Knowledge Forum Training

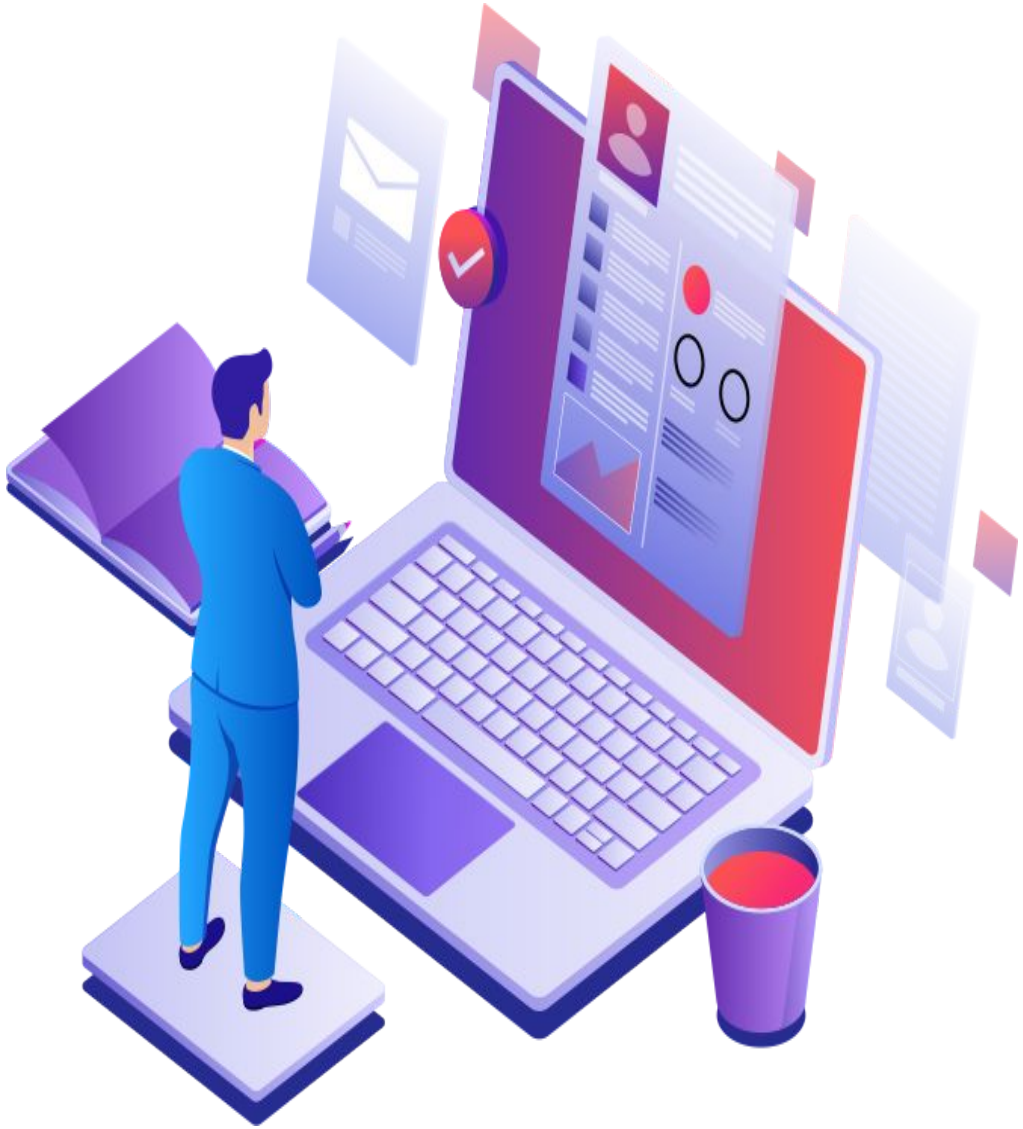
Power BI Beginners learner guide

August 2023

Learning Objectives

Understand the basics of Power BI, including the different components of the tool and how they work together:

1. Overview of PowerBI
2. Connecting to data Sources
   - Extract data from CSV and Excel (xlsx)
   - Transform data using Power Query
   - Extend knowledge of Power Query tools
3. Modelling the Data- Relationships
   - Build data table model relationships
4. Dax functions in Power BI
   - Transform data using DAX formula
   - Measures and Columns
5. Creating Visualizations
   - Building Basic Visuals
   - Dynamic Page navigation



Overview of PowerBI

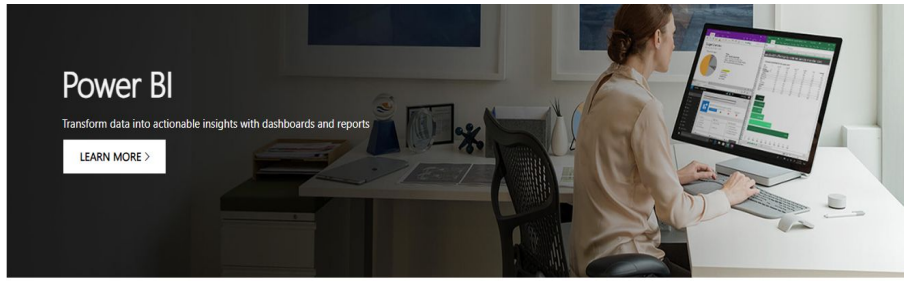
Power BI is a Business Intelligence tool developed by Microsoft. It helps you interactively visualize your data and make intelligence-based business decisions as a result.

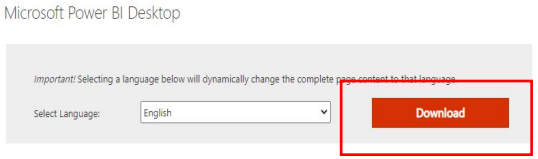
Key features of Power BI:

- Quick set up comparative to traditional BI
- Interactive visualizations
- Supports different data sources (Microsoft or otherwise)
- The ability to publish to web (app.powerbi.com)
- Cloud-based, no on-premise infrastructure needed
- Scalable
- Accessibility - view the dashboards/reports on iPad, iPhone, Android, and Windows devices Scheduled data refresh

Training Resources data files

Microsoft Power BI Desktop is built for the analyst. It combines state-of-the-art interactive visualizations, with industry-leading data query and modeling built-in. Create and publish your reports to Power BI. Power BI Desktop helps you empower others with timely critical insights, anytime, anywhere.





To download use this link click download and select the option that is compatible with your system.

