POWER BI

AN IN-DEPTH UNDERSTANDING

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BUSINESS INTELLIGENCE (BI) CONCEPTS

Business Intelligence (BI) Concepts

1. Introduction to Business Intelligence

2. The importance of Business Intelligence

3. The relation between Business Intelligence and Data Warehouse

4. Tools and Technologies in Business Intelligence area

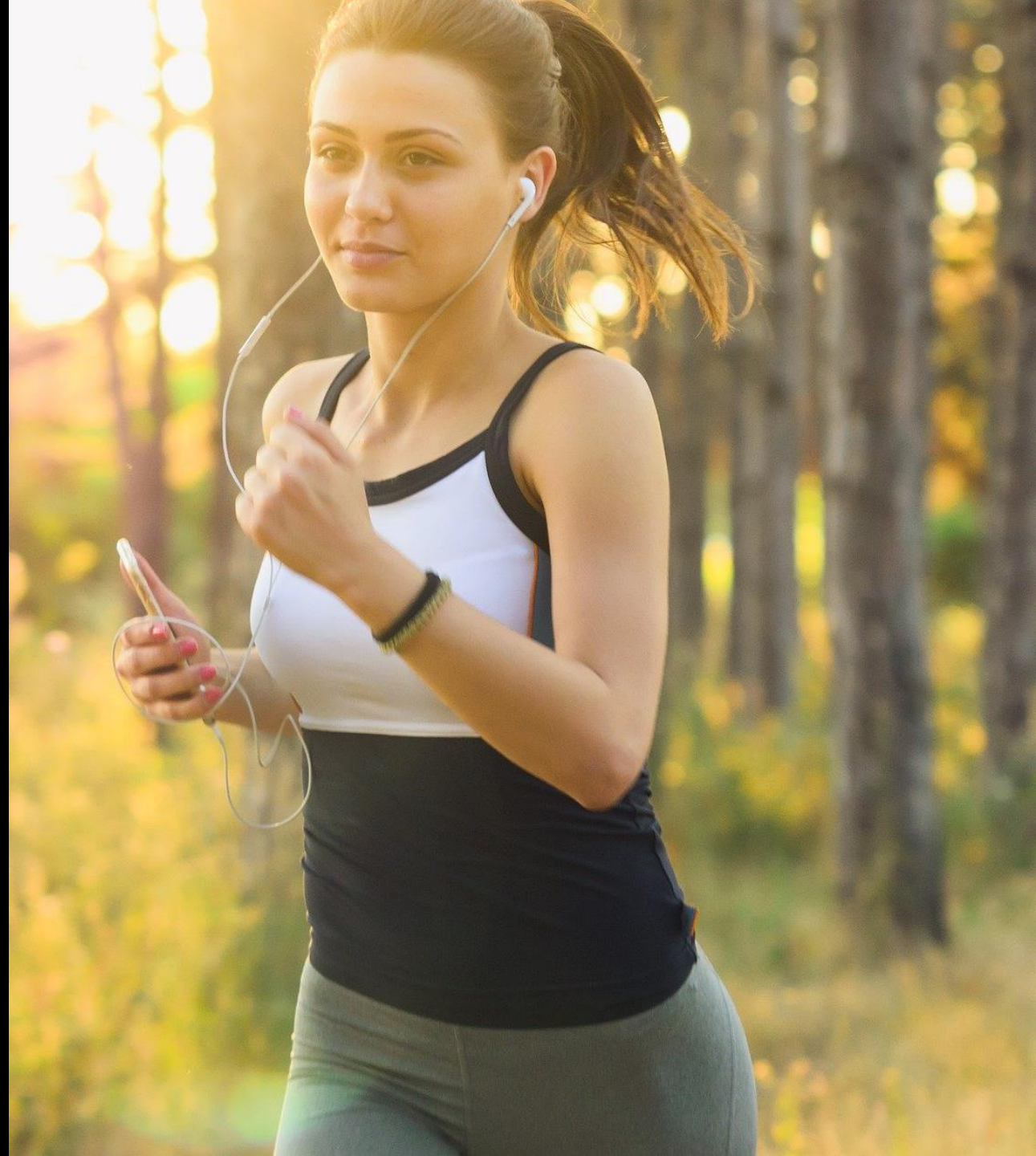
INTRODUCTION TO BUSINESS INTELLIGENCE

Business Intelligence (BI) is a process of analysing data through technology and presenting it to the end user(s) which help 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.

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.

RELATION BETWEEN BUSINESS INTELLIGENCE AND DATA WAREHOUSE (CONT.)

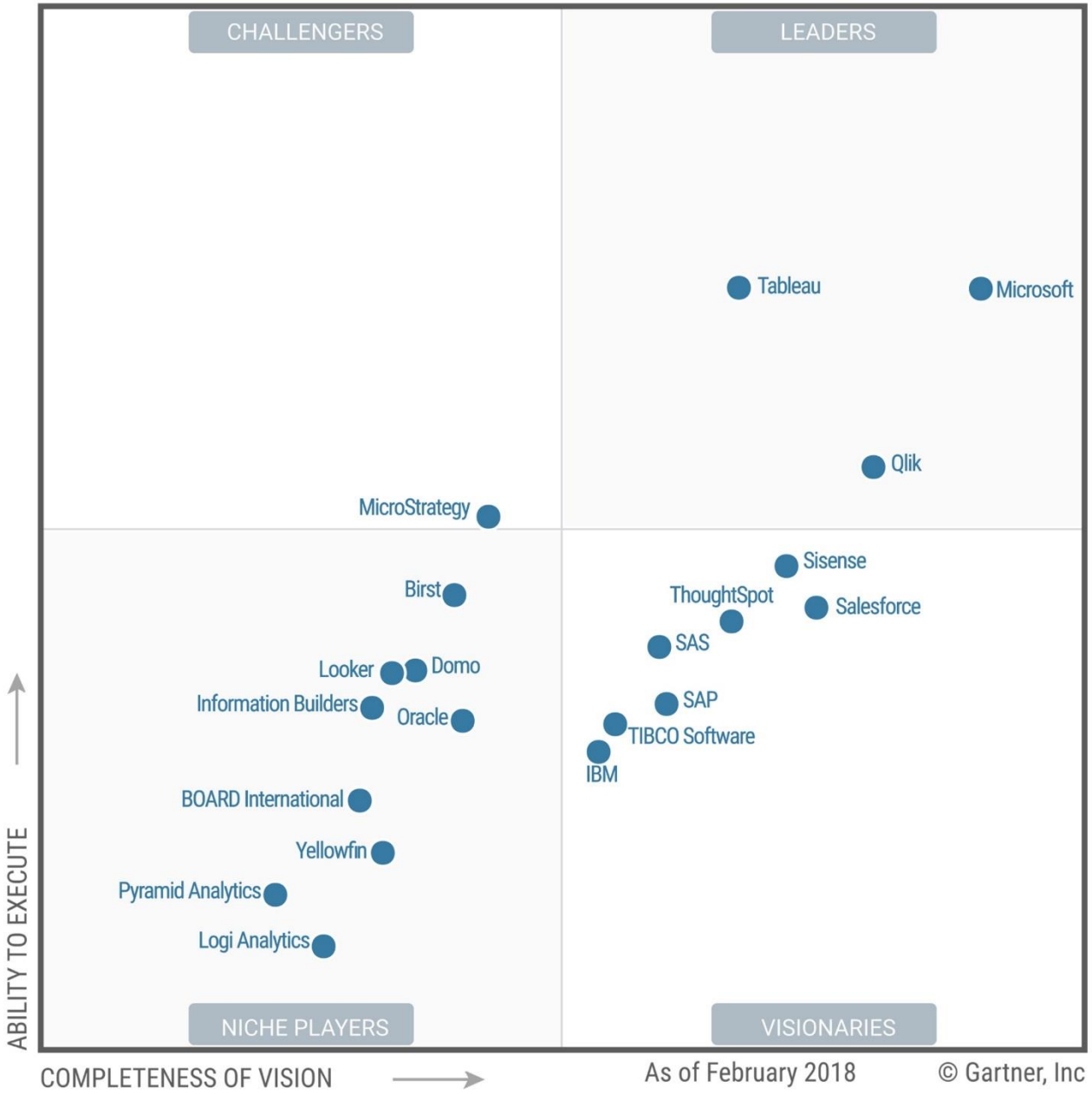
A Business Intelligence tool takes data from a Data warehouse to generate reports and help the end user to make informed decision. By this, we can call Data warehouse as a part of a complete Business Intelligence process.

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

Note: These are the most commonly used BI tools available in the market.

Figure 1. Magic Quadrant for Analytics and Business Intelligence Platforms



Source: Gartner (February 2018)

MICROSOFT POWER BI (MSPBI) INTRODUCTION

Microsoft Power BI (MSPBI) introduction

1. **Power BI introduction and overview**

2. **Power BI Architecture**

3. **Introduction and Power BI in Excel**

4. **Connecting with Data**

5. **Why Choose Power BI over Excel**

POWER BI INTRODUCTION AND OVERVIEW

Power BI is a collection of software/tools that works in synchronisation 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

01

Power BI Desktop

A Windows desktop application.

02

Power BI service

An online SaaS (Software as a Service) service

03

Power BI mobile apps

for Windows, iOS, and Android devices

04

Power BI Report Server

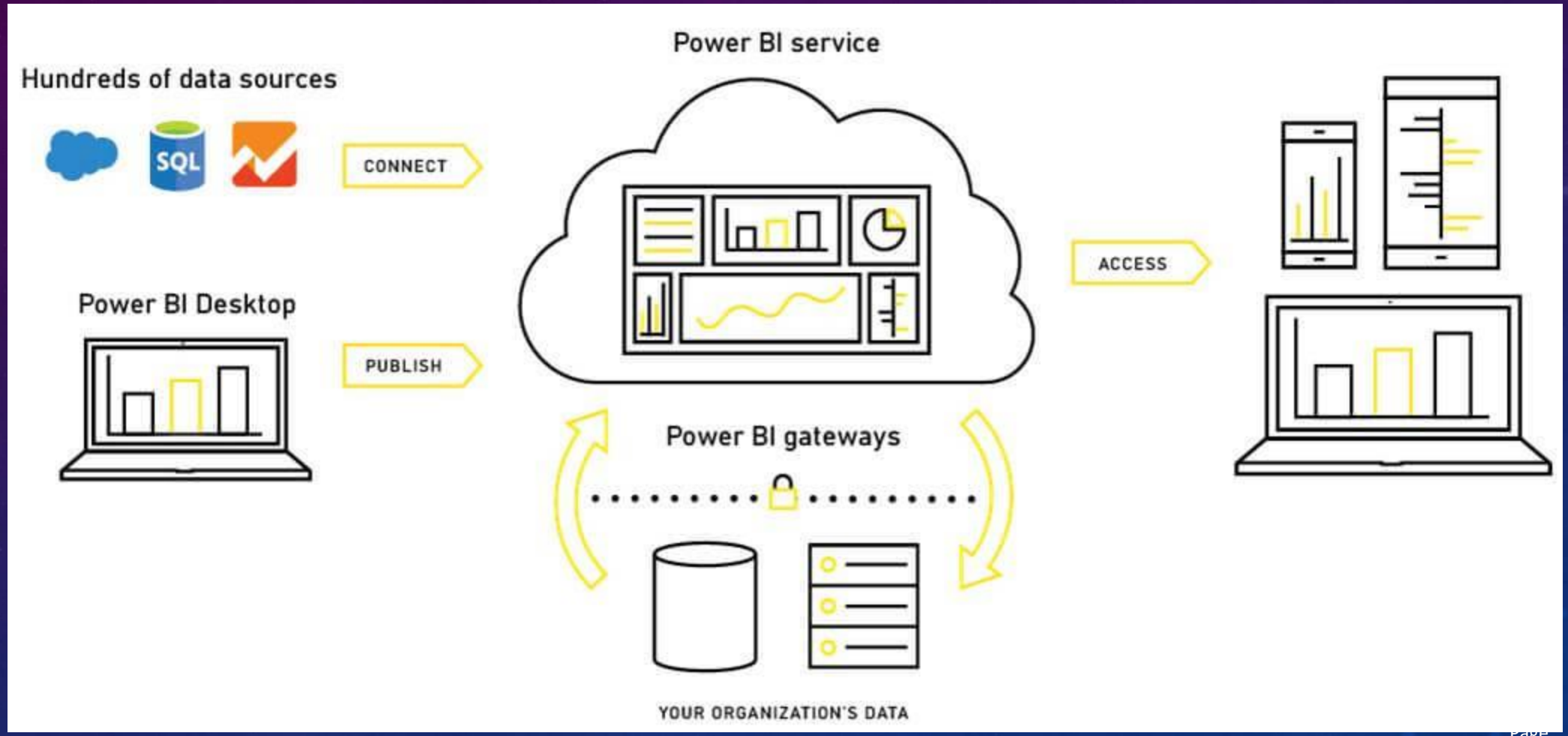
to publish Power BI reports to an on-premises report server, after creating them in

POWER BI FLOW

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.

POWER BI ARCHITECTURE



INTRODUCTION TO POWER BI DESKTOP

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.

WHY CHOOSE POWER BI OVER EXCEL

- **Store and analyse huge amount of data smoothly:** With powerful compression algorithms to import and cache the data within the .PBIX file, it can easily handle huge data bases. 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:** Its 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 then 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's of custom visuals.

WHY CHOOSE POWER BI OVER EXCEL (CONT.)

- **Publishing and Sharing the Report:** Just by hitting the publish button, one can publish the report on Power BI service and whosoever has an 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).

PROJECT INTRODUCTION & GETTING STARTED

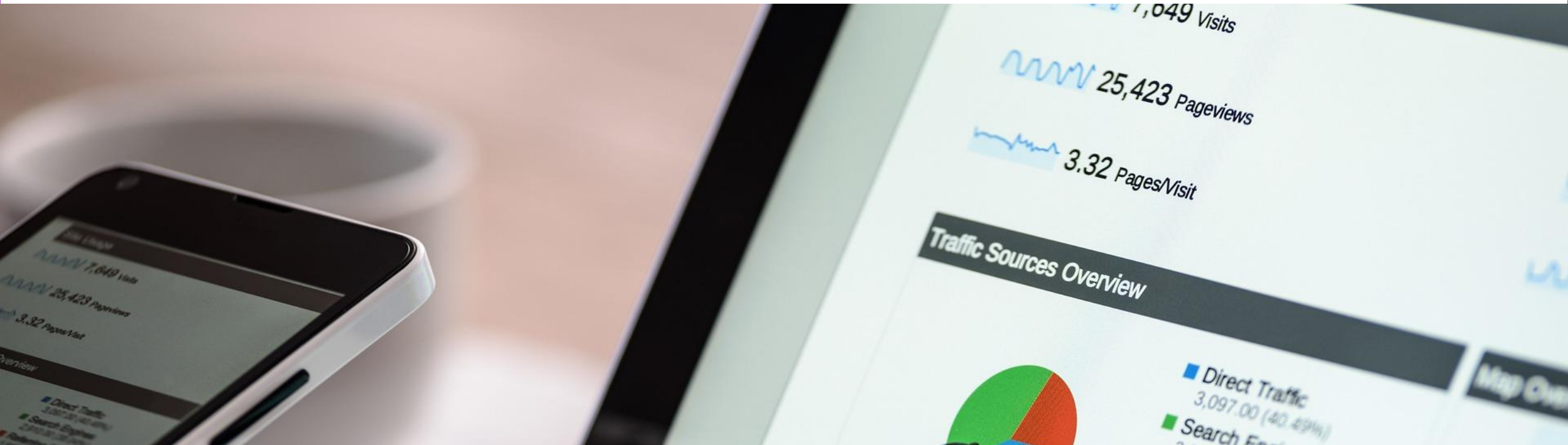
Project Introduction & Getting Started

Project Information

How to get Power BI desktop

Power BI Desktop Interface

Change Default Settings



PROJECT INTRODUCTION

Situation:

You have been hired by “Big Market”, an American Retail Corporation, to design and deliver the end-to-end business intelligence solution.

Given:

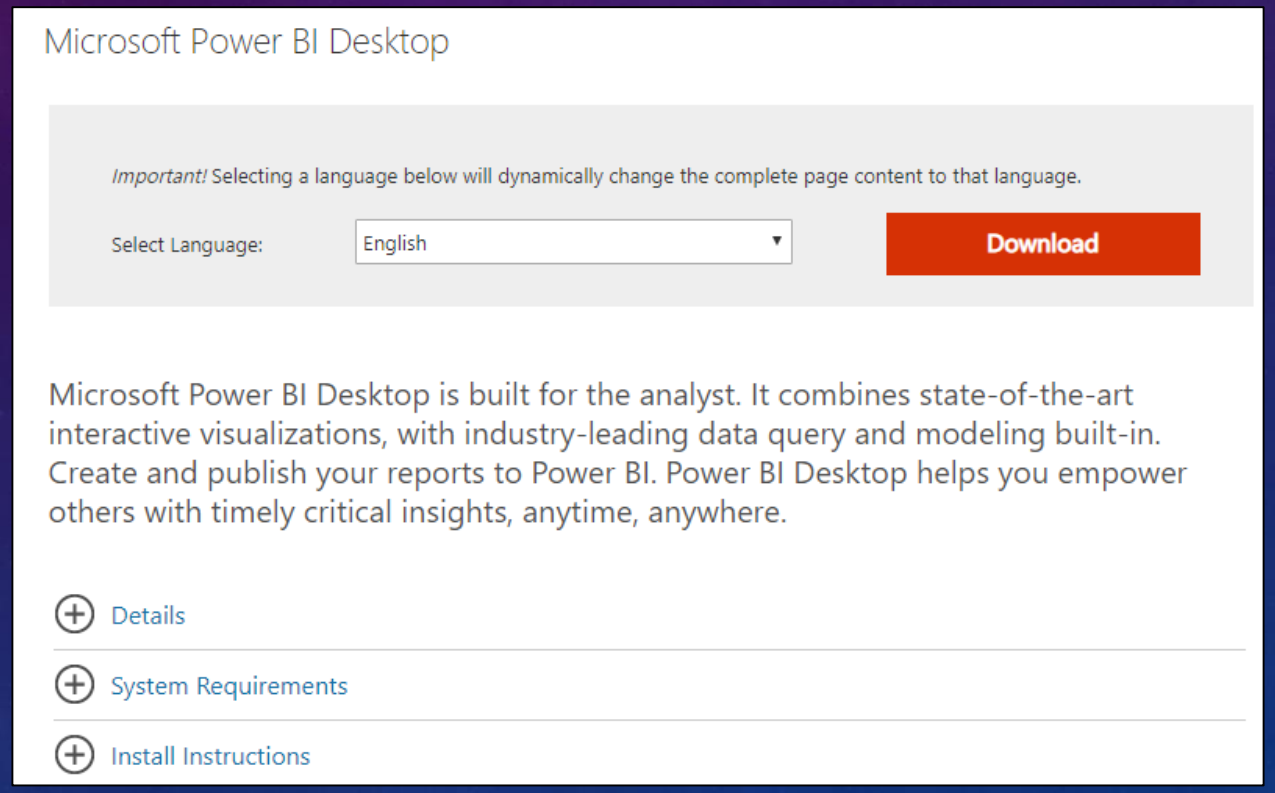
You will be given CSV files, containing the sales, customer, products etc for 2 years.

Expected:

Client want’s to track not only KPI’s (i.e. Sales, Profit, Cost, Return) but also the product level performance, forecast, regional level comparisons, and want to identify high value customers.

HOW TO GET POWER BI DESKTOP?

