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CHAPTER 1: INTRODUCTION TO POWER BI

What Is Power BI?

Power BI is a business analytics service provided by Microsoft.

It provides interactive visualizations with self-service business intelligence capabilities, where end users can create reports and dashboards by themselves, without having to depend on information technology staff or database administrators.

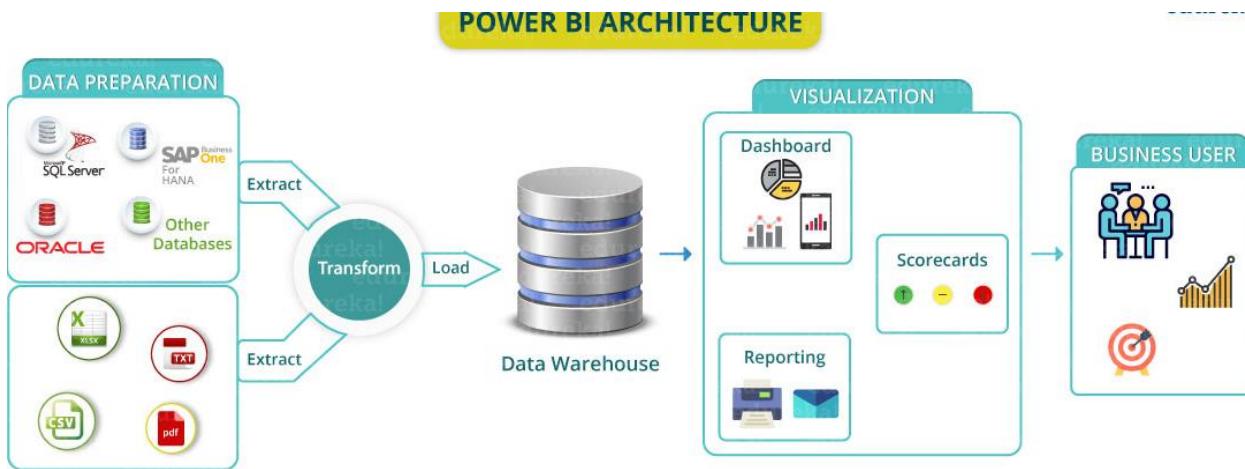
Power BI also gives you cloud-based BI services, known as “Power BI Services”, along with a desktop based interface, called “Power BI Desktop”.

It offers data warehouse capabilities, including data preparation, data discovery and interactive dashboards. In March 2016, Microsoft released an additional service called Power BI Embedded on its Azure cloud platform which enables the user to analyses data easily, perform various ETL operations and deliver reports with Power BI.

Power BI gateways let you connect with SQL Server databases, Analytical Services, and many other data sources to your dashboard in Power BI and reporting portals, embed Power BI reports and dashboards to give you a unified experience. The image below shows Power BI’s general workflow.

ARCHITECTURE OF POWER BI

The following image shows Power BI’s architecture.



Power BI's architecture has three phases.

The first two phases partially use ETL (Extract, Transform and Load) to handle the data. Let us take a look at these phases one by one:

Phase 1: Data Integration / Importing of Data

An organisation can be required to deal with data that comes from different sources. The data from data sources can be in different file formats. The data is first extracted from different sources which can be your different servers or databases etc. This data is then integrated in a standard format and then stored at a common area called as staging area.

Phase 2 : Data Processing / Manipulation of Data

The integrated data is still not ready for visualization because the data needs processing before it can be presented. This data is pre-processed or cleaned. For example, missing values or redundant values are removed from the data set. After the data is cleaned, business rules are applied to the data and it is transformed into presentable data. This data is then loaded into the Data Warehouse.

Phase 3 : Data Presentation / Visualization

So once the data is loaded and processed now it can be visualized much better with use of various visualizations that Power BI has to offer. Use of reports, dashboards help one represent data in more intuitive manner. These visuals, reports help business end users to take business decisions based on the insights.

BUILDING BLOCKS / COMPONENTS OF POWER BI

Everything you do in Power BI can be broken down into following building blocks. A good understanding of these building blocks would help you understand concepts and will let you create detailed and complex reports.

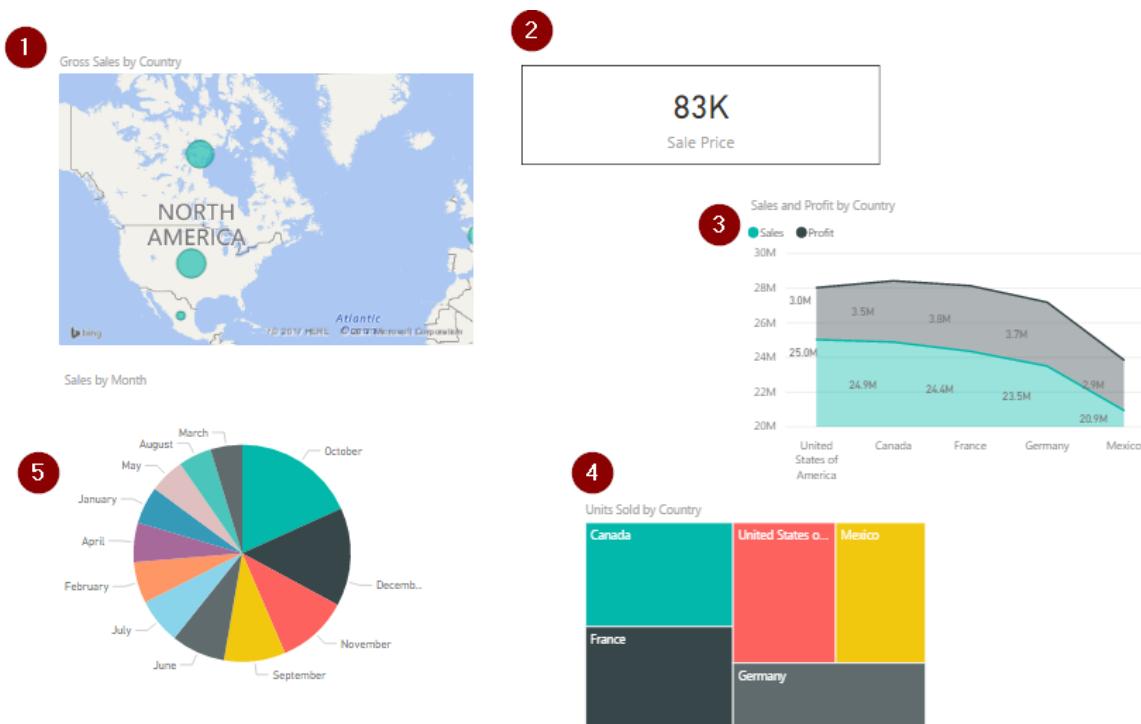
The basic building blocks/components of Power BI are the following:

- Visualizations
- Datasets
- Reports
- Dashboards

Visualizations:

A visual representation of data is called visualization. For example, a chart or a graph can be used to represent data visually. Power BI gives you different visualization types, which keep getting updated with time. Following image shows some commonly used visualizations:

1. Map representation
2. Card visualization
3. Stacked area chart
4. Tree map
5. Pie chart



Visualizations can be simple or they can be visually complex. However, visualization aims at presenting data in such a way that it gives you more insights in the context, which is otherwise difficult to discern from simple data files.

Datasets:

We know that data-set is nothing but a collection of data or information. Power BI harnesses this data to create visualizations. It can be a simple data set or a combination of many different sources, which can be filtered and combined to provide a different data set altogether.

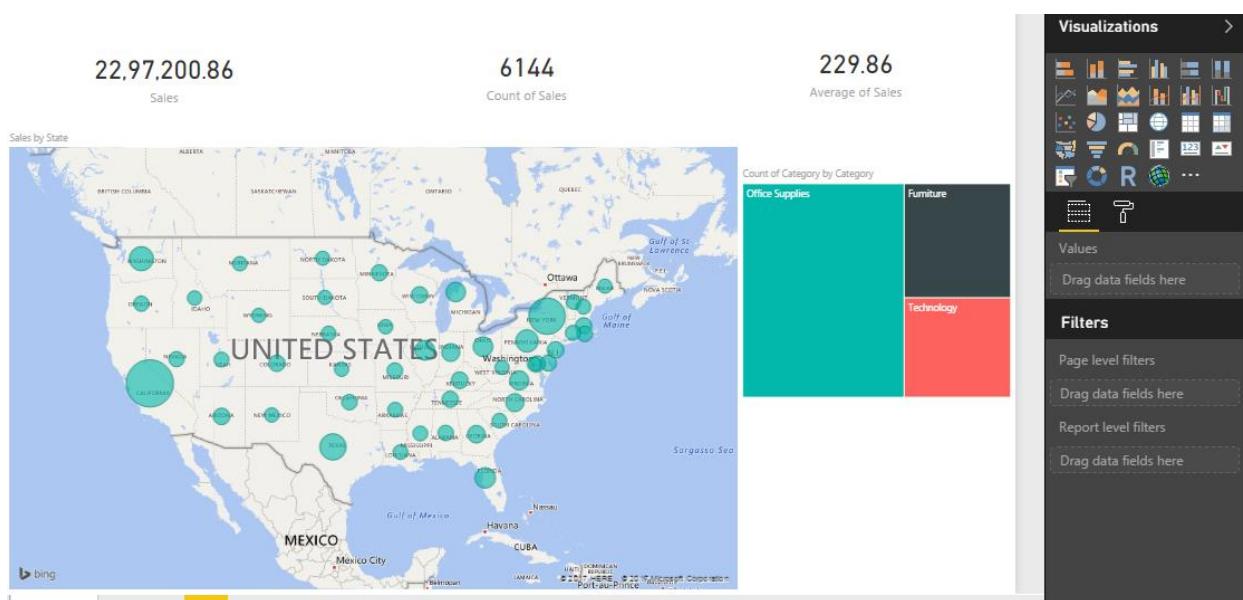
For example, you can pull together data from many different sources like different database fields, an excel table, and online results of some email campaign to create the data set

With the data set ready, you are free to create visualizations and display different portions of that data set in different ways, and with this, you gain insights.

Reports:

A collection of visualizations that appear together on one or more pages is a report in Power BI. It is a collection of items that are related to one another.

You can create visualizations, on multiple different pages if necessary, and arrange them in a way that suits your story best. The image below shows a sample report.

**Dashboards:**

A Power BI dashboard is a single page interface. It is often called a canvas, that uses visualizations to tell a story. Because it is limited to one page, a well-designed dashboard contains only the most-important elements of that story. The visualizations you see on the dashboard are called tiles and are pinned to the dashboard from reports.

In Power BI, a tile is a single visualization found in a report or on a dashboard. It's the rectangular box that contains each individual visual.

Power BI gives you the freedom to move or arrange tiles, so you can present the data the way you want to, even while you're creating a report or a dashboard. You can make the tiles bigger, change their height or width, and snuggle them up to other tiles the way you want.

So this was about Power BI's building blocks, now I am going to take this Power BI tutorial a step further with a demonstration of creating a simple report using Power BI. However, there are few prerequisites to get started. First of all you need a 'Power BI Desktop' installed on your system, this is an interface where you can create reports. It can be downloaded for free.

You will be required to login with an organizational email ID like an institute Email ID or your Email ID of the organization which you work for. It is important you create an account, because this will give you access to Power BI Service which is a must to publish your reports and create dashboards.

Once you have downloaded the Power BI Desktop. You would be needing a data set to visualize it. I would be using the finance data set created by Microsoft and it can be downloaded using this [link](#).

CHAPTER 2: POWER BI REPORTS

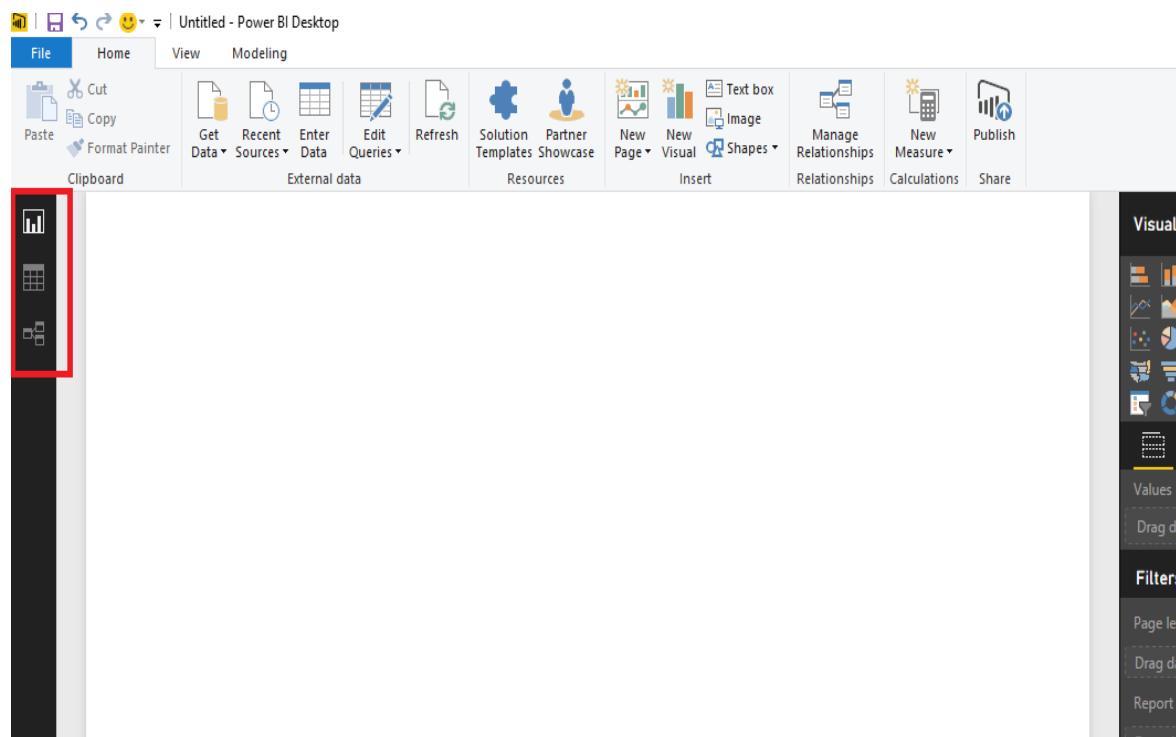
Power BI Tool is primarily used to create reports. We load the data from various sources and clean it and then build reports from the data. The IDE (Power BI Desktop software) is used to create visualization.

Power BI Report is PBIX file. The Report file consists of Power BI pages, where we add different types of visualization

CREATING A REPORT USING POWER BI

Note: For this you have to first download and install Power BI Desktop

The image below shows how a Power BI Desktop's interface looks. The highlighted section in blue colour, on the left panel shows the report, data and relationship workspaces. By default, the *report* workspace will open. This is where you create reports. Below the reports workspace is the data workspace which is used to see the imported data sets. Last tab is the relations tab which gives you relationship between different variables in a data set, if they are well defined. On the right side, you will see visualizations and field workspace.



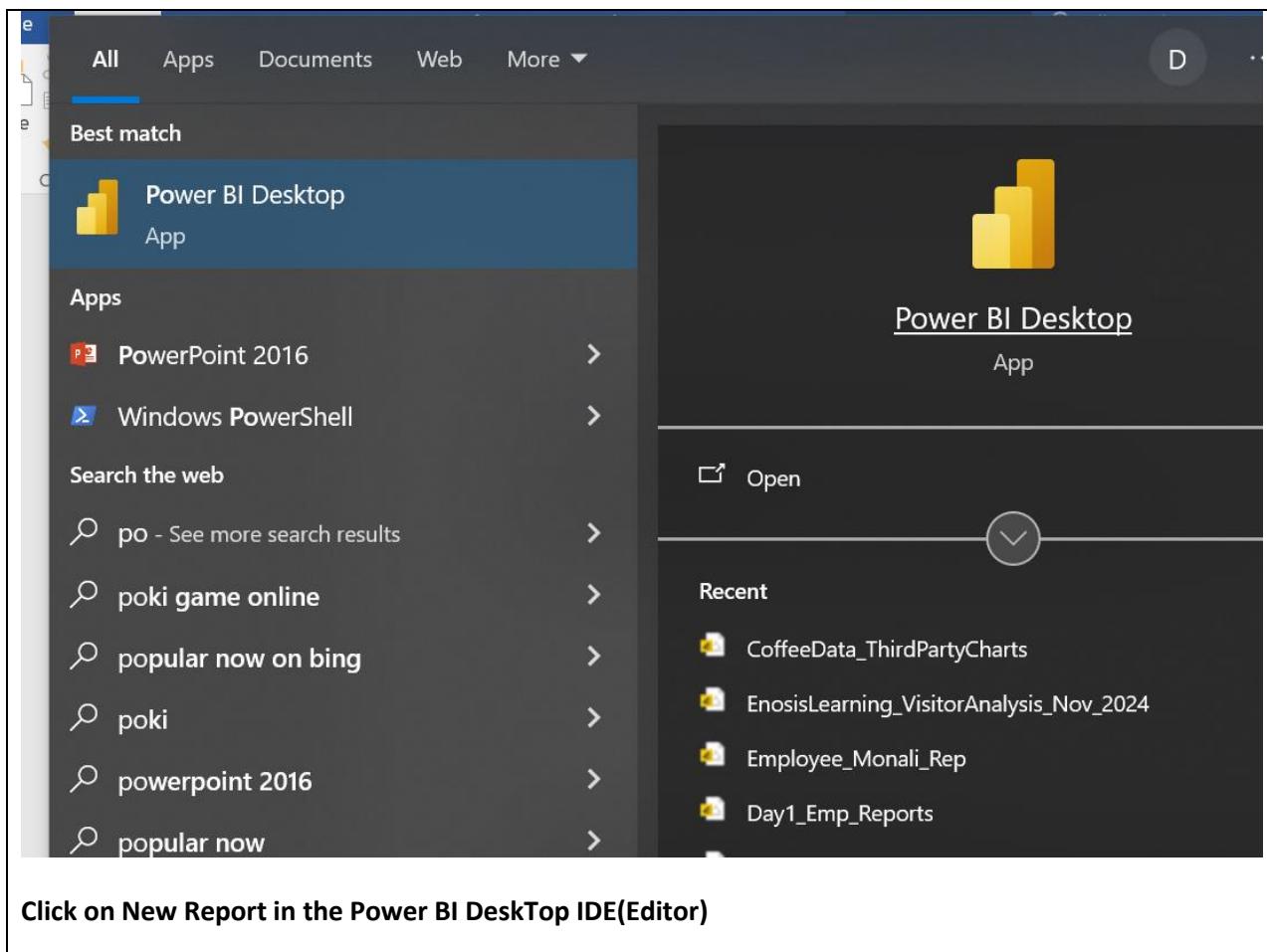
STEPS FOR CREATING POWER BI REPORTS

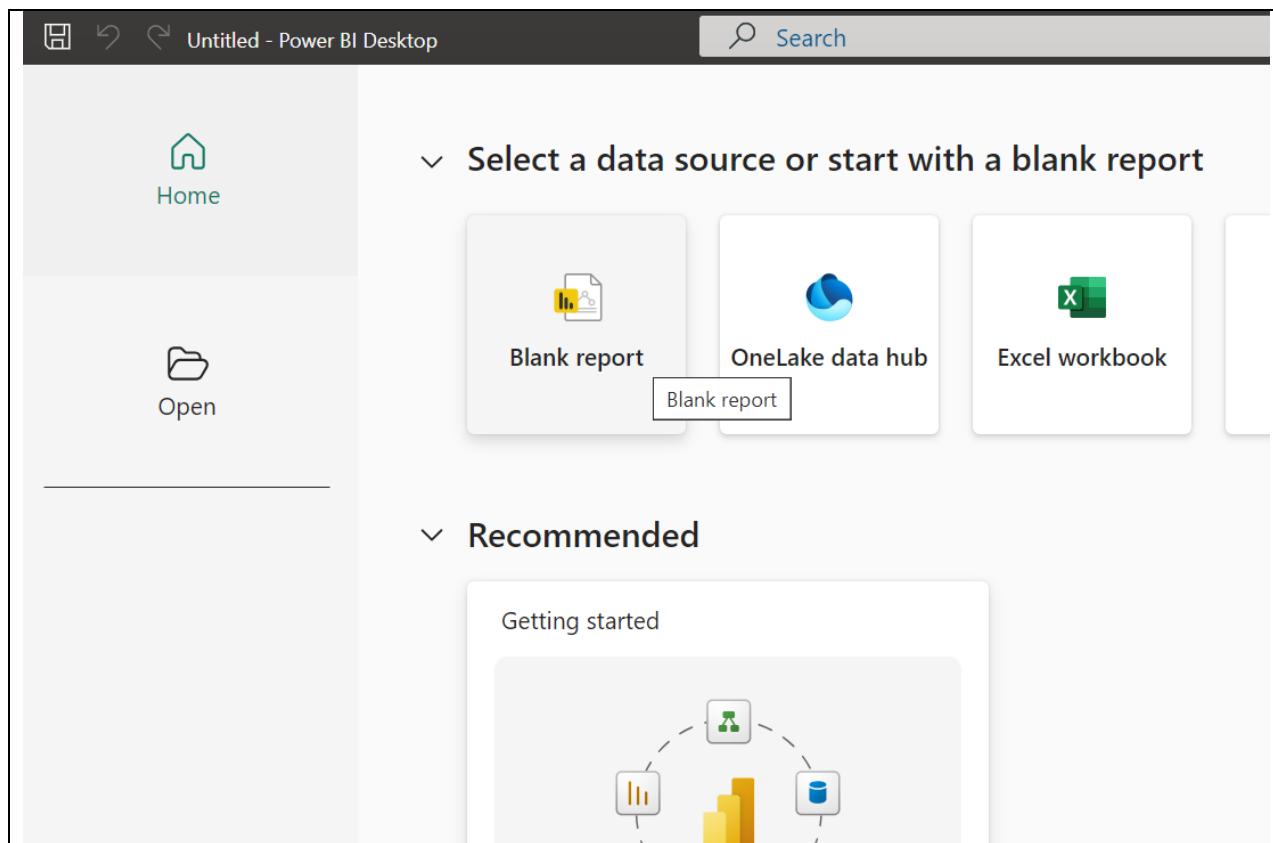
STEP 1	OPEN POWER BI DESKTOP AND CREATE A NEW POWER BI REPORT
STEP 2	IMPORT DATA AND LOAD THE DATA INTO POWER BI
STEP 3	VIEW THE DATA
STEP 4	ADD VISUALIZATION AND BIND THE DATA WITH THE VISUALIZATION
STEP 5	SAVE THE REPORT IN A PARTICULAR DRIVE OR LOCATION

CREATING THE FIRST REPORT USING POWER BI DESKTOP

The Example below shows all the steps with sample data.