For this Beginners training course in Power BI, we will base the learning activities on several data files. Please create a new folder on your desktop and download the data files in their current format (csv or xlsx):

1. Data file: data set > link

1. Get and transform data

Exploring the data files

Data 1: Customer's sales orders

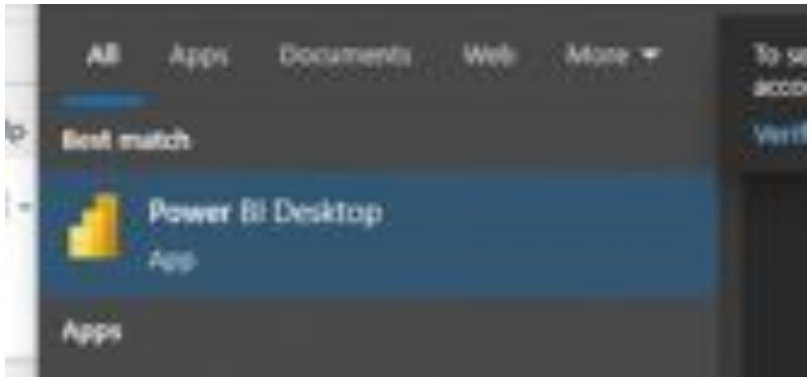
Tables	Description
DimCustomer	Master data for customers
DimDate	Master data for Date
DimProduct	Master data for Products
DimProductCategory	Master data for Product Categories
DimProductSubCategory	Master data for Product Subcategories
FactinternetSales	Transactional Data for all sales

Note: All the Sales level data rolls up to the customer data rows per transaction.

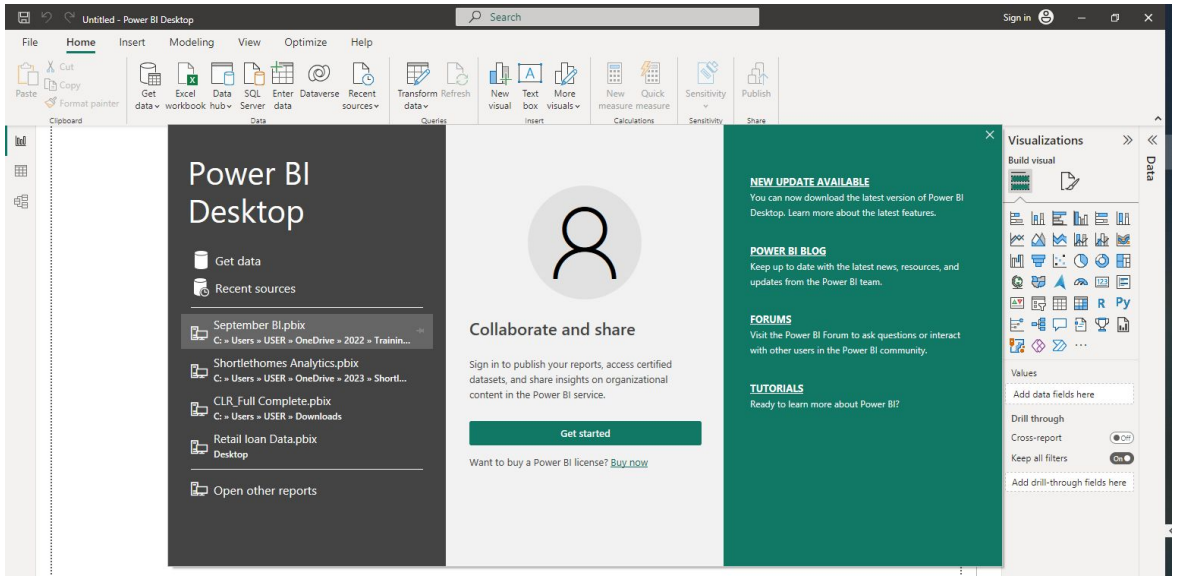
Connecting to Data Sources

This process is followed at the start of a new project, to import the data that you'll be working with, and at any point in the future when you need to add new data to the project.

Open PowerBI from your local system

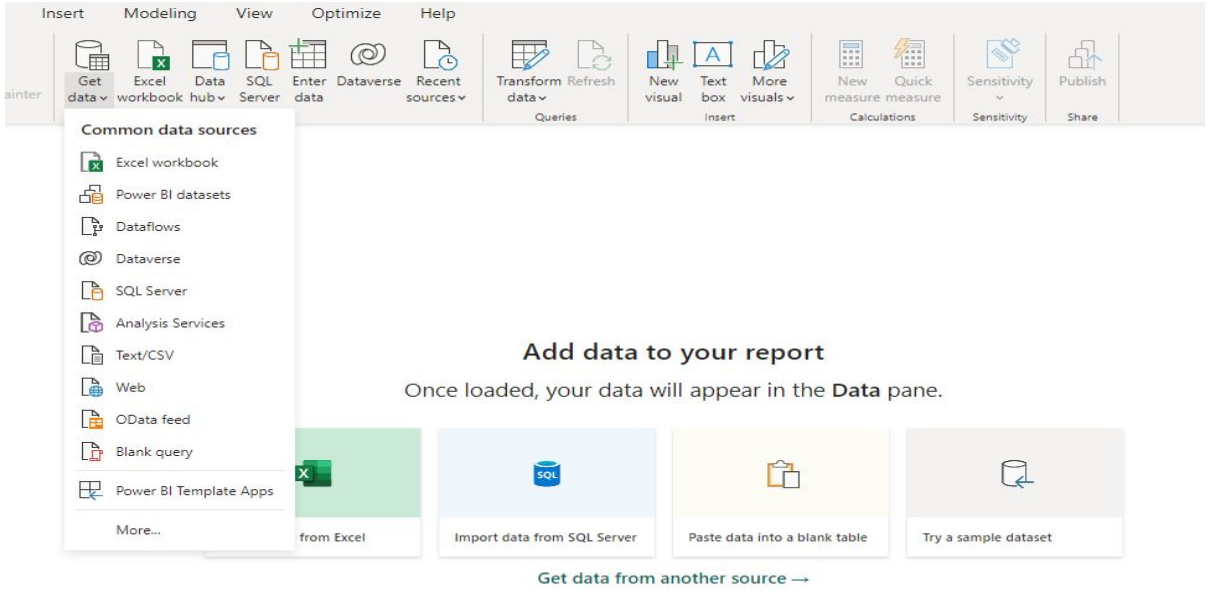


- When you launch Power BI Desktop, a welcome splash screen is displayed.
- To connect to the sample data for this exercise, select Get Data on the left-hand menu of the splash screen or from the home ribbon.

