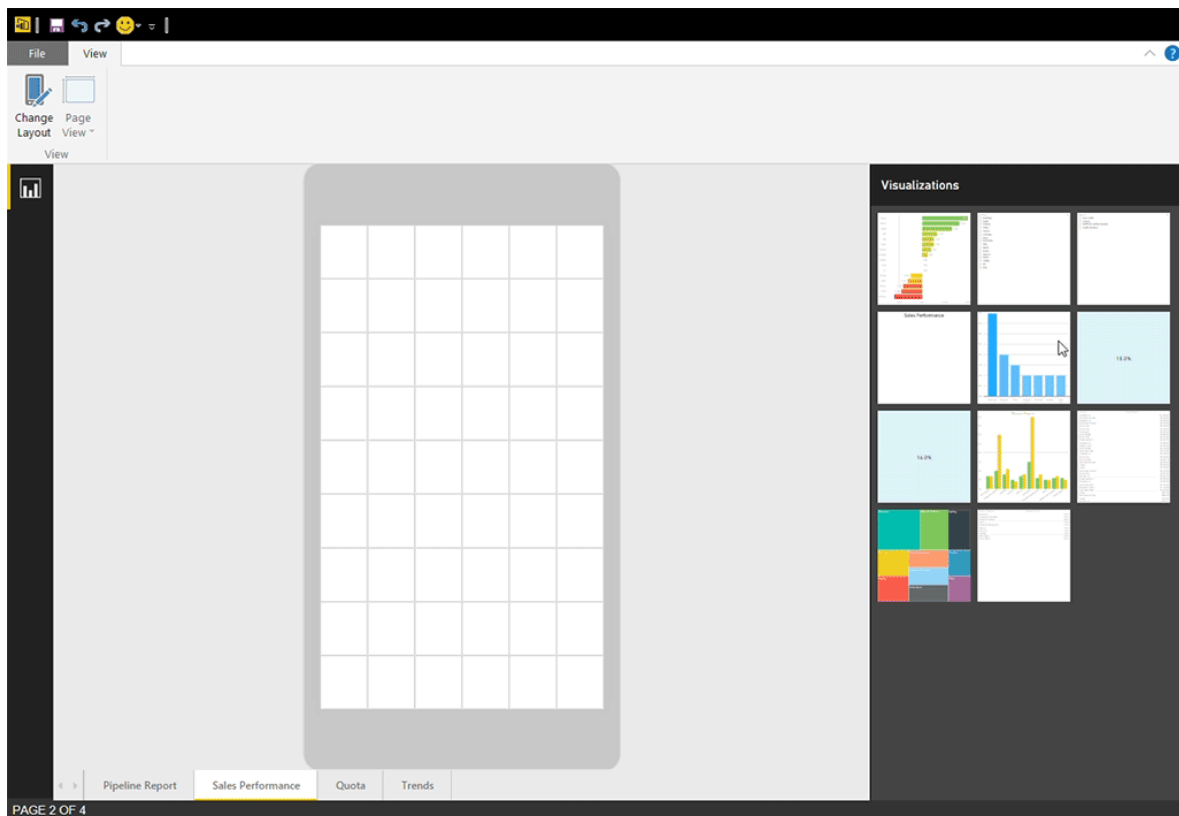
2. On the **View** tab, select **Phone Layout**.



You see a blank phone canvas. All of the visuals on the original report page are listed in the Visualizations pane on the right.

3. To add a visual to the phone layout, drag it from the Visualizations pane to the phone canvas.

Phone reports use a grid layout. As you drag visuals to the mobile canvas, they snap to that grid.

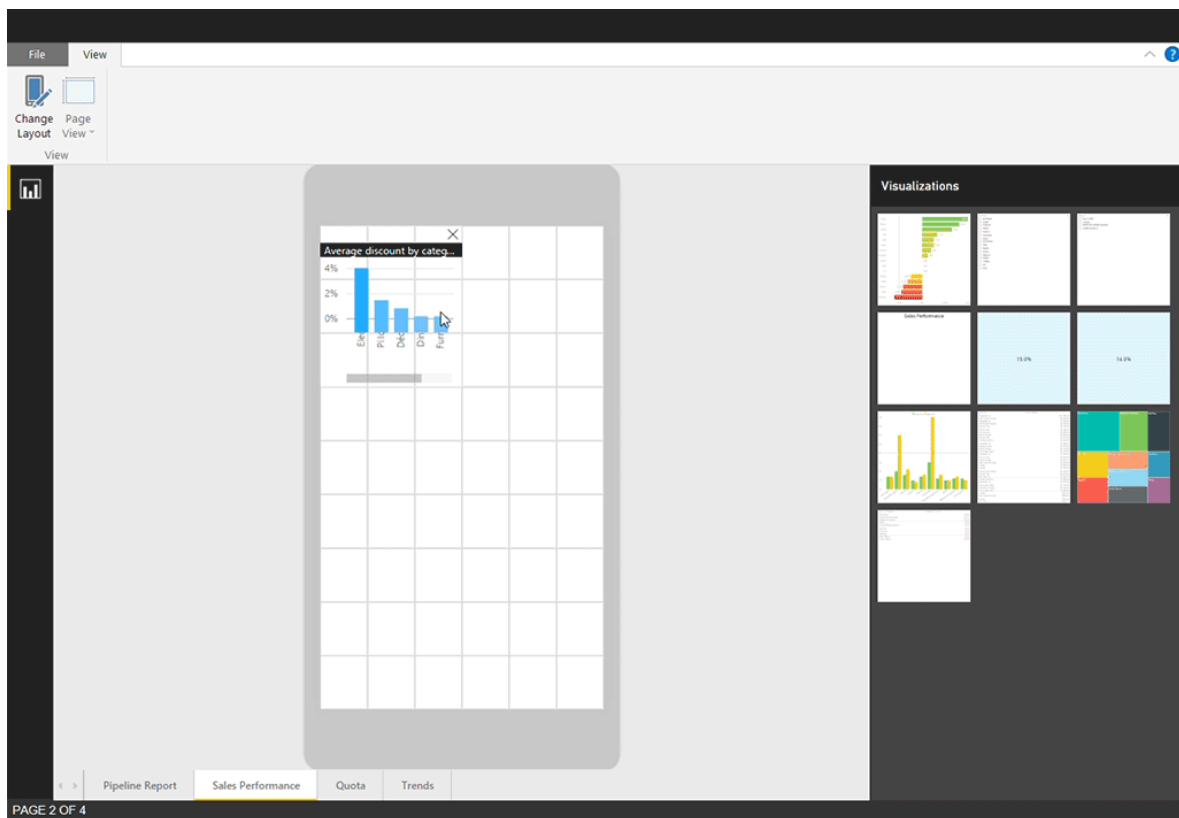


You can add some or all the master report page visuals to the phone report page. You can add each visual only once.

4. You can resize your visuals on the grid, as you would for tiles on dashboards and mobile dashboards.

NOTE

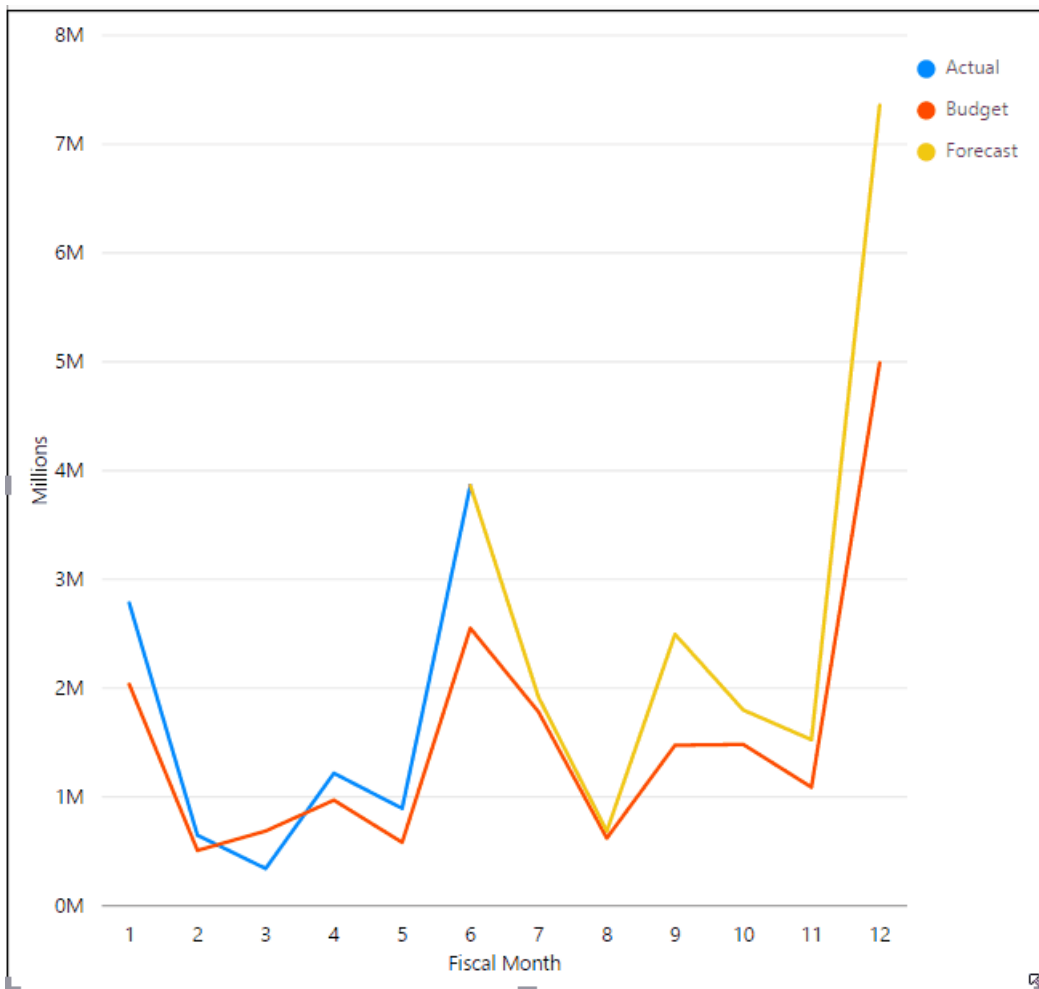
The phone report grid scales across phones of different sizes, so your report will look as good on small- and on large-screen phones.



Optimize a visual for any size

You can set the visuals in your dashboard or report to be *responsive*, to change dynamically to display the maximum amount of data and insight, no matter the screen size.

As a visual changes size, Power BI prioritizes the data view, for example removing padding and moving the legend to the top of the visual automatically, so the visual remains informative even as it gets smaller.



You choose whether to turn on responsiveness for each visual. Read more about [optimizing visuals](#).

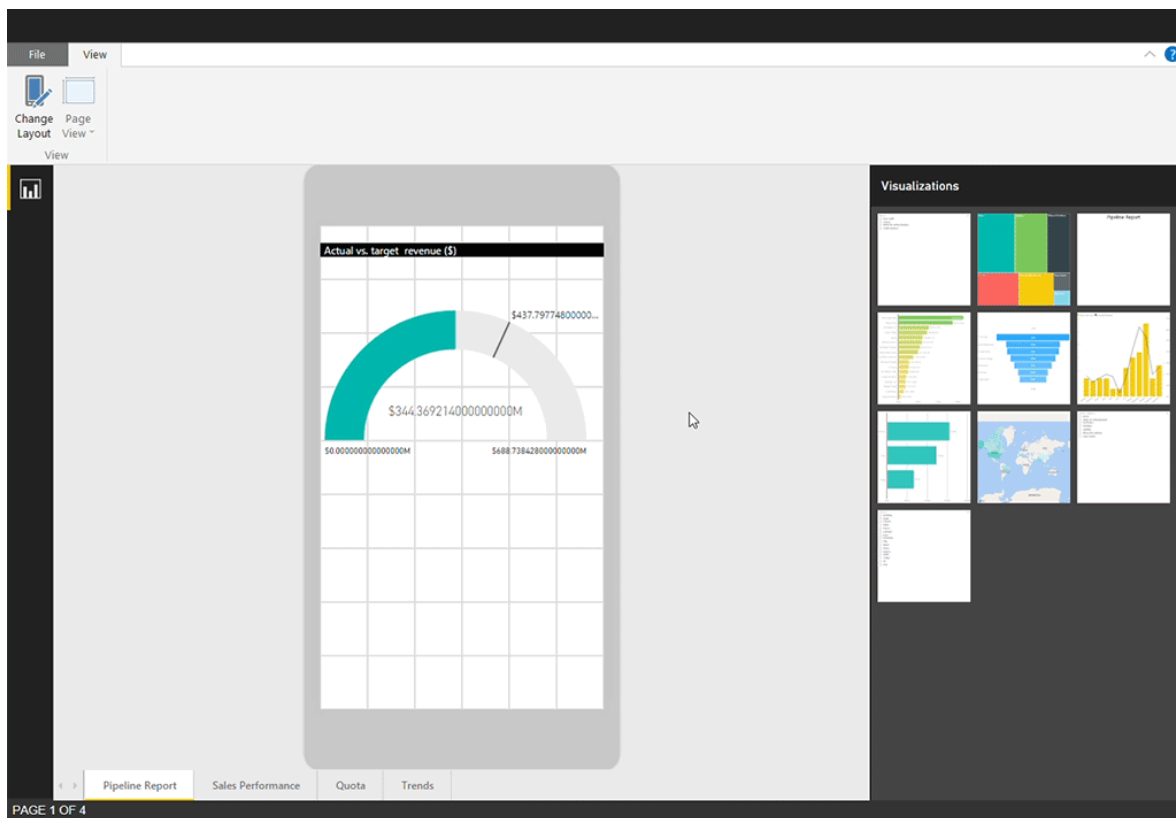
Considerations when creating phone report layouts

- For reports with multiple pages, you can optimize all the pages or only a few.
- If you've defined a background color for a report page, the phone report will have the same background color.
- You can't modify formatting settings for just the phone. Formatting is consistent between master and mobile layouts. For example, font sizes will be the same.
- To change a visual, such as changing its formatting, dataset, filters, or any other attribute, return to the regular report authoring mode.
- Power BI provides default titles and page names for phone reports in the mobile app. If you've created text visuals for titles and page names in your report, consider not adding them to your phone reports.

Remove a visual from the phone layout

- To remove a visual, click the X in the top-right of the visual on the phone canvas, or select it and press **Delete**.

Removing the visual here only removes it from the phone layout canvas. The visual and the original report aren't affected.



Enhance slicers to to work well in phone reports

Slicers offer on-canvas filtering of report data. When designing slicers in the regular report authoring mode, you can modify some slicer settings to make them more usable in phone reports:

- Decide if report readers can select only one or more than one item.
- Put a box around the slicer to make the report easier to scan.
- Make the slicer vertical, horizontal, or *responsive*.

If you make the slicer responsive, as you change its size and shape it shows more or fewer options. It can be tall, short, wide, or narrow. If you make it small enough, it becomes just a filter icon on the report page.



Read more about [creating responsive slicers](#).

Publish a phone report

- To publish the phone version of a report, you [publish the main report from Power BI Desktop to the Power BI service](#), and the phone version publishes at the same time.

Read more about [sharing and permissions in Power BI](#).

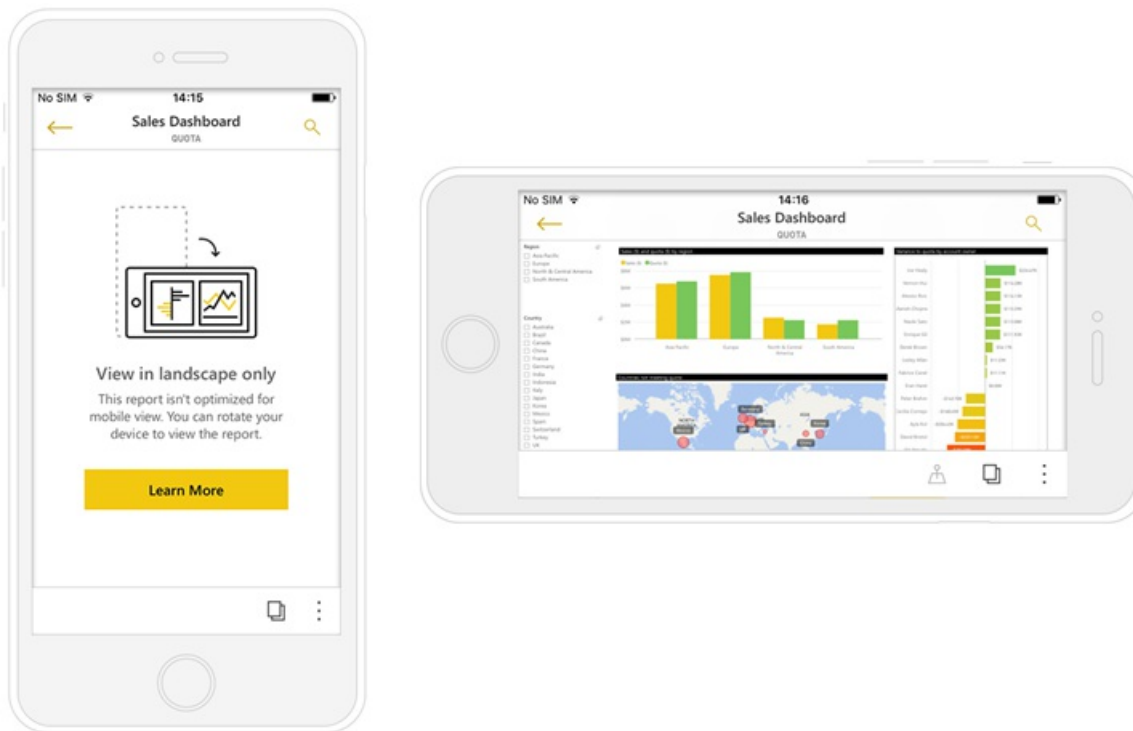
View optimized and unoptimized reports on a phone

In the mobile apps on phones, Power BI automatically detects optimized and unoptimized phone reports. If a phone-optimized report exists, the Power BI phone app automatically opens the report in phone report mode.

If a phone-optimized report doesn't exist, the report opens in the unoptimized, landscape view.

When in a phone report, changing the phone's orientation to landscape will open the report in the unoptimized view with the original report layout, whether the report is optimized or not.

If you only optimize some pages, readers will see a message in portrait view, indicating the report is available in landscape.



Report readers can turn their phones sideways to see the page in landscape mode. Read more about [interacting with Power BI reports optimized for your phone](#).

Next steps

- [Create a phone view of a dashboard in Power BI](#)
- [View Power BI reports optimized for your phone](#)
- [Create responsive visuals optimized for any size](#)
- More questions? [Try asking the Power BI Community](#)

Publish from Power BI Desktop

12/6/2017 • 1 min to read • [Edit Online](#)

When you publish a **Power BI Desktop** file to the **Power BI service**, the data in the model and any reports you created in **Report** view are published to your Power BI workspace. You'll see a new dataset with the same name, and any reports in your Workspace navigator.

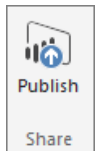
Publishing from **Power BI Desktop** has the same effect as using **Get Data** in Power BI to connect to and upload a **Power BI Desktop** file.

NOTE

Any changes you make in to the report Power BI, for example, add, delete, or change visualizations in reports, will not be saved to the original **Power BI Desktop** file.

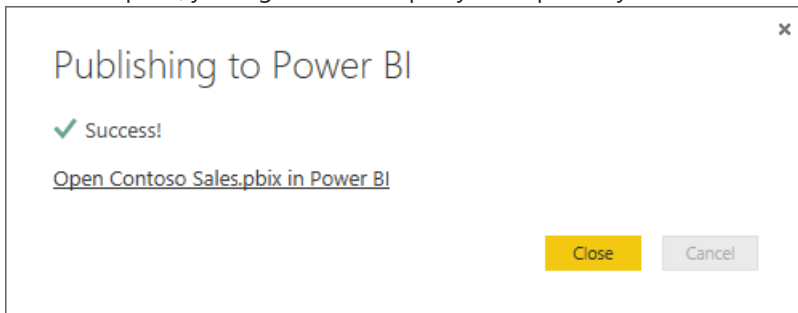
To publish a Power BI Desktop dataset and reports

1. In Power BI Desktop > **File** > **Publish** > **Publish to Power BI** or click **Publish** on the ribbon.



2. Sign in to Power BI.

When complete, you'll get a link to open your report in your Power BI site.



Re-publish or replace a dataset published from Power BI Desktop

When you publish a **Power BI Desktop** file, the dataset and any reports you created in **Power BI Desktop** are uploaded to your Power BI site. When you re-publish your **Power BI Desktop** file, the dataset in your Power BI site will be replaced with the updated dataset from the **Power BI Desktop** file.

This is all pretty straight forward, but there are a few things you should know:

- If you already have two or more datasets in Power BI with the same name as the **Power BI Desktop** file, publish could fail. Make sure you have only one dataset in Power BI with the same name. You can also rename the file and publish, creating a new dataset with same name as the file.
- If you rename or delete a column or measure, any visualizations you already have in Power BI with that field could be broken.
- Power BI ignores some format changes of existing columns. For example, if you change a column's format from 0.25 to 25%.
- If you have a refresh schedule configured for your existing dataset in Power BI and you add new data sources

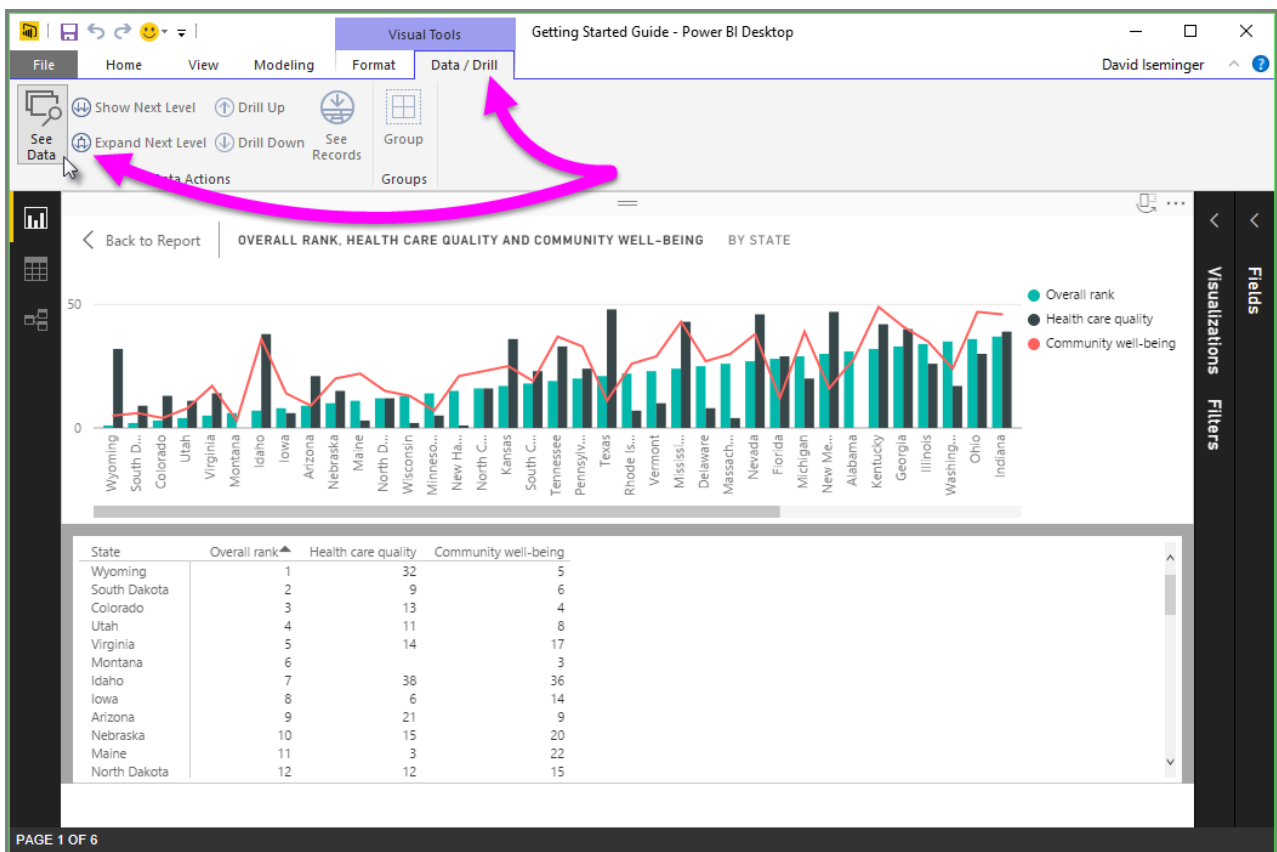
to your file and then re-publish, you'll have to sign into them in *Manage Data Sources* prior to the next scheduled refresh.

Use See Data and See Records in Power BI Desktop

1/25/2018 • 2 min to read • [Edit Online](#)

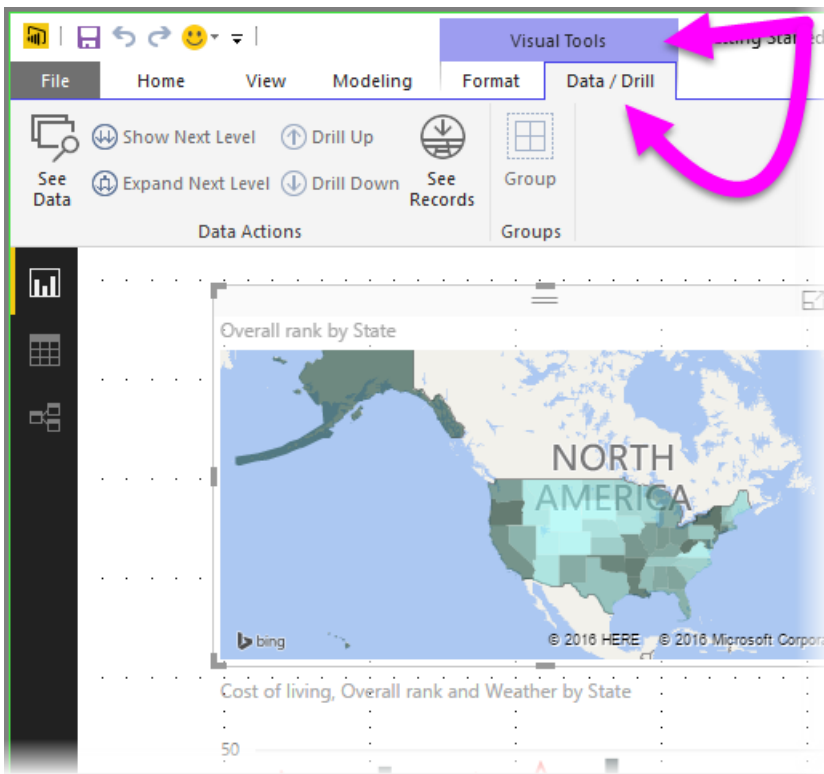
In **Power BI Desktop** you can drill into the details of any visual, and see a textual representation of the data or individual data elements for a selected visual. These features are sometimes referred to as *click-through*, or *drill-through* or *drill-through to details*.

You can use **See Records** to view the underlying rows for one selected data element from a visual, or use **See Data** to view a textual version of the values used in the visual. There are some limitations to using **See Data** and **See Records**, which are discussed at the end of this article.

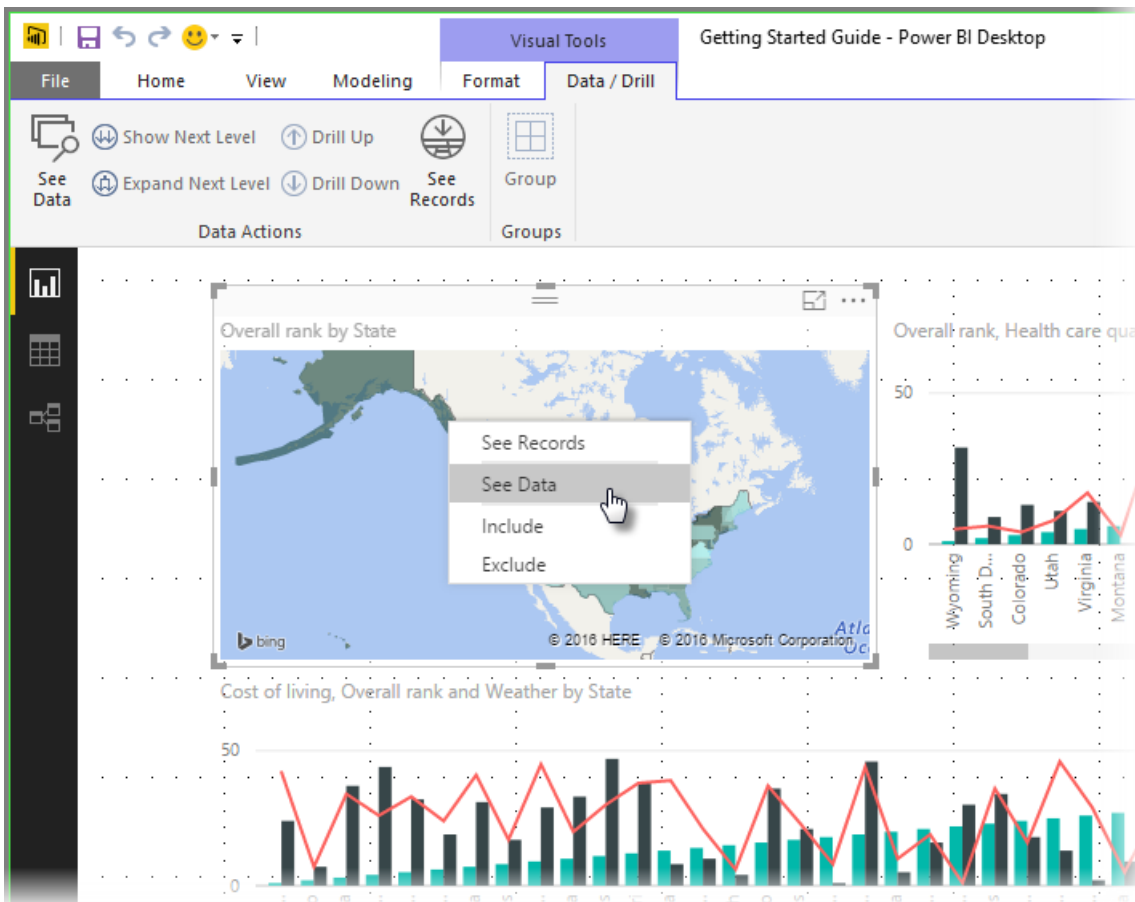


Using See Data in Power BI Desktop

The **See Data** button is located in the **Data / Drill** tab in the **Visual Tools** section of the ribbon.



You can also **See Data** by right-clicking on a visual, then selecting **See Data** from the menu that appears.

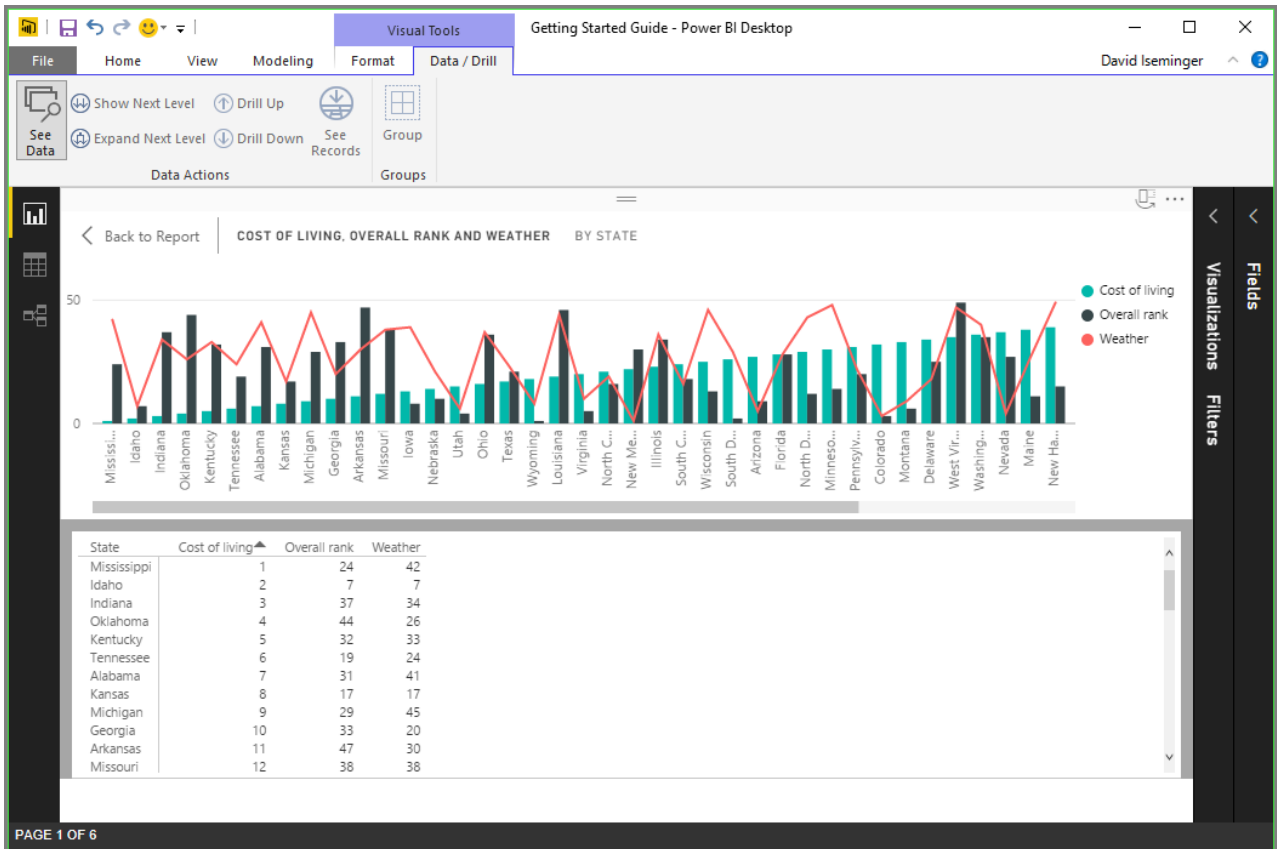


NOTE

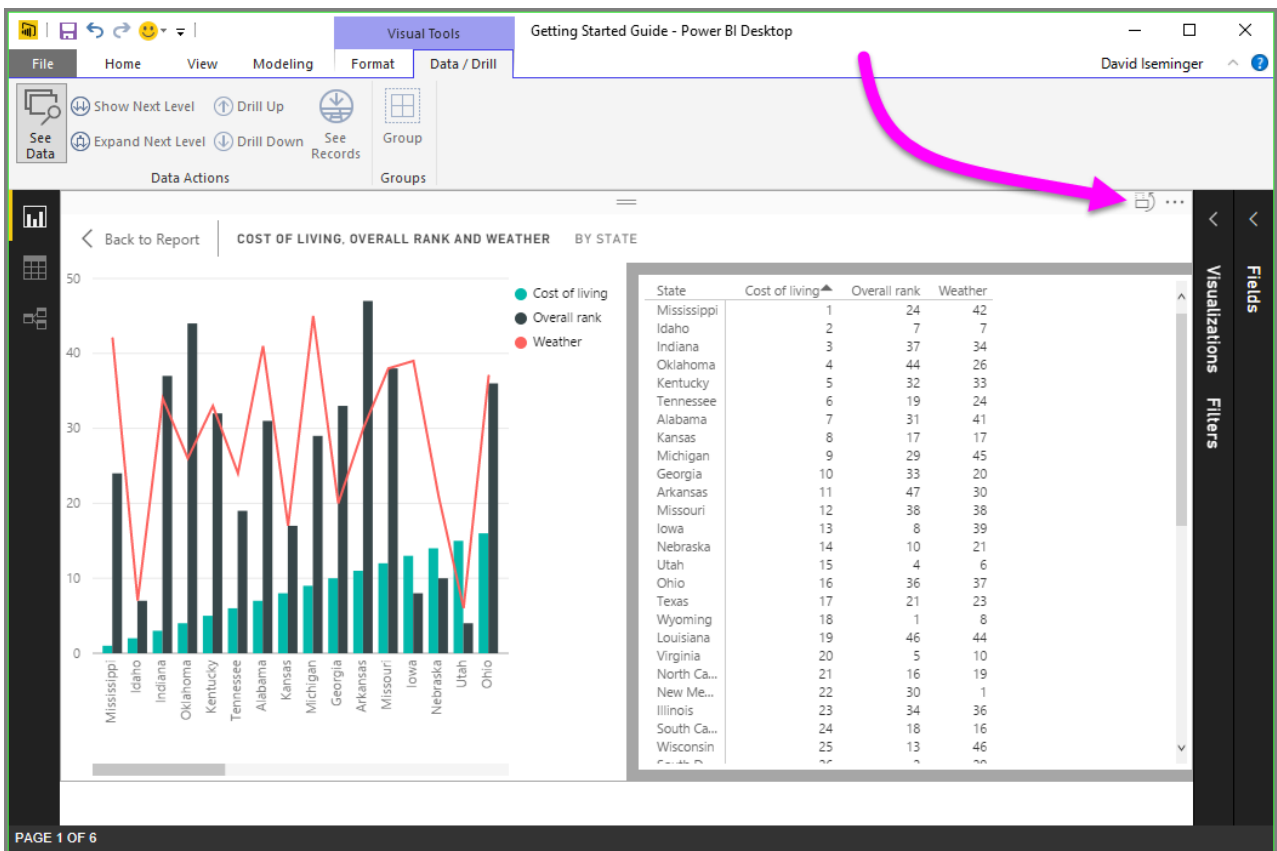
You must be hovering over a data point in the visual in order for the right-click menu to be available.

When you select **See Data**, **Power BI Desktop** focuses on the visual and data you selected and dedicates the canvas space to displaying the visual and the textual representation of the data. The visual is displayed on the top

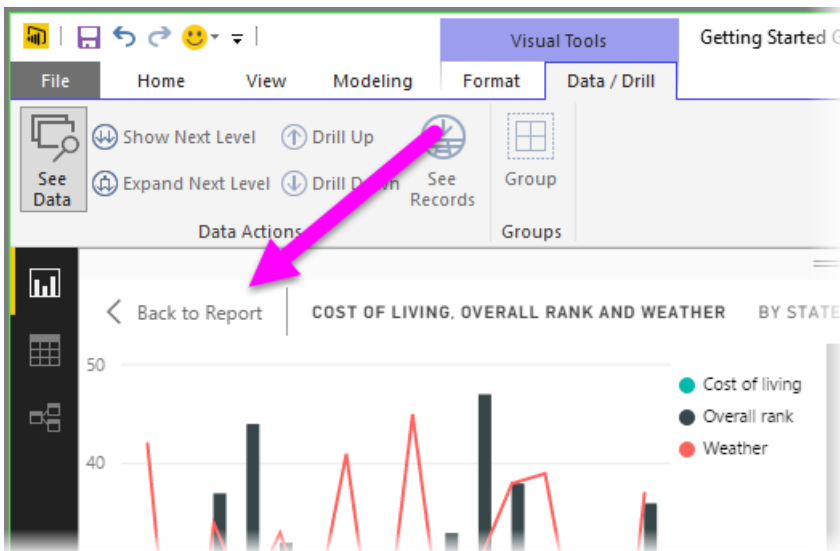
half of the canvas, and the data is shown on the bottom half, as shown in the following image. This is the *horizontal* view.



You can also switch to a *vertical view* (or back to *horizontal view*), by selecting the icon in the upper right corner.

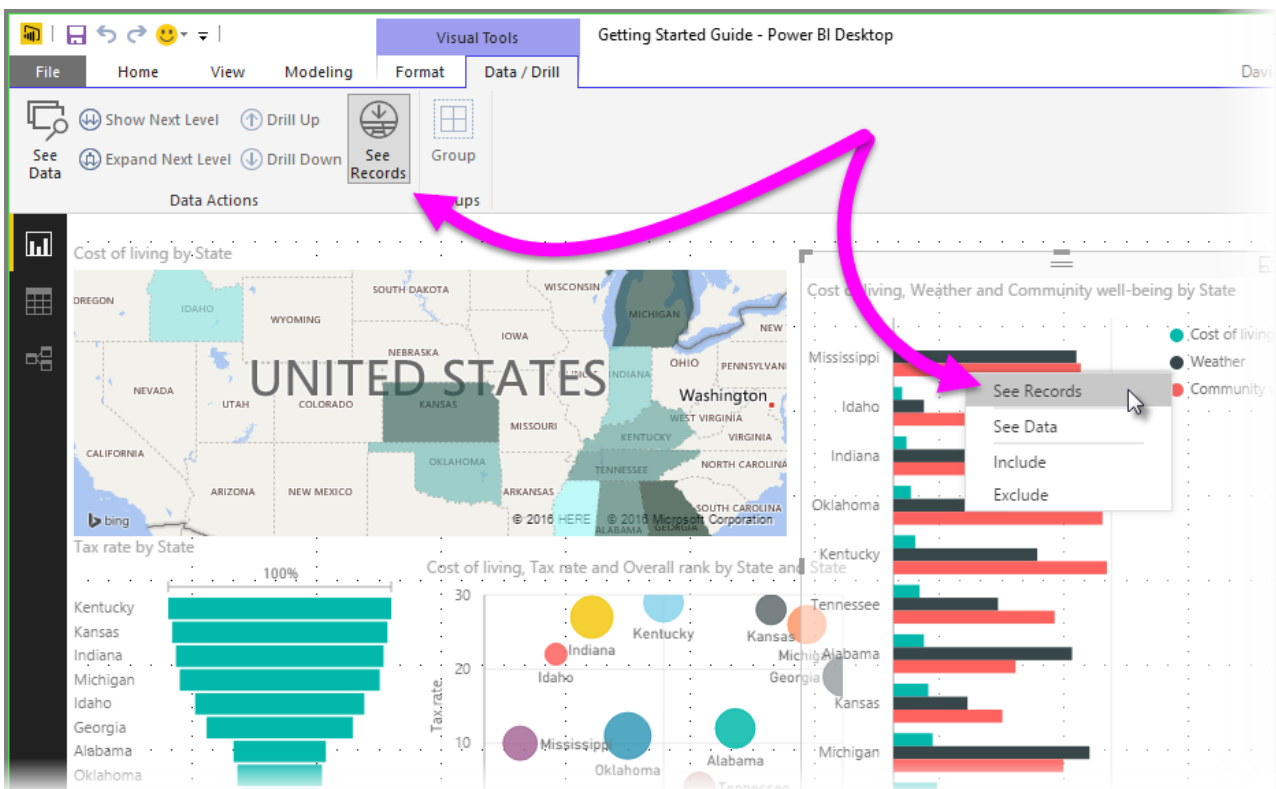


To get back to the report, select < **Back to Report** in the upper left corner of the canvas.



Using See Records in Power BI Desktop

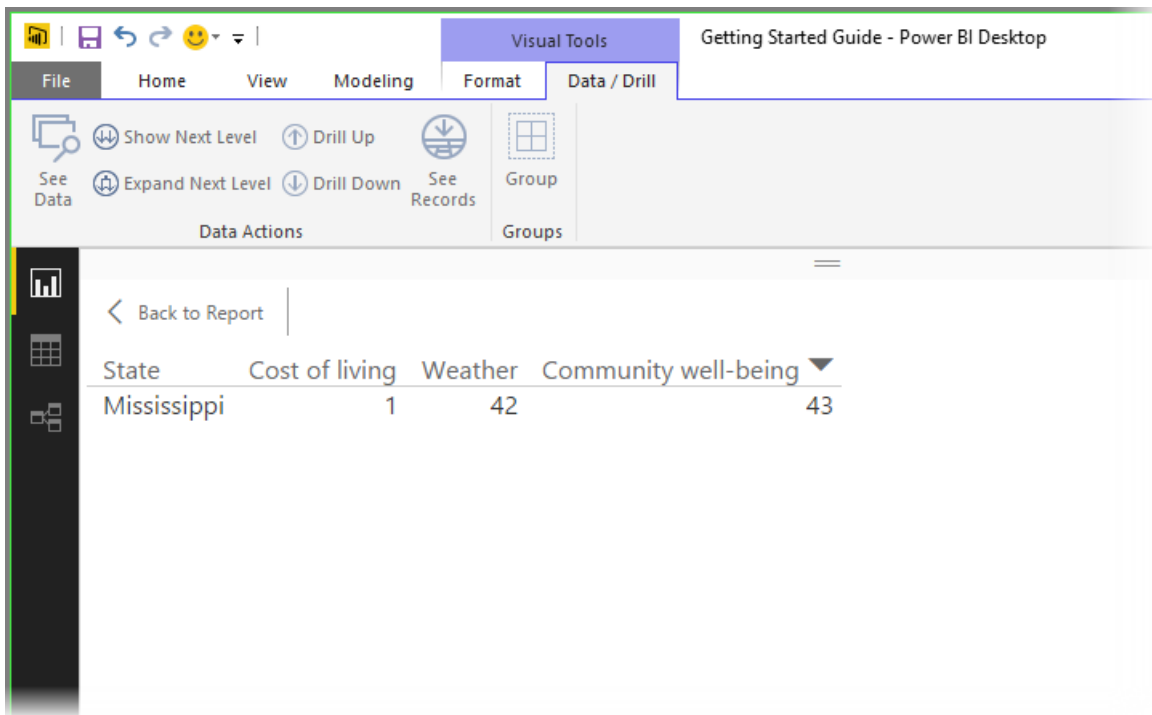
You can also focus on one data element in a visual, and drill into the data behind it. Once a visual is selected there are two ways to use **See Records**; you can enable the **See Records** toggle button in the **Data / Drill** ribbon and then click on a data element, or you can right-click on a data element and select **See Records** from the menu that appears.



NOTE

If the selected visual does not support **See Records** then the button on the ribbon is grayed out.

Once **See Records** is selected, **Power BI Desktop** focuses on that individual data element and dedicates the canvas area to displaying the data for that element, as shown in the following image.



To get back to the report, select the **Back to Report** button in the upper left corner of the canvas.

Limitations

There are a few limitations to consider when using **See Data** or **See Records**:

- Only the following visual types are supported:
 - **Bar**
 - **Column**
 - **Map**
 - **Tree Map**
 - **Filled Map**
 - **Pie**
 - **Donut**
 - **Funnel**
- You can't use **See Records** when your visual uses a calculated measure
- You can't use **See Records** when connected to a live multidimensional (MD) model

Next steps

There are all sorts of report formatting and data management features in **Power BI Desktop**. Check out the following resources for a few examples:

- [Use grouping and binning in Power BI Desktop](#)
- [Use gridlines, snap-to-grid, z-order, alignment and distribution in Power BI Desktop reports](#)

Analyzing Web page data using Power BI Desktop (tutorial)

12/6/2017 • 6 min to read • [Edit Online](#)

In this tutorial, you learn how to import a table of data from a Web page and create a report to visualize this data. As part of this process, you navigate across tables available on a web page, and apply data transformation steps to bring the table into a new shape.

In this article:

- **Task 1:** Connect to a web data source
- **Task 2:** Shape data in the Query view
 - Step 1: Remove Other Columns to only display columns of interest
 - Step 2: Replace Values to clean up values in a selected column
 - Step 3: Filter values in a column
 - Step 4: Rename a column
 - Step 5: Filter null values in a column
 - Step 6: Rename a query
 - Query Steps created
- **Task 3:** Create visualizations using the Report view
 - Step 1: Load the query to your report
 - Step 2: Create a Map visualization

Task 1: Connect to a web data source

In task 1, you import a Tournament Summary table from the UEFA European Football Championship Wikipedia page at the following location: http://en.wikipedia.org/wiki/UEFA_European_Football_Championship

W https://en.wikipedia.org/wiki/UEFA_European_Championship UEFA European Champions...

Results [\[edit\]](#)

See also: [List of UEFA European Championship finals](#)

Year	Host	Final			Third place match			Number of teams
		Winner	Score	Runner-up	Third place	Score	Fourth place	
1960 Details	France	Soviet Union	2–1 aet	Yugoslavia	Czechoslovakia	2–0	France	4
1964 Details	Spain	Spain	2–1	Soviet Union	Hungary	3–1 aet	Denmark	4
1968 Details	Italy	Italy	1–1 aet 2–0 replay	Yugoslavia	England	2–0	Soviet Union	4
1972 Details	Belgium	West Germany	3–0	Soviet Union	Belgium	2–1	Hungary	4
1976 Details	Yugoslavia	Czechoslovakia	2–2 aet (5–3) ps	West Germany	Netherlands	3–2 aet	Yugoslavia	4
1980 Details	Italy	West Germany	2–1	Belgium	Czechoslovakia	1–1 ^(a) (9–8) ps	Italy	8
Year	Host	Final			Losing semi-finalists ^{(a) (2)}			Number of teams
1984 Details	France	France	2–0	Spain	Denmark and Portugal			8
1988 Details	West Germany	Netherlands	2–0	Soviet Union	Italy and West Germany			8
1992 Details	Sweden	Denmark	2–0	Germany	Netherlands and Sweden			8
1996 Details	England	Germany	2–1 asdet	Czech Republic	England and France			16
2000 Details	Belgium & Netherlands	France	2–1 asdet	Italy	Netherlands and Portugal			16
2004 Details	Portugal	Greece	1–0	Portugal	Czech Republic and Netherlands			16
2008 Details	Austria & Switzerland	Spain	1–0	Germany	Russia and Turkey			16
2012 Details	Poland & Ukraine	Spain	4–0	Italy	Germany and Portugal			16

Add a Wikipedia page data source

1. In the **Getting Started dialog** or in the **Home** ribbon tab, select **Get Data**.
2. This brings up the **Get Data** dialog, where you can pick from a wide range of data sources to import data into Power BI Desktop. We will select **Web** which is available under the **All** or **Other** group.
3. In the **Web Content** dialog box, in the **URL** text box, paste the Wikipedia URL (http://en.wikipedia.org/wiki/UEFA_European_Football_Championship).
4. Click **OK**.

After establishing a connection to the web page, you see a list of tables available on this Wikipedia page in the **Navigator** dialog. You can single-click on each of these tables to preview the data.

In the **Navigator** left-pane, select the **Results[edit]** table for the Tournament Summary results, or select the **Results[edit]** table and select **Edit**. This will allow us to reshape this table before loading it to the Report, since the data is not in the shape that we need for our analysis.

Navigator

Search:

Show All | Show Selected [1]

- https://en.wikipedia.org/wiki/UEFA_European_Ch...
- UEFA European Championship
- Table 1
- Results[edit]
- Finalists[edit]
- Table 4
- Table 5
- Table 6
- Table 7
- Table 8
- Table 9
- Table 10
- Document

Results[edit]

Year	Host	Final Winner	Final Score
Year	Host	null	Final
Year	Host	null	Winner
1960	France	null	Soviet Union
1964	Spain	null	Spain
1968	Italy	null	Italy
1972	Belgium	null	West Germany
1976	Yugoslavia	null	Czechoslovakia
1980	Italy	null	West Germany
Year	Host	null	Final
Year	Host	null	Winner
1984	France	null	France
1988	West Germany	null	Netherlands
1992	Sweden	null	Denmark
1996	England	null	Germany
2000	Belgium &	null	France
2004	Portugal	null	Greece
2008	Austria &	null	Spain
2012	Poland &	null	Spain
2016	France	null	null
2020	Pan-European	null	null

Load Edit Cancel

This will land a preview of the table in the Query view, where we can apply a set of transformation steps to clean up the data.

Results[edit] - Query Editor

File Home Transform Add Column View

Close & Load New Source Recent Sources Refresh Preview Properties Advanced Editor Choose Columns Remove Columns Reduce Rows Sort Split Column Group By Data Type: Text Use First Row As Headers Replace Values Combine

1 Query

Results[edit]

= Table.TransformColumnTypes(Data2,{{"Year", type

Year	Host	Final Winner	Final Score
1 Year	Host	null	Final
2 Year	Host	null	Winner
3 1960	France	null	Soviet Union
4 1964	Spain	null	Spain
5 1968	Italy	null	Italy
6 1972	Belgium	null	West Germany
7 1976	Yugoslavia	null	Czechoslovakia
8 1980	Italy	null	West Germany
9 Year	Host	null	Final
10 Year	Host	null	Winner
11 1984	France	null	France
12 1988	West Germany	null	Netherlands
13 1992	Sweden	null	Denmark
14 1996	England	null	Germany
15 2000	Belgium &	null	France
16 2004	Portugal	null	Greece
17 2008	Austria &	null	Spain
18 2012	Poland &	null	Spain
19 2016	France	null	null
20 2020	Pan-European	null	null

Query Settings

PROPERTIES

Name Results[edit]

APPLIED STEPS

Source Navigation Changed Type

12 COLUMNS, 20 ROWS

PREVIEW DOWNLOADED AT 10:56 AM

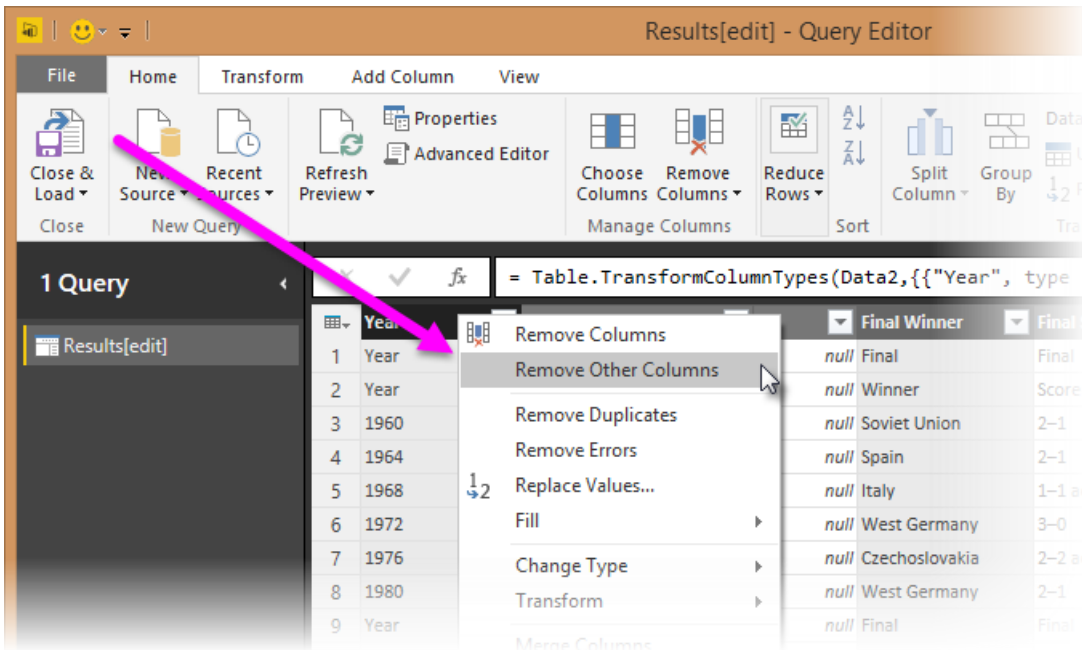
Task 2: Shape data in the subject table

Now that you have the subject table selected for your data query, you learn how to perform various data shaping and cleansing steps.

Step 1: Remove Other Columns to only display columns of interest

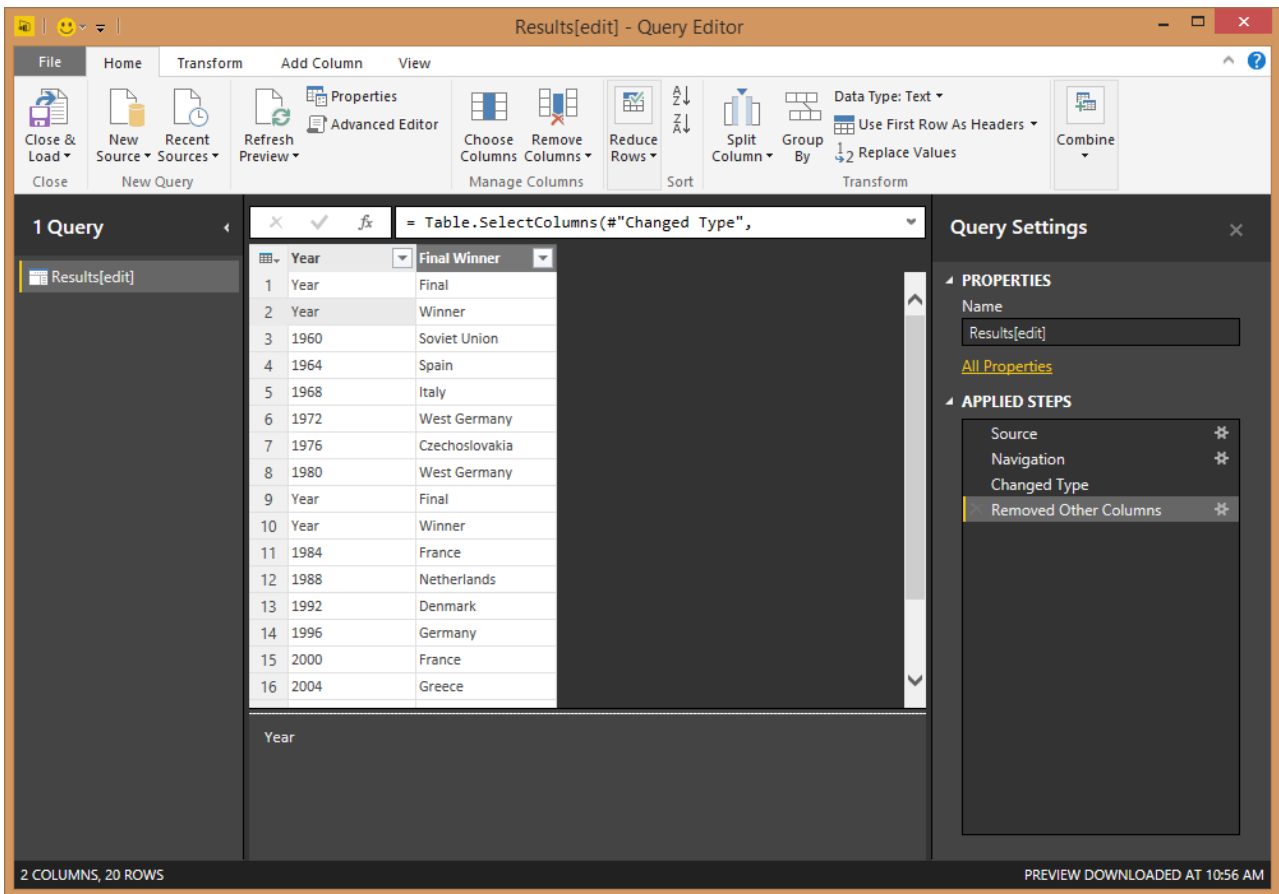
In this step, you remove all columns except **Year** and **Final Winners**.

1. In the **Query Preview** grid, select the **Year** and **Final Winners** columns (use **CTRL + Click**).
2. Right-click a column header in the **Query Preview** grid, and click **Remove Other Columns** to remove the unselected columns. Note that this operation is also available in the **Home** ribbon tab, in the **Manage Columns** group.

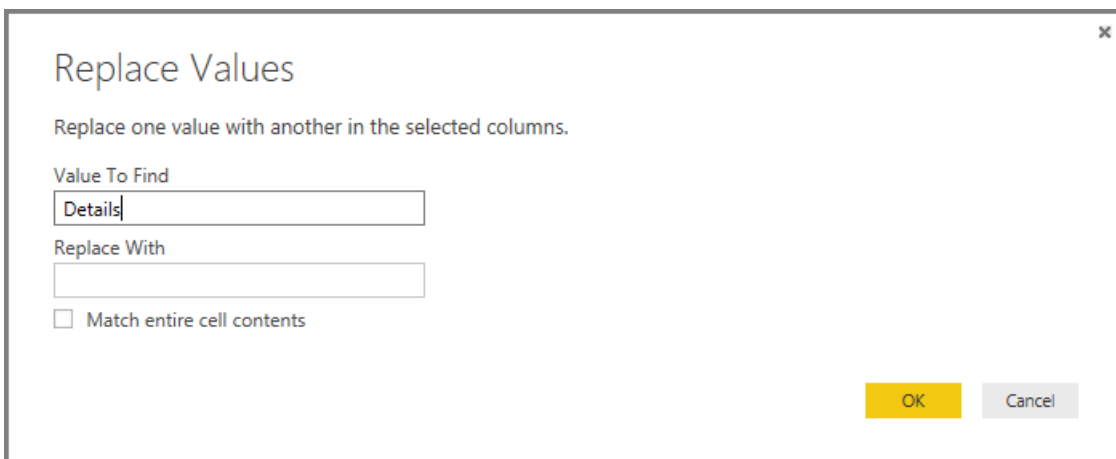


Step 2: Replace Values to clean up values in a selected column

In this step, you replace the Details suffix in the **Year** column. Note that this suffix is on a new line so it is not visible in the table preview. However, if you click in one of the cells with a numeric value in the Year column, you will see the full value in the detailed view.



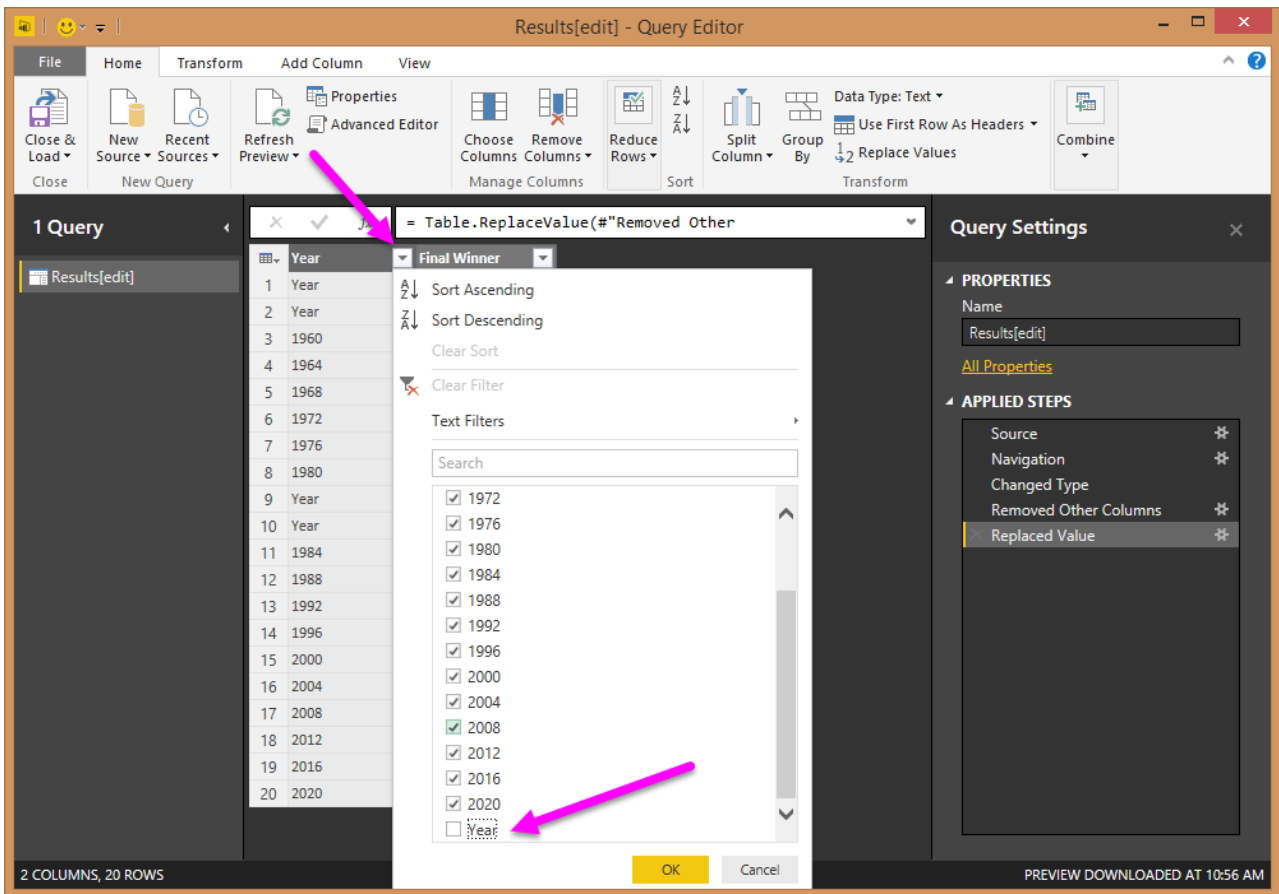
1. Select the **Year** column.
2. In the **Query view** ribbon, click **Replace Values** under the **Home** tab or right-click the **Year** column, and click **Replace Values** to replace Details with empty text.
3. In the **Replace Values** dialog box, type Details in the **Value to Find** text box and leave the **Replace With** text box empty.
4. Click **OK**.



Step 3: Filter values in a column

In this step, you filter the **Year** column to display rows that do not contain "Year".

1. Click the filter drop down arrow on the **Year** column.
2. In the **Filter** drop-down, clear the **Year** option.
3. Click **OK**.



Step 4: Rename a column

Now that we have cleaned up the data in the **Year** column, we are going to work on the **Final Winner** column.

Since we are only looking at the list of winners, we can rename this column to **Country**.

1. Select the **Final Winner** column in the Query preview.
2. In the **Query view** ribbon, under the **Transform** tab and **Any Column** group, you will find **Rename**.
3. This will make the column name editable. We will rename this column to **Country**.

Step 5: Filter out null values in a column

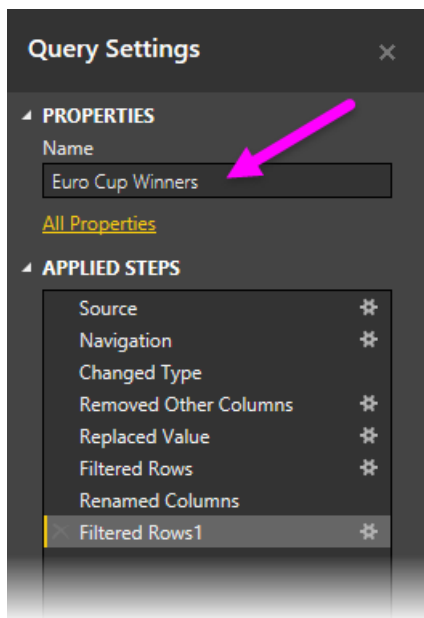
We also need to filter out null values in the **Country** column. In order to do this, we could use the filter menu as we saw in Step 3, or alternatively we can:

1. Right-click on one of the cells in the **Country** column that contain a null value.
2. Select **Text Filters** -> **Does not Equal** in the context menu.
3. This creates a new filter step to remove rows with null values in the **Country** column.

Step 6: Name a query

In this step, you name your final query **Euro Cup Winners**.

1. In the **Query Settings** pane, in the **Name** text box, enter **Euro Cup Winners**.

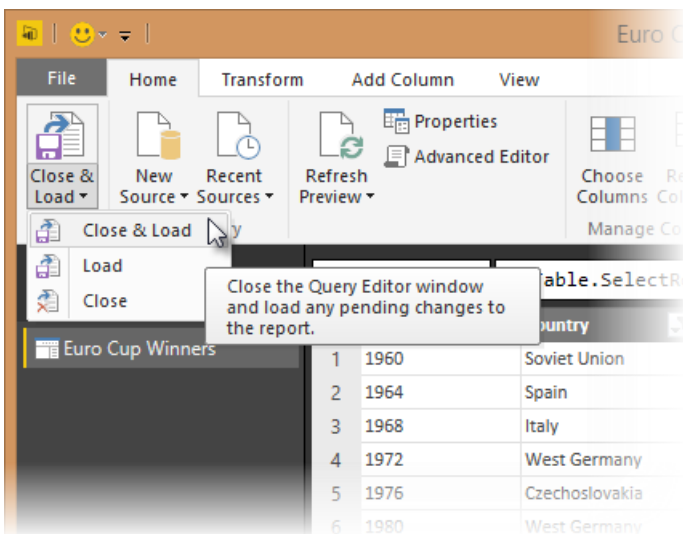


Task 3: Create visualizations using the Report view

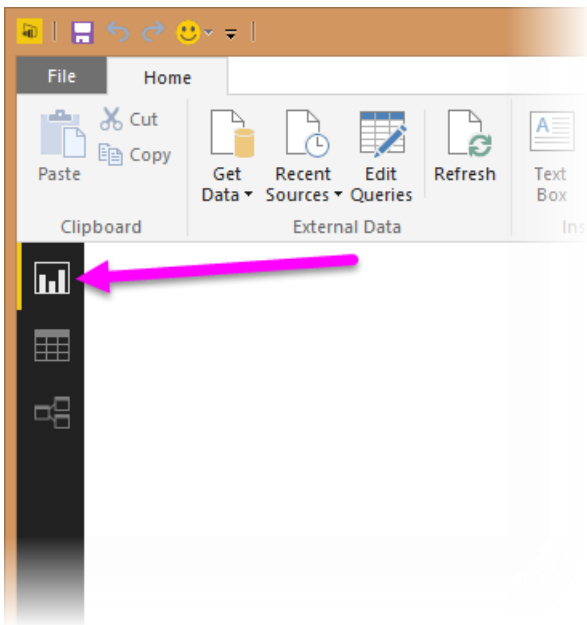
Now that we have converted the data into the shape that we need for our analysis, we can load the resulting table into our Report and create a few visualizations.

Step 1: Load the query to your report

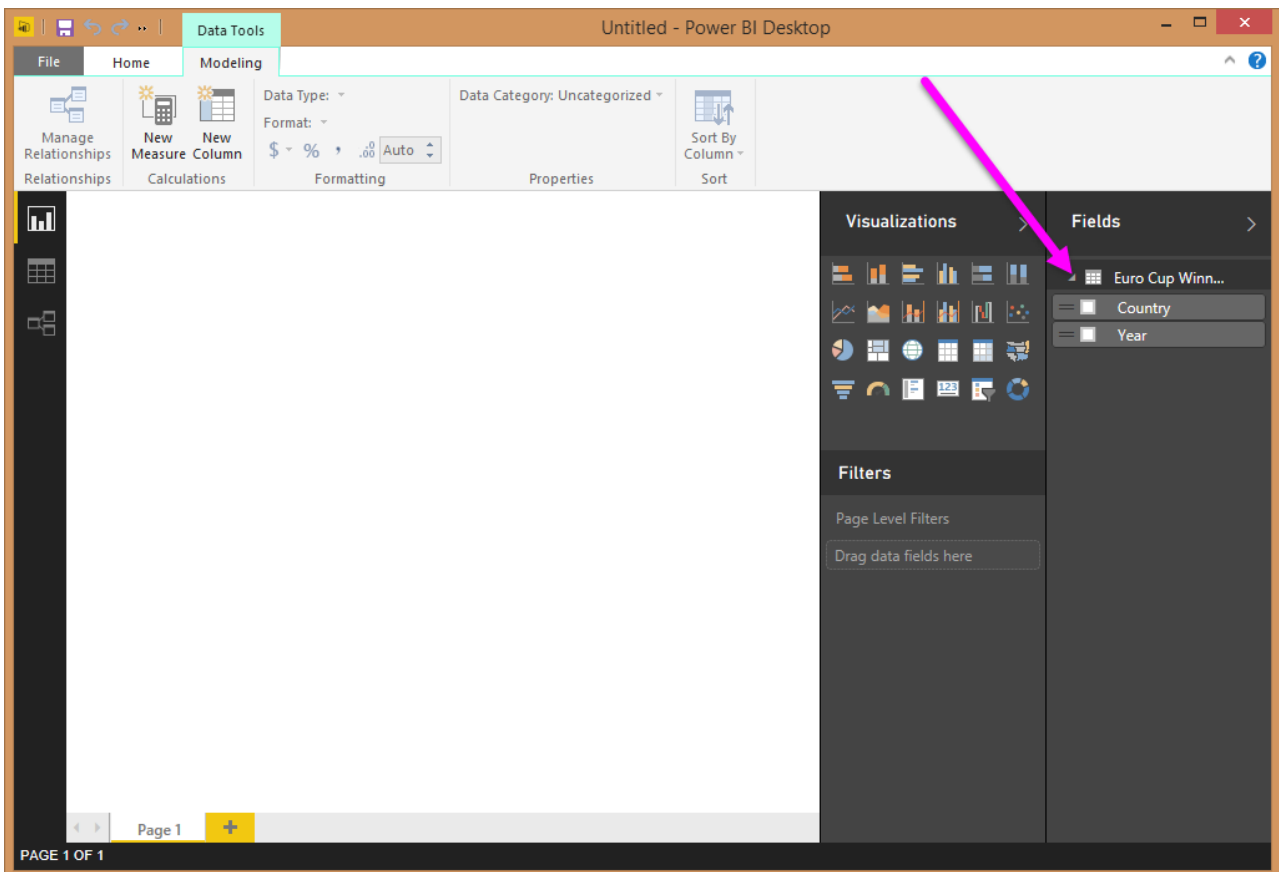
In order to load the query results to Power BI Desktop and create a report, we select **Close & Load** from the **Home** ribbon.



This will trigger evaluation of the query and load of the table output to the Report. In Power BI Desktop, select the **Report** icon to see Power BI Desktop in Report view.



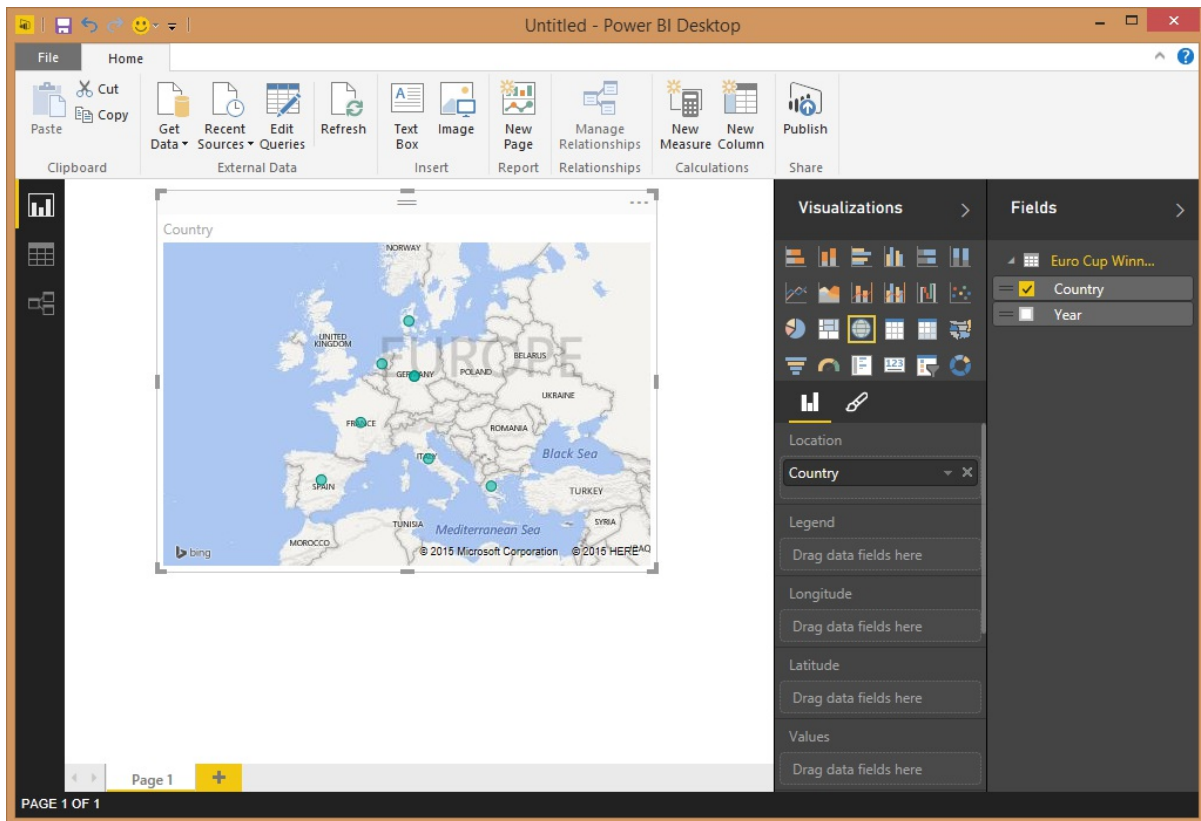
You can see the resulting table fields in the **Fields pane** at the right of the **Report view**.



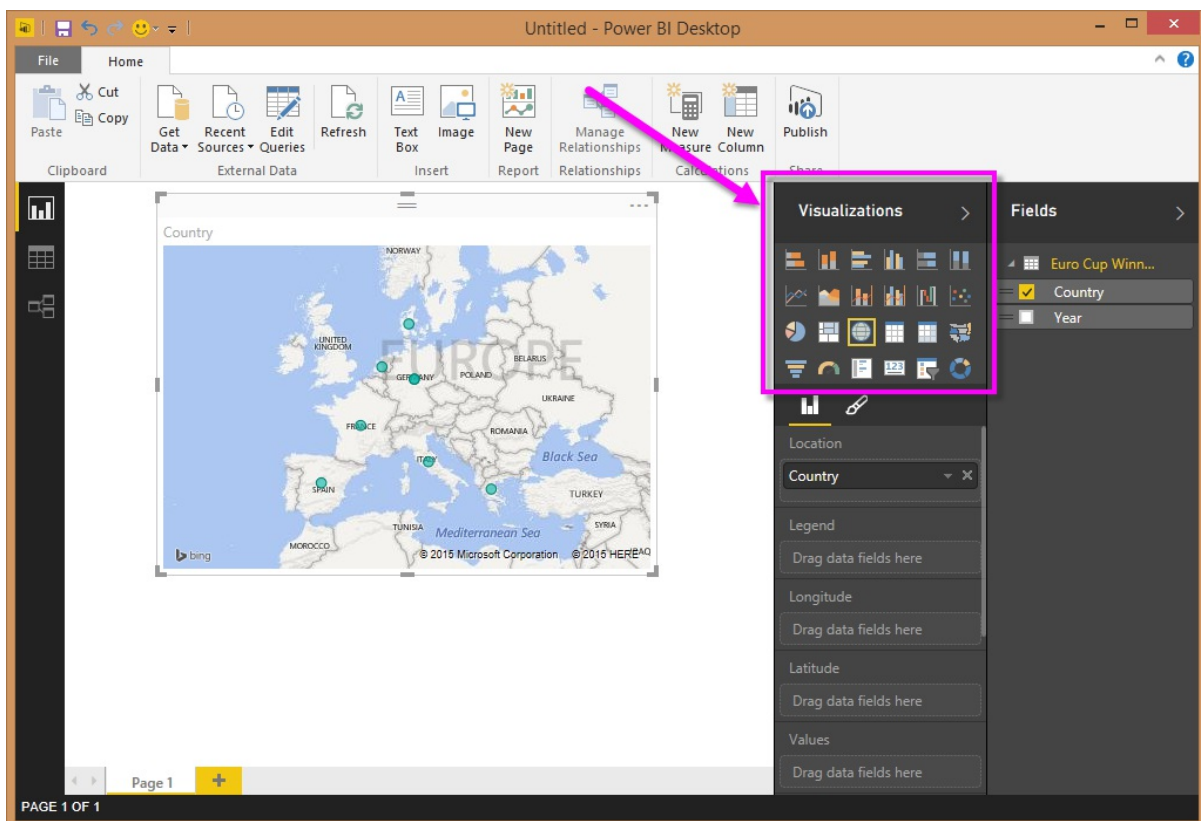
Step 2: Create a Map visualization

In order to create a visualization, we can drag fields from the **Field list** and drop them in the **Report canvas**.

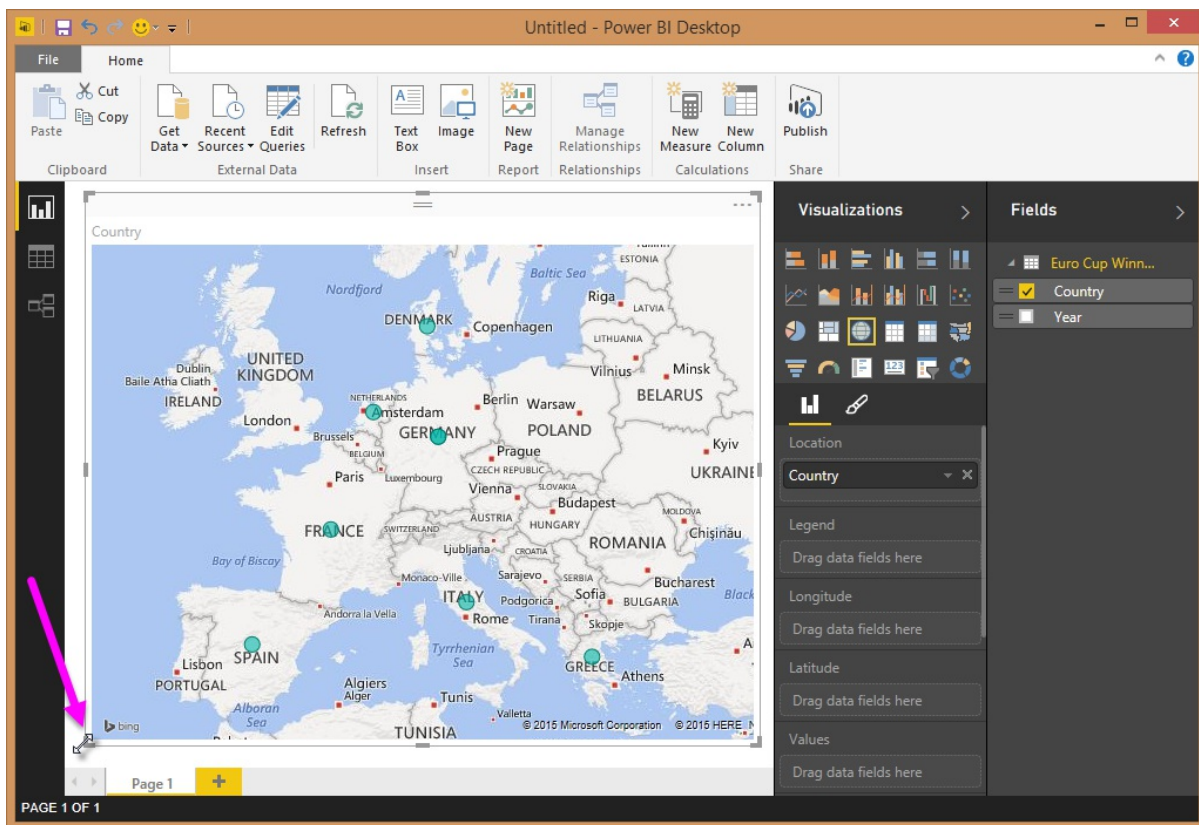
1. Drag the **Country** field and drop it in the **Report canvas**. This will create a new visualization in the **Report canvas**. In this case, since we have a list of countries, it will create a **Map visualization**.



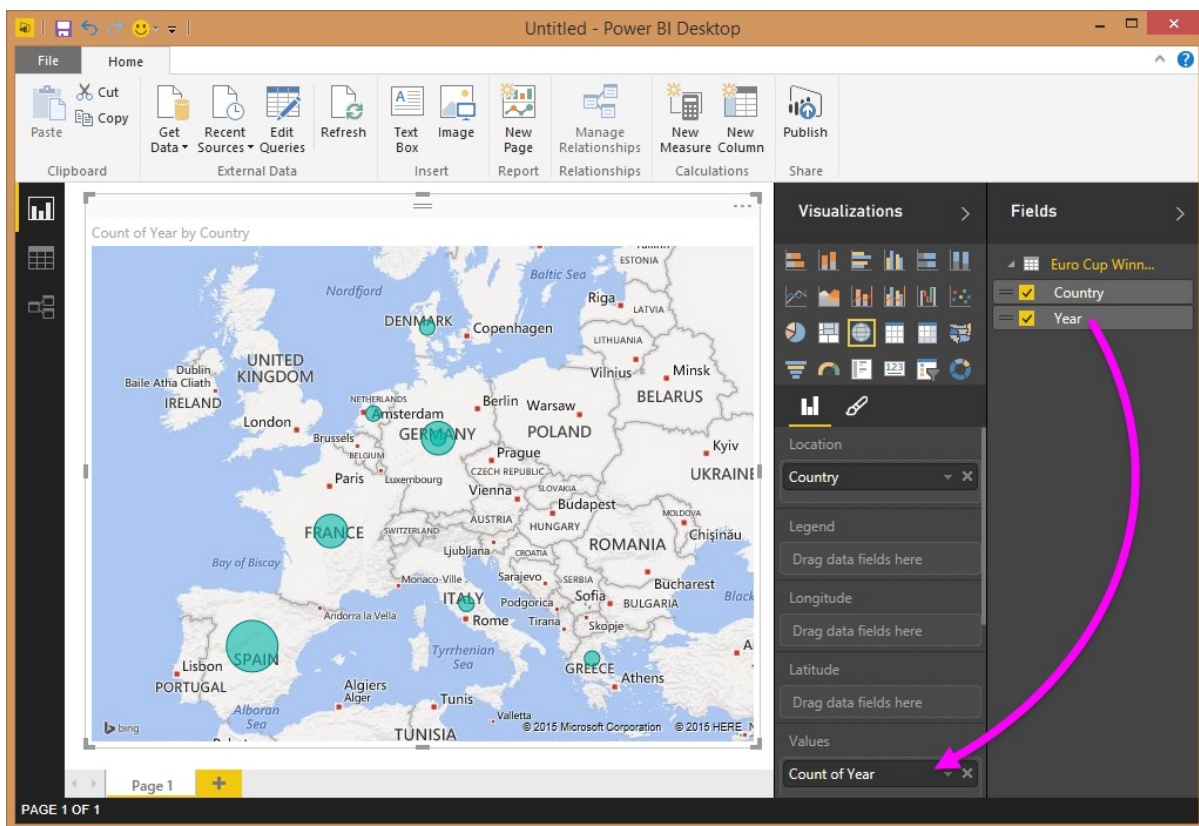
2. We can easily change the type of visualization by clicking on a different icon in the **Visualization** pane.



3. We are going to stay with the **Map** visualization type to Map, We can also resize the visualization by dragging from one of the corners of the visualization up to the desired size.



- Note that currently all the points in the map have the same size. We want to change this so that countries with more Euro Cup tournaments won are represented with a larger point in the map. In order to do this, we can drag the **Year** field in the **Fields list** to the **Values** box in the lower half of the **Fields pane**.



As you can see, it is very easy to customize visualizations in your report, in order to present the data in the way that you want. Power BI Desktop provides a seamless end-to-end experience from getting data from a wide range of data sources and shaping it to meet your analysis needs to visualizing this data in rich and interactive ways. Once your report is ready, you can [upload it to Power BI](#) and create dashboards based on it, which you can share with other Power BI users.

This concludes the **Importing Data from the Web** tutorial. You can download the completed Power BI Desktop file [here](#).

Where else can I get more information?

- [Read other Power BI Desktop tutorials](#)
- [Watch Power BI Desktop videos](#)
- [Visit the Power BI Forum](#)
- [Read the Power BI Blog](#)

Tutorial: Analyzing sales data from Excel and an OData feed

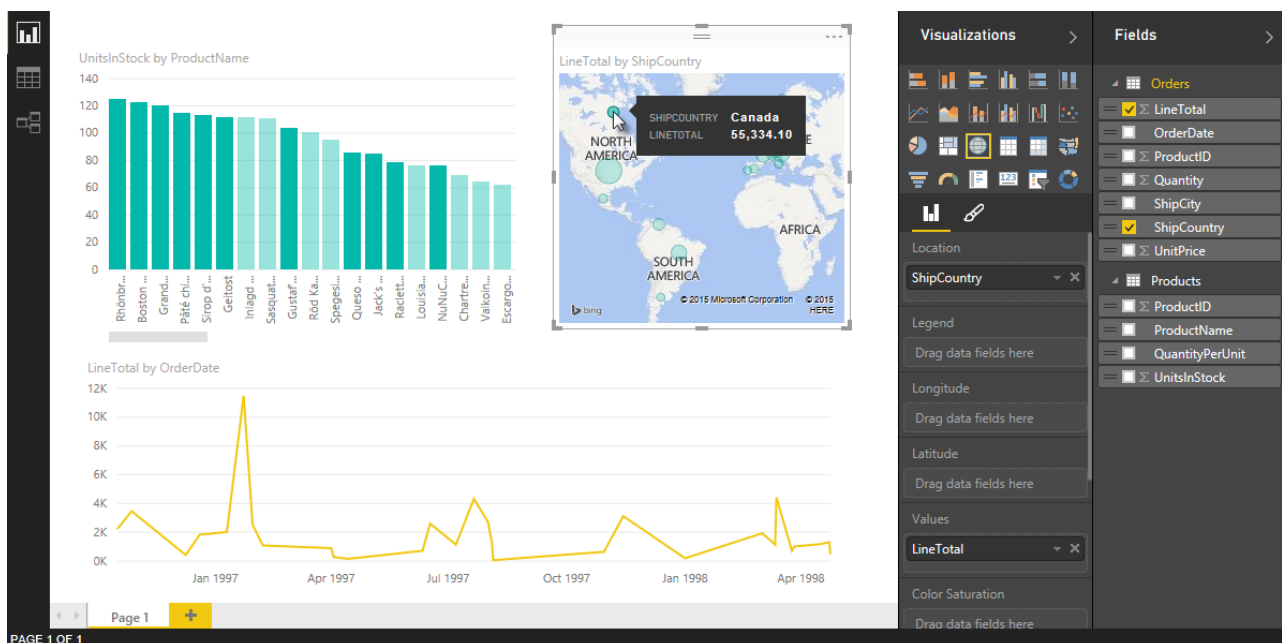
1/30/2018 • 10 min to read • [Edit Online](#)

With **Power BI Desktop**, you can connect to all sorts of different data sources, then combine and shape them in ways that facilitate making interesting, compelling data analysis and visualizations. In this tutorial, you'll learn how to combine data from two data sources.

It's common to have data spread across multiple data sources, such as product information in one database, and sales information in another. The techniques you'll learn in this document include an Excel workbook and an OData feed, but these techniques can be applied to other data sources too, like SQL Server queries, CSV files, or any data source in Power BI Desktop.

In this tutorial, you import data from Excel (it includes product information) and from an OData feed (which contains orders data). You'll perform transformation and aggregation steps, and combine data from both sources to produce a **Total Sales per Product and Year** report that includes interactive visualizations.

Here's what the final report will look like:



To follow the steps in this tutorial you need the Products workbook, which you can download: [click here to download Products.xlsx](#).

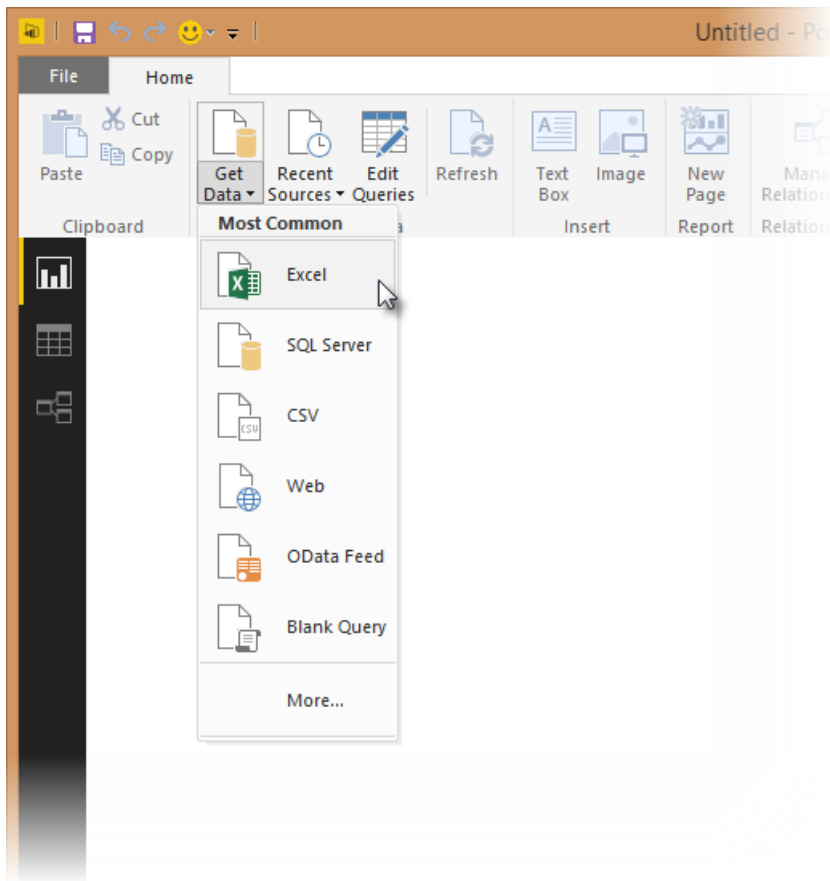
In the **Save As** dialog box, name the file **Products.xlsx**.

Task 1: Get product data from an Excel workbook

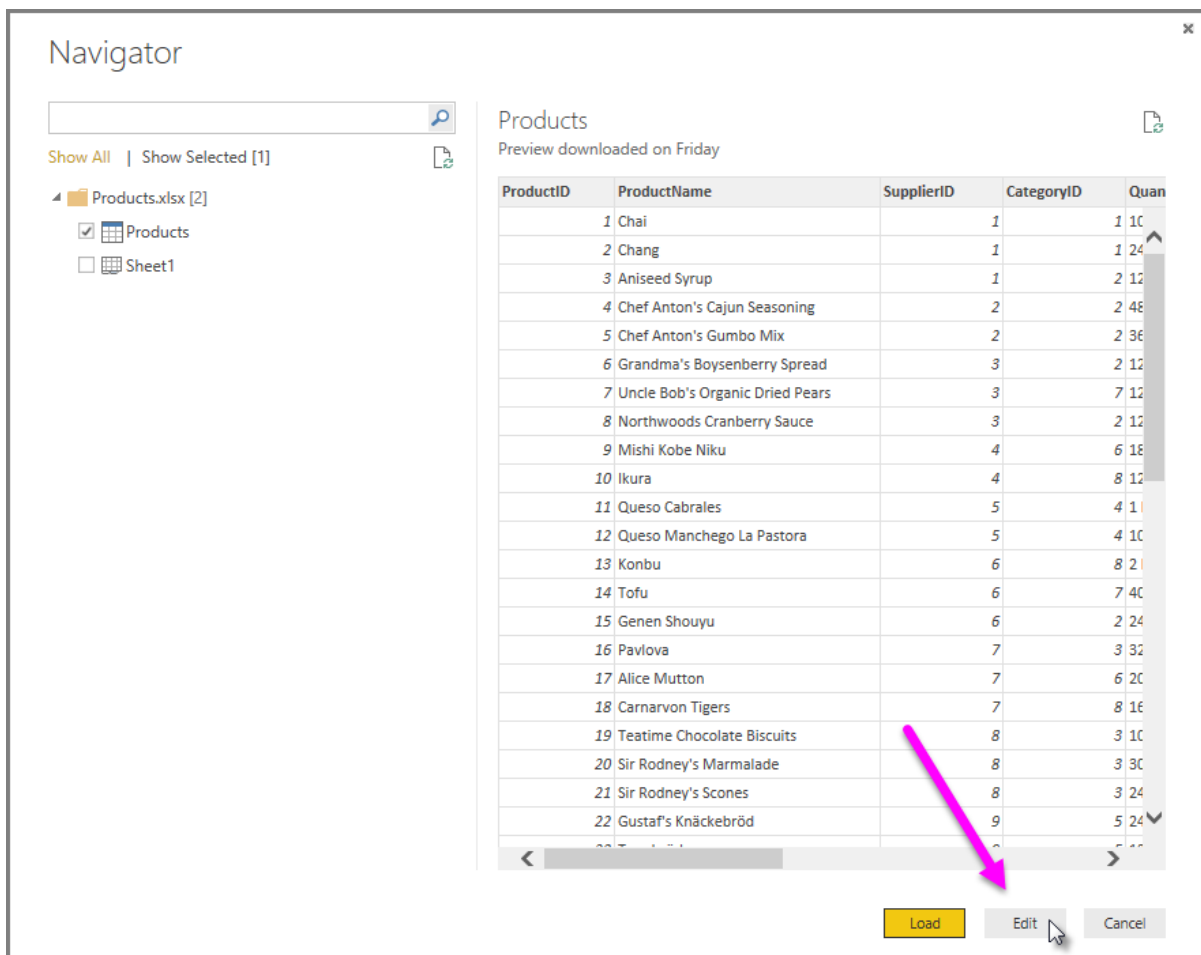
In this task, you import products from the Products.xlsx file into Power BI Desktop.

Step 1: Connect to an Excel workbook

1. Launch Power BI Desktop.
2. From the Home ribbon, select **Get Data**. Excel is one of the **Most Common** data connections, so you can select it directly from the **Get Data** menu.



3. If you select the Get Data button directly, you can also select **File > Excel** and select **Connect**.
4. In the **Open File** dialog box, select the **Products.xlsx** file.
5. In the **Navigator** pane, select the **Products** table and then select **Edit**.

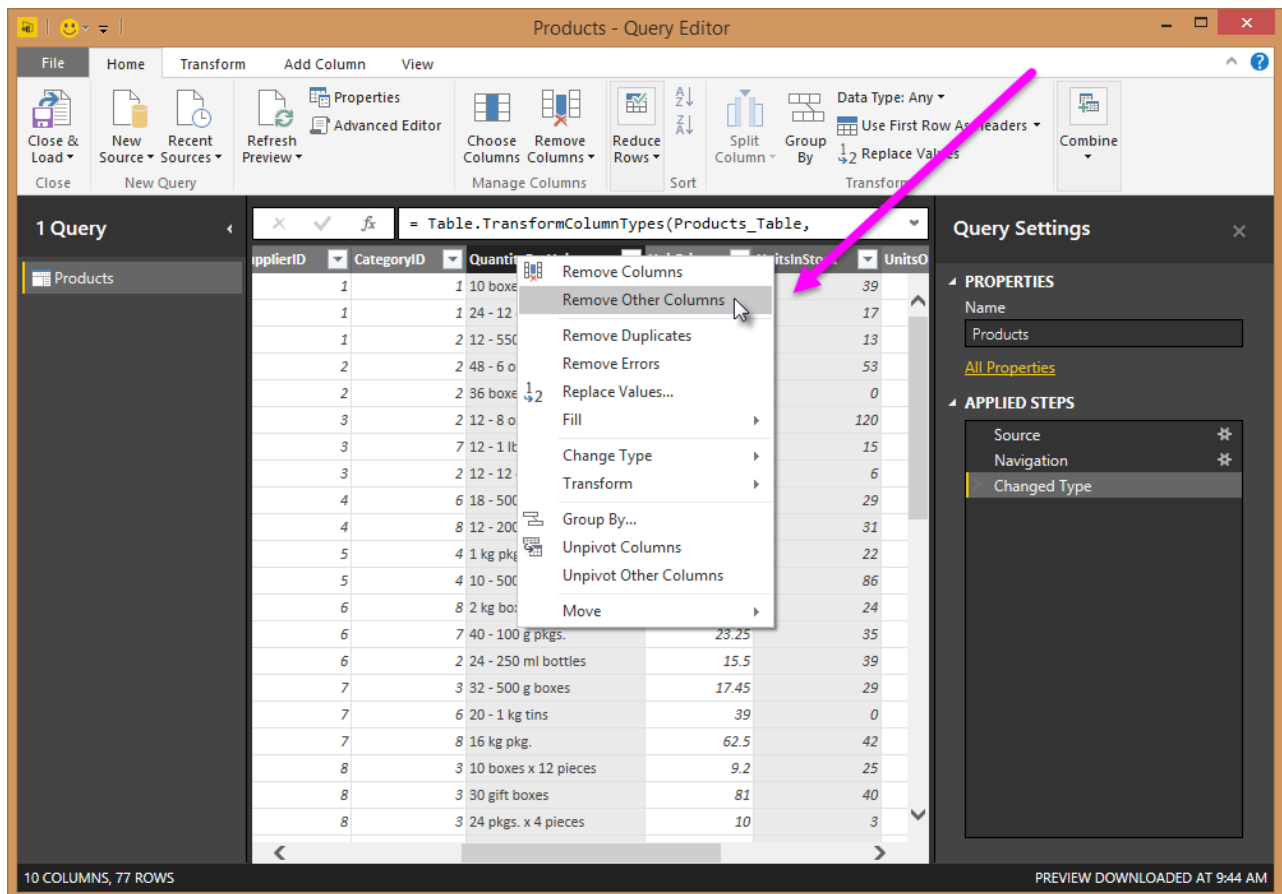


Step 2: Remove other columns to only display columns of interest

In this step you remove all columns except **ProductID**, **ProductName**, **UnitsInStock**, and **QuantityPerUnit**. In Power BI Desktop, there are often a few ways to accomplish the same task. For example, many buttons in the ribbon can also be achieved by using the right-click menu on a column or a cell.

Power BI Desktop includes Query Editor, which is where you shape and transform your data connections. Query Editor opens automatically when you select **Edit** from **Navigator**. You can also open the Query Editor by selecting **Edit Queries** from the **Home** ribbon in Power BI Desktop. The following steps are performed in Query Editor.

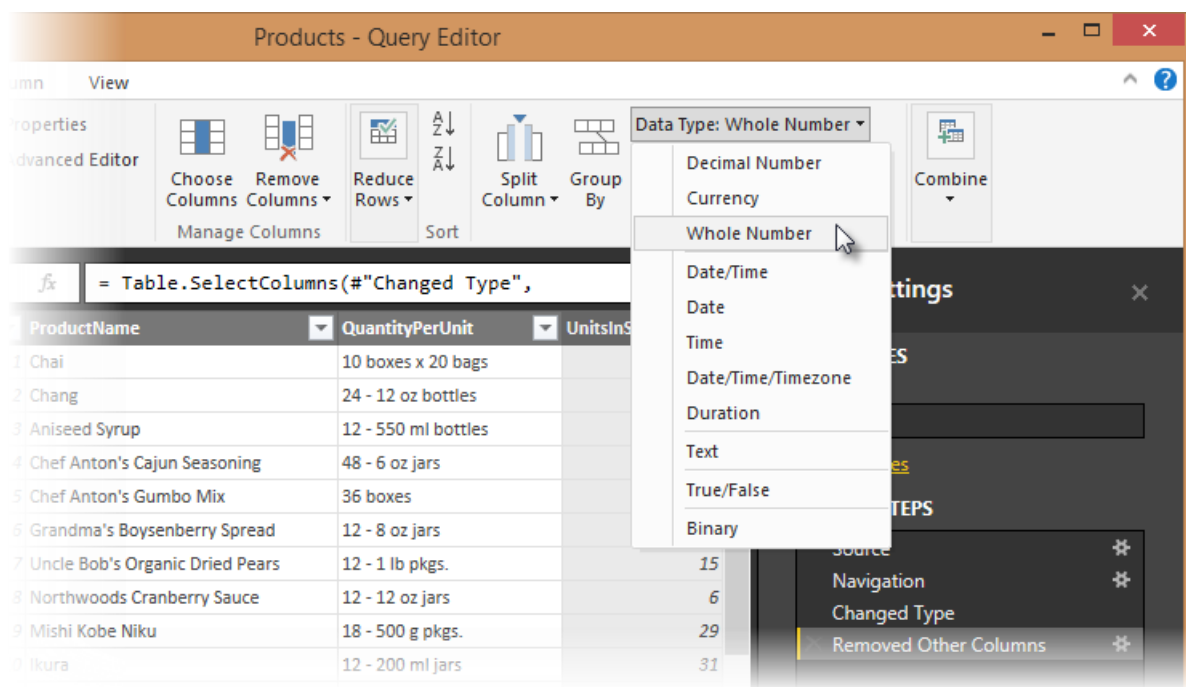
1. In Query Editor, select the **ProductID**, **ProductName**, **QuantityPerUnit**, and **UnitsInStock** columns (use **Ctrl+Click** to select more than one column, or **Shift+Click** to select columns that are beside each other).
2. Select **Remove Columns > Remove Other Columns** from the ribbon, or right-click on a column header and click **Remove Other Columns**.



Step 3: Change the data type of the UnitsInStock column

When Query Editor connects to data, it reviews each field and to determine the best data type. For the Excel workbook, products in stock will always be a whole number, so in this step you confirm the **UnitsInStock** column's datatype is Whole Number.

1. Select the **UnitsInStock** column.
2. Select the **Data Type** drop-down button in the **Home** ribbon.
3. If not already a Whole Number, select **Whole Number** for data type from the drop down (the **Data Type:** button also displays the data type for the current selection).



Power BI Desktop steps created

As you perform query activities in Query Editor, query steps are created and listed in the **Query Settings** pane, in the **Applied Steps** list. Each query step has a corresponding formula, also known as the "M" language. For more information about the "M" formula language, see [Learn about Power BI formulas](#).

TASK	QUERY STEP	FORMULA
Connect to an Excel workbook	Source	Source([Name="Products"])[Data]
Promote the first row to table column headers	FirstRowAsHeader	Table.PromoteHeaders (Products)
Remove other columns to only display columns of interest	RemovedOtherColumns	Table.SelectColumns (FirstRowAsHeader,{"ProductID", "ProductName", "QuantityPerUnit", "UnitsInStock"})
Change datatype	Changed Type	Table.TransformColumnTypes("#Removed Other Columns",{{"UnitsInStock", Int64.Type}})

Task 2: Import order data from an OData feed

In this task, you'll bring in order data. This step represents connecting to a sales system. You import data into Power BI Desktop from the sample Northwind OData feed at the following URL, which you can copy (and then paste) in the steps below: <http://services.odata.org/V3/Northwind/Northwind.svc/>

Step 1: Connect to an OData feed

1. From the **Home** ribbon tab in Query Editor, select **Get Data**.
2. Browse to the **OData Feed** data source.
3. In the **OData Feed** dialog box, paste the **URL** for the Northwind OData feed.
4. Select **OK**.
5. In the **Navigator** pane, select the **Orders** table, and then select **Edit**.

Navigator

http://services.odata.org/V3/Northwind/Nort...

- Alphabetical_list_of_products
- Categories
- Category_Sales_for_1997
- Current_Product_Lists
- Customer_and_Suppliers_by_Cities
- CustomerDemographics
- Customers
- Employees
- Invoices
- Order_Details
- Order_Details_Extendeds
- Order_Subtotals
- Orders
- Orders_Qries
- Product_Sales_for_1997
- Products
- Products_Above_Average_Prices
- Products_by_Categories
- Regions

Orders

OrderID	CustomerID	EmployeeID	OrderDate	RequiredDate
10248	VINET	5	7/4/1996 12:00:00 AM	8/1/1996
10249	TOMSP	6	7/5/1996 12:00:00 AM	8/16/1996
10250	HANAR	4	7/8/1996 12:00:00 AM	8/5/1996
10251	VICTE	3	7/8/1996 12:00:00 AM	8/5/1996
10252	SUPRD	4	7/9/1996 12:00:00 AM	8/6/1996
10253	HANAR	3	7/10/1996 12:00:00 AM	7/24/1996
10254	CHOPS	5	7/11/1996 12:00:00 AM	8/8/1996
10255	RICSU	9	7/12/1996 12:00:00 AM	8/9/1996
10256	WELLI	3	7/15/1996 12:00:00 AM	8/12/1996
10257	HILAA	4	7/16/1996 12:00:00 AM	8/13/1996
10258	ERNSH	1	7/17/1996 12:00:00 AM	8/14/1996
10259	CENTC	4	7/18/1996 12:00:00 AM	8/15/1996
10260	OTTIK	4	7/19/1996 12:00:00 AM	8/16/1996
10261	QUEDE	4	7/19/1996 12:00:00 AM	8/16/1996
10262	RATTC	8	7/22/1996 12:00:00 AM	8/19/1996
10263	ERNSH	9	7/23/1996 12:00:00 AM	8/20/1996
10264	FOLKO	6	7/24/1996 12:00:00 AM	8/21/1996
10265	BLONP	2	7/25/1996 12:00:00 AM	8/22/1996
10266	WARTH	3	7/26/1996 12:00:00 AM	9/6/1996
10267	FRANK	4	7/29/1996 12:00:00 AM	8/26/1996
10268	GROSR	8	7/30/1996 12:00:00 AM	8/27/1996
10269	WHITC	5	7/31/1996 12:00:00 AM	8/14/1996
10270	WARTH	1	8/1/1996 12:00:00 AM	8/29/1996

OK Cancel

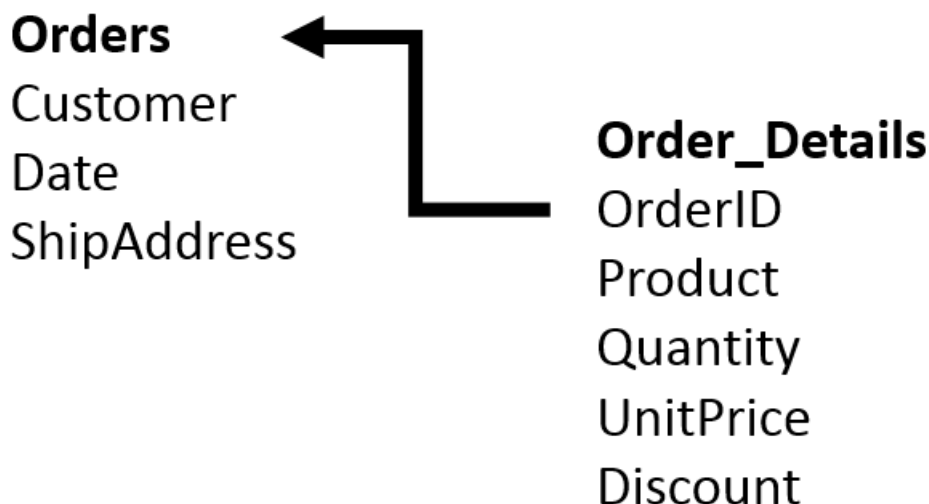
NOTE

You can click a table name, without selecting the checkbox, to see a preview.

Step 2: Expand the Order_Details table

The **Orders** table contains a reference to a **Details** table, which contains the individual products that were included in each Order. When you connect to data sources with multiples tables (such as a relational database) you can use these references to build up your query.

In this step, you expand the **Order_Details** table that is related to the **Orders** table, to combine the **ProductID**, **UnitPrice**, and **Quantity** columns from **Order_Details** into the **Orders** table. This is a representation of the data in these tables:

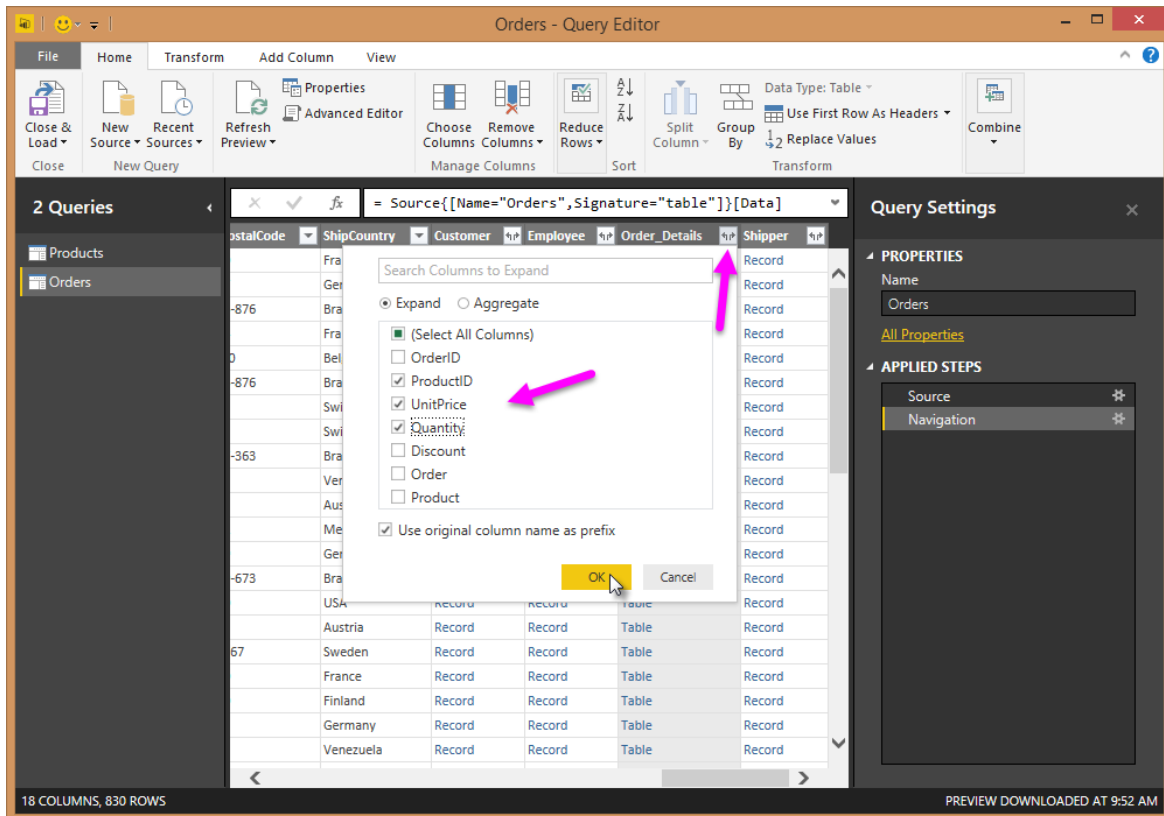


The **Expand** operation combines columns from a related table into a subject table. When the query runs, rows from

the related table (**Order_Details**) are combined into rows from the subject table (**Orders**).

After you expand the **Order_Details** table, three new columns and additional rows are added to the **Orders** table, one for each row in the nested or related table.

1. In the **Query View**, scroll to the **Order_Details** column.
2. In the **Order_Details** column, select the expand icon (⌵).
3. In the **Expand** drop-down:
 - a. Select (**Select All Columns**) to clear all columns.
 - b. Select **ProductID**, **UnitPrice**, and **Quantity**.
 - c. Click **OK**.



Step 3: Remove other columns to only display columns of interest

In this step you remove all columns except **OrderDate**, **ShipCity**, **ShipCountry**, **Order_Details.ProductID**, **Order_Details.UnitPrice**, and **Order_Details.Quantity** columns. In the previous task, you used **Remove Other Columns**. For this task, you remove selected columns.

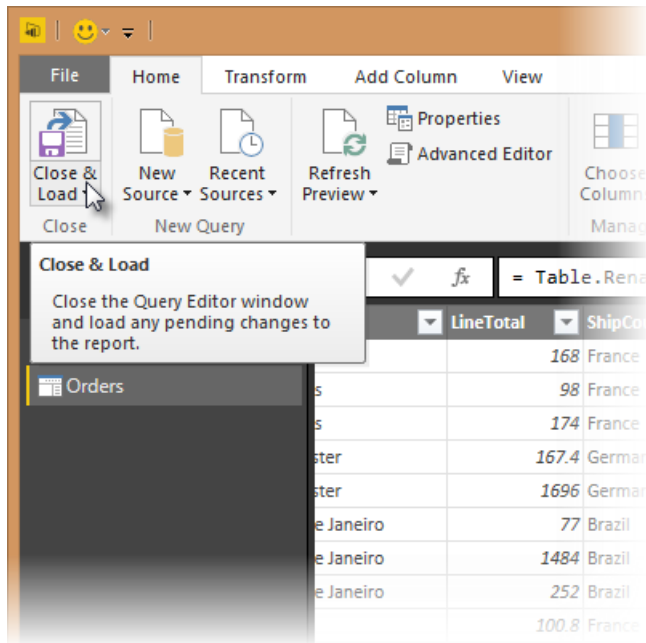
1. In the **Query View**, select all columns by completing a. and b.:
 - a. Click the first column (**OrderID**).
 - b. Shift+Click the last column (**Shipper**).
 - c. Now that all columns are selected, use Ctrl+Click to unselect the following columns: **OrderDate**, **ShipCity**, **ShipCountry**, **Order_Details.ProductID**, **Order_Details.UnitPrice**, and **Order_Details.Quantity**.
2. Now that only the columns we want to remove are selected, right-click on any selected column header and click **Remove Columns**.

Step 4: Calculate the line total for each Order_Details row

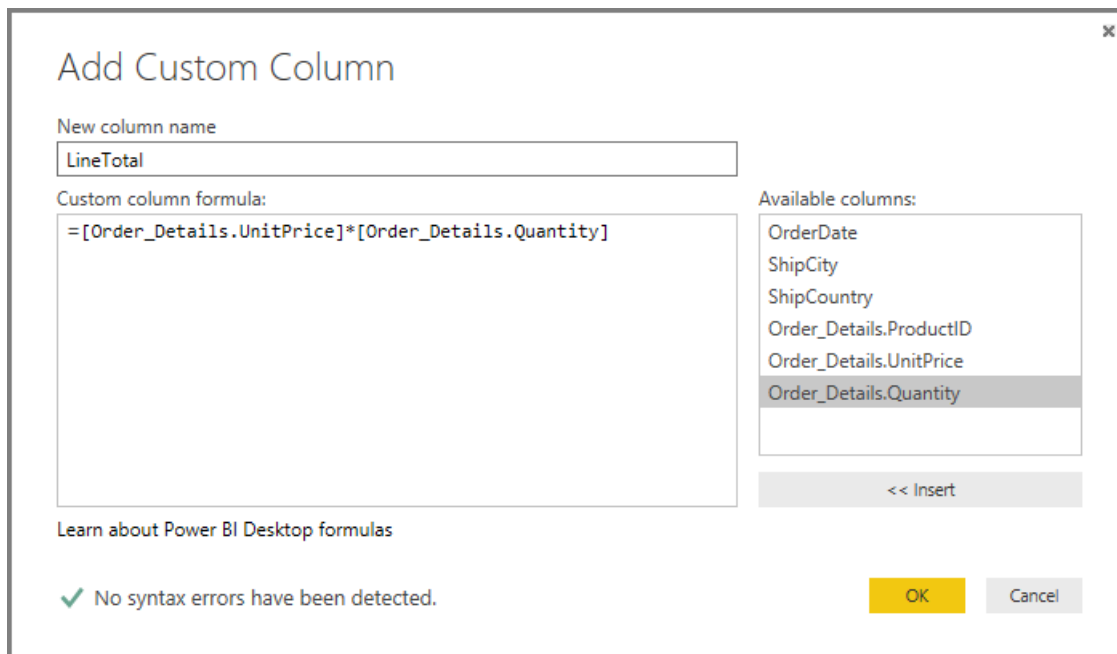
Power BI Desktop lets you to create calculations based on the columns you are importing, so you can enrich the data that you connect to. In this step, you create a **Custom Column** to calculate the line total for each **Order_Details** row.

Calculate the line total for each **Order_Details** row:

1. In the **Add Column** ribbon tab, click **Add Custom Column**.



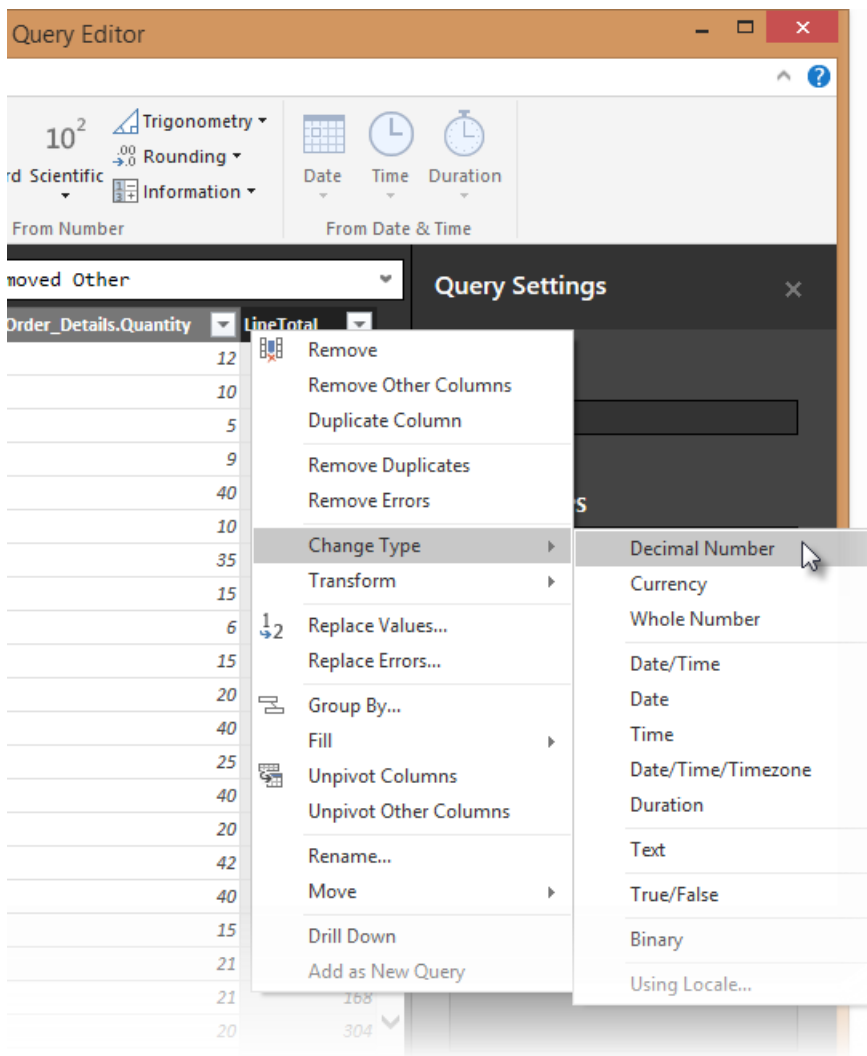
2. In the **Add Custom Column** dialog box, in the **Custom Column Formula** textbox, enter **[Order_Details.UnitPrice] * [Order_Details.Quantity]**.
3. In the **New column name** textbox, enter **LineTotal**.



4. Click **OK**.

Step 5: Set the datatype of the LineTotal field

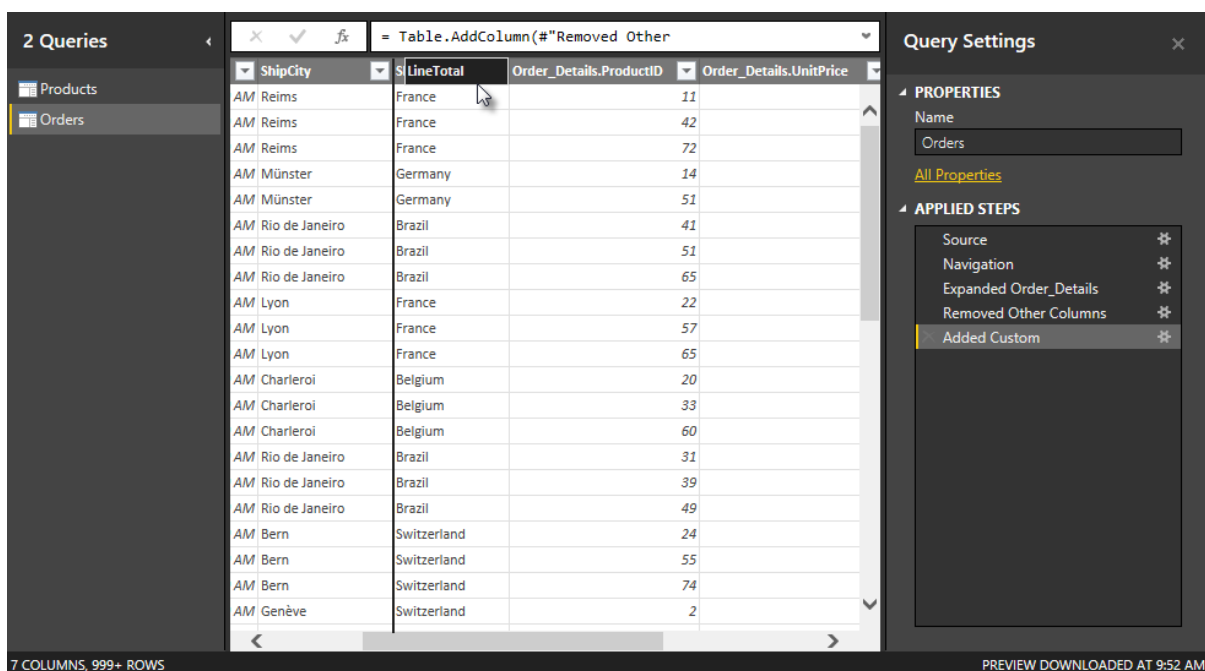
1. Right click the **LineTotal** column.
2. Select **Change Type** and choose **Decimal Number**.



Step 6: Rename and reorder columns in the query

In this step you finish making the model easy to work with when creating reports, by renaming the final columns and changing their order.

1. In **Query Editor**, drag the **LineTotal** column to the left, after **ShipCountry**.



2. Remove the *Order_Details.* prefix from the **Order_Details.ProductID**, **Order_Details.UnitPrice** and **Order_Details.Quantity** columns, by double-clicking on each column header, and then deleting that text from

the column name.

Power BI Desktop steps created

As you perform query activities in Query Editor, query steps are created and listed in the **Query Settings** pane, in the **Applied Steps** list. Each query step has a corresponding Power Query formula, also known as the "M" language. For more information about this formula language, see [Learn about Power BI formulas](#).

TASK	QUERY STEP	FORMULA
Connect to an OData feed	Source	Source{[Name="Orders"]}[Data]
Expand the Order_Details table	Expand Order_Details	Table.ExpandTableColumn (Orders, "Order_Details", {"ProductID", "UnitPrice", "Quantity"}, {"Order_Details.ProductID", "Order_Details.UnitPrice", "Order_Details.Quantity"})
Remove other columns to only display columns of interest	RemovedColumns	Table.RemoveColumns (#"Expand Order_Details",{"OrderID", "CustomerID", "EmployeeID", "RequiredDate", "ShippedDate", "ShipVia", "Freight", "ShipName", "ShipAddress", "ShipCity", "ShipRegion", "ShipPostalCode", "ShipCountry", "Customer", "Employee", "Shipper"})
Calculate the line total for each Order_Details row	InsertedColumn	Table.AddColumn (RemovedColumns, "Custom", each [Order_Details.UnitPrice] * [Order_Details.Quantity])

Task 3: Combine the Products and Total Sales queries

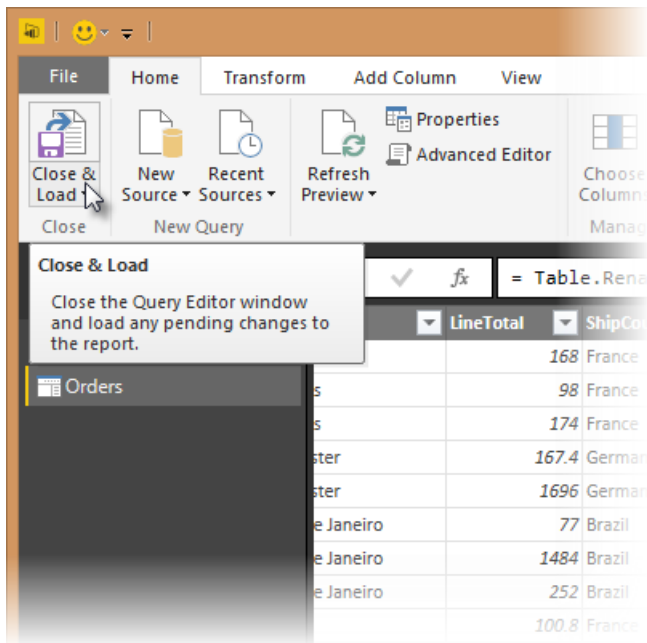
Power BI Desktop does not require you to combine queries to report on them. Instead, you can create **Relationships** between datasets. These relationships can be created on any column that is common to your datasets. For more information see [Create and manage relationships](#).

In this tutorial, we have Orders and Products data that share a common 'ProductID' field, so we need to ensure there's a relationship between them in the model we're using with Power BI Desktop. Simply specify in Power BI Desktop that the columns from each table are related (i.e. columns that have the same values). Power BI Desktop works out the direction and cardinality of the relationship for you. In some cases, it will even detect the relationships automatically.

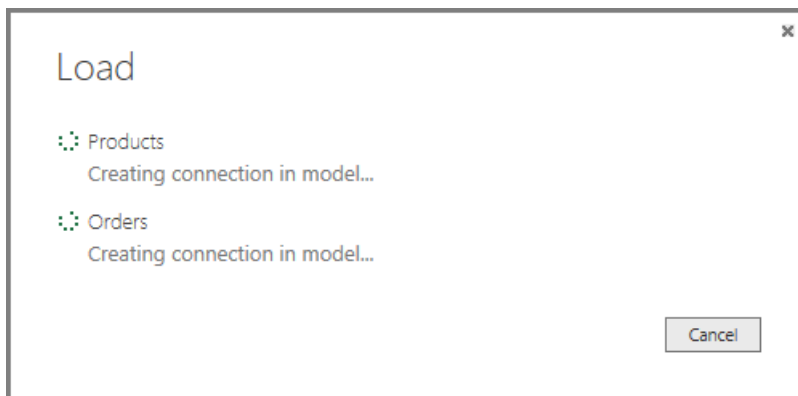
In this task, you confirm that a relationship is established in Power BI Desktop between the **Products** and **Total Sales** queries.

Step 1: Confirm the relationship between Products and Total Sales

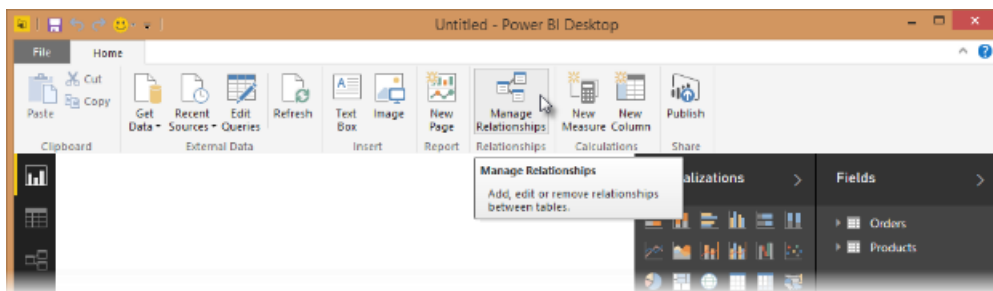
1. First, we need to load the model that we created in Query Editor into Power BI Desktop. From the **Home** ribbon of Query Editor, select **Close & Load**.



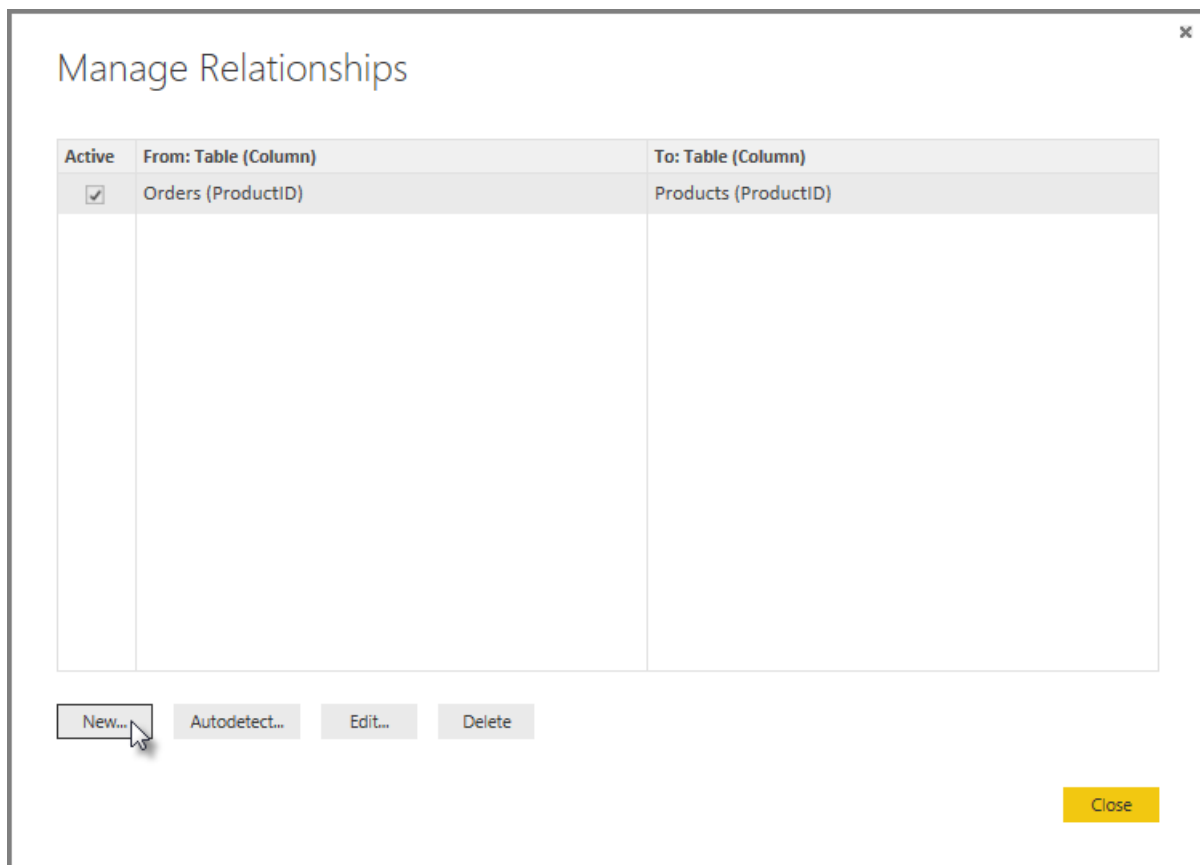
2. Power BI Desktop loads the data from the two queries.



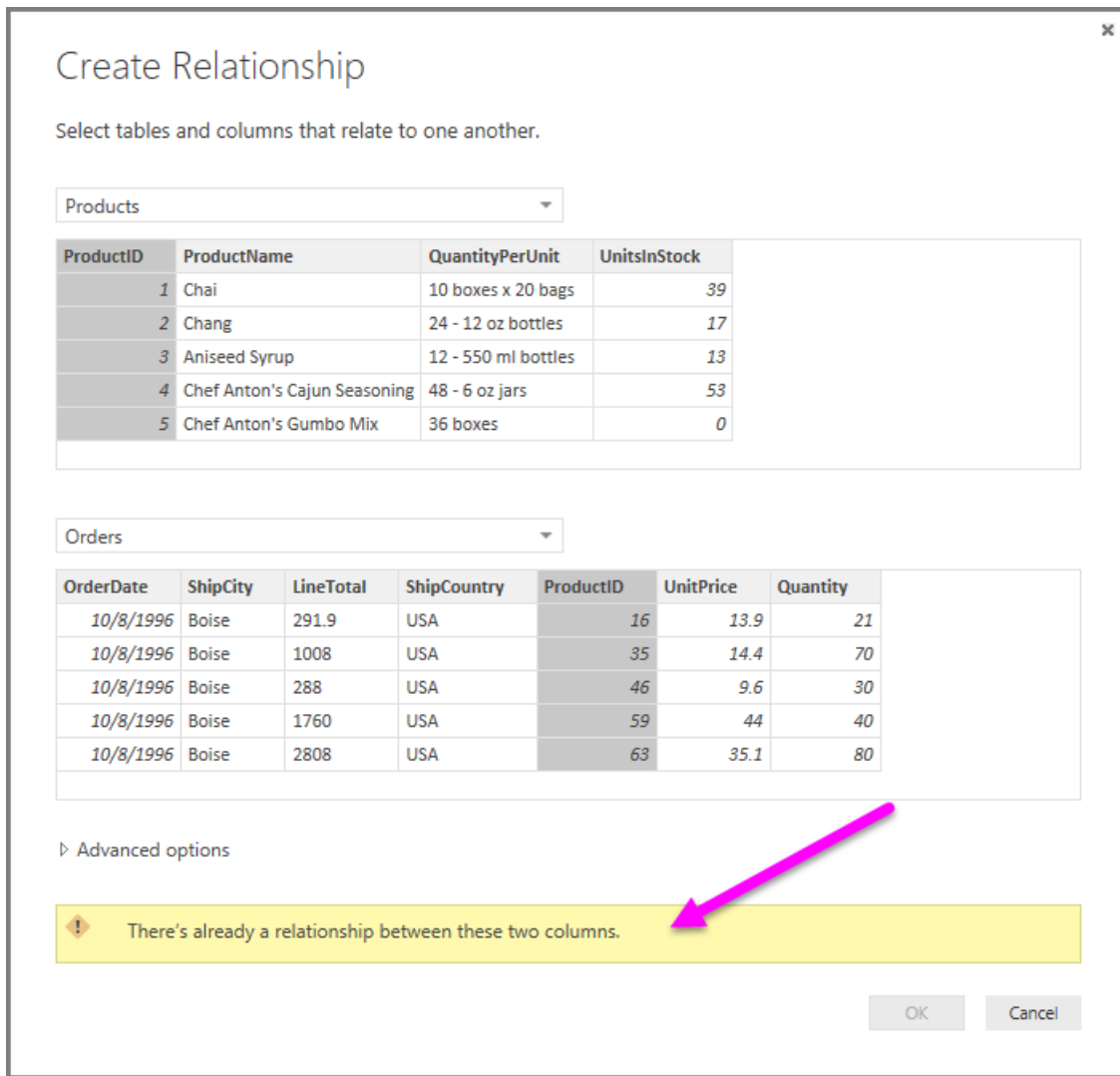
3. Once the data is loaded, select the **Manage Relationships** button **Home** ribbon.



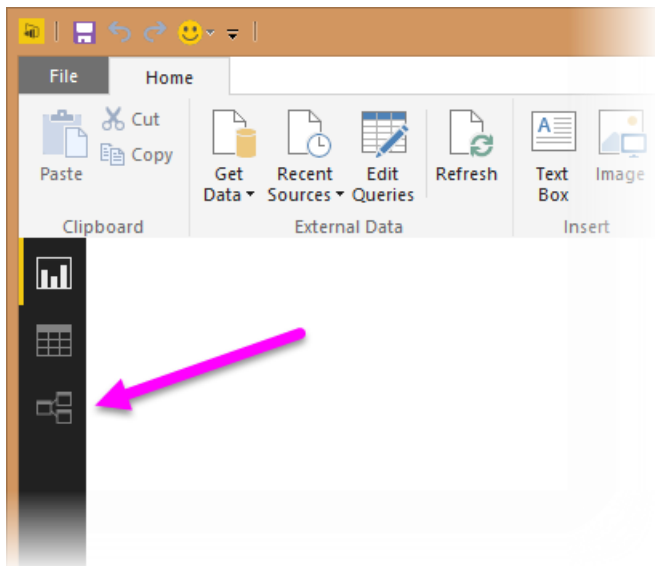
4. Select the **New...** button



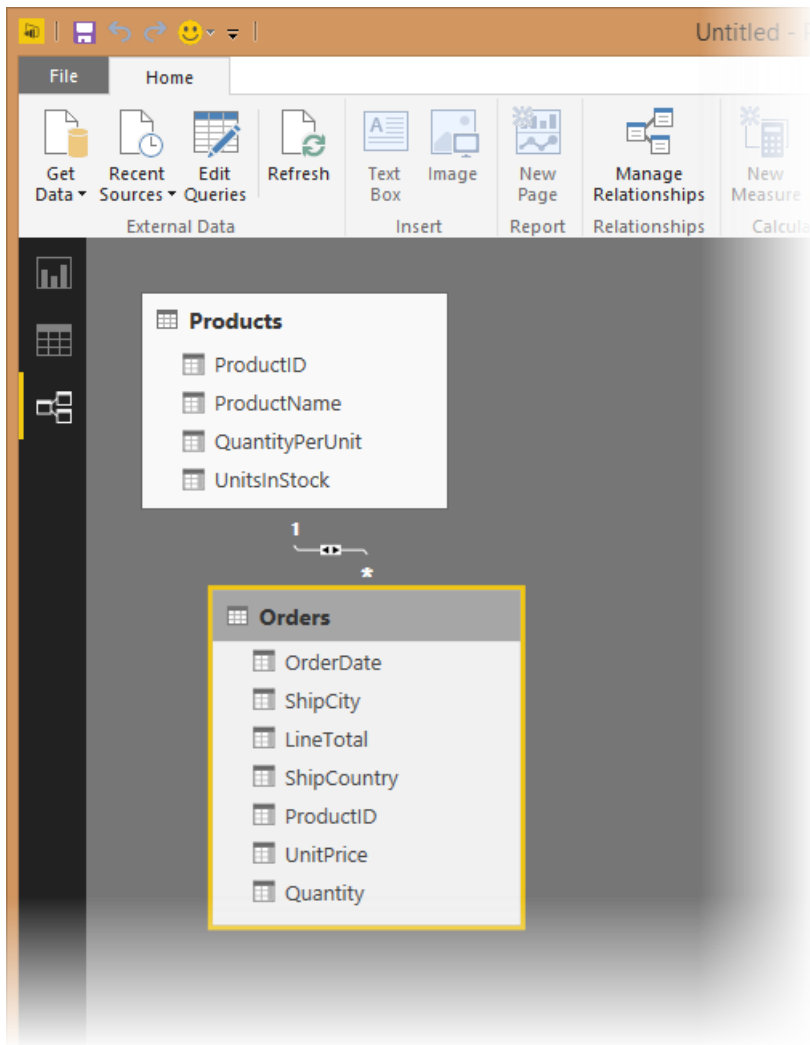
5. When we attempt to create the relationship, we see that one already exists! As shown in the **Create Relationship** dialog (by the shaded columns), the **ProductsID** fields in each query already have an established relationship.



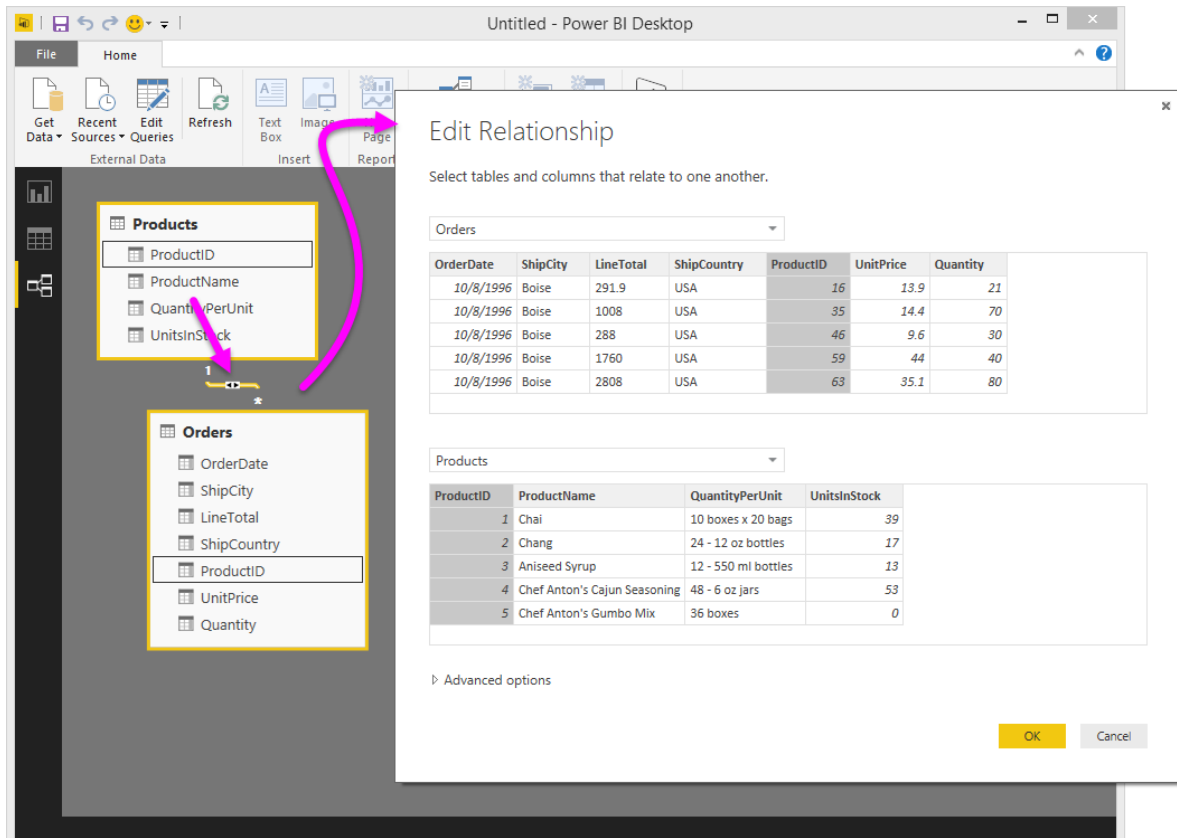
6. Select **Cancel**, and then select **Relationship** view in Power BI Desktop.



7. We see the following, which visualizes the relationship between the queries.



8. When you double-click the arrow on the line that connects the two queries, an **Edit Relationship** dialog appears.



9. No need to make any changes, so we'll just select **Cancel** to close the **Edit Relationship** dialog.

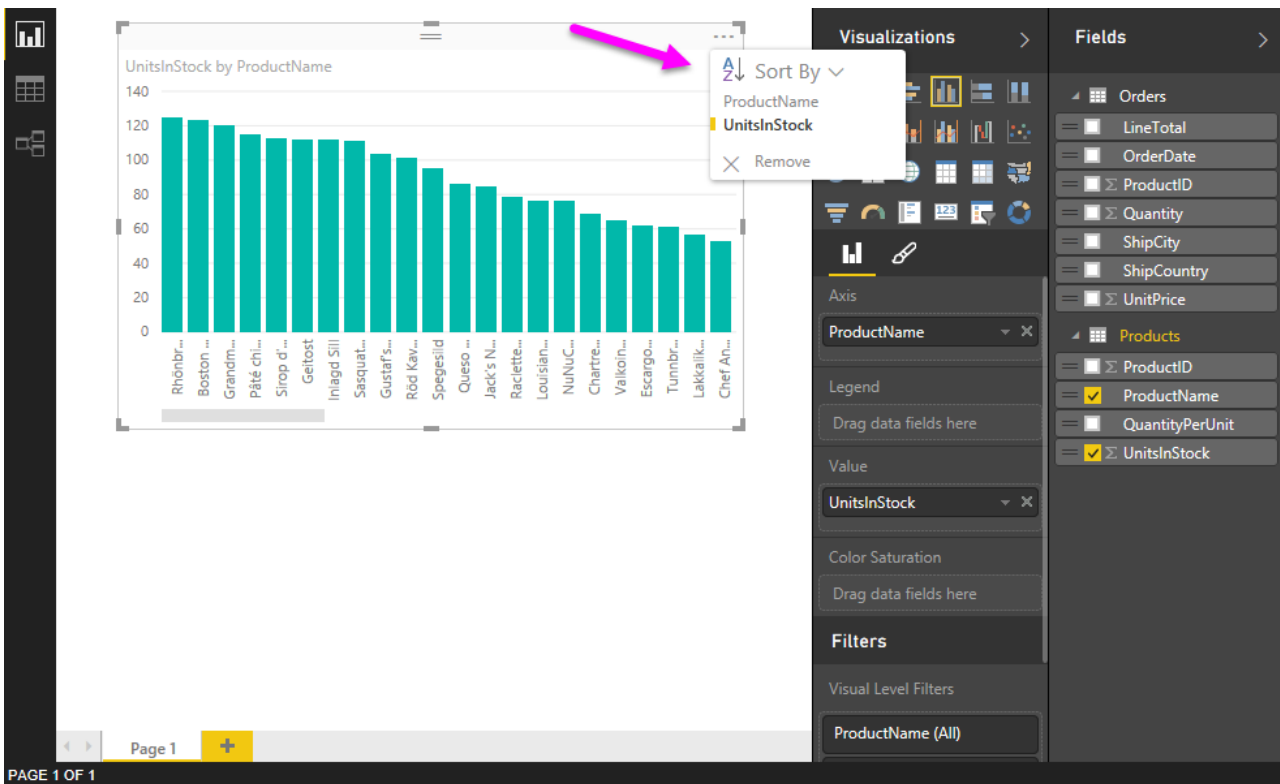
Task 4: Build visuals using your data

Power BI Desktop lets you create a variety of visualizations to gain insights from your data. You can build reports with multiple pages and each page can have multiple visuals. You can interact with your visualizations to help analyze and understand your data. For more information about editing reports, see [Edit a Report](#).

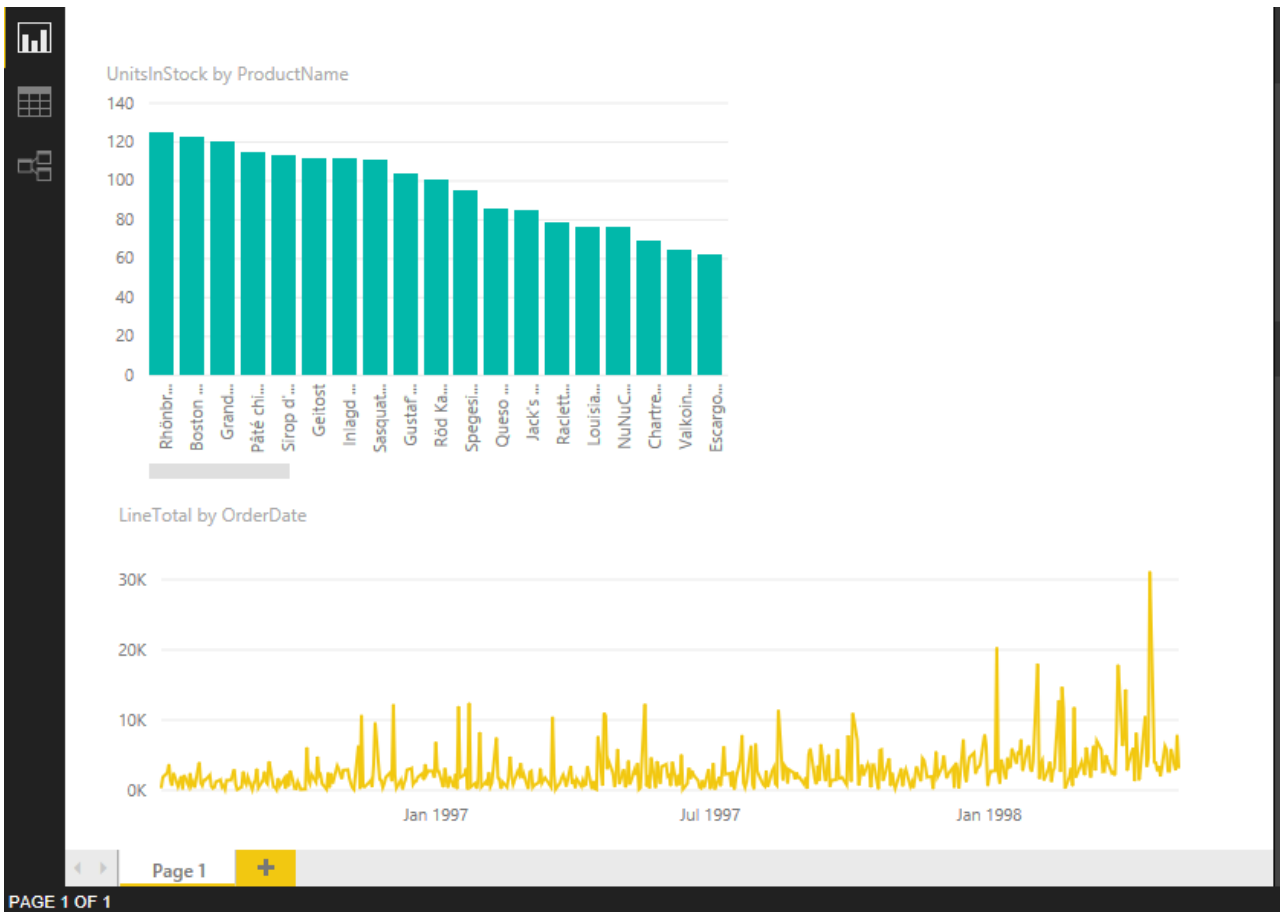
In this task, you create a report based on the data previously loaded. You use the Fields pane to select the columns from which you create the visualizations.

Step 1: Create charts showing Units in Stock by Product and Total Sales by Year

Drag **UnitsInStock** from the Field pane (the Fields pane is along the right of the screen) onto a blank space on the canvas. A Table visualization is created. Next, drag ProductName to the Axis box, found in the bottom half of the Visualizations pane. Then we then select **Sort By > UnitsInStock** using the skittles in the top right corner of the visualization.



Drag **OrderDate** to the canvas beneath the first chart, then drag LineTotal (again, from the Fields pane) onto the visual, then select Line Chart. The following visualization is created.



Next, drag **ShipCountry** to a space on the canvas in the top right. Because you selected a geographic field, a map was created automatically. Now drag **LineTotal** to the **Values** field; the circles on the map for each country are now relative in size to the **LineTotal** for orders shipped to that country.

The screenshot shows the Power BI interface with a map visualization titled "LineTotal by ShipCountry". The map displays bubbles of varying sizes over a world map, representing the total line value for orders shipped to different countries. The bubbles are largest for North America and Europe. A pink arrow points to the map.

The Fields pane on the right shows the configuration for the visualization:

- Visualizations:** Location is set to ShipCountry.
- Legend:** Drag data fields here.
- Longitude:** Drag data fields here.
- Latitude:** Drag data fields here.
- Values:** LineTotal is selected.
- Color Saturation:** Drag data fields here.

The Fields pane also shows the data sources and their fields:

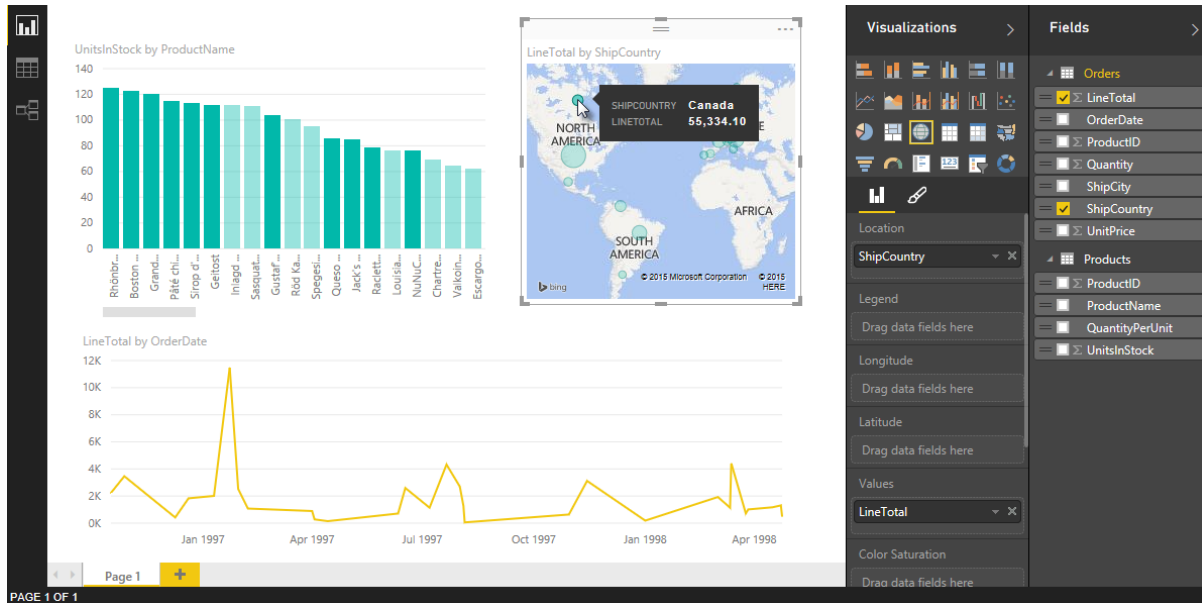
- Orders:** LineTotal (checked), OrderDate, ProductID, Quantity, ShipCity, ShipCountry (checked), UnitPrice.
- Products:** ProductID, ProductName, QuantityPerUnit, UnitsInStock.

A pink arrow points from the LineTotal field in the Orders section to the Values field in the Visualizations pane.

Step 2: Interact with your report visuals to analyze further

Power BI Desktop lets you interact with visuals that cross-highlight and filter each other to uncover further trends. For more detail see [Filtering and Highlighting in Reports](#)

1. Click on the light blue circle centered in **Canada**. Note how the other visuals are filtered to show Stock (**ShipCountry**) and Total Orders (**LineTotal**) just for Canada.



Complete Sales Analysis Report

After you perform all these steps, you will have a Sales Report that combines data from Products.xlsx file and Northwind OData feed. The report shows visuals that help analyze sales information from different countries. You can download a completed Power BI Desktop file for this tutorial [here](#).

Next steps

- [Read other Power BI Desktop tutorials](#)
- [Watch Power BI Desktop videos](#)
- [Visit the Power BI Forum](#)
- [Read the Power BI Blog](#)

Tutorial: Create your own measures in Power BI Desktop

12/6/2017 • 12 min to read • [Edit Online](#)

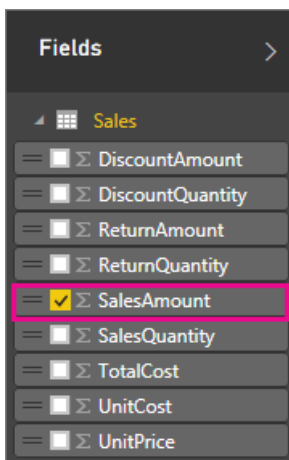
Some of the most powerful data analysis solutions in Power BI Desktop can be created by using measures. Measures help us by performing calculations on our data as we interact with our reports. This tutorial will guide you through understanding and creating some of your own basic measures in Power BI Desktop.

This article is intended for Power BI users already familiar with using Power BI Desktop to create more advanced models. You should already be familiar with using Get Data and Query Editor to import data, working with multiple related tables, and adding fields to the Report Canvas. If you're new to Power BI Desktop, be sure to check out [Getting Started with Power BI Desktop](#).

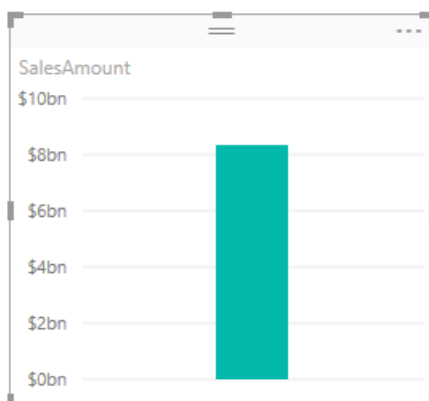
To complete the steps in this tutorial, you'll need to download the [Contoso Sales Sample for Power BI Desktop](#) file. It already includes online sales data from the fictitious company, Contoso, Inc. Because data in the file was imported from a database, you won't be able to connect to the datasource or view it in Query Editor. When you have the file on your own computer, go ahead and open it in Power BI Desktop.

What are these measures all about?

Measures are most often created for us automatically, like when we select the checkbox next to the **SalesAmount** field from the **Sales** table in the field list, or drag **SalesAmount** onto the Report canvas.



A new chart visualization appears, like this:



What we get is a Column chart showing a sum total amount of sales values from the SalesAmount field. Our

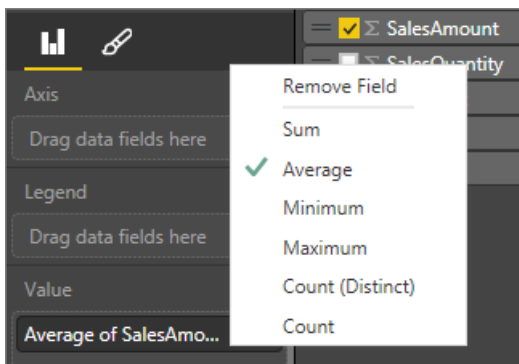
SalesAmount field is really just a column named SalesAmount in the Sales table we already imported.

