



Introduction to Microsoft Power BI

Microsoft Office 2016 Training Materials

Introduction to Microsoft Power BI

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Courseware Release Version 4.0

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ABOUT THIS COURSE

Course Prerequisites

This manual assumes the user has an intermediate knowledge of Microsoft Excel and Microsoft Access, as well as a basic knowledge of Windows and web browsers.

Course Overview

Welcome to Introduction to Microsoft Power BI! This powerful collection of software, apps, and services will help you analyze your organization's data and uncover insights and trends. This course will show you how to link and model data in Power BI and create visual reports that reveal data insights. Although the Power BI desktop client will be the primary focus, an introduction to the Power BI web app will also be provided.

Course Objectives

By the end of this course, users should be comfortable with:

- The purposes and basic functions of the core Power BI components
- Using the Power BI desktop client and web app
- Connecting to a data source using either the Power BI desktop client or the web app
- Modeling data
- Creating reports and visualizations

How To Use This Book

This course is divided into five lessons. Each lesson focuses on several key topics, each of which are broken down into easy-to-follow concepts. At the end of each topic, you will be given an activity to complete. At the end of each lesson, we will summarize what has been covered and provide a few review questions for you to answer. Supplemental learning for selected topics is provided in the form of Lesson Labs at the end of this book.

Before you begin, download the course's Exercise Files to a convenient location. They will be referenced throughout this course and are a key part of your learning experience.

The samples referenced throughout this course have been provided by obviEnce (www.obvience.com) through Microsoft. More information is available at <https://docs.microsoft.com/en-us/power-bi/sample-datasets>.

Please note that the Power BI desktop client is updated monthly and the web app is updated weekly. Therefore, the images you see in this course may differ from the current services. This manual uses the January 2018 version of the desktop client and web app.

Before beginning, users should install the Power BI desktop client and sign up for the service.

LESSON 1: GETTING STARTED

Lesson Objectives

In this lesson you will learn how to:

- Describe the components of Power BI
- Work with Power BI files
- Connect to data sources with the Power BI desktop client
- Create a report and visualizations
- Work with visualizations

TOPIC A: An Introduction to Power BI

To start this course, you will learn about the different elements of the Power BI service and its fundamental components. You will also take your first look at desktop client and web app interfaces.

Topic Objectives

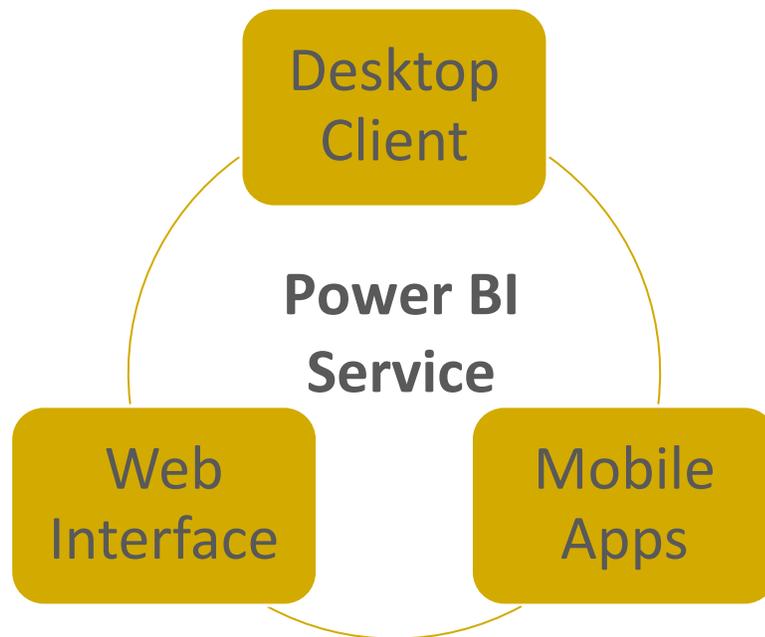
In this topic, you will learn:

- What Power BI is
- About the Power BI building blocks
- About the desktop client interface
- When to expect Power BI updates

What is Power BI?

Power BI is a collection of software, apps, and services designed to aggregate data so users can easily report on and interpret it. It offers many easy-to-use visualization and reporting tools. It also supports a wide range of data sources, from Facebook analytics to Azure data warehouses and everything in between.

There are three key parts to Power BI, which are all supported by the Power BI service:

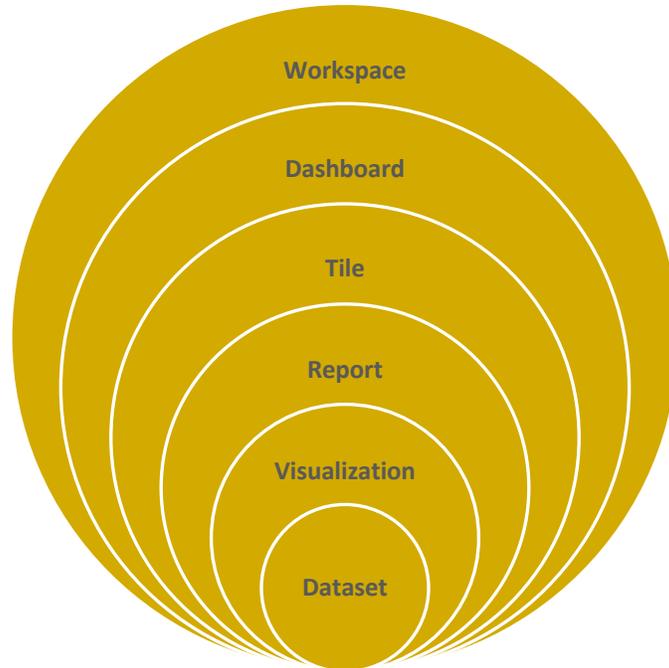


Power BI also offers many different connectors so that its data can be shared with, and embedded into, Microsoft apps such as SharePoint and Teams.

Typically, users will start by creating a **report** in Power BI from connected data sources. The user then publishes that report to the service and shares it, making it available to other users via the web interface and mobile apps. The web interface and mobile apps also support **dashboards**, which provide a customized summary of report visualizations, and **workspaces**, which allow users to create custom dashboard collections.

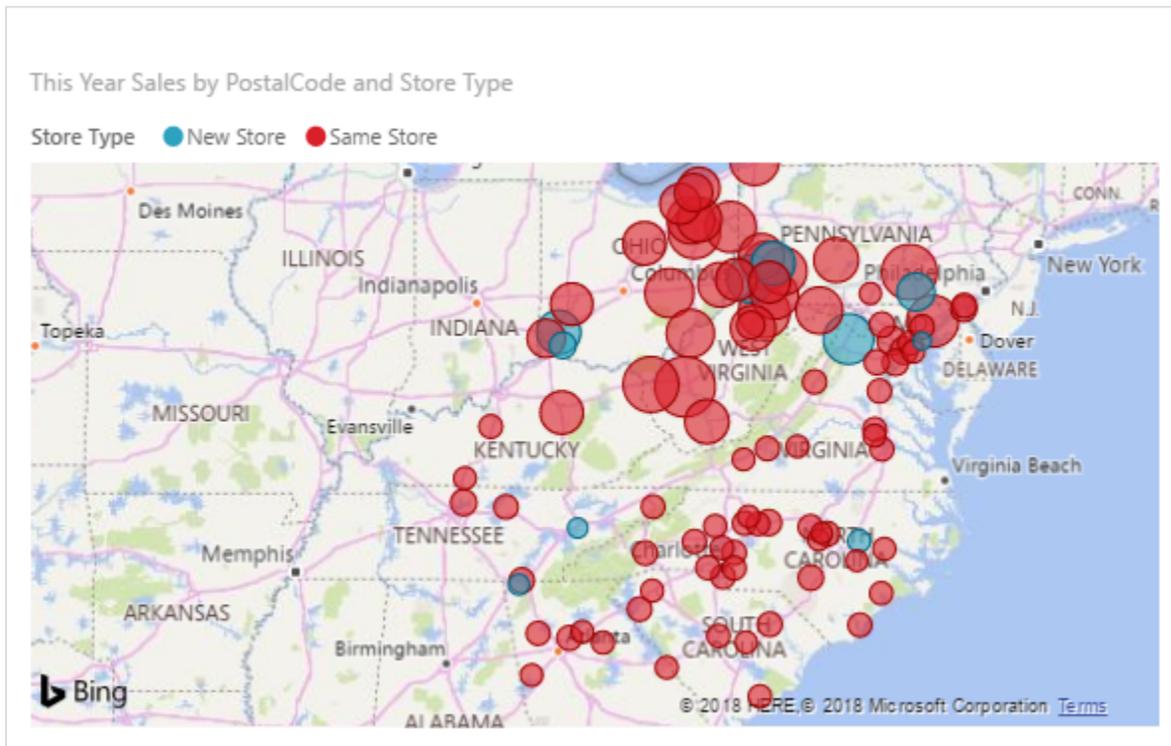
The Building Blocks of Power BI

Let's look at how all these elements work together in Power BI.



It all starts with the **dataset**, which simply means the data you have connected to. This might be an Excel workbook, Facebook analytics, and/or an SQL database (just to name a few of the options). These datasets are then added to **reports** as **visualizations**, which present that data in a graphical way.

For example, sales by region might be presented as a map, with a bubble representing each amount:



The Power BI web and mobile apps go a step further with **dashboards**, which allow you to collect visualizations from different reports into a single location. (The desktop client does not offer this feature.) For example, you might have a different dashboard for each region in your company, or a separate dashboard for revenue and expenses.

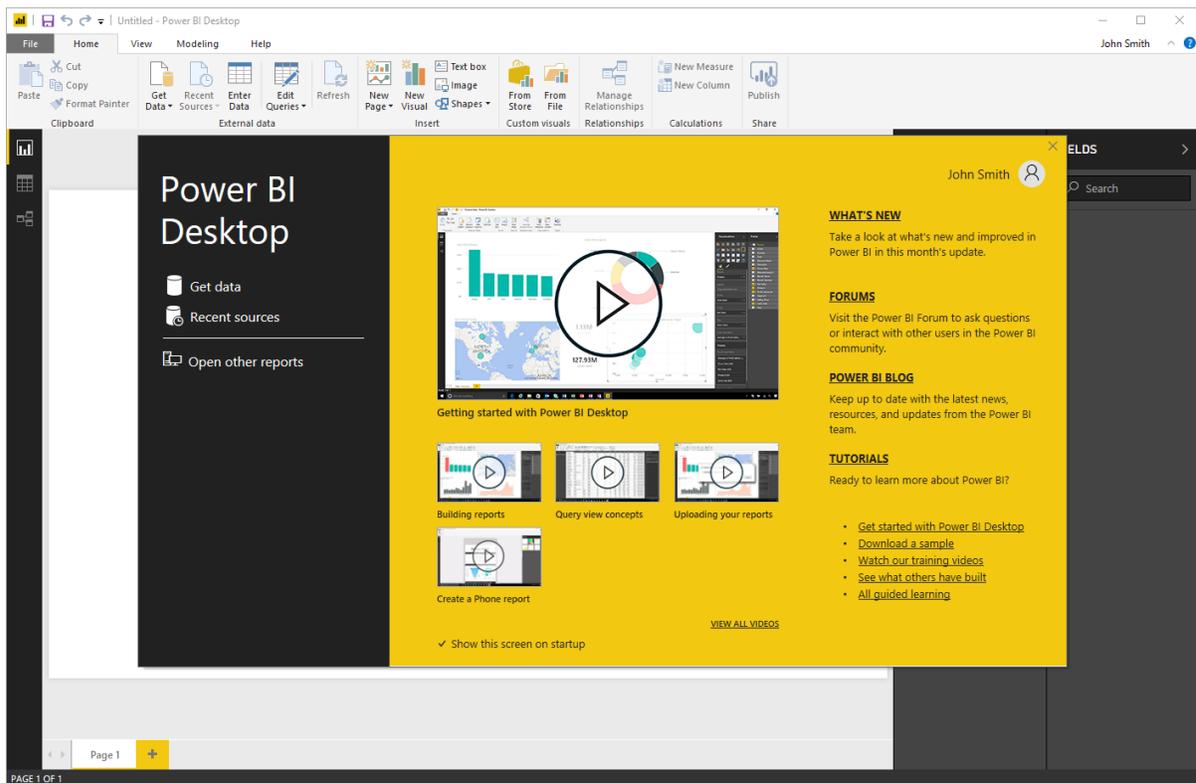
Each dashboard is made up of **tiles**, which are simply visualizations linked back to the original report. These dashboards can be collected into **workspaces**.

The Power BI Desktop Interface

To use the Power BI desktop client, get the installation package from the Windows Store or the Power BI website (<https://powerbi.microsoft.com/en-us/desktop/>). Once you have installed it, double-click the icon to start it:

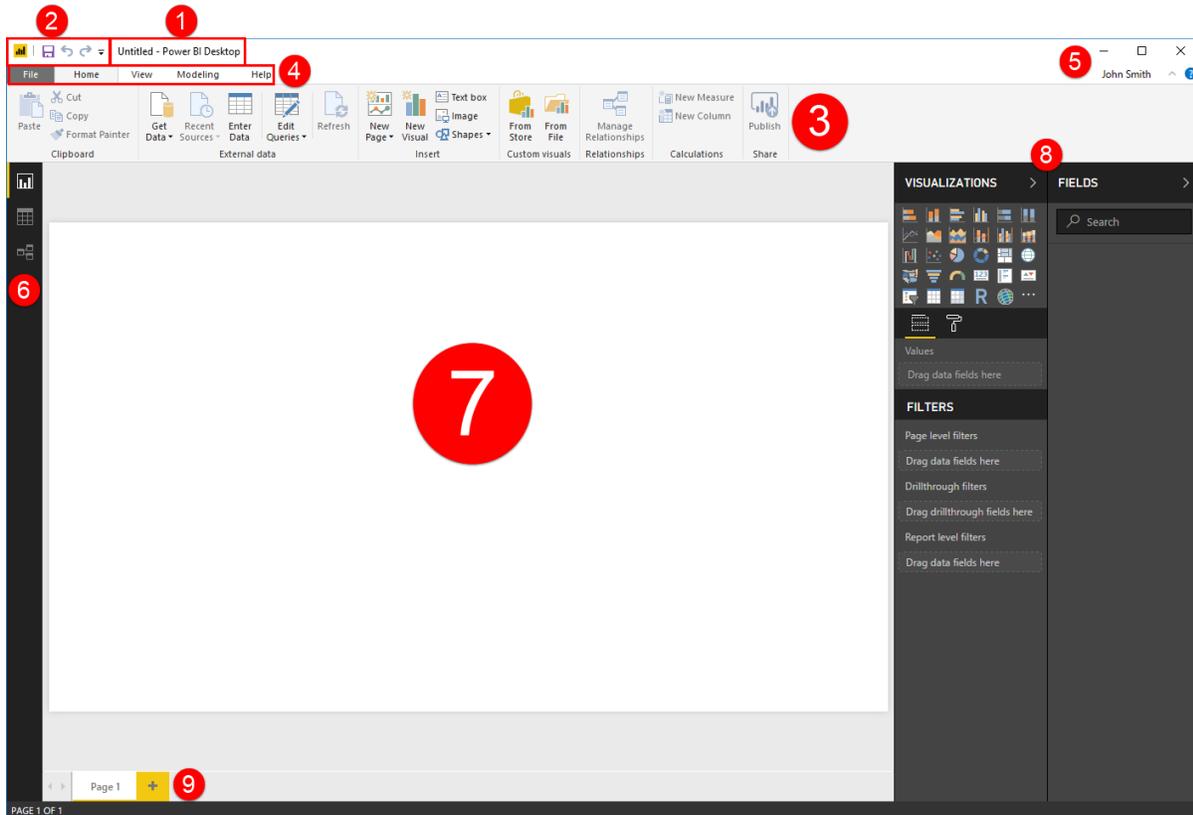


The app will then launch and display the Start screen:



Here, you can explore what's new, find help, watch videos, and create and open reports.

When this window is closed, the main interface will be displayed:



Let's explore each part.

1: Title Bar

The name of the program and the currently open file are displayed here.

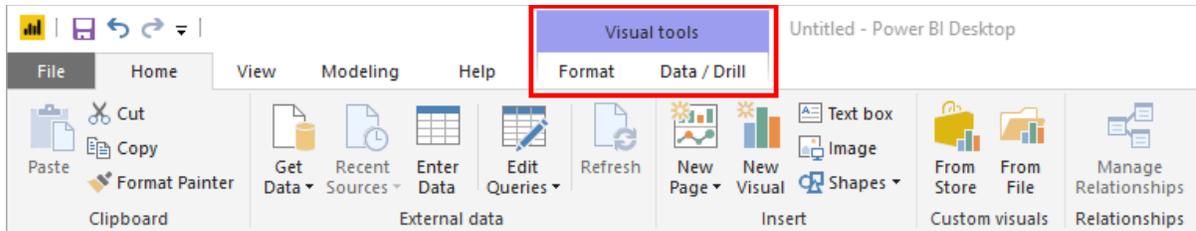
2: Quick Access Toolbar

As the name implies, the Quick Access toolbar gives you quick access to frequently used commands. Use the drop-down arrow to remove icons or change its position.

3 and 4: Ribbon Interface

Displays tab commands organized into groups. If you click the different **tabs (4)**, you will see the **commands (3)** change. Some of the commands might be grayed out (unavailable) if they are only usable in certain situations.

Power BI also features **contextual tabs**, which appear when you are working with a specific object or group of information. These tabs are usually denoted by a different color:



5: Program and Account Management

Using the top set of icons in the top right-hand corner of the screen, you can change how the ribbon is displayed, minimize the window, maximize/restore the window, or close the current file. Below this, you will see your Microsoft account name (or a command to sign in), a chevron to minimize the ribbon, and a help icon.

6: Navigation Pane

From top to bottom, choose if you want to work with reports, data, or relationships.

7: Canvas

The data in the currently open file will be shown here. In Report view, this is where you will create and work with visualizations.

8: Task Panes

Additional commands appear in these vertical task panes. Here, you can see the two default task panes: Visualizations/Filters and Fields.

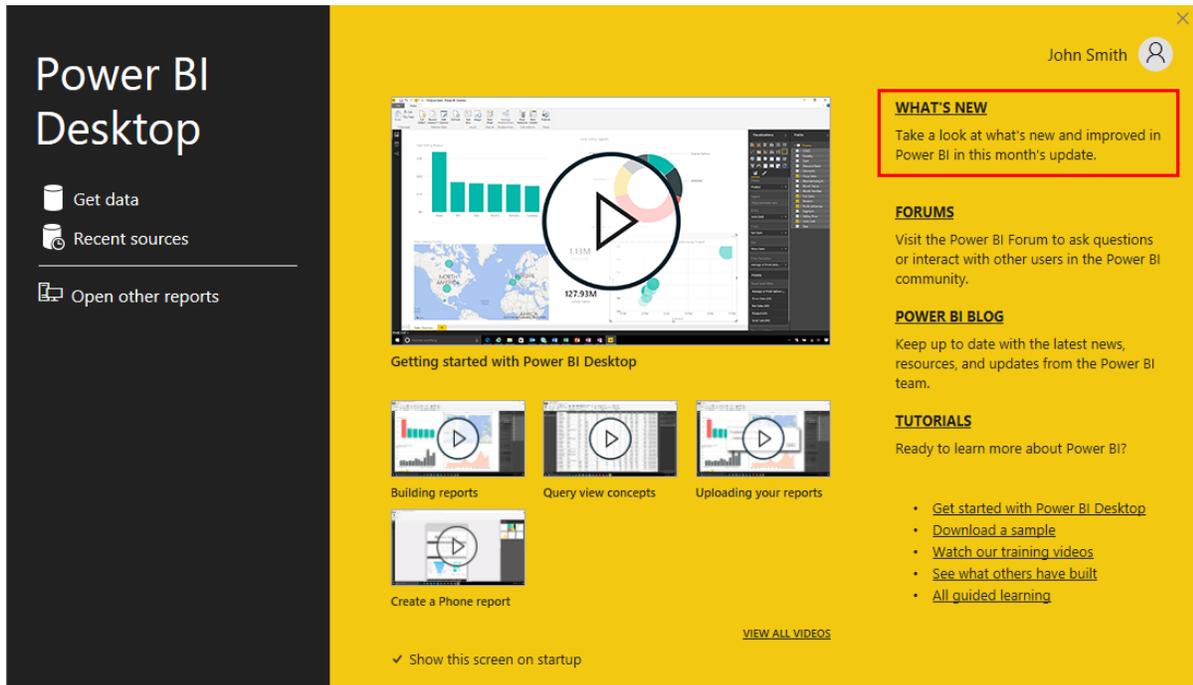
9: Page Navigator and Status Bar

Navigate through and manage pages in your report.

Important Information About Power BI Updates

The Power BI desktop client is updated monthly and the web app is updated weekly. Therefore, the images you see in this course may differ from the current services. However, the general instructions should stay the same.

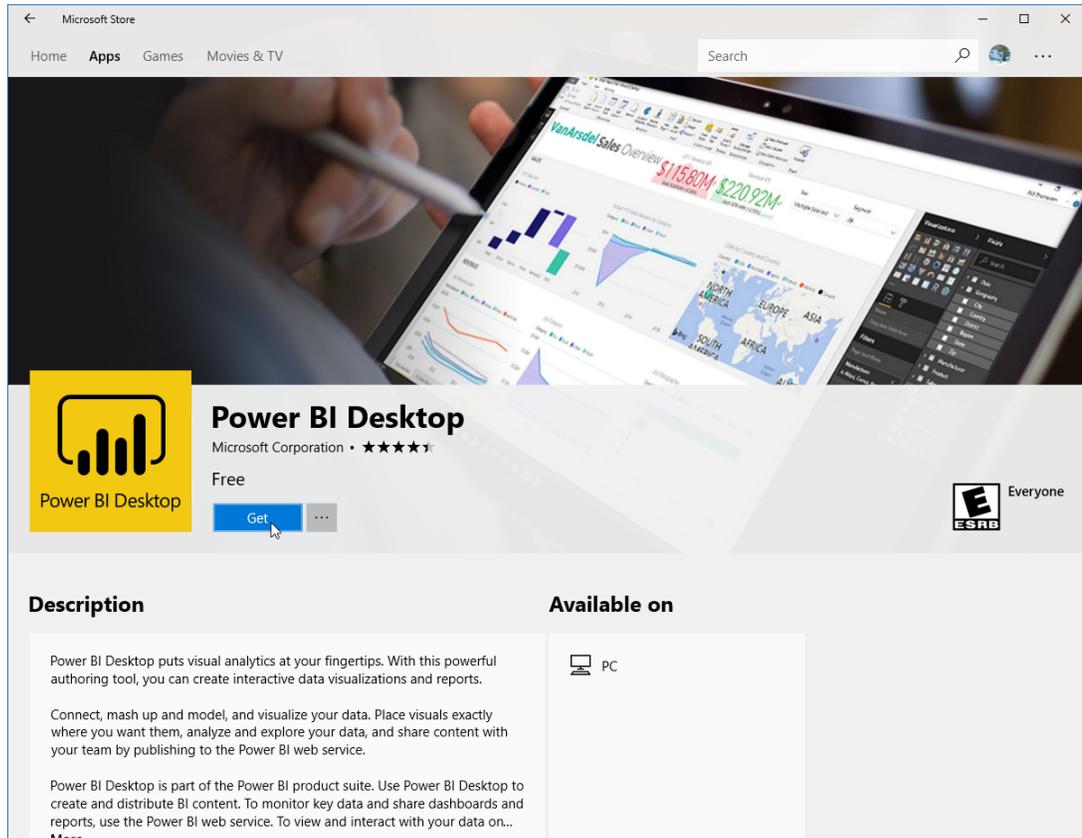
If you are using the desktop client, the Start screen will prompt you if updates are available. You can also access a link to see new features:



Activity 1-1: An Introduction to Power BI

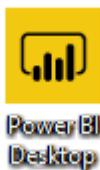
In this activity, learners will install and launch the Power BI desktop client. They will also explore the Power BI web app.

1. Download and install the Power BI desktop client from the Microsoft Store:

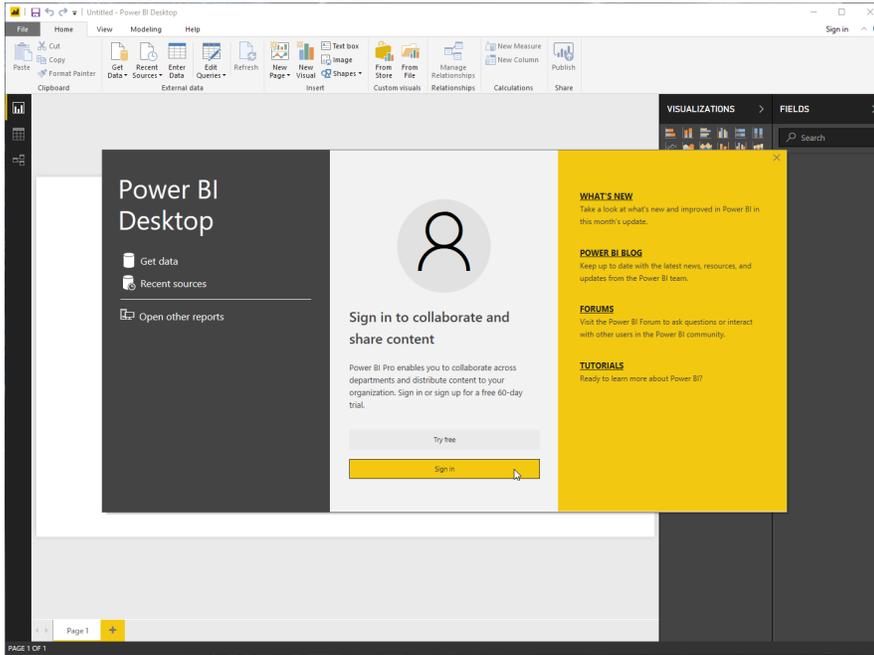


(If you have already downloaded and installed the app, skip to the next step.)

2. Double-click the icon to launch it:

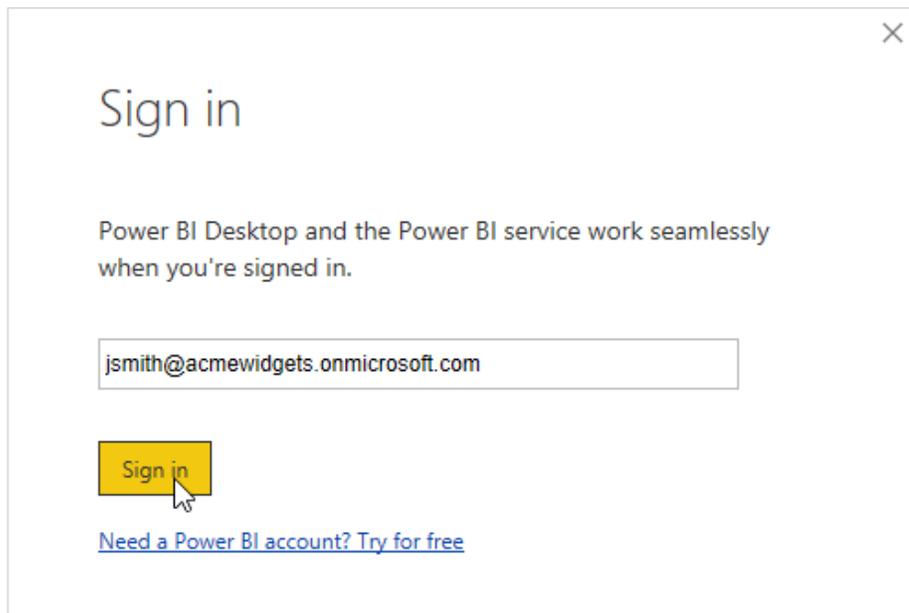


3. Click "Sign in:"

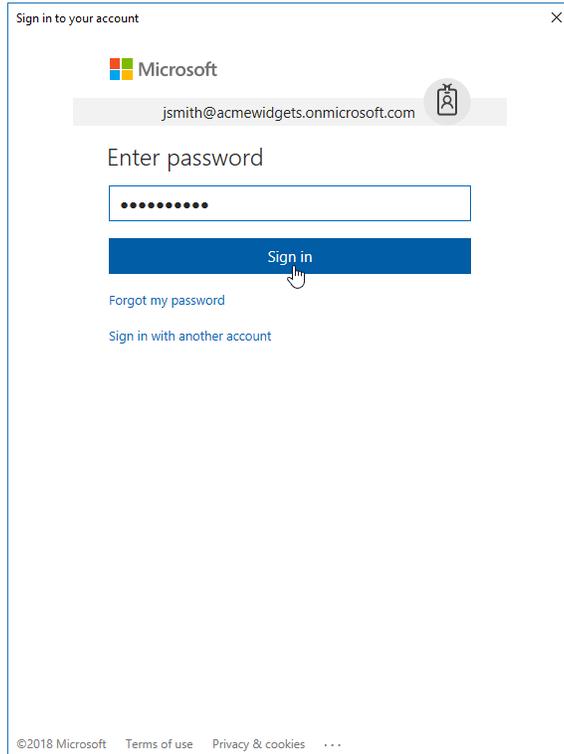


(If you are already signed in, close the Start screen and skip to Step 6.)

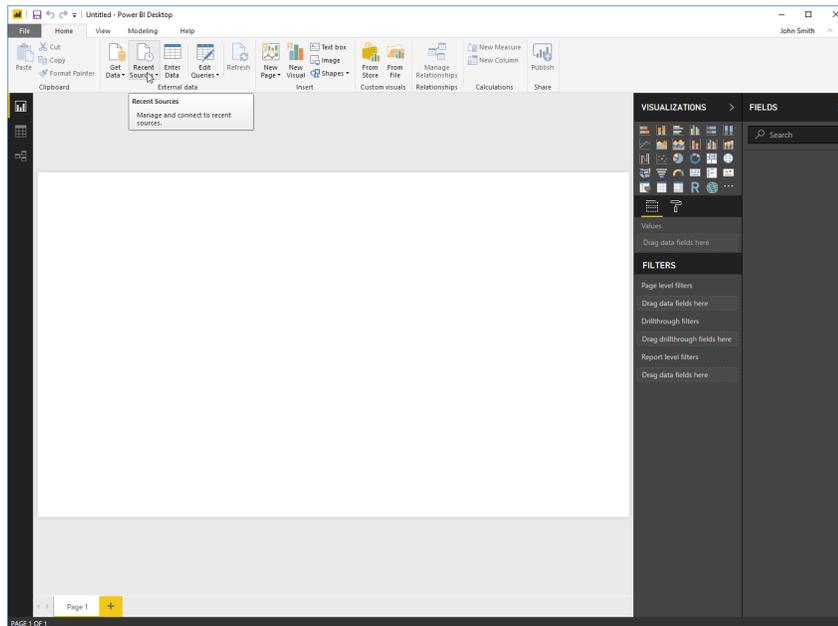
4. Enter your email address and click "Sign in:"



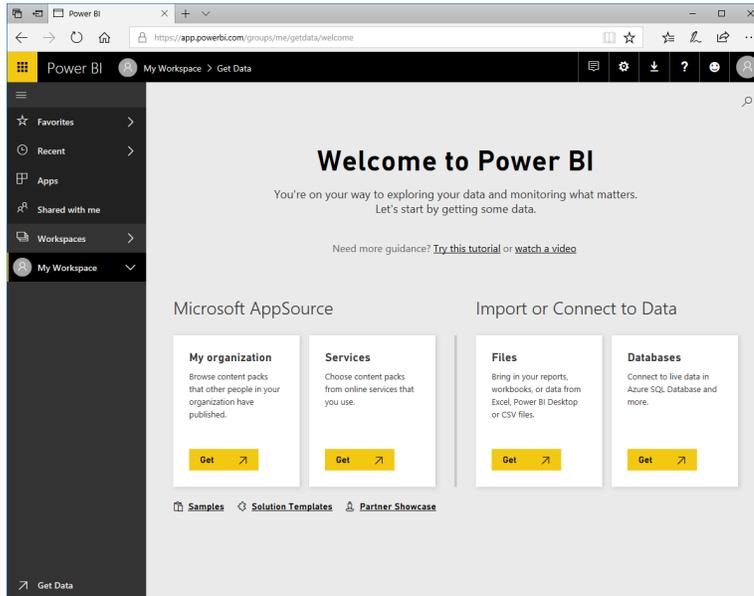
5. Enter your password and click “Sign in:”



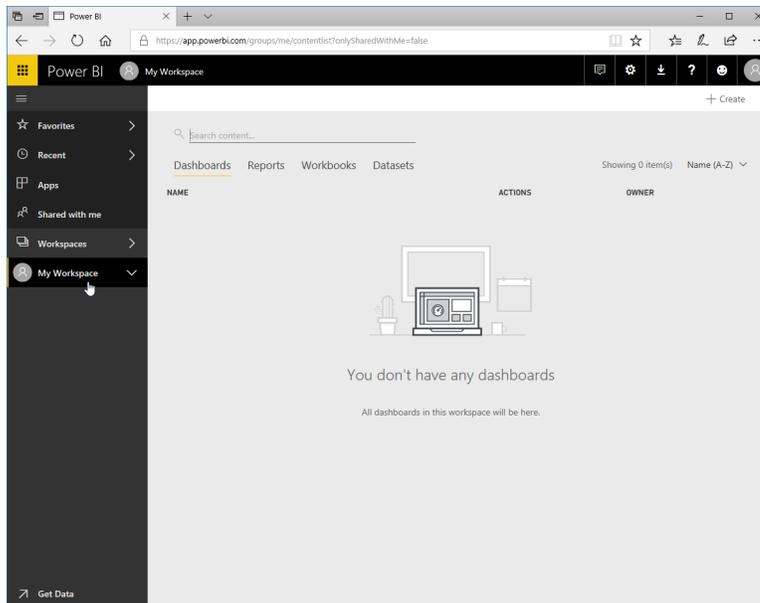
6. The Power BI interface will now be displayed. Review the parts of the interface and move your mouse over some of the commands to see more information:



- Next, launch Microsoft Edge and navigate to <https://app.powerbi.com/>. Sign in when prompted to see the Power BI web app:



- Take a moment to explore the app:



- Close all open windows to complete this activity.

TOPIC B: Working with Power BI Desktop Files

Like many other Office programs, Power BI has its own file format (.pbix), as well as the ability to create, open, and save standalone files. It also syncs with the Power BI web app so that your data can be accessed from anywhere, including Power BI mobile apps.

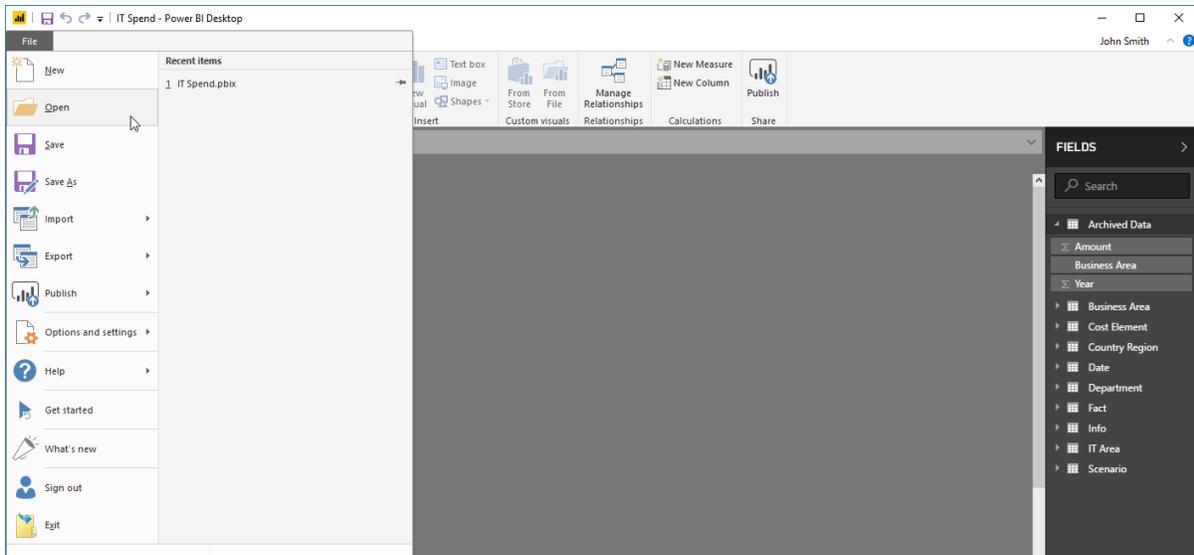
Topic Objectives

In this section, you will learn how to:

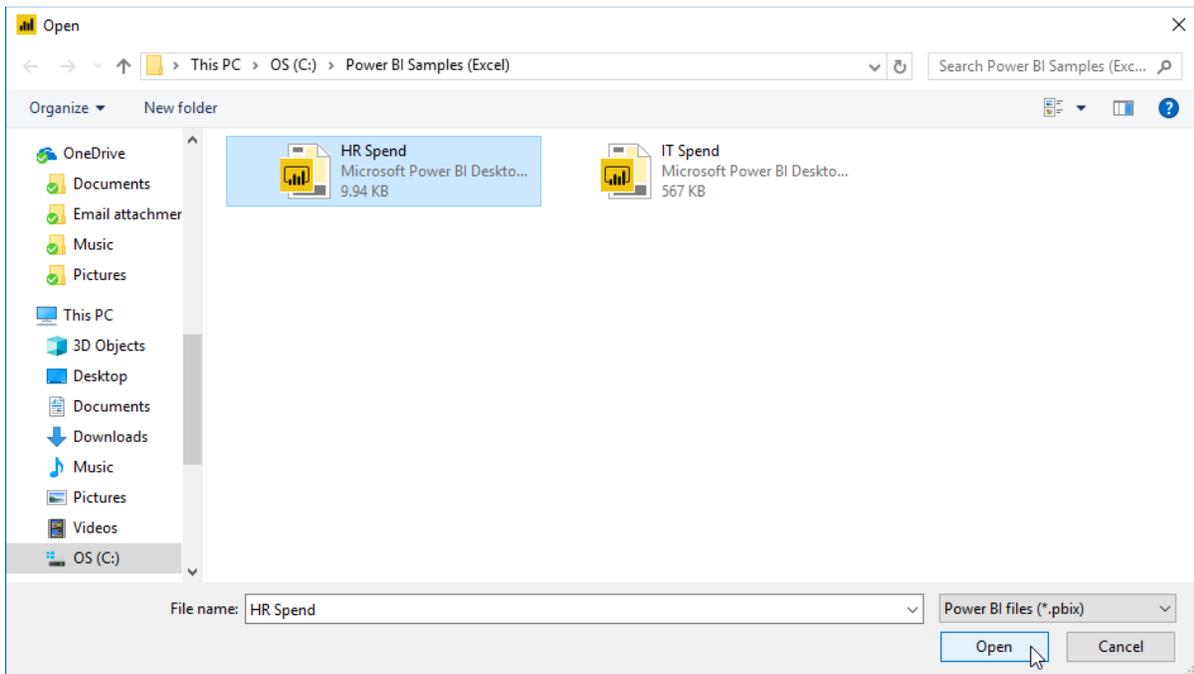
- Create, save, and open Power BI files
- Publish files to the Power BI web app

Opening Files

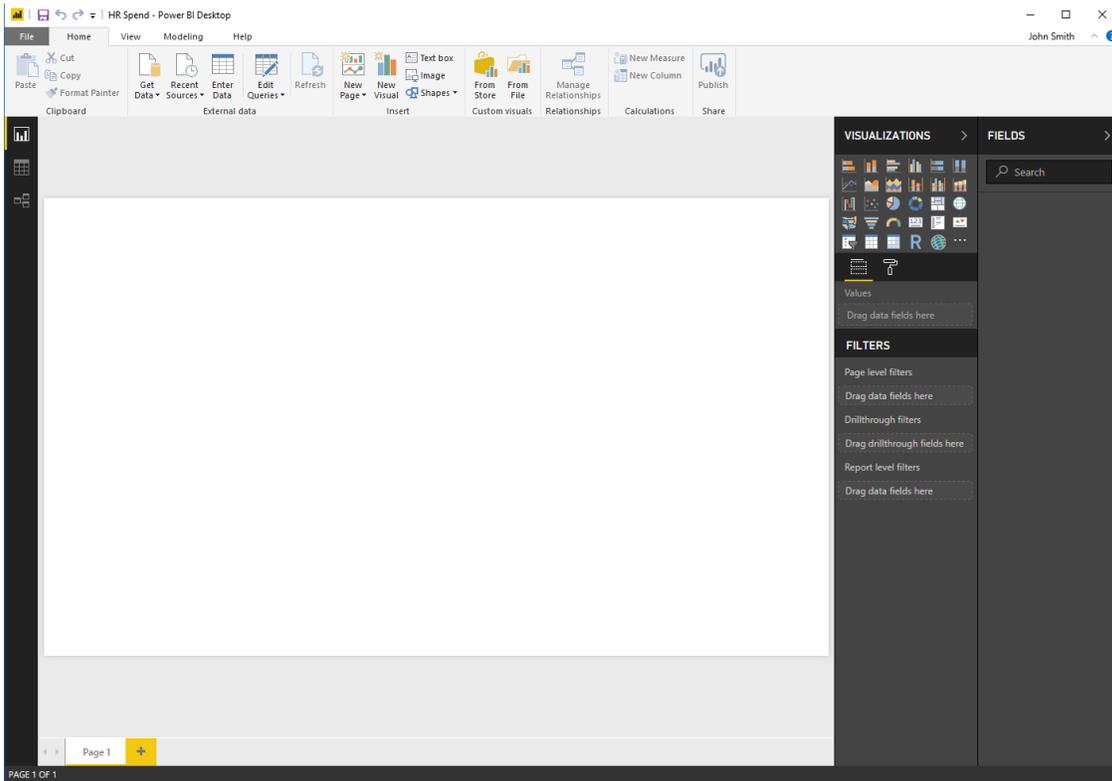
To open a file, click File → Open:



(You can also click a shortcut in the “Recent items” list to open it directly.) Next, navigate to your file, select it, and click Open:

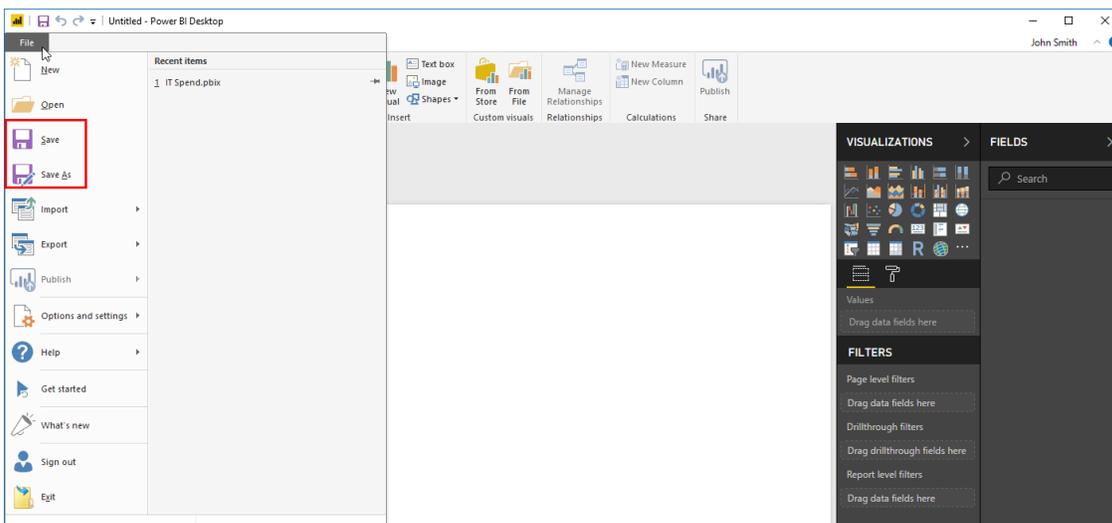


The file will now open in a new instance of Power BI, ready for use:

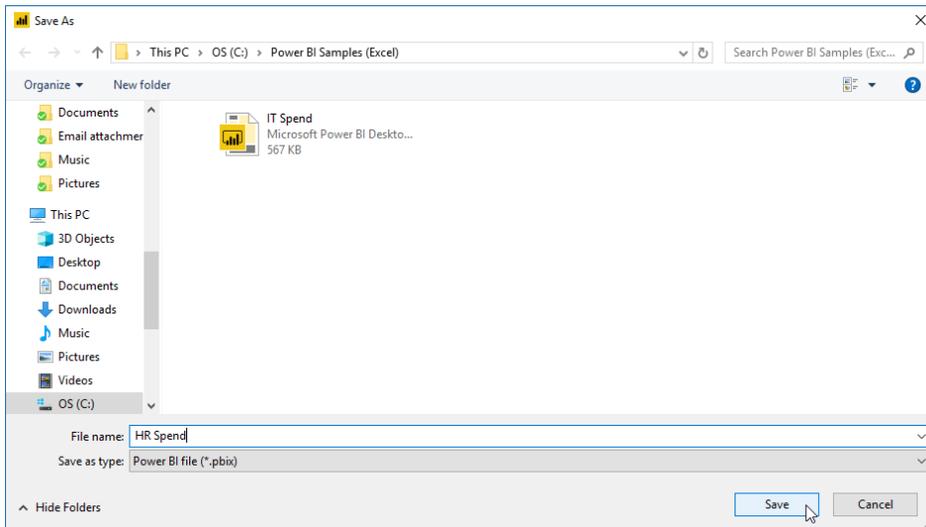


Saving Files

To save a file, click File → Save or Save As:



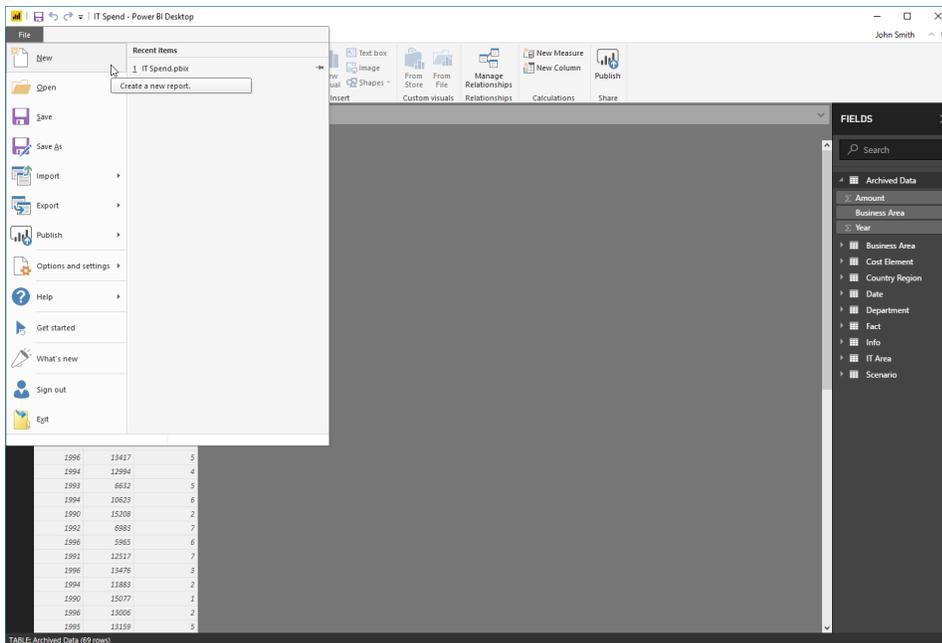
The Save As dialog will open. Here, you can choose a location and name for your file. Click Save when you are ready:



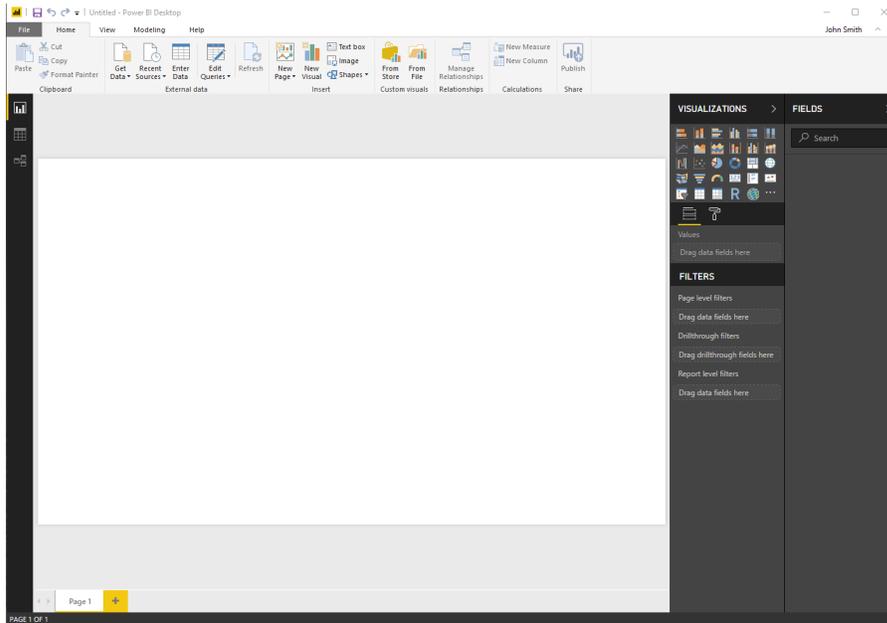
The file will now be saved.

Creating a New File

To create a new Power BI file, click File → New:



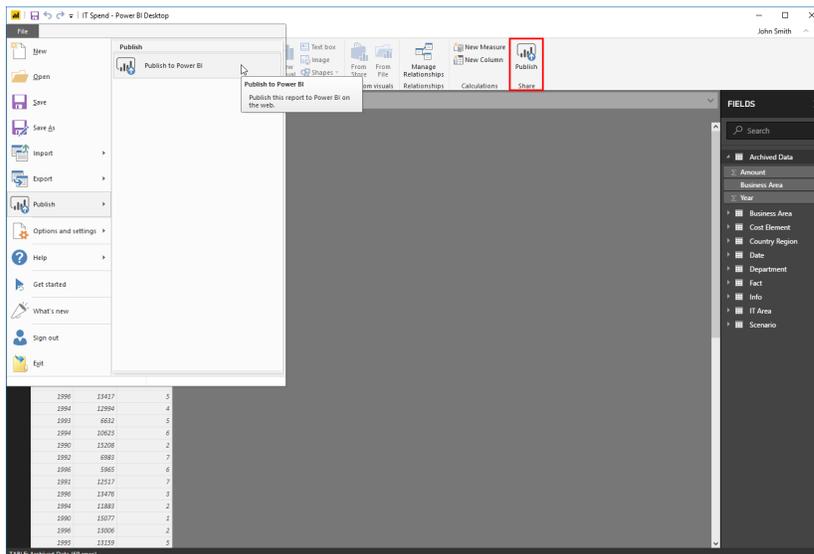
A new Power BI instance will open:



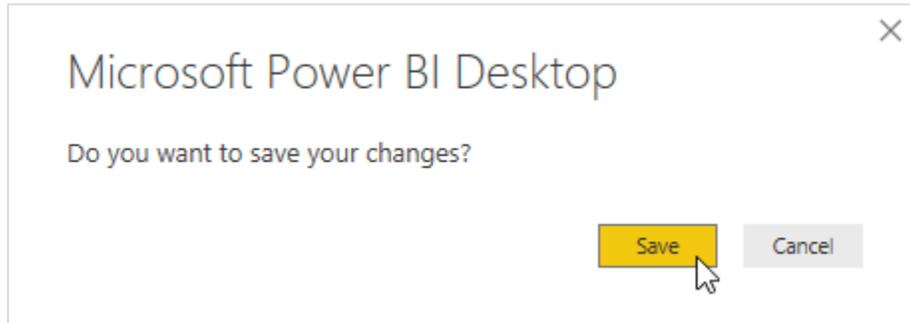
You can now work with the file.

Publishing to the Power BI Web App

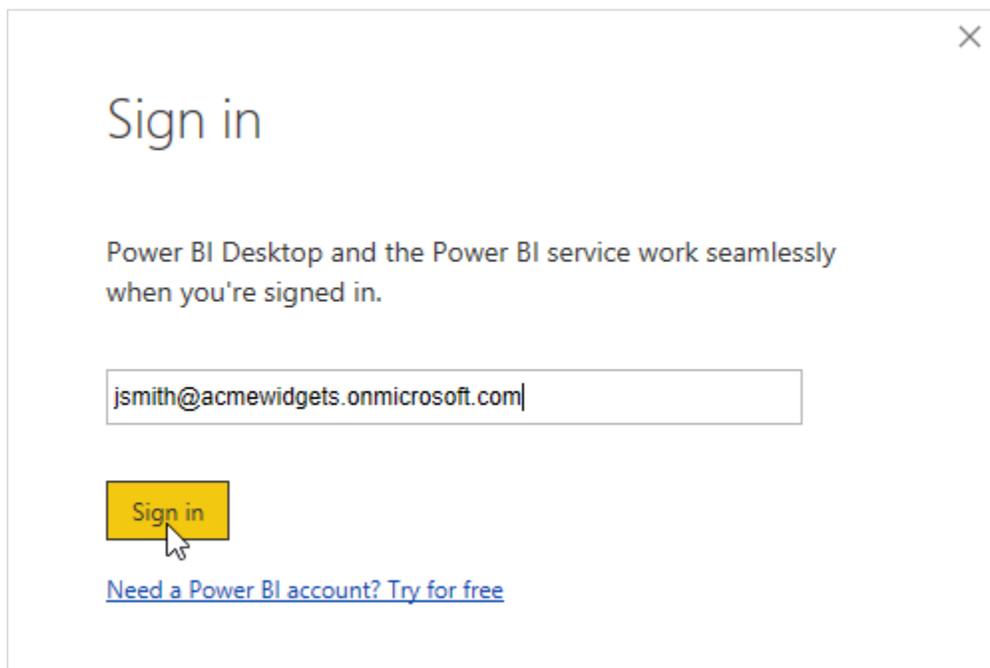
To publish your data to the Power BI web app, click File → Publish → Publish to Power BI, or click the Publish command on the Home tab:



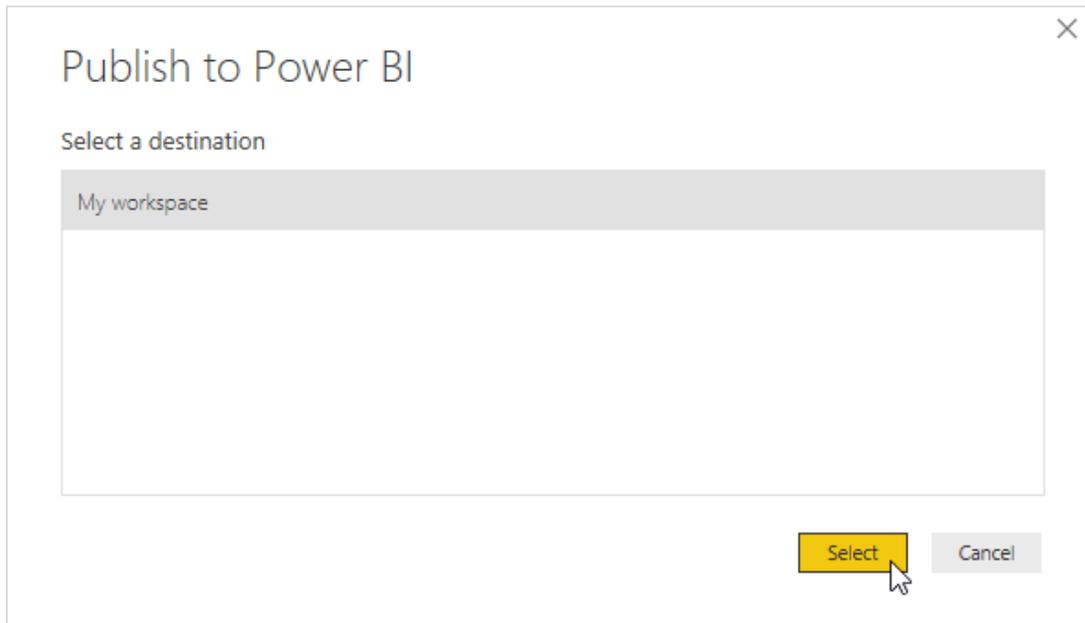
If prompted, save your changes:



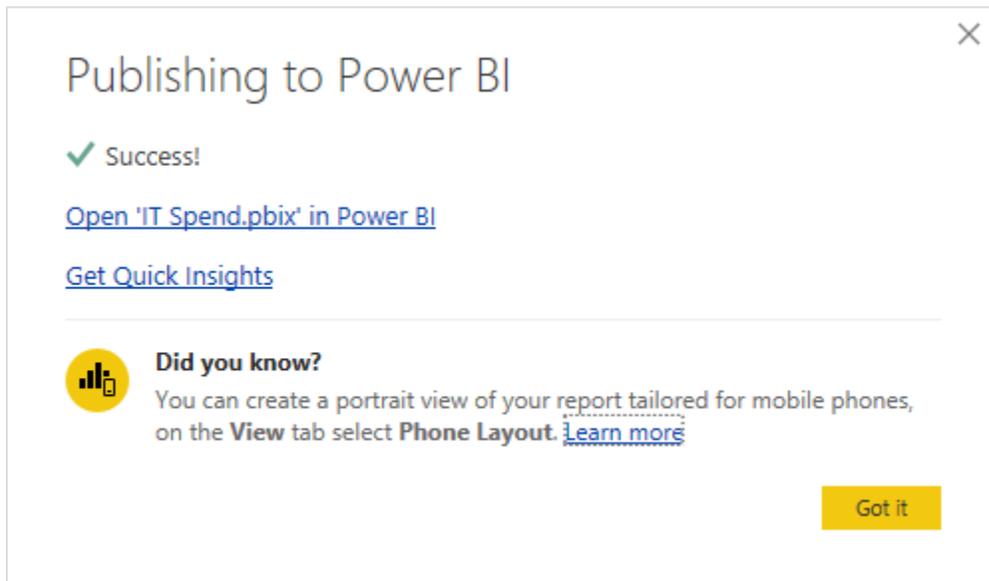
And sign in if prompted:



Next, select a destination for the file. We will use the default “My workspace:”



When the process is complete, you will see a notification:



You can open the data in the Power BI web app or click “Got it” to return to the Power BI desktop client. We will learn more about the Power BI web app in Lesson 5.

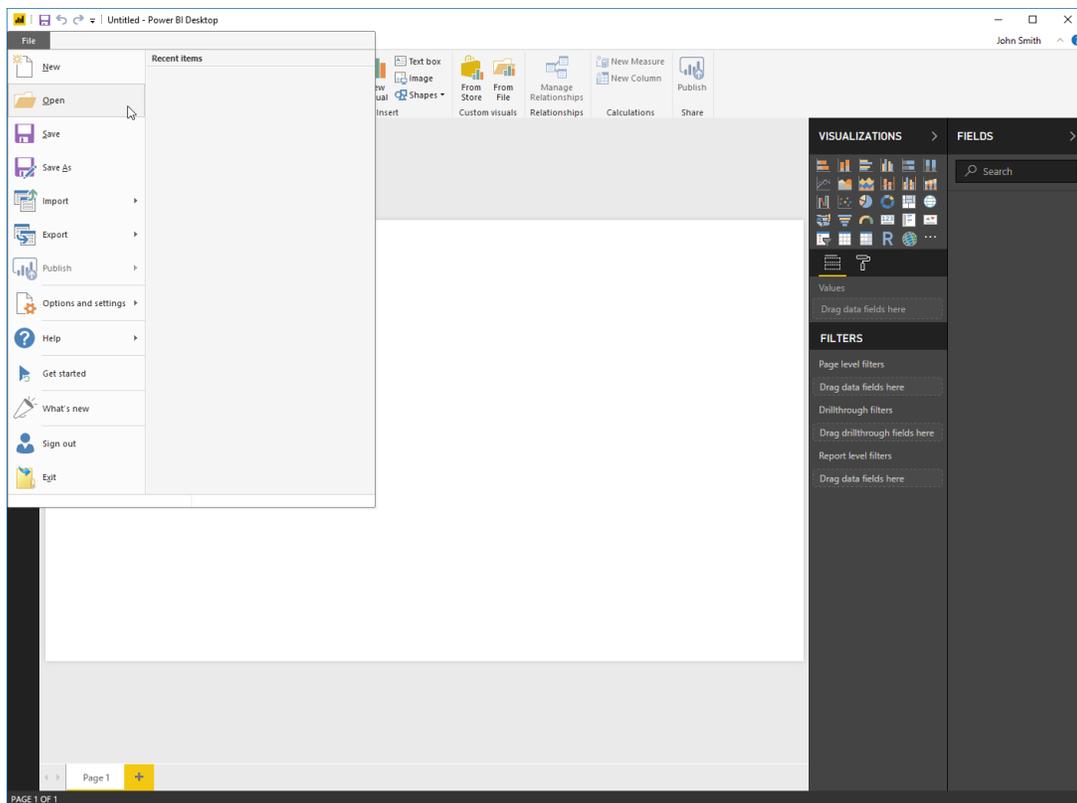
Activity 1-2: Working with Power BI Desktop Files

In this activity, you will open an existing Power BI file and use it to set up a new file.

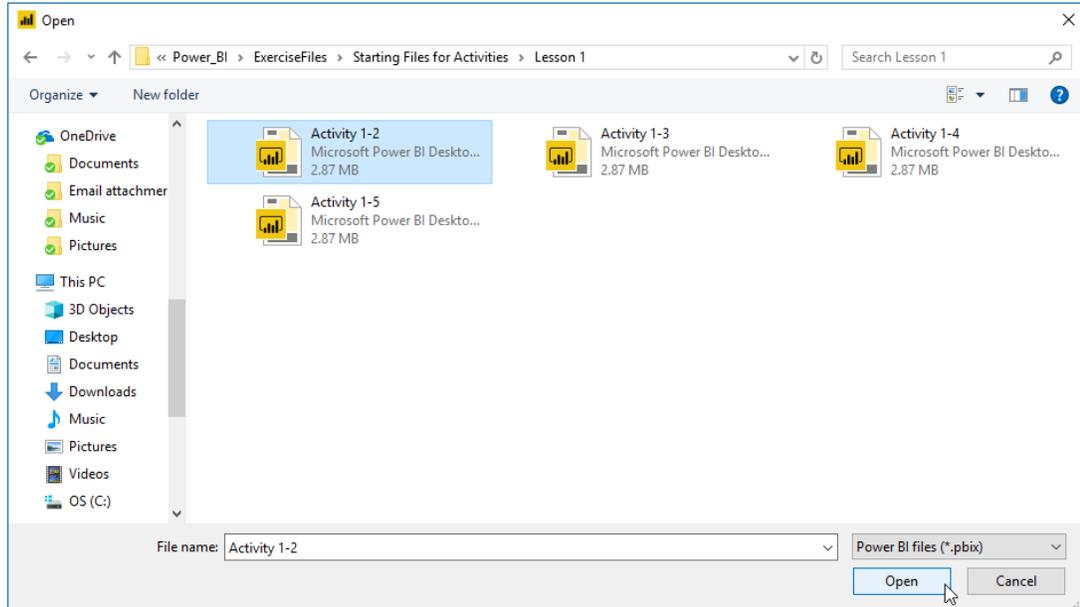
1. Open Power BI:



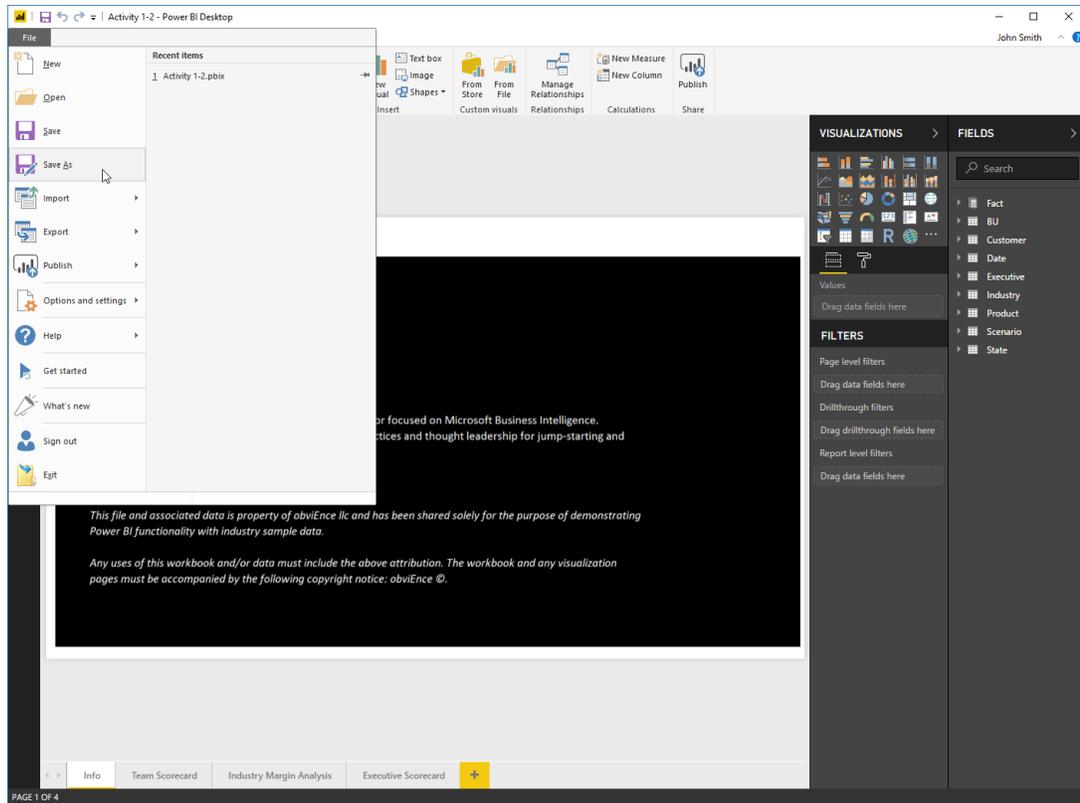
2. Close the Start screen if it appears. Then, click File → Open:



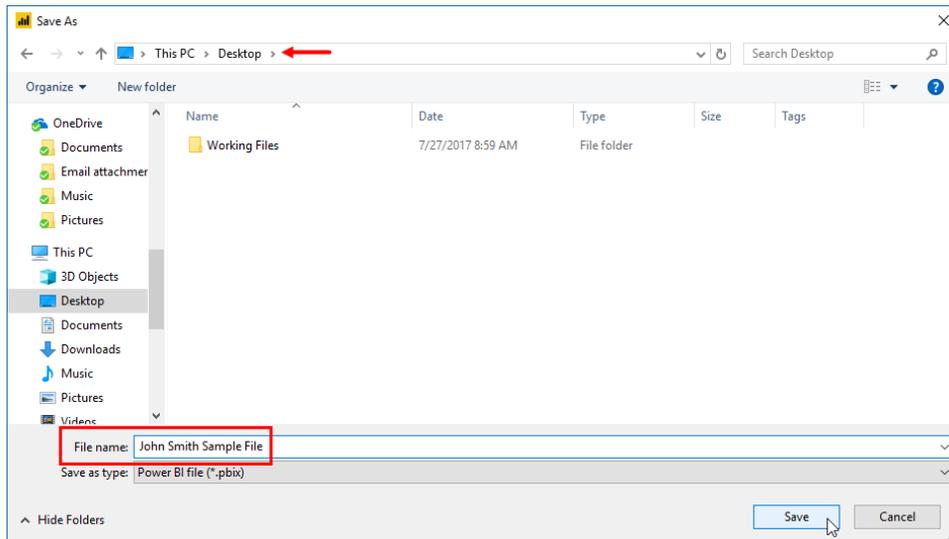
3. Navigate to your Exercise Files folder. Select Activity 1-2 and click Open:



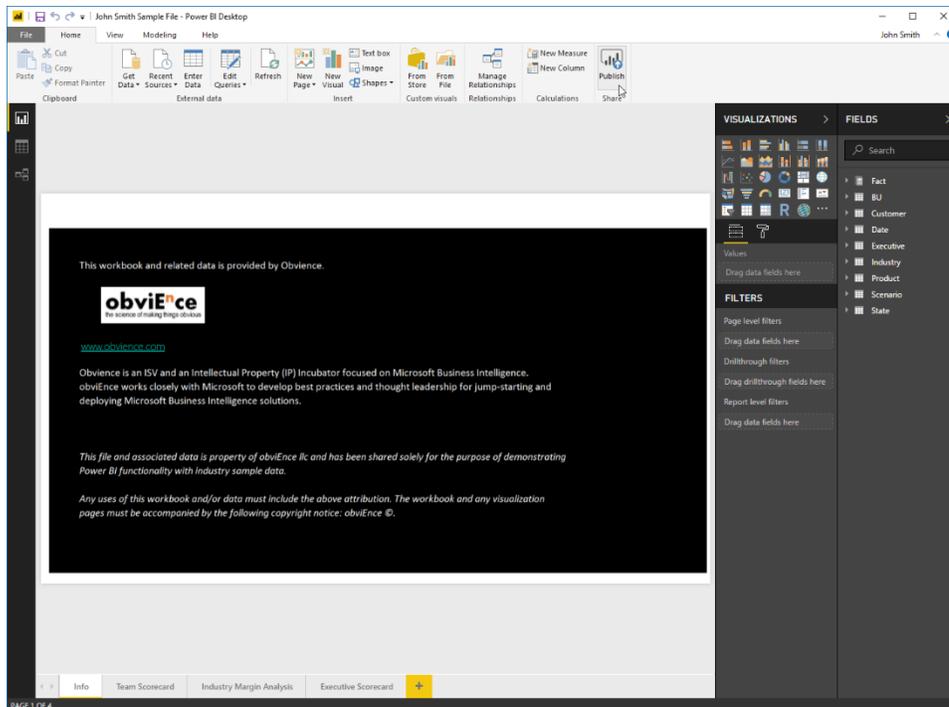
4. Now, let's save a copy of this file so we can modify it. Click File → Save As:



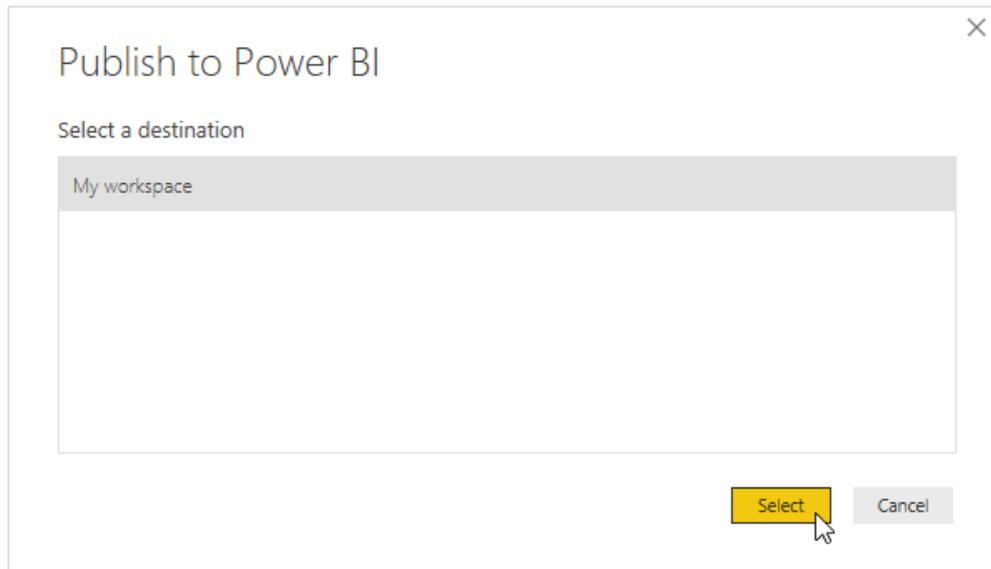
5. Navigate to your desktop. Then, enter “<Your Name> Sample File” as the file name. Click Save:



6. Now we are ready to publish this file to the Power BI web app. Click Home → Publish:

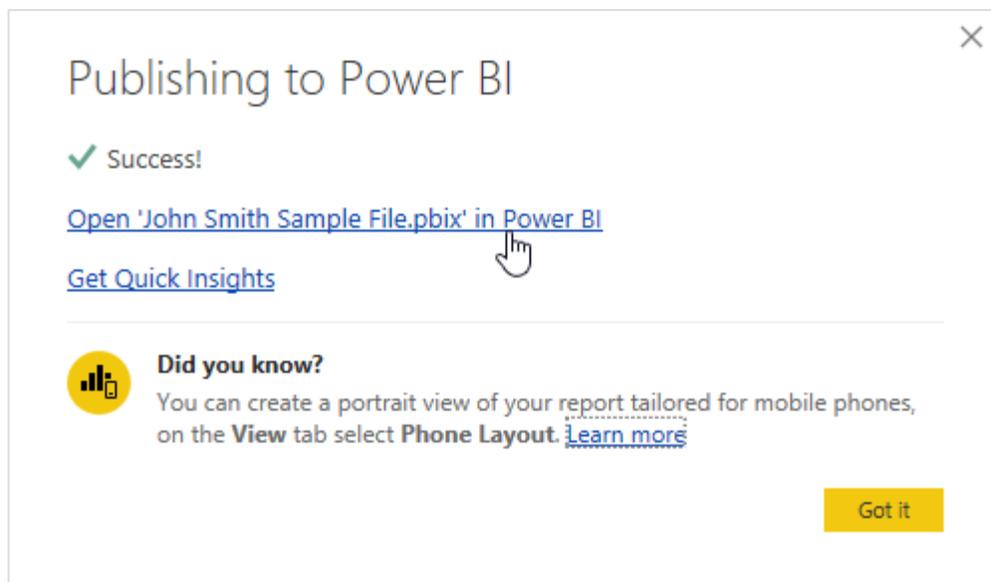


7. First, you will be asked to choose a destination for the file. The default location is fine, so click Select:

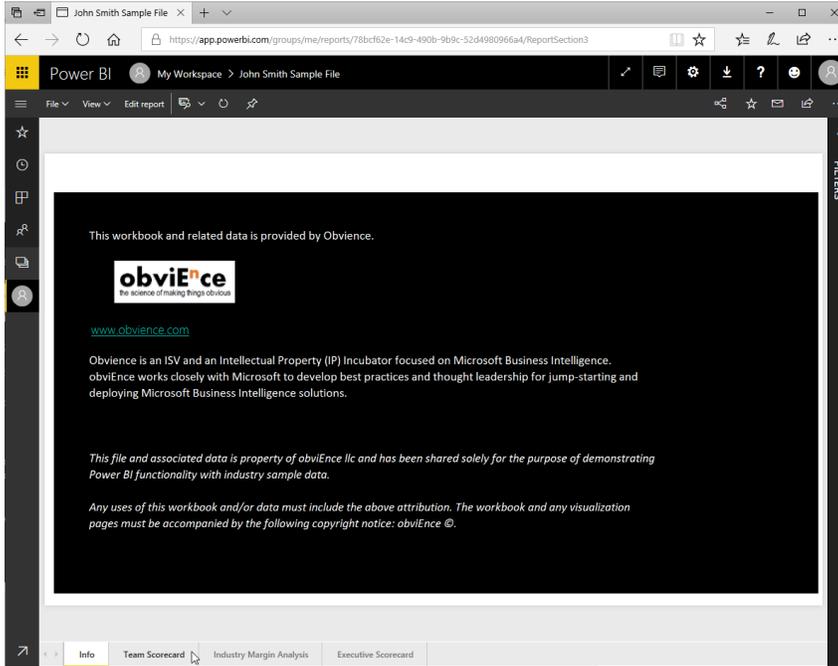


(If you are prompted to sign in, do so.)

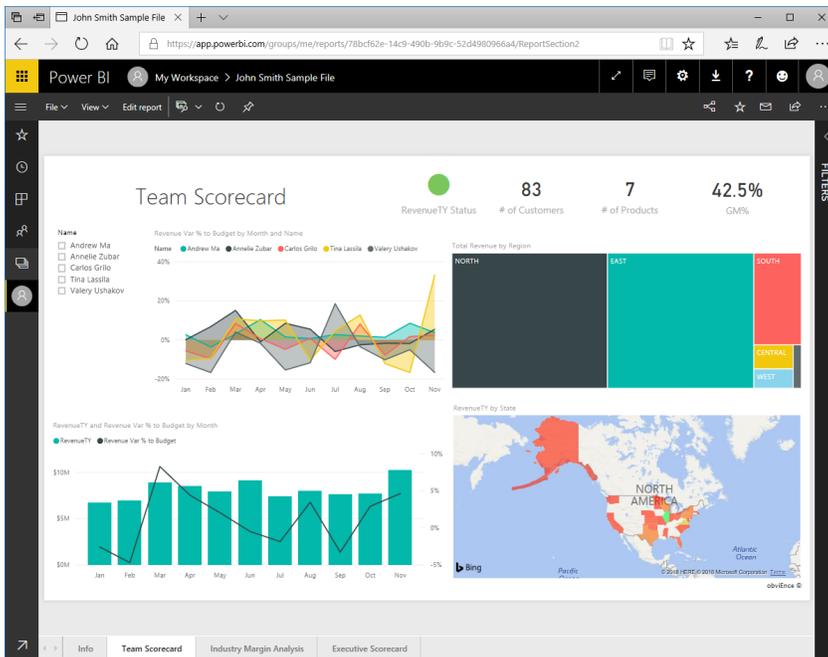
8. When you receive a completion notification, click the top link to see it in the web app:



- 9. The Power BI web app will open and display the report. Click any of the tabs at the bottom to see a sample page:



- 10. Review the report page, and then close your Internet browser to complete this activity:



TOPIC C: Connecting to Data Sources with Power BI Desktop

Your first step after creating a Power BI file will be to connect your data to it. We will cover the two most common scenarios (Excel workbooks and Access databases) and show you where to find additional options if you need them. We will also discuss creating a manual dataset and managing data sources.

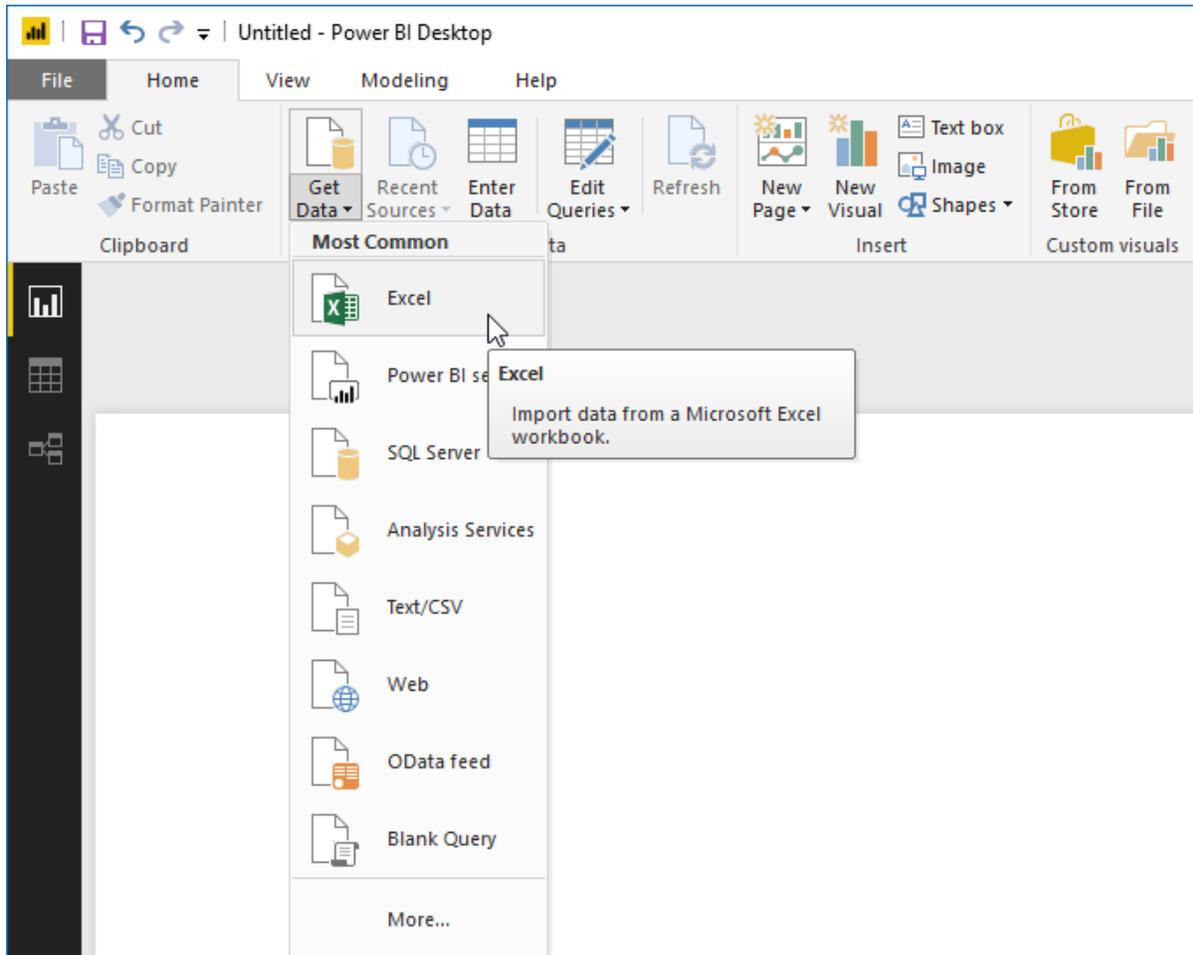
Topic Objectives

In this section, you will learn:

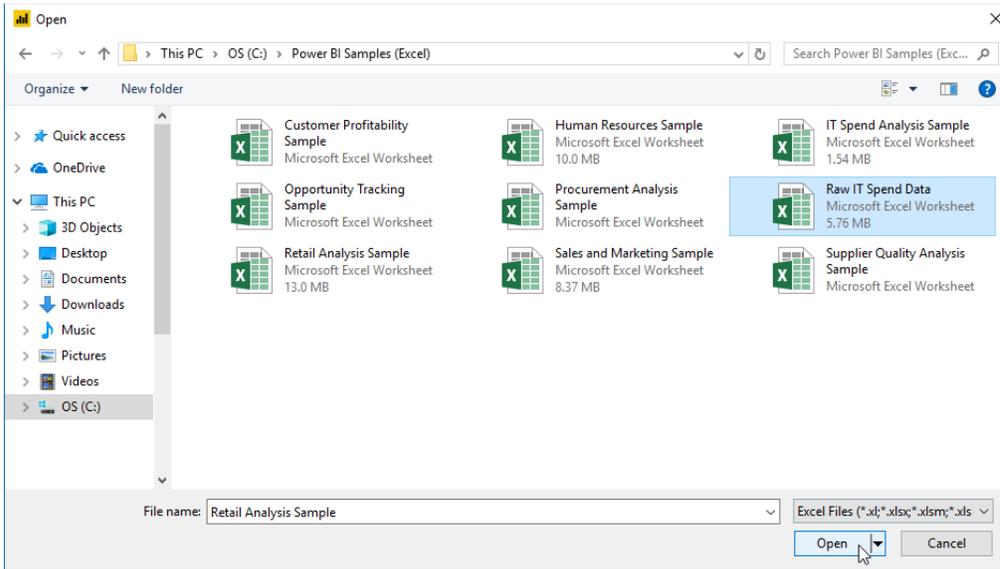
- How to connect to an Excel workbook or Access database
- How to view all connection options
- How to create a manual dataset
- How to manage data sources

Connecting to an Excel Workbook

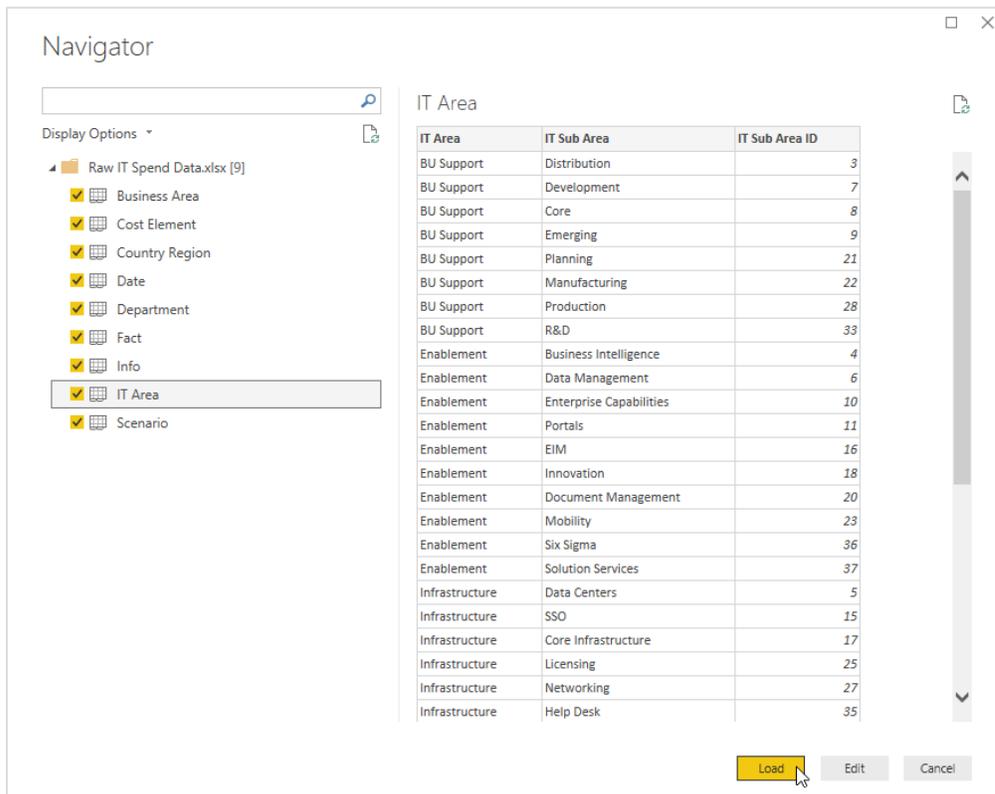
To connect to an Excel workbook, open the target Power BI file. (Here, we are starting from a new file.) Click Home → Get Data arrow → Excel:



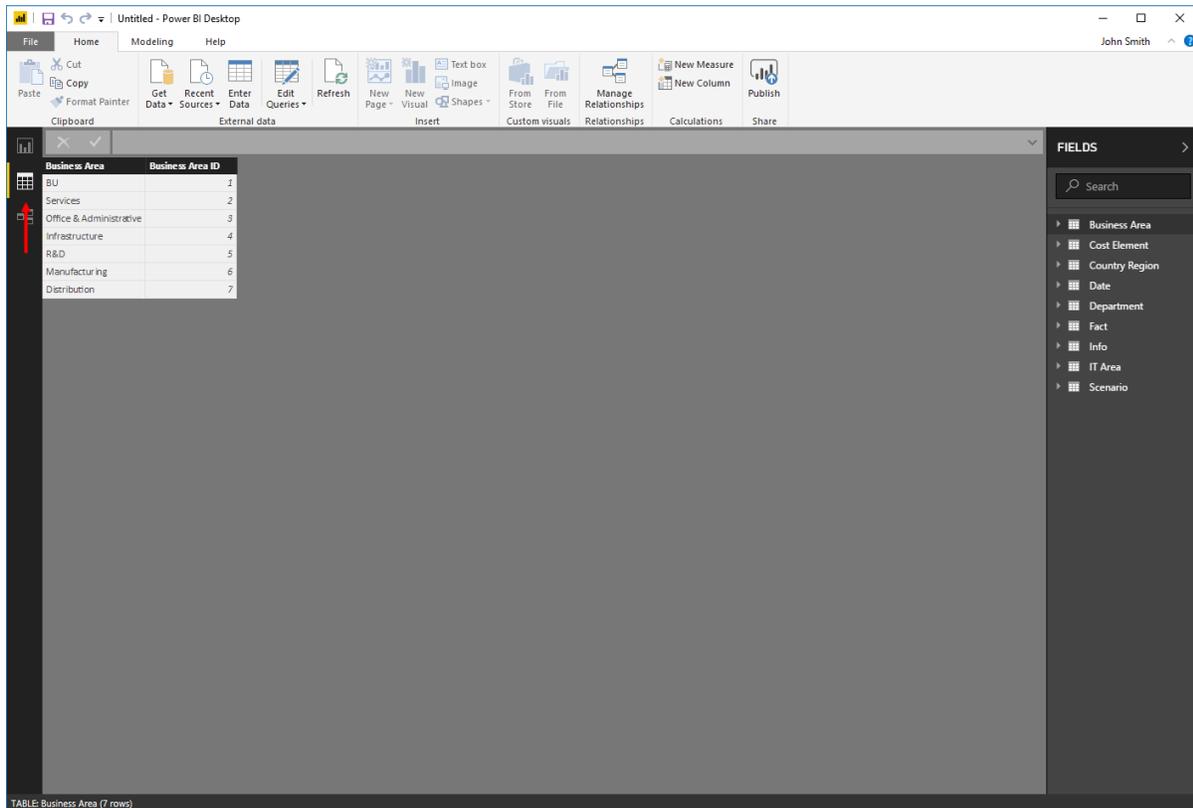
The Open dialog will appear. Navigate to your file, select it, and click Open:



Next, the Navigator will appear. On the left side, check the items you want to load into the current Power BI data model. (You can also click any item to preview it.) Click Load when you are ready:



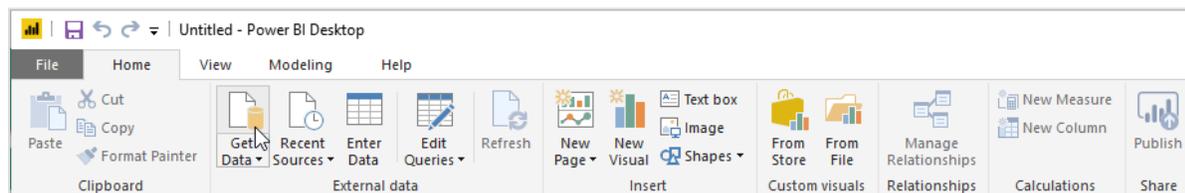
Your data will then be loaded. You can view it by clicking the Data icon in the navigation pane:



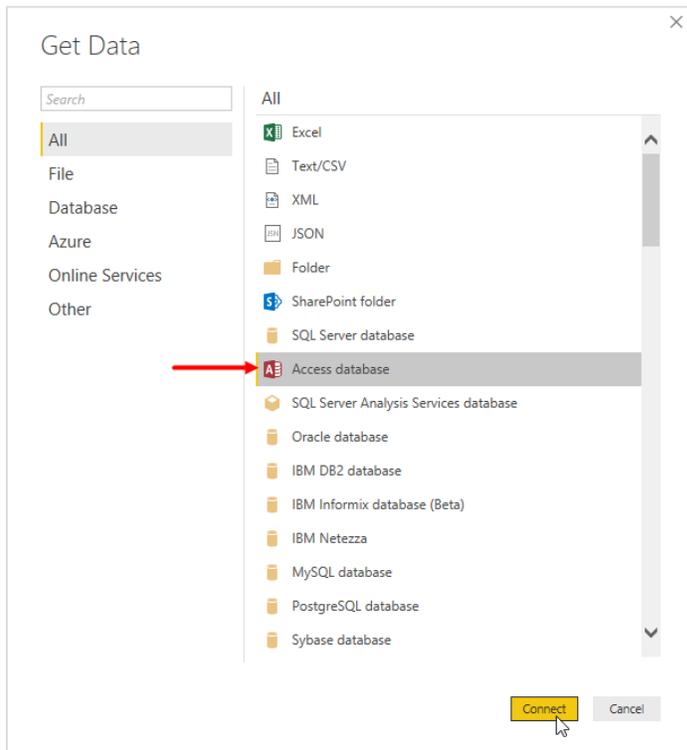
You can change the table currently being displayed by clicking any item in the Fields pane on the left side of the window.

Connecting to an Access Database

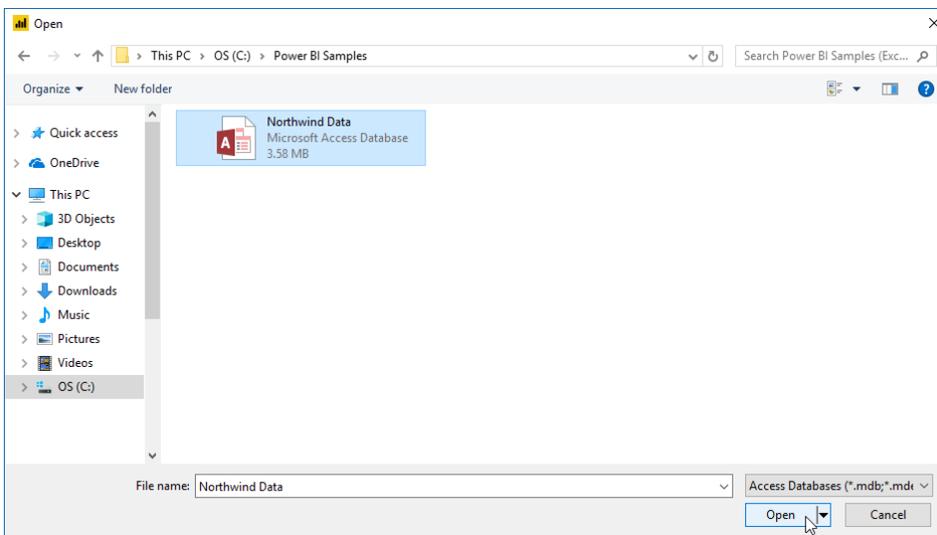
To connect to an Access database, click Home → Get Data:



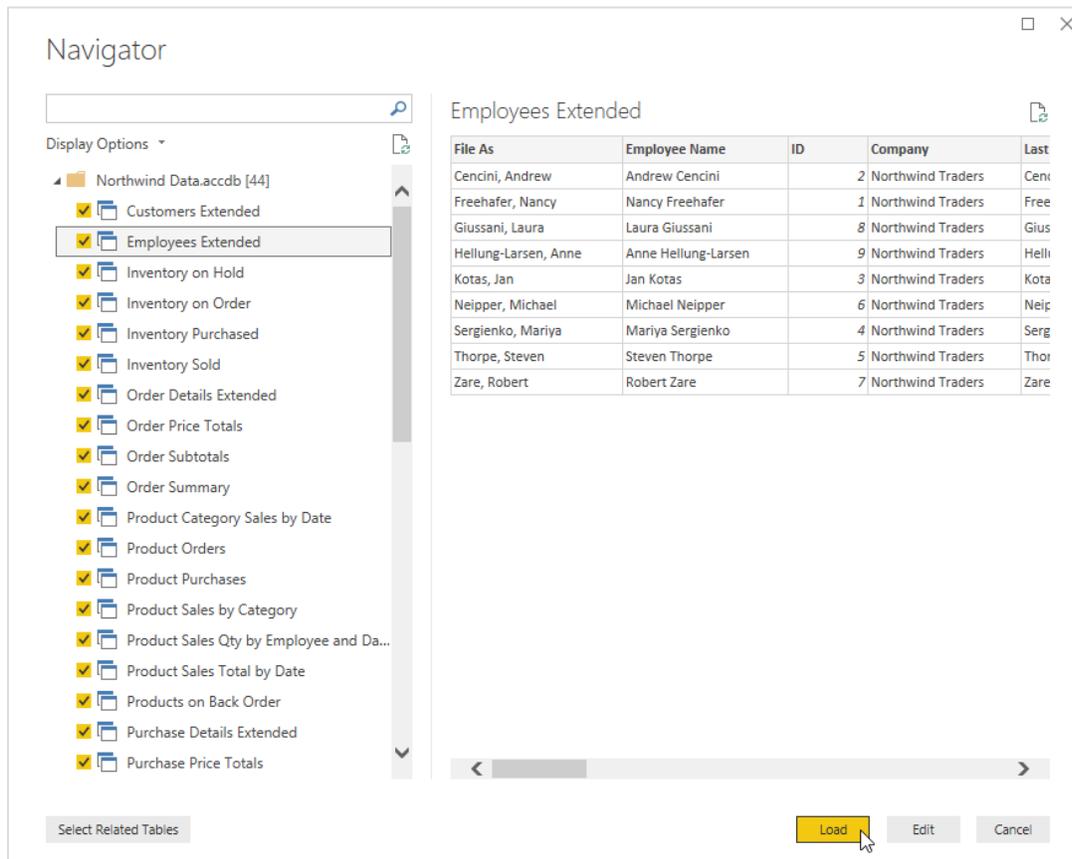
You will now see a list of all connection options. Click “Access database” to select it and then click Connect:



Just as before, the Open dialog will appear. Navigate to your file, select it, and click Open:



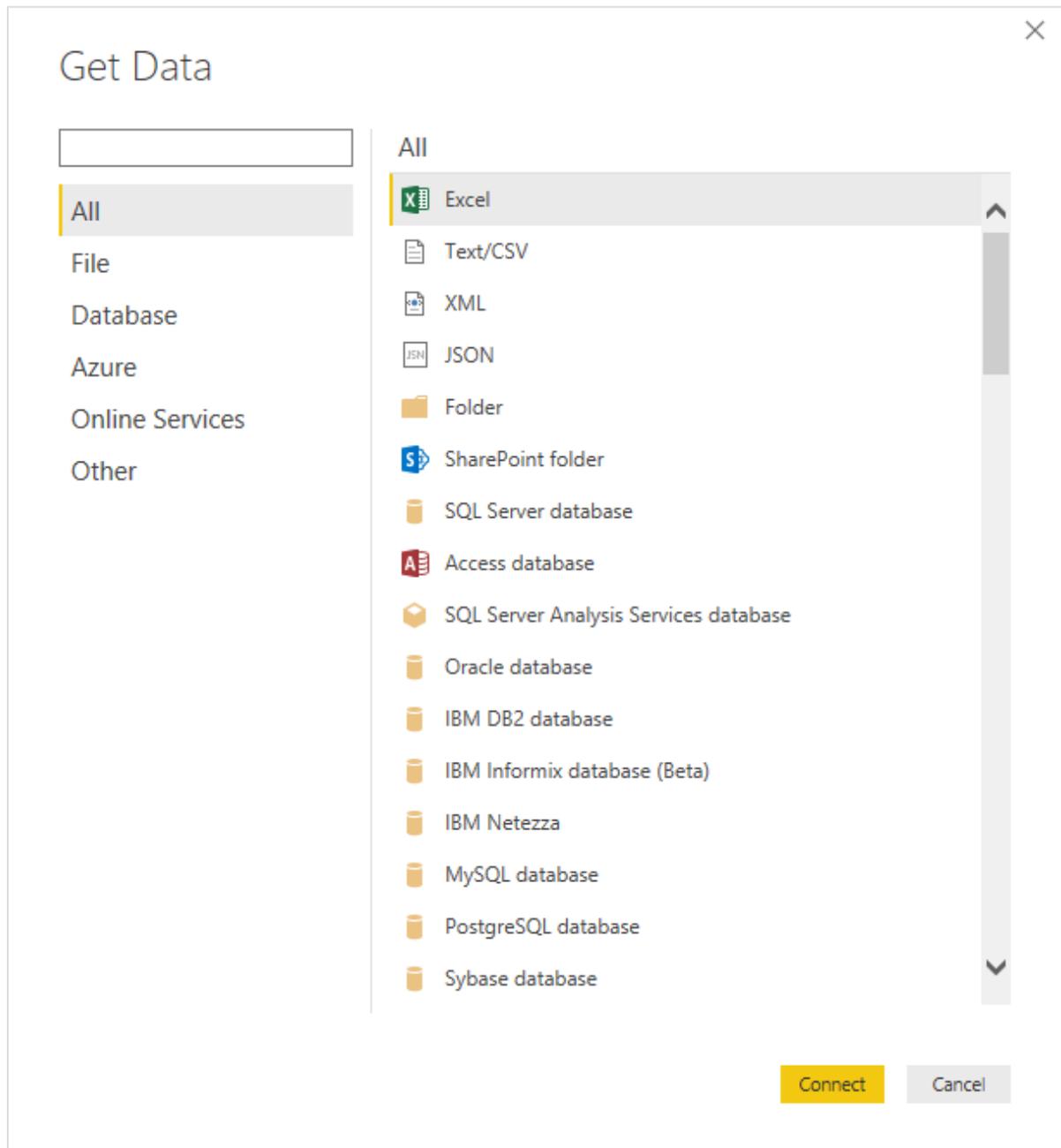
Next, the Navigator will appear. On the left side, check the items you want to load into the current Power BI data model. (You can also click any item to preview it.) Click Load when you are ready:



The data will now be loaded and will be accessible via Data view, just as when we imported an Excel workbook.

Viewing All Connection Options

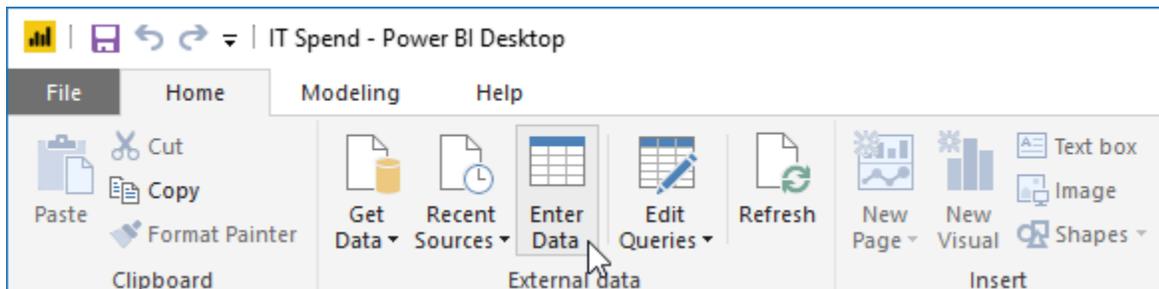
Let's take a closer look at the Get Data dialog, which appears when you click Home → Get Data:



Simply choose a source from the list on the right and click Connect to see the related options for specifying details about the source. On the left side, you can use the categories or the search field to narrow down the list on the right.

Creating a Manual Dataset

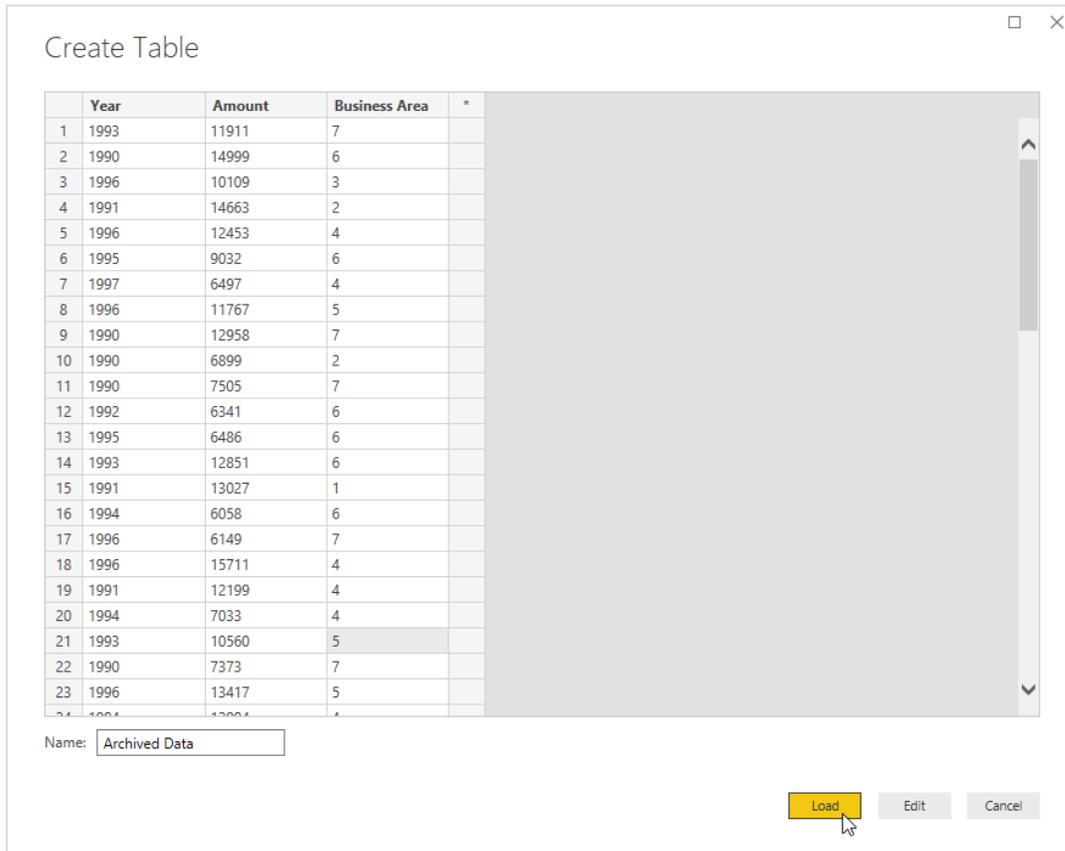
If your data does not yet exist, you can create a manual dataset that will be stored within Power BI. To start, click Home → Enter Data:



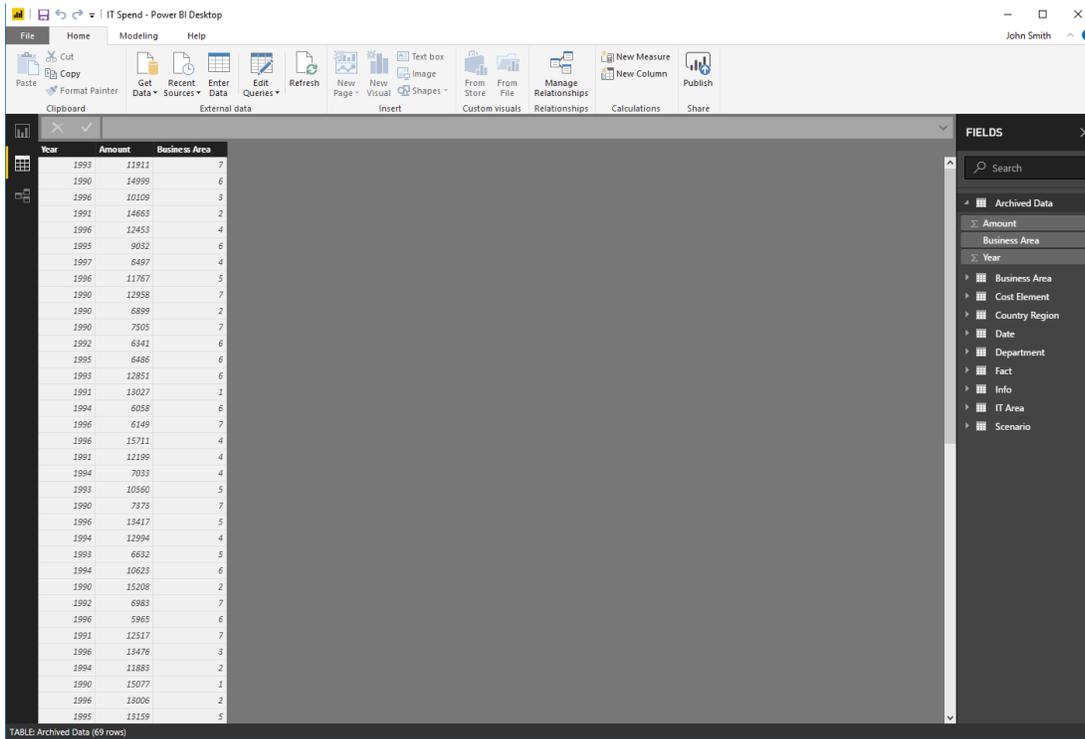
The Create Table window will appear:



To start, rename the table columns by double-clicking them. (You should also enter a table name in the field at the bottom of the dialog.) Then, enter your data into the table. (You can add more rows by pressing the down arrow key from the last row, and more columns with the right arrow key from the last column.) Once your data is entered, click Load to complete the process:

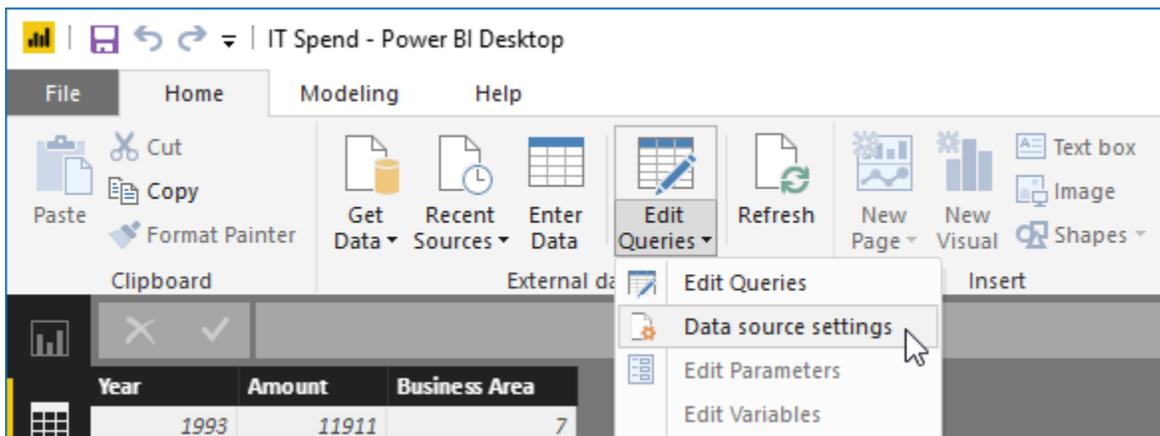


The table will now be added:

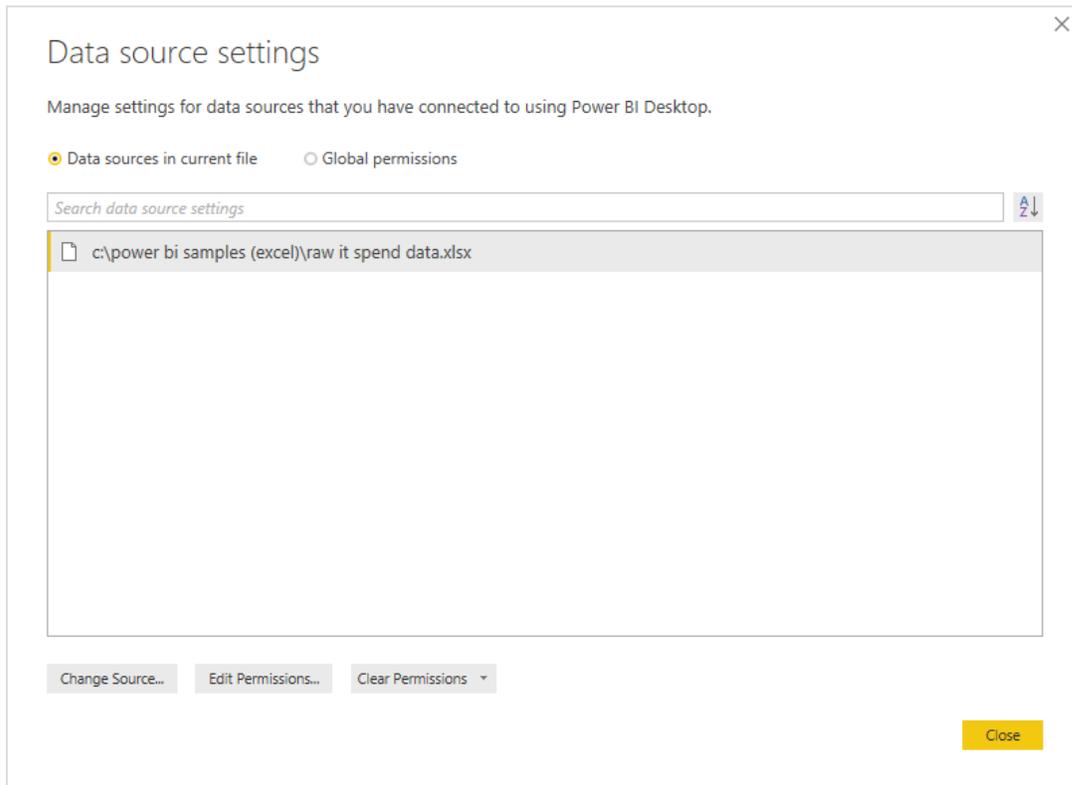


Managing Data Sources

To manage the data sources in a Power BI file, click Home → Edit Queries drop-down arrow → Data source settings:



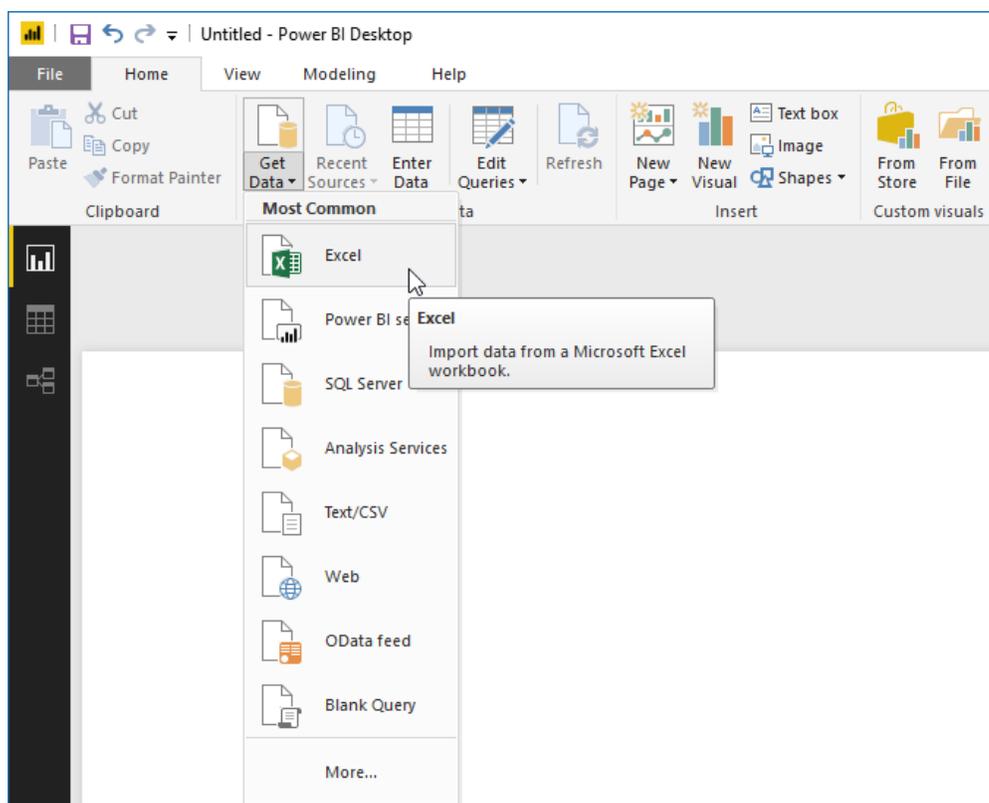
Here, you can view and edit the data sources currently connected to this file:



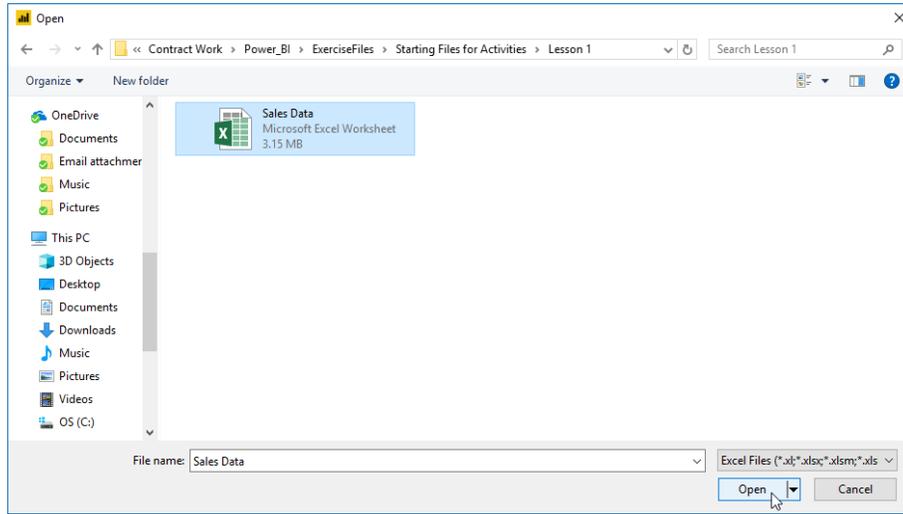
Activity 1-3: Connecting to Data Sources with Power BI Desktop

In this activity, you will connect two data sources to a new file.

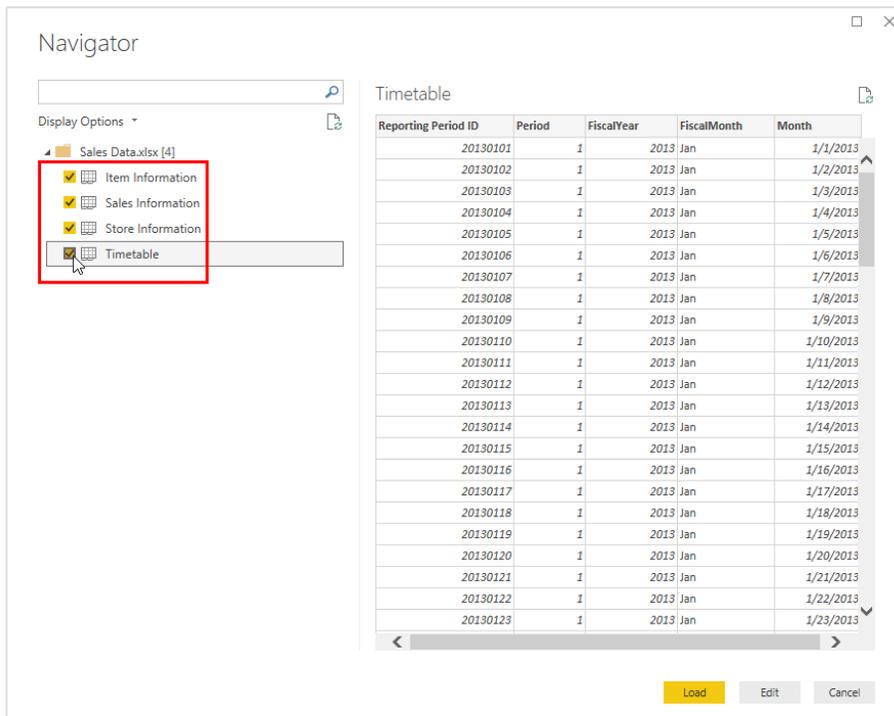
1. Open Power BI. A new file should be displayed.
2. First, let's import our main sales workbook. Click Home → Get Data arrow → Excel:



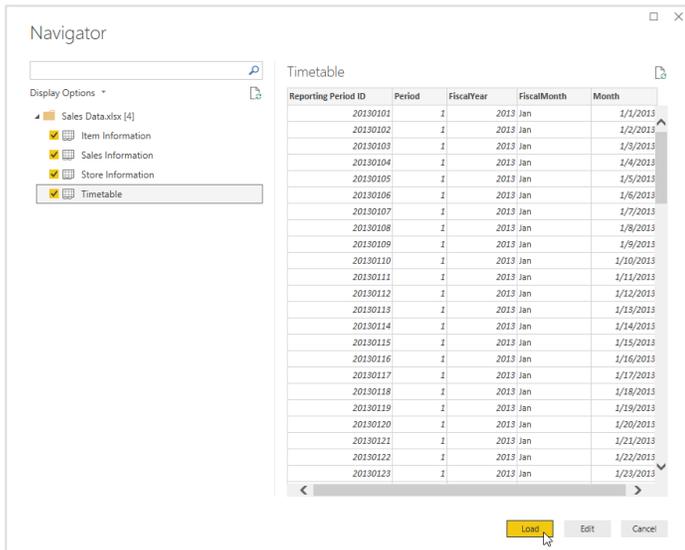
3. Navigate to the Lesson 1 folder of your Exercise Files. Click to select the Sales Data file and click Open:



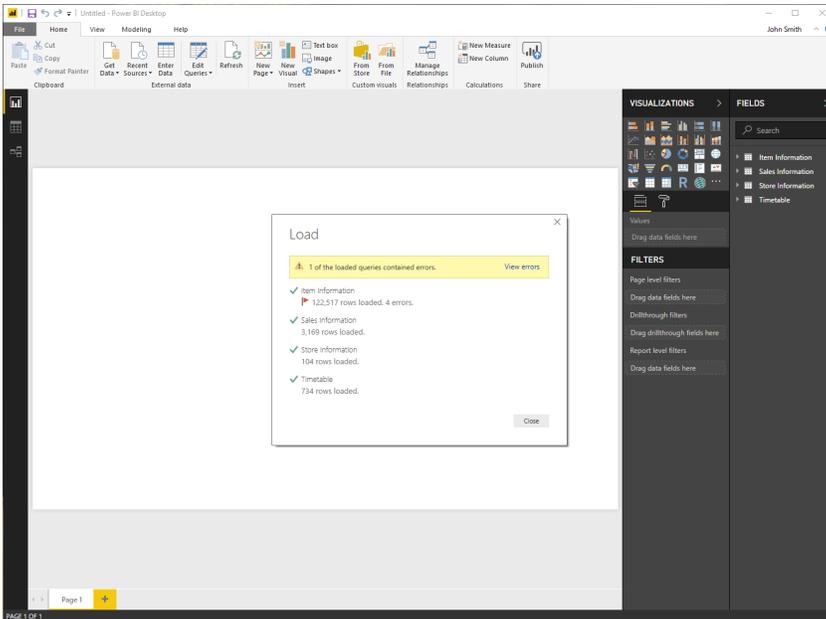
4. The Navigator will open. Check all four worksheets on the left side:



5. Click Load:

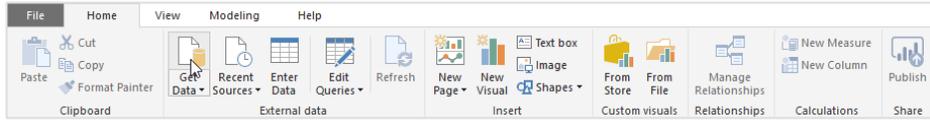


6. The data will be loaded (this may take a moment). When it is complete, you will see a summary of the operation:

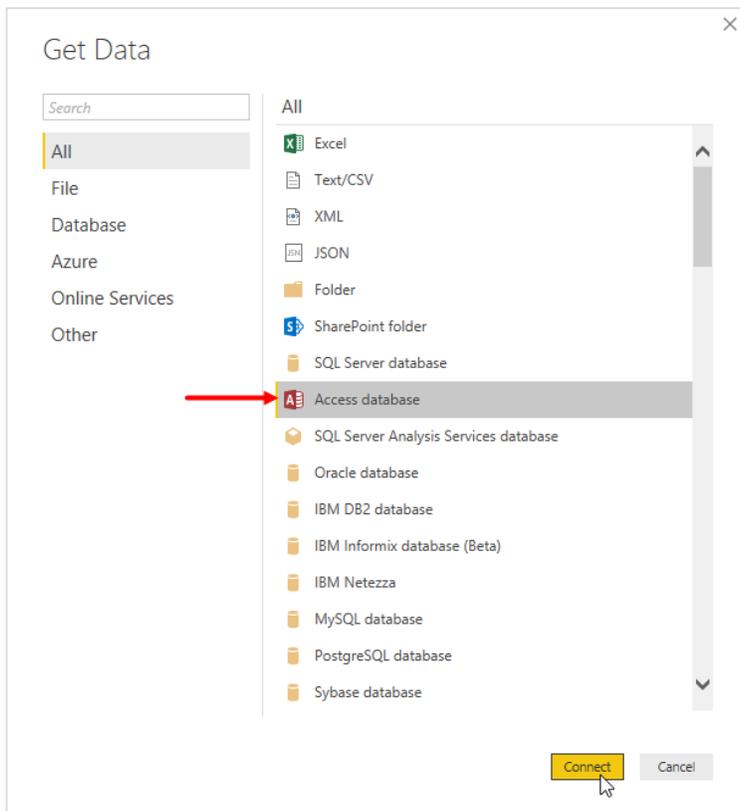


In this case, we had a few errors, which is not uncommon when importing data from other applications. We will learn how to manage these errors in the next lesson. For now, close the dialog box.

