TechMentors

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Microsoft Power BI Introduction

Student Manual

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Revised 25 January 2023

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1. Introduction

Unit time: 30 minutes

Complete this unit and you will be able to answer the following questions:

A. What is Power BI?

B. What can you do with Power BI?

C. What are the different versions of Power BI?

D. How do you Start Power BI Desktop?

A: What is Power BI?

Explanation: Power BI is both a set of analytical tools and a cloud-based business analytics service from Microsoft. The "BI" stands for business intelligence. With Power BI you can turn raw data into business intelligence that gives your organization actionable insights for making informed decisions.

Power BI includes the following components:

Power BI service

A web-based online service that allows organizations to share and manipulate business intelligence in the form of reports and interactive dashboards.

Power BI Desktop

A free windows-based desktop application that is used to model and transform data and create business intelligence reports that are published to the Power BI Service.

Power BI Mobile Apps

Apps for mobile devices (Android, iOS, and Windows based phones and tablets) for viewing, manipulating, annotating, and sharing Power BI reports and dashboards.

Power BI Gateway

Software that allows Power BI to access and refresh data that is kept in an on-premises data source such as a local SQL Server database.

Power BI Report Server

An on-premises server-based Power BI Reporting solution for organizations that need or desire to not store their data in the cloud-based Power BI Service.

Power BI Visuals Marketplace

A marketplace where you can get add-on visuals for Power BI, some have a fee, and some are free.

Additional reading:

For more information about the various components of Power BI check out these online resources.

- Information and sign-up options for Power BI
  https://powerbi.microsoft.com/en-us/
- Wikipedia's article on Microsoft Power BI
  https://en.wikipedia.org/wiki/Microsoft_Power_BI
- Differences Between Power BI Pro vs Power BI Fee vs Power BI Premium
  https://dynamics.folio3.com/blog/difference-between-power-bi-pro-vs-free-vs-premium/

Exercise: Power BI Components

Based on the information above, match the component below with its definition:

Component		Definition
___ A. Power BI Service	1	An on-premises server-based reporting solution for organizations that need or desire to not store their data in the cloud-based Power BI Service.
___ B. Power BI Desktop	2	A free windows-based desktop application that is used to model and transform data and create business intelligence reports that are published to the Power BI Service
___ C. Power BI Mobile Apps	3	Smart phone and tablet-based applications for viewing, manipulating, annotating, and sharing Power BI reports and dashboards.
___ D. Power BI Gateway	4	Software that allows Power BI to access and refresh data that is kept in an on-premises data source such as a local SQL Server database.
___ E. Power BI Report Server	5	A place where you can get add-on visuals for Power BI, some have a fee, and some are free.
___ F. Power BI Visuals Marketplace	6	A web-based online service that allows organizations to share and manipulate business intelligence in the form of reports and interactive dashboards.

B: What can you do with Power BI?

Explanation: Power BI lets you do many things to manipulate and visualize your data, including the following:

- Pull data in from multiple sources including SAP, Oracle, SQL Server, Microsoft Access, Microsoft Excel, Websites, and more.
- Easily clean up data with the query editor
- Create visualizations of your data
- Combine multiple visualizations into a report
- Enhance the reports to create interactive dashboards
- Share the reports and dashboards on different devices (desktops, tablets, and smart phones)
- Use Quick Insights to make use of Artificial Intelligence to auto generate visualizations

C: What are the different versions of Power BI?

Explanation: Power BI has three versions which are explained below.

Power BI Free / Desktop

Power BI Free is the Power BI Desktop window application without the Power BI Service. This gives users the ability to connect to multiple data sources, analyze the data, and create visualizations and reports. The reports can then be shared indirectly by exporting the report to a PDF which is then shared on a server or via email. Because it lacks the Power BI Service, cloud-based sharing is not possible until a paid version is acquired.

Power BI Pro

Power BI Pro is the free Power BI Desktop plus a monthly subscription to the Power BI Service. This essentially gives users the full version of Power BI. Users can create visualizations, reports, and dashboards that can be shared with other users who also have a Power BI Service subscription.

The Power BI Pro subscription costs $9.99 per user per month. Microsoft does have a free 60-day trial. For more information see https://powerbi.microsoft.com/en-us/pricing/.

Power BI Premium

Power BI Premium is an alternative to Power BI Pro that includes all the features of Power BI Pro plus enterprise-oriented features for AI, data management and big data.

Power BI Premium can be purchased for $20 per user per month, or for $4,995 per capacity per month. For more details go to https://powerbi.microsoft.com/en-us/pricing/.

2. Get Data and Create a Report

Unit time: 90 minutes

Complete this unit and you will be able to:

A. Define "data source"

B. Connect to an Excel data source

C. Describe the features of the Power BI Desktop screen

D. Create a simple Stacked bar chart

E. Save your work

F. Close a report

G. Connect to a CSV data source

H. Create a simple Line chart

I. Connect to an Access database

J. Connect to a server-based database

K. Connect to a web-based data source

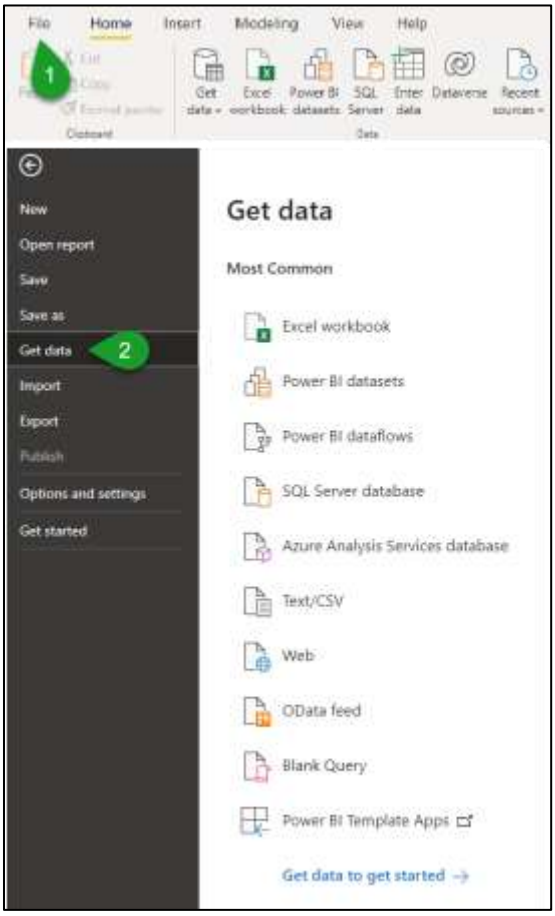
L. Open your work

A: What is Data Source?

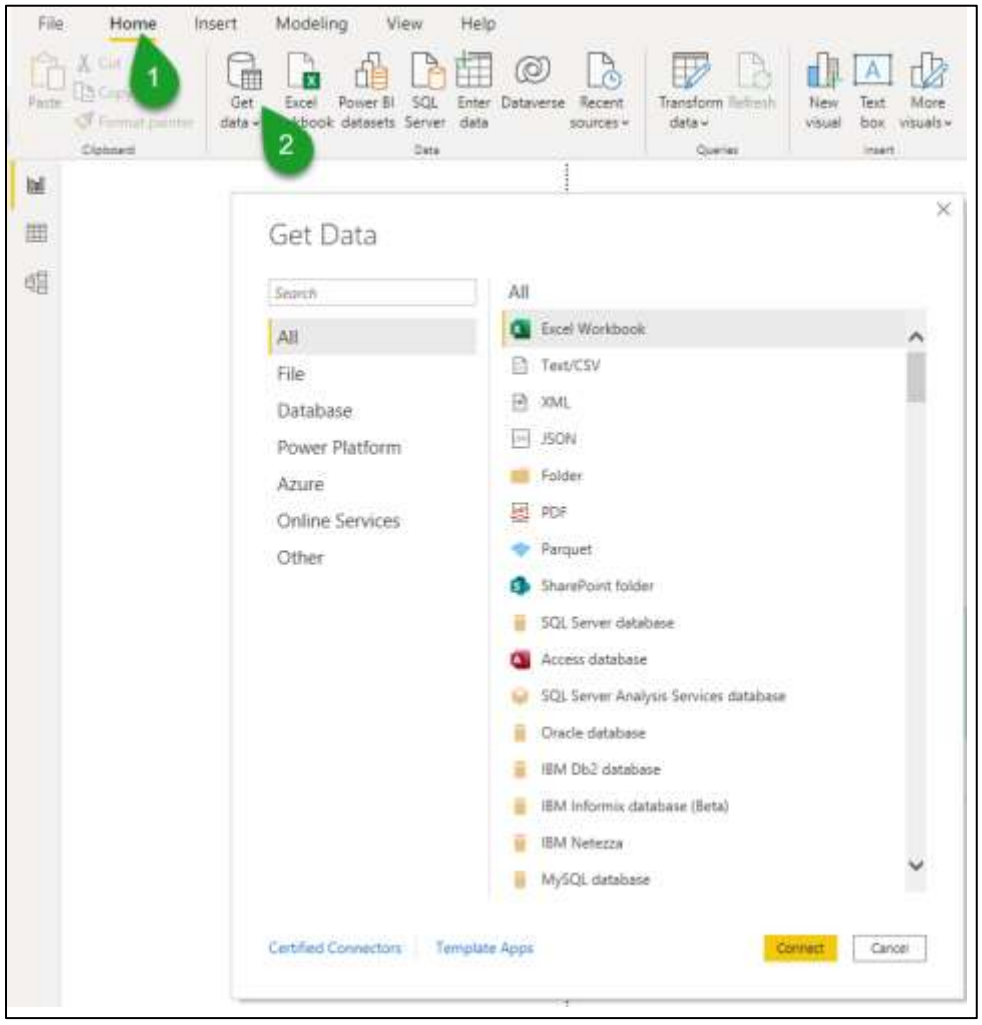
Explanation: As its name implies, a data source is a source of data. Any data from which Power BI can create a visualization is a data source. The data source can be a database, an Excel file, a text file, a folder on your server, or even information on Facebook. For more information see https://docs.microsoft.com/en-us/power-bi/connect-data/desktop-data-sources.

Microsoft's Power BI team continues to expand the data sources available to Power BI Desktop and the Power BI service. For a complete list of data sources available to Power BI go to https://docs.microsoft.com/en-us/power-bi/connect-data/power-bi-data-sources.

To connect to a data source, select **File**, **Get Data** and choose a one of the most common data source categories, and then follow the prompts to select your data source.



You can also select a data source from the ribbon.
From the **Home** tab, select **Get data**, and then choose your desired category, and then follow the prompts as needed.



B: Connect to an Excel data source

In the following exercise you will open and examine the contents of an Excel file that lists multiple 20th century movies. You will then close it, and load it into Power BI, and then create a simple Stacked Bar Chart.

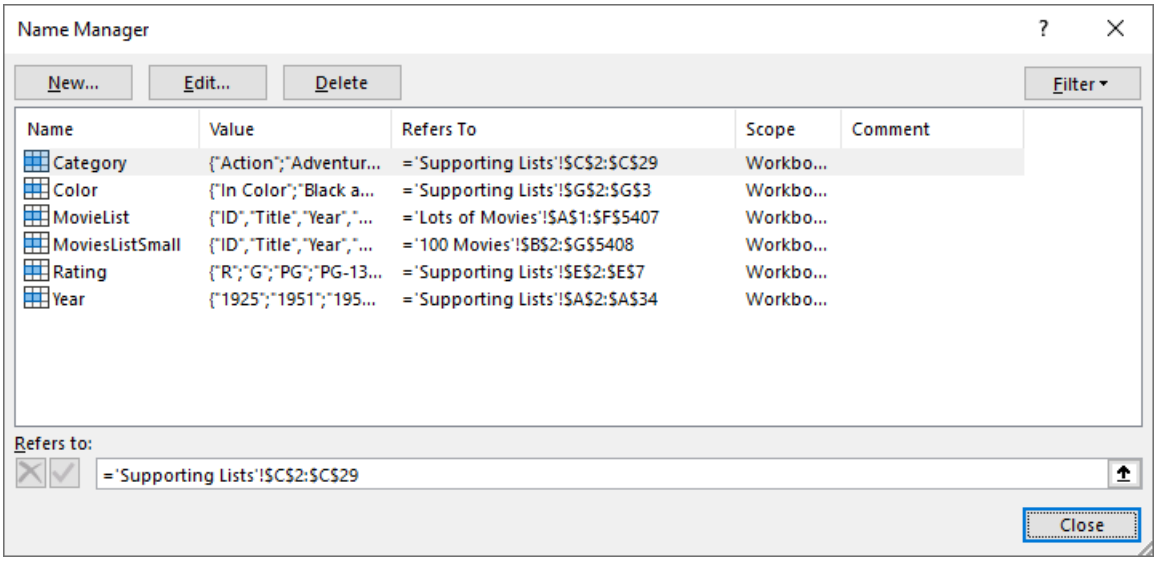
1. **Start Excel** and **open** the Movies.xlsx file from the exercise folder.

2. Look at the three sheets, and their contents.
   Notice the following:
   - **Lots of Movies** has a list of 5406 movies that starts in cell A1.
   - **100 Movies** has list of 100 movies that starts in cell B2.
   - **Supporting Lists** has 4 distinct lists, each separated by a column.

3. From the ribbon select **Formulas**, **Defined Names**, **Name Manager**.
   The name manager is an Excel feature that lets users create a name for a cell or group of cells.

   Notice the names and their references. The user set the **MovieList** and **MovieListSmall** to refer to a movie list and their column headings from one of the two movie sheets.

   Notice the user set the other named ranges, like **Category**, to refer to a block of data that starts at row 2, thus not including the column headings.



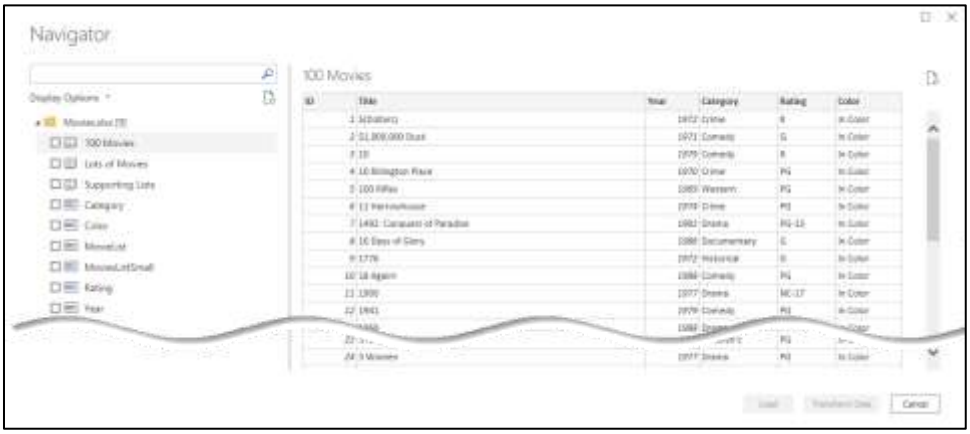
4. Close Excel.

5. Start the **Power BI Desktop** application.

6. If the startup screen is displayed, click the X in the top right corner to close it.

7. From the ribbon's **Home** tab, select **Get data**, choose **Excel Workbook**, and then select the Movies.xlsx file from the Exercise folder and click **Open**.

8. In the navigator screen notice the list of items.



Notice each item has a checkbox, an icon, and a name. The name comes from either a sheet name or a named range.

Notice the icon for the sheets is different than the icon for the named ranges.

Notice you can click on the name of the item, without checking its check box.

Notice a preview of data is displayed when you click on an item's name or check its check box.

9. Click on the name of the **100 movies** sheet, and notice, the preview does not show a blank row 1, nor a blank column A. Instead, it is based on the data that started in cell B2.

10. Click on the name of the **Supporting Lists** sheet and notice the blank cells are filled in with the italicized word "*null*", and the blank columns have a column heading starting with the word "Column".

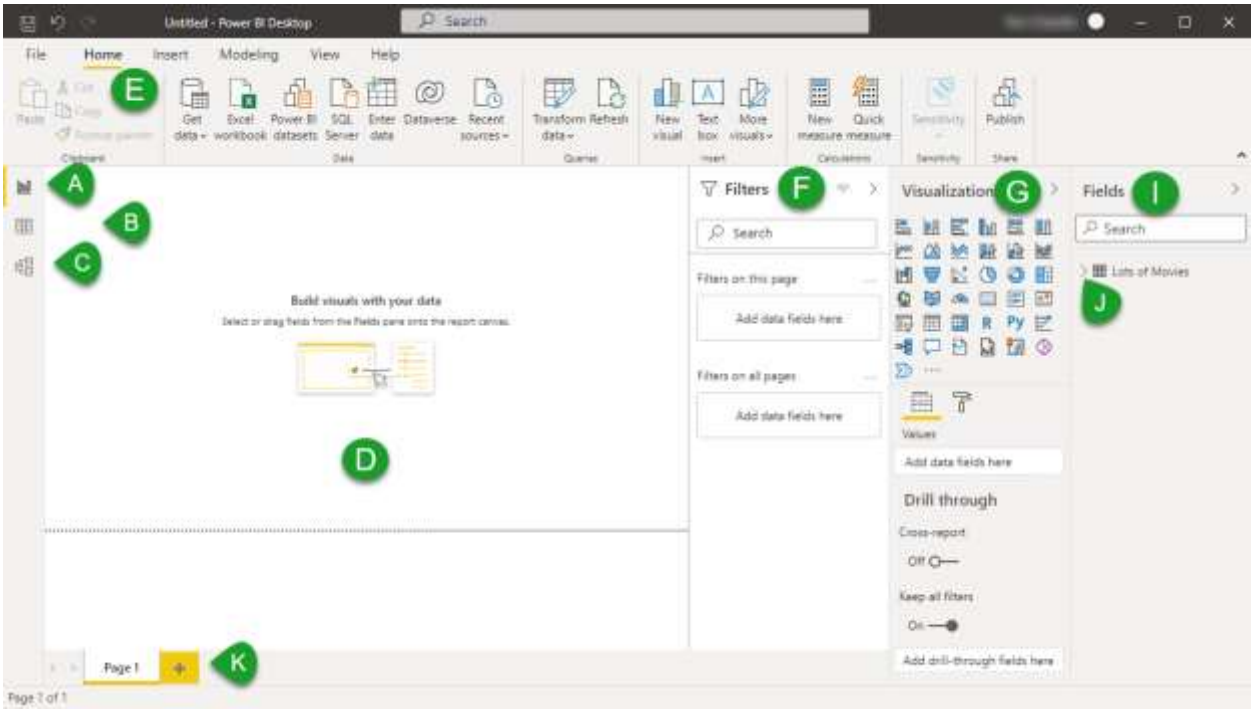
11. Click on the name of the **Category** named range and notice the column heading is "Column1". It is named Column1 because the user did not include column headings in the named range.

12. Make sure all the check boxes are unchecked, then check the box for the **Lots of Movies** sheet.

13 Next click the **Load** button.

Congratulations, you have loaded some Excel data into Power BI.

C: Describe the features of the Power BI Desktop screen



Using the shot above, find the following parts of the screen on the Power BI Desktop. For example, icon A is the Report View.

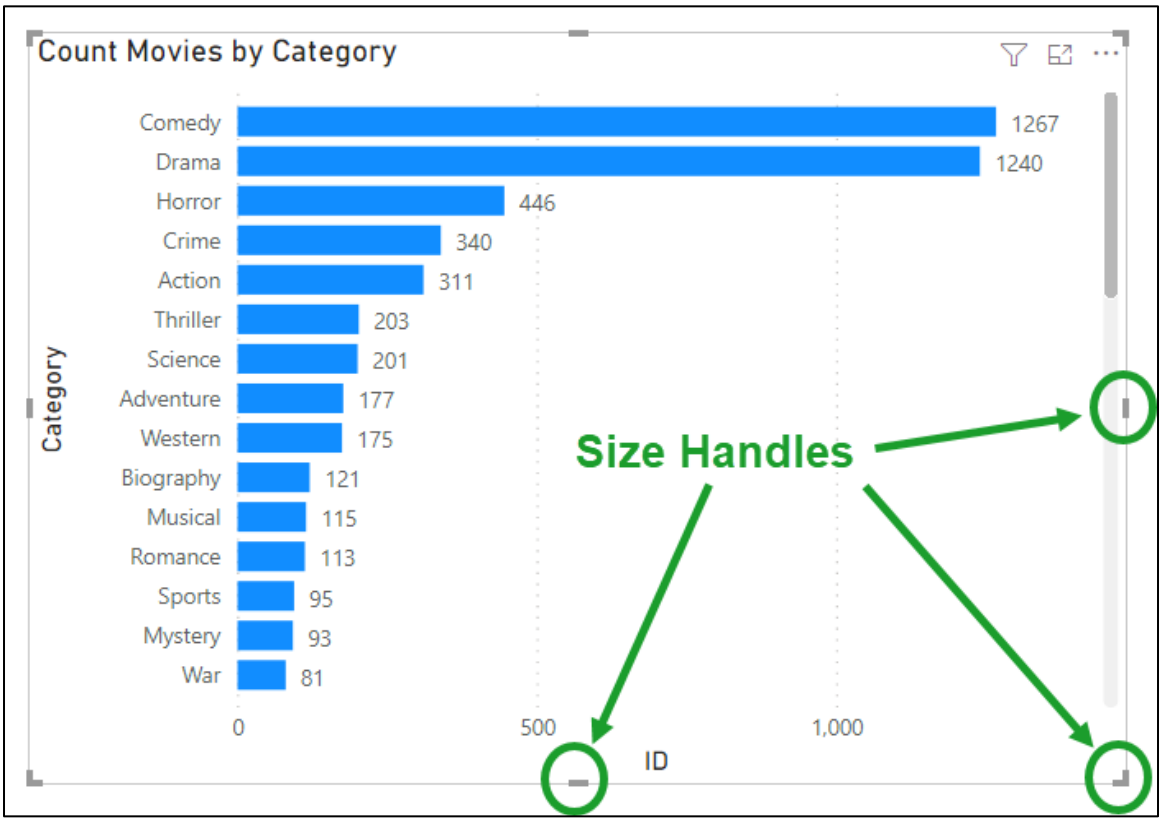
	Expand icon
	Fields pane
	Filters pane
	Report Canvas
	Model View
	Pages
A	Report View
	Ribbon
	Table View
	Visualizations pane

D: Create a simple Stacked bar chart

In the following exercise you will create a simple visualization from the Excel List of Movies you connected to in the previous exercise - **Connect to an Excel data source**.

1. **Expand** the **Lots of Movies** table.
2. In the **Visualizations** pane, click the **Stacked Bar Chart** icon.
3. Drag the **Category** field to the **Y-axis** field well.
4. Drag the **ID** field to **X-Axis** field well.
5. In the **Visualizations** pane, click the Format icon  .
6. In the **Visualizations** pane, click the **Data labels** option to display data labels.
7. In the **Visualizations** pane, click **General** then the expand button  for the **Title**, then change the **Title text** to "**`Count Movies by Category`**".

8. In the report **Canvas**, drag one or more of the **size handles** to resize the report.



E: Save your work

When you save your work, your report will be saved as a Power BI file, which has a **pbix** extension. Like most Microsoft programs, Power BI gives you many ways to save your work including the following:

- Select **File**, **Save as**, choose your desired folder, and enter a file name.
- Select **File**, **Save**.
- Press **Ctrl S**.
- Click the **Save** icon at the top left of the screen.

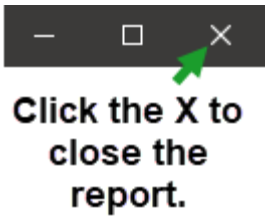
Once the file has been saved, the file name will appear in the title bar of the application.

Exercise: Save the Count by Category report

1. Press Ctrl S or any of the other methods shown above to save the file.
2. When prompted, point to the exercise folder, and enter **Count Movies by Category** as the filename.

F: Close a report

Unlike other programs, **Power BI does not have an option on the file menu for closing a report**. Instead, one simply clicks the X in the top right corner of the application. The system will prompt you to save your work if it has not been saved since the last change.



G: Connect to a CSV data source

In the following exercise you will open and examine the contents of a CSV file showing the daily cost of natural gas prices since January 1, 1997. You will then close it, and then use Power BI to create a simple graph.

What is a CSV file?

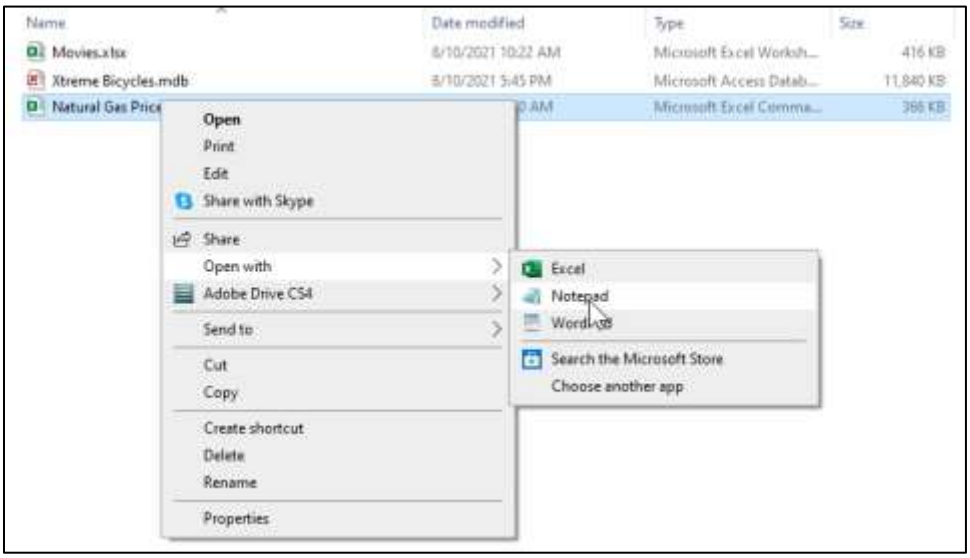
CSV stands for **C**omma **S**eparated **V**alues. In a CSV file, fields are separated by commas, and records are separated by carriage returns.

CSV files can easily be viewed by multiple programs including Notepad, Notepad++, Microsoft Excel, and of course Microsoft Power BI.

1. Open your exercise folder.

2. Right click on the Natural Gas Prices.csv file.

3. Select **Open with**, and then choose **Notepad**.



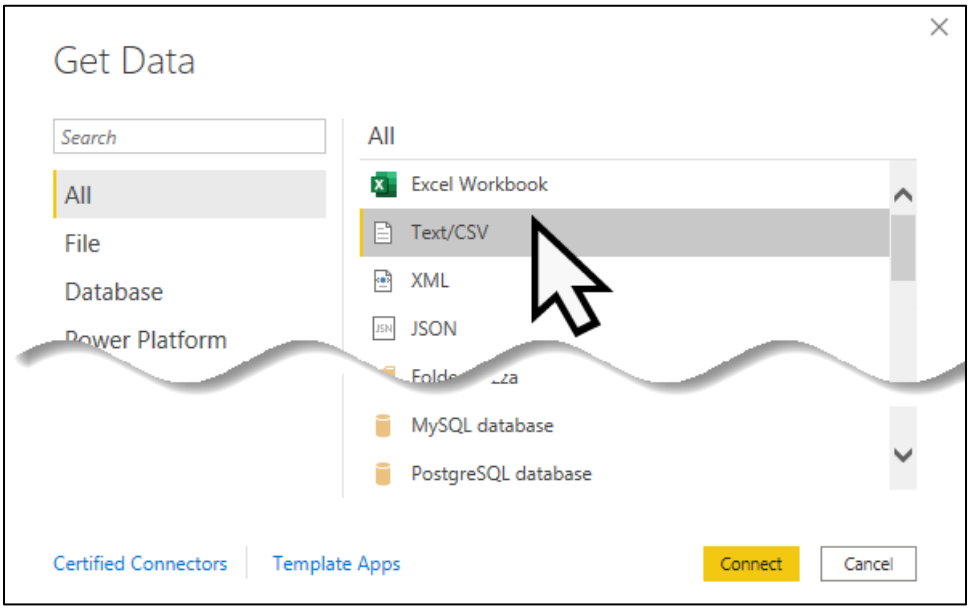
In a moment you should see the CSV data in Notepad.

4. Close Notepad.

5. Start the **Power BI Desktop** application.

6. If the startup screen is displayed, click the X in the top right corner to close it.

7. From the ribbon's **Home** tab, select **Get data**, select the **Text/CSV** option, and click **Connect**.



8. Choose the Natural Gas Prices.csv file from the Exercise folder and click **Open**.

Notice a different navigator screen is presented with a preview of the data and options for File Origin, Delimiter, and Data Type Detection.

File Origin is useful if you need to tell the computer the data has characters from Japan or some other country.

Delimiter lets you identify the character that separates fields. In a CSV file the delimiter is a comma. In other files it might be an equal sign, semicolon, space, tab, or some other character. If so, you would click the drop down and choose the appropriate delimiter.

Data Type Detection lets you direct Power BI how much data it should scan to determine if a field is a number, date, or text field.

9. In the navigator click the **Load** button.

Congratulations, you have loaded CSV data into Power BI.

H: Create a simple Line chart

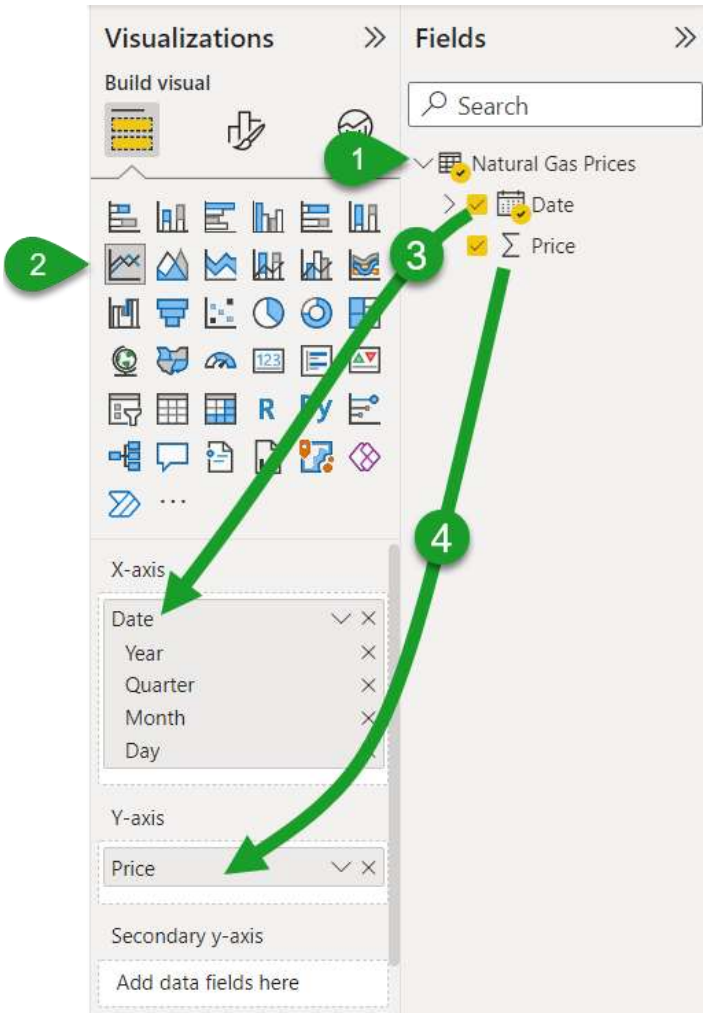
In the following exercise you will create a simple line chart based on the Natural Gas Prices CSV file you imported in the last exercise.