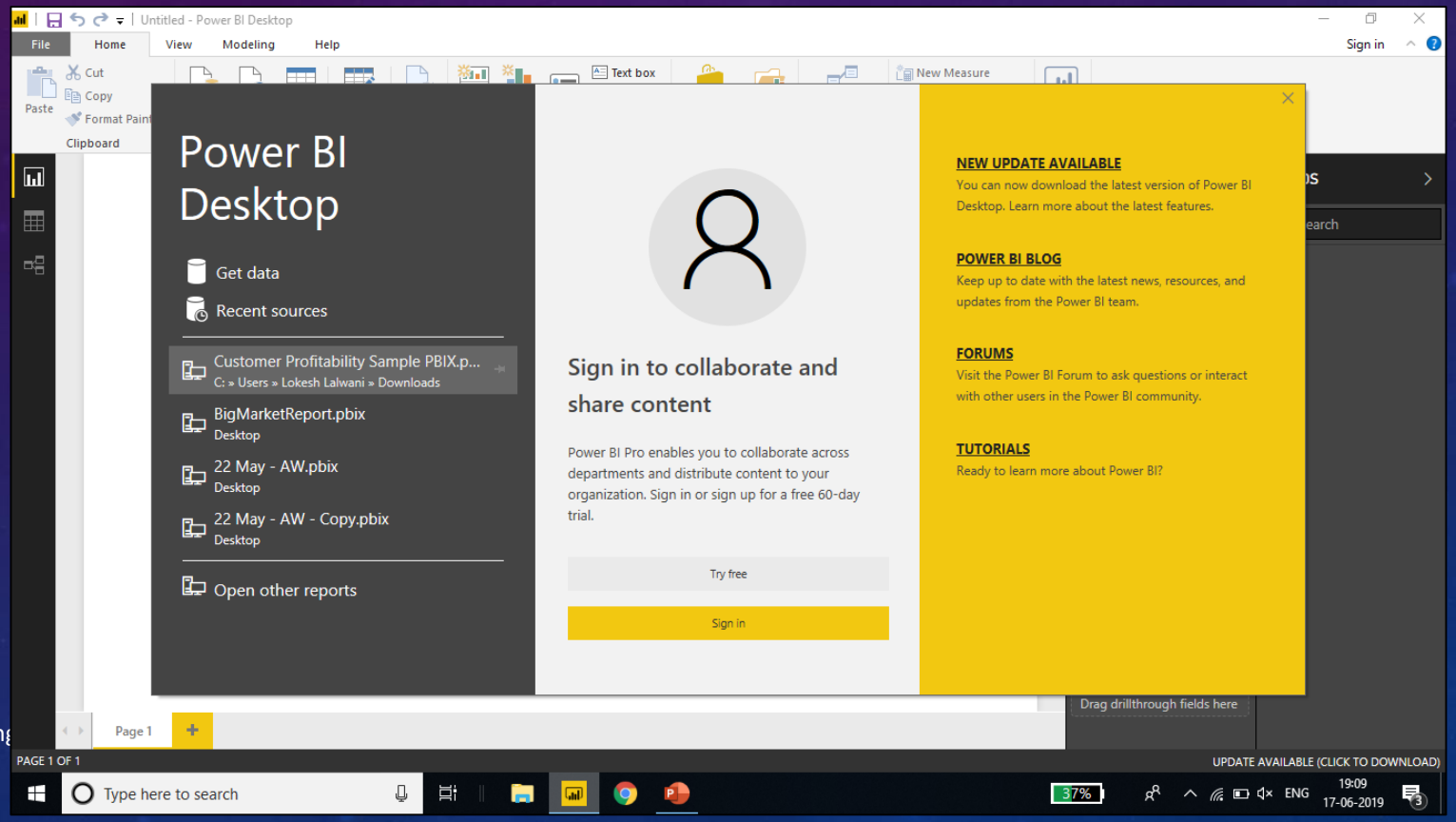
- Go to https://www.microsoft.com/en-us/download/details.aspx?id=45331 Check for the system requirements and hit the download button and you are good to go.



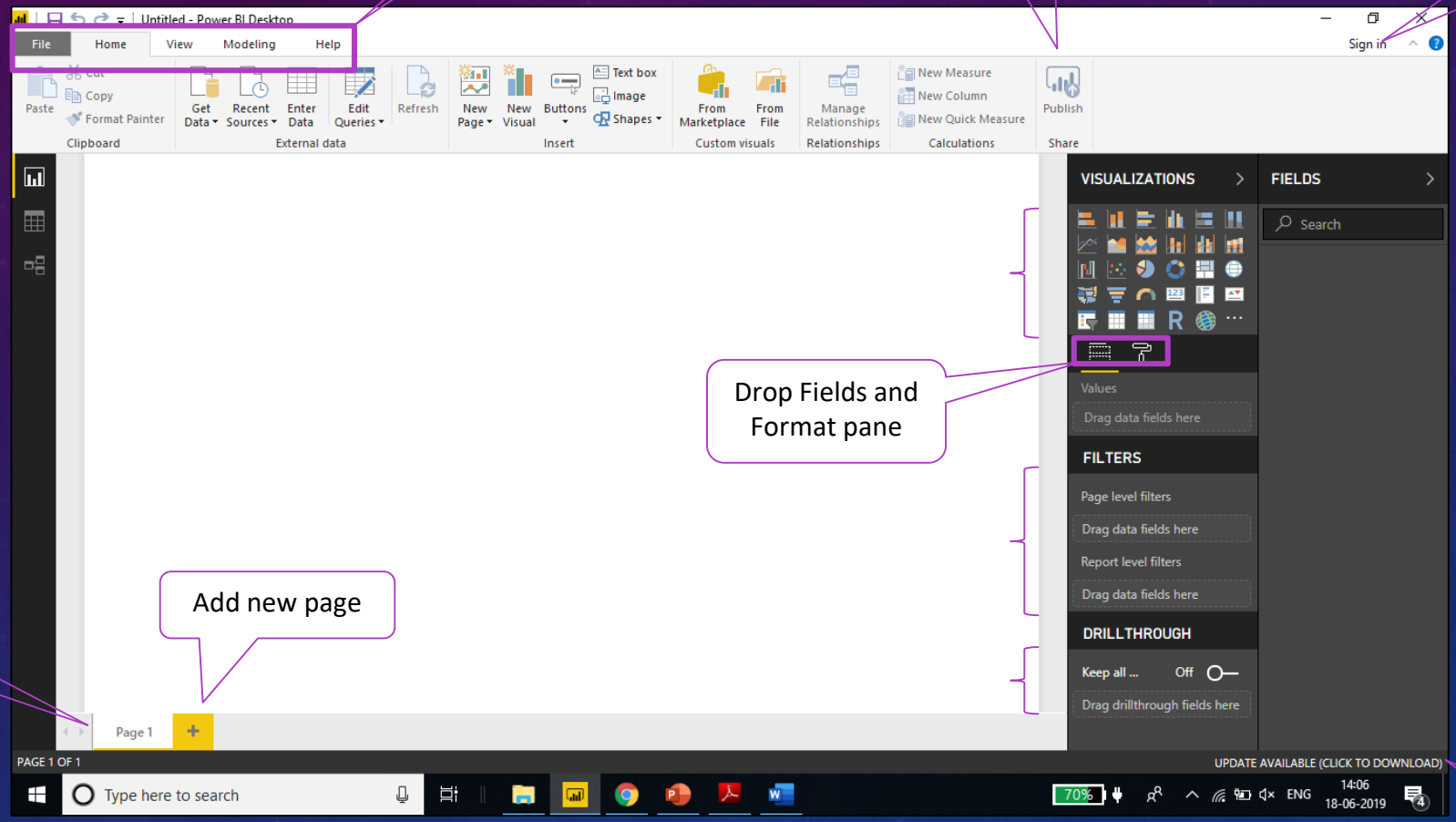
PBI DESKTOP - FIRST SCREEN

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 publish 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 can not accept personal email ids like gmail, yahoo etc.



POWER BI DESKTOP INTERFACE



POWER BI DESKTOP INTERFACE (CONT.)

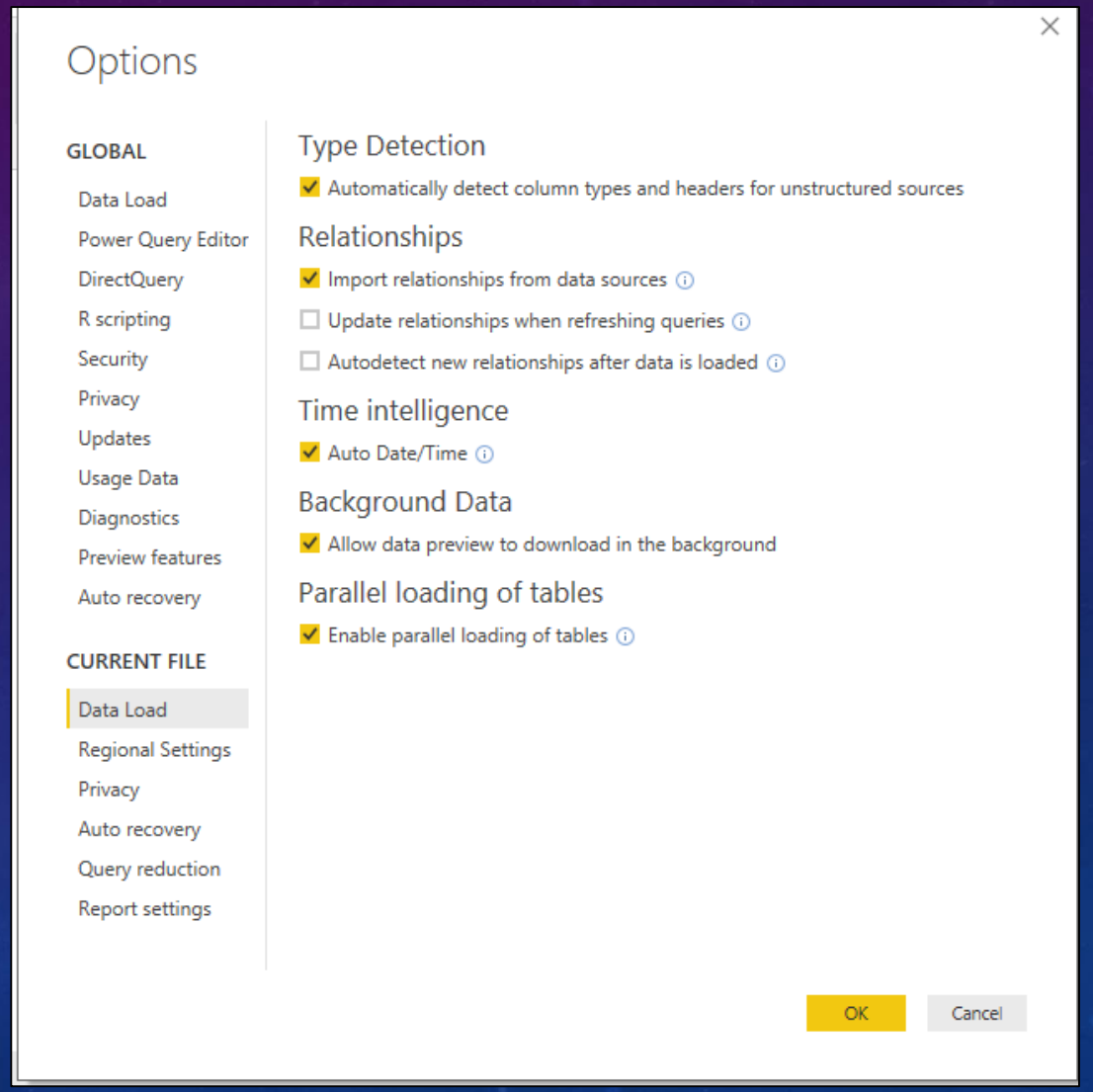
- Report Name: We can rename the report while saving the same for the first time.
- Views:
  - Report View – Under this we can use different visualizations to build report.
  - Data View – Once data is being loaded to PBI Desktop, the same can be seen here in the form of tables and fields. Here we can create calculated columns and measures.
  - Relationship View – This view is useful to build relationship 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 new page in the report.
- Tabs:
  - Home: This is a general purpose tab and used for connecting new data, editing queries etc.
  - View: One can set the view and even design the phone layout too.
  - Modelling: Creating new tables, parameters etc. can be done here.
  - 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 reported created in Power BI desktop to Power BI Service.
- Sign-In: To publish the report or importing 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 facilitate to drop 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.

CHANGE DEFAULT SETTINGS

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



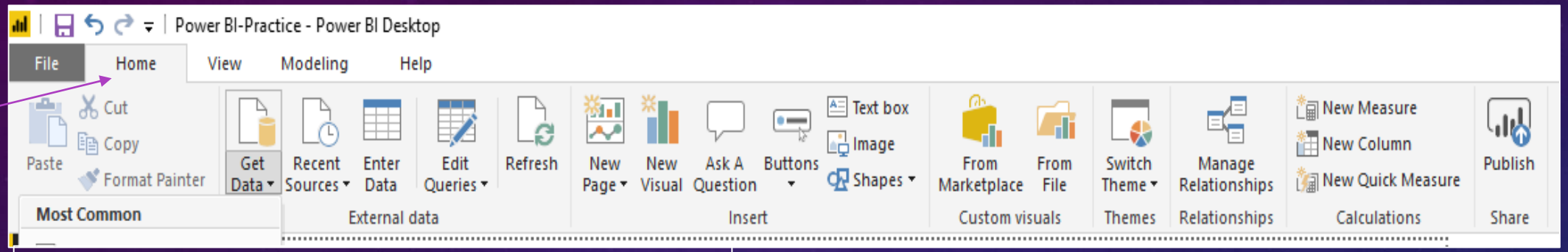
CONNECT TO VARIOUS DATA SOURCES

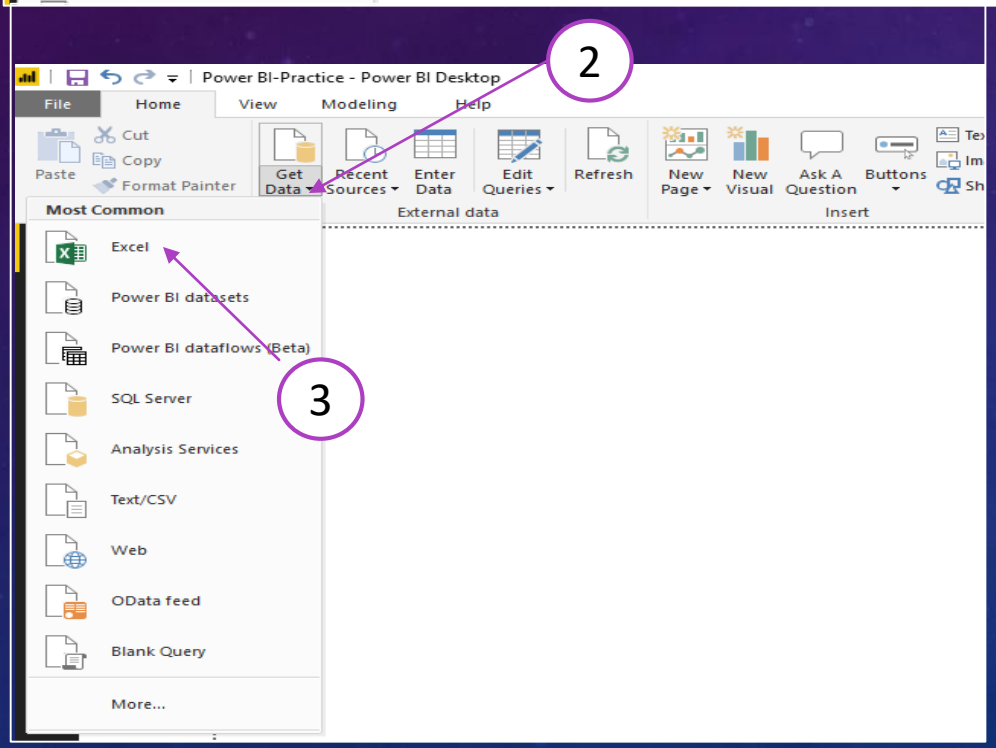
Connecting Power BI with Different Data sources

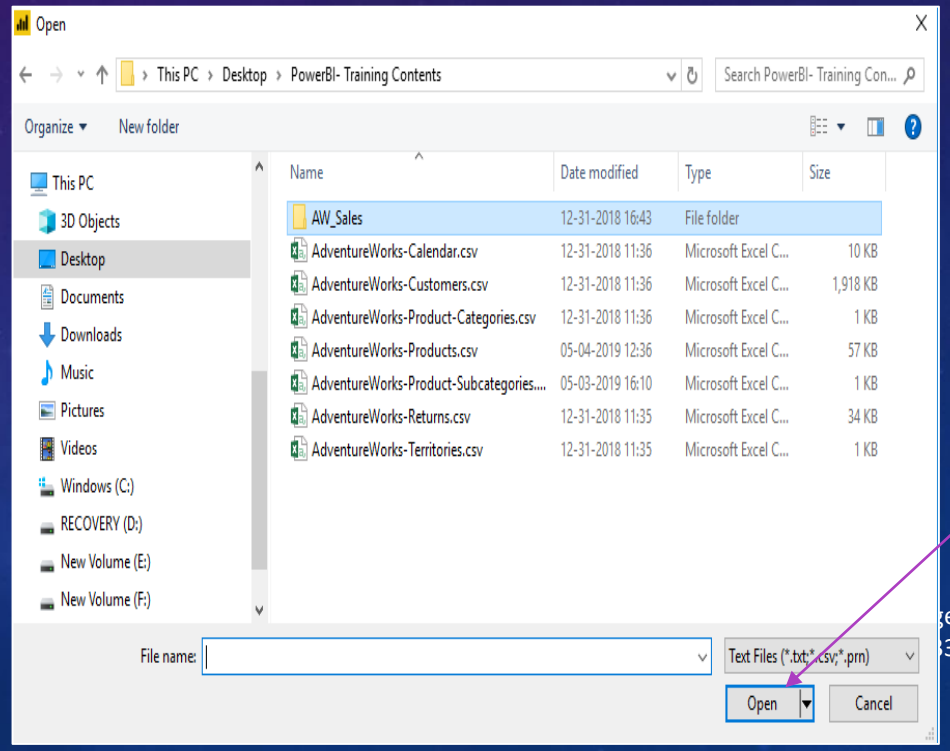
1. **Connect to CSV files**
2. **Connect to Excel**
3. **Connect to text**
4. **Connect to SQL Server**
5. **Connect to a Web page**
6. **Enter data directly**
7. **Analysis Services Tabular data**
8. **Connect to Direct SQL Query**

CONNECT TO CSV/TEXT/EXCEL FILES

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

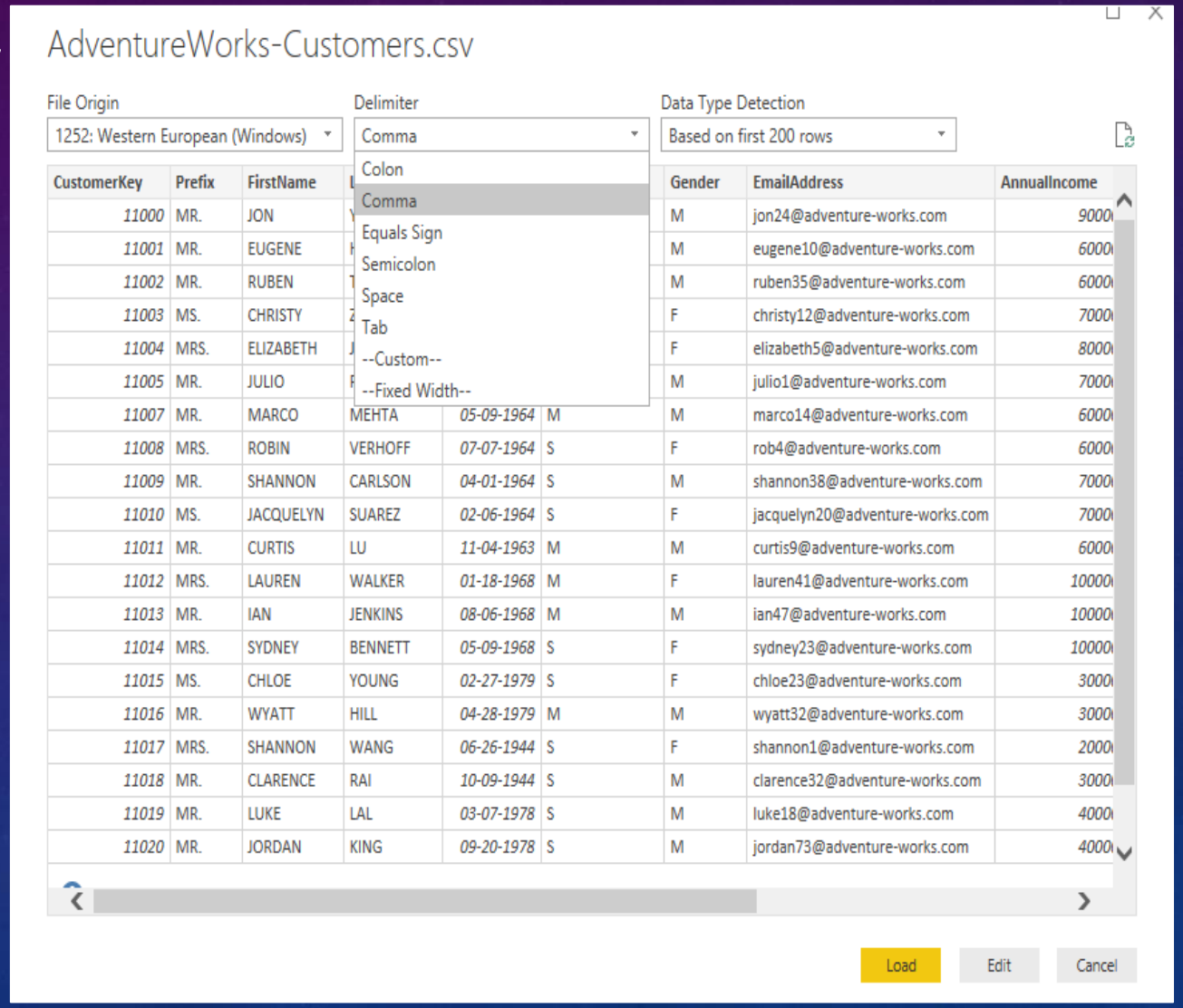






CONNECT TO CSV/TEXT/EXCEL FILES (CONT.)

