

Module 6: Interactive Data Visualizations

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Module overview

Self-service business intelligence (BI) is becoming increasingly popular within organizations. This approach enables business users to access corporate data, and create and share reports and key performance indicators (KPIs), without dependency on a dedicated report developer. Business users can utilize the Microsoft Power BI suite of tools to connect to a wide variety of data sources. These include the main industry-standard databases, Microsoft cloud-based services—Microsoft Azure SQL Database, Azure Data Lake, and Azure Machine Learning—alongside Microsoft

Excel® and other files, and software as a service (SaaS) providers such as Microsoft Bing®, Facebook, and MailChimp. The combination of flexibility and the ability to create visually stunning, interactive dashboards quickly makes Power BI an obvious choice for any organization that needs to provide its users with a self-service BI solution.

Objectives

After completing this module, you will be able to:

- Use Power BI Desktop to create interactive data visualizations.
- Manage a Power BI solution.

Lesson 1: Creating Power BI reports

This lesson concentrates on the visual report items that you add to Power BI charts. You will learn about the different types of charts, including custom visualizations.

Lesson objectives

After completing this lesson, you will be able to:

- Set the page properties of your reports to customize display options.
- Work with multiple visualizations on a report, and change default categorization

and summarization.

- Add charts to a Power BI report and customize chart settings.
- Work with geographic data and present it by using map visuals in a report.
- Use histograms to represent data.

Page layout and formatting

- Customize each report using formatting options:
 - **Page name:** give each report a name to describe the content, rather than the Power BI default of *Page 1*, *Page 2*
 - **Page size:** default aspect ratio is 16:9. Change to 4:3, Cortana, Letter, or set width and height in pixels using the Custom option
 - **Page background:** change the background color and transparency. Use theme color, or own color. Use image to create highly customized reports
 - **Page view:** alter the zoom on the page. Default is Page view—fits all visuals onto screen. Choose Actual Size for one-to-one pixel mapping

Each report can be customized with formatting options to enable you to design layouts suitable for your corporate look and feel. To view and edit the formatting of a report, click the report canvas without highlighting any visuals, shapes, or other elements on the report then, in the **VISUALIZATIONS** pane, click **Format**.

Page name

Under the **Page information** section, you can change the title of your report from the default naming convention of Page 1, Page 2, Page 3, and so on, automatically applied by Power BI. This is particularly useful if your report comprises multiple pages, because you can guide users through the report pages using applicable names. Type a new name into the **Name** box, and the name of the page is reflected immediately on the tab at the bottom of the Power BI Desktop screen.

Page size

By default, each new page you add to a report is created with an aspect ratio of **16:9**, which is the most suitable for modern monitors and laptop screens. You can change this to **4:3**, which creates a more square report size. If you already have visuals on your page, and change the aspect ratio, you might need to relocate or resize any that fall off the report canvas, or overlap. Other sizing options include **Cortana**, **Letter**, and **Custom**. If you select the **Cortana** layout, this might not appear useful for your current screen resolution because the page becomes tall and thin. However, you can use Power BI to produce a set of results displayed in Cortana when you ask a question of Cortana. The report can be formatted in a highly specified layout—for example, you could create a summary page and another page showing more detail.

You use the **Letter** page size to add reports to Office documents without losing the aspect. The **Custom** page size option is useful if you want to pin visuals in dashboards in the Power BI service, or embed visuals within custom web pages or applications. You specify the exact width and height of the page in pixels.

Page background

Each report background can be altered using colors and transparency. You select from the default theme colors that match the default colors in visuals, or you specify a custom color. The color can then be altered using the transparency setting to lighten or darken the tone. You can also use an image for the background. The image displays increased transparency so that visuals remain readable, and it's an effective way of creating highly customized reports.

Page view

You change the zoom used to display the page by selecting **Page View** from the **View** group on the **View** ribbon. By default, this is set to **Fit to Page**. You select **Actual Size**, which zooms in to the report so you see visuals in a closer view, with one-to-one pixel mapping. Scroll bars appear to bring any hidden areas into sight. Select **Fit to Width** to make the page fit within the width of the screen.

Working with multiple visualizations

- Use settings and formatting to ensure multiple visuals interact correctly on a report:
 - **Visual relationships:**
 - **Filter:** only show corresponding data
 - **None:** show all data, do not interact
 - **Highlight:** shows all data, corresponding values highlighted
 - **Show items with no data:** displays items with empty values, value of 0 included by default
 - **Default summarization:** change from the default sum to average, minimum, maximum, count, or count distinct
 - **Default categorization:** for example, ensures address fields are categorized as City rather than Country, or State
 - **Arrange report elements:** sending visuals forwards or backwards to create layers—known as z-order

It's likely that you will create reports that incorporate several visuals. When you have more than one visual, you control how they interact with one another, and think about their alignment and positioning on the report page, to deliver the best possible experience to the end user.

Visual relationships

When you click a data point in one of the multiple visuals on your report, the other visuals respond by highlighting the corresponding data. For example, if you have a column chart showing sales by country, and a donut chart showing sales by product color, when you click the data point for Germany in the column chart, the following

happens as a result: the column for Germany remains the same color, but the other country columns display with increased transparency. Furthermore, the corresponding data in the donut chart, represented as a ring, remains in high color for Germany, while the data representing all other countries shows increased transparency—you now see related sales. However, if you want to click the column chart and show data in the ring chart for Germany only, you achieve this by editing how the visuals interact:

1. Click the visual for which you want to edit the interactive properties.
2. The **Format** ribbon appears. Click **Edit interactions**.
3. The other visuals on the page now show **Filter** and **None** icons. Some visuals, such as donut and column charts, will also display a **Highlight** icon, depicted as a chart. Click an icon to choose how each visual responds when you click a data point in the highlighted visual:
 - a. **Filter**: this displays only the data for the selected data point. Returning to the previous example, if the column chart displaying sales by country is selected, selecting the Highlight icon on the donut chart would display data only for the selected country.
 - b. **None**: the visual will not change.
 - c. **Highlight**: this is the default behavior, whereby the corresponding data remains in full color, and the remaining data is displayed with increased transparency.

You can set how each visual, including slicers, interacts when a data point is selected on another visual, giving you complete control. When you have a group of visuals with the same behavior, you use shapes, such as the rectangle, or lines, to show visually that they relate and operate together.