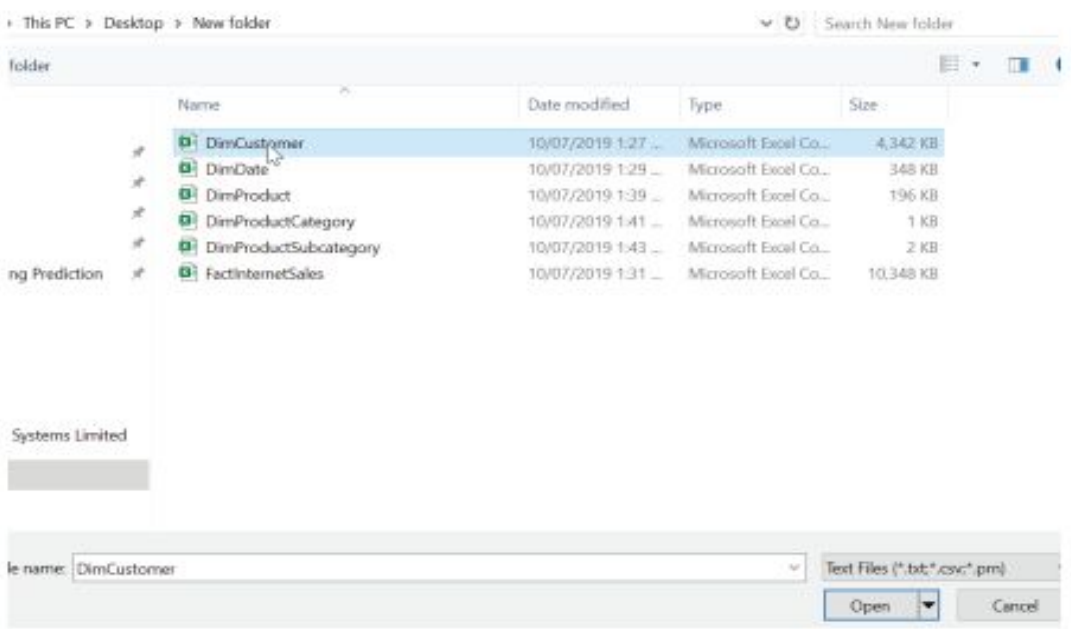


Connecting To Data Sources

- You can connect to the data source from that screen, and you can go to the PowerBI environment.
- On the environment, you can get from the 4 sources on your page or click on Get Data as shown below for more options.

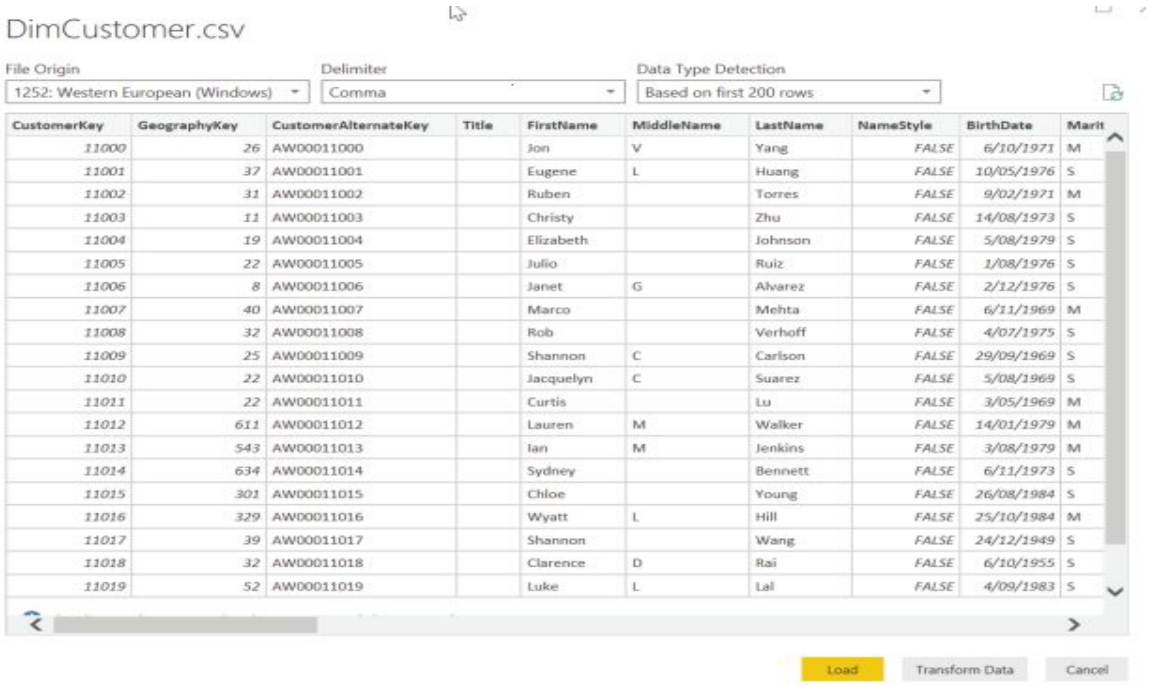


- Select Text/CSV from the list and click Connect.
- Browse to the unzipped data files you saved in step 3.2, select the first file DimCustomer.csv, and click Open



Connecting To Data Sources

• When you click Open, the below window appears, displaying sample data from the selected file.



CustomerKey	GeographyKey	CustomerAlternateKey	Title	FirstName	MiddleName	LastName	NameStyle	BirthDate	Marit
11000	26	AW00011000		Jon	V	Yang	FALSE	6/10/1971	M
11001	37	AW00011001		Eugene	L	Huang	FALSE	10/05/1976	S
11002	31	AW00011002		Ruben		Torres	FALSE	9/02/1971	M
11003	11	AW00011003		Christy		Zhu	FALSE	14/08/1973	S
11004	19	AW00011004		Elizabeth		Johnson	FALSE	5/08/1979	S
11005	22	AW00011005		Julio		Ruiz	FALSE	1/08/1976	S
11006	8	AW00011006		Janet	G	Alvarez	FALSE	2/12/1976	S
11007	40	AW00011007		Marco		Mehta	FALSE	6/11/1969	M
11008	32	AW00011008		Rob		Verhoff	FALSE	4/07/1975	S
11009	25	AW00011009		Shannon	C	Carlson	FALSE	29/09/1969	S
11010	22	AW00011010		Jacquelyn	C	Suarez	FALSE	5/08/1969	S
11011	22	AW00011011		Curtis		Lu	FALSE	3/05/1969	M
11012	611	AW00011012		Lauren	M	Walker	FALSE	14/01/1979	M
11013	543	AW00011013		Ian	M	Jenkins	FALSE	3/08/1979	M
11014	634	AW00011014		Sydney		Bennett	FALSE	6/11/1973	S
11015	301	AW00011015		Chloe		Young	FALSE	26/08/1984	S
11016	329	AW00011016		Wyatt	L	Hill	FALSE	25/10/1984	M
11017	39	AW00011017		Shannon		Wang	FALSE	24/12/1949	S
11018	32	AW00011018		Clarence	D	Rai	FALSE	6/10/1955	S
11019	52	AW00011019		Luke	L	Lal	FALSE	4/09/1983	S