1. **Expand** the **Natural Gas Prices** table.

2. In the **Visualizations** pane, click the **Line Chart** icon.

3. Drag the **Date** field to the **X-Axis** field well.

4. Drag the **Price** field to **Y-Axis** field well.



5. Resize the visualization as desired.

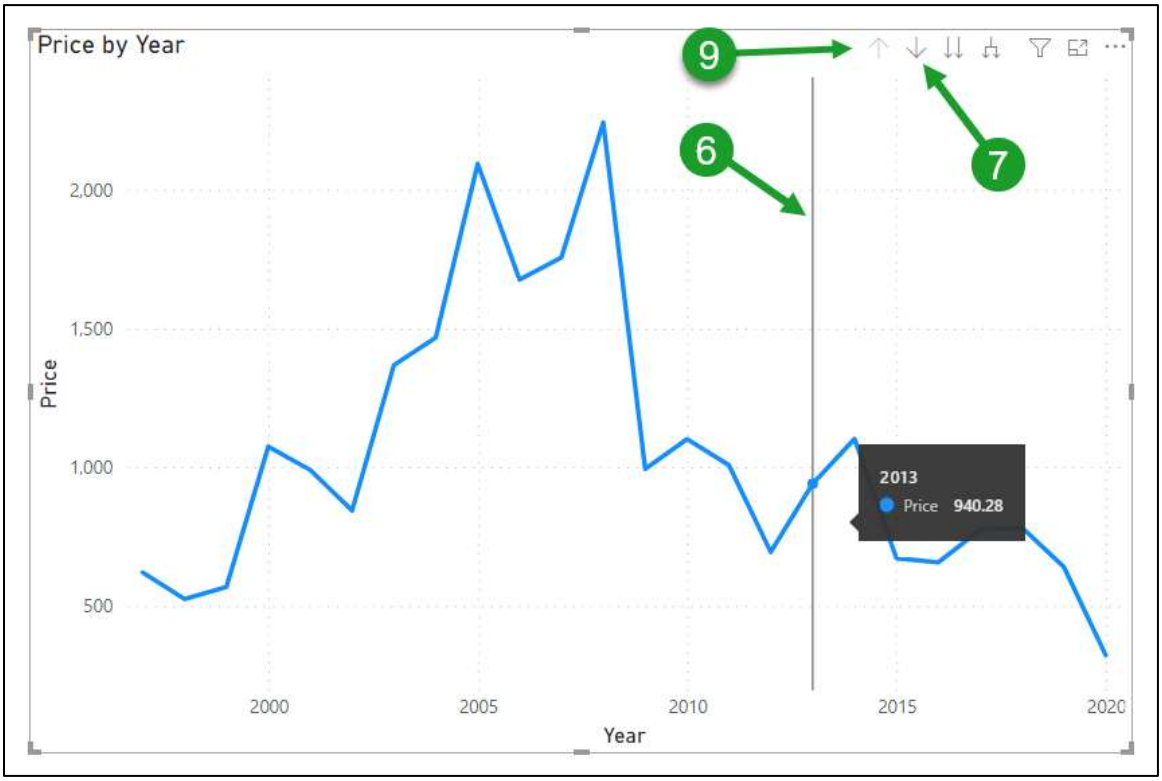
6. Move the mouse over different parts of the graph.
Notice the vertical line is displayed. If you pause moving the mouse, a tool tip displays the selected year and its price.

7. Click the down arrow to activate the drill down mode.
   Notice the arrow is now in a circle.

8. Click anywhere on any data point on the graph.
   Notice the chart "drills down" to show a deeper level of detail.

   If the chart does not drill down try clicking the up arrow a few times to drill up, and then click a data point to drill down.

9. Click the drill up arrow ↑ and notice the chart returns to the previous level of detail.



10. Save your report as **Natural Gas Prices**.

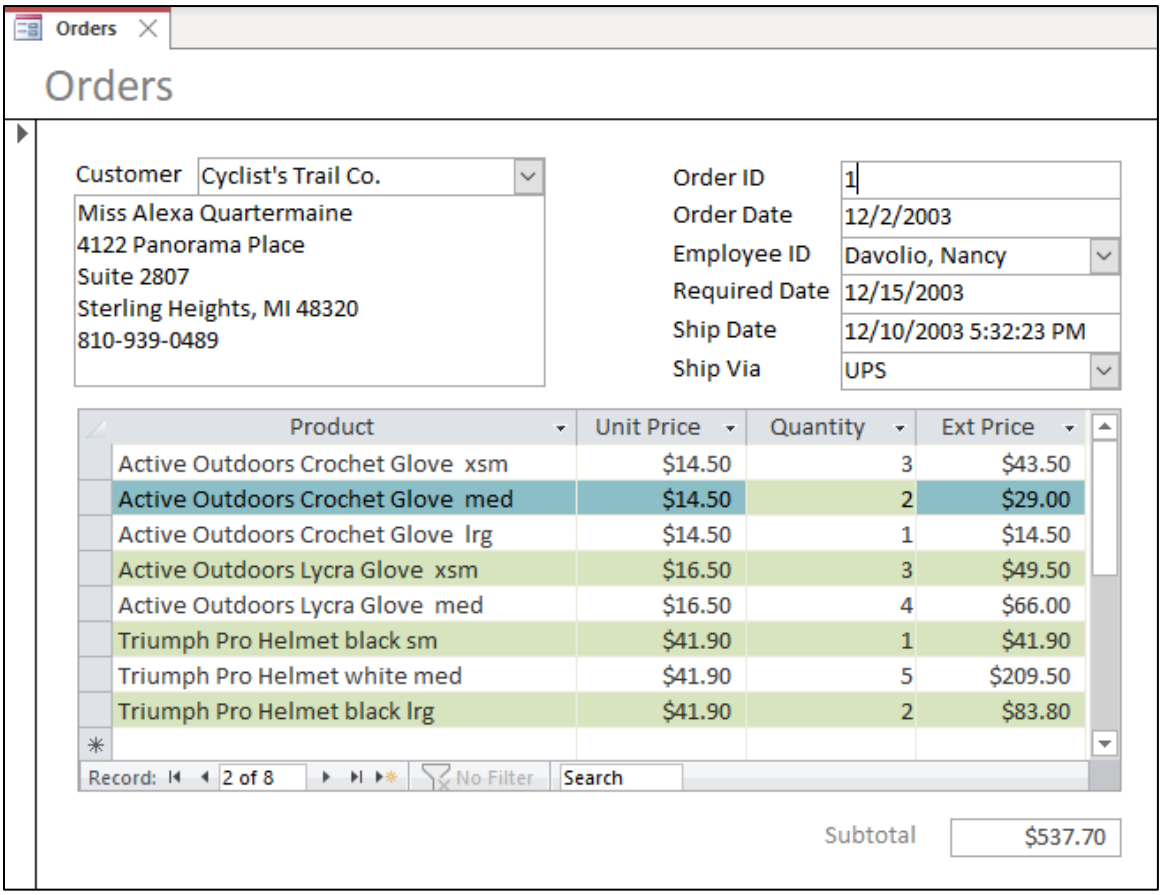
11. Click the X in the corner to close **Power BI**.

I: Connect to an Access database

In the following exercise you will open and examine the contents of an Access Database file that contains sales information for a Bicycle Manufacturing company. You will then close it, and then use Power BI to connect to it.

1. Start **Microsoft Access** and open the Xtreme Bicycles.mdb file from the exercise folder.

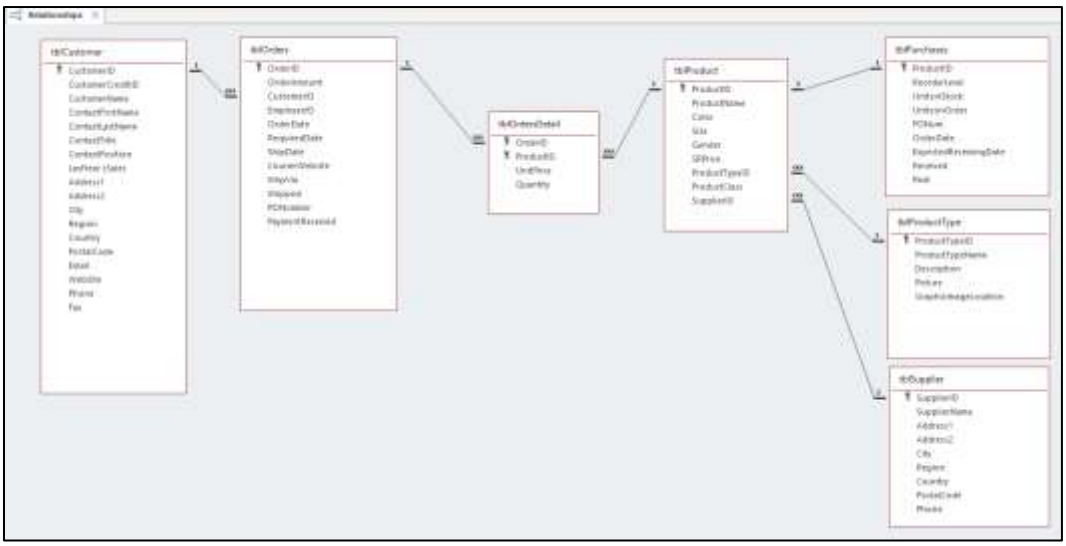
   The database displays an Access form that displays information about an order including the order ID, order date, sales rep, required date, ship date, customer name and address information, and the items on the order. All this information is coming from multiple database tables.



2. Press **F11** to display the Access Navigation Pane.

   As you scroll down the Navigation Pane you will see a list of tables, then queries, forms, reports, macros and modules. The tables hold all the data. The queries extract data from the tables. The other objects make inserting, editing, deleting and viewing data easier, but the data is actually stored in the tables.

3. From the ribbon, select **Database Tools**, **Relationships**, **Relationships**. This displays an entity relationship diagram – a diagram that shows how the information in one table is related to information in another table.



As you follow the lines you can see that information in one table is related to information in another table via a key field. For example, the Customer and Orders table are related via the Customer ID field. Knowing how the tables relate to each other is necessary for creating multi-table reports.

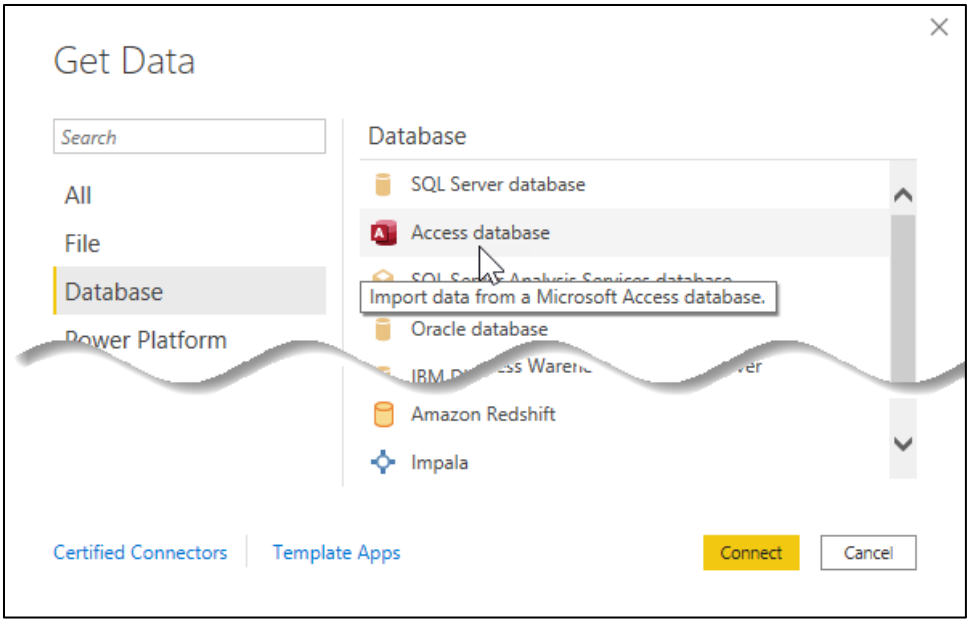
4. Close Microsoft Access.

5. Start the **Power BI Desktop** application.

6. If the startup screen is displayed, click the X in the top right corner to close it.

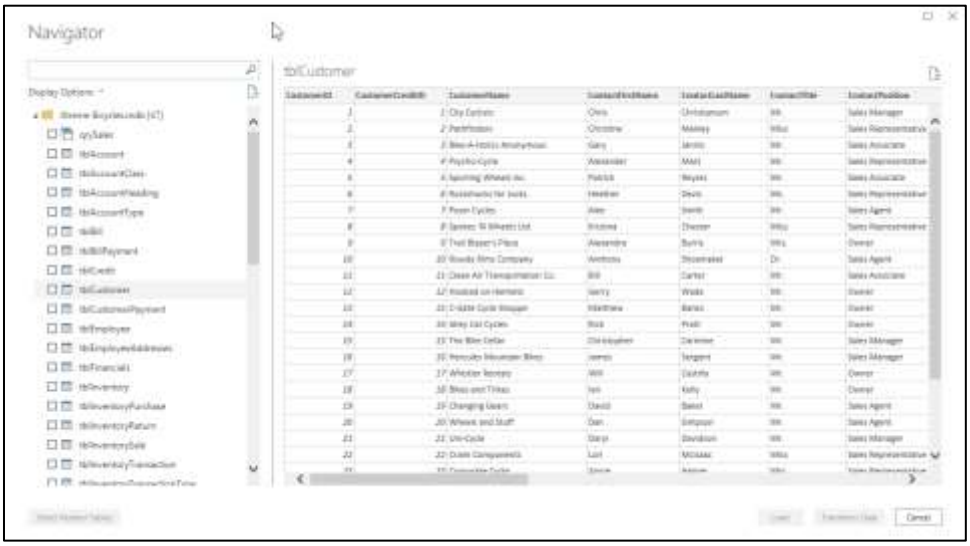
7. From the **Home** tab, select **Get data**, choose **More**.

8. Select the **Database** category on the left, then choose **Access database** and click **Connect**.



9. From the exercise folder choose the Xtreme Bicycles.mdb file from the Exercise folder and click **Open**.

10. In the navigator screen, notice the list of items.



Notice that, like with Excel, each item has a check box, an icon, and a name.

The name is the name of either a table or query.

Notice the query icon is different than the icon for the tables.

Notice the forms, reports, macros, and modules are not listed.

Notice that, like with Excel, when you click on an item's name, or check its check box, a preview of its data is displayed.

11. Check the following tables:

    - tblCustomer
    - tblOrders
    - tblOrderDetail
    - tblProduct

12. Click **Load**.

    Congratulations, you have loaded some Access data into Power BI.

13. Save your results as **Data from a Microsoft Access Database**, then close Power BI.

J: Connect to a server-based database

Server-based databases are more robust and complex than Access databases. Like Access, server-based databases have **tables**, and they have queries, which in a server-based database are called **views**.

Connecting to a server-based database requires the user to have access permissions to both 1) the database server, which may be in the cloud or on your local network, and 2) the desired database. You can get such permissions from your database administrator.

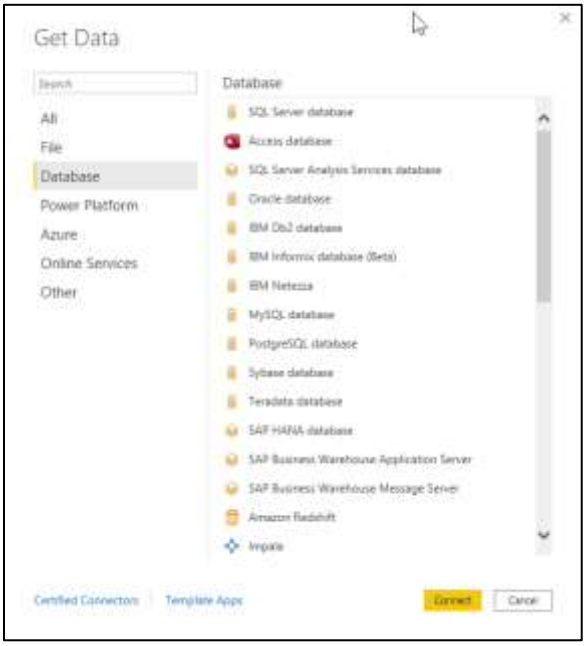
In this exercise you will see how to connect to a **SQL Server database** named **AdventureWorks2014** and then you will load three tables.

1. Start the **Power BI Desktop** application.

2. If the startup screen is displayed, click the X in the top right corner to close it.

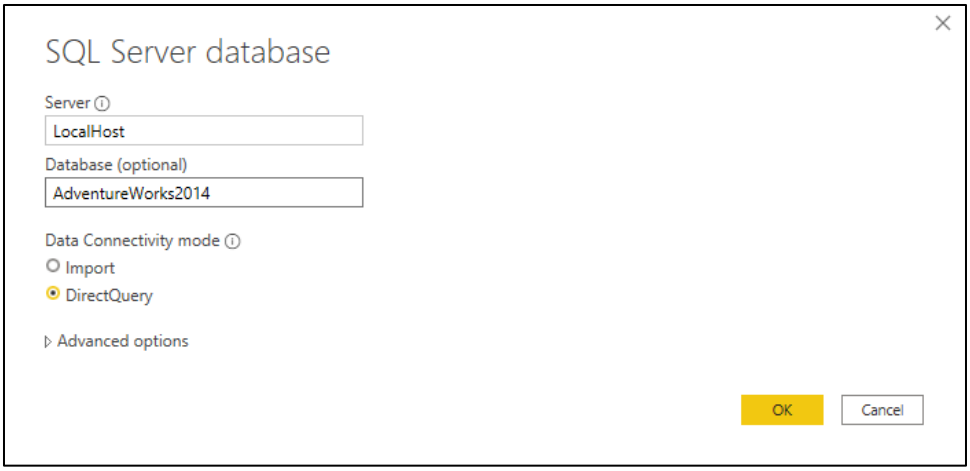
3. From the **Home** tab, select **Get data**.

4. Select the **Database** category on the left.
   Notice multiple types of databases are available.



5. Choose **SQL Server database** and click **Connect**.
   Notice the SQL Server database connection screen is displayed.

6. Enter the authentication information as shown below:



Server:
The server is the name of your SQL Server. When the computer you are using has its own "developer edition" instance of SQL Server then you can simply the name **LocalHost**. However, in most real-world situations your PC will not have a local instance and therefore you will need to get the name of the server from your database administrator.

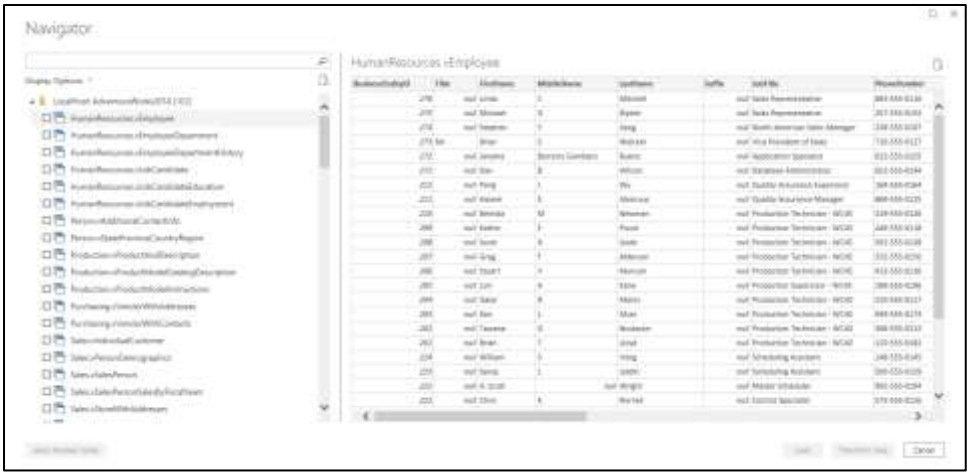
Database:
This option is for the name of the database. You can get it from your database administrator.

Data Connectivity Mode:
The **Import** option lets you store the data from the database in your report. This may make your report faster and will allow you to build the report when you are disconnected from the network. The downside is new and/or modified data on the server will not be reflected in your report until you refresh the data.

The **DirectQuery** option will not import the data, but instead will requery the database every time your report is run. Depending on the speed of your connection to the database, this may slow down your reports. The upside is your report will reflect current, up to the minute, data when it is run, and the size of your Power BI file will be smaller.

7. Click **OK**.
   In the navigator notice there are many items.

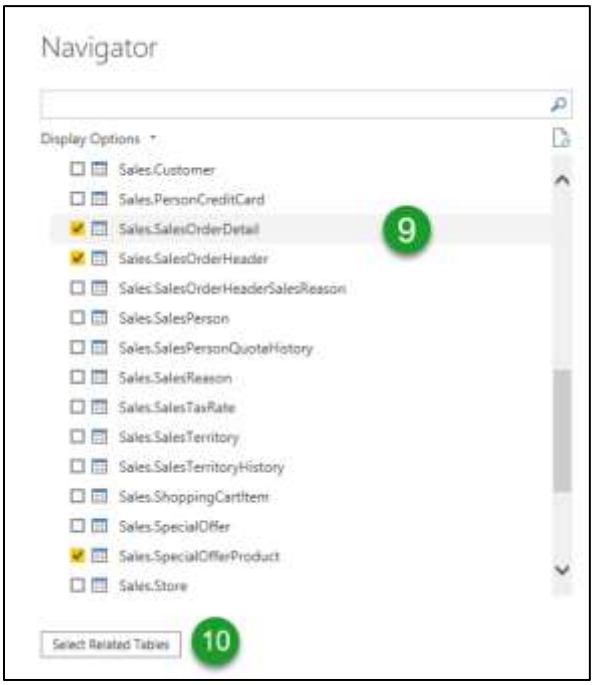
8. Select the first item, **HumanResources.vEmployee**.
   The icon identifies this as a view. The preview shows it includes many columns which come from multiple tables.



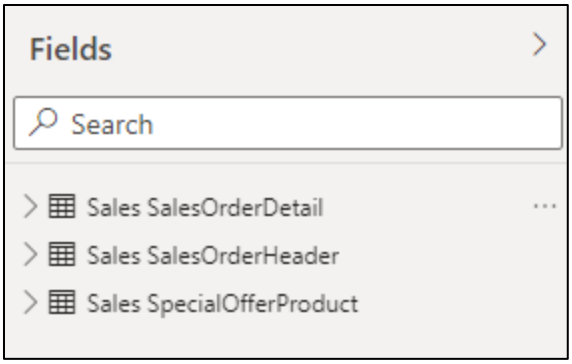
9. Scroll down and select the **HumanResources.Employee** item.
The icon identifies this as a table. The preview shows it includes many fields which come from the HumanResources.Employee table.

10. Check the boxes for **Sales.SalesOrderDetail** table.

11. Click the **Select Related Tables** button.
Notice the Sales.SalesOrderHeader, and Sales.SpecialOfferProduct tables have been selected.



12. Click **Load**.
Notice the three tables are displayed in the Fields Pane.



13. Save your result in the exercise folder as **Adventure Works Sales**, then close Power BI.

K: Connect to a web-based data source

In the following exercise you will open and examine data that is contained on a webpage. Specifically, you will get a table from a Wikipedia page listing US States and their Gross Domestic Product.

1. Open your browser and go to Wikipedia.org.

2. In the search bar enter **List of US States by GDP**.

3. From the drop down choose the **List of states and territories of the United States by GDP** option.

https://en.wikipedia.org/wiki/List_of_states_and_territories_of_the_United_States_by_GDP

4. Scroll down the page and notice the list which we will import into Power BI.

5. Copy the web address from the browser's address bar.

6. Start the **Power BI Desktop** application.

7. If the startup screen is displayed, click the X in the top right corner to close it.

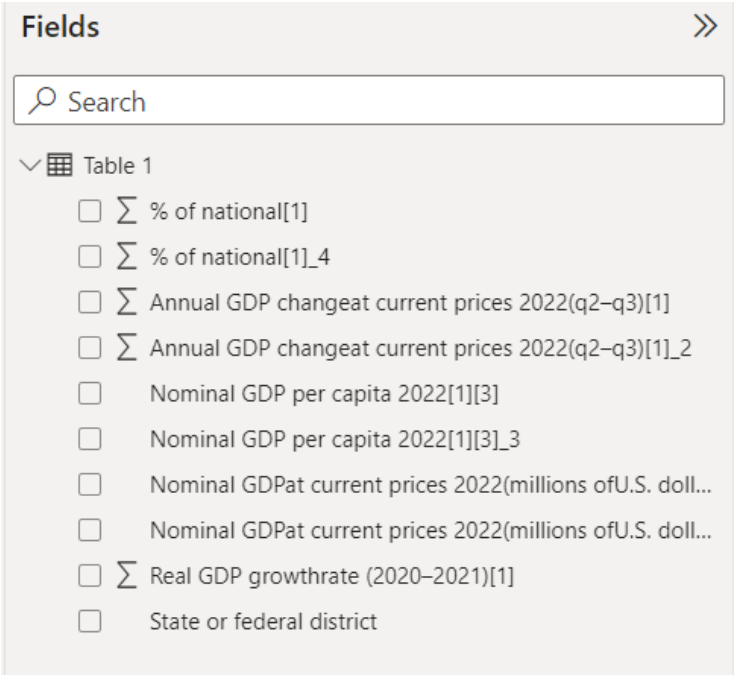
8. From the **Home** tab, select **Get data**, choose **Other** then choose **Web** and click **Connect**.

9. Paste (CTRL V) the web address in the URL box and click **OK**.

10. In the Navigator check the **Table 1** table.
Notice the preview displays the table of states and their GDP.

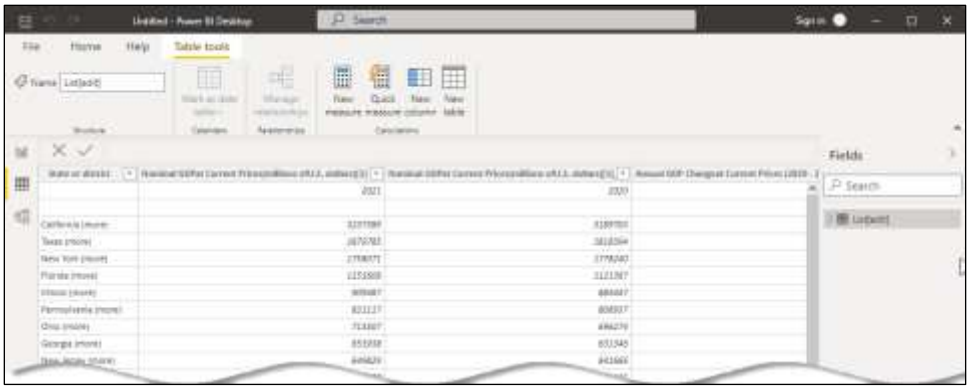
11. Click **Load**.
Notice it may take a moment to download the data to Power BI.

After it is loaded, expand the table, and notice the field names are not very user friendly. We will fix this in the next chapter.



12. On the left side of the screen click the **Table View** icon.

    Notice this shows you the data in the table.



13. Save your result in the exercise folder as **GDP data from the web**, then close Power BI.

    We will return to this file in the next chapter.

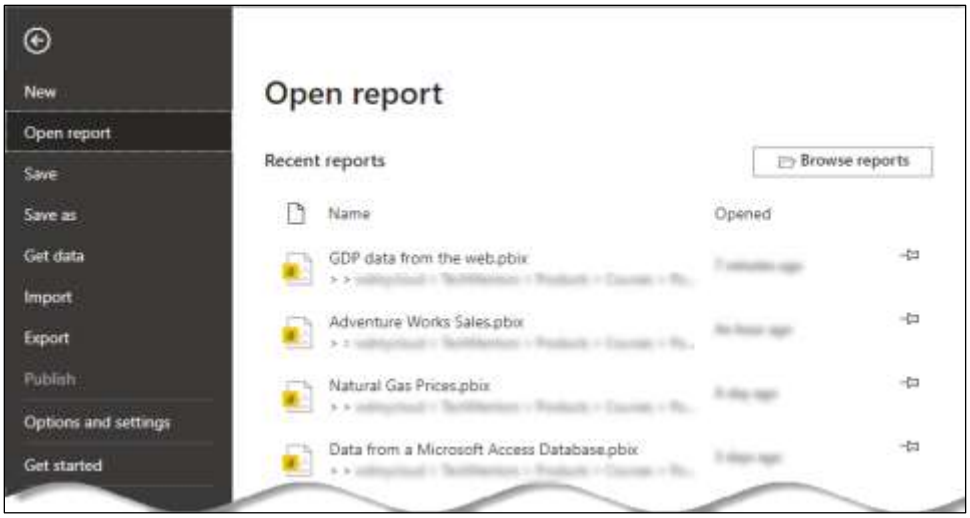
L: Open your work

Like most programs, Power BI lets you open previous files, and it keeps track of your most recently saved files.

How to open a report

1. Select the **File** menu and choose **Open report**.

2. Either click a report from the recent report list,
   or click the **Browse reports** button and select the report you want to open.