The SalesAmount column contains over two million of rows of sales values. You might be wondering why you don't see a table with rows of all those values. Well, Power BI Desktop knows that all of the values in SalesAmount are of a numeric datatype, and you'll probably want to aggregate them in some way, whether it be adding them up, averaging, counting, etc..

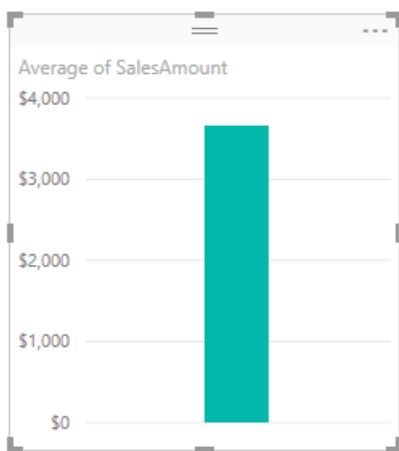
Whenever you see a field in the Fields list with a sigma icon Σ , it means the field is numeric, and its values can be aggregated. In this case, when we select SalesAmount, Power BI Desktop creates its own measure and the sum of all sales amounts is calculated and displayed in our chart.

Sum is the default aggregation when we select a field with a numeric datatype, but we can change to a different type of aggregation quite easily.

In the **Value** area, if we click the down arrow next to **SalesAmount**, we can then select **Average**.



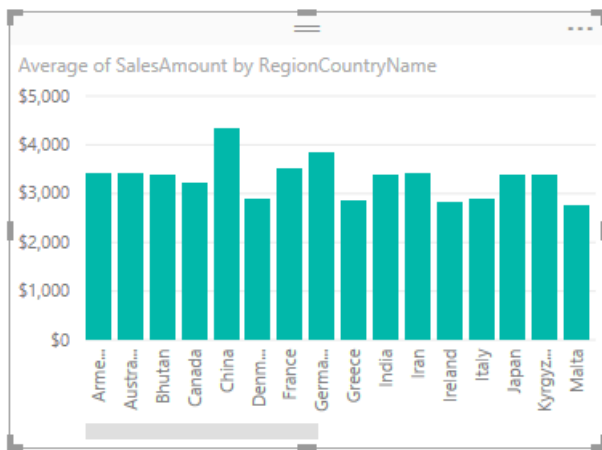
Our visualization changes to an average of all sales values in the SalesAmount field.



We can change the type of aggregation depending on the result we want, but not all types of aggregation apply to just any numeric datatype. For example, for our SalesAmount field, Sum and Average make sense. Minimum and Maximum have their place as well. But, Count won't really make much sense for our SalesAmount field because while its values are numeric, they're really currency.

Understanding aggregations is fundamental to understanding measures, because every measure will perform some type of aggregation. We'll see more examples of using a Sum aggregation a little later, when you create some of your own measures.

Values calculated from measures are always changing in response to our interactions with our report. For example, if we drag the **RegionCountryName** field from the **Geography** table to our chart, sales amounts for each country are averaged and displayed.



When the result of a measure changes because of an interaction with our report, we are affecting our measure's *context*. In fact, every time you interact with your report, you are changing the context in which a measure calculates and displays its results.

In most cases, Power BI does its thing and calculates and returns values according to the fields we've added and the types of aggregation we choose. But in other cases, you might have to create your own measures to perform more complex, unique calculations.

With Power BI Desktop, you create your own measures with the Data Analysis Expressions (DAX) formula language. DAX formulas are very similar to Excel formulas. In fact, DAX uses many of the same functions, operators, and syntax as Excel formulas. However, DAX's functions are designed to work with relational data and perform more dynamic calculations as we interact with our reports.

There are over 200 DAX functions that do everything from simple aggregations like Sum and Average to more complex statistical and filtering functions. We're not going to go into too much detail on the DAX language here, but there are many resources to help you learn more. After you've gone through this tutorial, be sure to see [DAX basics in Power BI Desktop](#).

When we create our own measures, they're added to the Fields list for the table we want. This is known as a *model* measure, and it will remain in our table as a field. Some of the great advantages of model measures are that we can name them what we want, making them more identifiable. We can also use them as an argument in other DAX expressions, and we can create measures that perform complex calculations very quickly.

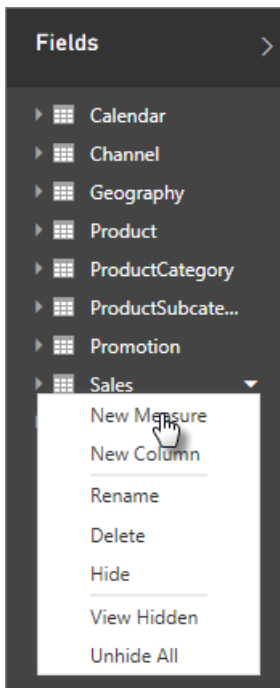
Let's create our own measure

Let's say we want to analyze our net sales. If we look at our Sales table in the field list, we see that there's no field named NetSales. But, we have the building blocks to create our own measure to calculate net sales.

We need a measure to subtract discounts and returns from sales amounts. Because we want our measure to calculate a result for whatever context we have in our visualization, in-effect, we need to subtract the sum of DiscountAmount and ReturnAmount from sum of SalesAmount. This might seem a little confusing at the moment; don't worry, it will be more clear in a little bit.

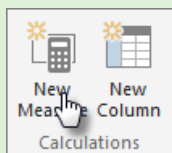
Net sales

1. Right click, or click the down arrow on the **Sales** table in the field list, and then click **New Measure**. This will make sure our new measure is saved in the Sales table, where it will be easier to find.



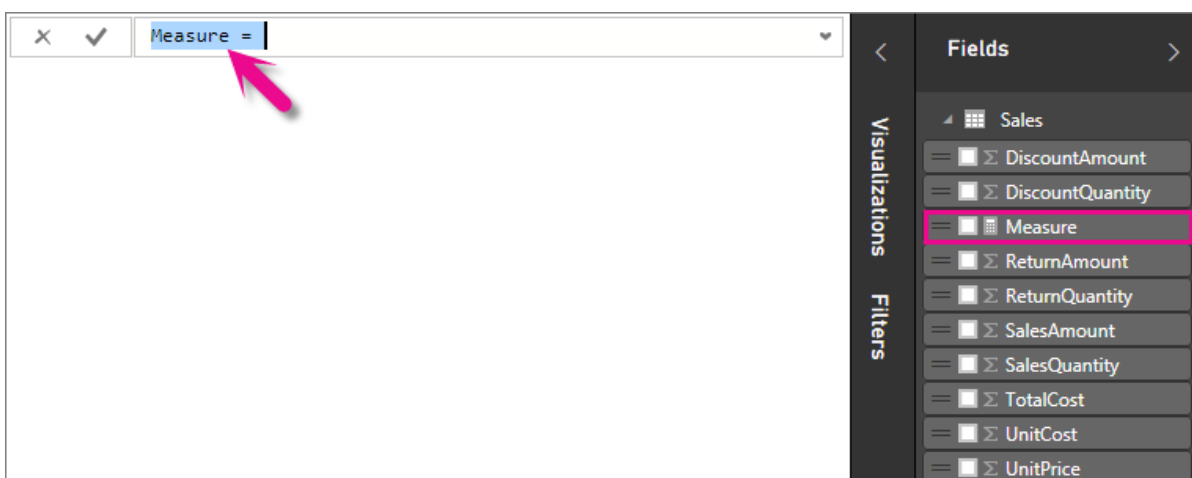
TIP

You can also create a new measure by clicking on the New Measure button in the ribbon on Power BI Desktop's Home tab.



When you create a measure from the ribbon, the measure could be created in any of the tables. While a measure doesn't have to belong in a particular table, it will be easier to find if you create them in a table most logical to you. If you want it to be in a particular table, click the table first, to make it active. Then click New Measure. In our case, we're going to create our first measure in the Sales table.

The formula bar appears along the top of the Report Canvas. This is where we can rename our measure and enter a DAX formula.

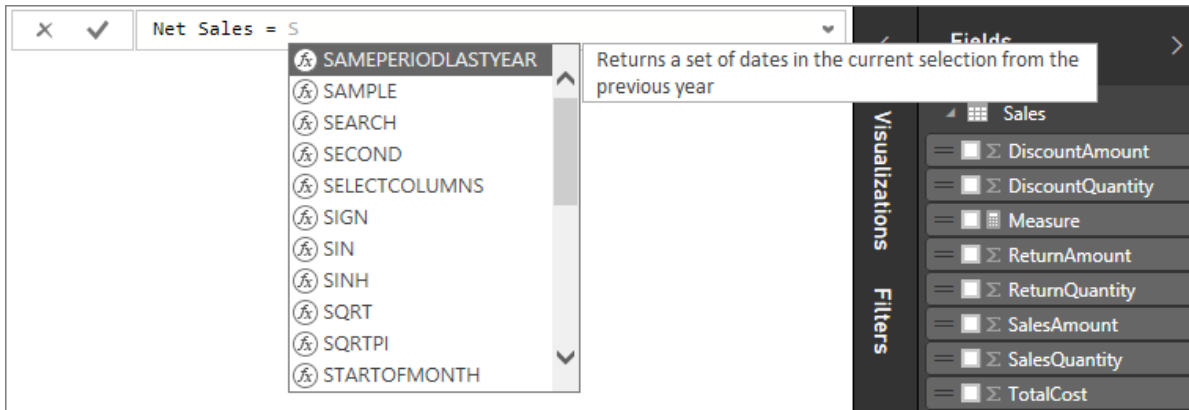


Let's give our new measure a name. By default a new measure is simply named Measure. If we don't rename it, when we create another, it will be named Measure 2, Measure 3, and so on. We want our measures to be more identifiable, so let's name our new measure Net Sales.

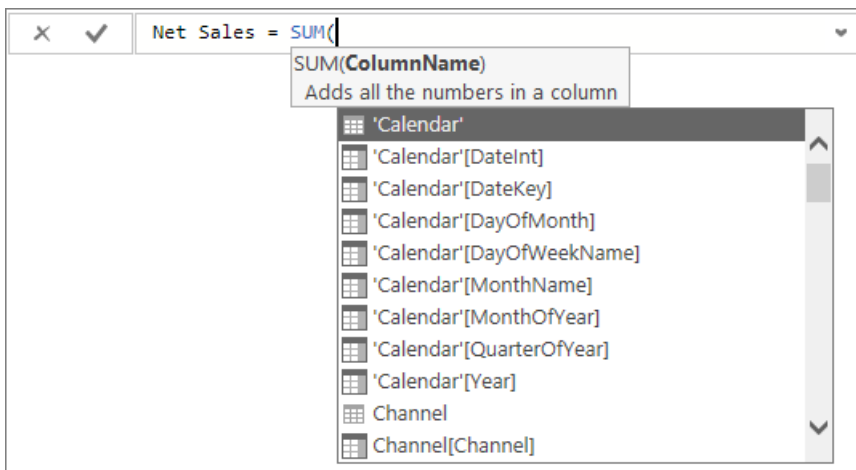
2. Highlight **Measure** in the formula bar, and then type **Net Sales**.

Now we can begin entering our formula.

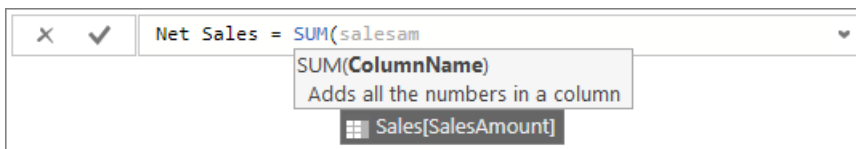
3. After the equals sign type an **S**. You'll see a dropdown suggestion list appear with all of the DAX functions beginning with the letter S. The more we type, the more the suggestion list is scaled closer to the function we need. Select **SUM** by scrolling down, and then press Enter.



After we press Enter, an opening parenthesis appears along with another suggestion list of all of the available columns we can pass to the SUM function.



An expression always appears between an opening and closing parenthesis. In this case, our expression is going to contain a single argument to pass to the SUM function; a column to sum up. We can narrow down our list of columns by typing the first letters of what we want. In this case, we want the SalesAmount column, so when we begin typing salesam, our list gets smaller, and we are shown two items we can select. They're actually the same column. One just shows [SalesAmount], because we're creating our measure in the same table the SalesAmount column is in. The other, we see the table name preceding the column name.



In general, it's good practice to enter the fully qualified name of a column. It will make your formulas easier to read.

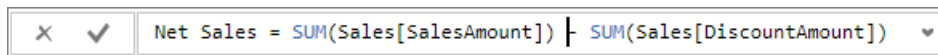
4. Select **Sales[SalesAmount]**, and then type a closing parenthesis.

TIP

Syntax errors are most often caused by a missing or misplaced closing parenthesis.

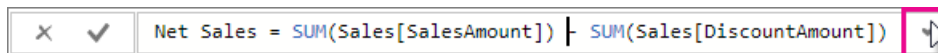
Now we want to subtract our other two columns.

5. After the closing parenthesis for our first expression, type a space, and then a minus operator (-), followed by another space. Then enter another SUM function with the **Sales[DiscountAmount]** column as its argument.

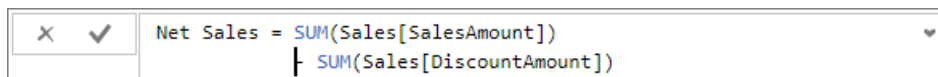


We're starting to run out of space for our formula. No problem.

6. Click the down chevron on the right side of the formula bar.

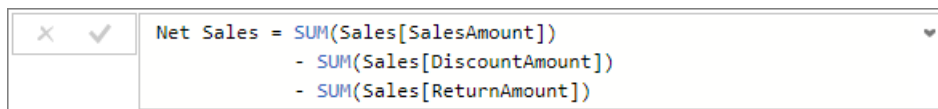


Now we have more space. We can enter new parts to our formula on a new line by pressing Alt-Enter. We can also move things over by using Tab.



Now we can add the final part of our formula.

7. Add another minus operator followed by another SUM function and the **Sales[ReturnAmount]** column as its argument.



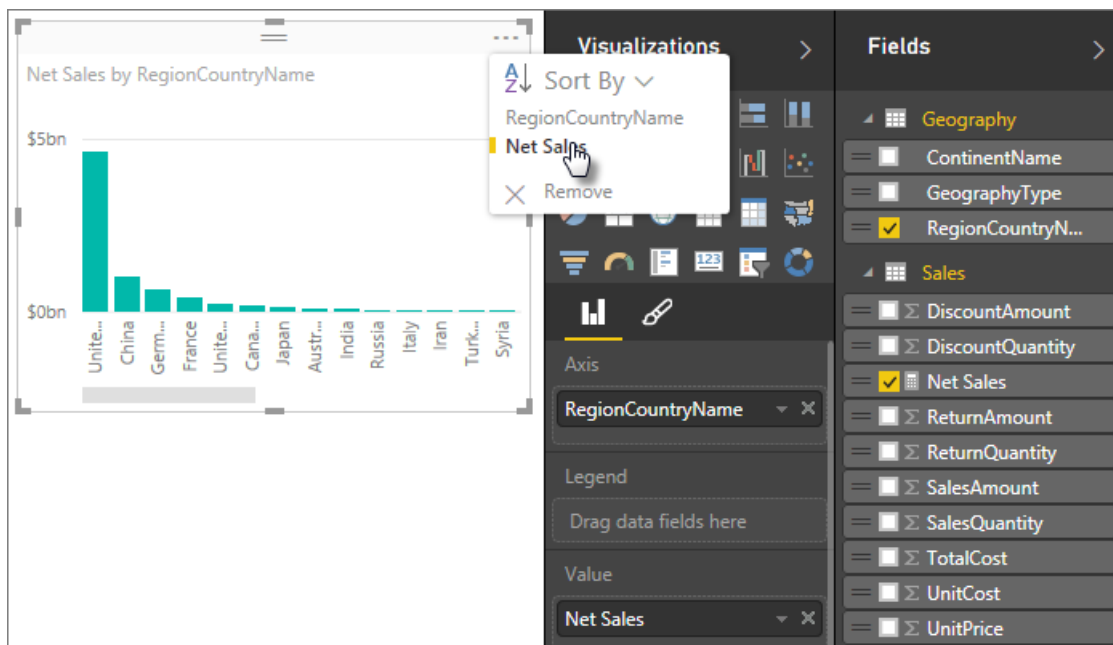
Our formula now looks ready.

8. Press Enter or click the checkmark in the formula bar to complete. The formula is validated and added to the field list in the Sales table.

Let's add our new measure to a report

Now we can add our Net Sales measure to the report canvas, and net sales will be calculated for whatever other fields we add to the report. Let's look at net sales by country.

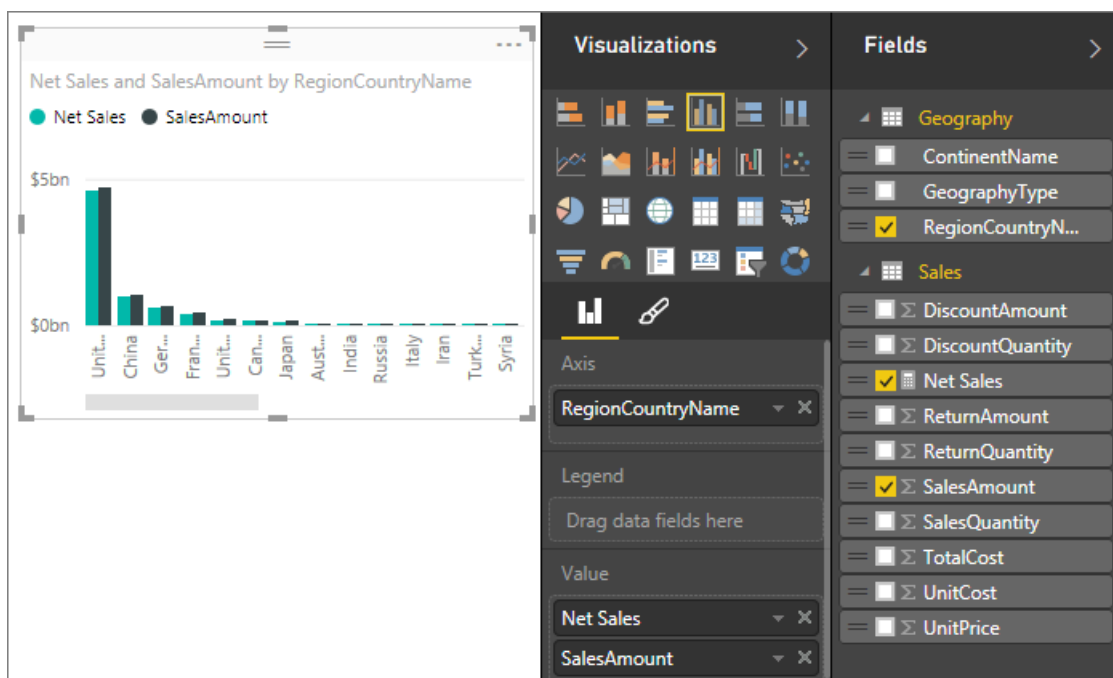
1. Drag the **Net Sales** measure from the **Sales** table onto the Report canvas.
2. Now drag the **RegionCountryName** field from the **Geography** table into the chart.



Let's add some more data.

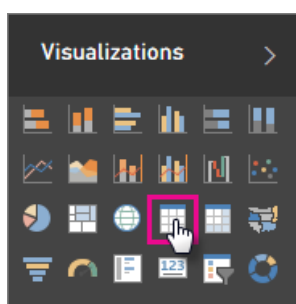
3. Drag the **SalesAmount** field into the chart, to see the difference between net sales and sales amount.

We now really have two measures in our chart. SalesAmount, which was summed up automatically, and the Net Sales measure we created. In each case, the results were calculated in context of another field we have in the chart, the countries in RegionCountryName.

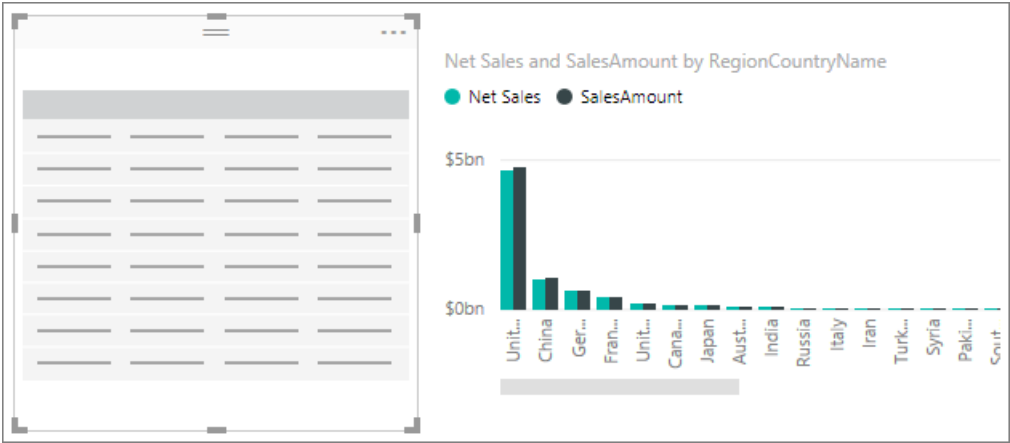


Let's add a Slicer, so we can further break down our net sales and sales amounts by calendar year.

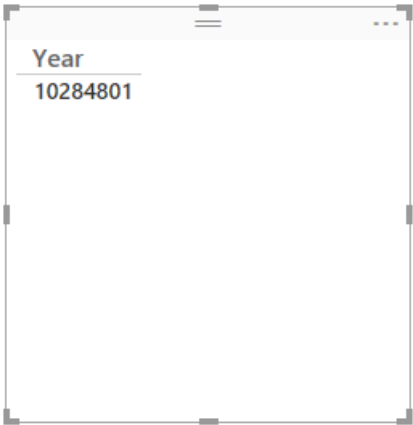
4. Click a blank area next to the chart, then in **Visualizations**, click on the Table visualization.



This creates a blank table visualization in the Report canvas.

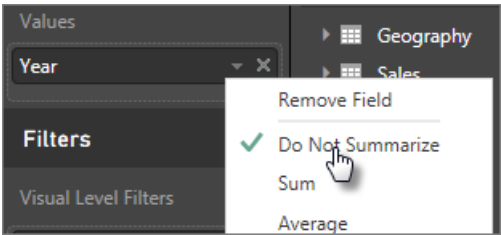


5. Drag the **Year** field from the **Calendar** table into the new blank table.



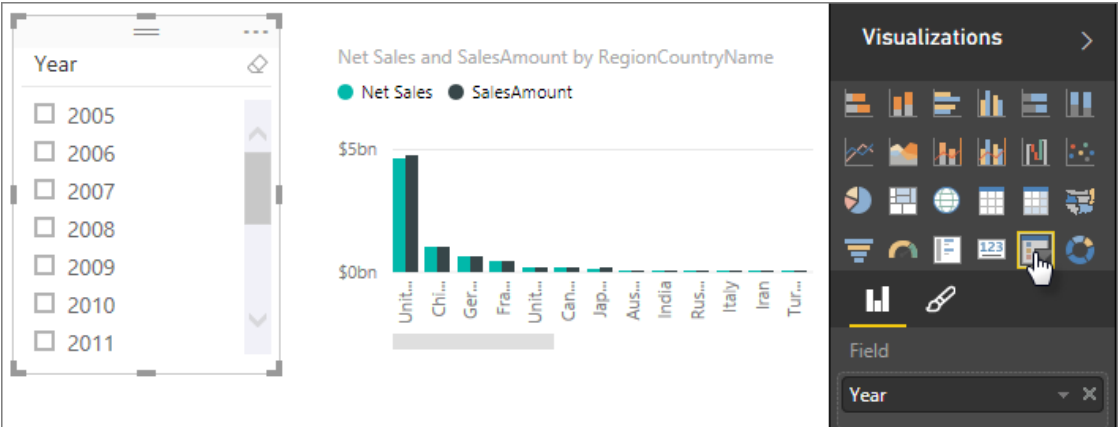
Because Year is a numeric field, Power BI Desktop summed up its values and gave us a chart. But, that doesn't do us much good as a Slicer.

6. In **Values**, click the down arrow next to **Year**, and then click **Do Not Summarize**.



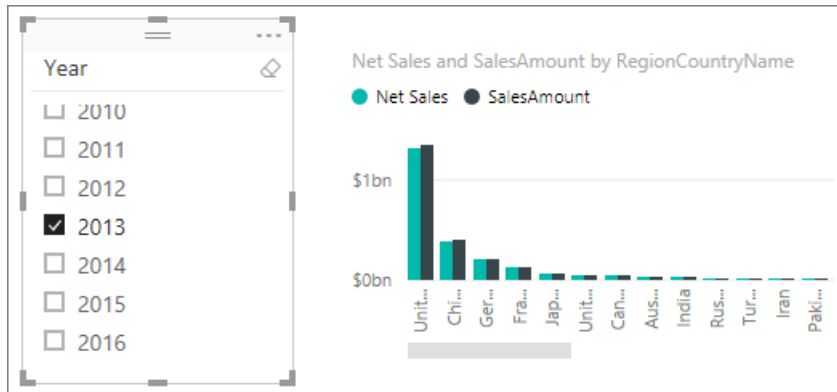
Now we can change the Year field in the table visualization into a Slicer.

a. In **Visualizations**, click the **Slicer** visualization.



Now we have Year as a Slicer. We can select any individual or group of years and our report's visualizations will all be sliced accordingly.

- Go ahead and click on **2013**. You'll see the chart change. Our Net Sales and SalesAmount measures are re-calculated, showing new results just for 2013. Here again, we've changed the context in which our measures calculate and display results.



Let's create another measure

Now that you know how to create your own measures, let's create another.

Net sales per unit

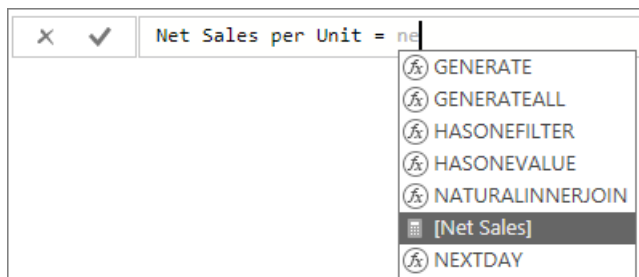
What if we want to find out which products with the most sales per unit sold is?

Well, we can create another measure. In this case, we want to divide net sales by the quantity of units sold. In-effect, we want to divide the result of our Net Sales measure by the sum of Sales[SalesQuantity].

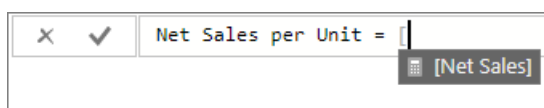
- Create a new measure named **Net Sales per Unit** in either the Sales or Products table.

In this measure, we're going to use the Net Sales measure we created earlier. With DAX, we can reference other measures in our formula.

- Begin typing **Net Sales**. The suggestion list will show what we can add. Select **[Net Sales]**.



You can also reference another measure by just typing an opening bracket ([). The suggestion list will show us only the measures we can add to our formula.



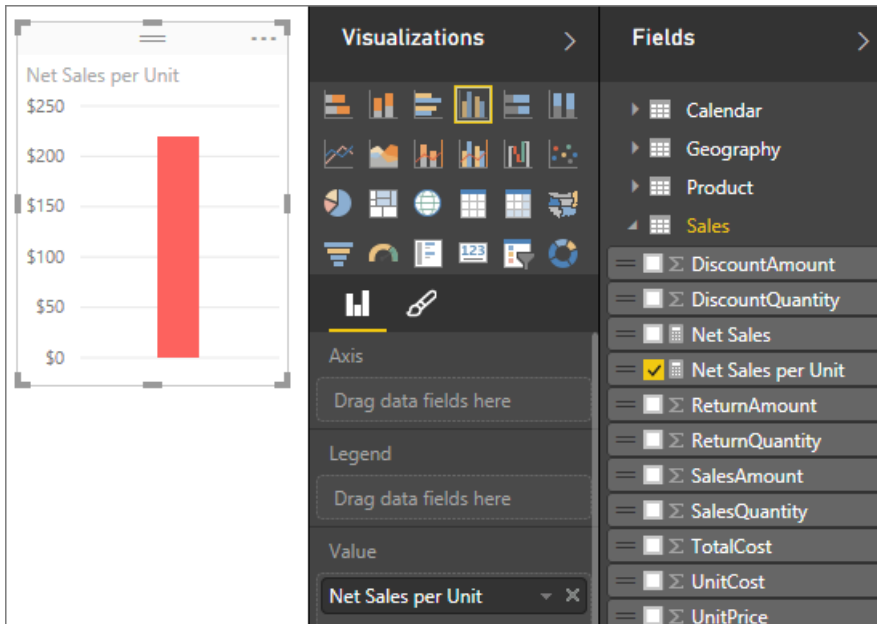
- Right after **[Net Sales]**, enter a space, then a divide operator (/), then enter a SUM function, then type **Quantity**. The suggestion list shows all of the columns with Quantity in the name. Select **Sales[SalesQuantity]**. The formula should now look like this:

```
Net Sales per Unit = [Net Sales] / SUM(Sales[SalesQuantity])
```

Pretty cool, huh? Entering DAX formulas is really quite easy when we use the DAX Editor's search and

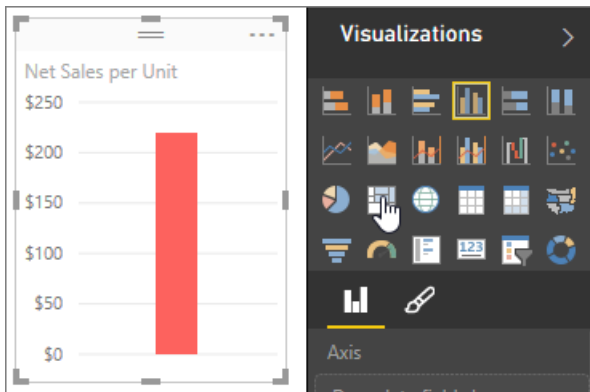
suggestion functionality. Now, let's see what we get with our new Net Sales per Unit measure.

4. Drag the **Net Sales per Unit** measure onto a blank area in the report canvas.

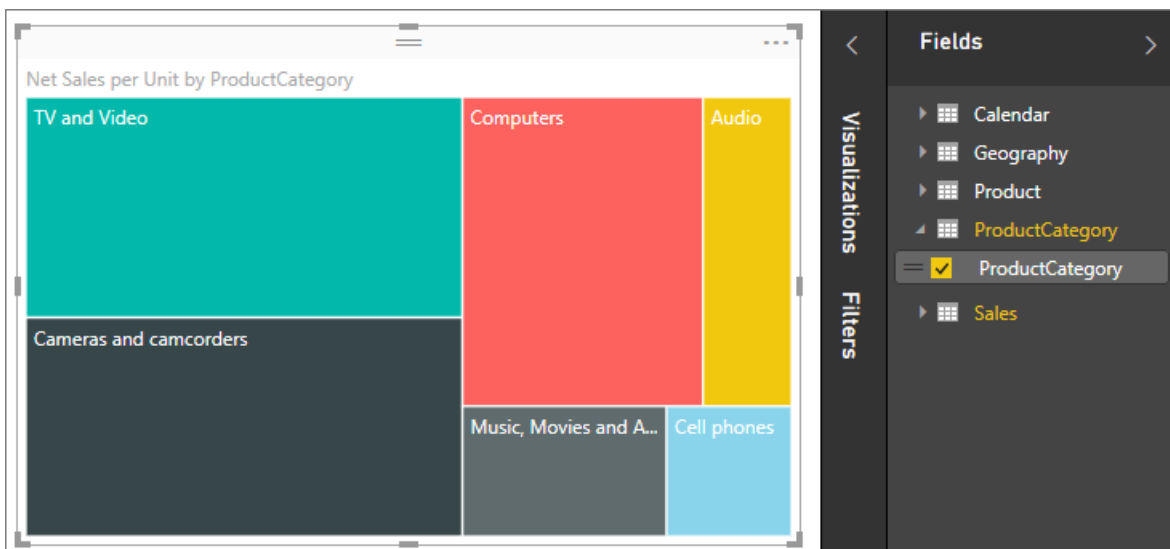


Not very interesting is it? Don't worry.

5. Change the chart visualization type to **Tree Map**.



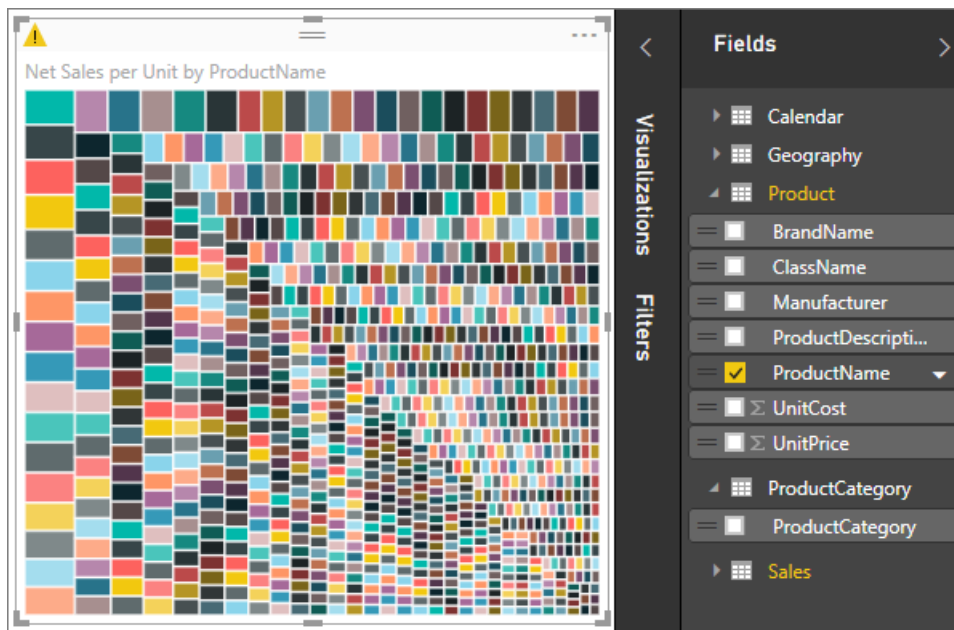
6. Now drag the **ProductCategory** field from the **ProductCategory** table down into the **Group** area.



That's some good info, but what if we want to look at net sales by product?

7. Remove the **ProductCategory** field, and then drag the **ProductName** field from the **Product** table down

into the **Group** area instead.



Ok, now we're just playing, but you have to admit, that's just cool! Of course, we can filter this tree map down any number of ways, but that's out of scope for this tutorial.

What we've learned

Measures give us a lot of power in getting the insights we want from our data. We've learned how to create measures by using the formula bar. We can name measures whatever makes most sense, and the suggestion lists make it easy to find and select the right element to add to our formulas. We've also been introduced to context, where the result of calculations in measures change according to other fields, or by other expressions in your measure formula.

Next steps

If you want to take a deeper dive into DAX formulas, and create some more advanced measures, see [DAX basics in Power BI Desktop](#). This article focuses on fundamental concepts in DAX, such as syntax, functions, and a more thorough understanding of context.

Be sure to add the [Data Analysis Expressions \(DAX\) Reference](#) to your favorites. This is where you'll find detailed info on DAX syntax, operators, and the over 200 DAX functions.

Tutorial: Create calculated columns in Power BI Desktop

12/6/2017 • 8 min to read • [Edit Online](#)

Sometimes the data you're analyzing just doesn't contain a particular field you need to get the results you're after. This is where calculated columns come in. Calculated columns use Data Analysis Expressions (DAX) formulas to define a column's values. Those values can be just about anything, whether it be putting together text values from a couple of different columns elsewhere in the model, or calculating a numeric value from other values. For example, let's say your data has a City and State columns (as fields in the Fields list), but you want a single Location field that has both as a single value, like Miami, FL. This is precisely what calculated columns are for.

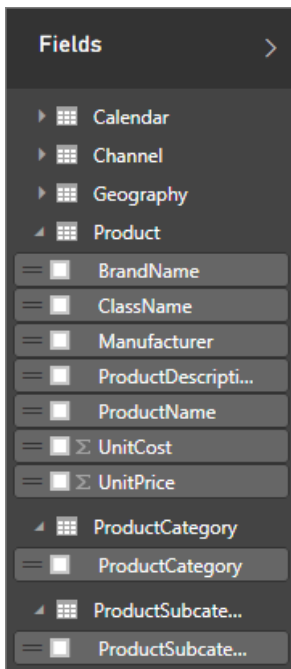
Calculated columns are similar to measures in that both are based on a DAX formula, but they differ in how they are used. Measures are most often used in the Values area of a visualization, to calculate results based on other fields you have on a row in a table, or in an Axis, Legend, or Group area of a visualization. Calculated columns on the other hand are used when you want the column's results on that row in the table, or in the Axis, Legend, or Group area.

This tutorial will guide you through understanding and creating some of your own calculated columns in Power BI Desktop. It's intended for Power BI users already familiar with using Power BI Desktop to create more advanced models. You should already be familiar with using Query to import data, working with multiple related tables, and adding fields to the Report Canvas. If you're new to Power BI Desktop, be sure to check out [Getting Started with Power BI Desktop](#).

To complete the steps in this tutorial, you'll need to download the [Contoso Sales Sample for Power BI Desktop](#) file. This is the same sample file used for the [Create your own measures in Power BI Desktop](#) tutorial. It already includes sales data from the fictitious company, Contoso, Inc. Because data in the file was imported from a database, you won't be able to connect to the datasource or view it in Query Editor. When you have the file on your own computer, go ahead and open it in Power BI Desktop.

Let's create a calculated column

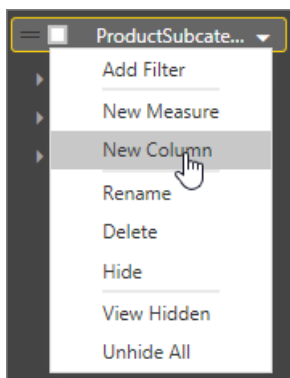
Let's say we want to display product categories together with product subcategories in a single value on rows, like Cell phones – Accessories, Cell phones – Smart phones & PDAs, and so on. In Report View or Data View (we're using Report View here), If we look at our product tables in the Fields list, we see there's no field that gives us what we want. We do, however, have a ProductCategory field and a ProductSubcategory field, each in their own tables.



We'll create a new calculated column to combine values from these two columns into new values for our new column. Interestingly enough, we need to combine data from two different tables into a single column. Because we're going to use DAX to create our new column, we can leverage the full power of the model we already have, including the relationships between different tables that already exist.

To create a **ProductFullCategory** column

1. Right click, or click the down arrow on the **ProductSubcategory** table in the Fields list, and then click **New Column**. This will make sure our new column is added to the ProductSubcategory table.



The formula bar appears along the top of the Report canvas or Data grid. This is where we can rename our column and enter a DAX formula.



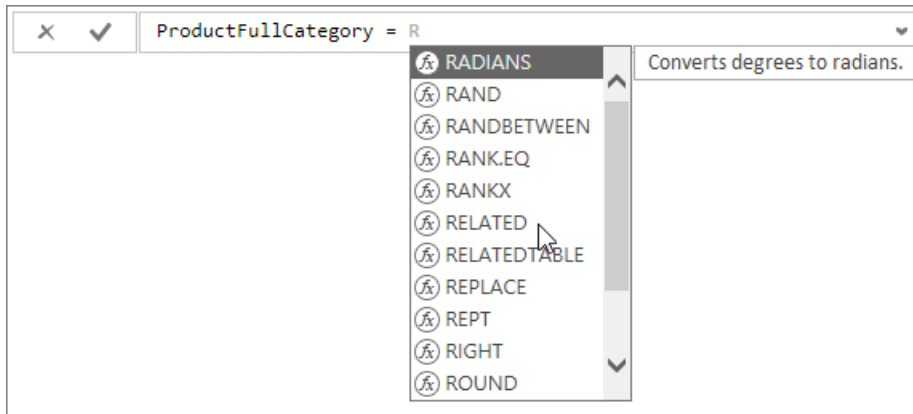
By default a new calculated column is simply named Column. If we don't rename it, when we create another, it will be named Column 2, Column 3, and so on. We want our columns to be more identifiable, so we'll give our new column a new name.

2. Since the **Column** name is already highlighted in the formula bar, just type **ProductFullCategory**.

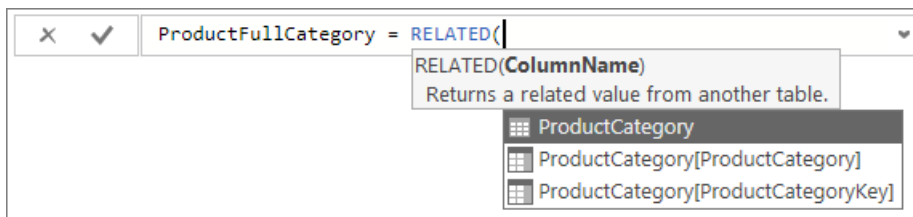
Now we can begin entering our formula. We want the values in our new column to start with the ProductCategory name from the ProductCategory table. Because this column is in a different, but related table, we're going to use the **RELATED** function to help us get it.

3. After the equals sign, type **R**. You'll see a dropdown suggestion list appear with all of the DAX functions beginning with the letter R. The more we type, the more the suggestion list is scaled closer to the function we need. Next to the function you'll see a description of the function. Select **RELATED** by scrolling down,

and then pressing Enter.



An opening parenthesis appears along with another suggestion list of all of the available columns we can pass to the RELATED function. A description and details on what parameters are expected is also shown.



An expression always appears between an opening and closing parenthesis. In this case, our expression is going to contain a single argument passed to the RELATED function; a related column to return values from. The list of columns is automatically narrowed down to show only the columns that are related. In this case, we want the ProductCategory column in the ProductCategory table.

Select **ProductCategory[ProductCategory]**, and then type a closing parenthesis.

TIP

Syntax errors are most often caused by a missing or misplaced closing parenthesis. But often Power BI Desktop will add it if you forget.



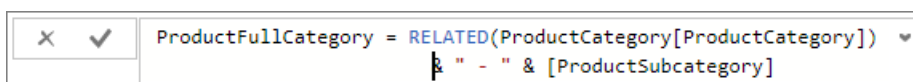
4. We want to add a dash symbol to separate each value, so after the closing parenthesis of the first expression, type a space, ampersand (&), quote, space, dash (-), another space, a closing quote, and then another ampersand. Your formula should now look like this:

ProductFullCategory = RELATED(ProductCategory[ProductCategory]) & " - " &

TIP

Click the down chevron on the right side of the formula bar to expand the formula editor. Click Alt & Enter to move down a line, and Tab to move things over.

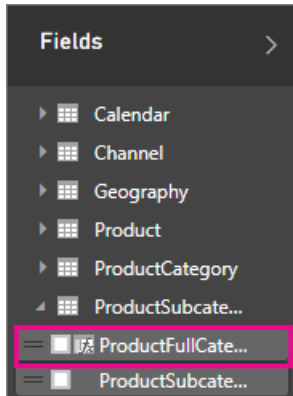
5. Finally, enter another opening bracket and then select the **[ProductSubcategory]** column to finish the formula. Your formula should look like this:



You'll notice we didn't use another RELATED function in the second expression calling the

ProductSubcategory column. This is because this column is already in the same table we're creating our new column in. We can enter [ProductCategory] with the table name (fully qualified) or without (non-qualified).

6. Complete the formula by pressing Enter or clicking on the checkmark in the formula bar. The formula is validated and added to the field list in the **ProductSubcategory** table.

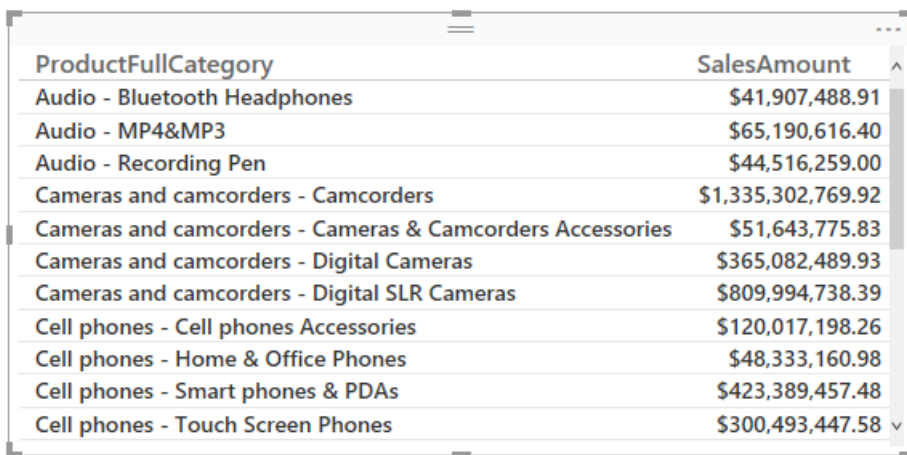


You'll notice calculated columns get a special icon in the field list. This shows they contain a formula. They'll only appear like this in Power BI Desktop. In the PowerBI service (your Power BI site), there's no way to change a formula, so a calculated column field doesn't have an icon.

Let's add our new column to a report

Now we can add our new ProductFullCategory column to the report canvas. Let's look at SalesAmount by ProductFullCategory.

Drag the **ProductFullCategory** column from the **ProductSubcategory** table onto the Report canvas, and then drag the **SalesAmount** field from the **Sales** table into the chart.



ProductFullCategory	SalesAmount
Audio - Bluetooth Headphones	\$41,907,488.91
Audio - MP4&MP3	\$65,190,616.40
Audio - Recording Pen	\$44,516,259.00
Cameras and camcorders - Camcorders	\$1,335,302,769.92
Cameras and camcorders - Cameras & Camcorders Accessories	\$51,643,775.83
Cameras and camcorders - Digital Cameras	\$365,082,489.93
Cameras and camcorders - Digital SLR Cameras	\$809,994,738.39
Cell phones - Cell phones Accessories	\$120,017,198.26
Cell phones - Home & Office Phones	\$48,333,160.98
Cell phones - Smart phones & PDAs	\$423,389,457.48
Cell phones - Touch Screen Phones	\$300,493,447.58

Let's create another

Now that you know how to create a calculated column, let's create another.

The Contoso Sales Sample for Power BI Desktop model contains sales data for both active and inactive stores. We want to make it really clear that data shown for inactive stores is identified as such. In-effect, we want a field named Active StoreName. To do this, we'll create another column. In this case, when a store is inactive, we want our new Active StoreName column (as a field) to show the store's name as "Inactive", but show the store's real name when it's an active store.

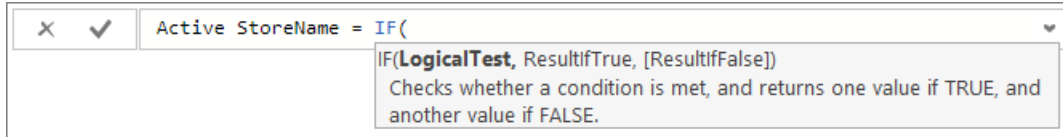
Fortunately, our Stores table has a column named Status, with a value of On for active stores, and Off for inactive stores. We can test values for each row in the Status column to create new values in our new column.

To create an Active StoreName column

1. Create a new calculated column named **Active StoreName** in the **Stores** table.

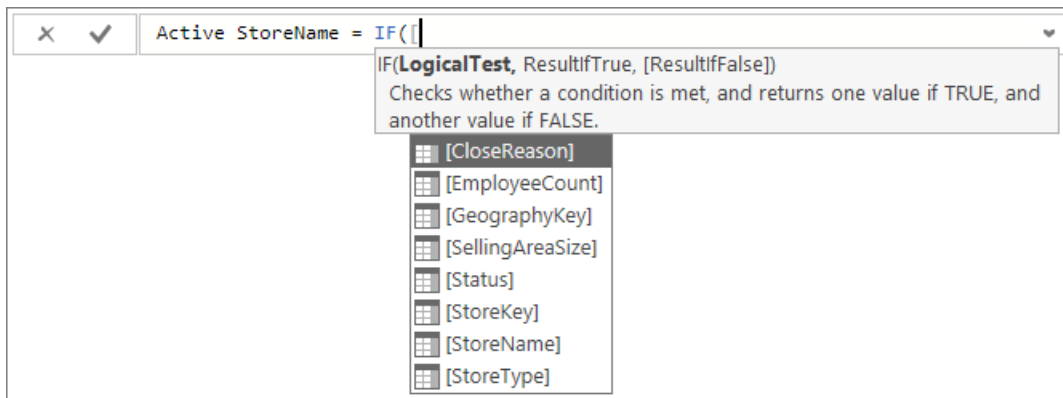
For this column, our DAX formula is going to check each stores status. If a stores status is On, our formula will return the stores name. If it's Off, it will have the name, "Inactive". To do this, we'll use the logical **IF** function to test the stores status and return a particular value if the result is true or false.

2. Begin typing **IF**. The suggestion list will show what we can add. Select **IF**.

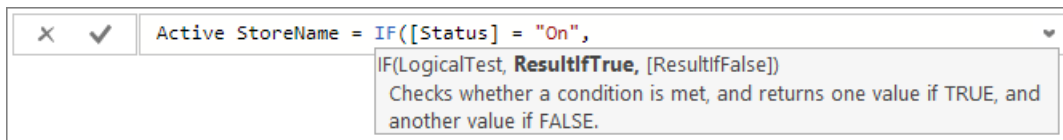


The first argument for IF is a logical test. We want to test whether or not a store has a status of "On".

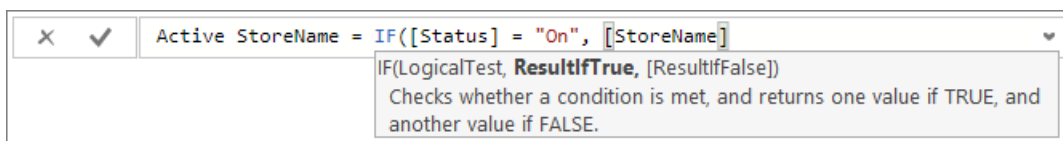
3. Type an opening bracket **[**, which allows us to select columns from the Stores table. Select **[Status]**.



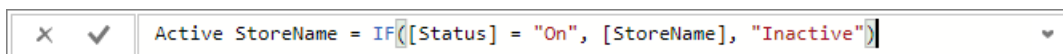
4. Right after **[Status]**, type **= "On"**, then enter a comma (,) to enter the second argument. The tooltip suggests we need to add the value for when the result is true.



5. If the store is On, we want to show the store's name. Type an opening bracket **[** and select the **[StoreName]** column, and then type another comma so we can enter our third argument.

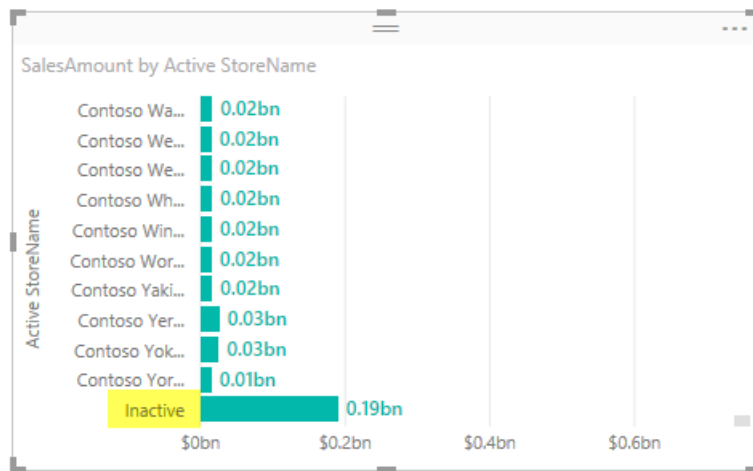


6. We need to add a value for when the result is false, in this case we want the value to be **"Inactive"**.



7. Complete the formula by pressing Enter or clicking on the checkmark in the formula bar. The formula is validated and added to the field list in the Stores table.

Just like any other field, we can use our new Active StoreName column in visualizations. In this chart, stores with a status of On are shown individually by name, but stores with a status of Off are grouped together and shown as Inactive.



What we've learned

Calculated columns can enrich our data, providing easier insights. We've learned how to create calculated columns by using the formula bar, how to use the suggestions list, and how to best name our new columns.

Next steps

If you want to take a deeper dive into DAX formulas, and create calculated columns with more advanced DAX formulas, see [DAX Basics in Power BI Desktop](#). This article focuses on fundamental concepts in DAX, such as syntax, functions, and a more thorough understanding of context.

Be sure to add the [Data Analysis Expressions \(DAX\) Reference](#) to your favorites. This is where you'll find detailed info on DAX syntax, operators, and the over 200 DAX functions.

Tutorial: Facebook analytics using Power BI Desktop

12/6/2017 • 9 min to read • [Edit Online](#)

In this tutorial you learn how to import and visualize data from **Facebook**. During the tutorial you'll learn how to connect to a specific Facebook page (the Power BI page), apply data transformation steps, and create some visualizations.

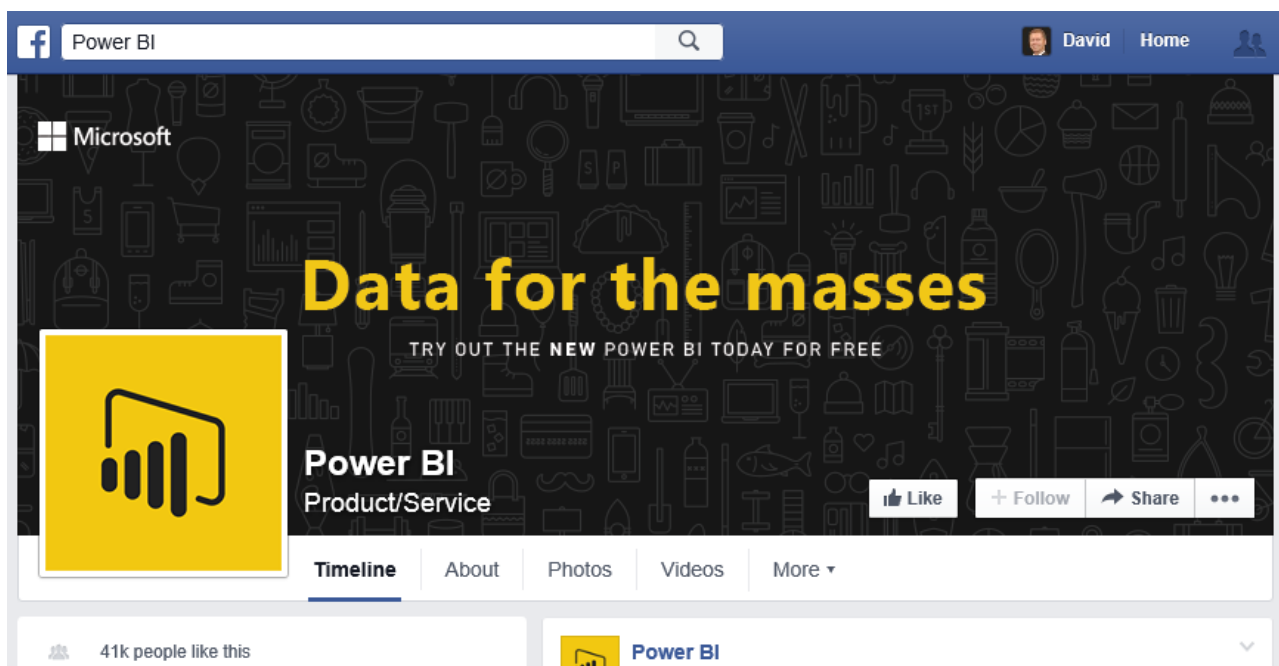
Here are the steps you'll take:

- **Task 1:** Connect to a Facebook Page
- **Task 2:** Create visualizations using the Report view
 - **Step 1:** Create a Treemap visualization
- **Task 3:** Shape data in the Query view
 - **Step 1:** Split the date-time column into two
 - **Step 2:** Add an aggregate value from a related table
- **Task 4:** Create additional visualizations using the Report view
 - **Step 1:** Load the query to your report
 - **Step 2:** Create a Line chart and a Bar chart

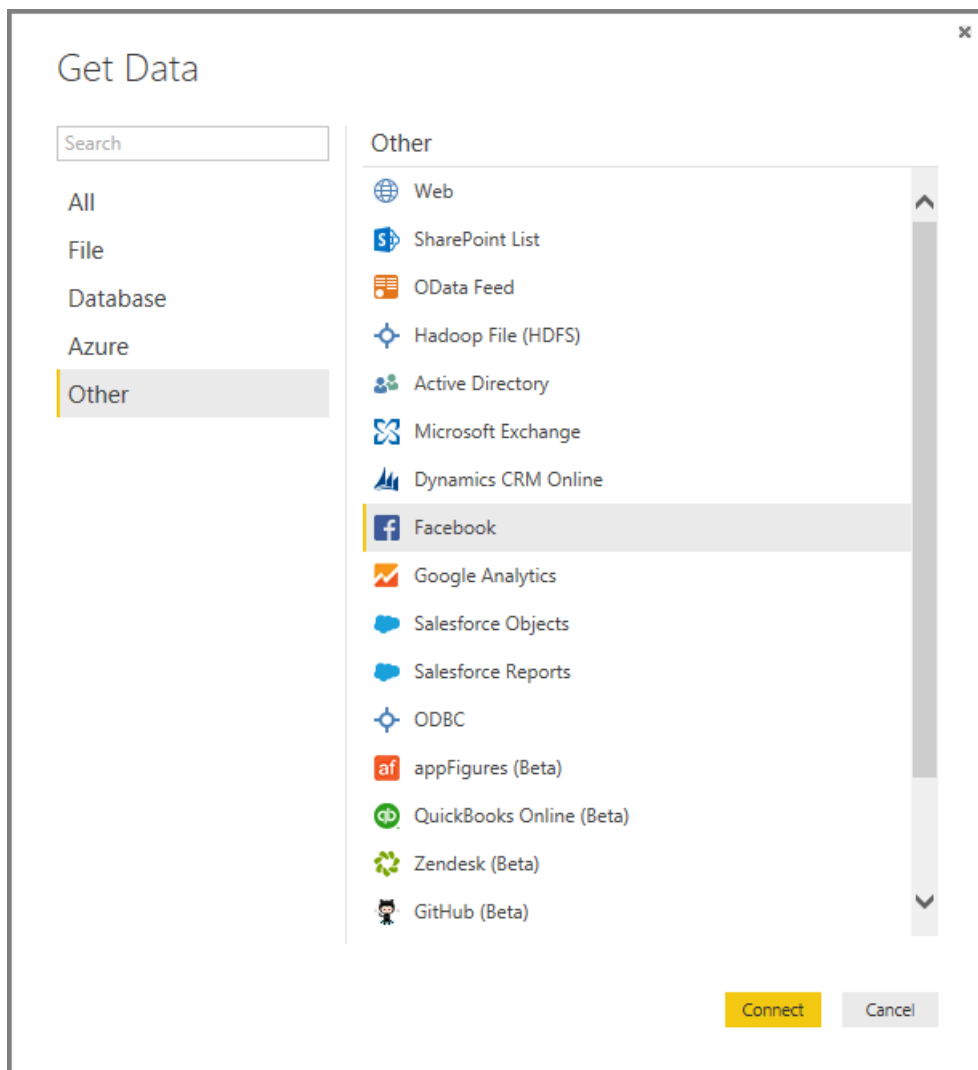
Task 1: Connect to a Facebook page

In this task you import data from the [Microsoft Power BI Facebooksite](https://www.facebook.com/microsoftbi) (here's the URL: <https://www.facebook.com/microsoftbi>).

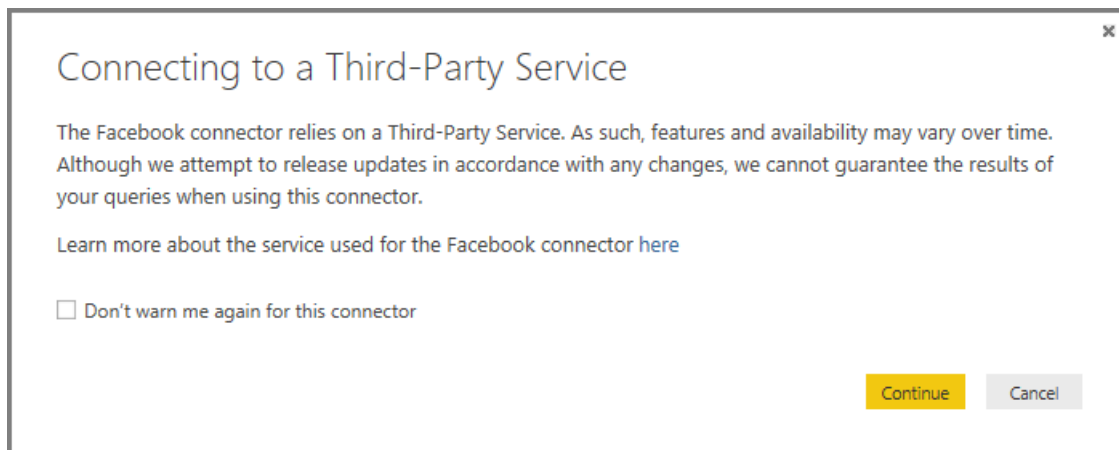
Anyone can connect to that page, and follow these steps - no special credentials (other than your own Facebook account, which you use in this step) are required.



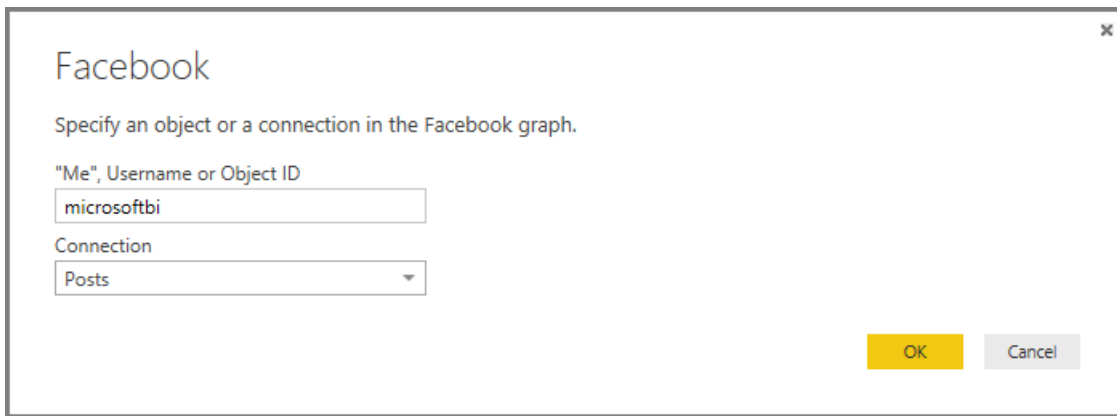
1. In the **Getting Started** dialog or in the **Home ribbon tab**, select **Get Data**.
2. The **Get Data** dialog appears, letting you select from all sorts of data sources. Select **Facebook** from the **Other** group.



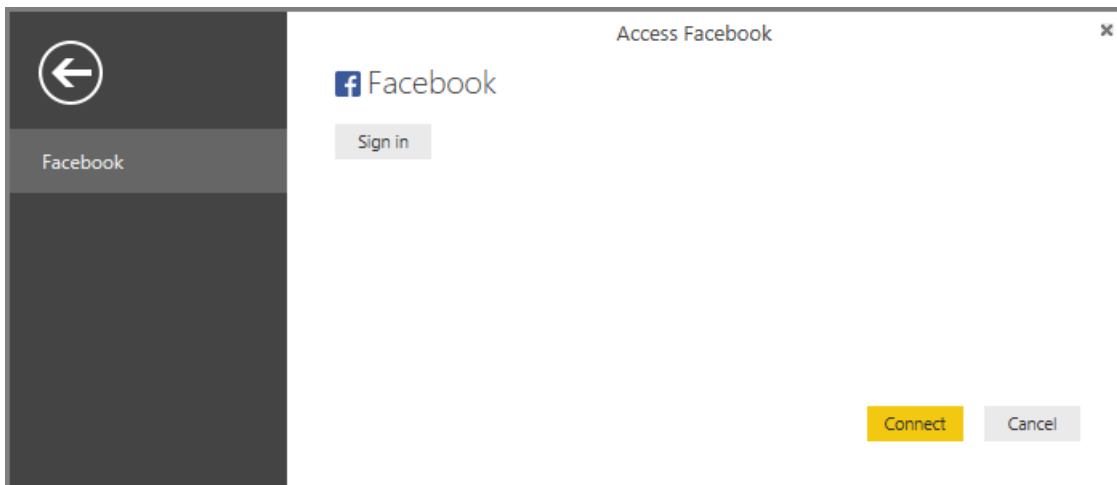
When you select **Connect**, a dialog appears to alert you to the risks of using a third-party service.



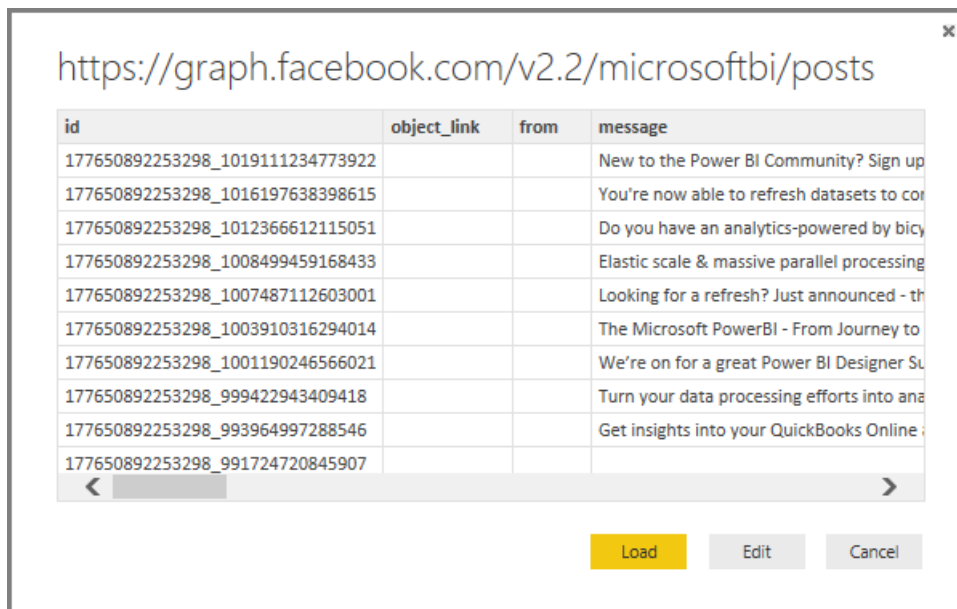
3. When you select Continue, the **Facebook** dialog box appears where you can paste the page name (**microsoftbi**) into the **Username** text box. Select **Posts** from the **Connection** drop down.



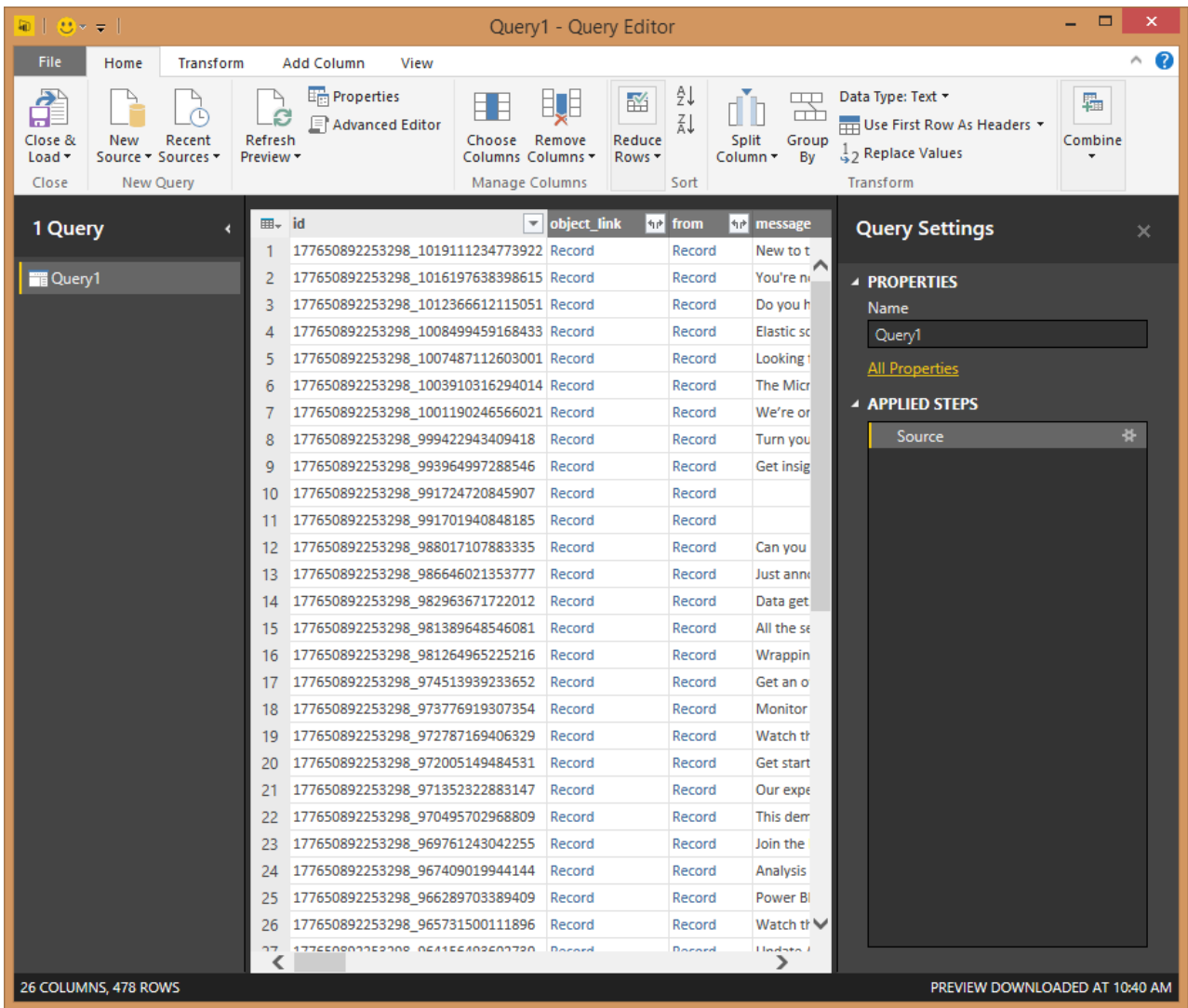
4. Click **OK**.
5. When prompted for credentials, sign in using your Facebook account and allow Power BI access through your account.



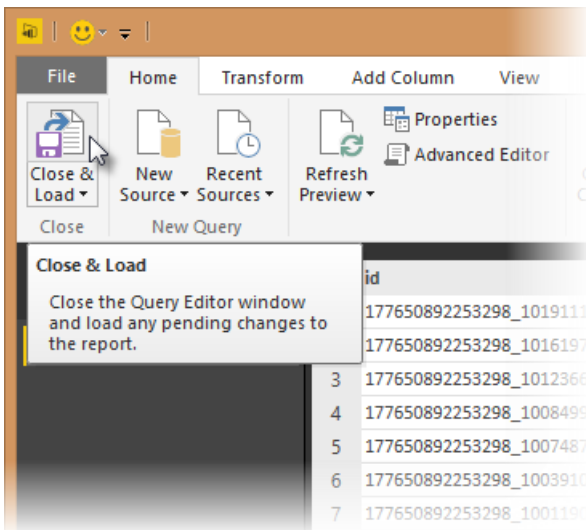
After establishing a connection to the page, you will see the data being loaded in the model.



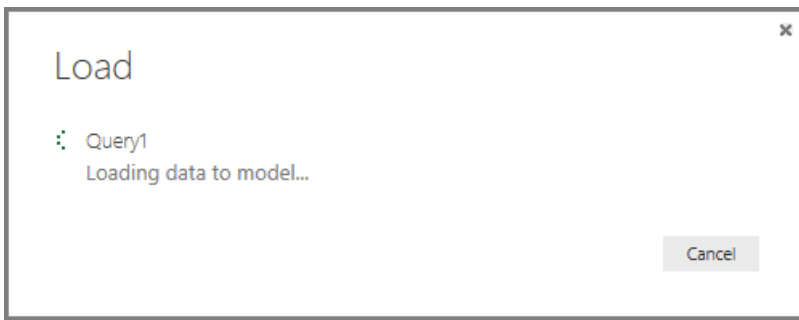
From there, **Query Editor** displays the data. **Query Editor** is part of Power BI Desktop, but loads in a separate window, and is where you perform all your transformations on your data connections.



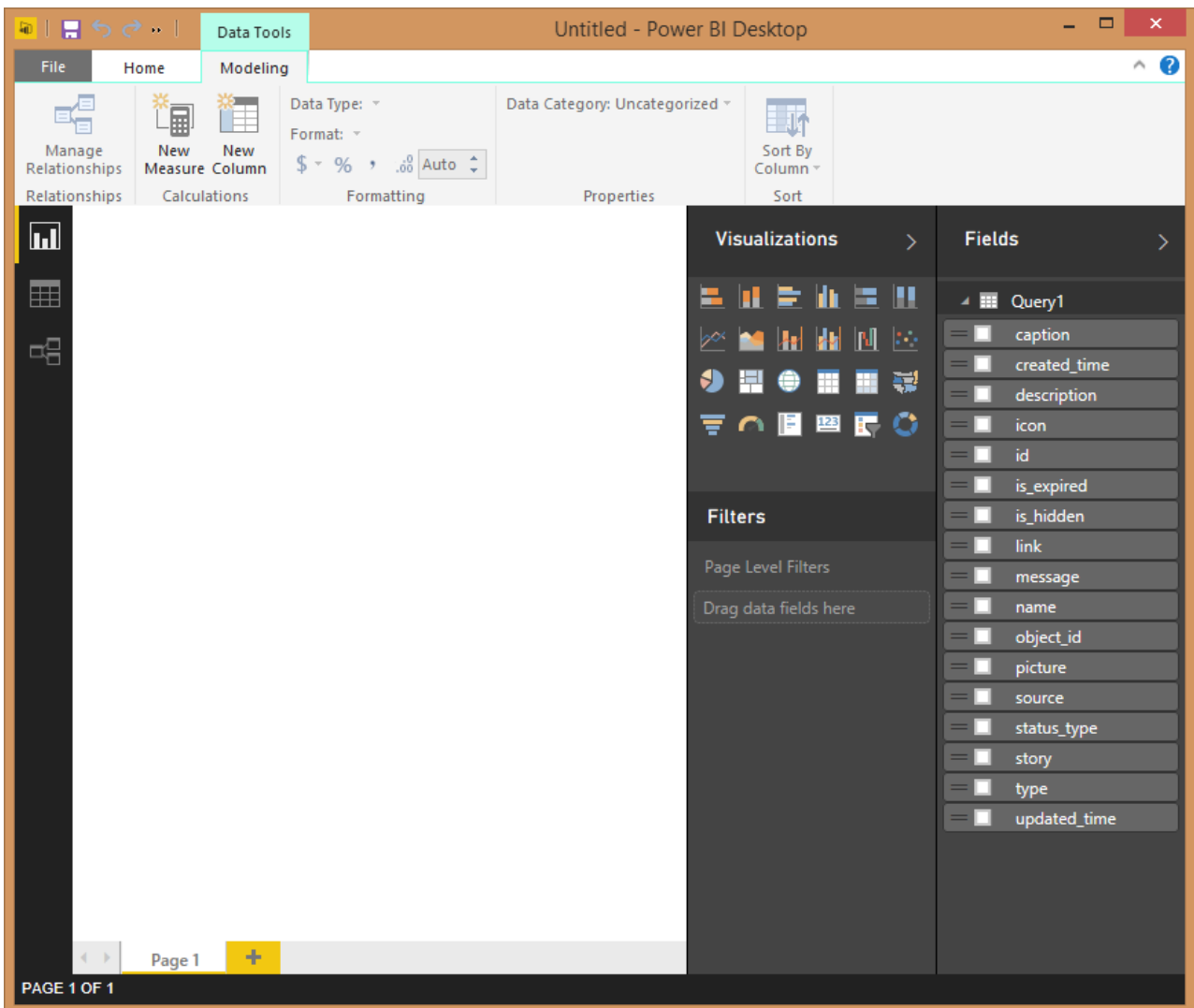
When your data is how you want it, you can load it into Power BI Desktop. Select **Load & Close** from the **Home** ribbon.



You'll see a dialog that displays the progress of loading the data into the Power BI Desktop data model.



Once loaded, you'll be taken to the **Report** view where the columns from the table are listed in the **Field** list on the right.



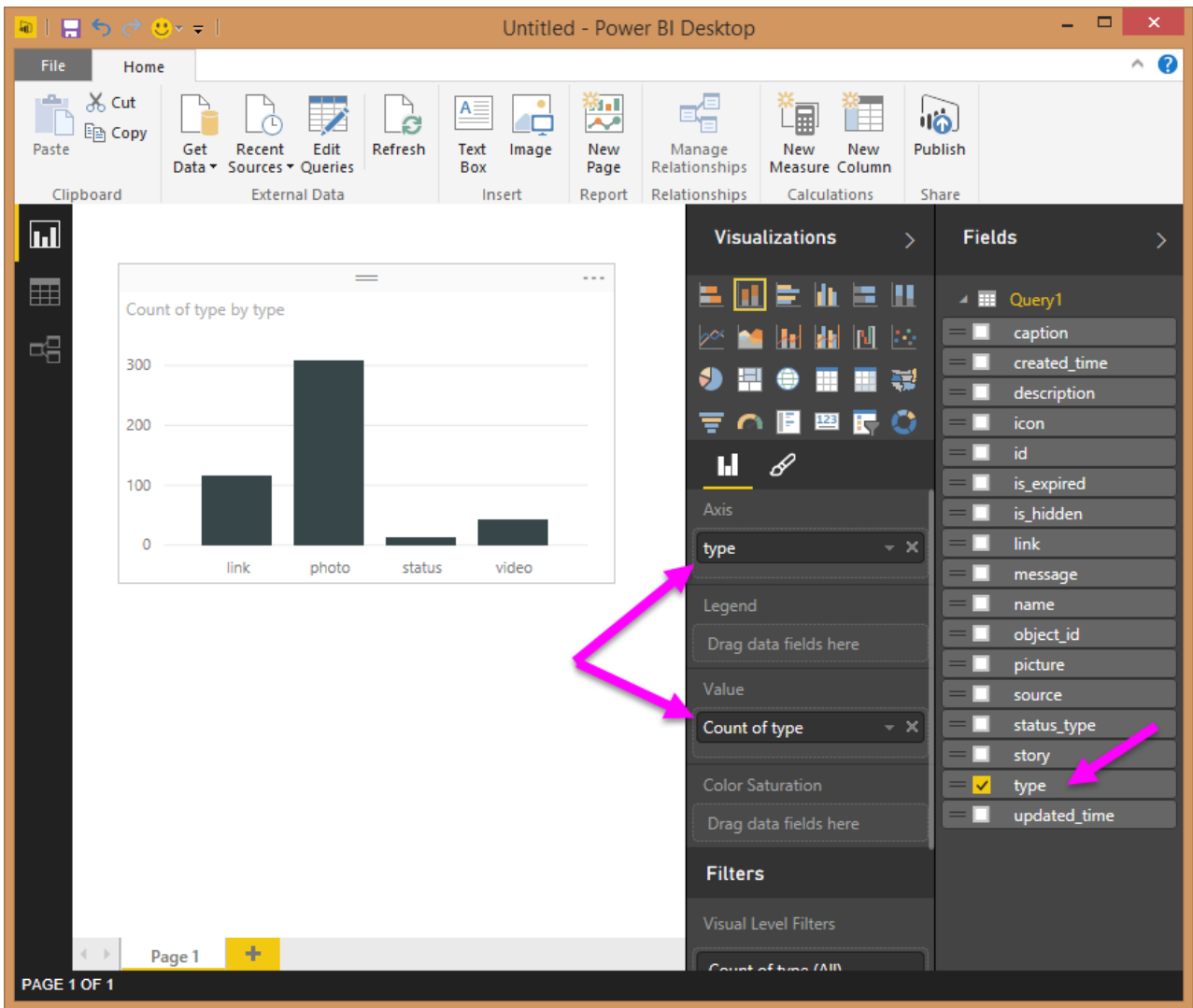
Task 2: Create visualizations using the Report view

Now that you have landed the data from the page, you can quickly and easily gain insights about your data, using visualizations.

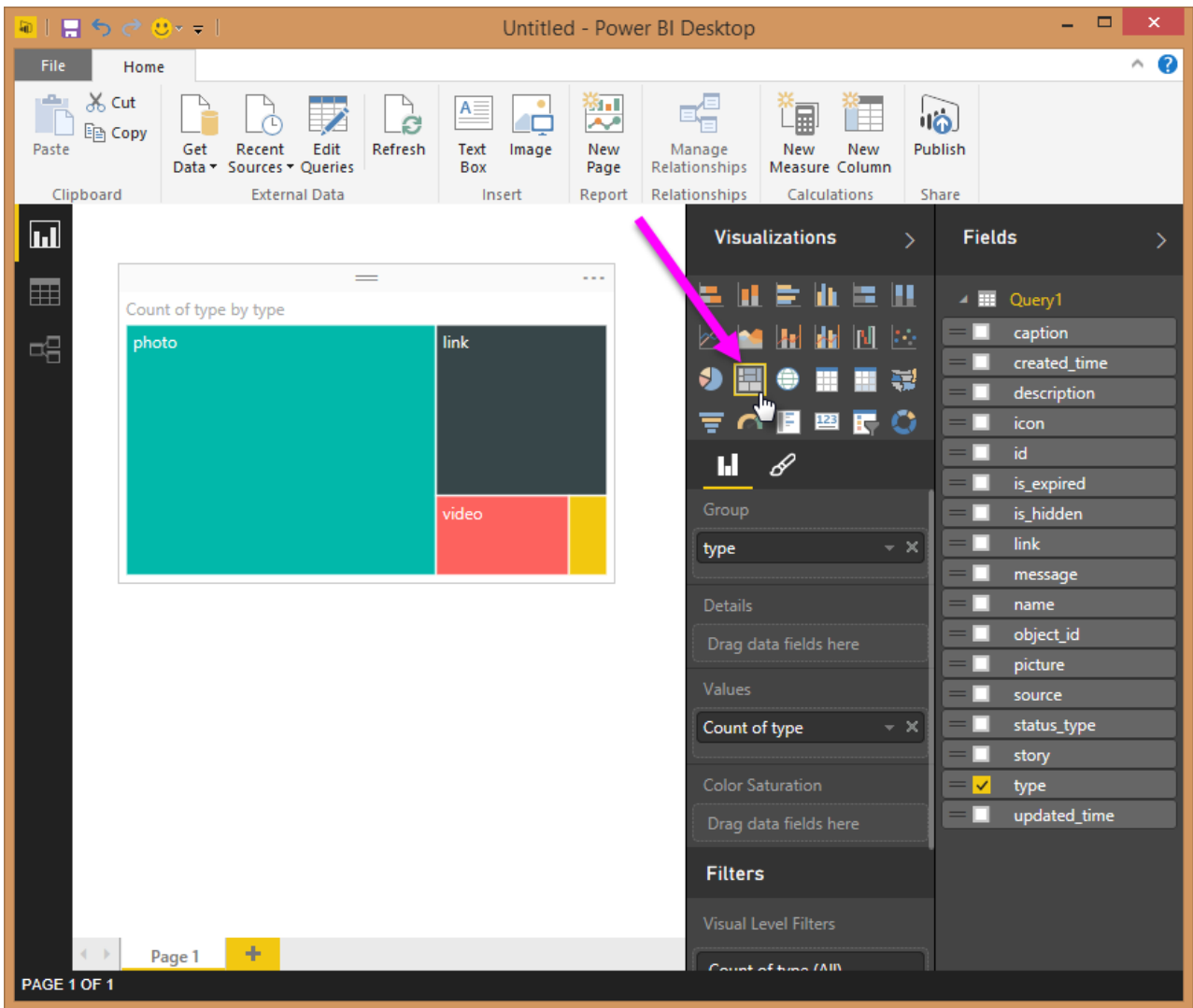
Step 1: Create a Treemap visualization

Creating a visualization is easy, we just drag a field from the **Field list** and drop it on the **Report canvas**.

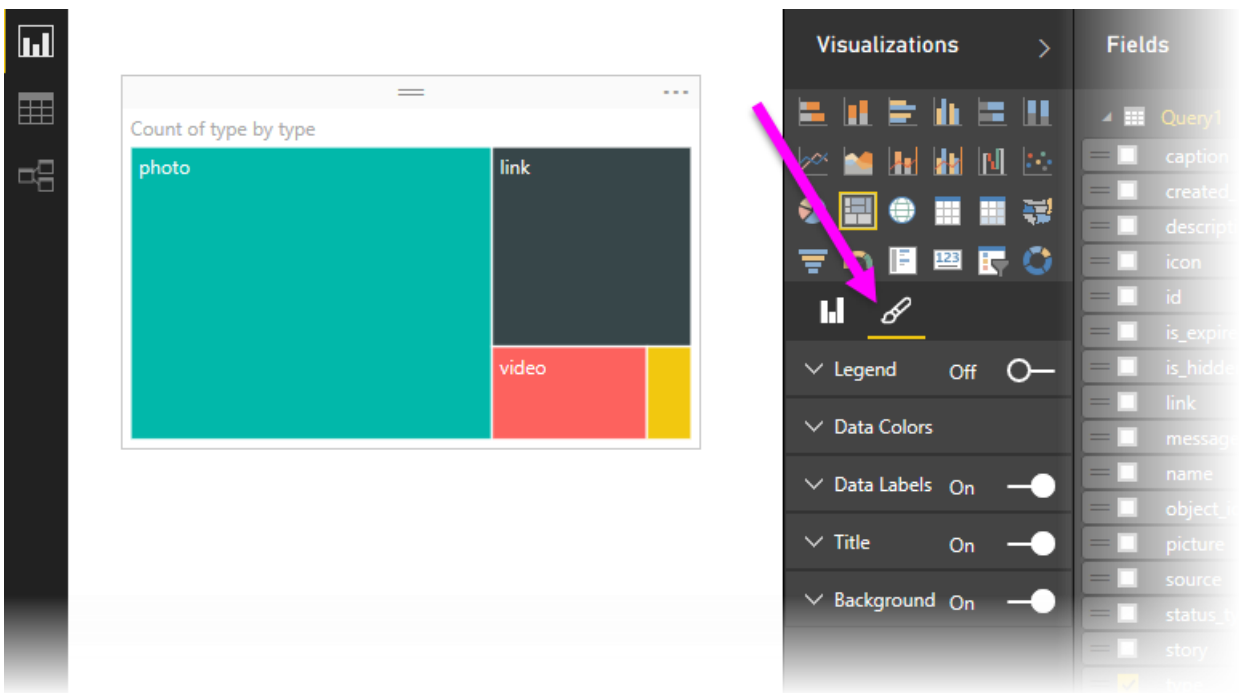
Drag the **type** field onto the **Report** canvas. Power BI Desktop creates a new visualization in the **Report canvas**. Next, drag **type** from **Fields** (the same field you just dragged onto the **Report** canvas) onto the **Value** area to create a **Bar** visualization.



We can easily change the type of visualization by selecting a different icon from the **Visualization** pane. Let's change the type to a **Treemap** by selecting its icon from **Visualizations**, as shown in the following image.



Next, let's add a legend, then change the color of a data point. Select the **Format** icon in the **Visualizations** pane; the **Format** icon looks like a paintbrush.

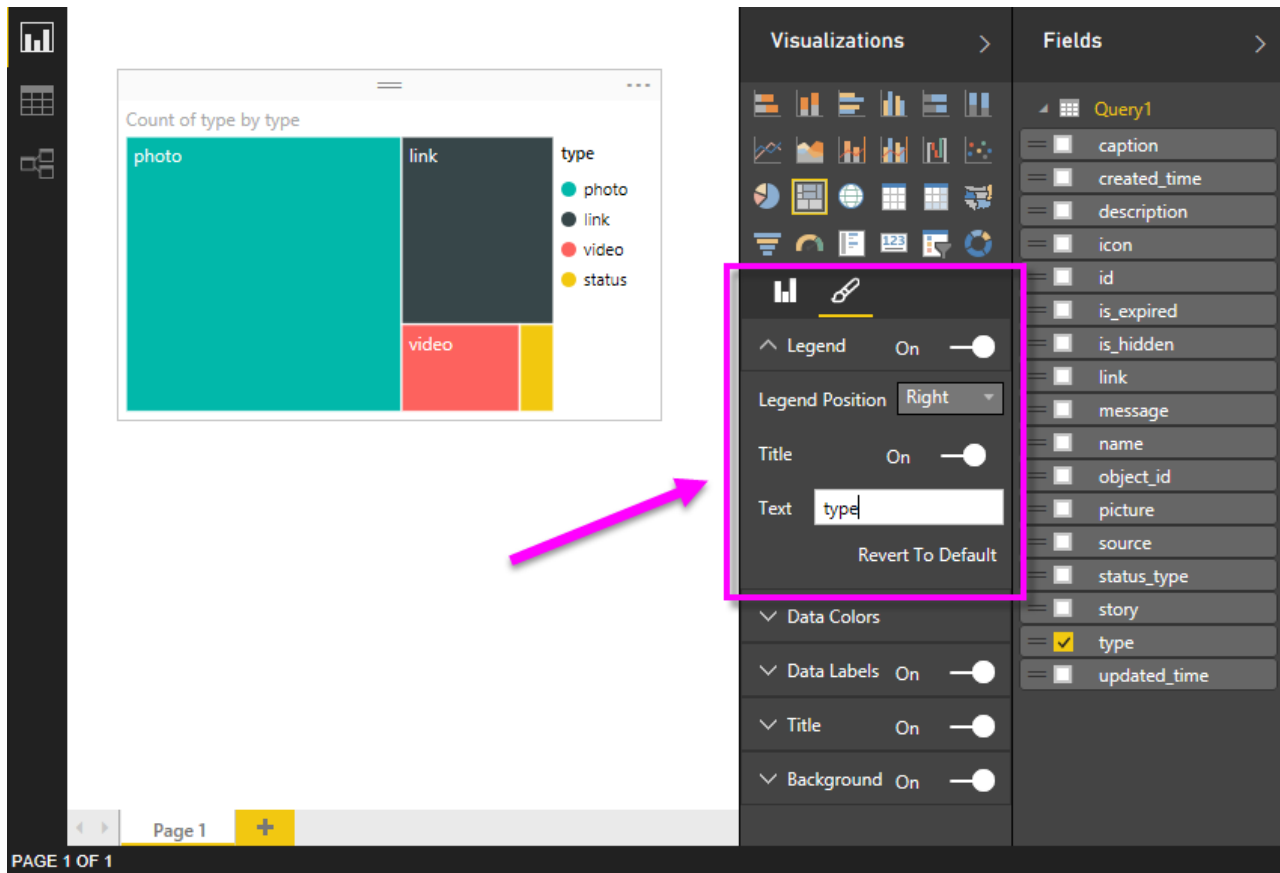


When you select the down arrow next to **Legend**, the section expands to show how to customize the legend for the selected visualization. In this case, we made the following selections:

- moved the **Legend** slider to **On** so a legend would appear

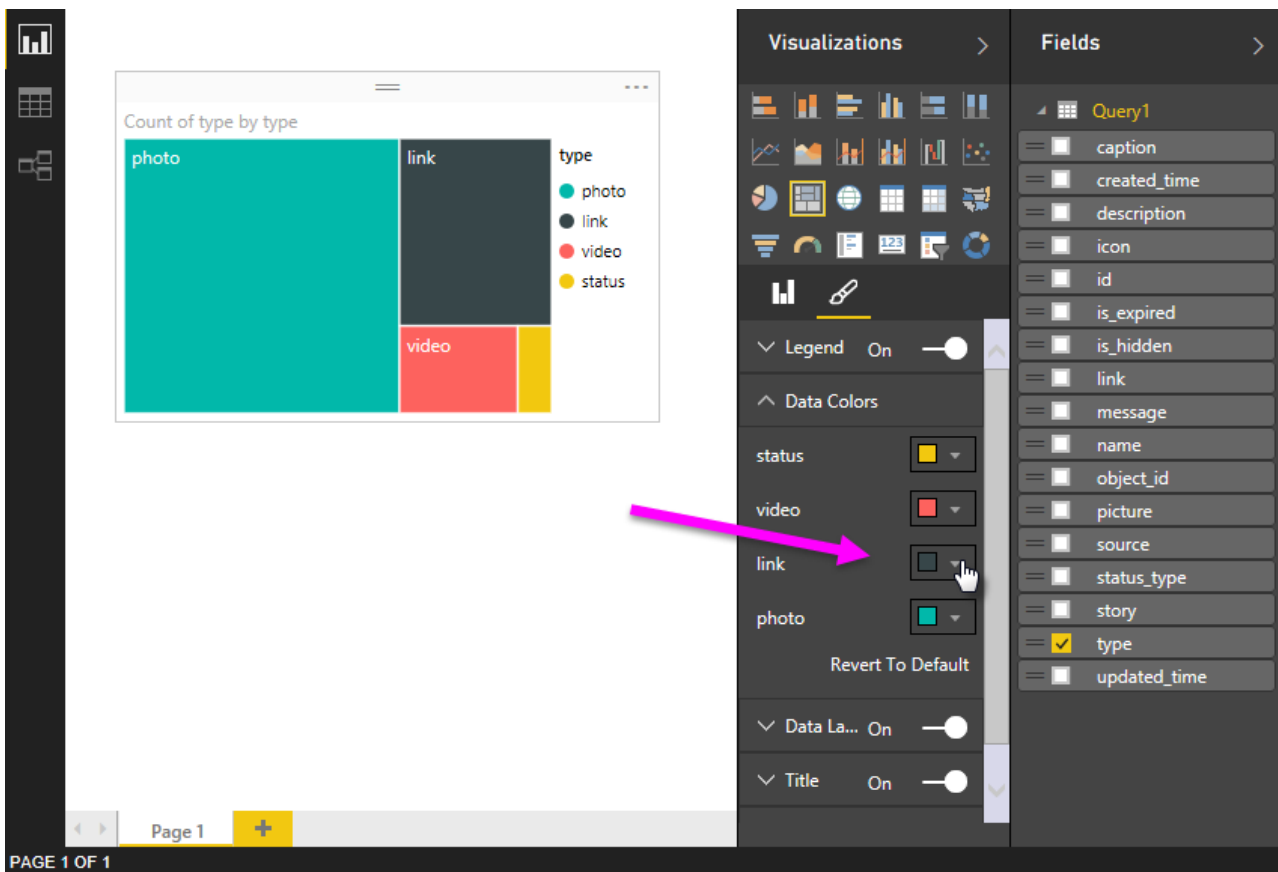
- selected **Right** from the **Legend Position** drop-down
- moved the **Title** slider to **On** as well, so a title for the legend will appear
- typed in **type** for the title of the legend

In the following image, those settings are already made and reflected in the visualization.

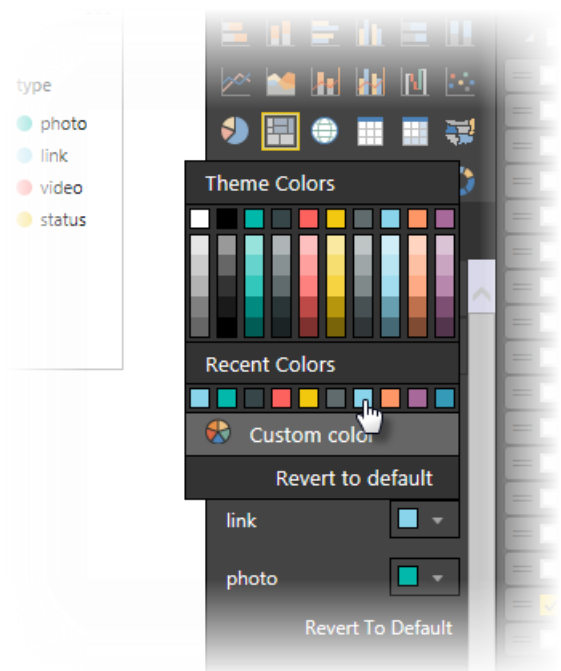


Next, let's change the color of one of the data points. The link data point should be blue, so it's closer to the common color for hyperlinks.

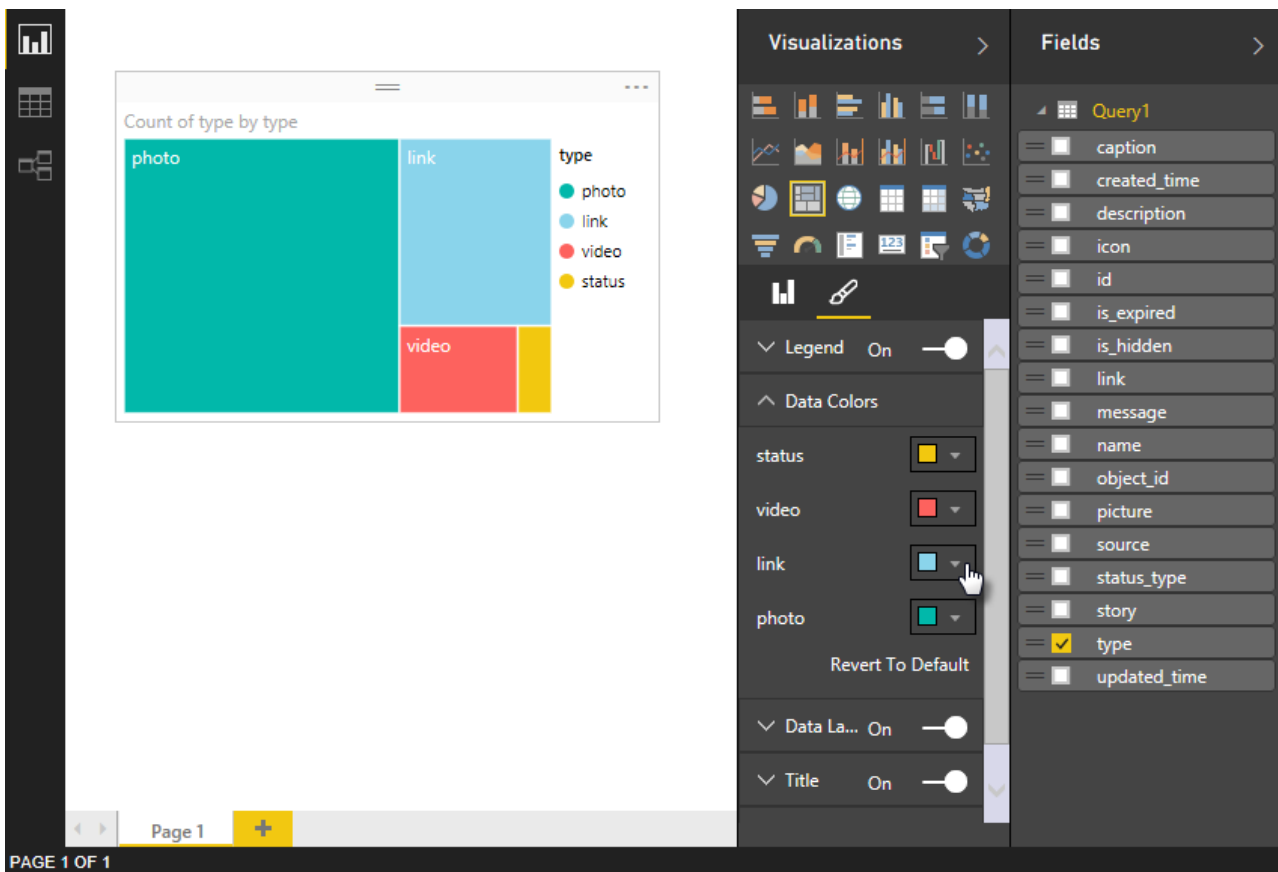
Select the arrow next to **Data Colors** to expand that section. The data points are shown, with selection arrows beside each color that allows us to select a different color for each data point.



When you click on the color box down arrow beside any data point, a color selection dialog appears, letting you choose your color. In this case, we'll choose light blue.



That's better. In the following image, you can see how the color is applied to the data point in the visualization, and that the legend is also automatically updated, as is its color in the **Data Colors** section.



Task 3: Shape data in the table

Now that you have imported the table selected and you start to visualize it, you may notice you need to perform various data shaping and cleansing steps in order to get the most out of your data.

Step 1: Split the date-time column into two

In this step, you will split the **created_time** column to get both the date and time values. Whenever you're in Power BI Desktop and you want to modify an existing query, you need to launch **Query Editor**. To do that, select **Edit Queries** from the **Home** tab.

The image shows the Power BI Desktop ribbon with the 'Data Tools' group selected. The 'Edit Queries' button is highlighted. Below the ribbon, a table is visible with the following columns: type, status_type, object_id, and created_time. The table contains several rows of data, including photo entries with their respective status_type, object_id, and created_time values.

type	status_type	object_id	created_time
photo	added_photos	1019111234773922	2015-07-15T14:30
photo	added_photos	1016197638398615	2015-07-09T14:00
photo	added_photos	1012366612115051	2015-07-02T14:00
photo	added_photos	1008499459168433	2015-06-25T15:50
photo	added_photos	1007487112603001	2015-06-23T18:40
photo	added_photos	1003910316294014	2015-06-17T14:00
photo	added_photos	1001190246566021	2015-06-12T18:30

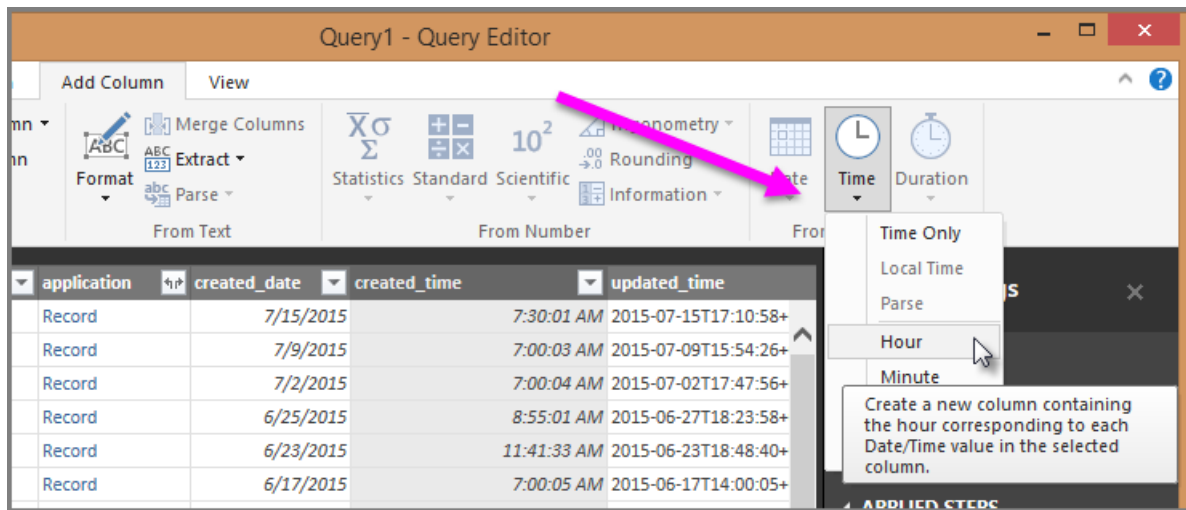
1. In the **Query Editor** grid, scroll to the right until you find the **created_time** column
2. Right-click a column header in the **Query Preview** grid, and click **Split Column > By Delimiter** to split the columns. Chose **Custom** in the delimiter drop down and enter **"T"** Note that this operation is also available in the **Home** ribbon tab, in the **Manage Columns** group.

The screenshot shows the Power BI Query Editor interface. The main area displays a data table with columns: object_id, application, created_date, created_time, shares, and is_hidden. A context menu is open over the 'created_date' column, with the 'Split Column' option selected, and its sub-menu 'By Delimiter...' is also open. The 'Query Settings' pane on the right shows the 'PROPERTIES' and 'APPLIED STEPS' sections. The status bar at the bottom indicates '26 COLUMNS, 478 ROWS' and 'PREVIEW DOWNLOADED AT 10:40 AM'.

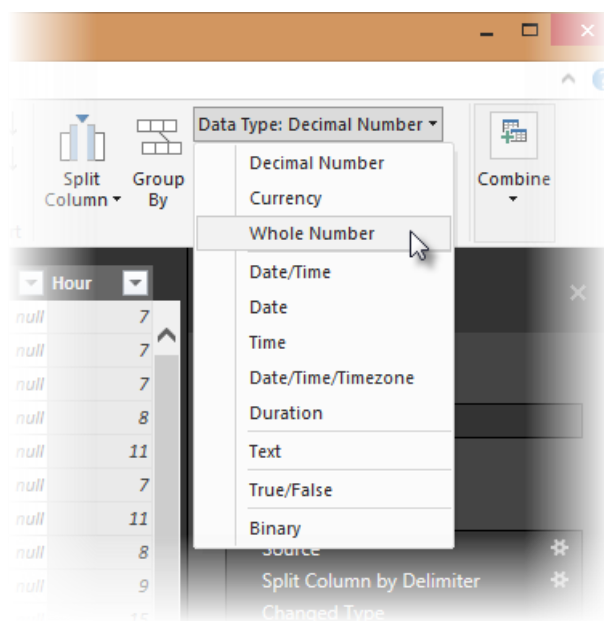
The dialog box is titled 'Split Column by Delimiter'. It contains the following elements:

- A dropdown menu labeled 'Select or enter delimiter' with the value '--Custom--'.
- A text input field containing the character 'T'.
- A section titled 'Split' with three radio button options:
 - At the left-most delimiter
 - At the right-most delimiter
 - At each occurrence of the delimiter
- A link labeled 'Advanced options'.
- 'OK' and 'Cancel' buttons at the bottom right.

3. Rename the created columns to **created_date** and **created_time** respectively.
4. Select the new column, **created_time**, and in the **Query view** ribbon, navigate to the **Add Column** tab and select **Time>Hour** under the **From Date & Time** group. This will add a new column that is only the hour component of the time.




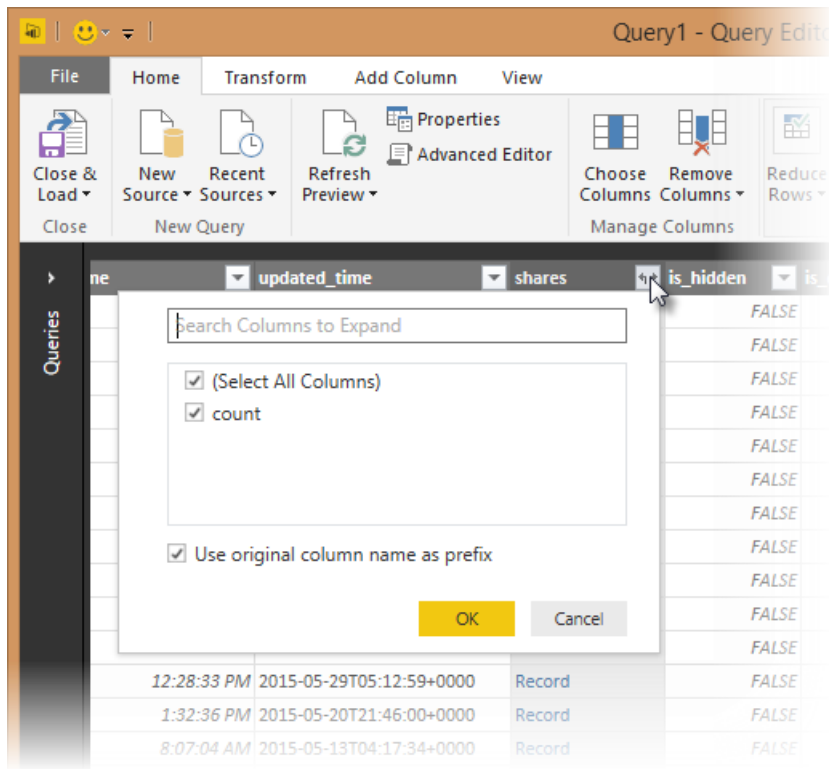
5. Change the type of the new **Hour** column to **Whole Number**, by navigating to the **Home** tab and selecting the **Data Type** drop down or by right-clicking the column and selecting **Transform>Whole Number**.



Step 2: Add an aggregate value from a related table

In this step, you add the count of shares from the nested value so that you can use it in the visualizations.

1. Continue scrolling to the right until you see the **shares** column. The nested value indicates that we need to do another transform in order to get the actual values.
2. In the top right of the column header, select the  icon to open the **Expand/Aggregate** builder. Select **count** and hit **OK**. This will add the count of the shares for each row in our table.

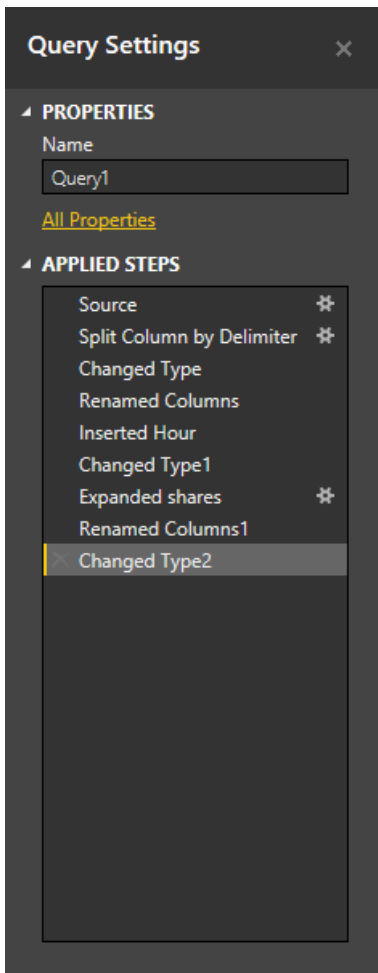


After the data loads, rename the column to **shares** by double clicking on the column name, right clicking the column or in the **Query view** ribbon, select **Rename** under the **Transform** tab and **Any Column** group.

3. Finally, change the type of the new **shares** column to **Whole Number**. With the column selected, the type can be changed by right-clicking the column and selecting **Transform>Whole Number** or **** by navigating to the **Home** tab and selecting the **Data Type** drop down or.

Query steps created

As you perform transformations in the Query view, query steps are created and listed in the **Query Settings** pane, in the **APPLIED STEPS** list. Each query step has a corresponding Query formula, also known as the "M" language.



TASK	QUERY STEP	FORMULA
Connect to a Facebook source	Source	Facebook.Graph ("https://graph.facebook.com/microsoftbi/posts;")
Split Columns to get the values you need	Split Column by Delimiter	Table.SplitColumn (Source,"created_time",Splitter.SplitTextByDelimiter("T"),{"created_time.1", "created_time.2"})
Change Type of the new columns (automatic step)	Changed Type	Table.TransformColumnTypes (#"Split Column by Delimiter",{"created_time.1", type date}, {"created_time.2", type time}))
Rename **a column**	Renamed Columns	Table.RenameColumns (#"Changed Type",{"created_time.1", "created_date"}, {"created_time.2", "created_time"})
Insert **a column**	Inserted Hour	Table.AddColumn (#"Renamed Columns", "Hour", each Time.Hour([created_time]), type number)
**Change Type **	Changed Type1	Table.TransformColumnTypes (#"Inserted Hour",{"Hour", type text})

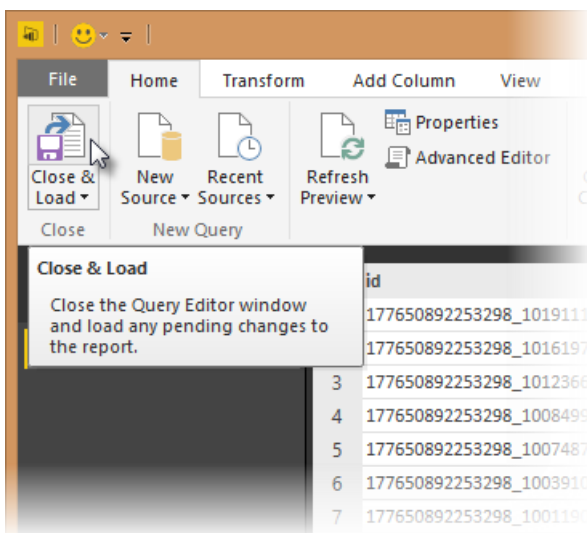
TASK	QUERY STEP	FORMULA
Expand **values in a nested table**	Expand shares	Table.ExpandRecordColumn (#"Changed Type1", "shares", {"count"}, {"shares.count"})
Rename **the column**	Renamed Columns1	Table.RenameColumns (#" Expand shares",{"shares.count", "shares"})
Change Type	Changed Type2	Table.TransformColumnTypes (#"Renamed Columns1",{"shares", Int64.Type})

Task 4: Create additional visualizations using the Report view

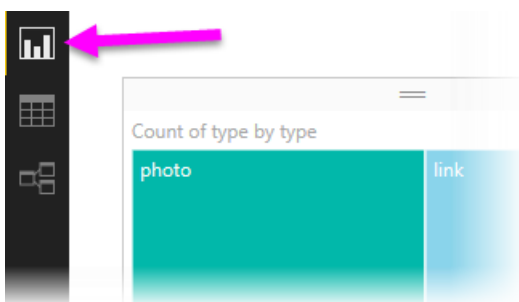
Now that we have converted the data into the shape that we need for the rest of our analysis, we can load the resulting table into our Report and create additional visualizations.

Step 1: Load the query to your report

In order to load the query results to the report, we need to select **Load & Close** from **Query Editor**. This will load our changes into Power BI Desktop, and close **Query Editor**.



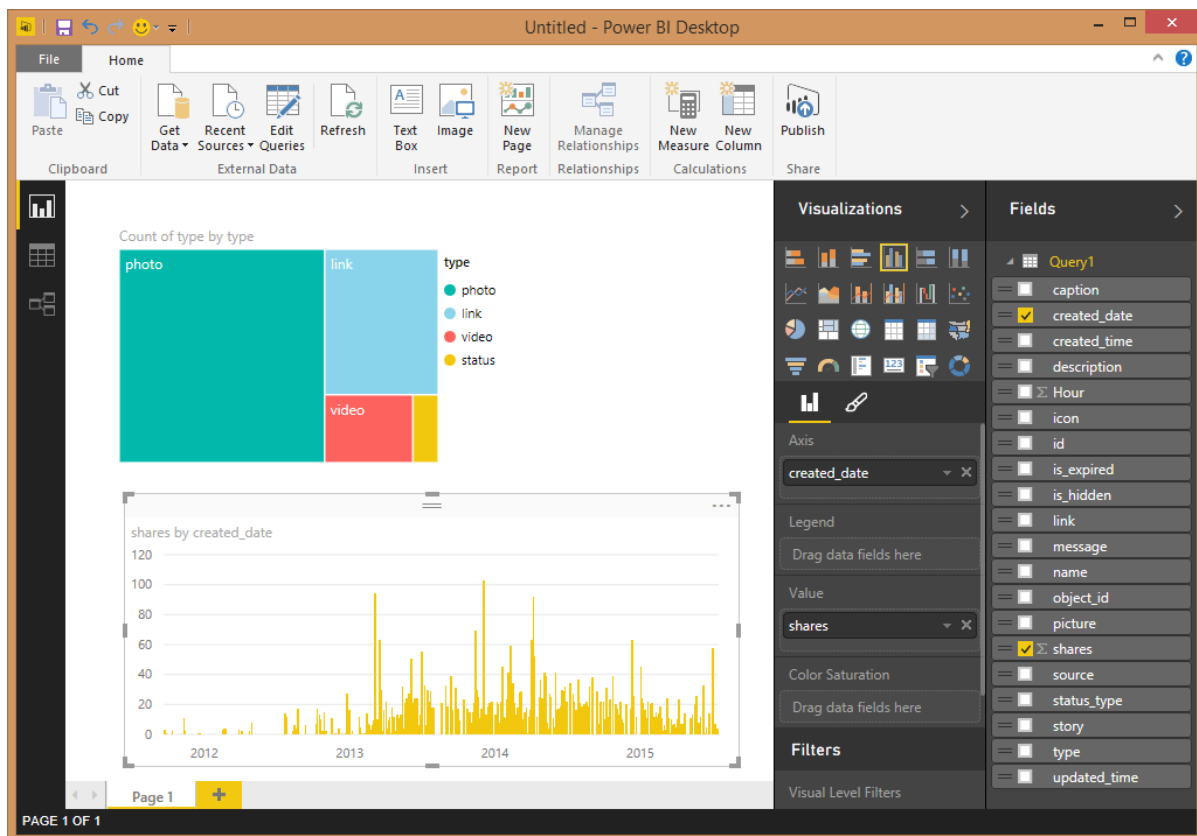
In Power BI Desktop, we need to make sure we're in **Report** view. Select the top icon from the left bar in Power BI Desktop.



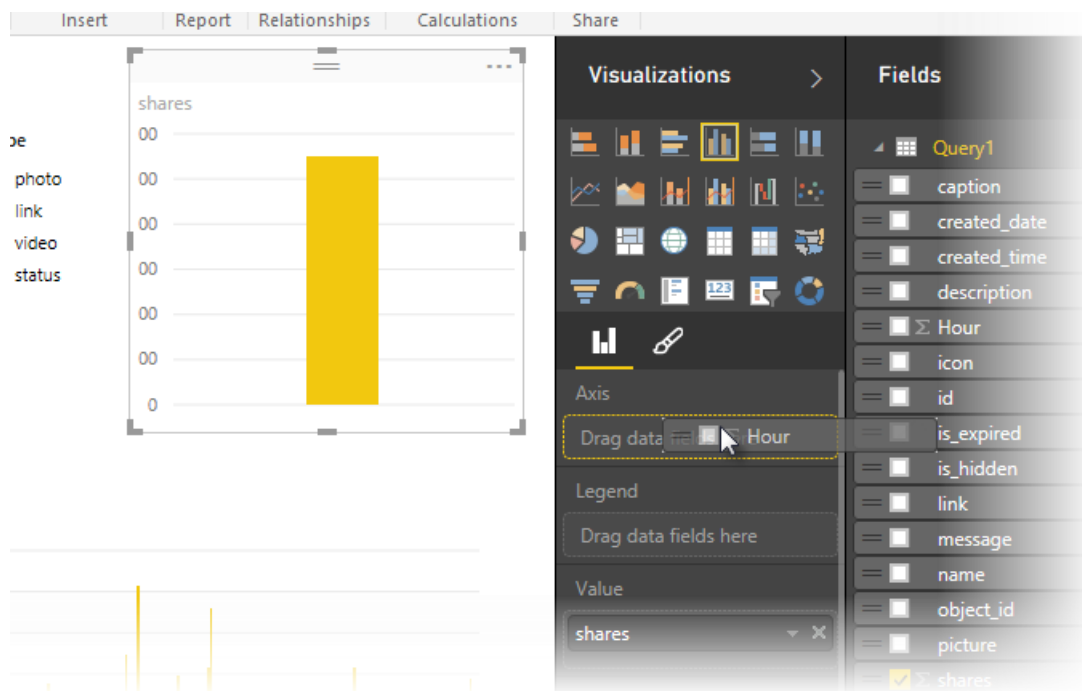
Step 2: Create a Line chart and a Bar chart

In order to create a visualization, we can drag fields from the **Field list** and drop them in the **Report canvas**.

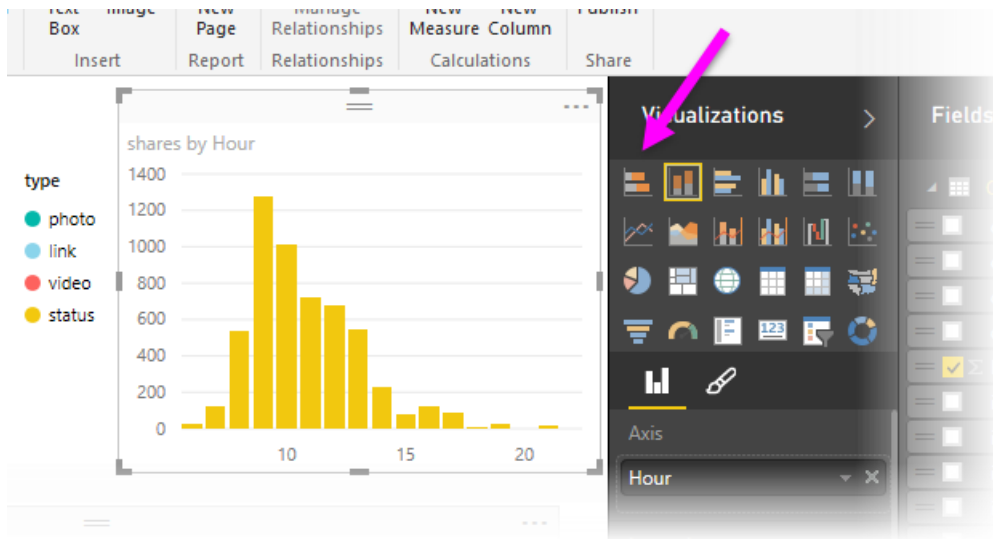
1. Drag the **shares** field onto the **Report** canvas, which creates a bar chart. Then drag **created_date** onto the chart, and Power BI Desktop changes the visualization to a **Line Chart**.



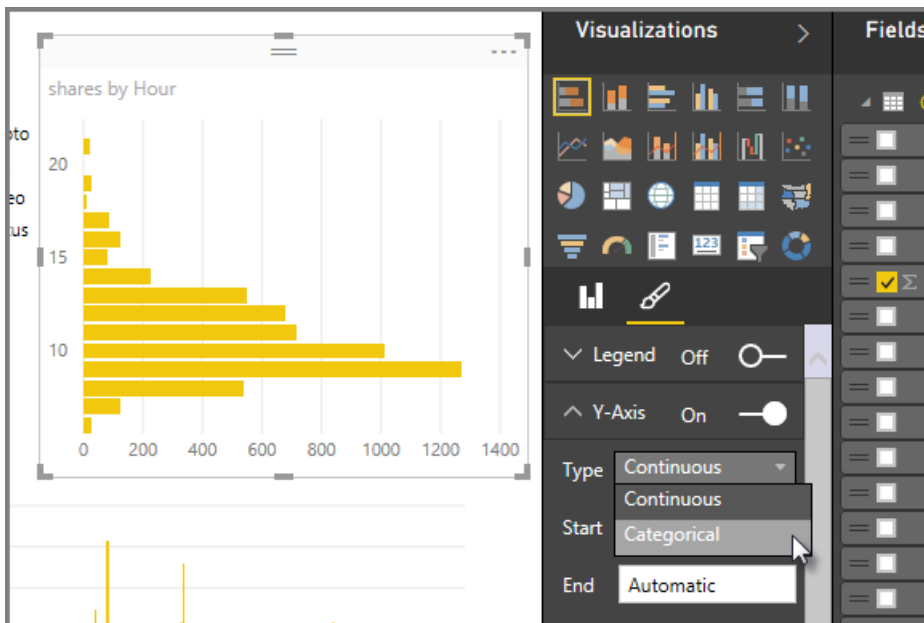
- Next, drag the **shares** field and drop it in the **Report canvas**. Now drag the **Hour** field into the **Axis** section under the **Field List**.



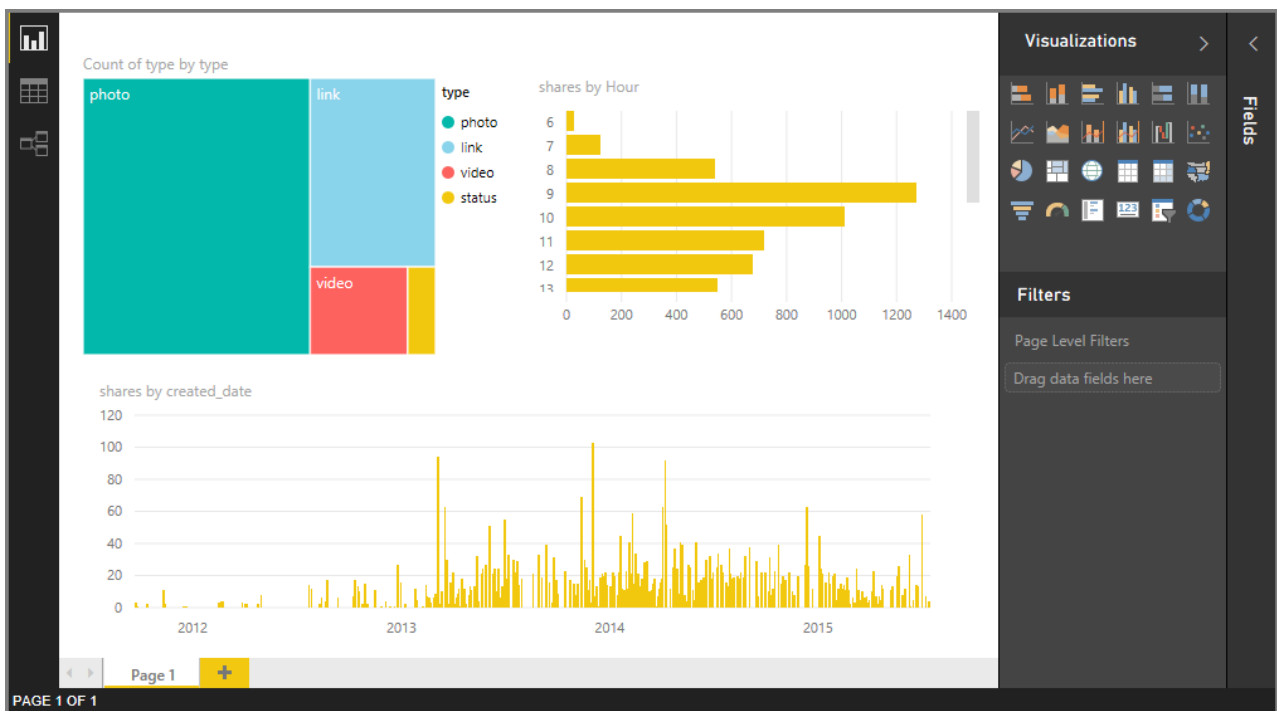
- We can easily change the type of visualization by clicking on a different icon in the **Visualization** pane. The arrow in the image below points to the **Bar Chart** icon.



4. Change the visualization type to **Bar Chart**.
5. The **Bar Chart** is created, but the axis isn't what we want - we want it sorted in the other direction (from high to low). Select the down arrow next to **Y-Axis** to expand that section. We need to change the type of axis from **Continuous** to **Categorical**, so it'll sort how we want it (the image below shows the axis before we make the selection - check out the subsequent image for how we want it to look).



That's better. And now we have three visualizations on this page, which we can size as we want to fill up the report page.



As you can see, it's easy to customize visualizations in your report, so you can present the data in the way that you want. Power BI Desktop provides a seamless end-to-end experience from getting data from a wide range of data sources and shaping it to meet your analysis needs to visualizing this data in rich and interactive ways. Once your report is ready, you can [upload it to Power BI](#) and create dashboards based on it, which you can share with other Power BI users.

You can download the end result of this tutorial [here](#)

Where else can I get more information?

- [Read other Power BI Desktop tutorials](#)
- [Watch Power BI Desktop videos](#)
- [Visit the Power BI Forum](#)
- [Read the Power BI Blog](#)

Power BI Desktop Send a Smile Privacy Statement

12/6/2017 • 3 min to read • [Edit Online](#)

At Microsoft, we are working hard to protect your privacy, while delivering products that bring you the performance, power, and convenience you want. This Privacy Statement explains many of the data collection and use practices of Microsoft Power BI Desktop Feedback *Send a Smile*. It doesn't apply to other online or offline Microsoft sites, products, or services.

Except as otherwise described in this statement, *Send a Smile* doesn't send personal information to Microsoft. Information that is sent to Microsoft isn't shared outside of Microsoft and its controlled subsidiaries and affiliates without your permission.

Send a Smile to Power BI Desktop allows you to send an email address with your feedback. This email address is used to contact you if Microsoft needs further information or clarification on your request. You don't have to register your email address with Microsoft to use *Send a Smile*.

Send a Smile to Power BI Desktop allows you to send feedback to Microsoft and, if you want, include screenshots showing the specific compliment or concern you have. Although *Send a Smile* doesn't intentionally collect personally identifiable information, it is possible that such information might be captured in the feedback or screenshots you provide. Microsoft doesn't use this information to identify you.

Send a Smile automatically collects some information about your system configuration, standard computer information, and basic information about how you use Microsoft products. This information is sent when you choose to send feedback.

Send a Smile generally collects information about:

- System configuration, such as the operating system version and architecture that you use (32-bit vs. 64-bit).
- Standard computer information, such as the Power BI Desktop, Internet Explorer version and CLR version that you are using.
- Power BI Desktop program usage, such as File Package Info (Document Locale, Fast Combine Enabled/Disabled state), Enabled and Disabled Preview Features, DirectQuery vs. Import mode, current Working Set and Peak Virtual Memory used in the current session.

The personal information we collect from you is used by Microsoft and its controlled subsidiaries and affiliates to provide the services or carry out the transactions you requested or authorized, and it might also be used to request additional information on:

- Feedback you provide about the product or service you are using
- To provide critical updates and notifications regarding the software
- To improve the product or service, for example, bug and survey form inquiries

Except as described in this statement, personal information you provide isn't transferred to third parties without your consent. We occasionally hire other companies to provide limited services on our behalf, such as:

- Packaging, sending and delivering purchases, and other mailings
- Answering customer questions about products or services
- Processing event registration
- Performing statistical analysis of our services

We only provide those companies with the personal information they need to deliver the service, and they are prohibited from using that information for any other purpose.

Microsoft might access or disclose information about you, including the content of your communications, to:

- Comply with the law or respond to lawful requests or legal process
- Protect the rights or property of Microsoft or our customers, including the enforcement of our agreements or policies governing your use of the services
- Act on a good faith belief that such access or disclosure is necessary to protect the personal safety of Microsoft employees, customers, or the public

Information collected by or sent to Microsoft by *Send a Smile* might be stored and processed in the United States or any other country in which Microsoft or its affiliates, subsidiaries, or service providers maintain facilities. Microsoft abides by the Safe Harbor Framework as set forth by the United States Department of Commerce regarding the collection, use, and retention of data from the European Union.

Security of your information

Microsoft is committed to helping protect the security of your personal information. We use a variety of security technologies and procedures to help protect your personal information from unauthorized access, use, or disclosure.

Changes to this Privacy Statement

Microsoft might occasionally update this Privacy Statement. The last updated date at the top of the Privacy Statement is updated with every revision. We encourage you to periodically review this Privacy Statement to be informed of how Microsoft is helping to protect your information.

Resolve issues importing Access and .XLS files in Power BI Desktop

1/25/2018 • 3 min to read • [Edit Online](#)

In **Power BI Desktop**, both **Access databases** and early versions of **Excel workbooks** (.XLS files of type Excel 2007-2003) use the *Access Database Engine*. There are three common situations that can prevent the Access Database Engine from working properly:

Situation 1: No Access Database Engine Installed

When the Power BI Desktop error message indicates the Access Database Engine is not installed, you must install the Access Database Engine version, either 32-bit or 64-bit, that matches your Power BI Desktop version. You can install the Access Database Engine from [this location](#).

NOTE

If the installed Access Database Engine bit version is different from your Microsoft Office installation's bit version, Office applications will not be able to use the Access Database Engine.

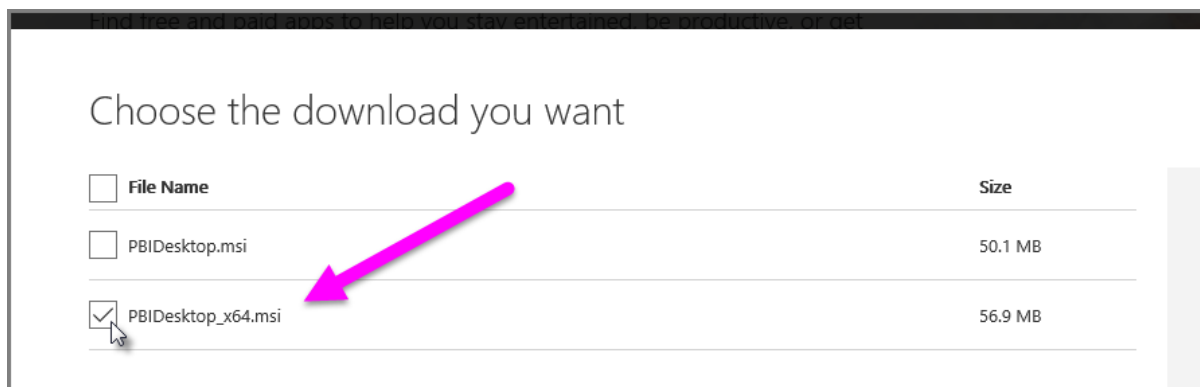
Situation 2: The Access Database Engine bit version (32-bit or 64-bit) is different from your Power BI Desktop bit version

This situation often occurs when the installed version of Microsoft Office is 32-bit, and the version of Power BI Desktop installed is 64-bit. The opposite can occur as well, and the bit-version mismatch can occur in either case (if you're using an Office 365 subscription, see **Situation 3** for a different issue and resolution). Any of the following solutions can remedy this bit-version mismatch error:

1. Change the version of Power BI Desktop to match the bit-version of your Microsoft Office installation. To change the bit-version of Power BI Desktop, uninstall Power BI Desktop, and then install the version of Power BI Desktop that matches your Office installation. To select a version of Power BI Desktop, on the download page for desktop select **Advanced download options**.



On the download page that appears, choose your language and then select the **Download** button. ON the screen that appears, select the checkbox beside PBIDesktop.msi for the 32-bit version, or PBIDesktop_x64.msi for the 64-bit version. In the following screen, the 64-bit version is selected.



NOTE

When using the 32-bit version of Power BI Desktop, when creating very large data models you might experience out-of-memory issues.

2. Change the version of Microsoft Office to match the bit-version of your Power BI Desktop installation. To change the bit-version of Microsoft Office, uninstall Office, and then install the version of Office that matches your Power BI Desktop installation.
3. If the error occurred when attempting to open an .XLS file (an Excel 2007-2003 workbook), you can avoid using the Access Database Engine by opening the .XLS file in Excel, and saving it as an XLSX file.
4. If the previous three solutions are not feasible, it is possible to install both versions of the Access Database Engine, but this is *not* a recommended workaround. Installing both versions will resolve this issue for Power Query for Excel and Power BI Desktop, but will introduce errors and issues for any application that automatically (by default) uses the bit-version of the Access Database Engine that was installed first. To install both bit-versions of the Access Database Engine, [download](#) both versions, then run each of them using the `/passive` switch. For example:

```
c:\users\joe\downloads\AccessDatabaseEngine.exe /passive  
  
c:\users\joe\downloads\AccessDatabaseEngine_x64.exe /passive
```

Situation 3: Trouble using Access or .XLS files with an Office 365 subscription

If you are using an Office 365 subscription, whether **Office 2013** or **Office 2016**, the Access Database Engine provider is registered in a virtual registry location that is *only* accessible to Office processes. As a result, the Mashup Engine (which is responsible for running non-Office 365 Excel and Power BI Desktop) which is not an Office process, cannot use the Access Database Engine provider.

To remedy this situation, you can download and install the Access Database Engine redistributable that matches the bit version of your Power BI Desktop installation (see earlier sections for more information about bit-versions).

Download link: [Access Database Engine download](#).

Other situations that cause import issues

We strive to cover as many issues that occur with Access or .XLS files as possible. If you encounter an issue that isn't covered in this article, please submit a question about the issue to [Power BI Support](#). We regularly look at issues that may be affecting many customers, and include them in our articles.

Resolve Issues when Power BI Desktop will not launch

1/25/2018 • 2 min to read • [Edit Online](#)

In **Power BI Desktop**, users who installed and are running previous versions of the **Power BI on-premises data gateway** can be blocked from launching Power BI Desktop, due to administrative policy restrictions that the Power BI on-premises gateway placed on named pipes on the local machine.

Resolve issues with the on-premises data gateway and Power BI Desktop

There are three options to resolve the issue associated with the on-premises data gateway, and enable Power BI Desktop to launch:

Resolution 1: Install the latest version of Power BI on-premises data gateway

The latest version of the Power BI on-premises data gateway does not place named pipe restrictions on the local machine, and allows Power BI Desktop to launch properly. If you need to continue using Power BI on-premises data gateway, this is the recommended resolution. You can download the latest version of Power BI on-premises data gateway from [this location](#). Note that the link is a direct download link to the installation executable.

Resolution 2: Uninstall or stop the Power BI on-premises data gateway Windows service

If you no longer need the Power BI on-premises data gateway, you can uninstall it, or you can stop the Power BI on-premises data gateway Windows service, which removes the policy restriction, and allows Power BI Desktop to launch.

Resolution 3: Run Power BI Desktop with administrator privilege

Alternatively, you can successfully launch Power BI Desktop as administrator, which also allows Power BI Desktop to successfully launch. It is still recommended that you install the latest version of Power BI on-premises data gateway, as described earlier in this article.

Help with other issues when launching Power BI Desktop

We strive to cover as many issues that occur with **Power BI Desktop** as possible. We regularly look at issues that may be affecting many customers, and include them in our articles.

If the issue with launching **Power BI Desktop** is not associated with the on-premises data gateway, or when the previous resolutions don't work, you can submit a support incident to [Power BI support](#) (<https://support.powerbi.com>) to help identify and solve your issue.

For other issues you may encounter in the future with **Power BI Desktop** (we hope there are none, or very few), it is helpful to turn on tracing and gather log files, to better isolate and identify the issue. To turn on tracing, select **File > Options and settings > Options** and then select **Diagnostics**, then check **Enable tracing** under *Diagnostic Options*. We realize that **Power BI Desktop** must be running to set this option, which is more helpful for future issues associated with launching **Power BI Desktop**.

Take Power BI anywhere in mobile apps for your mobile device

1/5/2018 • 2 min to read • [Edit Online](#)



You view your Power BI dashboards and reports in the Power BI service (<https://powerbi.com>), and your on-premises Power BI reports on [Power BI Report Server](#). Now you can connect to your on-premises and cloud data from the Power BI mobile apps. Try viewing and interacting with your Power BI dashboards and reports on your mobile device — be it iOS (iPad, iPhone, iPod Touch, or Apple Watch), Android phone or tablet, or Windows 10 device.






See what's new in the Power BI mobile apps

- Read the [Microsoft Power BI blog](#) for new features in the mobile apps.
- See the list of [what's new in the Power BI mobile apps](#).

The Power BI mobile apps

DEVICE	HIGHLIGHTS
	Your iPhone goes everywhere with you, and the Power BI mobile app for the iPhone goes everywhere your iPhone goes. Besides viewing your Power BI reports in a special phone layout view , you can add Power BI to your Apple Watch , and ask questions with the Q&A virtual analyst . Get started with the Power BI mobile app for the iPhone .
	On the iPad , the Power BI mobile app displays dashboards and reports the way they were designed for the Power BI service. Plus you can view your Power BI Report Server and Reporting Services KPIs and reports right on your iPad. You can set data alerts in the Power BI mobile app to notify you when data in a dashboard changes beyond limits you set. Get started with the Power BI mobile app for iPads .

DEVICE	HIGHLIGHTS
 <p>Android phone</p>	<p>The Power BI mobile app for the Android phone brings Power BI to your pocket, with up-to-date, touch-enabled mobile access to your business information. You can filter a report by your geographic location. You can even scan a QR code with your Android phone and go straight to a Power BI dashboard or report. Get started with the Power BI mobile app for Android phones.</p>
 <p>Android tablet</p>	<p>This mobile app runs on a number of different Android tablets, bringing you up-to-date, touch-enabled mobile access to your business information. On the Android tablet, the Power BI mobile app displays dashboards and reports the way they were designed for the Power BI service. You can mark your favorite dashboards and reports, so you can get to them quickly, along with your favorite Power BI Report Server and Reporting Services KPIs and reports. Get started with the Power BI mobile app for Android tablets.</p>
	<p>The Power BI mobile app for Windows 10 runs on any Windows 10 device, including Windows 10 phones. Along with all the features of the other mobile apps, the Power BI mobile app for Windows 10 offers some special functionality. For example, you can pin a Power BI tile or dashboard to the Windows 10 Start screen from the Power BI mobile app. Plus you can run Power BI in presentation mode on Surface Hub and in the Power BI mobile app for Windows 10. Get started with the Power BI mobile app for Windows 10 devices.</p>

Enterprise support for the Power BI mobile apps

Organizations can use Microsoft Intune to manage devices and applications, including Power BI mobile apps for Android and iOS.

Microsoft Intune lets organizations control items like requiring an access pin, controlling how data is handled by the application, and even encrypting application data when the app isn't in use.

Read more about [configuring Power BI mobile apps for Android and iOS with Microsoft Intune](#).






Next steps

- [Power BI free vs. Pro licenses](#)
- Questions? [Try asking the Power BI Community](#)

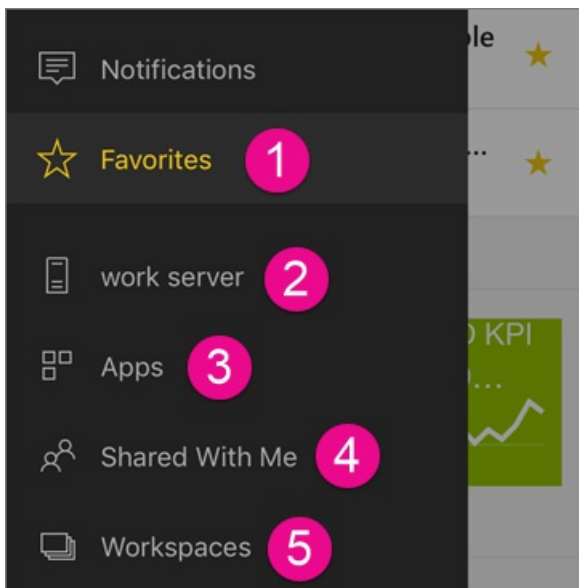
Find your dashboards, reports, and apps in the Power BI mobile apps

1/5/2018 • 2 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

Your dashboards, reports, and apps are stored in different locations in the Power BI mobile apps, depending on where they came from. This article explains what you'll find where. Plus you can always [search for anything](#) you have in Power BI.



1. [Favorites](#)
2. [Report servers](#) (optional)
3. [Apps](#)
4. [Shared with me](#)
5. [Workspaces](#)

1 Favorites

Collect the dashboards and apps you view most often by tagging them as favorites. Read more about [favorites in the Power BI mobile apps](#).

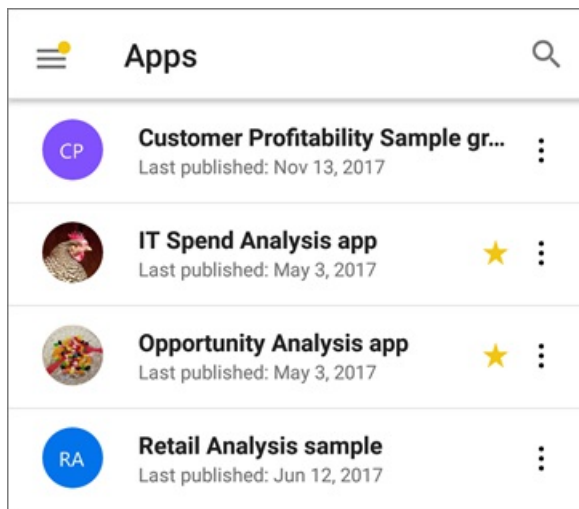
2 Report servers

You may have connections to one or more on-premises Power BI Report Server or SQL Server Reporting Services servers. If you do, the KPIs, Power BI reports, and paginated reports on the server show up here. If you've made any of them favorites on the server, they also show up in your Favorites list. Read more about [viewing on-](#)

premises KPIs and reports in the Power BI mobile apps.

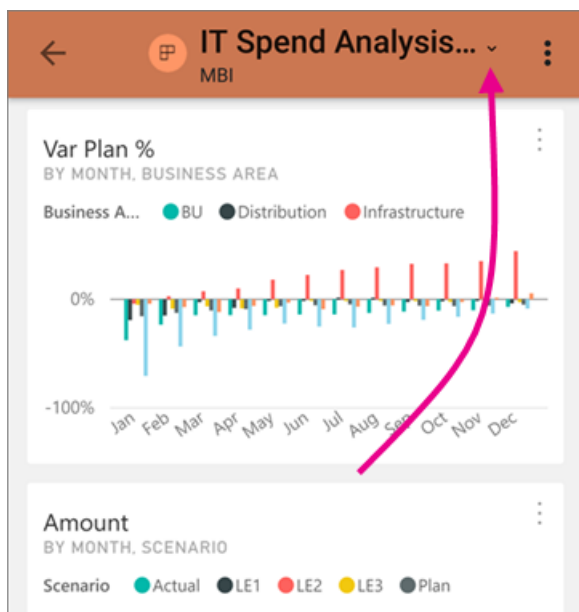
3 Apps

An app is a collection of dashboards and reports purpose-built by your organization to deliver key metrics for faster and easier data-driven decisions. In the Power BI service (<https://powerbi.com>), apps are easy to discover and install. After you install them, you can view them from any device.



With apps you automatically get all the updates the author makes, and the author also controls how often the data is scheduled to refresh. You don't need to worry about keeping up-to-date with the author's changes.

You can get back to the app content list by tapping the breadcrumb arrow to the right of the app name.



Read more about [apps in the Power BI service](#).

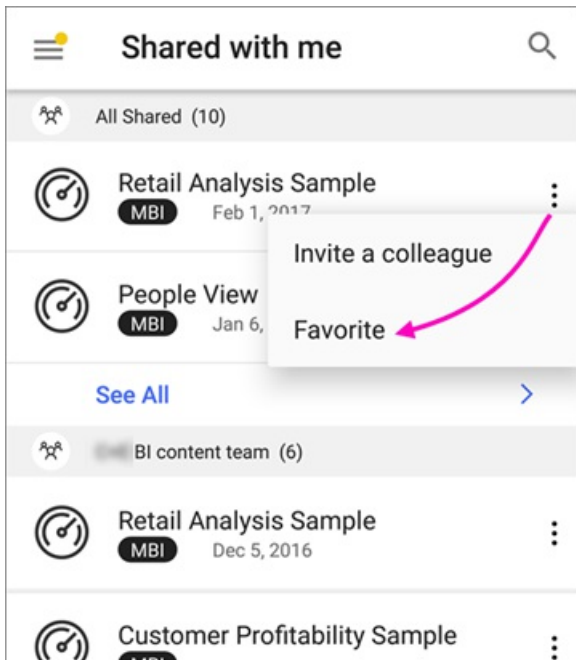
Get an app on a mobile device

In the Power BI mobile apps, you can view all the apps you've already installed. An app owner can send you a direct link to an app. When you click the link, the app downloads to your account and opens in the Power BI mobile app.

In the Power BI service, you can go to Microsoft AppSource to search for other apps, but not from the Power BI mobile apps.

4 Shared with me

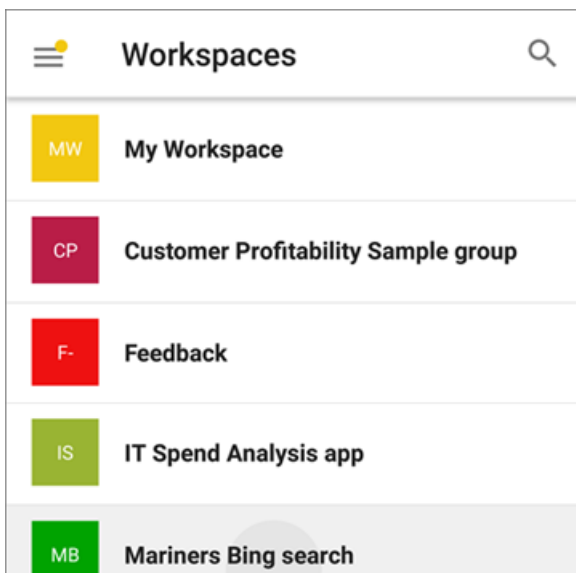
Here you'll find dashboards that colleagues have shared with you. You can filter by the owner of the dashboard or search to find what you're looking for. For shared content you visit frequently, you can favorite it right from **Shared with me** by tapping the ellipsis (...).



5 Workspaces

Also called *App workspaces*, these are staging environments in the Power BI service (<https://powerbi.com>) where you can collaborate with colleagues to create a collection of dashboards and reports. Then you distribute the collection as an *app*.

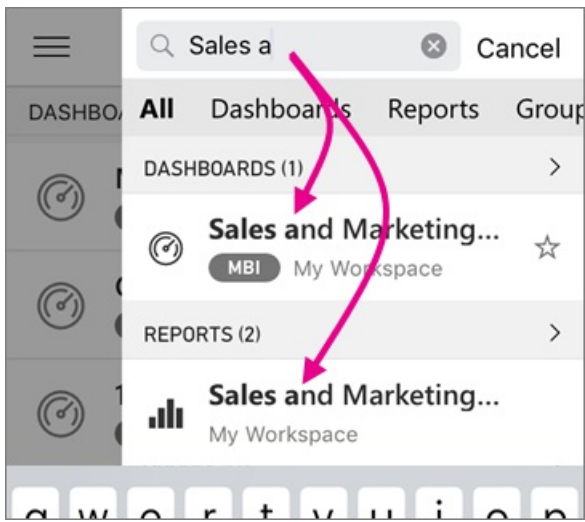
In the mobile apps, you can view and interact with content in any workspace where you're a member or an admin. You can't publish apps from workspaces in the mobile apps.



Read more about [apps in the Power BI service](#).

Search

You can always search for your Power BI contents, from the **Favorites**, **Apps**, **Shared with me**, or **Workspaces** pages. The search results will show you all the dashboards, reports, and apps from every location that match your search.



Next steps

- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

What's new in the mobile apps for Power BI

1/17/2018 • 19 min to read • [Edit Online](#)

For related "What's New" information, see:

- [Power BI team blog for the mobile apps](#)
- [What's new in Power BI Desktop](#)
- [What's new in the Power BI service](#)

December 2017

Improved security management

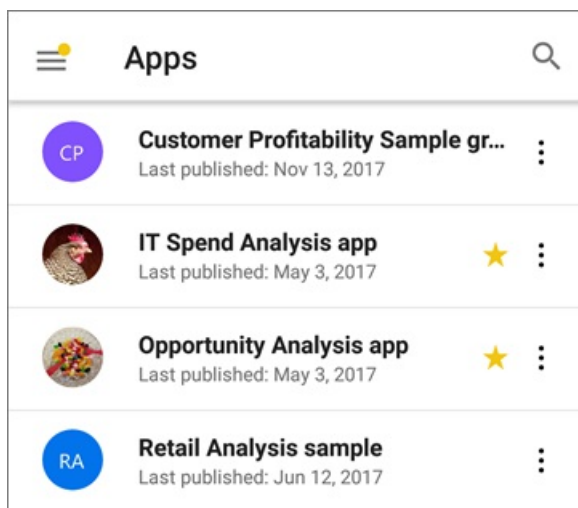
We've added support for conditional access (CA) and Microsoft Intune mobile device management (MDM) on Android devices, to better secure your organization's data. It's already available on iOS.

Improved permission management

We've made some changes that allow for more precise management of user permissions for datasets, dashboards, and reports.

Auto-installed apps

You don't need to install some of the apps in Power BI at all. Power BI app creators in your organization can create *apps* that contain a collection of dashboards and reports. Then they can publish the app and set it to install automatically in the Power BI service and the Power BI mobile apps. When an app is set to install for you, it automatically appears in your **Apps** menu:



November 2017

iPhone X optimization

We've optimized the app layout for iPhone X, so you can explore your data in style on every device.

October 2017

Filters for phone reports in Android

If you create a report with phone-optimized pages in Power BI Desktop, and the report has filters, you can now apply those filters in the phone report on your Android. Read more about filters for Power BI reports

on Android.

Show data in reports

You can now switch visuals in your reports to a table view to see the numbers behind the data. To access this feature, tap "Show data" from the visual's ... menu on your report or the new icon on the expanded visual's action menu.

Previous months

September 2017

Filters for phone reports in iPhones

If you create a report with phone-optimized pages in Power BI Desktop, and the report has filters, you can now apply those filters in the phone report on your iPhone. Read more about [filters for Power BI reports on iPhones](#).

August 2017

iOS proxy settings support

You can now set proxy settings in the Power BI iOS mobile app. This means that Power BI will now work with VPN connections on your mobile device, allowing more users and organizations to securely leverage the power of Power BI on the go.

July 2017

Read the [mobile apps feature summary for July 2017](#)

iOS devices

New Q&A experience on iOS (Preview) Instead of just receiving an answer to your question, you can now use natural language to get scoped insights. Even if you're not sure what you're looking for, Q&A proactively surfaces insights relevant to your data. The new Q&A experience on mobile, developed in collaboration with the Microsoft Research team, showcases powerful technologies within our product. Try the tutorial, [Ask questions about your data in the iOS mobile apps](#).

Responsive visuals

Responsive visual for phone reports and dashboards You can set the visuals in your dashboard or report to be *responsive*, to change dynamically to display the maximum amount of data and insight, no matter the screen size. Read the [blog about responsive visuals](#).

June 2017

All devices

Make apps favorites You can already make a dashboard a favorite. Recently, [Power BI added apps](#), and now you can make apps favorites, too.

May 2017

All devices

New menu: Shared with me Go to Shared with me in the mobile app menu to see all the content that's been shared with you.

New menu: Apps An app is a collection of dashboards and reports built by your organization to deliver key metrics for faster and easier data-driven decisions.

Read more about [how your Power BI content is organized](#).

iOS and Android devices

Power BI Report Server preview Create and publish Power BI reports on premises. Then [view and interact with them in your iOS or Android](#) mobile device.

April 2017

Read the [mobile apps feature summary for April 2017](#)

All devices

Background color for phone reports When you define a background color for a report in Power BI Desktop, the phone report will have the same background color. More about [optimizing report pages for phones](#).

Develop mobile-friendly custom visuals Read this [Developer guide](#) for tips on creating custom visuals that look good and work well on mobile devices.

iOS devices

Talk to your data: ask questions by speaking Now you can [ask questions of your data with Q&A](#) by talking rather than typing.

March 2017

Read the [mobile apps feature summary for March 2017](#).

All devices

Slicer interactions

We've improved touch interaction for time slicers.

iOS devices

Ask questions of your data with Q&A - and give us feedback Try asking questions of your data with Q&A, and then give us a smiley or frowny face to let us know how we did.

Use 3D touch for common actions Deep-press the Power BI app icon on the home screen of your iPhone 6s or later to access notifications, search, and recently used dashboards.

Support for right-to-left languages Power BI mobile apps now support right-to-left languages. In this context, "right-to-left languages" refers to Hebrew and Arabic writing systems, which are written from right to left and require contextual shaping. See the list of [Supported languages in the Power BI mobile apps](#).

Android devices

Connect to more than one SSRS server

Now you can have connections to up to five SQL Server Reporting Services (SSRS) servers at the same time.

Request access to dashboards

If you scan a QR code for a dashboard that you don't have access to, now you can submit a request for access right from the mobile app.

February 2017

All devices

Scrolling made easier

Now you can scroll in bar and column charts in a report by touching the chart itself, rather than touching the scroll bar on the side.

iOS devices

Ask questions of your data with a preview of Q&A

With Q&A, you ask questions about your data in your own words, and Power BI provides the answers. Q&A is already in the Power BI service on <http://powerbi.com>. Now it's also [available in the mobile app on your iPhone or iPad](#).

Connect to more than one SSRS server

Now you can have connections to up to five SQL Server Reporting Services (SSRS) servers at the same

time.

Android tablets

The Power BI mobile app for Android tablets is now available globally. Get started with the [Power BI on your Android tablet](#).

iOS and Android devices

New menu for dashboard tiles Navigate to the underlying report, expand the tile, or manage an alert, all directly from a menu on the tile on a dashboard.

This menu is new for iOS, Android phones in landscape mode, and Android tablets. It was already in Windows and Android phones in portrait modes.

January 2017

Read the [January 2017 mobile apps blog feature summary](#).

All devices

Load more than 100 rows in tables and matrices Now, if you have a large table or matrix on your dashboard or report, we show as much data as possible in the tile. Then in focus mode, you can scroll down to load additional rows.

Phone report - general availability Power BI phone reports are now generally available. In Power BI Desktop, you can tailor a portrait view of an existing report for mobile viewers. Learn more about [authoring phone reports in Power BI Desktop](#) and the [report experience on phones](#).

iOS

SSRS Authentication using Active Directory Federation Services (ADFS) Preview Now you can sign in to on-premises SQL Server Reporting Services servers from your mobile device with your organizational account. Read more about [using OAuth to connect to SSRS servers](#).

Android

SSRS Authentication using Active Directory Federation Services (ADFS) Preview Now you can sign in to on-premises SQL Server Reporting Services servers from your mobile device with your organizational account. Read more about [using OAuth to connect to SSRS servers](#).

New and improved: Annotate and share insights quickly Sharing and annotating are now fully functional on Android devices. The improved menu makes it easier and quicker to annotate and share insights, and you can also share an annotated report or directly from the Power BI app.

December 2016

Read the [December 2016 mobile apps blog feature summary](#).

All devices

Offline background refresh

To make sure you can access your latest data while offline, we perform a refresh in the background of the app so your business information is up to date, even if you haven't accessed it for a while. To make sure certain dashboards are always up to date, just mark them as favorites. Learn more about [offline capabilities in the Power BI mobile apps](#).

iOS devices

Annotate and share

Now you can annotate and share a tile, report, or visualization from the Power BI mobile app for iOS.

- [On the iPhone](#)
- [On the iPad](#)

Request access to dashboards

If you scan a QR code for a dashboard that you don't have access to, now you can submit a request for access right from the mobile app.

Custom URL on image tile

If an image tile has a custom URL defined by the dashboard owner, when you tap the tile you go directly to that URL without opening the tile in focus mode.

iPhone

Apple watch improvements

You can now refresh Apple Watch data directly from the Watch app. In the dashboard index page, deep press to refresh your data. (The Power BI mobile app must be running in the background on your iPhone for this to work).

Android

Custom URL on image tile

If an image tile has a custom URL defined by the dashboard owner, when you tap the tile you go directly to that URL without opening the tile in focus mode. Also, dashboard tiles containing predefined custom URLs can now redirect readers to reports within the app.

November 2016

Read the [November 2016 Power BI mobile apps feature summary](#).

Android tablets

Power BI mobile app for Android tablets Yes, the preview is here.

- Experience [Power BI on your Android tablet](#)
- Explore [Reporting Services mobile reports and KPIs on your Android tablet](#)

Android devices

Preview: Intune Mobile Application Management Power BI support for Microsoft Intune Mobile Application Manager (MAM) is now in preview for Power BI Pro users on Android devices.

Favorites Tag your favorite dashboards on your Android device, and see all your [favorite Power BI dashboards and Reporting Services mobile reports and KPIs](#) collected in one convenient location.

iOS devices

Links URLs in tiles and visualizations are now clickable, and open in a browser.

Windows devices

Center a map to focus on data near you in your location

September/October 2016

Read the [October 2016 Power BI mobile apps feature summary](#).

All devices

Favorites as landing page If you've marked any of your dashboards as favorites, then your landing page will be your Favorites entry.