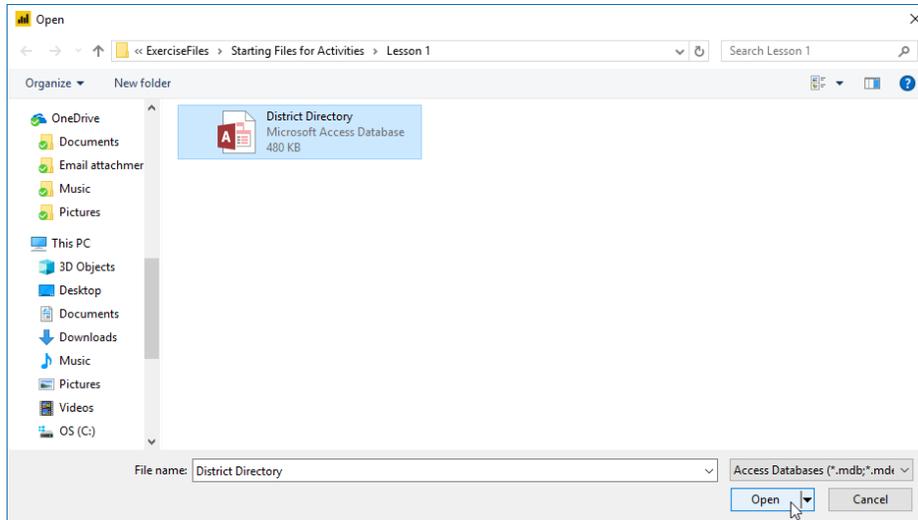
- Next, we need to import the district information, which is in an Access database. Click Home → Get Data:



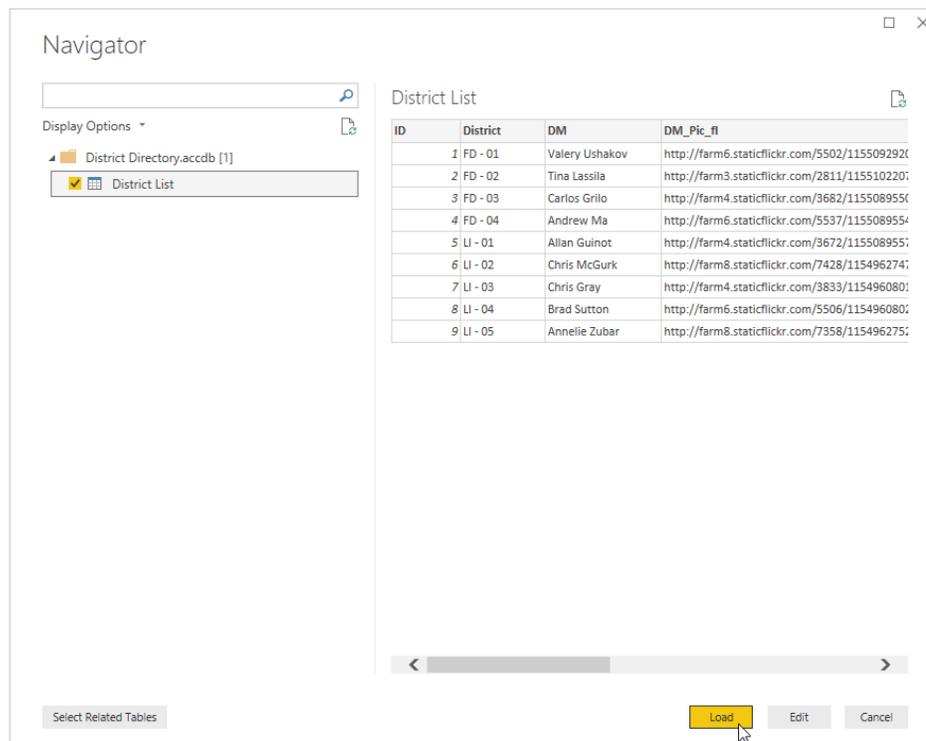
- You will now see a list of all connection options. Click “Access database” to select it and then click Connect:



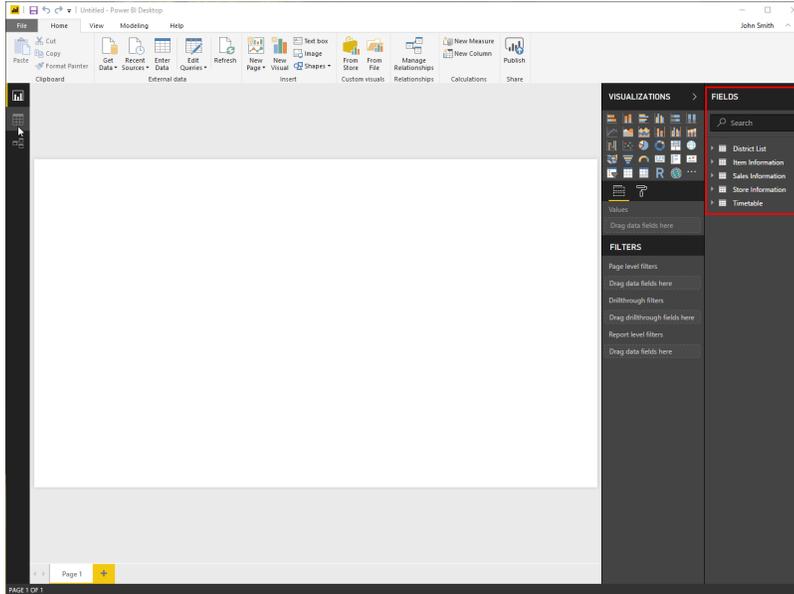
- The Open dialog will appear, and Lesson 1 of your Exercise Files should be displayed. (If it is not, navigate to it now.) Click the District Directory file to select it and click Open:



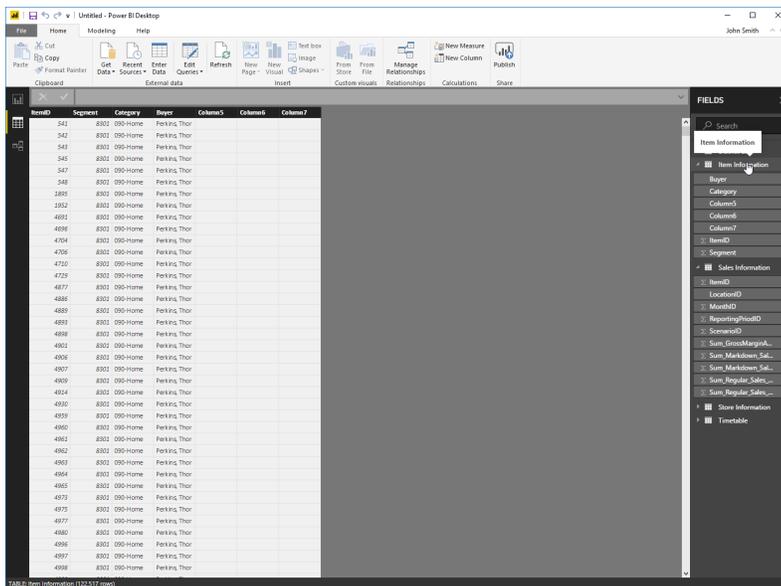
- Check the single table in this database (District List) and click Load:



- The data will be loaded. We can see it in the Fields pane, but click the Data icon in the navigation pane to take a closer look:



- Click each of the tables to see the data they contain:



- Save your file as Activity 1-3 Complete and close Power BI.

TOPIC D: Creating a Report with Visualizations

Now that we understand how to use Power BI and connect data to it, it is time for the fun part: creating a report with visualizations. Visualizations are simply graphics that represent data from one or more sources connected to a Power BI file.

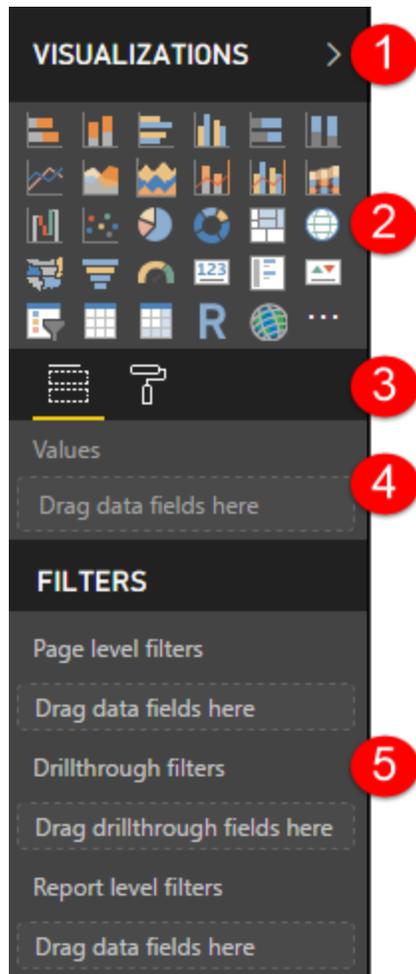
Topic Objectives

In this topic, you will learn how to:

- Use the Visualizations and Fields task panes
- Create, move, and resize visualizations
- Interact with visualizations
- Change the visualization type

Using the Visualizations Pane

First, let's look at the task panes you will use when creating a visualization. The first task pane is Visualizations:



The **top** of the task pane (1) shows both the name and an arrow to collapse or expand it. Next, there is a **gallery** (2) of available visualizations. (Click the ellipses to see options to manage visualizations.)

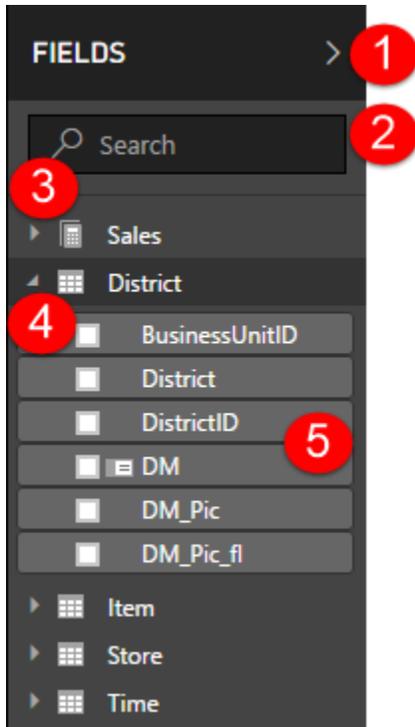
The **tabs** (3) in the middle of the pane control what tools appear in the bottom part. Here, you can see the Fields and Format icons, respectively. Depending on the visualization you are working with, you may also see an Analytics icon.

In the bottom of the pane, you will see commands related to the selected tab. Here, we have focused on the Fields and Filter commands, since we will explore the Format tab in the

next topic. These commands allow you to specify data to be displayed in the **visualization (4)** and **filtering options (5)**, and will differ depending on the visualization selected.

Using the Fields Pane

The second task pane is Fields:

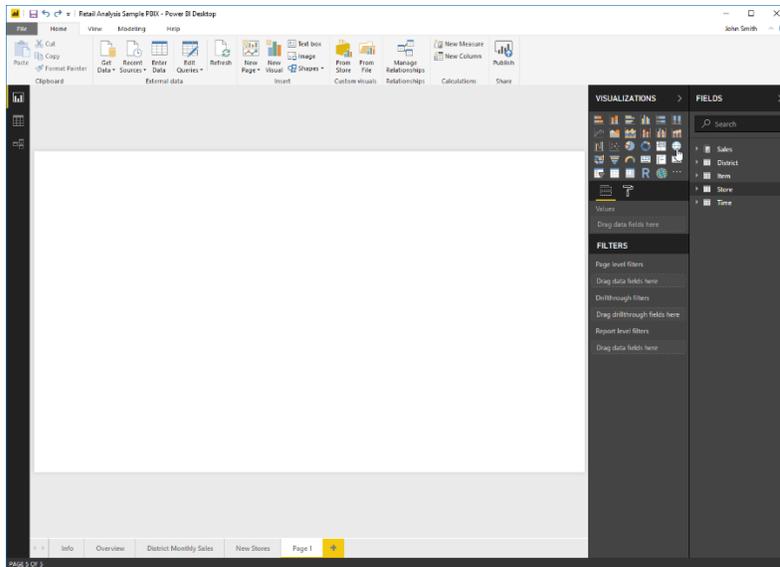


Just like the Visualizations pane, at the **top (1)** you will see the task pane name and an arrow that allows you to collapse it. Below this is a **search field (2)**. Entering a term here will show matching terms in the bottom part of the pane (the field display list).

By default, the field display list will group items by table, query, or a custom hierarchy. You can use the arrows to **expand (3)** or **collapse (4)** these lists. When a group is expanded, you will see the **individual data fields (5)**.

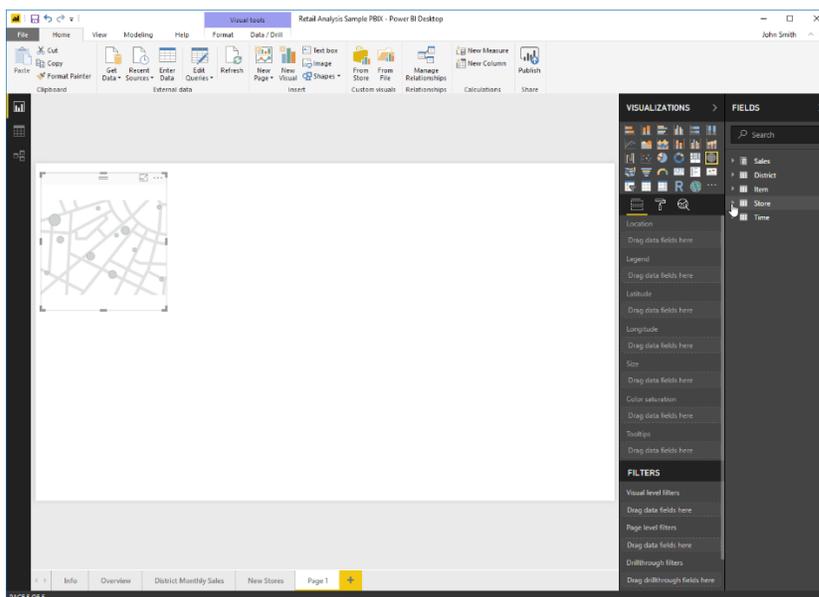
Creating a Visualization

To create a visualization, click the related icon in the Visualizations pane:

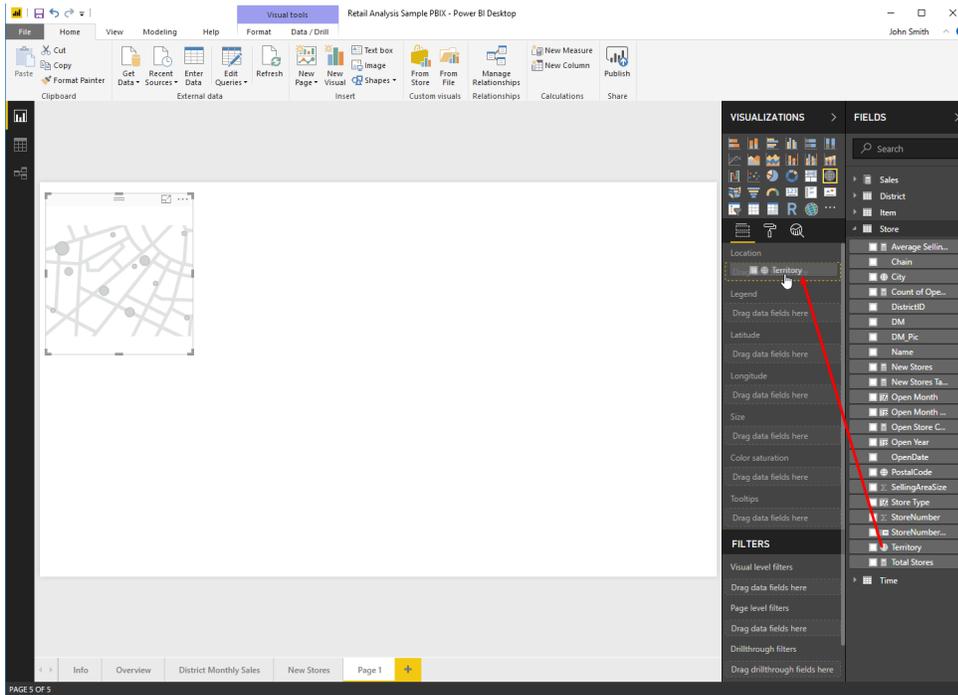


We want to see the number of stores in each territory, so we have chosen Map, which will show the value for each location as a bubble of relative size.

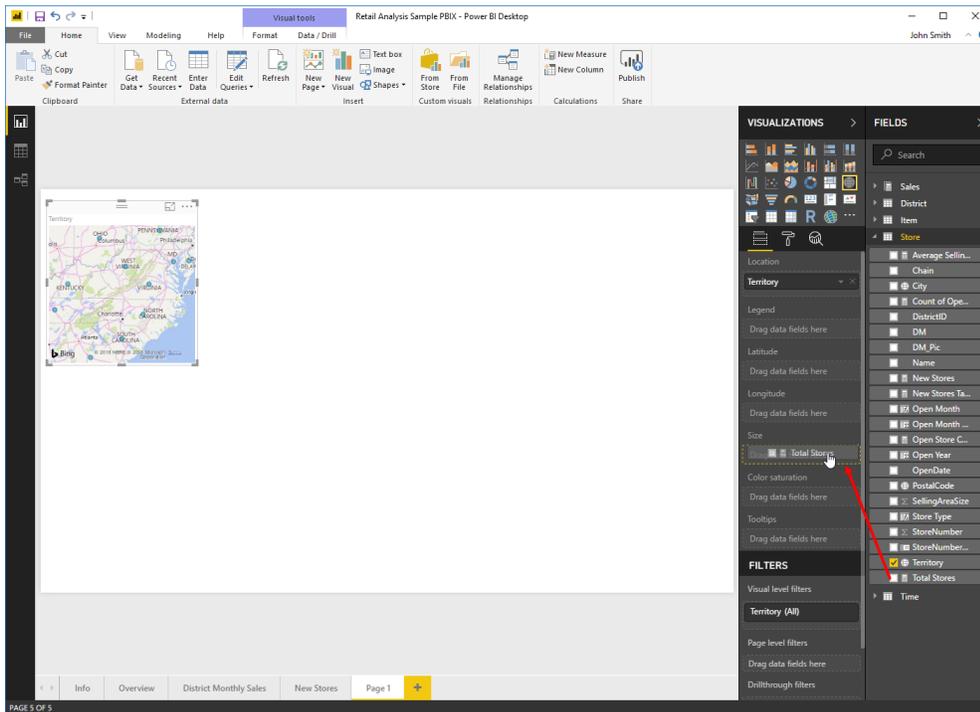
Once you click an icon, a placeholder will appear for that visualization. Now, we can add data to it by dragging and dropping items from the Fields pane. First, let's expand the Store category so we can see all the fields:



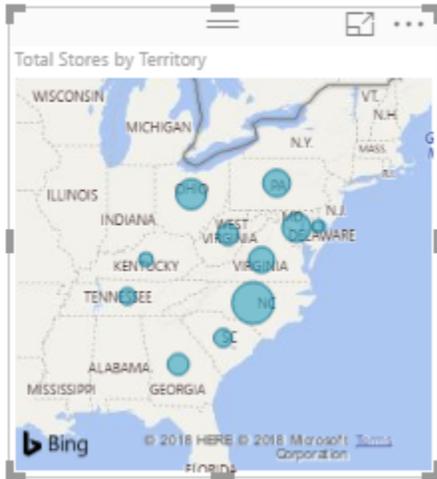
Next, we will click and drag the Territory field to the Location well:



The map will populate with this data, showing where the territories are. Now, let's drag the Total Stores field to the Size well:



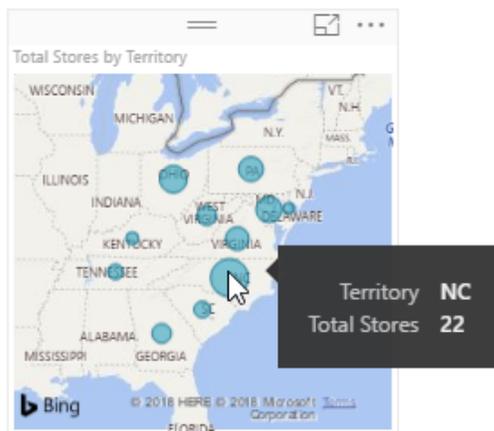
We can now see the total stores by territory, with each data point (number of stores) represented as a bubble:



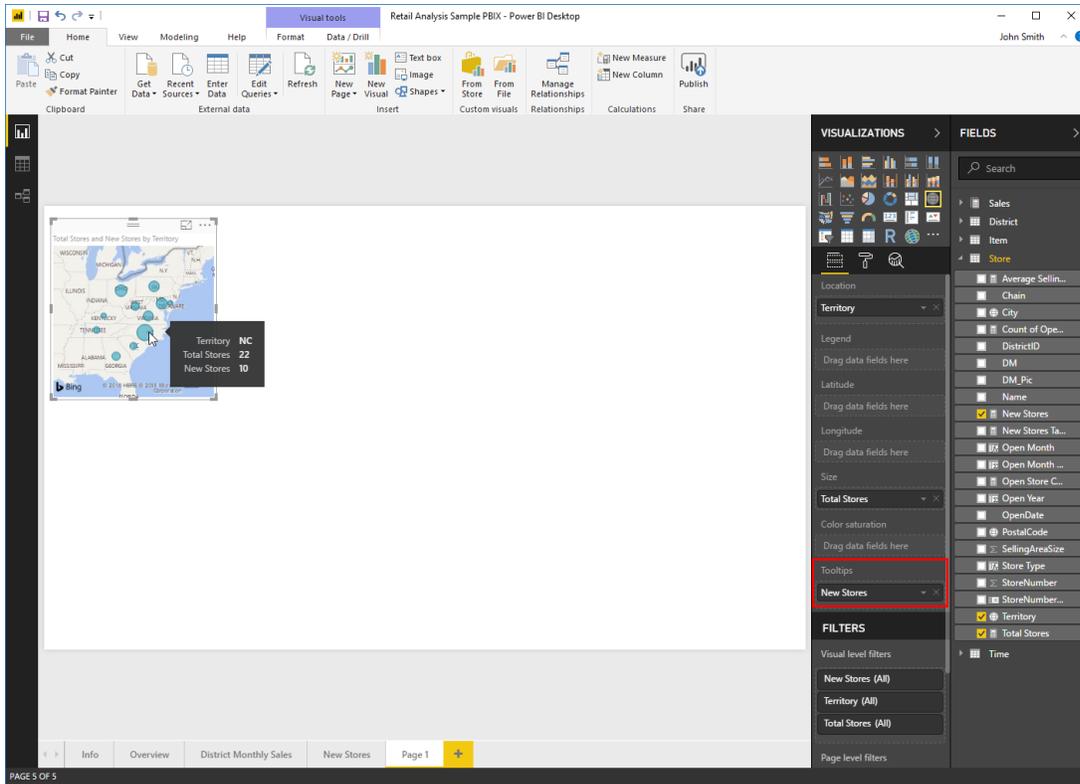
We can easily see that North Carolina has the largest number of stores, while Kentucky and Delaware have the fewest.

Interacting with Visualizations

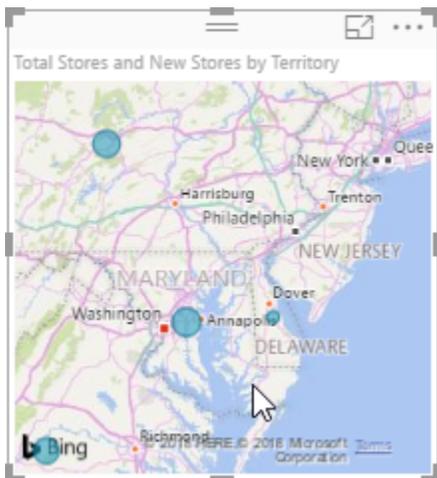
You can hover over different parts of a visualization to see more information. For example, in the visual we created earlier, we can hover over any bubble to see the name of the territory and the total stores:



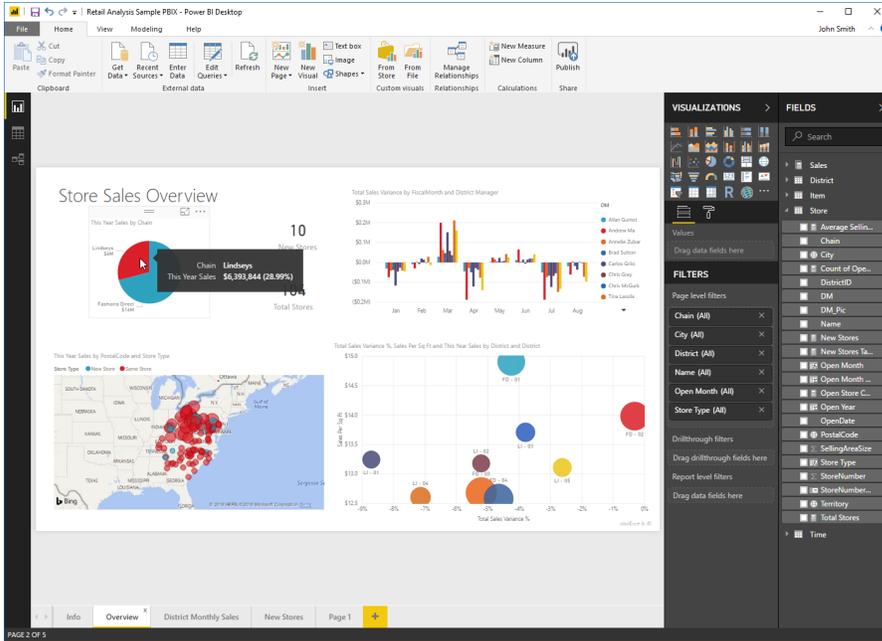
You can also add fields to the Tooltips well to display their data here. For example, here we have added the New Stores field, so we can see also how many of the total stores are new stores:



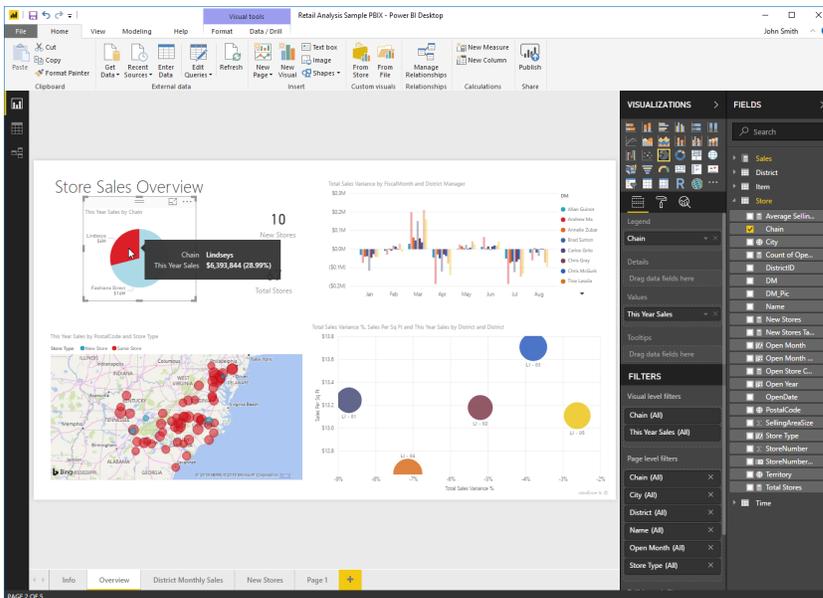
We can use the mouse or keyboard to move around the map. The plus and minus keys (or the scroll wheel on the mouse) allow you to scroll in or out to see a larger or smaller area:



If there is more than one visualization on a page, they will act as a filter on each other. For example, this report shows an overview of store sales. If we only want to see the values for Lindseys, we can click that item from the pie chart:

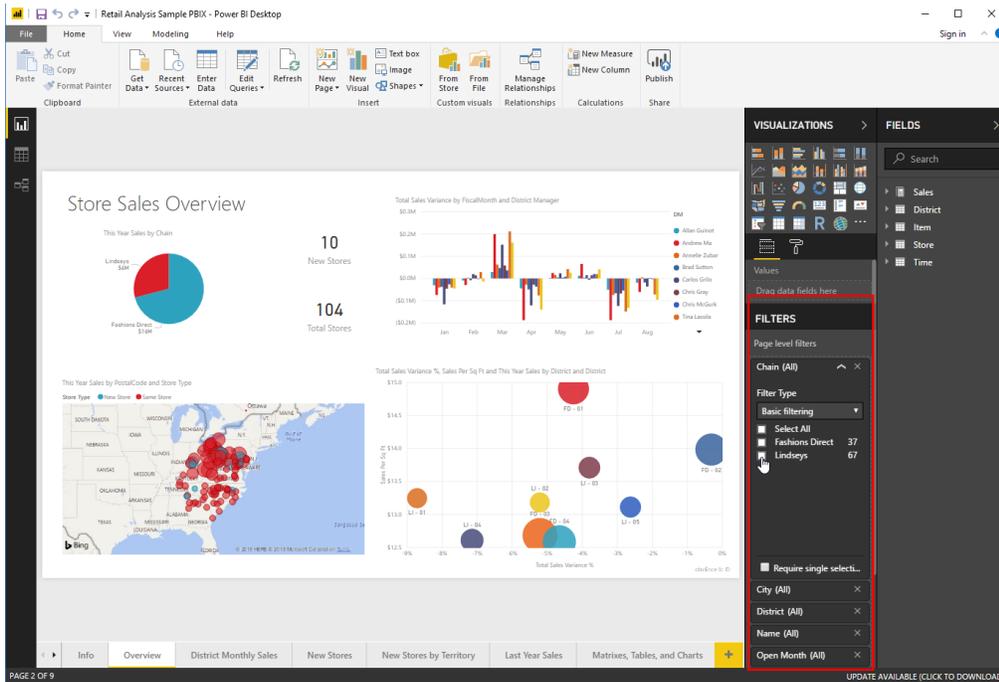


Now, the other visualizations will update and show only the data related to the Lindseys chain:



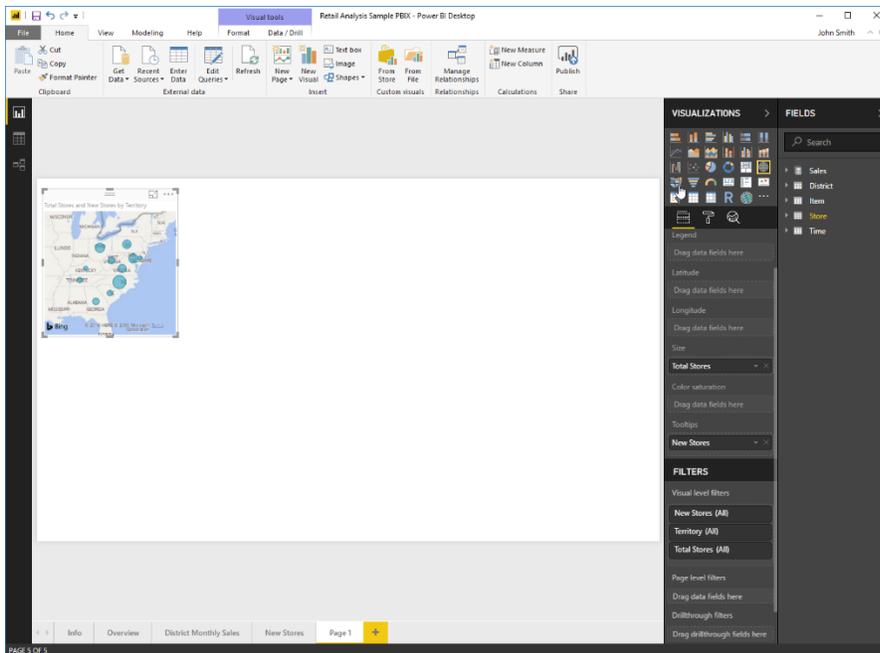
To return to the overall view, click the filtered item again.

You can also use the Filters section of the Visualizations pane to customize the data:

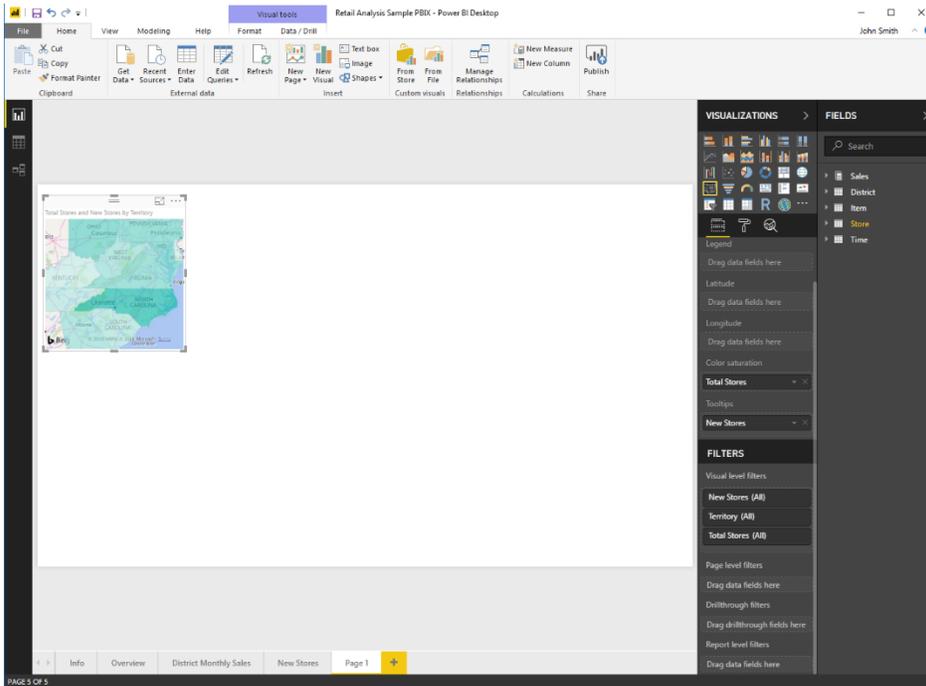


Changing the Visualization Type

You can change the visualization type by clicking another icon in the Visualizations task pane:



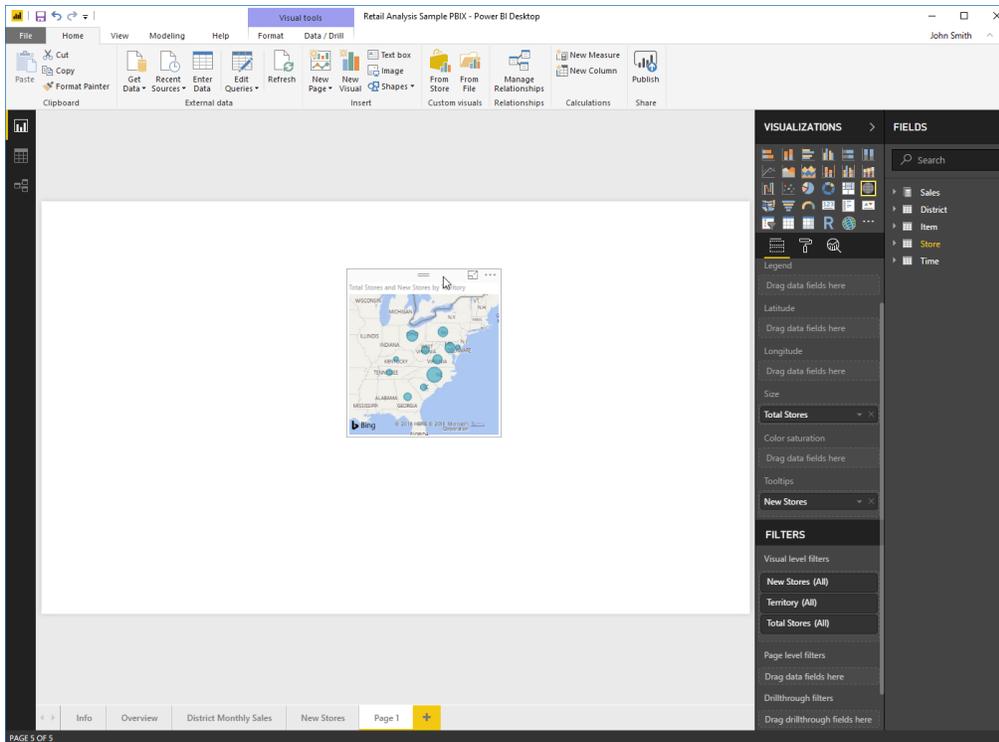
The change will be applied, and Power BI will keep the same data fields where possible:



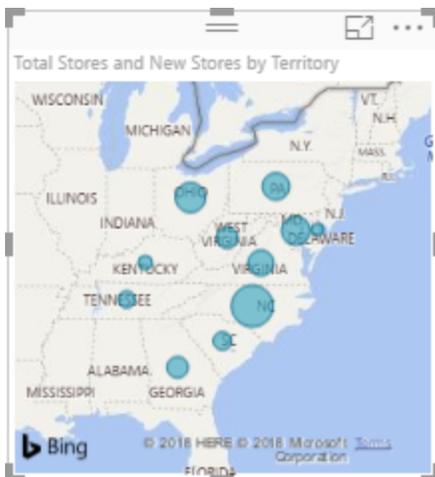
If you do not like the new visualization, use the Undo command on the Quick Access toolbar, or click the previous visualization icon in the Visualizations task pane.

Moving and Resizing Visualizations

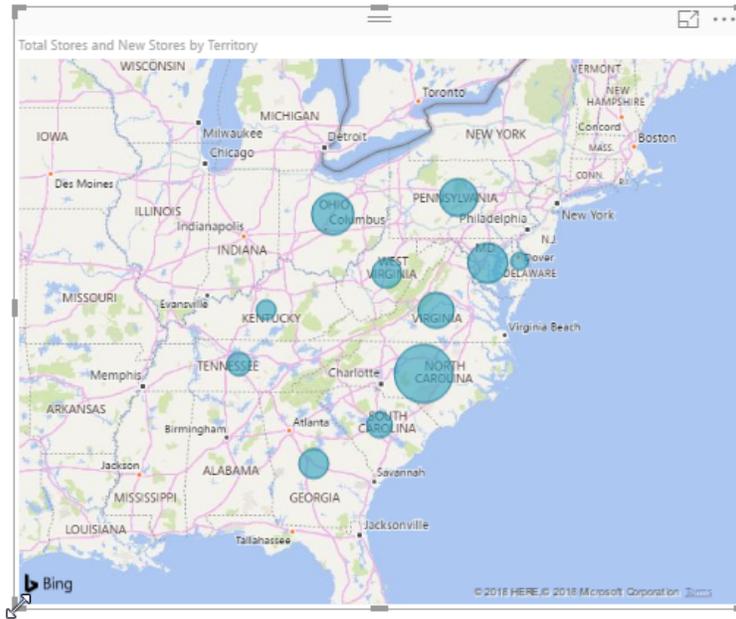
To move a visualization, click and drag it by its title bar to the desired location:



If you click the visualization's border to select it, you will see handles around its edges:



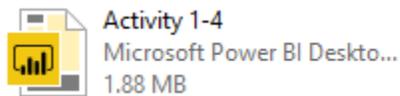
Click and drag these handles to change the visualization's size:



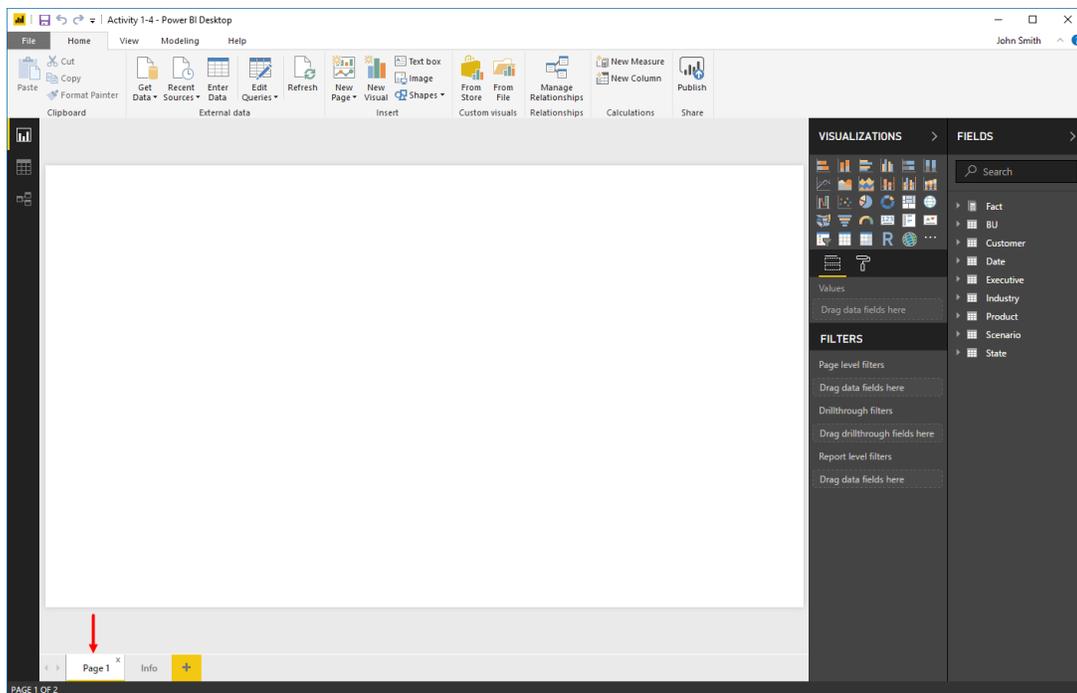
Activity 1-4: Creating a Report with Visualizations

In this activity, we will continue working with our retail report and add some visualizations. Note that we have included a more comprehensive data set than what was previously imported, for illustration purposes.

1. Open Power BI and open Activity 1-4:

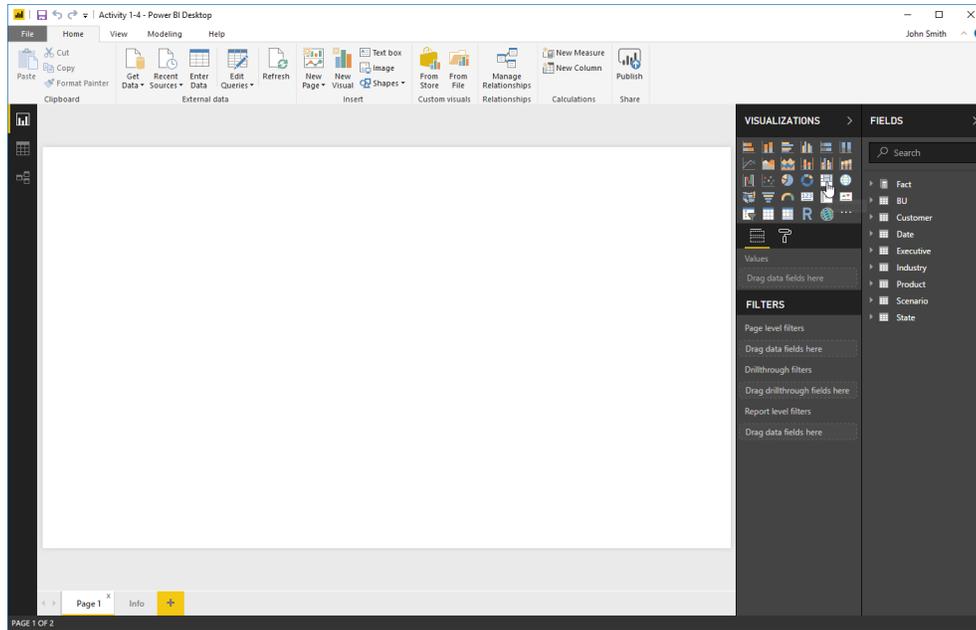


2. Ensure Page 1 is displayed, providing a blank canvas:

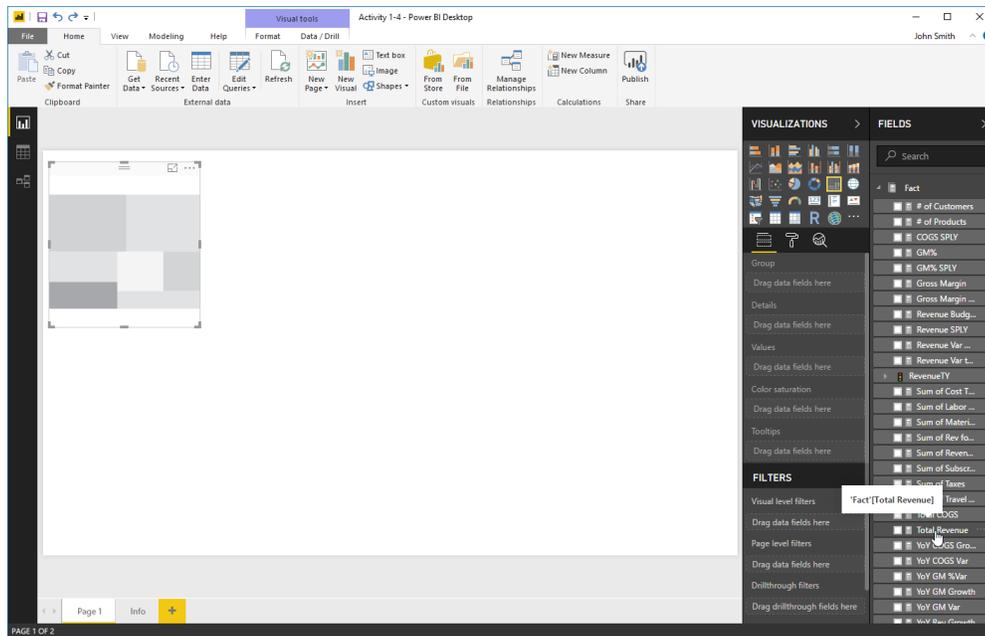


(If it is not displayed, click its tab at the bottom of the screen.)

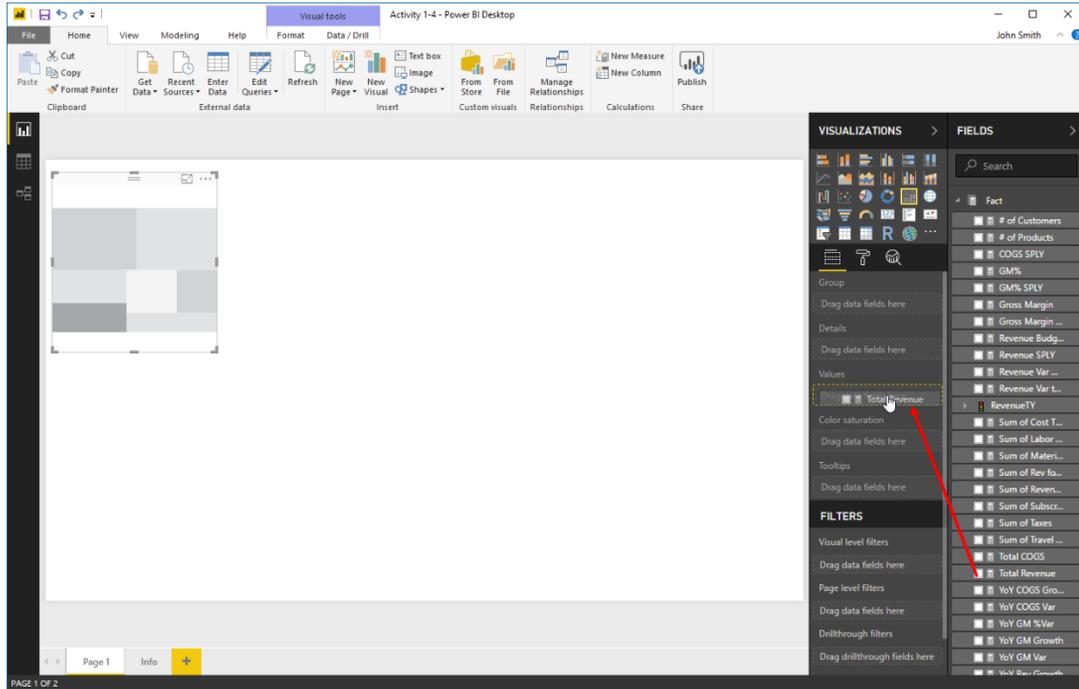
3. We want to create two visualizations that show a revenue breakdown by both division and state. A treemap might be a good way to show the breakdown by division, so click the Treemap icon in the Visualizations pane:



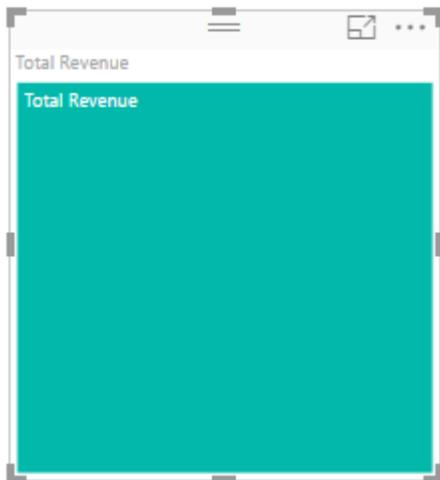
4. A treemap placeholder will be added. We want to see the total revenue value, so expand the Fact category and find the Total Revenue field:



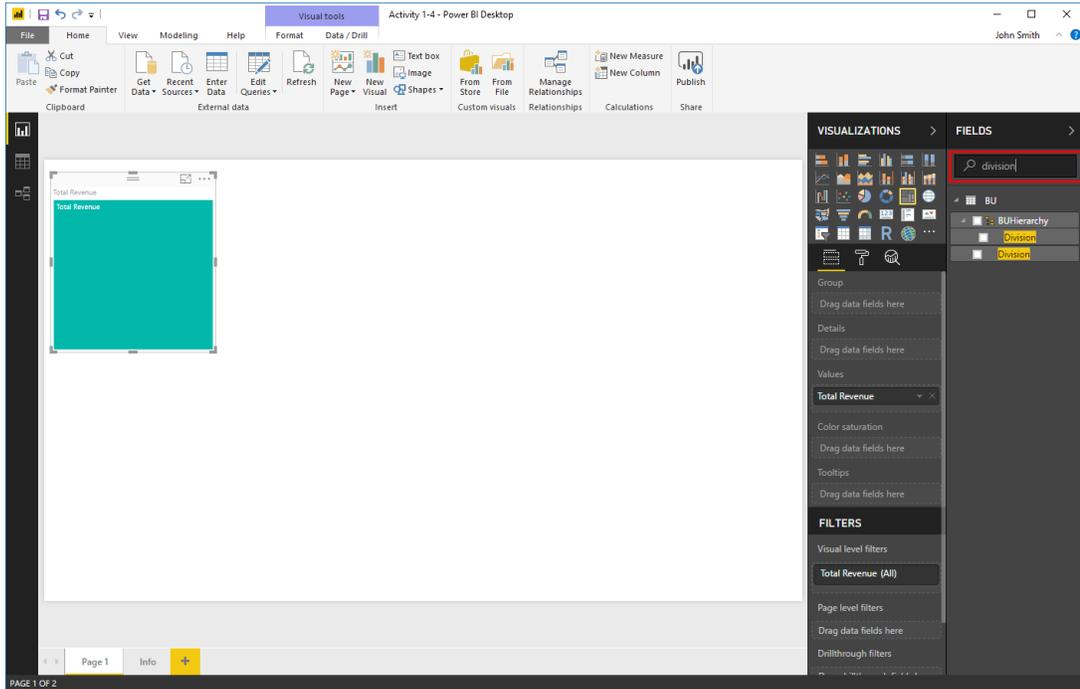
5. Drag it to the Values well in the Visualizations pane:



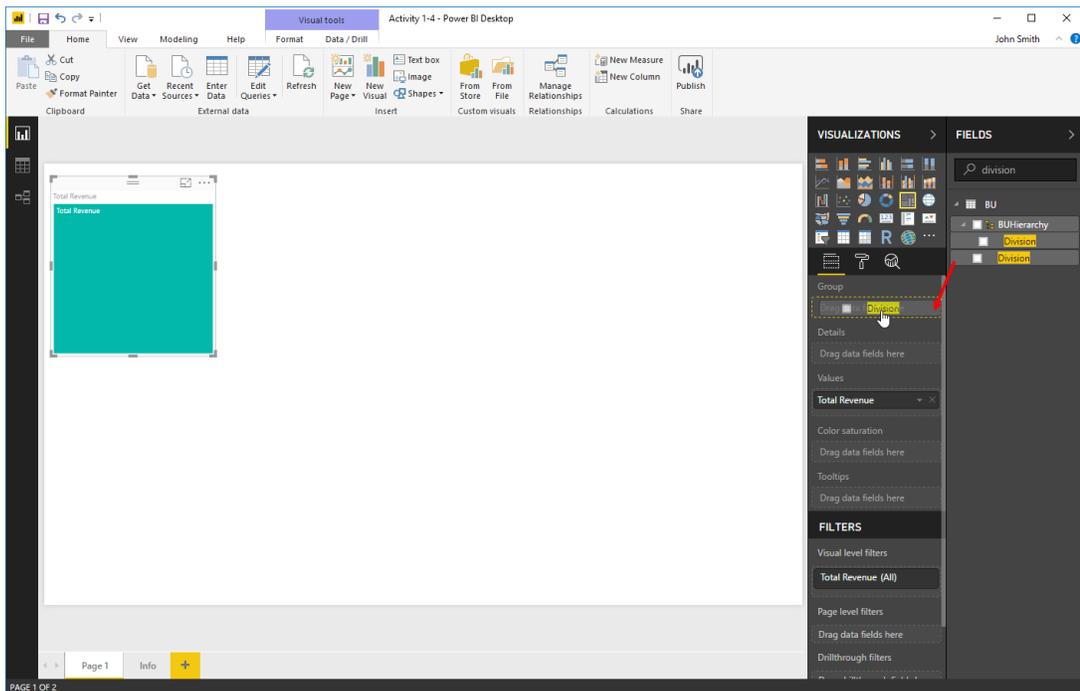
6. The visualization will start to populate:



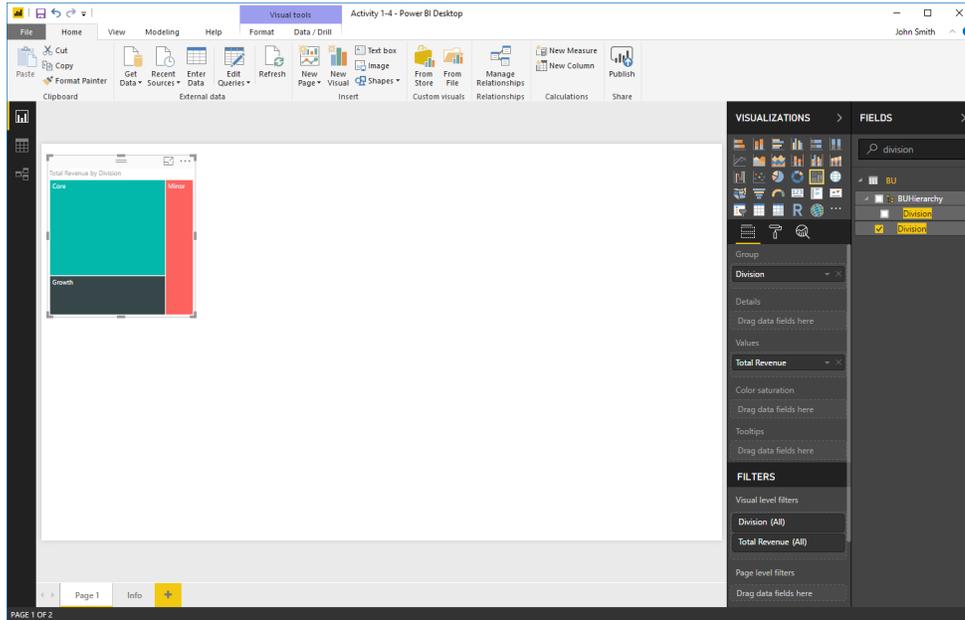
7. Since we want to see a breakdown by division, let's search for that field:



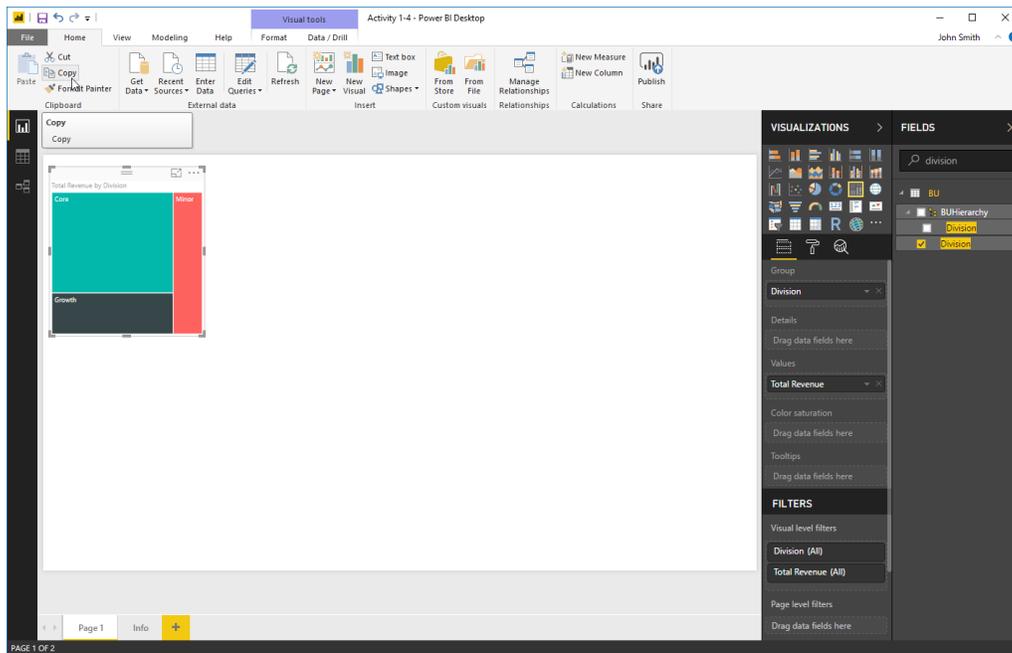
8. Next, click and drag the bottom result to the Group well in the Visualizations pane:



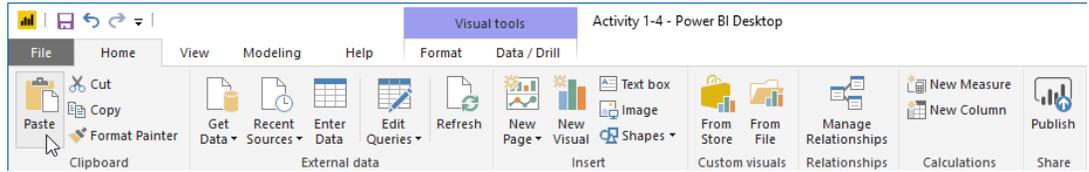
9. The visualization will now show total revenue by division:



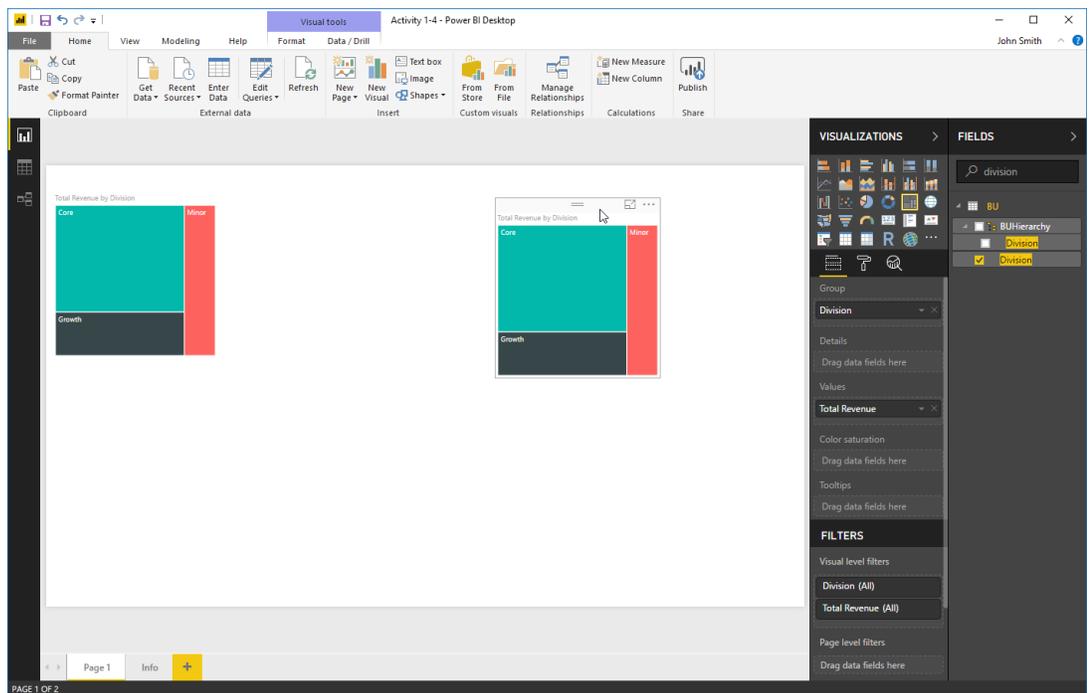
10. We also want to see total revenue by state. Ensure the visualization is selected (showing a border around it). Then, click Home → Copy:



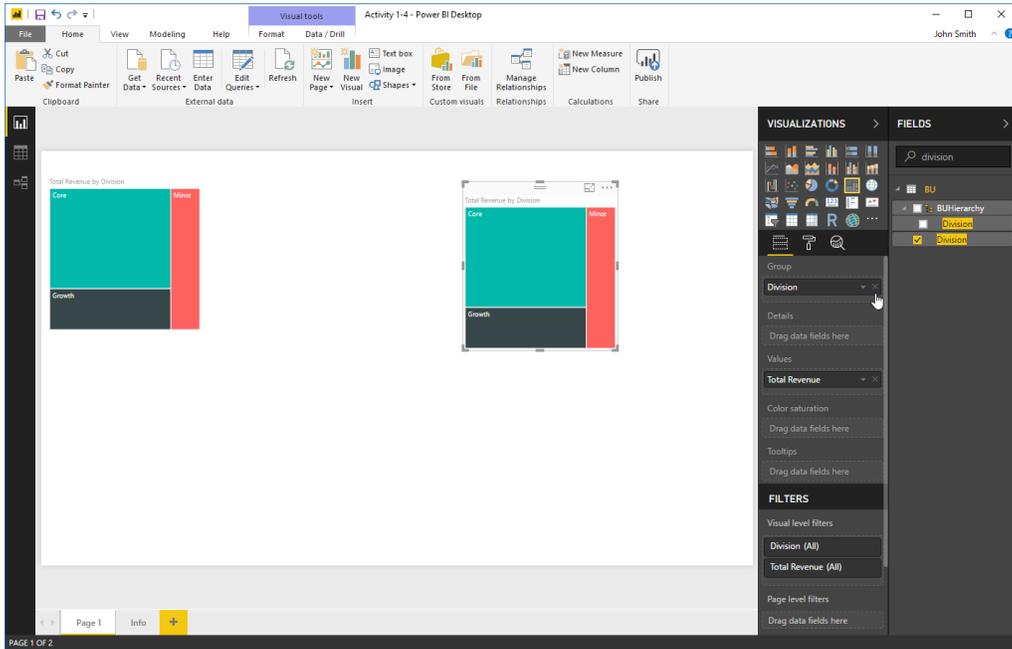
11. Click Home → Paste:



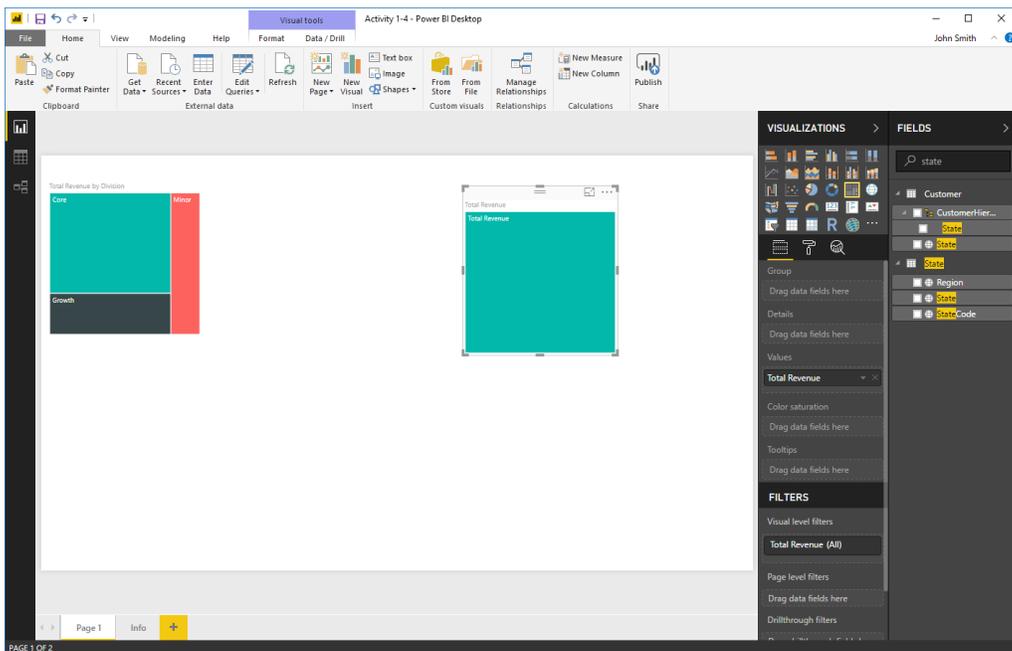
12. A copy of the visual will appear on top of the original. Click its title bar and drag it to the right side of the canvas:



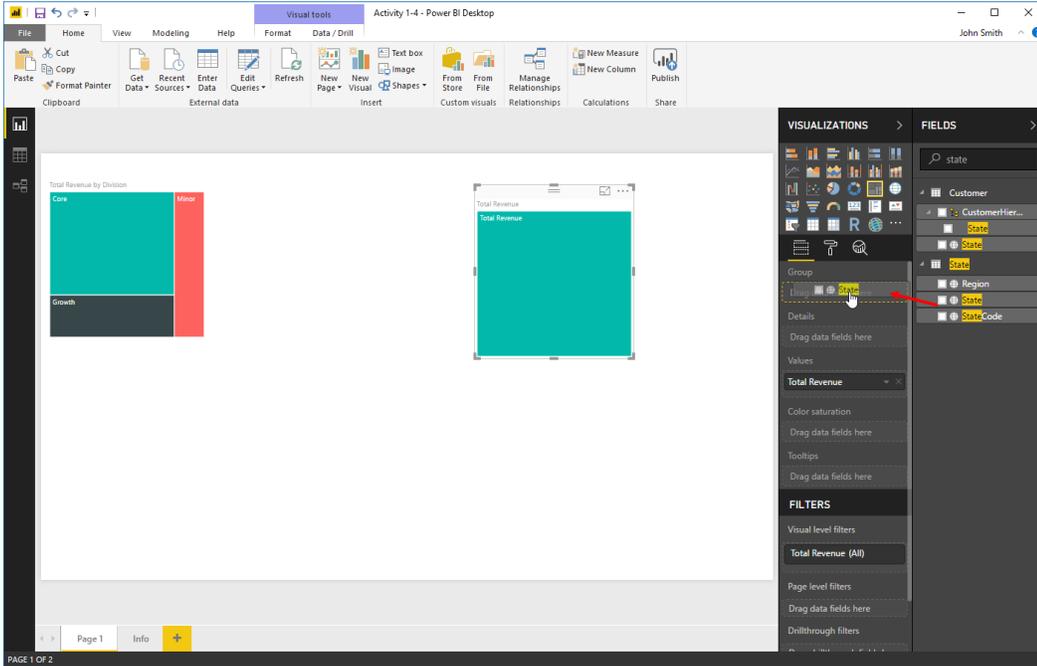
13. Now we can change the breakdown to state, instead of division. Click the X next to the Division field in the Visualizations pane to remove it:



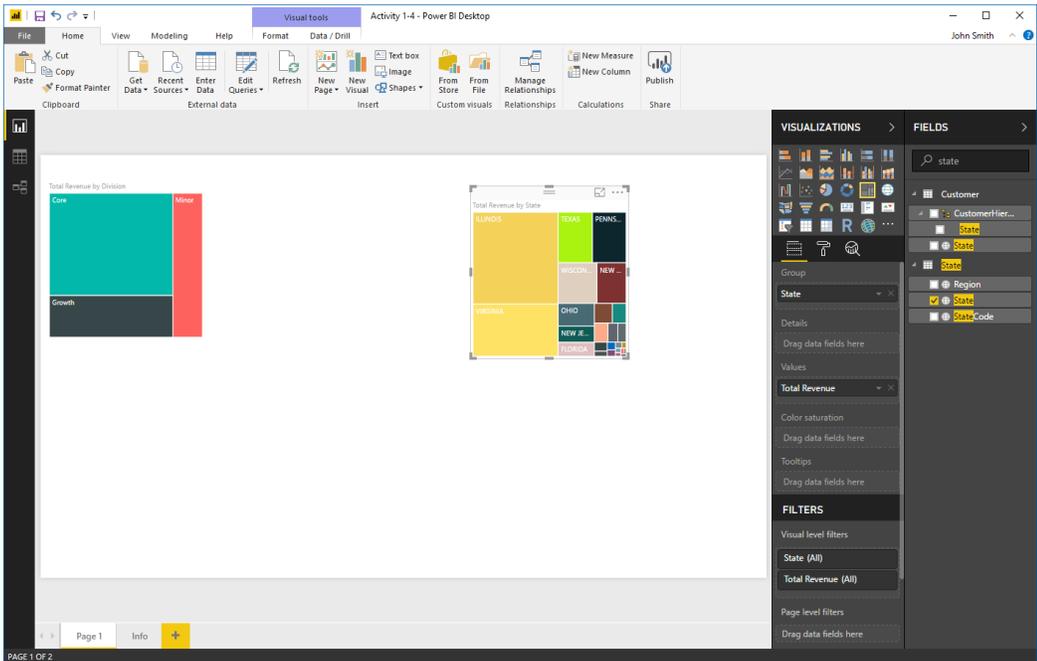
14. Now, search for “state” in the Fields pane:



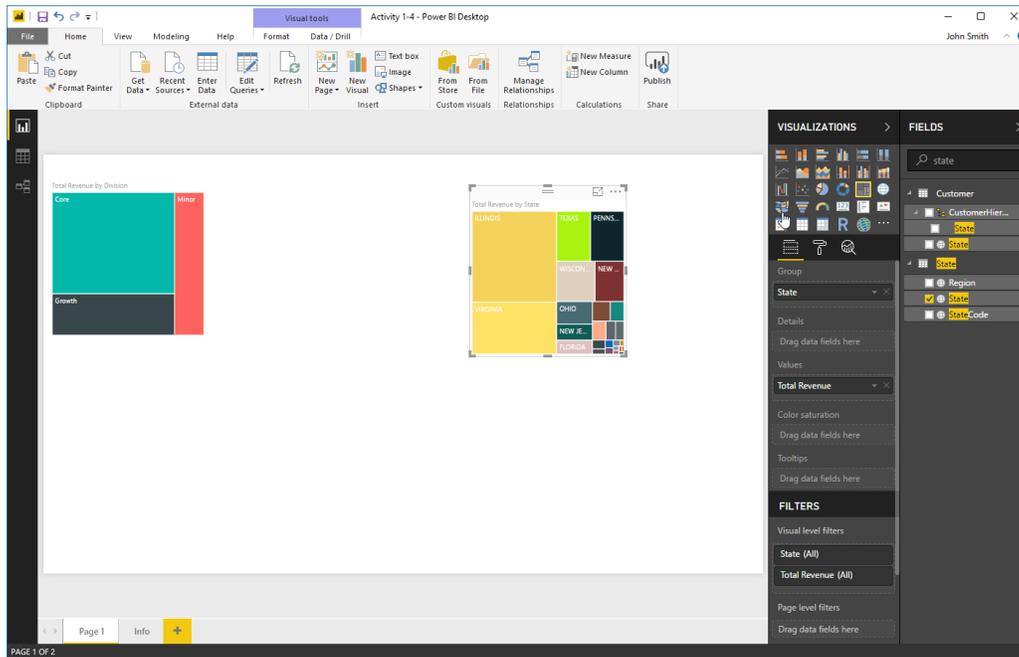
- 15. Drag the State field from the State group to the Group well in the Visualizations pane:



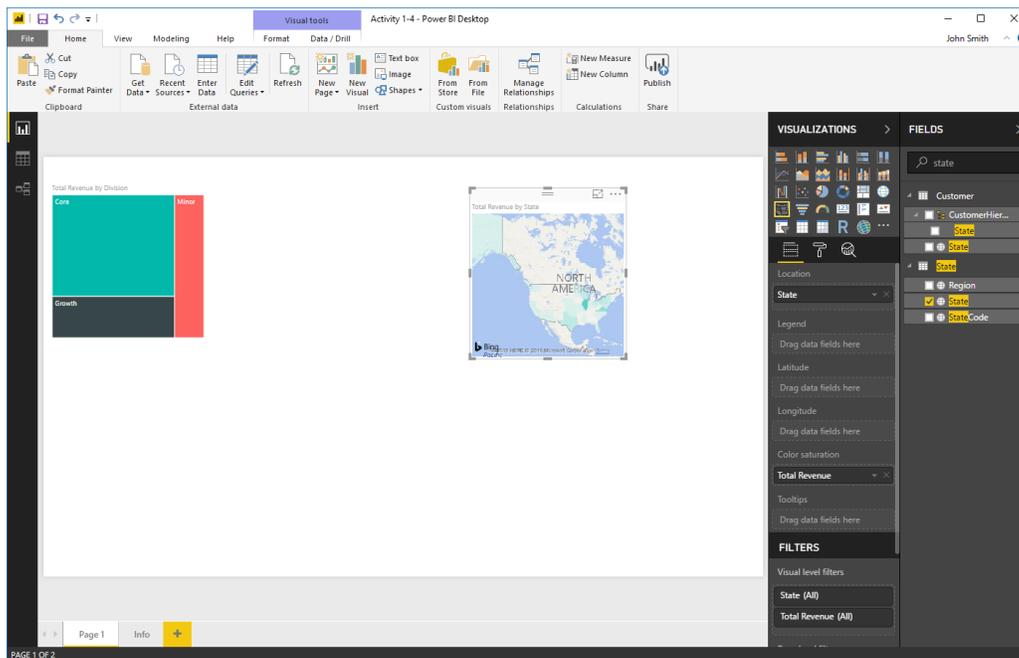
- 16. The total revenue by state will now be shown:



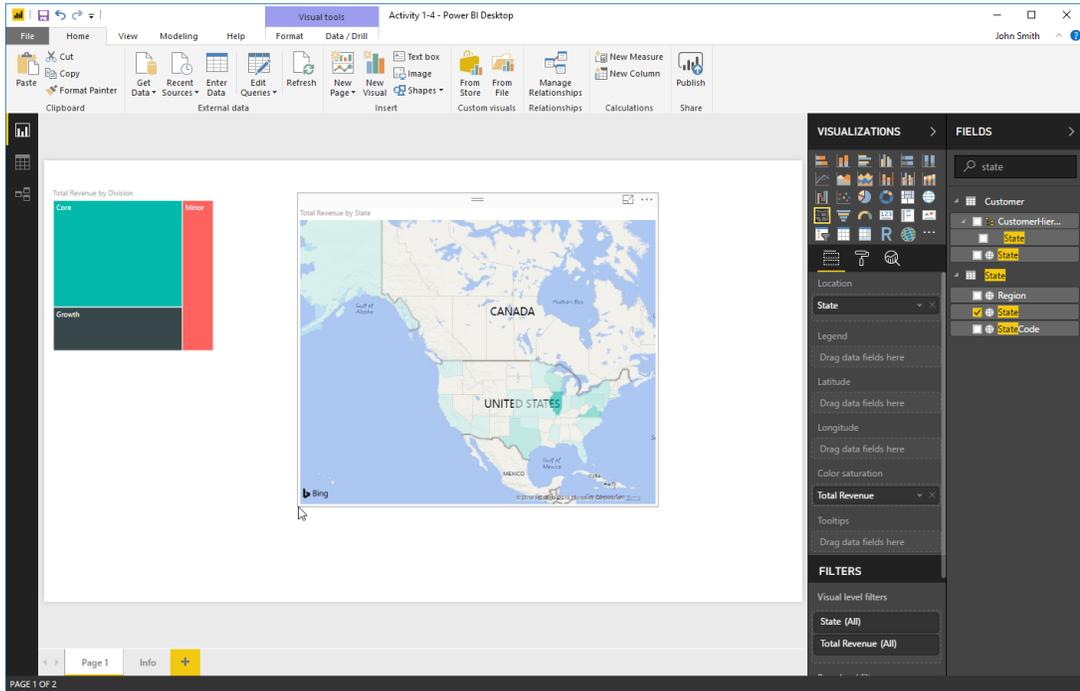
17. A map visualization might be better for this data. Click the “Filled map” icon in the Visualizations pane:



18. The visualization will update:



19. Click and drag the visualization's bottom left handle down and to the left to make it larger:



20. Save your work as Activity 1-4 Complete to finish this activity.

TOPIC E: Doing More with Visualizations

In the last topic, we explored how to create a report with a visualization. In this topic, we will take a closer look at some of the viewing and formatting options available when working with visualizations.

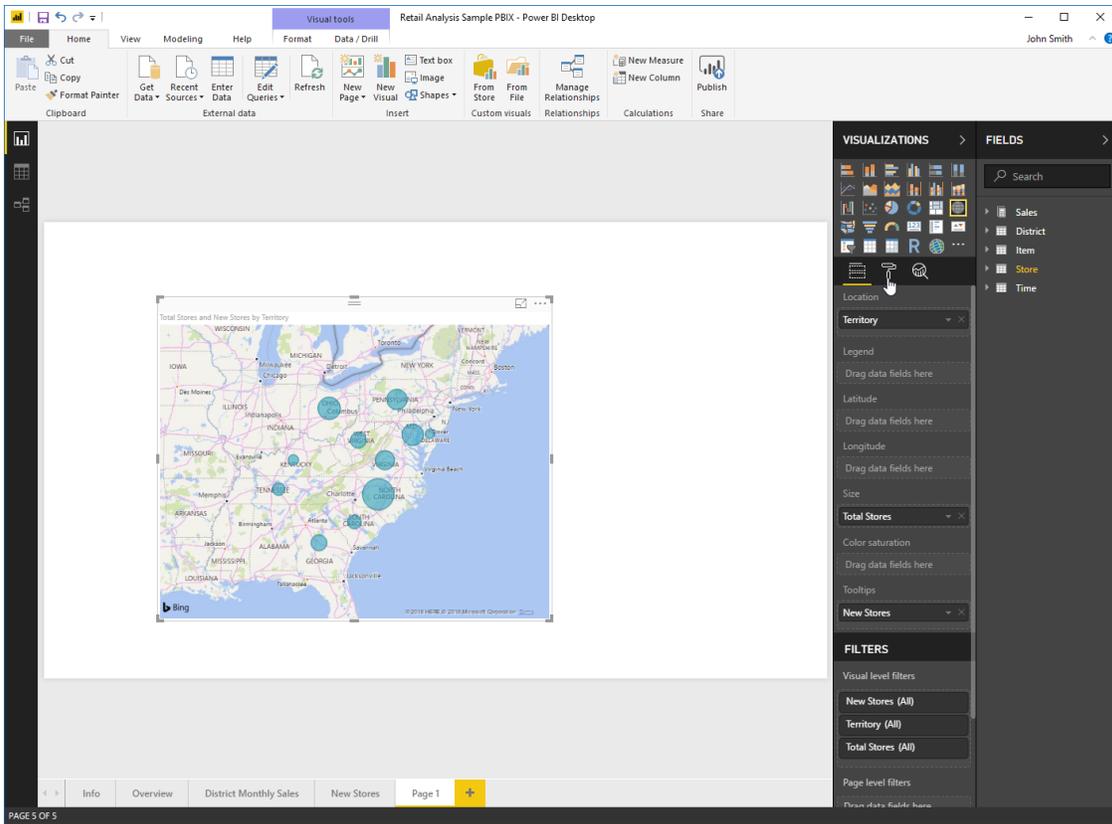
Topic Objectives

In this section, you will learn how to:

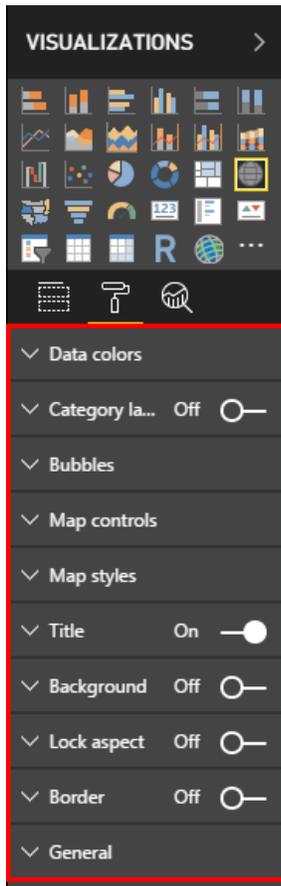
- Format visualizations
- View visualization data
- Use Focus Mode and Spotlight
- Remove a visualization

Formatting Visualizations

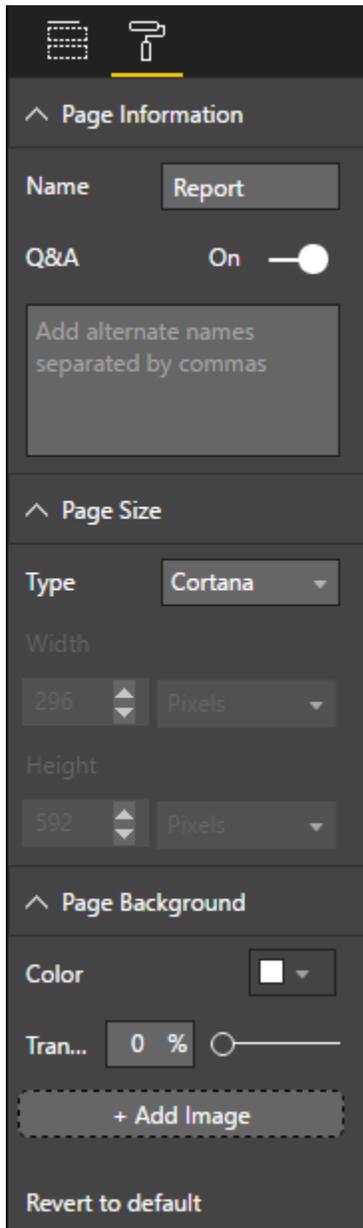
To format a visualization, click the Format tab in the Visualizations task pane:



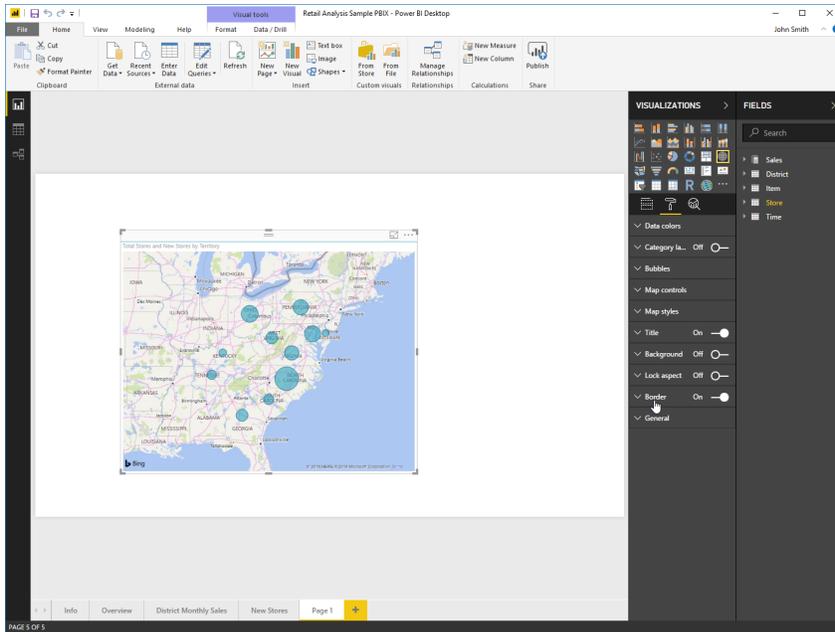
The options in the bottom part of the pane will change, and will be slightly different for each visualization:



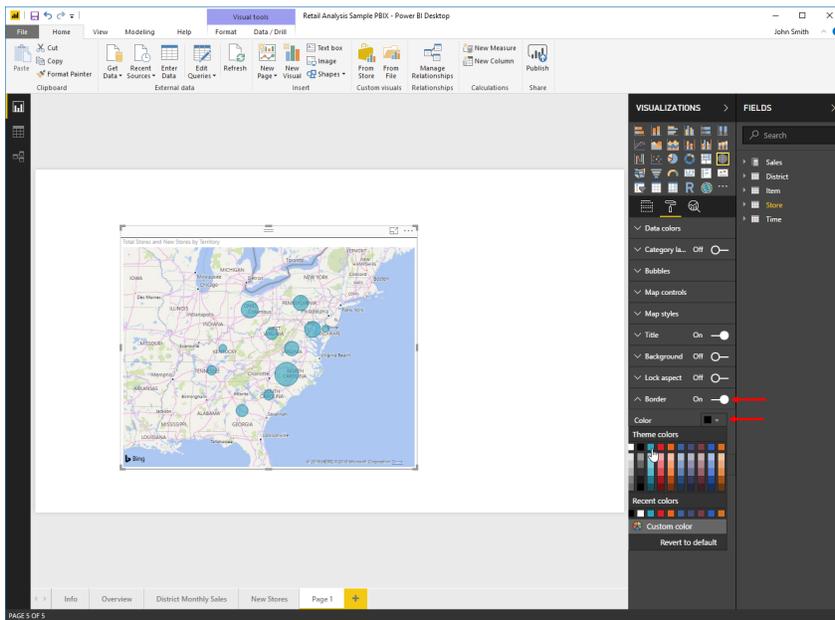
Note that if you open this pane without anything selected, you will see options to modify the page itself:



In either situation, you can click a category to expand it, and then use the related controls to modify the selected visualization. For example, let's say we want to add a border to our map. We will start by clicking the Border category to expand it:

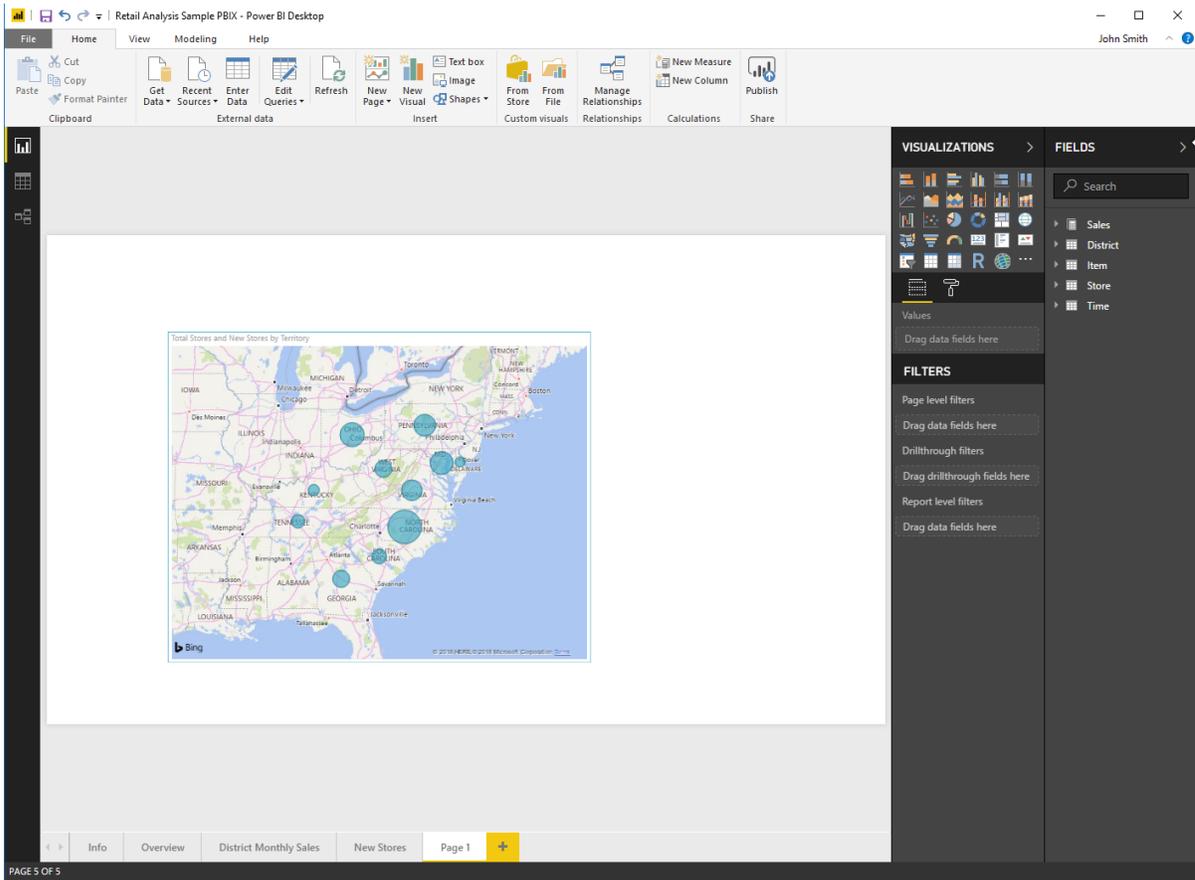


After toggling this feature to On, we can click the color picker and choose a color:



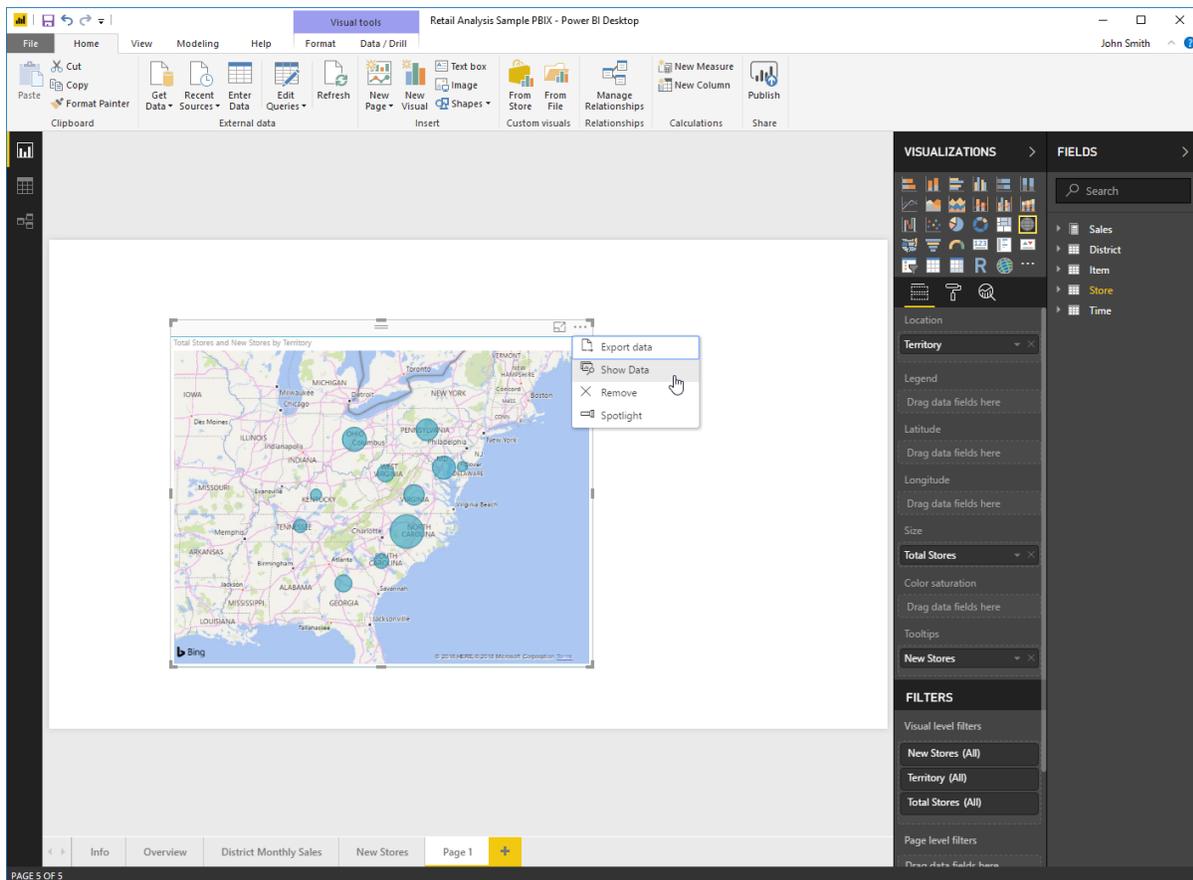
(Note the "Revert to default" link. This option is available in most formatting categories and is very useful for resetting a visualization to its default appearance.)

Here is what our visualization looks like with the new border:



Viewing Visualization Data

Although we can see what fields are displayed in a visualization via the Fields section of the Visualizations pane, it does not show the specific data. To see the data, move your mouse over the visualization, click the ellipses in the top right corner (called the “More options” menu), and click Show Data:



You can now see a table of the related data at the bottom of the window:

The screenshot shows the Microsoft Power BI Desktop interface. The main view is a map titled "TOTAL STORES AND NEW STORES BY TERRITORY" showing store locations across the United States. Below the map is a data table with the following data:

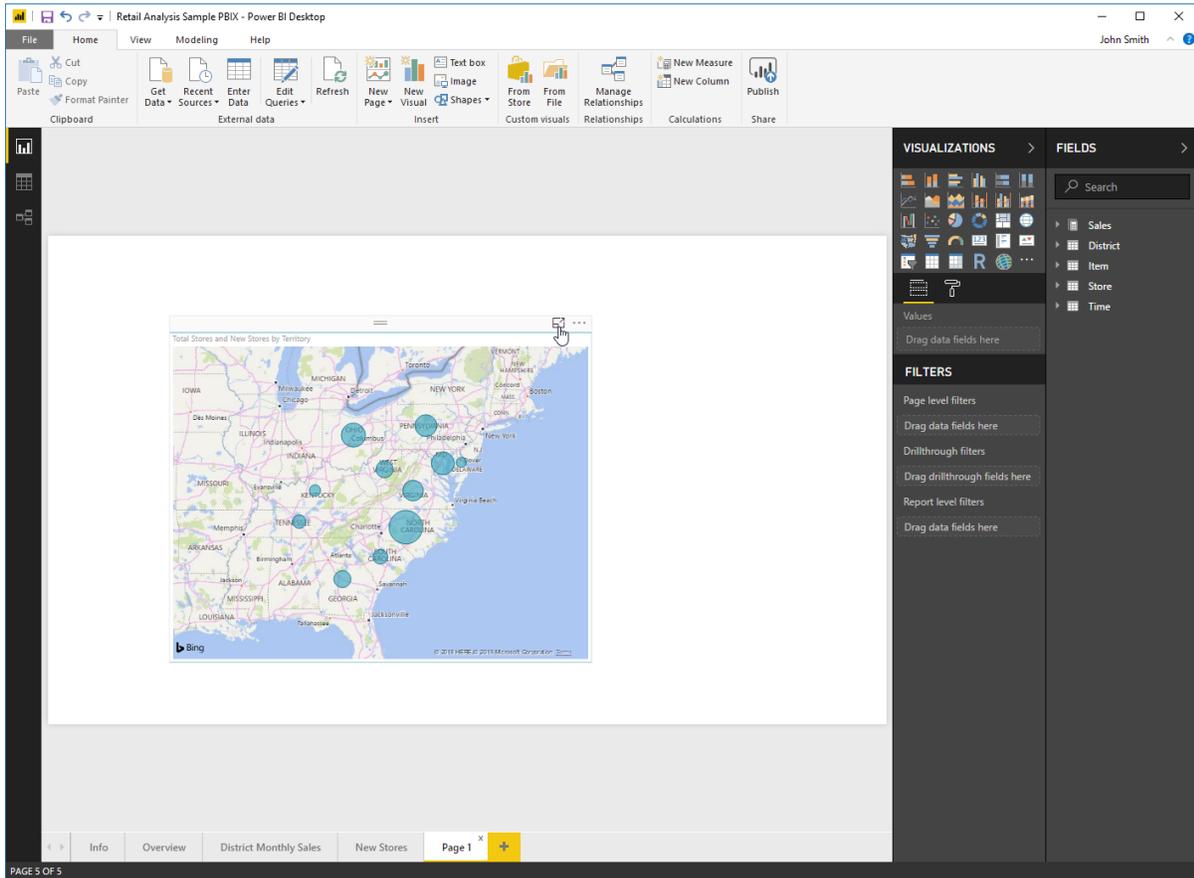
Territory	Total Stores	New Stores
NC	22	10
OH	14	10
MD	13	10
PA	12	10
VA	11	10
GA	8	10
WV	8	10
SC	6	10
TN	5	10
KY	3	10
DE	2	10

The table is highlighted with a red border. The interface also shows the "Visualizations" and "Fields" panes on the right, and the "Back to Report" button in the top left of the report area.

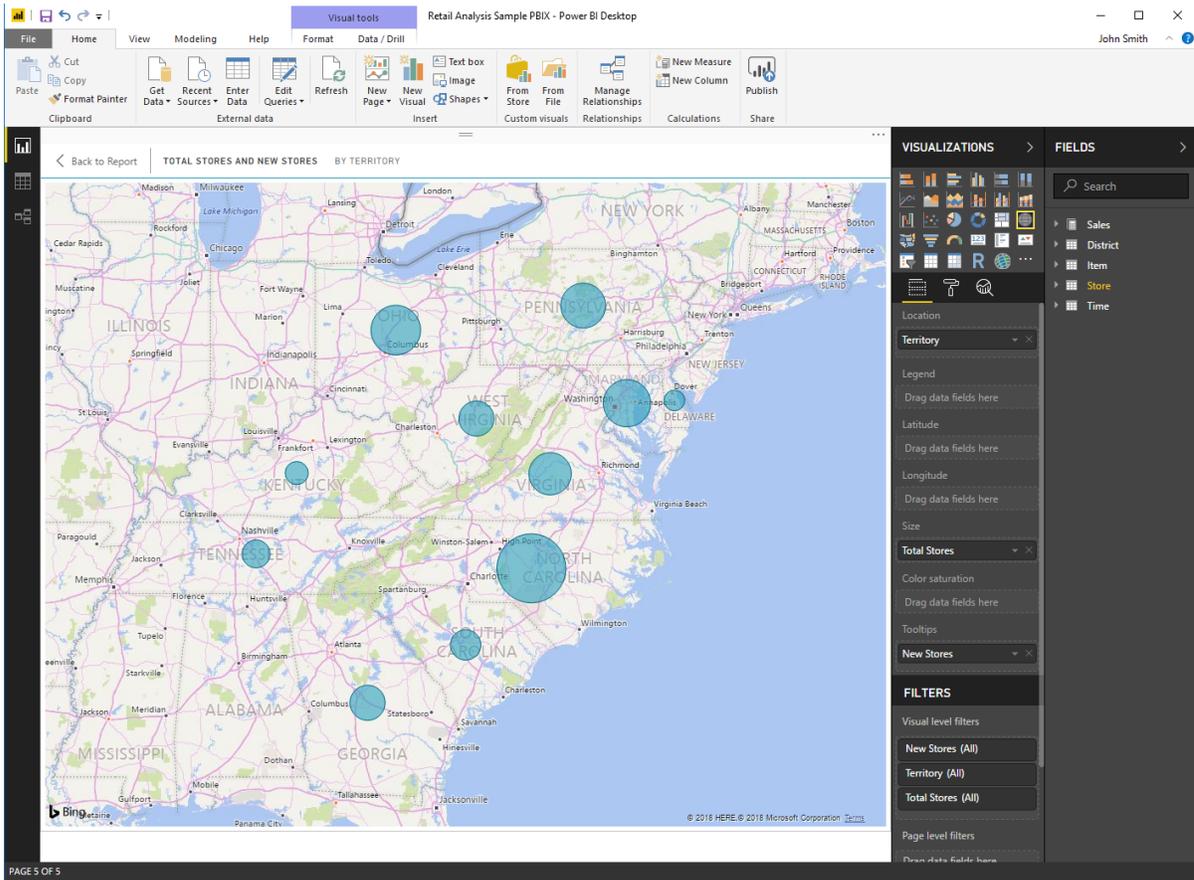
When you are finished, click “Back to Report” to close this view.

Using Focus Mode and Spotlight

There are two additional tools that you can use to focus on a visualization. The first is Focus Mode, accessible by moving your mouse over the visualization and clicking the icon next to the “More options” menu:

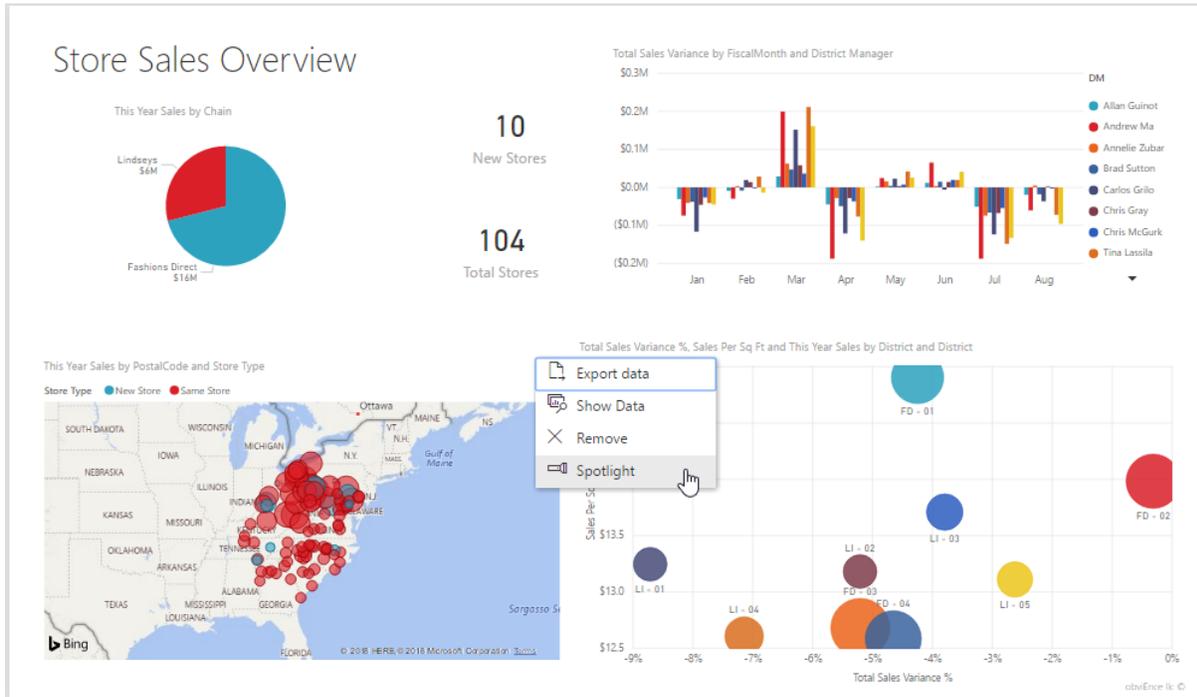


This will show the visualization in a full-screen style:

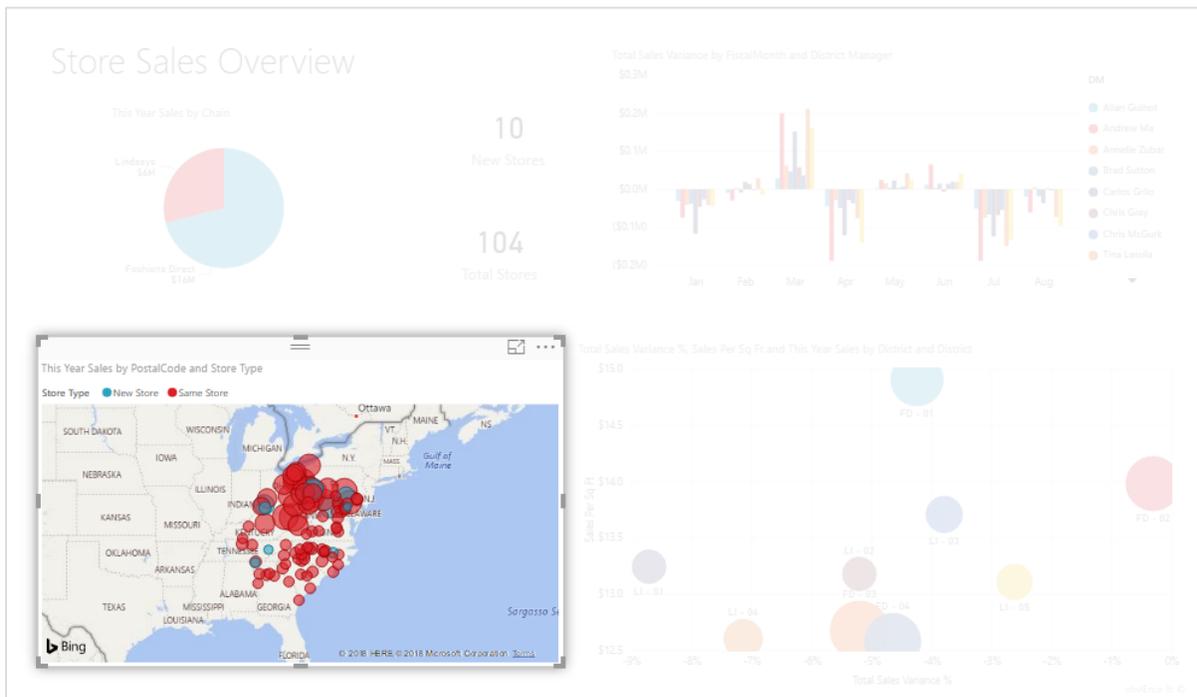


Just as when viewing visualization data, you can click “Back to Report” to return to the regular canvas view.

Spotlight is accessed from the “More options” menu:



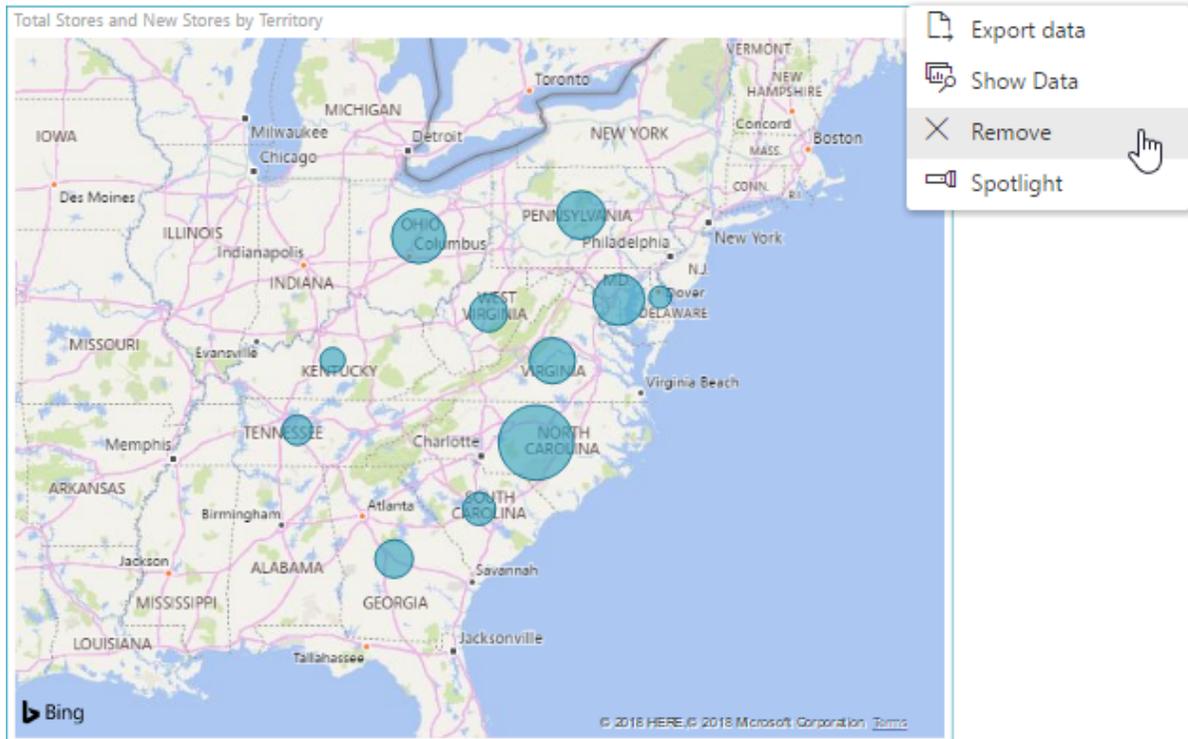
This dims the rest of the report, putting the focus on the selected visualization:



Click the Spotlight command again or press Esc on your keyboard to return to regular view.

Removing a Visualization

To remove a visualization, click the ellipses and click Remove:



The visualization will be removed from the page. This does not affect the underlying data in any way.

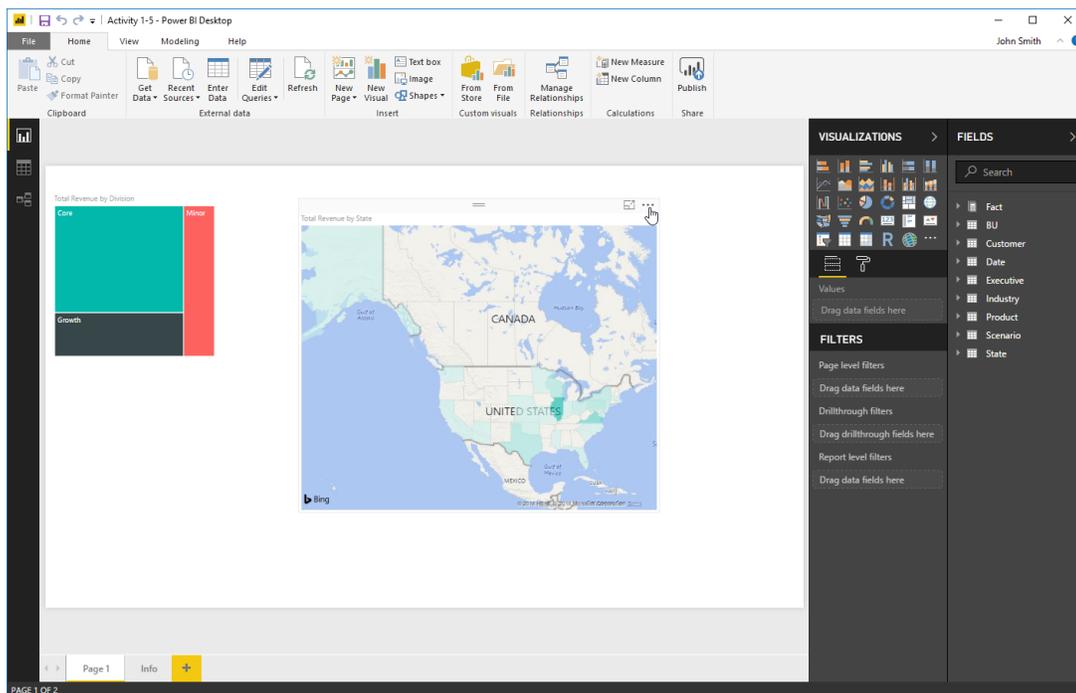
Activity 1-5: Doing More with Visualizations

In this activity, you will continue working with your map visualization.

