

Microsoft POWER BI



Microsoft
POWER BI

A large, abstract graphic element occupies the right half of the page. It consists of two overlapping curved shapes: a thick, light orange curve on top and a darker navy blue curve underneath, creating a dynamic, swooping effect.

Installation Guide

Installation for Windows

Step 1:	Go to download link: https://powerbi.microsoft.com/
Step 2:	<p>Click on Products → PowerBI Desktop</p> 
Step 3:	<p>Click on Download Free</p> 
Step 4:	<p>You will be redirected to the Windows Store, click on Install</p> 

Microsoft
POWER BI



Overview

Course Synopsis

- Lesson 1** Introduction to Power BI, Connecting to Sources, Basic Visuals
- Lesson 2** Data Modelling and Data Transformation with Power Query Editor
- Lesson 3** Data Analysis with DAX Features and Creating Themed Page
- Lesson 4** Actions, Advanced Features and Dashboard Creation Tips
- Assessment** Take home projects

Microsoft
POWER BI

Lesson 1



What is Power BI?

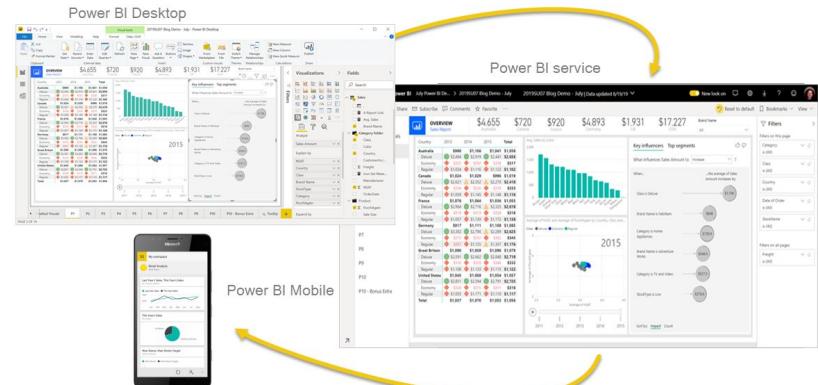
According to Microsoft, Power BI is

- A business intelligence platform
- Combines an intuitive user experience with analytics
- Discover insights with data and AI



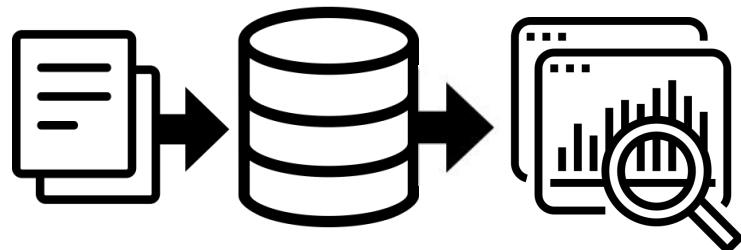
We will be using it to

- Work with data
- Create visuals
- Collaborate and share data for anybody (individuals/teams)



Why Power BI?

- **Data Preparation**
 - Data coming from different sources
 - Not properly formatted
(wrong format, redundant columns or data)
- **In-depth Data Analysis**
 - Calculations
(averages, date difference or other advanced calculations)
- **Visualisation**
 - Having your data show actionable insights



Power BI vs Excel

Although they overlap, the purpose for each tool are different!

Excel



Quick Calculations



Reports in Tabular Format



Single Tool Only

Power BI



Big Data

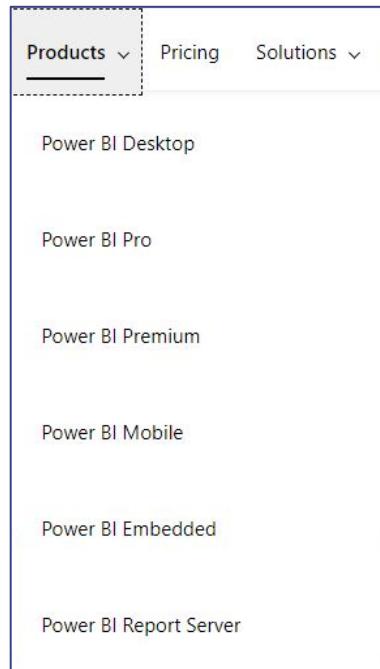


Interactive Visualizations



Collaboration

Power BI Components



- **Power BI Desktop (Free)**
 - Create dashboards and publish to own workspace for personal use
- **Power BI Pro & Premium (Paid)**
 - Sharing content with others (on the workspace or via link)
 - Advanced AI, self-service data prep for big data, and simplify data management and access at enterprise scale
- **Power BI Server**
 - Cloud-based version of Power BI with report editing and publishing features.
- **Power BI Mobile**
 - A mobile app of Power BI, which allows you to author, view, and share reports on the go.

Interface Tour

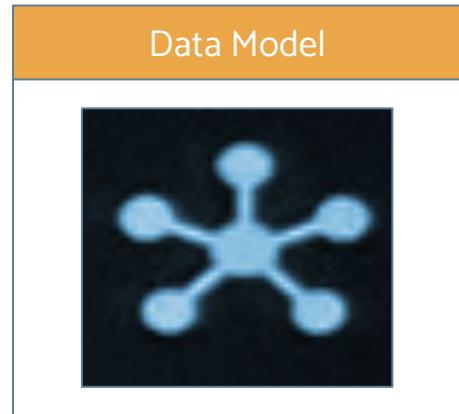
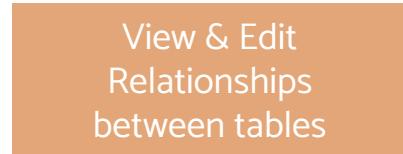
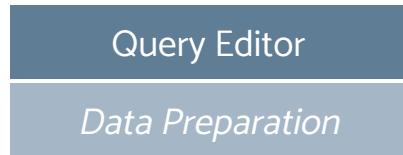
Visualisation and Dataset - 3 main views

- Report - custom visualisations and dashboards
- Data - view connected datasets
- Model - establish relationships between datasets

PowerBI Language / Calculations

- Power Query - data transformation and cleaning on the dataset (M - optional)
- DAX - create new information from data present in model

Power BI Creation Workflow



Download Data Sources

Link: <https://github.com/channxy/PowerBI-Course>

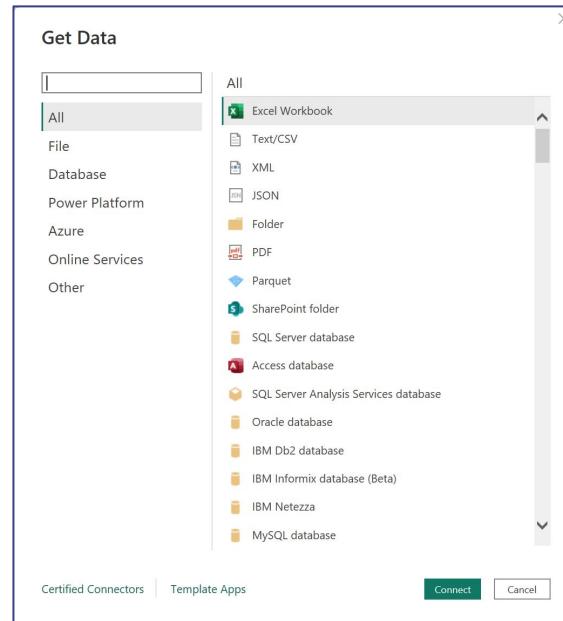
Dataset: Class Dataset » Global Superstore.xls



Connecting Data Sources

Connecting Power BI to Source Files

- Multiple source options (such as Excel, SQL, PowerBI Apps, Web)
- Can be linked directly to a datasource



Connecting Power BI to Source Files

- For a start, we will be using Excel to import data

Add data to your report

Once loaded, your data will appear in the **Fields** pane.



Import data from Excel



Import data from SQL Server



Paste data into a blank table



Try a sample dataset

Get data from another source →

Connecting Power BI to Source Files

Navigator

The screenshot shows the Power BI Navigator interface. On the left, there's a tree view of the 'Global Superstore.xlsx' file, with 'Orders', 'People', and 'Returns' selected. On the right, a 'Returns' datasheet is displayed with three columns: Column1, Column2, and Column3. The data includes various entries like 'Returned', 'Order ID', 'Market', and geographical codes. At the bottom, there are buttons for 'Load', 'Transform Data', and 'Cancel', with 'Load' being the one highlighted by a red box.

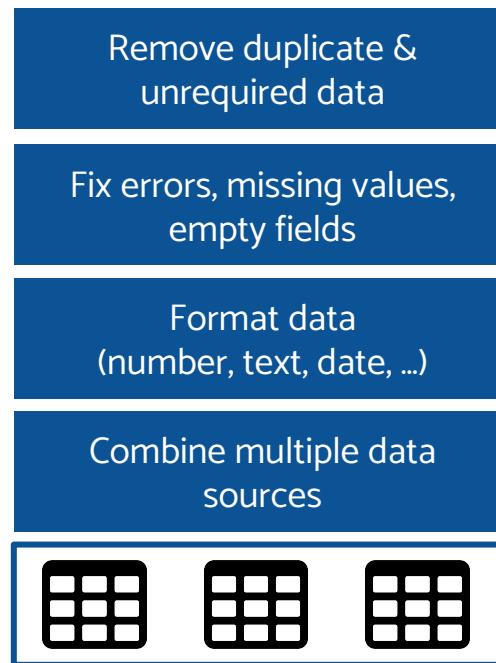
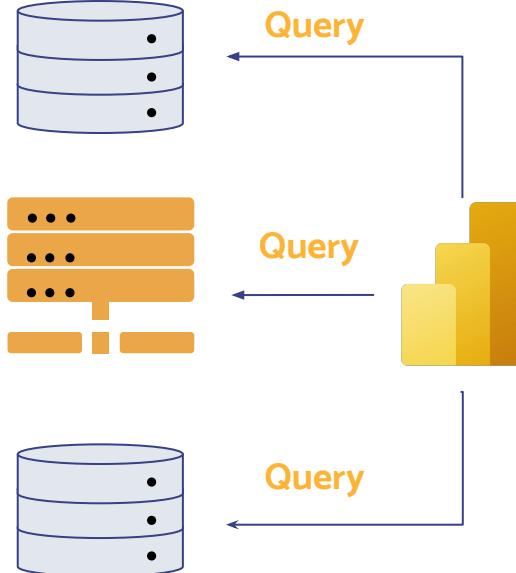
Column1	Column2	Column3
Returned	Order ID	Market
Yes	MX-2013-168137	LATAM
Yes	US-2011-165316	LATAM
Yes	ES-2013-1525878	EU
Yes	CA-2013-118311	United States
Yes	ES-2011-1276768	EU
Yes	MX-2013-131247	LATAM
Yes	ID-2011-20975	APAC
Yes	IN-2014-58460	APAC
Yes	ES-2011-3028321	EU
Yes	MX-2014-148285	LATAM
Yes	IN-2014-54708	APAC
Yes	ID-2011-20989	APAC
Yes	ES-2013-3323529	EU
Yes	MX-2014-135328	LATAM
Yes	IN-2012-63934	APAC
Yes	IN-2014-43039	APAC
Yes	CA-2012-150875	United States
Yes	ES-2011-3074997	EU
Yes	CA-2011-133690	United States
Yes	IN-2014-84948	APAC
Yes	CA-2013-157280	United States
Yes	ID-2012-44173	APAC
Yes	CA-2012-111948	United States

- Select the following datasheet to be imported:
 - Orders
 - People
 - Returns
- Select “Load”
- Since the dataset is large, it will take some time to load
- We will explore more about the “Transform Data” option later



Data Transformation

Data Cleaning



Query Data

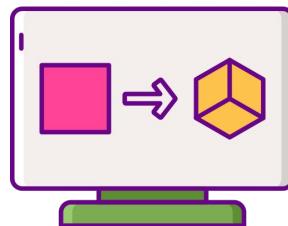
Clean Data

Analyse / Visualise Data

What is Data Transformation?

It is the process of changing data structures, format or values to prepare your set of data for analysis.