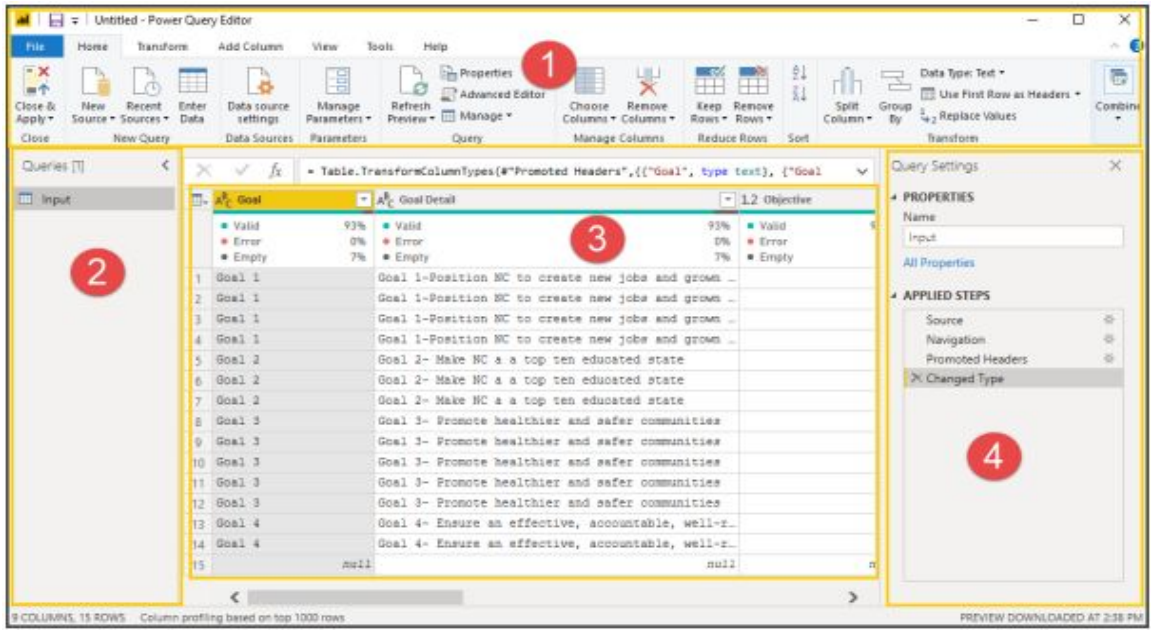
Above, you can see the options Load and Transform Data. For now, click Load to import the data directly into Power BI. This imports the data as it is, and loads it into Power BI Desktop.

• Repeat the same process and load all other sample files (DimDate, FactInternetSales, DimProduct, DimProductCategory, and DimProductSubCategory).
Note that you will have to load these one at a time.
• At this point it would be useful to Save the Power BI Desktop model.
The data has now been loaded into the Power BI model and you have a blank canvas to start working with

Interface Of Query Editor

- Query Editor consists of 4 Parts

1.Query Ribbon
2.Left Pane
3.Center (Data) Pane
4.Query Settings



The Ribbon in **Query Editor** consists of four tabs

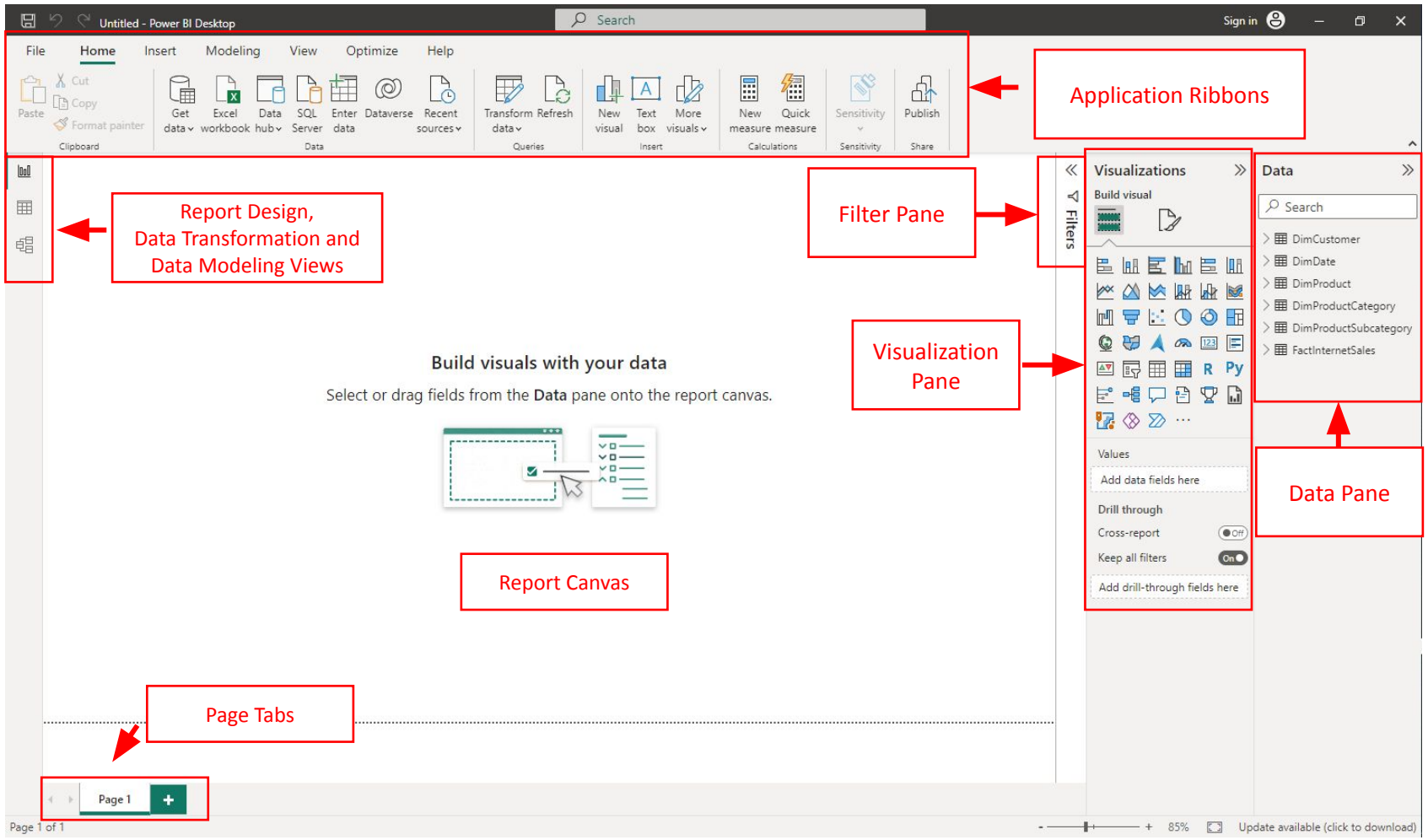
- **Home**
- **Transform**
- **Add Column**
- **View**