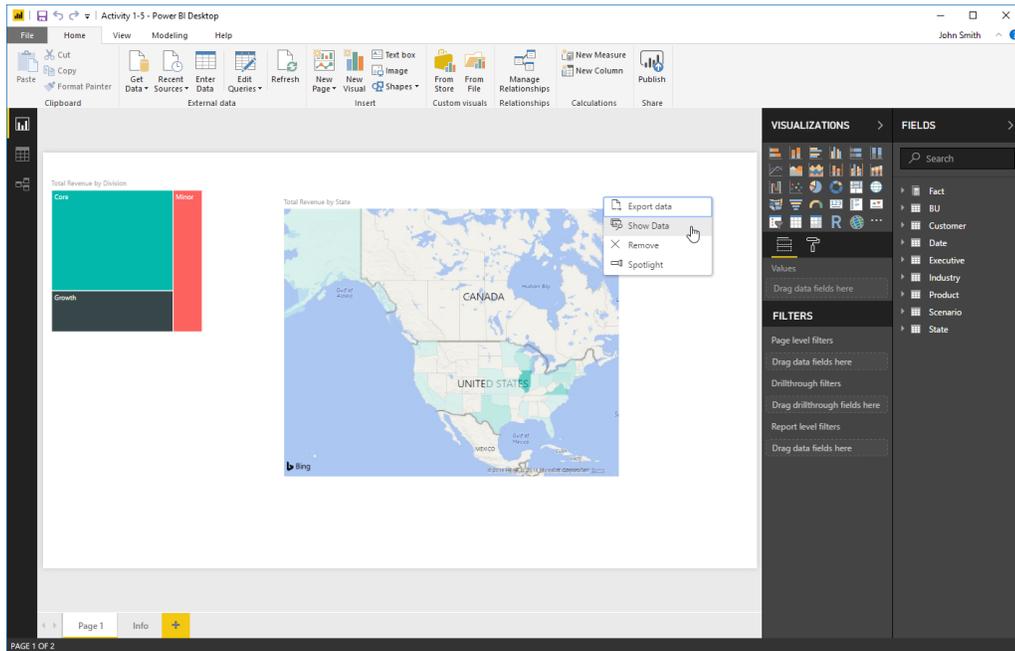
1. Open Power BI and open Activity 1-5:



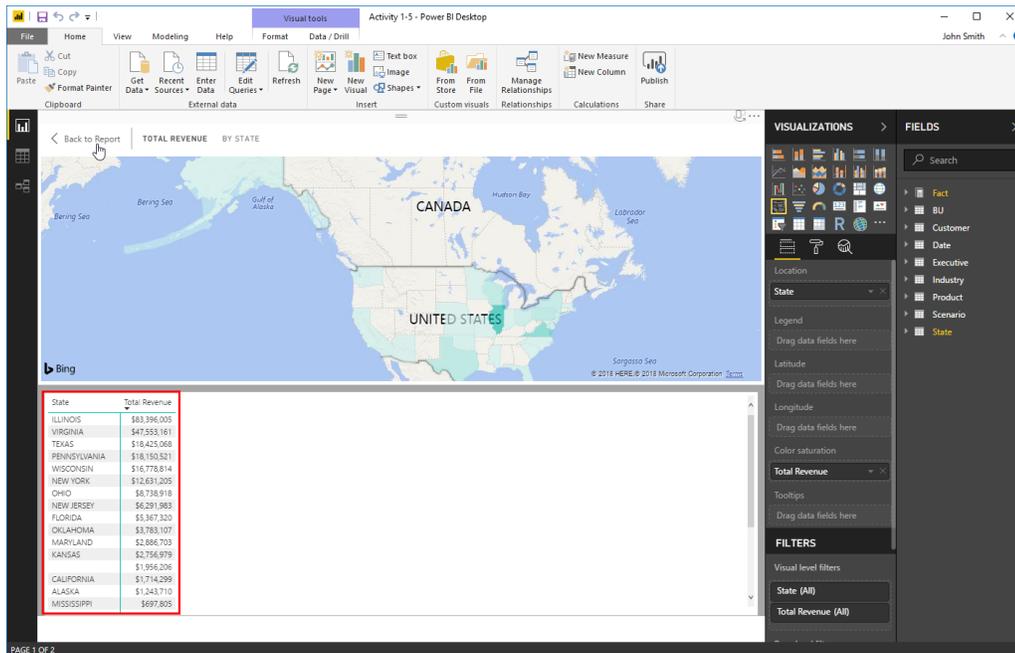
2. First, let's view the data for the map to confirm it is correct. Move your mouse over the visualization and click the ellipses to open the "More options" menu:



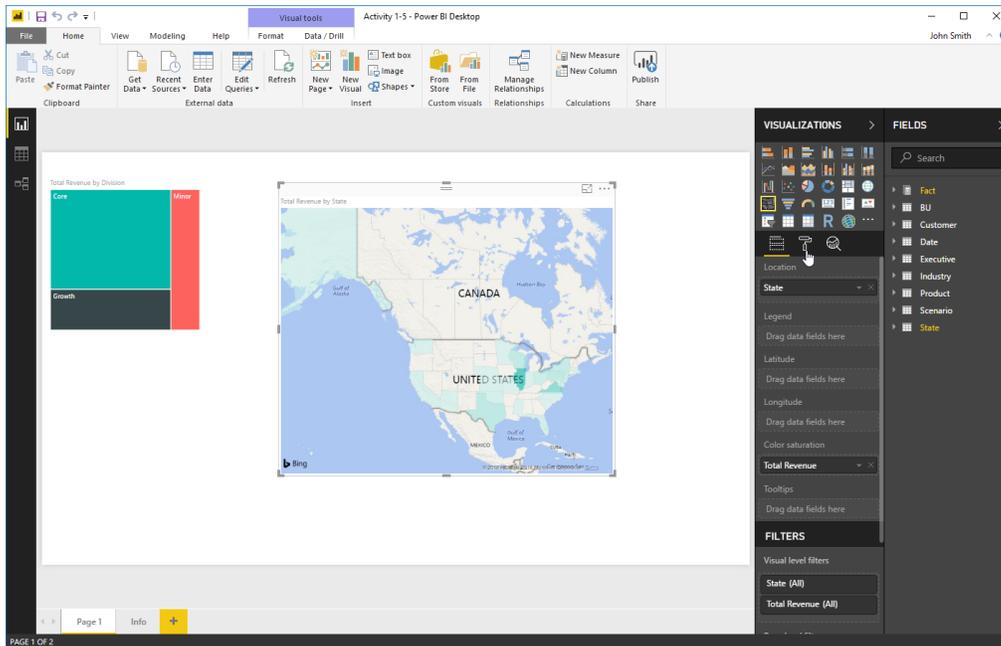
3. Click Show Data:



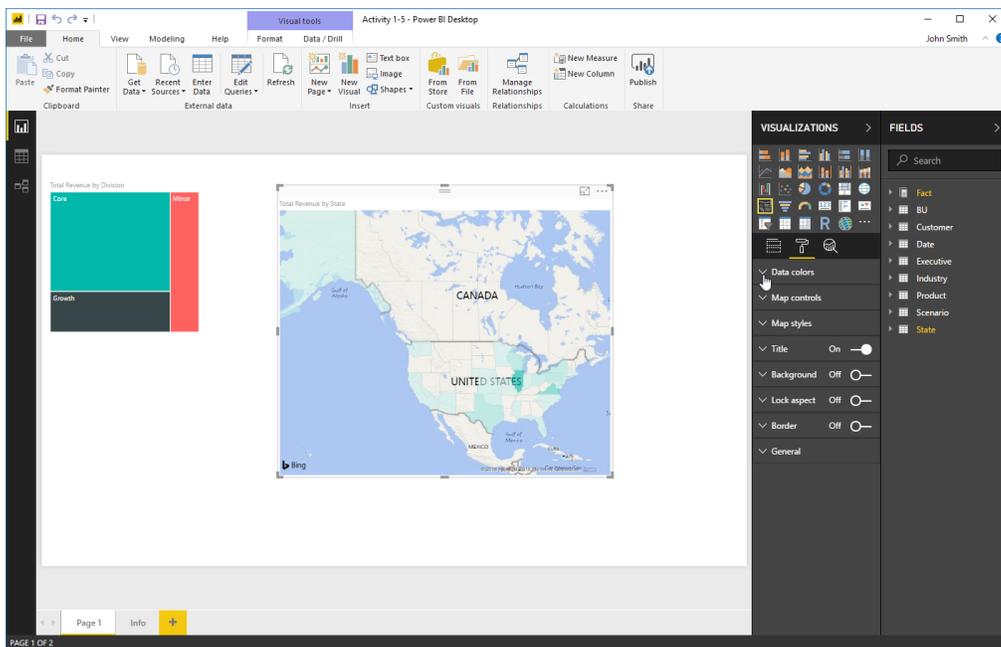
4. Review the data at the bottom of the screen. Then, click “Back to Report:”



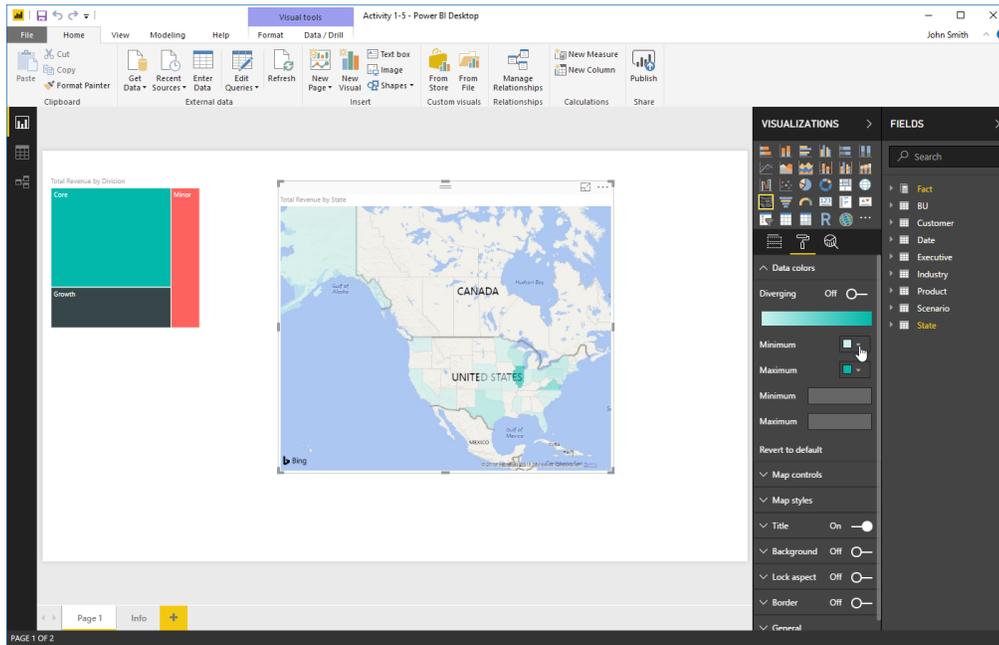
- Now, let's change the map's colors. Click the Format tab in the Visualizations task pane:



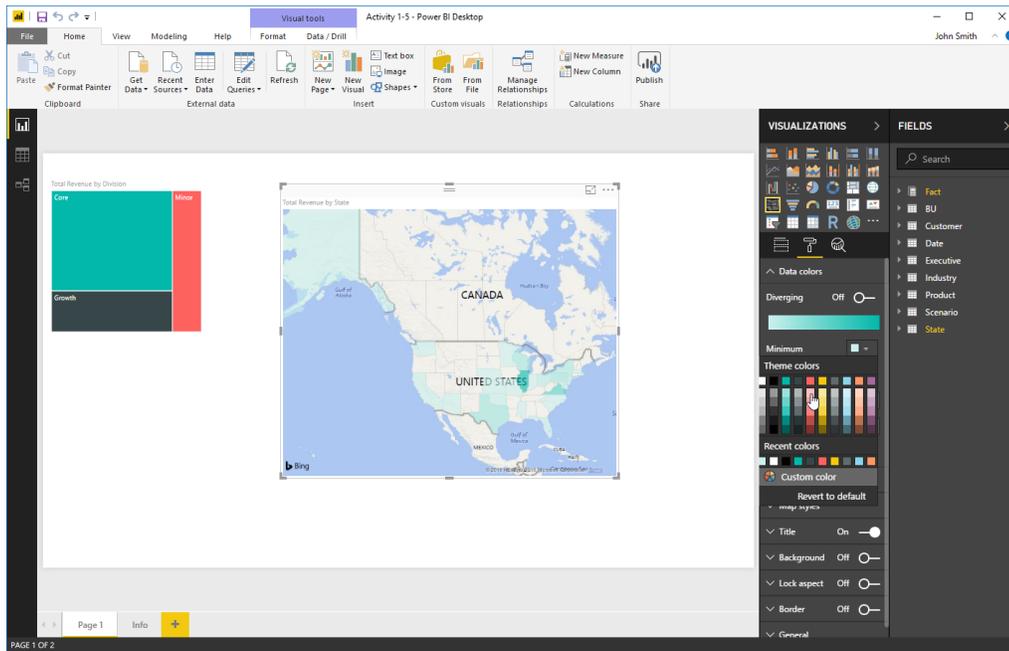
- Click the "Data colors" category to expand it:



7. Click the Minimum color picker:



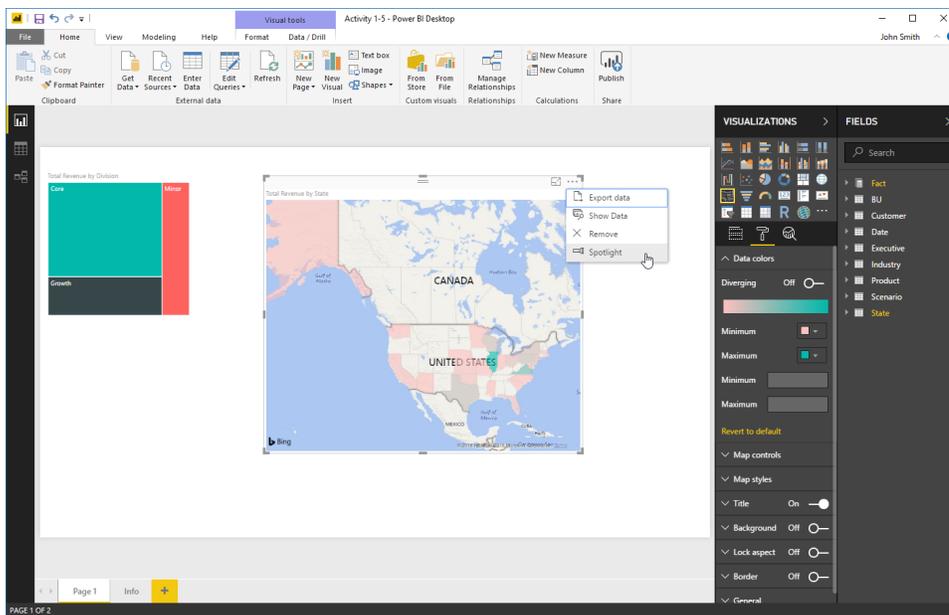
8. Choose a light shade of red:



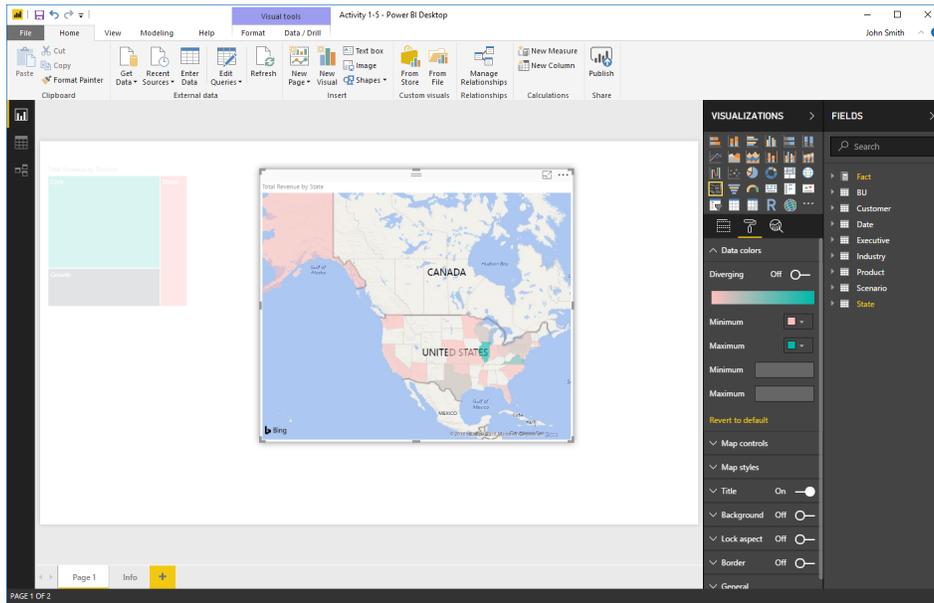
9. The map will now show lower values in red, and higher values in green:



10. Now, let's place a focus on this visualization. Click the "More options" menu and click Spotlight:



11. The effect will be applied:



12. Save your work as Activity 1-5 Complete to finish this activity.

Summary

In this lesson, you learned the basics of working with Power BI. We learned how to use the interface, work with Power BI files, connect to data sources, create a report, and create visualizations.

Review Questions

1. What are the six building blocks of Power BI?
2. How do you connect to an Excel workbook from Power BI?
3. What are the two task panes used when creating a visualization?
4. How do you see the data related to a visualization?
5. True or False: Removing a visualization also removes the related data.

LESSON 2: WORKING WITH DATA

Lesson Objectives

In this lesson you will learn how to:

- Transform and sanitize data
- Use the Query Editor
- Model data
- Manage relationships

TOPIC A: Transforming and Sanitizing Data

In the last lesson, we learned how to import a data source and create visualizations from it. However, we also saw that sometimes data will not import correctly. You may also need to clean up (sanitize) data or modify it in order to be of the most value in Power BI.

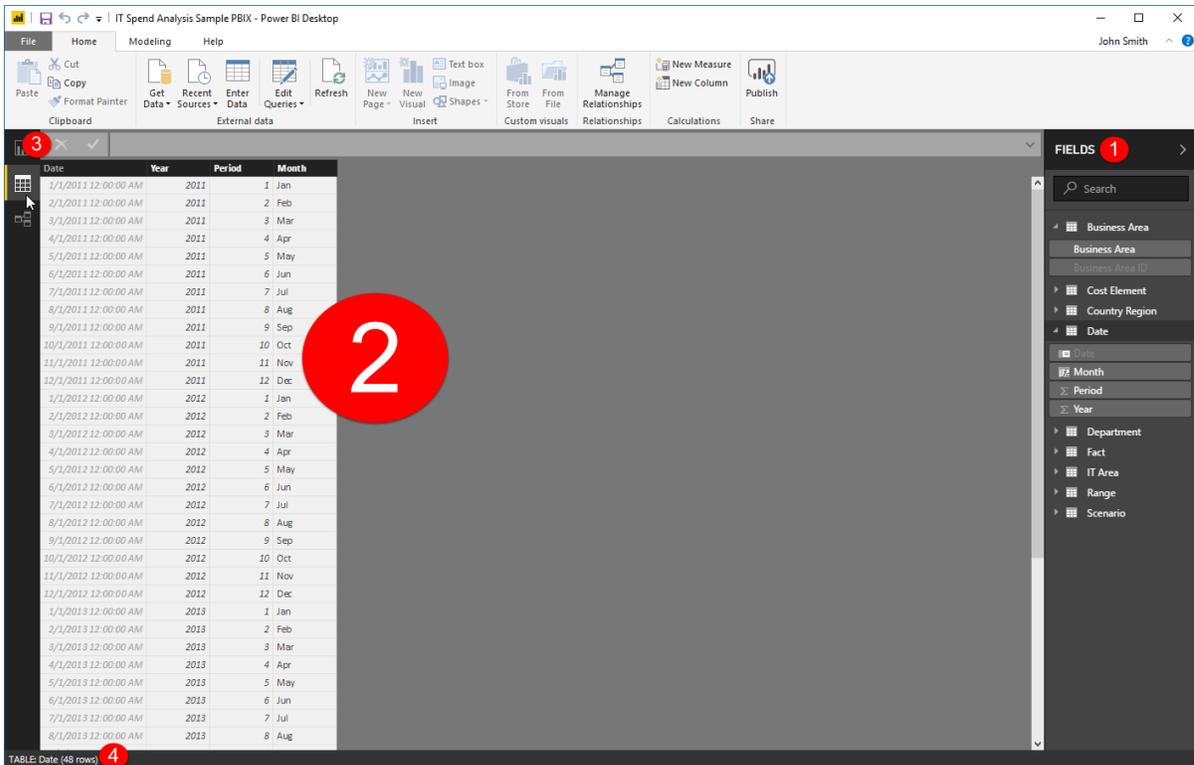
Topic Objectives

In this section, you will learn how to:

- Use Data view
- Clean irregularly formatted data
- Manage columns
- Sort table data

Using Data View

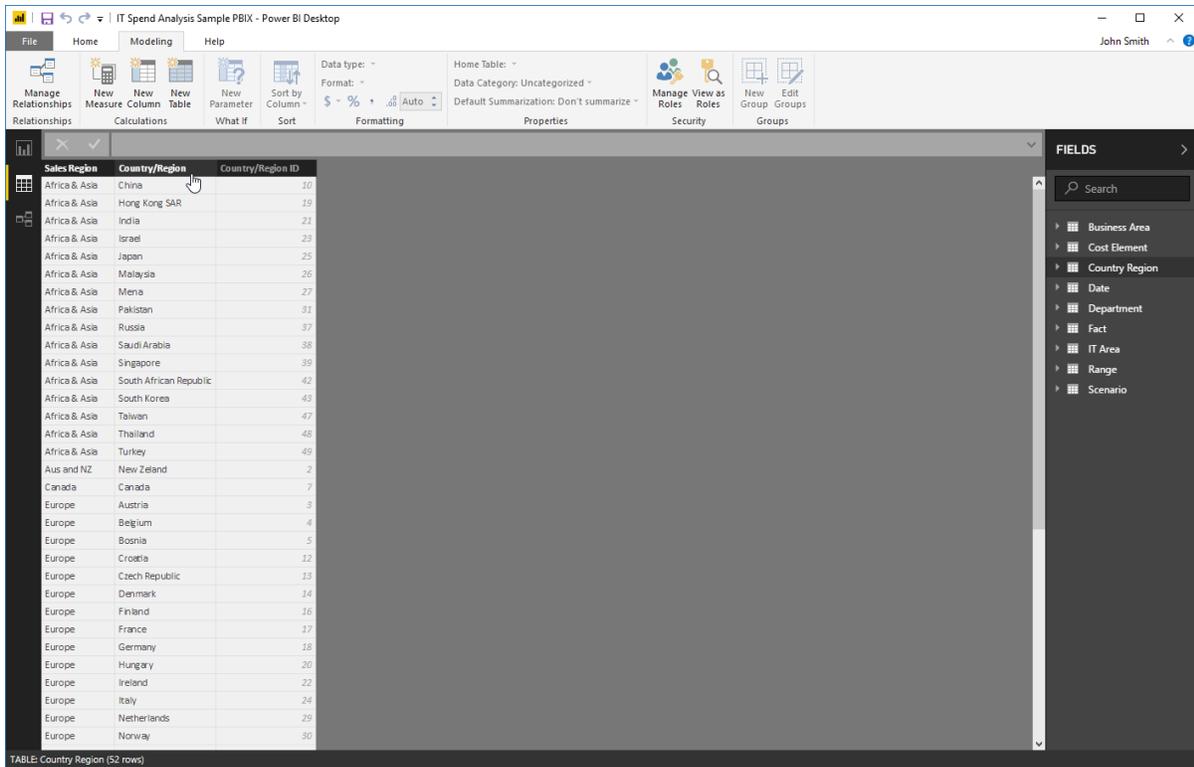
To access Data view, click the second icon in the navigation pane:



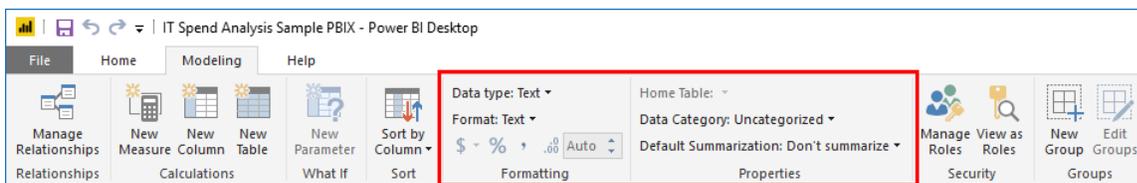
On the right side, you will see the **Fields task pane (1)**, which we saw in the last lesson. The selected table will be displayed in the **main window (2)**. At the top, the **expression editor (3)** is where you will enter functions, and the **status bar (4)** shows the current table name and the number of rows.

Cleaning Irregularly Formatted Data

To clean up table data, start by selecting the desired column:

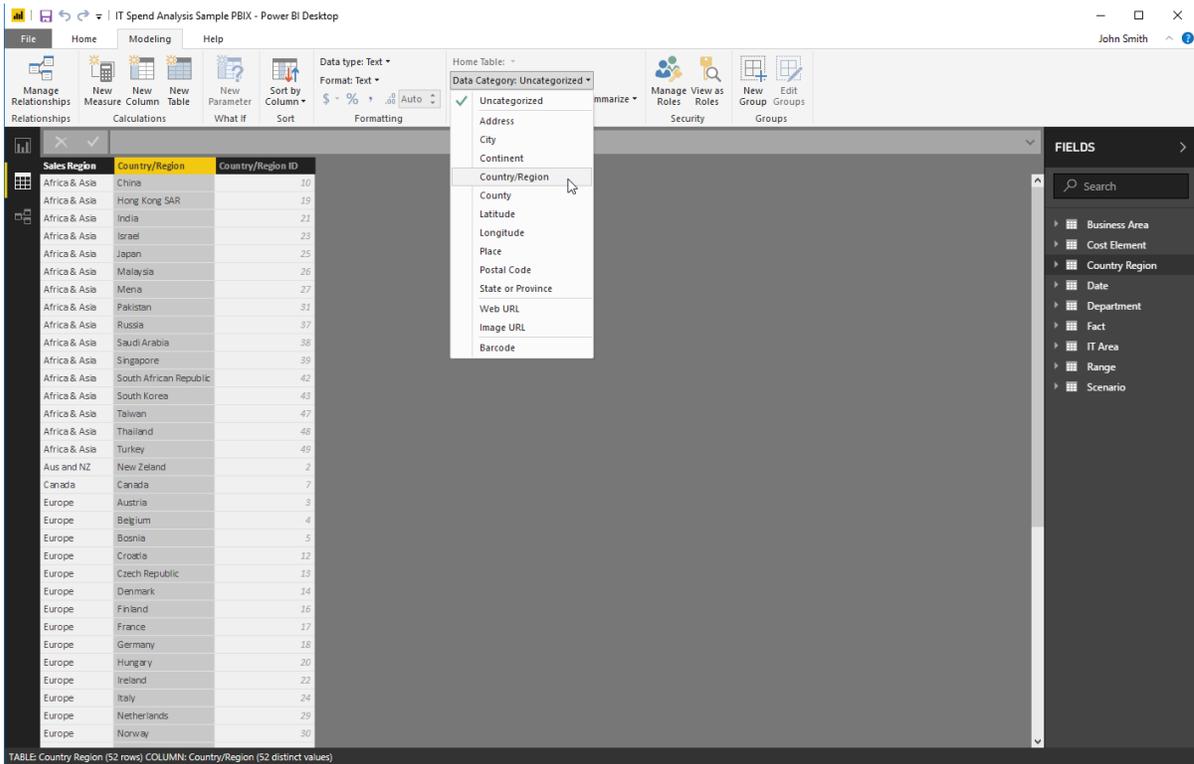


Next, use the appropriate tools on the Modeling tab:



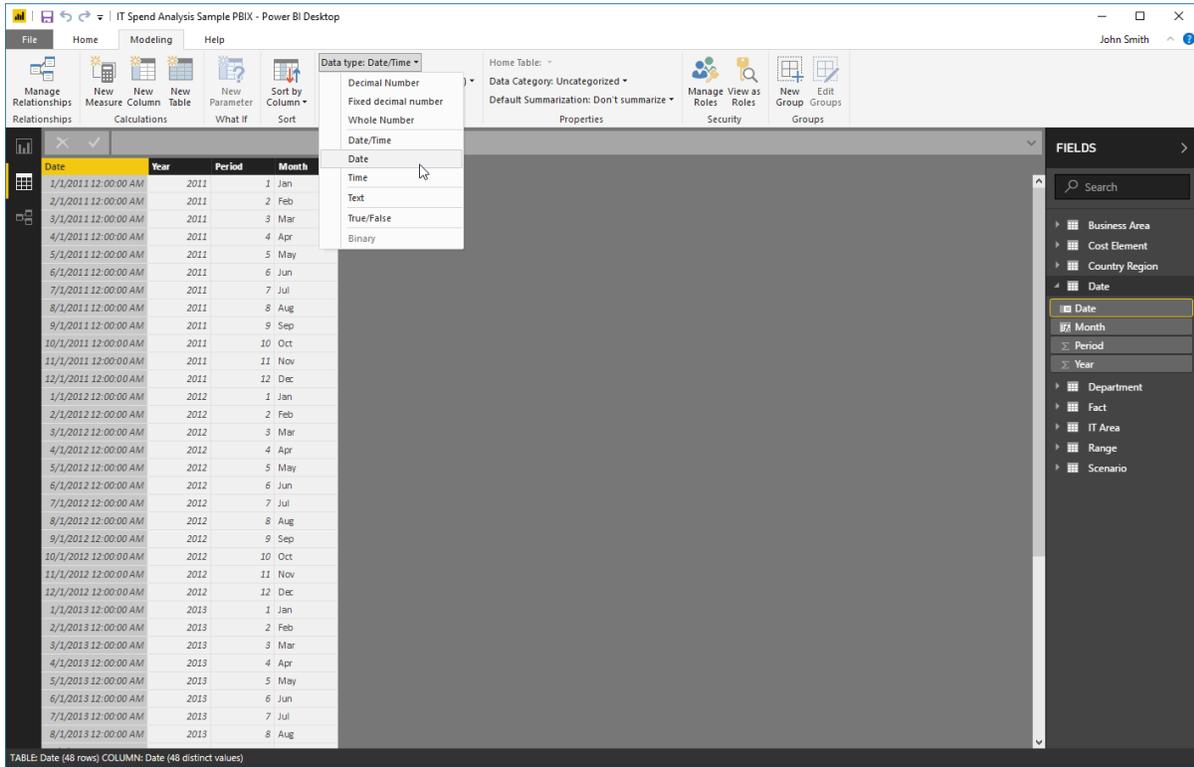
Here, you can set the data type, format, category, and summarization.

In this example, the Data Category is not set. Let's set it to Country/Region:



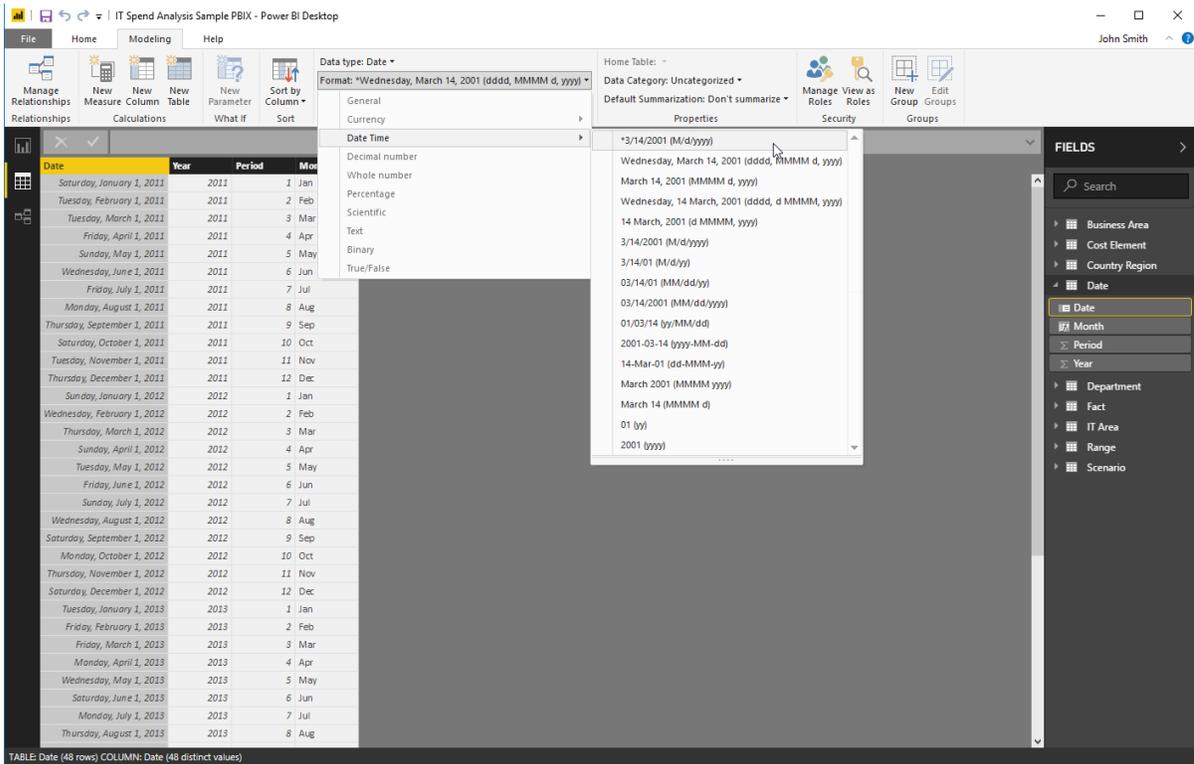
Now, Power BI knows how to best use this data – for example, we could now create a map visualization from it.

Here is another example. The Date column in this table also includes the time, which is unnecessary. We can change the data type to just date:



(All of the data will be retained; it will simply not be displayed.)

We can also simplify the date format:

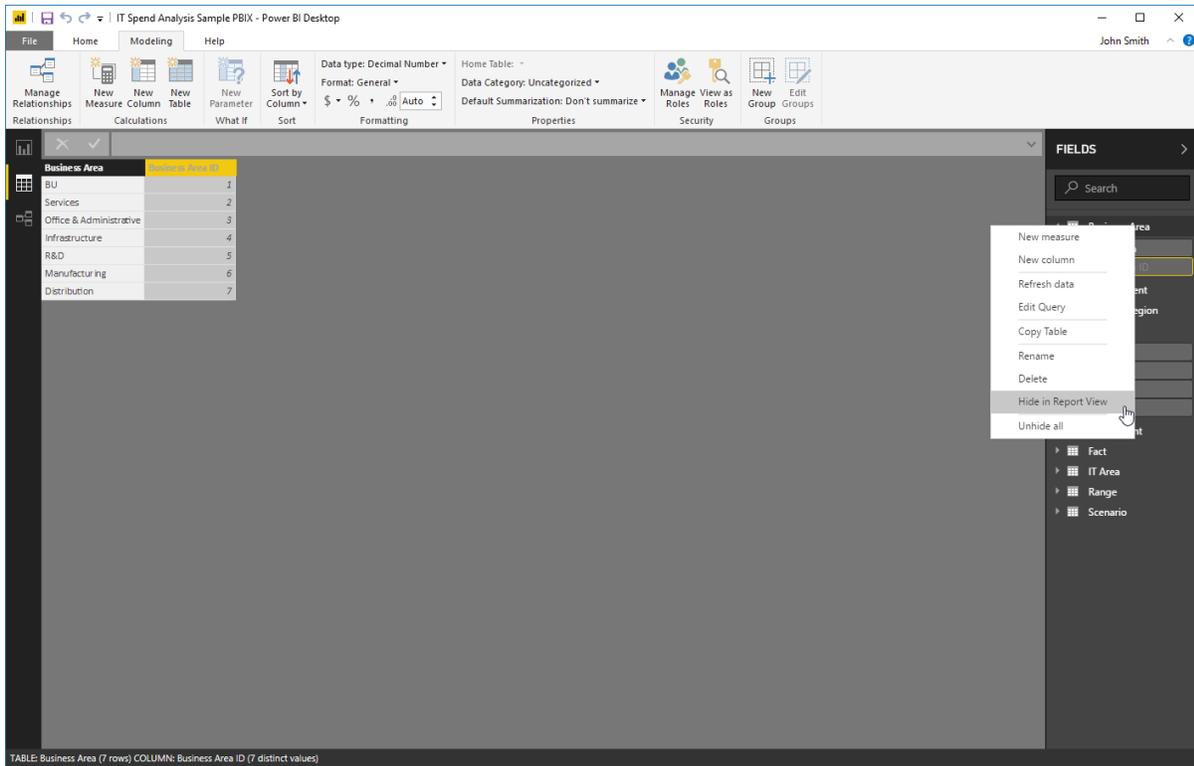


This makes the date much easier to read:

Date	Year	Period	Month
1/1/2011	2011	1	Jan
2/1/2011	2011	2	Feb
3/1/2011	2011	3	Mar
4/1/2011	2011	4	Apr
5/1/2011	2011	5	May
6/1/2011	2011	6	Jun
7/1/2011	2011	7	Jul
8/1/2011	2011	8	Aug
9/1/2011	2011	9	Sep
10/1/2011	2011	10	Oct
11/1/2011	2011	11	Nov
12/1/2011	2011	12	Dec
1/1/2012	2012	1	Jan
2/1/2012	2012	2	Feb
3/1/2012	2012	3	Mar
4/1/2012	2012	4	Apr

Managing Columns

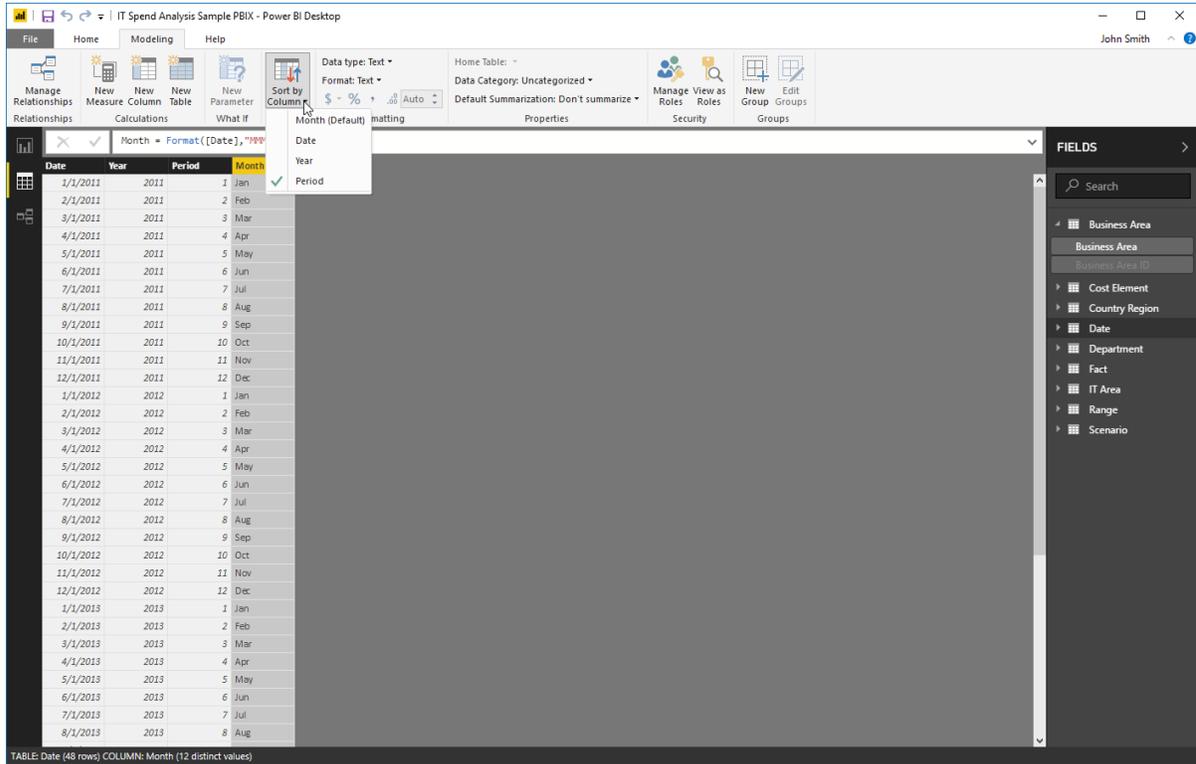
You can also choose to show or hide fields or even entire tables from Report view. Simply right-click the item in the Fields pane and select “Hide in Report View:”



(You can also right-click columns in Data view to access this option.) Notice that you can also delete or rename columns and tables from this right-click menu. To display a hidden field, de-select the “Hide in Report View” option.

Sorting Table Data

When viewing table data, you can choose what column is sorted by using the “Sort by column” menu:



You can also right-click any column header and choose an ascending or descending sort.

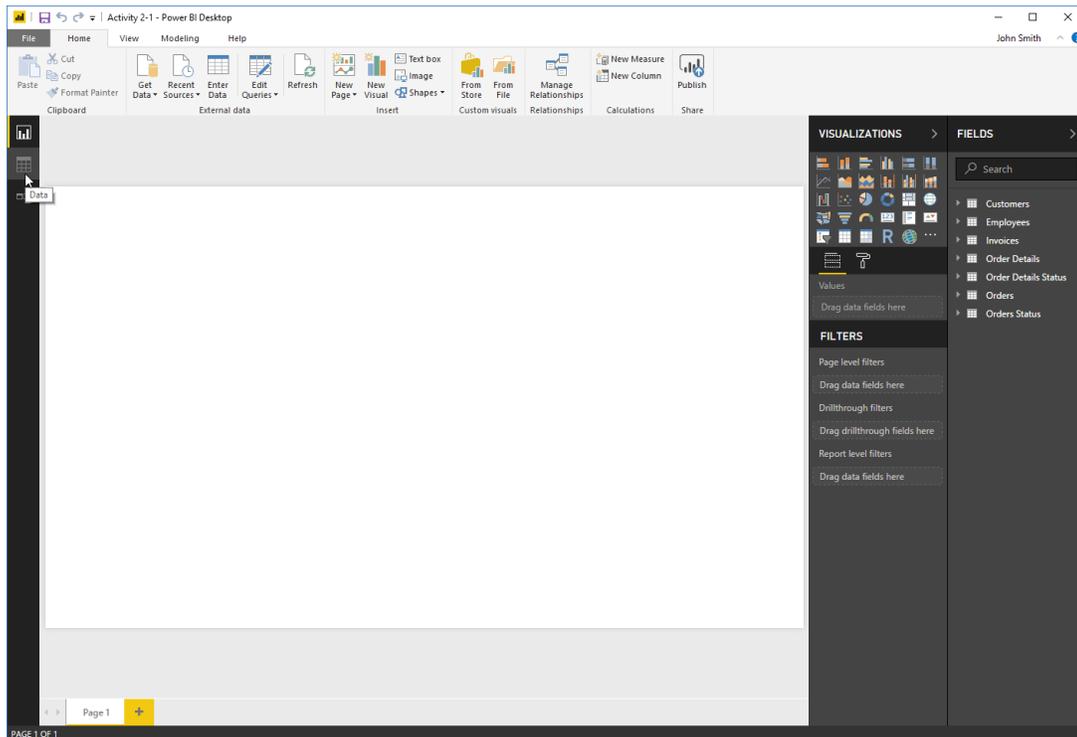
Activity 2-1: Transforming and Sanitizing Data

In this activity, you will begin working with a retail data set.

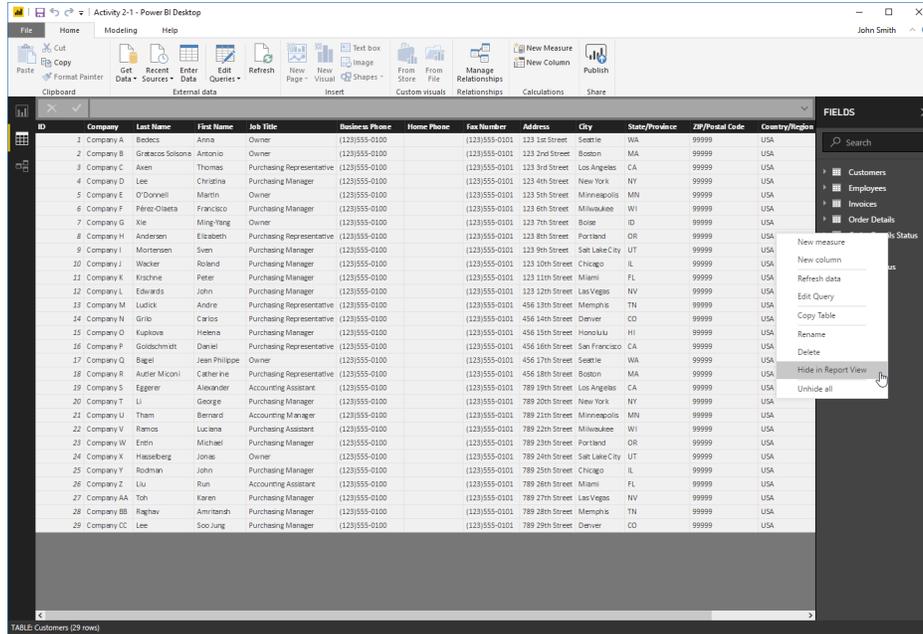
1. Open Power BI and open Activity 2-1:



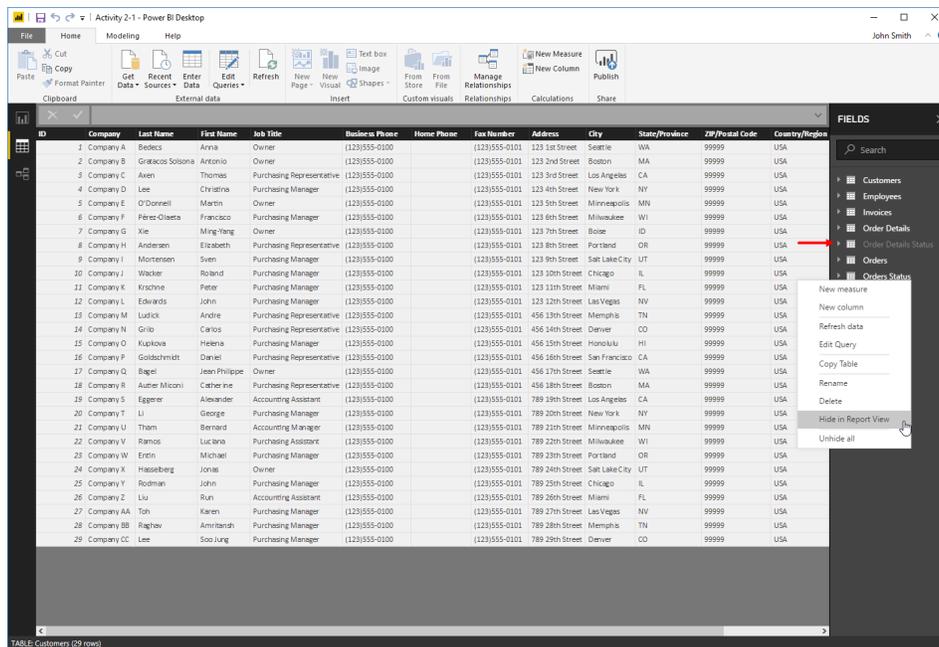
2. Click the Data view icon in the navigation pane:



- First, let's hide tables that are for reference purposes only (meaning we will not use them to create reports or visualizations). Right-click the Order Details Status table and click "Hide in Report View:"



- Notice that the table name is now gray, meaning it is hidden from Report View. Repeat Step 4 for the Orders Status table:



- Next, let's review the data and see where we can sanitize it to make it easier to work with. We will start with the Customers table. Click the first entry in the Fields task pane to see this table (if it is not already displayed):

TABLE: Customers (29 rows)

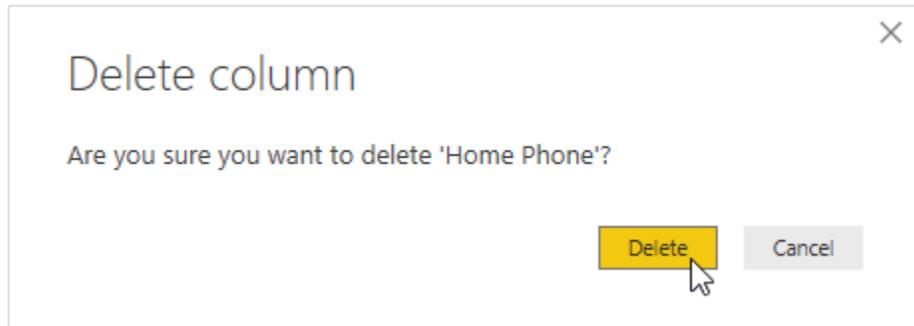
ID	Company	Last Name	First Name	Job Title	Business Phone	Home Phone	Fax Number	Address	City	State/Province	ZIP/Postal Code	Country/Region
1	Company A	Bedeck	Anna	Owner	(123)555-0100		(123)555-0101	123 1st Street	Seattle	WA	99999	USA
2	Company B	Gracasso Salsona	Antonio	Owner	(123)555-0100		(123)555-0101	123 2nd Street	Boston	MA	99999	USA
3	Company C	Axen	Thomas	Purchasing Representative	(123)555-0100		(123)555-0101	123 3rd Street	Los Angeles	CA	99999	USA
4	Company D	Lee	Christina	Purchasing Manager	(123)555-0100		(123)555-0101	123 4th Street	New York	NY	99999	USA
5	Company E	O'Donnell	Martin	Owner	(123)555-0100		(123)555-0101	123 5th Street	Minneapolis	MN	99999	USA
6	Company F	Pérez-Olajeta	Francisco	Purchasing Manager	(123)555-0100		(123)555-0101	123 6th Street	Milwaukee	WI	99999	USA
7	Company G	Xie	Ming-Yang	Owner	(123)555-0100		(123)555-0101	123 7th Street	Boise	ID	99999	USA
8	Company H	Andersen	Elizabeth	Purchasing Representative	(123)555-0100		(123)555-0101	123 8th Street	Portland	OR	99999	USA
9	Company I	Mortensen	Sven	Purchasing Manager	(123)555-0100		(123)555-0101	123 9th Street	Salt Lake City	UT	99999	USA
10	Company J	Wacker	Roland	Purchasing Manager	(123)555-0100		(123)555-0101	123 10th Street	Chicago	IL	99999	USA
11	Company K	Kraschne	Peter	Purchasing Manager	(123)555-0100		(123)555-0101	123 11th Street	Miami	FL	99999	USA
12	Company L	Edwards	John	Purchasing Manager	(123)555-0100		(123)555-0101	123 12th Street	Las Vegas	NV	99999	USA
13	Company M	Ludick	Andrie	Purchasing Representative	(123)555-0100		(123)555-0101	456 13th Street	Memphis	TN	99999	USA
14	Company N	Gribo	Carlos	Purchasing Representative	(123)555-0100		(123)555-0101	456 14th Street	Denver	CO	99999	USA
15	Company O	Kupkova	Helena	Purchasing Manager	(123)555-0100		(123)555-0101	456 15th Street	Honolulu	HI	99999	USA
16	Company P	Goldschmidt	Daniel	Purchasing Representative	(123)555-0100		(123)555-0101	456 16th Street	San Francisco	CA	99999	USA
17	Company Q	Bagel	Jean Philippe	Owner	(123)555-0100		(123)555-0101	456 17th Street	Seattle	WA	99999	USA
18	Company R	Aulier Miconi	Catherine	Purchasing Representative	(123)555-0100		(123)555-0101	456 18th Street	Boston	MA	99999	USA
19	Company S	Eggerer	Alexander	Accounting Assistant	(123)555-0100		(123)555-0101	789 19th Street	Los Angeles	CA	99999	USA
20	Company T	Li	George	Purchasing Manager	(123)555-0100		(123)555-0101	789 20th Street	New York	NY	99999	USA
21	Company U	Tham	Bernard	Accounting Manager	(123)555-0100		(123)555-0101	789 21st Street	Minneapolis	MN	99999	USA
22	Company V	Ramos	Luciana	Purchasing Assistant	(123)555-0100		(123)555-0101	789 22nd Street	Milwaukee	WI	99999	USA
23	Company W	Ertn	Michael	Purchasing Manager	(123)555-0100		(123)555-0101	789 23th Street	Portland	OR	99999	USA
24	Company X	Hasseberg	Jonas	Owner	(123)555-0100		(123)555-0101	789 24th Street	Salt Lake City	UT	99999	USA
25	Company Y	Rodman	John	Purchasing Manager	(123)555-0100		(123)555-0101	789 25th Street	Chicago	IL	99999	USA
26	Company Z	Liu	Run	Accounting Assistant	(123)555-0100		(123)555-0101	789 26th Street	Miami	FL	99999	USA
27	Company AA	Toh	Karen	Purchasing Manager	(123)555-0100		(123)555-0101	789 27th Street	Las Vegas	NV	99999	USA
28	Company BB	Raghav	Amrithash	Purchasing Manager	(123)555-0100		(123)555-0101	789 28th Street	Memphis	TN	99999	USA
29	Company CC	Lee	Soo Jung	Purchasing Manager	(123)555-0100		(123)555-0101	789 29th Street	Denver	CO	99999	USA

- You can see that the Home Phone field is empty in all rows. Right-click it and click Delete:

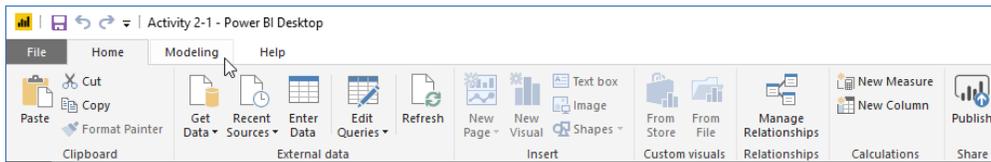
TABLE: Customers (29 rows) COLUMN: Home Phone (1 distinct values)

ID	Company	Last Name	First Name	Job Title	Business Phone	Home Phone	Fax Number	Address	City	State/Province	ZIP/Postal Code	Country/Region
1	Company A	Bedeck	Anna	Owner	(123)555-0100		(123)555-0101	123 1st Street	Seattle	WA	99999	USA
2	Company B	Gracasso Salsona	Antonio	Owner	(123)555-0100		(123)555-0101	123 2nd Street	Boston	MA	99999	USA
3	Company C	Axen	Thomas	Purchasing Representative	(123)555-0100		(123)555-0101	123 3rd Street	Los Angeles	CA	99999	USA
4	Company D	Lee	Christina	Purchasing Manager	(123)555-0100		(123)555-0101	123 4th Street	New York	NY	99999	USA
5	Company E	O'Donnell	Martin	Owner	(123)555-0100		(123)555-0101	123 5th Street	Minneapolis	MN	99999	USA
6	Company F	Pérez-Olajeta	Francisco	Purchasing Manager	(123)555-0100		(123)555-0101	123 6th Street	Milwaukee	WI	99999	USA
7	Company G	Xie	Ming-Yang	Owner	(123)555-0100		(123)555-0101	123 7th Street	Boise	ID	99999	USA
8	Company H	Andersen	Elizabeth	Purchasing Representative	(123)555-0100		(123)555-0101	123 8th Street	Portland	OR	99999	USA
9	Company I	Mortensen	Sven	Purchasing Manager	(123)555-0100		(123)555-0101	123 9th Street	Salt Lake City	UT	99999	USA
10	Company J	Wacker	Roland	Purchasing Manager	(123)555-0100		(123)555-0101	123 10th Street	Chicago	IL	99999	USA
11	Company K	Kraschne	Peter	Purchasing Manager	(123)555-0100		(123)555-0101	123 11th Street	Miami	FL	99999	USA
12	Company L	Edwards	John	Purchasing Manager	(123)555-0100		(123)555-0101	123 12th Street	Las Vegas	NV	99999	USA
13	Company M	Ludick	Andrie	Purchasing Representative	(123)555-0100		(123)555-0101	456 13th Street	Memphis	TN	99999	USA
14	Company N	Gribo	Carlos	Purchasing Representative	(123)555-0100		(123)555-0101	456 14th Street	Denver	CO	99999	USA
15	Company O	Kupkova	Helena	Purchasing Manager	(123)555-0100		(123)555-0101	456 15th Street	Honolulu	HI	99999	USA
16	Company P	Goldschmidt	Daniel	Purchasing Representative	(123)555-0100		(123)555-0101	456 16th Street	San Francisco	CA	99999	USA
17	Company Q	Bagel	Jean Philippe	Owner	(123)555-0100		(123)555-0101	456 17th Street	Seattle	WA	99999	USA
18	Company R	Aulier Miconi	Catherine	Purchasing Representative	(123)555-0100		(123)555-0101	456 18th Street	Boston	MA	99999	USA
19	Company S	Eggerer	Alexander	Accounting Assistant	(123)555-0100		(123)555-0101	789 19th Street	Los Angeles	CA	99999	USA
20	Company T	Li	George	Purchasing Manager	(123)555-0100		(123)555-0101	789 20th Street	New York	NY	99999	USA
21	Company U	Tham	Bernard	Accounting Manager	(123)555-0100		(123)555-0101	789 21th Street	Minneapolis	MN	99999	USA
22	Company V	Ramos	Luciana	Purchasing Assistant	(123)555-0100		(123)555-0101	789 22th Street	Milwaukee	WI	99999	USA
23	Company W	Ertn	Michael	Purchasing Manager	(123)555-0100		(123)555-0101	789 23th Street	Portland	OR	99999	USA
24	Company X	Hasseberg	Jonas	Owner	(123)555-0100		(123)555-0101	789 24th Street	Salt Lake City	UT	99999	USA
25	Company Y	Rodman	John	Purchasing Manager	(123)555-0100		(123)555-0101	789 25th Street	Chicago	IL	99999	USA
26	Company Z	Liu	Run	Accounting Assistant	(123)555-0100		(123)555-0101	789 26th Street	Miami	FL	99999	USA
27	Company AA	Toh	Karen	Purchasing Manager	(123)555-0100		(123)555-0101	789 27th Street	Las Vegas	NV	99999	USA
28	Company BB	Raghav	Amrithash	Purchasing Manager	(123)555-0100		(123)555-0101	789 28th Street	Memphis	TN	99999	USA
29	Company CC	Lee	Soo Jung	Purchasing Manager	(123)555-0100		(123)555-0101	789 29th Street	Denver	CO	99999	USA

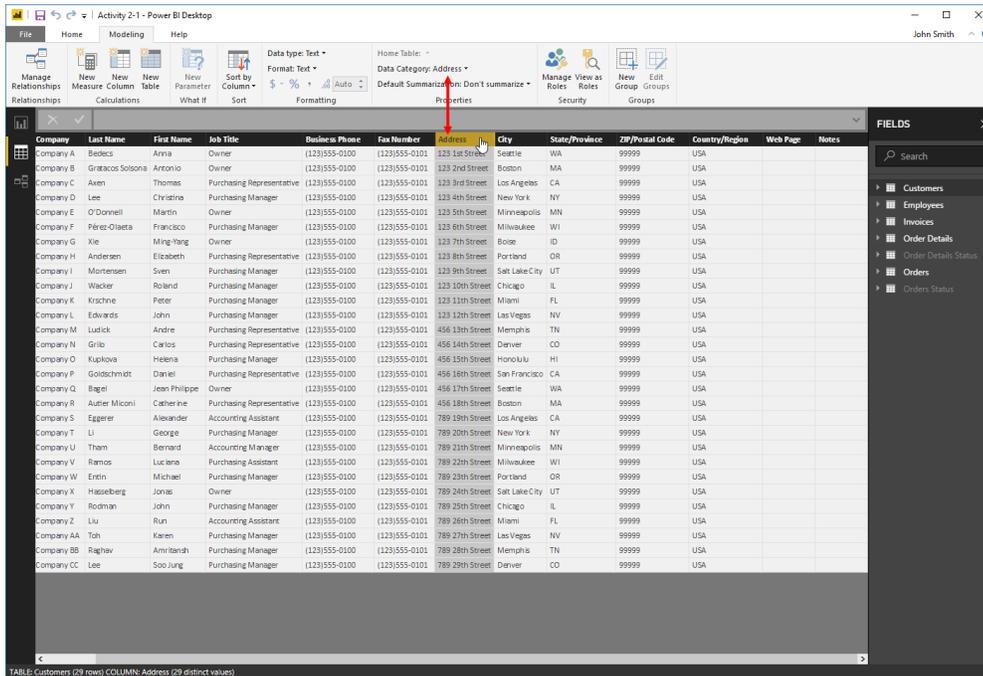
- When you are prompted to confirm the operation, click Delete:



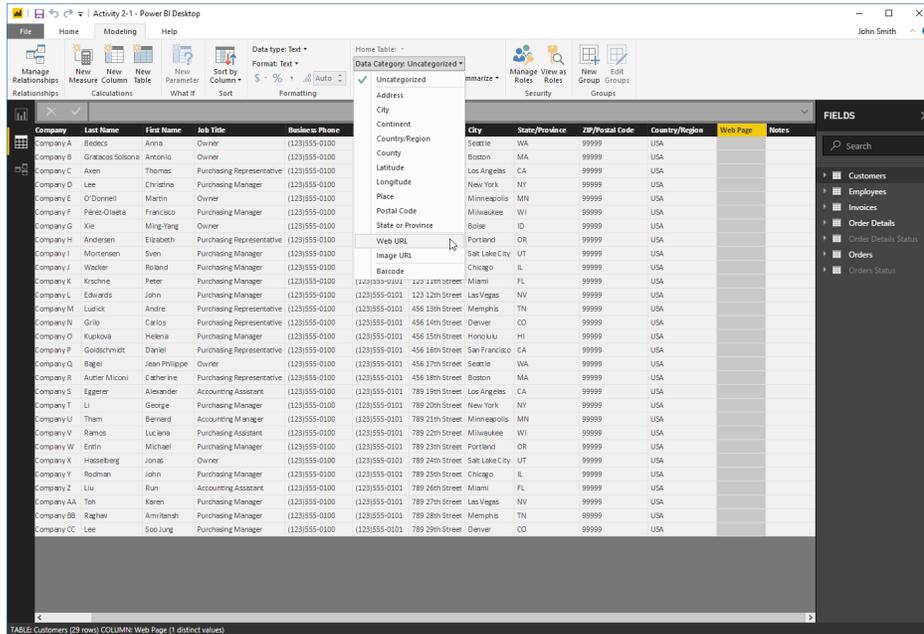
- Next, click the Modeling tab:



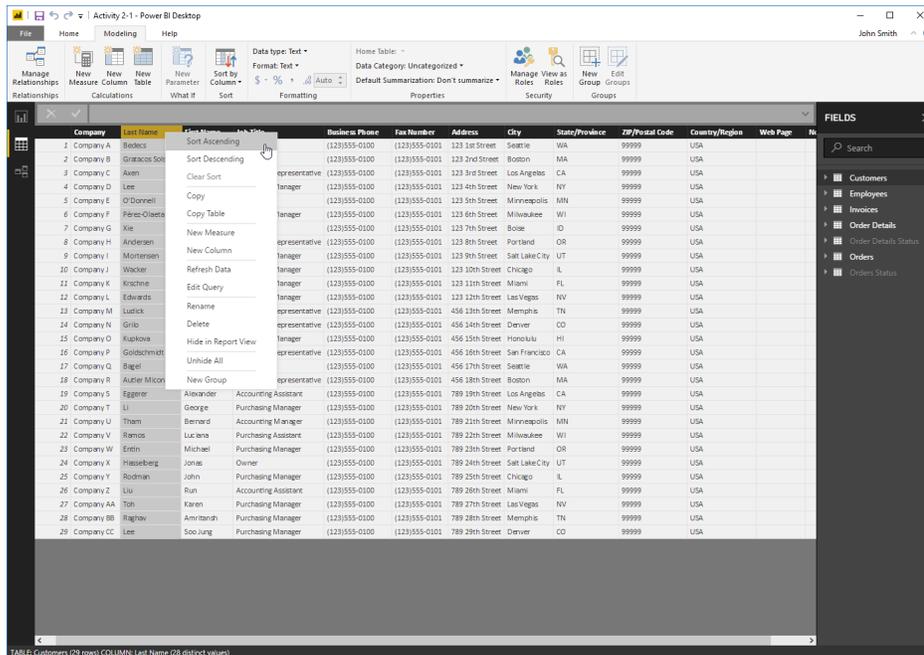
- Click the Address column. Confirm that the Data Category menu entry matches the column name:



- Repeat for the remaining columns to the right. All columns should be correct except Web Page. Choose the correct categorization for this column:



- Finally, let's sort by customer last name instead of company name. Right-click this column and click Sort Ascending:



12. The change will be implemented:

Company	Last Name	First Name	Job Title	Business Phone	Fax Number	Address	City	State/Province	ZIP/Postal Code	Country/Region
8 Company H	Andersen	Elizabeth	Purchasing Representative	(123)555-0100	(123)555-0101	123 8th Street	Portland	OR	99999	USA
18 Company R	Autier Miconi	Catherine	Purchasing Representative	(123)555-0100	(123)555-0101	456 18th Street	Boston	MA	99999	USA
3 Company C	Axen	Thomas	Purchasing Representative	(123)555-0100	(123)555-0101	123 3rd Street	Los Angeles	CA	99999	USA
17 Company Q	Bagel	Jean Philippe	Owner	(123)555-0100	(123)555-0101	456 17th Street	Seattle	WA	99999	USA
1 Company A	Bedecs	Anna	Owner	(123)555-0100	(123)555-0101	123 1st Street	Seattle	WA	99999	USA
12 Company L	Edwards	John	Purchasing Manager	(123)555-0100	(123)555-0101	123 12th Street	Las Vegas	NV	99999	USA
19 Company S	Eggerer	Alexander	Accounting Assistant	(123)555-0100	(123)555-0101	789 19th Street	Los Angeles	CA	99999	USA
23 Company W	Ertin	Michael	Purchasing Manager	(123)555-0100	(123)555-0101	789 23th Street	Portland	OR	99999	USA
16 Company P	Goldschmidt	Daniel	Purchasing Representative	(123)555-0100	(123)555-0101	456 16th Street	San Francisco	CA	99999	USA
2 Company B	Gratacos Solsona	Antonio	Owner	(123)555-0100	(123)555-0101	123 2nd Street	Boston	MA	99999	USA
14 Company N	Grijo	Carlos	Purchasing Representative	(123)555-0100	(123)555-0101	456 14th Street	Denver	CO	99999	USA
24 Company X	Hasselberg	Jonas	Owner	(123)555-0100	(123)555-0101	789 24th Street	Salt Lake City	UT	99999	USA
11 Company K	Krischne	Peter	Purchasing Manager	(123)555-0100	(123)555-0101	123 11th Street	Miami	FL	99999	USA
15 Company O	Kupkova	Helena	Purchasing Manager	(123)555-0100	(123)555-0101	456 15th Street	Honolulu	HI	99999	USA
4 Company D	Lee	Christina	Purchasing Manager	(123)555-0100	(123)555-0101	123 4th Street	New York	NY	99999	USA
29 Company CC	Lee	Soo Jung	Purchasing Manager	(123)555-0100	(123)555-0101	789 29th Street	Denver	CO	99999	USA
20 Company T	Li	George	Purchasing Manager	(123)555-0100	(123)555-0101	789 20th Street	New York	NY	99999	USA
26 Company Z	Liu	Run	Accounting Assistant	(123)555-0100	(123)555-0101	789 26th Street	Miami	FL	99999	USA
13 Company M	Ludick	Andre	Purchasing Representative	(123)555-0100	(123)555-0101	456 13th Street	Memphis	TN	99999	USA
9 Company I	Mortensen	Sven	Purchasing Manager	(123)555-0100	(123)555-0101	123 9th Street	Salt Lake City	UT	99999	USA
5 Company E	O'Donnell	Martin	Owner	(123)555-0100	(123)555-0101	123 5th Street	Minneapolis	MN	99999	USA
6 Company F	Pérez-Olaeta	Francisco	Purchasing Manager	(123)555-0100	(123)555-0101	123 6th Street	Milwaukee	WI	99999	USA
28 Company BB	Raghav	Amritansh	Purchasing Manager	(123)555-0100	(123)555-0101	789 28th Street	Memphis	TN	99999	USA
22 Company V	Ramos	Luciana	Purchasing Assistant	(123)555-0100	(123)555-0101	789 22th Street	Milwaukee	WI	99999	USA
25 Company Y	Rodman	John	Purchasing Manager	(123)555-0100	(123)555-0101	789 25th Street	Chicago	IL	99999	USA
21 Company U	Tham	Bernard	Accounting Manager	(123)555-0100	(123)555-0101	789 21th Street	Minneapolis	MN	99999	USA
27 Company AA	Toh	Karen	Purchasing Manager	(123)555-0100	(123)555-0101	789 27th Street	Las Vegas	NV	99999	USA
10 Company J	Wackler	Roland	Purchasing Manager	(123)555-0100	(123)555-0101	123 10th Street	Chicago	IL	99999	USA
7 Company G	Xie	Ming-Yang	Owner	(123)555-0100	(123)555-0101	123 7th Street	Boise	ID	99999	USA

13. Save your work as Activity 2-1 Complete and close Power BI.

TOPIC B: Using the Query Editor

If you have more advanced data transformation requirements, you can use Power BI's Query Editor. Here, you can transform data in bulk, perform merge and append operations, and much more.

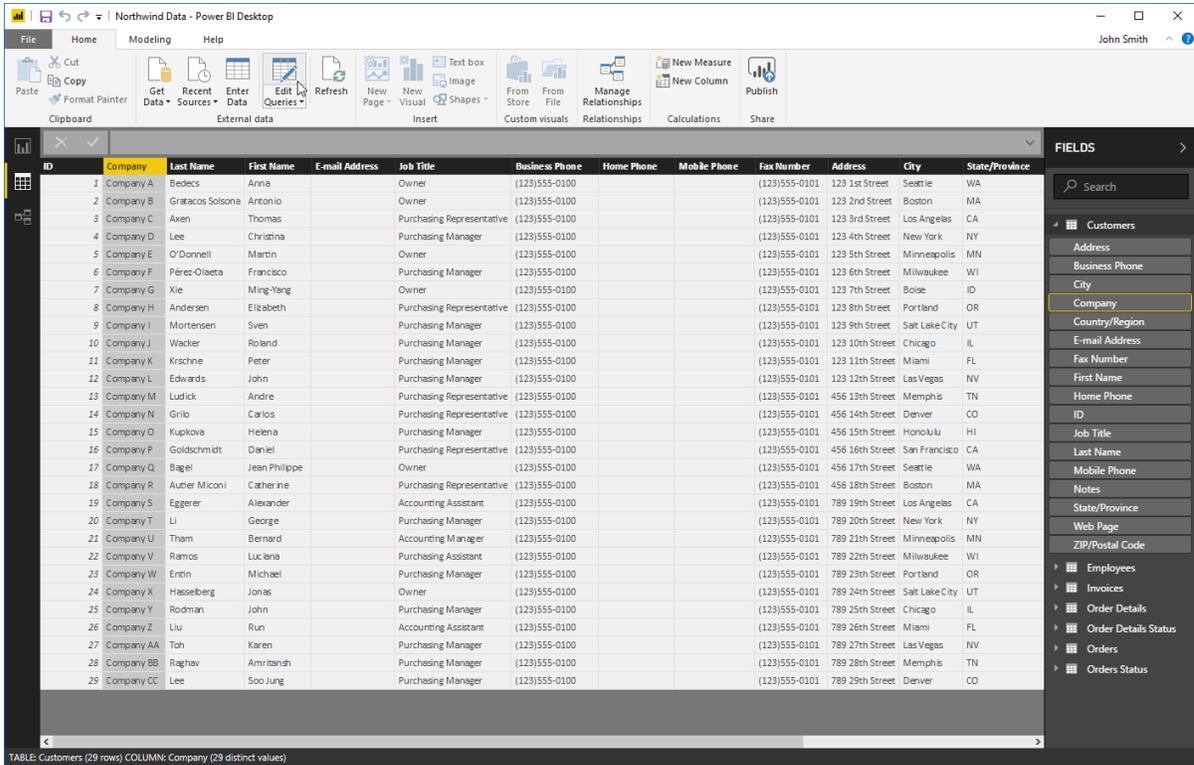
Topic Objectives

In this section, you will learn how to:

- Open the Query Editor
- Use the Query Editor interface, including the Query Settings pane
- Use Merge and Append queries

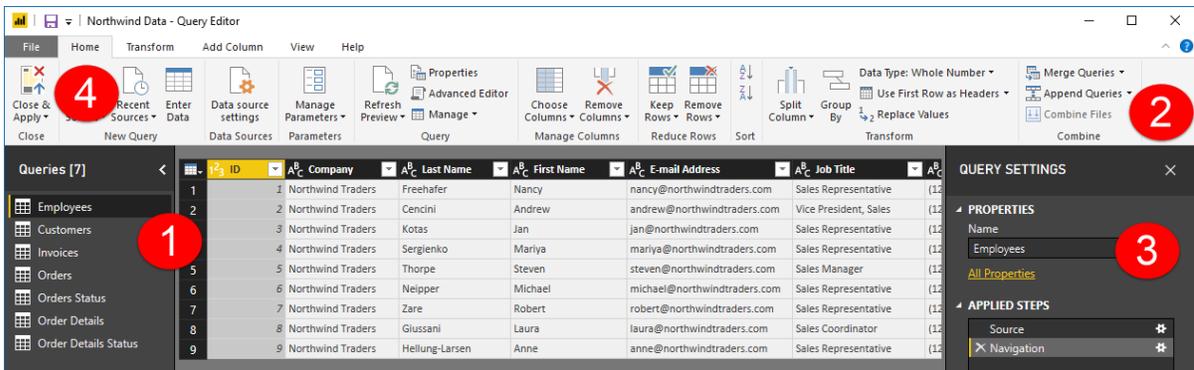
Opening the Query Editor

To open the Query Editor, click Home → Edit Queries:



The Query Editor Interface

When the Query Editor opens, you will see the following interface:

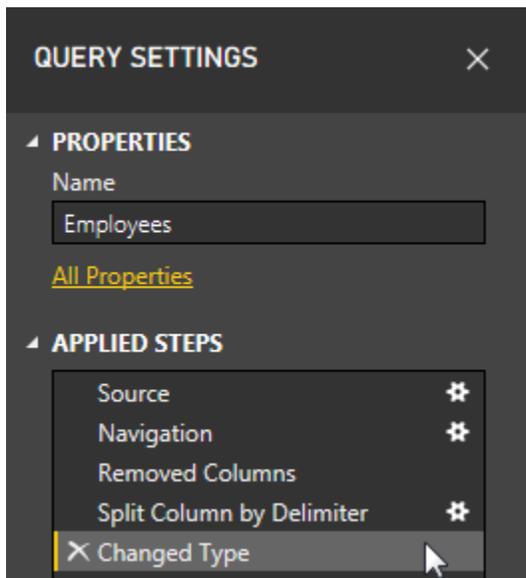


On the **left (1)**, you will see a list of queries, with the data displayed in the center pane. Its settings can then be modified using the commands on the **ribbon (2)**. These settings are

listed in the **Query Settings pane (3)**, which we will take a closer look at in a moment. Once you have finished making your changes, click Home→ **Close & Apply (4)**. (You can also click the drop-down arrow to apply your changes and stay in the window or close the window without applying your changes.)

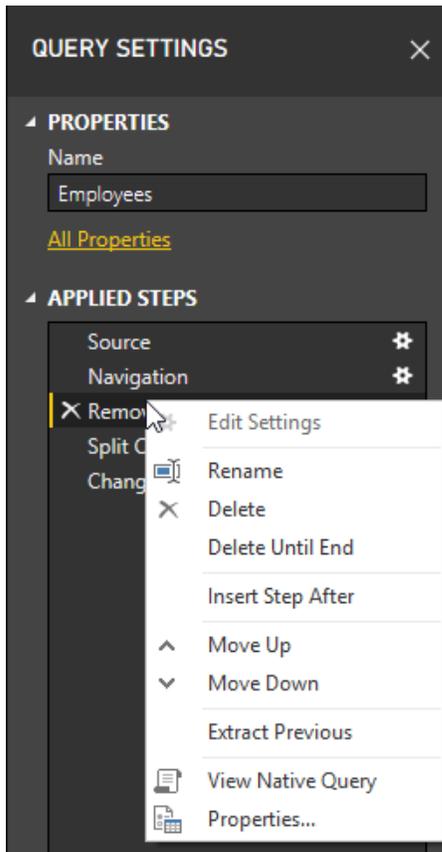
Using the Query Settings Pane

Let's take a closer look at the Query Settings pane:



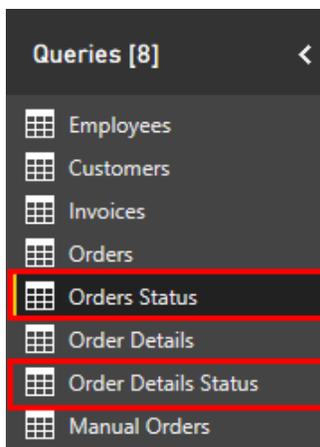
The Properties section of the Query Settings pane shows the name of the current item and a link to view all its properties. Then, the Applied Steps section shows each action. You can click the cog icon on the right of an action to see the settings or move your mouse over the item to make the X available (which will undo this action).

You can also right-click any action to see more options:

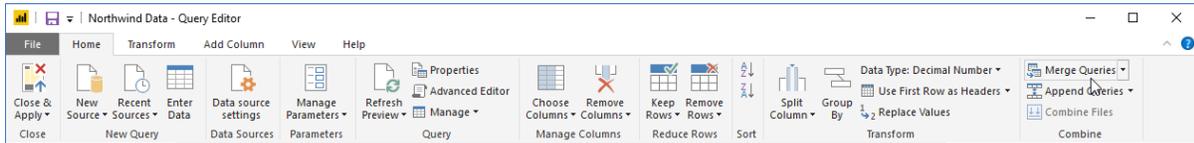


Using Merge Queries

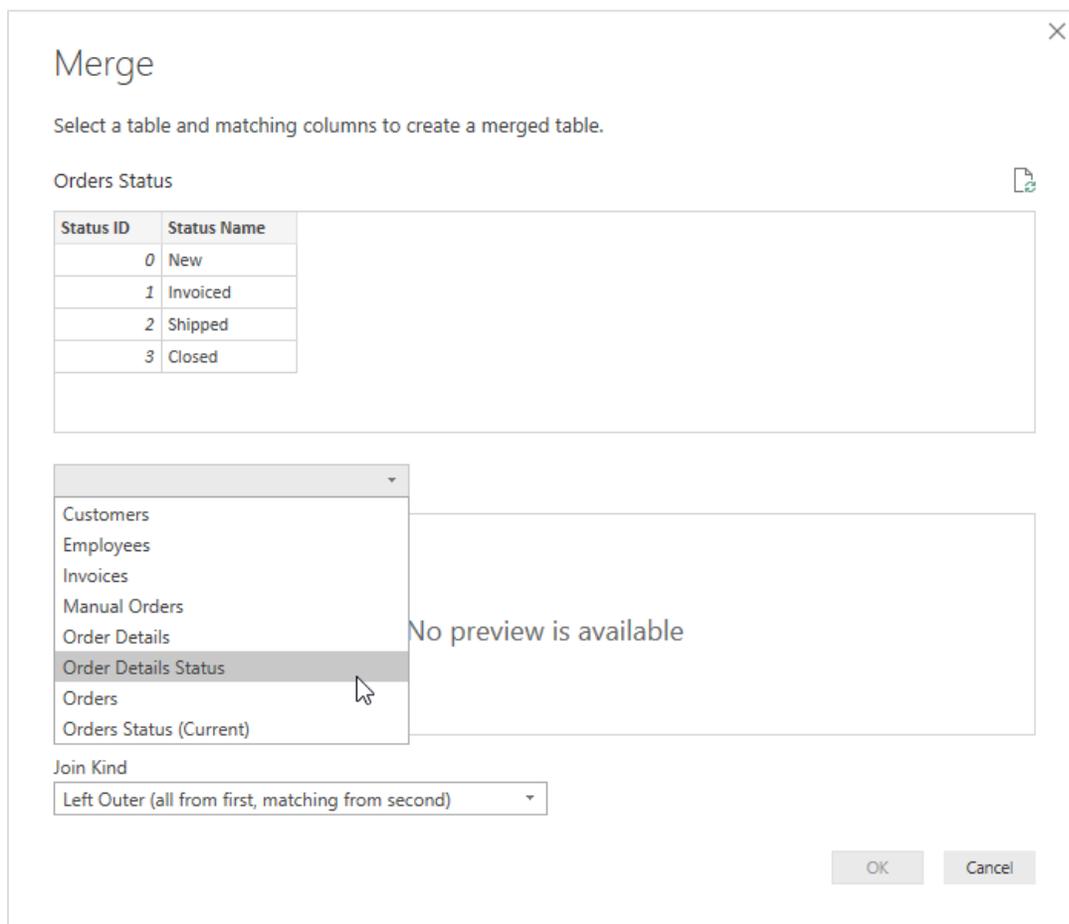
Just as in Microsoft Access, merge queries will join two tables together. In this example, we want to merge the two Orders Status tables together:



To start, we will select the Orders Status table (which we want to keep) and click Home → Merge Queries:



The Merge dialog will open. You will see the current table at the top. We can now select the table to be merged with it:



Now, click the column which will be matched from both tables:

Merge

Select a table and matching columns to create a merged table.

Orders Status

Status ID	Status Name
0	New
1	Invoiced
2	Shipped
3	Closed

Order Details Status

Status ID	Status Name
0	None
1	Allocated
2	Invoiced
3	Shipped
4	On Order

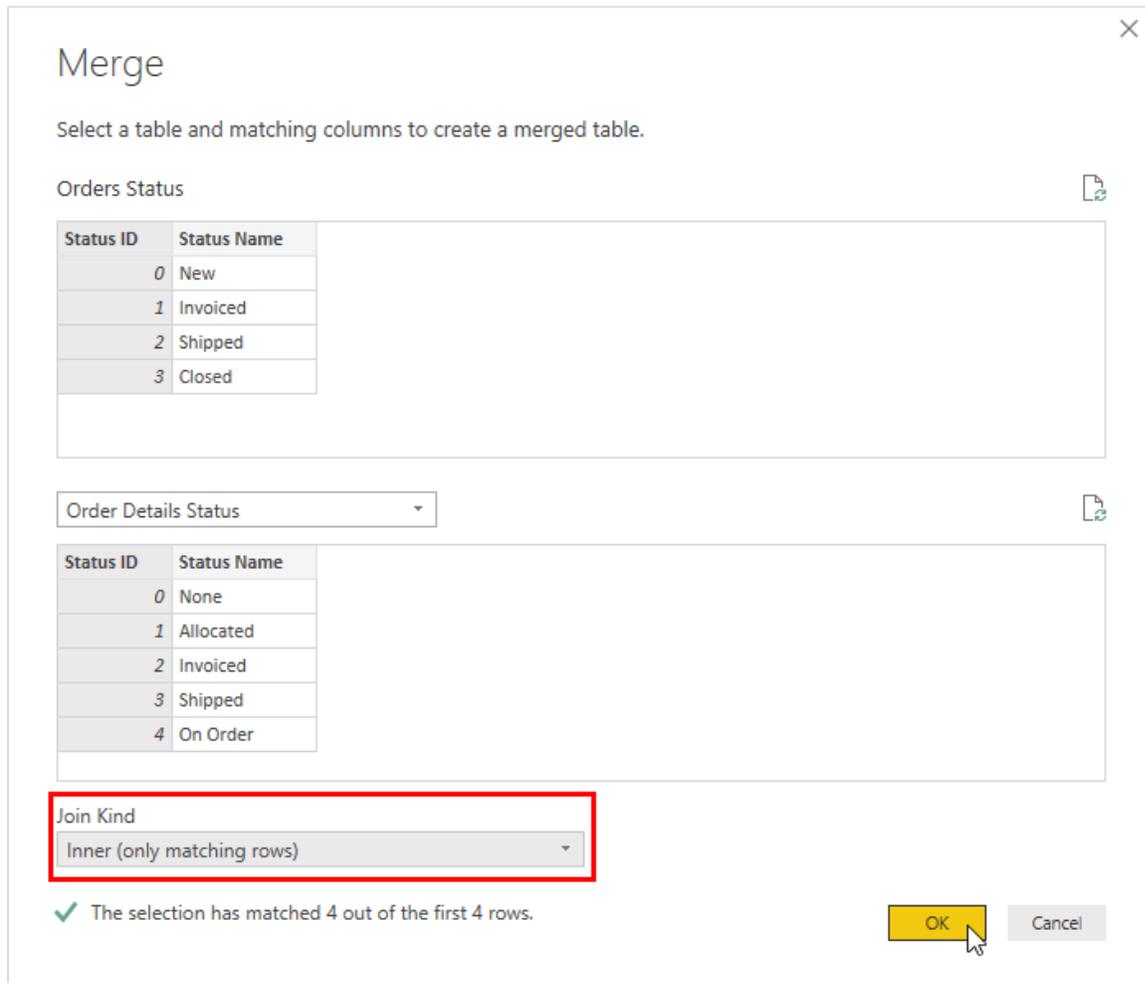
Join Kind

Left Outer (all from first, matching from second)

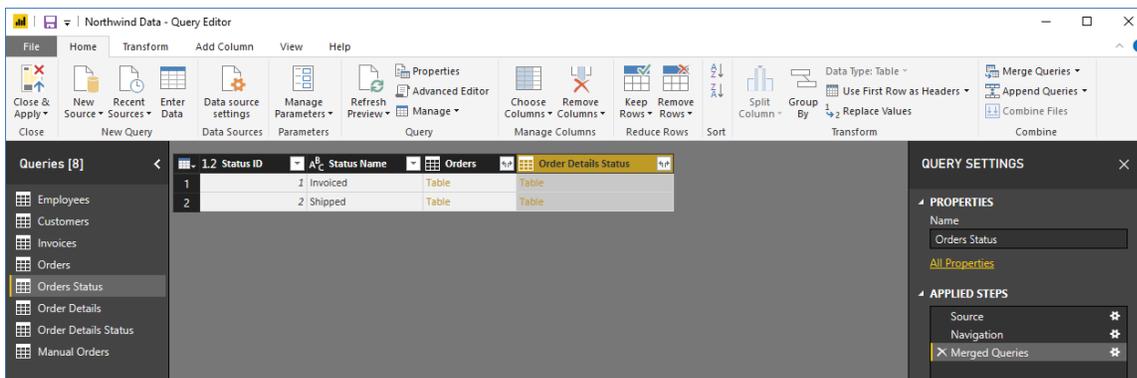
✓ The selection has matched 4 out of the first 4 rows.

OK Cancel

Finally, change the type of join (if necessary – Left Outer will be selected by default) and click OK:

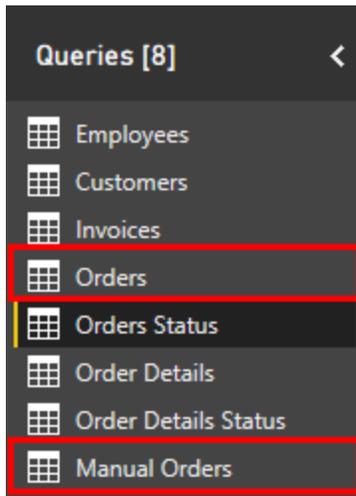


The merge will now be completed:

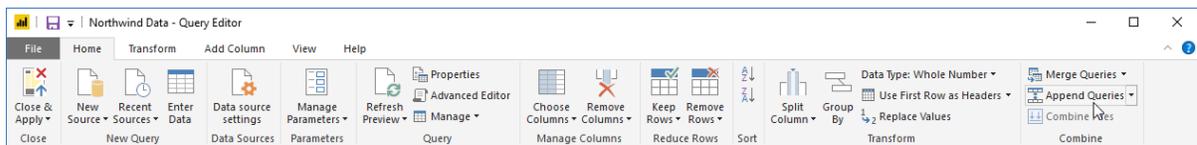


Using Append Queries

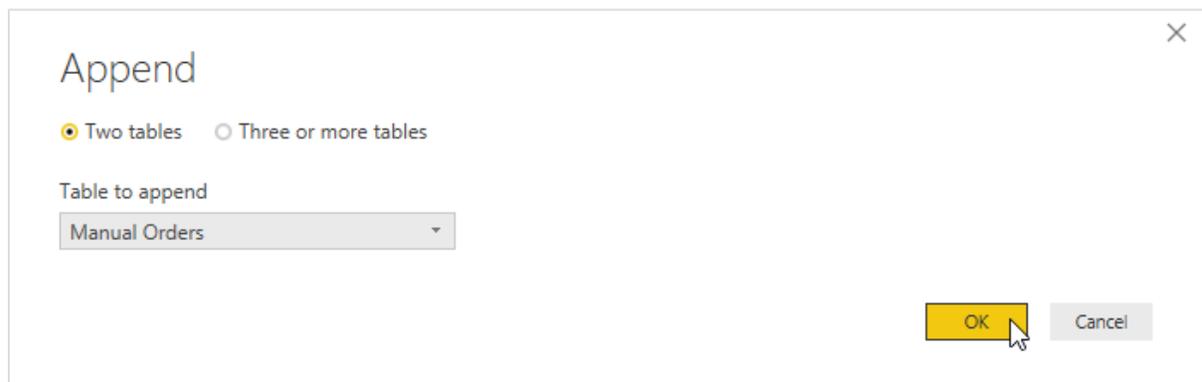
An Append query works a bit differently – it adds one data source into another, while keeping the original data. In this example, we want to append our Manual Orders table to the Orders table:



To start, we will select the primary table (Orders) and click Home → Append Queries:



Now, the Append dialog box will open. You can choose to append two tables together, or three or more. For this example, we only have two tables, so we can choose the Manual Orders table and then click OK:



The data will now be appended:

The screenshot displays the Microsoft Power BI Query Editor interface. The main area shows a data table with the following columns: Order ID, Employee ID, Customer ID, Order Date, Shipped Date, and Shipper ID. The data rows are numbered 1 through 35. The 'QUERY SETTINGS' pane on the right shows the 'APPLIED STEPS' section with 'Appended Query' selected. The status bar at the bottom indicates '35 COLUMNS, 96 ROWS' and 'PREVIEW DOWNLOADED AT 1:18 PM'.

Order ID	Employee ID	Customer ID	Order Date	Shipped Date	Shipper ID
30	9	27	1/15/2006 12:00:00 AM	1/22/2006 12:00:00 AM	
31	3	4	1/20/2006 12:00:00 AM	1/22/2006 12:00:00 AM	
32	4	12	1/22/2006 12:00:00 AM	1/22/2006 12:00:00 AM	
33	6	8	1/30/2006 12:00:00 AM	1/31/2006 12:00:00 AM	
34	9	4	2/6/2006 12:00:00 AM	2/7/2006 12:00:00 AM	
35	3	29	2/10/2006 12:00:00 AM	2/12/2006 12:00:00 AM	
36	4	3	2/23/2006 12:00:00 AM	2/25/2006 12:00:00 AM	
37	8	6	3/6/2006 12:00:00 AM	3/9/2006 12:00:00 AM	
38	9	28	3/10/2006 12:00:00 AM	3/11/2006 12:00:00 AM	
39	3	8	3/22/2006 12:00:00 AM	3/24/2006 12:00:00 AM	
40	4	10	3/24/2006 12:00:00 AM	3/24/2006 12:00:00 AM	
41	1	7	3/24/2006 12:00:00 AM	3/24/2006 12:00:00 AM	nt
42	1	10	3/24/2006 12:00:00 AM	4/7/2006 12:00:00 AM	
43	1	11	3/24/2006 12:00:00 AM	3/24/2006 12:00:00 AM	nt
44	1	1	3/24/2006 12:00:00 AM	3/24/2006 12:00:00 AM	nt
45	1	28	4/7/2006 12:00:00 AM	4/7/2006 12:00:00 AM	
46	7	9	4/5/2006 12:00:00 AM	4/5/2006 12:00:00 AM	
47	6	6	4/8/2006 12:00:00 AM	4/8/2006 12:00:00 AM	
48	4	8	4/5/2006 12:00:00 AM	4/5/2006 12:00:00 AM	
50	9	25	4/5/2006 12:00:00 AM	4/5/2006 12:00:00 AM	
51	9	26	4/5/2006 12:00:00 AM	4/5/2006 12:00:00 AM	
55	1	29	4/5/2006 12:00:00 AM	4/5/2006 12:00:00 AM	
56	2	6	4/3/2006 12:00:00 AM	4/3/2006 12:00:00 AM	
57	9	27	4/22/2006 12:00:00 AM	4/22/2006 12:00:00 AM	
58	3	4	4/22/2006 12:00:00 AM	4/22/2006 12:00:00 AM	
59	4	12	4/22/2006 12:00:00 AM	4/22/2006 12:00:00 AM	
60	6	8	4/30/2006 12:00:00 AM	4/30/2006 12:00:00 AM	
61	9	4	4/7/2006 12:00:00 AM	4/7/2006 12:00:00 AM	
62	3	29	4/12/2006 12:00:00 AM	4/12/2006 12:00:00 AM	
63	4	3	4/25/2006 12:00:00 AM	4/25/2006 12:00:00 AM	
64	8	6	5/9/2006 12:00:00 AM	5/9/2006 12:00:00 AM	
65	9	28	5/11/2006 12:00:00 AM	5/11/2006 12:00:00 AM	
66	3	8	5/24/2006 12:00:00 AM	5/24/2006 12:00:00 AM	
67	4	10	5/24/2006 12:00:00 AM	5/24/2006 12:00:00 AM	

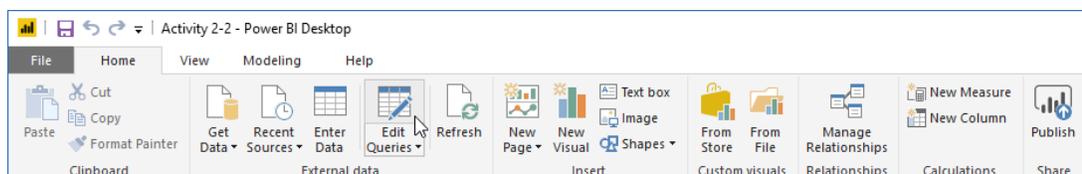
Activity 2-2: Using the Query Editor

In this activity, you will use the Query Editor to modify and append data.

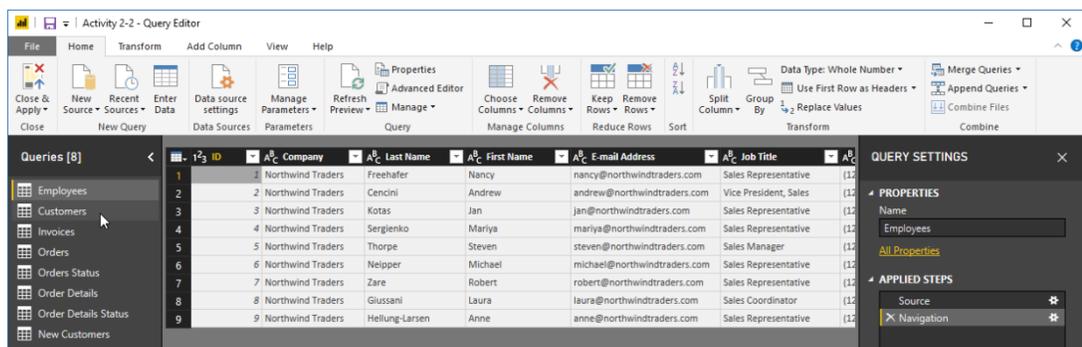
1. Open Power BI and open Activity 2-2:



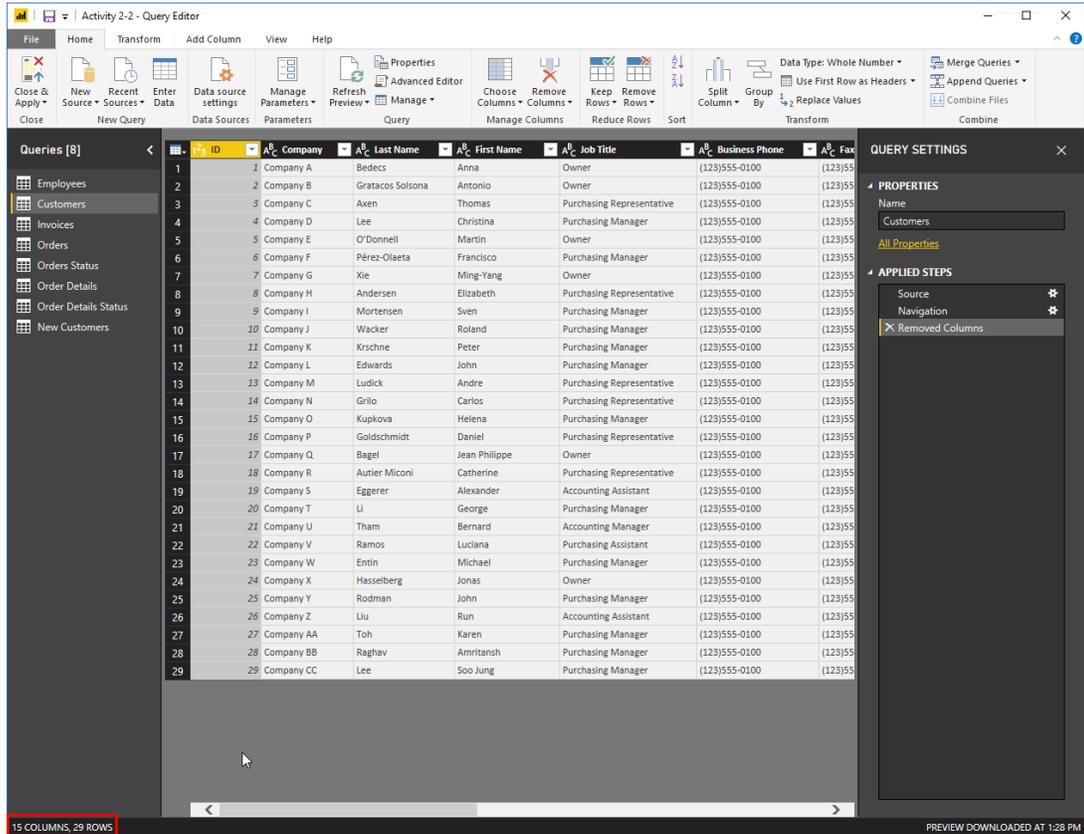
2. Click Home → Edit Queries:



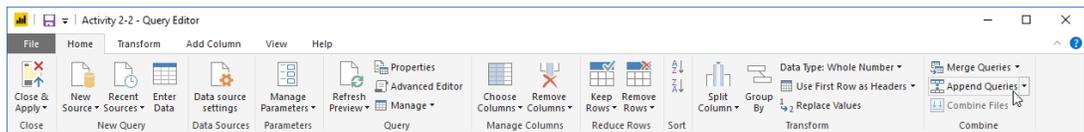
3. First, let's append new data to the Customers table. Click the Customers entry on the left side of the window:



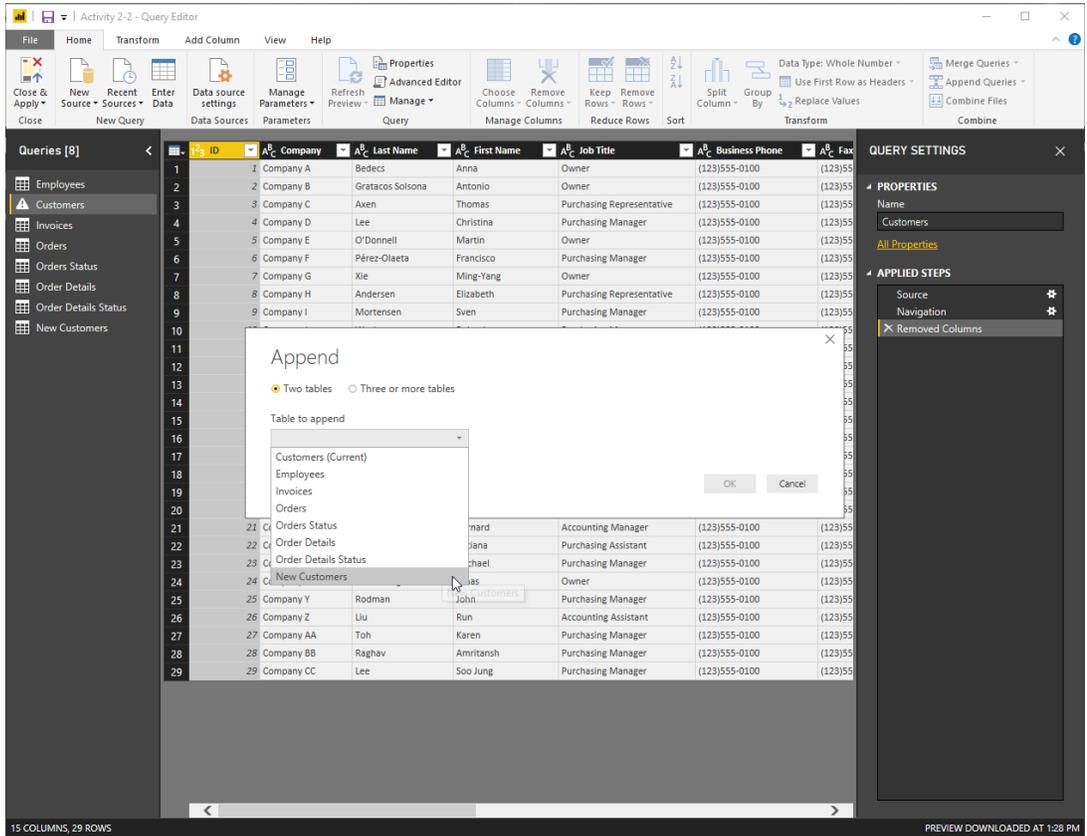
4. Note the current table size in the status bar:



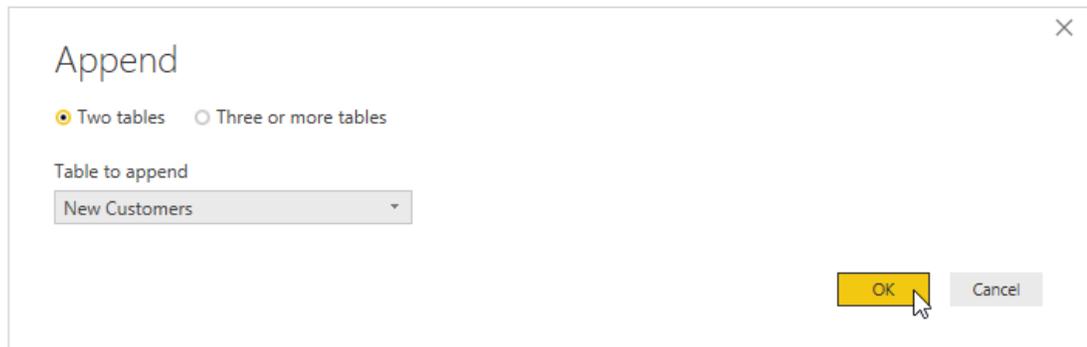
5. Click Home → Append Queries:



- The Append dialog box will open. Click the “Table to append” menu and click New Customers:



- Click OK to complete the operation:



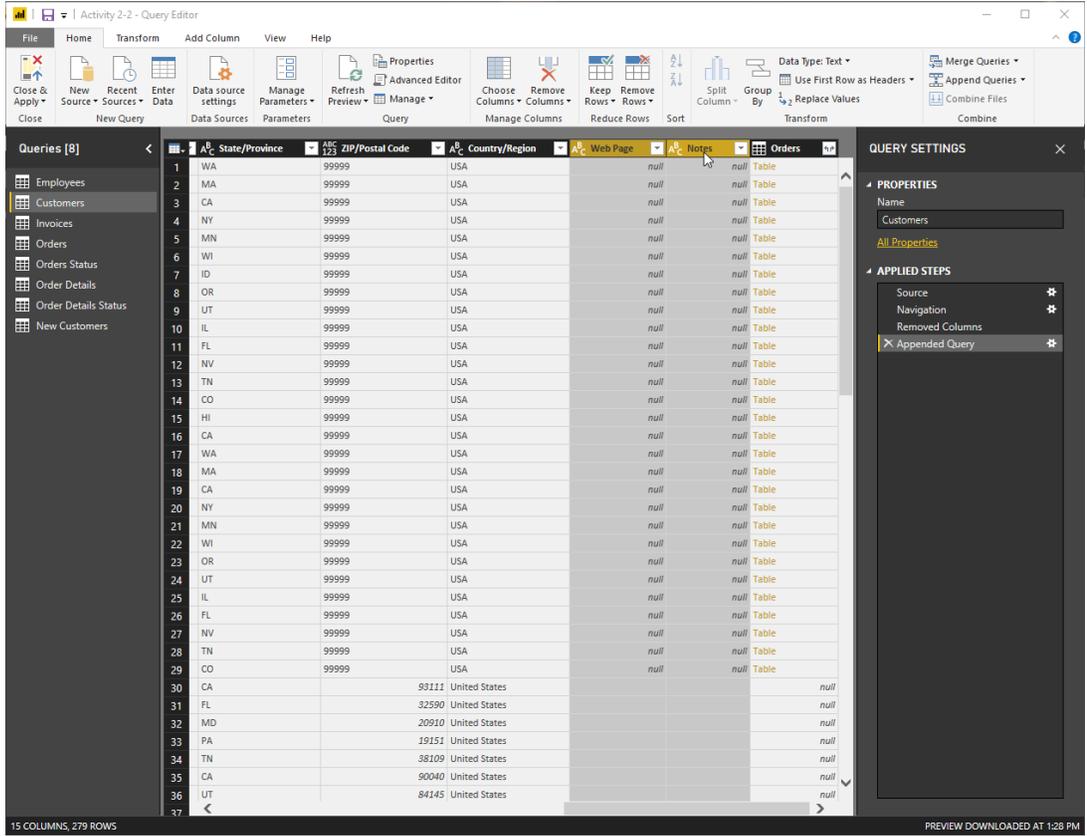
- The data will be appended. Note the action item in the Applied Steps portion of the Query Settings pane:

The screenshot shows the Microsoft Power BI Query Editor interface. The main area displays a table with 16 columns and 37 rows of data. The columns are: ID, Company, Last Name, First Name, Job Title, Business Phone, and Fax. The data includes various company and employee records.

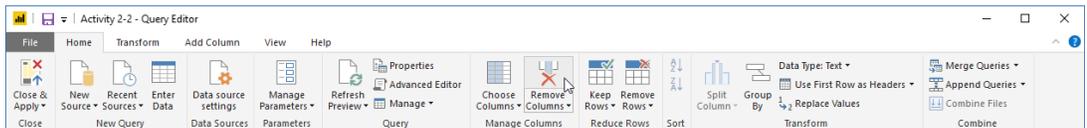
On the right side, the 'QUERY SETTINGS' pane is open, showing the 'APPLIED STEPS' section. The 'Appended Query' step is selected and highlighted in grey. A red arrow points to the 'Appended Query' step in the Applied Steps list.

ID	Company	Last Name	First Name	Job Title	Business Phone	Fax
1	Company A	Bedece	Anna	Owner	(123)555-0100	(123)
2	Company B	Gratacos Solsona	Antonio	Owner	(123)555-0100	(123)
3	Company C	Axen	Thomas	Purchasing Representative	(123)555-0100	(123)
4	Company D	Lee	Christina	Purchasing Manager	(123)555-0100	(123)
5	Company E	O'Donnell	Martin	Owner	(123)555-0100	(123)
6	Company F	Pérez-Olaeta	Francisco	Purchasing Manager	(123)555-0100	(123)
7	Company G	Xie	Ming-Yang	Owner	(123)555-0100	(123)
8	Company H	Andersen	Elizabeth	Purchasing Representative	(123)555-0100	(123)
9	Company I	Mortensen	Sven	Purchasing Manager	(123)555-0100	(123)
10	Company J	Wacker	Roland	Purchasing Manager	(123)555-0100	(123)
11	Company K	Krschne	Peter	Purchasing Manager	(123)555-0100	(123)
12	Company L	Edwards	John	Purchasing Manager	(123)555-0100	(123)
13	Company M	Ludlick	Andre	Purchasing Representative	(123)555-0100	(123)
14	Company N	Grilo	Carlos	Purchasing Representative	(123)555-0100	(123)
15	Company O	Kupkova	Helena	Purchasing Manager	(123)555-0100	(123)
16	Company P	Goldschmidt	Daniel	Purchasing Representative	(123)555-0100	(123)
17	Company Q	Bagel	Jean Philippe	Owner	(123)555-0100	(123)
18	Company R	Autler Miconi	Catherine	Purchasing Representative	(123)555-0100	(123)
19	Company S	Eggerer	Alexander	Accounting Assistant	(123)555-0100	(123)
20	Company T	Li	George	Purchasing Manager	(123)555-0100	(123)
21	Company U	Tham	Bernard	Accounting Manager	(123)555-0100	(123)
22	Company V	Ramos	Luciana	Purchasing Assistant	(123)555-0100	(123)
23	Company W	Entin	Michael	Purchasing Manager	(123)555-0100	(123)
24	Company X	Hasselberg	Jonas	Owner	(123)555-0100	(123)
25	Company Y	Rodman	John	Purchasing Manager	(123)555-0100	(123)
26	Company Z	Liu	Run	Accounting Assistant	(123)555-0100	(123)
27	Company AA	Toh	Karen	Purchasing Manager	(123)555-0100	(123)
28	Company BB	Raghav	Amritansh	Purchasing Manager	(123)555-0100	(123)
29	Company CC	Lee	Soo Jung	Purchasing Manager	(123)555-0100	(123)
30	Company U	Harold	Margaretha	Data Coordinator	(716) 2114246	(641)
31	Company A	Barwick	Vilhelmina	Help Desk Operator	(415) 8217016	(937)
32	Company U	L'argent	Killy	Budget/Accounting Analyst III	(919) 5617020	(212)
33	Company S	Sproston	Tobi	Account Coordinator	(706) 5912662	(408)
34	Company U	Bunnell	Davey	Associate Professor	(585) 2372096	(509)
35	Company U	Soldan	Stacee	Cost Accountant	(407) 2915048	(786)
36	Company B	Sole	Gabriel	Design Engineer	(310) 2767450	(832)
37						

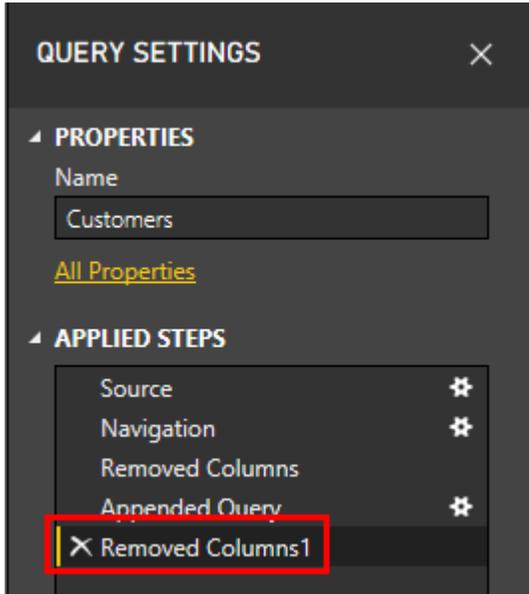
- You can see that the Web Page and Notes columns are empty for both the existing and new data. Hold the Ctrl key and click both columns to select them:



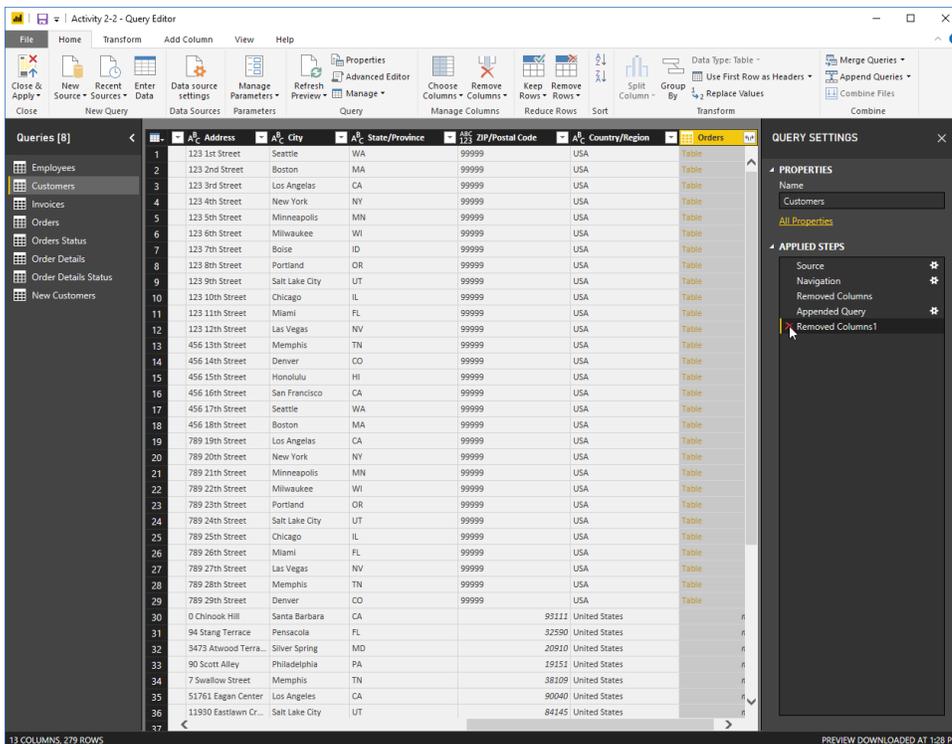
- Click Home → Remove Columns:



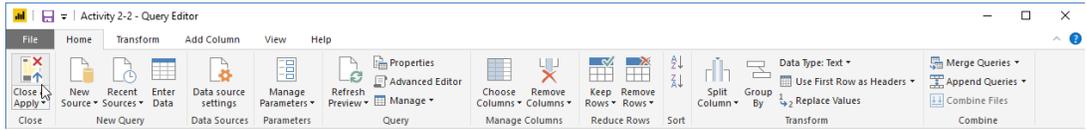
11. The action will now appear in the Query Settings pane:



12. On second thought, we may need those columns. Click this entry and click the X to undo the action:



13. Click Home → Close & Apply to apply your changes and return to Power BI:



14. Once the operation is complete, save your work as Activity 2-2 Complete and close Power BI.

TOPIC C: Data Modeling

In addition to basic data management tools, Power BI also includes the ability to create tables, calculated columns, and measures. It is also important to know that Power BI uses DAX (Data Analysis Expression) as its formula language.

Topic Objectives

In this topic, you will learn:

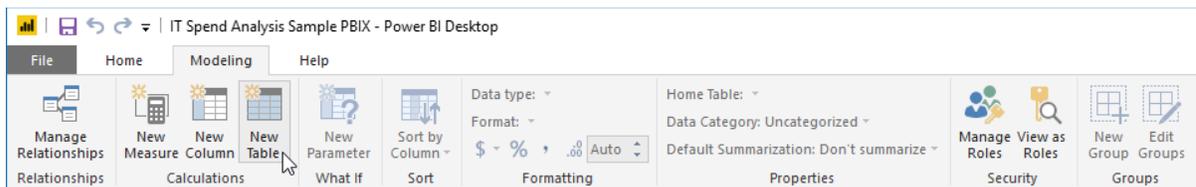
- About DAX
- How to create tables, calculated columns, and measures

What is DAX?

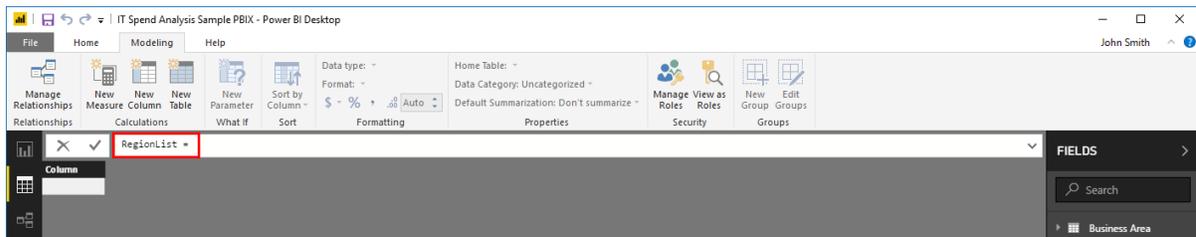
DAX (Data Analysis Expression) is a type of formula language used to create custom calculations and measures. It is designed to work based on data relationships, referring to tables and columns to provide relational analysis and more complex functions than traditional formulas.

Creating a New Table

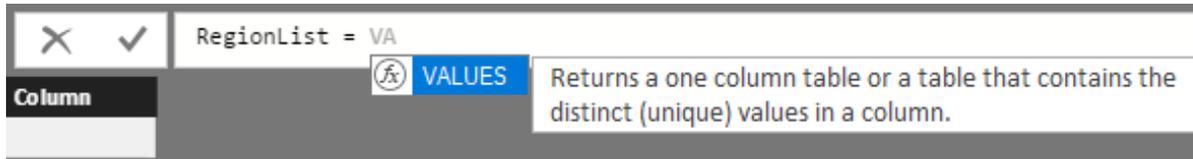
To create a new table that returns specified values from the dataset, click Modeling → New Table:



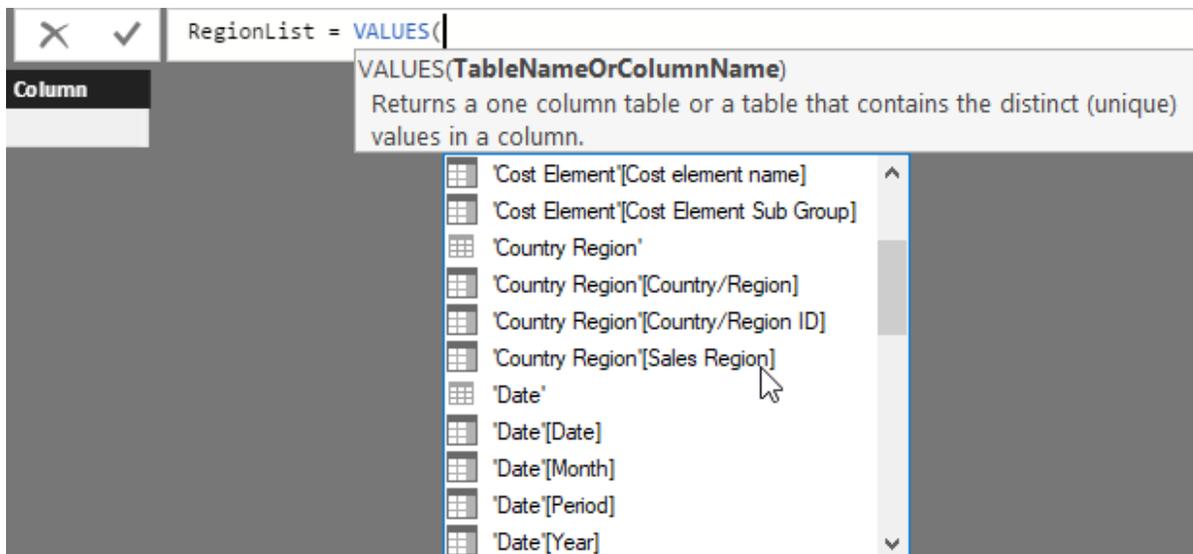
The expression editor will now become active. Replace the word “Table” with the name of the new table:



Now, you can type the DAX function. We are going to use the VALUES function to return a list of distinct values. As we start typing, Power BI will try to automatically complete the function. Press Enter to select the highlighted function, or if there is more than one function listed, use the arrow keys to select a different item:



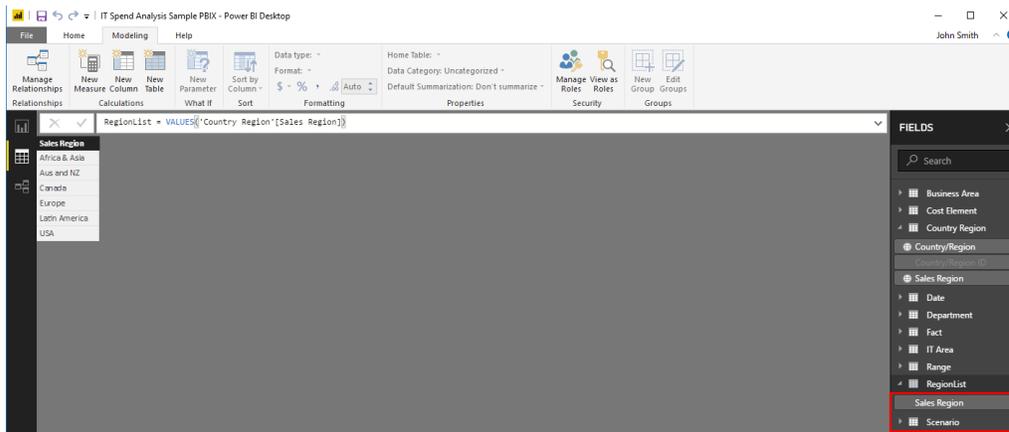
Once this function has been entered, we can choose the table and field it will apply to:



We can now add the closing bracket and press Enter or click the checkmark to create the function:



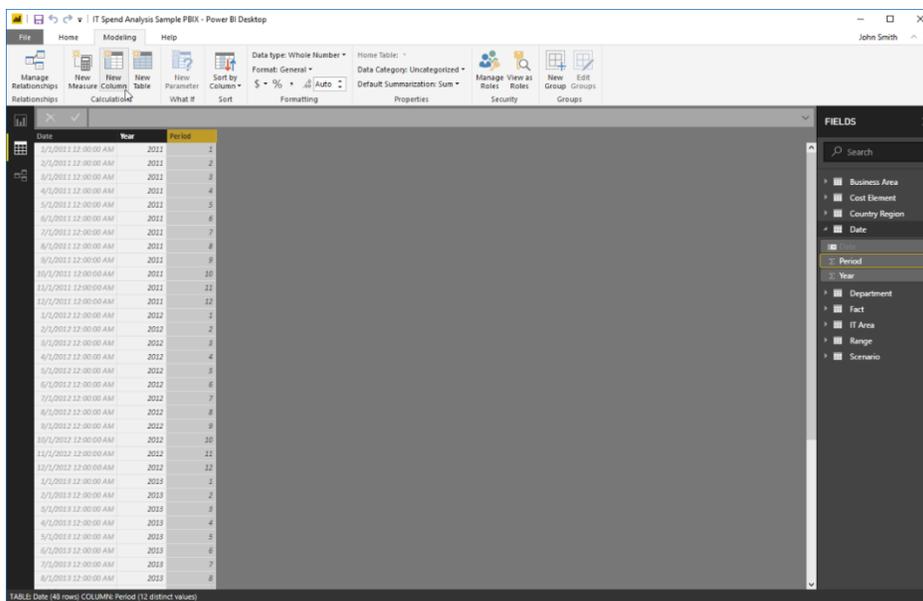
The table will now be created:



You can continue to add more columns to this table. It can also be used in visualizations and reports like any other dataset.

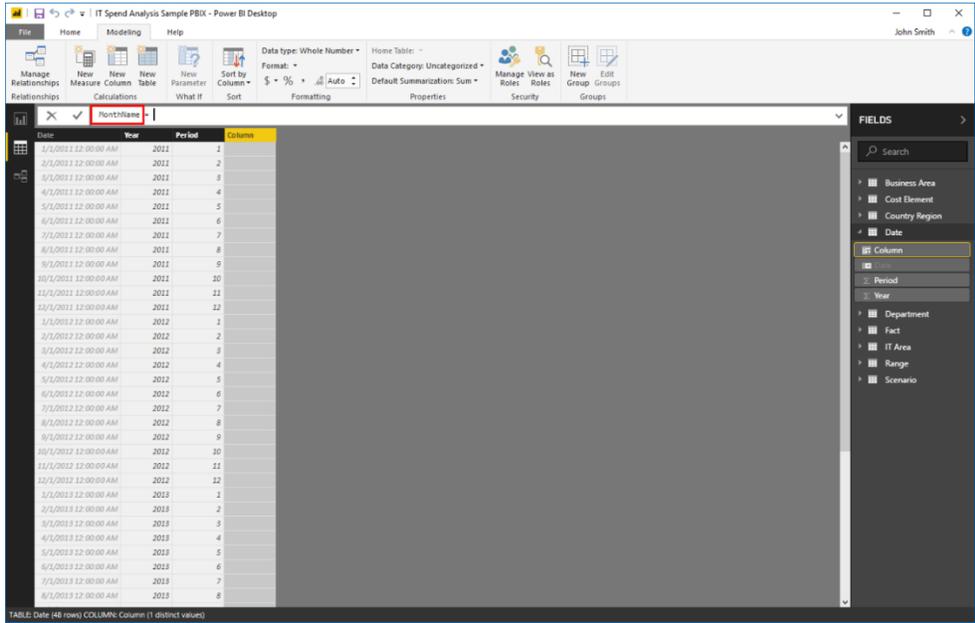
Creating a New Calculated Column

To create a new table column that returns a particular set of values from your data, open the table, choose the column you want the new column to be placed after, and click **Modeling** → **New Column**:

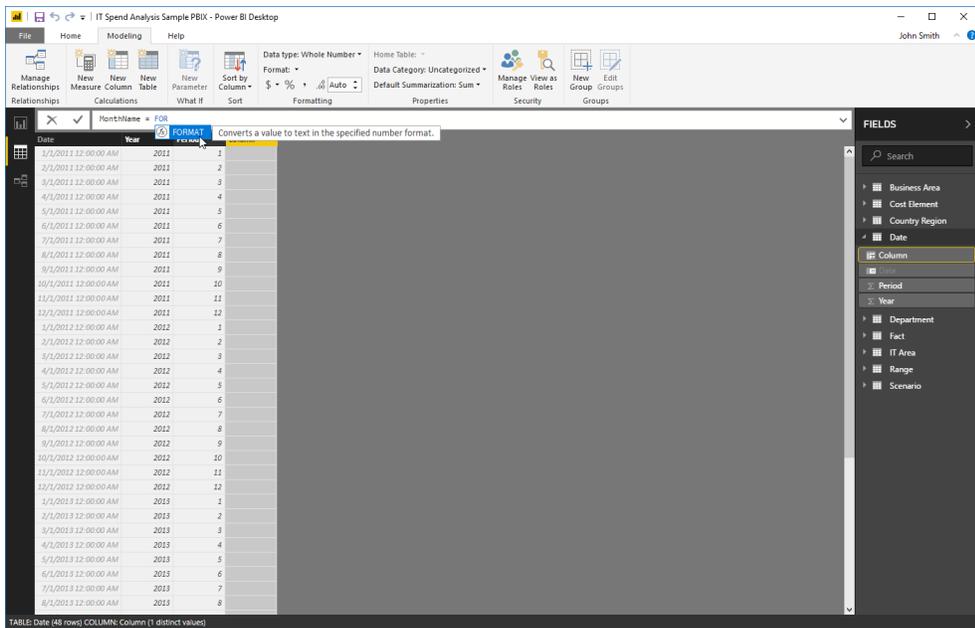


Just as when we were creating a table, the column will be created using the expression editor with a DAX function. We are going to create a new column that displays the value in the Period column as the proper month name.

