POWER BI

Draft on Understanding PowerBI

1. BUSINESS INTELLIGENCE (BI) CONCEPTS

Introduction to Business Intelligence The importance of Business Intelligence
The relation between Business Intelligence and Data Warehouse Tools and Technologies in Business Intelligence area

1.1 INTRODUCTION TO BUSINESS INTELLIGENCE

Business Intelligence (BI) is a process of analyzing data through technology and presenting it to the end user(s) which helps them to make an informed decision. With the use of historical and current data, a BI tool serves predictive view. Usually, a BI tool can perform tasks like data connection, data mining, data transformation, data modelling through building relationships, complex calculations, report building, dashboard creation, online analytical processing and predictive analysis.

1.2 RELATION BETWEEN BUSINESS INTELLIGENCE AND DATA WAREHOUSE

To understand the relationship between BI and Data warehouse, lets first understand what is Data warehouse?

DATA WAREHOUSE

It consists of a huge storage of data gathered from single or many sources to aid the process of making an informed decision at any level of an enterprise. A typical data warehouse follows an ETL (Extract, Transform, Load) process.

ETL

Extract:- The first step in using Data Warehousing is to extract data from single or multiple sources to load in its environment.

Transform:- The Data which has been extracted, may not come in the desired format or size etc, so there may be the need to transform the incoming data to meet business requirements and objects.

Load:- Once the data is being transformed, its ready to be loaded in targeted tables.

1.3 RELATION BETWEEN BUSINESS INTELLIGENCE AND DATA WAREHOUSE (CONT.)

A Business Intelligence tool takes data from a Data warehouse to generate reports and help the end user to make informed decision. By this, we can call Data warehouse as a part of a complete Business Intelligence process.

1.4 BI TOOLS

- Microsoft Power BI
- Tableau
- Sisense
- Looker
- datapine
- Zoho Analytics
- Yellowfin
- Answer Dock
- Hotjar
- ReportPlus
- QlikView
- SAP BusinessObjects Lumira
- SAP Crystal Reports
- SAP Business Intelligence
- Vista
- Clootrack

Figure 1. Magic Quadrant for Analytics and Business Intelligence Platforms

Source: Gartner (February 2018)

2. MICROSOFT POWER BI (MSPBI) INTRODUCTION

Power BI introduction and overview
Power BI Architecture
Introduction and Power BI in Desktop
Why Choose Power BI over Excel

2.1 POWER BI INTRODUCTION AND OVERVIEW

Power BI is a collection of software/tools that works in synchronization to turn unrelated sources of data into meaningful and interactive insights. Power BI support 100's of data sources including the most common one's like Excel spreadsheets, Text/CSV, SQL, Oracle etc.

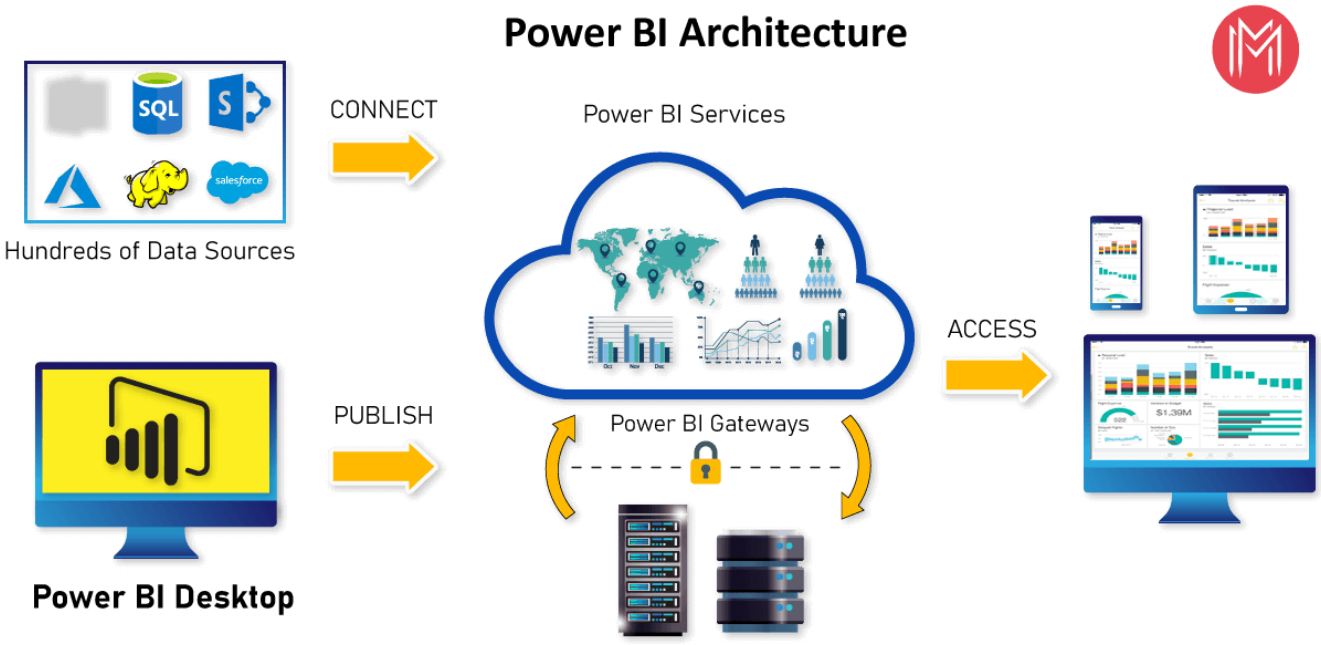
PARTS OF POWER BI

- Power BI Desktop - A Windows desktop application
- Power BI service - for Windows, iOS, and Android devices
- Power BI mobile apps - An online SaaS (Software as a Service) service
- Power BI Report Server - to publish Power BI reports to an on-premises report server after creating them in.

POWER BI FLOW

It starts with connecting to data then transforming it, building relationships and finally creating reports and publishing it to Power BI service. Later it can be shared so that end users in the Power BI service and mobile devices can view and interact with the report.

2.2 POWER BI ARCHITECTURE



2.3 INTRODUCTION TO POWER BI DESKTOP

It starts with connecting to data then transforming it, building relationships and finally creating reports and publishing it to Power BI service. Later it can be shared so that end users in the Power BI service and mobile devices can view and interact with the report.

2.4 WHY TO CHOOSE POWER BI OVER EXCEL

Store and analyze huge amounts of data smoothly : With powerful compression algorithms to import and cache the data within the .PBIX file, it can easily handle huge databases. On the other hand, Excel struggles even in opening an file having few hundred thousands of rows.

Find Data insights and show trends in minutes: With build-in time intelligence functions, it becomes very easy to dig into vast amount of data and draw trend (unlike Excel).

User Friendly Report Interface: It's just about drag and drop of the fields when it comes create impressive visualizations. Even a complex report with diverse visualizations won't take more than 10 to 20 mins to create. If you think that pre- enabled visualizations are not enough, then you can import a custom visualization anytime in just few clicks from the library of 100'sof custom visuals.

Publishing and Sharing the Report: Just by hitting the publish button, one can publish the report on Power BI service and whosoever has access to it can view the updated report or dashboard always. On the other hand, in Excel, one need to send emails or putting in the share drive or share point and telling them that we have updated the file.

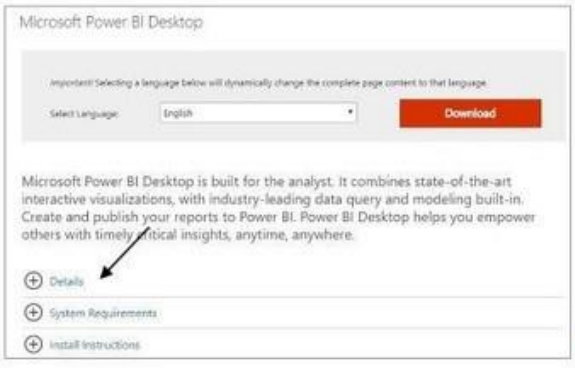
Defining Roles: Power BI gives us an option to define roles to make sure people from different departments or locations can see only their respective data (Which can't be done in Excel).

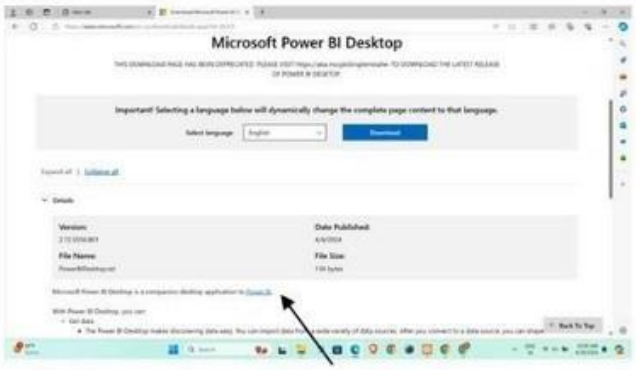
3. INTRODUCTION & GETTING STARTED

- *How to get Power BI desktop*
- *Power BI Desktop Interface*
- *Change Default Settings*

3.1 HOW TO GET POWER BI DESKTOP?

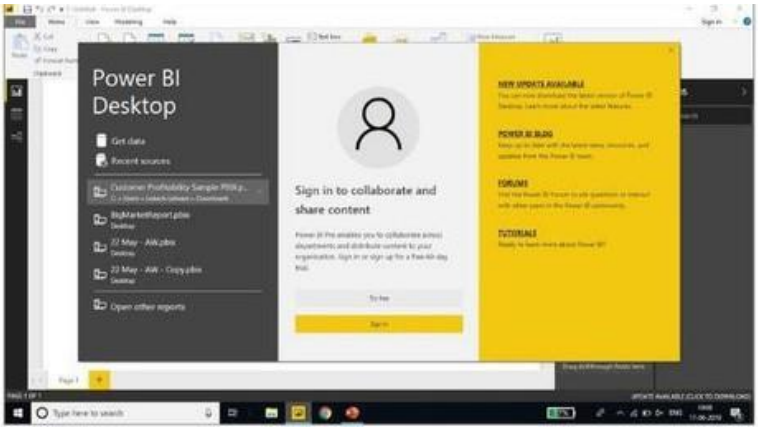
Go to https://www.microsoft.com/en-us/download/details.aspx?id=45331.
Check for the system requirements and hit the download button and you are good to go.