Home Tab: The Home tab contains the common query tasks, including the first step in any query, which is **Get Data**.

Transform: The **Transform** tab provides access to common data transformation tasks, such as adding or removing columns, changing data types, splitting columns, and other data-driven tasks**.**

Add Column: This tab provides additional tasks associated with adding a column, formatting column data, and adding custom columns. The following image shows the **Add Column** tab**.**

The PowerBI Desktop Application Interface



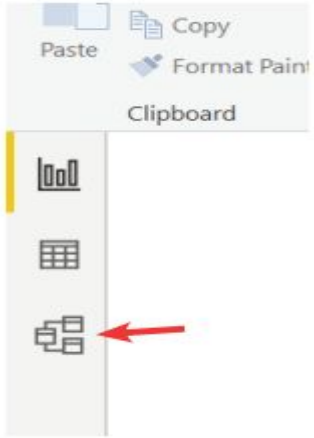
1. The left menu is used to switch between, **Report Design, Data Transformations** and **Data Modelling** (creating relationships within your data).
2. The **Report Canvas** is for Visual Design and Layout.
3. The **Application ribbons** contain all options and settings, visual or page level properties, and another settings configuration.
4. The report building panes contain all the components that may be added to a report. You can:
    a. Select fields and data from imported tables on the **Data pane**.
    b. Select different ways to display this data from **the Visualizations pane**.
    c. Apply filtering to the data in the **Filters pane.**

3. Modelling Data Relationship

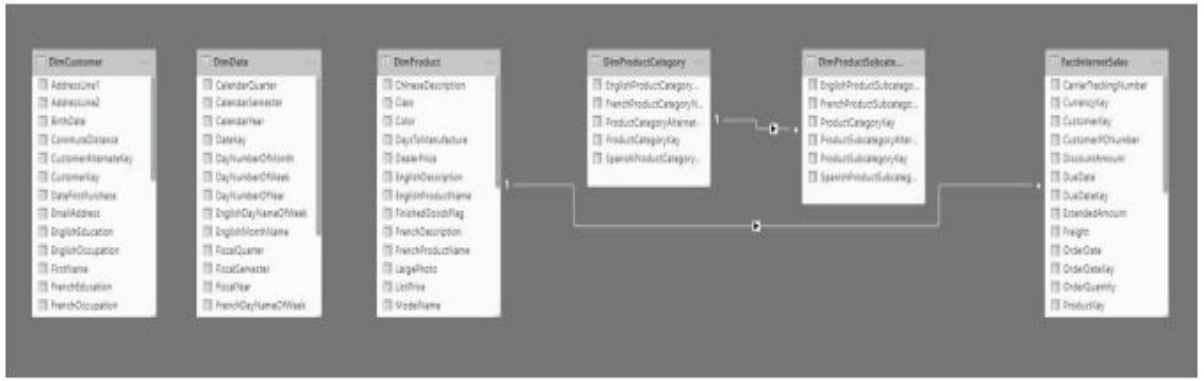
Creating Relationships

Once the required data is loaded, there may be a need to use Power Query Editor to shape the data by removing unnecessary columns, changing data types, adding new calculated columns, and so on. Power Query Editor is not covered further in this document.

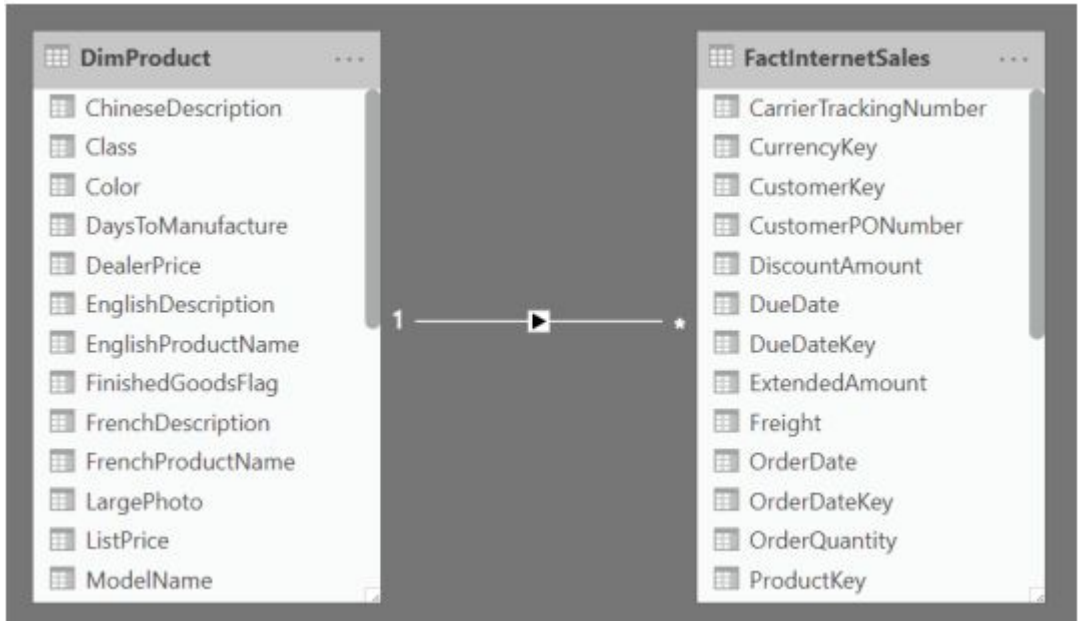
- Select the Data Modeling view, as indicated below