Step 1 : OPEN POWER BI DESKTOP AND CREATE A NEW POWER BI REPORT

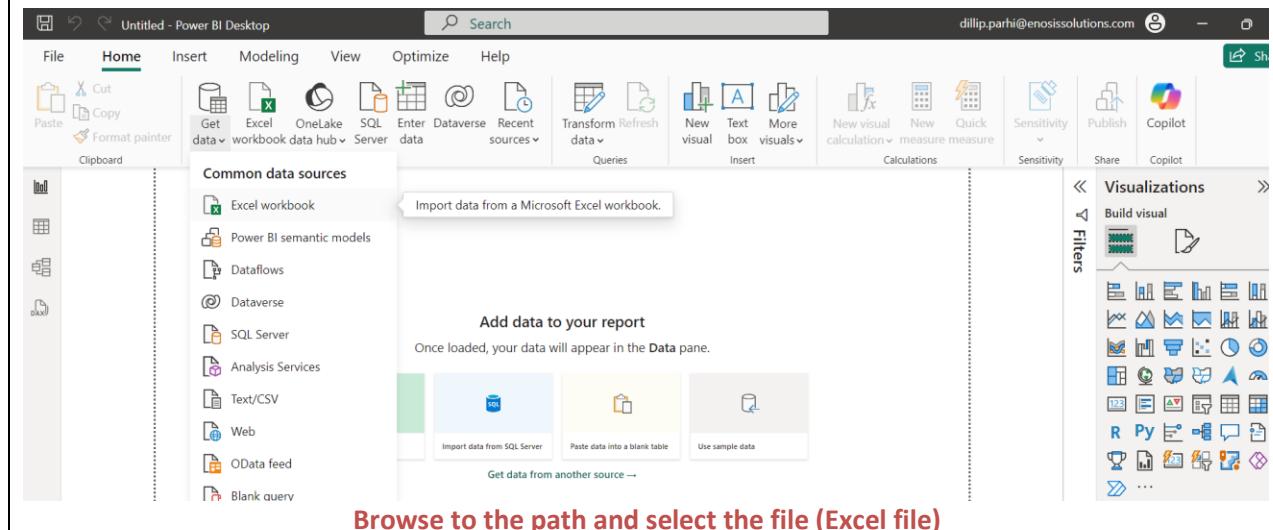




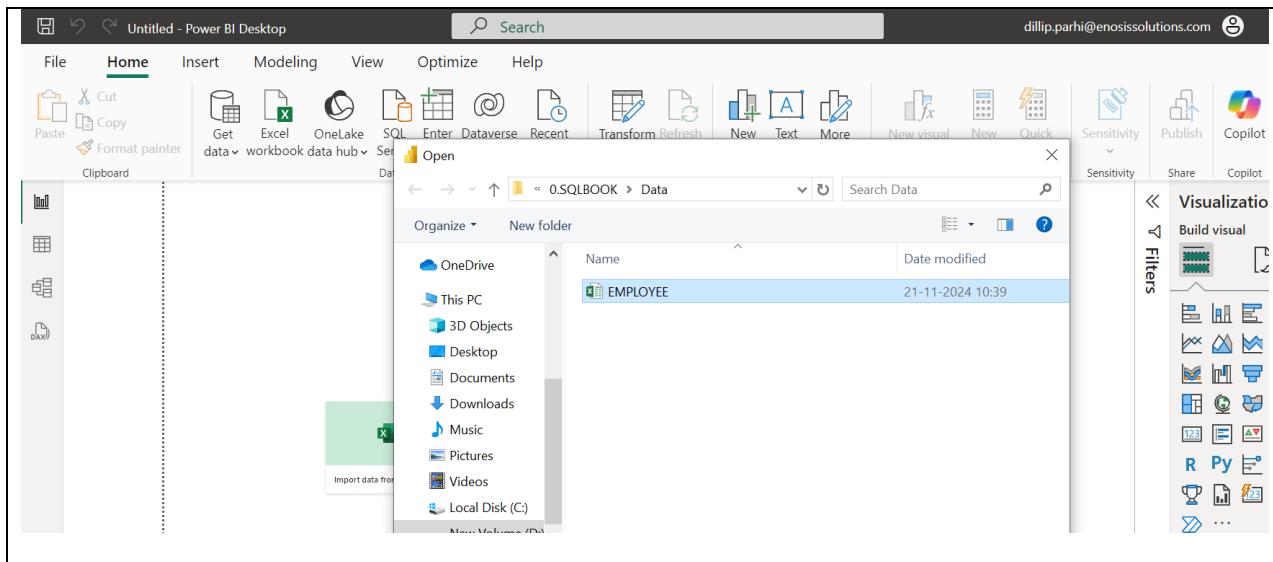
IT WILL OPEN THE NEW POWER BI REPORT PAGE (INTERFACE TO LOAD AND CREATE VISUALIZATIONS)

STEP 2 : IMPORT DATA AND LOAD THE DATA INTO POWER BI

In Power BI DeskTop, click on Get Data and select Excel worksheet and

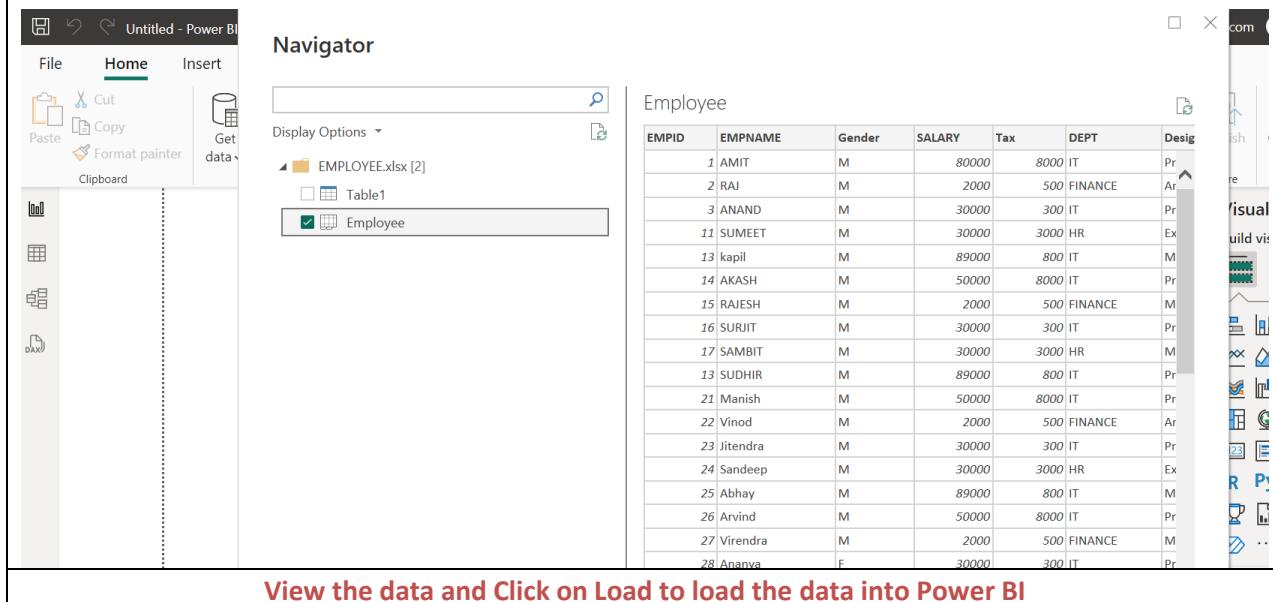


Browse to the path and select the file (Excel file)



Select the sheet from the excel path

It will display the sheets present in the Excel, select the Employee sheet data



EMPID	EMPNNAME	Gender	SALARY	Tax	DEPT	Design
1	AMIT	M	80000	8000	IT	Pr
2	RAJ	M	2000	500	FINANCE	Ar
3	ANAND	M	30000	300	IT	Pr
11	SUMEET	M	30000	3000	HR	Ex
13	kapil	M	89000	800	IT	M
14	AKASH	M	50000	8000	IT	Pr
15	RAJESH	M	2000	500	FINANCE	M
16	SURJIT	M	30000	300	IT	Pr
17	SAMBIT	M	30000	3000	HR	M
13	SUDHIR	M	89000	800	IT	Pr
21	Manish	M	50000	8000	IT	Pr
22	Vinod	M	2000	500	FINANCE	Ar
23	Jitendra	M	30000	300	IT	Pr
24	Sandeep	M	30000	3000	HR	Ex
25	Abhay	M	89000	800	IT	M
26	Arvind	M	50000	8000	IT	Pr
27	Virendra	M	2000	500	FINANCE	M
28	Ananya	F	30000	300	IT	Pr

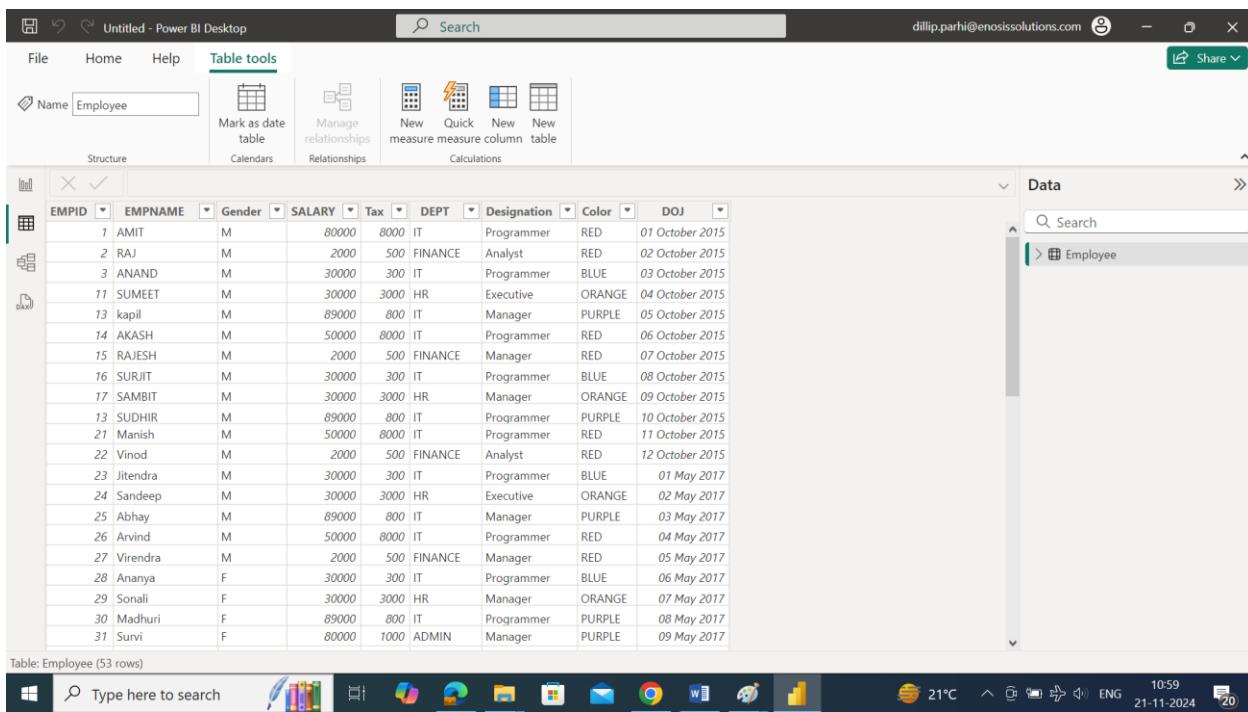
View the data and Click on Load to load the data into Power BI

The screenshot shows the Microsoft Power BI desktop interface. On the left, the Navigator pane displays a file named "EMPLOYEE.xlsx [2]" containing a single table called "Employee". The main area shows a preview of the "Employee" table with the following data:

EMPID	EMPNNAME	Gender	SALARY	Tax	DEPT	Design
1	AMIT	M	80000	8000	IT	Pr
2	RAJ	M	2000	500	FINANCE	Ar
3	ANAND	M	30000	300	IT	Pr
11	SUMEET	M	30000	3000	HR	Ex
13	kapil	M	89000	800	IT	M
14	AKASH	M	50000	8000	IT	Pr
15	RAJESH	M	2000	500	FINANCE	M
16	SURIT	M	30000	300	IT	Pr
17	SAMBIT	M	30000	3000	HR	M
13	SUDHIR	M	89000	800	IT	Pr
21	Manish	M	50000	8000	IT	Pr
22	Vinod	M	2000	500	FINANCE	Ar
23	Jitendra	M	30000	300	IT	Pr
24	Sandeep	M	30000	3000	HR	Ex
25	Abhay	M	89000	800	IT	M
26	Arvind	M	50000	8000	IT	Pr
27	Virendra	M	2000	500	FINANCE	M
28	Ananya	F	30000	300	IT	Pr
29	Sonali	F	30000	3000	HR	M
30	Madhuri	F	89000	800	IT	Pr
31	Survi	F	80000	1000	ADMIN	M
32	Pratik	M	78000	500	IT	M

At the bottom right of the Power BI window, there are buttons for "Load", "Transform Data", and "Cancel". The system tray at the bottom of the screen shows various icons and the date/time as 21-11-2024.

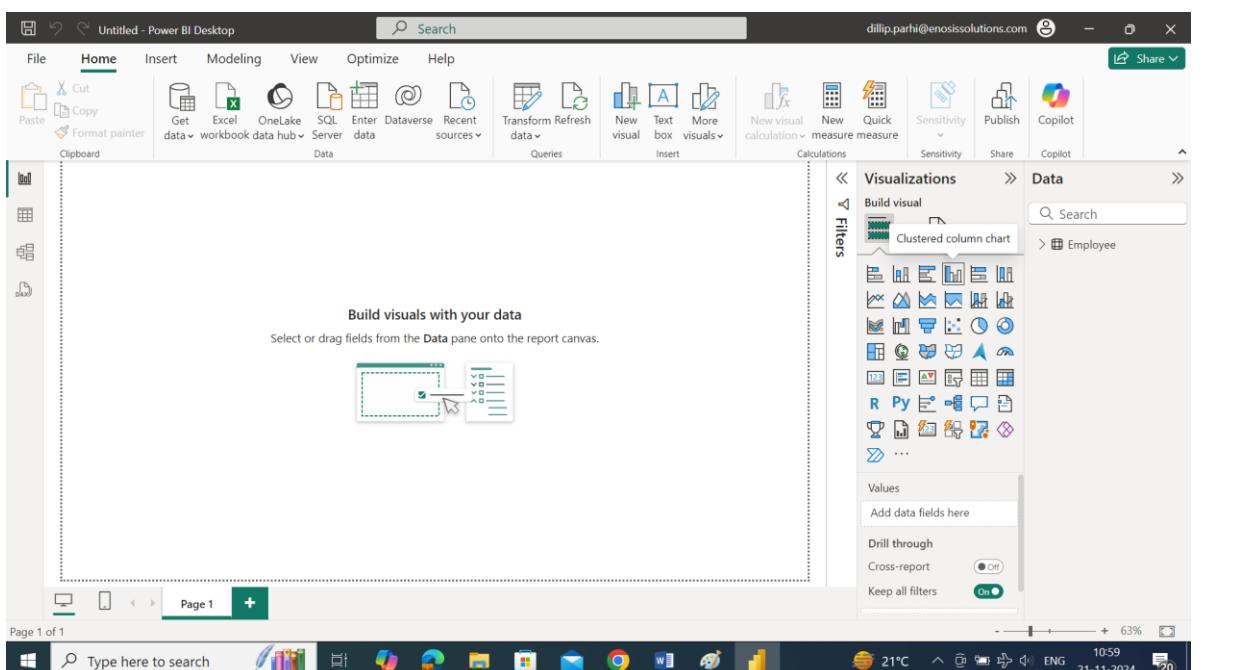
STEP 3 : VIEW THE DATA IN POWER BI BY GOING TO THE DATA SECTION IN POWERBI



The screenshot shows the Power BI Desktop interface with the 'Data' pane open on the right. The 'Employee' table is selected, displaying 53 rows of data. The columns include EMPID, EMPNAME, Gender, SALARY, Tax, DEPT, Designation, Color, and DOJ. The Data pane also shows a search bar and a list of recent tables.

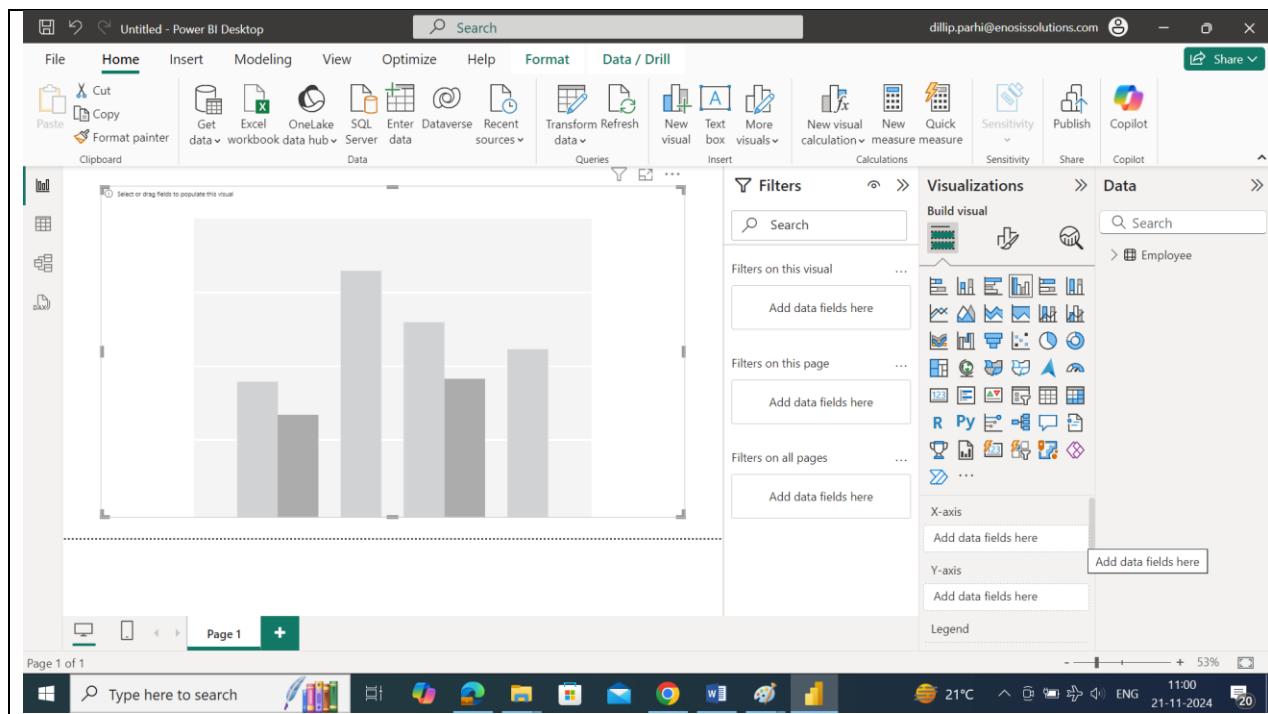
EMPID	EMPNAME	Gender	SALARY	Tax	DEPT	Designation	Color	DOJ
1	AMIT	M	80000	8000	IT	Programmer	RED	01 October 2015
2	RAJ	M	2000	500	FINANCE	Analyst	RED	02 October 2015
3	ANAND	M	30000	300	IT	Programmer	BLUE	03 October 2015
11	SUMEET	M	30000	3000	HR	Executive	ORANGE	04 October 2015
13	kapil	M	85000	800	IT	Manager	PURPLE	05 October 2015
14	AKASH	M	50000	8000	IT	Programmer	RED	06 October 2015
15	RAJESH	M	2000	500	FINANCE	Manager	RED	07 October 2015
16	SURJIT	M	30000	300	IT	Programmer	BLUE	08 October 2015
17	SAMBHIT	M	30000	3000	HR	Manager	ORANGE	09 October 2015
13	SUDHIR	M	89000	800	IT	Programmer	PURPLE	10 October 2015
21	Manish	M	50000	8000	IT	Programmer	RED	11 October 2015
22	Vinod	M	2000	500	FINANCE	Analyst	RED	12 October 2015
23	Jitendra	M	30000	300	IT	Programmer	BLUE	01 May 2017
24	Sandeep	M	30000	3000	HR	Executive	ORANGE	02 May 2017
25	Abhay	M	89000	800	IT	Manager	PURPLE	03 May 2017
26	Arvind	M	50000	8000	IT	Programmer	RED	04 May 2017
27	Virendra	M	2000	500	FINANCE	Manager	RED	05 May 2017
28	Ananya	F	30000	300	IT	Programmer	BLUE	06 May 2017
29	Sonali	F	30000	3000	HR	Manager	ORANGE	07 May 2017
30	Madhuri	F	89000	800	IT	Programmer	PURPLE	08 May 2017
31	Survi	F	80000	1000	ADMIN	Manager	PURPLE	09 May 2017

STEP 4 : ADD VISUALIZATION FROM THE VISUALIZATION PANE



The screenshot shows the Power BI Desktop interface with the 'Visualizations' pane open on the right. A 'Clustered column chart' is selected from the list of available visualizations. The main canvas area is labeled 'Build visuals with your data' and shows a small icon of a chart.

Drag the Visualization from the Visualization Pane to Power BI Page



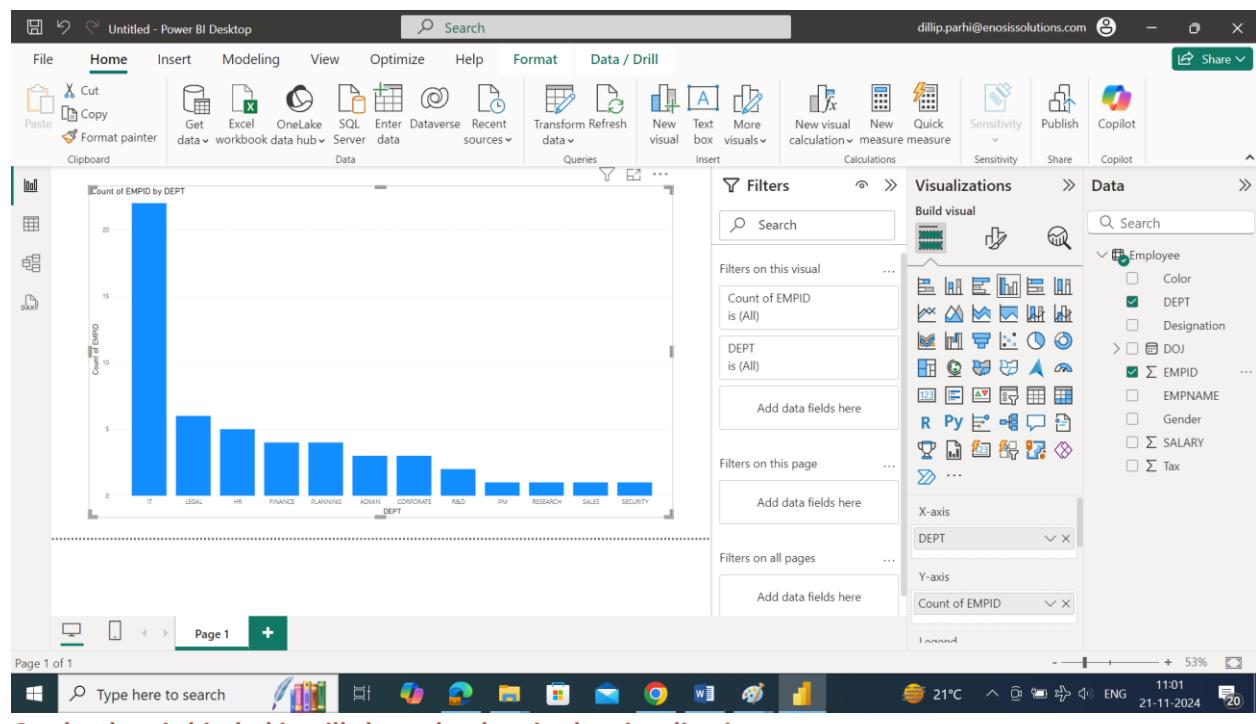
The screenshot shows the Power BI Desktop interface with an 'Untitled - Power BI Desktop' window. On the left, there's a visual area with a bar chart placeholder labeled 'Select or drag fields to populate this visual'. The ribbon menu at the top includes Home, Insert, Modeling, View, Optimize, Help, Format, and Data / Drill. The Data section on the ribbon has options like Get data, Transform data, New visual, and Insert. The Visualizations pane on the right lists various chart types. The Data pane shows a search bar and a list of data sources, with 'Employee' selected. The status bar at the bottom indicates 'Page 1 of 1'.

Bind the x-axis and y-axis with the fields /columns data from Data Section.

In this example we have selected the following columns in x axis and y-axis

X- AXIS : DEPT

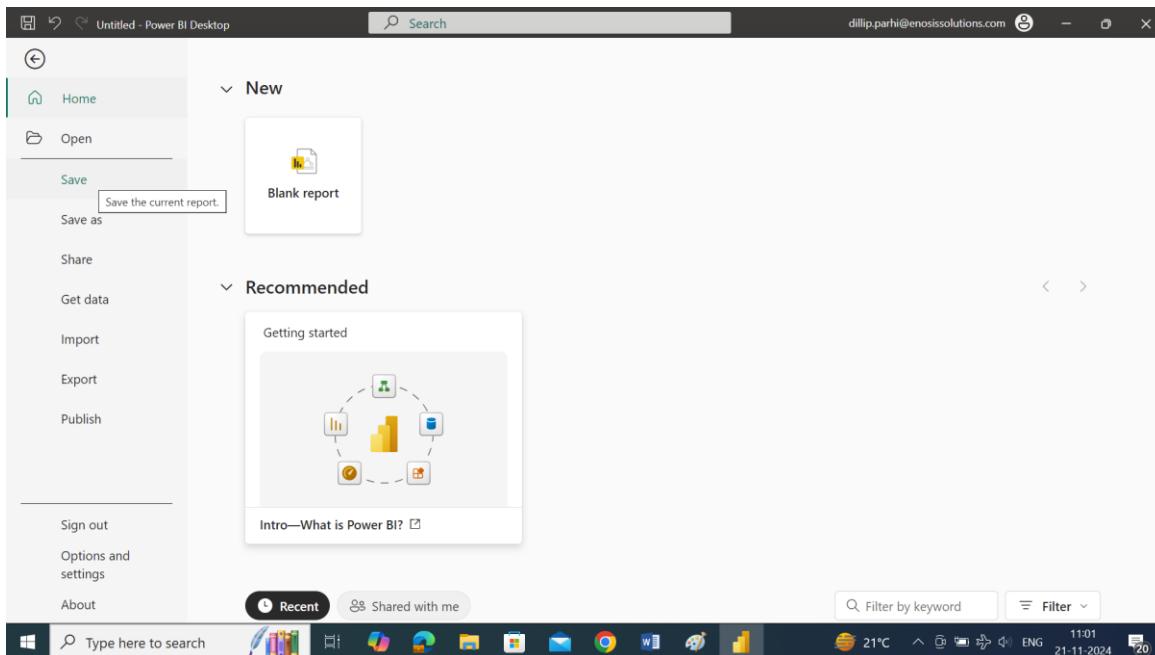
Y – AXIS : COUNT(EMPID) . Y – axis always apply aggregation by default.