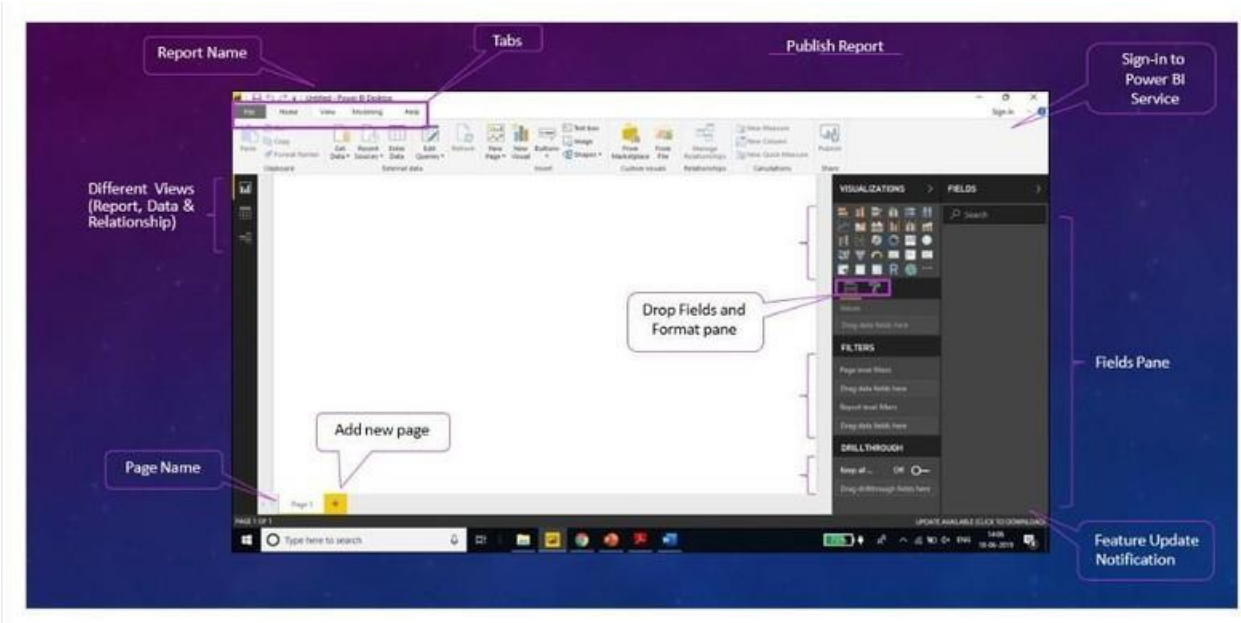


PBI DESKTOP - FIRST SCREEN

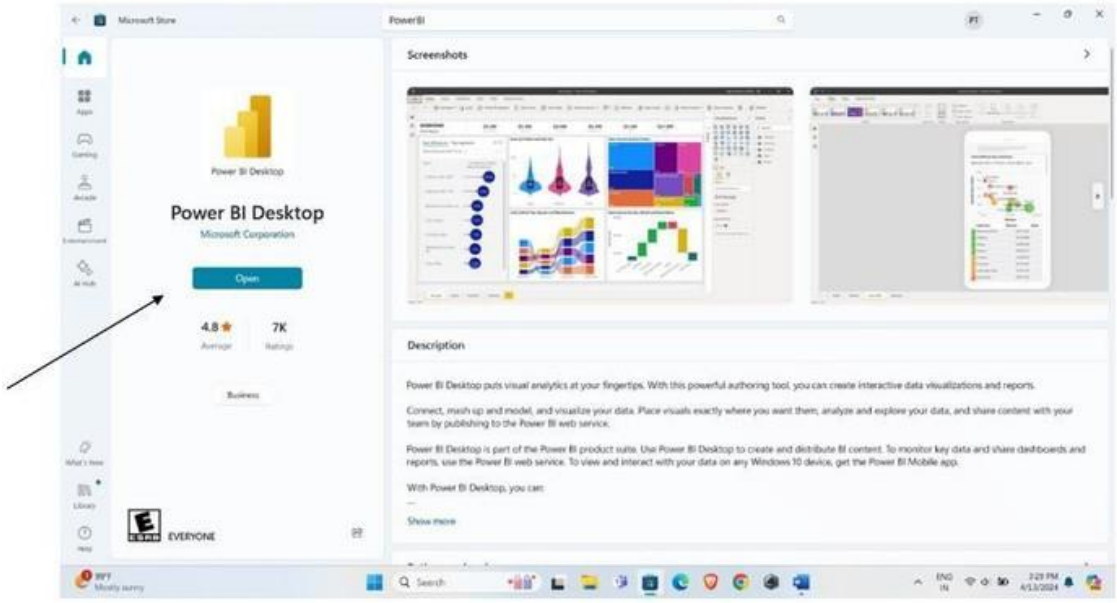
Below is the first screen you will get, once you open PBI desktop. You will be prompted to sign- in but sign-in is required only when it comes to publishing the report to PowerBI.com, rest the whole model can be created without sign- in. Note: Sign-in can be done only using an official email ID. i.e. it cannot accept personal email ids like Gmail, yahoo etc.



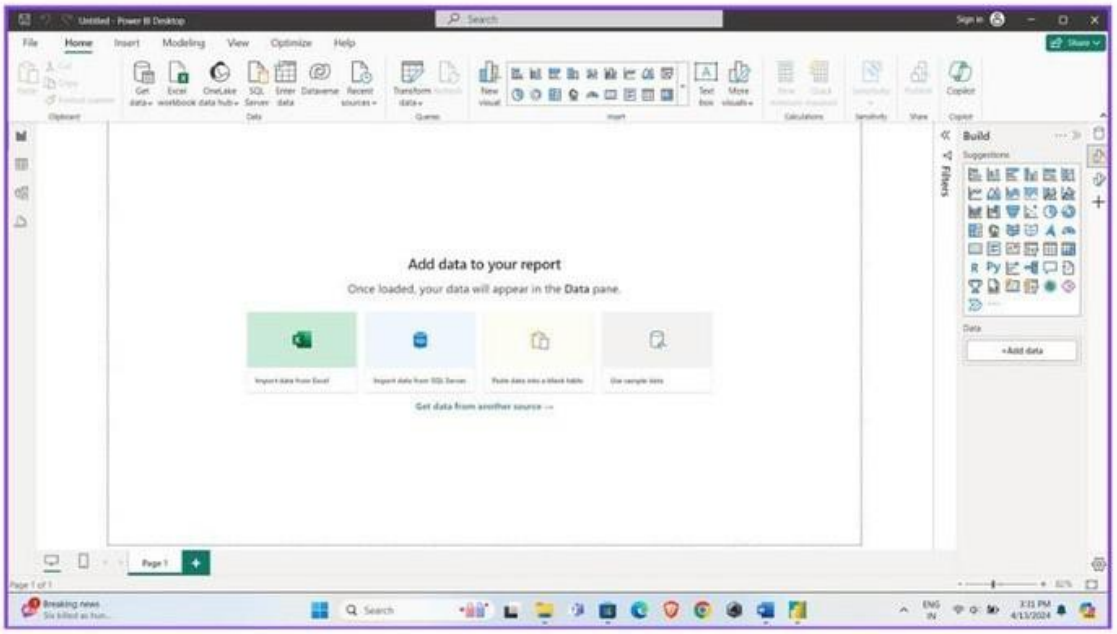
3.2 POWER BI DESKTOP INTERFACE



CONNECT TO POWERBI APP FROM MICROSOFT STORE



How Microsoft App look like?



POWER BI DESKTOP INTERFACE (CONT.)

- Report Name: *We can rename the report while saving the same for the first time.*

- Views:

1. *Report View – Under this we can use different visualizations to build report.*
2. *Data View – Once data is being loaded to PBI Desktop, the same can be seen here in the form of tables and fields. Here we can create calculated columns and measures.*
3. *Relationship View – This view is useful to build relationships to create data model.*

- Page Name: *We can have multiple pages into a single report. Each page contributes a part of a report. Its just like "Sheet" tabs in MS Excel.*

- Add New Page: *By clicking the plus sign, we can add a new page in the report.*

- Tabs:

1. *Home: This is a general-purpose tab and used for connecting new data, editing queries etc.*
2. *View: One can set the view and even design the phone layout too.*

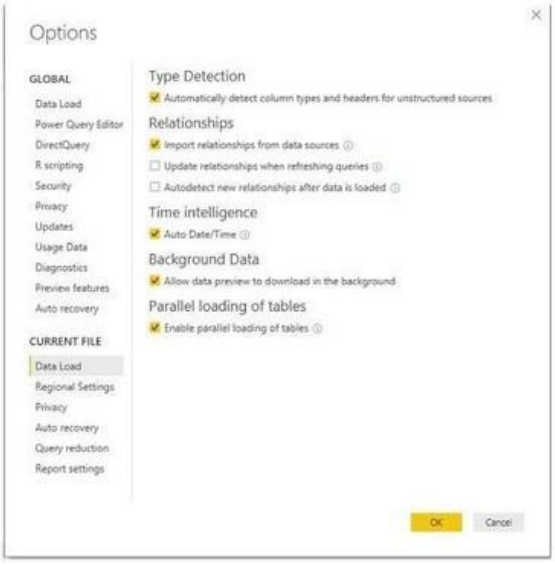
- Help: *It's a good resource to learn this program and even post your queries in PBI forums/community.*

POWER BI DESKTOP INTERFACE (CONT.)

- Publish Report: *This helps in publishing the reports created in Power BI desktop to Power BI Service.*
- Sign-In: *To publish the report or import new visualizations, one has to sign into Power BI service.*
- Visualization Pane: *Here we can choose among many visualizations like charts, slicers, maps etc.*
- Filters Pane: *PBI Desktop provides three levels of filters i.e. Visual, Page & Report level filter.*
- Drill-Through Filter: *Helps in accessing the detailed report of an item.*
- Drop Fields pane: *As every visualization needs one or multiple fields to show data into it. This pane facilitates dropping the desired fields from the fields pane.*
- Format Pane: *Every visualization has different formatting options; this pane helps in formatting the selected visualization.*
- Fields Pane: *Show all the connected data tables and fields. •Feature Update Notification: This will show a notification for any new update released from Microsoft PBI team.*

3.3 CHANGE DEFAULT SETTINGS

- Go to File -> Options & Setting -> Options.
- Data Load – Deselect "Update Relationships" and "Auto detect new relationships after data is loaded."
- Regional Settings – select "English (United States)"
- Preview Features – deselect any active feature.



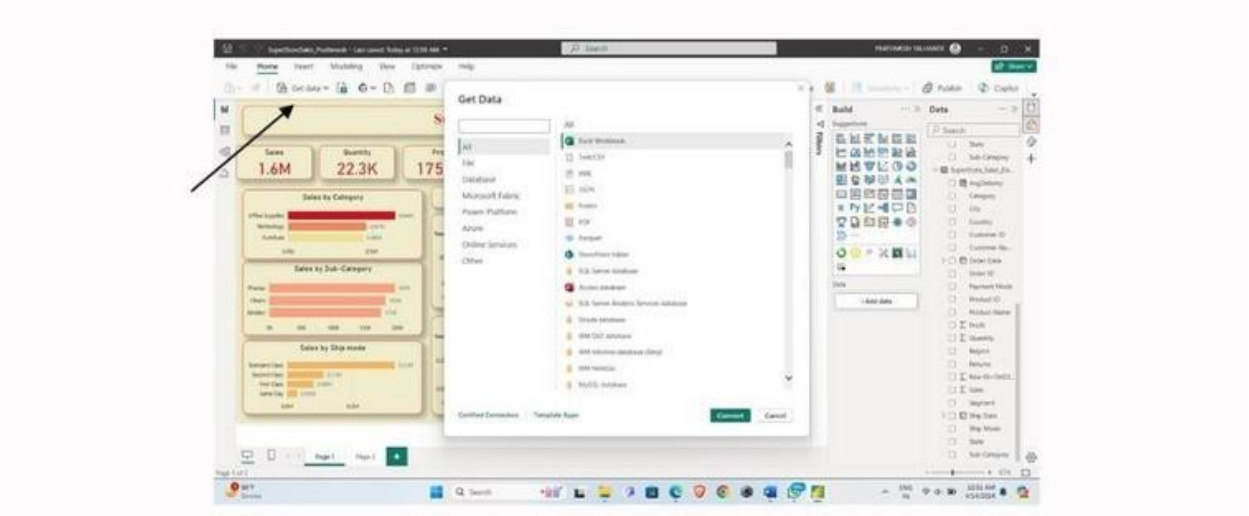
4. CONNECT TO VARIOUS DATA SOURCES

Connecting PowerBI with Different Data Sources

- *Connect to CSV files.*
- *Connect to Excel*
- *Connect to text.*
- *Connect to SQL Server*
- *Connect to a Web page.*
- *Enter data directly.*
- *Analysis Services Tabular data*
  Connect to Direct SQL Query

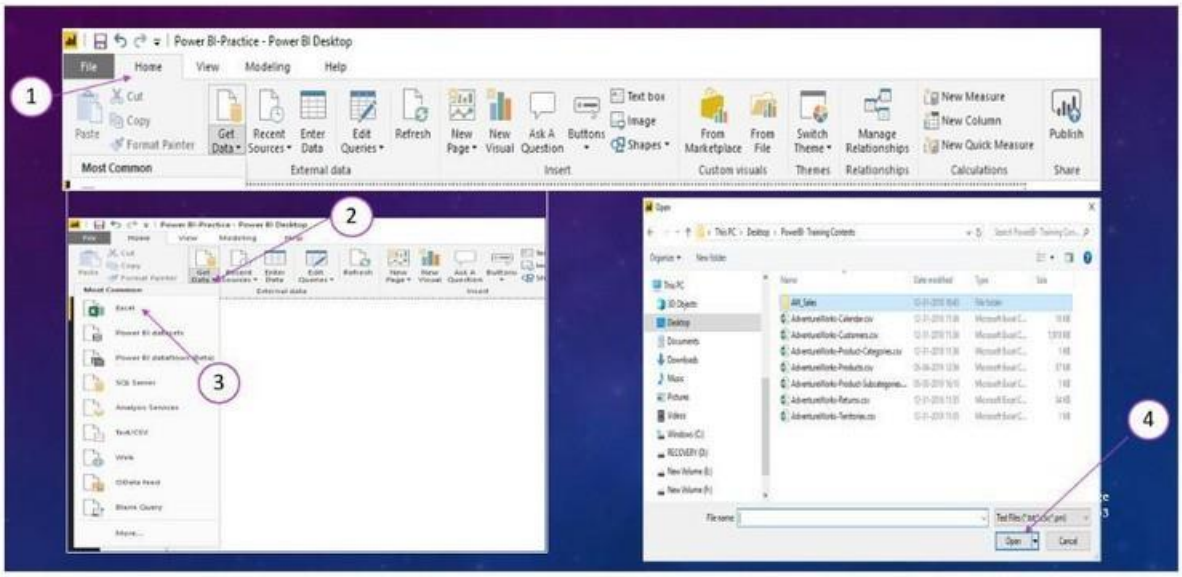
What is the purpose of the 'Get Data' icon in Power BI?

When users click on the Get Data icon in Power BI, a drop-down menu appears, and it shows all data sources from which data can be ingested. Data can be directly ingested from any source including files in Excel, CSV, XML, JSON, PDF, and SharePoint formats and databases such as SQL, Access, SQL Server Analysis Services, Oracle, IBM, MySQL, and much more. Also, Power BI datasets and Power BI data flows are compatible. Data can also be taken in from Azure and other online sources.