Items with no data

By default, Power BI only displays column headings in reports for items containing data. If you had a table showing sales by country, and did not yet have sales in Italy, then Italy would be excluded from the results. However, it might be that you want to see results for items with no data. You can then identify countries with no sales, or products that have not sold this week. To change this, right-click the field in the **Visuals** bucket in the **VISUALIZATIONS** pane, and then click **Show items with no data**. Any empty columns now appear with blank values. However, if a column has 0 as a value, it appears in visualizations.

Default summarization and categorization

The data model contains two properties that you use to set the default summarization and categorization of fields. When you import data into the data model in its raw form, it might not be obvious what this data represents, and Power BI defaults to using the sum aggregator. You might have fields for which you want to apply a count or average aggregation, and you change this using the **Default Summarization** property:

1. In the **Fields** pane, click the column in the **Fields** list that you want to change.

The column will be highlighted with a yellow border.

2. On the **Modeling** tab, in the **Properties** group, click **Default Summarization: Sum** to show the full list of options. Choose from **Don't summarize**, **Sum**, **Average**, **Minimum**, **Maximum**, **Count**, or **Count (Distinct)**.
3. When a new visual is created using that field, the aggregator value is now changed. However, if you have an existing visual that uses the column for which you have changed the default summarization, this is not updated. In this case, right-click the column in the **Value** bucket, or select the down arrow, and choose another summarization option.

You use the Formatting group on the Modeling ribbon to add symbols to your data—which is particularly useful for indicating what the data represents. Choose from numerous currency symbols, apply a percentage format, and manage how you present numbers with commas to separate thousands.

The default categorizations of a field can also be customized. For example, when working with geographic data, if you have locations that could be considered either a country or a state, such as Georgia, or a city or a state, such as Washington, you can add a categorization so that map visuals plot the data with accuracy. To change the categorization, perform the following steps:

1. In the **Fields** pane, click the column in the **Fields** list that you want to change. The column will be highlighted with a yellow border.

2.

On the **Modeling** tab, in the **Properties** group, click **Data Category: Uncategorized**. Select one of the following options: **Uncategorized**, **Address**, **City**, **Continent**, **Country/Region**, **County**, **Latitude**, **Longitude**, **Place**, **Postal Code**, **State or Province**, **Web URL**, **Image URL**, or **Barcode**.

Arranging report elements

When your reports include many elements, you can use settings within Power BI to control how they overlap each other, whether they are layered, or arranged one on top of the other. This design strategy is more commonly known as the z-order, and is particularly helpful for arranging visuals over shapes used as borders to group elements together. You control the z-order using the **Arrange** group on the **Format** ribbon. When you click a visual, the **Format** ribbon appears. Click **Bring forward** to move an element in front of another, or click **Send backward** to force it behind another. The **Arrange** group includes the **Align** menu, so you can align elements **left**, **center**, **right**, **top**, **middle**, or **bottom**. You can select multiple elements and select **Distribute horizontally**, or **Distribute vertically**, to arrange the elements with equal spacing between them.

Creating charts

- Power BI includes a wide range of chart types:

- Bar and column
- Line and area
- Line and column
- Ribbon
- Scatter and bubble
- Funnel
- Gauge
- Pie and donut
- Slicers
- Waterfall
- Table and matrix
- Tree map
- R visual

- Formatting charts

By using the chart visuals in Power BI Desktop, you can quickly create visually stunning interactive reports and dashboards.

Chart types

Power BI includes bar, column, area, line, pie, and scatter charts, along with maps, slicers, gauges, KPIs, R, and table visuals. You can select a chart from the **VISUALIZATIONS** pane to add to the report canvas, or you can drag a data field onto the report to create a table visual automatically—this can then be converted to another chart type. For example, you can drag a **Categories** field onto the report, which creates a table. You can then drag **TotalSales** onto the table, to add another

column. You can then click one of the chart icons in the **VISUALIZATIONS** pane, and quickly switch between bar or pie charts. After adding charts to your report, you can optionally set the page filter property so that users can drill down, and chart items simultaneously reflect the page filter.

Bar and column charts

Stacked bar and column charts are identical, except that the bars on a stacked bar chart span horizontally, rather than vertically, as in a column chart. Each chart accepts an Axis field, such as **Sales Person**, and a Value, for example, **Sales YTD**. The data field in the Value will be a numeric value that can be summed. You include another data field for the Legend, such as **City**, to color-code the bars and show the city in which the salesperson operates.

Clustered bar and column charts are like stacked charts, but they include two data fields for the Value, which results in two bars or columns for each axis. To build on the previous example, you could add **Sales Quota** to the Value, to compare the amount of sales so far, with the target quota set for each salesperson.

Bar and column charts that are 100 percent stacked are like stacked and clustered charts, except that the bars and columns stretch the width or length of the chart area, and display the progress of each axis against a value. You add two data fields to the Value, such as **Sales YTD** and **Sales Quota**. Charts that are 100 percent stacked are useful for displaying progress in meeting a target figure. In this example, the **Sales YTD** figure can combine with the **Sales Quota** figure to show how far each salesperson is progressing toward meeting their annual target.

Line and area charts

The line and area charts are fundamentally the same, but the area chart is filled in, so the area below the line values appears as a solid block. Line and area charts are useful for displaying data over time, such as financial data. For example, you could chart sales over time, using year or month data for the Axis and **Gross Sales** for the Value. You use the stacked area chart to compare multiple values so, using the above example, you could add **Share Price** and **Net Sales** to show the profit that occurs over time, and how this affects the share price of the organization.

Line and column charts

The line and stacked column chart combines columns and lines. The columns and lines share the same data field for the axis, for example, **Year**. The column value could be **Gross Sales**, with a line value for **Share Price**. You can include multiple lines on a line and stacked column chart. The line and clustered column chart enables you to include multiple columns for each shared axis. To alter the previous example, the columns could represent **Gross Sales** and **Net Sales**, with a line for **Share Price**.

Ribbon charts

Ribbon charts initially look similar to stacked column charts, but they also enable you to visualize trends in your data. On a ribbon chart, the largest value is always at the top of the chart, so the values appear to flow like ribbons over time. You use a ribbon chart to display the sales figures for members of a team over time. The position of

each member of the team will show you how they have performed relative to the other members of the team.