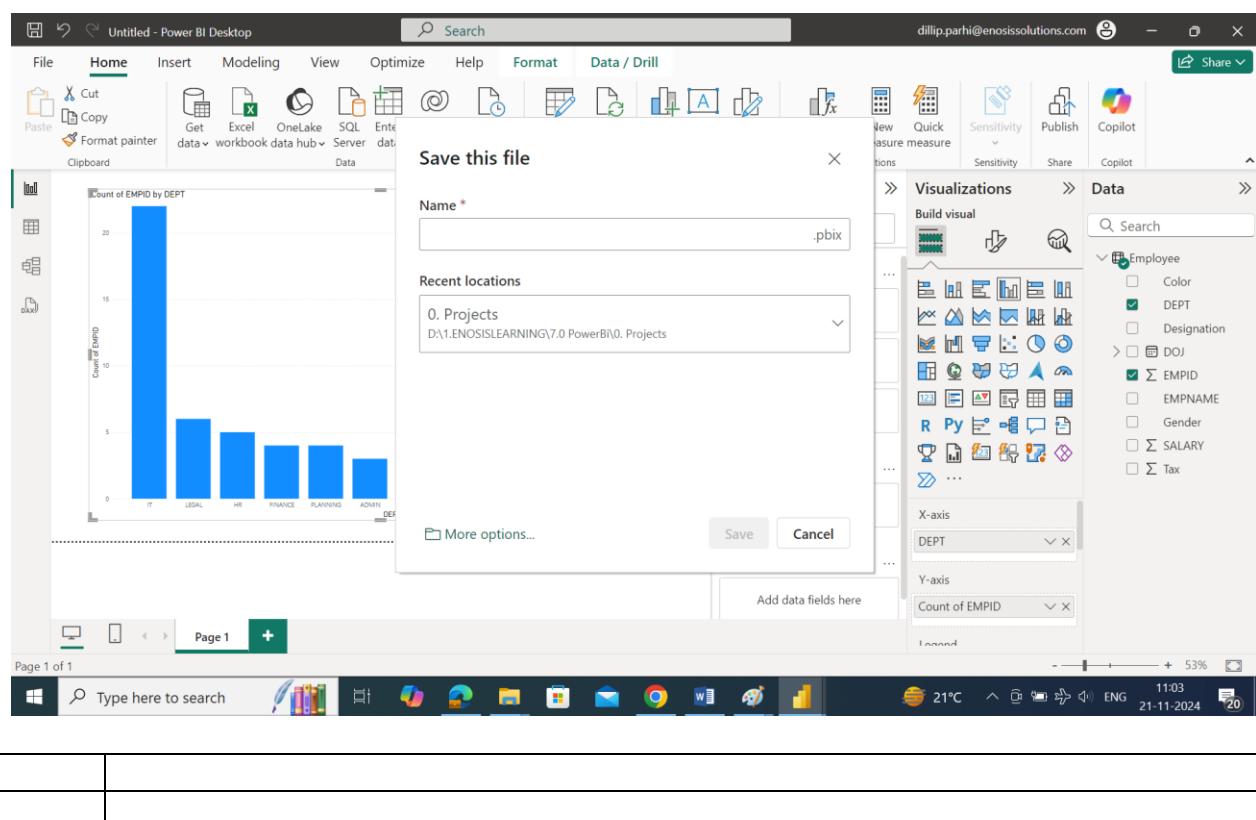
The screenshot shows the Power BI Desktop interface with the same 'Untitled - Power BI Desktop' window. The visual area now displays a bar chart titled 'Count of EMPID by DEPT'. The X-axis is labeled 'DEPT' and shows categories like IT, LEGAL, HR, FINANCE, PLANNING, ADMIN, CORPORATE, R&D, PM, RESEARCH, SALES, and SECURITY. The Y-axis is labeled 'Count of EMPID' and ranges from 0 to 20. The ribbon menu and Data pane are identical to the previous screenshot. The Visualizations pane shows various chart types. The Data pane shows the 'Employee' data source with specific fields like Color, DEPT, Designation, DOJ, EMPID, EMPNAME, Gender, SALARY, and Tax listed. The status bar at the bottom indicates 'Page 1 of 1'.

On the data is binded it will show the data in the visualization.

Step 5: SAVE THE REPORT IN A PARTICULAR DRIVE OR LOCATION by Clicking on Save from the menu.



Define the location and Name of the Report.



The screenshot shows the Power BI Desktop interface with a 'Save this file' dialog box in the foreground. The dialog box has a 'Name' field containing '.pbix' and a 'Recent locations' dropdown set to '0. Projects D:\1.ENOSISLEARNING\7.0 PowerBI\0. Projects'. To the right of the dialog is the Power BI visual editor, which displays a bar chart titled 'Count of EMPID by DEPT'. The chart shows data for various departments: IT, LEGAL, HR, FINANCE, PLANNING, ADMIN, and DEF. The Power BI Data view pane is visible on the right, showing fields like Employee, Color, DEPT, Designation, DOJ, SUM(EMPID), EMPNAME, Gender, SUM(SALARY), and SUM(Tax). The system tray at the bottom shows the date as 21-11-2024 and the time as 11:03.

CHART FEATURES

FIELDS	FORMATTING	ANALYTICS
The values of fields /columns are binded to the charts as data. Based upon the fields attached to the visualization it will display the values accordingly	The formatting option will change the look and feel of the visualization. For example back color, forecolor, axis labels, titles can be changed using formation options	The Analytics section is used to add different analytics line to the charts like constant line, min line,max line, median line etc.

The following are the common features of Each Visualization in Power BI

FIELDS

AXIS	The Names to be displayed on the X-Axis. For each axis a new chart will be created
LEGEND	The values will be divided based upon the legend field.
VALUE	The value field to be displayed on the Y-Axis. For each value field a new bar will be displayed for that particular axis-name
COLOUR SATURATION	The values used to determine saturation of the data points
TOOLTIPS	The field which will be displayed as tooltip for the chart.

FORMATS

GENERAL	Define the X-Position, Y-Position
X-AXIS	Defines the X-Axis features like x –axis title, font type, font size etc.
Y- AXIS	Defines the X-Axis features like Y –axis title, font type, font size etc.
DATA – COLORS	Show the colors of the Data bars
DATA – LABELS	Show the labels for the Data bars
PLOT AREA	Add a Image in the background
TITLE	Define the Title for the Charts. Defines the Font color, font size, alignment for the Title
BACKGROUND	Defines the Background color for the chart.
LOCK ASPECT	It locks the proportions of an element - so if you resize - it will keep the same proportions.
BORDER	Defines the border color for the chart.
TOOLTIP	Define the tooltip for the chart.

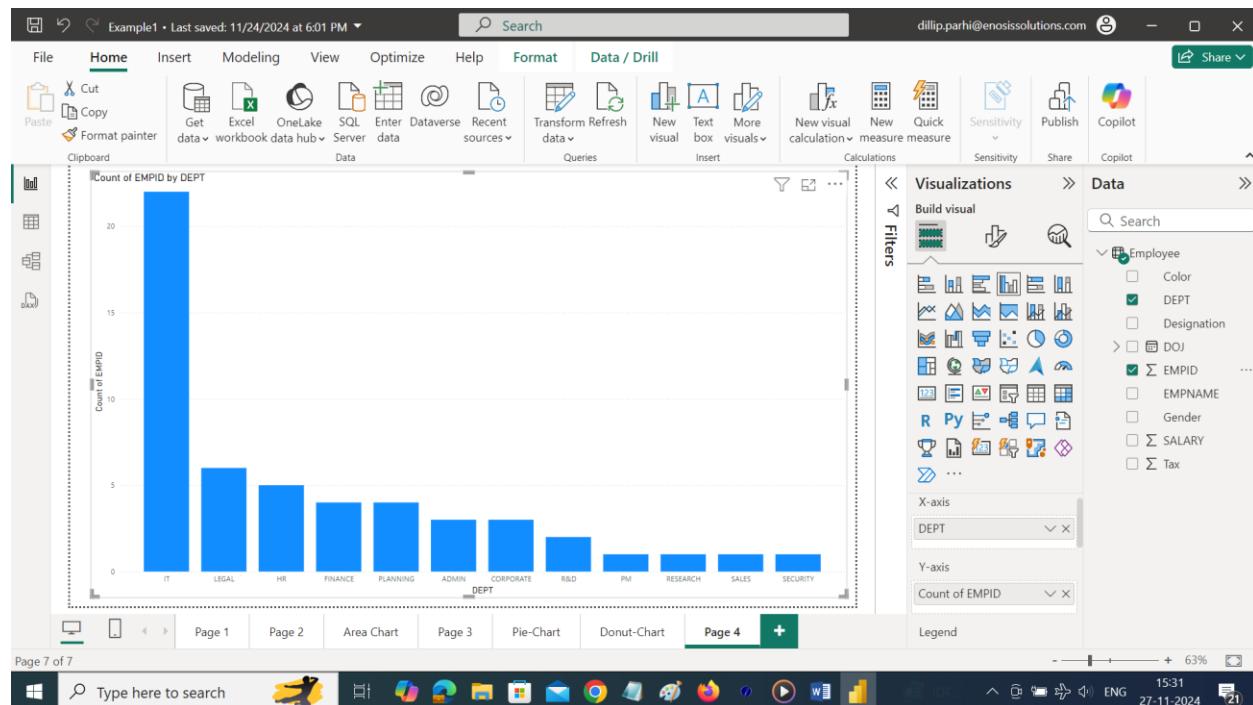
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ANALYTICS:

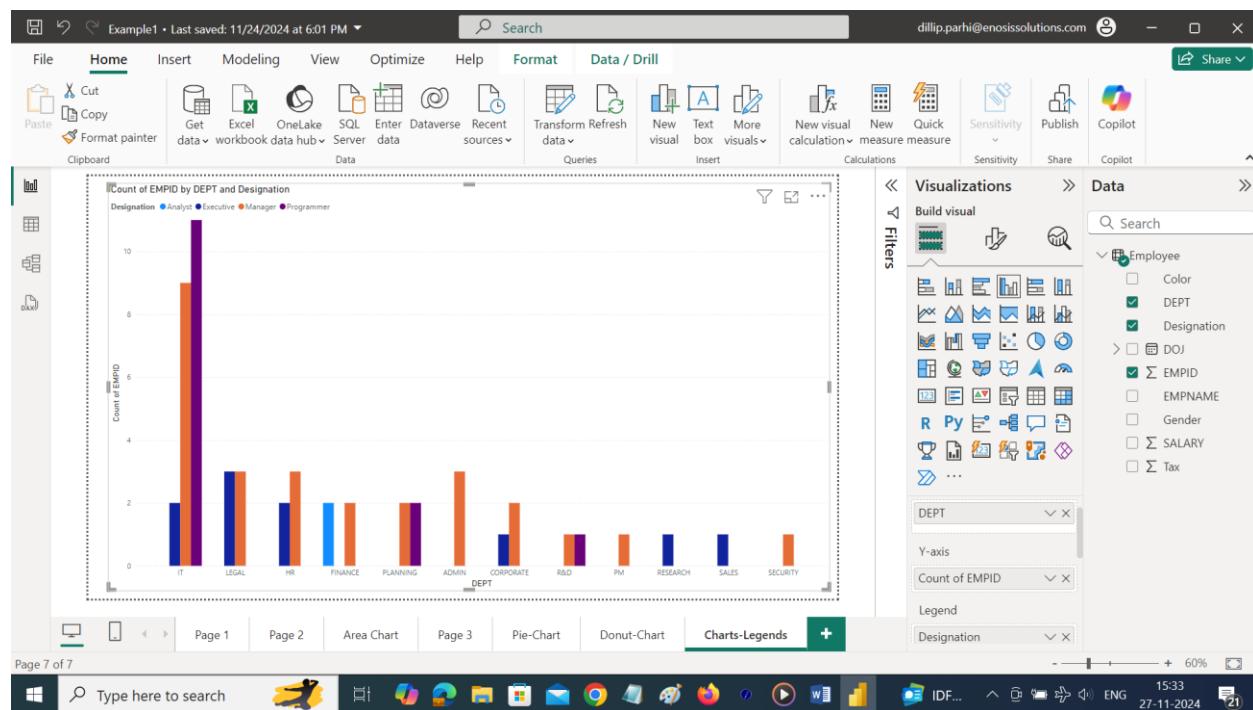
CONSTANT LINE	Constant line in the analytics pane can be used to create a reference line for a set of visualizations.
MIN LINE	Defines the minimum line for the chart
MAX LINE	Defines the maximum line for the chart.
AVERAGE LINE	Defines the average line for the chart.
MEDIAN LINE	Defines the median line for the chart.
PERCENTILE LINE	Defines the percentile line for the chart

EXAMPLE OF X- AXIS , Y - AXIS , LEGEND

Legends divided the X – Axis



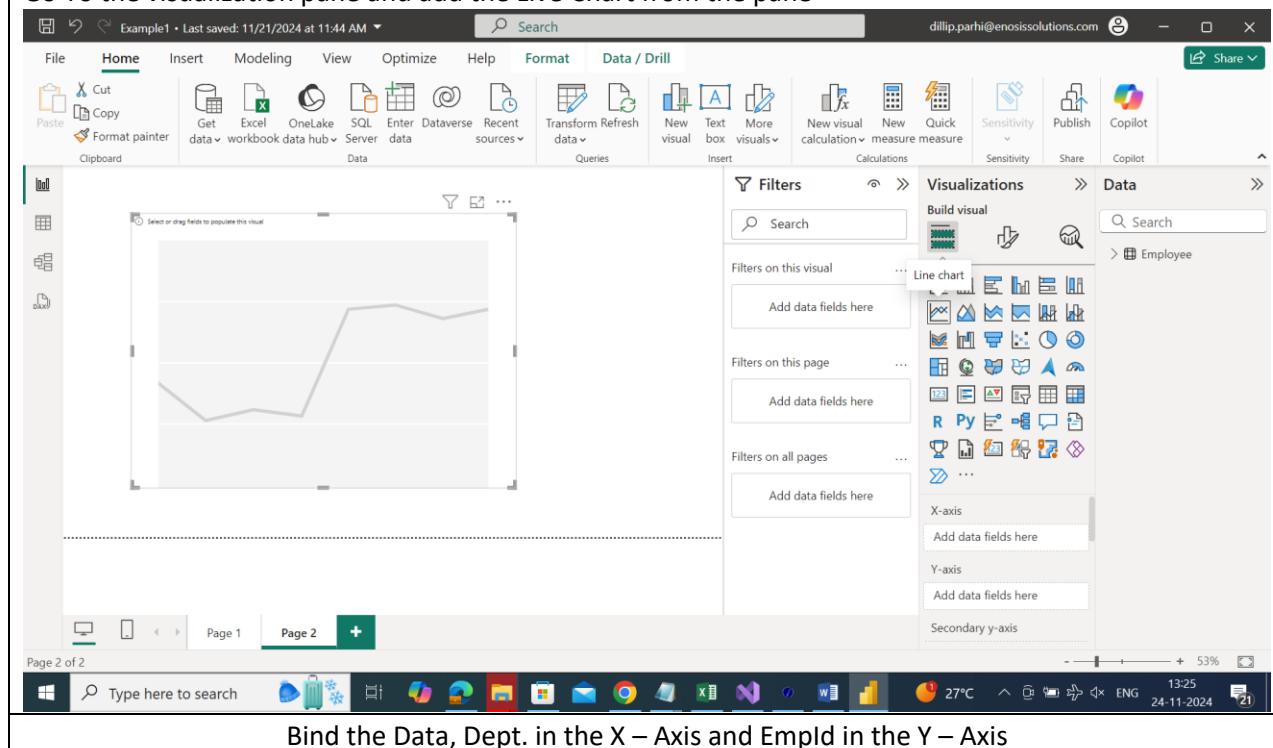
In the chart, lets add a Legened designation and the chart will display as shown below:

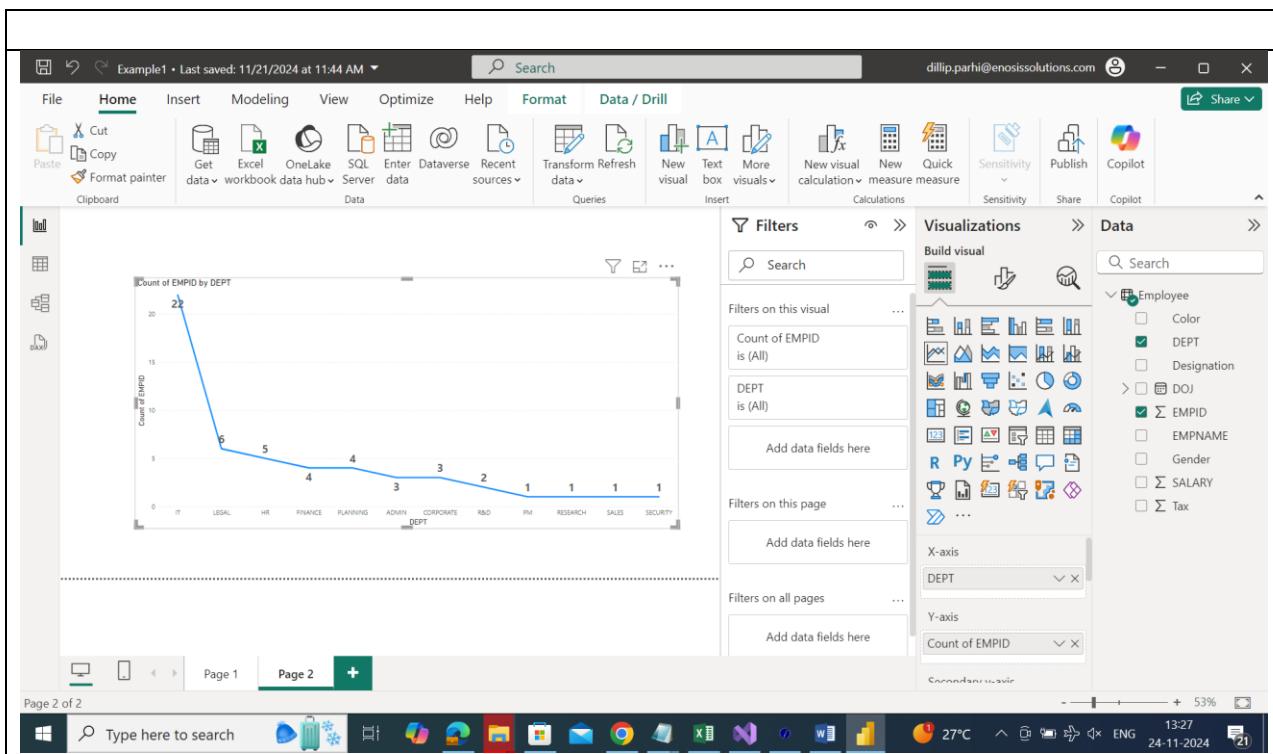


TYPES OF CHARTS/VISUALIZATIONS IN POWER BI

LINE CHARTS : A Line is created for each value specified.

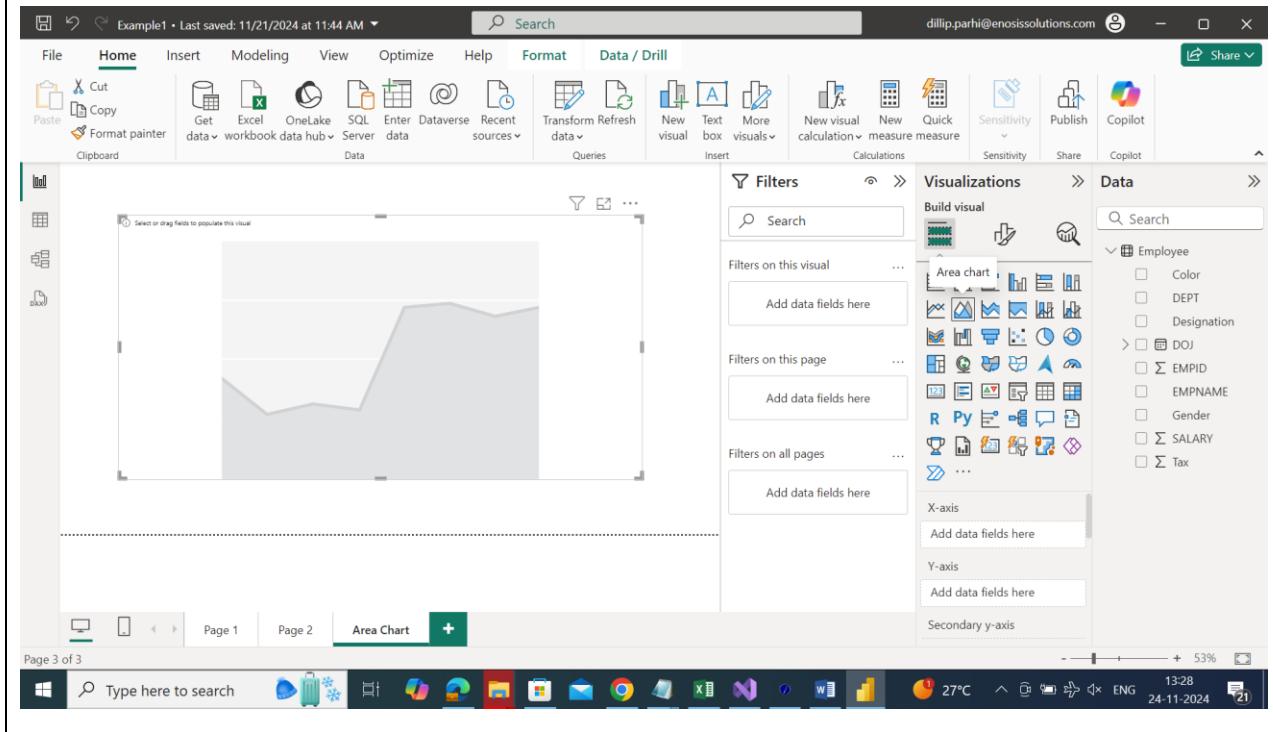
Go To the visualization pane and add the Live Chart from the pane



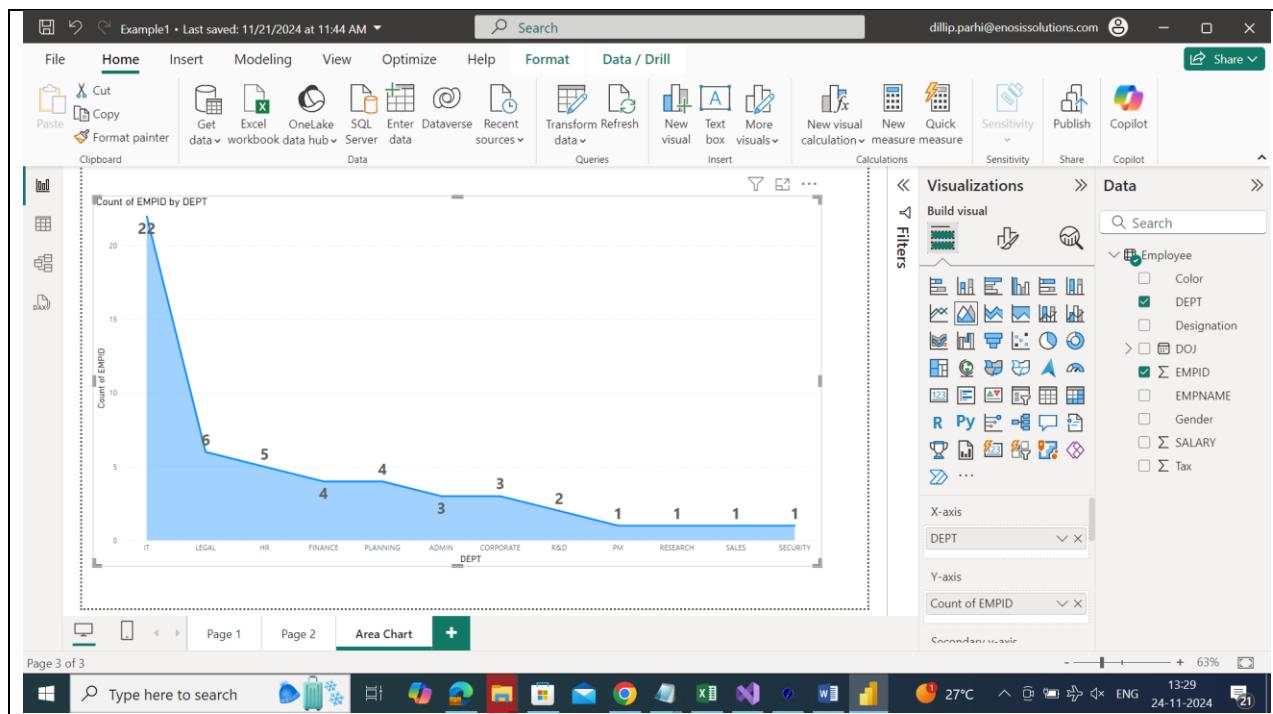


AREA CHART : An **area chart** displays graphically quantitative data.