4.1 CONNECT TO CSV/TEXT/EXCEL FILES

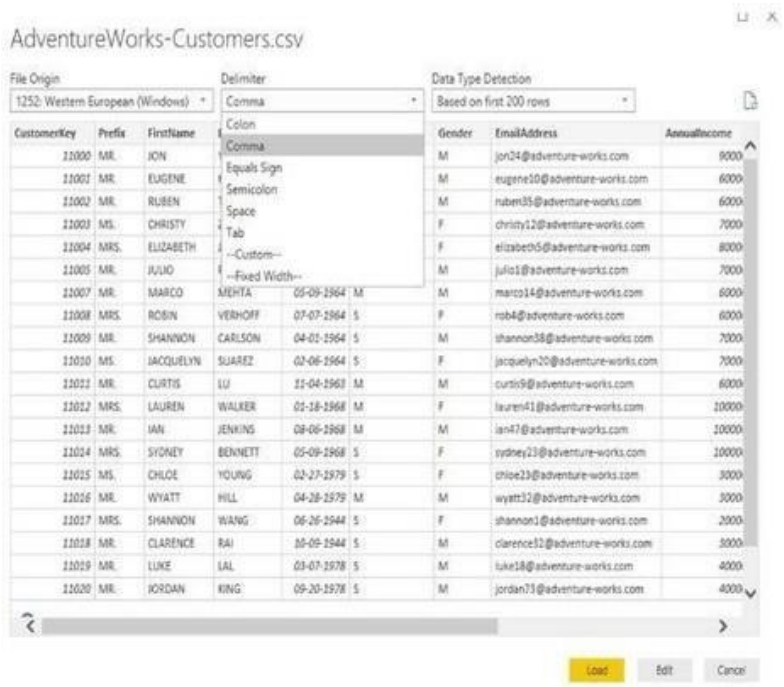
Home Tab -> Get Data -> Click on Text/CSV or Excel -> Choose File -> Open



4.2 CONNECT TO CSV/TEXT/EXCEL FILES (CONT.)

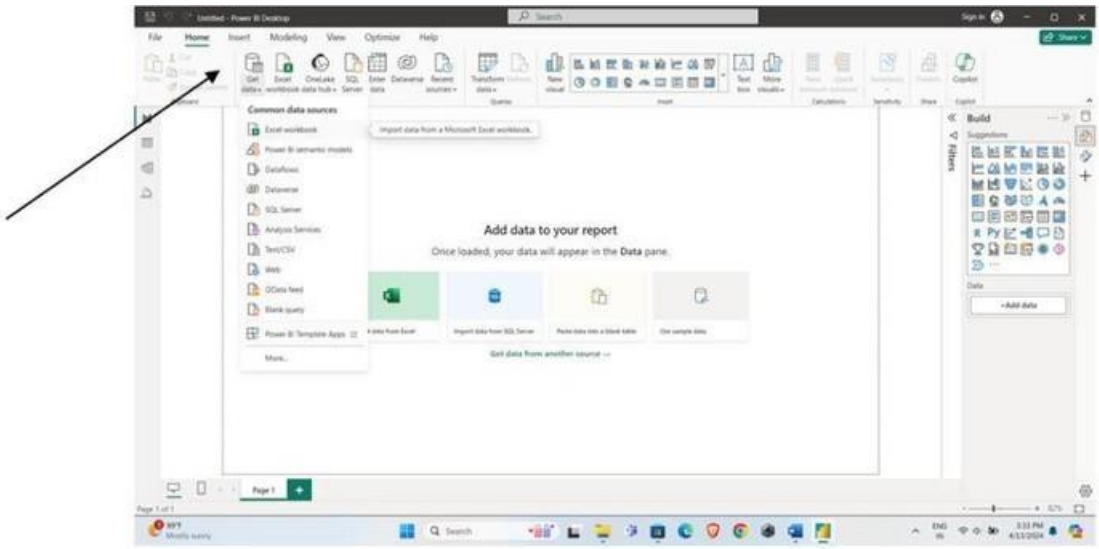
When we click on the open button, a new dialogue box will get open. In which, following delimiter can be selected to extract the data–

- Comma
- Colon
- Equal sign
- Semicolon
- Space
- Tab
- Custom
- Fixed with

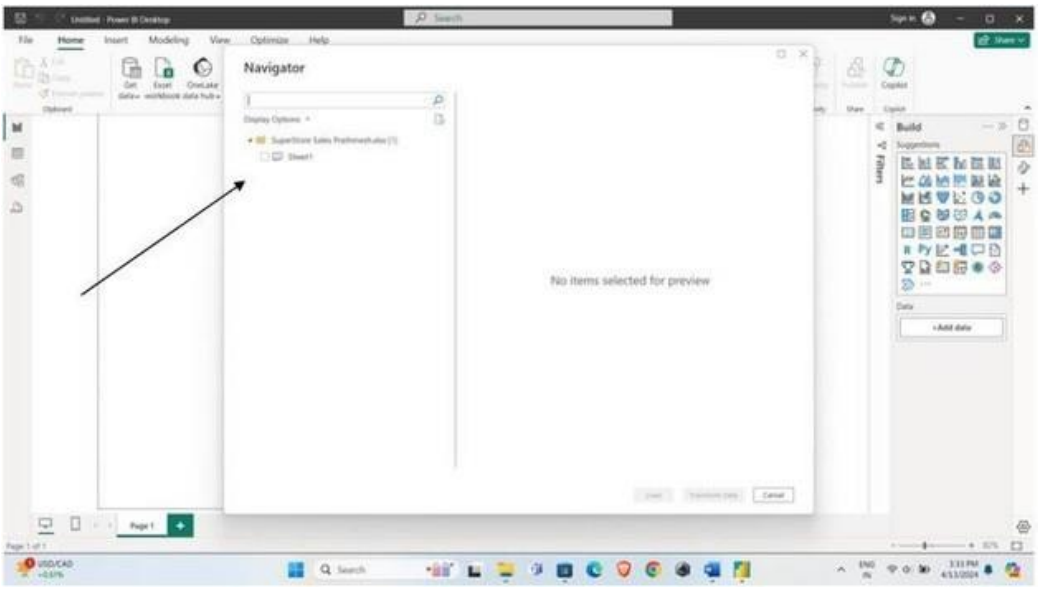


4.3 CONNECT TO CSV/TEXT/EXCEL FILES (CONT.)

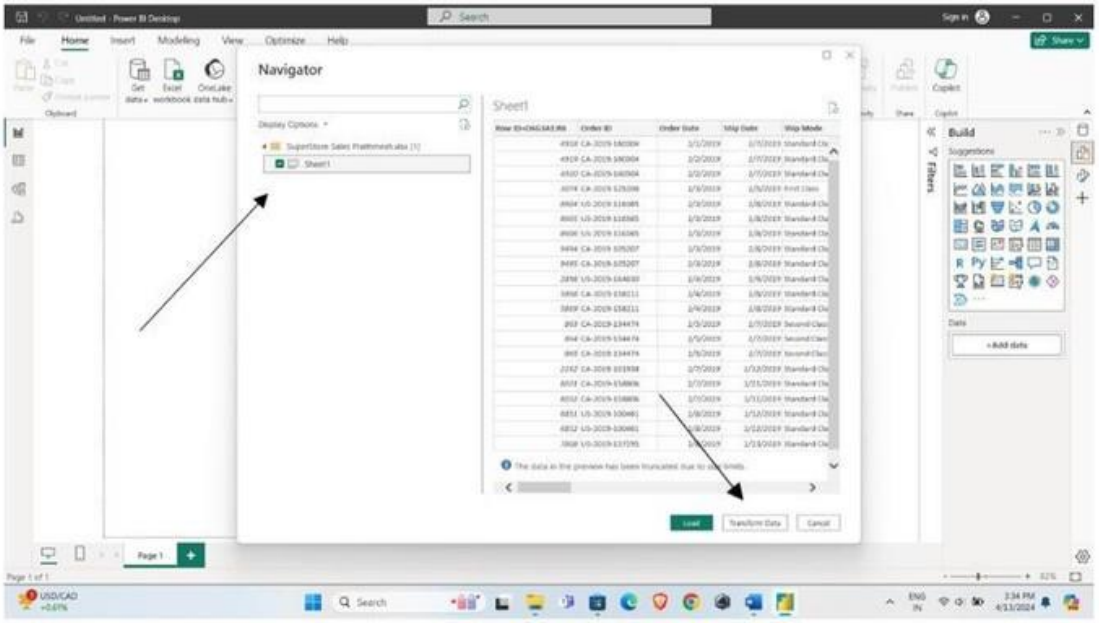
Load the dataset from Get data.



Choose which dataset you want to choose- For long dataset search via navigator.

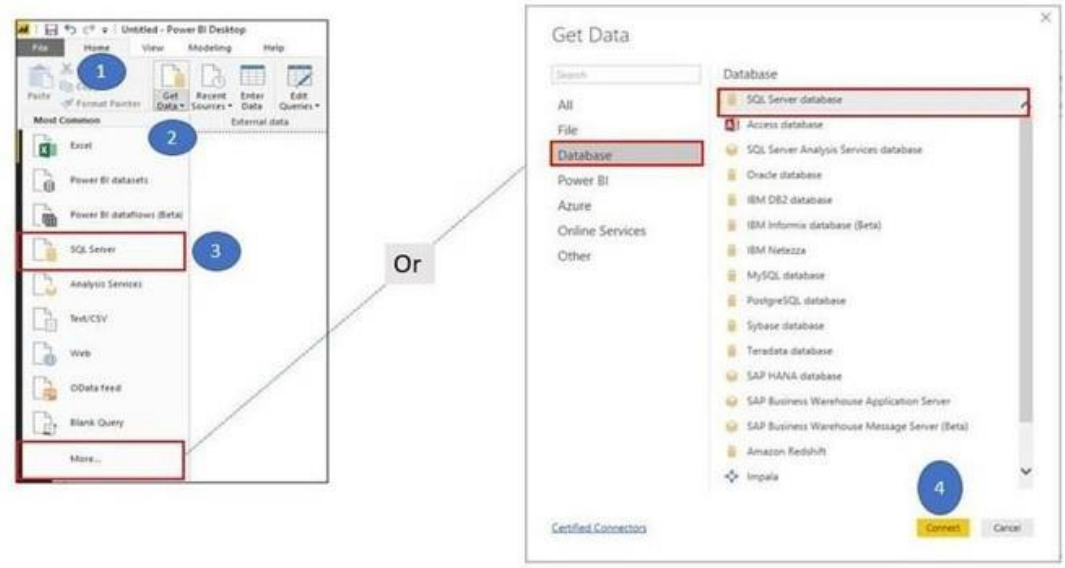


Select particular excel sheet and transform dataset.



4.4 CONNECT TO SQL SERVER

Home Tab -> Get Data-> Choose SQL server Database or More-> Choose SQL server database - > Connect.



4.5 CONNECT TO SQL SERVER (CONT.)

- Following are the list of available fields in order to connect Power BI desktop to SQL Server Database
- Server- In this section we will provide default SQL server Instance.
- Database- If we want to use custom SQL query then this option is required.
- Data Connectivity Mode- Choose whether we want to import or directly connect through query.

4.5 CONNECT TO SQL SERVER (CONT.)

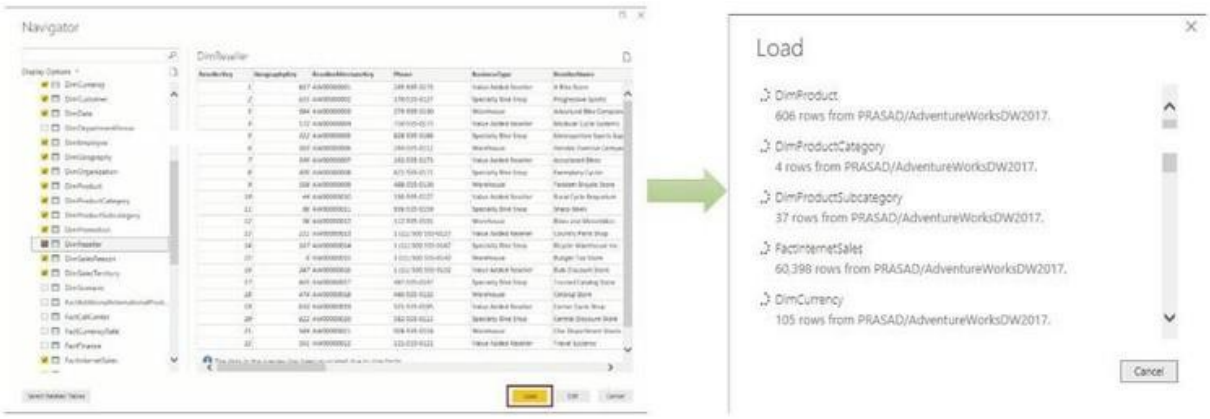
Windows – Here we can access the SQL Server database using our windows credentials.

4.5 CONNECT TO SQL SERVER (CONT.)

Once PBI Desktop is connected to SQL server, it will open up navigator to choose the files or tables we would like to connect to in our model.