Scatter and bubble charts

A scatter chart shows the relationship between two numeric values by using circles that are plotted on the chart. Scatter charts are useful for displaying large sets of data and, in particular, highlighting nonlinear trends, outliers, and clusters. They also enable you to compare data without including time data. The more data you include, the better the results. Your scatter chart must include a point identifier, otherwise all of the data is aggregated into a single point—so add a non-numeric data field such as **Categories** to the **Details** property of the chart.

The bubble chart is based on the scatter chart and works with three numeric values. The bubbles are sized to represent the data proportionally. A bubble chart is created by using a scatter chart, and then adding a data field to the **Size** property.

Note: All the chart types listed previously enable you to add one or more reference lines. In the report view, click **Format**, and then toggle **Reference Line** to **On**. In the **Value** field, type a numeric value such as **100,000**. You can change the color and transparency, and choose a style from dotted, solid, or dashed. You use the **Arrange** property to decide whether you want the line behind or in front of the other elements on the chart. Toggle **Data label** to **On** or **Off** to show or hide the number in the **Value** field. Power BI automatically displays the currency of the data, so if you add a reference line to a chart measuring sales, the reference line value appears as \$100,000, for example. You can change the color of the data label, and

choose the horizontal position, to display the label on the left or right, and above or below the line.

The scatter chart, which includes the bubble chart, enables you to set a reference line for the x-axis and y-axis. All formatting features are available, so you can fully customize both lines.

Funnel charts

Funnel charts help you visualize a process that flows between stages, such as a production process that has different steps, or a value that changes over a series. For example, you could show the relative time periods that a bicycle is in the different stages of production or the sales figures across different states. In the latter example, the data will generally be sorted on the sales figure and plotted horizontally, resulting in a funnel shaped chart.

Gauge charts

Gauge charts enable you to display a current value as progress towards a total goal. For example, you could show sales to date in a month as progress towards the monthly target.

Pie and donut charts

Pie and donut charts have similar functionality, except that the donut chart has a hollow center. For example, you could add **Salesperson** for the Legend value, and **Sales YTD** to Values. The pie or donut chart is divided into portions that are sized to

represent the value. In this example, each **Salesperson** would have a portion of the pie or donut chart—the more sales they have achieved, the larger their portion.

Slicers

A slicer enables you to filter an entire report, applying the data selection to all visuals. You would add a slicer to filter on fields such as Territory, Region, Sales Person, Color, or Category. By default, visuals show values that include all data. Select a value in the slicer to filter all the visuals to show the data for the one selected value.

Note: The Power BI slicer includes the ability to search through the filter list, which is useful if the list is particularly long. On the slicer visual, click the ellipsis, then click Search, and start typing your search string. The list will filter the results as you type. Click to select the value to filter on.

Waterfall charts

The waterfall chart enables you to show changes in a value over time, such as annual revenue. Using a waterfall chart, you see how changes affect a value, and color-coded columns quickly highlight any increase or decrease in value. The chart includes two options: Category and Y Axis. For example, because waterfall charts are typically used to show changes in a value over time, you could add Year to the Category field, and Sales Variance to the Y Axis. This would display the data with the variance for each year, flowing left to right from the earliest to the latest year. By default, increases would show as green and decreases as red, though these are fully customizable. The chart also includes a total column on the far right.

Table and matrix charts

The table and matrix charts enable you to add data fields to create columns and build up a table. Each numeric column is automatically summed, with a total at the bottom of the column. Visually, the table and matrix charts look similar, with the matrix chart supporting the addition of rows and columns and providing drilldown functionality.

Tree map

The tree map might not physically represent a tree, but the principle behind its function is representative of a tree. On a tree map, larger data scales through to smaller data, as if the data were branches scaling down to twigs. The largest data value, represented as a rectangle, is in the lower-left corner, with the smallest in the upper-right corner. For example, add the **City** data field to Group, and **Total Sales** to Values. Each city is represented by a rectangle that is proportionate to the number of sales, so the cities that have the most sales have the largest rectangles.

R visual

Power BI Desktop supports statistical analysis through integration with R, and the hosting of R visualizations. When you select the R visual from the Visualizations pane, a placeholder is added to the page. You are then presented with an R script editor that you can use on the canvas. When you add fields to the R visual, they are automatically added to the R script editor pane. After you have created your script in the editor, click **Run**. The data added from the Fields pane is posted to the local installation of R. The script created in the R editor is then run on the local R

installation. The R installation returns a visual to Power BI, which then displays on the canvas in the R visual.

Other charts

There are other types of chart in Power BI, including gauge, card, multi-row card, and KPI. For more information about using these charts, including how-to guides and tips, see *Visualizations in Power BI reports* in the Power BI documentation:

Visualizations in Power BI reports

<http://aka.ms/Cfrub0>

Formatting charts

Each chart includes options for formatting. The available options depend on the type of chart. If you use a data field—for example, **Salesperson**—in a column chart and a pie chart, the colors for each person are identical in the two charts. This retains consistency within the report, although you have the option to change the color for each data field. It also means that, when you click a **Salesperson**, all charts reflecting their data show as the same color. Use formatting to add data labels, change colors, and add titles, backgrounds, borders, and more.

When you add data to a visual, Power BI sorts values alphabetically. If you want to sort your data by another value, you can change the sort order by using the data model. The funnel chart is one example where you are likely to want to sort by a

numeric value, rather than a string value; otherwise, the bars that form the funnel do not align to a funnel shape. To sort the data, view the dataset in **Data View**, on the **Sort** ribbon menu, select **Sort By Column**, and then choose the column from the list.

Using geographic data

- Map and filled map charts:
 - Power BI integrates with Bing to determine location
 - Bing makes a best guess—known as geocoding
 - Always include location—longitude and latitude are aggregated
 - Add data categories to columns for better accuracy
 - Concatenate string address fields into one column
 - Display value data as:
 - Color-coded bubbles on map charts
 - Shaded regions on filled map charts
- ArcGIS map charts:
 - More customization
 - Provide reference layers, information pins, infographics

In addition to the extensive list of chart types that are covered in the previous topic, Power BI Desktop includes the map chart, filled map chart, and ArcGIS map chart. Use these charts to map your data visually, by region and globally.

Map and filled map charts

Power BI integrates with Bing maps to find default coordinates for locations in map and filled map charts. It does this using a string value in a process known as geocoding. This integration means that you do not need to provide longitude and latitude coordinates in your data, with Bing making a best guess at the location.