Go to the Visualization Pane and add the Area Chart

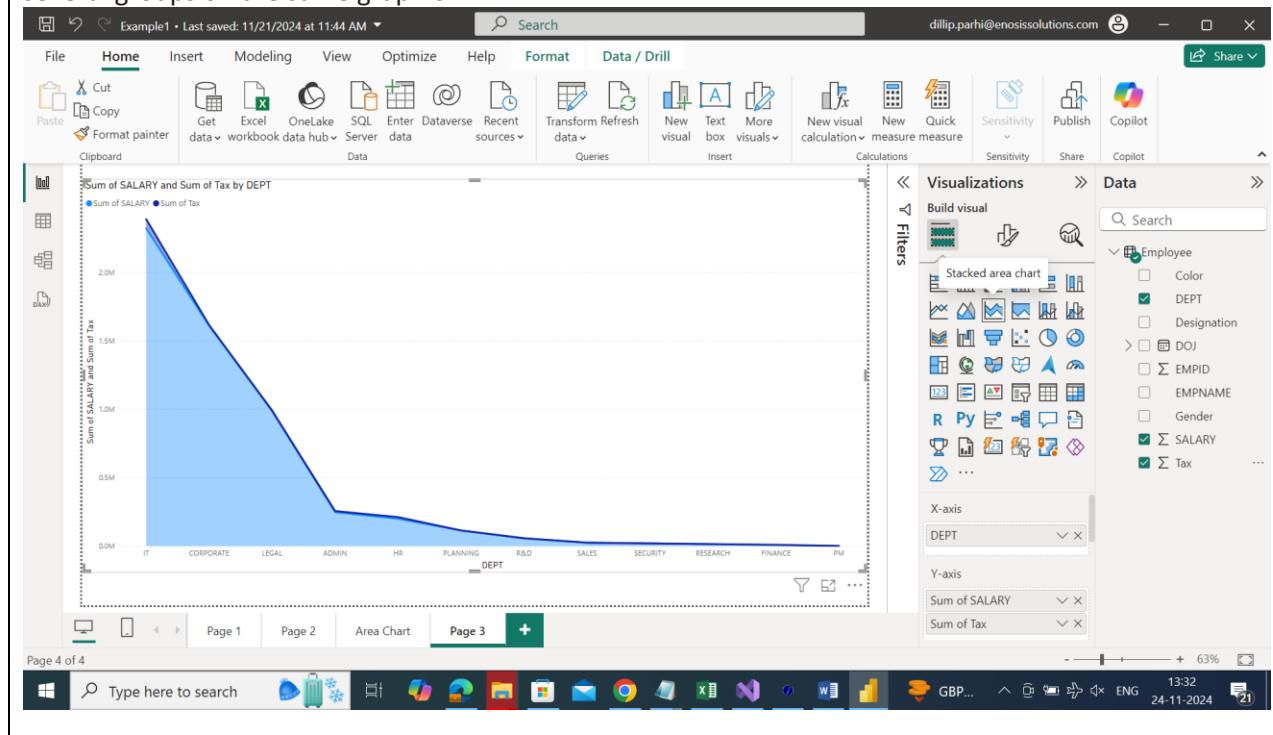


Bind the Data, Dept. in the X – Axis and Empld in the Y – Axis



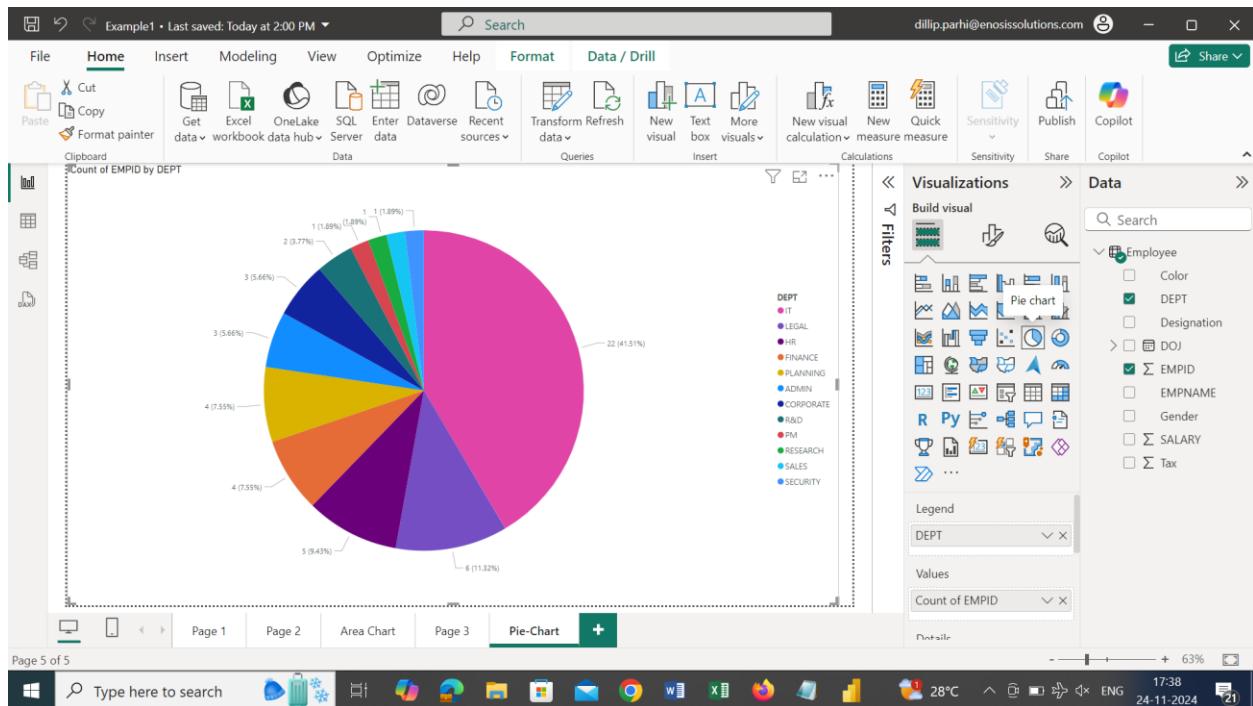
STACKED AREA CHART:

A **stacked area chart** is the extension of a basic **area chart** to display the evolution of the value of several groups on the same graphic.



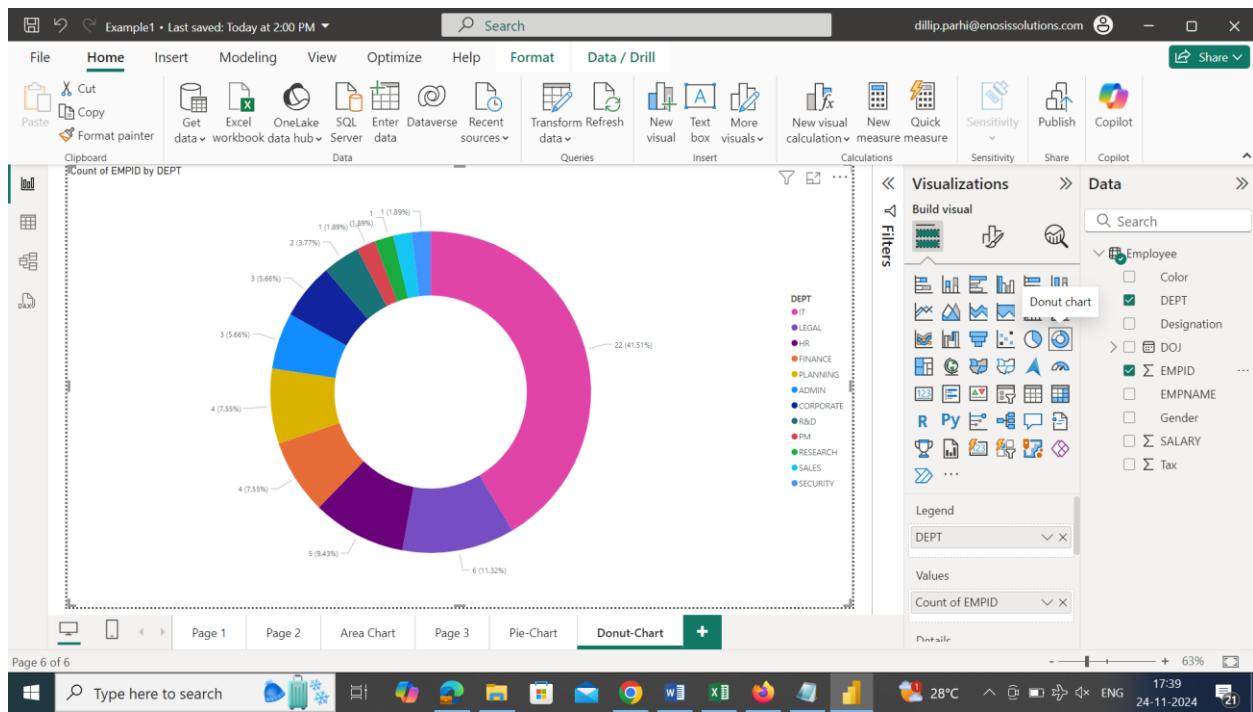
PIE CHART

- The purpose of a Pie chart is to illustrate the contribution of different values to a total



DONUT CHART

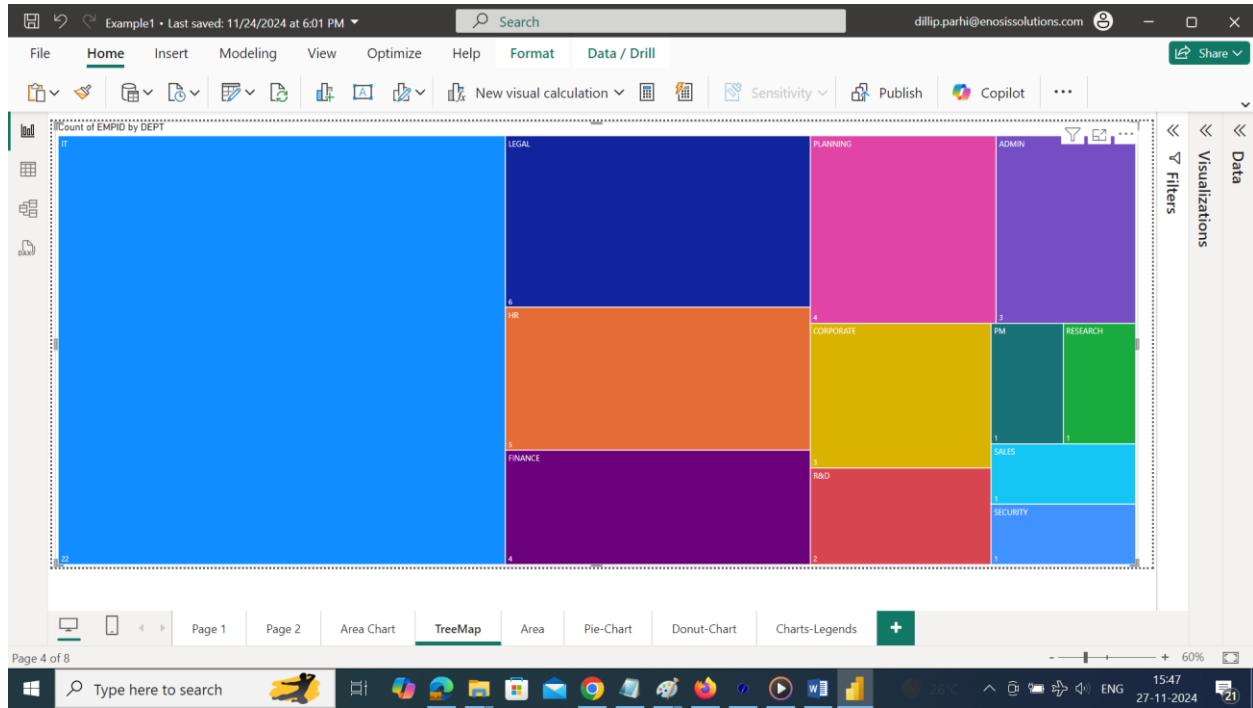
- A doughnut chart is similar to a pie chart in that it shows the relationship of parts to a whole. The only difference is that the center is blank and allows space for a label or icon.



TREEMAP

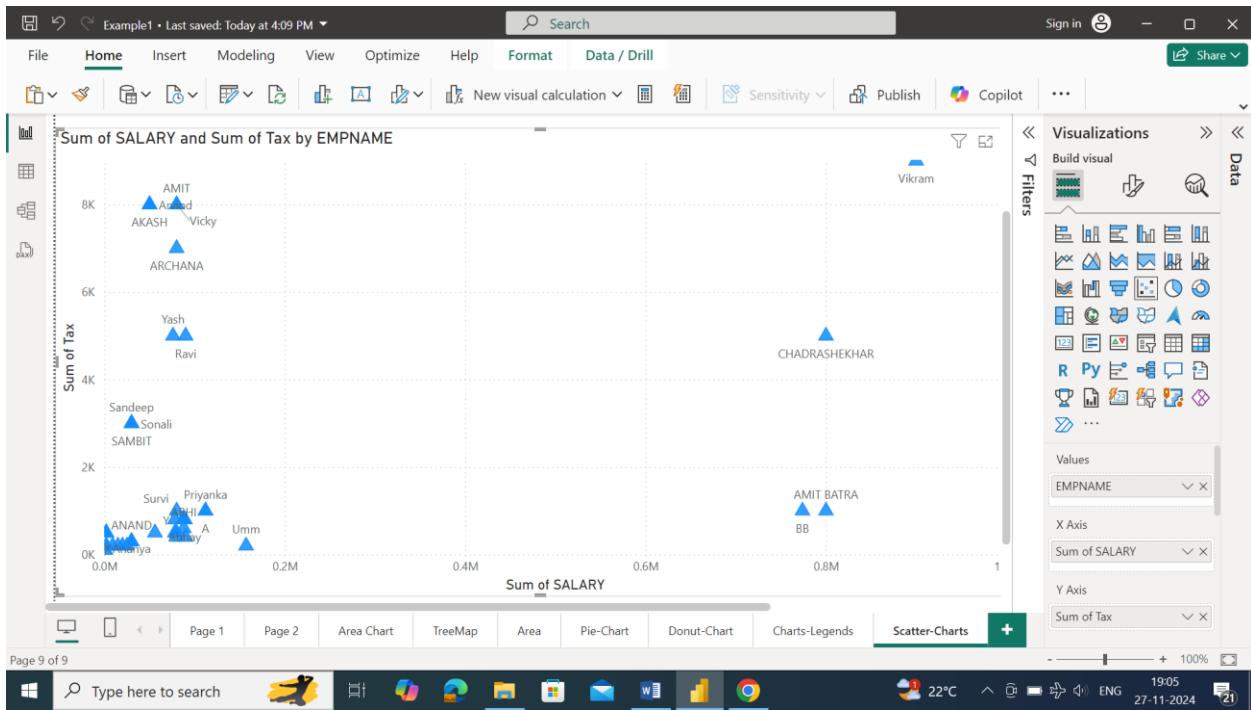
- **Power BI Treemap** is used to display the data in Rectangle Boxes. The Tree maps in Power BI are very useful to display largest data in small region.

Example of TreeMap



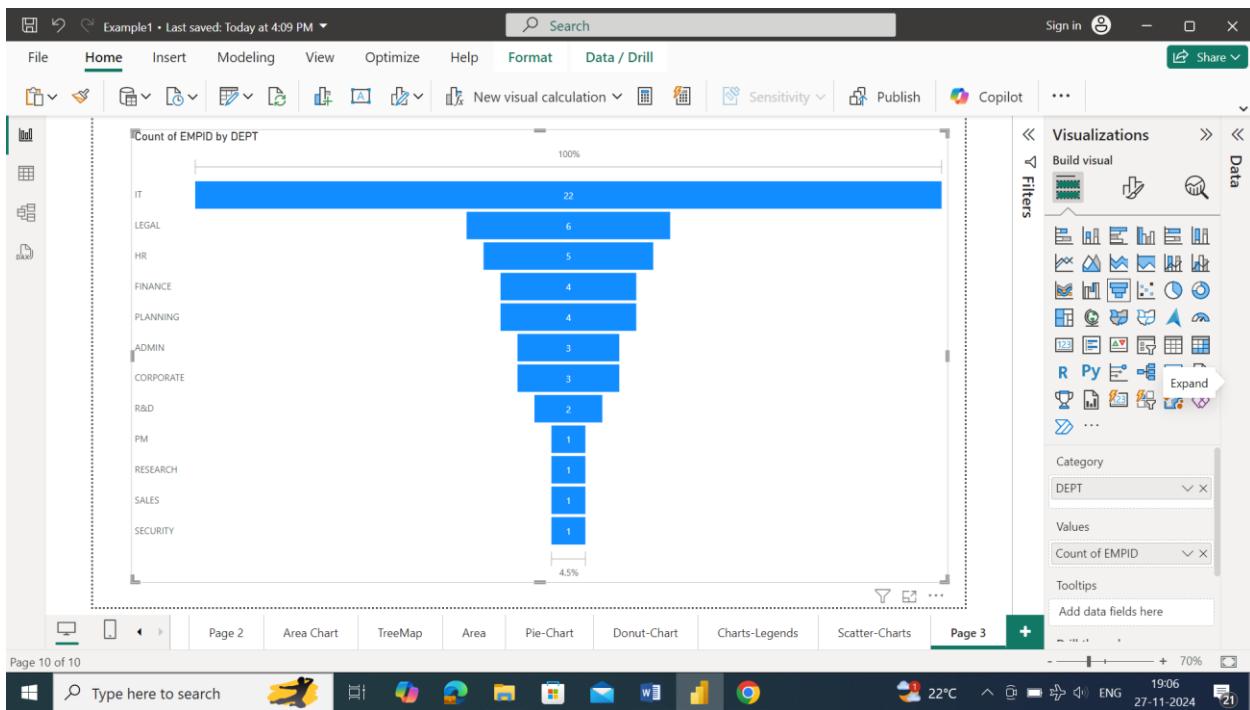
SCATTER CHART

- A **scatter chart** always has two value axes to show: one set of numerical data along a horizontal axis and another set of numerical values along a vertical axis.
- The **chart** displays points at the intersection of an x and y numerical value, combining these values into single data points.



FUNNEL

- A **funnel** chart helps you visualize a linear process that has sequential connected stages.



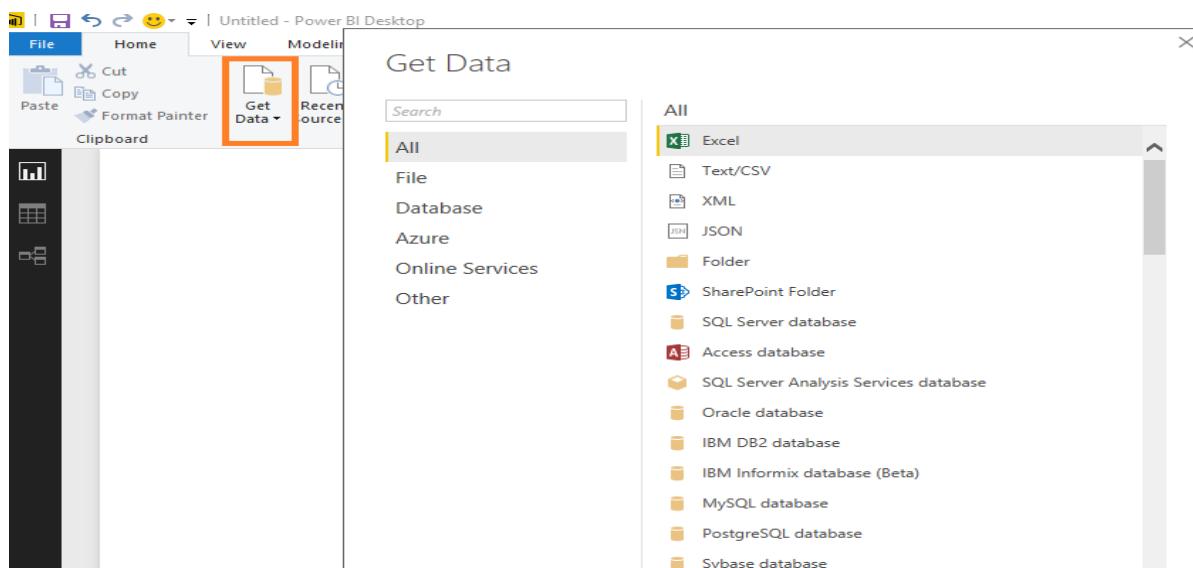
CHAPTER 3: POWER BI DESKTOP COMPONENTS

COMPONENTS OF POWER BI DESKTOP

In this chapter we will explore different components of Power BI Desktop

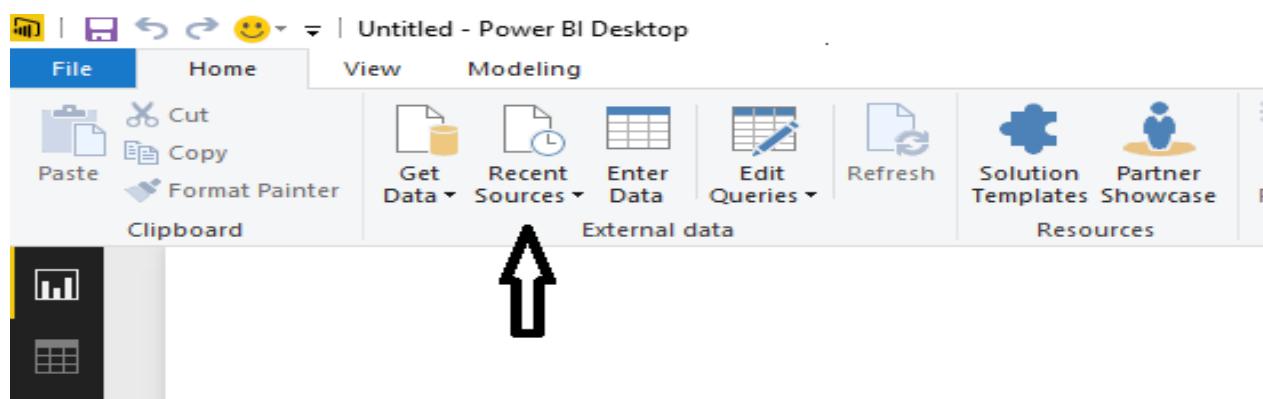
GETDATA

- This will connect to the Data Sources and get the data.
- You can connect power bi desktop to many types of data sources including TXT,CSV,SQL server, excel , DW,cloud services,analyticsl data sources etc.



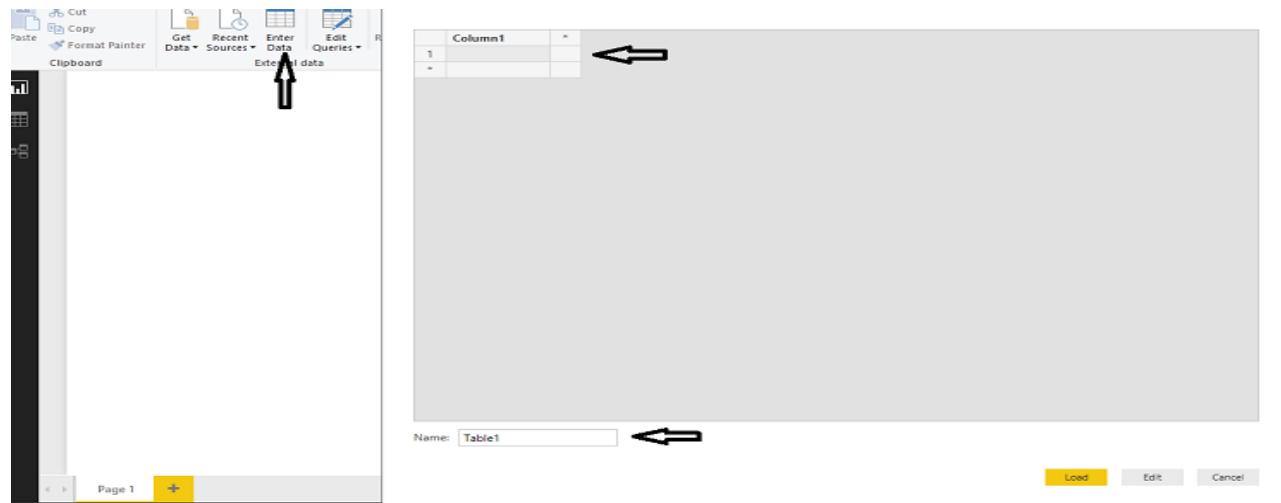
RECENT SOURCES

This will show all recent connects made by recent power bi reports.



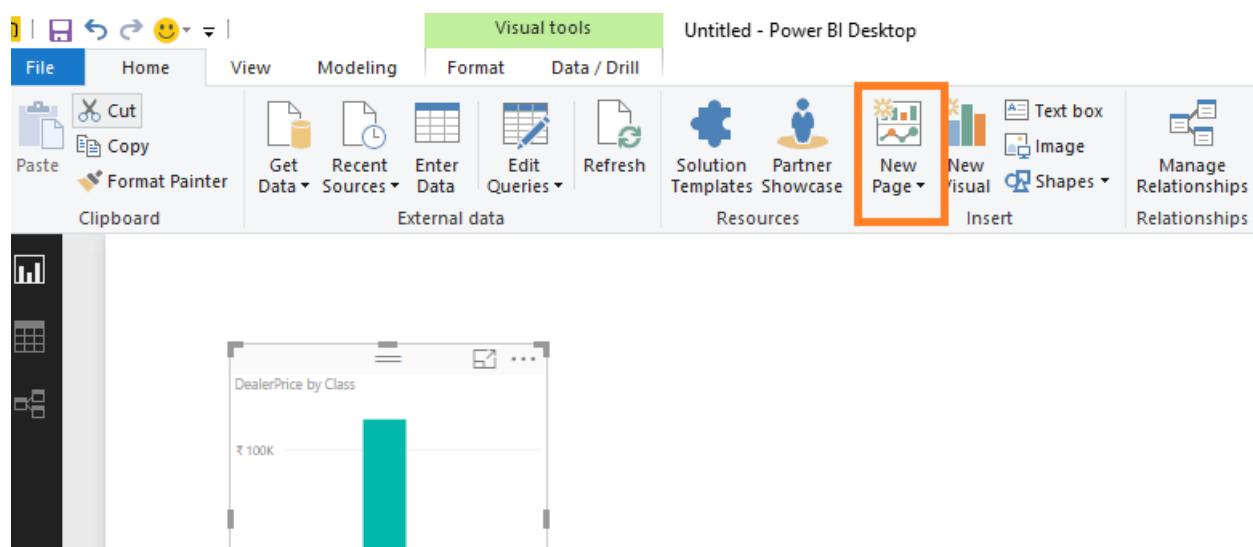
ENTER DATA

This allows to enter data and create your own table in power-bi.