Improved navigation The main navigation has a new look, and groups navigation has moved to the groups catalog.

Report and dashboard performance improvements Improved the experience of loading reports and dashboards in the Power BI mobile apps

Enhanced alert notifications Notifications for your data-driven alerts now contain more information on what triggered the alert and why.

iOS on iPhones

Apple Watch refresh improvements The Apple Watch mobile app has been improved for Watch OS3

Android phones

Added manual tile refresh You can now manually refresh your dashboard tiles. For tiles based on DirectQuery, this will retrieve the latest data from the dataset.

Windows 10 phones

Geographic filtering On your Windows 10 phone you can now filter your report based on your current location, and see only the data you need.

SandDance visualization This custom visualization is now available on the Surface Hub

August 2016

All phones

Favorites View your favorite dashboards from all Power BI mobile apps, and manage the list of favorites from the Power BI mobile apps for iOS and Windows 10 devices. Read more about [favorites in the Power BI mobile apps](#).

Dashboard data classification See the data classifications that dashboard owners have assigned their dashboards. Read more about [classifying dashboards](#).

Data-driven alerts Get notified by an alert when your data changes in pre-set ways for KPI, gauge, and card tiles. Learn more about:

- [Alerts on the Power BI app for Android phones](#).
- [Alerts on the Power BI apps for iOS](#).
- [Alerts on the Power BI app for Windows 10 devices](#).

iOS on iPhones and iPads

Tiles full-screen in focus mode on iPad When you tap a tile on your iPad, the tile will now open full-screen in focus mode, taking advantage of the entire iPad screen size.

Manually refresh tiles Manually refresh your tiles by opening the dashboard in the Power BI mobile app for iOS and pulling down from the top of the screen.

Support for Intune MAM Added support for Microsoft Intune mobile application management (MAM) capabilities.

Read more about [Microsoft Intune on Power BI mobile apps](#).

Windows 10 devices

Full-screen and presentation modes Display reports in presentation mode on Surface Hub, and display dashboards, reports, and tiles in full-screen mode on Windows 10 devices.

July 2016

All phones

In the Power BI service you can now [create a view of a dashboard specifically for phones](#) in portrait mode.

Android phones

Favorites tab Access all your favorite dashboards from a single location.

Improved security management Select a risk classification for the business data presented in a specific dashboard.

Improved warning and banners We've improved warnings and banners for the mobile app.

QR codes for report pages A QR code generated in the service will link to a specific page rather than the entire report.

Improved alerts Data-driven alerts are now formatted based on your device's locale.

iOS on iPhones and iPads

Improved security management Select a risk classification for the business data presented in a specific dashboard.

Mobile insights View summary data (max, min, and all) on clustered column chart tiles.

Improved manual refresh You can now manually refresh your dashboard tiles. For tiles based on Direct Query, this retrieves the latest data from the data model.

Improved warning and banners We've improved warnings and banners for the mobile app.

QR codes for report pages A QR code generated in the service will link to a specific page rather than the entire report.

General improvements We've improved error messages for tiles in the mobile app.

Windows 10 devices

Improved security management Select a risk classification for the business data presented in a specific dashboard.

Improved warning and banners We've improved warnings and banners for the mobile app.

June 2016

See the [June Power BI mobile apps blog post](#) for more details.

QR codes now display in augmented reality (iOS)

Now when you scan a QR code generated by the Power BI service, the tile renders in augmented reality.

More about [connecting to data in the real world](#).

Filter data with barcodes (iPhone)

Now you can scan barcodes printed on products or shelves at your store to display related Power BI reports filtered by the scanned value.

More about [filtering your data with barcodes](#).

SQL Server 2016 Reporting Services mobile reports

Now you can drill through from a Reporting Services KPI or a mobile report to another mobile report or to any custom URL.

Notification center

The notification center in your Power BI mobile app shows new data or dashboards that are shared with you, or changes to groups you belong to.

May 2016

iOS devices and Android phones

- **QR codes** are now available **for reports**, too. Scan the code with your Power BI app to go directly to a related report, with no navigation or search needed.
- **Improved data management** for SQL Server 2016 Reporting Services: Reduced load times and data consumption on your device.
- **SQL Server 2016 themed mobile reports**: See themes for mobile reports on your device.
- **Geofiltering**: Filter reports by your current location.

April 2016

See the [April Power BI Mobile Apps blog](#) for more details.

All apps

- Select more than one option in a report slicer.

Android mobile app

- **SQL Server 2016 Reporting Services mobile reports** now on Android phones.
- **Report gallery** Open your reports directly in the report gallery.
- **NTLM authentication** support for mobile reports in SQL Server 2016 Reporting Services.

Power BI app for Windows 10 devices

- **Presentation mode** Display Power BI dashboards and reports in presentation mode from the Power BI app.
- **SQL Server 2016 Reporting Services mobile reports** now on Windows 10 devices.
- See **data tooltips** when you hover your mouse over a dashboard tile.

March 2016

Read the [Power BI Mobile Apps blog for March 2016](#).

iPhone mobile app

Apple Watch View your Power BI tiles and KPIs on your [Apple Watch](#).

iOS 9.0 and later To accommodate the best possible experience and new features for Power BI, we are now supporting only devices running iOS 9.0 and later.

Global search Added a new “recently viewed” list and global search so you can find the data you need quickly.

Report gallery Open your reports directly in the report gallery.

Fresh data offline New background refresh automatically updates your cached data when you’re online, so you have the freshest data [even when you're offline](#).

Bing and R tiles Open Bing and R tiles in focus mode.

Android mobile app

SQL Server 2016 mobile reports and KPIs [View SQL Server 2016 mobile reports and KPIs](#), and navigate between SSRS folders.

View reports Open reports from tiles on your dashboards.

Fresh data offline New background refresh automatically updates your cached data when you’re online, so you have the freshest data [even when you're offline](#).

Power BI app for Windows 10 devices

Quick access Access your dashboards, reports, and groups quickly with a new “recently viewed” list and global search so you can find the data you need.

Bing and R tiles Open Bing and R tiles in focus mode.

More live tiles on your Start screen [Pin KPIs and row cards to your Start screen](#) as live tiles, so you can see all of your critical metrics at a glance.

Pinch to zoom Use pinch-to-zoom on your tablet to examine dashboards in greater detail.

Notifications Get notified when your datasets, reports, and dashboards update with new data.

Report gallery Open your reports directly in the report gallery.

February 2016

Android

View dashboards in [landscape mode on Android phones](#).

Power BI app for Windows 10 devices

View dashboards in [landscape mode in Windows 10 phones](#).

View [reports on your Windows 10 phone](#).

Faster time to [insights on your Windows 10 mobile dashboards](#): Share a tile snapshot or open a report directly from the dashboard.

January 2016

All of the January improvements are already in the new [Power BI app for Windows 10 phones](#), released in December 2015. Now they're rolling out to the other Power BI apps for mobile devices. Read the blog post about these improvements.

Real-time data support Dashboards refresh in real time, so you don't need to refresh them manually.

Offline indicators When you don't have signal, you see an offline indicator at the top of your dashboard.

Access cached data Cached data no longer expires, so you have access to your cached data indefinitely while offline.

R tiles and web widgets View these new tile types in dashboards on your mobile device.

Bing dashboards In the Power BI service, you can now create [dashboards with Bing search results](#), and view them on your mobile device.

Report pages pinned as tiles to dashboards Now that you can pin a whole report page to a dashboard in the Power BI service, you can view report pages in the Power BI app on your iPhone or on your Android phone.

December 2015

The Power BI team ended 2015 strong, with several major additions and updates.

SQL Server 2016 Reporting Services mobile reports in iOS

Now you can view your SQL Server mobile reports in the Power BI app on your iOS device, be it iPad or iPhone. Read more:

- [SQL 16 SSRS on Power BI app for iOS](#) blog post
- View [SQL Server mobile reports and KPIs in the iPhone and iPad apps](#) documentation

Power BI app for Windows 10 phones

The new Power BI app for Windows 10 phones is optimized for touch and mobile productivity. Explore dashboards and reports, invite colleagues to view data, and share insights over email to engage your team. Plus you can [pin Power BI dashboards to your Windows phone Start screen](#).

- Read the [Power BI app for Windows 10 phones blog post](#).
- [Get started with the Power BI app for Windows 10 phones](#).

Other additions

Read the [Power BI mobile apps December blog post](#) for more details.

- Receive notifications when a colleague shares a dashboard with you. (iOS)
- View entire pinned report pages in your dashboards. (iOS and Android)
- [Scan a QR code](#) and go directly to a relevant tile on your Android phone.

November 2015

Read the [November 2015 Power BI mobile blog post](#).

All Power BI mobile apps

- A new welcome experience.
- Improved chart data capacity.

iOS and Android mobile apps

- Enterprises can now [configure Power BI mobile apps for iOS and Android with Microsoft Intune](#) to manage devices and applications.

iPhone mobile app

- [Add a picture tile to a dashboard](#) directly from your iPhone.
- [Create QR codes in the Power BI service](#), then scan them from your iPhone to open the Power BI app to a specific tile.

The Power BI app for Windows devices

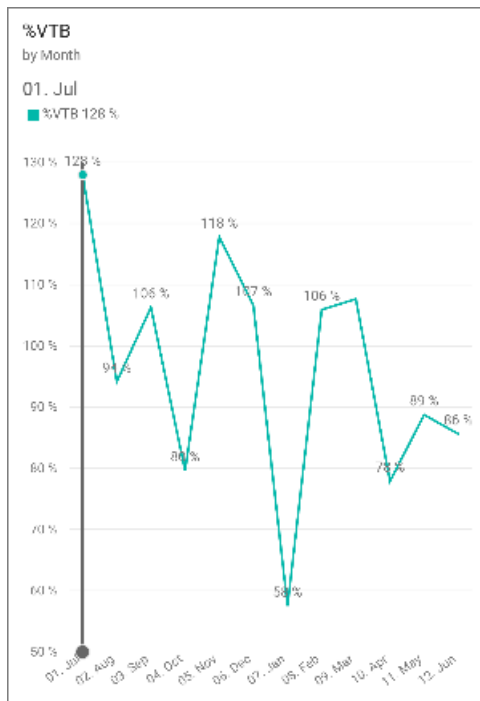
- [Link directly from a tile to a specific URL](#).

October 2015

Read the [mid-October Power BI mobile blog post](#).

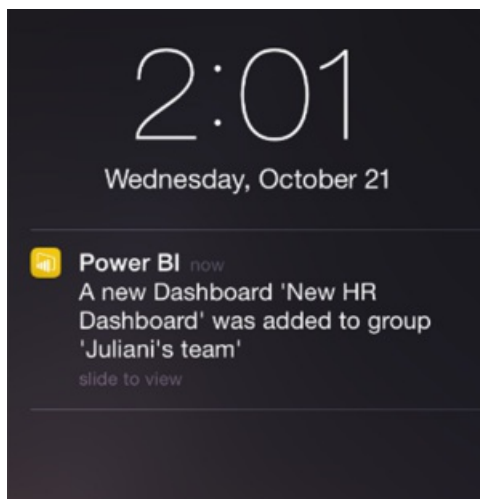
All Power BI mobile apps

- Line charts with a percentage-based Y-axis now calculate the visual range according to your actual data. The graph now starts from the lowest data point in the chart, instead of from a default value.
- Line, column, and bar charts can now have data labels.



iPhone

- Stay up to date with your groups' newest dashboards -- receive notifications on your iPhone each time a team member adds a dashboard to one of your groups.



- You can now view dashboards horizontally, just by turning your phone. Read more about [landscape mode in the iPhone app](#).



September 2015

Improvements in the Power BI mobile apps -- Android, iOS (iPhone and iPad), and Windows. Read the [mid-September Power BI mobile blog post](#).

Android

- Support for group workspaces: Collaborate with colleagues in group workspaces.
- Support for non-authenticated users: For the few scenarios when users fail or can't sign in to the app, we added a fast, convenient way to contact support and send feedback.
- Improved user experience when accessing dashboards using role-based security.
- Improved data formatting of charts and alignment of all dashboard tiles.

iOS (iPhone and iPad)

- New & improved navigation: New drawer navigation maximizes screen real estate and improves navigation throughout the app.
- Group workspaces: Collaborate with colleagues in group workspaces.
- Authentication process upgrade: Quality, performance, and functionality improvements enhance the app authentication process, including support for SSO (Single Sign-On).
- Improved data representation of line chart tiles to better compress the x-axis.
- Improved user experience when using with role-based security.
- Touch-optimized improvements for matrix chart tiles: Now you can easily scroll through your matrix data and view all its data easily and intuitively.
- Improved data formatting of charts and alignments of dashboard tiles.
- Removal of iOS 7 support: To maintain highest security standards for Power BI, we will no longer support iOS 7 installed devices. iOS 8 and above is required.
- Send feedback and rating added in app: Added in-app capability to send feedback and provide ratings so that we can increase the community's influence on our roadmap and promote issues easily and directly from the app.

Windows

- Improved map tile rendering in in-focus mode to maximize screen real estate.
- Improved user experience when accessing dashboards using role-based security.
- A new capability allows you to browse back and forth through dashboard tiles exploring them directly in in-focus mode without the need to return to the dashboard to select the next tile.
- Additional stability and performance improvements.

Explore your data on the Power BI mobile app for iOS devices

11/9/2017 • 1 min to read • [Edit Online](#)

The Microsoft Power BI app for iOS delivers the mobile BI experience on iPad, iPhone, Apple Watch, and iPod Touch. The apps provide live, touch-enabled mobile access to your important business information, so you can view and interact with your organization's Power BI dashboards and reports, and Reporting Services mobile reports and KPIs, from anywhere. Explore the data in your dashboards, and share them with your colleagues in email or text messages.



Go to Power BI (<https://powerbi.com>) to sign up for the Power BI service.

See [what's new in the Power BI mobile apps](#).

Power BI mobile app for iPhone, Apple Watch, and iPod Touch



Your **iPhone** goes everywhere with you, and the [Power BI mobile app for the iPhone](#) and the iPod Touch goes everywhere your iPhone goes. Besides viewing your Power BI dashboards and reports, you can also [add Power BI to your Apple Watch](#), and [annotate and share a tile, report, or visualization](#). You can even [scan a QR code with your iPhone](#) and go straight to a Power BI dashboard or report.

Download the [Power BI app for iOS](#) on an iPhone, Apple Watch, or iPod Touch and [get started](#).

Power BI mobile app for iPad



On your **iPad**, the Power BI mobile app displays dashboards and reports the way they were designed for the Power BI service. You can [set data alerts in the Power BI mobile app](#) to notify you when data in a dashboard changes beyond limits you set. If you have SQL Server Reporting Services, you can view your [KPIs and mobile reports](#) right on your iPad. Plus you can [filter a report by your geographic location](#).

Download the [Power BI app for iOS](#) on an iPad, and [get started](#).

Get started with Power BI

Start by [getting your data](#) from sources as varied as Excel spreadsheets, SQL Server Analysis Services, Salesforce,

and GitHub. Then bring your data together by creating [dashboards](#) and [reports](#) in Power BI.

Now experience your data in the Power BI apps for iOS.





Next steps

- Questions? [Try asking the Power BI Community](#)

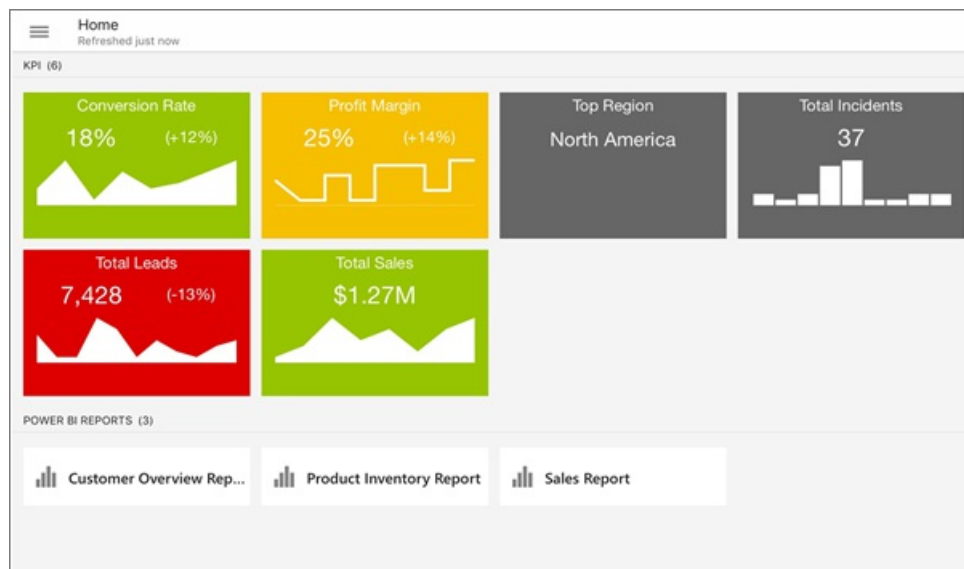
View on-premises report server reports and KPIs in the Power BI mobile apps

12/19/2017 • 3 min to read • [Edit Online](#)

Applies to:

			
iPhones	iPads	Android phones	Android tablets

The Power BI mobile apps deliver live, touch-enabled mobile access to your on-premises business information in Power BI Report Server and SQL Server 2016 Reporting Services (SSRS).



First things first



The mobile apps are where you view Power BI content, not where you create it.

- You and other report creators in your organization [create Power BI reports with Power BI Desktop](#), then [publish them to the Power BI Report Server](#) web portal.
- You create [KPIs right in the web portal](#), organize them in folders, and mark your favorites so you can find them easily.
- You [create Reporting Services mobile reports](#) with SQL Server 2016 Enterprise Edition Mobile Report Publisher and publish them to the [Reporting Services web portal](#).

Then in the Power BI mobile apps, connect to up to five report servers to view the Power BI reports and KPIs, organized in folders or collected as favorites.

Explore samples in the mobile apps without a server connection

Even if you don't have access to a Reporting Services web portal, you can still explore the features of Reporting Services mobile reports and KPIs.

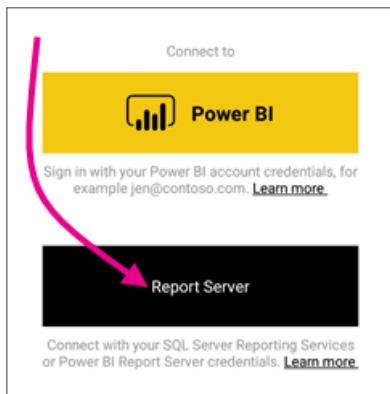
1. Tap the global navigation button  in the upper-left corner, then tap the gear icon in the upper right .
2. Tap **Reporting Services samples**, then browse to interact with the sample KPIs and mobile reports.





Connect to an on-premises server

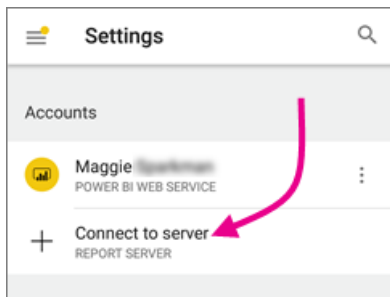
You can view on-premises Power BI reports, Reporting Services mobile reports, and KPIs in the Power BI mobile apps.

1. On your mobile device, open the Power BI app.
2. If you haven't signed in to Power BI yet, tap **Report Server**.



If you've already signed in to the Power BI app, tap the global navigation button , then tap the gear icon  in the upper-right.

3. Tap **Connect to server**.



The mobile app needs to access the server in some way. There are a few ways to do that:

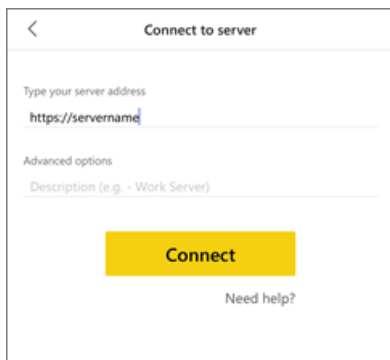
- Being on the same network/using VPN is the easiest way.
 - It's possible to use a Web Application Proxy to connect from outside the organization. See [Using OAuth to connect to Reporting Services](#) for details.
 - Open a connection (port) in the firewall.
4. Fill in the server address and your user name and password. Use this format for the server address:

```
http://<servername>/reports
```

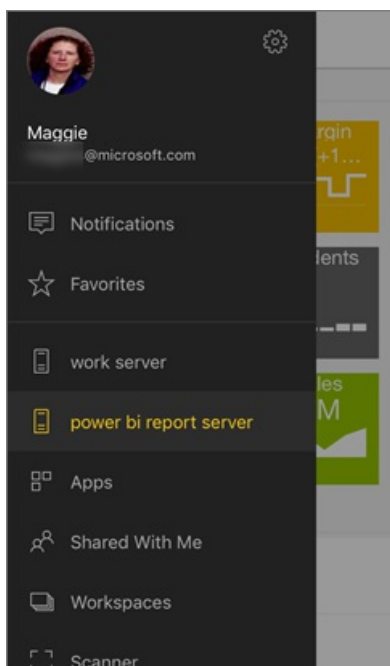
OR

```
https://<servername>/reports
```

Include **http** or **https** in front of the connection string.




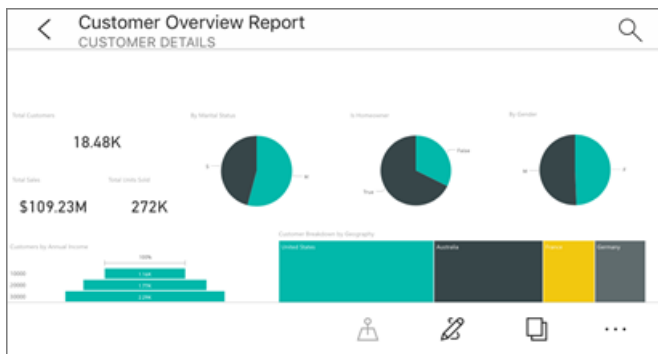
5. (Optional) Under **Advanced options**, you can give the server a friendly name, if you'd like.
6. Now you see the server in the left navigation bar--in this example, called "power bi report server."




View Power BI reports and KPIs in the Power BI app

Power BI reports, Reporting Services mobile reports, and KPIs are displayed in the same folders they're in on the Reporting Services web portal.

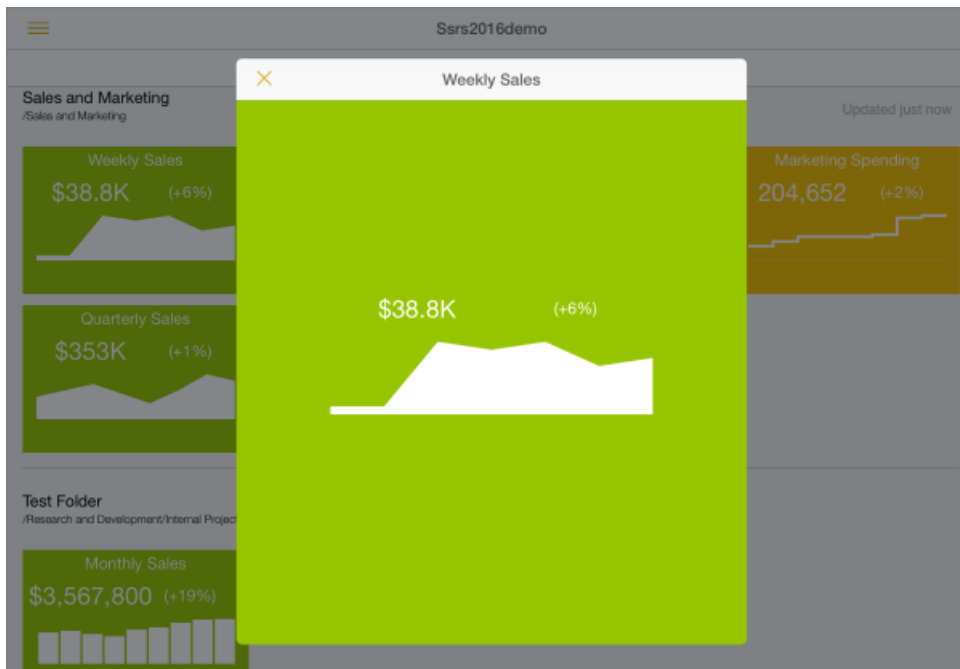
- Tap a Power BI report . It opens in landscape mode, and you can interact with it in the Power BI app.



- In Power BI Desktop, report owners can [optimize a report](#) for the Power BI mobile apps. On your mobile phone, optimized reports have a special icon, , and layout.



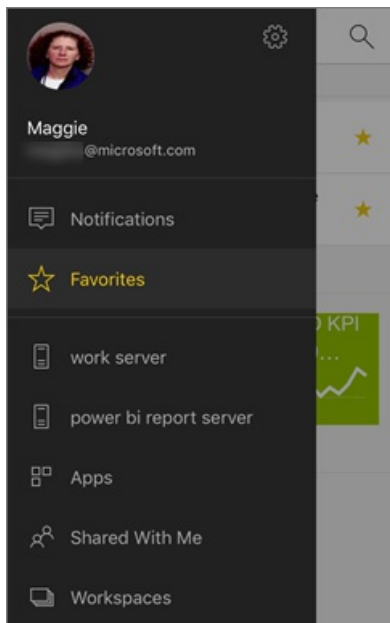
- Tap a KPI to see it in focus mode.



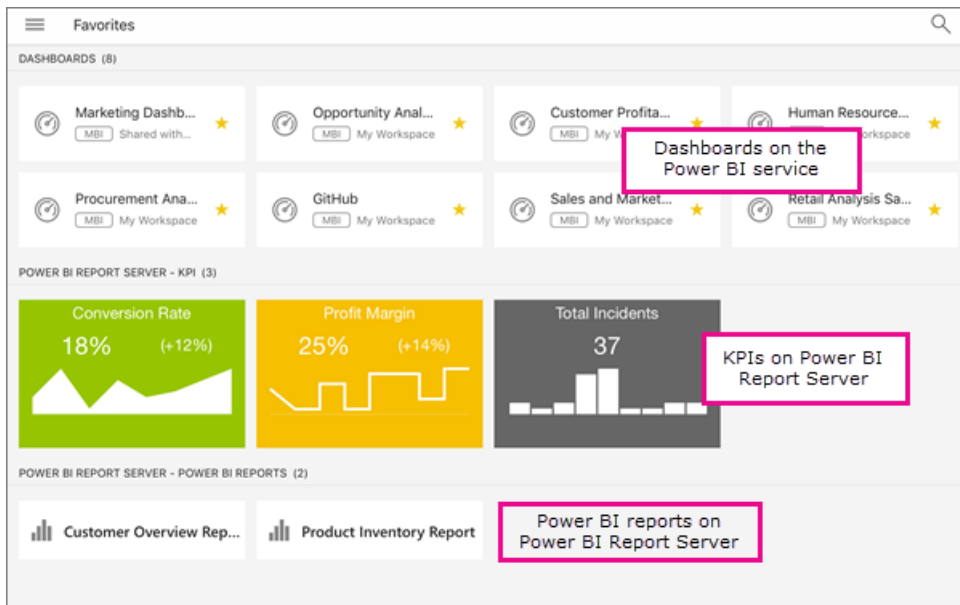
View your favorite KPIs and reports

You can mark KPIs and reports as favorites on the web portal, and then view them in one convenient folder on your mobile device, along with your Power BI favorite dashboards.

- Tap **Favorites**.



Your favorite KPIs and reports from the web portal are all on this page, along with Power BI dashboards in the Power BI service:



Remove a connection to a report server

1. At the bottom of the left navigation bar, tap **Settings**.
2. Tap the server name you don't want to be connected to.
3. Tap **Remove Server**.






Next steps

- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

View dashboards and reports in the Power BI mobile apps

1/17/2018 • 7 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	 Windows 10 devices
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

Dashboards are a portal to your company's life cycle and processes. A dashboard is an overview, a single place to monitor the current state of the business.

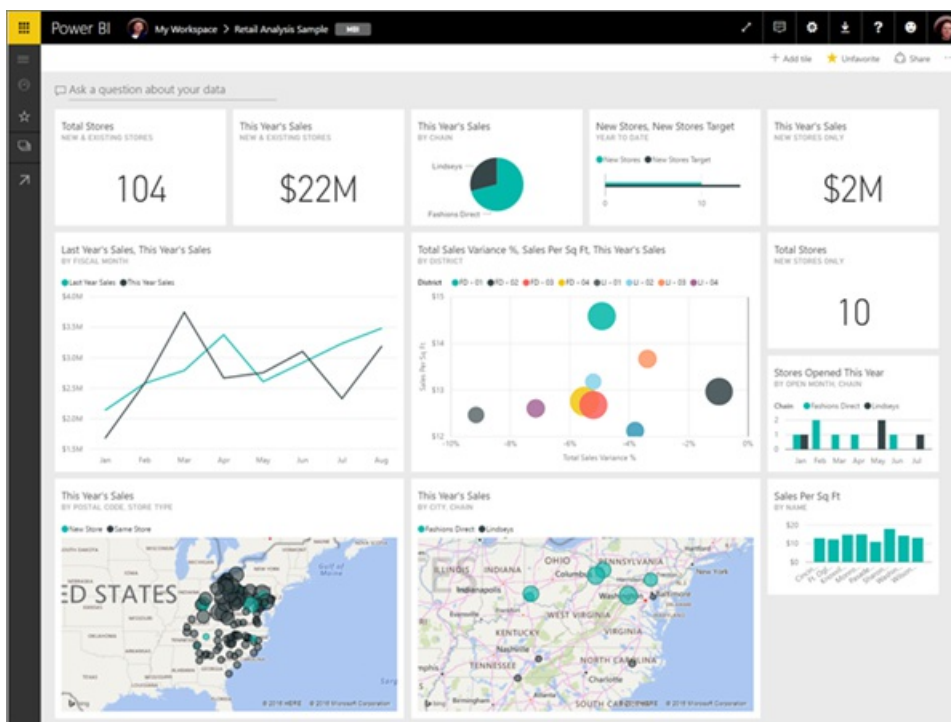
Create dashboards in the Power BI service (<https://powerbi.com>)

You don't create dashboards in the mobile apps.

To see dashboards and reports on your mobile device, you need to create or connect to them in a Web browser.

1. Go to the Power BI service (<https://www.powerbi.com>) and [sign up for an account](#).
2. [Create your own Power BI dashboards and report](#), or connect to existing [Power BI apps](#) for a variety of services, such as [Microsoft Dynamics CRM](#) and [Adobe Analytics](#).

Here's a Power BI dashboard in the Power BI service:

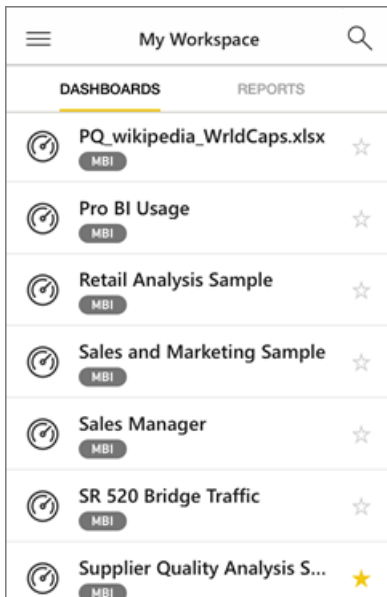




View dashboards on your iPhone

1. Open the Power BI app on your iPhone and sign in.

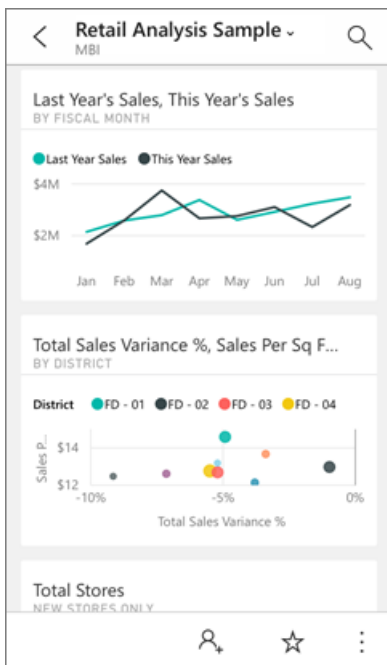
Need to [download the iPhone app](#) from the Apple App Store?

2. Tap a dashboard to open it.



- The yellow stars  show which dashboards are favorites.
- The notation below each dashboard name (in this case, "MBI")  shows how the data in each dashboard is classified. Read more about [data classification in Power BI](#).

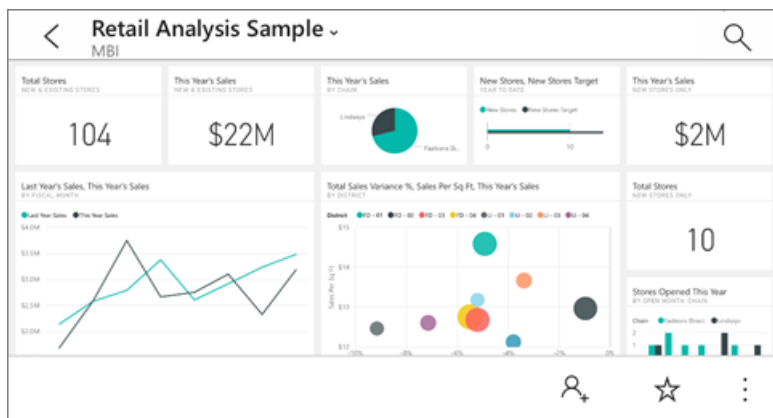
By default, Power BI dashboards look a little different on your iPhone. All the tiles appear the same size, and they're arranged one after another from top to bottom.





TIP

If you're the dashboard owner, in the Power BI service you can [create a view of the dashboard specifically for phones](#) in portrait mode.

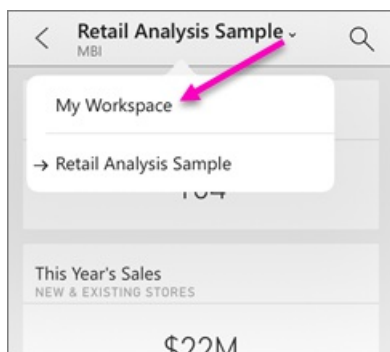
Or just turn your phone sideways to view the dashboard in landscape mode on your phone.



3. Swipe up and down to see all the tiles in the dashboard. You can:

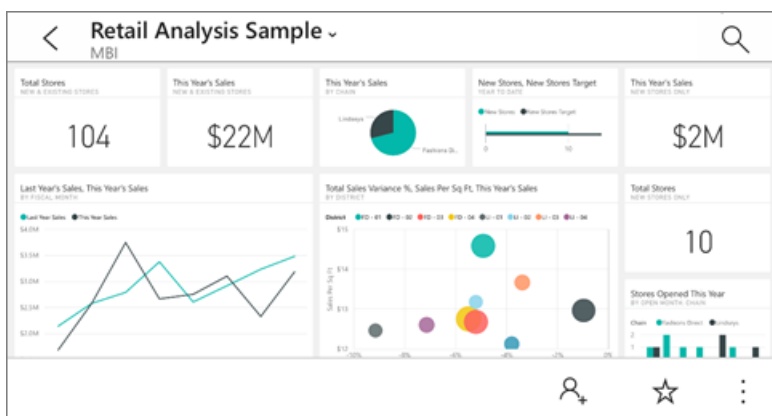
- Tap a tile to open it in focus mode and interact with it.
- Tap the star  to make it a favorite.
- Tap **Invite**  to invite a colleague to view your dashboard.
- Sync the dashboard with your Apple Watch.

4. To get back to the list of dashboards, tap the arrow next to the dashboard title, then tap **My Workspace**.



View dashboards in landscape mode in your iPhone

Just turn your phone sideways to view dashboards in landscape mode. The dashboard layout changes from a series of tiles to a view of the whole dashboard—you see all of the dashboard's tiles just as they are in the Power BI service.



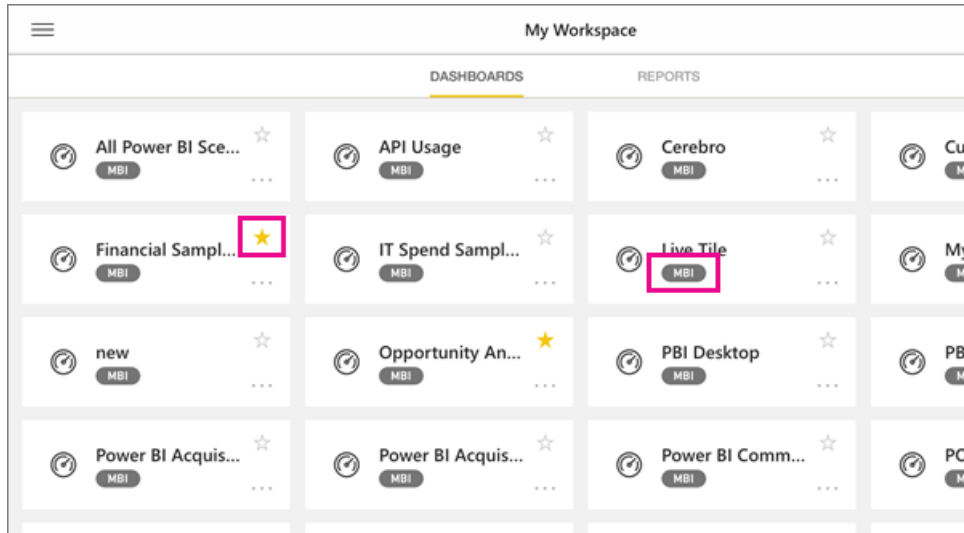
You can use the "pinch" gesture to zoom in and out on different areas of your dashboard, pan to navigate it. And you can still tap a tile to open the tile in focus mode and interact with your data.

View dashboards on your iPad

1. Open the Power BI app.

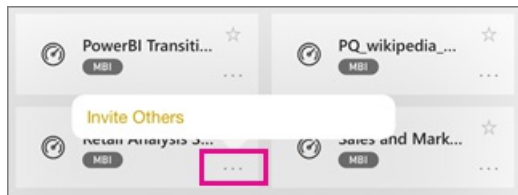
Need to download the iPad app from the Apple App Store first?

2. Tap **Dashboards** at the top of the app.



- The yellow stars ★ show which dashboards are favorites.
- The notation below each dashboard name (in this case, "MBI") shows how the data in each dashboard is classified. Read more about [data classification in Power BI](#).

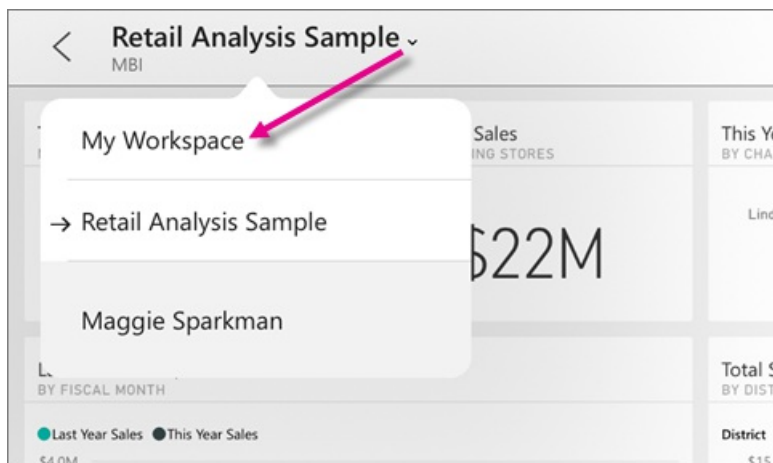
3. You can share a dashboard from your workspace. Tap the ellipsis (...) in the lower-right corner of the dashboard tile, and tap **Invite Others**.



4. You can also tap a dashboard to open it and see the tiles in that dashboard. While on the dashboard you can interact with it:

- [Tap a tile to interact](#) with the tile.
- [Open the reports](#) behind the tiles.
- [Invite others to view the dashboard](#).
- [Annotate and share a snapshot](#) of a tile.

5. To go back to My Workspace, tap the name of the dashboard in the upper-left corner, then tap **My Workspace**.

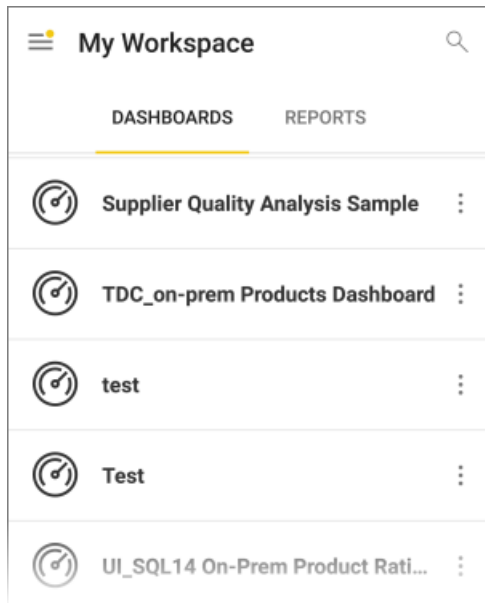


View dashboards on your Android phone

1. Open the Power BI app on your Android phone and sign in.

Need to [download the Android app](#) first?

2. Tap a dashboard to open it.



- Yellow stars ★ show which dashboards are favorites.
- A notation below a dashboard name (in this case, "MBI") shows how the data in each dashboard is classified. Read more about [data classification in Power BI](#).

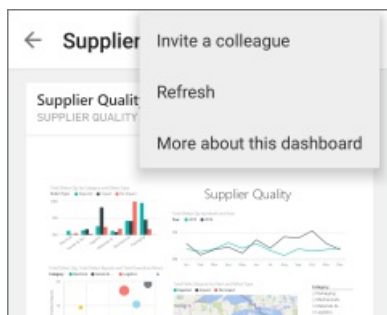
Power BI dashboards look a little different on your Android phone. All the tiles appear the same width, and they're arranged one after another from top to bottom.

! [Dashboard portrait view] (media/mobile-apps-view-dashboard/pbi_andr_dash.png)

Or just turn your phone sideways to view them in landscape mode on your phone.

> [AZURE.TIP] If you're the dashboard owner, in the Power BI service you can [create a view of the dashboard specifically for phones] (service-create-dashboard-mobile-phone-view.md) in portrait mode.

1. While on the dashboard, you can tap the vertical ellipsis (...) next to the name to invite a colleague, refresh, or get information about the dashboard:



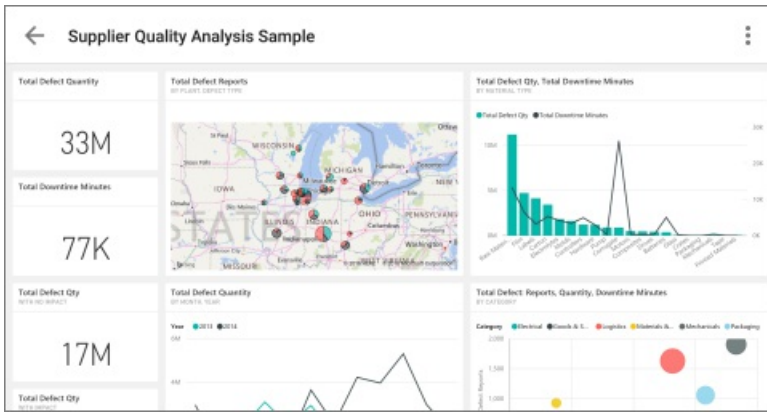
2. Swipe up and down to see all the [tiles in the dashboard](#).

3. To go back to the dashboards home page, tap the dashboard name to open the breadcrumb trail, then tap **My Workspace**.

View dashboards in landscape mode on your Android phone

You can also view dashboards in landscape mode, just by turning your phone. The dashboard layout changes

from a series of tiles to a view of the whole dashboard — you see all of the dashboard’s tiles laid out as they are in the Power BI service.



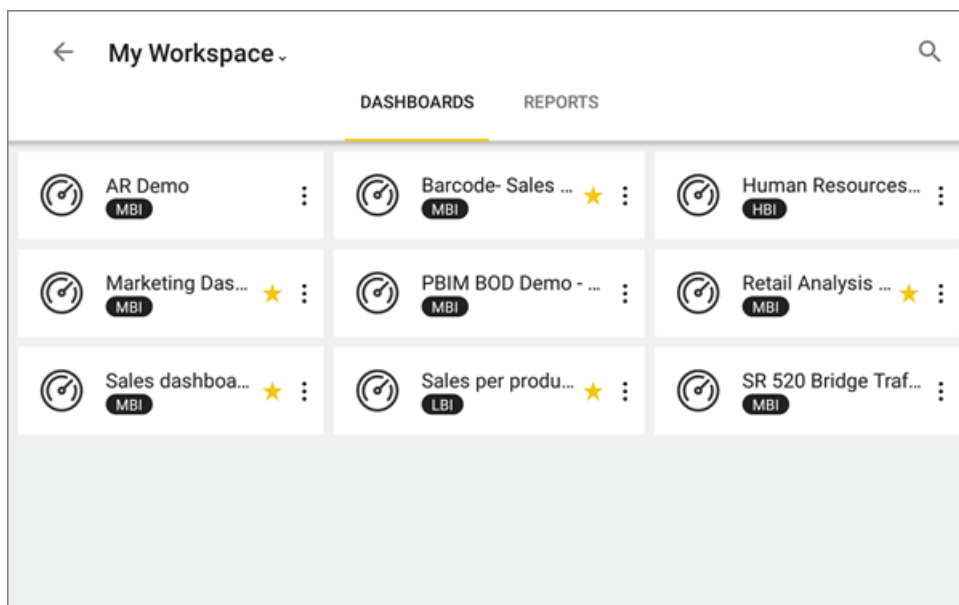
You can use the “pinch” gesture to zoom in and out on different areas of your dashboard, pan to navigate it. And you can still [tap a tile](#) to open the tile in focus mode and interact with your data.

View dashboards on your Android tablet

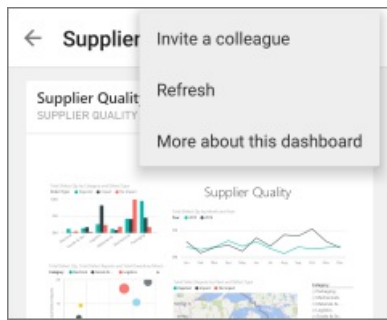
1. Open the Power BI app on your Android tablet and sign in.

Need to [download the Android app](#) first?

2. Tap a dashboard to open it.



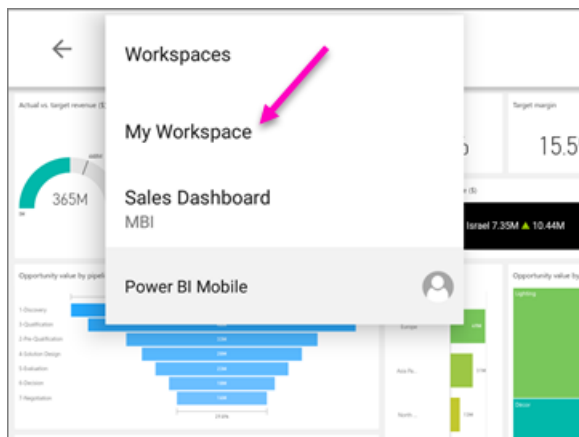
- The yellow stars ★ show which dashboards are favorites.
 - The notation below each dashboard name (in this case, "MBI") **MBI** shows how the data in each dashboard is classified. Read more about [data classification in Power BI](#).
3. While on the dashboard, you can tap the vertical ellipsis (...) next to the name to invite a colleague, refresh, or get information about the dashboard:



4. Swipe up and down to see all the [tiles in the dashboard](#).

You can use the “pinch” gesture to zoom in and out on different areas of your dashboard, pan to navigate it. And you can still [tap a tile](#) to open the tile in focus mode and interact with your data.

5. To go back to the dashboards home page, tap the dashboard name to open the breadcrumb trail, then tap **My Workspace**:



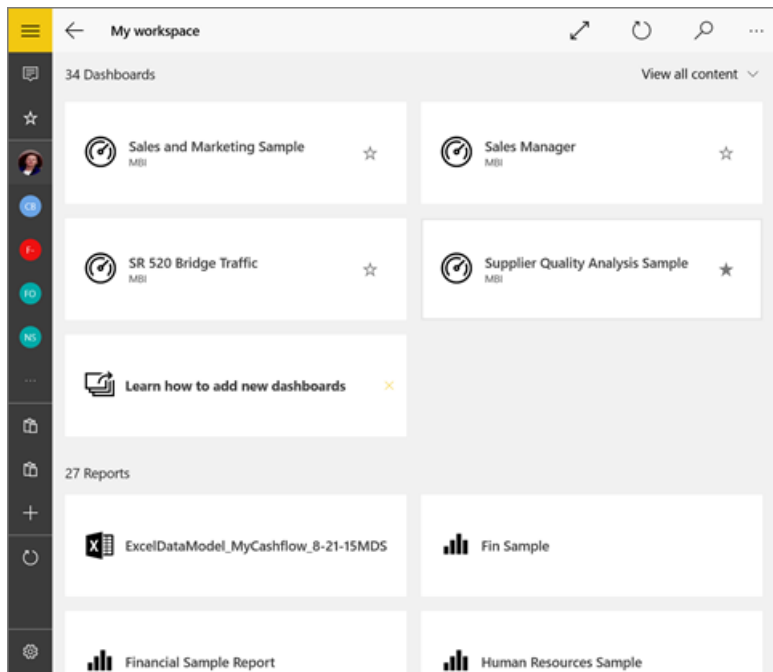
You can use the “pinch” gesture to zoom in and out on different areas of your dashboard, pan to navigate it. And you can still [tap a tile](#) to open the tile in focus mode and interact with your data.

View dashboards on your Windows 10 device

1. Open the Power BI app on your Windows 10 device and sign in.

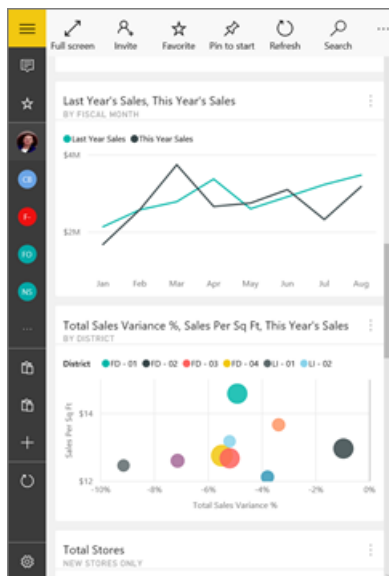
Need to [download the app](#) first?

2. Tap a dashboard to open it.



- The black stars show which dashboards are favorites.
- The notation below each dashboard name (in this example, **MBI**) shows how the data in each dashboard is classified. Read more about [data classification in Power BI](#).

Power BI dashboards look a little different on your Windows 10 phone. All the tiles appear the same width, and they're arranged one after another from top to bottom.






You can also turn your phone sideways to view dashboards in landscape mode on your phone.

TIP

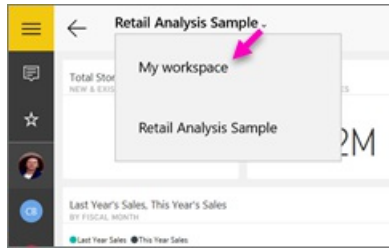
If you're the dashboard owner, in the Power BI service you can [create a view of the dashboard specifically for phones](#) in portrait mode.

3. In the dashboard, you can:

- Tap a [tile](#) to open and interact with it.
- Tap the **Full Screen** icon  to present your Power BI dashboard without borders or menus, like **Slide Show** view in PowerPoint.
- Tap the **Invite** icon  to [share your dashboard](#) with a colleague.

- Tap the star  to [make the dashboard a favorite](#).
- Tap the **Pin to Start** icon to [pin the dashboard to your Windows Start screen](#).

4. To go back to the dashboards home page, tap the dashboard name to open the breadcrumb trail, then tap **My Workspace**:



View dashboards in landscape mode on your Windows 10 phone

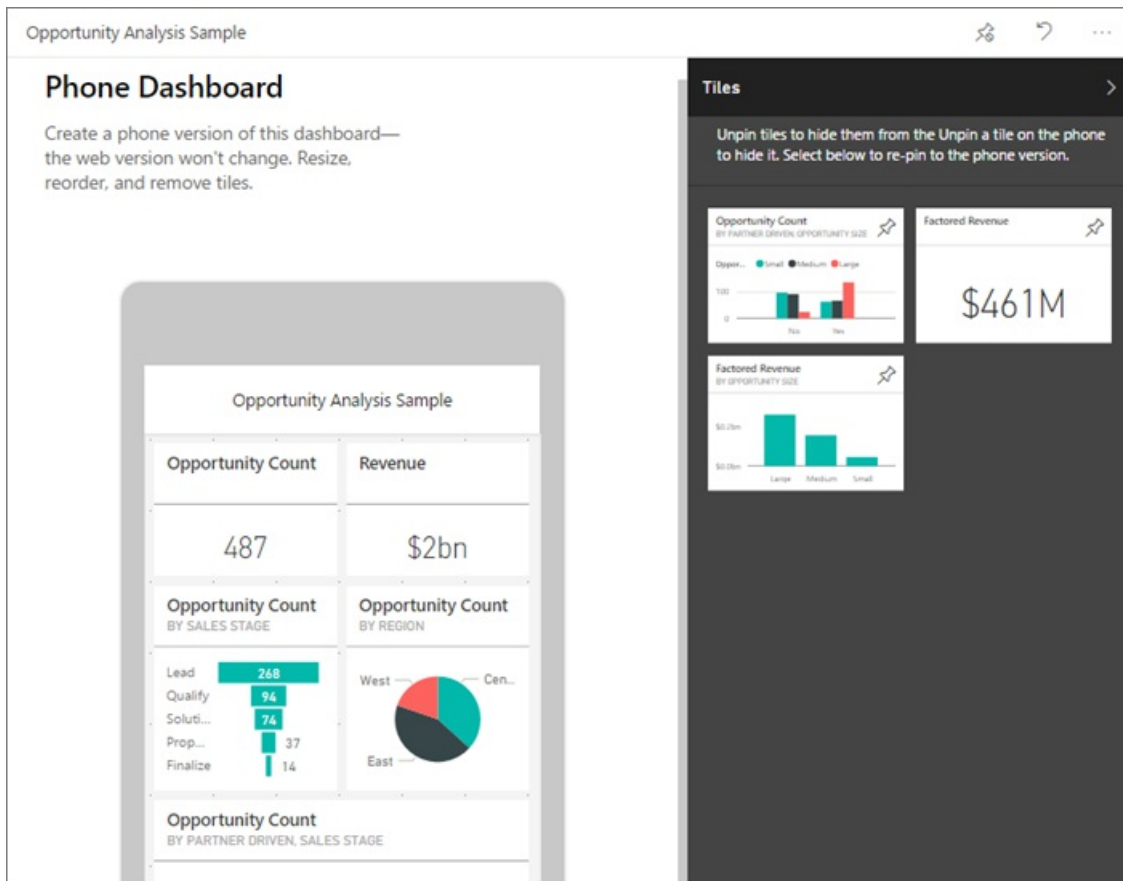
You can also view dashboards in landscape mode, just by turning your phone. The dashboard layout changes from a series of tiles to a view of the whole dashboard — you see all of the dashboard’s tiles laid out as they are in the Power BI service.



You can use the “pinch” gesture to zoom in and out on different areas of your dashboard, pan to navigate it. And you can still [tap a tile](#) to open the tile in focus mode and interact with your data.

Create a phone view of a dashboard in the Power BI service

If you're the dashboard owner, *in the Power BI service* you can create a view of the dashboard specifically for phones in portrait mode.



Read more about [creating a phone view of a dashboard](#).






Next steps

- [Download the Android app](#) from Google play
- [Get started with the Android app for Power BI](#)
- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Explore reports in the Power BI mobile apps

1/26/2018 • 3 min to read • [Edit Online](#)

Applies to:

				
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

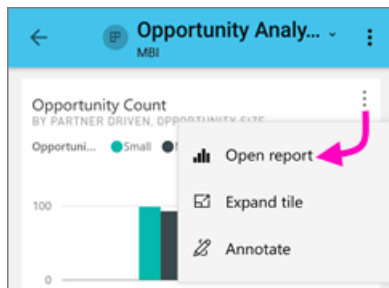
A Power BI report is an interactive view of your data, with visuals representing different findings and insights from that data. Viewing reports in the Power BI mobile apps is the third step in a three-step process.

1. [Create reports in Power BI Desktop](#). You can even [optimize a report for phones](#) in Power BI Desktop.
2. Publish those reports to the Power BI service (<https://powerbi.com>) or [Power BI Report Server](#).
3. Then interact with those reports in the Power BI mobile apps.

Open a Power BI report in the mobile app

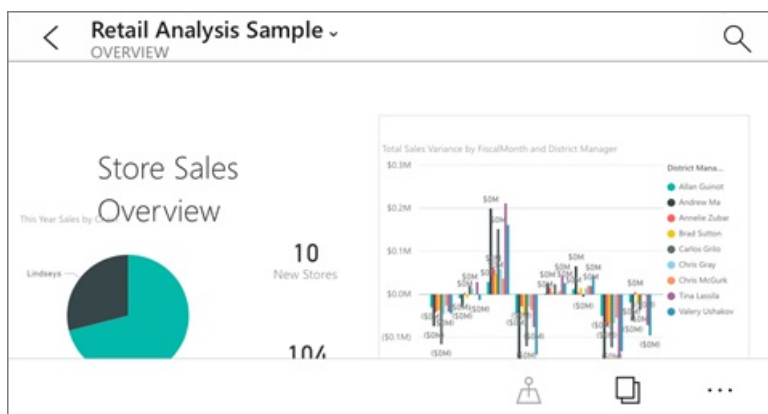
Power BI reports are stored in different places in the mobile app, depending on where you got them. They can be in Apps, Shared with me, Workspaces (including My Workspace), or on a report server. Sometimes you go through a related dashboard to get to a report, and sometimes they're listed.

- In a dashboard, tap the ellipsis (...) in the upper-right corner of a tile > **Open report**.




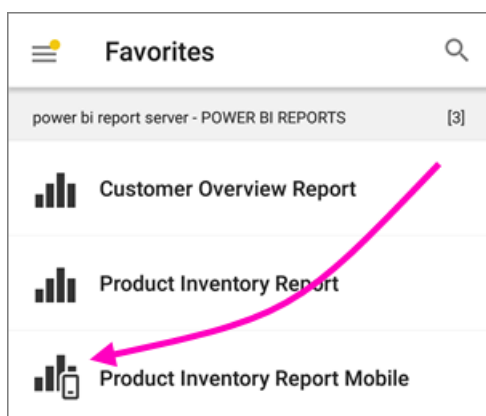
Not all tiles have the option to open in a report. For example, tiles created by asking a question in the Q&A box don't open reports when you tap them.

On a phone, the report opens in landscape mode, unless it's [optimized for viewing on a phone](#).

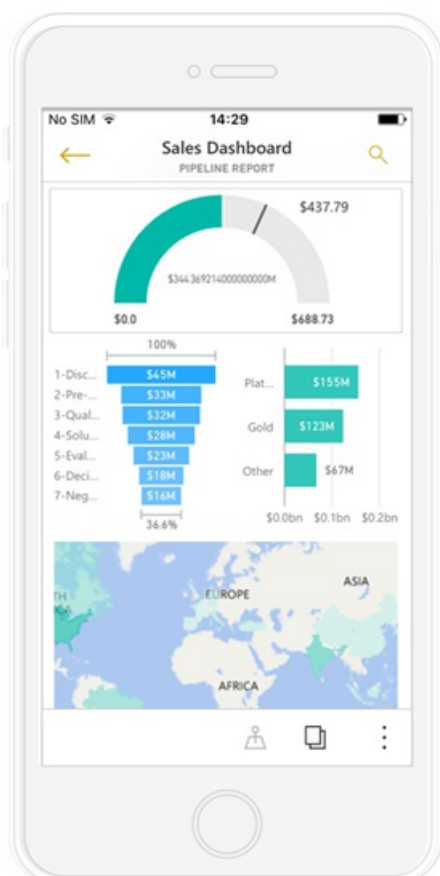


View reports optimized for phones

Power BI report authors can create a report layout specifically optimized for phones. Report pages optimized for phones have added functionality: for example, you can drill down and sort in visuals in focus mode, and you can access the [filters the report author added to the report page](#). In a list of reports, an optimized report has a special icon :



When you view that report on a phone, it opens in portrait view.



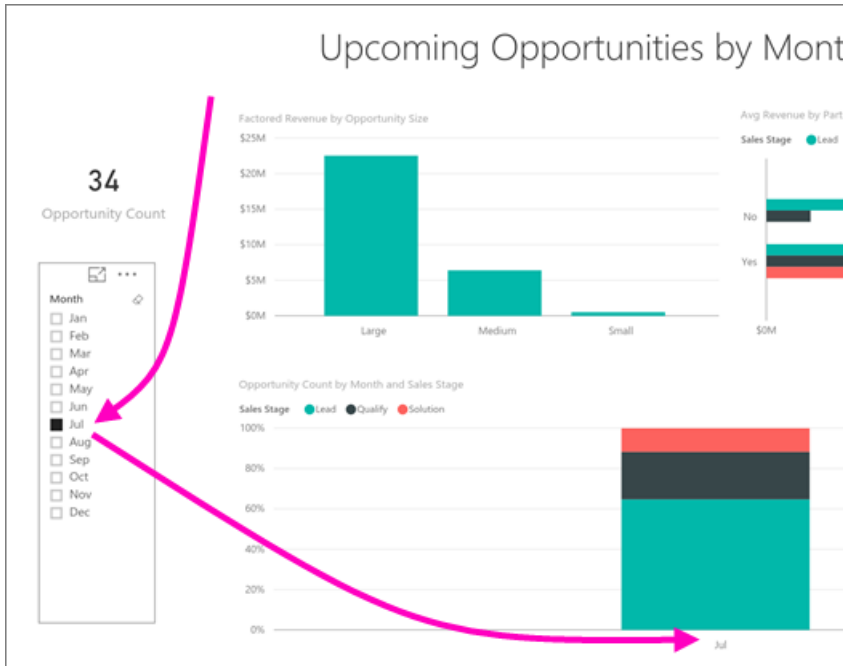
A report may have a mix of pages that are and aren't optimized for phones. If so, when you flip through the report the view will switch from portrait to landscape for each page.

Read more about [reports optimized for phone view](#).

Use slicers to filter a report page

When designing a report in Power BI Desktop or the Power BI service, consider [adding slicers to a report page](#). You and your colleagues can use the slicers to filter the page in a browser and in the mobile apps. When you view the report on a phone, you can see and interact with the slicers in landscape mode and in a page optimized for the phone's portrait mode.

- When you select a value in a slicer on the report page, it filters the other visuals on the page.

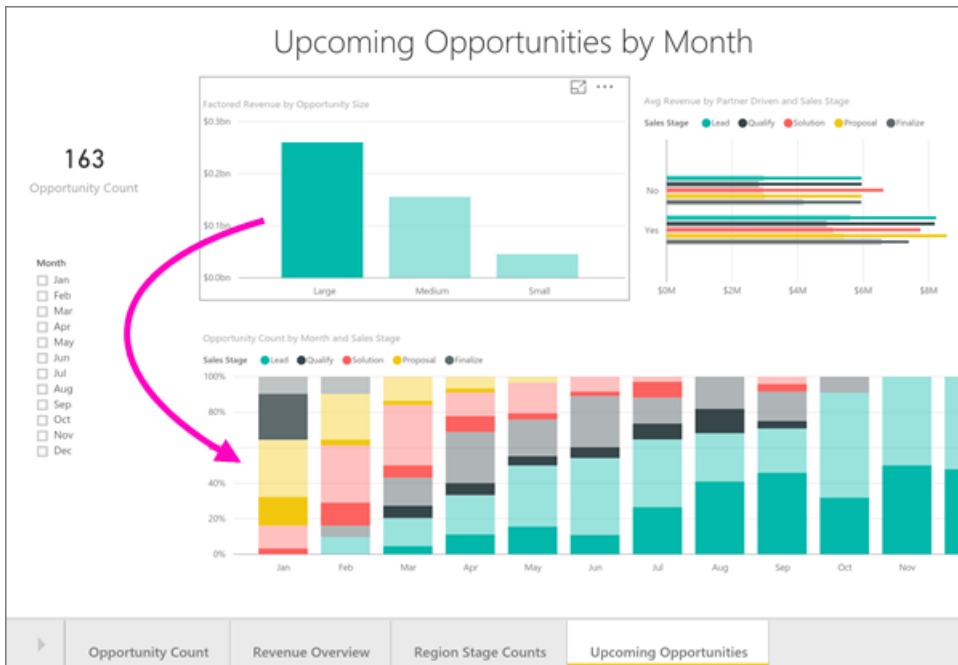


In this illustration, the slicer is filtering the column chart to show only July values.

Cross-filter and highlight a Power BI report page

When you select a value in a visual, it doesn't filter the other visuals. It highlights the related values in the other visuals.

- Tap a value in a visual.



Tapping the Large column in one visual highlights related values in the other visuals.

Sort a visual on an iPad or a tablet

- Tap the chart, tap the ellipsis (...) and tap the field name.






- To reverse the sort order, tap the ellipsis (...) again, then tap the same field name again.

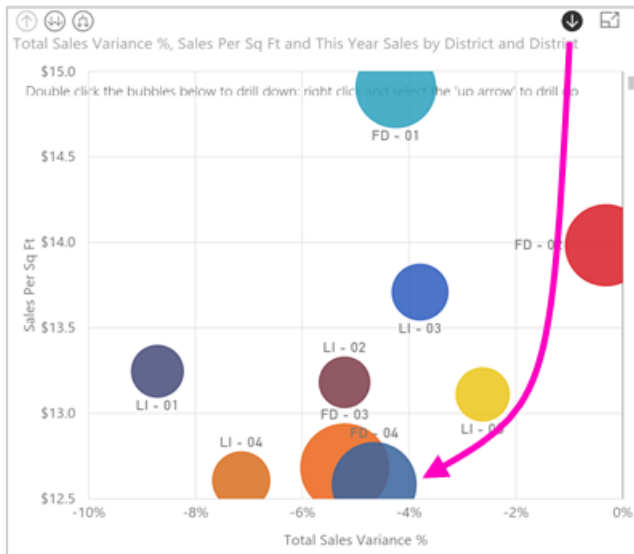
Drill down and up in a visual on an iPad or a tablet

If a report author has added this capability to a visual, on an iPad or a tablet you can drill down in a visual to see the values that make up one part of it. You [add drill down to a visual](#) in Power BI Desktop or the Power BI service.

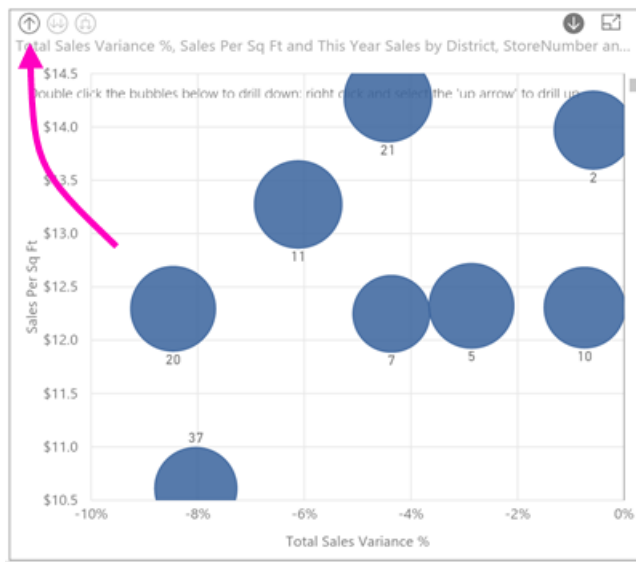
NOTE

Currently, drill-down doesn't work on maps in the iPad or tablet.

- Tap a visual. If it has up and down arrows in the upper corners   , then you can drill down. To drill down on one value, tap the arrow in the upper-right corner, then tap a value in the visual — in this case, the dark-blue FD-04 bubble.

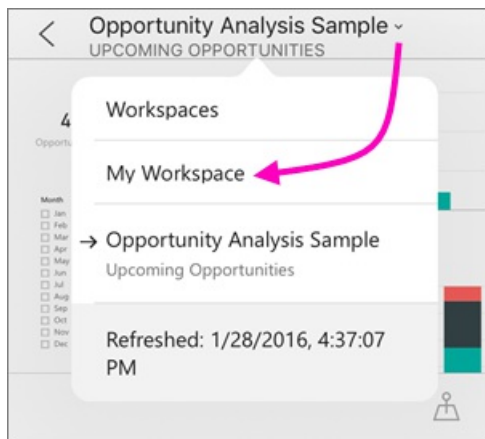


- To drill back up, tap the up arrow in the upper-left corner.



Go back to My Workspace

- Tap the arrow next to the report name > tap **My Workspace**.








Next steps

- [View and interact with Power BI reports optimized for your phone](#)
- [Create a version of a report optimized for phones](#)
- Questions? [Try asking the Power BI Community](#)

Explore tiles in the Power BI mobile apps

11/9/2017 • 4 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

Tiles are live snapshots of your data, pinned to a dashboard. Their values change as the data changes. **You add tiles to a dashboard in the Power BI service.**

Then in the Power BI mobile apps, you open tiles in focus mode and interact with them. You can open tiles with all kinds of visuals, including tiles based on Bing and R.

Tiles in the iOS apps

NOTE

You can [create picture tiles with your iPhone app](#) and save them to your dashboards.

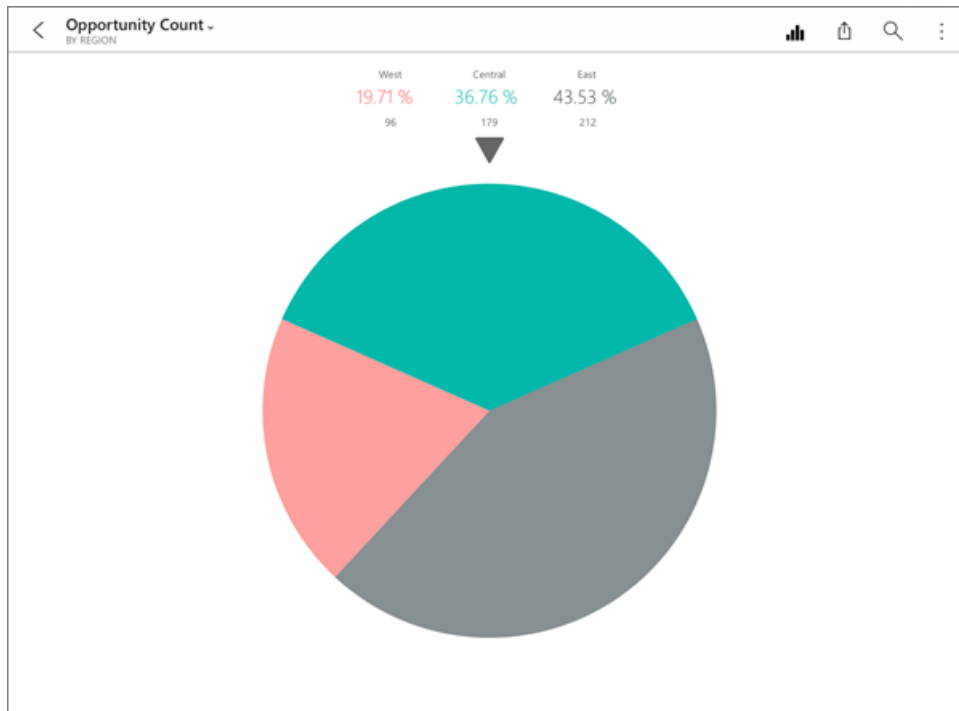
1. Open a [dashboard in the mobile app for iOS](#).
2. Tap a tile. It opens in focus mode, where it's easier to view and explore the tile data. In focus mode you can:

In a line, bar, or column chart, tap to view the values for specific parts of the visualization.

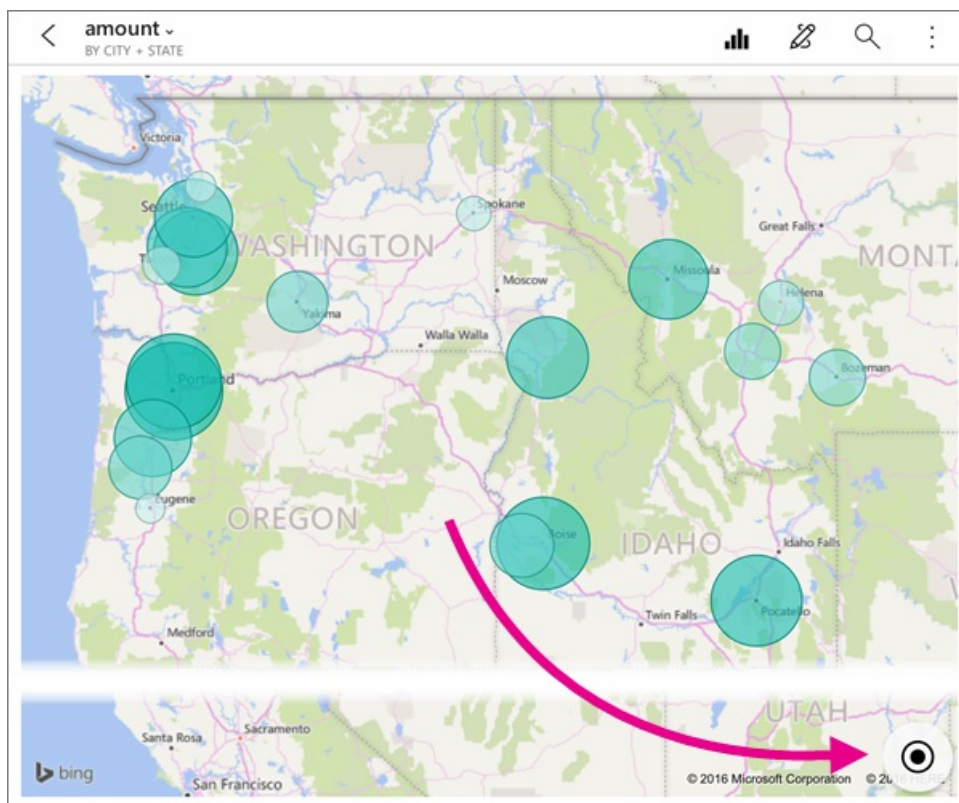




For example, in this line chart, the selected values are for **This Year Sales** and **Last Year Sales** in **August**.

In a pie chart, tap a slice of the pie to show the value of the slice at the top of the pie.



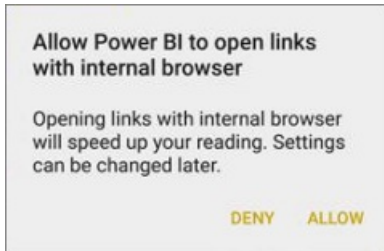
3. In a map, tap the **Center Map** icon  to center the map to your current location.




4. Tap the share icon  to [annotate and share a tile](#) with others.
5. [Add an alert to the tile](#). If the values go above or below targets, Power BI will notify you.
6. Sometimes the dashboard creator has added a link to a tile. If so, it has a link icon  when it's in focus mode:

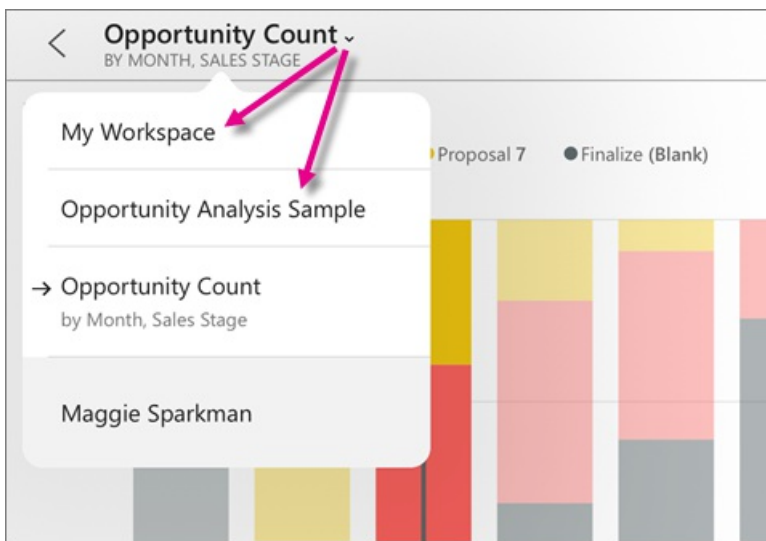


Links can go to other Power BI dashboards or to an external URL. You can [tap the link](#) to open it inside the Power BI app. If it's an external site, Power BI asks you to allow it.



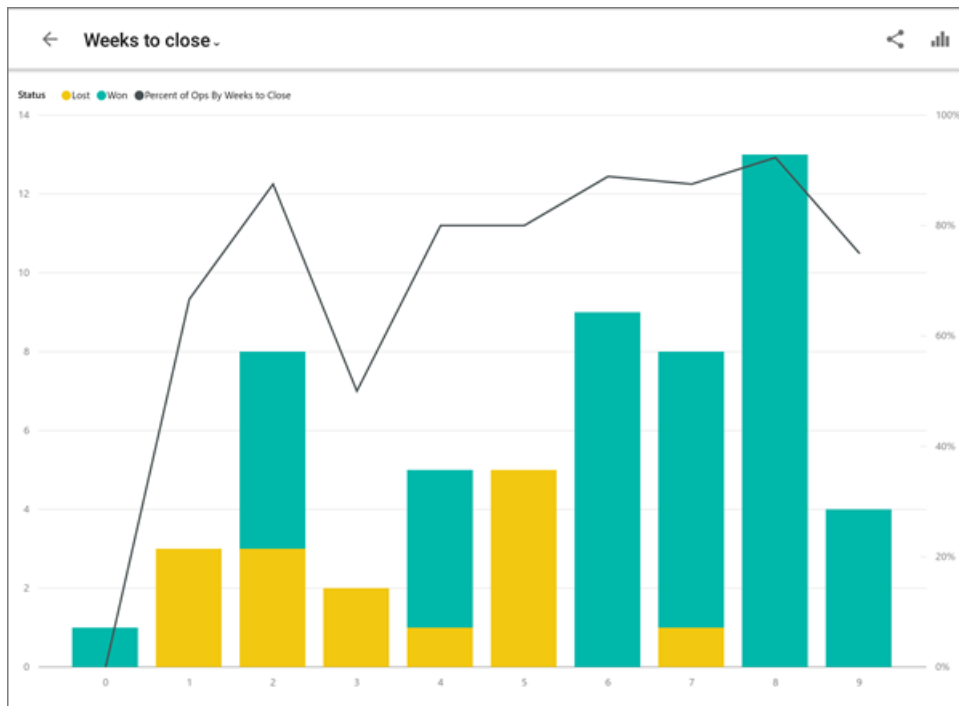
After you open the link in the Power BI app, you can copy the link and open it in a browser window instead.

7. [Open the report](#)  that the tile is based on.
8. To leave tile focus mode, tap the tile name, then tap the dashboard name or **My Workspace**.






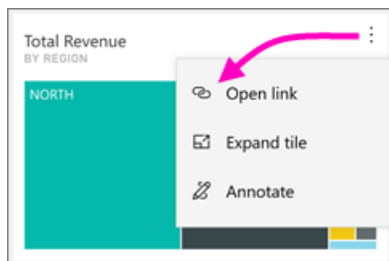
Tiles in the mobile app for Android phones and tablets

1. Open a [dashboard in the Power BI mobile app](#).
2. Tap a tile to open it in focus mode, where it's easier to view and explore the tile data.

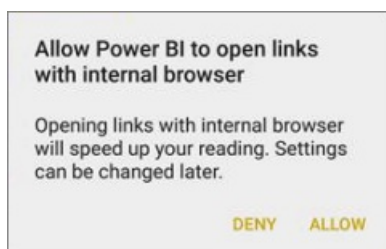


In focus mode, you can:

- Tap the chart to move the bar in a line, bar, column, or bubble chart, to view the values for a specific point in the visualization.
 - Tap the Share snapshot icon  to [annotate and share the tile](#) with others.
 - Tap the Open report icon  to [view the report](#) in the mobile app.
3. Sometimes the dashboard creator has added a link to a tile. If so, when you tap the vertical ellipsis (...) you see **Open link** :



Links can go to other Power BI dashboards or to an external URL. You can [tap the link](#) to open it inside the Power BI app. If it's an external site, Power BI asks you to allow it.



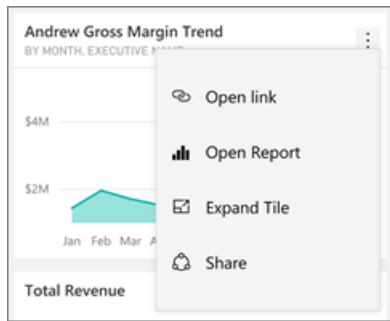
After you open the link in the Power BI app, you can copy the link and open it in a browser window instead.

4. Tap the arrow in the upper-left corner to close the tile and return to the dashboard.

Tiles in the Windows 10 mobile app

1. Open a [dashboard in the Power BI mobile app](#) for Windows 10.


2. Tap the vertical ellipsis on the tile. From here, you can:



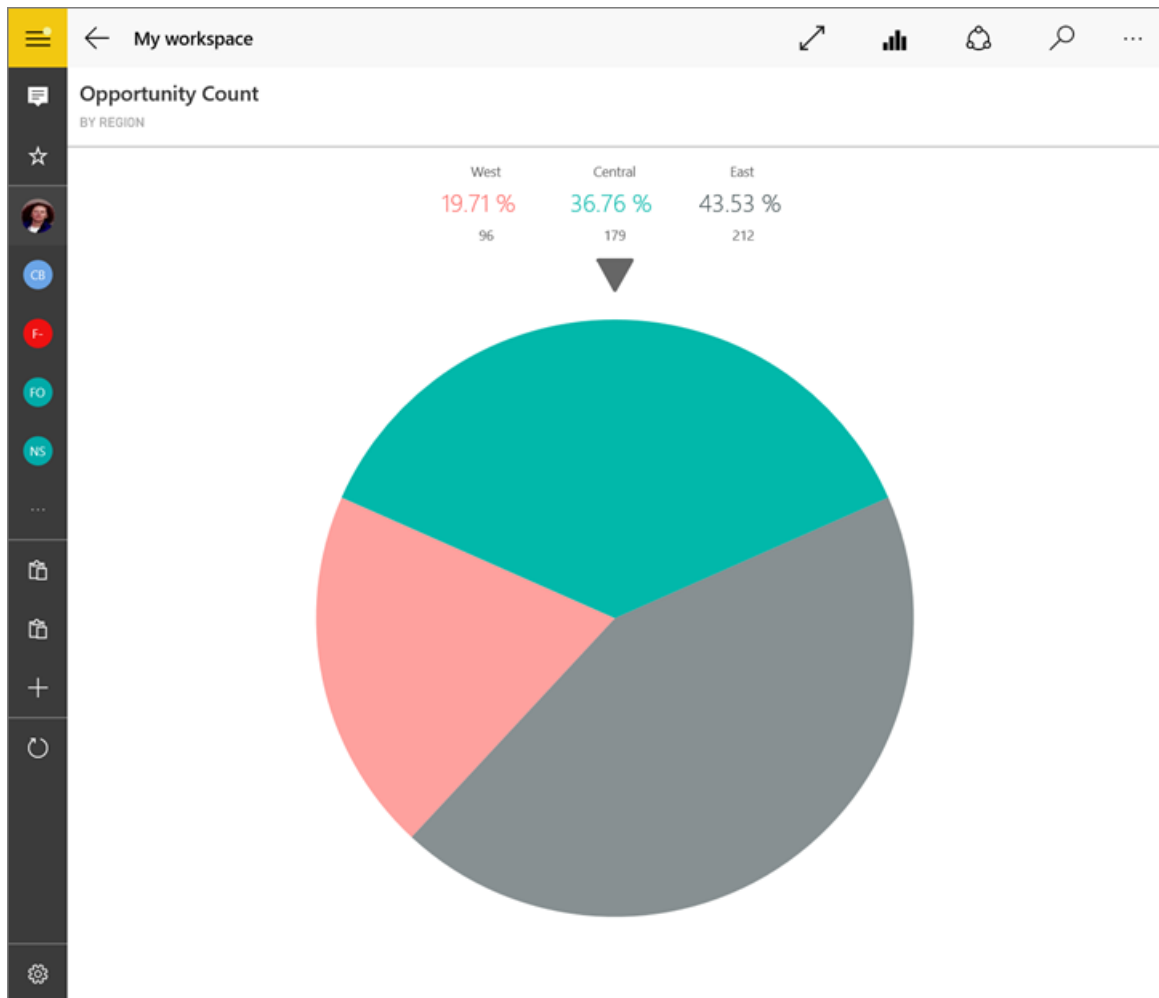
Share a snapshot of the tile.

Tap **Open Report**  to view the underlying report.

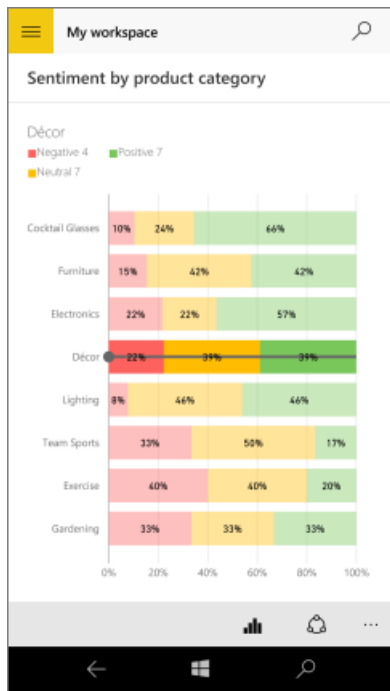
Open the link, if it has a link. Links can go to Power BI dashboards or to an external URL.

3. Tap **Expand Tile** . It opens in focus mode, where it's easier to view and explore the tile data. In this mode you can:


Spin a pie chart to show the values of the slice at the top of the pie.



Tap the chart to move the bar in a line, bar, column, or bubble chart, to view the values for a specific point in the visualization.



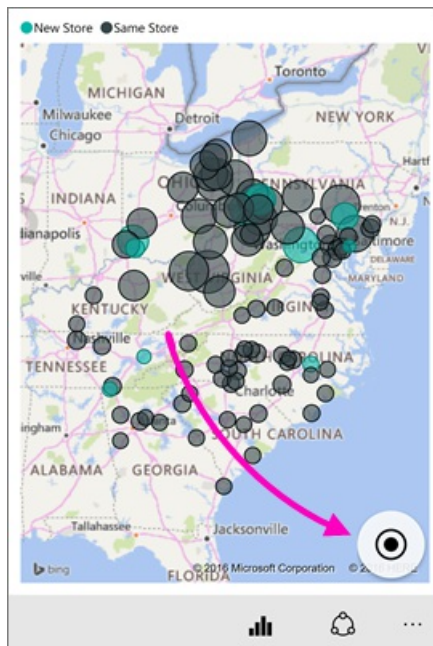
In this bar chart, the values for the **Décor** bar are shown at the top of the chart.*

Tap the **Full screen** icon  to open the tile in full-screen mode, without the navigation and menu bars.


NOTE

You can also [view dashboards and reports in full-screen mode](#) in the Power BI mobile app for Windows 10.

In a map, tap the **Center Map** icon  to center the map to your current location.



Tap the Share Snapshot icon  to [share a tile](#) with others.

Tap the Open Report icon  to [view the report](#) that the tile is based on.

4. Tap the back arrow or the back button to close the tile and return to the dashboard.






Next steps

- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Share a dashboard from the Power BI mobile apps

1/30/2018 • 5 min to read • [Edit Online](#)


Applies to:

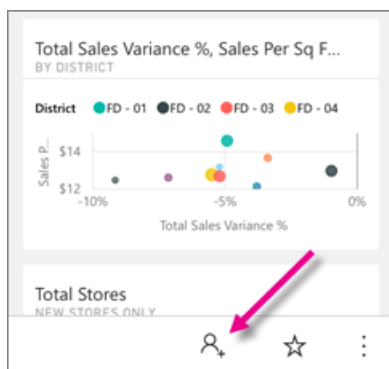
 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

With a [Power BI Pro license](#), you can invite colleagues to view your dashboards by sharing links from the Power BI mobile apps. The people you share dashboards with need to be the same email domain as you and have a Power BI Pro license, too, or the content needs to be in a [Premium capacity](#).

From the Power BI mobile apps for iOS and Android, you can also [annotate and share a snapshot of a tile, report, or visual](#) with anyone.

Share a dashboard from your iPhone

1. In the actions bar at the bottom of the dashboard, tap the share icon .

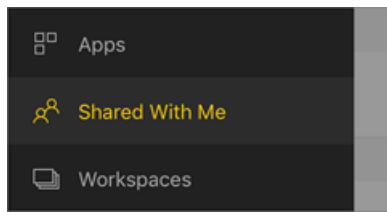


2. Tap **Invite a colleague**.
3. Type names, separated by commas, and a message to accompany your dashboard invitation.
4. To allow resharing, leave **Allow recipients to share this dashboard** selected.

Resharing allows your colleagues to forward the email invitation to others in your organization, either through the web or the mobile apps.

5. Tap **Send** in the upper-right corner.


Your colleagues get an email invitation with a direct link to the dashboard. The invitation expires after one month. When they open it, in a browser or in the Power BI mobile app, it's added to the **Shared with me** section of their Power BI account.



Read more [notes about sharing dashboards with colleagues](#).

Unshare a dashboard from your iPhone

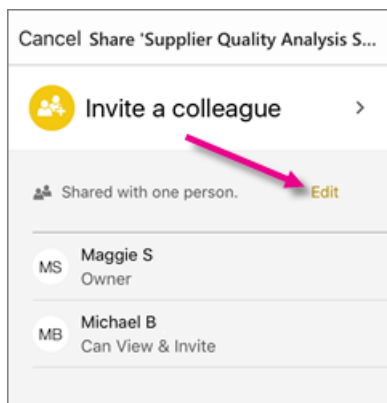
You can only unshare a dashboard if you're the dashboard owner.

1. In the actions bar at the bottom of the dashboard, tap the share icon .
2. Tap **Invite a colleague**.

You see the list of colleagues with whom you've shared this dashboard, with these phrases:


- **Can View:** They can view the dashboard but not share it.
- **Can View & Invite:** They can view the dashboard and share it with other colleagues.

3. Tap **Edit**.



4. To unshare, tap the red circle next to a name and tap **Delete**.

Share a dashboard from your iPad

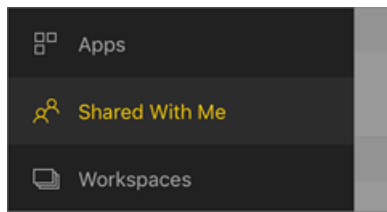
1. Tap the Share icon  icon in the upper-right corner of your dashboard.
2. Tap **Invite a colleague**, then type email addresses and a message to accompany your dashboard invitation.
3. To allow resharing, leave **All recipients to share this dashboard** selected.

NOTE

Resharing allows your coworkers to forward the email invitation to others in your organization, either through the web or the mobile apps.

4. Tap **Send** in the upper-right corner.


Your colleagues get an email invitation with a direct link to the dashboard. The invitation expires after one month. When they open it, in a browser or in the Power BI mobile app, it's added to the **Shared with me** section of their Power BI account



Read more [notes about sharing dashboards with colleagues](#).

Unshare a dashboard from your iPad

You can only unshare a dashboard if you're the dashboard owner.

1. Tap the Share icon  in the upper-right corner of your dashboard.

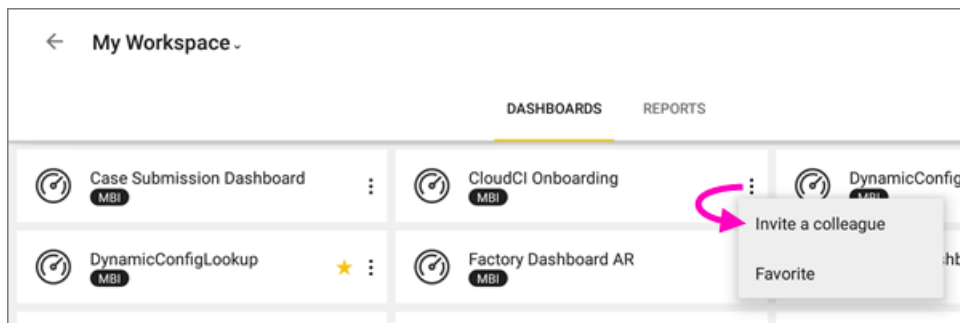
You see the list of colleagues with whom you've shared this dashboard. Below their names are these words:


- **Pending:** They haven't viewed the dashboard yet.
- **Can View:** They can view the dashboard but not share it.
- **Can View & Invite:** They can view the dashboard and share it with other colleagues.

2. Tap **Edit**.
3. To unshare, tap the red circle next to a name and tap **Delete**.

Share a dashboard from your Android device

1. On the dashboards home page, tap the ellipsis (...) and tap **Invite a colleague**.



2. Or, in the upper-right corner of a dashboard, tap the invite icon .


If you're the owner of the dashboard, you see the list of colleagues with whom you've shared this dashboard, with these notes:

- **Can view:** They have viewed the dashboard but can't share it.
- **Can view & invite:** They have viewed the dashboard and can share it with other colleagues.

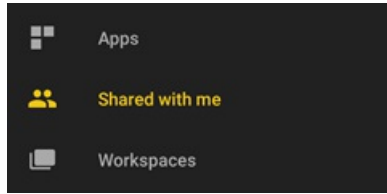
3. Type email addresses, and a message to accompany your dashboard invitation. Otherwise Power BI sends a default message.
4. To allow resharing, leave **Allow recipients to share this dashboard** selected.

NOTE

Resharing allows your coworkers to forward the email invitation to others in your organization, either through the browser or the mobile apps.

5. Tap the Send icon  in the upper-right corner to send the mail.


Your colleagues get an email invitation with a direct link to the dashboard. The invitation expires after one month. When they open it, in a browser or in the Power BI mobile app, it's added to the **Shared with me** section of their Power BI account



Read more [notes about sharing dashboards with colleagues](#).

Unshare a dashboard from your Android device


Only the dashboard owner can unshare a dashboard.

1. In the upper-right corner of your dashboard, tap the invite icon .

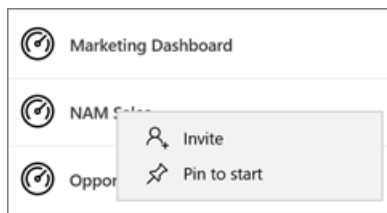
You see the list of colleagues with whom you've shared this dashboard.

2. To stop sharing the dashboard with a colleague, tap the **X** next to a name > **Remove**.

Share a dashboard from your Windows 10 device

1. In a dashboard, tap the Invite icon .

Or on the dashboards home page, right-click or press and hold, and tap **Invite**.

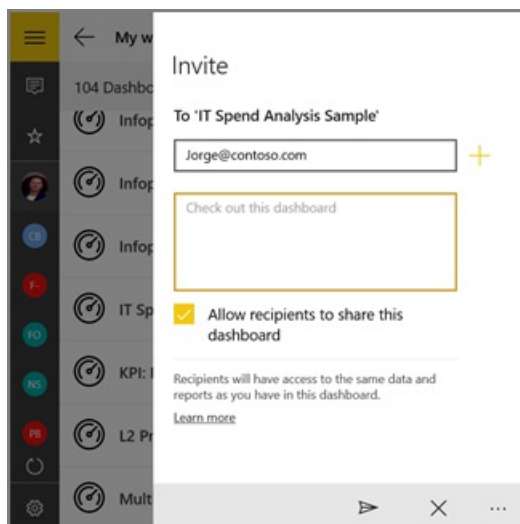


If you're the owner of the dashboard, you see the list of colleagues with whom you've shared this dashboard, with these notes:

Read only: They have viewed the dashboard but can't share it.

Read and reshare: They have viewed the dashboard and can share it with other colleagues.

2. Type email addresses, and a message to accompany your dashboard invitation. Otherwise Power BI sends a default message.



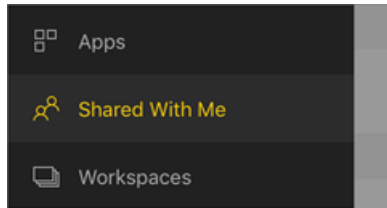
- To allow resharing, leave **Allow recipients to share this dashboard** selected.

NOTE

Resharing allows your coworkers to share this dashboard with others in your organization, either through the browser or the mobile apps.

- Tap the Send icon .

Your colleagues get an email invitation with a direct link to the dashboard. The invitation expires after one month. When they open it, in a browser or in the Power BI mobile app, it's added to the **Shared with me** section of their Power BI account



Read more [notes about sharing dashboards with colleagues](#).






Next steps

- [Annotate & share a snapshot of a tile, report, or visual in the mobile apps](#)
- [Share a dashboard in Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Make favorite dashboards, apps, and on-premises reports in the Power BI mobile apps

11/9/2017 • 2 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

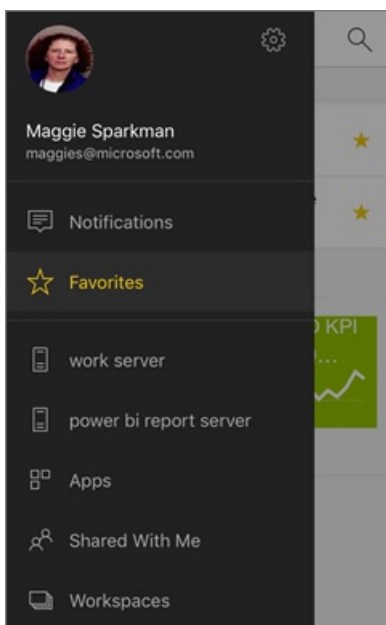
On the Favorites page in the mobile apps, you see your favorite Power BI dashboards and apps, together with favorite on-premises Power BI Report Server and Reporting Services KPIs and mobile reports. When you make a dashboard or an app a *favorite* in the Power BI mobile apps, you see it on your Favorites page the Power BI service (<https://powerbi.com>) and all of your mobile devices.

You can also [make Power BI dashboards and apps favorites in the Power BI service](#). Then you see them on the Favorites page in the mobile app.

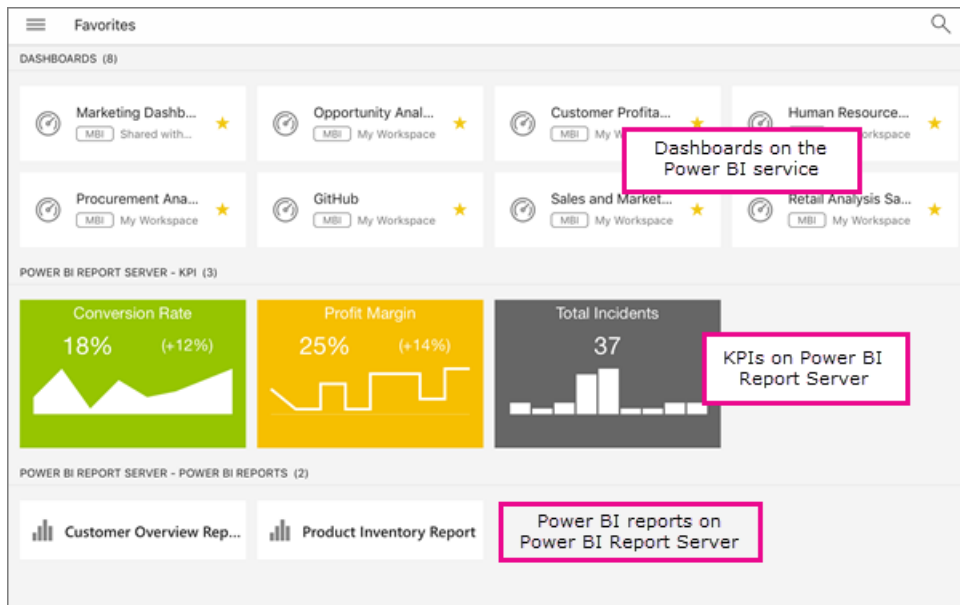
You can mark KPIs and reports as favorites on a Power BI Report Server or Reporting Services web portal, and then view them in one convenient folder on your mobile device, along with your Power BI favorite dashboards.

View your favorite Power BI dashboards and apps, and on-premises reports and KPIs

- Tap the top navigation menu , then tap **Favorites**.

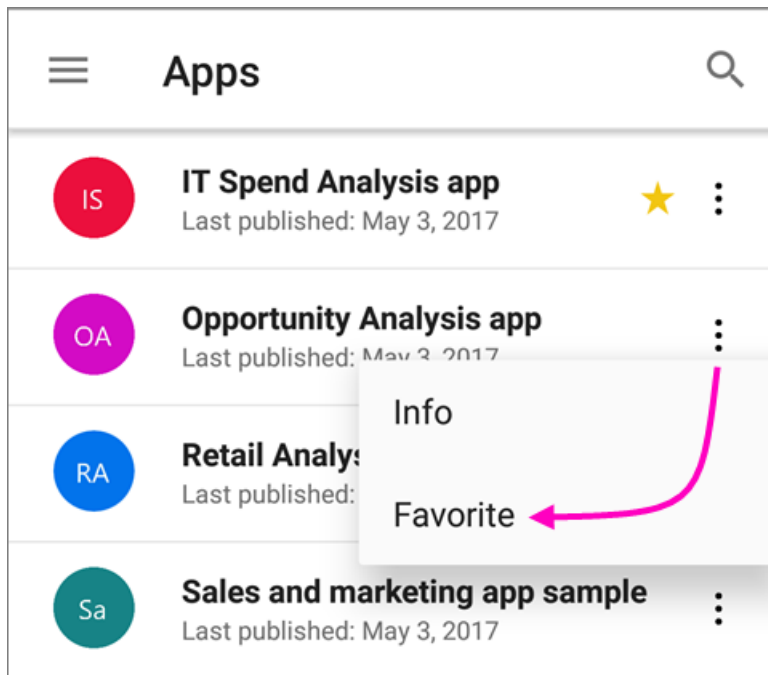


You see all your favorites together on this page:

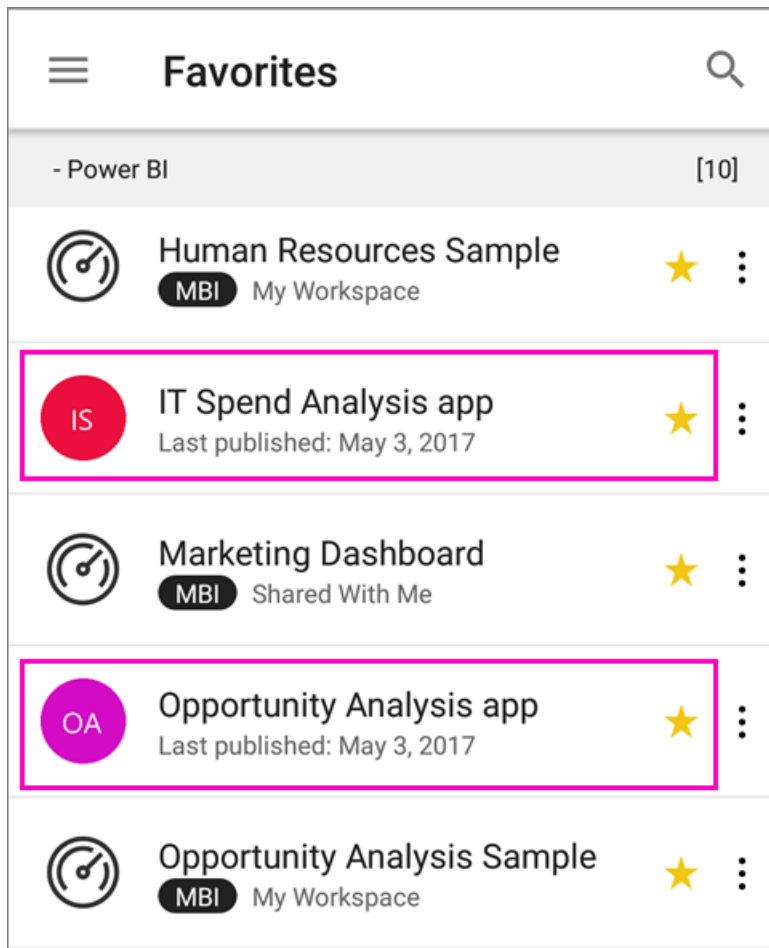


Make an app a favorite

1. In the list of apps in the mobile app, tap the ellipsis (...) next to the app > **Favorite**.





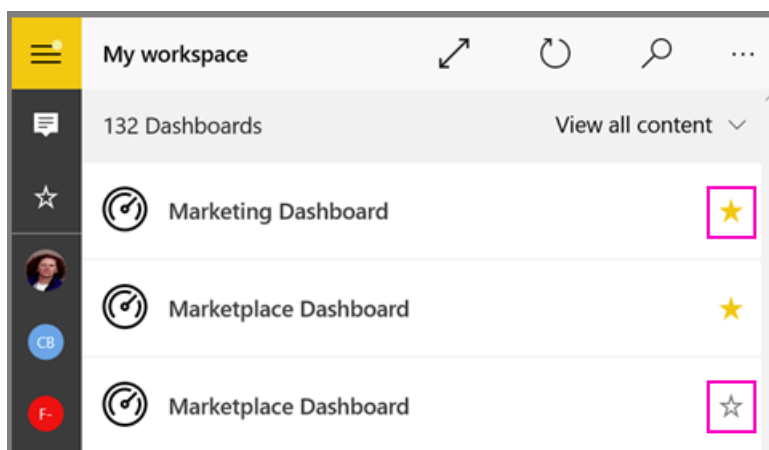
Now it's listed with your other favorite dashboards and apps.





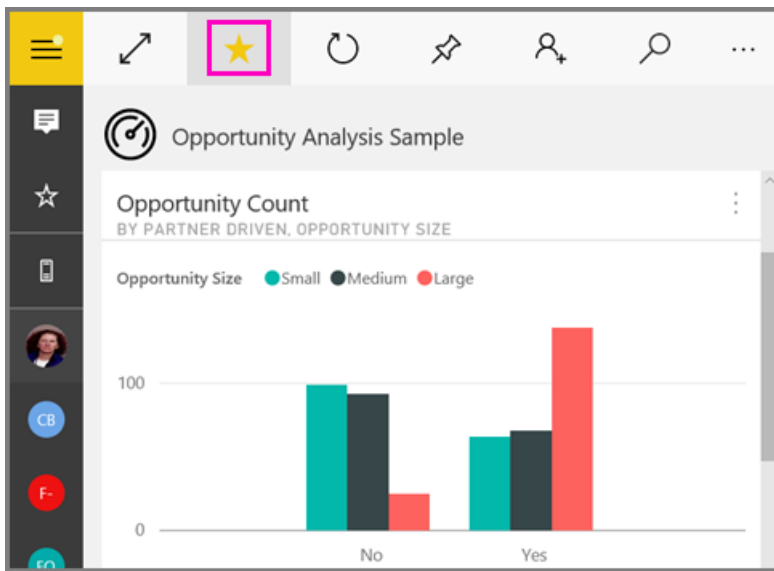
Make a dashboard a favorite in the iOS and Windows 10 mobile apps

You can make a Power BI dashboard or an app a favorite from the list of dashboards or from the dashboard itself.

- In the list of dashboards in the mobile app, tap the empty star next to the dashboard name . The star turns yellow .




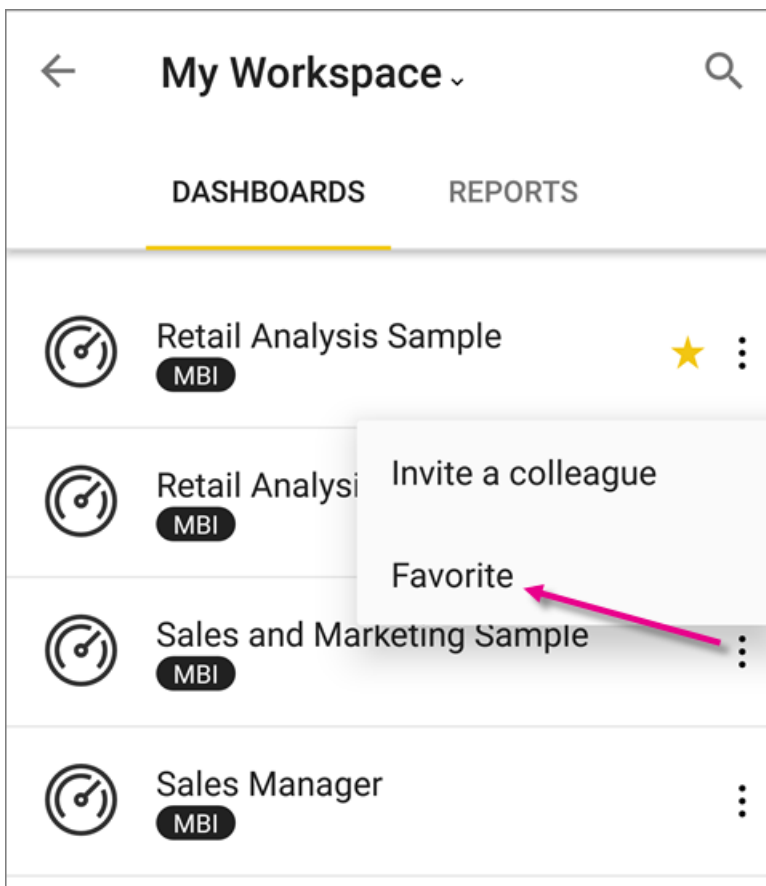
- On the dashboard, tap the empty star in the ribbon at the top . The star turns yellow .




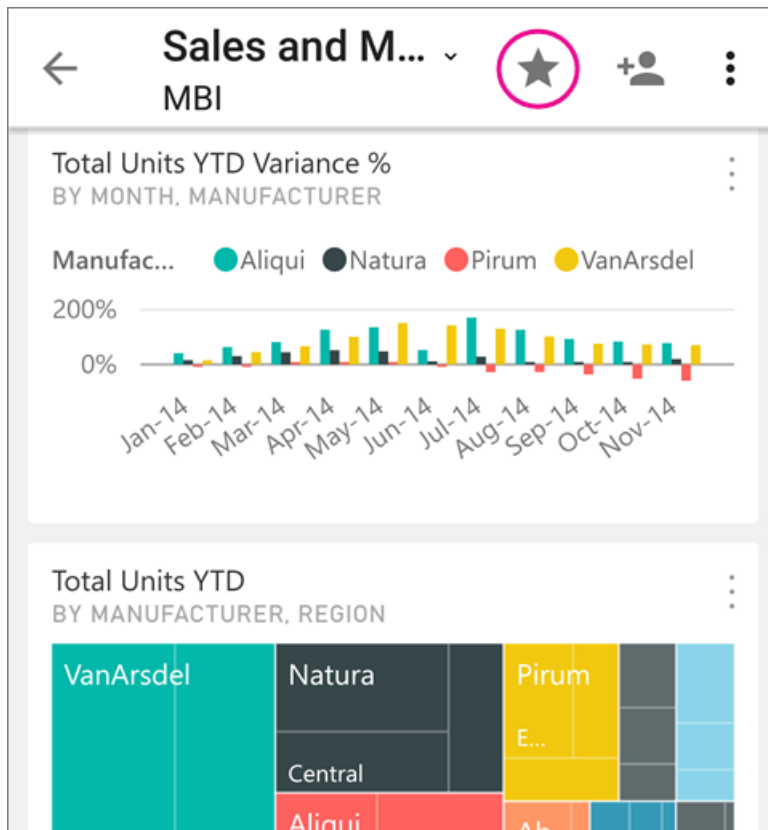
Make a dashboard a favorite in the Android mobile apps

You can make a dashboard a favorite from the list of dashboards or from the dashboard itself.

- In the list of dashboards in the mobile app, tap the vertical ellipsis (...) next to the dashboard name, then tap **Favorite**. You see a yellow star next to the name .



- On the dashboard, tap the empty star in the ribbon at the top . The star turns dark gray .



Make favorite Power BI Report Server and Reporting Services reports and KPIs

You can view your favorite Power BI Report Server and Reporting Services reports and KPIs in the Power BI mobile apps, but you can't make them favorites in the mobile apps. You [tag them as favorites in the web portal](#).

Next steps

- [Favorite dashboards in the Power BI service](#)
- Questions? [Try asking the Power BI Community](#)

Get data from the real world with the Power BI mobile apps

11/9/2017 • 1 min to read • [Edit Online](#)

Power BI mobile apps can connect the real world directly to related BI information, in a number of different ways.

QR codes for tiles

Create a QR code for a tile in a dashboard, and put the QR code anywhere you want. When your colleagues scan the code with their iPhones or Android phones, they see the tile you've associated with that QR code — on an iPhone, they see the tile in augmented reality.



More about:

- [Creating a QR code for a tile in Power BI](#)
- [Scanning a Power BI QR code from your mobile device](#)

QR codes for reports

Create a QR code for a report. When your colleagues scan the code with their iPhones (Android phones are coming soon), they see the report you've associated with that QR code.

More about [creating a QR code for a report in Power BI](#)

Barcodes

Tag barcode data in your report so your colleagues can scan a barcode on a product and go straight to that report, filtered for that product.



More about:

- [Tagging barcode data in a report](#)
- [Scanning a barcode from the Power BI app on your iPhone](#)

Filter by location

Categorize geographical data in a report in Power BI Desktop. Then your colleagues view that report in the Power BI mobile app for iOS, Power BI automatically provides geographical filters that match where they are.

More about [filtering by location](#).




Next steps

- [Create a QR code for a tile in Power BI](#)
- [Create a QR code for a report in Power BI](#)

Scan a Power BI QR code from your mobile device

11/9/2017 • 2 min to read • [Edit Online](#)

Applies to:

		
iPhones	Android phones	Android tablets

QR codes in Power BI can connect any item in the real world directly to related BI information — no navigation or search needed.


Say a colleague has [created a QR code in the Power BI service](#) for a report or for a tile in a dashboard, shared the dashboard or report with you, and placed the QR code in a key location — for example, in an email or on a specific item.

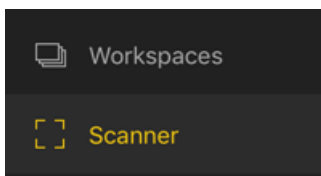
You can scan the QR code for immediate access to the relevant tile or report, right from your phone, using either the scanner in the Power BI app, or any other scanner installed on your phone.

NOTE

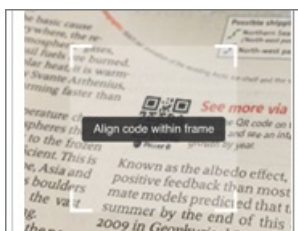
If your colleague hasn't shared the dashboard or report with you, you can request access directly from the mobile app.

Scan a Power BI QR code on your iPhone with the Power BI scanner

1. In the Power BI mobile app open the global navigation menu  in the upper left.
2. Scroll down to **Scanner** and select it.



3. If your camera is not enabled, you need to approve the Power BI app to use the camera. This is a one-time approval.
4. Point the scanner at the Power BI QR code.



5. The tile or report appears to hover over the background in augmented reality.




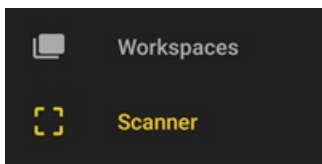
6. Tap the report or the tile to open it in focus mode, or go back to the scanner.

Scan a QR code from an external scanner on your iPhone

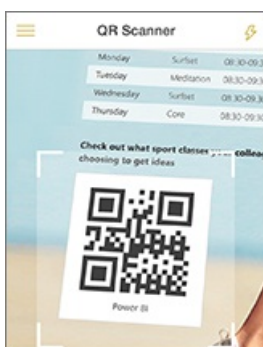
1. From any scanner installed on your phone, point the scanner to the relevant Power BI QR code for immediate access to the tile or report.
2. If you don't have the Power BI app installed, you are redirected to the [Apple App Store to download it](#) on your iPhone.

Scan a Power BI QR code on your Android device with the Power BI scanner

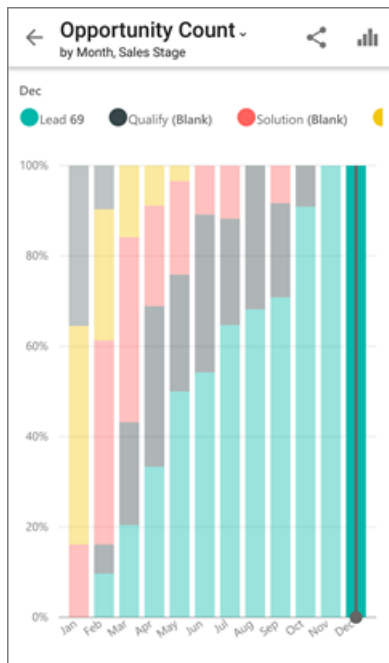
1. In the Power BI mobile app open the global navigation button  in the upper left.
2. Scroll down to **QR Scanner** and select it.



3. If your camera isn't enabled, you need to approve the Power BI app to use the camera. This is a one-time approval.
4. Point the scanner at the Power BI QR code.



5. The tile or report opens automatically in Power BI.



Scan a QR code from an external scanner on your Android device

1. From any scanner installed on your Android device, point the scanner to the relevant Power BI QR code for immediate access to the tile or report.
2. If you don't have the Power BI app installed, you are redirected to [Google Play to download it](#).






Next steps

- [Connect to Power BI data from the real world](#) with the mobile apps
- [Create a QR code for a tile in the Power BI service](#)
- [Create a QR code for a report in the Power BI service](#)
- Questions? [Try asking the Power BI Community](#)

Get notifications in the Power BI mobile apps

1/17/2018 • 1 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

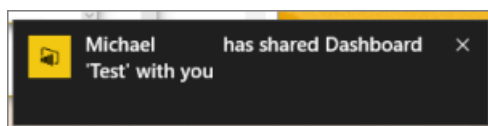
Notifications bring information related to your Power BI experience right to you, in the Power BI service or on your mobile device. When you open Notifications, you see a sequential feed of messages about [alerts you've set](#), new dashboards that have been shared with you, changes to your group workspace, information about Power BI events and meetings, and more.

NOTE

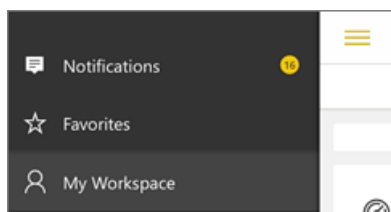
On an iOS device, the first time you sign in to the [updated version of the Power BI apps](#), you see a message asking if you'd like Power BI to send notifications. You can also configure how Power BI notifies you in **Settings** for your device.

View notifications on your mobile device


1. When you receive notifications on your mobile device, by default Power BI makes a sound and shows a notification banner.

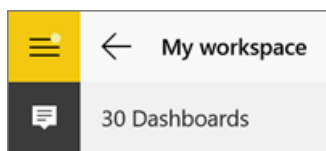


Or on an iPad:



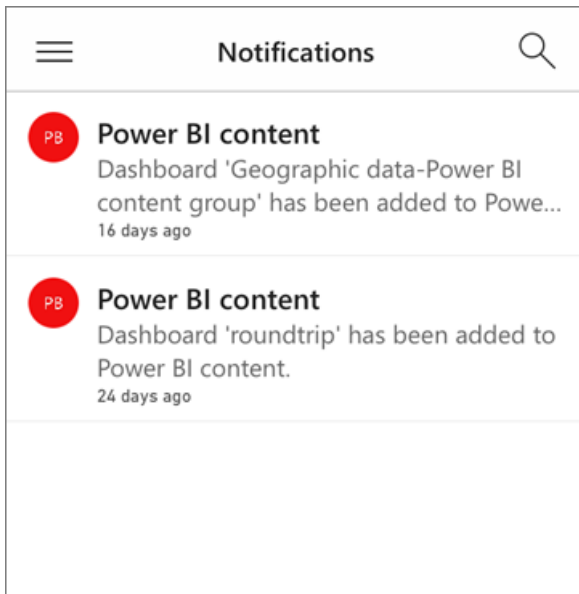
You can [change how Power BI notifies you](#).

2. If you've received notifications, when you sign in to Power BI on your mobile device you see a yellow dot on global navigation button  (Android) or on the **Notifications** icon.



3. Select the Notifications icon  (Windows 10).

Notifications are displayed with the most recent on top and unread messages highlighted. Notifications are retained for 90 days unless you delete them or reach the maximum limit of 100.



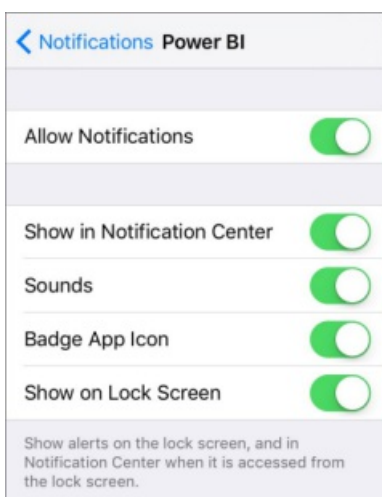
4. To dismiss a notification, tap and hold it and select **Dismiss**.

Change or turn off notifications on your mobile device

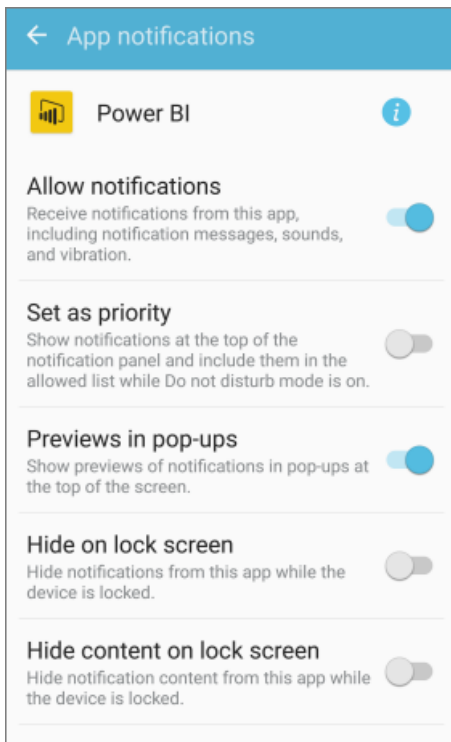
You can change how Power BI notifies you.

1. On an iOS device, go to **Settings > Notifications**.
On an Android phone, go to **Notification Settings**.
On a Windows device, in **Settings** go to **System > Notifications & actions**.
2. In the list of apps, select **Power BI**.
3. Here you can turn notifications off completely or choose which notifications you want.

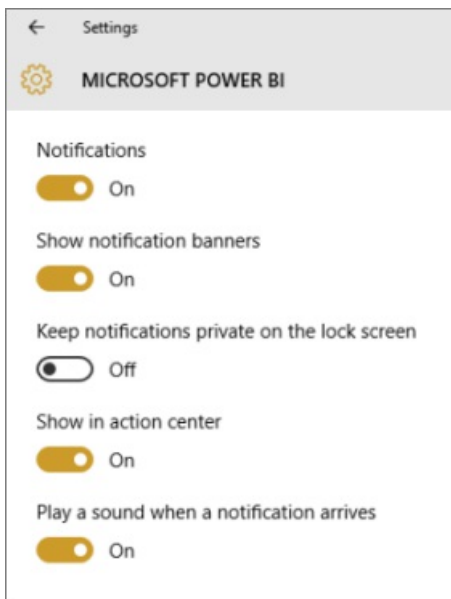
On an iPhone



On an Android phone



On a Windows 10 device







Next steps

- [Data alerts in Power BI service](#)
- [Set data alerts in the iPhone app \(Power BI for iOS\)](#)
- [Set data alerts in the Power BI mobile app for Windows 10](#)
- [Download the latest version of the Power BI apps for mobile devices](#)

Annotate and share a tile, report, or visual in Power BI mobile apps

11/9/2017 • 2 min to read • [Edit Online](#)

Applies to:

		 Android phone	 Android tablet
iPhones	iPads	Android phones	Android tablets

You can annotate and share a snapshot of a tile, report, or visual from the Power BI mobile app for iOS and Android devices. Your recipients see it exactly as it was when you sent the mail, plus a link. You can send snapshots of tiles to anyone — not just colleagues in the same email domain. You can add annotations — lines, text, or stamps — before you share it.




A report with annotations

The mail with the snapshot of the tile, report, or visual also includes a link to the actual object on the Power BI service (<https://powerbi.com>). You recipients can click the link and go straight to that tile, report, or visual, if you and they have Power BI Pro licenses, or the content is in a [Premium capacity](#), and you've already shared the item with them.

You can [share a tile from the Power BI mobile app for Windows 10 devices](#), too, but not annotate it.

Open a tile for annotating

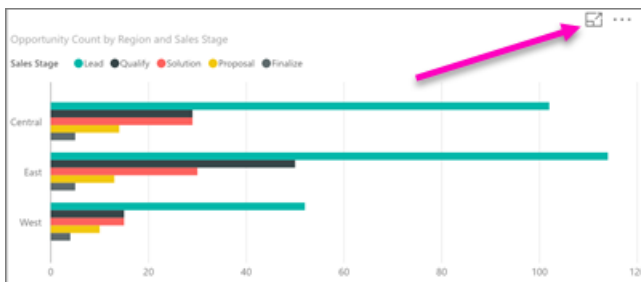
1. Tap the tile to open it in focus mode.
2. Tap the annotate icon  in the upper-right corner of the tile.
3. You're ready to [annotate and share the tile](#).


Open a report for annotating

1. Open a report.
2. Tap the annotate icon  in the upper-right corner of the report.
3. You're ready to [annotate and share the report](#).

Open a visual for annotating

1. In a report, tap a visual, then tap the expand icon to open it in focus mode.



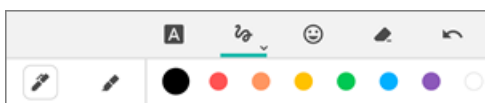
2. Tap the annotate icon  in the upper-right corner of the visual.
3. You're ready to [annotate and share the visual](#).

Annotate and share the tile, report, or visual

1. Here's how you annotate:

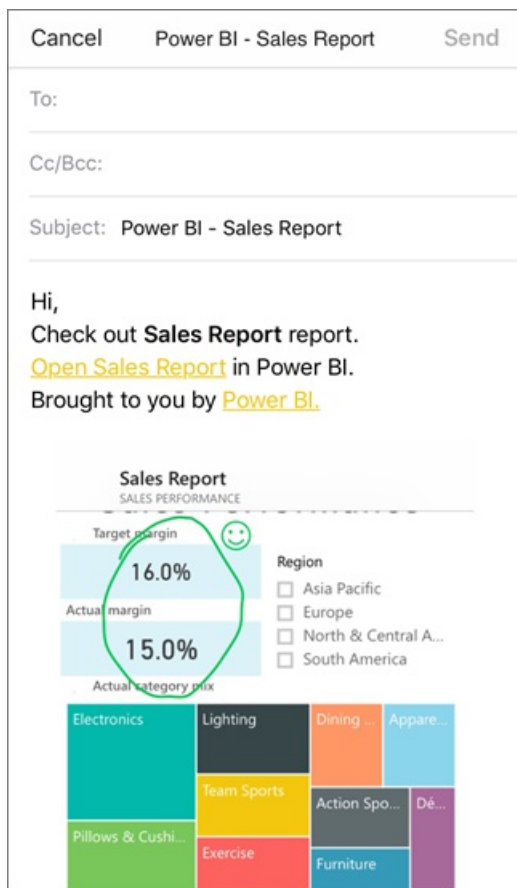


The annotation bar in iPhones and iPads



The annotation bar in Android devices

- To draw lines of different colors and thicknesses, tap the squiggly-line icon, choose a width and color, and draw.
 - To type comments, tap the **AA**, choose the text size and color, and type.
 - To paste stamps (like emoticons) on the tile, tap the smiley face, choose a color, and tap where you want them.
2. After annotating, tap **Share** in the upper-right corner.
 3. Open your mail app, type the recipients' names, and modify the message, if you want.



The mail has an image, and a link to the specific tile, report, or visual.

4. Tap **Send**.






Next steps

- [Share a dashboard from the Power BI mobile apps](#)
- Questions? [Try asking the Power BI Community](#)

Set data alerts in the Power BI mobile apps

12/19/2017 • 5 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

You can set alerts on dashboards in the Power BI mobile apps and in the Power BI service. Alerts notify you when data in a tile changes beyond limits you set. Alerts work for tiles featuring a single number, such as cards and gauges, but not with streaming data. You can set data alerts on your mobile device and see them in the Power BI service, and vice versa. Only you can see the data alerts you set, even if you share a dashboard or a snapshot of a tile.

You can set alerts on tiles if you have a Power BI Pro license, or if you have a free Power BI license and the shared dashboard is in a Premium capacity.

WARNING

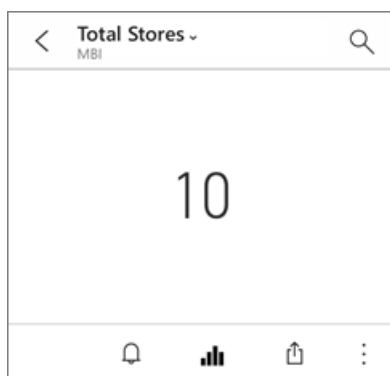
Data-driven alert notifications provide information about your data. If your device gets stolen, we recommend going to the Power BI service to turn off all data-driven alert rules.

[Learn more about managing data alerts in the Power BI service.](#)

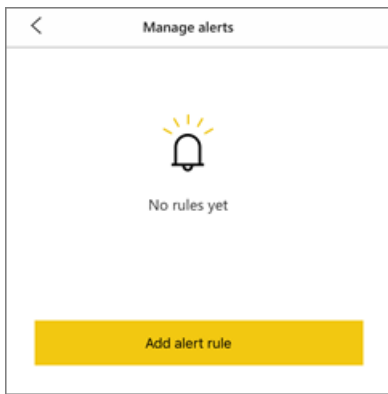
Data alerts on an iPhone or iPad

Set an alert on an iPhone or iPad

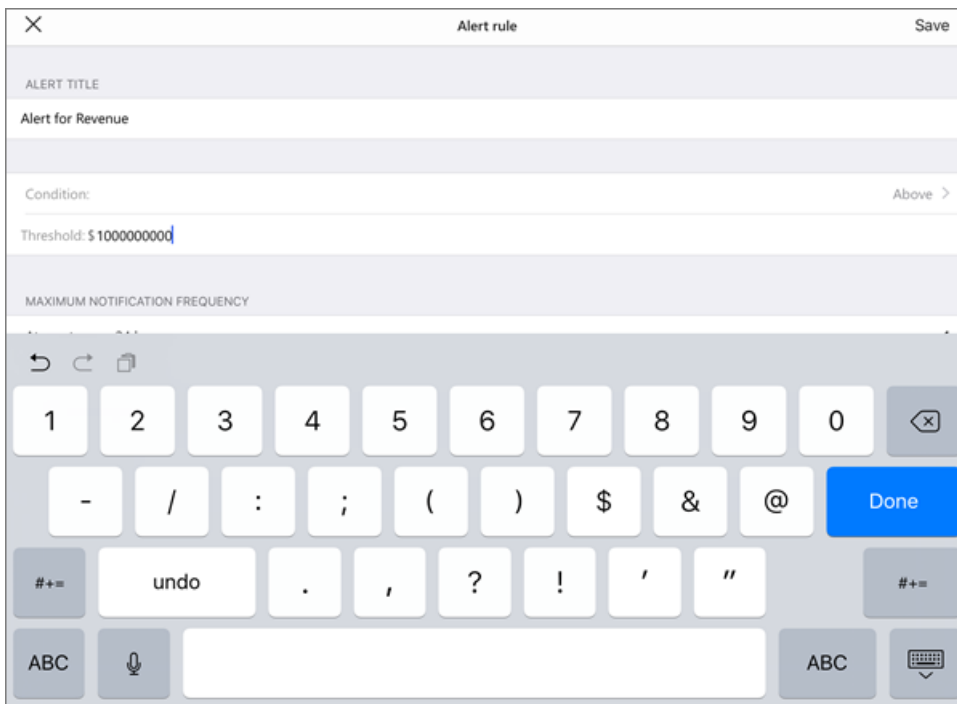
1. Tap a number or gauge tile in a dashboard to open it in focus mode.



2. Tap the bell icon  to add an alert.
3. Tap **Add alert rule**.



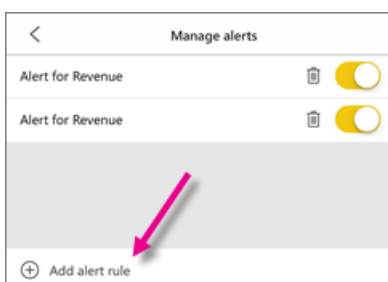
4. Choose to receive alerts above or below a value, then set the value.



5. Decide whether to receive hourly or daily alerts, and whether to also receive an email when you get the alert.

NOTE
You don't receive alerts every hour or every day unless the data has actually refreshed in that time.

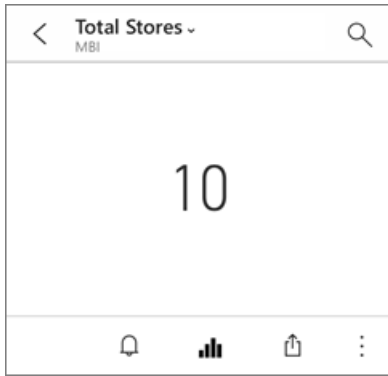
6. You can change the alert title, too.
7. Tap **Save**.
8. A single tile can have alerts for values both above and below thresholds. In **Manage alerts**, tap **Add alert rule**.




Manage alerts on your iPhone or iPad

You can manage individual alerts on your mobile device or [manage all your alerts in the Power BI service](#).

1. In a dashboard, tap a number or gauge tile that has an alert.




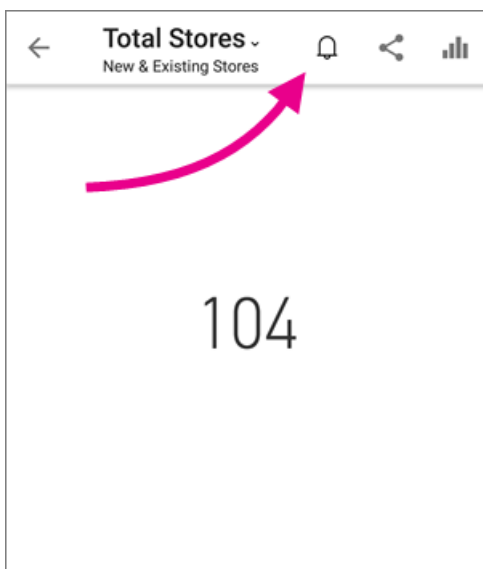
2. Tap the bell icon .
3. Tap the name of the alert to edit it, tap the slider to turn off email alerts, or tap the garbage can to delete the alert.



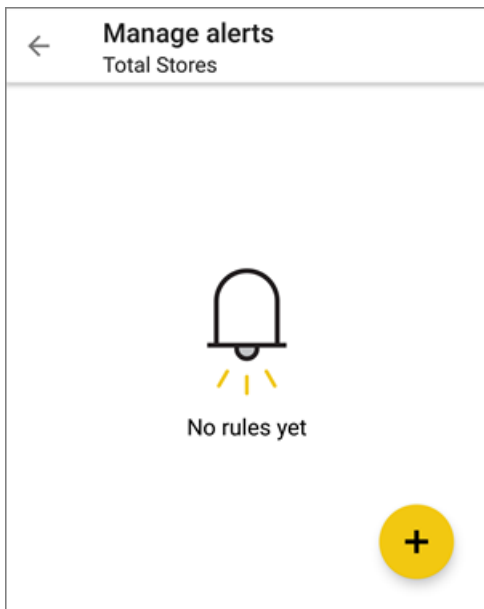
Data alerts on an Android device

Set an alert on an Android device

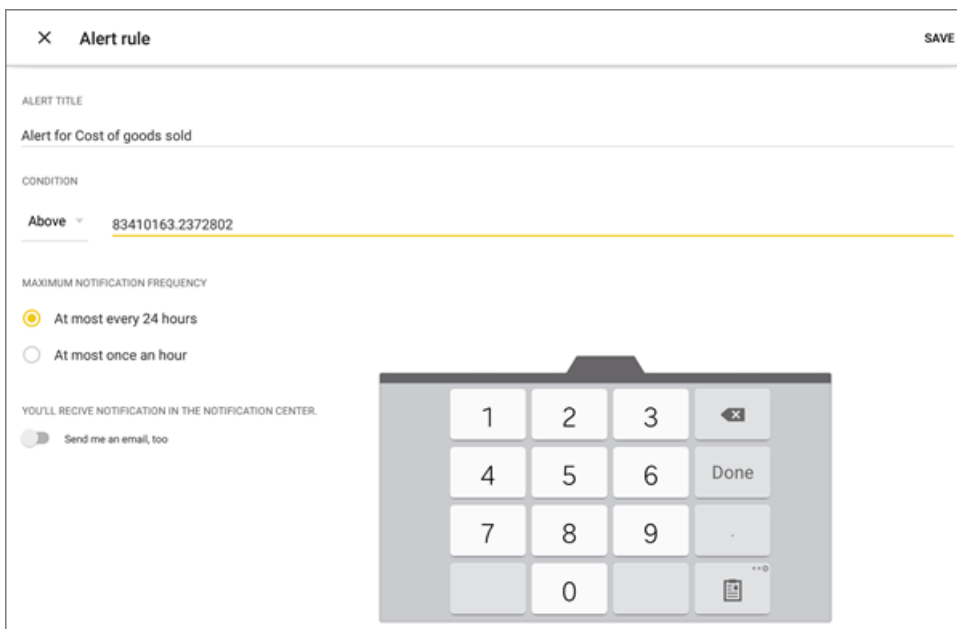
1. In a Power BI dashboard, tap a number or gauge tile to open it.
2. Tap the bell icon  to add an alert.



3. Tap the plus icon (+).



4. Choose to receive alerts above or below a value, and type the value.



5. Tap **Done**.
6. Decide whether to receive hourly or daily alerts, and whether to also receive an email when you get the alert.


NOTE

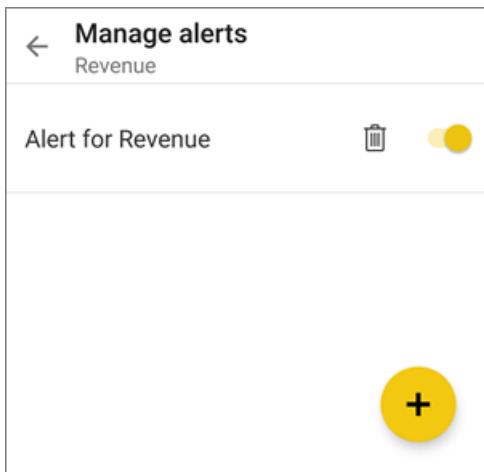
You don't receive alerts every hour or every day unless the data has actually refreshed in that time.


7. You can change the alert title, too.
8. Tap **Save**.

Manage alerts on an Android device

You can manage individual alerts in the Power BI mobile app or [manage all your alerts in the Power BI service](#).


1. In a dashboard, tap a card or gauge tile that has an alert.
2. Tap the solid bell icon .
3. Tap the alert to change a value or turn it off.

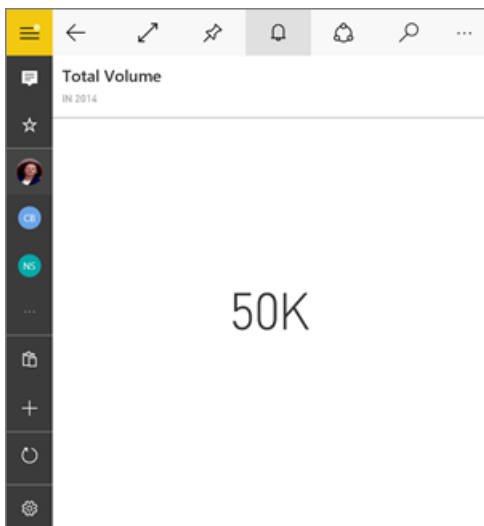


4. Tap the plus icon (+) to add another alert to the same tile.
5. To delete the alert altogether, tap the garbage can icon .

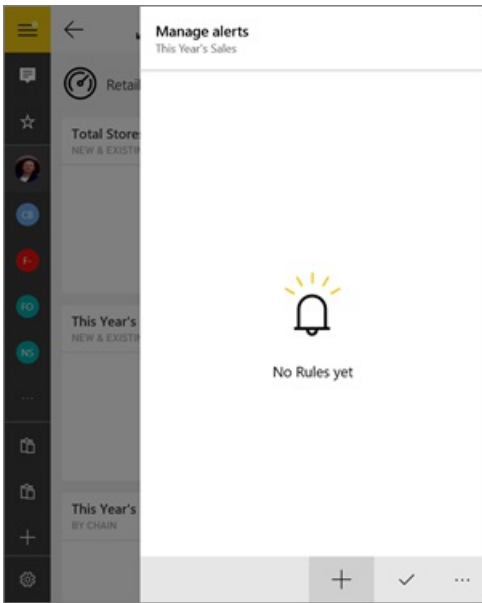
Data alerts on a Windows device

Set data alerts on a Windows device

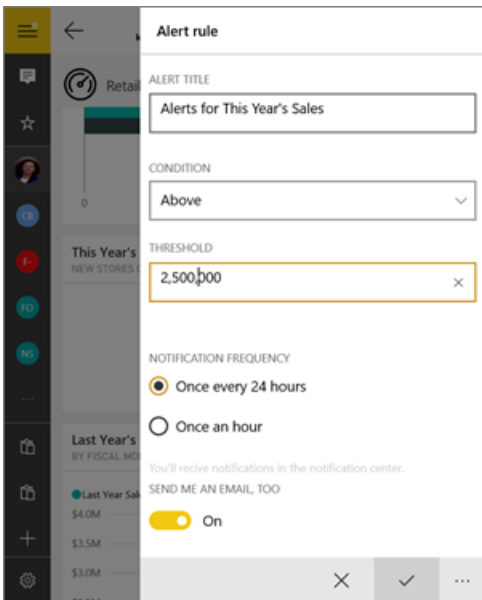
1. Tap a number or gauge tile in a dashboard to open it.
2. Tap the bell icon  to add an alert.



3. Tap the plus icon (+).



4. Choose to receive alerts above or below a value, and type the value.

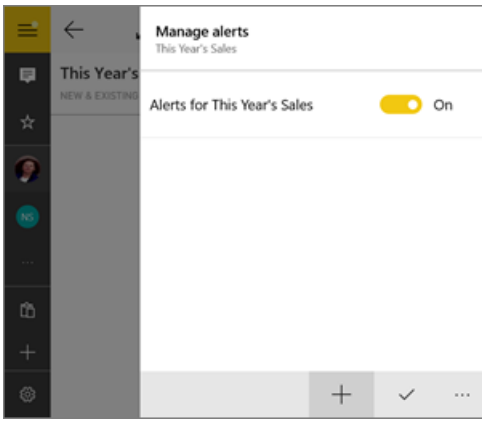


5. Decide whether to receive hourly or daily alerts, and whether to also receive an email when you get the alert.

NOTE


You don't receive alerts every hour or every day unless the data has actually refreshed in that time.

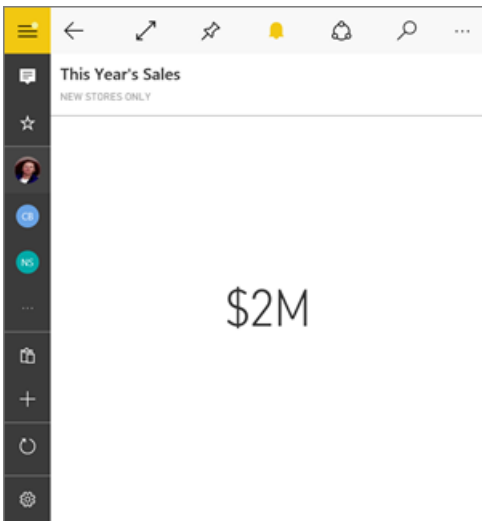
6. You can change the alert title, too.
7. Tap the check mark.
8. A single tile can have alerts for values both above and below thresholds. In **Manage alerts**, tap the plus sign (+).



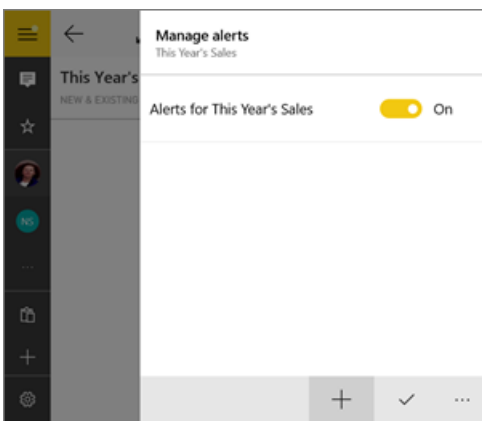
Manage alerts on a Windows device

You can manage individual alerts in the Power BI mobile app or [manage all your alerts in the Power BI service](#).

1. In a dashboard, tap a card or gauge tile that has an alert.
2. Tap the bell icon .



3. Tap the alert to change a value or turn it off.



4. To delete the alert altogether, right-click or tap and hold > **Delete**.

Receiving alerts

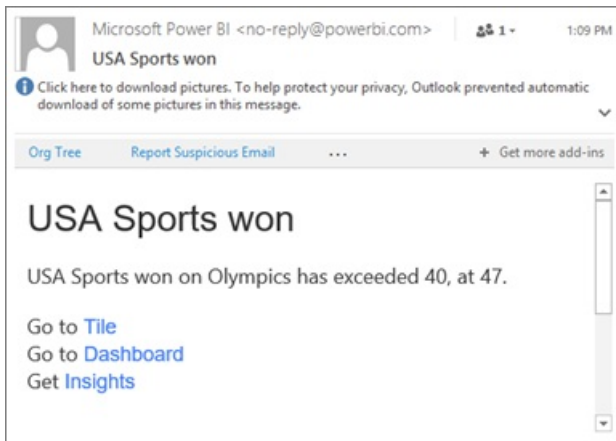
You receive alerts in the Power BI [Notification Center](#) on your mobile device or in the Power BI service, along with notifications about new dashboards that someone has shared with you.

Data sources are often set to refresh daily, although some refresh more often. When the data in the dashboard is refreshed, if the data being tracked reaches one of the thresholds you've set, several things will happen.


1. Power BI checks to see if it's been more than an hour or more than 24 hours (depending on the option you selected) since the last alert was sent.

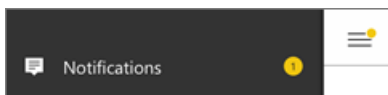
As long as the data is past the threshold, you'll get an alert every hour or every 24 hours.

2. If you've set the alert to send you an email, you'll find something like this in your Inbox.



3. Power BI adds a message to your **Notification center** and adds a new alert icon to the applicable tile .

4. Tap the global navigation button  to [open your Notification center](#) and see the alert details.



NOTE

Alerts only work on data that is refreshed. When data refreshes, Power BI looks to see if an alert is set for that data. If the data has reached an alert threshold, an alert is triggered.

Tips and troubleshooting

- Alerts currently aren't supported for Bing tiles or card tiles with date/time measures.
- Alerts only work with numeric data.
- Alerts only work on data that is refreshed. They don't work on static data.
- Alerts don't work with tiles that contain streaming data.






Next steps

- [Manage your alerts in the Power BI service](#)
- [Power BI Mobile Notification Center](#)
- Questions? [Try asking the Power BI Community](#)

Filter a report by geographic location in the Power BI mobile apps

11/9/2017 • 1 min to read • [Edit Online](#)

Applies to:


 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 phones

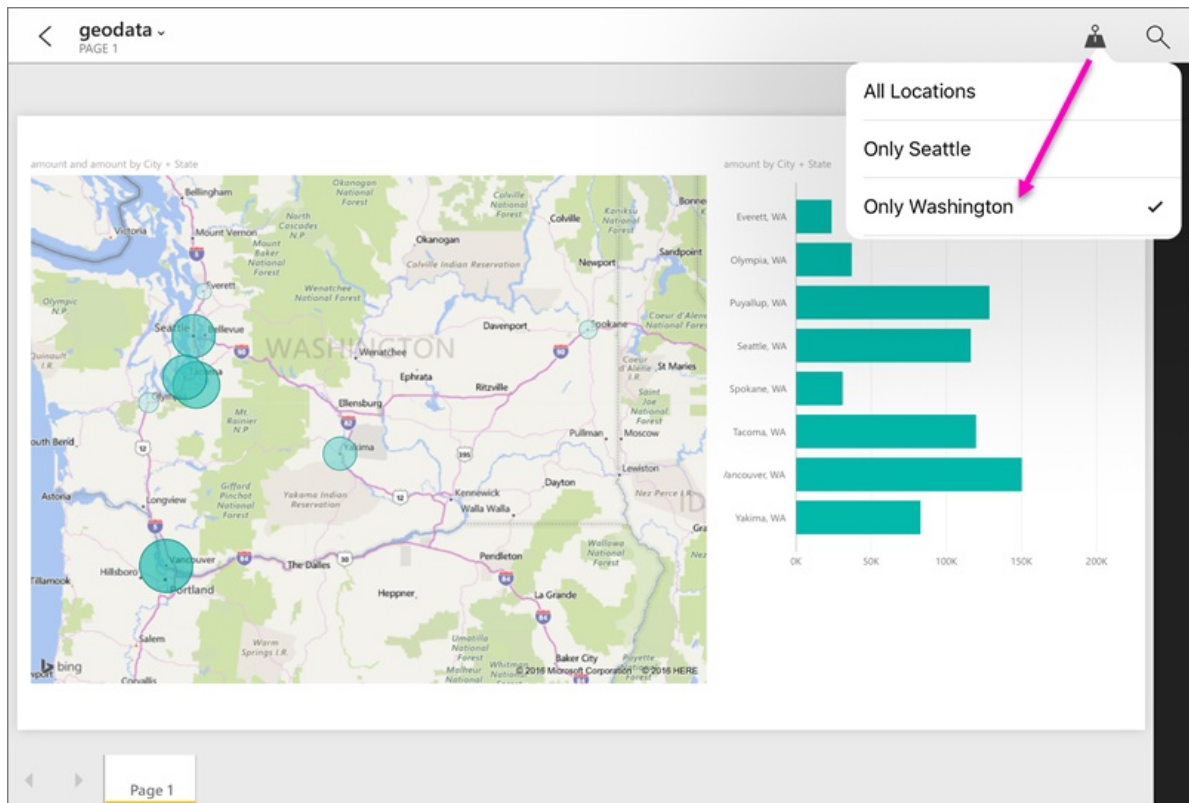
When you look at a Power BI report on your mobile device, do you see a little pushpin icon in the upper-right corner? If so, then you can filter that report based on your geographic location.

NOTE

You can only filter by location if the geographic names in the report are in English—for example, "New York City" or "Germany". Windows 10 tablets and PCs don't support geographic filtering, but Windows 10 phones do.

Filter your report by your geographic location

1. Open a report in the Power BI mobile app on your mobile device.
2. If the report has geographic data, you see a message asking to allow Power BI to access your location. Click **Allow**, then tap **Allow** again.
3. Tap the push pin . You can filter on city, state/province, or country/region, depending on the data in the report. The filter only lists options that match your current location.



Why don't I see location tags on a report?

All three of these conditions need to be true, for you to see location tags.

- The person who created the report in Power BI Desktop [categorized geographical data](#) for at least one column, such as City, State, or Country/Region.
- You are in one of the locations that has data in that column.
- You're using one of these mobile devices:
 - iOS (iPad, iPhone, iPod).
 - Android phone or tablet.
 - Windows 10 phone (other Windows 10 devices such as PCs and tablets don't support geographic filtering).

Read more about [setting up geographic filtering](#) in Power BI Desktop.



Next steps

- [Connect to Power BI data from the real world](#) with the mobile apps
- [Data categorization in Power BI Desktop](#)
- Questions? [Try asking the Power BI Community](#)

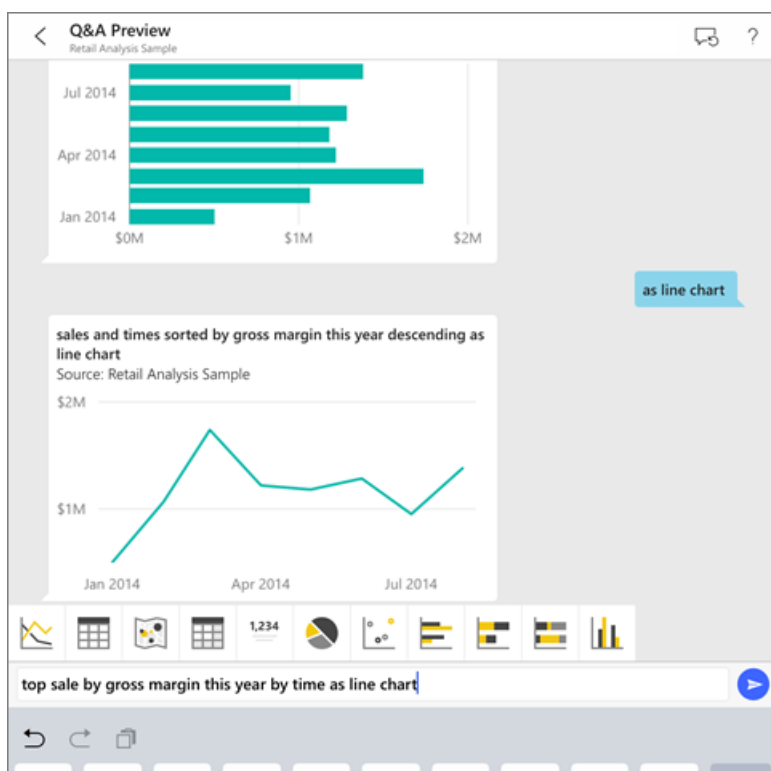
Ask questions about your data with the Q&A virtual analyst in iOS apps - Power BI

1/19/2018 • 3 min to read • [Edit Online](#)

Applies to:

	
iPhones	iPads

The easiest way to learn about your data is to ask questions about it in your own words. In this tutorial, try asking questions and viewing featured insights about sample data with the Q&A virtual analyst.




In the Microsoft Power BI mobile app on your iPad, iPhone, and iPod Touch, the Q&A virtual analyst is a conversational BI experience that enhances the previous version of Q&A in iOS. The Q&A virtual analyst still accesses underlying Q&A data in the Power BI service (<https://powerbi.com>). You can still type or say a question, and it also delivers data insights in context.

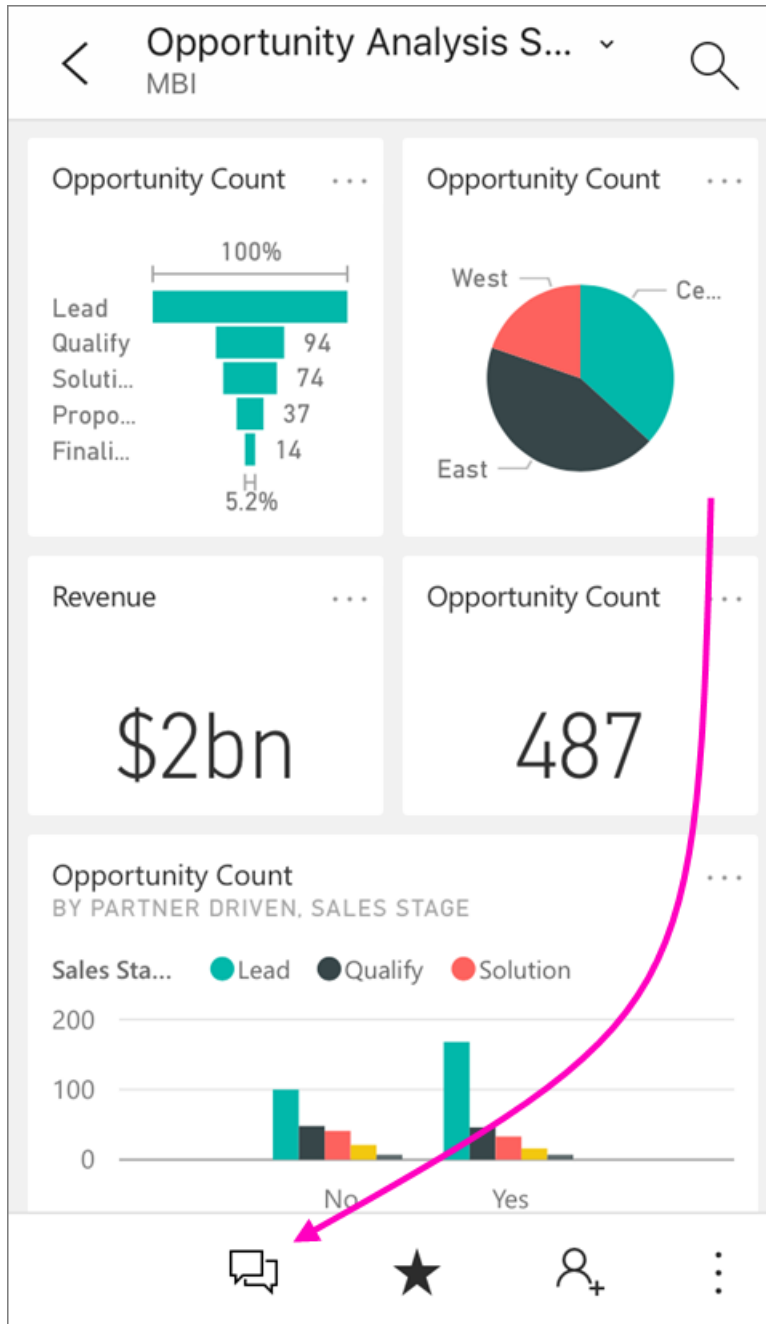
Download the samples

The first step in the tutorial is to download the Retail Analysis and Opportunity Analysis samples in the Power BI service.

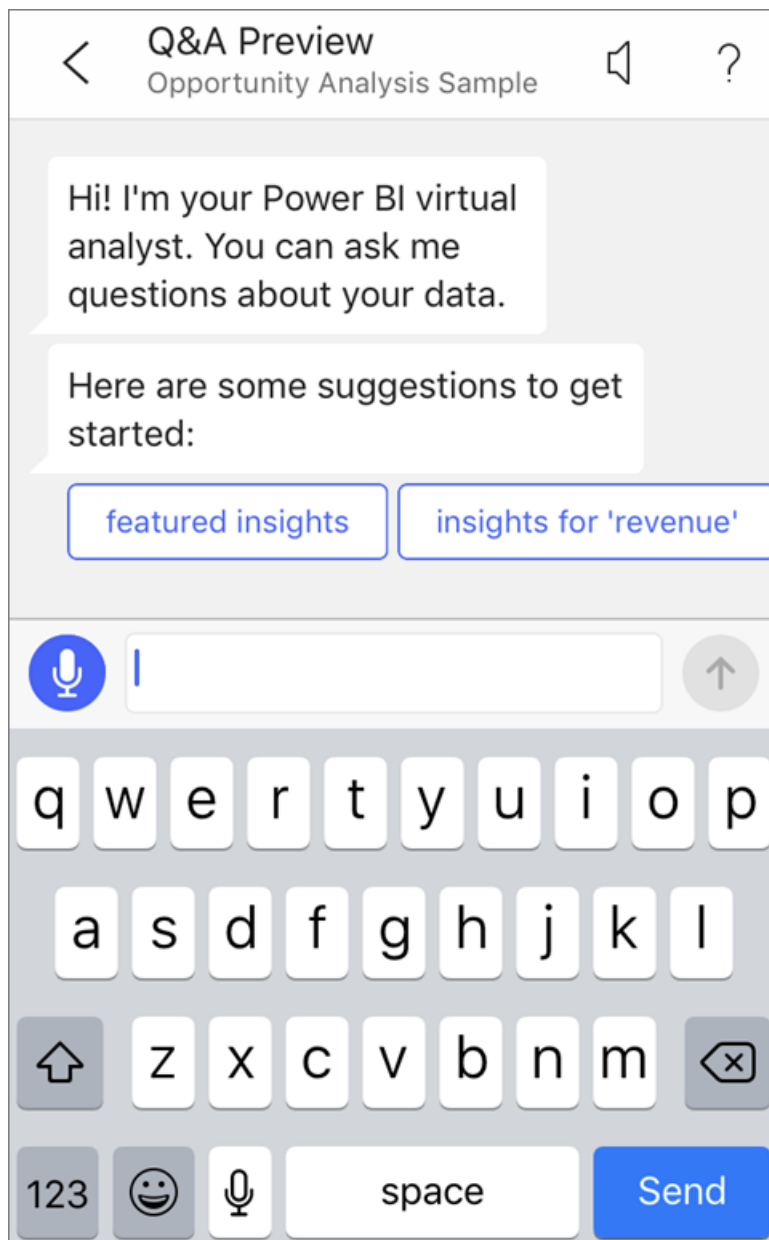
- In your workspace on the Power BI service (<https://powerbi.com>):
 - Select **Get Data > Samples > Opportunity Analysis Sample > Connect**.
 - After the Opportunity Analysis Sample finishes downloading, select **Get Data > Samples > Retail Analysis Sample > Connect**.