Power BI Desktop makes creating relationships easy through an Auto Detect feature. When the data is loaded, Power BI Desktop will attempt to find and create relationships for you based on column names in the tables. If there are matching column names, these relationships are created automatically



It is worth noting the following details about relationships:



1. **Relationship:** The line between two tables represents that a relationship exists.
2. **Direction:** The arrow indicates which direction filtering will occur. In this example: If DimProduct is filtered on a particular value, FactInternetSales will also be filtered to only show records related to the selected value.
3. **“One” side:** The 1 indicates that the relationship works off a single unique record on the DimProduct table.
4. **“Many” side:** The * indicates that the relationship links to many records on the FactInternetSales table

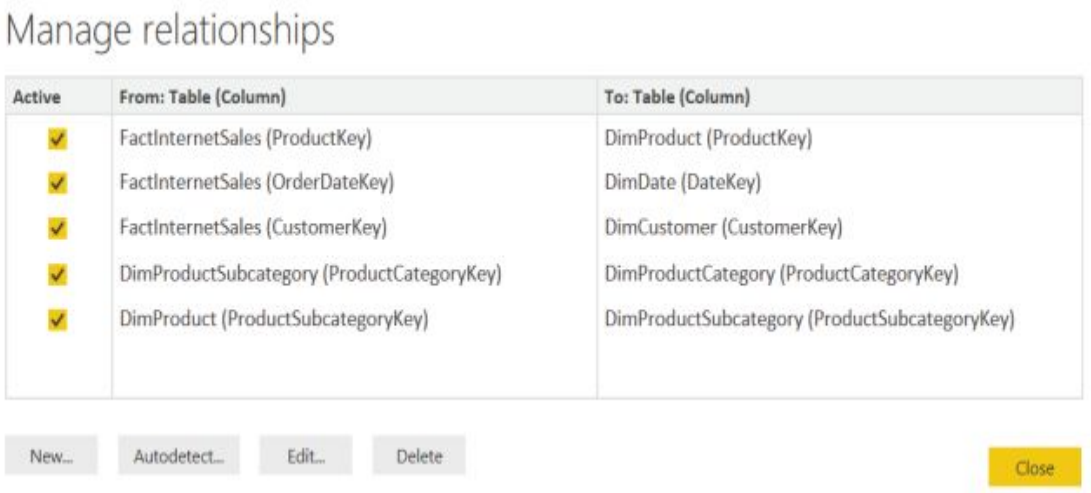
Creating Relationships

As not all relationships have been auto detected, we will need create the rest of them manually.
The next section explains how we will do this.

- Select Modeling from the top menu. Then select **Manage Relationships**

- Select **New…**
- Select **DimProduct** from the first dropdown box
- Highlight the column **ProductSubCategoryKey**
- Select **DimProductSubCateogory** from the second dropdown box
- Highlight the column **ProductSubCategoryKey**

- Ensure the **Cardinality** is set to Many to One (*:1), **Cross filter direction** is set to single and "**Make this relationship active"** is ticked.
- Click Ok



- Click Close to save the relationships.
- Save the model

4. Dax functions

Data Analytics Expression

What is DAX?

DAX is the abbreviated form of Data Analytics Expressions (DAX). It means that it is a type of formulae or expressions that are used for the analysis and calculations of data in Power Query and Power BI. The combination or collection of different expressions such as constants, operators, and functions form a formula to give results or output. Power BI DAX helps in finding more detailed information from raw data.

When is DAX used?

When a new column calculation is needed

When you create a data model on the Power BI Desktop, you can extend a table by creating new columns. The content of the columns is defined by a DAX expression, evaluated row by row or in the context of the current row across that table.

Measures

There is another way of defining calculations in a DAX model, useful if you need to operate on aggregate values instead of on a row-by-row basis. These calculations are called measures. One of the requirements of DAX is that a measure needs to be defined in a table. However, the measure does not really belong to the table. So, you can move a measure from one table to another one without losing its functionality. Measure, unlike Columns exist in the filter context of the data.

Note

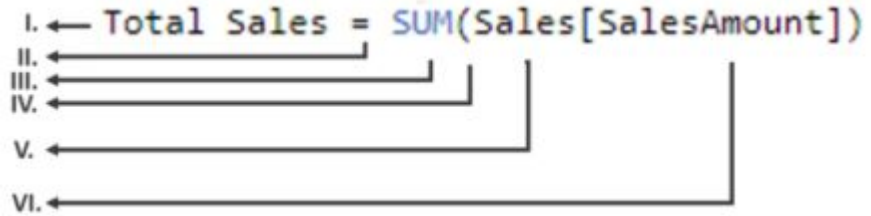
A column takes up physical space in your Power BI model, whereas a measure is calculated and thus only evaluated when needed.

How does DAX work?

• There are three fundamental concepts for Power BI DAX: **Syntax, Context, and Functions**.

Syntax

The Syntax comprises various components that make up a formula and how it's written. Look at this simple DAX formula



I. Total Sales is the measure name.
II. The equals sign operator (=) indicates the beginning of the formula.
III. SUM adds up all the numbers in the column, Sales[SalesAmount].
IV. There are these parentheses () that surround an expression containing one or more arguments.
All functions require at least one argument.
V. Sales is the table referenced.
VI. An argument passes a value to a function. The referenced column [SalesAmount] is an argument
with which the SUM function knows the column on which it has to aggregate a SUM.

Data Analytics Expression

Functions.
Functions are predefined, structured and ordered formulae. They perform calculations using arguments passed on to them. These arguments can be numbers, text, logical values or other functions.

Aggregate Functions

MIN(<Column>), MAX(<Column>), SUM(<Column>), AVERAGE(<Column>)

COUNT Functions

DISTINCTCOUNT(<Column>), COUNT(<Column>), COUNTA(<Column>), COUNTROWS(<Column>), COUNTBLANK(<Column>),

DATE-TIME Functions

DATE(<Year>,<month>,<day>), HOUR(<Column>),TODAY(),EOMONTH(<Start_date>,<months>),Calendar(<StartDate>,<EndDate>)

Naming convention

Acronym	Description	Shift	Aggregation	Comparison
YTD	Year-to-date		X	
QTD	Quarter-to-date		X	
MTD	Month-to-date		X	
MAT	Moving annual total		X	
PY	Previous year	X		
PQ	Previous quarter	X		
PM	Previous month	X		
PYC	Previous year complete	X		
PQC	Previous quarter complete	X		
PMC	Previous month complete	X		
PP	Previous period (automatically selects year, quarter, or month)	X		
PYMAT	Previous year moving annual total	X	X	
YOY	Year-over-year			X
QOQ	Quarter-over-quarter			X
MOM	Month-over-month			X
MATG	Moving annual total growth	X	X	X
POP	Period-over-period (automatically selects year, quarter, or month)			X
PYTD	Previous year-to-date	X	X	
PQTD	Previous quarter-to-date	X	X	
PMTD	Previous month-to-date	X	X	
YOYTD	Year-over-year-to-date	X	X	X
QOQTD	Quarter-over-quarter-to-date	X	X	X
MOMTD	Month-over-month-to-date	X	X	X
YTDOPY	Year- to-date-over-previous-year	X	X	X
QTDOPQ	Quarter-to-date-over-previous-quarter	X	X	X
MTDOPM	Month-to-date-over-previous-month	X	X	X

Data Analytics Expression

DAX functions and operators that can be combined to build formulas and expressions in a more effective way.