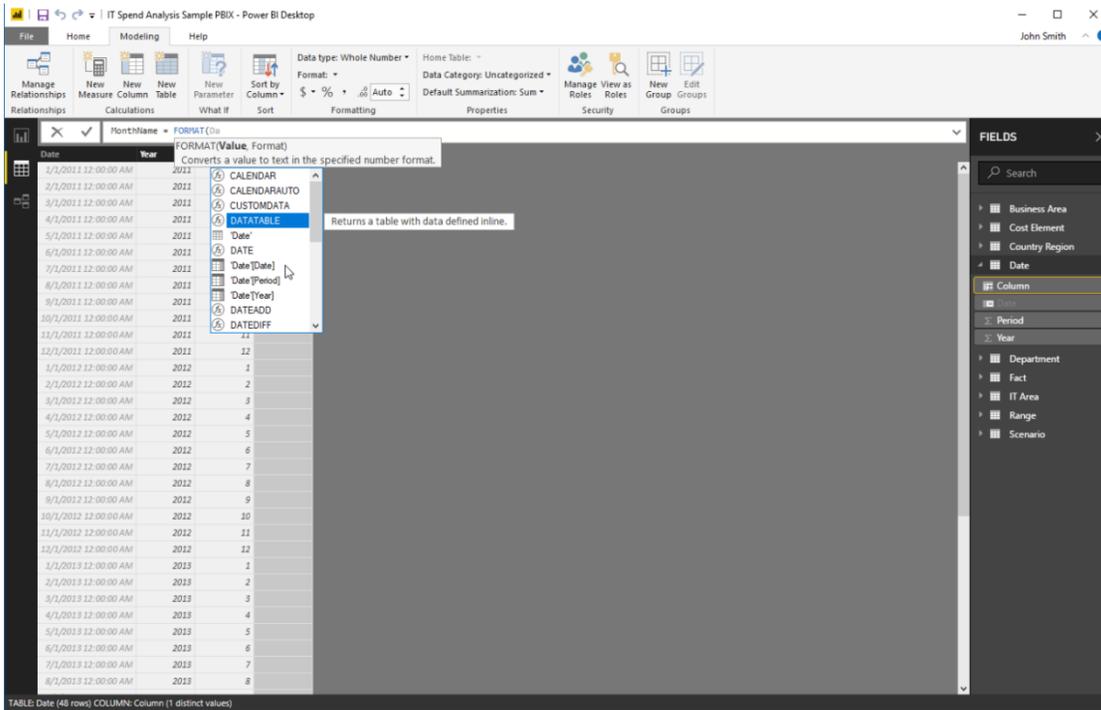
We will start by changing the placeholder “Column” text to “MonthName:”



Next, we will add the FORMAT function:



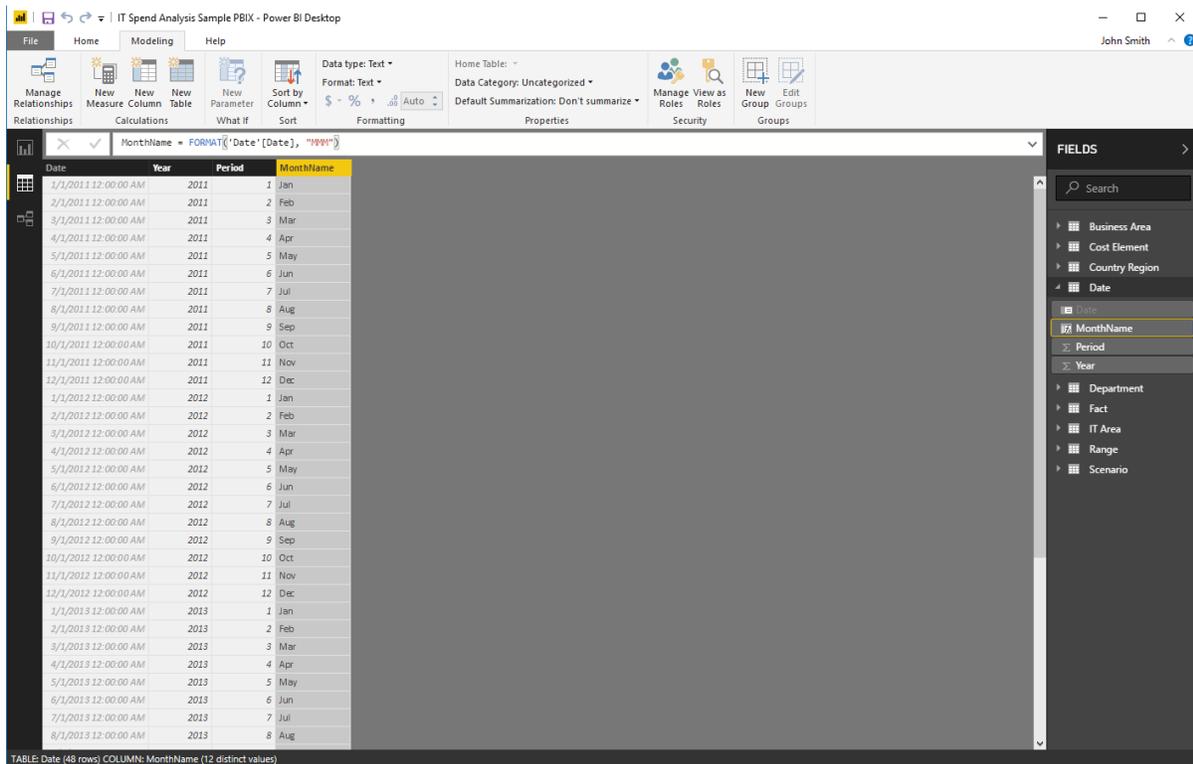
Now, we will choose the Date field from the current table:



And enter "MMM" as we want a three-letter month:



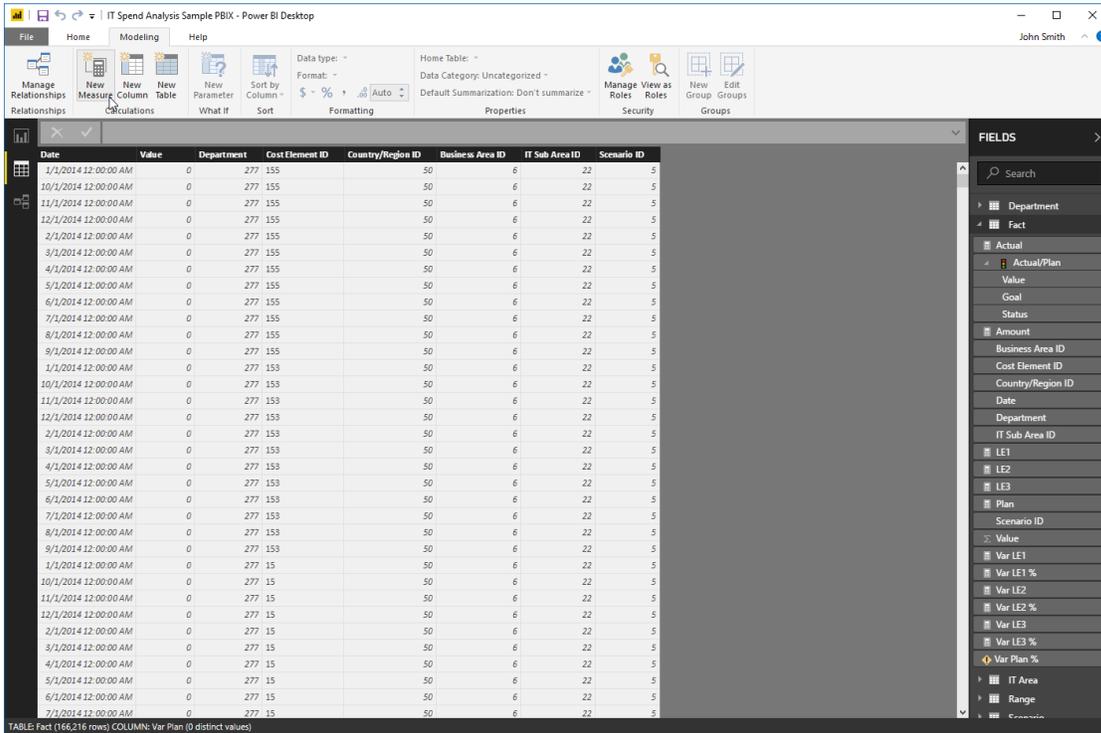
After adding the closing parenthesis and pressing Enter, our new column will be created:



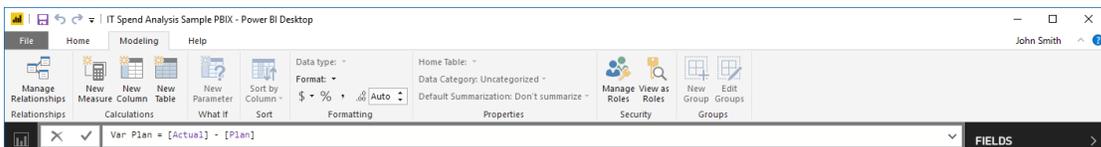
Creating a New Measure

A **measure** is a formula that shows a value calculated from specified data. When you create a new measure, it will be stored within whichever table is currently active. Although it does not really matter where the measure is stored, we recommend storing it with the related table so you can find it later if needed.

To start, select the active table and click the New Measure command on the Home or Modeling tab:

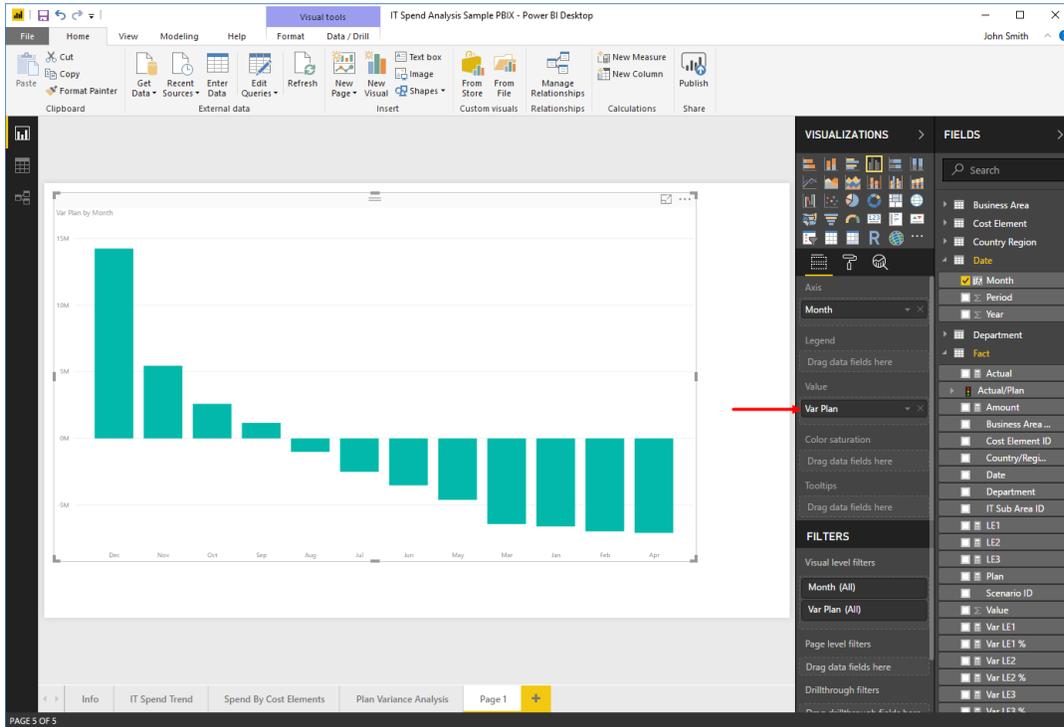


Now, enter the name of the measure, enter the function, and choose the data:



In this case, we have created a measure called “Var Plan,” which will show the variance between the actual data and the planned data.

We can now use this measure to create a simple visualization showing the variance by month:



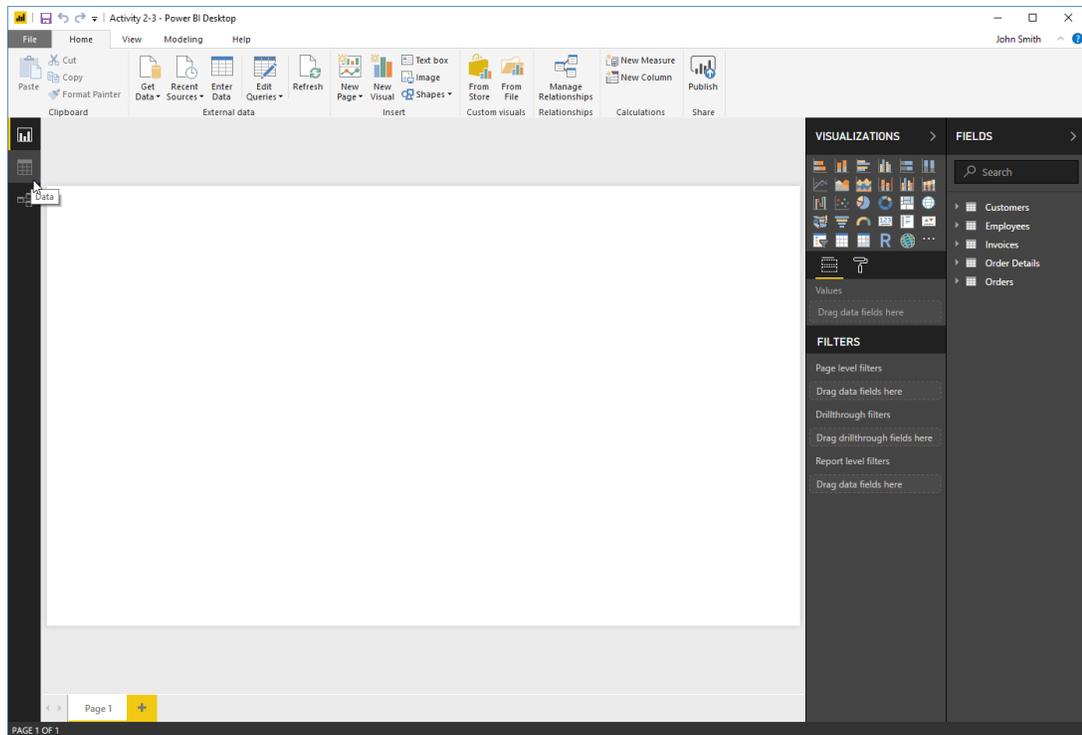
Activity 2-3: Data Modeling

Your sales team has asked you to help them answer three questions about your organization’s retail data. In this activity, you will answer these questions using data modeling tools.

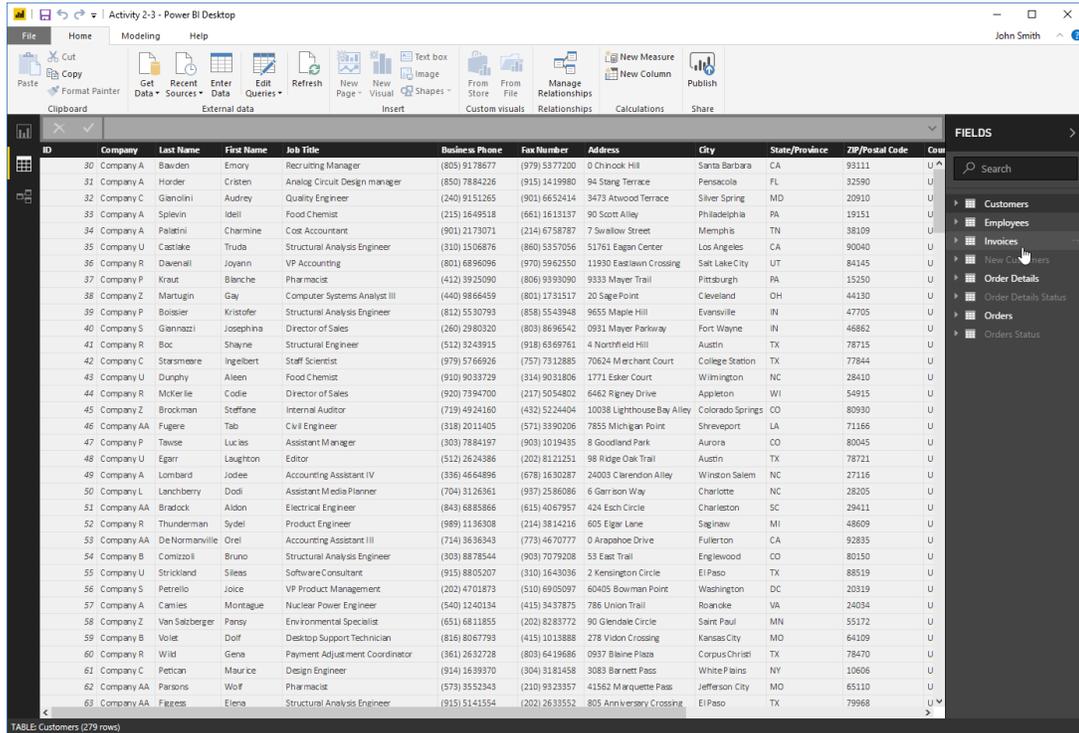
1. Open Power BI and open Activity 2-3:



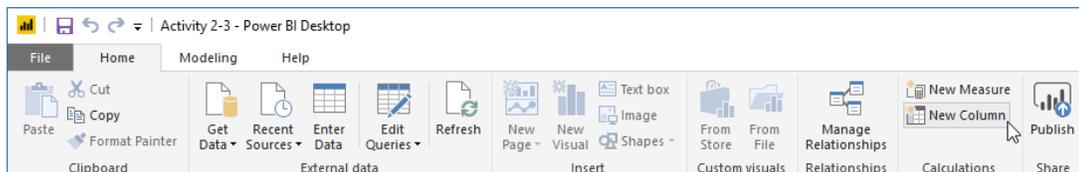
2. The first question the sales team has is how to easily see which orders are past due. (Invoices are always due at the end of the quarter in which they were issued.) Let’s use a calculated column for this purpose. To begin, switch to Data view:



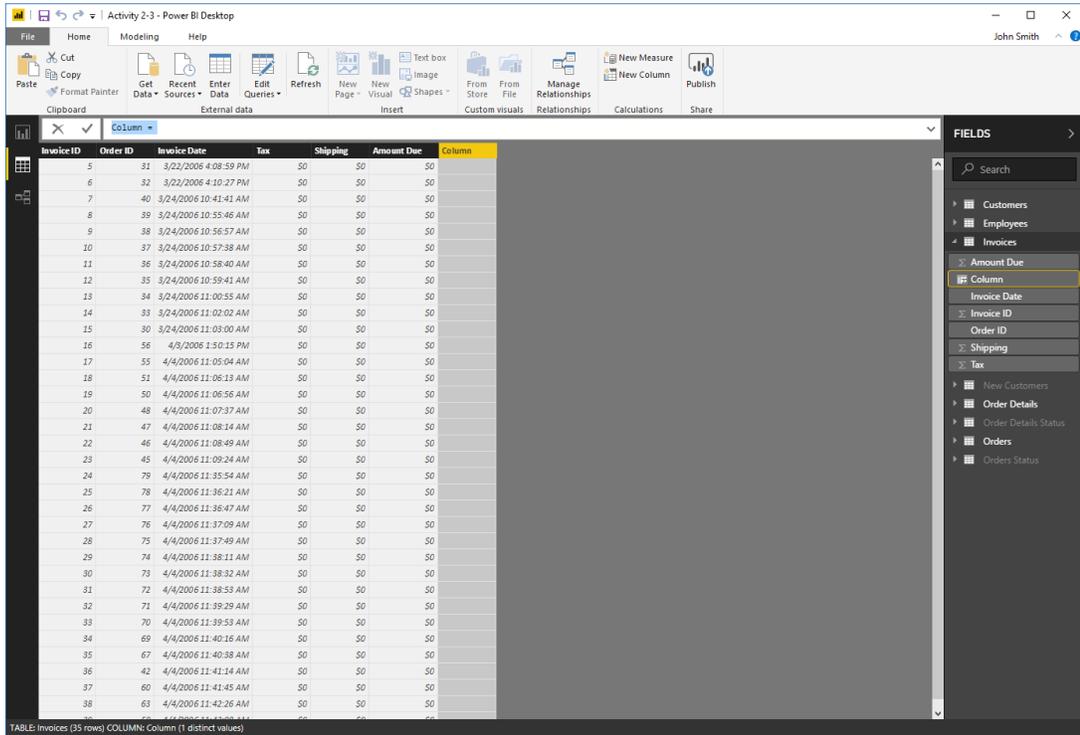
3. Since we want to work with invoice data, select that table from the Fields pane:



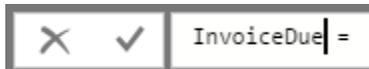
4. Now, click Home → New Column:



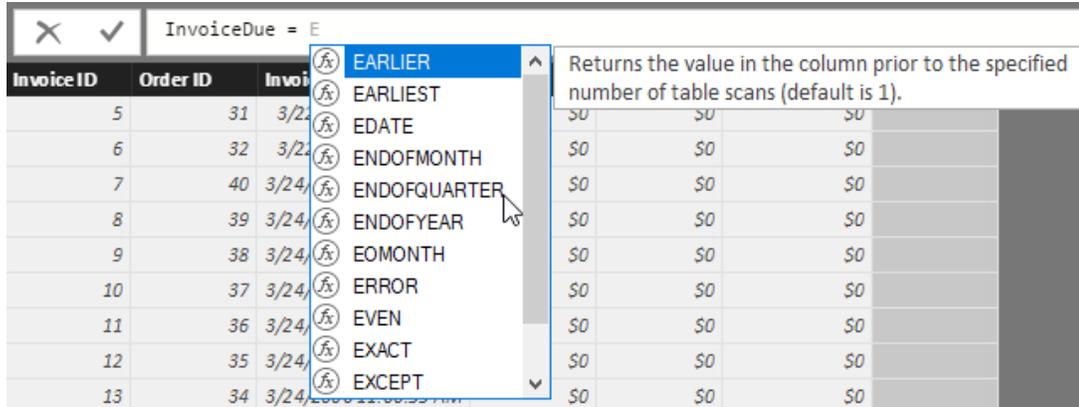
- The new column will be created, ready to accept the expression that will define its data:



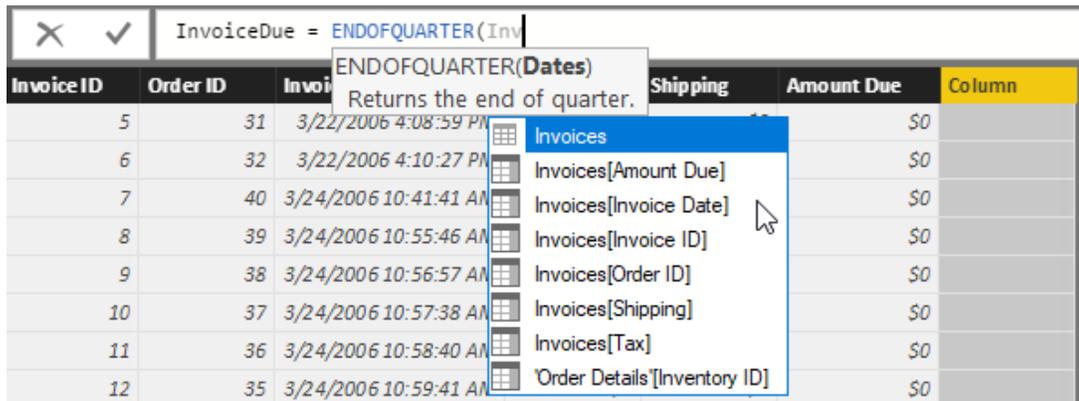
- Replace the word "Column" with "InvoiceDue:"



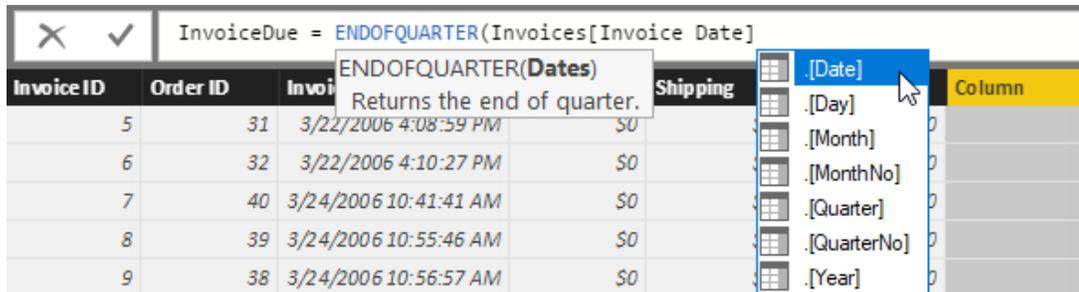
- Now, we want to return the end of the quarter date, based on the value of another column. Type the letter “E” and then double-click the “ENDOFQUARTER” function from the list:



- Now we can choose what data this value should be based on. Type “Inv” and then double-click the “Invoice Date” field from the Invoices table:



- Double-click “Date” to return a full date:



10. Add a closing bracket, double-check the expression, and press Enter:

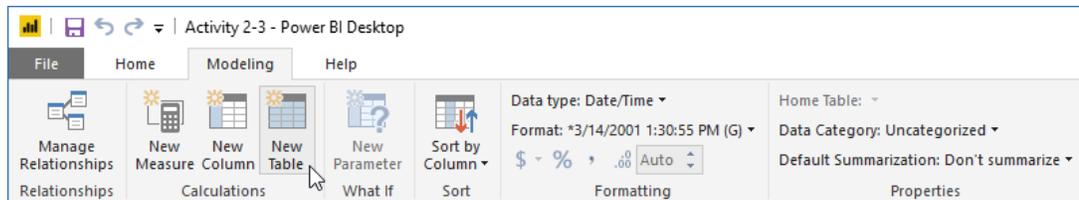


11. The InvoiceDue column will now be created. It will return the end date of each quarter based on the Invoice Date field:

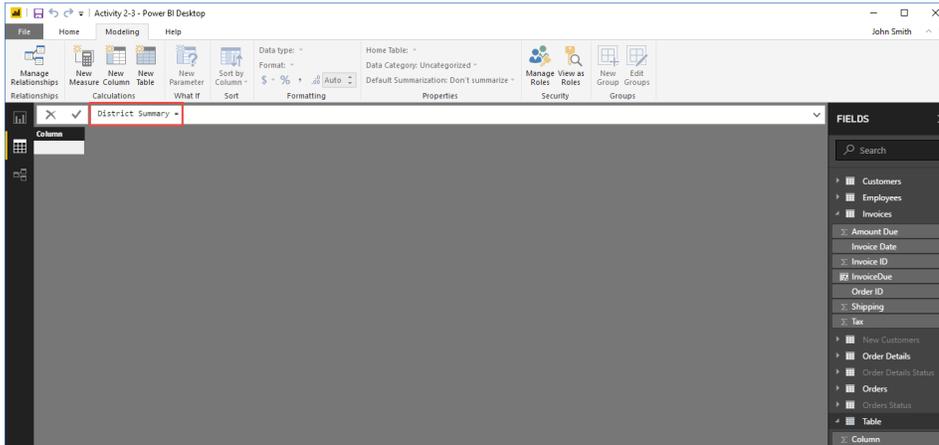
The screenshot shows the DAX formula bar with the expression: `InvoiceDue = ENDOFQUARTER([Invoices[Invoice Date].[Date]])`. Below the formula bar is a table with the following data:

Invoice ID	Order ID	Invoice Date	Tax	Shipping	Amount Due	InvoiceDue
5	31	3/22/2006 4:08:59 PM		\$0	\$0	3/31/2006 12:00:00 AM
6	32	3/22/2006 4:10:27 PM		\$0	\$0	3/31/2006 12:00:00 AM
7	40	3/24/2006 10:41:41 AM		\$0	\$0	3/31/2006 12:00:00 AM
8	39	3/24/2006 10:55:46 AM		\$0	\$0	3/31/2006 12:00:00 AM
9	38	3/24/2006 10:56:57 AM		\$0	\$0	3/31/2006 12:00:00 AM
10	37	3/24/2006 10:57:38 AM		\$0	\$0	3/31/2006 12:00:00 AM
11	36	3/24/2006 10:58:40 AM		\$0	\$0	3/31/2006 12:00:00 AM
12	35	3/24/2006 10:59:41 AM		\$0	\$0	3/31/2006 12:00:00 AM
13	34	3/24/2006 11:00:55 AM		\$0	\$0	3/31/2006 12:00:00 AM

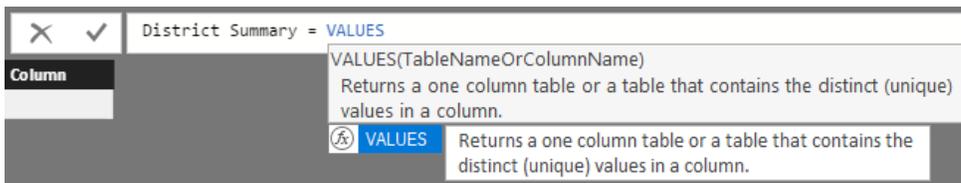
12. The next question comes from the sales manager, who wants to restructure the districts and would like a list of where current customers are located. This will require a new table, so click Modeling → New Table:



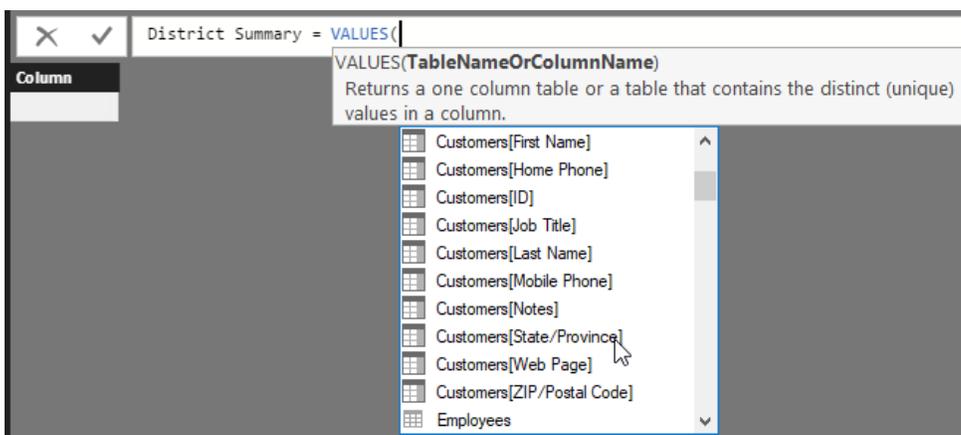
13. The new table will be created. Enter “District Summary” as the table name:



14. We want to return unique values from the State/Province field of the Customers table. This means we will use the VALUES function:



15. Type an opening bracket. A field list will then appear. Scroll down slightly and double-click the State/Province field from the Customers table:



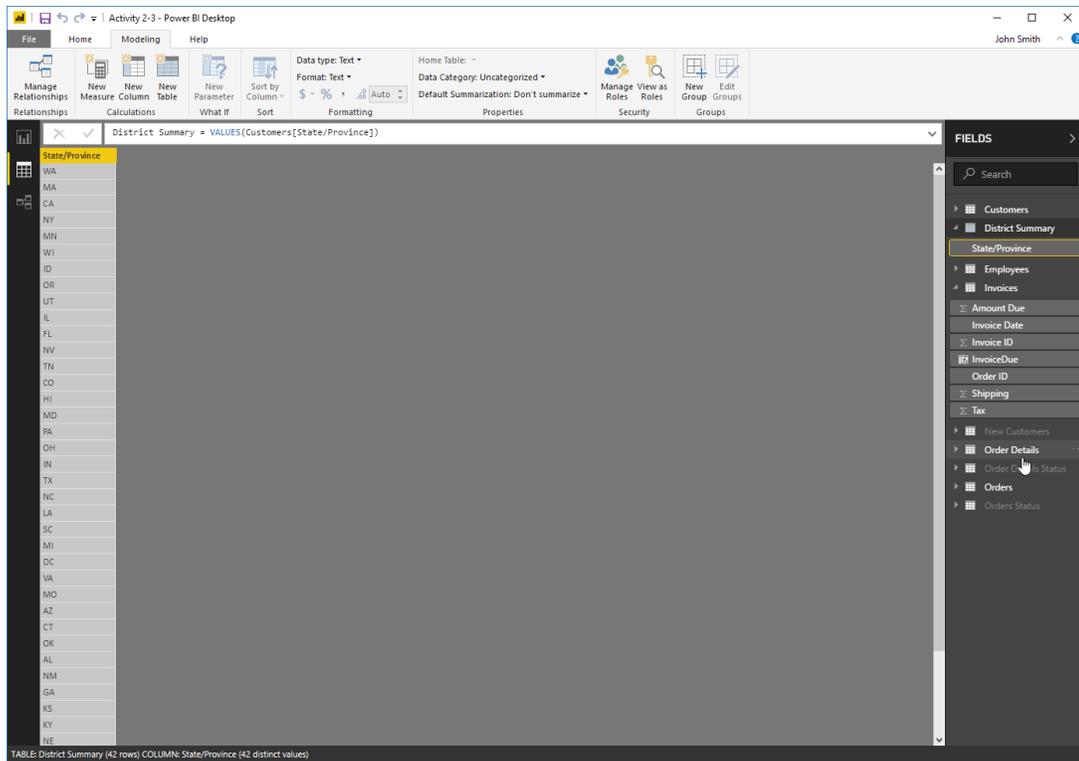
16. Close the bracket and press Enter:



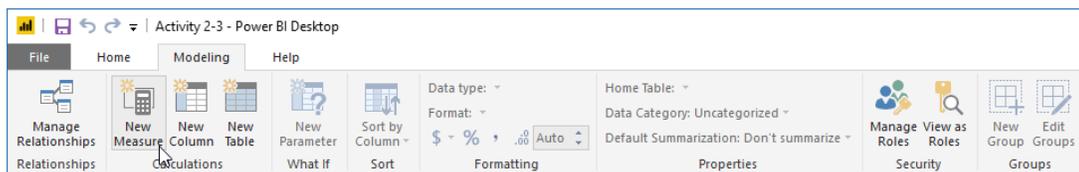
17. The table will now be created:



- Finally, the team wants to know the total unit price from all sales (excluding taxes and shipping). To do this, we will create a measure and then display it as a visualization. Let's place it in the Order Details table, which contains the unit price values. Click this table to select it:



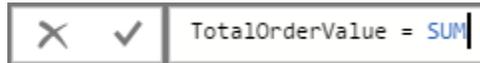
- Now, click New Measure on either the Home or Modeling tabs:



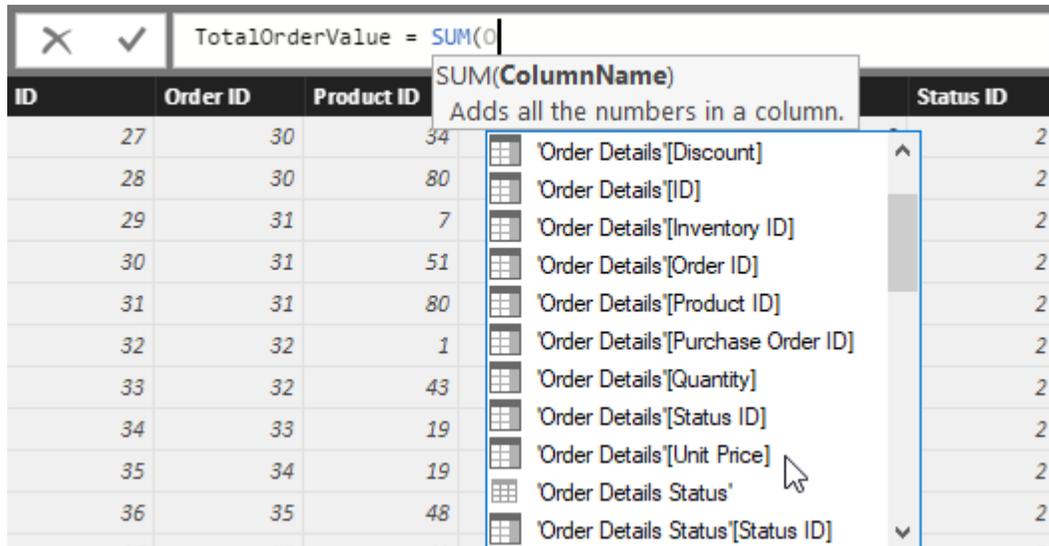
- Name the new measure "TotalOrderValue:"



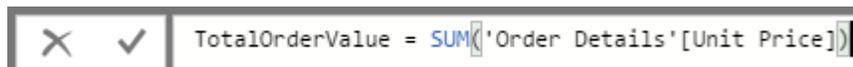
21. Type SUM for the function:



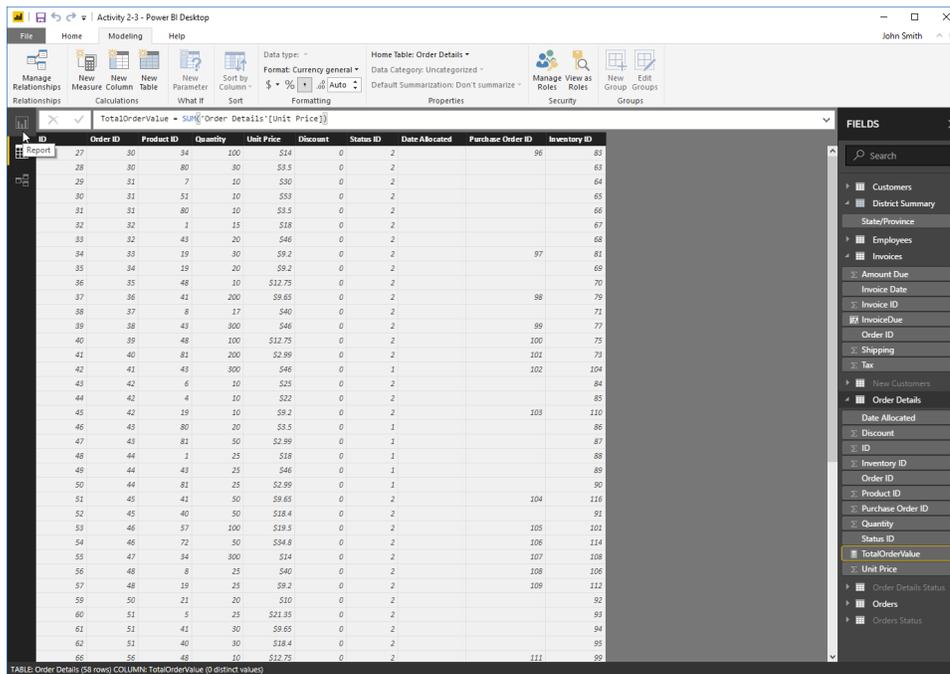
22. Type a bracket, type the letter "O," and double-click the Unit Price field in the Order Details table:



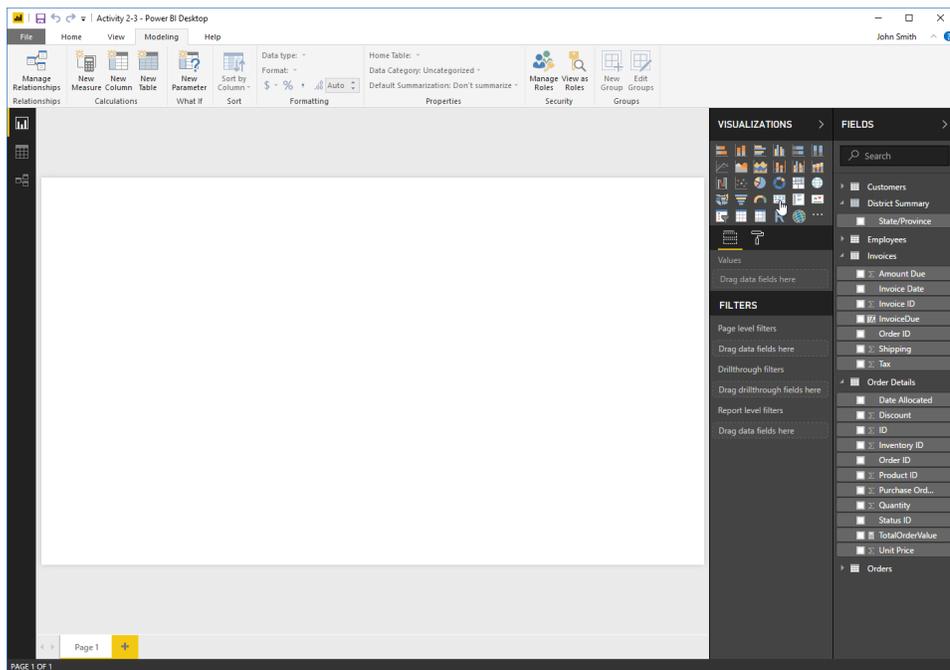
23. Type a closing bracket and then press Enter to complete the measure:



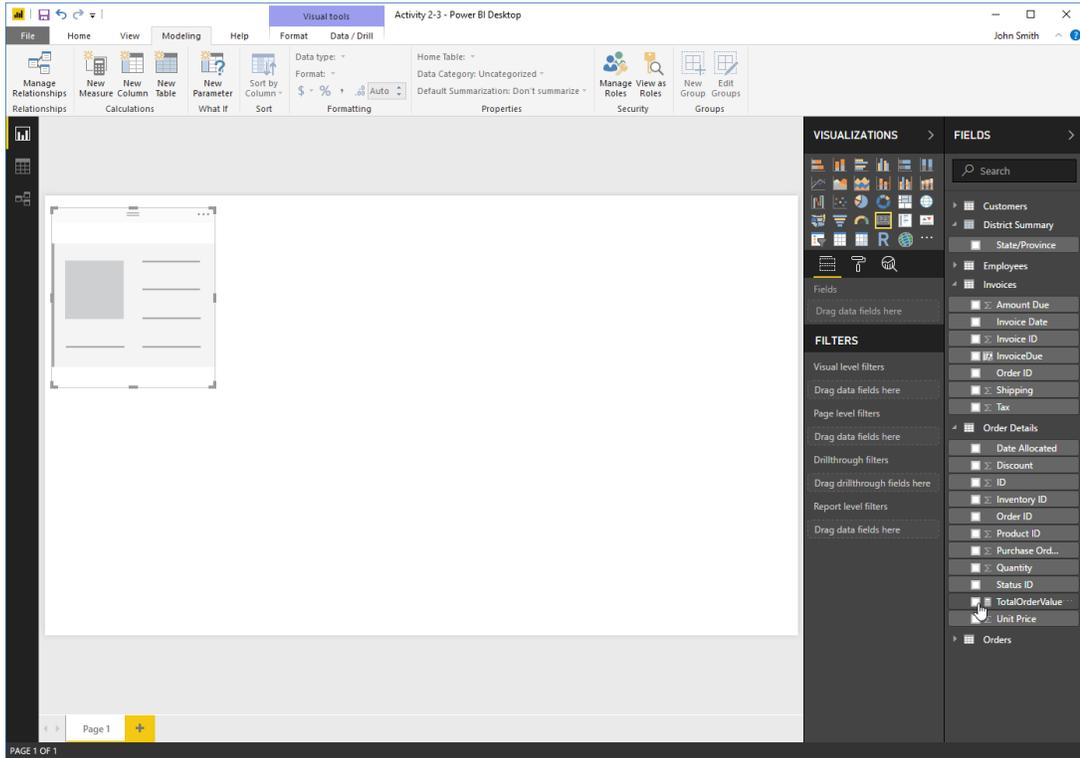
24. Now, let's display this new measure as a visualization. Switch back to Report view:



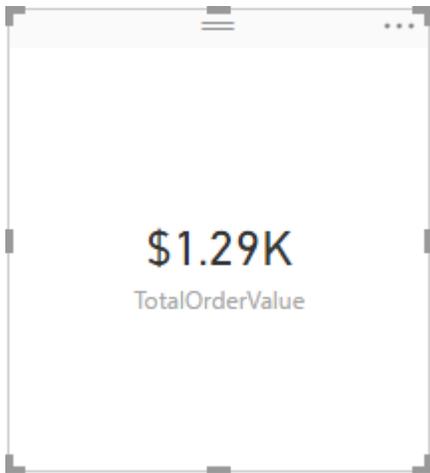
25. Click the Card visualization from the Visualizations pane:



26. Check the new TotalOrderValue measure:



27. The total will be displayed:



28. Save your work as Activity 2-3 Complete and close Power BI.

TOPIC D: Managing Relationships

Just as in Access, relationships define how the tables and fields in your database relate to each other. Once these relationships have been defined, reports and visualizations will be able to draw information from all of them just as if they were one large dataset.

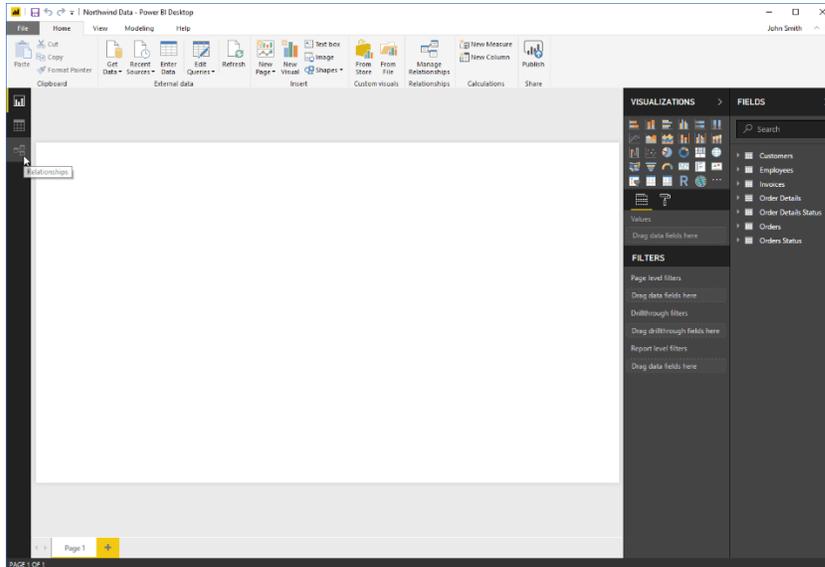
Topic Objectives

In this section, you will learn how to:

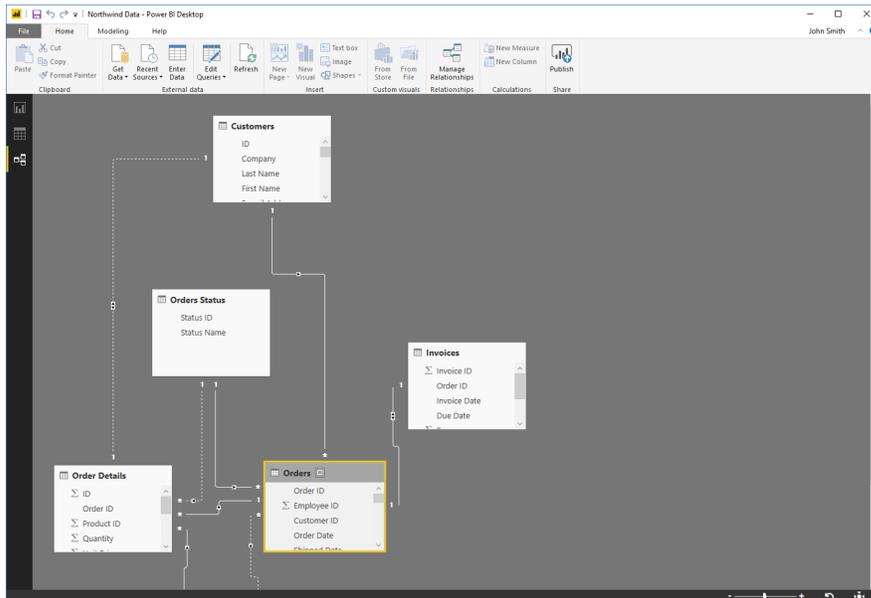
- Use the Relationships view
- Create, edit, and delete relationships
- Use the Manage Relationships dialog

Using the Relationships View

To access Relationships view, click the third icon in the navigation pane:

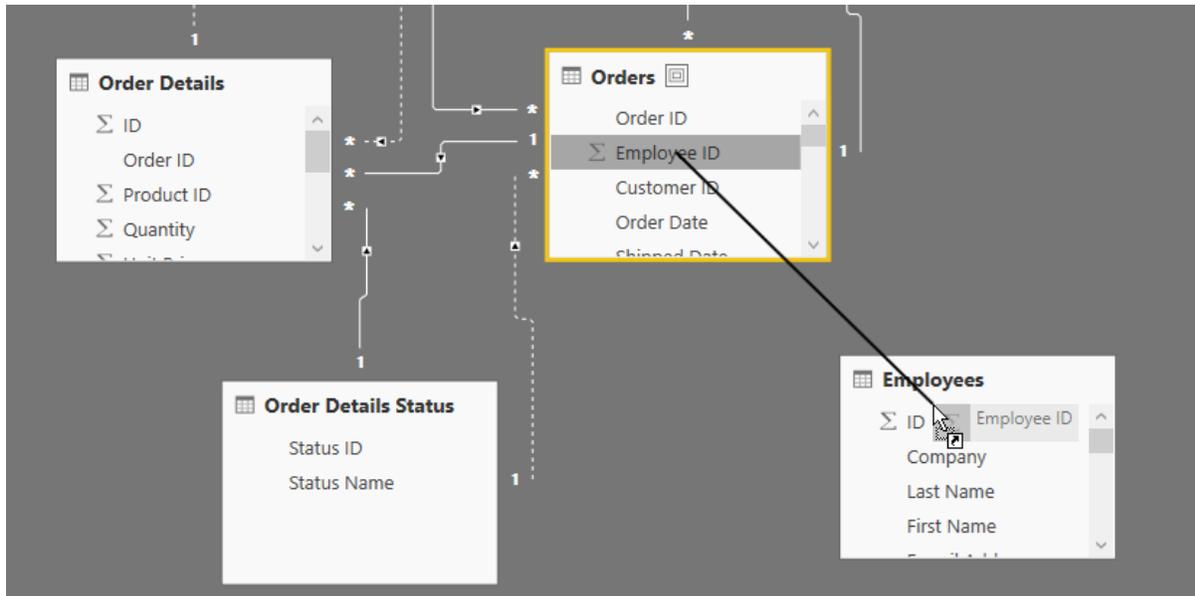


You will then see a view of all the tables and fields in the current data sources, and how they are linked:

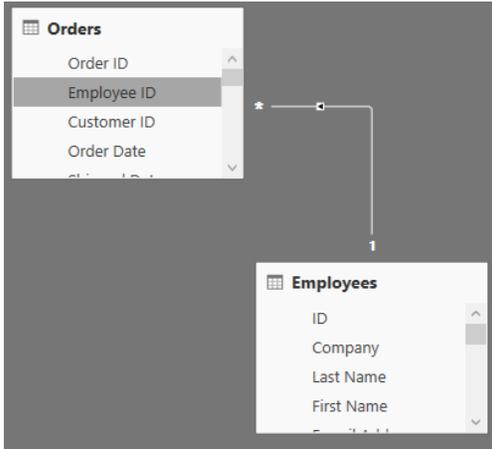


Creating Relationships

To create a relationship between two fields, drag one field to the other. Here, we are linking two Employee ID fields:



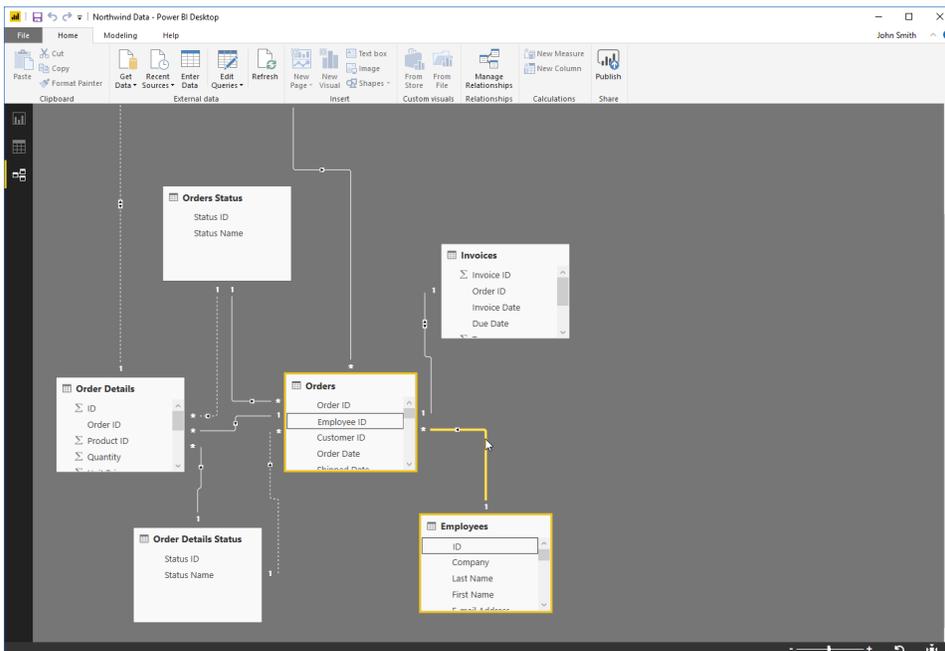
The relationship will then be created, as indicated by a white arrow:



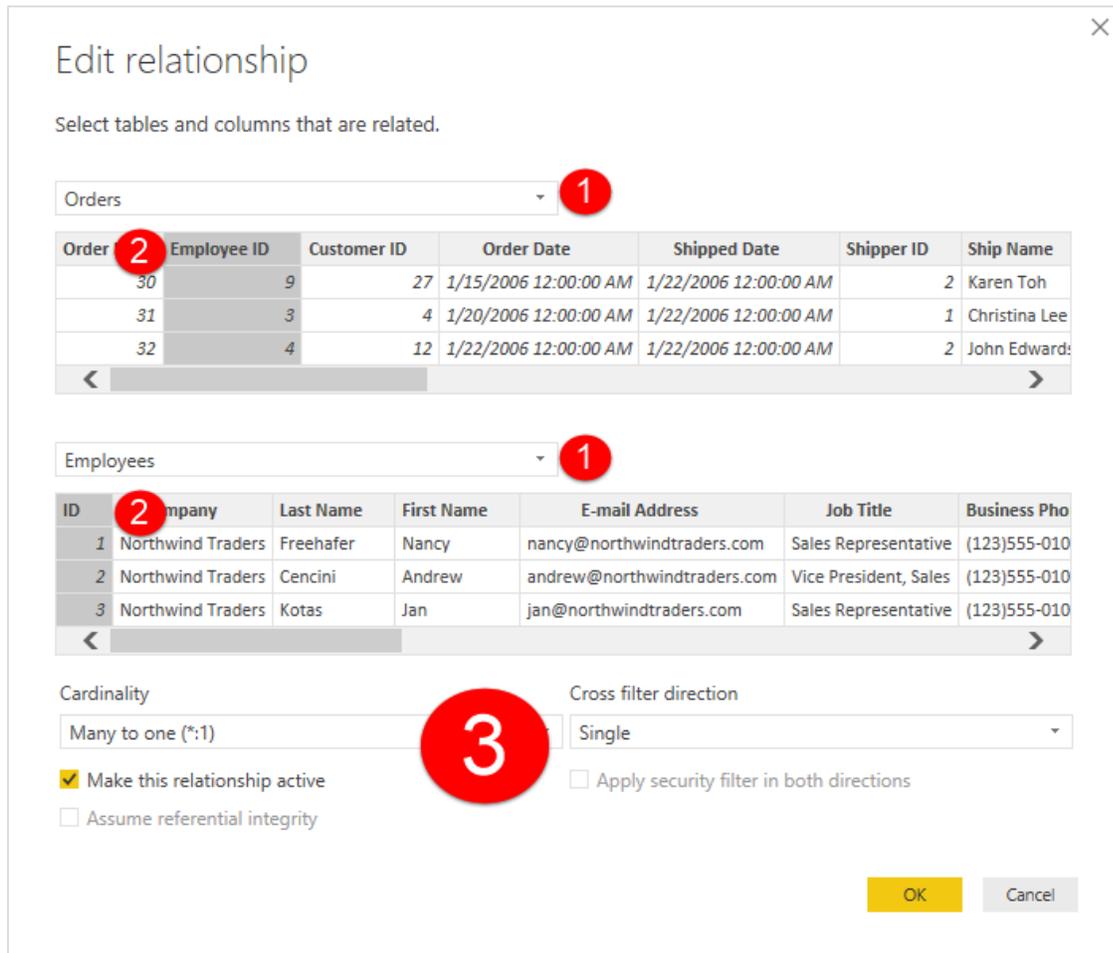
As in Access, the direction of the arrow and the symbols on it provide more information about the relationship.

Editing Relationships

To edit a relationship, double-click it:



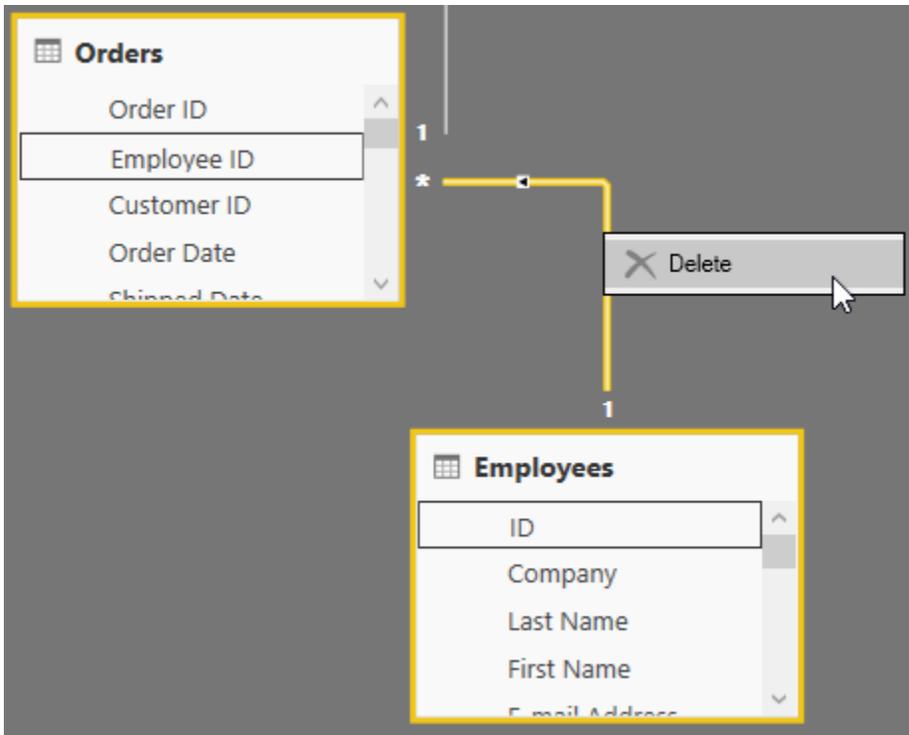
The “Edit relationship” dialog will open:



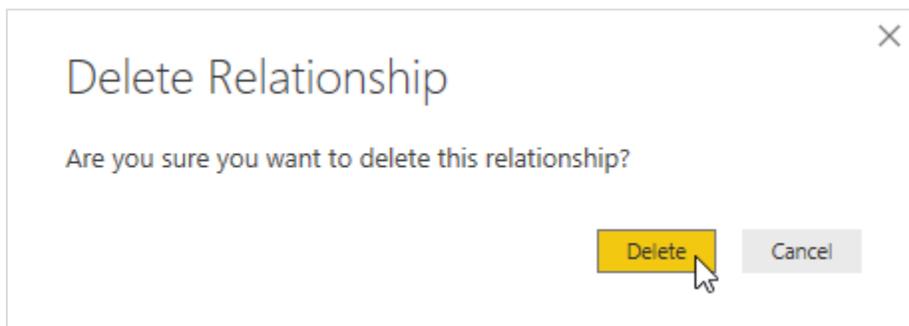
Here, you can specify the **tables (1)** and **fields (2)** that are related. At the bottom, you can **set options (3)** like cardinality. Click OK when you are finished editing the relationship to apply the changes.

Deleting Relationships

To delete a relationship, right-click it and click Delete:



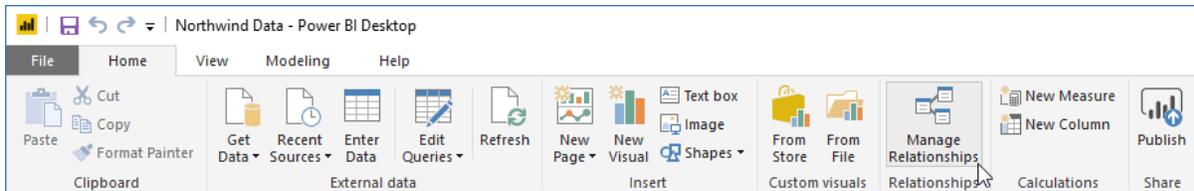
Then, click Delete to confirm the operation:



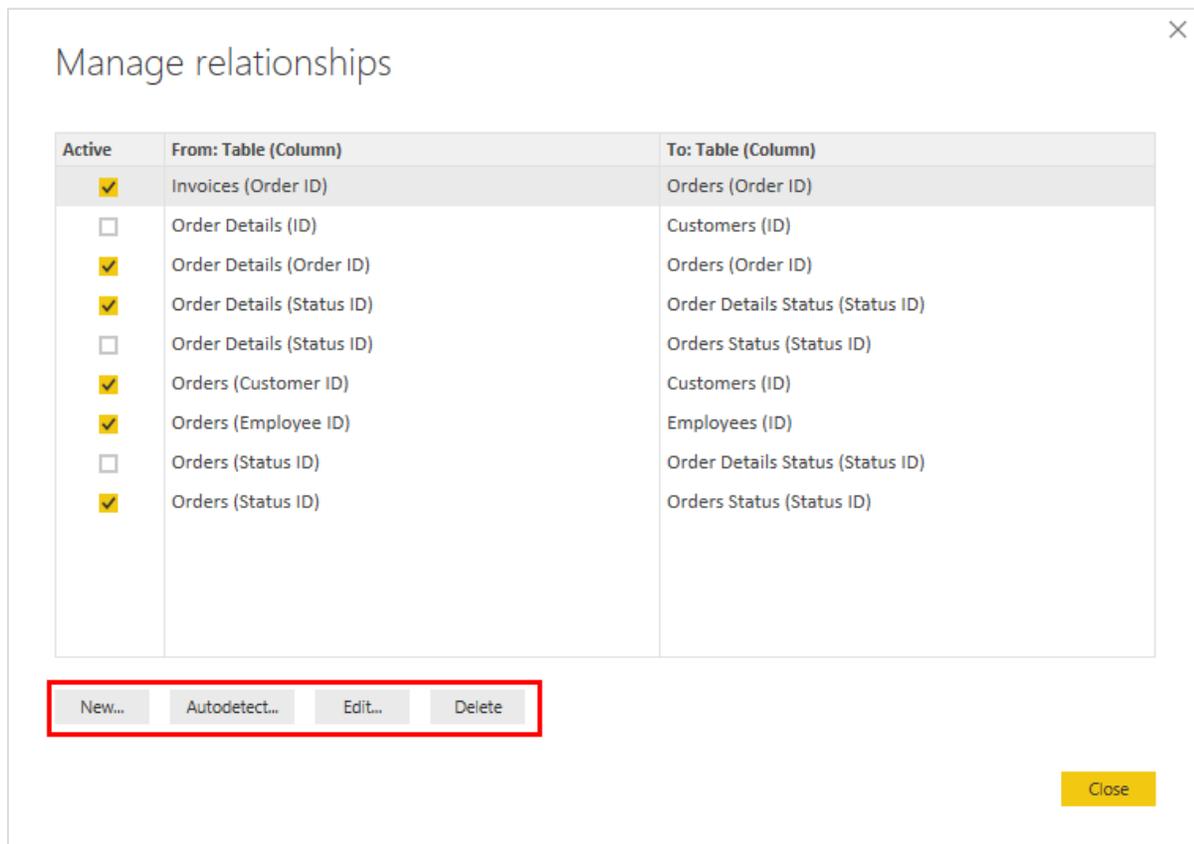
Always be very careful when deleting relationships, as they may adversely affect the integrity of your data, and therefore your ability to build visualizations!

Using the Manage Relationships Dialog

You can quickly access the Manage Relationships dialog from the Home tab in any view:



This dialog allows you to create, manage, view, and edit relationships:

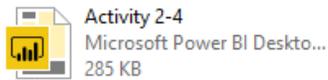


There is also a command here to automatically detect and build relationships – useful if you have imported several different data sources that are not yet related.

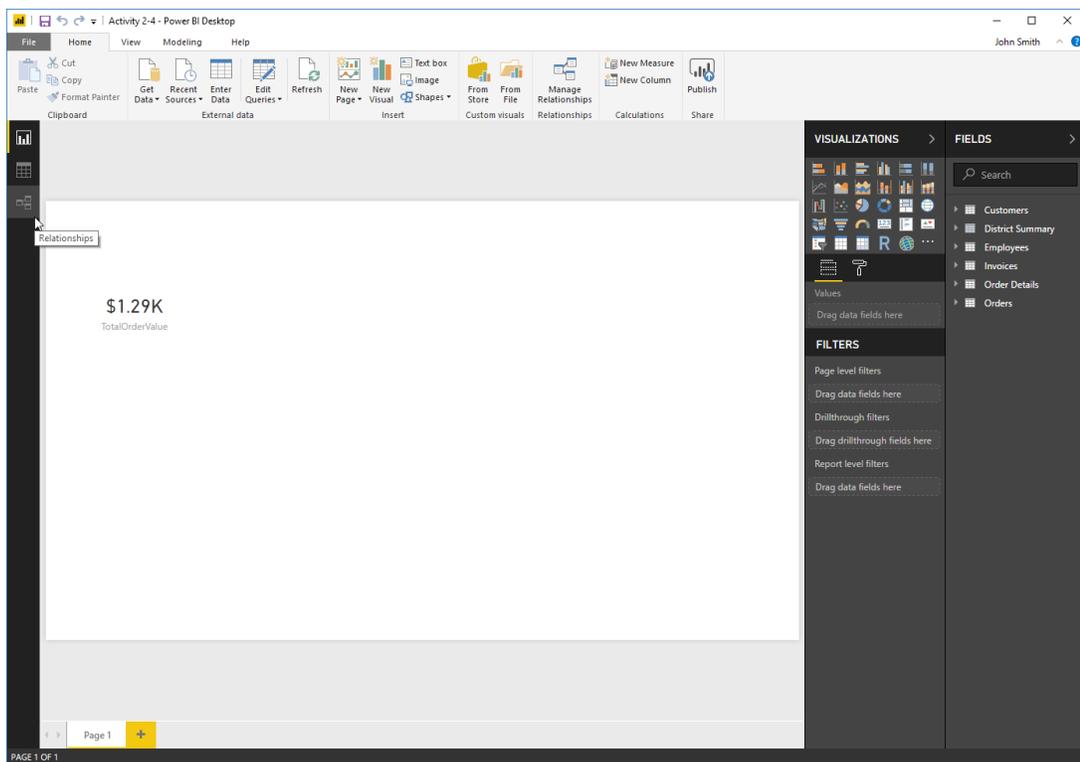
Activity 2-4: Managing Relationships

In this activity, we will review and update the relationships in our sample file.

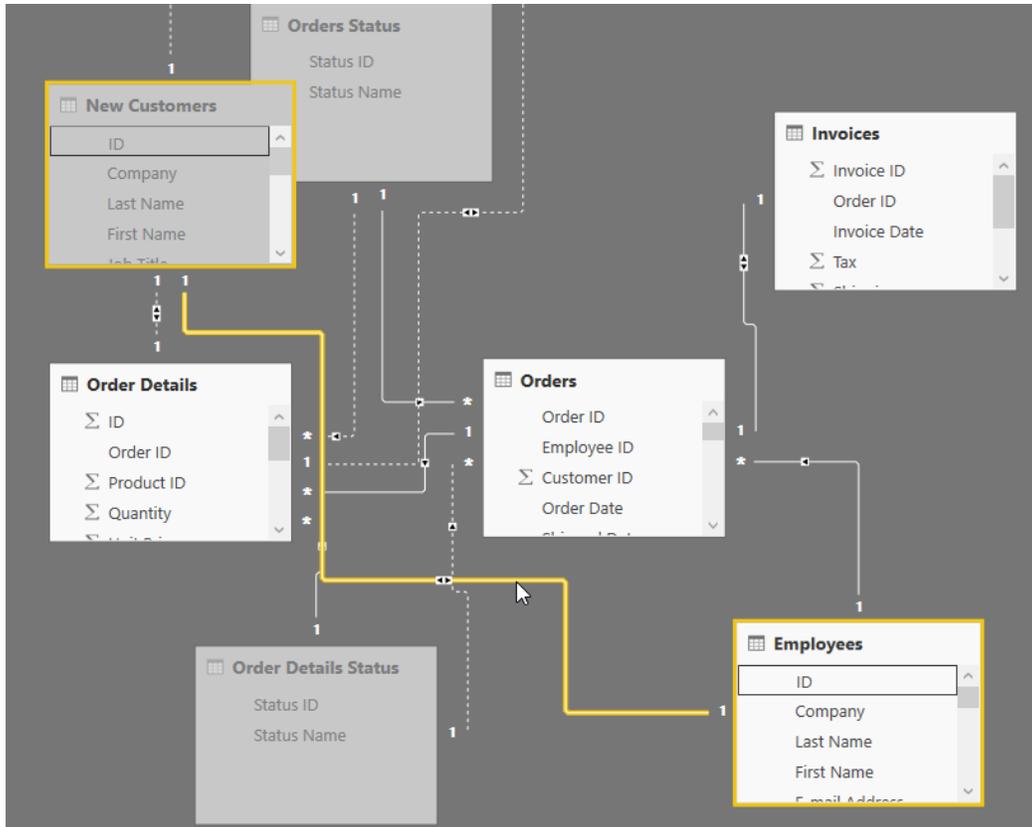
1. Open Power BI and open Activity 2-4:



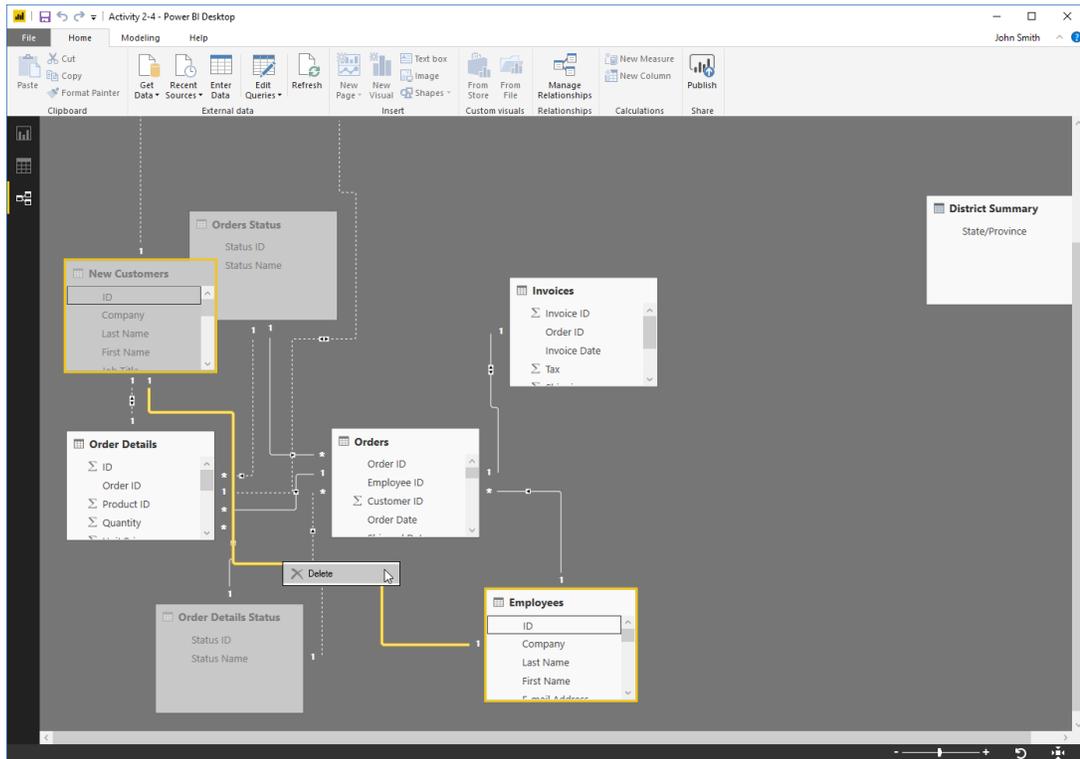
2. Click the Relationships icon in the navigation pane:



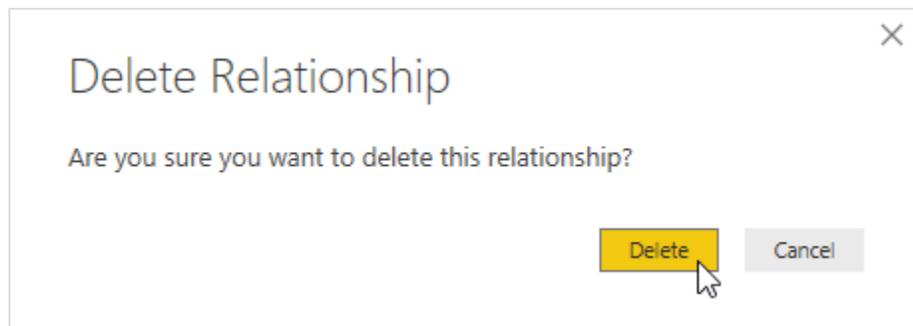
3. Review the relationships in this data file. You can see that the New Customers table, which we appended to the Customers table earlier in this lesson, was erroneously linked to the Employees table:



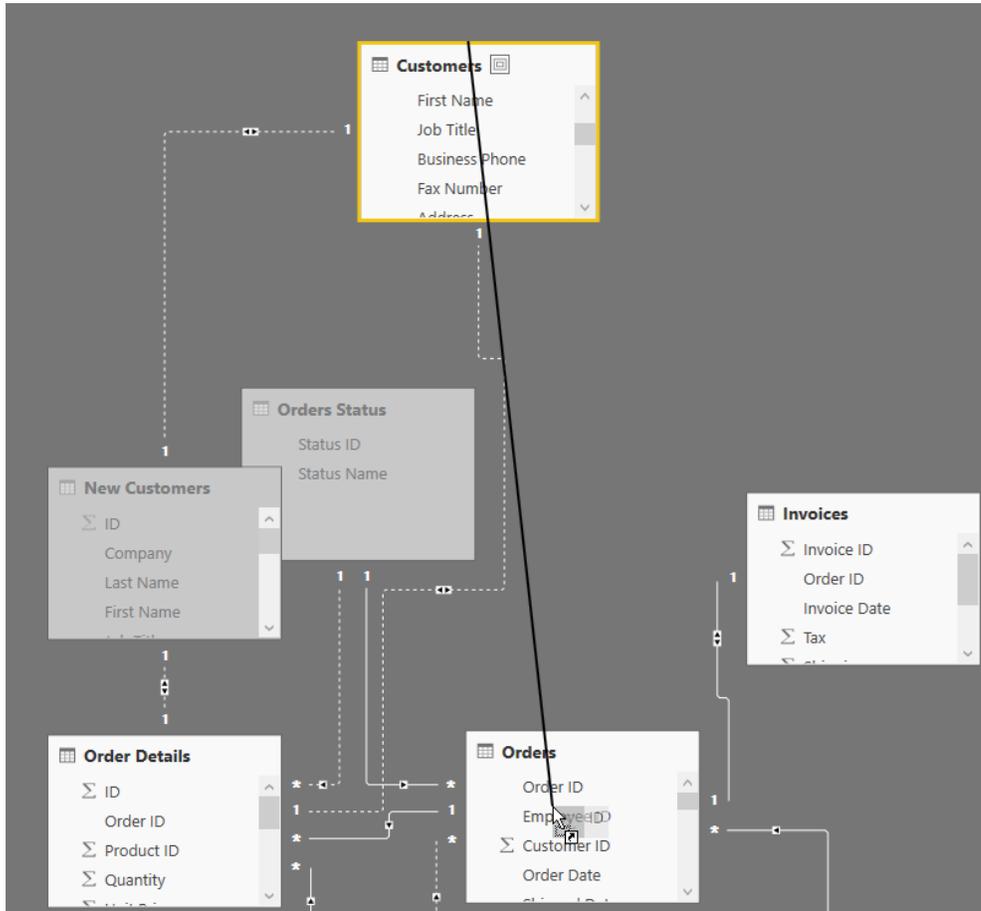
4. Right-click the relationship line and click Delete:



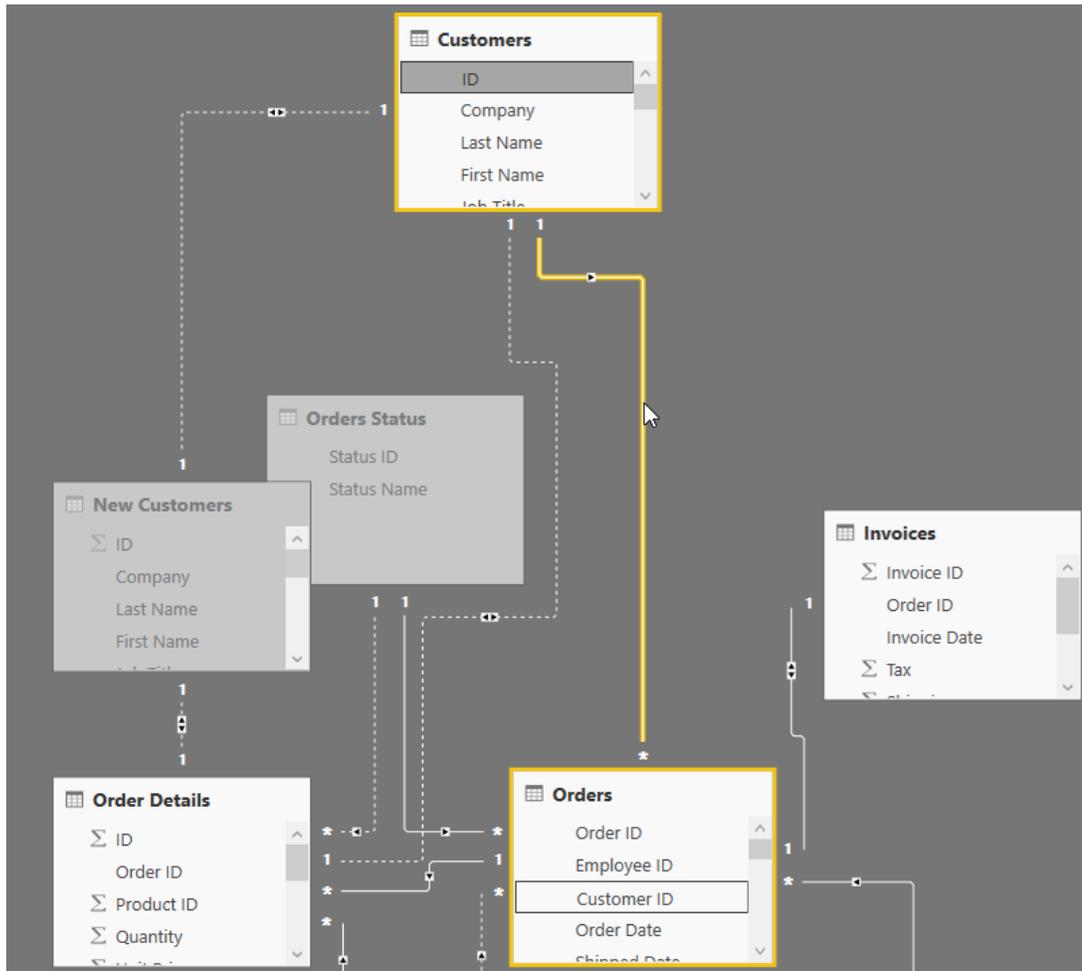
5. Click Delete to confirm the operation:



6. We can also see that the Customers table is not linked to the Orders table. Click and drag the Order ID field from the former table to the latter:



7. The relationship will be created. Double-click the line to see its details:



- Review the cardinality options and confirm that the relationship type is set correctly. (Many orders can belong to one customer.) Click OK to close the dialog box:

Edit relationship ✕

Select tables and columns that are related.

Orders

Order ID	Employee ID	Customer ID	Order Date	Shipped Date	Shipper ID	Ship Name
30	9	27	1/15/2006 12:00:00 AM	1/22/2006 12:00:00 AM	2	Karen Toh
31	3	4	1/20/2006 12:00:00 AM	1/22/2006 12:00:00 AM	1	Christina Lee
32	4	12	1/22/2006 12:00:00 AM	1/22/2006 12:00:00 AM	2	John Edward

Customers

ID	Company	Last Name	First Name	Job Title	Business Phone	Fax Number	
30	Company A	Bawden	Emory	Recruiting Manager	(805) 9178677	(979) 5377200	0 Chi
31	Company A	Horder	Cristen	Analog Circuit Design manager	(850) 7884226	(915) 1419980	94 St
32	Company C	Gianolini	Audrey	Quality Engineer	(240) 9151265	(901) 6652414	3473

Cardinality: Many to one (*:1)

Cross filter direction: Single

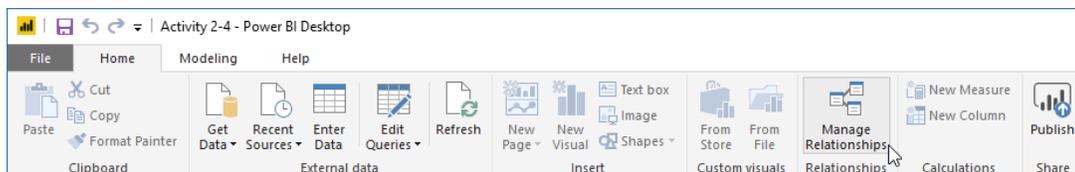
Make this relationship active

Assume referential integrity

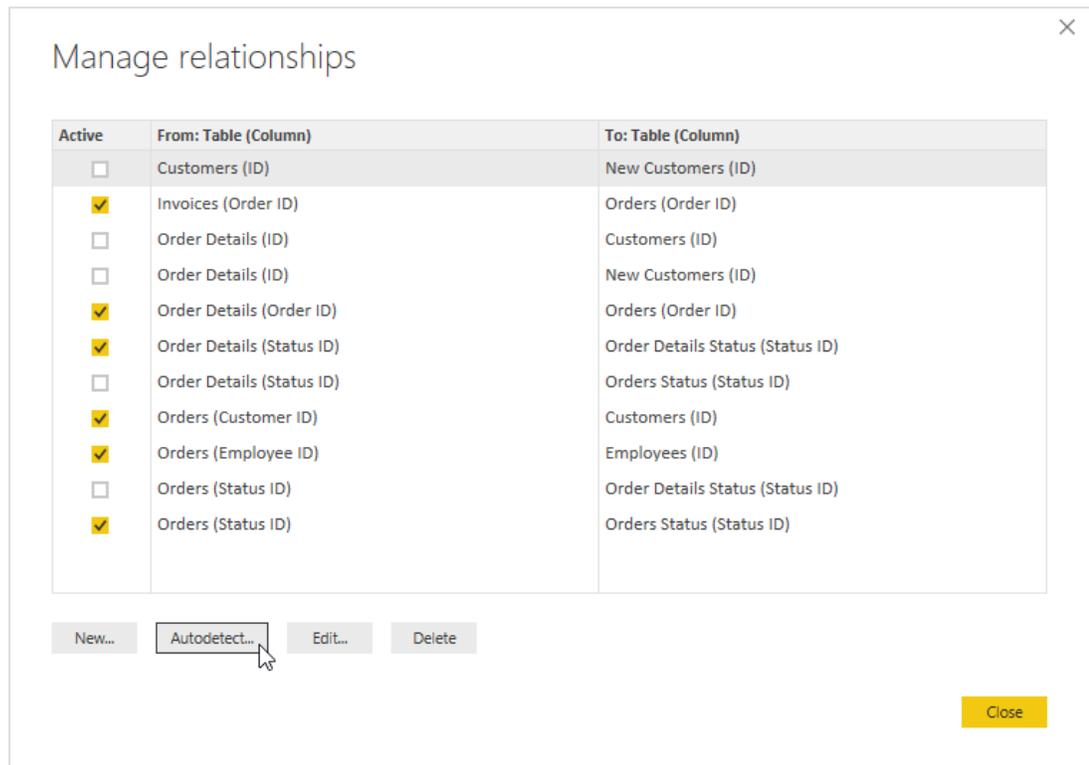
Apply security filter in both directions

OK
Cancel

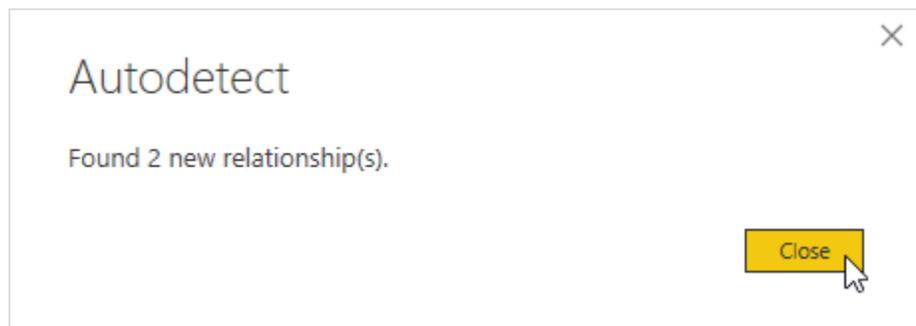
- Let's do a final check to make sure all relationships are configured correctly. Click Home → Manage Relationships:



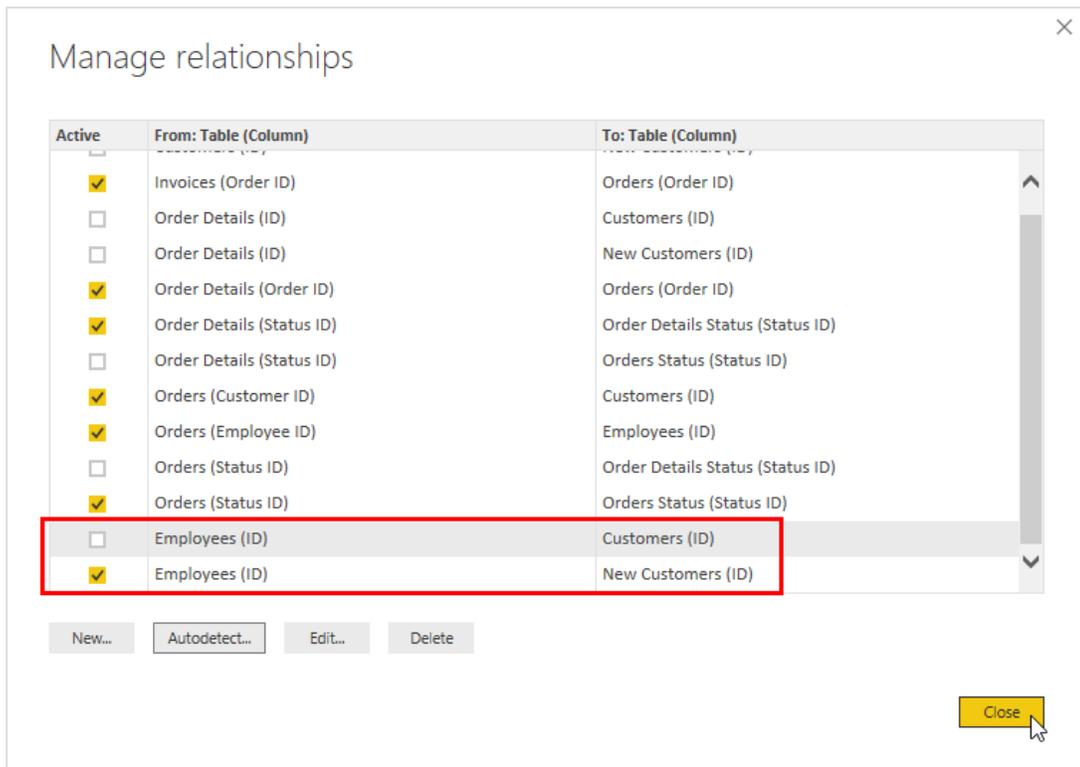
10. The Manage Relationships dialog box will open. Click Autodetect:



11. Power BI should detect two new relationships. Click Close when you see the notification:



12. Review the two new relationships added. Close the dialog box:



13. Save your work as Activity 2-4 Complete and close Power BI.

Summary

In this lesson, we learned how to prepare data before creating visualizations. You should now be familiar with transforming and sanitizing data using Data view and the Query Editor. You should also be familiar with data modeling using DAX and managing relationships.

Review Questions

1. What is DAX?
2. Where should a measure be stored?
3. Which tab contains commands to set the data type, format, category, and summarization?
4. How do you create a relationship between two fields in Relationships view?
5. How do you open the Query Editor?

LESSON 3: WORKING WITH REPORTS AND VISUALIZATIONS

Lesson Objectives

In this lesson you will learn how to:

- Manage report pages
- Change report view options
- Work with visualizations and their data
- Add static objects to a report

TOPIC A: Managing Report Pages

In this lesson, we will turn our focus back to Report view. You can add multiple pages to a report, and add, delete, and modify them as required.

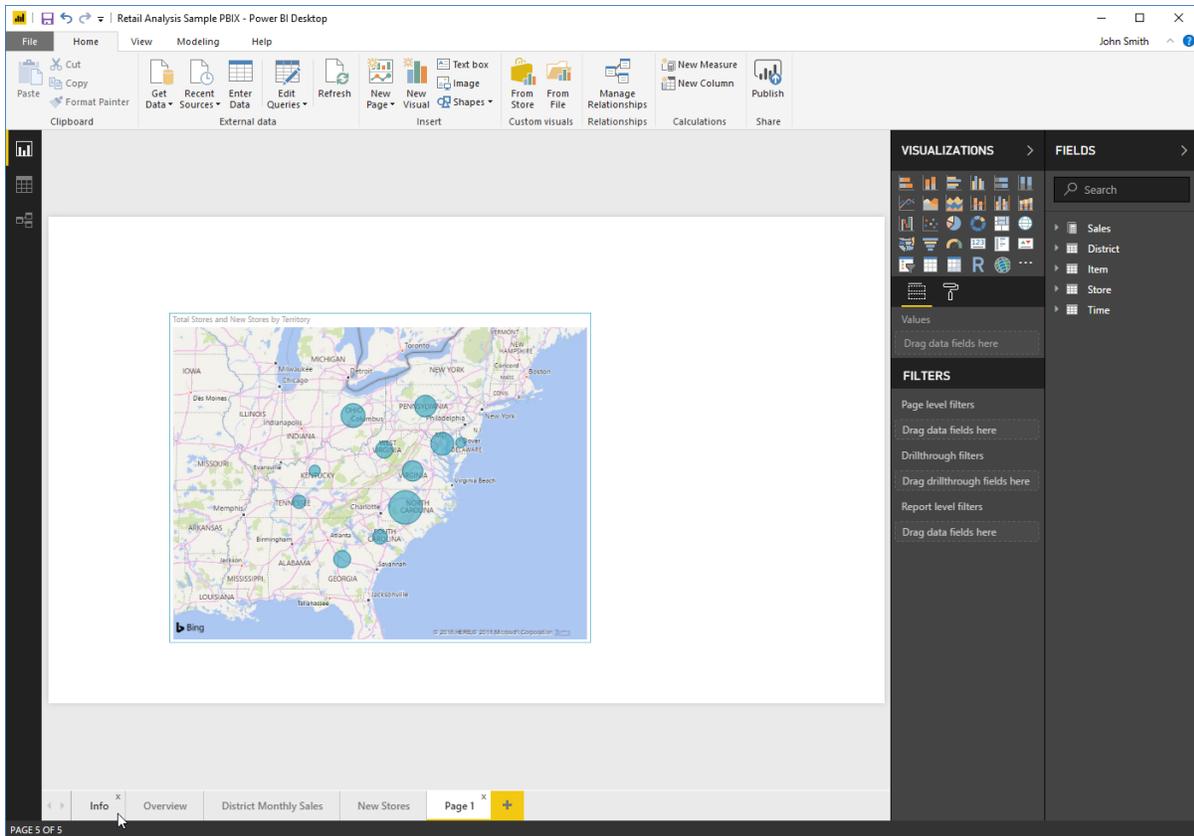
Topic Objectives

In this topic, you will learn how to:

- Navigate through report pages
- Show and hide pages
- Add, delete, and rename pages
- Change page order

Navigating Through Pages

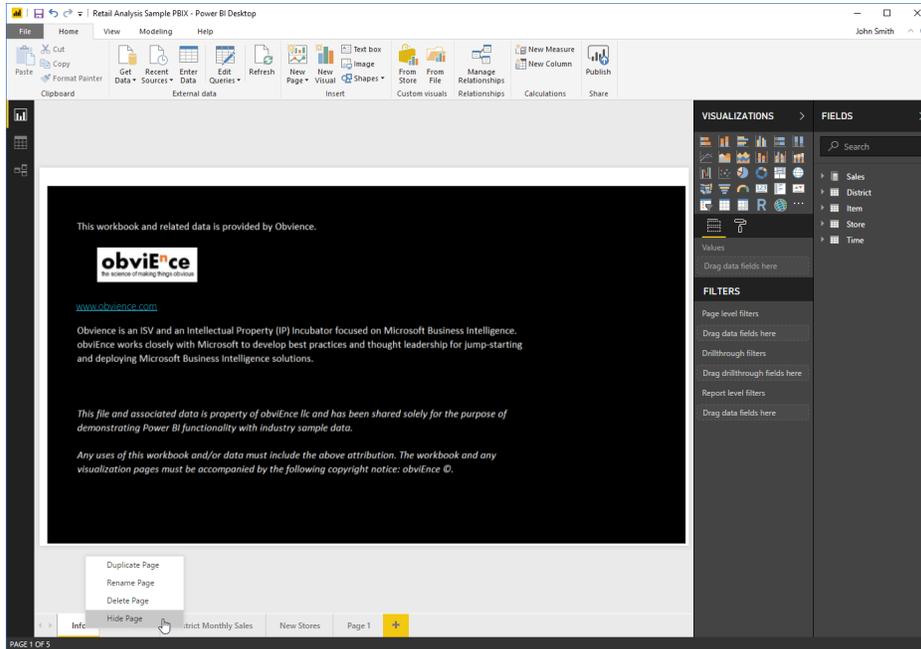
To view a different report page, simply click its tab at the bottom of Report view:



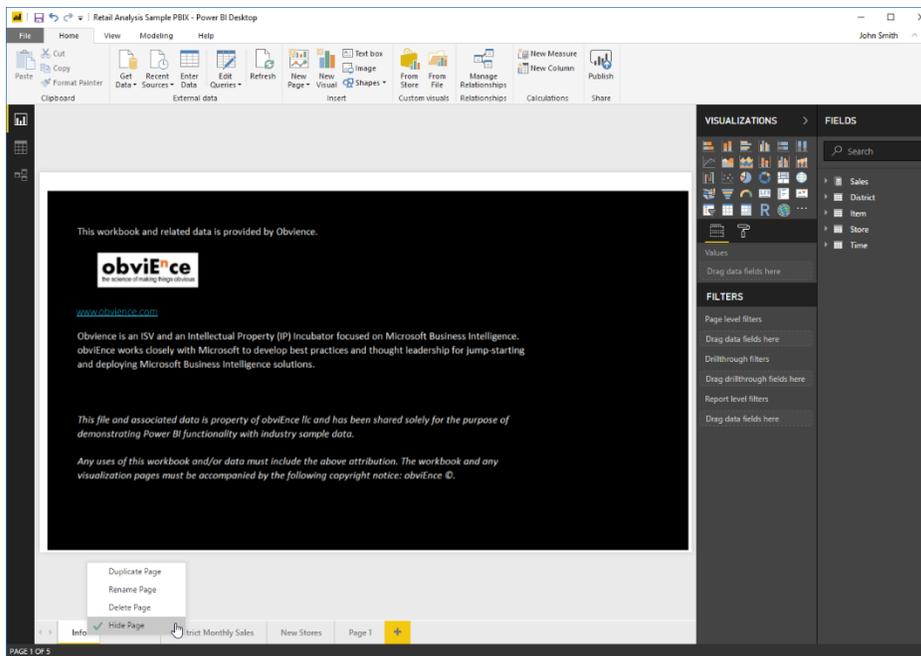
Its contents will then be displayed.

Showing and Hiding Pages

To temporarily hide a page, right-click its tab and click Hide Page:

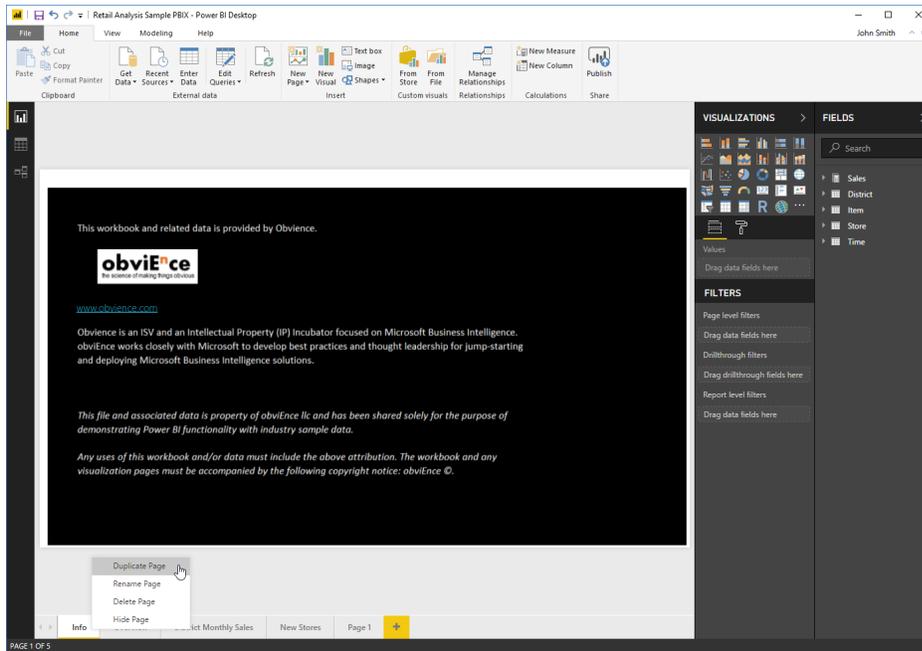


The page tab will then be grayed out. You can show it again by right-clicking the page tab again and de-selecting Hide Page:

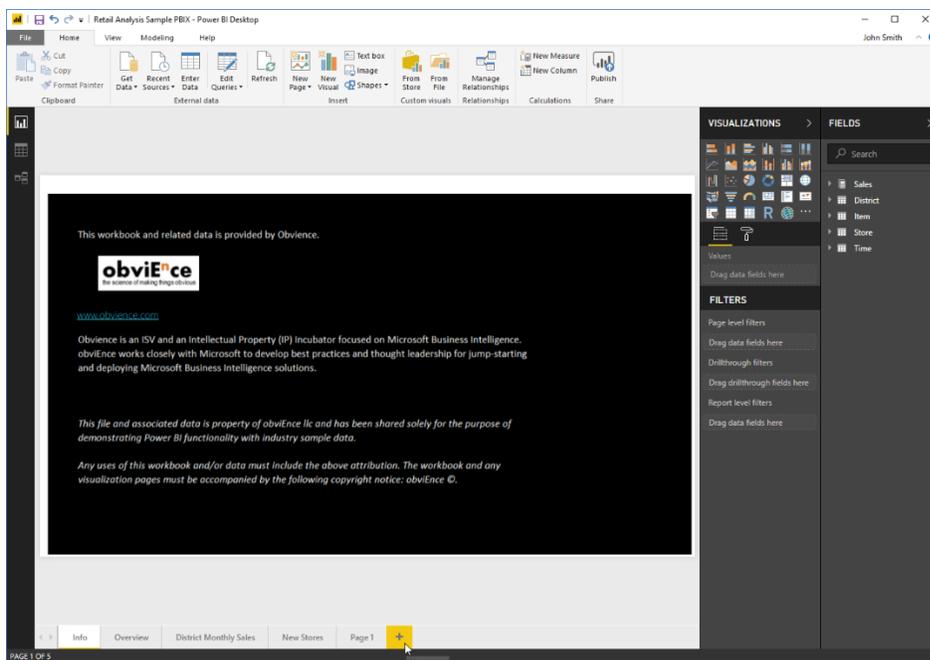


Adding Pages

There are two ways to add a new page. You can create a duplicate of the current page from the right-click menu:

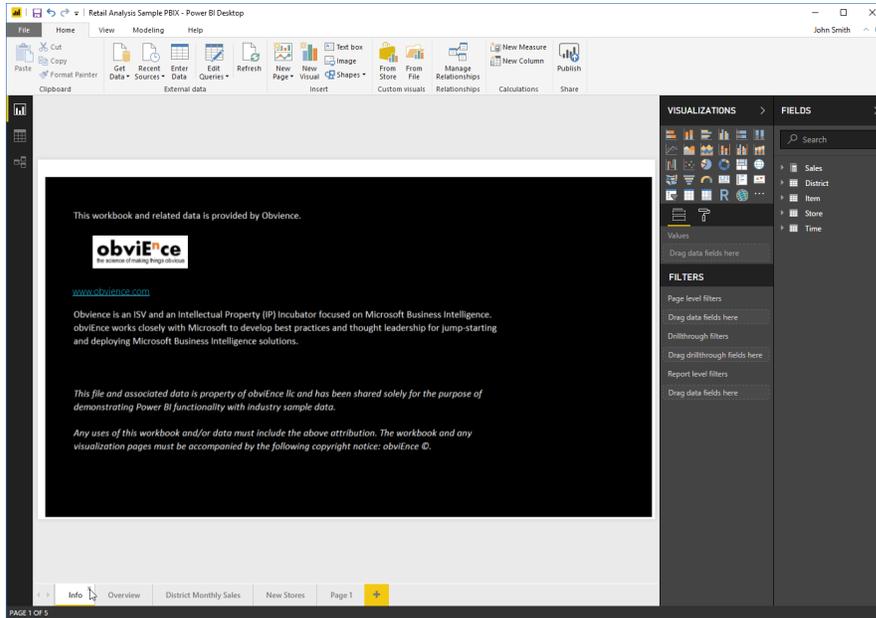


Or, you can create a blank page using the plus sign at the end of the page tab list:

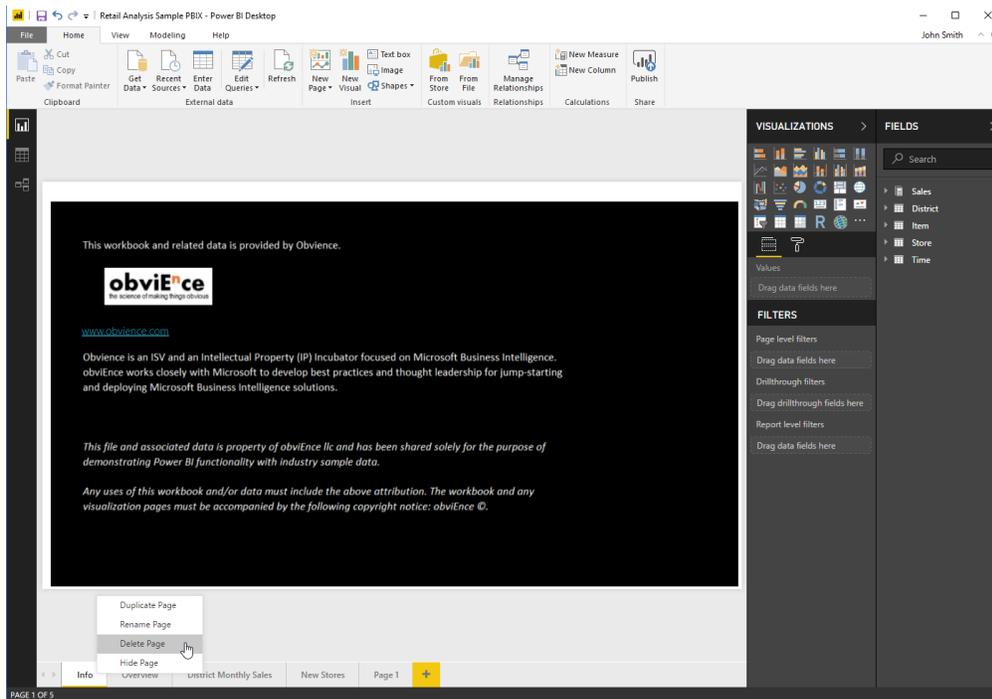


Deleting Pages

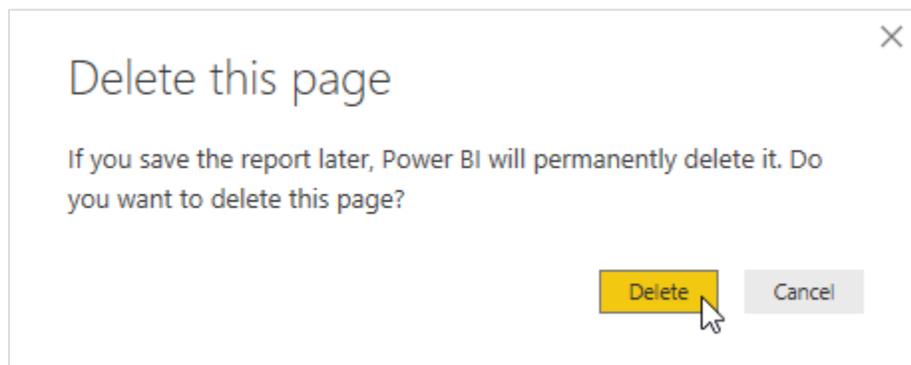
To permanently delete a page, move your mouse over the page tab and click the X:



You can also delete a page from the right-click menu:

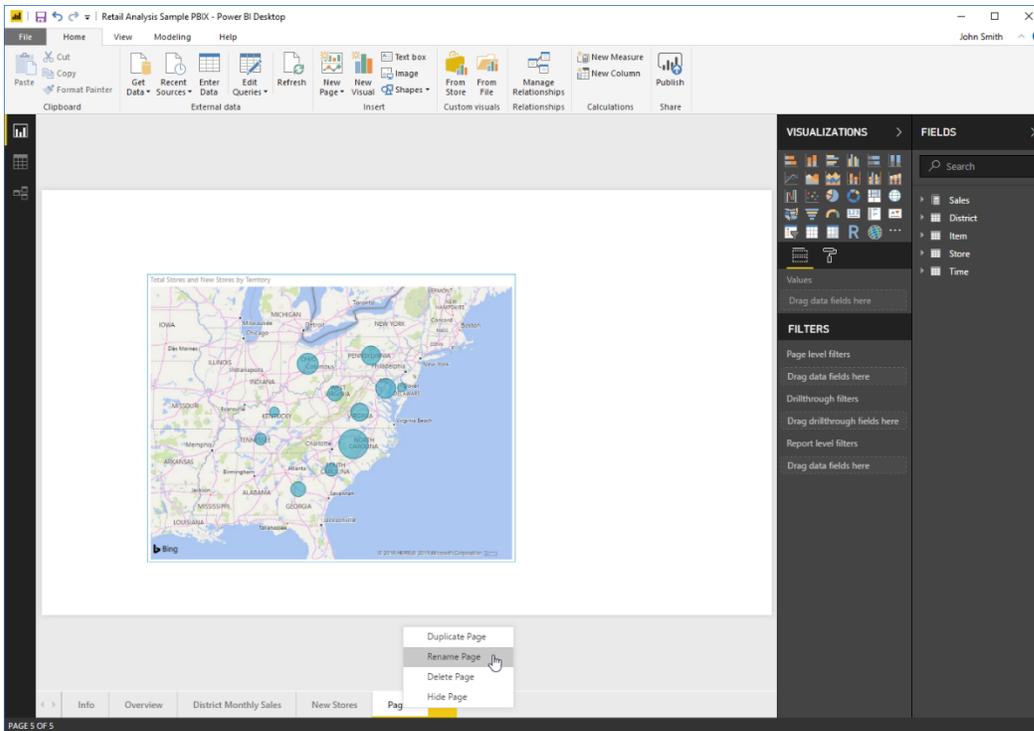


In either case, you will be prompted to click Delete to confirm the operation:

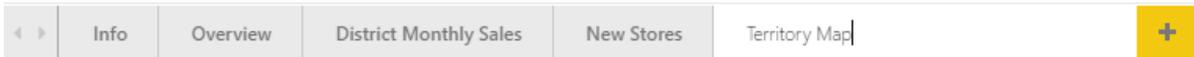


Renaming Pages

The final command on the right-click menu is Rename Page:

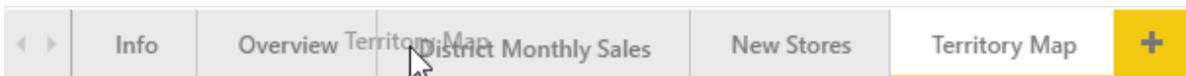


This command will change the page tab name into an editable field. Simply type the new name and press Enter to apply it:



Changing Page Order

Finally, to change the order of pages, simply click and drag the tab:



Release your cursor when you have reached the desired location.

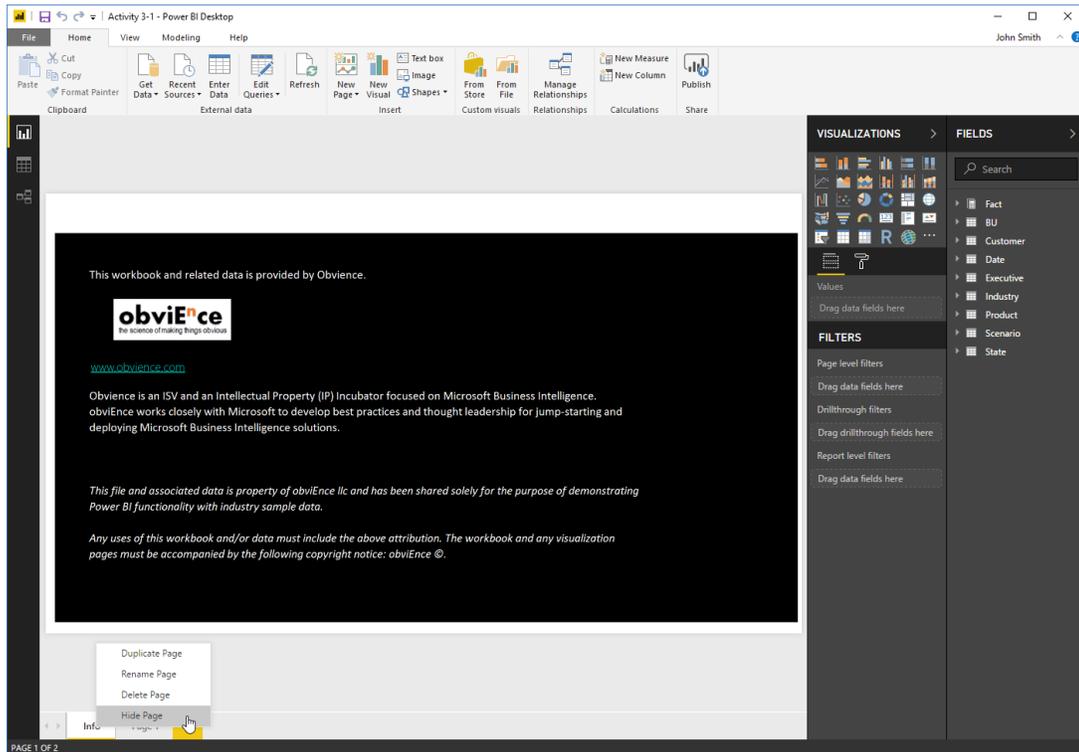
Activity 3-1: Managing Report Pages

In this activity, we will set up the report that will be used throughout this lesson.

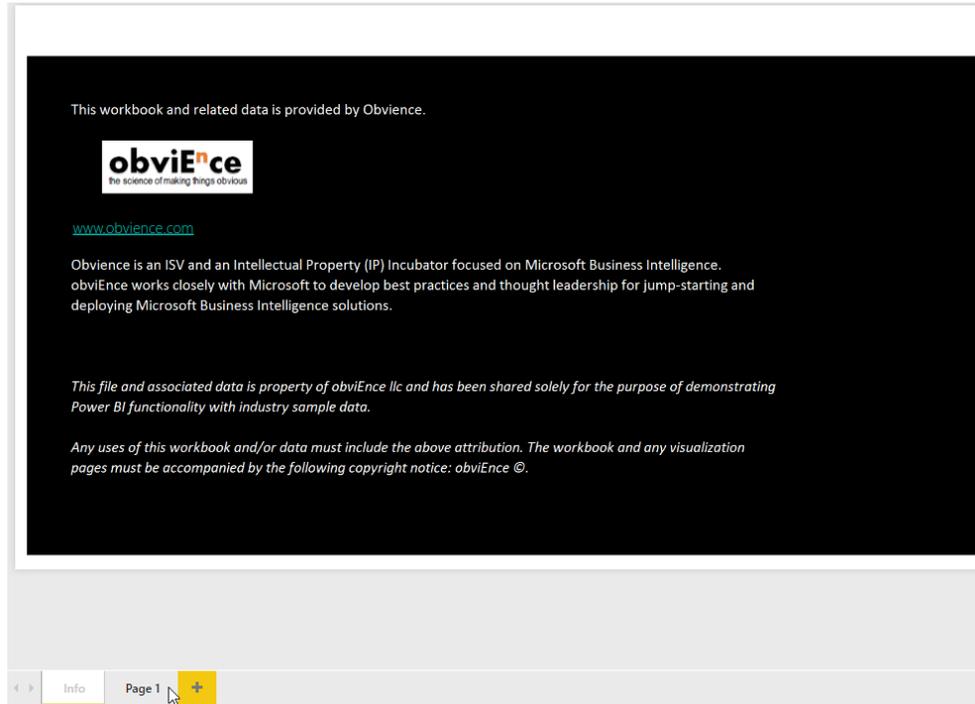
1. Open Power BI and open Activity 3-1:



2. The Info page should be displayed by default. This is important information but does not need to be displayed to our report users. Right-click the page tab and click Hide Page:



3. Click the Page 1 tab to view it:



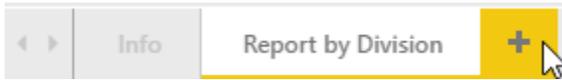
4. There are two different visualizations on this page. Let's create a separate page for each of them. First, let's set up the pages. Right-click the Page 1 tab and click Rename Page:



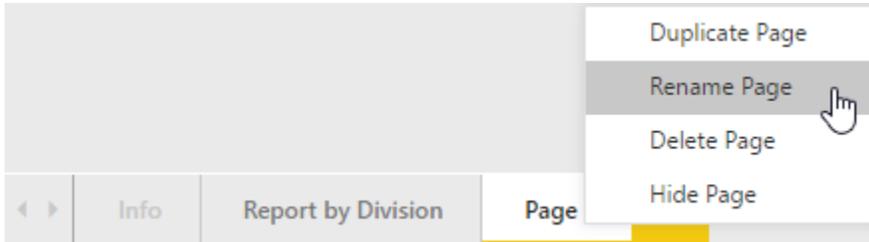
5. Type, "Report by Division" in the field and press Enter:



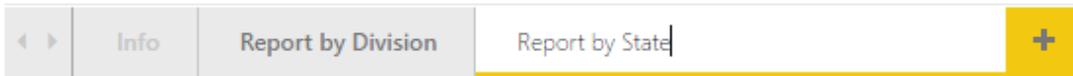
6. Now, click the plus sign to create a new page:



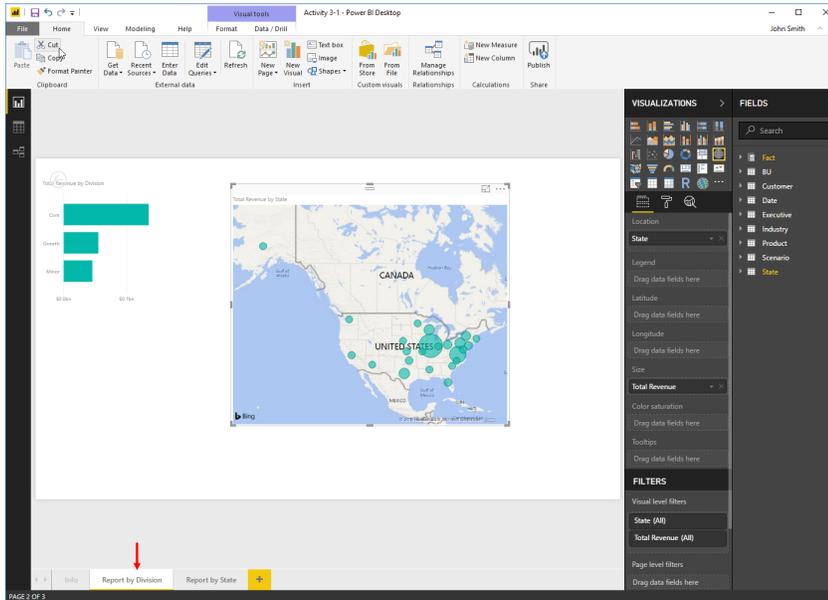
7. Right-click this new tab and click Rename Page:



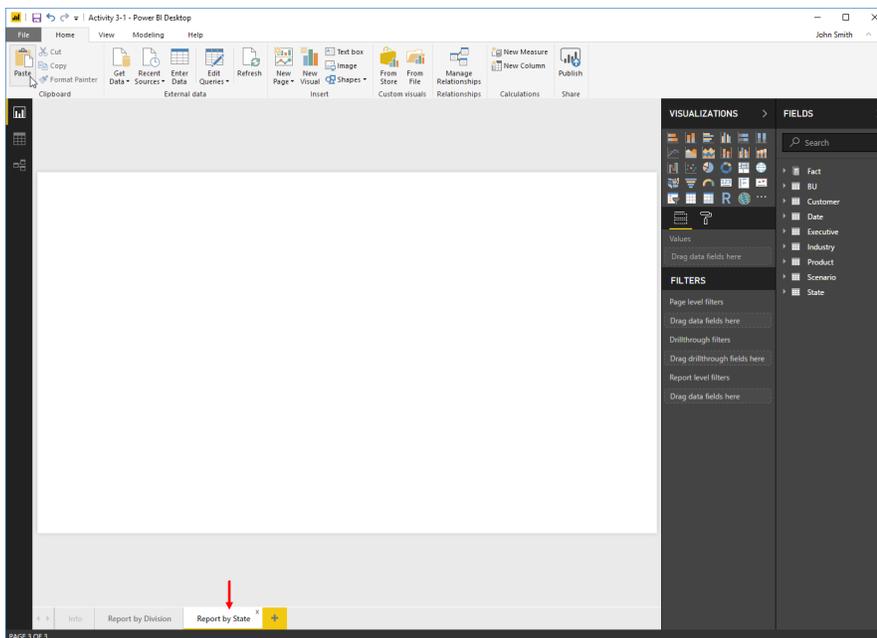
8. Type, "Report by State" in the field and press Enter:



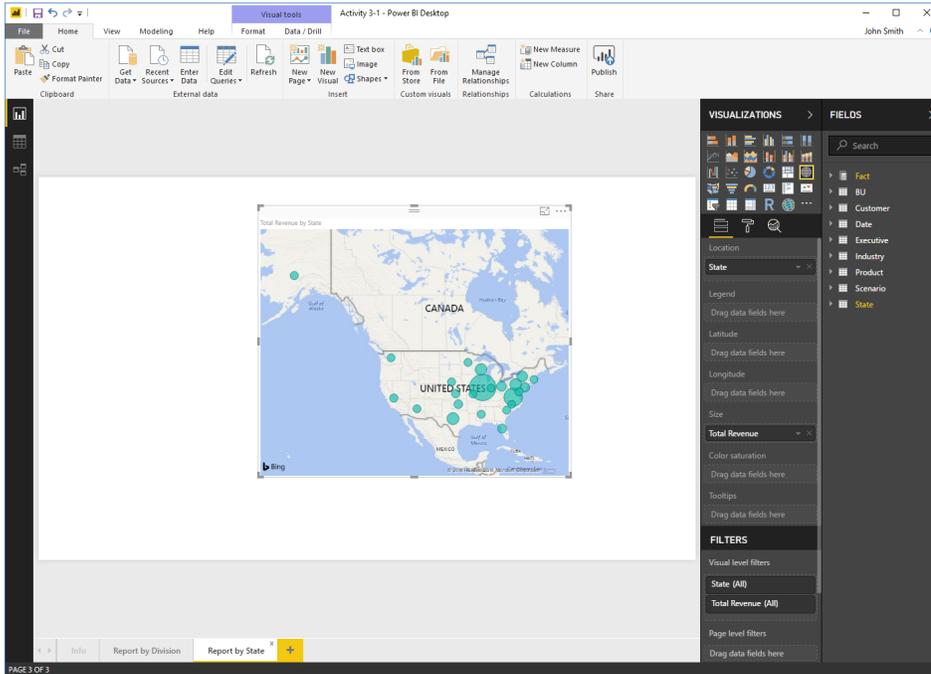
- Now, go back to the Report by Division page by clicking its tab. Click the border of the map visualization to select it and click Home → Cut:



- Go back to the Report by State tab. Click Home → Paste:



11. The visualization will now be moved onto the new page:



12. Finally, let's move the Info page to the end of the page tab list. Click and drag the page tab to its new position:



13. Save your work as Activity 3-1 Complete and close Power BI.

TOPIC B: Changing Report View Options

One tab we have not yet explored is the View tab. Here, you can change the view and layout of the current report.

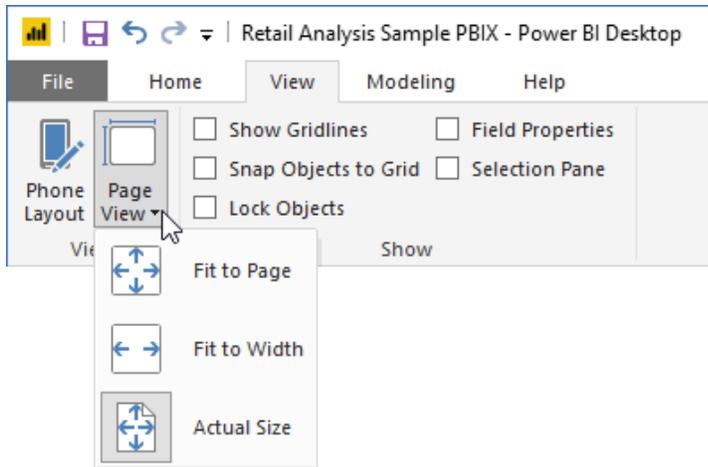
Topic Objectives

In this section, you will learn:

- How to set page view options
- How to customize your view
- About phone and desktop layout

Setting Page View Options

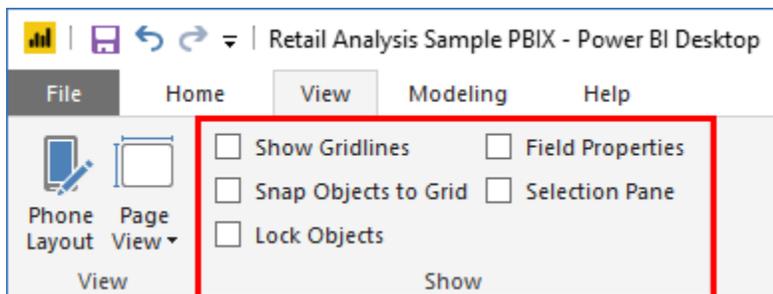
To set page view options, click Home → Page View:



This menu allows you to fit the current canvas to the page, the screen width, or to its actual size.