Formatting your data for geocoding

The more information you provide for Bing to determine the location, the greater the chances of accuracy. Bing uses algorithms and hints to guess the location, so including additional location data helps Bing to make a better guess. Ensure that you name your columns usefully by using the geographic designation, such as **City**, **State**, **County**, **Province**, **Country**, and so on. When place names are ambiguous, such as Washington State or Washington DC, these column headings can help Bing to work out which you are referring to. You can also append additional information, so if your data refers to Washington in England, you can pass “Washington, England” to Bing. If you do have the longitude and latitude data for a location, you need to include a location field—otherwise the data is aggregated by default, and may not return the results that you expect.

Data categorization

When you import data, Power BI makes assumptions about that data based on the table and column names. Power BI assumes that you want to aggregate numeric columns—and always places them in the Values area when you drag them onto a chart. If you had a column named **Location Code**, with a value of “CA,” this could refer to the state of California, or the country, Canada. Data categorization helps to

solve this problem and can be applied in both the report view and the data view. In the **FIELDS** list, select the field that you want to categorize, and then on the **Modeling** ribbon, in the **Properties** group, select **Data Category**. You can choose from **Address**, **City**, **Continent**, **Country/Region**, **County**, **Latitude**, **Longitude**, **Place**, **Postal Code**, **State**, or **Province**. If a category is not appropriate for a data type, it is disabled in the list.

Creating specific location strings

In some instances, you might find that even using data categorization does not generate the desired locations in Bing. If this happens, you can create a new column and concatenate your address fields into a full address string. In Power BI Desktop, in either the report view or the data view, in the **FIELDS** list, select the dataset to which you want to add the new column. On the **Modeling** ribbon, in the **Calculations** group, click **New Column**. In the formula bar, concatenate your address fields, for example, by using the following code:

```
FullAddress = [AddressLine1] & " " & [AddressLine2] & " " & [City] & " " & [PostalCode]
```

The concatenation only works with string data types, so you might need to convert numeric values to string as part of your formula. You can then use this **FullAddress** field in your map chart.

Using map charts

The map chart accepts data for the **Location**, **Legend**, **Longitude**, **Latitude**, and **Size** properties. The **Location** property accepts fields such as **City**, **County**, and **Province**, whereas the **Size** property accepts numeric values such as **Total Sales** or **Number of Customers**. The numeric values are presented as colored bubbles on the applicable location. The bubbles are sized proportionally to the data that they represent within the field in the dataset—that is, the bigger the value, the bigger the bubble.

Note: If you drag a data field such as **City** or **Country** onto the report, Power BI detects that it is geographic data and automatically adds a map chart.

Using filled map charts

The filled map chart (also known as a choropleth), uses a slightly different visualization to represent the data. This chart uses colors to represent the data value across a geographic area.

You create the chart as for the map chart, but using the **Tooltips** property for the value data. This produces a chart with colored areas where data exists. You can then customize the colors using the Data colors section of the Format bucket. Click the vertical ellipsis next to **Default color**, and then click **Conditional formatting**. The default settings use red for the lowest value and green for the highest value, but you can change these to meet your needs. This shading is particularly useful for presenting socioeconomic data, because it provides a visual overview of data across a wide area, such as all of the states in the United States.

ArcGIS map charts

The ArcGIS map is provided by Esri (www.esri.com) for use in Power BI. When you first add an ArcGIS map to your report, you must agree to the Esri terms and privacy policy to continue using the chart.

You can add data to the ArcGIS map using **Location**, **Latitude**, **Longitude**, **Size**, and **Color** properties similar to the standard Power BI map charts. After populating the ArcGIS map, you can customize it using the ArcGIS menus. To open the menu, select the map on the report view, in the top-right of the map click the ellipsis, and then click **Edit**. An ArcGIS menu now appears across the top of the map to edit the visual in different ways:

- **Basemap** enables you to change the base map on which you display your data, choosing from different base shades or different street maps.
- **Location type** enables you to display the locations as boundaries or points on the map.
- **Map theme** enables you to modify how the value data displays, from heat maps to clustered points.
- **Symbol style** enables you to change the colors, transparency, and symbol types displaying the data.
- **Analytics** enables you to add information pins to your map, add reference layers such as household income or household size, and add infographics aligned to your data.

ArcGIS maps are supported in Power BI Desktop, Power BI Service, and Power BI mobile applications.

Histograms

- Histograms differ from bar charts:
 - No spaces between the bars
 - Bars (or bins or buckets) represent a range of values
 - Ranges must be contiguous
 - Width of the bars represent a proportion of the total bin limit
- Download Histogram visual from the marketplace
- Specify a data field for the **Values** (bin) and a field for the **Frequency**

Histograms might initially look very similar to bar charts, but there are two fundamental differences:

- **A histogram chart contains no spaces between the bars.** This is because each

bar represents a range of data rather than a single value—for example, ages. The bars might be grouped into age ranges such as 0-17 years, 18-24 years, 25-34 years, 35-44 years, 45-59 years, and 60 years and above. These are known as bins, or buckets. The bin values are contiguous, so there are no gaps between the bars.

- **Each bar in a histogram chart is also proportionally representative in size.** Using the previous example, the 0-17 years bar is wider than the 18-24 years bar because it represents a range of 18 years inclusive, compared with the seven years (inclusive) of 18-24. Again, this requires a contiguous range of values in the buckets.

Power BI does not include a histogram chart by default; however, you can download a custom visual from the marketplace. To do this:

1. Open Power BI Desktop.
2. In the **VISUALIZATIONS** pane, click the ellipsis, and then click **Import from marketplace**.
3. In the **Caution** dialog box, click **Import**.
4. In the **Power BI Visuals** dialog box, in the search box, type **Microsoft Histogram**, and then click the search icon.
5. Click **Histogram Chart**, and then click **Add**.

6. In the **Import custom visual** dialog box, click **OK** and the new chart appears under **VISUALIZATIONS**.

Click the histogram icon, and the visual appears on your report as a watermark template. To use the histogram, provide a field for the **Values** (x-axis), and the field for aggregating in the **Frequency** (y-axis). The histogram automatically works out the bins, also known as buckets, and you can set the number of bins in the properties pane.

Alternatively, you can download other custom histogram visuals from the Power BI marketplace. Custom visuals are discussed later in this course.

Demonstration: Adding visualizations to a report

In this demonstration, you will see how to:

- Connect to a database in Azure SQL Database and import data.
- Add visualizations to a report in Power BI Desktop.