Try featured insights

1. On your iPhone or iPad, open the Power BI app and navigate to the Opportunity Analysis Sample dashboard.
2. Tap the Q&A virtual analyst icon  from the action menu at the bottom of the page (at the top of the page on an iPad).



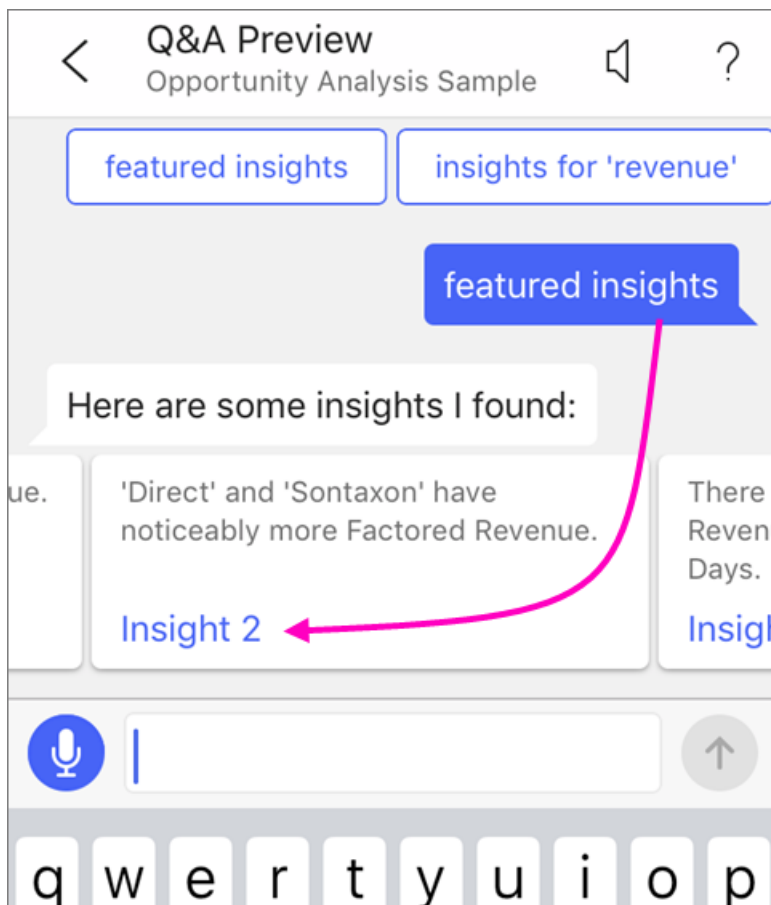
The Power BI Q&A virtual analyst offers some suggestions to get started.



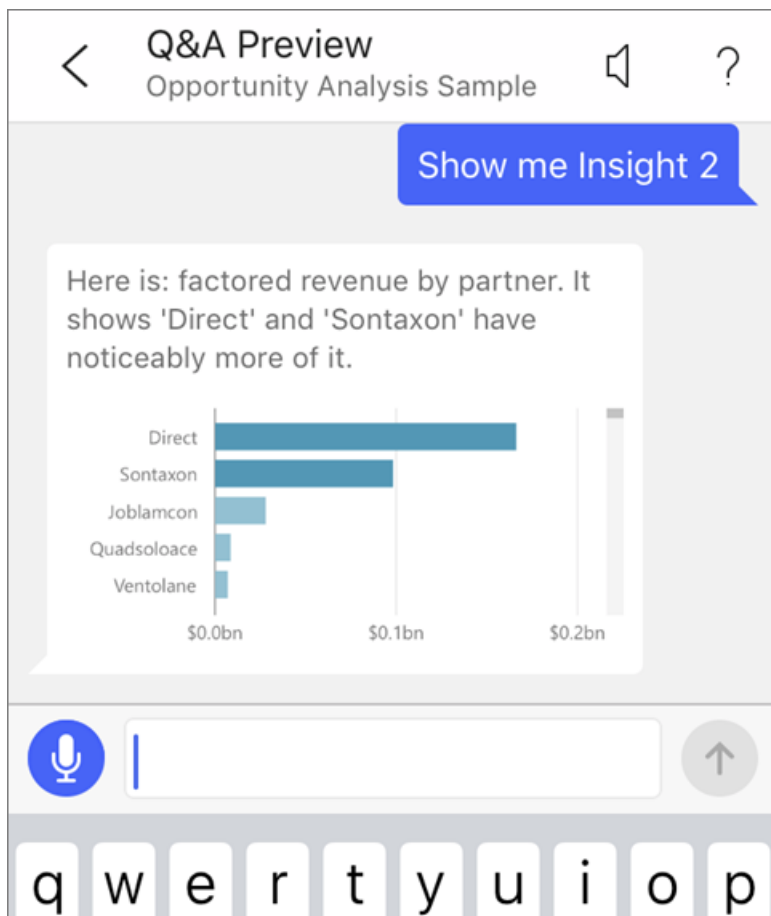
3. Tap **featured insights**.

The Q&A virtual analyst suggests some insights.

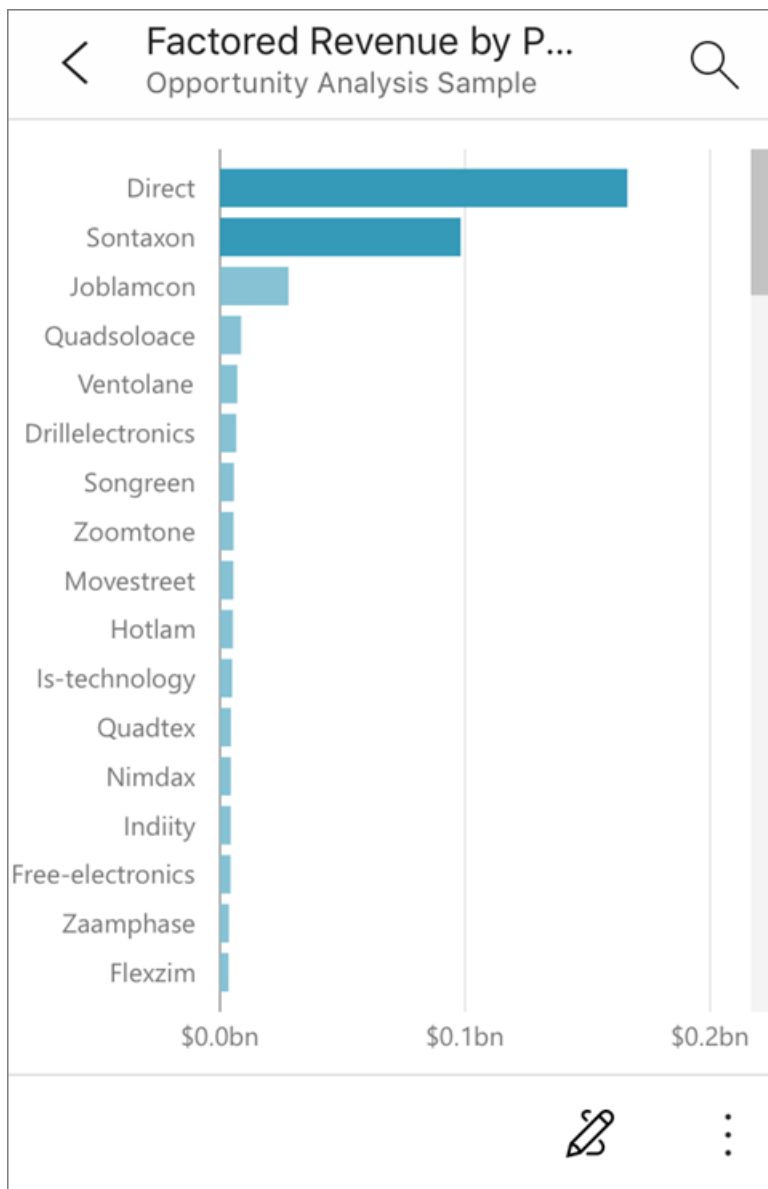
4. Scroll to the right and tap **Insight 2**.



The Q&A virtual analyst displays Insight 2.





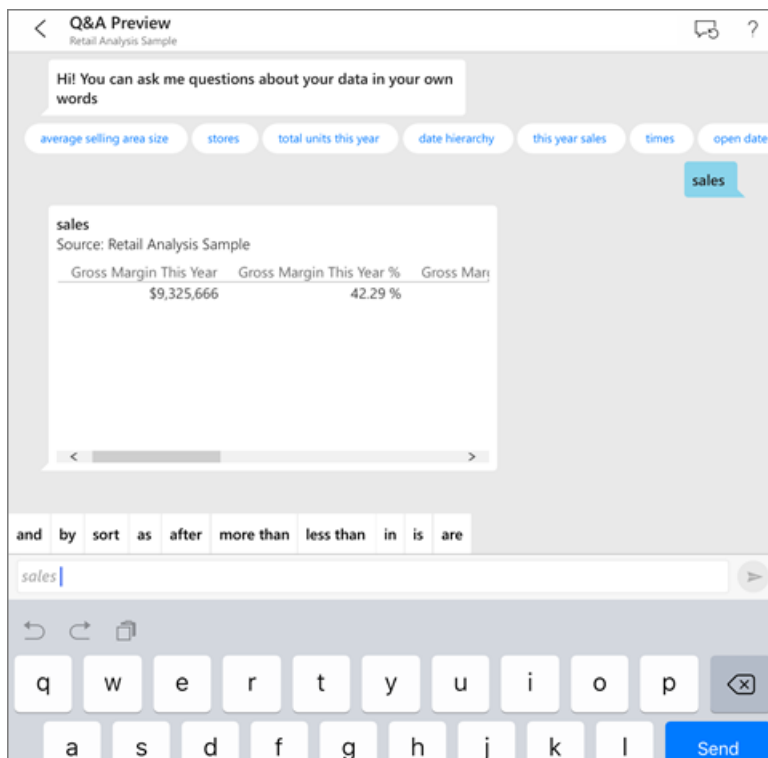
5. Tap the chart to open it in focus mode.




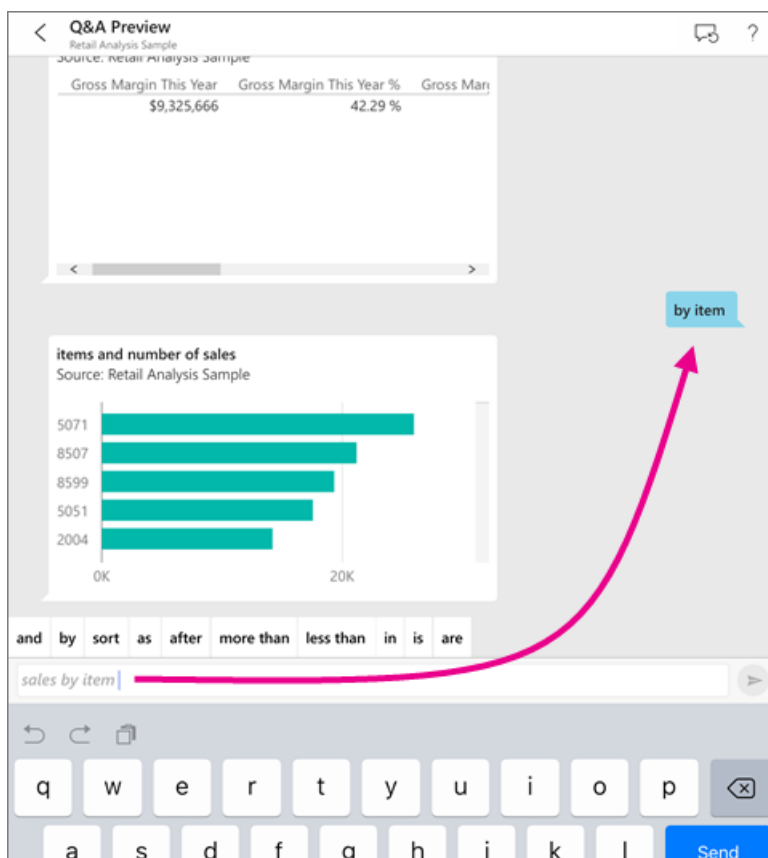
6. Tap the arrow in the upper-left corner to go back to the Q&A virtual analyst experience.



Try asking questions on your iPhone or iPad

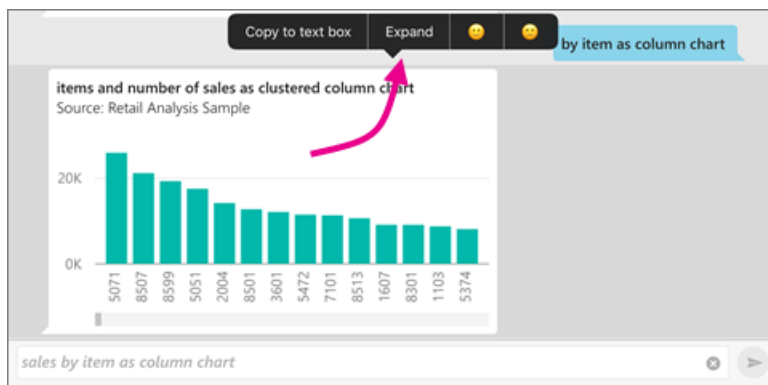
1. On your iPhone or iPad, open the Power BI app and navigate to the Retail Analysis Sample dashboard.
2. Tap the Q&A virtual analyst icon  from the action menu at the bottom of the page (at the top of the page on an iPad). The Q&A virtual analyst offers some suggestions to get started.
3. Type **show**, tap **sales** from the suggestion list > **Send** .



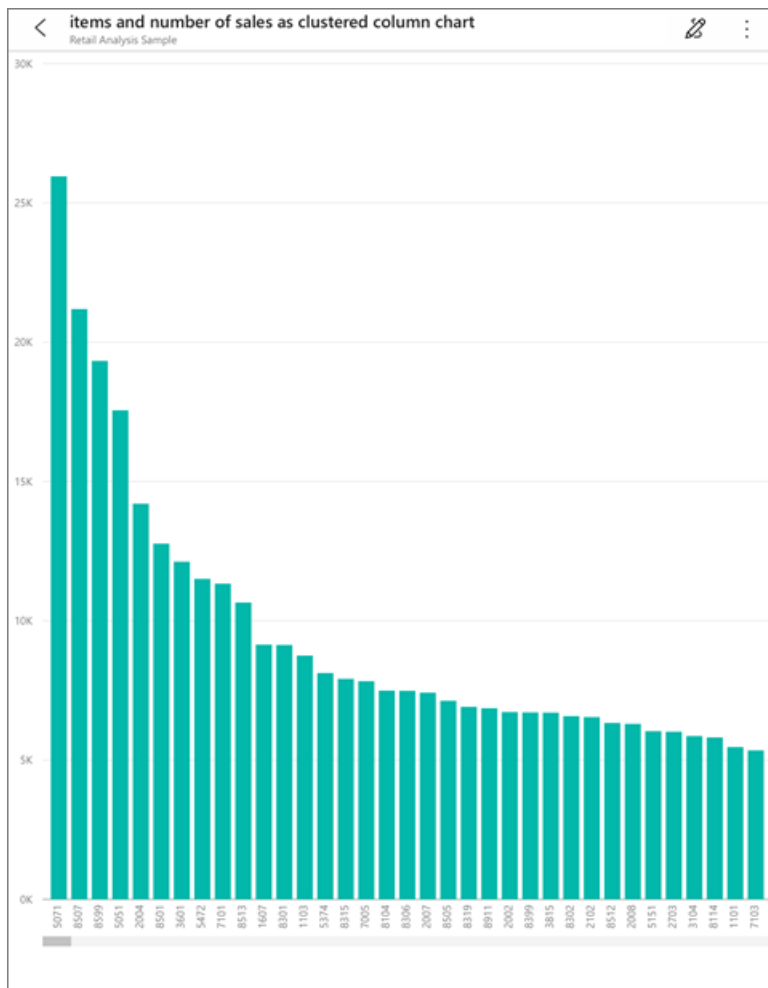
- Tap **by** from the keywords, then tap **item** from the suggestion list > **Send** .




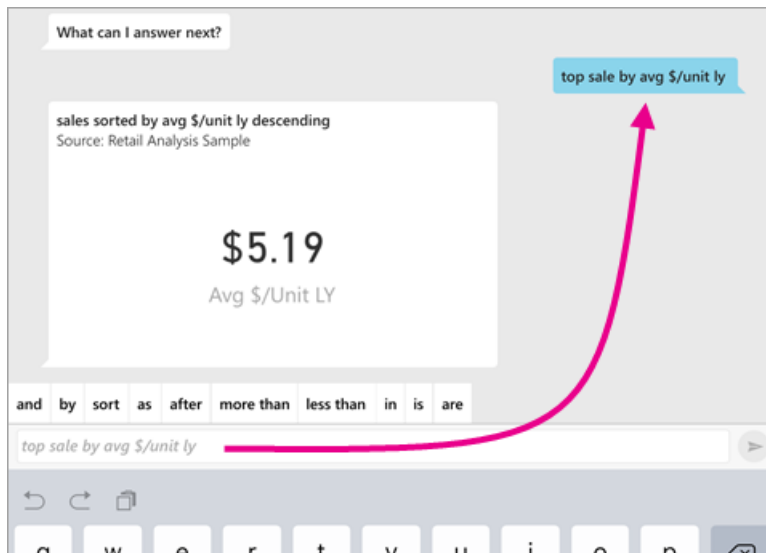
- Tap **as** from the keywords, tap the column chart icon , then tap **Send** .
- Long-tap the resulting chart, then tap **Expand**.




The chart opens in focus mode in the app.



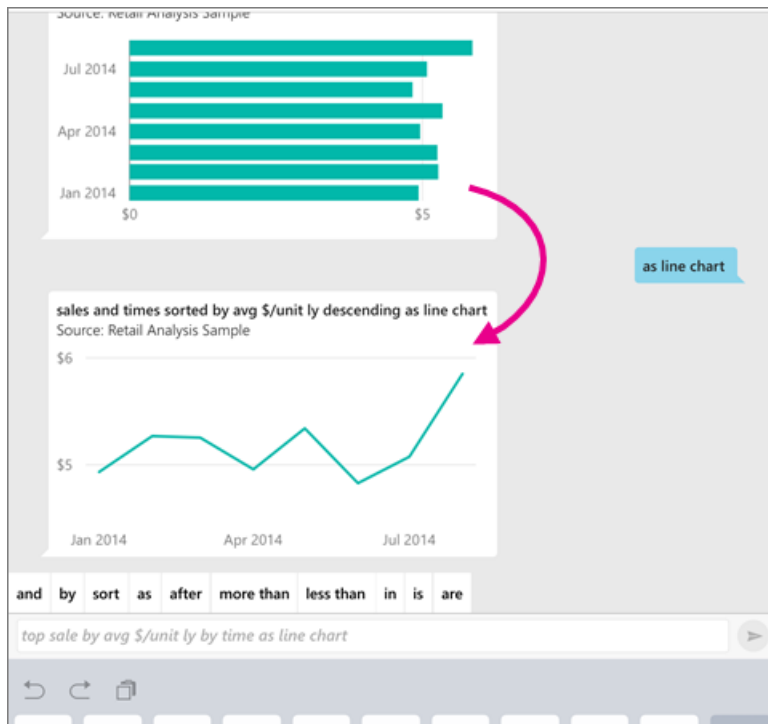
7. Tap the arrow in the upper-left corner to go back to the Q&A virtual analyst chat window.
8. Tap the X at the right of the text box to delete the text and start over.
9. Try a new question: Tap **top** from the keywords, tap **sale by avg \$/unit ly** > **Send** .



10. Choose **by** from the keywords, tap **time** from the suggestion list at the top > **Send** .





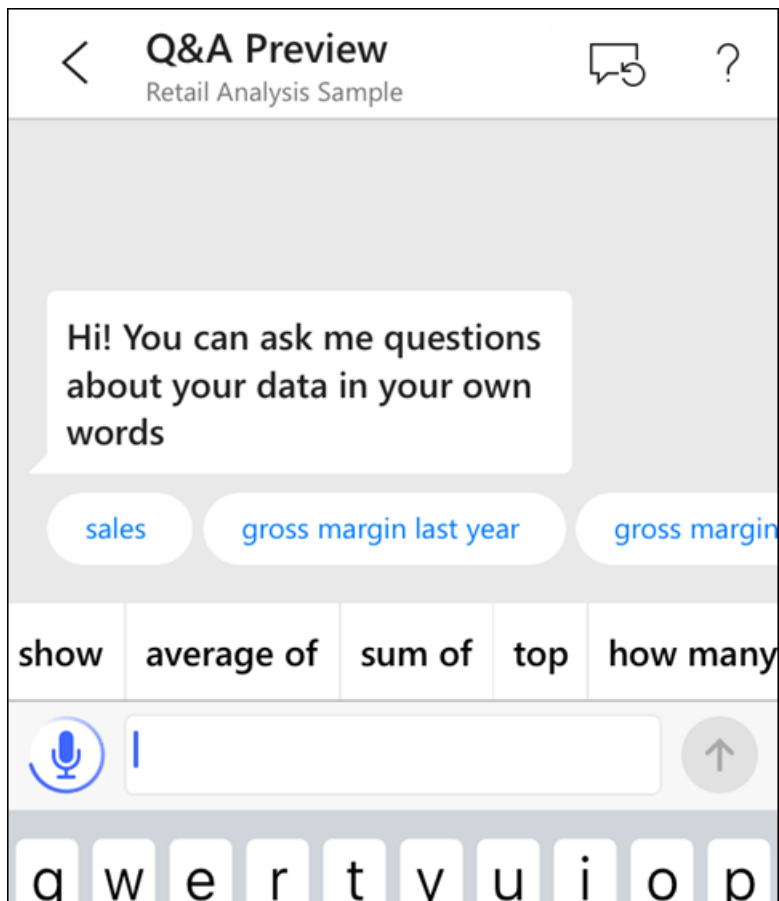
11. Type **as**, pick the line chart icon  from the suggestion list > **Send** .



Try saying your questions

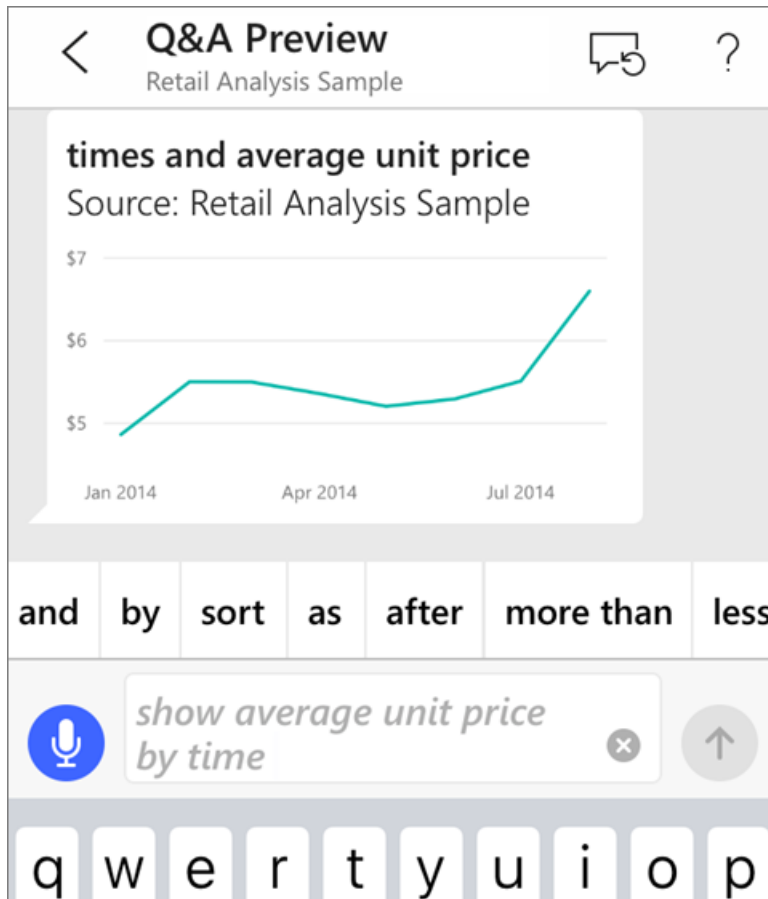
You can now ask questions about your data in the Power BI mobile app by speaking instead of typing.

1. Tap the Q&A virtual analyst icon  from the action menu at the bottom of the page (at the top of the page on an iPad).
2. Tap the microphone icon .



3. When the microphone icon is active, start speaking. For example, say "average unit price by time", then tap

Send 

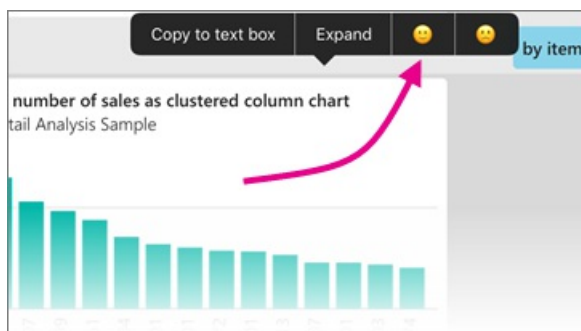


Questions about privacy when using speech-to-text?

See the Speech Recognition section of [What's New in iOS](#) in the Apple iOS Developer Guides.

Help and feedback

- Need help? Just say "Hi" or "Help", and you'll get assistance with starting a new question.
- Care to provide feedback on the results? Long-tap a chart or other result, then tap the smiley or frowny face.



Your feedback is anonymous, and helps us improve our answers to questions.

Enhance your Q&A virtual analyst results

You can improve the results you and your customers get when they use the Q&A virtual analyst on a dataset, either by asking more targeted questions or by enhancing the dataset.

How to ask questions

- Follow these [tips for asking questions in Q&A](#) in the Power BI service or the Q&A virtual analyst in your iOS

mobile app.

How to enhance the dataset

- Enhance the dataset in Power BI Desktop or in the Power BI service to [make your data work well with Q&A and the Q&A virtual analyst](#).

Next steps

- [Q&A in the Power BI service](#)
- Questions? Check the [Mobile apps section of the Power BI Community](#)

Create a link to a specific location in the Power BI mobile apps

11/9/2017 • 2 min to read • [Edit Online](#)

You can create and use a uniform resource identifier (URI) to link to a specific location (a *deep link*) within the Power BI mobile apps on all the mobile platforms: iOS, Android devices, and Windows 10.

URI links can point directly to dashboards, tiles, and reports.

The destination of the deep link determines the format of the URI. Follow these steps to create deep links to different locations.

Open the Power BI mobile app

Use this URI to open the Power BI mobile app on any device:

```
mspb://app/
```

Open to a specific dashboard

This URI opens the Power BI mobile app to a specific dashboard:

```
mspb://app/OpenDashboard?DashboardObjectId=<36-character-dashboard-id>
```

To find the 36-character dashboard object id, navigate to the specific dashboard in the Power BI service (<https://powerbi.com>). For example, see the highlighted section of this URL:

https://powerbi.com/groups/me/dashboards/**61b7e871-cb98-48ed-bddc-6572c921e270**

If the dashboard is in a group other than My Workspace, add `&GroupObjectId=<36-character-group-id>` either before or after the dashboard ID. For example,

```
mspb://app/OpenDashboard?DashboardObjectId=e684af3a-9e7f-44ee-b679-b9a1c59b5d60&GroupObjectId=8cc900cc-7339-467f-8900-fec82d748248
```

Note the ampersand (&) between the two.

Open to a specific tile in focus

This URI opens a specific tile in focus in the Power BI mobile app:

```
mspb://app/OpenTile?DashboardObjectId=<36-character-dashboard-id>&TileObjectId=<36-character-tile-id>
```

To find the 36-character dashboard and tile object IDs, navigate to the specific dashboard in the Power BI service (<https://powerbi.com>) and open the tile in focus mode. For example, see the highlighted sections of this URL:

https://powerbi.com/groups/me/dashboards/**3784f99f-b460-4d5e-b86c-b6d8f7ec54b7**/tiles/**565f9740-5131-4648-87f2-f79c4c9c5f5**/infocus

For this tile, the URI would be:

```
mspb://app/OpenTile?DashboardObjectId=3784f99f-b460-4d5e-b86c-b6d8f7ec54b7&TileObjectId=565f9740-5131-4648-87f2-f79c4cf9c5f5
```

Note the ampersand (&) between the two.

If the dashboard is in a group other than My Workspace, add `&GroupObjectId=<36-character-group-id>`

Open to a specific report

This URI opens a specific report in the Power BI mobile app:

```
mspb://app/OpenReport?ReportObjectId=<36-character-report-id>
```

To find the 36-character report object id, navigate to the specific report in the Power BI service (<https://powerbi.com>). For example, see the highlighted section of this URL:

https://powerbi.com/groups/me/reports/**df9f0e94-31df-450b-b97f-4461a7e4d300**

Open to a specific report page

This URI opens a specific report page in the Power BI mobile app:

```
mspb://app/OpenReport?ReportObjectId=<36-character-report-id>&reportPage=ReportSection<number>
```

The report page is called "ReportSection" followed by a number. Again, open the report in the Power BI service (<https://powerbi.com>) and navigate to the specific report page.

For example, see the highlighted section of this URL:

https://powerbi.com/groups/me/reports/df9f0e94-31df-450b-b97f-4461a7e4d300/**ReportSection11**

Open in full-screen mode

Add the parameter in bold to open to a specific report in full-screen mode:

```
mspb://app/OpenReport?ReportObjectId=<36-character-report-id>*&openFullScreen=true*
```

For example:

```
mspb://app/OpenReport?ReportObjectId=500217de-50f0-4af1-b345-b81027224033&openFullScreen=true
```

Add context (optional)

You can also add context in the string. Then if you need to contact us, we can use that context to filter our data to your app. Add `&context=<app-name>` to the link

For example, see the highlighted section of this URL:

https://powerbi.com/groups/me/reports/df9f0e94-31df-450b-b97f-4461a7e4d300/**&context=SlackDeepLink**

Next steps






Your feedback helps us decide what to implement in the future, so don't forget to vote for other features you'd like to see in Power BI mobile apps.

- [Power BI apps for mobile devices](#)
- Follow [@MSPowerBI](#) on Twitter
- Join the conversation at the [Power BI Community](#)
- [Get started with Power BI](#)

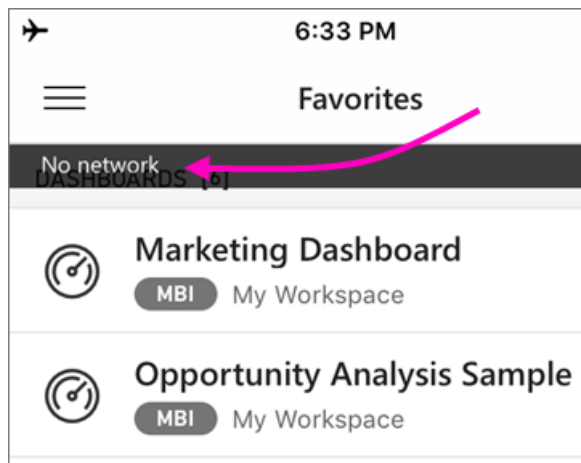
View your data offline in the Power BI mobile apps

1/17/2018 • 2 min to read • [Edit Online](#)

Applies to:

 iPhone	 iPad	 Android phone	 Android tablet	
iPhones	iPads	Android phones	Android tablets	Windows 10 devices

One advantage of viewing Power BI in a mobile app rather than in a mobile browser is that you can see your data even when you're not connected to a network.



By default, Power BI refreshes the data frequently so you get up-to-date answers to your business questions any time, even while commuting or roaming.

Data access while you're offline

While you're offline, you can access and interact with dashboards you've accessed previously from the mobile app.

You also have read-only access to any Power BI reports you've accessed previously from the mobile app. You can see the full report, but not filter, cross-filter, sort, or use slicers on it.

Background data refresh

Background refresh updates your favorite dashboards, plus dashboards and reports you've viewed in the last two weeks, with the data on the Power BI service (not the data source). If you're connected to wi-fi, background refresh updates every 2 hours. Otherwise, if you're on a 3G network, Power BI updates the content every 24 hours.

You can turn off background refresh, for example to avoid network usage. Check the settings on your device.

NOTE

If you use the Power BI mobile app on an iOS device and your organization has configured Microsoft Intune MAM, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

Read more about [configuring Power BI mobile apps with Microsoft Intune](#).

Offline indicators

Power BI provides clear indicators when you go in and out of offline mode, as well as indicators for missing dashboards, reports, and tiles that aren't available offline.

Limitations

When you're offline with Power BI on your mobile device, you may encounter these limitations:

- Power BI can cache up to 250 MB of data offline.
- Some tile types require an active server connection, so they aren't available offline — for example, Bing map tiles and some custom tiles.
- Whole Excel workbooks in Power BI aren't available offline.
- You can see Reporting Services mobile reports and KPIs offline, if you have viewed them while connected. They don't refresh in the background. They refresh every time you open them.

Next steps



Your feedback helps us decide what to implement in the future, so don't forget to vote for other features you'd like to see in Power BI mobile apps.

- [Power BI apps for mobile devices](#)
- Follow @MSPowerBI on Twitter
- Join the conversation at the [Power BI Community](#)
- [Get started with Power BI](#)

View Power BI reports optimized for your phone

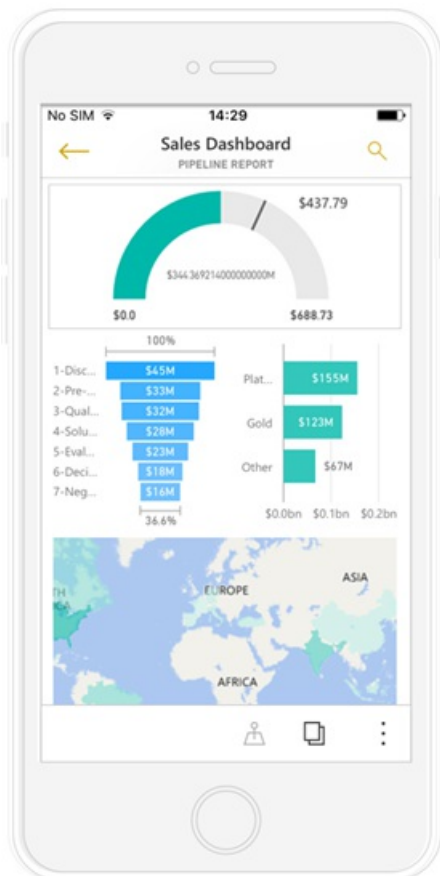
1/5/2018 • 3 min to read • [Edit Online](#)

Applies to:

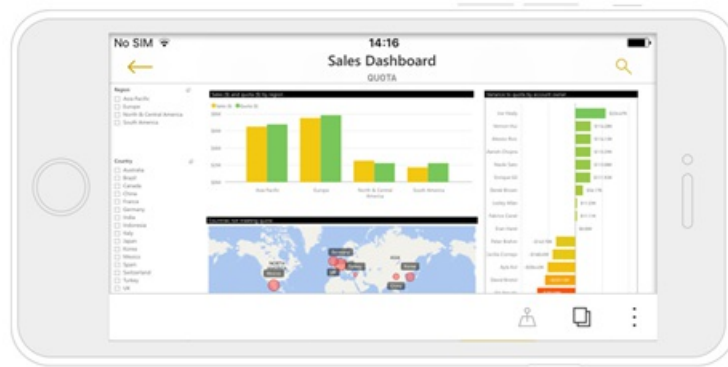
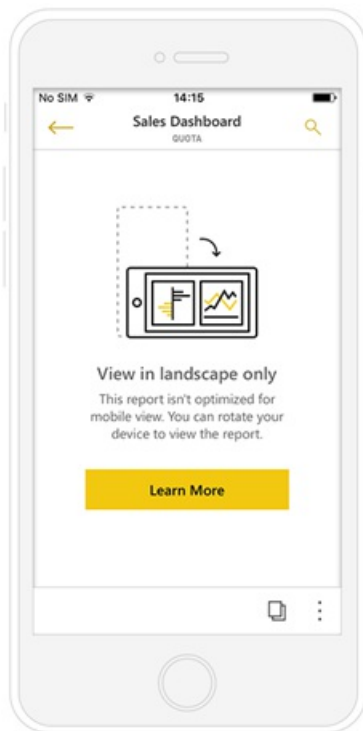
	
iPhones	Android phones

When you create a Power BI report in Power BI Desktop, you can also [create a version of that report optimized for viewing](#) in the Power BI app on a phone.

Then, when you open a Power BI report on a phone, Power BI detects if the report has been optimized for phones and automatically opens the optimized report in portrait view.



If a phone-optimized report doesn't exist, the report still opens, but in the non-optimized landscape views. Even in a phone-optimized report, if you turn your phone sideways, the report opens in the non-optimized view with the original report layout. If only some pages are optimized, you see a message in portrait view, indicating the report is available in landscape.




All the other features of Power BI reports still work in phone-optimized reports. Read more about what you can do in:

- [Reports on iPhones.](#)
- [Reports on Android phones.](#)

Filter the report page on a phone

If a phone-optimized report has filters defined, when you view the report on a phone you can use those filters.

1. Tap the filter icon  at the bottom of the page.
2. Use basic or advanced filtering to see the results you're interested in.



Cross-highlight visuals

Cross highlighting visuals in phone reports works the same as it does in the Power BI service and in reports on phones in landscape view: When you select data in one visual, it highlights related data in the other visuals on that page.

Read more about [filtering and highlighting in Power BI](#).

Select visuals

In phone reports when you select a visual, the phone report highlights that visual and focuses on it, neutralizing canvas gestures.

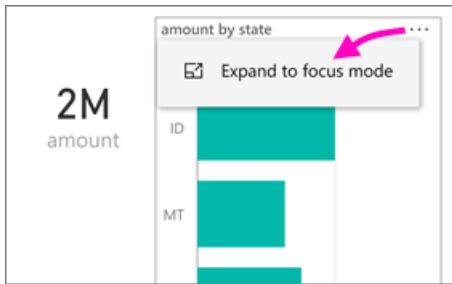
With the visual selected, you can do things like scroll within the visual. To de-select a visual, just touch anywhere outside the visual area.

Open visuals in focus mode

Phone reports also offer a focus mode, so you can get a bigger view of a single visual and explore it and the

report.

- In a phone report, tap the ellipsis (...) in the upper-right corner of a visual > **Expand to focus mode**.

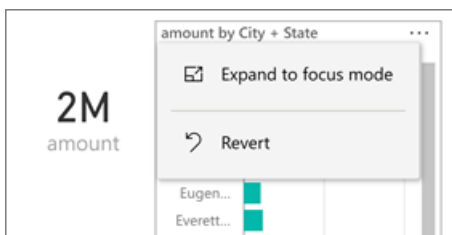


What you do in focus mode carries over to the report canvas and vice versa, for a seamless exploration experience. For example, if you highlight a value in a visual, then return to the whole report, the report as a whole will be filtered to the value you highlighted in the visual.

Some actions are only possible in focus mode, due to screen size constraints:

- **Drill down** into the information displayed in a visual. Read more about [drilling down and up](#) in a phone report, below.
- **Sort** the values in the visual.
- **Revert**: Clear exploration steps you've taken on a visual and revert to the definition set when the report was created.

To clear all exploration from a visual, tap the ellipsis (...) > **Revert**.

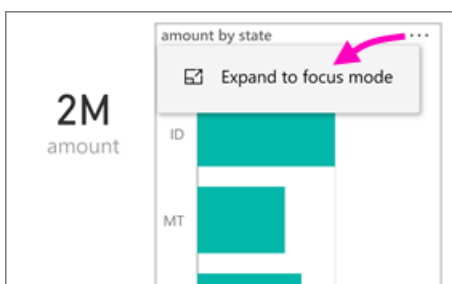


Revert is available at the report level, clear all exploration from all visuals, or at the visual level, clearing all exploration from the specific visual selected.

Drill down in a visual

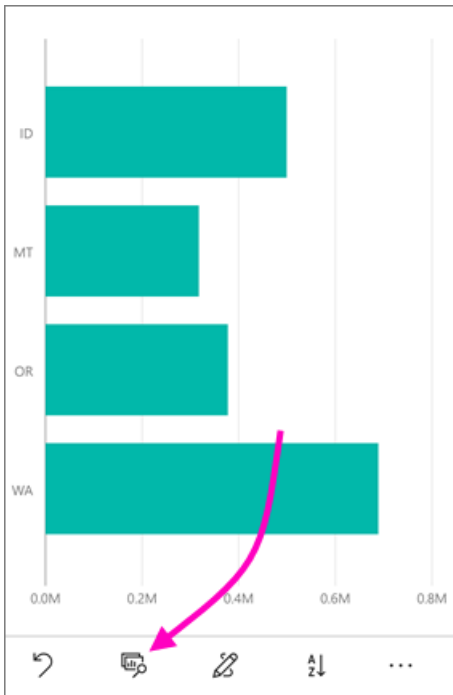
If hierarchy levels are defined in a visual, you can drill down into the detailed information displayed in a visual, then back up. You [add drill-down to a visual](#) either in the Power BI service or in Power BI Desktop. Drill-down only works in phone-optimized Power BI reports when you view them on a phone.

1. In a report on a phone, tap the ellipsis (...) in the upper-right corner > **Expand to focus mode**.

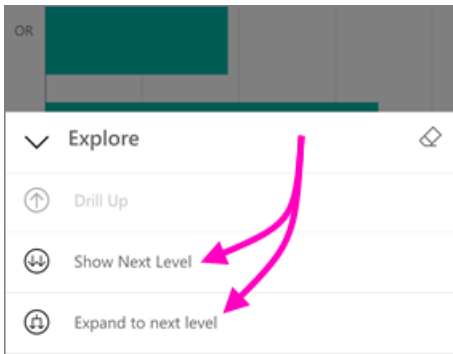


In this example, the bars show the values for states.

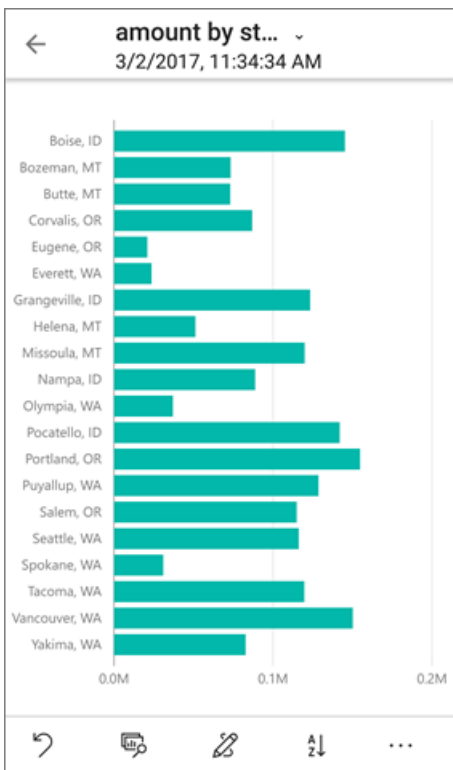
2. Tap the explore icon  in the lower-left.



3. Tap **Show next level** or **Expand to next level**.

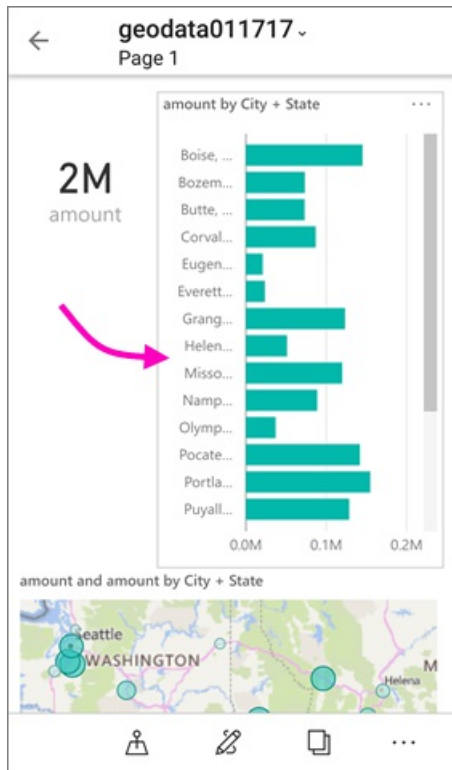


Now the bars show the values for cities.

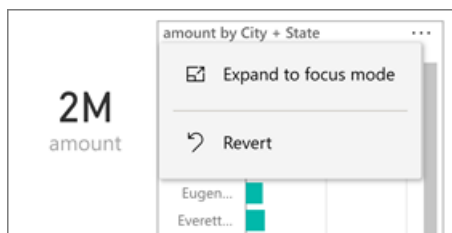


4. If you tap the arrow in the upper-left corner, you return to the phone report with the values still expanded

to the lower level.



5. To go back up to the original level, tap the ellipsis (...) again > **Revert**.



Next steps

- [Create reports optimized for the Power BI phone apps](#)
- [Create a phone view of a dashboard in Power BI](#)
- [Create responsive visuals optimized for any size](#)
- More questions? [Try asking the Power BI Community](#)

Configure mobile apps with Microsoft Intune

1/30/2018 • 6 min to read • [Edit Online](#)

Microsoft Intune enables organizations to manage devices and applications. The Power BI mobile applications, for iOS and Android, integrate with Intune to allow you to manage the application on your devices, and to control security. Through configuration policies, you can control items like requiring an access pin, controlling how data is handled by the application and even encrypting application data when the app is not in use.

General mobile device management configuration

This article is not meant as full configuration guide for Microsoft Intune. If you are just now integrating with Intune, there are a few things you will want to make sure you have setup. [Learn more](#)

Microsoft Intune can co-exist with Mobile Device Management (MDM) within Office 365. [Learn more](#)

This article assumes that Intune is configured properly and you have devices enrolled with Intune. If you are co-existing with MDM, the device will show enrolled within MDM, but is available to manage within Intune.

NOTE

After your organization has configured Microsoft Intune MAM, if you use the Power BI mobile app on an iOS or Android device, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

Step 1: Get the url for the application

Before we create the application within Intune, we need to get the urls for the apps. For iOS, we will get this from iTunes. For Android, you can get it from the Power BI mobile page.

Save the url, as you will need it when we create the application.

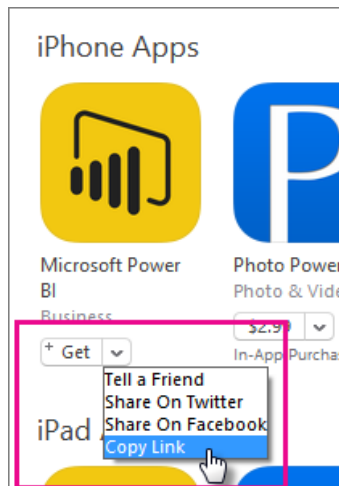
iOS

To get the app url for iOS, we will need to get it from iTunes.

1. Open iTunes.
2. Search for *Power BI*.
3. You should see **Microsoft Power BI** listed under **iPhone Apps** and **iPad Apps**. You can use either, as you

will get the same url.

4. Select the **Get** drop down and select **Copy Link**.



It should look similar to the following.

```
https://itunes.apple.com/us/app/microsoft-power-bi/id929738808?mt=8
```

Android

You can get the url to Google Play from the [Power BI mobile page](#). Clicking on the **Download from Google Play** icon will take you to the app page. You can copy the URL from the browser address bar. It should look similar to the following.

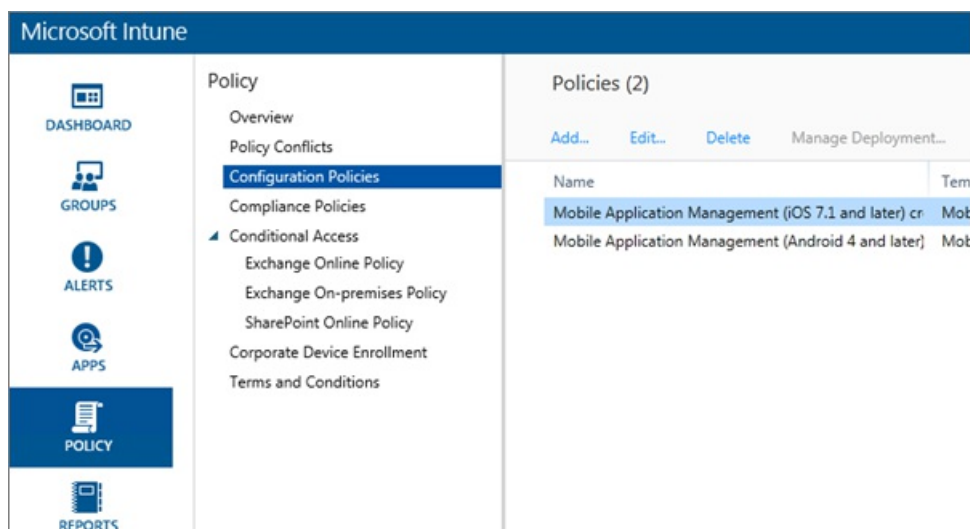
```
https://play.google.com/store/apps/details?id=com.microsoft.powerbim
```

Step 2: Create a mobile application management policy

The mobile application management policy allows you to enforce items like an access pin. You can create one within the Intune portal.

You can create the application, or the policy first. The order in which they are added doesn't matter. They will just need to both exist for the deploy step.

1. Select **Policy** > **Configuration Policies**.



2. Select **Add...**

3. Under **Software** you can select Mobile Application Management for either Android or iOS. To get started quickly, you can select **Create a policy with the recommended settings**, or you can create a custom policy.
4. Edit the policy to configure the restrictions you want on the application.

Step 3: Create the application

The application is a reference, or package, that is saved into Intune for deployment. We will need to create an application and reference the app url that we got from either Google Play or iTunes.

You can create the application, or the policy first. The order in which they are added doesn't matter. They will just need to both exist for the deploy step.

1. Go to the Intune portal and select **Apps** from the left menu.
2. Select **Add App**. This will launch the **Add Software** application.

iOS

1. Select **Managed iOS App from the App Store** from the drop down.
2. Enter the app url, that we got from [Step 1](#), and select **Next**.

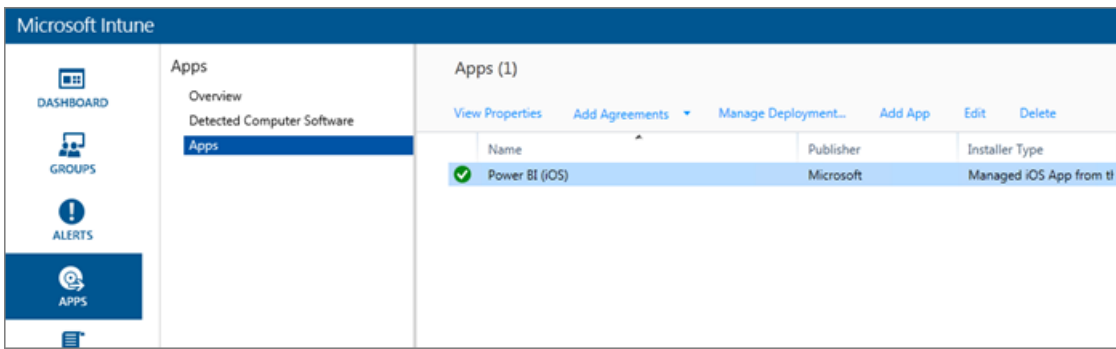
1

2

3. Provide a **Publisher, Name** and **Description**. You can optionally provide an **Icon**. The **Category** is for the Company Portal app. Once you are done, select **Next**.
4. You can decide if you want to publish the app as **Any** (default), **iPad** or **iPhone**. By default it will show **Any** and will work for both device types. The Power BI app is the same url for both iPhone and iPad. Select **Next**.
5. Select **Upload**.

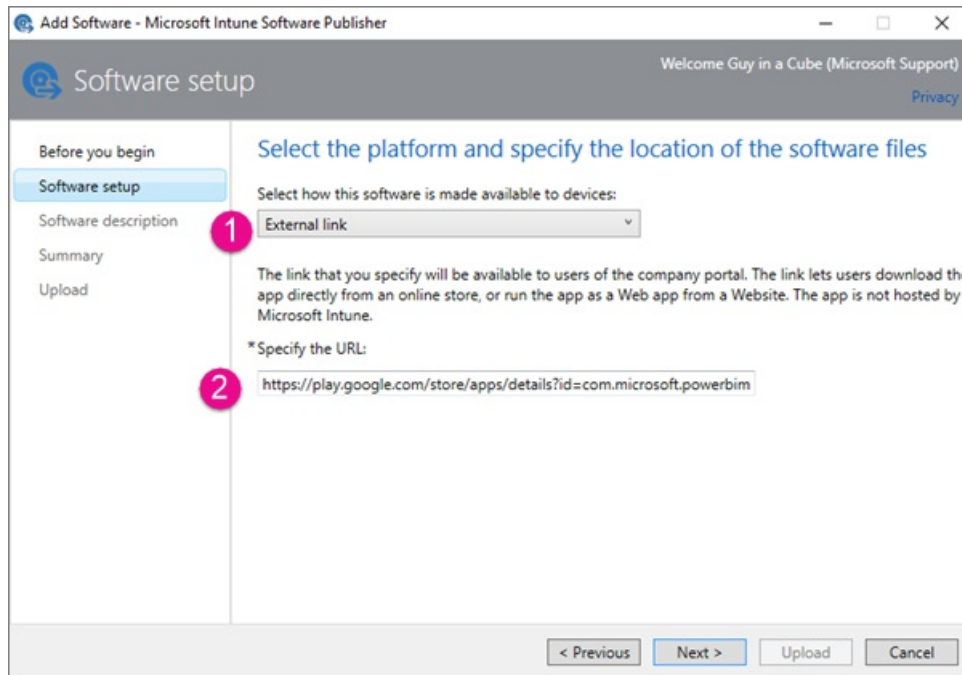
NOTE

You may not see it show up in the app list until you refresh the page. You can click on **Overview** and back to **Apps** to get the page to reload.



Android

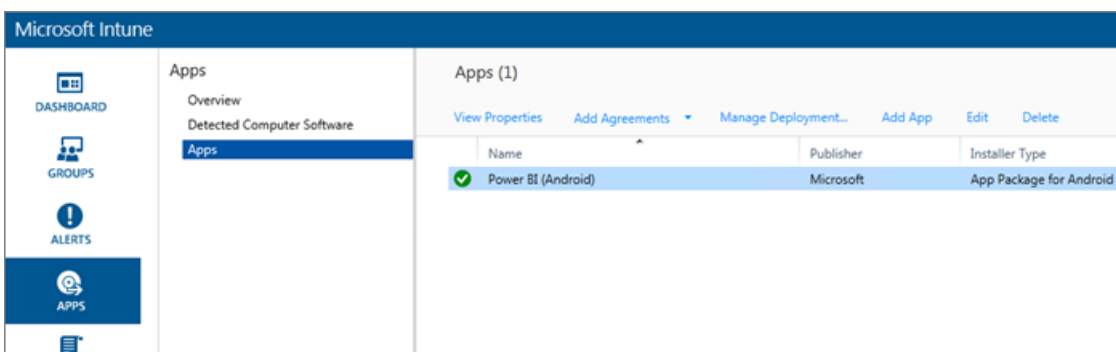
1. Select **External Link** from the drop down.
2. Enter the app url, that we got from [Step 1](#), and select **Next**.



3. Provide a **Publisher, Name** and **Description**. You can optionally provide an **Icon**. The **Category** is for the Company Portal app. Once you are done, select **Next**.
4. Select **Upload**.

NOTE

You may not see it show up in the app list until you refresh the page. You can click on **Overview** and back to **Apps** to get the page to reload.

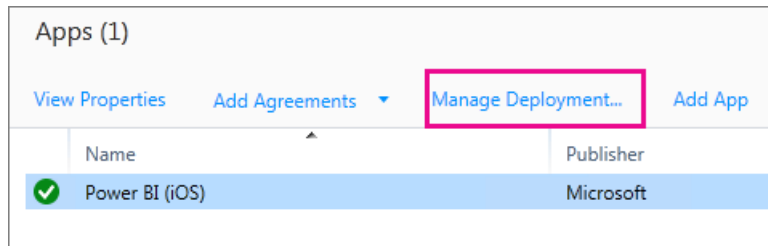


Step 4: Deploy the application

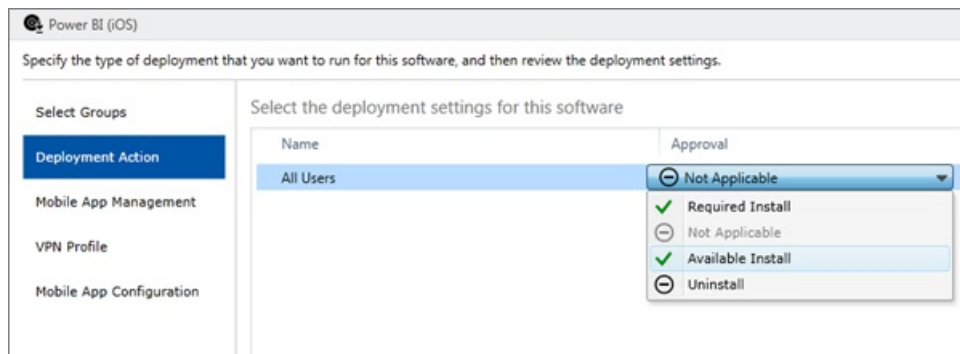
After you have added the application, you will need to deploy it so that it is available to your end users. This is the step where you will bind the policy you created with the app.

iOS

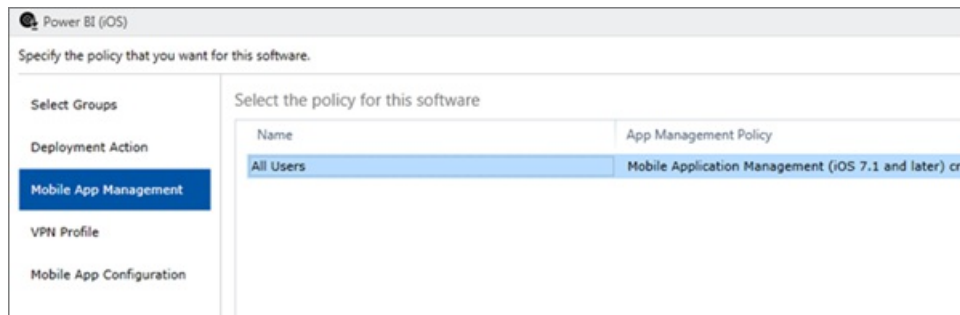
1. On the apps screen, select the app you created. Then select the **Manage Deployment...** link.



2. In the **Select Groups** screen, you can choose which groups you want to deploy this app to. Select **Next**.
3. In the **Deployment Action** screen, you can choose how you want to deploy this app. Selecting **Available Install**, or **Required Install**, will make the app available in the Company Portal for users to install on-demand. After you are done making your selection, select **Next**.



4. In the **Mobile App Management** screen, you can select the Mobile App Management policy that we created in [Step 2](#). It will default to the policy you made, if that is the only iOS policy available. Select **Next**.

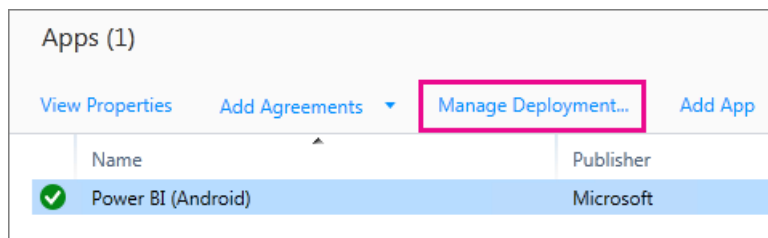


5. In the **VPN Profile** screen, you can select a policy if you have one for your organization. It defaults to **None**. Select **Next**.
6. In the **Mobile App Configuration** screen, you can select an **App Configuration Policy** if you created one. It defaults to **None**. This is not required. Select **Finish**.

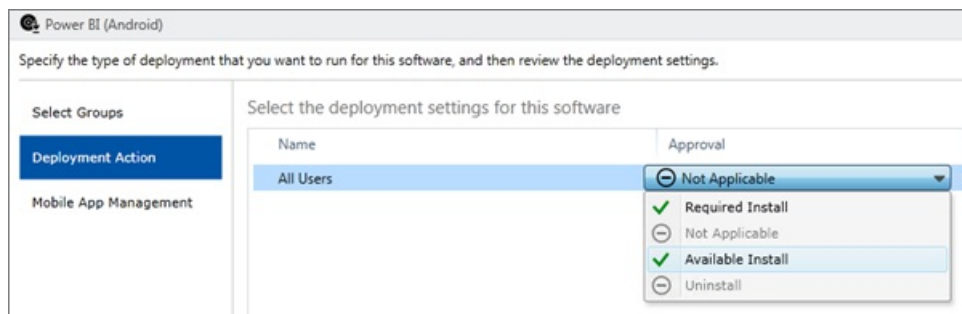
After you have deployed the app, it should show **Yes** for deployed, in the apps page.

Android

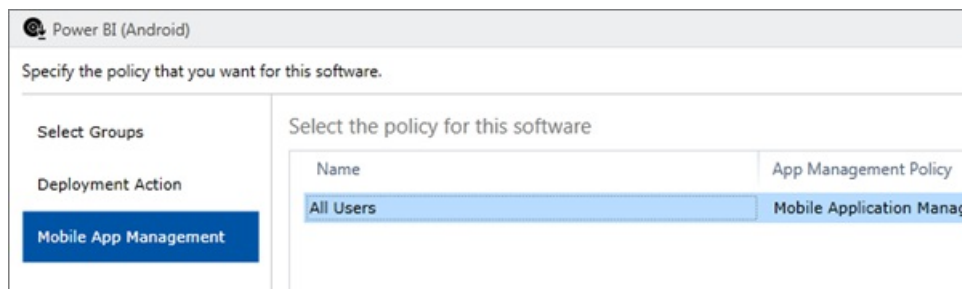
1. On the apps screen, select the app you created. Then select the **Manage Deployment...** link.



2. In the **Select Groups** screen, you can choose which groups you want to deploy this app to. Select **Next**.
3. In the **Deployment Action** screen, you can choose how you want to deploy this app. Selecting **Available Install**, or **Required Install**, will make the app available in the Company Portal for users to install on-demand. After you are done making your selection, select **Next**.



4. In the **Mobile App Management** screen, you can select the Mobile App Management policy that we created in [Step 2](#). It will default to the policy you made, if that is the only Android policy available. Select **Finish**.

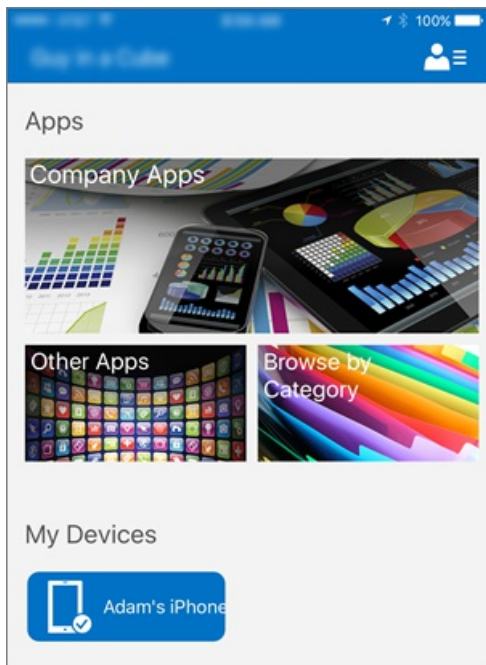


After you have deployed the app, it should show **Yes** for deployed, in the apps page.

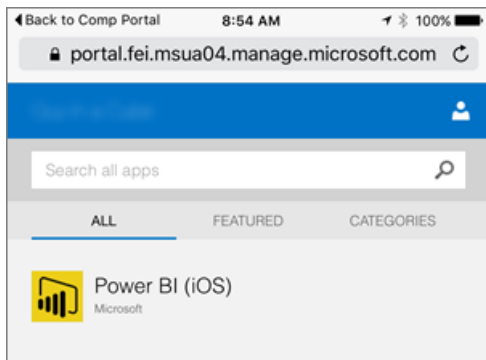
Step 5: Install the application on a device

You will install the application through the Company Portal app. If you haven't installed the Company Portal, you can get it through the app store on either iOS or Android platforms. You will sign into the Company Portal with your organizational login.

1. Open the Company Portal app.
2. If you don't see the Power BI app listed as a featured app, select **Company Apps**.



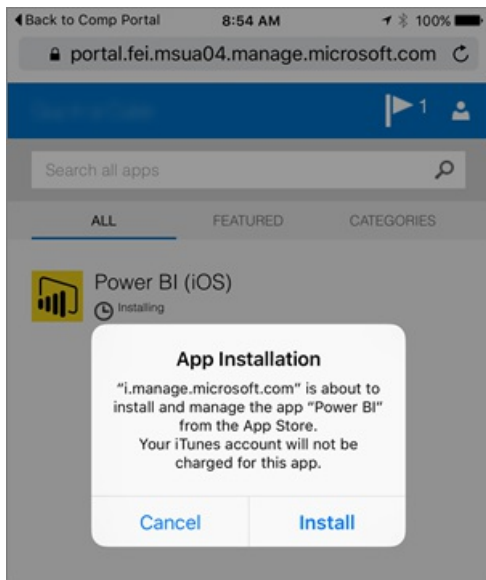
3. Select the Power BI app that you deployed.



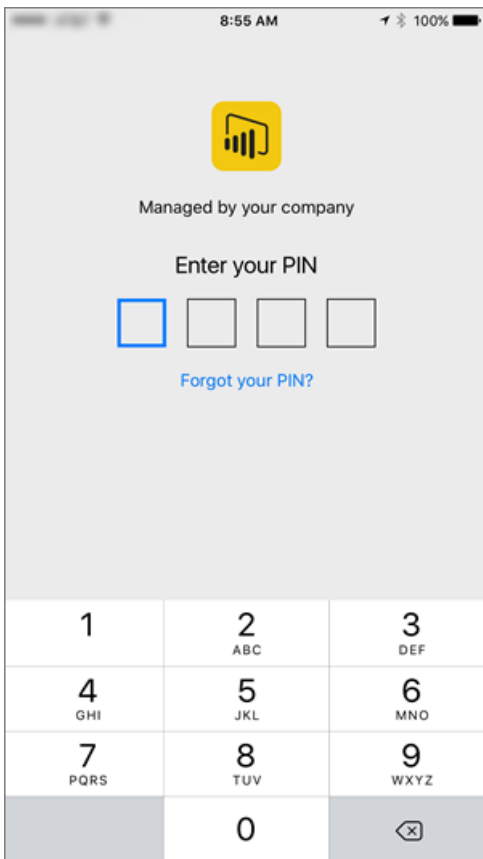
4. Select **Install**.



5. If you are on iOS, it will push the app to you. Select **Install** on the push dialog.



After it is installed, you will see that it is **Managed by your company**. If you enabled access with a pin, in the policy, you will see the following.



Next steps

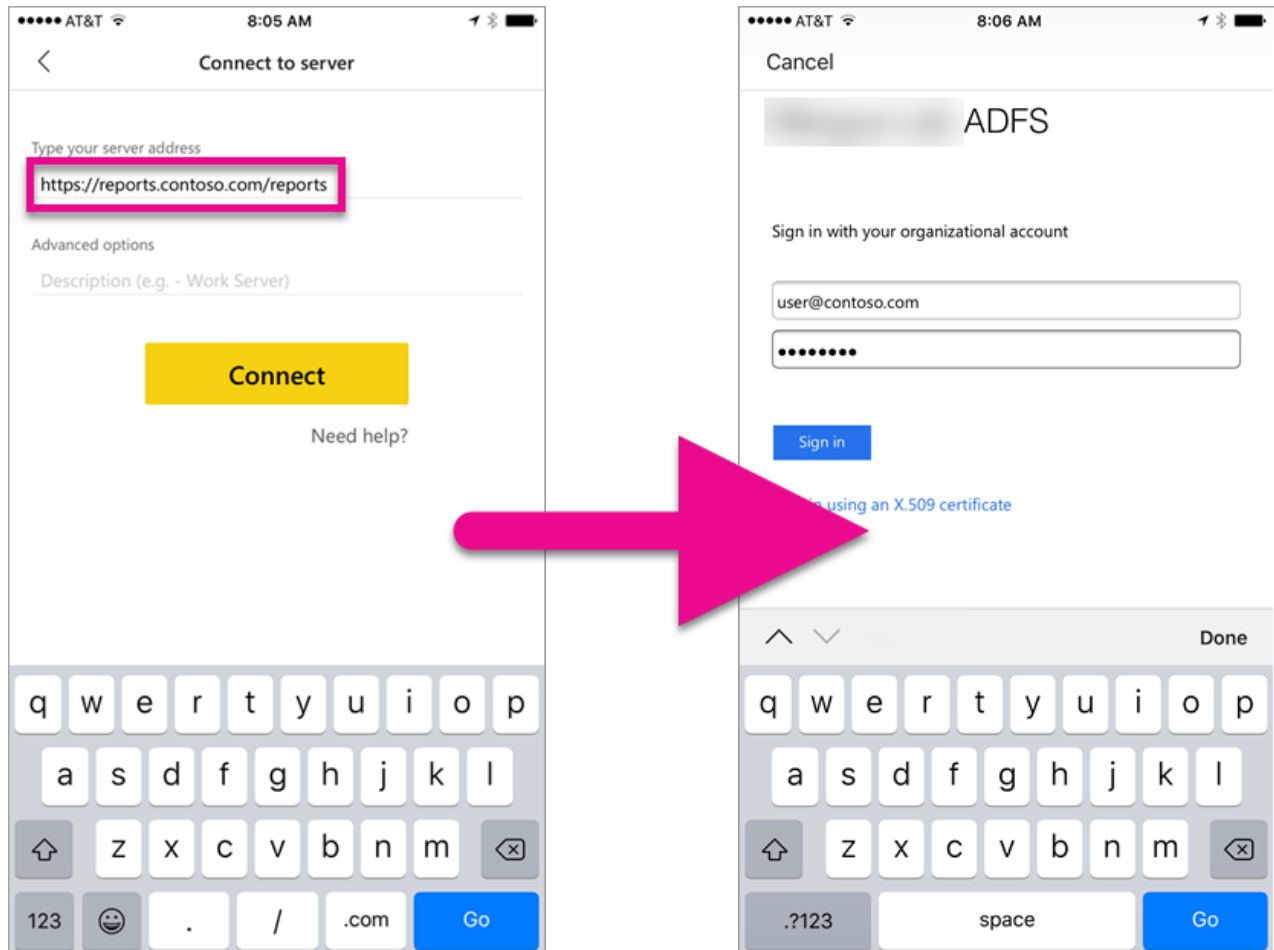
[Configure and deploy mobile application management policies in the Microsoft Intune console](#)
[Power BI apps for mobile devices](#)

More questions? [Try asking the Power BI Community](#)

Using OAuth to connect to Reporting Services

1/30/2018 • 7 min to read • [Edit Online](#)

Learn how to configure your environment to support OAuth authentication with the Power BI mobile app in order to connect to Reporting Services 2016 or later.



In the past, the Power BI mobile app only supported basic authentication, over HTTPS, to Reporting Services in order to display Mobile Reports or KPIs. Many organizations do not allow this type of configuration due to security concerns. With an update to the Power BI mobile app, you can now use OAuth to connect to Reporting Services. Windows Server 2016 provides some improvements to the Web Application Proxy role to allow this type of authentication.

Requirements

Windows Server 2016 is required for the Web Application Proxy (WAP) and Active Directory Federation Services (ADFS) servers. You do not need to have a Windows 2016 functional level domain.

Domain Name Services (DNS) configuration

You will need to determine what the public URL will be that the Power BI mobile app will connect to. For example, it may look similar to the following.

```
https://reports.contoso.com
```

You will need to point your DNS record for **reports** to the public IP address of the Web Application Proxy (WAP) server. You will also need to configure a public DNS record for your ADFS server. For example, you may have configured the ADFS server with the following URL.

```
https://fs.contoso.com
```

You will need to point your DNS record for **fs** to the public IP address of the Web Application Proxy (WAP) server as it will be published as part of the WAP application.

Certificates

You will need to configure certificates for both the WAP application and the ADFS server. Both of these certificates must be part of a valid certificate authority that your mobile devices recognize.

Reporting Services configuration

There isn't much to configure on the Reporting Services side. We just need to make sure that we have a valid Service Principal Name (SPN) to enable the proper Kerberos authentication to occur and that the Reporting Services server is enabled for negotiate authentication.

Service Principal Name (SPN)

The SPN is a unique identifier for a service that uses Kerberos authentication. You will need to make sure you have a proper HTTP SPN present for your report server.

For information on how to configure the proper Service Principal Name (SPN) for your report server, see [Register a Service Principal Name \(SPN\) for a Report Server](#).

Enabling negotiate authentication

To enable a report server to use Kerberos authentication, you will need to configure the Authentication Type of the report server to be RSWindowsNegotiate. This is done within the rsreportserver.config file.

```
<AuthenticationTypes>
  <RSWindowsNegotiate />
  <RSWindowsKerberos />
  <RSWindowsNTLM />
</AuthenticationTypes>
```

For more information, see [Modify a Reporting Services Configuration File](#) and [Configure Windows Authentication on a Report Server](#).

Active Directory Federation Services (ADFS) Configuration

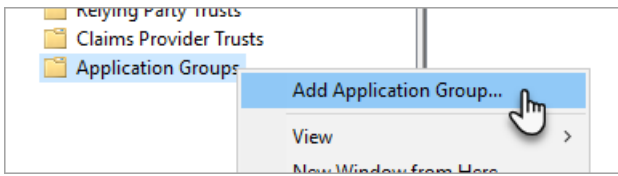
You will need to configure ADFS on a Windows 2016 server within your environment. This can be done through the Server Manager and selecting Add Roles and Features under Manage. For more information, see [Active Directory Federation Services](#).

Create an application group

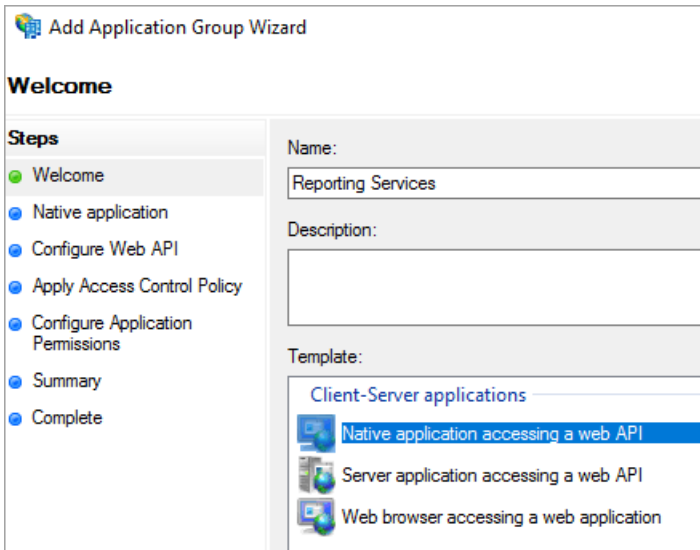
Within the AD FS Management screen, you will want to create an application group for Reporting Services which will include information for the Power BI Mobile apps.

You can create the application group with the following steps.

1. Within the AD FS Management app, right click **Application Groups** and select **Add Application Group...**



2. Within the Add Application Group Wizard, provide a **name** for the application group and select **Native application accessing a web API**.



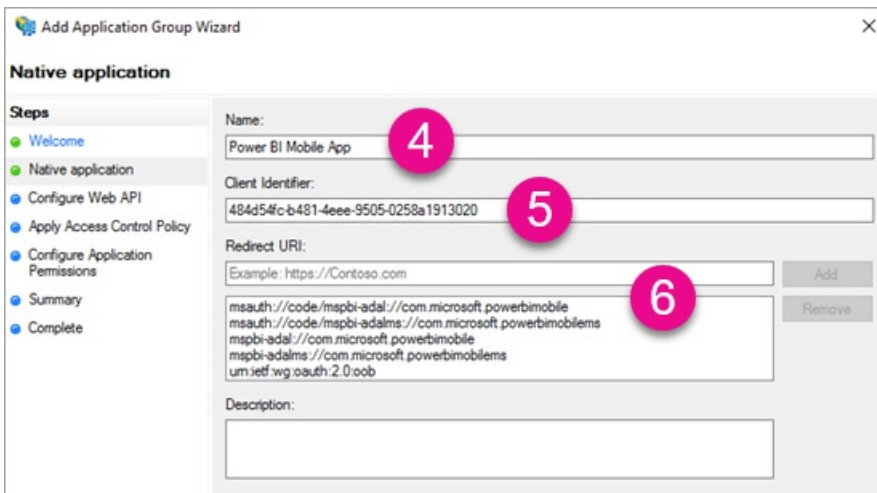
3. Select **Next**.
4. Provide a **name** for the application you are adding.
5. While the **Client ID** will be auto generated for your, enter in `484d54fc-b481-4eee-9505-0258a1913020` for both iOS and Android.
6. You will want to add the following **Redirect URLs**:

Entries for Power BI Mobile – iOS:

msauth://code/mspbi-adal://com.microsoft.powerbimobile
 msauth://code/mspbi-adalms://com.microsoft.powerbimobilems
 mspbi-adal://com.microsoft.powerbimobile
 mspbi-adalms://com.microsoft.powerbimobilems

Android Apps only need the following:

urn:ietf:wg:oauth:2.0:oob

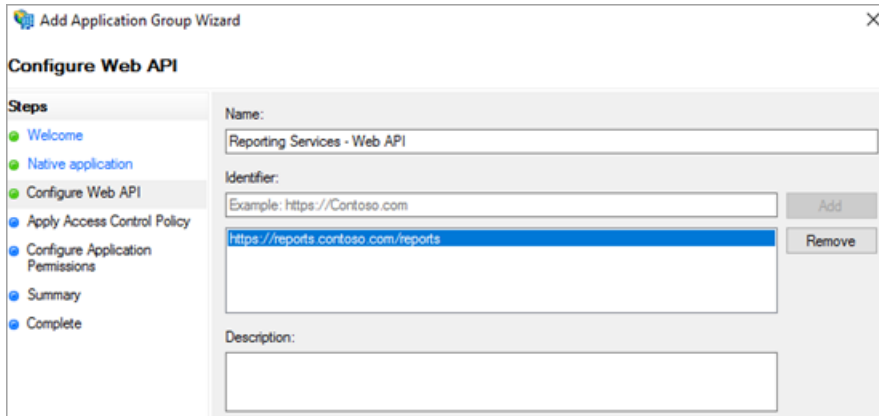


7. Select **Next**.
8. Supply the URL for your Report Server. This is the external URL that will hit your Web Application Proxy. It should be in the following format.

NOTE

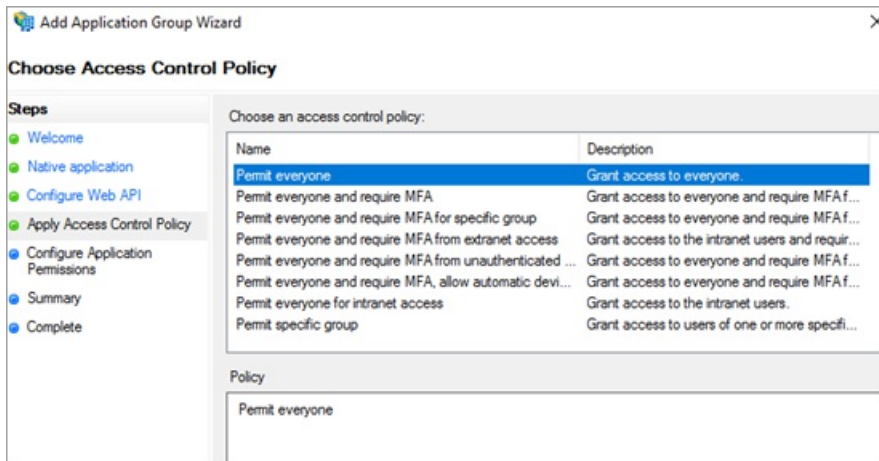
This URL is case sensitive!

https://reports



9. Select **Next**.

10. Choose the **Access Control Policy** that fits your organization's needs.



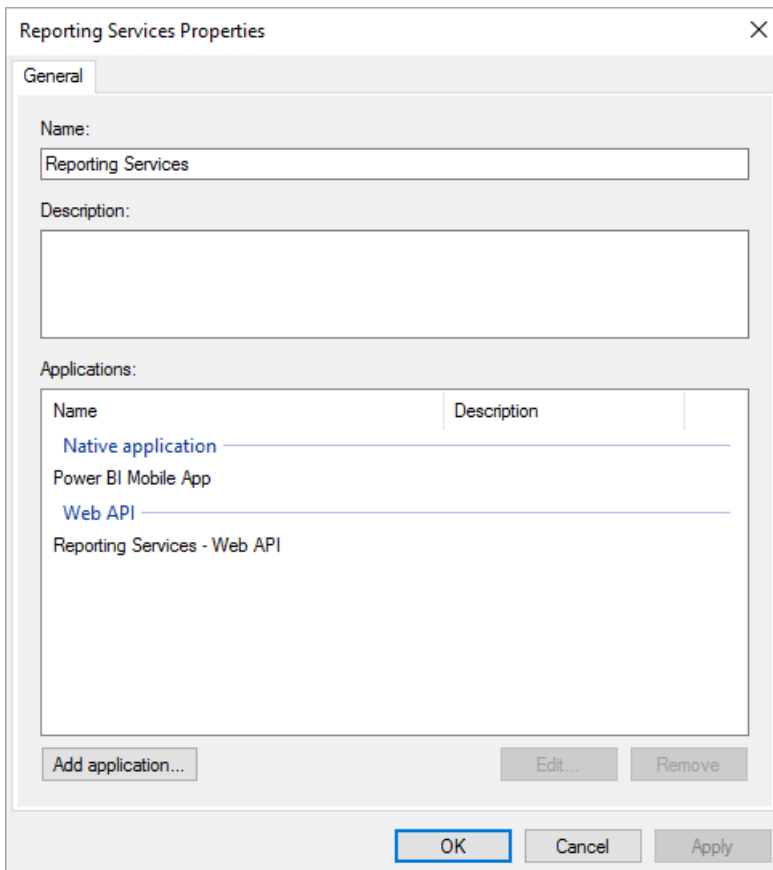
11. Select **Next**.

12. Select **Next**.

13. Select **Next**.

14. Select **Close**.

When completed, you should see the properties of your application group look similar to the following.



Web Application Proxy (WAP) Configuration

You will want to enable the Web Application Proxy (Role) Windows role on a server in your environment. This must be on a Windows 2016 server. For more information, see [Web Application Proxy in Windows Server 2016](#) and [Publishing Applications using AD FS Preauthentication](#).

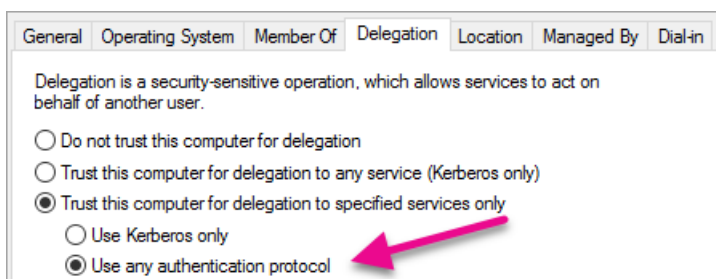
Constrained delegation configuration

In order to transition from OAuth authentication to Windows authentication, we need to use constrained delegation with protocol transition. This is part of the Kerberos configuration. We already defined the Reporting Services SPN within the Reporting Services configuration.

We need to configure constrained delegation on the WAP Server machine account within Active Directory. You may need to work with a domain administrator if you don't have rights to Active Directory.

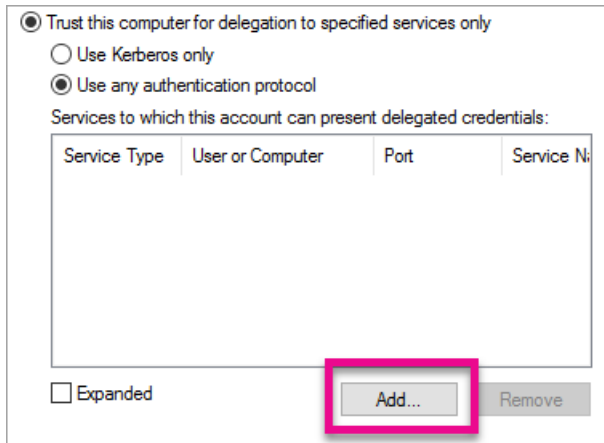
To configure constrained delegation, you will want to do the following.

1. On a machine that has the Active Directory tools installed, launch **Active Directory Users and Computers**.
2. Find the machine account for your WAP server. By default, this will be in the computers container.
3. Right click the WAP server and go to **Properties**.
4. Select the **Delegation** tab.
5. Select **Trust this computer for delegation to specified services only** and then **Use any authentication protocol**.



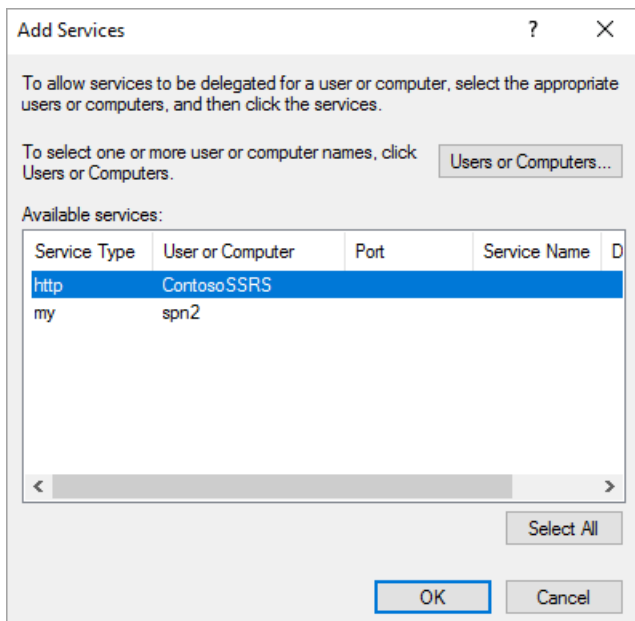
This sets up constrained delegation for this WAP Server machine account. We then need to specify the services that this machine is allowed to delegate to.

6. Select **Add...** under the services box.

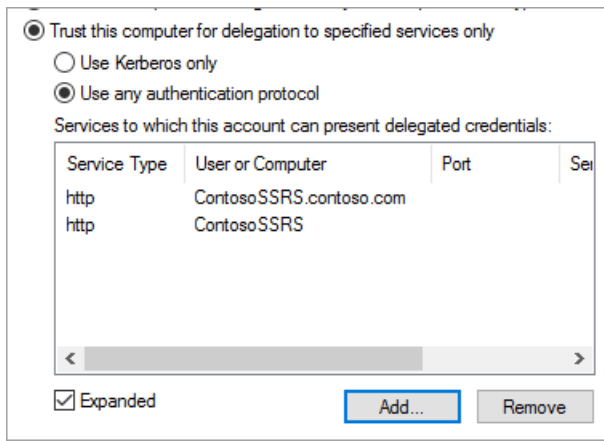


7. Select **Users or Computers...**
8. Enter the service account that you are using for Reporting Services. This is the account you added the SPN to within the Reporting Services configuration.
9. Select the SPN for Reporting Services and then select **OK**.

NOTE
You may only see the NetBIOS SPN. It will actually select both the NetBIOS and FQDN SPNs if they both exist.



10. The result should look similar to the following when the **Expanded** checkbox is checked.



11. Select **OK**.

Add WAP Application

While you can publish applications within the Report Access Management Console, we will want to create the application via PowerShell. Here is the command to add the application.

```
Add-WebApplicationProxyApplication -Name "Contoso Reports" -ExternalPreauthentication ADFS -ExternalUrl https://reports.contoso.com/reports/ -ExternalCertificateThumbprint "0ff79c75a725e6f67e3e2db55bdb103efc9acb12" -BackendServerUrl http://ContosoSSRS/reports/ -ADFSRelyingPartyName "Reporting Services - Web API" -BackendServerAuthenticationSPN "http/ContosoSSRS.contoso.com" -UseOAuthAuthentication
```

PARAMETER	COMMENTS
ADFSRelyingPartyName	This is the Web API name that you created as part of the Application Group within ADFS.
ExternalCertificateThumbprint	This is the certificate to use for the external users. It is important that this certificate be valid on mobile devices and come from a trusted certificate authority.
BackendServerUrl	This is the URL to the Report Server from the WAP server. If the WAP server is in a DMZ, you may need to use a fully qualified domain name. Make sure you can hit this URL from the web browser on the WAP server.
BackendServerAuthenticationSPN	This is the SPN you created as part of the Reporting Services configuration.

Setting Integrated Authentication for the WAP Application

After you add the WAP Application, you will need to set the BackendServerAuthenticationMode to use IntegratedWindowsAuthentication. In order to set this, you need the ID from the WAP Application.

```
Get-WebApplicationProxyApplication "Contoso Reports" | fl
```

```
PS C:\Windows\system32> Get-WebApplicationProxyApplication "Contoso Reports" | fl
ADFSRelyingPartyID           : 18ff495d-b9c0-e611-836b-00155d010910
ADFSRelyingPartyName         : Reporting Services - Web API
ADFSUserCertificateStore      :
BackendServerAuthenticationMode : NoAuthentication
BackendServerAuthenticationSPN : http/ContosoSSRS.contoso.com
BackendServerCertificateValidation : None
BackendServerUrl              : http://contosossrs/reports/
ClientCertificateAuthenticationBindingMode : None
ClientCertificatePreauthenticationThumbprint :
DisableHttpOnlyCookieProtection : False
DisableTranslateUrlInRequestHeaders : False
DisableTranslateUrlInResponseHeaders : False
EnableHTTPRedirect            : False
EnableSignOut                  : False
ExternalCertificateThumbprint  : 0ff79c75a725e6f67e3e2db55bdb103efc9acb12
ExternalPreauthentication      : ADFS
ExternalUrl                    : http://reports.contoso.com/reports/
ID                             : 30198C7F-DDE4-0D82-E654-D369A47B1EE5
InactiveTransactionsTimeoutSec : 300
Name                           : Contoso Reports
PersistentAccessCookieExpirationTimeSec : 0
UseOAuthAuthentication         : True
PSComputerName                 :
```

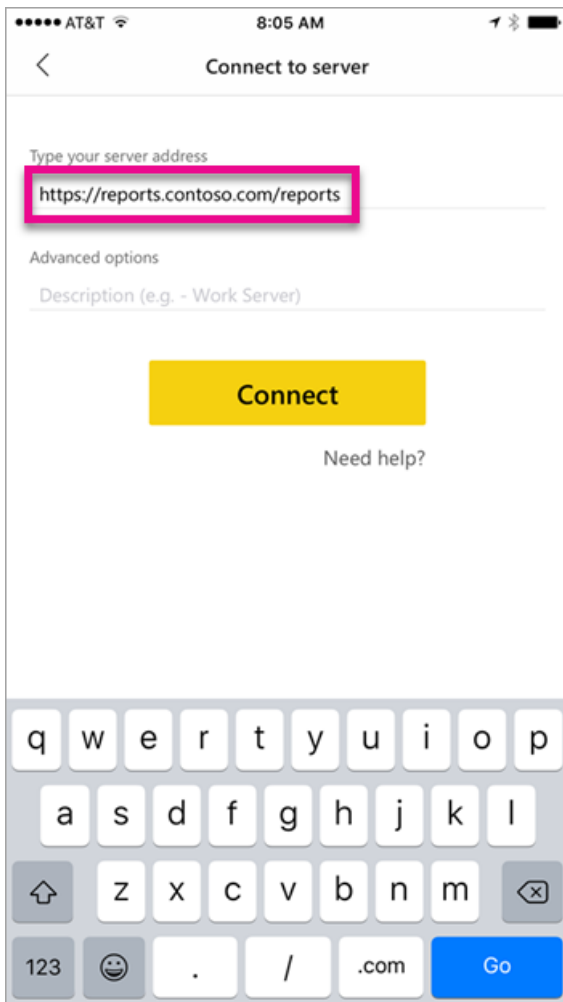
Run the following command to set the BackendServerAuthenticationMode using the ID of the WAP Application.

```
Set-WebApplicationProxyApplication -id 30198C7F-DDE4-0D82-E654-D369A47B1EE5 -BackendServerAuthenticationMode
IntegratedWindowsAuthentication
```

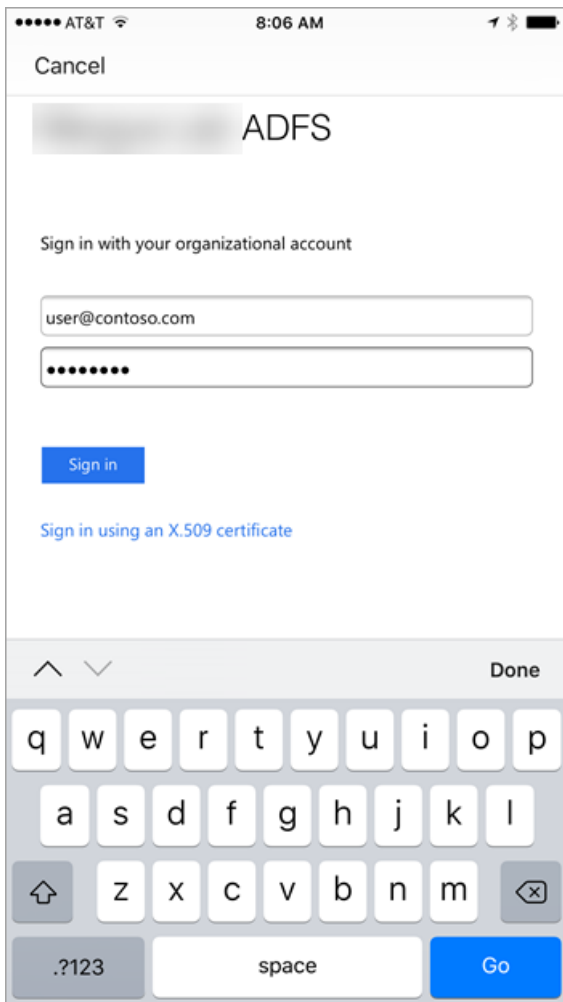
```
PS C:\Windows\system32> Get-WebApplicationProxyApplication "Contoso Reports" | fl
ADFSRelyingPartyID           : 18ff495d-b9c0-e611-836b-00155d010910
ADFSRelyingPartyName         : Reporting Services - Web API
ADFSUserCertificateStore      :
BackendServerAuthenticationMode : IntegratedWindowsAuthentication
BackendServerAuthenticationSPN : http/ContosoSSRS.contoso.com
BackendServerCertificateValidation : None
BackendServerUrl              : http://contosossrs/reports/
ClientCertificateAuthenticationBindingMode : None
ClientCertificatePreauthenticationThumbprint :
DisableHttpOnlyCookieProtection : False
DisableTranslateUrlInRequestHeaders : False
DisableTranslateUrlInResponseHeaders : False
EnableHTTPRedirect            : False
EnableSignOut                  : False
ExternalCertificateThumbprint  : 0ff79c75a725e6f67e3e2db55bdb103efc9acb12
ExternalPreauthentication      : ADFS
ExternalUrl                    : https://reports.contoso.com/reports/
ID                             : 30198c7f-dde4-0d82-e654-d369a47b1ee5
InactiveTransactionsTimeoutSec : 300
Name                           : Contoso Reports
PersistentAccessCookieExpirationTimeSec : 0
UseOAuthAuthentication         : True
PSComputerName                 :
```

Connecting with the Power BI Mobile App

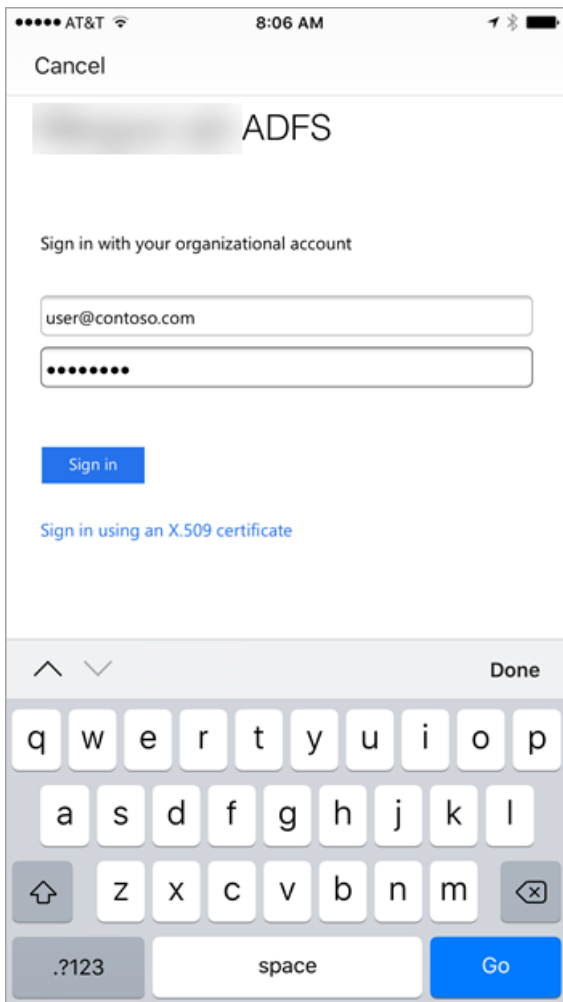
Within the Power BI mobile app, you will want to connect to your Reporting Services instance. To do that, supply the **External URL** for your WAP Application.



When you select **Connect**, you will be directed to your ADFS login page. Enter valid credentials for your domain.



After you select **Sign in**, you will see the elements from your Reporting Services server.

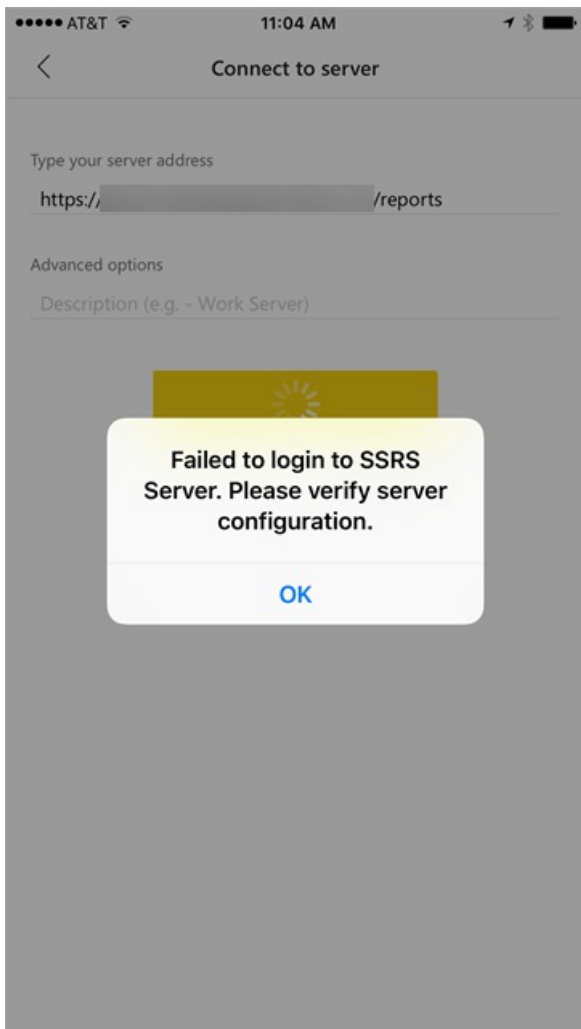


Multi-factor authentication

You can enable multi-factor authentication to enable additional security for your environment. To learn more, see [Configure AD FS 2016 and Azure MFA](#).

Troubleshooting

You receive the error Failed to login to SSRS server. Please verify server configuration.



You can set up [Fiddler](#) to act as a proxy for your mobile devices to see how far the request made it. To enable a Fiddler proxy for your phone device, you will need to setup the [CertMaker for iOS and Android](#) on the machine running Fiddler. This is an add-on from Telerik for Fiddler.

If the sign in works successfully when using Fiddler, you may have a certificate issue with either the WAP application or the ADFS server. You can use a tool such as [Microsoft Message Analyzer](#) to verify if the certificates are valid.

Next steps

[Register a Service Principal Name \(SPN\) for a Report Server](#)

[Modify a Reporting Services Configuration File](#)

[Configure Windows Authentication on a Report Server](#)

[Active Directory Federation Services](#)

[Web Application Proxy in Windows Server 2016](#)

[Publishing Applications using AD FS Preauthentication](#)

[Configure AD FS 2016 and Azure MFA](#)

More questions? [Try the Power BI Community](#)

Supported languages in the Power BI mobile apps

1/17/2018 • 1 min to read • [Edit Online](#)

The Power BI mobile apps currently support these languages:

- Arabic (iOS only)
- Catalan - català
- Chinese (Simplified) - 中文(简体)
- Chinese (Traditional) - 中文(繁體)
- Croatian - hrvatski
- Czech - čeština
- Danish - dansk
- Dutch - Nederlands
- English - English
- Finnish - suomi
- French - français
- German - Deutsch
- Greek - Ελληνικά
- Hebrew (iOS only)
- Hindi - हिंदी
- Hungarian - magyar
- Indonesian - Bahasa Indonesia
- Italian - italiano
- Japanese - 日本語
- Korean - 한국어
- Malay - Bahasa Melayu
- Norwegian (Bokmål) - norsk (bokmål)
- Polish - Polski
- Portuguese (Brazil) - Português
- Portuguese (Portugal) - português
- Romanian - română
- Russian - Русский
- Slovak - slovenčina
- Spanish - español
- Swedish - svenska
- Thai - ไทย
- Turkish - Türkçe
- Ukrainian - українська
- Vietnamese - Tiếng Việt

Notes

- Power BI uses the language that corresponds with the locale of the mobile device. You can't set a different language.
- Notifications are in English only. For example, if someone shares a dashboard with you, the notification will be

in English.

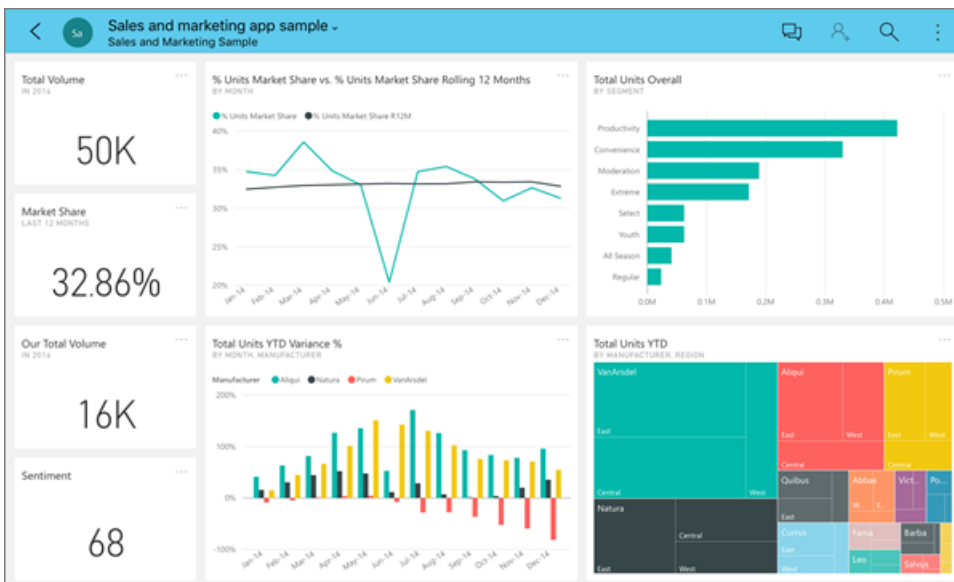
Next steps

- [Supported languages and countries/regions for Power BI](#)
- Questions? Try asking the [Power BI Community](#).
- Still have an issue? Please visit the [Power BI support page](#).

Get started with the Power BI mobile app on an iPad

1/26/2018 • 4 min to read • [Edit Online](#)

The Microsoft Power BI for iOS on the iPad delivers the mobile BI experience for Power BI, Power BI Report Server, and Reporting Services. View and interact with your company dashboards on premises and in the cloud from anywhere, with live, touch-enabled mobile access. Explore the data in dashboards, and share with your colleagues in email or text messages.



You create Power BI reports in Power BI Desktop, and publish them:

- [Publish them to the Power BI service](#), and create dashboards.
- [Publish them on-premises to Power BI Report Server](#).

Then in the Power BI app for the iPad, you interact with your dashboards and reports, whether on-premises or in the cloud.

Find out [what's new in the Power BI mobile apps](#).

Download the iOS app for the iPad

[Download the iPad app](#) from the Apple App Store.

NOTE

Your iPad needs to be running at least iOS 10.

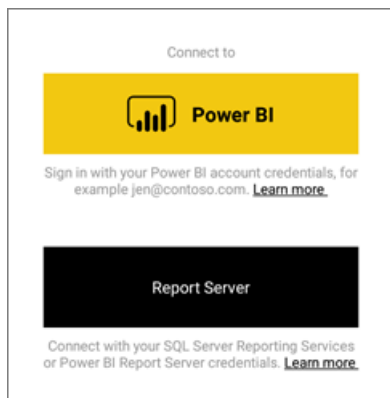
Sign up for the Power BI service


Go to Power BI (<https://powerbi.com>) to sign up for the service, if you haven't already. It's free.

Get started with the Power BI app

1. In the iPad, open the Power BI app.
2. To view your Power BI dashboards and reports, tap **Power BI**. Sign in with the same credentials as your Power BI account on the web.

To view your Reporting Services mobile reports and KPIs, tap **SQL Server Reporting Services**. Sign in with your SQL Server Reporting Services credentials.





When you're in the app, just tap the global navigation button  in the upper-left corner to go between the two services.

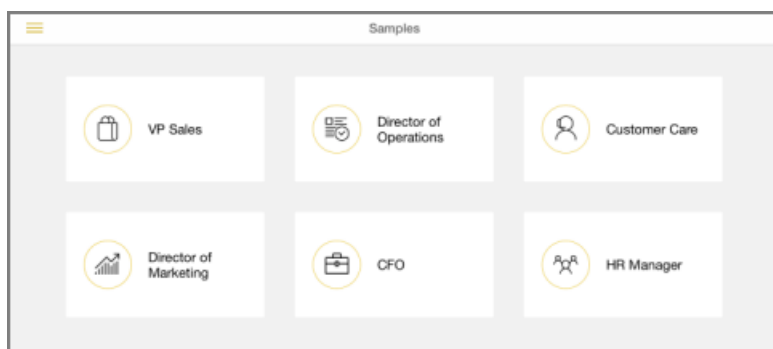
Try the Power BI and Reporting Services samples

Even without signing up, you can play with the Power BI and Reporting Services samples. After you download the app, you can view the samples or get started. Go back to the samples whenever you want from the dashboards home page.

Power BI samples

You can view and interact with the Power BI dashboard samples, but there are a few things you can't do with them. You can't open the reports behind the dashboards, share the samples with others, or make them your favorites.



1. Tap the global navigation button  in the upper-left corner, then tap the Settings icon .
2. Tap **Power BI samples**, then pick a role and explore the sample dashboard for that role.

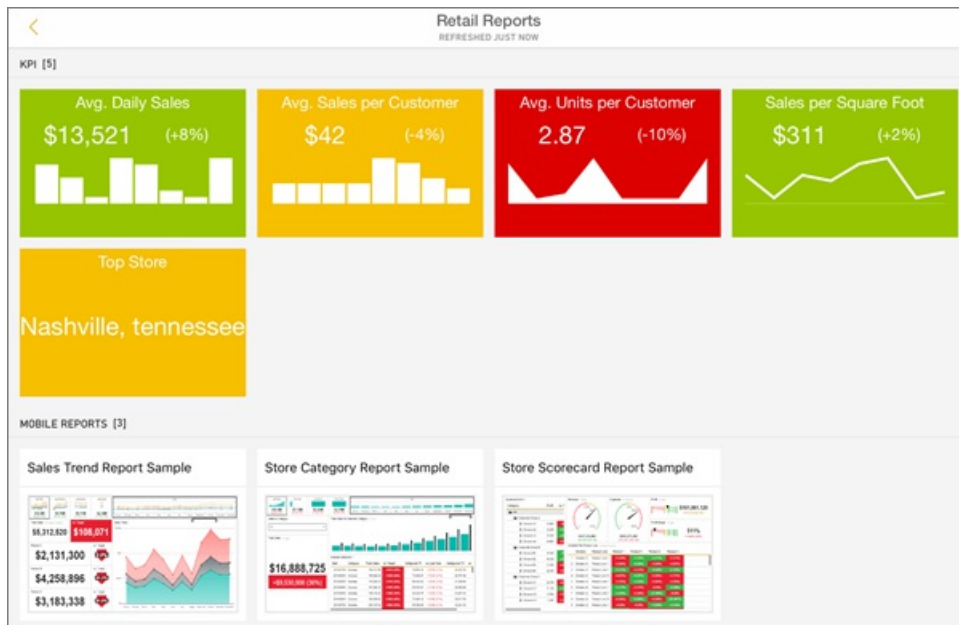


NOTE

Not all features are available in the samples. For example, you can't view the sample reports that underlie the dashboards.

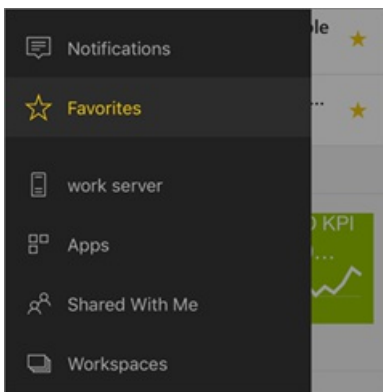
Reporting Services mobile report samples

1. Tap the global navigation button  in the upper-left corner, then tap the Settings icon .
2. Tap **Reporting Services samples**, then open either the Retail Reports or the Sales Reports folder to explore their KPIs and mobile reports.




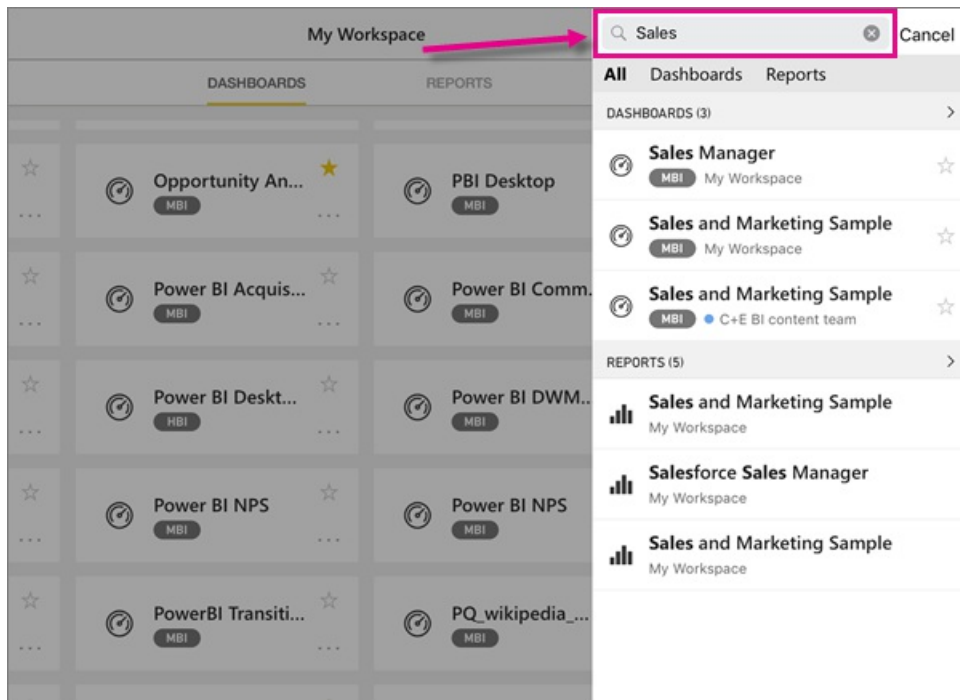
Find your content in the Power BI mobile apps

Your dashboards and reports are stored in different locations in the Power BI mobile apps, depending on where they came from. Read about [finding your content in the mobile apps](#). Plus you can always search for anything you have in the Power BI mobile apps.



Search for a dashboard or report

- Tap the magnifying glass in the upper-right corner , then type the term to find.

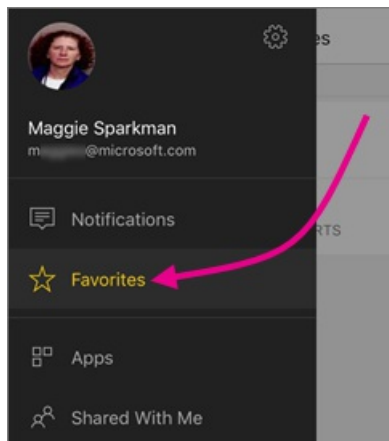


By default it searches all dashboards and reports, but you can search just one or the other.

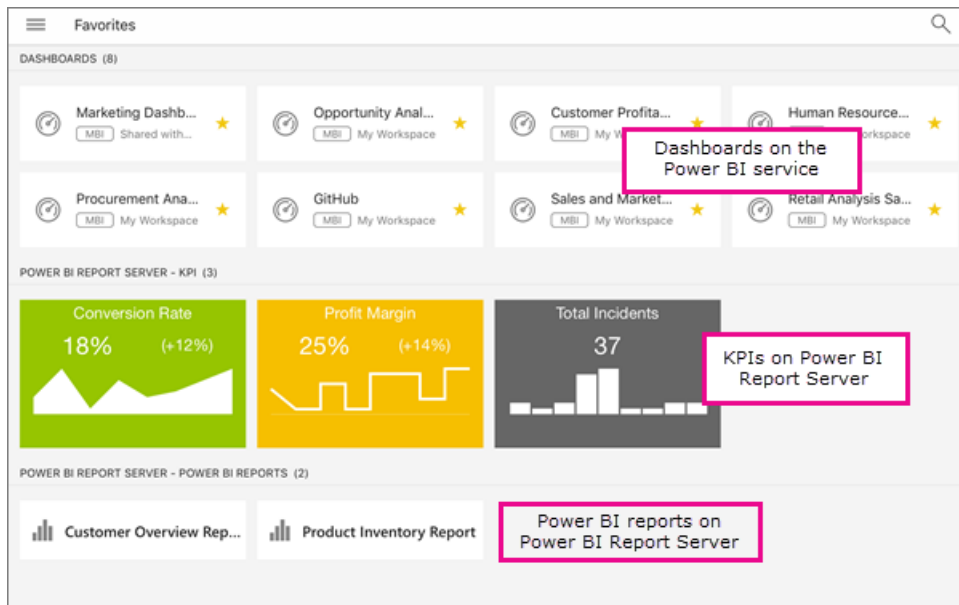
View your favorite dashboards, KPIs, and reports

On the Favorites page in the mobile apps, you see all of your favorite Power BI dashboards, together with Power BI Report Server and Reporting Services KPIs and reports. When you make a dashboard a *favorite* in the Power BI mobile app, you can access it from all of your devices, including the Power BI service in your browser.

- Tap **Favorites**.



Your Power BI favorites and your favorites from the report server web portal are all on this page.



Read more about [favorites in the Power BI mobile apps](#).

Enterprise support for the Power BI mobile apps

Organizations can use Microsoft Intune to manage devices and applications, including the Power BI mobile apps for Android and iOS.

Microsoft Intune lets organizations control items like requiring an access pin, controlling how data is handled by the application, and even encrypting application data when the app isn't in use.

NOTE

If you use the Power BI mobile app on your iPad and your organization has configured Microsoft Intune MAM, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

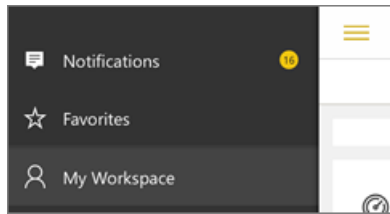
Read more about [configuring Power BI mobile apps with Microsoft Intune](#).

Next steps

Here are some other things you can do in the iPad app with dashboards and reports in Power BI, and reports and KPIs in the Power BI Report Server or Reporting Services web portal.

Power BI dashboards and reports

- View [your apps](#).
- View your [Power BI dashboards](#).
- [Ask questions of your data](#) in your own words with Q&A
- [Scan a Power BI QR code](#) to open a related dashboard tile or report.
- [Set data alerts](#) to get notifications when your data changes.
- View [notifications about updates to your Power BI account](#), such as dashboards that colleagues share with you.



Reports and KPIs on the report server web portals

- [View reports and KPIs on the web portal](#) in the Power BI mobile app for iOS devices.
- Create [KPIs on the web portal](#).
- Create [reports in Power BI Desktop and publish them on the Power BI Report Server web portal](#)

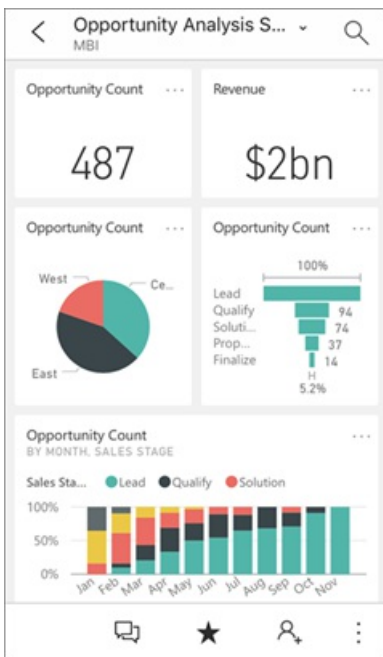
See also

- [Get started with Power BI](#)
- Questions? Try asking the [Power BI Community](#)

Get started with the Power BI mobile app on an iPhone or iPod Touch

1/26/2018 • 4 min to read • [Edit Online](#)

The Microsoft Power BI for iOS app on the iPhone or iPod Touch delivers the mobile BI experience for Power BI, Power BI Report Server, and Reporting Services. View and interact with your company dashboards on premises and in the cloud from anywhere, with live, touch-enabled mobile access. Explore the data in dashboards, and share with your colleagues in email or text messages. And keep up to date with your most timely data on your [Apple Watch](#).



You create Power BI reports in Power BI Desktop, and publish them:

- [Publish them to the Power BI service](#), and create dashboards.
- [Publish them on-premises to Power BI Report Server](#).

Then in the Power BI app for the iPhone, you interact with your dashboards and reports, whether on-premises or in the cloud.

Find out [what's new in the Power BI mobile apps](#).

Download the app

[Download the iOS app](#) from the Apple App Store to your iPhone or iPod Touch.

NOTE

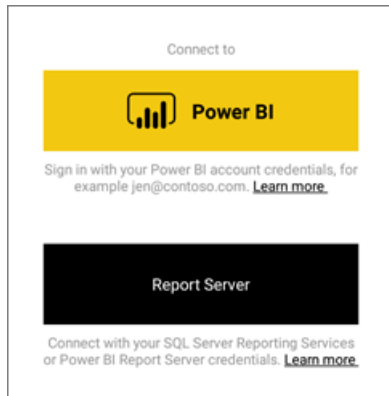
You can run the Power BI for iOS app on iPhone 5 and above, with iOS 10 or later. You can also run it on an iPod Touch with iOS 10 or later.


Sign up for the Power BI service

Go to Power BI (<https://powerbi.com>) for the service, if you haven't already. It's free.

Get started with the Power BI app

1. In the iPhone, open the Power BI app.
2. To view your Power BI dashboards, tap **Power BI**.
To view your Reporting Services mobile reports and KPIs, tap **SQL Server Reporting Services**.





When you're in the app, just tap the global navigation button  in the upper-left corner to go between the two.

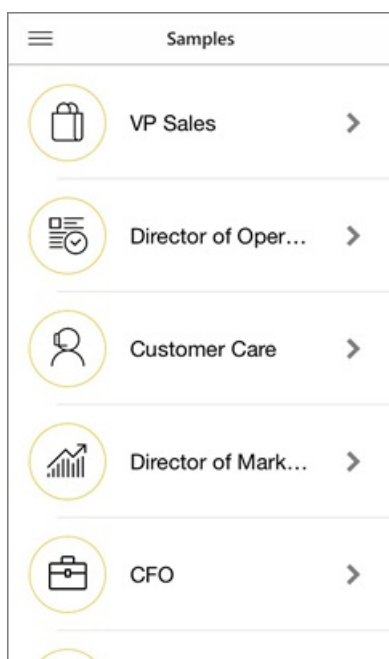
Try the Power BI and Reporting Services samples

Even without signing up, you can play with the Power BI and Reporting Services samples. After you download the app, you can view the samples or get started. Go back to the samples whenever you want from the global navigation.

Power BI samples

You can view and interact with the Power BI dashboard samples, but there are a few things you can't do with them. You can't open the reports behind the dashboards, share the samples with others, or make them your favorites.

1. Tap the global navigation button  in the upper-left corner.
2. Tap the gear icon in the upper-right , then tap **Power BI samples**.
3. Pick a role and explore the sample dashboard for that role.



NOTE

Not all features are available in the samples. For example, you can't view the sample reports that underlie the dashboards.

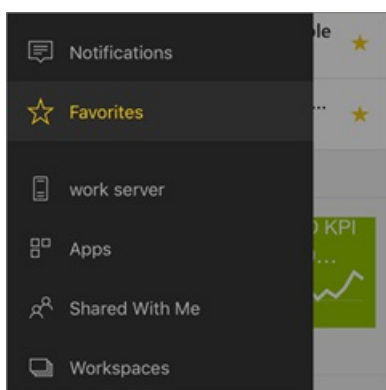
Reporting Services mobile report samples

1. Tap the global navigation button  in the upper-left corner.
2. Tap the gear icon in the upper-right , then tap **Reporting Services samples**.
3. Open either the Retail Reports or the Sales Reports folder to explore their KPIs and mobile reports.



Find your content in the Power BI mobile apps

Your dashboards and reports are stored in different locations in the Power BI mobile apps, depending on where they came from. Read about [finding your content in the mobile apps](#). Plus you can always search for anything you have in the Power BI mobile apps.

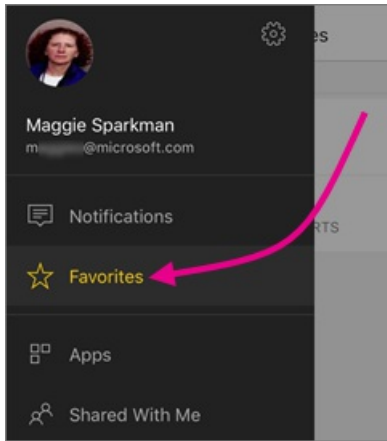


Read more about [finding your content in the mobile apps](#).

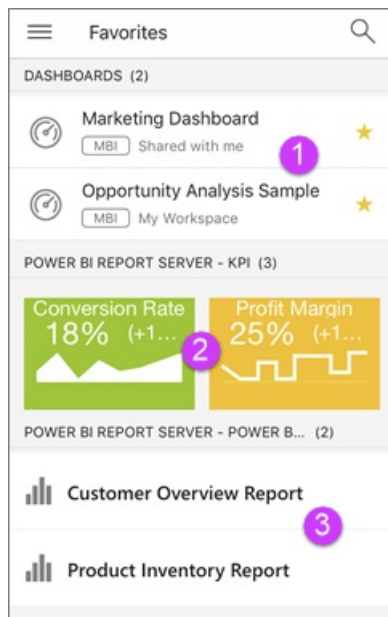
View your favorite dashboards, KPIs, and reports

On the Favorites page in the mobile apps, you see all of your favorite Power BI dashboards, together with Power BI Report Server and Reporting Services KPIs and reports. When you make a dashboard a *favorite* in the Power BI mobile app, you can access it from all of your devices, including the Power BI service in your browser.

- Tap **Favorites**.



You see all your favorites together on this page:



1. Dashboards on the Power BI service
2. KPIs on Power BI Report Server
3. Power BI reports on Power BI Report Server

Read more about [favorites in the Power BI mobile apps](#).

Enterprise support for the Power BI mobile apps

Organizations can use Microsoft Intune to manage devices and applications, including the Power BI mobile apps for Android and iOS.

Microsoft Intune lets organizations control items like requiring an access pin, controlling how data is handled by the application, and even encrypting application data when the app isn't in use.

NOTE

If you use the Power BI mobile app on your iPhone and your organization has configured Microsoft Intune MAM, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

Read more about [configuring Power BI mobile apps with Microsoft Intune](#).

Next steps

Here are some other things you can do in the iPhone app with dashboards and reports in Power BI, and reports and KPIs in the Power BI Report Server or Reporting Services web portal.

Power BI dashboards and reports

- View [your apps](#).
- View your [Power BI dashboards](#).
- [Ask questions of your data](#) in your own words with Q&A
- View your Power BI tiles on your [Apple Watch](#).
- Set [data alerts](#) for your data.
- Share [Power BI dashboards](#).
- [Annotate and share](#) a tile, report, or visualization.
- [Scan a Power BI QR code](#) to open a related dashboard tile or report.
- [Create picture tiles](#) with your iPhone app.
- View [notifications about updates to your Power BI account](#), such as dashboards that colleagues share with you.

Reports and KPIs on the report server web portals

- [View reports and KPIs on the web portal](#) in the Power BI mobile app for iOS devices.
- Create [KPIs on the web portal](#).
- Create [reports in Power BI Desktop and publish them on the Power BI Report Server](#) web portal

See also

- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Explore your data in the Power BI mobile app on your Apple Watch

11/15/2017 • 2 min to read • [Edit Online](#)

With the Power BI Apple Watch app, you can view KPIs and card tiles from your Power BI dashboards, right on your watch. KPIs and card tiles are best suited to providing a heartbeat measure on the small screen. You can refresh a dashboard from your iPhone or from the Watch itself.

Install the Apple Watch app

The Power BI Apple Watch app is bundled with the Power BI for iOS app, so when you [download the Power BI app to your iPhone](#) from the Apple App Store, you're automatically also downloading the Power BI Watch app. The Apple guide explains how to [install Apple Watch applications](#).

Use the Power BI app on the Apple Watch

Get to the Power BI Apple Watch app either from the watch's springboard, or by clicking the Power BI widget (if configured) directly from the watch face.



The Power BI Apple Watch app consists of two parts.

- The **index screen** allows a quick overview of all KPI and card tiles from the synced dashboard.



- The **in-focus tile**: Click a tile on the index screen for an in-depth view of a specific tile.



Refresh a dashboard from your Apple Watch

You can refresh a synced dashboard directly from your watch.

- While in the dashboard view on the watch app, deep press your screen and select **refresh**.

Your watch app will now sync your dashboard with data from the Power BI service.

NOTE

The watch app communicates with Power BI via Power BI mobile app on the iPhone. Therefore, the Power BI app must be running on your iPhone, at least in the background, for the dashboard on the watch app to refresh.

Refresh a dashboard on your Apple Watch from your iPhone

You can also refresh a dashboard that's on your Apple Watch from your iPhone.

1. In Power BI on your iPhone, open the dashboard you want to sync with the Apple Watch.
2. Select the ellipsis (...) > **Sync with Watch**.

Power BI shows an indicator that the dashboard is synced with the watch.

You can only sync one dashboard at a time with the watch.

TIP

To view tiles from multiple dashboards on your watch, create a new dashboard in the Power BI service, and pin all the relevant tiles to it.

Set a custom Power BI widget

You can also display a specific Power BI tile directly on the Apple Watch face, so it's visible and accessible at all times.

The Power BI Apple Watch widget updates close to the time your data updates, keeping your needed information always up to date.

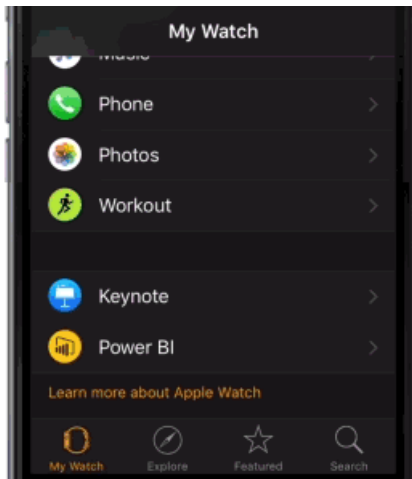
Add a Power BI widget to your watch face

See [Customize your Apple Watch face](#) in the Apple Guide.

Change the text on the widget

Given the small space on the Apple Watch face, the Power BI Apple Watch app lets you change the title of the widget to fit the small space.

- On your iPhone, go to the Apple Watch control app, select Power BI, navigate to the widget name field, and type a new name.



NOTE

If you don't change the name, the Power BI widget will shorten the name to the number of characters that fit the small space on the watch face.

Next steps

Your feedback will help us decide what to implement in the future, so please don't forget to vote for other features that you would like to see in Power BI mobile apps.

- Download the [Power BI iPhone mobile app](#)
- Follow [@MSPowerBI on Twitter](#)
- Join the conversation at the [Power BI Community](#)

Scan a barcode with your iPhone from the Power BI mobile app

11/9/2017 • 2 min to read • [Edit Online](#)


Scan barcodes in the real world to go directly to filtered BI information in the Power BI mobile app.

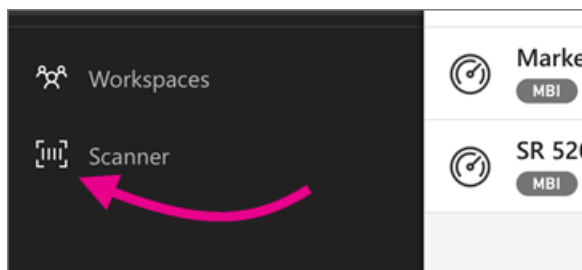


Say a colleague has [tagged a barcode field in a report Power BI Desktop](#) and shared the report with you.

When you scan a product barcode with the scanner in the Power BI app on your iPhone, you see the report (or list of reports) with that barcode. You can open that report on your iPhone, filtered to that barcode.

Scan a barcode with the Power BI scanner



1. In the Power BI mobile app open the main navigation menu  in the upper left.
2. Scroll down to **Scanner** and select it.



3. If your camera is not enabled, you need to approve the Power BI app to use the camera. This is a one-time approval.
4. Point the scanner at a barcode on a product.
You see a list of reports associated with that barcode.
5. Tap the report name to open it on your iPhone, automatically filtered to that barcode.

Filter by other barcodes while in a report

While looking at a report filtered by a barcode on your iPhone, you may want to filter the same report by a different barcode.

- If the barcode icon has a filter , the filter is active and report is already filtered by a barcode.
- If the icon doesn't contain a filter , the filter isn't active and the report isn't filtered by a barcode.

Either way, tap the icon to open a small menu with a floating scanner.

- Focus the scanner on the new item to change the filter of the report to a different barcode value.

- Select **Clear barcode filter** to go back to the unfiltered report.
- Select **Filter by recent barcodes** to change the report filter to one of the barcodes you've scanned within the current session.

Issues with scanning a barcode

Here are some messages you may see when you scan a barcode on a product.

“Couldn’t filter report...”

The report you choose to filter is based on a data model that does not include this barcode value. For example, the product "mineral water" isn't included in the report.

All/some of the visuals in the report don’t contain any value

The barcode value you scanned exists in your model but all/Some of the visuals on your report don’t contain this value and therefore filtering will return an empty state. Try looking into other report pages or edit your reports in Power BI desktop to contain this value

“Looks like you don’t have any reports that can be filtered by barcodes.”

This means you don’t have any barcode-enabled reports. The barcode scanner can only filter reports that have a column marked as **Barcode**.

Make sure you or the report owner has tagged a column as **Barcode** in Power BI Desktop. Learn more about [tagging a barcode field in Power BI Desktop](#)

“Couldn’t filter report - Looks like this barcode doesn't exist in the report data.”

The report you chose to filter is based on a data model that doesn't include this barcode value. For example, the product "mineral water" isn't included in the report. You can scan a different product, choose a different report (if more than one report is available), or view the report unfiltered.

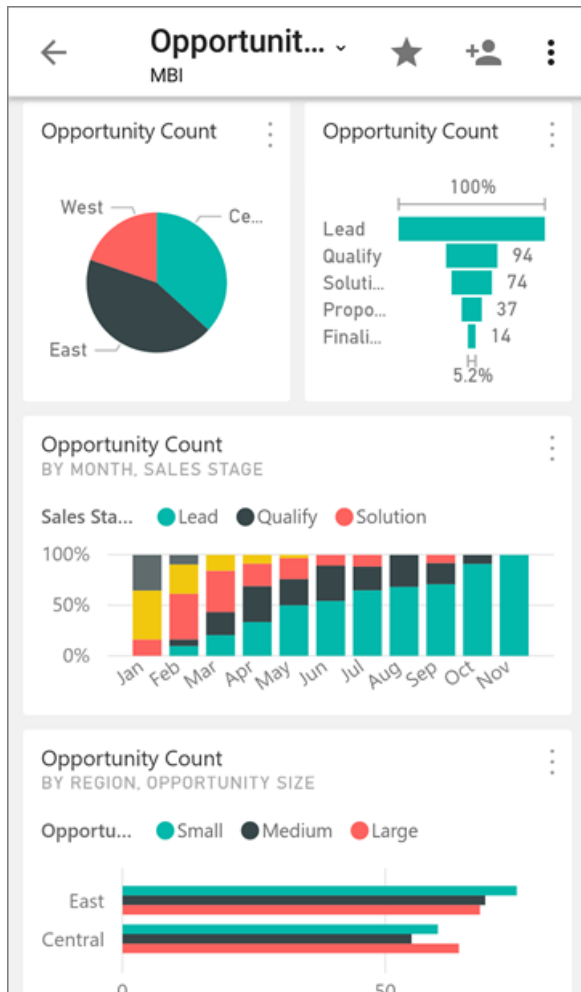
Next steps

- [Tag a barcode field in Power BI Desktop](#)
- [Dashboard tiles in Power BI](#)
- [Dashboards in Power BI](#)

Get started with the Power BI mobile app on Android phones

11/9/2017 • 5 min to read • [Edit Online](#)

The Android app for Microsoft Power BI delivers the mobile BI experience for Power BI, Power BI Report Server, and Reporting Services. View and interact with your company dashboards on premises and in the cloud from anywhere, with live, touch-enabled mobile access. Explore the data in dashboards, and share with your colleagues in email or text messages.



You create Power BI reports in Power BI Desktop, and publish them:

- [Publish them to the Power BI service](#), and create dashboards.
- [Publish them on-premises to Power BI Report Server](#).

Then in the Power BI app for Android phones, you interact with your dashboards and reports, whether on-premises or in the cloud.

Find out [what's new in the Power BI mobile apps](#).

First things first

- **Get the app** [Get the Power BI for Android app](#) from Google Play.

Power BI can run on a number of different Android phones. Your phone needs to be running the Android

5.0 operating system, or later. To check on your phone, go to **Settings** > **About device** > **Android version**.

- **Start when you open the app** Even without signing up or signing in, after you open the app you can flip through the sign-in pages for a quick overview of things you can do with the Power BI app on your Android phone. Tap **Skip** to view and explore the samples, and get hands-on experience with the app. You can [go back to the samples](#) whenever you want from the dashboards home page.
- Find out [what's new in the Power BI mobile apps](#).

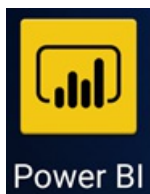
Sign up for the Power BI service on the web

If you haven't signed up yet, go to the [Power BI service \(http://powerbi.com/\)](http://powerbi.com/) to sign up for your own account for creating and storing dashboards and reports, and bringing your data together. Then sign in to Power BI from your Android phone to see your own dashboards from anywhere.

1. In the Power BI service, tap [Sign up](#) to create a Power BI account.
2. Start [creating your own dashboards and reports](#).

Get started with the Power BI app on your phone

1. On your Android phone, from the start screen open the Power BI for Android app.

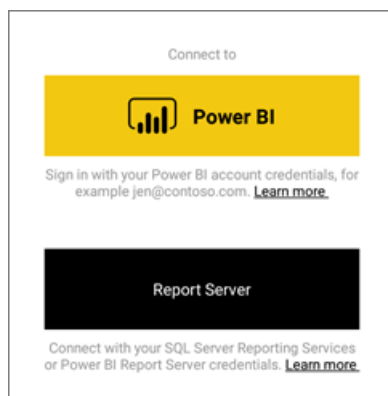


2. To view your Power BI dashboards and reports, tap **Power BI**.

IMPORTANT

If you get a message that Power BI can't sign you in, see "[Could not authenticate because your corporate SSL certificate is untrusted](#)" for details on how to resolve the issue.

To view your Power BI Report Server and Reporting Services reports and KPIs, tap **Report Server**.




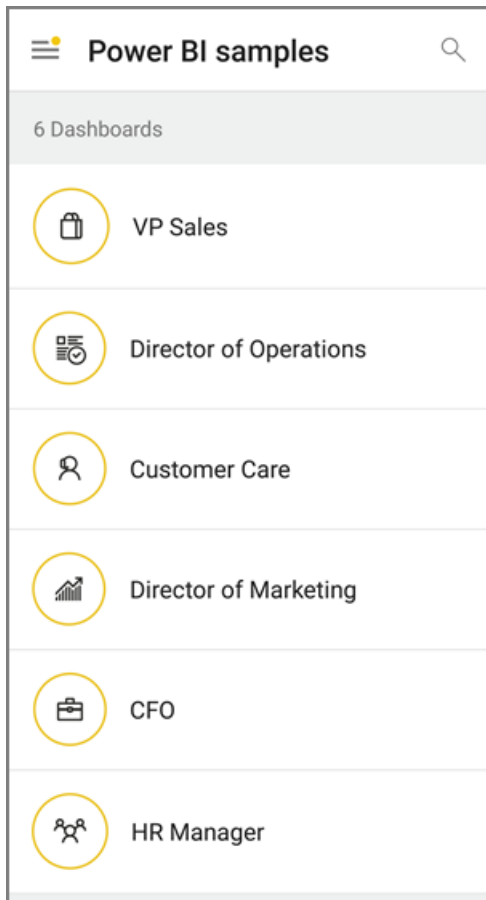
Try the Power BI and Reporting Services samples

Even without signing up, you can play with the Power BI and Reporting Services samples. After you download the app, you can view the samples or get started. Go back to the samples whenever you want from the dashboards home page.


Power BI samples

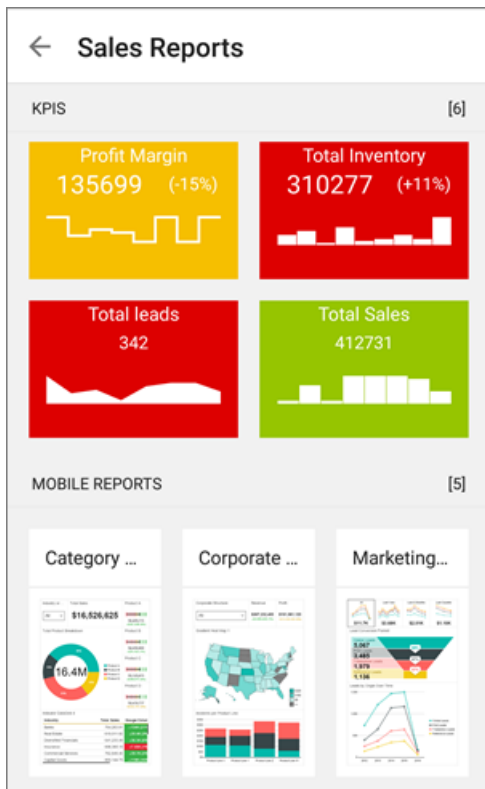
You can view and interact with the Power BI dashboard samples, but there are a few things you can't do with them. You can't open the reports behind the dashboards, share the samples with others, or make them your favorites.

1. Tap the global navigation button  in the upper-left corner.
2. Tap **Settings > Discover our samples**, then pick a role and explore the sample dashboard for that role.




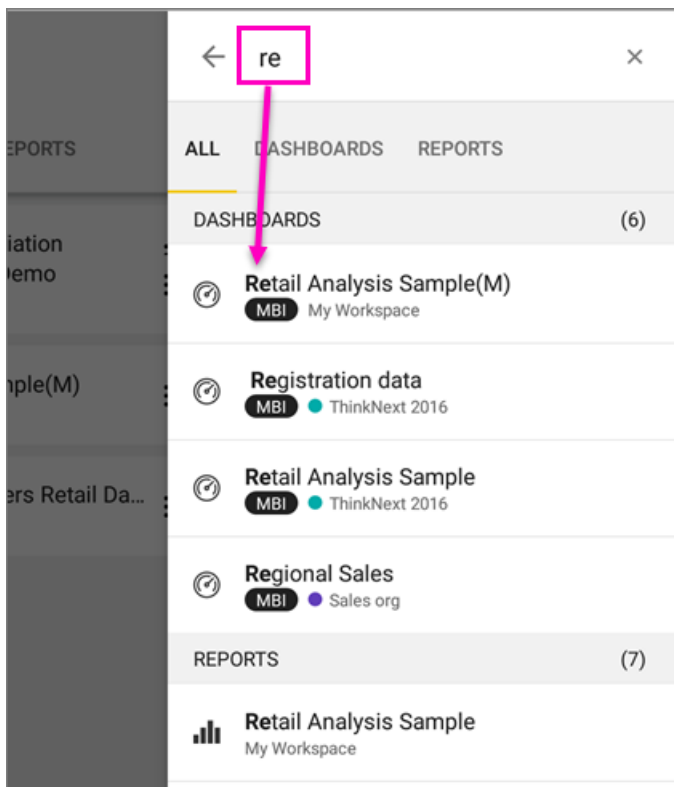
Reporting Services mobile report samples

1. Tap the global navigation button  in the upper-left corner.
2. Tap **Reporting Services samples**, then open either the Retail Reports or the Sales Reports folder to explore their KPIs and mobile reports.



Search for a dashboard or report

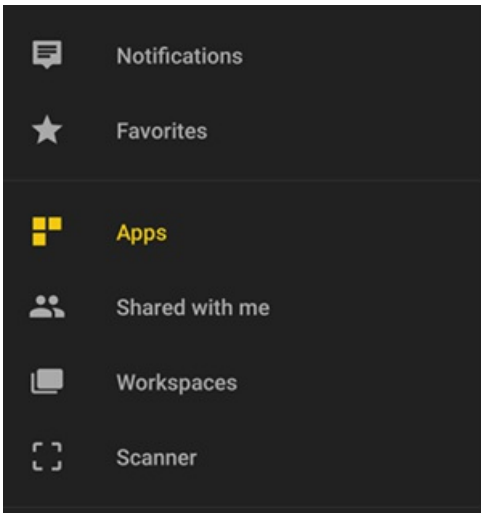
- Tap the magnifying glass in the upper-right corner , then type the term to find.



By default it searches all dashboards and reports, but you can search just one or the other.

Find your content in the Power BI mobile apps

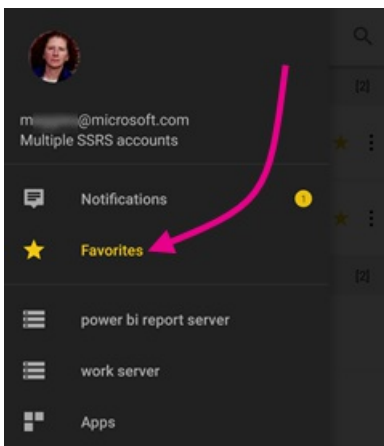
Your dashboards and reports are stored in different locations in the Power BI mobile apps, depending on where they came from. Read about [finding your content in the mobile apps](#). Plus you can always search for anything you have in the Power BI mobile apps.



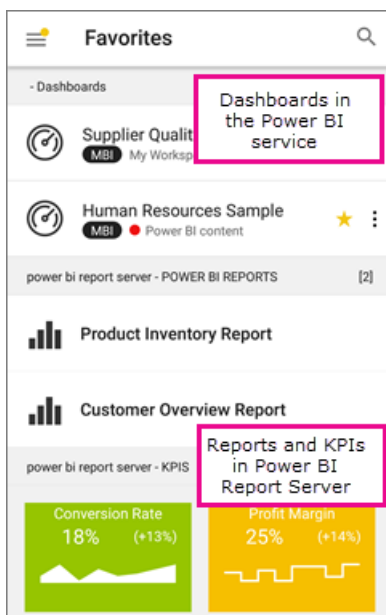
View your favorite dashboards, KPIs, and reports

On the Favorites page in the mobile apps, you see all of your favorite Power BI dashboards, together with Power BI Report Server and Reporting Services KPIs and reports. When you make a dashboard a *favorite* in the Power BI mobile app, you can access it from all of your devices, including the Power BI service in your browser.

- Tap **Favorites**.



Your Power BI favorites and your favorites from the Power BI Report Server and Reporting Services web portal are all on this page.



Read more about [favorites in the Power BI mobile apps](#).

Enterprise support for the Power BI mobile apps

Organizations can use Microsoft Intune to manage devices and applications, including the Power BI mobile apps for Android and iOS.

Microsoft Intune lets organizations control items like requiring an access pin, controlling how data is handled by the application, and even encrypting application data when the app isn't in use.

NOTE

If you use the Power BI mobile app on your Android device and your organization has configured Microsoft Intune MAM, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

Read more about [configuring Power BI mobile apps for Android with Microsoft Intune](#).

Next steps

Here are some other things you can do in the Android phone app for Power BI with dashboards and reports in Power BI, and reports and KPIs in the Power BI Report Server or Reporting Services web portal.

Power BI dashboards and reports

- View [your apps](#).
- View your [dashboards](#).
- Explore the [tiles on your dashboards](#).
- Open [Power BI reports](#).
- View [your apps](#).
- [Annotate and share tiles](#).
- Share [dashboards](#).
- [Scan a Power BI QR code](#) to open a related dashboard tile or report.
- View [notifications about updates to your Power BI account](#), such as dashboards that colleagues share with you.

Reports and KPIs on the Power BI Report Server and Reporting Services web portals

- [View reports and KPIs on the web portal](#) in the Power BI mobile app for Android devices.
- Create [KPIs on the web portal](#).
- Create [reports in Power BI Desktop and publish them on the Power BI Report Server web portal](#)

See also

- [Download the Android app](#) from the Android app store.
- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Error: "Corporate SSL certificate is untrusted" - Power BI

11/9/2017 • 1 min to read • [Edit Online](#)

When signing in to the Android mobile app for Microsoft Power BI, you may see the message, "Could not authenticate because your corporate SSL certificate is untrusted by this device. Please contact your company IT admin."

What you need to do usually depends on the operating system on your Android device, but there are a couple of other issues that may cause this error.

On Android 7 or later

Look for an update for an app named **Chrome**, and install the update.

On Android 6 and earlier

Your device may need a updated version of System Webview. It may be installed on your device, and you may just need to click **Update**.

If System Webview isn't installed on your device:

1. On your Android device, close Power BI.
2. Open the Google Play Store and search for **System Webview** by Google Inc.
3. Install it.
4. Restart the Power BI app and sign in.

Time-zone settings

Time-zone settings on your device may be wrong.

Go to **Settings** > **System** > **Date and time** to check them.

Custom authentication server

If you're using a custom authentication server, the SSL certificate in the corporate authentication server may not be valid. Please contact your organization's IT admin to help you.

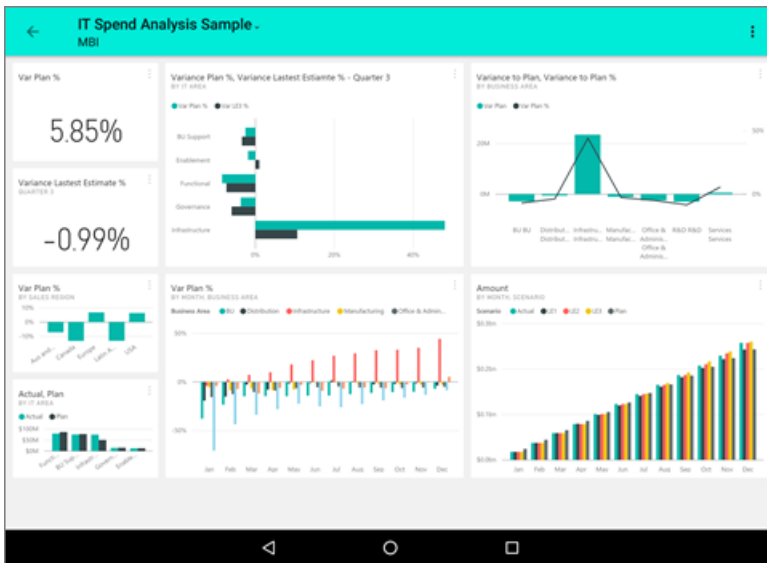
Next steps

- [Download the Android app](#) from the Android app store.
- Questions? [Try asking the Power BI Community](#)

Get started with the Power BI mobile app on Android tablets

11/15/2017 • 5 min to read • [Edit Online](#)

The Power BI mobile app for Android tablets delivers the mobile BI experience for Power BI, Power BI Report Server, and Reporting Services. View and interact with your company dashboards on premises and in the cloud from anywhere, with live, touch-enabled mobile access. Explore the data in dashboards, and share with your colleagues in email or text messages.



You create Power BI reports in Power BI Desktop, and publish them:

- [Publish them to the Power BI service](#), and create dashboards.
- [Publish them on-premises to Power BI Report Server](#).

Then in the Power BI app for Android tablets, you interact with your dashboards and reports, whether on-premises or in the cloud. Find out [what's new in the Power Bi mobile apps](#).

First things first

- **Get the app** [Get the Power BI for Android app](#) from Google Play.

NOTE

Power BI can run on a number of different Android tablets. Your tablet needs to be running the Android 5.0 operating system, or later. To check on your tablet, go to **Settings > About device > Android version**.

- **Start when you open the app** Even without signing up or signing in, after you open the app you can flip through the sign-in pages for a quick overview of things you can do with the Power BI app on your Android tablet. Tap **Skip** to view and explore the samples, and get hands-on experience with the app. You can [go back to the samples](#) whenever you want from the dashboards home page.
- Find out [what's new in the Power Bi mobile apps](#).

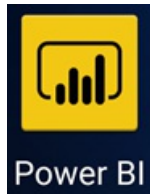
Sign up for the Power BI service on the web

If you haven't signed up yet, go to the [Power BI service \(http://powerbi.com/\)](http://powerbi.com/) to sign up for your own account for creating and storing dashboards and reports, and bringing your data together. Then sign in to Power BI from your Android tablet to see your own dashboards from anywhere.

1. In the Power BI service, tap [Sign up](#) to create a Power BI account.
2. Start [creating your own dashboards and reports](#).

Get started with the Power BI app on your tablet

1. On your Android tablet, from the start screen open the Power BI for Android app.

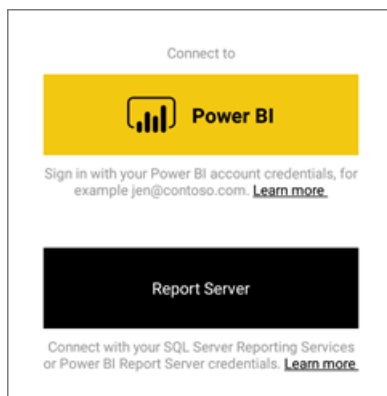


2. To view your Power BI dashboards and reports, tap **Power BI**.

IMPORTANT

If you get a message that Power BI can't sign you in, see ["Could not authenticate because your corporate SSL certificate is untrusted"](#) for details on how to resolve the issue.

To view your on-premises Power BI Report Server and Reporting Services reports and KPIs, tap **Report Server**.




Give your report server sign-in information to [view Power BI Report Server and Reporting Services reports and KPIs](#) in the Android tablet app for Power BI.

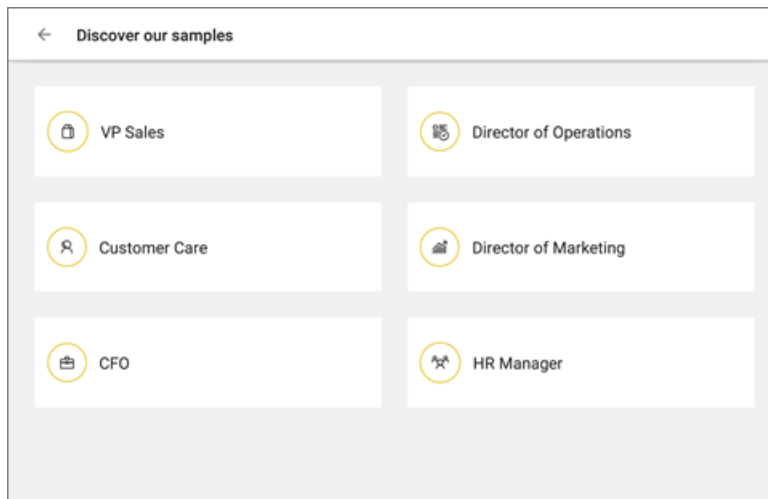
Try the Power BI and Reporting Services samples

Even without signing up, you can play with the Power BI and Reporting Services samples. After you download the app, you can view the samples or get started. Go back to the samples whenever you want from the dashboards home page.


Power BI samples

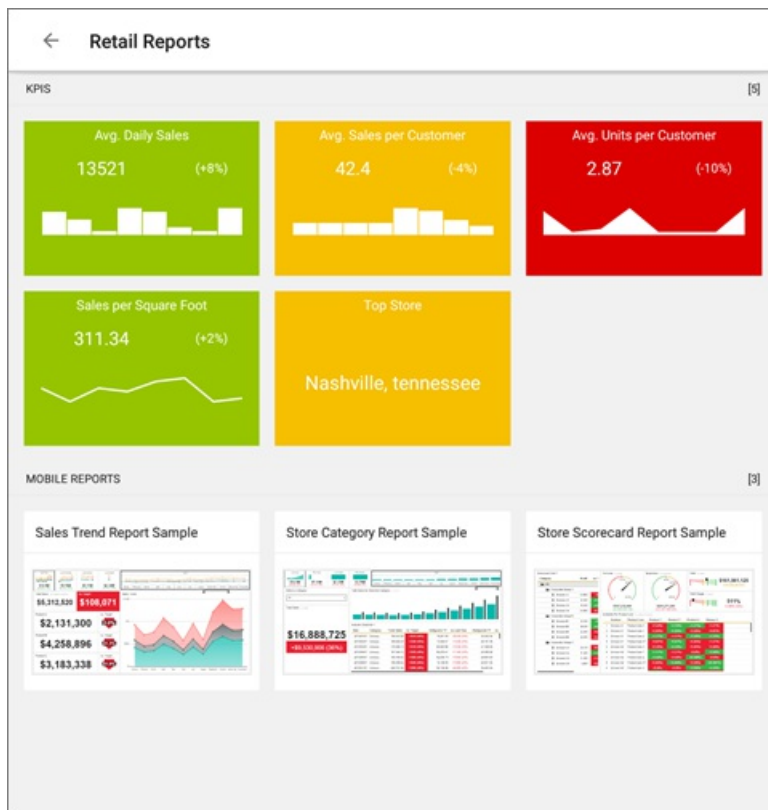
You can view and interact with the Power BI dashboard samples, but there are a few things you can't do with them. You can't open the reports behind the dashboards, share the samples with others, or make them your favorites.

1. Tap the global navigation button  in the upper-left corner.
2. Tap **Settings** > **Discover our samples**, then pick a role and explore the sample dashboard for that role.




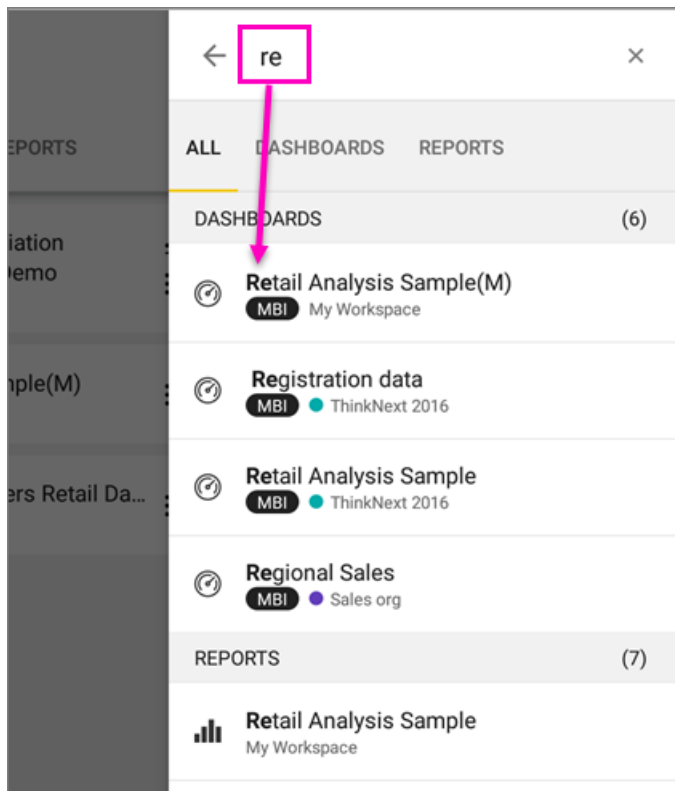
Reporting Services mobile report samples

1. Tap the global navigation button  in the upper-left corner.
2. Tap **Reporting Services samples**, then open either the Retail Reports or the Sales Reports folder to explore their KPIs and mobile reports.



Search for a dashboard or report

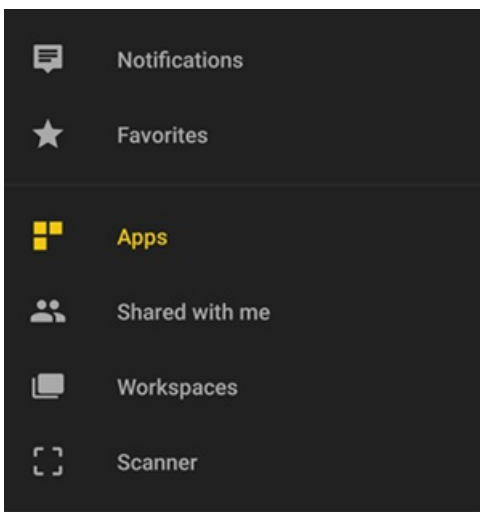
- Tap the magnifying glass in the upper-right corner , then type the term to find.