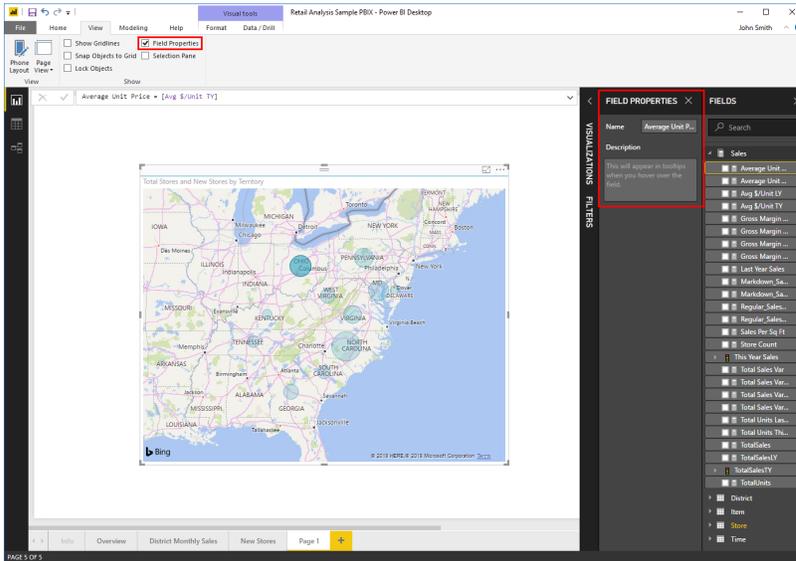
Customizing Your View

Next, let's look at the Show group on the View tab:

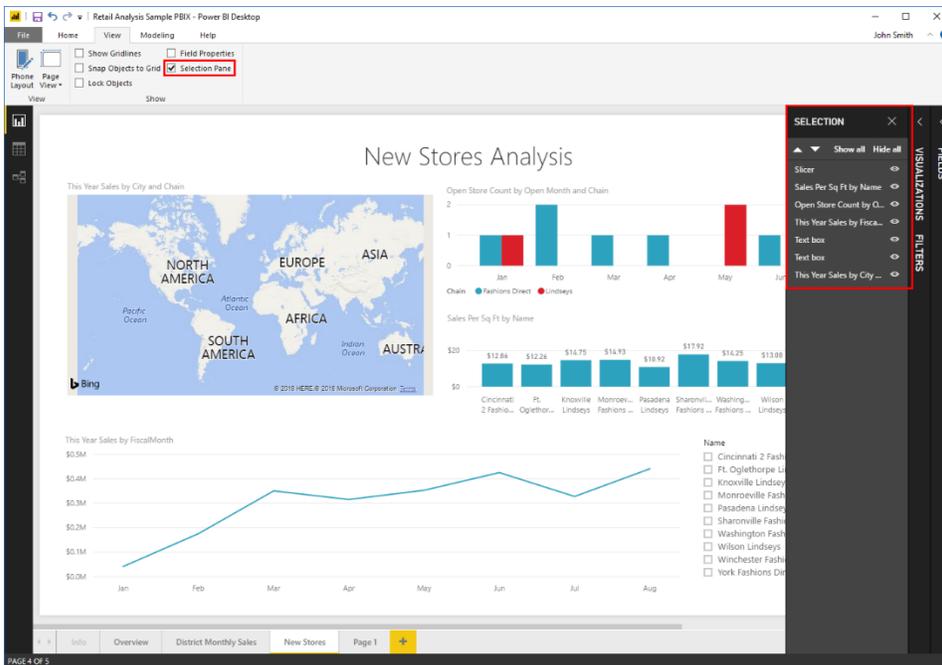


The three options on the left allow you to customize the canvas and its objects, allowing you to show gridlines, turn on snap, and lock the objects on the current page.

The Field Properties option allows you to show or hide the related task pane, where you can customize the field name and description:



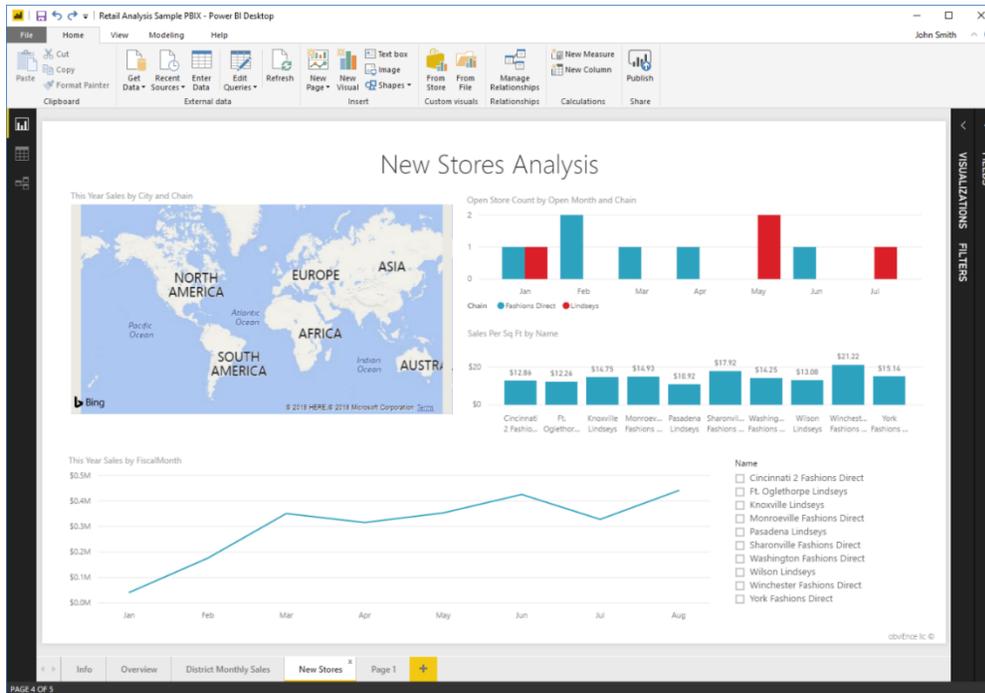
The Selection Pane option will also show a task pane:



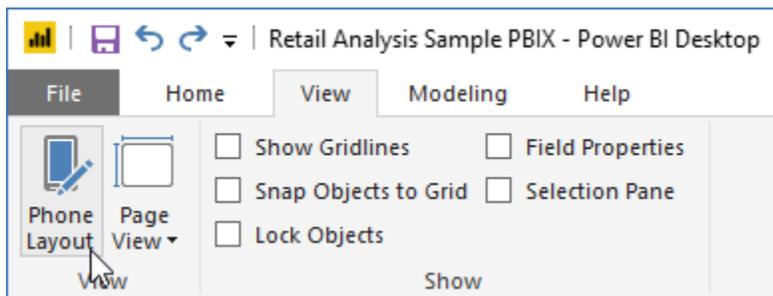
Here, you can select objects by clicking them from the task pane. You can also show, hide, and change the order of objects.

Using Phone vs. Desktop Layout

So far, we have been using desktop layout, which is the standard view for the Power BI desktop client. This presents the report in a standard landscape-style format:

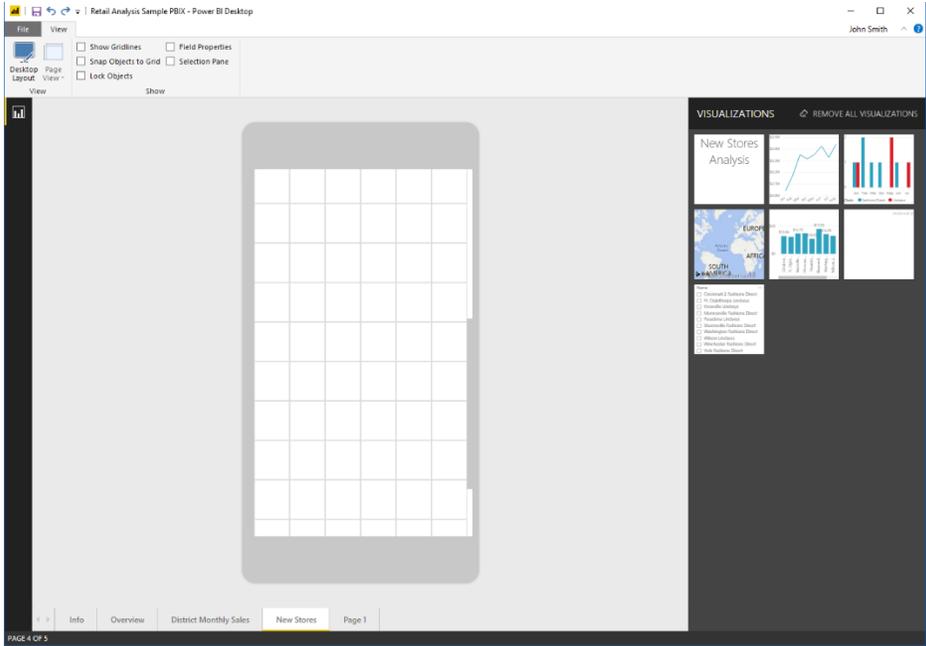


However, if you are designing reports that will be used in Power BI mobile apps, you may want to add a mobile view. To start, click View → Phone Layout:

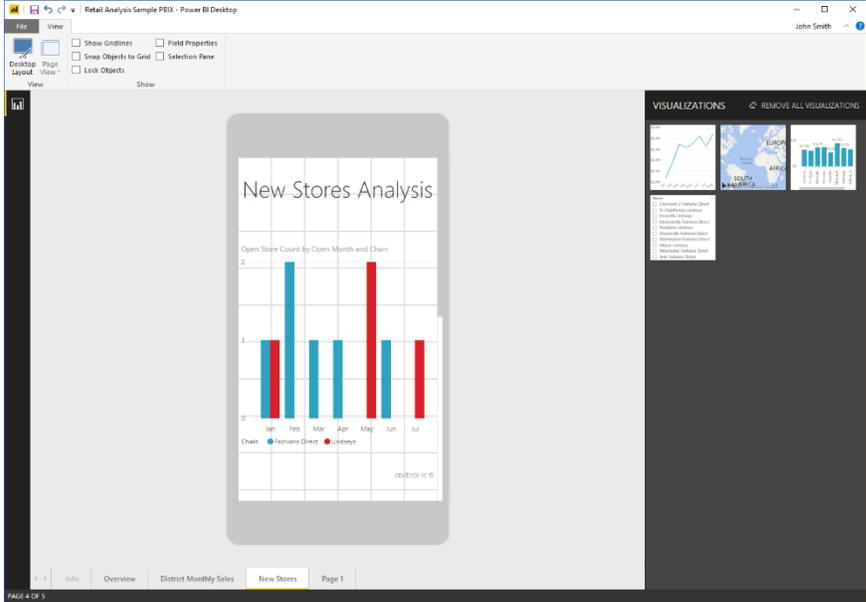


You will now see a blank, scrollable canvas in the shape of a smartphone, with the existing visualizations listed in a pane on the right:

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Click and drag the visualizations to the canvas to add them. You can also size and place them as desired:



(You cannot create new visualizations in this view.) When you are finished, click Desktop Layout on the View tab to return to the full interface.

Now, when users access this report on a smartphone, they will see the phone layout instead of the desktop layout.

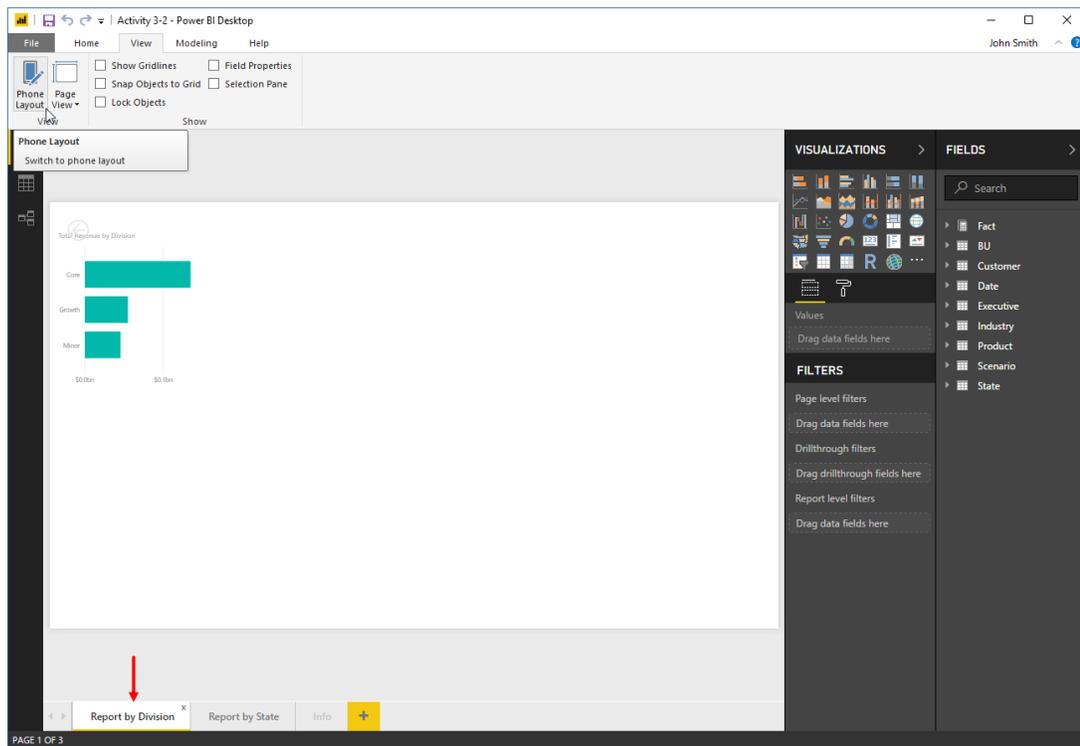
Activity 3-2: Changing Report View Options

In this activity, we will create a smartphone view for one of our reports, and modify our view options.

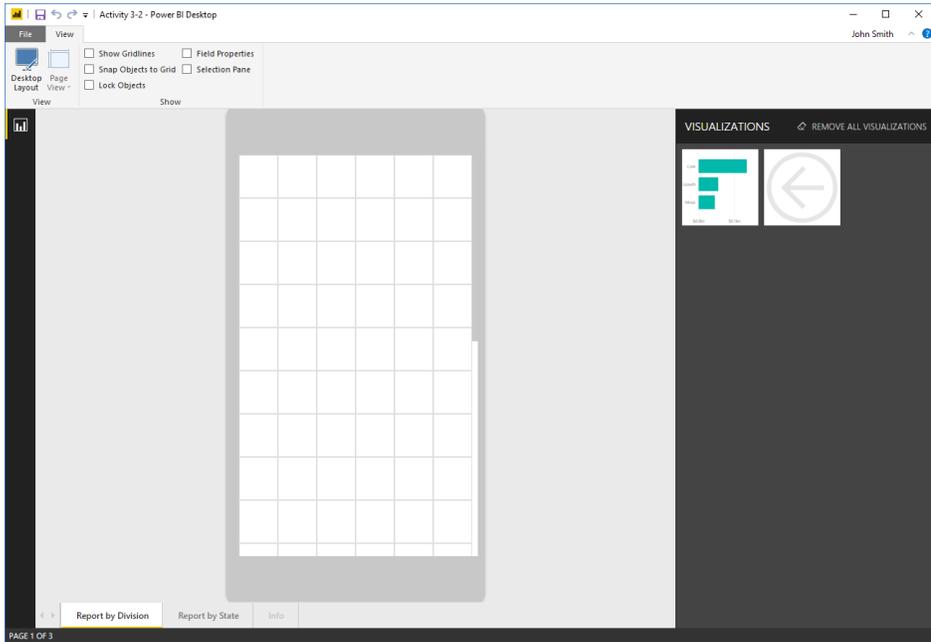
1. Open Power BI and open Activity 3-2:



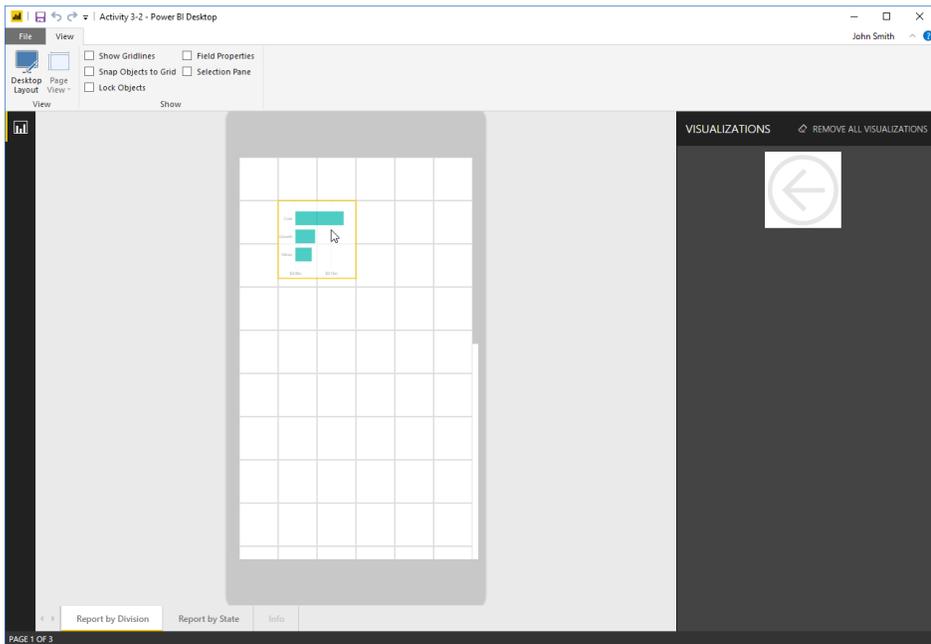
2. Ensure the "Report by Division" page is selected, as this is the report we want to create the smartphone view for. Click View → Phone Layout:



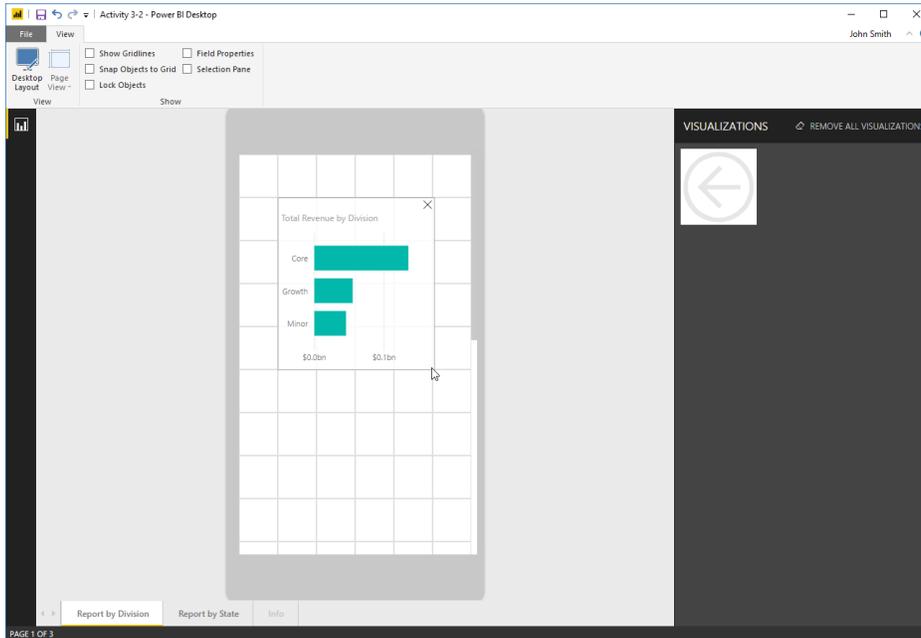
3. The new view will be displayed, with a blank layout in the canvas area and the visualizations to the right:



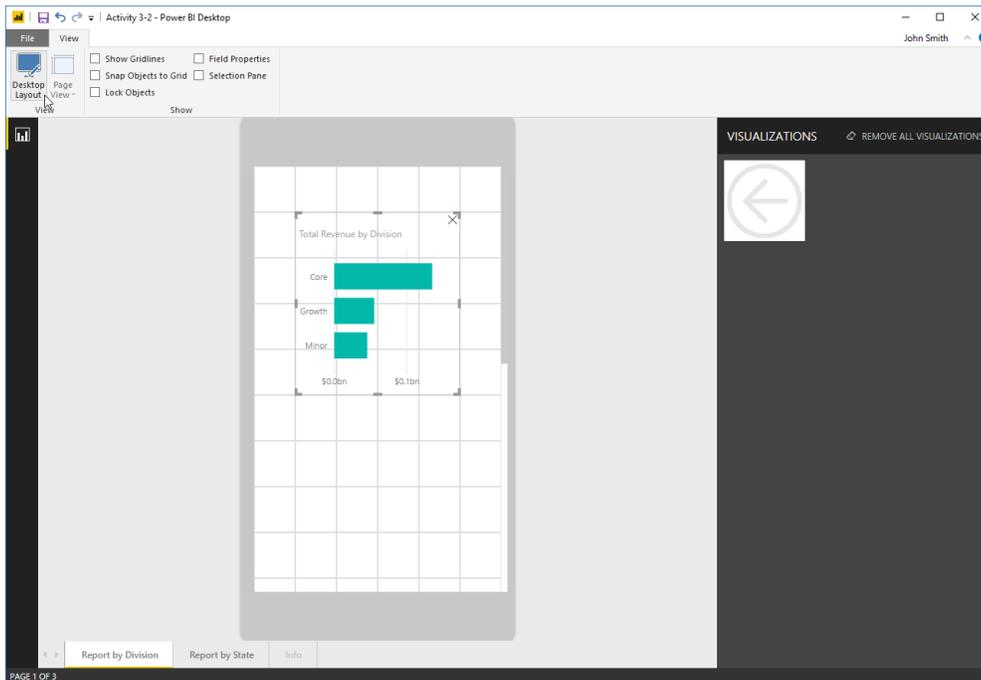
4. Now, drag the chart onto the smartphone canvas, lining it up as shown here:



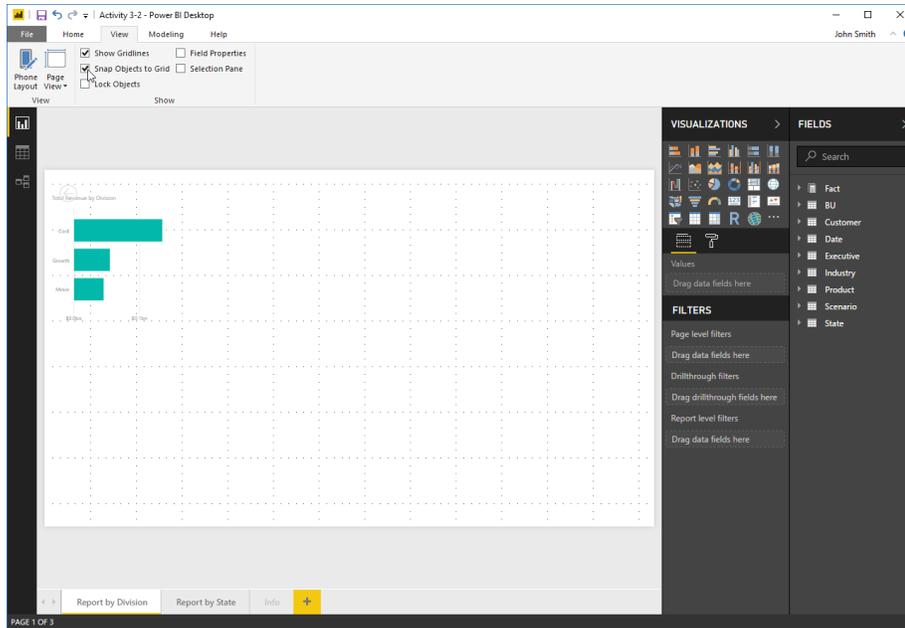
5. If necessary, click the visualization to select it. Then, drag the bottom right handle down and to the right to make it slightly larger, as shown here:



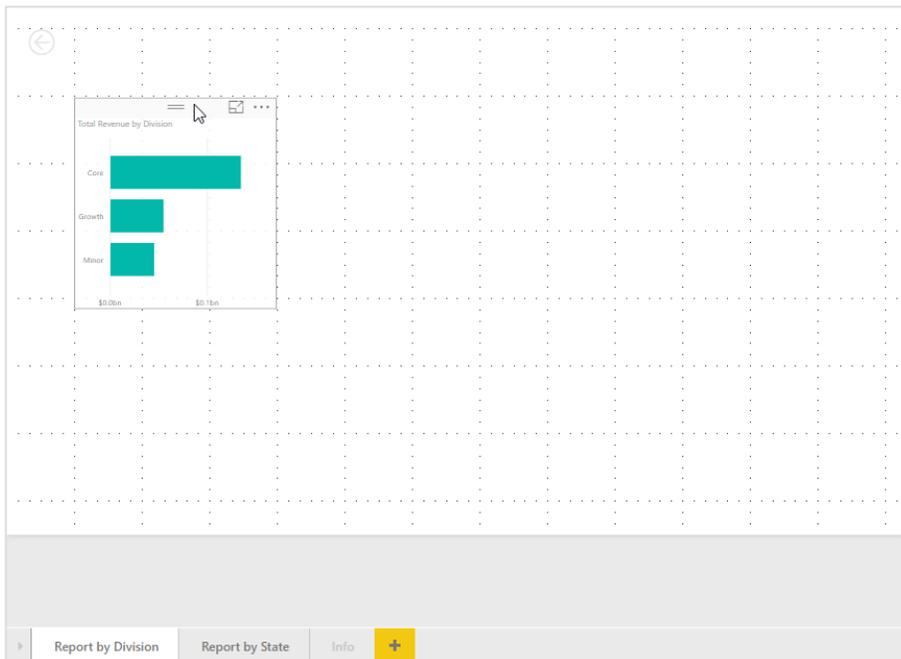
6. Return to desktop layout using the View tab:



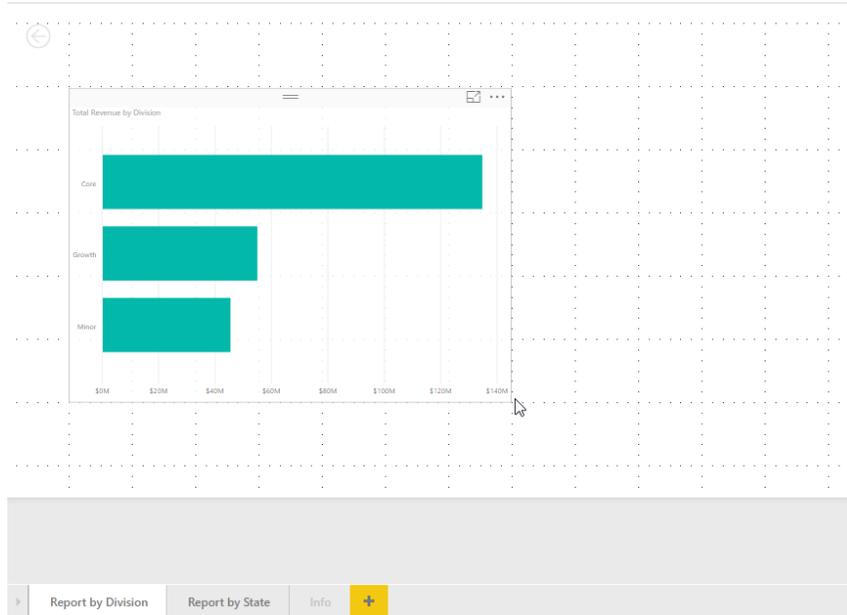
7. Notice that our original report has not changed. However, it could use some layout improvements. Check the “Show Gridlines” and “Snap Objects to Grid” options on the View tab:



8. Click and drag the visualization to the position shown here:



9. Now, resize the visualization to the dimensions shown here:



10. Save your work as Activity 3-2 Complete and close Power BI.

TOPIC C: Working with Visualizations

Next, we are going to take a closer look at working with visualization data. This is the biggest strength of Power BI: the ability to quickly and easily view your data in different ways.

Topic Objectives

In this section, you will learn how to:

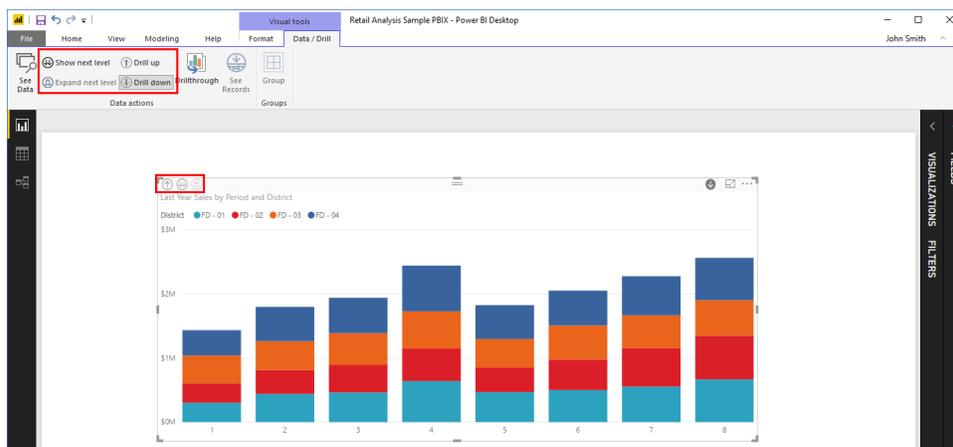
- Drill through data
- Change category and summarization options
- Arrange visualizations
- Edit interactions
- Add custom visualizations to Power BI

Understanding Drillthrough Options

When a report has time data, Power BI automatically breaks it down by time period. For example, this dataset originally had only the ReportingPeriodID field, but Power BI broke it down into the remaining components:

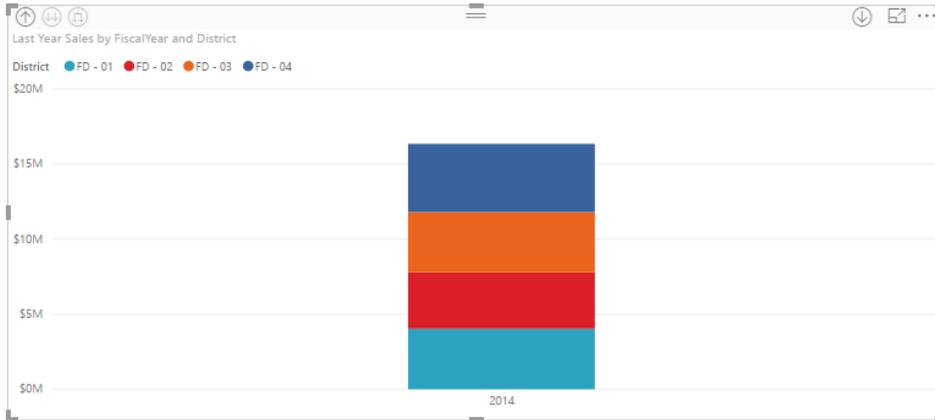
ReportingPeriodID	Period	FiscalYear	FiscalMonth	Month
20130101	1	2013	Jan	1/1/13
20130102	1	2013	Jan	1/2/13
20130103	1	2013	Jan	1/3/13
20130104	1	2013	Jan	1/4/13
20130105	1	2013	Jan	1/5/13
20130106	1	2013	Jan	1/6/13
20130107	1	2013	Jan	1/7/13
20130108	1	2013	Jan	1/8/13
20130109	1	2013	Jan	1/9/13
20130110	1	2013	Jan	1/10/13
20130111	1	2013	Jan	1/11/13

This breakdown can then be used to drill through data in different ways using either the visualization itself or the Visual Tools – Data/Drill tab:



The single arrows allow you to move through a single hierarchy of data, while the double arrows allow you to move through multiple hierarchies (if available – otherwise they will navigate through the single hierarchy).

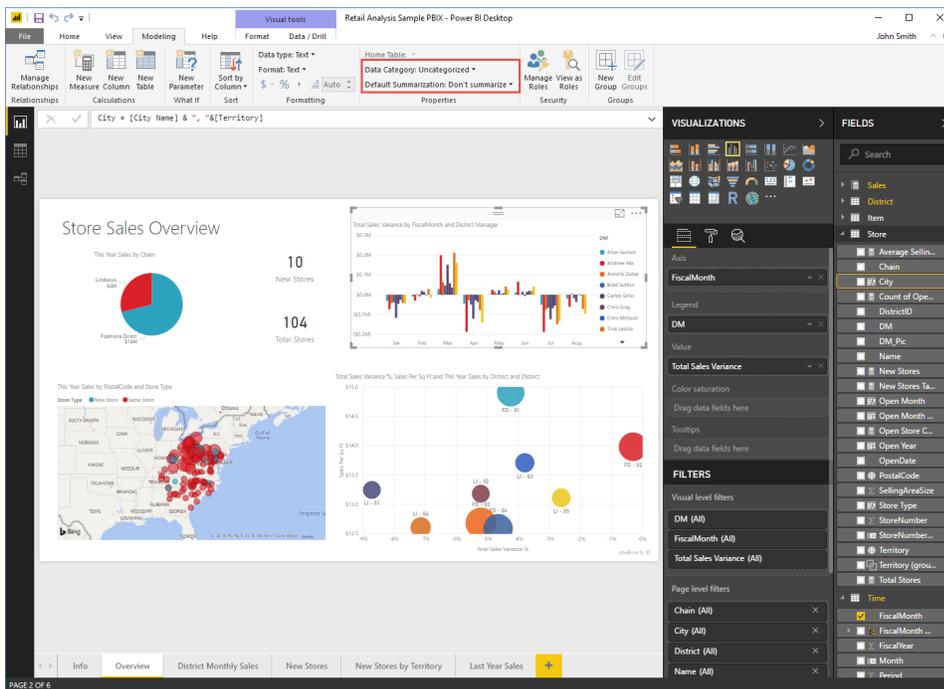
For example, if we drill all the way through the data, we will see a total for the fiscal year:



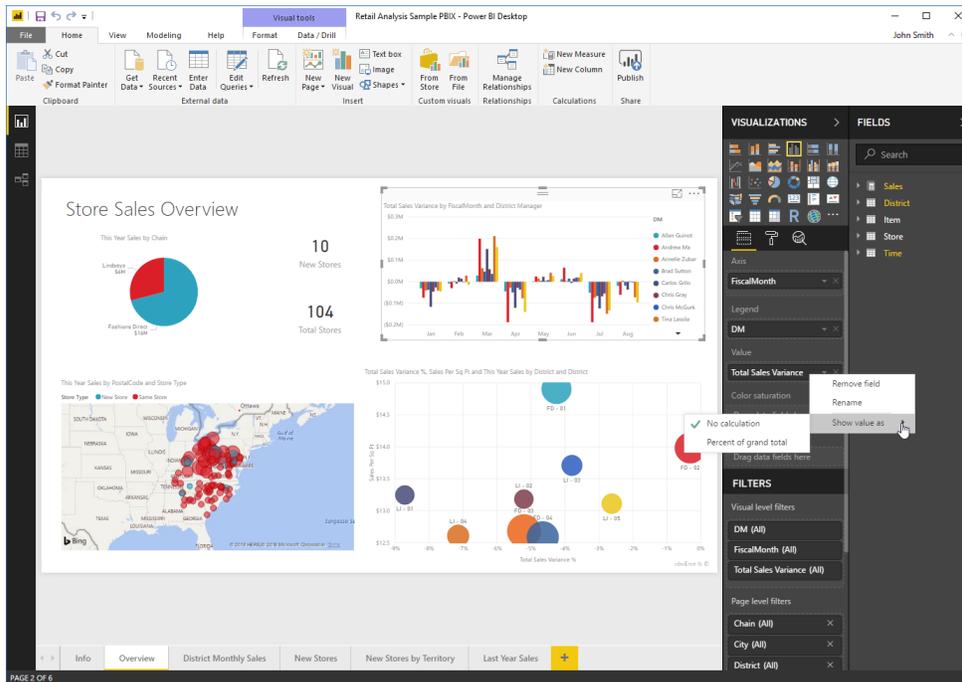
Notice that the visualization title has updated, too.

Changing Category and Summarization Options

Earlier, we looked at setting the category and summarization options when working with raw data in Data view. You can also change these options on the fly from the Modeling tab while in Report view:

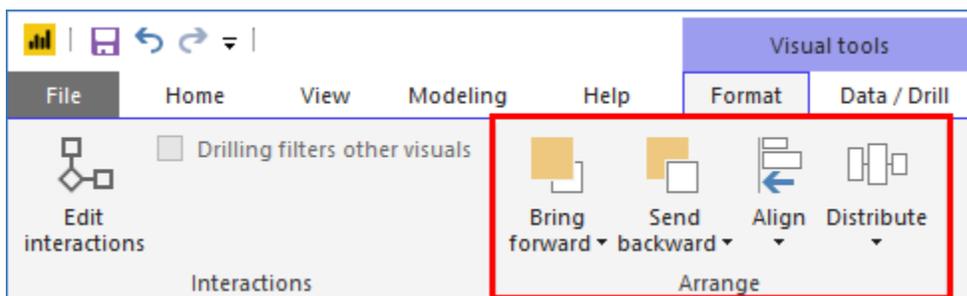


You can also right-click field(s) in the Value well of the Visualizations pane and customize how to show it:

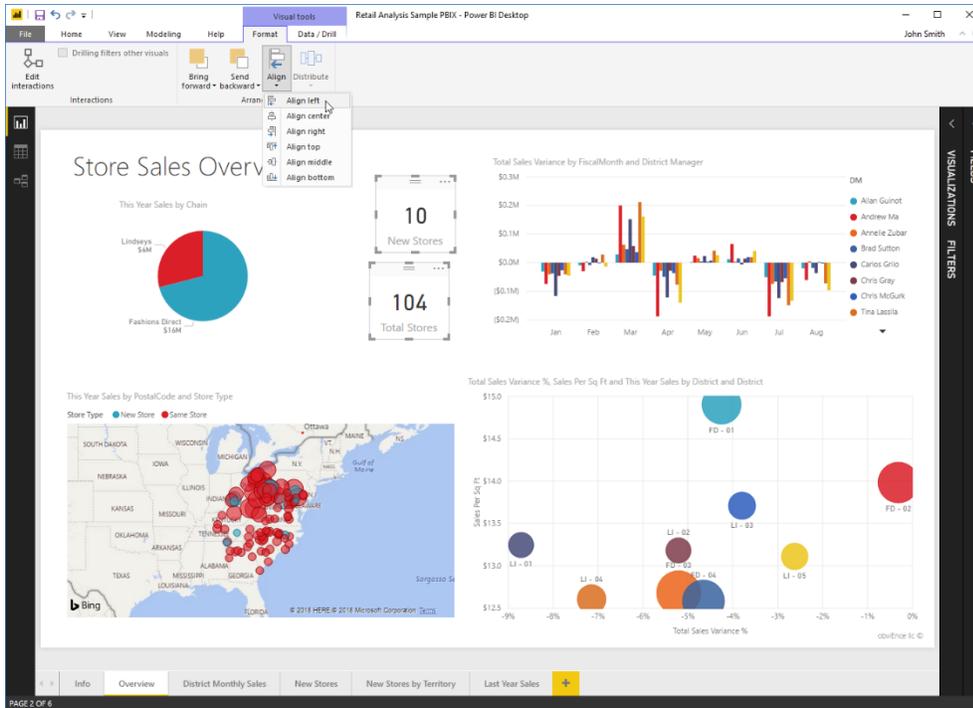


Arranging Visualizations

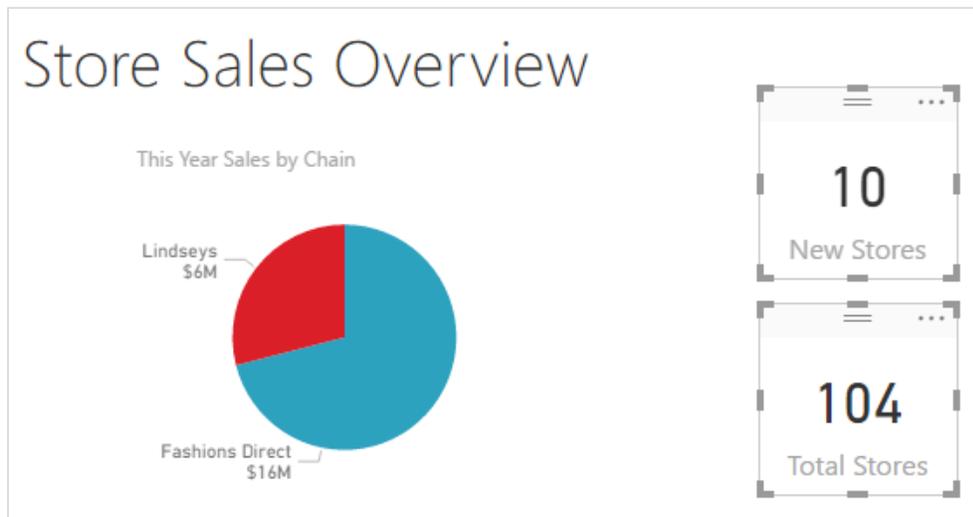
So far, we have been working with the Visual Tools – Data/Drill tab. Let's look at the Format tab; specifically, the Arrange group:



If you have worked with graphics in other Office applications, these commands work in a similar way. For example, if we want to left-align these two text cards, we can hold Ctrl, click each of them to select them, and then click Align → Align left:

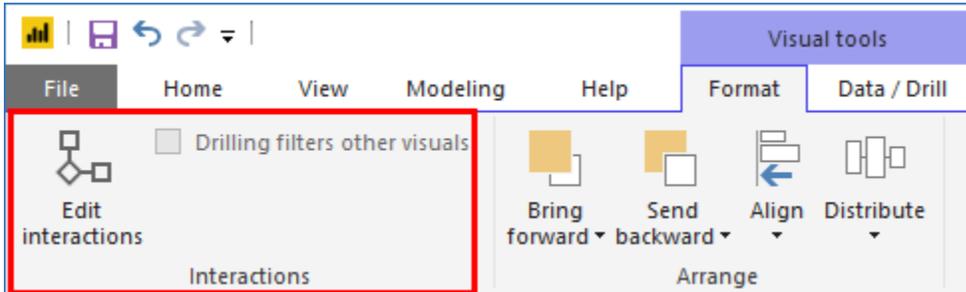


The cards' left borders will now be aligned:



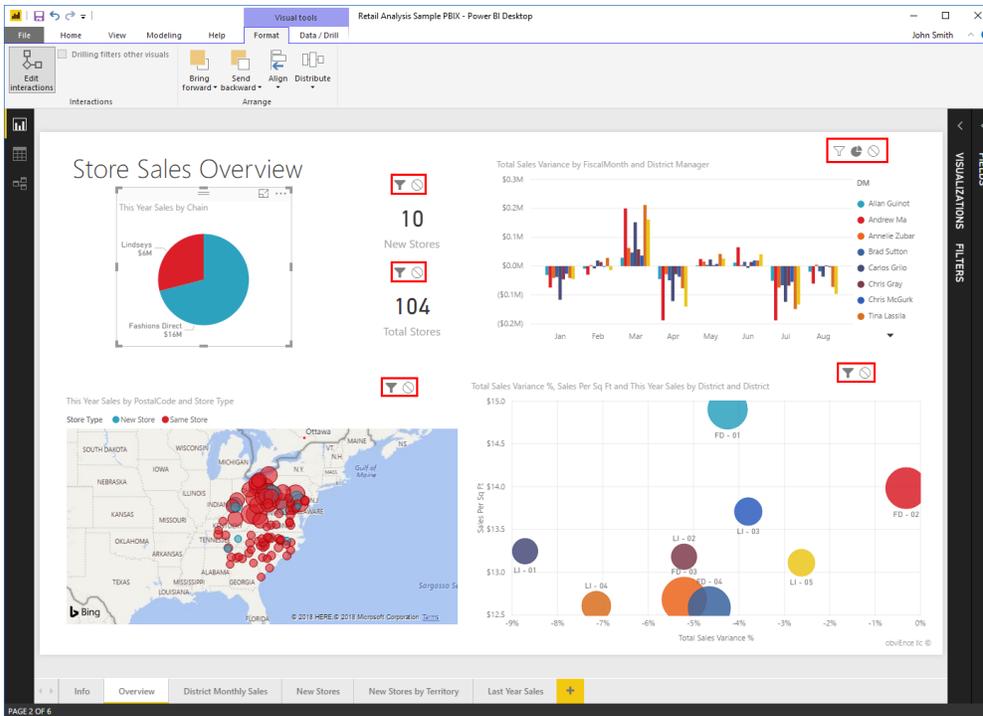
Editing Interactions

The Interactions group of the Visual Tools – Format tab controls how visualizations affect each other:



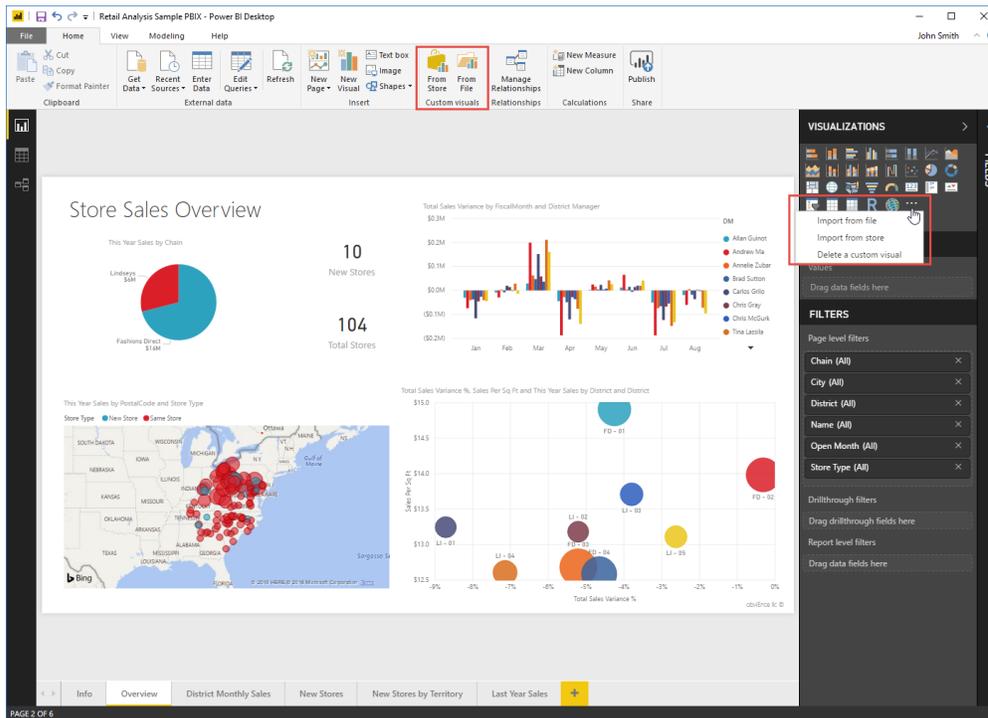
If you have a visualization with drilldown options, you can uncheck the “Drilling filters other visuals” option so that it does not affect the other visuals.

To customize how visualizations interact with each other, select the target visualization and click the “Edit interactions” command. This will show additional options on each visualization:



About Custom Visualizations

If you have custom visualizations available through your organization, or need a custom visualization from the Microsoft Store, you can access them through the Home tab or the ellipses in the Visualizations pane:

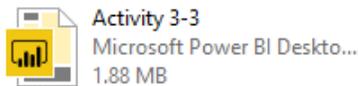


Simply choose your source, and then browse for the desired visual. It will then be available in the Visualizations pane just like the default visualization options.

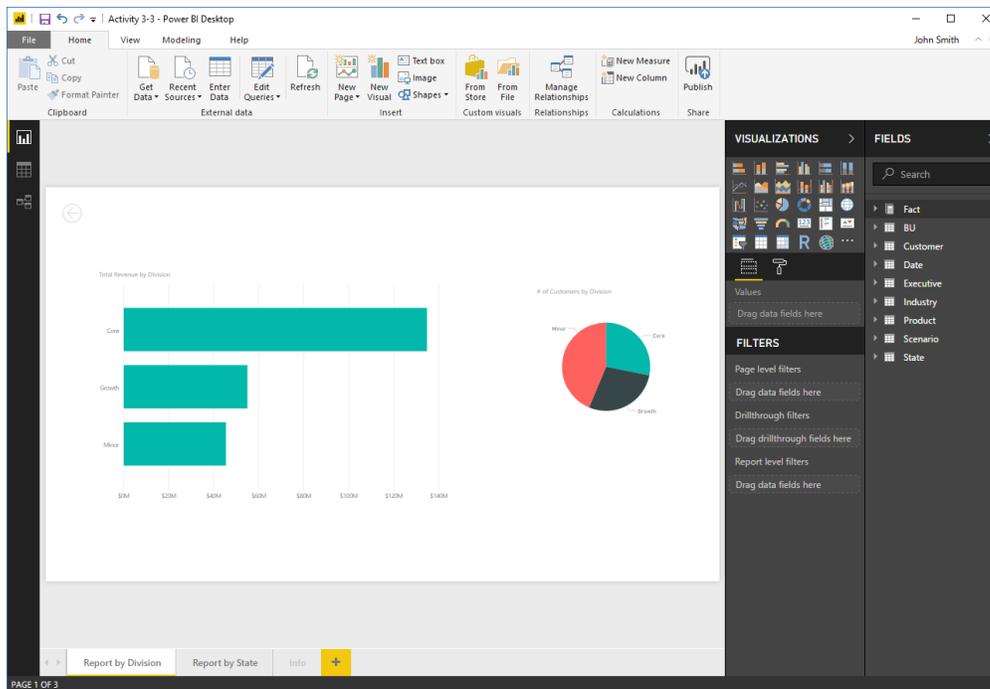
Activity 3-3: Working with Visualizations

In this activity, we will adjust the position of a visualization, add drilldown options to it, and customize its interactions.

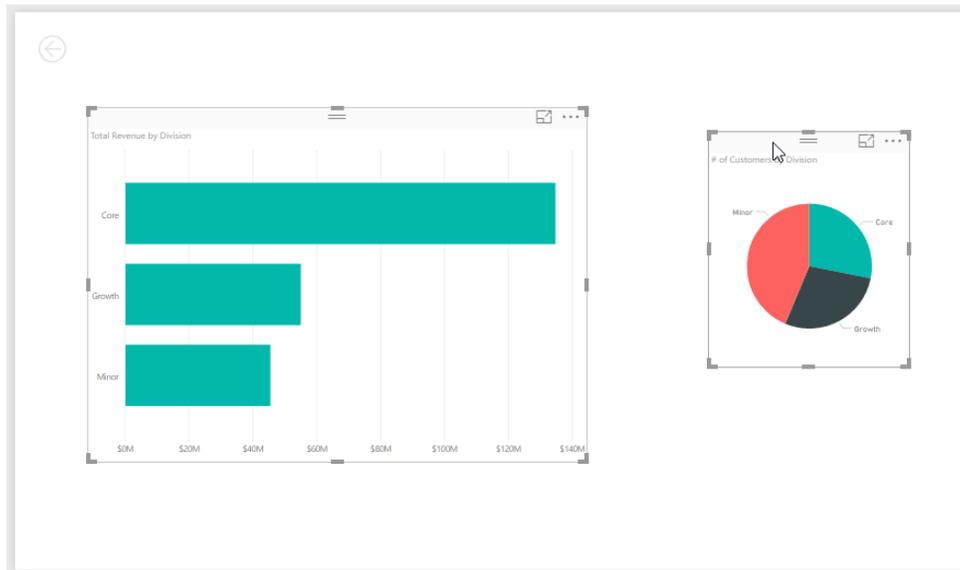
1. Open Power BI and open Activity 3-3:



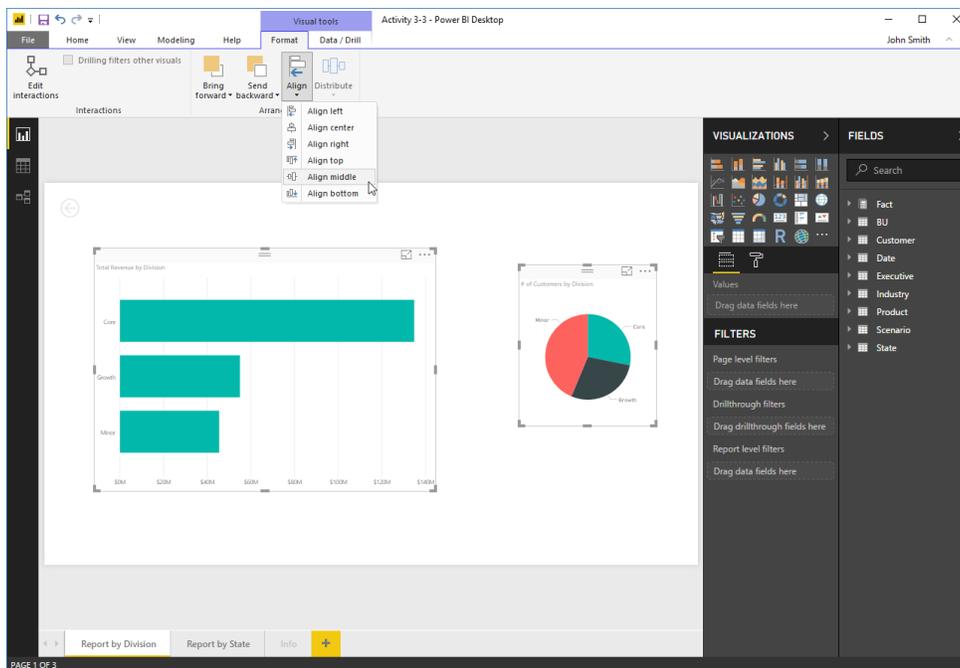
2. The “Report by Division” page should be displayed. (If not, click its tab to view it.) Notice that we have added a pie chart to this page that displays the number of customers. We have also turned off the canvas gridlines:



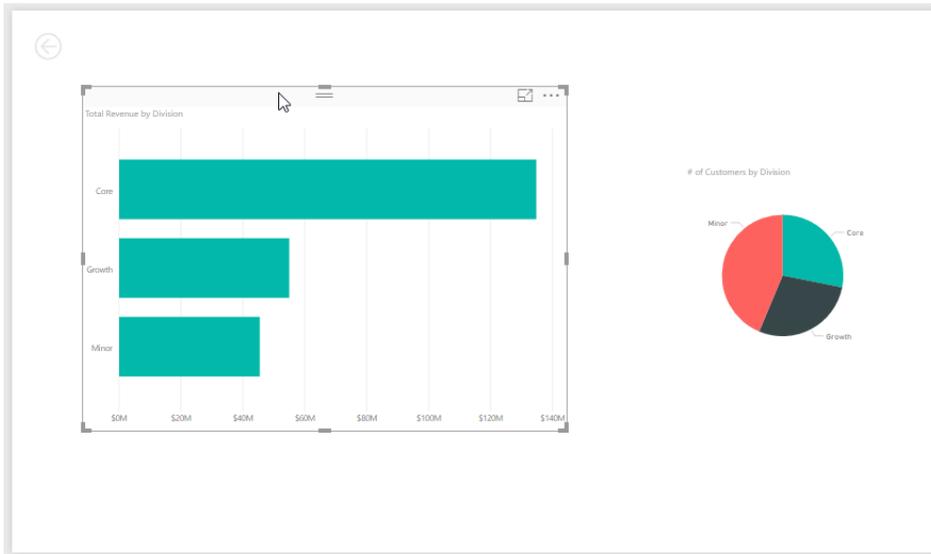
3. First, let's align these two objects. Hold the Ctrl key and click each visualization:



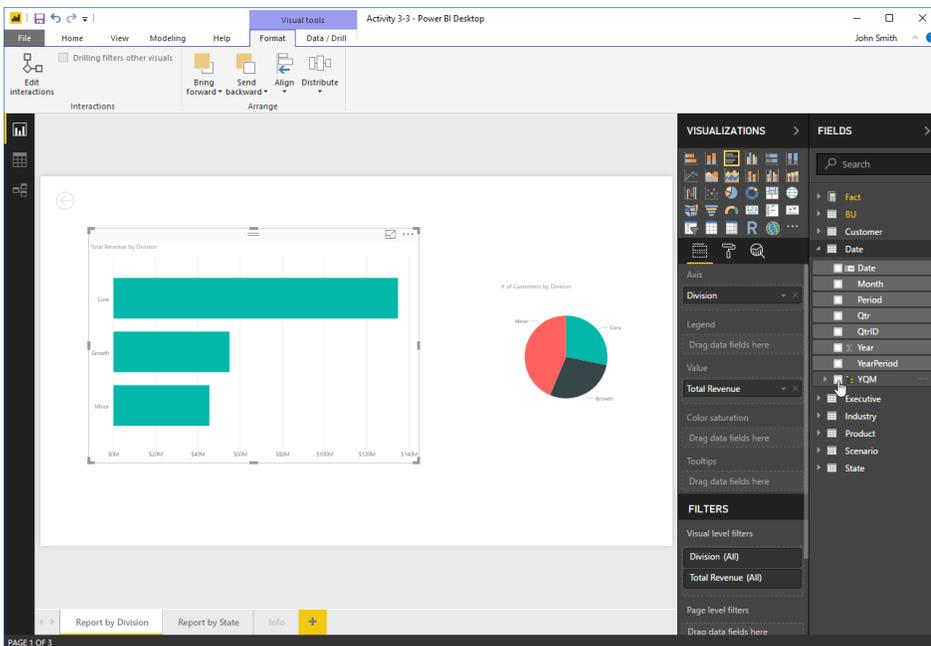
4. Click Visual Tools – Format → Align → Align middle:



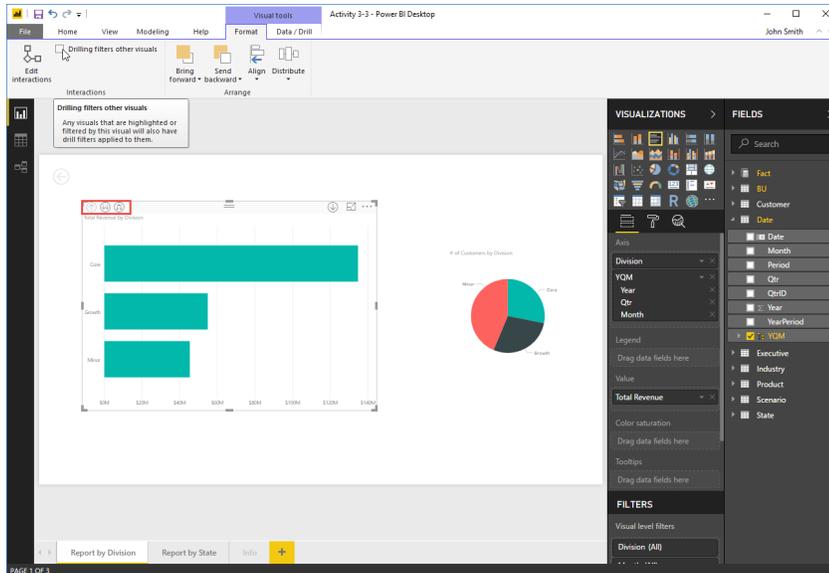
- The objects will now be aligned at their middle point. Click the bar chart to select it:



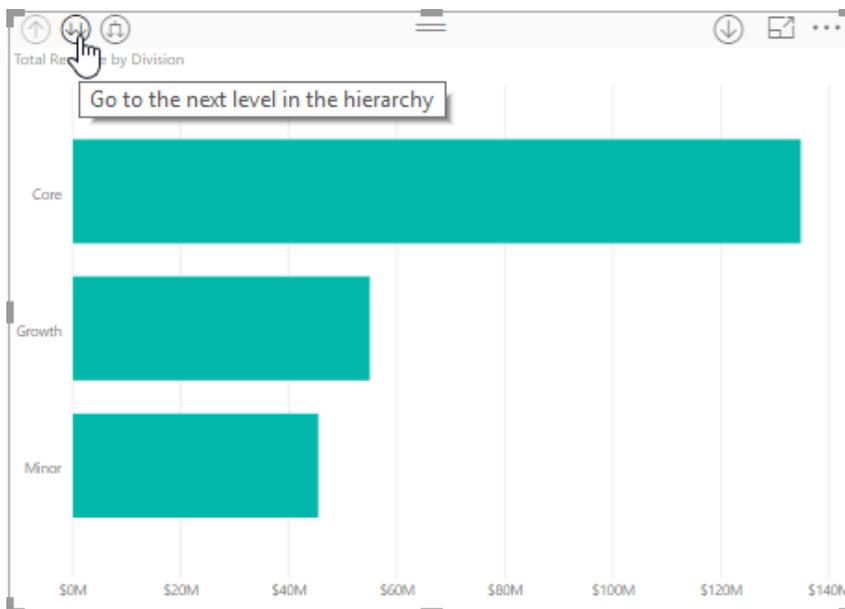
- Now, let's add a time value to the chart. This will add more meaning to the data and provide drilldown options. In the Fields pane, expand the Date table and check the YQM data hierarchy to add it to the chart:



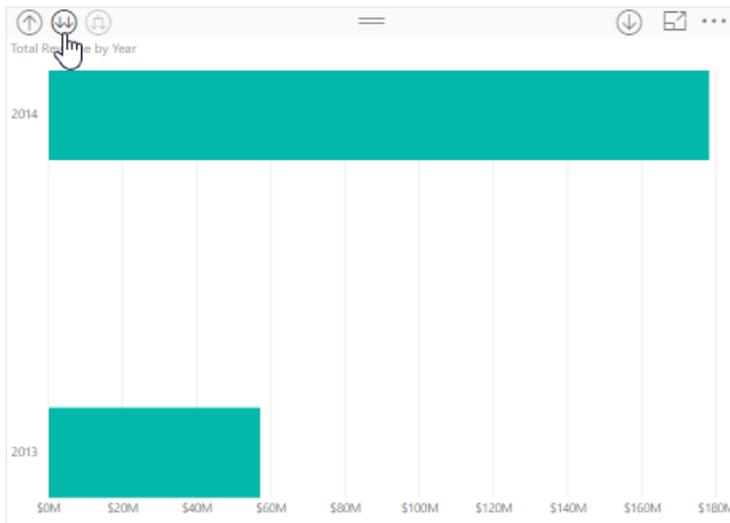
- 7. Drilldown options will now appear on the chart. We want our other chart to remain static while drilling down, however, so click Visual Tools – Format and ensure the “Drilling filters other visuals” option is unchecked:



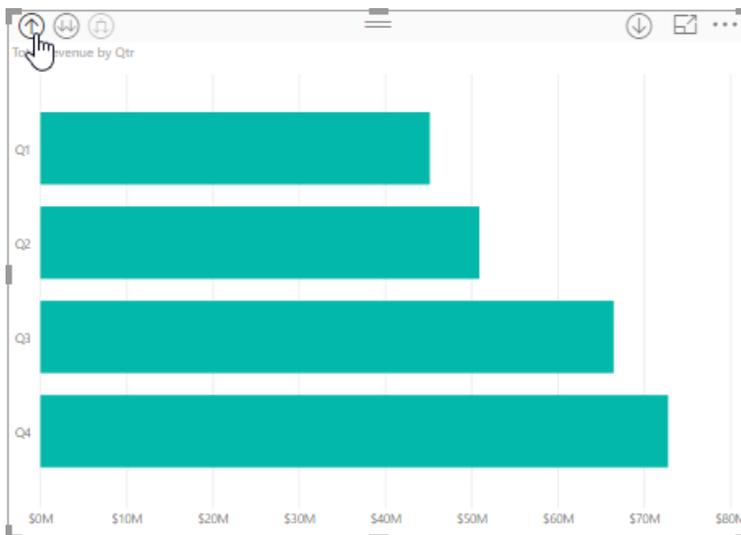
- 8. Right now, we are seeing the total revenue by division. Let’s drill down a level, to see the revenue by year. Click the double down arrow to do this:



9. Drill down once more to see the revenue by quarter:



10. Review the data. Then, click the up arrow twice to return to the original view:



11. Save your work as Activity 3-3 Complete and close Power BI.

TOPIC D: Adding Static Objects to a Report

To wrap up this lesson, we will look at some of the static objects you can add to a report, such as shapes, images, and text boxes. We will also take a quick look at working with static objects and arranging them on the page.

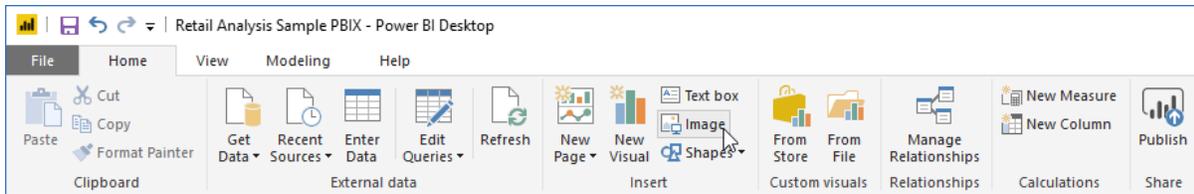
Topic Objectives

In this section, you will learn how to:

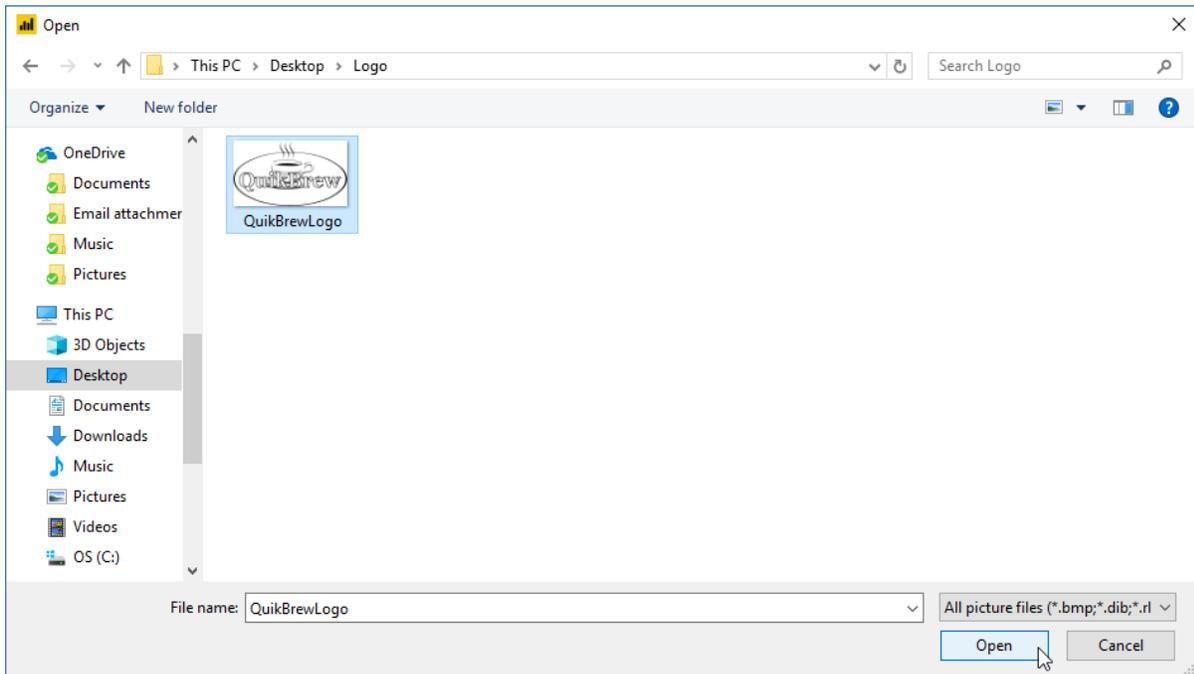
- Insert pictures, text boxes, and shapes
- Work with static objects

Inserting Pictures

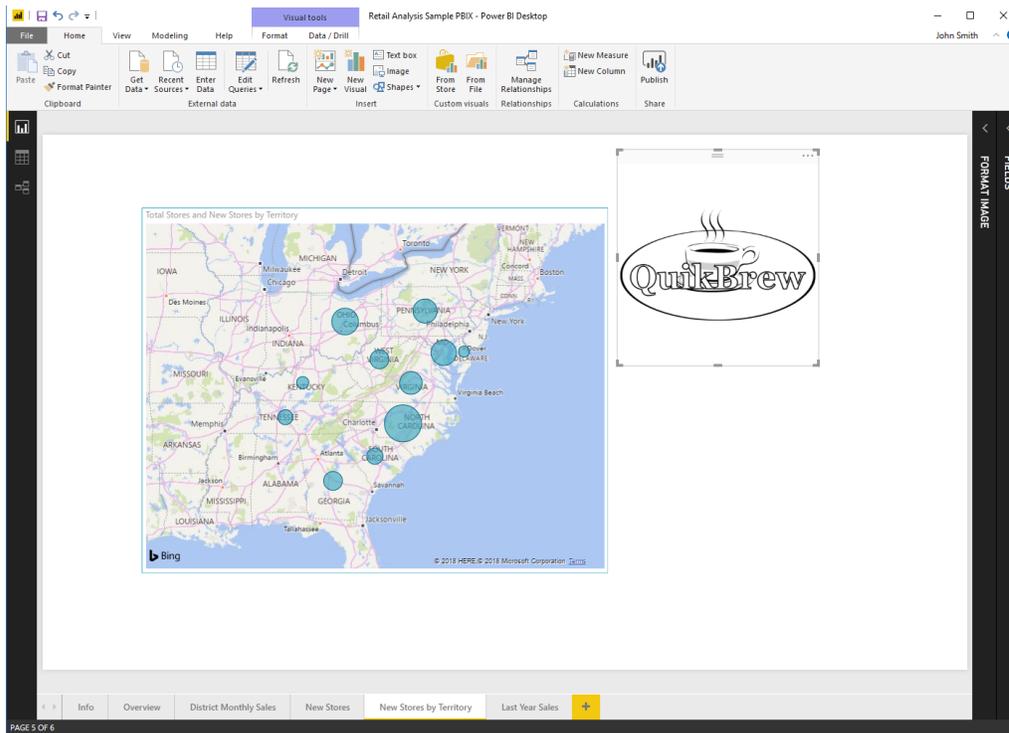
To add a picture to a report, click Home → Image:



Then, navigate to the file, click to select it, and click Open:

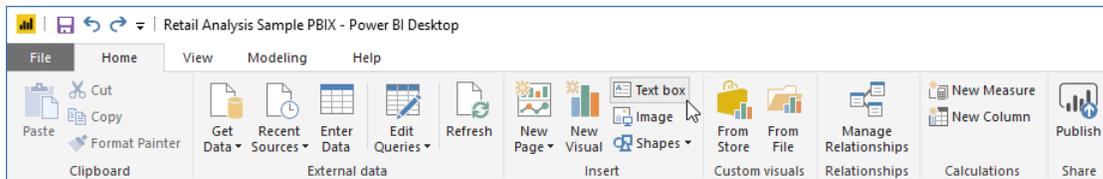


The image will then be added to the page:

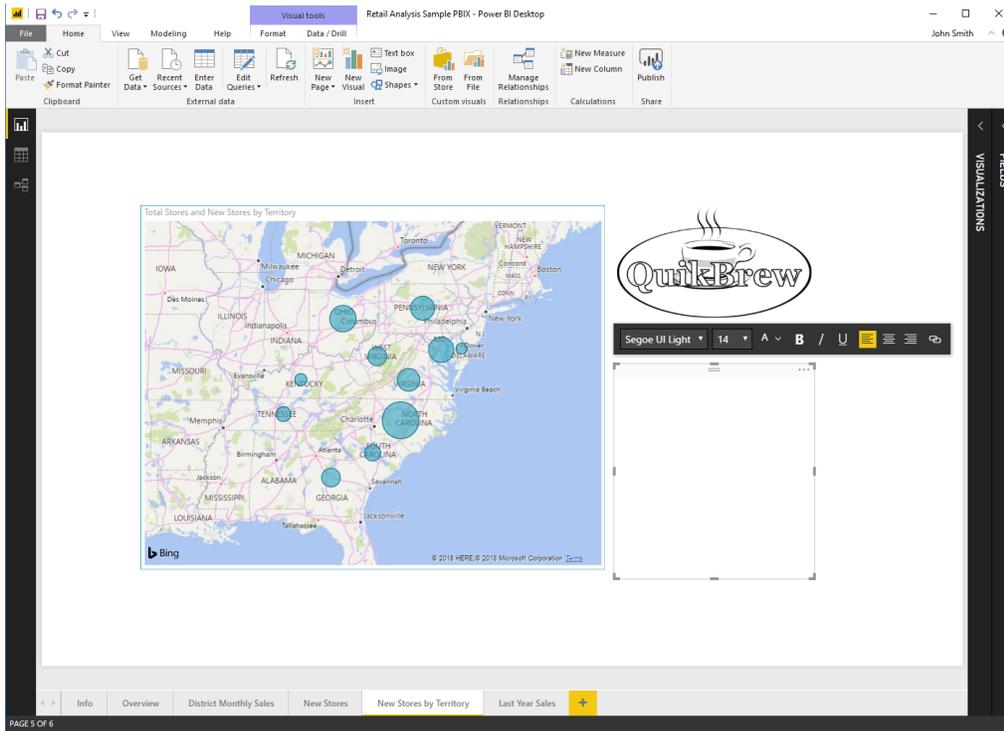


Inserting Text Boxes

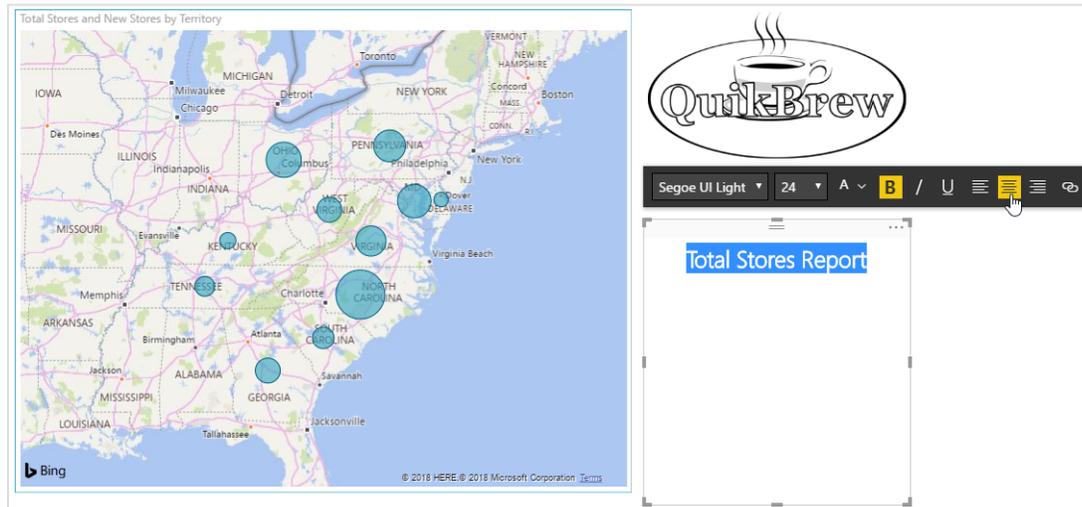
To add a static text box to a page, click Home → Text box:



The text box will be inserted and selected:

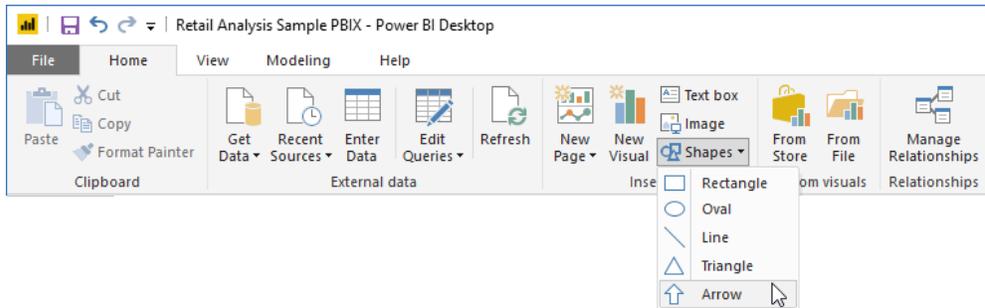


Simply type your text, and use the mini toolbar to format it as necessary:

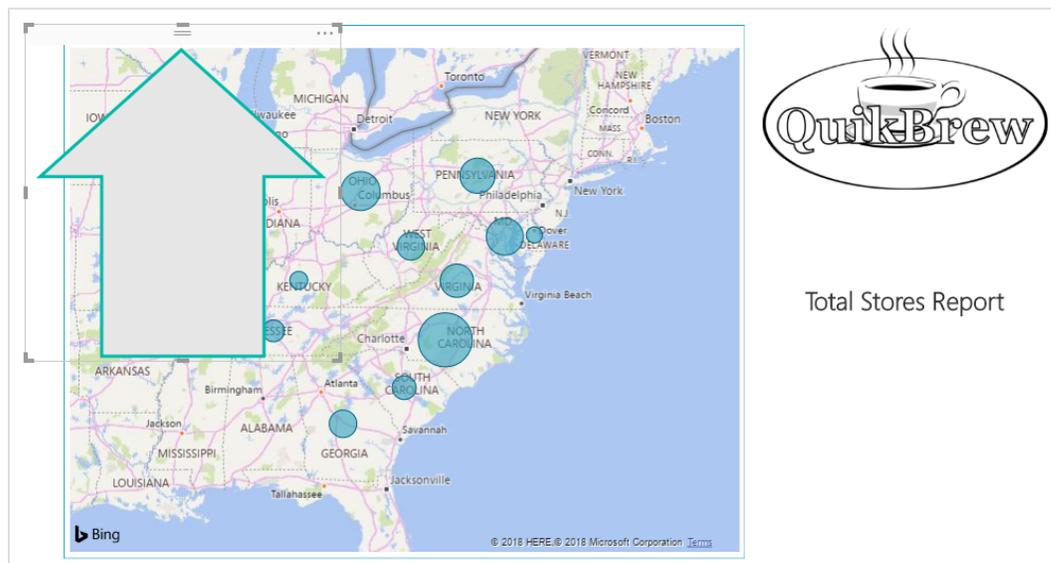


Inserting Shapes

The last option we will look at is drawing a shape. Click Home → Shapes and choose the shape you want to add:

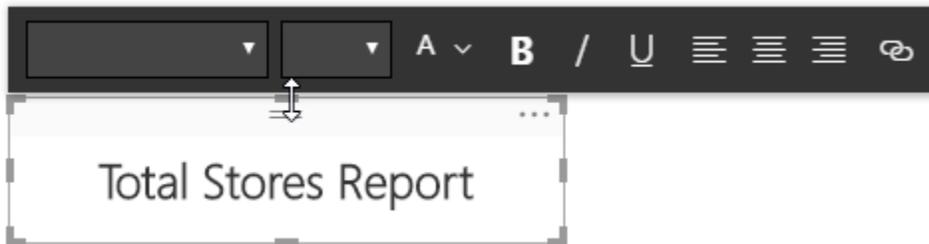


It will be added to the page, and can be moved and resized as desired:

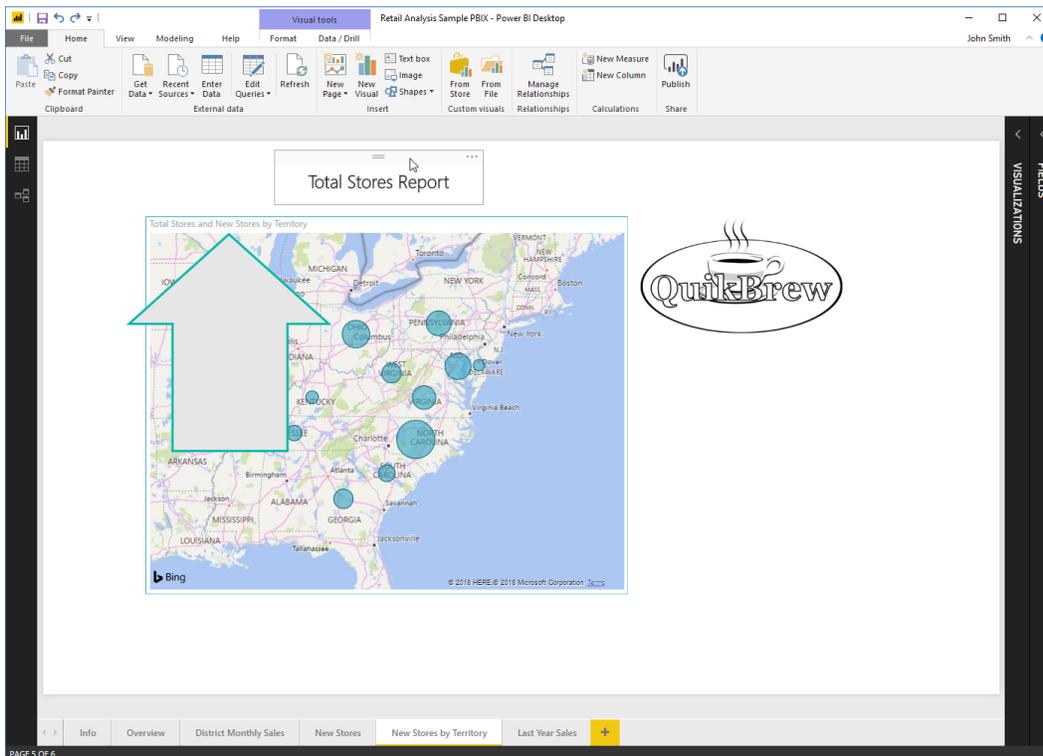


Working with Static Objects

You can manage static objects just like visualizations. For example, use the handles to resize an object:



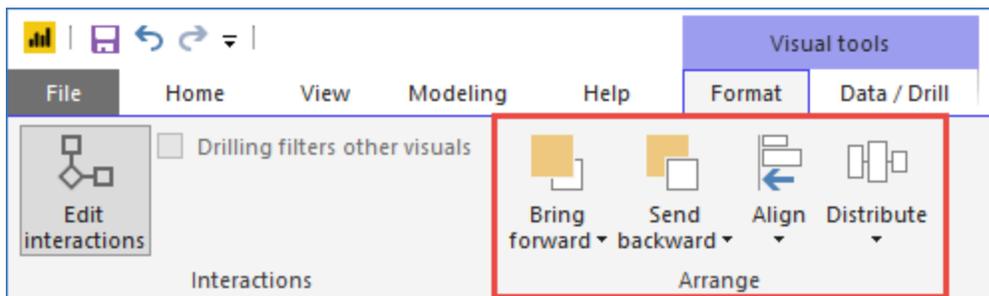
Click and drag it to move it:



Click the “More options” icon to see options to remove or spotlight it:



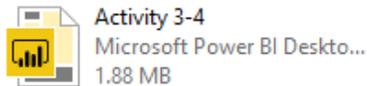
You can also use the Visual Tools – Format tab to arrange and distribute objects:



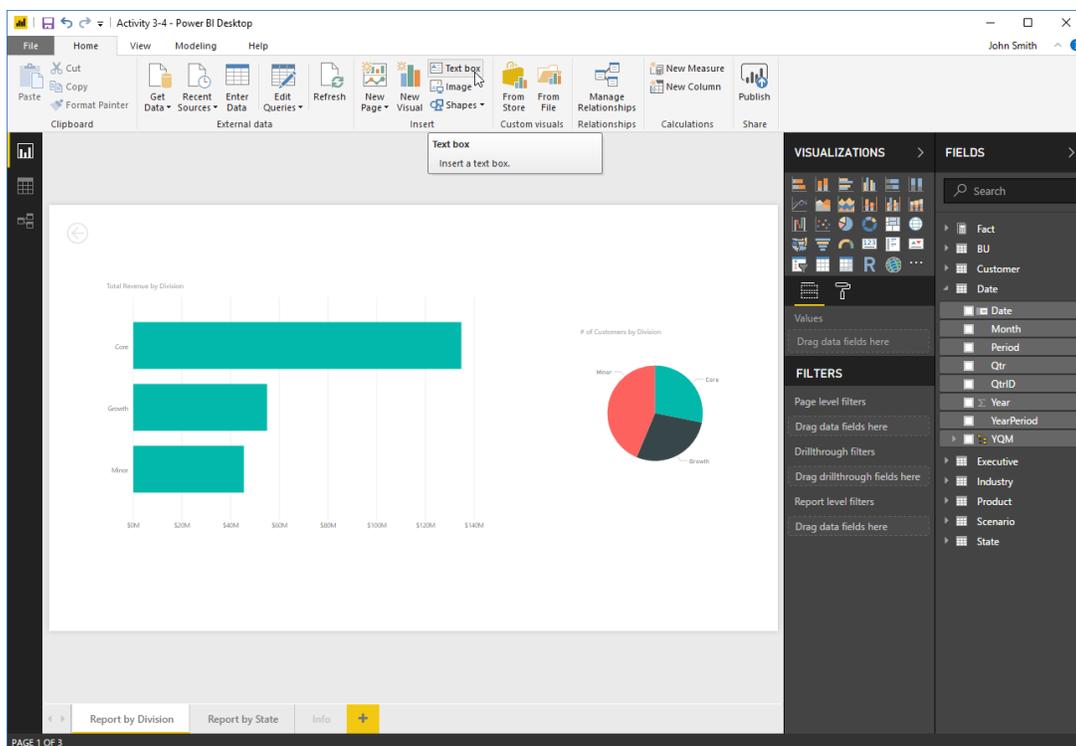
Activity 3-4: Adding Static Objects to a Report

In this activity, we will add a picture and a text box to the report we have been working on.

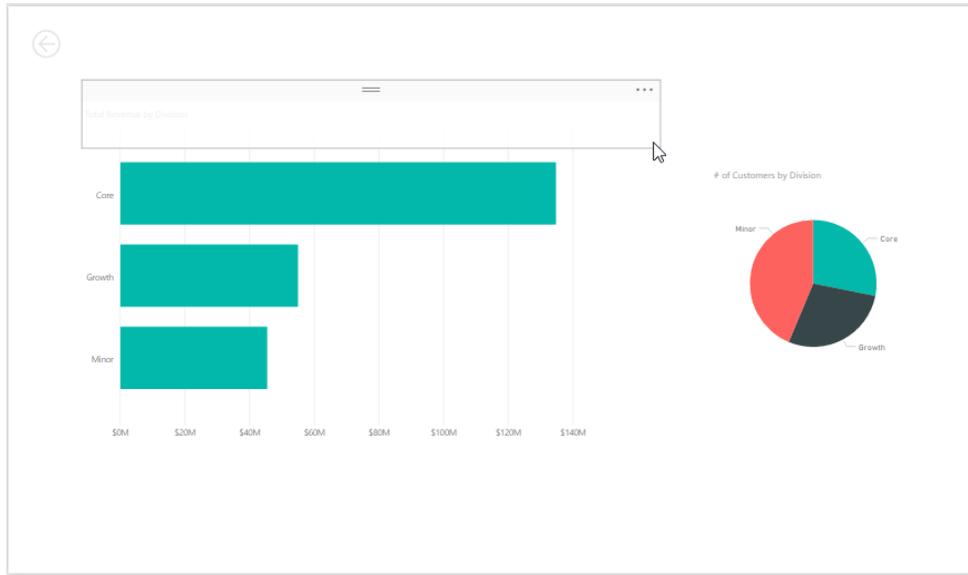
1. Open Power BI and open Activity 3-4:



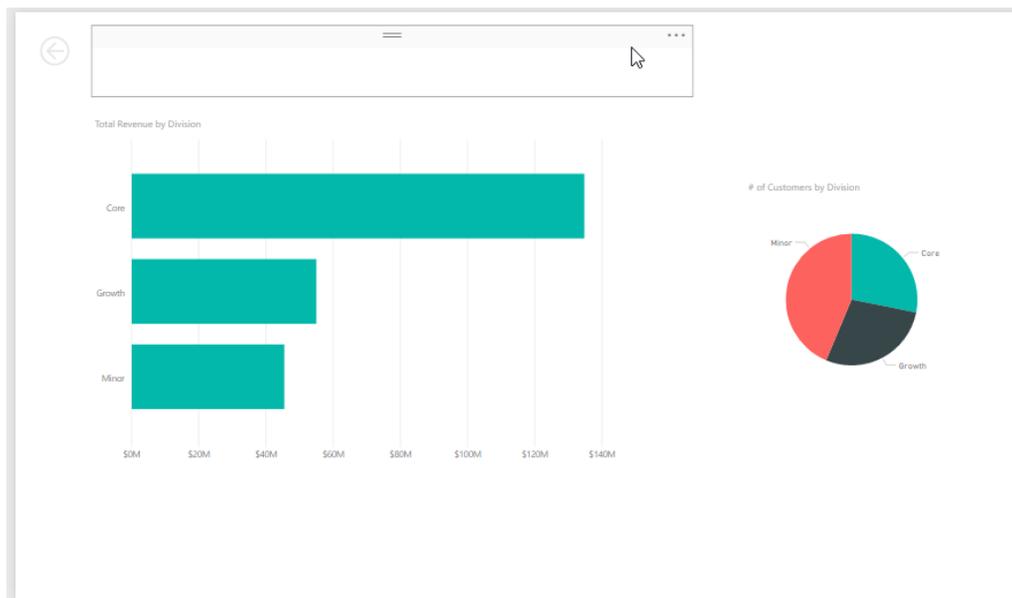
2. The "Report by Division" page should be displayed. (If not, click its tab to view it.)
Click Home → Text box:



3. The text box will be inserted. Click and drag the bottom right handle up and to the right to create a rectangle of approximately the size shown here:



4. Now, click and drag the text box, and move it to the position shown here:

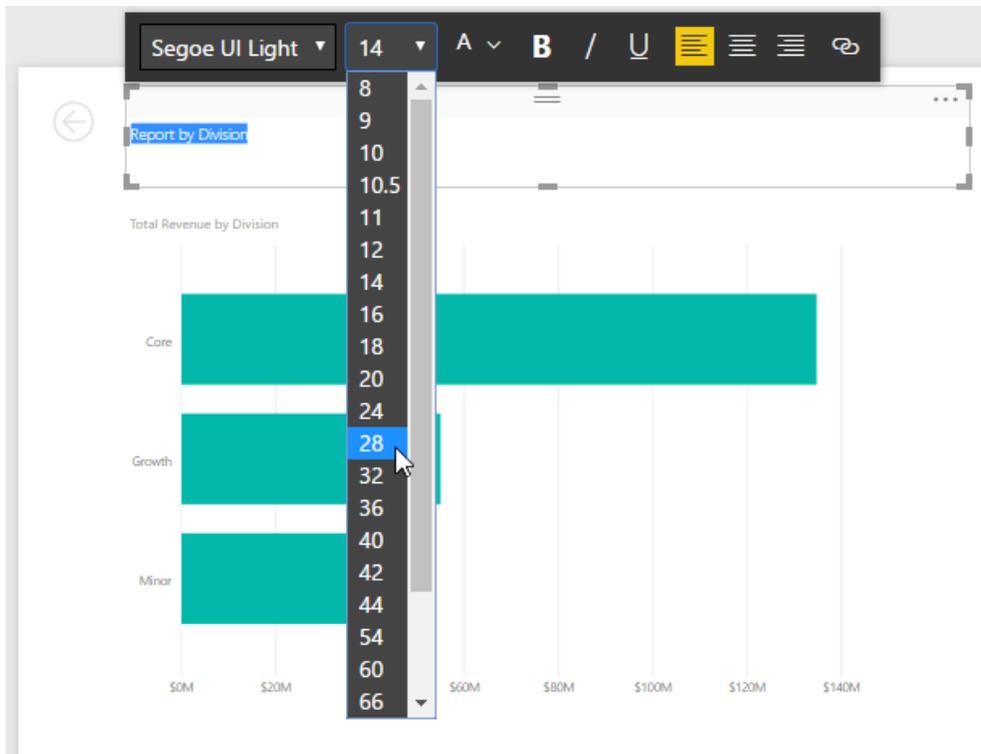


(It should snap into place.)

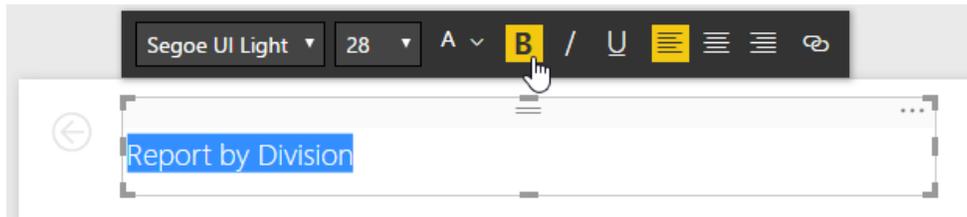
5. Click inside the text box and type, "Report by Division:"



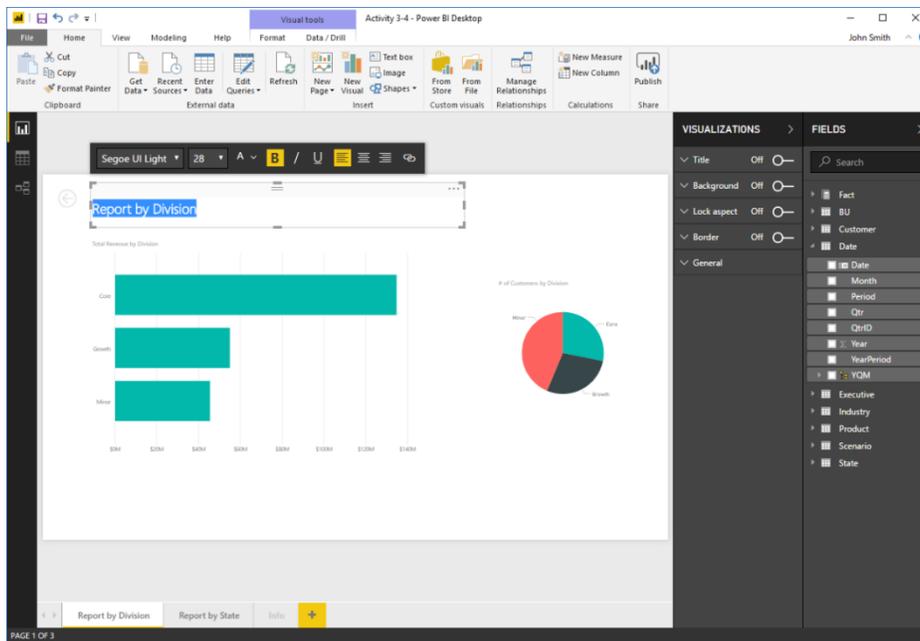
6. Select the text. Use the mini toolbar to increase the size to 28:



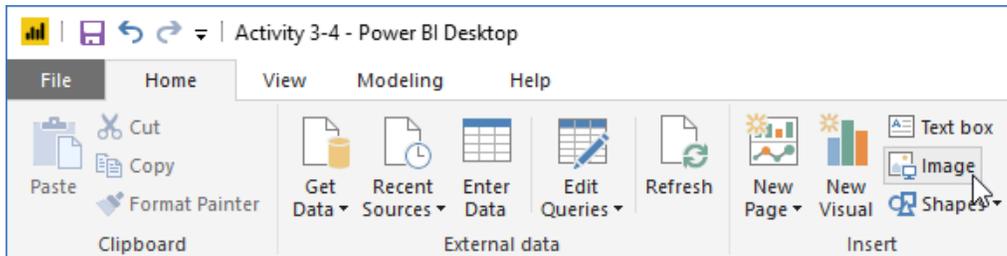
7. Add a bold effect:



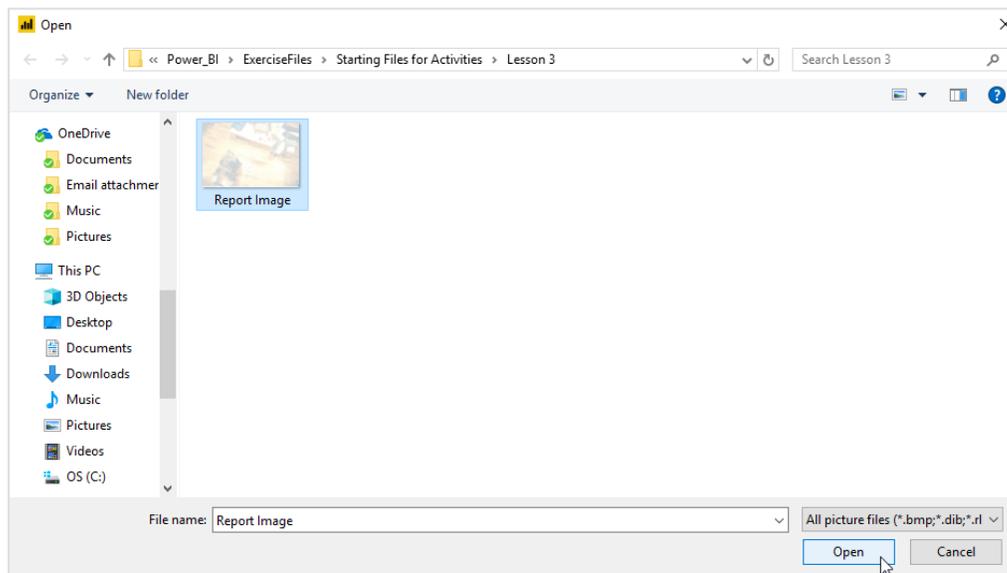
8. The title is now complete:



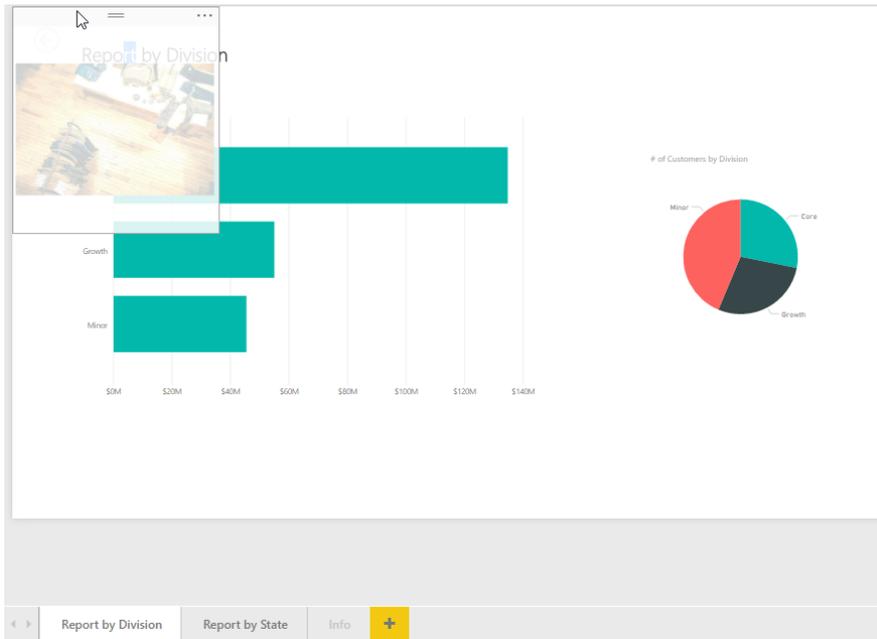
9. Click outside the text box to de-select it. Now, let's add an image. Click Home → Image:



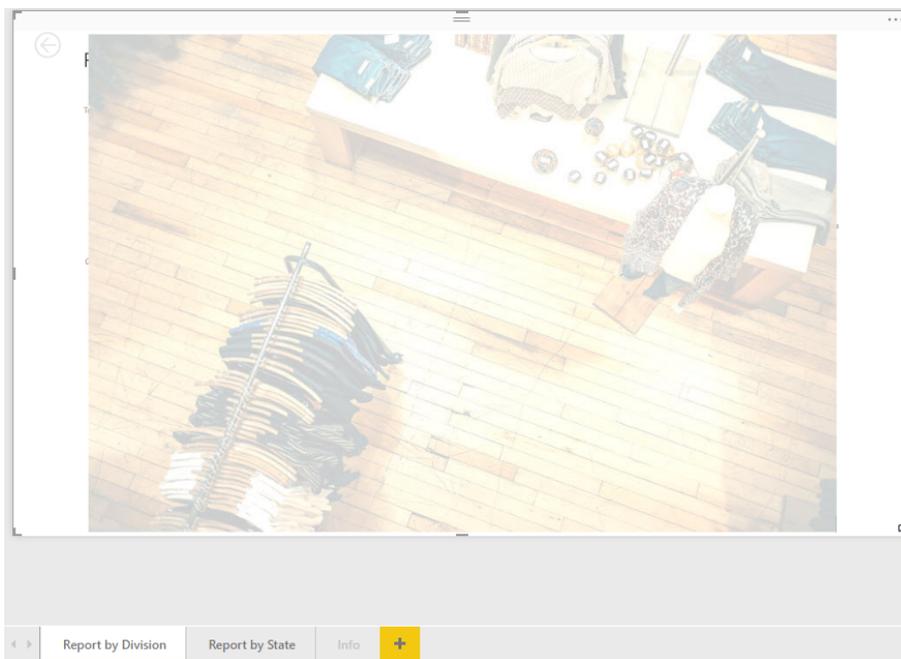
10. The Open dialog will appear. Navigate to your Exercise Files, open the Lesson 3 folder, select the Report Image file, and click Open:



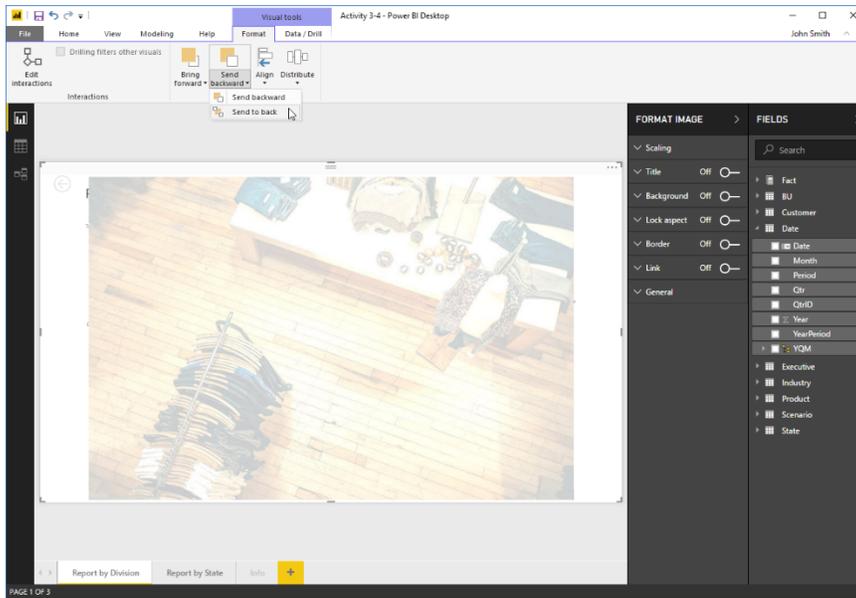
11. The image will be inserted. Click and drag it to the top left corner of the canvas:



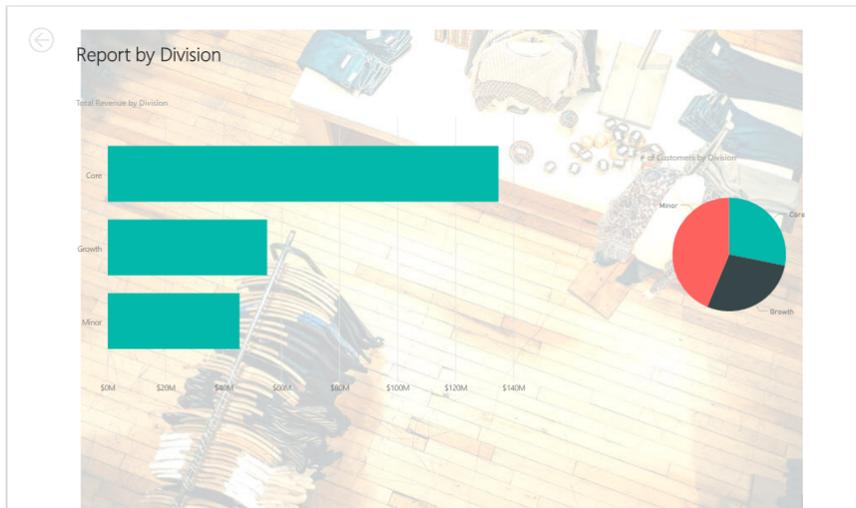
12. Click and drag the bottom right handle down and to the right to make it the same size as the canvas:



- Now, let's place the picture in the background. Click Visual Tools – Format → Send backward → Send to back:



- The report background is now complete:



- Save your work as Activity 3-4 Complete and close Power BI.

Summary

In this lesson, we learned more about reports and visualizations. You should now feel ready to set up report pages and view options, work with visualizations, and add static objects.

Review Questions

1. You have hidden a page in your report showing next year's budget. You are now ready to share it with others. How do you show it?
2. True or False: Always duplicate a page when creating a phone layout so the desktop layout is not lost.
3. You have a chart with drilldown enabled, but you do not want the other visualizations on the page to change when the user is drilling through the data. Where do you set this option?
4. How do you add a local picture to a report page?
5. How do you add an online picture to a report page?

LESSON 4: A CLOSER LOOK AT VISUALIZATIONS

Lesson Objectives

In this lesson you will learn how to create and manage the following types of visualizations:

- Matrixes
- Tables
- Charts
- Maps
- Gauges
- Cards
- KPIs
- Slicers

TOPIC A: Matrixes, Tables, and Charts

In this lesson, we will take a closer look at some of the visualizations available in Power BI. To begin, we will explore matrices, tables, and charts.

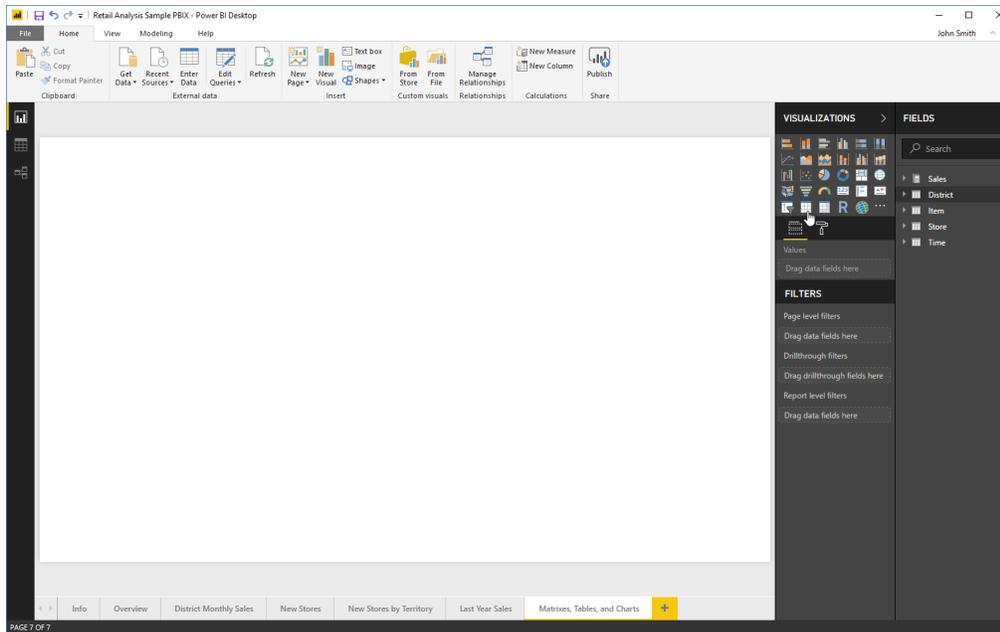
Topic Objectives

In this topic, you will learn how to:

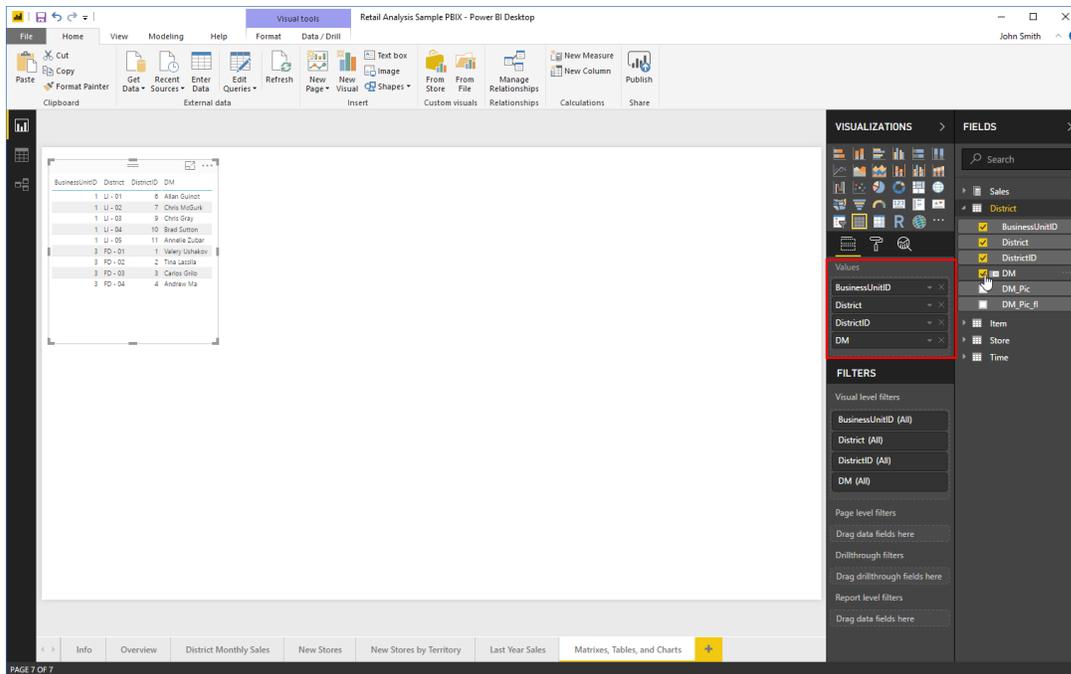
- Create matrix, table, and chart visualizations

Creating a Table

First, let's look at creating a basic table:

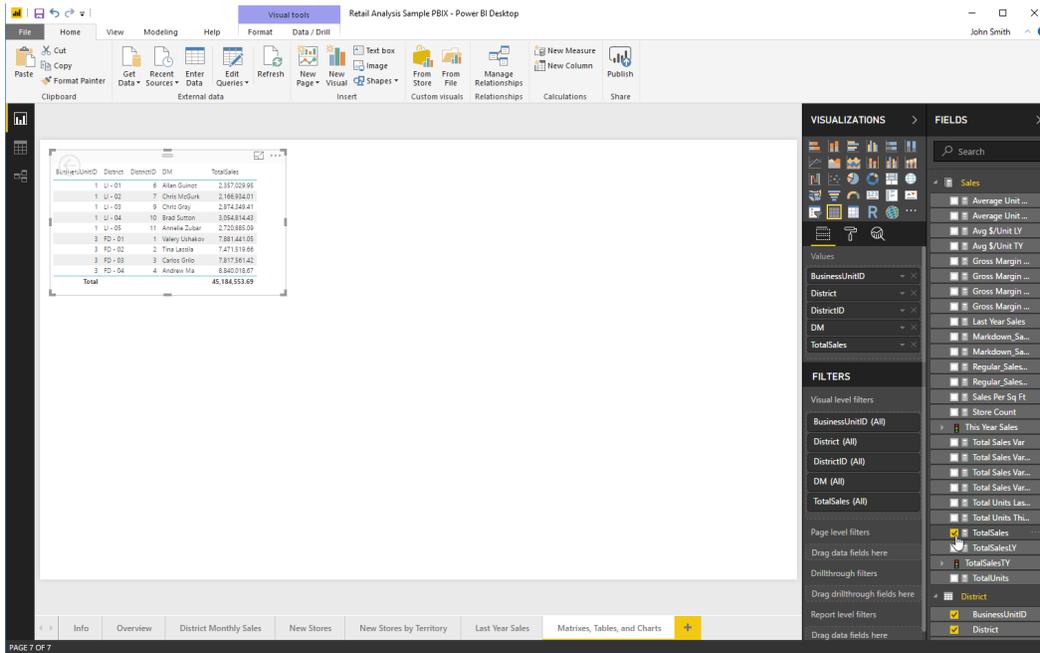


Once we add the visualization, we can choose the fields to display by checking them in the Fields task pane. This will automatically add them to the Values well, which is the only well available for tables:

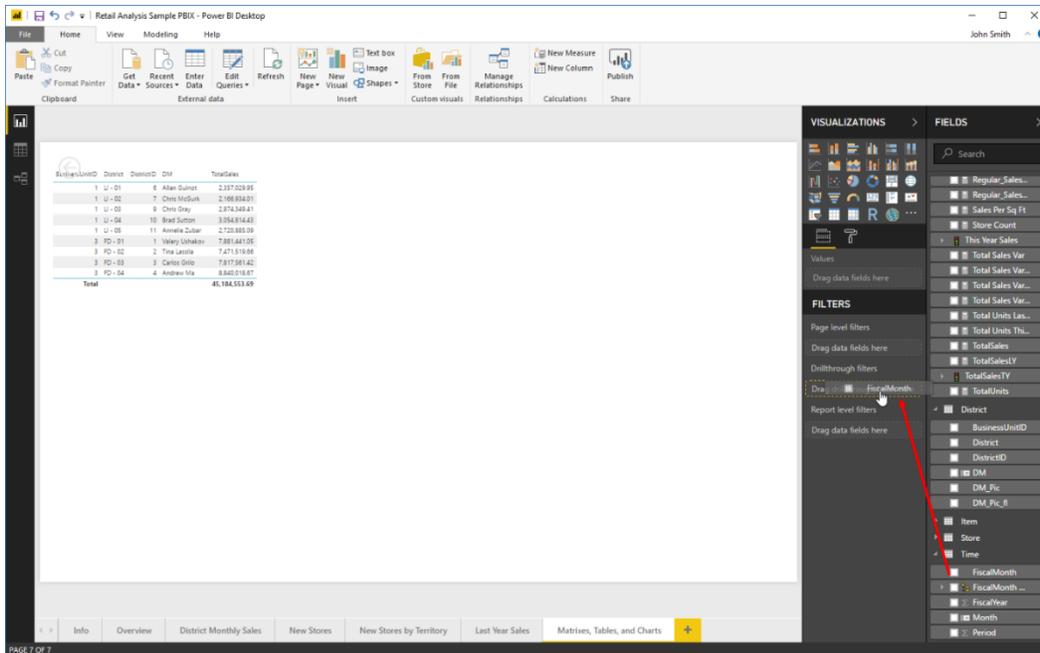


Note, however, that you can add filters to customize table display.

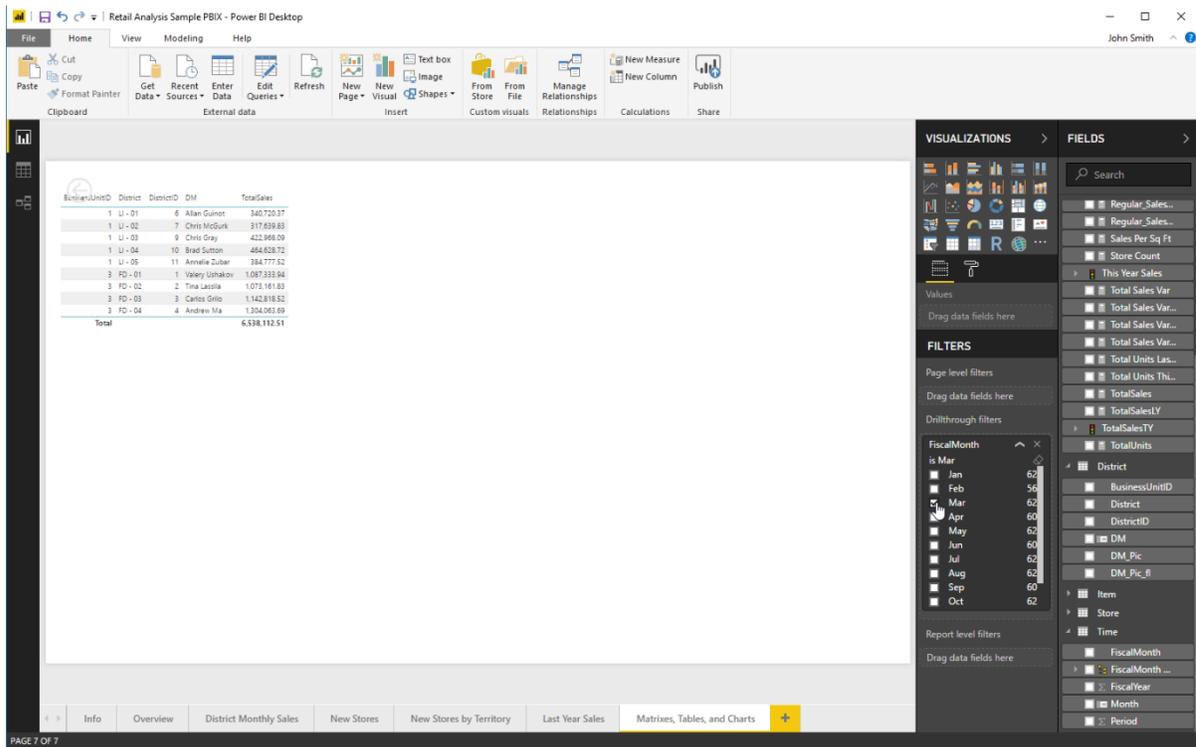
For example, here we have added the TotalSales field to the table:



We can then add the FiscalMonth field to the “Page level filters” area:

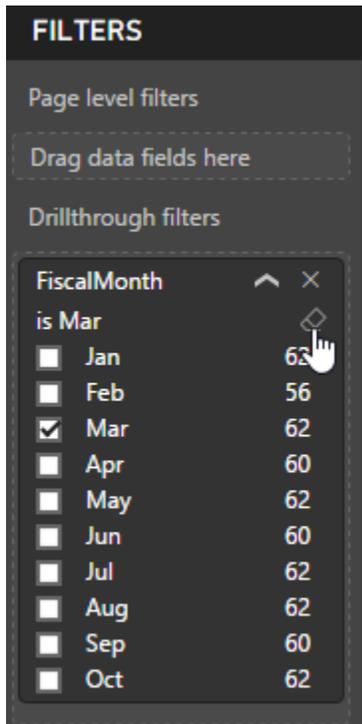


And then choose the month to see data for:



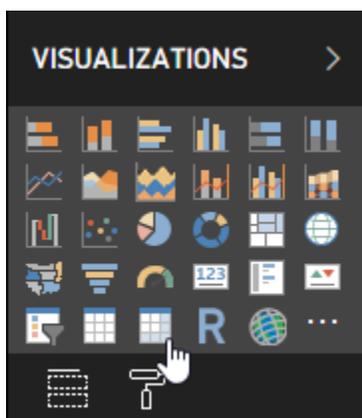
(If we want the filter to be available for other visualizations on this page, we could add the filter to the “Page level filters” area. Or, add it to the “Report level filters” area to make it available across all pages.)

To clear the filter, click the eraser icon at the top of the list:

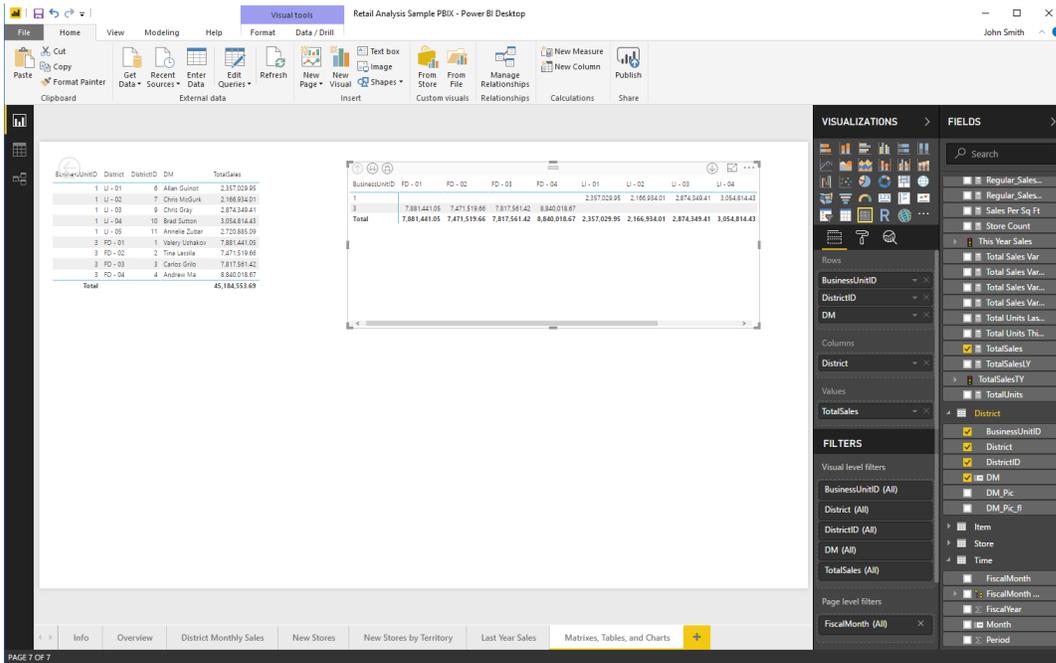


Creating a Matrix

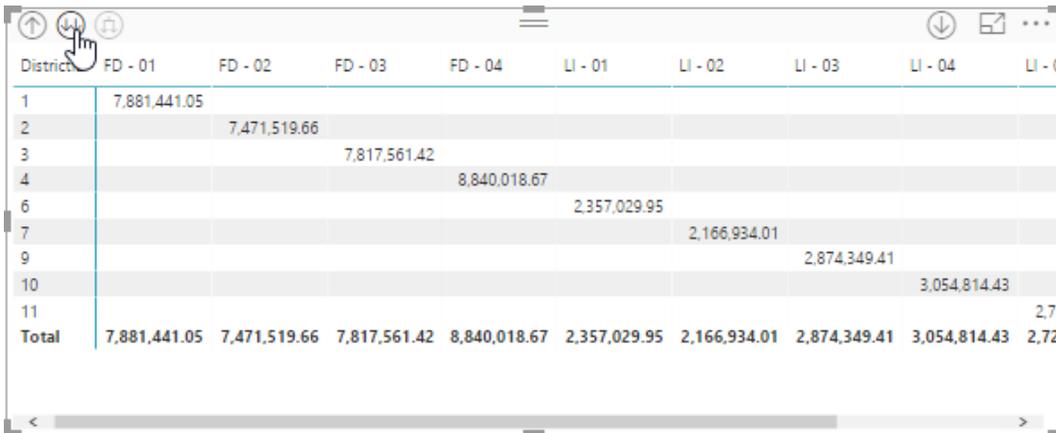
A matrix is similar to a table but has additional flexibility and displays data in a crosstab-style view. Its icon is next to the Table icon in the Visualizations pane:



Let's add the same fields to the matrix that we used for the table:

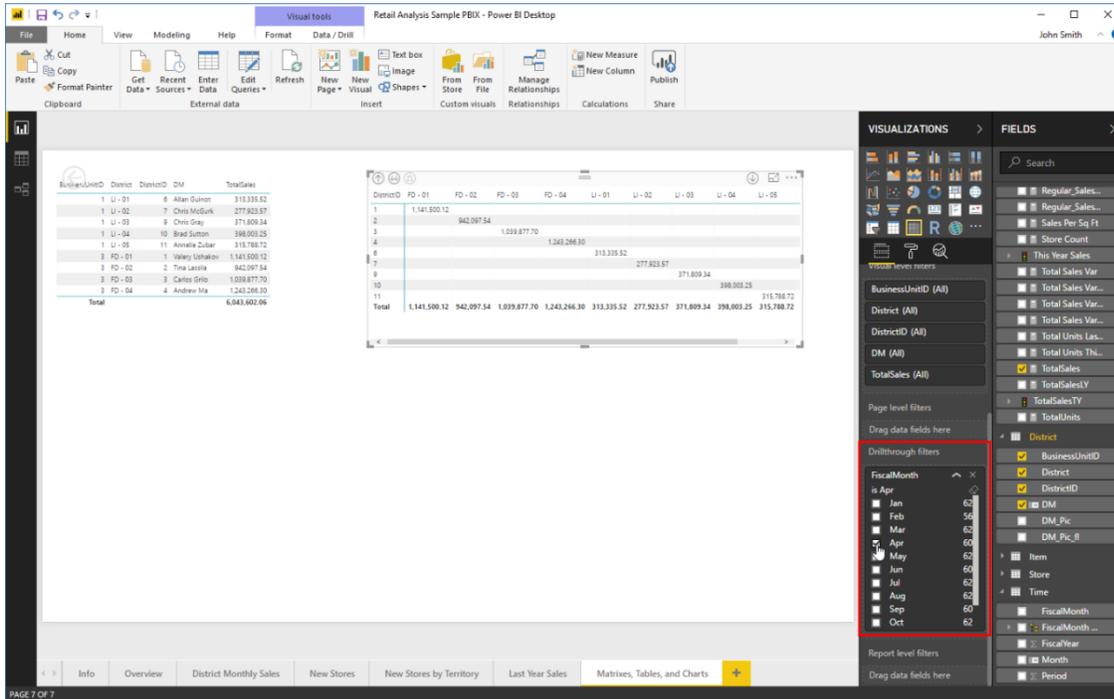


We can see sales by business unit, separated by district, with a total for each. Drilldown options are also available as each business unit is separated into districts:



As well, notice the scroll bar at the bottom of the matrix – use this to view more data.