Check your knowledge

Discovery

Discuss some of the charts that you could use to represent your organizational data. What types of chart would you use? Would different charts represent the data in different ways? Do you have data that would benefit from using a scatter chart, so that you can identify clusters, or outliers? Are there any missing chart types in Power BI that you might be able to download from the marketplace to fulfill your requirements?

Show solution Reset

Lesson 2: Managing a Power BI solution

This lesson discusses the management aspect of Power BI. It examines how to use the admin portal and how to configure settings in the Power BI interfaces.

Lesson objectives

After completing this lesson, you will be able to:

- Access and use the Power BI admin portal.
- Use the Power BI service settings to manage the service environment.
- Use the Power BI Desktop settings to configure your working environment.
- Enhance reports and dashboards using additional settings in Power BI.

Power BI admin portal

- View and manage administrative settings
- Only available to:
 - Power BI service administrators
 - Office 365 Global Admins
- Includes:
 - Usage metrics: most used reports and dashboards
 - Users: link to Office 365
 - Audit logs: link to Office 365
 - Tenant settings: configure functionality for the tenant
 - Capacity settings: configure and monitor capacities

The admin portal provides one location where you can view and manage administrative settings for Power BI.

To access information in the admin portal, you must either be assigned the Power BI service administrator role or you must be a Global Admin in your organization's Office 365 team. To learn how to assign the Power BI service administrator role, see *Understanding the Power BI service administrator role* in the Power BI documentation:

Understanding the Power BI service administrator role

<https://aka.ms/Miuvej>

To access the admin portal, in the Power BI service, click the **Settings** gear, and then click **Admin portal**. The portal contains various sections that you can use to manage the service.

Usage metrics

The usage metrics is a dashboard displaying tiled sections:

- The first section displays usage analytics for individual users, with a count of user dashboards, reports, and datasets within the tenant. There are also charts displaying the most consumed dashboards and packages by users and tables showing how many reports and dashboards individual users can access. This can be indicative of users who are most active within Power BI.
- The second section offers the same usage information, but is presented for groups. You see which groups are most active, in addition to the data that they are accessing. At the top of the section, there are counts for the number of group dashboards, reports, and datasets. As in the previous section, there are also charts displaying the most consumed dashboards and packages by groups and tables for the most accessible dashboards and reports.

You use this information to see how users access data and dashboards—it highlights those users and groups that are most active. Conversely, you can use this

information to find out why other users are not very active in Power BI, and investigate why particular dashboards are not being used. There might be an underlying problem with the data: for example, perhaps the correct data has not been made available, or it does not cover a required period.

Users

Power BI user management is controlled by Office 365, so there are no actions available in the Power BI admin portal. The Users tab just contains a link to the Office 365 admin center. Being assigned the Power BI service administrator role does not provide any permissions to access the Office 365 admin center—therefore, you need further privileges to be assigned before you can manage the users of your Power BI service.

Audit logs

Similar to user management, audit logs are located and managed in Office 365, so the Audit Logs tab contains a link to the Security & Compliance center in Office 365. Again, you need Office 365 privileges to access this area—being a Power BI service administrator does not provide the relevant permissions.

Tenant settings

The Tenant settings enable you to configure and, in some cases, lock down, the functionality available in your tenant. For example, this is where you can disable sharing content with external users, creating app workspaces, publishing to the web,

exporting information, and printing reports. For each of these actions, you can enable and disable for the whole organization. You can also enable for a subset of your organization by using security groups.

Capacity settings

This page displays the Power BI Premium capacity purchased and available for your apps. You can modify the capacities here to scale-up or scale-down resources, add and remove capacity admins, add and remove additional workloads, assign workspaces to capacities, and change regions. You can also use the Health tab to monitor workload metrics and system metrics.

Power BI service settings

- **General**
 - Manage privacy, language, close account, enable custom visuals, and ArcGIS maps
- **Dashboards**
 - Show or hide the Q&A search box, and enable tile flow
- **Datasets**
 - View refresh history, manage connections, manage credentials, manage parameters, schedule refreshes, and configure Q&A
- **Workbooks**
 - Rename and delete workbooks
- **Alerts**
 - Turn off, rename, delete, and configure alerts

Use the settings in Power BI to customize elements to behave appropriately for your needs. The options differ between the Power BI service, discussed here, and Power BI Desktop, which you'll see in the next topic. To customize the settings in the Power BI service, log in to your account at powerbi.com, click the **Settings** cog, and then click **Settings** from the menu. You can view and edit settings under the following tabs:

General

- **Privacy:** Microsoft automatically collects the search terms you use in Power BI, as part of their commitment to ongoing product improvement. If you do not wish to

participate, clear the check box to stop sharing your search terms.

- **Language:** you can choose which language appears in the Power BI user interface and parts of the visuals. Select your relevant language from the list and click **Apply**. This resets the interface to show the chosen language, including menus, buttons, and messages. Certain features might only be available in English as the service undergoes continuous improvement and development.
- **Close account:** closing your account deletes any content you have created, and you no longer have access to the Power BI service. To close your account, optionally select the reason for closing from the list, and add any further information for Microsoft that you would like them to know about your reasons for closing the account. Click **Close account**. This option is not available if your account is managed by your organization.
- **Developer:** this setting enables developers to include visuals for testing. Turn this setting on if you want to create custom visuals for Power BI.
- **ArcGIS Maps for Power BI:** Power BI has integrated ArcGIS maps from Esri. Using the ArcGIS visual, you can create sophisticated maps and discover insights in your data that might otherwise be hidden in the standard mapping visuals—for example, by using the heat map feature.

Dashboards

You can change settings on an individual dashboard level, enabling you to control the behavior of dashboards more specifically. Under the Dashboards tab, you will find a

list of all your dashboards. Click a dashboard to change the following settings:

- **Q&A:** you can toggle this setting to show or hide the Q&A search box on each dashboard. The search box is enabled by default.
- **Dashboard tile flow:** this setting ensures the dashboard content is automatically aligned to the canvas. If the setting is on, when you move a tile on the dashboard, the layout is adjusted automatically so the tile fits. This feature is turned off by default.

Datasets

Datasets are managed at the report level. On the Datasets tab, you will see a list of all the reports you have published to Power BI. You can alter the following settings for each report:

- **Refresh history:** click the **Refresh history** link to view scheduled and OneDrive data refresh history. The Start and End dates enable you to determine the length of time taken for each data refresh. The Status shows whether the refresh completed or failed.
- **Gateway connection:** use this setting to view and manage your gateway connections. This displays the status of your Power BI personal gateway—and if it is online and running. If you have other gateways connections, you can optionally switch using the toggle.