Examples of Data Transformation		
Excluding rows with missing data	Renaming column headings	Changing data type
Creating a conditional column	Removing unnecessary columns	Splitting columns



Power Query Editor Tour

The screenshot shows the Microsoft Power Query Editor interface with several numbered callouts:

- 1**: The ribbon menu bar at the top.
- 2**: The "Queries [1]" pane on the left, which contains a list of available queries and the currently selected "Customers" query.
- 3**: A red circle highlighting the "CustomerID" column header in the main data grid.
- 4**: The "Query settings" pane on the right, which includes fields for "Name" (set to "Customers") and "Entity type" (set to "Custom").
- 5**: The status bar at the bottom of the window.

Power Query - Edit queries

Home Transform Add column View Help

Get data Options Manage parameters Refresh Advanced editor Properties Choose columns Remove columns Keep rows Remove rows Sort Reduce rows Split column Group by Use first row as headers Replace values Merge queries Append queries Combine files Map to entity CDM Insights

Queries [1]

Customers

	CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region
1	ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative	Obere Str. 57	Berlin	null
2	ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constitución 2222	México D.F.	null
3	ANTON	Antonio Moreno Taquería	Antonio Moreno	Manager	Mataderos 2312	México D.F.	null
4	AROUT	Around the Horn	Thomas Hardy	Sales Representative	120 Hanover Sq.	London	null
5	BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator	Berguvsvägen 8	Luleå	null
6	BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative	Forsterstr. 57	Mannheim	null
7	BLONP	Blondesdsssl père et fils	Frédérique Citeaux	Marketing Manager	24, place Kléber	Strasbourg	null
8	BOLID	Bólido Comidas preparadas	Martín Sommer	Owner	C/ Araquil, 67	Madrid	null
9	BONAP	Bon app'	Laurence Lebihan	Owner	12, rue des Bouchers	Marseille	null
10	BOTTM	Bottom-Dollar Markets	Elizabeth Lincoln	Accounting Manager	23 Tsawassen Blvd.	Tsawassen	BC
11	BSBEV	B's Beverages	Victoria Ashworth	Sales Representative	Fauntleroy Circus	London	null
12	CACTU	Cactus Comidas para llevar	Patricia Simpson	Sales Agent	Cerrito 333	Buenos Aires	null
13	CENTC	Centro comercial Móctezuma	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.	null
14	CHOPS	Chop-suey Chinese	Yang Wang	Owner	Hauptstr. 29	Bern	null
15	COMMI	Comércio Mineiro	Pedro Afonso	Sales Associate	Av. dos Lusiadas, 23	Sao Paulo	SP
16	CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative	Berkley Gardens 12 Brewery	London	null
17	DRACD	Drachenblut Delikatessen	Sven Ottlieb	Order Administrator	Walsenweg 21	Aachen	null
18	DUMON	Du monde entier	Janine Labrune	Owner	67, rue des Cinquante Otages	Nantes	null
19							

1 warning Completed (1.57 s) Columns: 13 Rows: 91

Step Cancel Save & close

Power Query Editor Tour

The screenshot shows the Microsoft Power Query Editor window with several numbered callouts:

- 1**: Points to the ribbon at the top of the window.
- 2**: Points to the main content area where a box highlights the "Ribbon" section.
- 3**: Points to the "CustomerID" column header in the query grid.
- 4**: Points to the "Properties" pane on the right side.
- 5**: Points to the status bar at the bottom of the window.

1. Ribbon

Provides multiple tabs to add transforms, select options for your query and access different ribbon buttons to complete various tasks.

	Address	City	Region
Obere Str. 57	Berlin	null	
Avda. de la Constitución 2222	México D.F.	null	
Mataderos 2312	México D.F.	null	
120 Hanover Sq.	London	null	
Berguvvägen 8	Luleå	null	
Forsterstr. 57	Mannheim	null	
24, place Kléber	Strasbourg	null	
C/ Araquil, 67	Madrid	null	
12, rue des Bouchers	Marseille	null	
23 Tsavassen Blvd.	Tsawassen	BC	
Fauntieroy Circus	London	null	
Cerrito 333	Buenos Aires	null	
Sierras de Granada 9993	México D.F.	null	
Hauptstr. 29	Bern	null	
Av. dos Lusiadas, 23	Sao Paulo	SP	
Berkley Gardens 12 Brewery	London	null	
Walsenweg 21	Aachen	null	
67, rue des Cinquante Otages	Nantes	null	

1 warning Completed (1.57 s) Columns: 13 Rows: 91

Cancel Save & close

Power Query Editor Tour

The screenshot shows the Microsoft Power Query Editor window with several numbered callouts:

1. Top ribbon: Home, Transform, Add column, View, Help.
2. Queries pane: Shows a list of available queries, with "Customers" selected. A red box highlights this area, and a red circle with the number 2 is placed on it.
3. Main workspace: Displays the "Customers" query data. The first few rows are:

CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	
1	ALFKI	Maria Anders	Sales Representative	Obere Str. 57	Berlin	null	
2	ANATR	Andréアンダーツ	Owner	Chai	México D.F.	null	
3	ANTON	Anton Zaytsev	Sales Representative	Magazino 17	México D.F.	null	
4	AROUT	Anne Robinson	Marketing Manager	54, Princes Street	London	null	
5	BERGS	Christina Berglund	Owner	Centralparken 9	Luleå	null	
6	BLAUS	Robert Müller	Marketing Manager	Spaferstr. 12	Mannheim	null	
7	BLONP	Manuela Gmelin	Owner	Postkasten 123	Strasbourg	null	
8	BOLID	Michael Svennberg	Marketing Manager	Åkergatan 24	Madrid	null	
9	BONAP	Helena Westberg	Owner	Vasagatan 22	Marseille	null	
10	BOTTM	Jonathon S. Park	Marketing Manager	Östermalmsgatan 54	Tsawassen	BC	
11	BSBEV	Robert King	Owner	Skidôme 3	London	null	
12	CACTU	Patricia Evans	Marketing Manager	201, 8th Avenue	Buenos Aires	null	
13	CENTC	Centro comercial Moctezuma	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.	null
14	CHOPS	Chop-suey Chinese	Yang Wang	Owner	Hauptstr. 29	Bern	null
15	COMMI	Comércio Mineiro	Pedro Afonso	Sales Associate	Av. dos Lusiadas, 23	Sao Paulo	SP
16	CONSH	Consolidated Holdings	Elizabeth Brown	Sales Representative	Berkley Gardens 12 Brewery	London	null
17	DRAKD	Drachenblut Delikatessen	Sven Ottlieb	Order Administrator	Walsenweg 21	Aachen	null
18	DUMON	Du monde entier	Janine Labrune	Owner	67, rue des Cinquante Otages	Nantes	null
19							
4. Query settings pane: Shows properties like Name (Customers), Entity type (Custom), and applied steps (Source, Navigation). A red box highlights this area, and a red circle with the number 4 is placed on it.
5. Bottom status bar: Shows 1 warning, Completed (1.57 s), Columns: 13, Rows: 91.

Power Query Editor Tour

The screenshot shows the Microsoft Power Query Editor interface. The top navigation bar includes Home, Transform, Add column, View, and Help. The Home tab is selected, indicated by a red circle labeled '1'. Below the ribbon are various toolbar icons for data import, parameters, and transformation operations. The main area displays a preview of a 'Customers' query, which contains 15 rows of data from the Northwind database. The columns shown are CustomerID, CompanyName, ContactName, ContactTitle, Address, City, Region, and null. A red circle labeled '2' highlights the 'Customers' entry in the Queries list on the left. A red circle labeled '3' points to the 'ContactTitle' column header in the preview grid. A red circle labeled '4' points to the 'Properties' section in the Query settings pane on the right, where the query name is set to 'Customers' and the entity type is 'Custom'.

CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	null
ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative	Obere Str. 57	Berlin	null	
ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constitución 2222	México D.F.	null	
ANTON	Antonio Moreno Taquería	Antonio Moreno	Manager	Mataderos 2312	México D.F.	null	
AROUT	Around the Horn	Thomas Hardy	Sales Representative	120 Hanover Sq.	London	null	
BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator	Berguvsvägen 8	Luleå	null	\$
BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative	Forsterstr. 57	Mannheim	null	E
BLONP	Blondesdösl père et fils	Frédérique Citeaux	Marketing Manager	24, place Kléber	Strasbourg	null	E
BOLID	Bólido Comidas preparadas	Martín Sommer	Owner	C/ Araquil, 67	Madrid	null	I
BONAP	Bon app'	Laurence Lebihan	Owner	12, rue des Bouchers	Marseille	null	
BOTTM	Bottom-Dollar Markets	Elizabeth Lincoln	Accounting Manager	23 Tsawassen Blvd.	Tsawassen	BC	1
BSBEV	B's Beverages	Victoria Ashworth	Sales Representative	Fauntleroy Circus	London	null	E
CACTU	Cactus Comidas para llevar	Patricia Simpson	Sales Agent	Cerrito 333	Buenos Aires	null	
CENTC	Centro comercial Móctezuma	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.	null	C
CHOPS	Chop-suey Chinese	Yang Wang	Owner	Hauptstr. 29	Bern	null	E
COMMI	Comércio Mineiro	Pedro Afonso	Sales Associate	Av. dos Lusiadas, 23	Sao Paulo	SP	C

3. Current View

Main working view, that by default, displays a preview of the data for your query. You can also enable the diagram view along with the data preview view.

Power Query Editor Tour

The screenshot shows the Microsoft Power Query Editor interface. The top navigation bar includes Home, Transform, Add column, View, and Help. The Home tab is selected, indicated by a red circle labeled '1'. Below the ribbon is a toolbar with various icons for data retrieval, transformation, and management. On the left, a sidebar titled 'Queries [1]' lists a single query named 'Customers' (indicated by a red circle labeled '2'). The main area displays a preview of the 'Customers' table with columns: CustomerID, CompanyName, ContactName, ContactTitle, Address, City, Region, and null. A red box highlights this preview area. To the right is the 'Query settings' pane, which shows the query name 'Customers' and entity type 'Custom'. It also lists 'Applied steps' including 'Source' and 'Navigation'. A red circle labeled '4' points to the 'Properties' section in the settings pane. The bottom status bar shows 'Completed (1.57 s)', 'Columns: 13', 'Rows: 911', and buttons for 'Cancel' and 'Save & close'.

4. Query Settings

A view of the currently selected query with relevant information, such as query name, query steps, and various indicators.

Power Query Editor Tour

The screenshot shows the Microsoft Power Query Editor window with several numbered callouts:

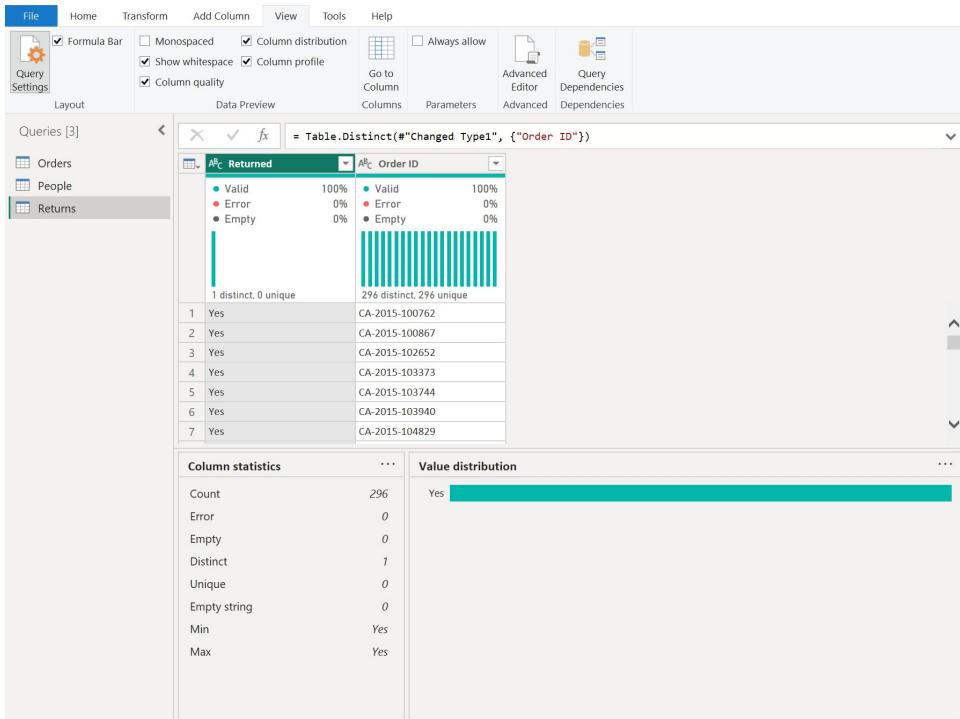
1. Top ribbon menu bar: Home, Transform, Add column, View, Help.
2. Left sidebar: Queries [1], showing a list of queries and a preview of the 'Customers' query.
3. Main data grid: A table of customer data with columns: CustomerID, CompanyName, ContactName, ContactTitle, Address, City, Region, and Country.
4. Right sidebar: Query settings panel, showing the query name 'Customers' and entity type 'Custom'.
5. Status Bar: Located at the bottom left, displaying '1 warning', 'Completed (1.57 s)', 'Columns: 13', 'Rows: 91', and a progress bar.