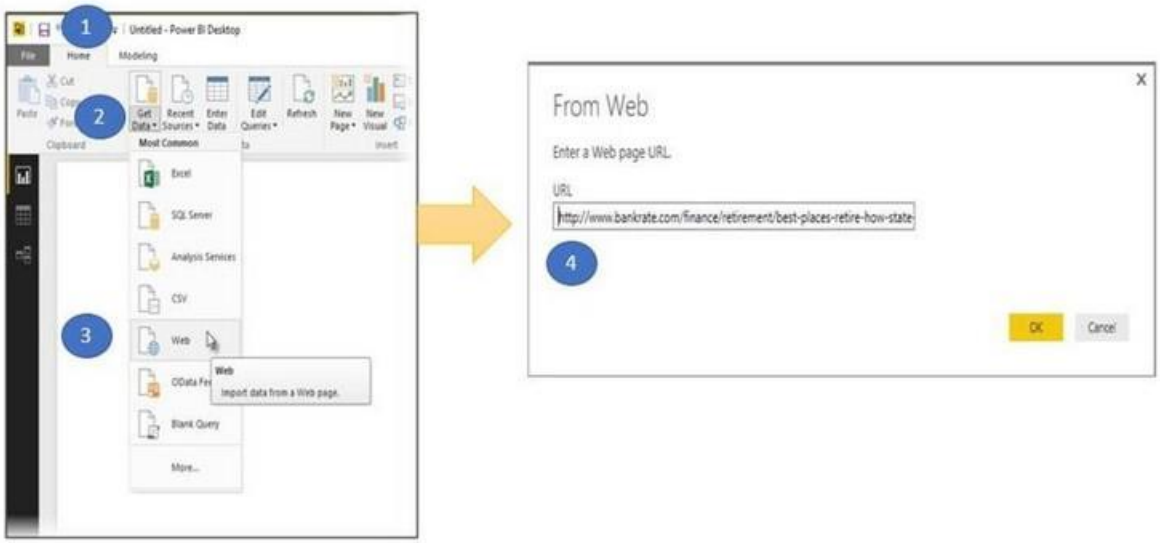
4.5 CONNECT TO SQL SERVER (CONT.)

After selecting the tables that need to be added in the model, we can click on "Load" to load them into PBI environment directly.



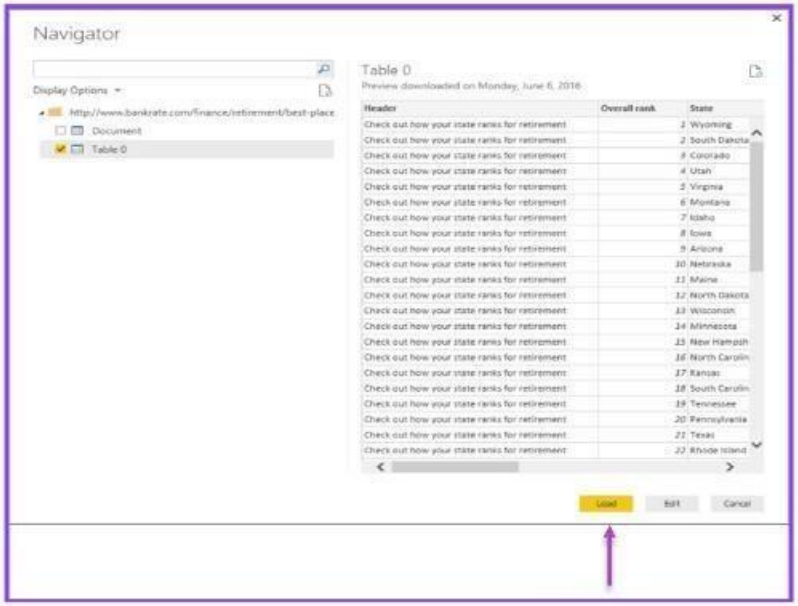
4.6 CONNECT TO A WEB PAGE

Home Tab -> GetData -> Web data -> Type the URL -> Connect.



4.7 CONNECT TO A WEB PAGE (CONT.)

Once Power BI desktop connects with the web page, it presents the data available into the navigator window. When we click on any table showing inside the navigator pane, it will display the preview of data. When we select the Load option in the navigator, Power BI imports the selected item data and makes them visible inside the Fields Tab.

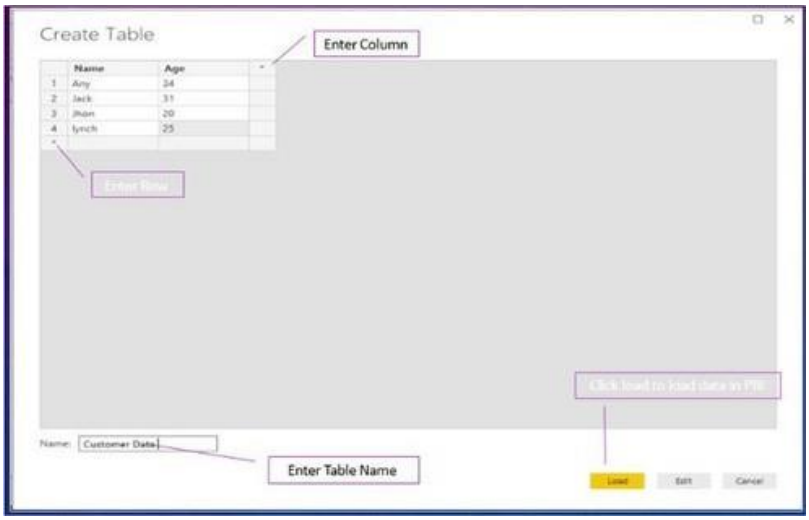


4.8 ENTER DATA DIRECTLY

Home Tab -> Enter Data This will trigger "Create Table" dialogue box.

4.8 ENTER DATA DIRECTLY (CONT.)

To Insert a new Column or row just click on the asterisk (*) symbol which is showing on both sides of the Column and Row. At the bottom, we can define Table Name, for example – Customer data.



4.9 CONNECT TO DIRECT SQL QUERY

Home -> Get Data -> SQL server database -> Type server Name -> Type Database (Optional) -> Click on Direct Query. Enter the credentials to access the database.

Note: Rest of the steps are same as we discussed above in "Connect to SQL Server Database".

5. POWER QUERY FOR DATA TRANSFORMATION

- *Using SQL Different versions of Power Query*
- *Power Query Introduction*
- *Query Editor*
- *Manipulation in Power Query*

5.1 POWER QUERY

Power Query acts as an "ETL" tool for Power BI i.e. it Extracts data from one or multiple sources, Transform that data and finally Load it into Power BI environment.

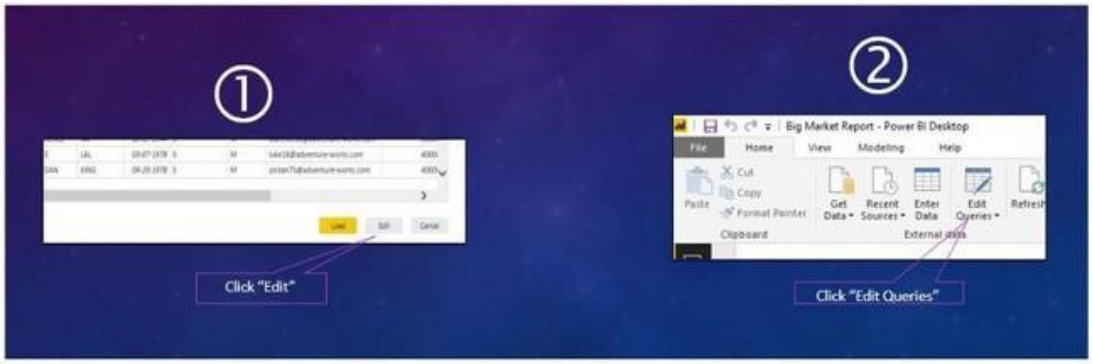
It also facilitates an "Applied Steps" feature, where whatever we do, will get recorded as steps and upon updating the source data, all those steps will get applied to them automatically and this way the creator of the report needs not to repeat the steps.

5.2 HOW TO OPEN POWER QUERY EDITOR?

Power query editor is a separate window which can be accessed by either of the following ways:

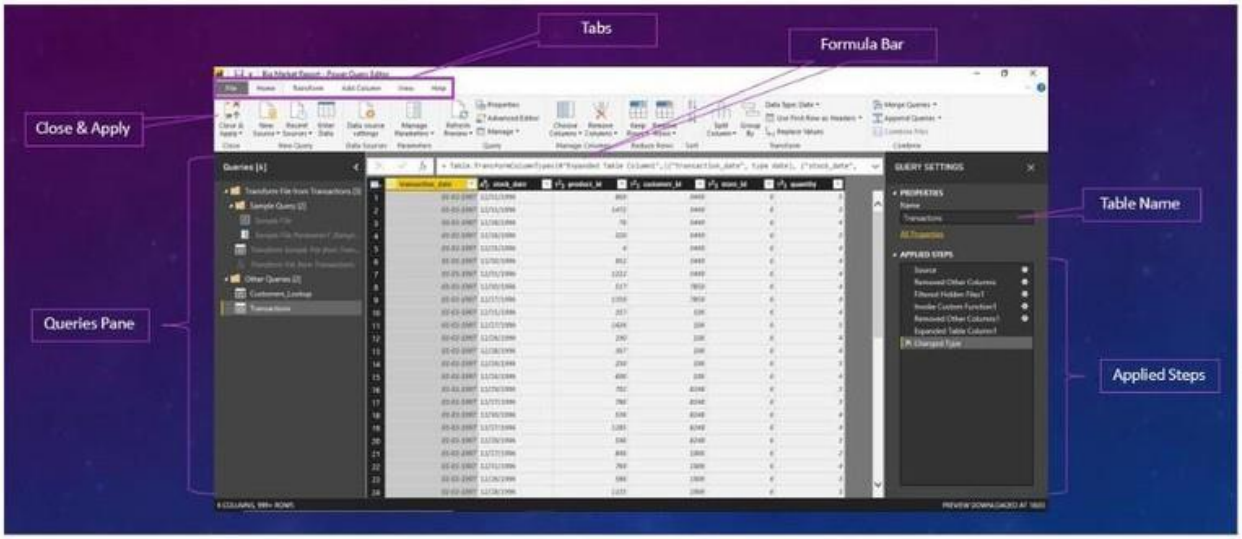
o Power BI window Home -> Get Data -> Choose the respective data source -> Browse the file -> "Edit". (Here "Edit" button will open Query editor).

o Power BI window Home -> "Edit Queries"



5.3 POWER QUERY EDITOR INTERFACE

Home Tab -> GetData -> Web data -> Type the URL -> Connect

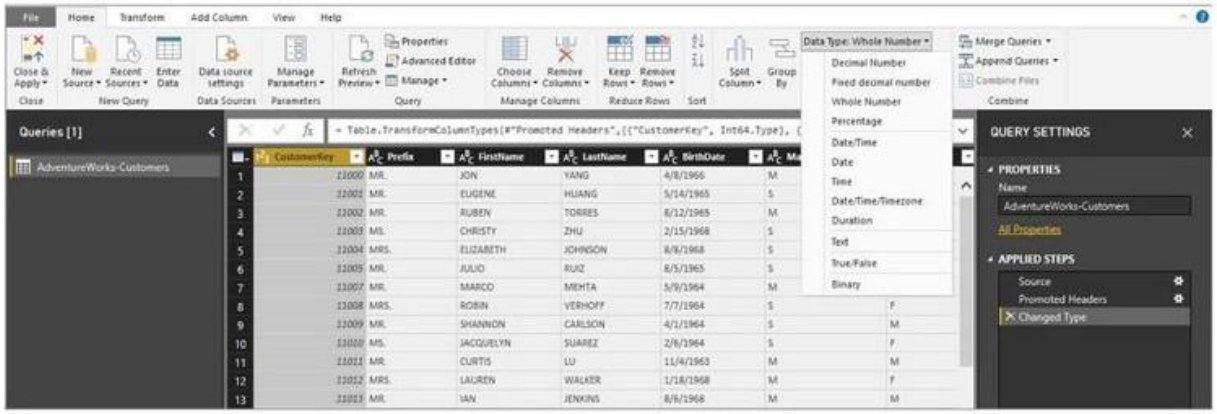


5.4 POWER QUERY EDITOR INTERFACE (CONT.)

- Q ueries pane: *This will show all the queries or the data with which our model is connected to.*
- Applied Steps: *List of steps that has been recorded while using the Power Query Editor. When the data in the data source will be updated then we need to just refresh our Power BI model and all the transformation steps which has been recorded by the Query Editor will get applied to updated data and that saves lots of repetitive work and time.*
- Table Name: *We can rename the table name to something that helps in recognizing the same in Power BI environment.*
- Formula Bar: *As Power BI use "M Code" language. The same can be seen here for each applied steps been recorded by Query Editor.*
- Tabs:
- File: *General customizations related to Query Editor window can be done here. • Home: Major options can be found under this tab like et Data, Append &Merge Query, Data source settings etc.*
- Transform: *This helps in transforming the existing column(s) like changing the data types, change formatting, Pivot or Unpivot columns etc. (Note: These operations will be applied only on the selected column(s).*
- Add Column: *This adds a new column based on calculation or existing column. •View: Here we can turn on or off the formula bar, whitespace etc.*
- Help: *It's a good resource to learn this program and even post your queries in PBI forums/community.*
- Close & Apply : *Once transformation of the data is done, hitting this button, Power Query will load the data into Power BI and apply all the recent changes.*

5.5 DATA TYPES

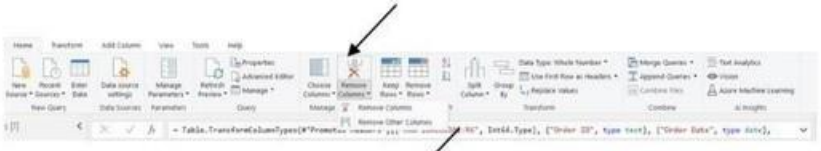
Make sure the suitable data type must be assigned to each column.



5.6 Transformation procedure happens in Power Query

What is Power Query? Power query is an ETL tool which helps you to clean, shape, and modify data utilizing instinctive interfaces without doing anything. M-code is a new programming language that is used in power query.