- **Data source credentials:** if you have connected to a data source that includes credentials such as a username and password, you can manage them by expanding the **Data source credentials** link.
- **Parameters:** if your query takes parameters, you can manage them here.
- **Scheduled refresh:** toggle the option **Keep your data up to date** to schedule the refresh of a dataset. You can set the refresh frequency, such as Daily, and set which time zone to use. Furthermore, you can have a notification emailed to you if the refresh fails.
- **Q&A and Cortana:** use the **Allow Cortana to access this dataset** option if you want Cortana to share the information with other Power BI users who have access to it. By default, this setting is turned off.
- **Featured Q&A questions:** You can add, edit, and delete featured questions that will be displayed as suggestions for the dataset in Q&A. This is helpful when sharing your dashboards with colleagues.

Workbooks

Workbooks are managed on an individual basis. You can rename and delete workbooks within your My Workspace area.

Alerts

Use the Alerts tab to turn off, edit, and delete your alerts that have been added from Power BI Mobile. You can rename alerts, and manage the conditions of the alert. Use this setting to change the frequency of the alert—you can also toggle between **At most every 24 hours**, or **At most once an hour**. Alerts are only sent when the data changes, and by default you receive notifications in the notification center. Select **Send me email, too** to receive alerts in your inbox.

For a list of countries and languages supported by Power BI, see *Supported languages and countries/regions for Power BI* in the Power BI documentation:

Supported languages and countries/regions for Power BI

<https://aka.ms/adoke1>

Power BI Desktop settings

- **Global:** set the data load cache; configure Power Query Editor options; configure R home directories and IDE; set global privacy; enable sending of usage data to Microsoft; turn on diagnostic tracing, and manage auto recovery options to prevent accidental loss of work
- **Current file:** manage data load options; change regional settings (locale); set privacy and auto recovery options
- **Data source:** change location of file sources; manage credentials and privacy levels: None, Private, Organizational, or Public

The settings in the Power BI Desktop application differ to those in the Power BI service. You can change global settings that are applicable across the environment, reports and datasets, or adjust settings at a file level. To configure the global and file settings, in Power BI Desktop, on the **File** menu, point to **Options and settings**, and then click **Options**. The **Options** dialog box includes the following options:

Global

- **Data load:** this setting enables you to manage the volume of data that is locally cached—for both query preview results and Q&A answers. The default limit for each type of cached data is 4096 MB and, although you can adjust this level up or

down, Microsoft does not recommend that you reduce it below 32 MB. You can also clear the cached data and restore the cache sizes to the default setting.

- **Power Query Editor:** numerous settings are available for the Power Query Editor. You can toggle to show or hide the Query Settings pane and formula bar. You can configure the font and display setting for preview data. You can also turn on the setting to allow parameters in data sources and transformation dialogs, and enable M Intellisense in the UI.
- **R scripting:** you manage R script settings by configuring the location of your R home directories—and which R integrated development environment (IDE) to launch from within Power BI. This tab includes links to articles on installing R, and learning about the R IDE.
- **Security:** use this tab to set user approval for new native database queries. This is turned on by default. Furthermore, you can set the web preview warning level, choosing from **Strict**, **Moderate**, or **None**. Strict means the user sees a preview warning before a web preview is displayed; the Moderate option shows a warning only if the URL has not been explicitly entered, or is a trusted site; and None hides all warnings. You can also choose whether to show a security warning when adding a custom visual to a report. This is on by default. Finally, you can view your approved ADFS authentication services, and delete unwanted entries.
- **Privacy:** use this tab to set the isolation level of your data connections to determine how they interact, if at all. By setting a higher privacy level, you can prevent data sources from exchanging data. However, this can have an impact on the functionality of your reports, and have an adverse effect on performance. You also set the privacy level at the data source and file levels, so the option you

choose at a global level is affected by these lower level settings. For the highest level of security, choose **Always combine data according to your Privacy Level settings for each source**, which uses the privacy set at the data source level, and gives you the most control. The default setting is **Combine data according to each file's Privacy Level settings**, enabling you to manage security on a file basis. Alternatively, you can choose **Always ignore Privacy Level settings**, but be aware that you could potentially expose sensitive or confidential data. The hyperlink in the tab contains detailed information on setting privacy levels.

- **Usage data:** you can choose to send usage information to Microsoft to help improve the product, by sharing the features that you use. This does not disclose any personal information or data, and runs silently without affecting the performance of the application.
- **Diagnostics:** toggle **Enable tracing** to turn on the capture of diagnostic data. This is turned off by default. Use this tab to view the current version number and monthly release date of your installed application.
- **Auto recovery:** it's worth checking the auto recovery options before you begin using Power BI Desktop. This ensures that your work is saved as often as you need, in case of incidents that cause the application to close unexpectedly. The **Store auto recovery information every 10 minutes** option is selected by default. You can optionally turn this setting off, or adjust the frequency at which auto recovery information is stored—for example, to every five minutes. You can also toggle the **Keep the last auto recovery version if I close without saving** option. This useful feature is turned off by default but is certainly worth enabling to prevent

any accidental loss of work. You can also change the location where Power BI auto saves your files.

Current file

- **Data load:** use this tab to configure how data is managed when connecting to, and importing from, a data source. The **Automatically detect column types and headers for unstructured sources** option is turned on by default, and helps you when importing loosely structured data. Power BI makes a best guess at the type of data in each column on import—this can be altered later in the Power Query Editor. You can configure several settings for the relationships within your data. You can turn off the default option to **Import relationships from data sources**, in which Power BI uses the foreign keys in the imported data to detect relationships between tables. The setting **Update relationships when refreshing queries** is turned off by default. This option looks for relationship changes that have occurred since the data was last imported; however, it can potentially remove any relationships you might have created manually. The **Autodetect new relationships after data is loaded** option is turned on by default and helps you find related data that might not have an existing foreign key relationship. The time intelligence setting, **Auto Date/Time**, is also turned on by default. This creates a hidden date table for each column in the dataset that has a date or datetime data type. The date table holds a set of contiguous dates, from the earliest to latest dates, enabling you to perform analysis over time. For example, you can compare sales on a date, or a date range from last year, to sales on those dates in this year. The **Allow data preview to download in the background** option is turned

on by default. This is useful when connecting to a data source as you can see a preview of the data before you select it for importing. You can turn this off if you are connecting to a very large dataset and don't need to see the data values before you import the data. Another setting that is automatically turned on is **Enable parallel loading of tables**. This enables Power BI to simultaneously load data from multiple sources, though be aware that it can affect performance.