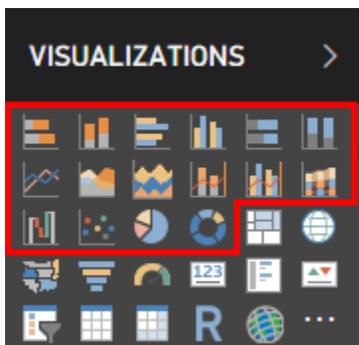
The “Drillthrough filters” section also allows you to filter data, just as we did with tables. Simply check the data to view and uncheck the data to hide:



Note that in this example, these filter options will affect the table as well since they are using the same data fields.

Overview of Chart Types

As of this writing, there are 16 types of charts available in the Visualizations pane:



Let's take a quick look at each type, moving from left to right and top to bottom.

Chart Type	Description
Stacked Bar	Display relationships between values.
Stacked Column	Display relationships between values within categories, or changes over time.
Clustered Bar	Display multiple relationships between values.
Clustered Column	Display multiple relationships between values within categories, or changes over time.
100% Stacked Bar	Display relationships between values within categories (or changes over time) as related to the whole.
100% Stacked Column	Display relationships between values as related to the whole.
Line	Show the progression of values over time.
Area	Show relationships between values over time.
Stacked Area	Show relationships between values over time as part of a whole.
Line and Stacked Column	Display relationships between values within categories, or changes over time, with a constant line.
Line and Clustered Column	Display relationships between values within categories, or changes over time, with a constant line.
Ribbon	Similar to a Line chart, but with a 3-D display and additional data options.
Waterfall	Displays the cumulative effect of positive or negative values.

Scatter	Displays values for two variables within a dataset.
Pie	Displays values as part of the whole.
Donut	Also displays values as part of the whole but allows comparison of more than one data series.

Creating Charts

All charts are created in a similar way and offer similar features. Let's create a simple line chart for this example:

The screenshot shows the Microsoft Power BI Desktop interface. The main area displays a data table with columns: BusinessUnitID, District, DistrictID, DM, and TotalSales. The data is as follows:

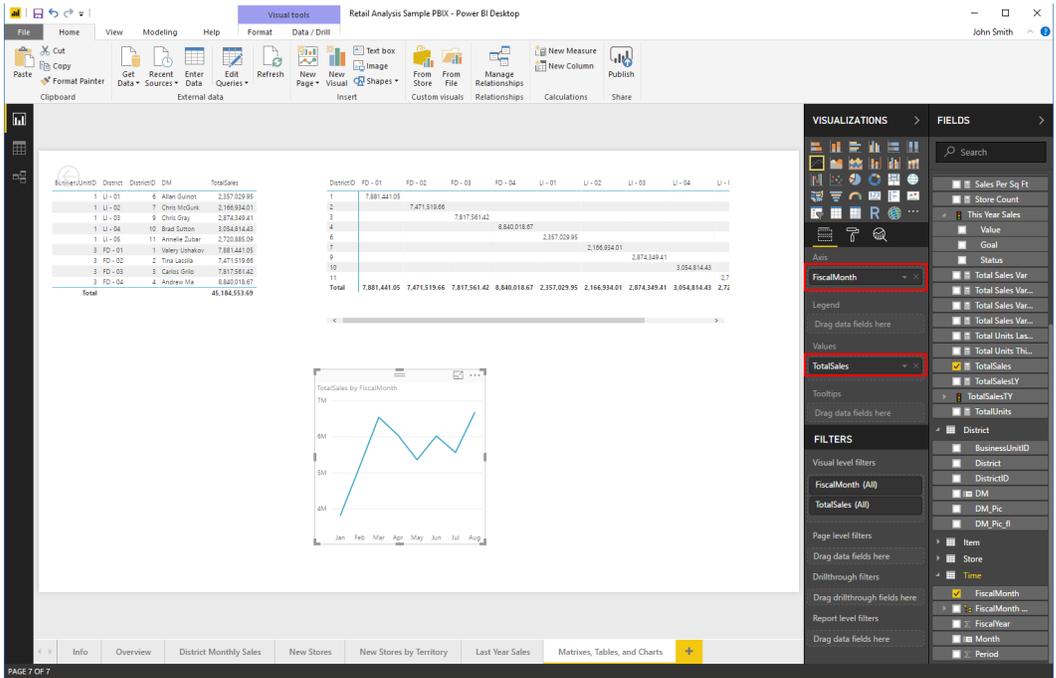
BusinessUnitID	District	DistrictID	DM	TotalSales
1	U - 01	6	Allan Guinot	2,357,029.95
1	U - 02	7	Chris McGurk	2,166,934.01
1	U - 03	9	Chris Gray	2,874,349.41
1	U - 04	10	Brad Sutton	3,054,814.43
1	U - 05	11	Arsenio Suber	2,720,885.09
3	FD - 01	1	Valery Ushakov	7,881,441.05
3	FD - 02	2	Tina Lassila	7,471,519.66
3	FD - 03	3	Carlos Ghis	7,817,561.42
3	FD - 04	4	Andrew Ma	8,840,018.67
Total				45,184,553.69

Below the data table is a PivotTable with columns: DistrictID, FD - 01, FD - 02, FD - 03, FD - 04, U - 01, U - 02, U - 03, U - 04, U - 1. The data is as follows:

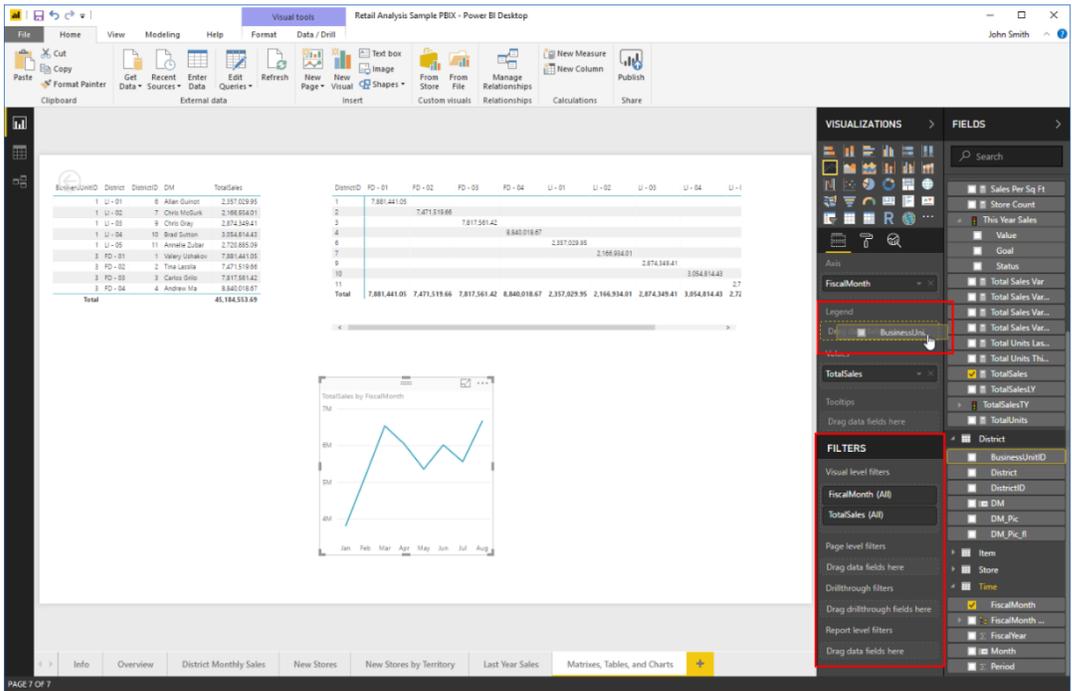
DistrictID	FD - 01	FD - 02	FD - 03	FD - 04	U - 01	U - 02	U - 03	U - 04	U - 1
1	7,881,441.05								
2		7,471,519.66							
3			7,817,561.42						
4				8,840,018.67					
6					2,357,029.95				
7						2,166,934.01			
9							2,874,349.41		
10								3,054,814.43	2.7
11									2.72
Total	7,881,441.05	7,471,519.66	7,817,561.42	8,840,018.67	2,357,029.95	2,166,934.01	2,874,349.41	3,054,814.43	2.72

The interface also shows a ribbon with options like 'Visualizations' and 'Fields'. The 'Fields' pane on the right shows a search bar and a list of fields: Sales, District, Item, Store, Time, FiscalMonth, FiscalYear, Month, and Period.

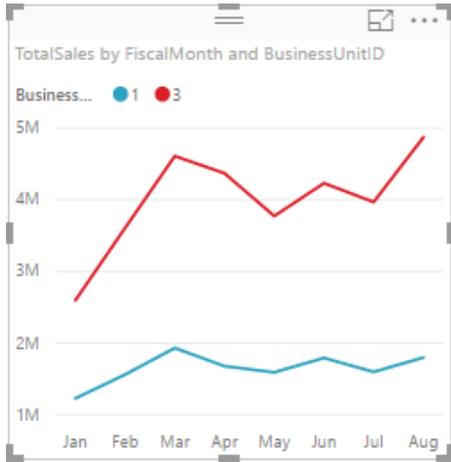
We will add the TotalSales field as the Values, and the FiscalMonth as the Axis:



Just as with other visualizations, we can add filters to customize the data. We can also add a legend to show another category:



Here are the results:



You can change the chart type at any time by choosing another icon:

The screenshot displays the Power BI Desktop environment. The central area shows a data table with the following structure:

BusinessUnitID	District	DimGeoID	DM	TotalSales
1	U-01	6	Allan Gunot	2,357,029.95
1	U-02	7	Chris McGurk	2,966,934.01
1	U-03	9	Chris Gray	2,874,248.41
1	U-04	10	Brend Simon	3,054,814.43
1	U-05	11	Anamika Zuber	2,720,889.09
3	FD-01	1	Nancy Johnson	7,881,441.05
3	FD-02	2	Tina Leslie	7,471,519.66
3	FD-03	3	Carlos Gello	7,817,561.42
3	FD-04	4	Andrew Ika	8,840,918.67
Total				45,184,953.69

The interface also shows a pivot table and a smaller version of the line chart. The right-hand pane contains the 'VISUALIZATIONS' and 'FIELDS' panes, which are used to select and configure the data visualizations.

And do not forget about the Format tab, which you can use to customize your chart:

The screenshot displays the Microsoft Power BI Desktop interface. The main workspace is divided into three sections: a data table on the left, a line chart in the center, and a Visualizations pane on the right. The ribbon at the top includes the 'Format' tab, which is currently selected. The data table shows sales data for various BusinessUnits (BU) across different Districts (DM) and Fiscal Months (FD). The line chart, titled 'TotalSales by FiscalMonth and BusinessUnitID', shows sales trends over time for three BusinessUnits. The Visualizations pane on the right allows for customizing the chart's appearance, with the 'Format' tab active.

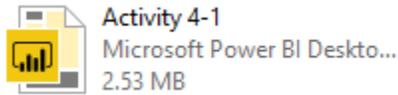
BusinessUnitID	District	DistrictID	DM	TotalSales
1	LI-01	6	Alan Gunter	2,357,029.95
1	LI-02	7	Chris McGurk	2,166,934.01
1	LI-03	9	Chris Gray	2,874,349.41
1	LI-04	10	Brad Sutton	3,054,814.43
1	LI-05	11	Avenile Sutor	2,702,885.59
3	FD-01	1	Vikary Ushakov	7,881,441.05
3	FD-02	2	Tina Lassila	7,471,519.66
3	FD-03	3	Carlos Giron	7,817,561.42
3	FD-04	4	Andrew Ma	8,840,018.67
Total				45,184,553.69

DistrictID	FD-01	FD-02	FD-03	FD-04	LI-01	LI-02	LI-03	LI-04	LI-05									
1	7,881,441.05																	
2		7,471,519.66																
3			7,817,561.42															
4				8,840,018.67														
6					2,357,029.95													
7						2,166,934.01												
9							2,874,349.41											
10								3,054,814.43										
11									2,702,885.59									
Total										7,881,441.05	7,471,519.66	7,817,561.42	8,840,018.67	2,357,029.95	2,166,934.01	2,874,349.41	3,054,814.43	2,702,885.59

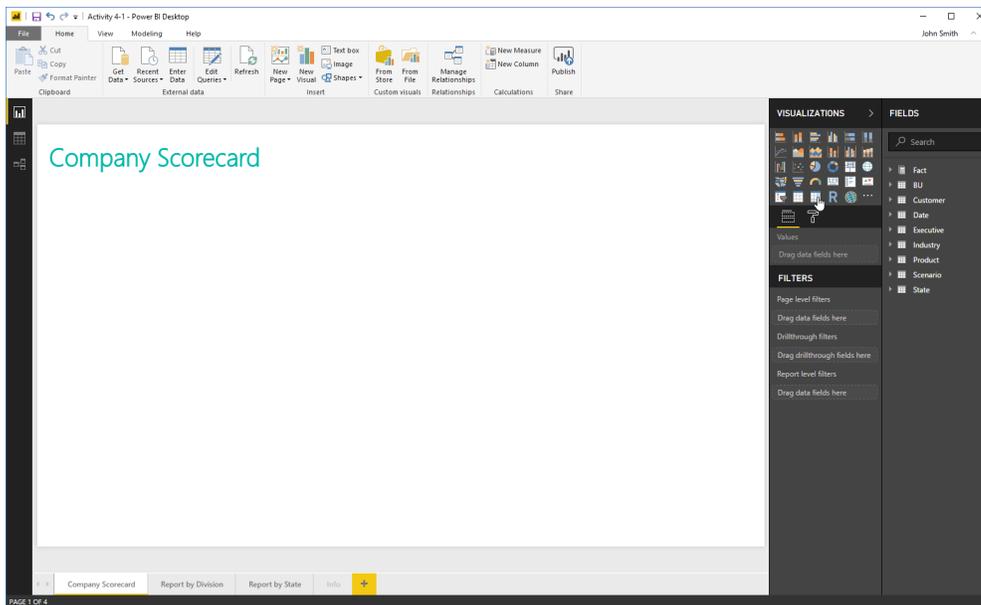
Activity 4-1: Matrices, Tables, and Charts

In this activity, you will begin creating a company scorecard report.

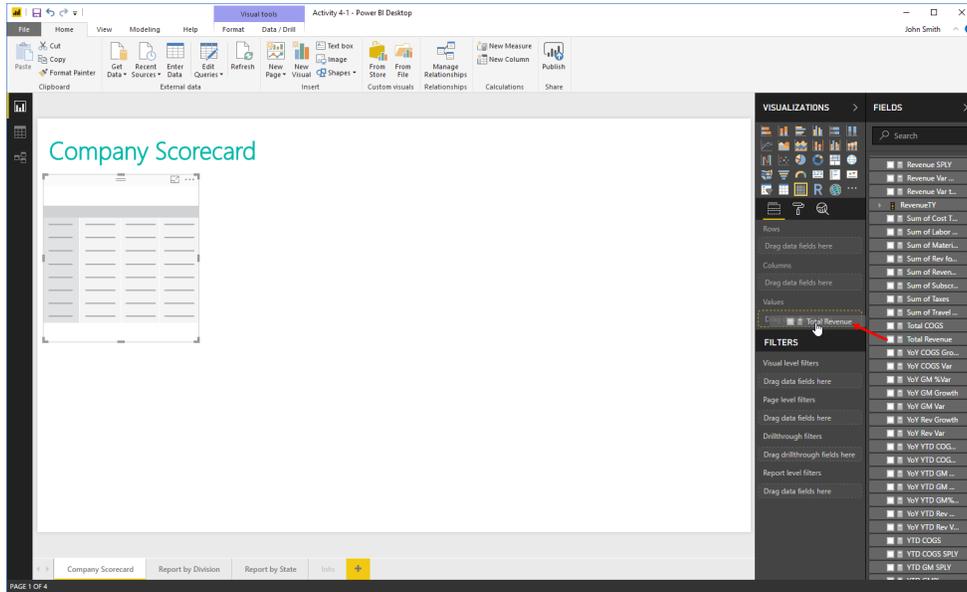
1. Open Power BI and open Activity 4-1:



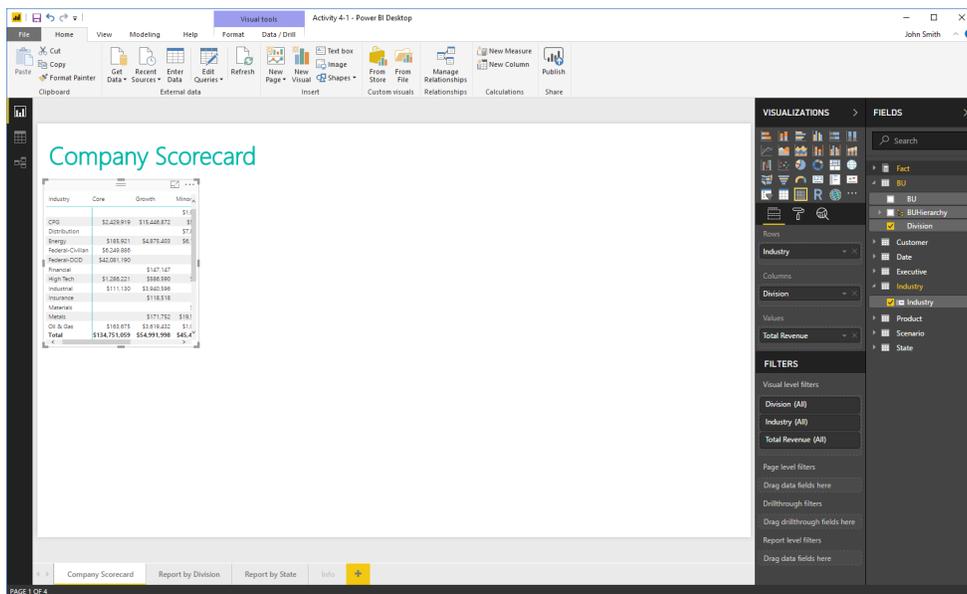
2. The Company Scorecard page should be displayed. (Make sure it is selected.) Our first task is to show the sum of revenue, broken down by division and industry. Let's use a matrix to display this data. Click the Matrix icon in the Visualizations task pane:



3. Since we want to see the total revenue as the matrix data, locate this field in the Fact category. Drag it to the Values well:



4. Add the Industry field (from the Industry group) to the Rows well and the Division field (from the BU group) to the Columns well:



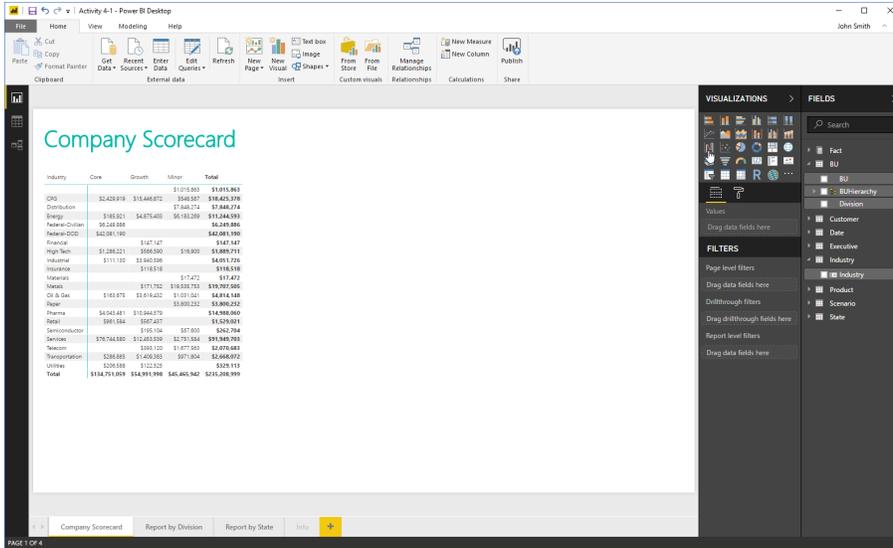
5. Resize the matrix so all data is displayed:

Company Scorecard

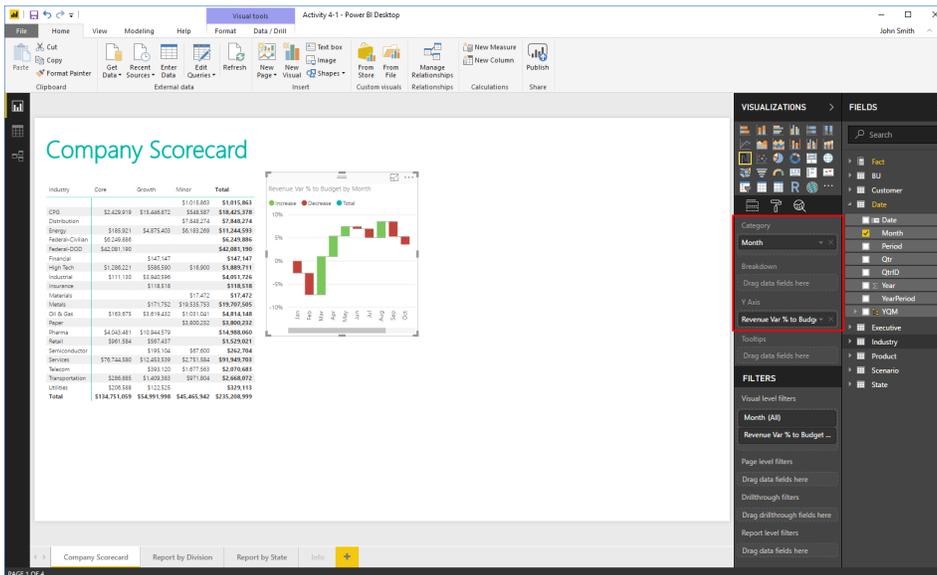
Industry	Core	Growth	Minor	Total
			\$1,015,863	\$1,015,863
CPG	\$2,429,919	\$15,446,872	\$548,587	\$18,425,378
Distribution			\$7,848,274	\$7,848,274
Energy	\$185,921	\$4,875,403	\$6,183,269	\$11,244,593
Federal-Civilian	\$6,249,886			\$6,249,886
Federal-DOD	\$42,081,190			\$42,081,190
Financial		\$147,147		\$147,147
High Tech	\$1,286,221	\$586,590	\$16,900	\$1,889,711
Industrial	\$111,130	\$3,940,596		\$4,051,726
Insurance		\$118,518		\$118,518
Materials			\$17,472	\$17,472
Metals		\$171,752	\$19,535,753	\$19,707,505
Oil & Gas	\$163,675	\$3,619,432	\$1,031,041	\$4,814,148
Paper			\$3,800,232	\$3,800,232
Pharma	\$4,043,481	\$10,944,579		\$14,988,060
Retail	\$961,584	\$567,437		\$1,529,021
Semiconductor		\$195,104	\$67,600	\$262,704
Services	\$76,744,580	\$12,453,539	\$2,751,584	\$91,949,703
Telecom		\$393,120	\$1,677,563	\$2,070,683
Transportation	\$286,885	\$1,409,383	\$971,804	\$2,668,072
Utilities	\$206,588	\$122,525		\$329,113
Total	\$134,751,059	\$54,991,998	\$45,465,942	\$235,208,999



- Next, we want to know how much revenue varied from the budget, summarized by month. Let's use a waterfall chart to display this data. Click a blank area of the canvas to de-select the matrix. Click the Waterfall icon in the Visualizations pane:



- Set up the fields as shown here:

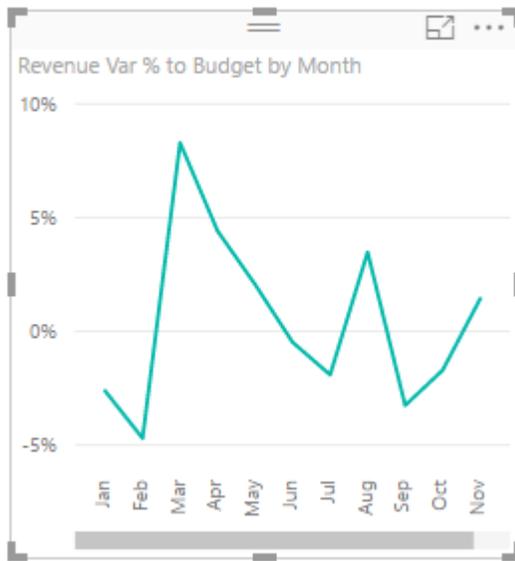


- This does not show the data as clearly as we would like. Click the “Line chart” icon to change the visualization:

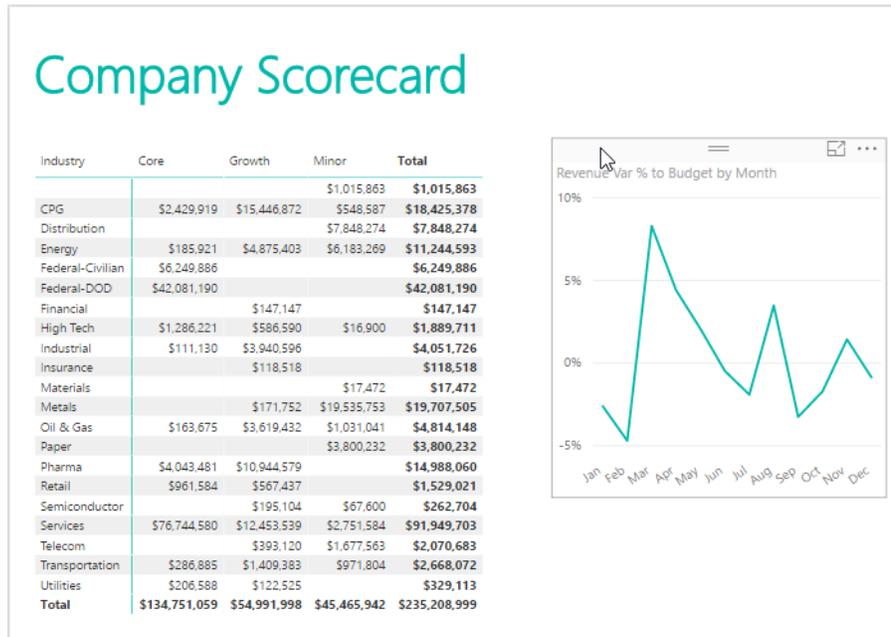
The screenshot shows the Power BI Desktop interface. The main view displays a 'Company Scorecard' report. On the left, there is a table with columns for 'Industry', 'Core', 'Growth', 'Minor', and 'Total'. The table lists various industries such as CPO, Distribution, Retail, etc., with their respective values. On the right, there is a bar chart titled 'Revenue Var % to Budget by Month'. The chart shows monthly variance percentages, with a legend for 'Increase', 'Decrease', and 'Total'. The right-hand pane shows the 'VISUALIZATIONS' and 'FIELDS' panes, with the 'Line chart' icon selected in the visualizations pane.

Industry	Core	Growth	Minor	Total
CPO	\$2,429,279	\$16,448,872	\$649,597	\$19,815,963
Distribution				\$7,849,274
Retail	\$188,021	\$6,875,483	\$6,183,296	\$13,246,800
Patent-Culnan	\$6,249,888			\$6,249,888
Patent-CDD	\$42,081,199			\$42,081,199
Finance		\$147,147		\$147,147
High Tech	\$1,285,221	\$588,590	\$18,900	\$1,892,711
Industrial	\$111,139	\$1,940,356		\$4,651,726
Insurance		\$118,518		\$118,518
Materials		\$17,472		\$17,472
Metals		\$171,752	\$19,830,753	\$19,797,585
Oil & Gas	\$149,679	\$1,919,412	\$1,039,341	\$4,814,148
Other			\$1,890,262	\$5,990,262
Pharma	\$4,041,481	\$10,344,379		\$14,789,860
Retail	\$993,568	\$997,497		\$5,529,851
Semiconductor		\$195,104	\$67,800	\$262,784
Services	\$76,744,589	\$15,583,839	\$2,759,564	\$95,349,992
Telecom		\$99,100	\$1,877,563	\$2,076,663
Transportation	\$288,099	\$1,499,289	\$971,854	\$2,668,992
Utilities	\$20,858	\$12,215		\$19,713
Total	\$114,751,039	\$44,991,938	\$45,463,542	\$225,206,519

- Review the results:



10. Resize and align the visuals as shown here:



11. Save your work as Activity 4-1 Complete and close Power BI.

TOPIC B: Maps

The next type of visualization we will explore is maps. Bubble and filled maps are excellent for geographical breakdowns, while treemaps show parts of data as they relate to the whole.

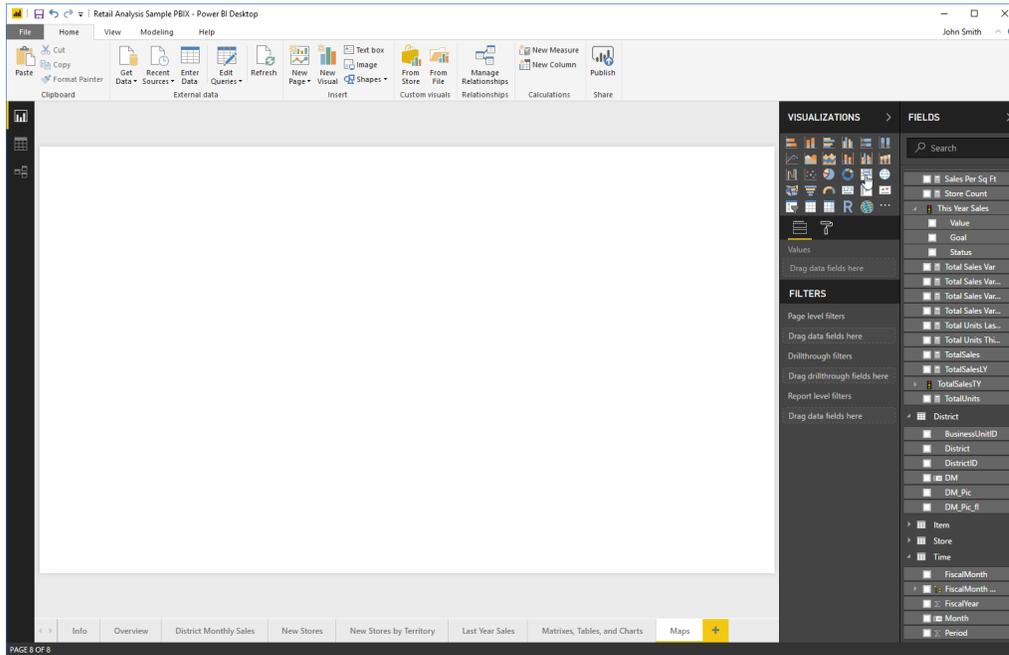
Topic Objectives

In this section, you will learn how to:

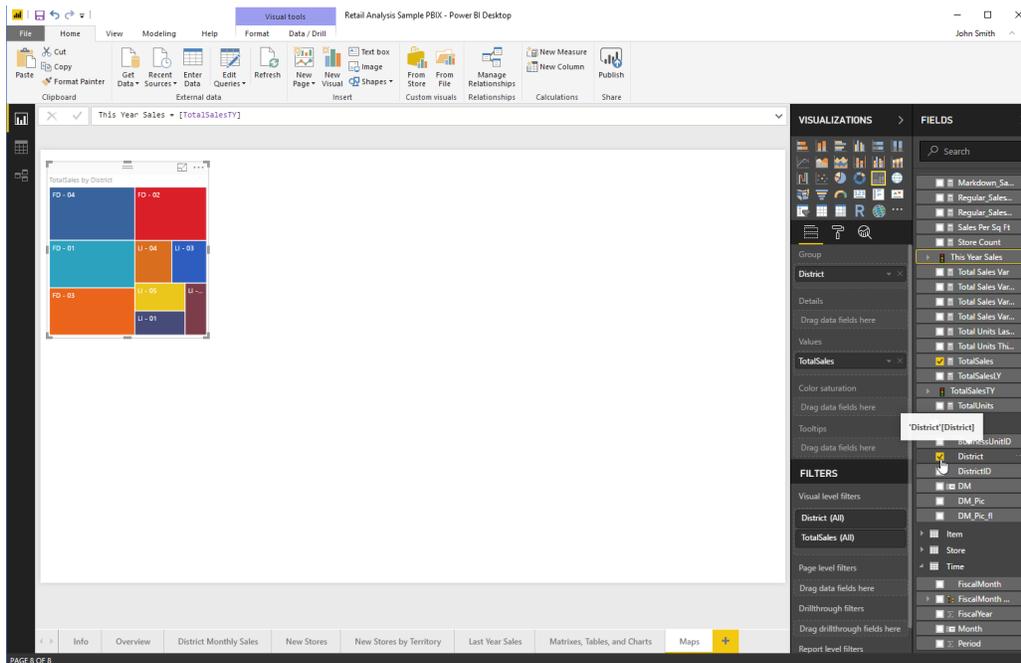
- Create treemaps, bubble maps, and filled maps

Creating a Treemap

Treemaps show a visual breakdown of data as it relates to the whole. Let's try creating one to show how much each district contributed to annual sales. We will start by choosing the Treemap visual:



Now, we can add the TotalSales and District fields as the Values and Group, respectively:

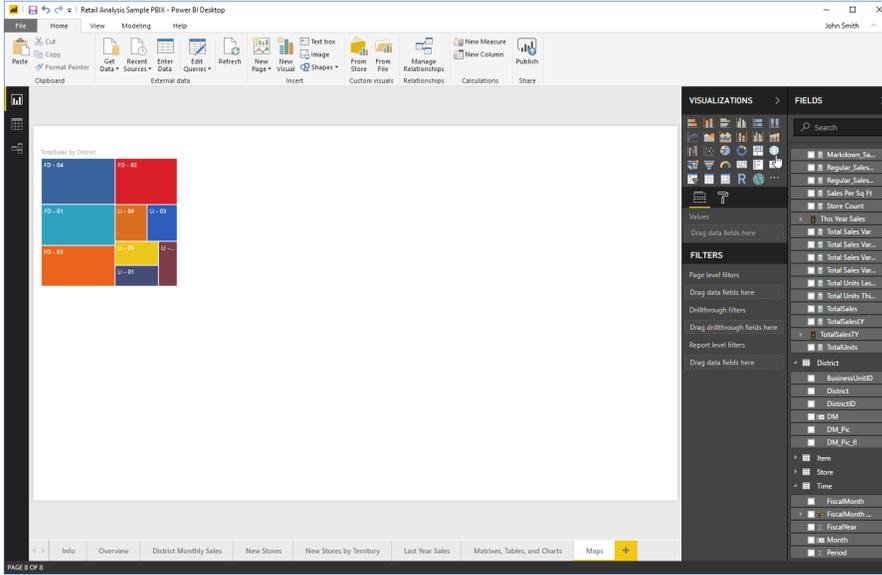


Notice the additional field areas in the Visualizations pane:

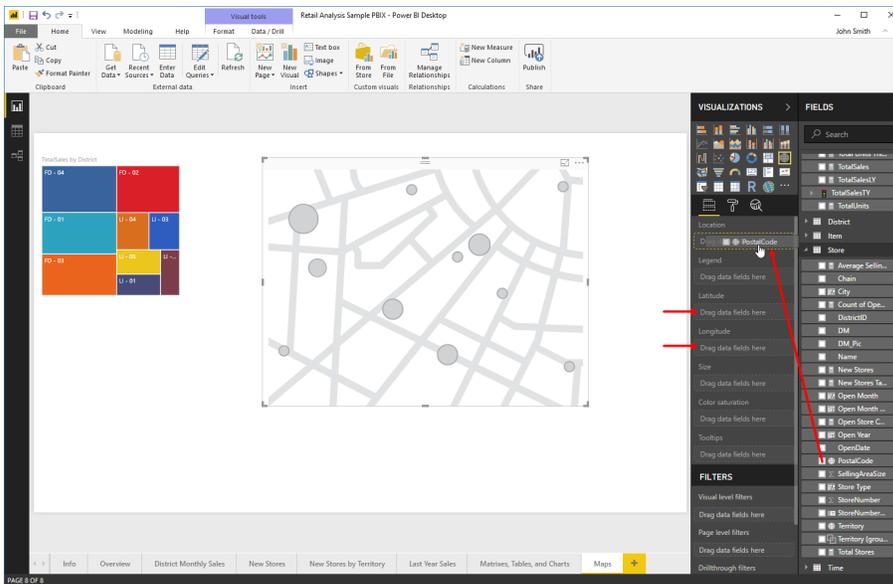
- **Details:** Add more text to the treemap shapes. For example, we could add the DM field to show the District Manager's name for each district.
- **Color Saturation:** Color fields in relation to a particular data set. For example, we could add Sales Per Square Foot to this well. Darker shades would represent a higher value, while lighter shades would represent a lower value.
- **Tooltips:** Similar to Details, but only shows the data when the user moves their mouse over the visualization.

Creating a Bubble Map

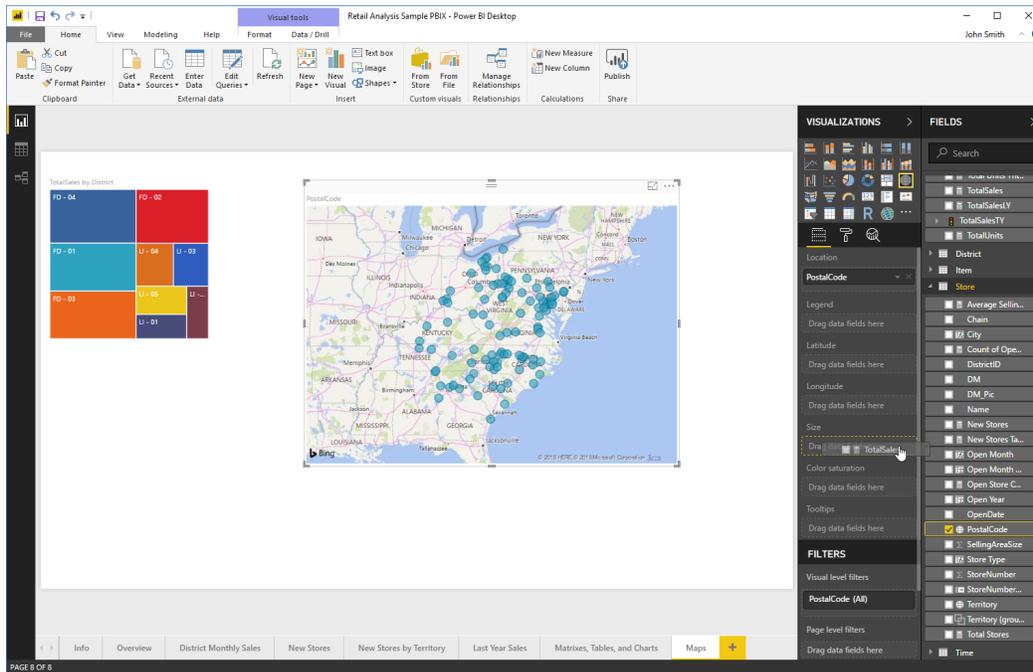
There are two types of geographical map visualizations in Power BI. The basic map visualization is also called a **bubble map** because of how it represents data:



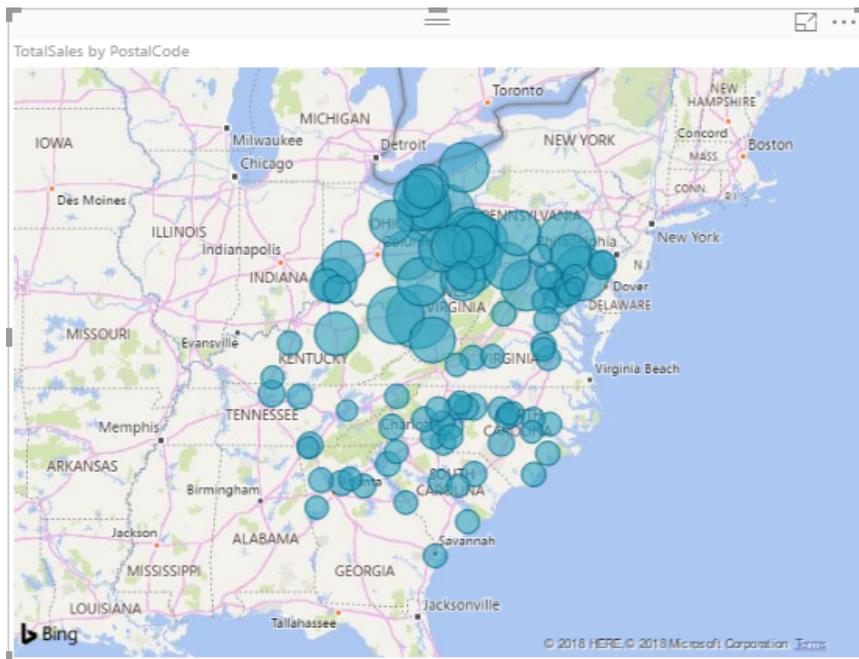
Here, we have added the placeholder, and moved and resized it to make it easier to see. The next step is to add a location-based field to the Location well. If you have latitude and longitude values, you can use those wells instead:



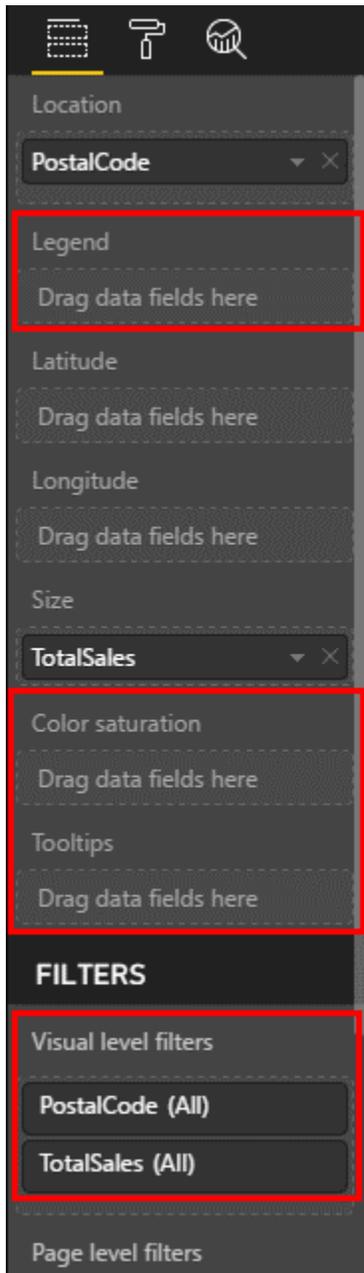
Next, we need to choose what will determine the size of each bubble. In this case, we will use the TotalSales field:



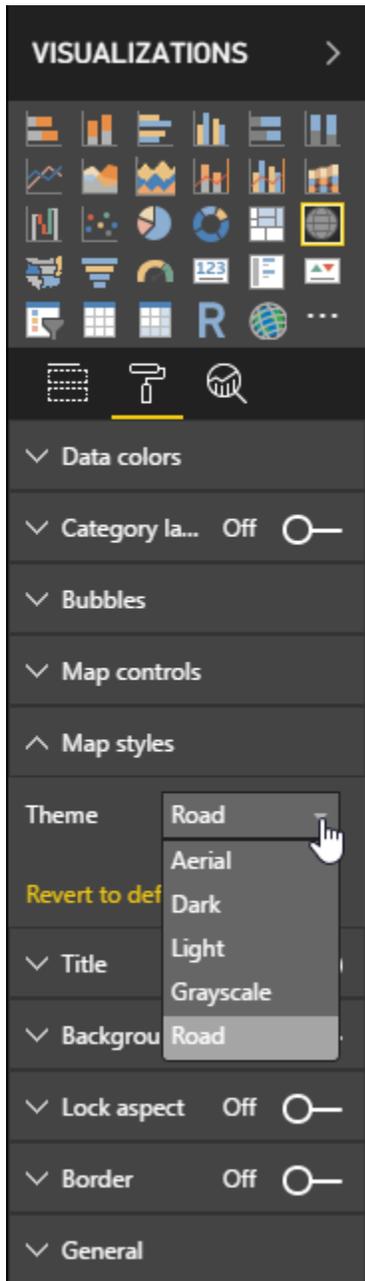
Here are the results:



Notice that you can add more fields in the Legend, Color saturation, and Tooltips fields to make your map even more meaningful. Filters are also available:



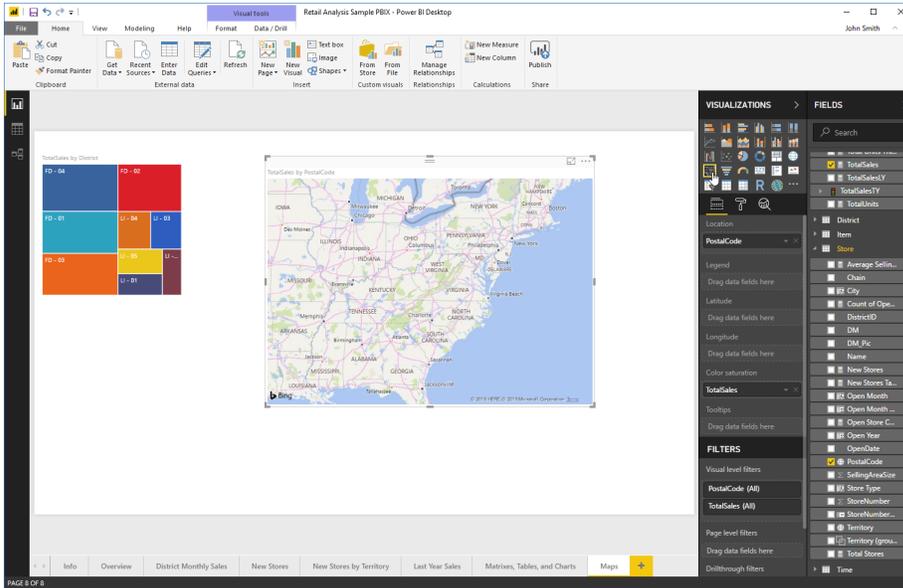
As a final note, the Format tab of the Visualizations task pane contains lots of options to customize the appearance of your map. Of particular note is the Theme menu:



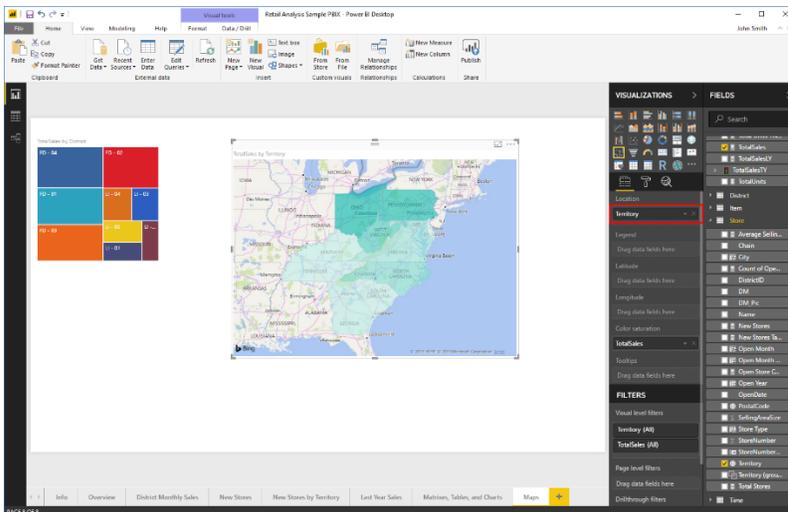
By default, a road map is used, but several other options are also available.

Creating a Filled Map

A **filled map** works the same way as a bubble map, except it fills in geographical areas based on the data set. Let's try changing our bubble map to a filled map:



In this case, no data points are displayed as the PostalCode field is too specific. We can fix this by clicking the X next to this field to remove it, and adding the Territory field instead:

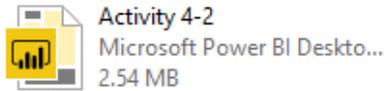


Filled maps have all the same options as previously discussed, including Legend, Color saturation, and Tooltips wells; filters; and a wide range of formatting options.

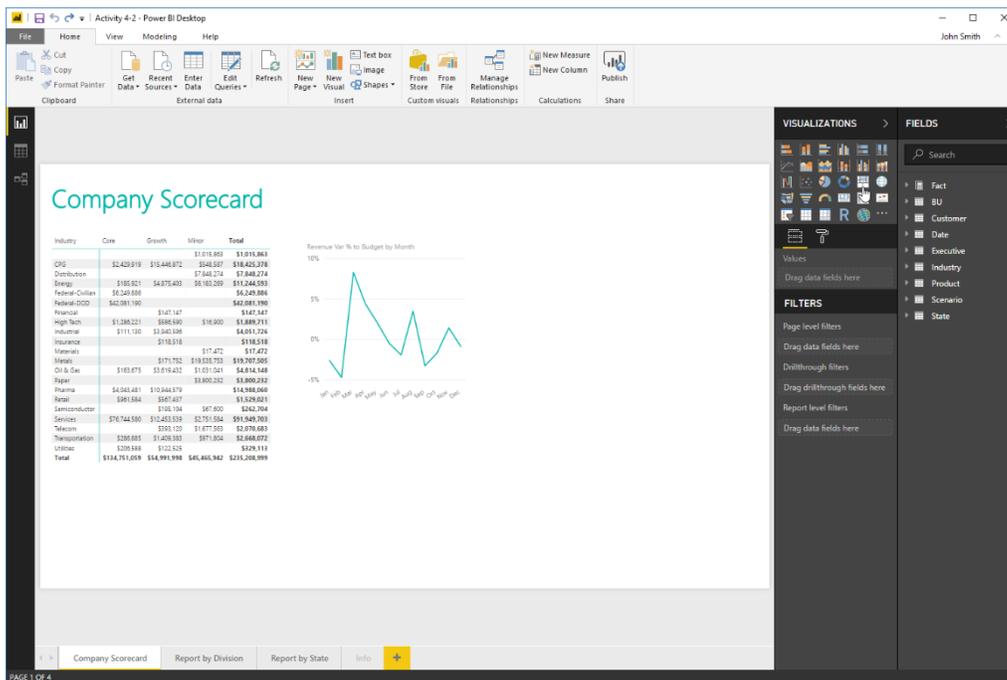
Activity 4-2: Maps

In this activity, we will add two maps to our Company Scorecard report.

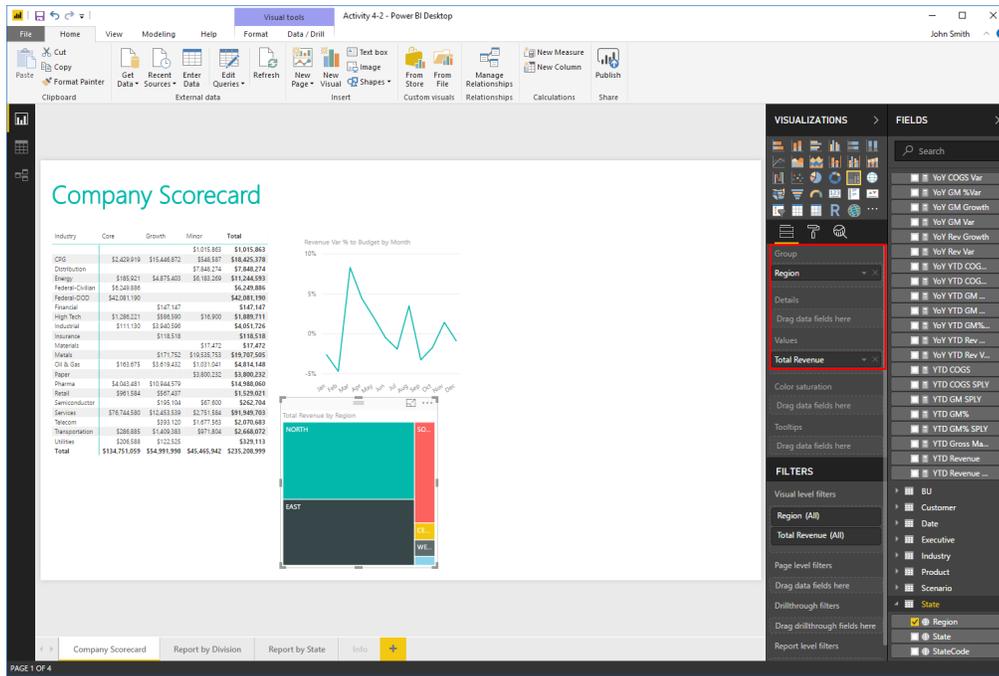
1. Open Power BI and open Activity 4-2:



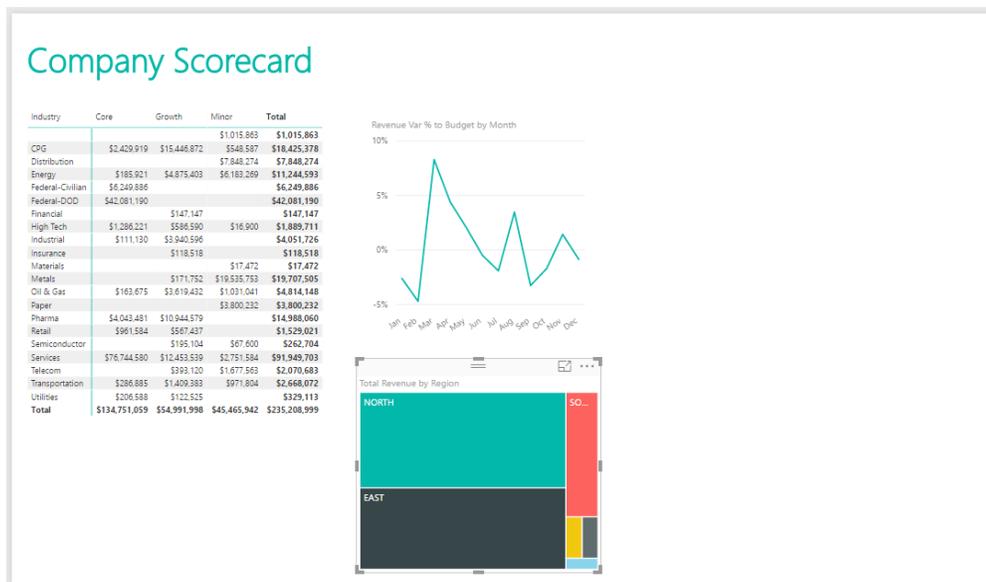
2. First, let's create a treemap to show revenue by region. Click the Treemap icon in the Visualizations task pane:



3. Add the Region field (from the State group) to the Group well. Add the Total Revenue field (from the Fact group) to the Values well:



4. Resize and position the visualization as shown here:



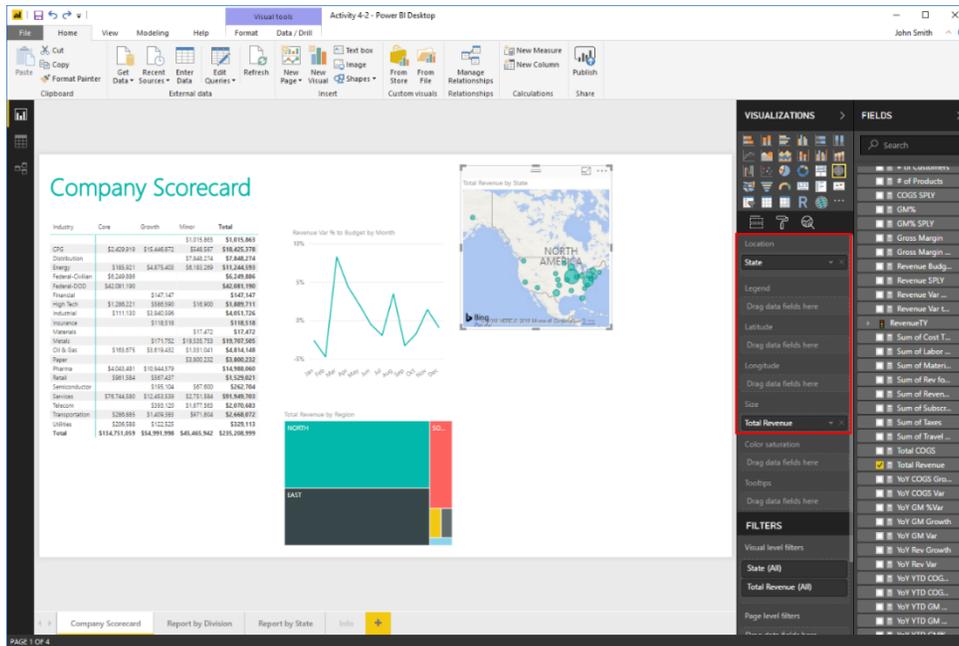
- Next, let's add a similar visualization, but using the State field instead. De-select the treemap by clicking a blank area of the canvas. Then, click the Map icon from the Visualizations task pane:

The screenshot displays the Microsoft Power BI Desktop interface. The main canvas shows a report titled "Company Scorecard" with three visualizations:

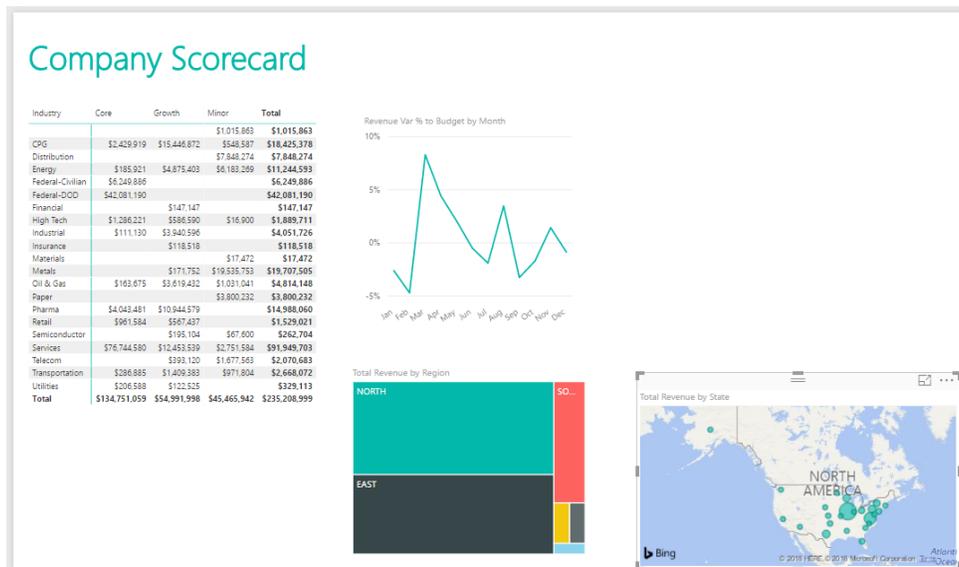
- Table:** A table with columns for Industry, Cost, Growth, Minor, and Total. It lists various industries such as CPG, Distribution, Energy, Federal-Contract, Food-Beverage, Financial, High-Tech, Industrial, Insurance, Metals, Oil & Gas, Paper, Pharma, Retail, Semiconductor, Services, Telecom, Transportation, and Utilities.
- Line Chart:** Titled "Revenue Var % to Budget by Month", showing percentage variance over time.
- Treemap:** Titled "Total Revenue by Region", showing revenue distribution across North and East regions.

The right-hand pane contains the "VISUALIZATIONS" and "FIELDS" task panes. The "FIELDS" pane shows a search bar and a list of available fields, including "State" and "StateCode".

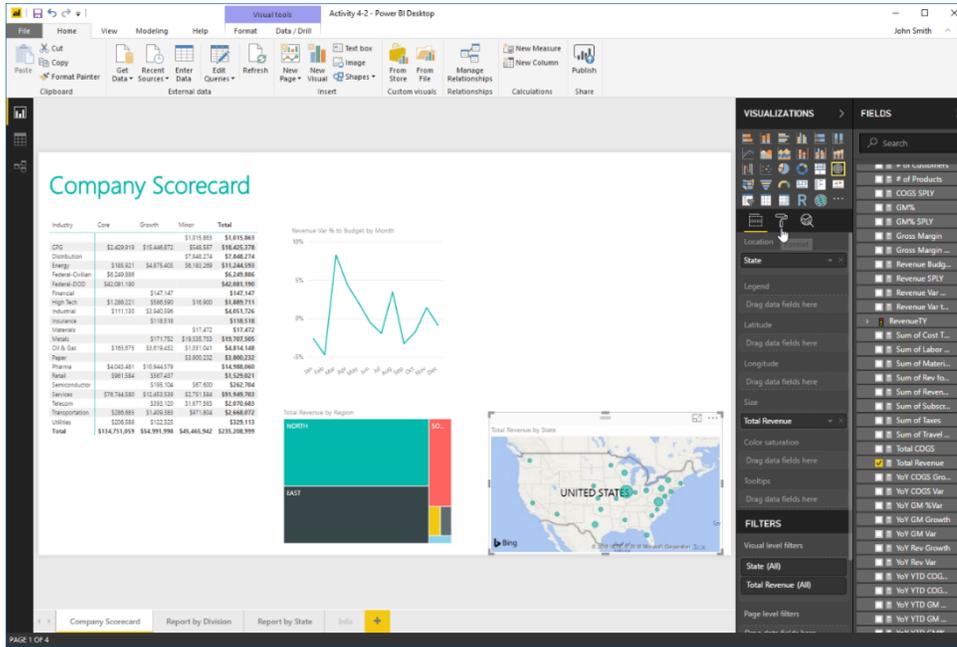
6. Add the State field (from the State group) to the Location well. Add the Total Revenue field (from the Fact group) to the Size well:



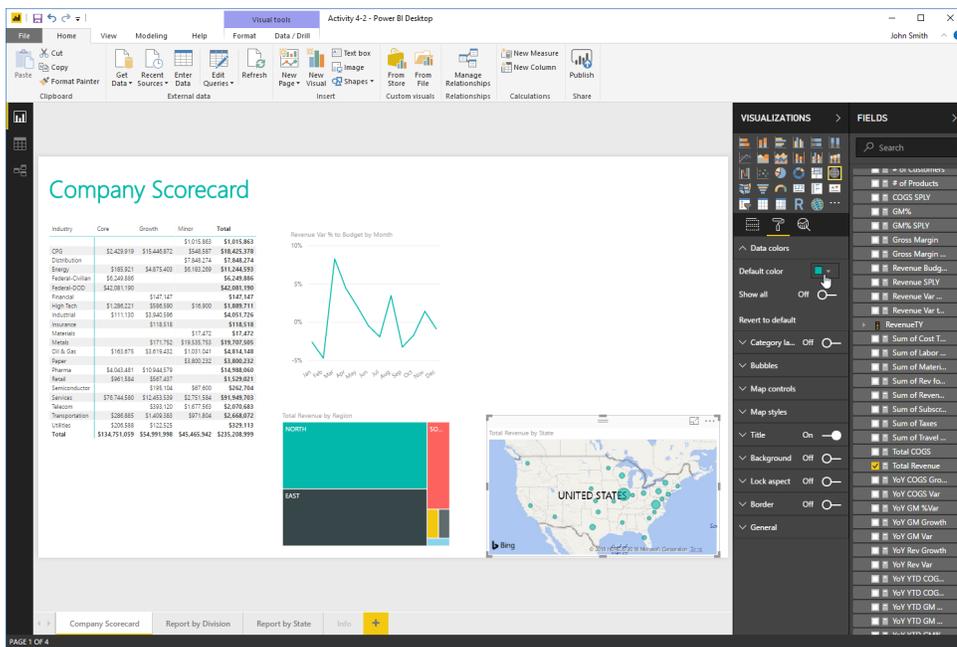
7. Resize and position the visualization as shown here:



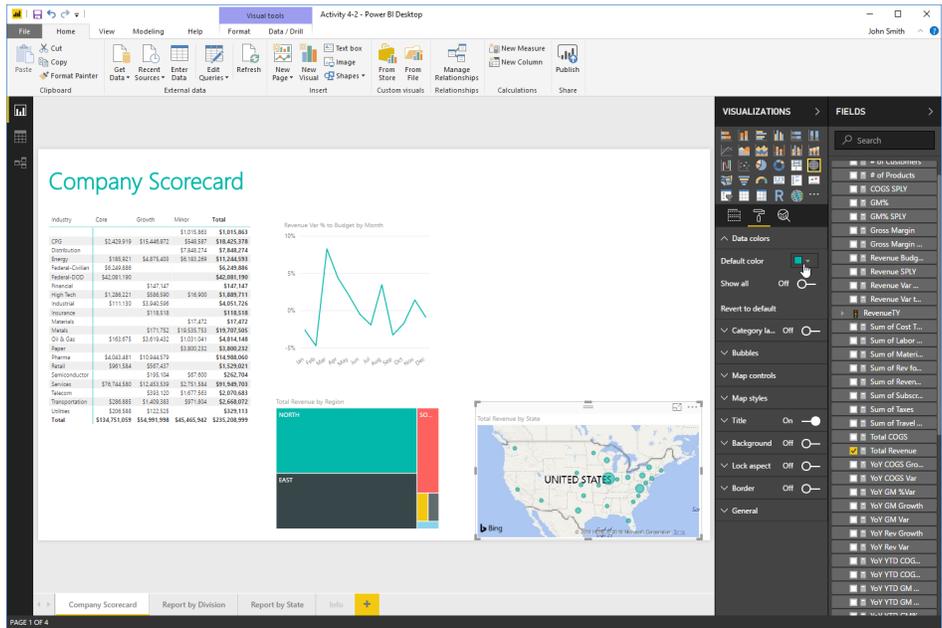
- Let's customize this visualization. Click the Format tab in the Visualizations task pane:



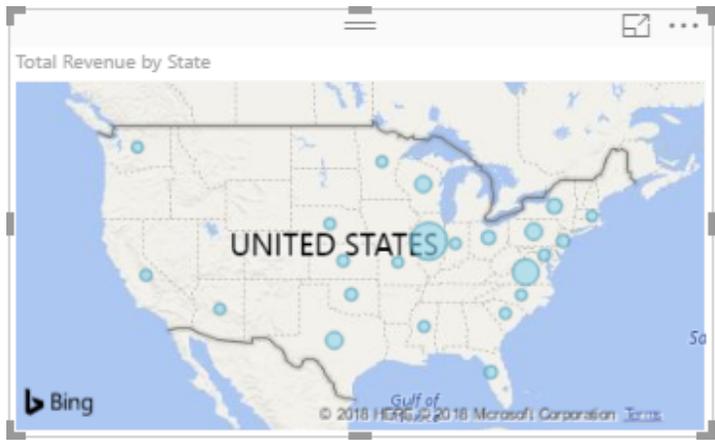
- Click the Data Colors category. Then, click the color picker:



10. Click any color you like from the menu:



11. The color will then be applied. Now, use the Ctrl + Shift keyboard shortcut to zoom into the eastern continental U.S. If necessary, click and drag the map to change the focus as shown below:



12. Save your work as Activity 4-2 Complete and close Power BI.

TOPIC C: Cards, Gauges, and KPIs

The next set of visualizations we are going to explore show data points either on their own or as they relate to a target. This is particularly useful if you want to emphasize a particular value (such as sales to date) or progress towards a target (such as sales to date compared to sales targets).

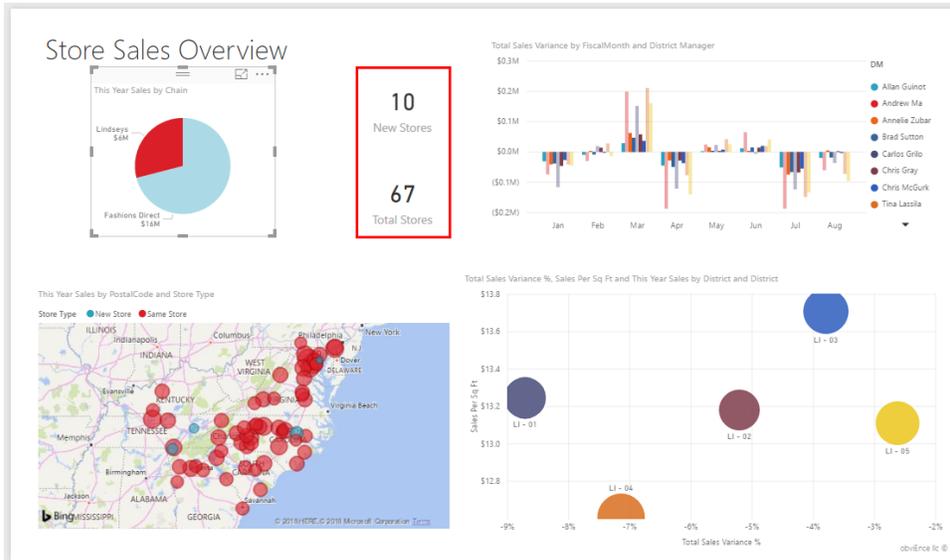
Topic Objectives

In this section, you will learn how to:

- Create single and multiple row cards
- Create gauges and KPIs

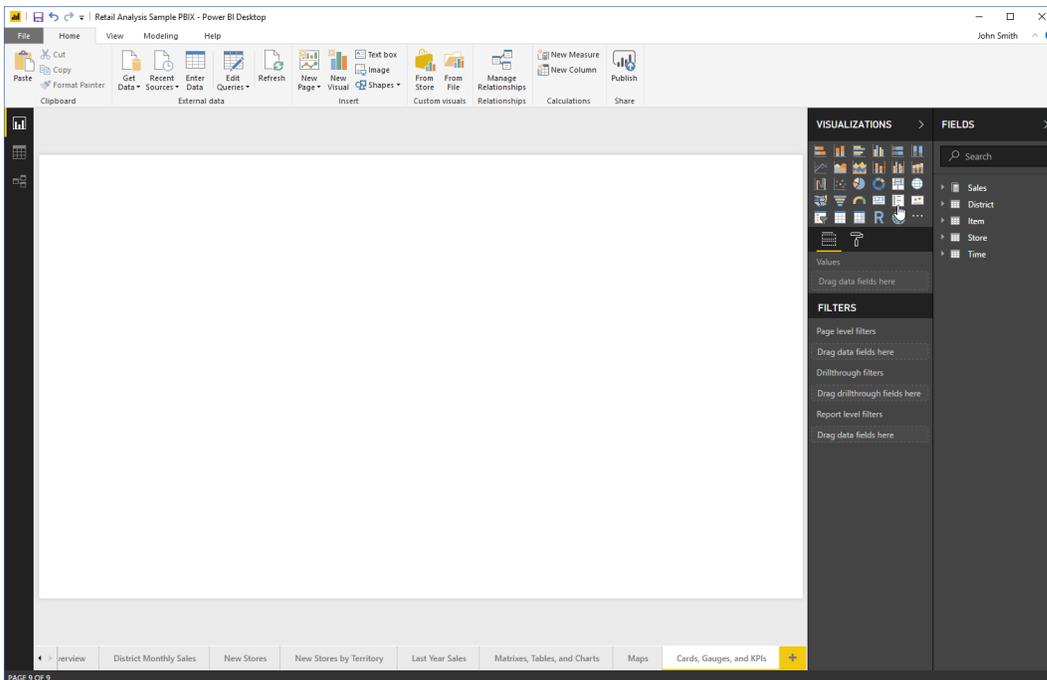
Creating a Card

Cards show one or more rows of data. Like other visualizations, the card data updates if the source is refreshed or the user interacts with other visualizations on the page:

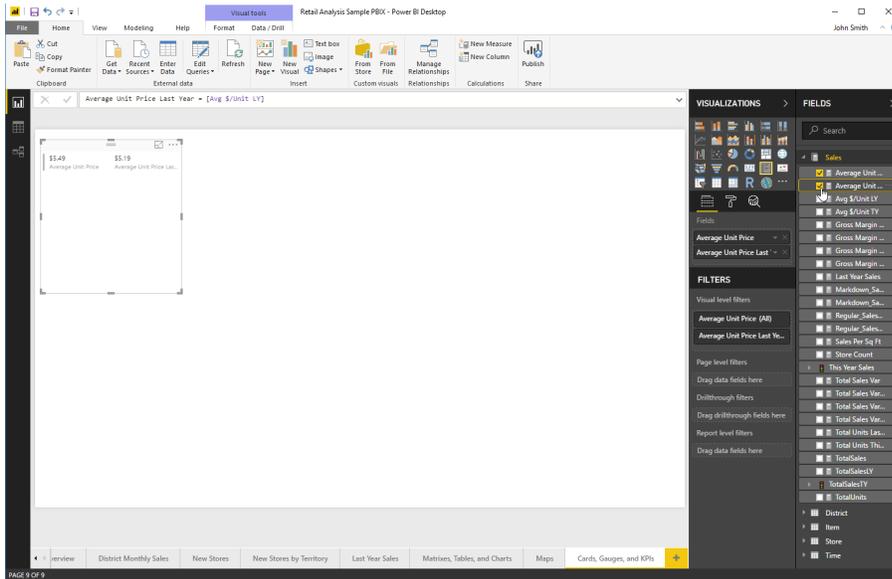


They are excellent for highlighting key points and creating data summaries.

Let's try creating a multi-row card; note that the single-row card icon is to its left.



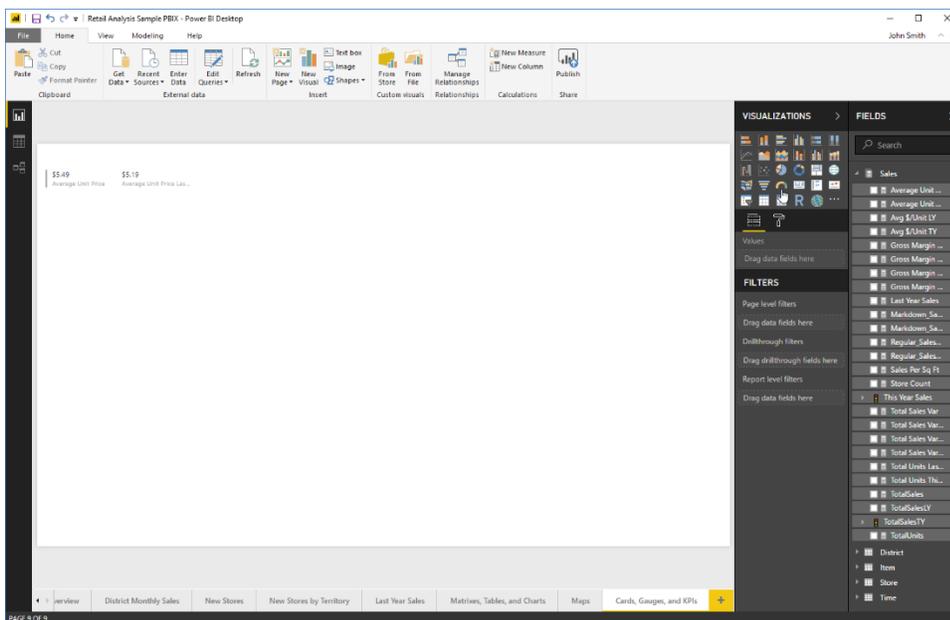
We can now check the fields we would like displayed:



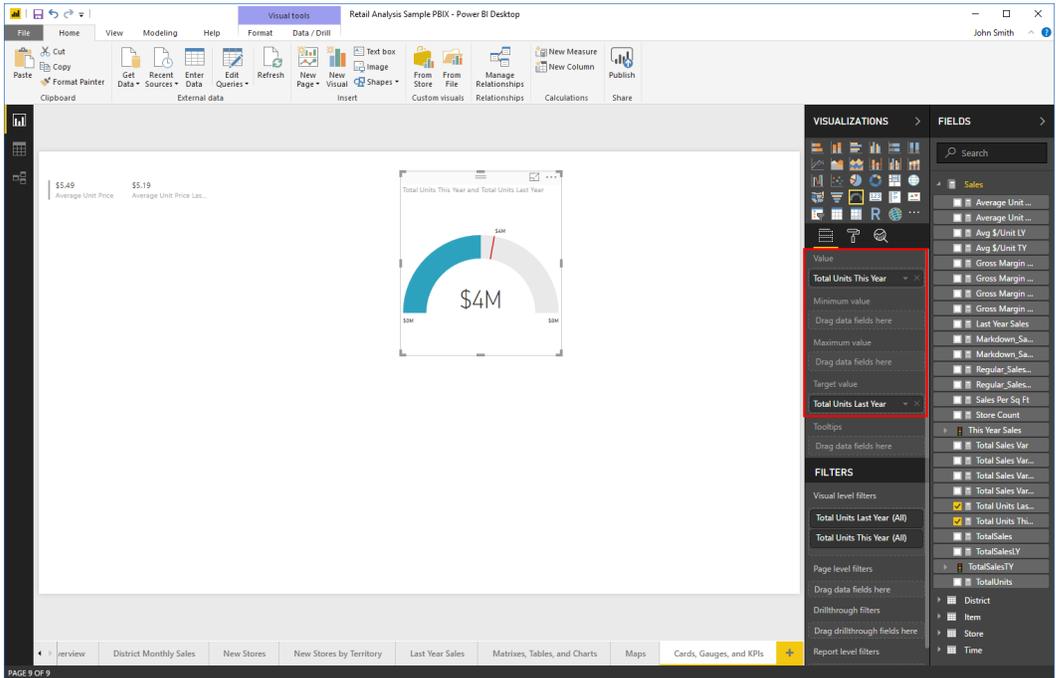
You can use the Filters section of the Visualizations task pane, and the Format tab, to customize the card's display.

Creating a Gauge

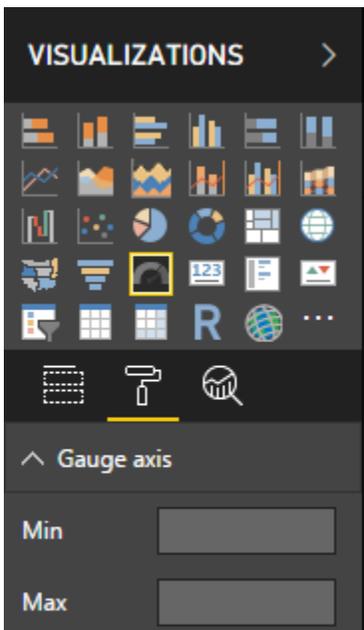
The next visualization we will explore is the **gauge**, which shows progress towards a goal:



Now we can specify the fields to include. Our target value is our total units last year, while the value to be shown is the total units this year:

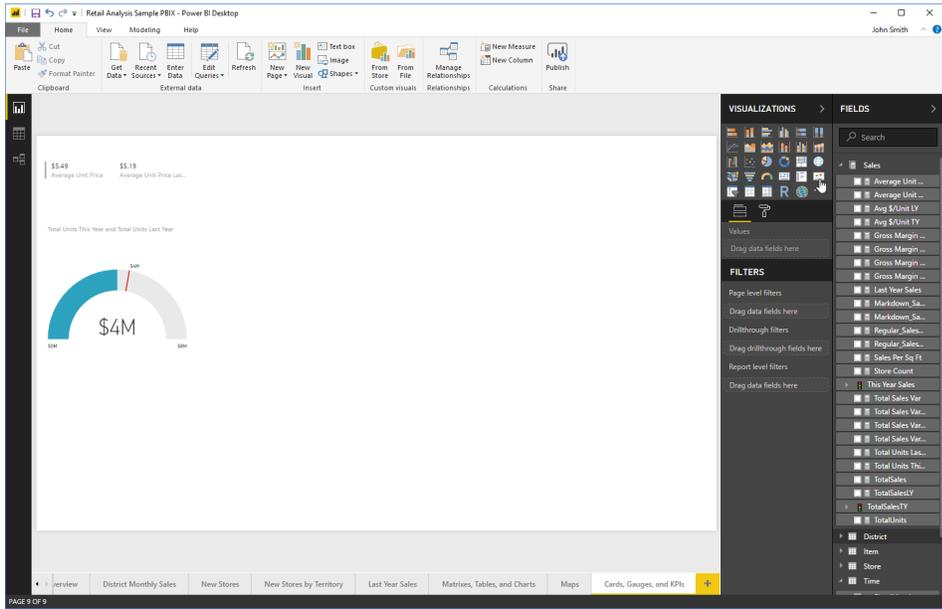


Notice that we can set minimum and maximum values based on other data fields. You can also manually specify these options under the Format tab of the Visualizations task pane:

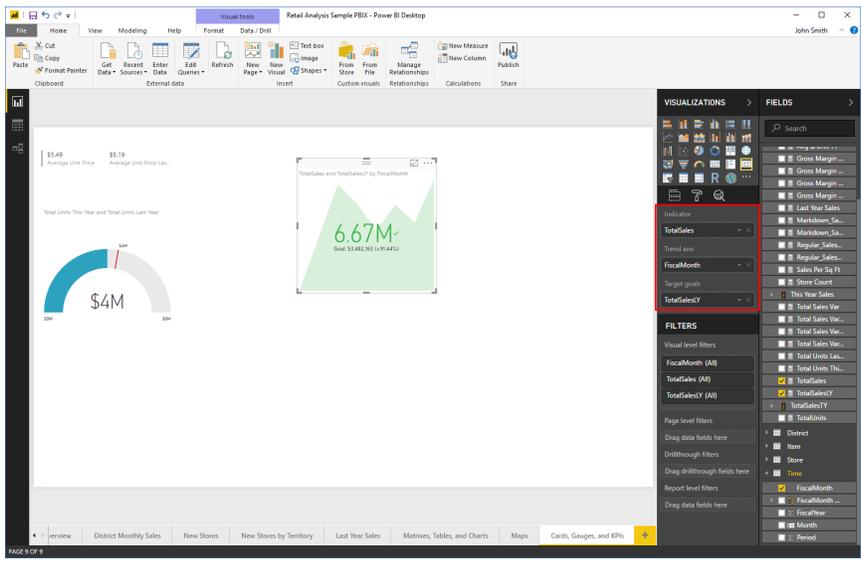


Creating a KPI

A KPI visualization also displays progress towards a goal or the percentage of a value, but with more detail. Let's try creating this visualization to see if we are matching last year's sales:

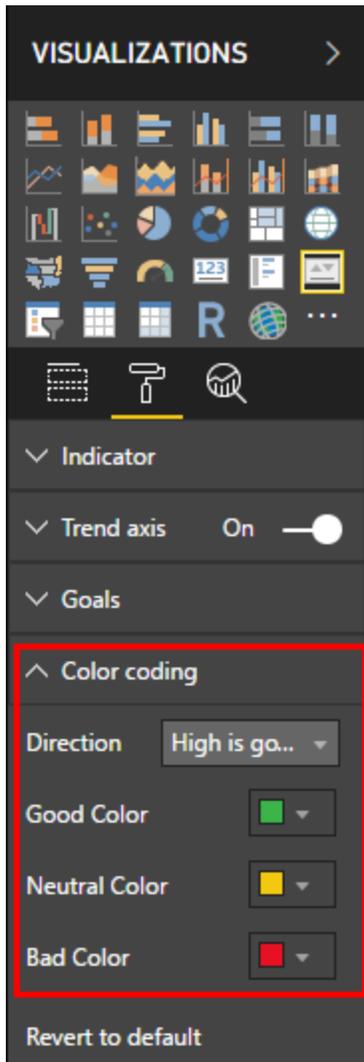


We will add the TotalSales field as the Indicator (the value to measure), the TotalSalesLY field as the “Target goal” (the value to compare against), and the FiscalMonth as the “Trend axis” (to categorize progress):



We can now see the progress, and that we are 91% above this KPI! Note that the KPI is formatted in green because we have met or exceeded it; it would be red if we have not yet met our goal.

This can be changed in the Format tab of the Visualizations pane. You can also set if high or low are the preferred values:



Activity 4-3: Cards, Gauges, and KPIs

In this activity, we will add a gauge and a card to our Company Scorecard report.

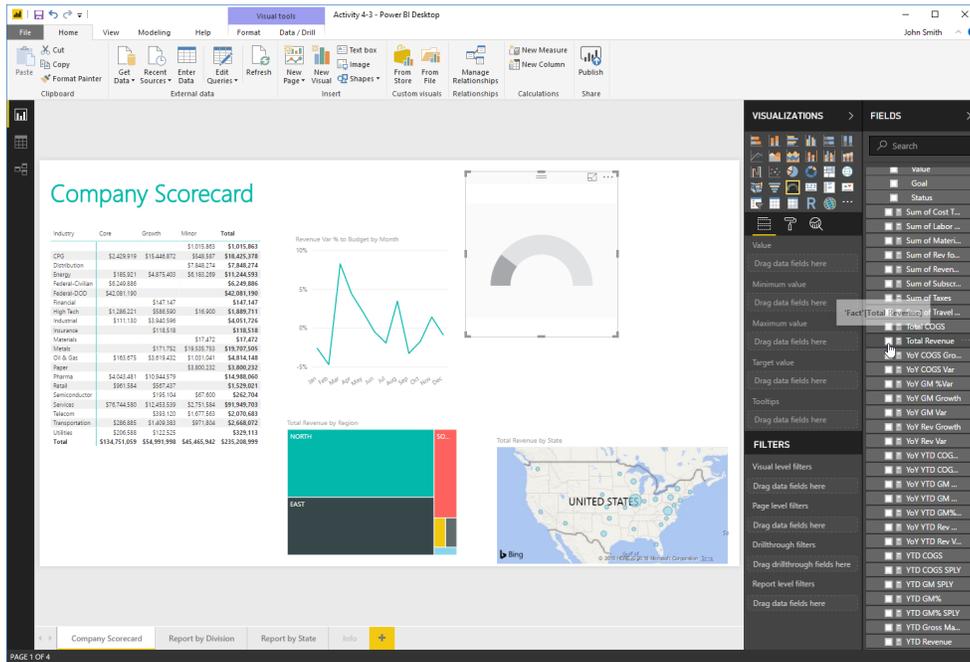
1. Open Power BI and open Activity 4-3:



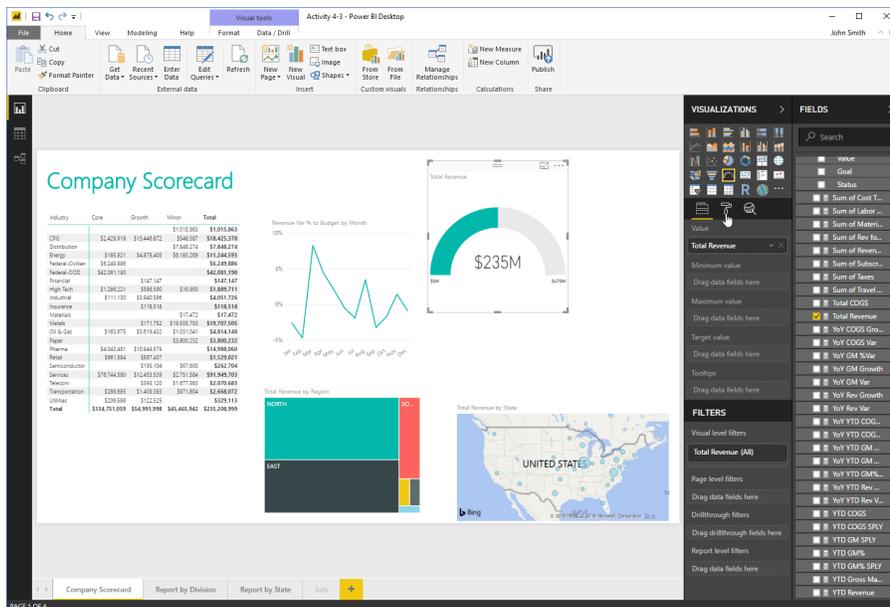
2. First, we want to show the total revenue as compared to last year. We will use a gauge to display this data, so click that icon from the Visualizations task pane:

Industry	Core	Growth	Mean	Total
CPG	\$1,429,919	\$15,448,872	\$948,587	\$18,425,378
Distribution	\$1,985,821	\$4,875,423	\$6,183,289	\$13,244,533
Food/Beverage	\$2,228,550			\$6,203,566
Health-Care	\$42,981,190			\$42,981,190
Finance	\$147,347			\$147,347
High Tech	\$1,286,221	\$849,390	\$18,900	\$1,999,711
Industrial	\$111,130	\$3,840,596		\$4,051,726
Insurance	\$138,818			\$138,818
Manufacturing		\$17,472		\$17,472
Media	\$171,792	\$19,020,733	\$19,797,565	\$39,797,565
Oil & Gas	\$163,871	\$319,843	\$1,031,141	\$4,914,148
Paper	\$4,342,481	\$10,844,373	\$3,800,232	\$19,987,086
Pharma	\$981,884	\$67,427		\$1,529,021
Semiconductor	\$165,324	\$67,800		\$262,704
Services	\$76,744,580	\$7,453,028	\$2,795,954	\$85,993,562
Telcom	\$39,120	\$1,677,169		\$2,076,889
Transportation	\$298,885	\$1,480,280	\$979,834	\$2,568,999
Utilities	\$295,588	\$122,525		\$328,113
Total	\$134,751,059	\$54,991,998	\$45,485,542	\$235,228,959

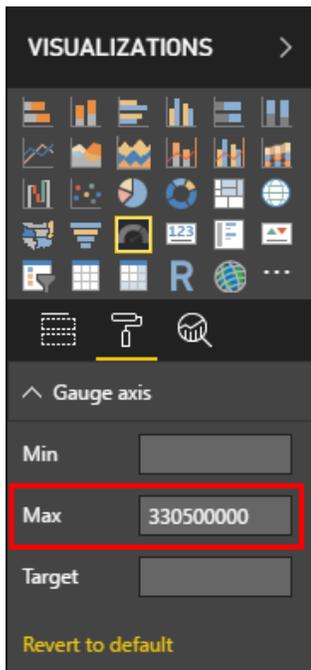
3. Check the Total Revenue field to add it to the gauge:



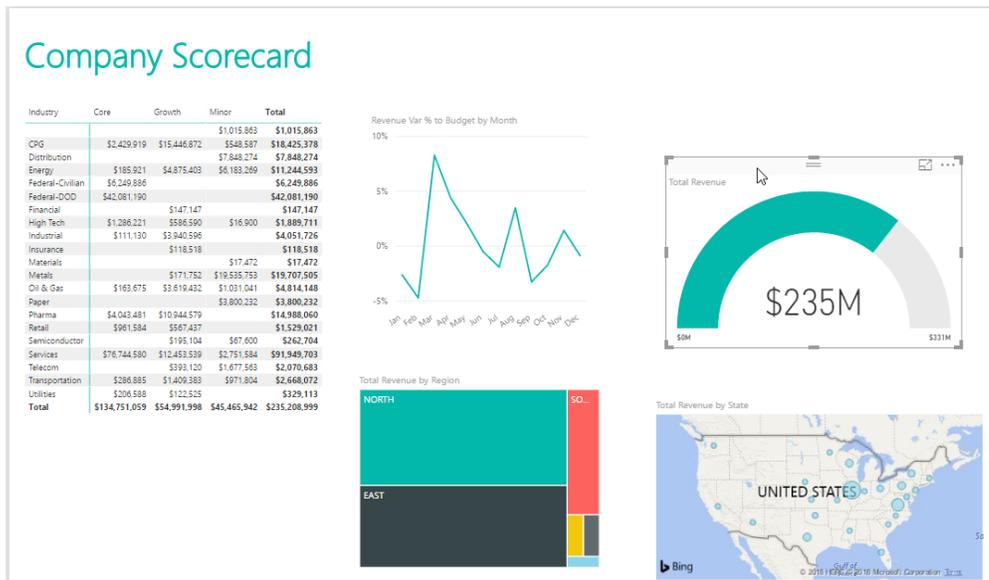
4. We want to compare it to last year's revenue, which is not in this dataset. Click the Format tab of the Visualizations task pane to enter it manually:



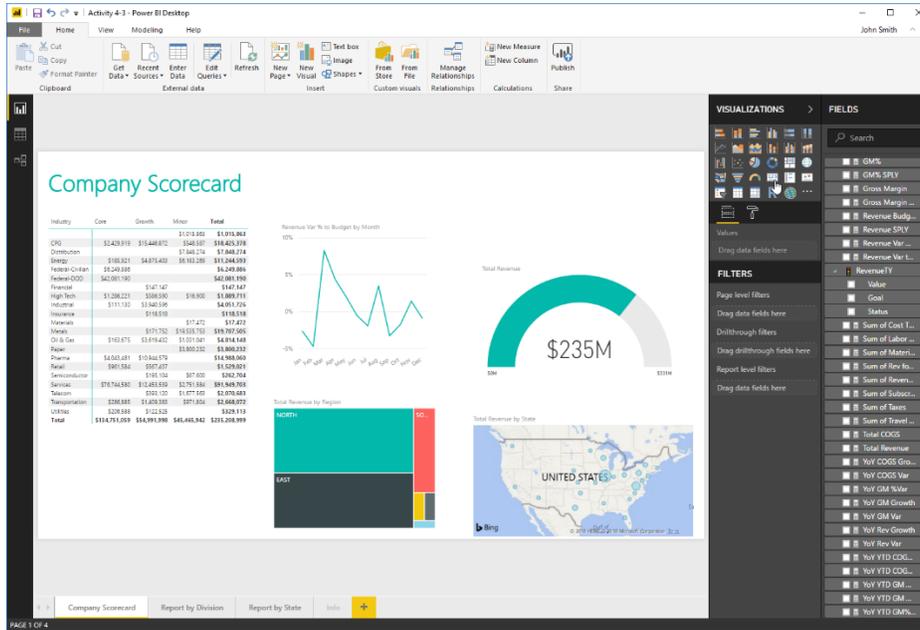
- Expand the "Gauge axis" section and enter "330500000" in the Max field:



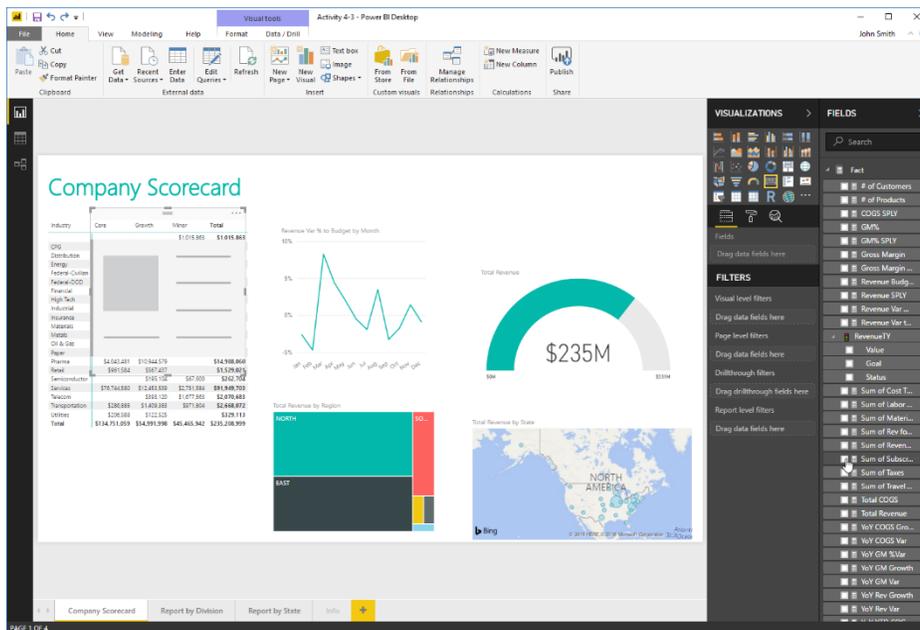
- Resize and position the gauge as shown here:



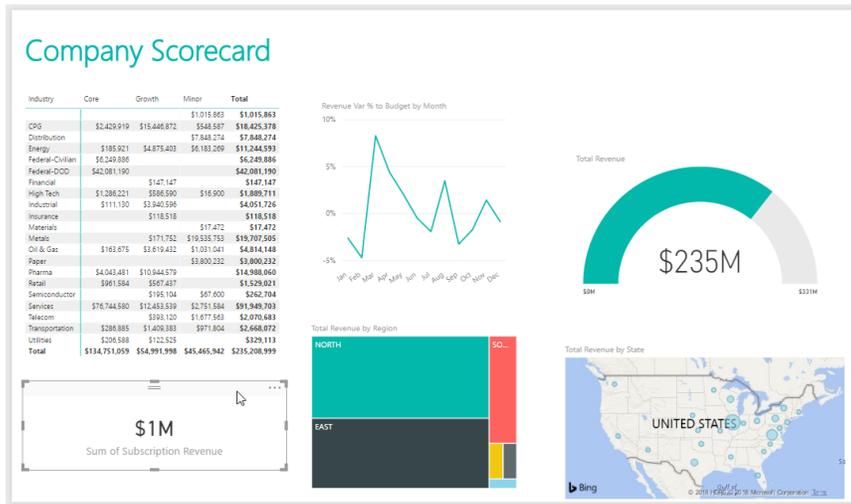
- We also want to quickly see the percentage of revenue from subscriptions. We will use a card to display this data. De-select the gauge and click the Card visualization:



- Check the “Sum of Subscription Revenue” field to add it to this card:



9. Resize and reposition the card as shown here:



10. Save your work as Activity 4-3 Complete and close Power BI.

TOPIC D: Slicers

The final visualization we will explore in this lesson is a bit different than the other types we have looked at. Slicers allow users to filter data on the fly, even with the Power BI web and mobile apps. (They are different from the Filters section of the Visualizations pane only in that users may not have access to these tools in the apps, and slicers are much more user-friendly.) If you have used slicers in Excel, the concept is the same.

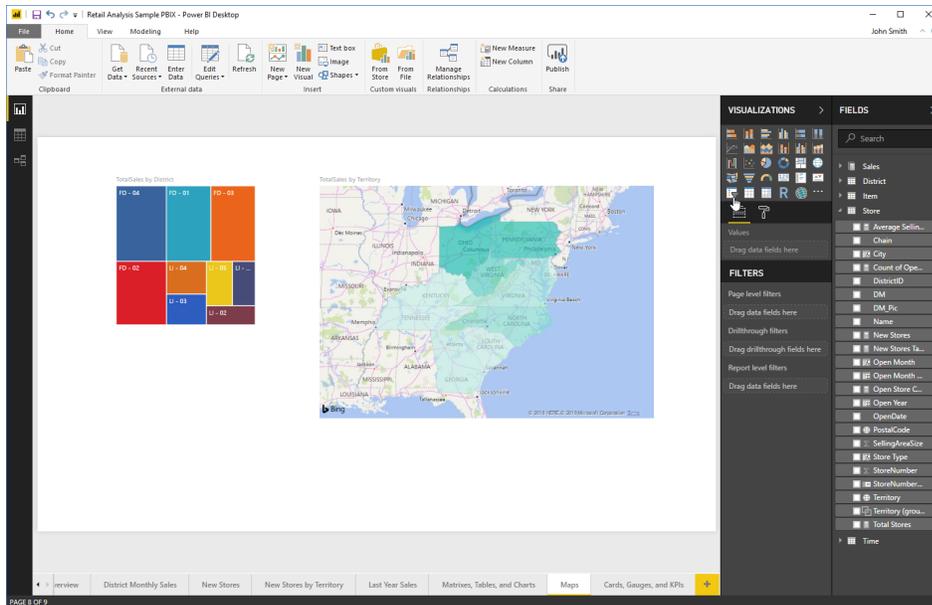
Topic Objectives

In this section, you will learn how to:

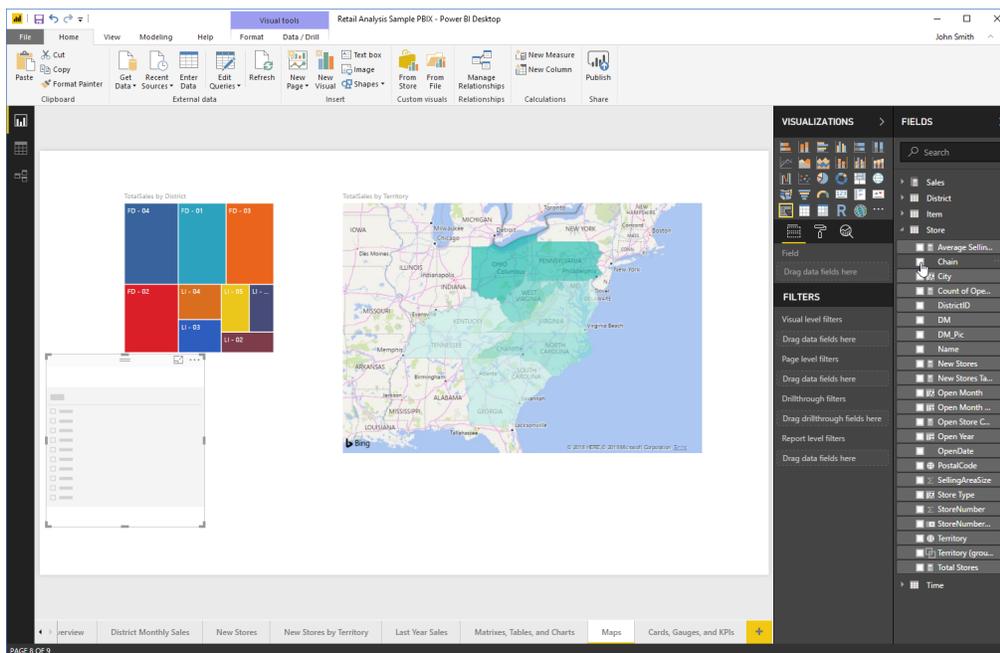
- Create and use slicers
- Customize slicer display
- Change slicer mode and orientation

Creating a Slicer

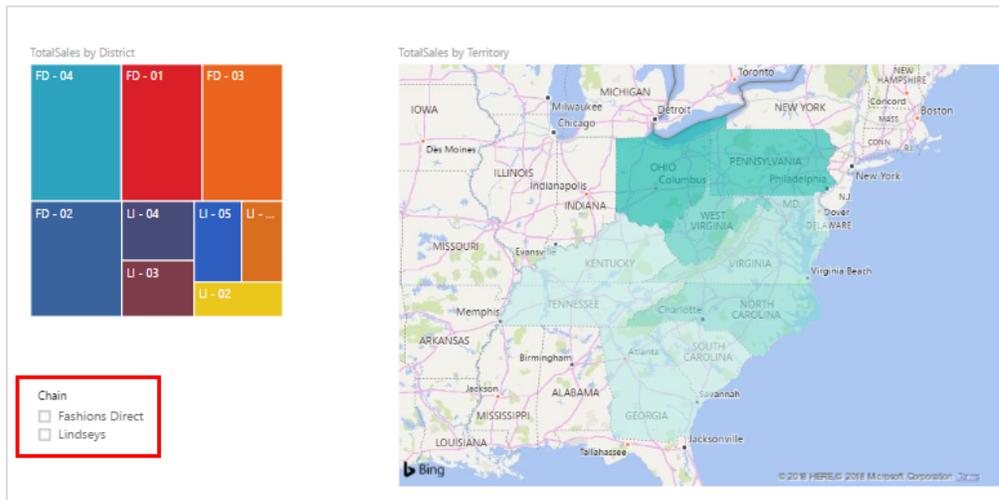
To create a slicer, simply click the related icon from the Visualizations task pane:



Then, choose the slicer field:

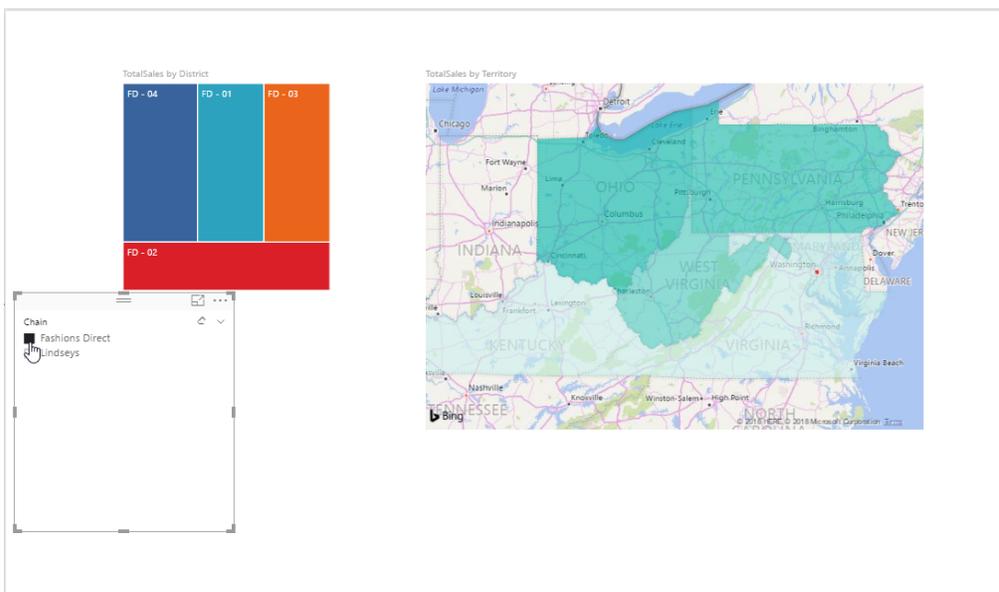


The slicer is now ready to use:



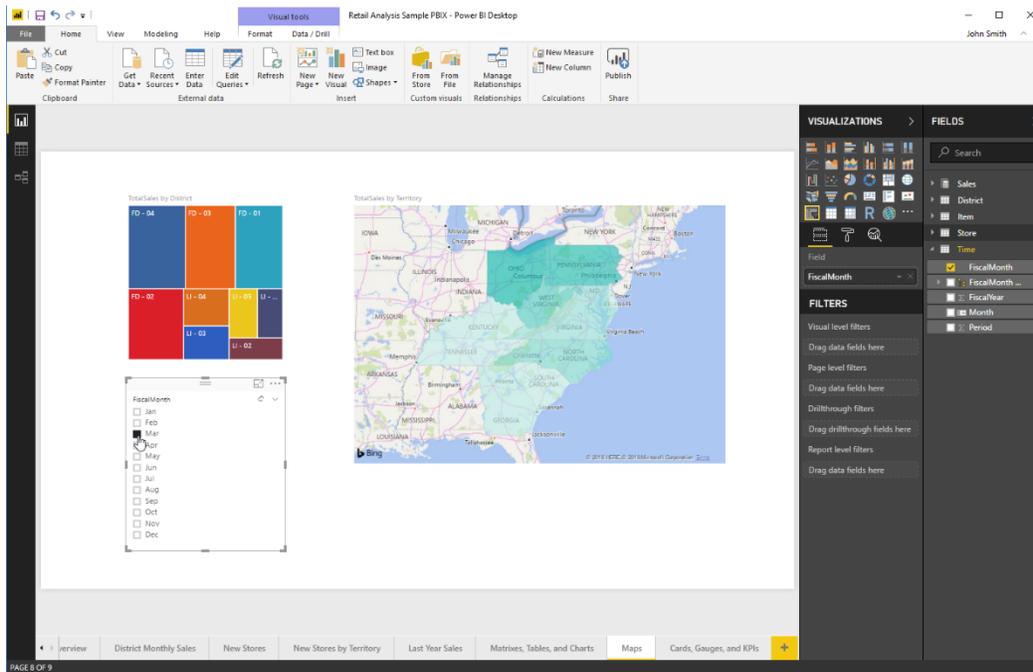
Using Slicers

Using a slicer is as easy as clicking the item you want to filter the data by:

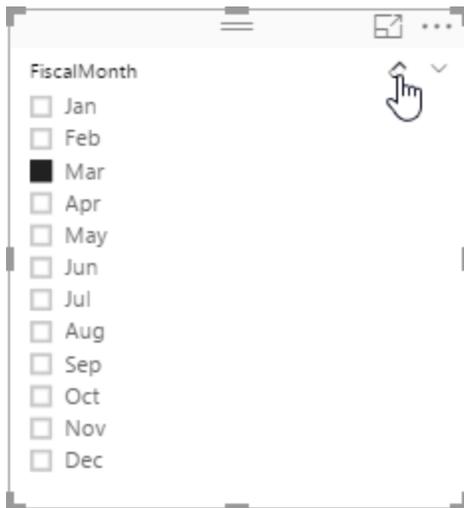


Here, we have chosen to view data only for the Fashions Direct chain.

Here is another example, where we have filtered sales data by month:

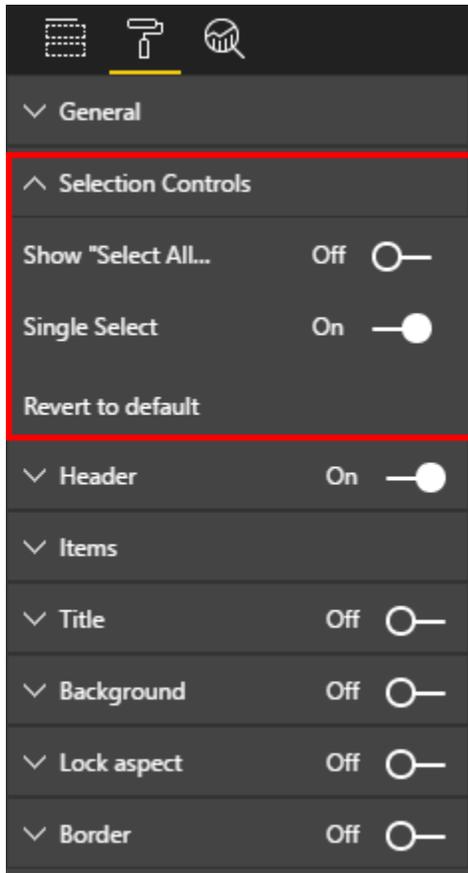


To clear the filter, uncheck the box or click the Clear Selections command in the top right corner of the slicer:



Customizing Slicer Display

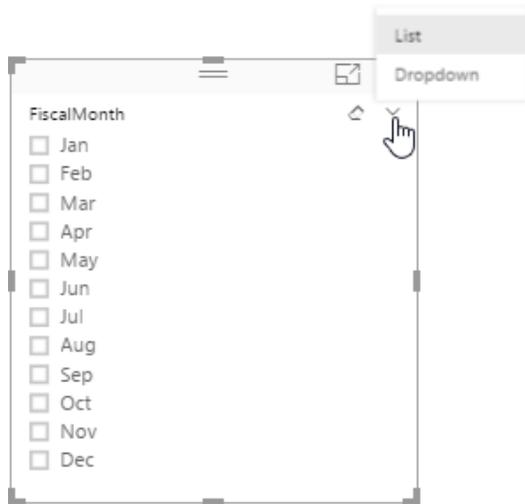
By default, users can only select one item from a slicer at a time. This option can be changed in the Format tab of the Visualizations task pane by setting the Single Select option to Off:



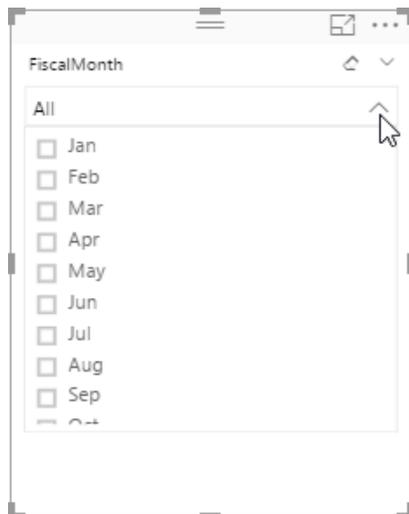
An option to show a "Select All" control is also available here, along with many other formatting choices.

Changing Slicer Mode

By default, slicer values are shown as a list, where the user checks the data they want to view. However, you can change this display to a dropdown list. Click the arrow in the top right corner of the slicer and click Dropdown:



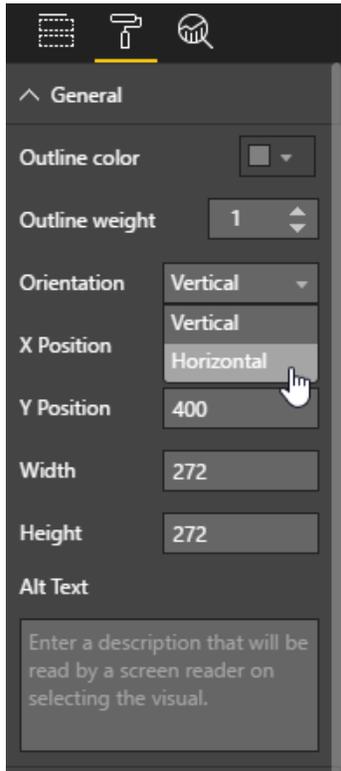
Here is how the slicer now appears:



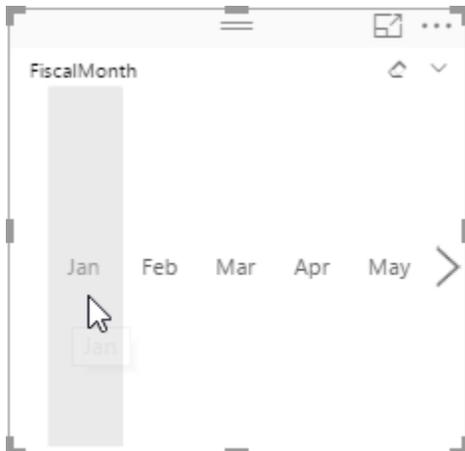
Note that, however, it works in the same way. You can change it back to a list at any time by clicking the arrow icon and clicking List.

Changing Slicer Orientation

You can also display a slicer as a list of buttons, allowing the user to click the items they want to see. Click the Format tab in the Visualizations task pane, click the Orientation menu, and choose Horizontal:



Here is how our slicer now looks; we can click any month icon to see its data. Note the arrows that allow you to view more buttons:



Activity 4-4: Slicers

In this activity, we will add the final element to our Company Scorecard report: a slicer.

1. Open Power BI and open Activity 4-4:



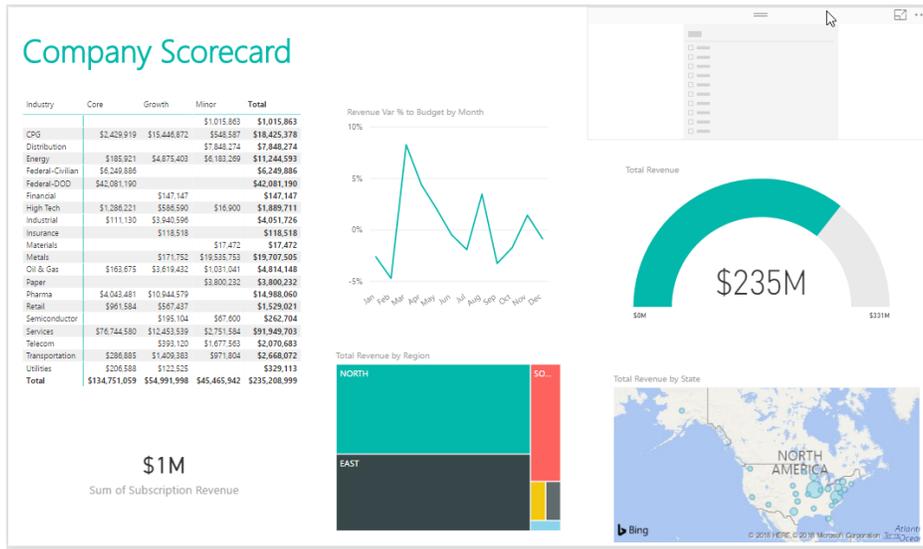
2. Click the Slicer icon from the Visualizations task pane:

The screenshot displays the Microsoft Power BI Desktop interface. The main report area is titled 'Company Scorecard' and contains several visualizations:

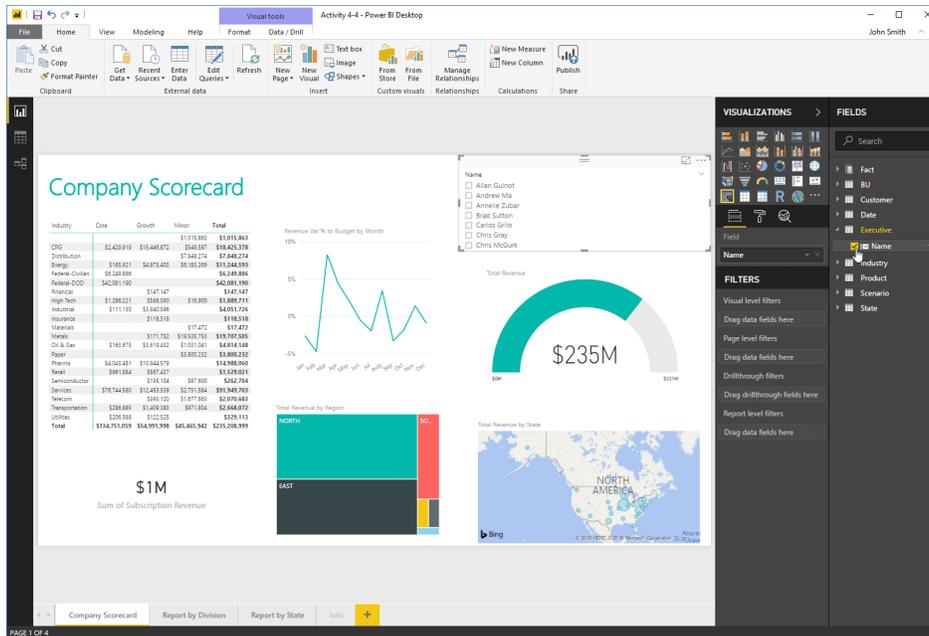
- Table:** A table with columns for Industry, Size, Growth, Minar, and Total. The 'Total' column values range from \$1,015,903 to \$114,791,029.
- Line Chart:** 'Revenue Var % to Budget by Month' showing percentage fluctuations over time.
- Gauge Chart:** 'Total Revenue' showing a value of \$235M against a target of \$339M.
- Bar Chart:** 'Total Revenue by Region' with categories for NORTH and EAST.
- Map:** 'Total Revenue by State' showing a map of North America.

The 'VISUALIZATIONS' task pane on the right side of the screen shows various chart icons. The 'Slicer' icon, which looks like a vertical bar with a horizontal line, is highlighted with a mouse cursor.