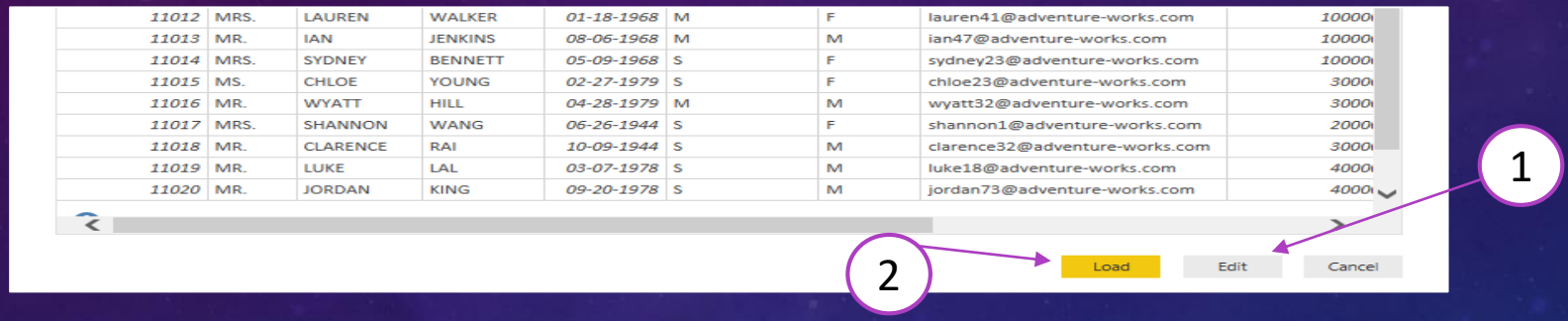
- When we click on the open button, a new dialogue box will get open. In which, following delimiter can be selected to extract the data–
  - Comma
  - Colon
  - Equal sign
  - Semicolon
  - Space
  - Tab
  - Custom
  - Fixed with

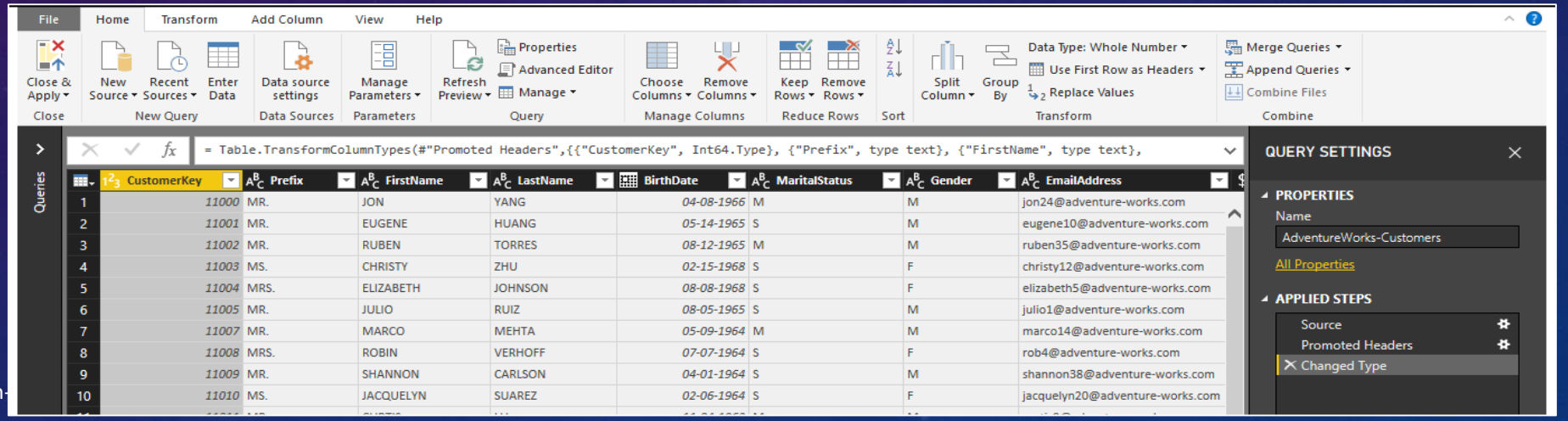


CONNECT TO CSV/TEXT/EXCEL FILES (CONT.)

Here we have two options: Edit and Load.

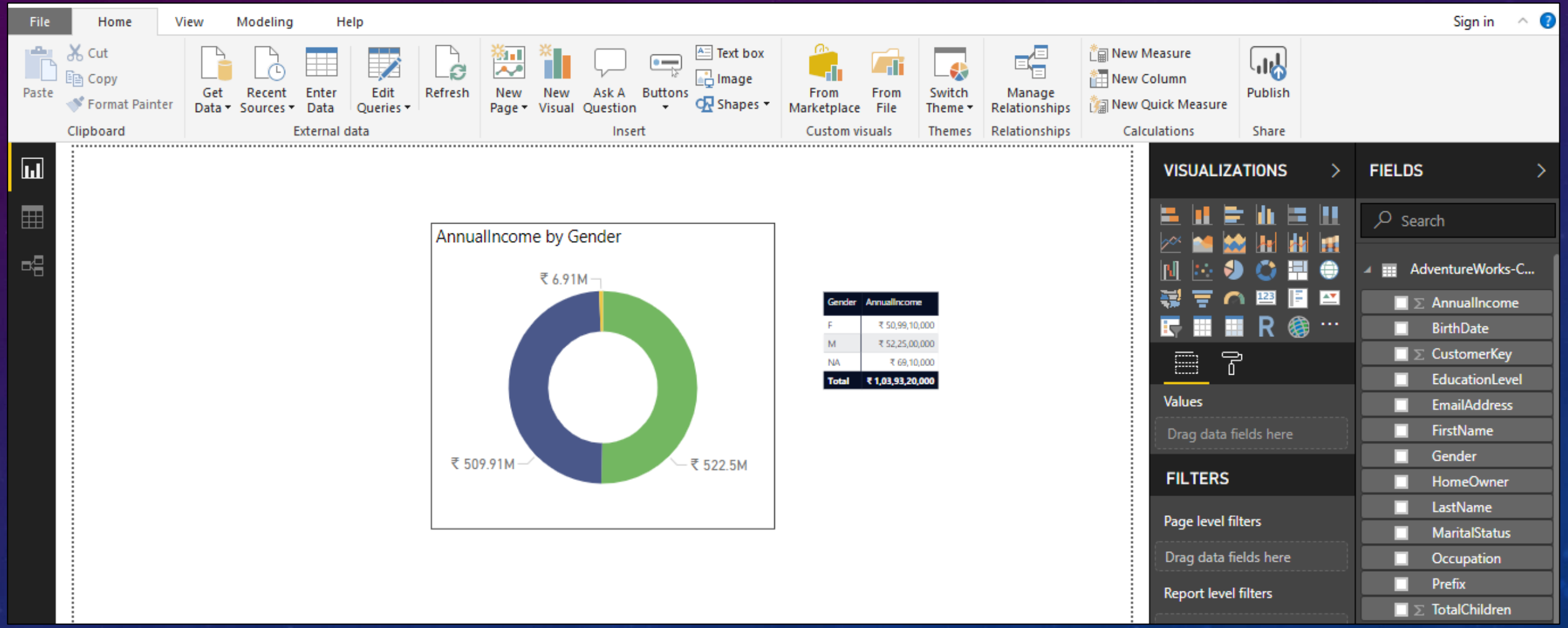
1. Edit will take take us in Power Query editor page. Where we can do necessary formatting, calculation and re-arrange data. Then click on close & Apply. Data will be upload into the PowerBI Desktop.





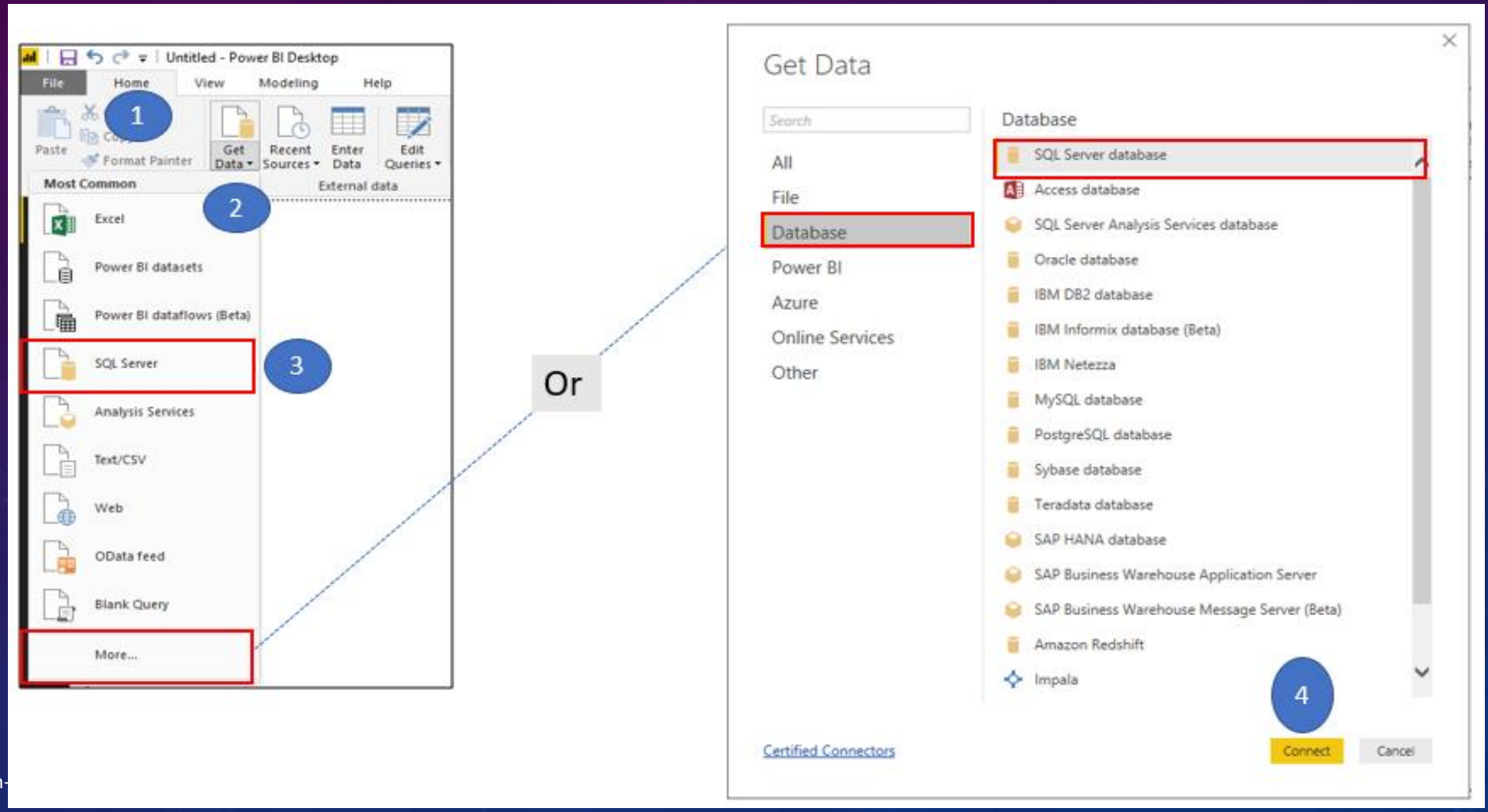
CONNECT TO CSV/TEXT/EXCEL FILES (CONT.)

2. Load will directly upload the data into PowerBI Desktop.



CONNECT TO SQL SERVER

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

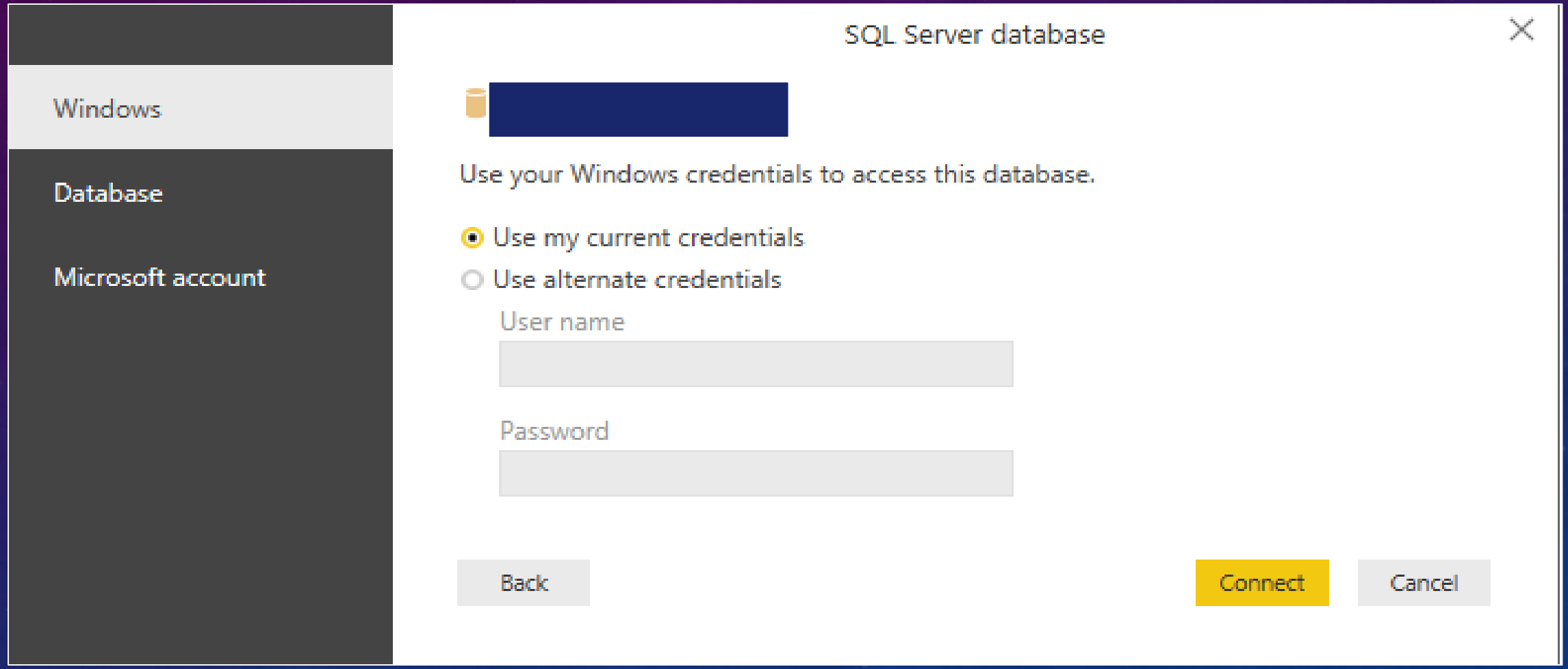


CONNECT TO SQL SERVER (CONT.)

- 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

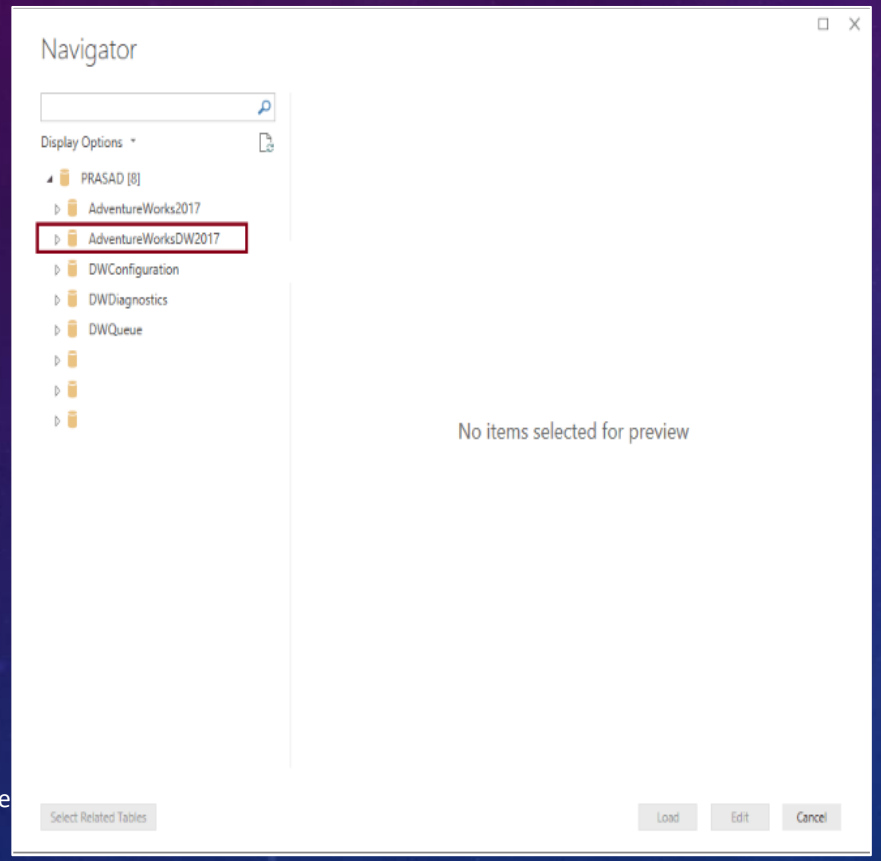
CONNECT TO SQL SERVER (CONT.)