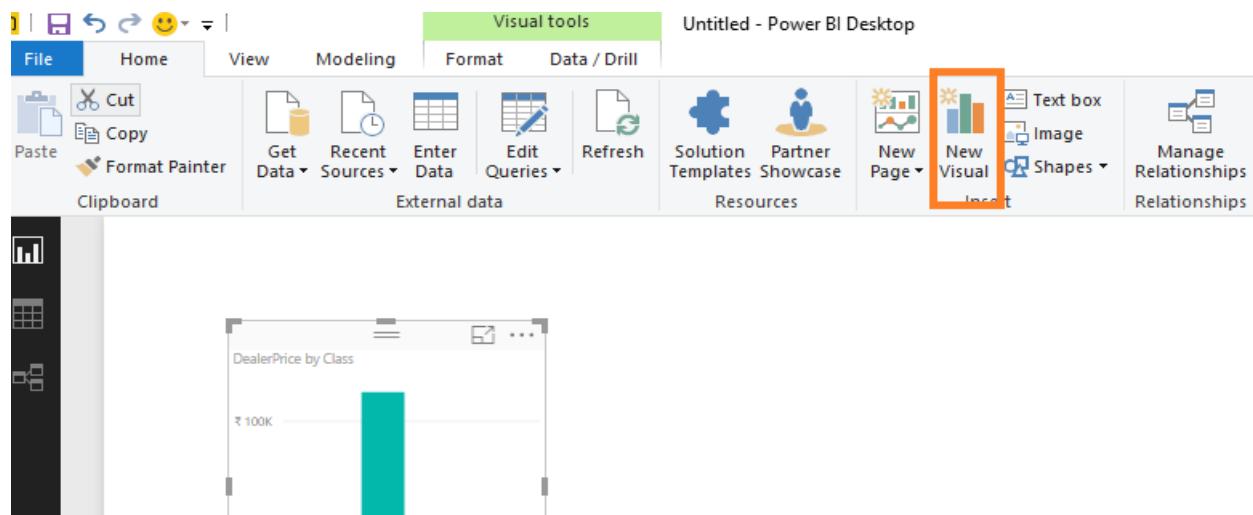
New Page

This will add a new page to the PowerBI Projects



NEW VISUAL

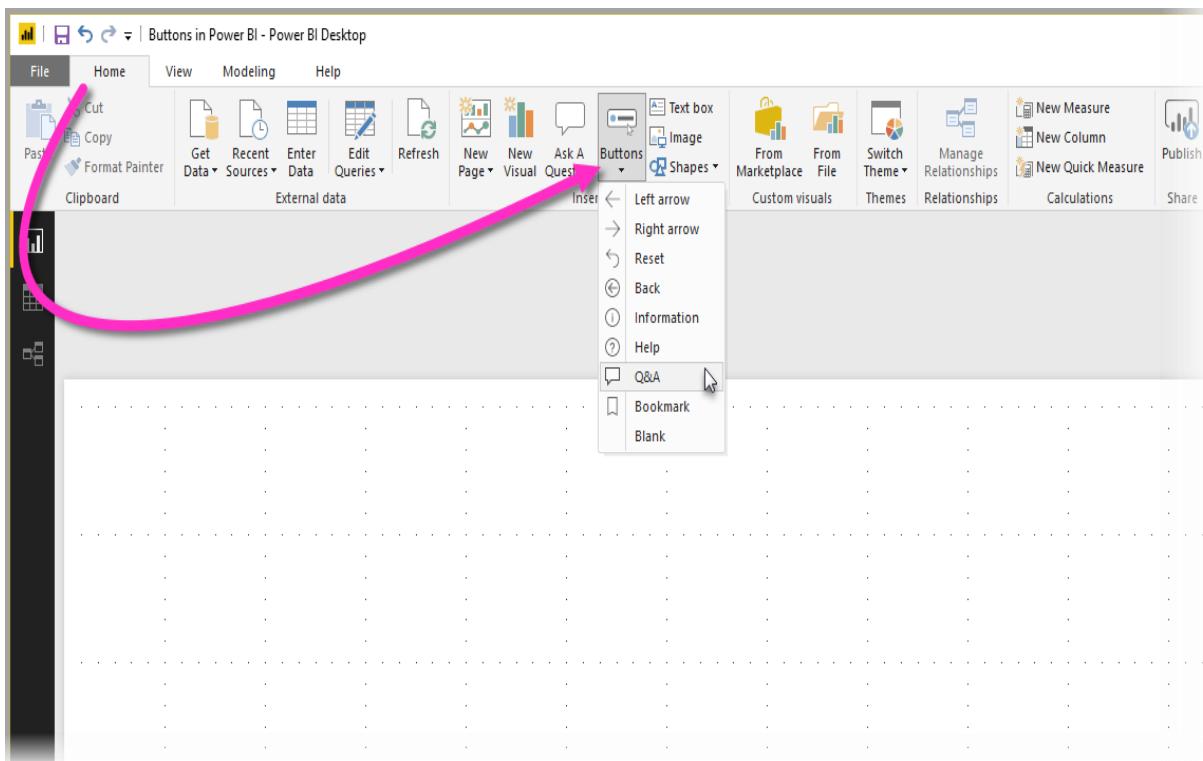
This will add a new visualization components into the page

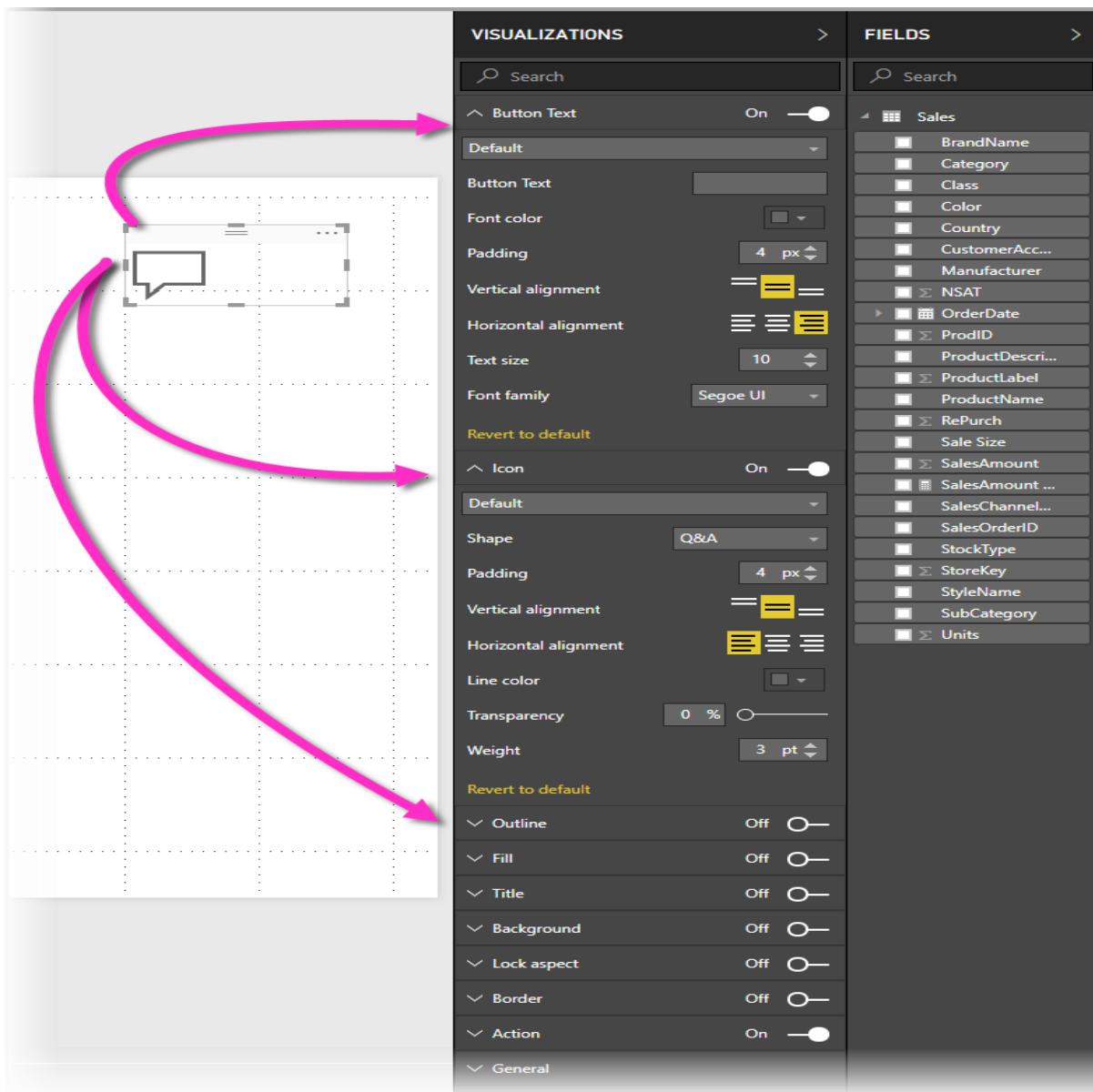


BUTTONS

This will add buttons like Left Arrow,Right Arrow

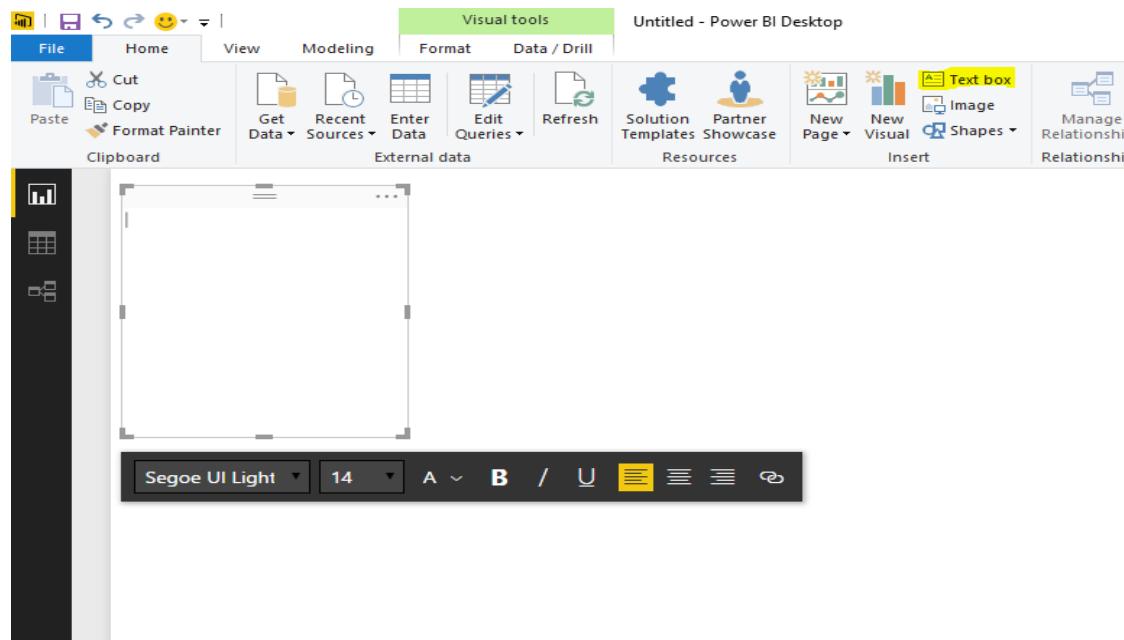
This buttons can be used for navigations etc.





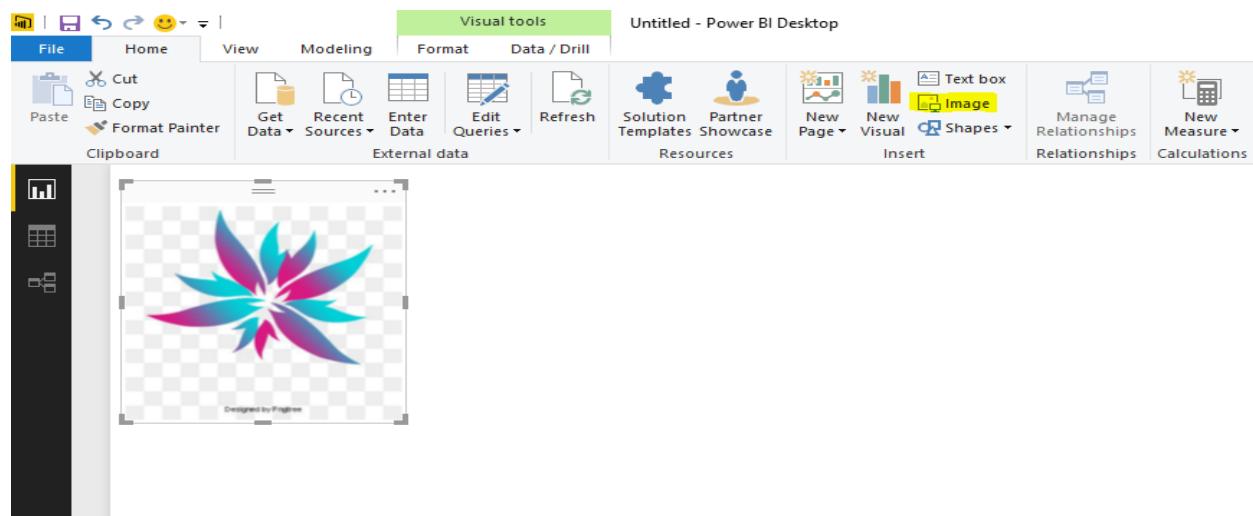
TEXTBOX

This will add a textbox in the Power BI Page



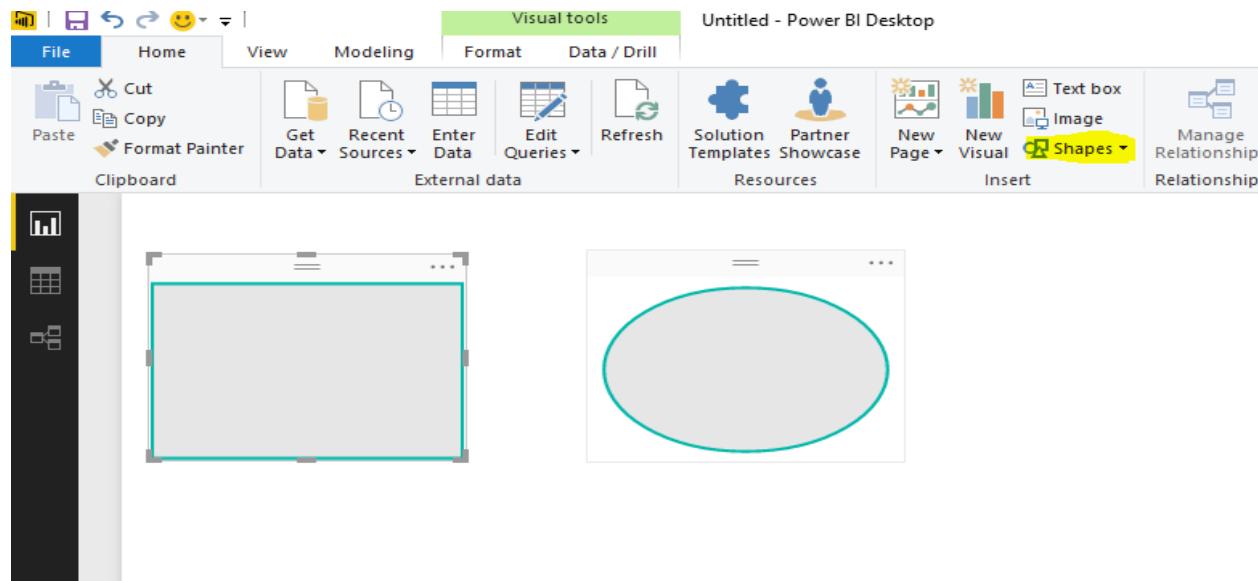
IMAGES

This will add images into the PowerBI Report Page. You can add different external images and show it in Power BI



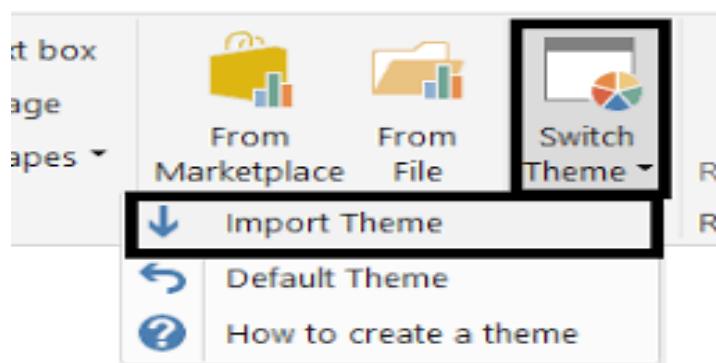
SHAPES

This will add shapes to the Power BI Report Page



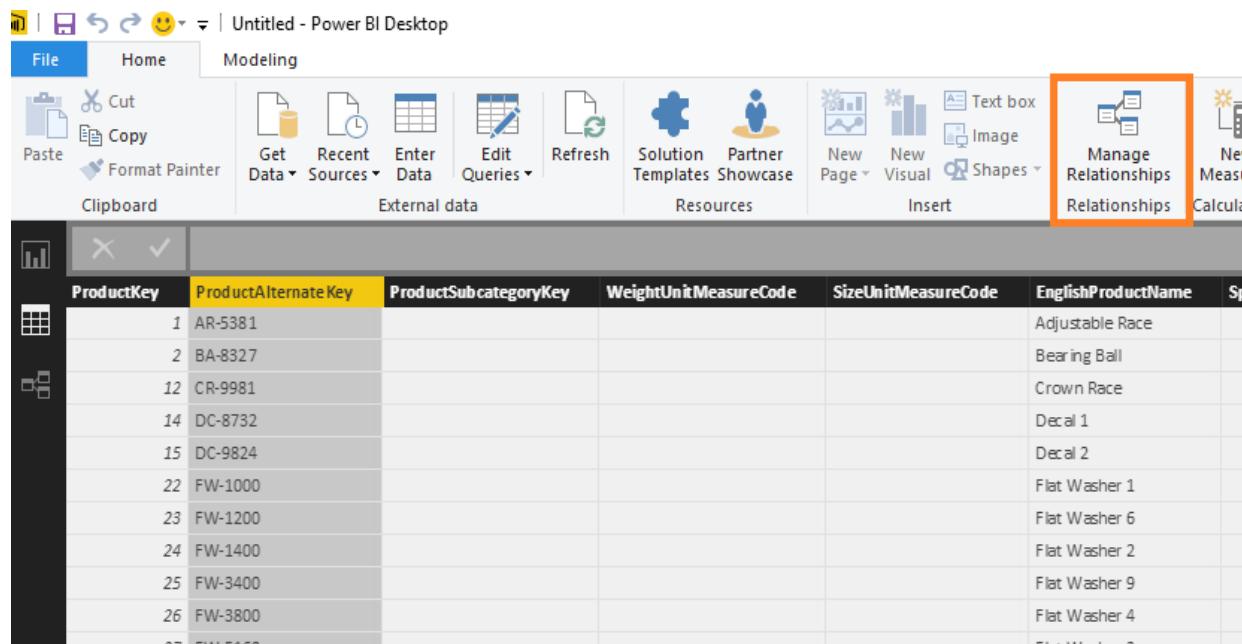
SWITCH THEME

The Switch Theme sections will be used to add different theme to the Power BI Reports. The colors of charts will change based upon the selection of schemes.



MANAGE RELATIONSHIP

The section is used to show the existing relationship between the tables of the Datasets. We can add or edit the existing relationship of the tables.

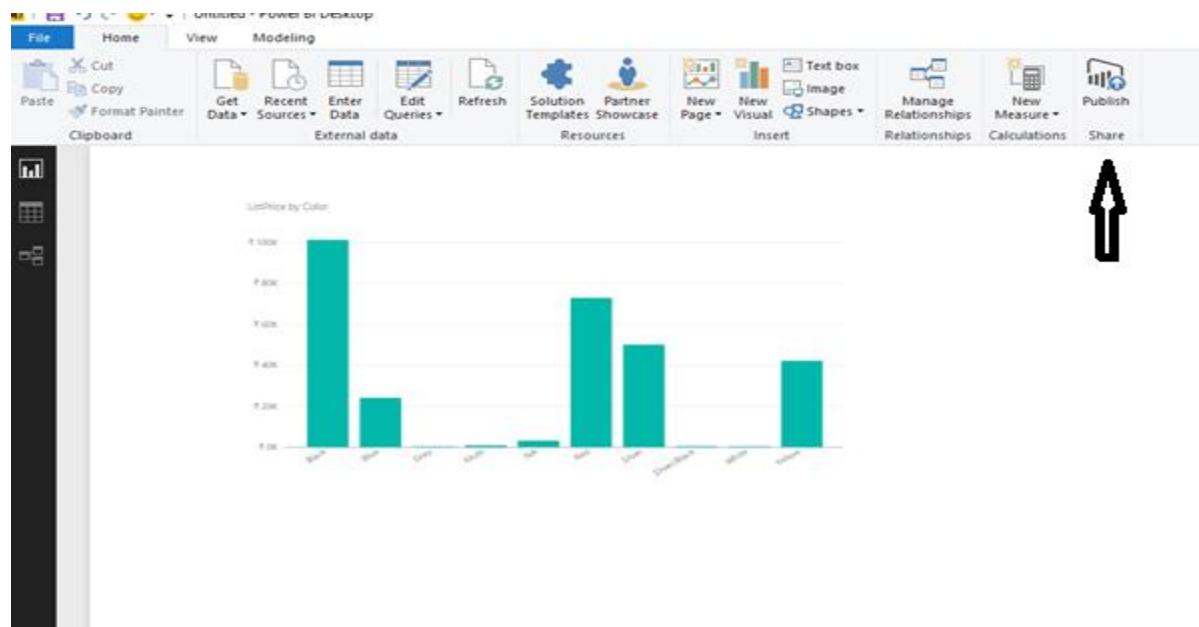


The screenshot shows the Power BI Desktop interface with the 'Modeling' tab selected in the ribbon. The 'Insert' tab is also visible. The 'Manage Relationships' button, located in the 'Relationships' group under the 'Insert' tab, is highlighted with an orange box.

ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode	EnglishProductName	Sp
1	AR-5381				Adjustable Race	
2	BA-8327				Bearing Ball	
12	CR-9981				Crown Race	
14	DC-8732				Decal 1	
15	DC-9824				Decal 2	
22	FW-1000				Flat Washer 1	
23	FW-1200				Flat Washer 6	
24	FW-1400				Flat Washer 2	
25	FW-3400				Flat Washer 9	
26	FW-3800				Flat Washer 4	
27	FW-5150				Flat Washer 3	

PUBLISH

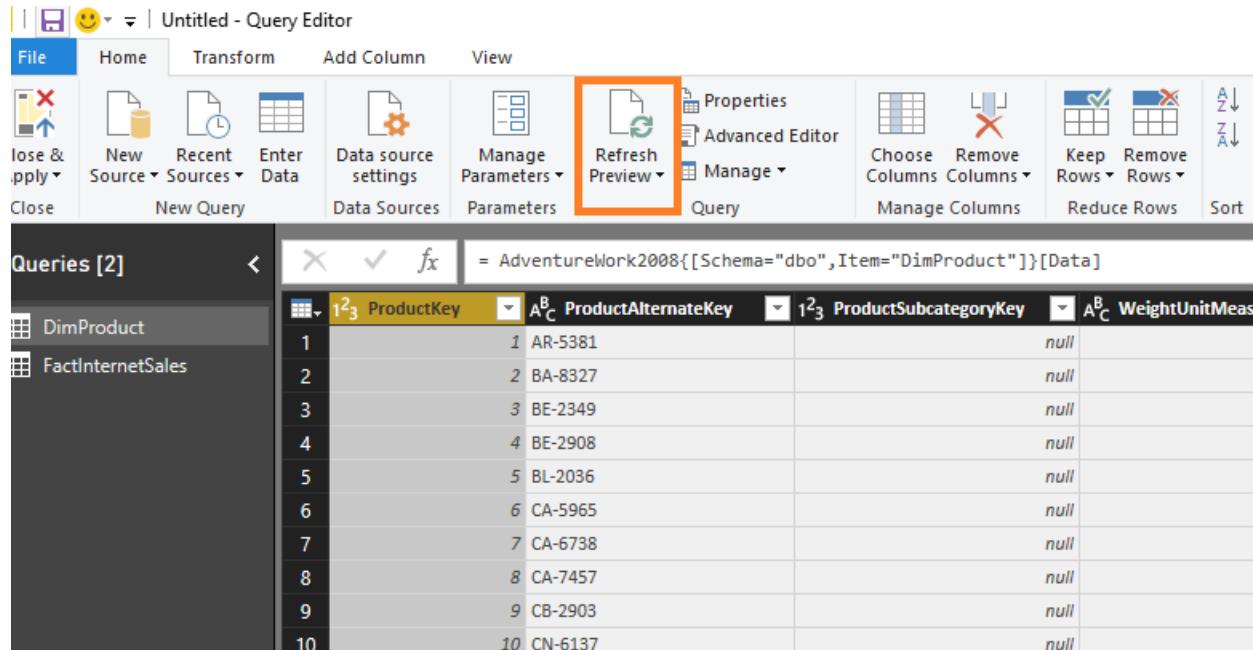
This will publish the power bi reports into the Power BI Cloud Server



The screenshot shows the Power BI Desktop interface with a bar chart titled 'UnitsSold by Color' displayed. The chart has a teal color scheme. A black arrow points from the 'Publish' button in the ribbon towards the chart area.

REFRESH PREVIEW

This will refresh the Power BI Page / Visualizations

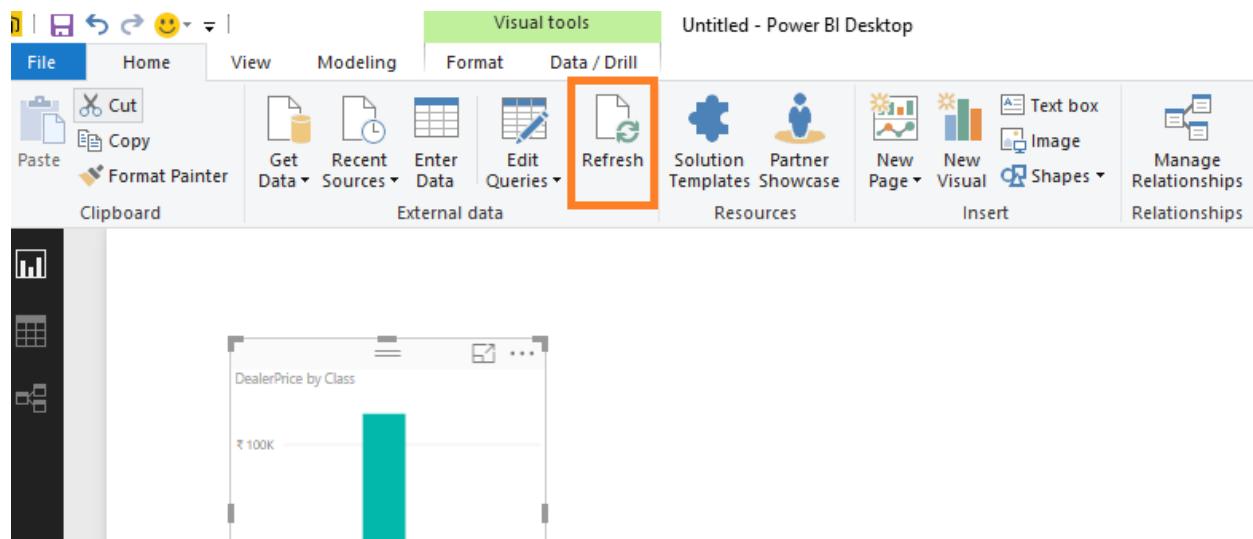


The screenshot shows the Power BI Query Editor interface. The ribbon at the top has tabs like File, Home, Transform, Add Column, View, etc. A specific button, 'Refresh Preview' located under the 'Query' tab, is highlighted with a red box. Below the ribbon, there's a section for 'Queries [2]' containing 'DimProduct' and 'FactInternetSales'. To the right is a preview grid showing data from the 'DimProduct' query, specifically columns ProductKey, ProductAlternateKey, ProductSubcategoryKey, and WeightUnitMeasure. The data listed includes rows 1 through 10, with most values being 'null' except for ProductKey which lists various product codes.

	ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasure
1	AR-5381			null
2	BA-8327			null
3	BE-2349			null
4	BE-2908			null
5	BL-2036			null
6	CA-5965			null
7	CA-6738			null
8	CA-7457			null
9	CB-2903			null
10	CN-6137			null

REFRESH

This will refresh the page



The screenshot shows the Power BI Desktop ribbon. The 'Visual tools' tab is active, followed by 'File', 'Home', 'View', 'Modeling', 'Format', and 'Data / Drill'. A specific button, 'Refresh', located under the 'Data / Drill' tab, is highlighted with a red box. Below the ribbon, there's a visualization titled 'DealerPrice by Class' showing a single teal bar chart with the value '₹ 100K'. The left side of the screen features a dark sidebar with various icons for navigation and management.

CHAPTER 4 : POWER BI DATA SOURCES

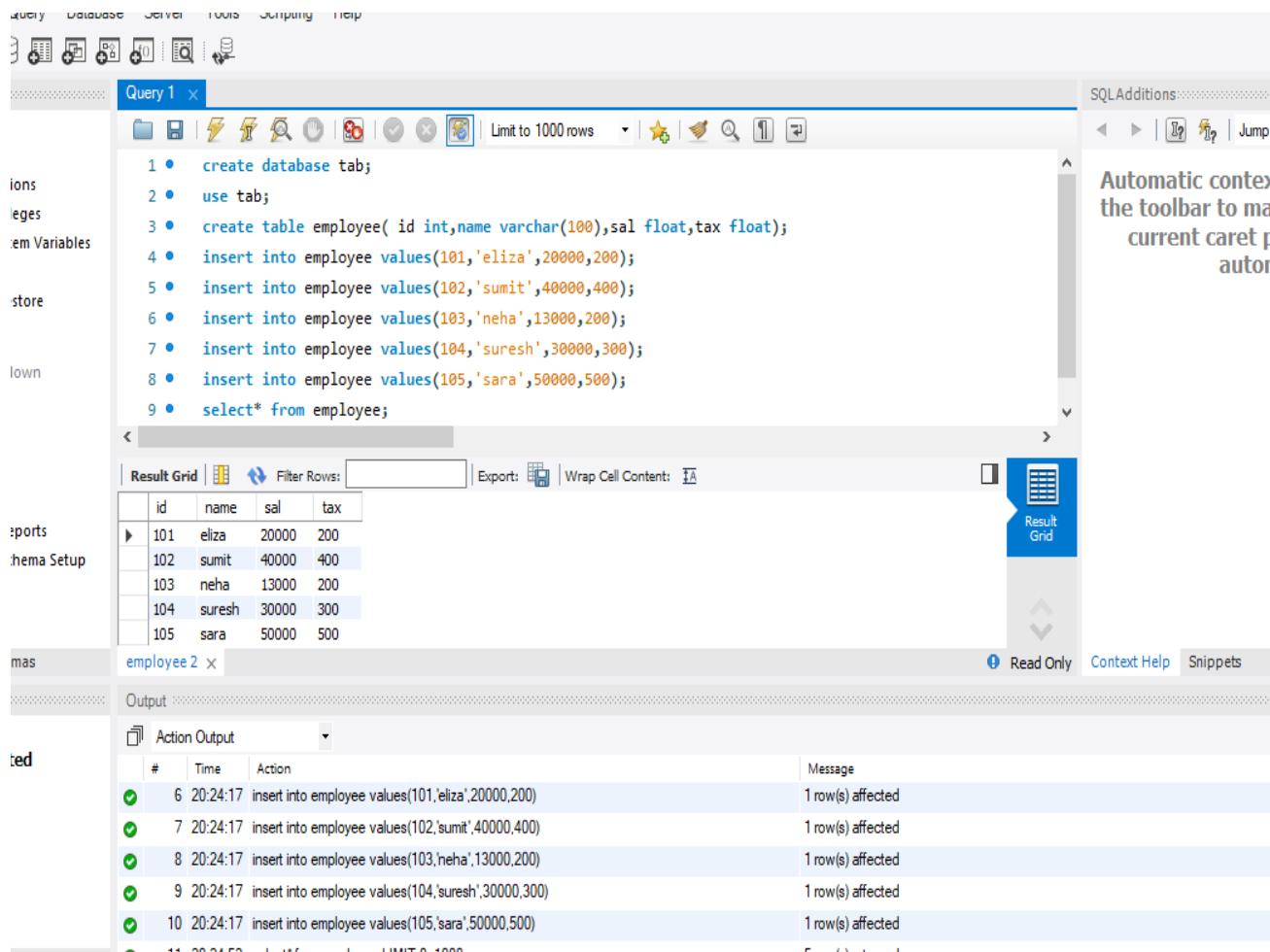
In this chapter we will explore important data sources of Power BI Desktop

CONNECTING WITH MYSQL

The example below explains the process with connect with the Database server : **MYSQL**

EXAMPLE : HOW TO CONNECT MYSQL WITH POWERBI

STEP 1: CREATE TABLE IN MYSQL



The screenshot shows the MySQL Workbench interface. The 'Query 1' tab contains the following SQL code:

```

1 •  create database tab;
2 •  use tab;
3 •  create table employee( id int,name varchar(100),sal float,tax float);
4 •  insert into employee values(101,'eliza',20000,200);
5 •  insert into employee values(102,'sumit',40000,400);
6 •  insert into employee values(103,'neha',13000,200);
7 •  insert into employee values(104,'suresh',30000,300);
8 •  insert into employee values(105,'sara',50000,500);
9 •  select* from employee;

```

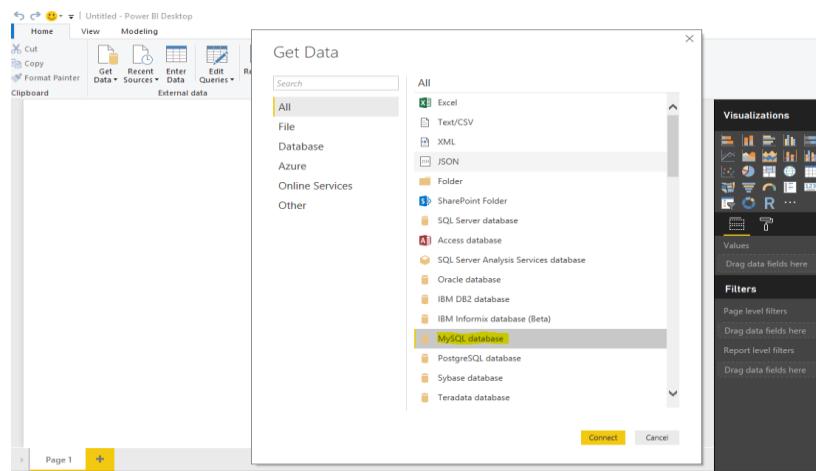
The 'Result Grid' pane displays the data inserted into the 'employee' table:

	id	name	sal	tax
▶	101	eliza	20000	200
	102	sumit	40000	400
	103	neha	13000	200
	104	suresh	30000	300
	105	sara	50000	500

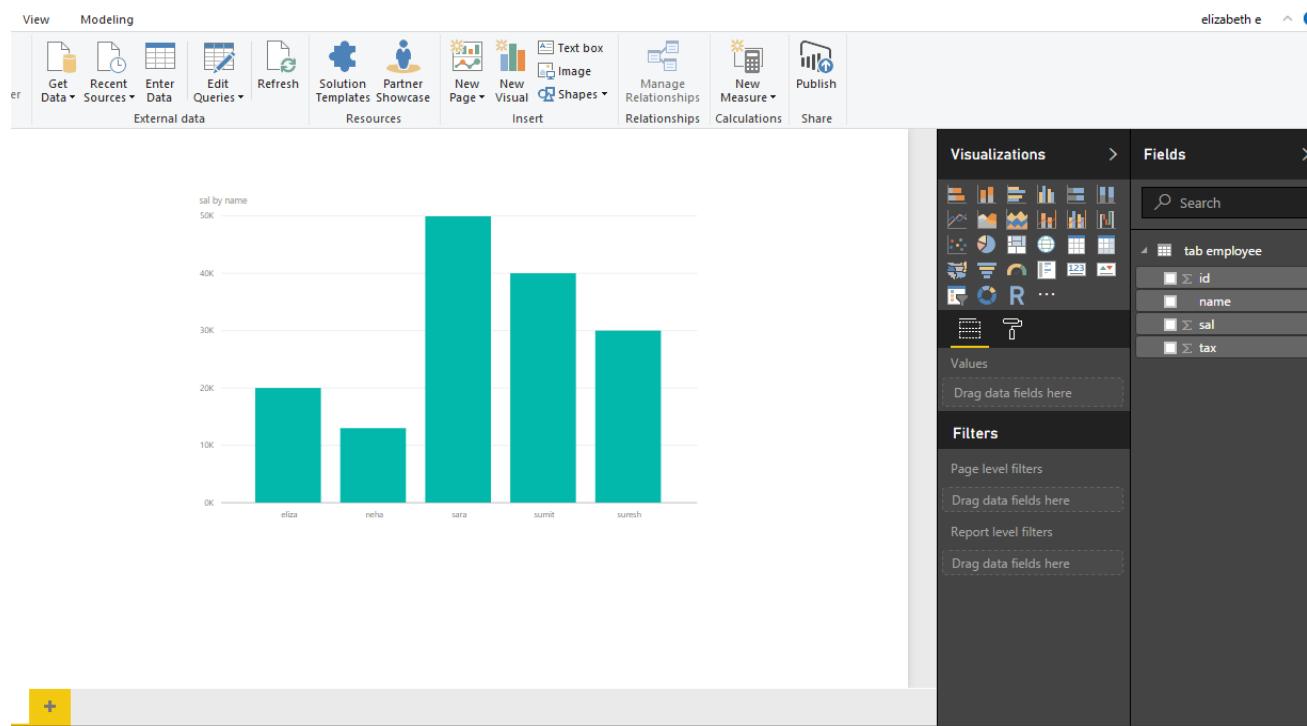
The 'Action Output' pane shows the log of actions taken:

#	Time	Action	Message
6	20:24:17	insert into employee values(101,'eliza',20000,200)	1 row(s) affected
7	20:24:17	insert into employee values(102,'sumit',40000,400)	1 row(s) affected
8	20:24:17	insert into employee values(103,'neha',13000,200)	1 row(s) affected
9	20:24:17	insert into employee values(104,'suresh',30000,300)	1 row(s) affected
10	20:24:17	insert into employee values(105,'sara',50000,500)	1 row(s) affected

STEP 2: IMPORT DATA FROM MYSQL DATABASE USING GETDATA



STEP 3: CREATE VISUALIZATION

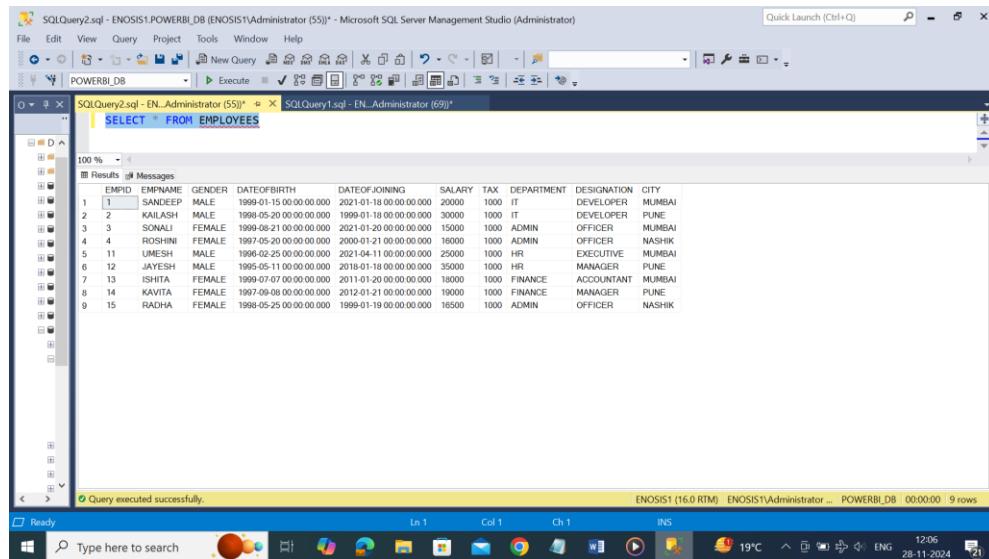


CONNECTING WITH SQL SERVER

In the example below, we will explore how to connect with SQL SERVER.

We will first run the following SQL script in a SQL database. It creates an employee table and adds few records in table.

```
CREATE TABLE EMPLOYEES
(
    EMPID INT, EMPNAME VARCHAR(100), GENDER VARCHAR(10),
    DATEOFBIRTH DATETIME, DATEOFJOINING DATETIME, SALARY FLOAT, TAX FLOAT,
    DEPARTMENT VARCHAR(100), DESIGNATION VARCHAR(100), CITY VARCHAR(100)
)
SELECT * FROM EMPLOYEES
INSERT INTO EMPLOYEES
VALUES(1, 'SANDEEP', 'MALE', '01/15/1999', '01/18/2021', 20000, 1000, 'IT', 'DEVELOPER', 'MUMBAI')
)
INSERT INTO EMPLOYEES
VALUES(2, 'KAILASH', 'MALE', '05/20/1998', '01/18/1999', 30000, 1000, 'IT', 'DEVELOPER', 'PUNE')
INSERT INTO EMPLOYEES
VALUES(3, 'SONALI', 'FEMALE', '08/21/1999', '01/20/2021', 15000, 1000, 'ADMIN', 'OFFICER', 'MUMBAI')
)
INSERT INTO EMPLOYEES
VALUES(4, 'ROSHINI', 'FEMALE', '05/20/1997', '01/21/2000', 16000, 1000, 'ADMIN', 'OFFICER', 'NASHIK')
)
INSERT INTO EMPLOYEES
VALUES(11, 'UMESH', 'MALE', '02/25/1996', '04/11/2021', 25000, 1000, 'HR', 'EXECUTIVE', 'MUMBAI')
)
INSERT INTO EMPLOYEES
VALUES(12, 'JAYESH', 'MALE', '05/11/1995', '01/18/2018', 35000, 1000, 'HR', 'MANAGER', 'PUNE')
)
INSERT INTO EMPLOYEES
VALUES(13, 'ISHITA', 'FEMALE', '07/07/1999', '01/20/2011', 18000, 1000, 'FINANCE', 'ACCOUNTANT', 'MUMBAI')
)
INSERT INTO EMPLOYEES
VALUES(14, 'KAVITA', 'FEMALE', '09/08/1997', '01/21/2012', 19000, 1000, 'FINANCE', 'MANAGER', 'PUNE')
)
INSERT INTO EMPLOYEES
VALUES(15, 'RADHA', 'FEMALE', '05/25/1998', '01/19/1999', 16500, 1000, 'ADMIN', 'OFFICER', 'NASHIK')
```



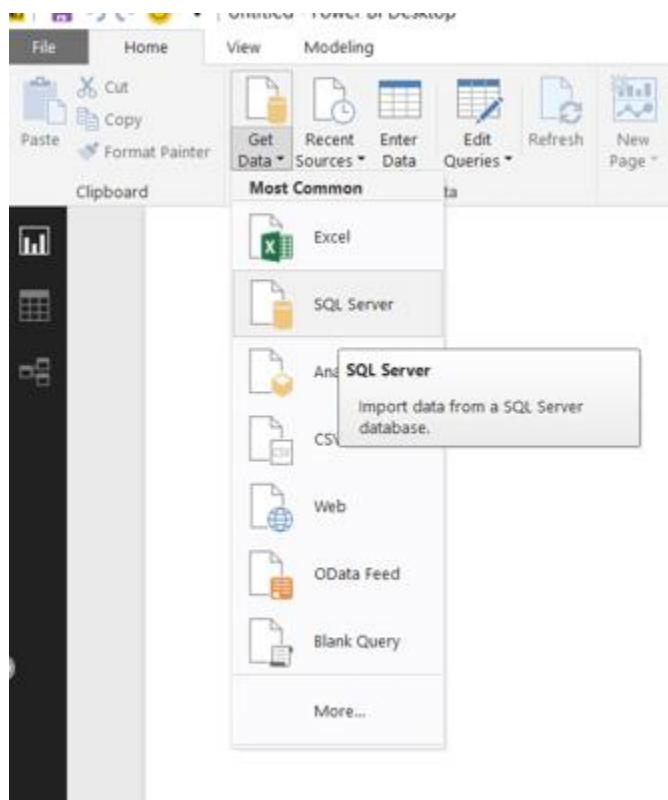
The screenshot shows the Microsoft SQL Server Management Studio interface. A query window titled 'SQLQuery2.sql - ENOSIS1.POWERBI_DB (ENOSIS1\Administrator (55))' is open, displaying the results of a 'SELECT * FROM EMPLOYEES' query. The results grid contains 15 rows of employee data with columns: EMPID, EMPNAME, GENDER, DATEOFBIRTH, DATEOJOINING, SALARY, TAX, DEPARTMENT, DESIGNATION, and CITY. The data includes various employees like Sandeep, Kailash, Sonali, Roshni, Umesh, Jayesh, Ishita, Kavita, and Radha, with details such as their gender, birth date, joining date, salary, tax, department, designation, and city.

EMPID	EMPNAME	GENDER	DATEOFBIRTH	DATEOJOINING	SALARY	TAX	DEPARTMENT	DESIGNATION	CITY	
1	SANDEEP	MALE	1999-01-15 00:00:00.000	2021-01-18 00:00:00.000	20000	1000	IT	DEVELOPER	MUMBAI	
2	KAILASH	MALE	1998-05-20 00:00:00.000	1999-01-18 00:00:00.000	30000	1000	IT	DEVELOPER	PUNE	
3	SONALI	FEMALE	1999-08-21 00:00:00.000	2021-01-20 00:00:00.000	15000	1000	ADMIN	OFFICER	MUMBAI	
4	ROSHNI	FEMALE	1997-05-20 00:00:00.000	2000-01-21 00:00:00.000	16000	1000	ADMIN	OFFICER	NASHIK	
5	11	UMESH	MALE	1996-02-25 00:00:00.000	2021-04-11 00:00:00.000	25000	1000	HR	EXECUTIVE	MUMBAI
6	12	JAYESH	MALE	1995-05-11 00:00:00.000	2018-01-18 00:00:00.000	35000	1000	HR	MANAGER	PUNE
7	13	ISHITA	FEMALE	1999-07-07 00:00:00.000	2011-01-20 00:00:00.000	18000	1000	FINANCE	ACCOUNTANT	MUMBAI
8	14	KAVITA	FEMALE	1997-09-09 00:00:00.000	2012-01-21 00:00:00.000	19000	1000	FINANCE	MANAGER	PUNE
9	15	RADHA	FEMALE	1998-05-25 00:00:00.000	1999-01-19 00:00:00.000	18500	1000	ADMIN	OFFICER	NASHIK

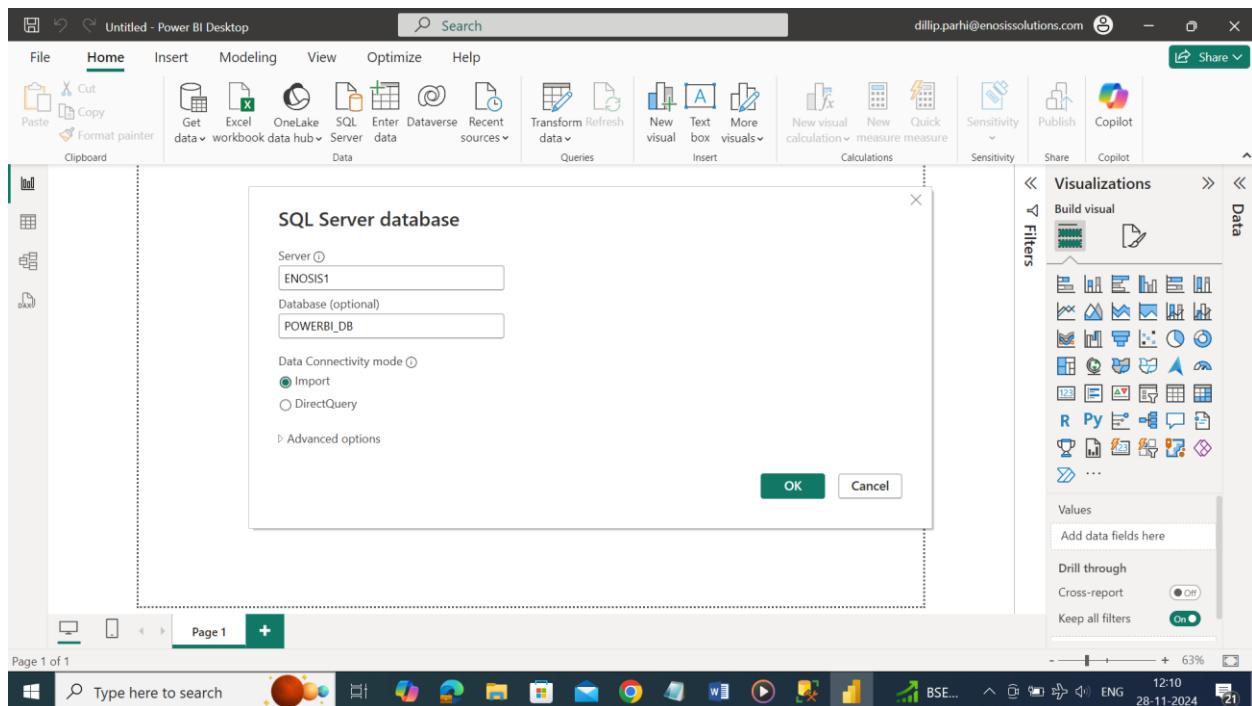
Query executed successfully.

Step1: Connect with SQL SERVER FROM POWER BI DESKTOP

To create a report, we need to bring our SQL SERVER data into Power BI desktop. Open Power BI desktop and click on 'Get Data' and select 'SQL server' as the data source.



Connect to the database in Power BI, and then select the **employee** table.

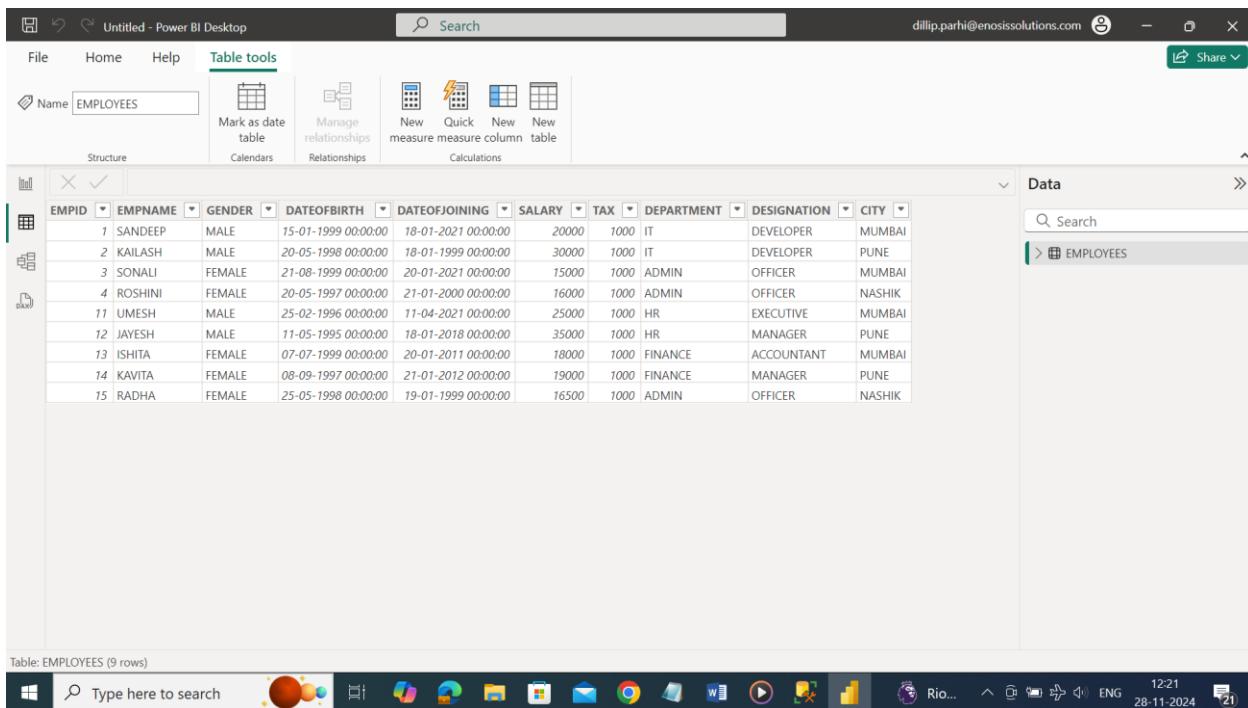


The screenshot shows the Power BI Navigator window. On the left, there's a search bar and a 'Display Options' dropdown. Below that, a tree view shows a connection named 'ENOSIS1: POWERBI_DB [1]' with a single table named 'EMPLOYEES' selected, indicated by a checked checkbox. On the right, the 'EMPLOYEES' table is displayed as a grid with columns: EMPID, EMPNAME, GENDER, DATEOFBIRTH, and DATEOJOINING. The data contains 15 rows of employee information. At the bottom of the window are buttons for 'Select Related Tables', 'Load' (which is highlighted in green), 'Transform Data', and 'Cancel'.