3. Prepare Data for Modeling

Unit time: 90 minutes

Complete this unit and you will be able to:

A. Define "data modeling"

B. Rename tables and fields

C. Remove columns

D. Undo an action in the Power Query Editor

E. Remove unwanted rows

F. Manipulate / correct textual data

G. Rearrange columns

H. Apply changes made in the Power Query Editor

I. Identify rows as column headings

J. Define "data type"

K. Change a column's data type

L. Add columns

M. Unpivot data

N. Split a column into multiple columns

O. Manipulate / correct numeric date and time data

P. Manipulate / correct numeric data with math

Q. Complete a practice exercise

A: Define "data modeling"

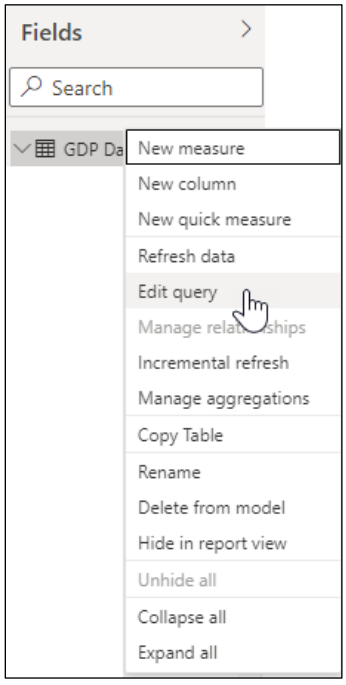
As you have seen, Power BI lets you connect to multiple data sources. Sometimes the data is not set up the way you wish. For example, when we imported data from the web we saw that the table name and field names were less than useful. **Data Modeling is the process by which you manipulate and connect data so it can be more useful**.

In this chapter you will learn how to use Power BI and the Power Query Editor to manipulate individual tables and fields. In the next chapter you will learn how to complete the data model by connecting, merging and joining data from different tables.

Power Query and the Power Query Editor

Microsoft Excel, Microsoft Power BI, and other Microsoft products come with a data transformation and data preparation engine called Power Query. This engine comes with a graphical interface, and an editor that allows users to Extract, Transform, and Load (ETL) data. For more information see https://docs.microsoft.com/en-us/power-query/power-query-what-is-power-query.

As you will soon see, you can open the Power Query Editor by right clicking on a table and choosing Edit Query.



B: Rename tables and fields

In this exercise you will reopen the GDP data from the web report and rename its table and its fields.

1. Start the **Power BI Desktop** application and open the GDP data from the web.pbix report that you saved earlier.

2. In the Fields pane, right click on the **Table 1** table, choose **Rename**, and then enter **GDP Data** as the new name.

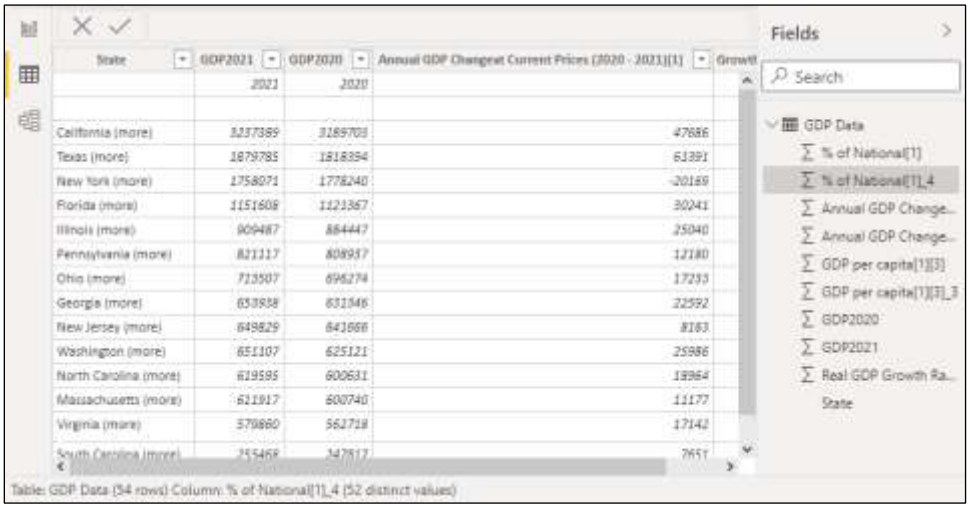
3. Expand the list of fields, then right click on the **State or federal district** field, choose **Rename**, and then enter **State** as the new name.

As shown in the next two steps, you can also rename a field in the Table View.

4. On the left side of the screen click the **Table View** icon.

5. Right click on the second column heading, choose **Rename**, and then enter **GDP 2022 Q3**.

6. Double click the name of the third column, and then enter **GDP 2022 Q2**.



C: Remove columns

The following exercise will demonstrate multiple ways to delete unneeded columns from your data model.

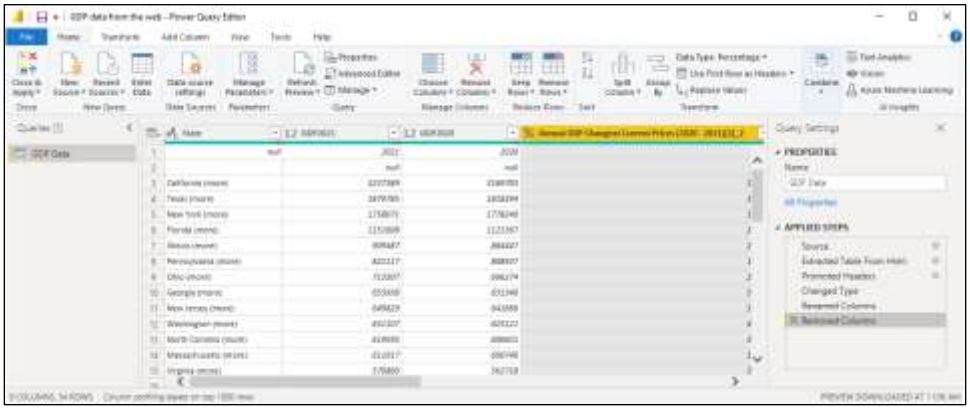
1. Right click on the fourth column and then choose **Delete**.

2. When prompted click the **Delete** button.

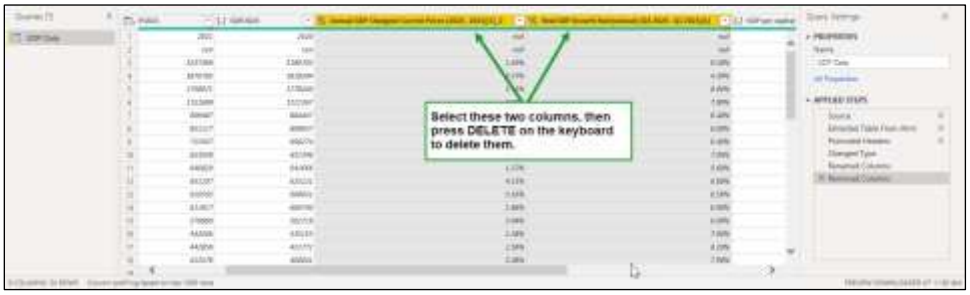
Another method for deleting columns is with the Power Query Editor.

3. Return to the Report View, then in the Fields pane, right click on the **GDP Data** table and choose **Edit Query**.

   Notice the Power Query Editor opens in a new window.

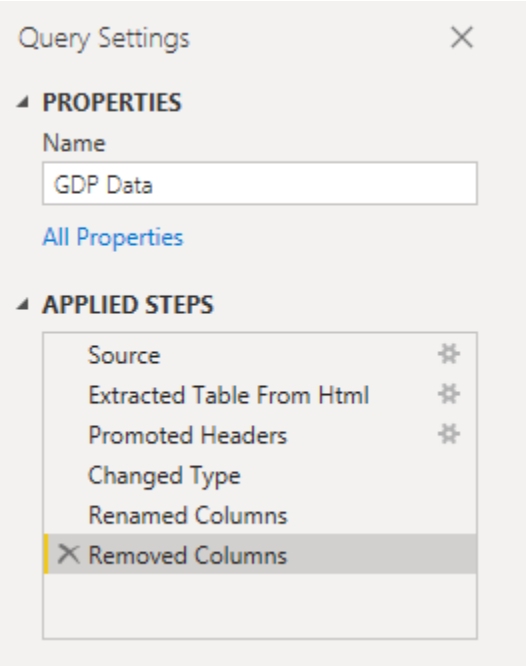


4. Select the next two columns after the GDP2020 column, and then press **Delete** on the keyboard.



D: Undo an action in the Power Query Editor

The **Power Query Editor does not have the typical Undo feature** of most applications. Instead, it shows you a list of **Applied Steps** in the **Query Settings** pane. When you click on an applied step you will see the data as if that step had not been applied. If you click the ✕ next to any Applied Step, that step is undone.

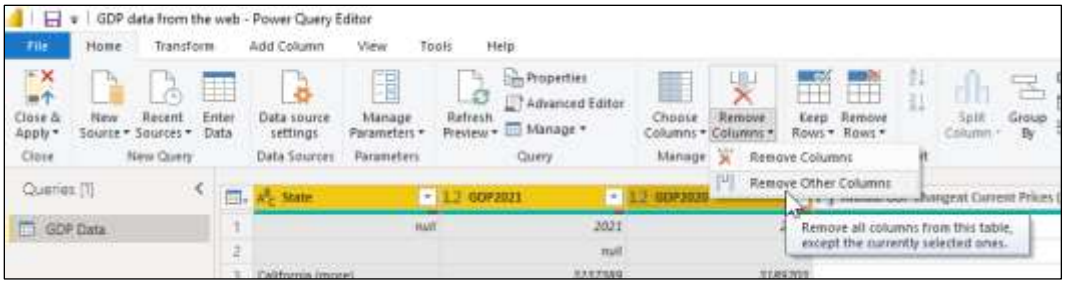


Practice undoing

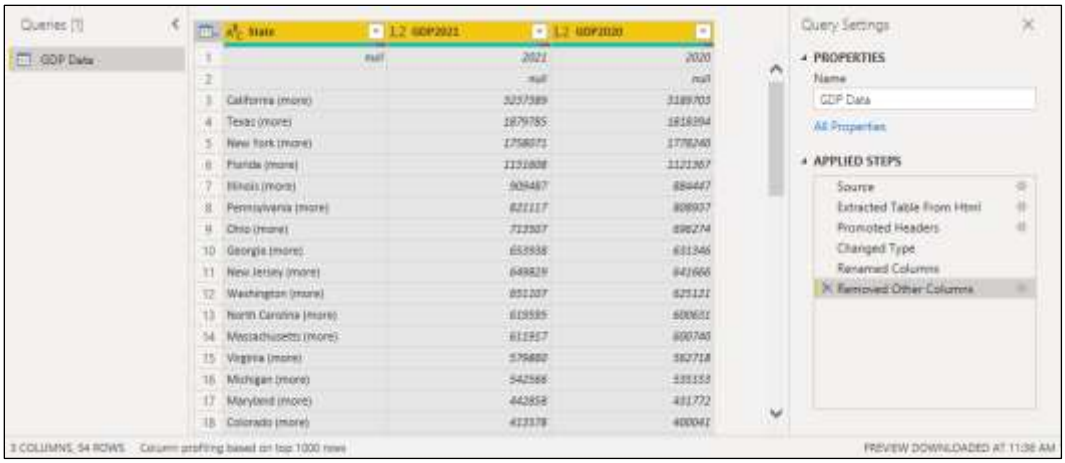
In this exercise you will delete three columns, and then use the Applied Steps to undo the deletion.

1. Select the first three columns.
2. From the ribbon, select **Home**, **Manage Columns**, **Remove Columns**.
3. In the **Applied Steps** list, click the ✕ next to the **Removed Columns** item.

   Notice the three recently deleted columns have been undeleted.
4. Again, select the first three columns: State, GDP2021, and GDP2020.
5. From the ribbon, select **Home**, **Manage Columns**, **Remove Columns**, **Remove Other Columns**.



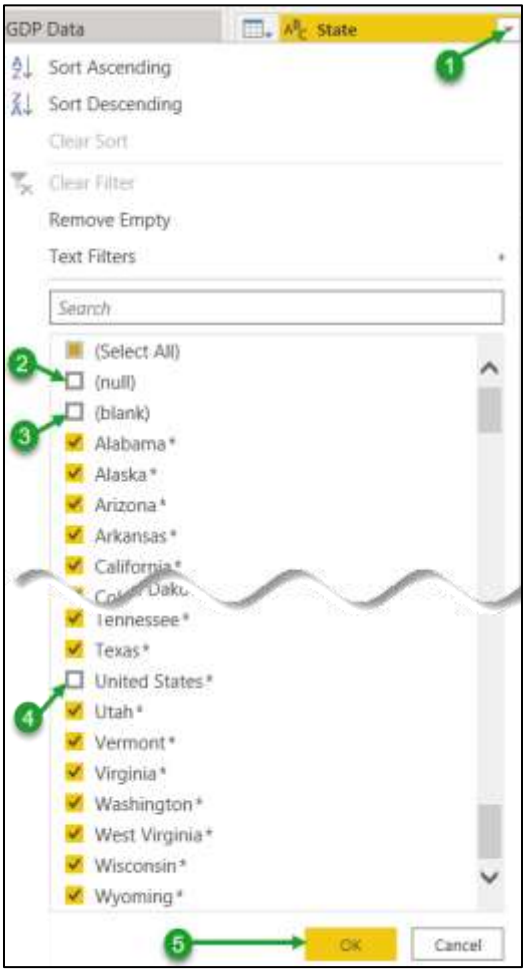
Notice all the columns except the first three have been deleted.



E: Removing unwanted rows

The Power Query Editor lets you delete rows as well as columns. In the following exercise you will filter out unwanted rows / records.

1. Click the drop-down menu for the **State** column.
2. Uncheck the **(null)** value.
3. Uncheck the **(blank)** value.
4. Scroll to the bottom of the list and then uncheck the **United States*** value.
5. Click **OK**.

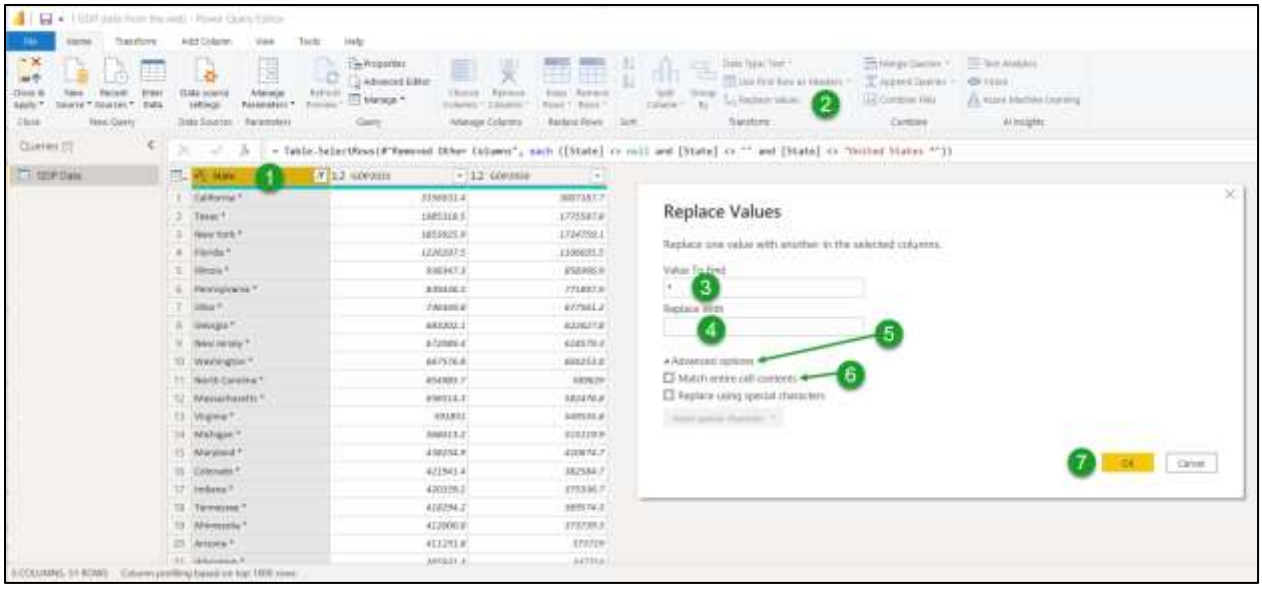


F: Manipulate / correct textual data

The Power Query Editor lets you manipulate and clean up the data in each column. For example, notice that each State has "*" after its name. In this exercise you will clean this up.

1. Select the **State** column.
2. From the ribbon select **Home**, **Transform**, **Replace Values**.
3. In the **Value To Find** field enter an asterisk *****.
4. Make sure the **Replace With field** is blank.
5. Click on **Advanced options**.
6. Be sure the **Match entire contents** option is unchecked.
7. Click **OK**.

   The * is removed.

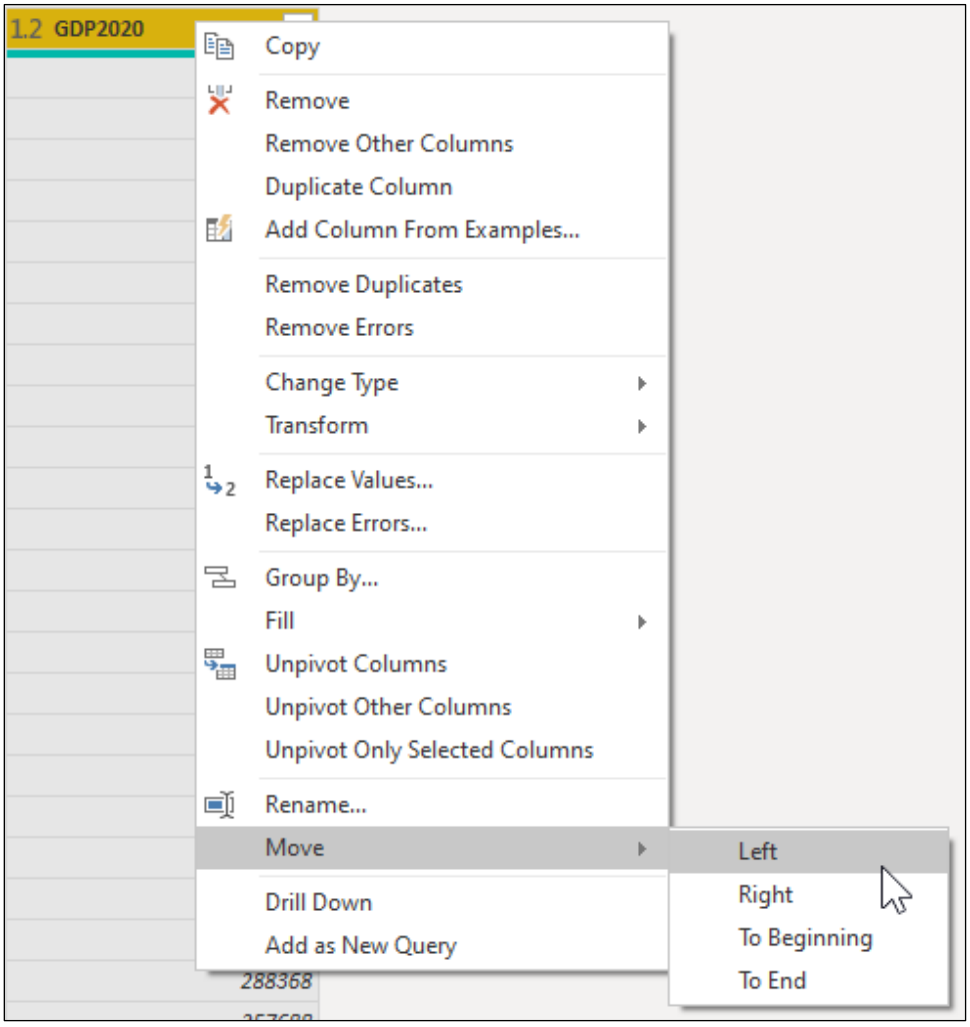


G: Rearrange columns

The Power Query Editor lets your rearrange columns. In our case we want to move the third column before the second column.

1. Select the third column.

2. Right click on the column heading and choose **Move**, **Left**.



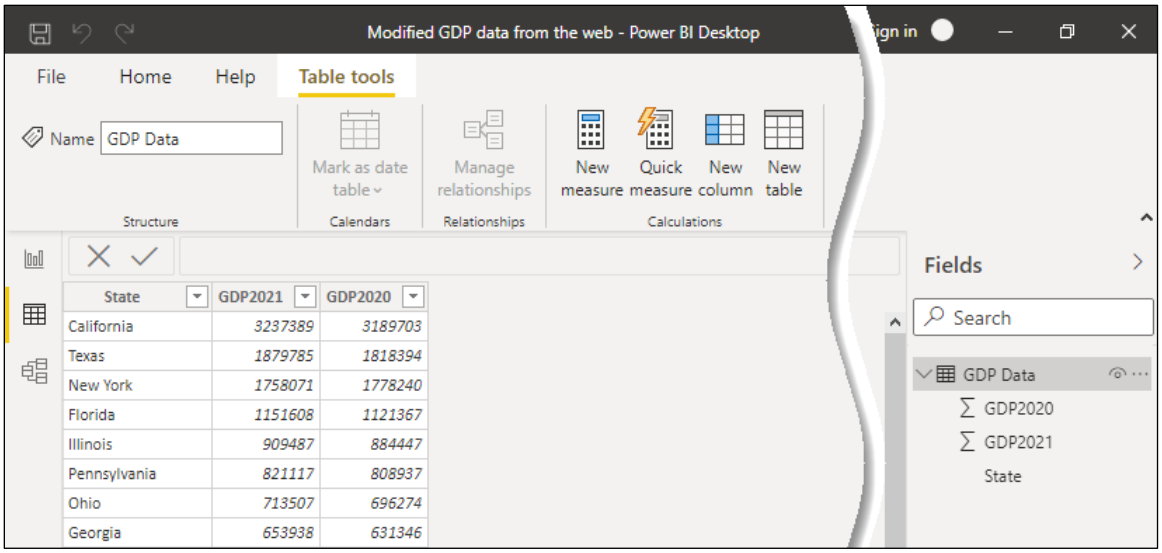
Note: You can also move columns by dragging and dropping them into the desired location.

H: Apply changes made in the Power Query Editor

After you have made your changes in the Power Query Editor they need to be applied as shown below.

1. In the Power Query Editor, from the ribbon choose **Home**, **Close**, **Close & Apply**.

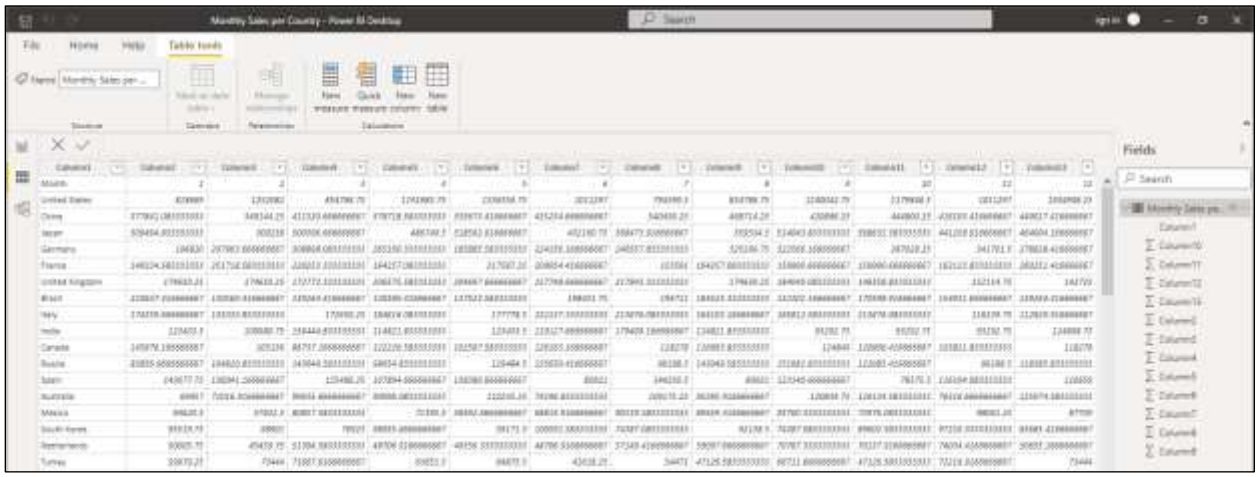
   Notice Power BI is refreshed and then shows the data from the modified data model.



2. Save your result in the exercise folder as **Modified GDP data from the web**, then close Power BI.

I: Identify rows as column headings

Sometimes Power BI misunderstands your data. For example, it can interpret your first row as column data. Notice in the screen shot below column 1 is a list of countries, and columns 2 through 13 are for months 1 through 12. Because the month numbers and the sales numbers are both numbers, Power BI assumed incorrectly that there were no column headings. In this next exercise you will fix this.



1. Start the **Power BI Desktop** application and open the **Monthly Sales per Country** report.

2. In the Fields pane, right click on the **Monthly Sales per Country** table and choose **Edit Query**.

3. In the Query Editor, from the ribbon, choose **Home**, **Transform**, **Use First Row as Headers**.

Notice that the first row has been promoted to become column headings.

4. Rename the first column as "**`Country`**".

J: Define "data type"

There are different types of data such as numbers, dates, time, and text. Each piece of data is therefore assigned a data type. The data type then determines the type of functions that can be run against the data. For example, you can perform mathematical calculation on numeric data, but not against textual data.

Below is a list of data types recognized by Power BI.

Data Type	Description
Decimal Number	Numbers that have multiple decimal places
Fixed decimal number	Numbers that are limited to a fixed number of decimal places
Whole Number	Numbers that have zero decimal places
Percentage	Numbers with decimal places that are used as a percent
Date/Time	A value with both a date (month, day, year) component and a time (hour, minute, second) component
Date	A date value with no time component
Time	A time value with no date component
Date/Time/Timezone	A value with a date, time, and time zone components
Duration	A numeric value that measures a duration between two events, as opposed to a set date or time.
Text	Alpha-numeric characters
True/False	A value that is true or false, yes or no, on or off.
Binary	Photographs and sound are stored as binary data

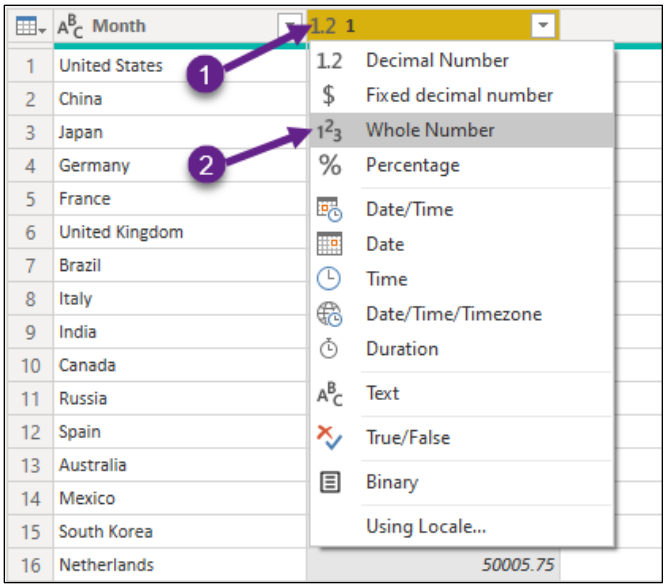
K: Change a column's data type

You can use the Power Query Editor to change a data's type. Doing so will allow you to then manipulate the data in various ways, depending on the chosen type.

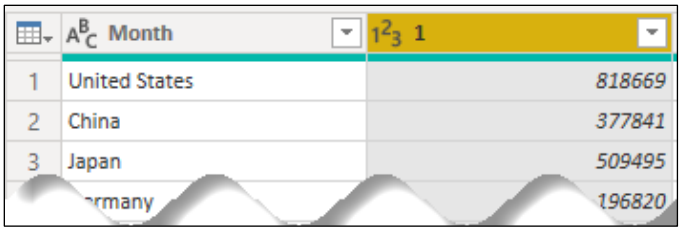
In this exercise you will change the Monthly Sales Data into whole numbers.

1. Click the icon in the left corner of the second column.
   Notice a drop-down menu of data types appear.

2. Choose **Whole Number**.

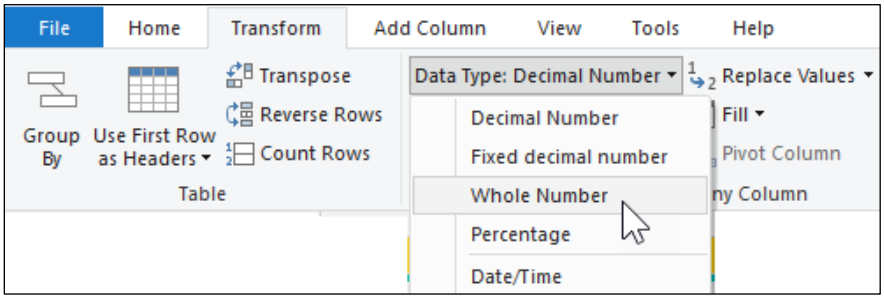


   Notice the icon in the column change from 1.2 to 123.



3. Select the 3rd through 13th columns which are for the months of February through December.

4. From the ribbon choose **Transform**, **Any Column**, **Data Type**, **Whole Number**.



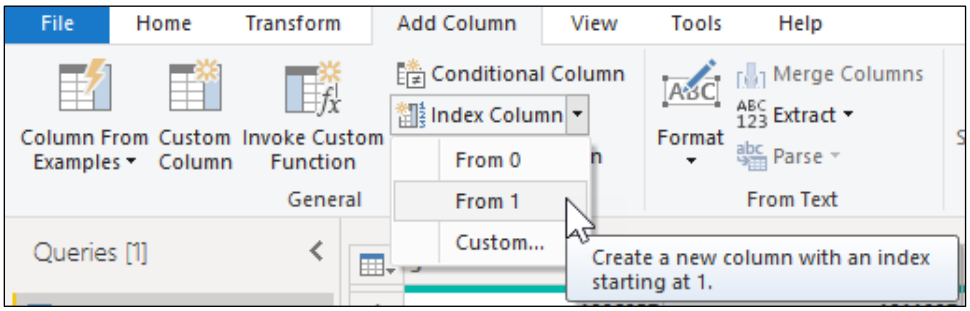
Notice that each of the selected columns now has the "123" icon.

L: Add columns

The Power Query Editor lets you add columns to your data. In this example you will add two columns. You will first create an index column so each country record will have an ID column. Then you will a Total Sales column for the total sales of all 12 months.