Remove columns



Remove rows

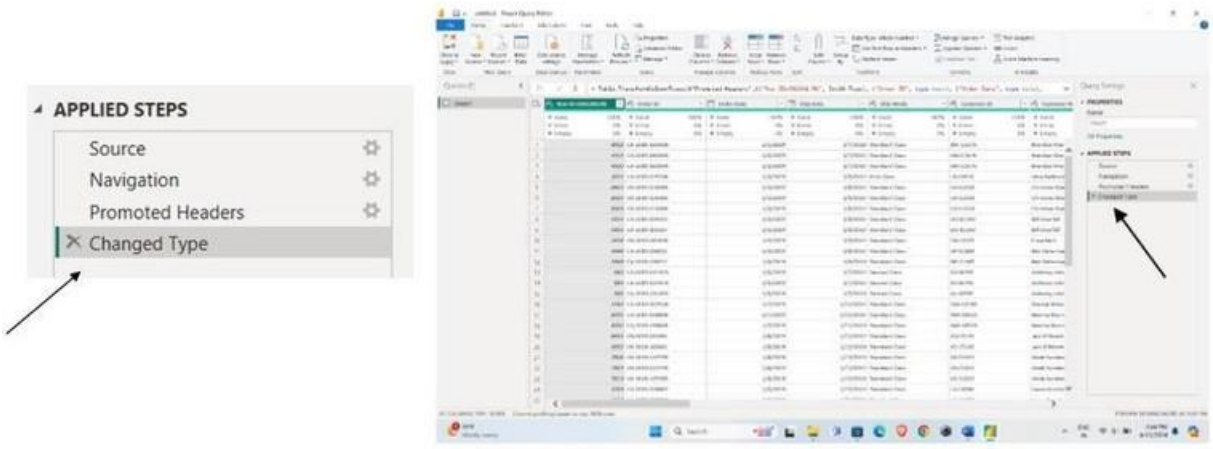
Spliting columns

5.7 MERGE & APPEND QUERIES

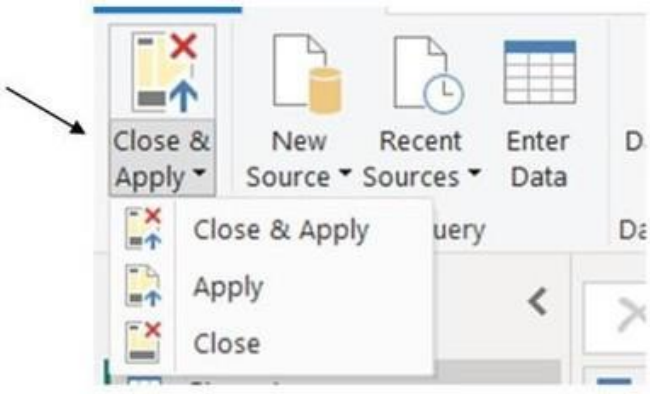
Merge Queries This allows us to join two tables based on one common column (like Vlookup function in Excel) •Example: Merging Sales & Product table based on Product key in both the tables.

Append Queries It allows us to combine two or more tables that shares the same table structure and data types. •Example: Appending two years of sales data.

In Power Query there is no step to undo or ctrl+Z will also not work thus follow following procedure to remove applied steps

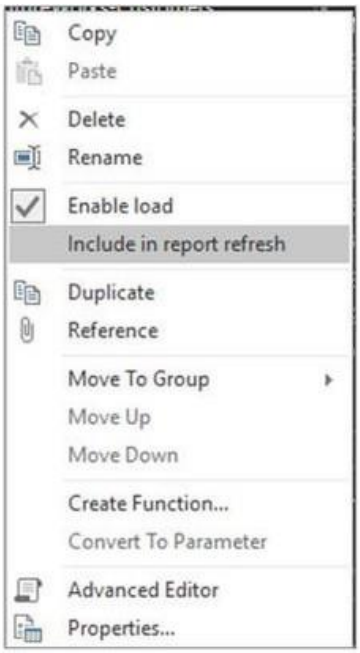


5.8 Choose Apply and close



5.9 INCLUDE IN REPORT REFRESH

Once we click the "Refresh" command from the home tab in Power BI desktop window, it will refresh all the queries presenting Query editor. But queries which won't change often like lookup table (e.g. Product table, Territory Table etc.), we can set it to exclude from refresh by right clicking on the query in Query editor window and deselecting "include in Report Refresh" option.



5.10 DEFINING DATA CATEGORIES

Data Categories are used to define geographical data. This will help in plotting the same on the 3D map, where the "Bing map" will recognize these fields.

To define the same, select the respective column and then go to Modelling tab in Power BI desktop and choose the related option.

6. DATA MODELLING IN POWER BI

- *Data Model*
- *Lookup Tables*
- *Primary & Foreign Key*
- *Creating Table Relationships*
- *Snowflake Schemas*
- *Editing Relationships*
- *Relationship Cardinality*
- *Filter*
- *Introduction to DAX*
- *Calculated Columns*
- *Measures*
- *Implicit & Explicit Measures*
- *Calculated Tables*
- *Row Context vs Set Context*
- *Advanced calculations using Calculate functions.*
- *Time Intelligence Functions*

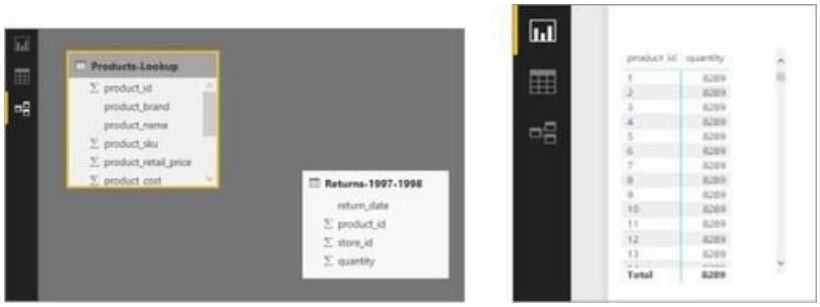
6.1 DATA MODEL

- When the collection of two or more independent tables are connected through relationships based on common fields forms a Data Model.

- Data Modelling helps in building custom calculations on the existing tables, which can further be used directly into Power BI visualizations.

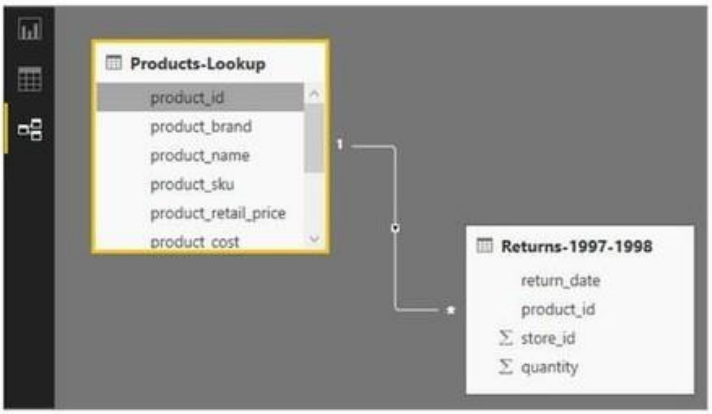
6.2 WITHOUT DATA MODEL

In our sample data, if the relationship between returns table and products table do not exist then using the fields in the report view from both tables will leads to independent and meaningless results.



6.3 WITH DATA MODEL

Now both returns and Product tables are connected. Here, we are getting the correct result.

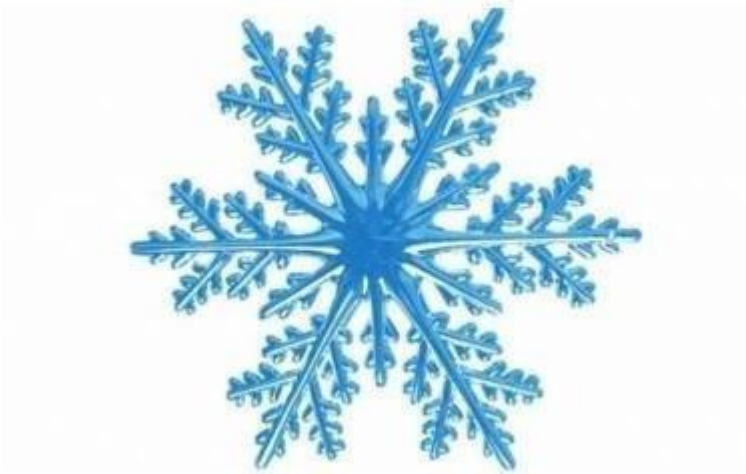


6.4 BUILDING RELATIONSHIPS

This can be done by either picking up common keys and dropping them on related table or by using "Manage Relationship" option.

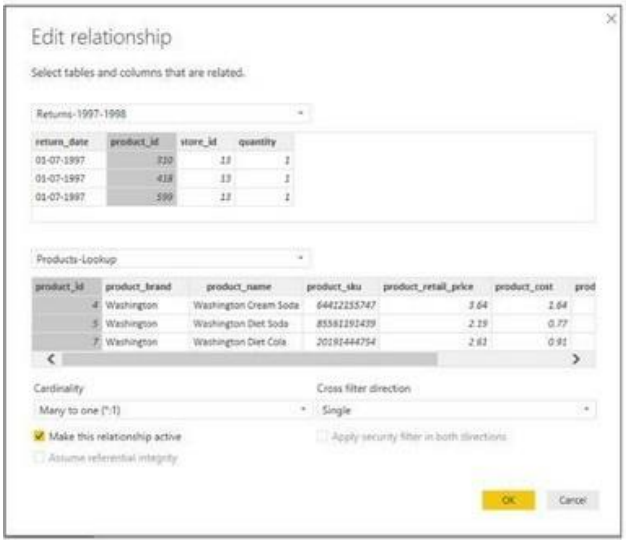
6.5 UNDERSTANDING "SNOWFLAKE" SCHEMAS

When a Lookup table has a primary key which doesn't exist as foreign key in a Data table but in another lookup table, which in turn is connected to the data table, the relationship formed between the Lookup Tables called a "Snowflake" schema.



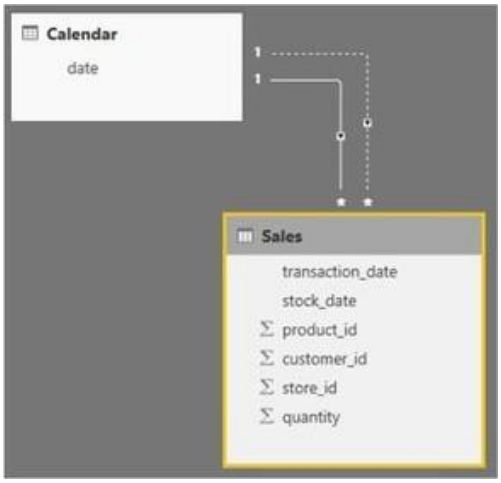
6.6 EDITING EXISTING RELATIONSHIPS

In the relationship view either one can double click on the relationship thread or can go to Home -> Manage Relationships.



6.7 ACTIVE AND INACTIVE RELATIONSHIPS

Having two foreign keys in a data table can facilitate two relationships with one Lookup Table at the same time. But only one can be activated at one time. E.g. date field in calendar lookup table can have two relationships with Sales table with "Transaction Date" and Stock Date" field. But only one can remain active at one time. Note: An inactive relation will be shown as a dotted line in relationship view.



6.8 RELATIONSHIP CARDINALITY

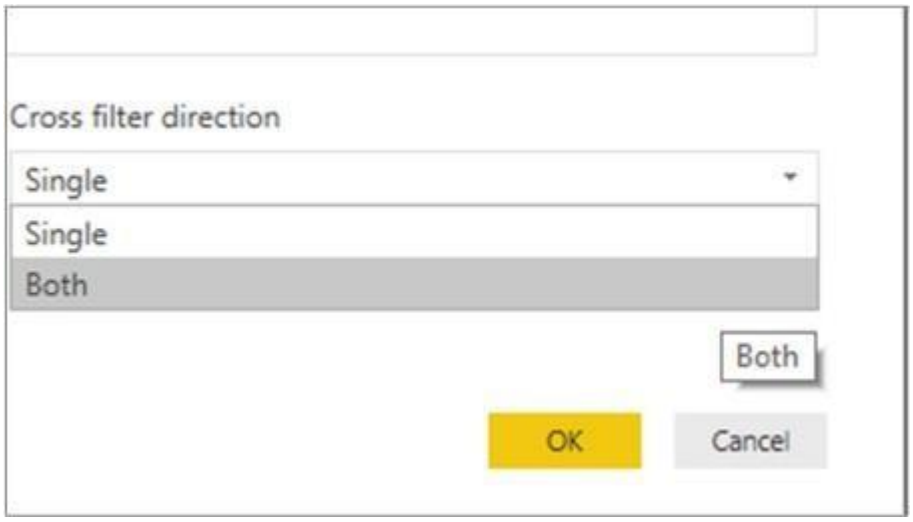
Cardinality refers to the uniqueness of values in a column. Here, high cardinality means a higher number of unique values and low cardinality means higher number of repetitive values.

