Microsoft

# POWER BI

Course 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 |

# 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 3 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.

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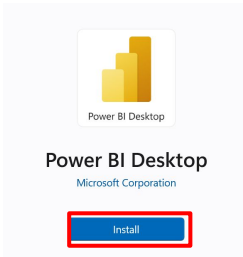
# POWER BI

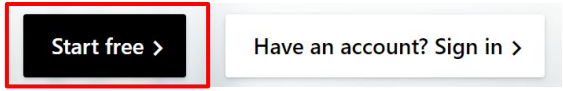
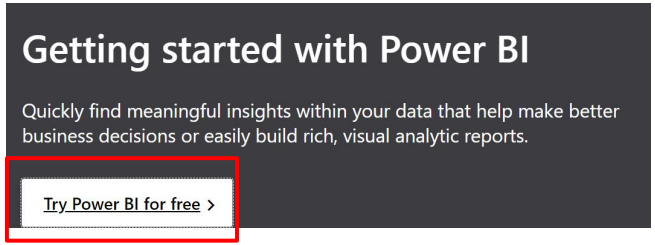
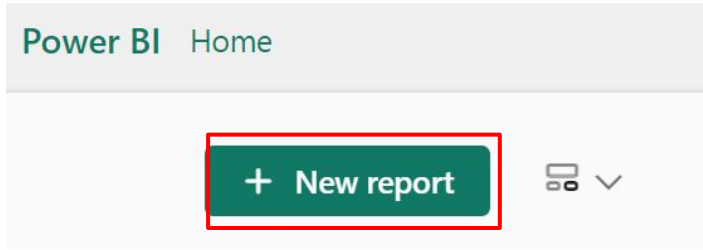
Installation Guide

# Installation for Windows

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

# PowerBI Online for Mac Users

** Note that it is always recommended to use the PowerBI Desktop version as the online version does not have Power Query Editor and does not allow you to load datasets directly.

| | |
|---|---|
| **Step 1:** | Go to download link: https://powerbi.microsoft.com/ |
| **Step 2:** | Click on Start Free   |
| **Step 3:** | Click on Try Power BI for free   |
| **Step 4:** | Click on New Report   |

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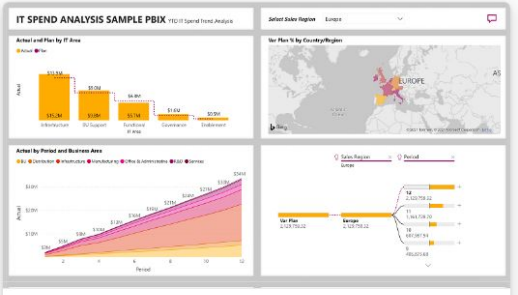
# POWER BI

Usage and Samples

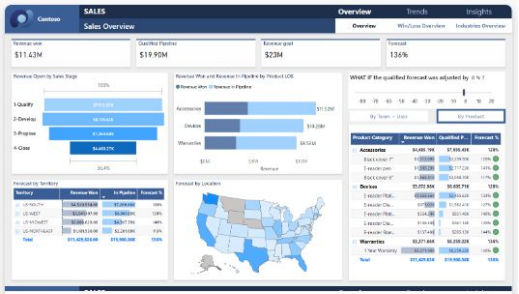
# What PowerBI can do: Sample reports


Revenue Opportunities

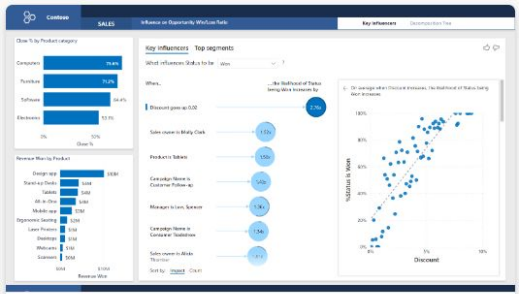



Corporate Spend


Employee Hiring and History



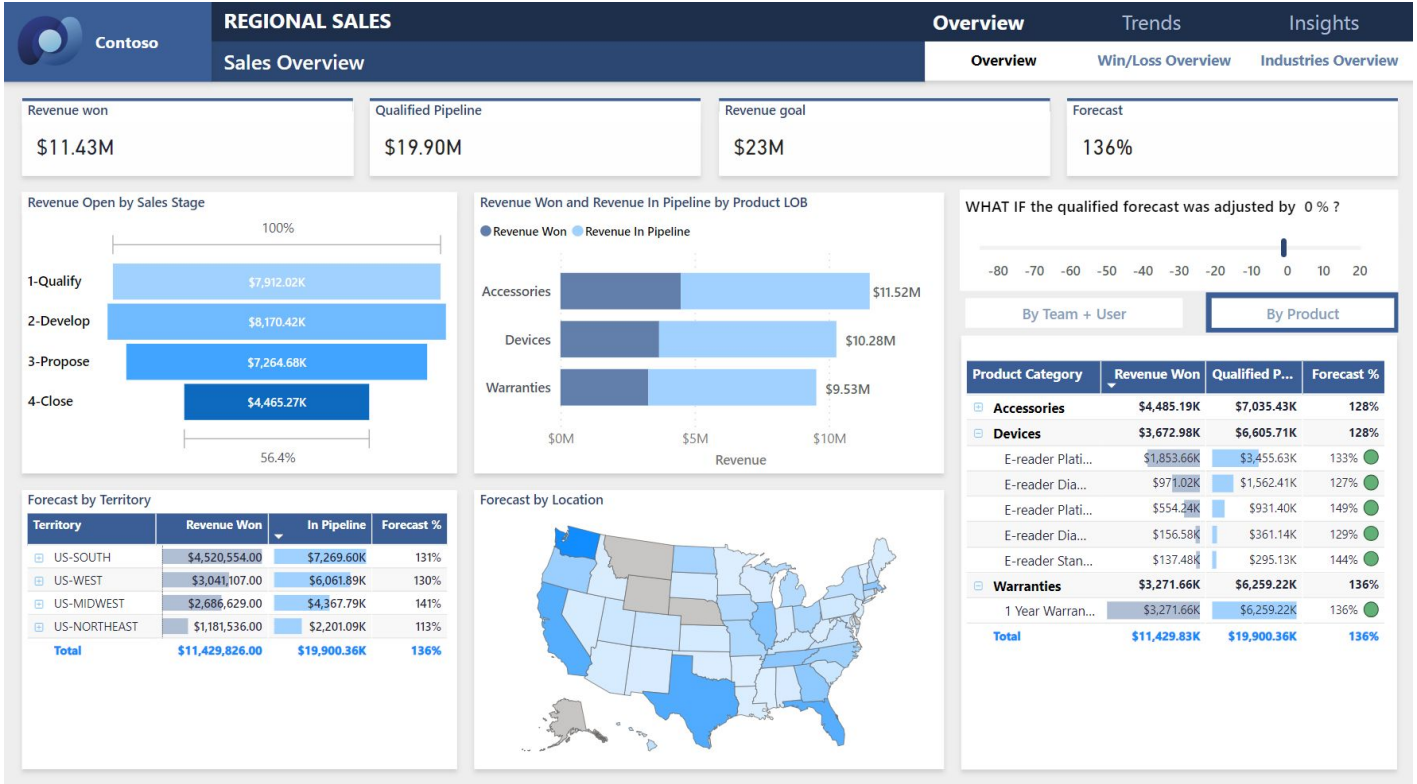

Regional Sales Sample



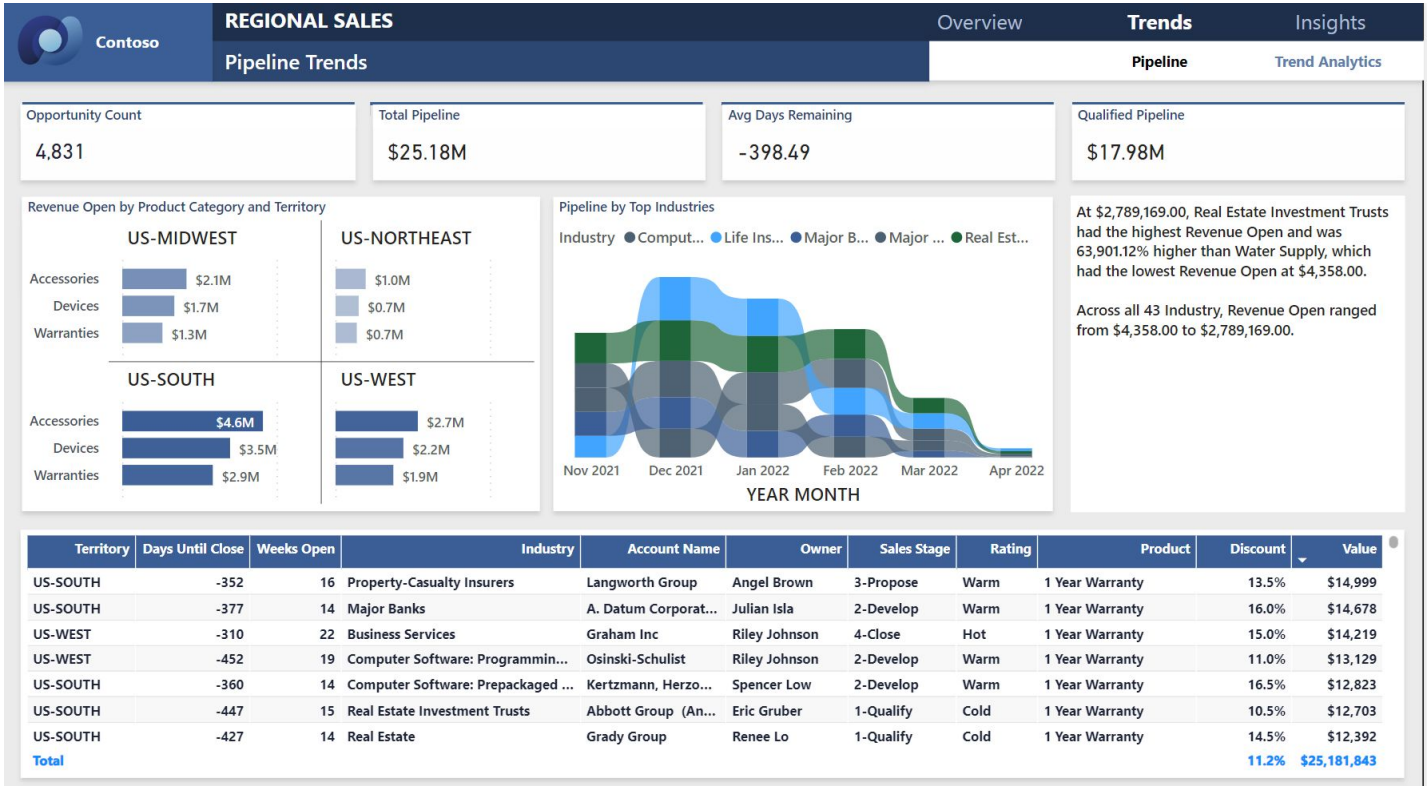

Artificial Intelligence Sample

**and more!**

# Regional Sales Sample - Overview

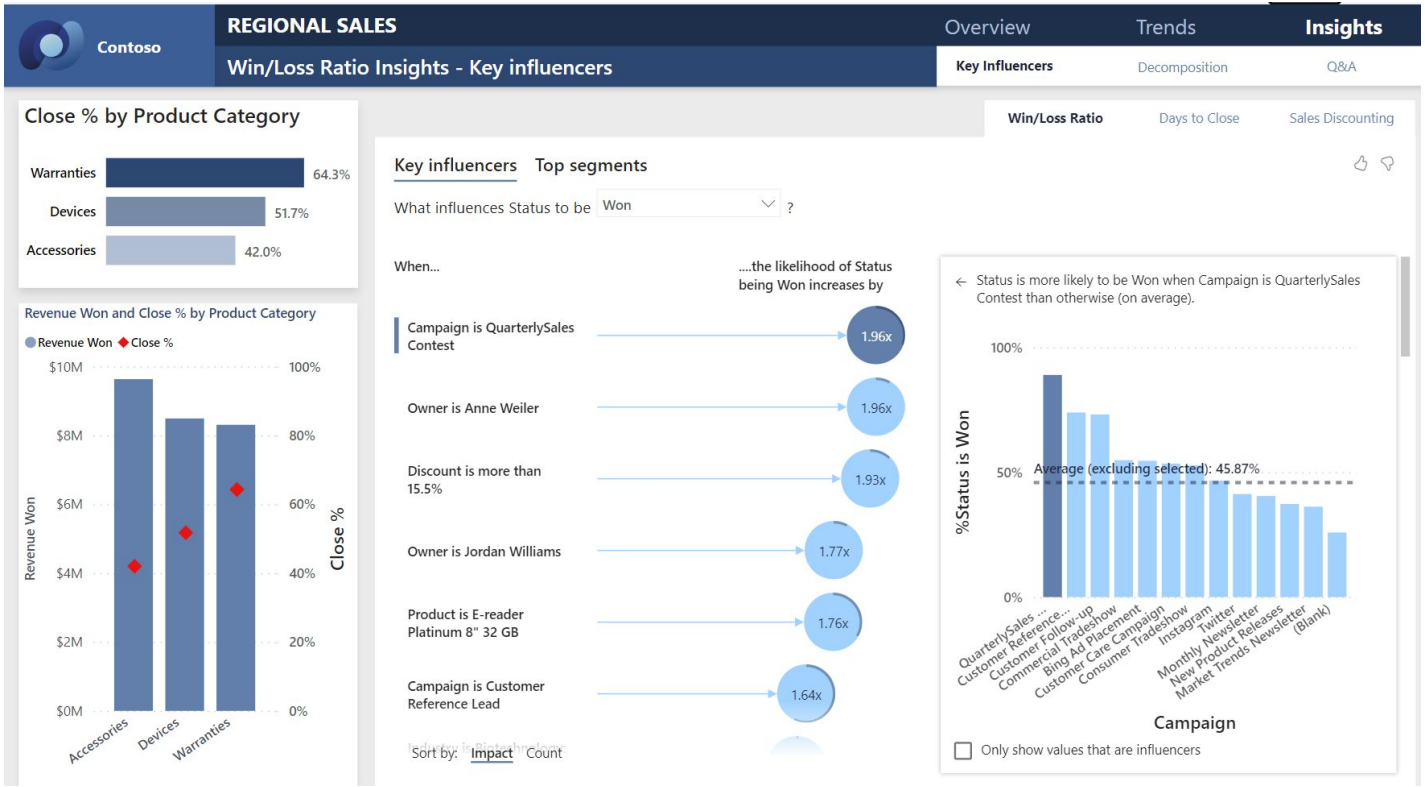


# Regional Sales Sample - Trends




| Territory | Days Until Close | Weeks Open | Industry | Account Name | Owner | Sales Stage | Rating | Product | Discount | Value |
|---|---|---|---|---|---|---|---|---|---|---|
| US-SOUTH | -352 | 16 | Property-Casualty Insurers | Langworth Group | Angel Brown | 3-Propose | Warm | 1 Year Warranty | 13.5% | $14,999 |
| US-SOUTH | -377 | 14 | Major Banks | A. Datum Corporat... | Julian Isla | 2-Develop | Warm | 1 Year Warranty | 16.0% | $14,678 |
| US-WEST | -310 | 22 | Business Services | Graham Inc | Riley Johnson | 4-Close | Hot | 1 Year Warranty | 15.0% | $14,219 |
| US-WEST | -452 | 19 | Computer Software: Programmin... | Osinski-Schulist | Riley Johnson | 2-Develop | Warm | 1 Year Warranty | 11.0% | $13,129 |
| US-SOUTH | -360 | 14 | Computer Software: Prepackaged ... | Kertzmann, Herzo... | Spencer Low | 2-Develop | Warm | 1 Year Warranty | 16.5% | $12,823 |
| US-SOUTH | -447 | 15 | Real Estate Investment Trusts | Abbott Group (An... | Eric Gruber | 1-Qualify | Cold | 1 Year Warranty | 10.5% | $12,703 |
| US-SOUTH | -427 | 14 | Real Estate | Grady Group | Renee Lo | 1-Qualify | Cold | 1 Year Warranty | 14.5% | $12,392 |
| Total | | | | | | | | | 11.2% | $25,181,843 |

# Regional Sales Sample - Insights



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# POWER BI

Lesson 1

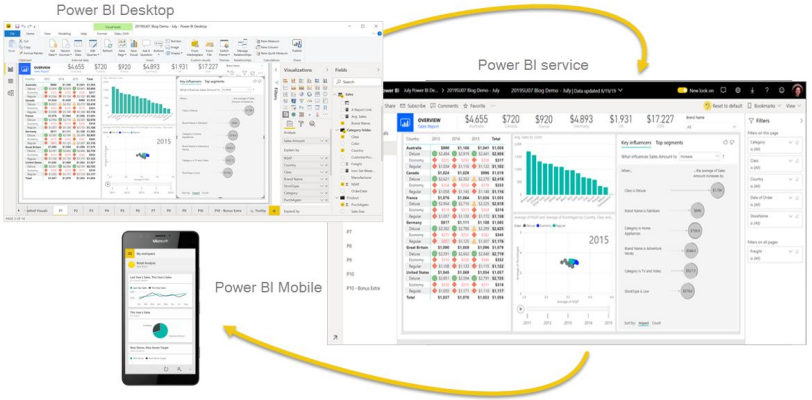
# What is Power BI?