EMPID	EMPNAME	GENDER	DATEOFBIRTH	DATEOJOINING
1	SANDEEP	MALE	15-01-1999 00:00:00	18-01-2021 00:00:00
2	KAILASH	MALE	20-05-1998 00:00:00	18-01-1999 00:00:00
3	SONALI	FEMALE	21-08-1999 00:00:00	20-01-2021 00:00:00
4	ROSHINI	FEMALE	20-05-1997 00:00:00	21-01-2000 00:00:00
11	UMESH	MALE	25-02-1996 00:00:00	11-04-2021 00:00:00
12	JAYESH	MALE	11-05-1995 00:00:00	18-01-2018 00:00:00
13	ISHITA	FEMALE	07-07-1999 00:00:00	20-01-2011 00:00:00
14	KAVITA	FEMALE	08-09-1997 00:00:00	21-01-2012 00:00:00
15	RADHA	FEMALE	25-05-1998 00:00:00	19-01-1999 00:00:00

Click on Load Button

Your Power Bi desktop screen should look like the screenshot below.

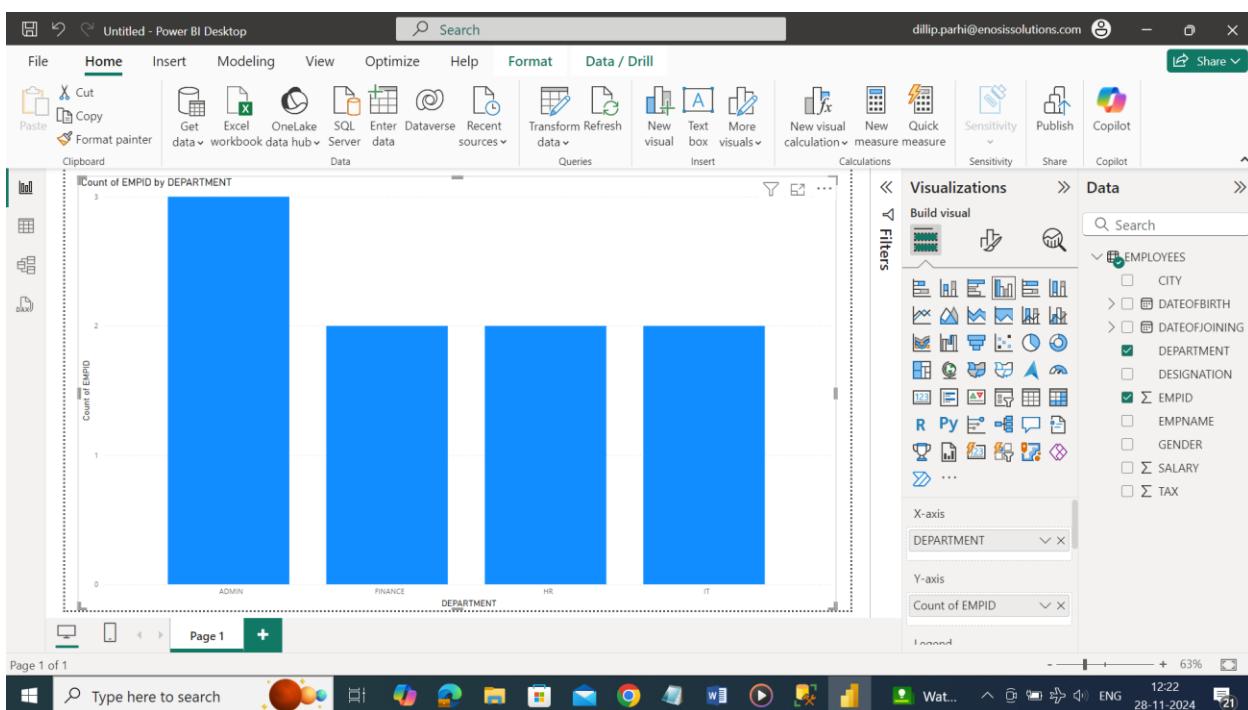


The screenshot shows the Power BI Desktop interface with the 'EMPLOYEES' table selected. The table contains 15 rows of employee data with columns: EMPID, EMPNAME, GENDER, DATEOFBIRTH, DATEOJJOINING, SALARY, TAX, DEPARTMENT, DESIGNATION, and CITY. The 'Table tools' ribbon is visible at the top.

EMPID	EMPNAME	GENDER	DATEOFBIRTH	DATEOJJOINING	SALARY	TAX	DEPARTMENT	DESIGNATION	CITY
1	SANDEEP	MALE	15-01-1999 00:00:00	18-01-2021 00:00:00	20000	1000	IT	DEVELOPER	MUMBAI
2	KAILASH	MALE	20-05-1998 00:00:00	18-01-1999 00:00:00	30000	1000	IT	DEVELOPER	PUNE
3	SONALI	FEMALE	21-08-1999 00:00:00	20-01-2021 00:00:00	15000	1000	ADMIN	OFFICER	MUMBAI
4	ROSHINI	FEMALE	20-05-1997 00:00:00	21-01-2000 00:00:00	16000	1000	ADMIN	OFFICER	NASHIK
11	UMESH	MALE	25-02-1998 00:00:00	11-04-2021 00:00:00	25000	1000	HR	EXECUTIVE	MUMBAI
12	JAYESH	MALE	11-05-1995 00:00:00	18-01-2018 00:00:00	35000	1000	HR	MANAGER	PUNE
13	ISHITA	FEMALE	07-07-1999 00:00:00	20-01-2011 00:00:00	18000	1000	FINANCE	ACCOUNTANT	MUMBAI
14	KAVITA	FEMALE	08-09-1997 00:00:00	21-01-2012 00:00:00	19000	1000	FINANCE	MANAGER	PUNE
15	RADHA	FEMALE	25-05-1998 00:00:00	19-01-1999 00:00:00	16500	1000	ADMIN	OFFICER	NASHIK

Step2:

Now we can create a Power BI report using various visualization components.

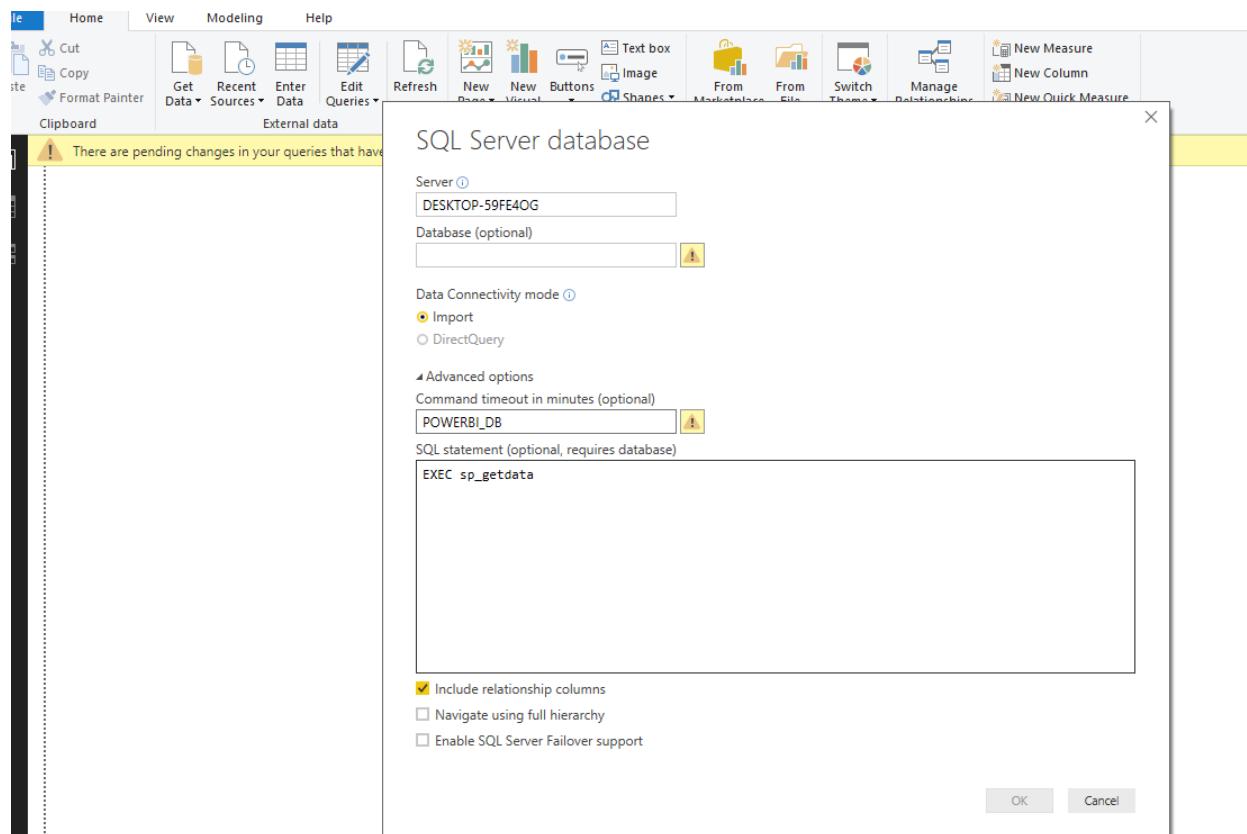


The screenshot shows a bar chart titled 'Count of EMPID by DEPARTMENT'. The Y-axis is labeled 'Count of EMPID' and ranges from 0 to 3. The X-axis is labeled 'DEPARTMENT' and shows four categories: ADMIN, FINANCE, HR, and IT. The chart displays the count of employees per department. The Power BI interface is visible with the Home tab selected, showing the ribbon and various tools.

DEPARTMENT	Count of EMPID
ADMIN	3
FINANCE	2
HR	2
IT	2

CALLING STORED PROCEDURE IN POWERBI

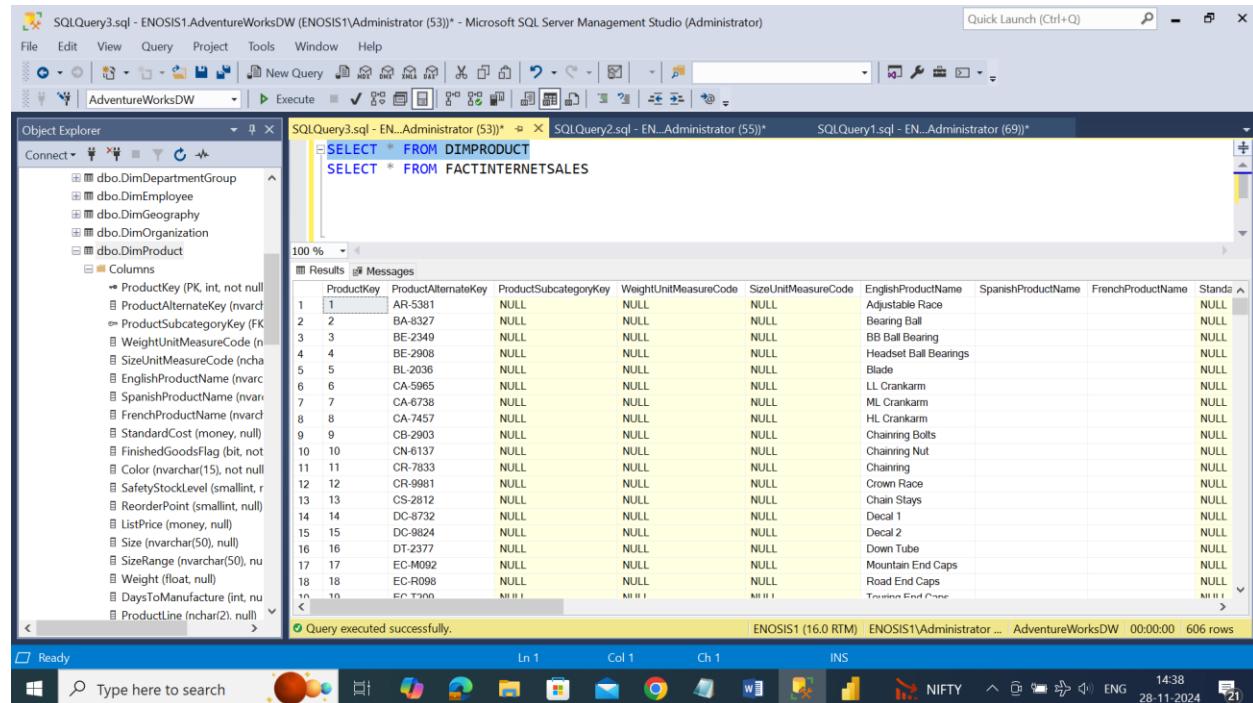
This example show how to call a stored procedure in Power BI DeskTop



CHAPTER 5: POWER BI - DATA TRANSFORMATION FEATURES

In this chapter, we will explore Data Transformation features of Power BI

In the Example we will be using the DimProduct, FactInternetSales table in the AdventureWorksDW Database.



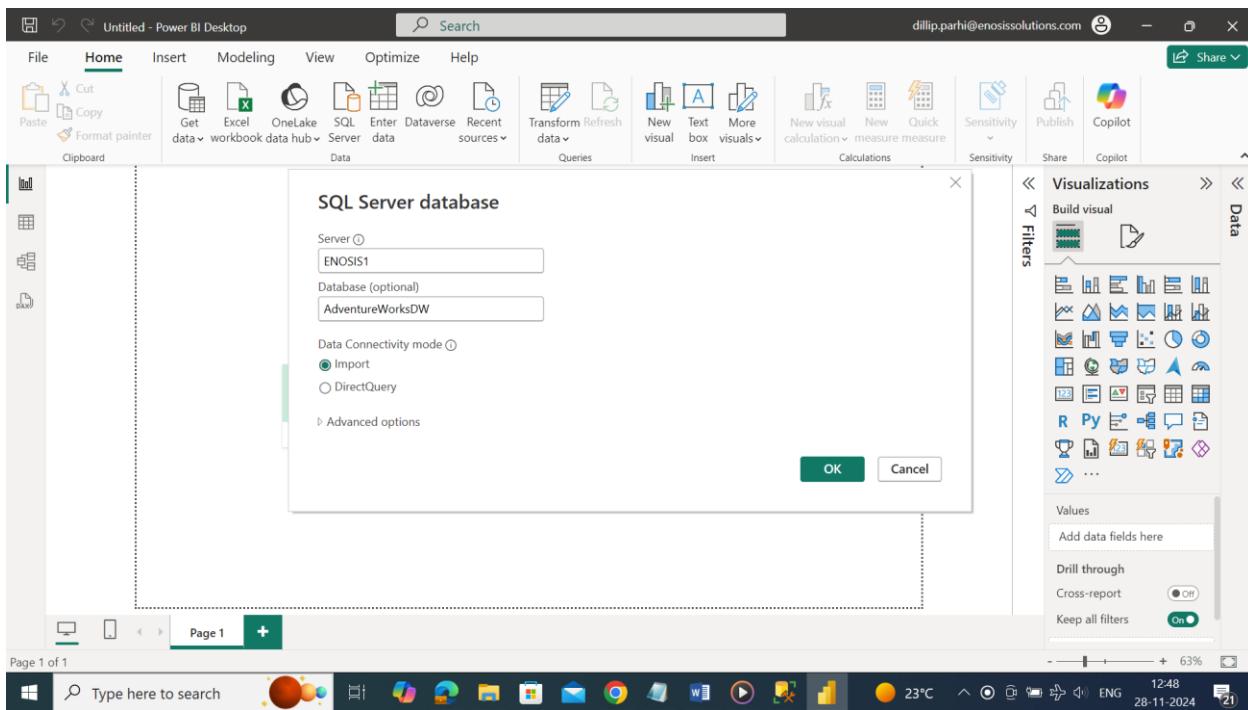
```

SQLQuery3.sql - ENOSIS1.AdventureWorksDW (ENOSIS1\Administrator (53))* - Microsoft SQL Server Management Studio (Administrator)
File Edit View Query Project Tools Window Help
Object Explorer Connect
SQLQuery3.sql - EN...Administrator (53)* X SQLQuery2.sql - EN...Administrator (55)* X SQLQuery1.sql - EN...Administrator (69)*
SELECT * FROM DIMPRODUCT
SELECT * FROM FACTINTERNETSALES

Results Messages
ProductKey ProductAlternateKey ProductSubcategoryKey WeightUnitMeasureCode SizeUnitMeasureCode EnglishProductName SpanishProductName FrenchProductName Standard
1 AR-5381 NULL NULL NULL Adjustable Race NULL
2 BA-8327 NULL NULL NULL Bearing Ball NULL
3 BE-2349 NULL NULL NULL BB Ball Bearing NULL
4 BE-2908 NULL NULL NULL Headset Ball Bearings NULL
5 BL-2036 NULL NULL NULL Blade NULL
6 CA-5965 NULL NULL NULL LL Crankarm NULL
7 CA-6738 NULL NULL NULL ML Crankarm NULL
8 CA-7457 NULL NULL NULL HL Crankarm NULL
9 CB-2903 NULL NULL NULL Channing Bolts NULL
10 CN-6137 NULL NULL NULL Channing Nut NULL
11 CR-7833 NULL NULL NULL Chaining NULL
12 CR-9981 NULL NULL NULL Crown Race NULL
13 CS-2812 NULL NULL NULL Chain Stays NULL
14 DC-8732 NULL NULL NULL Decal 1 NULL
15 DC-9824 NULL NULL NULL Decal 2 NULL
16 DT-2377 NULL NULL NULL Down Tube NULL
17 EC-M092 NULL NULL NULL Mountain End Caps NULL
18 EC-R098 NULL NULL NULL Road End Caps NULL
19 ER-9966 KII II KII II KII II Tournier End Caps NULL
< >
Query executed successfully. ENOSIS1 (16.0 RTM) ENOSIS1\Administrator ... AdventureWorksDW 00:00:00 606 rows

```

First Create a Report in Power BI by connecting to SQL SERVER.



Choose the tables : DimProduct & FactInternetsales from the list of tables

Navigator

The screenshot shows the Power BI Navigator interface. On the left, there is a list of tables under 'Display Options'. Several tables are listed with checkboxes: DimDate, DimDepartmentGroup, DimEmployee, DimGeography, DimOrganization, DimProduct (which is checked), DimProductCategory, DimProductSubcategory, DimPromotion, DimReseller, DimSalesReason, DimSalesTerritory, DimScenario, FactAdditionalInternationalProductDes..., FactCallCenter, FactCurrencyRate, FactFinance, FactInternetSales (which is also checked), FactInternetSalesReason, and FactProductInventory. The 'FactInternetSales' table is currently selected, highlighted with a green border. On the right, a preview of the 'FactInternetSales' table is displayed as a grid. The columns are labeled: ProductKey, OrderDateKey, DueDateKey, ShipDateKey, CustomerKey, and Pro. The data shows various sales records with keys ranging from 310 to 314. A note at the bottom of the preview area states: 'The data in the preview has been truncated due to size limits.' At the bottom right of the interface, there are three buttons: 'Load' (green), 'Transform Data' (grey), and 'Cancel' (grey).

ProductKey	OrderDateKey	DueDateKey	ShipDateKey	CustomerKey	Pro
310	20101229	20110110	20110105	21768	
346	20101229	20110110	20110105	28389	
346	20101229	20110110	20110105	25863	
336	20101229	20110110	20110105	14501	
346	20101229	20110110	20110105	11003	
311	20101230	20110111	20110106	27645	
310	20101230	20110111	20110106	16624	
351	20101230	20110111	20110106	11005	
344	20101230	20110111	20110106	11011	
312	20101231	20110112	20110107	27621	
312	20101231	20110112	20110107	27616	
330	20101231	20110112	20110107	20042	
313	20101231	20110112	20110107	16351	
314	20101231	20110112	20110107	16517	

The Data will be loaded and can be viewed in Power BI Desktop. Transformation

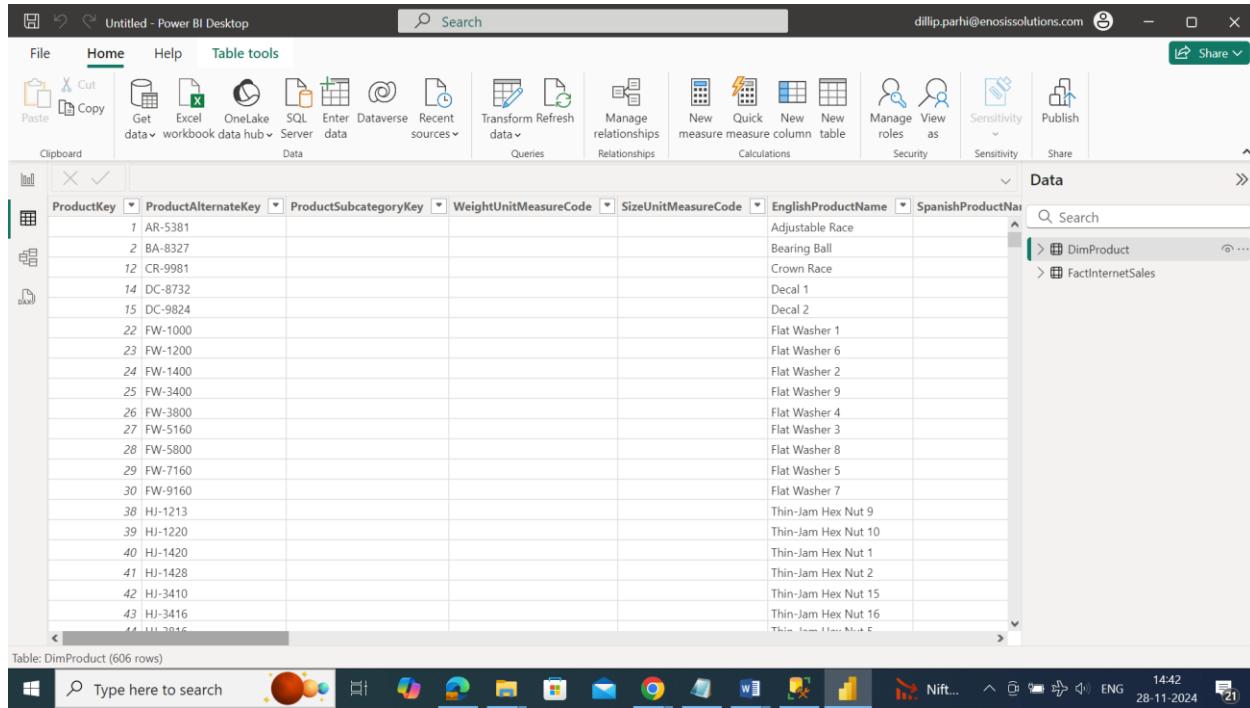


Table: DimProduct (606 rows)

Click on Transformation

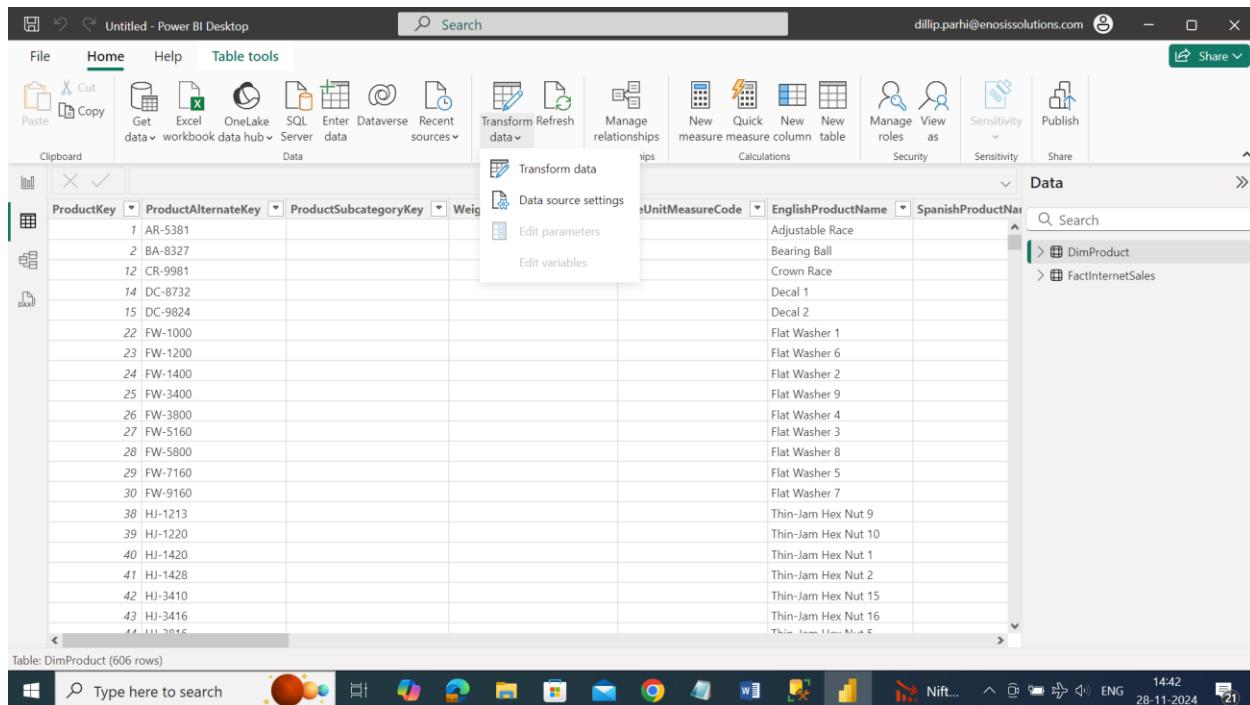
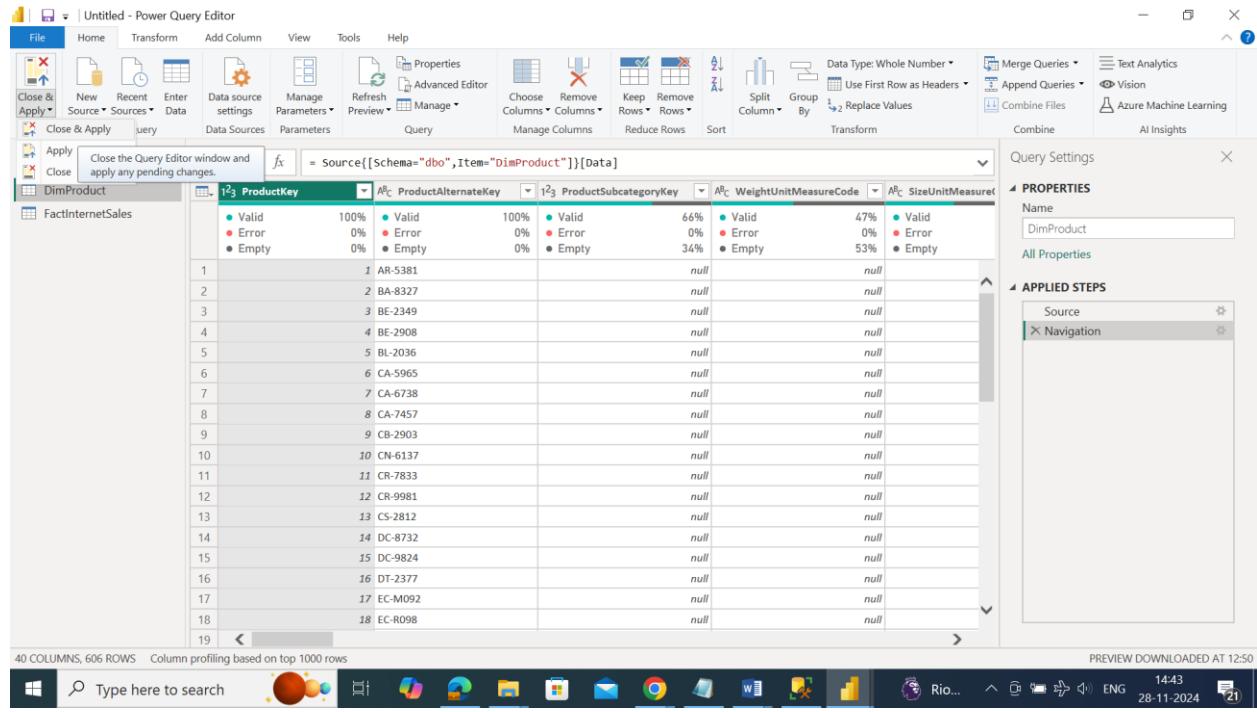


Table: DimProduct (606 rows)

Click on Transform Data in the Home Section and it will open the Data Transformation window.