- **Regional settings:** use this tab to set the **Locale** of the current file. The language setting you choose affects how numbers, dates, and time from imported data are interpreted. For example, you can select English from United States, United Kingdom, or Australia, or select French for France, Luxembourg, or Monaco.
- **Privacy:** you can edit the permissions for each connection in your files to work with or override the settings at the global level. Choose from the default **Combine data according to your Privacy Level settings for each source** (this is discussed in the section below), or **Ignore the Privacy Levels and potentially improve performance**. The last setting has the potential to expose your data to unauthorized users, so use caution if working with sensitive or confidential data.
- **Auto recovery:** the **Disable auto recovery for this file** option overrides the global setting and is turned off by default. Only turn this on if you are sure you can afford to lose work in the case of unexpected application behavior.

Data source settings

To manage settings for the data sources in the current file and globally, on the **File** menu, point to **Options and settings**, and then click **Data source settings**. If you have imported data from a document such as Excel, CSV, or Access, you can change the file location of the source, and add additional file parts. You can also manage how the file is opened—for example, if you import a text file, you can choose that this file is opened with Excel.

As previously discussed, you can configure privacy options at the file and data source level. Use **Edit Permissions** to set the privacy level for each data source, choosing from **None**, **Public**, **Organizational**, or **Private**. By default, data sources are set to None, so if your data contains sensitive or confidential data, ensure you change it to Private. The Private setting isolates the data source from other sources, and is useful if you want to restrict access to authorized users only. Data sources that only need to be visible within a trusted group of people can use the **Organizational** setting. This isolates the data source from all Public data sources, but enables visibility to other Organizational data sources. Only data that is freely available, such as that on a public website, or from a data marketplace, should be secured as **Public**, because the source becomes visible to everyone. If your data sources use credentials, you can also manage them on the **Edit Permissions** dialog.

Note: Changing options might require Power BI Desktop to be restarted before they can take effect.

Dashboard and report settings

- Customize reports and dashboards using settings:
 - **Filter dashboard:** use Focus mode to open a tile, then apply filters to categories and values
 - **Featured questions:** add custom featured questions, and enable results in Cortana and Q&A
 - **Print dashboard and export questions:** print a hard copy of a report or dashboard; export dashboard data to CSV, or report data to XLSX or CSV
 - **Publish to web:** create URL to send in email or social media; use embed code in webpage or blog post
 - **Custom URL and title:** change the default destination when clicking on a tile to a URL; alter title and subtitle

Dashboards and reports include settings that help you to work with your data more efficiently, in addition to presenting options for printing and exporting data, and sharing it through a variety of media.

Filtering a dashboard

When you view a dashboard in the Power BI service, unlike reports, filters are not immediately available to you. However, you can filter on individually pinned tiles. If you click **More options** in the top right corner of a tile, and then click **Open in focus mode**—the tile opens so it is the only one in view. You can then expand the **FILTERS** pane, to filter on categories in the chart, and set criteria on values. For example, you

can filter on products, or show data where sales are above \$150 million and less than \$250 million.

Featured questions

Q&A enables you to ask natural query language questions of your data. There are a couple of features in your reports and dashboards that you can use to enhance the results returned to Q&A. When you click **Ask a question about your data**, the Q&A box expands to include suggestions from the fields, calculations, and measures in the data model, to help you get started. You can add suggestions to this list to enable other users to quickly find the answers they need, using the following steps:

1. Click **My Workspace**. In the **Dashboards** list, on the dashboard you want to configure, click **Settings**.
2. Under Q&A, use the toggle to enable Q&A.
3. Click **Save**.
4. In the top right corner of the screen, click **Settings**, and choose **Settings** from the menu.
5. Click **Datasets**, and select the data you want to configure from the list.
6. Click **Featured Q&A questions** to expand the list of available questions.
7. You can delete existing questions, or click **Add a question** to create a new question. This opens a new text box. Type your question, and click **Apply** after

adding all the questions you want to include.

8. Click **My Workspace**. Select the dashboard to which you have added one or more Featured Questions. Click **Ask a question about your data**, and the Featured Questions you have just added now appear at the top of the list of suggestions. Click a question to see the results.

You can also add keywords and filtering to a report to guide users to find the exact data they need when asking a question:

1. From My Workspace, click the report you want to alter, and then on the menu bar, click **Edit report**.
2. Drag a column from the **FIELDS** pane to **Page level filters**—for example, **Manufacturer**.
3. Click **Require single selection** so the page is displayed in results in Cortana or Q&A.
4. Click **Format**, then click **Page information**, and toggle **Q&A to On**. This prompts Q&A to use the report if a user asks a question related to the data in the report.
5. In the text box, type in alternative names, or terms that users might type when asking questions, such as **manufacturer performance**. Separate each phrase with a comma.

6.

Click **Save**.

When you, or another user, search using a combination of the phrase and the filter, more accurate results can be returned. For example, in the dashboard's Q&A box, type **manufacturer performance** and Power BI returns a list of all the manufacturers from the filter. You can select a filter and the results are displayed just for that manufacturer.

Printing a dashboard and exporting questions

Some occasions might demand a hard copy of a report or the underlying data, and Power BI offers print and export functionality to support this. Open the dashboard you want to print, on the **File** menu, click the ellipsis in the top right corner of the screen, and then click **Print dashboard**. This opens the standard print dialog where you can set the page layout, paper size, quality, and other printer options. After setting additional options, click **Print**. To print a report, open it and then on the **File** menu, click **Print**.

You can export the data for any visual within Power BI. Open the relevant report, click the ellipsis in the top right corner of the visual, and then click **Export data**. You can then choose to export **Summarized data** or **Underlying data**. In addition, you can choose to export to Excel format (.xlsx) or .csv. The data is exported with any filters that have been applied to generate the results in the visual. You can now ask a question of your data, view the results, and then export them.