5. Status Bar

A bar that displays relevant information about your query, such as execution time, total columns and rows, and processing status. It also contains buttons to change your current view.

CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	Country
1 ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative	Obere Str. 57	Berlin	null	DE
2 ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constitución 2222	México D.F.	null	MX
3 ANTON	Antonio Moreno Taquería	Antonio Moreno	Manager	Mataderos 2312	México D.F.	null	MX
4 ABOUC	À la Carte Services	Eric Fernandes	Marketing Manager	120 Hanover Sq.	London	null	GB
5 CLOUD	Coffee-Tea-Go	Frédéric Migaud	Marketing Manager	106 Gabriel-Velluquière	Lille	null	FR
6 EATON	Eaton	Klaus Ostermaier	Marketing Manager	2014 Freeman	London	null	GB
7 FRANZ	Franz Gustav	Markus Rödel	Marketing Manager	Obere Str. 57	Mannheim	null	DE
8 ISLATR	Island Trading	Margherita Li Credenza	Marketing Manager	Avda. de la Constitución 2222	Strasbourg	null	FR
9 KARHU	Kärrbo Mat	Anna Mattsson	Marketing Manager	Mataderos 2312	Madrid	null	ES
10 KONIG	König	Ulrich Hügel	Marketing Manager	120 Hanover Sq.	Marseille	null	FR
11 LARSEN	Larsen	Janet King	Marketing Manager	guvvägen 8	Luleå	null	SE
12 MOLIN	Molsen	Andrea Varga	Marketing Manager	sternstr. 57	Mannheim	null	DE
13 OCEMEX	Océ Mexico	Paulina Martínez	Marketing Manager	place Kléber	Strasbourg	null	FR
14 PAPAYA	Papaya	Yousaf Ali	Marketing Manager	braquil, 67	Madrid	null	ES
15 RUSTIC	Rustic	Michael Svennberg	Marketing Manager	que des Bouchers	Marseille	null	FR
16 SANTINI	Santini	Francesco Sartori	Marketing Manager	Tavassan Blvd.	Tsawassen	BC	CA
17 TASTY	Tasty Etc.	John Clark	Marketing Manager	Antieroy Circus	London	null	GB
18 TORTU	Tortuga	Patricia Heurtado	Marketing Manager	ato 333	Buenos Aires	null	AR
19 VONRICH	Von Richetti	Manuela Mendez	Marketing Manager	ras de Granada 9993	México D.F.	null	MX
20 WARTHOG	Warthog	Christina Nairn	Marketing Manager	atstr. 29	Bern	null	CH
21 ZEEBRA	Zeebra	Elaine Davis	Marketing Manager	dos Lusíadas, 23	Sao Paulo	SP	BR
22 ZEEBRA	Zeebra	Elaine Davis	Marketing Manager	keley Gardens 12 Brewery	London	null	GB
23 ZEEBRA	Zeebra	Elaine Davis	Marketing Manager	serweg 21	Aachen	null	DE
24 ZEEBRA	Zeebra	Elaine Davis	Marketing Manager	ue des Cinquante Otages	Nantes	null	FR

Data Profile



- Further identify the dataset distribution
- Check the data quality
- “Returned” column in “Returns” Sheet is redundant since all the values are “Yes”
- Delete the “Returned” column
 - Right click on the column
 - Delete
- Save
 - Home
 - Close & Apply

Changing Data Formats in Data Tab

The screenshot shows the 'Data' tab in Power BI. At the top, there are fields for 'Name' (set to 'Order Date'), 'Format' (set to '14/3/2001 (d/m/yyyy)'), and 'Summ'. Below these, the 'Data type' is set to 'Date'. A tooltip explains: 'Choose how the values in this column are displayed (this doesn't impact how they're stored). If you see an asterisk (*), that format will reflect the date and time settings of your operating system.' The main area displays a table with columns: Row ID, Order ID, Order Date, Ship Date, and Ship Mode. The 'Order Date' column is highlighted in green.

Row ID	Order ID	Order Date	Ship Date	Ship Mode
43	CA-2017-101343	17/7/2017	Saturday, 22 July 2017	Standard Cla
514	CA-2018-163405	21/12/2018	Tuesday, 25 December 2018	Standard Cla
515	CA-2018-163405	21/12/2018	Tuesday, 25 December 2018	Standard Cla
1606	US-2017-115819	19/4/2017	Monday, 24 April 2017	Second Class
1607	US-2017-115819	19/4/2017	Monday, 24 April 2017	Second Class
1609	US-2017-115819	19/4/2017	Monday, 24 April 2017	Second Class

Changing Data Formats in Data Tab

Sales	Quantity	Discount	Profit
\$77.88	2	\$0.00	\$3.89
\$6.63	3	\$0.00	\$1.79
\$5.88	2	\$0.00	\$1.71
\$5.46	3	\$0.00	\$1.53
\$73.20	5	\$0.00	\$21.23
\$22.72	4	\$0.00	\$10.22
\$45.36	7	\$0.00	\$21.77
\$11.34	3	\$0.00	\$5.22
\$80.30	5	\$0.00	\$20.88

Sales, Discount and Profit should be listed in the “Currency” format so that the charts will automatically display the \$ as well.

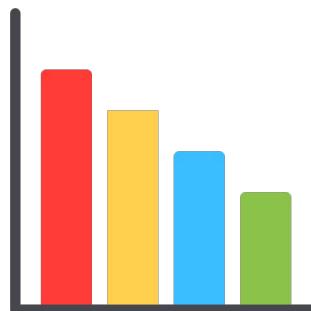
You can set them as:

- **Format:** Currency
- **Decimal:** 2



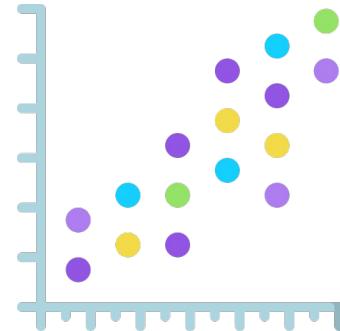
Creating Charts

Common Chart Types



Bar Chart

Easily displays ranks of values



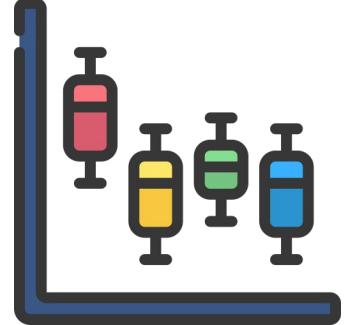
Scatter Plot

Demonstrates the relationship between continuous variables



Line Graph

Demonstrates the relationship between an amount and rate



Box Plot

Summarises the distribution of the data

FOUR TYPES OF DATA

NOMINAL: Data sorted into categories

ORDINAL: Arbitrary numerical scale

DISCRETE: Represents units

CONTINUOUS: Can be measured on a continuum

TYPES OF CHARTS

→ Bar chart 

→ Pie chart, bar chart 

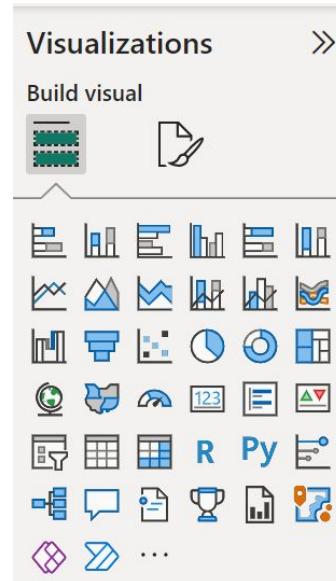
→ Arrays, Pie chart, Bar chart 

→ Line chart 

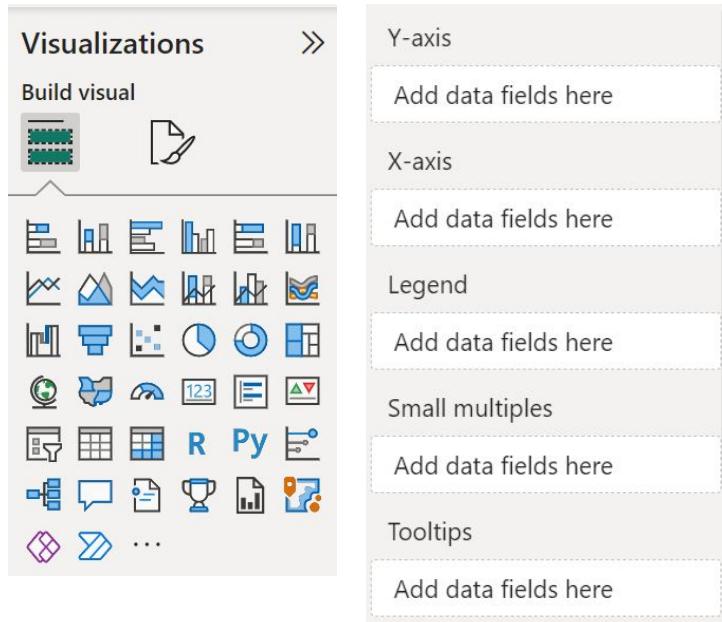
Charts Available on Power BI

- Stacked bar chart
- Stacked column chart
- Area Charts
- Line Charts
- Bar Charts
- Column Charts
- Combo Charts
- Pie Charts
- Doughnut Charts
- Gauge Charts

and more!!!



Creating Charts in Power BI



Data

Think about what data you want to explore and include in your visualisations

Chart

Select the type of charts that best represent your data

Fields

Drag and drop the relevant fields to the respective columns

Chart Creation Tips

1. **Know your audience** → What is the purpose of the chart?
2. **Know what are you trying to show** → What is your chart trying to convey?
3. **Readability** → Is your chart comprehensive and easy to understand?
4. **Color and visual effects** → Does the colour aid in explaining the charts?
5. **Chart Labels** → Are the labels unobstructed and easily identified?



Overall: Create a chart that is visually **interesting** and **functional**

Deviation

Emphasise variation (V) or have a field reference point. Typically the reference point is the mean, median, mode, range or a long-term average. Can also be used to highlight outliers.

Example FT uses
Trade surplus/deficit; climate change

Diverging bar



A simple standard bar chart where bars have both positive and negative values.

Spine



Perfect for presenting survey results which are measured on a scale from one extreme against a second extreme (e.g. disagree/agree).

Surplus/deficit/flow bar



The shaded area above a horizontal line shows a surplus, either against a second series or between two series.

Correlation

Show the relationship between two or more variables for important units (e.g. people, companies, countries) or a long-term average. Can also be used to highlight outliers.

Example FT uses
Inflation and unemployment; income and life expectancy

Scatterplot



The standard way to show the relationship between two continuous variables. Each data point has a value for each variable.

Column + line



A good way of showing the relationship between an amount (column) and a rate (line).

Bubble



Like a scatterplot, but adds additional detail by adding size according to a third variable.

XV heatmap



A good way of showing data across multiple categories. Data tends to be sorted by value.

Slope



Perfect for showing data points that have changed over time or category.

Lollipop



Lollipops draw more attention to the data points than a standard scatterplot and can be used to show rank and value effectively.