By default it searches all dashboards and reports, but you can search just one or the other.

Find your content in the Power BI mobile apps

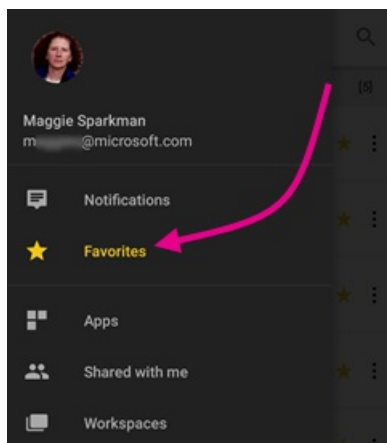
Your dashboards and reports are stored in different locations in the Power BI mobile apps, depending on where they came from. Read about [finding your content in the mobile apps](#). Plus you can always search for anything you have in the Power BI mobile apps.



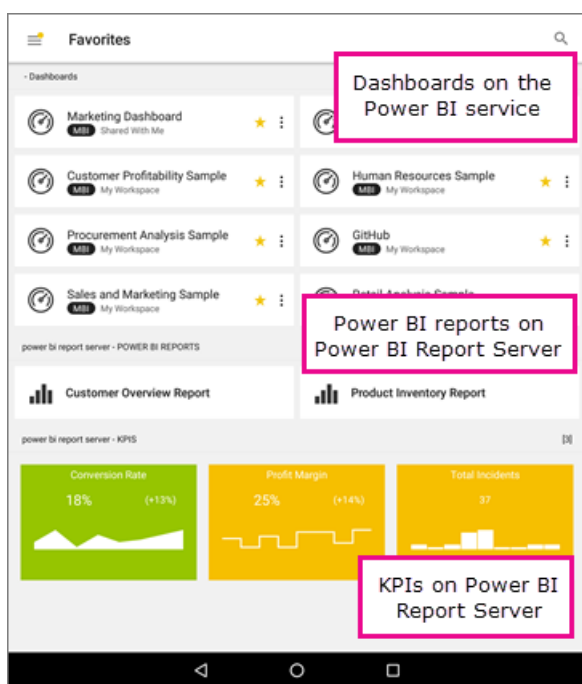
View your favorite dashboards, KPIs, and reports

On the Favorites page in the mobile apps, you can view all of your favorite Power BI dashboards, together with KPIs and reports on the Power BI Report Server or Reporting Services web portal. When you make a dashboard a *favorite* in the Power BI mobile app, you can access it from all of your devices, including the Power BI service in your browser.

- Tap **Favorites**.



Your Power BI favorites and your favorites from the Power BI Report Server and Reporting Services web portal are all on this page.



Read more about [favorites in the Power BI mobile apps](#).

Enterprise support for the Power BI mobile apps

Organizations can use Microsoft Intune to manage devices and applications, including the Power BI mobile apps for Android and iOS.

Microsoft Intune lets organizations control items like requiring an access pin, controlling how data is handled by the application, and even encrypting application data when the app isn't in use.

NOTE

If you use the Power BI mobile app on your Android device and your organization has configured Microsoft Intune MAM, then background data refresh is turned off. The next time you enter the app, Power BI refreshes the data from the Power BI service on the web.

Read more about [configuring Power BI mobile apps for Android with Microsoft Intune](#).

Next steps

Here are some other things you can do in the Android tablet app for Power BI with dashboards and reports in

Power BI, and reports and KPIs in the Power BI Report Server or Reporting Services web portal.

Power BI dashboards and reports

- View [your apps](#).
- View your [dashboards](#).
- [Annotate and share tiles](#).
- Share [dashboards](#).
- [Scan a Power BI QR code](#) to open a related dashboard tile or report.
- View [notifications about updates to your Power BI account](#), such as dashboards that colleagues share with you.

Reports and KPIs on the Power BI Report Server and Reporting Services web portals

- [View reports and KPIs on the web portal](#) in the Power BI mobile app for Android devices.
- Create [KPIs on the web portal](#).
- Create [reports in Power BI Desktop and publish them on the Power BI Report Server](#) web portal

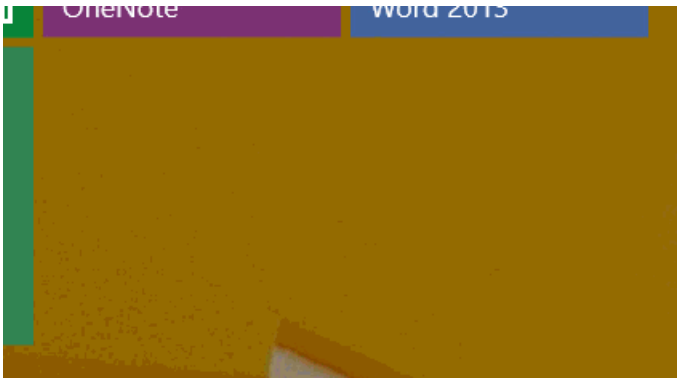
See also

- [Download the Android app](#) from the Android app store.
- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Get started with the Power BI mobile app for Windows 10

12/7/2017 • 3 min to read • [Edit Online](#)

The Power BI mobile app for Windows 10 brings Power BI to your tablet or phone, with up-to-date, touch-enabled mobile access to your business information. View and interact with your company dashboards from anywhere — right on your [Windows Start screen](#).



You [create dashboards and reports in the Power BI service](#) with your data.

Then interact with your dashboards and reports, explore the data, and share them, all from the Power BI mobile app for Windows 10.

First things first

- [Get the Power BI mobile app for Windows 10](#) from the Windows Store.

Your device needs to be running Windows 10. The app can run on devices with at least 3 GB RAM and 8 GB internal storage.

- Find out [what's new in the Power BI mobile apps](#).

Sign up for the Power BI service on the web

If you haven't signed up yet, go to the [Power BI service](#) to sign up for your own account for creating and storing dashboards and reports, and bringing your data together. Then sign in to Power BI from your Windows 10 device to see your own dashboards from anywhere.

1. In the Power BI service, tap [Sign up](#) to create a Power BI account.
2. Start [creating your own dashboards and reports](#).

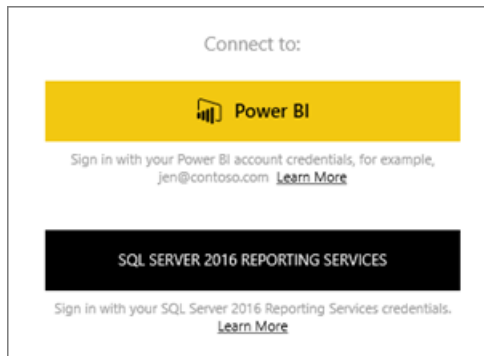
Get started with the Power BI app

1. On the Start screen of your Windows 10 device, open the Power BI app.



2. To view your Power BI dashboards and reports, tap **Power BI**. Sign in with the same credentials as your Power BI account on the web.

To view your Reporting Services mobile reports and KPIs, tap **SQL Server 2016 Reporting Services**. Sign in with your SQL Server Reporting Services credentials.





3. Tap **Start exploring** to view your own dashboards.

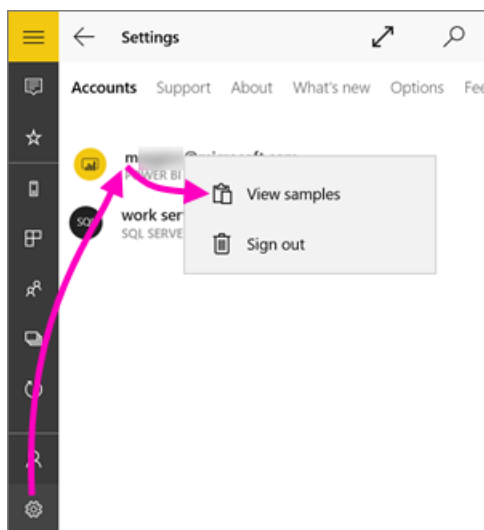
Try the Power BI and Reporting Services samples

Even without signing up, you can play with the Power BI and Reporting Services samples. After you download the app, you can view the samples or get started. Go back to the samples whenever you want from the dashboards home page.

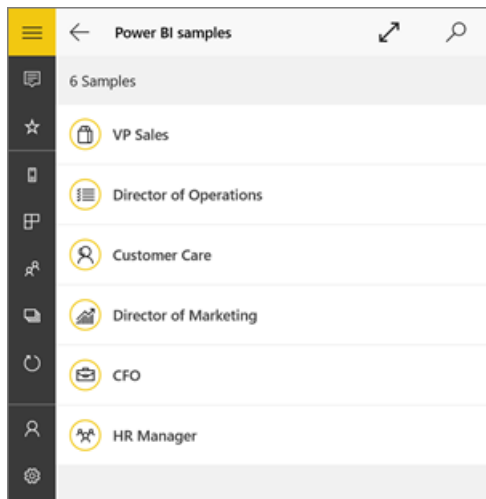
Power BI samples

You can view and interact with the Power BI dashboard samples, but there are a few things you can't do with them. You can't open the reports behind the dashboards, share the samples with others, or make them your favorites.



1. Tap the global navigation button  in the upper-left corner.
2. Tap **Settings** icon , tap your name, then tap **View samples**.

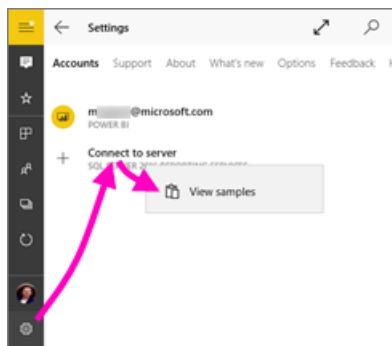


3. Pick a role and explore the sample dashboard for that role.

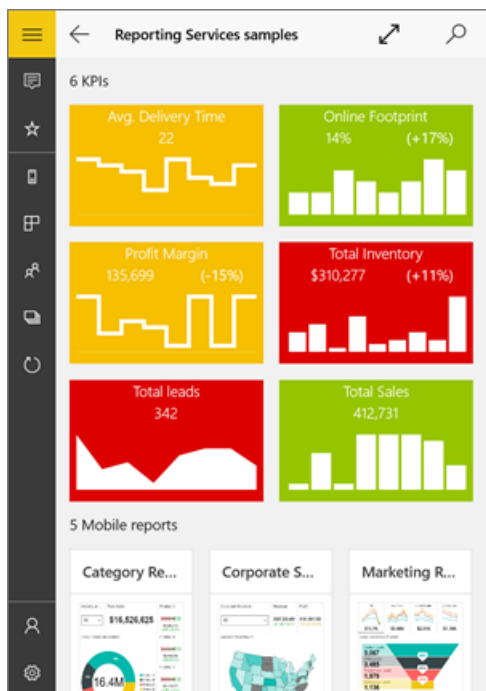


Reporting Services mobile report samples

1. Tap the global navigation button  in the upper-left corner.
2. Tap **Settings** icon , right-click or tap and hold **Connect to server**, then tap **View samples**.



3. Open the Retail Reports or Sales Reports folder to explore their KPIs and mobile reports.



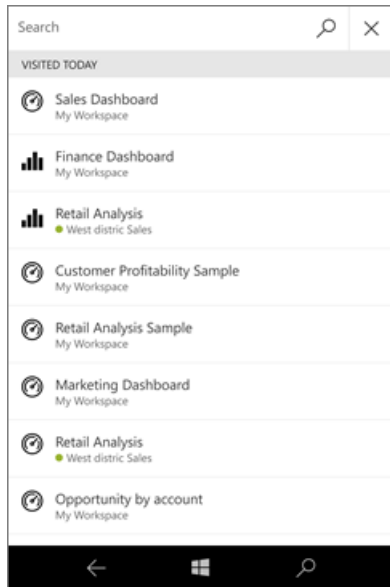
Search for dashboards, reports, and apps

Find your dashboards, reports, and apps quickly by typing in the search box, always at the top of the app.

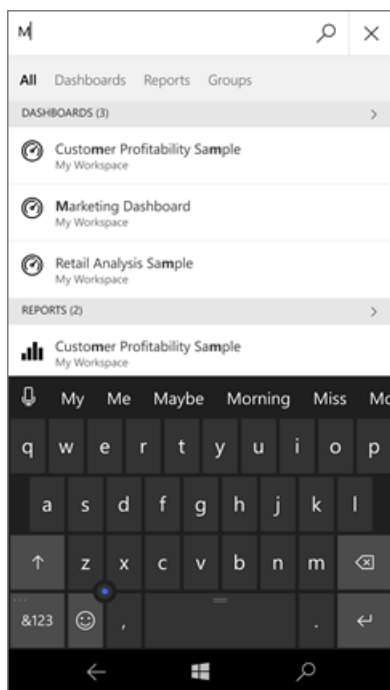
1. Tap the search icon in the upper-right corner.



Power BI displays your most recent dashboards, reports, and apps.

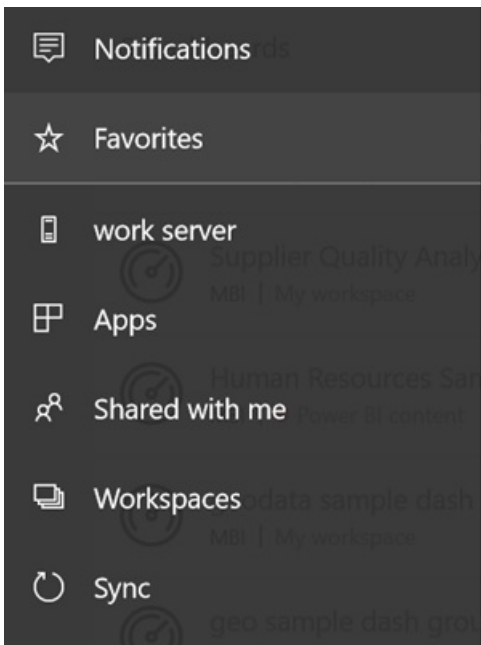


2. As you start typing, Power BI displays all relevant results.



Find your content in the Power BI mobile apps

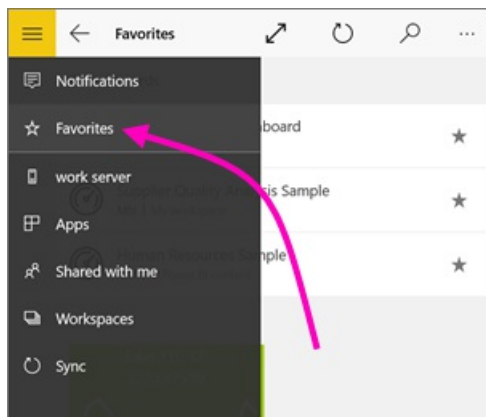
Your dashboards and reports are stored in different locations in the Power BI mobile apps, depending on where they came from. Read about [finding your content in the mobile apps](#). Plus you can always search for anything you have in the Power BI mobile apps.



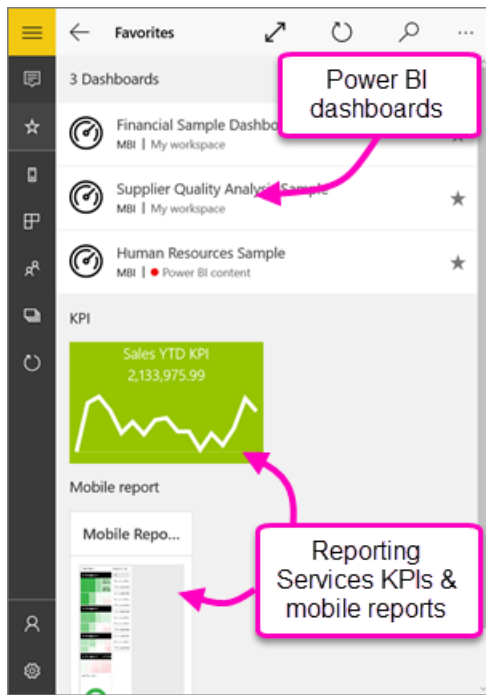
View your favorite dashboards, KPIs, and reports

You can view all of your favorite Power BI dashboards, together with Reporting Services KPIs and mobile reports, on the Favorites page in the mobile apps. When you make a dashboard a *favorite* in the Power BI mobile app, you can access it from all of your devices, including the Power BI service in your browser.

- Tap **Favorites**.



Your Power BI favorites and your favorites from the Reporting Services web portal are all on this page.



Read more about [favorites in the Power BI mobile apps](#).

Next steps

Here are some other things you can do in the Power BI app for Windows 10 devices with dashboards and reports in Power BI, and Reporting Services mobile reports and KPIs in the Reporting Services web portal

Power BI dashboards and reports

- View [your apps](#).
- View your [dashboards](#).
- [Pin Power BI tiles and dashboards](#) to your device's Start screen as live tiles.
- [Share tiles](#).
- Share [dashboards](#).

Reporting Services mobile reports and KPIs

- [View Reporting Services mobile reports and KPIs](#) in the Power BI app for Windows 10 devices.
- Create [KPIs on the Reporting Services web portal](#).
- [Create your own mobile reports with the SQL Server Mobile Report Publisher](#), and publish them to the Reporting Services web portal.

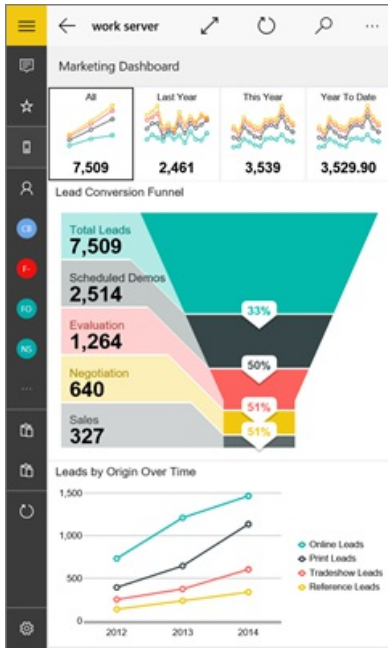
Next steps

- [Download the Power BI app](#) from the Windows Store
- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

View Reporting Services (SSRS) mobile reports and KPIs in the Windows 10 Power BI mobile app

11/15/2017 • 2 min to read • [Edit Online](#)

The Power BI mobile app for Windows 10 offers live, touch-enabled mobile access to your important on-premises business information in SQL Server 2016 Reporting Services.



First things first

Create Reporting Services mobile reports with SQL Server 2016 Enterprise Edition Mobile Report Publisher and publish them to the Reporting Services web portal. Create KPIs right in the web portal. Organize them in folders and mark your favorites, so you can find them easily.



Then in the Power BI mobile app for Windows 10, view the mobile reports and KPIs, organized in folders or collected as favorites.

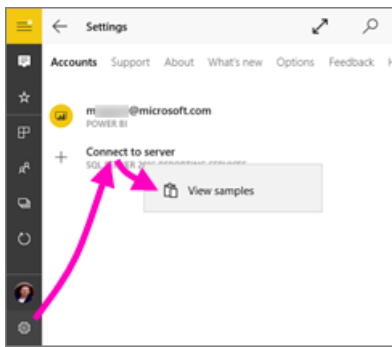
NOTE

Your device needs to be running Windows 10. The app works best on devices with at least 1 GB RAM and 8 GB internal storage.

Explore samples without a SQL Server 2016 Reporting Services server

Even if you don't have access to a Reporting Services web portal, you can still explore the features of Reporting Services mobile reports.

1. In your Windows 10 device, open the Power BI app.
2. Tap the global navigation button  in the upper-left corner.
3. Tap **Settings** icon , right-click or tap and hold **Connect to server**, then tap **View samples**.




4. Open the Retail Reports or Sales Reports folder to explore their KPIs and mobile reports.



Browse the samples to interact with KPIs and mobile reports.

Connect to a Reporting Services report server

1. At the bottom of the left navigation bar, tap **Settings** 
2. Tap **Connect to server**.
3. Fill in the server address and your user name and password. Use this format for the server address:

OR

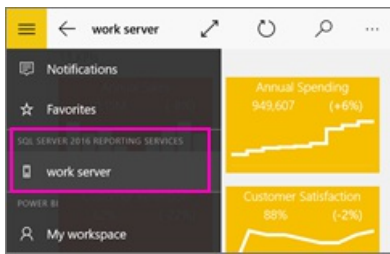
NOTE

Include **http** or **https** at the beginning of the connection string.


Tap **Advanced option** to give the server a name, if you'd like.

4. Tap the check mark to connect.

Now you see the server in the left navigation bar.

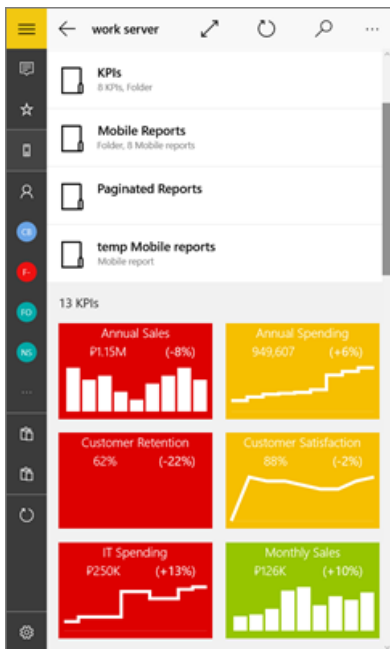


TIP

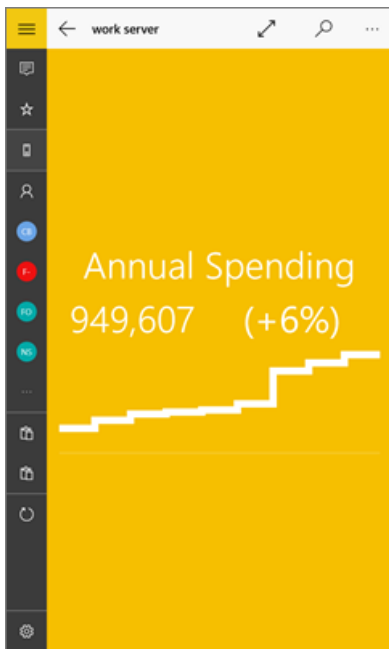
Tap the global navigation button  anytime to go between your Reporting Services mobile reports and your dashboards in the Power BI service.

View Reporting Services KPIs and mobile reports in the Power BI app

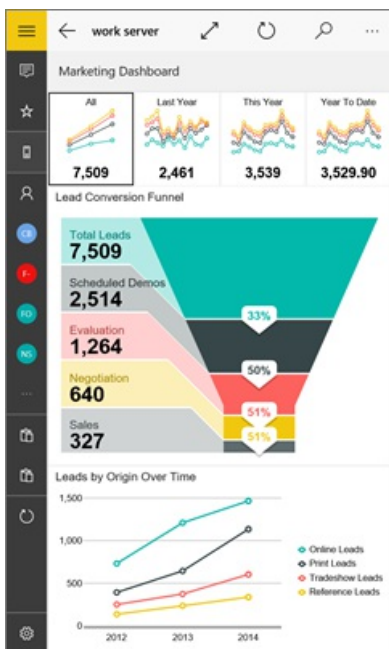
Reporting Services KPIs and mobile reports are displayed in the same folders they're in on the Reporting Services web portal.



- Tap a KPI to see it in focus mode.



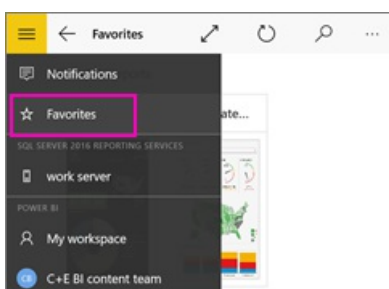
- Tap a mobile report to open and interact with it in the Power BI app.



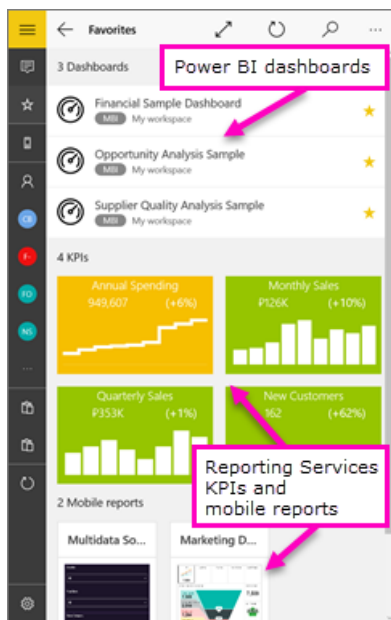
View your favorite KPIs and reports

You can mark KPIs and mobile reports as favorites on your Reporting Services web portal, and then view them in one convenient folder on your Windows 10 device, along with your Power BI favorite dashboards and reports.

- Tap **Favorites**.




Your favorites from the web portal are all on this page.

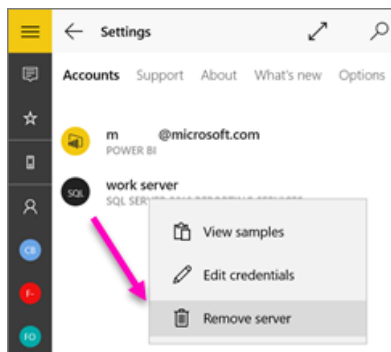


Read more about [favorites in the Power BI mobile apps](#).

Remove a connection to a report server

You can only be connected to one report server at a time from your Power BI mobile app. If you want to connect to a different server, you need to disconnect from the current one.

1. At the bottom of the left navigation bar, tap **Settings** .
2. Tap and hold the server name you don't want to be connected to.
3. Tap **Remove server**.



Create Reporting Services mobile reports and KPIs

You don't create Reporting Services KPIs and mobile reports in the Power BI mobile app. You create them in SQL Server Mobile Report Publisher and a SQL Server 2016 Reporting Services web portal.

- [Create your own Reporting Services mobile reports](#), and publish them to a Reporting Services web portal.
- [Create KPIs on a Reporting Services web portal](#)

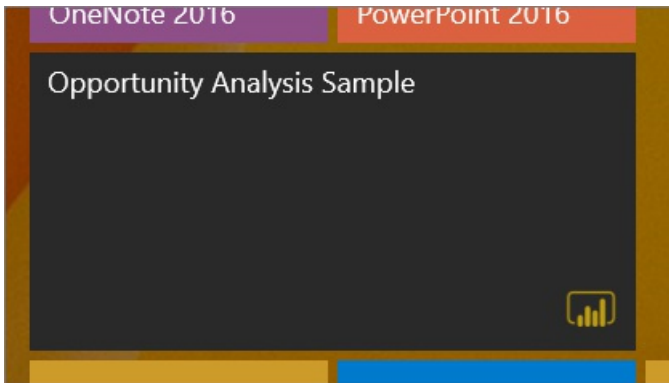
Next steps

- [Get started with the Power BI mobile app for Windows 10](#)
- [Get started with Power BI](#)
- Questions? [Try asking the Power BI Community](#)

Pin a dashboard to your Windows 10 Start screen from the Power BI mobile app

1/26/2018 • 1 min to read • [Edit Online](#)

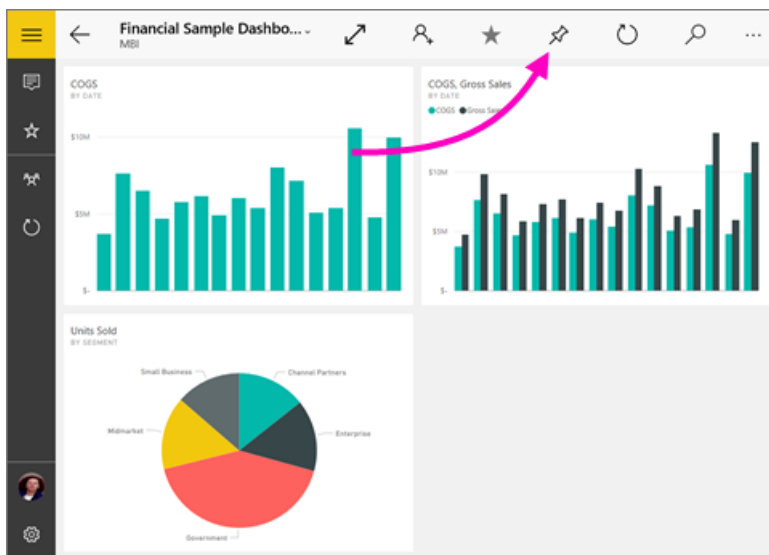
You can pin Power BI dashboards to the Windows Start screen from the Power BI mobile app for Windows 10. They become *live tiles*. When you tap the tile on the Start screen, the dashboard opens in the Power BI mobile app for Windows 10.



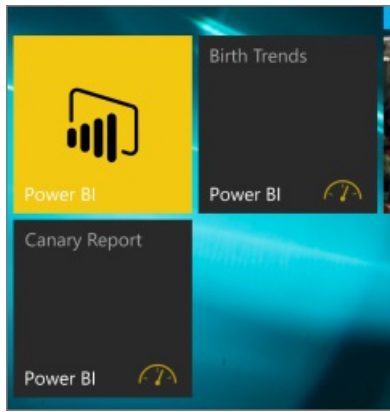
Pin a dashboard to your Start screen as a live tile

1. Open a dashboard.

2. Tap **Pin to Start** .



Go to your device Start screen to see the live tile.



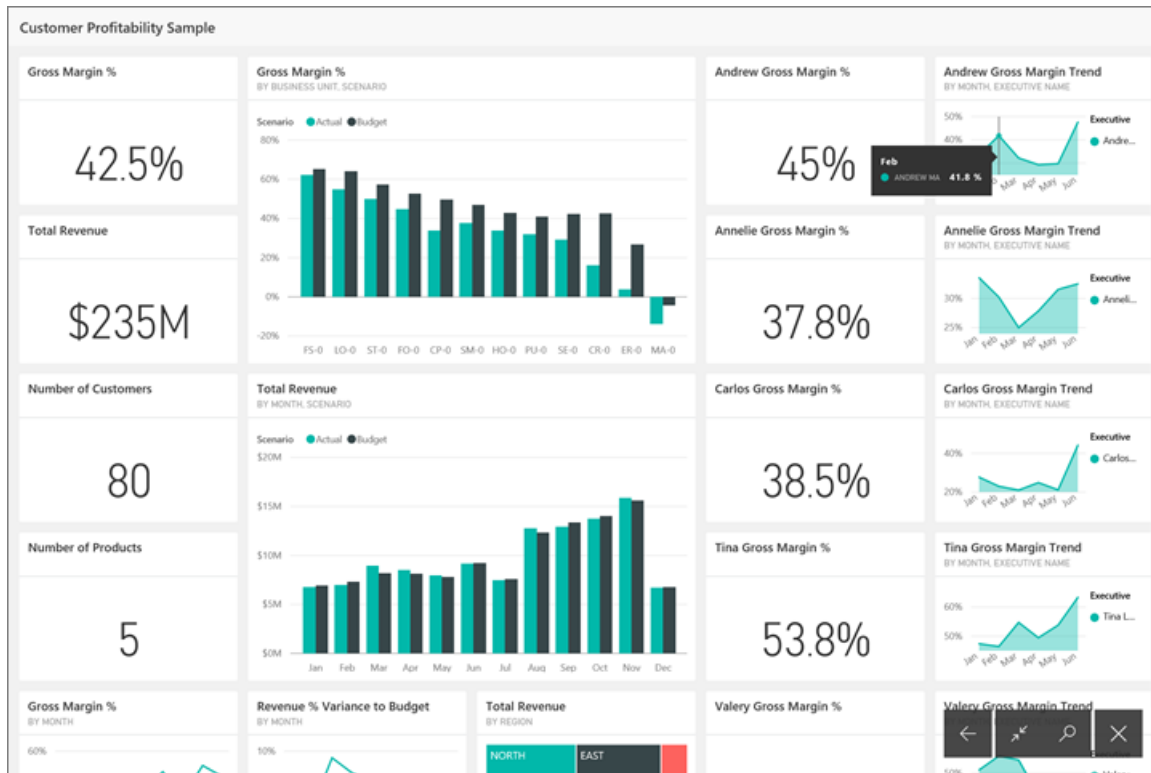
Next steps

- [Download the Power BI mobile app for Windows 10](#) from the Windows Store
- [Get started with the Power BI mobile app for Windows 10](#)
- [Get started with Power BI](#)
- Questions? Try asking the [Power BI Community](#)

View reports in presentation mode on Surface Hub and Windows 10 – Power BI

11/9/2017 • 2 min to read • [Edit Online](#)

You can display reports in presentation mode on Surface Hub, and display dashboards, reports, and tiles in full-screen mode on Windows 10 devices.



Presentation and full-screen modes are useful for displaying Power BI at a meeting or conference, or on a dedicated projector in an office, or even just for maximizing space on a small screen.

In full-screen mode in the Power BI mobile app, all the "chrome" such as the navigation and menu bars is removed, except the page tabs and filter pane in reports.


When you display a report in presentation mode on Surface Hub, you can draw on the pages with different colors of ink and navigate between the pages of the report.

You can also [display dashboards and reports in full-screen mode from the Power BI service](#) on the web.

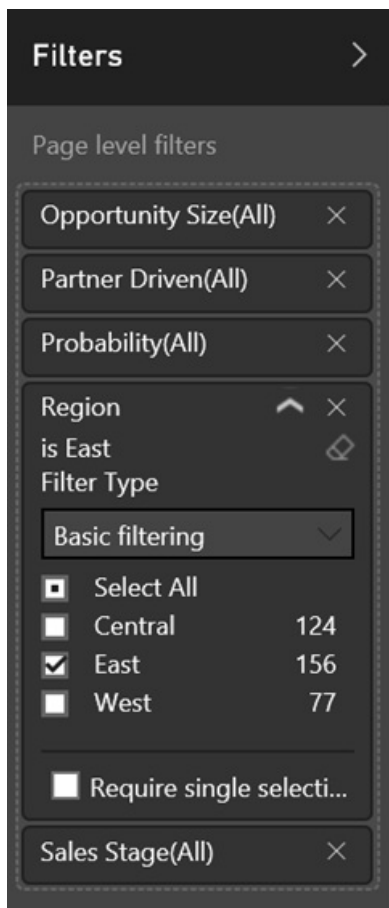
NOTE

Presentation mode is different from [focus mode for tiles](#).

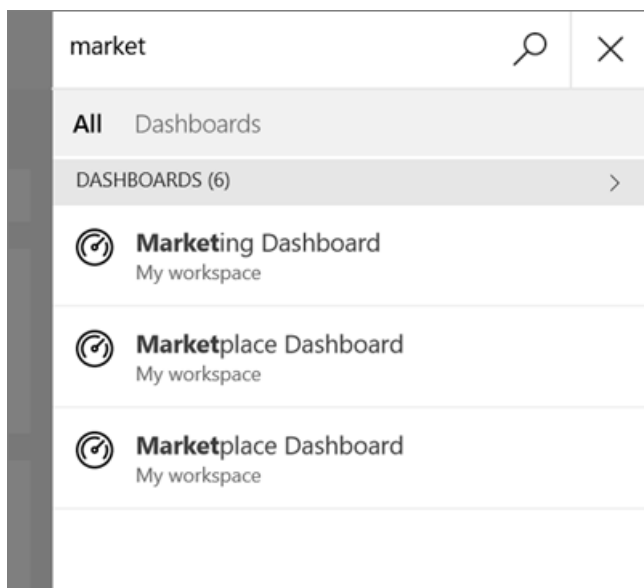
Display dashboards, reports, and tiles in full-screen mode



1. In the Power BI mobile app on a dashboard, report, or tile, tap the **Full screen** icon  to go to full-screen mode.
2. In presentation mode, you can filter a report, or search for other dashboards and reports.

Expand the Filters pane to set or remove filters.




Tap the search icon  to look for other dashboards.

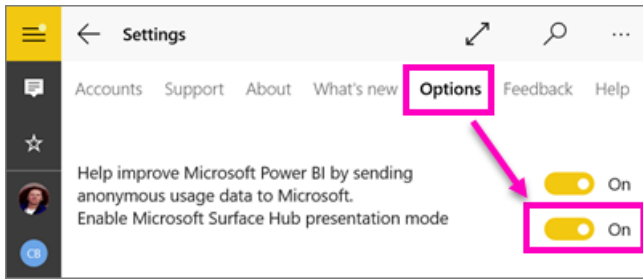


3. To exit full-screen mode, tap the icon with two inward-facing arrows  on the toolbar, or swipe down from the top and tap the two inward-facing arrows .

Turn on presentation mode for Surface Hub

Presentation mode is on by default in Surface Hub, but if it's turned off, you can turn it back on.

1. Tap the Settings icon  at the bottom of the left navigation bar.
2. Tap **Options**, then slide **Enable Microsoft Surface Hub presentation mode** to **On**.

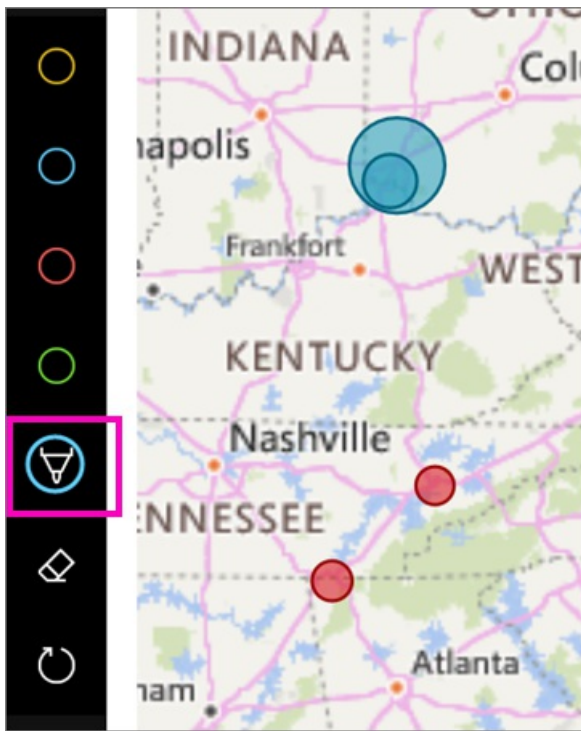


Display and draw on reports on Surface Hub

1. In a report, tap the **Full screen** icon  to go to Surface Hub presentation mode.


You see a collapsible action bar on both sides of the screen.

- To open it, swipe in or tap the handle.
 - To close it, swipe out or tap the X at the top.
2. On devices that support writing with a pen, you can start writing immediately.
 3. To change the ink color, tap the pen in the left or right action bar.



4. Tap the eraser or the undo arrow to remove some or all of the ink.
5. Tap the circular arrow to refresh the report content.
6. Tap the sideways arrows to go to other pages in the report.



7. To exit full-screen mode, swipe down from the top and tap the two inward-facing arrows .

Next steps

- [Display dashboards and reports in full-screen mode from the Power BI service](#)
- [Questions? Try asking the Power BI Community](#)

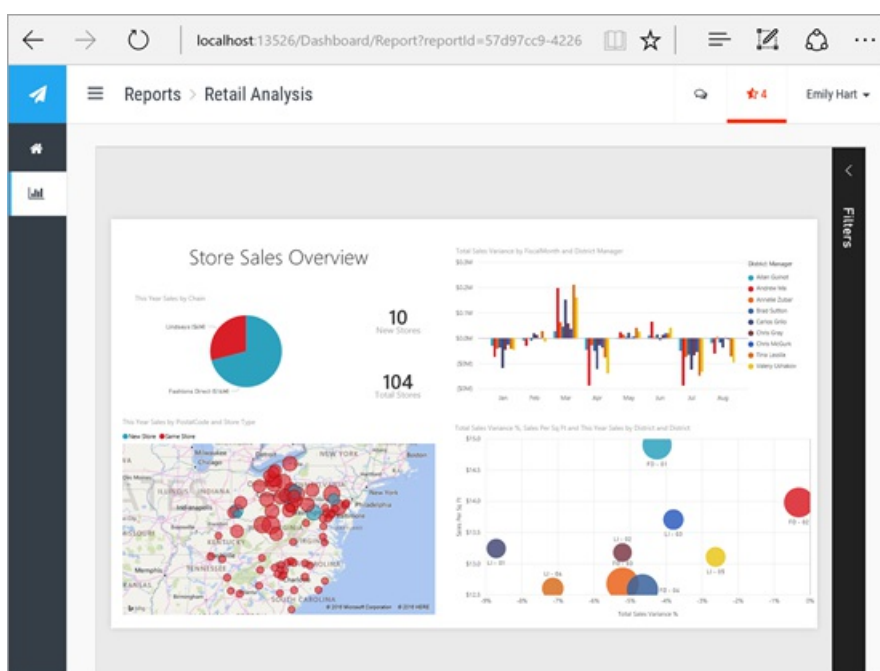
What can developers do with Power BI?

1/30/2018 • 1 min to read • [Edit Online](#)

Power BI offers a wide range of options for developers. This ranges from embedding to custom visuals and streaming datasets.

Embedding

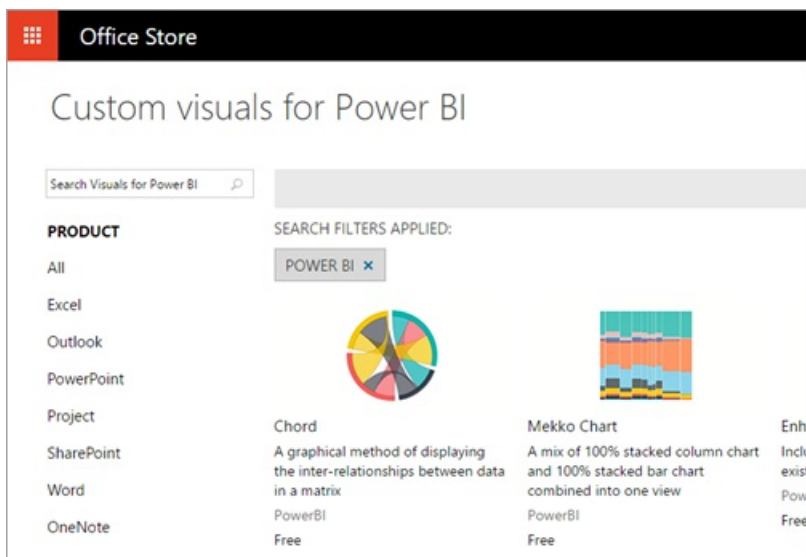
The Power BI service and Power BI Embedded in Azure are coming together to offer a single API for embedding your dashboards and reports. This means you will have one API surface, a consistent set of capabilities and access to the latest Power BI features – such as dashboards, gateways and app workspaces – when embedding your content. For more information, see [Embedding with Power BI](#).



Custom visuals

Custom visuals allow you to create your own visuals for use within Power BI reports. Custom visuals are written in TypeScript which is a superset of JavaScript that supports some advanced features and early access to ES6/ES7 functionality. Visual styling is handled using cascading styles sheets (css). For your convenience, we use the Less pre-compiler which supports some advanced features such as nesting, variables, mixins, conditions, loops, etc. If you don't want to use any of those features, you can just write plain css in the less file.

For more information about how to develop and publish a custom visual, see [Publish custom visuals to the Office store](#).



Push data into Power BI

You can use the Power BI API to push data into a dataset. This allows you to add a row to a table within a dataset. The new data can then be reflected in tiles on a dashboard and within visuals within your report.

For more information, see [Push data into a dashboard](#)

Next steps

[Embedding with Power BI](#)

[How to migrate Power BI Embedded workspace collection content to Power BI](#)

[JavaScript API Git repo](#)

[Power BI C# Git repo](#)

[Publish custom visuals to the Office store](#)

[Power BI Visuals Git repo](#)

[JavaScript embed sample](#)

[Power BI Premium whitepaper](#)

More questions? [Try the Power BI Community](#)

What can developers do with Power BI?

1/30/2018 • 1 min to read • [Edit Online](#)

Power BI displays dashboards that are interactive, and can be created and updated from many different data sources in real time. Using any programming language that supports REST calls, you can create apps that integrate with a Power BI dashboard in real-time. You can also integrate Power BI tiles and reports into apps.

Developers can also build their own data visualizations that can be used in interactive reports and dashboards.

Here are some of the things you can do with the Power BI APIs.

TO DO THIS	GO HERE
Embed dashboards, reports and tiles for Power BI users and Non-Power BI users (app owns data)	How to embed your Power BI dashboards, reports and tiles
Extend an existing business workflow to push key data into a Power BI dashboard.	Push data into a dashboard
Import a Power BI Desktop file	Import PBIX File
Authenticate to Power BI.	Authenticate to Power BI
Create a custom visual.	Use developer tools to create custom visuals

NOTE

The Power BI APIs still refer to app workspaces as groups. Any references to groups mean that you are working with app workspaces.

Power BI Developer Samples

The Power BI Developer samples include items for embedding dashboards, reports and tiles.

[Power BI Developer samples](#)

- Samples within **App Owns Data** are for embedding with non-Power BI users.
- Samples within **User Owns Data** are for embedding with Power BI users.

GitHub repositories

- [.NET SDK](#)
- [JavaScript API](#)
- [Custom Visuals](#)

Developer tools

The following are tools you can use to aid in your development of Power BI items.

- [JavaScript embed sample](#)

Next steps

[Push data into a dataset](#)

[Getting started with custom visuals developer tools](#) [Power BI REST API reference](#)

More questions? [Try asking the Power BI Community](#)

Embedding with Power BI

1/30/2018 • 3 min to read • [Edit Online](#)

Power BI offers APIs for embedding your dashboards and reports into applications. The Power BI APIs offer a consistent set of capabilities and access to the latest Power BI features – such as dashboards, gateways and app workspaces – when embedding content.

A single API

There are two main scenarios when embedding Power BI content. Embedding for users in your organization (who have licenses for Power BI) and embedding for your users and customers without requiring them to have Power BI licenses. The Power BI REST API allows for both scenarios.

For customers and users without Power BI licenses, you can embed dashboards and reports into your custom application, using the same API to either service your organization or your customers. Your customers see the data that is managed by the application. And for Power BI users in your organization, they'll have the additional options to view *their own data* directly in Power BI or in the context of the embedded application. You can take full advantage of the JavaScript and REST APIs for your embedding needs.

To view a sample of how embedding works, see the [JavaScript embed sample](#).

Embedding for your organization

Embedding for your organization allows you to extend the Power BI service. This requires that users of your application sign into the Power BI service when they want to view their content. Once someone in your organization signs in, they will only have access to dashboards and reports that they own or that have been shared with them in the Power BI service.

Examples of embedding for your organization include internal web application, the SharePoint Online web part and Microsoft Teams integration.

For embedding for your organization, see the following:

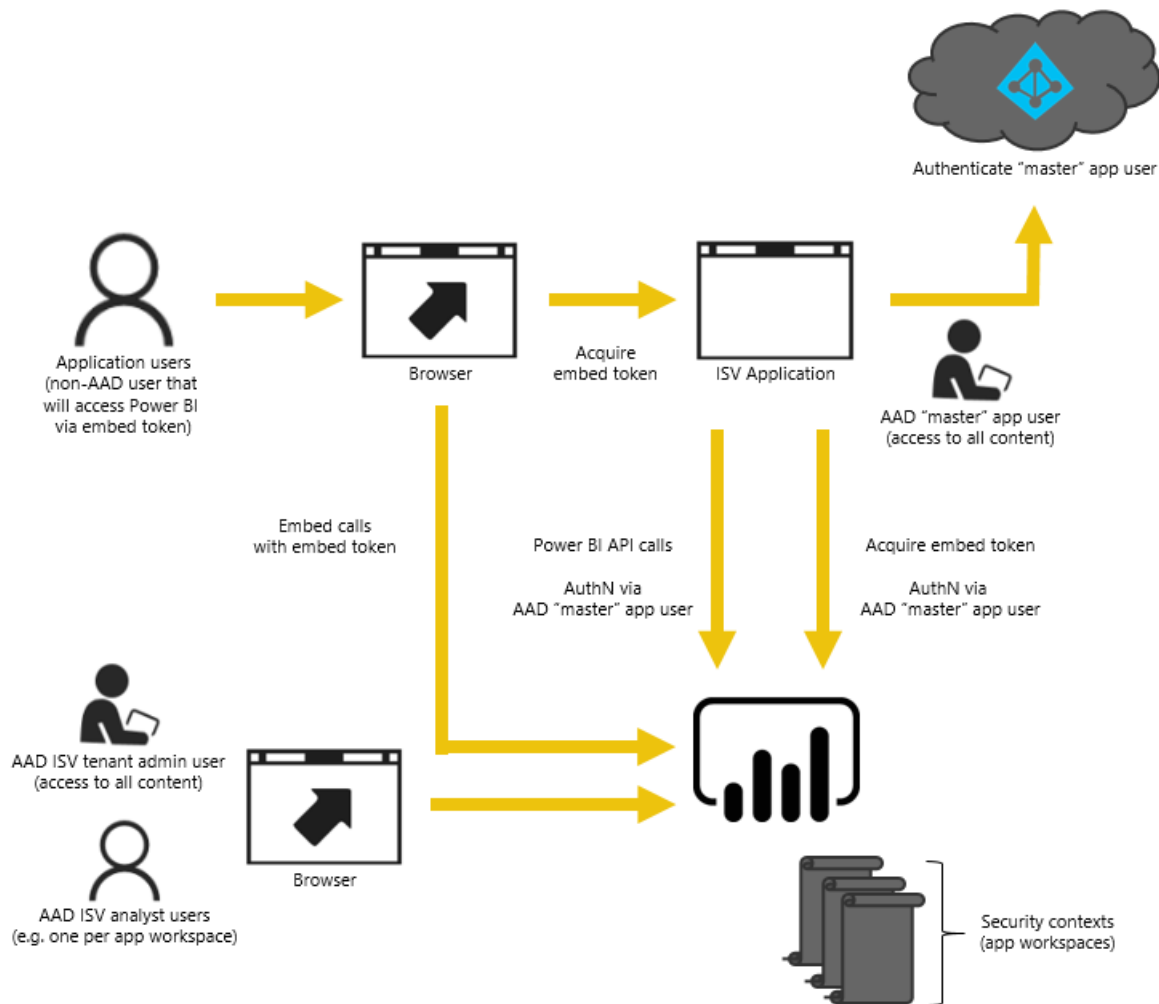
- [Integrate a dashboard into an app](#)
- [Integrate a tile into an app](#)
- [Integrate a report into an app](#)

Self-service capabilities, such as edit, save and more, are available through the [JavaScript API](#) when embedding for Power BI users.

Embedding for your customers

Embedding for your customers provides the ability to embed dashboards and reports to users who don't have an account for Power BI. Your customers don't need to know anything about Power BI. At least one Power BI Pro account is needed to create an embedded application. The Power BI Pro account acts as a master account for your application. Think of this as a proxy account. The Power BI Pro account also allows you to generate embed tokens that provide access to dashboards and reports within the Power BI service that are owned/managed by your application.

An example of embedding for your customers is an ISV application being sold to other companies.



To embed dashboards, reports and tiles, you would use the same APIs that you would use for embedding for your organization.

IMPORTANT

While embedding has a dependency on the Power BI service, there is not a dependency on Power BI for your customers. They do not need to sign up for Power BI to view the embedded content in your application.

When you are ready to move to production, your app workspace must be assigned to a capacity. Power BI Embedded, within Microsoft Azure, offers capacity to use with your applications.

For details on how to embed, see [How to embed your Power BI dashboards, reports and tiles](#).

If you were using the Power BI Workspace Collections service within Azure, see [Migrate content from the Power BI Workspace Collections Azure service](#) for information on how to migrate your content over.

Next steps

[How to embed your Power BI dashboards, reports and tiles](#)

[How to migrate Power BI Embedded workspace collection content to Power BI](#)

[Power BI Premium - what is it?](#)

[JavaScript API Git repo](#)

[Power BI C# Git repo](#)

[JavaScript embed sample](#)

[Embedded analytics capacity planning whitepaper](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Embed your Power BI dashboards, reports and tiles

1/30/2018 • 9 min to read • [Edit Online](#)

Learn about the steps you need to take to embed Power BI content within your application.

Microsoft [announced Power BI Premium](#), a new capacity-based licensing model that increases flexibility for how users access, share and distribute content. The offering also delivers additional scalability and performance to the Power BI service. Power BI Embedded was also announced that allows for creating capacity within Microsoft Azure. Power BI Embedded is focused on your application and your customers.

This article will look at embedding your Power BI content for both your organization and your customers. The steps are similar between the two scenarios. Callouts will be made when a step is specific to embedding for your customer.

There are a few steps you have to do with your application to make this possible. We will go through the steps needed to allow you to create and use embedded content within your application.

NOTE

The Power BI APIs still refer to app workspaces as groups. Any references to groups mean that you are working with app workspaces.

Step 1: Setup your embedded analytics development environment

Before you start embedding dashboards and reports into your application, you need to make sure your environment is setup to allow for embedding. As part of the setup, you will need to do the following.

- [Make sure you have an Azure Active Directory tenant](#)
- [Create your Power BI Pro account](#)
- [Register your Azure Active Directory application and permissions](#)

NOTE

Power BI capacity is not required for development of your application. The developers of the application will need to have a Power BI Pro license.

Azure Active Directory tenant

You will need an Azure Active Directory (Azure AD) tenant in order to embed items from Power BI. This tenant must have at least one Power BI Pro user. You will also need to define an Azure AD app within the tenant. You can make use of an existing Azure AD tenant or create a new one specifically for embedding purposes.

You will need to determine what tenant setup to use if you are embedding for your customers.

- Use your existing corporate Power BI tenant?
- Use a separate tenant for your application?
- Use a separate tenant for each customer?

If you do not want to use an existing tenant, you can decide to create a new tenant for your application, or one for each customer, see [Create an Azure Active Directory tenant](#) or [How to get an Azure Active Directory tenant](#).

Create a Power BI Pro user account

You only need a single Power BI Pro account to embed content. However, you may want to have a few different users that have specific access to items. Here is a look at possible users to consider within your tenant.

The following accounts will need to exist within your tenant and have a Power BI Pro license assigned to them. A Power BI Pro license is required to work with app workspaces within Power BI.

An organization/tenant admin user

It is recommended that your organization/tenant Global Admin user should not be used as account your application uses if embedding for your customers. This is to minimize access that the application account has within your tenant. It is recommended that the admin user be an admin of all app workspaces created for the purpose of embedding.

Accounts for analysts that will create content

You may have multiple users that create content for Power BI. You will need a Power BI Pro account for each analyst that is creating and deploying content to Power BI.

An application *master* user account for embedding for your customers

The master account is the account your application will use when embedding content for your customers. The scenario is typically for ISV applications. The master account is really the only required account you need within your organization. It can also be used as the admin and analyst account, but it is not recommended. Your application's backend will store the credentials for this account and use it for acquiring an Azure AD auth token for use with the Power BI APIs. This account will be used to generate an embed token for the application to use for your customers.

The master account is just a regular user with a Power BI Pro license that you use with your application. The account must be an admin of the app workspace that is being used for embedding.

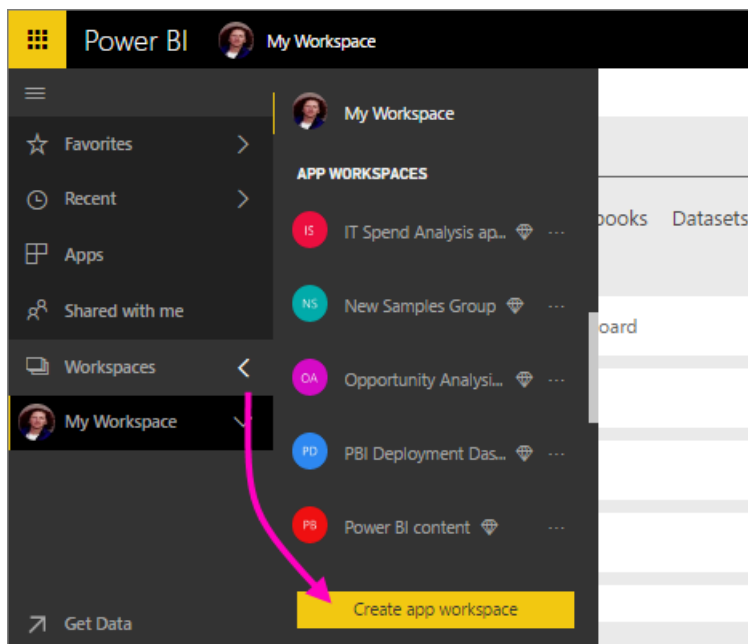
App registration and permissions

You will need to register your application with Azure AD in order to make REST API calls. For more information, see [Register an Azure AD app to embed Power BI content](#).

Create app workspaces

If you are embedding dashboards and reports for your customers, those dashboards and reports have to be placed within an app workspace. The *master* account, that was mentioned above, must be an admin of the app workspace.

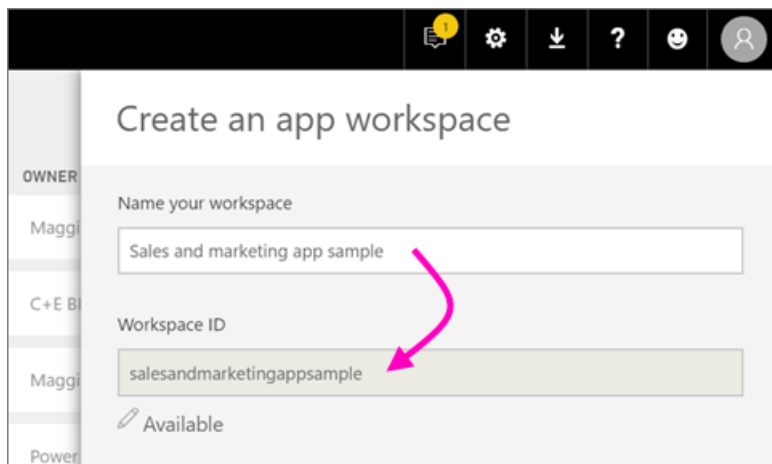
1. Start by creating the workspace. Select **Workspaces** > **Create app workspace**.



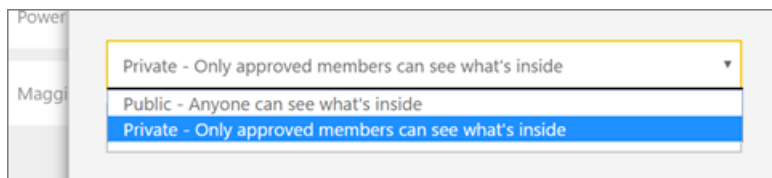
This will be the place to put content that you and your colleagues collaborate on.

2. Give the workspace a name. If the corresponding **Workspace ID** isn't available, edit it to come up with a unique ID.

This will be the name of the app, too.

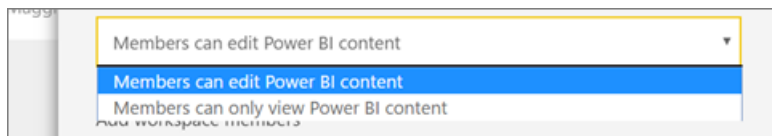


3. You have a few options to set. If you choose **Public**, anyone in your organization can see what's in the workspace. **Private**, on the other hand, means only members of the workspace can see its contents.



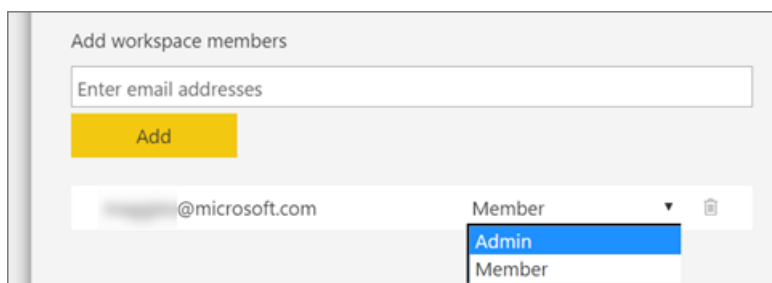
You can't change the Public/Private setting after you've created the group.

4. You can also choose if members can **edit** or have **view-only** access.



Only add people to the app workspace so they can edit the content. If they're only going to view the content, don't add them to the workspace. You can include them when you publish the app.

5. Add email addresses of people you want to have access to the workspace, and select **Add**. You can't add group aliases, just individuals.
6. Decide whether each person is a member or an admin.

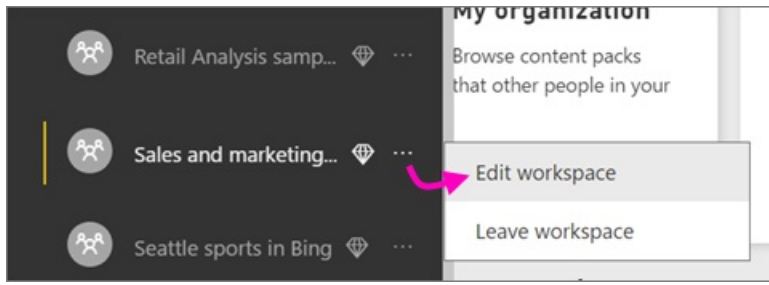


Admins can edit the workspace itself, including adding other members. Members can edit the content in the workspace, unless they have view-only access. Both admins and members can publish the app.

7. Select **Save**.

Power BI creates the workspace and opens it. It appears in the list of workspaces you're a member of. Because you're an admin, you can select the ellipsis (...) to go back and make changes to it, adding new members or

changing their permissions.



Create and upload your reports

You can create your reports and datasets using Power BI Desktop and then publish those reports to an app workspace. The end user publishing the reports need to have a Power BI Pro license in order to publish to an app workspace.

Step 2: Embed your content

Within your application, you will need to authenticate with Power BI. If you are embedding content for your customers, you will store the credentials for the *master* account within your application. For more information, see [Authenticate users and get an Azure AD access token for your Power BI app](#).

Once authenticated, within your application, use the Power BI REST APIs and JavaScript APIs to embed dashboards and reports into your application.

For **embedding for your organization**, see the following walkthroughs:

- [Integrate a dashboard into an app](#)
- [Integrate a tile into an app](#)
- [Integrate a report into an app](#)

For **embedding with your customers**, which is typical for ISVs, see the following:

- [Integrate a dashboard, tile, or report into your application](#)

When embedding for your customers, an embed token is required. To learn more see, [GenerateToken](#).

Step 3: Promote your solution to production

Moving to production requires a few extra steps.

Embedding for your organization

If you are embedding for your organization, you only need to let people know how to get to your application.

Free users can consume content that is embedded from an app workspace (group), if that workspace is backed by capacity. List the Free user as a member of app workspace (group), otherwise you receive a 401 unauthorized error. The following table lists the available Power BI Premium SKUs available within Office 365.

CAPACITY NODE	TOTAL CORES (BACKEND + FRONTEND)	BACKEND CORES	FRONTEND CORES	DIRECTQUERY/LIV E CONNECTION LIMITS	MAX PAGE RENDERS AT PEAK HOUR
EM3	4 v-cores	2 cores, 10GB RAM	2 cores		601-1,200
P1	8 v-cores	4 cores, 25GB RAM	4 cores	30 per second	1,201-2,400

CAPACITY NODE	TOTAL CORES (BACKEND + FRONTEND)	BACKEND CORES	FRONTEND CORES	DIRECTQUERY/LIV E CONNECTION LIMITS	MAX PAGE RENDERS AT PEAK HOUR
P2	16 v-cores	8 cores, 50GB RAM	8 cores	60 per second	2,401-4,800
P3	32 v-cores	16 cores, 100GB RAM	16 cores	120 per second	4,801-9600

NOTE

You must be a Global or Billing Admin, within your tenant, in order to purchase Power BI Premium. For information on how to purchase Power BI Premium, see [How to purchase Power BI Premium](#).

Embedding for your customers

If you are embedding for your customers, do the following.

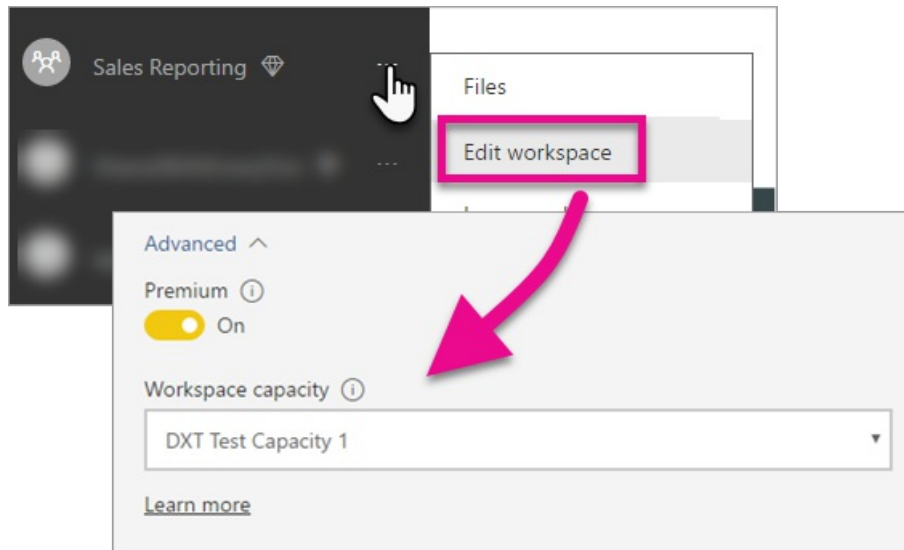
- If you are using a separate tenant for development, then you must make sure your app workspaces, along with dashboards and reports, are available in your production environment. Make sure that you create the application in Azure AD for your production tenant and assign the proper app permissions as indicated in Step 1.
- Purchase a capacity that fits your needs. You can use the table below to understand which Power BI Embedded capacity SKU you may need. For more details, see [Embedded analytics capacity planning whitepaper](#). When you are ready to purchase, you can do so within the [Microsoft Azure portal](#). For details on how to create Power BI Embedded capacity, see [Create Power BI Embedded capacity in the Azure portal](#).

IMPORTANT

Because embed tokens are intended for development testing only, the number of embed tokens a Power BI master account can generate is limited. A [capacity must be purchased](#) for production embedding scenarios. There is no limit to embed token generation when a capacity is purchased.

CAPACITY NODE	TOTAL CORES (BACKEND + FRONTEND)	BACKEND CORES	FRONTEND CORES	DIRECTQUERY/LIV E CONNECTION LIMITS	MAX PAGE RENDERS AT PEAK HOUR
A1	1 v-cores	.5 cores, 3GB RAM	.5 cores	5 per second	1-300
A2	2 v-cores	1 core, 5GB RAM	1 core	10 per second	301-600
A3	4 v-cores	2 cores, 10GB RAM	2 cores	15 per second	601-1,200
A4	8 v-cores	4 cores, 25GB RAM	4 cores	30 per second	1,201-2,400
A5	16 v-cores	8 cores, 50GB RAM	8 cores	60 per second	2,401-4,800
A6	32 v-cores	16 cores, 100GB RAM	16 cores	120 per second	4,801-9600

- Edit the app workspace and assign it to a capacity under advanced.



- Deploy your updated application to production and begin embedding Power BI dashboards and reports.

Admin settings

Global Admins, or Power BI service administrators, can turn the ability to use the REST APIs, on or off for a tenant. Power BI admins can set this setting for the entire organization, or for individual security groups. It is enabled for the entire organization by default. This is done through the [Power BI admin portal](#).

Next steps

[Embedding with Power BI](#)

[How to migrate Power BI Embedded workspace collection content to Power BI](#)

[Power BI Premium - what is it?](#)

[How to purchase Power BI Premium](#)

[JavaScript API Git repo](#)

[Power BI C# Git repo](#)

[JavaScript embed sample](#)

[Embedded analytics capacity planning whitepaper](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

How to migrate Power BI Embedded workspace collection content to Power BI

1/30/2018 • 8 min to read • [Edit Online](#)

Learn how to migrate from Power BI Embedded to the Power BI service and leverage advances for embedding in apps.

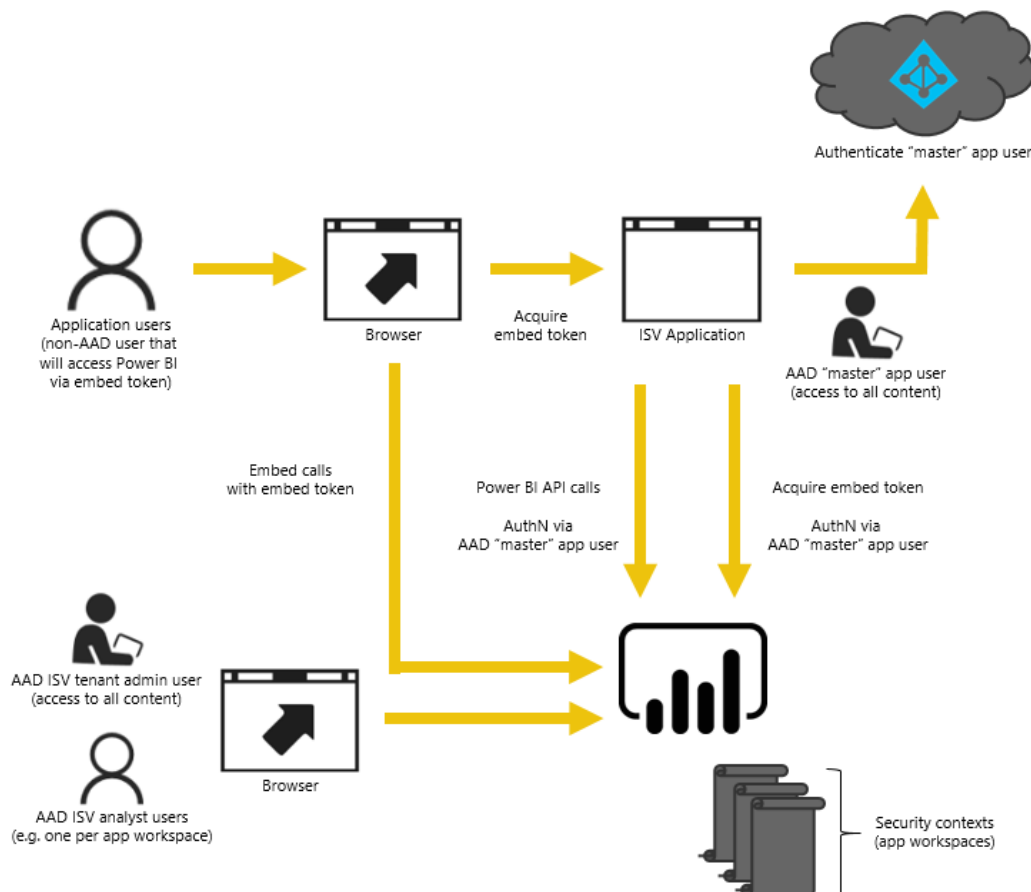
Microsoft recently [announced Power BI Premium](#), a new capacity-based licensing model that increases flexibility for how users access, share and distribute content. The offering also delivers additional scalability and performance to the Power BI service.

With the introduction of Power BI Premium, Power BI Embedded and the Power BI service are converging to advance how Power BI content is embedded in apps. This means you will have one API surface, a consistent set of capabilities and access to the latest Power BI features – such as dashboards, gateways and app workspaces – when embedding your content. Moving forward you'll be able to start with Power BI Desktop and move to deployment with Power BI Premium, which will be generally available late in the second quarter of 2017.

The current Power BI Embedded service will continue to be available for a limited time following general availability of the converged offering: customers under an Enterprise Agreement will have access to through the expiration of their existing agreements; customers that acquired Power BI Embedded through Direct or CSP channels will enjoy access for one year from General Availability of Power BI Premium. This article will provide some guidance for migrating from the Azure service to the Power BI service and what to expect for changes in your application.

IMPORTANT

While the migration will take a dependency on the Power BI service, there is not a dependency on Power BI for the users of your application when using an **embed token**. They do not need to sign up for Power BI to view the embedded content in your application. You can use this embedding approach to service non-Power BI users.



Prepare for the migration

There are a few things you need to do to prepare for migrating from Power BI Embedded Azure service over to the Power BI service. You will need a tenant available, along with a user that has a Power BI Pro license.

1. Make sure you have access to an Azure Active Directory (Azure AD) tenant.

You will need to determine what tenant setup to use.

- Use your existing corporate Power BI tenant?
- Use a separate tenant for your application?
- Use a separate tenant for each customer?

If you decide to create a new tenant for your application, or each customer, see [Create an Azure Active Directory tenant](#) or [How to get an Azure Active Directory tenant](#).

2. Create a user within this new tenant that will act as your application "master" account. That account needs to sign up for Power BI and needs to have a Power BI Pro license assigned to it.

Accounts within Azure AD

The following accounts will need to exist within your tenant.

NOTE

These accounts will need to have Power BI Pro licenses in order to use App workspaces.

1. A tenant admin user.

It is recommended that this user be a member of all App workspaces created for the purpose of embedding.

2. Accounts for analysts that will create content.

These users should be assigned to App workspaces as needed.

3. An application *master* user account, or service account.

The applications backend will store the credentials for this account and use it for acquiring an Azure AD token for use with the Power BI REST APIs. This account will be used to generate the embed token for the application. This account also needs to be an admin of the App workspaces created for embedding.

NOTE

This is just a regular user account in your organization that will be used for the purposes of embedding.

App registration and permissions

You will need to register an application within Azure AD and grant certain permissions.

Register an application

You will need to register your application with Azure AD in order to make REST API calls. This includes going to the Azure portal to apply additional configuration in addition to the Power BI app registration page. For more information, see [Register an Azure AD app to embed Power BI content](#).

You should register the application using the application **master** account.

Create App workspaces (Required)

You can take advantage of App workspaces to provide better isolation if your application is servicing multiple customers. Dashboards and reports would be isolated between your customers. You could then use a Power BI account per App workspace to further isolate application experiences between your customers.

IMPORTANT

You cannot use a personal workspace to take advantage of embedding to non-Power BI users.

You will need a user that has a Pro license in order to create an app workspace within Power BI. The Power BI user that creates the App workspace will be an admin of that workspace by default.

NOTE

The application *master* account needs to be an admin of the workspace.

Content migration

Migrating your content from your workspace collections to the Power BI service can be done in parallel to your current solution and doesn't require any downtime.

A **migration tool** is available for you to use in order to assist with copying content from Power BI Embedded to the Power BI service. Especially if you have a lot of content. For more information, see [Power BI Embedded migration tool](#).

Content migration relies mainly on two APIs.

1. Download PBIX - this API can download PBIX files which were uploaded to Power BI after October 2016.
2. Import PBIX - this API uploads any PBIX to Power BI.

For some related code snippets, see [Code snippets for migrating content from Power BI Embedded](#).

Report types

There are several types of reports, each requiring a somewhat different migration flow.

Cached dataset & report

Cached datasets refer to PBIX files that had imported data as opposed to a live connection or DirectQuery connection.

Flow

1. Call Download PBIX API from PaaS workspace.
2. Save PBIX.
3. Call Import PBIX to SaaS workspace.

DirectQuery dataset & report

Flow

1. Call GET
`https://api.powerbi.com/v1.0/collections/{collection_id}/workspaces/{wid}/datasets/{dataset_id}/Default.GetBoundGatewayDataSources`
and save connection string received.
2. Call Download PBIX API from PaaS workspace.
3. Save PBIX.
4. Call Import PBIX to SaaS workspace.
5. Update connection string by calling - POST
`https://api.powerbi.com/v1.0/myorg/datasets/{dataset_id}/Default.SetAllConnections`
6. Get GW id and datasource id by calling - GET
`https://api.powerbi.com/v1.0/myorg/datasets/{dataset_id}/Default.GetBoundGatewayDataSources`
7. Update user's credentials by calling - PATCH
`https://api.powerbi.com/v1.0/myorg/gateways/{gateway_id}/datasources/{datasource_id}`

Old dataset & reports

These are datasets/reports created before October 2016. Download PBIX doesn't support PBIXs which were uploaded before October 2016

Flow

1. Get PBIX from your development environment (your internal source control).
2. Call Import PBIX to SaaS workspace.

Push Dataset & report

Download PBIX doesn't support *Push API* datasets. Push API dataset data can't be ported from PaaS to SaaS.

Flow

1. Call "Create dataset" API with dataset Json to create dataset in SaaS workspace.
2. Rebuild report for the created dataset*.

It is possible using some workarounds to migrate the push api report from PaaS to SaaS by trying the following.

1. Uploading some dummy PBIX to PaaS workspace.
2. Clone the push api report and bind it to the dummy PBIX from step 1.
3. Download push API report with the dummy PBIX.
4. Upload dummy PBIX to your SaaS workspace.
5. Create push dataset in your SaaS workspace.
6. Rebind report to push api dataset.

Create and upload new reports

In addition to the content you migrated from the Power BI Embedded Azure service, you can create your reports and datasets using Power BI Desktop and then publish those reports to an app workspace. The end user publishing the reports need to have a Power BI Pro license in order to publish to an app workspace.

Rebuild your application

1. You will need to modify your application to use the Power BI REST APIs and the report location inside powerbi.com.
2. Rebuild your AuthN/AuthZ authentication using the *master* account for your application. You can take advantage of using an [embed token](#) to allow this user to act on behalf of other users.
3. Embed your reports from powerbi.com into your application.

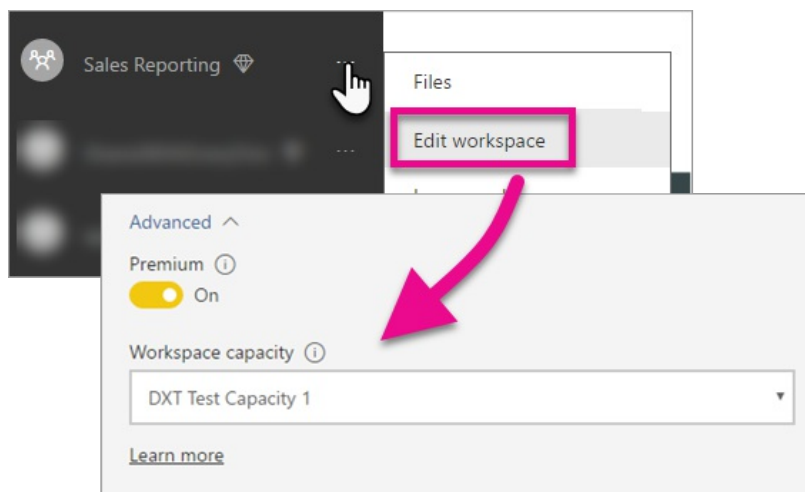
Map your users to a Power BI user

Within your application, you will map users that you manage within the application to a *master* Power BI credential for the purposes of your application. The credentials for this Power BI *master* account will be stored within your application and be used to creating embed tokens.

What to do when you are ready for production

When you are ready to move to production, you will need to do the following.

- If you are using a separate tenant for development, then you will need to make sure your app workspaces, along with dashboards and reports, are available in your production environment. You will also need to make sure that you created the application in Azure AD for your production tenant and assigned the proper app permissions as indicated in Step 1.
- Purchase a capacity that fits your needs. To better understand how the amount and type of capacity you need, see the [Embedded analytics capacity planning whitepaper](#). You can [purchase capacity](#) in Azure.
- Edit the App workspace and assign it to a Premium capacity under advanced.



- Deploy your updated application to production and begin embedding reports from the Power BI service.

After migration

You should do some cleanup within Azure.

- [Remove all workspaces off of the deployed solution within the Azure service of Power BI Embedded.](#)
- [Delete any Workspace Collections that exist within Azure.](#)

Next steps

[Embedding with Power BI](#)

[Power BI Embedded migration tool](#)

[Code snippets for migrating content from Power BI Embedded](#)

[How to embed your Power BI dashboards, reports and tiles](#)

[Power BI Premium - what is it?](#)

[JavaScript API Git repo](#)

[Power BI C# Git repo](#)

[JavaScript embed sample](#)

[Embedded analytics capacity planning whitepaper](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Integrate a dashboard into an app for your organization

1/30/2018 • 7 min to read • [Edit Online](#)

Learn how to integrate, or embed, a dashboard into a web app using REST API calls along with the Power BI JavaScript API when embedding for your organization.



To get started with this walkthrough, you need a **Power BI** account. If you don't have an account, you can [sign up for a free Power BI account](#), or you can create your own [Azure Active Directory tenant](#) for testing purposes.

NOTE

Looking to embed a dashboard for your customers, using an embedtoken, instead? See, [Integrate a dashboard, tile, or report into your application for your customers](#).

To integrate a dashboard into a web app, you use the **Power BI** REST API, or the Power BI C# SDK, and an Azure Active Directory (AD) authorization **access token** to get a dashboard. Then, you load the dashboard using the same access token. The **Power BI** API provides programmatic access to certain **Power BI** resources. For more information, see [Overview of Power BI REST API](#) and the [Power BI JavaScript API](#).

Download the sample

This article shows the code used in the [integrate-dashboard-web-app](#) on GitHub. To follow along with this walkthrough, you can download the sample.

Step 1 - register an app in Azure AD

You will need to register your application with Azure AD in order to make REST API calls. For more information, see [Register an Azure AD app to embed Power BI content](#).

If you downloaded the [Integrate a dashboard sample](#), you use the **Client ID** and **Client Secret** you get, after registration, so that the sample can authenticate to Azure AD. To configure the sample, change the **Client ID** and **Client Secret** in the *cloud.config* file.

```
appsettings.json
<PBIWebApp.Properties.Settings>
  <setting name="ClientID" serializeAs="String">
    <value>{Enter your app ClientID}</value>
  </setting>
  <setting name="ClientSecret" serializeAs="String">
    <value>{Enter your app SecretKey}</value>
  </setting>
```

Step 2 - get an access token from Azure AD

Within your application, you will first need to get an **access token**, from Azure AD, before you can make calls to the Power BI REST API. For more information, see [Authenticate users and get an Azure AD access token for your Power BI app](#).

Step 3 - get a dashboard

To get a **Power BI** dashboard, you use the [Get Dashboards](#) operation which gets a list of **Power BI** dashboards. From the list of dashboards, you can get a dashboard id.

Step 2: Get dashboards from your account.

Get Dashboards		
Id	DisplayName	EmbedUrl
fcff76f9-15ff-4a8e-8242-275ac9c25b90	Human Resources Sample	https://app.powerbi.com/dashboardEmbed?dashboardid
03e557ab-1a6f-4664-a1c4-a6390c0c00bf	Opportunity Analysis Sample	https://app.powerbi.com/dashboardEmbed?dashboardid
2282c0eb-e1ad-432e-8799-7ca534e0fc26	Retail Analysis Sample	https://app.powerbi.com/dashboardEmbed?dashboardid
9512f8ea-f932-474e-851f-9f1b7304crae	Sales and Marketing Sample	https://app.powerbi.com/dashboardEmbed?dashboardid

Get dashboards using an access token

With the **access token** you retrieved in [step 2](#), you can call the [Get Dashboards](#) operation. The [Get Dashboards](#) operation returns a list of dashboards. You can get a single dashboard from the list of dashboards. Below is a complete C# method to get a dashboard.

To make the REST API call, you must include an *Authorization* header in the format of *Bearer {access token}*.

Get dashboards with the REST API

Default.aspx.cs

```

protected void getDashboardsButton_Click(object sender, EventArgs e)
{
    string responseContent = string.Empty;

    //Configure dashboards request
    System.Net.WebRequest request = System.Net.WebRequest.Create(String.Format("{0}dashboards", baseUri)) as
System.Net.HttpWebRequest;
    request.Method = "GET";
    request.ContentType = "application/json";
    request.Headers.Add("Authorization", String.Format("Bearer {0}", authResult.AccessToken));

    //Get dashboards response from request.GetResponse()
    using (var response = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get reader from response stream
        using (var reader = new System.IO.StreamReader(response.GetResponseStream()))
        {
            responseContent = reader.ReadToEnd();

            //Deserialize JSON string
            PBIDashboards PBIDashboards = JsonConvert.DeserializeObject<PBIDashboards>(responseContent);

            if (PBIDashboards != null)
            {
                var gridViewDashboards = PBIDashboards.value.Select(dashboard => new {
                    Id = dashboard.id,
                    DisplayName = dashboard.displayName,
                    EmbedUrl = dashboard.embedUrl
                });

                this.GridView1.DataSource = gridViewDashboards;
                this.GridView1.DataBind();
            }
        }
    }
}

//Power BI Dashboards used to deserialize the Get Dashboards response.
public class PBIDashboards
{
    public PBIDashboard[] value { get; set; }
}
public class PBIDashboard
{
    public string id { get; set; }
    public string displayName { get; set; }
    public string embedUrl { get; set; }
    public bool isReadOnly { get; set; }
}

```

Get dashboards using the .NET SDK

You can use the .NET SDK to retrieve a list of dashboards instead of calling the REST API directly.

```

using Microsoft.IdentityModel.Clients.ActiveDirectory;
using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

var tokenCredentials = new TokenCredentials(<ACCESS TOKEN>, "Bearer");

// Create a Power BI Client object. It will be used to call Power BI APIs.
using (var client = new PowerBIClient(new Uri(ApiUrl), tokenCredentials))
{
    // Get a list of dashboards your "My Workspace"
    ODataResponseListDashboard dashboards = client.Dashboards.GetDashboards();

    // Get a list of dashboards from a group (app workspace)
    ODataResponseListDashboard dashboards = client.Dashboards.GetDashboardsInGroup(groupId);

    Dashboard dashboard = dashboards.Value.FirstOrDefault();

    var embedUrl = dashboard.EmbedUrl
}

```

Step 4 - load a dashboard using JavaScript

You can use JavaScript to load a dashboard into a div element on your web page.

Default.aspx

```

<!-- Embed Dashboard-->
<div>
    <asp:Panel ID="PanelEmbed" runat="server" Visible="true">
        <div>
            <div><b class="step">Step 3</b>: Embed a dashboard</div>

            <div>Enter an embed url for a dashboard from Step 2 (starts with https://):</div>
            <input type="text" id="tb_EmbedURL" style="width: 1024px;" />
            <br />
            <input type="button" id="bEmbedDashboardAction" value="Embed Dashboard" />
        </div>

        <div id="dashboardContainer"></div>
    </asp:Panel>
</div>

```

Site.master

```

window.onload = function () {
    // client side click to embed a selected dashboard.
    var el = document.getElementById("bEmbedDashboardAction");
    if (el.addEventListener) {
        el.addEventListener("click", updateEmbedDashboard, false);
    } else {
        el.attachEvent('onclick', updateEmbedDashboard);
    }

    // handle server side post backs, optimize for reload scenarios
    // show embedded dashboard if all fields were filled in.
    var accessTokenElement = document.getElementById('MainContent_accessTokenTextbox');
    if (accessTokenElement !== null) {
        var accessToken = accessTokenElement.value;
        if (accessToken !== "")
            updateEmbedDashboard();
    }
};

// update embed dashboard
function updateEmbedDashboard() {

    // check if the embed url was selected
    var embedUrl = document.getElementById('tb_EmbedURL').value;
    if (embedUrl === "")
        return;

    // get the access token.
    accessToken = document.getElementById('MainContent_accessTokenTextbox').value;

    // Embed configuration used to describe the what and how to embed.
    // This object is used when calling powerbi.embed.
    // You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-Configuration-Details.
    var config = {
        type: 'dashboard',
        accessToken: accessToken,
        embedUrl: embedUrl
    };

    // Grab the reference to the div HTML element that will host the dashboard.
    var dashboardContainer = document.getElementById('dashboardContainer');

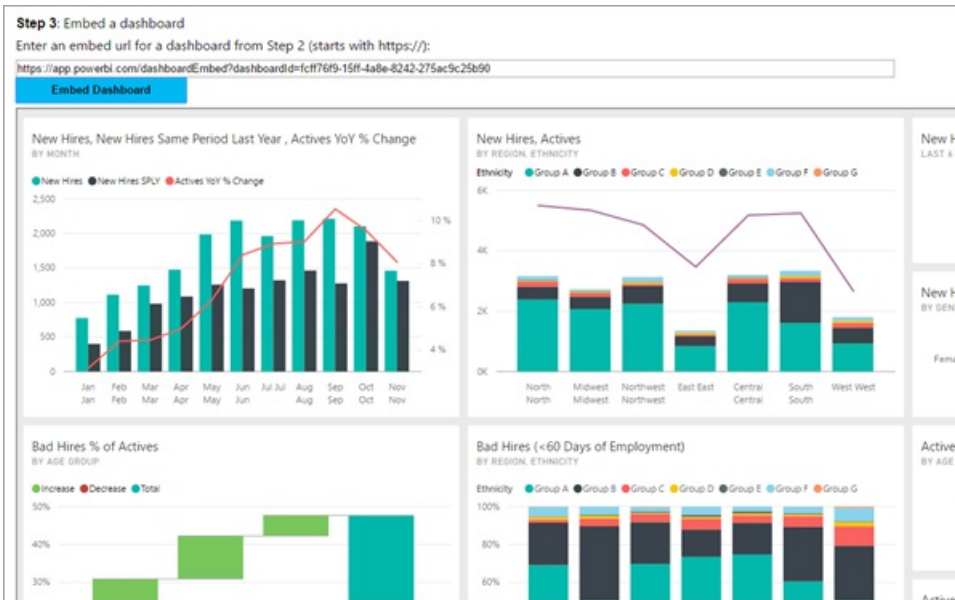
    // Embed the dashboard and display it within the div container.
    var dashboard = powerbi.embed(dashboardContainer, config);

    // dashboard.on will add an event handler which prints to Log window.
    dashboard.on("tileClicked", function (event) {
        var logView = document.getElementById('logView');
        logView.innerHTML = logView.innerHTML + "Tile Clicked<br/>";
        logView.innerHTML = logView.innerHTML + JSON.stringify(event.detail, null, " ") + "<br/>";
        logView.innerHTML = logView.innerHTML + "-----<br/>";
    });

    // dashboard.on will add an event handler which prints to Log window.
    dashboard.on("error", function (event) {
        var logView = document.getElementById('logView');
        logView.innerHTML = logView.innerHTML + "Error<br/>";
        logView.innerHTML = logView.innerHTML + JSON.stringify(event.detail, null, " ") + "<br/>";
        logView.innerHTML = logView.innerHTML + "-----<br/>";
    });
}

```

If you downloaded and ran the [Integrate a dashboard sample](#), the sample will look similar to below.



Tile clicked events

In the sample above, you may have noticed that you can handle events when the tile is clicked on the dashboard. For more information about events, see [Handling Events within the JavaScript API](#).

```
// dashboard.on will add an event handler which prints to Log window.
dashboard.on("tileClicked", function (event) {
  var logView = document.getElementById('logView');
  logView.innerHTML = logView.innerHTML + "Tile Clicked<br/>";
  logView.innerHTML = logView.innerHTML + JSON.stringify(event.detail, null, " ") + "<br/>";
  logView.innerHTML = logView.innerHTML + "-----<br/>";
});

// dashboard.on will add an event handler which prints to Log window.
dashboard.on("error", function (event) {
  var logView = document.getElementById('logView');
  logView.innerHTML = logView.innerHTML + "Error<br/>";
  logView.innerHTML = logView.innerHTML + JSON.stringify(event.detail, null, " ") + "<br/>";
  logView.innerHTML = logView.innerHTML + "-----<br/>";
});
```

If you downloaded and ran the [Integrate a dashboard sample](#), clicking on a tile will output text below the dashboard. The text will look similar to the following. This would allow you to log that a tile was clicked, and then navigate the user to the appropriate location.

```
Tile Clicked
{ "event": "TileClick", "reportEmbedUrl": "", "navigationUrl": "https://app.powerbi.com/dashboards/fcff76f9-15ff-4a8e-8242-275ac9c25b90/qna?q=count%20of%20new%20hires%20from%20July%202014%20to%20December%202014", "tileId": "0e99b45c-9b53-4920-b239-cee7d37d2369" }
-----
Tile Clicked
{ "event": "TileClick", "reportEmbedUrl": "https://app.powerbi.com/reportEmbed?reportId=ab199308-80b1-4626-9823-43a84623bd9c", "navigationUrl": "https://app.powerbi.com/reports/ab199308-80b1-4626-9823-43a84623bd9c/ReportSection1", "tileId": "ffc30447-674a-4511-944f-79e182d719de", "pageName": "ReportSection1" }
-----
```

Working with groups (app workspaces)

For embedding a dashboard from a group (app workspace), you will want to get the list of all available dashboards within a group using the following REST API call. To find more information about this REST API call, see [Get](#)

[Dashboards](#). You will need to have permission in the group for the request to return results.

```
https://api.powerbi.com/v1.0/myorg/groups/{groupId}/dashboards
```

The above API returns the list of the available dashboards. Each dashboard has an EmbedUrl property which is already constructed to support group embedding.

```
https://app.powerbi.com/dashboardEmbed?dashboardId={dashboardId}&groupId={groupId}
```

Limitations

- The end users who access the embedded dashboards must have a Power BI account and have access to the dashboard. Either they own the dashboard or the dashboard was shared with the user.
- Currently Q&A is not supported in embedded dashboards.
- As a temporary limitation, when sharing a dashboard with security groups, user have to first access the dashboards in PowerBI.com before they can see it embedded.

Next steps

A sample application is available on GitHub for you to review. The above examples are based on that sample. For more information, see [integrate-dashboard-web-app](#).

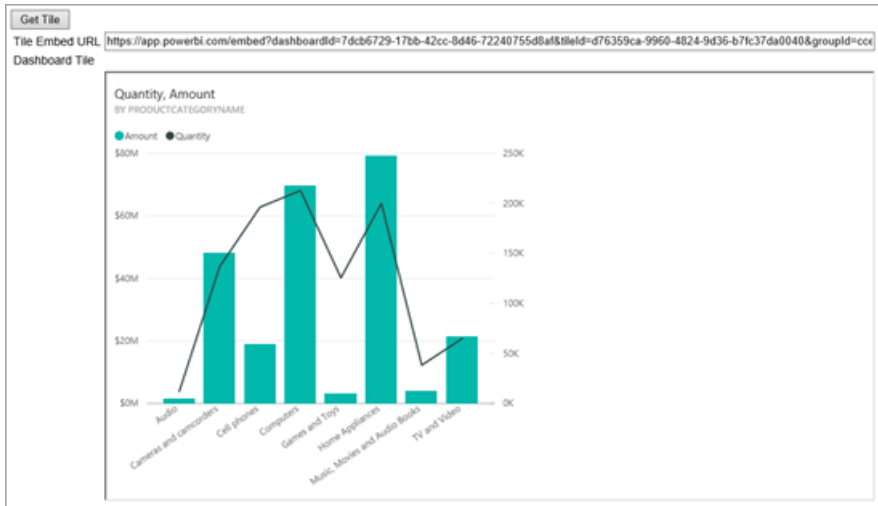
More information is available for the JavaScript API, see [Power BI JavaScript API](#).

More questions? [Try asking the Power BI Community](#)

Integrate a tile into an app (user owns data)

1/30/2018 • 5 min to read • [Edit Online](#)

Learn how to integrate, or embed, a tile into a web app using REST API calls along with the Power BI JavaScript API when embedding for your organization.



To get started with this walkthrough, you need a **Power BI** account. If you don't have an account, you can [sign up for a free Power BI account](#), or you can create your own [Azure Active Directory tenant](#) for testing purposes.

NOTE

Looking to embed a tile for your customers, using an embedtoken, instead? See, [Integrate a dashboard, tile, or report into your application for your customers](#).

To integrate a tile into a web app, you use the **Power BI** REST API, or the Power BI C# SDK, and an Azure Active Directory (AD) authorization **access token** to get a tile. Then, you load the tile using the same access token. The **Power BI** API provides programmatic access to certain **Power BI** resources. For more information, see [Overview of Power BI REST API](#) and the [Power BI JavaScript API](#).

Download the sample

This article shows the code used in the [integrate-tile-web-app](#) on GitHub. To follow along with this walkthrough, you can download the sample.

Step 1 - register an app in Azure AD

You will need to register your application with Azure AD in order to make REST API calls. For more information, see [Register an Azure AD app to embed Power BI content](#).

If you downloaded the [integrate-tile-web-app](#), you use the **Client ID** and **Client Secret** you get, after registration, so that the sample can authenticate to Azure AD. To configure the sample, change the **Client ID** and **Client Secret** in the `cloud.config` file.

```
applicationSettings:
  <PBIWebApp.Properties.Settings>
    <setting name="ClientID" serializeAs="String">
      <value>{Enter your app ClientID}</value>
    </setting>
    <setting name="ClientSecret" serializeAs="String">
      <value>{Enter your app SecretKey}</value>
    </setting>
```

Step 2 - get an access token from Azure AD

Within your application, you will first need to get an **access token**, from Azure AD, before you can make calls to the Power BI REST API. For more information, see [Authenticate users and get an Azure AD access token for your Power BI app](#).

Step 3 - get a tile

To get a **Power BI** tile, you use the [Get Tiles](#) operation which gets a list of **Power BI** tiles from a given dashboard. From the list of tiles, you can get a tile id and embed URL.

A dashboard ID will need to be retrieved first before you can get the tile. For information on how to retrieve a dashboard, see [Integrate a dashboard into an app \(user owns data\)](#).

Get tiles using an access token

With the **access token** you retrieved in [step 2](#), you can call the [Get Tiles](#) operation. The [Get Tiles](#) operation returns a list of tiles. You can get a single tile from the list of tiles. Below is a complete C# method to get a tile.

To make the REST API call, you must include an *Authorization* header in the format of *Bearer {access token}*.

Get tiles with the REST API

Default.aspx.cs

```

using Newtonsoft.Json;

//Get a tile from a dashboard. In this sample, you get the first tile.
protected void GetTile(string dashboardId, int index)
{
    //Configure tiles request
    System.Net.WebRequest request = System.Net.WebRequest.Create(
        String.Format("{0}Dashboards/{1}/Tiles",
            baseUri,
            dashboardId)) as System.Net.HttpWebRequest;

    request.Method = "GET";
    request.ContentLength = 0;
    request.Headers.Add("Authorization", String.Format("Bearer {0}", accessToken.Value));

    //Get tiles response from request.GetResponse()
    using (var response = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get reader from response stream
        using (var reader = new System.IO.StreamReader(response.GetResponseStream()))
        {
            //Deserialize JSON string
            PBITiles tiles = JsonConvert.DeserializeObject<PBITiles>(reader.ReadToEnd());

            //Sample assumes at least one Dashboard with one Tile.
            //You could write an app that lists all tiles in a dashboard
            if (tiles.value.Length > 0)
                tileEmbedUrl.Text = tiles.value[index].embedUrl;
        }
    }
}

//Power BI Tiles used to deserialize the Get Tiles response.
public class PBITiles
{
    public PBITile[] value { get; set; }
}
public class PBITile
{
    public string id { get; set; }
    public string title { get; set; }
    public string embedUrl { get; set; }
}

```

Get tiles using the .NET SDK

You can use the .NET SDK to retrieve a list of dashboards instead of calling the REST API directly.

```

using Microsoft.IdentityModel.Clients.ActiveDirectory;
using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

var tokenCredentials = new TokenCredentials(<ACCESS TOKEN>, "Bearer");

// Create a Power BI Client object. It will be used to call Power BI APIs.
using (var client = new PowerBIClient(new Uri(ApiUrl), tokenCredentials))
{
    // Get a list of dashboards your "My Workspace"
    ODataResponseListDashboard tiles = client.Dashboards.GetDashboards();

    // Get a list of dashboards from a group (app workspace)
    ODataResponseListDashboard dashboards = client.Dashboards.GetDashboardsInGroup(groupId);

    Dashboard dashboard = dashboards.Value.FirstOrDefault();

    // Get the first tile from the above dashbaord
    ODataResponseListTile tiles = client.Dashboards.GetTiles(dashboard.Id);

    Tile tile = tiles.Value.FirstOrDefault();
}

```

Step 4 - load a tile using JavaScript

You can use JavaScript to load a tile into a div element on your web page.

Default.aspx

```

<!-- Embed Tile-->
<div>
  <asp:Panel ID="PanelEmbed" runat="server" Visible="true">
    <div>
      <div><b class="step">Step 3</b>: Embed a tile</div>

      <div>Enter an embed url for a tile from Step 2 (starts with https://):</div>
      <input type="text" id="tb_EmbedURL" style="width: 1024px;" />
      <br />
      <input type="button" id="bEmbedTileAction" value="Embed Tile" />
    </div>

    <div id="tileContainer"></div>
  </asp:Panel>
</div>

```

Site.master

```

window.onload = function () {
    // client side click to embed a selected tile.
    var el = document.getElementById("bEmbedTileAction");
    if (el.addEventListener) {
        el.addEventListener("click", updateEmbedTile, false);
    } else {
        el.attachEvent('onclick', updateEmbedTile);
    }

    // handle server side post backs, optimize for reload scenarios
    // show embedded tile if all fields were filled in.
    var accessTokenElement = document.getElementById('MainContent_accessTokenTextbox');
    if (accessTokenElement !== null) {
        var accessToken = accessTokenElement.value;
        if (accessToken !== "")
            updateEmbedTile();
    }
};

// update embed tile
function updateEmbedTile() {

    // check if the embed url was selected
    var embedUrl = document.getElementById('tb_EmbedURL').value;
    if (embedUrl === "")
        return;

    // get the access token.
    accessToken = document.getElementById('MainContent_accessTokenTextbox').value;

    // Embed configuration used to describe the what and how to embed.
    // This object is used when calling powerbi.embed.
    // You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-Configuration-Details.
    var config = {
        type: 'tile',
        accessToken: accessToken,
        embedUrl: embedUrl
    };

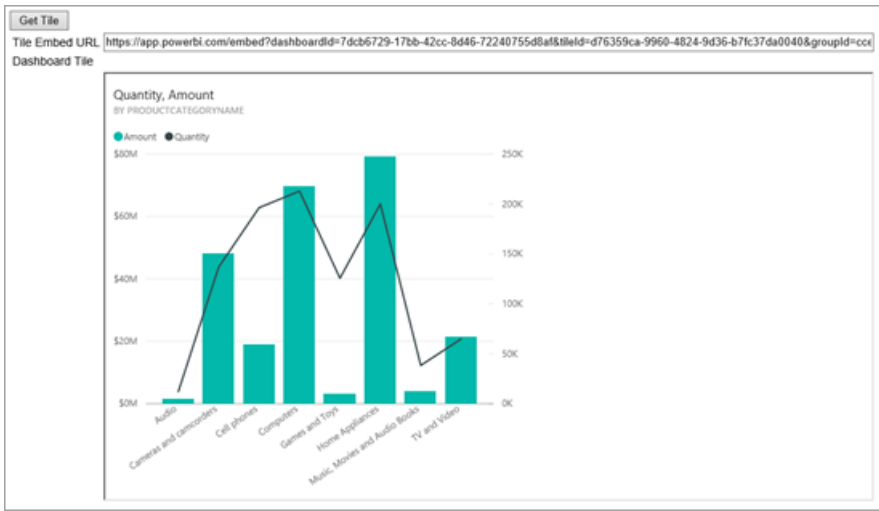
    // Grab the reference to the div HTML element that will host the tile.
    var tileContainer = document.getElementById('tileContainer');

    // Embed the tile and display it within the div container.
    var tile = powerbi.embed(tileContainer, config);

    // tile.on will add an event handler which prints to Log window.
    tile.on("error", function (event) {
        var logView = document.getElementById('logView');
        logView.innerHTML = logView.innerHTML + "Error<br/>";
        logView.innerHTML = logView.innerHTML + JSON.stringify(event.detail, null, " ") + "<br/>";
        logView.innerHTML = logView.innerHTML + "-----<br/>";
    });
}

```

If you downloaded and ran the [integrate-tile-web-app](#), the sample will look similar to below.



Working with groups (app workspaces)

For embedding a tile from a group (app workspace), you will want to get the list of all available tiles within a group's dashboard using the following REST API call. To find more information about this REST API call, see [Get Tiles](#). You will need to have permission in the group for the request to return results.

```
https://api.powerbi.com/v1.0/myorg/groups/{groupId}/dashboards/{dashboard_id}/tiles
```

The above API returns the list of the available tiles. Each tile has an EmbedUrl property which is already constructed to support group embedding.

```
https://app.powerbi.com/embed?dashboardId={dashboard_id}&tileId={tile_id}&groupId={group_id}
```

Next steps

[Tile Embed](#) on PowerBI-JavaScript Wiki

[Power BI JavaScript API](#).

[integrate-tile-web-app](#) sample on GitHub.

More questions? [Try asking the Power BI Community](#)

Integrate a report into an app for your organization

1/30/2018 • 5 min to read • [Edit Online](#)

Learn how to integrate, or embed, a report into a web app using REST API calls along with the Power BI JavaScript API when embedding for your organization.

Power BI Embed Report

Basic Sample
First make sure you [register your app](#). After registration, copy **Client ID** and **Client Secret** to web.config file.

Select **"Get Report"** to get and embed first report from your Power BI account.

Get Report

Report Name:

Report Id:

Report Embed URL:

Embedded Report

The screenshot shows a Power BI report with three main components: a world map, a bar chart, and a table. The world map displays sales data by region. The bar chart shows sales by product category. The table lists the following data for May:

ProductCategoryName	Amount
Audio	\$1,464,181.96
Cameras and camcorders	\$48,178,715.17
Cell phones	\$19,047,906.60
Computers	\$69,741,349.14
Games and Toys	\$3,233,815.42
Home Appliances	\$79,211,539.08
Music, Movies and Audio Books	\$3,896,535.33
TV and Video	\$21,367,887.58
Total	\$246,141,930.27

To get started with this walkthrough, you need a **Power BI** account. If you don't have an account, you can [sign up for a free Power BI account](#), or you can create your own [Azure Active Directory tenant](#) for testing purposes.

NOTE

Looking to embed a report for your customers, using an embedtoken, instead? See, [Integrate a dashboard, tile, or report into your application for your customers](#).

To integrate a report into a web app, you use the **Power BI** REST API, or the Power BI C# SDK, and an Azure Active Directory (AD) authorization **access token** to get a report. Then, you load the report using the same access token. The **Power BI** API provides programmatic access to certain **Power BI** resources. For more information, see [Overview of Power BI REST API](#) and the [Power BI JavaScript API](#).

Download the sample

This article shows the code used in the [integrate-report-web-app](#) on GitHub. To follow along with this walkthrough, you can download the sample.

Step 1 - register an app in Azure AD

You will need to register your application with Azure AD in order to make REST API calls. For more information, see [Register an Azure AD app to embed Power BI content](#).

If you downloaded the [integrate-report-web-app](#), you use the **Client ID** and **Client Secret** you get, after

registration, so that the sample can authenticate to Azure AD. To configure the sample, change the **Client ID** and **Client Secret** in the `cloud.config` file.

```
applicationSettings>
<PBIWebApp.Properties.Settings>
  <setting name="ClientID" serializeAs="String">
    <value>{Enter your app ClientID}</value>
  </setting>
  <setting name="ClientSecret" serializeAs="String">
    <value>{Enter your app SecretKey}</value>
  </setting>
</PBIWebApp.Properties.Settings>
```

Step 2 - get an access token from Azure AD

Within your application, you will first need to get an **access token**, from Azure AD, before you can make calls to the Power BI REST API. For more information, see [Authenticate users and get an Azure AD access token for your Power BI app](#).

Step 3 - get a report

To get a **Power BI** report, you use the [Get Reports](#) operation which gets a list of **Power BI** reports. From the list of reports, you can get a report id.

Get reports using an access token

With the **access token** you retrieved in [step 2](#), you can call the [Get Reports](#) operation. The [Get Reports](#) operation returns a list of reports. You can get a single report from the list of reports. Below is a complete C# method to get a report.

To make the REST API call, you must include an *Authorization* header in the format of *Bearer {access token}*.

Get reports with the REST API

Default.aspx.cs


```

using Newtonsoft.Json;

//Get a Report. In this sample, you get the first Report.
protected void GetReport(int index)
{
    //Configure Reports request
    System.Net.WebRequest request = System.Net.WebRequest.Create(
        String.Format("{0}/Reports",
            baseUri)) as System.Net.HttpWebRequest;

    request.Method = "GET";
    request.ContentLength = 0;
    request.Headers.Add("Authorization", String.Format("Bearer {0}", accessToken.Value));

    //Get Reports response from request.GetResponse()
    using (var response = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get reader from response stream
        using (var reader = new System.IO.StreamReader(response.GetResponseStream()))
        {
            //Deserialize JSON string
            PBIReports Reports = JsonConvert.DeserializeObject<PBIReports>(reader.ReadToEnd());

            //Sample assumes at least one Report.
            //You could write an app that lists all Reports
            if (Reports.value.Length > 0)
            {
                var report = Reports.value[index];

                txtEmbedUrl.Text = report.embedUrl;
                txtReportId.Text = report.id;
                txtReportName.Text = report.name;
            }
        }
    }
}

//Power BI Reports used to deserialize the Get Reports response.
public class PBIReports
{
    public PBIReport[] value { get; set; }
}
public class PBIReport
{
    public string id { get; set; }
    public string name { get; set; }
    public string webUrl { get; set; }
    public string embedUrl { get; set; }
}

```

Get reports using the .NET SDK

You can use the .NET SDK to retrieve a list of reports instead of calling the REST API directly.

```

using Microsoft.IdentityModel.Clients.ActiveDirectory;
using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

var tokenCredentials = new TokenCredentials(<ACCESS TOKEN>, "Bearer");

// Create a Power BI Client object. It will be used to call Power BI APIs.
using (var client = new PowerBIClient(new Uri(ApiUrl), tokenCredentials))
{
    // Get the first report all reports in that workspace
    ODataResponseListReport reports = client.Reports.GetReports();

    Report report = reports.Value.FirstOrDefault();

    var embedUrl = report.EmbedUrl;
}

```

Step 4 - load a report using JavaScript

You can use JavaScript to load a report into a div element on your web page.

Default.aspx

```

<!-- Embed Report-->
<div>
  <asp:Panel ID="PanelEmbed" runat="server" Visible="true">
    <div>
      <div><b class="step">Step 3</b>: Embed a report</div>

      <div>Enter an embed url for a report from Step 2 (starts with https://):</div>
      <input type="text" id="tb_EmbedURL" style="width: 1024px;" />
      <br />
      <input type="button" id="bEmbedReportAction" value="Embed Report" />
    </div>

    <div id="reportContainer"></div>
  </asp:Panel>
</div>

```

Site.master

```

window.onload = function () {
    // client side click to embed a selected report.
    var el = document.getElementById("bEmbedReportAction");
    if (el.addEventListener) {
        el.addEventListener("click", updateEmbedReporte, false);
    } else {
        el.attachEvent('onclick', updateEmbedReport);
    }

    // handle server side post backs, optimize for reload scenarios
    // show embedded report if all fields were filled in.
    var accessTokenElement = document.getElementById('MainContent_accessTokenTextbox');
    if (accessTokenElement !== null) {
        var accessToken = accessTokenElement.value;
        if (accessToken !== "")
            updateEmbedReport();
    }
};

// update embed report
function updateEmbedReport() {

    // check if the embed url was selected
    var embedUrl = document.getElementById('tb_EmbedURL').value;
    if (embedUrl === "")
        return;

    // get the access token.
    accessToken = document.getElementById('MainContent_accessTokenTextbox').value;

    // Embed configuration used to describe the what and how to embed.
    // This object is used when calling powerbi.embed.
    // You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-Configuration-Details.
    var config = {
        type: 'report',
        accessToken: accessToken,
        embedUrl: embedUrl
    };

    // Grab the reference to the div HTML element that will host the report.
    var reportContainer = document.getElementById('reportContainer');

    // Embed the report and display it within the div container.
    var report = powerbi.embed(reportContainer, config);

    // report.on will add an event handler which prints to Log window.
    report.on("error", function (event) {
        var logView = document.getElementById('logView');
        logView.innerHTML = logView.innerHTML + "Error<br/>";
        logView.innerHTML = logView.innerHTML + JSON.stringify(event.detail, null, " ") + "<br/>";
        logView.innerHTML = logView.innerHTML + "-----<br/>";
    });
}

```

If you downloaded and ran the [integrate-report-web-app](#), the sample will look similar to below.

Power BI Embed Report

Basic Sample

First make sure you [register your app](#). After registration, copy [Client ID](#) and [Client Secret](#) to web.config file.

Select **"Get Report"** to get and embed first report from your Power BI account.

Get Report

Report Name:

Report Id:

Report Embed URL:

Embedded Report

ProductCategoryName	Amount
Audio	\$1,464,181.96
Cameras and camcorders	\$48,178,715.17
Cell phones	\$19,047,906.60
Computers	\$69,741,349.14
Games and Toys	\$3,233,815.42
Home Appliances	\$79,211,539.08
Music, Movies and Audio Books	\$3,896,535.33
TV and Video	\$21,367,887.58
Total	\$246,141,930.27

Working with groups (app workspaces)

For embedding a report from a group (app workspace), you will want to get the list of all available reports within a group's dashboard using the following REST API call. To find more information about this REST API call, see [Get Reports](#). You will need to have permission in the group for the request to return results.

```
https://api.powerbi.com/v1.0/myorg/groups/{group_id}/reports
```

The above API returns the list of the available reports. Each report has an EmbedUrl property which is already constructed to support group embedding.

```
https://app.powerbi.com/reportEmbed?reportId={report_id}&groupId={group_id}
```

Next steps

A sample application is available on GitHub for you to review. For more information, see [integrate-report-web-app](#).

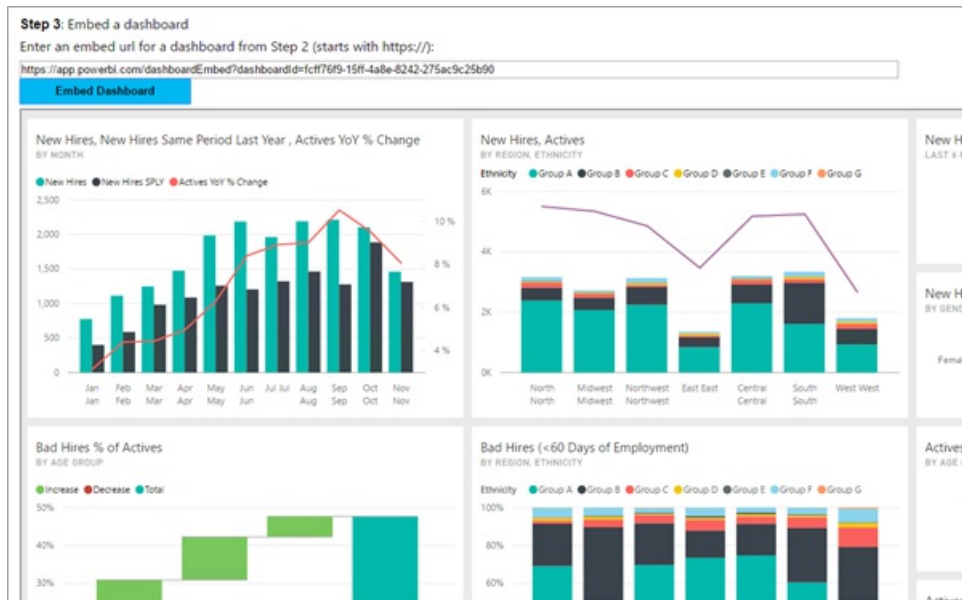
More information is available for the JavaScript API, see [Power BI JavaScript API](#).

More questions? [Try asking the Power BI Community](#)

Embed a Power BI dashboard, tile, or report into your application

1/30/2018 • 7 min to read • [Edit Online](#)

Learn how to integrate, or embed, a dashboard, tile or report, into a web app using the Power BI .NET SDK along with the Power BI JavaScript API when embedding for your customers. This is typically the ISV scenario.



To get started with this walkthrough, you need a **Power BI Pro** account. If you don't have an account, you can [sign up for a free Power BI account](#) and then sign up for a [Power BI Pro trial](#), or you can create your own [Azure Active Directory tenant](#) for testing purposes.

NOTE

Looking to embed a dashboard for your organization instead? See, [Integrate a dashboard into an app for your organization](#).

To integrate a dashboard into a web app, you use the **Power BI API**, and an Azure Active Directory (AD) authorization **access token** to get a dashboard. Then, you load the dashboard using an embed token. The **Power BI API** provides programmatic access to certain **Power BI** resources. For more information, see [Overview of Power BI REST API](#), [Power BI .NET SDK](#) and the [Power BI JavaScript API](#).

Download the sample

This article shows the code used in the [Embedding for your organization sample](#) on GitHub. To follow along with this walkthrough, you can download the sample.

Step 1 - register an app in Azure AD

You will need to register your application with Azure AD in order to make REST API calls. For more information, see [Register an Azure AD app to embed Power BI content](#).

If you downloaded the [Embedding for your organization sample](#), you use the **Client ID** you get, after registration, so that the sample can authenticate to Azure AD. To configure the sample, change the **clientid** in the *web.config*

file.

Step 2 - get an access token from Azure AD

Within your application, you will first need to get an **access token**, from Azure AD, before you can make calls to the Power BI REST API. For more information, see [Authenticate users and get an Azure AD access token for your Power BI app](#).

You can see examples of this within each content item task in **Controllers\HomeController.cs**.

Step 3 - get a content item

To embed your Power BI content, you will need to do a couple of things to make sure it embeds correctly. While all of these steps can be done with the REST API directly, the sample application, and the examples here, are made with the .NET SDK.

Create the Power BI Client with your access token

With your access token, you will want to create your Power BI client object which will allow you to interact with the Power BI APIs. This is done by wrapping the `AccessToken` with a `Microsoft.Rest.TokenCredentials` object.

```
using Microsoft.IdentityModel.Clients.ActiveDirectory;
using Microsoft.Rest;
using Microsoft.PowerBI.Api.V2;

var tokenCredentials = new TokenCredentials(authenticationResult.AccessToken, "Bearer");

// Create a Power BI Client object. It will be used to call Power BI APIs.
using (var client = new PowerBIClient(new Uri(ApiUrl), tokenCredentials))
{
    // Your code to embed items.
}
```

Get the content item you want to embed

Use the Power BI client object to retrieve a reference to the item you want to embed. You can embed dashboards, tiles or reports. Here is an example of how to retrieve the first dashboard, tile or report from a given workspace.

A sample of this is available within **Controllers\HomeController.cs** of the [App Owns Data sample](#).

Dashboards

```
using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

// You will need to provide the GroupID where the dashboard resides.
ODataResponseListDashboard dashboards = client.Dashboards.GetDashboardsInGroup(GroupID);

// Get the first report in the group.
Dashboard dashboard = dashboards.Value.FirstOrDefault();
```

Tile

```

using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

// To retrieve the tile, you first need to retrieve the dashboard.

// You will need to provide the GroupID where the dashboard resides.
ODataResponseListDashboard dashboards = client.Dashboards.GetDashboardsInGroup(GroupID);

// Get the first report in the group.
Dashboard dashboard = dashboards.Value.FirstOrDefault();

// Get a list of tiles from a specific dashboard
ODataResponseListTile tiles = client.Dashboards.GetTilesInGroup(GroupID, dashboard.Id);

// Get the first tile in the group.
Tile tile = tiles.Value.FirstOrDefault();

```

Report

```

using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

// You will need to provide the GroupID where the dashboard resides.
ODataResponseListReport reports = client.Reports.GetReportsInGroupAsync(GroupID);

// Get the first report in the group.
Report report = reports.Value.FirstOrDefault();

```

Create the embed token

An embed token needs to be generated which can be used from the JavaScript API. The embed token will be specific to the item you are embedding. This means that any time you embed a piece of Power BI content, you need to create a new embed token for it. For more information, including which **accessLevel** to use, see [GenerateToken API](#).

IMPORTANT

Because embed tokens are intended for development testing only, the number of embed tokens a Power BI master account can generate is limited. A [capacity must be purchased](#) for production embedding scenarios. There is no limit to embed token generation when a capacity is purchased.

A sample of this is available within **Controllers\HomeController.cs** of the [Embedding for your organization sample](#).

This assumes a class is created for **EmbedConfig** and **TileEmbedConfig**. A sample of these are available within **Models\EmbedConfig.cs** and **Models\TileEmbedConfig.cs**.

Dashboard

```

using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

// Generate Embed Token.
var generateTokenRequestParameters = new GenerateTokenRequest(accessLevel: "view");
EmbedToken tokenResponse = client.Dashboards.GenerateTokenInGroup(GroupId, dashboard.Id,
generateTokenRequestParameters);

// Generate Embed Configuration.
var embedConfig = new EmbedConfig()
{
    EmbedToken = tokenResponse,
    EmbedUrl = dashboard.EmbedUrl,
    Id = dashboard.Id
};

```

Tile

```

using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

// Generate Embed Token for a tile.
var generateTokenRequestParameters = new GenerateTokenRequest(accessLevel: "view");
EmbedToken tokenResponse = client.Tiles.GenerateTokenInGroup(GroupId, dashboard.Id, tile.Id,
generateTokenRequestParameters);

// Generate Embed Configuration.
var embedConfig = new TileEmbedConfig()
{
    EmbedToken = tokenResponse,
    EmbedUrl = tile.EmbedUrl,
    Id = tile.Id,
    dashboardId = dashboard.Id
};

```

Report

```

using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;

// Generate Embed Token.
var generateTokenRequestParameters = new GenerateTokenRequest(accessLevel: "view");
EmbedToken tokenResponse = client.Reports.GenerateTokenInGroup(GroupId, report.Id,
generateTokenRequestParameters);

// Generate Embed Configuration.
var embedConfig = new EmbedConfig()
{
    EmbedToken = tokenResponse,
    EmbedUrl = report.EmbedUrl,
    Id = report.Id
};

```

Step 4 - load an item using JavaScript

You can use JavaScript to load a dashboard into a div element on your web page. The sample uses an EmbedConfig/TileEmbedConfig model along with views for a dashboard, tile or report. For a full sample of using the JavaScript API, you can use the [Microsoft Power BI Embedded Sample](#).

An application sample of this is available within the [Embedding for your organization sample](#).

Views\Home\EmbedDashboard.cshtml

```
<script src="~/scripts/powerbi.js"></script>
<div id="dashboardContainer"></div>
<script>
  // Read embed application token from Model
  var accessToken = "@Model.EmbedToken.Token";

  // Read embed URL from Model
  var embedUrl = "@Html.Raw(Model.EmbedUrl)";

  // Read dashboard Id from Model
  var embedDashboardId = "@Model.Id";

  // Get models. models contains enums that can be used.
  var models = window['powerbi-client'].models;

  // Embed configuration used to describe the what and how to embed.
  // This object is used when calling powerbi.embed.
  // This also includes settings and options such as filters.
  // You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-Configuration-Details.
  var config = {
    type: 'dashboard',
    tokenType: models.TokenType.Embed,
    accessToken: accessToken,
    embedUrl: embedUrl,
    id: embedDashboardId
  };

  // Get a reference to the embedded dashboard HTML element
  var dashboardContainer = $('#dashboardContainer')[0];

  // Embed the dashboard and display it within the div container.
  var dashboard = powerbi.embed(dashboardContainer, config);
</script>
```

Views\Home\EmbedTile.cshtml

```
<script src="~/scripts/powerbi.js"></script>
<div id="tileContainer"></div>
<script>
  // Read embed application token from Model
  var accessToken = "@Model.EmbedToken.Token";

  // Read embed URL from Model
  var embedUrl = "@Html.Raw(Model.EmbedUrl)";

  // Read tile Id from Model
  var embedTileId = "@Model.Id";

  // Read dashboard Id from Model
  var embedDashboardId = "@Model.dashboardId";

  // Get models. models contains enums that can be used.
  var models = window['powerbi-client'].models;

  // Embed configuration used to describe the what and how to embed.
  // This object is used when calling powerbi.embed.
  // This also includes settings and options such as filters.
  // You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-Configuration-Details.
  var config = {
    type: 'tile',
    tokenType: models.TokenType.Embed,
    accessToken: accessToken,
    embedUrl: embedUrl,
    id: embedTileId,
    dashboardId: embedDashboardId
  };

  // Get a reference to the embedded tile HTML element
  var tileContainer = $('#tileContainer')[0];

  // Embed the tile and display it within the div container.
  var tile = powerbi.embed(tileContainer, config);
</script>
```

Views\Home\EmbedReport.cshtml

```

<script src="~/scripts/powerbi.js"></script>
<div id="reportContainer"></div>
<script>
  // Read embed application token from Model
  var accessToken = "@Model.EmbedToken.Token";

  // Read embed URL from Model
  var embedUrl = "@Html.Raw(Model.EmbedUrl)";

  // Read report Id from Model
  var embedReportId = "@Model.Id";

  // Get models. models contains enums that can be used.
  var models = window['powerbi-client'].models;

  // Embed configuration used to describe the what and how to embed.
  // This object is used when calling powerbi.embed.
  // This also includes settings and options such as filters.
  // You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-
  Configuration-Details.
  var config = {
    type: 'report',
    tokenType: models.TokenType.Embed,
    accessToken: accessToken,
    embedUrl: embedUrl,
    id: embedReportId,
    permissions: models.Permissions.All,
    settings: {
      filterPaneEnabled: true,
      navContentPaneEnabled: true
    }
  };

  // Get a reference to the embedded report HTML element
  var reportContainer = $('#reportContainer')[0];

  // Embed the report and display it within the div container.
  var report = powerbi.embed(reportContainer, config);
</script>

```

Next steps

A sample application is available on GitHub for you to review. The above examples are based on that sample. For more information, see [Embedding for your organization sample](#).

More information is available for the JavaScript API, see [Power BI JavaScript API](#).

More questions? [Try asking the Power BI Community](#)

Custom layouts

1/30/2018 • 2 min to read • [Edit Online](#)

Use custom layout to embed a report with different layout than in an original report. Defining a new layout varies between defining only a page size, controlling visual sizes, or position and visibility.

To define a custom layout, define a custom layout object and pass it into the settings object in embed configuration. In addition, set `LayoutType` to `Custom`. To learn more, see [Embed Configuration Details](#).

```
var embedConfig = {
  ...
  settings: {
    layoutType: models.LayoutType.Custom
    customLayout: {...}
  }
};
```

Object Definition

```
interface ICustomLayout {
  pageSize?: IPageSize;
  displayOption?: DisplayOption;
  pagesLayout?: PagesLayout;
}

enum PageSizeType {
  Widescreen,
  Standard,
  Cortana,
  Letter,
  Custom
}

interface IPageSize {
  type: PageSizeType;
}

interface ICustomPageSize extends IPageSize {
  width?: number;
  height?: number;
}

enum DisplayOption {
  FitToPage,
  FitToWidth,
  ActualSize
}
```

- `pageSize` : Use page size to control the canvas area size (i.e. report white area).
- `displayOptions` : Possible values are: `FitToWidth`, `FitToPage` or `ActualSize`. It controls how to scale the canvas to fit into the iframe.
- `pagesLayout` : Controls the layout for each visual. see `PagesLayout` for more details.

Pages layout

Defining a pages layout object is basically defining a layout for each page, and for each page, you define a layout for each visual. `PageLayout` is optional. If you don't define a layout for a page, the default layout (which is saved in

the report) will be applied.

pagesLayout is a map from page name to PageLayout object. Definition:

```
type PagesLayout = { [key: string]: IPageLayout; };
```

PageLayout contains a visual layout map, which maps each visual name to a visual layout object:

```
interface IPageLayout {  
  visualsLayout: { [key: string]: IVisualLayout; };  
}
```

Visual layout

To define a visual layout, pass a new position and size and a new visibility state.

```
interface IVisualLayout {  
  x?: number;  
  y?: number;  
  z?: number;  
  width?: number;  
  height?: number;  
  displayState?: IVisualContainerDisplayState;  
}  
  
interface IVisualContainerDisplayState {  
  mode: VisualContainerDisplayMode;  
}  
  
enum VisualContainerDisplayMode {  
  Visible,  
  Hidden  
}
```

- `x,y,z`: Defines the new position of the visual.
- `width`, `height`: Defines the new size of the visual.
- `displayState`: Defines the visibility of the visual.

Update layout

You can use `updateSettings` method to update the report layout any time while the report is loaded. See [Update Settings](#).

Code example

```

// Get models. models contains enums that can be used.
var models = window['powerbi-client'].models;

var embedConfiguration = {
  type: 'report',
  id: '5dac7a4a-4452-46b3-99f6-a25915e0fe55',
  embedUrl: 'https://app.powerbi.com/reportEmbed',
  tokenType: models.TokenType.Embed,
  accessToken: 'H4...rf',
  settings: {
    layoutType: models.LayoutType.Custom
    customLayout: {
      pageSize: {
        type: models.PageSizeType.Custom,
        width: 1600,
        height: 1200
      },
      displayOption: models.DisplayOption.ActualSize,
      pagesLayout: {
        "ReportSection1" : {
          visualsLayout: {
            "VisualContainer1": {
              x: 1,
              y: 1,
              z: 1,
              width: 400,
              height: 300,
              displayState: {
                mode: models.VisualContainerDisplayMode.Visible
              }
            },
            "VisualContainer2": {
              displayState: {
                mode: models.VisualContainerDisplayMode.Hidden
              }
            }
          }
        }
      }
    }
  }
};

// Get a reference to the embedded report HTML element
var embedContainer = document.getElementById('embedContainer');

// Embed the report and display it within the div container.
var report = powerbi.embed(embedContainer, embedConfiguration);

```

See also

[Embed your Power BI dashboards, reports and tiles](#)

[Ask the Power BI Community](#)

Create an Azure Active Directory tenant to use with Power BI

1/30/2018 • 3 min to read • [Edit Online](#)

Learn how to create a new Azure Active Directory (Azure AD) tenant for use with your custom application using the Power BI REST APIs.

A tenant is representative of an organization within Azure Active Directory. It is a dedicated instance of the Azure AD service that an organization receives and owns when it signs up for a Microsoft cloud service such as Azure, Microsoft Intune, or Office 365. Each Azure AD tenant is distinct and separate from other Azure AD tenants.

Once you have an Azure AD tenant, you can define an application and assign permissions so your application can make use of the Power BI REST APIs.

Your organization may already have an Azure AD tenant that you can use for your application. You can make use of that tenant for your application needs or you can create a new tenant specifically for your application. This article looks at how to create a new tenant.

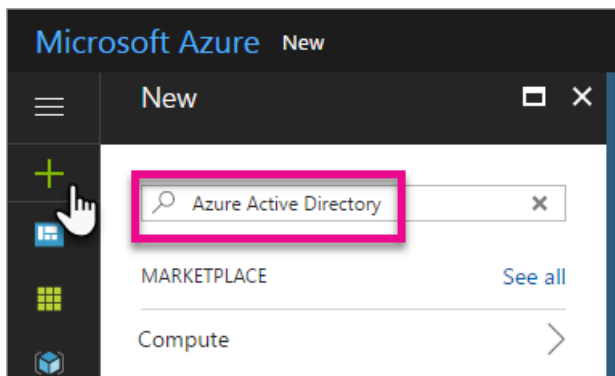
Create an Azure Active Directory tenant

In order to integrate Power BI into your custom application, you need to define an application within Azure AD. To do that, you need a directory within Azure AD. This is your tenant. If your organization doesn't have a tenant yet, because they aren't using Power BI or Office 365, [you will need to create one](#). You may also need to create one if you don't want your application mixing with your organization's tenant. This allows you to keep things isolated.

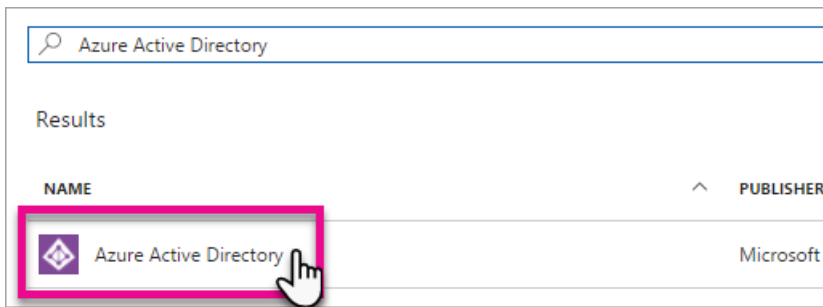
Or, you may just want to create a tenant for testing purposes.

To create a new Azure AD tenant, do the following.

1. Browse to the [Azure portal](#) and sign in with an account that has an Azure subscription.
2. Select the **plus icon (+)** and search for *Azure Active Directory*.



3. Select **Azure Active Directory** in the search results.



4. Select **Create**.
5. Provide a **name for the organization** along with the **initial domain name**. Then select **Create**. This will create your directory.

NOTE

Your initial domain will be part of onmicrosoft.com. You can add other domain names later. The directory, of a tenant, can have multiple domains assigned to it.

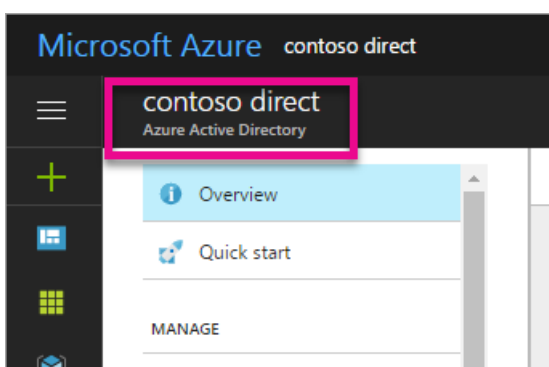
6. After your directory creation is complete, select the information box to manage your new directory.

Your directory is now created. Next we will want to add a user to the tenant.

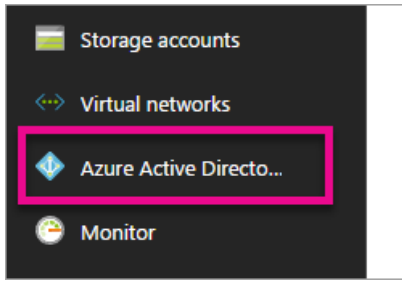
Create some users in your Azure Active Directory tenant

Now that we have a directory, let's create at least two users. One that will be a Global Admin for the tenant and another that will be our master user for embedding. Think of this as a service account.

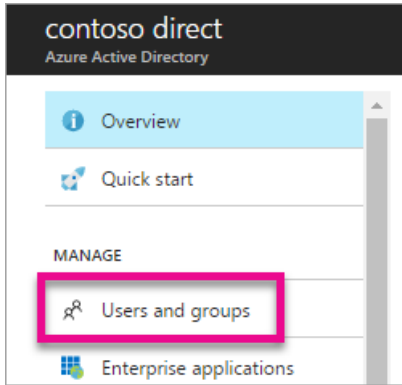
1. Within the Azure portal, make sure we are on the Azure Active Directory fly out.



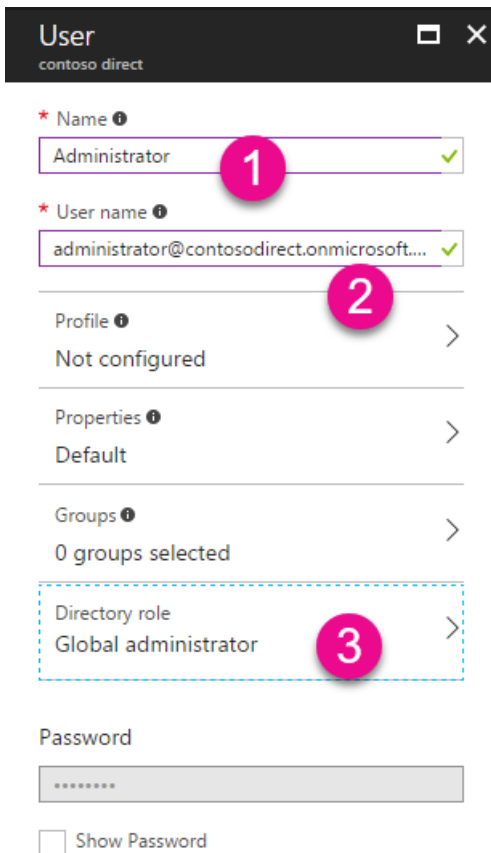
If you are not, select the Azure Active Directory icon from the left services bar.



2. Under **Manage**, select **Users and groups**.



3. Select **All users** and then select **+ New user**.
4. Provide a name and username for this user. This will be your Global Admin for the tenant. You will also want to change the **Directory role** to *Global administrator*. You can also show the temporary password. When you are done, select **Create**.



5. You will want to do the same thing again for a regular user in your tenant. This could also be used for your master embedding account. This time, for **Directory role**, we will leave it as *User*. Be sure to make note of the password. Then select **Create**.

User
contoso direct

* Name 1
PBI Embed ✓

* User name 2
pbiembed@contosodirect.onmicrosoft.com ✓

Profile 3
Not configured >

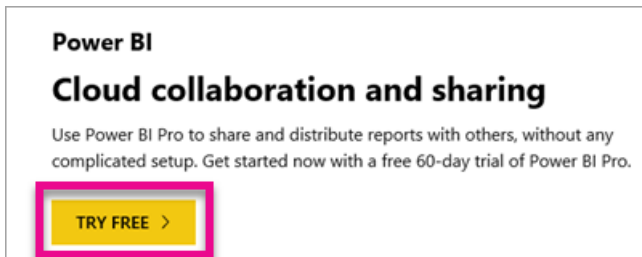
Properties
Default >

Groups
0 groups selected >

Directory role
User >

Password
.....
 Show Password

6. Sign up for Power BI with your user account that you created in step 5. You can do that by going to powerbi.com and selecting **Try free** under *Power BI - Cloud collaboration and sharing*.



When you sign up, you will be prompted to try Power BI Pro free for 60 days. You can opt into that to become a pro user. Now you can also start developing an embedded solution if that is what you are looking for.

NOTE

Make sure you sign up with the email address you gave the user account.

Next steps

Now that you have an Azure AD tenant, you can use this tenant to test items within Power BI, and/or you can move forward to embed Power BI dashboards and reports in your application. For more information on how to embed items, see [How to embed your Power BI dashboards, reports and tiles](#).

[What is an Azure AD directory?](#)

[How to get an Azure Active Directory tenant](#)

More questions? [Try asking the Power BI Community](#)

Register an Azure AD app to embed Power BI content

1/30/2018 • 6 min to read • [Edit Online](#)

Learn how to register an application within Azure Active Directory (Azure AD) for use with embedding Power BI content.

You register your application with Azure AD to allow your application access to the Power BI REST APIs. This will allow you to establish an identity for your application and specify permissions to Power BI REST resources.

IMPORTANT

Before you register a Power BI app you need an [Azure Active Directory tenant and an organizational user](#). If you haven't signed up for Power BI with a user in your tenant, the app registration will not complete successfully.

There are two ways to register your application. The first is with the [Power BI App Registration Tool](#) or you can do it directly within the Azure portal. The Power BI App Registration Tool is the easiest option since there are just a few fields to fill in. If you want to make changes to your app, use the Azure portal.

Register with the Power BI App Registration Tool

You need to register your application in **Azure Active Directory** to establish an identity for your application and specify permissions to Power BI REST resources. When you register an application, such as a console app or a web site, you receive an identifier which is used by the application to identify themselves to the users that they are requesting permissions from.

Here's how to register your application with the Power BI App Registration Tool:

1. Go to dev.powerbi.com/apps.
2. Select **Sign in with your existing account**.
3. Provide an **App Name**.
4. The App type selection will depend on the type of application you are using.
 - Use **Server-side Web app** for web apps or web APIs.
 - Use **Native app** for apps that run on client devices. **You will also choose *Native app** if you are embedding content for your customers regardless of what the actual application is. Even for web applications.***
5. Enter a value for **Redirect URL** and **Home Page URL**. Any valid URL will work.

Home Page URL is only available if you choose **Server-side Web app** for the application type.

For the *embedding for your customers* and *integrate-dashboard-web-app* samples, the redirect URL will be `http://localhost:13526/redirect`. For the report and tile sample, the redirect URL will be `http://localhost:13526/`.

6. Choose the APIs that this application will have access to. For more information about Power BI access permissions, see [Power BI Permissions](#).

Step 3 Choose APIs to access

Select the APIs and the level of access your app needs.

Dataset APIs	Report and Dashboard APIs	Other APIs
<input checked="" type="checkbox"/> Read All Datasets	<input checked="" type="checkbox"/> Read All Dashboards	<input checked="" type="checkbox"/> Read All Groups
<input type="checkbox"/> Read and Write All Datasets	<input checked="" type="checkbox"/> Read All Reports	<input type="checkbox"/> Create Content
	<input type="checkbox"/> Read and Write All Reports	

7. Select **Register App**.

You will then be provided with a **Client ID**. If you selected **Server-side Web app**, you will also receive a **Client Secret**. The **Client ID** can be retrieved from the Azure portal, at a later time, if needed. If you lose the **Client Secret**, you will need to create a new one within the Azure portal.

You can now use the registered application as part of your custom application to interact with the Power BI service.

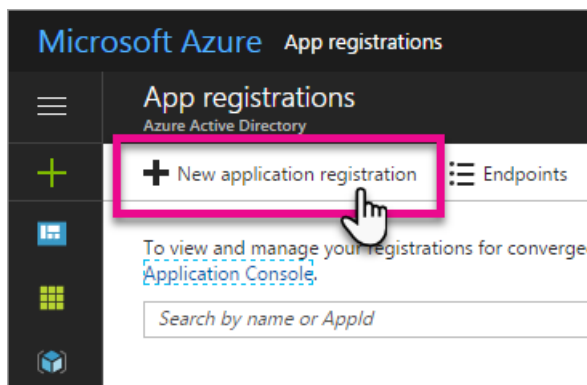
IMPORTANT

If you are embedding content for your customers, you will need to configure additional permissions within the Azure portal. For more information, see [Apply permissions to your application](#).

Register with the Azure portal

Your other option for registering your application is to do so directly in the Azure portal. To register your application, follow these steps.

1. Accept the [Microsoft Power BI API Terms](#).
2. Sign into the [Azure portal](#).
3. Choose your Azure AD tenant by selecting your account in the top right corner of the page.
4. In the left-hand navigation pane, choose **More Services**, select **App Registrations** under **Security + Identity** and select **New application registration**.



5. Follow the prompts and create a new application.

- For Web Applications, provide the Sign-On URL, which is the base URL of your app, where users can sign in e.g <http://localhost:13526>.
- For Native Applications, provide a Redirect URI, which Azure AD uses to return token responses. Enter a value specific to your application, e.g <http://myapplication/redirect>

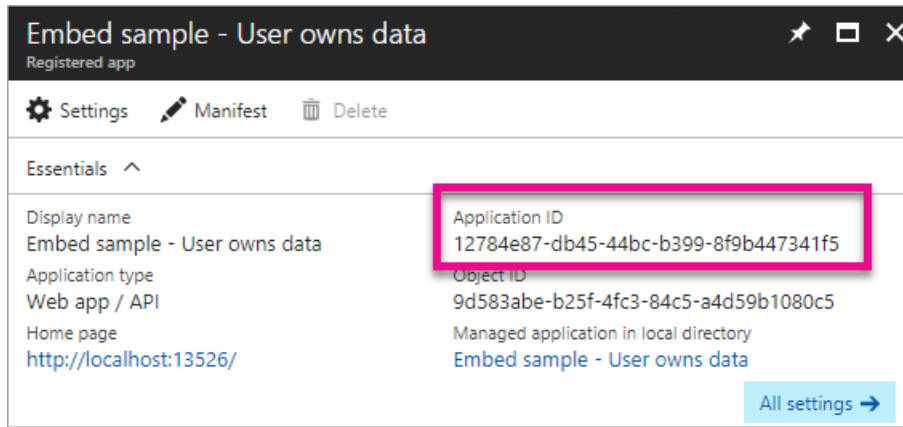
For more information about how to register applications in Azure Active Directory, see [Integrating applications with Azure Active Directory](#)

How to get the client id

When you register an application, you receive a **Client ID**. The **Client ID** is used by the application to identify themselves to the users that they are requesting permissions from.

Here's how to get a client id:

1. Sign into the [Azure portal](#).
2. Choose your Azure AD tenant by selecting your account in the top right corner of the page.
3. In the left-hand navigation pane, choose **More Services** and select **App Registrations**.
4. Select the application that you want to retrieve the client id for.
5. You will see **Application ID** listed as a GUID. This is the client id for the application.



Apply permissions to your application within Azure AD

IMPORTANT

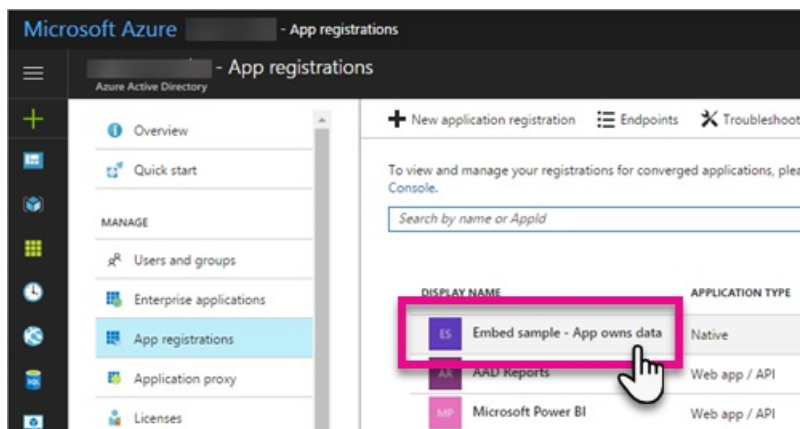
This section only applies to applications that are **embedding content for your organization**.

You will need to enable additional permissions to your application in addition to what was provided in app registration page. You can accomplish this through the Azure AD portal, or programmatically.

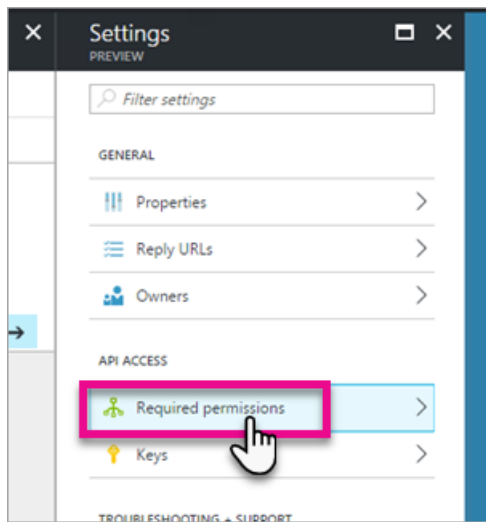
You will want to be logged in with either the *master* account, used for embedding, or a Global admin account.

Using the Azure AD portal

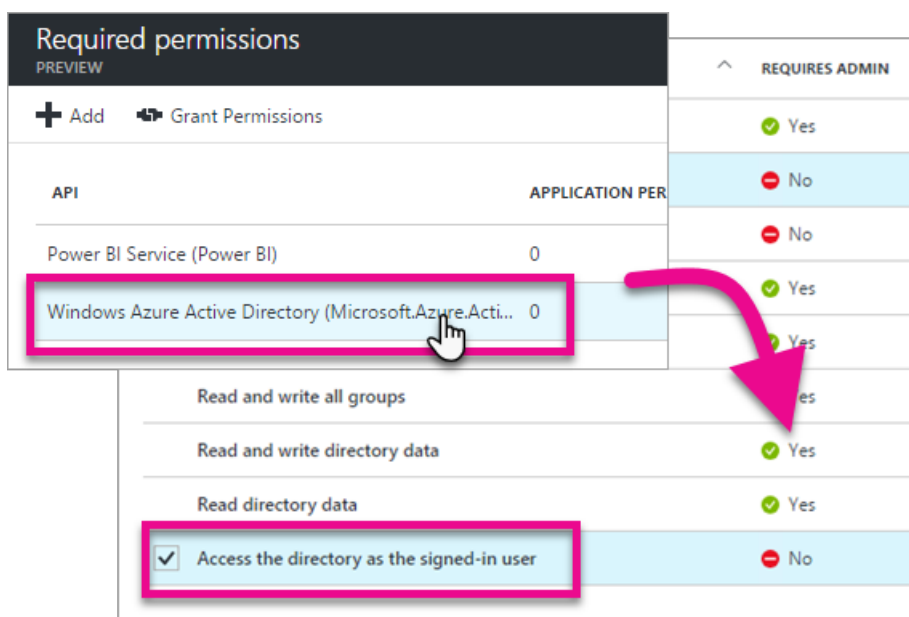
1. Browse to [App registrations](#) within the Azure portal and select the app that you are using for embedding.



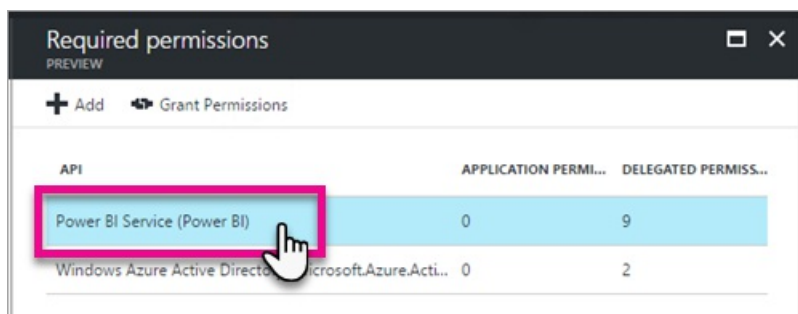
2. Select **Required permissions** under **API Access**.



3. Select **Windows Azure Active Directory** and then make sure **Access the directory as the signed-in user** is selected. Select **Save**.



4. Within **Required permissions**, select **Power BI Service (Power BI)**.



NOTE

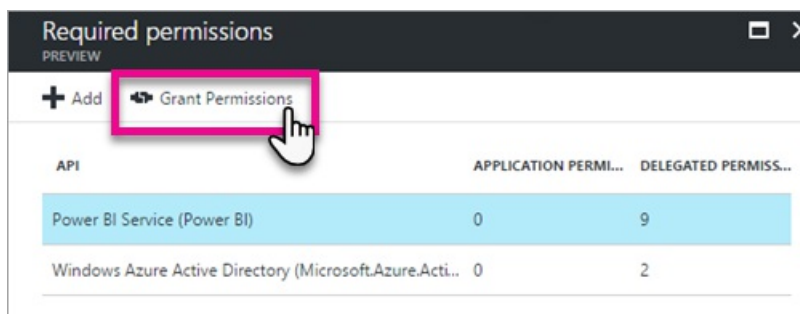
If you created the app directly in the Azure AD portal, **Power BI Service (Power BI)** may not be present. If it is not, select **+ Add** and then **1 Select and API**. Select **Power BI Service** in the API list and select **Select**. If **Power BI Service (Power BI)** is not available within **+ Add**, sign up for Power BI with at least one user.

5. Select all permissions under **Delegated Permissions**. You will need to select them one by one in order to save the selections. Select **Save** when done.

DELEGATED PERMISSIONS		REQUIRES ADMIN
<input checked="" type="checkbox"/>	View users Groups	No
<input checked="" type="checkbox"/>	View all Groups	No
<input checked="" type="checkbox"/>	View all Reports (preview)	No
<input checked="" type="checkbox"/>	Create content (preview)	No
<input checked="" type="checkbox"/>	View content properties (preview)	No
<input checked="" type="checkbox"/>	Read and Write all Datasets	No
<input checked="" type="checkbox"/>	View all Datasets	No
<input checked="" type="checkbox"/>	View all Dashboards (preview)	No
<input checked="" type="checkbox"/>	Add data to a user's dataset (preview)	No

6. Within **Required permissions**, select **Grant Permissions**.

The **Grant Permissions** action is needed for the *master account* to avoid being prompted for consent by Azure AD. If the account performing this action is a Global Admin, you will grant permissions to all users within your organization for this application. If the account performing this action is the *master account* and is not a Global Admin, you will grant permissions only to the *master account* for this application.



Applying permissions programmatically

1. You will need to get the existing service principals (users) within your tenant. For information on how to do that, see [Get servicePrincipal](#).

You can call the *Get servicePrincipal* api without {id} and it will get you all of the service principals within the tenant.

2. Check for a service principal with you app client id as **appId** property.
3. Create a new service plan if missing for your app.

```

Post https://graph.microsoft.com/beta/servicePrincipals
Authorization: Bearer ey..qw
Content-Type: application/json
{
  "accountEnabled" : true,
  "appId" : "{App_Client_ID}",
  "displayName" : "{App_DisplayName}"
}

```

4. Grant App Permission to PowerBI API

```
Post https://graph.microsoft.com/beta/OAuth2PermissionGrants
Authorization: Bearer ey..qw
Content-Type: application/json
{
  "clientId": "{Service_Plan_ID}",
  "consentType": "AllPrincipals",
  "resourceId": "c78b2585-1df6-41de-95f7-dc5aeb7dc98e",
  "scope": "Dataset.ReadWrite.All Dashboard.Read.All Report.Read.All Group.Read Group.Read.All Content.Create Metadata.View_Any Dataset.Read.All Data.Alter_Any",
  "expiryTime": "2018-03-29T14:35:32.4943409+03:00",
  "startTime": "2017-03-29T14:35:32.4933413+03:00"
}
```

5. Grant App Permission to AAD

The value for **consentType** will depend on the user performing the request. You can supply either **AllPrincipals** or **Principal**. **AllPrincipals** can only be used by an administrator to grant permission to all users. **Principal** is used to grant permission to a specific user.

The permission grant is needed for the *master account* to avoid being prompted for consent by Azure AD.

If you are using an existing tenant, and not interested in granting permissions on behalf of all tenant users, you can grant permissions to a specific user by replacing the value of **consentType** to **Principal**.

```
Post https://graph.microsoft.com/beta/OAuth2PermissionGrants
Authorization: Bearer ey..qw
Content-Type: application/json
{
  "clientId": "{Service_Plan_ID}",
  "consentType": "AllPrincipals",
  "resourceId": "61e57743-d5cf-41ba-bd1a-2b381390a3f1",
  "scope": "User.Read Directory.AccessAsUser.All",
  "expiryTime": "2018-03-29T14:35:32.4943409+03:00",
  "startTime": "2017-03-29T14:35:32.4933413+03:00"
}
```

Next steps

Now that you have registered your application within Azure AD, you will need to authenticate users within your application. Have a look at [Authenticate users and get an Azure AD access token for your Power BI app](#) to learn more.

More questions? [Try asking the Power BI Community](#)

Authenticate users and get an Azure AD access token for your Power BI app

1/30/2018 • 4 min to read • [Edit Online](#)

Learn how you can authenticate users within your Power BI application and retrieve an access token to use with the REST API.

Before you can call the Power BI REST API, you need to get an Azure Active Directory (Azure AD) **authentication access token** (access token). An **access token** is used to allow your app access to **Power BI** dashboards, tiles and reports. To learn more about Azure Active Directory **access token** flow, see [Azure AD Authorization Code Grant Flow](#).

Depending on how you are embedding content, the access token will be retrieved differently. Two different approaches are used within this article.

Access token for Power BI users (user owns data)

This example is for when your users will manually log into Azure AD with their organization login. This is used when embedding content for Power BI users that will access content they have access to within the Power BI service.

Get an authorization code from Azure AD

The first step to get an **access token** is to get an authorization code from **Azure AD**. To do this, you construct a query string with the following properties, and redirect to **Azure AD**.

Authorization code query string

```
var @params = new NameValueCollection
{
    //Azure AD will return an authorization code.
    //See the Redirect class to see how "code" is used to AcquireTokenByAuthorizationCode
    {"response_type", "code"},

    //Client ID is used by the application to identify themselves to the users that they are requesting
    //permissions from.
    //You get the client id when you register your Azure app.
    {"client_id", Properties.Settings.Default.ClientID},

    //Resource uri to the Power BI resource to be authorized
    // https://analysis.windows.net/powerbi/api
    {"resource", Properties.Settings.Default.PowerBiAPI},

    //After user authenticates, Azure AD will redirect back to the web app
    {"redirect_uri", "http://localhost:13526/Redirect"}
};
```

After you construct a query string, you redirect to **Azure AD** to get an **authorization code**. Below is a complete C# method to construct an **authorization code** query string, and redirect to **Azure AD**. After you have the authorization code, you get an **access token** using the **authorization code**.

Within `redirect.aspx.cs`, [AuthenticationContext.AcquireTokenByAuthorizationCode](#) will then be called to generate the token.

Get authorization code

```

protected void signInButton_Click(object sender, EventArgs e)
{
    //Create a query string
    //Create a sign-in NameValueCollection for query string
    var @params = new NameValueCollection
    {
        //Azure AD will return an authorization code.
        //See the Redirect class to see how "code" is used to AcquireTokenByAuthorizationCode
        {"response_type", "code"},

        //Client ID is used by the application to identify themselves to the users that they are requesting
        //permissions from.
        //You get the client id when you register your Azure app.
        {"client_id", Properties.Settings.Default.ClientID},

        //Resource uri to the Power BI resource to be authorized
        // https://analysis.windows.net/powerbi/api
        {"resource", Properties.Settings.Default.PowerBiAPI},

        //After user authenticates, Azure AD will redirect back to the web app
        {"redirect_uri", "http://localhost:13526/Redirect"}
    };

    //Create sign-in query string
    var queryString = HttpUtility.ParseQueryString(string.Empty);
    queryString.Add(@params);

    //Redirect authority
    //Authority Uri is an Azure resource that takes a client id to get an Access token
    // AADAuthorityUri = https://login.windows.net/common/oauth2/authorize/
    string authorityUri = Properties.Settings.Default.AADAuthorityUri;
    var authUri = String.Format("{0}?{1}", authorityUri, queryString);
    Response.Redirect(authUri);
}

```

Get an access token from authorization code

You should now have an authorization code from Azure AD. Once **Azure AD** redirects back to your web app with an **authorization code**, you use the **authorization code** to get an access token. Below is a C# sample that you could use in your redirect page and the Page_Load event for your default.aspx page.

The **Microsoft.IdentityModel.Clients.ActiveDirectory** namespace can be retrieved from the [Active Directory Authentication Library](#) NuGet package.

```
Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory
```

Redirect.aspx.cs

```

using Microsoft.IdentityModel.Clients.ActiveDirectory;

protected void Page_Load(object sender, EventArgs e)
{
    //Redirect uri must match the redirect_uri used when requesting Authorization code.
    string redirectUri = String.Format("{0}Redirect", Properties.Settings.Default.RedirectUrl);
    string authorityUri = Properties.Settings.Default.AADAuthorityUri;

    // Get the auth code
    string code = Request.Params.GetValues(0)[0];

    // Get auth token from auth code
    TokenCache TC = new TokenCache();

    AuthenticationContext AC = new AuthenticationContext(authorityUri, TC);
    ClientCredential cc = new ClientCredential
        (Properties.Settings.Default.ClientID,
        Properties.Settings.Default.ClientSecret);

    AuthenticationResult AR = AC.AcquireTokenByAuthorizationCode(code, new Uri(redirectUri), cc);

    //Set Session "authResult" index string to the AuthenticationResult
    Session[_Default.authResultString] = AR;

    //Redirect back to Default.aspx
    Response.Redirect("/Default.aspx");
}

```

Default.aspx

```

using Microsoft.IdentityModel.Clients.ActiveDirectory;

protected void Page_Load(object sender, EventArgs e)
{
    //Test for AuthenticationResult
    if (Session[authResultString] != null)
    {
        //Get the authentication result from the session
        authResult = (AuthenticationResult)Session[authResultString];

        //Show Power BI Panel
        signInStatus.Visible = true;
        signInButton.Visible = false;

        //Set user and token from authentication result
        userLabel.Text = authResult.UserInfo.DisplayableId;
        accessTokenTextbox.Text = authResult.AccessToken;
    }
}

```

Access token for non-Power BI users (app owns data)

This approach is typically used for ISV type applications where the app owns access to the data. Users will not necessarily be Power BI users and the application controls authentication and access for the end users.

For this approach, you will use a single *master* account that is a Power BI Pro user. The credentials for this account are stored with the application. The application will authenticate against Azure AD with those stored credentials.