Add an Index column

1. From the ribbon choose **Add Column**, **General**, **Index Column**, **From 1**.



   Notice a new Index column appears on the right.

2. Right click on the **Index** column, choose **Move**, then choose **To Beginning**.

Add a custom column for Total Sales

1. From the ribbon choose **Add Column**, **General**, **Custom Column**.

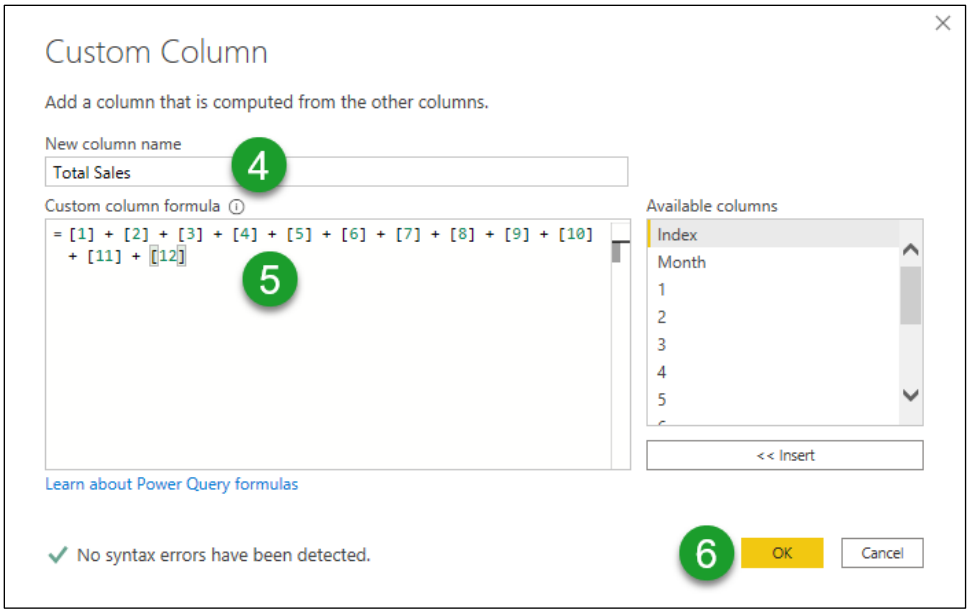
2. In the **New column name** field enter **Total Sales**.

3. In the **Custom column formula** field enter the following:

```
[1] + [2] + [3] + [4] + [5] + [6] + [7] + [8] + [9] + [10]
+ [11] + [12]
```

   Notice the formula encloses field names in square brackets the names of the 12 columns of monthly sales. You can enter the formula from the keyboard, or you can select the month field from the Available columns section and then click the << Insert button follow by typing the +.

4. Click **OK**.



Notice the new Total Sales column appears on the right side of the data.

Notice in the **Query Settings** pane, in the **Applied Steps** list, next to the **Added Custom** step is an edit icon . When clicked it will let you edit the formula.

Notice its data type icon is both ABC and 123. Instead, we want the total to use the Whole Number data type.

5. Click the data type icon on the left of the Total Sales column, then choose **Whole Number**.

6. From the ribbon choose **Home**, **Close**, **Close & Apply**.

7. Save your result in the exercise folder as **Modified Monthly Sales per Country**.

M: Unpivot data

It appears that the data in the Monthly Sales per Country file was the result of a Pivot Table in Excel. Pivoted Data is great for helping humans view and understand data. It is not so great for building visualization; instead, the original unpivoted data would be better. However, we no longer have the original unpivoted data. The good news is we can use the Power Query Editor to unpivot the data.

In this exercise you will unpivot the sales data, and then remove the Total Sales records.

1. Return to the Query Editor by right clicking on the **Monthly Sales per Country** field and then choose **Edit Query**.

2. Select the **12 monthly sales columns** and the **Total Sales column**.

3. From the ribbon choose **Transform**, **Any Column**, **Unpivot Columns**, **Unpivot Only Selected Columns**.

   Notice the 13 columns have been replaced with two columns: one with the month number, and one with the sales value.

4. Rename the **Value** column as **Sales**.

5. Rename the **Attribute** column as **Time Period**.

6. Click the Time Period drop-down, and uncheck the **Total Sales** value, then click **OK**.

   Notice the data is now unpivoted and no longer includes the Total Sales records.

7. From the ribbon choose **Home**, **Close**, **Close & Apply**.

8. Save your result in the exercise folder as **Unpivoted Monthly Sales per Country,** then close Power BI.

N: Split a column into multiple columns

Sometimes the raw data you import into Power BI has data that should be split into multiple columns. In this exercise you will open split a "Last, First" Contact Name column into a Contact First Name and Contact Last Name column. You will do the same thing for a Sales Rep column.

1. Start the **Power BI Desktop** application.
2. From the ribbon, select **Home**, **Data**, **Excel Workbook**.
3. Choose the **Data to be Split.xlsx** from the Exercises folder and click **Open**.
4. Check the **Sheet1** table and click **Transform Data**.

   Notice the data is loaded immediately into the Power Query Editor.
5. Select the **Contact** column.
6. From the ribbon, select **Transform**, **Text Column**, **Split Column**, **By Delimiter**.
7. In the **Split Column by Delimiter** dialog box set the following options then click **OK**.

Setting	Option
Select or enter delimiter	Comma
Split at	Left-most delimiter

8. Rename the first column to **Contact Last Name**.
9. Rename the second column to **Contact First Name**.
10. Repeat the process for the **SaleRep** column.

O: Manipulate / correct numeric date and time data

The Power Query Editor lets you modify date fields. For example, notice the Order Date field in the Data to be Split.xlsx file displays the time as well as the date. Since all the times are midnight, you will change this field to show just the date.

1. Select the **Order Date** field.

2. From the ribbon, select **Transform**, **Date & Time Column**, **Date**, **Date Only**.

   Notice the field now only shows the date.

The Power Query Editor lets you manipulate dates in other ways. Feel free to experiment and then undo the applied step after you see what it does.

3. From the ribbon, select **Transform**, **Date & Time Column**, **Date**, **Year**.

   Notice under **Year** there are options for the **Year** (which will drop the month and day values), **Start of Year**, and **End of Year**.

   Notice under **Month** there are options for the **Month** (which will drop the year and day values), **Start of Month**, **End of Month**, **Days in Month** and **Name of Month**.

   Notice there are similar options for **Quarter**, **Week**, and **Day**. Notice there are also options for **Earliest** and **Latest**.

   If you applied any of these options, click the most recent  in the applied steps area.

P: Manipulate / correct numeric data with math

The Power Query Editor lets you modify numeric data. In this exercise you increase the unit price by $10 and double the quantity ordered.

Increase the price by $10.

1. Select the **Unit Price** field.
2. From the ribbon, select **Transform**, **Number Column**, **Standard, Add**.
3. In the Add dialog box enter a **value** of **10** and click **OK**.

   Notice each unit price has increased by $10.

Double the quantity.

1. Select the **Qty** field.
2. From the ribbon, select **Transform**, **Number Column**, **Standard, Multiply**.
3. In the Multiply dialog box enter a **value** of **2** and click **OK**.

   Notice each quantity has doubled.

4. Become familiar with the additional number column manipulation options that are available on the **Transform**, **Number Column** portion of the ribbon.

   If you applied any of these options, click the most recent  in the applied steps area.

Q: Practice

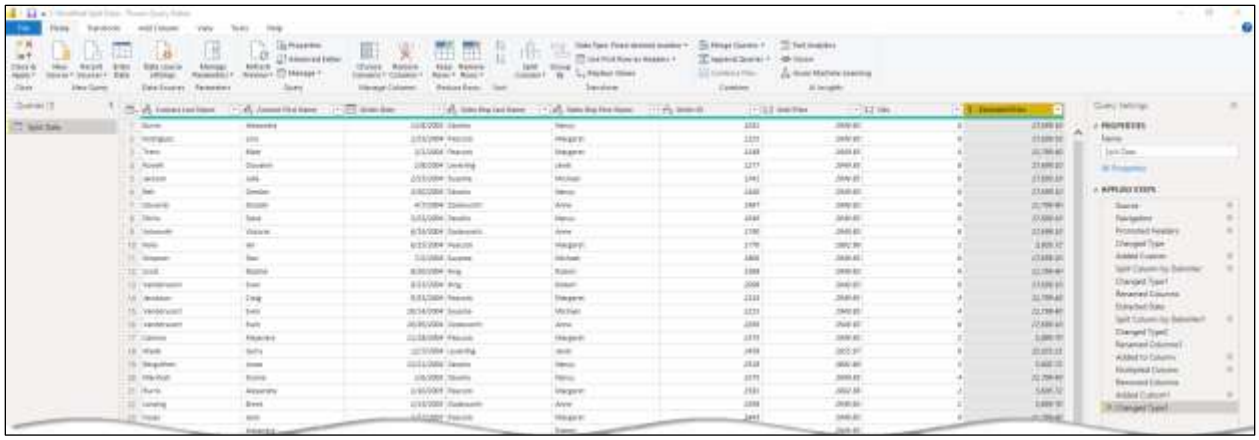
Now that you know how to manipulate data with the Power Query Editor, see if you can do the following:

1. Create an **Extended Price** column with a calculation of [Unit Price] * [Qty].

2. Change the **Extended Price** column data type to a fixed decimal number.

3. Rename the query to **Split Data**.

The Query Editor should now look like the screen shot below.



When finished, close and apply your work, then save the report as **Modified Split Data**. Finally close Power BI.

4. Create the Data Model

Unit time: 90 minutes

Complete this unit and you will be able to:

A. Append records from one source to another

B. Merge columns from multiple sources

C. Hide a table from a report

D. List the different join types

E. Join data from different tables

F. Edit the model

A: Append records from one source to another

Data can be messy. In the last chapter you say how to use Power BI and the Power Query Editor to manipulate individual tables and fields. You cleaned up the data, changed column headings, modified data types, split some columns, and inserted others.

In this chapter you will continue preparing a data model by connecting, merging, and joining data from different tables. You start out by combining data from multiple sheets into a new sheet.

1. **Start Excel** and **open** the **Xtreme Bicycles Sales.xlsx** file from the exercise folder.

2. Notice the following:
   - The workbook has 8 sheets.
   - Most of the sheets have data.
   - Each sheet has its own kind of data.
   - The Bicycle Sales sheet and the Accessory Sales sheet have the same columns. They could have been combined into one sheet, but the author chose to keep them on separate sheets.
   - Many of the sheets have an ID column. Sometimes these ID fields show up on different sheets.
   - The Relationship sheet has no data. Instead, it has a graphical diagram that shows how the different tables are linked.

3. Close Excel.

4. Start the **Power BI Desktop** application.

5. If the startup screen is displayed, click the X in the top right corner to close it.

6. From the ribbon's **Home** tab, select **Get data**, choose **Excel Workbook**, and then select the **Xtreme Bicycles Sales.xlsx** file from the Exercise folder, choose all the sheets except Relationships, and click **Transform Data**.

Create the new sheet

1. Right click on the **Accessory Sales** query, then choose **Duplicate**.

2. In the Query Settings pane, rename the Accessory Sales (2) sheet to **All Sales Items**.

3. From the ribbon select **Home**, **Combine**, **Append Queries**, **Append Queries**.

4. In the Append dialog box select **Two Tables**, then in the **Table to append** drop down choose **Bicycle Sales** as the destination, then click **OK**.

The All Sales Items now includes 3,692 records which includes the 1,774 Bicycle Sales records + the 1,918 Accessory Sales records.

Bicycle Sales 1,774 records	→	All Sales 3,692 records
Accessory Sales 1,918 records	→	

Add an Extended Price column

1. Add a Custom Column named **Extended Price**. The formula will be [Unit Price] * [Qty].

2. Change the data type to **Fixed Decimal Number**.

B: Merge columns from multiple sources

Two methods exist for combining data from two sources: vertically and horizontally. A vertical merge occurs when you add records as in the previous exercise. A horizontal merge occurs when you add columns from one query to another. For example, it would be beneficial to have the Product Type Name field in the Product table. That is what you will do in this exercise.

1. In the Power Query Editor select the **Product** query.

2. From the ribbon select **Home**, **Combine**, **Merge Queries**, **Merge Queries**.

   The Merge dialog box is display and shows a preview of the Product query.

3. In the dialog box choose the **Product Type** from the drop down.

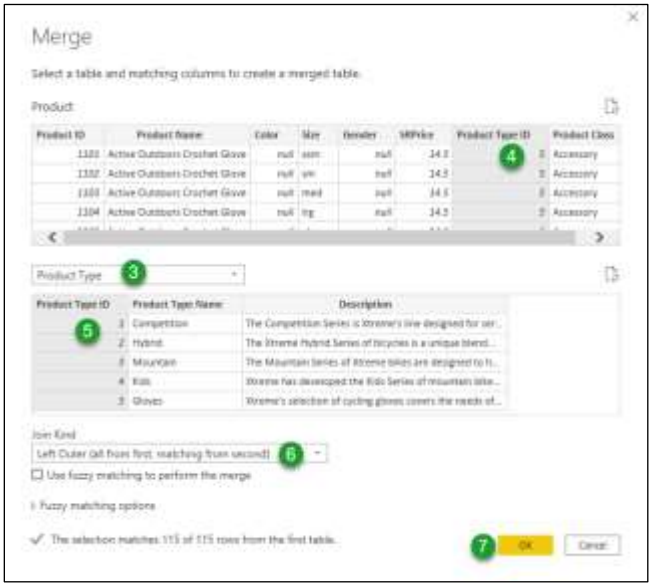
Match the two queries by Product Type ID

4. In the dialog box, in the **Product** table, select the **Product Type ID** column.

5. In the dialog box, in the **Product Type** table, select the **Product Type ID** column.

6. In the **Join Kind** drop down select the **Left Outer (all from first, matching from second)** option.

7. Click **OK**.



Finish preparing the new column

8. Notice the following:

   - A new Product Type column has been added to the Product query.
   - All the values in the new column are `Table`.
   - The Product Type column heading has this icon: 

9. In the **Product Type** column, click the  icon.

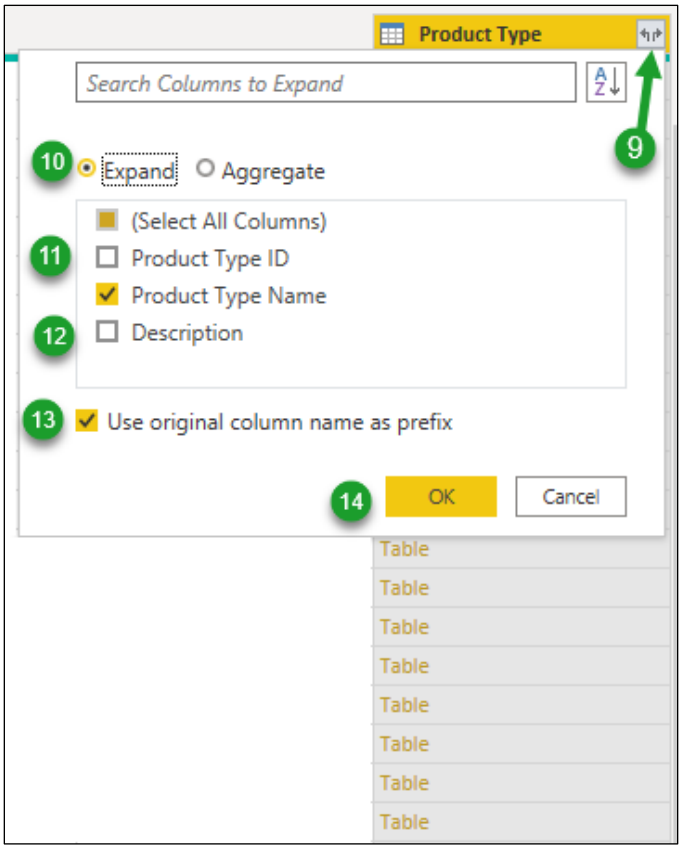
10. Click the **Expand** option.

11. Uncheck the **Product Type ID** field.

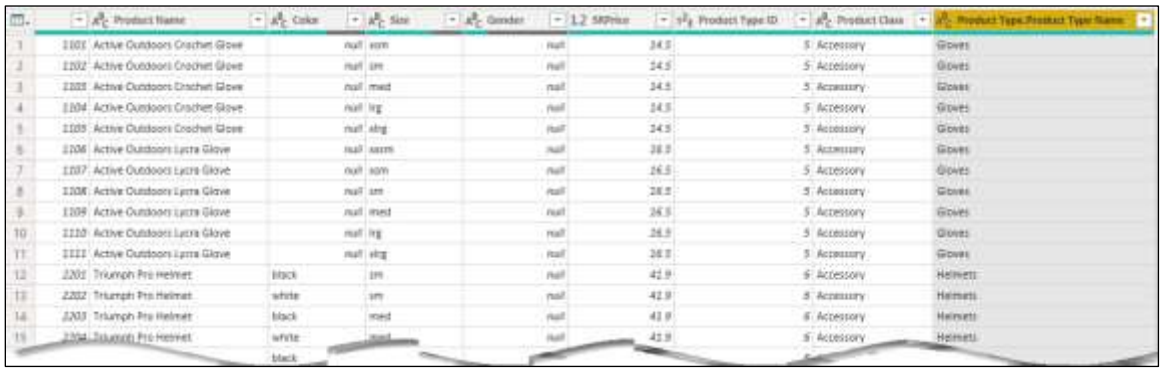
12. Uncheck the **Description** field.

13. Check the **Use original column name as prefix** option.

14. Click **OK**.



The Product Type field now shows the product type name value from the Product Type table.

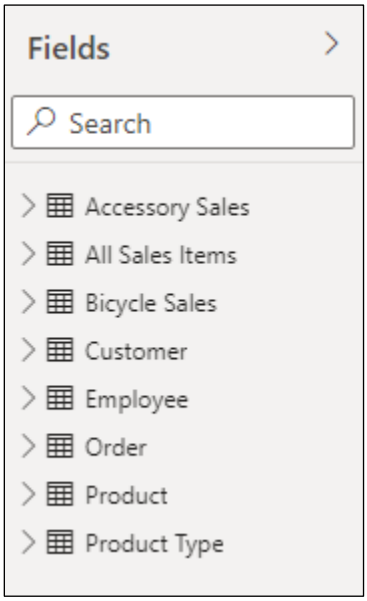


Clean up

15. Rename the field as **Product Type Name**.

16. From the ribbon choose **Home**, **Close**, **Close & Apply**.

    You should now see the following tables in the Fields pane.



C: Hide a table from a report

After merging, you may discover you no longer have a need for all the tables in your model. While you can delete them, you also have the option to merely hide them. The advantage of hiding is you can always unhide the table if you need to get to it.

In this exercise you will hide the **Product Type**, **Accessory Sales**, and **Bicycle Sales** tables.

Hiding Tables

1. Be sure you are in the Power BI Desktop.

2. In the **Fields pane**, right click on the **Product Type** table and choose **Hide**.

3. In the **Fields pane**, right click on the **Accessory Sales** table and choose **Hide**.

4. In the **Fields pane**, right click on the **Bicycle Sales** table and choose **Hide**.

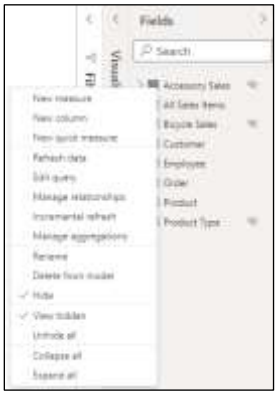
Viewing Hidden Tables

1. In the **Fields pane**, right click on the **All Sales Items** table and choose **View hidden**.

   Notice all tables are now displayed, and that the hidden tables have a hidden icon  next to their name.

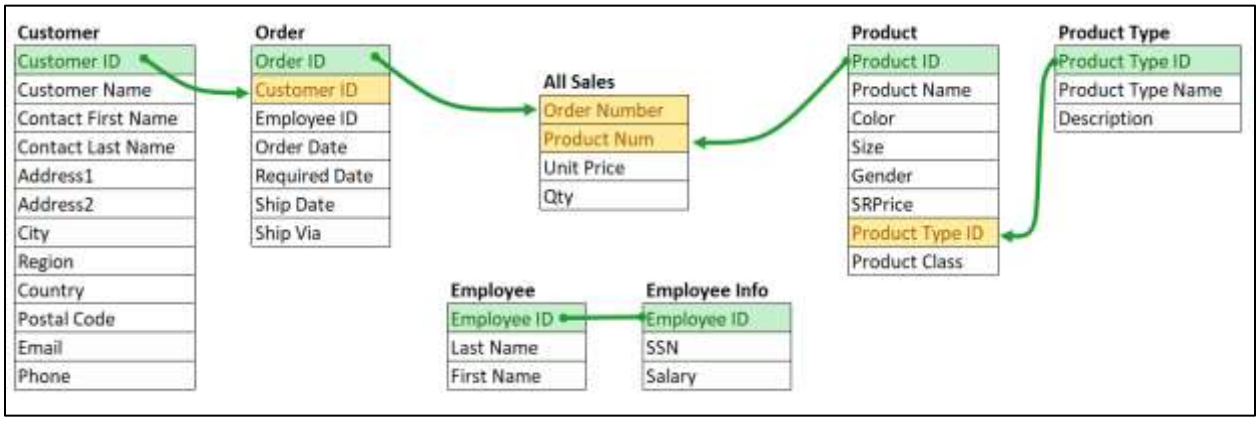
   If you need to unhide a table, right click on it, and remove the **Hide** check mark by clicking on it.

   If you need to unhide all the hidden tables, right click on any table and then click the **Unhide all** option.



D: List the different join types

Some of the reports you create will naturally come from multiple tables. This will require either combining all the tables into one table (which is not practical) or joining the tables in your data model. Joining tables means you link them together via key fields. For example, the image below shows the tables and fields in a Sales data model for Rad Bikes, a competitor to Xtreme Bicycle.



Notice the lines and arrows show the key fields that can be linked to one another to create the relationships.

Four types of joins can exist in a Power BI model. They are listed below with a description and example.

Join Type	Description	Example
One-to-one	One record in the first table has only one corresponding record in the second table.	One record in the **Employee** table has only one corresponding record in the **Employee Info** table. The relationship is based on the **Employee ID** fields.
One-to-many	One record in the first table has many corresponding records in the second table.	One record in the **Customer** table has many corresponding records in the **Order** table. The relationship is based on the **Customer ID** fields.
Many-to-one	Many records in the first table have only one corresponding record in the second table.	Many records in the **Order** table have only one corresponding record in the **Customer** table. The relationship is based on the **Customer ID** fields.
Many-to-many	Many records in the first table have many corresponding records in the second table.	Many records in the **Order** table have many corresponding records in the **Product** table. This relationship cannot be set in this model because there is no common field between the two tables.

Cardinality

"Cardinality" is another word for relationship type. You will see the word cardinality in some of the Power BI screens.

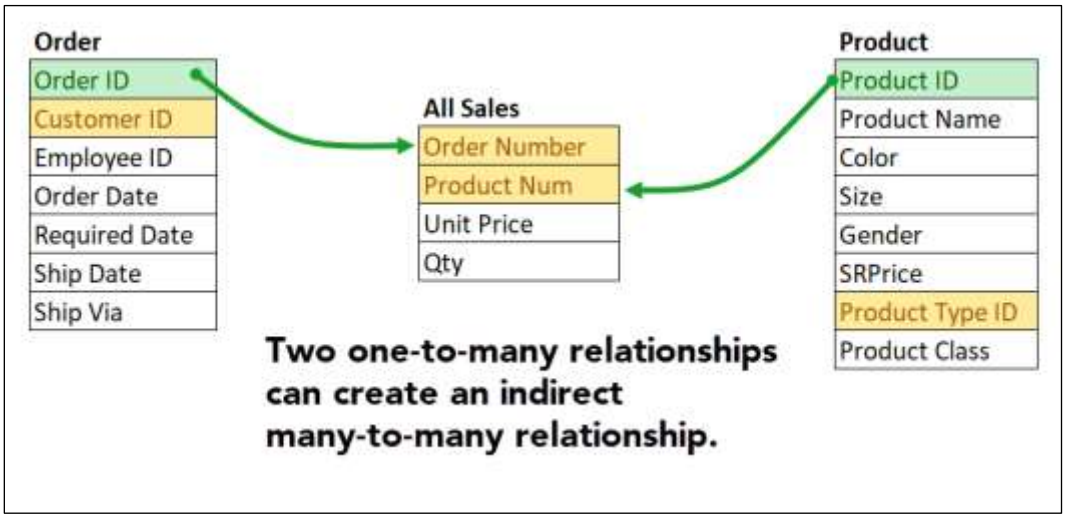
Parent-child relationship

The one-to-many relationship is often referred to as a parent-child relationship because one parent can have many children.

The many-to-one relationship is the same as the one-to-many, except that it is from the children's point of view.

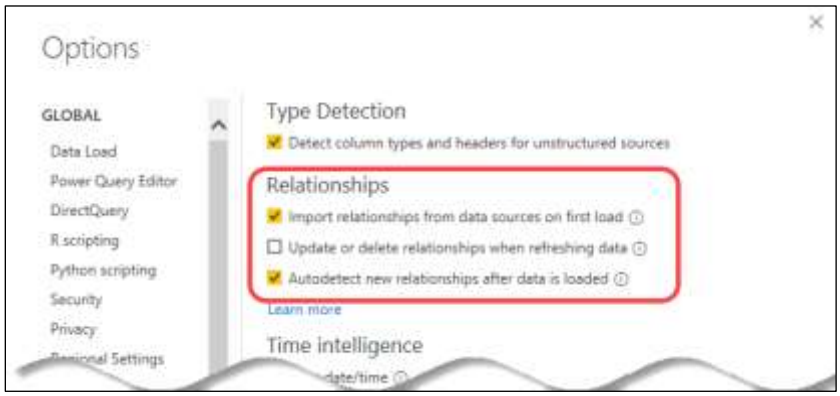
Many to many alternative

The many-to-many relationship is seldom used in a relational database. Instead, two separate one-to-many relationships are created. For example, the many-to-many between Order and Products can be achieved by creating a one-to-many between the Order table and the All Sales table, and another one-to-many between the Product table and the All Sales table.



E: Join data from different tables

Power BI provides multiple methods for establishing relationships between tables. By default, when data is first imported into Power BI the application will autodetect relationship when the data is imported and loaded. You can change this by selecting **File**, **Options and settings**, **Options**, **Data Load**, and changing the relationship options. For now we will keep the setting as is.



Changing relationships from the Report View

As demonstrated in this exercise, you can change relationships from the report view.

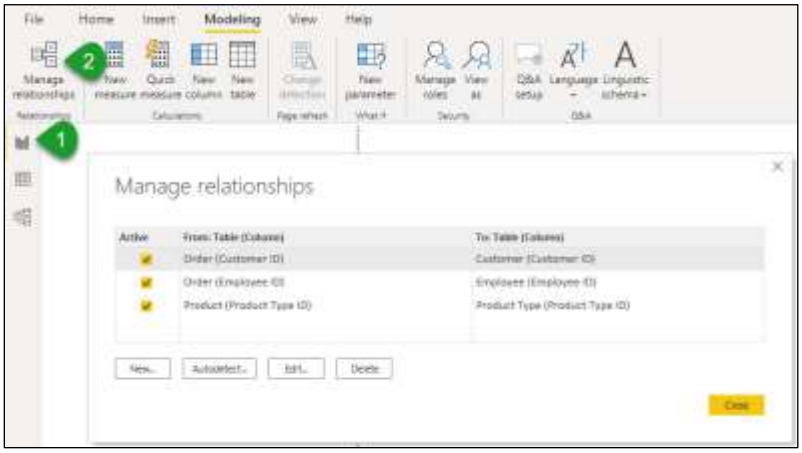
1. In Power BI desktop click the Report view icon .

2. From the ribbon select **Modeling**, **Relationships**, **Manage relationships**.

   The Manage relationships dialog box appears.

   Notice three relationships already exist.

   Notice for each relationship you can see the **From table and column**, and the **To table and column**.



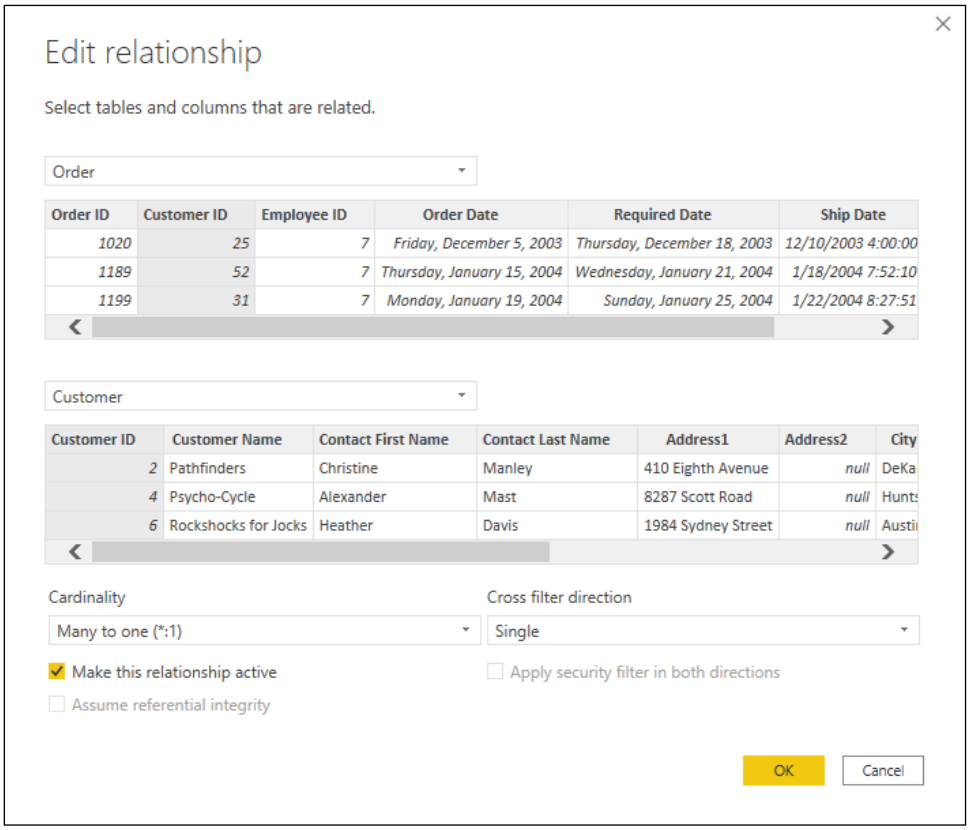
View relationship details

3. Select the first relationship and click the **Edit…** button.

   Notice the first table is the **Order** table and the **Customer ID** field is selected.