6.9 FILTER FLOW

Filter flow passes downstream from lookup tables to data tables

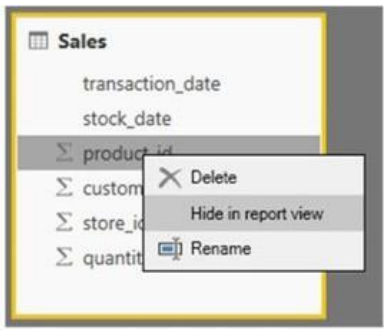
6.10 BOTH-WAY FILTER

We can have a two-way filter too i.e. it can flow from Lookup table to Data table and at the same time Data table to lookup table. Note: This can be dangerous to have both way filter when we have more than one Data table in the model.



6.11 HIDING FOREIGN KEYS

Its quite usual for any user to use foreign key, which will give us an incorrect result. To make user forcefully use a Primary key, we can hide the foreign keys from the report view.



6.12 INTRODUCTION TO DAX

Data Analysis Expressions (DAX) is a collection of operators and functions used to calculate and return one or more values. This helps in creating new and meaningful information from existing data present in our model. We can use DAX by either creating a "Calculated Column" or by creating "Measures".

6.13 CALCULATED COLUMNS

These are new formula-based columns which can be added into the tables. These are calculated based on the entire column or table. It understands row context, so for basic statistical functions like sum, count, average etc. this will not be useful.

6.14 MEASURES

Measures are used to create new calculated values. These also works on entire columns or tables and entertain filter context. These values can't be seen in data view.

6.15 MEASURES VS. CALCULATED COLUMNS

Measures

- Creates new calculated value.
- Understand filter context.
- Works on entire column or table
- Can only be seen in Report view.
- Doesn't increase file size.

Calculated Columns

- Create a new column.
- Understand row context.
- Works on entire column or table
- Can be seen in both Data and Report view.
- Increase file size.

6.16 ADDING MEASURES

Measures can be added either by right clicking within the table orby using "Quick Measures".

6.17 IMPLICIT & EXPLICIT MEASURES

- Implicit Measures These are being created when we drag a numerical field into the values pane of a visualization in the report view and choose any pre-defined calculation on the same as Sum, count, average etc. These can be accessed only in the visualization where these have been created.
- Explicit Measures These are being created by entering the DAX function. These can be accessed anywhere in the report and can be used in other DAX calculations too.

6.18 CALCULATED TABLES

Calculated Tables are the new tables to be added to the model using DAX. Usually, we import data from different sources and use them as tables in Data and report view but Calculated tables are being created using DAX on existing data.

6.19 DAX Operators

ARITHMETIC OPERATORS

Arithmetic operator	Meaning
+ (plus sign)	Addition
– (minus sign)	Subtraction or sign
* (asterisk)	Multiplication
/ (forward slash)	Division
^ (caret)	Exponentiation

COMPARISON OPERATORS

Comparison operator	Meaning
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to

LOGICAL OPERATORS

Logical operator	Meaning
&& (double ampersand)	Creates an AND condition between two expressions that each have a Boolean result. If both expressions return TRUE, the combination of the expressions also returns TRUE; otherwise the combination returns FALSE.
|| (double pipe symbol)	Creates an OR condition between two logical expressions. If either expression returns TRUE, the result is TRUE; only when both expressions are FALSE is the result FALSE.
IN	Creates a logical OR condition between each row being compared to a table. Note: the table constructor syntax uses curly braces.

6.20 What is DAX ?

It is a formula expression language called (DAX) that can be used with various visualization tools like Power BI. It is also known as a functional language, where the full code is kept inside a function.

6.21 How to apply DAX ?

Go to dataset, right click and click on measure or table

6.22 All About DAX

New Measure is created with writing DAX m code language for mathematical operations and will not retain extra data storage in your working data. While New table is created by same by writing DAX but table create new calculated column and will retain space in your working space.

What are the data types of Dax?
Data types of Dax are: 1) Numeric, 2) Boolean, 3) Date Time, 4) String, and 5) Decimal.

Benefits of using Variables in DAX.

Here, are benefits of using DAX function: ·By declaring and evaluating a variable, the variable can be reused multiple times in a DAX expression, which helps you to avoid additional queries of the source database. ·Variables can make DAX expressions more useful and logical. Variables is only scoped, which should be measure or query which can't be among measures.

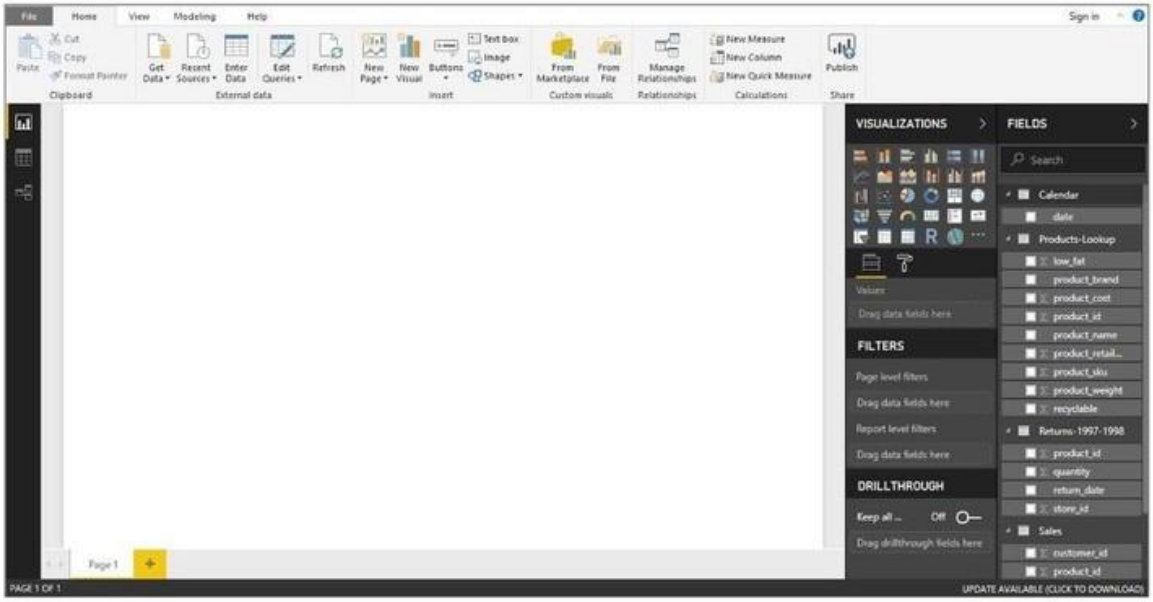
7. REPORTS IN POWER BI

- *Connect to Direct SQL Query in Power BI Desktop*
- *Create a new Power BI report.*
- *The report editor in Power BI*
- *Add a page to a Power BI report.*
- *Add a filter to a report in Power BI*
- *Save a report in Power BI*
- *About filters and highlighting in Power BI reports*
- *How to use report filters*
- *Analyze in Excel*
- *Other Miscellaneous operations*

7.1 CONNECT TO DIRECT SQL QUERY IN DESKTOP

DirectQuery – no data is imported or copied into Power BI Desktop. For relational sources, the selected tables and columns appear in the Fields list. For multi-dimensional sources like SAP Business Warehouse, the dimensions and measures of the selected cube appear in the Fields list. As you create or interact with a visualization, Power BI Desktop queries the underlying data source, which means you're always viewing current data. Many data modeling and data transformations are available when using DirectQuery, though with some limitations. When creating or interacting with a visualization, the underlying source must be queried and the time necessary to refresh the visualization is dependent on the performance of the underlying data source. When the data necessary to service the request has recently been requested, Power BI Desktop uses recent data to reduce the time required to display the visualization. Selecting Refresh from the Home ribbon will ensure all visualizations are refreshed with current data.

REPORT VIEW (INTERFACE)



7.2 There are 3 different types of views in PowerBI.

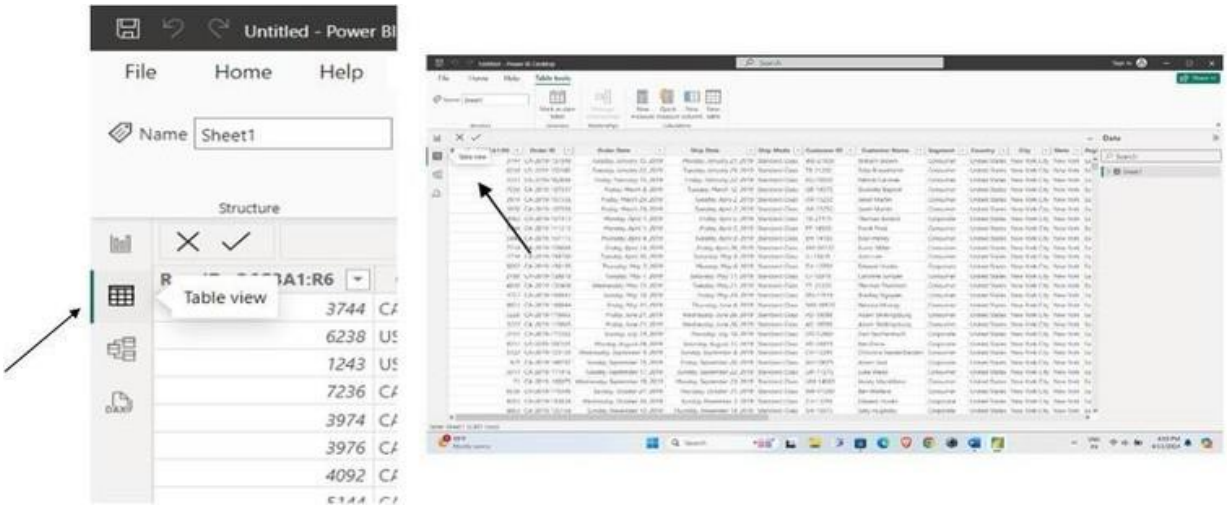
- Report View: Users can add visualizations and additional report pages and publish the same on the portal from here.
- Table/Data View: Data shaping can be performed through Query Editor tools.
- Model/Relationship View: Users can manage relationships between datasets in this view.

7.3 REPORT VIEW

Report view – For making reports using different visualization charts. "Report" view is where you create, design, and interact with visualizations based on your data.

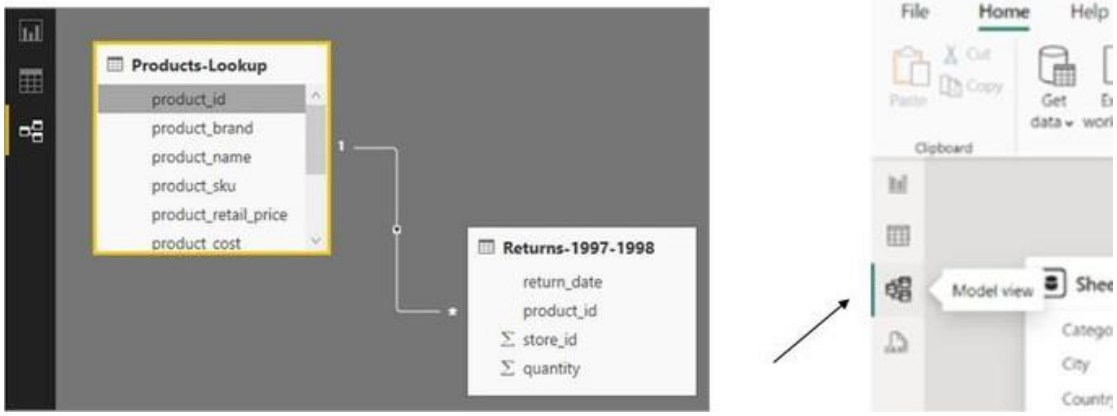
7.4 TABLE VIEW

Table view – "Table view" is a feature that allows you to interact with your data in a tabular format, like how data appears in a spreadsheet.



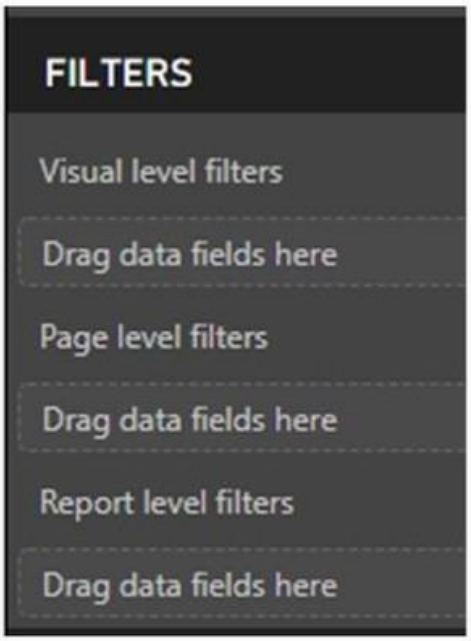
7.5 MODEL VIEW

Model view – "Model view" is a feature that allows you to view and manage the relationships between different data tables within your dataset.



7.6 POWER BI DESKTOP FILTERS

- Visual Level Filter: This is applied only to the active visual.
- Page Level Filter: This gets applied to all the visuals in the existing page.
- Report Level Filter: This is applied to all the visuals in all the existing pages in the report.