**Power BI is**

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

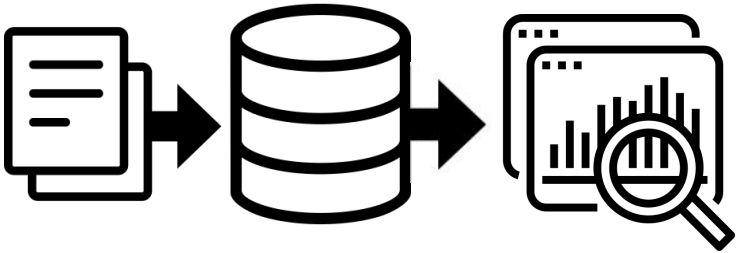

**We will be using it to**

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



# Why Power BI?

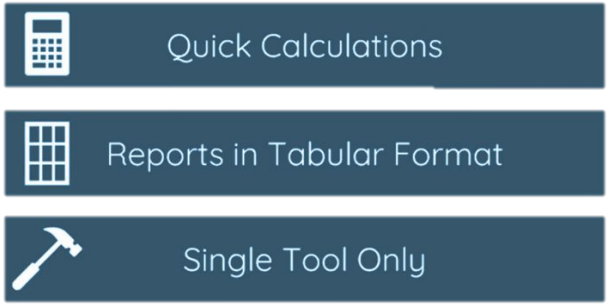
- **Data Preparation**
  - Data coming from different sources
  - Not properly formatted
    (wrong format, redundant columns or data)
- **In-depth Data Analysis**
  - Calculations
    (averages, date difference or other advanced calculations)
- **Visualisation**
  - Having your data show actionable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



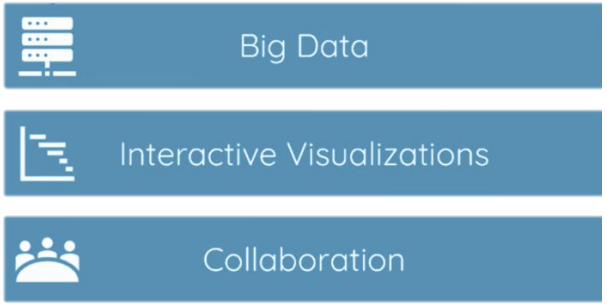
# Power BI vs Excel

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

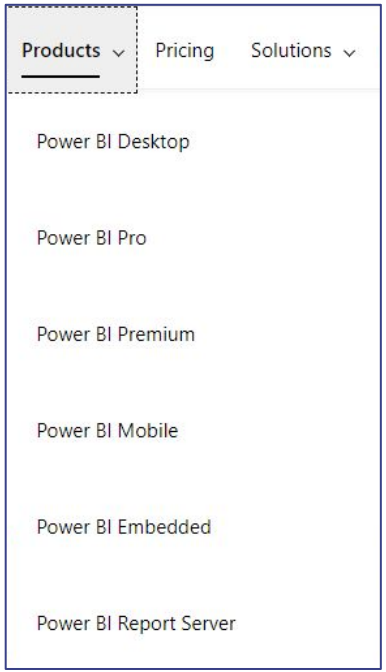
## Excel




## Power BI



# 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

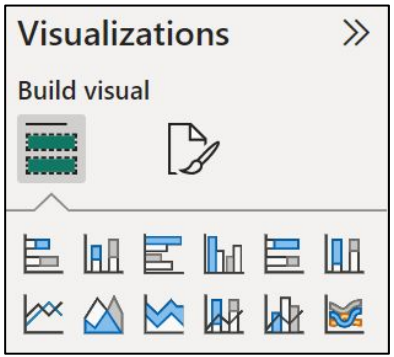
# Building Blocks

- **Visualizations (Visuals)**
- **Datasets**
- **Reports**
- **Dashboards**
- **Tiles**

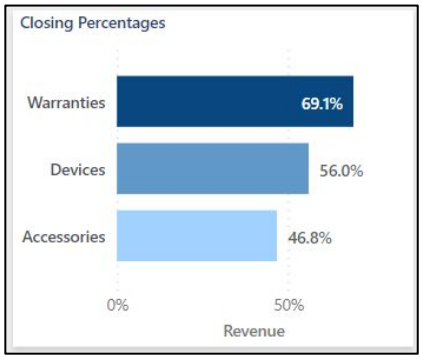
# 1. Visualizations

**Visual representation of data like charts**

- Can be simple or complex
- goal of a visual is to present data in a way that provides context and insights



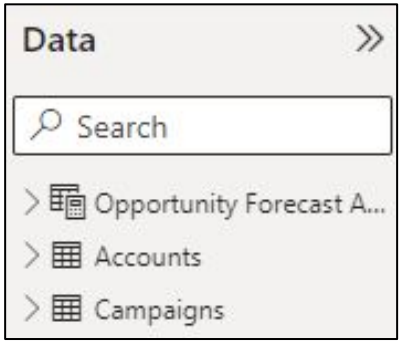


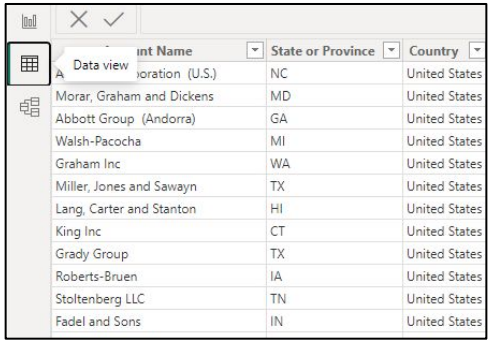


# 2. Datasets

**Collection of data like excel workbooks, csv**

- Can be based on a single table or a combination of many different sources
- Can be filtered for targeted insights generation



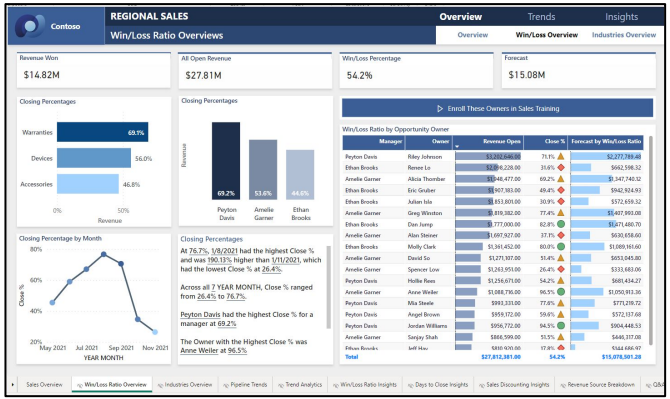



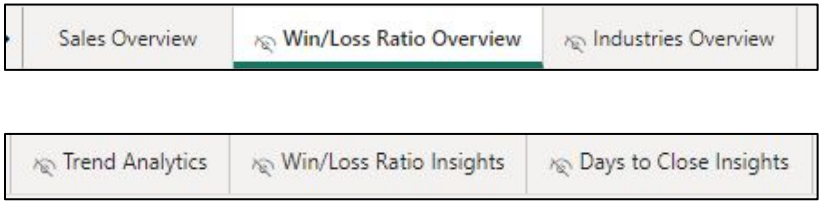

| Name | State or Province | Country |
|---|---|---|
| oration (U.S.) | NC | United States |
| Morar, Graham and Dickens | MD | United States |
| Abbott Group (Andorra) | GA | United States |
| Walsh-Pacocha | MI | United States |
| Graham Inc | WA | United States |
| Miller, Jones and Sawayn | TX | United States |
| Lang, Carter and Stanton | HI | United States |
| King Inc | CT | United States |
| Grady Group | TX | United States |
| Roberts-Bruen | IA | United States |
| Stoltenberg LLC | TN | United States |
| Fadel and Sons | IN | United States |

# 3. Reports

**Collection of visualizations that appear together on one or more pages**

- Items are related to one another in telling a story
- Includes many visualizations, on multiple pages

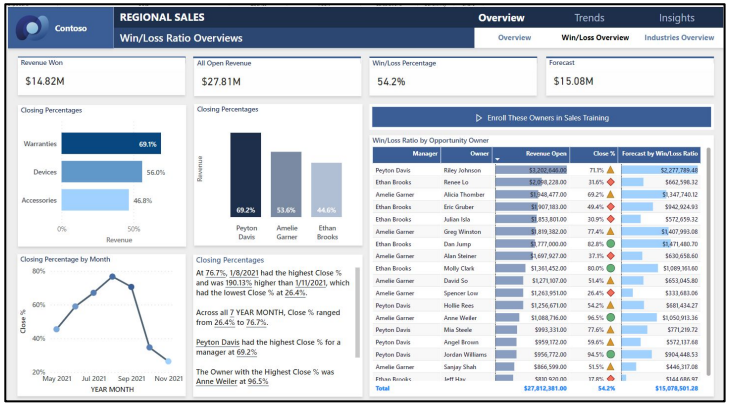


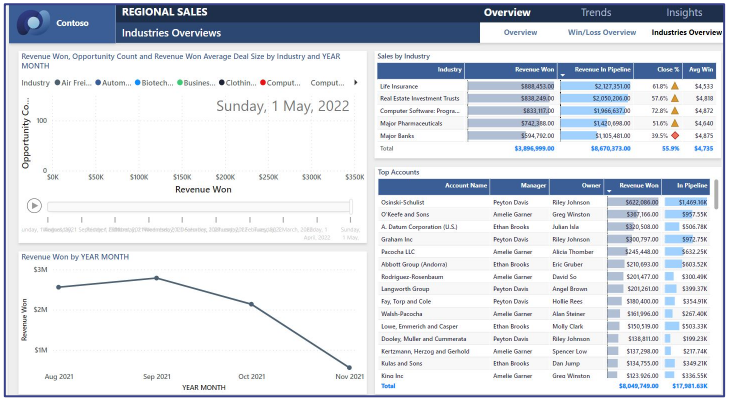



# 4. Dashboards

**Collection of visuals that provide quick insight into the data or story you're trying to present**

- Must fit on a single page (canvas)

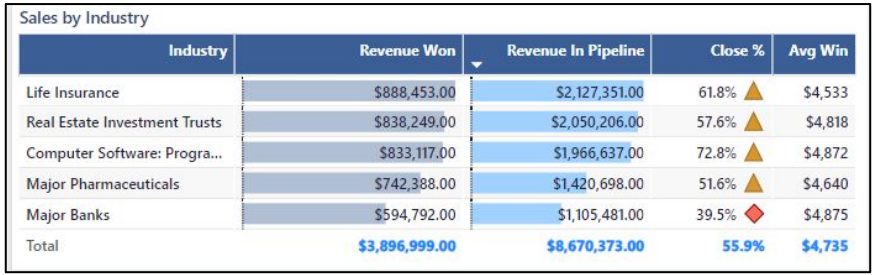


# 5. Tiles

**A single visualization on a dashboard**

- Rectangular box that holds an individual visual
- Can be moved and arranged to fit the aesthetics of the dashboard



Sales by Industry

| Industry | Revenue Won | Revenue In Pipeline | Close % | Avg Win |
|---|---|---|---|---|
| Life Insurance | $888,453.00 | $2,127,351.00 | 61.8% | $4,533 |
| Real Estate Investment Trusts | $838,249.00 | $2,050,206.00 | 57.6% | $4,818 |
| Computer Software: Progra... | $833,117.00 | $1,966,637.00 | 72.8% | $4,872 |
| Major Pharmaceuticals | $742,388.00 | $1,420,698.00 | 51.6% | $4,640 |
| Major Banks | $594,792.00 | $1,105,481.00 | 39.5% | $4,875 |
| Total | $3,896,999.00 | $8,670,373.00 | 55.9% | $4,735 |

# Power BI Creation Workflow

| | | |
|---|---|---|
| Query Editor<br>*Data Preparation* | Clean & Transform | Extract<br>Transform<br>Load |
| Data & Model View<br>*Data Analysis* | Inspect, Explore & Understand Data | View & Edit Relationships between tables |
| Report View<br>*Data Visualisation* | Create Reports with Multiple Visuals | |

Query Editor

Data Model

# Download Data Sources

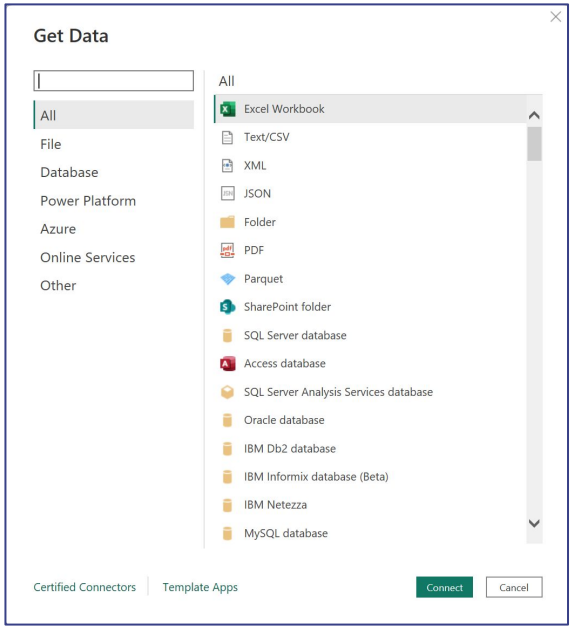
**Link:** https://github.com/channxy/PowerBI-Course

**Dataset:** Class Dataset >> Sample - Superstore.xls

# Connecting Data Sources

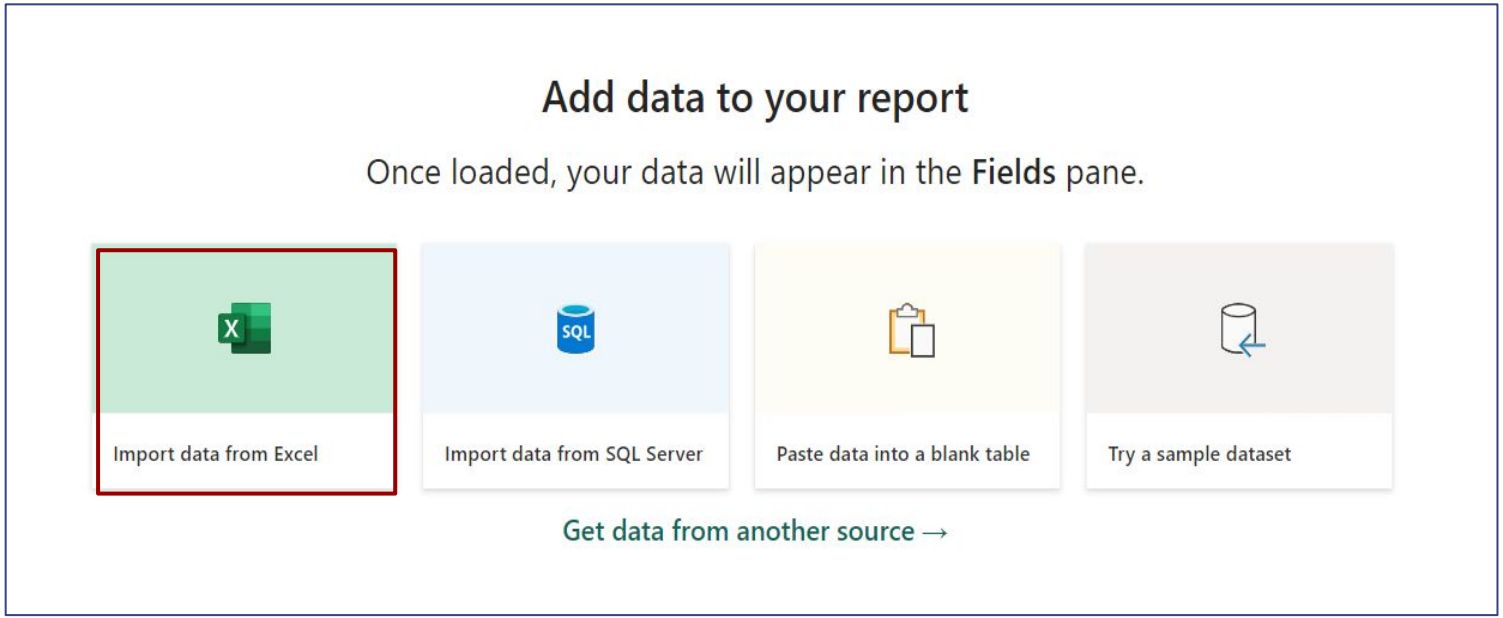
# Connecting Power BI to Source Files

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

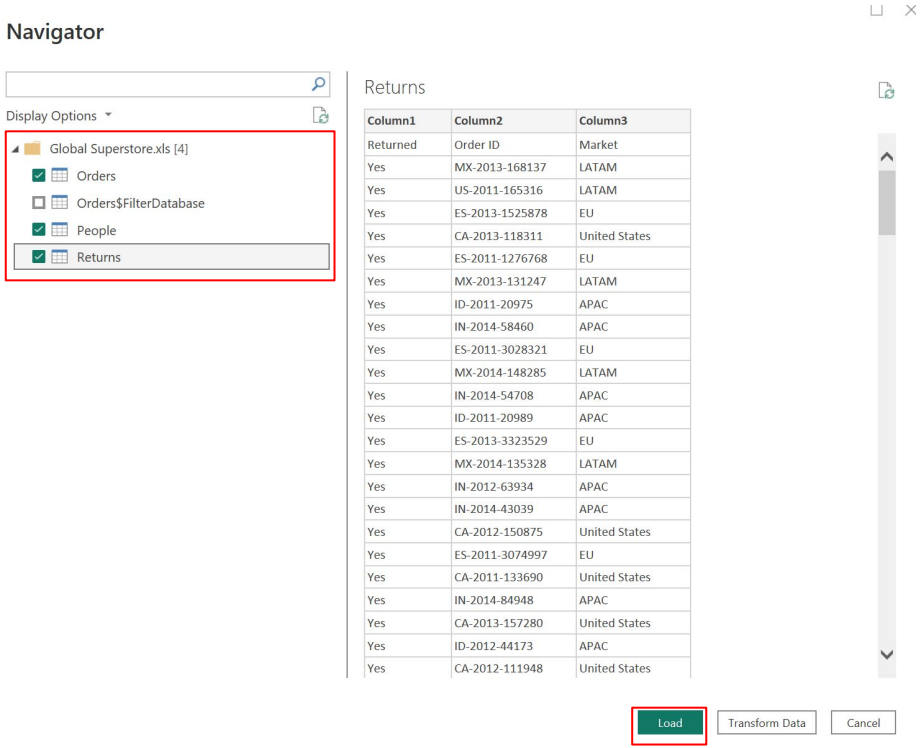


# Connecting Power BI to Source Files

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



# Connecting Power BI to Source Files

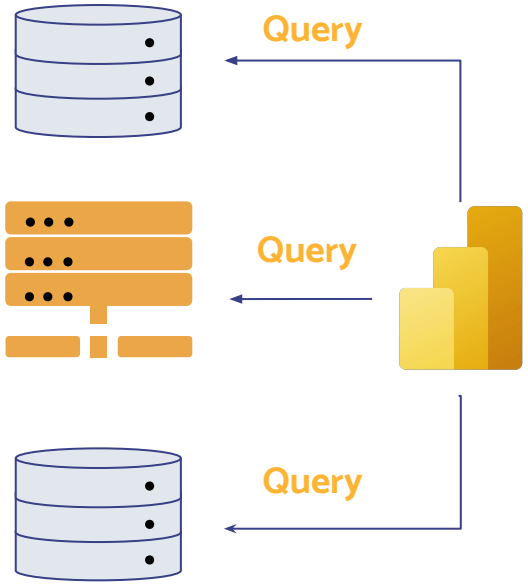



| Column1 | Column2 | Column3 |
|---|---|---|
| Returned | Order ID | Market |
| Yes | MX-2013-168137 | LATAM |
| Yes | US-2011-165316 | LATAM |
| Yes | ES-2013-1525878 | EU |
| Yes | CA-2013-118311 | United States |
| Yes | ES-2011-1276768 | EU |
| Yes | MX-2013-131247 | LATAM |
| Yes | ID-2011-20975 | 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

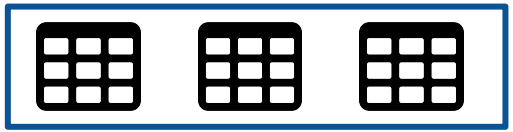



Remove duplicate & unrequired data

Fix errors, missing values, empty fields

Format data (number, text, date, ...)