Remember: DAX formulas always start with an equal sign (=). You can provide any expression that evaluates to a scalar, or an expression that can be converted to a scalar after the equals sign.

Basic Aggregate and Math functions

Problem	Calculation Expression
Total Sales Calculation	**Calculated measure using SUM to aggregate a column** Total Sales = SUM('TableName'[SalesAmount])
Total Cost Calculation	**Calculated measure using SUM to aggregate a column** Total Cost = SUM('TableName'[Cost])
Profit Calculation	**Calculated measure using two previously created calculated measures to determine profit** Profit = [Total Sales] - [Total Cost]
Profit Margin	**Calculated measure using two previously created calculated measures to determine profit margin, the DIVIDE function is used to perform the division** Profit Margin = DIVIDE([Profit], [Total Sales])
Transaction Count	**Calculated measure that returns a count of all rows in a table, ultimately, many times this simple calculation is used to return transaction counts** Transactions = COUNTROWS('Table')
Related Table Count	**Returns the total rows in a related table. For example, total transactions by Product** Transactions = COUNTROWS(RELATEDTABLE('TABLE'))

Month To Date Sales

- Month-to-date (MTD): a period starting at the beginning of the current calendar month and ending at the current date.
- Month-to-date is used in various contexts, typically for recording results of an activity in the time between a date (exclusive since this day may not yet be "complete") and the beginning of the current month.
- Example: If today is the 15th of the month, and your manager asks you for the month to date sales figures, you will want to add your sales from the 1st of the month up to the 14th (as the 15th is not complete yet).

Problem	Calculation Expression
MTD Sales	**Calculates Total Sales for all days in the current month up to the maximum day in the selection** MTD Sales = TOTALMTD([Total Sales], 'DateTable'[DateColumn])
MTD Sales (Direct Query)	**Calculates Total Sales for all days in the current month up to the maximum day in the selection** MTD Sales = CALCULATE ([Total Sales], FILTER (ALL ('DateTable'), 'DateTable'[DateYear] = MAX ('DateTable'[DateYear]) && 'DateTable'[DateMonth] = MAX ('DateTable'[DateMonth]) && 'DateTable'[Date] <= MAX ('DateTable'[Date])))

Data Analytics Expression

Adding a Time Intelligence Quick Measure

DAX functions and operators that can be combined to build formulas and expressions in a more effective way.

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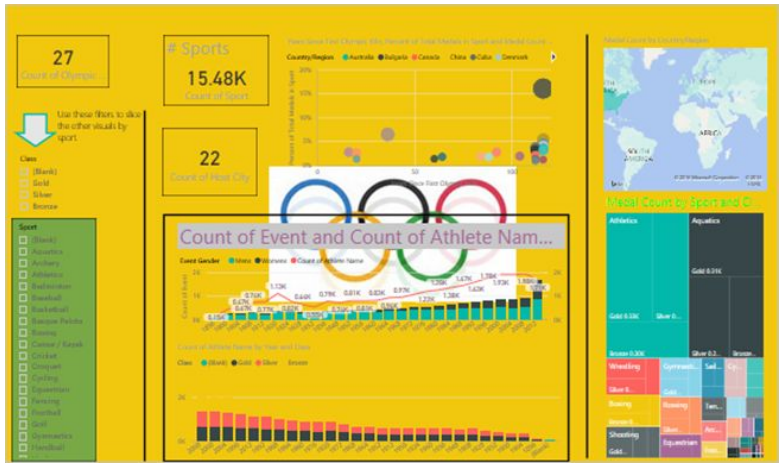
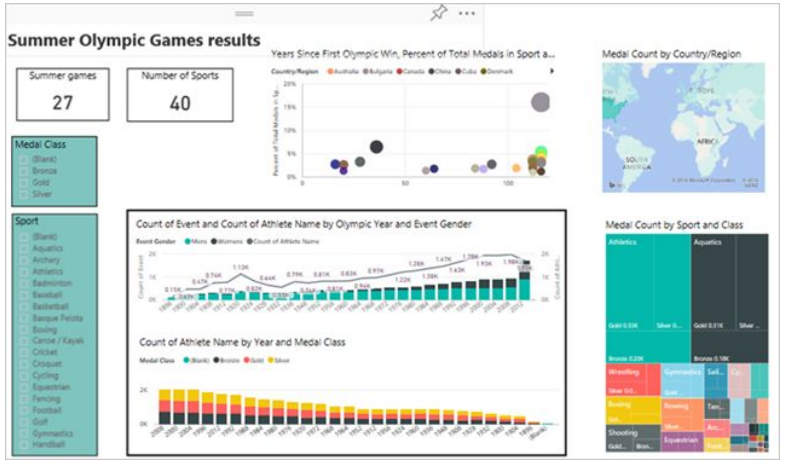
5. Creating Visualizations

Principles of report design





Layout

- Alignment
- Order
- Proximity
- Space
- Sorting
- No clutter

Clarity

- Someone without prior knowledge can understand the report without any explanation
- Focus on most important element
- Change ‘left-right and top-down’ by adding cues like labels, shapes, borders, size, and colour

Aesthetics

- Meet a business need
- Some ‘beauty’ is required - emotions kick in first!
- Create a theme or look
- Support, don’t detract
- Apply best practices