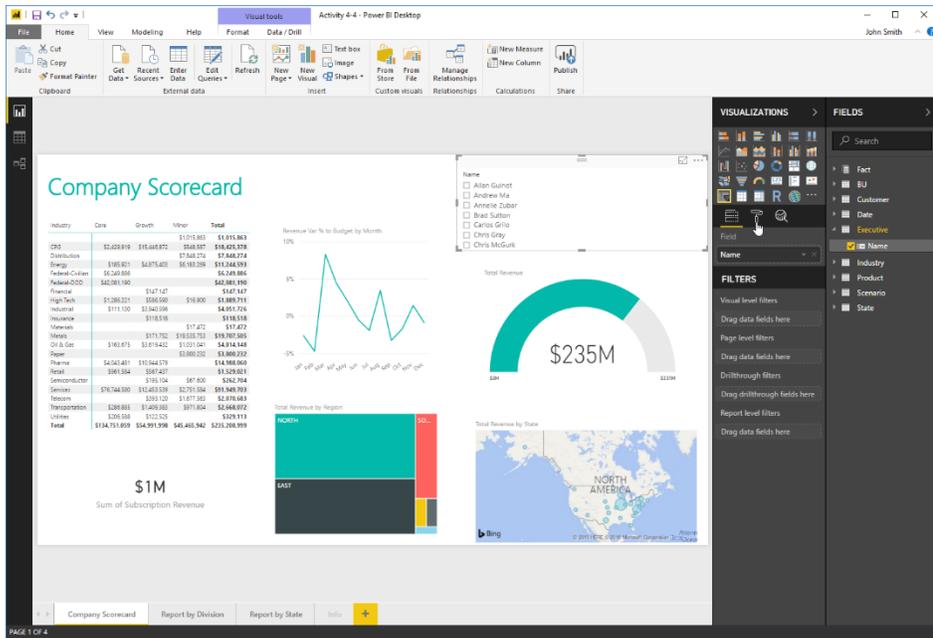
3. Resize and reposition it as shown here:



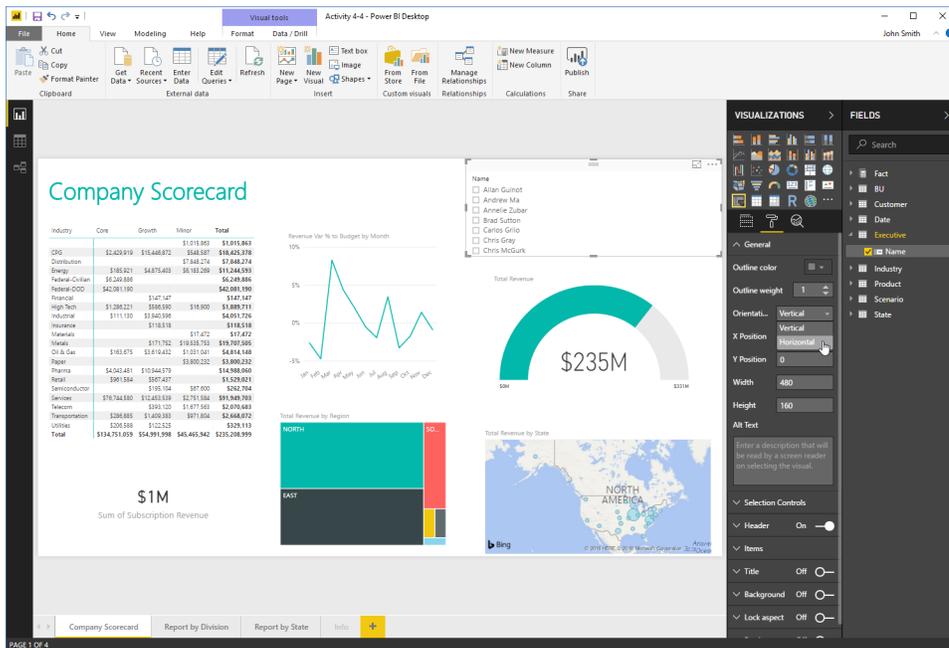
4. Add the Name field from the Executive group to the slicer:



- Now, let's customize the slicer display. Click the Format tab in the Visualizations task pane:



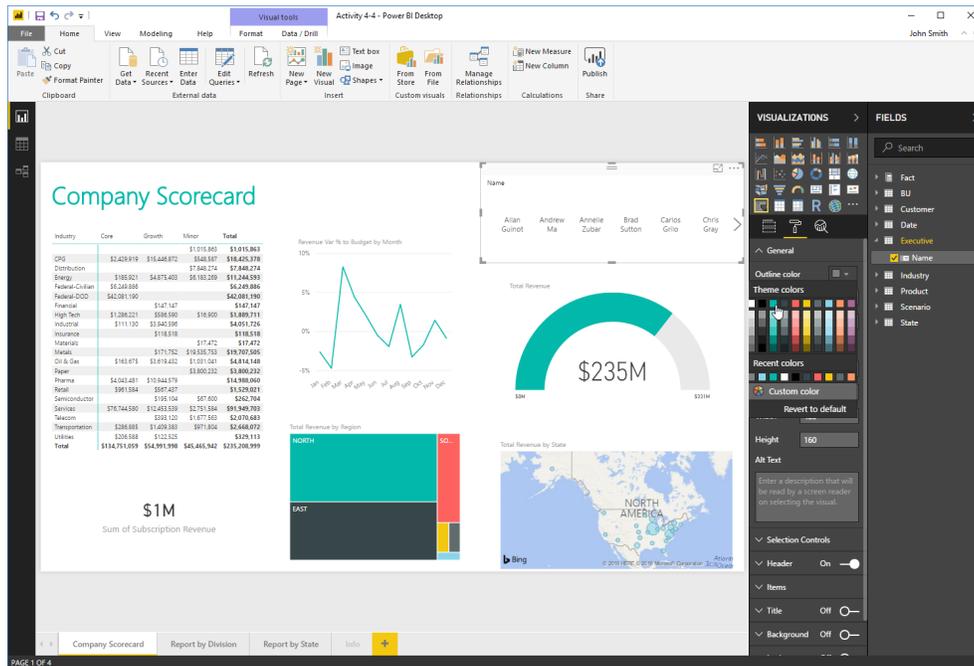
- Expand the General category. Change the orientation from Vertical to Horizontal:



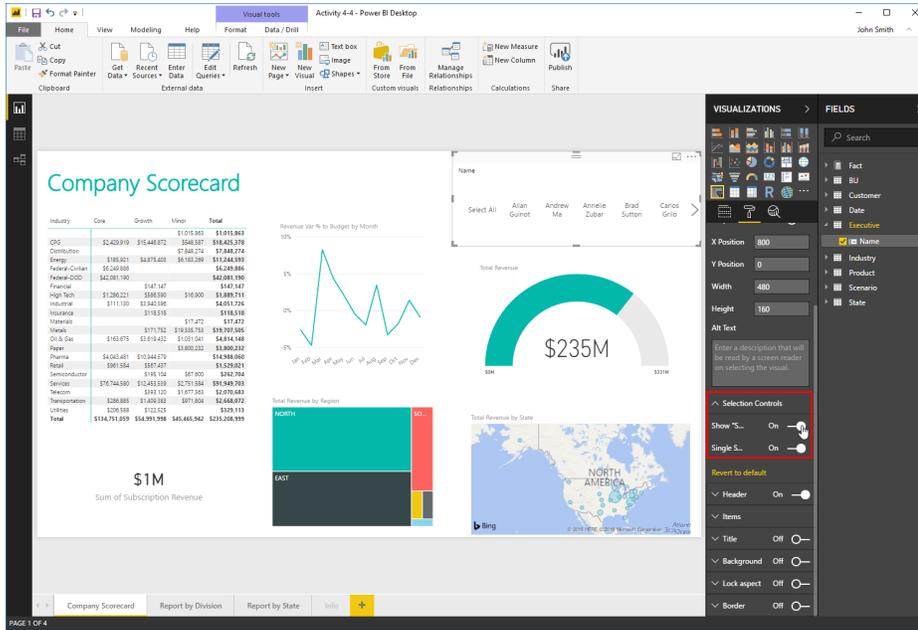
7. This will display the slicer as a row of buttons:



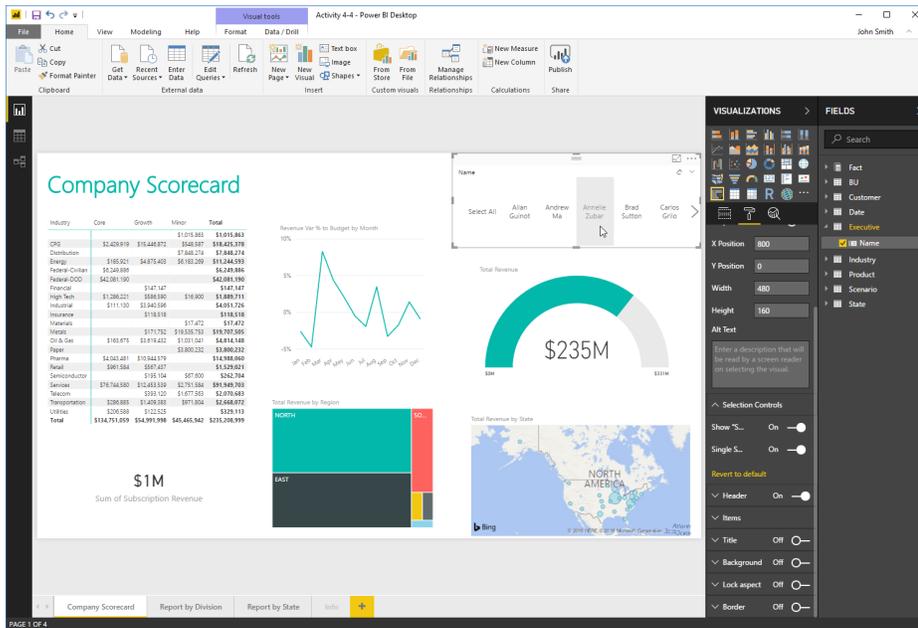
8. Click the “Outline color” color picker. Choose the top shade of teal:



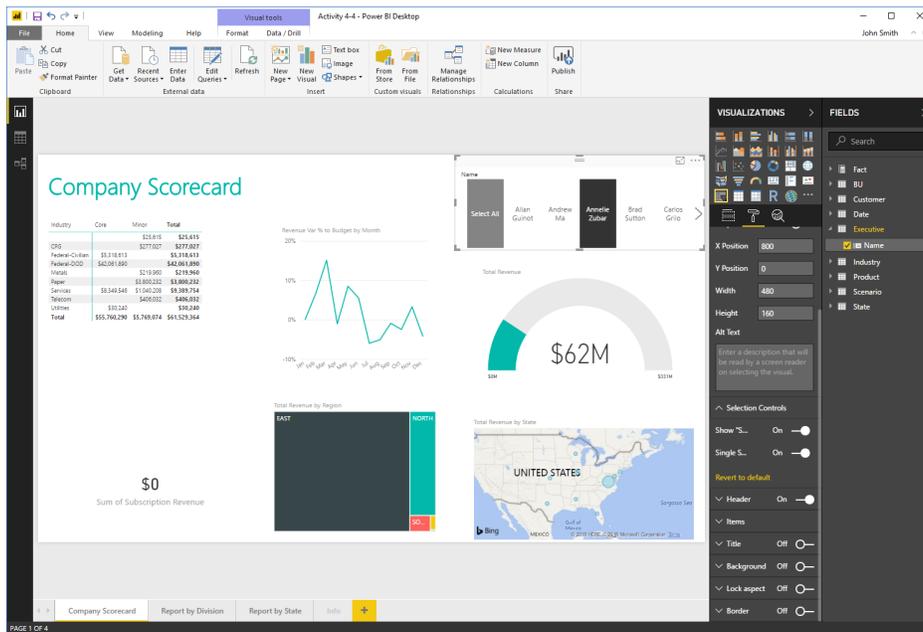
- Now, scroll down in the pane and expand the Selection Controls section. Ensure both options are set to “On:”



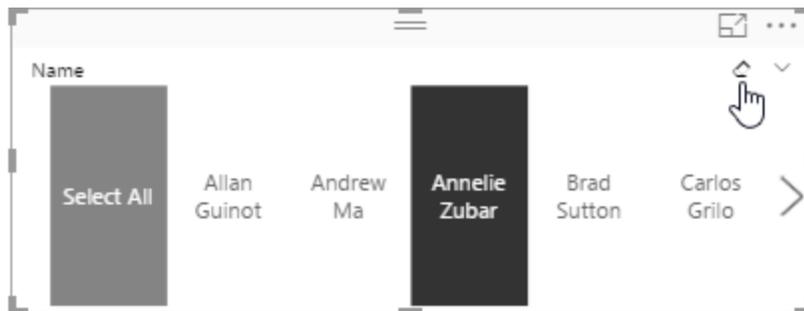
- Now, try clicking one of the executives' names from the new slicer:



11. Observe how the data changes:



12. Click the Clear Selection icon in the slicer:



13. Save your work as Activity 4-4 Complete and close Power BI.

Summary

In this lesson, we looked at the different kinds of visualizations available in Power BI. You should now feel comfortable creating and customizing all types of visualizations.

Review Questions

1. What is the process for creating any kind of visualization?
2. How do you display a slicer as a list of buttons?
3. If you want to show the cumulative effect of positive or negative values, what chart type would you choose?
4. What is the difference between the KPI and gauge visualizations?
5. What are the two types of geographical map visualizations?

LESSON 5: INTRODUCTION TO THE POWER BI WEB APP

Lesson Objectives

In this lesson you will learn how to:

- Use the Power BI web app
- Connect to data sources from the Power BI app
- Use workspaces, dashboards, reports, and other Power BI app features

TOPIC A: Getting Started

So far, we have focused on the Power BI desktop client. However, Power BI also features a web app that is very useful for users who primarily need to view reports (rather than modifying the underlying data or report structure). In this topic, we will begin exploring the Power BI web app.

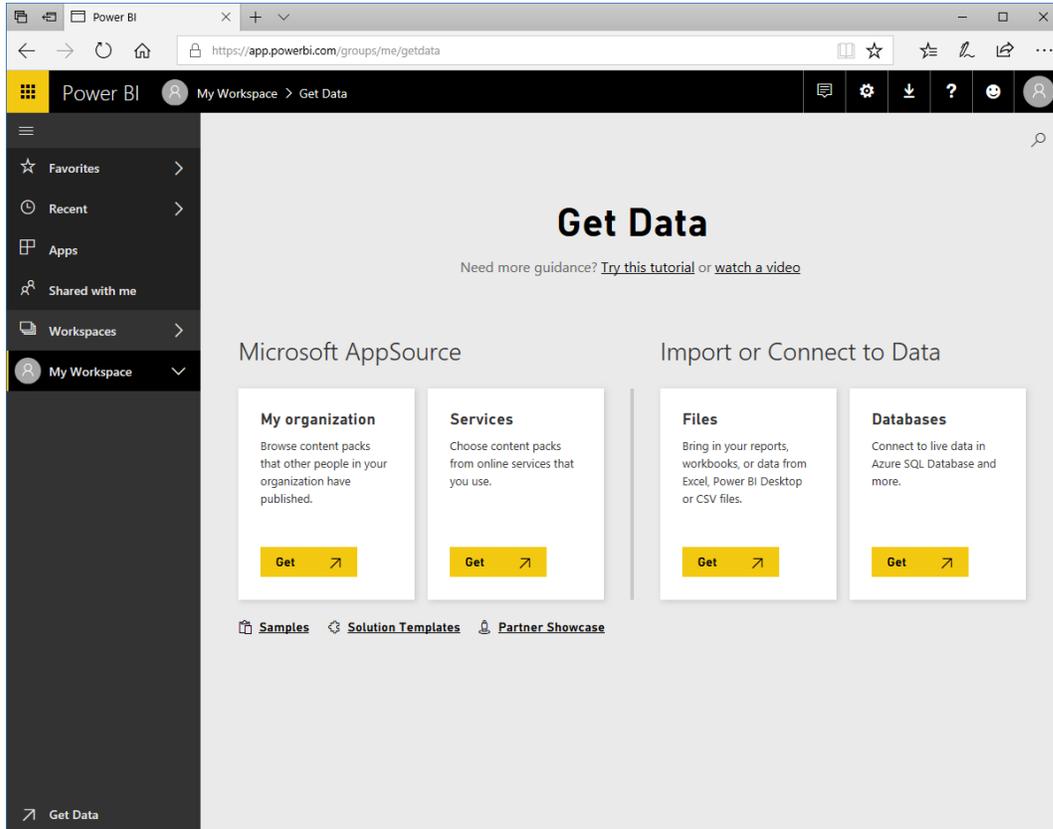
Topic Objectives

In this section, you will learn how to:

- Access and use the Power BI web app
- Identify differences between the web app and desktop client

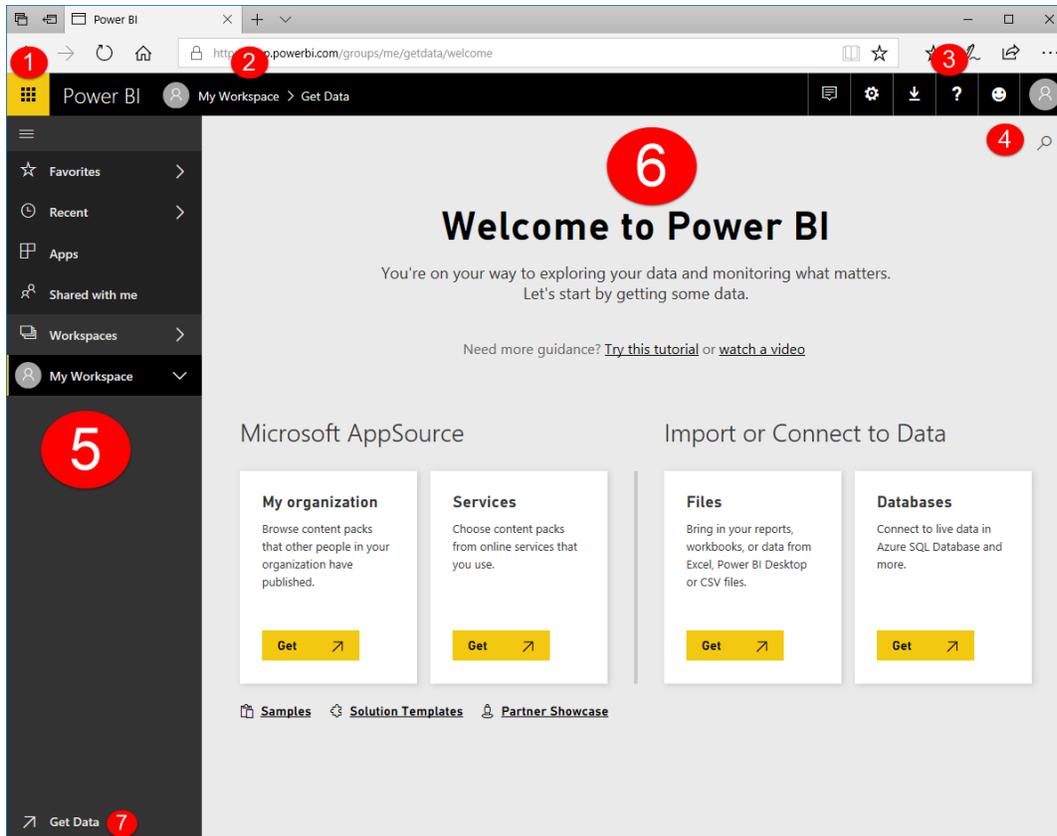
Opening the Power BI Web App

To start, enter <https://app.powerbi.com> into your browser's address bar. You will be prompted to sign in and then the app will be displayed:



The Web App Interface

Let's take a closer look at the web app interface:



1: App Launcher

Click the yellow icon to see shortcuts to other Office 365 apps.

2: Breadcrumb Trail

Shows where you currently are in Power BI. Click a location to go to it.

3: Office 365 Commands

From left to right:

- View Office 365 notifications
- Manage Power BI settings
- Download Power BI tools
- Access help and support resources

- Give feedback
- View your Office 365 profile

4: Search field

Search Power BI data.

5: Navigation pane

Access different parts of the Power BI app. Click a chevron to expand sub-categories; click the down arrow to collapse them. All workspaces will be displayed in this pane, with the related dashboards, reports, workbooks, and datasets listed as sub-items. Simply expand the desired workspace and then click the item you want to view.

6: Canvas

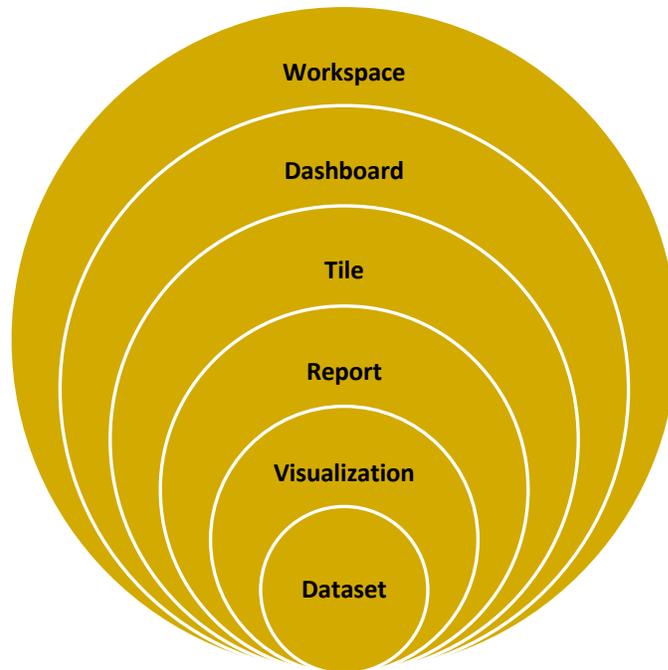
Visualizations in the current item (dashboard, report, etc.) will be shown here.

7: Get Data

Use this link to quickly import data sources. Samples can also be accessed from here.

Web App Building Blocks

Let's review the elements of Power BI:



The Power BI web app focuses on **dashboards**, which allow you to collect visualizations from different reports into a single location. Each dashboard is made up of **tiles**, which are simply visualizations linked back to the original report. As well, dashboards can be organized using **workspaces**.

Key Differences

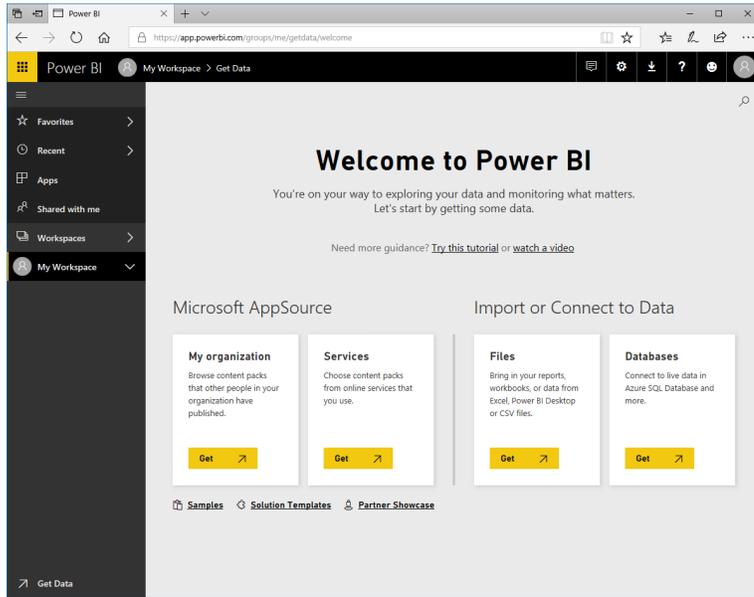
To summarize, here is a list of some of the key differences between the Power BI desktop and web clients.

Power BI Desktop Client	Power BI Web App
<ul style="list-style-type: none">• Runs off a single computer• Designed for managing data, building reports, and viewing reports• No sharing features• Updated monthly	<ul style="list-style-type: none">• Cloud-based (can be accessed from anywhere)• Designed for viewing and managing reports• Extensive sharing features and integration with Office 365• Updated weekly

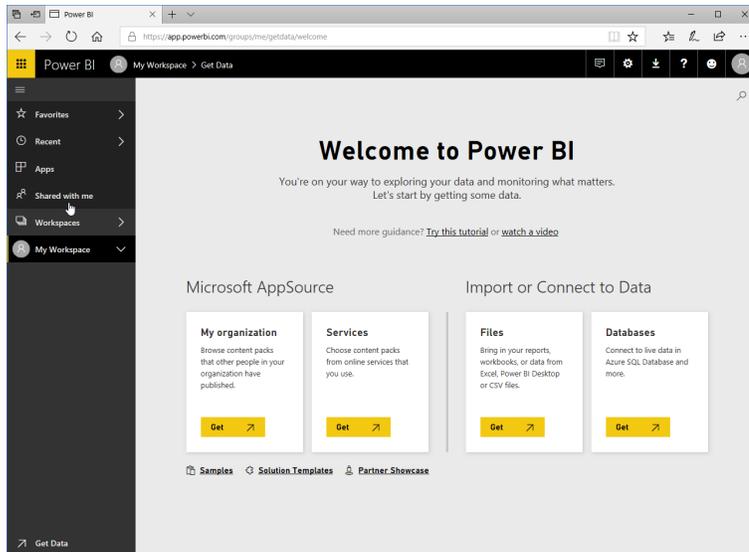
Activity 5-1: Getting Started

In this activity, you will open and explore the Power BI web app.

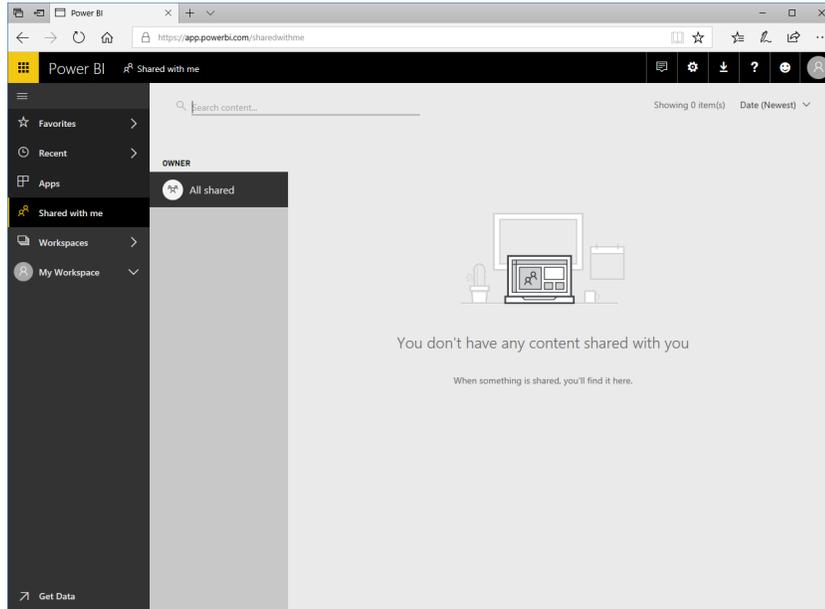
1. Launch Microsoft Edge and navigate to <https://app.powerbi.com/>. Sign in when prompted to see the Power BI web app:



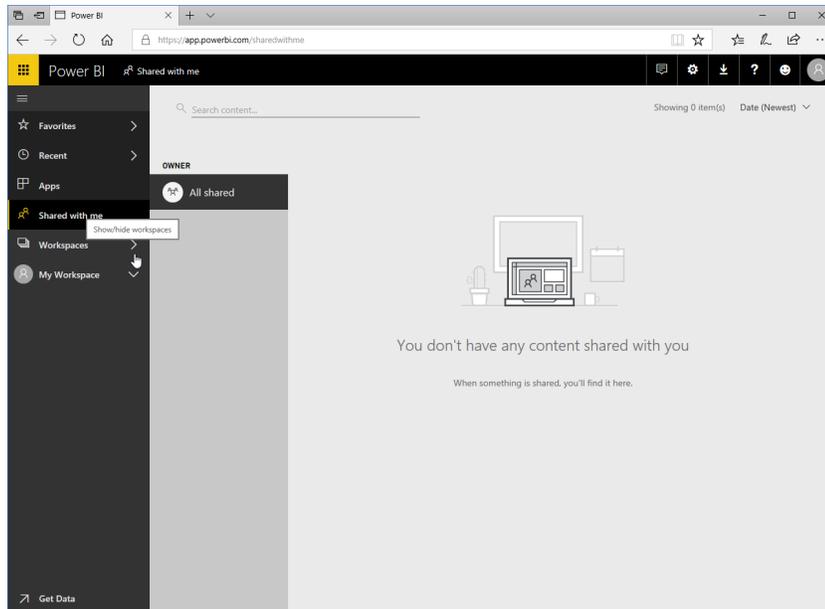
2. Click the “Shared with me” category from the navigation pane:



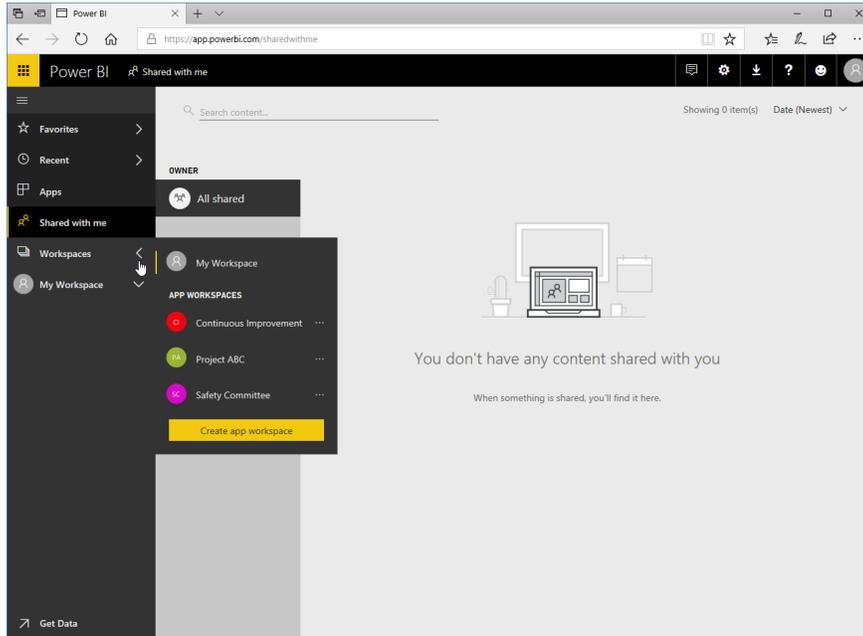
3. Do you have any shared items?



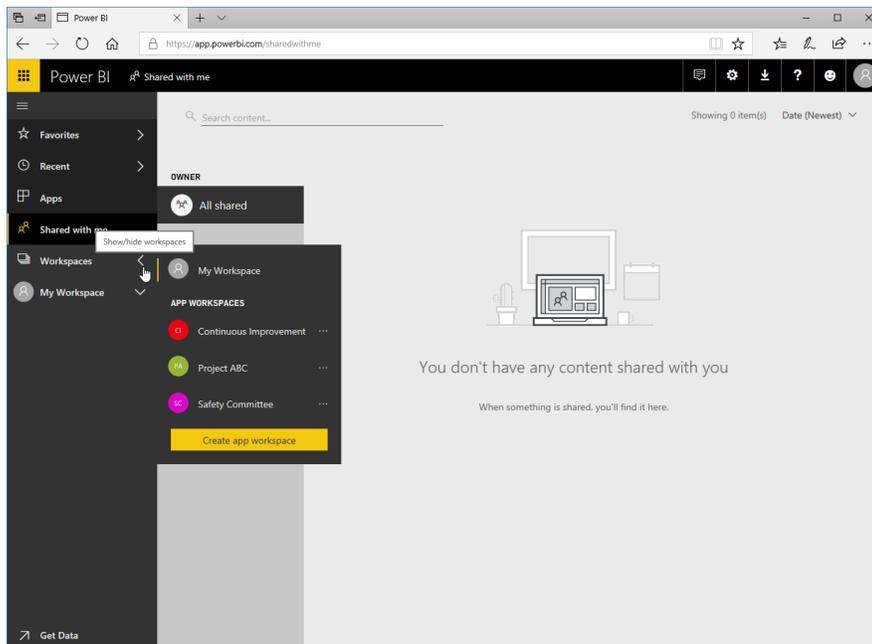
4. Now, click the chevron next to the Workspaces category:



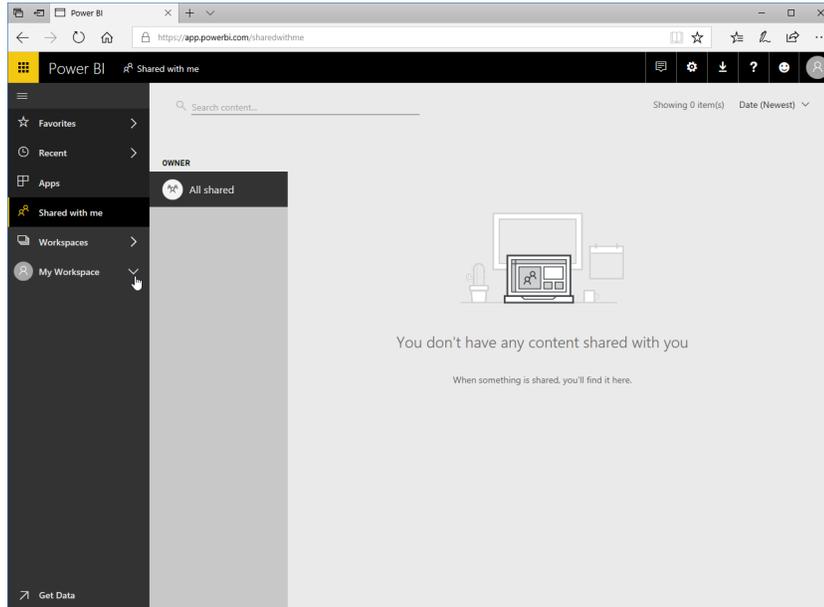
5. What workspaces are available to you?



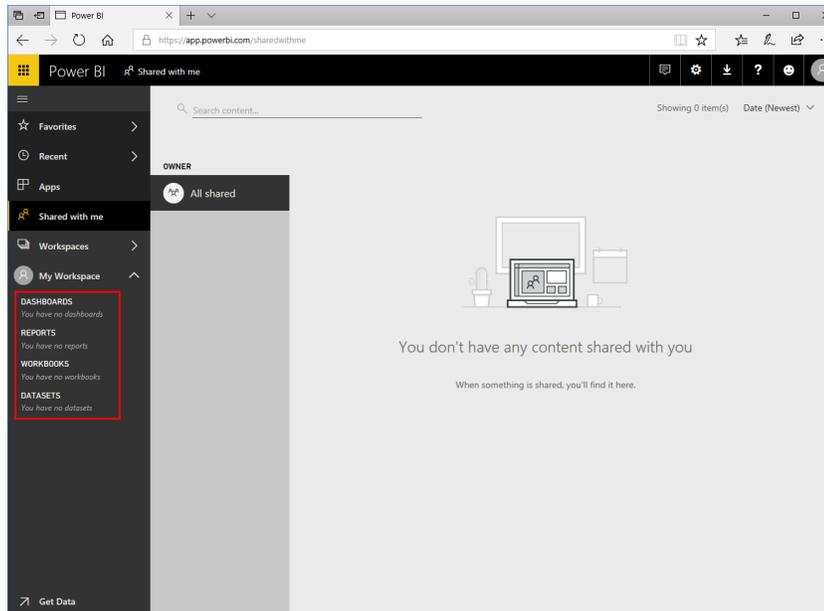
6. Click the chevron again to hide the Workspaces sub-menu:



7. Expand the “My Workspace” category:



8. Do you have any items in your workspace?



9. This activity is now complete. Leave your browser open for the next activity.

TOPIC B: Connecting to Data Sources with the Power BI Web App

You can also connect to data sources directly with the Power BI web app. It also offers some unique options, like sample data and content packs.

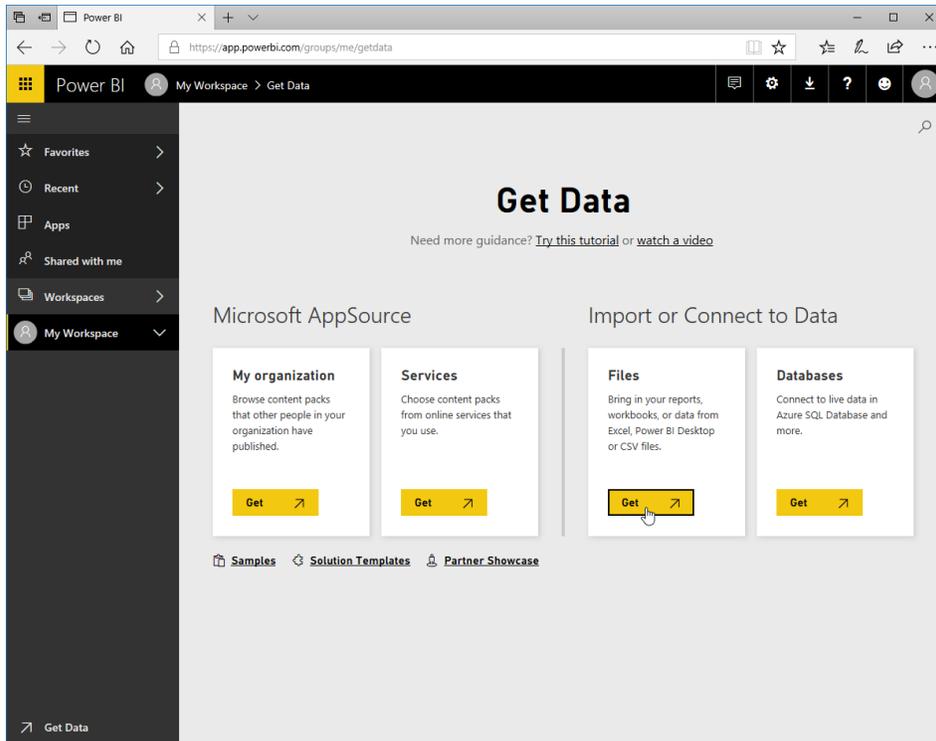
Topic Objectives

In this section, you will learn how to:

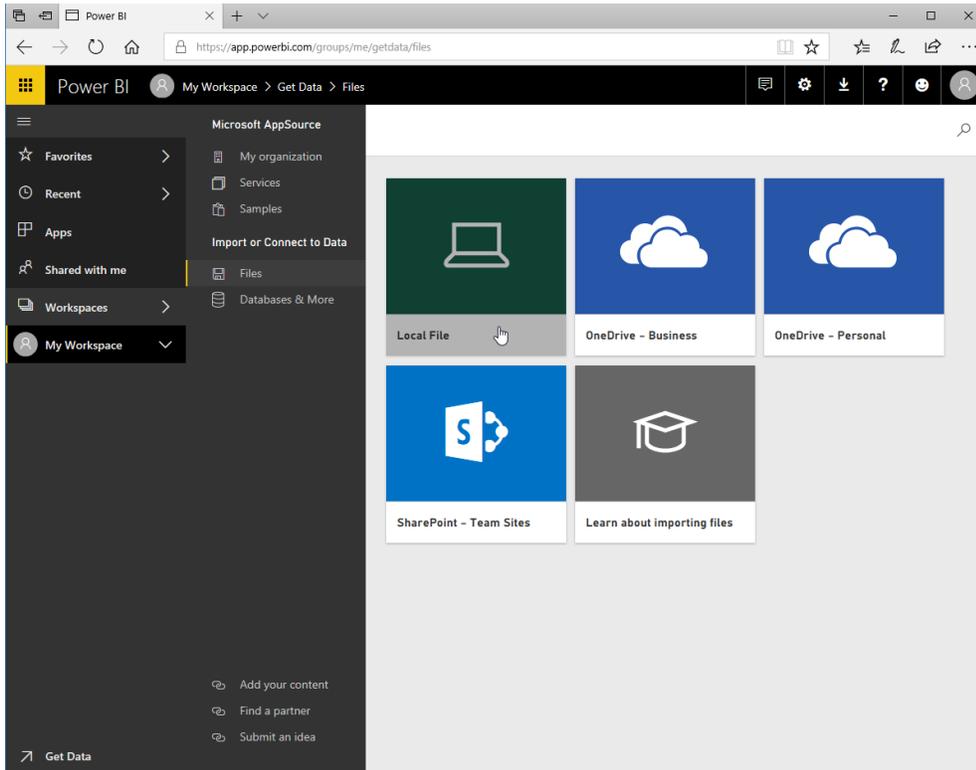
- Connect to local data files, live data sources, content packs, and samples

Connecting to Local Data

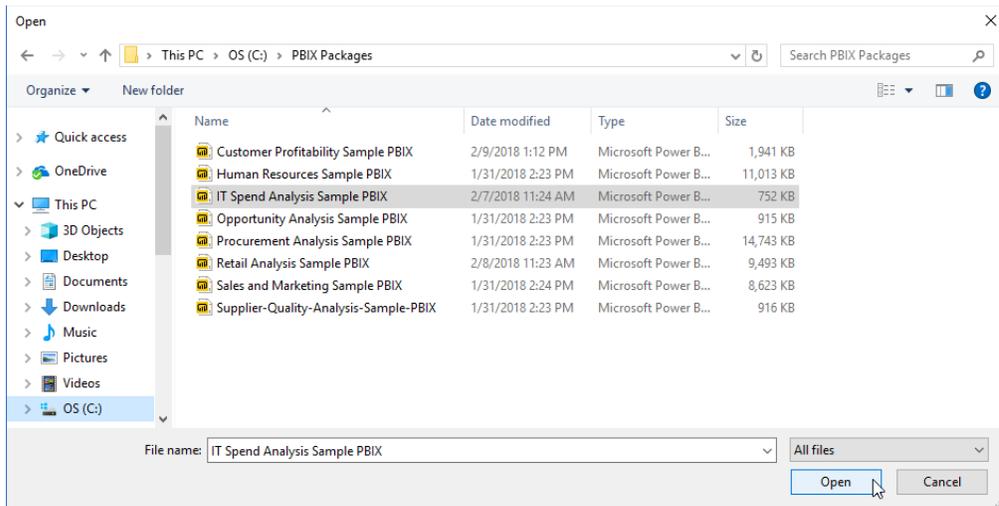
To connect to a file on your PC (such as an Excel workbook or Power BI desktop file), click the Get link in the Files section of the Start screen:



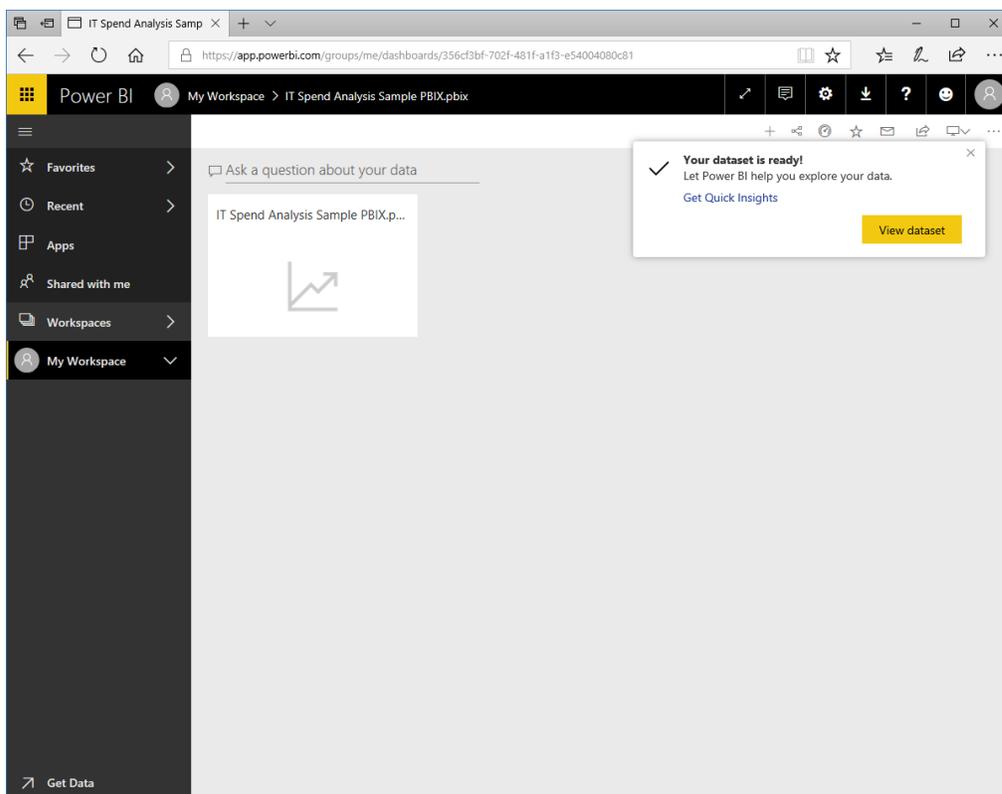
Now, click Local File:



Now, browse to the file, select it, and click Open:

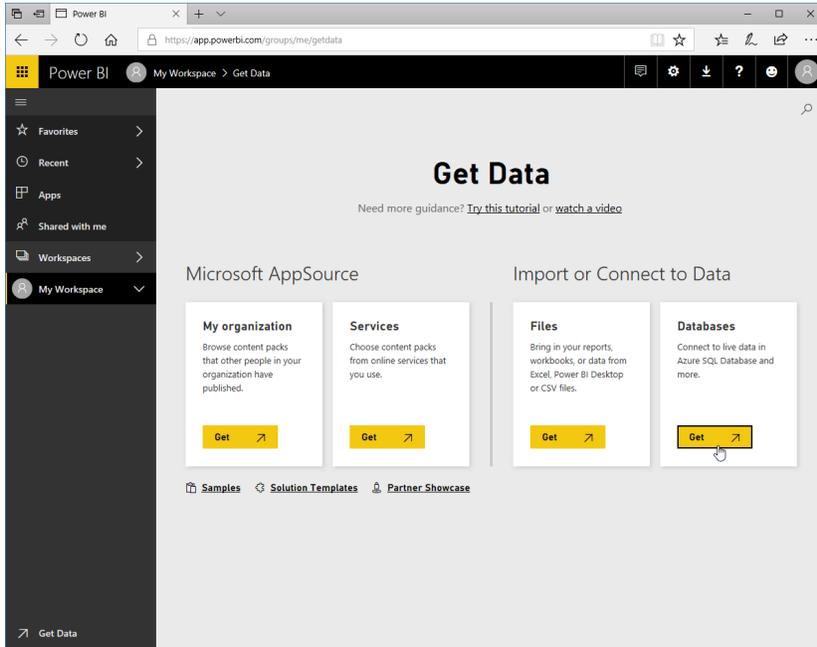


The data will now be connected:

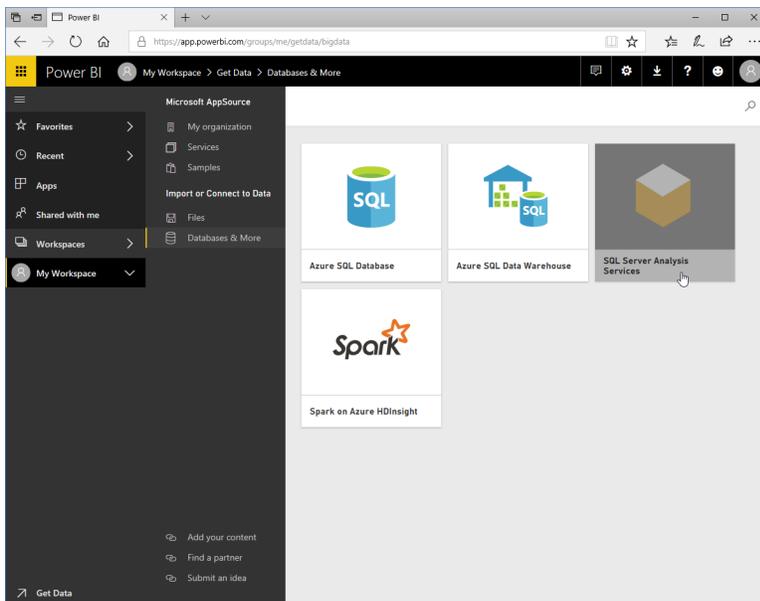


Connecting to Live Data

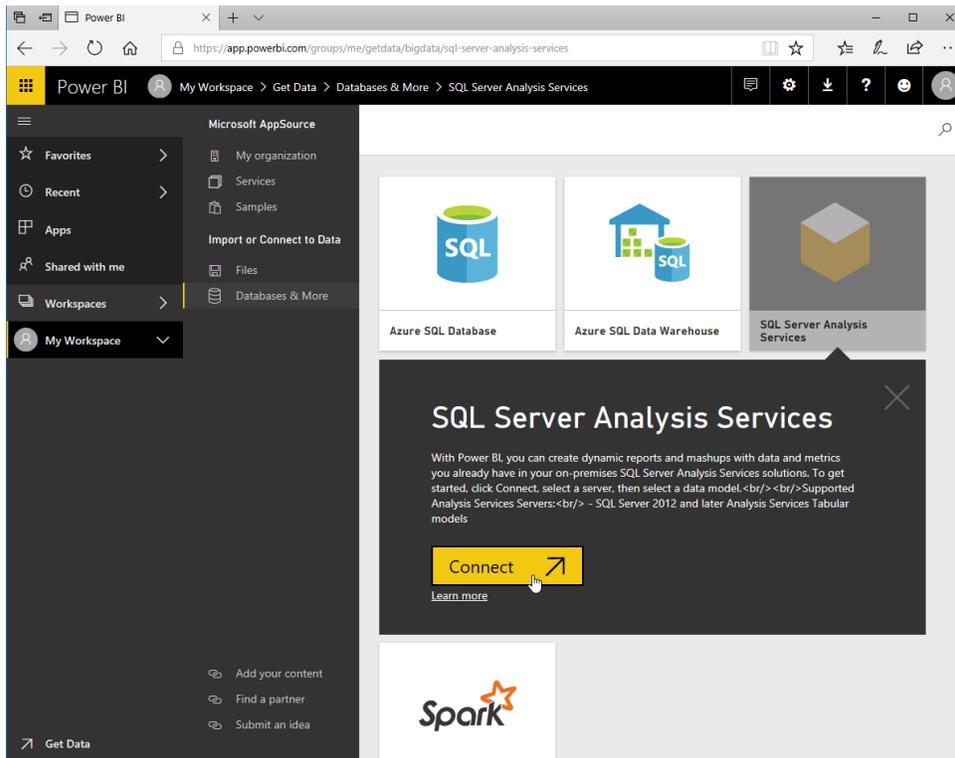
There is also an option on the Get Data page to connect to live data from a database service:



Now, choose your content service:



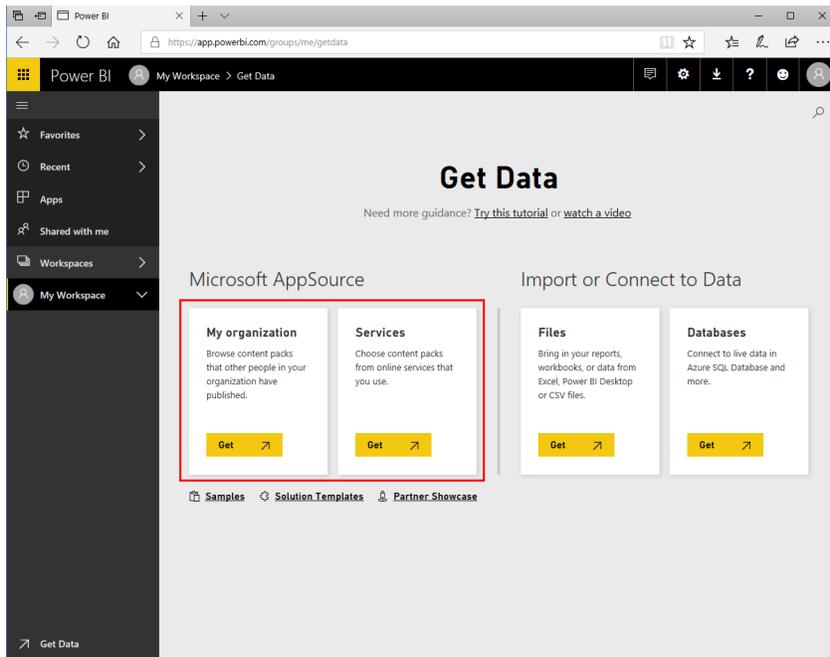
Click Connect to view available servers and connect to them:



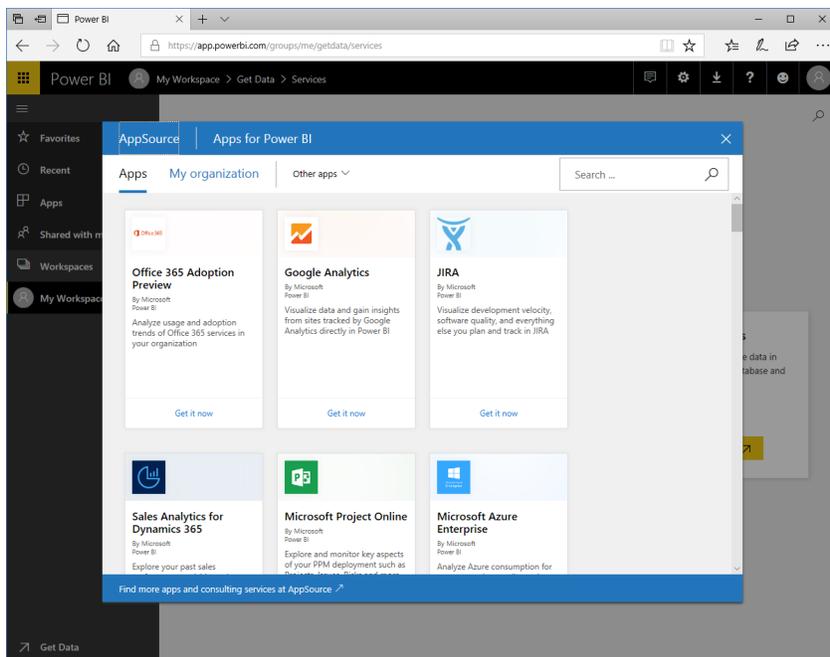
Connecting to Content Packs

A **content pack** is like a set of templates for Power BI. It typically includes pre-defined visuals and reports based on a specific dataset (like Microsoft Dynamics or MailChimp.) Content packs can be provided by other organizations or developed by Power BI users and shared within your company.

You can connect to content packs from the Getting Started screen:



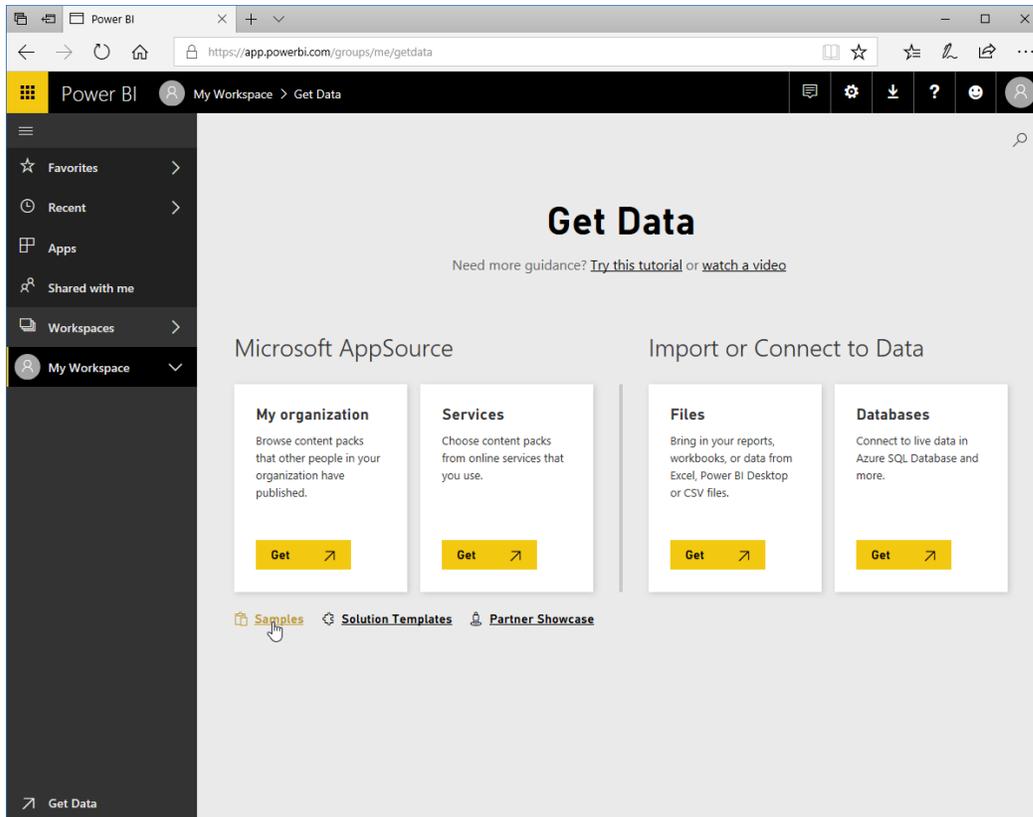
If you click Get under the Services section, third-party content packs will be shown:



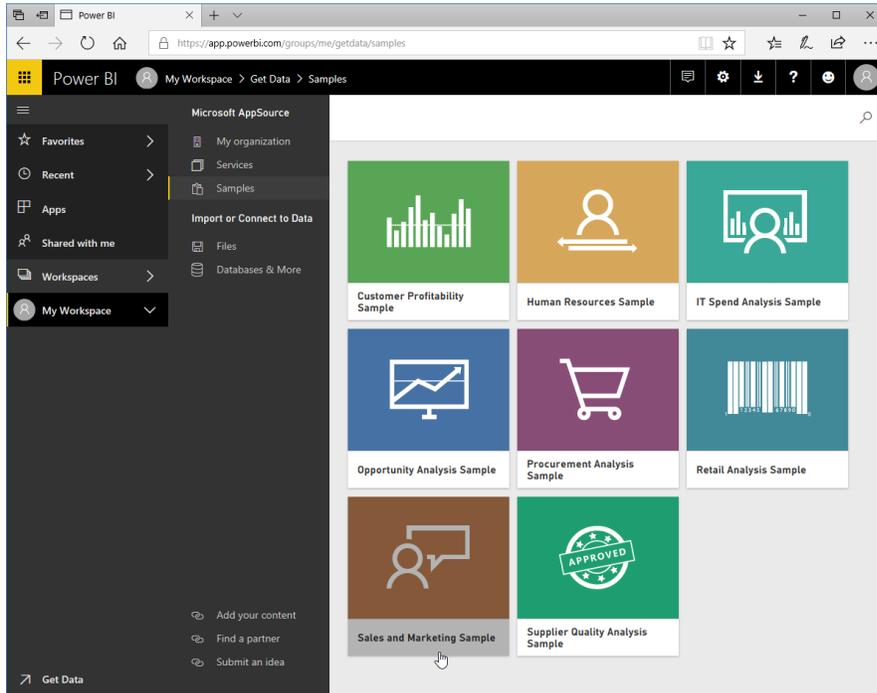
Click the appropriate link for the pack you want to download for more information and connection options.

Connecting to Samples

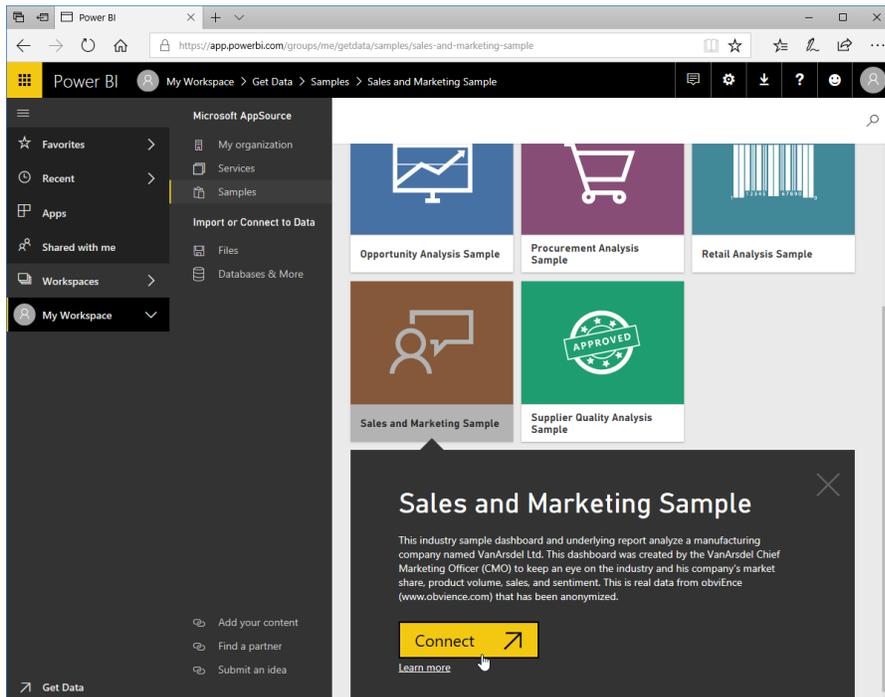
You can also access samples from the Get Data page:



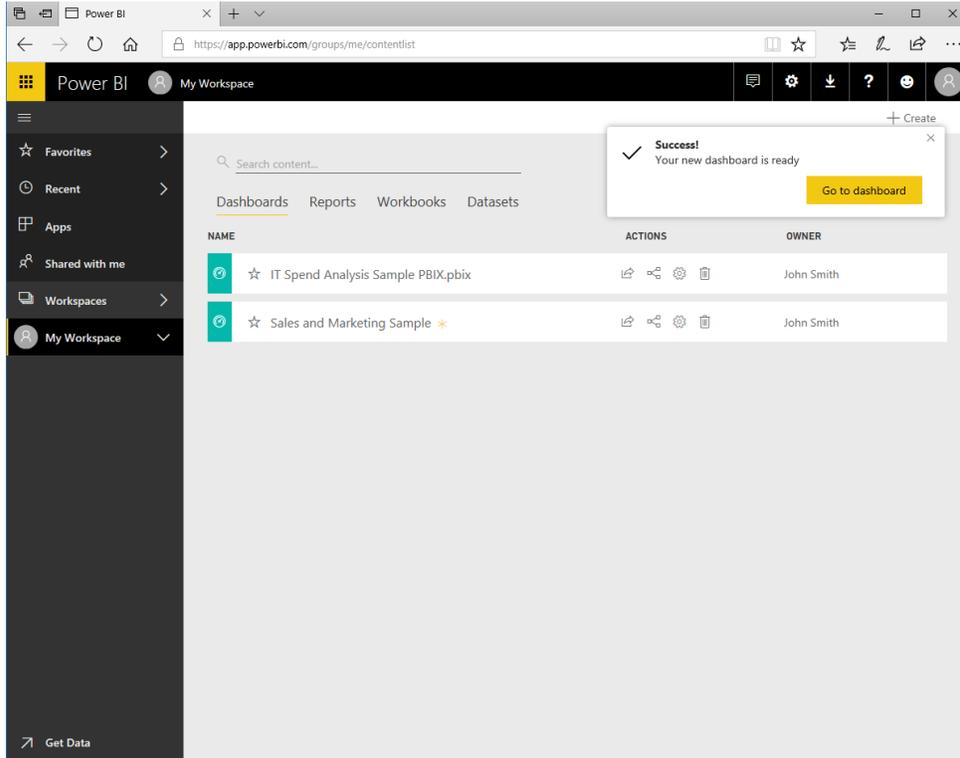
Once you click the Samples link, you will see a list of available items. Click any icon to continue:



Then, click Connect to confirm the operation:



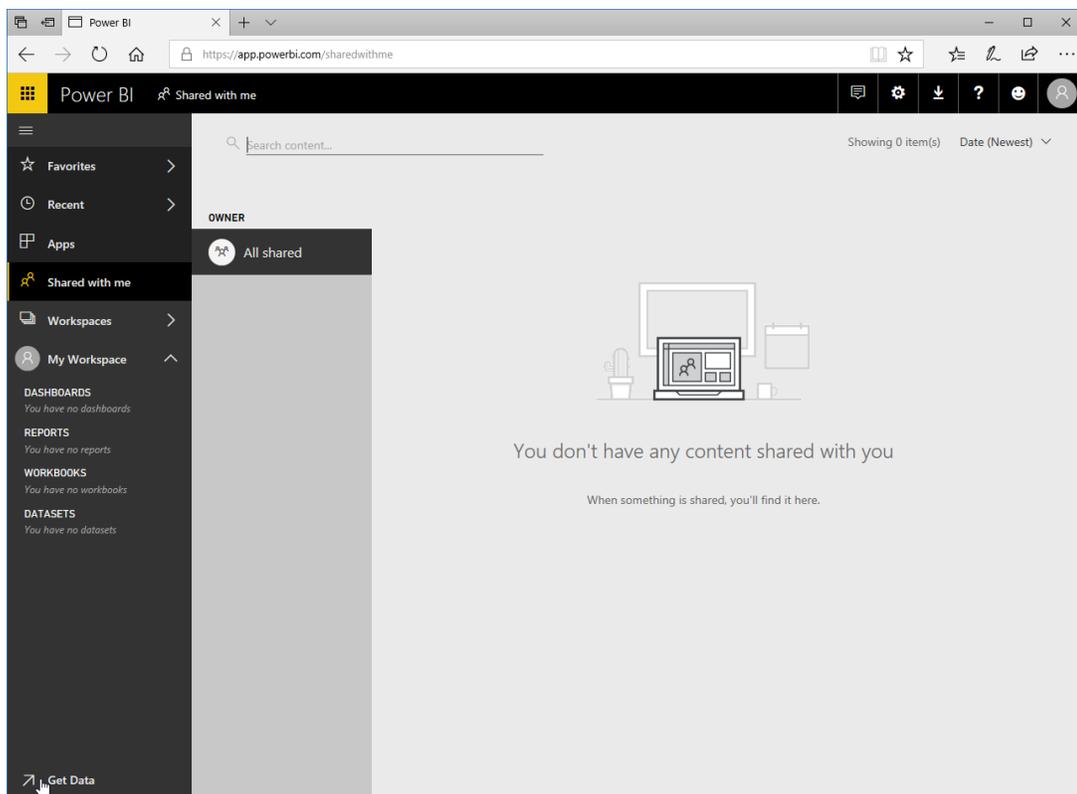
The dataset will then be added:



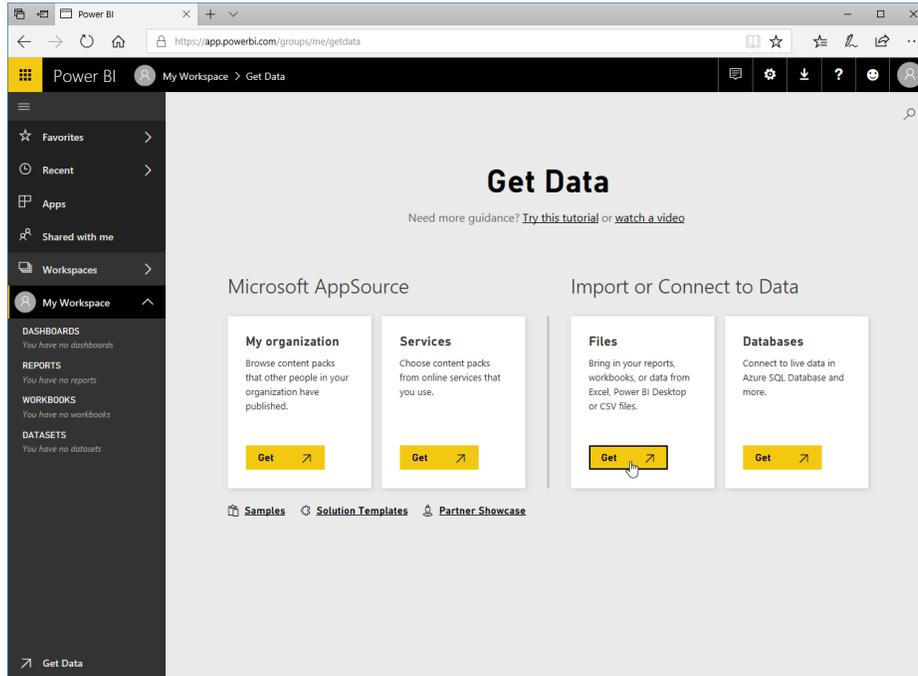
Activity 5-2: Connecting to Data Sources with the Power BI App

In this activity, you will connect the Power BI web app to a local data file. You will also check if there are any content packs available in your organization.

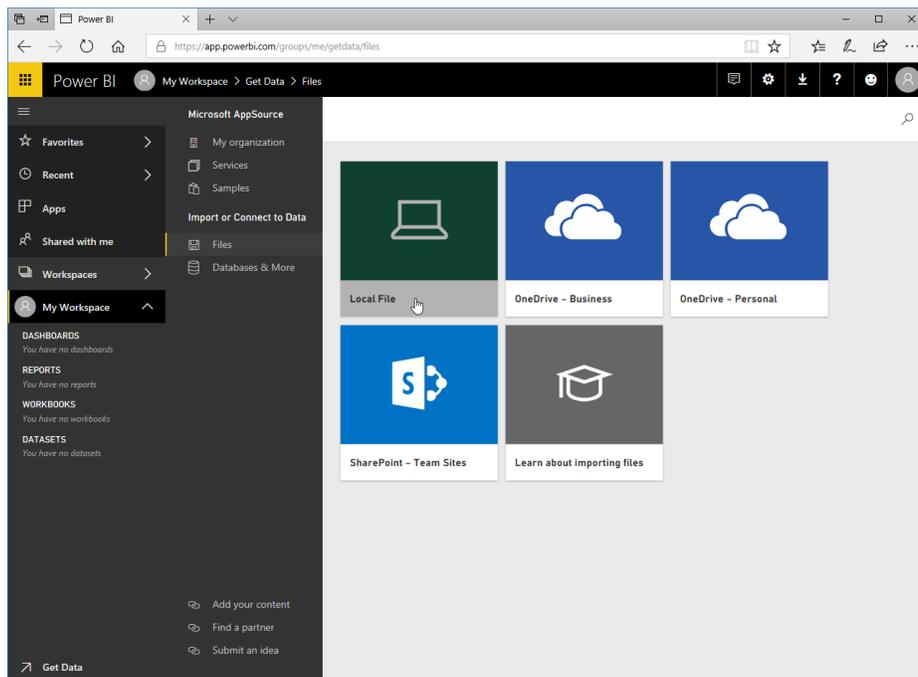
1. Ensure Microsoft Edge is open and the Power BI app is displayed.
2. Click the Get Data link in the bottom left corner of the window:



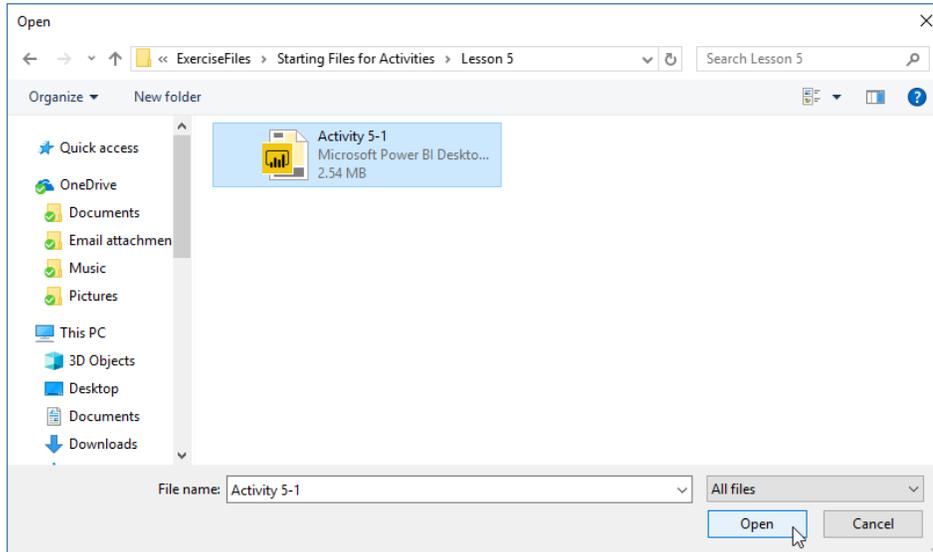
3. Click Get in the Files section:



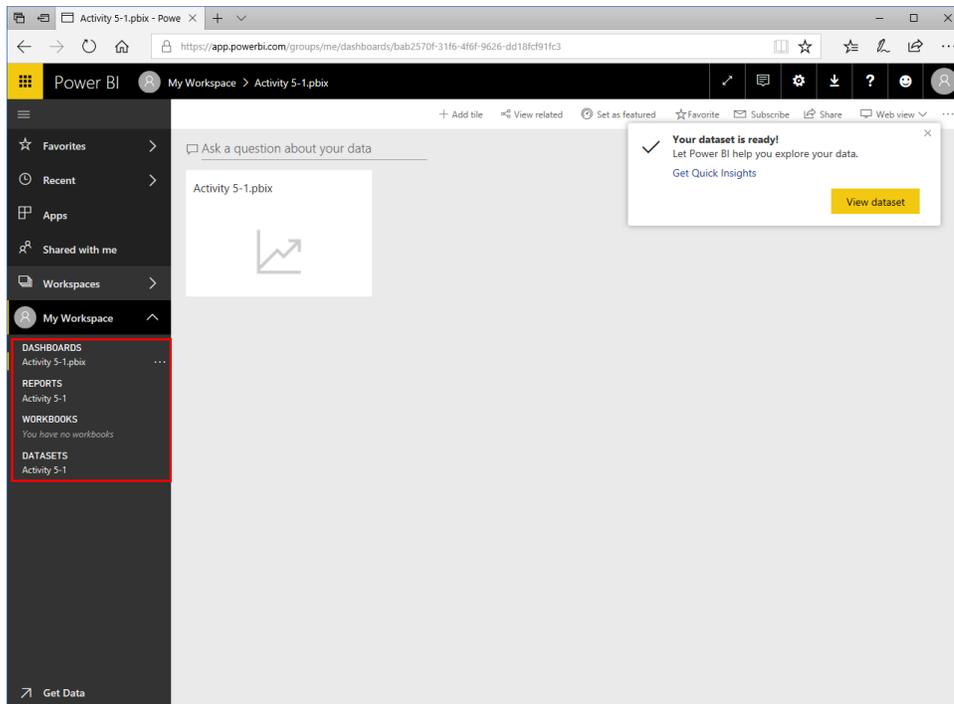
4. Click Local File:



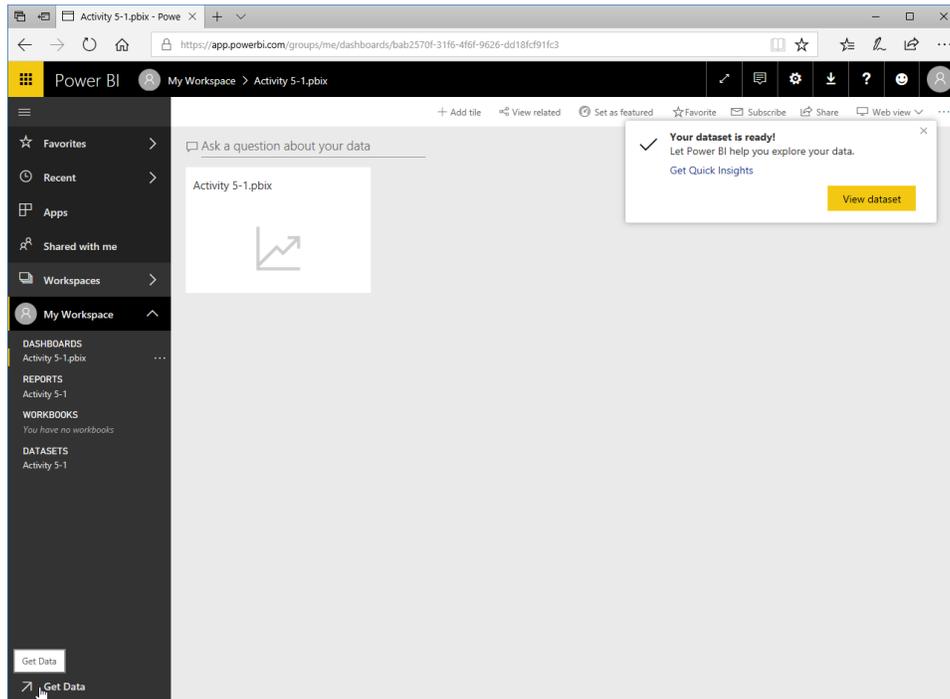
5. Browse to the Lesson 5 folder of your Exercise Files. Select Activity 5-1 and click Open:



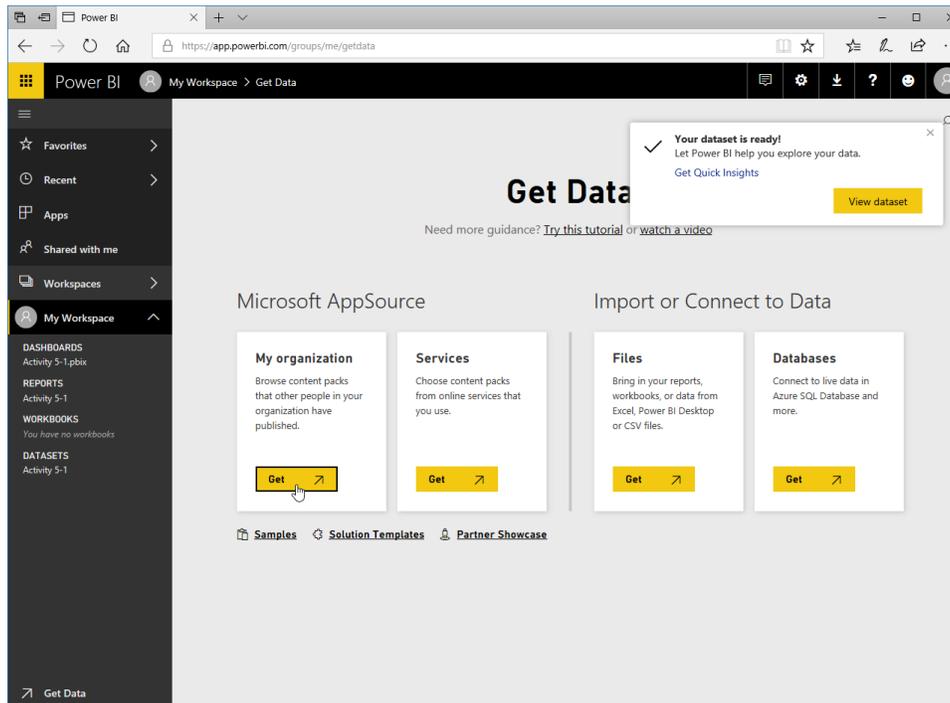
6. The data file will now be imported:



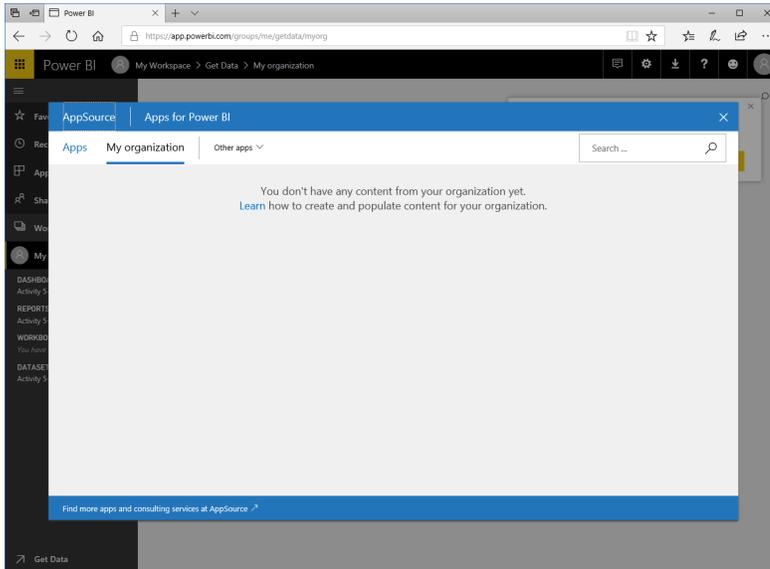
7. Now, let's explore available content packs. Click the Get Data link again:



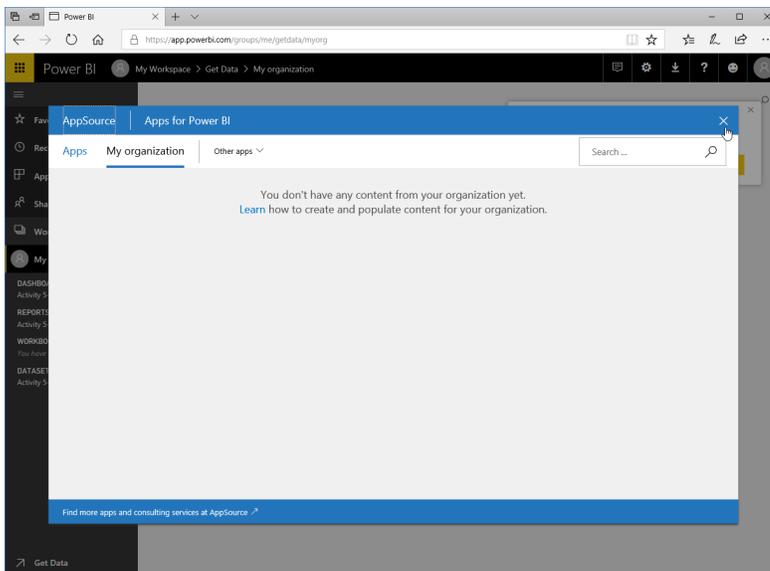
8. Click Get in the "My organization" section:



9. The AppSource window will open. Are there any content packs for your organization?



10. Close the AppSource window:



11. This activity is now complete. Leave your browser open for the next activity.

TOPIC C: Using Workspaces, Dashboards, and Reports

Let's take a closer look at the object structure in Power BI. Remember, the Power BI web app is built around on **dashboards**, which allow you to collect visualizations from different **reports** into a single location. Dashboards can be organized using **workspaces**.

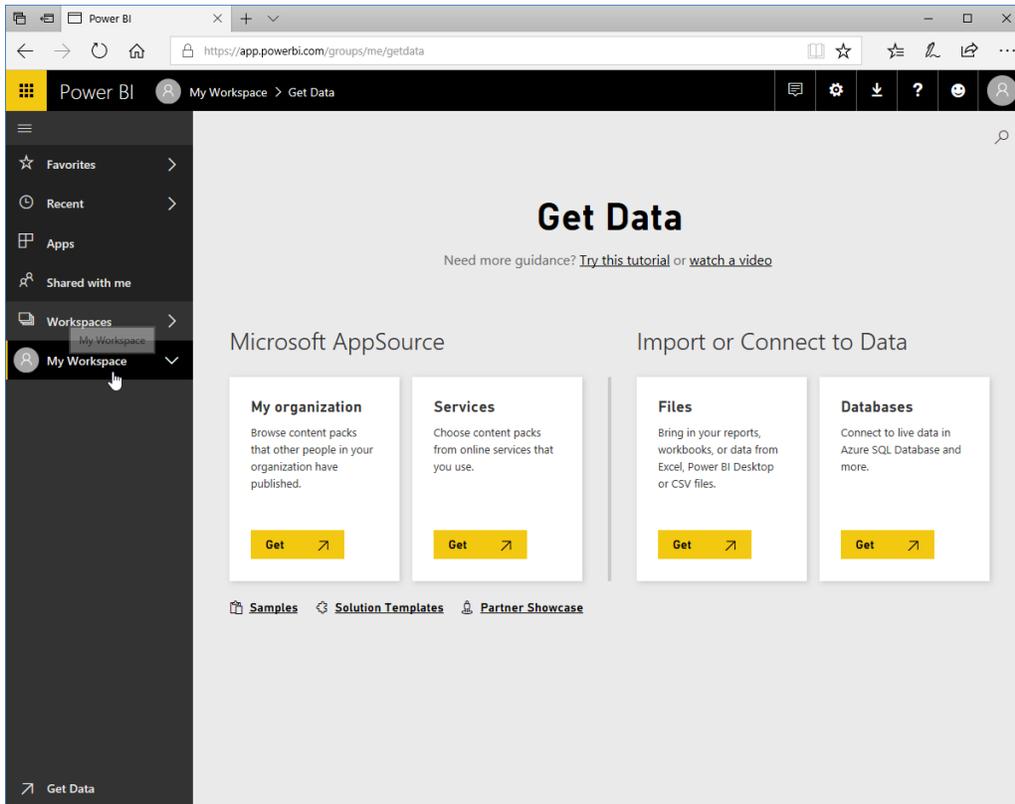
Topic Objectives

In this section, you will learn how to:

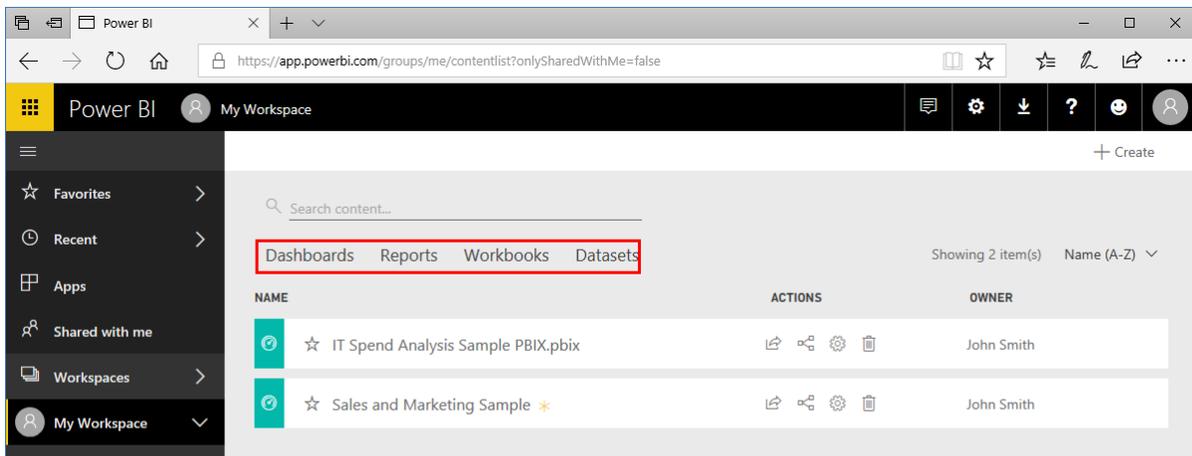
- View and manage Power BI content
- View workspaces, dashboards, and reports
- Manage reports

Viewing and Managing Power BI Content

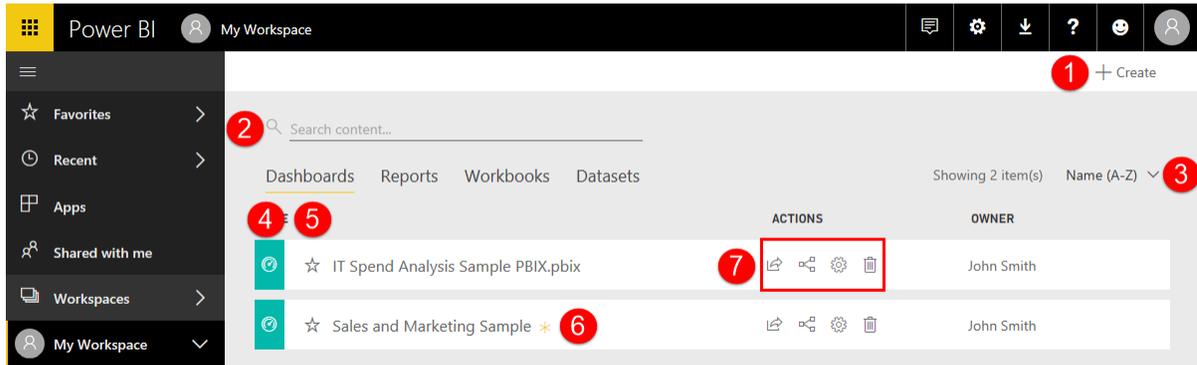
To view and manage the content and data sources in your Power BI app, click My Workspace from the navigation pane:



You will now see an overview of your Power BI content. Notice the tabs that allow you to quickly view and manage each content type:



Let's take a closer look at the options available:



1: Create

Create a new report, dashboard, or dataset.

2: Search Field

Search all content sources for a particular term.

3: Sort

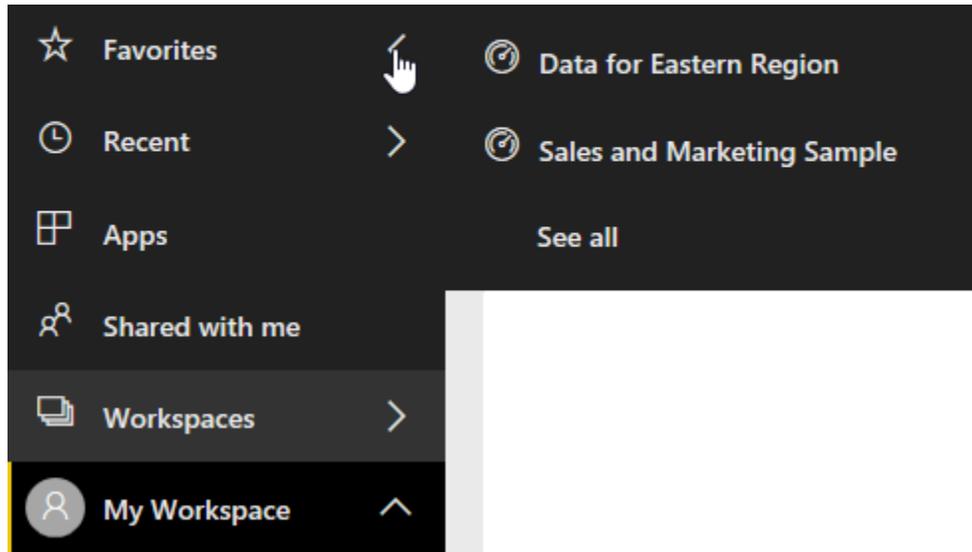
Change how the content list is sorted.

4: Content Icon

Dashboards, reports, workbooks, and datasets are identified by a unique icon.

5: Favorite

Click the star to favorite this item. Favorites can easily be accessed from the navigation pane:



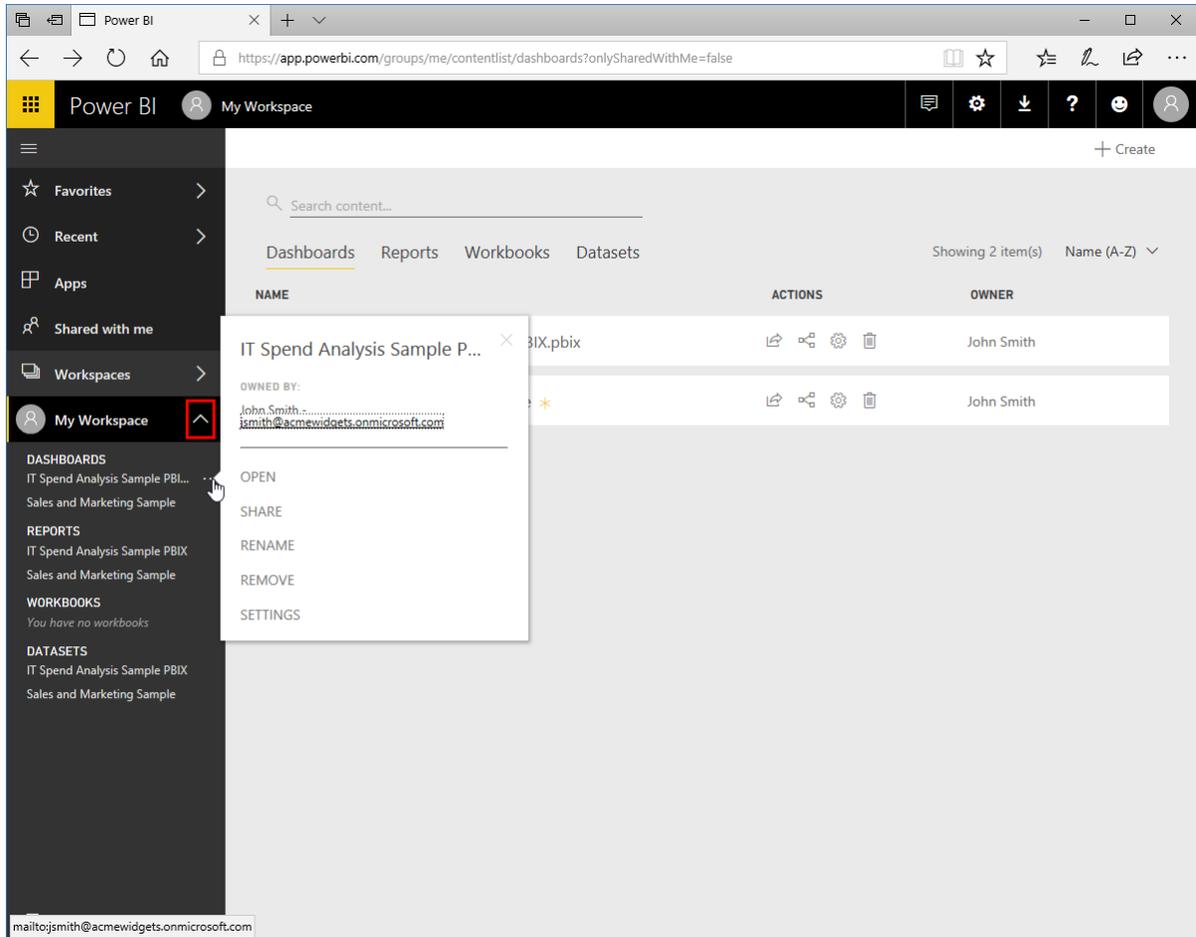
6: New Item

An asterisk denotes a new item.

7: Actions

Shows what actions are available for this object. (Available actions depend on the content type and your permissions.) From left to right, here you can see icons to share the content, view related objects, change its settings, and remove it.

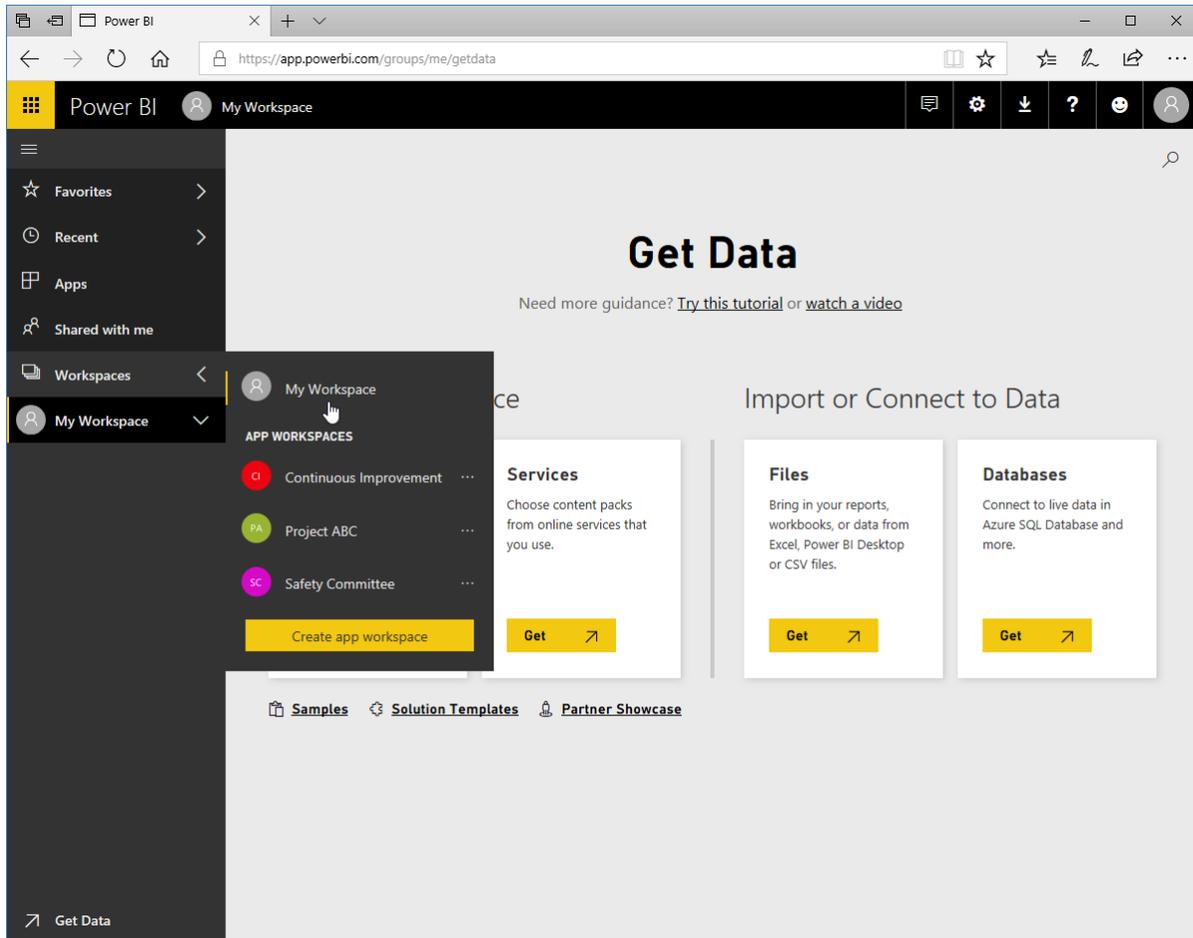
Note that you can quickly access content object options by clicking the chevron next to My Workspace in the navigation pane, moving your mouse over the target object, and clicking the ellipses:



(Remember, you can view the object's contents by clicking its link.)

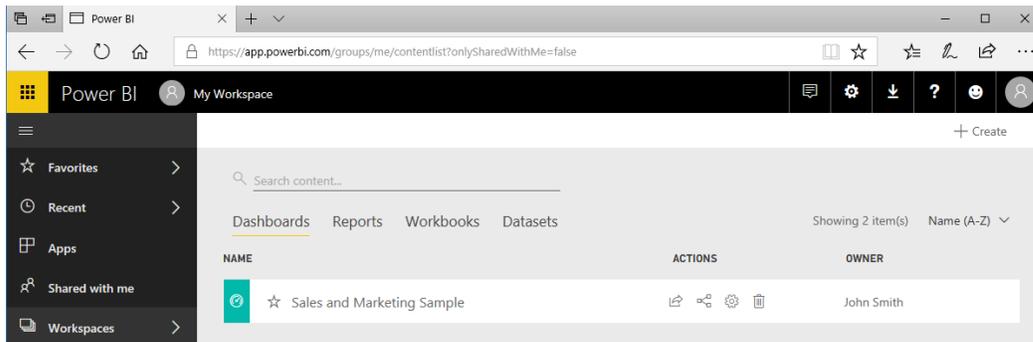
Viewing a Workspace

First, let's take a closer look at workspaces. To view a workspace, click the Workspaces category in the navigation pane and click the target workspace from the menu:



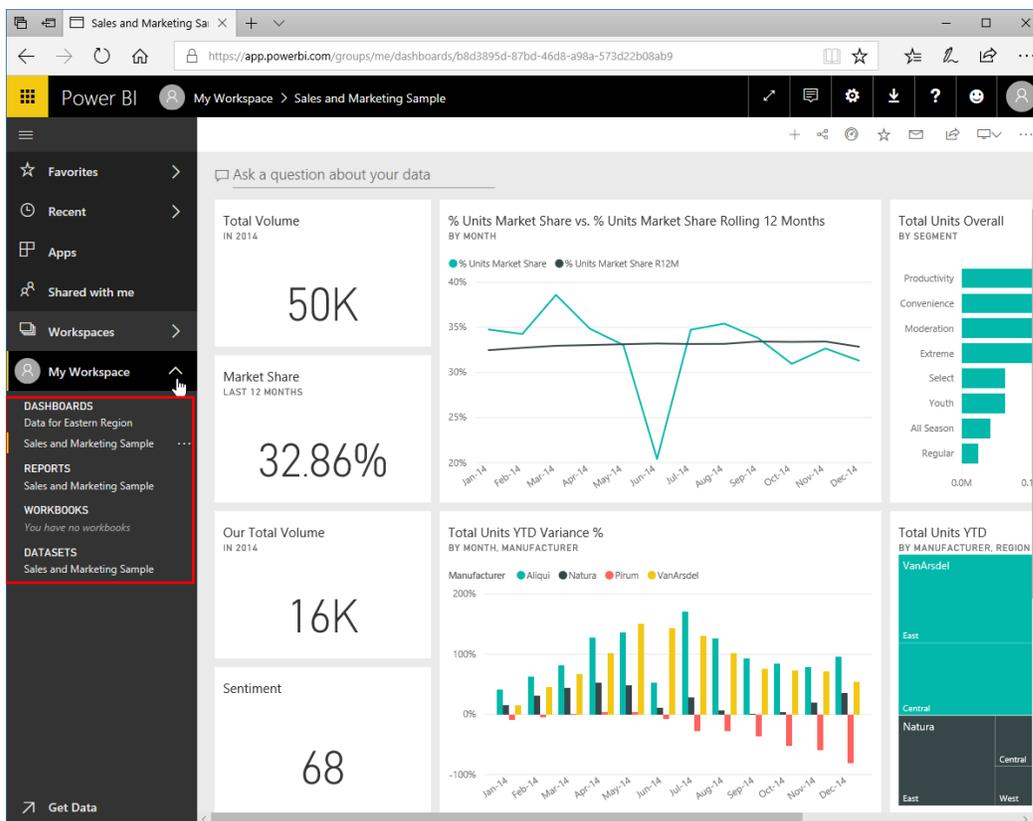
(Note that here we have the default My Workspace, as well as workspaces for SharePoint groups and other apps. Workspaces must be created by the system administrator.)

The workspace contents will then be displayed:



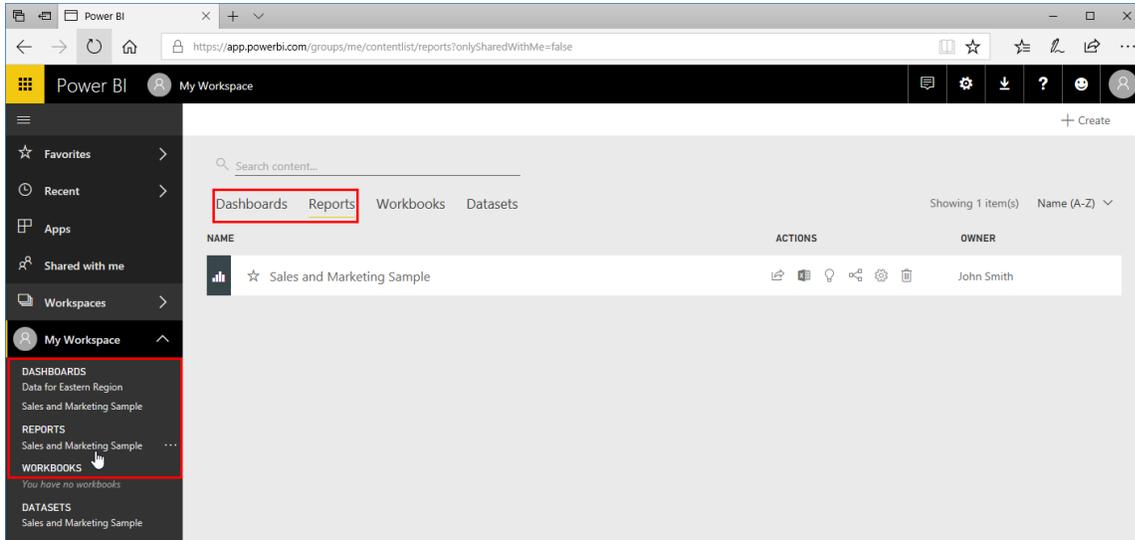
Now, click any item to see the related content.

You can also quickly view and access objects in the default My Workspace from the navigation pane by clicking the chevron and then clicking the object you want to view:

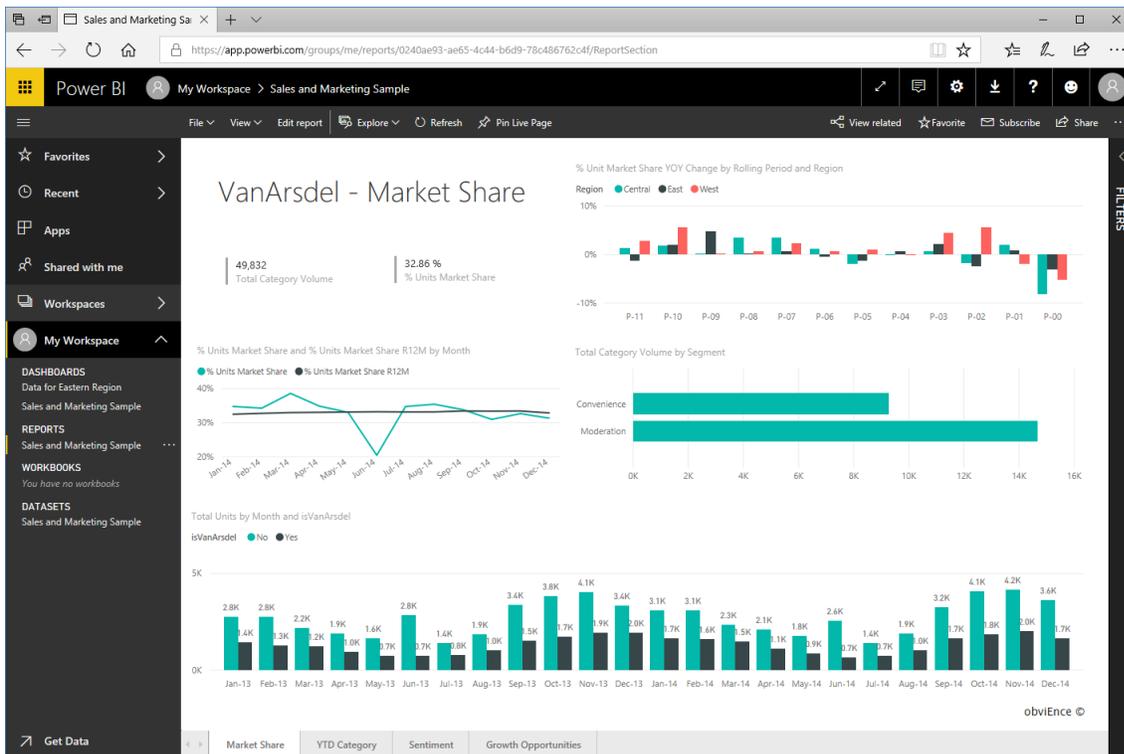


Viewing Dashboards and Reports

You can access dashboards and reports from the navigation pane or the Workspaces page:

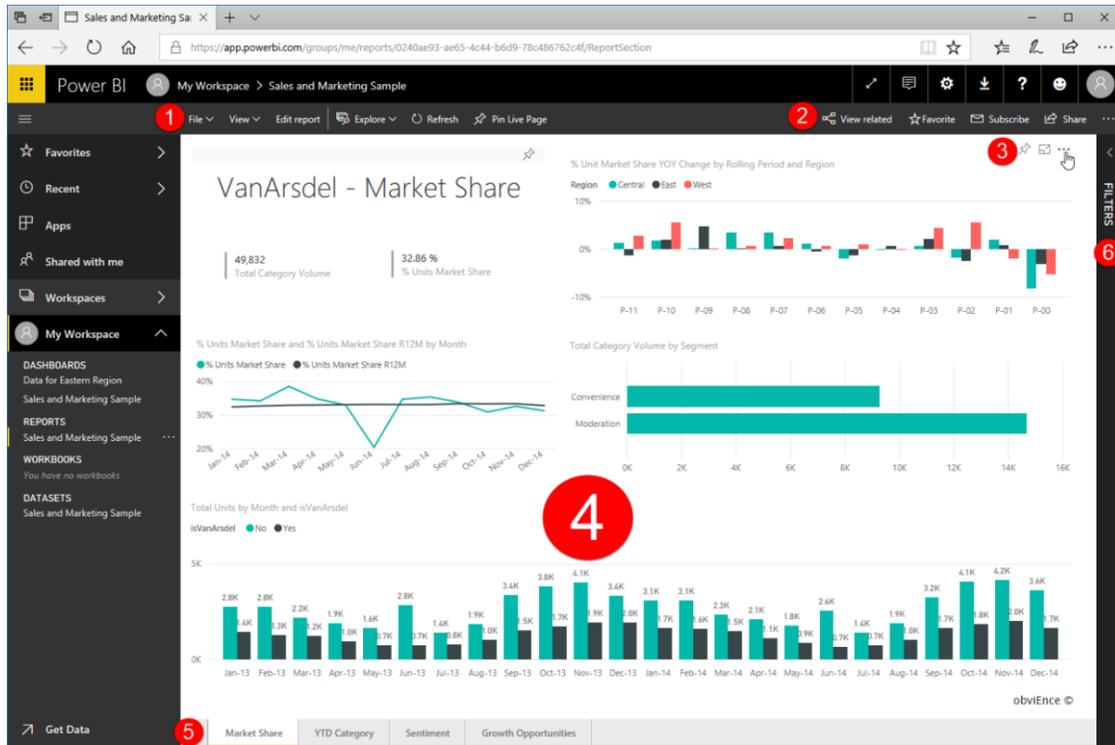


Just click the link for the object you want to view. Here, we have viewed the “Sales and Marketing Sample” report:



Managing Reports

Although you must use the Power BI desktop client to create reports, the Power BI web app does contain many features to customize and edit these reports:



1 and 2: Action Bars

The commands at the top of the report are divided into two sections. The **left section (1)** contains file-related commands:

- The **File** menu contains additional commands to save, print, publish, download, and export this report.
- The **View** menu contains options to change the report display, as well as toggle task panes on or off.
- Click **“Edit report”** to access the Visualizations and Fields panes (which are the same as in the Power BI desktop client) and other advanced commands.
- The **Explore** button shows a menu with options to drill through and view data.

- Click **Refresh** to reconnect to the original data source and update the data, if necessary.
- Finally, **Pin Live Page** allows you to pin the entire page to a dashboard.

The **right section (2)** contains commonly used commands to view related data, add the report as a favorite, and subscribe to or share it. The “More options” menu (accessible from the ellipses icon) includes commands to export the data or generate a QR code for quick access.

3: Visualization Commands

Just as in the Power BI desktop client, you can move your mouse over a visualization to see commands to pin the visualization, switch to Focus Mode, and access the More Options menu. (This menu contains commands to export, show, spotlight, and sort data.)

4: Canvas

Visualizations are displayed in the main area of the report, called the canvas.

5: Page Tabs

Use these tabs to navigate through and view the report’s pages.

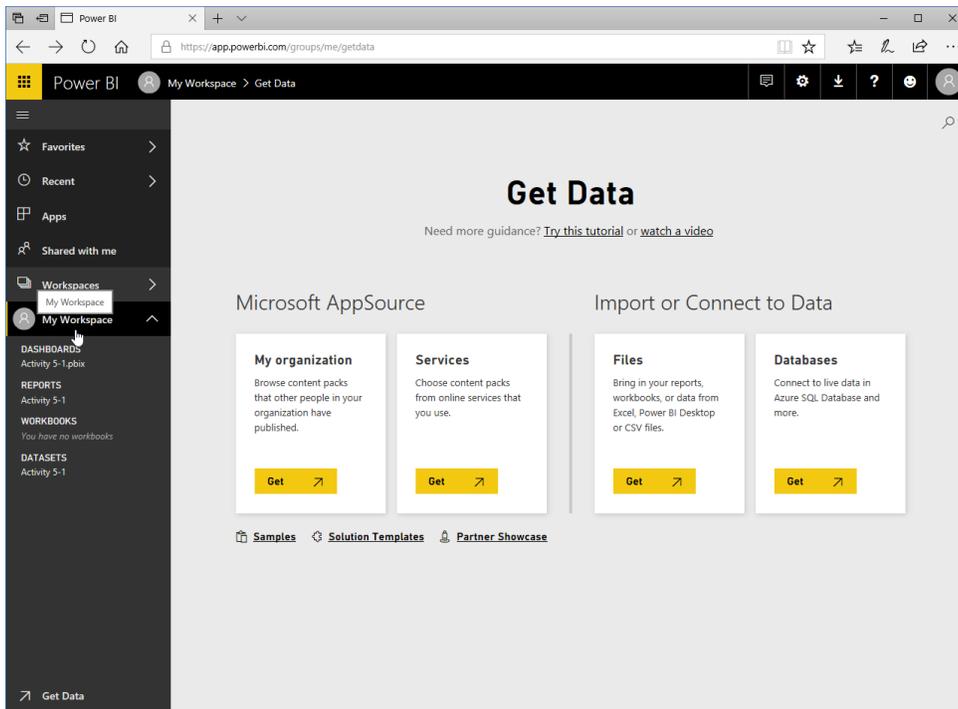
6: Filters Task Pane

View and modify report filters.

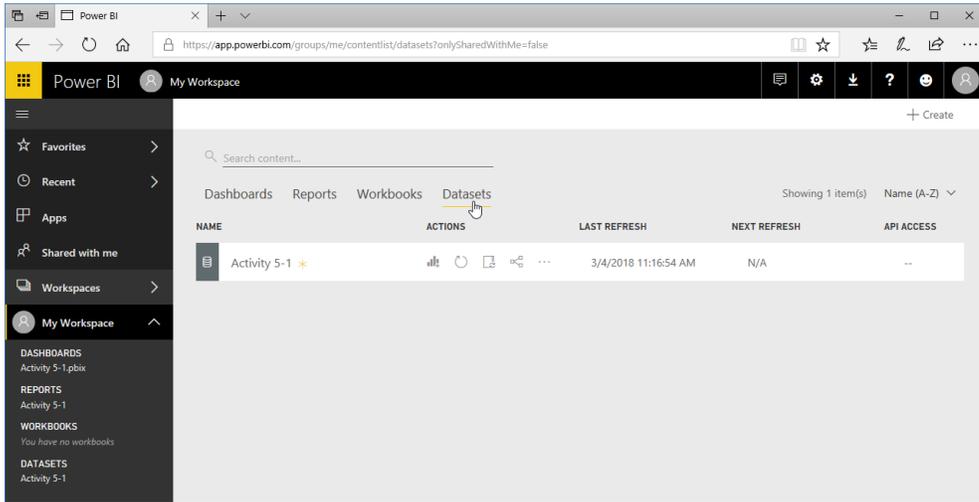
Activity 5-3: Using Workspaces, Dashboards, and Reports

In this activity, you will explore the data in the file we imported in the last activity.

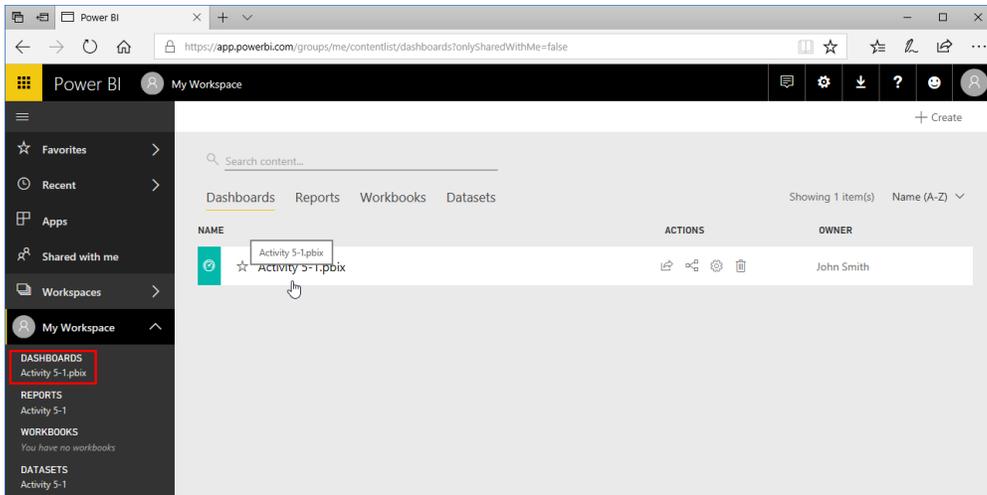
1. Ensure you have completed Activity 5-2.
2. Click My Workspace in the navigation pane:



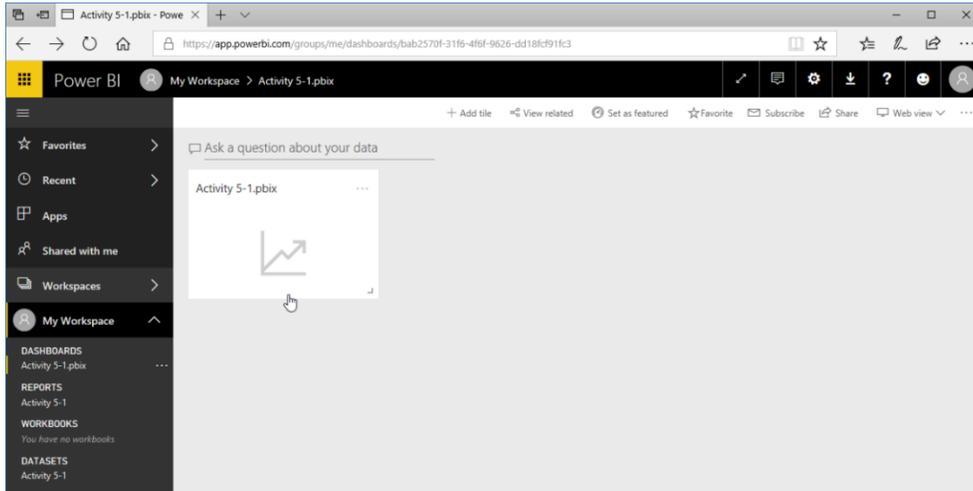
3. The workspace contents will be displayed. Click each tab to view the related contents:



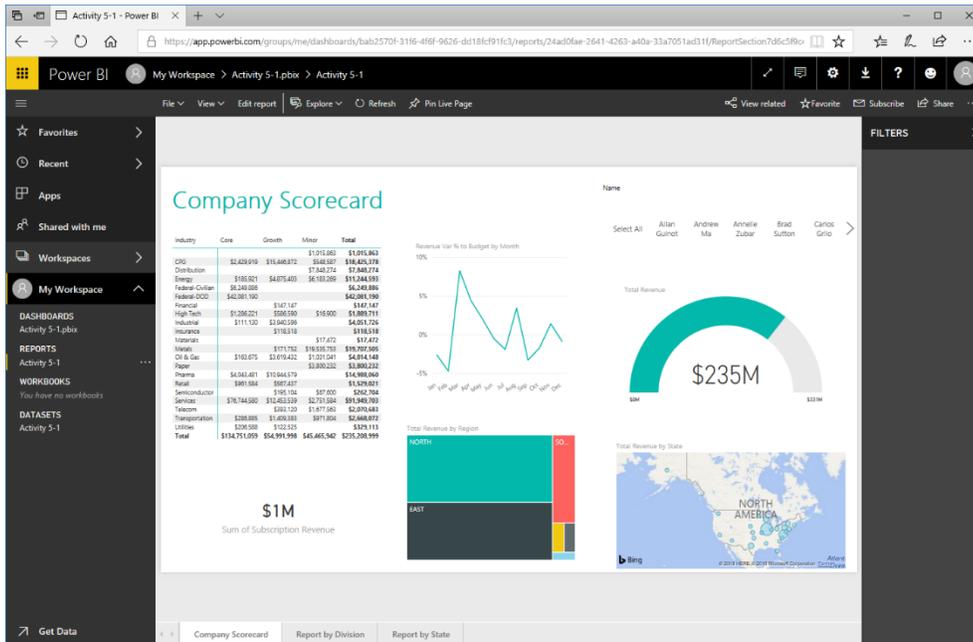
4. First, let's explore the dashboard that was created when we imported this file. Click the Dashboards tab and click the Activity 5-1 link, or click the link in the navigation pane:



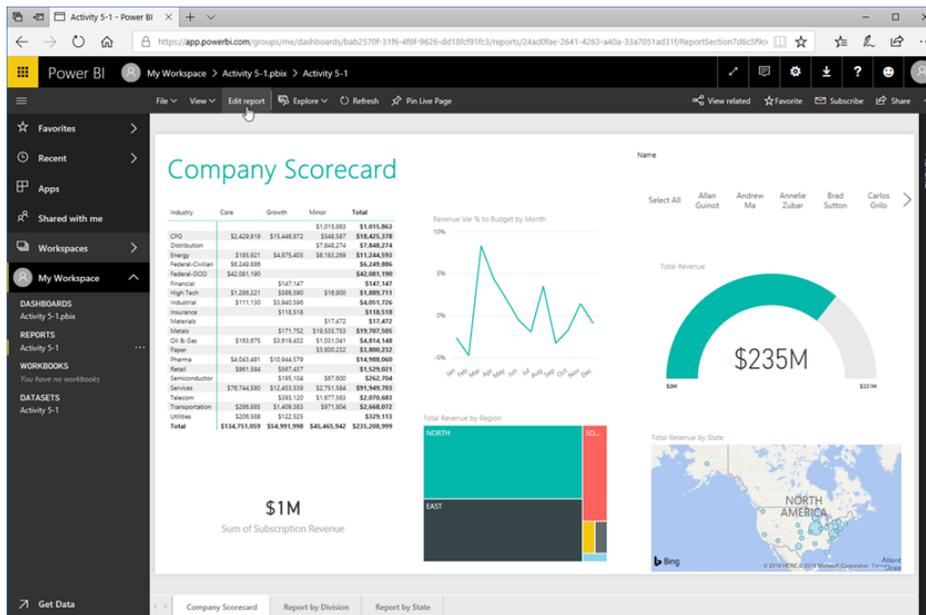
- This dashboard contains only one report. Click its icon:



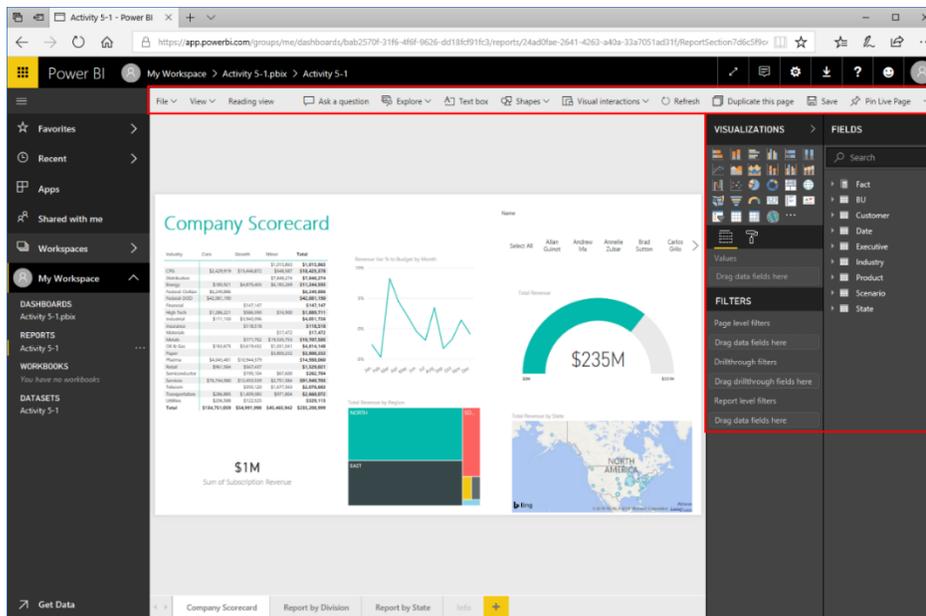
- Review the contents of the report:



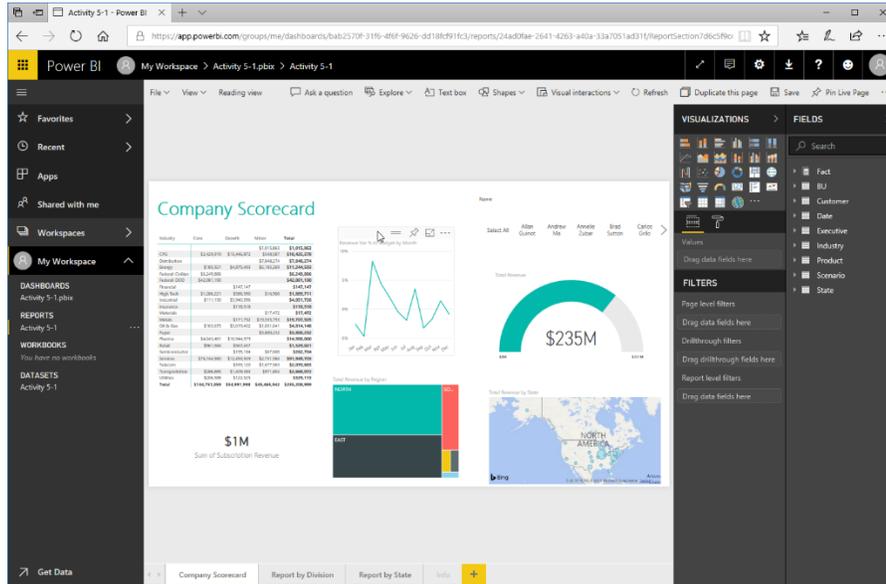
7. Click the “Edit report” command:



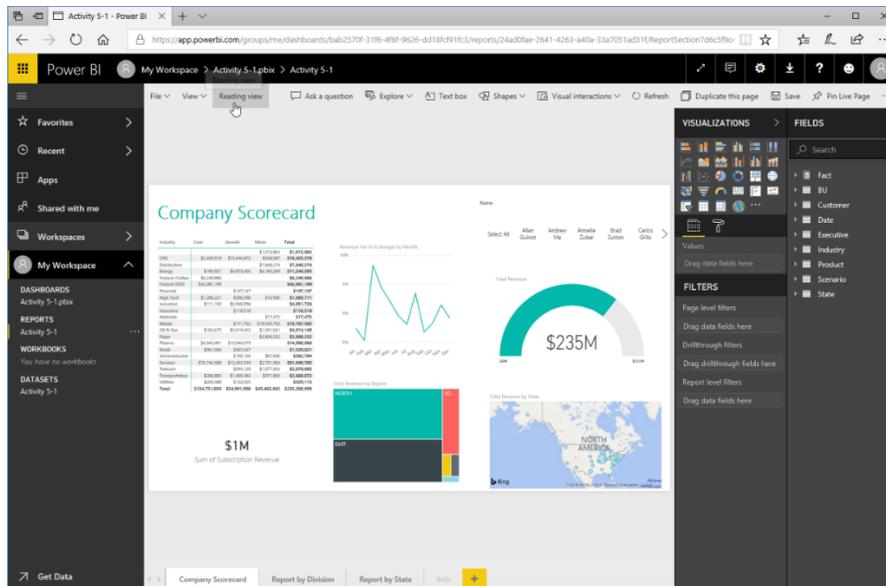
8. Review the available options and task panes:



9. Move your mouse over any visualization. Notice that it can be edited:



10. Click "Reading view" to return to that mode:



11. This activity is now complete. Leave your browser open for the next activity.

TOPIC D: Creating Custom Dashboards

We know that dashboards allow you to collect and organize report visualizations. These visualizations remain linked to their original report, ensuring you are always viewing the most up-to-date information. For example, your organization may have individual reports for sales, revenue, and expense data. You can collect the visualizations relating to your specific department or region on your own dashboard to make it easy to quickly access the information that is relevant to you.