Combine multiple data sources

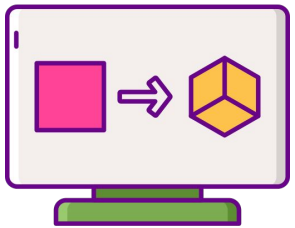


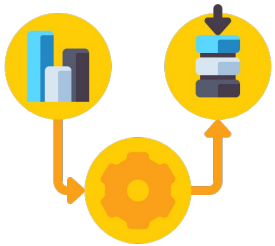
Query Data → Clean Data → Analyse / Visualise Data

# 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 |





# You might have noticed

- The headers for the “People” and “Return” sheet was not automatically detected by Power BI

Orders

| Row ID | Order ID | Order Date |
|---|---|---|
| 32298 | CA-2012-124891 | 31/7/2012 |
| 26341 | IN-2013-77878 | 5/2/2013 |
| 25330 | IN-2013-71249 | 17/10/2013 |
| 13524 | ES-2013-1579342 | 28/1/2013 |
| 47221 | SG-2013-4320 | 5/11/2013 |
| 22732 | IN-2013-42360 | 28/6/2013 |

People

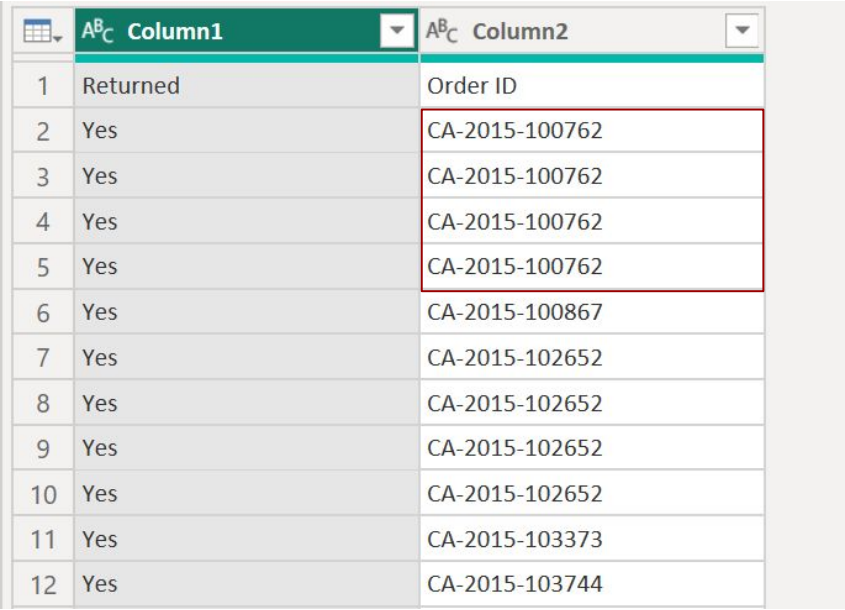
| Column1 | Column2 |
|---|---|
| Person | Region |
| Anna Andreadi | Central |
| Chuck Magee | South |
| Kelly Williams | East |
| Matt Collister | West |

Returns

| Column1 | Column2 |
|---|---|
| Returned | Order ID |
| Yes | MX-2013-168137 |
| Yes | US-2011-165316 |
| Yes | ES-2013-1525878 |
| Yes | CA-2013-118311 |

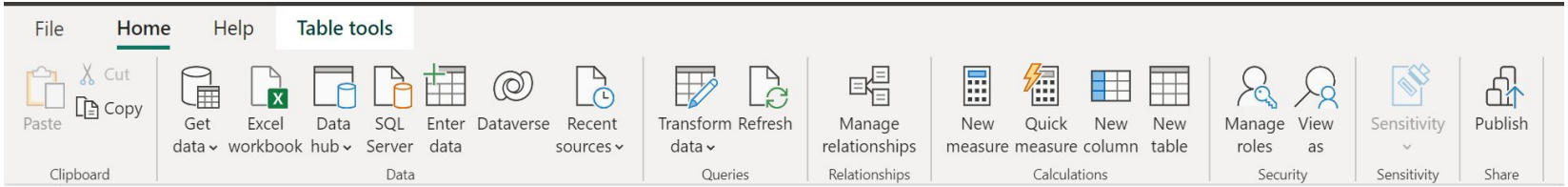
# You might have noticed

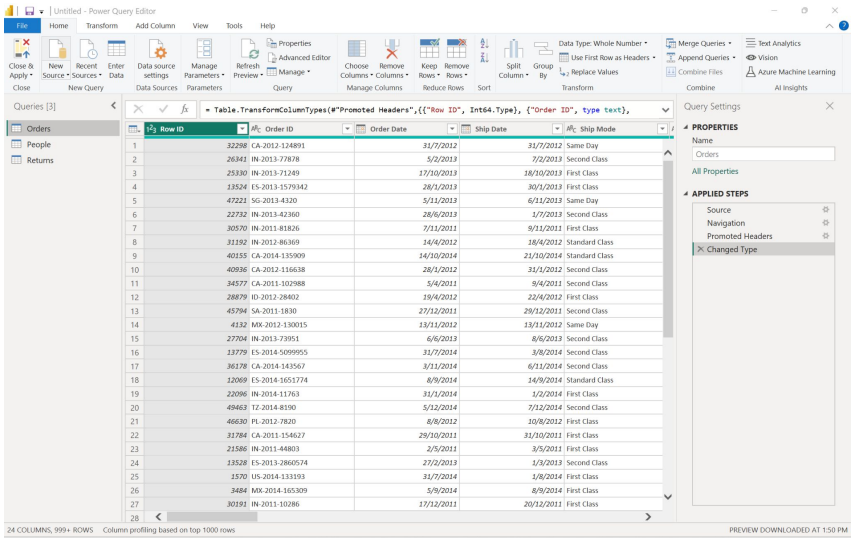
- The “Return” sheet has multiple rows that are duplicated



| | Column1 | Column2 |
|---|---|---|
| 1 | Returned | Order ID |
| 2 | Yes | CA-2015-100762 |
| 3 | Yes | CA-2015-100762 |
| 4 | Yes | CA-2015-100762 |
| 5 | Yes | CA-2015-100762 |
| 6 | Yes | CA-2015-100867 |
| 7 | Yes | CA-2015-102652 |
| 8 | Yes | CA-2015-102652 |
| 9 | Yes | CA-2015-102652 |
| 10 | Yes | CA-2015-102652 |
| 11 | Yes | CA-2015-103373 |
| 12 | Yes | CA-2015-103744 |

# Data Transformation



# Power Query Editor

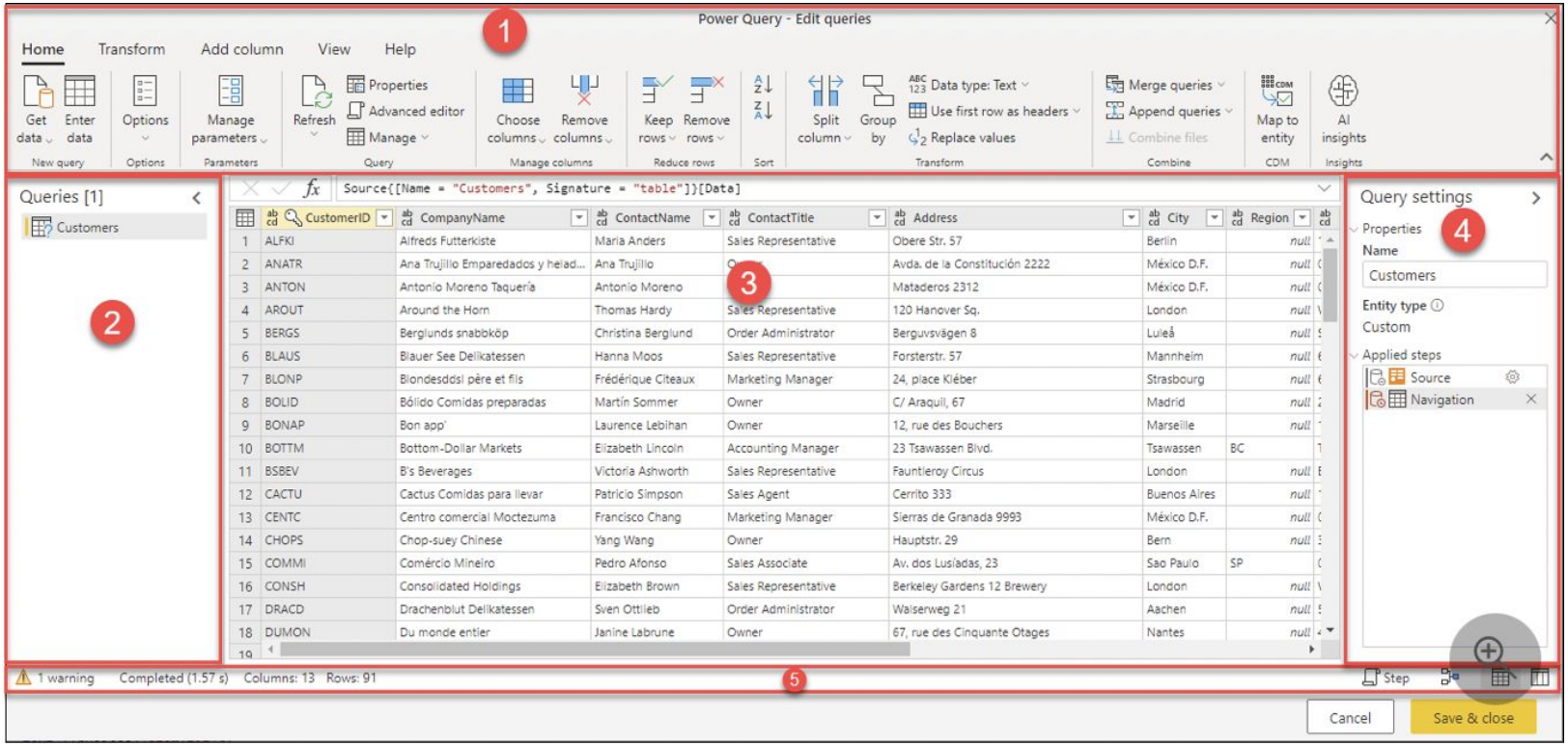
**Data preparation tool**

- It is a graphical interface that allows you to connect to various data sources, transform and clean the data, and prepare it for analysis and visualization.
- Allows you to load clean and structured data into Power BI

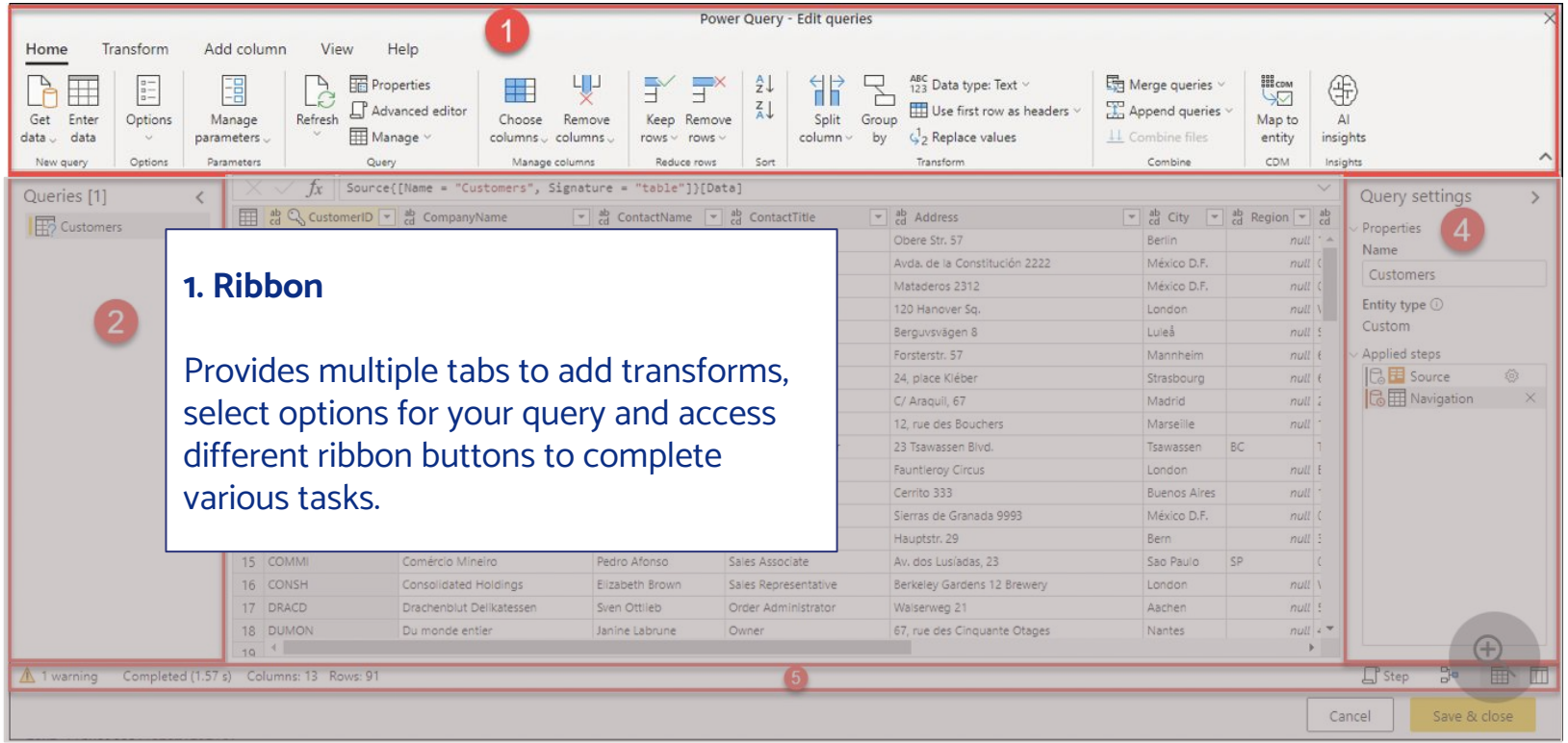
# PQE Key Features

- **Data Source Connectivity**
  - databases, files (such as Excel, CSV, and JSON), online services (such as SharePoint and Azure), and more
- **Data Transformation**
  - filtering, sorting, merging, splitting, grouping, pivoting, and aggregating data
- **Data Cleansing (ensure data accuracy)**
  - removing duplicates, changing data types, handling null values, renaming columns, and applying formatting
- **Formula Language (M)**
  - write custom data transformation logic
- **Applied Steps**
  - step-by-step history allows you to review and modify the transformations applied to the data
- **Query Dependencies**
  - allowing for data mashups and combining data from multiple sources