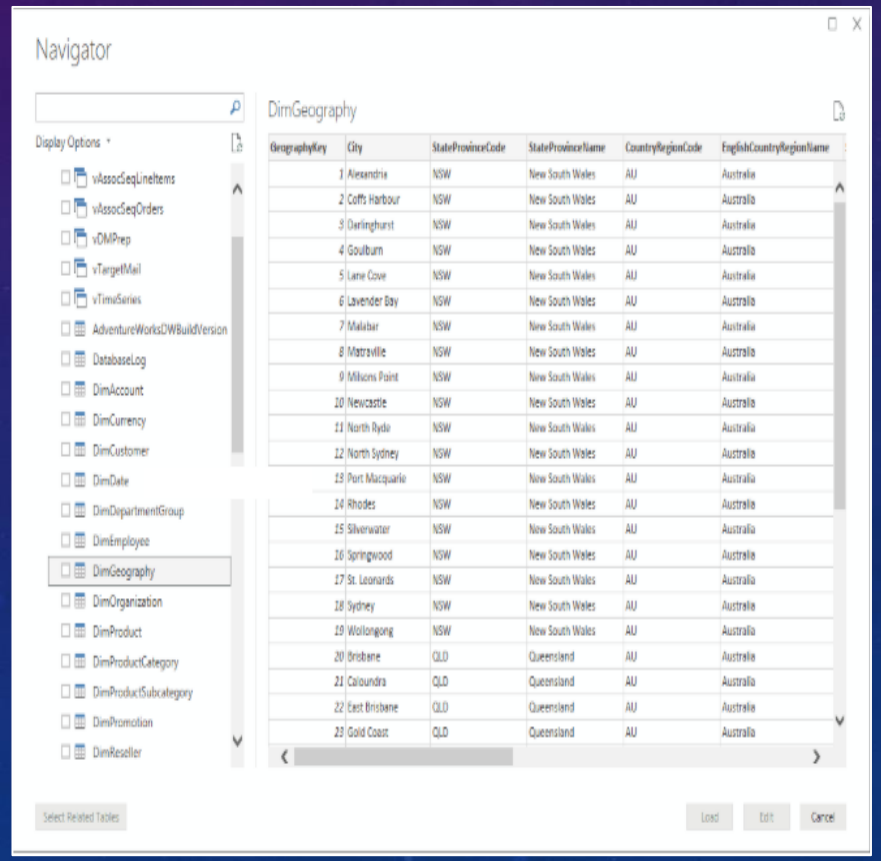
Windows – Here we can access the SQL Server database using our windows credentials



CONNECT TO SQL SERVER (CONT.)

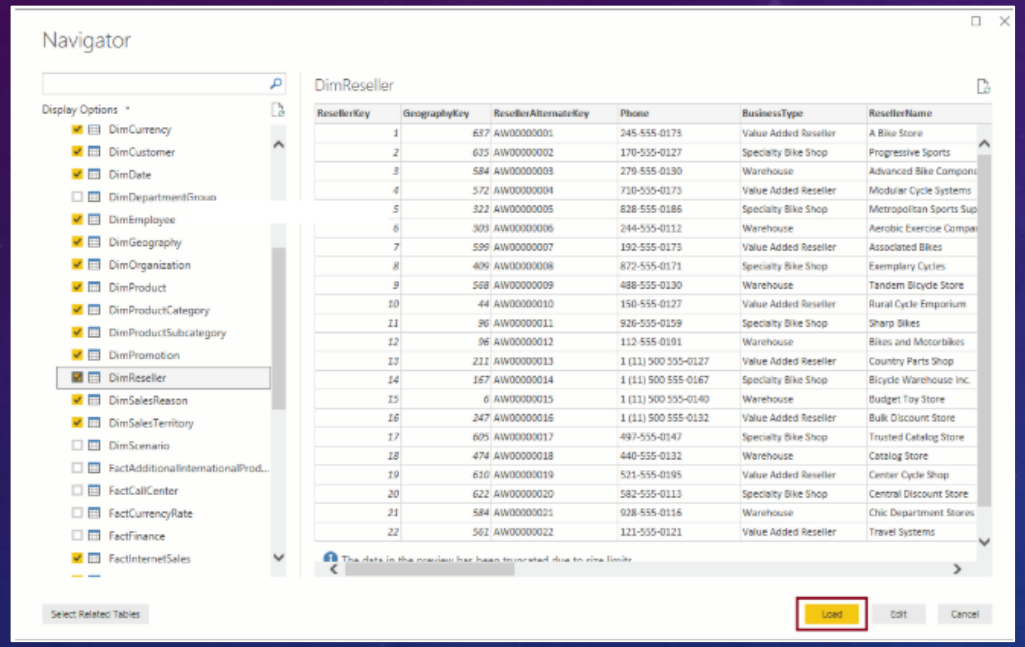
Once PBI Desktop is connected to SQL server, it will open up navigator to choose the files or tables we would like to connect in our model.

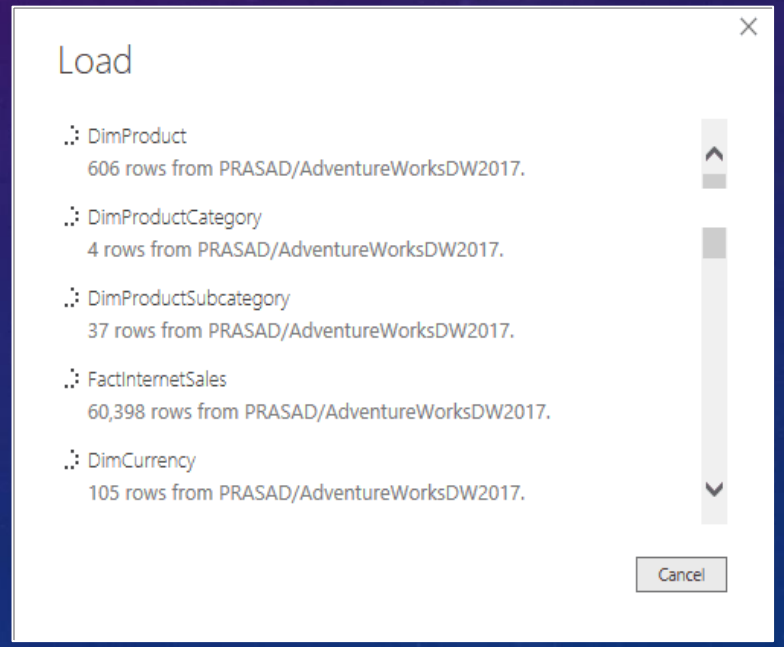




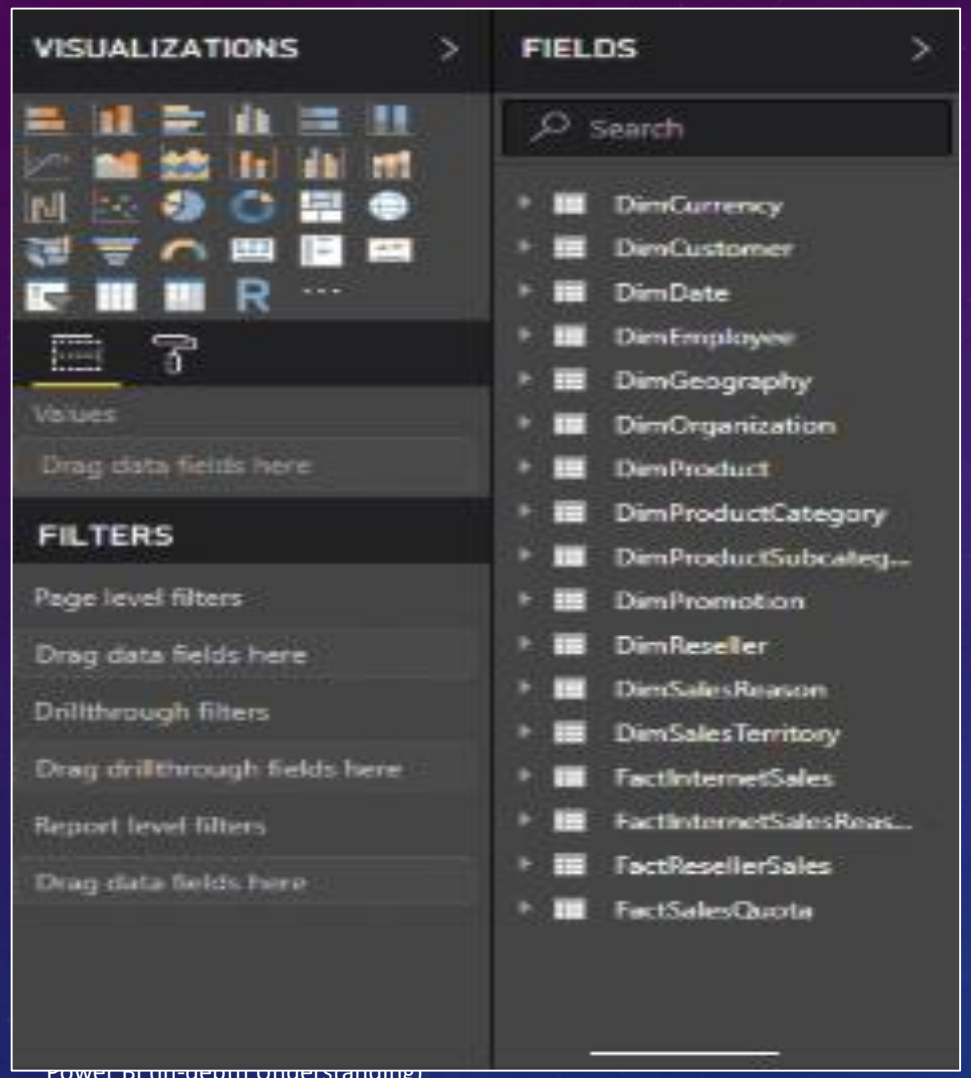
CONNECT TO SQL SERVER (CONT.)

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





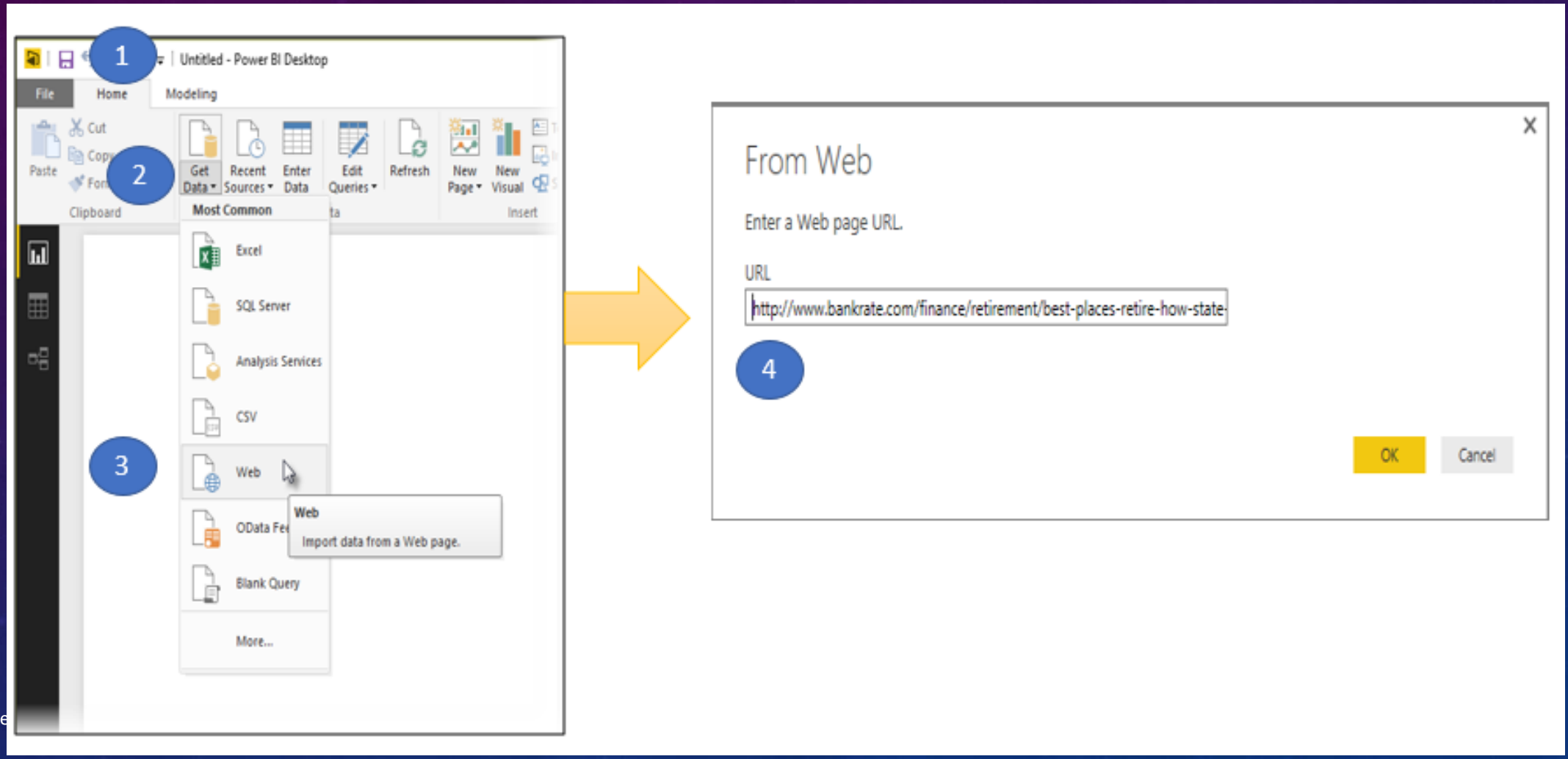
CONNECT TO SQL SERVER (CONT.)



Once loaded, now we can access all the fields of the SQL server database tables into the report view of PBI desktop.

CONNECT TO A WEB PAGE

Home Tab -> Get Data -> Web data -> Type the URL -> Connect



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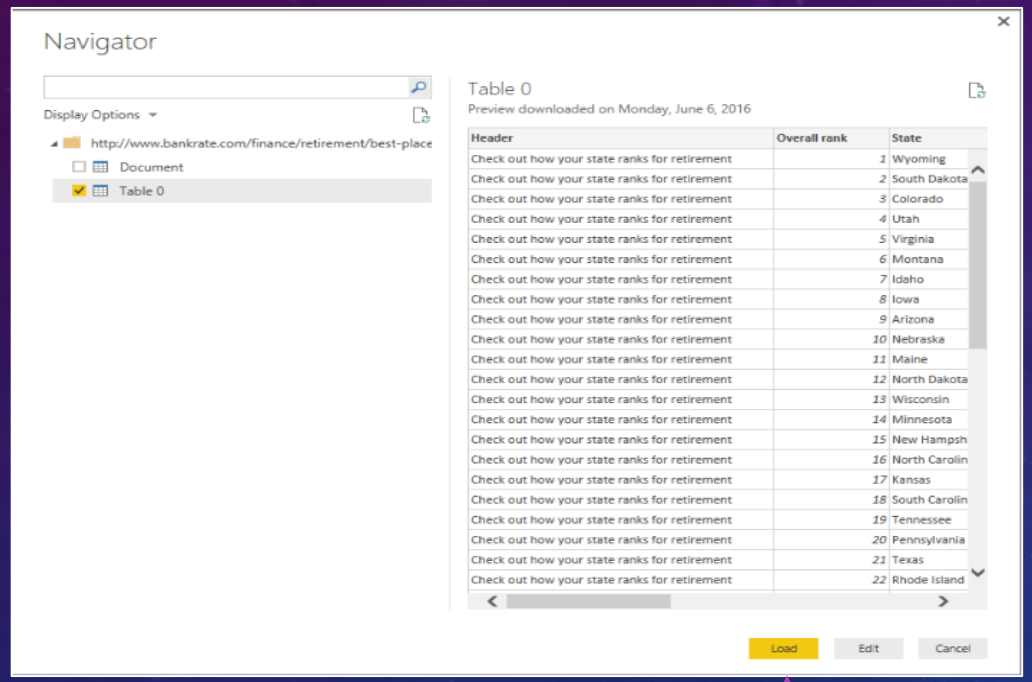
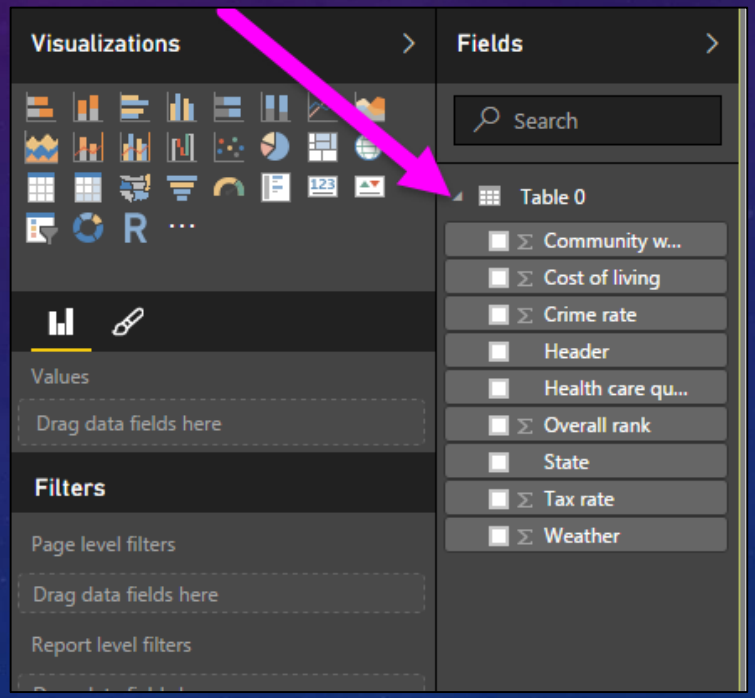
CONNECT TO A WEB PAGE (CONT.)

Once Power BI desktop connects with the web page, it present 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 nevigator, Power BI imports the selected item data and make them visible inside the Fields Tab.