   Notice the second table is the **Customer** table and its **Customer ID** field is selected

   Notice the Cardinality is **Many to one**.



4. Click **OK**.

Create a new One-to-Many relationship for Orders and All Sales Items

5. Click the **New…** button

6. From the first drop down select the **Order** table.

7. Select the **Order ID** column.

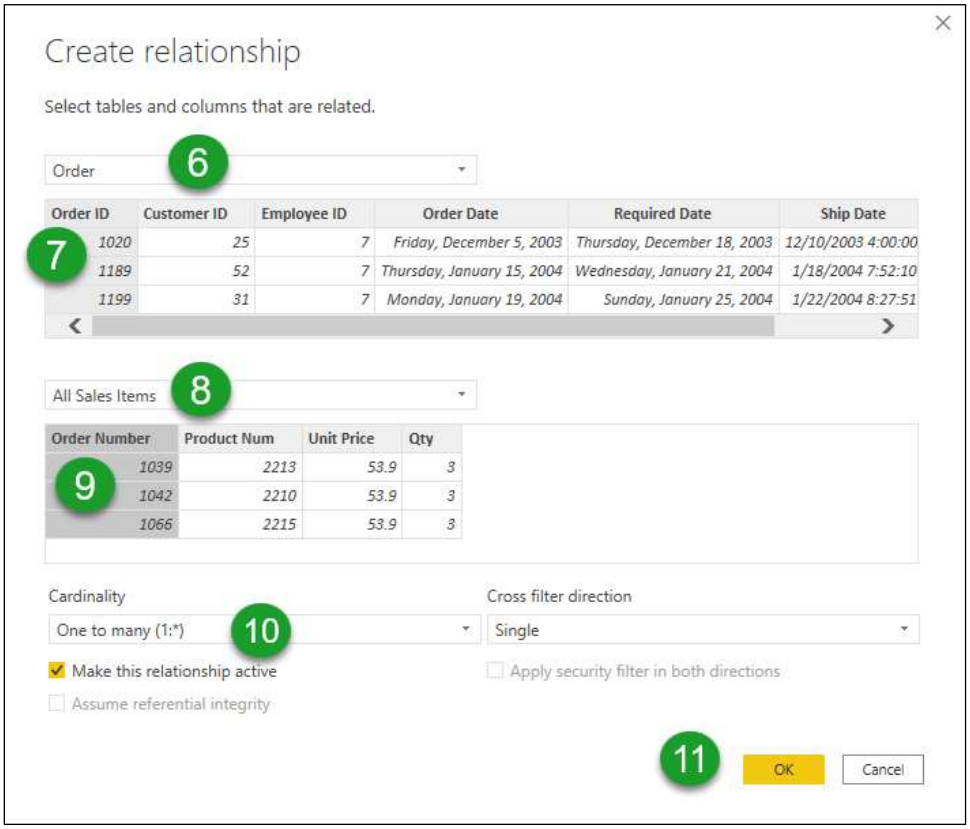
8. From the second drop down select the **All Sales Items** table.

9. Select the **Order Number** column.

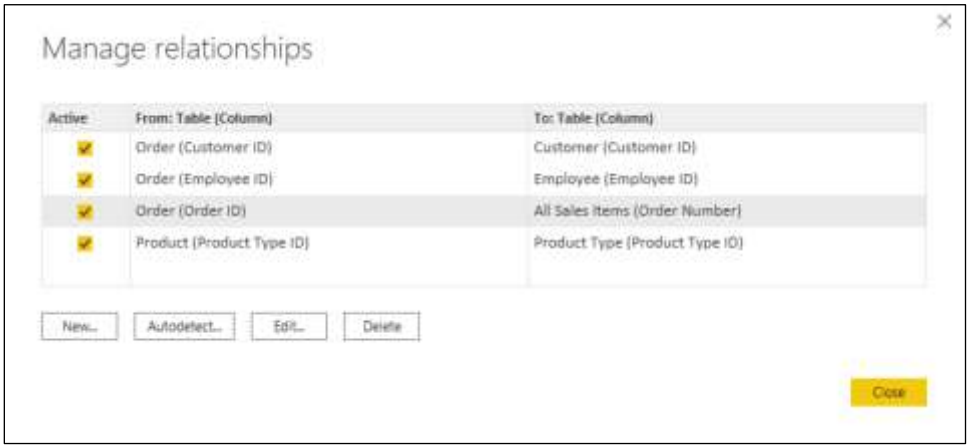
10. Notice the computer autodetected that this is a One-to-many relationship.

    If you needed to, you could click the Cardinality drop down and choose a different relationship.

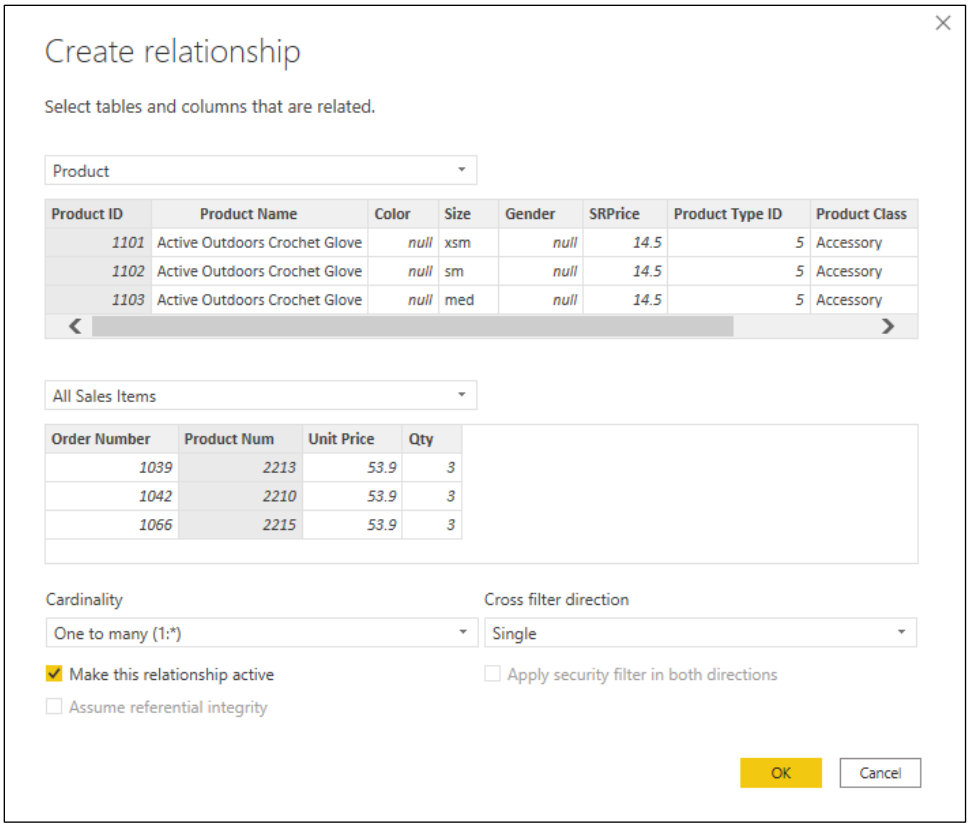
11. Click **OK**.



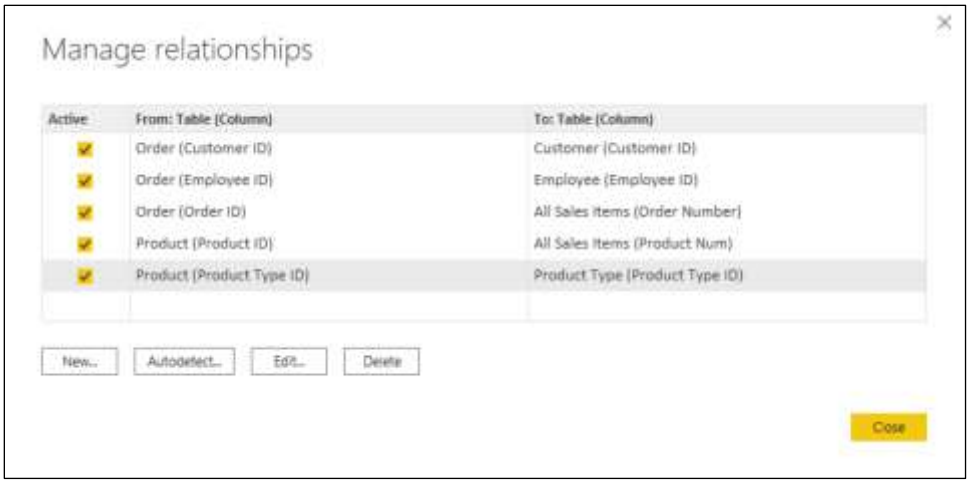
Notice the new relationship has been added.



12. Practice: Create a new relationship between the **Product** table and the **All Sales Items** table.



Your list of relationships should be like the following:



13. Click **Close**.

F: Edit the model

Power BI includes a model view that lets you see your model. It includes the following:

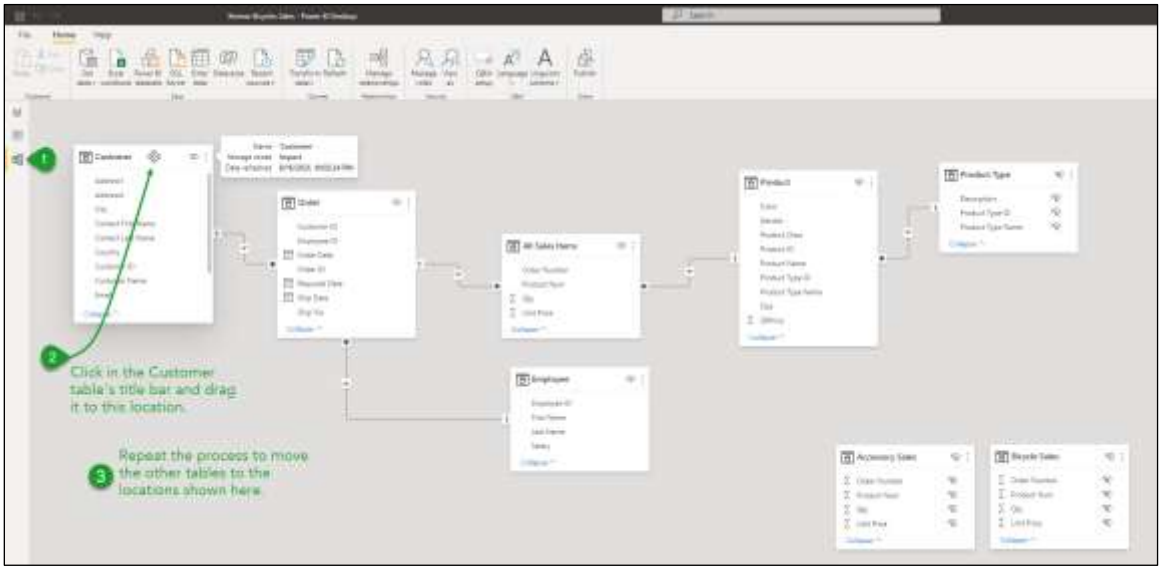
- Tiles for each table
- Relationship lines between tables
- Icons to identify the one side 1 or the many side * of a relationship
- Icons to identify if the table is visible or hidden .

In this exercise you will edit the model.

1. In Power BI desktop click the Model view icon .

2. Grab the Customer table's tile by its title bar and drag it to the top left corner of the screen.

3. Repeat the process to move the tables to the location specified below.



4. Save the report as **Xtreme Bicycles Sales** and close Power BI.

5. Create Visualizations and Reports

Unit time: 90 minutes

Complete this unit and you will be able to:

A. Define "Visualization"

B. Define "Report"

C. List various types of visualizations

D. Create a visualization

E. Format a visualization

F. Add more pages to a report

G. Add more visualizations

H. Filter a page or report

I. Define Slicer

J. Create a Slicer

K. Complete a practice exercise

A: Define "Visualization"

In this course so far, you have learned how to get data into Power BI and how to prepare that data for data modeling, and then how to create the data model. Along the way you have created a few visualizations. But what is a visualization?

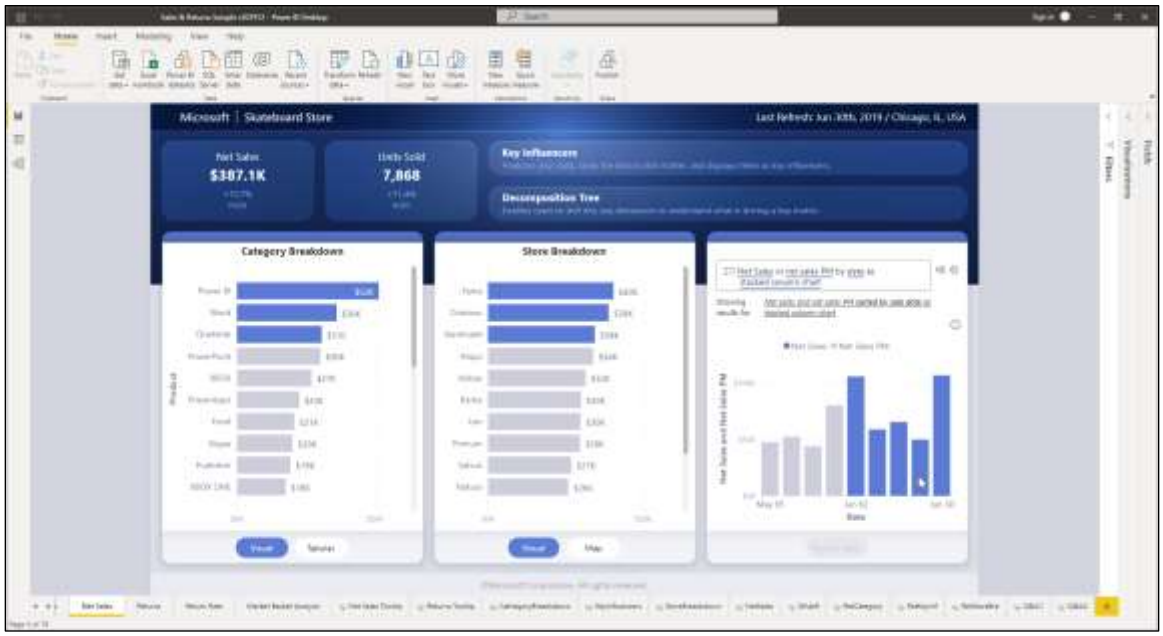
A visualization (or visual for short) is an object that "displays insights that have been discovered in the data."[1] For example, the Stacked bar chart we created earlier is a visualization. You may have one or many visuals in a Power BI report.

[1] See https://docs.microsoft.com/en-us/power-bi/visuals/power-bi-report-visualizations

B: Define "Report"

A report is a collection of visualizations. When you saved your Power BI work you were saving a report. Microsoft says, "A Power BI report is a multi-perspective view into a dataset, with visuals that represent different findings and insights from that dataset."[2]

Each report, in addition to having one or more visualizations, can also have one or more pages. A Power BI report file can have multiple pages, and each page can have multiple visualizations. The image below shows a sample report created by Microsoft. Notice it has multiple pages. Notice the visible page has multiple visualizations.



[2] See https://docs.microsoft.com/en-us/power-bi/consumer/end-user-reports

C: List various types of visualizations

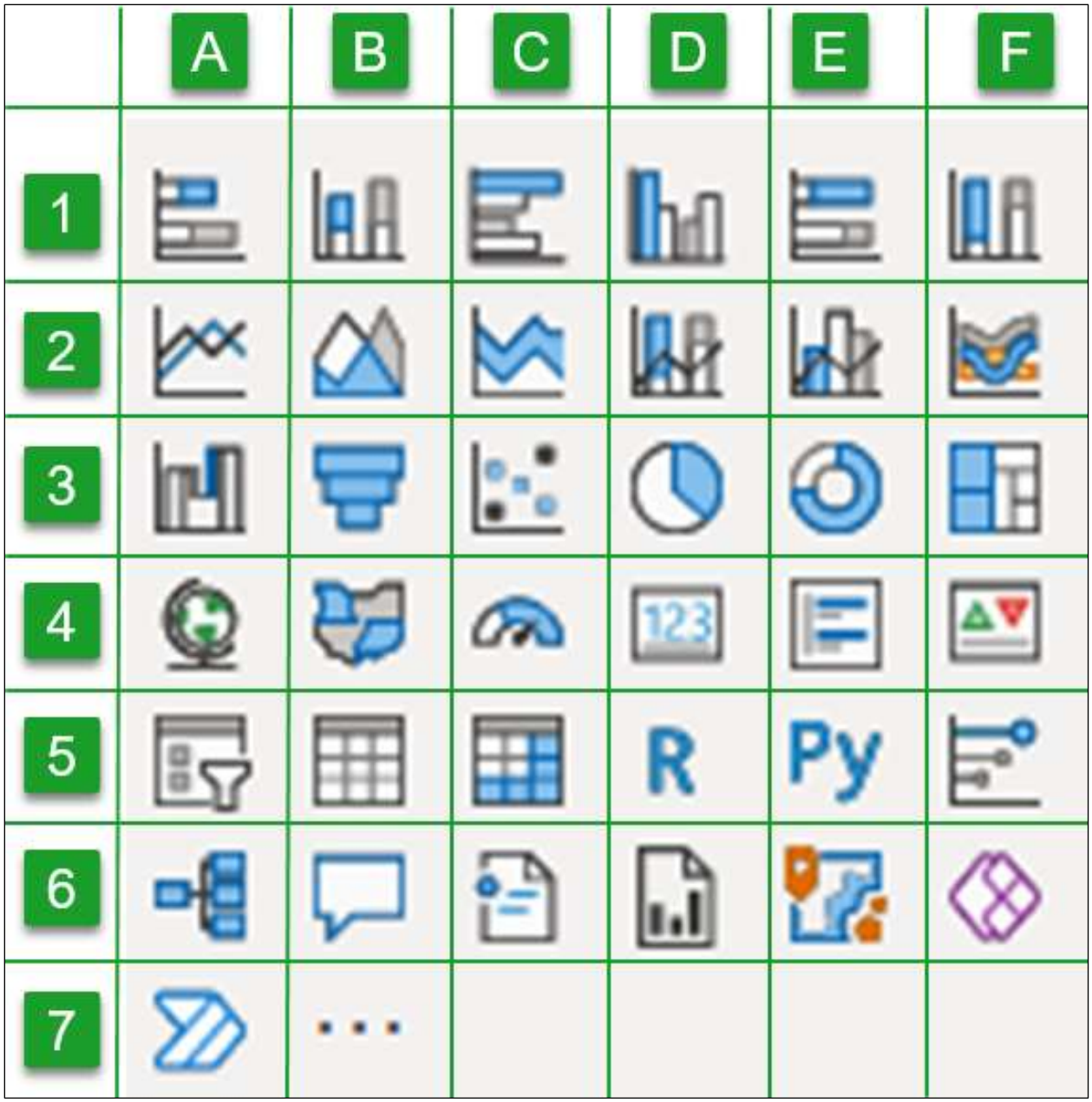
In the Power BI visualizations pane, you can see multiple icons that represent different types of visualizations. More visualizations can be downloaded from Microsoft.

Identify the icon

In this exercise you will identify the names of Visualizations in the Visualizations pane.

1. If necessary, start Power BI and **open** the **Xtreme Bicycles Sales** report.
2. If necessary, expand the **Visualization** pane.
3. Hover your mouse over a visualization icon and notice its name appears as a tool tip.
4. Using the screen shot on the next page and the table below, match each visualization with its name. For example, the icon at A1 is the Stacked bar chart.

	Line and clustered column chart	Area Chart	Treemap
	Line and stacked column chart	Line Chart	Funnel
	Pagination report (preview)	Get more visuals	Matrix
	Power Automate for Power BI	Key influencers	Slicer
	100% Stacked column chart	R script visual	Gauge
	ArcGIS Maps for Power BI	Smart narrative	Table
	Power Apps for Power BI	Waterfall chart	Card
	100% Stacked bar chart	Multi-row card	KPI
	Clustered column chart	Python visual	Map
	Stacked column chart	Scatter chart	Q&A
	Clustered bar chart	Ribbon chart	
	Decomposition tree	Donut chart	
A1	Stacked bar chart	Field map	
	Staked Area Chart	Pie chart	


A
B
C
D
E
F
1
2
3
4
5
6
7
123
R
Py

D: Create a visualization

In this exercise you will create a simple table visualization, and then you will experiment changing it into various other visualizations.

1. If necessary, **start Power BI** and **open** the **Xtreme Bicycles Sales** report, and select the **Report** view.

2. If necessary, **expand** the **Fields pane**.

3. **Expand** the **Product** table.

4. Click the check box for the **Product Type Name** field.

5. **Expand** the **All Sales Items** table.

6. Click the check box for the **Qty** field.

   Notice a spreadsheet like table is displayed showing the quantity sold for each product type.

7. If necessary, **expand** the **Visualization pane**, then click the fields icon  .

   Notice the columns well shows the Product Type Name and Qty fields have been chosen.

8. Using the visualizations size handles, make the chart much wider and taller.

9. In the Visualization pane click the **Stacked Bar** chart.

   Notice the visual changes to a bar chart.

10. In the Visualization pane click the **Stacked Column** chart.

    Notice the visual changes to a column chart.

11. In the Visualization pane click the **Line** chart.

    Notice the visual changes to a line chart.

12. In the Visualization pane click the **Area** chart.

    Notice the visual changes to an area chart.

13. In the Visualization pane click the **Pie** chart.

    Notice the visual changes to a pie chart.

14. In the Visualization pane click the **Donut** chart.

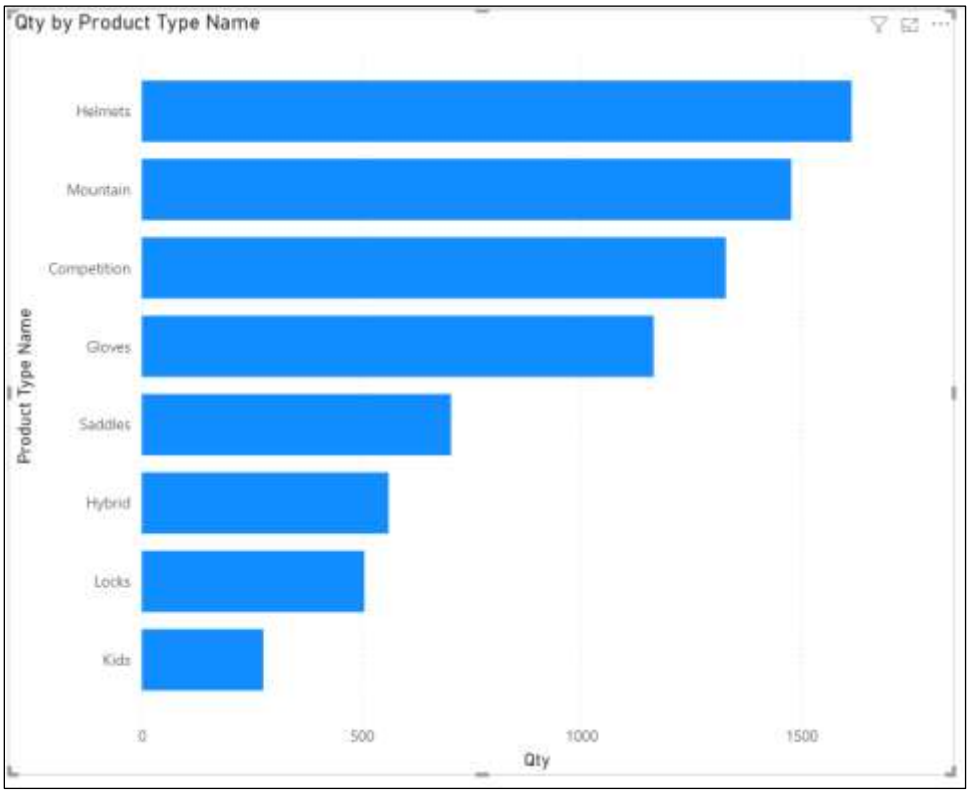
    Notice the visual changes to a donut chart.

15. In the Visualization pane click the **Treemap** chart.

    Notice the visual changes to a Treemap chart.

16. Change the Visualization back to a **Stacked Bar** chart.

    In the next exercise you will format the Staked Bar chart.

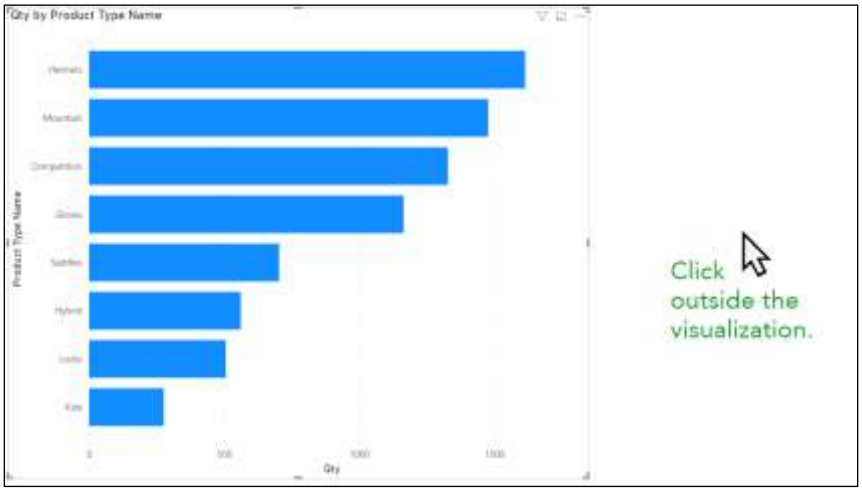


E: Format a visualization

In this exercise you will format the page and its visualization.

Format the page

1. Click outside the visualization but inside the page



2. In the visualization's pane click the **Format Report** icon  .

   Notice the options are all related to the page.

3. **Expand** the **Page information** section.

4. In the Name well enter **`My first visualization`** as the page name.

5. **Collapse** the **Page information** section.

6. **Expand** the **Canvas background** section.

7. Click the **Color** drop down and choose a different color.

   Notice the color did NOT change.

8. Drag the **Transparency** setting to the left to **0%**.

   Notice the page background has changed to your selected color.

9. Click the **Revert to default** link.

   Notice the page color is back to white with 100% transparency.

Format the chart

In this exercise you will have the opportunity to format the chart. Much of this exercise will be unstructured, thus giving you the option play with and become familiar with the various options.

1. Click inside the chart.

   Notice the Visualizations pane is again displaying Y-axis and X-axis information.

2. In the visualization's pane again click the **Format** icon  .

   Notice the options are now related to the chart.

Y-axis options

3. Click the **Y-axis** option to turn it **off**.

   Notice the names of each bar have disappeared.

4. Click the **Y-axis** option again to turn it **on**.

   Notice the names of each bar have reappeared.

5. Expand the Y-axis section.

   Notice you have options to switch the axis position (off = left or on = right) as well as the axis font type, size, attributes and color. You can also expand the title section to change the axis title, its font, size, etc.

   Experiment with these options as time permits.

X-axis options

6. Collapse the Y-axis section and **expand** the **X-axis** section.

   Notice the range section lets you change minimum and maximum values, turn on or off a logarithmic scale, and toggle inverting the range. The values section lets you change font attributes, display units, and decimal places of values. The title section also lets you change the title, its font, color, etc.

   Experiment with these options as time permits.

Data labels

7. **Collapse** the **X-axis** section and then turn on the option for Data labels.

   Notice each bar now has a data label specifying the count for each product.

8. **Expand** the **Data labels** section.

   Notice you can change the position of the label. The values section lets you format the label's font, display units, decimal places and more. The background section lets you add a colored background for your label.

   Experiment with these options as time permits.

Other options

9. **Collapse** the **Data labels** section.

   Notice you have more Visual options and General options. Experiment with these and other options (gridlines, zoom sliders, bars, etc.) as time permits.

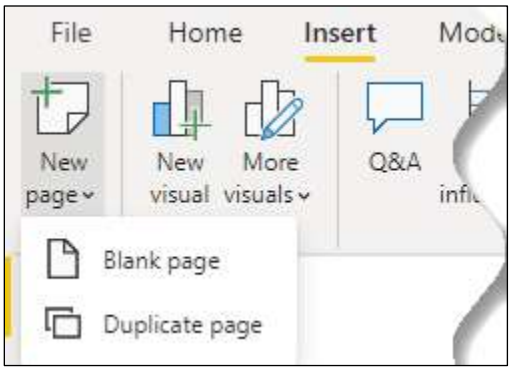
F: Add more pages to a report

A Power BI report can be composed of multiple pages. In this exercise you will add a new page to the existing report.

1. If necessary, **start Power BI** and **open** the **Xtreme Bicycles Sales** report, and select the **Report** view.

2. At the bottom of the application click the  icon to add a new page.

   You can also create a new page by from the ribbon by selecting **Insert**, **New Page**, and then choosing either **Blank page** or **Duplicate page**.



3. Right click on the tab of the new page and choose **Rename**.

4. Enter the new name: **`More Visualizations`**.

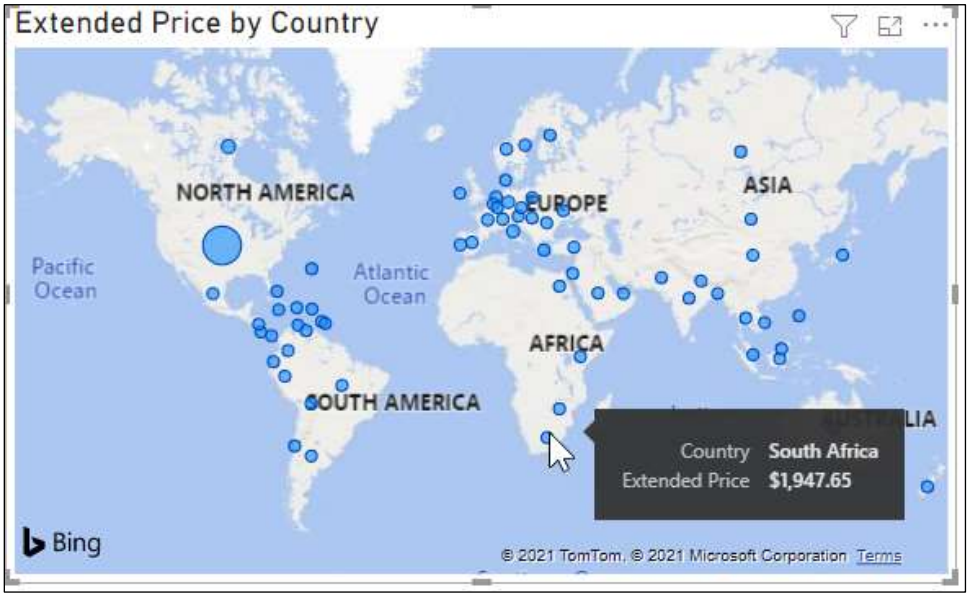
G: Add more visualizations

In this exercise you will create multiple visualizations on the same page.