Bar



Effective for showing data points across multiple data sets. For large datasets, consider using facets.

Ranking

Show where an item's position is in an ordered list that is more important than others. It's often used to highlight the top few items of interest.

Example FT uses
House prices; league tables; constituency election results

Ordered bar



Standard bar chart where values much more different are ordered into order.

Dot plot



A simple way of showing change or movement between multiple categories.

Dot strip plot



Good for showing the relationship between two variables, can be used to show how many dots have the same value.

Barcode plot



Like a dot plot, good for showing all data points at once. Works best when comparing individual values.

Boxplot



Summarise multiple data points into a single box and whisker representation of the range of the data.

Violin plot



Similar to a box plot but more effective with density information. Data that cannot be easily summarised with a single average.

Population pyramid



A standard way of showing the age and sex distribution of a population. Good for comparing two populations, such as a country or a region.

Frequency polygon



For displaying multiple distributions of data. Good for comparing two distributions but not as clear as a population pyramid.

Besidearm



Used to emphasise individual points in a distribution. Points can be highlighted with an additional variable, such as a red dot on a blue dataset.

Distribution

Show values in a distribution and how often they occur. The shape (or 'skew') of a distribution is important when highlighting the lack of uniformity in the data.

Example FT uses
Income distribution; population; geographic distribution; brewing industry

Histogram



The simplest way to show a distribution - keep the data points separate so that they can be highlighted.

Line



The standard way to show a changing trend. If the data is too noisy, consider using a moving average or derivatives.

Column



The standard way to show the count of things. Most charts start at zero so it's good to use columns.

Slope



Good for showing changing data as long as the data is linear. Can be simplified into 1 or 2 segments for a key point of story.

Area chart



Good with these data types as they don't change too much. Good for showing the total area of data.

Marimekko



A good way of showing the relationship between two variables. Good for showing the proportion of data at the same time - as long as the data is linear.

Proportional symbol



Usually focused on one data series, but good for showing opening/closing brackets or other data points of interest.

Calender heatmap



A great way of showing temporal patterns - or the expression of a quantity.

Change over Time

Give emphasis to changing trends. These can be short (one day) or longer (months, years, decades or centuries). Usually these show a 'trend' or 'path'. Trends are often more important to provide suitable context.

Example FT uses
Share price movements; economic time series; sectoral changes in a market

Line



The standard way to show a changing trend. If the data is too noisy, consider using a moving average or derivatives.

Bar



Good above. Good when the data are not time series and long enough marks.

Paired column



As standard but allows for multiple series. Can be paired up with a line chart with more than 2 series.

Paired bar



As above. Good when the data are not time series and long enough marks.

Dot



Similar to a pie chart - but the centre can be a hole. Good for showing the size of data or when the data is not complicated.

Treemap



Use for hierarchical relationships. Good when there are many small segments.

Parallel coordinates



Excellent solution in 2 dimensions. Good only with categorical data as it's hard to represent data with more than 2 dimensions.

Dotplot



Lollipop chart. Lollipops draw more attention to the data points than a standard scatterplot and can be used to show rank and value effectively.

Magnitude

Show size comparisons. These can be relative (just being able to see larger/smaller) or absolute (able to see the size difference). Usually these show a 'volume' or 'scale' rather than a 'trend' or 'path'.

Example FT uses
Commodity production; market capitalisation; volumes in general

Stacked column/bar



A simple way of showing parts of whole relationships that can be added together to get the total.

Marimekko



A good way of showing the relationship between two variables. Good for showing the proportion of data at the same time - as long as the data is linear.

Pie



A common way of showing proportions. Good for showing the total of the data - but the centre can be a hole.

Donut



Similar to a pie chart - but the centre can be a hole. Good for showing the size of data or when the data is not complicated.

Tree map



Use for hierarchical relationships. Good when there are many small segments.

Equilateral compass



Showing each unit on a map in an equal-sized shape - good for showing the directionality of varying regions with equal value.

Scattered categories



Good for showing the sequencing of data or when the data is 2D and needs to be mapped onto a particular value.

Dot density



Used to show the individual locations - good for showing the location of any pattern the reader needs to see.

Part-to-whole

Show how a single value can be broken down into its component elements. If the reader needs to understand the size of the components, consider a magnitude chart instead.

Example FT uses
Population density; natural resource location; commodity prices; carabiner areas; variation in election results

Spatial



Acknowledge that maps only work when precise locations or geographical boundaries are important to the reader than anything else.

Flow



Show movement between locations or flow between locations.

Waterfall



Designed to show the outcome of a complex process.

Chord



A complex, multi-layered diagram which can illustrate the connections between entities involved in a process.

Network



Used for showing the strength and complexity of relationships of varying types.

Flow

Show the relative volumes or intensity of movement between two or more areas in space or time, or the sequence of events in a geographical location.

Example FT uses
Movement of funds; trade; migrants; news; information; relationships; graphs

Bar



Show changes in flows from one location to at least one other - good for showing the outcome of a complex process.

Waterfall



Designed to show the flow of money through a process, usually from raw materials to final product.

Chord



A complex, multi-layered diagram which can illustrate the connections between entities involved in a process.

Network



Used for showing the strength and complexity of relationships of varying types.

Visual vocabulary

Designing with data

There are so many ways to visualise data - how do we know which one to pick? Use the categories across the top to decide which data relationship is most important in your story, then look at the different types of chart within the category to form some initial ideas about what might work best. This list is not meant to be exhaustive, nor a wizard, but is a useful starting point for making informative and meaningful data visualisations.

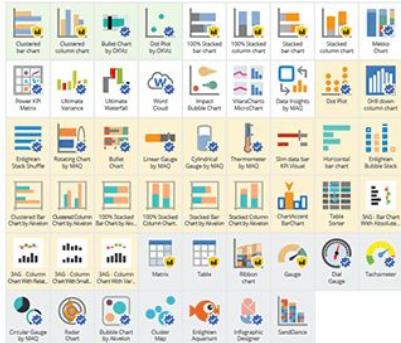
FT graphic: Alex Gaskins/CNN Creative Studio; Ltd. Design: Daniel Potts; Artwork: Emily Sherriff; Shared; Paul McLellan; Martin Clarke

Inspired by the Digital Compendium by Jon Schmid and Sophie Beale

ft.com/vocabulary

COMPARISON

Display measures compared by their magnitude

**CHANGE OVER TIME**

Display the changing trend of measures

**RANKING**

Display measures by their rank order

**SPATIAL**

Display measures over spatial maps

**FLOW**

Display a flow or dynamic relations

**PART-TO-WHOLE**

Display the parts of a measure

**DISTRIBUTION**

Display the distribution of a measure

**CORRELATION**

Display relations between measures

**SINGLE**

Display single values

**FILTER**

Control report filters

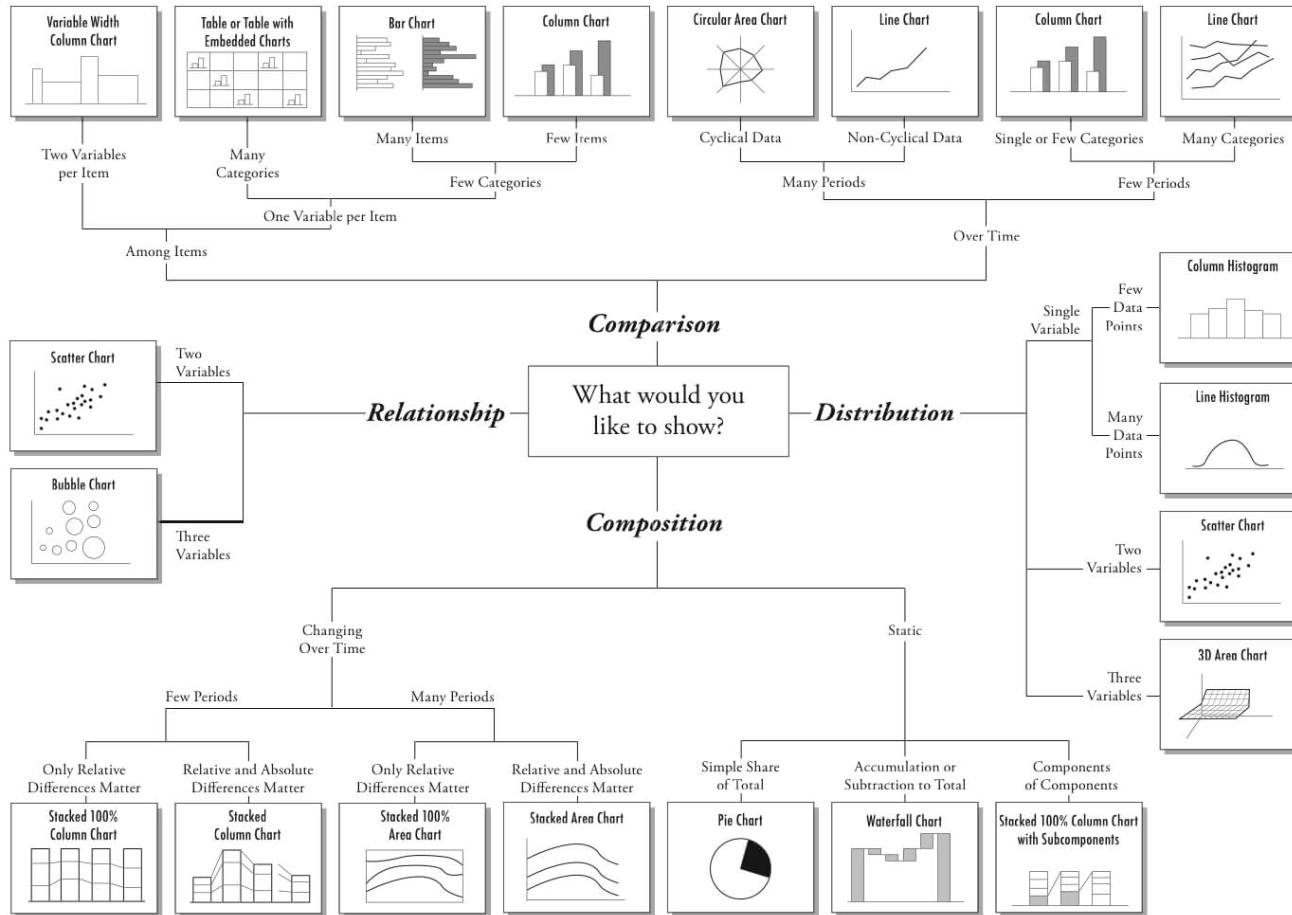
**NARRATIVE**

Tell a story with data

**MISCELLANEOUS**

Chart Suggestions—A Thought-Starter

www.ExtremePresentation.com
© 2009 A. Abela — a.v.abela@gmail.com



Source: <https://infogram.com/page/choose-the-right-chart-data-visualization>

Summary

- **PowerBI Features**
 - Report, Data, Model
 - Power Query, DAX
- **Connecting Data Sources**
 - Excel
- **Data Transformation with Power Query Editor**
 - Update Row Headers, Delete Duplicate Rows
 - Check Column Quality, Data Distribution
- **Creating Charts**
 - Bar Chart, Pie Chart, Cards, Treemap, Line Chart
- **Modifying Chart Visuals**
 - Title, Data Labels, Axis, Chart Colours

Microsoft
POWER BI

Lesson 2



Filters



Multiple ways to filter

Three main methods, but can be further broken down into sub-methods

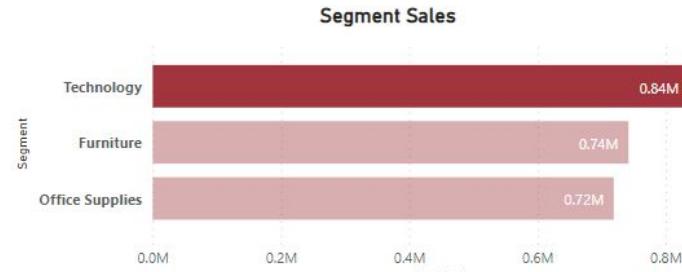
1. Cross-filter and Cross-highlight
2. Slicers
3. Filters Pane

Cross-filter and Cross-highlight

Filters the data without using filters or slicers

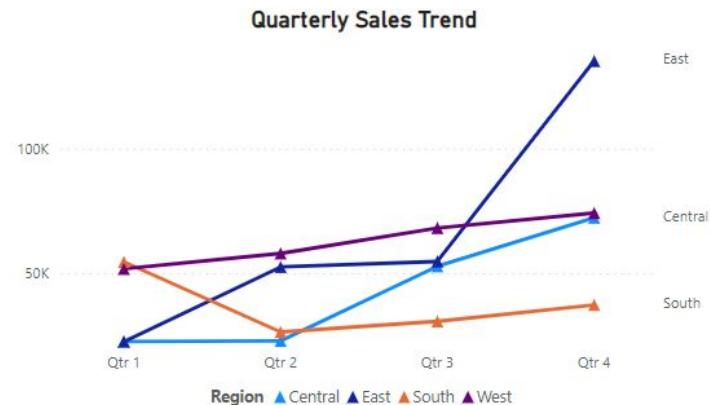
- **Cross-highlighting**

- i. Selecting a value in one visual highlights the related data in visuals such as column and bar charts.
- ii. The unrelated data is still visible but dimmed.