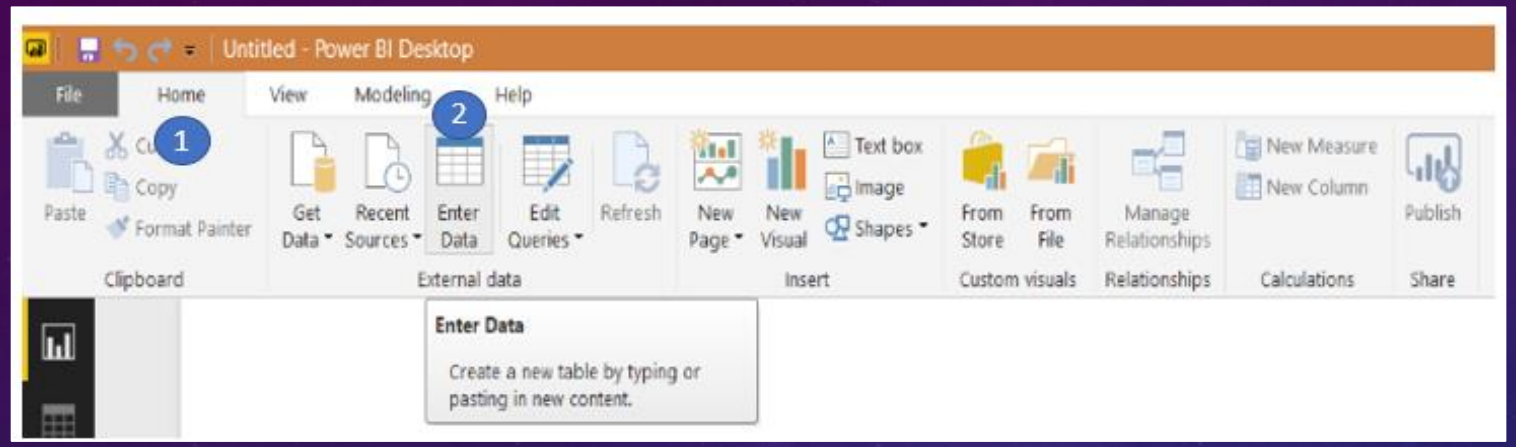




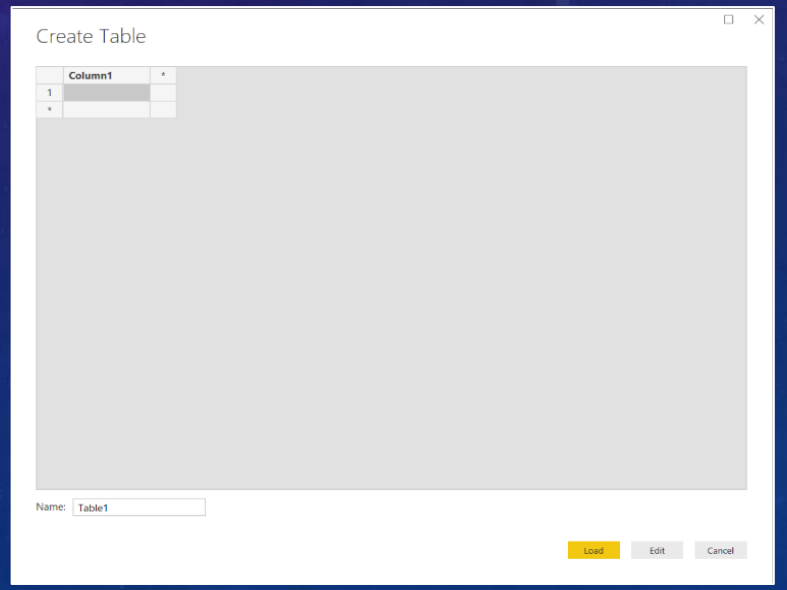
Click Load

ENTER DATA DIRECTLY

Home Tab -> Enter Data



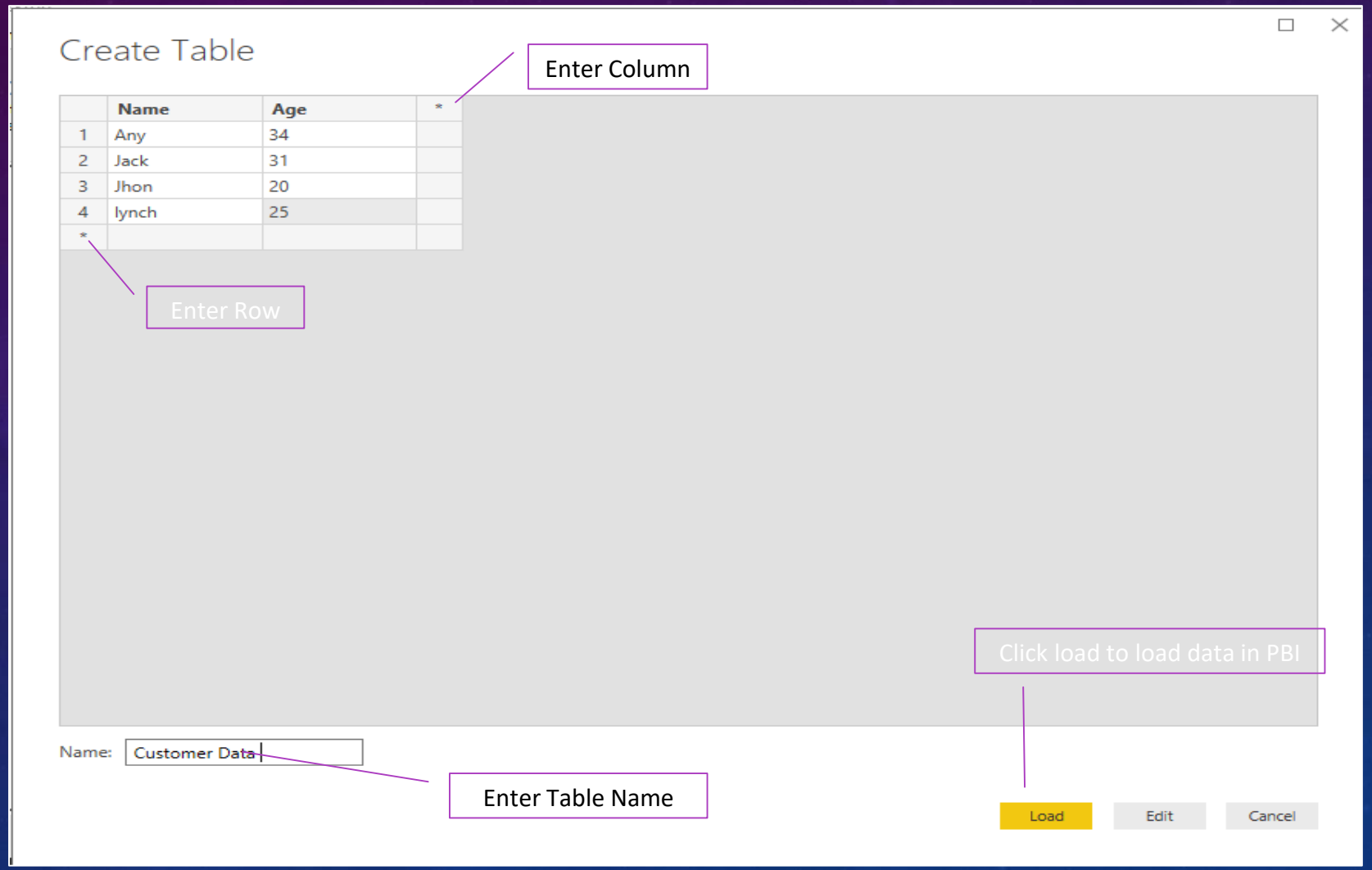
This will trigger “Create Table” dialogue box.



ENTER DATA DIRECTLY (CONT.)

To Insert a new Column or row just click on the asterisk (*) symbol which is showing on the both sides of the Column and Row.

At the bottom , we can define Table Name for example – Customer data



ENTER DATA DIRECTLY (CONT.)

Once the data is loaded, all the fields can be accessed in PBI.

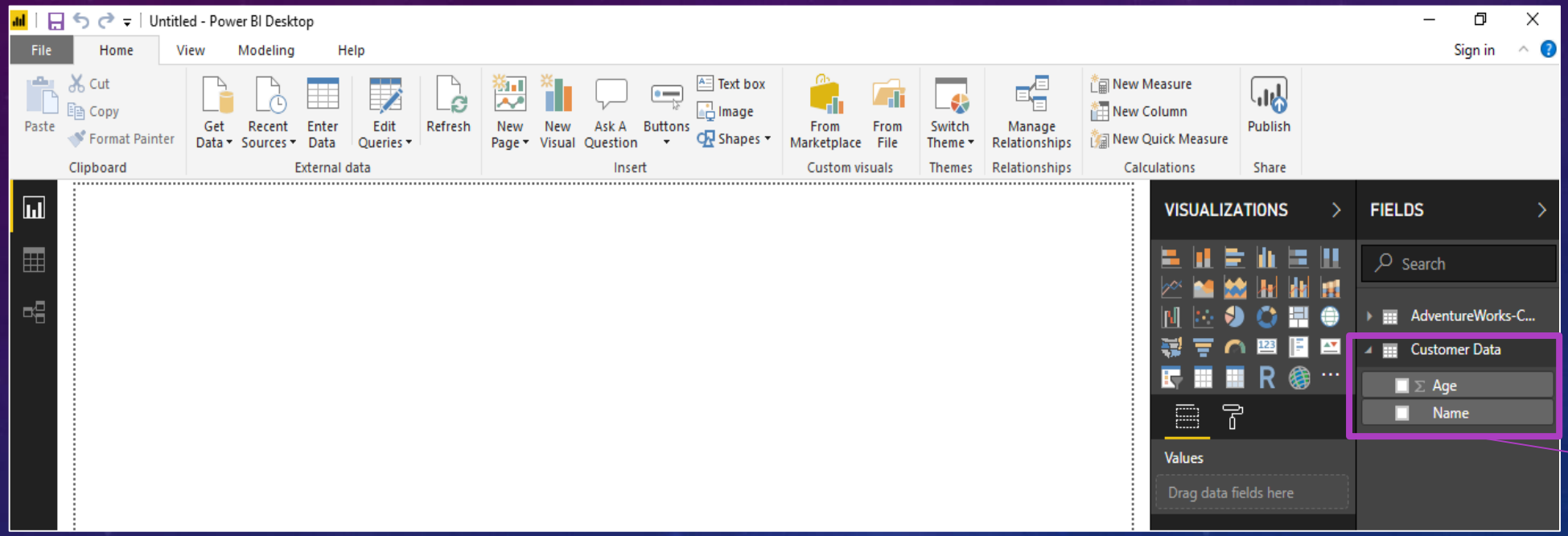


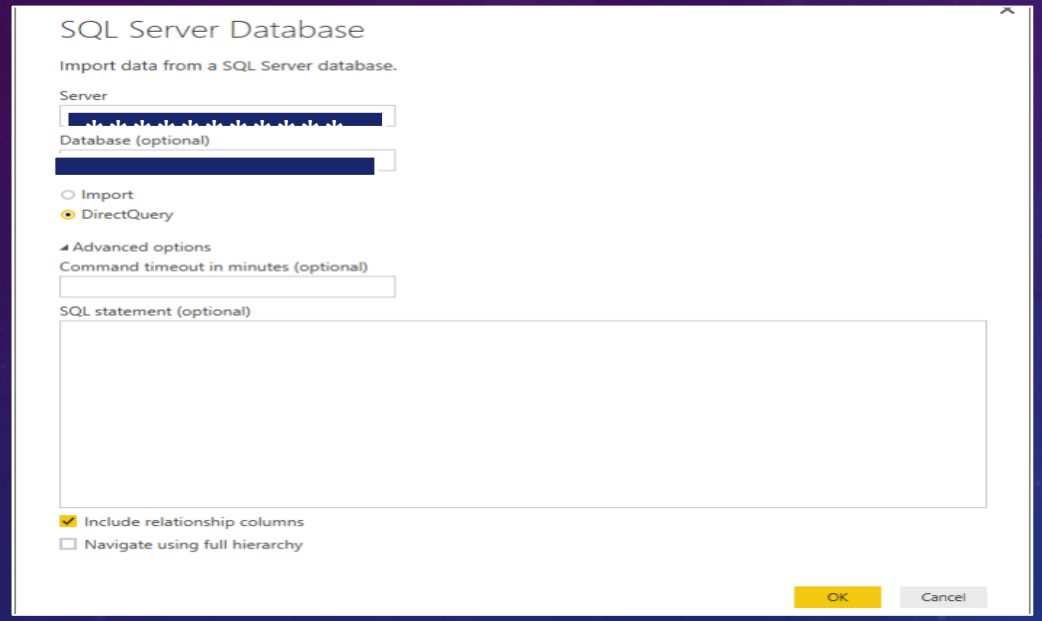
Table & Fields

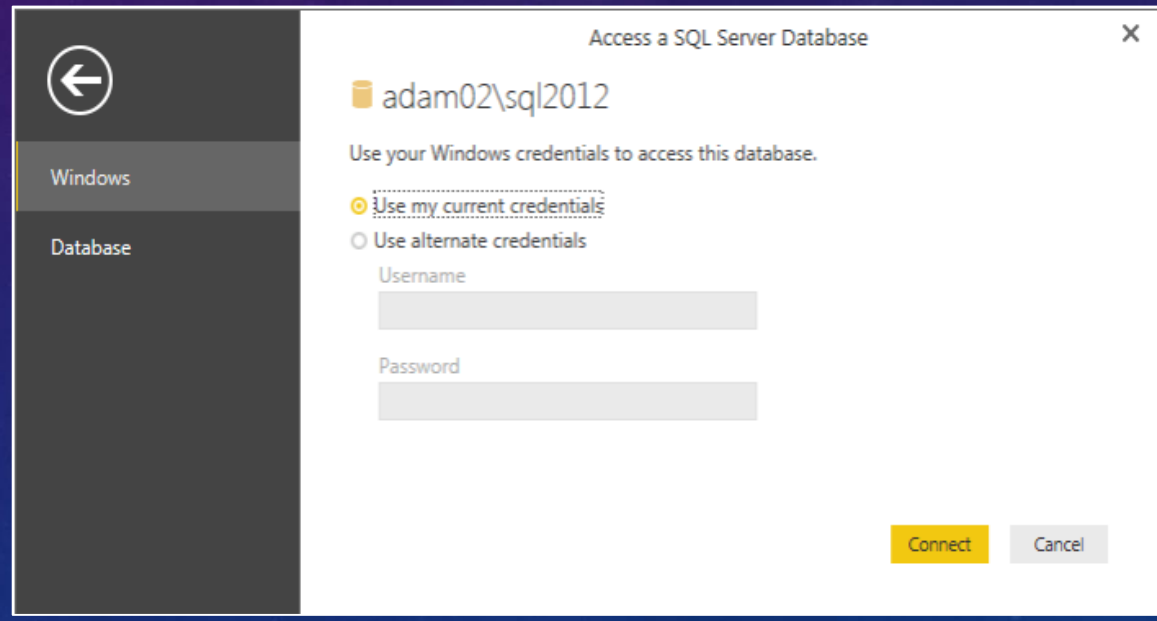
CONNECT TO DIRECT SQL QUERY

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".





Power Query for Data Transformation

Power Query for Data Transformation

Using SQL Different versions of Power Query
Power Query Introduction
Query Editor
Transformation GUI
Row Transformations
Column Transformations
Data Type
Adding Column
Text Transformations
Number Column Calculations
Date and Time Calculations
Data types, Lists, Records, and tables in M
M built-in functions
Writing Custom Functions

POWER QUERY

Power Query act 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.

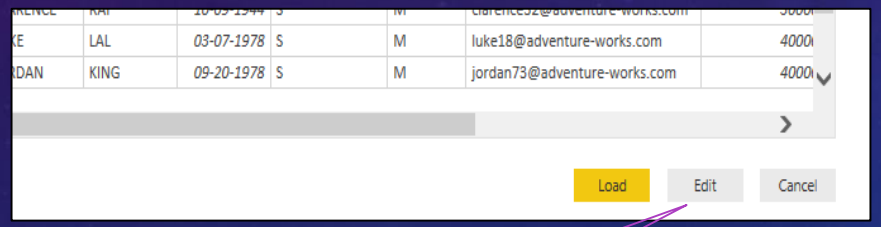
It also facilitates an “Applied Steps” feature, where whatever we do, will get recorded as steps and upon updating the source data, all those steps will get applied to them automatically and this way the creator of the report needs not to repeat the steps.

HOW TO OPEN POWER QUERY EDITOR?

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

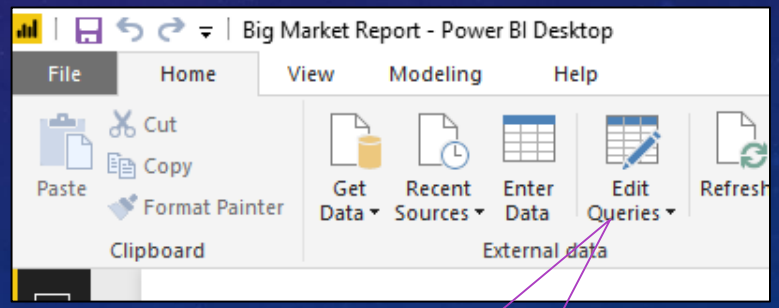
1. Power BI window Home -> Get Data -> Choose the respective data source -> Browse the file -> “Edit”. (Here “Edit” button will open Query editor).
2. Power BI window Home -> “Edit Queries”

①



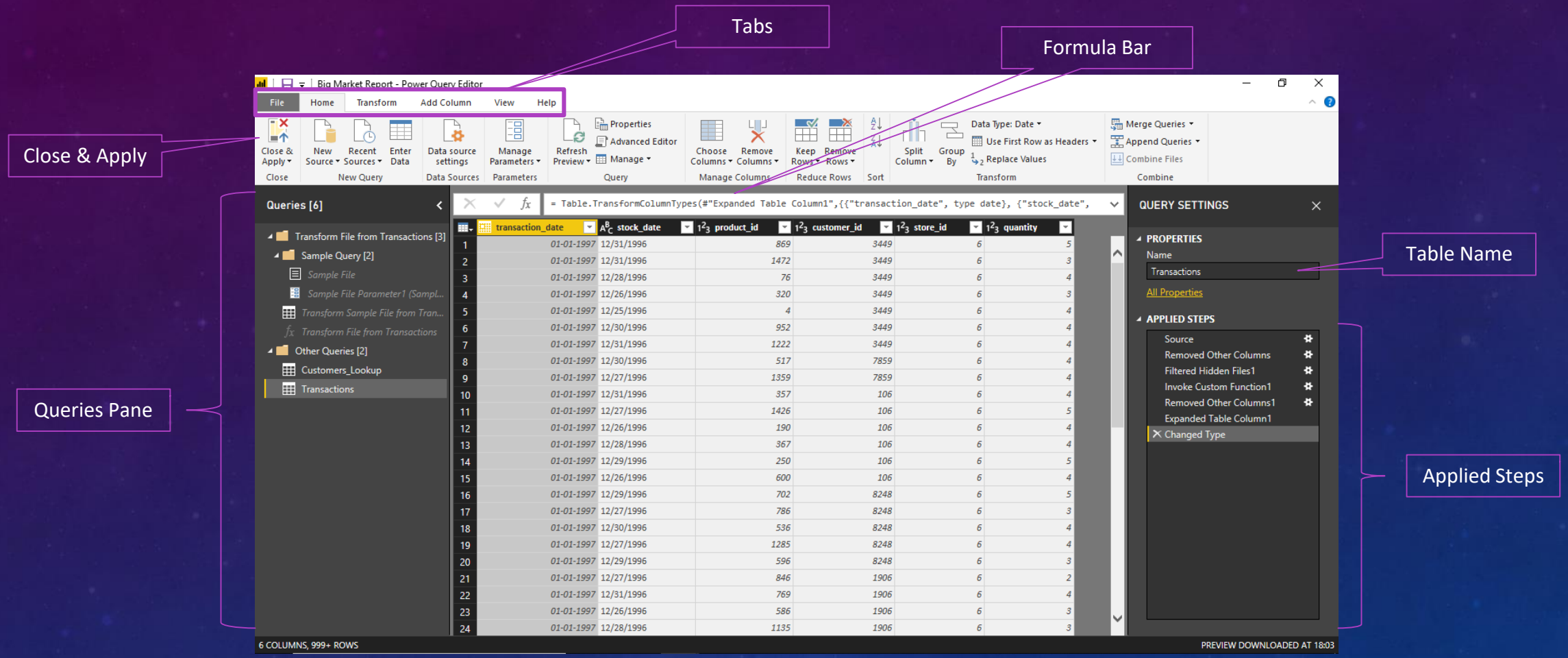
Click “Edit”

②



Click “Edit Queries”

POWER QUERY EDITOR INTERFACE



	transaction_date	stock_date	product_id	customer_id	store_id	quantity
1	01-01-1997	12/31/1996	869	3449	6	5
2	01-01-1997	12/31/1996	1472	3449	6	3
3	01-01-1997	12/28/1996	76	3449	6	4
4	01-01-1997	12/26/1996	320	3449	6	3
5	01-01-1997	12/25/1996	4	3449	6	4
6	01-01-1997	12/30/1996	952	3449	6	4
7	01-01-1997	12/31/1996	1222	3449	6	4
8	01-01-1997	12/30/1996	517	7859	6	4
9	01-01-1997	12/27/1996	1359	7859	6	4
10	01-01-1997	12/31/1996	357	106	6	4
11	01-01-1997	12/27/1996	1426	106	6	5
12	01-01-1997	12/26/1996	190	106	6	4
13	01-01-1997	12/28/1996	367	106	6	4
14	01-01-1997	12/29/1996	250	106	6	5
15	01-01-1997	12/26/1996	600	106	6	4
16	01-01-1997	12/29/1996	702	8248	6	5
17	01-01-1997	12/27/1996	786	8248	6	3
18	01-01-1997	12/30/1996	536	8248	6	4
19	01-01-1997	12/27/1996	1285	8248	6	4
20	01-01-1997	12/29/1996	596	8248	6	3
21	01-01-1997	12/27/1996	846	1906	6	2
22	01-01-1997	12/31/1996	769	1906	6	4
23	01-01-1997	12/26/1996	586	1906	6	3
24	01-01-1997	12/28/1996	1135	1906	6	3

POWER QUERY EDITOR INTERFACE (CONT.)

- Queries 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 Get 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).