The example code shown below comes from the [App owns data sample](#)

HomeController.cs

```
using Microsoft.IdentityModel.Clients.ActiveDirectory;

// Create a user password cradentials.
var credential = new UserPasswordCredential(Username, Password);

// Authenticate using created credentials
var authenticationContext = new AuthenticationContext(AuthorityUrl);
var authenticationResult = await authenticationContext.AcquireTokenAsync(ResourceUrl, ClientId, credential);

if (authenticationResult == null)
{
    return View(new EmbedConfig()
    {
        ErrorMessage = "Authentication Failed."
    });
}

var tokenCredentials = new TokenCredentials(authenticationResult.AccessToken, "Bearer");
```

For information on how to use **await**, see [await \(C# Reference\)](#)

Next steps

Now that you have the access token, you can call the Power BI REST API to embed content. For information on how to embed your content, see [How to embed your Power BI dashboards, reports and tiles](#).

More questions? [Try asking the Power BI Community](#)

Power BI permissions

1/30/2018 • 3 min to read • [Edit Online](#)

Permission scopes

Power BI permissions give an application the ability to take certain actions on a user's behalf. All permissions must be approved by a user in order to be valid.

DISPLAY NAME	DESCRIPTION	SCOPE VALUE
View all Datasets	The app can view all datasets for the signed in user and datasets that the user has access to.	Dataset.Read.All
Read and Write all Datasets	The app can view and write to all datasets for the signed in user and datasets that the user has access to.	Dataset.ReadWrite.All
Add data to a user's dataset (preview)	Gives an app access to add or delete a user's dataset rows. This permission does not grant the app access to the user's data.	Data.Alter_Any
Create content (preview)	App can automatically create content and datasets for a user.	Content.Create
View users Groups	The app can view all groups that the signed in user belongs to.	Group.Read
View all Groups	The app can view all groups that the signed in user belongs to.	Group.Read.All
View all Dashboards (preview)	The app can view all dashboards for the signed in user and dashboards that the user has access to.	Dashboard.Read.All
View all Reports (preview)	The app can view all reports for the signed in user and reports that the user has access to. The app can also see the data within the reports as well as its structure.	Report.Read.All
Read and write all Reports	The app can view and write to all the reports for the signed in user and any reports that the user has access to. This does not provide rights to create a new report.	Report.ReadWrite.All

An application can request permissions when it first attempts to log in to a user's page by passing in the requested permissions in the scope parameter of the call. If the permissions are granted, an access token will be returned to the app which can be used on future API calls. The access can only be used by a specific application.

NOTE

The Power BI APIs still refer to app workspaces as groups. Any references to groups mean that you are working with app workspaces.

Requesting Permissions

While you can call the API to authenticate with a username and password, in order to take actions on behalf of another user, they will need to request permissions that the user then approves and then send the resulting access token on all future calls. For this process, we will follow the standard [OAuth 2.0](#) protocol. While the actual implementation may vary, the OAuth flow for Power BI has the following elements:

- **Login UI** - This is a UI that the developer can evoke to request permissions. It would require the user to log in if not already. The user would also need to approve the permissions that the application is requesting. The login window will post back either an access code or an error message to a redirect URL that is supplied.
 - A standard redirect URL should be supplied by Power BI for use by native applications.
- **Authorization Code** - Authorization Codes are returned to web applications after login via URL parameters in the redirect URL. Since they are in parameters there is some security risk. Web applications will have to exchange the authorization code for an Authorization Token
- **Authorization Token** - Are used to authenticate API calls on another user's behalf. They will be scoped to a specific application. Tokens have a set lifespan and when they expire they will need to be refreshed.
- **Refresh Token** - When tokens expire there will be a process of refreshing them.

More questions? [Try asking the Power BI Community](#)

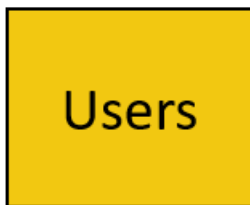
Use row-level security with Power BI embedded content

1/30/2018 • 6 min to read • [Edit Online](#)

Row level security (RLS) can be used to restrict user access to data within dashboards, tiles, reports, and datasets. Multiple, different users can work with those same artifacts all while seeing different data. Embedding supports RLS.

If you're embedding for non-Power BI users (app owns data), which is typically an ISV scenario, then this article is for you! You will need to configure the embed token to account for the user and role. Read on to learn how to do this.

If you are embedding to Power BI users (user owns data), within your organization, RLS works the same as it does within the Power BI service directly. There is nothing more you need to do in your application. For more information see, [Row-Level security \(RLS\) with Power BI](#).

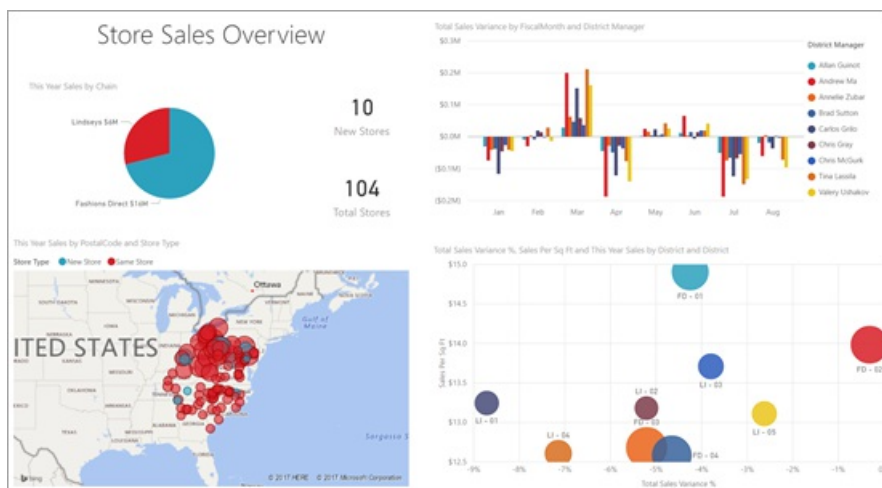


To take advantage of RLS, it's important you understand three main concepts; Users, Roles, and Rules. Let's take a closer look at each:

Users – End-users viewing the artifact (dashboard, tile, report, or dataset). In Power BI Embedded, users are identified by the username property in an embed token.

Roles – Users belong to roles. A role is a container for rules and can be named something like *Sales Manager* or *Sales Rep*. You create roles within Power BI Desktop. For more information, see [Row-level security \(RLS\) with Power BI Desktop](#).

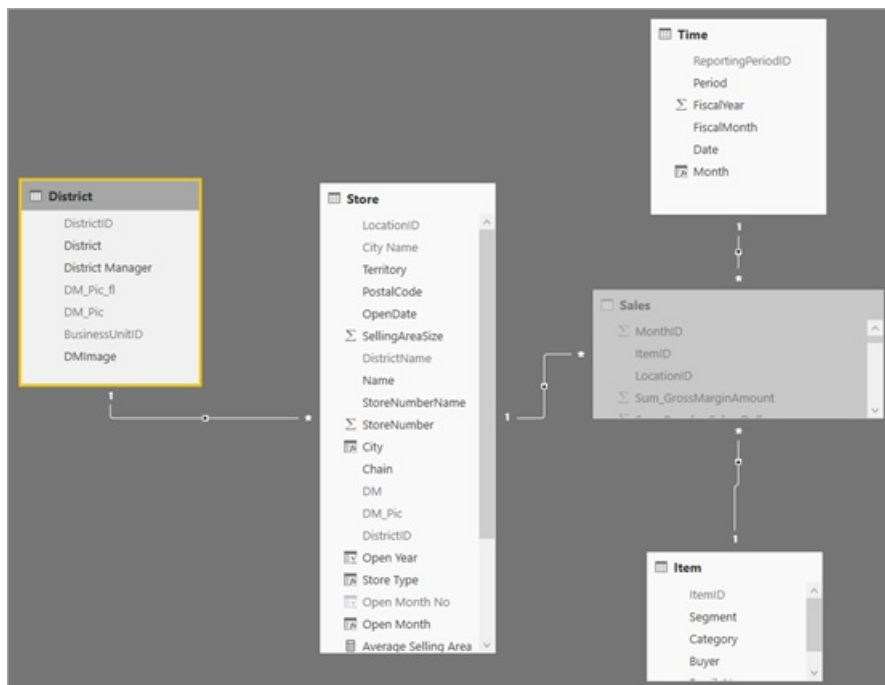
Rules – Roles have rules, and those rules are the actual filters that are going to be applied to the data. This could be as simple as "Country = USA" or something much more dynamic. For the rest of this article, we'll provide an example of authoring RLS, and then consuming that within an embedded application. Our example uses the [Retail Analysis Sample](#) PBIX file.



Adding roles with Power BI Desktop

Our Retail Analysis sample shows sales for all the stores in a retail chain. Without RLS, no matter which district manager signs in and views the report, they'll see the same data. Senior management has determined each district manager should only see the sales for the stores they manage, and to do this, we can use RLS.

RLS is authored in Power BI Desktop. When the dataset and report are opened, we can switch to diagram view to see the schema:



Here are a few things to notice with this schema:

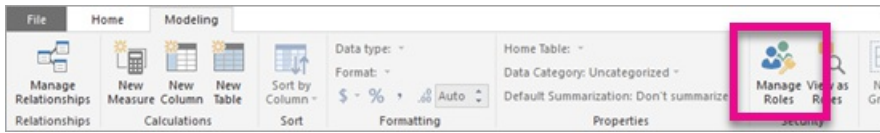
- All measures, like **Total Sales**, are stored in the **Sales** fact table.
- There are four additional related dimension tables: **Item**, **Time**, **Store**, and **District**.
- The arrows on the relationship lines indicate which way filters can flow from one table to another. For example, if a filter is placed on **Time[Date]**, in the current schema it would only filter down values in the **Sales** table. No other tables would be affected by this filter since all the arrows on the relationship lines point to the sales table and not away.
- The **District** table indicates who the manager is for each district:

DistrictID	District	District Manager
1	FD - 01	Valery Ushakov
2	FD - 02	Tina Lassila
3	FD - 03	Carlos Grilo
4	FD - 04	Andrew Ma
6	LI - 01	Allan Guinot
7	LI - 02	Chris McGurk
9	LI - 03	Chris Gray
10	LI - 04	Brad Sutton
11	LI - 05	Annelie Zubar

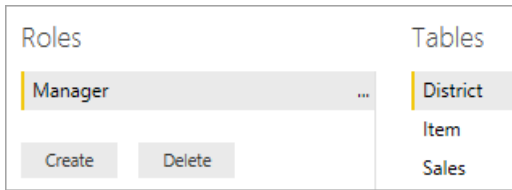
Based on this schema, if we apply a filter to the **District Manager** column in the **District** table, and if that filter matches the user viewing the report, that filter will also filter down the **Store** and **Sales** tables to only show data for that district manager.

Here's how:

1. On the **Modeling** tab, select **Manage Roles**.



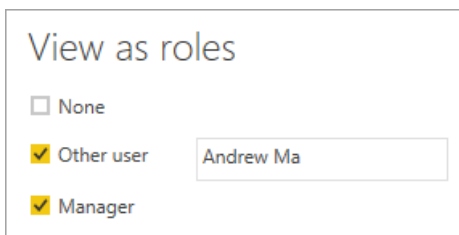
2. Create a new role called **Manager**.



3. In the **District** table, enter the following DAX expression: **[District Manager] = USERNAME()**.



4. To make sure the rules are working, on the **Modeling** tab, select **View as Roles**, and then select both the **Manager** role you just created, along with **Other user**. Enter **Andrew Ma** for the user.



The reports will now show data as if you were signed in as **Andrew Ma**.

Applying the filter, the way we did here, will filter down all records in the **District**, **Store**, and **Sales** tables. However, because of the filter direction on the relationships between **Sales** and **Time**, **Sales** and **Item**, and **Item** and **Time** tables will not be filtered down. To learn more about bidirectional cross-filtering, download the [Bidirectional cross-filtering in SQL Server Analysis Services 2016 and Power BI Desktop](#) whitepaper.

Applying user and role to an embed token

Now that you have your Power BI Desktop roles configured, there is some work needed in your application to take advantage of the roles.

Users are authenticated and authorized by your application and embed tokens are used to grant that user access to a specific Power BI Embedded report. Power BI Embedded doesn't have any specific information on who your user is. For RLS to work, you'll need to pass some additional context as part of your embed token in the form of identities. This is done by way [GenerateToken](#) API.

The [GenerateToken](#) API accepts a list of identities with indication of the relevant datasets. For RLS to work, you will need to pass the following as part of the identity.

- **username (mandatory)** – This is a string that can be used to help identify the user when applying RLS rules. Only a single user can be listed.
- **roles (mandatory)** – A string containing the roles to select when applying Row Level Security rules. If passing more than one role, they should be passed as a string array.
- **dataset (mandatory)** – The dataset that is applicable for the artifact you are embedding.

You can create the embed token by using the **GenerateTokenInGroup** method on **PowerBIClient.Reports**.

For example, you could change the [PowerBIEmbedded_AppOwnsData](#) sample. *Home\HomeController.cs line 76 and 77* could be updated from:

```
// Generate Embed Token.
var generateTokenRequestParameters = new GenerateTokenRequest(accessLevel: "view");

var tokenResponse = await client.Reports.GenerateTokenInGroupAsync(GroupId, report.Id,
generateTokenRequestParameters);
```

to

```
var generateTokenRequestParameters = new GenerateTokenRequest("View", null, identities: new
List<EffectiveIdentity> { new EffectiveIdentity(username: "username", roles: new List<string> { "roleA",
"roleB" }, datasets: new List<string> { "datasetId" }) });

var tokenResponse = await client.Reports.GenerateTokenInGroupAsync("groupId", "reportId",
generateTokenRequestParameters);
```

If you are calling the REST API, the updated API now accepts an additional JSON array, named **identities**, containing a user name, list of string roles and list of string datasets, e.g.:

```
{
  "accessLevel": "View",
  "identities": [
    {
      "username": "EffectiveIdentity",
      "roles": [ "Role1", "Role2" ],
      "datasets": [ "fe0a1aeb-f6a4-4b27-a2d3-b5df3bb28bdc" ]
    }
  ]
}
```

Now, with all the pieces together, when someone logs into your application to view this artifact, they'll only be able to see the data that they are allowed to see, as defined by our row-level security.

Working with Analysis Services live connections

Row-level security can be used with Analysis Services live connections for on-premises servers. There are a few specific concepts that you should understand when using this type of connection.

The effective identity that is provided for the username property must be a Windows user with permissions on the Analysis Services server.

On-premises data gateway configuration

An [on-premises data gateway](#) is used when working with Analysis Services live connections. When generating an embed token, with an identity listed, the master account needs to be listed as an admin of the gateway. If the master account is not listed, the row-level security will not be applied property to the data. A non-admin of the gateway can provide roles, but must specify its own username for the effective identity.

Use of roles

Roles can be provided with the identity in an embed token. If no role is provided, the username that was provided will be used to resolve the associated roles.

Considerations and limitations

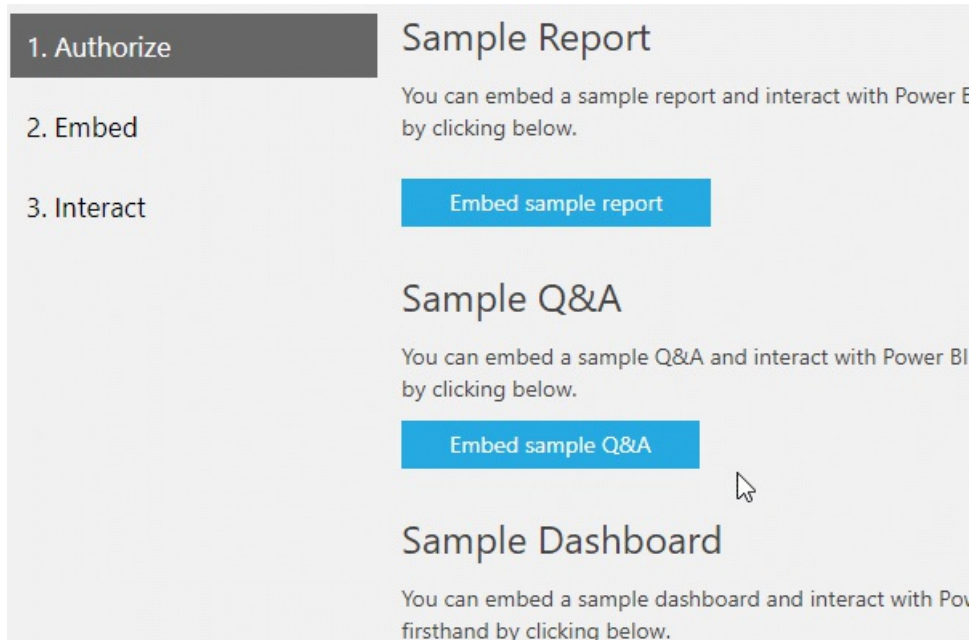
- Assignment of users to roles within the Power BI service does not affect RLS when using an embed token.
- While the Power BI service will not apply RLS setting to admins or members with edit permissions, when you supply an identity with an embed token, it will be applied to the data.
- Analysis Services live connections are supported for on-premises servers.
- Azure Analysis Services live connections support filtering by roles, but not dynamic by username.
- If the underlying dataset doesn't require RLS, the GenerateToken request must **not** contain an effective identity.
- If the underlying dataset is a cloud model (cached model or DirectQuery), the effective identity must include at least one role, otherwise role assignment will not occur.
- A list of identities enables multiple identity tokens for dashboard embedding. For all others artifacts, the list contains a single identity.

More questions? [Try asking the Power BI Community](#)

Q&A in Power BI Embedded

1/30/2018 • 2 min to read • [Edit Online](#)

Power BI Embedded offers you a way to incorporate Q&A into an application and allow your users to ask questions using natural language and receive immediate answers in the form of visuals like charts or graphs.



1. Authorize

Sample Report

You can embed a sample report and interact with Power BI Embedded by clicking below.

Embed sample report

Sample Q&A

You can embed a sample Q&A and interact with Power BI Embedded by clicking below.

Embed sample Q&A

Sample Dashboard

You can embed a sample dashboard and interact with Power BI Embedded firsthand by clicking below.

There are two modes for embedding Q&A within your application: **interactive** and **result only**. **Interactive** mode allows you to type in questions and have them displayed within the visual. If you have a saved question, or a set question you want to display, you can use the **result only** mode by populating the question in your embed config.

Here is a look at what the JavaScript code will look like.

```
// Embed configuration used to describe the what and how to embed.
// This object is used when calling powerbi.embed within the JavaScript API.
// You can find more information at https://github.com/Microsoft/PowerBI-JavaScript/wiki/Embed-Configuration-Details.
var config= {
  type: 'qna',
  tokenType: models.TokenType.Embed | models.TokenType.Aad,
  accessToken: access token value,
  embedUrl: https://app.powerbi.com/qnaEmbed (groupId to be appended as query parameter if required),
  datasetIds: array of requested data set ids (at the moment we support only one dataset),
  viewMode: models.QnAMode.Interactive | models.QnAMode.ResultOnly,
  question: optional parameter for Explore mode (QnAMode.Interactive) and mandatory for Render Result mode (QnAMode.ResultOnly)
};

// Get a reference to the embedded QNA HTML element
var qnaContainer = $('#qnaContainer')[0];

// Embed the QNA and display it within the div container.
var qna = powerbi.embed(qnaContainer, config);
```

Set question

If you used **result mode** with a set question, you can inject additional questions into the frame and have them immediately answered replacing the previous result. A new visual is rendered matching the new question.

One example of this usage would be a frequently asked question list. The user could go through the questions and have them answered within the same embedded part.

Code snippet for JS SDK usage:

```
// Get a reference to the embedded Q&A HTML element
var qnaContainer = $('#qnaContainer')[0];

// Get a reference to the embedded Q&A.
qna = powerbi.get(qnaContainer);

qna.setQuestion("This year sales")
  .then(function (result) {
    .....
  })
  .catch(function (errors) {
    .....
  });
```

Visual rendered event

For **interactive** mode, the application can be notified with a data changed event each time the rendered visual changes to target the updated input query as it is being typed.

Listening to the *visualRendered* event allows you to save questions for use later.

Code snippet for JS SDK usage:

```
// Get a reference to the embedded Q&A HTML element
var qnaContainer = $('#qnaContainer')[0];

// Get a reference to the embedded Q&A.
qna = powerbi.get(qnaContainer);

// qna.off removes a given event listener if it exists.
qna.off("visualRendered");

// qna.on will add an event listener.
qna.on("visualRendered", function(event) {
  .....
});
```

Embed token

Create an embed token off of a dataset to start a Q&A part. For more information, see [Generate token for Q&A](#).

Next steps

To give Q&A embedding a try, check out the [JavaScript embed sample](#).

More questions? [Try asking the Power BI Community](#)

Power BI Embedded migration tool

1/30/2018 • 8 min to read • [Edit Online](#)

This migration tool can be used to copy your reports from the Power BI Embedded Azure service (PaaS) to the Power BI service (SaaS).

Migrating your content from your workspace collections to the Power BI service can be done in parallel to your current solution and doesn't require any downtime.

Limitations

- Pushed datasets cannot be downloaded and will need to be recreated using the Power BI REST APIs for the Power BI service.
- PBIX files imported before November 26, 2016 will not be downloadable.

Download

You can download the migration tool sample from [GitHub](#). You can either download a zip of the repository, or you can clone it locally. Once downloaded, you can open *powerbi-migration-sample.sln* within Visual Studio to build and run the migration tool.

Migration Plans

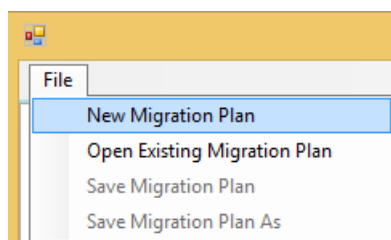
Your migration plan is just metadata that catalogs the content within Power BI Embedded and how you want to publish them to the Power BI service.

Start with a new migration plan

A migration plan is the metadata of the items available in Power BI Embedded that you then want to move over to the Power BI service. The migration plan is stored as an XML file.

You will want to start by creating a new migration plan. To create a new migration plan, do the following.

1. Select **File > New Migration Plan**.

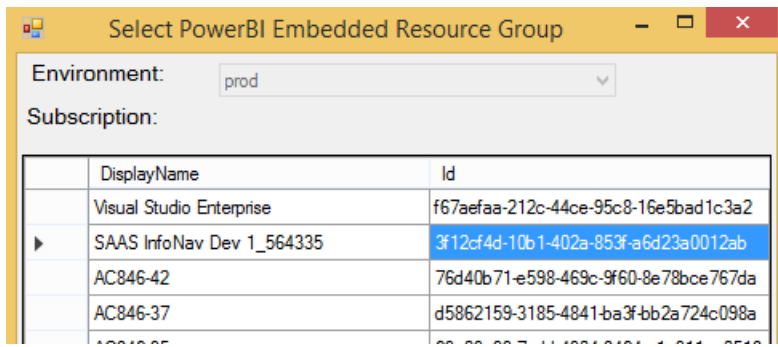


2. In the **Select Power BI Embedded Resource Group** dialog, you will want to select the Environment dropdown and select prod.
3. You will be prompted to sign in. You will use your Azure subscription login.

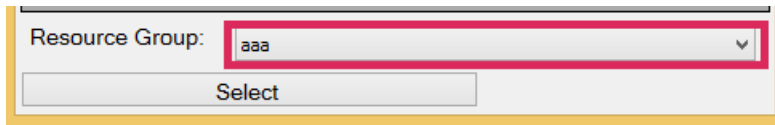
IMPORTANT

This is **not** your Office 365 organization account that you sign into Power BI with.

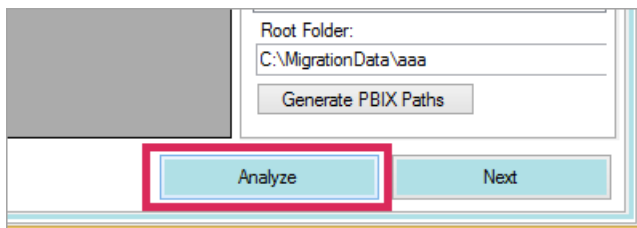
4. Select the Azure subscription which stores your Power BI Embedded workspace collections.



- Below the subscription list, select the **Resource Group** that contains your workspace collections and select **Select**.



- Select **Analyze**. This will get an inventory of the items within your Azure subscription for you to begin your plan.



NOTE

The analyze process could take several minutes depending on the number of Workspace collections and how much content exists in the workspace collection.

- When **Analyze** is complete, it will prompt you to save your migration plan.

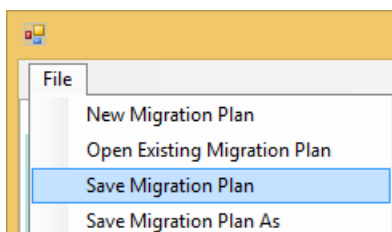
At this point, you have connected your migration plan to your Azure subscription. Read below to understand the flow of how to work with your migration plan. This includes Analyze & Plan Migration, Download, Create Groups and Upload.

Save your migration plan

You can save your migration plan for use later. This will create an XML file that contained all the information in your migration plan.

To save your migration plan, do the following.

- Select **File > Save Migration Plan**.



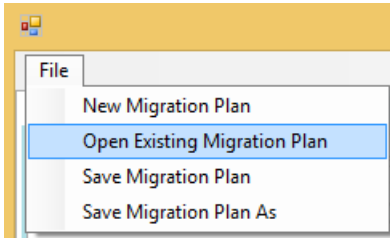
- Give your file a name or use the generated file name and select **Save**.

Open an existing migration plan

You can open a saved migration plan to continue working on your migration.

To open your existing migration plan, do the following.

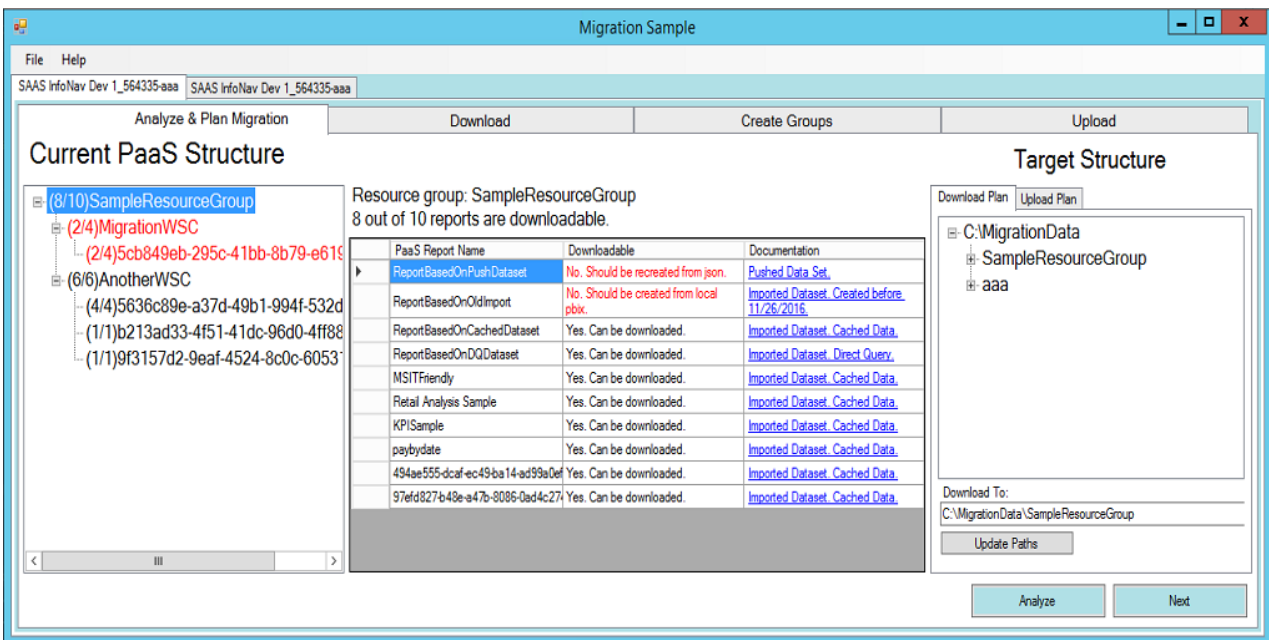
1. Select **File > Open Existing Migration Plan**.



2. Select your migration file and select **Open**.

Step 1: Analyze & Plan Migration

The **Analyze & Plan Migration** tab gives you a view of what is currently in your Azure subscription's resource group.

A screenshot of the 'Migration Sample' application window. The window has a title bar and a menu bar with 'File' and 'Help'. Below the menu bar, there are tabs for 'Analyze & Plan Migration', 'Download', 'Create Groups', and 'Upload'. The 'Analyze & Plan Migration' tab is active, showing a tree view on the left titled 'Current PaaS Structure' and a table in the center. The tree view shows a hierarchy starting with '(8/10)SampleResourceGroup', which contains '(2/4)MigrationWSC' and '(6/6)AnotherWSC'. The table lists various reports with columns for 'PaaS Report Name', 'Downloadable', and 'Documentation'. The 'Downloadable' column contains status messages like 'No. Should be recreated from json.' or 'Yes. Can be downloaded.'. On the right side, there is a 'Target Structure' section with a tree view showing 'C:\MigrationData' containing 'SampleResourceGroup' and 'aaa'. Below this, there is a 'Download To:' field with the path 'C:\MigrationData\SampleResourceGroup' and an 'Update Paths' button. At the bottom right, there are 'Analyze' and 'Next' buttons.

We will look at the *SampleResourceGroup* as an example.

PaaS Topology

This is a listing of your *Resource Group > Workspace collections > Workspaces*. The resource group and workspace collections will show a friendly name. The workspaces will show a GUID.

The items in the list will also display a color and a number in the format of (#/#). This indicates the number of reports that can be downloaded. A black color means that all reports can be downloaded.

A red color means that some reports cannot be downloaded. The left number will indicate the total number of reports that can be downloaded. The number on the right indicates the total number of reports within the grouping.

You can select an item within the PaaS topology to display the reports in the reports section.

Reports

The reports section will list out the reports available and indicates whether it can be downloaded or not.

Workspace Collection: MigrationWSC
2 out of 4 reports are downloadable.

PaaS Report Name	Downloadable	Documentation
ReportBasedOnPushDataset	No. Should be recreated from json.	Pushed Data Set.
ReportBasedOnOldImport	No. Should be recreated from local pbix.	Imported Dataset. Created before 11/26/2016.
ReportBasedOnCachedDataset	Yes. Can be downloaded.	Imported Dataset. Cached Data.
ReportBasedOnDQDataset	Yes. Can be downloaded.	Imported Dataset. Direct Query.

Target structure

The **Target structure** is where you tell the tool where things will be downloaded to and how to upload them.

Download Plan

A path will automatically be created for you. You can change this path if you wish. If you do change the path, you will need to select **Update paths**.

NOTE

This does not actually perform the download. This is only specifying the structure of where the reports will be downloaded to.

Upload Plan

Here you can specify a prefix to be used for the App Workspaces that will be created within the Power BI service. After the prefix will be the GUID for the workspace that existed in Azure.

Target Structure

Download Plan | Upload Plan

- [-] Migrated-5cb849eb-295c-41bb-8b79-e619cd15c
 - ReportBasedOnOldImport
 - ReportBasedOnCachedDataset
 - ReportBasedOnDQDataset
- [-] Migrated-5636c89e-a37d-49b1-994f-532dbf8a23
- [-] Migrated-b213ad33-4f51-41dc-96d0-4ff88e865e
- [-] Migrated-9f3157d2-9eaf-4524-8c0c-605313197f

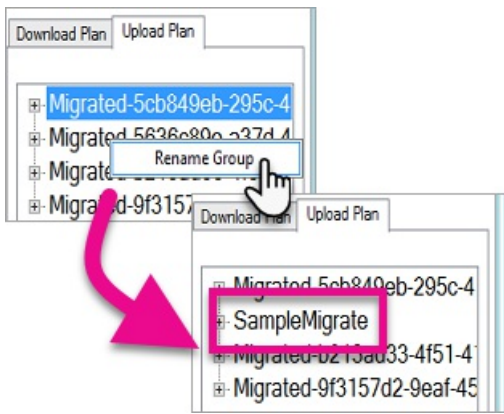
Group Name Prefix:

NOTE

This does not actually create the groups within the Power BI service. This only defines the naming structure for the groups.

If you change the prefix, you will need to select **Generate Upload Plan**.

You can right click on a group and choose to rename the group within the Upload plan directly, if desired.



NOTE

The name of the *group* must not contain spaces or invalid characters.

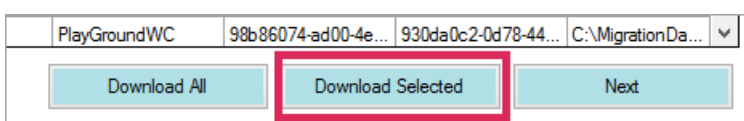
Step 2: Download

On the **Download** tab, you will see the list of reports and associated metadata. You can see what the export status is along with the previous export status.

Analyze & Plan Migration	Download				Create Groups	Upload		
	PaaSReportName	PBIXExists	ExportState	LastExportStatus	PaaSWorkspaceColl	PaaSWorkspaceId	PaaSReportId	PbxPath
▼	ivy	Yes			elIWUS	8d2d5e7e-c2e8-4...	3b131418-9cc0-4...	C:\MigrationData\...
	Retail Analysis Sa...	Yes			testSample	67aa2641-8f11-4c...	0c938f00-ce17-4a...	C:\MigrationData\...
	testSaveAs	Yes			testSample	67aa2641-8f11-4c...	a2d7ddc-442d-4a...	C:\MigrationData\...
	createReortTestS...	Yes			testSample	67aa2641-8f11-4c...	405bc30c-3f31-41...	C:\MigrationData\...
	test2	Yes			testSample	67aa2641-8f11-4c...	3f424a81-6e4c-4b...	C:\MigrationData\...
	MSITFriendly	Yes			ReportEmbedMSI...	5636c89e-a37d-4...	bf33002e-9adc-45...	C:\MigrationData\...
	Retail Analysis Sa...	Yes			ReportEmbedMSI...	5636c89e-a37d-4...	30513283-db0c-4...	C:\MigrationData\...
	KPISample	No			ReportEmbedMSI...	5636c89e-a37d-4...	58f8b783-c148-45...	C:\MigrationData\...
	paybydate	Yes			ReportEmbedMSI...	5636c89e-a37d-4...	de167449-ef49-40...	C:\MigrationData\...
	494ae555-dcaf-ec...	Yes			ReportEmbedMSI...	b213ad33-4f51-41...	6b67c306-6847-4...	C:\MigrationData\...
	97efd827-b48e-a4...	Yes			ReportEmbedMSI...	9f3157d2-9eaf-45...	16922288-6f07-46...	C:\MigrationData\...
	mySmallDQ	Yes			yoavMSIT333	df8a7a6b-071c-4c...	8c2f2a63-6c34-41...	C:\MigrationData\...
	Retail Analysis Sa...	Yes			yoavWSC222	37adde84-0f51-40...	b667c6f-6c2a-45...	C:\MigrationData\...
	assads	Yes			dasded	1bb2ee7c-b718-4...	02895240-4f3d-4e...	C:\MigrationData\...
	Retail Analysis Sa...	No			yoavTryWSC22	52e990a3-4c69-4...	12aee802-96a7-4...	C:\MigrationData\...
	newCloneReport	No			yoavNewWSC	fc579782-122a-48...	a03dfe3-dc50-49...	C:\MigrationData\...
	Retail Analysis RLS	No			yoavNewWSC	fc579782-122a-48...	60d0c219-6bb5-4...	C:\MigrationData\...
	DDcreateSQLAz	No			yoavNewWSC	fc579782-122a-48...	9c640fab-024c-4a...	C:\MigrationData\...

You have two options.

- Select specific reports and select **Download Selected**
- Select **Download All**.



For a successful download, you will see a status of *Done* and it will reflect that the PBIX file exists.

After the download is completed, select the **Create Groups** tab.

Step 3: Create Groups

After you have downloaded the reports that are available, you can go to the **Create Groups** tab. This tab will create the app workspaces within the Power BI service based on the migration plan that you created. It will create the app workspace with the name you provided on the **Upload** tab within **Analyze & Plan Migration**.

Analyze & Plan Migration	Download	Create Groups	Upload	
				Reset Group Ids
	GroupName	GroupCreationStatus	ForReport	CreatedGroupId
	Migrated-76131034f4f4-445e-bbf...		ClonedFromFullToShort	
	Migrated-828f93e4-c0a6-4082-8d...		Retail Analysis Sample	
	Migrated-98b86074-ad00-4e93-b...		Pyramid3DChart-sample	

To create the app workspaces, you can select either **Create Selected Groups** or **Create All Missing Groups**.

When you select either of these options, you will be prompted to sign in. *You will want to use your credentials for the Power BI service that you want to create the app workspaces on.*

The screenshot shows the 'Create Groups' interface. At the top, there are two buttons: 'Create All Missing Groups' and 'Create Selected Groups'. The 'Create Selected Groups' button is highlighted with a red box. Below the buttons is a Microsoft Azure sign-in prompt with the text 'Work or school, or personal Microsoft account'. There are input fields for 'john@contoso.com' and 'Password', and a 'Sign in' button. A red arrow points from the 'Create Selected Groups' button to the sign-in prompt. Below the sign-in prompt is a table with the following data:

Version2	Migrated-76131034f4f4-445e-bbf...			
csvBasedShortPaas	SampleMigrate	6da6f072-0135-4e6c-bc92-000d...	Created. Not Confirmed	
cloned	SampleMigrate			

This will create the app workspace within the Power BI service. This does not upload the reports to the app workspace.

You can verify that the app workspace was created by signing into Power BI and validating that the workspace exists. You will notice that nothing is in the workspace.

The screenshot shows the Power BI workspace navigation pane. The 'Workspaces' section is expanded, and the 'SampleMigrate' workspace is selected. The 'SampleMigrate' workspace is highlighted with a red box. The navigation pane also shows 'DASHBOARDS' and 'REPORTS' sections, both with the text 'You have no dashboards' and 'You have no reports' respectively. The 'SampleMigrate' workspace is represented by a red circle with the letter 'S'.

After the workspace is created, you can move onto the **Upload** tab.

Step 4: Upload

On the **Upload** tab, this will upload the reports to the Power BI service. You will see a list of the reports that we downloaded on the Download tab along with the target group name based on your migration plan.

Analyze & Plan Migration		Download		Create Groups		Upload	
TargetName	UploadState	UploadError	TargetGroupName	TargetGroupCreatedId	UploadedReportId	Abort	
ivy			Migrated-8d2d5e7e-...	3a8cbb04-8fca-4d07...		If a report with the same name exists.	
Retail Analysis Sample			Migrated-67aa2641-...	173f6e5a-8a0d-447c...			
testSaveAs			Migrated-67aa2641-...	173f6e5a-8a0d-447c...			
createReortTestSav...			Migrated-67aa2641-...	173f6e5a-8a0d-447c...			
test2			Migrated-67aa2641-...	173f6e5a-8a0d-447c...			
MSITFriendly			Migrated-5636c89e-...				
Retail Analysis Sample			Migrated-5636c89e-...				

You can upload selected reports, or you could upload all the reports. You can also reset the upload status to re-upload items.

You also have the option of selecting what to do if a report with the same name exists. You can choose between **Abort**, **Ignore** and **Overwrite**.

If a report with the same name exists:

Abort

Abort

Ignore

Overwrite



TargetName	UploadState	UploadError	TargetGroupName	TargetGroupCreated	UploadedReportId
ClonedFromFullToSh...	Done		Migrated-761310...	bbf0014e-3da0-4...	c0f5ec3b-208c-4...
GTestGrip1Full	Done		Migrated-761310...	bbf0014e-3da0-4...	46e28fe7f3e2-4a...
ClonedFromFullToSh...	Failed	Report with the same name al...	Migrated-761310...	bbf0014e-3da0-4...	

Duplicate report names

If you have a report that has the same name, but you know it is a different report, you will need to change the **TargetName** of the report. You can change the name by manually editing the migration plan XML.

You will need to close the migration tool to make the change and then re-open the tool and the migration plan.

In the above example, one of the cloned reports failed indicating a report with the same name existed. If we go look at the migration plan XML, we will see the following.

```

<ReportMigrationData>
  <PaaSWorkspaceCollectionName>SampleWorkspaceCollection</PaaSWorkspaceCollectionName>
  <PaaSWorkspaceId>4c04147b-d8fc-478b-8dcb-bcf687149823</PaaSWorkspaceId>
  <PaaSReportId>525a8328-b8cc-4f0d-b2cb-c3a9b4ba2efe</PaaSReportId>
  <PaaSReportLastImportTime>1/3/2017 2:10:19 PM</PaaSReportLastImportTime>
  <PaaSReportName>cloned</PaaSReportName>
  <IsPushDataset>false</IsPushDataset>
  <IsBoundToOldDataset>false</IsBoundToOldDataset>
  <PbixPath>C:\MigrationData\SampleResourceGroup\SampleWorkspaceCollection\4c04147b-d8fc-478b-8dcb-
bcf687149823\cloned-525a8328-b8cc-4f0d-b2cb-c3a9b4ba2efe.pbix</PbixPath>
  <ExportState>Done</ExportState>
  <LastExportStatus>OK</LastExportStatus>
  <SaaSTargetGroupName>SampleMigrate</SaaSTargetGroupName>
  <SaaSTargetGroupId>6da6f072-0135-4e6c-bc92-0886d8aeb79d</SaaSTargetGroupId>
  <SaaSTargetReportName>cloned</SaaSTargetReportName>
  <SaaSImportState>Failed</SaaSImportState>
  <SaaSImportError>Report with the same name already exists</SaaSImportError>
</ReportMigrationData>

```

For the failed item, we can change the name of the SaaSTargetReportName.

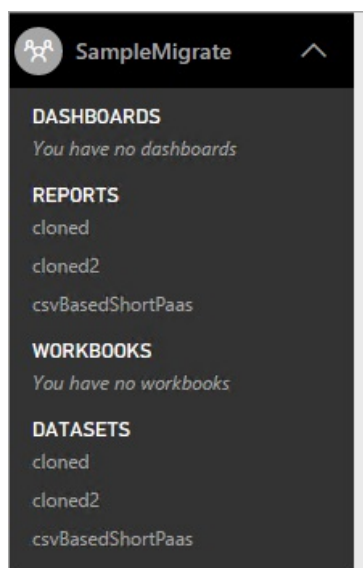
```

<SaaSTargetReportName>cloned2</SaaSTargetReportName>

```

We can then re-open the plan, in the migration tool, and upload the failed report.

Going back to Power BI, we can see that the reports and datasets have been uploaded in the app workspace.



Upload a local PBIX file

You can upload a local version of a Power BI Desktop file. You will have to close the tool, edit the XML and put the full path to your local PBIX in the **PbixPath** property.

```

<PbixPath>[Full Path to PBIX file]</PbixPath>

```

After you have edited the xml, re-open the plan within the migration tool and upload the report.

DirectQuery reports

You will need to update to update the connection string for DirectQuery reports. This can be done within powerbi.com, or you can programmatically query the connection string from Power BI Embedded (Paas). For an example, see [Extract DirectQuery connection string from PaaS report](#).

You can then update the connection string for the dataset within the Power BI service (Saas) and set the credentials

for the data source. You can look at the following examples to see how to do this.

- [Update DirectQuery connection string in SaaS workspace](#)
- [Set DirectQuery credentials in SaaS workspace](#)

Embedding

Now that your reports have been migrated from the Power BI Embedded Azure service to the Power BI service, you can now update your application and begin embedding the reports in this app workspace.

For more information, see [How to migrate Power BI Embedded workspace collection content to Power BI](#).

Next steps

[Embedding with Power BI](#)

[How to migrate Power BI Embedded workspace collection content to Power BI](#)

[Power BI Premium - what is it?](#)

[JavaScript API Git repo](#)

[Power BI C# Git repo](#)

[JavaScript embed sample](#)

[Power BI Premium whitepaper](#)

More questions? [Try asking the Power BI Community](#)

Code snippets for migrating content from Power BI Embedded

1/30/2018 • 4 min to read • [Edit Online](#)

Here are some code snippets of basic operations needed for content migration. For related flows for certain report types, see [How to migrate Power BI Embedded workspace collection content to Power BI](#).

A **migration tool** is available for you to use in order to assist with copying content from Power BI Embedded (PaaS) to the Power BI service (SaaS). Especially if you have a lot of content. For more information, see [Power BI Embedded migration tool](#).

The code below are examples using C# and the [Power BI .NET SDK](#).

Make sure you are using the following namespaces to execute the code snippets below.

```
using Microsoft.IdentityModel.Clients.ActiveDirectory;
using Microsoft.PowerBI.Api.V1;
using Microsoft.PowerBI.Api.V1.Models;
using Microsoft.PowerBI.Api.V2;
using Microsoft.PowerBI.Api.V2.Models;
using Microsoft.Rest;
using Microsoft.Rest.Serialization;
using Newtonsoft.Json;
using Newtonsoft.Json.Linq;
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Net;
using System.Net.Http;
using System.Net.Http.Headers;
using System.Text;
using System.Threading.Tasks;
```

Export report from PaaS workspace

```

// Create a token credentials with "AppKey" type
var credentials = new TokenCredentials(<myAppKey==>, "AppKey");

// Instantiate your Power BI client passing in the required credentials
var client = new PowerBIClient(credentials);

client.BaseUri = new Uri("https://api.powerbi.com");

var response = client.Reports.ExportReportWithHttpMessagesAsync(<myWorkspaceCollectionName>,
<myWorkspaceId>, <myReportId>);

if (response.Result.Response.StatusCode == HttpStatusCode.OK)
{
    var stream = response.Result.Response.Content.ReadAsStreamAsync();

    using (FileStream fileStream = File.Create(@"C:\Migration\myfile.pbix"))
    {
        stream.Result.CopyTo(fileStream);
        fileStream.Close();
    }
}

```

Import report to SaaS workspace

```

AuthenticationContext authContext = new
AuthenticationContext("https://login.windows.net/common/oauth2/authorize");
var PBISaaSAuthResult = authContext.AcquireToken("https://analysis.windows.net/powerbi/api", <myClientId>,
new Uri("urn:ietf:wg:oauth:2.0:oob"), PromptBehavior.Always);
var credentials = new TokenCredentials(PBISaaSAuthResult.AccessToken);
var client = new PowerBIClient(new Uri($"{"https://api.powerbi.com"}"), credentials);
using (var file = File.Open(@"C:\Migration\myfile.pbix", FileMode.Open))
{
    client.Imports.PostImportWithFileInGroup(<mySaaSWorkspaceId>, file, "importedreport", "Abort");
    while (true) ;
}

```

Extract DirectQuery connection string from PaaS report

This is for updating the PBIX after migrating to SaaS.

```

// Extract connection string from PaaS - DirectQuery report
// Create a token credentials with "AppKey" type
var credentials = new TokenCredentials(<myAppKey==>, "AppKey");

// Instantiate your Power BI client passing in the required credentials
var client = new PowerBIClient(credentials);

client.BaseUri = new Uri("https://api.powerbi.com");

var reports = client.Reports.GetReports(<myWorkspaceCollectionName>, <myWorkspaceId>);

Report report = reports.Value.FirstOrDefault(r => string.Equals(r.Id, <myReportId>,
StringComparison.OrdinalIgnoreCase));

var datasource = client.Datasets.GetDatasources(<myWorkspaceCollectionName>, <myWorkspaceId>,
report.DatasetId);

```

Update DirectQuery connection string in SaaS workspace


```

public class ConnectionString
{
    [JsonProperty(PropertyName = "connectionString")]
    public string connection { get; set; }
}

AuthenticationContext authContext = new
AuthenticationContext("https://login.windows.net/common/oauth2/authorize");
var PBISaaSAuthResult = authContext.AcquireToken("https://analysis.windows.net/powerbi/api", <myclient_id>,
new Uri("urn:ietf:wg:oauth:2.0:oob"), PromptBehavior.Always);
var credentials = new TokenCredentials(PBISaaSAuthResult.AccessToken);
var client = new PowerBIClient(new Uri($"https://api.powerbi.com"), credentials);

ConnectionString connection = new ConnectionString() { connection = "data source = <server_name>; initial
catalog = <db_name>; persist security info = True; encrypt = True; trustservercertificate = False" };

client.Datasets.SetAllConnectionsInGroup(<myWorkspaceId>, <dataset_id>, connection);

```

Set DirectQuery credentials in SaaS workspace

In this snippet, we are using unencrypted credentials for simplicity, sending encrypted credentials is supported as well.

```

public class ConnectionString
{
    [JsonProperty(PropertyName = "connectionString")]
    public string connection { get; set; }
}

public class BasicCreds
{
    [JsonProperty(PropertyName = "username")]
    public string user { get; set; }

    [JsonProperty(PropertyName = "password")]
    public string pwd { get; set; }
}

var basicCreds = new BasicCreds() { user = <sqldb_username>, pwd = <sqldb_password> };
var body = new SetCredsRequestBody() { credentialType = "Basic", basicCreds = basicCreds };

var url = string.Format("https://api.powerbi.com/v1.0/myorg/gateways/{0}/datasources/{1}", <gateway_id>,
<datasource_id>);
var request = new HttpRequestMessage(new HttpMethod("PATCH"), url);
// Set authorization header from you acquired Azure AD token
AuthenticationContext authContext = new
AuthenticationContext("https://login.windows.net/common/oauth2/authorize");
var PBISaaSAuthResult = authContext.AcquireToken("https://analysis.windows.net/powerbi/api",
<myclient_id>, new Uri("urn:ietf:wg:oauth:2.0:oob"), PromptBehavior.Always);

request.Headers.Authorization = new AuthenticationHeaderValue("Bearer", PBISaaSAuthResult.AccessToken);

request.Content = new StringContent(JsonConvert.SerializeObject(body), Encoding.UTF8, "application/json");

HttpClient simpleClient = new HttpClient();
var response = await simpleClient.SendAsync(request);

```

Push dataset & report

You will need to rebuild the report for the created dataset.

In this snippet, we assume that the pushable dataset is already in an app workspace within the SaaS environment.

For information about the push API, see [Push data into a Power BI dataset](#).

```

var credentials = new TokenCredentials(<Your WSC access key>, "AppKey");

// Instantiate your Power BI client passing in the required credentials
var client = new Microsoft.PowerBI.Api.V1.PowerBIClient(credentials);
client.BaseUri = new Uri("https://api.powerbi.com");

// step 1 -> create dummy dataset at PaaS worksapce
var fileStream = File.OpenRead(<Path to your dummy dataset>);
var import = client.Imports.PostImportWithFileAsync(<Your WSC NAME>, <Your workspace ID>, fileStream,
"dummyDataset");
while (import.Result.ImportState != "Succeeded" && import.Result.ImportState != "Failed")
{
    import = client.Imports.GetImportByIdAsync(<Your WSC NAME>, <Your workspace ID>, import.Result.Id);
    Thread.Sleep(1000);
}
var dummyDatasetID = import.Result.Datasets[0].Id;

// step 2 -> clone the pushable dataset and rebind to dummy dataset
var cloneInfo = new Microsoft.PowerBI.Api.V1.Models.CloneReportRequest("pushableReportClone",null,
dummyDatasetID);
var clone = client.Reports.CloneReportAsync(<Your WSC NAME>, <Your workspace ID>, <Your pushable report
ID>, cloneInfo);
var pushableReportCloneID = clone.Result.Id;

// step 3 -> Download the push API clone report with the dummy dataset
var response = client.Reports.ExportReportWithHttpMessagesAsync(<Your WSC NAME>, <Your workspace ID>,
pushableReportCloneID);
if (response.Result.Response.StatusCode == HttpStatusCode.OK)
{
    var stream = response.Result.Response.Content.ReadAsStreamAsync();
    using (fileStream = File.Create(@"C:\Migration\PushAPIReport.pbix"))
    {
        stream.Result.CopyTo(fileStream);
        fileStream.Close();
    }
}

// step 4 -> Upload dummy PBIX to SaaS workspace
AuthenticationContext authContext = new
AuthenticationContext("https://login.windows.net/common/oauth2/authorize");
var PBISaaSAuthResult = authContext.AcquireToken("https://analysis.windows.net/powerbi/api", <Your client
ID>, new Uri("urn:ietf:wg:oauth:2.0:oob"), PromptBehavior.Always);
var credentialsSaaS = new TokenCredentials(PBISaaSAuthResult.AccessToken);
var clientSaaS = new Microsoft.PowerBI.Api.V2.PowerBIClient(new Uri($"{"https://api.powerbi.com"}"),
credentialsSaaS);
using (var file = File.Open(@"C:\Migration\PushAPIReport.pbix", FileMode.Open))
{
    var importSaaS = clientSaaS.Imports.PostImportWithFileAsyncInGroup(<Your GroupID>, file,
"importedreport1", "Abort");
    while (importSaaS.Result.ImportState != "Succeeded" && importSaaS.Result.ImportState != "Failed")
    {
        importSaaS = clientSaaS.Imports.GetImportByIdAsync(importSaaS.Result.Id);
        Thread.Sleep(1000);
    }
    var importedreport1ID = importSaaS.Result.Reports[0].Id;

    // step 5 -> Rebind report to "real" push api dataset
    var rebindInfoSaaS = new Microsoft.PowerBI.Api.V2.Models.RebindReportRequest(<Your pushable dataset
ID at power bi>);
    var rebindSaaS = clientSaaS.Reports.RebindReportInGroupWithHttpMessagesAsync(<Your GroupID>,
importedreport1ID, rebindInfoSaaS);
}
}

```

Next steps

[Power BI Embedded migration tool](#)

[Embedding with Power BI](#)

[How to migrate Power BI Embedded workspace collection content to Power BI](#)

[How to embed your Power BI dashboards, reports and tiles](#)

[Power BI Premium - what is it?](#)

[JavaScript API Git repo](#)

[Power BI C# Git repo](#)

[JavaScript embed sample](#)

[Power BI Premium whitepaper](#)

More questions? Try asking the [Power BI Community](#)

Troubleshooting your embedded application

1/30/2018 • 3 min to read • [Edit Online](#)

This article discusses some common issues you may encounter when embedding content from Power BI.

Tools for troubleshooting

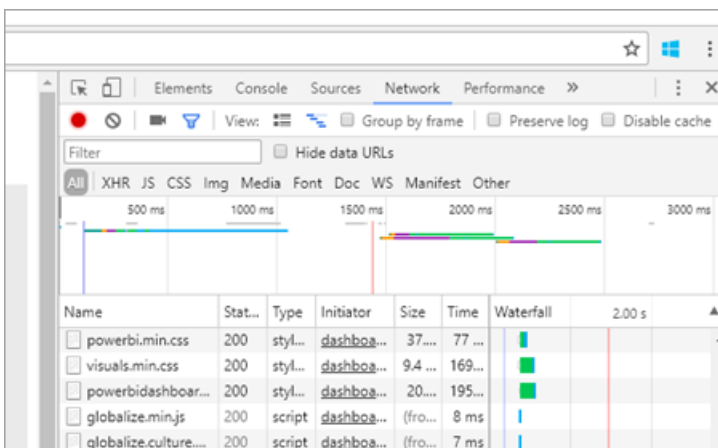
Fiddler Trace

Fiddler is a free tool from Telerik that monitors HTTP traffic. You can see the back and forth with the Power BI APIs from the client machine. This may show errors and other related information.

8	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/gateways/discover
9	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/dmm/aggregateDataSource/147516?testConnection=true
11	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/content/packages/147029/refresh/
13	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
14	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe
16	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/dashboard/95433/tiles
17	200	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/metadata/models/147516/?modelOptions=Default
18	-	HTTPS	wabi-west-us-redirect.analysis.windows.net	/powerbi/refresh/subscribe

F12 in Browser for front end debugging

F12 will launch the developer window within your browser. This provides the ability to look at network traffic and other information.



Extracting error details from Power BI response

This code snippet shows how to extract the error details from HTTP exception:

```
public static string GetExceptionText(this HttpOperationException exc)
{
    var errorText = string.Format("Request: {0}\r\nStatus: {1} ({2})\r\nResponse: {3}",
        exc.Request.Content, exc.Response.StatusCode, (int)exc.Response.StatusCode, exc.Response.Content);
    if (exc.Response.Headers.ContainsKey("RequestId"))
    {
        var requestId = exc.Response.Headers["RequestId"].FirstOrDefault();
        errorText += string.Format("\r\nRequestId: {0}", requestId);
    }

    return errorText;
}
```

We recommend logging the request ids (and error details for troubleshooting). Please provide the request id when approaching Microsoft support.

App registration

App registration failure

Error messages within the Azure portal or the Power BI app registration page will mention insufficient privileges. In order to register an application, you must be an admin in the Azure AD tenant or application registrations must be enabled for non-admin users.

Power BI Service does not appear in Azure portal when registering a new App

At least one user must be signed up for Power BI. If you do not see **Power BI Service** listed within the API list, no user is signed up for Power BI.

REST API

API call returning 401

A fiddler capture may be required to investigate further. The required permission scope may be missing for the registered application within Azure AD. Verify the required scope is present within the app registration for Azure AD within the Azure portal.

API call returning 403

A fiddler capture may be required to investigate further. There could be several reason for a 403 error.

- The Azure AD auth token expired.
- The authenticated user is not a member of the group (app workspace).
- The authenticated user is not an admin of the group (app workspace).
- The authorization header may not be listed correctly. Make sure there are no typos.

The backend of the application may need to refresh the auth token before calling GenerateToken.

```
GET https://wabi-us-north-central-redirect.analysis.windows.net/metadata/cluster HTTP/1.1
Host: wabi-us-north-central-redirect.analysis.windows.net
...
Authorization: Bearer eyJ0eXAiOi...
...

HTTP/1.1 403 Forbidden
...

{"error":{"code":"TokenExpired","message":"Access token has expired, resubmit with a new access token"}}
```

Generate token fails when providing effective identity

GenerateToken can fail, with effective identity supplied, for a few different reasons.

- Dataset does not support effective identity
- Username was not provided
- Role was not provided
- DatasetId was not provided
- User doesn't have the correct permissions

To verify which it is, try the following.

- Execute the [get dataset](#). Is the property `IsEffectiveldentityRequired` true?
- Username is mandatory for any `Effectiveldentity`.
- If `IsEffectiveldentityRolesRequired` is true, Role is required.

- DatasetId is mandatory for any EffectivenessIdentity.
- For Analysis Services, the master user has to be a gateway admin.

Data sources

ISV wants to have different credentials for the same data source

A data source can have a single set of credentials for one master user. If you need to use different credentials, create additional master users. Then, assign the different credentials in each of the master users context, and embed using the Azure AD token of that user.

Content rendering

Rendering, or consumption, of embedded content fails or times out

Make sure the embed token did not expire. Make sure you are checking the embed token expiration and refreshing it. For more information, see [Refresh token using JavaScript SDK](#).

Report or dashboard does not load

If the user is unable to see the report or dashboard, make sure the report or dashboard loads correctly within powerbi.com. The report or dashboard will not work within your application if it doesn't load within powerbi.com.

Report or dashboard is performing slowly

Open the file from Power BI Desktop, or within powerbi.com, and verify that performance is acceptable to rule out issues with your application or the embedding apis.

For answers to frequently asked questions, see the [Power BI Embedded FAQ](#).

More questions? [Try the Power BI Community](#)

Frequently asked questions about Power BI Embedded

1/30/2018 • 8 min to read • [Edit Online](#)

- If you have other questions, [try asking the Power BI Community](#).
- Still have an issue? Please visit the [Power BI support page](#).

General

What is Power BI Embedded?

Microsoft Power BI Embedded allows application developers to embed stunning, fully interactive reports, dashboards and tiles into applications without the time and expense of building their own data visualizations and controls from the ground-up.

Who is the target audience for Power BI Embedded?

Developers and software companies making their own applications referred to as independent software vendors (ISVs).

How is Power BI Embedded different from Power BI the service?

Power BI Embedded is intended for ISVs or developers who are building applications and want to embed visuals into those applications to help their customers make decisions without building an analytics' solution from the ground up. Embedded analytics enables business users to access the business data and perform queries to generate insights using this data within the application.

Power BI, on the other hand, is a software-as-a-service analytics solution that gives organizations a single view of their most critical business data.

What is the difference between Power BI Premium and Power BI Embedded?

Power BI Premium is capacity geared toward enterprises, who want a complete BI solution that provides a single view of its organization, partners, customers, and suppliers. Power BI Premium helps your organization make decisions. Power BI Premium is a SaaS product and comes with the ability for users to consume content through the Power BI portal, mobile app, and through internally developed apps.

Power BI Embedded is for ISVs or developers who are building applications and want to embed visuals into those applications. Power BI Embedded helps your customers make decisions because Power BI Embedded is for application developers, customers of that application can consume content stored on Power BI Embedded capacity, including anyone inside or outside the organization. Power BI Embedded capacity content cannot be shared through one-click publish to Web or one-click publish to SharePoint, and it does not support SSRS reports.

What is the Microsoft recommendation for when a customer should buy Power BI Premium vs Power BI Embedded?

The recommendation of Microsoft is that enterprises buy Power BI Premium, an enterprise-grade, self-service cloud BI solution, and ISVs buy Power BI Embedded, cloud-powered embedded analytics components. However, there are no restrictions on which product a customer can buy.

There may be some cases where an ISV (typically large) wants to use a P SKU to get the additional benefits of the pre-packaged Power BI service within their organization as well as embed in their applications. And of course, some Enterprises may decide to use A SKUs in Azure if they are only interested in building line of business applications and embedding analytics into them and are not interested in using the pre-packaged Power BI service.

How many embed tokens can I create?

Embed tokens with PRO license are intended for development and dev testing, so the number of embed tokens a Power BI master account can generate is limited. You must [purchase a capacity](#) for embedding in a production environment. There is no limit to how many embed tokens you can generate when a capacity is purchased.

When will Power BI Embedded be available in Azure?

Power BI Embedded is now available.

Technical

What is the difference between the A SKUs in Azure and EM SKUs in Office 365?

PowerBI.com is an enterprise solution that includes many capabilities like social collaboration, email subscription, etc. in a Software as a Service offering

Power BI Embedded is a set of APIs available for developers to create an embedded analytics solution in a Platform as a Service offering. For the Embedded analytics scenario, PowerBI.com should be used to help ISVs and developers manage their embedded analytics solution content and tenant level settings.

Here is a partial list of differences you may use with each.

FEATURE	POWER BI EMBEDDED (A SKUS)	POWER BI PREMIUM CAPACITY (EM SKUS)
Embed artifacts from a Power BI App workspaces	Azure capacity	Office 365 capacity
Power BI license required to consume reports	No	Yes
Consume Power BI reports in an Embedded application	Yes	Yes
Consume Power BI reports in SharePoint	No	Yes
Consume Power BI reports in Teams	No	Yes

Power BI now offers three SKUs for embedding: A SKUs, EM SKUs and P SKUs. Which one should I purchase for my scenario?

	A SKU (POWER BI EMBEDDED)	EM SKU (POWER BI PREMIUM)	P SKU (POWER BI PREMIUM)
Purchase	Azure portal	Office	Office
Use cases	* Embed content in your own application	* Embed content in your own application * Share content with Power BI FREE users outside PowerBI.com and embed in other SaaS applications (SharePoint, Teams)	* Embed content in your own application * Share content with Power BI FREE users outside PowerBI.com and embed in other SaaS applications (SharePoint, Teams) * Share content with Power BI FREE users through PowerBI.com
Billing	Hourly	Monthly	Monthly

	A SKU (POWER BI EMBEDDED)	EM SKU (POWER BI PREMIUM)	P SKU (POWER BI PREMIUM)
Commitment	No commitment	Yearly	Monthly/Yearly
Differentiation	Full elasticity- can scale up/down, pause/ resume resources in Azure portal or through API	Can be used to embed content in SharePoint Online and Microsoft Teams	Combine embedding in applications and use the Power BI Service in the same capacity

What are the prerequisites to create a PBIE capacity in Azure?

- You need to sign in to your organizational directory (MSA accounts are not supported).
- You need to have a Power BI tenant, i.e., at least one user in your directory has signed up to Power BI.
- You need to have an Azure subscription in your organizational directory.

How can I monitor capacity consumption?

Monitoring through Azure is on the near-term roadmap. The Azure resource, Power BI Embedded, will include monitoring KPIs that will show health, and usage.

Will my capacity scale automatically to adjust to the consumption of my app?

While there is no automated scaling now, all the APIs are available to scale at any time.

What is the authentication model for Power BI Embedded?

Power BI Embedded will continue to use Azure AD for authentication of the master user (a designated Power BI Pro licensed user), authenticating the application inside Power BI.

The authentication and authorization of the application users will be implemented by the ISV, the ISV can implement their own authentication for their applications.

If you already have an Azure AD tenant, you can use your existing directory, or you can create a new Azure AD tenant for your embedded application content security.

How is Power BI Embedded different from other Azure services?

The ISV/developer must have a Power BI account before the purchase of Power BI Embedded in Azure. Your Power BI Embedded deploy region is determined by your Power BI account. Manage your Power BI Embedded resource in Azure to:

- Scale up/down
- Add capacity admins
- Pause/resume of service

Use PowerBI.com to assign/un-assign workspaces to your Power BI Embedded capacity.

What deploy regions are supported?

Australia Southeast, Brazil South, Canada Central, East US 2, India West, Japan East, North Central US, North Europe, South Central US, Southeast Asia, UK South, West Europe, West US, and West US 2.

Licensing

How do I purchase Power BI Embedded?

Power BI Embedded is available through Azure.

How Power BI Embedded be metered?

Power BI Embedded will have an hourly meter.

How does the usage of Power BI Embedded show up on my bill?

Power BI Embedded bills on a predictable hourly rate based on the type of node(s) deployed. Note that as long as your resource is active, you will be billed even if there is no usage. To stop being billed you need to actively pause your resource. Pausing can be done through Azure or through ARM APIs.

What happens if I already purchased Power BI Premium and now I want some of the benefits of Power BI Embedded in Azure?

Customers will continue to pay for any existing Power BI Premium purchases until the end of their current agreement term and then may switch their Power BI Premium purchases as necessary at that point.

Do I still have to buy Power BI Premium to get access to Power BI Embedded?

No, Power BI Embedded includes the Azure based capacity that you need to deploy and distribute your solution to customers.

Who needs a Power BI Pro license for Power BI Embedded and why?

It is required that any analyst that needs to add reports to a Power BI workspace, any developer that requires use of the REST APIs, any tenant admin that needs to manage the Power BI tenant and capacity will need a Power BI Pro license.

Because Power BI Embedded allows use of the Power BI portal for managing and validating embedded content, the Power BI Pro license is required to authenticate the App inside PowerBI.com to get access to the reports in the right repositories.

Can I get started for free?

Yes, you can use your [Azure credits](#) for Power BI Embedded.

Can I get a trial experience for Power BI Embedded in Azure?

Since Power BI Embedded is a part of Azure it is possible to use the service with the [\\$200 credit received when signing up for Azure](#).

What's the purchase commitment for Power BI Embedded?

Customers may change their usage on an hourly basis. There is no monthly or annual commitment for the Power BI Embedded service.

Where is Power BI Embedded available? US Government? Germany? China? What is the timing?

Power BI Embedded will be available in Azure commercial clouds at GA. Sovereign cloud availability will be added in the future.

Is Power BI Embedded available for non-profits and educational?

Non-profit and educational entities can purchase Azure. There is no special pricing for these types of customers in Azure.

More questions? [Try the Power BI Community](#)

Use developer tools to create custom visuals

1/30/2018 • 10 min to read • [Edit Online](#)

Custom visuals allow you to meet your users' needs and match your app's design. Learn how to create a custom visual for Power BI using the developer tools.

NOTE

You can use this document to get up and running. For more in-depth information, see the reference information within the [Power BI Visuals git repo](#).

Requirements

- NodeJS 4.0+ Required (5.0 or later recommended) [Download NodeJS](#)

Install NodeJS and the Power BI tools

In order to create a custom visual, you will need to install NodeJS. NodeJS is required to run the command line tools.

1. Download and install [NodeJS](#). Version 4.0 or later is required but it is recommended to have 5.0 or later.
2. Install the command line tools. Run the following command from a command prompt.

```
npm install -g powerbi-visuals-tools
```

3. You can confirm that the tools are installed by running the following command without any parameters.

```
pbviz
```

You should see the help output.

```

+syyso+/
oms/+osyhdhyso/
ym/      /+oshddhys+/
ym/      /+oyhddhyo+/
ym/      /osyhdho
ym/      sm+
ym/      yddy      om+
ym/      shho /mmm/ om+
/      oys/ +mmm /mmm/ om+
oso ommh +mmm /mmm/ om+
ymmy smmh +mmm /mmm/ om+
ymmy smmh +mmm /mmm/ om+
ymmy smmh +mmm /mmm/ om+
+dmd+ smmh +mmm /mmm/ om+
      /hmdo +mmm /mmm/ /so+/ym/
      /dmh /mmm /osyhhy/
      //      dmmd
      ++

```

PowerBI Custom Visual Tool

Usage: pbiviz [options] [command]

Commands:

```

new [name]      Create a new visual
info           Display info about the current visual
start         Start the current visual
package       Package the current visual into a pbiviz file
update [version] Updates the api definitions and schemas in the current visual. Changes the version
if specified
help [cmd]     display help for [cmd]

```

Options:

```

-h, --help      output usage information
-V, --version   output the version number
--install-cert  Install localhost certificate

```


Server Certificate setup

To enable a live preview of your visual, a trusted https server is needed. Before you can start, you will need to install an SSL certificate which will allow visual assets to load in your web browser.

NOTE

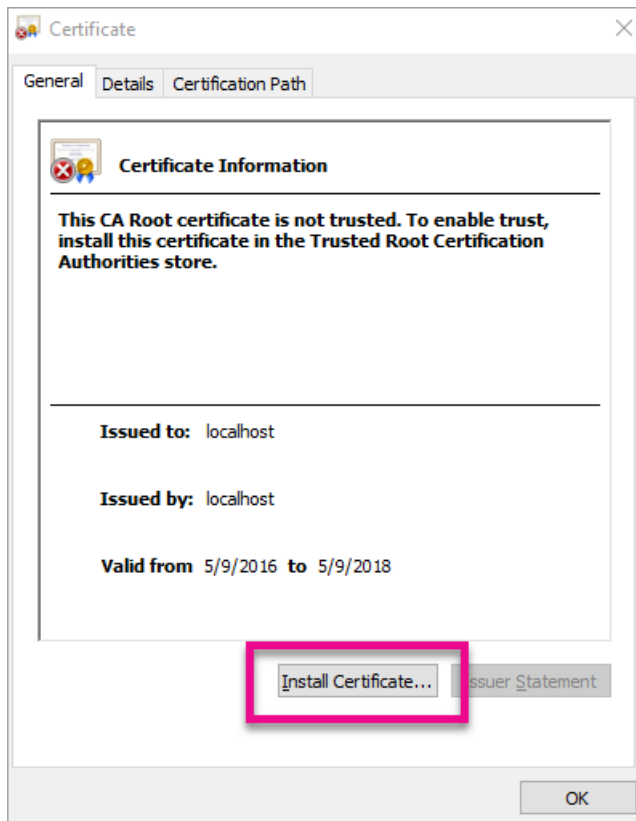
This is a one-time setup for your developer workstation.

To *add* a certificate, run the following command.

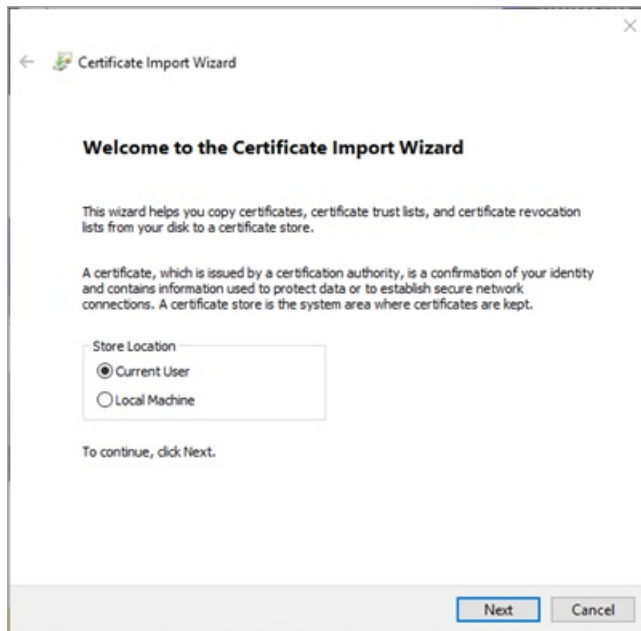
```
pbiviz --install-cert
```

Windows OS

1. Select **Install Certificate...**

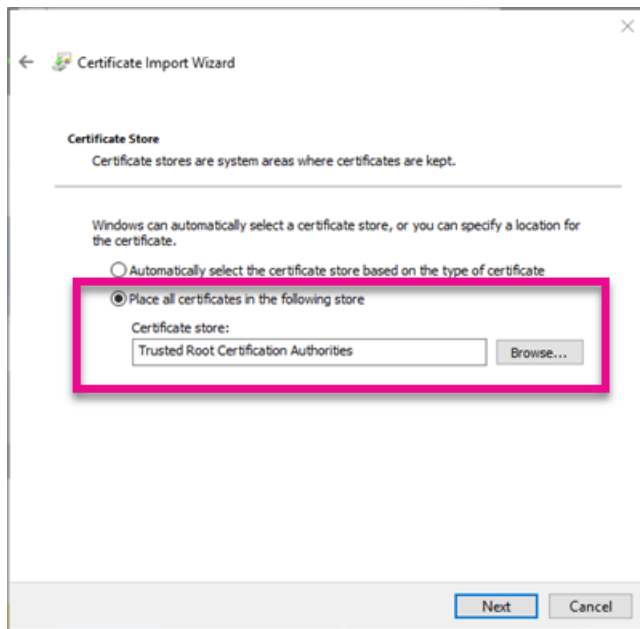


2. Select **Current User** and then select **Next**.

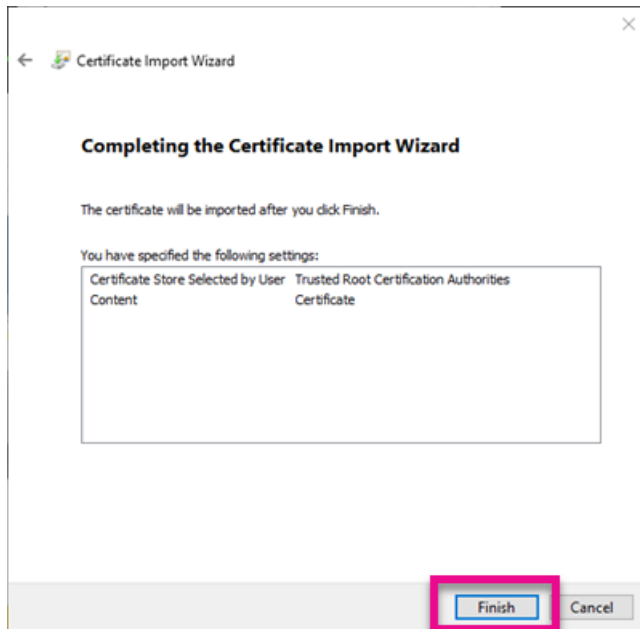


3. Select **Place all certificate in the following store** and select **Browse...**

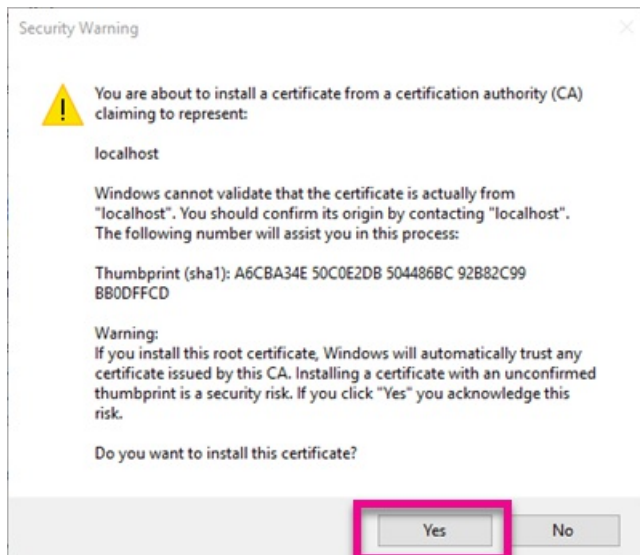
4. Select **Trusted Root Certification Authorities** and then select **OK**. Select **Next**.



5. Select **Finish**.



6. Select **Yes** on the security warning dialog.



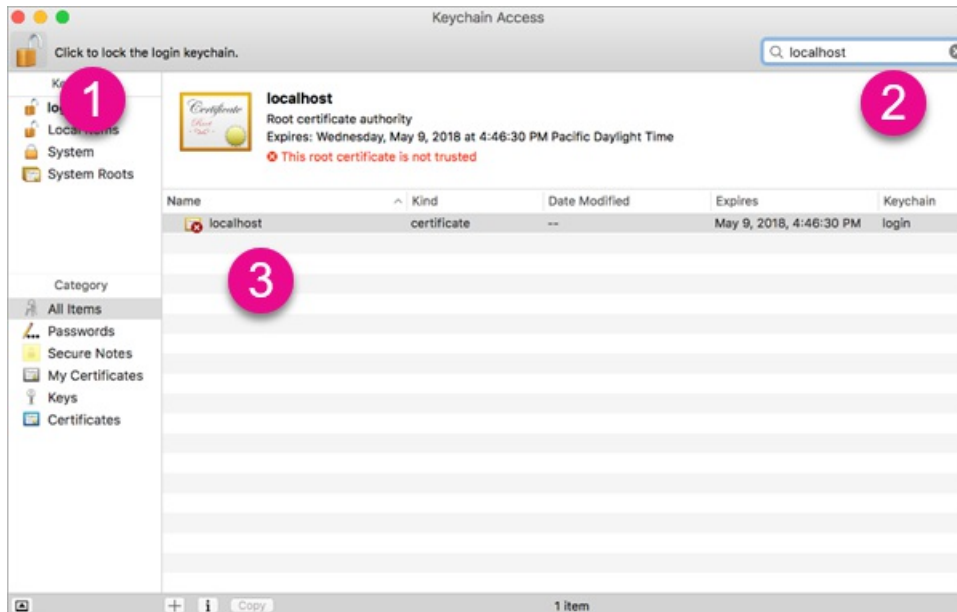
7. Close any browsers that you have open.

NOTE

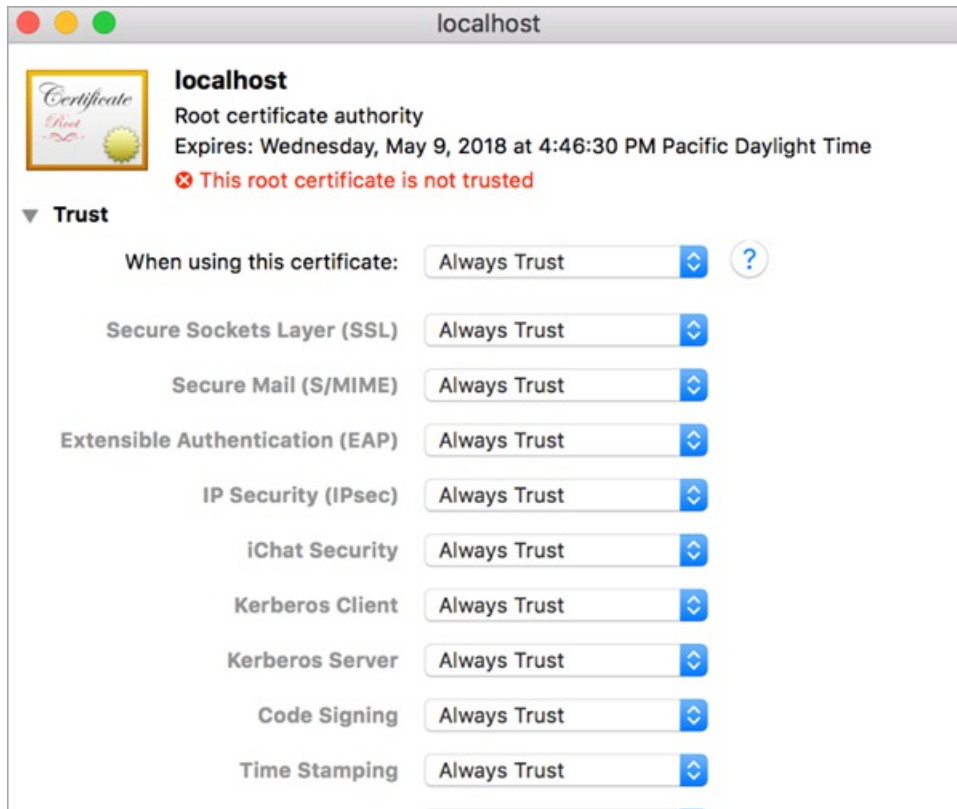
If the certificate is not recognized, you may need to restart your computer.

OSX

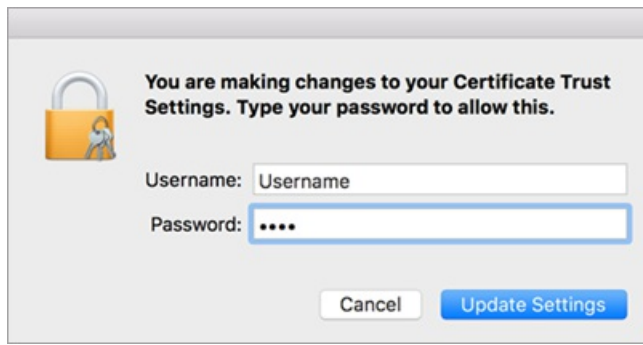
1. If the lock in the upper left is locked, select it to unlock. Search for *localhost* and double click on the certificate.



2. Select **Always Trust** and close the window.



3. Enter your username and password. Select **Update Settings**.



4. Close any browsers that you have open.

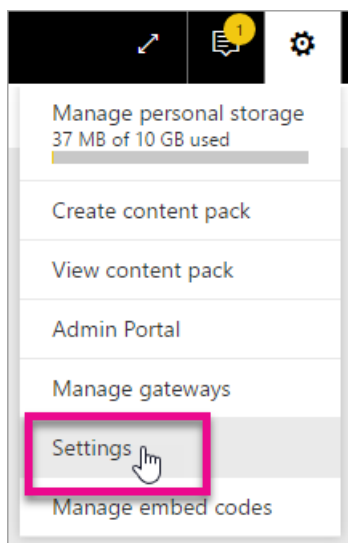
NOTE

If the certificate is not recognized, you may need to restart your computer.

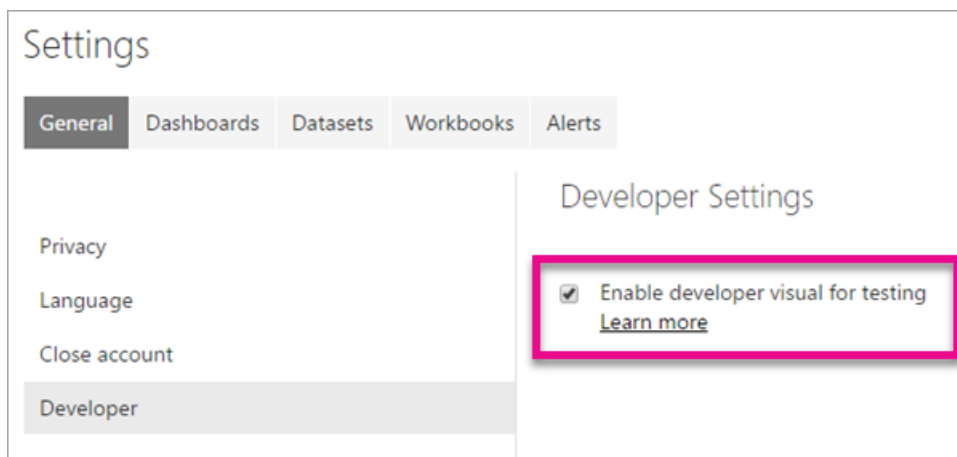
Enable live preview of developer visual

To enable a live preview of your custom visual, follow these steps. This allows the visual to be used within the Power BI service when editing reports.

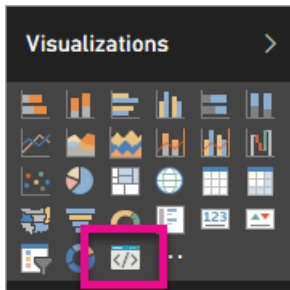
1. Browse and sign into app.powerbi.com.
2. Select the **gear icon** and then select **Settings**.



3. Select **Developer** and then select **Enable developer visual for testing**.



4. Select the **Developer Visual** in the **Visualization** pane.



NOTE

This requires that you have run `pbiviz start` from the visual folder on your development machine. For more information on creating your visual, see [Create a new visual](#) in this article.

5. Select the visual in the report canvas. You can bind data in the same way you do other visuals.

You can now begin developing your visual.

Create a new visual

You can create a new visual project by running the following command.

```
pbiviz new My Visual name
```

You can replace *My Visual Name* with the name you want to give the visual. This can be changed later by modifying the `name` and `displayName` fields within the generated `pbiviz.json` file.

This command will create a new folder in the direct where the command was run. It will generate a basic starter template for your visual. Once the command completes, you can open the directory and use your favorite editor to start working on your new visual.

Testing your visual in Power BI

You can test your visual within the Power BI service within reports and dashboards.

Running your visual

You can run your visual by doing the following.

1. Open a prompt.
2. Change your directory to be your visual folder. This is the folder that contains the `pbiviz.json` file.
3. Run the following command.

```
pbiviz start
```

```
D:\src\Visuals\myVisual>pbiviz start
info Building visual...
done build complete

info Starting server...
info Server listening on port 8080.
```

If you are in the wrong location, you will see an error similar to the following.

```

error LOAD ERROR Error: pbviz.json not found. You must be in the root of a visual project to run this
command.
    at e (C:\Users\[user]\AppData\Roaming\npm\node_modules\powerbi-visuals-
tools\lib\VisualPackage.js:67:35)
    at Function.loadVisualPackage (C:\Users\[user]\AppData\Roaming\npm\node_modules\powerbi-visuals-
tools\lib\VisualPackage.js:62:16)
    at Object.<anonymous> (C:\Users\[user]\AppData\Roaming\npm\node_modules\powerbi-visuals-
tools\bin\pbviz-start.js:43:15)
    at Module._compile (module.js:556:32)
    at Object.Module._extensions..js (module.js:565:10)
    at Module.load (module.js:473:32)
    at tryModuleLoad (module.js:432:12)
    at Function.Module._load (module.js:424:3)
    at Module.runMain (module.js:590:10)
    at run (bootstrap_node.js:394:7)

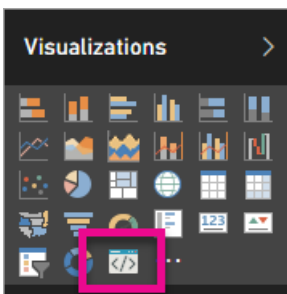
```

Viewing your visual in Power BI

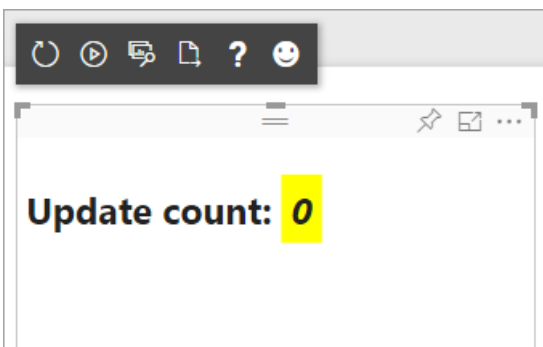
To view your visual in a report, go to that report and select the visual within the **Visualizations** pane.

NOTE

You must run the `pbviz start` command before doing this as described in the [Running your visual](#) section.



You will then see the starter template for the visual.



TOOLBAR ITEM	DESCRIPTION
Refresh visual	Manually refresh the visual if auto reload is disabled.
Toggle auto reload	When turned on, the visual will automatically update every time you save your visual file.
Show dataview	Shows the visual's underlying data view for debugging
Get help	Documentation within GitHub

TOOLBAR ITEM	DESCRIPTION
Send feedback	Let us know if there is anyway we can improve the experience! (Requires GitHub account)

Package your visual for use in Power BI Desktop and distribution

Before you can load your visual into [Power BI Desktop](#), or share it with the community in the [Power BI Visual gallery](#), you'll need to generate a `pbiviz` file.

You can package your visual by doing the following.

1. Open a prompt.
2. Change your directory to be your visual folder. This is the folder that contains the `pbiviz.json` file.
3. Run the following command.

```
pbiviz package
```

This command will create a `pbiviz` in the `dist/` directory of your visual project. If there is already a `pbiviz` file present, it will be overwritten.

Updating the visuals API version

When you create a visual using `pbiviz new`, a copy of the appropriate API type definitions and json schemas are copied into your visual's directory. You can use the `pbiviz update` command to update these files if needed. This can be useful if we release a fix for a past API version or if you want to update to the latest API version.

Updating your existing API version

If we release an update to an existing API, you can get the latest version by doing the following.

```
#Update your version of pbiviz
npm install -g powerbi-visuals-tools

#Run update from the root of your visual project, where pbiviz.json is located
pbiviz update
```

This will download the latest tools from npm which include the updated type definitions and schemas. Using `pbiviz update` will overwrite the `apiVersion` property in your `pbiviz.json` file with the latest version.

Upgrading to a different API version

You can update to a different API version by using the same steps as mentioned above. You can explicitly specify the API version you want to use.

```
#Update your version of pbiviz
npm install -g powerbi-visuals-tools

#Run update from the root of your visual project, where pbiviz.json is located
pbiviz update 1.2.0
```

This would update your visual to API version 1.2.0. You can replace `1.2.0` with whatever version you want to use.

WARNING

The default API version used by the tools will always be the stable version of the API. Any versions later than the default API version are unstable and subject to change. They may have unexpected behaviors and behave differently between the Power BI service and Power BI Desktop. For the current stable API version, see the [change log](#). For more information about pre-release versions, see the [roadmap](#).

Inside the visual project

Your visual project is the folder that gets created when you run the `pbviz new` command.

File structure

ITEM	DESCRIPTION
assets/	Used to store visual assets (icon, screenshots, etc).
dist/	When you run <code>pbviz package</code> , the pbviz file will be generated here.
src/	Typescript code for your visual.
style/	Less styles for your visual.
.gitignore	Tells git to ignore files that shouldn't be tracked in the repository.
capabilities.json	Used to define the capabilities of your visual.
package.json	Used by npm to manage modules.
pbviz.json	Main configuration file.
tsconfig.json	Typescript compiler settings. Learn more about tsconfig.json .

pbviz.json

This file is the main configuration file for your visual. It contains metadata, as well as information about your files, needed to build your visual.

```

{
  "visual": {
    "name": "myVisual", // internal visual name (should not contain spaces)
    "displayName": "My Visual!", // visual name displayed to user (used in gallery)
    "guid": "PBI_CV_xxxxxxx", // a unique id for this visual MUST BE UNIQUE
    "visualClassName": "Visual" // the entry class for your visual
    "version": "1.0.0", // visual version. Should be semantic version (increment if you update the
visual)
    "description": "", // description used in gallery
    "supportUrl": "", // url to where users can get support for this visual
    "githubUrl": "" // url to the source in github (if applicable)
  },
  "apiVersion": "1.0.0", //API version this visual was created with
  "author": {
    "name": "", // your name
    "email": "" // your e-mail
  },
  "assets": {
    "icon": "assets/icon.png" // relative path to your icon file (20x20 png)
  },
  "style": "style/visual.less", // relative path to your less file
  "capabilities": "capabilities.json" // relative path to your capabilities definition
}

```

Visual source (TypeScript)

Visual code should be written in TypeScript, which is a superset of JavaScript that support more advanced features and early access to ES6/ES7 functionality.

All TypeScript files should be stored in the `src/` directory and added to the `files` array in `tsconfig.json`. This allows the TypeScript compiler to load them and in what order.

When your visual is built, all of the TypeScript will be compiled into a single JavaScript file. This allows you to reference exported elements from other files without needing to manually `require` them as long as both files are listed in the `tsconfig`.

You can create as many files and classes as you need to create your visual.

Learn more about [TypeScript](#).

Visual style (Less)

Visual styling is handled using cascading style sheets (CSS). For your convenience, we use the Less pre-compiler which supports some advanced features such as nesting, variables, mixins, conditions, loops, etc. If you don't want to use any of these features, you can just write plain CSS in the Less file.

All Less files should be stored in the `style/` directory. The file specified under the `style` field within your `pbiviz.json` file will be loaded. Any additional files should be loaded using `@import`.

Learn more about [Less](#).

Debugging

For tips about debugging your custom visual, see the [debugging guide](#).

Submit your visual to AppSource

You can list your visual for others to use but submitting it to AppSource. For more information on this process, see [publish custom visuals to AppSource](#).

Troubleshooting

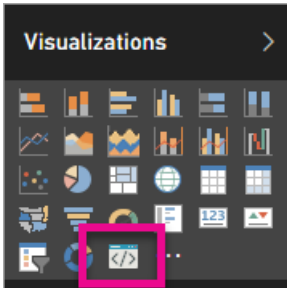
Pbiviz command not found (or similar errors)

If you run `pbiviz` in your terminal / command line, you should see the help screen. If not, it is not installed correctly. Make sure you have at least the 4.0 version of NodeJS installed.

For more information, see [Install NodeJS and the Power BI tools...](#)

Cannot find the debug visual in the Visualizations tab

The debug visual looks like a prompt icon within the **Visualizations** tab.



If you don't see it, make sure you have enabled it within the Power BI settings.

NOTE

The debug visual is currently only available in the Power BI service and not in Power BI Desktop or the mobile app. The packaged visual will still work everywhere.

For more information, see [Enable live preview of developer visual...](#)

Can't contact visual server

Run the visual server with the command `pbiviz start` in your terminal / command line from the root of your visual project. If the server is running, it is likely that your SSL certificates weren't installed correctly.

For more information, see [Running your visual](#) or [Server certificate setup](#).

Next steps

[Visualizations in Power BI](#)

[Custom Visualizations in Power BI](#)

[Publish custom visuals to the Office store](#)

[TypeScript](#)

[Less CSS](#)

More questions? [Try asking the Power BI Community](#)

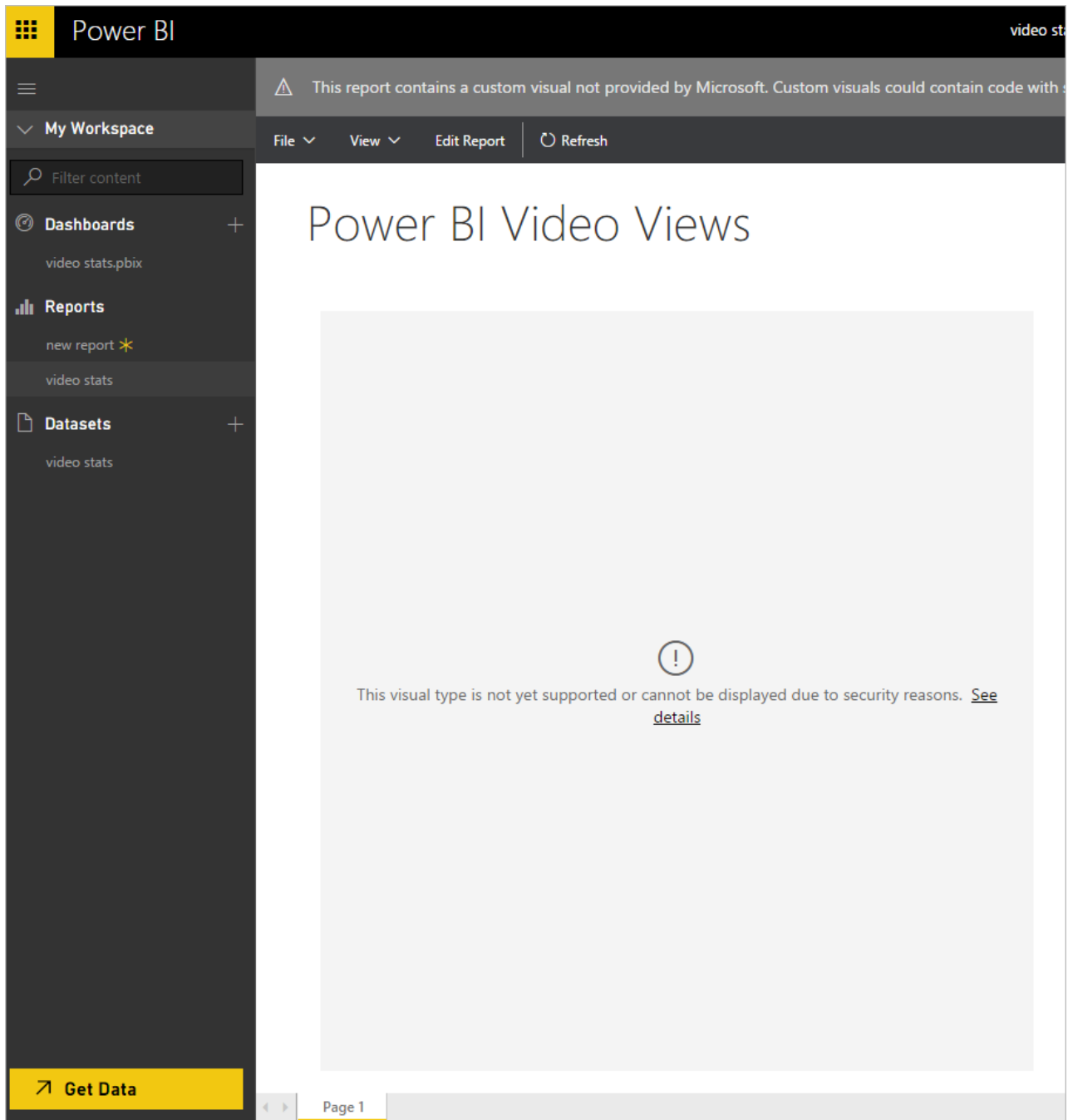
Review custom visuals for security and privacy

1/30/2018 • 5 min to read • [Edit Online](#)

Before you enable a custom visual, you should review that visual for security and privacy to make sure it will fit your organization's standards.

Enable a custom visual

A custom visual in the report is disabled until you choose **Enable custom visuals** as shown below.



Considerations before you enable a custom visual

WARNING

A custom visual could contain code with security or privacy risks; therefore, a custom visual in the report is disabled until you choose Enable custom visuals. Here are some considerations to decide whether to enable a custom visual:

1. Ensure you trust the author and the source of the custom visuals used in the report
2. If you are unsure what to do, you should reach out to your IT team to weigh in on whether you should enable custom visuals for reports you view.
3. If someone shares a report with you that contains a custom visual, even if they're a close co-worker, do not feel obligated to enable the custom visual. It's okay to step back and consider whether it is essential to the task at hand. It's always okay to ask someone to provide you a report without custom visuals if you don't feel confident about the custom visual.

Security best practices for IT Professionals to enable a custom visual

WARNING

A custom visual could contain code with security or privacy risks; therefore, a custom visual in the report is disabled until you choose Enable custom visuals. There are several best practices you can follow to evaluate a custom visual for security and privacy.

1. Implement a vetting process for custom visuals within the organization. Vetted custom visuals would be shared with internal users through an internal website, such as a SharePoint document library or OneNote document.
2. Provide guidance for business users on appropriate use of custom visuals and an email group for business users to send security and privacy questions to.
3. Evaluate the JavaScript code in the custom visual pbiviz file.

To evaluate the JavaScript code in a custom visual

A custom visual uses JavaScript and can therefore contain security or privacy risks. If you receive a custom visual or a pbix file with a custom visual from an unknown source, you may want to look at the JavaScript to see if it is safe.

To evaluate the JavaScript code in a custom visual, extract the custom visual code. Here's how to extract the code:

1. Save the .pbiviz file to a folder.
2. Rename the file to a .zip file.
3. Extract the zip file to a local folder.

Custom visual file contents

The following are the contents of a pbiviz file:

FILE	DESCRIPTION
./package.json	A manifest file that indicates which files to load for the custom visual.
./resources	Contains the CSS, TypeScript, and JavaScript used by the custom visual.
./resources/<name>	<name> is the name of the custom visual.

FILE	DESCRIPTION
./resources/<name>.css	The css resource file for the custom visual.
./resources/<name>.js	The code that executes when a user clicks Enable custom visuals or after a user Imports a custom visual. Warning JavaScript code could contain security or privacy risks.
./resources/<name>.ts	The JavaScript source code for the visual in TypeScript format. Warning JavaScript or TypeScript code could contain security or privacy risks.
./resources/<name>.png	The icon shown to the user for the visual.

After you extract the pbviz file, you can evaluate the code. Here are some best practices and threats to look for.

Best practices to evaluate the JavaScript or TypeScript code

JavaScript or **TypeScript** code could contain security or privacy risks. Here are some best practices and threats to look for.

Best practices to evaluate JavaScript code

- Always evaluate the .js file contents. This is the code that actually runs. It could be that the contents of the .ts file don't compile to the .js file included in the custom visual.
- Always evaluate the .ts file contents. You can load the .ts file into the **Developer Tools**, export the visual and compare the resulting .js file in the newly create .pbviz file to the original .js file contained in the visual
- Check that the icon for the custom visual does not resemble too closely other visuals the user is familiar with.
- Always evaluate the visual in a test account that has minimal privileges and does not have access to any sensitive data. Ideally the test account would be a local account with no sign-in information to services other than Power BI.

Threats to look for in JavaScript code

- Check network activity when the visual is being used in both edit and view mode. Ensure you're satisfied with the requests that are being made. You should not see requests to resources outside the Power BI domain unless the visual author has communicated this ahead of time.
- Any data you see leaving the Power BI domain should match your expectations for what 'normal' use would be. For example - if the visual implements a video player that uses an iFrame to view a video from another site, some information should travel in the iFrame requests to render the video correctly. However, if you see the entire data set being sent across the wire, you might investigate further if this is required and desired.
- Check if personally identifiable data is being sent or stored by the custom visual.
- Check if the custom visual is trying to access local machine resources such as writing files to disk or accessing cookies.
- Check if the custom visual has what appears to be obfuscated code or code without a clear purpose.
- Save copies of each visual you reviewed in the past.
- If you are reviewing an update to a visual you previously reviewed, ensure to check for changes. Always apply equal rigor to updates as you did the first time you received the visual for review
- If you find something suspicious or unclear, please reach out to us we're here to help.

Next steps

[Visualizations in Power BI](#)

[Custom Visualizations in Power BI](#)

[Publish custom visuals to the Office store](#)

[Getting started with custom visuals developer tools](#)

[How to certify a custom visual](#)

[Video: Creating custom visualizations for Power BI with Sachin Patney and Nico Cristache](#)

[More questions? Try asking the Power BI Community](#)

Getting a custom visual *certified*

1/26/2018 • 2 min to read • [Edit Online](#)

What is meant by *certified*?

A *certified custom visual* is one that has met a set of code requirements and has passed strict security tests. Once a custom visual has been certified, it can be [exported to PowerPoint](#) and will display in the emails received when a user [subscribes to report pages](#). Of course, it can also be used like [standard custom visuals](#), added to Power BI service and Power BI Desktop reports and viewed in Power BI mobile and embedded.

Are you a Web developer and interested in creating your own visualizations and adding them to [Microsoft AppSource](#)? See [Get started with Developer Tools](#) to learn how.

Certification requirements

- Microsoft AppSource approved
- Custom visual is written with Versioned API 1.2 or higher
- Code repository available for review (e.g., Visual Code available to us through GitHub)
- Uses only public reviewable OSS components
- Does not access external services or resources

TIP: We recommend that you use ESLint with default security ruleset, to pre-validate your code before submission.

Process for submitting a custom visual for Certification

To submit a custom visual for certification:

1. Send an email to Power BI Custom Visuals Support (pbicvsupport@microsoft.com). In the email, include the following information:
 - Title: Visual Certification Request
 - Link to GitHub repository where the visual source code is hosted
 - Adhere to the requirements (see above)
 - Pass the code and security review
2. The Custom Visuals team at Microsoft will notify you when your custom visual is certified and added to the Certified list (below), or rejected with a report of the issues that need to be fixed. It is the developer's responsibility to maintain an open line of communication with Microsoft and to update their Certified visuals as needed.

Removal of Power BI Certified custom visuals

Microsoft, at its discretion, may remove a visual from the Certified list.

List of custom visuals that have been certified

LINK TO APPSOURCE	LINK TO VIDEO
Association rules	

LINK TO APPSOURCE	LINK TO VIDEO
Aster plot	
BciCalendar (Beyondsoft Calendar)	
Bowtie chart by MAQ Software	Video
Box and Whisker	
Brick chart by MAQ Software	
Bubble chart by Akvelon	
Bullet Chart	Video1 Video2
Bullet Chart by OKViz	Video
Calendar by Tallan	
Candlestick by OKViz	
Chiclet slicer	Video
Chord chart	Video
Circular gauge by MAQ Software	
Cylindrical gauge	
Dial gauge	Video
Donut chart (Ring chart) by MAQ Software	Video
Dot Plot by MAQ Software	
Dot Plot by OKViz	Video
Dot Plot by Microsoft	
Drill down donut chart by ZoomCharts	
Drilldown Cartogram	
Drilldown Choropleth	
Drilldown column chart by ZoomCharts	
Drilldown column chart for time-based data by ZoomCharts	
Drilldown Donut chart by ZoomCharts	

LINK TO APPSOURCE	LINK TO VIDEO
Dual KPI	Video
Enhanced scatter	
Enlighten Aquarium	
Enlighten Bubble stack	
Enlighten Slicer	
Enlighten Stack Shuffle	
Enlighten waffle chart	
Enlighten World Flags	
Force-Directed Graph	Video
Forecasting TBATS	
Hierarchy chart by Akvelon	
Histogram	
Horizontal Funnel	Video
Image Timeline	
Infographic Designer	
KPI Indicator	
KPI Ticker by MAQ Software	
LineDot chart	
Linear gauge by MAQ Software	Video
Mekko chart	Video
Play Axis (Dynamic Slicer)	
Power KPI	Video
Pulse chart	
Radar chart	
Ring chart (Donut chart) by MAQSoftware	Video

LINK TO APPSOURCE	LINK TO VIDEO
Rotating chart by MAQ Software	
Sankey chart	Video
Scroller	Video
Smart Filter by SQLBI	Video
Sparkline by OKViz	Video
Stream graph	
Sunburst	
Table Heatmap	
Tachometer	Video
Text wrapper	
Thermometer	Video
Time series decomposition	
Timeline slicer	Video
Tornado chart	Video
Ultimate Variance chart by Klaus Birringer	
Ultimate Waterfall free	
VitaraCharts - MicroChart	
Waffle chart	Video
Word Cloud	Video

Next steps

[Getting started with custom visuals developer tools \(Preview\)](#)

[Microsoft's custom visual playlist on YouTube](#)

[Visualizations in Power BI](#)

[Custom Visualizations in Power BI](#)

[Publish custom visuals to Microsoft AppSource](#)

[More questions? Try the Power BI Community](#)

Push data into a Power BI dataset

1/30/2018 • 2 min to read • [Edit Online](#)

With the Power BI API, you can push data into a Power BI dataset. For example, you want to extend an existing business workflow to push key data into your dataset. In this case, you want to push a Sales Marketing dataset which has a Product table into a dataset.

Before you get started pushing data into a dataset, you need an Azure Active Directory (Azure AD) and a [Power BI account](#).

Steps to push data into a dataset

- Step 1: [Register an app with Azure AD](#)
- Step 2: [Get an authentication access token](#)
- Step 3: [Create a dataset in Power BI](#)
- Step 4: [Get a dataset to add rows into a Power BI table](#)
- Step 5: [Add rows to a Power BI table](#)

The next section is a general discussion of Power BI API operations that push data.

Power BI API operations to push data

With the Power BI REST API, you can push data sources to Power BI. When an app adds rows to a dataset, tiles on the dashboard are updated automatically with the updated data. To push data, you use the [Create Dataset](#) operation along with the [Add Rows](#) operation. To find a dataset, you use the [Get Datasets](#) operation. For any of these operations, you can pass a group id to work with a group. Use the [Get Groups](#) operation to get a list of group id's.

Here are the operations to push data into a dataset:

- [Create Dataset](#)
- [Get Datasets](#)
- [Add Rows](#)
- [Get Groups](#)

You create a dataset in Power BI by passing a JavaScript Object Notation (JSON) string to the Power BI service. To learn more about JSON, see [Introducing JSON](#).

The JSON string for a dataset has the following format:

Power BI Dataset JSON object

```
{
  "name": "dataset_name", "tables":
  [
    {
      "name": "", "columns":
      [
        { "name": "column_name1", "dataType": "data_type" },
        { "name": "column_name2", "dataType": "data_type" },
        { ... }
      ]
    }
  ]
}
```


So, for our Sales Marketing dataset example, you would pass a JSON string such as the example below. In this example, **SalesMarketing** is the name of the dataset, and **Product** is the name of the table. After you define the table, you define the table schema. For the **SalesMarketing** dataset, the table schema has these columns: ProductID, Manufacturer, Category, Segment, Product, and IsCompete.

Example dataset object JSON

```
{
  "name": "SalesMarketing",
  "tables": [
    {
      "name": "Product",
      "columns": [
        {
          "name": "ProductID",
          "dataType": "int"
        },
        {
          "name": "Manufacturer",
          "dataType": "string"
        },
        {
          "name": "Category",
          "dataType": "string"
        },
        {
          "name": "Segment",
          "dataType": "string"
        },
        {
          "name": "Product",
          "dataType": "string"
        },
        {
          "name": "IsCompete",
          "dataType": "bool"
        }
      ]
    }
  ]
}
```

For a Power BI table schema, you can use the following data types.

Power BI table data types

DATA TYPE	RESTRICTIONS
Int64	Int64.MaxValue and Int64.MinValue not allowed.
Double	Double.MaxValue and Double.MinValue values not allowed. NaN not supported. +Infinity and -Infinity not supported in some functions (e.g. Min, Max).
Boolean	None
Datetime	During data loading we quantize values with day fractions to whole multiples of 1/300 seconds (3.33ms).
String	Currently allows up to 128K characters.

Learn more about pushing data into Power BI

To get started pushing data into a dataset, see [Step 1: Register an app with Azure AD](#) in the left navigation pane.

[Next Step >](#)

Next steps

[Sign up for Power BI](#)

[Create Dataset](#)

[Get Datasets](#)

[Add Rows](#)

[Get Groups](#)

[Introducing JSON](#)

[Overview of Power BI REST API](#)

More questions? [Try the Power BI Community](#)

Step 1: Register an app with Azure AD

1/30/2018 • 1 min to read • [Edit Online](#)

This article is part of a step-by-step walkthrough to [push data into a dataset](#).

The first step to push data into a Power BI dataset is to register your app in Azure AD. You need to do this first so that you have a **Client ID** that identifies your app in Azure AD. Without a **Client ID**, Azure AD cannot authenticate your app.

NOTE: Before you register an app for Power BI, you need to [Sign up for Power BI](#).

Here are the steps to register an app in Azure AD.

Register an app in Azure AD

1. Go to dev.powerbi.com/apps.
2. Click **Sign in with your existing account**, and sign into your Power BI account.
3. Enter an **App Name** such as "Sample push data app".
4. For **App Type**, choose **Native app**.
5. Enter a **Redirect URL**, such as https://login.live.com/oauth20_desktop.srf. For a **Native client app**, a redirect uri gives **Azure AD** more details on the specific application that it will authenticate. The standard Uri for a client app is https://login.live.com/oauth20_desktop.srf.
6. For **Choose APIs to access**, choose **Read and Write All Datasets**. For all Power BI app permissions, see [Power BI Permissions](#).
7. Click **Register app**, and save the **Client ID** that was generated. A **Client ID** identifies the app in Azure AD.

Here's how your **Register an Application for Power BI** page should look:

Register an Application for Power BI

Register a new application that can be used to call Power BI APIs

Step 1 Login to your Power BI account

Welcome, ██████████ (Wrong account? No problem, [logout](#) and try again.)

Step 2 Tell us about your app

Let's start with some basic details.

App Name:

Sample push data app

App Type:

Specify the type of app. Use 'Server-side Web app' for web apps or Web APIs, or 'Native app' for apps that run on client devices (Android, iOS, Windows, etc.).

Native app

Redirect URL:

A valid URL

https://login.live.com/oauth20_desktop.srf

Step 3 Choose APIs to access

Select the APIs and the level of access your app needs.

Dataset APIs

Read All Datasets

Read and Write All Datasets

Report and Dashboard APIs

Read All Dashboards (preview)

Read All Reports (preview)

Other APIs

Read All Groups

The next step shows you how to [get an authentication access token](#).

[Next Step >](#)

Next steps

[Sign up for Power BI](#)

[Get an authentication access token](#)

[Walkthrough: Push data into a dataset](#)

[Register an application](#)

[Overview of Power BI REST API](#)

More questions? [Try asking the Power BI Community](#)

Step 2: Get an authentication access token

1/30/2018 • 4 min to read • [Edit Online](#)

This article is part of a step-by-step walkthrough to [push data into a dataset](#).

In **step 1** of Push data into a dataset, [Register the app with Azure AD](#), you registered a client app in Azure AD. In this step, you get an authentication access token. Power BI apps are integrated with **Azure AD** to provide secure sign in and authorization for your app. You use a token to authenticate to **Azure AD** and gain access to Power BI resources.

Here's how to get an authentication access token.

Get an authentication access token

NOTE: Before you get started, make sure you have followed the previous steps in the [push data into a dataset](#) walkthrough.

1. In Visual Studio 2015, create a **Console Application** project.
2. Install the [Azure AD Authentication Library for .NET NuGet package](#). To get an authentication security token in a .NET app, you use this package. Here's how to install the package:
 - a. In Visual Studio 2015, choose **Tools > NuGet Package Manager > Package Manager Console**.
 - b. In **Package Manager Console**, enter Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory - Version 2.21.301221612.
3. Add the code below into class Program {...}.
4. Replace "{ClientID}", with the **Client ID** you got when you registered the app. See [Register the app with Azure AD](#).
5. After installing the Microsoft.IdentityModel.Clients.ActiveDirectory package, add **using Microsoft.IdentityModel.Clients.ActiveDirectory;** to Program.cs.
6. Run the Console App, and login to your Power BI account. You should see a token string in the Console Window.

Sample code to get authentication security token

Add this code to Program {...}.

- A token variable to call operations:

```
private static string token = string.Empty;

static void Main(string[] args)
{
}
```

- In static void Main(string[] args):

```

static void Main(string[] args)
{
    //Get an authentication access token
    token = GetToken();
}

```

- Add a GetToken() method:

```

#region Get an authentication access token
private static string GetToken()
{
    // TODO: Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory -Version 2.21.301221612
    // and add using Microsoft.IdentityModel.Clients.ActiveDirectory

    //The client id that Azure AD created when you registered your client app.
    string clientID = "{Client_ID}";

    //RedirectUri you used when you register your app.
    //For a client app, a redirect uri gives Azure AD more details on the application that it will
authenticate.
    // You can use this redirect uri for your client app
    string redirectUri = "https://login.live.com/oauth20_desktop.srf";

    //Resource Uri for Power BI API
    string resourceUri = "https://analysis.windows.net/powerbi/api";

    //OAuth2 authority Uri
    string authorityUri = "https://login.windows.net/common/oauth2/authorize";

    //Get access token:
    // To call a Power BI REST operation, create an instance of AuthenticationContext and call
AcquireToken
    // AuthenticationContext is part of the Active Directory Authentication Library NuGet package
    // To install the Active Directory Authentication Library NuGet package in Visual Studio,
    // run "Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory" from the nuget Package
Manager Console.

    // AcquireToken will acquire an Azure access token
    // Call AcquireToken to get an Azure token from Azure Active Directory token issuance endpoint
    AuthenticationContext authContext = new AuthenticationContext(authorityUri);
    string token = authContext.AcquireToken(resourceUri, clientID, new Uri(redirectUri)).AccessToken;

    Console.WriteLine(token);
    Console.ReadLine();

    return token;
}

#endregion

```

After you get an authentication token, you can call any Power BI operation. The next step shows you how to call the [Create Dataset](#) operation to create a dataset to push data into a dashboard.

The next step shows you how to [create a dataset in Power BI](#).

Below is the [complete code listing](#).

Complete code listing

```

using System;
using Microsoft.IdentityModel.Clients.ActiveDirectory;

namespace walkthrough_push_data
{
    class Program
    {
        private static string token = string.Empty;

        static void Main(string[] args)
        {

            //Get an authentication access token
            token = GetToken();

        }

        #region Get an authentication access token
        private static string GetToken()
        {
            // TODO: Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory -Version 2.21.301221612
            // and add using Microsoft.IdentityModel.Clients.ActiveDirectory

            //The client id that Azure AD created when you registered your client app.
            string clientID = "{Client_ID}";

            //RedirectUri you used when you register your app.
            //For a client app, a redirect uri gives Azure AD more details on the application that it will
            authenticate.
            // You can use this redirect uri for your client app
            string redirectUri = "https://login.live.com/oauth20_desktop.srf";

            //Resource Uri for Power BI API
            string resourceUri = "https://analysis.windows.net/powerbi/api";

            //OAuth2 authority Uri
            string authorityUri = "https://login.windows.net/common/oauth2/authorize";

            //Get access token:
            // To call a Power BI REST operation, create an instance of AuthenticationContext and call
            AcquireToken
            // AuthenticationContext is part of the Active Directory Authentication Library NuGet package
            // To install the Active Directory Authentication Library NuGet package in Visual Studio,
            // run "Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory" from the nuget Package
            Manager Console.

            // AcquireToken will acquire an Azure access token
            // Call AcquireToken to get an Azure token from Azure Active Directory token issuance endpoint
            AuthenticationContext authContext = new AuthenticationContext(authorityUri);
            string token = authContext.AcquireToken(resourceUri, clientID, new Uri(redirectUri)).AccessToken;

            Console.WriteLine(token);
            Console.ReadLine();

            return token;
        }

        #endregion
    }
}

```

[Next Step >](#)

Next steps

[Create a dataset in Power BI](#)

[Register an app with Azure AD](#)

[Azure AD Authentication Library for .NET NuGet package](#)

[Push data into a Power BI dataset](#)

[Overview of Power BI REST API](#)

[Power BI REST API reference](#)

[More questions? Try the Power BI Community](#)

Step 3: Create a dataset in Power BI

1/30/2018 • 4 min to read • [Edit Online](#)

This article is part of a step-by-step walkthrough to [push data into a dataset](#).

In **step 2** of Push data into a dataset, [Get an authentication access token](#), you got a token to authenticate to **Azure AD**. In this step, you use the token to call the [Create Dataset](#) operation.

To make a call to a REST resource, you use a url that locates the resource, and you send a JavaScript Object Notation (JSON) string, which describes the dataset, to the Power BI service resource. A REST resource identifies the part of the Power BI service you want to work with. To push data into the dataset, the target resource is a **Dataset**. The URL that identifies a dataset is <https://api.PowerBI.com/v1.0/myorg/datasets>. If you are pushing data within a group, the url is https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets.

To authenticate a Power BI REST operation, you add the token you got in [Get an authentication access token](#) to a request header:

When you call the [Create Dataset](#) operation, a new dataset is created.

The screenshot shows the Power BI 'My Workspace' interface. On the left, the 'Datasets' section is expanded, showing 'Retail Analysis Sample' and 'SalesMarketing' (highlighted with an orange box). An arrow points from a yellow box labeled 'Creates Datasets' to the 'SalesMarketing' dataset. A larger orange-bordered box contains the text: 'The Create Dataset operation POST https://api.PowerBI.com/v1.0/myorg/datasets'. The main dashboard area displays a 'RETAIL ANALYSIS SAMPLE' with a search bar and several visualizations: 'This Year's Sales BY CHAIN' (pie chart), 'This Year's Sales BY CITY, CHAIN' (map), 'Stores Opened This Year BY OPEN MONTH, CHAIN' (bar chart), and 'This Year's Sales, Last Year's Sales BY FISCAL MONTH' (line chart).

Here's how to create a dataset in Power BI.

Create a dataset in Power BI

NOTE

Before you get started, make sure you have followed the previous steps in the [push data into a dataset](#) walkthrough.

1. In the Console Application project you created in [Step 2 - Get an authentication access token](#), add **using System.Net;** and **using System.IO;** to Program.cs.
2. In Program.cs, add the code below.
3. Run the Console App, and login to your Power BI account. You should see **Dataset Created** in the Console

Window. Also, you can login to Power BI to see the new dataset.

Sample push data into a dataset

Add this code into Program.cs.

- In static void Main(string[] args):

```
static void Main(string[] args)
{
    //Get an authentication access token
    token = GetToken();

    //Create a dataset in Power BI
    CreateDataset();
}
```

- Add a CreateDataset() method:

```

#region Create a dataset in Power BI
private static void CreateDataset()
{
    //TODO: Add using System.Net and using System.IO

    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
    https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
    System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "POST";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    //Create dataset JSON for POST request
    string datasetJson = "{ \"name\": \"SalesMarketing\", \"tables\": " +
        "[{ \"name\": \"Product\", \"columns\": " +
        "[{ \"name\": \"ProductID\", \"dataType\": \"Int64\"}, " +
        "{ \"name\": \"Name\", \"dataType\": \"string\"}, " +
        "{ \"name\": \"Category\", \"dataType\": \"string\"}, " +
        "{ \"name\": \"IsCompete\", \"dataType\": \"bool\"}, " +
        "{ \"name\": \"ManufacturedOn\", \"dataType\": \"DateTime\"} " +
        "]]}";

    //POST web request
    byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(datasetJson);
    request.ContentLength = byteArray.Length;

    //Write JSON byte[] into a Stream
    using (Stream writer = request.GetRequestStream())
    {
        writer.Write(byteArray, 0, byteArray.Length);

        var response = (HttpWebResponse)request.GetResponse();

        Console.WriteLine(string.Format("Dataset {0}", response.StatusCode.ToString()));

        Console.ReadLine();
    }
}
#endregion

```

The next step shows you how to [get a dataset to add rows into a Power BI table](#).

Below is the [complete code listing](#).

Complete code listing

```

using System;
using Microsoft.IdentityModel.Clients.ActiveDirectory;
using System.Net;
using System.IO;

namespace walkthrough_push_data
{
    class Program
    {
        private static string token = string.Empty;

        static void Main(string[] args)

```

```

{

    //Get an authentication access token
    token = GetToken();

    //Create a dataset in Power BI
    CreateDataset();

}

#region Get an authentication access token
private static string GetToken()
{
    // TODO: Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory -Version 2.21.301221612
    // and add using Microsoft.IdentityModel.Clients.ActiveDirectory

    //The client id that Azure AD created when you registered your client app.
    string clientID = "{Client_ID}";

    //RedirectUri you used when you register your app.
    //For a client app, a redirect uri gives Azure AD more details on the application that it will
authenticate.
    // You can use this redirect uri for your client app
    string redirectUri = "https://login.live.com/oauth20_desktop.srf";

    //Resource Uri for Power BI API
    string resourceUri = "https://analysis.windows.net/powerbi/api";

    //OAuth2 authority Uri
    string authorityUri = "https://login.windows.net/common/oauth2/authorize";

    //Get access token:
    // To call a Power BI REST operation, create an instance of AuthenticationContext and call
AcquireToken
    // AuthenticationContext is part of the Active Directory Authentication Library NuGet package
    // To install the Active Directory Authentication Library NuGet package in Visual Studio,
    // run "Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory" from the nuget Package
Manager Console.

    // AcquireToken will acquire an Azure access token
    // Call AcquireToken to get an Azure token from Azure Active Directory token issuance endpoint
    AuthenticationContext authContext = new AuthenticationContext(authorityUri);
    string token = authContext.AcquireToken(resourceUri, clientID, new Uri(redirectUri)).AccessToken;

    Console.WriteLine(token);
    Console.ReadLine();

    return token;
}

#endregion

#region Create a dataset in Power BI
private static void CreateDataset()
{
    //TODO: Add using System.Net and using System.IO

    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpWebRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "POST";
    request.ContentLength = 0;
    request.ContentType = "application/json";
}
}

```

```

//Add token to the request header
request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

//Create dataset JSON for POST request
string datasetJson = "{ \"name\": \"SalesMarketing\", \"tables\": " +
    "[{ \"name\": \"Product\", \"columns\": " +
    "[{ \"name\": \"ProductID\", \"dataType\": \"Int64\"}, " +
    "{ \"name\": \"Name\", \"dataType\": \"string\"}, " +
    "{ \"name\": \"Category\", \"dataType\": \"string\"}, " +
    "{ \"name\": \"IsCompete\", \"dataType\": \"bool\"}, " +
    "{ \"name\": \"ManufacturedOn\", \"dataType\": \"DateTime\"} " +
    "]]}";

//POST web request
byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(datasetJson);
request.ContentLength = byteArray.Length;

//Write JSON byteArray into a Stream
using (Stream writer = request.GetRequestStream())
{
    writer.Write(byteArray, 0, byteArray.Length);

    var response = (HttpWebResponse)request.GetResponse();

    Console.WriteLine(string.Format("Dataset {0}", response.StatusCode.ToString()));

    Console.ReadLine();
}
}
#endregion
}
}

```

[Next Step >](#)

Next steps

[Get a dataset to add rows into a Power BI table](#)

[Get an authentication access token](#)

[Create Dataset](#)

[Push data into a Power BI Dashboard](#)

[Overview of Power BI REST API](#)

[Power BI REST API reference](#)

More questions? [Try the Power BI Community](#)

Step 4: Get a dataset to add rows into a Power BI table

1/30/2018 • 5 min to read • [Edit Online](#)

This article is part of a step-by-step walkthrough to [push data into a dataset](#).

In **step 3** of Push data into a dataset, [Create a dataset in Power BI](#), you called the [Create Dataset](#) operation to create a dataset in Power BI. In this step, you use the [Get Datasets](#) operation and Newtonsoft.Json to get a dataset id. You use the dataset id in step 4 to add rows to a dataset.

To push data into a Power BI dataset, you need to reference the table in the dataset. To reference a table in a dataset, you first need to get a **Dataset ID**. You get a **Dataset ID** using the [Get Dataset](#) operation. The **Get Dataset** operation returns a JSON string containing a list of all datasets in Power BI. The recommended way to deserialize a JSON string is with [Newtonsoft.Json](#).

Here's how you get a dataset.

Get a Power BI dataset

NOTE: Before you get started, make sure you have followed the previous steps in the [push data into a dataset](#) walkthrough.

1. In the Console Application project you created in Step 2: Walkthrough to push data, [Get an authentication access token](#), install the Newtonsoft.Json NuGet package. Here's how to install the package:
 - a. In Visual Studio 2015, choose **Tools > NuGet Package Manager > Package Manager Console**.
 - b. In **Package Manager Console**, enter Install-Package Newtonsoft.Json.
2. After the package is installed, add **using Newtonsoft.Json;** to Program.cs.
3. In Program.cs, add the code below to get a **Dataset ID**.
4. Run the Console App, and login to your Power BI account. You should see **Dataset ID:** followed by an id in the Console Window.

Sample get a dataset

Add this code into Program.cs.

- In static void Main(string[] args):

```
static void Main(string[] args)
{
    //Get an authentication access token
    token = GetToken();

    //Create a dataset in Power BI
    CreateDataset();

    //Get a dataset to add rows into a Power BI table
    string datasetId = GetDataset();
}
```

- Add a GetDataset() method:

```
#region Get a dataset to add rows into a Power BI table
private static string GetDataset()
{
    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
    https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "GET";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    string datasetId = string.Empty;
    //Get HttpResponseMessage from GET request
    using (HttpResponse httpResponse = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get StreamReader that holds the response stream
        using (StreamReader reader = new System.IO.StreamReader(httpResponse.GetResponseStream()))
        {
            string responseContent = reader.ReadToEnd();

            //TODO: Install NuGet Newtonsoft.Json package: Install-Package Newtonsoft.Json
            //and add using Newtonsoft.Json
            var results = JsonConvert.DeserializeObject<dynamic>(responseContent);

            //Get the first id
            datasetId = results["value"][0]["id"];

            Console.WriteLine(String.Format("Dataset ID: {0}", datasetId));
            Console.ReadLine();

            return datasetId;
        }
    }
}
#endregion
```

The next step shows you how to [add rows to a Power BI table](#).

Below is the [complete code listing](#).

Complete code listing

```
using System;
using Microsoft.IdentityModel.Clients.ActiveDirectory;
using System.Net;
using System.IO;
using Newtonsoft.Json;

namespace walkthrough_push_data
{
    class Program
    {
        private static string token = string.Empty;

        static void Main(string[] args)
        {
```

```

//Get an authentication access token
token = GetToken();

//Create a dataset in Power BI
CreateDataset();

//Get a dataset to add rows into a Power BI table
string datasetId = GetDataset();

}

#region Get an authentication access token
private static string GetToken()
{
    // TODO: Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory -Version 2.21.301221612
    // and add using Microsoft.IdentityModel.Clients.ActiveDirectory

    //The client id that Azure AD created when you registered your client app.
    string clientID = "{Client_ID}";

    //RedirectUri you used when you register your app.
    //For a client app, a redirect uri gives Azure AD more details on the application that it will
authenticate.
    // You can use this redirect uri for your client app
    string redirectUri = "https://login.live.com/oauth20_desktop.srf";

    //Resource Uri for Power BI API
    string resourceUri = "https://analysis.windows.net/powerbi/api";

    //OAuth2 authority Uri
    string authorityUri = "https://login.windows.net/common/oauth2/authorize";

    //Get access token:
    // To call a Power BI REST operation, create an instance of AuthenticationContext and call
AcquireToken
    // AuthenticationContext is part of the Active Directory Authentication Library NuGet package
    // To install the Active Directory Authentication Library NuGet package in Visual Studio,
    // run "Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory" from the nuget Package
Manager Console.

    // AcquireToken will acquire an Azure access token
    // Call AcquireToken to get an Azure token from Azure Active Directory token issuance endpoint
    AuthenticationContext authContext = new AuthenticationContext(authorityUri);
    string token = authContext.AcquireToken(resourceUri, clientID, new Uri(redirectUri)).AccessToken;

    Console.WriteLine(token);
    Console.ReadLine();

    return token;
}

#endregion

#region Create a dataset in Power BI
private static void CreateDataset()
{
    //TODO: Add using System.Net and using System.IO

    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpWebRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "POST";
    request.ContentLength = 0;
    request.ContentType = "application/json";
}

```



```

//Add token to the request header
request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

//Create dataset JSON for POST request
string datasetJson = "{ \"name\": \"SalesMarketing\", \"tables\": " +
    "[{ \"name\": \"Product\", \"columns\": " +
    "[{ \"name\": \"ProductID\", \"dataType\": \"Int64\"}, " +
    "{ \"name\": \"Name\", \"dataType\": \"string\"}, " +
    "{ \"name\": \"Category\", \"dataType\": \"string\"}, " +
    "{ \"name\": \"IsCompete\", \"dataType\": \"bool\"}, " +
    "{ \"name\": \"ManufacturedOn\", \"dataType\": \"DateTime\"} " +
    "]}]";

//POST web request
byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(datasetJson);
request.ContentLength = byteArray.Length;

//Write JSON byte[] into a Stream
using (Stream writer = request.GetRequestStream())
{
    writer.Write(byteArray, 0, byteArray.Length);

    var response = (HttpWebResponse)request.GetResponse();

    Console.WriteLine(string.Format("Dataset {0}", response.StatusCode.ToString()));

    Console.ReadLine();
}
}
#endregion

#region Get a dataset to add rows into a Power BI table
private static string GetDataset()
{
    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
    https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
    System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "GET";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    string datasetId = string.Empty;
    //Get HttpResponseMessage from GET request
    using (HttpWebResponse httpResponse = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get StreamReader that holds the response stream
        using (StreamReader reader = new System.IO.StreamReader(httpResponse.GetResponseStream()))
        {
            string responseContent = reader.ReadToEnd();

            //TODO: Install NuGet Newtonsoft.Json package: Install-Package Newtonsoft.Json
            //and add using Newtonsoft.Json
            var results = JsonConvert.DeserializeObject<dynamic>(responseContent);

            //Get the first id
            datasetId = results["value"][0]["id"];

            Console.WriteLine(String.Format("Dataset ID: {0}", datasetId));
            Console.ReadLine();

            return datasetId;
        }
    }
}

```

```
    }  
  }  
  #endregion  
}
```

[Next Step >](#)

Next steps

[Add rows to a Power BI table](#)

[Newtonsoft.Json](#)

[Get Datasets](#)

[Push data into Power BI](#)

[Overview of Power BI REST API](#)

[Power BI REST API reference](#)

More questions? [Try the Power BI Community](#)

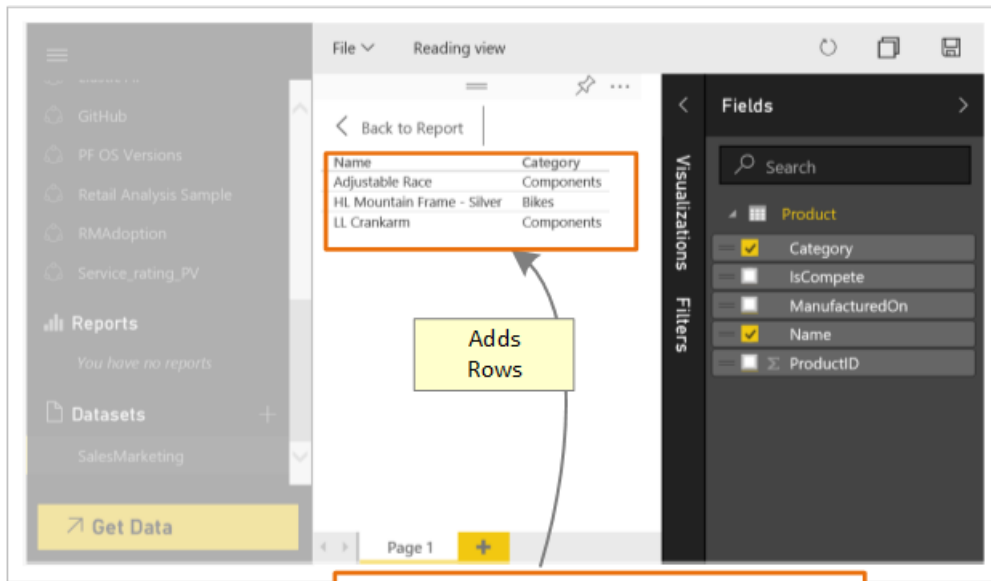
Step 5: Add rows to a Power BI table

1/30/2018 • 5 min to read • [Edit Online](#)

This article is part of a step-by-step walkthrough to [push data into a dataset](#).

In **step 4** of Push data into a dataset, [Get a dataset to add rows into a Power BI table](#), you used the [Get Datasets](#) operation and Newtonsoft.Json to get a dataset id. In this step, you use the dataset id with the [Add Rows](#) operation to add rows to a **Power BI** dataset.

When you call the [Add Rows](#) operation, you add rows to a dataset.



The Add Rows operation

```
POST https://api.powerbi.com/v1.0/myorg/datasets/{dataset_id}/tables/{table_name}/rows
```

Here's how to add rows to a dataset using the Power BI API.

Add rows to a Power BI table

NOTE

Before you get started, make sure you have followed the previous steps in the [push data into a dataset](#) walkthrough.

1. In the Console Application project you created in Step 2: Walkthrough to push data, [Get an authentication access token](#), add the code below.
2. Run the Console App, and login to your Power BI account. You should see **Rows Added** in the Console Window. You can also login to Power BI to see the rows added to the dataset.

Sample push data into a dataset

Add this code into Program.cs.

- In static void Main(string[] args):

```
static void Main(string[] args)
{

    //Get an authentication access token
    token = GetToken();

    //Create a dataset in Power BI
    CreateDataset();

    //Get a dataset to add rows into a Power BI table
    string datasetId = GetDataset();

    //Add rows to a Power BI table
    AddRows(datasetId, "Product");
}
```

- Add an AddRows() method:

```

#region Add rows to a Power BI table
private static void AddRows(string datasetId, string tableName)
{
    string powerBIApiAddRowsUrl =
String.Format("https://api.powerbi.com/v1.0/myorg/datasets/{0}/tables/{1}/rows", datasetId, tableName);

    //POST web request to add rows.
    //To add rows to a dataset in a group, use the Groups uri:
https://api.powerbi.com/v1.0/myorg/groups/{group_id}/datasets/{dataset_id}/tables/{table_name}/rows
    //Change request method to "POST"
    HttpRequest request = System.Net.WebRequest.Create(powerBIApiAddRowsUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "POST";
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    //JSON content for product row
    string rowsJson = "{\"rows\":[" +
        "{\"ProductID\":1,\"Name\":\"Adjustable
Race\",\"Category\":\"Components\",\"IsCompete\":true,\"ManufacturedOn\":\"07/30/2014\"}, " +
        "{\"ProductID\":2,\"Name\":\"LL
Crankarm\",\"Category\":\"Components\",\"IsCompete\":true,\"ManufacturedOn\":\"07/30/2014\"}, " +
        "{\"ProductID\":3,\"Name\":\"HL Mountain Frame -
Silver\",\"Category\":\"Bikes\",\"IsCompete\":true,\"ManufacturedOn\":\"07/30/2014\"}]}";

    //POST web request
    byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(rowsJson);
    request.ContentLength = byteArray.Length;

    //Write JSON byte[] into a Stream
    using (Stream writer = request.GetRequestStream())
    {
        writer.Write(byteArray, 0, byteArray.Length);

        var response = (HttpWebResponse)request.GetResponse();

        Console.WriteLine("Rows Added");

        Console.ReadLine();
    }
}
#endregion

```

Below is the [complete code listing](#).

Complete code listing

```

using System;
using Microsoft.IdentityModel.Clients.ActiveDirectory;
using System.Net;
using System.IO;
using Newtonsoft.Json;

namespace walkthrough_push_data
{
    class Program
    {
        private static string token = string.Empty;

        static void Main(string[] args)

```

```

{

    //Get an authentication access token
    token = GetToken();

    //Create a dataset in Power BI
    CreateDataset();

    //Get a dataset to add rows into a Power BI table
    string datasetId = GetDataset();

    //Add rows to a Power BI table
    AddRows(datasetId, "Product");

}

#region Get an authentication access token
private static string GetToken()
{
    // TODO: Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory -Version 2.21.301221612
    // and add using Microsoft.IdentityModel.Clients.ActiveDirectory

    //The client id that Azure AD created when you registered your client app.
    string clientID = "{Client_ID}";

    //RedirectUri you used when you register your app.
    //For a client app, a redirect uri gives Azure AD more details on the application that it will
authenticate.
    // You can use this redirect uri for your client app
    string redirectUri = "https://login.live.com/oauth20_desktop.srf";

    //Resource Uri for Power BI API
    string resourceUri = "https://analysis.windows.net/powerbi/api";

    //OAuth2 authority Uri
    string authorityUri = "https://login.windows.net/common/oauth2/authorize";

    //Get access token:
    // To call a Power BI REST operation, create an instance of AuthenticationContext and call
AcquireToken
    // AuthenticationContext is part of the Active Directory Authentication Library NuGet package
    // To install the Active Directory Authentication Library NuGet package in Visual Studio,
    // run "Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory" from the nuget Package
Manager Console.

    // AcquireToken will acquire an Azure access token
    // Call AcquireToken to get an Azure token from Azure Active Directory token issuance endpoint
    AuthenticationContext authContext = new AuthenticationContext(authorityUri);
    string token = authContext.AcquireToken(resourceUri, clientID, new Uri(redirectUri)).AccessToken;

    Console.WriteLine(token);
    Console.ReadLine();

    return token;
}

#endregion

#region Create a dataset in a Power BI
private static void CreateDataset()
{
    //TODO: Add using System.Net and using System.IO

    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;

```

```

request.KeepAlive = true;
request.Method = "POST";
request.ContentLength = 0;
request.ContentType = "application/json";

//Add token to the request header
request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

//Create dataset JSON for POST request
string datasetJson = "{ \"name\": \"SalesMarketing\", \"tables\": " +
    "[{ \"name\": \"Product\", \"columns\": " +
    "[{ \"name\": \"ProductID\", \"dataType\": \"Int64\"}, " +
    "{ \"name\": \"Name\", \"dataType\": \"string\"}, " +
    "{ \"name\": \"Category\", \"dataType\": \"string\"}, " +
    "{ \"name\": \"IsCompete\", \"dataType\": \"bool\"}, " +
    "{ \"name\": \"ManufacturedOn\", \"dataType\": \"DateTime\"} " +
    "]}]";

//POST web request
byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(datasetJson);
request.ContentLength = byteArray.Length;

//Write JSON byte[] into a Stream
using (Stream writer = request.GetRequestStream())
{
    writer.Write(byteArray, 0, byteArray.Length);

    var response = (HttpWebResponse)request.GetResponse();

    Console.WriteLine(string.Format("Dataset {0}", response.StatusCode.ToString()));

    Console.ReadLine();
}
}
#endregion

#region Get a dataset to add rows into a Power BI table
private static string GetDataset()
{
    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
    https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "GET";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    string datasetId = string.Empty;
    //Get HttpWebResponse from GET request
    using (HttpWebResponse httpResponse = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get StreamReader that holds the response stream
        using (StreamReader reader = new System.IO.StreamReader(httpResponse.GetResponseStream()))
        {
            string responseContent = reader.ReadToEnd();

            //TODO: Install NuGet Newtonsoft.Json package: Install-Package Newtonsoft.Json
            //and add using Newtonsoft.Json
            var results = JsonConvert.DeserializeObject<dynamic>(responseContent);

            //Get the first id
            datasetId = results["value"][0]["id"];

```

```

        Console.WriteLine(String.Format("Dataset ID: {0}", datasetId));
        Console.ReadLine();

        return datasetId;
    }
}
#endregion

#region Add rows to a Power BI table
private static void AddRows(string datasetId, string tableName)
{
    string powerBIApiAddRowsUrl =
String.Format("https://api.powerbi.com/v1.0/myorg/datasets/{0}/tables/{1}/rows", datasetId, tableName);

    //POST web request to add rows.
    //To add rows to a dataset in a group, use the Groups uri:
https://api.powerbi.com/v1.0/myorg/groups/{group_id}/datasets/{dataset_id}/tables/{table_name}/rows
    //Change request method to "POST"
    HttpRequest request = System.Net.WebRequest.Create(powerBIApiAddRowsUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "POST";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    //JSON content for product row
    string rowsJson = "{\"rows\":[" +
        "{\"ProductID\":1,\"Name\":\"Adjustable
Race\",\"Category\":\"Components\",\"IsCompete\":true,\"ManufacturedOn\":\"07/30/2014\"},\" +
        "{\"ProductID\":2,\"Name\":\"LL
Crankarm\",\"Category\":\"Components\",\"IsCompete\":true,\"ManufacturedOn\":\"07/30/2014\"},\" +
        "{\"ProductID\":3,\"Name\":\"HL Mountain Frame -
Silver\",\"Category\":\"Bikes\",\"IsCompete\":true,\"ManufacturedOn\":\"07/30/2014\"}]]";

    //POST web request
    byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(rowsJson);
    request.ContentLength = byteArray.Length;

    //Write JSON byte[] into a Stream
    using (Stream writer = request.GetRequestStream())
    {
        writer.Write(byteArray, 0, byteArray.Length);

        var response = (HttpWebResponse)request.GetResponse();

        Console.WriteLine("Rows Added");

        Console.ReadLine();
    }
}
#endregion
}
}

```

Next steps

[Add Rows](#)

[Push data into a Power BI Dashboard](#)

[Overview of Power BI REST API](#)

[Power BI REST API reference](#)

More questions? [Try the Power BI Community](#)

Push data to a dataset complete code listing

1/30/2018 • 3 min to read • [Edit Online](#)

This article is part of a step-by-step walkthrough to [push data into a dataset](#).

After you follow Steps 2 to 5 in **Push data into a dataset**, your complete source code should look like the following.

Push data to dataset code

```
using System;
using Microsoft.IdentityModel.Clients.ActiveDirectory;
using System.Net;
using System.IO;
using Newtonsoft.Json;

namespace walkthrough_push_data
{
    class Program
    {
        private static string token = string.Empty;

        static void Main(string[] args)
        {
            //Get an authentication access token
            token = GetToken();

            //Create a dataset in Power BI
            CreateDataset();

            //Get a dataset to add rows into a Power BI table
            string datasetId = GetDataset();

            //Add rows to a Power BI table
            AddRows(datasetId, "Product");
        }

        #region Get an authentication access token
        private static string GetToken()
        {
            // TODO: Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory -Version 2.21.301221612
            // and add using Microsoft.IdentityModel.Clients.ActiveDirectory

            //The client id that Azure AD created when you registered your client app.
            string clientID = "{Client_ID}";

            //RedirectUri you used when you register your app.
            //For a client app, a redirect uri gives Azure AD more details on the application that it will
            authenticate.
            // You can use this redirect uri for your client app
            string redirectUri = "https://login.live.com/oauth20_desktop.srf";

            //Resource Uri for Power BI API
            string resourceUri = "https://analysis.windows.net/powerbi/api";

            //OAuth2 authority Uri
            string authorityUri = "https://login.windows.net/common/oauth2/authorize";

            //Get access token:
```

```

// To call a Power BI REST operation, create an instance of AuthenticationContext and call
AcquireToken
// AuthenticationContext is part of the Active Directory Authentication Library NuGet package
// To install the Active Directory Authentication Library NuGet package in Visual Studio,
// run "Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory" from the nuget Package
Manager Console.

// AcquireToken will acquire an Azure access token
// Call AcquireToken to get an Azure token from Azure Active Directory token issuance endpoint
AuthenticationContext authContext = new AuthenticationContext(authorityUri);
string token = authContext.AcquireToken(resourceUri, clientID, new Uri(redirectUri)).AccessToken;

Console.WriteLine(token);
Console.ReadLine();

return token;
}

#endregion

#region Create a dataset in Power BI
private static void CreateDataset()
{
//TODO: Add using System.Net and using System.IO

string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
//POST web request to create a dataset.
//To create a Dataset in a group, use the Groups uri:
https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;
request.KeepAlive = true;
request.Method = "POST";
request.ContentLength = 0;
request.ContentType = "application/json";

//Add token to the request header
request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

//Create dataset JSON for POST request
string datasetJson = "{\"name\": \"SalesMarketing\", \"tables\": \" +
    \"[{\"name\": \"Product\", \"columns\": \" +
    \"[{ \"name\": \"ProductID\", \"dataType\": \"Int64\"}, \" +
    \"{ \"name\": \"Name\", \"dataType\": \"string\"}, \" +
    \"{ \"name\": \"Category\", \"dataType\": \"string\"},\" +
    \"{ \"name\": \"IsCompete\", \"dataType\": \"bool\"},\" +
    \"{ \"name\": \"ManufacturedOn\", \"dataType\": \"DateTime\"}\" +
    \"}]\"}";

//POST web request
byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(datasetJson);
request.ContentLength = byteArray.Length;

//Write JSON byte[] into a Stream
using (Stream writer = request.GetRequestStream())
{
    writer.Write(byteArray, 0, byteArray.Length);

    var response = (HttpWebResponse)request.GetResponse();

    Console.WriteLine(string.Format("Dataset {0}", response.StatusCode.ToString()));

    Console.ReadLine();
}
}
#endregion

#region Get a dataset to add rows into a Power BI table
private static string GetDataset()

```

```

private static string CreateDataset()
{
    string powerBIDatasetsApiUrl = "https://api.powerbi.com/v1.0/myorg/datasets";
    //POST web request to create a dataset.
    //To create a Dataset in a group, use the Groups uri:
    https://api.PowerBI.com/v1.0/myorg/groups/{group_id}/datasets
    HttpRequest request = System.Net.WebRequest.Create(powerBIDatasetsApiUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "GET";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    string datasetId = string.Empty;
    //Get HttpResponseMessage from GET request
    using (HttpResponse httpResponse = request.GetResponse() as System.Net.HttpWebResponse)
    {
        //Get StreamReader that holds the response stream
        using (StreamReader reader = new System.IO.StreamReader(httpResponse.GetResponseStream()))
        {
            string responseContent = reader.ReadToEnd();

            //TODO: Install NuGet Newtonsoft.Json package: Install-Package Newtonsoft.Json
            //and add using Newtonsoft.Json
            var results = JsonConvert.DeserializeObject<dynamic>(responseContent);

            //Get the first id
            datasetId = results["value"][0]["id"];

            Console.WriteLine(String.Format("Dataset ID: {0}", datasetId));
            Console.ReadLine();

            return datasetId;
        }
    }
}

#endregion

#region Add rows to a Power BI table
private static void AddRows(string datasetId, string tableName)
{
    string powerBIApiAddRowsUrl =
String.Format("https://api.powerbi.com/v1.0/myorg/datasets/{0}/tables/{1}/rows", datasetId, tableName);

    //POST web request to add rows.
    //To add rows to a dataset in a group, use the Groups uri:
    https://api.powerbi.com/v1.0/myorg/groups/{group_id}/datasets/{dataset_id}/tables/{table_name}/rows
    //Change request method to "POST"
    HttpRequest request = System.Net.WebRequest.Create(powerBIApiAddRowsUrl) as
System.Net.HttpWebRequest;
    request.KeepAlive = true;
    request.Method = "POST";
    request.ContentLength = 0;
    request.ContentType = "application/json";

    //Add token to the request header
    request.Headers.Add("Authorization", String.Format("Bearer {0}", token));

    //JSON content for product row
    string rowsJson = "{ \"rows\": " +
        "[ { \"ProductID\":1, \"Name\": \"Adjustable
Race\", \"Category\": \"Components\", \"IsCompete\": true, \"ManufacturedOn\": \"07/30/2014\" }, " +
        "{ \"ProductID\":2, \"Name\": \"LL
Crankarm\", \"Category\": \"Components\", \"IsCompete\": true, \"ManufacturedOn\": \"07/30/2014\" }, " +
        "{ \"ProductID\":3, \"Name\": \"HL Mountain Frame -
Silver\", \"Category\": \"Bikes\", \"IsCompete\": true, \"ManufacturedOn\": \"07/30/2014\" } ] }";
}

```

```
//POST web request
byte[] byteArray = System.Text.Encoding.UTF8.GetBytes(rowsJson);
request.ContentLength = byteArray.Length;

//Write JSON byte[] into a Stream
using (Stream writer = request.GetRequestStream())
{
    writer.Write(byteArray, 0, byteArray.Length);

    var response = (HttpWebResponse)request.GetResponse();

    Console.WriteLine("Rows Added");

    Console.ReadLine();
}
}

#endregion
}
```

Next steps

[Push data into a Power BI dataset](#)

[Walkthrough - Push data into a Power BI dataset](#)

[Register an app with Azure AD](#)

[Get an authentication access token](#)

[Create a dataset in Power BI](#)

[Get a dataset to add rows into a Power BI table](#)

[Add rows to a Power BI table](#)

[Power BI REST API reference](#)

[Overview of Power BI REST API](#)

More questions? [Try the Power BI Community](#)

Overview of the Power BI service content pack program

1/30/2018 • 2 min to read • [Edit Online](#)

A content pack is a set of out-of-box content allowing users to immediately gain insights from a source. A content pack is typically focused on a specific business scenario providing insights for a role, domain, or workflow.

ISVs can build template content packs that allow customers to connect and instantiate with their own accounts. As domain experts, they can unlock the data in a way that is easily consumable by a business users. The content packs offer adhoc monitoring and analysis to your customers without investing heavily in reporting infrastructure.

These ISV built template content packs can be submitted to the Power BI team to become publicly available in the Power BI content pack gallery (app.powerbi.com/getdata/services) and on Microsoft AppSource (appsourc.microsoft.com). An example of the public content pack experience can be found [here](#).

Overview

The general process to develop and submit an template content pack involves multiple steps.



1. [Review the requirements](#) and make sure you meet them
2. [Build content](#) in the Power BI Desktop
3. [Create a dashboard](#) in PowerBI.com
4. [Test the content pack](#) yourself within your organization
5. [Submit](#) the content to Power BI for publishing

Requirements

To build and submit a content pack to be published in the PowerBI service and AppSource, you must meet the following requirements:

- You have a SaaS application used by business users.
- Your SaaS application has user data that can be visualized in Power BI.
- Your SaaS application has an API that is accessible through public internet. Ideally the API is a REST based API or an OData feed. Power BI content packs support multiple authentication types like Basic Authentication, OAuth 2.0 and API Key.
- Your SaaS application is approved for publishing a content pack. Submit your request to pbiservicesapps@microsoft.com. We will review each submission on relevance and expected usage.
- Signed partner agreement. You will do that in the [submission step](#).

Please review the [authoring](#) section for more details on the technical requirements.

Business scenario

Content packs provide insights and metrics focused on a specific business scenario. Understanding your audience and the benefit they'll receive from the content pack will help ensure your users are successfully with the content you provide.

Tips

- Identify your audience and the task they're trying to accomplish
- Focus on a certain time period (last 90 days) or the last N results
- Only import the tables/columns related to your scenario
- Consider offering more than one content pack for separate unique scenarios

Frequently asked questions

Can I build a Power BI Service content pack for a third-party SaaS application that I don't own?

No, we currently require signing a partner agreement with the owner of the SaaS application prior to publishing the content pack in the service.

I don't have a public developer API for my service. Can I still build a Power BI service content pack that pulls the data directly from the data storage?

No, Power BI service content packs require a developer API that is accessible through public Internet.

What kind of APIs are supported by service content packs and what authentication types can they work with?

Power BI service content packs support any REST API or OData feed. Power BI can work with multiple authentication types including Basic Authentication, OAuth2.0 and Web API Key. More details on the technical requirements in the [Authoring](#) article.

I have more questions about service Content Packs. How can I contact you?

Feel free to email us your questions at pbiservicesapps@microsoft.com

Support

For support during development, please use <https://powerbi.microsoft.com/support>. This is actively monitored and managed. Customer incidents quickly find their way to the appropriate team.

Next step

[Authoring](#)

Author template content packs in Power BI

1/30/2018 • 5 min to read • [Edit Online](#)

Authoring a template content pack uses the Power BI Desktop and PowerBI.com. There are four components to your content pack:

- Queries allow you to [connect](#) and [transform](#) the data, as well as define [parameters](#)
- Data model to create [relationships](#), [measures](#), and Q&A improvements
- Report [pages](#) include visuals and filters to provide insights into your data
- [Dashboard](#) and [tiles](#) offer an overview of the insights included

You may be familiar with each piece as existing Power BI features. When building a content pack, there are additional things to consider for each aspect, see each section below for more details.

Queries

For template content packs, queries developed in the Power BI Desktop are used to connect to your data source and import data. These queries are required to return a consistent schema and are supported for Scheduled Data refresh (direct query is not supported).

Template content packs only support one data source per content pack so define your queries carefully. A single data source is defined as a source that requires the same authentication. You can make multiple API calls in different queries if all the calls are to the same API endpoint and use the same authentication. Power BI content packs do not support multiple sources that require different authentications.

Connect to your API

To get started, you will need to connect to your API from Power BI Desktop to start building your queries.

You can use the Data Connectors that are available out of the box in Power BI Desktop to connect to your API. You can use the Web Data Connector (Get Data -> Web) to connect to your Rest API or the OData connector (Get Data -> OData feed) to connect to your OData feed. Please note that these connectors will work out of the box only if your API supports Basic Authentication.

NOTE

If your API uses any other authentication types, like OAuth 2.0 or Web API Key, then you will need to develop your own Data Connector to allow Power BI Desktop to successfully connect and authenticates to your API. For details on how to develop your own Data Connector for your Content Pack, check the Data Connectors documentation [here](#).

Consider the source

The queries define the data that will be included in the data model. Depending on the size of your system, these queries should also include filters to ensure your customers are dealing with a manageable size that fits your business scenario.

Power BI content packs can execute multiple queries in parallel and for multiple users concurrently. Plan ahead your throttling and concurrency strategy and ask us how to make your content pack fault tolerant.

Schema enforcement

Ensure your queries are resilient to changes in your system, changes in schema on refresh can break the model. If the source could return null/missing schema result for some queries, consider returning an empty table or throw a custom error messages that is meaningful to your user.

Parameters

[Parameters](#) in Power BI Desktop allow your users to provide input values that customize the data retrieved by the user. Think of the parameters upfront to avoid rework after investing time to build detailed queries or reports.

NOTE

Template content packs only support text parameters currently. Other parameter types can be used during development but during the [testing](#) portion all values provided by the users will be literal.

Additional query tips

- Ensure all columns are typed appropriately
- Columns have informative names (see Q&A)
- For shared logic, consider using functions or queries
- Privacy levels are not currently supported in the service - if you get a prompt about privacy levels, you may need to re-write the query to use relative paths

Data Model

A well-defined data model will ensure your customers can easily and intuitively interact with the content pack. Create the data model in the Power BI Desktop.

NOTE

Much of the basic modelling (typing, column names) should be done in the [queries](#).

Q&A

The modelling will also affect how well Q&A can provide results for your customers. Ensure you add synonyms to commonly used columns and that your columns are properly named in the [queries](#).

Additional data model tips

- All value columns have formatting applied >[!NOTE] >Types should be applied in the query.
- All measures have formatting applied
- Default Summarization is set. Especially "Do Not Summarize", when applicable (for unique values for example)
- Data Category has been set, when applicable
- Relationships are set, as necessary

Reports

The report pages offer additional insight into the data included in your content pack. Use the pages of the reports to answer the key business questions your content pack is trying to address. Create the report using the Power BI Desktop.

NOTE

Only one report may be included in a content pack, take advantage of the different pages to call out particular sections of your scenario.

Additional report tips

- Use more than one visual per page for cross-filtering
- Align the visuals carefully (no overlapping)
- Page is set to "4:3" or "16:9" mode for layout

- All of the aggregations presented make numeric sense (averages, unique values)
- Slicing produces rational results
- Logo is present on at least the top report
- Elements are in the client's color scheme to the extent possible

Dashboard

The dashboard is the main point of interaction with your content pack for your customers. It should include an overview of the content included, especially the important metrics for your business scenario.

To create a dashboard for your template content pack, simply upload your PBIX through Get Data > Files or publish directly from the Power BI Desktop.

NOTE

Template content packs currently require a single report and dataset per content pack. Do not pin content from multiple reports/datasets onto the dashboard used in the content pack.

Additional dashboard tips

- Maintain the same theme when pinning so that the tiles on your dashboard are consistent
- Pin a logo to the theme so consumers know where the pack is from
- Suggested layout to work with most screen resolutions is 5-6 small tiles wide
- All dashboard tiles should have appropriate titles/subtitles
- Consider groupings in the dashboard for different scenarios, either vertically or horizontally

Summary of restrictions

As listed in the above sections, currently the template content packs have a set of restrictions:

SUPPORTED	NOT SUPPORTED
Datasets built in PBI Desktop	<i>Datasets from other content packs or inputs such as Excel files</i>
Data source supported for cloud Scheduled Data refresh	<i>Direct query or on-prem connectivity is not supported</i>
Queries returning consistent schema or errors where appropriate	<i>Dynamic or custom schemas</i>
One data source per dataset	<i>Multiple data sources such as mashups or URLs that are detected as multiple data sources</i>
Parameters of type text	<i>Other parameter types (such as date) or "list allowed of values"</i>
One dashboard, report and dataset	<i>Multiple dashboards, reports or datasets</i>

Next step

[Content Pack Testing and Submission](#)

Testing template content packs for Power BI

1/30/2018 • 3 min to read • [Edit Online](#)

There are multiple ways to test your content pack before submitting it for publishing.