- **Cross-filtering**

- i. Selecting a value in one visual acts more like a filter in other visuals, such as line charts, scatter charts, and maps.
- ii. The unrelated data isn't visible, just as you'd see with a filter.



Slicers

Basic

Person

- Select all
- Anna Andreadi
- Cassandra Brandom
- Chuck Magee
- Kelly Williams

Numeric

Profit

-2,938.71

4,111.06

-

Filters numeric columns such as between numbers, less than or equal to a number etc

Relative Date

Order Date

Last

▼

1

Years

▼

⌚ 19/1/2022 - 18/1/2023

E.g. Show items within the last day or week

Relative Time

Order Date

Last

▼

1

Minutes

▼

⌚ 11:57:45 AM - 11:58:45 AM

E.g. Show items within the last minute or hour

Responsive, resizable

Region

Select all	East	West
Central	South	

Resize to fit any space on the report

Hierarchical / Multiple Fields

Category, Sub-Category

- Select all
- Furniture
 - Bookcases
 - Chairs
 - Furnishings

Filter multiple related fields in a single slicer

Filters Pane

1. Visual filter

- Applies to a single visual on a report page
- You see visual-level filters when you select a visual on the report canvas

2. Page filter

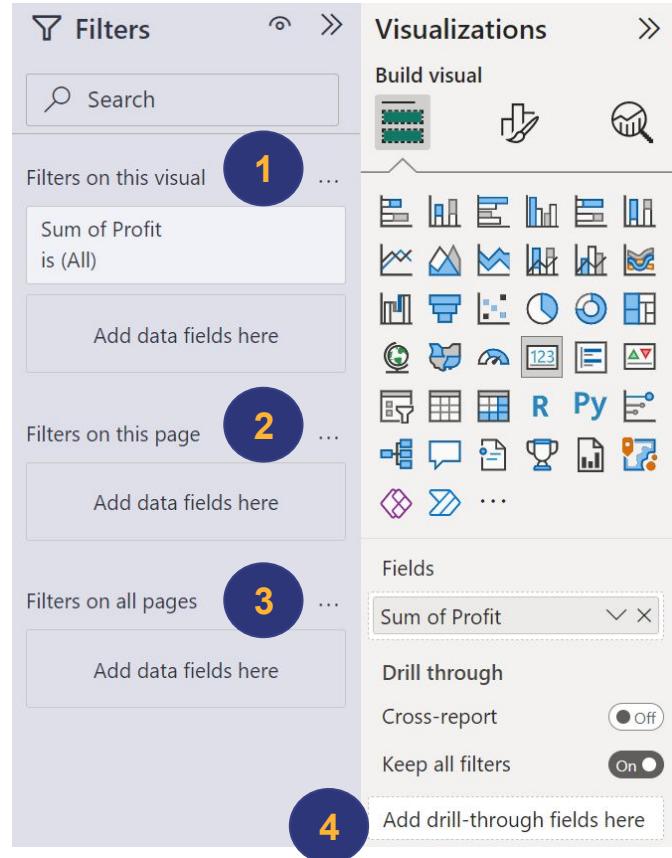
- Applies to all the visuals on the report page

3. Report filter

- Applies to all pages in the report

4. Drillthrough filter

- Create a destination report page that focuses on a specific entity, such as a supplier. From the other report pages, users can right-click a data point for that entity and drill through to the focused page.
- More will be explored in lesson 4



Other types of Filters

Filter type	Edit	Clear	Delete	Hide	Lock	Sort	Rename
Automatic filters	Y	Y	N	Y	Y	Y	Y
Manual filters	Y	Y	Y	Y	Y	Y	Y
Include/Exclude filters	N	N	Y	Y	Y	Y	N
Drill-down filters	Y	Y	N	N	N	N	N
Cross-drill filters	N	N	N	N	N	N	N
Drillthrough filters (Invokes drillthrough)	Y	Y	Y	Y	Y	N	N
Drillthrough filters (Transient)	Y	Y	Y	N	N	N	N
URL filters - transient	Y	Y	Y	N	N	N	N
Pass-through filters	N	N	Y	Y	N	Y	N



Data Modelling

Power BI Desktop Workflow

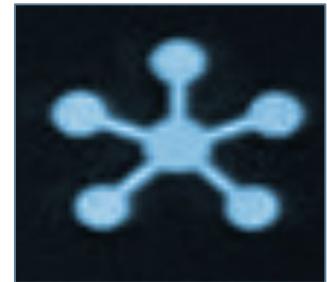
Data & Model View

Data Analysis

Inspect, Explore &
Understand Data

View & Edit
Relationships
between tables

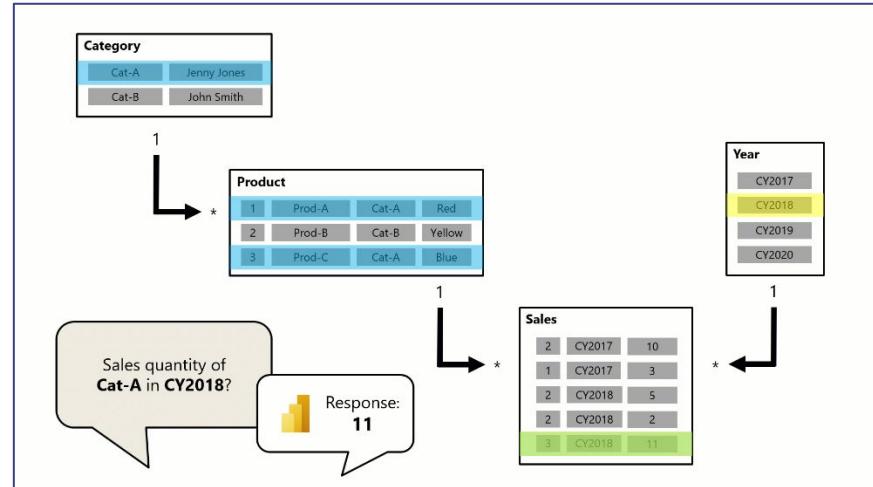
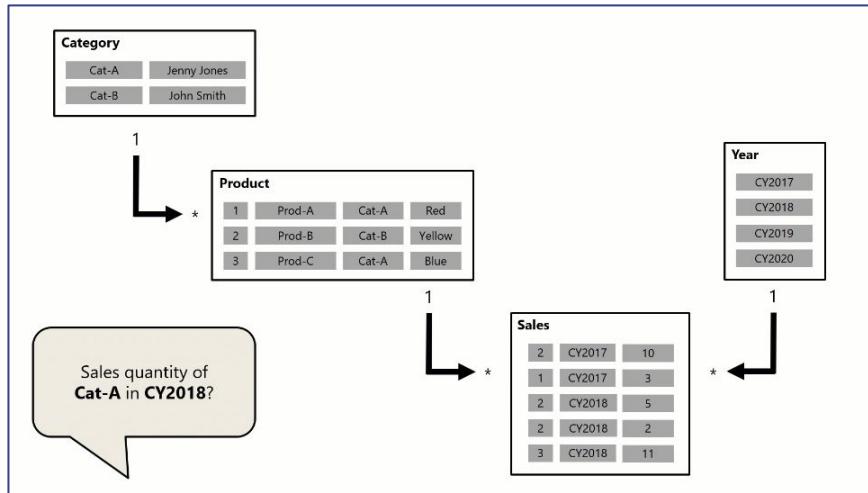
Data Model



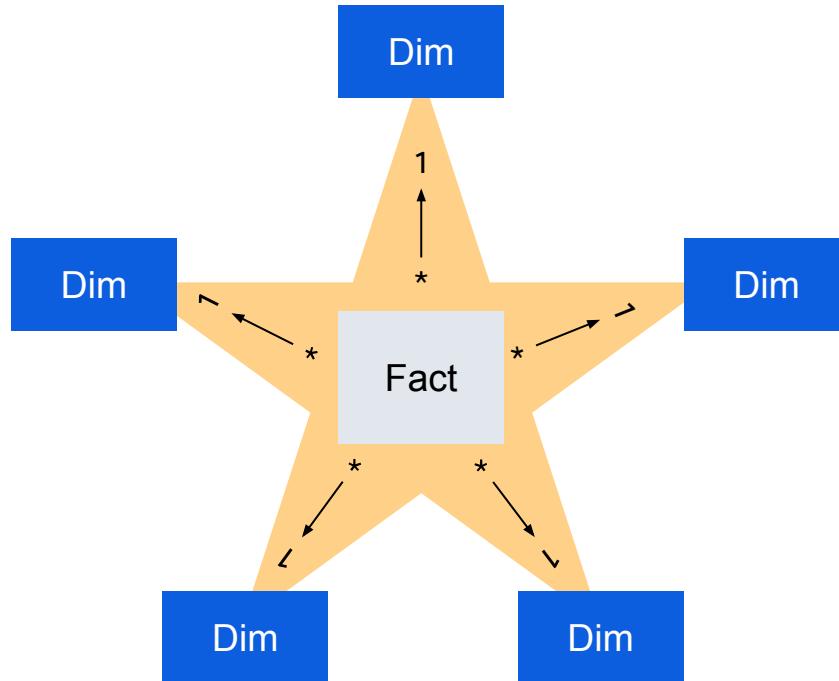
What is Data Modelling?

- Data Modeling is one of the features used to connect multiple data sources in BI tool using a relationship.
- A relationship defines how data sources are connected with each other and you can create interesting data visualizations on multiple data sources.
- A model relationship propagates filters applied on the column of one model table to a different model table

Sometimes data is stored across multiple tables



Star Schema Design



- Dim: dimension tables contain a relatively small number of rows
- Fact: Fact tables contain a very large number of rows and continue to grow over time

Example

ID	Name	Street	Country
1	Aaron	Anchorvale	Singapore
2	Benjamin	Bras Basah	Singapore
3	Calista	Commonwealth	Singapore
4	Danny	Commonwealth	Singapore
5	Eugenia	Anchorvale	Singapore
6	Frederick	Johor Bahru	Malaysia

Example

ID	Name	Street
1	Aaron	Anchorvale
2	Benjamin	Bras Basah
3	Calista	Commonwealth
4	Danny	Commonwealth
5	Eugenia	Anchorvale
6	Frederick	Johor Bahru

* → 1

Street	Country
Anchorvale	Singapore
Bras Basah	Singapore
Commonwealth	Singapore
Johor Bahru	Malaysia

Data Modelling

Relationships

A model relationship propagates filters applied on the column of one model table to a different model table.

Relationship paths are deterministic, meaning that filters are always propagated in the same way and without random variation.



Each model relationship is defined by a cardinality type.

Cardinality

Cardinality Type	Description	Cross Filter Options
One-to-many (or Many-to-one)	One of the columns contains unique values (most common)	Single Both
One-to-one	Both columns contain unique values (uncommon)	Both
Many-to-one	Both columns contain duplicate values (infrequently used)	Single (Table1 to Table2) Single (Table2 to Table1) Both

Data Modelling

Edit relationship

Select tables and columns that are related.