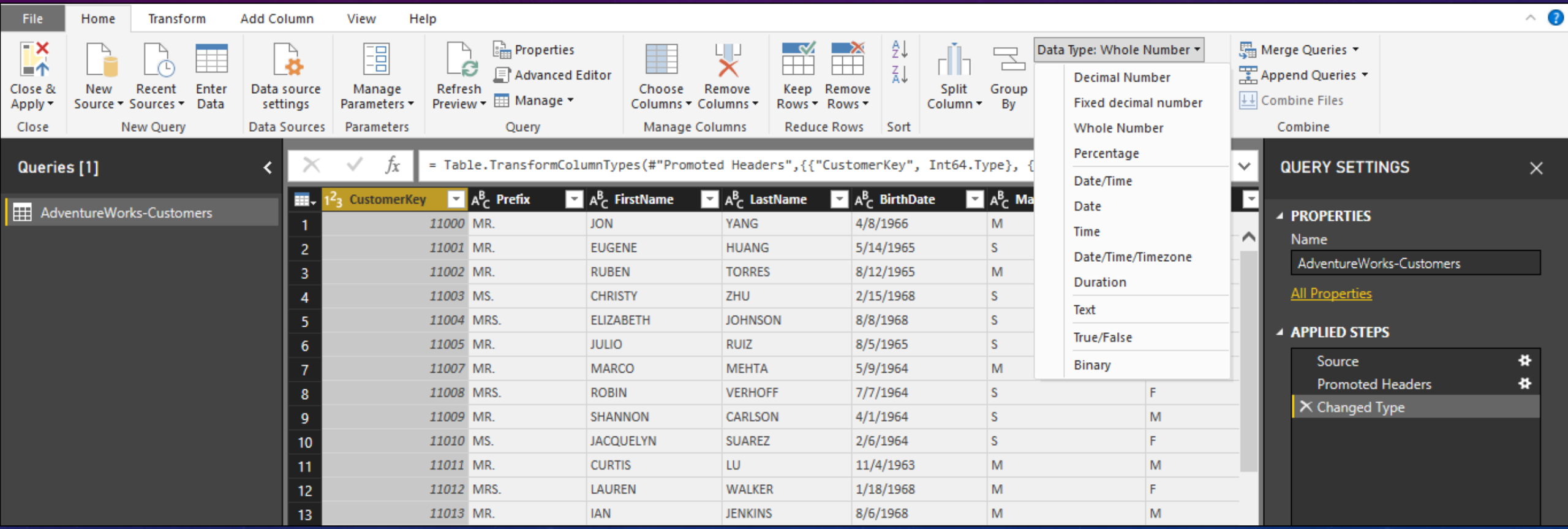
POWER QUERY EDITOR INTERFACE (CONT.)

- Add Column: This add 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.

DATA TYPES

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



	CustomerKey	Prefix	FirstName	LastName	BirthDate	Ma	
1	11000	MR.	JON	YANG	4/8/1966	M	
2	11001	MR.	EUGENE	HUANG	5/14/1965	S	
3	11002	MR.	RUBEN	TORRES	8/12/1965	M	
4	11003	MS.	CHRISTY	ZHU	2/15/1968	S	
5	11004	MRS.	ELIZABETH	JOHNSON	8/8/1968	S	
6	11005	MR.	JULIO	RUIZ	8/5/1965	S	
7	11007	MR.	MARCO	MEHTA	5/9/1964	M	
8	11008	MRS.	ROBIN	VERHOFF	7/7/1964	S	F
9	11009	MR.	SHANNON	CARLSON	4/1/1964	S	M
10	11010	MS.	JACQUELYN	SUAREZ	2/6/1964	S	F
11	11011	MR.	CURTIS	LU	11/4/1963	M	M
12	11012	MRS.	LAUREN	WALKER	1/18/1968	M	F
13	11013	MR.	IAN	JENKINS	8/6/1968	M	M

MERGE & APPEND QUERIES

Merge Queries

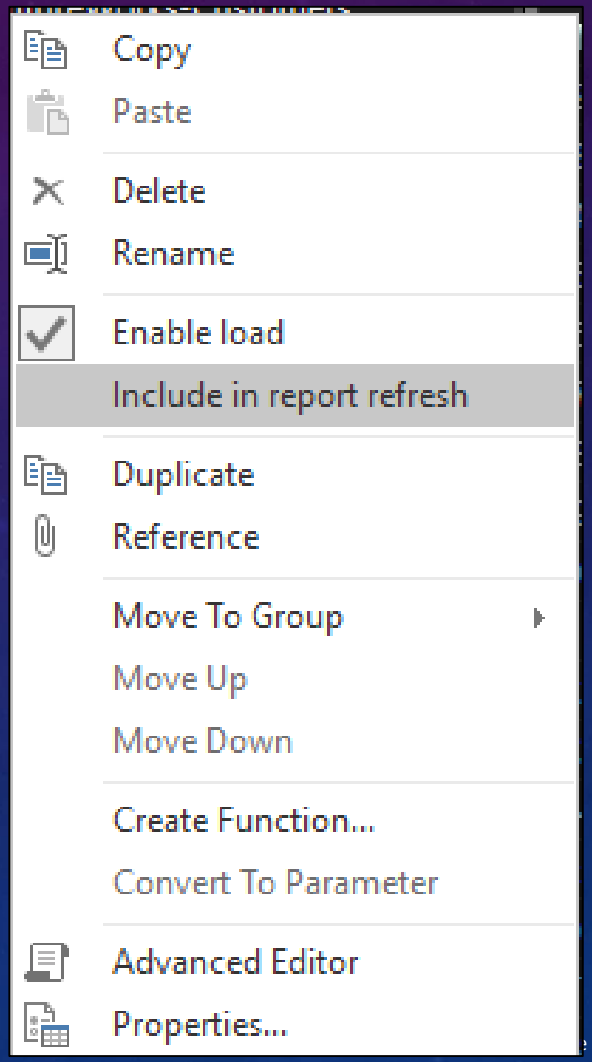
- This allow us to join two tables based on one common column (like Vlookup function in Excel)
- Example: Merging Sales & Product table based on Product key in both the tables.

Append Queries

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

INCLUDE IN REPORT REFRESH

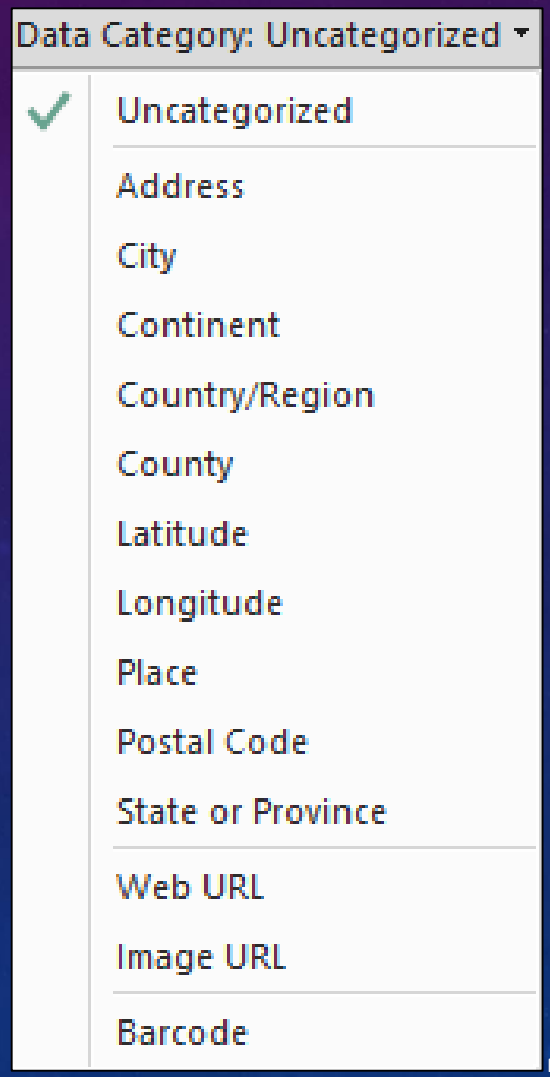
- Once we click the “Refresh” command from the home tab in Power BI desktop window, it will refresh all the queries present in Query editor. But queries which won’t change often like lookup table (e.g. Product table, Territory Table etc.), we can set it to exclude from refresh by right clicking on the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



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.



Data Modelling in Power BI

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

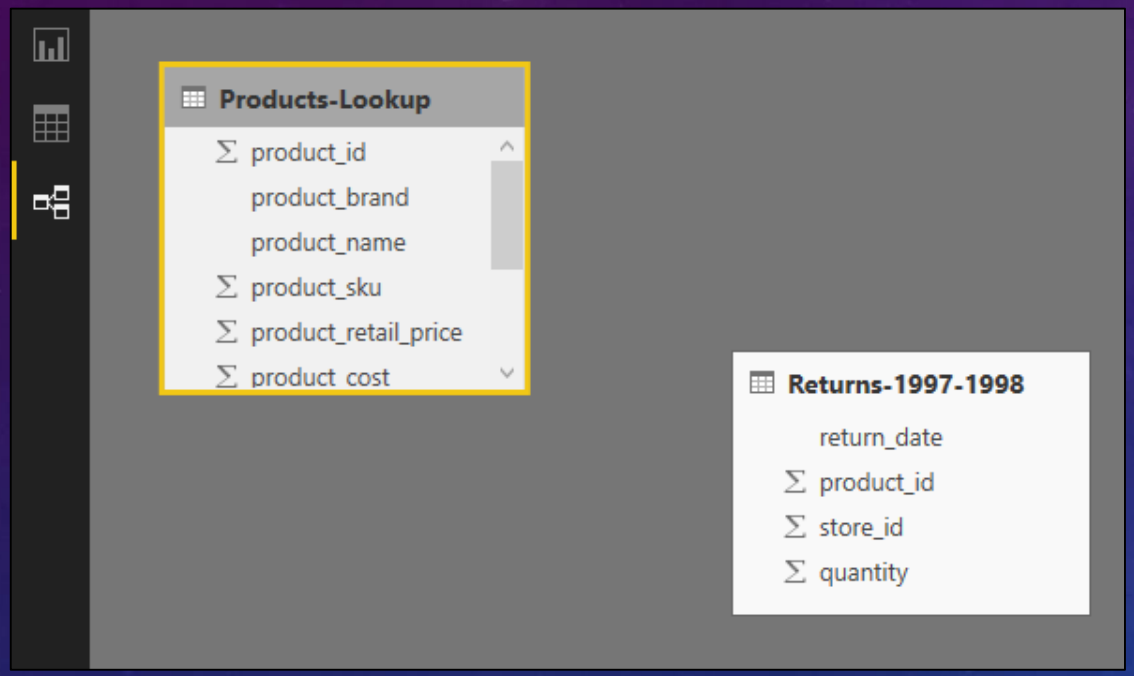
DATA MODEL

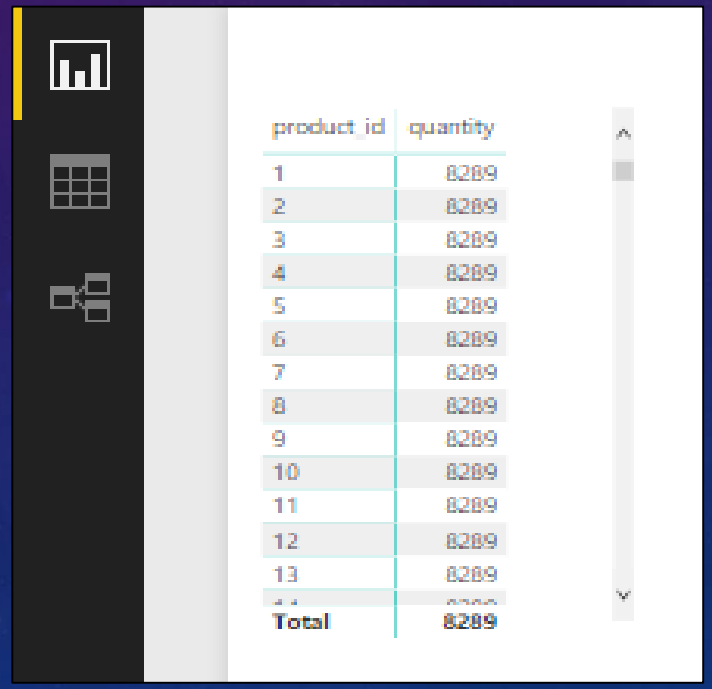
- When the collection of two or more independent tables are connected through relationships based on common fields forms a Data Model.

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

WITHOUT DATA MODEL

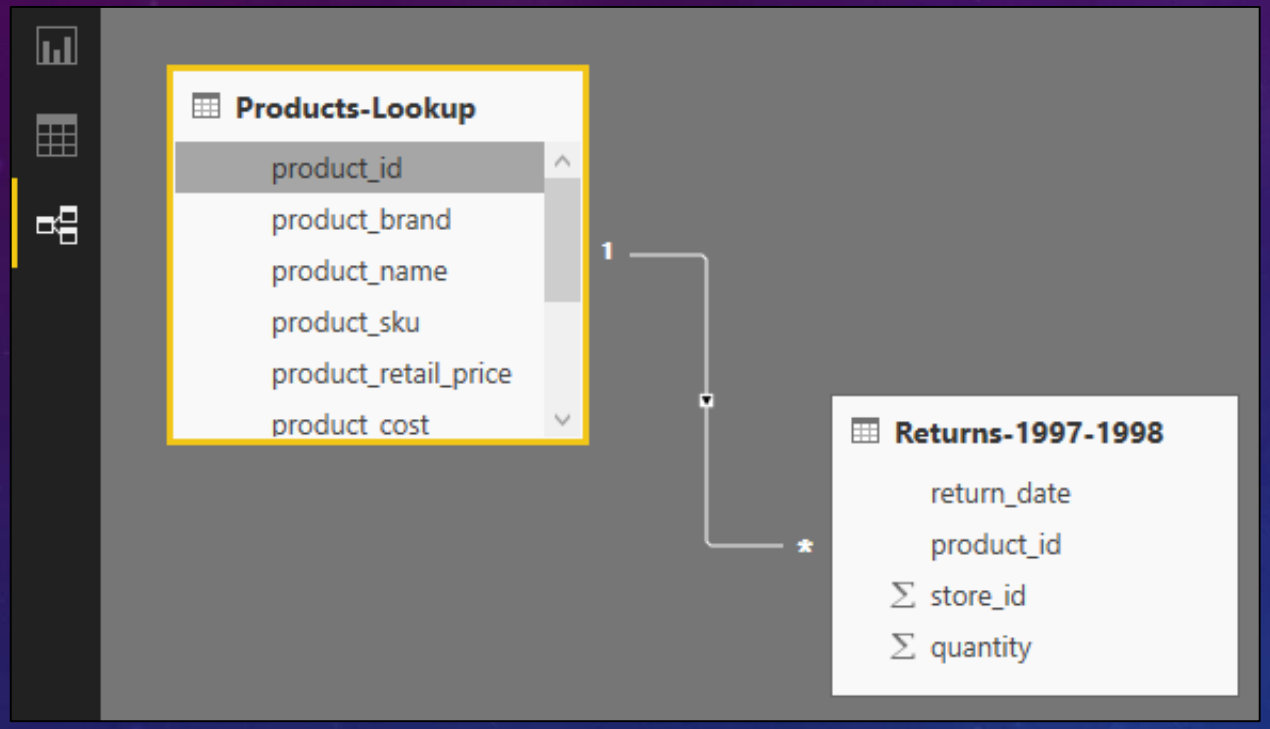
In our sample data, if the relationship between returns table and products table do not exist then using the fields in the report view from both of these tables will leads to independent and meaningless results.

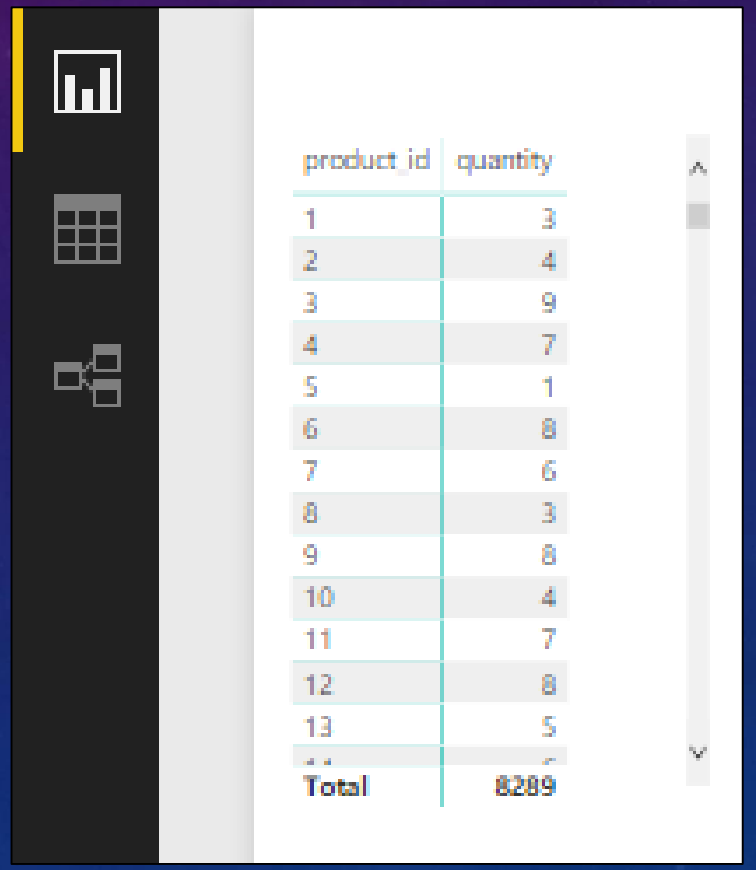




WITH DATA MODEL

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





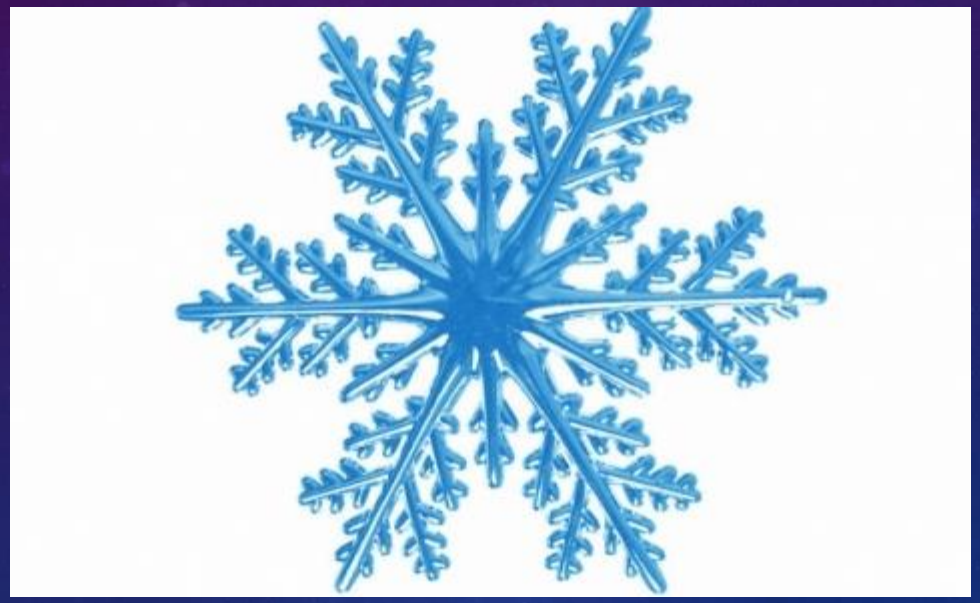
product_id	quantity
1	3
2	4
3	9
4	7
5	1
6	8
7	6
8	3
9	8
10	4
11	7
12	8
13	5
Total	8289