1. In the fields pane expand the **Customer** table.
2. Check the box next to the **Country**.

   A new Map visualization is displayed. Each dot represents a country.
3. Resize the map so you can view the whole world.
4. In the fields pane expand the **All Sales Items** table.
5. Check the box next to the **Extended Price**.

   Notice the size of the circles has changed to reflect the total Extended Price per country. If you hover over each circle a tool tip will display the Extended Price for that country.



Rename the Extended Price for this visual

1. In the visualizations pane, click the expand button for the **Bubble Size** which currently has a value of **Extended Price**.
2. From the pop-up menu select **Rename for this visual**.
3. Type **Total Sales** in the Size well and press ENTER.

4. Hover your mouse over a blue circle and notice the tool tip now says Total Sales.

Add a border

1. In the visualizations pane click the format icon .

2. Click **General**, expand **Effects**, and turn on the **Visual border** option.

Duplicate a visual

1. Click on the visualizations title to select it.

2. Press Ctrl C to copy the visualization.

3. Press Ctrl V to paste a new visualization.

4. Move the new visualization below the first.

   Notice dashed red guidelines appear to help you line up the two visuals.

5. In the visualizations pane click the **Stacked column chart.**

   Notice the second visualization now displays a column chart.

6. In the visualizations pane click the format icon .

7. **Turn on** the **Data labels** option.

8. **Expand** the **Data labels** section.

9. Change the **Orientation** to **Vertical**.

Create a third visual

1. Click outside both visuals so neither is selected.

2. In the fields pane click on the check box for the following fields:

   - Product, Product Type Name
   - Product, Product Name
   - All Sales Items, Qty
   - All Sales Items, Unit Price

3. Format the visual as desired.

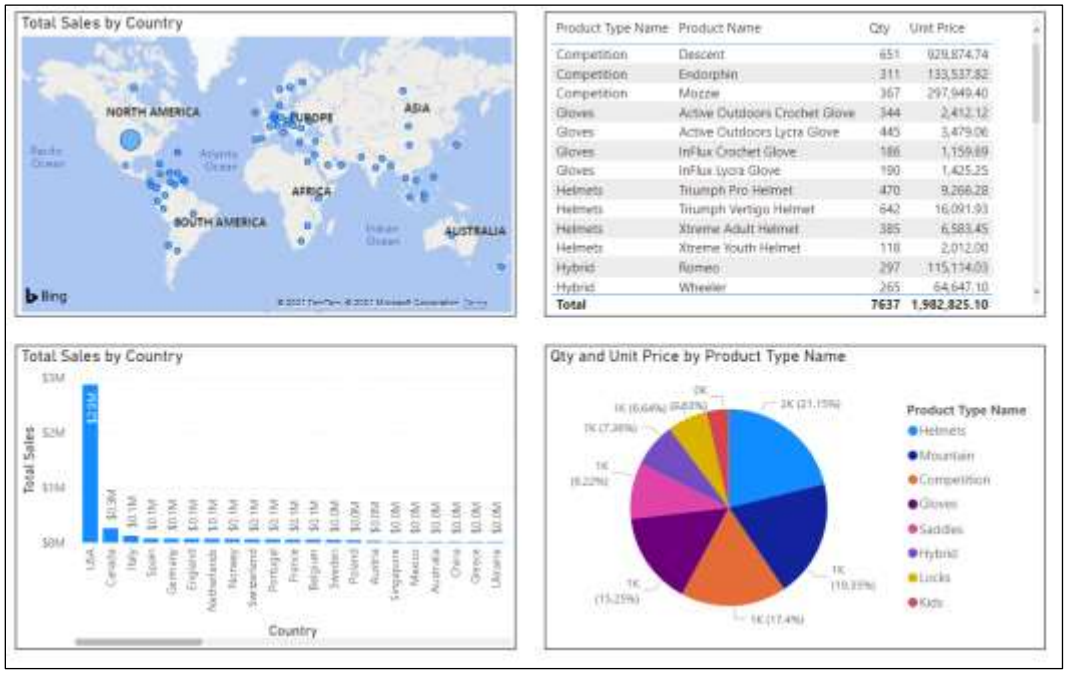
Practice: Create a fourth visual

1. Duplicate the third visual.

2. Position the new visual below the third.

3. Change the visual to a **Pie Chart**.

4. In the fields pane, **uncheck** the **Product Name** field.



H: Filter a page or report

The filters pane allows you to filter / hide data from a visual, from a page, or from the whole report. Some filters are basic in that they allow you to select the data you want to see. Other, more advanced filters, let you filter the data with a formula. In this exercise you will filter the page with basic filtering.

Basic Filtering on the page

1. Expand the filters pane.

   Notice you have options to apply a filter for this page and/or all pages.

2. Drag the **Customer** / **Country** field to the **Filter on this page** well.

   Notice a filter card is created.

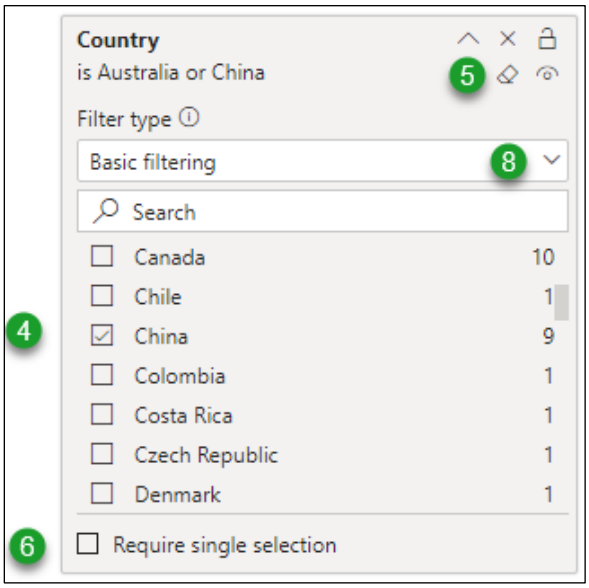
3. Check the box next to Australia.

   Notice the visualizations on the page are filtered to only show data that is related to a customer in Australia.

4. Scroll down and check the box next to China.

   Notice the visualizations on the page now only show data that is related to customers in Australia and China.

   Notice the top of the filter card says Country is Australia or China.



5. Click the **eraser** icon  to clear the filter.

6. Click the check box for **Require single selection**.

   Notice the filter now only lets you select one country at a time.

7. Clear the check box for **Require single selection** and click the **eraser** again to clear the filter.

Advanced Filtering

1. Click the drop down for the Filter type and change the option from **Basic filtering** to **Advanced filtering**.

   Notice the filtering options have changed.

2. Click the drop-down arrow for the **Show items when the value** option then choose the "**is**" option.

3. In the well below the drop down type "`Canada`".

4. Click the radio button for **Or**.

5. In the next drop down choose the "**is**" option.

6. In the well below that enter "**`USA`**".

   Notice the page has not yet changed.

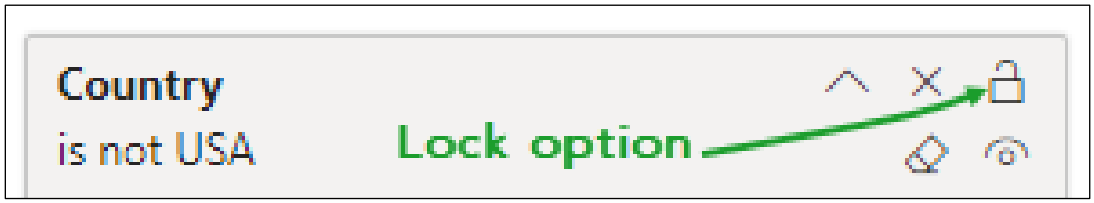
7. Click the **Apply filter** text.

8. As time permits see if you can apply the following filters:

   - Countries that contain `aus` in their name.
   - Countries that start with the letter `A`.
   - Countries that are not the `USA`.

Lock a filter

Power BI lets you lock a filter for users / viewers of your report by clicking the Lock icon at the top of the filter card.



This feature will not affect your ability to change the filter because you are a report designer.

Remove a Filter

To remove a filter, click the X next to the lock.

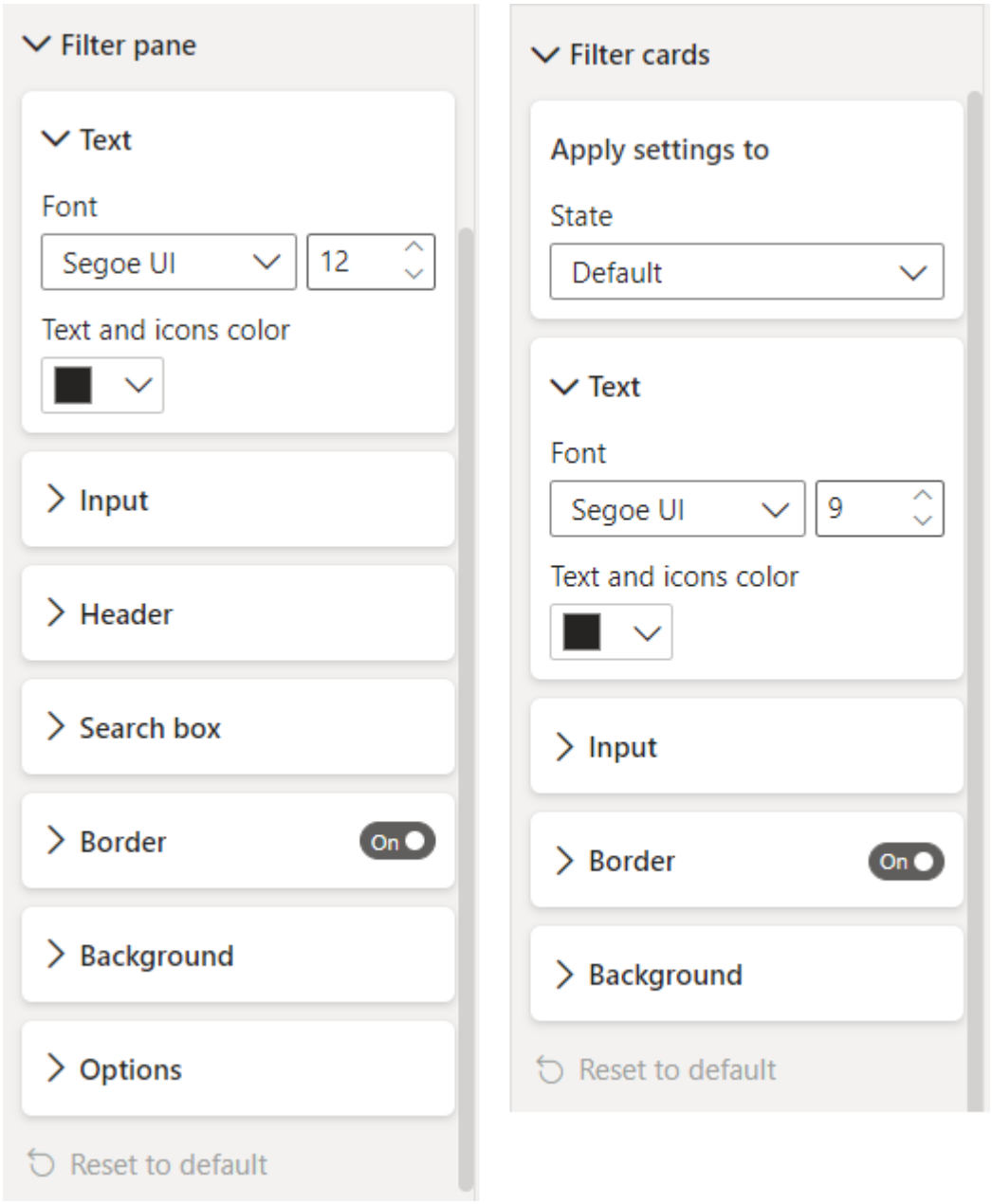
1. Remove the page filter by clicking the X.

Format Filter pane and Filter cards

When you click on the page (as opposed to a specific visual), and then in the Visualizations pane click the format page icon, you will see an option to format the Filter pane. As shown on the next page, this includes options to change the background color, font, and border.

Format Filter cards

You can also format the look and feel of your filter cards. As shown on the next page you can change the color, font, and border of cards.


Filter pane
Text
Font
Segoe UI
12
Text and icons color
Input
Header
Search box
Border
On
Background
Options
Reset to default
Filter cards
Apply settings to
State
Default
Text
Font
Segoe UI
9
Text and icons color
Input
Border
On
Background
Reset to default

I: Define Slicer

A slicer is a special type of visualization. It lets you apply a page level filter to the other visualizations on the page. But unlike filters, it not only appears in the filters pane, but it also appears in the report alongside other visualization.

J: Create a Slicer

1. In the Visualization pane click the **Slicer** icon.

   Notice a new slicer visualization appears on the page.

2. In the **Fields** pane expand the **Customer** table and then drag **Country** field into the slicer.

3. In the slicer check the box for **Argentina**.

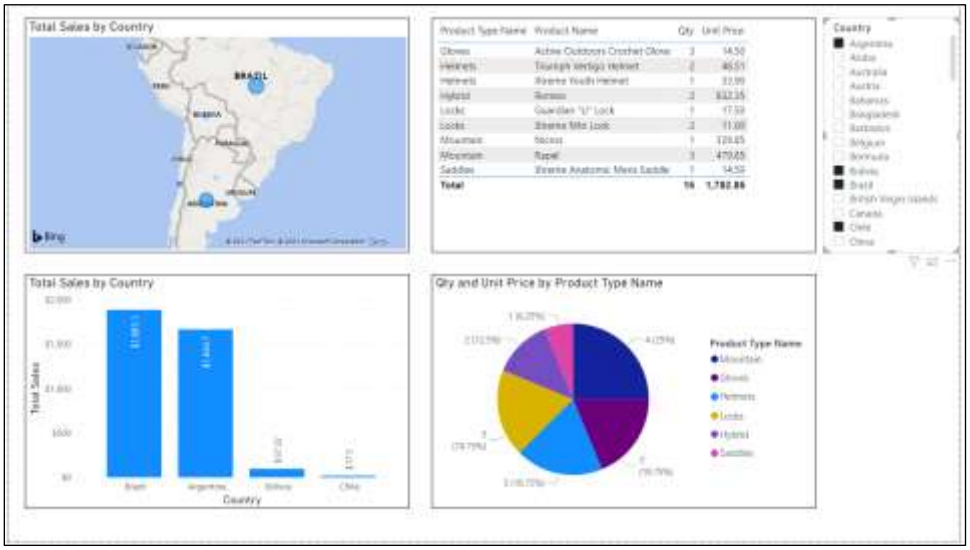
   Notice the four visualizations change to reflect data that is related to Argentina.

4. In the slicer check the box for **Brazil**.

   Notice the four visualizations change to reflect data that is related to Brazil, and the data for Argentina is no longer included.

5. While holding down the control key, in the slicer check the box for **Argentina**, **Bolivia**, and **Chile**.

   Notice the four visualizations change to reflect data that is related to Argentina, Bolivia, and Chile has been added to the data for Brazil.



6. While holding down the control key, in the slicer click the box for **Argentina**.

   Notice Argentina is removed from the four visualizations.

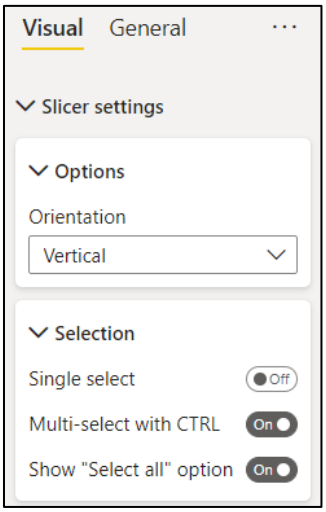
7. With the Slicer still selected, in the **visualization pane**, click the **format your visual** icon.

8. Click the expand button for the **Slicer settings**, and then the **Selection** controls.

   Notice the following options:

Single select	When single select is turned on, only one country can be selected, and all the other options disappear. When turned off the other options reappear.
Multi-select with CTRL	As you have seen when this is turned on the CTRL key can be used to add additional countries. When this is turned off, additional countries can be added / removed by checking / unchecking their box.
Show "Select all" option	When turned on the Slicer has a **Select all** option.

9. Set the following options:



10. Click the **Select all** check box in the slicer.

11. Expand the option for the **Slicer header**.

12. Change the Title text to "`Pick a country`".

Vertical List, Title, Dropdown

13. In the **slicer** settings, **options** area, **Style** dropdown choose **Title**. Then change it to **Dropdown**. Finally, change it back to **Vertical** list. Noticed the differences.

14. Click the drop down and select **Argentina** and CTRL click on **Brazil**, then click away from the drop down.

    Notice the drop down now says "Multiple selections".

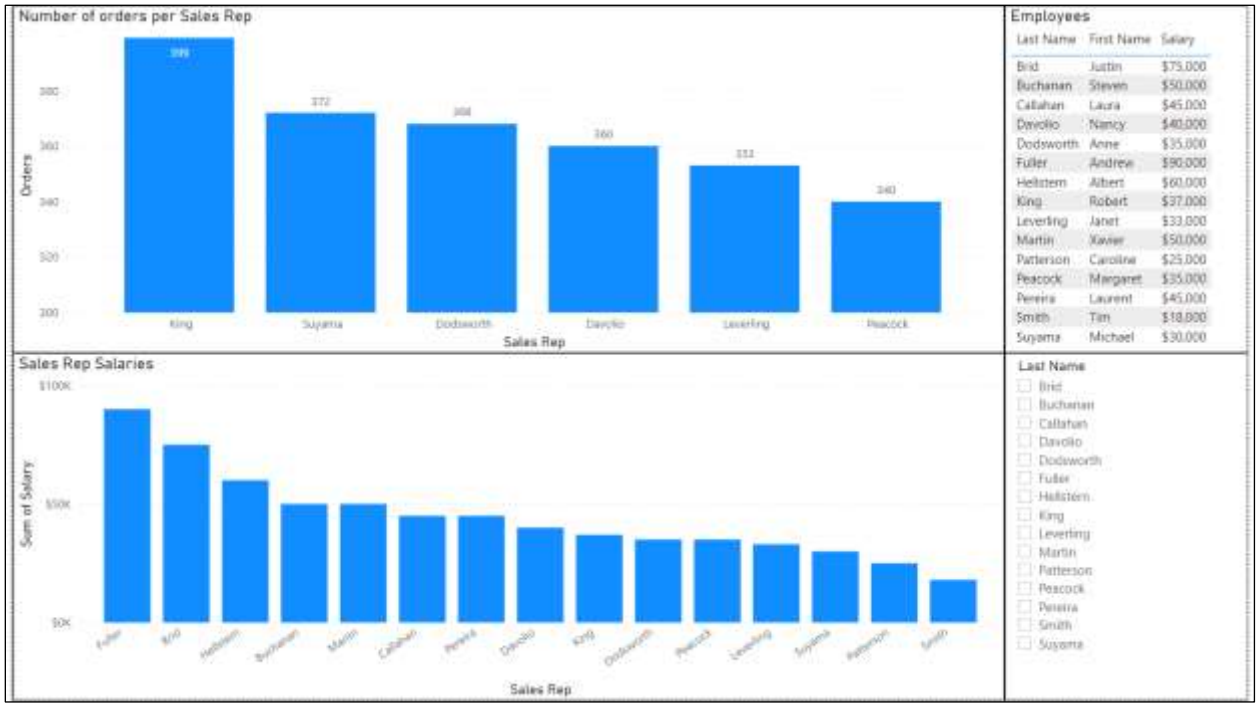
15. Practice: Change the slicer back into a list box.

16. Experiment with slicers and their format properties as time permits.

17. Save your report.

K: Practice

As time permits create a new page, name it Employee Visuals, and then create multiple visualizations based on Employees and their sales. Include at least two charts and one slicer based on Employee Last Name. Below is one example:



6. Create Dashboards

Unit time: 30 minutes

Complete this unit and you will be able to:

A. Define "Dashboard"

B. Publish a report to the Power BI Service

C. Create a dashboard

D. Share a dashboard with others

A: Define "Dashboard"

According to Microsoft's Introduction to dashboards for Power BI designer's webpage[3] a Power BI dashboard is like a single page Power BI report. That single page is often called a canvas. Dashboards are created with the Power BI service, but not with the Power BI desktop.

In the same way a Power BI report page can have multiple visualizations, a Power BI dashboard can have multiple *tiles*. The tiles are *pinned* from reports. When users select a tile in a Power BI dashboard, they are taken to the underlying report and its dataset.

The following table compares some of the differences between Power BI Dashboards and Reports:

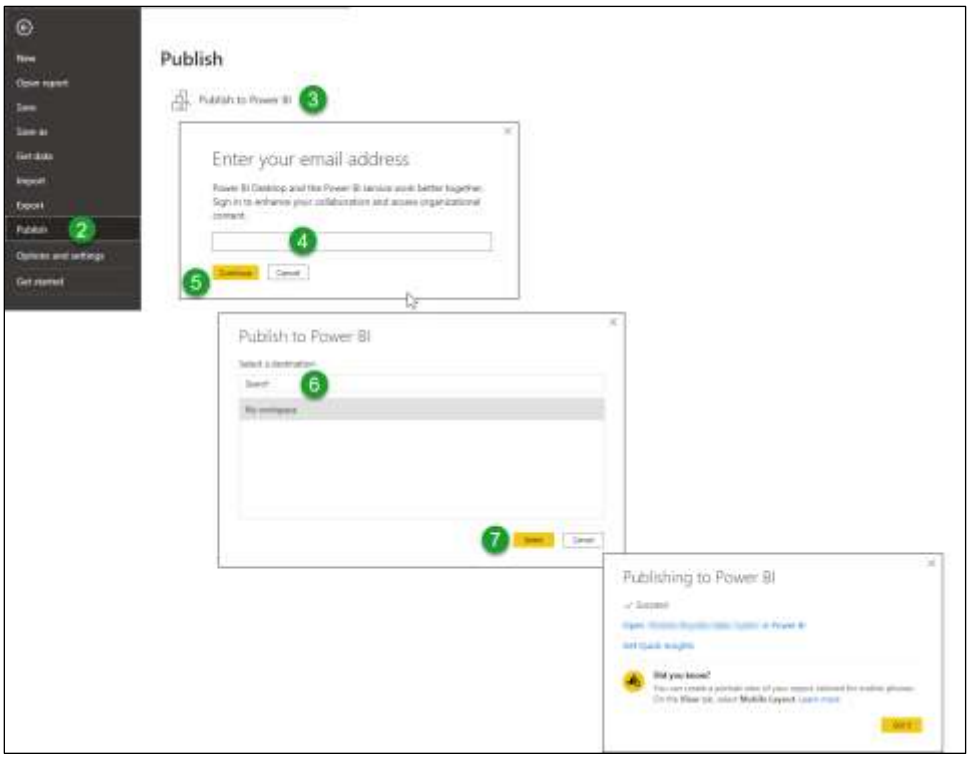
Feature	Dashboards	Reports
Pages	Only one page	One or multiple pages
Data Source	One or multiple reports	One dataset per report
Available in…	Power BI Service	Power BI Service Power BI Desktop
View underlying data set	No. Data can be exported but the tables and fields cannot be viewed in the dashboard.	Yes

[3] https://docs.microsoft.com/en-us/power-bi/create-reports/service-dashboards

B: Publish a report to the Power BI Service

You can publish your Power BI report to the Power BI Service by doing the following:

1. Open your Power BI report in Power BI desktop.
2. From the **File** menu select **Publish.**
3. Select **Publish to Power BI**.
4. **Enter your email address**.
5. Click **Continue** to sign into the Power BI service.
6. Select a destination.
7. Click **Select**.
8. Wait a moment while the report is published.



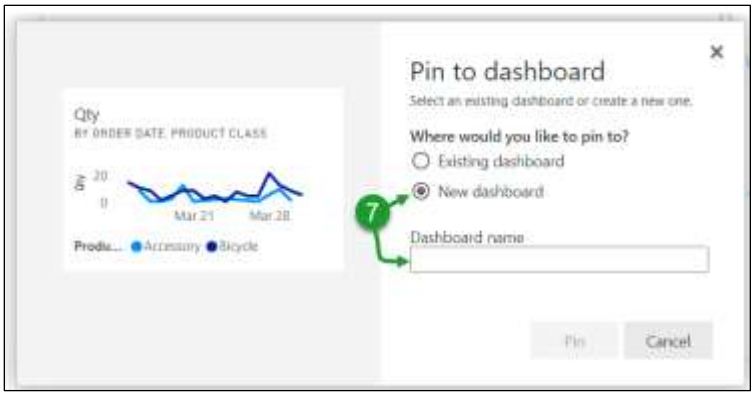
C: Create a dashboard

Power BI dashboards can be created from scratch, from a report, or by duplicating an existing dashboard. The directions below show how to create a dashboard from a report.

1. Open your browser to **app.powerbi.com**.
2. If necessary, sign in.
3. Open your report.
4. Find the visual you would like to pin to a dashboard.
5. Hover the mouse over the visual.
6. Click the pin icon toward the top or bottom right.

7. When the Pin to dashboard dialog box is displayed either choose **Existing dashboard** and the select the desired dashboard,

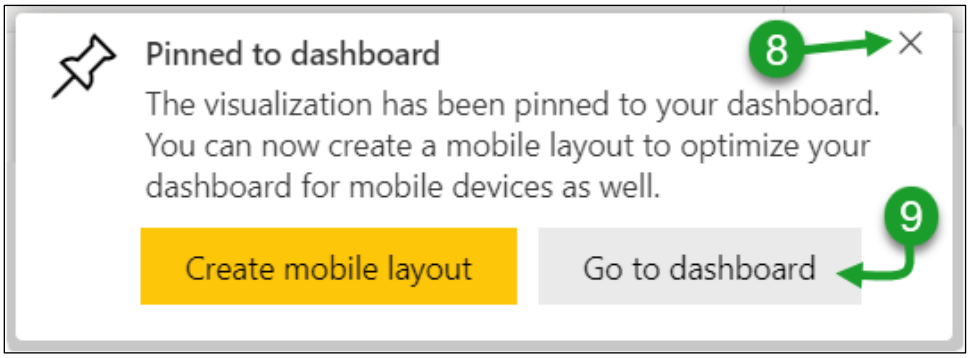
or
click **New dashboard** and enter a dashboard name.



The Pinned to dashboard dialog box appears.

8. If you want to add more tiles, click the X to close the dialog box, then repeat steps 4 through 8.

9. When you are ready to view or edit the dashboard click **Go to dashboard**.

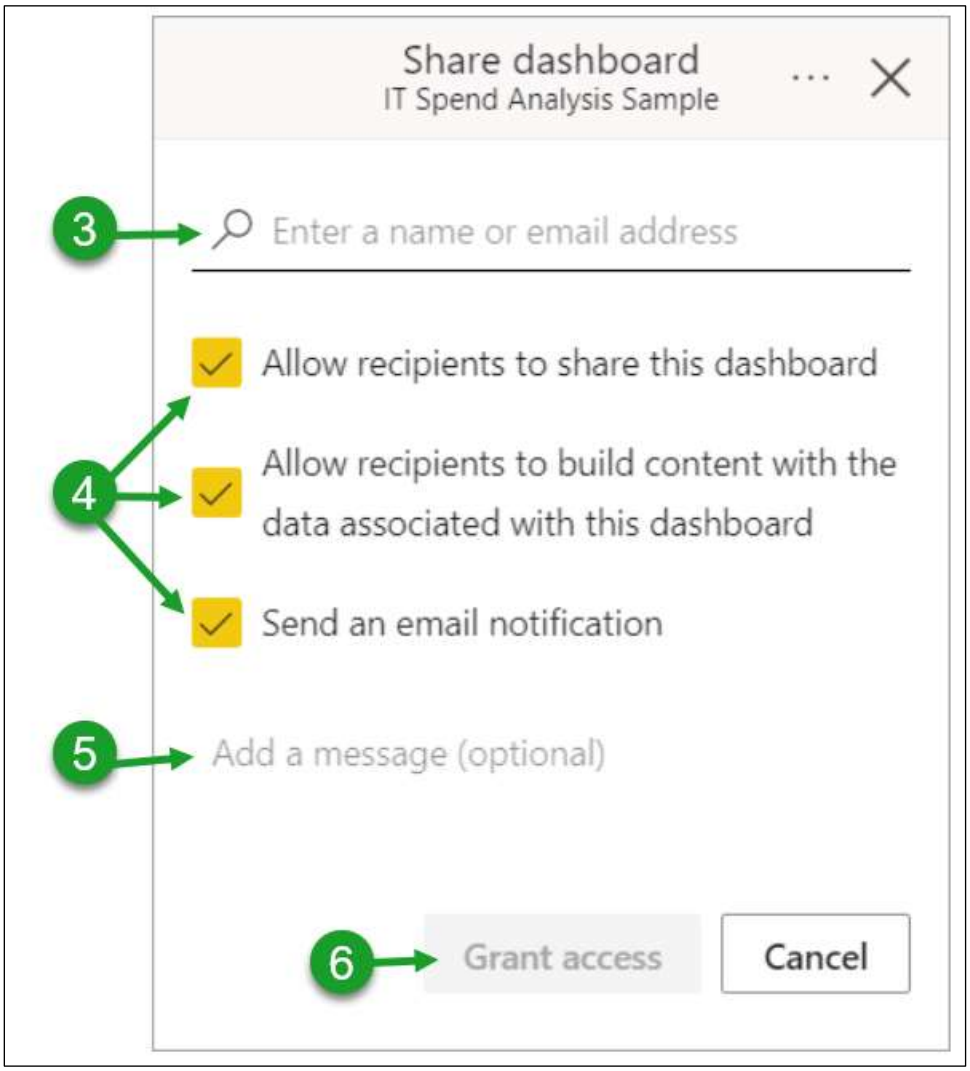


10. To learn more about editing dashboards check out https://docs.microsoft.com/en-us/power-bi/create-reports/service-dashboard-create. This Microsoft webpage explains both how to create and edit a dashboard. It also includes a short video demonstration.