# Power Query Editor Tour



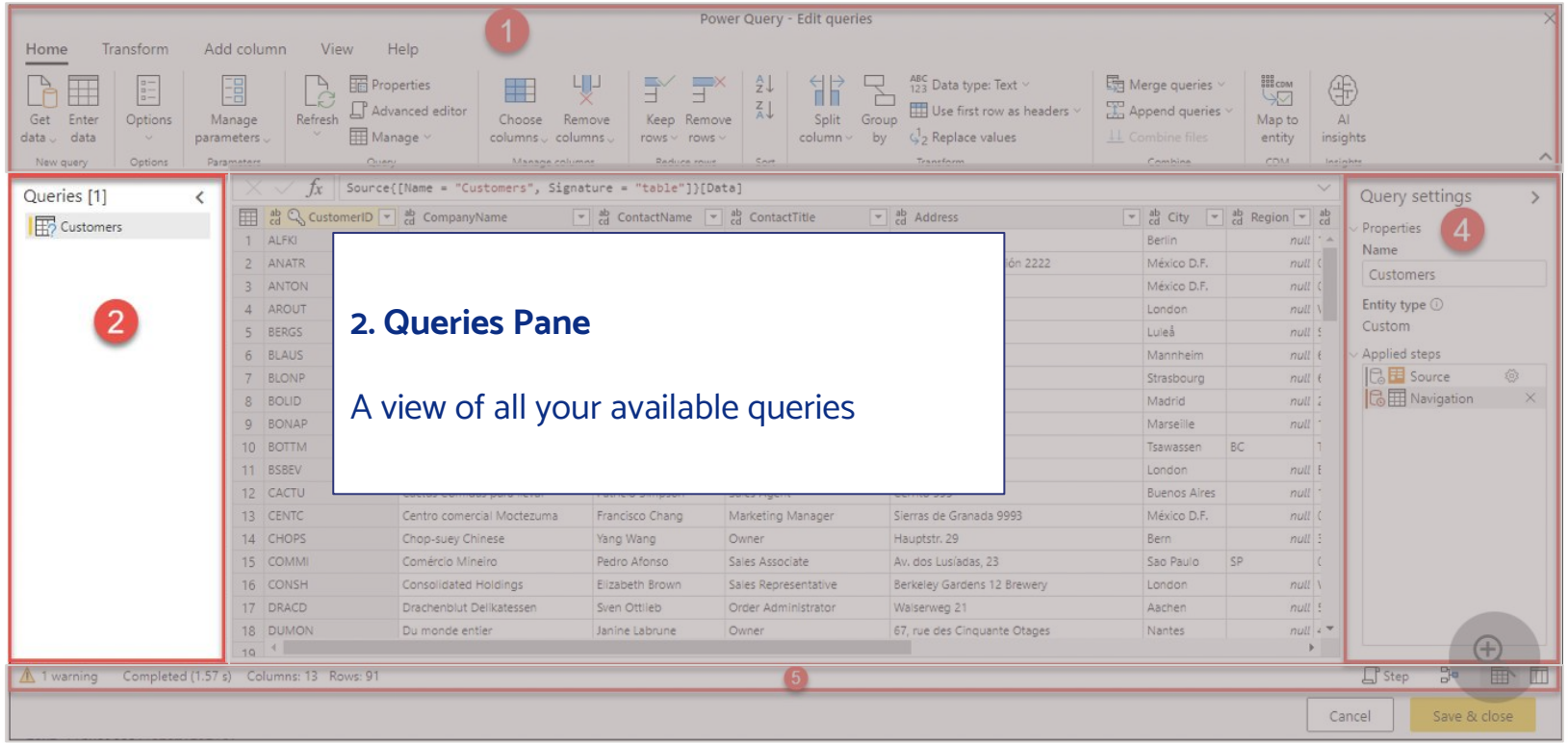
# Power Query Editor Tour



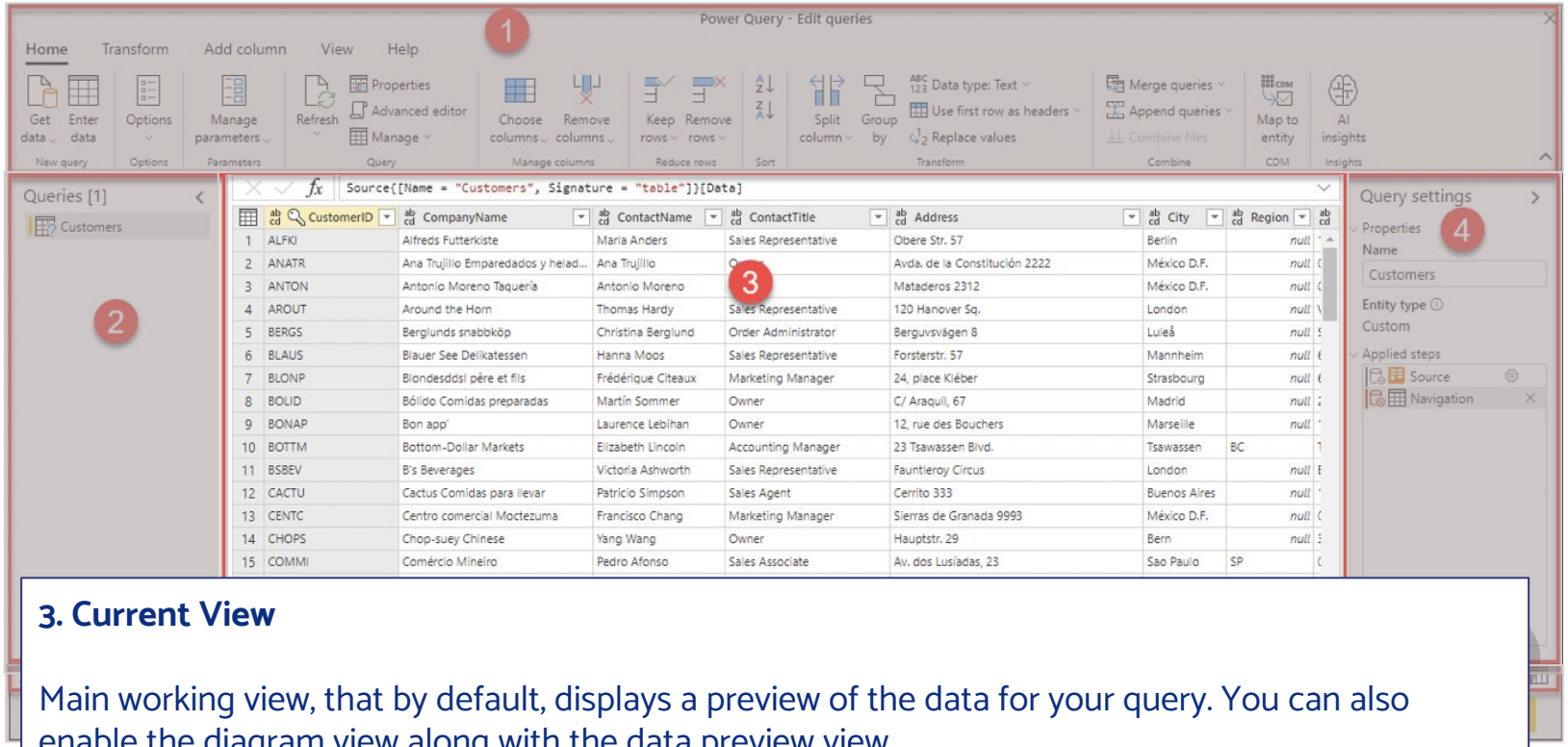

**1. Ribbon**

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

# Power Query Editor Tour



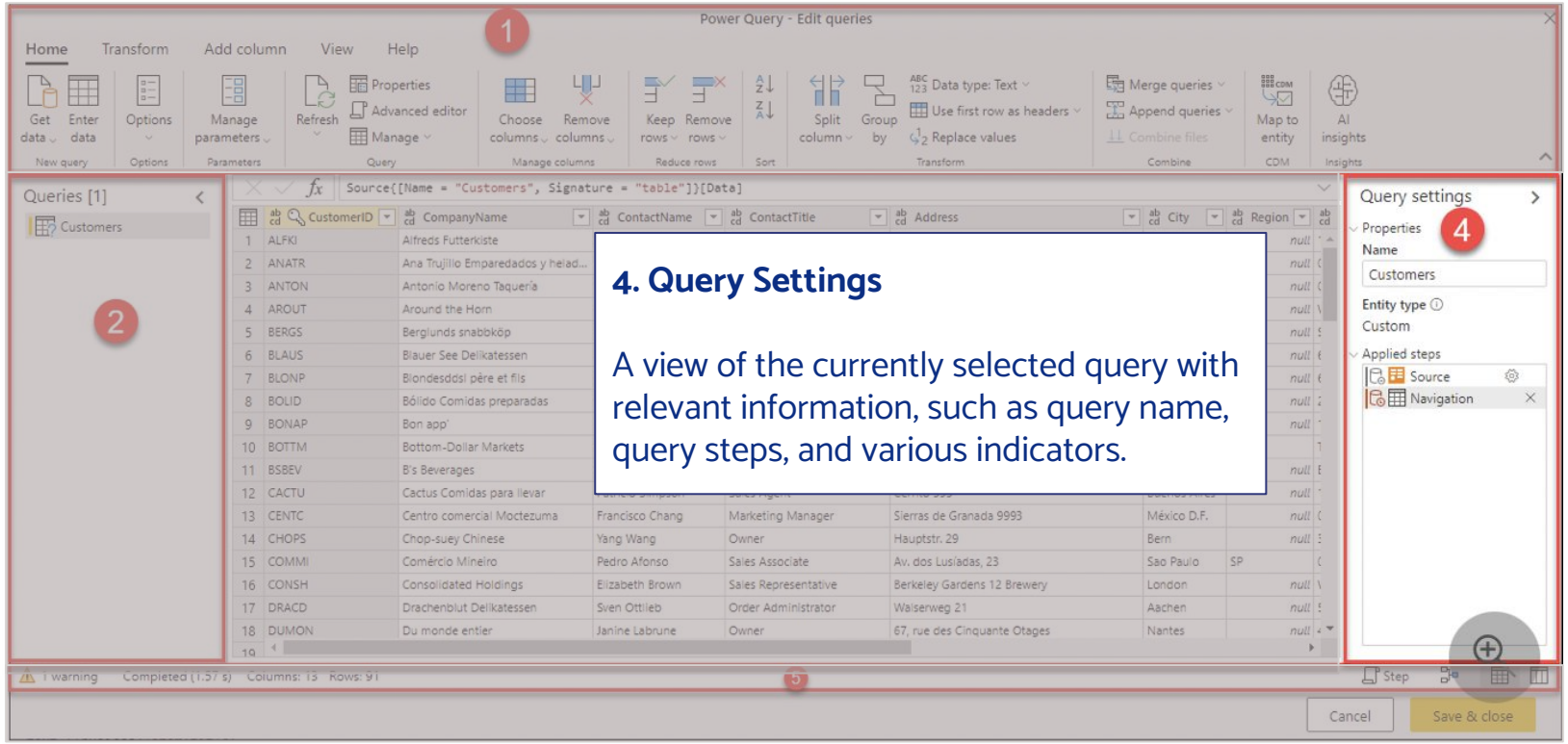
# Power Query Editor Tour



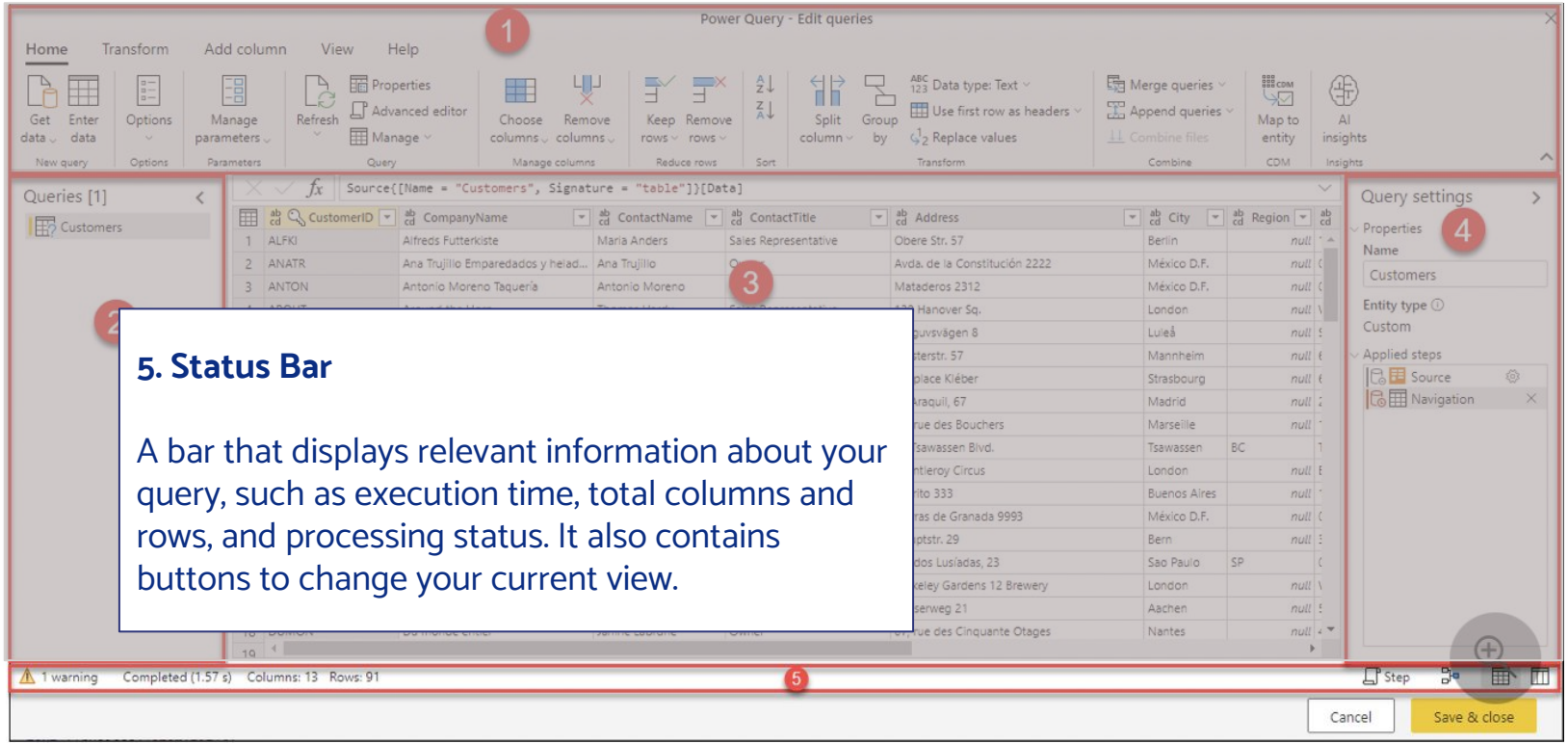

### 3. Current View

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



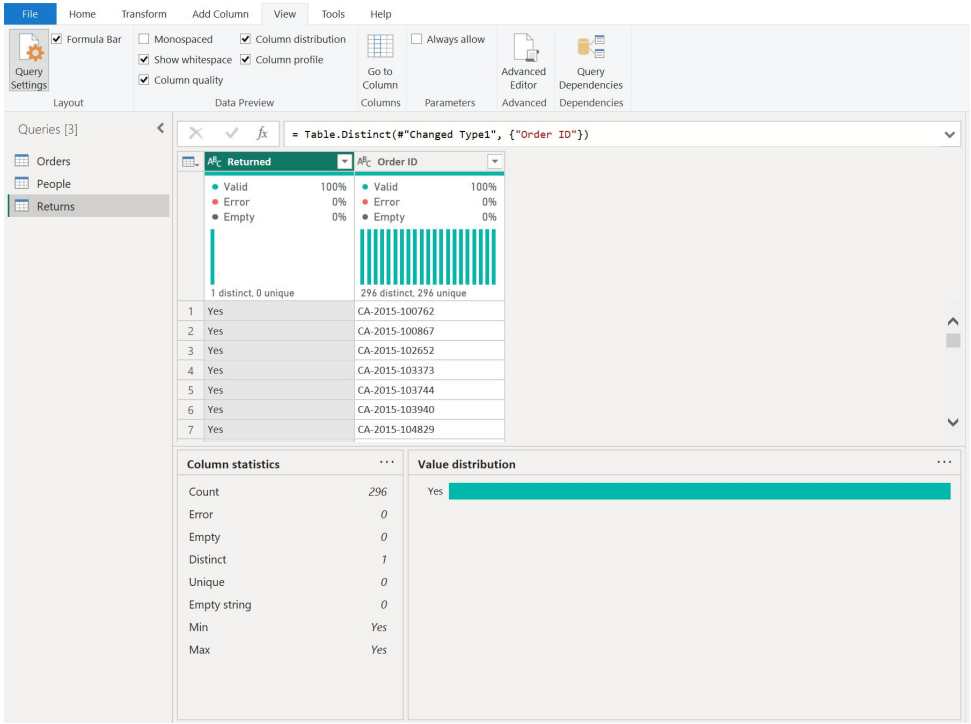
# Power Query Editor Tour




**5. Status Bar**

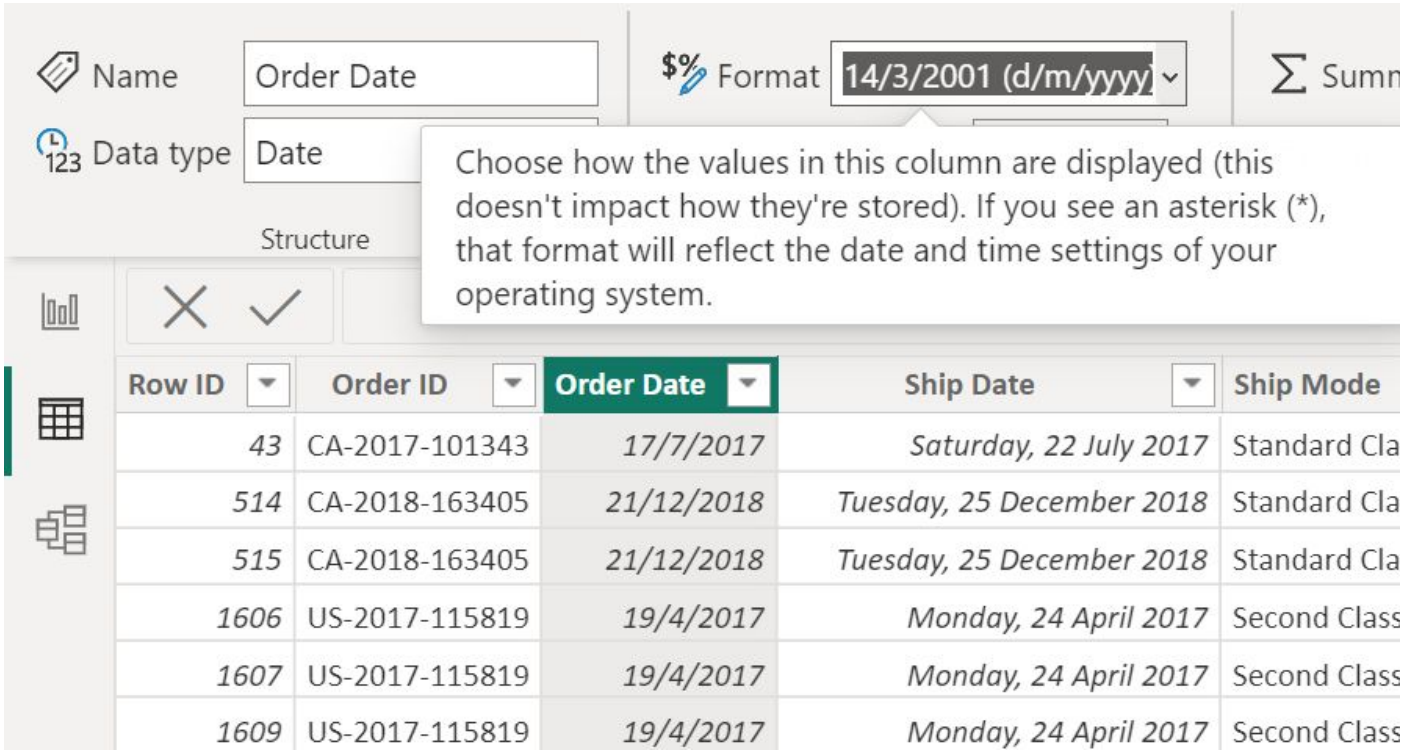
A bar that displays relevant information about your query, such as execution time, total columns and rows, and processing status. It also contains buttons to change your current view.

# 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




| 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 |

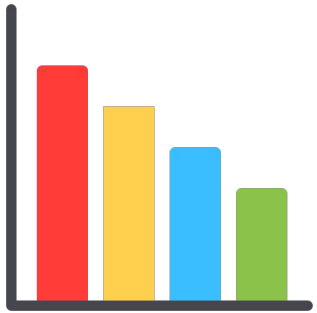
Sales, Discount and Profit should be listed in the “Currency” format so that the charts will automatically display the $ as well.