NOTE

If your content pack uses a custom [Data Connector](#) that you developed, you will not be able to test the data refresh or the template content pack as described below. If that is the case, please proceed to [submit](#) your content pack and the Power BI team will work with you on testing your content pack.

Testing Scheduled Data Refresh

Template content packs leverage Refresh in PowerBI.com to instantiate a content pack with the customer's data when they connect. Prior to the content pack being publicly available, you can test this flow with the Desktop file you've created.

After uploading the file, select the "..." next to the dataset and select Schedule Refresh. Configure credentials for the source. Make sure that your dataset refreshes successfully, try both "Refresh Now" and "Scheduled Refresh". If your refresh hits any failures, check the error message and validate your queries and your end system.

Additional refresh tips

- Only one data source should be detected when you try to schedule refresh
- Test connection should indicate that your user will be able to load the content pack. If that's not the case, ensure your queries handle the additional error cases.
- Refresh should complete in a reasonable time, ~5mins is suggested

The screenshot shows the Power BI interface with the 'Settings' page open for a dataset named 'GitHub'. The 'Datasets' tab is selected, and the 'Schedule Refresh' section is expanded. A notification box is overlaid on the screen, displaying the message: "Last refresh succeeded: Wed Feb 24 2016 20:25:45 GMT-0800 (Pacific Standard Time). Refresh schedule is not enabled." The notification box includes buttons for "EXPLORE", "RENAME", "REMOVE", "SCHEDULE REFRESH", "REFRESH NOW", and "QUICK INSIGHTS", along with a link to "Add another time". The "Apply" button is highlighted in yellow.

Testing Templates

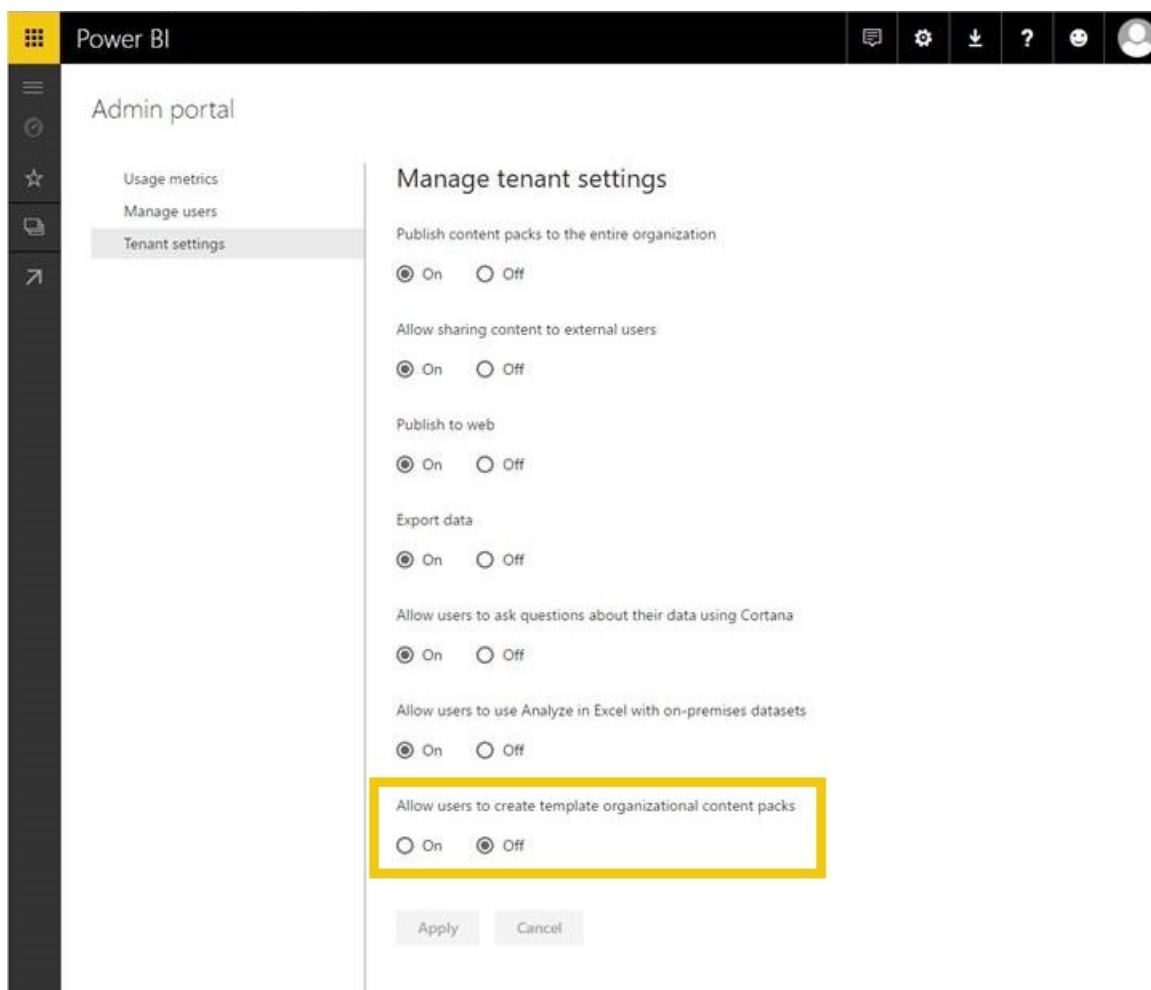
A template content pack is similar to existing solutions except that it does not include the actual data in the dataset. Instead, when a user consumes or instantiates a template, they are prompted for parameters and credentials in order to connect. Once connected, they'll see their own data in the dashboard, report and datasets.

After a user instantiates the content pack they have access to the dataset settings including scheduled refresh, any RLS settings on the dataset are **not** published with the content pack.

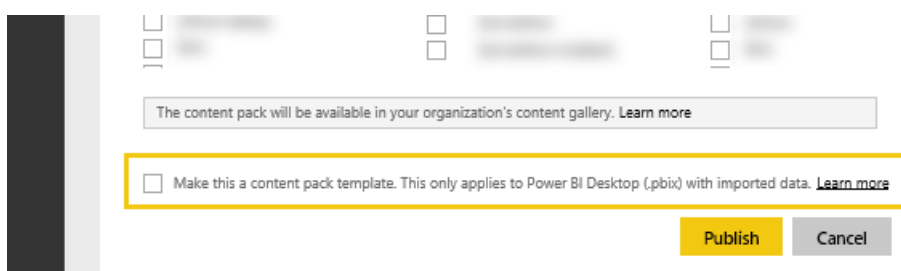
NOTE

Template content packs can only include 1 dashboard, 1 report and 1 dataset. Please see the list of restrictions in the [authoring](#) page.

To enable template creation for your tenant, please work with your Power BI admin to enable the feature switch below.



Once enabled, you'll see a checkbox at the bottom of "Create content pack", allowing you to publish a template content pack to your organization.

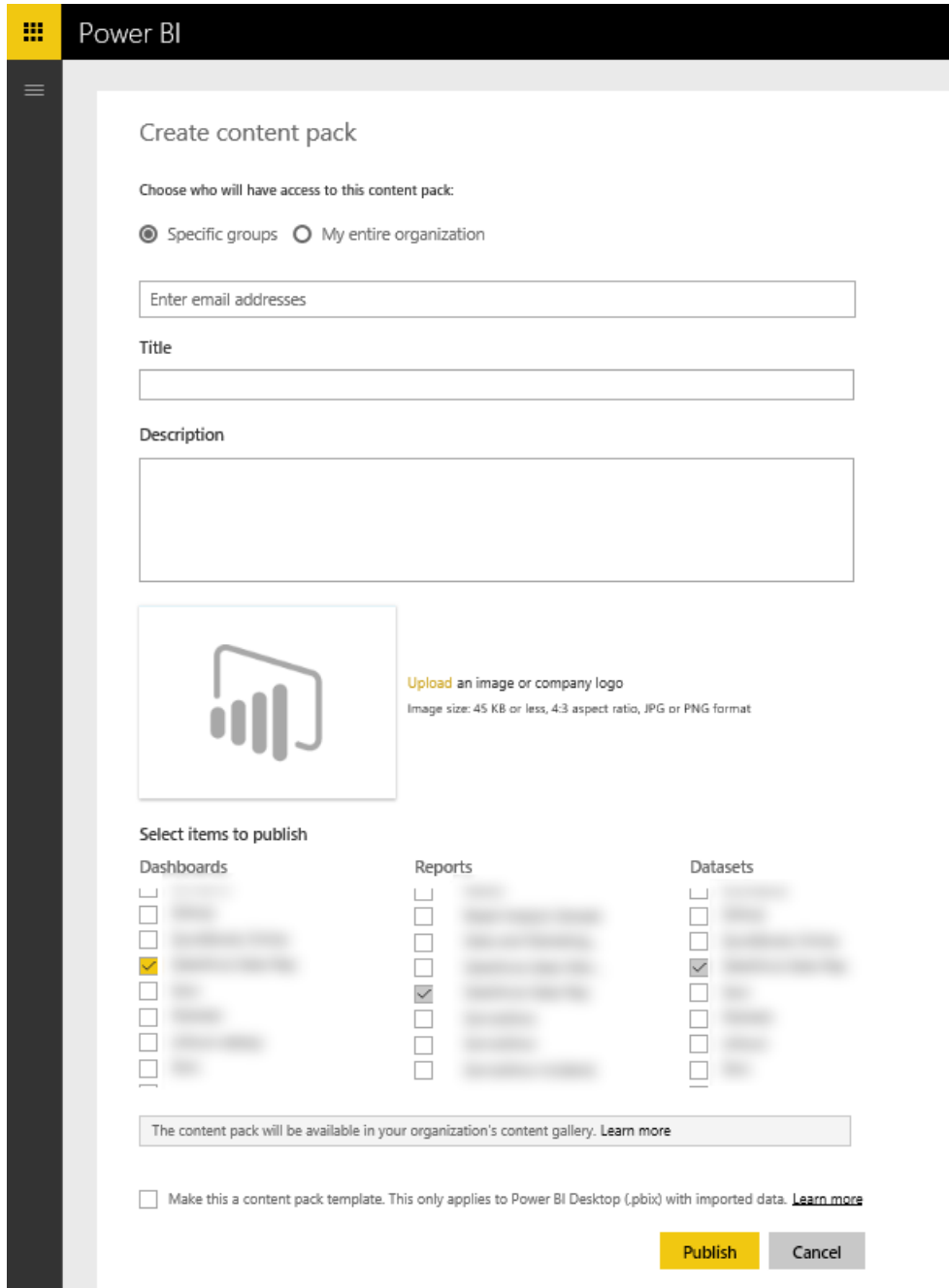


Naming

We suggest naming your dashboard, report and dataset consistently across your content pack. These names are hardcoded and will be the same for all users, so using your product/scenario name can make it easier for your customers to locate.

Additional template tips

- Ensure the parameters you specified in the queries are meaningful to your end users
- Consider how long your end user will be waiting for scheduled refresh to complete



The screenshot shows the 'Create content pack' interface in Power BI. The interface is titled 'Create content pack' and includes the following elements:

- Access Control:** A section titled 'Choose who will have access to this content pack:' with two radio buttons: 'Specific groups' (selected) and 'My entire organization'.
- Input Fields:** A text box for 'Enter email addresses', a 'Title' field, and a 'Description' text area.
- Image Upload:** A placeholder image of a hand holding a tablet, with the text 'Upload an image or company logo' and 'Image size: 45 KB or less, 4:3 aspect ratio, JPG or PNG format'.
- Select items to publish:** Three columns of checkboxes for 'Dashboards', 'Reports', and 'Datasets'. In the 'Dashboards' column, the second checkbox is checked. In the 'Reports' column, the third checkbox is checked. In the 'Datasets' column, the second checkbox is checked.
- Information:** A grey box stating 'The content pack will be available in your organization's content gallery. [Learn more](#)'.
- Template Option:** A checkbox labeled 'Make this a content pack template. This only applies to Power BI Desktop (.pbix) with imported data. [Learn more](#)'.
- Buttons:** 'Publish' (yellow) and 'Cancel' (grey) buttons at the bottom right.

Submission

The submission process through [Microsoft AppSource](#) will allow you to publish your template content pack in the service content packs gallery in PowerBI.com as well as list your content pack in [Microsoft AppSource](#).

Before submission

- Review the authoring tips for each of the artifacts within the content pack
- Test and connect with various accounts and data conditions. (Skip this step if you developed your own custom [Data Connector](#))

- Review all visuals, look carefully for misspelled items
- Ensure the content pack responds well to Q&A, we suggest testing at least 30 varied questions across the data model. (Skip this step if you developed your own custom [Data Connector](#))

Submission

Once ready to submit, visit the [Apps submission page](#) on AppSource and submit your information. Please make sure to select Power BI from the available list of products

The Power BI team will review your submission and will reach out to you to ensure all the artifacts meets the submission requirements. In addition to being complete, we'll also validate the quality of the dashboard and reports provided ensuring they meet the business scenario described in the application.

Updates

Updating your content pack follows a similar flow to the original submission.

Template content pack experiences in Power BI

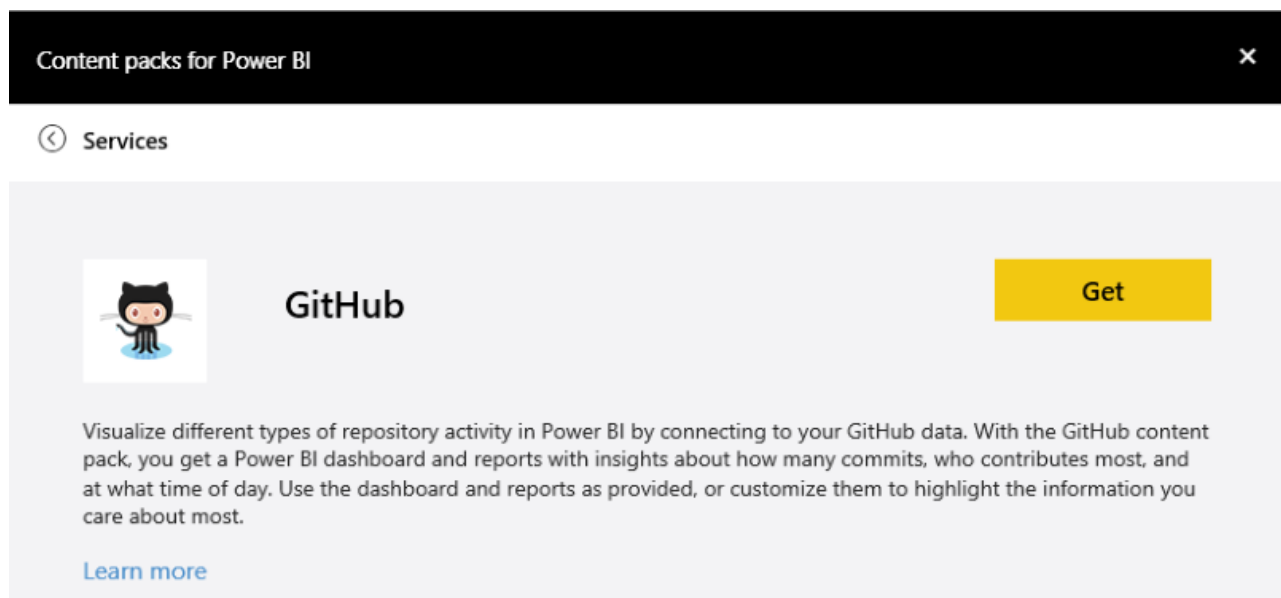
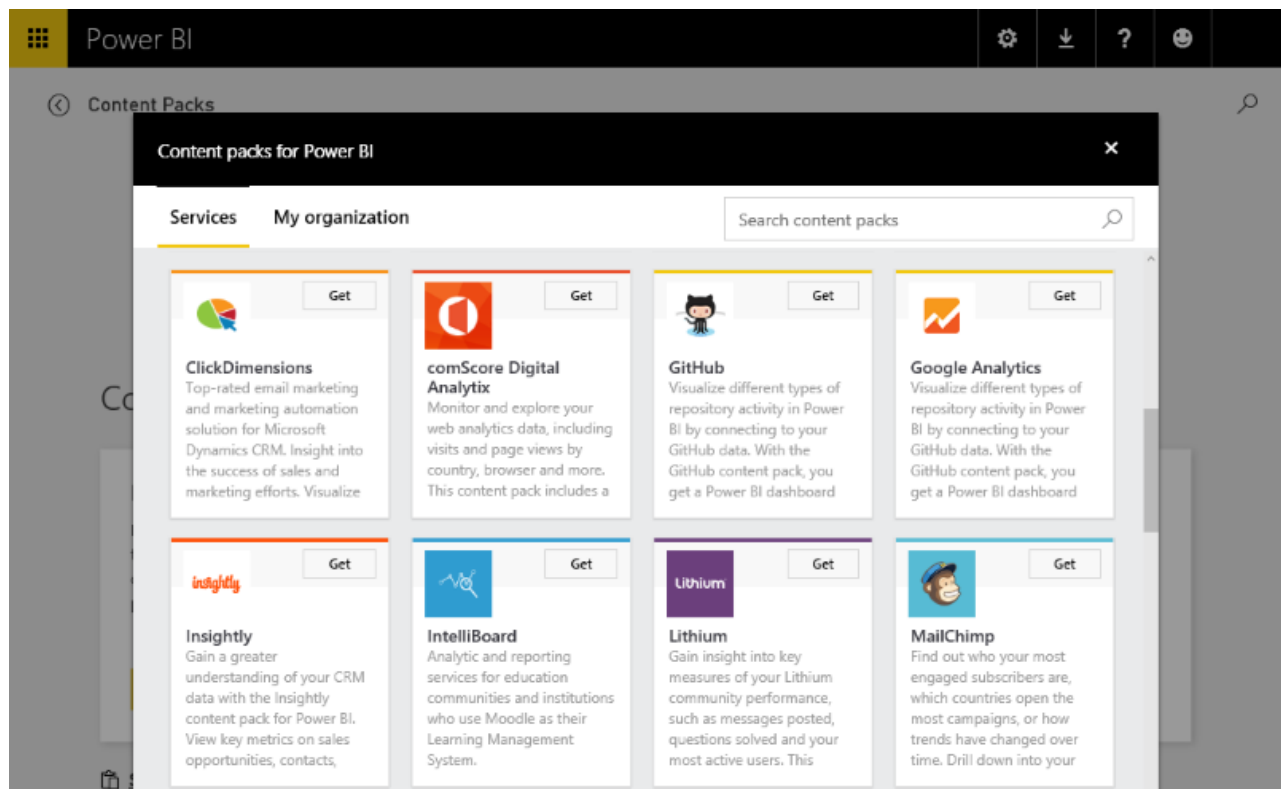
1/30/2018 • 1 min to read • [Edit Online](#)

This section highlights a typical experience for a user connecting to an ISV [content pack](#).

Try the connection experience yourself by connecting to a released content pack at <https://app.powerbi.com/getdata/services> (such as the [GitHub content pack](#) described below).

Connect

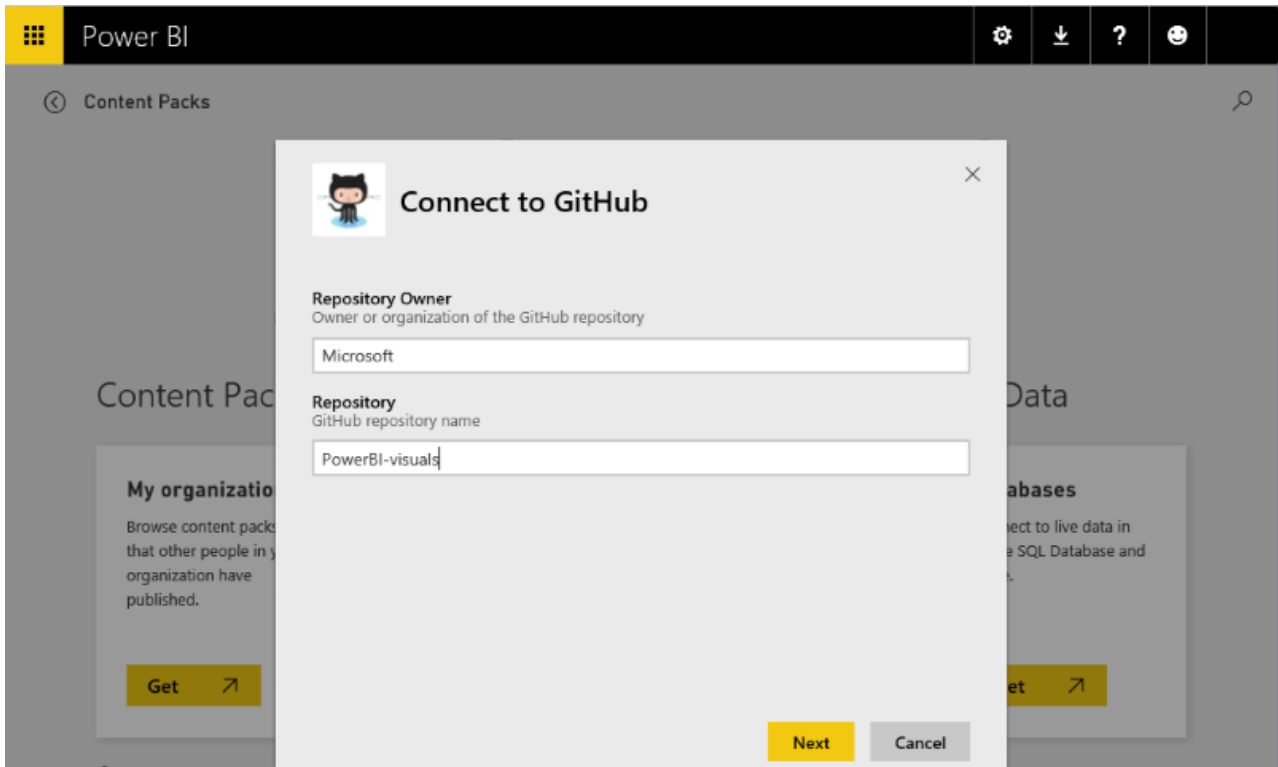
To get started, a user browses the content pack gallery and selects a content pack to connect to. The content pack entry provides a name, an icon and a descriptive text providing more information to the user.



Parameters

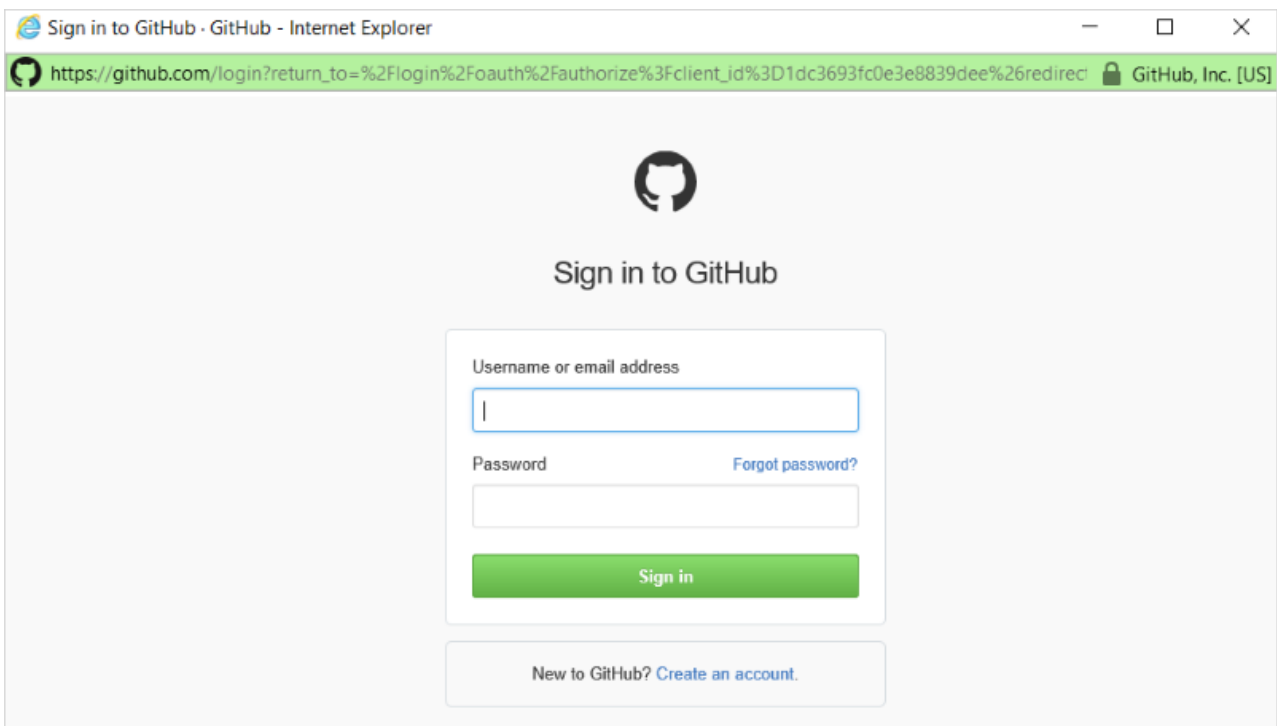
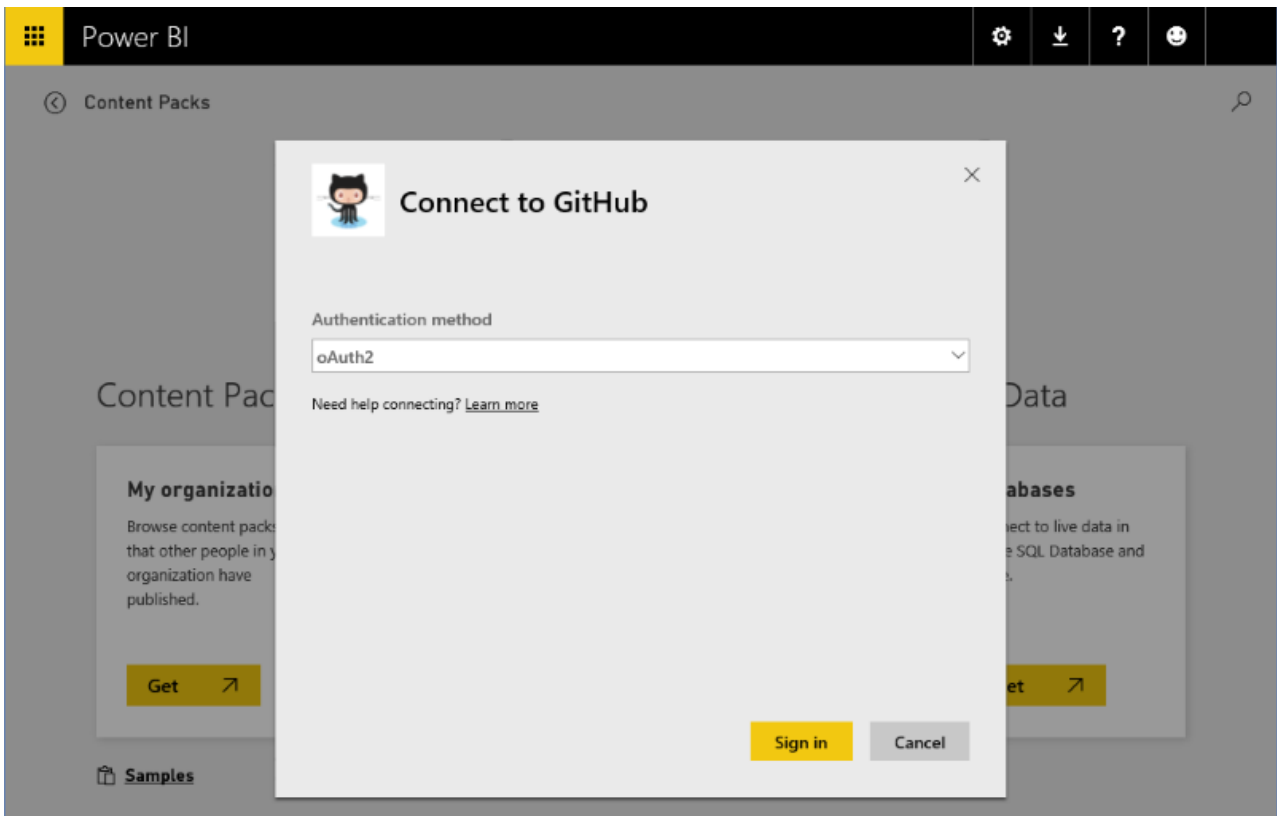
Once selected, the user will be prompted to provide parameters (if required). The parameters dialog is provided declaratively by the author during the creation of the content pack.

Currently the parameters UI is very basic – there is no way to enumerate drop down lists and data input validation is constrained to regex.



Credentials

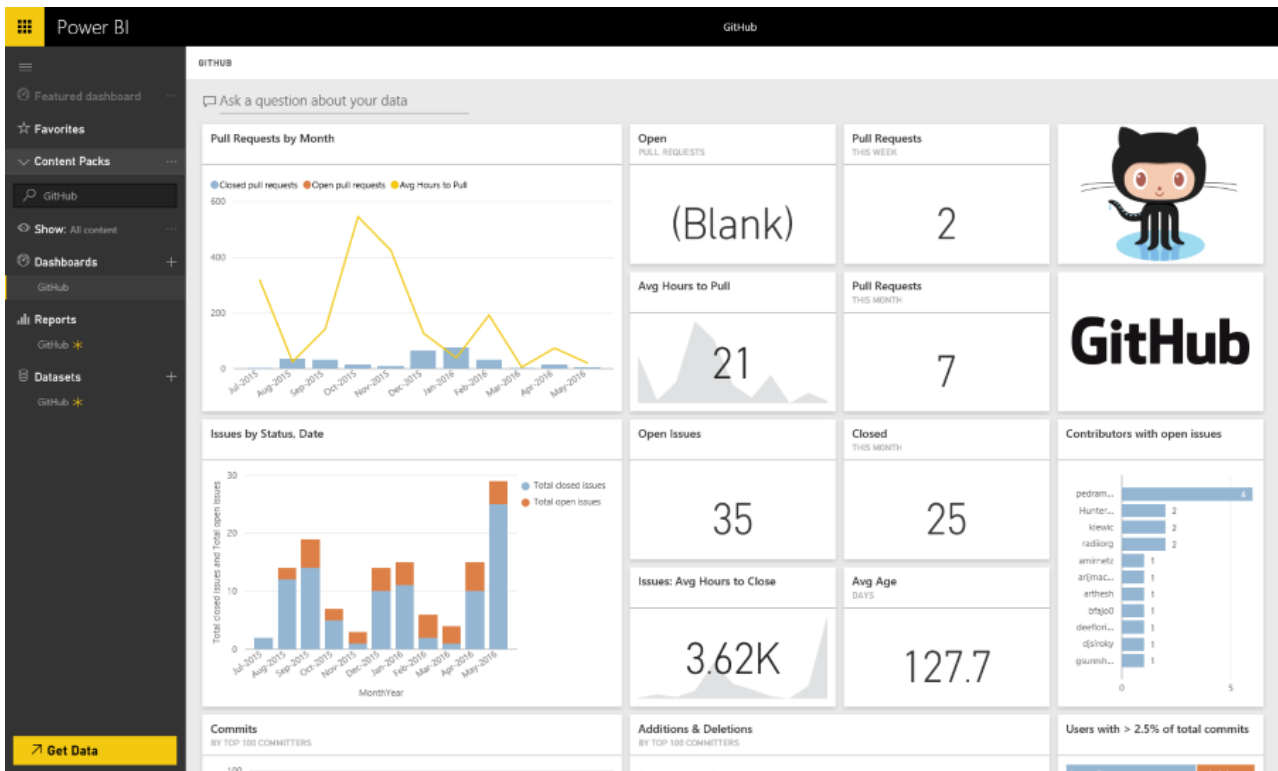
After parameters, the user will be prompted to login. If the source supports multiple types of authentication, the user will choose the appropriate option. If the source requires OAuth, then the service's login UI will pop up when the user presses Sign In. Otherwise, the user can enter their credentials in the provided dialog.



Instantiation

When login succeeds, the artifacts included in the content pack - model, reports, and dashboard - appear in the navigation bar. These artifacts are added to each users' account. The data load asynchronously to populate the dataset (model). The user is then able to consume the dashboard, reports, and model.

By default a daily refresh schedule is configured for the user, which will re-evaluate the queries in the model. The credentials provided to the user must allow them to refresh the data without being present.



Exploration and Monitoring

Once the content pack is hydrated into the users' account, they can explore and monitor the data/insights.

Typically this includes:

- Viewing and customizing the dashboard.
- Viewing and customizing the report.
- Using natural language to ask questions of the data
- Using the exploration canvas to explore the data in the data model

Consideration should be made for providing natural language modelling (synonyms) and understandable model schema to enable better exploration experiences.

Power BI REST API Reference

1/30/2018 • 1 min to read • [Edit Online](#)

Power BI is a cloud-based service that you can use to build custom dashboard applications. The Power BI REST API is a REST-based API that provides programmatic access to **Dashboard** resources such as **Datasets**, **Tables**, and **Rows** in Power BI.

The Power BI REST API has the following operations:

- Dataset operations: Get and create Datasets.
- Table operations: Get Tables and update Table schema.
- Row operations: Add Rows and Delete Rows.
- Group operations: Get Groups.

To learn more about the Power BI REST API, see [Overview of Power BI REST API](#).

More questions? [Try asking the Power BI Community](#)

Get started with Power BI Report Server

1/30/2018 • 3 min to read • [Edit Online](#)

Create, deploy, and manage Power BI, mobile and paginated reports on premises with the range of ready-to-use tools and services that Power BI Report Server provides.

Create, deploy, and manage reports

Power BI Report Server is a solution that customers deploy on their own premises for creating, publishing, and managing reports, then delivering them to the right users in different ways, whether that's viewing them in web browser, on their mobile device, or as an email in their in-box.

Power BI Report Server offers a suite of products:

- A modern web portal you can view in any modern browser. In the web portal, you can organize and display reports and KPIs. You can also store Excel workbooks on the portal.
- Power BI reports, created with Power BI Desktop, that you can view within the web portal in your own environment.
- Paginated reports so you can create modern-looking reports, with tools for creating them.
- Mobile reports with a responsive layout that adapts to different devices and the different ways you hold them.

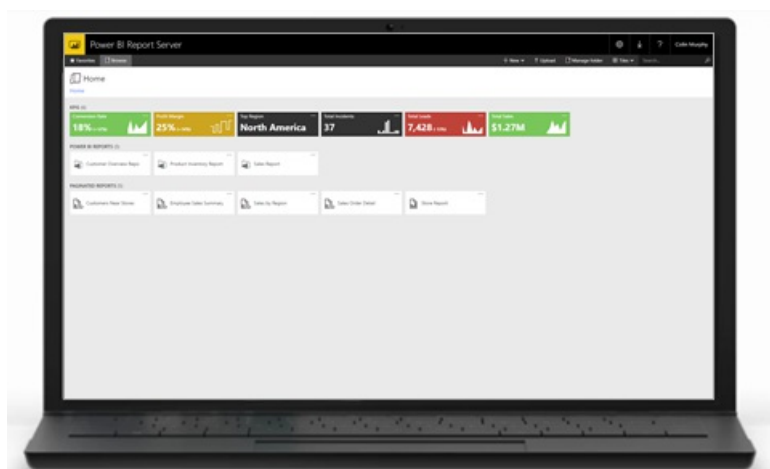
Read on for more about each.

What's new in Power BI Report Server

These sources will keep you up-to-date on new features in Power BI Report Server.

- [What's New in Power BI Report Server](#)
- [Microsoft Power BI Blog](#)
- [SQL Server Reporting Services Team Blog](#)
- The [Guy in a Cube YouTube channel](#)

Web portal



For end users of Power BI Report Server, the front door is a modern web portal you can view in any modern browser. You can access all your reports and KPIs in the new portal.

You can apply your own custom [branding](#) to your web portal. And you can create KPIs right in the web portal. KPIs can surface key business metrics at a glance in the browser, without having to open a report.

The content on the web portal is organized by type: Power BI reports, mobile reports, paginated reports and KPIs, plus Excel workbooks, shared datasets, and shared data sources to use as building blocks for your reports. You can store and manage them securely here, in the traditional folder hierarchy. You can tag your favorites, and you can manage the content if you have that role.

And you can schedule report processing, access reports on demand, and subscribe to published reports in the new web portal.

More about the [Web portal](#).

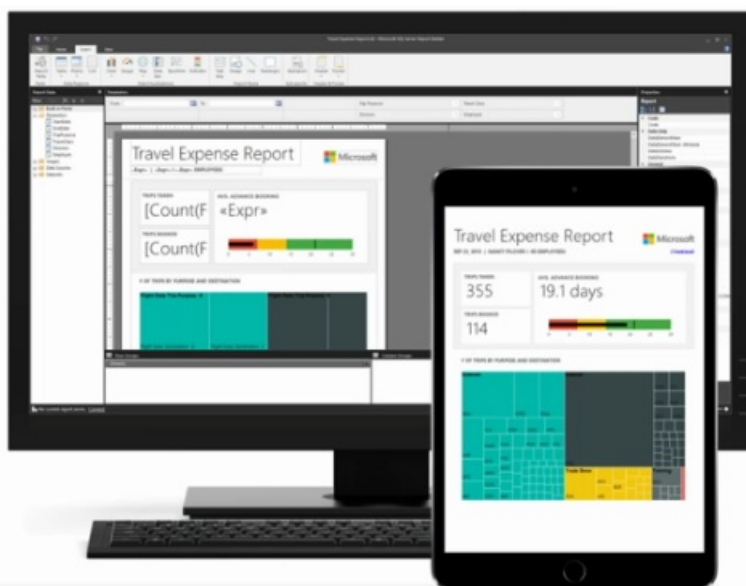
Power BI reports



A Power BI report is a multi-perspective view into a dataset, with visualizations that represent different findings and insights from that dataset. A report can have a single visualization or pages full of visualizations. Depending on your job role, you may be someone who creates reports and/or you may be someone who consumes or uses reports.

Reports are based on a single dataset. The visualizations in a report each represent a nugget of information. And the visualizations aren't static; you can add and remove data, change visualization types, and apply filters and slicers as you dig into the data to discover insights and look for answers. Like a dashboard, but more-so, a report is highly interactive and highly customizable and the visualizations update as the underlying data changes.

Paginated reports



Paginated reports are paginated document-style reports, in which the more data you have, the more rows in the tables, and the more pages the report would have. That's great for generating fixed-layout, pixel-perfect

documents optimized for printing, such as PDF and Word files.

You can create modern-looking reports using [Report Builder](#) or Report Designer in [SQL Server Data Tools \(SSDT\)](#).

Report Server programming features

Take advantage of Power BI Report Server programming features so you can extend and customize your reporting functionality, with APIs to integrate or extend data and report processing in custom applications.

More [Report Server developer documentation](#).

Next steps

[User handbook](#)

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

What's new in Power BI Report Server

1/30/2018 • 5 min to read • [Edit Online](#)

Learn about what's new in Power BI Report Server. This covers the major feature areas and is updated as new items are released.

To download Power BI Report Server, and Power BI Desktop optimized for Power BI Report Server, go to [On-premises reporting with Power BI Report Server](#).

Tip

For the current release notes, see [Power BI Report Server - Release notes](#).

For related "What's New" information, see:

- [What's new in the Power BI service](#)
- [What's new in Power BI Desktop](#)
- [What's new in the mobile apps for Power BI](#)
- [Power BI team blog](#)

October 2017 release

Power BI report data sources

Power BI reports in Power BI Report Server can connect to a variety of data sources. You can import data and schedule data refresh, or query it directly using DirectQuery or a live connection to SQL Server Analysis Services. See the list of data sources that support scheduled refresh and those that support DirectQuery in "Power BI report data sources in Power BI Report Server".

Scheduled data refresh for imported data

In Power BI Report Server, you can set up scheduled data refresh to keep data up to date in Power BI reports with an embedded model rather than a live connection or DirectQuery. With an embedded model you import the data, so it's disconnected from the original data source. It needs to be updated to keep the data fresh, and scheduled refresh is the way to do that. Read more about "scheduled refresh for Power BI reports in Power BI Report Server".

Editing Power BI reports from the server

You can open and edit Power BI report (.pbix) files from the server, but you get back the original file you uploaded. This means **if the data has been refreshed by the server, the data won't be refreshed when you first open the file**. You need to manually refresh it locally to see the change.

Large file upload/download

You can upload files up to 2 GB in size, though by default this limit is set to 1 GB in the Report Server settings in SQL Server Management Studio (SSMS). These files are stored in the database just as they are for SharePoint, and no special configuration for the SQL Server catalog is required.

Accessing shared datasets as OData feeds

You can access shared datasets from Power BI Desktop with an OData feed. For more information, see [Accessing shared datasets as OData feeds in Power BI Report Server](#).

Scale-out

This release supports scale-out. Use a load-balancer and set server affinity for the best experience. Note that the scenario is not yet optimized for scale-out, so you'll see models potentially replicated across multiple nodes. The scenario will work without the Network Load Balancer and sticky sessions. However, you'll not only see an over-use of memory across nodes as the model is loaded N times, but performance will slow in between connections as

the model is streamed as it hits a new node in between requests.

Administrator settings

Administrators can set the following properties in SSMS Advanced Properties for the server farm:

- EnableCustomVisuals: True/False
- EnablePowerBIReportEmbeddedModels: True/False
- EnablePowerBIReportExportData: True/False
- MaxFileSizeMb: Default is now 1000
- ModelCleanupCycleMinutes: How often it checks to evict models from memory
- ModelExpirationMinutes: How long until model expires and is evicted, based on last time used
- ScheduleRefreshTimeoutMinutes: How long data refresh can take for a model. By default, this is two hours. There is no hard upper limit.

Config file rsreportserver.config

```
<Configuration>
  <Service>
    <PollingInterval>10</PollingInterval>
    <IsDataModelRefreshService>>false</IsDataModelRefreshService>
    <MaxQueueThreads>0</MaxQueueThreads>
  </Service>
</Configuration>
```

Developer API

The developer API (REST API) introduced for SSRS 2017 has been extended for Power BI Report Server to work with both Excel files and .pbix files. One potential use case is to programmatically download files from the server, refresh them, and then republish them. This is the only way to refresh Excel workbooks with PowerPivot models, for example.

Note that there is a new separate API for large files, which will be updated in the Power BI Report Server version of Swagger.

SQL Server Analysis Services (SSAS) and the Power BI Report Server memory footprint

Power BI Report Server now hosts SQL Server Analysis Services (SSAS) internally. This isn't specific to scheduled refresh. Hosting SSAS can greatly expand the report server memory footprint. The AS.ini configuration file is available on the server nodes, so if you're familiar with SSAS, you may want to update the settings, including maximum memory limit and disk caching etc. See [Server properties in Analysis Services](#) for details.

Viewing and interacting with Excel workbooks

Excel and Power BI contain a portfolio of tools that is unique in the industry. Together, they enable business analysts to more easily gather, shape, analyze, and visually explore their data. In addition to viewing Power BI reports in the web portal, business users can now do the same with Excel workbooks in Power BI Report Server, giving them a single location to publish and view their self-service Microsoft BI content.

We've published a [walkthrough of how to add Office Online Server \(OOS\) to your Power BI Report Server preview environment](#). Customers with a Volume Licensing account can download OOS from the Volume License Servicing Center at no cost and will have view-only functionality. Once configured, users can view and interact with Excel workbooks that:

- Have no external data source dependencies
- Have a live connection to an external SQL Server Analysis Services data source
- Have a PowerPivot data model

Support for new table and matrix visuals

Power BI Report Server now supports the new Power BI table and matrix visuals. To create reports with these visuals, you will need an updated Power BI Desktop release for the October 2017 release. It can't be installed side-by-side with the Power BI Desktop (June 2017) release. For the latest version of Power BI Desktop, on the [Power BI Report Server download page](#), select **Advanced download options**.

June 2017

- Power BI Report Server made generally available (GA).

May 2017

- Power BI Report Server Preview made available
- Ability to publish Power BI reports on-premises
 - Support for custom visuals
 - Support for Analysis Services live connections only with more data sources to come.
 - Power BI Mobile app updated to display Power BI reports hosted in Power BI Report Server
- Enhanced collaboration in reports with comments

Next steps

[Power BI Report Server release notes](#)

[User handbook](#)

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

Power BI Report Server release notes

1/30/2018 • 1 min to read • [Edit Online](#)

This topic describes limitations and issues with Power BI Report Server.

To download Power BI Report Server, and Power BI Desktop optimized for Power BI Report Server, go to [On-premises reporting with Power BI Report Server](#).

October 2017

- Support for imported data in Power BI reports
- Ability to view excel workbooks within the web portal. This is done by configuring Office Online Server.
- Support for the new Power BI table and matrix visuals.
- REST API support

June 2017

- No new items for June 2017.

May 2017

- Power BI reports must be created with Power BI Desktop optimized for Power BI Report Server in order to work with Power BI Report Server. You can download Power BI Desktop from the download link at the top of this page.
- Power BI Reports only support live connections to Analysis Services (tabular or multidimensional).
- No support for R visuals.

Issue and customer impact: If you have both SQL Server Reporting Services and Power BI Report Server on the same machine and uninstall one of them, you will no longer be able to connect to the remaining report server with Report Server Configuration Manager.

Workaround To work around this issue, you must perform the following operations after uninstalling one of the servers.

1. Launch a command prompt in Administrator mode.
2. Go to the directory where the remaining report server is installed.

Default location for Power BI Report Server: C:\Program Files\Microsoft Power BI Report Server

Default location for SQL Server Reporting Services: C:\Program Files\Microsoft SQL Server Reporting Services

3. Then go to the next folder. This will either be *SSRS* or *PBIRS* depending on what is remaining.
4. Go to the WMI folder.
5. Run the following command:

```
regsvr32 /i ReportingServicesWMIProvider.dll
```

You can ignore the following error, if you see it.

The module "ReportingServicesWMIProvider.dll" was loaded but the entry-point DLLInstall was not found.
Make sure that "ReportingServicesWMIProvider.dll" is a valid DLL or OCX file and then try again.

Next steps

[What's new in Power BI Report Server](#)

[User handbook](#)

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

Changelog for Power BI Report Server

1/11/2018 • 2 min to read • [Edit Online](#)

This change log is for Power BI Report Server and lists new items along with bug fixes for each released build.

For detailed information about new features, see [What's new in Power BI Report Server](#).

October 2017

• Power BI Report Server

- *Version 1.1.6582.41691 (Build 14.0.600.442), Released: January 10, 2018*
 - Security Updates
 - Bug Fixes
 - Fix for Model.GetParameters returning 400
 - Fix for setting shared data set to existing Paginated Reports (RDL)
 - Fix for ExecutionNotFoundException when exporting report with different parameter values to PDF
- *Version 1.1.6551.5155 (Build 14.0.600.438), Released: December 11, 2017*
 - Bug Fixes
 - Failure to save data after refreshing for certain Power BI Desktop reports.
- *Version 1.1.6530.30789 (Build 14.0.600.437), Released: November 17, 2017*
 - Bug Fixes
 - Fix for Basic Authentication Scenarios
 - Fix for weekdays were not selectable on schedule page for Subscriptions, Cache Refresh Plans and History Snapshots on Portal
 - For Paginated Reports (RDL), fix for having expressions in Textbox with CanGrow property set to false is resulting in values not showing colors and fonts not being proper
 - For Power BI Reports (PBIX), fix for adding Legends to line chart renders an empty visual
- *Version 1.1.6514.9163 (Build 14.0.600.434), Released: November 1, 2017*
 - Bug Fixes
 - Fix for upload reliability problems for PBIX reports over 500MB
 - Fix for data loading issue for PBIX reports over 1GB
- *Version 1.1.6513.3500 (Build 14.0.600.433), Released: October 31, 2017*
 - Features
 - Embedded Data Model Support
 - Excel Workbook Viewing (with Office Online Server integration enabled)
 - Scheduled Data Refresh (PBIX)
 - Direct Query Support
 - Large File Support (up to 2 GB)
 - Public REST API
 - Shared Dataset support in Power BI Desktop (via oData)
 - URL Parameter Support for PBIX files
 - Accessibility improvements

- **Power BI Desktop (optimized for Power BI Report Server)**

- *Version: 2.51.4885.2501 (October 2017), Released: January 10, 2018*
 - Security Updates
- *Version: 2.51.4885.1423 (October 2017), Released: November 17, 2017*
 - Bug Fixes
 - Fix for 32-bit Power BI Desktop failing to run on x86 OS
 - For Power BI Reports (PBIX), fix to show x-axis gridlines
 - Other minor bug fixes
- *Version: 2.51.4885.1041 (October 2017), Released: October 31, 2017*
 - Features
 - Contains changes required for connection with Power BI Report Server (October 2017)

June 2017

- **Power BI Report Server**

- *Build 14.0.600.309, Released: January 10, 2018*
 - Security Updates
- *Build 14.0.600.305, Released: September 19, 2017*
 - Bug Fixes
 - Update to the latest [Bing Maps Web Control](#)
- *Build 14.0.600.301, Released: July 11, 2017*
 - Bug Fixes
 - The {{UserId}} tag resolves to the stored credentials instead of the user executing the report in Power BI Reports
 - Some images fail to render in Power BI Report Server reports
 - Unable to change the name of a Power BI Report in the Power BI Report Server
 - Unable to load Custom Visuals in the Power BI mobile application (it requires reinstall of the mobile app to clear up the local cache)
- *Build 14.0.600.271, Released: June 12, 2017*
 - Power BI Report Server initial release

- **Power BI Desktop (optimized for Power BI Report Server)**

- *Version: 2.47.4766.4901 (June 2017), Released: January 10, 2018*
 - Security Updates

Next steps

[User handbook](#)

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

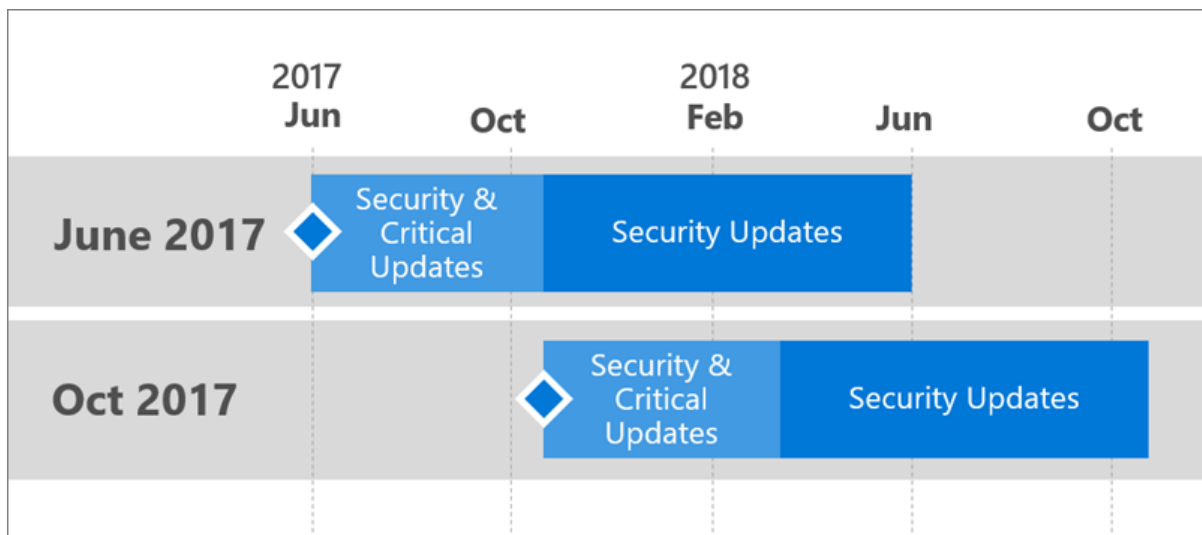
Support timeline for Power BI Report Server

1/30/2018 • 1 min to read • [Edit Online](#)

Power BI Report Server will be released a few times per year. Security and critical updates will be available until the next release becomes generally available (GA). After the next release, the previous release will continue to receive security updates for the remainder of the 12 month release lifespan.

This support policy allows us to deliver innovation to customers at a rapid rate while providing flexibility for customers to adopt the innovation at their pace.

- Security and Critical Updates servicing phase - When running the latest current version of Power BI Report Server, you will receive both Security and Critical updates.
- Security Updates (Only) servicing phase - After a new version is released, support for older versions will reduce to Security updates only for the remainder of the twelve (12) month support lifecycle (shown in figure 1).



Version history

VERSION	AVAILABILITY DATE	SUPPORT END DATE
October 2017	October 31, 2017	October 31, 2018
June 2017	June 12, 2017	June 12, 2018

To download Power BI Report Server, and Power BI Desktop optimized for Power BI Report Server, go to [On-premises reporting with Power BI Report Server](#).

For the current release notes, see [Power BI Report Server - Release notes](#).

Next steps

[What's new in Power BI Report Server](#)

[Power BI Report Server release notes](#)

[User handbook](#)

[Administrator handbook](#)

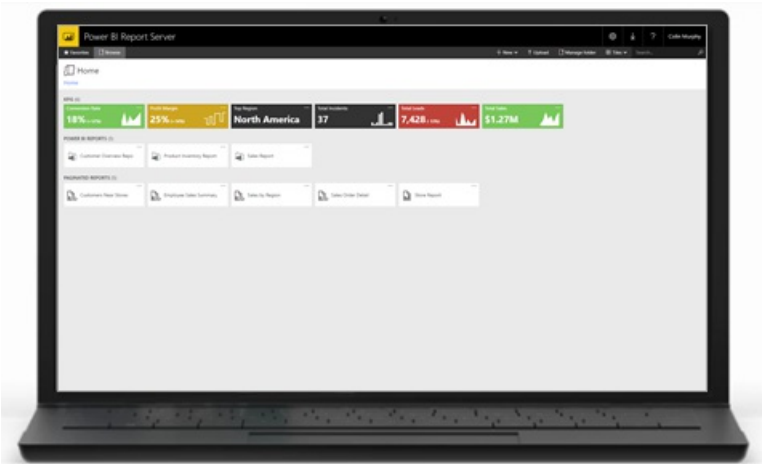
[Quickstart: Install Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

User handbook overview for Power BI Report Server

11/9/2017 • 2 min to read • [Edit Online](#)

Welcome to the user handbook for Power BI Report Server, an on-premises location for storing and managing your Power BI, mobile, and paginated reports.

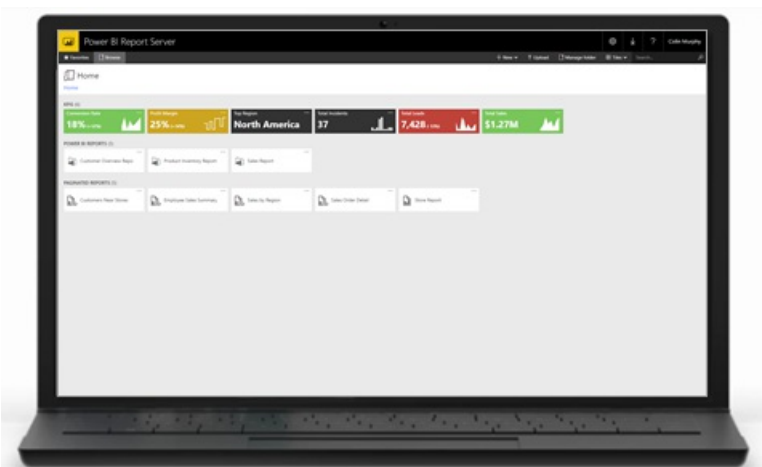


Power BI Report Server is also a set of products and experiences that work together to bring your data to life:

- A [web portal](#) you can view in any modern browser. In the web portal, reports and KPIs are organized and displayed in folders, and you can mark them as favorites. You can also store Excel workbooks there.
- [Power BI reports](#) created with Power BI Desktop, which you view within the web portal or in the Power BI mobile apps.
- [Paginated reports](#), modern-looking, fixed-layout documents optimized for printing, with tools for creating them.

Read on for more about each.

Web portal



The front door of Power BI Report Server is a modern web portal you can view in any modern browser. You can access all your reports and KPIs in the new portal.

The web portal may feature your organization's custom branding and display KPIs right in the web portal. KPIs can surface key business metrics at a glance in the browser, so you don't have to open a report.

The content on the web portal is organized into folders, and within each folder, it's organized by type: Power BI

reports, mobile reports, paginated reports, and KPIs, plus Excel workbooks. You can tag your favorite reports and KPIs. They're all collected in the Favorites folder so you can find them fast.

Power BI reports



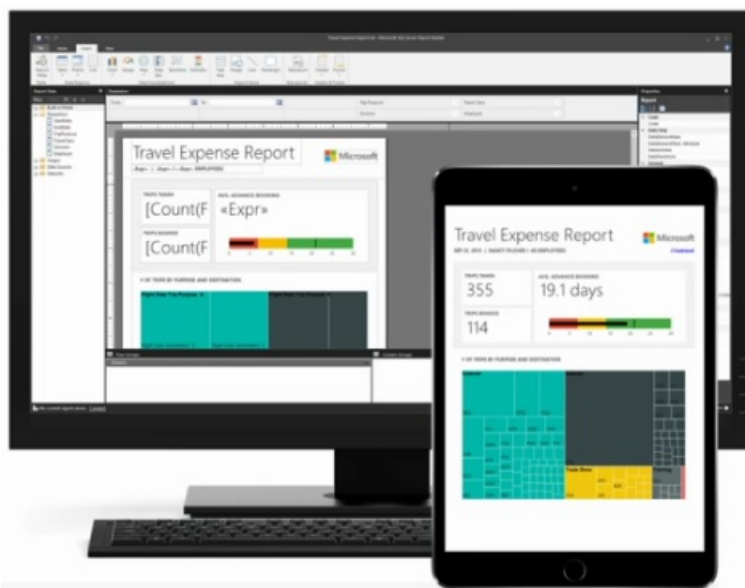
A Power BI report is a multi-perspective view into a dataset, with visualizations that represent different findings and insights from that dataset. A report can have a single visualization or pages full of visualizations. Depending on your role, you may be someone who creates reports and/or you may be someone who views and interacts with reports.

Reports are based on a single dataset. The visualizations in a report each represent a nugget of information. And the visualizations aren't static: Like a dashboard but more so, a report is interactive and customizable, and the visualizations update as the underlying data changes.

- If you're a report creator you can add and remove data, add or rearrange visualizations, or change visualization types.
- If you're a report viewer, you can sort and apply filters and slicers as you dig into the data to discover insights and look for answers.

You create Power BI reports with a special edition of Power BI Desktop. Download [Microsoft Power BI Desktop](#) (Optimized for Power BI Report Server - October 2017 GA).

Paginated reports



Paginated reports are document-style reports, in which the more data you have, the more rows in the tables, and the more pages the report has. They make great fixed-layout, pixel-perfect documents optimized for printing,

such as PDF and Word files.

You create these paginated reports with [Report Builder](#) or Report Designer in [SQL Server Data Tools \(SSDT\)](#).

Next steps

[Install Power BI Desktop optimized for Power BI Report Server](#)

[Quickstart: Paginated reports](#)

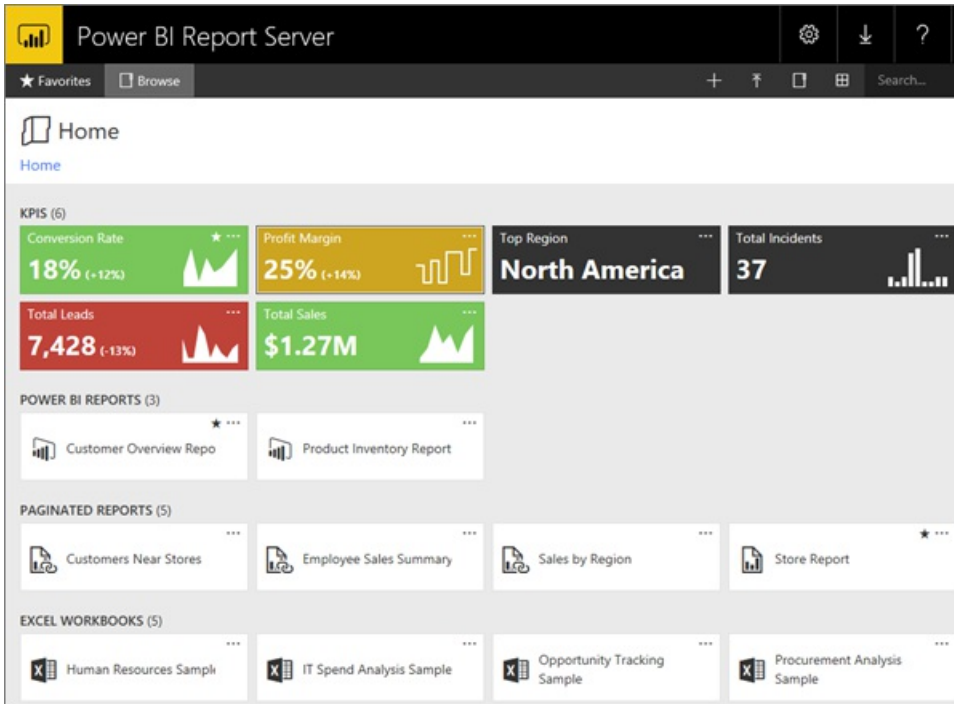
[Quickstart: Power BI reports](#)

More questions? [Try asking the Power BI Community](#)

Navigating the Power BI Report Server web portal

11/9/2017 • 5 min to read • [Edit Online](#)

The Power BI Report Server web portal is an on-premises location for viewing, storing and managing your Power BI, mobile, and paginated reports, and KPIs.



You can view the web portal in any modern browser. In the web portal, reports and KPIs are organized in folders, and you can mark them as favorites. You can also store Excel workbooks there. From the web portal, you can launch the tools you need to create reports:

- **Power BI reports** created with Power BI Desktop: View them in the web portal and the Power BI mobile apps.
- **Paginated reports** created in Report Builder: Modern-looking, fixed-layout documents optimized for printing.
- **KPIs** created right in the web portal.

In the web portal you can browse the report server folders or search for specific reports. You can view a report, its general properties and past copies of the report that are captured in report history. Depending on your permissions, you might also be able to subscribe to reports for delivery to your e-mail inbox or a shared folder on the file system.

Web portal tasks

You can use the web portal for a number of tasks, including these:

- View, search, print, and subscribe to reports.
- Create, secure, and maintain the folder hierarchy to organize items on the server.
- Configure report execution properties, report history, and report parameters.
- Create shared schedules and shared data sources to make schedules and data source connections more manageable.
- Create data-driven subscriptions to roll out reports to a large recipient list.
- Create linked reports to reuse and re-purpose an existing report in different ways.
- Download and open common tools such as Power BI Desktop (Report Server), Report Builder, and Mobile

Report Publisher.

- [Create KPIs](#).
- Send feedback or make feature requests.
- [Branding the web portal](#)
- [Working with KPIs](#)
- [Working with shared datasets](#)

Web portal roles and permissions

The web portal is a web application that runs in a browser. When you start the web portal, the pages, links, and options you see vary based on the permissions you have on the report server. If you're assigned to a role with full permissions, you have access to the complete set of application menus and pages for managing a report server. If you're assigned to a role with permissions to view and run reports, you only see the menus and pages you need for those activities. You can have different role assignments for different report servers, or even for the various reports and folders on a single report server.

Start the web portal

1. Open your web browser.

See this list of [supported web browsers and versions](#).

2. In the address bar, type the web portal URL.

By default, the URL is *http://[ComputerName]/reports*.

The report server might be configured to use a specific port. For example, *http://[ComputerName]:80/reports* or *http://[ComputerName]:8080/reports*

You see that the web portal groups items into these categories:

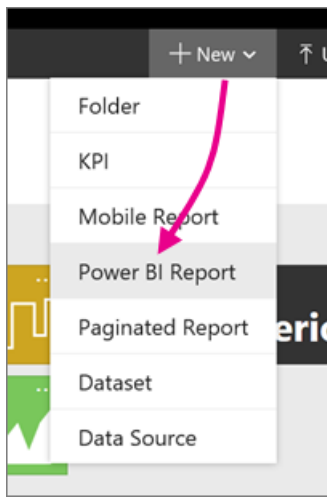
- KPIs
- Mobile reports
- Paginated reports
- Power BI Desktop reports
- Excel workbooks
- Datasets
- Data sources
- Resources

Create and edit Power BI Desktop reports (.pbix files)

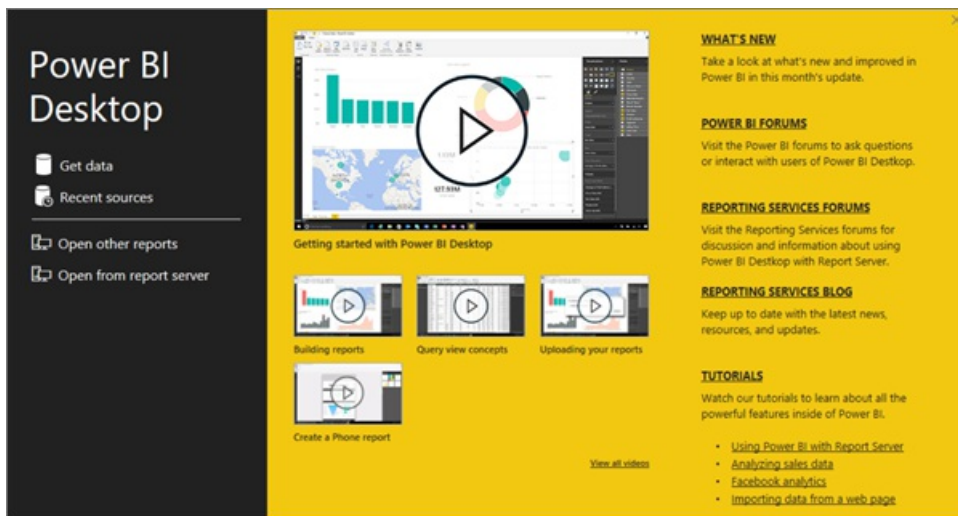
You can view, upload, create, organize, and manage permissions for Power BI Desktop reports in the web portal.

Create a Power BI Desktop report

1. Select **New > Power BI Report**.



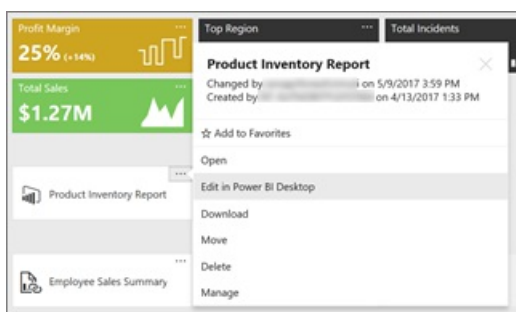
The Power BI Desktop app opens.



2. Create your Power BI report. See [Quickstart: Power BI reports](#) for details.
3. Upload your report to the report server.

Edit an existing Power BI Desktop report

1. Select the ellipsis (...) in the upper-right corner of the report tile > **Edit in Power BI Desktop**.



The Power BI Desktop app opens.

2. Make your changes and save... [how?]

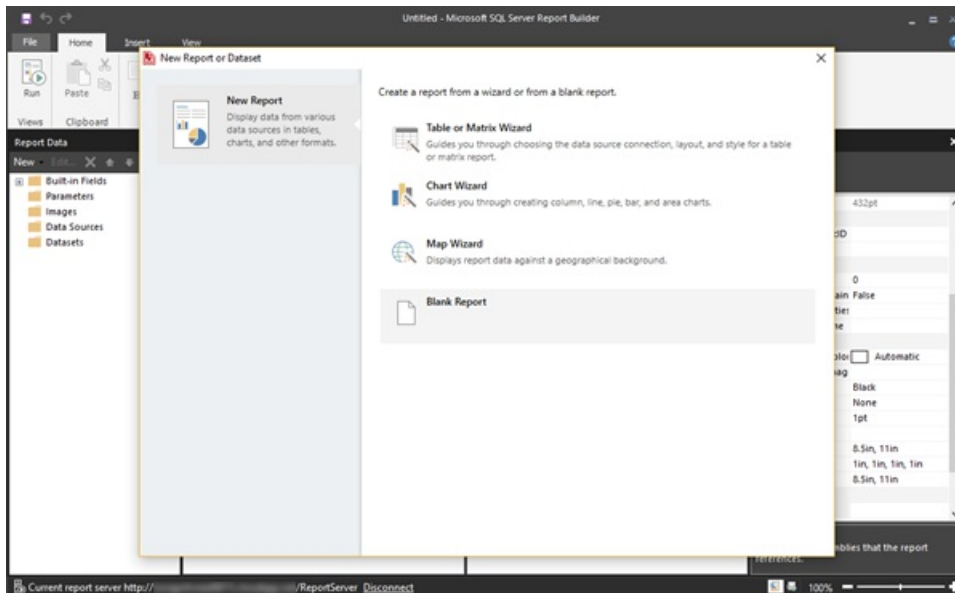
Create and edit paginated reports (.rdl files)

You can view, upload, create, organize, and manage permissions for paginated reports in the web portal.

Create a paginated report

1. Select **New > Paginated Report**.

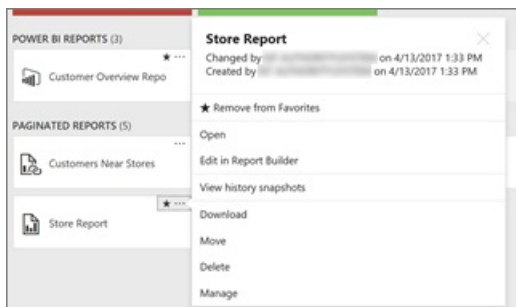
The Report Builder app opens.



2. Create your paginated report. See [Quickstart: Paginated reports](#) for details.
3. Upload your report to the report server.

Edit an existing paginated report

1. Select the ellipsis (...) in the upper-right corner of the report tile > **Edit in Report Builder**.



The Report Builder app opens.

2. Make your changes and save.

Upload and organize Excel workbooks

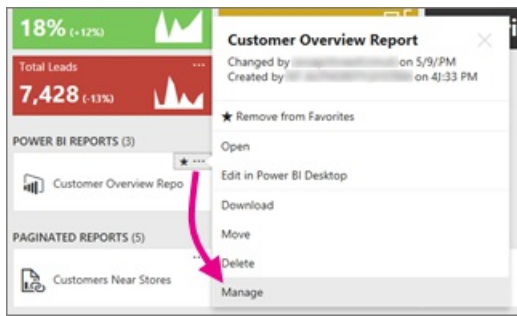
You can upload, organize, and manage permissions for Power BI Desktop reports and Excel workbooks. They will be grouped together within the web portal.

The workbooks are stored within Power BI Report Server, similar to other resource files. Selecting one of the workbooks downloads it locally to your desktop. You can save changes you've made by uploading it to the report server again.

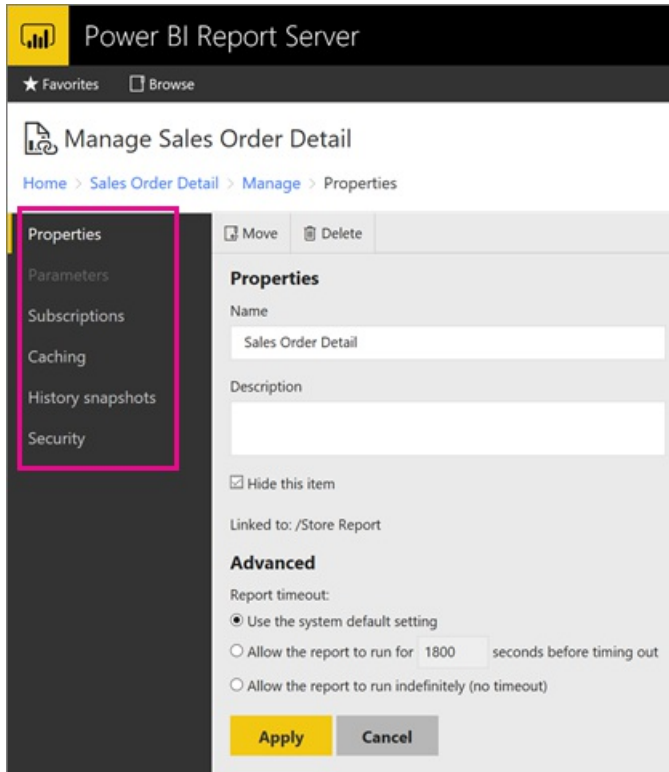
Manage items in the web portal

Power BI Report Server offers detailed control of the items you store on the web portal. For example, you can set up subscriptions, caching, snapshots, and security on individual paginated reports.

1. Select the ellipsis (...) in the upper-right corner of an item, then select **Manage**.



2. Choose the property or other feature you want to set.



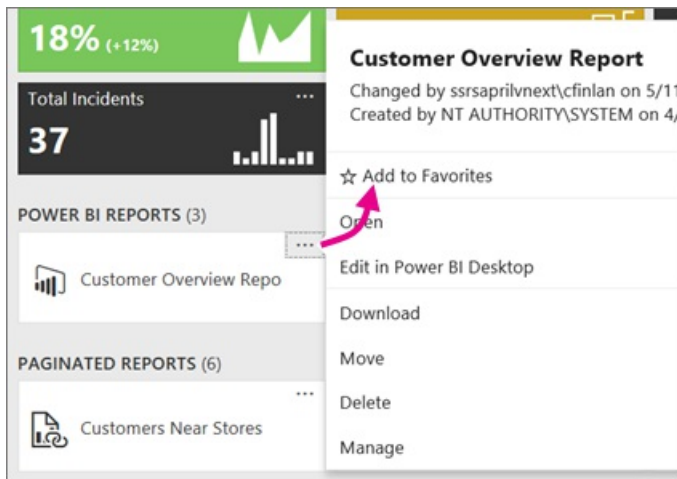
3. Select **Apply**.

Read more about [working with subscriptions in the web portal](#).

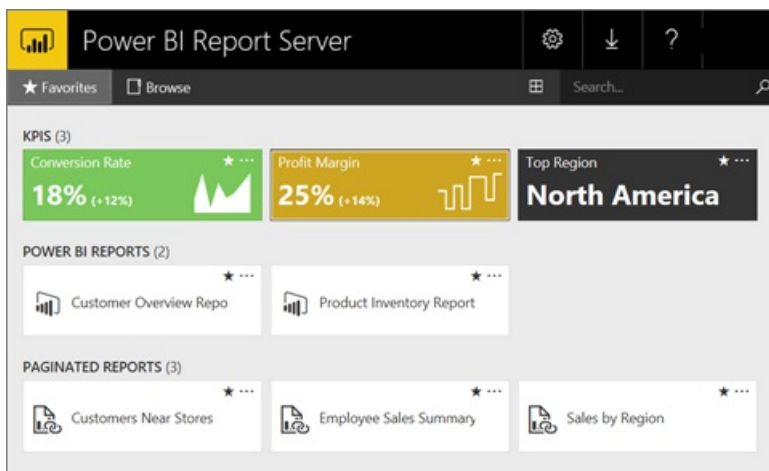
Tag your favorite reports and KPIs

You can tag the reports and KPIs that you want to be favorites. They're easier to find because they're all gathered in a single Favorites folder, both in the web portal and in the Power BI mobile apps.

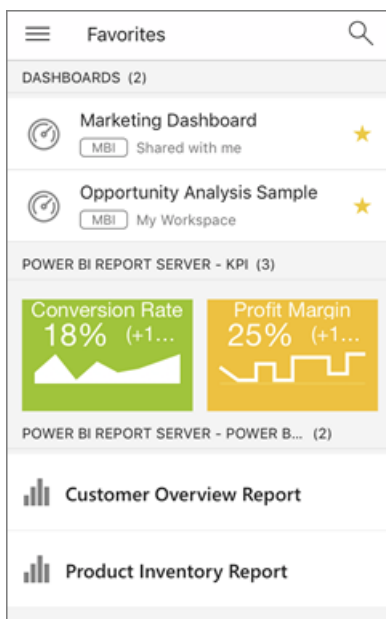
1. Select the ellipsis (...) in the upper-right corner of the KPI or report that you want to make a favorite, and select **Add to Favorites**.



2. Select **Favorites** on the web portal ribbon to see it along with your other favorites on the Favorites page in the web portal.



Now in the Power BI mobile apps you see these favorites along with your favorite dashboards from the Power BI service.

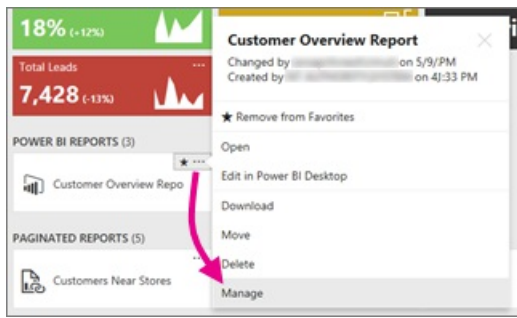


Hide or view items in the web portal

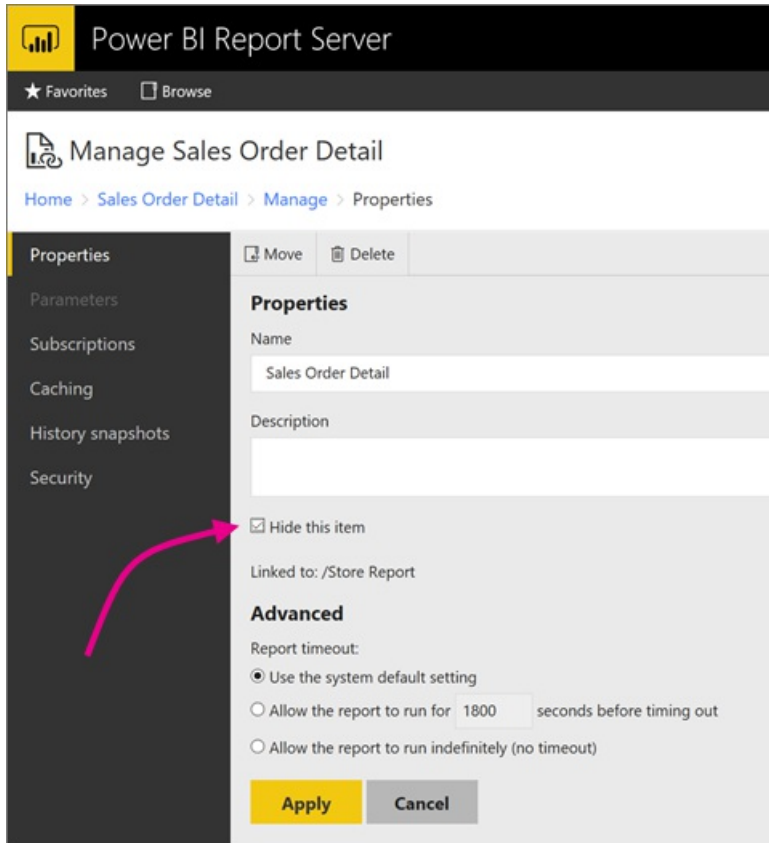
You can hide items in the web portal, and you can choose to view hidden items.

Hide an item

1. Select the ellipsis (...) in the upper-right corner of an item, then select **Manage**.



2. Select **Hide this item**.

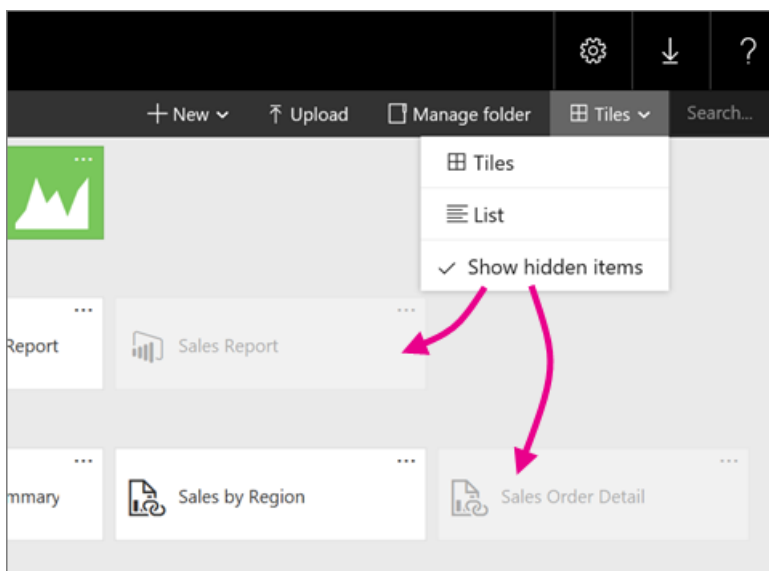


3. Select **Apply**.

View hidden items

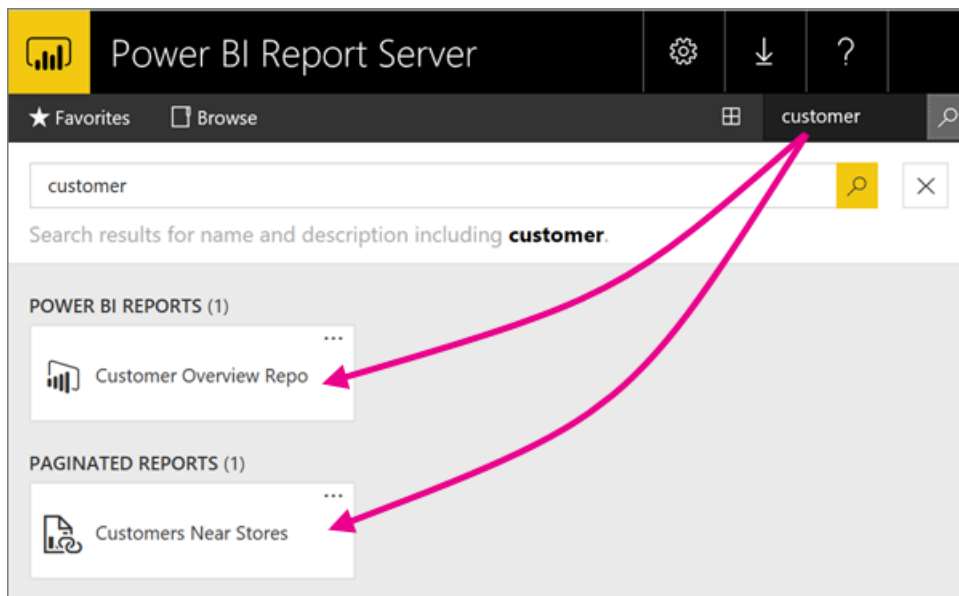
1. Select **Tiles** (or **List**) in the upper-right corner > **Show hidden items**.

The items appear. They're grayed, but you can still open and edit them.



Search for items

You can enter a search term, and you will see everything you can access. The results are categorized into KPIs, reports, datasets, and other items. You can then interact with the results and add them to your favorites.

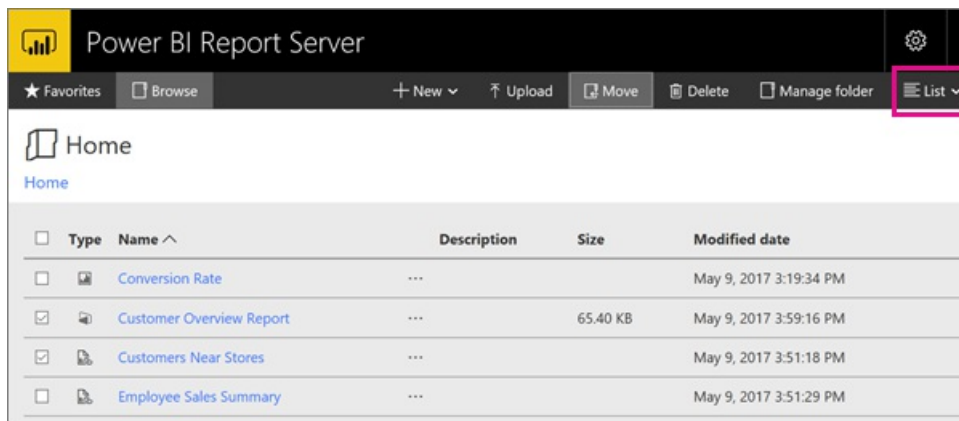


Move or delete items in List view

By default, the web portal displays its contents in Tile view.

You can switch to List view, where it's easy to move or delete multiple items at a time.

1. Select **Tiles > List**.



2. Select the items, then select **Move** or **Delete**.

Next steps

[User handbook](#)

[Quickstart: Paginated reports](#)

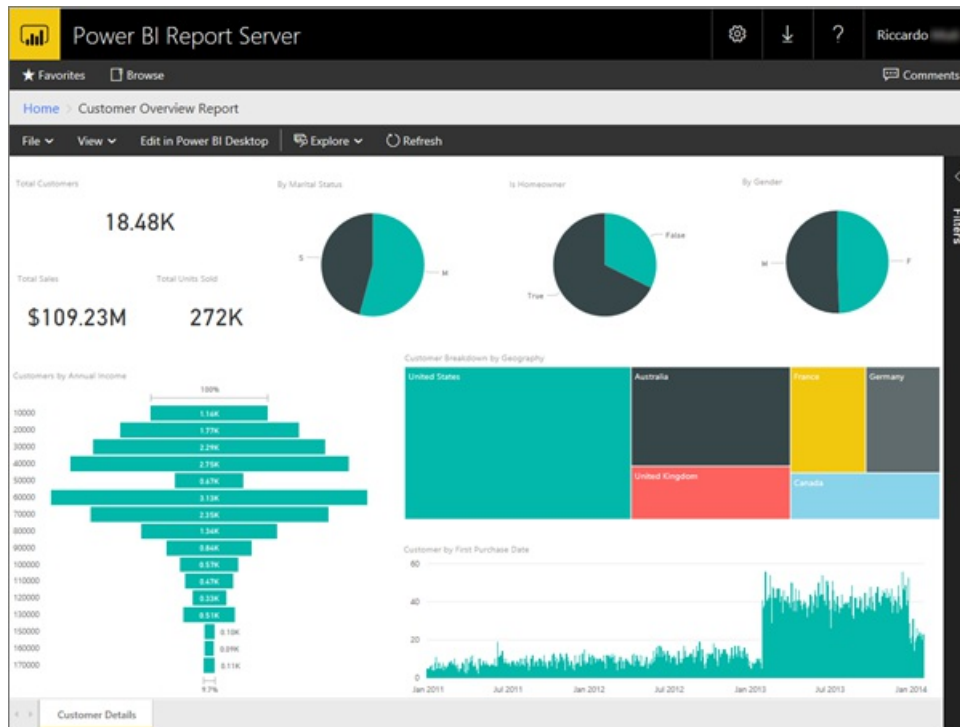
[Quickstart: Power BI reports](#)

More questions? [Try asking the Power BI Community](#)

Quickstart: Create a Power BI report for Power BI Report Server

12/19/2017 • 3 min to read • [Edit Online](#)

You can store and manage Power BI reports on premises in the Power BI Report Server web portal, just as you can store Power BI reports in the cloud in the Power BI service (<https://powerbi.com>). You create and edit reports in Power BI Desktop, and publish them to the web portal. Then report readers in your organization can view them in a browser or in a Power BI mobile app on a mobile device.

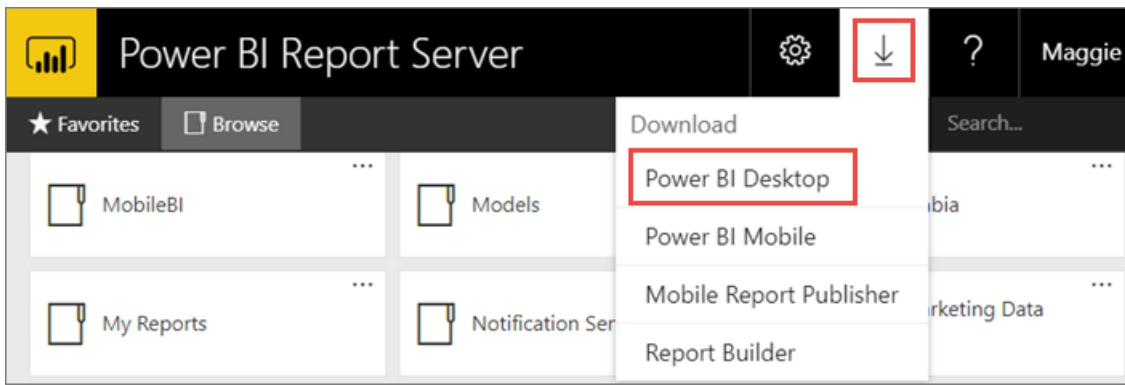


Here are four quick steps to get you started.

Step 1: Install Power BI Desktop optimized for Power BI Report Server

If you've already created Power BI reports in Power BI Desktop, then you're almost ready to create Power BI reports for Power BI Report Server. We recommend installing the version of Power BI Desktop optimized for Power BI Report Server so you know the server and the app are always in sync. You can have both versions of Power BI Desktop on the same computer.

1. In the report server web portal, select the **Download** arrow > **Power BI Desktop**.



Or you can go directly to [Microsoft Power BI Desktop](#) (Optimized for Power BI Report Server - October 2017) in the Microsoft Download Center.

2. In the Download Center page, select **Download**.

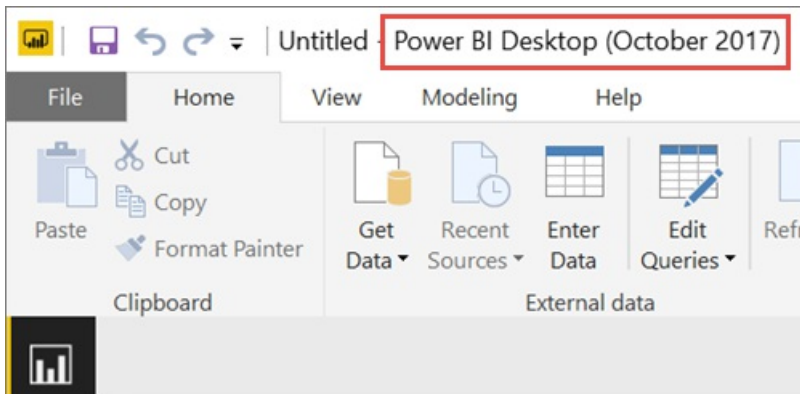
3. Depending on your computer, select:

- **PBIDesktopRS.msi** (the 32-bit version) or
- **PBIDesktopRS_x64.msi** (the 64-bit version).

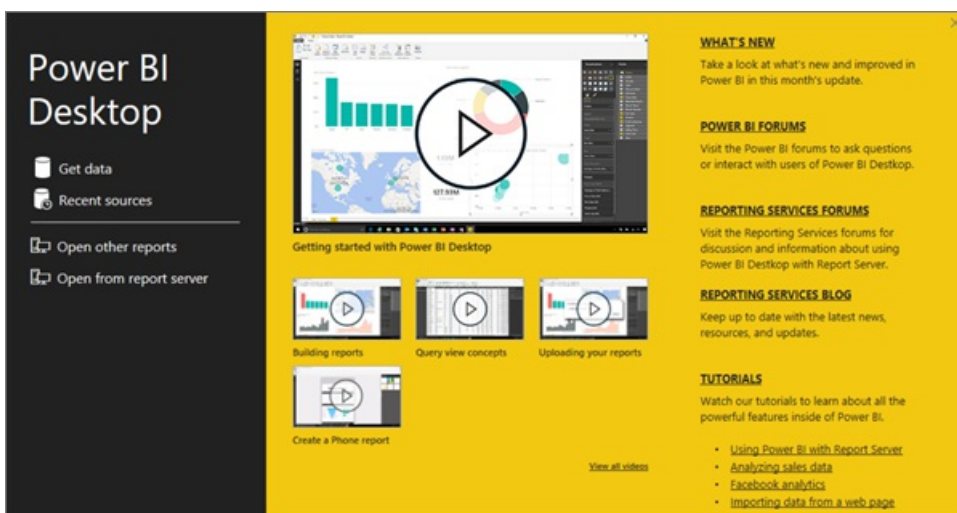
4. After you download the installer, run the Power BI Desktop (October 2017) Setup Wizard.

5. At the end of the installation, check **Start Power BI Desktop now**.

It starts automatically and you're ready to go. You can tell you have the right version because "Power BI Desktop (October 2017)" is in the title bar.



6. If you're not familiar with Power BI Desktop, consider watching the videos on the welcome screen.



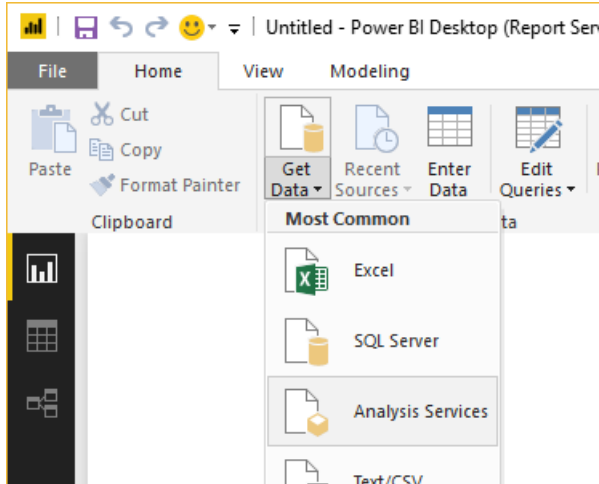
Step 2: Select a data source

You can connect to a variety of data sources. Read more about [connecting to data sources](#).

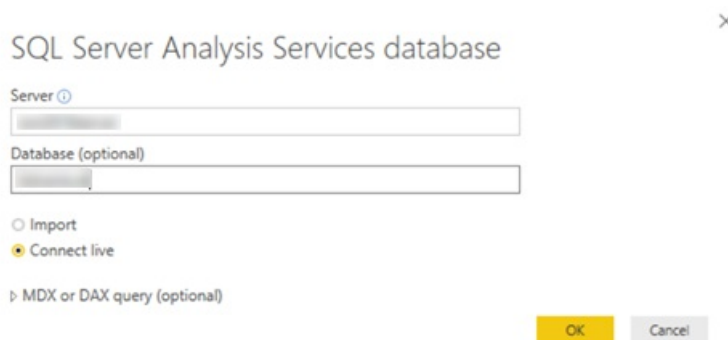
1. From the welcome screen, select **Get Data**.

Or on the **Home** tab, select **Get Data**.

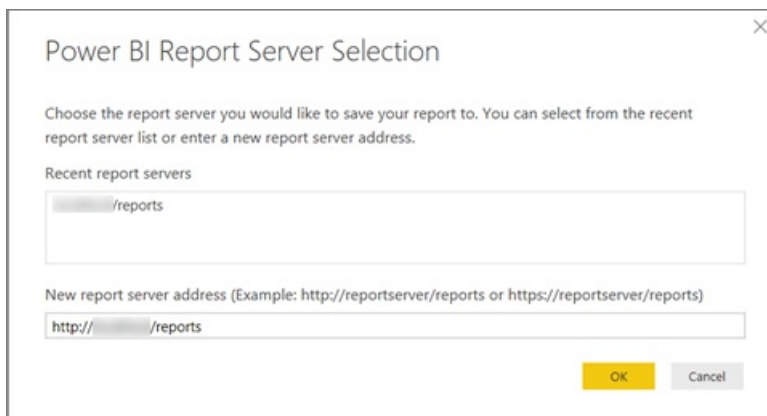
2. Select your data source -- in this example, **Analysis Services**.



3. Fill in **Server**, and optionally, **Database**. Make sure **Connect live** is selected > **OK**.



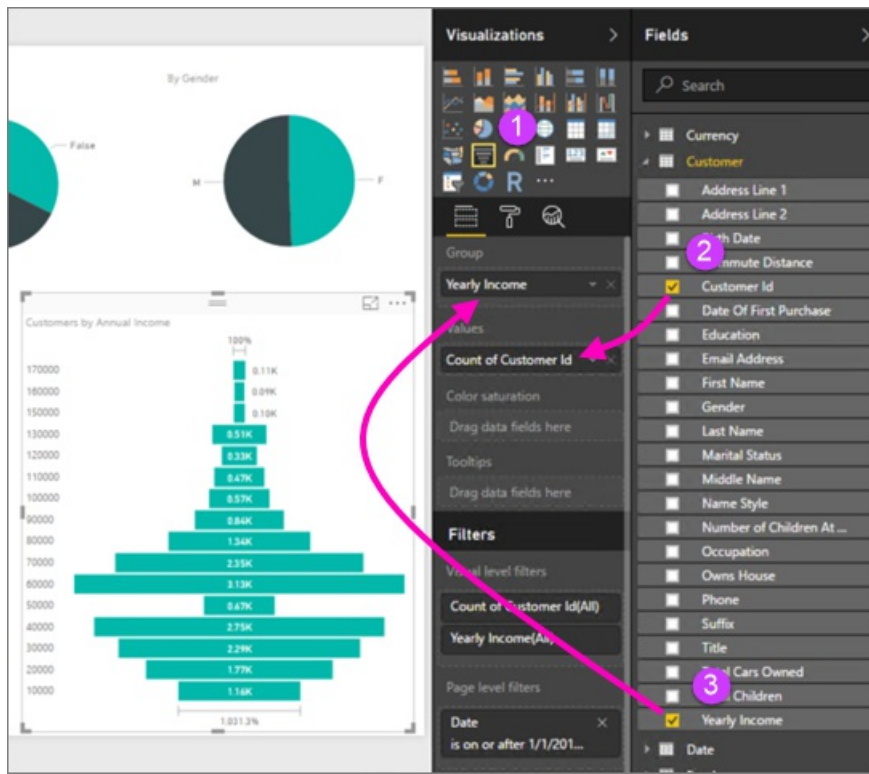
4. Choose the report server where you'll save your reports.



Step 3: Design your report

Here's the fun part: You get to create visuals that illustrate your data.

For example, you could create a funnel chart of customers and group values by yearly income.



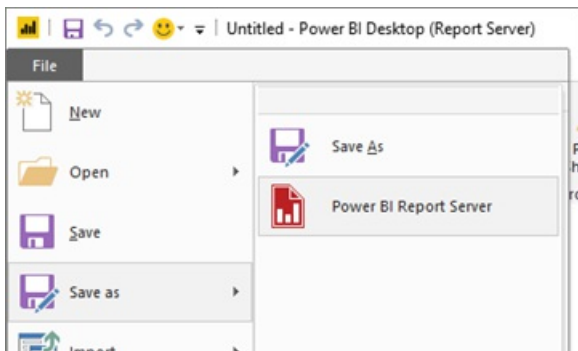
1. In **Visualizations**, select **Funnel chart**.
2. Drag the field to be counted to the **Values** well. If it's not a numeric field, Power BI Desktop automatically makes it a *Count of* the value.
3. Drag the field to group on to the **Group** well.

Read much more about [designing a Power BI report](#).

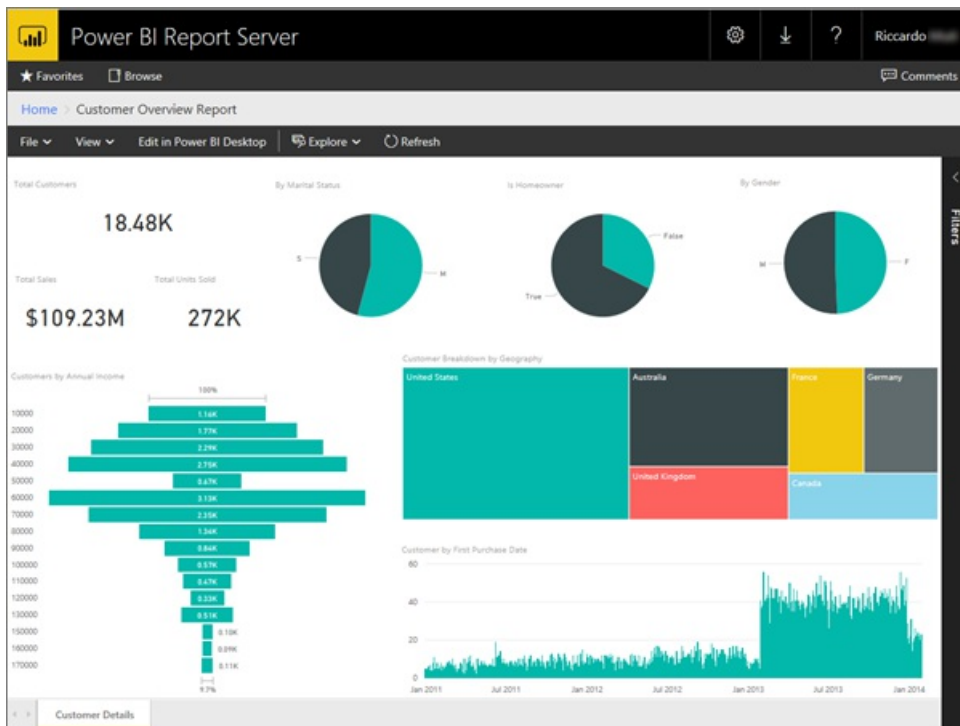
Step 4: Save your report to the report server

When your report is ready, you save it to the Power BI Report Server you chose in Step 2.

1. On the **File** menu, select **Save as > Power BI Report Server**.



2. Now you can view it in the web portal.



Considerations and limitations

Reports in Power BI Report Server and in the Power BI service (<http://powerbi.com>) act almost exactly the same, but a few features are different.

In a browser

Power BI Report Server reports support all visualizations, including:


- Custom visuals

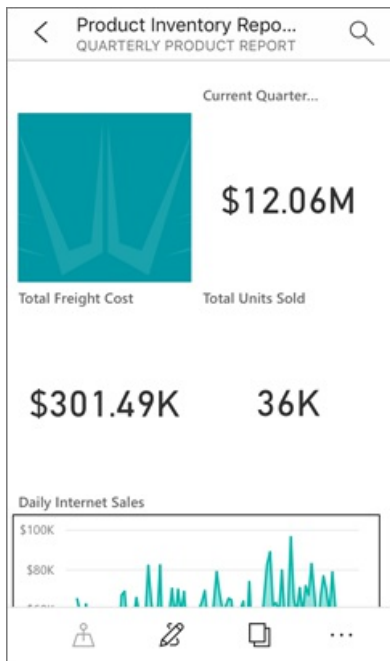
Power BI Report Server reports don't support:

- R visuals
- ArcGIS maps
- Breadcrumbs
- Power BI Desktop preview features

In the Power BI mobile apps

Power BI Report Server reports support all the basic functionality in the [Power BI mobile apps](#), including:

- [Phone report layout](#): You can optimize a report for the Power BI mobile apps. On your mobile phone, optimized reports have a special icon, , and layout.



Power BI Report Server reports don't support these features in the Power BI mobile apps:

- R visuals
- ArcGIS maps
- Custom visuals
- Breadcrumbs
- Geofiltering or bar codes

Next steps

Power BI Desktop

There are so many great resources for creating reports in Power BI Desktop. These links are a good starting point.

- [Get started with Power BI Desktop](#)
- Guided learning: [Getting started with Power BI Desktop](#)

Power BI Report Server

- [Install Power BI Desktop optimized for Power BI Report Server](#)
- [Power BI Report Server user handbook](#)

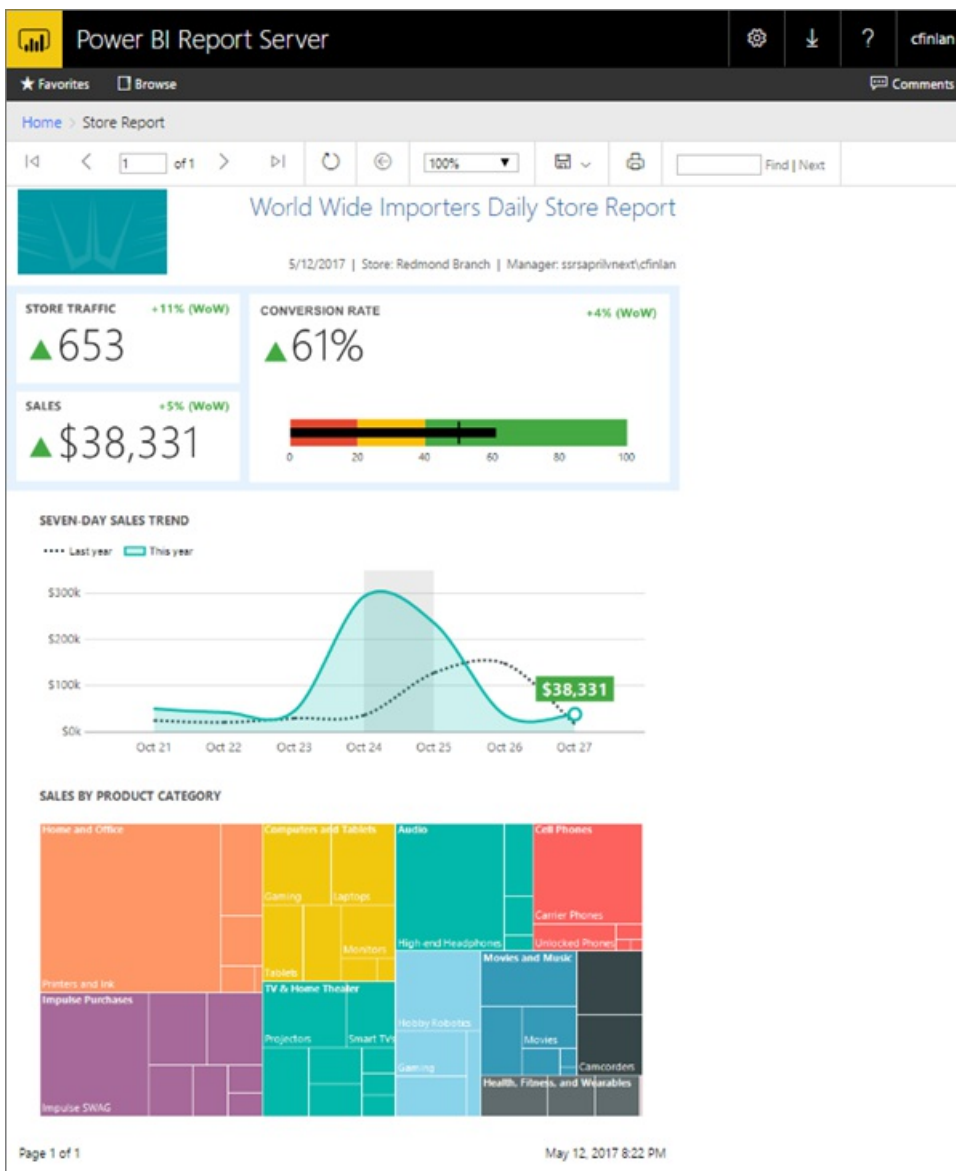
More questions? [Try asking the Power BI Community](#)

Quickstart: Create a paginated report for Power BI Report Server

11/9/2017 • 3 min to read • [Edit Online](#)

As the name suggests, paginated reports can run to many pages. They're laid out in a fixed format and offer precise customization. Paginated reports are .rdl files.

You can store and manage paginated reports in the Power BI Report Server web portal, just as you can in the SQL Server Reporting Services (SSRS) web portal. You create and edit them in Report Builder or Report Designer in SQL Server Data Tools (SSDT), then publish them to either web portal. Then report readers in your organization can view them in a browser or in a Power BI mobile app on their mobile device.

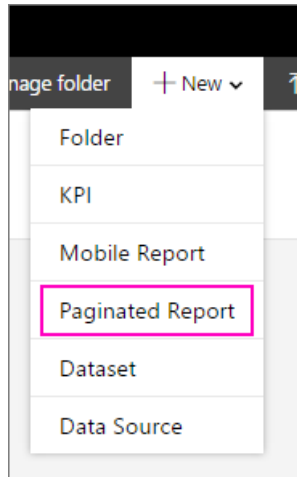


If you've already created paginated reports in Report Builder or Report Designer, then you're ready to create paginated reports for Power BI Report Server. If not, here are some quick steps to get you started.

Step 1: Install and start Report Builder

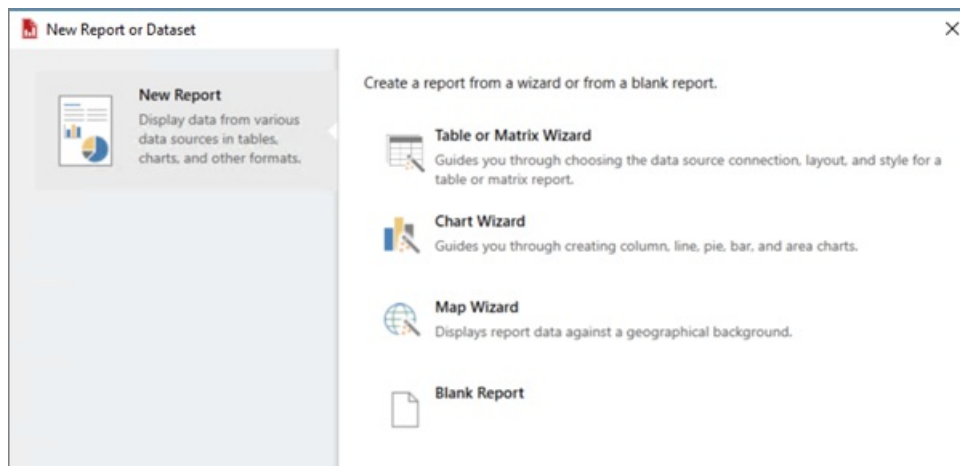
You may already have installed Report Builder to create reports for an SSRS server. You can use the same version or Report Builder to create reports for Power BI Report Server. If you haven't installed it, the process is easy.

1. In the Power BI Report Server web portal, select **New > Paginated Report**.



If you don't have Report Builder installed already, it leads you through the installation process now.

2. After it's installed, Report Builder opens to the **New Report or Dataset** screen.



3. Select the wizard for the kind of report you want to create:

- Table or matrix
- Chart
- Map
- Blank

4. Let's start with the Chart wizard.

The Chart wizard walks you the steps of creating a basic chart in a report. From there, you can customize your report in almost unlimited ways.

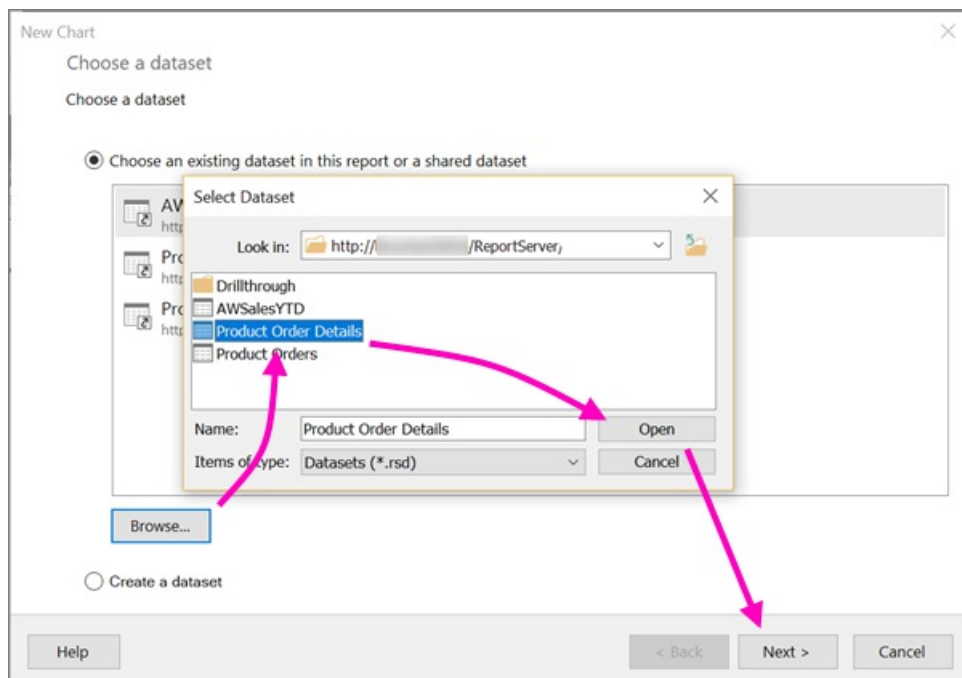
Step 2: Go through the Chart wizard

The Chart wizard walks you through the basic steps of creating a visualization in a report.

Paginated reports can connect to a wide variety of data sources, from Microsoft SQL Server and Microsoft Azure SQL Database to Oracle, Hyperion, and many more. Read about [data sources supported by paginated reports](#).

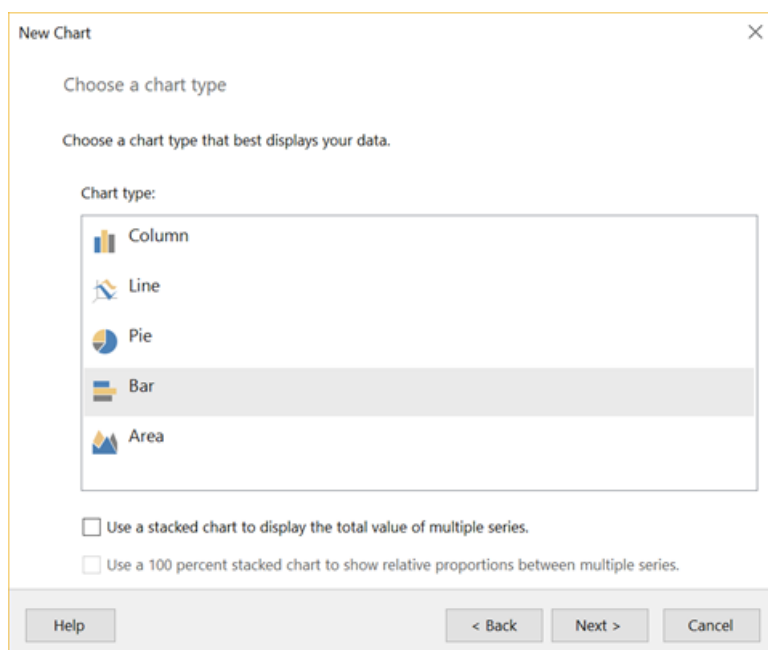
In the first page in the Chart wizard, **Choose a dataset**, you can create a dataset or choose a shared dataset on a server. *Datasets* return report data from a query on an external data source.

1. Select **Browse > select a shared dataset on a server > Open > Next**.

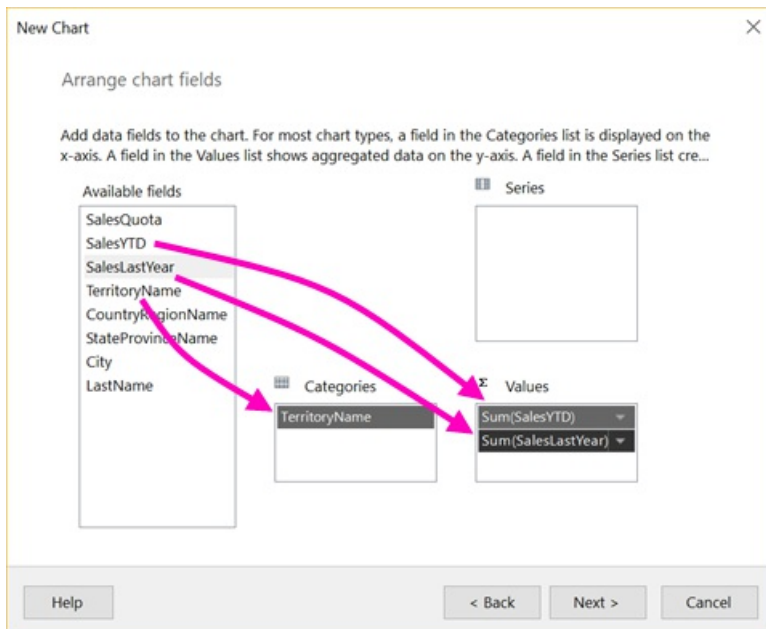


Need to create a dataset? See [Create a shared or embedded dataset](#).

2. Choose a chart type -- in this case, a bar chart.



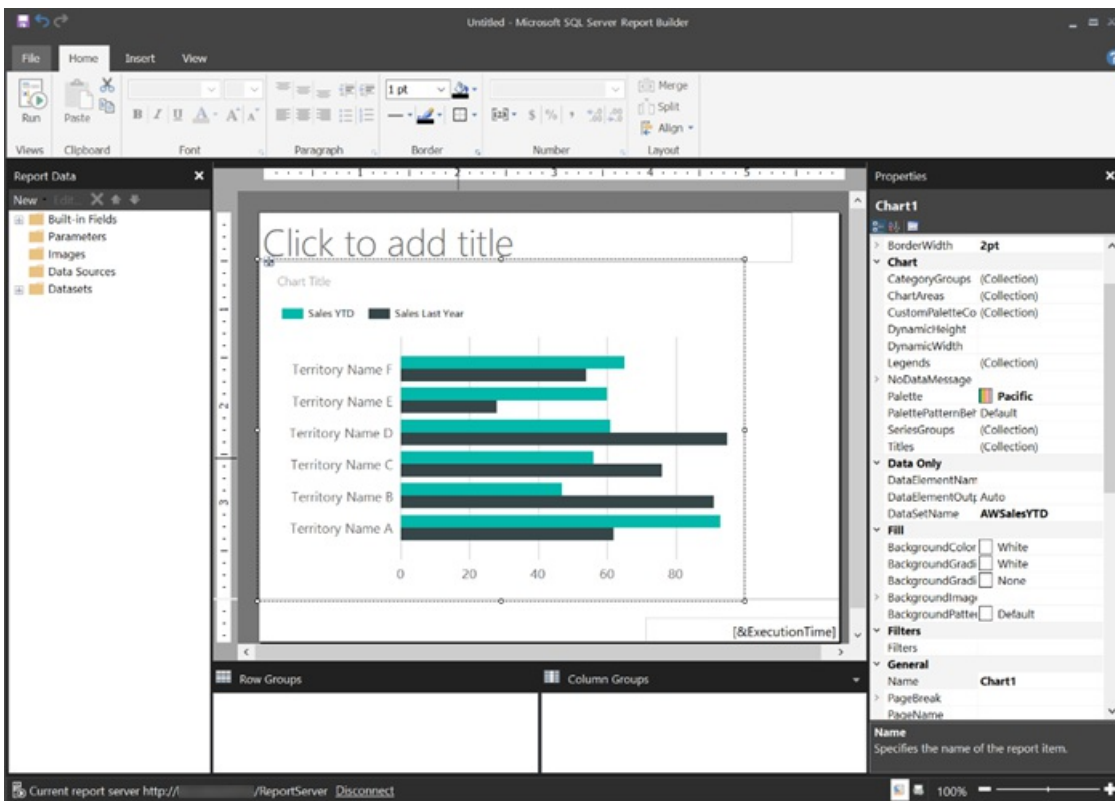
3. Arrange the fields by dragging them to the **Categories**, **Series**, and **Values** boxes.



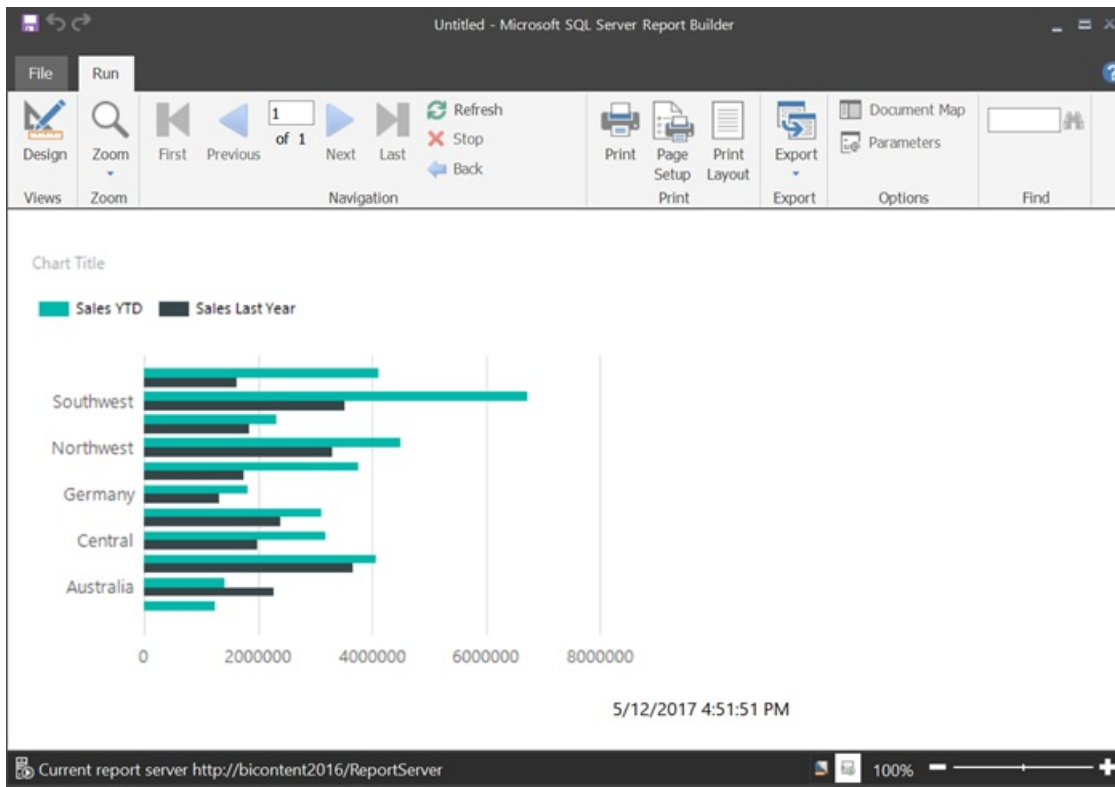
4. Select **Next > Finish**.

Step 3: Design your report

Now you're in Report Design view. Notice the data is placeholder data, not your data.



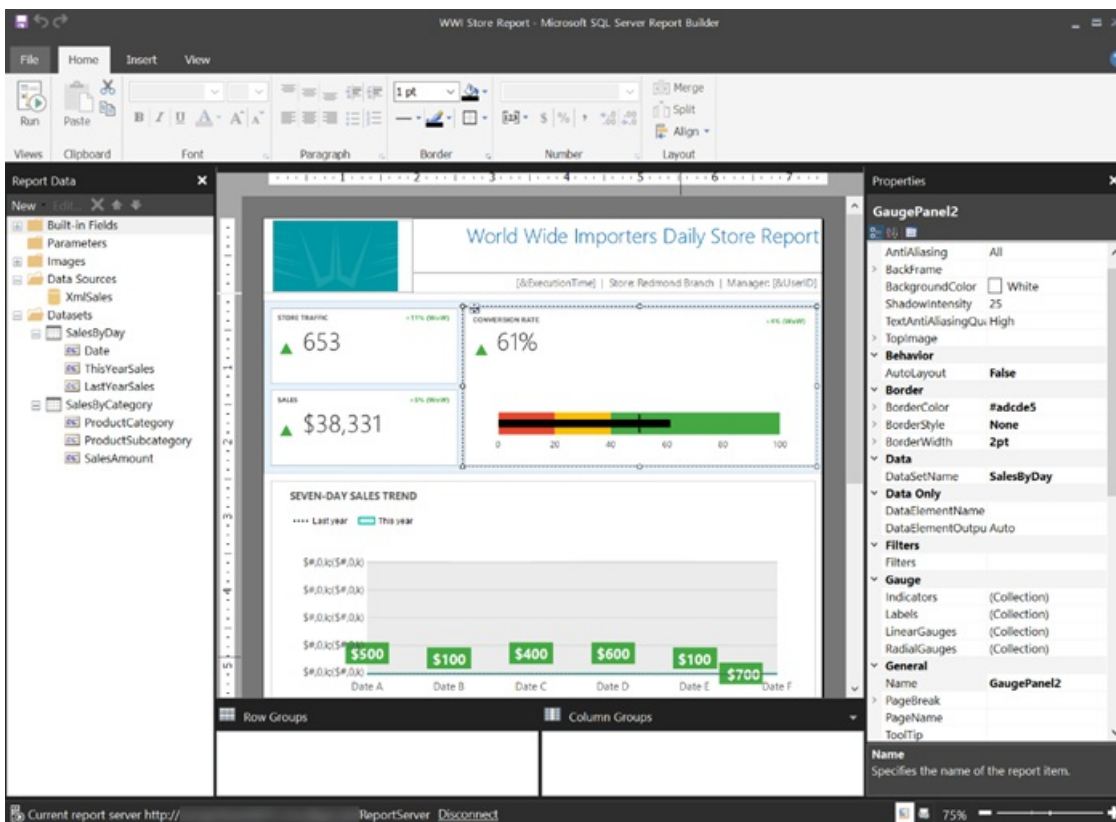
- To view your data, select **Run**.



- To go back to Design view, select **Design**.

You can modify the chart you just created, changing the layout, values, legend... really just about anything.

And you can add all sorts of other visualizations: gauges, tables, matrixes, tables, maps, and more. You can add headers and footers for multiple pages. See the [Report Builder tutorials](#) to try them for yourself.

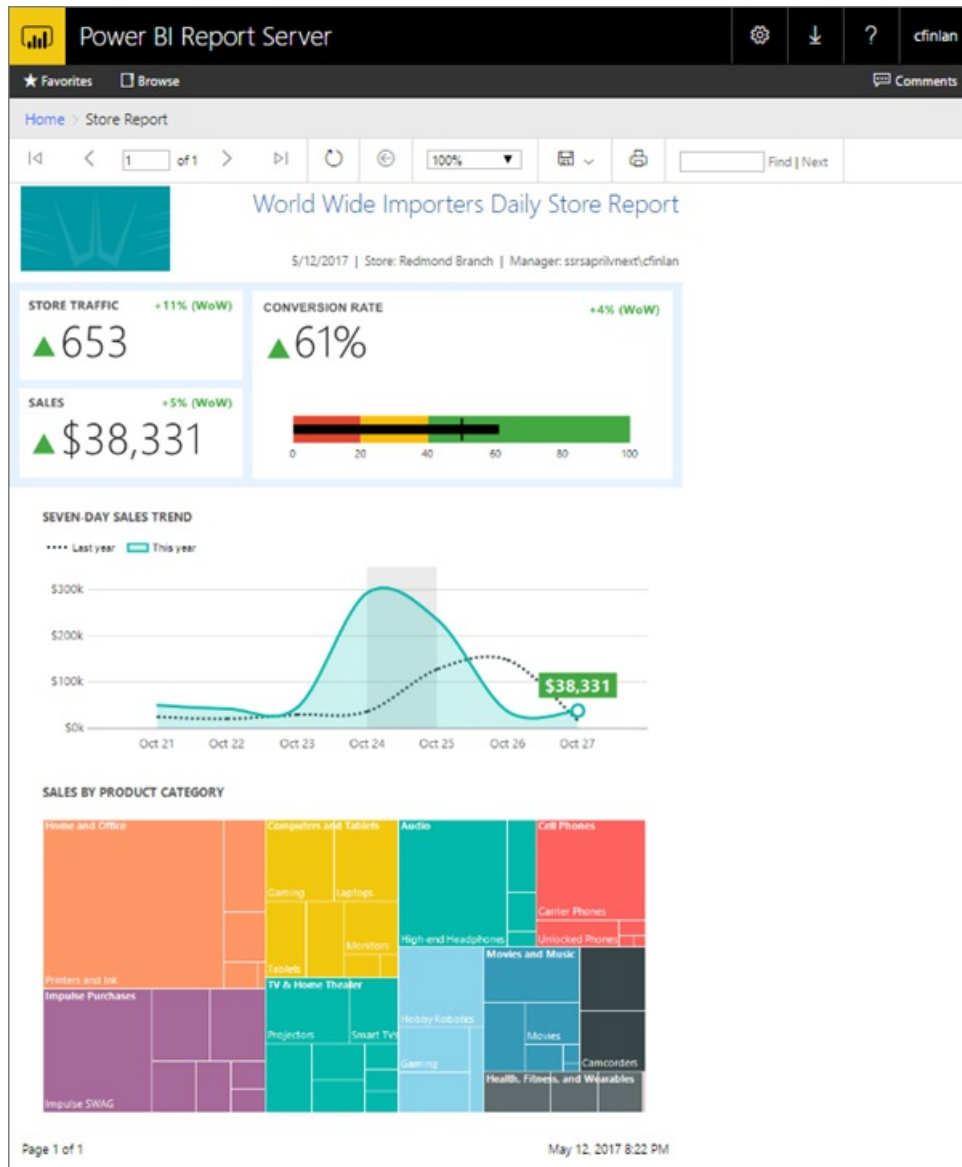


Step 4: Save your report to the report server

When your report is ready, save it to Power BI Report Server.

1. On the **File** menu, select **Save as**, and save it to the report server.

2. Now you can view it in the browser.



Next steps

There are many great resources for designing reports in Report Builder and in Report Designer in SQL Server Data Tools. The Report Builder tutorials are a good place to start.

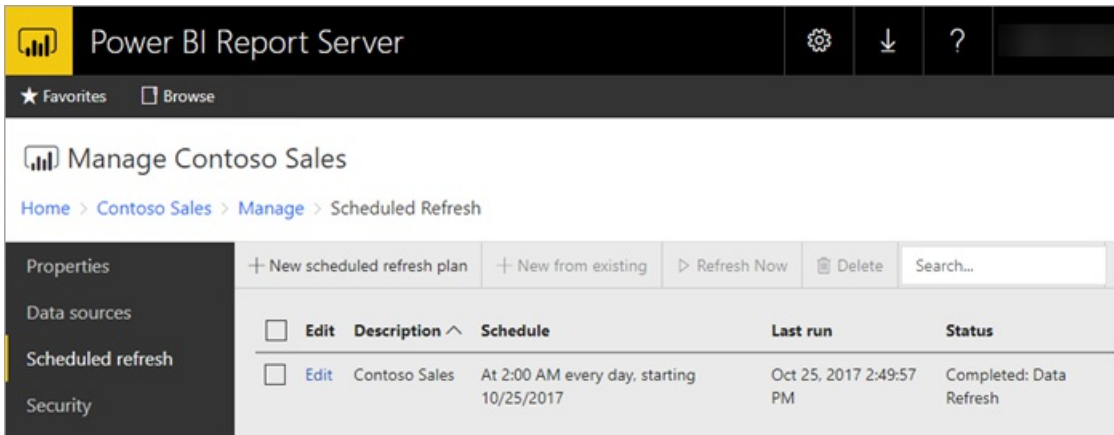
- [Report Builder tutorials](#)
- [Power BI Report Server user handbook](#)

More questions? [Try asking the Power BI Community](#)

Power BI report scheduled refresh in Power BI Report Server

1/30/2018 • 3 min to read • [Edit Online](#)

Scheduled refresh for Power BI reports allows the data for a report to stay up to date.



The screenshot shows the Power BI Report Server interface for the 'Manage Contoso Sales' report. The breadcrumb navigation is 'Home > Contoso Sales > Manage > Scheduled Refresh'. The interface includes a left-hand navigation pane with options like 'Properties', 'Data sources', 'Scheduled refresh', and 'Security'. The main content area shows a table of scheduled refresh plans with columns for 'Edit', 'Description', 'Schedule', 'Last run', and 'Status'. A single refresh plan is listed for 'Contoso Sales' with a schedule of 'At 2:00 AM every day, starting 10/25/2017' and a last run of 'Oct 25, 2017 2:49:57 PM'. The status is 'Completed: Data Refresh'.

	Edit	Description	Schedule	Last run	Status
<input type="checkbox"/>	Edit	Contoso Sales	At 2:00 AM every day, starting 10/25/2017	Oct 25, 2017 2:49:57 PM	Completed: Data Refresh

Scheduled refresh is specific to Power BI reports with an embedded model. Meaning you imported data into the report instead of using a live connection or DirectQuery. When importing your data, it is disconnected from the original data source and needs to be updated to keep data fresh. Scheduled refresh is the way to keep your data up to date.

Scheduled refresh is configured within the management section of a report. For more information on how to configure scheduled refresh, see [How to configure Power BI report scheduled refresh](#).

How this works

Several components are involved when using scheduled refresh for your Power BI reports.

- SQL Server Agent as a timer to generate scheduled events.
- Scheduled jobs are added to a queue of events and notifications in the report server database. In a scale-out deployment, the queue is shared across all of the report servers in the deployment.
- All report processing that occurs as a result of a schedule event is performed as a background process.
- The data model is loaded within an Analysis Services instance.
- For some data sources, the Power Query mashup engine is used to connect to data sources and transform the data. Other data sources may be connected to directly from an Analysis Services service used to host the data models for Power BI Report Server.
- New data is loaded into the data model within Analysis Services.
- Analysis Services processes the data and executes any needed calculations.

Power BI Report Server maintains an event queue for all scheduled operations. It polls the queue at regular intervals to check for new events. By default, the queue is scanned at 10 second intervals. You can change the interval by modifying the **PollingInterval**, **IsNotificationService**, and **IsEventService** configuration settings in the `RSReportServer.config` file. **IsDataModelRefreshService** can also be used to set whether a report server process scheduled events.

Analysis Services

Rendering a Power BI report, as well as performing a scheduled refresh, requires loading the Power BI report's data

model in Analysis Services. An Analysis Services process will be running with Power BI Report Server.

Considerations and limitations

When scheduled refresh can't be used

Not all Power BI Reports can have a scheduled refresh plan created on them. The following is a list of Power BI Reports that you Can't create a scheduled refresh plan.

- Your report contains one or more Analysis Services data sources, which use a live connection.
- Your report contains one or more data sources, which use DirectQuery.
- Your report does not contain any data source. For example, data is manually entered via *Enter Data* or a report contains only static content like images, text, etc.

In addition to the above list, there are specific scenarios with data sources in *import* mode, for which you cannot created refresh plans.

- If a *File* or *Folder* data source is used and the file path is a local path (e.g. C:\Users\user\Documents), then a refresh plan cannot be created. The path must be a path the report server can connect to like a network share. For example, *\myshare\Documents*.
- If data source can be connected using only OAuth (e.g. Facebook, Google Analytics, Salesforce, etc.), then cache refresh plan cannot be created. At the moment, RS does not support OAuth authentication for any data source whether it is for paginated, mobile or Power BI reports.

Memory limits

Traditional workload for a report server has been similar to a web application. The ability to load reports with imported data or DirectQuery, and the ability to perform scheduled refresh, rely on an Analysis Services instance being hosted alongside of the report server. As a result, this could result is unexpected memory pressure on the server. Plan your server deployment accordingly knowing that Analysis Services may be consuming memory alongside the report server.

For information on how to monitor an Analysis Services instance, see [Monitor an Analysis Services Instance](#).

For information about memory settings within Analysis Services, see [Memory Properties](#).

Authentication and Kerberos

If your data source is set to use Windows credentials, Kerberos constrained delegation may need to be configured in order to work. For more information, see [Configure Windows authentication on the report server](#).

Next steps

Configure [scheduled refresh](#) on a Power BI report.

More questions? [Try asking the Power BI Community](#)

Power BI report data sources in Power BI Report Server

1/30/2018 • 2 min to read • [Edit Online](#)

Power BI reports can connect to different data sources. Depending on how data is used, different data sources are available. Data can be imported or data can be queried directly using DirectQuery or a live connection to SQL Server Analysis Services.

These data sources are specific to Power BI reports used within Power BI Report Server. For information about data sources supported with paginated reports, see [Data Sources Supported by Reporting Services](#).

IMPORTANT

All data sources in a Power BI Desktop report must be supported to configure scheduled refresh.

List of supported data sources

Other data sources may work even though they aren't on the supported list.

DATA SOURCE	CACHED DATA	SCHEDULED REFRESH	LIVE/DIRECTQUERY
SQL Server Database	Yes	Yes	Yes
SQL Server Analysis Services	Yes	Yes	Yes
Azure SQL Database	Yes	Yes	Yes
Azure SQL Data Warehouse	Yes	Yes	Yes
Excel	Yes	Yes	No
Access Database	Yes	Yes	No
Active Directory	Yes	Yes	No
Amazon Redshift	Yes	No	No
Azure Blob Storage	Yes	Yes	No
Azure Data Lake Store	Yes	No	No
Azure HDInsight (HDFS)	Yes	Yes	No
Azure HDInsight (Spark)	Yes	Yes	No
Azure Table Storage	Yes	Yes	No
Dynamics 365 (online)	Yes	No	No

DATA SOURCE	CACHED DATA	SCHEDULED REFRESH	LIVE/DIRECTQUERY
Facebook	Yes	No	No
Folder	Yes	Yes	No
Google Analytics	Yes	No	No
Hadoop File (HDFS)	Yes	No	No
IBM DB2 Database	Yes	Yes	No
Impala	Yes	No	No
JSON	Yes	Yes	No
Microsoft Exchange	Yes	No	No
Microsoft Exchange Online	Yes	No	No
MySQL Database	Yes	Yes	No
OData Feed	Yes	Yes	No
ODBC	Yes	Yes	No
OLE DB	Yes	Yes	No
Oracle Database	Yes	Yes	Yes
PostgreSQL Database	Yes	Yes	No
Power BI service	No	No	No
R Script	Yes	No	No
Salesforce Objects	Yes	No	No
Salesforce Reports	Yes	No	No
SAP Business Warehouse server	Yes	Yes	Yes
SAP HANA Database	Yes	Yes	Yes
SharePoint Folder (on-premises)	Yes	Yes	No
SharePoint List (on-premises)	Yes	Yes	No
SharePoint Online List	Yes	No	No

DATA SOURCE	CACHED DATA	SCHEDULED REFRESH	LIVE/DIRECTQUERY
Snowflake	Yes	No	No
Sybase Database	Yes	Yes	No
Teradata Database	Yes	Yes	Yes
Text/CSV	Yes	Yes	No
Web	Yes	Yes	No
XML	Yes	Yes	No
appFigures (Beta)	Yes	No	No
Azure Analysis Services database (Beta)	Yes	No	No
Azure Cosmos DB (Beta)	Yes	No	No
Azure HDInsight Spark (Beta)	Yes	No	No
Common Data Service (Beta)	Yes	No	No
comScore Digital Analytix (Beta)	Yes	No	No
Dynamics 365 for Customer Insights (Beta)	Yes	No	No
Dynamics 365 for Financials (Beta)	Yes	No	No
GitHub (Beta)	Yes	No	No
Google BigQuery (Beta)	Yes	No	No
IBM Informix database (Beta)	Yes	No	No
IBM Netezza (Beta)	Yes	No	No
Kusto (Beta)	Yes	No	No
MailChimp (Beta)	Yes	No	No
Microsoft Azure Consumption Insights (Beta)	Yes	No	No
Mixpanel (Beta)	Yes	No	No
Planview Enterprise (Beta)	Yes	No	No

DATA SOURCE	CACHED DATA	SCHEDULED REFRESH	LIVE/DIRECTQUERY
Projectplace (Beta)	Yes	No	No
QuickBooks Online (Beta)	Yes	No	No
Smartsheet	Yes	No	No
Spark (Beta)	Yes	No	No
SparkPost (Beta)	Yes	No	No
SQL Sentry (Beta)	Yes	No	No
Stripe (Beta)	Yes	No	No
SweetIQ (Beta)	Yes	No	No
Troux (Beta)	Yes	No	No
Twilio (Beta)	Yes	No	No
tyGraph (Beta)	Yes	No	No
Vertica (Beta)	Yes	No	No
Visual Studio Team Services (Beta)	Yes	No	No
Webtrends (Beta)	Yes	No	No
Zendesk (Beta)	Yes	No	No

IMPORTANT

Row-level security configured at the data source should work for certain DirectQuery (SQL Server, Azure SQL Database, Oracle and Teradata) and live connections assuming Kerberos is configured properly in your environment.

Next steps

Now that your data source is picked out, [create a report](#) using data from that data source.

More questions? [Try asking the Power BI Community](#)

Connecting to data sources

1/30/2018 • 1 min to read • [Edit Online](#)

Learn about what data sources you can connect to within Power BI Report Server.

Power BI Reports

Power BI reports can work with data that is imported or using an Analysis Services live connection along with DirectQuery. The October 2017 release includes support for connections other than Analysis Services live connections. This includes imported data. You can download the October 2017 release over at powerbi.com.

For information about what data sources are supported, see [Power BI report data sources in Power BI Report Server](#).

Other reports

Other report types support the same data sources that are present in SQL Server Reporting Services. For more information, see [Data sources supported by Reporting Services](#).

Next steps

[User handbook](#)

[Quickstart: Paginated reports](#)

[Quickstart: Power BI reports](#)

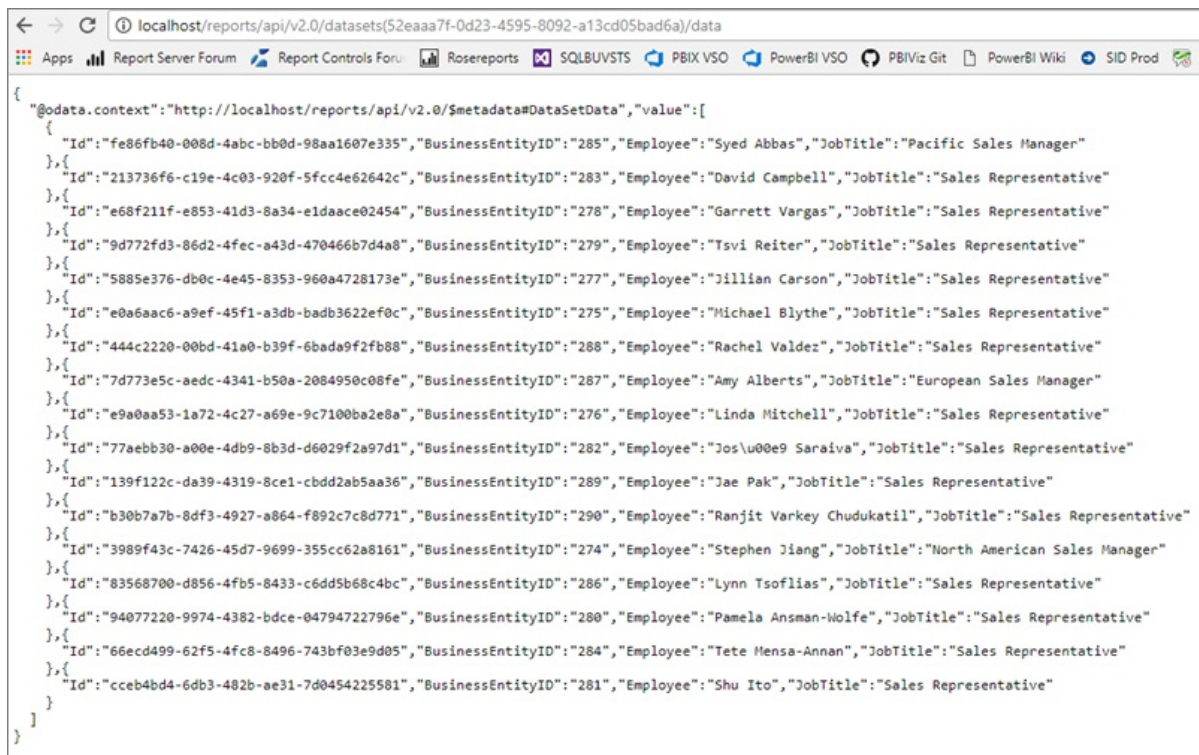
More questions? [Try asking the Power BI Community](#)

Accessing shared datasets as OData feeds in Power BI Report Server

1/30/2018 • 1 min to read • [Edit Online](#)

You can access shared datasets from Power BI Desktop with an OData feed.

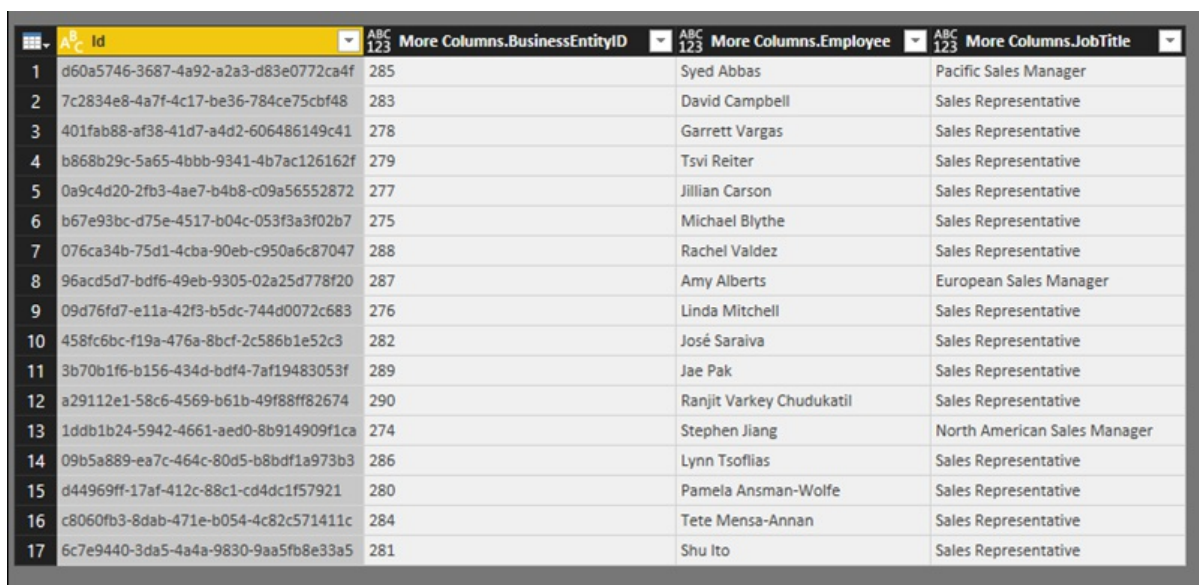
1. With the OData feed URL, you connect to the OData source.



```
localhost/reports/api/v2.0/datasets(52eaaa7f-0d23-4595-8092-a13cd05bad6a)/data

{
  "@odata.context": "http://localhost/reports/api/v2.0/$metadata#DataSetData", "value": [
    {
      "Id": "fe86fb40-008d-4abc-bb0d-98aa1607e335", "BusinessEntityID": "285", "Employee": "Syed Abbas", "JobTitle": "Pacific Sales Manager"
    },
    {
      "Id": "213736f6-c19e-4c03-920f-5fcc4e62642c", "BusinessEntityID": "283", "Employee": "David Campbell", "JobTitle": "Sales Representative"
    },
    {
      "Id": "e68f211f-e853-41d3-8a34-e1daace02454", "BusinessEntityID": "278", "Employee": "Garrett Vargas", "JobTitle": "Sales Representative"
    },
    {
      "Id": "9d772fd3-86d2-4fec-a43d-470466b7d4a8", "BusinessEntityID": "279", "Employee": "Tsvi Reiter", "JobTitle": "Sales Representative"
    },
    {
      "Id": "5885e376-db0c-4e45-8353-960a4728173e", "BusinessEntityID": "277", "Employee": "Jillian Carson", "JobTitle": "Sales Representative"
    },
    {
      "Id": "e0a6aac6-a9ef-45f1-a3db-badb3622ef0c", "BusinessEntityID": "275", "Employee": "Michael Blythe", "JobTitle": "Sales Representative"
    },
    {
      "Id": "444c2220-00bd-41a0-b39f-6bada9f2fb88", "BusinessEntityID": "288", "Employee": "Rachel Valdez", "JobTitle": "Sales Representative"
    },
    {
      "Id": "7d773e5c-aedc-4341-b50a-2084950c08fe", "BusinessEntityID": "287", "Employee": "Amy Alberts", "JobTitle": "European Sales Manager"
    },
    {
      "Id": "e9a0aa53-1a72-4c27-a69e-9c7100ba2e8a", "BusinessEntityID": "276", "Employee": "Linda Mitchell", "JobTitle": "Sales Representative"
    },
    {
      "Id": "77aebb30-a00e-4db9-8b3d-d6029f2a97d1", "BusinessEntityID": "282", "Employee": "Jos\u00e9 Saraiva", "JobTitle": "Sales Representative"
    },
    {
      "Id": "139f122c-da39-4319-8ce1-cbddd2ab5aa36", "BusinessEntityID": "289", "Employee": "Jae Pak", "JobTitle": "Sales Representative"
    },
    {
      "Id": "b30b7a7b-8df3-4927-a864-f892c7c8d771", "BusinessEntityID": "290", "Employee": "Ranjit Varkey Chudukatil", "JobTitle": "Sales Representative"
    },
    {
      "Id": "3989f43c-7426-45d7-9699-355cc62a8161", "BusinessEntityID": "274", "Employee": "Stephen Jiang", "JobTitle": "North American Sales Manager"
    },
    {
      "Id": "83568700-d856-4fb5-8433-c6dd5b68c4bc", "BusinessEntityID": "286", "Employee": "Lynn Tsoflias", "JobTitle": "Sales Representative"
    },
    {
      "Id": "94077220-9974-4382-bdce-04794722796e", "BusinessEntityID": "280", "Employee": "Pamela Ansman-Wolfe", "JobTitle": "Sales Representative"
    },
    {
      "Id": "66ecd499-62f5-4fc8-8496-743bf03e9d05", "BusinessEntityID": "284", "Employee": "Tete Mensa-Annan", "JobTitle": "Sales Representative"
    },
    {
      "Id": "cceb4bd4-6db3-482b-ae31-7d0454225581", "BusinessEntityID": "281", "Employee": "Shu Ito", "JobTitle": "Sales Representative"
    }
  ]
}
```

2. After you bring the data into Power BI Desktop, you can modify it in the Query Editor.



Id	BusinessEntityID	Employee	JobTitle
d60a5746-3687-4a92-a2a3-d83e0772ca4f	285	Syed Abbas	Pacific Sales Manager
7c2834e8-4a7f-4c17-be36-784ce75cbf48	283	David Campbell	Sales Representative
401fab88-af38-41d7-a4d2-606486149c41	278	Garrett Vargas	Sales Representative
b868b29c-5a65-4bbb-9341-4b7ac126162f	279	Tsvi Reiter	Sales Representative
0a9c4d20-2fb3-4ae7-b4b8-c09a56552872	277	Jillian Carson	Sales Representative
b67e93bc-d75e-4517-b04c-053f3a3f02b7	275	Michael Blythe	Sales Representative
076ca34b-75d1-4cba-90eb-c950a6c87047	288	Rachel Valdez	Sales Representative
96acd5d7-bdf6-49eb-9305-02a25d778f20	287	Amy Alberts	European Sales Manager
09d76fd7-e11a-42f3-b5dc-744d0072c683	276	Linda Mitchell	Sales Representative
458fc6bc-f19a-476a-8bcf-2c586b1e52c3	282	Jos\u00e9 Saraiva	Sales Representative
3b70b1f6-b156-434d-bdf4-7af19483053f	289	Jae Pak	Sales Representative
a29112e1-58c6-4569-b61b-49f88ff82674	290	Ranjit Varkey Chudukatil	Sales Representative
1ddb1b24-5942-4661-aed0-8b914909f1ca	274	Stephen Jiang	North American Sales Manager
09b5a889-ea7c-464c-80d5-b8bdf1a973b3	286	Lynn Tsoflias	Sales Representative
d44969ff-17af-412c-88c1-cd4dc1f57921	280	Pamela Ansman-Wolfe	Sales Representative
c8060fb3-8dab-471e-b054-4c82c571411c	284	Tete Mensa-Annan	Sales Representative
6c7e9440-3da5-4a4a-9830-9aa5fb8e33a5	281	Shu Ito	Sales Representative

3. Now you can use the data in designing reports.

The image shows a screenshot of the Power BI Desktop interface. On the left, a data table is displayed with three columns: BusinessEntityID, Employee, and JobTitle. The table contains 17 rows of data. On the right, the 'FIELDS' pane is visible, showing a search bar and a list of fields for 'Query1'. The fields 'BusinessEntityID', 'Employee', and 'JobTitle' are checked. Below the fields pane, the 'VALUES' section shows 'BusinessEntityID', 'Employee', and 'JobTitle' listed. The 'FILTERS' section shows 'BusinessEntityID(All)' and 'Employee(All)' listed.

BusinessEntityID	Employee	JobTitle
274	Stephen Jiang	North American Sales Manager
275	Michael Blythe	Sales Representative
276	Linda Mitchell	Sales Representative
277	Jillian Carson	Sales Representative
278	Garrett Vargas	Sales Representative
279	Tsvi Reiter	Sales Representative
280	Pamela Ansman-Wolfe	Sales Representative
281	Shu Ito	Sales Representative
282	José Saraiva	Sales Representative
283	David Campbell	Sales Representative
284	Tete Mensa-Annan	Sales Representative
285	Syed Abbas	Pacific Sales Manager
286	Lynn Tsoflias	Sales Representative
287	Amy Alberts	European Sales Manager
288	Rachel Valdez	Sales Representative
289	Jae Pak	Sales Representative
290	Ranjit Varkey Chudukatil	Sales Representative

Be sure to use **Advanced Options** so you can turn on Open Type Columns and format the columns accordingly in Power Query to meet your needs.

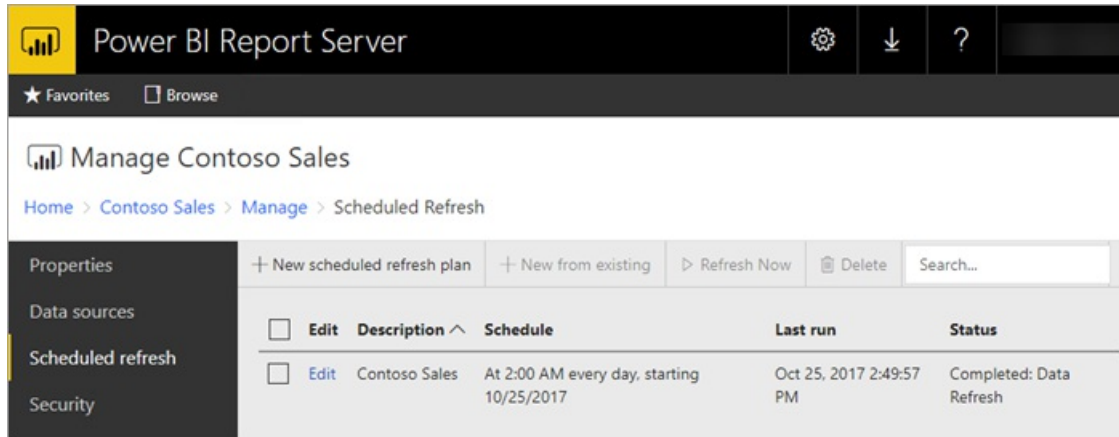
Read more about [connecting to OData feeds in Power BI Desktop](#).

More questions? [Try asking the Power BI Community](#)

How to configure Power BI report scheduled refresh

1/30/2018 • 2 min to read • [Edit Online](#)

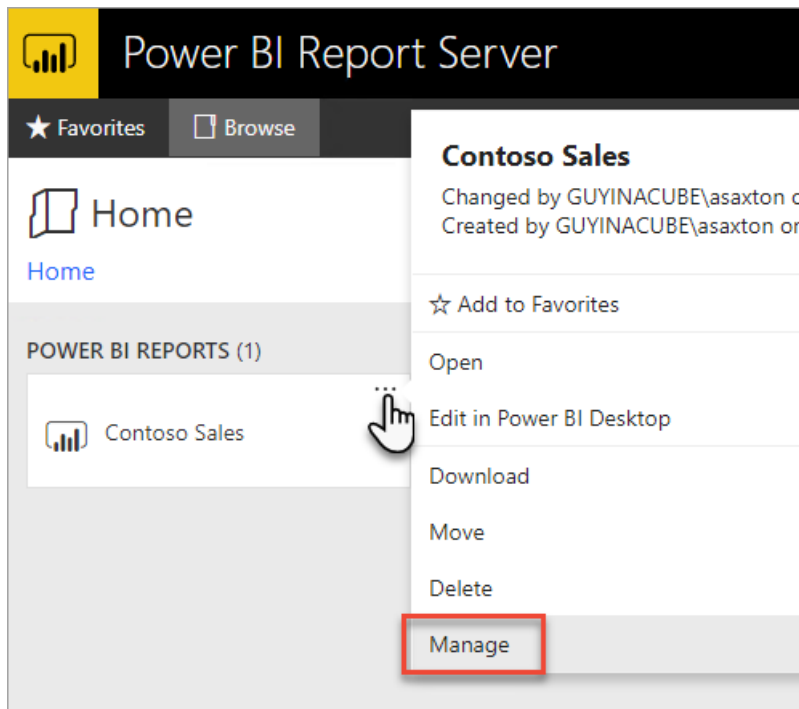
To refresh data in your Power BI report, a scheduled refresh plan must be created. This is done within the *Manage* area of a Power BI report.



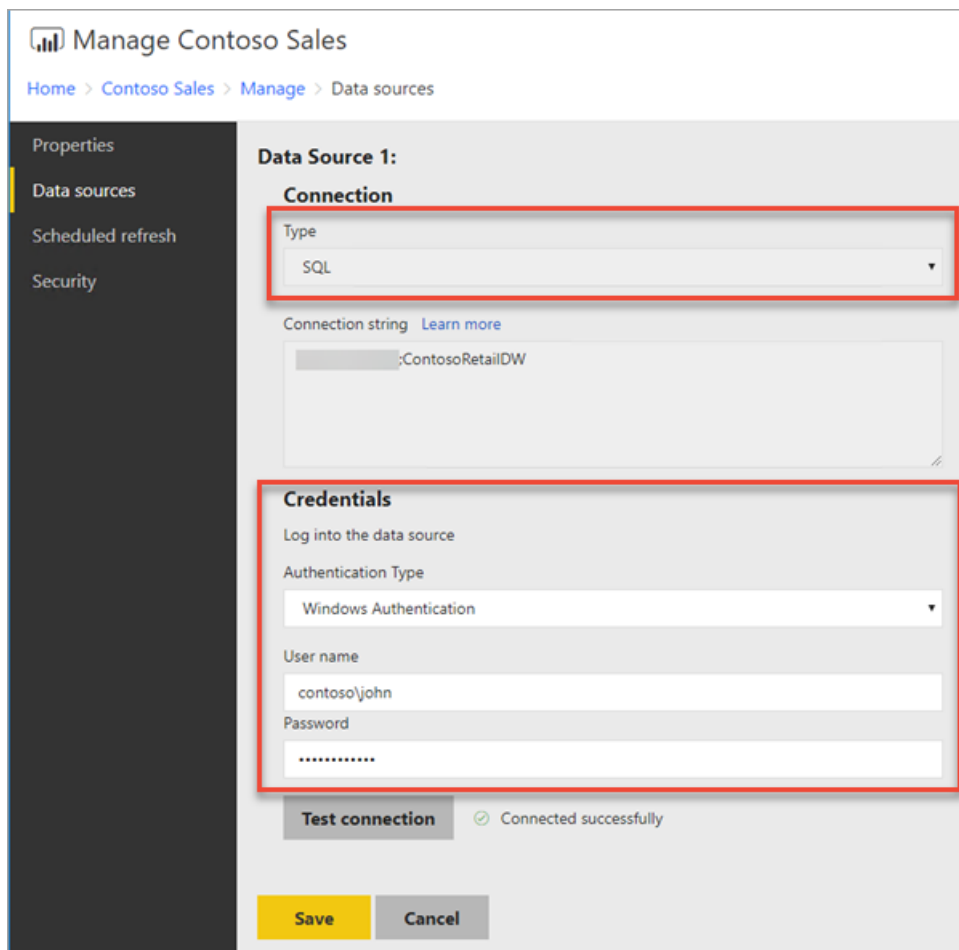
Configure data source credentials

Prior to creating a schedule data refresh plan, you need to set the credentials for **each data source** used in your Power BI report.