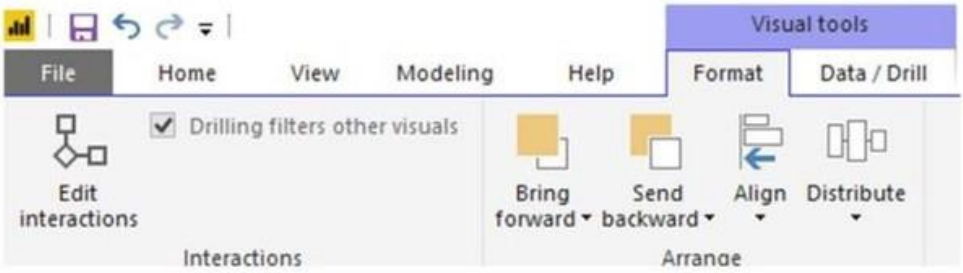


7.7 How can we filter data in Power BI?

Data can be filtered using various filters that are available in Power BI, implicitly. There are basically three types of filters, namely, Page- level filters, Drillthrough filters, and Report-level filters.

7.8 REPORT INTERACTIONS

By default, all the visualizations are connected to each other and filtering items in one visual will impact others too. Through "Edit interactions" we can prevent certain visualizations to get filtered.



8. REPORTS AND VISUALIZATION TYPES IN POWER BI

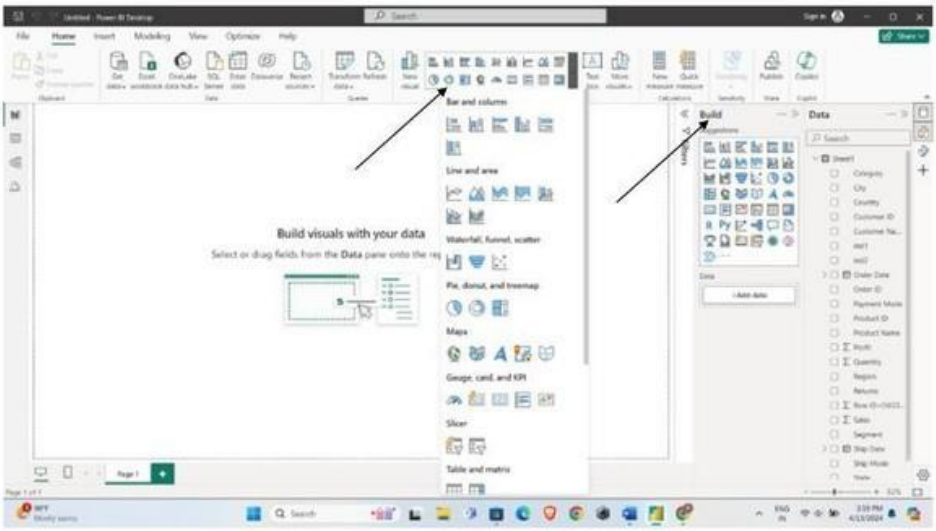
- *Types of visualization in a Power BI report*
- *Custom visualization to a Power BI report*
- *Types of visualization in a Power BI report*
- *Add a custom visualization to a Power BI report*
- *Download a custom visual from the gallery*
- *Getting started with color formatting and axis properties*
- *Change how a chart is sorted in a Power BI report*
- *Move, resize, and pop out a visualization in a Power BI report*
- *Drill down in a visualization in Power BI*

9. TYPES OF VISUALIZATION IN A POWER BI REPORT

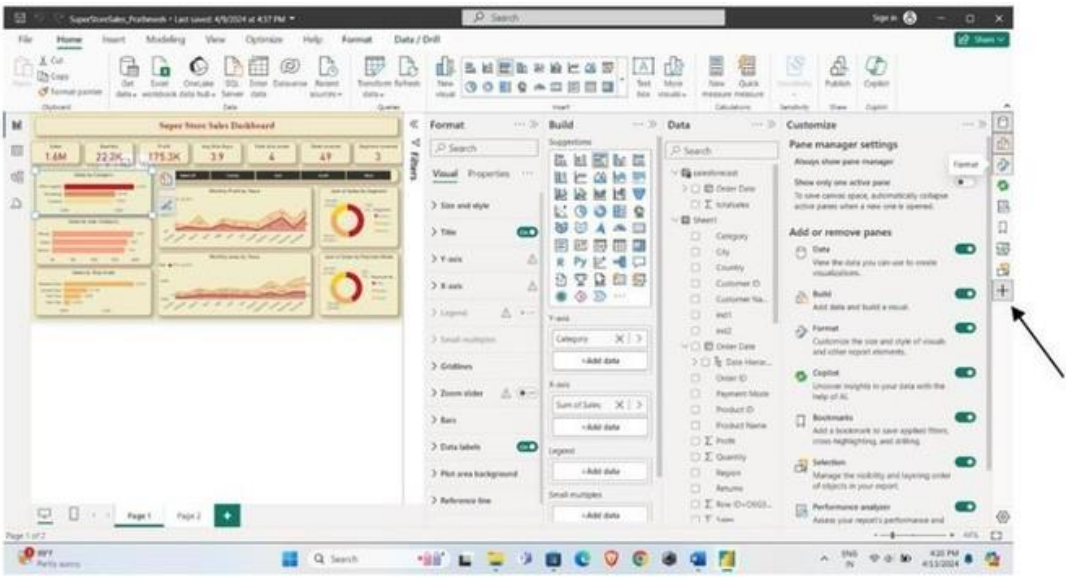
- *Area*
- *Stacked Area*
- *Bar/Column*
- *Clustered Bar/Column*
- *100% Stacked Bar/Column*
- *Combo •Ribbon*
- *Tree map*
- *3D Map*
- *Filled Map*
- *Card/KPI*
- *Slicer*
- *Table*
- *Matrix*
- *Doughnut*
- *Funnel*
- *Gauge*
- *Line*
- *Pie*
- *Scatter*
- *Waterfall*

TYPES OF VISUALIZATION IN A POWER BI REPORT

Accessing the different visualizations from PowerBI Report view: -26 Charts are provided default and More can be imputed with paid login id. Charts are visible under Build portion.



Activating all the pane from format option at rightmost side of the report view



Making visualizations in report view

Making title for visualization using Text Box option available on top and with formatting option visible in white strip we can entitle the visualization.

Creating bar graph visualization

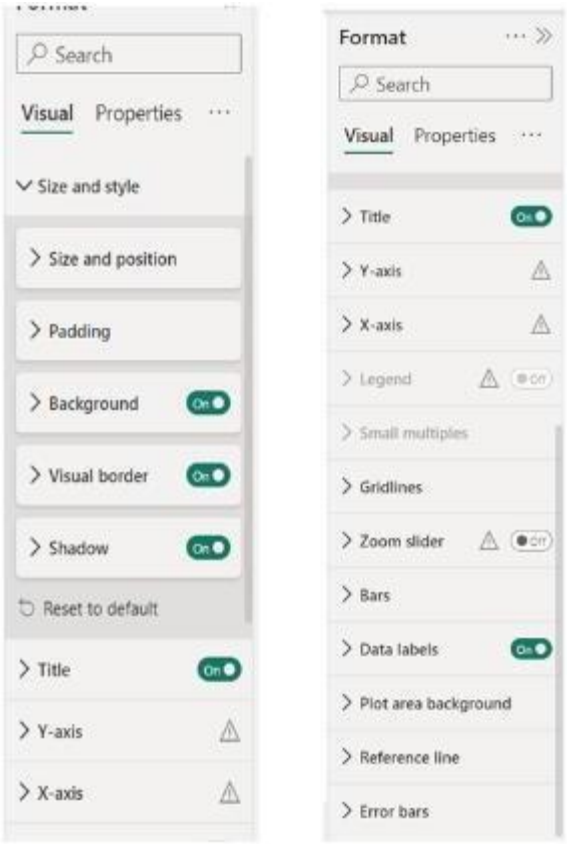
Choose horizontal bar graph option from insert or build suggestions. Choose values for x-axis and y-axis Build option, click on 3 dots available on top of bar graph to get option like Export data, Show as a table, Remove, Spotlight, Sort axis and Format.

Formatting the Visualization

Format Pane: The "Format" tab contains several sections, each with its own set of formatting options. These options may vary depending on the type of visualization you've selected.

Explore different formatting option to create visualization.

- Data colors: *Customize the colors used within the visualization, including data series colors, background colors, and font colors.*
- Data labels: *Control the appearance of data labels, including font size, color, position, and formatting.*
- Title: *Customize the title of the visualization, including font size, color, alignment, and formatting options.*
- X-axis / Y-axis: *Format axis labels, titles, scales, and other properties specific to the X and Y axes.*
- Legend: *Adjust the appearance and position of the legend, including font size, color, orientation, and visibility.*
- Shapes: *Add shapes or lines to the visualization and customize their appearance, such as color, style, and thickness.*
- Tooltip: *Customize the tooltip that appears when hovering over data points in the visualization, including the information displayed and formatting options.*
- Small multiples: *Instead of viewing a single large chart, small multiples allow users to compare different categories or dimensions within the same chart type.*



Exporting Data

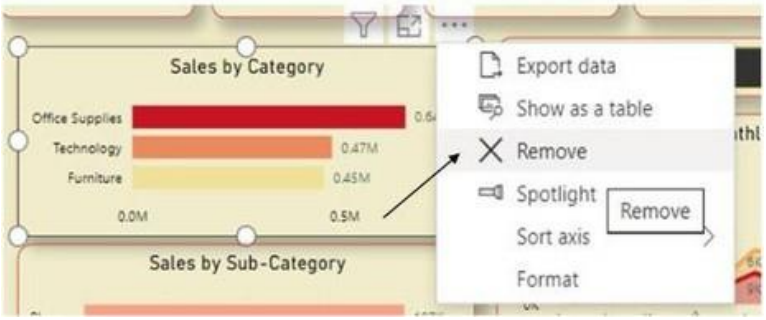
Users can export the data displayed in visualizations such as charts, tables, matrices, and other visual elements.

Show as table

"Show as table" is a feature that allows you to view the data underlying a visualization in a tabular format

Removing

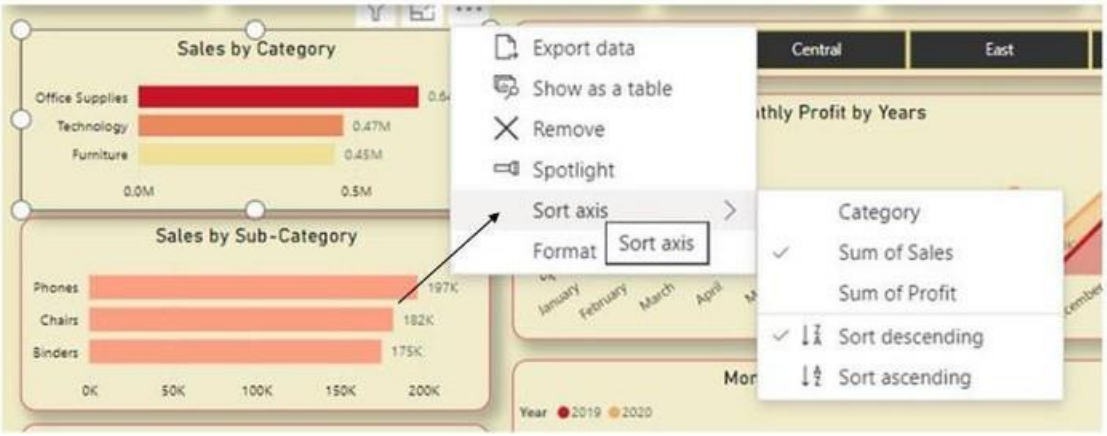
Option to remove particular visualization.



Spotlight

To create spotlight on visualization

Sorting graph



Focus mode

Focus mode in Power BI allows users to view a visual or a report in full-screen mode, providing a distraction-free environment for focused analysis.

Types of Visualization

9.1 Card

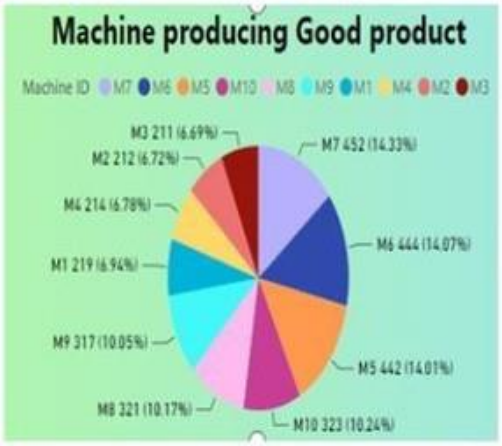
"Card" visualization is a simple yet powerful way to display a single value or a key performance indicator (KPI)

9.2 Bar graph

horizontal, vertical, joint-bar, stack-bar, clustered bar

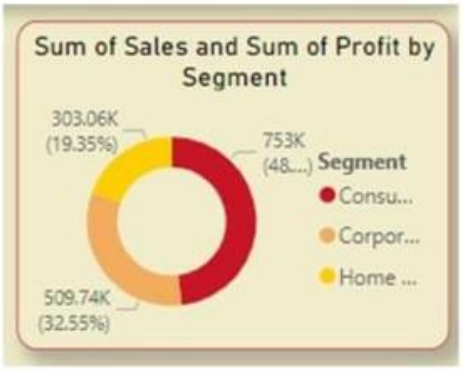
9.3 Pie chart

- Legend: Color-coded key showing categories or segments.
- Value: Numerical data associated with each segment.
- Tooltip: Additional info displayed on hover.
- Details: Specific data points or records behind each segment.