You can set them as:

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

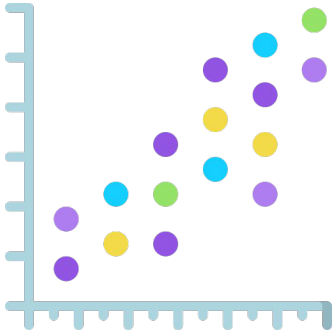
# Creating Charts

# Common Chart Types



**Bar Chart**

Easily displays ranks of values

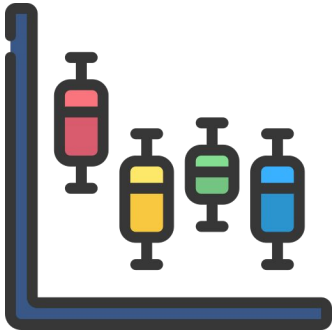


**Scatter Plot**

Demonstrates the relationship between continuous variables

**Line Graph**

Demonstrates the relationship between an amount and rate



**Box Plot**

Summarises the distribution of the data

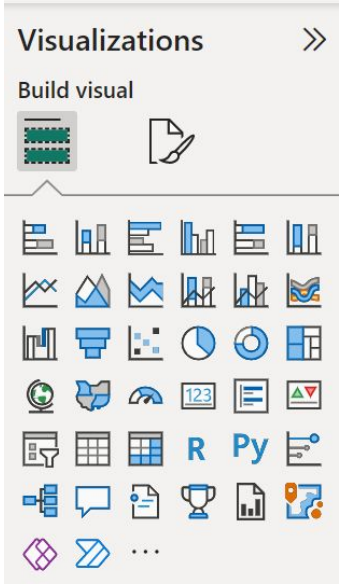
| FOUR TYPES OF DATA | | TYPES OF CHARTS |
| --- | --- | --- |
| NOMINAL: Data sorted into categories | ⟶ | Bar chart |
| ORDINAL: Arbitrary numerical scale | ⟶ | Pie chart, bar chart |
| DISCRETE: Represents units | ⟶ | Arrays, Pie chart, Bar chart |
| CONTINUOUS: Can be measured on a continuum | ⟶ | Line chart |



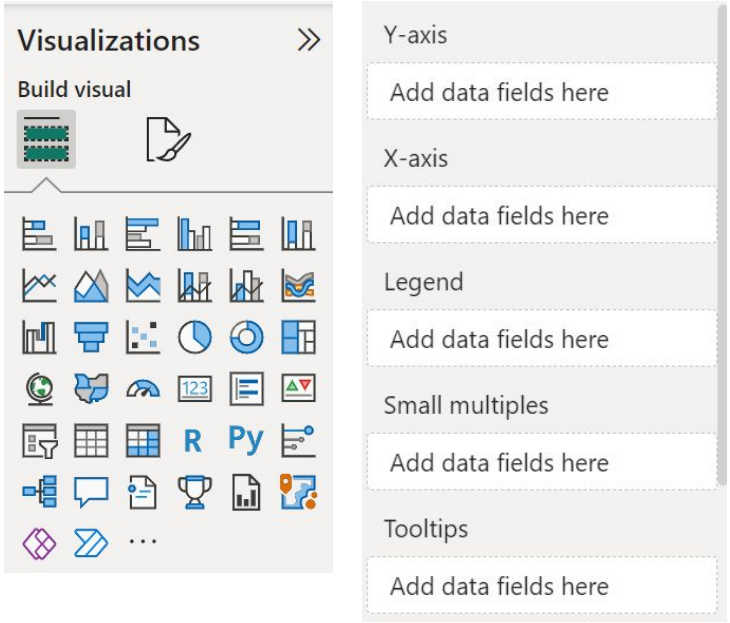

# Charts Available on Power BI

- 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 resp 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**

# 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: Alan Smith, Chris Campbell, Ian Bott, Liz Faunce, Graham Parrish, Billy Ehrenberg-Shannon, Paul McCallum, Martin Stabe
Inspired by: the Graphic Continuum by Jon Schwabish and Severino Ribecca

ft.com/vocabulary

## Deviation

Emphasise variations (+/-) from a fixed reference point. Typically the reference point is zero but it can also be a target or a long-term average. Can also be used to show sentiment (positive/neutral/negative).

**Example FT uses**
Trade surplus/deficit, climate change

### Diverging bar

A simple standard bar chart that can handle both negative and positive magnitude values.

### Diverging stacked bar

Perfect for presenting survey results which involve sentiment (eg disagree/neutral/agree).

### Spine

Splits a single value into two contrasting components (eg male/female).

### Surplus/deficit filled line

The shaded area of these charts allows a balance to be shown - either against a baseline or between two series.

## Correlation

Show the relationship between two or more variables. Be mindful that, unless you tell them otherwise, many readers will assume the relationships you show them to be causal (ie, one causes the other).

**Example FT uses**
Inflation and unemployment, income and life expectancy

### Scatterplot

The standard way to show the relationship between two continuous variables, each of which has its own axis.

### Column + fine timeline

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

### Connected scatterplot

Usually used to show how the relationship between 2 variables has changed over time.

### Bubble

Like a scatterplot, but adds additional detail by sizing the circles according to a third variable.

### XY heatmap

A good way of showing the patterns between 2 categories of data, less effective at showing fine differences in amounts.

## Ranking

Use where an item's position in an ordered list is more important than its absolute or relative value. Don't be afraid to highlight the points of interest.

**Example FT uses**
Wealth, deprivation, league tables, constituency election results

### Ordered bar

Standard bar charts display the ranks of values much more easily when sorted into order.

### Ordered column

See above.

### Ordered proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

### Dot strip plot

Dots placed in order on a strip are a space-efficient method of laying out ranks across multiple categories.

### Slope

Perfect for showing how ranks have changed over time or vary between categories.

### Lollipop

Lollipops draw more attention to the data value than standard bar/column and can also show rank and value effectively.

### Bump

Effective for showing changing rankings across multiple dates. For large datasets, consider grouping lines using colour.

## Distribution

Show values in a dataset and how often they occur. The shape (or 'skew') of a distribution can be a memorable way of highlighting the lack of uniformity or equality in the data.

**Example FT uses**
Income distribution, population (age/sex) distribution, revealing inequality

### Histogram

The standard way to show a statistical distribution - keep the gaps between columns small to highlight the 'shape' of the data.

### Dot plot

A simple way of showing the change or range (or emphasis) of data across multiple categories.

### Dot strip plot

Good for showing individual values in a distribution, can be a problem when too many dots have the same value.

### Barcode plot

Like dot strip plots, good for displaying all the data in a table, they work best when highlighting individual values.

### Boxplot

Summarise multiple datasets by showing the median (centre) and range of the data

### Violin plot

Similar to a box plot but more effective with complex distributions (data that cannot be summarised with simple average).

### Population pyramid

A standard way for showing the age and sex breakdown of a population/distribution; effectively, back to back histograms.

### Cumulative curve

A good way of showing how unequal a distribution is: y axis is always cumulative frequency, x axis is always a measure.

### Frequency polygons

For displaying multiple distributions of data. Like a regular line chart, best limited to a maximum of 3 or 4 datasets.

### Beeswarm

Use to emphasise individual points in a distribution. Points can be sized to an additional variable. Best with medium-sized datasets.

## Change over Time

Give emphasis to changing trends. These can be short (intra-day) movements or extended series traversing decades or centuries. Choosing the correct time period is important to provide suitable context for the reader.

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

### Line

The standard way to show a changing time series. If data are irregular, consider markers to represent data points.

### Column

Columns work well for showing change over time - but usually best with only one series of data at a time.

### Column + line timeline

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

### Slope

Good for showing changing data as long as the data can be simplified into 2 or 3 points without missing a key part of story.

### Area chart

Use with care – these are good at showing changes to total, but seeing change in components can be very difficult.

### Candlestick

Usually focused on day-to-day activity, these charts show opening/closing and high/low points of each day.

### Fan chart (projections)

Use to show the uncertainty in future projections - usually this grows the further forward to projection.

### Connected scatterplot

A good way of showing changing data for two variables whenever there is a relatively clear pattern of progression.

### Calendar heatmap

A great way of showing temporal patterns (daily, weekly, monthly) – at the expense of showing precision in quantity.

### Priestley timeline

Great when date and duration are key elements of the story in the data.

### Circle timeline

Good for showing discrete values of varying size across multiple categories (eg earthquakes by continent).

### Vertical timeline

Presents time on the Y axis. Good for displaying detailed time series that work especially well when scrolling on mobile.

### Seismogram

Another alternative to the circle timeline for showing series where there are big variations in the data.

### Streamgraph

A type of area chart: use when seeing changes in proportions over time is more important than individual values

## Magnitude

Show size comparisons. These can be relative (just being able to see larger/bigger) or absolute (need to see fine differences). Usually these show a 'counted' number (for example, barrels, dollars or people) rather than a calculated rate or per cent.

**Example FT uses**
Commodity production, market capitalisation, volumes in general

### Column

The standard way to compare the size of things. Must always start at 0 on the axis.

### Bar

See above. Good when the data are not time series and labels have long category names.

### Paired column

As per standard column but allows for multiple series. Can become tricky-to-read with more than 2 series.

### Paired bar

See above.

### Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

### Proportional symbol

Use when there are big variations between values and/or seeing fine differences between data is not so important.

### Isotype (pictogram)

Excellent solution in some instances – use only with whole numbers (do not slice off an arm to represent a decimal).

### Lollipop

Lollipop charts draw more attention to the data value than standard bar/column - does not have to start at zero (but preferable).

### Radar

A space-efficient way of showing value of multiple variables- but make sure they are organised in a way that makes sense to reader.

### Parallel coordinates

An alternative to radar charts – again, the arrangement of the variables is important. Usually benefits from highlighting values.

### Bullet

Good for showing a measurement against the context of a target or performance range.

### Grouped symbol

An alternative to bar/column charts when being able to count data or highlight individual elements is useful.

## Part-to-whole

Show how a single entity can be broken down into its component elements. If the reader's interest is solely in the size of the components, consider a magnitude-type chart instead.

**Example FT uses**
Fiscal budgets, company structures, national election results

### Stacked column/bar

A simple way of showing part-to-whole relationships but can be difficult to read with more than a few components.

### Marimekko

A good way of showing the size and proportion of data at the same time – as long as the data are not too complicated.

### Pie

A common way of showing part-to-whole data – but be aware that it's difficult to accurately compare the size of the segments.

### Donut

Similar to a pie chart – but the centre can be a good way of making space to include more information about the data (eg total).

### Treemap

Use for hierarchical part-to-whole relationships, can be difficult to read when there are many small segments.

### Voronoi

A way of turning points into areas – any point within each area is closer to the central point than any other centroid.

### Arc

A hemicycle, often used for visualising parliamentary composition by number of seats.

### Gridplot

Good for showing % information, they work best when used on whole numbers and work well in small multiple layout form.

### Venn

Generally only used for schematic representation.

### Waterfall

Can be useful for showing part-to-whole relationships where some of the components are negative.

## Spatial

Aside from locator maps only used when precise locations or geographical patterns in data are more important to the reader than anything else.

**Example FT uses**
Population density, natural resource locations, natural disaster risk/impact, catchment areas, variation in election results

### Basic choropleth (rate/ratio)

The standard approach for putting data on a map – should always be rates rather than totals and use a sensible base geography.

### Proportional symbol (count/magnitude)

Use for totals rather than rates – be wary that small differences in data will be hard to see.

### Flow map

For showing unambiguous movement across a map.

### Contour map

For showing areas of equal value on a map. Can use deviation colour schemes for showing +/- values

### Equalised cartogram

Converting each unit on a map to a regular and equally-sized shape – good for representing voting regions with equal value.

### Scaled cartogram (cube)

Stretching and shrinking a map so that each area is sized according to a particular value.

### Dot density

Used to show the location of individual events/locations – make sure to annotate any patterns the reader should see.

### Heat map

Grid-based data values mapped with an intensity-colour scale. As choropleth map - but not snapped to an admin/political unit.

## Flow

Show the reader volumes or intensity of movement between two or more states or conditions. These might be logical sequences or geographical locations.

**Example FT uses**
Movement of funds, trade, migrants, lawsuits, information/relationship graphs.

### Sankey

Shows changes in flows from one condition to at least one other, good for tracing the eventual outcome of a complex process.

### Waterfall

Designed to show the sequencing of data through a flow process, typically budgets. Can include +/- components.

### Chord

A complex but powerful diagram which can illustrate 2-way flows (and net winner) in a matrix.

### Network

Used for showing the strength and inter-connectedness of relationships of varying types.

FT

sqlbi. OKViz

# THE VISUALS REFERENCE

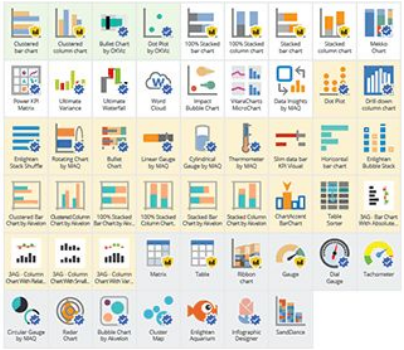
— FOR MICROSOFT POWER BI —

SEP. 2018

http://sql.bi/visual-reference

## COMPARISON

Display measures compared by their magnitude



## CHANGE OVER TIME

Display the changing trend of measures

## RANKING

Display measures by their rank order

## SPATIAL

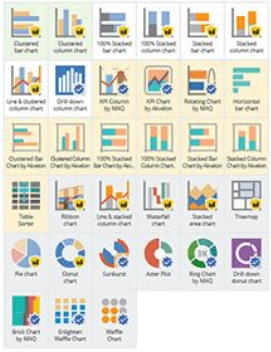
Display measures over spatial maps

## 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

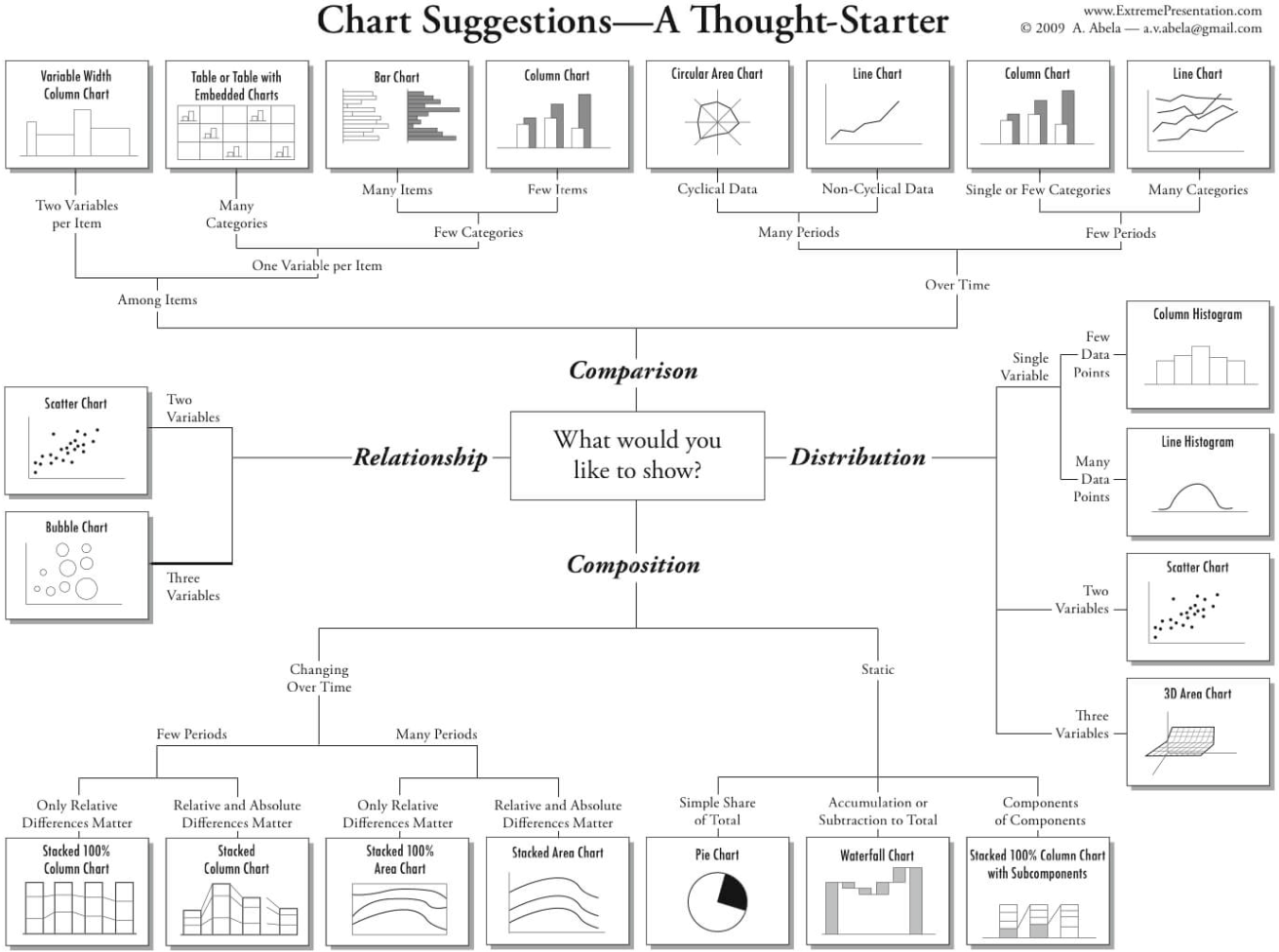
Control report filters

## NARRATIVE

Tell a story with data

### MISCELLANEOUS

Recommended | There is a better alternative | Don't use in the category | Built-in visual | Certified visual | R required




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**

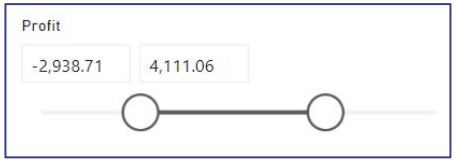
  i. Selecting a value in one visual acts more like a filter in other visuals, such as line charts, scatter charts, and maps.

  ii. The unrelated data isn't visible, just as you'd see with a filter.