1. In the web portal, right-click on the Power BI report and select **Manage**.



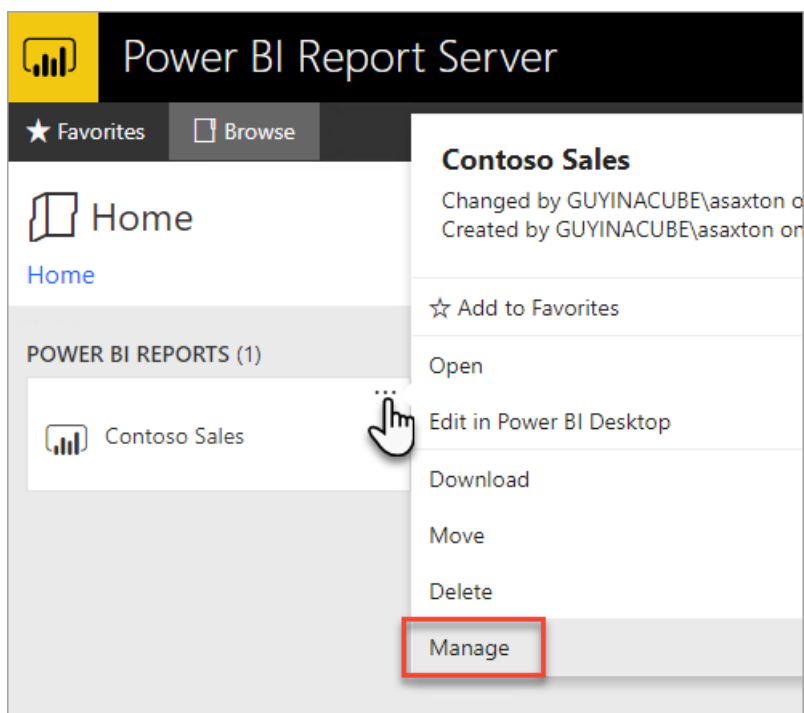
2. In the left menu, select the **Data sources** tab.
3. For each data source that appears, choose the type of authentication to use when connecting to that data source. Enter the appropriate credentials.



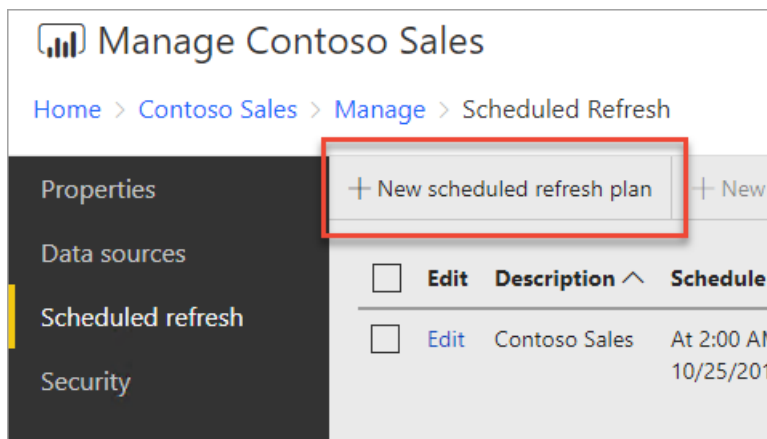
Creating a Schedule Refresh Plan

Follow these steps to create a scheduled refresh plan.

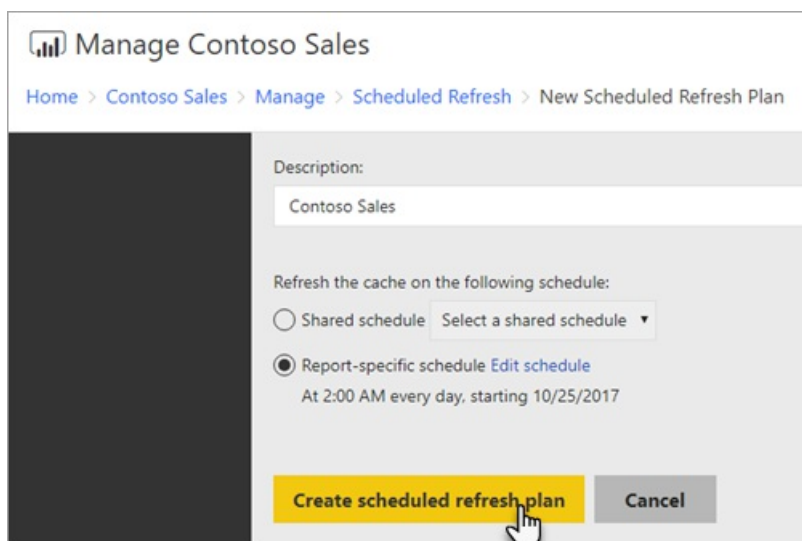
1. In the web portal, right-click on the Power BI report and select **Manage**.



2. In the left menu, select the **Scheduled refresh** tab.
3. On the **Scheduled refresh** page, select **New scheduled refresh plan**.



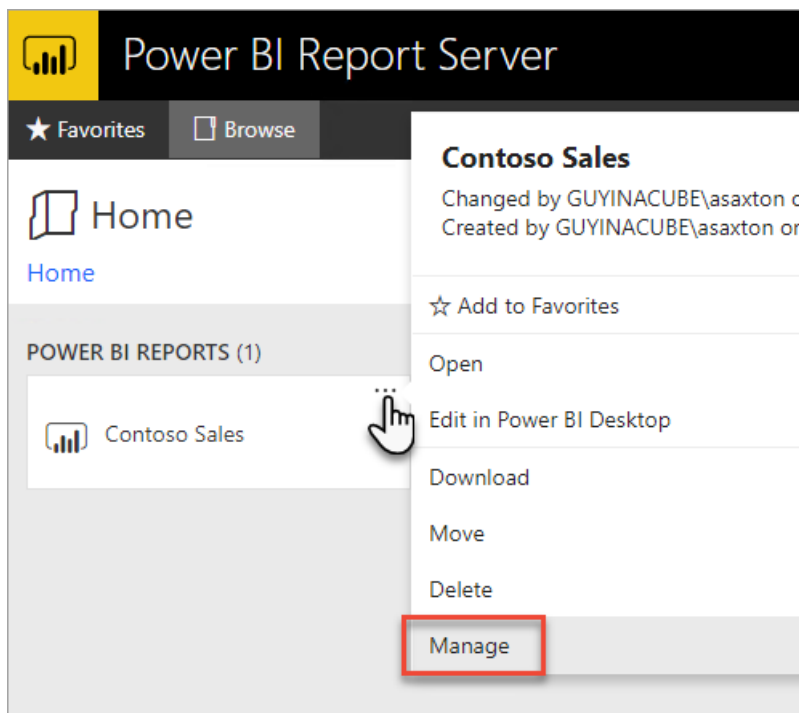
4. On the **New Scheduled Refresh Plan** page, enter a description and set a schedule for when you want your data model to be refreshed.
5. Select **Create scheduled refresh plan** when done.



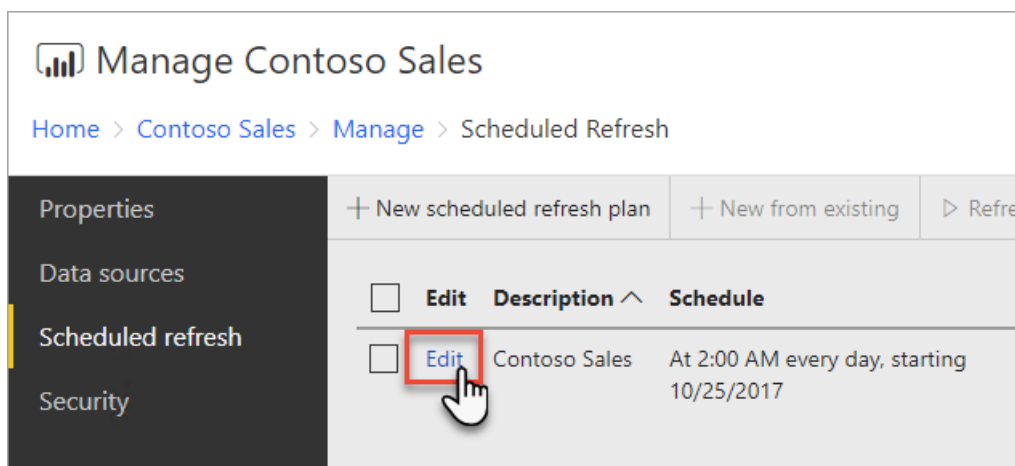
Modifying a Schedule Refresh Plan

Modifying a scheduled refresh plan is similar to creating one.

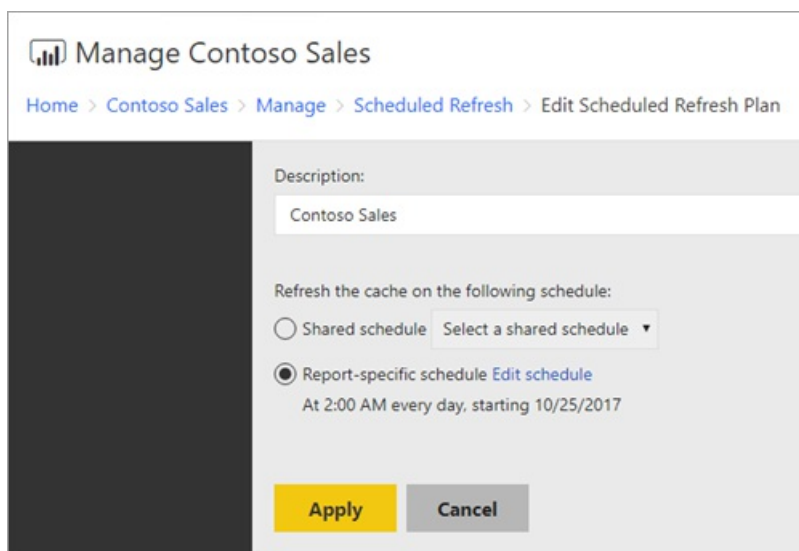
1. In the web portal, right-click on the Power BI report and select **Manage**.



2. In the left menu, select the **Scheduled refresh** tab.
3. On the **Scheduled refresh** page, select **Edit** beside the refresh plan you want to manage.



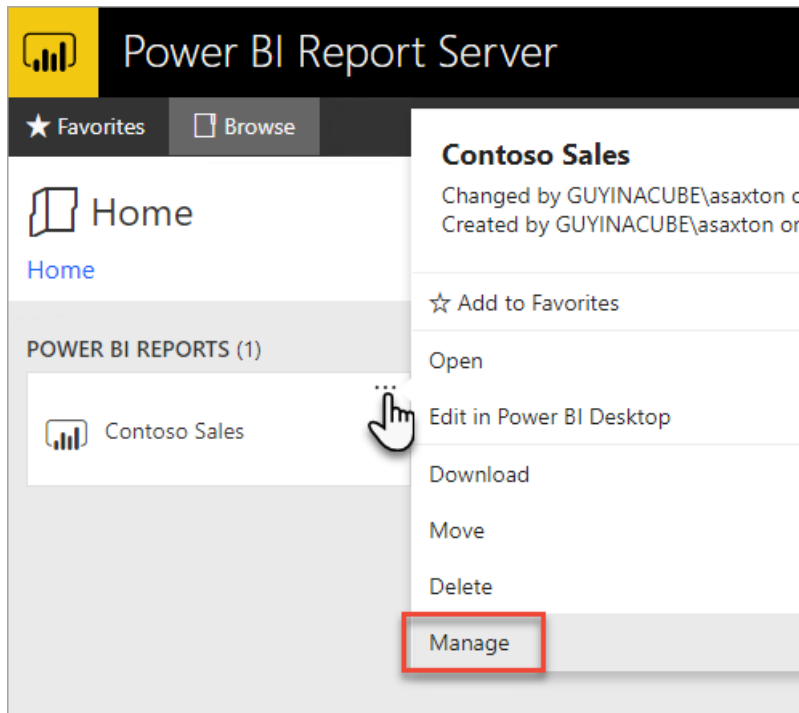
4. On the **Edit Scheduled Refresh Plan** page, enter a description and set a schedule for when you want your data model to be refreshed.
5. Select **Apply** when done.



Viewing the status of Schedule Refresh Plan

View the status of a schedule refresh plan in the web portal.

1. In the web portal, right-click on the Power BI report and select **Manage**.



2. In the left menu, select the **Scheduled refresh** tab.
3. On the **Scheduled refresh** page, the right most column displays the status of a plan.

STATUS	DESCRIPTION
New Scheduled Refresh Plan	The plan has been created but has not ran.
Refreshing	The refresh process has started.
Streaming model to Analysis Server	Copying the model from the report server catalog database to the hosted Analysis Services instance.
Refreshing data	Refreshing the data within the model.
Removing credentials from the model	Removed the credentials used to connect to the data source from the model.
Saving model to the catalog	Refreshing of data is complete and the refreshed model is being saved back to the report server catalog database.
Completed: Data Refresh	Refresh is done.
Error:	An error occurred during refresh and is displayed.

The web page must be refreshed to see the current status. The status will not change automatically.

Next steps

To learn more about creating and modifying schedules, see [Create, modify, and delete schedules](#).

For information on how to troubleshoot scheduled refresh, see [Troubleshoot scheduled refresh in Power BI Report Server](#).

More questions? [Try asking the Power BI Community](#)

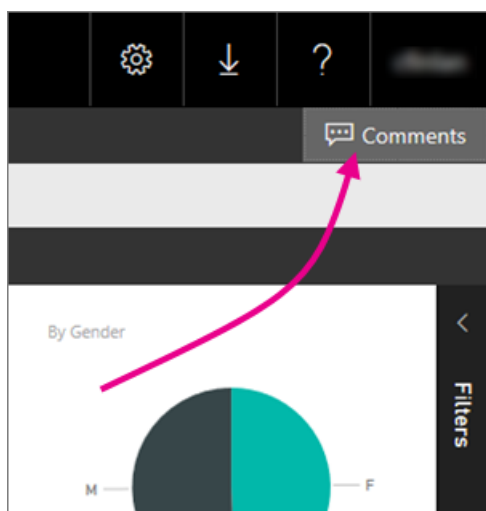
Add comments to a report in a report server

11/9/2017 • 1 min to read • [Edit Online](#)

You can add comments to reports, including Power BI reports, within the web portal of a report server. The comments live with the report, and anyone with the right permissions can see the comments for the report. See the [Permissions](#) section below for details.

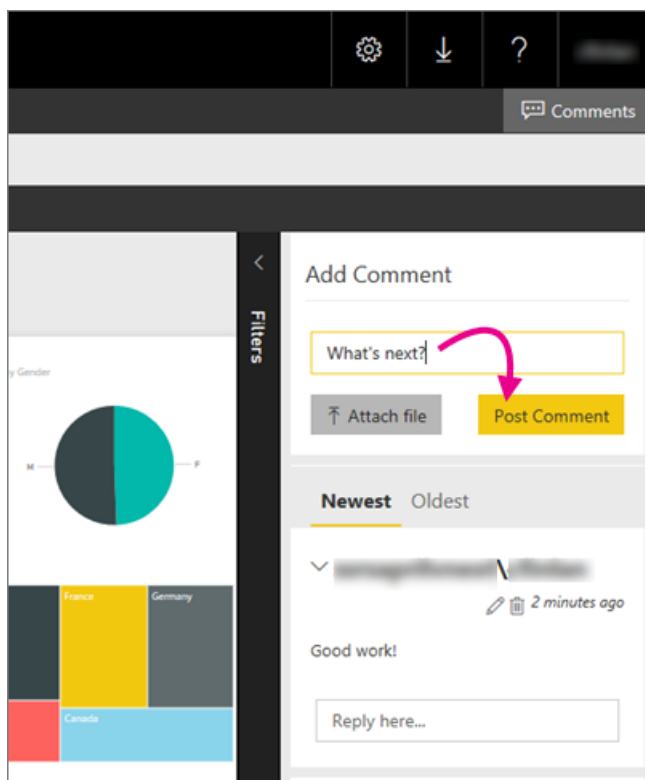
Add or view comments

1. Open a paginated or Power BI report on a report server.
2. In the upper-right corner, select **Comments**.



In the Comments pane, you can see any existing comments.

3. Write your comment, then select **Post Comment**.



Your comment shows in the pane on the web portal, along with any previous comments. They don't appear with the report on in the Power BI mobile apps.

TIP

Did you know? You can [annotate Power BI reports in the Power BI mobile apps](#) and share the annotated reports with others.

Permissions

Depending on your permissions, you can:

- Not see comments.
- See all comments, and post, edit, and delete your own.
- See all comments; post, edit, and delete your own; and delete other people's.

Next steps

- [Power BI Report Server user handbook](#)

More questions? [Try asking the Power BI Community](#)

Quickstart: Embed a Power BI report using an iFrame and URL parameters

1/30/2018 • 2 min to read • [Edit Online](#)

You can embed any report by using an iFrame in your application.

URL parameter

For any URL to a report, you can add a querystring parameter of `?rs:Embed=true`.

For example:

```
http://myserver/reports/powerbi/Sales?rs:embed=true
```

This will work on all report types within Power BI Report Server.

iFrame

Once you have your URL, you can create an iFrame within a web page, to host the report.

For example:

```
<iframe width="800" height="600" src="http://myserver/reports/powerbi/Sales?rs:embed=true" frameborder="0" allowFullScreen="true"></iframe>
```

URL filter

You can add a query string parameter to the URL to filter the data that's returned in the Power BI report.

The syntax is straightforward; start with the report URL, add a question mark, then this filter syntax.

URL?filter=**Table/Field** eq '**value**'

Keep these considerations in mind:

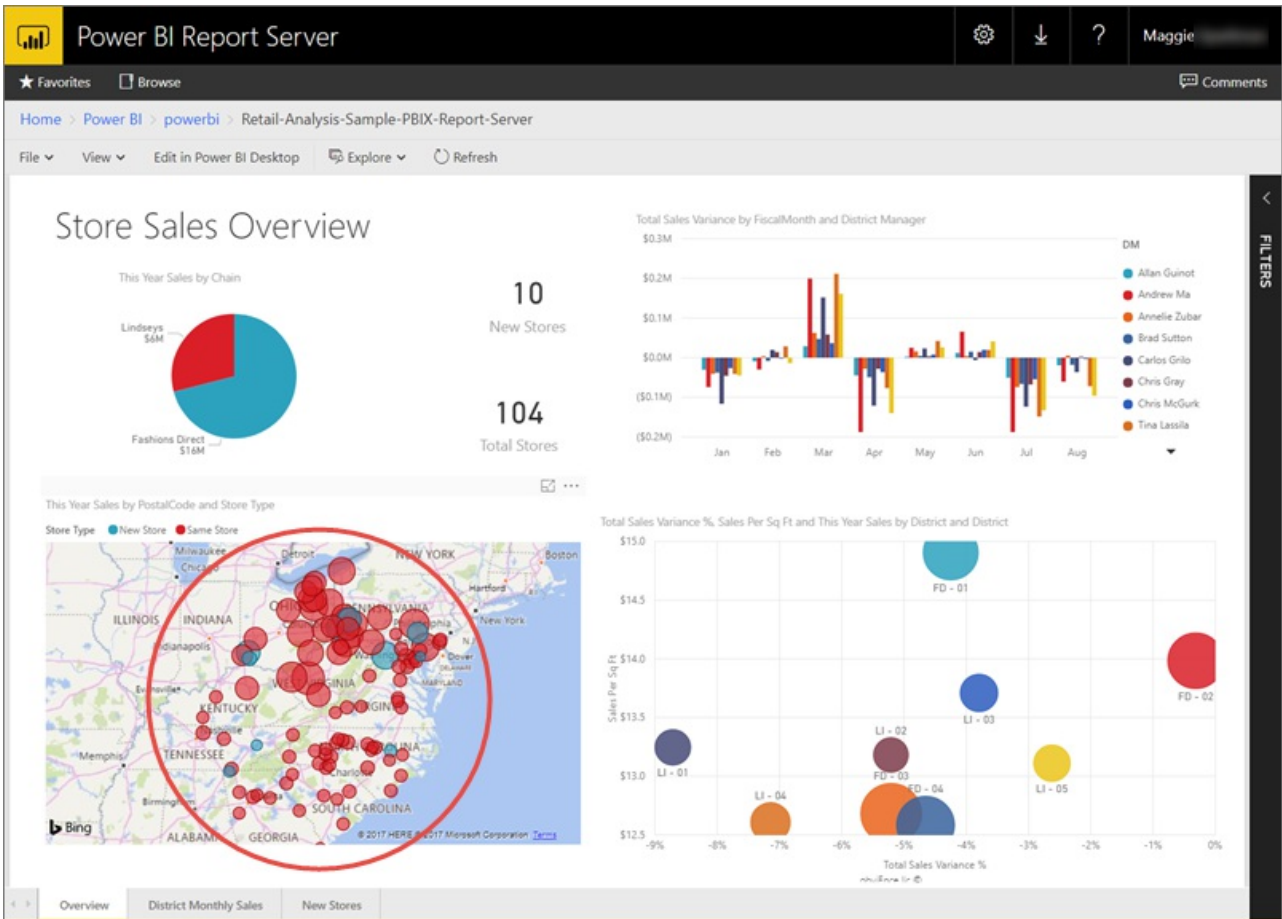
- **Table** and **Field** names are case sensitive; **value** isn't.
- You can filter a report with fields that are hidden from report view.
- **Value** has to be enclosed with single quotes.
- Field type has to be string.
- Table and field names can't have spaces.

Example: Filter on a field

Take for example the [Retail Analysis sample](#). Say this is the URL to the report on the report server in a folder called "power-bi":

```
https://report-server/reports/power-bi/Retail-Analysis-Sample
```

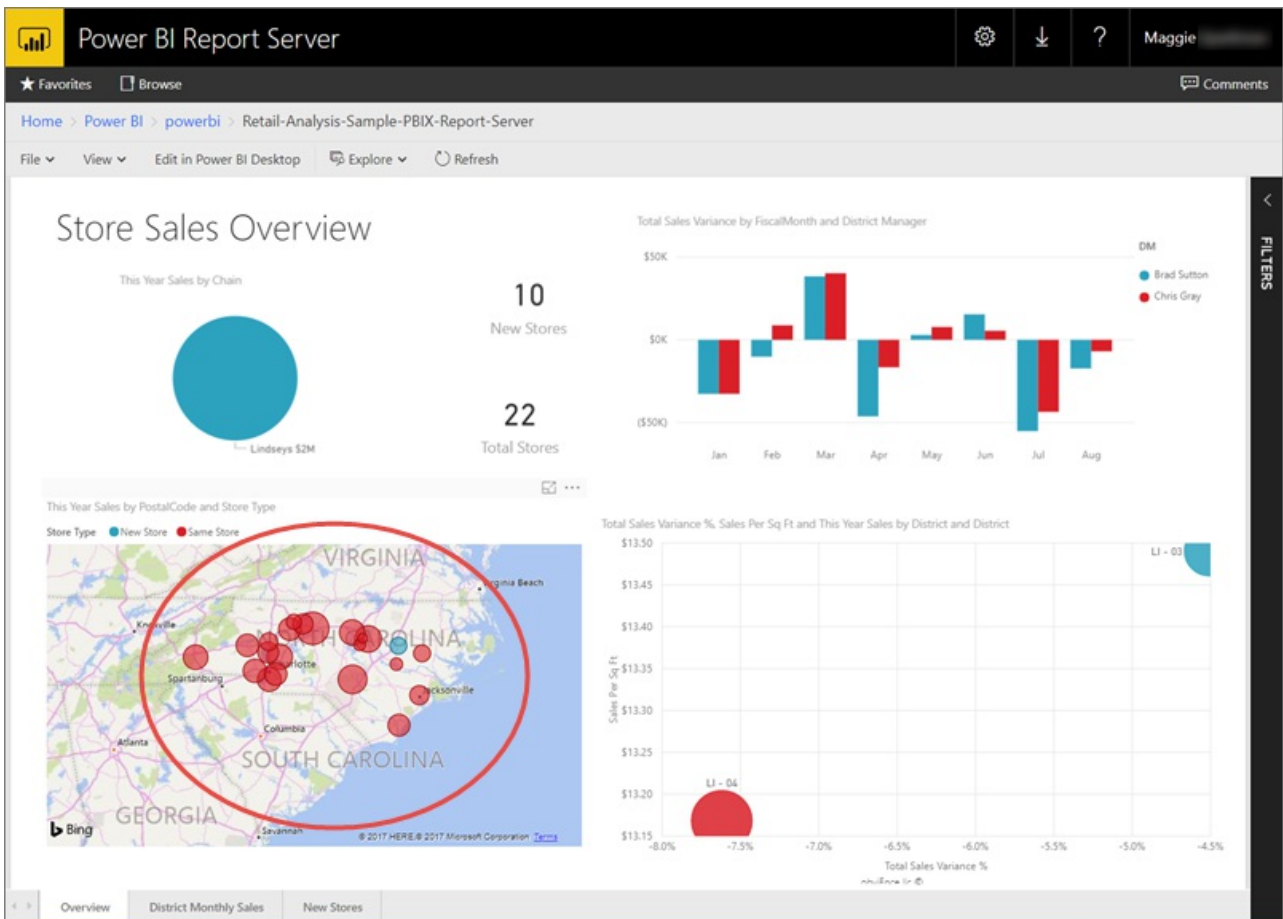
You see the map visualization in the Retail Analysis sample shows stores in North Carolina and other states.



NC is the value for North Carolina stored in the **Territory** field of the **Store** table. So to filter the report to show data only for stores in North Carolina, append the following to the URL:

```
?filter=Store/Territory eq 'NC'
```

Now the report is filtered for North Carolina; all the visualizations on the report page show data for only North Carolina.



Create a DAX formula to filter on multiple values

Another way to filter on multiple fields is by creating a calculated column in Power BI Desktop that concatenates two fields to a single value. Then you can filter on that value.

For example, the Retail Analysis sample has two fields: Territory and Chain. In Power BI Desktop, you can [create a calculated column](#) (Field) called TerritoryChain. Remember that the **Field** name can't have any spaces. Here is the DAX formula for that column.

TerritoryChain = [Territory] & "-" & [Chain]

Publish the report to the Power BI Report Server, then use the URL query string to filter to display data for only Lindseys stores in NC.

```
https://report-server/reports/power-bi/Retail-Analysis-Sample?filter=Store/TerritoryChain eq 'NC-Lindseys'
```

Next steps

- [Quickstart: Create a Power BI report for Power BI Report Server](#)
- [Quickstart: Create a paginated report for Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Troubleshoot scheduled refresh in Power BI Report Server

1/30/2018 • 7 min to read • [Edit Online](#)

This article discusses resources available to troubleshoot issues with scheduled refresh in Power BI Report Server.

As issues come up, this article will be updated with information to help you.

Common issues

The following are the more common issues you will hit when trying to schedule refresh for a report.

Driver related problems

Connecting to different data sources may require 3rd party drivers that need to be installed in order to connect successfully. Not only would you need to install them on the machine you are using Power BI Desktop on, but you will also need to make sure the driver is installed on the report server.

The driver may also come in both 32bit and 64bit. Make sure to install the 64bit driver as Power BI Report Server is 64bit.

Please refer to the manufacturer for details on how to install and configure 3rd party drivers.

Memory pressure

Memory pressure can occur when reports require more memory to process and render. Schedule refresh on reports may demand a significant amount of memory on the machine. Especially for larger reports. Memory pressure can result in report failures as well as a potential crash of the report server itself.

If you are encountering memory pressure consistently, it may be worth looking at a scaled out deployment of the report server in order to spread the load of resources. You can also define that a given report server is used for data refresh with the `IsDataModelRefreshService` setting within `rsreportserver.config`. With this setting, you could define one or more servers to be the front end server to handle on demand reports, and have another set of servers to only be used for scheduled refresh.

For information on how to monitor an Analysis Services instance, see [Monitor an Analysis Services Instance](#).

For information about memory settings within Analysis Services, see [Memory Properties](#).

Kerberos configuration

Connecting to a data source with windows credentials may require configuring Kerberos constrained delegation to make a successful connection. For more information about how to configure Kerberos constrained delegation, see [Configure Kerberos to use Power BI reports](#).

Known issues

Information about known issues will be listed here when they become available.

Configuration settings

The following settings can be used to affect scheduled refresh. Settings set within SQL Server Management Studio (SSMS) apply to all report servers within a scale-out deployment. Settings configured within `rsreportserver.config` are for the specific server they are set on.

Settings within SSMS:

SETTING	DESCRIPTION
EnablePowerBIReportEmbeddedModels	Enables or disables the ability to use imported data within your reports. Valid values are True or False.
MaxFileSizeMb	Maximum file size for uploaded reports. Default is 1000 MB (1 GB). Maximum value is 2000 MB (2 GB).
ModelCleanupCycleMinutes	Defines how often the model is checked to evict it from memory. Default is 15 minutes.
ModelExpirationMinutes	Defines how long until the model expires based on the last time used and is evicted. Default is 60 minutes.
ScheduleRefreshTimeoutMinutes	Defines how long the data refresh can take for a mode. Default is 120 minutes. There is no upper limit.

Settings within rsreportserver.config:

```
<Configuration>
  <Service>
    <PollingInterval>10</PollingInterval>
    <IsDataModelRefreshService>>false</IsDataModelRefreshService>
    <MaxQueueThreads>0</MaxQueueThreads>
  </Service>
</Configuration>
```

Tools for troubleshooting

Logs relevant for scheduled refresh of Power BI reports

The log files which hold information about scheduled refresh are the RSPowerBI_ logs. They are located in the LogFiles folder of your report server installation location.

```
C:\Program Files\Microsoft Power BI Report Server\PBIRS\LogFiles\RSPowerBI_*.log
```

Error condition

```
2017-10-20 02:00:09.5188|ERROR|744|Error Processing Data Model Refresh: SessionId: e960c25e-ddd4-4763-aa78-0e5dceb53472, Status: Error Model can not be refreshed because not all the data sources are embedded, Exception Microsoft.PowerBI.ReportServer.AsServer.InvalidDataSourceException: Model can not be refreshed because not all the data sources are embedde
at
Microsoft.PowerBI.ReportServer.WebHost.EventHandler.AnalysisServicesDataRefresh.CanModelRefresh(IEnumerable`1 dataSources)
at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.<>c__DisplayClass7.
<ExecuteActionWithLogging>b__5()
at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.
<ExecuteFuncWithLogging>d__1`1.MoveNext()
```

Successful refresh

```

2017-10-25 15:23:41.9370|INFO|6|Handling event with data: TimeEntered: 10/25/2017 8:23:41 PM, Type: Event,
SessionId: 46d398db-0b1f-49d8-b7bd-c5461c07ec7a, EventType: DataModelRefresh
2017-10-25 15:23:41.9370|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Data Refresh.
2017-10-25 15:23:41.9370|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Retrieving PBIX AsDatabaseInfo.
2017-10-25 15:23:42.7134|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Verifying all the data sources are embedded.
2017-10-25 15:23:42.7134|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Verifying connection strings are valid.
2017-10-25 15:23:42.7134|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Streaming model to Analysis Server.
2017-10-25 15:23:42.7603|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Refreshing the model.
2017-10-25 15:23:51.5258|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Removing credentials from the model.
2017-10-25 15:23:51.6508|INFO|6|Processing Data Model Refresh: SessionId: 46d398db-0b1f-49d8-b7bd-
c5461c07ec7a, Status: Starting Saving model to the catalog.

```

Incorrect Credentials

```

2017-10-20 08:22:01.5595|INFO|302|Processing Data Model Refresh: SessionId: 22cd9ec3-b21a-4eb1-81ae-
15fac8d379ea, Status: Starting Refreshing the model.
2017-10-20 08:22:02.3758|ERROR|302|Error Processing Data Model Refresh: SessionId: 22cd9ec3-b21a-4eb1-81ae-
15fac8d379ea, Status: Error Failed to refresh the model, Exception
Microsoft.AnalysisServices.OperationOperationException: Failed to save modifications to the server. Error returned:
'The credentials provided for the SQL source are invalid. (Source at rosecatalog;reportserver.). The exception
was raised by the IDbCommand interface.
'.
    at Microsoft.AnalysisServices.Tabular.Model.SaveChanges(SaveOptions saveOptions)
    at Microsoft.PowerBI.ReportServer.AsServer.TOMWrapper.RefreshModel(Database database)
    at Microsoft.PowerBI.ReportServer.AsServer.AnalysisServicesServer.RefreshDatabase(String databaseName,
IEnumerable`1 dataSources)
    at
Microsoft.PowerBI.ReportServer.WebHost.EventHandler.AnalysisServicesDataRefresh.RefreshDatabase(AsDatabaseInfo
asDatabaseInfo)
    at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.<>c__DisplayClass7.
<ExecuteActionWithLogging>b__5()
    at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.
<ExecuteFuncWithLogging>d__1`1.MoveNext()
2017-10-20 08:22:02.4588|ERROR|302|Error Processing Data Model Refresh: SessionId: 22cd9ec3-b21a-4eb1-81ae-
15fac8d379ea, Status: Error Failed Data Refresh, Exception Microsoft.AnalysisServices.OperationOperationException:
Failed to save modifications to the server. Error returned: 'The credentials provided for the SQL source are
invalid. (Source at rosecatalog;reportserver.). The exception was raised by the IDbCommand interface.
'.
    at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.ExecuteActionWithLogging(Action
methodToExecute, String description, String localizedDescription, String messageInFailure, RefreshInfo
refreshInfo, DataAccessors dataAccessors, ReportEventType operation, Int64 size, Boolean isDataRetrieval,
Boolean showInExecutionLog)
    at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.AnalysisServicesDataRefresh.RefreshData(RefreshInfo
refreshInfo)
    at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.<>c__DisplayClass7.
<ExecuteActionWithLogging>b__5()
    at Microsoft.PowerBI.ReportServer.WebHost.EventHandler.DataRefreshScope.
<ExecuteFuncWithLogging>d__1`1.MoveNext()

```

Enabling Verbose Logging

Enabling verbose logging, in Power BI Report Server, is the same as it is for SQL Server Reporting Services.

1. Open `<install directory>\PBIRS\ReportServer\bin\ReportingServicesService.exe.config`.
2. Under `<system.diagnostics>`, change **DefaultTraceSwitch** to **4**.
3. Under `<RSTrace>`, change **Components** to **all:4**.

ExecutionLog

Whenever a Power BI report is rendered, or a schedule refresh plan is executed, new entries are added to the Execution Log in the database. These entries are available in the **ExecutionLog3** view within the report server catalog database.

Execution log entries for Power BI reports differ from entries for other report types.

- TimeRendering columns is always 0. Rendering of Power BI reports happens in the browser, not in the server.
- There are 2 Request Types and subsequent item actions:
 - **Interactive**: whenever a report is being viewed.
 - **ASModelStream**: when the data model is streamed to Analysis Services from the catalog.
 - **ConceptualSchema**: when user clicks on viewing the report.
 - **QueryData**: whenever data is being requested from client.
 - **Refresh Cache**: whenever a schedule refresh plan has been executed.
 - **ASModelStream**: whenever the data model is streamed to Analysis Services from the catalog.
 - **DataRefresh**: whenever data is being refreshed from one or more data sources.
 - **SaveToCatalog**: whenever the data model is being saved back to the catalog.

Analysis Services

There may be times you want to modify Analysis Services for diagnosing issues, or adjust memory limits.

IMPORTANT

These settings will be reset any time you upgrade the report server. Be sure to keep a copy of your changes and reapply them if needed.

Install location

The default location for Power BI Report Server, and Analysis Services is the following.

```
C:\Program Files\Microsoft Power BI Report Server\PBIRS\ASEngine
```

Configuring Analysis Services settings (msmdsrv.ini)

In the `<install_directory>\PBIRS\ASEngine` directory, you will find the *msmdsrv.ini* file, which you can use to control different settings of Analysis Services. When you open this file, you will immediately realize that this file doesn't have all the settings you would expect in the *msmdsrv.ini* file.

This is because the actual Analysis Services process that is run by Power BI Report Server is launched in `<install_directory>\PBIRS\ASEngine\workspaces`. In that folder, you will see the full *msmdsrv.ini* file you are used to. It is important not to modify the file within the *workspaces* folder as it is rewritten whenever the Analysis Services process launches. If you want to control a setting, please do this by modifying *msmdsrv.ini* in the `<install_directory>\PBIRS\ASEngine` directory.

The following settings are reset when ever the Analysis Services process is launched. Any changes you make to these will be ignored.

- ConfigurationSettings\PrivateProcess
- ConfigurationSettings\DataDir
- ConfigurationSettings\LogDir
- ConfigurationSettings\TempDir
- ConfigurationSettings\BackupDir
- ConfigurationSettings\AllowedBrowsingFolders
- ConfigurationSettings\CrashReportsFolder

- ConfigurationSettings\ExtensionDir
- ConfigurationSettings\Port
- ConfigurationSettings\DeploymentMode
- ConfigurationSettings\ServerLocation
- ConfigurationSettings\TMCompatabilitySKU
- ConfigurationSettings\FlightRecorder\TraceDefinitionFile

Profiling the local Analysis Services process

A SQL Profiler trace can be run on the local Analysis Services process for diagnostic purposes. To connect to the local Analysis Services instance, do the following.

SQL Server Profiler Trace is included with the [SQL Server Management Studio \(SSMS\) download](#).

1. Start **SQL Server Profiler** as an administrator.
2. Select the **New Trace** button.
3. In the **Connect to server** dialog, select **Analysis Services** and enter **localhost:5132** for the server name.
4. In the **Trace properties** dialog, select the events you want to capture and select **Run**.

Lock Pages In Memory Windows privilege

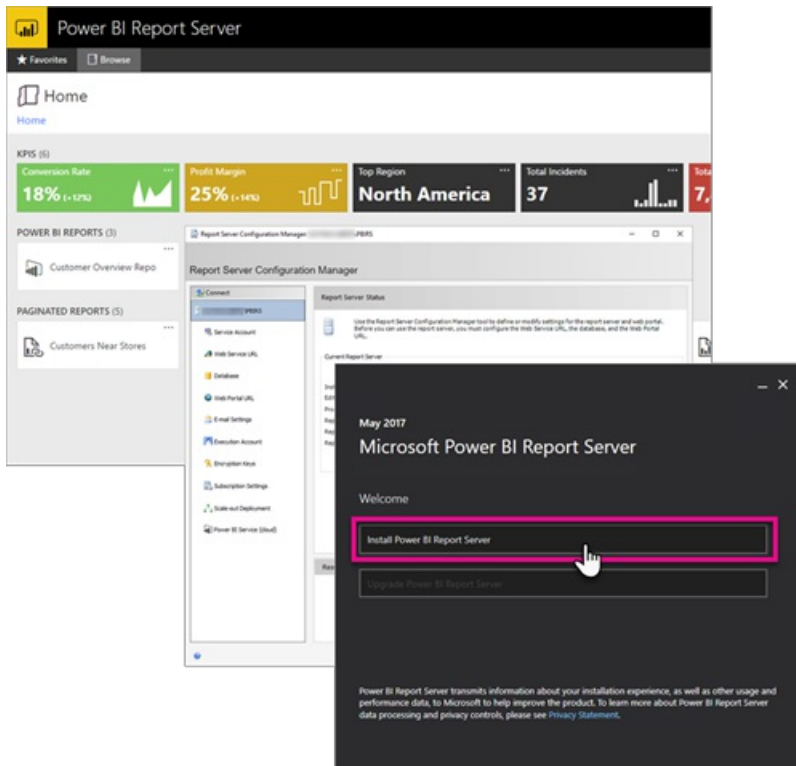
If you find that you are unable to render a Power BI report, assigning the **Lock pages in memory** privilege to the services account running Power BI Report server may help. For more information about how to configure **Lock pages in memory**, see [Windows privileges assigned to the Analysis Services service account](#).

More questions? [Try asking the Power BI Community](#)

Administrator handbook overview, Power BI Report Server

1/30/2018 • 1 min to read • [Edit Online](#)

Welcome to the administrator handbook for Power BI Report Server, an on-premises location for storing and managing your Power BI, mobile, and paginated reports.



This handbook will help you understand concepts on planning, deploying and managing your Power BI Report Server.

Installing and migration

You will need to install Power BI Report Server to start using it. We have information that will allow you to handle this task.

Before you start to install, upgrade or migrate to Power BI Report Server, take a look at the [system requirements](#) for the report server.

Installing

If you are deploying a new Power BI Report Server, you use the following documents to help you. A quickstart is available to jump right in. Or, you can look at the install document for full details.

- [Quickstart: Install Power BI Report Server](#)
- [Install Power BI Report Server](#)

Migration

There is no in place upgrade for SQL Server Reporting Services. If you have an existing SQL Server Reporting Services instance that you want to make a Power BI Report Server, you will need to migrate it. There are other reasons that you may want to perform a migration as well. Review the migration document for more details.

[Migrate a report server installation](#)

Configuring your report server

You have many options when configuring your report server. Will you use SSL? Are you configuring an email server? Do you want to intergrate with the Power BI service to pin visualizations?

The majority of your configuration will occur within the Report Server Configuration Manager. Check out the [configuration manager](#) documentation for more details.

Security

Security and protection are important to every organization. You can learn about authentication, authorization, roles and permissions over in the [security](#) documentation.

Next steps

[Quickstart: Install Power BI Report Server](#)

[How to find your report server product key](#)

[Install Power BI Desktop optimized for Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

Hardware and software requirements for installing Power BI Report Server

1/30/2018 • 3 min to read • [Edit Online](#)

Here you will find the minimum hardware and software requirements to install and run Power BI Report Server.

Processor, Memory, and Operating System Requirements

COMPONENT	REQUIREMENT
.NET Framework	<p>4.6</p> <p>You can manually install the .NET Framework from Microsoft .NET Framework 4.6 (Web Installer) for Windows.</p> <p>For more information, recommendations, and guidance about the .NET Framework 4.6 see .NET Framework Deployment Guide for Developers.</p> <p>Windows 8.1, and Windows Server 2012 R2 require KB2919355 before installing .NET Framework 4.6.</p>
Hard Disk	<p>Power BI Report Server requires a minimum of 1 GB of available hard-disk space.</p> <p>Additional space will be required on the database server that is hosting the report server database.</p>
Memory	<p>Minimum: 1 GB</p> <p>Recommended: At least 4 GB</p>
Processor speed	<p>Minimum: x64 Processor: 1.4 GHz</p> <p>Recommended: 2.0 GHz or faster</p>
Processor type	<p>x64 Processor: AMD Opteron, AMD Athlon 64, Intel Xeon with Intel EM64T support, Intel Pentium IV with EM64T support</p>

COMPONENT	REQUIREMENT
Operating system	Windows Server 2016 Datacenter Windows Server 2016 Standard Windows Server 2012 R2 Datacenter Windows Server 2012 R2 Standard Windows Server 2012 R2 Essentials Windows Server 2012 R2 Foundation Windows Server 2012 Datacenter Windows Server 2012 Standard Windows Server 2012 Essentials Windows Server 2012 Foundation Windows 10 Home Windows 10 Professional Windows 10 Enterprise Windows 8.1 Windows 8.1 Pro Windows 8.1 Enterprise Windows 8 Windows 8 Pro Windows 8 Enterprise

NOTE

Installation of Power BI Report Server is supported on x64 processors only.

Database server version requirements

SQL Server is used to host the report server databases. The SQL Server Database Engine instance can be a local or remote instance. The following are the supported versions of SQL Server Database Engine that can be used to host the report server databases:

- SQL Server 2017
- SQL Server 2016
- SQL Server 2014
- SQL Server 2012
- SQL Server 2008 R2
- SQL Server 2008

Creating the report server database on a remote computer requires that you configure the connection to use a

domain user account or a service account that has network access. If you decide to use a remote SQL Server instance, consider carefully which credentials the report server should use to connect to the SQL Server instance. For more information, see [Configure a Report Server Database Connection](#).

Considerations

Power BI Report Server will install default values to configure the core settings required to make a report server operational. It has the following requirements:

- A SQL Server Database Engine must be available after setup and before you configure the database for the report server. The Database Engine instance hosts the report server database that Reporting Services Configuration Manager will create. The Database Engine is not required for the actual setup experience.
- The user account used to run Setup must be a member of the local Administrators group.
- The user account used for Reporting Services Configuration Manager must have permission to access and create databases on the Database Engine instance that hosts the report server databases.
- Setup must be able to use the default values to reserve the URLs that provide access to the report server and the web portal. These values are port 80, a strong wildcard, and the virtual directory names in the format **ReportServer** and **Reports**.

Read-only domain controller (RODC)

While the report server can be installed in an environment that has a Read-Only Domain Controller (RODC), Reporting Services needs access to a Read-Write Domain Controller to function properly. If Reporting Services only has access to a RODC, you may encounter errors when trying to administer the service.

Power BI reports and Analysis Services live connections

You can use a live connection against tabular or multidimensional instances. Your Analysis Services server has to me the proper version and edition to work properly.

SERVER VERSION	REQUIRED SKU
2012 SP1 CU4 or later	Business Intelligence and Enterprise SKU
2014	Business Intelligence and Enterprise SKU
2016 and later	Standard SKU or higher

Next steps

[User handbook](#)

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

How to find your report server product key

1/30/2018 • 1 min to read • [Edit Online](#)

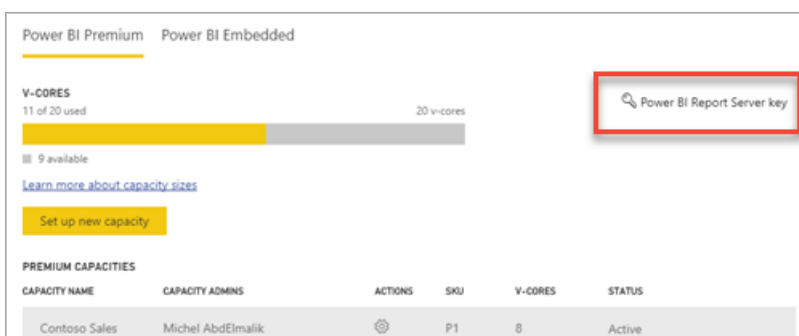
Learn how you can find your Power BI Report Server product key to install your server in a production environment.

You downloaded Power BI Report Server, and you have a SQL Server Enterprise Software Assurance agreement. Or, you purchased Power BI Premium. You want to install the server in a production environment, but you need a product key in order to do that. Where is the product key?

The product key will be in one of two places depending on what you purchased.

Purchased Power BI Premium

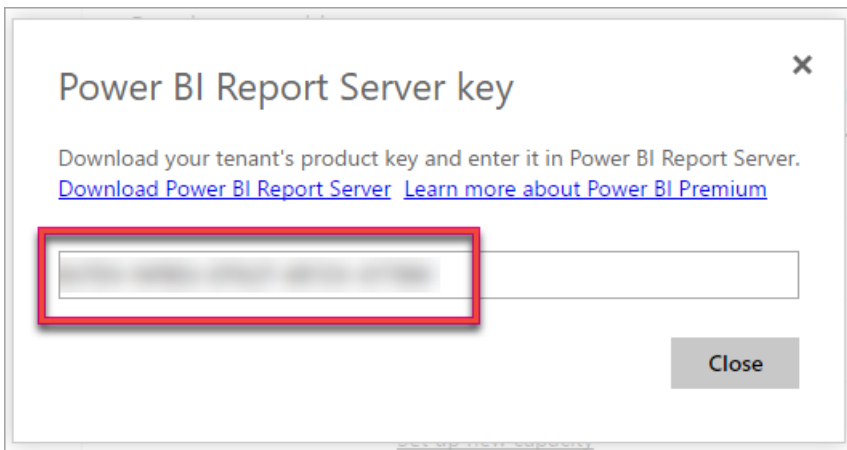
If you have purchased Power BI Premium, within the **Capacity settings** tab of the Power BI admin portal, you will have access to your Power BI Report Server product key. This will only be available for Global Admins or users assigned the Power BI service administrator role.



The screenshot shows the Power BI admin portal interface. At the top, there are tabs for 'Power BI Premium' and 'Power BI Embedded'. Below this, the 'V-CORES' section displays a progress bar indicating '11 of 20 used' and '20 v-cores' total. A red box highlights a button labeled 'Power BI Report Server key'. Below the progress bar, there is a '9 available' indicator and a 'Learn more about capacity sizes' link. A 'Set up new capacity' button is also visible. At the bottom, there is a table titled 'PREMIUM CAPACITIES' with columns for 'CAPACITY NAME', 'CAPACITY ADMINS', 'ACTIONS', 'SKU', 'V-CORES', and 'STATUS'. The table contains one row with the following data:

CAPACITY NAME	CAPACITY ADMINS	ACTIONS	SKU	V-CORES	STATUS
Contoso Sales	Michel AbdElmalik		P1	8	Active

Selecting **Power BI Report Server key** will display a dialog contain your product key. You can copy it and use it with the installation.

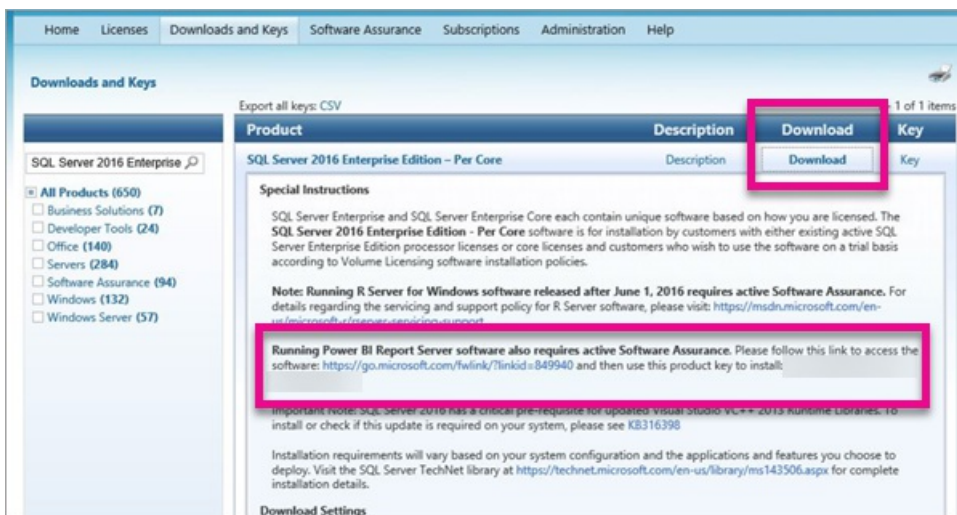


Purchased Software Assurance agreement

If you have a SQL Server Enterprise SA agreement, you can get your product key from the [Volume Licensing Service Center](#). Look under the latest service pack, for the latest version of SQL Server. If you don't see it there, look under the RTM release of the latest SQL Server version.

NOTE

You need to look under the download section. Not the keys section.



Next steps

[Quickstart: Install Power BI Report Server](#)

[Install Power BI Desktop optimized for Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

Quickstart: Install Power BI Report Server

1/30/2018 • 1 min to read • [Edit Online](#)

Installing Power BI Report Server itself is very quick. From downloading, to installing and configuring, you should be up and running within a few minutes.

This is a quick look at how to install a report server if you just want to get up and running with a new server. For more detailed information on installing a report server, see [Install Power BI Report Server](#).

Download

To download Power BI Report Server, go to [On-premises reporting with Power BI Report Server](#).

Go to the Microsoft Download Center to download [Microsoft Power BI Desktop](#) (Optimized for Power BI Report Server - October 2017).



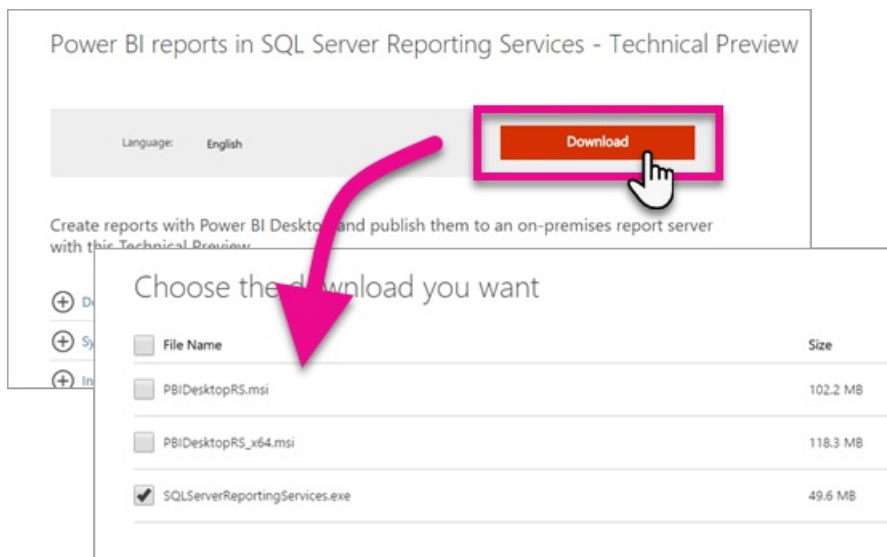
For the current release notes, see [Power BI Report Server - Release notes](#).

Before you begin

Before you install Power BI Report Server, it is recommended that you review the [Hardware and Software Requirements for installing Power BI Report Server](#).

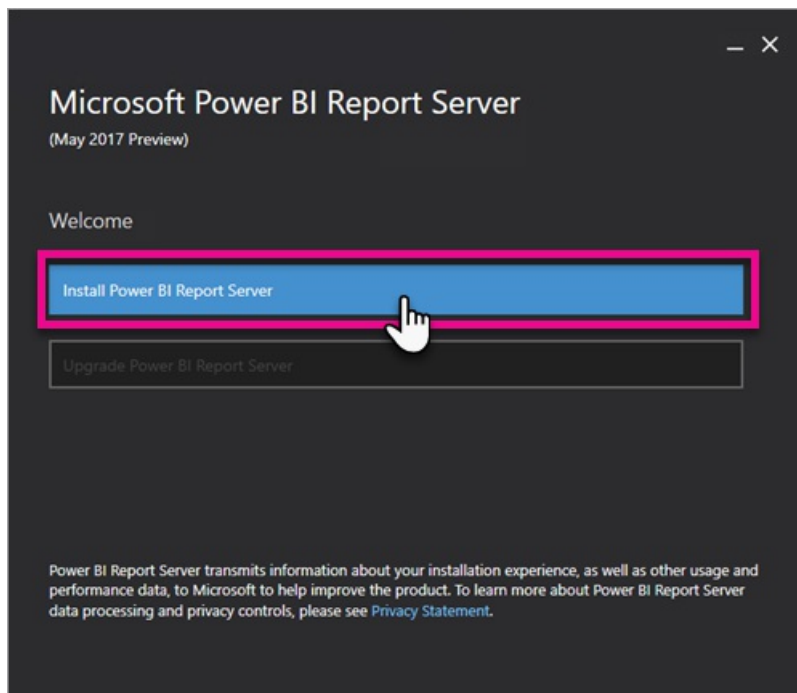
Step 1: Download

Download the installation files, for Power BI Report Server, locally. To download Power BI Report Server, go to the [Microsoft download center](#).



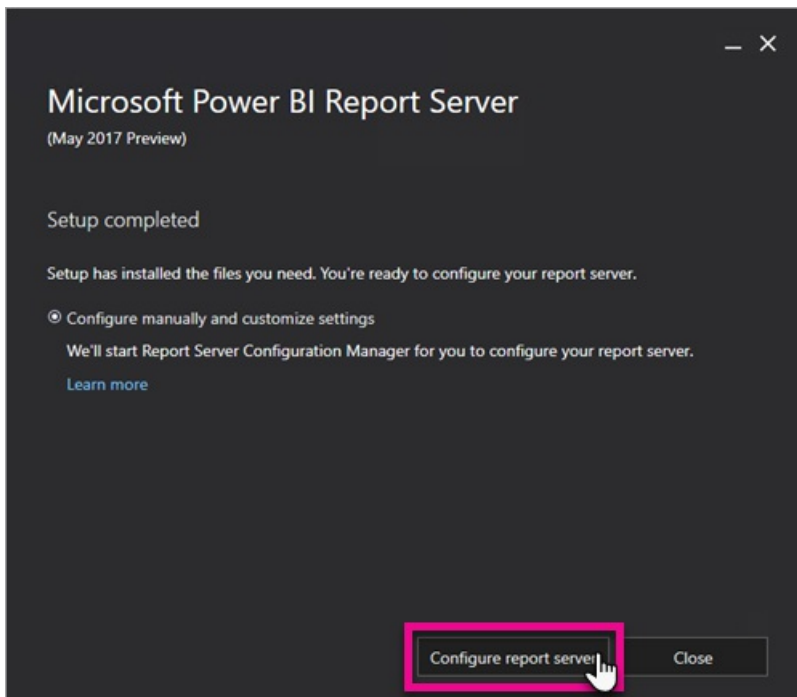
Step 2: Run installer

Run the PowerBIReportServer.exe file that you downloaded and step through the installation screens. You will have the opportunity to select the the installation path as well as select the edition you want to install. You can choose between an evaluation that expires within 180 days, a developer edition or to provide a product key.



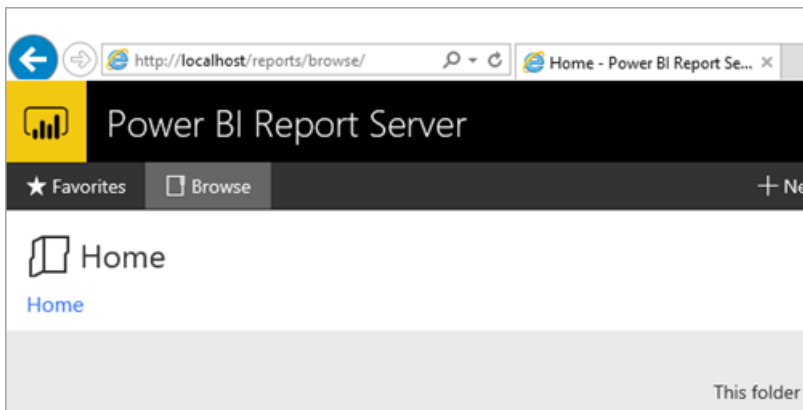
Step 3: Configure the server

After you are done installing, you will run the configuration manager to finish setting up your server. You will need to create a ReportServer catalog database as well as confirm the web portal and web service URLs.



Step 4: Browse to web portal

Now that you are configured, you should be able to open a browser to the web portal of your server. By default, this will be `http://localhost/reports`. You will also be able to browse using the machine name instead of using localhost by default, assuming you are not being blocked by any type of firewall.



Next steps

[Administrator handbook](#)

[How to find your report server product key](#)

[Install Power BI Report Server](#)

[Install Power BI Desktop optimized for Power BI Report Server](#)

[Browser support for Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Install Power BI Report Server

1/30/2018 • 5 min to read • [Edit Online](#)

Learn how to install Power BI Report Server.

Download

To download Power BI Report Server, go to [On-premises reporting with Power BI Report Server](#).

Go to the Microsoft Download Center to download [Microsoft Power BI Desktop](#) (Optimized for Power BI Report Server - October 2017).

Tip

 For the current release notes, see [Power BI Report Server - Release notes](#).

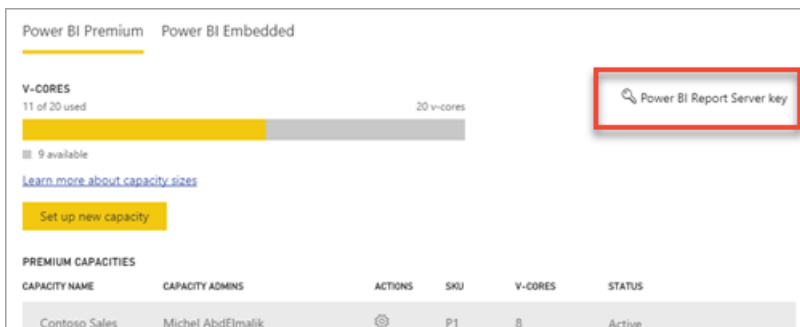
Before you begin

Before you install Power BI Report Server, it is recommended that you review the [Hardware and Software Requirements for installing Power BI Report Server](#).


Power BI Report Server product key

Power BI Premium

If you have purchased Power BI Premium, within the **Premium settings** tab of the Power BI admin portal, you will have access to your Power BI Report Server product key. This will only be available for Global Admins or users assigned the Power BI service administrator role.

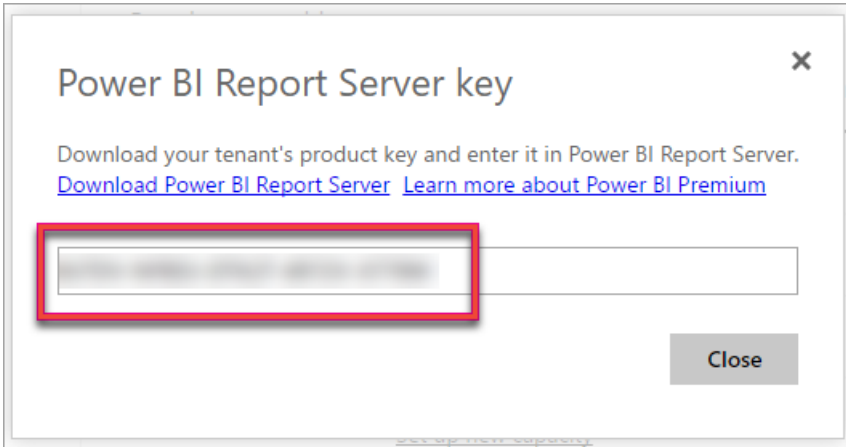


The screenshot shows the Power BI Premium admin portal interface. At the top, there are tabs for 'Power BI Premium' and 'Power BI Embedded'. Below the tabs, there is a section for 'V-CORES' showing a progress bar with '11 of 20 used' and '20 v-cores' total. A 'Power BI Report Server key' button is highlighted with a red box. Below this, there is a 'Set up new capacity' button and a link to 'Learn more about capacity sizes'. At the bottom, there is a table titled 'PREMIUM CAPACITIES' with columns for 'CAPACITY NAME', 'CAPACITY ADMINS', 'ACTIONS', 'SKU', 'V-CORES', and 'STATUS'. The table contains one row for 'Contoso Sales' with 'Michel AbdElmalik' as the admin, a gear icon for actions, 'P1' as the SKU, '8' v-cores, and 'Active' status.

CAPACITY NAME	CAPACITY ADMINS	ACTIONS	SKU	V-CORES	STATUS
Contoso Sales	Michel AbdElmalik		P1	8	Active

Selecting **Power BI Report Server key** will display a dialog contain your product key. You can copy it and use it

with the installation.



SQL Server Enterprise Software Assurance (SA)

If you have a SQL Server Enterprise SA agreement, you can get your product key from the [Volume Licensing Service Center](#).

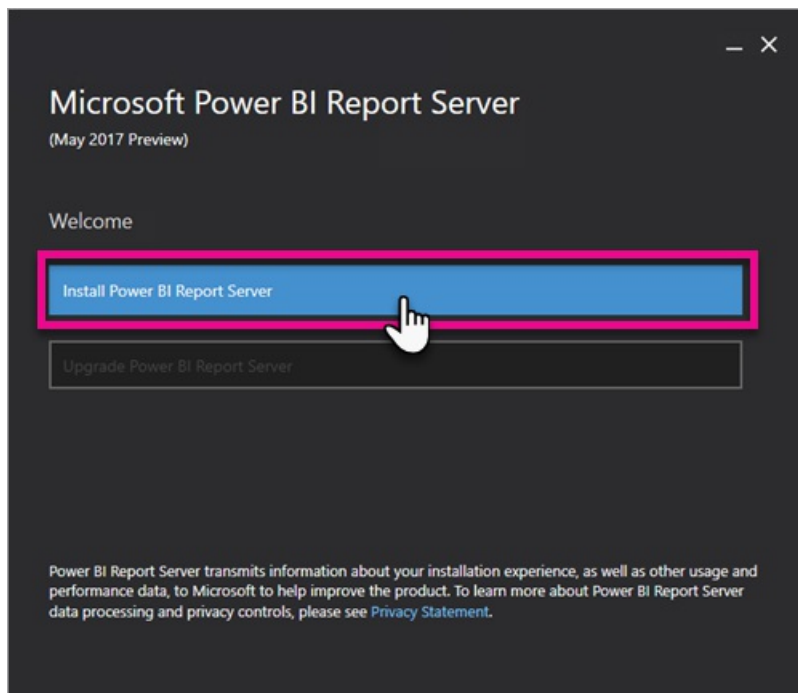
Install your report server

Installing Power BI Report Server is straight forward. There are only a few steps to install the files.

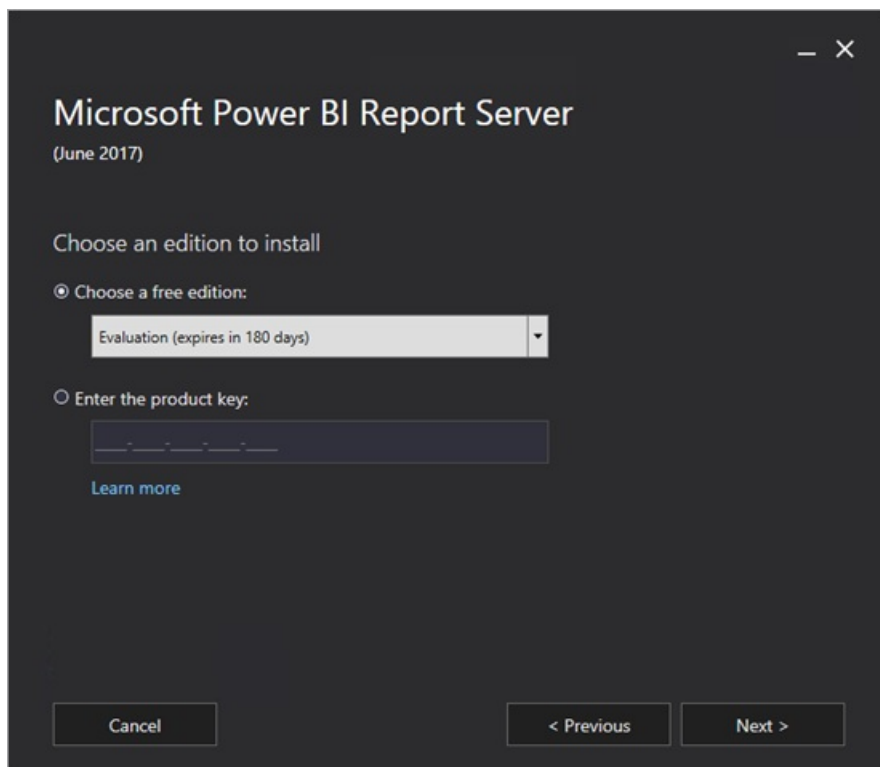
NOTE

You do not need a SQL Server Database Engine server available at the time of install. You will need one to configure Reporting Services after install.

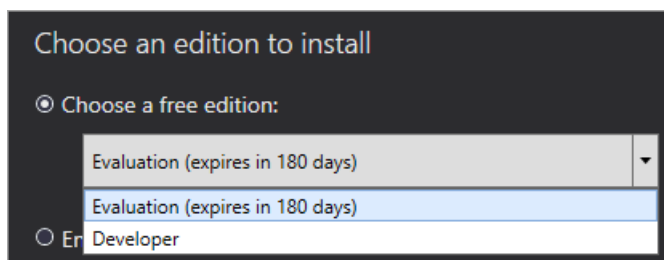
1. Find the location of PowerBIReportServer.exe and launch the installer.
2. Select **Install Power BI Report Server**.



3. Choose an edition to install and then select **Next**.



You can choose either Evaluation or Developer edition from the drop down.

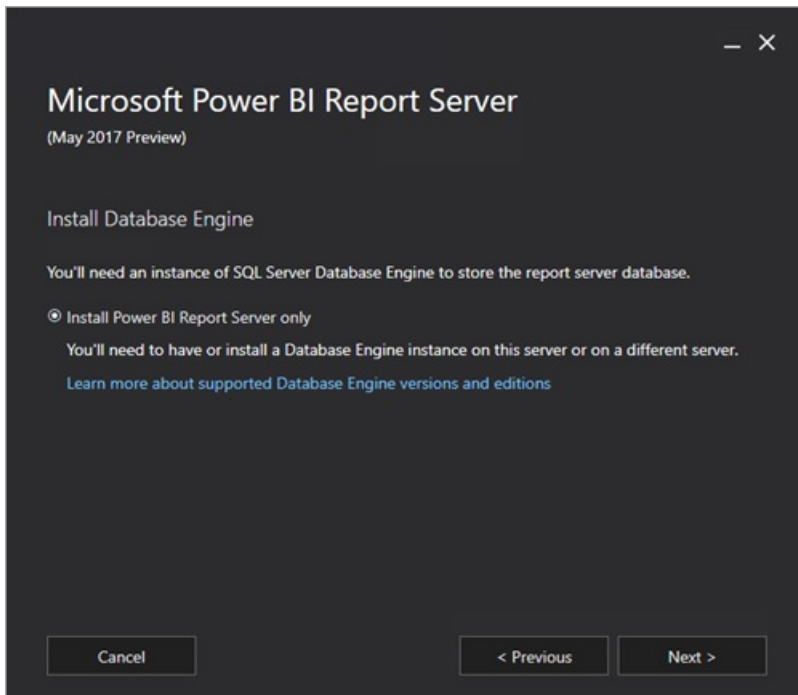


Otherwise, you can enter a product key for the server that you acquired from either the Power BI service or the Volume License Service Center. For more information about how to get your product key, see the [Before you begin](#) section.

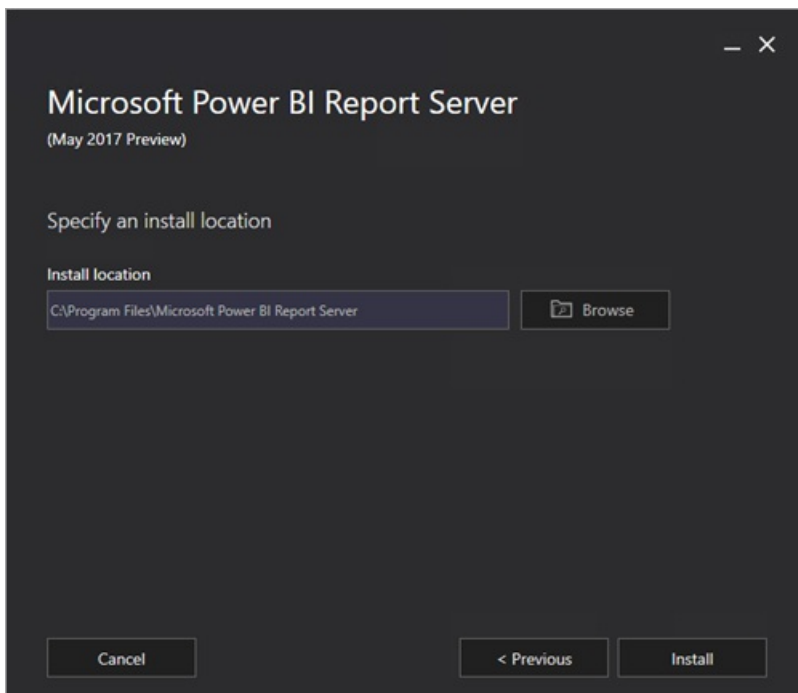
4. Read and agree to the license terms and conditions and then select **Next**.



5. You need to have a Database Engine available to store the report server database. Select **Next** to install the report server only.



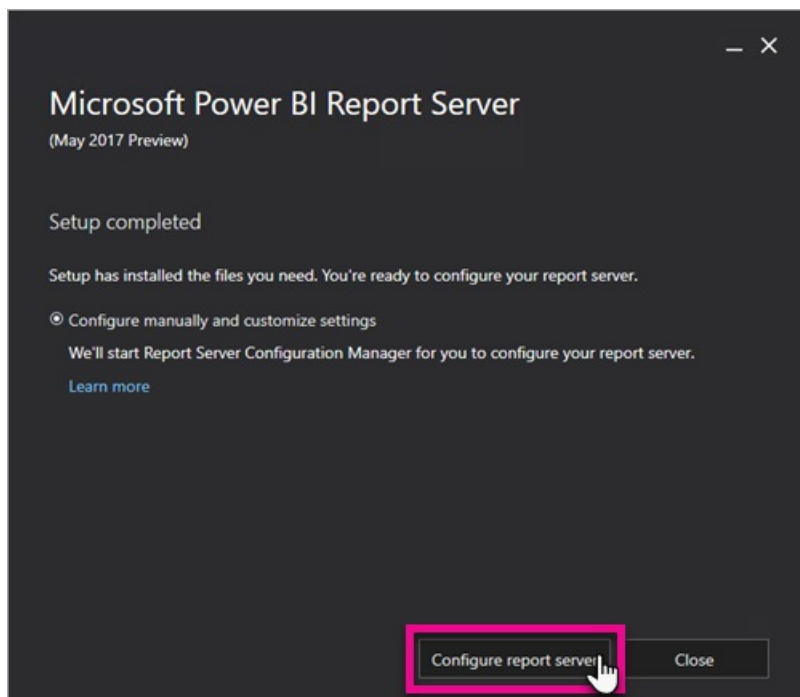
6. Specify the install location for the report server. Select **Install** to continue.



NOTE

The default path is C:\Program Files\Microsoft Power BI Report Server.

7. After a successful setup, select **Configure Report Server** to launch the Reporting Services Configuration Manager.



Configuration your report server

After you select **Configure Report Server** in the setup, you will be presented with Reporting Services Configuration Manager. For more information, see [Reporting Services Configuration Manager](#).

You need to [create a report server database](#) to complete the initial configuration of Reporting Services. A SQL Server Database server is required to complete this step.

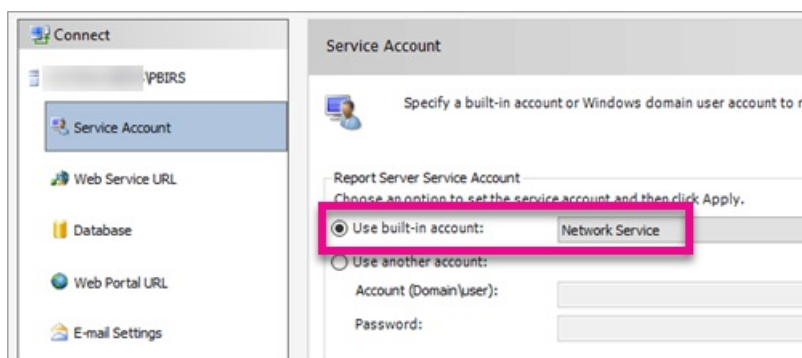
Creating a database on a different server

If you are creating the report server database on a database server on a different machine, you need to change the service account for the report server to a credential that is recognized on the database server.

By default, the report server uses the virtual service account. If you try to create a database on a different server, you may receive the following error on the Applying connection rights step.

```
System.Data.SqlClient.SqlException (0x80131904): Windows NT user or group '(null)' not found. Check the name again.
```

To work around the error, you can change the service account to either Network Service or a domain account. Changing the service account to Network Service applies rights in the context of the machine account for the report server.



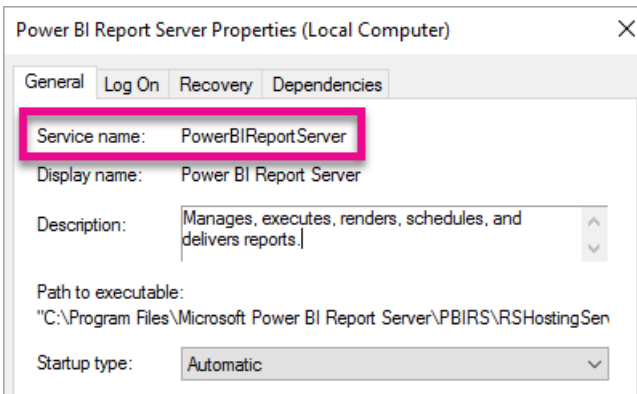
For more information, see [Configure the report server service account](#).

Windows Service

A windows service is created as part of the installation. It is displayed as **Power BI Report Server**. The service

name is **PowerBIReportServer**.

Portable Device Enumerator...	Enforces gr...		Manual (Trig...	Local System...
Power	Manages p...	Running	Automatic	Local System...
Power BI Report Server	Manages, e...	Running	Automatic	NT SERVIC...
Print Spooler	This service ...	Running	Automatic	Local System...
Printer Extensions and Notif...	This service ...		Manual	Local System...



Default URL reservations

URL reservations are composed of a prefix, host name, port, and virtual directory:

PART	DESCRIPTION
Prefix	The default prefix is HTTP. If you previously installed a Secure Sockets Layer (SSL) certificate, Setup tries to create URL reservations that use the HTTPS prefix.
Host name	The default host name is a strong wildcard (+). It specifies that the report server accepts any HTTP request on the designated port for any host name that resolves to the computer, including <code>http://<computername>/reportserver</code> , <code>http://localhost/reportserver</code> , or <code>http://<IPAddress>/reportserver</code> .
Port	The default port is 80. If you use any port other than port 80, you have to explicitly add it to the URL when you open web portal in a browser window.
Virtual directory	By default, virtual directories are created in the format of ReportServer for the Report Server Web service and Reports for the web portal. For the Report Server Web service, the default virtual directory is reportserver . For the web portal, the default virtual directory is reports .

An example of the complete URL string might be as follows:

- `http://+:80/reportserver`, provides access to the report server.
- `http://+:80/reports`, provides access to the web portal.

Firewall

If you are accessing the report server from a remote machine, you want to make sure you have configured any firewall rules if there is a firewall present.

You need to open up the TCP port that you have configured for your Web Service URL and Web Portal URL. By

default, these are configured on TCP port 80.

Additional configuration

- To configure integration with the Power BI service so you can pin report items to a Power BI dashboard, see [Integrate with the Power BI service](#).
- To configure email for subscriptions processing, see [E-Mail settings](#) and [E-Mail delivery in a report server](#).
- To configure the web portal so you can access it on a report computer to view and manage reports, see [Configure a firewall for report server access](#) and [Configure a report server for remote administration](#).

Next steps

[Administrator handbook](#)

[How to find your report server product key](#)

[Install Power BI Desktop optimized for Power BI Report Server](#)

[Verify a reporting services installation](#)

[Configure the report server service account](#)

[Configure report server URLs](#)

[Configure a report server database connection](#)

[Initialize a report server](#)

[Configure SSL connections on a report server](#)

[Configure windows service accounts and permissions](#)

[Browser support for Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Install Power BI Desktop optimized for Power BI Report Server

12/19/2017 • 3 min to read • [Edit Online](#)

Learn how to install Power BI Desktop optimized for Power BI Report Server.

To create Power BI reports for Power BI Report Server, you need to download and install Power BI Desktop optimized for Power BI Report Server. This release is different from the Power BI Desktop used with the Power BI service. For example, the version of Power BI Desktop for the Power BI service includes preview features that aren't available in the Power BI Report Server version until after they're released. Using this release makes sure that the report server can interact with a known version of the reports and model.

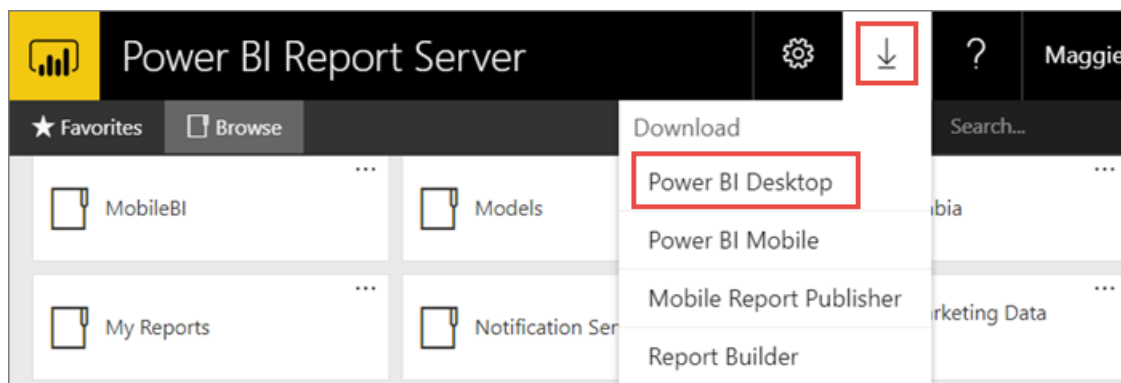
NOTE

You can install Power BI Desktop and Power BI Desktop optimized for Power BI Report Server side by side on the same computer.

Download and install Power BI Desktop

The easiest way to be sure you have the most up-to-date version of Power BI Desktop optimized for Power BI Report Server is to start from the web portal of your report server.

1. In the report server web portal, select the **Download** arrow > **Power BI Desktop**.



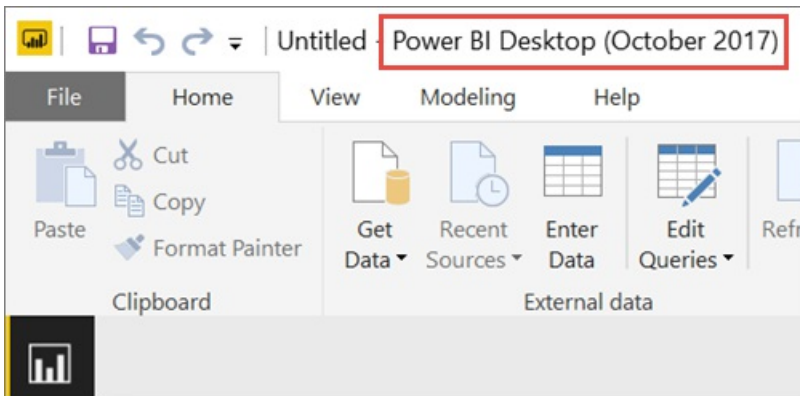
Or you can go directly to [Microsoft Power BI Desktop](#) (Optimized for Power BI Report Server - October 2017) in the Microsoft Download Center.

2. In the Download Center page, select **Download**.
3. Depending on your computer, select:
 - **PBIDesktopRS.msi** (the 32-bit version) or
 - **PBIDesktopRS_x64.msi** (the 64-bit version).
4. After you download the installer, run the Power BI Desktop (October 2017) Setup Wizard.
5. At the end of the installation, check **Start Power BI Desktop now**.

It starts automatically and you're ready to go.

Verify you are using the correct version

You can verify that you are using the correct Power BI Desktop by looking at the launch screen or title bar within Power BI Desktop. The title bar indicates the release month and year of the release.



The Power BI Desktop version for the Power BI service doesn't have the month and year in the title bar.

File extension association

If you installed both Power BI Desktop and Power BI Desktop optimized for Power BI Report Server on the same machine, the last install of Power BI Desktop will have the file association with .pbix. This means that when you double click on a pbix file, it will launch the Power BI Desktop that was last installed.

If you had Power BI Desktop and then installed Power BI Desktop optimized for Power BI Report Server, all pbix files will open in Power BI Desktop optimized for Power BI Report Server by default. If you would rather Power BI Desktop be the default to launch when opening a pbix file, reinstall Power BI Desktop from the Power BI service.

You can always open the version of Power BI Desktop you want to use first. And then open the file from within Power BI Desktop.

Editing a Power BI report from within Power BI Report Server, or creating a new Power BI report from the web portal, will always open the correct version of Power BI Desktop.

Considerations and limitations

Reports in Power BI Report Server and in the Power BI service (<http://powerbi.com>) act almost exactly the same, but a few features are different.

In a browser

Power BI Report Server reports support all visualizations, including:


- Custom visuals

Power BI Report Server reports don't support:

- R visuals
- ArcGIS maps
- Breadcrumbs
- Power BI Desktop preview features

In the Power BI mobile apps

Power BI Report Server reports support all the basic functionality in the [Power BI mobile apps](#), including:

- [Phone report layout](#): You can optimize a report for the Power BI mobile apps. On your mobile phone, optimized reports have a special icon, , and layout.



Power BI Report Server reports don't support these features in the Power BI mobile apps:

- R visuals
- ArcGIS maps
- Custom visuals
- Breadcrumbs
- Geofiltering or bar codes

Next steps

Now that you have Power BI Desktop installed, you can start creating Power BI reports.

[Quickstart: Create a Power BI report for Power BI Report Server](#)

[Get started with Power BI Desktop](#)

Guided learning: [Getting started with Power BI Desktop](#)

[User handbook overview, Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Upgrade Power BI Report Server

1/30/2018 • 2 min to read • [Edit Online](#)

Learn how to upgrade Power BI Report Server.

Download

To download Power BI Report Server, and Power BI Desktop optimized for Power BI Report Server, go to [On-premises reporting with Power BI Report Server](#).



For the current release notes, see [Power BI Report Server - Release notes](#).

Before you begin

Before you upgrade a report server, it is recommended that you perform the following steps to back up your report server.

Backing up the encryption keys

You should backup the encryption keys when you configure a report server installation for the first time. You should also backup the keys any time you change the identity of the service accounts or rename the computer. For more information, see [Back Up and Restore Reporting Services Encryption Keys](#).

Backing up the report server databases

Because a report server is a stateless server, all application data is stored in the **reportserver** and **reportservertempdb** databases that run on a SQL Server Database Engine instance. You can backup the **reportserver** and **reportservertempdb** databases using one of the supported methods for backing up SQL Server databases. Recommendations that are specific to the report server databases include the following:

- Use the full recovery model to backup the **reportserver** database.
- Use the simple recovery model to backup the **reportservertempdb** database.
- You can use different backup schedules for each database. The only reason to backup the **reportservertempdb** is to avoid having to recreate it if there is a hardware failure. In the event of hardware failure, it is not necessary to recover the data in **reportservertempdb**, but you do need the table structure. If you lose **reportservertempdb**, the only way to get it back is to recreate the report server database. If you recreate the **reportservertempdb**, it is important that it have the same name as the primary report server database.

For more information about backup and recovery of SQL Server relational databases, see [Back Up and Restore of SQL Server Databases](#).

Backing up the configuration files

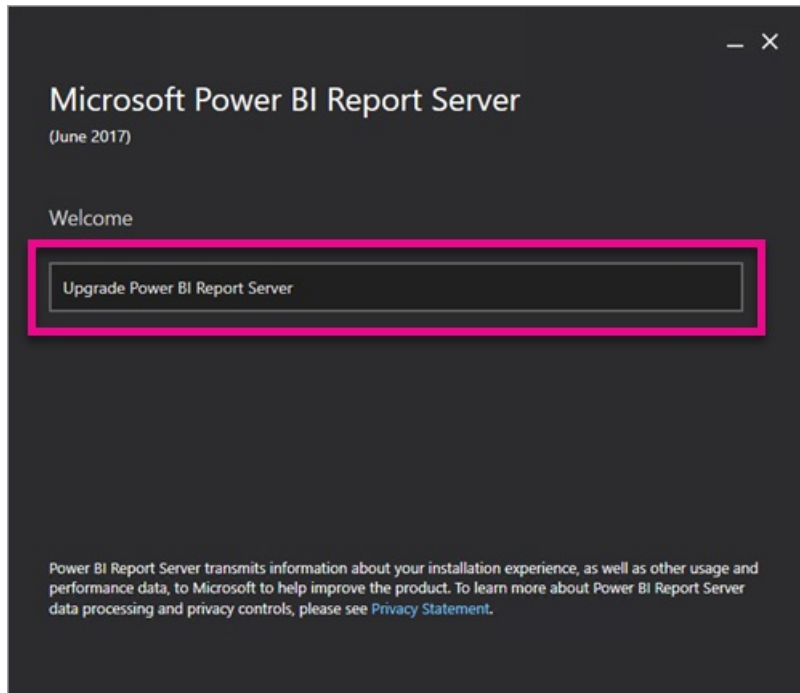
Power BI Report Server uses configuration files to store application settings. You should backup the files when you first configure the server and after you deploy any custom extensions. Files to back up include:

- config.json
- RSHostingService.exe.config
- Rsreportserver.config
- Rssvrpolicy.config
- Reportingserviceservice.exe.config
- Web.config for the Report Server ASP.NET applications
- Machine.config for ASP.NET

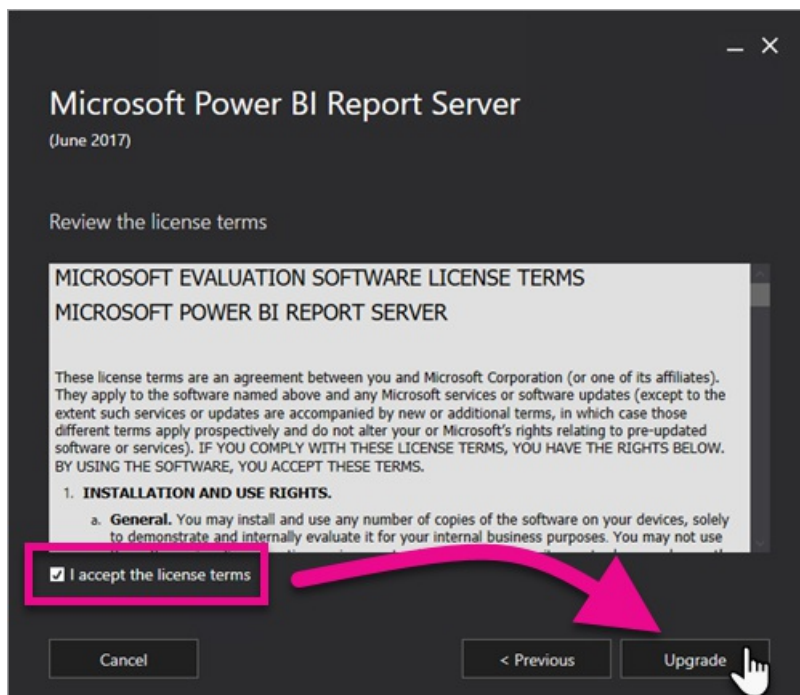
Upgrade the report server

Upgrading Power BI Report Server is straight forward. There are only a few steps to install the files.

1. Find the location of PowerBIReportServer.exe and launch the installer.
2. Select **Upgrade Power BI Report Server**.



3. Read and agree to the license terms and conditions and then select **Upgrade**.



4. After a successful upgrade, you can select **Configure Report Server** to launch the Reporting Services Configuration Manager, or select **Close** to exit the installer.



Upgrade Power BI Desktop

After the report server is upgrade, you will want to make sure that any Power BI report authors upgrade to the version of Power BI Desktop optimized for Power BI Report Server that matches the server.

Next steps

[Administrator handbook](#)

[Install Power BI Desktop optimized for Power BI Report Server](#)

[Verify a reporting services installation](#)

[Configure the report server service account](#)

[Configure report server URLs](#)

[Configure a report server database connection](#)

[Initialize a report server](#)

[Configure SSL connections on a report server](#)

[Configure windows service accounts and permissions](#)

[Browser support for Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Migrate a report server installation

1/30/2018 • 2 min to read • [Edit Online](#)

Learn how to migrate your existing SQL Server Reporting Services (SSRS) instance to an instance of Power BI Report Server.

Migration is defined as moving application data files to a new Power BI Report Server instance. The following are common reasons why you might migrate your installation:

- You are wanting to move from SQL Server Reporting Services to Power BI Report Server

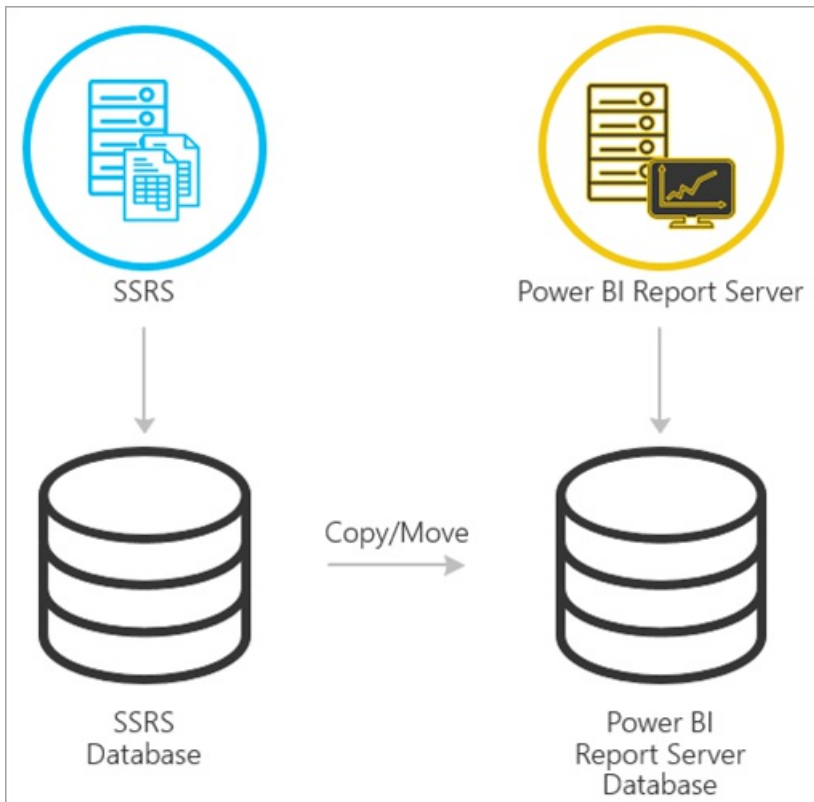
NOTE

There is not an in-place upgrade from SQL Server Reporting Services to Power BI Report Server. A migration is necessary.

- You have a large scale deployment or update requirements
- You are changing the hardware or topology of your installation
- You encounter an issue that blocks upgrade

Migrating to Power BI Report Server from SSRS (Native mode)

Migrating from an SSRS (Native mode) instance to Power BI Report Server consists of a few steps.



NOTE

SQL Server 2008 Reporting Services and later are supported for migration.

- Backup database, application and configuration files
- Back up the encryption key
- Clone your report server database hosting your reports
- Install Power BI Report Server. If you are using the same hardware, you can install Power BI Report Server on the same server as the SSRS instance. For more information on installing Power BI Report Server, see [Install Power BI Report Server](#).

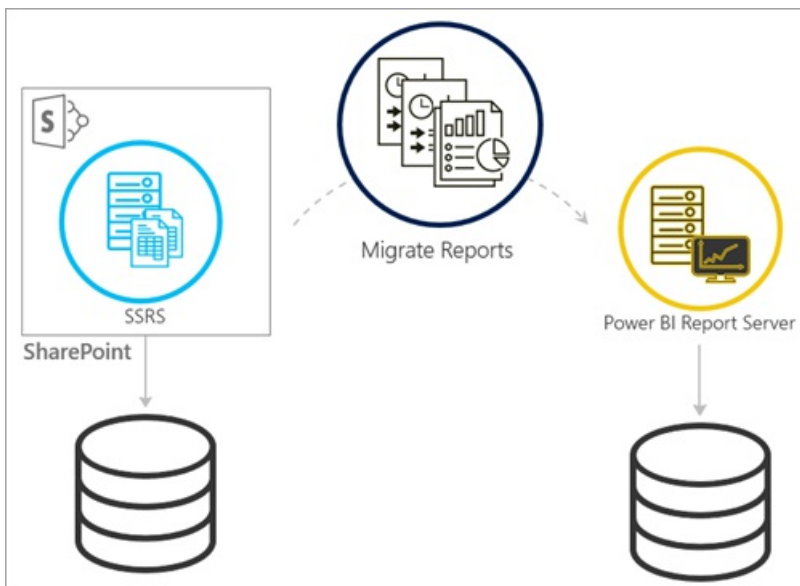
NOTE

The instance name for the Power BI Report Server will be *PBIRS*.

- Configure the report server using Report Server Configuration Manager and connect to the cloned database.
- Perform any cleanup needed for the SSRS (Native mode) instance

Migration to Power BI Report Server from SSRS (SharePoint-integrated mode)

Migrating from an SSRS (SharePoint-integrated mode) to Power BI Report Server is not as straight forward as native mode. While these steps will provide some guidance, you may have other files and assets within SharePoint that will need to be managed outside of these steps.



You will need to migrate the specific report server content from SharePoint to your Power BI Report Server. This assumes you have already installed Power BI Report Server somewhere in your environment. For more information on installing Power BI Report Server, see [Install Power BI Report Server](#).

If you want to copy the report server content from your SharePoint environment to Power BI Report Server, you will need to use tools such as **rs.exe** to copy the content. Below is a sample of what the script would be to copy report server content from SharePoint to Power BI Report Server.

NOTE

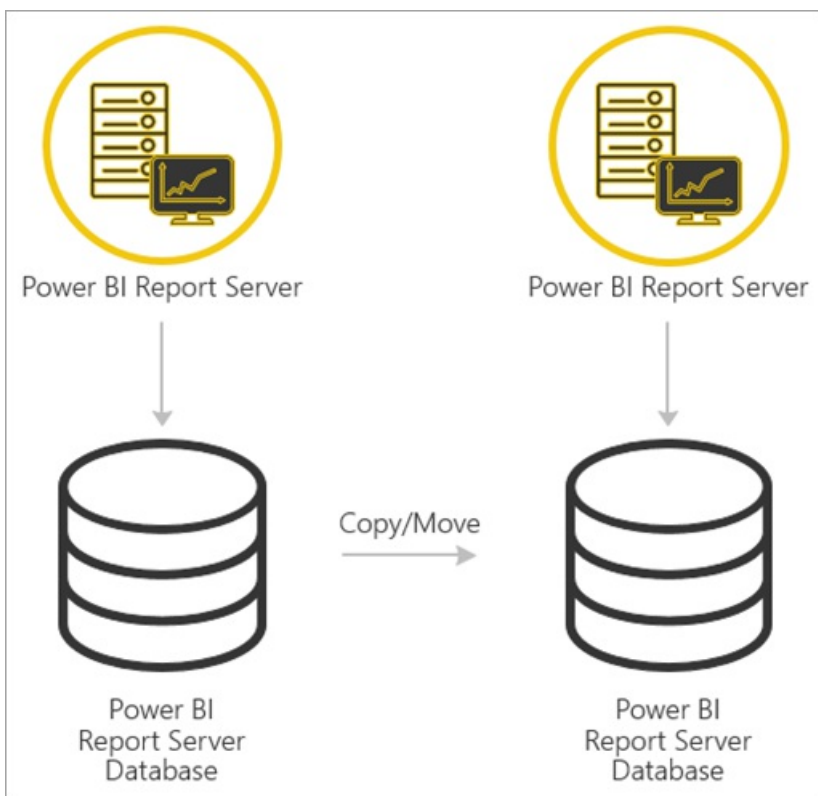
The sample script should work against SharePoint 2010 and later and SQL Server 2008 Reporting Services and later.

Sample script


```
Sample Script
rs.exe
-i ssrs_migration.rss -e Mgmt2010
-s http://SourceServer/_vti_bin/reportserver
-v st="sites/bi" -v f="Shared Documents"
-u Domain\User1 -p Password
-v ts=http://TargetServer/reportserver
-v tu="Domain\User" -v tp="Password"
```

Migrating from one Power BI Report Server to another

Migrating from one Power BI Report Server is the same process as migrating from SSRS (Native-mode).



- Backup database, application and configuration files
- Back up the encryption key
- Clone your report server database hosting your reports
- Install Power BI Report Server. You *cannot* install Power BI Report Server on the same server as the one you are migrating from. For more information on installing Power BI Report Server, see [Install Power BI Report Server](#).

NOTE

The instance name for the Power BI Report Server will be *PBIRS*.

- Configure the report server using Report Server Configuration Manager and connect to the cloned database.
- Perform any cleanup needed for the old Power BI Report Server installation.

Next steps

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Script with the rs.exe Utility and the Web Service](#)

More questions? [Try asking the Power BI Community](#)

Browser support for Power BI Report Server

1/30/2018 • 3 min to read • [Edit Online](#)

Learn about what browser versions are supported for managing and viewing Power BI Report Server and the Report Viewer Controls.

Browser requirements for the web portal

The following is the current list of browsers supported for the web portal.

Microsoft Windows

Windows 7, 8.1, 10; Windows Server 2008 R2, 2012, 2012 R2

- Microsoft Edge (+)
- Microsoft Internet Explorer 11
- Google Chrome (+)
- Mozilla Firefox (+)

Apple OS X

OS X 10.9-10.11

- Apple Safari (+)
- Google Chrome (+)
- Mozilla Firefox (+)

Apple iOS

iPhone and iPad with iOS 10

- Apple Safari (+)

Google Android

Phones and tablets with Android 4.4 (KitKat) or later

- Google Chrome (+)

(+) Latest publicly released version

Browser requirements for the Report Viewer web control (2015)

The following is the current list of browsers supported with the Report Viewer web control. The report viewer supports viewing reports from the web portal.

Microsoft Windows

Windows 7, 8.1, 10; Windows Server 2008 R2, 2012, 2012 R2

- Microsoft Edge (+)
- Microsoft Internet Explorer 11
- Google Chrome (+)
- Mozilla Firefox (+)

Apple OS X

OS X 10.9-10.11

- Apple Safari (+)

(+) Latest publicly released version

Authentication requirements

Browsers support specific authentication schemes that must be handled by the report server in order for the client request to succeed. The following table identifies the default authentication types supported by each browser running on a Windows operating system.

BROWSER TYPE	SUPPORTS	BROWSER DEFAULT	SERVER DEFAULT
Microsoft Edge (+)	Negotiate, Kerberos, NTLM, Basic	Negotiate	Yes. The default authentication settings work with Edge.
Microsoft Internet Explorer	Negotiate, Kerberos, NTLM, Basic	Negotiate	Yes. The default authentication settings work with Internet Explorer.
Google Chrome(+)	Negotiate, NTLM, Basic	Negotiate	Yes. The default authentication settings work with Chrome.
Mozilla Firefox(+)	NTLM, Basic	NTLM	Yes. The default authentication settings work with Firefox.
Apple Safari(+)	NTLM, Basic	Basic	Yes. The default authentication settings work with Safari.

(+) Latest publicly released version

Script requirements for viewing reports

To use the report viewer, configure your browser to run scripts.

If scripting is not enabled, you will see an error message similar to the following when you open a report:

Your browser does not support scripts or has been configured to not allow scripts to run. Click here to view this report without scripts

If you choose to view the report without script support, the report is rendered in HTML without report viewer capabilities such as the report toolbar and the document map.

NOTE

The report toolbar is part of the HTML Viewer component. By default the toolbar appears at the top of every report that is rendered in a browser window. The report viewer provides features include the ability to search the report for information, scroll to a specific page, and adjust the page size for viewing purposes. For more information about the report toolbar or HTML Viewer, see [HTML Viewer and the Report Toolbar](#).

Browser support for Report Viewer web server controls in Visual Studio

The Report Viewer Web server control is used to embed report functionality in an ASP.NET web application. For

more information on how to get the Report Viewer Control, see [Integrating Reporting Services Using Report Viewer Controls - Get Started](#).

Use a browser that has script support enabled. If the browser cannot run scripts, you cannot view the report.

Microsoft Windows

Windows 7, 8.1, 10; Windows Server 2008 R2, 2012, 2012 R2

- Microsoft Edge (+)
 - Microsoft Internet Explorer 11
 - Google Chrome (+)
 - Mozilla Firefox (+)
- (+) Latest publicly released version

Next steps

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

Configure Kerberos to use Power BI reports

1/30/2018 • 9 min to read • [Edit Online](#)

Learn how to configure your report server for Kerberos authentication to data sources used within your Power BI reports for a distributed environment.

Power BI Report Server includes the ability to host Power BI reports. Many data sources are supported by your report server. While this article focuses specifically on SQL Server Analysis Services, you can use the concepts and apply that to other data sources such as SQL Server.

You can install Power BI Report Server, SQL Server and Analysis Services on a single machine and everything should work without additional configuration. This is great for a test environment. You may hit errors if you have these services installed on separate machines which is called a distributed environment. In this environment, you are required to use Kerberos authentication. There is configuration required to implement this.

Specifically, you will need to configure constrained delegation. You may have Kerberos configured in your environment but it may not be configured for constrained delegation.

Error running report

If your report server is not configured properly, you may receive the following error.

```
Something went wrong.
```

```
We couldn't run the report because we couldn't connect to its data source. The report or data source might not be configured correctly.
```

Within Technical details, you will see the following message.

```
We couldn't connect to the Analysis Services server. The server forcibly closed the connection. To connect as the user viewing the report, your organization must have configured Kerberos constrained delegation.
```

Something went wrong.

We couldn't run the report because we couldn't connect to its data source. The report or data source might not be configured correctly.

Please try again later or contact support. If you contact support, please provide these details.

We couldn't connect to the Analysis Services server. The server forcibly closed the connection. To connect as the user viewing the report, your organization must have configured Kerberos constrained delegation.

Request ID 7d763c57-1cfd-c13a-ea6b-11533d0b5176

Time Wed Jan 11 2017 10:15:35 GMT-0600 (Central Standard Time)

Version 14.0.1.325

Configuring Kerberos constrained delegation

There are several items that need to be configured in order for Kerberos constrained delegation to work. This includes Service Principal Names (SPN) and delegation settings on service accounts.

NOTE

In order to configure SPNs and delegation settings, you need to be a domain administrator.

We will need to configure, or validate, the following.

1. Authentication type within Report Server config.
2. SPNs for the report server service account.
3. SPNs for the Analysis Services service.
4. SPNs for the SQL Browser service on the Analysis Services machine. This is for named instances only.
5. Delegation settings on the report server service account.

Authentication type within Report Server configuration

We need to configure the authentication type for the report server to allow for Kerberos constrained delegation. This is done within the **rsreportserver.config** file. The default location for this file is

```
C:\Program Files\Microsoft Power BI Report Server\PBIRS\ReportServer .
```

Within the rsreportserver.config file, you will want to fine the **Authentication/AuthenticationTypes** section.

We want to make sure that RSWindowsNegotiate is listed and the first in the list of authentication types. It should look similar to the following.

```
<AuthenticationTypes>
  <RSWindowsNegotiate/>
  <RSWindowsNTLM/>
</AuthenticationTypes>
```

If you had to change the configuration file, you will want to stop and start the report server to make sure the changes take effect.

For more information, see [Configure Windows Authentication on the Report Server](#).

SPNs for the report server service account

Next, we need to make sure that the report server has valid SPNs available. This is based on the service account

that is configured for the report server.

Virtual Service Account or Network Service

If your report server is configured for the Virtual Service Account or Network Service account, you should not have to do anything. These are in the context of the machine account. The machine account will have HOST SPNs by default. These will cover the HTTP service and will be used by the report server.

If you are using a virtual server name, one that is not same as the machine account, the HOST entries will not cover you and you will need to manually add the SPNs for the virtual server host name.

Domain user account

If your report server is configured to use a domain user account, you will have to manually create HTTP SPNs on that account. This can be done using the setspn tool that comes with Windows.

NOTE

You will need domain admin rights in order to create the SPN.

It is recommended to create two SPNs. One with the NetBIOS name and the other with the fully qualified domain name (FQDN). The SPN will be in the following format.

```
<Service>/<Host>:<port>
```

Power BI Report Server will use a Service of HTTP. For HTTP SPNs you will not list a port. The service we are interested in here is HTTP. The host of the SPN will be the name you use in a URL. Typically, this is the machine name. If you are behind a load balancer, this may be a virtual name.

NOTE

You can verify the URL by either looking at what you enter into the address bar of the browser, or you can look in the Report Server Configuration Manager on the Web Portal URL tab.

If your machine name is ContosoRS, your SPNs would be the following.

SPN TYPE	SPN
Fully Qualified Domain Name (FQDN)	HTTP/ContosoRS.contoso.com
NetBIOS	HTTP/ContosoRS

Location of SPN

So, where do you put the SPN? The SPN will be placed on whatever you are using for your service account. If you are using Virtual Service Account or Network Service, this will be the machine account. Although we mentioned before you should only need to do this for a virtual URL. If you are using a domain user for the report server service account, then you will place the SPN on that domain user account.

For example, if we are using the Network Service account and our machine name is ContosoRS, we would place the SPN on ContosoRS.

If we are using a domain user account of RSService, we would place the SPN on RSService.

Using SetSPN to add the SPN

We can use the SetSPN tool to add the SPN. We will follow the same example as above with the Machine account

and the domain user account.

Placing the SPN on a machine account, for both the FQDN and NetBIOS SPN, would look similar to the following if we were using a virtual URL of contosoports.

```
Setspn -a HTTP/contosoports.contoso.com ContosoRS
Setspn -a HTTP/contosoports ContosoRS
```

Placing the SPN on a domain user account, for both the FQDN and NetBIOS SPN, would look similar to the following if you were using the machine name for the host of the SPN.

```
Setspn -a HTTP/ContosoRS.contoso.com RService
Setspn -a HTTP/ContosoRS RService
```

SPNs for the Analysis Services service

The SPNs for Analysis Services are similar to what we did with Power BI Report Server. The format of the SPN is a little different if you have a named instance.

For Analysis Services, we use a Service of MSOLAPSvc.3. We will specify the instance name for the port location on the SPN. The host part of the SPN will either be the machine name, or the Cluster virtual name.

An example of an Analysis Services SPN would look like the following.

TYPE	FORMAT
Default instance	MSOLAPSvc.3/ContosoAS.contoso.com MSOLAPSvc.3/ContosoAS
Named instance	MSOLAPSvc.3/ContosoAS.contoso.com:INSTANCENAME MSOLAPSvc.3/ContosoAS:INSTANCENAME

Placement of the SPN is also similar to what was mentioned with Power BI Report Server. It is based on the service account. If you are using Local System or Network Service, you will be in the context of the machine account. If you are using a domain user account for the Analysis Services instance, you will place the SPN on the domain user account.

Using SetSPN to add the SPN

We can use the SetSPN tool to add the SPN. For this example, the machine name will be ContosoAS.

Placing the SPN on a machine account, for both the FQDN and NetBIOS SPN, would look similar to the following.

```
Setspn -a MSOLAPSvc.3/ContosoAS.contoso.com ContosoAS
Setspn -a MSOLAPSvc.3/ContosoAS ContosoAS
```

Placing the SPN on a domain user account, for both the FQDN and NetBIOS SPN, would look similar to the following.

```
Setspn -a MSOLAPSvc.3/ContosoAS.contoso.com OLAPService
Setspn -a MSOLAPSvc.3/ContosoAS OLAPService
```

SPNs for the SQL Browser service

If you have an Analysis Services named instance, you also need to make sure you have an SPN for the browser service. This is unique to Analysis Services.

The SPNs for SQL Browser are similar to what we did with Power BI Report Server.

For SQL Browser, we use a Service of MSOLAPDisco.3. We will specify the instance name for the port location on the SPN. The host part of the SPN will either be the machine name, or the Cluster virtual name. You do not have to specify anything for the instance name or port.

An example of an Analysis Services SPN would look like the following.

```
MSOLAPDisco.3/ContosoAS.contoso.com  
MSOLAPDisco.3/ContosoAS
```

Placement of the SPN is also similar to what was mentioned with Power BI Report Server. The difference here is that SQL Browser always runs under the Local System account. This means that the SPNs will always go on the machine account.

Using SetSPN to add the SPN

We can use the SetSPN tool to add the SPN. For this example, the machine name will be ContosoAS.

Placing the SPN on the machine account, for both the FQDN and NetBIOS SPN, would look similar to the following.

```
Setspn -a MSOLAPDisco.3/ContosoAS.contoso.com ContosoAS  
Setspn -a MSOLAPDisco.3/ContosoAS ContosoAS
```

For more information, see [An SPN for the SQL Server Browser service is required](#).

Delegation settings on the report server service account

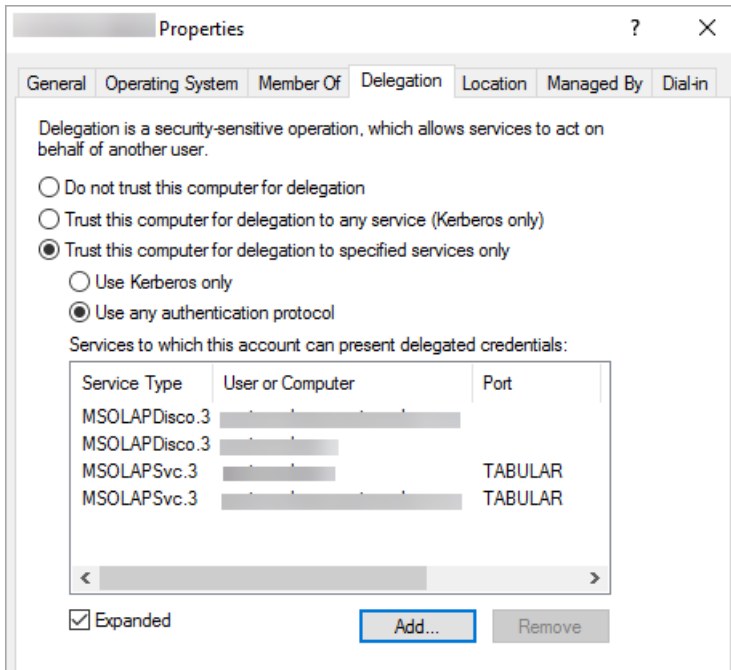
The last part that we have to configure are the delegation settings on the report server service account. There are different tools you can use to perform these steps. For the purposes of this document, we will stick with Active Directory Users and Computers.

You will need to start by going to the properties of the report server service account within Active Directory Users and Computers. This will either be the machine account, if you used Virtual Service Account or Network Service, or it will be a domain user account.

We will want to configure constrained delegation with protocol transiting. With constrained delegation, you need to be explicit with which services we want to delegate to. We will go and add both the Analysis Services service SPN and the SQL Browser SPN to the list that Power BI Report Server can delegate to.

1. Right click on the report server service account and select **Properties**.
2. Select the **Delegation** tab.
3. Select **Trust this computer for delegation to specified services only**.
4. Select **Use any authentication protocol**.
5. Under the **Services to which this account can present delegated credentials**: select **Add**.
6. In the new dialog, select **Users or Computers**.
7. Enter the service account for the Analysis Services service and select **Ok**.
8. Select the SPN that you created. It will begin with `MSOLAPSvc.3`. If you added both the FQDN and the NetBIOS SPN, it will select both. You may only see one.
9. Select **OK**. You should see the SPN in the list now.
10. Optionally, you can select **Expanded** to show both the FQDN and NetBIOS SPN in the list.
11. Select **Add** again. We will add the SQL Browser SPN now.

12. In the new dialog, select **Users or Computers**.
13. Enter the Machine name for the machine the SQL Browser service is on and select **Ok**.
14. Select the SPN that you created. It will begin with `MSOLAPDisco.3`. If you added both the FQDN and the NetBIOS SPN, it will select both. You may only see one.
15. Select **Ok**. The dialog should look similar to the following if you checked **Expanded**.



16. Select **Ok**.
17. Reboot the Power BI Report Server.

Running a Power BI Report

After all of the above configuration is in place, your report should display properly.



While this configuration should work in most cases, with Kerberos, there can be different configuration depending on your environment. If the report will still not load, you will want to reach out to your domain administrator to investigate further or contact support.

Next steps

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Capacity planning guidance for Power BI Report Server

1/6/2018 • 7 min to read • [Edit Online](#)

Power BI Report Server is a self-service BI and enterprise reporting solution that customers can deploy on their premises, behind their firewall. It combines the interactive report capability of Power BI Desktop with the on-premises server platform of SQL Server Reporting Services. With heavy and growing usage of analytics and reporting within enterprises, budgeting the hardware infrastructure and software licenses required to scale to an enterprise user base can be a challenge. This paper aims to offer guidance on capacity planning for Power BI Report Server by sharing results of numerous load test executions of various workloads against a report server. While organizations' reports, queries, and usage patterns vary widely, the results presented in this paper, along with the actual tests used and a detailed description of how they were executed, serve as a reference point for anyone in the early-stage planning process of deploying Power BI Report Server.

Executive summary

We executed two different types of workloads against Power BI Report Server; each workload consisted of rendering different types of reports as well as performing various web portal operations.

- In "Power BI Report Heavy" workload, the most frequently executed operation (i.e. the operation executed 60% of the time) was rendering Power BI reports.
- In "Paginated Report Heavy" workload, the most frequently executed operation was rendering paginated reports.

Under a four-server topology of Power BI Report Server and the expectation that no more than 5% of users will access a report server at any one time, the following table describes the maximum number of users Power BI Report Server can handle with at least 99% reliability.

WORKLOAD	8 CORE/32 GB RAM	16 CORE/64 GB RAM
Power BI Report Heavy (>60%)	1,000 users	3,000 users
Paginated (RDL) Report Heavy (>60%)	2,000 users	3,200 users

In each run, the most overwhelmed resource was CPU. Due to this, increasing the number of cores to Power BI Report Server would yield a higher gain in the reliability of the system than increasing the amount of memory or hard-disk space.

Test methodology

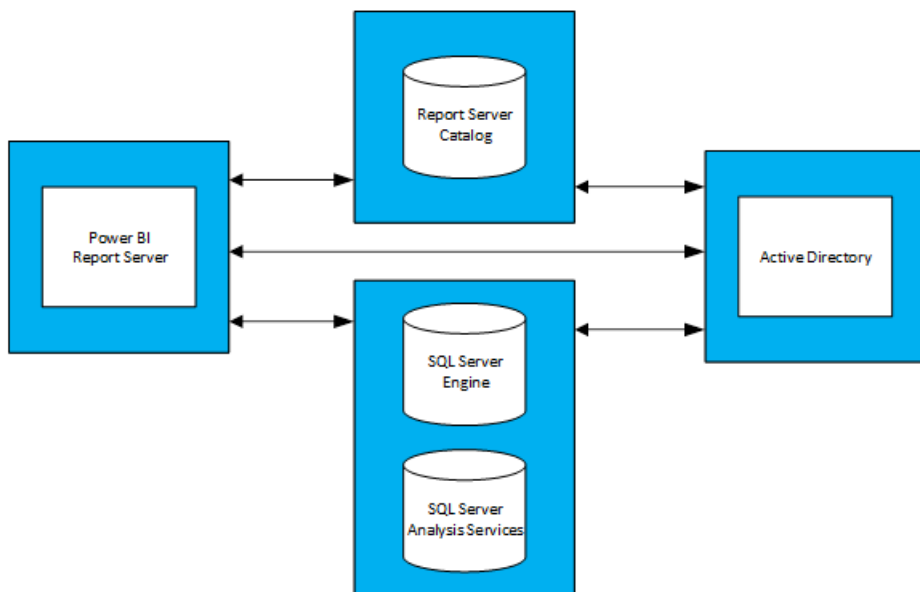
The testing topology used was based on Microsoft Azure Virtual Machines instead of vendor-specific physical hardware. All machines were hosted in US regions. This reflects the general trend of hardware virtualization both on premises and in the public cloud.

Power BI Report Server topology

The Power BI Report Server deployment consisted of the following virtual machines:

- Active Directory Domain Controller: this was needed by SQL Server Database Engine, SQL Server Analysis Services, and Power BI Report Server to securely authenticate all requests.

- SQL Server Database Engine and SQL Server Analysis Services: this was where we stored all the databases for the reports to consume when we rendered them.
- Power BI Report Server
- Power BI Report Server Database. The report server database is hosted on a different machine than Power BI Report Server so that it does not need to compete with SQL Server Database Engine for memory, CPU, network, and disk resources.



See Appendix 1.1 Power BI Report Server Topology and Appendix 1.2 Power BI Report Server Virtual Machine Configuration for a thorough configuration of each virtual machine used in the topology.

Tests

The tests used in the load test runs are publicly available in a GitHub project called Reporting Services LoadTest (See <https://github.com/Microsoft/Reporting-Services-LoadTest>). This tool allows users to study the performance, reliability, scalability and recoverability characteristics of SQL Server Reporting Services and Power BI Report Server. This project consists of four groups of test cases:

- Tests simulating rendering Power BI reports,
- Tests simulating rendering mobile reports,
- Tests simulating rendering small and large paginated reports, and
- Tests simulating performing various types of web portal operations.

All tests were written to perform an end-to-end operation (such as rendering a report, creating a new data source, etc.). They accomplish this by making one or more web requests to the report server (via APIs). In the real world, a user may need to perform a few intermediate operations to complete one of these end-to-end operations. For example, to render a report a user will need to go to the web portal, navigate to the folder where the report is, then click the report to render it. While tests don't perform all the operations needed to accomplish an end-to-end task, they still impose most of the load that Power BI Report Server would experience. You can learn more about the different types of reports used as well as the variety of operations performed by exploring the GitHub project.

Workloads

There are 2 workload profiles used in testing: Power BI Report Heavy and Paginated Report Heavy. The table below describes the distribution of requests executed against the Report Server.

ACTIVITY	POWER BI REPORT HEAVY, FREQUENCY OF OCCURRENCE	PAGINATED REPORT HEAVY, FREQUENCY OF OCCURRENCE
Rendering Power BI reports	60%	10%

ACTIVITY	POWER BI REPORT HEAVY, FREQUENCY OF OCCURRENCE	PAGINATED REPORT HEAVY, FREQUENCY OF OCCURRENCE
Rendering paginated (RDL) reports	30%	60%
Rendering mobile reports	5%	20%
Web portal operations	5%	10%

User load

For each test run, tests were executed based on the frequency specified in one of the two workloads. Tests started with 20 concurrent user requests to the report server. The user load was then gradually increased until reliability dropped below the 99% target.

Results

Concurrent user capacity

As stated earlier, tests started with 20 concurrent users making requests to the report server. The number of concurrent users was then gradually increased until 1% of all requests were failing. The results in the following table tell us the number of concurrent user requests that the server would be able to handle under peak load with a failure rate of less than 1%.

WORKLOAD	8 CORE/32 GB	16 CORE/64 GB
Power BI Report Heavy	50 concurrent users	150 concurrent users
Paginated Report Heavy	100 concurrent users	160 concurrent users

Total user capacity

At Microsoft, we have a production deployment of Power BI Report Server that several teams used. When we analyze actual usage of this environment, we observe that the number of concurrent users at any given time (even during daily peak load) doesn't tend to exceed 5% of the total user base. Using this 5% concurrency ratio as a benchmark, we extrapolated the total user base Power BI Report Server could handle with 99% reliability.

WORKLOAD	8 CORE/32 GB	16 CORE/64 GB
Power BI Report Heavy	1,000 users	3,000 users
Paginated Report Heavy	2,000 users	3,200 users

View results

Select a report to view the results of the load test.

WORKLOAD	8 CORE/32 GB	16 CORE/64 GB
Power BI Report Heavy	View - 8 core	View - 16 core
Paginated Report Heavy	View - 8 core	View - 16 core

Summary

For each load test run, CPU was the most overwhelmed resource at the point of peak load on the Power BI Report Server machine. Due to this, the first resource that should be increased is the number of cores. Alternately, you can consider scaling out by adding more servers hosting Power BI Report Server in your topology.

The results presented in this paper were derived from executing a specific set of reports consuming a specific set of data, repeated in a specific way. It's a useful reference point, but keep in mind that your usage will depend on your reports, queries, usage patterns and deployment of your Power BI Report Server.

Appendix

1 Topology

1.1 Power BI Report Server Topology

To focus solely on Power BI Report Server behavior under different configurations, the VM configuration for each type of machine (except for the machine hosting Power BI Report Server) was fixed. Each machine was provisioned according to the second-generation (v2) D Series machines with Premium Storage Disks. You can find detailed information about each VM size under the "General Purpose" section on <https://azure.microsoft.com/en-us/pricing/details/virtual-machines/windows/>.

VIRTUAL MACHINE TYPE	PROCESSOR	MEMORY	AZURE VM SIZE
Active Directory Domain Controller	2 Cores	7 GB	Standard_DS2_v2
SQL Server Database Engine and Analysis Services	16 Cores	56 GB	Standard_DS5_v2
Report Server Database	16 Cores	56 GB	Standard_DS5_v2

1.2 Power BI Report Server Virtual Machine Configuration

Different configurations of processor and memory were used for the Virtual Machine hosting Power BI Report Server. Unlike the other VMs, this machine was provisioned according to the third-generation (v3) D Series Machines with Premium Storage Disks. You can find detailed information about this VM size under the "General Purpose" section on <https://azure.microsoft.com/en-us/pricing/details/virtual-machines/windows/>.

VIRTUAL MACHINE	PROCESSOR	MEMORY	AZURE VM SIZE
Power BI Report Server (Small)	8 Cores	32 GB	Standard_D8S_v3
Power BI Report Server (Large)	16 Cores	64 GB	vStandard_D16S_v3

2 Run the LoadTest tool

If you'd like to run the Reporting Services LoadTest tool against your or a Microsoft Azure deployment of Power BI Report Server, follow these steps.

1. Clone the Reporting Services LoadTest project from GitHub (<https://github.com/Microsoft/Reporting-Services-LoadTest>).
2. In the project directory, you will find a solution file called RSLoadTests.sln. Open this file in Visual Studio 2015 or later.
3. Determine whether you want to run this tool against your deployment of Power BI Report Server or against a deployment of Power BI Report Server in Microsoft Azure. If you are going to run it against your own deployment, go to step 5.
4. Follow the instructions listed on <https://github.com/Microsoft/Reporting-Services-LoadTest#create-a-sql-server-reporting-services-load-environment-in-azure> to create a Power BI Report Server environment in Azure.
5. Once you finish deploying the environment, follow the instructions listed on <https://github.com/Microsoft/Reporting-Services-LoadTest#load-test-execution> to run the tests.

More questions? [Try asking the Power BI Community](#)

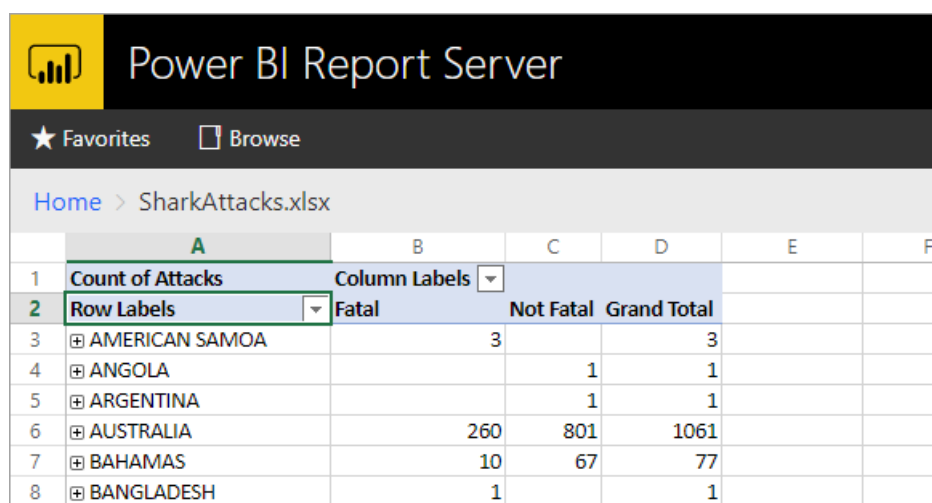
Configure your report server to host Excel workbooks using Office Online Server (OOS)

1/30/2018 • 5 min to read • [Edit Online](#)

In addition to viewing Power BI reports in the web portal, business users can now do the same with Excel workbooks in Power BI Report Server, giving them a single location to publish and view their self-service Microsoft BI content.

NOTE

This is a preview feature included in the August 2017 preview release. For more information, see [What's new in Power BI Report Server](#).



The screenshot shows the Power BI Report Server interface. At the top, there is a navigation bar with 'Favorites' and 'Browse' options. Below that, the breadcrumb 'Home > SharkAttacks.xlsx' is visible. The main content area displays an Excel spreadsheet with a pivot table. The pivot table has 'Count of Attacks' as the column label and 'Row Labels' as the row label. The data is summarized by country, with columns for 'Fatal', 'Not Fatal', and 'Grand Total'.

	A	B	C	D	E	F
1	Count of Attacks	Column Labels				
2	Row Labels	Fatal	Not Fatal	Grand Total		
3	AMERICAN SAMOA	3		3		
4	ANGOLA		1	1		
5	ARGENTINA		1	1		
6	AUSTRALIA	260	801	1061		
7	BAHAMAS	10	67	77		
8	BANGLADESH	1		1		

This is accomplished by making use of [Office Online Server](#) (OOS).

Prepare server to run Office Online Server

Perform these procedures on the server that will run Office Online Server. This server must be Windows Server 2012 R2 or Windows Server 2016. Windows Server 2016 requires Office Online Server April 2017 or later.

Install prerequisite software for Office Online Server

1. Open the Windows PowerShell prompt as an administrator and run this command to install the required roles and services.

Windows Server 2012 R2:

```
Add-WindowsFeature Web-Server,Web-Mgmt-Tools,Web-Mgmt-Console,Web-WebServer,Web-Common-Http,Web-Default-Doc,Web-Static-Content,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Security,Web-Filtering,Web-Windows-Auth,Web-App-Dev,Web-Net-Ext45,Web-Asp-Net45,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-Includes,InkandHandwritingServices,NET-Framework-Features,NET-Framework-Core,NET-HTTP-Activation,NET-Non-HTTP-Activ,NET-WCF-HTTP-Activation45,Windows-Identity-Foundation,Server-Media-Foundation
```

Windows Server 2016:

```
Add-WindowsFeature Web-Server,Web-Mgmt-Tools,Web-Mgmt-Console,Web-WebServer,Web-Common-Http,Web-Default-
Doc,Web-Static-Content,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Security,Web-
Filtering,Web-Windows-Auth,Web-App-Dev,Web-Net-Ext45,Web-Asp-Net45,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-
Includes,NET-Framework-Features,NET-Framework-45-Features,NET-Framework-Core,NET-Framework-45-Core,NET-
HTTP-Activation,NET-Non-HTTP-Activ,NET-WCF-HTTP-Activation45,Windows-Identity-Foundation,Server-Media-
Foundation
```

If prompted, restart the server.

2. Install the following software:

- [.NET Framework 4.5.2](#)
- [Visual C++ Redistributable Packages for Visual Studio 2013](#)
- [Visual C++ Redistributable for Visual Studio 2015](#)
- [Microsoft.IdentityModel.Extention.dll](#)

Install Office Online Server

If you plan to use any Excel Online features that utilize external data access (such as Power Pivot), note that Office Online Server must reside in the same Active Directory forest as its users as well as any external data sources that you plan to access using Windows-based authentication.

1. Download Office Online Server from the [Volume Licensing Service Center \(VLSC\)](#). The download is located under those Office products on the VLSC portal. For development purposes, you can download OOS from MSDN subscriber downloads.
2. Run Setup.exe.
3. On the **Read the Microsoft Software License Terms** page, select **I accept the terms of this agreement** and select **Continue**.
4. On the **Choose a file location** page, select the folder where you want the Office Online Server files to be installed (for example, `C:\Program Files\Microsoft Office Web Apps`) and select **Install Now**. If the folder you specified doesn't exist, Setup creates it for you.

We recommend that you install Office Online Server on the system drive.

5. When Setup finishes installing Office Online Server, select **Close**.

Install language packs for Office Web Apps Server (optional)

Office Online Server Language Packs let users view web-based Office files in multiple languages.

To install the language packs, follow these steps.

1. Download the Office Online Server Language Packs from the [Microsoft Download Center](#).
2. Run **wacserverlanguagepack.exe**.
3. In the Office Online Server Language Pack Wizard, on the **Read the Microsoft Software License Terms** page, select **I accept the terms of this agreement** and select **Continue**.
4. When Setup finishes installing Office Online Server, select **Close**.

Deploy Office Online Server

Create the Office Online Server farm (HTTPS)

Use the `New-OfficeWebAppsFarm` command to create a new Office Online Server farm that consists of a single server, as shown in the following example.

```
New-OfficeWebAppsFarm -InternalUrl "https://server.contoso.com" -ExternalUrl "https://wacweb01.contoso.com" -
CertificateName "OfficeWebApps Certificate"
```

Parameters

- **-InternalURL** is the fully qualified domain name (FQDN) of the server that runs Office Online Server, such as <http://servername.contoso.com>.
- **-ExternalURL** is the FQDN that can be accessed on the Internet.
- **-CertificateName** is the friendly name of the certificate.

Create the Office Online Server farm (HTTP)

Use the `New-OfficeWebAppsFarm` command to create a new Office Online Server farm that consists of a single server, as shown in the following example.

```
New-OfficeWebAppsFarm -InternalURL "http://servername" -AllowHttp
```

Parameters

- **-InternalURL** is the name of the server that runs Office Online Server, such as <http://servername>.
- **-AllowHttp** configures the farm to use HTTP.

Verify that the Office Online Server farm was created successfully

After the farm is created, details about the farm are displayed in the Windows PowerShell prompt. To verify that Office Online Server is installed and configured correctly, use a web browser to access the Office Online Server discovery URL, as shown in the following example. The discovery URL is the `InternalUrl` parameter you specified when you configured your Office Online Server farm, followed by `/hosting/discovery`, for example:

```
<InternalUrl>/hosting/discovery
```

If Office Online Server works as expected, you should see a Web Application Open Platform Interface Protocol (WOPI)-discovery XML file in your web browser. The first few lines of that file should resemble the following example:

```
<?xml version="1.0" encoding="utf-8" ?>
- <wopi-discovery>
- <net-zone name="internal-http">
- <app name="Excel" favIconUrl="<InternalUrl>/x/_layouts/images/FavIcon_Excel.ico" checkLicense="true">
<action name="view" ext="ods" default="true" urlsrc="<InternalUrl>/x/_layouts/xlviewerinternal.aspx?
<ui=UI_LLCC&><rs=DC_LLCC&>" />
<action name="view" ext="xls" default="true" urlsrc="<InternalUrl>/x/_layouts/xlviewerinternal.aspx?
<ui=UI_LLCC&><rs=DC_LLCC&>" />
<action name="view" ext="xlsb" default="true" urlsrc="<InternalUrl>/x/_layouts/xlviewerinternal.aspx?
<ui=UI_LLCC&><rs=DC_LLCC&>" />
<action name="view" ext="xlsm" default="true" urlsrc="<InternalUrl>/x/_layouts/xlviewerinternal.aspx?
<ui=UI_LLCC&><rs=DC_LLCC&>" />
```

Configure Excel workbook maximum size

The maximum file size for all files in Power BI Report Server is 100 MB. To stay in sync with that, you need to manually set this in OOS.

```
Set-OfficeWebAppsFarm -ExcelWorkbookSizeMax 100
```

Using EffectiveUserName with Analysis Services

To allow for live connections to Analysis Services, for connections within an Excel workbook that make use of `EffectiveUserName`. For OOS to make use of `EffectiveUserName`, you will need to add the machine account of the

OOS server as an administrator for the Analysis Services instance. Management Studio for SQL Server 2016 or later is needed to do this.

Only embedded Analysis Services connections are currently supported within an Excel workbook. The user's account will need to have permission to connect to Analysis Services as the ability to proxy the user is not available.

Run the following PowerShell commands on the OOS Server.

```
Set-OfficeWebAppsFarm -ExcelUseEffectiveUserName:$true
Set-OfficeWebAppsFarm -ExcelAllowExternalData:$true
Set-OfficeWebAppsFarm -ExcelWarnOnDataRefresh:$false
```

Configure a Power Pivot instance for data models

Installing an Analysis Services Power Pivot mode instance lets you work with Excel workbooks that are using Power Pivot. Make sure that the instance name is *POWERPIVOT*. Add the machine account of the OOS server as an administrator, for the Analysis Services Power Pivot mode instance. Management Studio for SQL Server 2016 or later is needed to do this.

For OOS to use the Power Pivot mode instance, run the following command.

```
New-OfficeWebAppsExcelBIServer -ServerId <server_name>\POWERPIVOT
```

If you did not already allow external data, from the Analysis Services step above, run the following command.

```
Set-OfficeWebAppsFarm -ExcelAllowExternalData:$true
```

Firewall considerations

To avoid firewall issues, you may need to open the ports 2382 and 2383. You can also add the *msmdsrv.exe*, for the Power Pivot instance, as an application firewall wall policy.

Configure Power BI Report Server to use the OOS Server

On the **General** page of **Site settings**, enter the OOS discovery url. The OOS discovery url is the *InternalUrl*, used when deploying the OOS server, followed by */hosting/discovery*. For example,

`http://servername/hosting/discovery`, for HTTP. And, `https://server.contoso.com/hosting/discovery` for HTTPS.

To get to **Site settings**, select the **gear icon** in the upper right and select **Site settings**.

Only a user with the **System Administrator** role will see the Office Onlien Server discovery url setting.

Site settings

General
Branding
Schedules
Security

Properties

Name
RoseReports (product issues or suggestions: rsteam@microsoft.com)

Advanced

Report timeout (default):
 Allow the report to run for 1800 seconds before timing out
 Allow the report to run indefinitely (no timeout)

History snapshot retention (default):
 Retain the 10 most recent history snapshots
 Retain all history snapshots

Office Online Server Discovery Endpoint URL [Learn more](#)
Please enter a valid URL
Example: http://server/hosting/discovery or https://server/hosting/discovery

Apply

After you enter the discovery url, and select **Apply**, selecting an Excel workbook, within the web portal, should display the workbook within the web portal.

Limitations and considerations

- The ability to view Excel workbooks within Power BI Report Server is currently in preview.
- You will have read only capability with workbooks.

Next steps

[Administrator handbook](#)

[Quickstart: Install Power BI Report Server](#)

[Install Report Builder](#)

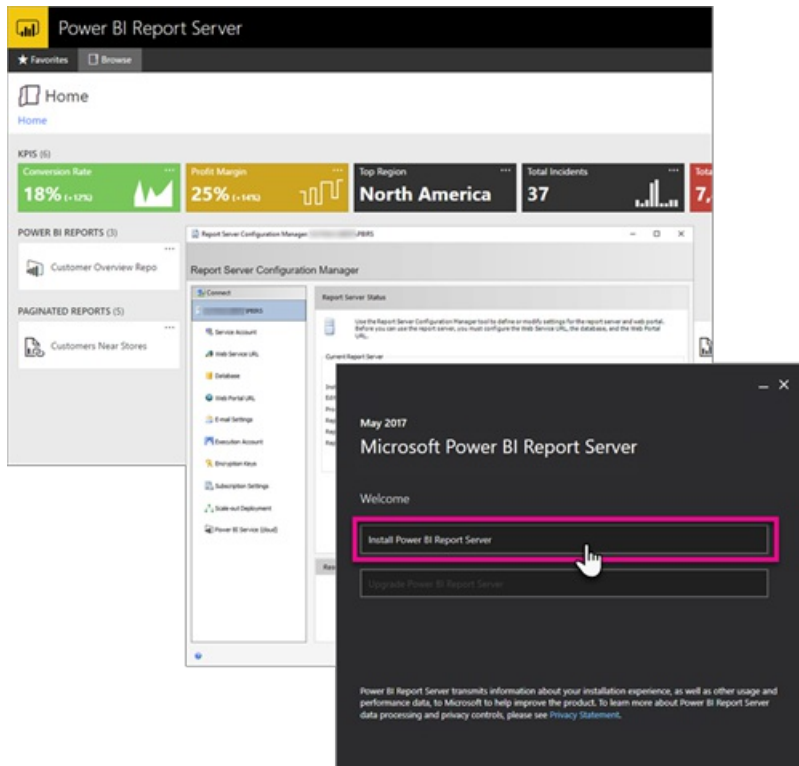
[Download SQL Server Data Tools \(SSDT\)](#)

More questions? [Try asking the Power BI Community](#)

Developer handbook overview, Power BI Report Server

1/30/2018 • 1 min to read • [Edit Online](#)

Welcome to the developer handbook for Power BI Report Server, an on-premises location for storing and managing your Power BI, mobile, and paginated reports.



This handbook will highlight options you have, as a developer, to work with Power BI Report Server.

Embedding

For any report within Power BI Report Server, you can embed within an iFrame by adding the querystring parameter `?rs:Embed=true` to the URL. This works with Power BI reports as well as other report types.

Report Viewer Control

For paginated reports, you can take advantage of the Report Viewer Control. This allows you to place the control within a .NET windows or web application. For more information, see [Get started with the Report Viewer Control](#).

APIs

You have several API options for interacting with Power BI Report Server. This includes the following.

- [REST APIs](#)
- [URL Access](#)
- [WMI Provider](#)

You can also use the open source [PowerShell utilities](#) to manage your report server.

NOTE

The PowerShell utilities do not currently support Power BI Desktop files (.pbix).

Custom extensions

The Extension Library is a set of classes, interfaces, and value types that are included in Power BI Report Server. This library provides access to system functionality and is designed to be the foundation on which Microsoft .NET Framework applications can be used to extend Power BI Report Server components.

There are several types of extensions you can build.

- Data processing extensions
- Delivery extensions
- Rendering extensions for paginated reports
- Security extensions

To learn more, see [Extension library](#).

Next steps

[Get started with the Report Viewer Control](#)

[Building Applications Using the Web Service and the .NET Framework](#)

[URL Access](#)

[Extension library](#)

[WMI Provider](#)

More questions? [Try asking the Power BI Community](#)

Quickstart: Embed a Power BI report using an iFrame and URL parameters

1/30/2018 • 2 min to read • [Edit Online](#)

You can embed any report by using an iFrame in your application.

URL parameter

For any URL to a report, you can add a querystring parameter of `?rs:Embed=true`.

For example:

```
http://myserver/reports/powerbi/Sales?rs:embed=true
```

This will work on all report types within Power BI Report Server.

iFrame

Once you have your URL, you can create an iFrame within a web page, to host the report.

For example:

```
<iframe width="800" height="600" src="http://myserver/reports/powerbi/Sales?rs:embed=true" frameborder="0" allowFullScreen="true"></iframe>
```

URL filter

You can add a query string parameter to the URL to filter the data that's returned in the Power BI report.

The syntax is straightforward; start with the report URL, add a question mark, then this filter syntax.

URL?filter=**Table/Field** eq '**value**'

Keep these considerations in mind:

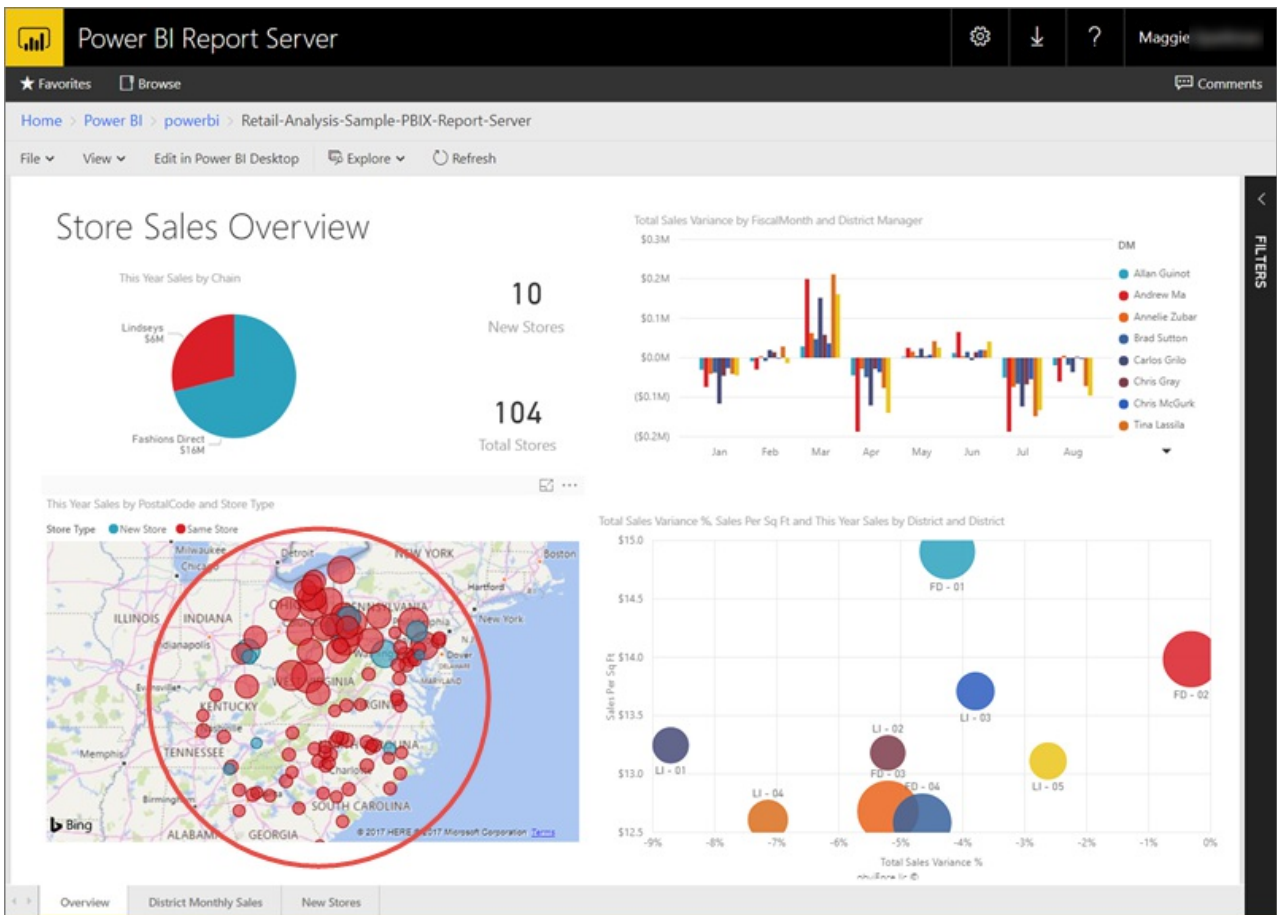
- **Table** and **Field** names are case sensitive; **value** isn't.
- You can filter a report with fields that are hidden from report view.
- **Value** has to be enclosed with single quotes.
- Field type has to be string.
- Table and field names can't have spaces.

Example: Filter on a field

Take for example the [Retail Analysis sample](#). Say this is the URL to the report on the report server in a folder called "power-bi":

```
https://report-server/reports/power-bi/Retail-Analysis-Sample
```

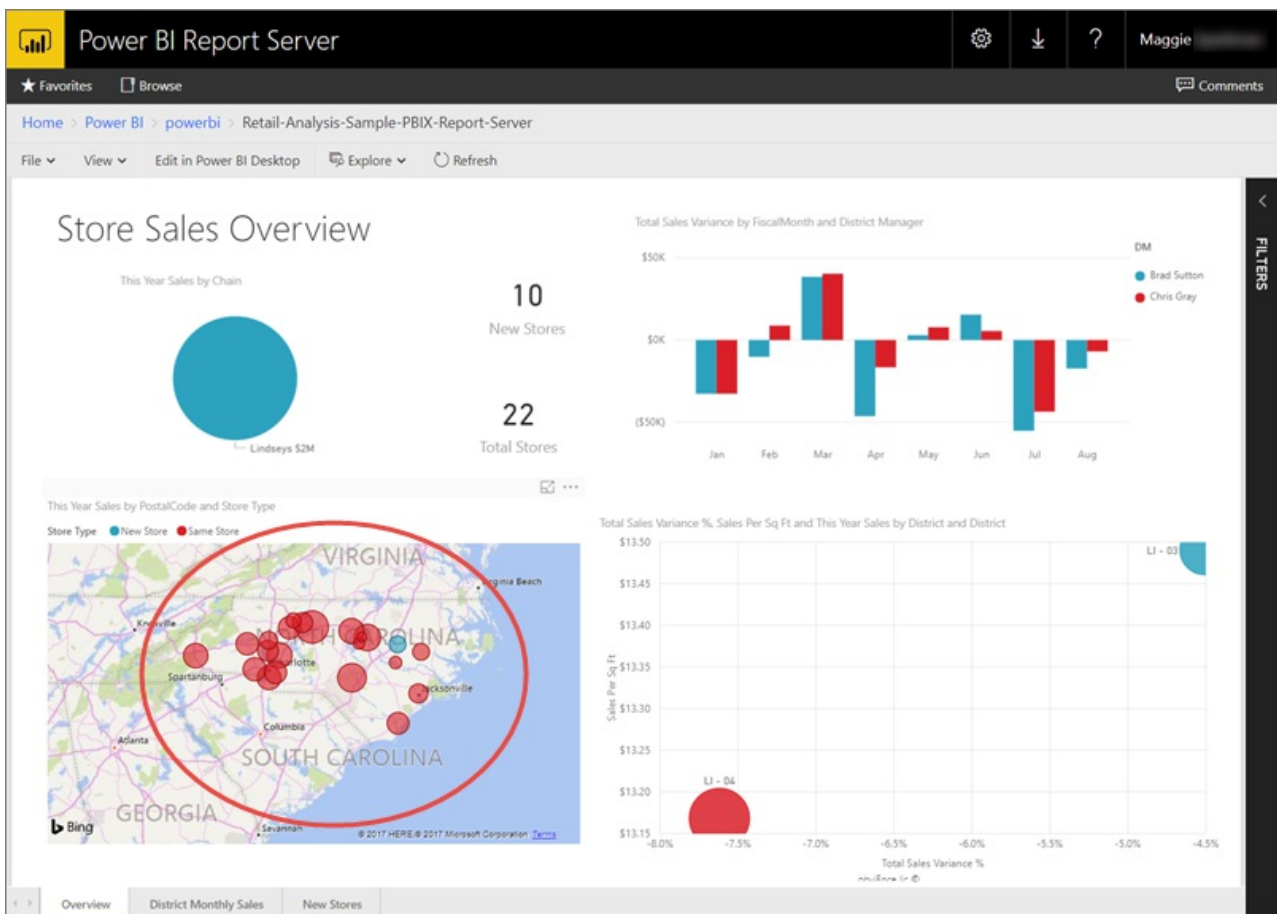
You see the map visualization in the Retail Analysis sample shows stores in North Carolina and other states.



NC is the value for North Carolina stored in the **Territory** field of the **Store** table. So to filter the report to show data only for stores in North Carolina, append the following to the URL:

?filter=Store/Territory eq 'NC'

Now the report is filtered for North Carolina; all the visualizations on the report page show data for only North Carolina.



Create a DAX formula to filter on multiple values

Another way to filter on multiple fields is by creating a calculated column in Power BI Desktop that concatenates two fields to a single value. Then you can filter on that value.

For example, the Retail Analysis sample has two fields: Territory and Chain. In Power BI Desktop, you can [create a calculated column](#) (Field) called TerritoryChain. Remember that the **Field** name can't have any spaces. Here is the DAX formula for that column.

TerritoryChain = [Territory] & "-" & [Chain]

Publish the report to the Power BI Report Server, then use the URL query string to filter to display data for only Lindseys stores in NC.

```
https://report-server/reports/power-bi/Retail-Analysis-Sample?filter=Store/TerritoryChain eq 'NC-Lindseys'
```

Next steps

- [Quickstart: Create a Power BI report for Power BI Report Server](#)
- [Quickstart: Create a paginated report for Power BI Report Server](#)

More questions? [Try asking the Power BI Community](#)

Develop with the REST APIs for Power BI Report Server

1/30/2018 • 3 min to read • [Edit Online](#)

Power BI Report Server support Representational State Transfer (REST) APIs. The REST APIs are service endpoints that support a set of HTTP operations (methods), which provide create, retrieve, update, or delete access for resources within a report server.

The REST API provides programmatic access to the objects in a Power BI Report Server catalog. Examples of objects are folders, reports, KPIs, data sources, datasets, refresh plans, subscriptions, and more. Using the REST API, you can, for example, navigate the folder hierarchy, discover the contents of a folder, or download a report definition. You can also create, update, and delete objects. Examples of working with objects are upload a report, execute a refresh plan, delete a folder, and so on.

Components of a REST API request/response

A REST API request/response pair can be separated into five components:

- The **request URI**, which consists of: `{URI-scheme} :// {URI-host} / {resource-path} ? {query-string}`. Although the request URI is included in the request message header, we call it out separately here because most languages or frameworks require you to pass it separately from the request message.
 - URI scheme: Indicates the protocol used to transmit the request. For example, `http` or `https`.
 - URI host: Specifies the domain name or IP address of the server where the REST service endpoint is hosted, such as `myserver.contoso.com`.
 - Resource path: Specifies the resource or resource collection, which may include multiple segments used by the service in determining the selection of those resources. For example: `CatalogItems(01234567-89ab-cdef-0123-456789abcdef)/Properties` can be used to get the specified properties for the CatalogItem.
 - Query string (optional): Provides additional simple parameters, such as the API version or resource selection criteria.
- HTTP request message header fields:
 - A required **HTTP method** (also known as an operation or verb), which tells the service what type of operation you are requesting. Reporting Services REST APIs support DELETE, GET, HEAD, PUT, POST, and PATCH methods.
 - Optional additional header fields, as required by the specified URI and HTTP method.
- Optional HTTP **request message body** fields, to support the URI and HTTP operation. For example, POST operations contain MIME-encoded objects that are passed as complex parameters. For POST or PUT operations, the MIME-encoding type for the body should be specified in the `Content-type` request header as well. Some services require you to use a specific MIME type, such as `application/json`.
- HTTP **response message header** fields:
 - An **HTTP status code**, ranging from 2xx success codes to 4xx or 5xx error codes. Alternatively, a service-defined status code may be returned, as indicated in the API documentation.
 - Optional additional header fields, as required to support the request's response, such as a `Content-type` response header.
- Optional HTTP **response message body** fields:

- MIME-encoded response objects are returned in the HTTP response body, such as a response from a GET method that is returning data. Typically, these objects are returned in a structured format such as JSON or XML, as indicated by the `Content-type` response header.

API documentation

A modern REST API calls for modern API documentation. The REST API is built on the OpenAPI specification (a.k.a. the swagger specification) and documentation is available on [SwaggerHub](#). Beyond documenting the API, SwaggerHub helps generate a client library in the language of choice – JavaScript, TypeScript, C#, Java, Python, Ruby, and more.

Testing API calls

A tool for testing HTTP request/response messages is [Fiddler](#). Fiddler is a free web debugging proxy that can intercept your REST requests, making it easy to diagnose the HTTP request/ response messages.

Next steps

Review the available APIs over on [SwaggerHub](#).

Samples are available on [GitHub](#). The sample includes an HTML5 app built on TypeScript, React, and webpack along with a PowerShell example.

More questions? [Try asking the Power BI Community](#)

Power BI videos

1/23/2018 • 1 min to read • [Edit Online](#)

We have a YouTube channel for Power BI! You can visit [our channel](#) and, if you're new to Power BI a good place to start is the [Analyze and Visualize data with Power BI playlist](#).

Here are a few videos from that playlist to get you started.

- Overview of Power BI service and Power BI Desktop.

- Collaborating and sharing.

- Overview of Power BI mobile

- [Power BI for developers](#)

Watch some of our new uploads

- [Date slicer](#)
- [Custom visualizations](#)
- [Alerts in the Power BI service](#)

More videos

Check out the following collection of sources and content for more videos.

- [Guided Learning for Power BI](#) - a sequential learning tour of Power BI, in bite-size pieces
- [Guy in a Cube channel](#) - fresh videos on Power BI features and capabilities

Next steps

[Get started with Power BI](#)

More questions? [Try asking the Power BI Community](#)

Power BI webinars

1/31/2018 • 2 min to read • [Edit Online](#)

Register for our upcoming live webinars or watch our recorded sessions on-demand.

Featured webinars

Get started with these popular on-demand webinars

Getting Started with Power BI

by Miguel Martinez

[Register and watch now](#)

Simply Compelling – Seven Tips to Better Visualization Design

by Miranda Li

[Watch now](#)

Better Together: 5 Benefits Excel Users Will Get From Using Power BI

by Carlos Otero and Miguel Martinez

[Register and watch now](#)

[Browse the library of Power BI on-demand webinars from our community experts](#)

Upcoming webinars

Register to hear from Power BI experts and participate in live Q&A sessions

Learn to Navigate Your Way Through a Power BI Dashboard in 20 Minutes

by Miguel Martinez

February 21st, 10:00AM PST, 1:00PM EST

Have you ever opened a Power BI Dashboard just to think, now what? How do I navigate through this to find the data that's important to me? Do you limit your use of filters & slicers for fear of 'breaking something'? Fear not, join us to learn how to navigate your way through a Power BI dashboard. We will walk you through common features used by other managers to drill down to the data you want, when you want it.

[Register to watch on February 21st](#)

[Attend upcoming webinars from the Power BI community](#)

On-Demand webinars

Watch recorded sessions at any time

Getting Started

How to Design Visually Stunning Power BI Reports

by Charles Sterling

[Watch now](#)

Transforming A Report From Good to GREAT!

by Reid Havens

[Watch now](#)

Partners

Improving Profitability in Healthcare

by Stephen Cracknell and Stuart Macanliss from US Medical IT

[Register and watch now](#)

Applied Intelligence for Sales & Service

by Ed Bobrin from Avanade

[Register and watch now](#)

Manufacturers: Your industry is going through a digital transformation - Maintain leadership by leveraging analytics to maximize profitability

by Jon Thompson from Blue Margin and Jim Pastor from Elgin Fastener Group

[Register and watch now](#)

Advanced Topics

How to Implement a Successful Data Governance Strategy That Makes Your Organization More Secure

by Ajay Anandan

[Register and watch now](#)

Power BI security deep dive

by Kasper de Jonge

[Watch now](#)

Accelerating modern BI adoption with Power BI Premium

by Sirui Sun and Miguel Martinez

[Register and watch now](#)

Ask a Partner: Developing Custom Visuals for Power BI

by Ted Pattison

[Watch now](#)

What's new and exciting in Power BI Report Server

by Riccardo Muti, Chris Finlan and Chinmay Joshi

[Register and watch now](#)

How Microsoft does Power BI

by Kirkland Barrett

[Register and watch now](#)

See also

- [Power BI whitepapers](#)
- [Microsoft Data Insights Summit 2017 on-demand sessions](#)
- [Get started with Power BI](#)
- Follow [@MSPowerBI](#) on Twitter
- Subscribe to our [YouTube channel](#)

More questions? [Try asking the Power BI Community](#)

Whitepapers for Power BI

1/30/2018 • 1 min to read • [Edit Online](#)

Whitepapers allow you to explore Power BI topics at a deeper level. Here you can find a list of available whitepapers for Power BI.

WHITEPAPER	DESCRIPTION
Microsoft Power BI Premium	Describes Power BI Premium, both as it exists when launched and also how it will evolve.
Planning a Power BI Enterprise Deployment	This is a technical whitepaper outlining considerations for a well-performing and secure organizational Power BI deployment.
Plan capacity for embedded analytics with Power BI Premium	This paper provides guidance for the app developer/ISV to determine the most appropriate capacity for its business.
Distribute Power BI content to external guest users using Azure Active Directory B2B	This paper outlining how to distribute content to users outside the organization using the integration of Azure Active Directory Business-to-business (AAD B2B).
Best design practices for reports and visuals	Provides best practices for designing reports in Power BI.
Advanced Analytics with Power BI	Describes the advanced analytics capabilities of Power BI, including predictive analytics, custom visualizations, R integration, and data analysis expressions.
Bidirectional filtering	Explains bidirectional cross-filtering in Power BI Desktop (the whitepaper also covers SQL Server Analysis Services 2016, both have the same behavior).
DirectQuery in SQL Server 2016 Analysis Services	For SQL Server 2016, DirectQuery was redesigned for dramatically improved speed and performance, however, it is also now more complex to understand and implement.
Governance	Provides a framework for increasing the return on investment related to Power BI.
Security	Provides a detailed explanation of security within Power BI.
Securing the Tabular BI Semantic Model	This paper introduces the security model for tabular BI semantic and Power BI. You will learn how to create roles, implement dynamic security, configure impersonation settings, manage roles, and choose a method for connecting to models that works in your network security context.
Capacity planning guidance for Power BI Report Server	This paper aims to offer guidance on capacity planning for Power BI Report Server by sharing results of numerous load test executions of various workloads against a report server.
Power BI Premium Planning and Deployment	This paper provides guidance and best practices for planning and deploying Premium capacity for well-defined workloads.

WHITEPAPER	DESCRIPTION
------------	-------------

More questions? [Try asking the Power BI Community](#)