BUILDING RELATIONSHIPS

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

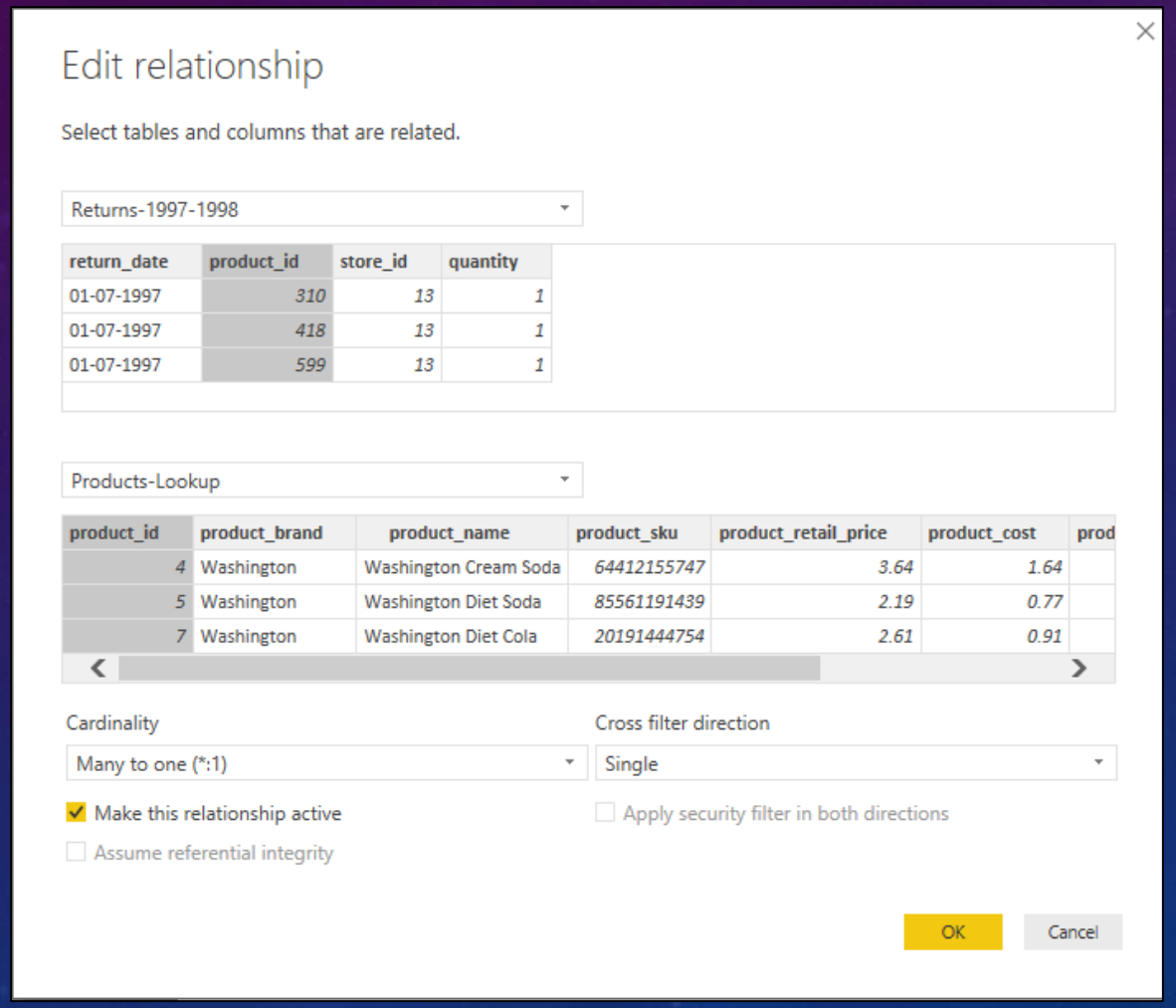
UNDERSTANDING “SNOWFLAKE” SCHEMAS

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” schemas.



EDITING EXISTING RELATIONSHIPS

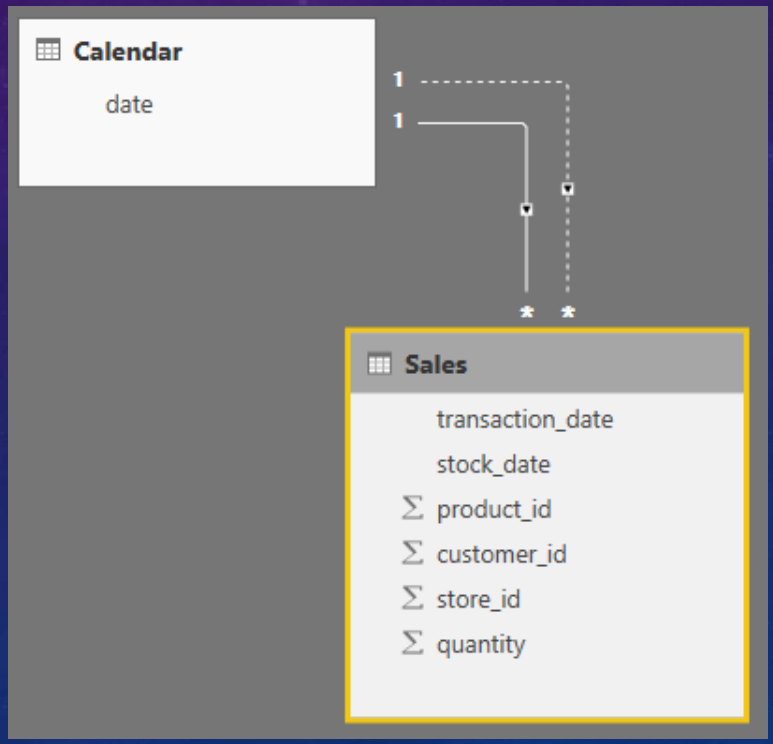
In the relationship view either one can double click on the relationship thread or can go to Home -> Manage Relationships.



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.



RELATIONSHIP CARDINALITY

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

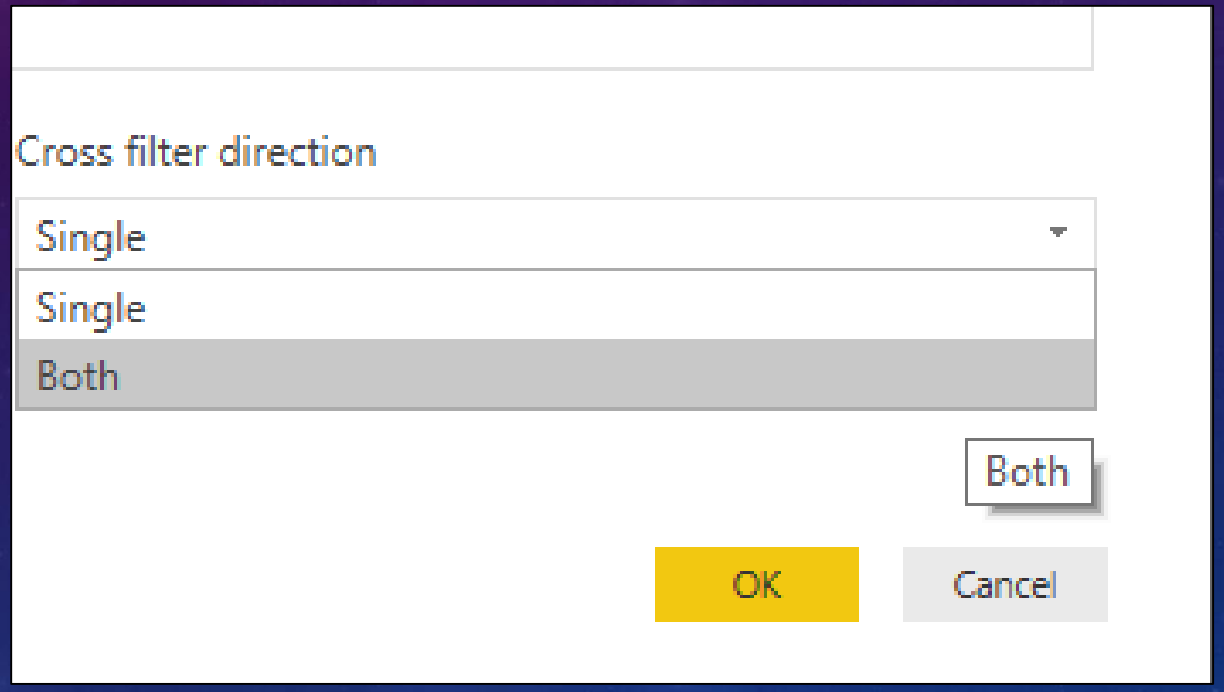
FILTER FLOW

- Filter flow passes downstream from lookup tables to data tables

BOTH-WAY FILTER

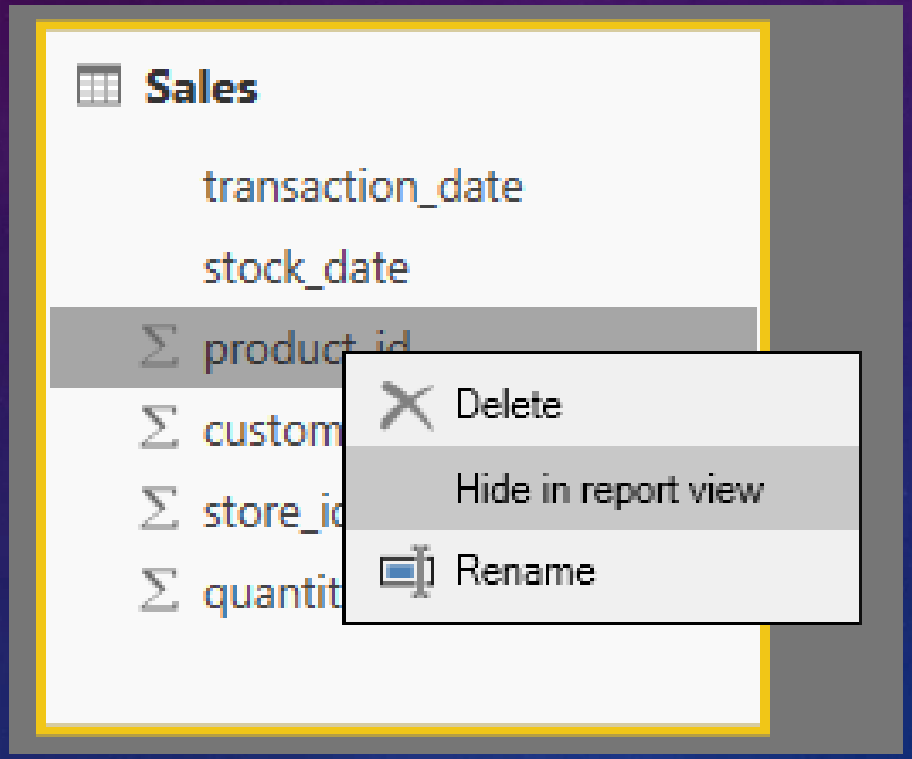
We can have both-way filter too i.e. it can flow from Lookup table to Data table and at the same time Data table to lookup table.

Note: This can be dangerous to have both way filter when we have more then one Data table in the model.



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.



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”.

CALCULATED COLUMNS

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

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.

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

ADDING MEASURES

- Measures can be added either by right clicking within the table or by using “Quick Measures”.

IMPLICIT & EXPLICIT MEASURES

- **Implicit Measures**

These are being create 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 like Sum, count, average etc. These can be accessed only in the visualization where these has 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.

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.

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

TEXT CONCATENATION OPERATORS

Text concatenation operator	Meaning
& (ampersand)	Connects, or concatenates, two values to produce one continuous text value

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.

DAX FUNCTIONS CATEGORIES

- Date and time
- Time-intelligence
- Filter
- Information
- Logical
- Math & Trigonometry
- Other
- Parent and Child
- Statistical
- Text

DATE AND TIME FUNCTIONS

- CALENDAR
- CALENDARAUTO
- DATE
- DATEDIFF
- DATEVALUE
- DAY
- EDATE
- EOMONTH
- HOUR
- MINUTE
- MONTH
- NOW
- SECOND
- TIME
- TIMEVALUE
- TODAY
- UTCNOW
- UTCTODAY
- WEEKDAY
- WEEKNUM
- YEAR
- YEARFRAC

TIME-INTELLIGENCE FUNCTIONS

- CLOSINGBALANCEMONTH
- CLOSINGBALANCEQUARTER
- CLOSINGBALANCEYEAR
- DATEADD
- DATESBETWEEN
- DATESINPERIOD
- DATESMTD
- DATESQTD
- DATESYTD
- ENDOFMONTH
- ENDOFQUARTER
- ENDOFYEAR
- FIRSTDATE
- FIRSTNONBLANK
- LASTDATE
- LASTNONBLANK
- NEXTDAY
- NEXTMONTH
- NEXTQUARTER
- NEXTYEAR
- OPENINGBALANCEMONTH
- OPENINGBALANCEQUARTER
- OPENINGBALANCEYEAR
- PARALLELPERIOD

- PREVIOUSDAY
- PREVIOUSMONTH
- PREVIOUSQUARTER
- PREVIOUSYEAR
- SAMEPERIODLASTYEAR
- STARTOFMONTH
- STARTOFQUARTER
- STARTOFYEAR
- TOTALMTD
- TOTALQTD

FILTER FUNCTIONS

- ADDMISSINGITEMS
- ALL
- ALLCROSSFILTERED
- ALLEXCEPT
- ALLNOBLANKROW
- ALLSELECTED
- CALCULATE
- CALCULATETABLE
- CROSSFILTER
- DISTINCT (column)
- DISTINCT (table)
- EARLIER
- EARLIEST
- FILTER
- FILTERS
- HASONEFILTER
- HASONEVALUE
- ISCROSSFILTERED
- ISFILTERED
- KEEPFILTERS
- RELATED
- RELATEDTABLE
- SELECTEDVALUE
- SUBSTITUTEWITHINDEX
- USERELATIONSHIP
- VALUES

INFORMATION FUNCTIONS

- CONTAINS
- CUSTOMDATA
- IN Operator / CONTAINSROW function
- ISBLANK
- ISERROR
- ISEVEN
- ISINSCOPE
- ISLOGICAL
- ISNONTEXT
- ISNUMBER
- ISODD
- ISONORAFTER
- ISTEXT
- LOOKUPVALUE
- USERNAME

LOGICAL FUNCTIONS

- AND
- False
- IF
- IFERROR
- IN
- NOT
- OR
- SWITCH
- True

MATH & TRIGONOMETRY FUNCTIONS

- ABS
- ACOS
- ACOSH
- ASIN
- ASINH
- ATAN
- ATANH
- CEILING
- COMBIN
- COMBINA
- COS
- COSH
- CURRENCY
- DEGREES
- DIVIDE
- EVEN
- EXP
- FACT
- FLOOR
- GCD
- INT
- ISO.CEILING
- LCM
- LN
- LOG
- LOG10
- MOD
- MROUND
- ODD
- PI

- POWER
- PRODUCT
- PRODUCTX
- QUOTIENT
- RADIANS
- RAND
- RANDBETWEEN
- ROUND
- ROUNDDOWN
- ROUNDUP
- SIGN
- SQRT
- SUM
- SUMX
- TRUNC

OTHER FUNCTIONS

- DATATABLE
- ERROR
- EXCEPT
- GENERATESERIES
- GROUPBY
- INTERSECT
- ISEMPTY
- ISSELECTEDMEASURE
- NATURALINNERJOIN
- NATURALLEFTOUTERJOIN
- SELECTEDSMEASURE
- SELECTEDMEASUREFORMATSTRING
- SELECTEDSMEASURENAME
- SUMMARIZECOLUMNS
- Table Constructor
- TREATAS
- UNION
- VAR

PARENT & CHILD FUNCTIONS

- Understanding functions for Parent-Child Hierarchies
- PATH
- PATHCONTAINS
- PATHITEM
- PATHITEMREVERSE
- PATHLENGTH

STATISTICAL FUNCTIONS

- ADDCOLUMNS
- APPROXIMATEDISTINCTCOUNT
- AVERAGE
- AVERAGEA
- AVERAGEX
- BETA.DIST
- BETA.INV
- CHISQ.INV
- CHISQ.INV.RT
- CONFIDENCE.NORM
- CONFIDENCE.T
- COUNT
- COUNTA
- COUNTAX
- COUNTBLANK
- COUNTROWS
- COUNTX
- CROSSJOIN
- DISTINCTCOUNT
- EXPON.DIST
- GENERATE
- GENERATEALL
- GEOMEAN
- GEOMEANX
- MAX
- MAXA
- MAXX
- MEDIAN
- MEDIANX
- MIN
- MINA
- MINX
- NORM.DIST
- NORM.INV
- NORM.S.DIST
- NORM.S.INV
- PERCENTILE.EXC
- PERCENTILE.INC
- PERCENTILEX.EXC
- PERCENTILEX.INC
- PERMUT
- POISSON.DIST
- RANK.EQ
- RANKX
- ROW
- SAMPLE
- SELECTCOLUMNS
- SIN
- SINH
- STDEV.S
- STDEV.P
- STDEVX.S
- STDEVX.P
- SQRTPI
- SUMMARIZE
- T.DIST

TEXT FUNCTIONS

- BLANK
- CODE
- COMBINEVALUES
- CONCATENATE
- CONCATENATEX
- EXACT
- FIND
- FIXED
- LEFT
- LEN
- LOWER
- MID
- REPLACE
- REPT
- RIGHT
- SEARCH
- SUBSTITUTE
- TRIM
- UNICHAR
- UPPER
- VALUE

Reports in Power BI

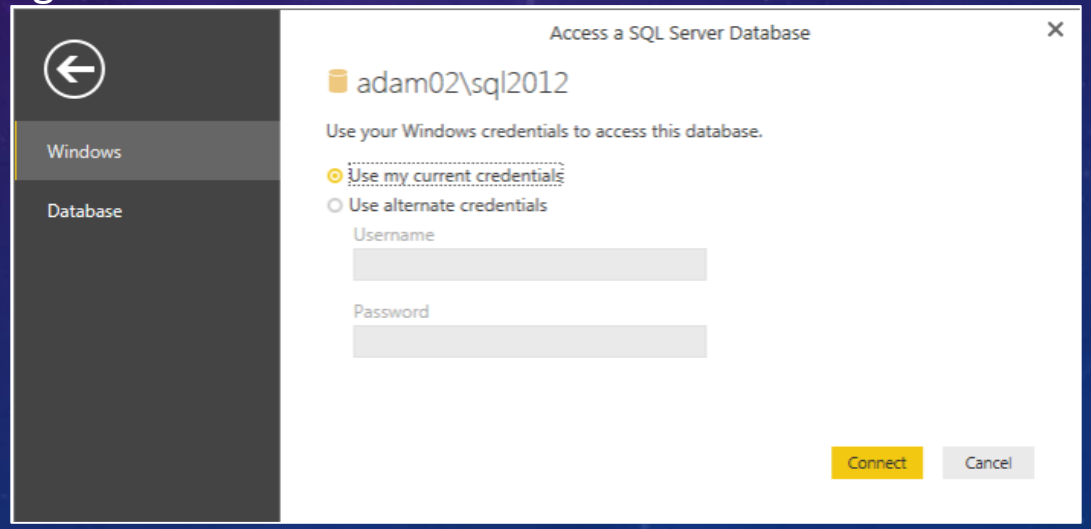
Reports in Power BI

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
Change how visuals interact in a report
Open a Power BI report in Reading View
Go from Reading View to Editing View in Power BI
Interact with a report in Editing View in Power BI
Aggregates (sum, average, maximum, etc.) in Power BI
Rename a report in Power BI
Page display settings in a Power BI report
Duplicate a report page in Power BI
Delete a page from a Power BI report
Delete a report from Power BI
Rename a report page in Power