9.4 Ring Chart/Donut

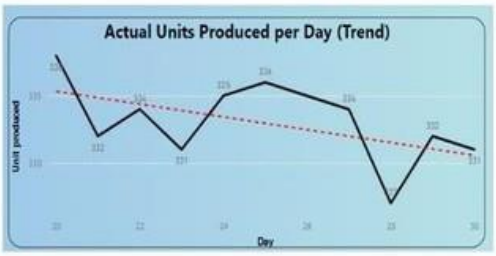
- Legend: Color-coded key showing categories or segments.
- Value: Numerical data associated with each segment.
- Tooltip: Additional info displayed on hover.
- Details: Specific data points or records behind each segment.



9.5 Line chart

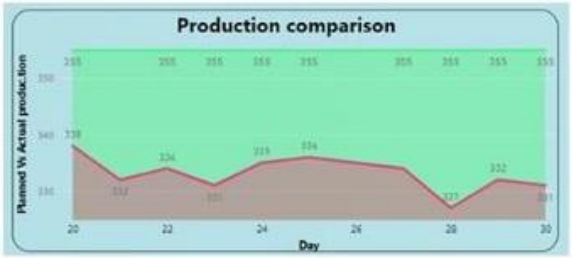
Line chart is a type of visualization used to represent data trends over time or any ordered dimension

- Secondary Axis: *Allows plotting two measures with different scales on the same chart.*
- Small Multiple: *Displays multiple charts, each representing a subset of data, for comparison.*
- Legend: *Color-coded key identifying categories or measures represented in the chart.*



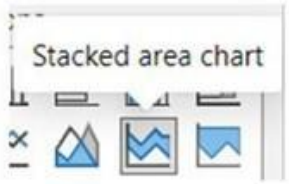
9.6 Area Chart

- Secondary Y-axis: Allows plotting two measures with different scales on the same chart.
- Legend: Color-coded key identifying categories or measures represented in the chart.
- Tooltip: Provides additional information when hovering over data points.



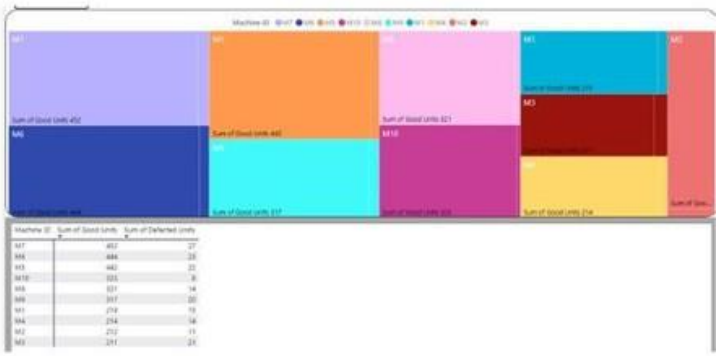
9.7 Stack Area Chart

A stacked area chart in Power BI is a type of visualization that displays multiple series of data as layers, stacked on top of each other. Each layer represents a different category or subgroup of the data, and the combined height of the layers at any given point represents the total value of the data for that category.



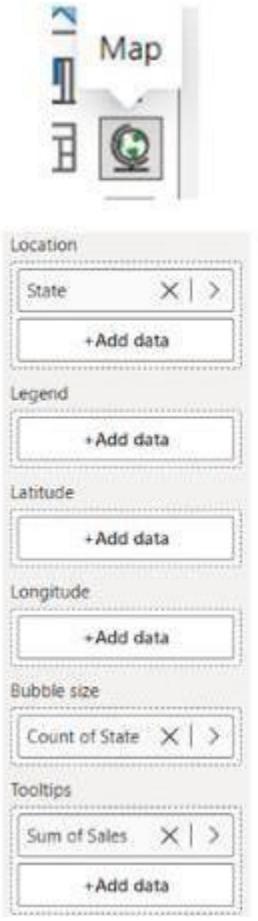
9.8 Tree map

A tree map in Power BI is a type of hierarchical visualization that displays hierarchical data as a set of nested rectangles. Each rectangle represents a category or group, and its size corresponds to a quantitative measure, such as sales revenue or population.



9.9 Map

- Location: *Represents geographic data points plotted on the map.*
- Legend: *Color-coded key identifying categories or values on the map.*
- Latitude and Longitude: *Coordinates specifying the location of each data point.*
- Bubble Size: *Size of data markers representing quantitative measures on the map.*
- Tooltip: *Provides additional information when hovering over data points.*



9.10 Gauge Chart

A gauge chart in Power BI is a type of visualization used to display a single value within a predefined range or target. It resembles a speedometer or gauge found in dashboards and instruments. Single Value Representation: A gauge chart typically represents a single value, such as a key performance indicator (KPI), a progress metric, or a target attainment percentage.

9.11 Matrix

A matrix in Power BI is a data visualization tool that organizes data in rows and columns, similar to a spreadsheet or a pivot table.

Job Role Satisfaction Ratings

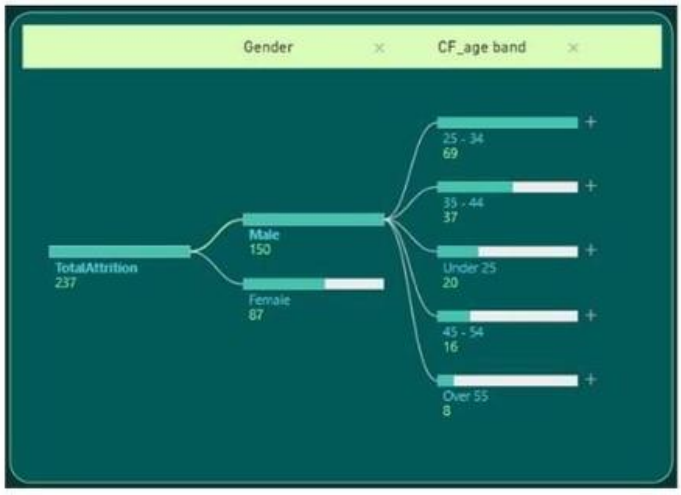
Job Role	1	2	3	4	Total
Healthcare Representative	26	19	43	43	131
Human Resources	10	16	13	13	52
Laboratory Technician	56	48	75	80	259
Manager	21	21	27	33	102
Manufacturing Director	26	32	49	38	145
Research Director	15	16	27	22	80
Research Scientist	54	53	90	95	292
Total	**289**	**280**	**442**	**459**	**1470**

9.12 Slicer

Slicers are interactive visualizations that allow users to filter data across multiple visualizations and reports dynamically. They are typically used to filter data based on specific criteria, such as categories, time periods, or regions, enabling users to focus on relevant subsets of data.

9.13 Decomposition Tree

The decomposition tree is a powerful visualization tool in Power BI that enables users to analyze and understand the factors driving a particular metric or measure.

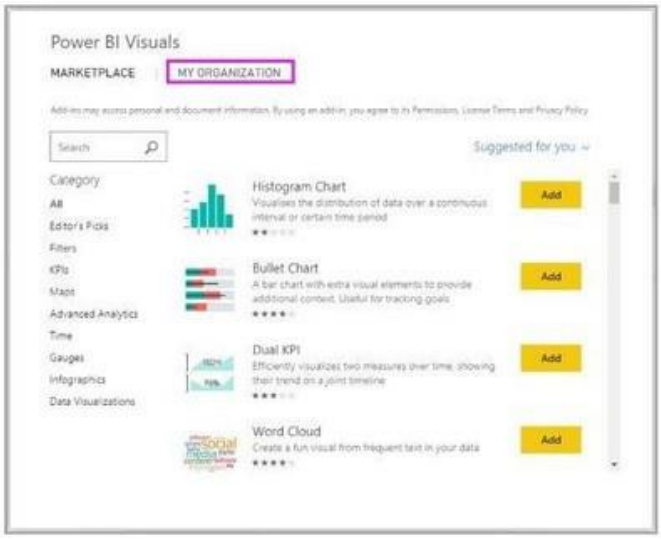


9.14 Q&A

- Q&A (Question and Answer) is a feature in Power BI that allows users to ask questions about their data using natural language queries and receive instant visualizations and insights in response. Here's how it works:
- Natural Language Queries: Users can type questions in plain English (or other supported languages) directly into the Q&A box in Power BI. They can ask questions about their data, such as "What were the sales last month?" or "Show me a pie chart of sales by region.
- " Natural Language Processing (NLP): Power BI's Q&A feature utilizes natural language processing (NLP) technology to interpret and understand the user's query. It analyzes the text input to identify keywords, entities, and intents, allowing it to generate relevant visualizations and insights. Instant Visualizations: After interpreting the user's query, Power BI dynamically generates visualizations that best represent the requested information. It automatically selects the appropriate visualization type based on the data and the nature of the query.

9.15 CUSTOM VISUALIZATION TO A POWER BI

Power BI also provides us an option to download custom visualization from the Microsoft App store.



VISUALIZATION SETTINGS

These settings are different for each visualization.

VISUALIZATION DRILL DOWN OPTION

When a visual has a hierarchy, it supports drill down/up feature e.g. putting "Product Category, Sub-Category and Product" into a matrix will automatically enable dill down/up feature.

DRILLTHROUGH FILTERS

It helps in creating a dedicated page for specific entities. A detailed page can be created for the user to dig-in from the dashboard. The moment we add a drill through filter, Power BI automatically adds a back button to go back to the overview.

10. DASHBOARD IN POWER BI

- *Create a Power BI dashboard Dashboard tiles in Power BI*
- *Pin a tile to a Power BI dashboard from a report.*
- *Pin a tile to a Power BI dashboard from Excel.*
- *Publish PowerBI report.*

POWER BI DASHBOARD

- This is a single page view of the overall story through visualizations. For detailed summary, user can visit the related reports.
- Dashboard is a feature of Power BI Service. This is unavailable in Power BI Desktop. A pro license if needed to access Power BI Service.

DIFFERENCE BETWEEN DASHBOARD & REPORT

DASHBOARD :-

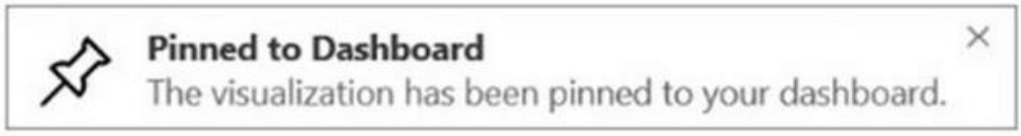
- Data source can be one or more reports or data sets
- Only One page
- Not available in PBI Desktop
- We can't do filtering or slicing in a Dashboard

REPORT: -

- Data source can be only single dataset per report
- One or more pages
- Available in PBI Desktop
- Filtering or slicing can be done here

TILES IN DASHBOARD

One can add a new tile from within the Dashboard. Clicking on these tiles will take back into the report. Even a whole report page can be pinned to dashboard. This is also considered as pinning a live tile because tiles from reports are synced and upon any update in report will update these tiles in dashboard too.



PIN AN ENTIRE REPORT PAGE TO PBI DASHBOARD

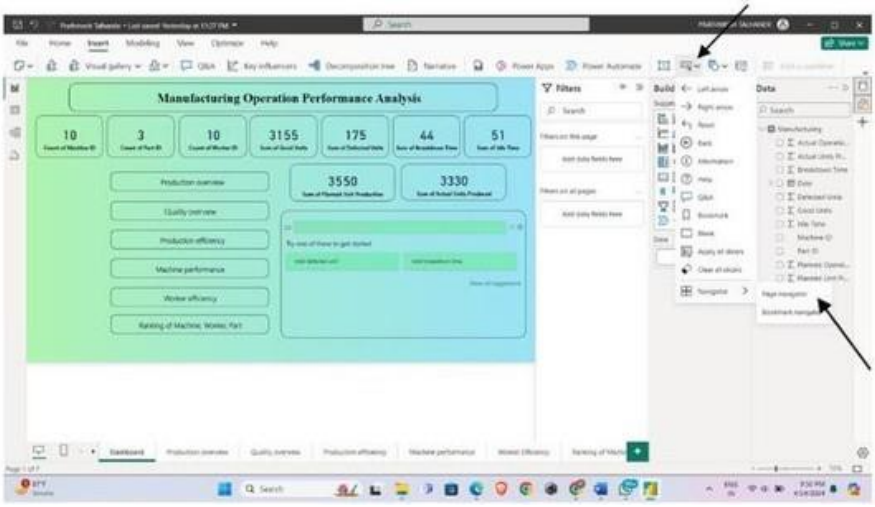
If the requirement is to pin more then one visualization in the dashboard then its better to pin the entire report. When we pin the complete page then the tiles become live, we can interact with them directly from the dashboard.

DATA ALERTS IN POWER BI SERVICE

Setting a data alert is possible with Power BI Pro license. Alerts can only beset on the tiles pinned from report visuals, and only on gauges, KPI's and cards. Alerts can't be set on the streaming tiles created directly on the dashboard.

How do create actions and navigations in Power BI?

To Navigate to a certain report on click, you must Bookmark a page and assign the bookmark to a button or icon. Page navigation helps you direct you directly on required report view page or parameter.



11. PUBLISHING THE REPORT

- Step 1 :- Login to PowerBI with your Login ID
- Step 2 :- Click on Publish in my workspace, Go to link which will appear after publish to access and preview PowerBI dashboard.