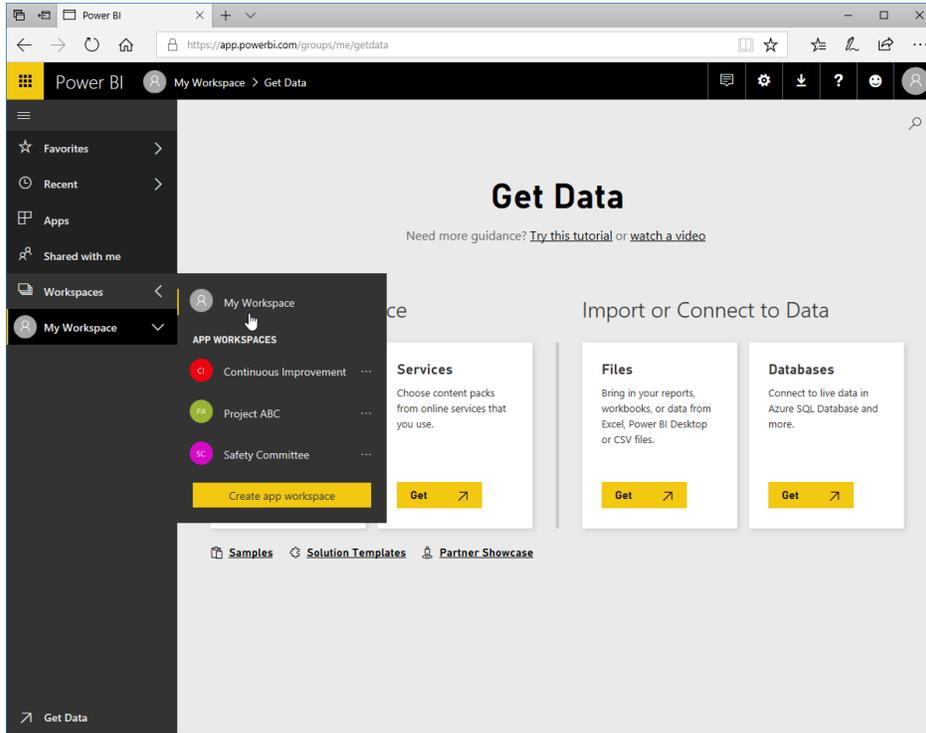
Topic Objectives

In this section, you will learn how to:

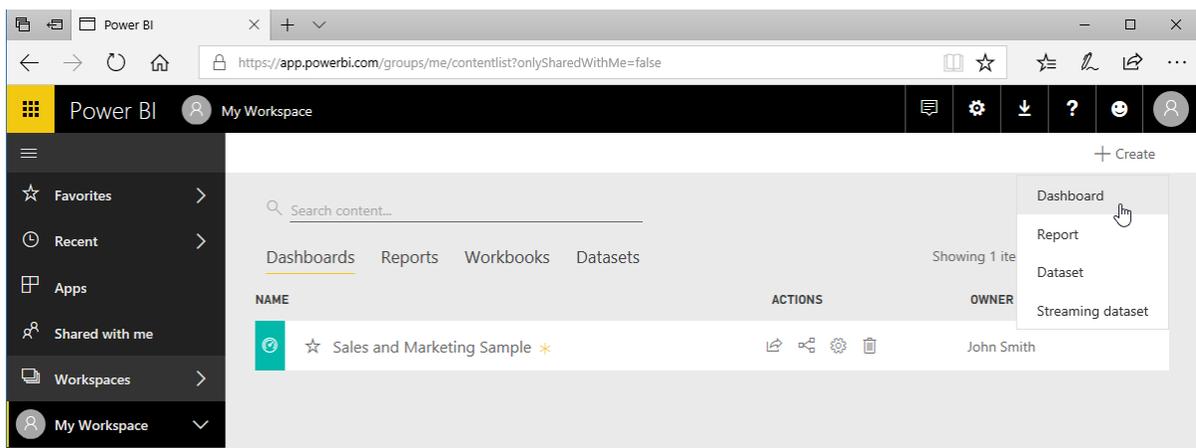
- Create and manage dashboards
- Add custom tiles and visualizations to a dashboard

Creating a Dashboard

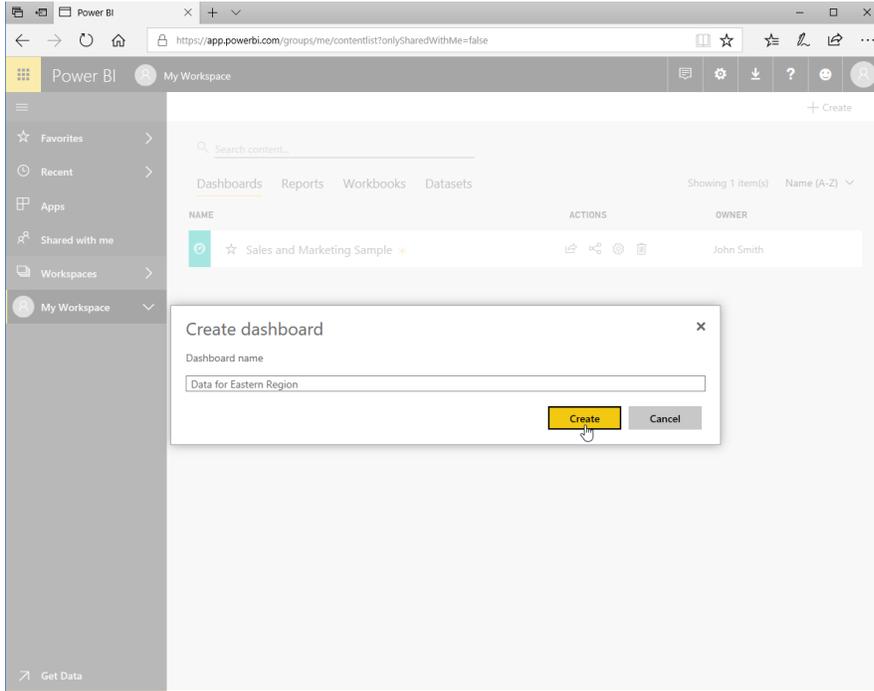
To create a new dashboard, click the chevron next to the Workspaces item in the navigation pane and click the target workspace:



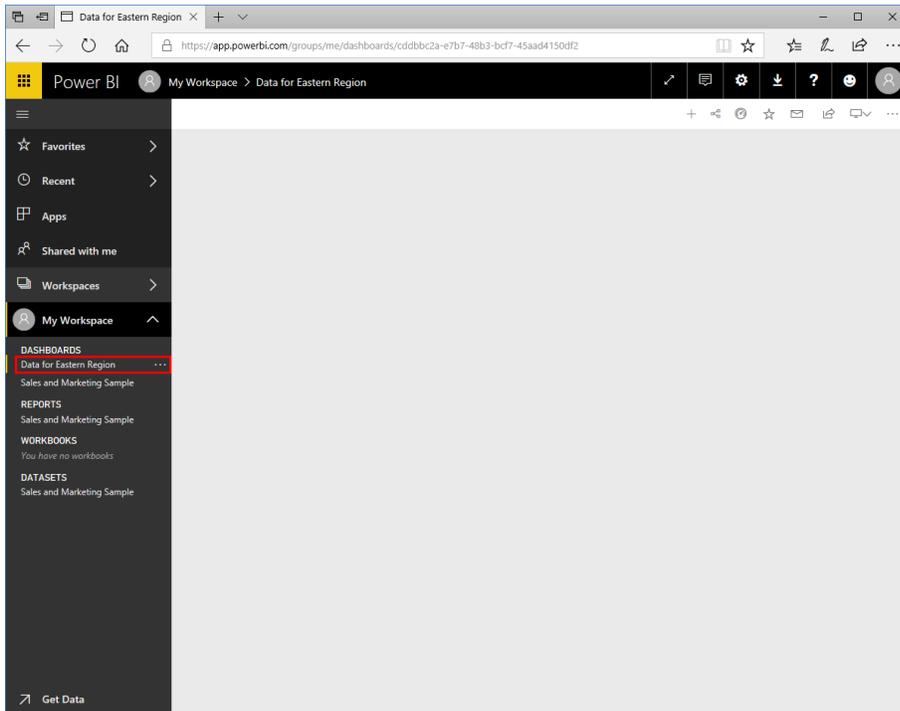
Next, click Create → Dashboard:



When prompted, type the name of your dashboard and click Create (or press Enter):

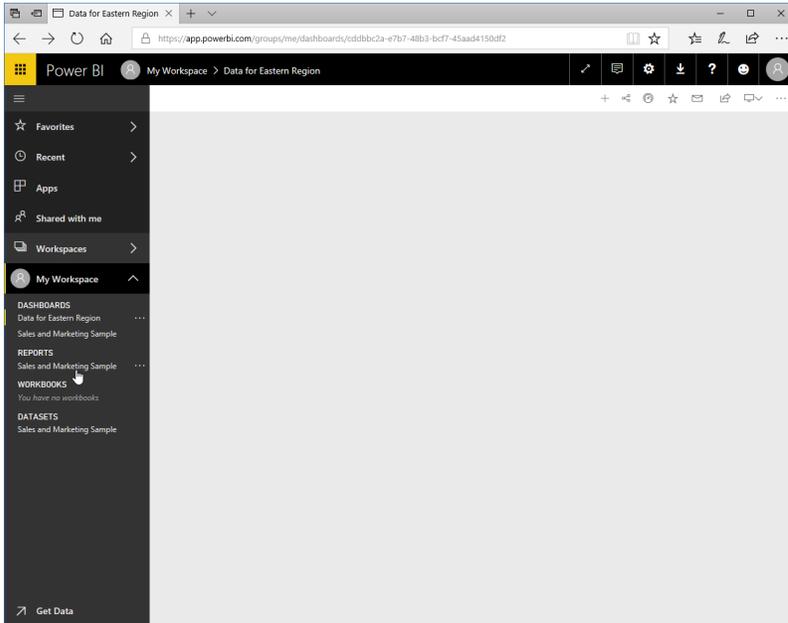


The dashboard will now be created, and can be accessed from the navigation pane:

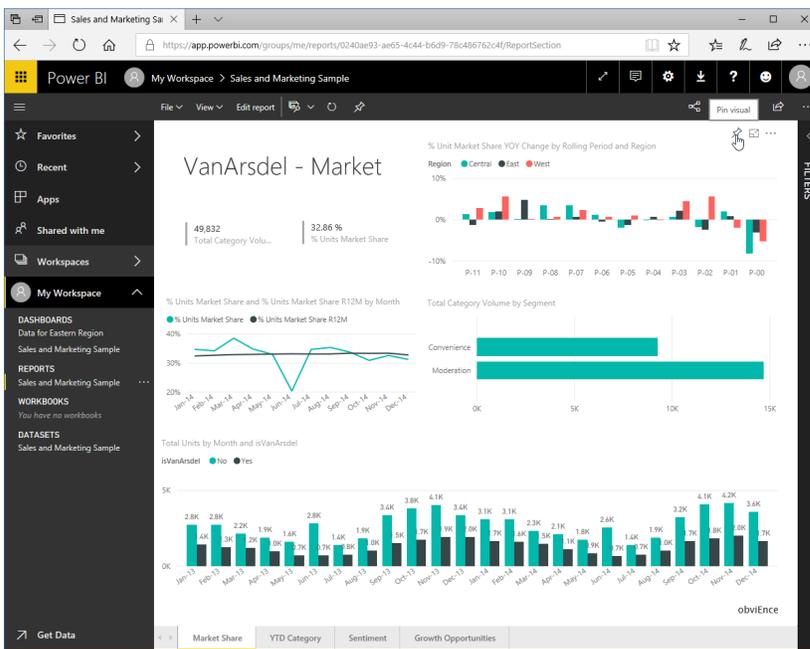


Pinning Visualizations to a Dashboard

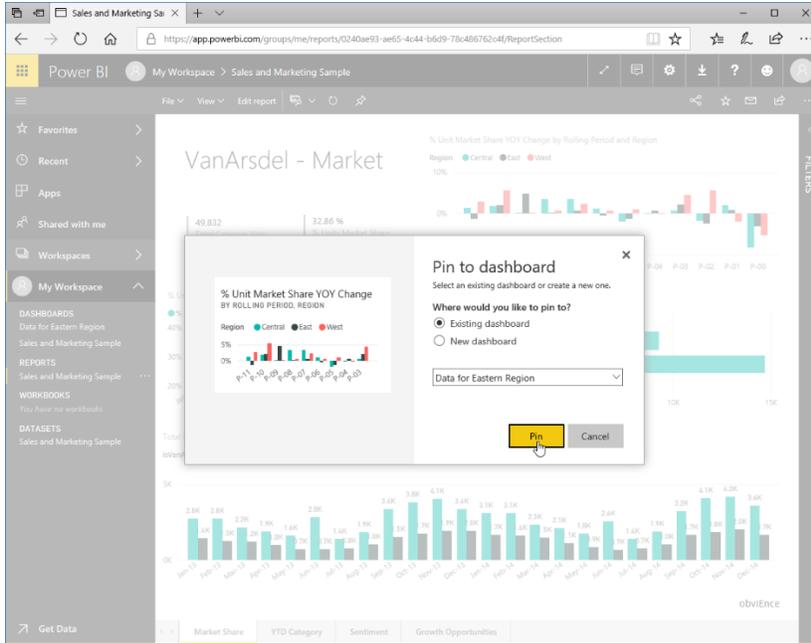
You can add any visualization you like to a dashboard from a report. For this example, let's navigate to the "Sales and Marketing Sample" report:



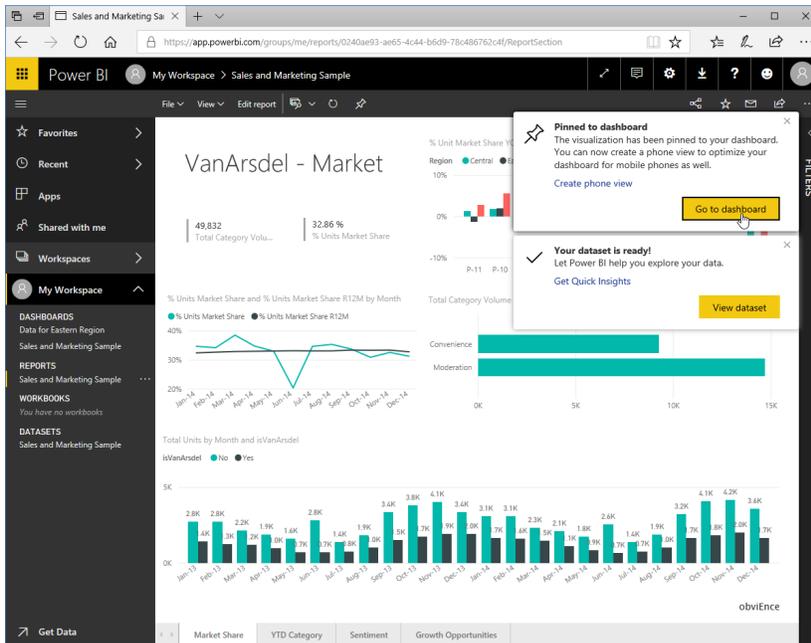
Now, we can move our mouse over any visualization and click the "Pin visual" icon:



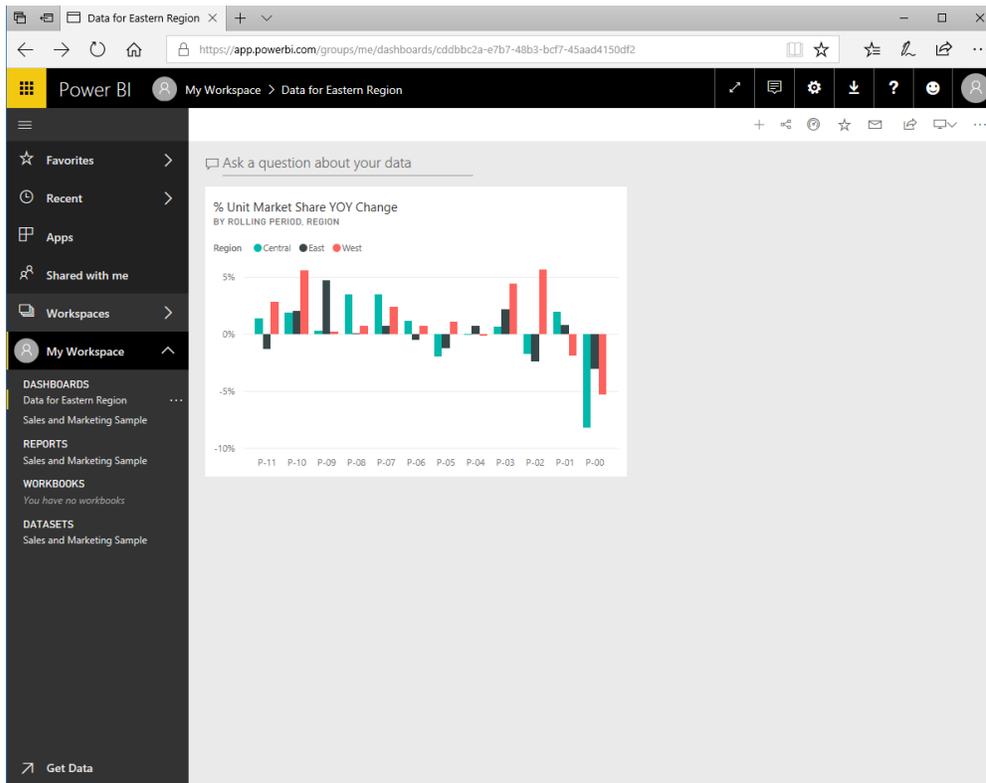
We will then be prompted to specify where to add the visualization to. For this example, we will choose the dashboard we just created, but note that you can create a new dashboard from here as well:



You can now go to the dashboard, or close the notifications and return to the report. Let's go to the dashboard:



The visualization is now available on the selected dashboard:

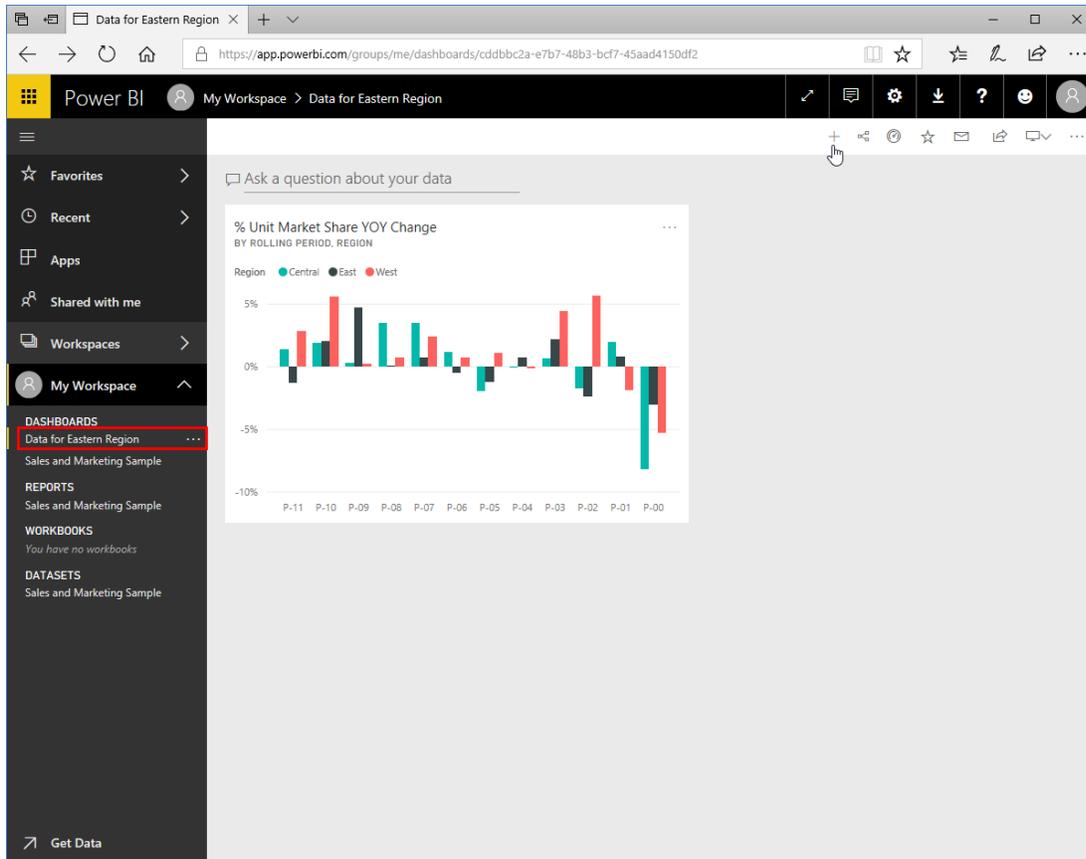


You can:

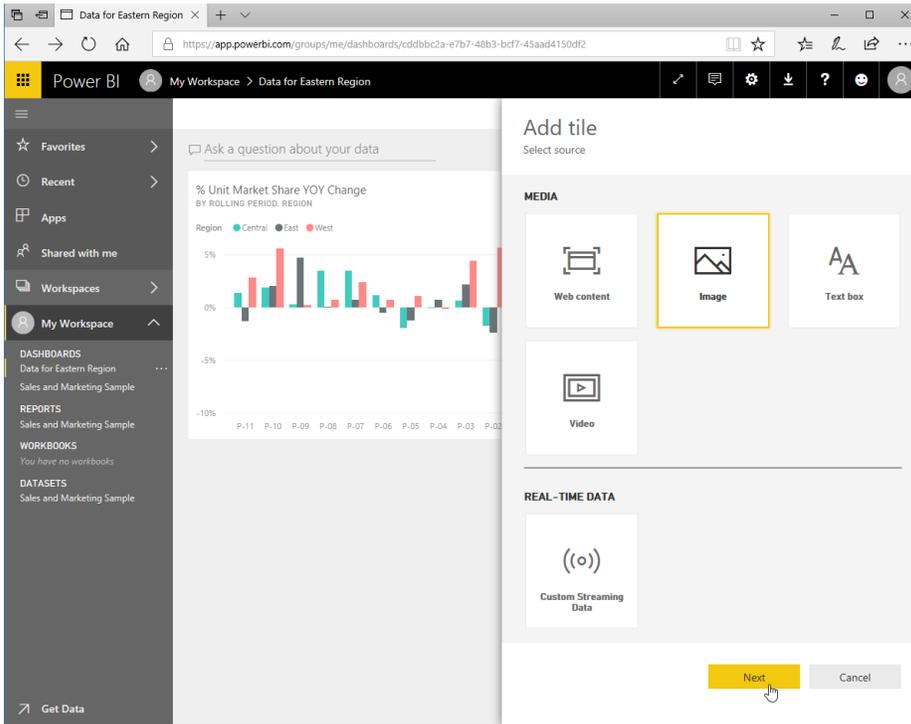
- Click the visualization to go to the source report
- Move and resize the visualization
- Move your mouse over the visualization and click the ellipses menu in the corner to view additional options, including deleting it from the dashboard

Adding Custom Tiles

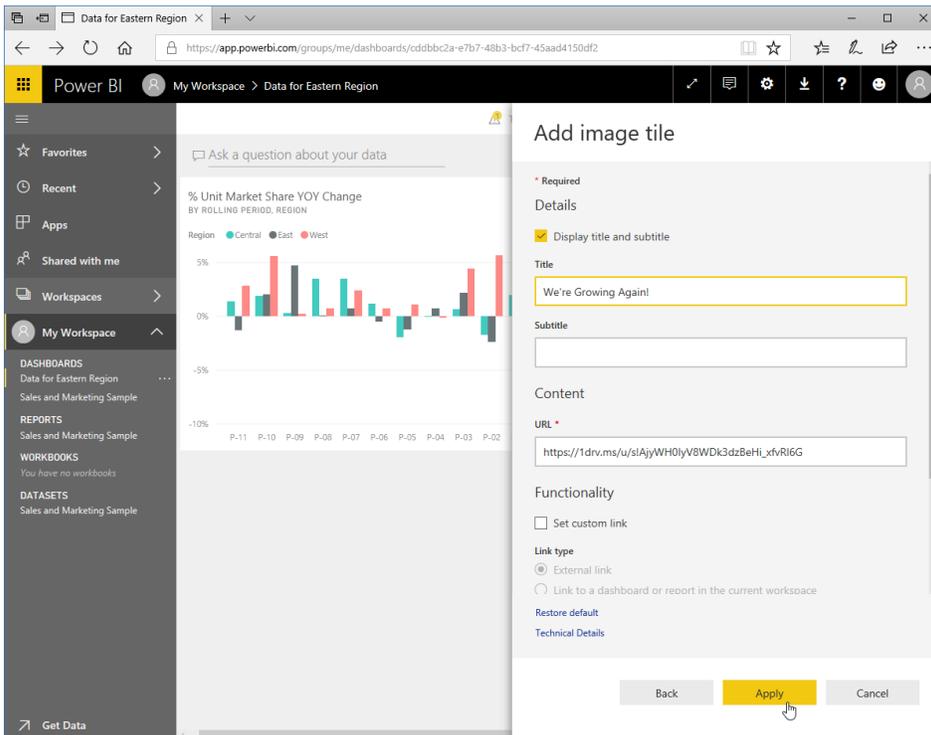
Power BI also allows you to add custom tiles to a dashboard, like images and text boxes. To start, open the dashboard from the navigation pane. Then, click the “Add tile” icon:



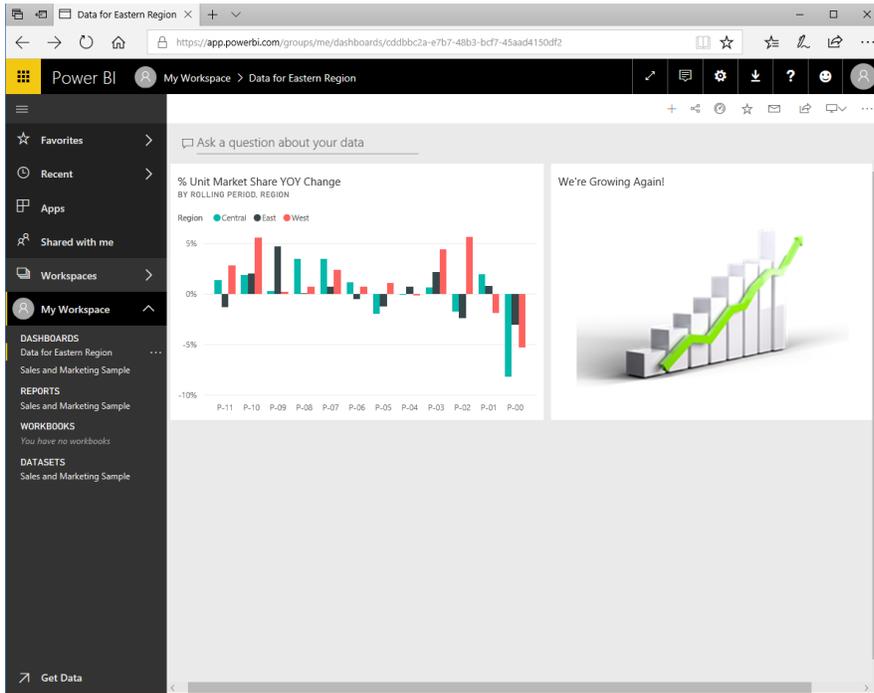
Now, choose what to add and click Next:



Finally, enter the object details (in this case, the title and URL) and click Apply:



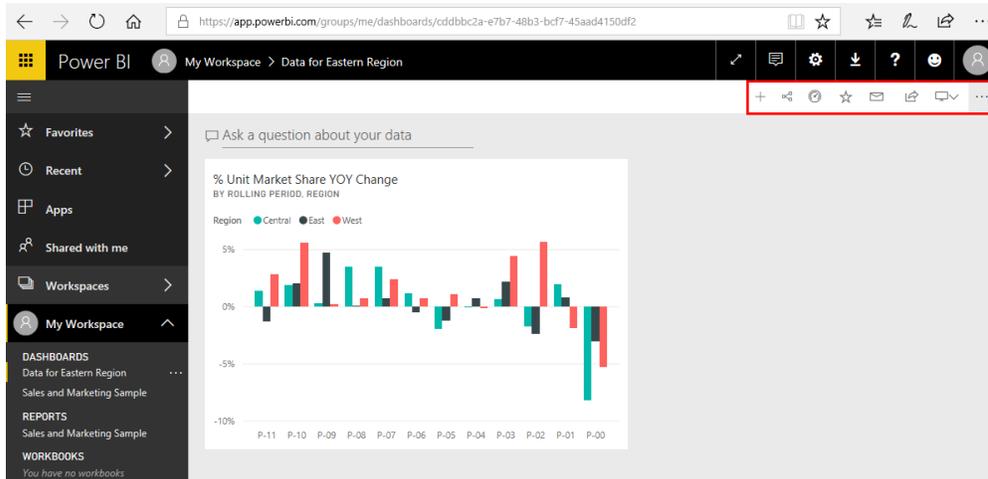
The tile will then be added:



You can work with these custom tiles in the same way as visualization tiles.

Managing Dashboards

In the top right corner, you will see options to manage your dashboard:



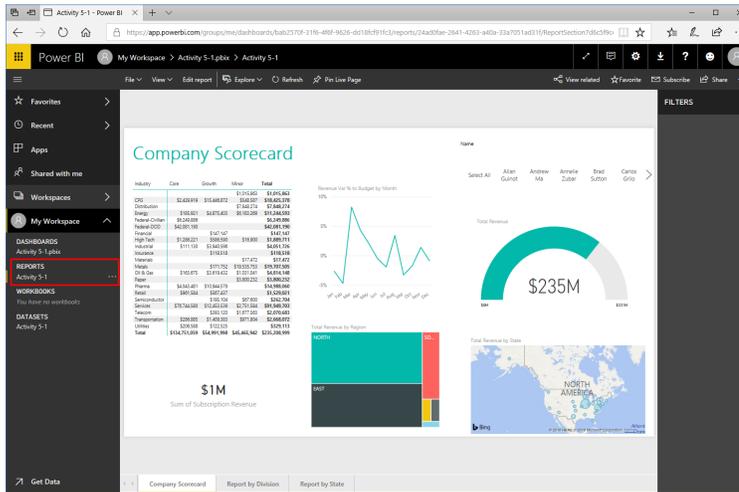
From left to right, the commands are:

- Add a custom tile
- View content related to the visualizations on this dashboard
- Set this as your featured dashboard so it is automatically displayed when you open the workspace
- Mark this dashboard as a favorite
- Enable notifications when there are changes to this dashboard
- Share this dashboard
- Change to phone view
- Access more options, including commands to delete, print, and refresh the dashboard and change its settings

Activity 5-4: Creating Custom Dashboards

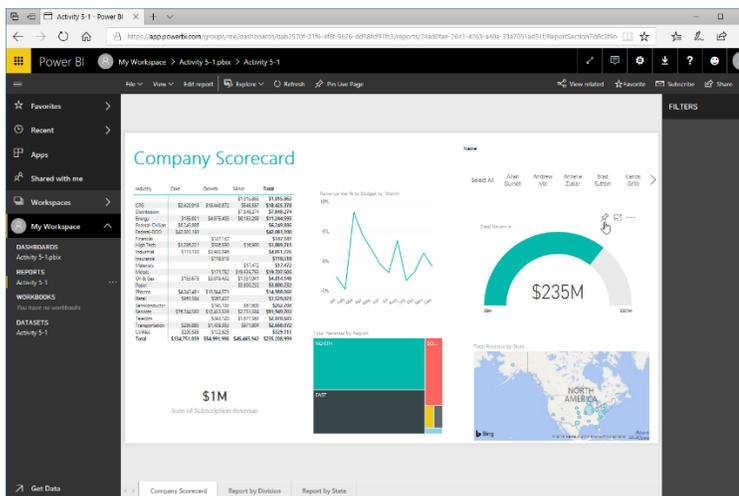
In this activity, you will create a custom dashboard.

1. Ensure you have completed Activity 5-3. The Activity 5-1 report should be displayed:

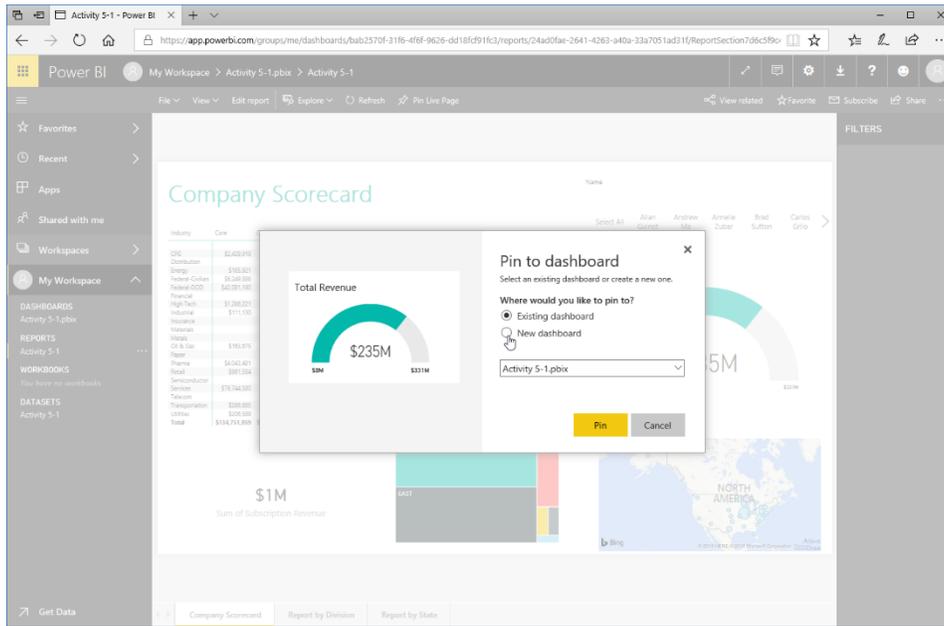


(If it is not displayed, click its link from the navigation pane.)

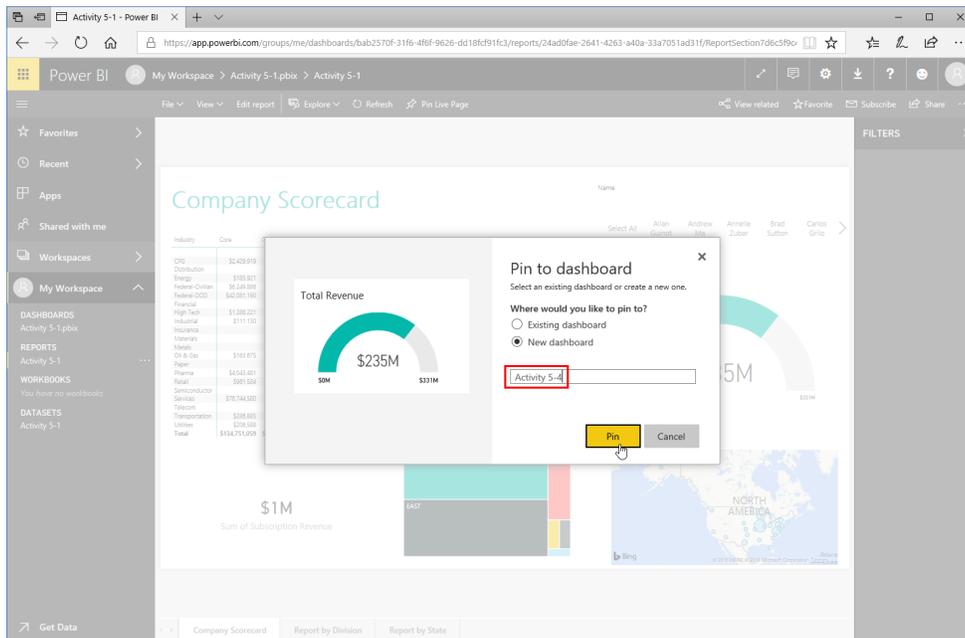
2. We want to create a dashboard summarizing revenue. First, let's add the KPI visualization to this dashboard. Move your mouse over the visualization and click the pin icon:



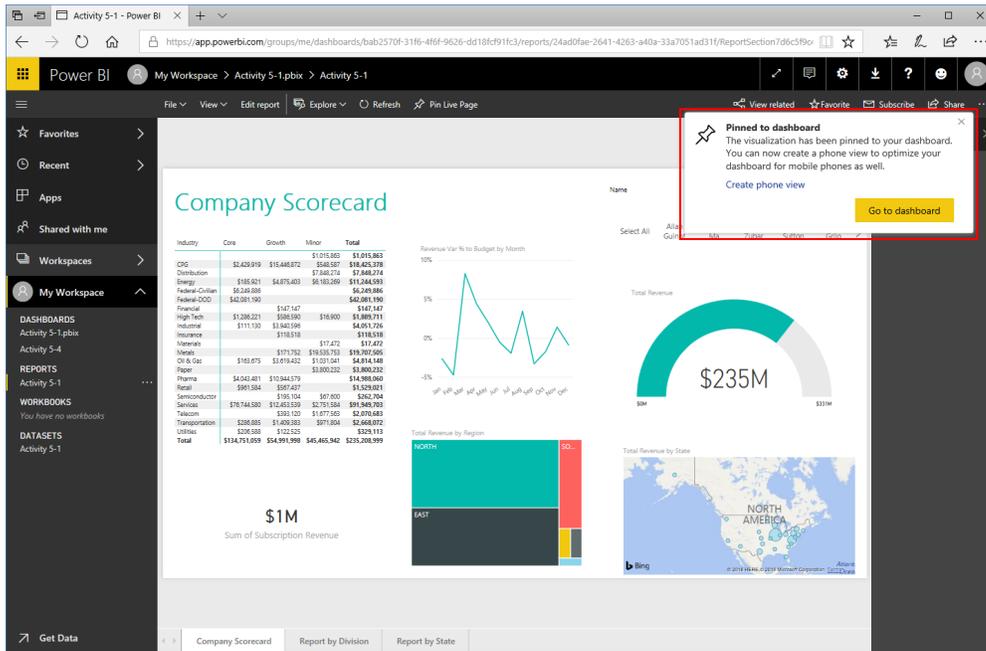
- The “Pin to dashboard” dialog will open. Click the “New dashboard” radio button:



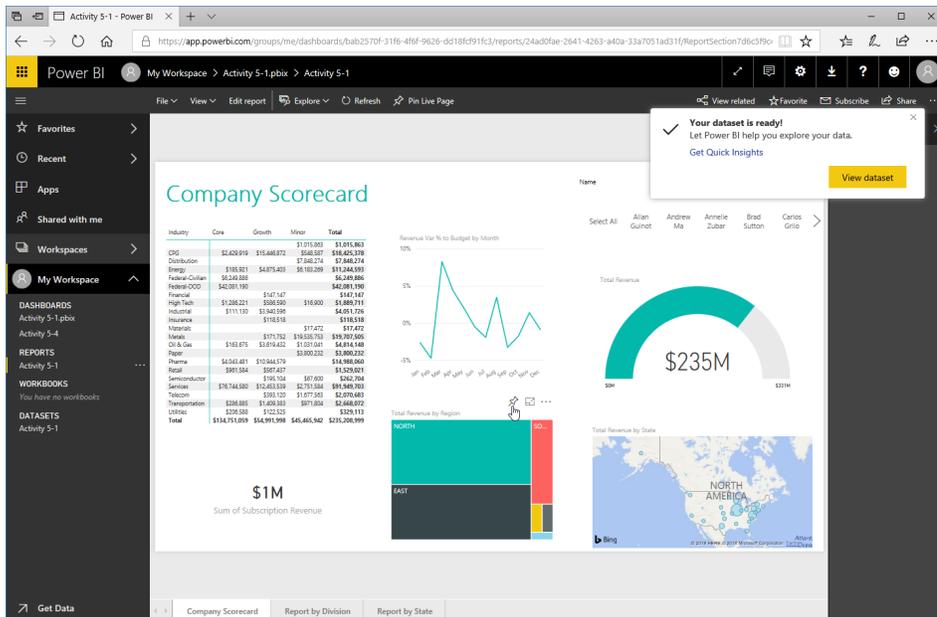
- Type, “Activity 5-4” for the dashboard name and click Pin:



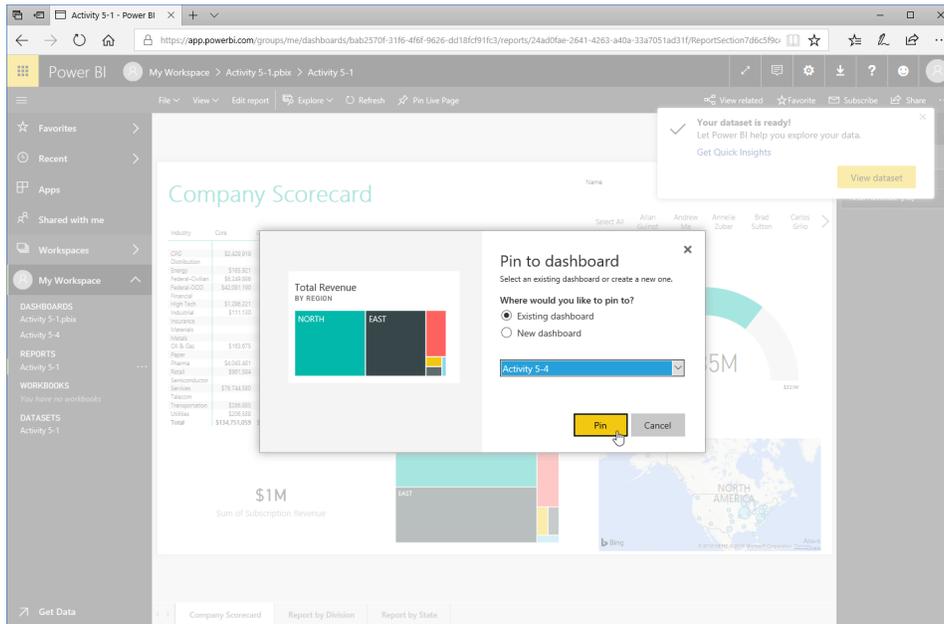
5. You will see a notification that the dashboard has been created:



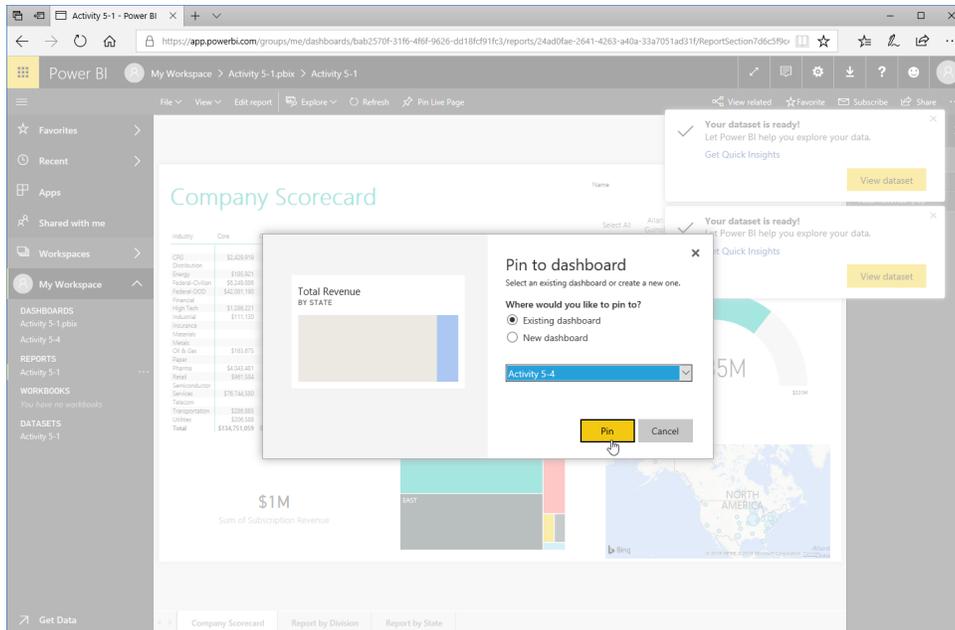
6. Move your mouse over the "Total Revenue by Region" visualization and click the pin icon:



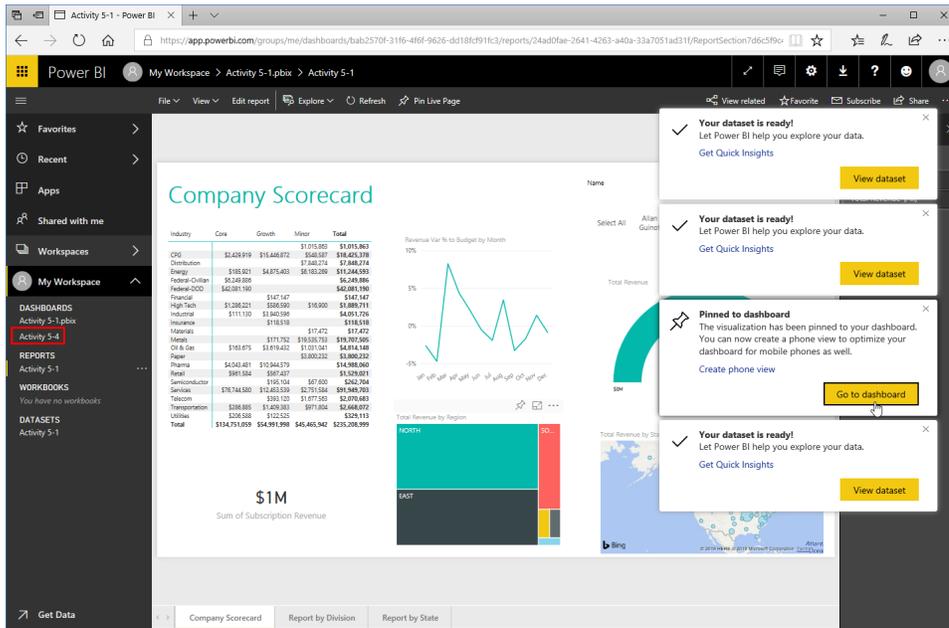
7. Ensure that Activity 5-4 is selected as the dashboard and click Pin:



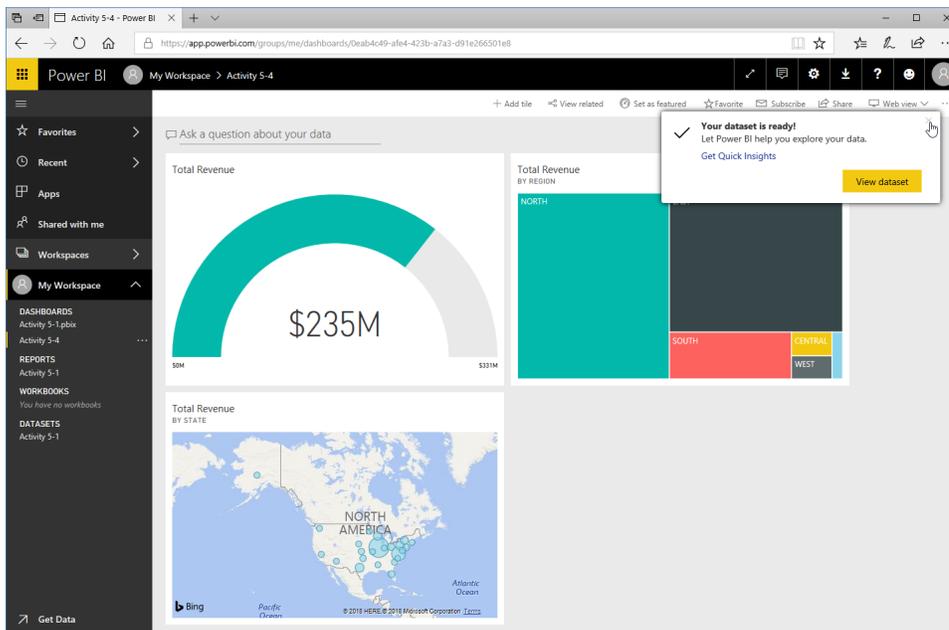
8. Repeat Steps 6 and 7 to pin the “Total Revenue by State” visualization to the new dashboard:



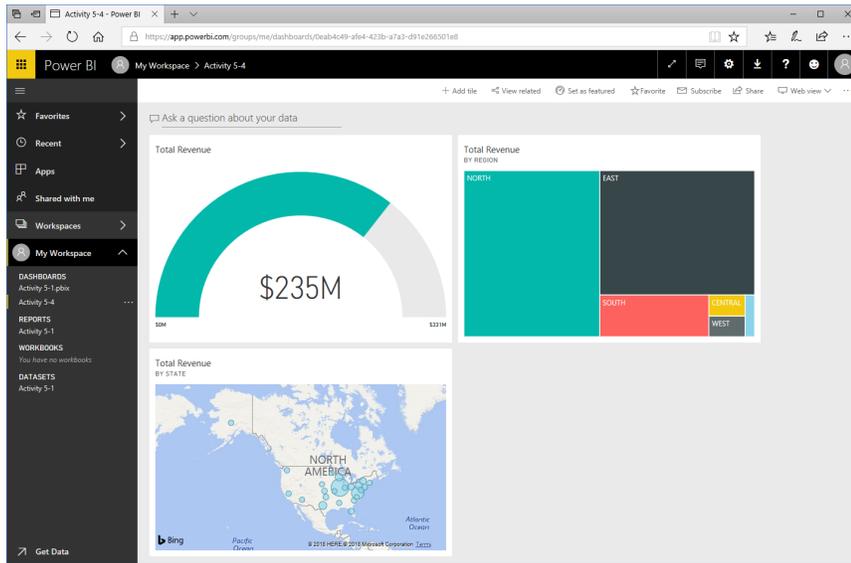
9. Now, use the notification link or the navigation pane to go to the new dashboard:



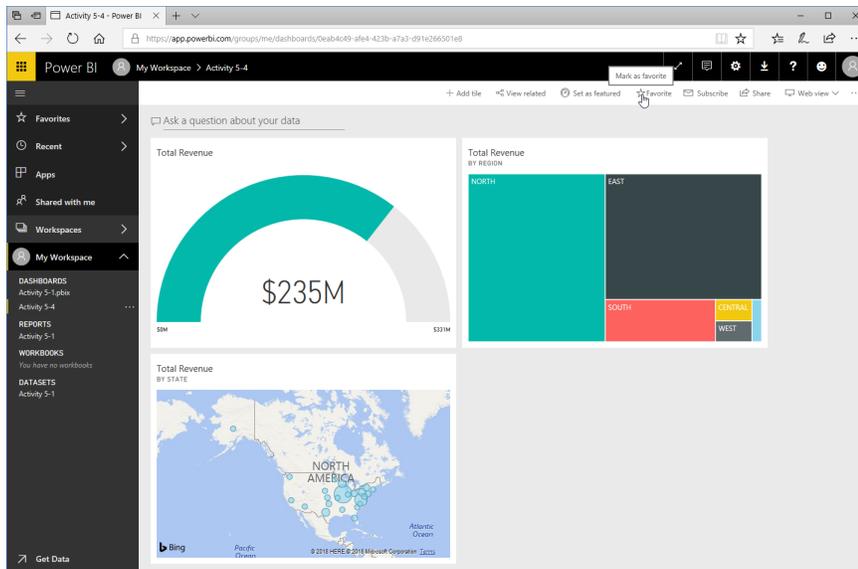
10. Close all notifications for a better view:



11. Review the dashboard:



12. Click the Favorite icon to add it to that category of the navigation pane:



13. This activity is now complete. Leave your browser open for the next activity.

TOPIC E: Power BI Web App

Features

To wrap up this lesson, we will explore some of Power BI's data analysis features which, as of this writing, are unique to the web app.

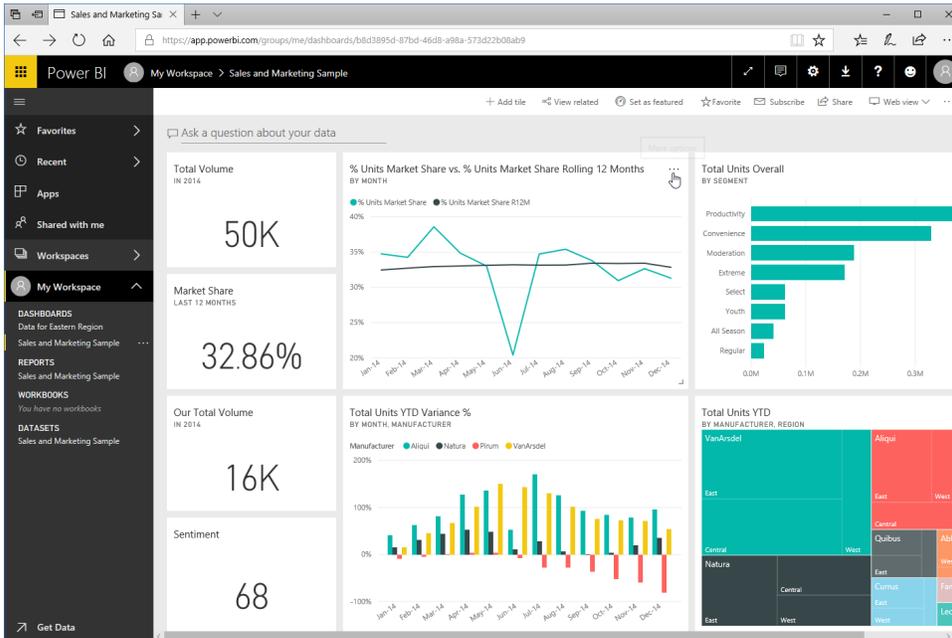
Topic Objectives

In this section, you will learn about:

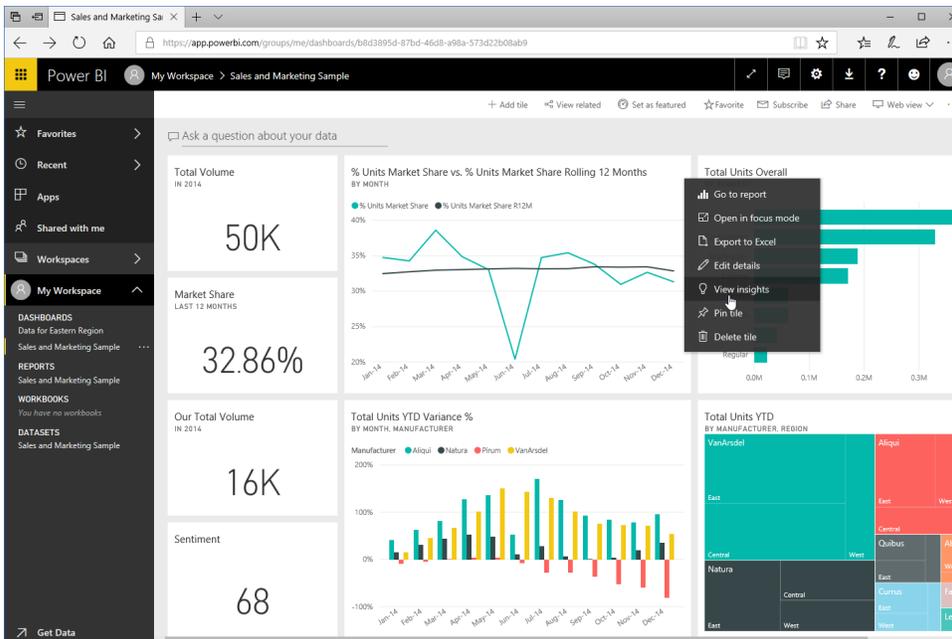
- Using Insights and Q & A
- Customizing Q & A suggestions

Using Insights

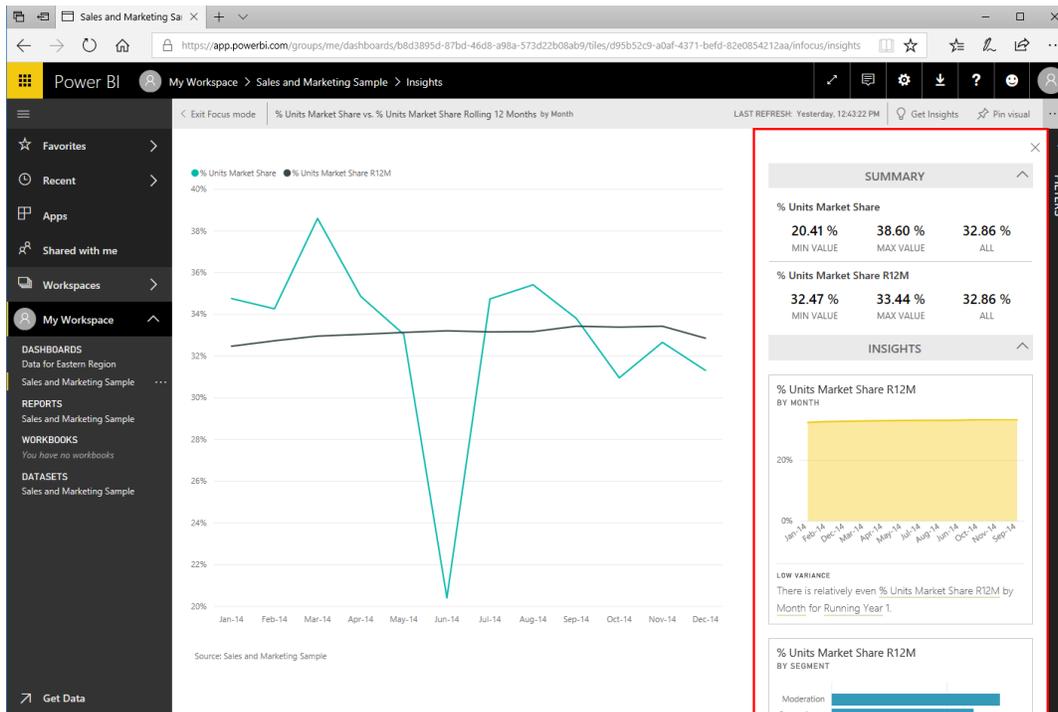
The Power BI web app features Insights, which provide related data and statistics for a particular visualization within a dashboard. To view these insights, move your mouse over the visualization and click the ellipses icon that appears:



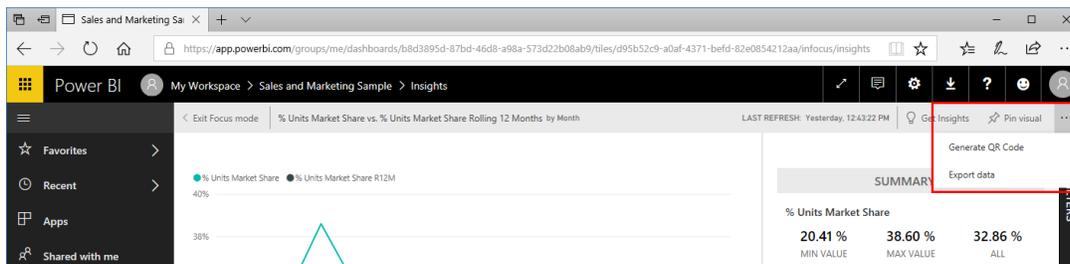
Then, click "View insights:"



You will now see the data insights in a pane on the left side of the window:

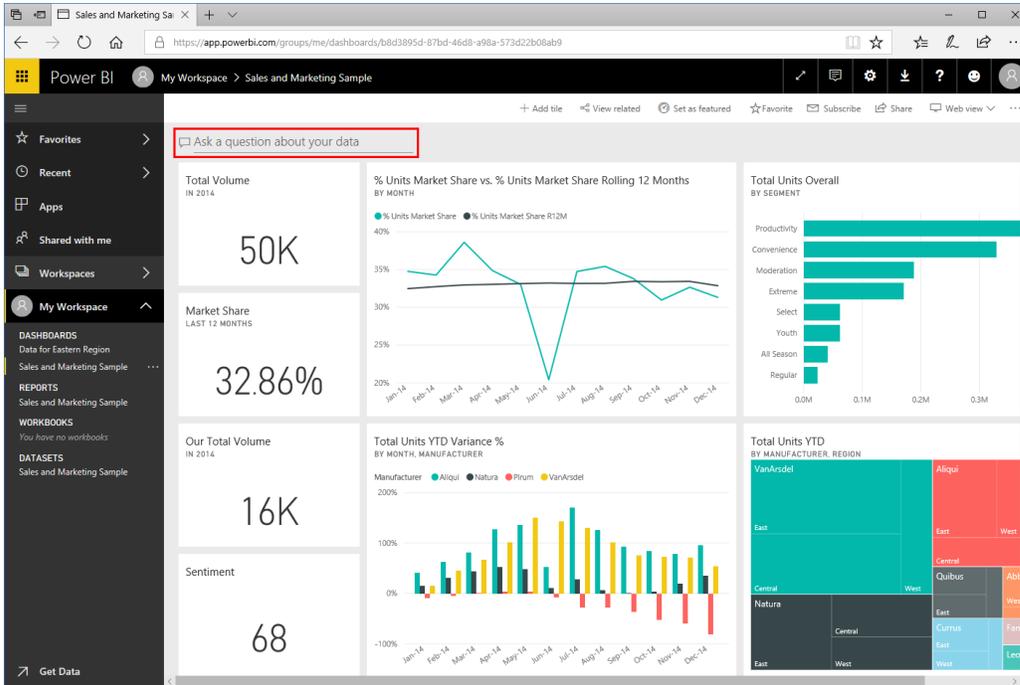


You can pin this data as its own visualization, or click ellipses icon at the top of this pane to see more options, including exporting the data and generating a QR code for quick access:

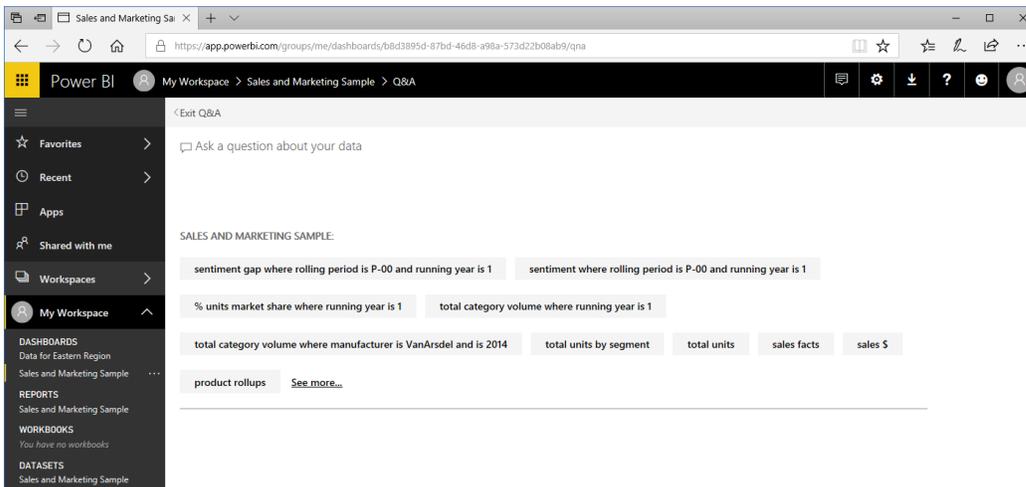


Using Q & A

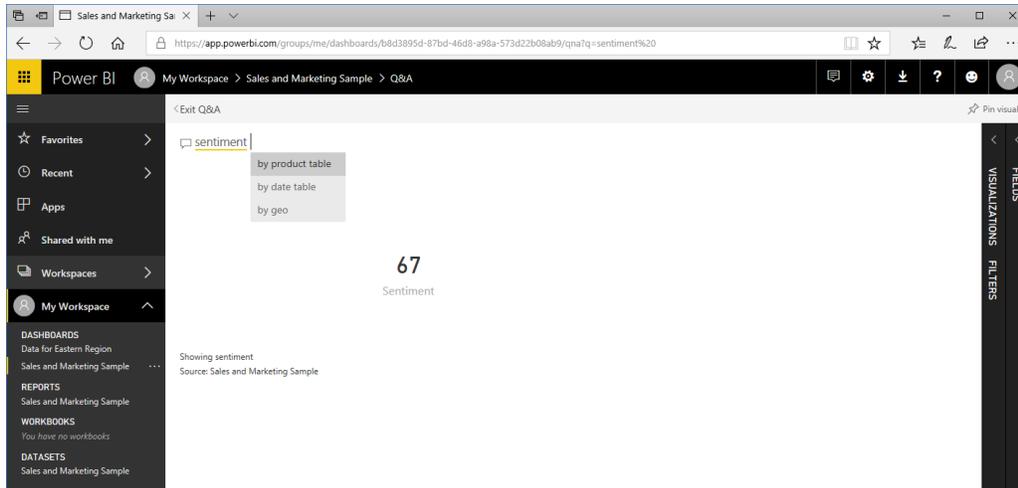
Another interesting feature is Q & A, which allows you to ask questions about your data:



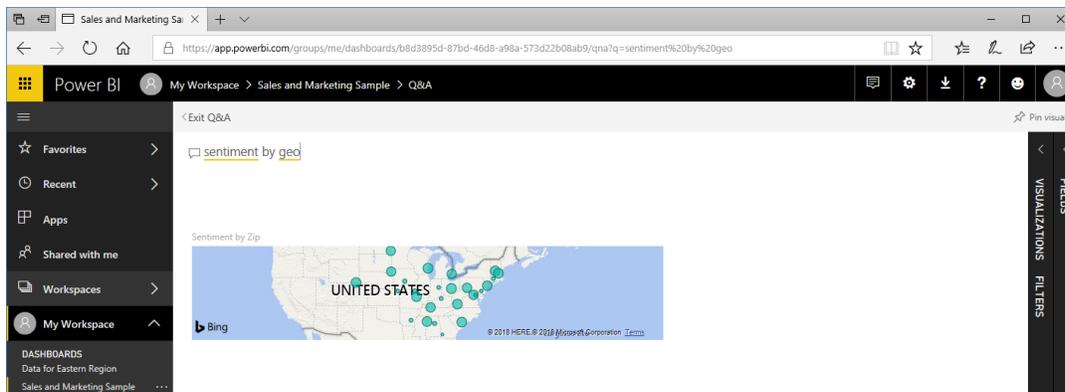
If you click in this field, you will see a number of pre-populated questions:



Click to select one of these questions, or type your own question in the field. With either action, additional suggestions to refine the question will appear in an auto-complete menu. Click to select the desired criterion:



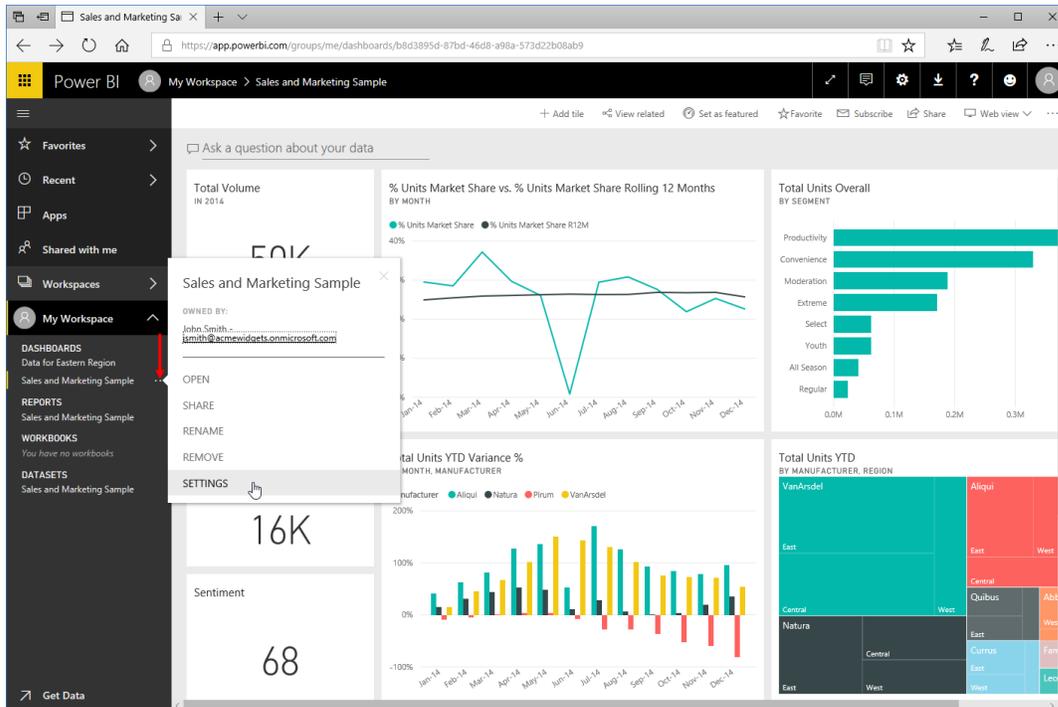
Here we have asked for sentiment by geography, so a bubble map has automatically been created from the underlying data:



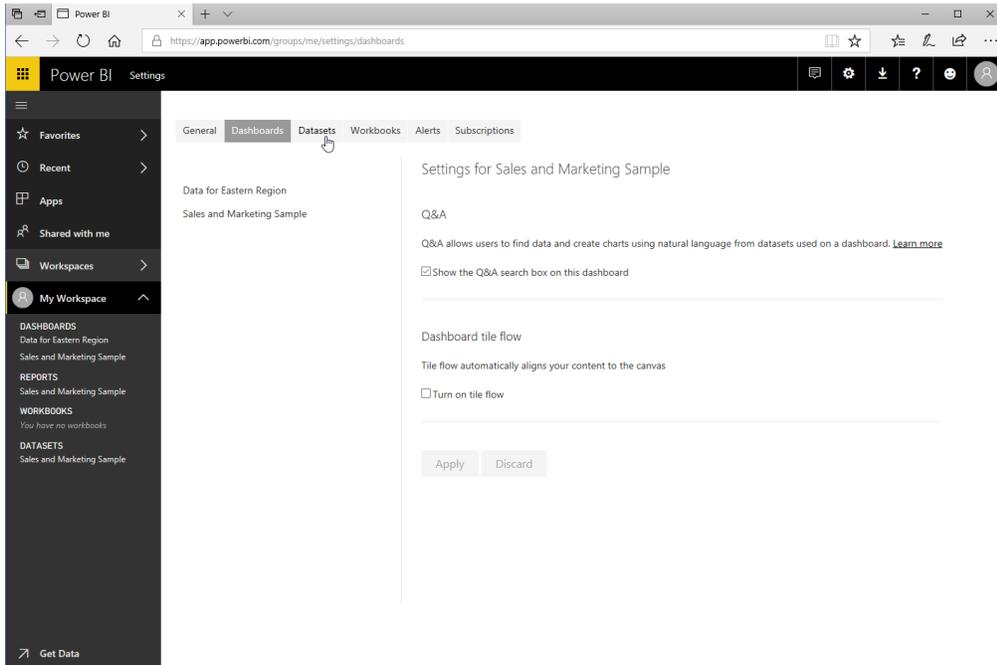
We can pin this visual using the command in the top right corner of the screen, or click Exit Q & A to return to the dashboard.

Customizing Q & A Suggestions

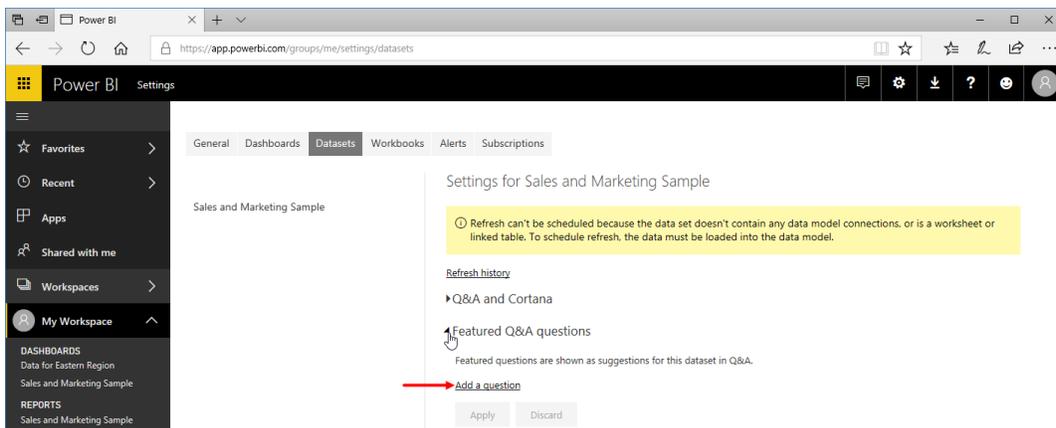
To customize the suggestions presented by Q & A, move your mouse over the dashboard entry in the navigation pane, click the ellipses, and click Settings:



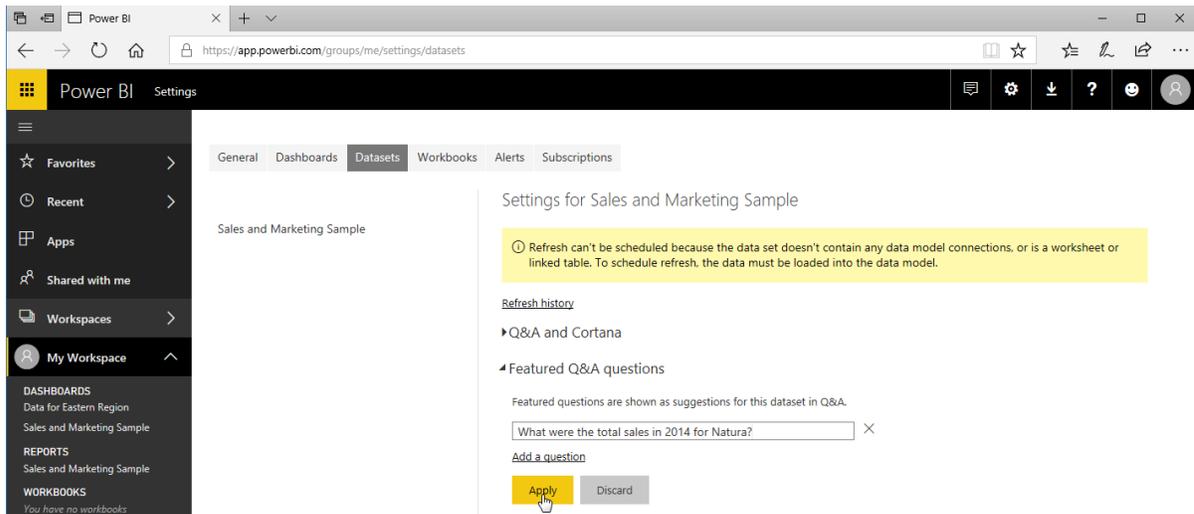
The Settings page for this dashboard will be displayed. Click the Datasets category:



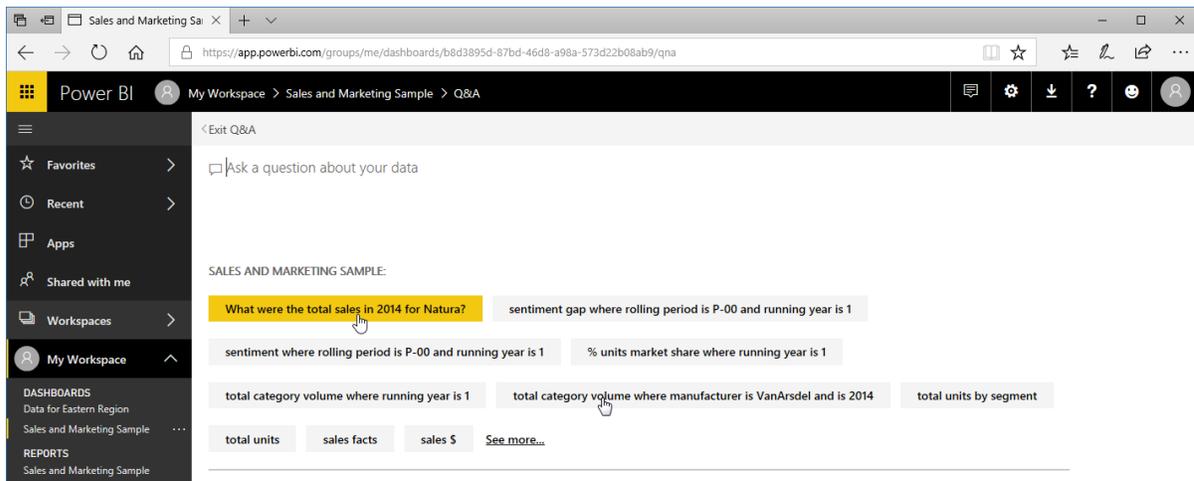
Now, expand the “Featured Q & A questions” section and click the “Add a question” link:



Type the question and click Apply:



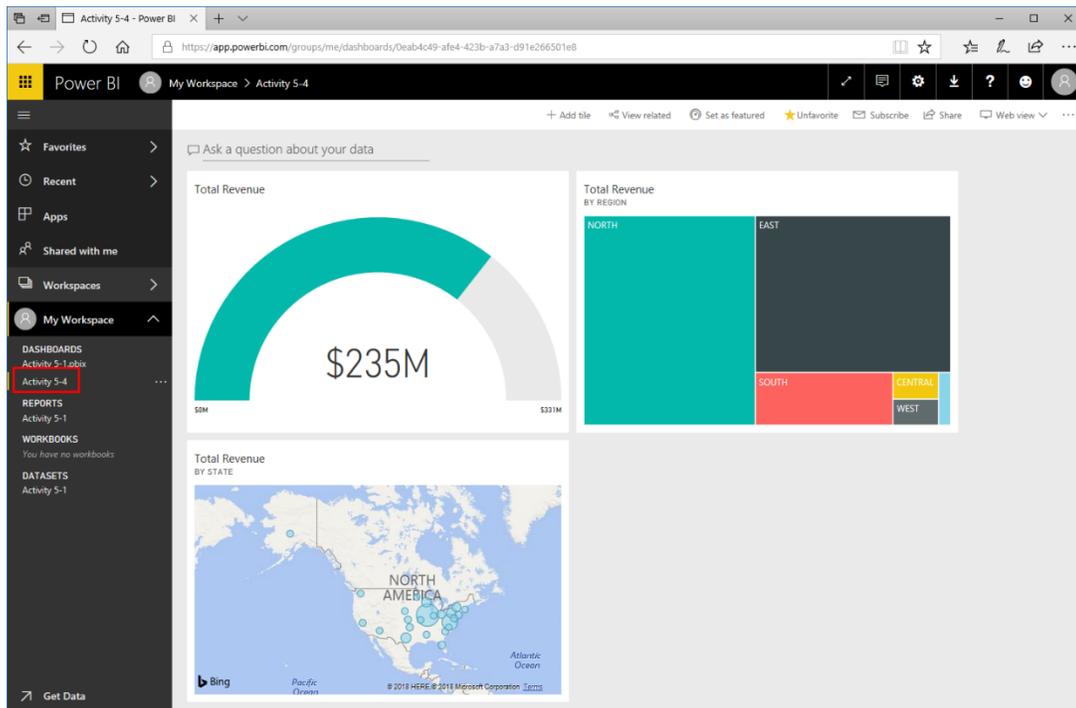
Now, the question will be added to the Q & A list:



Activity 5-5: Power BI Web App Features

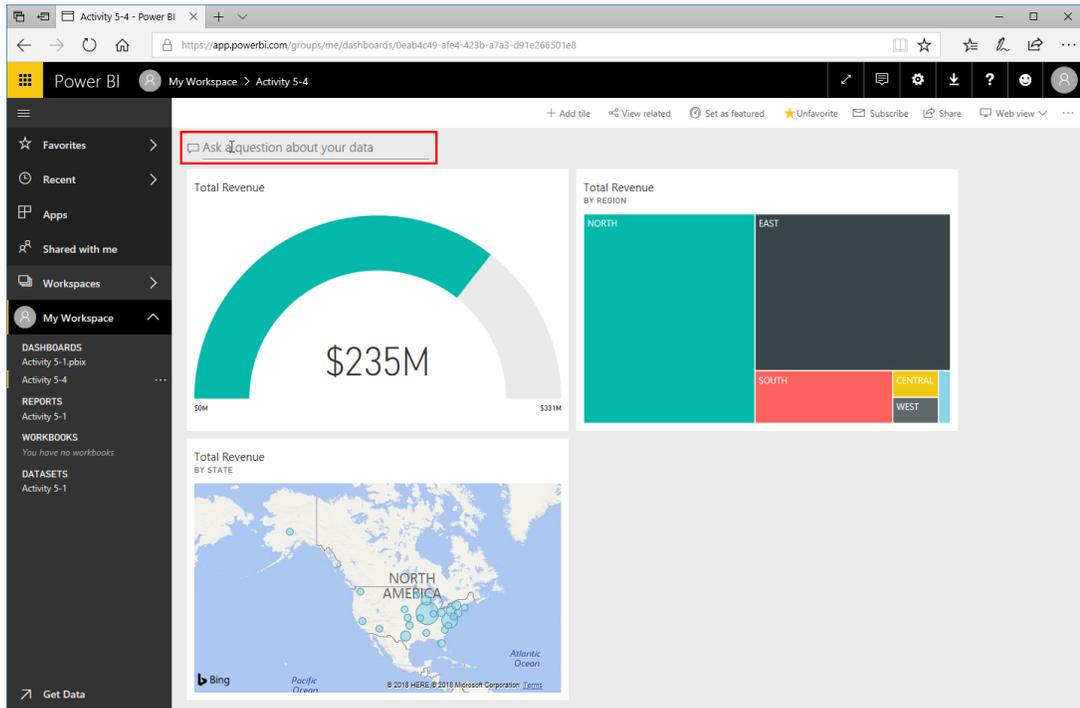
In this activity, you will use Insights and Q & A.

1. Ensure you have completed Activity 5-4. The Activity 5-4 dashboard should be displayed:

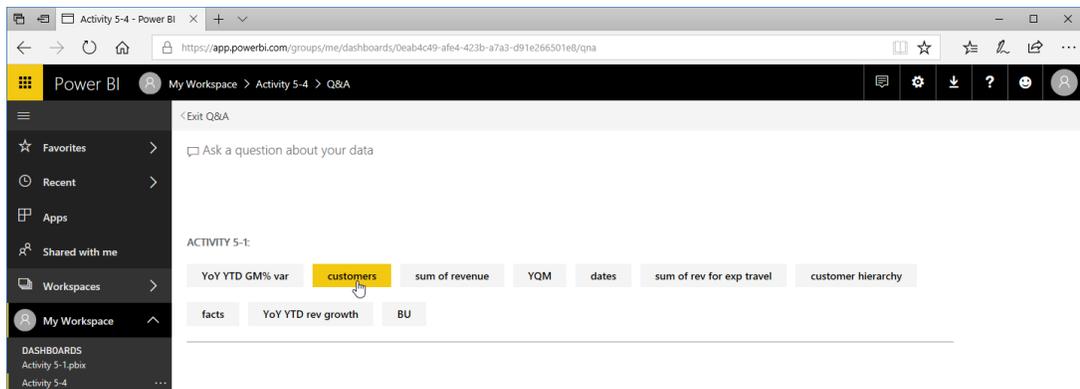


(If it is not displayed, click its link from the navigation pane.)

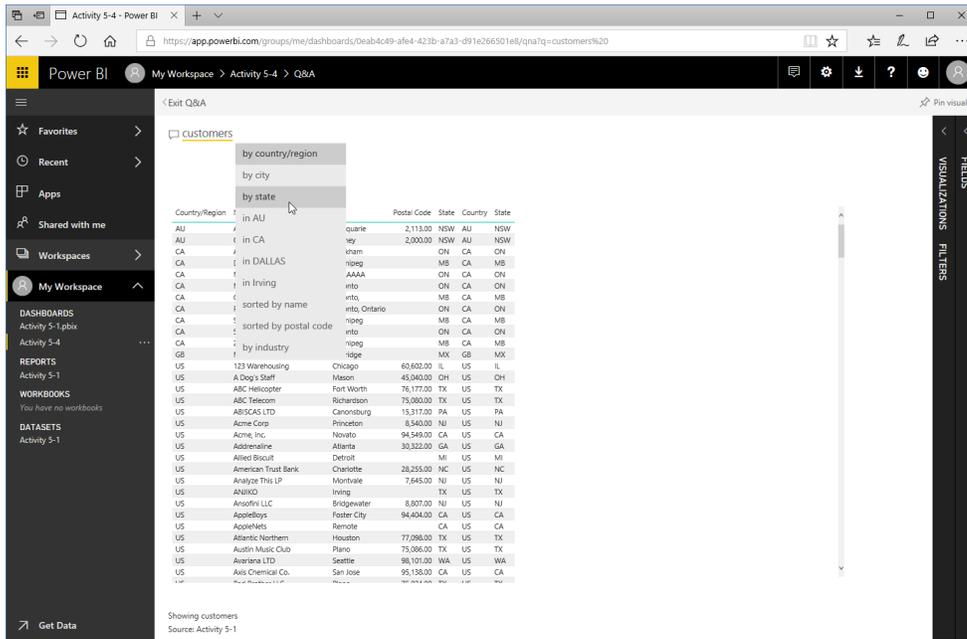
2. Click the “Ask a question about your data” field:



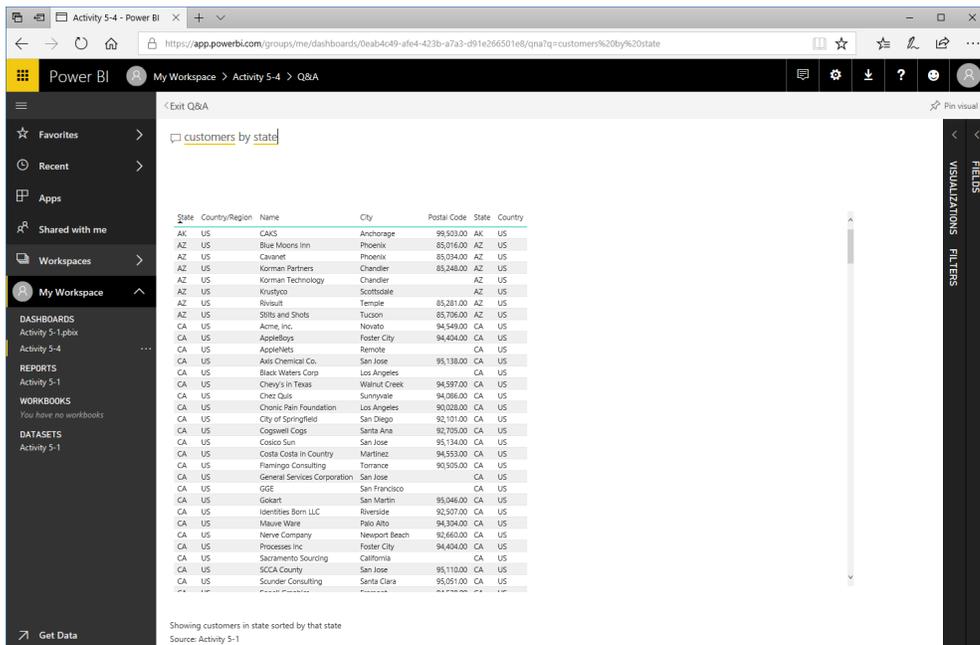
3. We want to view a summary of customers by state, so click “customers” from the suggested list:



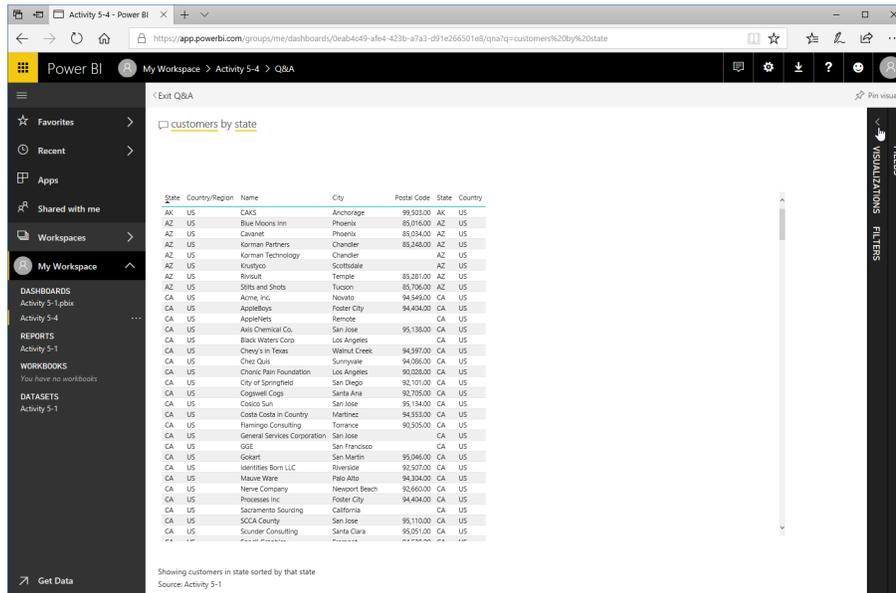
4. Now, click “by state” from the auto-complete menu:



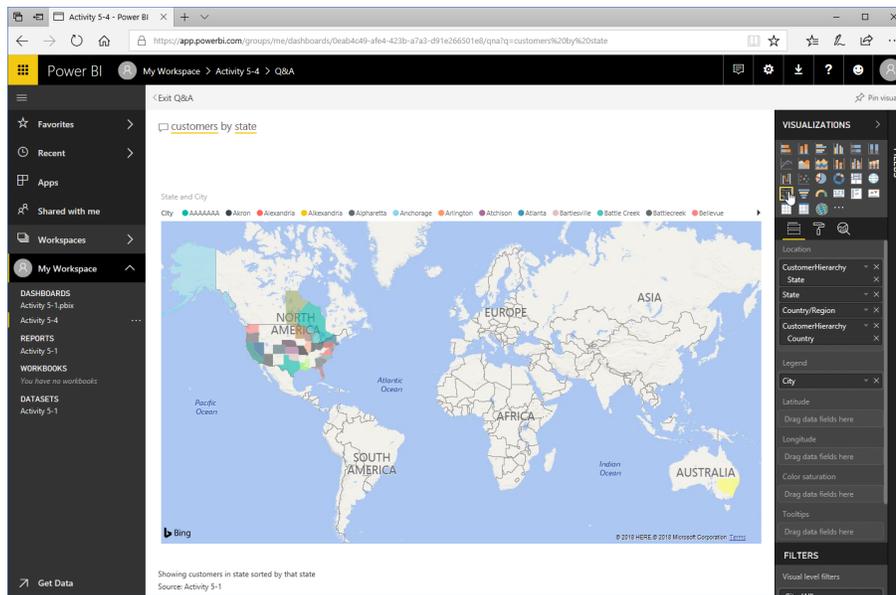
5. The data will now be displayed:



6. Click the chevron in the Visualizations task pane:

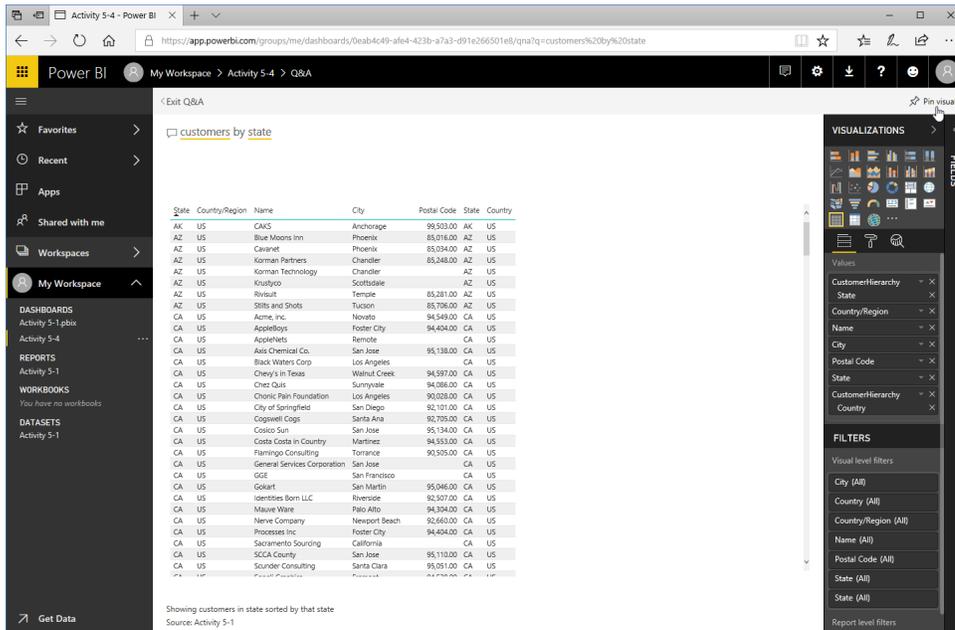


7. Click a few visualization icons to experiment with different display options:

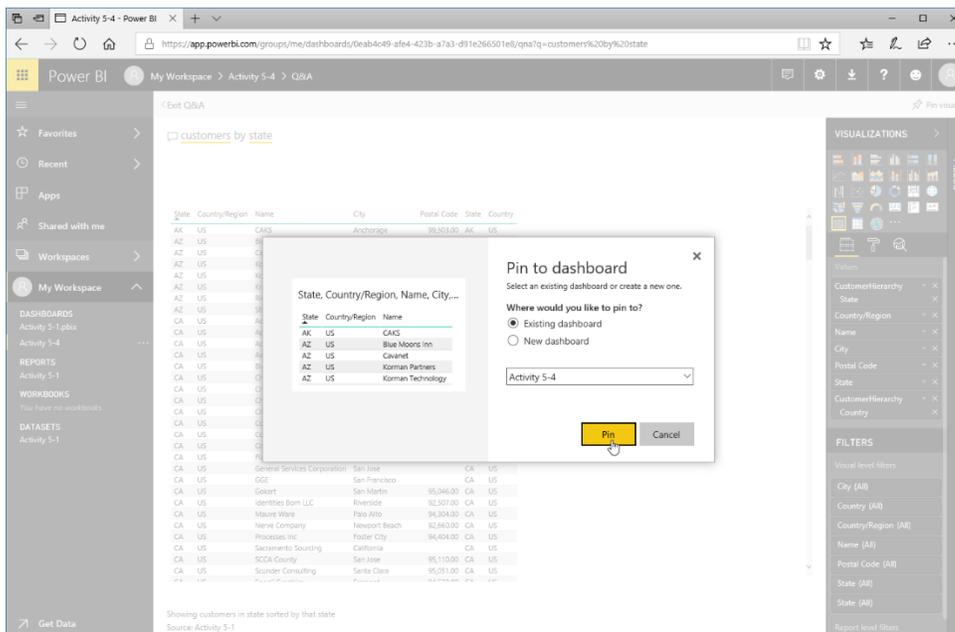


Return to the Table visualization when you are finished.

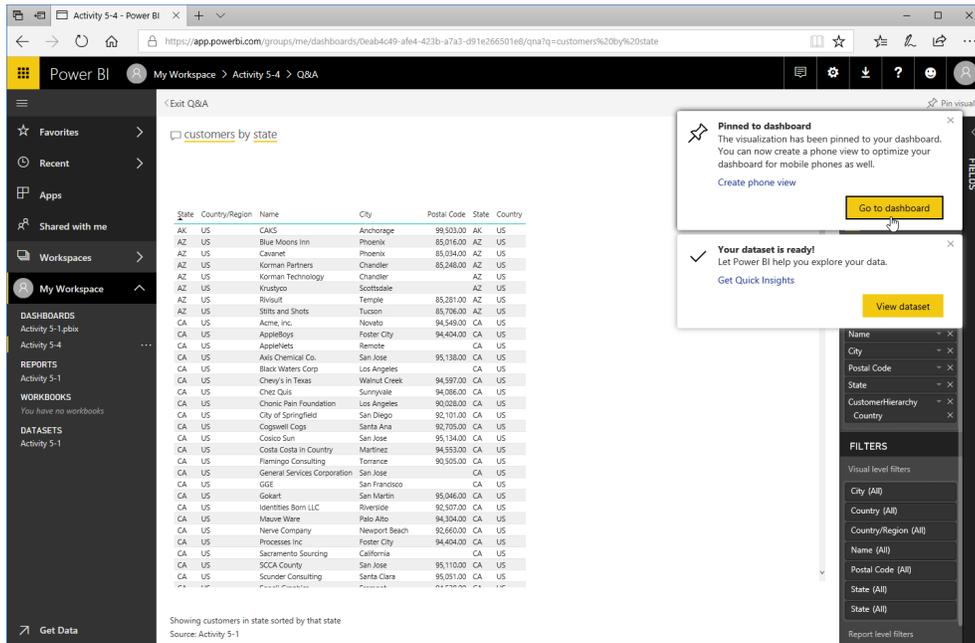
8. Let's add this information to our dashboard. Click "Pin visual:"



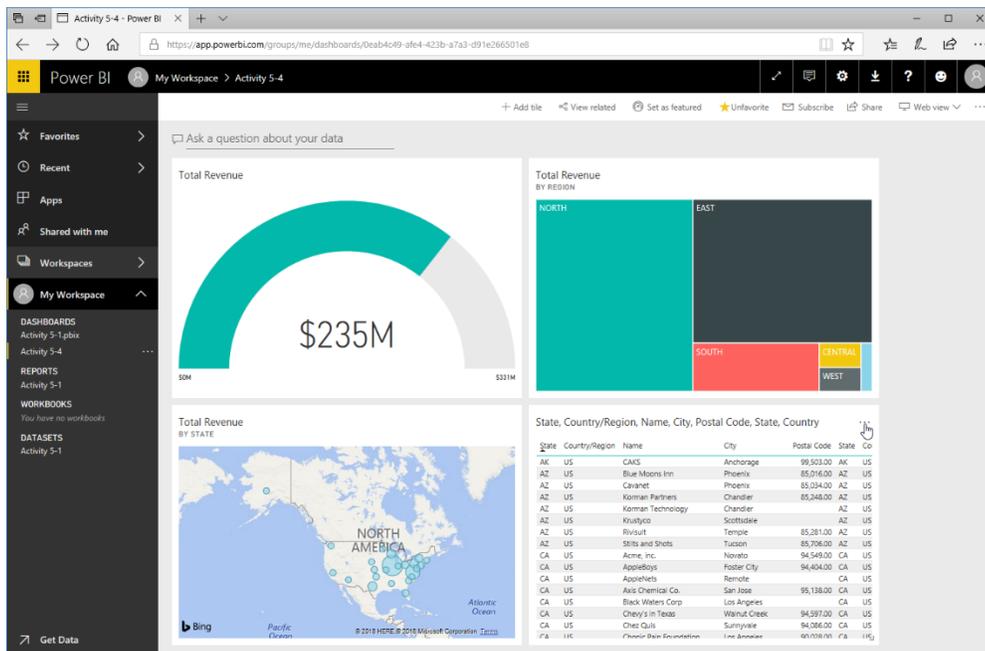
9. Ensure that the Activity 5-4 dashboard is selected and click Pin:



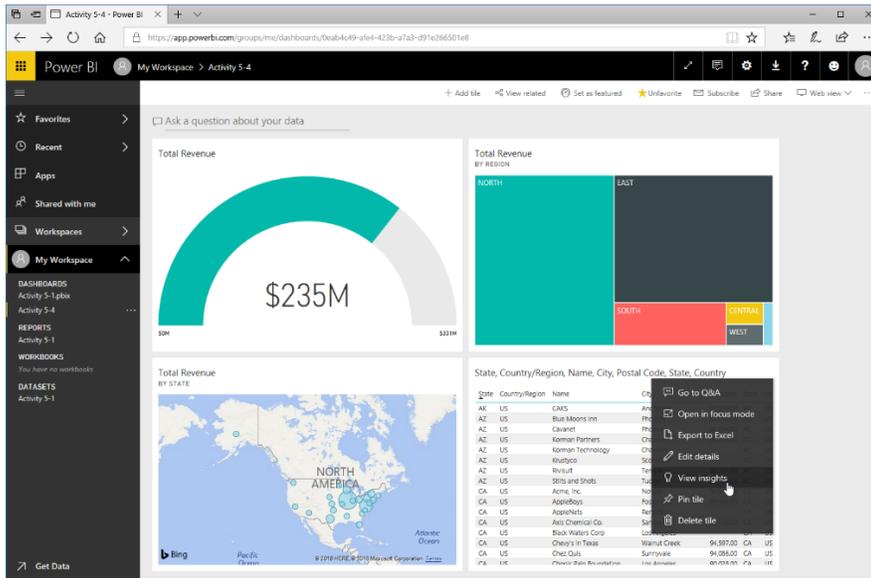
10. Click the notification link to go back to the dashboard:



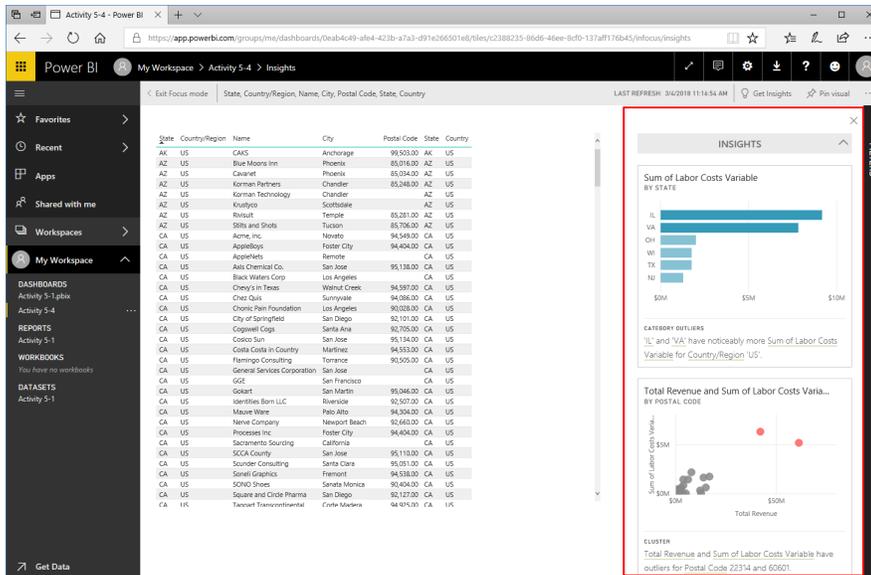
11. The visualization will now be added to the dashboard. Move your mouse over it and click the ellipses icon:



12. Click “View insights:”



13. You will now see insights related to this data:



14. Close your browser to complete this activity.

Summary

In this lesson, we took a closer look at the features in the Power BI web app. You learned how to open the app; connect to data in it; use workspaces, dashboards, and reports; create custom dashboards; and use Q & A and Insights to get even more out of your data.

Review Questions

1. Which Power BI client is designed for managing data?
2. How do you drill through data when viewing a report in the Power BI web app?
3. What is a content pack?
4. How do you view data insights?
5. How do you pin a visualization to a dashboard?

LESSON LABS

Lesson 1

Lesson Lab 1-1

Objective

To understand how to open and use Power BI files.

Briefing

You have been given an existing Power BI data file. You want to see what data it contains and what reports have been created.

Tasks

- Open the Sample Data file.
- Explore the Visualizations and Fields task panes.

Sample Data



Follow-Up Questions

If you have access to the Power BI web app, publish the Sample Data file and review its contents.

Lesson Lab 1-2

Objective

To add an Excel file to your Power BI data source.

Briefing

After reviewing the existing Power BI data file, you noticed that the regional list of directors is missing. You want to import this file and start creating a new report.

Tasks

- Open the Power BI Sample Data file.
- Connect to the Excel Sample Data file.
- Add two visualizations to the Demographic Summary page:
 - A pie chart showing New Hires as the Values and Gender as the Legend
 - A donut chart showing New Hires as the Values and Ethnicity as the Legend
- Format, place, and resize these visualizations however you like.
- Try interacting with each visualization to see how they affect each other.

Sample Data



Lesson Lab 1-2
Microsoft Power BI Desktop
8.29 MB



Regional Directors
Microsoft Excel Worksheet
9.99 KB

Follow-Up Questions

Review the other two report pages and see how the visualizations interact with each other.

Lesson 2

Lesson Lab 2-1

Objective

To manage the Excel data we imported in the last lesson.

Briefing

You want to explore and update the Excel data you imported into your Power BI file in the last Lesson Lab.

Tasks

- View the Directory table in Data view.
- Rename the “Phone Number” column to “Director’s Number.”
- Ensure each column has the correct data category applied (if applicable).
- Link the Region field in the Directory table to the Region field in the BU table.

Sample Data



Lesson Lab 2-1
Microsoft Power BI Desktop...
8.30 MB

Lesson Lab 2-2

Objective To add information from the Directory table to the BU table.

Briefing You have some ideas for using calculated columns and measures to add more meaning to your Power BI file.

Task

- Add a column to the BU table to show which director each VP reports to.
- Use a measure to calculate the average tenure in years. (Hint: There is a similar measure for days and months.)

Hints If you get stuck, review the completed Sample Data file.

Sample Data



Lesson Lab 2-2
Microsoft Power BI Deskto...
8.30 MB

Lesson 3

Lesson Lab 3-1

- Objective** To create a scorecard that will look the same on all devices.
- Briefing** You want to create an easy-to-read scorecard that will show both new hires and separations (employees who have left the company).
- Task**
- Create a new report page named Scorecard. Set the size. Move this page after the Info page.
 - Add a line chart with the New Hires and Separations fields as the Values. Add the YQM hierarchy as the axis.
 - Position this chart at the bottom of the page. Resize as necessary.
- Hints** You can change page size in the Visualizations task pane, under the Format tab, when no visualizations are selected.
- Sample Data**
-  **Lesson Lab 3-1**
Microsoft Power BI Deskto...
8.31 MB
- Follow-Up Questions** Explore the drill-down feature. Leave the chart drilled to quarter.

Lesson Lab 3-2

Objective

To add a few final touches to your Scorecard report.

Briefing

You want to finalize your scorecard report and create a phone view.

Tasks

- Continue working with the Scorecard report.
- Add a text box with the title “Hiring Scorecard.” Feel free to use whatever font, color, and/or effects you like.
- Add the Sample Data image.
- Resize and position these objects as necessary.
- Create a phone view that matches the desktop view we have already created.

Sample Data



Lesson Lab 3-2
Microsoft Power BI Deskto...
8.31 MB



Report Image
PNG File
623 KB

Lesson 4

Lesson Lab 4-1

Objective

To create a new report in your sample file.

Briefing

You need to create a New Hires report for your manager that shows the progression of new hires over time, a geographical breakdown of new hires, and a chart of full-time vs. part-time new hires.

Task

Create a new report page named “New Hires Report.” Add three visualizations to show the information requested.

Sample Data



Follow-Up Questions

Use a text box to add a title to the report. Format it any way you like.

Lesson Lab 4-2

Objective You have sent your report to your manager. She has made two additional requests.

Briefing Your manager wants to easily see how many active employees there are. She also wants to monitor bad hires (those who leave within 60 days of their start date) with the goal of keeping it under 15% of active employees.

Task Add two visualizations to display this data. Rearrange the report visualizations if needed.

Sample Data



Lesson Lab 4-2
Microsoft Power BI Desktop
8.98 MB

Follow-Up Questions Add a slicer to filter the values by year.

Lesson 5

Lesson Lab 5-1

Objective

You are now ready to share your Power BI file with your organization.

Briefing

You need to connect your Power BI file to the web service and then share key information with your organization.

Tasks

- Log into the Power BI web app.
- Connect the Sample Data file.
- View the dashboard and report in this file.

Sample Data



Lesson Lab 5-1
Microsoft Power BI Desкто...
8.98 MB

Follow-Up Questions

Be sure to review all report pages.

Lesson Lab 5-2

Objective

To create a custom dashboard.

Briefing

Your manager wants a summary that she can share with her director.

Tasks

- Ensure you have completed Lesson Lab 5-1.
- Create a new dashboard named “Lesson Lab 5-2.”
- Open the New Hires Report. Review all five pages and pin any three visualizations to the new dashboard.
- Add the new dashboard as a favorite and share it with a classmate.

Hints

If you are completing this course on your own, you can skip the sharing step.

COURSE WRAP-UP

Keyboard Shortcut Quick Reference Sheet (Power BI Desktop Client)

File Management	Create a new file	Ctrl + N
	Save a file	Ctrl + S
	Open the Save As dialog	F12
	Open a file	Ctrl + O
	Close current window	Alt + F4
	Get Help	F1
Editing Tools	Select all items on current page	Ctrl + A
	Copy selected object(s)	Ctrl + C
	Cut selected object(s)	Ctrl + X
	Paste selected object(s)	Ctrl + V
	Undo last action	Ctrl + Z
	Redo last action	Ctrl + Y

Formatting Tools	Apply bold formatting	Ctrl + B
	Apply underlining	Ctrl + U
	Apply italic formatting	Ctrl + I

Post-Course Assessment

1. How do you connect to an Excel workbook from the Power BI desktop client?
 - a. File → Connect → Excel
 - b. Home → Get Data arrow → Excel
 - c. Tools → Import → Excel Workbook
 - d. All of the above

2. What are the basic steps for creating any visualization? (Select all that apply.)
 - a. Click the visualization icon from the Visualizations pane
 - b. Install the necessary visualizations package
 - c. Set the fields to display in the Fields pane
 - d. Ensure all fields are related

3. Which Power BI client is designed for managing data?
 - a. Desktop
 - b. Web
 - c. Mobile

4. What is DAX?
 - a. The Power BI file format
 - b. A type of formula language used to create custom calculations and measures in Power BI
 - c. An XML data schema
 - d. A legacy database file format

5. What types of content can you connect to with the Power BI web app?
 - a. Content packs
 - b. Local files (like Excel workbooks)
 - c. Live data (like SQL databases)
 - d. All of the above

6. What is a measure?
 - a. Table that returns specified values from a dataset
 - b. Column that returns specified values from a dataset
 - c. Formula that shows a value calculated from specified data
 - d. Editor that allows you to enter a DAX expression

7. You have a chart with drilldown enabled, but you do not want the other visualizations on the page to change when the user is drilling through the data. Where can you disable this feature in the Power BI desktop client?
 - a. Select the visual, click the Visual Tools – Format tab, and uncheck “Drilling filters other visuals”
 - b. Ensure the visualization’s fields are different than the other visualizations on the page
 - c. Click the ellipses and uncheck “Linked drilldown”
 - d. You cannot disable this feature for the other visualizations

8. If there is more than one visualization on a page, which of the following statements are true?
 - a. They will act as a filter on each other
 - b. They must use the same design theme
 - c. They must be the same size
 - d. All of the above

9. How do you see a visualization’s data in the Power BI desktop client?
 - a. Click the ellipses in the top right corner of the visualization and click Show Data
 - b. Right-click it and click Show Data
 - c. Press Ctrl + D with the visualization selected
 - d. Any of the above

10. What is a slicer?

- a. A drilldown type
- b. A tool that allows the user to capture a static image of a visualization
- c. A table filtering option only available for data imported from Excel
- d. A visualization that allows users to filter data on the fly

Course Summary

Congratulations on completing **Introduction to Microsoft Power BI** training. During this course, you learned how to:

- Use the Power BI desktop client and web app
- Connect to data sources
- Create and manage visualizations, including:
 - Matrices and tables
 - Charts
 - Maps
 - Cards
 - Gauges
 - KPIs
 - Slicers
- Transform, sanitize, and model data
- Use the Query Editor
- Manage relationships
- Manage report pages
- Change report view options
- Add static objects to a report
- Use workspaces, dashboards, and reports in the Power BI web app
- Use Insights and Q & A in the Power BI web app

You should now feel comfortable linking and modeling data in Power BI, and then using that data to create visual reports and reveal data insights.

ANSWER KEYS

Lesson 1 Review Questions

1. What are the six building blocks of Power BI?

Workspaces, dashboards, tiles, reports, visualizations, and datasets.

2. How do you connect to an Excel workbook from Power BI?

Click Home → Get Data arrow → Excel.

3. What are the two task panes used when creating a visualization?

Visualizations and Fields.

4. How do you see the data related to a visualization?

Move your mouse over the visualization, click the ellipses in the top right corner, and click Show Data.

5. True or False: Removing a visualization also removes the related data.

This statement is false. Removing a visualization does not affect the related data.

Lesson 2 Review Questions

1. What is DAX?

A type of formula language used to create custom calculations and measures.

2. Where should a measure be stored?

Ideally, with the related table. This is not a requirement of Power BI – it is simply so you can find it later if needed.

3. Which tab contains commands to set the data type, format, category, and summarization?

The Modeling tab.

4. How do you create a relationship between two fields in Relationships view?

Drag one field to the other.

5. How do you open the Query Editor?

Click Home → Edit Queries.

Lesson 3 Review Questions

1. You have hidden a page in your report showing next year's budget. You are now ready to share it with others. How do you show it?

Right-click the page tab and click Hide Page to de-select it.

2. True or False: Always duplicate a page when creating a phone layout so the desktop layout is not lost.

This statement is false. Creating a phone layout will automatically create an alternate version of the report – there is no need to duplicate it.

3. You have a chart with drilldown enabled, but you do not want the other visualizations on the page to change when the user is drilling through the data. Where do you set this option?

Uncheck the "Drilling filters other visuals" option on the Visual Tools – Format tab.

4. How do you add a local picture to a report page?

Click Home → Image.

5. How do you add an online picture to a report page?

As of this writing, all images must be stored locally to be added to a report.

Lesson 4 Review Questions

1. What is the process for creating any kind of visualization?

Click its icon from the Visualizations pane and then choose the fields to display.

2. How do you display a slicer as a list of buttons?

Click the Format tab in the Visualizations task pane, click the Orientation menu, and choose Horizontal.

3. If you want to show the cumulative effect of positive or negative values, what chart type would you choose?

Waterfall.

4. What is the difference between the KPI and gauge visualizations?

Both display progress towards a goal, but in different ways.

5. What are the two types of geographical map visualizations?

Bubble (standard) and filled.

Lesson 5 Review Questions

1. Which Power BI client is designed for managing data?

The Power BI desktop client.

2. How do you drill through data when viewing a report in the Power BI web app?

Click Explore on the top action bar.

3. What is a content pack?

A set of templates for Power BI that includes pre-defined visuals and reports based on a specific dataset.

4. How do you view data insights?

Move your mouse over the visualization, click the ellipses icon, and click “View insights.”

5. How do you pin a visualization to a dashboard?

Move your mouse over the visualization and click the pin icon. In the dialog box that appears, select or create a dashboard and click Pin.

Post-Course Assessment

1. How do you connect to an Excel workbook from the Power BI desktop client?

- a. File → Connect → Excel
- b. Home → Get Data arrow → Excel
- c. Tools → Import → Excel Workbook
- d. All of the above

To connect to an Excel workbook, click Home → Get Data arrow → Excel.

2. What are the basic steps for creating any visualization? (Select all that apply.)

- a. Click the visualization icon from the Visualizations pane
- b. Install the necessary visualizations package
- c. Set the fields to display in the Fields pane
- d. Ensure all fields are related

Click its icon from the Visualizations pane and then choose the fields to display. No special package is required, and if a relationship is needed, Power BI will prompt you to create one.

3. Which Power BI client is designed for managing data?

- a. Desktop
- b. Web
- c. Mobile

The Power BI desktop client is designed for managing data.

4. What is DAX?

- a. The Power BI file format
- b. A type of formula language used to create custom calculations and measures in Power BI
- c. An XML data schema
- d. A legacy database file format

DAX is a type of formula language used to create custom calculations and measures. It is used in Power BI, Excel, and many other data-related applications.

5. What types of content can you connect to with the Power BI web app?

- a. Content packs
- b. Local files (like Excel workbooks)
- c. Live data (like SQL databases)
- d. All of the above

The Power BI web app can connect to all of these data sources, and more.

6. What is a measure?

- a. Table that returns specified values from a dataset
- b. Column that returns specified values from a dataset
- c. Formula that shows a value calculated from specified data
- d. Editor that allows you to enter a DAX expression

A measure is a formula that shows a value calculated from specified data.

7. You have a chart with drilldown enabled, but you do not want the other visualizations on the page to change when the user is drilling through the data. Where can you disable this feature in the Power BI desktop client?

- a. Select the visual, click the Visual Tools – Format tab, and uncheck “Drilling filters other visuals”
- b. Ensure the visualization’s fields are different than the other visualizations on the page
- c. Click the ellipses and uncheck “Linked drilldown”
- d. You cannot disable this feature for the other visualizations

If you have a visualization with drilldown options, you can uncheck the “Drilling filters other visuals” option so that it does not affect the other visualizations.

8. If there is more than one visualization on a page, which of the following statements are true?

- a. They will act as a filter on each other
- b. They must use the same design theme
- c. They must be the same size
- d. All of the above

If there is more than one visualization on a page, they will act as a filter on each other.

9. How do you see a visualization's data in the Power BI desktop client?

- a. Click the ellipses in the top right corner of the visualization and click Show Data
- b. Right-click it and click Show Data
- c. Press Ctrl + D with the visualization selected
- d. Any of the above

To see the data in a visualization, click the ellipses in the top right corner (called the "More options" menu), and click Show Data.

10. What is a slicer?

- a. A drilldown type
- b. A tool that allows the user to capture a static image of a visualization
- c. A table filtering option only available for data imported from Excel
- d. A visualization that allows users to filter data on the fly

Slicers allow users to filter data on the fly, even with the Power BI web and mobile apps.

APPENDICES

Glossary

card

Visualization that shows one or more dynamic rows of data.

connectors

Software component that connects data with the Power BI apps.

content pack

Set of pre-defined visuals based on a specific dataset.

dashboard

In Power BI, a customized summary of report visualizations.

dataset

Another term for data source, such as an Excel workbook, Facebook analytics, or a SQL database.

DAX (Data Analysis Expression)

A type of formula language used to create custom calculations and measures.

gauge

Visualization that shows progress towards a goal.

KPI

Visualization that shows progress towards a key metric or goal.

matrix

Visualization that displays data in a crosstab format.

Power BI

a collection of software, apps, and services designed to aggregate data so users can easily report on and interpret it.

Q & A

Power BI web app feature that allows the user to ask natural-language questions about the data in a dashboard.

Query Editor

Power BI feature that provides advanced data transformation features.

Quick Access toolbar

Interface element that provides quick access to frequently used commands.

report

Collections of visualizations.

slicer

Dynamic data filter.

table

Visualization that displays data in a standard row/column format.

tile

Dashboard component; visualization linked back to the original report.

treemap

Visualization that shows a visual breakdown of data as it relates to the whole.

visualization

Highly customizable object that presents data in a visual way.

Index

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