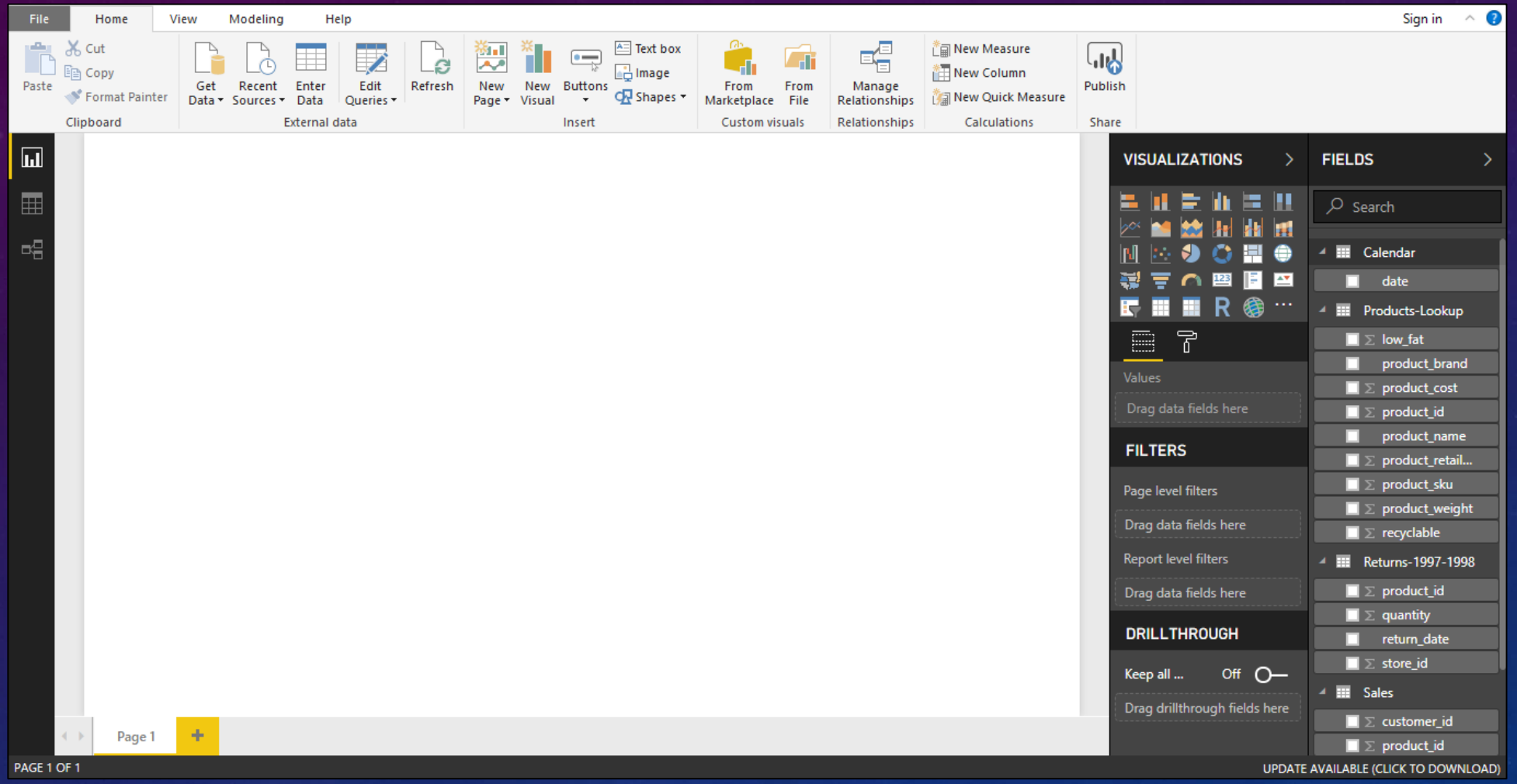
CONNECT TO DIRECT SQL QUERY IN DESKTOP

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.

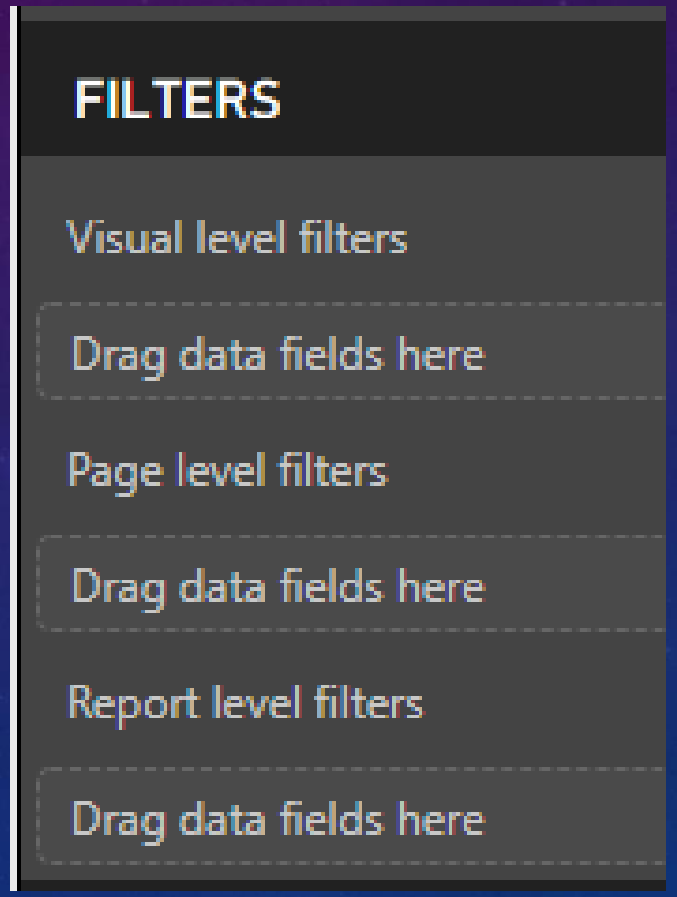


REPORT VIEW (INTERFACE)



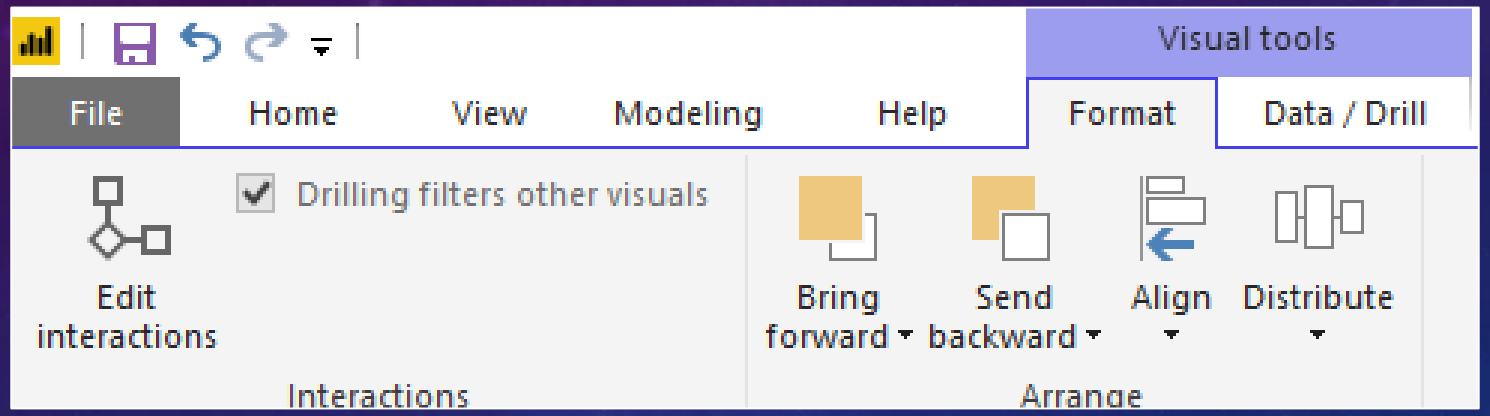
POWER BI DESKTOP FILTERS

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



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.



Reports and Visualization types in Power BI

Reports and Visualization types in Power BI

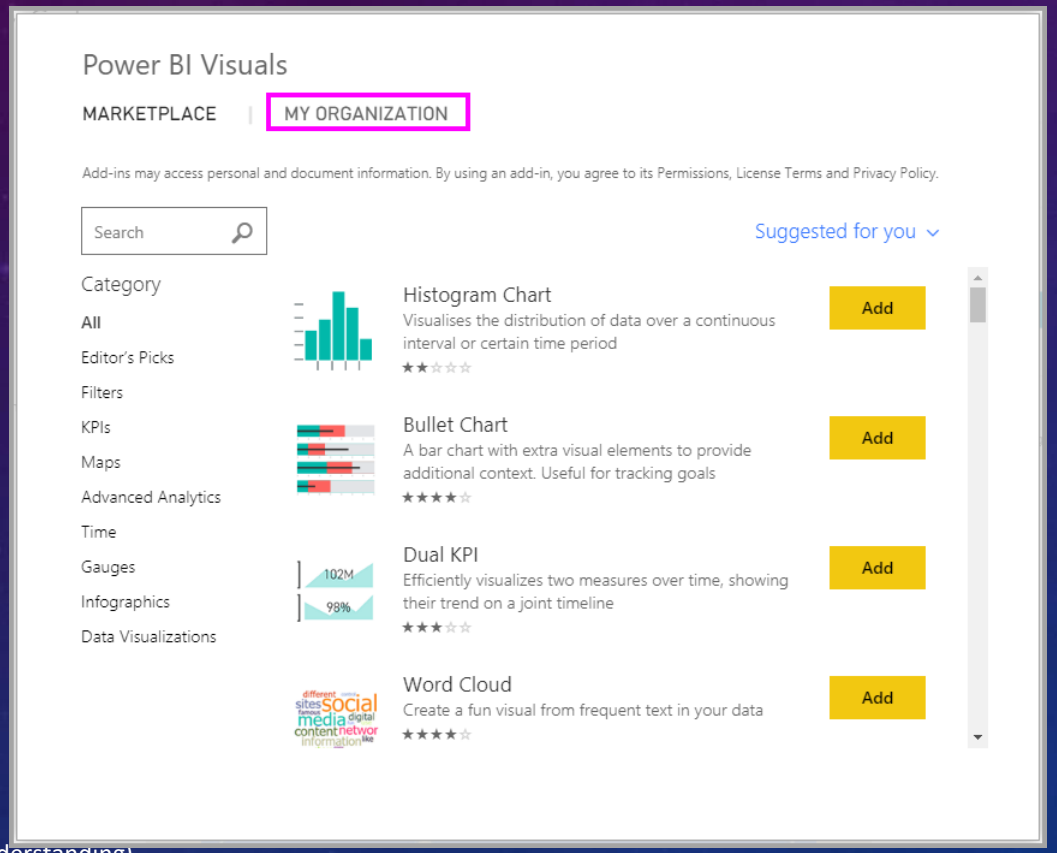
Types of visualization in a Power BI report
Custom visualization to a Power BI report
Types of visualization in a Power BI report
Add a custom visualization to a Power BI report
Download a custom visual from the gallery
Getting started with color formatting and axis properties
Change how a chart is sorted 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

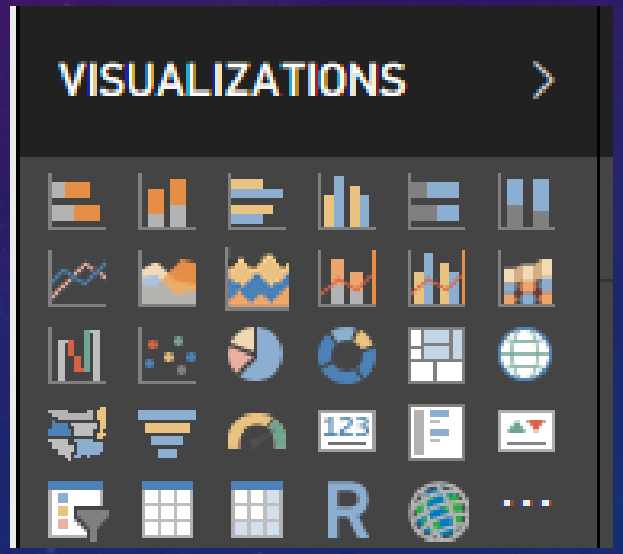
TYPES OF VISUALIZATION IN A POWER BI REPORT

- Area
- Stacked Area
- Bar/Column
- Clustered Bar/Column
- 100% Stacked Bar/Column
- Combo
- Ribbon
- Treemap
- 3D Map
- Filled Map
- Card/KPI
- Slicer
- Table
- Matrix
- Doughnut
- Funnel
- Gauge
- Line
- Pie
- Scatter
- Wanterfall

CUSTOM VISUALIZATION TO A POWER BI

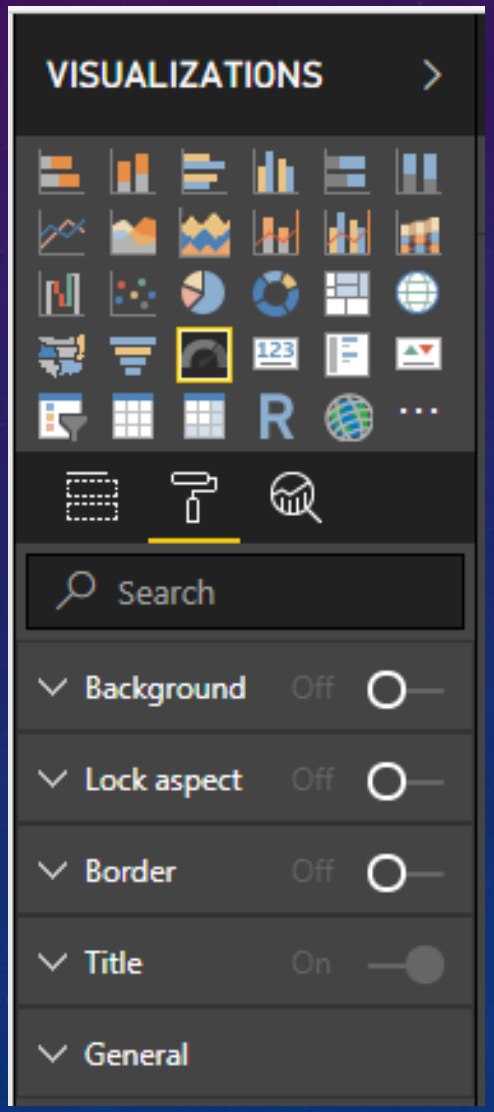
Power BI also provides us an option to download custom visualization from the Microsoft App store.





VISUALIZATION SETTINGS

These settings are different for each visualization.

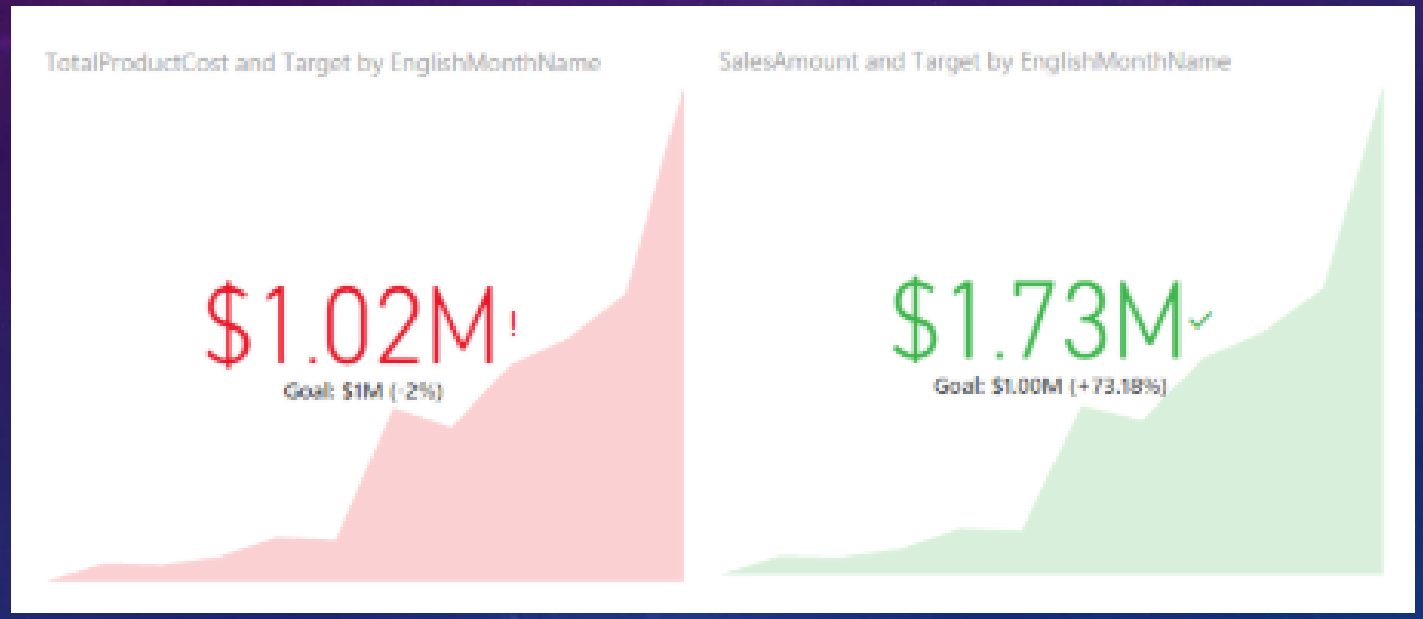


VISUALIZATION DRILL DOWN OPTION

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.

KPI VISUAL

These are useful when it comes to compare actual versus target.



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 drillthorugh filter, Power BI automatically adds a back button to go back to the overview.

Dashboard in Power BI

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
Power BI publisher for Excel
Pin an entire report page to a Power BI dashboard
Data alerts in Power BI service
Add an image, text box, video, or web code to your dashboard
Edit a tile -- resize, move, rename, pin, delete, add hyperlink
Tips for designing a great Power BI dashboard
Print a dashboard, print a dashboard tile, print a report page
Display dashboards and reports in Full Screen mode (TV mode)
Display a dashboard tile in Focus mode
Featured dashboards in Power BI
Create a phone view of a dashboard
Add an image to a dashboard

POWER BI DASHBOARD

- This is a single page view of 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.

ADVANTAGES OF A DASHBOARD

- Due to one pager, it’s a huge timesaving way to monitor KPI’s.
- It can be accessed from anywhere using PBI Mobile app.
- Data used in the visuals may come from on-premises and/or cloud data.
- Its highly interactive.
- Tiles used in a dashboard gets updated automatically once the underlying data changes/updated.

DIFFERENCE BETWEEN DASHBOARD & REPORT

Dashboard

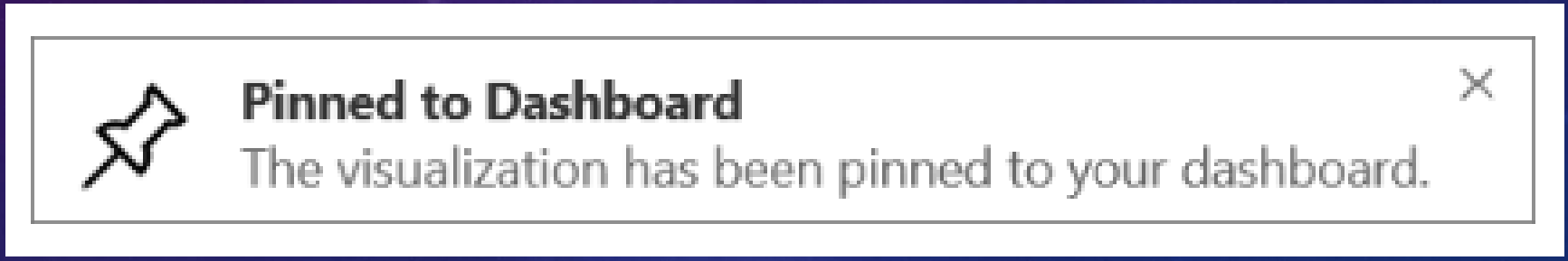
- Data source can be one or more reports or data sets
- Only One page
- Not available in PBI Desktop
- We can’t do filtering or slicing in a Dashboard

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 be set 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.

CREATE A PHONE VIEW OF A DASHBOARD

- Viewing dashboard in a portrait mode on a phone will laid the tiles out as one after another in same size. In PBI service, we can create a customized view of the dashboard, specially for the portrait mode on the phone.

Data Refresh in Power BI

Data Refresh in Power BI

Configure scheduled refresh

Refresh a dataset created from a Power BI Desktop file – local

Refresh a dataset created from a Power BI Desktop file – cloud

Refresh a dataset created from an Excel workbook – local

Disable privacy settings

CONFIGURING SCHEDULED REFRESH

- **Gateway Connection**
- **Data Source Credentials**
- **Schedule Refresh**

Thank You