# Slicers

## Basic


## Numeric

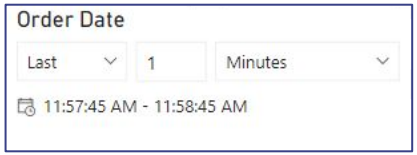



Filters numeric columns such as between numbers, less than or equal to a number etc

## Relative Date


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

## Relative Time




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

## Responsive, resizable

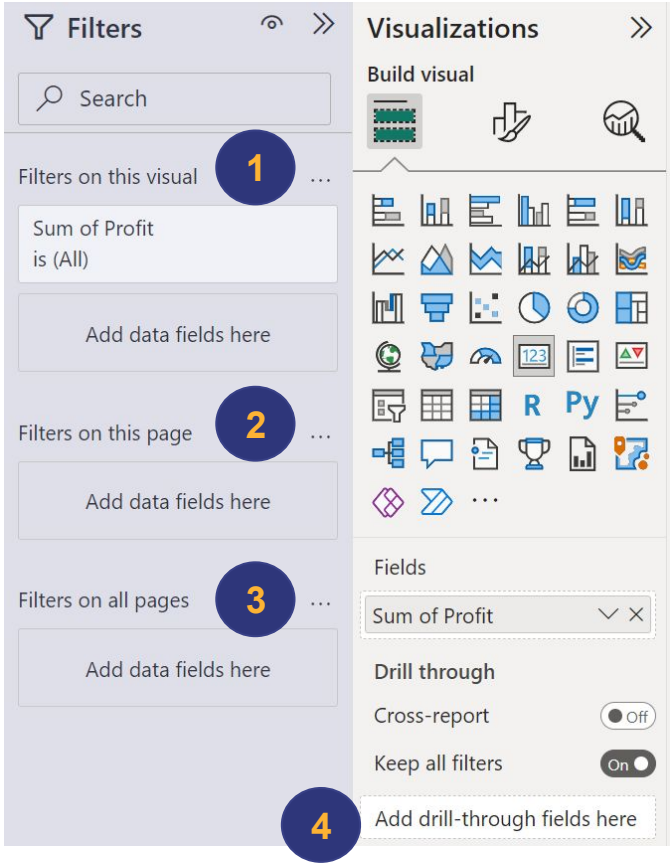

Resize to fit any space on the report

## Hierarchical / Multiple Fields


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

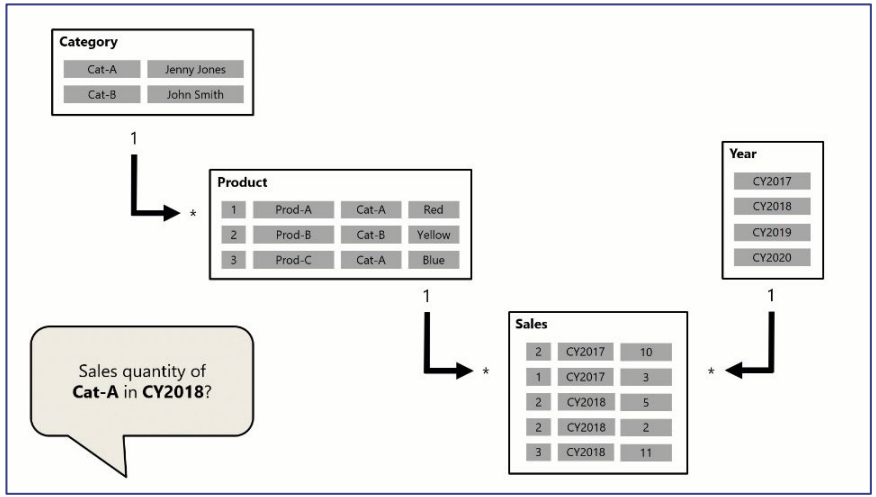
View & Edit Relationships between tables

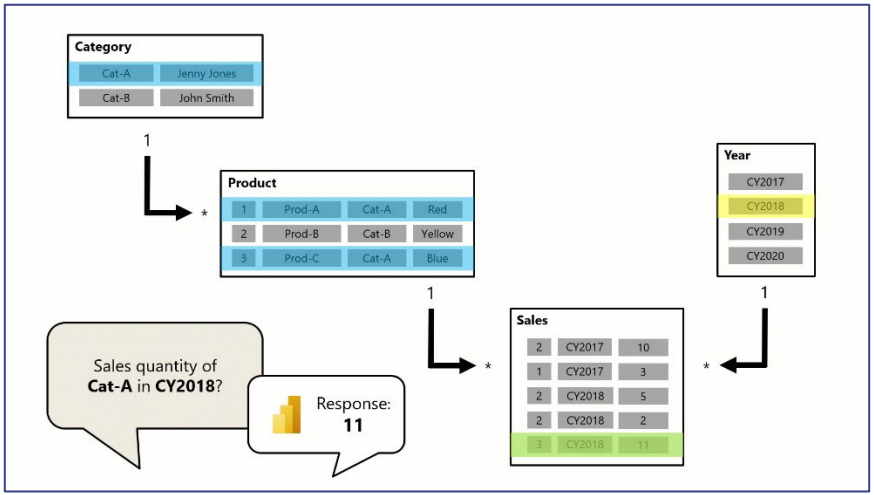
Data Model

# What is Data Modelling?

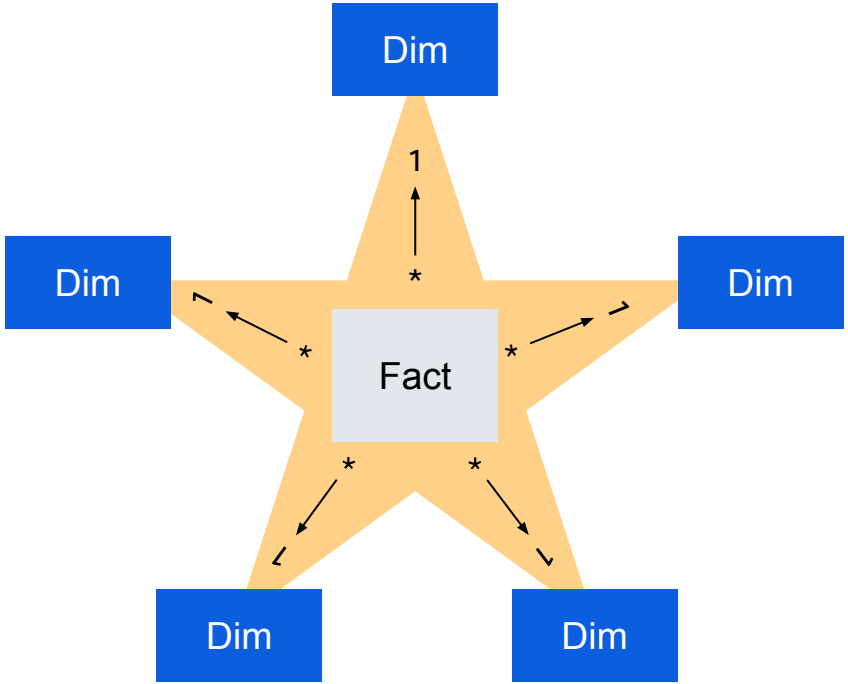
- Data Modeling is one of the features used to connect multiple data sources in BI tool using a relationship.
- A relationship defines how data sources are connected with each other and you can create interesting data visualizations on multiple data sources.
- A model relationship propagates filters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

# Sometimes data is stored across multiple tables



# Star Schema Design



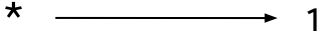

- Dim: dimension tables contain a relatively small number of rows
- Fact: Fact tables contain a very large number of rows and continue to grow over time

# 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 |

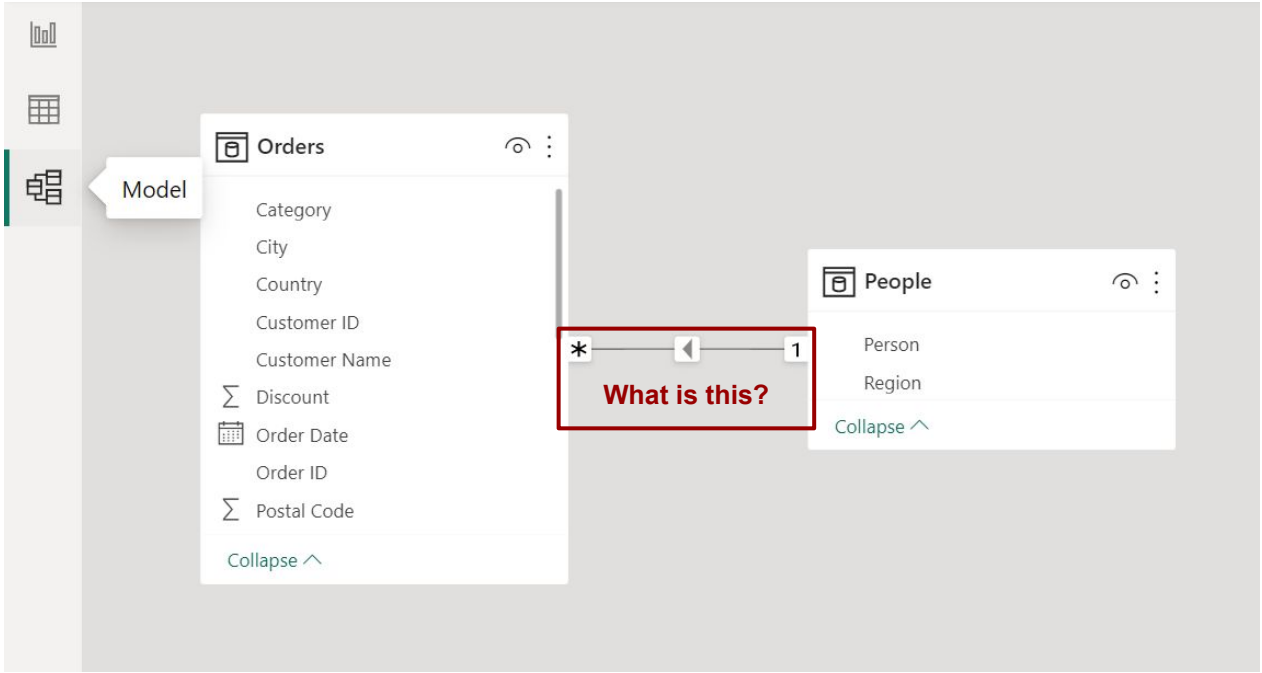
# Example

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




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

# Data Modelling



# Data Modelling

## Relationships

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

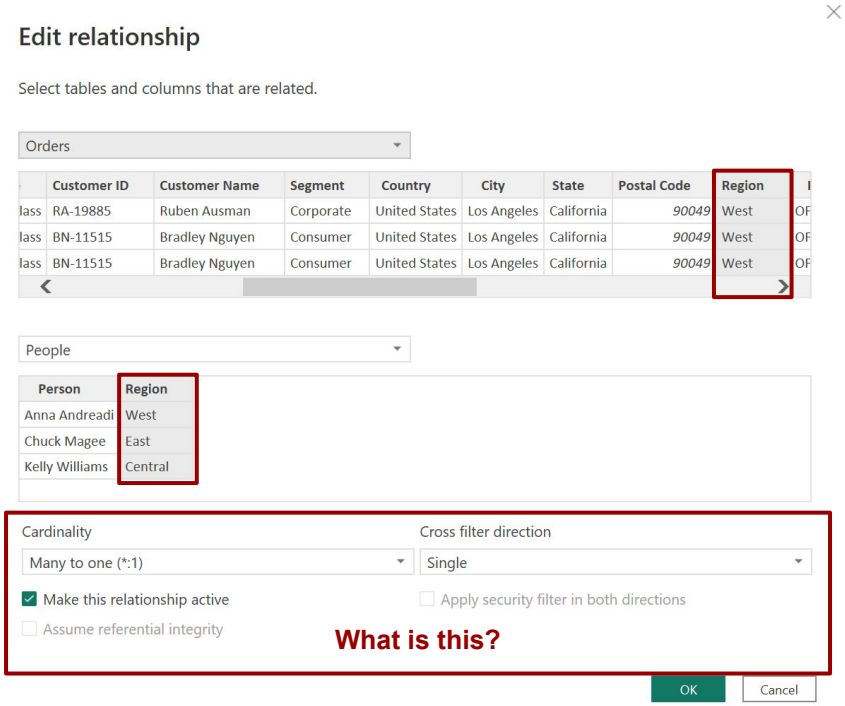
Relationship paths are deterministic, meaning that filters are always propagated in the same way and without random variation.

**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<br>Both |
| One-to-one | Both columns contain unique values (uncommon) | Both |
| Many-to-many | Both columns contain duplicate values (infrequently used) | Single (Table1 to Table2)<br>Single (Table2 to Table1)<br>Both |

# Data Modelling



# Creating Relationships

**Method 1**

- On the Modeling tab, select Manage relationships > New.

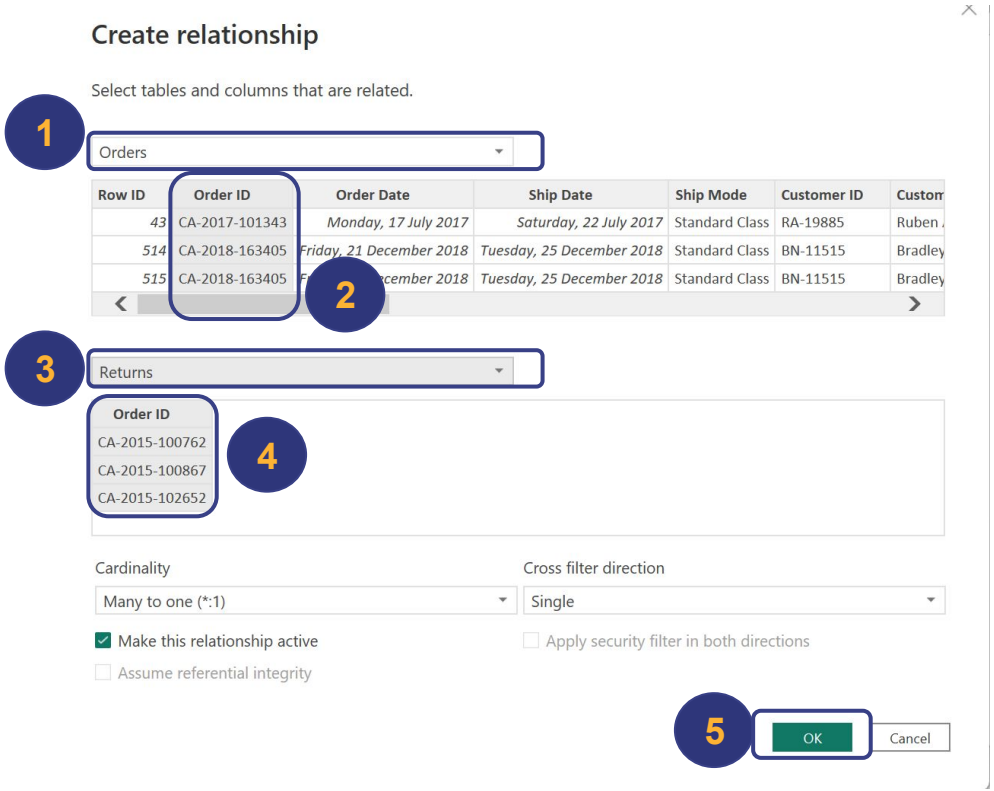
- In the Create relationship dialog box, in the first table drop-down list, select a table.
    - Select the column you want to use in the relationship.

- 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

## Default 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

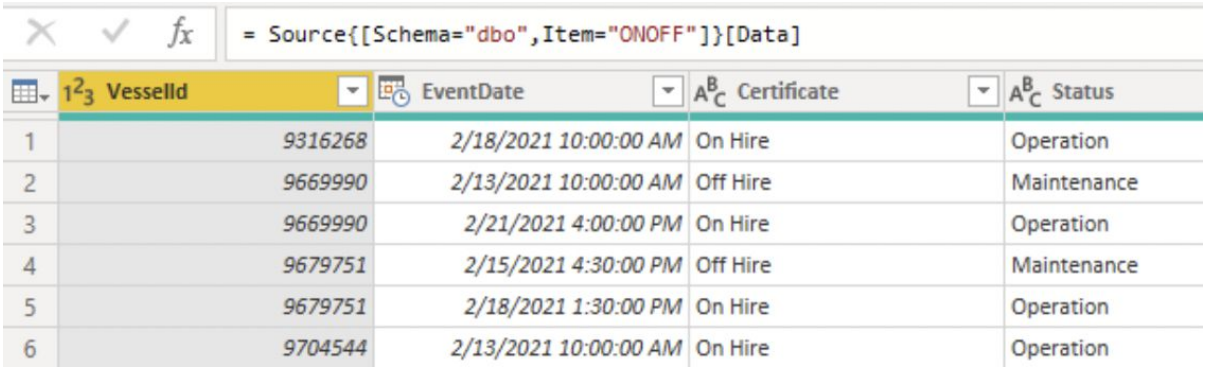
Microsoft

# 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.



```
= Source{[Schema="dbo",Item="ONOFF"]}[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 |

# What is DAX?

- It consists 3 important concepts: **Syntax, Functions and Context**
    - **Syntax** – Proper DAX syntax is made up of a variety of elements, some of which are common to all formulas.
    - **Functions** – DAX functions are predefined formulas that take some parameters and perform a specific calculation.
    - **Context** – DAX uses context to determine which rows should be used to perform a calculation.

Some of the most common DAX functions used in reports are:

1. Simple calculations: COUNT, DISTINCTCOUNT, SUM, AVERAGE, MIN, MAX.
2. SUMMARISE: Returns a table typically used to further apply aggregations over different groupings.
3. CALCULATE: Performs an aggregation along with one or more filters. When you specify more than one filter, the function will perform the calculation where all filters are true.
4. IF: Based on a logical condition, it will return a different value for if it is true or false. This is similar to the CASE WHEN operation in SQL.
5. IFERROR: Looks for any errors for an inner function and returns a specified result
6. ISBLANK: Checks if the rows in a column are blank and returns true or false. Useful to use in conjunction with other functions like IF.
7. EOMONTH: Returns the last day of the month of a given date (column reference in a date format) for as many months in the past or the future.
8. DATEDIFF: returns the difference between 2 dates (both as column references in date formats) in days, months, quarters, years, etc.

https://www.datacamp.com/tutorial/power-bi-dax-tutorial-for-beginners

# What is DAX?

- It can go for as intuitive/simple as this:

```
1  Average Days to Ship = AVERAGE(Orders[Days to Ship])
```

- To as complex as this (creating own variables and returning it) or even long queries to manipulate the data

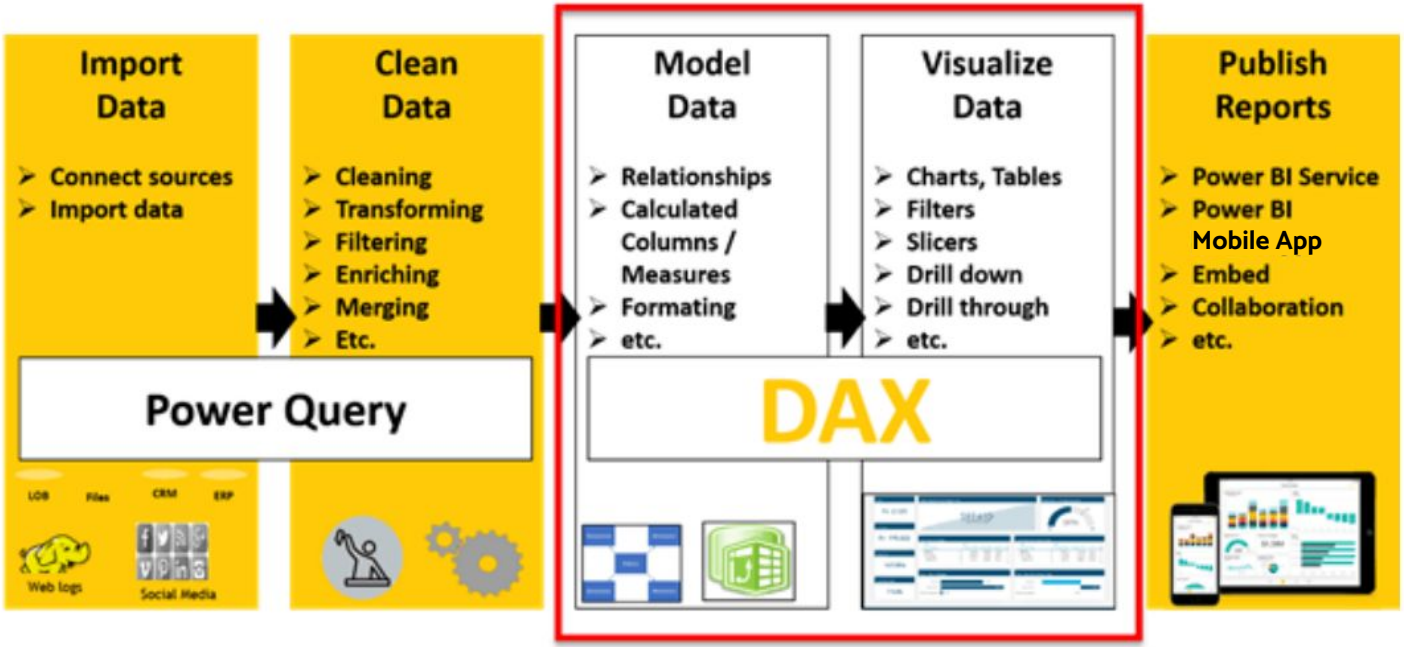
```
=
CALCULATE (
    MAX ( Changes[new_value] ),
    FILTER ( Changes, Changes[member_id] = EARLIER ( Changes[member_id] ) ),
    FILTER ( Changes, Changes[change_type] = "Type" ),
    FILTER (
        changes,
        Changes[start_date]
            = CALCULATE (
                MAX ( Changes[start_date] ),
                FILTER (
                    CALCULATETABLE (
                        Changes,
                        FILTER ( Changes, Changes[member_id] = EARLIEST ( Changes[member_id] ) ),
                        FILTER ( Changes, Changes[change_type] = "Type" )
                    ),
                    Changes[start_date] < EARLIEST ( Changes[start_date] )
                )
            )
    )
)
```