Publish to web

You use the Power BI Publish to web feature to share a report by creating a URL you can send through email or social media, or embedded code that can be used in webpages, or blog posts. You can also edit, update, refresh, and unshare visuals you choose to publish. The Publish to web feature is available in reports that you can edit in your personal or group workspace. You cannot publish reports that were shared with you, or that use row level security to secure the data. To publish a report to the web, use the following steps:

1. From My Workspace, open the report you want to use, and then on the **File** menu, click **Publish to web**.
2. Review the information in the displayed dialog, and click **Create embed code**.
3. A warning is shown asking you to confirm that the data can be made public. If you agree, click **Publish**.
4. You are then shown a link to use in an email, and HTML iframe code that can be pasted directly into a webpage or blog. Optionally, you can use the sizing list to ensure your report displays in the best possible way to present the data. The default is 800 x 600 pixels. After copying and pasting the text, you can change the height and width values as required.

Each report has a single embed code. Click **Settings**, then click **Manage embed codes** to see a list of reports for which a code has been generated, and the time and

date of generation. To copy the code, or delete the code, click the ellipsis next to a report. If you delete a code, any webpages that embed the report, will no longer be able to display it. This feature also supports custom visuals.

Note: Use the Publish to web feature with caution, because making your data publicly available allows anyone to view it. There is no inclusion of authentication, so always check that the data you publish is not sensitive. This feature can be turned off by administrators who have access to the admin portal. Go to **Tenant Settings**, and set **Publish to web** to **Disabled**. This affects the current tenant.

For more detailed information, and the limitations of this feature, see *Publish to web from Power BI* in the Power BI documentation:

Publish to web from Power BI

<https://aka.ms/eq7ft3>

Custom URL and title

When you click a tile in a dashboard, by default you are taken to the original visual in the report from which it was pinned. You can change this behavior to point to another location. Open the dashboard and click the ellipsis in the top right corner of the tile you want to amend. Click **Edit details**. In the **Tile details** pane, select **Set custom link**, and type or paste a web address into the **URL** text box. Choose whether to open the custom link in the same tab using the radio buttons.

Additionally, you can change the title and subtitle for the tile by overwriting the text in the **Title** and **Subtitle** text boxes. It is also useful to show the date and time the item was last refreshed, using the check box to enable this addition to the tile. When this is done, click **Apply**. You can use this feature so a company logo directs the user to the main corporate home page, or perhaps other pages in the corporate site that contain more detailed information relevant to the visual.

Demonstration: Creating featured questions

In this demonstration, you will see how to:

- Add featured questions to a Power BI dashboard.
- Use featured questions to enhance the user's experience when using dashboards.

Check your knowledge

Select the best answer

Which of the following statements about the Manage Data portal is false?

The portal enables you to manage your shared queries.

You can edit and control access to your data sources in the portal.

Using the portal enables you to delete data sources that you no longer need.

The Usage Report shows how many times a dashboard was consumed in Power BI.

The Usage Report displays the most active groups in Power BI.

[Check answer](#)[Show solution](#)[Reset](#)

Lab: Creating a Power BI report

Scenario

Adventure Works employees are increasingly frustrated by the time that it takes to implement managed BI services. The existing managed BI infrastructure, including a data warehouse, enterprise data models, and reports and dashboards, are valued sources of decision-making information. However, users increasingly want to explore relationships with other, currently unmanaged data, and it takes too long for the IT department to include these requirements in the corporate BI solution.

As a BI professional, you are asked to explore ways in which Adventure Works can empower business users to augment their managed enterprise BI solution with self-service BI.

Objectives

After completing this lab, you will be able to:

- Connect, shape, and combine data in Power BI.
- Create a report by using chart and map visuals.
- Publish reports and share dashboards.

Note: Because of updates to Microsoft Power BI, the lab steps for this course change frequently. Microsoft Learning regularly updates the lab steps, so they are not available in this manual – but you can access them on GitHub.

Lab setup

Estimated time: 60 minutes

Virtual machine: **20778C-MIA-SQL**

User name: **ADVENTUREWORKS\Student**

Password: **Pa55w.rd**

All the lab steps are contained in 20778C_LAB_06.md.

Exercise 1: Connecting to Power BI data

Scenario

You have decided to explore the features in Power BI because you believe that they offer the best solution to enable business users to create self-service BI solutions. To convince the business users that this is the best option, you will build a sample report to demonstrate the capabilities of the features in Power BI. You will create reports in Power BI Desktop by using corporate data that is stored in a database in Azure SQL Database. After importing the data, you will shape the data by using the Power BI

transformation tools. You will then combine the data by merging columns and appending rows.

The main tasks for this exercise are as follows:

1. Prepare the environment.
2. Connect to existing data in Azure.
3. Shape data.
4. Combine data.

Result: After this exercise, you should have imported data from Azure, shaped it by using the Power BI transformation tools, and combined the data by merging columns and appending rows.

Exercise 2: Building Power BI reports

Scenario

You are happy that Power BI can import the data that you require and shape it, so you have decided to add visualizations to the report to display the data. After creating the report, you will show its capabilities to your senior managers to convince them

that Power BI is a suitable platform for adopting self-service BI within your organization.

The main tasks for this exercise are as follows:

1. Create a chart.
2. Create a map visualization.

Result: After this exercise, you should have created a report that has chart visuals and is ready to publish to the Power BI service.

Exercise 3: Creating a Power BI dashboard

Scenario

The reports that you have created are ready to present to senior management. However, you have decided that you will first publish them to the Power BI service, to demonstrate its true potential by creating a dashboard.

The main tasks for this exercise are as follows:

1. Publish reports from Power BI Desktop.
2. Create a Power BI dashboard.

Result: After this exercise, you should have published a report to the Power BI service and used the visuals to create a dashboard.

Review question(s)

Check your knowledge

Discovery

Discuss the tools that you used to shape and combine data in the labs. How did this compare to using Excel, or coding Transact-SQL to deliver the same results? Do you think it is quicker to use Power BI rather than the applications that you currently use?

Show solution Reset

Check your knowledge

Discovery

Discuss some of the visualizations that you used in the optional exercise to create a report that was relevant for your organization. If you did not have time to do the optional exercise, which of the charts that you used in the lab will you reuse to create reports for your organization? Can you think of data that you can present by using the map charts?

Show solution Reset

Module review and takeaways

In this module, you have learned how to enhance your Power BI charts by using interactive data visualizations, and how to manage your Power BI solutions.

Review question(s)

Check your knowledge

Discovery

Why do you think the Manage Data portal prevents you from deleting data sources? Do you agree with this, or should you be able to delete the data sources for the queries that you have shared?

Show solution Reset