D: Share a dashboard with others

If you have a Power BI Pro license you can share your dashboard with others.

1. Open your dashboard in the Power BI service.
2. Click the share button.
3. Enter the recipient's name or email address.
4. Check your desired options.
5. Optional, enter a message for the recipient.
6. Click **Grant access**.



7. Practice Lab

In this lab you will practice creating multiple visualizations including the following:

A. Bar charts, Tables and Slicers

B. Column charts

C. Line charts

D. Area charts

E. Scatter charts

F. Ribbon charts

G. Waterfall charts

H. Pies, Donuts, Treemaps and Cards

I. Funnels

J. Maps

K. Q & A

A: Bar charts, Tables and Slicers

Bar Charts

As you have seen, bar charts use horizontal bars to display data. They are excellent visualizations for comparing the value of multiple items.

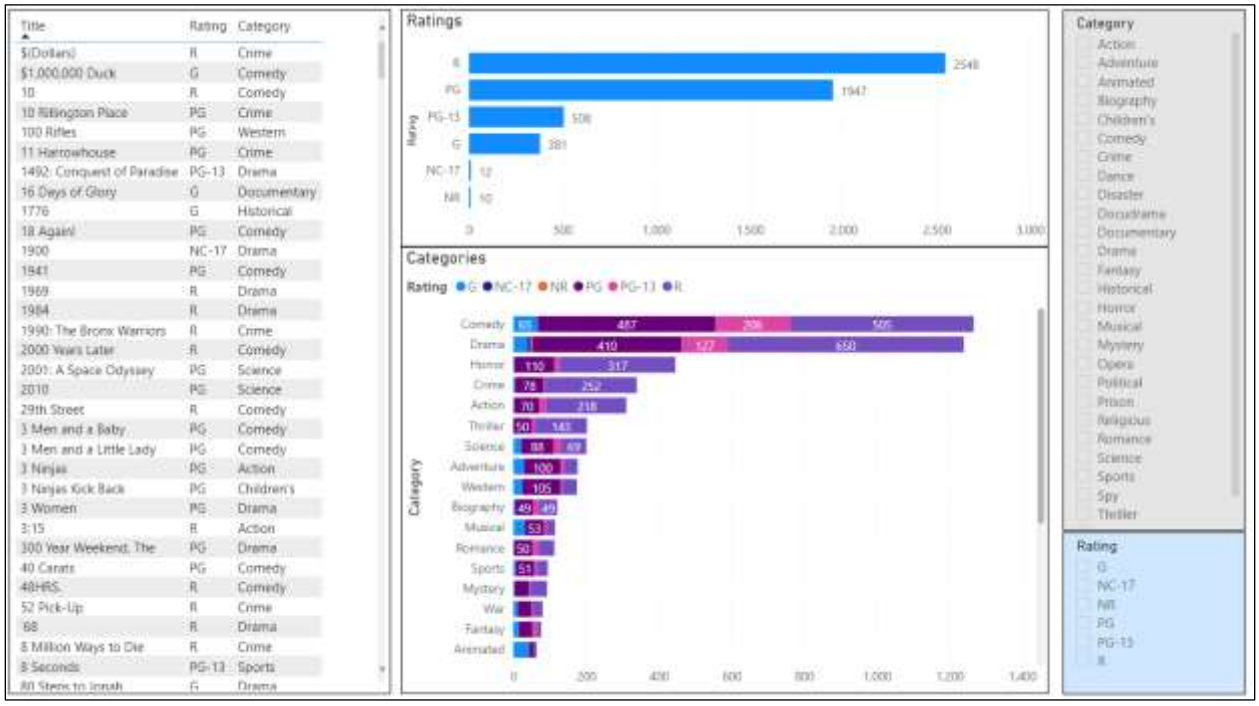
Tables

Tables are like spreadsheets – they show fields in columns, and records in rows. They are useful in communicating the actual data to a viewer.

Slicers

As discussed in chapter 5, a slicer is a filter that can be viewed and manipulated on the page.

In this exercise you will create two bar charts, a table, and two slicers like the image below.



1. Start a new Power BI report.

2. Get your data from **Movies.xlsx** file and choose the **Lots of Movies** sheet.

3. Add a **Table** visualization that shows **Title**, **Rating**, and **Category**.

4. Show the border.

5. Resize the table as desired.

6. Create a **Stacked Bar Chart.**
   Drag the **Ratings** field to the **Y-axis** well.
   Drag the **Title** field to the **X-axis** well.

7. Change the Visualization's **Title** to **Ratings**.

8. Show the **Data Labels**.

9. Change the **Data Labels**, **Values**, **Display units** to **None**.

10. Show the **X-axis** but turn the **X-axis title off**.

11. Show the border.

12. Resize the visual as desired.

13. Create another **Stacked Bar Chart**.
    Drag the **Category** field to the **Y-axis** well.
    Drag the **Title** field to the **X-axis** well.
    Drag the **Rating** field to the **Legend** well.

14. Change the Visualization's **Title** to **Categories**.

15. Show **Data Labels**.

16. Show the **X-axis**, but turn off the **X-axis title**.

17. Show the border.

18. Add a **Slicer** for the **Category** field.

19. Show the border.

20. Resize as needed.

21. Change the **background color** to **gray** with **50% transparency**.

22. Add a second **slicer** for **Ratings**.

23. Show the border.

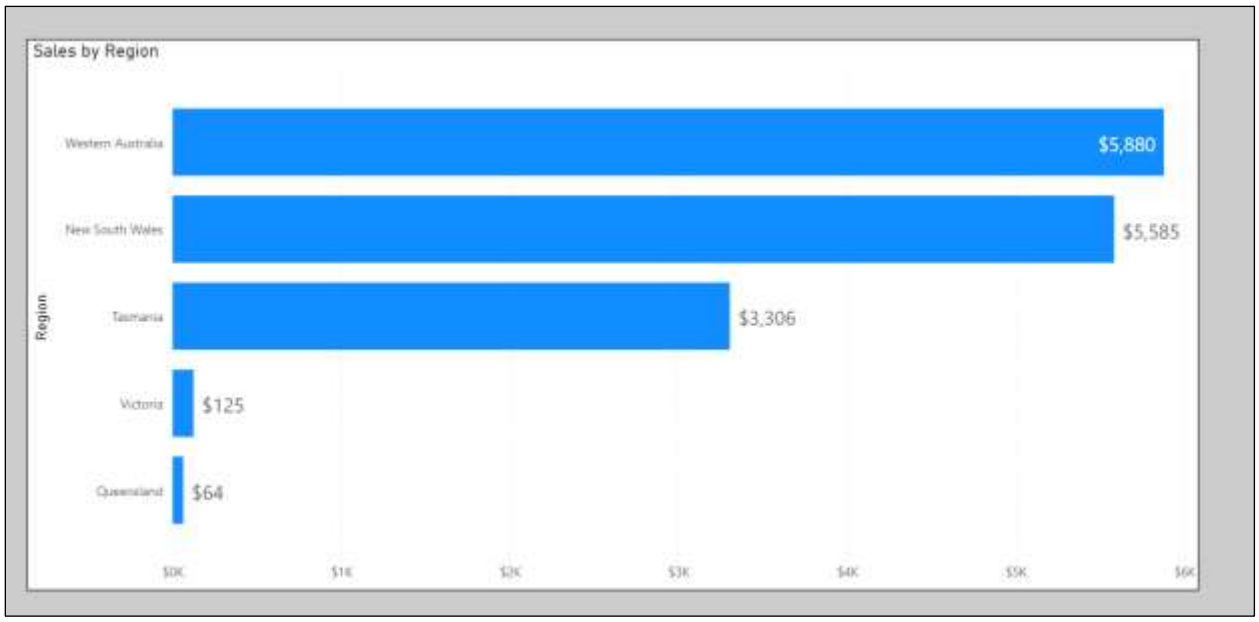
24. Change the **background color** to **light blue** with **50% transparency**.

25. Using the slicer answer the following questions:

- How many G, PG, or PG-13 rated Action movies are in the data?
- How many Historical and Prison movies are rated R?
- Which categories have the most NR rated movies?

Practice exercise: Create a Stacked bar chart

In this exercise you will create and format a simple stacked bar chart based on the Xtreme report file. When finished, the report should look something like this.



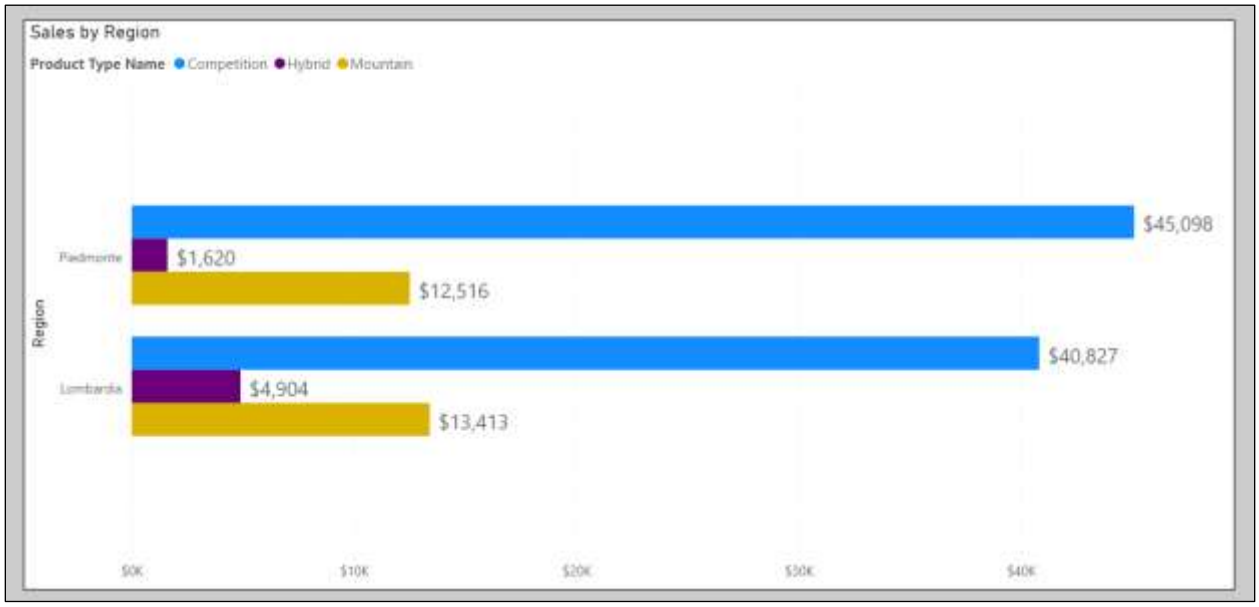
Set the properties as shown below.

Property	Value
Visualization	Stacked Bar Chart
Y-Axis	'Customer' [Region]
Y-axis	On
X-Axis	Extended Price
X-axis	On
Legend	*None*
Filter Field	'Customer' [Country]
Filter Values	Australia
Border	On

Property	Value
Title	On
Title Text	Sales by Region
Data Labels	On
Data Labels > Values > Display Units	None
Data Labels > Values > Decimal places	0
Canvas background >Color	Gray, 50% Transparency
Visual's Background Color	White
Bar Colors	Blue
Page Name	Sales in Australia

Practice exercise: Create a Clustered bar chart

In this exercise you will create and format a simple **Clustered bar chart** based on the Xtreme report file. When finished, the report should look something like this.



Set the properties as shown below.

Property	Value
Visualization	Clustered Bar Chart
Y-Axis	'Customer' [Region]
Y-axis	On
X-Axis	'All Sales Items' [Extended Price]
X-axis	On
Legend	'Product' [Product Type Name]
Legend	On
Filter Field	'Customer' [Country]
Filter Values	Italy
Filter Field	Product Type Name
Filter Values	Competition, Hybrid, Mountain

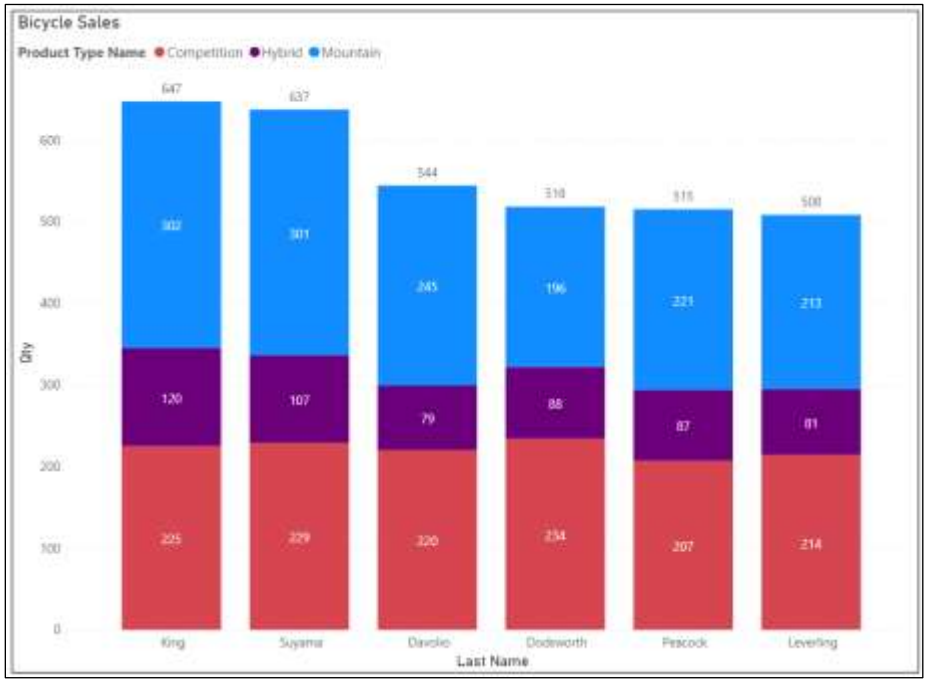
Property	Value
Title	On
Title Text	Sales by Region
Data Labels	On
Data Labels > Values > Display Units	None
Data Labels > Values > Decimal places	0
Visual's Background Color	White
Border	On
Page Name	Sales in Italy
Canvas Background > Color	Gray, 50% Transparency

B: Column charts

Column charts are like bar charts, except the bars are vertical instead of horizontal.

Stacked column chart

In this exercise you will create and format a simple **Stacked column chart** based on the **Xtreme** report file. When finished, the report should look something like this.



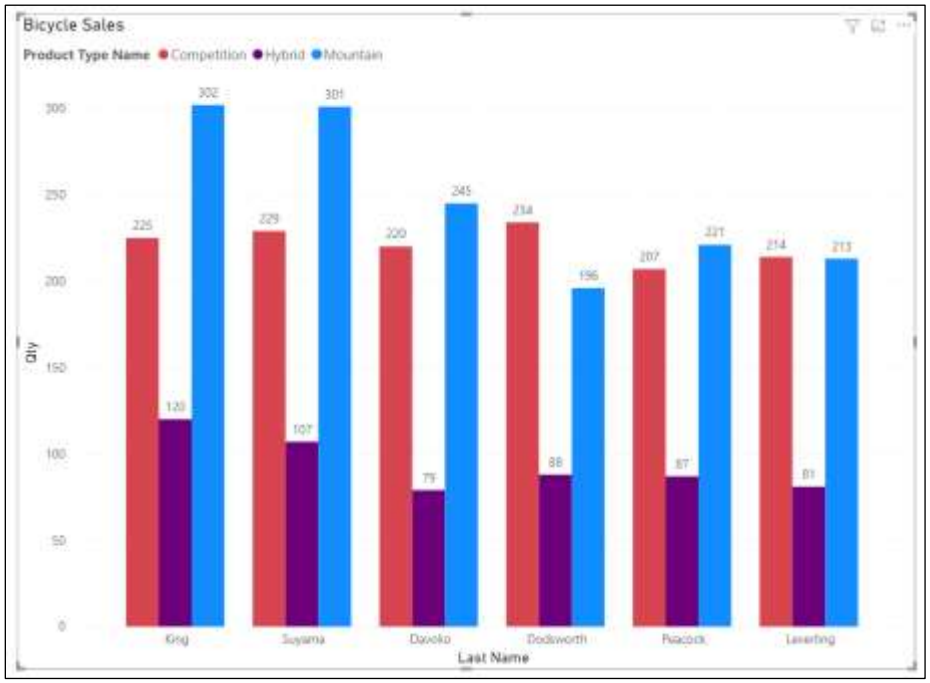
Set the properties as shown below.

Property	Value
Visualization	Stacked Column Chart
Y-axis	'All Sales Items' [Qty]
Y-axis	On
X-axis	'Employee' [Last Name]
X-axis	On
Legend	'Product' [Product Type Name]
Legend	On

Property	Value
Title	On
Title Text	Bicycle Sales
Data Labels	On
Total Labels	On
Filter Field	Product Type Name
Filter Values	Competition, Hybrid, Mountain
Columns > Colors	Competition = Red Hybrid = Purple Mountain = Blue

Clustered column chart

In this exercise you will create and format a simple **Clustered column chart** based on the **Xtreme** report file. When finished, the report should look something like this.



Duplicate the Stacked Column Chart.

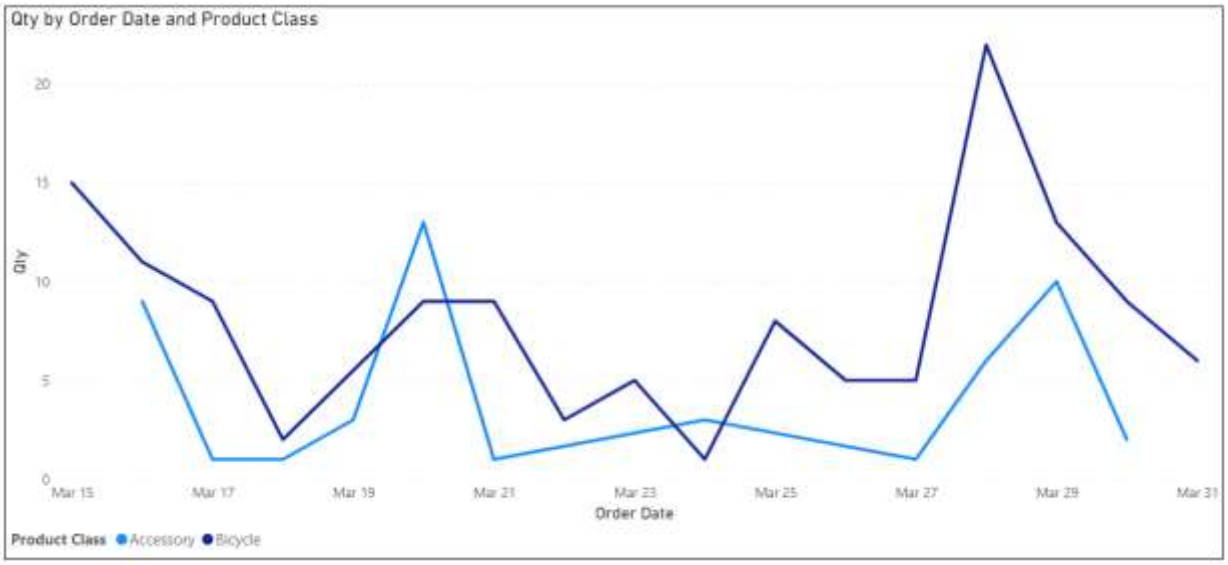
Change the copied chart to a Clustered Column Chart.

Resize and reposition the charts as desired.

Rename the page to "**Column Charts**".

C: Line charts

Line charts show the overall shape of a series of values. They most often have an X-axis based on time. In this exercise you will create and format a simple **Line chart** based on the **Xtreme** report file. When finished, the report should look something like this.



1. If necessary, open the **Xtreme Bicycles Sales** report.

2. Add a new page. Name the page **Line Chart**.

3. Add a Line chart visualization.
   Drag the **'Orders' [Order Date]** to the **X-axis** well.
   Drag the **'All Sales Items' [Qty]** to the **Y-axis** well.
   Drag the **'Product' [Product Class]** to the **Legend** well.

4. Click the **X-axis**, **Order Date** down arrow and choose **Order Date** instead of **Date Hierarchy**.

5. Click the **Format** icon and turn the **Legend on**.

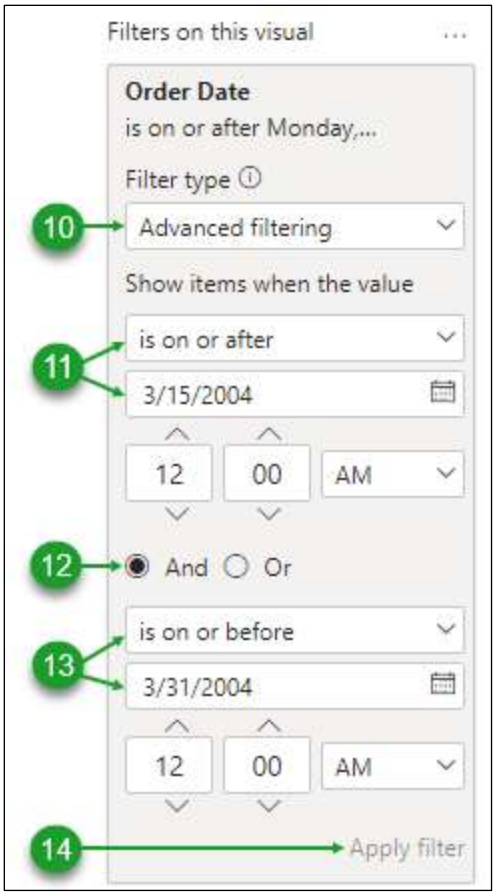
6. Expand the **Legend** property and set the **Position** to **Bottom Left**.

7. If necessary, **turn off** the **Data labels**.

8. **Expand** the **Filter pane**.

9. **Expand** the **Filters on this visual**, **Order date** area.

10. Change the **Filter type** to **Advanced Filtering**.



11. For the **Show items when the value** drop-down choose **is on or after** and then enter **3/15/2004**.

12. Select the **And** option.

13. For the next drop down choose **is on or before** and then enter **3/31/2004**.

14. Click the **Apply filter** button.

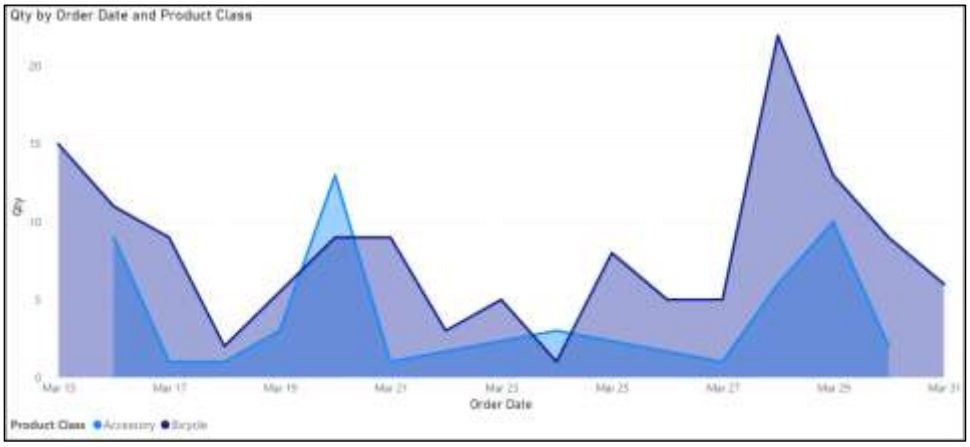
D: Area charts

Area charts are line charts with the area between the line and the axis filled in with color. This helps emphasize the magnitude of change over time.

Area chart

In this exercise you will create an Area based on the line chart from the previous exercise.

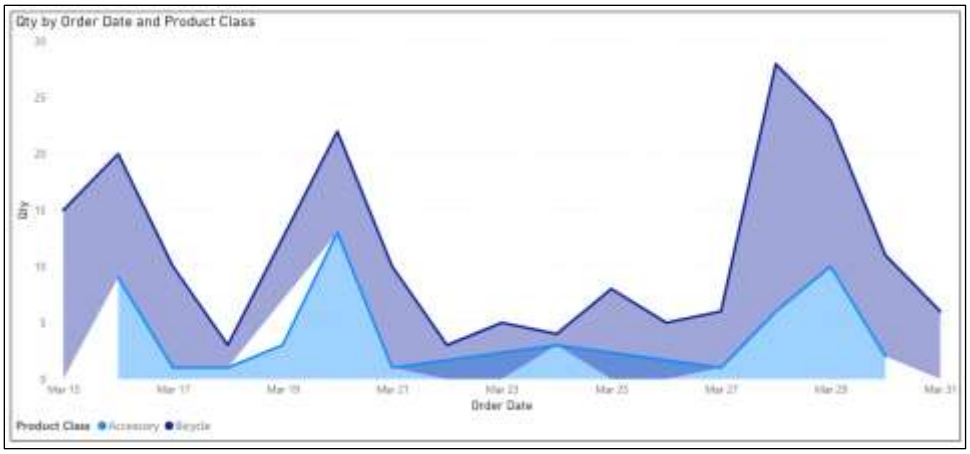
1. Make sure you are in the Xtreme report file from the last exercise.
2. Right click on the page that has the line chart and choose Duplicate Page.
3. Rename the page to **Area Chart**.
4. Select the line chart visualization and then click on the **Area chart** icon.



5. Format the Area chart as desired.

Stacked Area Chart

1. Duplicate the page with the area chart.
2. Rename the page to **Stacked area chart**.
3. Select the area chart and change it to a **Stacked area chart**.

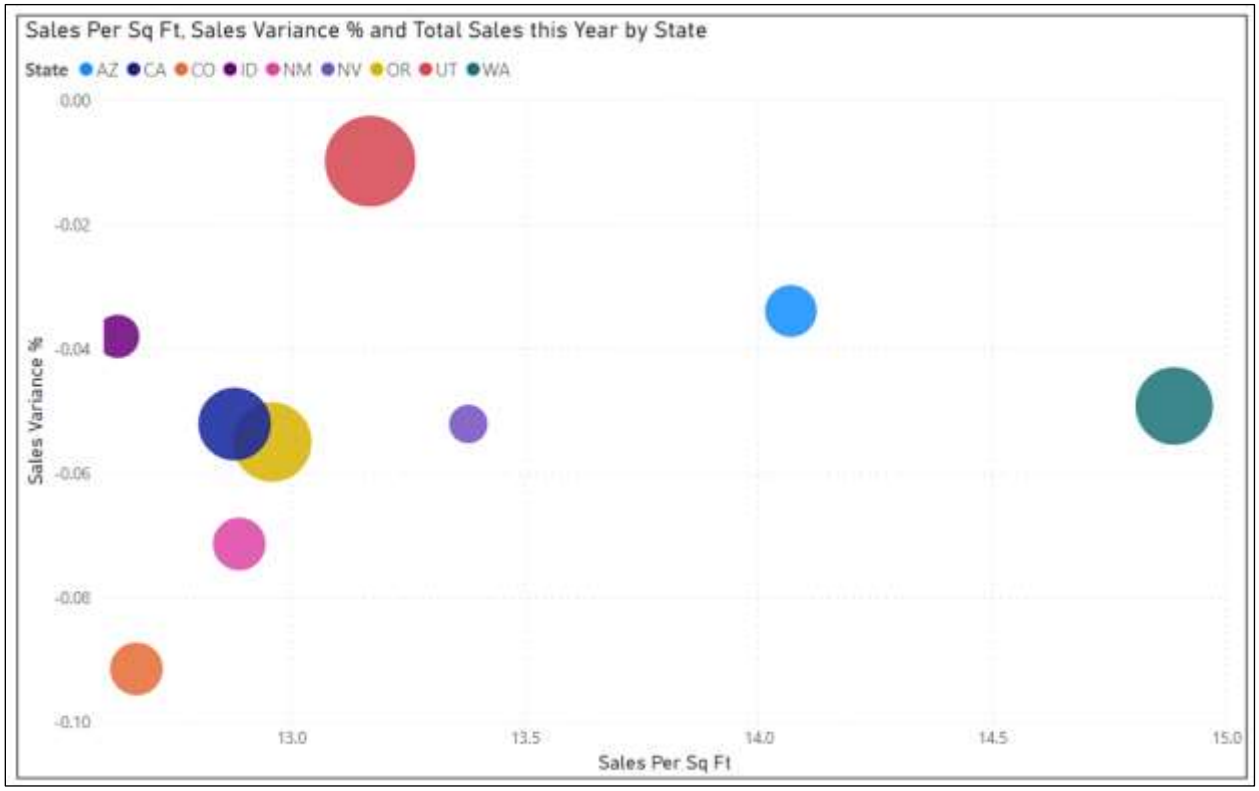


Notice the Stacked area chart is taller than the Area chart. Each successive (upper) line represents a cumulative total.

4. Format the Stacked area chart as desired.

E: Scatter charts

A scatter chart, also known as a bubble chart, is an excellent visualization for seeing the relationship between three numeric dimensions. The X-axis provides one dimension, the Y-axis provides the second, and the size of the bubble is the third dimension. In this exercise you will create a scatter chart similar to the one below.