Orders

Customer ID	Customer Name	Segment	Country	City	State	Postal Code	Region	
RA-19885	Ruben Ausman	Corporate	United States	Los Angeles	California	90049	West	OF
BN-11515	Bradley Nguyen	Consumer	United States	Los Angeles	California	90049	West	OF
BN-11515	Bradley Nguyen	Consumer	United States	Los Angeles	California	90049	West	OF

People

Person	Region
Anna Andreadi	West
Chuck Magee	East
Kelly Williams	Central

Cardinality Cross filter direction

Many to one (*:1) Single

Make this relationship active Apply security filter in both directions

Assume referential integrity

What is this?

OK Cancel

Creating Relationships

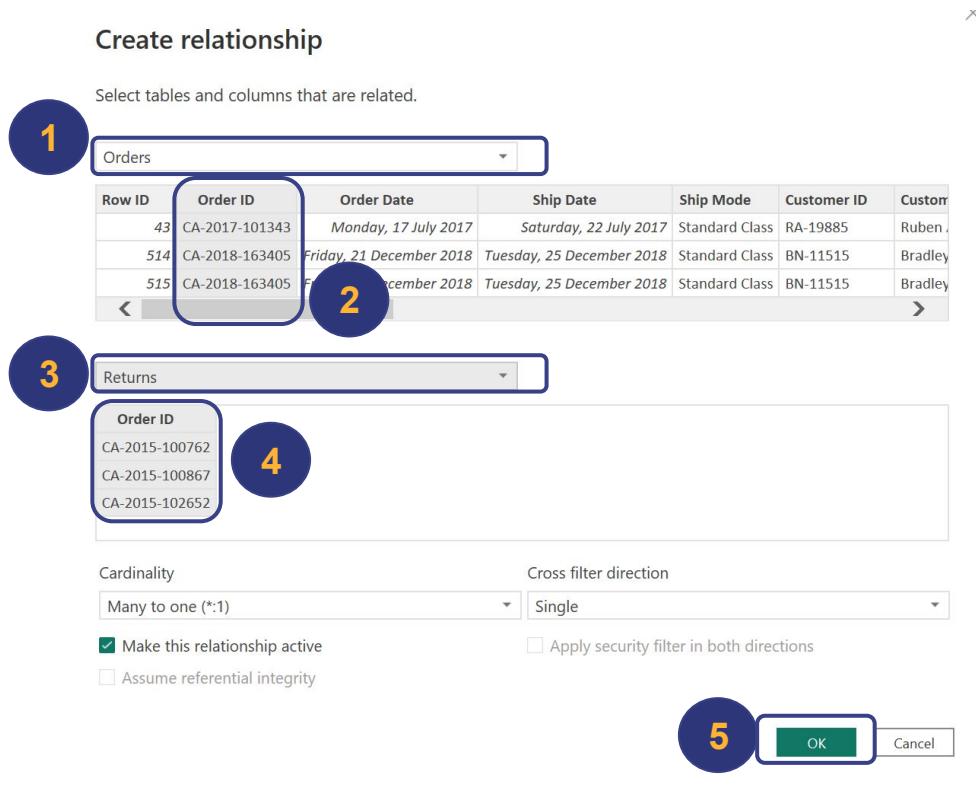
Method 1

- On the Modeling tab, select Manage relationships > New.
- In the Create relationship dialog box, in the first table drop-down list, select a table.
 - Select the column you want to use in the relationship.
- In the second table drop-down list, select the other table you want in the relationship.
 - Select the other column you want to use, and then select OK

Method 2

- Select both tables first, and the relationship will be automatically detected

Creating Relationships



1. In the Create relationship dialog box, in the first table drop-down list, select a table.
2. Select the column you want to use in the relationship.
3. In the second table drop-down list, select the other table you want in the relationship.
4. Select the other column you want to use
5. Select OK



Dashboard Creation

PowerBI Themes

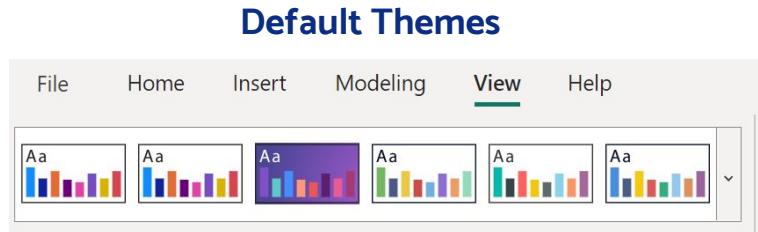
Apply design changes to your entire report

i.e.

- using corporate colors
- changing icon sets
- applying new default visual formatting

* You should apply a theme before amending the chart designs

** You can also customize your own themes



View ribbon → Themes section → Select dropdown arrow → Select theme

Advanced / Community added themes



<https://community.powerbi.com/t5/Themes-Gallery/bd-p/ThemesGallery>

Go to website: Select Theme → Download Json file

Go to PowerBI: View ribbon → Themes section → Select dropdown arrow → "Browse for themes" → Upload Json file downloaded

Dashboard Creation Tips



Consider your audience

Your readers can drill into the reports from your dashboard, so don't put a detail on the dashboard unless that's what your readers need to monitor.



Use the right visualisation

Visualizations should paint a picture and be easy to read and interpret. For some data and visualizations, a simple graphic visualization is enough. Other data might need a more complex visualization.



Accent the most important info

If the text and visualizations on a dashboard are all the same size, readers have difficulty focusing on what's most important. Card visualizations are a good way to display an important number prominently.



Tell a story on one screen

Dashboards are meant to show important information at a glance, having all the tiles on one screen is best.

Summary

- **Filters**
 - Cross-filter, Cross-highlight
 - Slicers
 - Filters Page
- **Data Modelling**
 - Star Schema and Cardinalities
 - Joining different tables
 - Creating relationships in Power BI
- **Dashboard Creation**
 - Dashboard Creation Tips
 - Creating a dashboard page with a filter pane

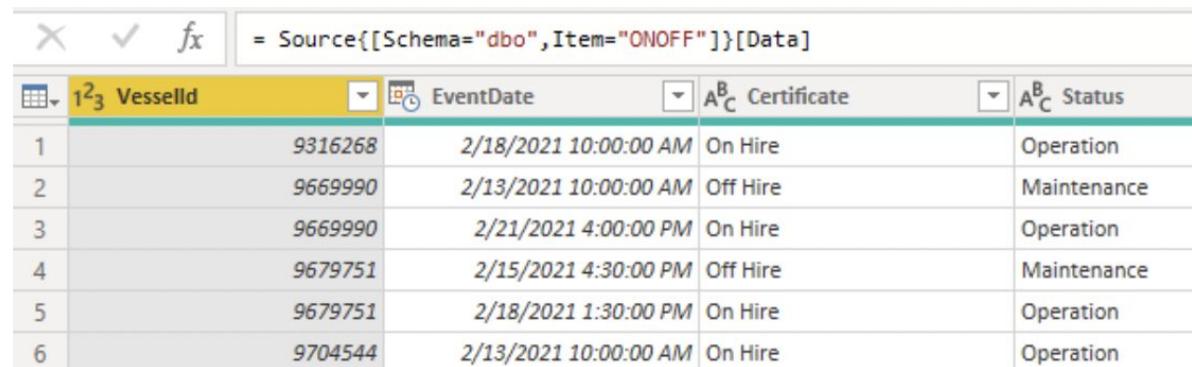
Microsoft
POWER BI

Lesson 3



What is DAX?

- Stands for Data Analysis eXpressions
- A collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values.
- DAX helps you create new information from data already in your model.
- It consists 3 important concepts: **Syntax, Functions and Context**



The screenshot shows a DAX formula bar at the top with the formula `= Source{[Schema=""dbo"", Item=""ONOFF""]}[Data]`. Below the formula bar is a table view with the following data:

	VesselId	EventDate	Certificate	Status
1	9316268	2/18/2021 10:00:00 AM	On Hire	Operation
2	9669990	2/13/2021 10:00:00 AM	Off Hire	Maintenance
3	9669990	2/21/2021 4:00:00 PM	On Hire	Operation
4	9679751	2/15/2021 4:30:00 PM	Off Hire	Maintenance
5	9679751	2/18/2021 1:30:00 PM	On Hire	Operation
6	9704544	2/13/2021 10:00:00 AM	On Hire	Operation

DAX vs Power Query

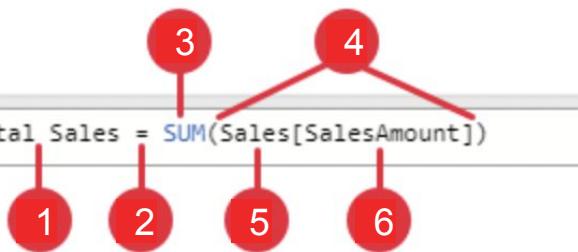
DAX	Power Query / M
<ul style="list-style-type: none">• Used for Data Analysis	<ul style="list-style-type: none">• Used for Data Engineering - Extract Transform Load (ETL)
<ul style="list-style-type: none">• Similar to Microsoft Excel functions• Uses a collection of functions and operators	<ul style="list-style-type: none">• Uses the M programming language• Power Query is able to do data engineering without coding (M)
<ul style="list-style-type: none">• Creating measures and calculated columns	<ul style="list-style-type: none">• Download and fetch data from different sources (Data Ingestion)• Combine, clean, and model this data (Data Wrangling)

Things to remember:

- Power Query is where it all begins to bring in and clean your data.
- M is the language used in Power Query (*you don't have to use M directly, but it makes your life easier in the long run*).
- DAX is the language used once your data is in Power BI to create calculated columns and measures.
- If you *can* do it in Power Query/M, you *should* (*except when you are adding a column to a table that references a column in a different table*).
- If a calculated column or a measure will work, *use a measure*.

DAX Syntax

This formula has **6** syntax elements



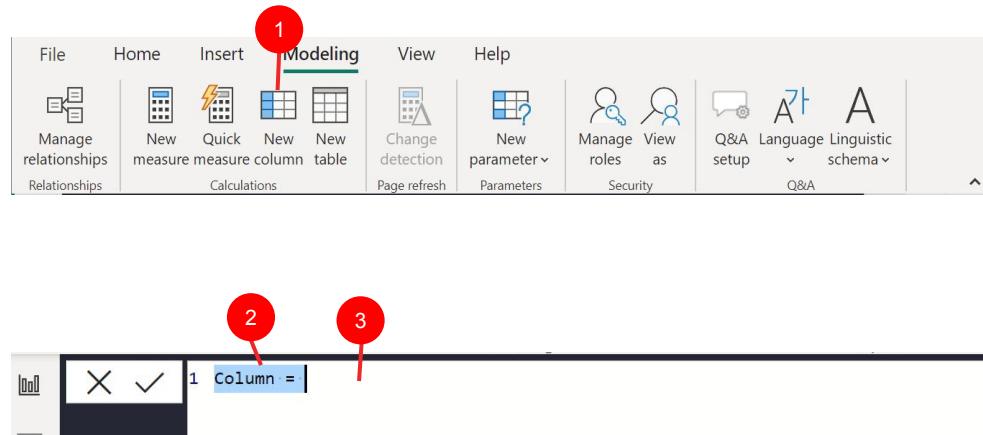
1. **The measure name**, Total Sales.
2. **The equals sign operator (=)**, which indicates the beginning of the formula. When calculated, it will return a result.
3. **The DAX function SUM**, which adds up all of the numbers in the Sales[SalesAmount] column.
4. **Parenthesis ()**, which surround an expression that contains one or more arguments. Most functions require at least one argument. An argument passes a value to a function.
5. **The referenced table, Sales**.
6. **The referenced column, [SalesAmount]**, in the Sales table. With this argument, the SUM function knows on which column to aggregate a SUM.