```
Sales SPLY using Var =
VAR _sales=SUM(FactInternetSales[SalesAmount])
return
CALCULATE(
    _sales,
    SAMEPERIODLASTYEAR(DimDate[FullDateAlternateKey].[Date])
)
```

# DAX vs Power Query

| DAX | Power Query / M |
| --- | --- |
| • Used for Data Analysis | • Used for Data Engineering - Extract Transform Load (ETL) |
| • Similar to Microsoft Excel functions<br>• Uses a collection of functions and operators | • Uses the M programming language<br>• Power Query is able to do data engineering without coding (M) |
| • Creating measures and calculated columns | • Download and fetch data from different sources (Data Ingestion)<br>• Combine, clean, and model this data (Data Wrangling) |

# DAX or Power Query?




Power BI development phases

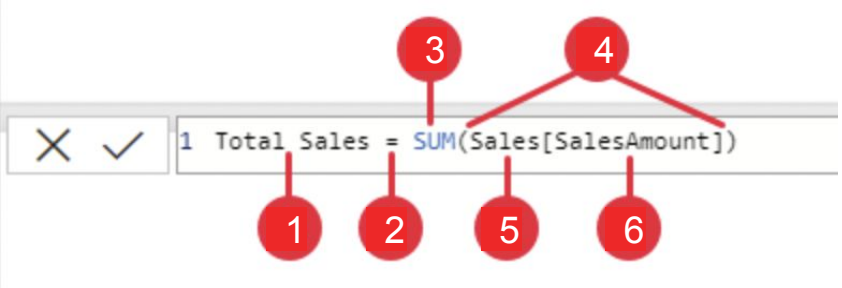
https://www.powerbi-pro.com/en/how-dax-calculates-values/

## 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.***

https://towardsdatascience.com/power-bi-m-vs-dax-vs-measures-4c77ae270790

# 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**.

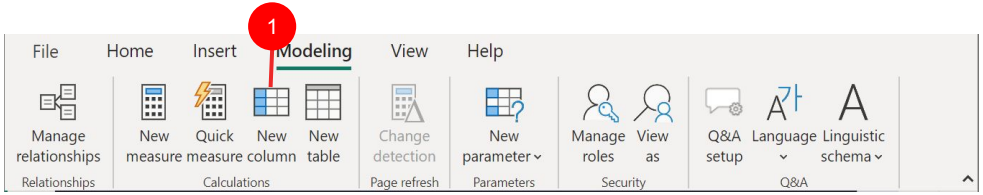
6. **The referenced column, [SalesAmount]**, in the Sales table. With this argument, the SUM function knows on which column to aggregate a SUM.

# 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.

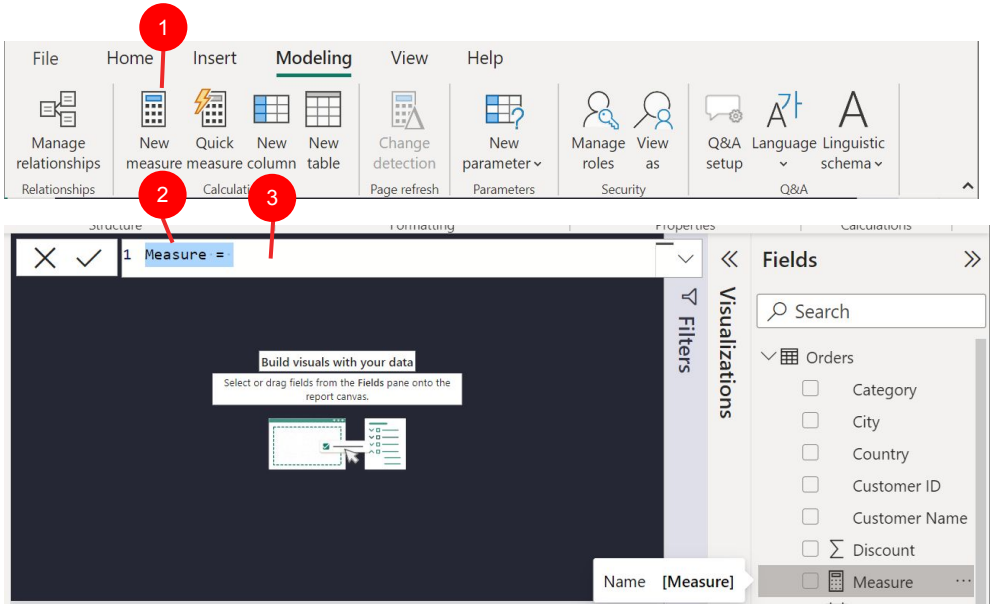



2. In the formula bar, replace Column by entering a new column name


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 will 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 | • Measures only use CPU, whereas calculated columns use space on both disk and RAM.<br>• Thus, it is more space and memory efficient to avoid using calculated columns.<br>• This becomes more crucial the larger the dataset. |
| Operate on aggregate values instead of on a row-by-row basis | Measures | • Calculated columns cannot be used to perform this calculation as you cannot use an aggregation of calculated columns.<br>• For example, when computing the aggregate value of a percentage. |
| Large and complex calculations | Calculated Column | • Pre-compute intermediate values in a calculated column<br>• 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.<br>• 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 | • 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.<br>• 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?

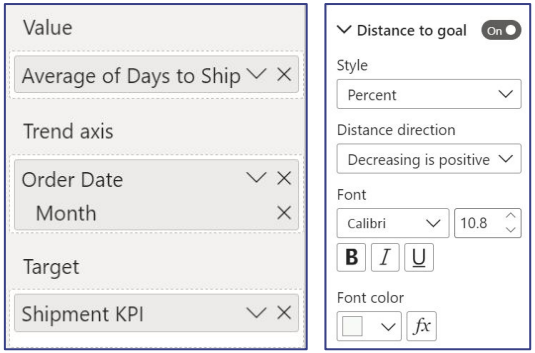
- Visual cue that communicates the amount of progress made toward a measurable goal
- The KPI is to help evaluate the current value and status of a metric against a defined target
- A KPI visual requires a *base* measure that evaluates to a value, a *target* measure or value, and a *threshold* or *goal*.
- 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

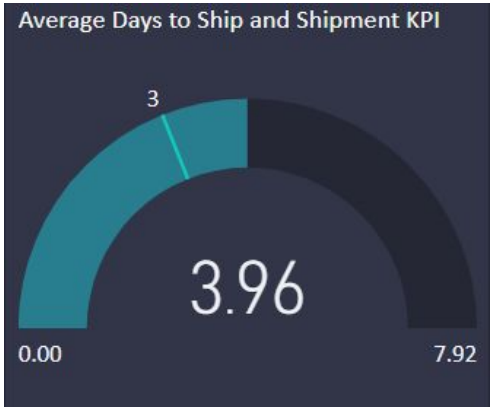
3. Format the KPI by selecting the paint brush icon to open the Format visual pane
    a. Target label - when set to On, the visual shows the value's label. Distance to goal sets the style and direction of the distance from the goal.

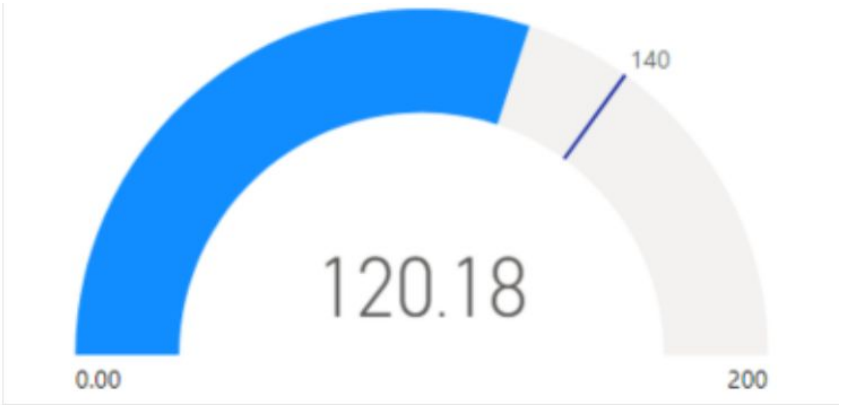



# Gauge Chart

# What is a Gauge Chart?

- Gauge charts are used to show progress towards a particular goal
- It can represent key performance indicators (KPIs) such as sales, revenue, manpower productivity, or profits
- You can also show the minimum and maximum value to be shown

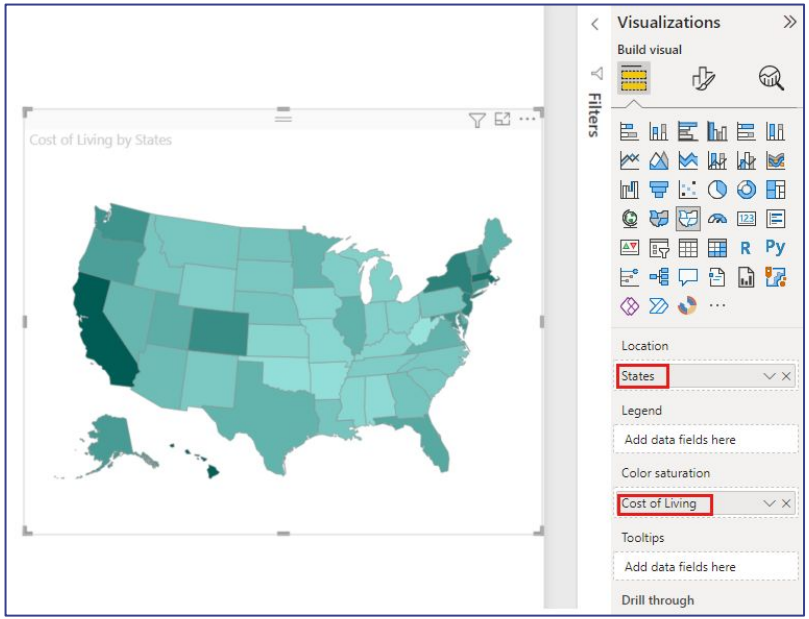


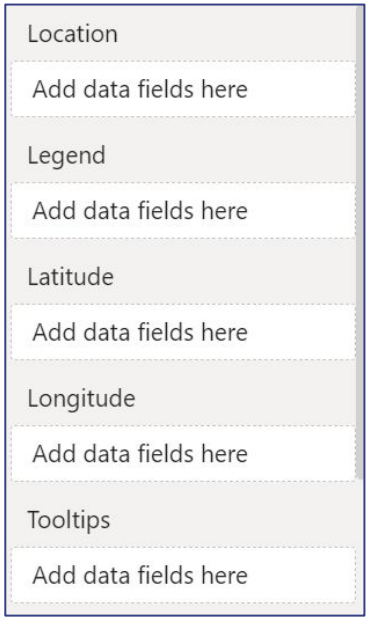



# Map Chart

# What is a Map Visual?

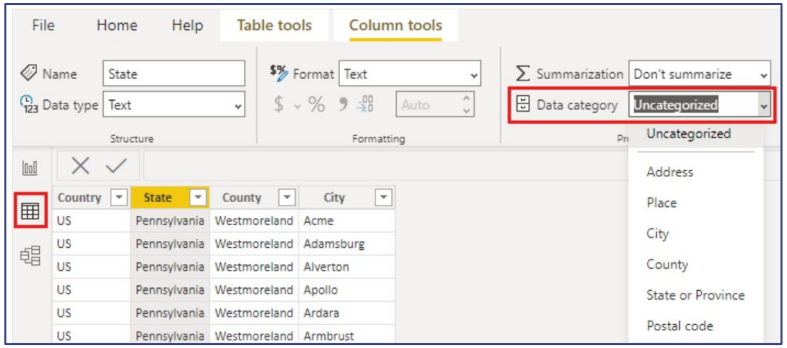
- Power BI integrates with Bing Maps to provide default map coordinates (a process called geocoding) so you can create maps

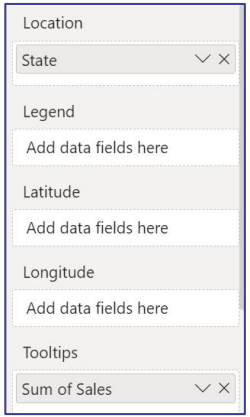


# Creating a Map Visual

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

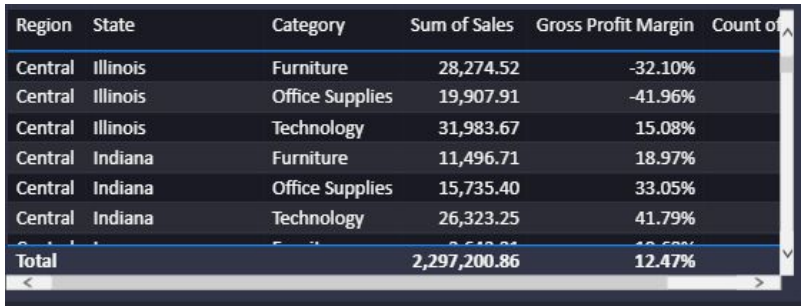



# Tables and Matrix

# What is a Table Visual?

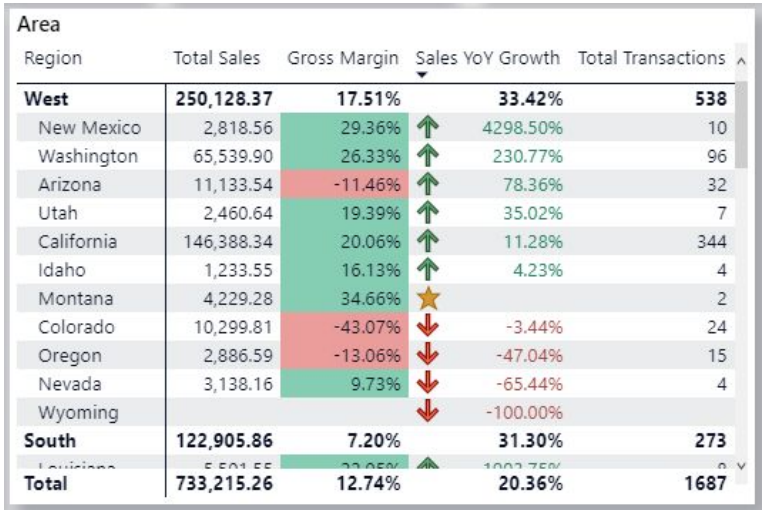
- A grid that contains related data in a logical series of rows and columns. It may also contain headers and a row for totals.
- When to use?
    - To see and compare detailed data and exact values (instead of visual representations).
    - To display data in a tabular format.
    - To display numerical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



| Region | State | Category | Sum of Sales | Gross Profit Margin | Count of |
|---|---|---|---|---|---|
| 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% | |
| Total | | | 2,297,200.86 | 12.47% | |

# 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



# 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

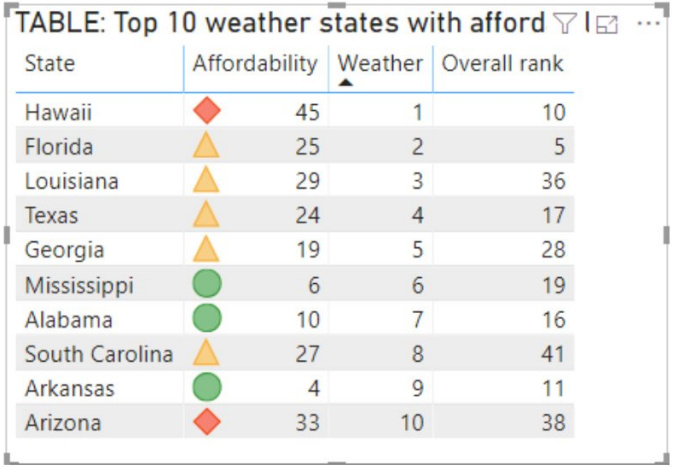
| Region | Sum of Sales | Gross Profit Margin | No. of Transactions |
|---|---|---|---|
| ⊞ West | 725,457.82 | 14.94% | 1611 |
| ⊞ East | 678,781.24 | 13.48% | 1401 |
| ⊞ Central | 501,239.89 | 7.92% | 1175 |
| ⊞ South | 391,721.91 | 11.93% | 822 |
| **Total** | **2,297,200.86** | **12.47%** | **5009**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

| 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

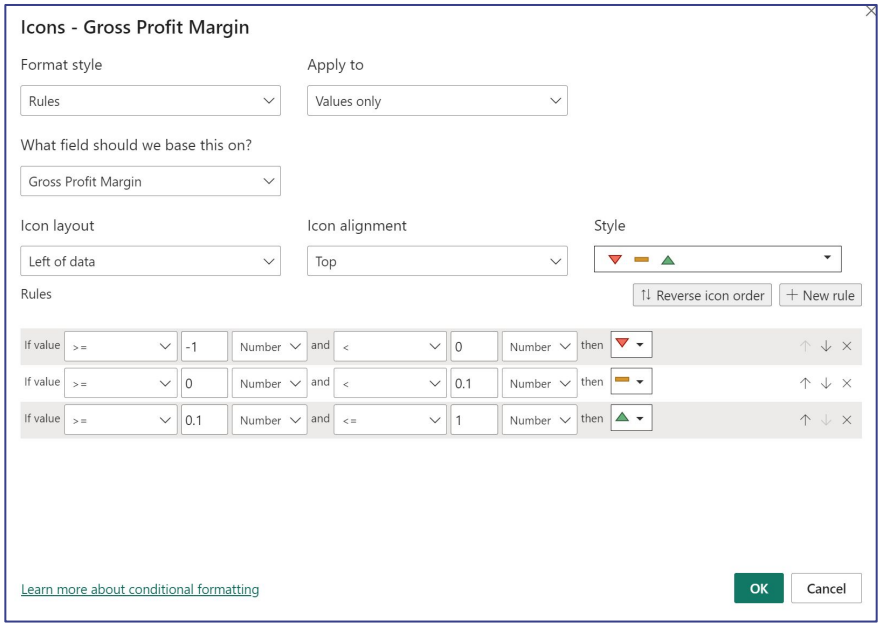
- Specify customized cell colors, including color gradients, based on field values
- Select Conditional formatting, and then select the type of formatting to apply
- Conditional formatting can be applied to any text or data field, as long as you base the formatting on a field that has numeric, color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




| 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




| 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

# Types of Buttons

### Page Navigation

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

### Bookmark

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

### 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.

### 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.

### Q&A

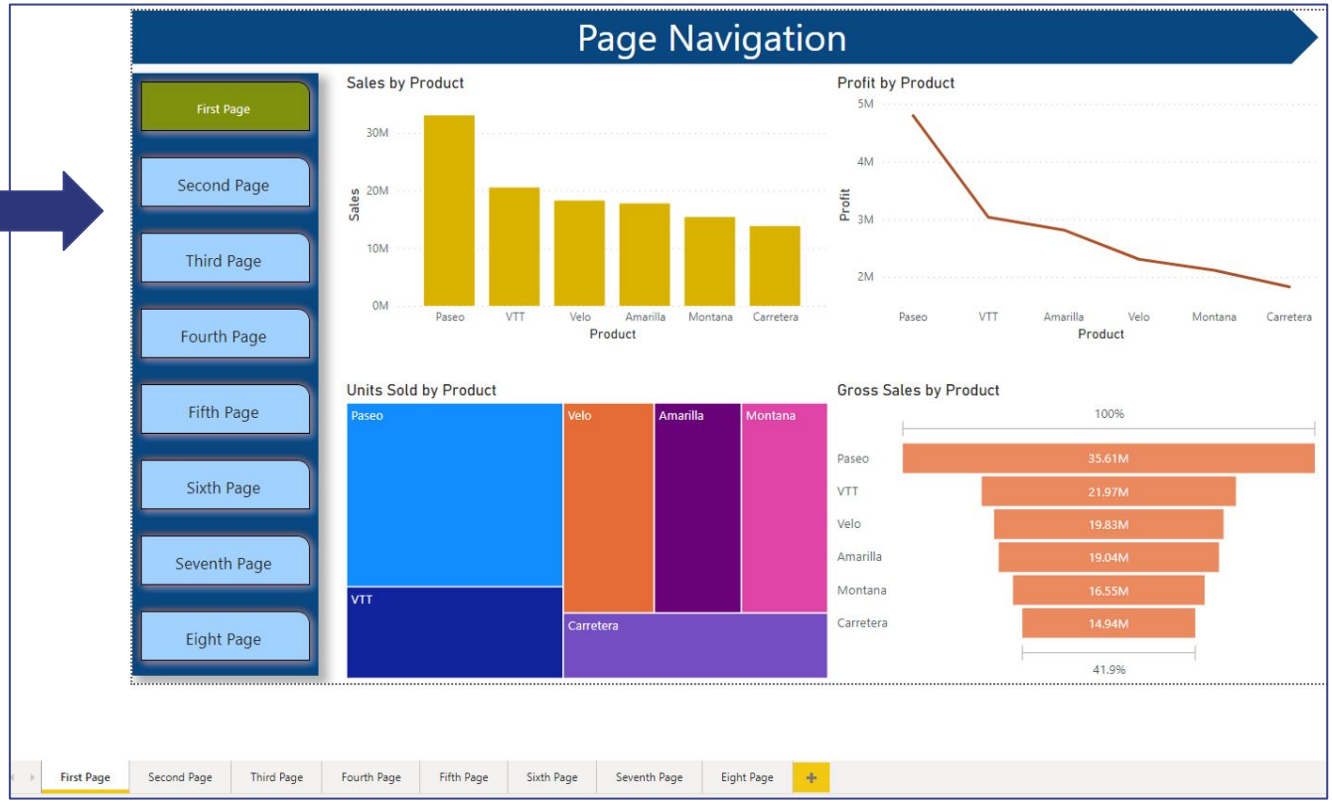
Selecting a Q&A button opens the Power BI Q&A Explorer window. The Q&A window displays on top of the report page and can be closed by selecting the X.

### 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

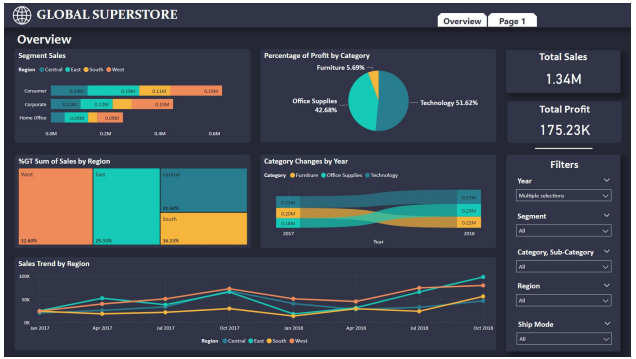
These links allow users to move through different pages or screens easily



# Button Demo - Page Navigation

**Objective:** Create a button that links to the other pages

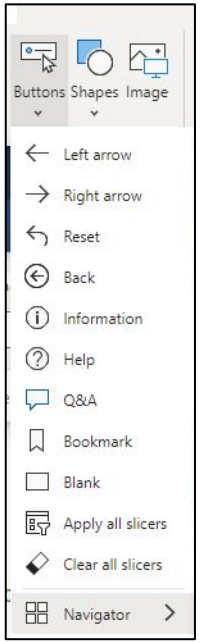
1. Insert ribbon, select Buttons
2. Customize a button (Shape, style, rotation)
3. Select the action for a button (Page Navigation, Destination)

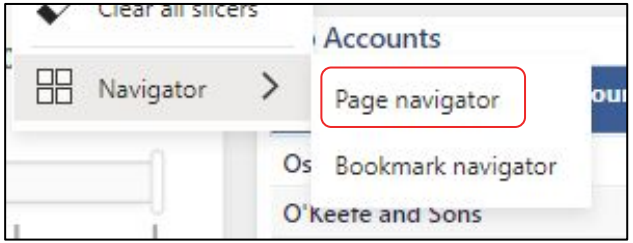



# Button Demo - Page Navigation

**For page navigation you can also just use the Page Navigator Option but it will not allow you to customize the look of your navigator**

1. Insert ribbon, select Buttons
2. Select Navigator
3. Select Page Navigation

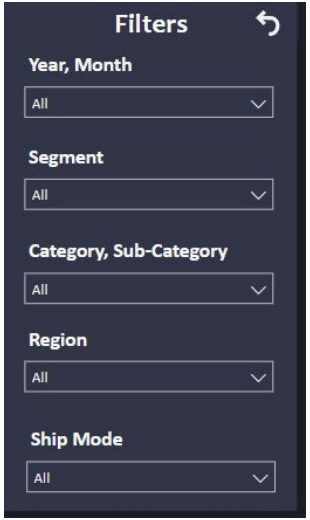


# Button/Bookmarks - Clear Filters

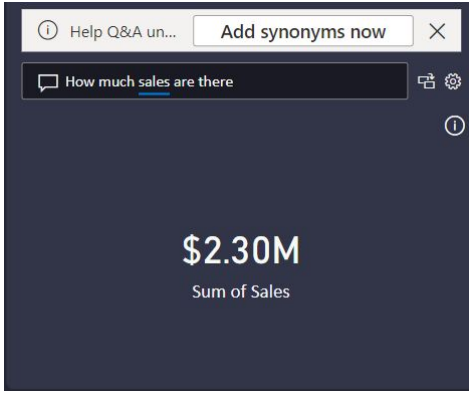
**Allows user to reset the filter selected**

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

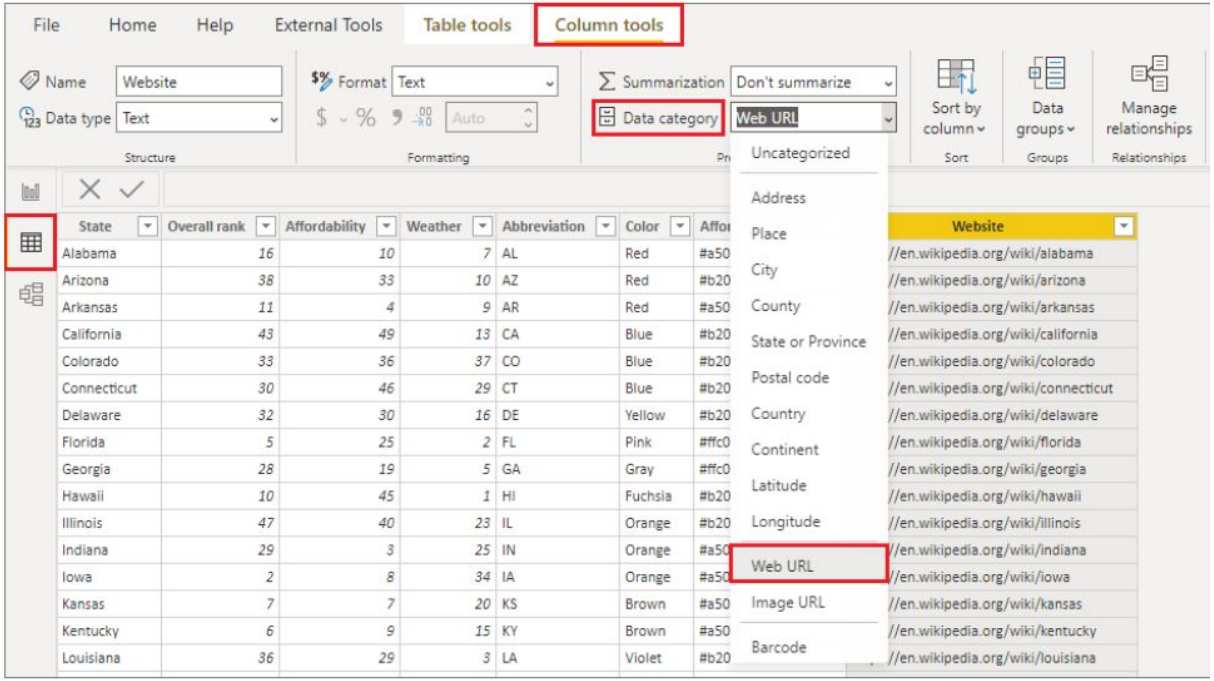


# Q&A

- The Q&A question box is where you type your question using natural language.
- Q&A recognizes the words you type and figures out where, and in which dataset, to find the answer.
- Q&A also helps you form your question with auto-completion, restatement, and other textual and visual aids.




# Web URL

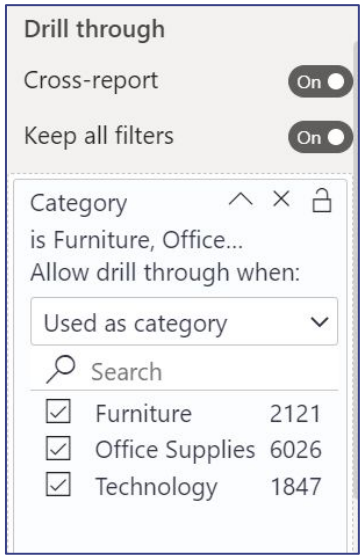



| State | Overall rank | Affordability | Weather | Abbreviation | Color | Website |
|---|---|---|---|---|---|---|
| Alabama | 16 | 10 | 7 | AL | Red | //en.wikipedia.org/wiki/alabama |
| Arizona | 38 | 33 | 10 | AZ | Red | //en.wikipedia.org/wiki/arizona |
| Arkansas | 11 | 4 | 9 | AR | Red | //en.wikipedia.org/wiki/arkansas |
| California | 43 | 49 | 13 | CA | Blue | //en.wikipedia.org/wiki/california |
| Colorado | 33 | 36 | 37 | CO | Blue | //en.wikipedia.org/wiki/colorado |
| Connecticut | 30 | 46 | 29 | CT | Blue | //en.wikipedia.org/wiki/connecticut |
| Delaware | 32 | 30 | 16 | DE | Yellow | //en.wikipedia.org/wiki/delaware |
| Florida | 5 | 25 | 2 | FL | Pink | //en.wikipedia.org/wiki/florida |
| Georgia | 28 | 19 | 5 | GA | Gray | //en.wikipedia.org/wiki/georgia |
| Hawaii | 10 | 45 | 1 | HI | Fuchsia | //en.wikipedia.org/wiki/hawaii |
| Illinois | 47 | 40 | 23 | IL | Orange | //en.wikipedia.org/wiki/illinois |
| Indiana | 29 | 3 | 25 | IN | Orange | //en.wikipedia.org/wiki/indiana |
| Iowa | 2 | 8 | 34 | IA | Orange | //en.wikipedia.org/wiki/iowa |
| Kansas | 7 | 7 | 20 | KS | Brown | //en.wikipedia.org/wiki/kansas |
| Kentucky | 6 | 9 | 15 | KY | Brown | //en.wikipedia.org/wiki/kentucky |
| Louisiana | 36 | 29 | 3 | LA | Violet | //en.wikipedia.org/wiki/louisiana |

| State | Website |
|---|---|
| Alabama | https://en.wikipedia.org/wiki/alabama |
| Arizona | https://en.wikipedia.org/wiki/arizona |
| Arkansas | https://en.wikipedia.org/wiki/arkansas |
| California | https://en.wikipedia.org/wiki/california |
| Colorado | https://en.wikipedia.org/wiki/colorado |
| Connecticut | https://en.wikipedia.org/wiki/connecticut |
| Delaware | https://en.wikipedia.org/wiki/delaware |
| Florida | https://en.wikipedia.org/wiki/florida |
| Georgia | https://en.wikipedia.org/wiki/georgia |
| Hawaii | https://en.wikipedia.org/wiki/hawaii |
| Illinois | https://en.wikipedia.org/wiki/illinois |
| Indiana | https://en.wikipedia.org/wiki/indiana |
| Iowa | https://en.wikipedia.org/wiki/iowa |
| Kansas | https://en.wikipedia.org/wiki/kansas |
| Kentucky | https://en.wikipedia.org/wiki/kentucky |
| Louisiana | https://en.wikipedia.org/wiki/louisiana |
| Maryland | https://en.wikipedia.org/wiki/maryland |

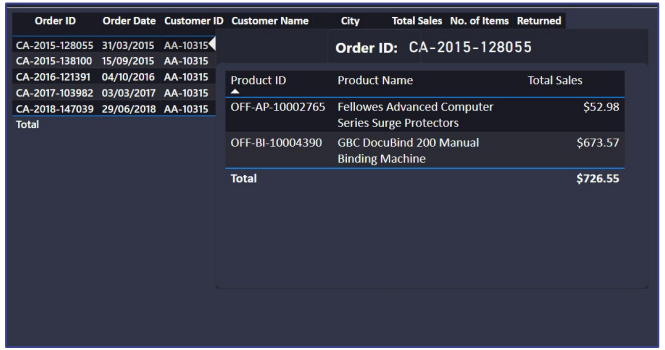
# Drillthrough

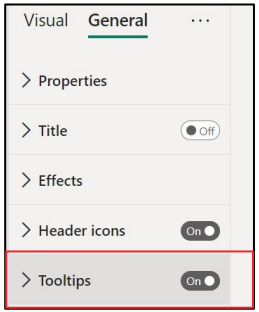
- Create a destination target page in your report that focuses on a specific entity (i.e. category, product etc)
- Allows user to right-click a data point in other source report pages, they drill through to the target page to get details that are filtered to that context

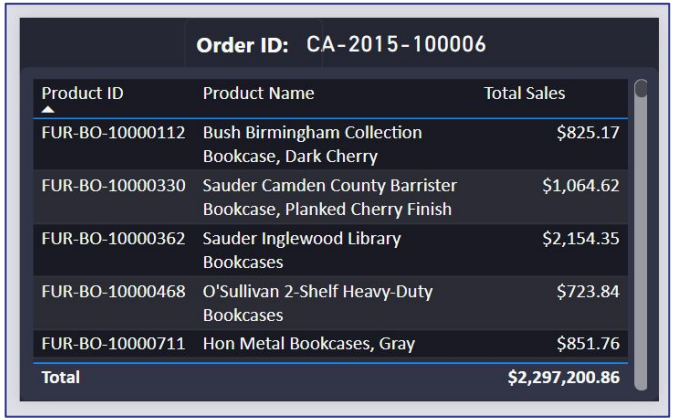


# Tooltips

- Provide additional information and context when hovering over or clicking on a visual element
- Tooltips can be a powerful way to enhance the user experience and deliver more insights without cluttering the main view
- Create a tooltip page → Click on the visualisation → enable Tooltips



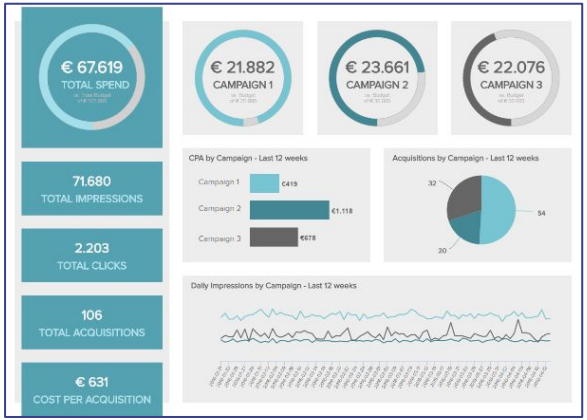



# Dashboard Types and Insights

# 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**
  - Page Navigation
  - Navigation Bar
  - Bookmark
  - Drillthrough
  - Back
  - Tooltips
- **Dashboard Types**
- **Chart Insights**
- **Reorganizing Dashboards**
- **Publishing Dashboards**