1. Create a new Power Bi report based on the **Bubble Chart Data.xlsx** file.

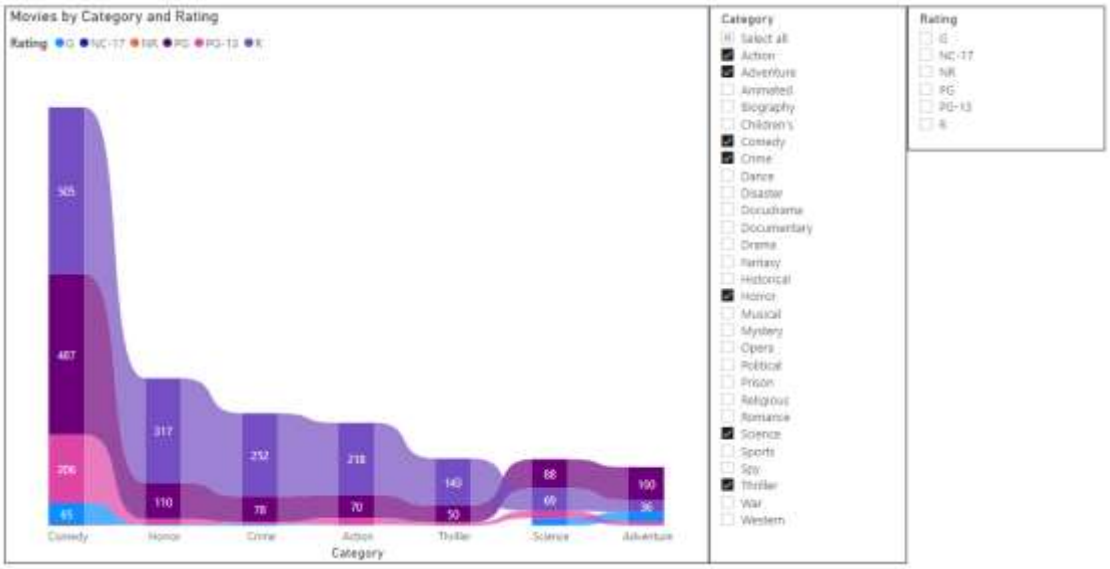
2. Add a Scatter Chart visualization.
   Drag the **State** field to the **Legend** well.
   Drag the **Sales Per Sq Ft** to the **X-axis**.
   Drag the **Sales Variance %** to the **Y-axis** well.
   Drag the **Total Sales this Year** to the **Size** well.

3. Hover the mouse over a bubble to reveal its tool tip.

4. Format the chart as desired.

F: Ribbon charts

Ribbon charts help viewers visualize data to quickly discover which category has the largest value, and to see changes in rank. In this exercise you will create a ribbon chart showing the number of movies per category and rating.



1. Start a new Power BI report.

2. Get your data from **Movies.xlsx** file and choose the **Lots of Movies** sheet.

3. Add a ribbon visualization.
   Drag the **Category** field to the **X-axis** well.
   Drag the **Title** field to the **Y-axis** well.
   Drag the **Rating** field to the **Legend** well.

4. Turn on the **Data labels**.

5. **Expand** the **Data labels** property and in the **Values** section turn the **Overflow text** option **On**.

6. Add a meaningful **Title**.

7. Format the **Ribbons**, **Colors** as follows:

G	Green
PG	Yellow
PG13	Orange

R	Red
NC-17	Black
NR	Light blue

8. Add a **Slicer** for **Category**.

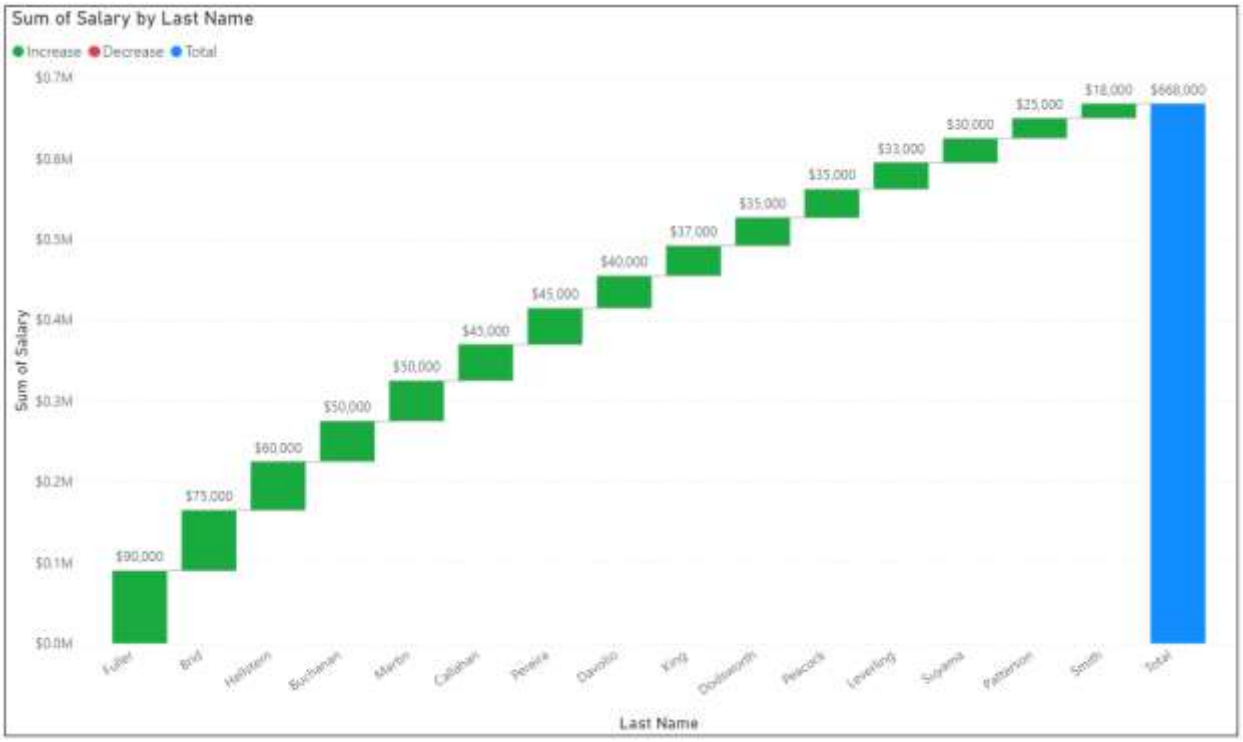
9. Add a second **Slicer** for **Rating**.

10. Format the slicers and ribbon chart as desired.

11. As time permits, experiment with selecting categories and ratings to see their effect on the chart.

G: Waterfall charts

Waterfall charts are excellent for viewing a running total because one can see how each piece adds to the total. In this exercise you will create a waterfall chart for employee salaries.



1. If necessary, open your Xtreme Bicycles Sales report.

2. Add a Waterfall chart visualization to a new page.
   Drag the **Employee > Last Name** field to the **Category** well.
   Drag the **Employee > Salary** field to the **Y-axis** well.

3. **Expand** the **Y-axis** well and **change** the **calculation** to **Sum** instead of Count.

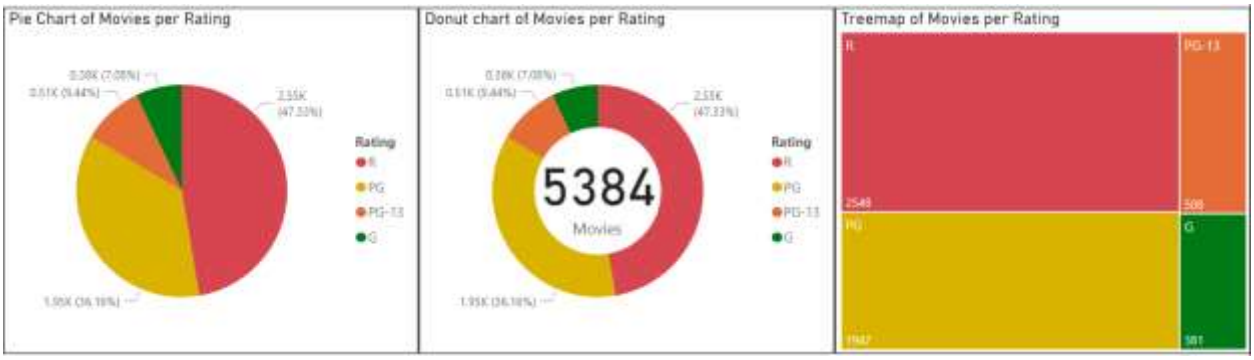
4. Turn on the **Data labels**.

5. Expand the **Data labels** and change the **Value Display units** to **None**.

6. Format the chart as desired.

H: Pies, Donuts, Treemaps and Cards

Pie charts, Donut charts, and Treemaps are good visuals for comparing data between different groups. In this exercise you will create a pie chart of movies per rating. You will add a page filter to limit the list to G, PG, PG-13, and R rated movies. You will then duplicate the pie to create a donut chart and then a treemap. Finally, you will create a Card visualization which you will place in the donut chart.



Create the pie chart

1. Create a new Power BI report based on **Movies.xlsx**.

2. Add a Pie Chart visualization.
   Drag the **Rating** field to the **Legend** well.
   Drag the **Title** field to the **Values** well.

3. Expand the Filters pane.

4. From the Fields pane, **drag** the **Rating** field into the **Filters on this page** section of the Filters pane.

5. For the rating filter, choose the **G**, **PG**, **PG-13**, and **R** ratings.

6. In the Visualizations pane, click the format icon, and then expand the Data colors section.

7. Change the Slices, Colors as shown below:

G	Green
PG	Yellow
PG-13	Orange
R	Red

Create the Donut chart

1. **Duplicate** the **Pie chart** visualization and move it to the right.
2. Change the new chart to a **Donut chart**.

Create the Treemap

1. **Duplicate** the **Pie chart** visualization again.
2. Move it to the right of the other two charts.
3. Change the new chart to a **Treemap**.
4. **Turn on** the **Data labels** for the **Treemap**.
5. If necessary, **expand** the **Data labels** property and change the **Display units** to **None**.

Create a Card visualization

1. On the same page, add a **Card** visualization.
   Drag the **Title** field into the **Fields** well.
2. Click the fields well drop down and choose **Count**.
3. Click the fields well drop down again and choose **Rename for this visual**.
   Enter **`Movies`**.
4. **Turn off** the **background** for the Card visual.
5. **Resize** and **move** the Card visual so it is in the center of the Donut chart.
6. Format the visualizations as desired.

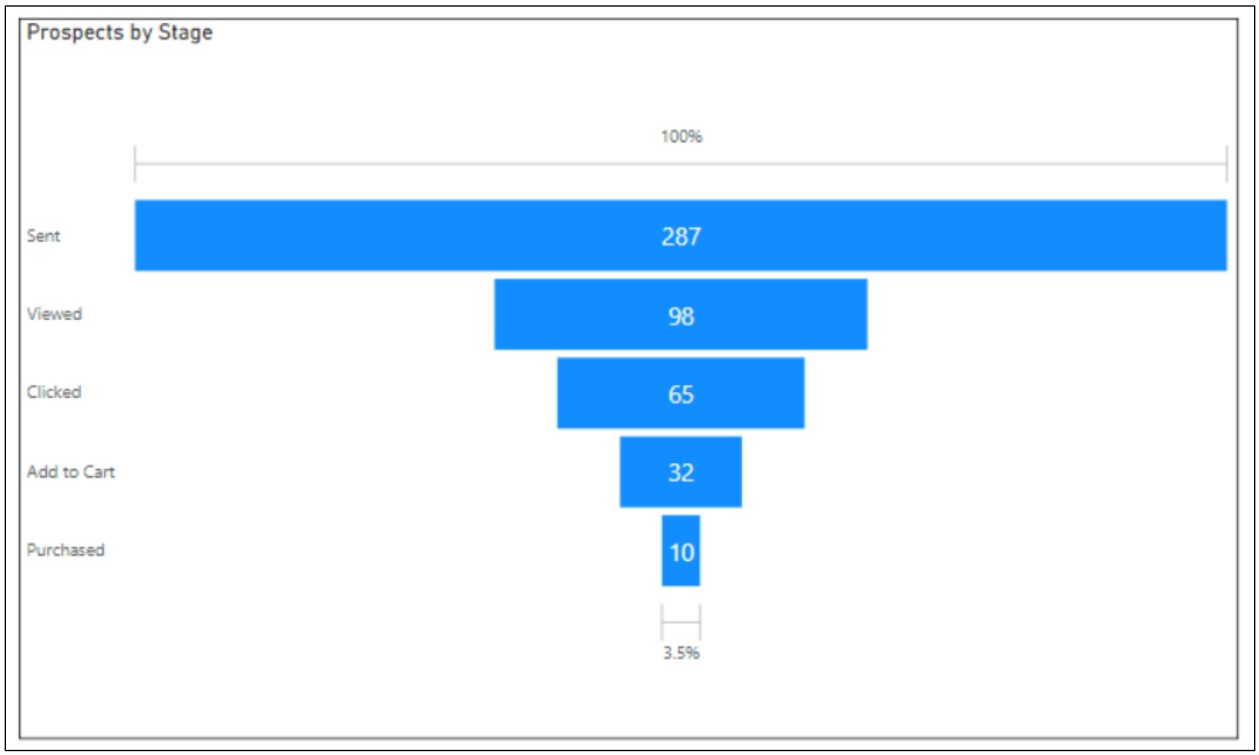
Group the Card and Donut visuals

Because the Card and Donut visuals overlap, they appear to be one chart. However, if you move one, the other will not move with it. To fix that you will group the two charts.

1. Select the **Card** visual then using the control key click on the Donut chart.
2. From the ribbon's **Format** menu, click **Group**.

I: Funnels

A funnel chart displays a linear process. For example, in this exercise you will create a funnel chart that shows the results of an email campaign. You will see many emails were sent, less were viewed, some were clicked the email's call to action button, less added the product to their cart, and finally it shows how many completed their purchase.



1. Start a new Power BI report.

2. Get your data from **Email Campaign.xlsx** file.

3. Add a **Funnel** visualization.
   Drag the **Stage** field to the **Category** well.
   Drag the **Prospects** field to the **Values** well.

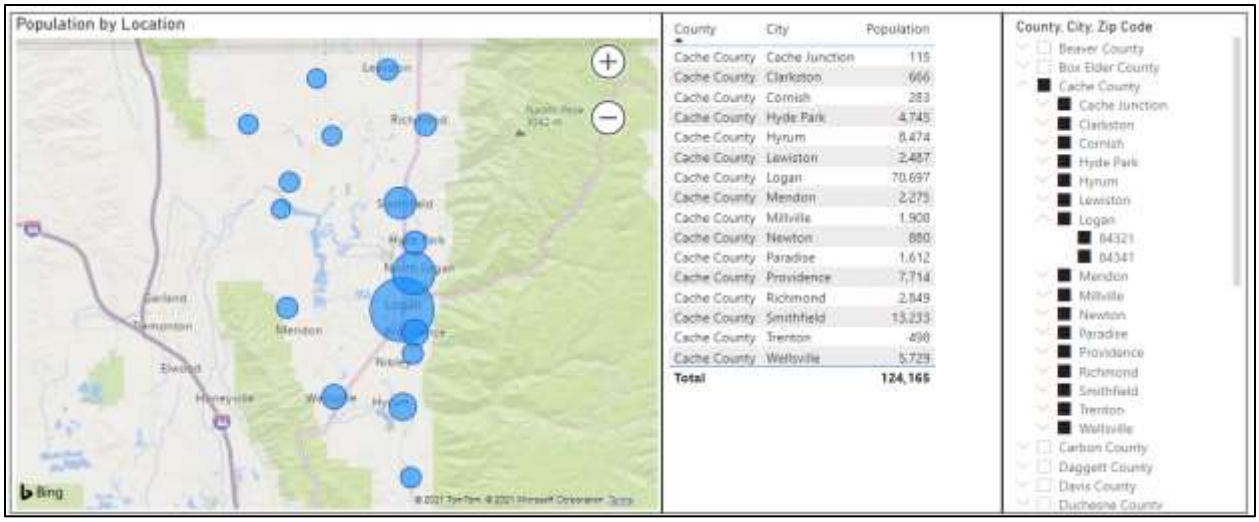
4. Format the chart as desired.

J: Maps

Two Power BI visualizations make maps. The first, called Map, creates a bubble map. The second, called Filled Map, fills in various geographic areas with color. In the next two exercises you will create both types of maps.

Bubble Map

In this exercise you will create a new report that maps the population in the state of Utah. The report will include three visualizations: a Map, a Table, and a Slicer.



1. Start a new Power BI report.

2. Get your data from the https://worldpopulationreview.com/zips/utah webpage. If you have any issues you can also get the data from the **Utah Population by Zip Code.csv** file.

3. Choose **Table 1** and click **Load**.

4. Switch to **Data** view.

5. Rename **Table 1** to **Utah Population by Zip Code**.

6. Select the **Zip Code** column, then from the ribbon set the **Column tools**, **Properties**, **Data Category** to **Postal Code**.

7. Select the **City** column, then from the ribbon set the **Column tools**, **Properties**, **Data Category** to **City**.

8. Select the **County** column, then from the ribbon set the **Column tools**, **Properties**, **Data Category** to **County**.

9. Create a new calculated column named Location with the following formula:
```
Location = [City] & ", " & [County] & ", UT, USA, " & [Zip Code]
```

10. Select the **Location** column, then from the ribbon set the **Column tools**, **Properties**, **Data Category** to **Place**.

11. Select the **Population** column, then from the ribbon set the **Column tools**, **Formatting**, and click the **Comma** icon.

12. Return to the **Report** view.

13. Add a **Map** visualization.
Drop the **Location** field in the **Location** well.
Drop the **Population** field in the **Bubble size** well.

14. Add a **Table** visualization.
Add the **County**, **City**, and **Population** fields to the table.

15. Add a **Slicer** visualization.
Add the **County**, **City**, and **Zip Code** fields to the slicer.

16. In the slicer, check the **Cache County** check box.

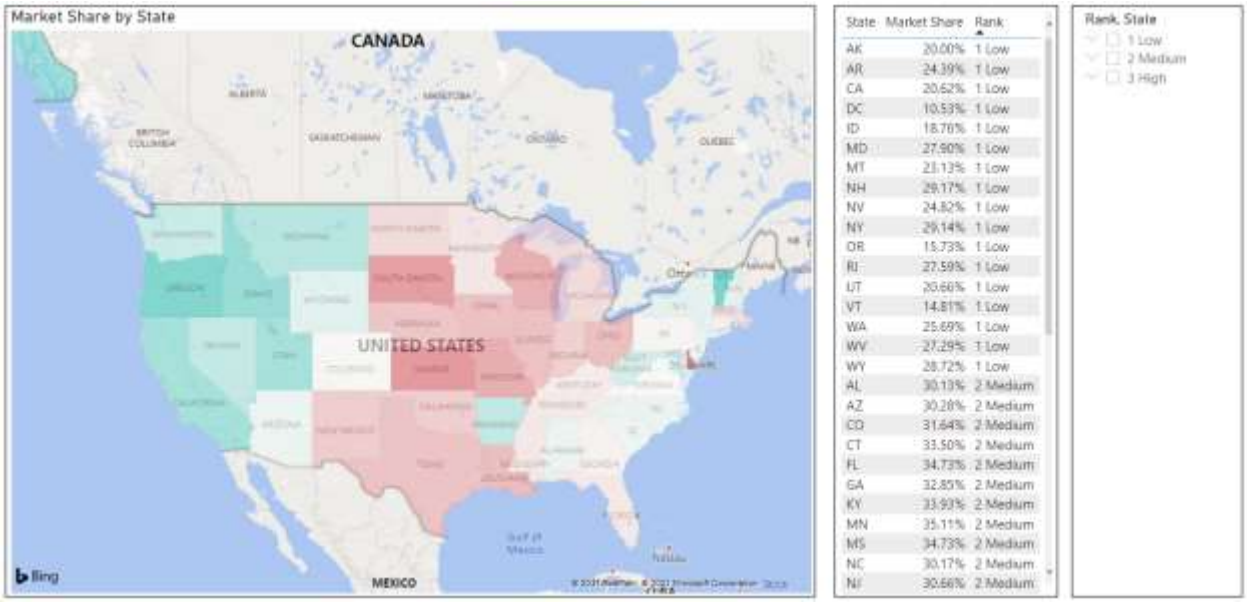
17. Zoom in on the map as desired.

18. Format the visuals to your liking as time permits.

19. Save the file as **Utah Population Map.pbix**.

Filled Map

In this exercise you will create a new report that maps a company's market share per state. The report will include three visualizations: a Filled Map, a Table, and a Slicer.



1. Start a new Power BI report.

2. Get your data from **Pct Units Market Share by State.xlsx** file.

3. In the **Data view** rename **Sheet1** to **Pct Market Share per State**.

4. Select the **State** field, and then using the ribbon's **Column tools** tab, change the **Data Category** to **State or Province**.

5. Select the **Market Share** field and then using the ribbon's **Column tools** tab set the format to **Percentage** and set the decimal places to 2.

6. Return to the **Report view**.

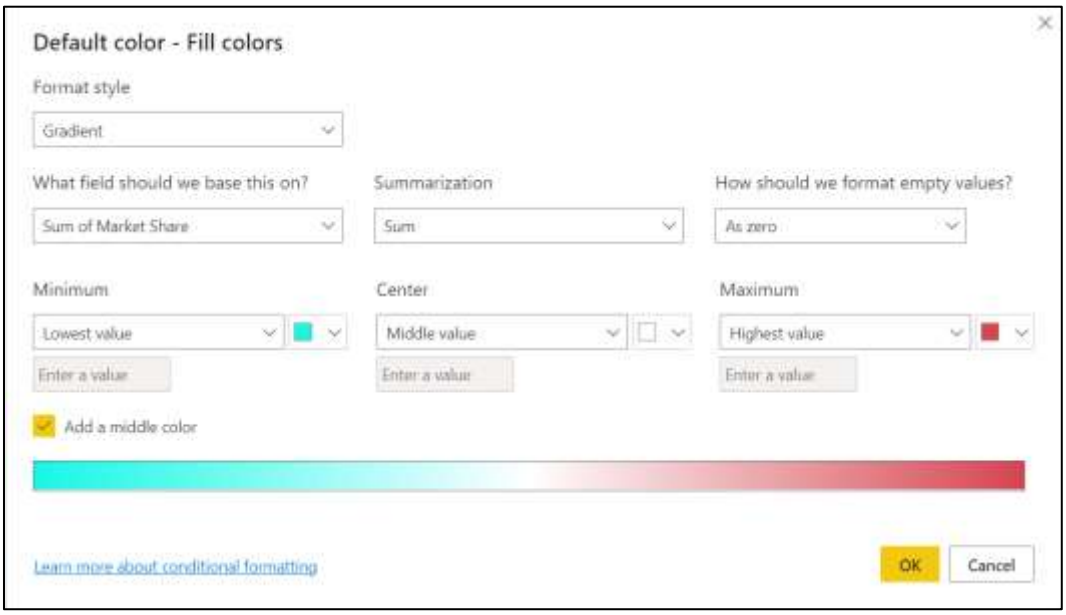
7. Add **Filled Map** visualization.
   Drop the **State** field in the **Location** well.
   Drop the **Market Share** in the **Tooltips** well.
   Resize the visualization as desired.

8. Click the **format** icon and expand the **Fill colors** property.

9. Click the *fx* button.

   The Default color – Data colors dialog box appears.

10. Set the various properties based on the screen shot and table below, then click **OK**.



Property	Setting
Format style	Gradient
What field should we base this on?	Sum of Market Share
Summarization	Sum
How should we format empty values?	As zero
Minimum	Lowest value
Minimum color	Aqua Green
Add a middle color	Checked
Center	Middle value
Center color	White
Maximum	Highest value
Maximum color	Red

11. Add a **Table** visualization with the **State**, **Market Share** and **Rank** fields.

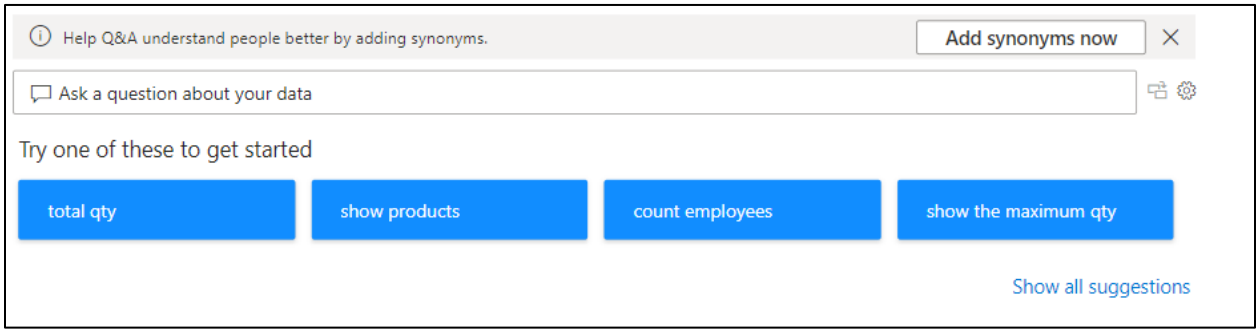
12. In the table visualization, **click** the **Rank** column heading to sort the table by Rank.

13. Add a Slicer with **Rank** and **Market Share** fields.

14. Format the report and visualizations per your preferences as time permits.

K: Q&A

The Q&A Visualization allows users to either ask a question or choose one of multiple suggested questions. Power BI will then instantly create a visualization that answers the question.



In this exercise you will create a new page and add a Q&A Visualization to it.

1. **Open** the **Xtreme Bicycle Sales** report from earlier.

2. Add a **new page** to your report.

3. Add the **Q&A** visualization to the new page.

4. Resize the visualization as desired.

5. Notice the text box that says, `Ask a question about your data`.
   As the prompt says in this box you can type a question about your data.

6. Notice the blue boxes which represent standard questions the computer can answer.

7. Click the **Show all suggestions** link.

   Notice additional "questions" are displayed in boxes.

8. **Click** on one of the boxes.
   Notice the "answer" that Power BI generates in the Q&A visualization.
   Notice also the earlier "`Ask a question`" text box has been filled in with the text of the question.

9. Click inside the text box, and then click the x to delete the question.

10. Enter the following question and press enter.
    `How many employees have an extended price?`

11. Change the question to the following and press enter.
    `Which employees have an extended price?`

    Notice a table visual is created to answer the question.

12. Change the question to the following and press enter.
    `Extended Price in USA by product name as a tree`

    Notice Power BI creates a treemap of sales per product name in the United States.

    Notice some of the terms are underlined in blue. You can click on these to find possible replacement options.

    Notice any term underlined in red is not understood by Power BI.

13. Click the "Turn this Q&A result into a standard visual" button.
    Notice the Q&A has been replaced with the visualization.

Appendix A: Installing Power BI Desktop

The following instructions show you how to install Microsoft Power BI Desktop on a Windows PC. Because Microsoft Power BI may connect to a data source related to Microsoft Office, it is important that the correct version be selected. For example, if your PC uses a 32-bit version of Microsoft Access, then installing the 64-bit version of Microsoft Power BI Desktop may cause problems. Therefore, these instructions first show how to check which version of Microsoft Office is installed.

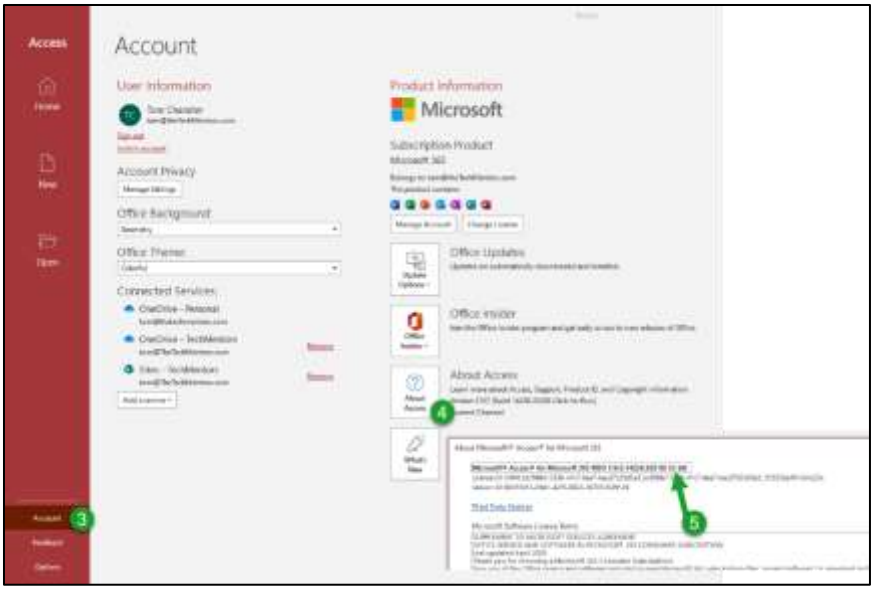
1. If **Microsoft Access** is installed, open it. If not, open Microsoft **Excel** instead.

2. If the ribbon is displayed, click on the **File** menu.

3. From the menu on the left, select **Account**.

4. Click the **About Access** button.

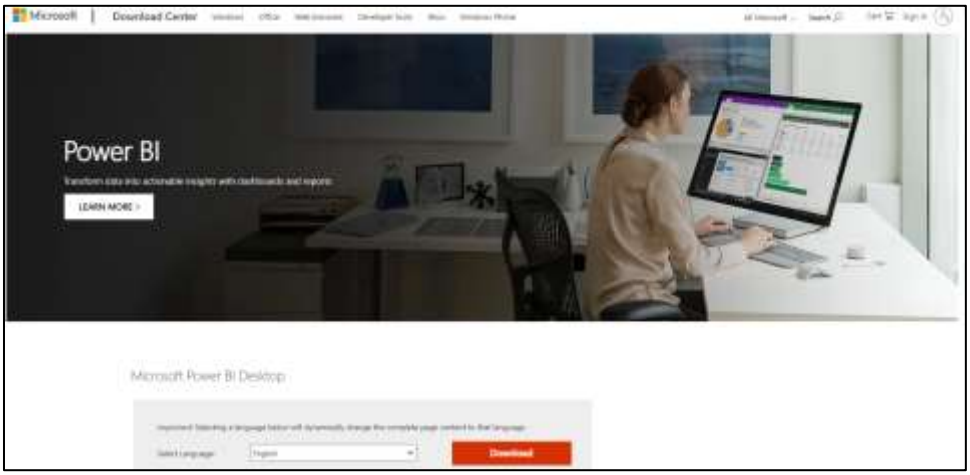
5. Note if the version is 32-bit or 64-bit.



6. Click **OK**, then close Microsoft Access.

7. Open your browser and go to the following web address.
https://www.microsoft.com/en-us/download/details.aspx?id=58494

8. Verify the selected language is **English** and then click the red **Download** button.



9. If your version of Office is 64-bit then check the **PBIDesktopSetup_x64.exe**.
If your version of Office is 32-bit then check the **PBIDesktopSetup.exe**.
Then click **Next**.

Wait while the setup application file is downloaded.

10. Launch the setup program by clicking on it, then follow the prompts.

Appendix B: Additional Resources

Getting Started with Power BI
https://docs.microsoft.com/en-us/power-bi/fundamentals/desktop-getting-started

Get Power BI Desktop
https://docs.microsoft.com/en-us/power-bi/fundamentals/desktop-get-the-desktop