Measures vs Calculated Columns

	Measures	Calculated Columns
Similarities	Both uses DAX expressions	
Differences	Do not have row context	Rely only on row context
	Computed at query time	Computed based on data that has already been loaded into your data model
	Stored as source code	Stored in the model, increases data model size

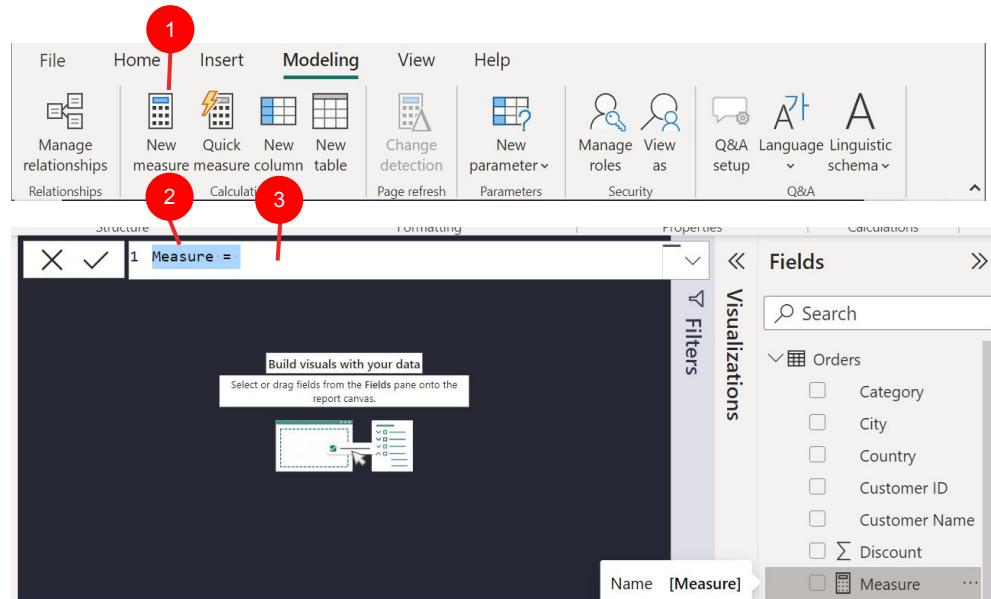
Creating Calculated Columns

1. In Report view, in the field list, right-click the desired table, and then select New column.
2. In the formula bar, replace Column by entering a new column name
3. After the equals sign, type in the function you want to use



Creating Measures

1. In Report view, in the field list, right-click the desired table, and then select New Measure.
2. In the formula bar, replace Measure by entering a new measure name
3. After the equals sign, type in the function you want to use



Returns the same value but behaves differently

Measures:

- By default, do not have a row context, the measure uses the iterator function AVERAGEX in order to create a row context.
- AVERAGEX will iterate through each row of the visual in which the measure is applied one by one and will apply the formula in that row.
- It will then aggregate all of the results at the end by adding up all of the values in each row to produce a Average Days to Ship value.

Calculated column:

- has a row context and the notion of current row, so no aggregator wrapper around the expression is needed.
- The expression is evaluated for each row of the table (Column can be seen in data view)
- For each row in the Orders table, Orders Date is subtracted from the Ship Date to produce a Days to Ship Value. These values are stored within the model in a new calculated column called Days to Ship.

Summary: Measures is usually preferred but it is still scenario dependent

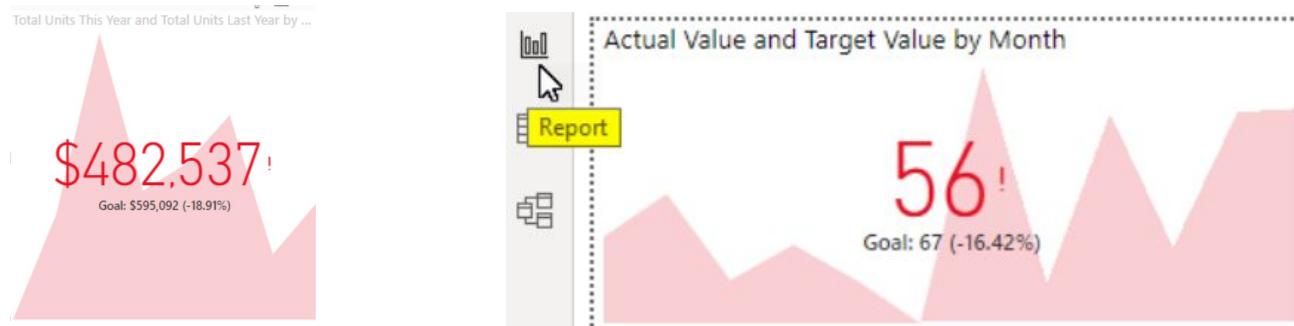
Scenarios	Use	Why
Calculations of numbers that you want to build into your report and add to visuals	Measures	<ul style="list-style-type: none">• Measures only use CPU, whereas calculated columns use space on both disk and RAM.• Thus, it is more space and memory efficient to avoid using calculated columns.• This becomes more crucial the larger the dataset.
Operate on aggregate values instead of on a row-by-row basis	Measures	<ul style="list-style-type: none">• Calculated columns cannot be used to perform this calculation as you cannot use an aggregation of calculated columns.• For example, when computing the aggregate value of a percentage.
Large and complex calculations	Calculated Column	<ul style="list-style-type: none">• Pre-compute intermediate values in a calculated column• Having the expression evaluated at data refresh using a calculated column rather than at query time using a measure may result in a better user experience.• In this case, improvements to the user experience through not having to wait for the calculation at query time may outweigh the cost of using more space in your model.
Physical structure of the calculated column is required	Calculated Column	<ul style="list-style-type: none">• For example, if you need to place the calculated results in a slicer or if you need to use the result as a filter condition, you will have to create a calculated column as you cannot filter/slice by a measure.• Another scenario where you can only use a calculated column is if you want to categorize text or numbers.

KPI Chart



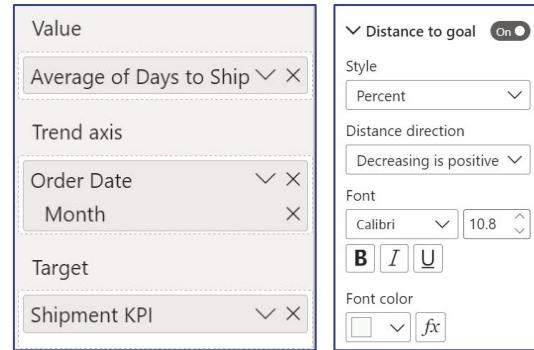
What is a KPI Chart?

- Visual cue that communicates the amount of progress made toward a measurable goal
- The KPI is to help evaluate the current value and status of a metric against a defined target
- A KPI visual requires a *base measure* that evaluates to a value, a *target measure* or value, and a *threshold* or *goal*.
- Use it when you are showing an important measure value in the report, and you want to compare it with a target and see if it meets the target or not



Creating the KPI chart for Shipment

1. Selecting the KPI icon from the Visualization pane 
2. Add in the Values to be displayed and the Trend Axis and Target
3. Format the KPI by selecting the paint brush icon to open the Format visual pane
 - a. Target label - when set to On, the visual shows the value's label. Distance to goal sets the style and direction of the distance from the goal.

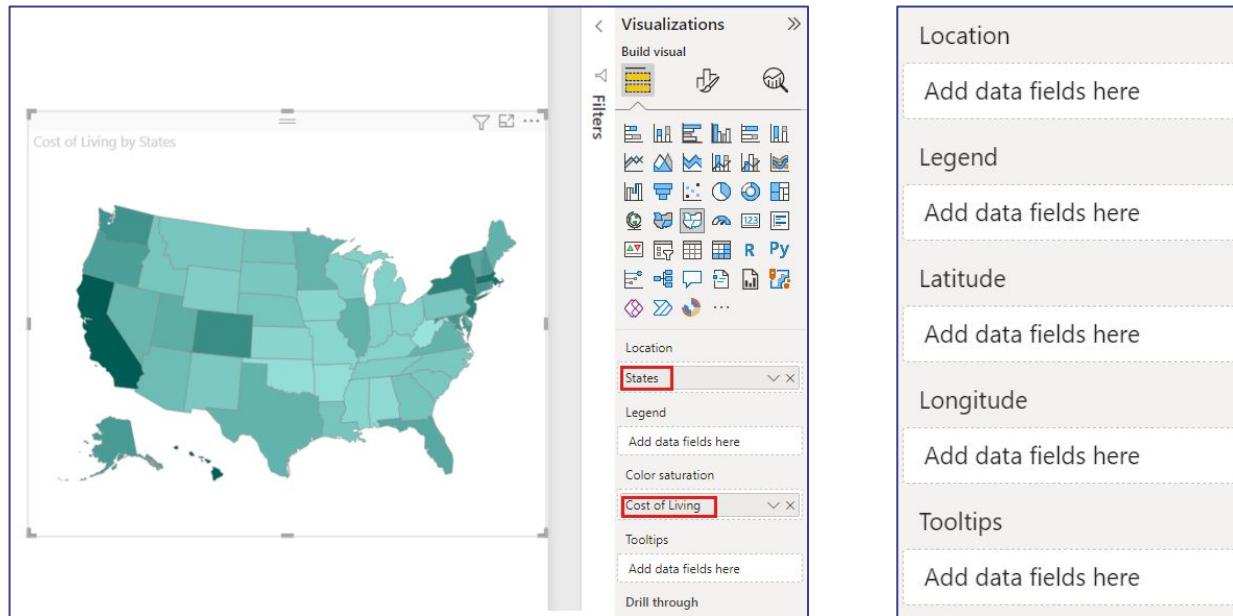


Map Chart



What is a Map Visual?

- Power BI integrates with Bing Maps to provide default map coordinates (a process called geocoding) so you can create maps



Creating a Map Visual

1. From the Data Tab, change the Data Category of State to “State or Province”
2. From the Visualisation Pane, select Map
3. From the Fields pane, select the following:
 - Location: State
 - Tooltips: Gross Profit Margin, Sum of Sales

The screenshot shows the Power BI Data Tab interface. A table is displayed with columns: Country, State, County, and City. The 'State' column has its 'Data category' set to 'Uncategorized' (highlighted by a red box). Other columns like 'Country' and 'County' have their categories set to 'State'. The 'Data type' for the 'State' column is set to 'Text'.

The screenshot shows the Power BI Fields pane. Under the 'Location' section, 'State' is selected. Under the 'ToolTips' section, 'Sum of Sales' is selected. Other options like 'Latitude' and 'Longitude' are also listed.





Tables and Matrix

What is a Table Visual?

- A grid that contains related data in a logical series of rows and columns. It may also contain headers and a row for totals.
- When to use?
 - To see and compare detailed data and exact values (instead of visual representations).
 - To display data in a tabular format.
 - To display numerical data by categories.

Region	State	Category	Sum of Sales	Gross Profit Margin	Count of Items
Central	Illinois	Furniture	28,274.52	-32.10%	
Central	Illinois	Office Supplies	19,907.91	-41.96%	
Central	Illinois	Technology	31,983.67	15.08%	
Central	Indiana	Furniture	11,496.71	18.97%	
Central	Indiana	Office Supplies	15,735.40	33.05%	
Central	Indiana	Technology	26,323.25	41.79%	
Grand Total:			2,297,200.86	12.47%	
Total					

What is a Matrix Visual?