HR ANALYTICS DASHBOARD

Human Resources | Research & Development | Sales

Overall Employee
159

Attrition
35

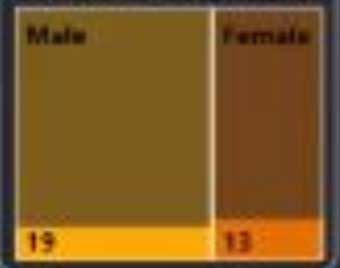
Attrition Rate
22%

Average Age
38

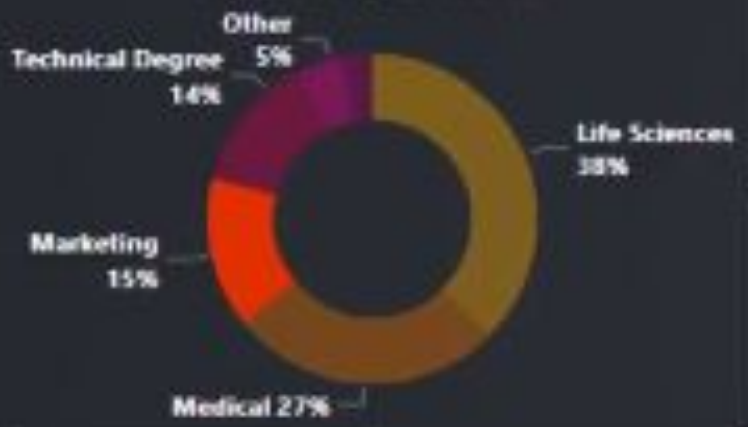
Average Salary
7.35K

Years At Company
8

Attrition By Gender



Attrition By Education



Attrition By Age

Job Statisfication Based on Job Role

JobRole	1	2	3	4	Total
Manager	0	1	0	1	2
Sales Executive	5	3	7	6	21
Sales Representative	2	5	4	1	12
Total	7	9	11	8	35

Attrition By Job Role

Attrition By Years At Company

Attrition By Salary Slab

0:00


ECCOMERCE SALES DASHBOARD
438K
5615
37K
121K
Profit by Month
Top 5 Customer by sales
Top 4 Sub-Category by sales

Resources

Continuous practice helps you develop your PowerBI skills and preparation is key for your Data analytics position. Find below some PowerBI resources for your use

Questions and answers

Simplilearn: https://www.simplilearn.com/power-bi-interview-questions-and-answers-article

Guru99: https://www.guru99.com/power-bi-interview-questions.html

Edureka:
https://www.edureka.co/blog/interview-questions/power-bi-interview-questions/

Powerbidocs:
https://powerbidocs.com/interview-questions-and-answers/

Training resources

Microsoft Learn:
https://learn.microsoft.com/en-us/power-bi/create-reports/sample-datasets

Online courses

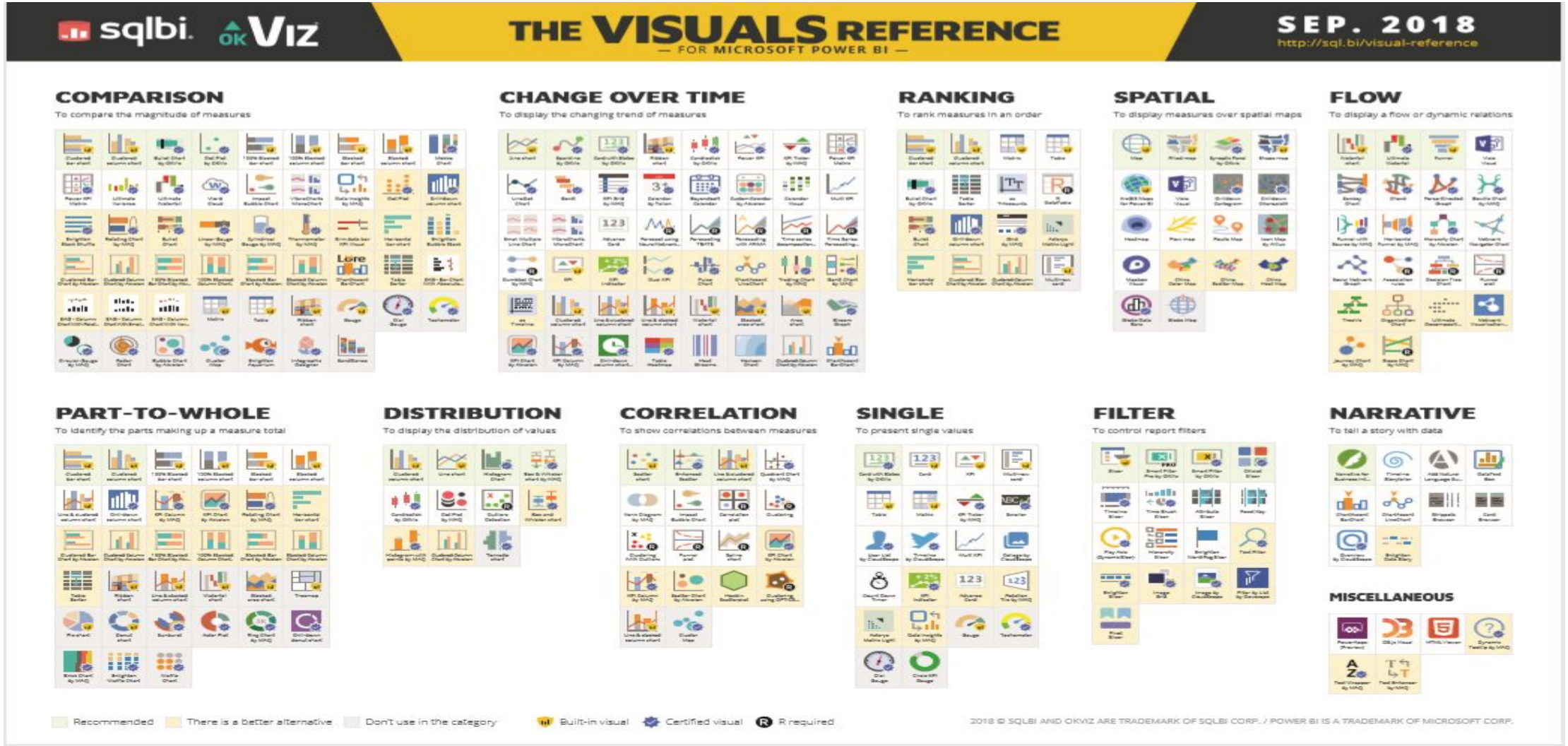
Data Analyst Boot Camp:
https://www.youtube.com/watch?v=rGx1QNdYzvs&list=PLUaB-1hjhk8FE_XZ87vPPSfHqb6OcM0cF

Datacamp: Link

Microsoft Learn: Link

Learnit:
https://www.youtube.com/watch?v=e6QD8lP-m6E

Guide to Chart Selection



Source: https://www.sqlbi.com/wp-content/uploads/visuals-reference-sep2018-A3.pdf