- Matrix visual is similar to a table
- A matrix makes it easier to display data meaningfully across multiple dimensions -- it supports a stepped layout
- The matrix automatically aggregates the data and enables you to drill up/down
- You can also expand and collapse row headers

Area	Region	Total Sales	Gross Margin	Sales YoY Growth	Total Transactions
West	New Mexico	250,128.37	17.51%	33.42%	538
	Washington	2,818.56	29.36%	▲ 4298.50%	10
	Arizona	65,539.90	26.33%	▲ 230.77%	96
	Utah	11,133.54	-11.46%	▲ 78.36%	32
	California	2,460.64	19.39%	▲ 35.02%	7
	Idaho	146,388.34	20.06%	▲ 11.28%	344
	Montana	1,233.55	16.13%	▲ 4.23%	4
	Colorado	4,229.28	34.66%	★ -3.44%	2
	Oregon	10,299.81	-43.07%	▲ -47.04%	24
	Nevada	2,886.59	-13.06%	▲ -65.44%	15
	Wyoming	3,138.16	9.73%	▲ -100.00%	4
South	Tennessee	122,905.86	7.20%	▲ 31.30%	273
	Total	733,215.26	12.74%	▲ 20.36%	1687

Creating a Matrix Visual

- From the Visualisation Pane, select Matrix
- From the Fields pane, select the following:
 - Rows: Region, State, Category
 - Values: Sum of Sales, Gross Profit Margin, Count of Order ID (rename to No. of Transactions)
- ** Multiple rows allow you to drill down the data

Region	Sum of Sales	Gross Profit Margin	No. of Transactions
West	725,457.82	14.94%	1611
East	678,781.24	13.48%	1401
Central	501,239.89	7.92%	1175
South	391,721.91	11.93%	822
Total	2,297,200.86	12.47%	5009



State	Sum of Sales	Gross Profit Margin	No. of Transactions
California	457,687.63	16.69%	1021
New York	310,876.27	23.82%	562
Texas	170,188.05	-15.12%	487
Pennsylvania	116,511.91	-13.35%	288
Illinois	80,166.10	-15.73%	276
Washington	138,641.27	24.09%	256
Ohio	78,258.14	-21.69%	236
Total	2,297,200.86	12.47%	5009



Category	Sum of Sales	Gross Profit Margin	No. of Transactions
Office Supplies	719,047.03	17.04%	3742
Furniture	741,999.80	2.49%	1764
Technology	836,154.03	17.40%	1544
Total	2,297,200.86	12.47%	5009

Conditional Formatting

- Specify customized cell colors, including color gradients, based on field values
- Select Conditional formatting, and then select the type of formatting to apply
- Conditional formatting can be applied to any text or data field, as long as you base the formatting on a field that has numeric, color name or hex code, or web URL values.

TABLE: Top 10 weather states with afford				
State	Affordability	Weather	Overall rank	...
Hawaii	◆	45	1	10
Florida	▲	25	2	5
Louisiana	▲	29	3	36
Texas	▲	24	4	17
Georgia	▲	19	5	28
Mississippi	●	6	6	19
Alabama	●	10	7	16
South Carolina	▲	27	8	41
Arkansas	●	4	9	11
Arizona	◆	33	10	38

Format Gross Profit Margin (Icons)

- Select Gross Profit Margin → Conditional Formatting → Icons
- Apply the following settings

Icons - Gross Profit Margin

Format style Apply to

Rules Values only

What field should we base this on?

Gross Profit Margin

Icon layout Icon alignment

Left of data Top Style: ▼ — ▲

Rules

If value \geq -1 and < 0 then ▼

If value \geq 0 and < 0.1 then □

If value \geq 0.1 and \leq 1 then ▲

Reverse icon order + New rule

Learn more about conditional formatting OK Cancel

Region	Sum of Sales	Gross Profit Margin	No. of Transactions
West	725,457.82	14.94%	1611
California	457,687.63	16.69%	1021
Washington	138,641.27	24.09%	256
Arizona	35,282.00	-9.72%	108
Colorado	32,108.12	-20.33%	79
Oregon	17,431.15	-6.83%	56
Utah	11,220.06	22.70%	26
Total	2,297,200.86	12.47%	5009

Summary

- **Data Modelling with DAX**
 - Measures
 - Calculated Columns
 - Measures vs Calculated Columns
- **Creating Charts**
 - KPI, Map, Table, Matrix
 - Additional Charts
- **Modifying Chart Visuals**
 - Conditional Formatting

Microsoft

POWER BI

Lesson 4





Buttons and Navigation

Buttons PowerBI

- Types of buttons
- States of buttons
- Creating buttons

Buttons in Power BI have four possible states:

- Default: How buttons appear when not hovered over or selected.
- On hover: How buttons appear when hovered over.
- On press: How buttons appear when selected.
- Disabled: How buttons appear when they can't be selected.

Types of Buttons

Bookmark

The bookmark button takes you to the location and settings as defined for that bookmark.

Drillthrough

Drilling through takes you to a different report page and the data on that destination page is presented according to the filters and selections you've made on the source page.

Back

A back button may have an arrow icon and when you select it, Power BI takes you back to the previous page. Back buttons are often used with drillthrough.

Page Navigation

Page navigation buttons take you to a different page in the same report.

Q&A

Selecting a Q&A button opens the Power BI Q&A Explorer window. The Q&A window displays on top of the report page and can be closed by selecting the X.

Web URL

Web URL buttons open a new browser window. Since the page opens in a separate window, close the window or select your Power BI tab to return to the Power BI report.

Navigation Bar

These links allow users to move through different pages or screens easily

Page Navigation

Sales by Product

Product	Sales
Paseo	32M
VTT	21M
Velo	19M
Amarilla	18M
Montana	15M
Carretera	13M

Profit by Product

Product	Profit
Paseo	5M
VTT	3M
Amarilla	2.5M
Velo	2.2M
Montana	1.8M
Carretera	1.5M

Units Sold by Product

Product	Units Sold
Paseo	450000
VTT	300000
Velo	250000
Amarilla	200000
Montana	180000
Carretera	150000

Gross Sales by Product

Product	Gross Sales
Paseo	35.61M
VTT	21.97M
Velo	19.83M
Amarilla	19.04M
Montana	16.55M
Carretera	14.94M

Page Navigation Buttons:

- First Page
- Second Page
- Third Page
- Fourth Page
- Fifth Page
- Sixth Page
- Seventh Page
- Eight Page
- + (New Page)

Button Demo - Page Navigation

Objective: Create a button that links to the other pages

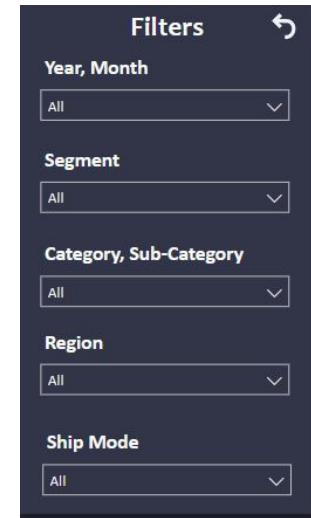
1. Insert ribbon, select Buttons
2. Customize a button (Shape, style, rotation)
3. Select the action for a button (Page Navigation, Destination)



Button Demo - Clear Filters

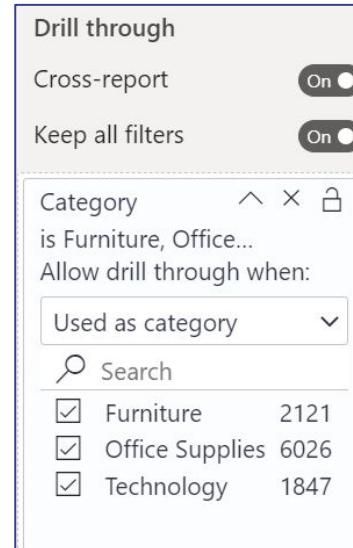
Allows user to reset the filter selected

1. Add a button for reset
2. Go to View -> Bookmarks → Add (Ensure that the page has no set filters)
3. Rename the bookmark to “Clear Filters”
4. Link the “Clear Filters” Bookmark to the Action of the reset button
5. You need to create 1 Bookmark for each page



Drillthrough Demo

- Create a destination target page in your report that focuses on a specific entity (i.e. category, product etc)
- Allows user to right-click a data point in other source report pages, they drill through to the target page to get details that are filtered to that context





Dashboard Types and Insights

Types of Dashboards

1. **Operational dashboards** tell you what is happening now
 - monitoring and managing operations that have a shorter time horizon
2. **Strategic dashboards** track key performance indicators.
 - monitoring the long-term company strategy
3. **Analytical dashboards** process data to identify trends
 - contains a vast amount of data created and used by analysts to provide support to executives

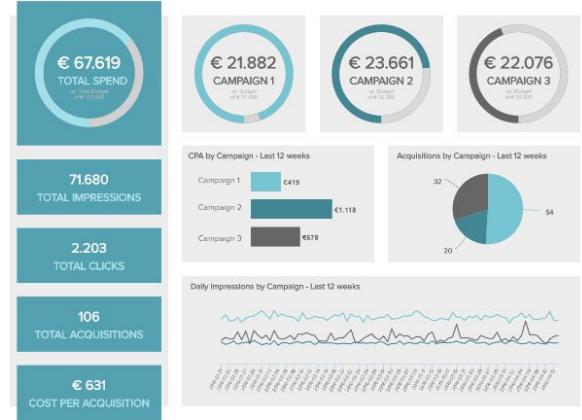


Chart Insights

Here are some questions you may consider:

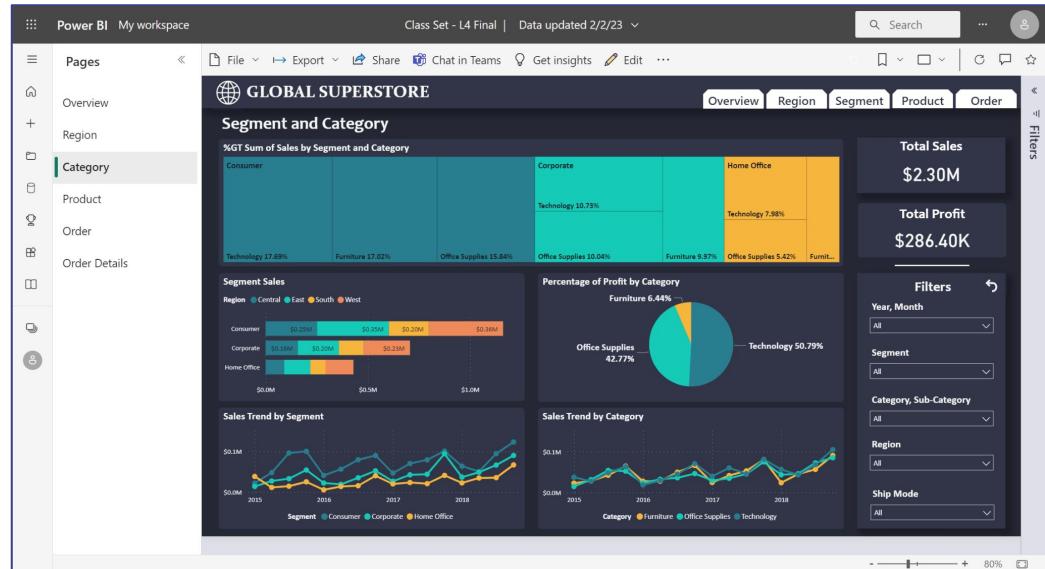
- What is the purpose of the chart?
- What insight does it gives?
- Does my chart contribute in telling the story to the audience?



Publish Dashboard

Publish Dashboard

- In Power BI Desktop, choose File → Publish → Publish to Power BI or select Publish on the Home ribbon.
- Sign in to Power BI
- Select Destination → My workspace



Summary

- **Buttons and Navigation**
 - Bookmark
 - Drillthrough
 - Back
 - Page Navigation
 - Navigation Bar
- **Dashboard Types**
- **Chart Insights**
- **Reorganizing Dashboards**
- **Publishing Dashboards**

Assessment Notes

Select Dataset

Pick from the files given or self-source

Follow Guidelines

Look through the rubrics

Consistency

Work on it progressively

Deadline

1 March 2023 (2359)

Submission

Zip all supporting files and PowerBI file into a folder and **email it to xychan002@suss.edu.sg** before the deadline

Important Notes for issuance of Certificate of Completion:

- (1) For Zoom video lessons, students are required to turn on their cameras throughout the lesson. Please ensure that your internet connection works well as to avoid missing out information. For F2F lessons, students are required to be present throughout the lessons. Students who did not observe this requirement will not be issued the Certificate of Completion.
- (2) Certificate of Completion will only be issued to participants who have attended all lessons, turned on their video camera throughout the lessons, submitted and obtain a Pass grade for the end-of-workshop assignment and uploaded it to Portfolium within the deadline given by the Teaching Assistants. Exemption may be granted on a case-by-case basis with email to Teaching Assistants xychan002@suss.edu.sg and copied to careerdev@suss.edu.sg.
- (3) Students will not be awarded with the Certificate will be notified 2 weeks after end of workshop and may clarify with the Teaching Assistants within 3 days of notification. A reply to the Teaching Assistants is required to acknowledge the notification, after which no exception will be made to issue the Certificate.