Untitled - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Recent Source Sources Enter Data Data source settings Manage Parameters Refresh Advanced Editor Properties Preview Manage Choose Columns Remove Rows Keep Rows Remove Columns Group By Split Column Use First Row as Headers Data Type Whole Number Merge Queries Append Queries Text Analytics Vision Combine Files Azure Machine Learning Combine AI Insights

DimProduct

FactInternetSales

1 2 3 ProductKey 1 2 3 ProductAlternateKey 1 2 3 ProductSubcategoryKey 1 2 3 WeightUnitMeasureCode 1 2 3 SizeUnitMeasure

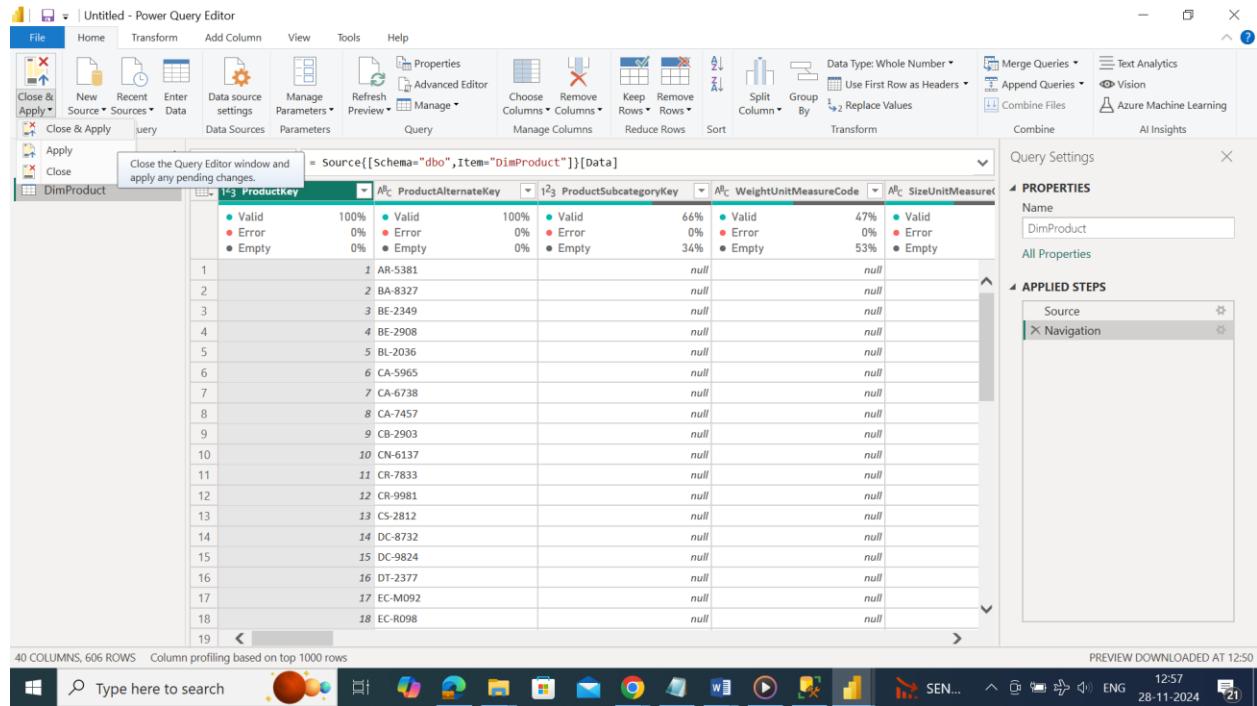
	ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasure
1	AR-5381			null	null
2	BA-8327			null	null
3	BE-2349			null	null
4	BE-2908			null	null
5	BL-2036			null	null
6	CA-5965			null	null
7	CA-6738			null	null
8	CA-7457			null	null
9	CB-2903			null	null
10	CN-6137			null	null
11	CR-7833			null	null
12	CR-9981			null	null
13	CS-2812			null	null
14	DC-8732			null	null
15	DC-9824			null	null
16	DT-2377			null	null
17	EC-M092			null	null
18	EC-R098			null	null

40 COLUMNS, 606 ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED AT 12:50

Windows Taskbar: Type here to search, Start button, File Explorer, Mail, Edge, Google Chrome, Word, Excel, Power BI, etc.

Rio... 14:43 ENG 28-11-2024

Now lets explore different transformation features of Power BI.



Untitled - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Recent Source Sources Enter Data Data source settings Manage Parameters Refresh Advanced Editor Properties Preview Manage Choose Columns Remove Rows Keep Rows Remove Columns Group By Split Column Use First Row as Headers Data Type Whole Number Merge Queries Append Queries Text Analytics Vision Combine Files Azure Machine Learning Combine AI Insights

DimProduct

FactInternetSales

1 2 3 ProductKey 1 2 3 ProductAlternateKey 1 2 3 ProductSubcategoryKey 1 2 3 WeightUnitMeasureCode 1 2 3 SizeUnitMeasure

	ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasure
1	AR-5381			null	null
2	BA-8327			null	null
3	BE-2349			null	null
4	BE-2908			null	null
5	BL-2036			null	null
6	CA-5965			null	null
7	CA-6738			null	null
8	CA-7457			null	null
9	CB-2903			null	null
10	CN-6137			null	null
11	CR-7833			null	null
12	CR-9981			null	null
13	CS-2812			null	null
14	DC-8732			null	null
15	DC-9824			null	null
16	DT-2377			null	null
17	EC-M092			null	null
18	EC-R098			null	null

40 COLUMNS, 606 ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED AT 12:50

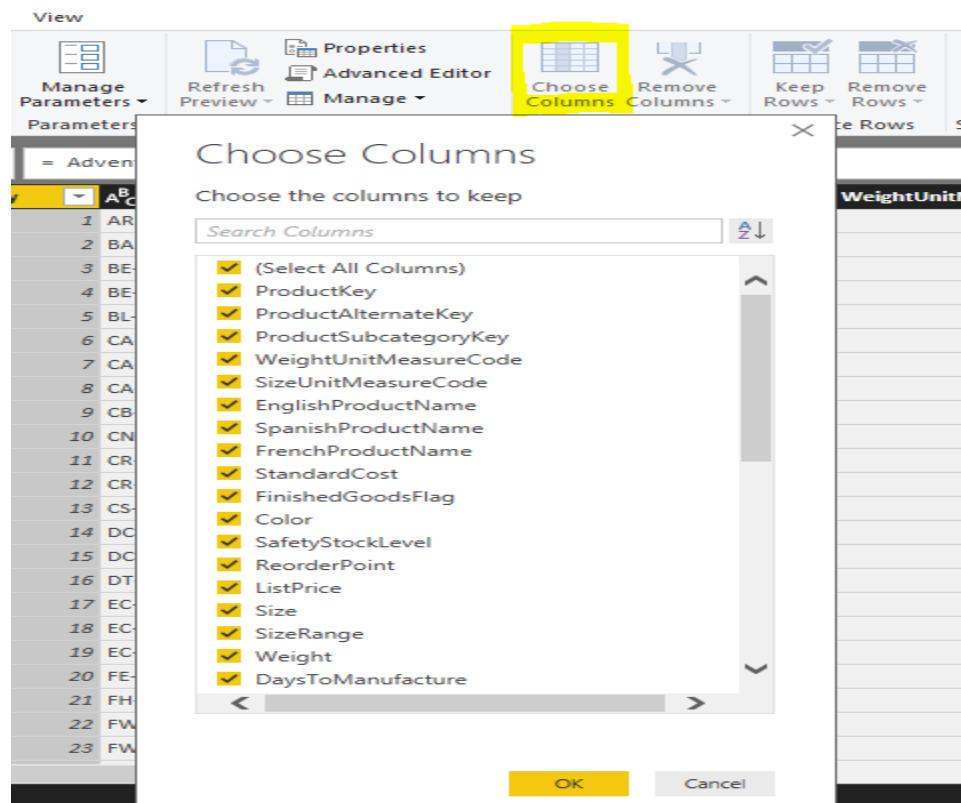
Windows Taskbar: Type here to search, Start button, File Explorer, Mail, Edge, Google Chrome, Word, Excel, Power BI, etc.

SEN... 12:57 ENG 28-11-2024

NOW LETS EXPLORE THE DATA TRANFORMATION FEATURES IN POWER BI.

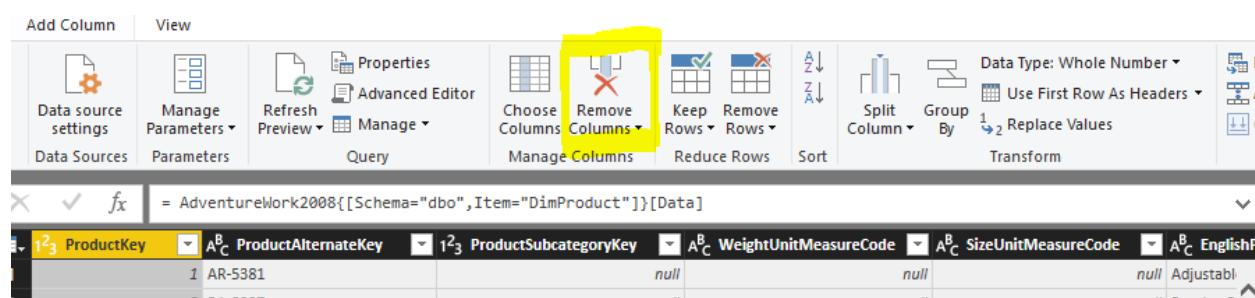
CHOOSE COLUMNS

This will allow users to choose columns from the selected datasets.



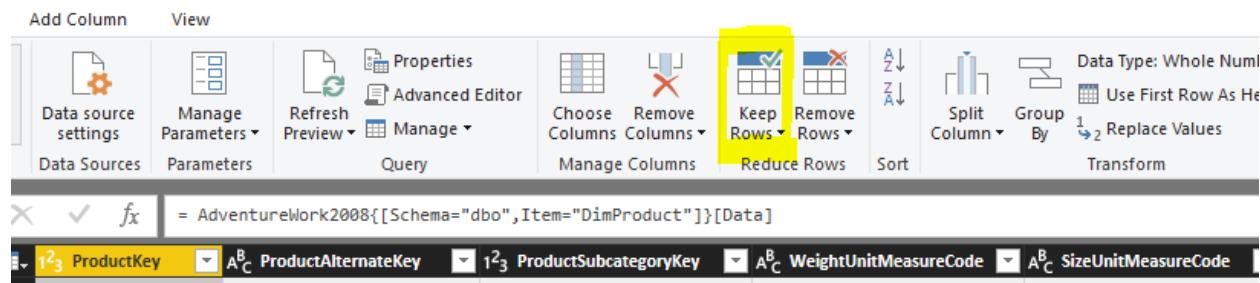
REMOVE COLUMNS

This will remove columns from the selected datasets.



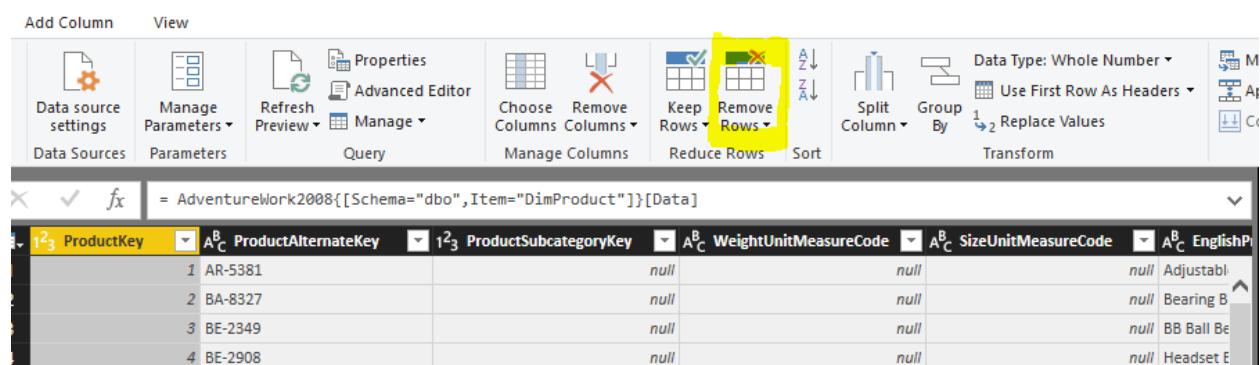
KEEP ROWS

This is keep the number of rows in the dataset as specified.



REMOVE ROWS

This will remove the rows from the dataset as specified.



SPLIT COLUMN

We can use this to split column based upon delimiters

fx = AdventureWork2008{[Schema="dbo",Item="DimProduct"]}[Data]

ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode
1	AR-5381		null	null
2	BA-8327		null	null
3	BE-2349		null	null

Split Column by Delimiter

Specify the delimiter used to split the text column.

Select or enter delimiter

-

Split

- At the left-most delimiter
- At the right-most delimiter
- At each occurrence of the delimiter

Advanced options

OK **Cancel**

21	FH-2981		null	null
22	FW-1000		null	null
23	FW-1200		null	null

fx = AdventureWork2008{[Schema="dbo",Item="DimProduct"]}[Data]

ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode	CategoryName
1	AR-5381		null	null	null

Split Column by Number of Characters

Specify the number of characters used to split the text column.

Number of characters

Split

- Once, as far left as possible
- Once, as far right as possible
- Repeatedly

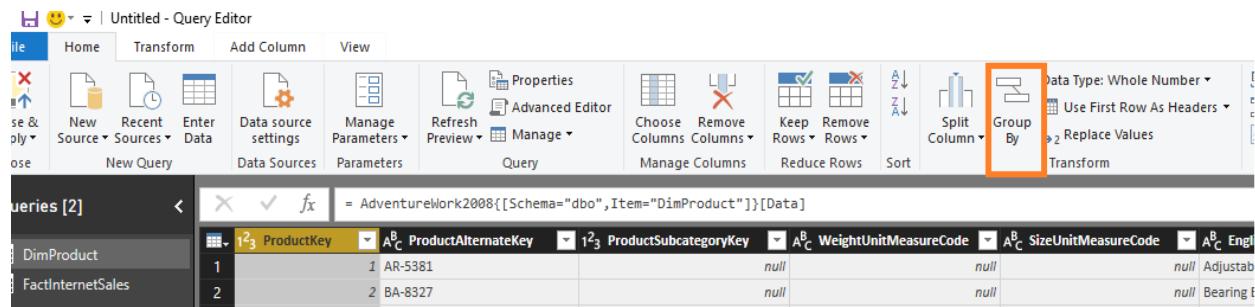
Advanced options

OK **Cancel**

18	EC-RU98		null	null	Road
19	EC-T209		null	null	Touri
20	FE-3760		null	null	Fork
21	FH-2981		null	null	Freev
22	FW-1000		null	null	Flat
23	FW-1200		"	"	Plat

GROUP BY

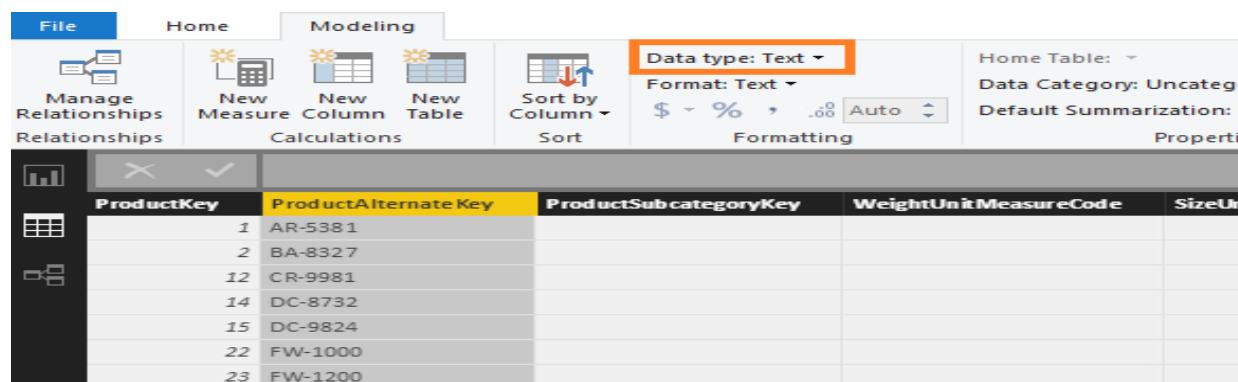
This is used to add a Group By on the data.



The screenshot shows the Power BI Query Editor interface. The ribbon at the top has tabs for Home, Transform, Add Column, and View. The Transform tab is selected. The ribbon bar contains various icons for data operations like New Source, Refresh, Manage, and Group By. The 'Group By' icon is highlighted with an orange box. Below the ribbon is a list of queries: DimProduct and FactInternetSales. A preview pane shows the DimProduct table with columns: ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, SizeUnitMeasureCode, and EnglishName. The first two rows of data are visible.

DATA TYPES

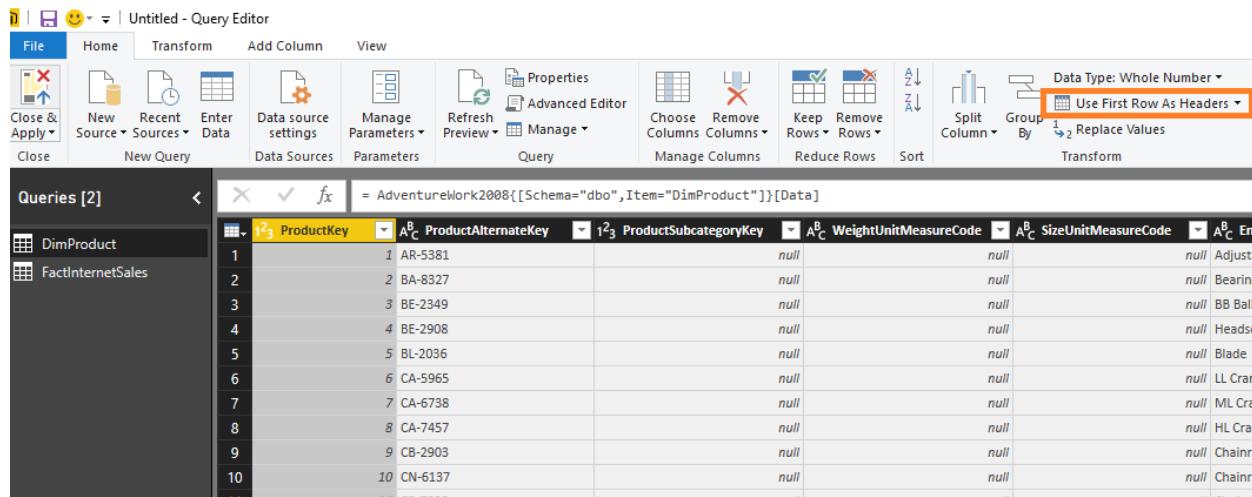
This is to store the particular data type.



The screenshot shows the Power BI Modeling tab. The ribbon has tabs for File, Home, and Modeling. The Modeling tab is selected. The ribbon bar includes icons for Manage Relationships, New Measure, New Column, and New Table. The 'Data type' dropdown is highlighted with an orange box and set to 'Text'. Below the ribbon is a table editor showing the DimProduct table with columns: ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, and SizeUnitMeasureCode. The first few rows of data are visible.

USE FIRST ROW AS HEADERS

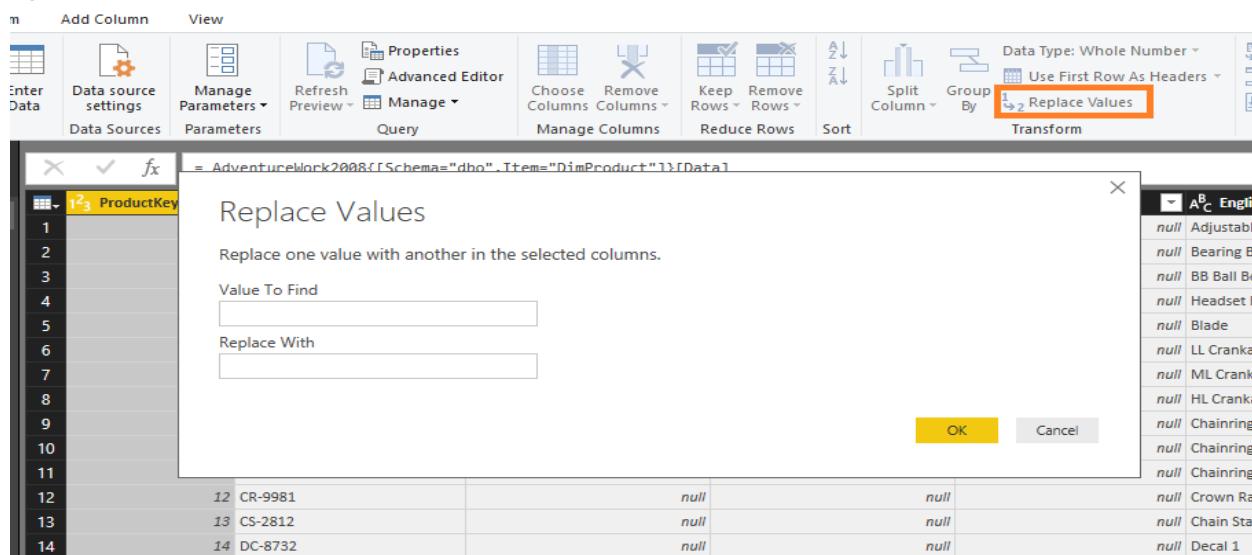
Using this we can make the first row as header.



The screenshot shows the PowerBI Query Editor interface. The ribbon at the top has 'File', 'Home', 'Transform', 'Add Column', and 'View' tabs. Under the 'Transform' tab, there are several icons for data management: Close & Apply, New Source, Recent Sources, Enter Data, Data source settings, Manage Parameters, Refresh Preview, Advanced Editor, Choose Columns, Remove Columns, Keep Rows, Remove Rows, Reduce Rows, Sort, Split Column, Group By, and Replace Values. The 'Replace Values' icon is highlighted with a red box. Below the ribbon is a list of queries: DimProduct and FactInternetSales. The main area displays a table of data from the DimProduct table, showing columns like ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, SizeUnitMeasureCode, and EnglishName. The first few rows show values such as AR-5381, BA-8327, BE-2349, etc.

REPLACE VALUES

This will replace values in the datasets for the columns

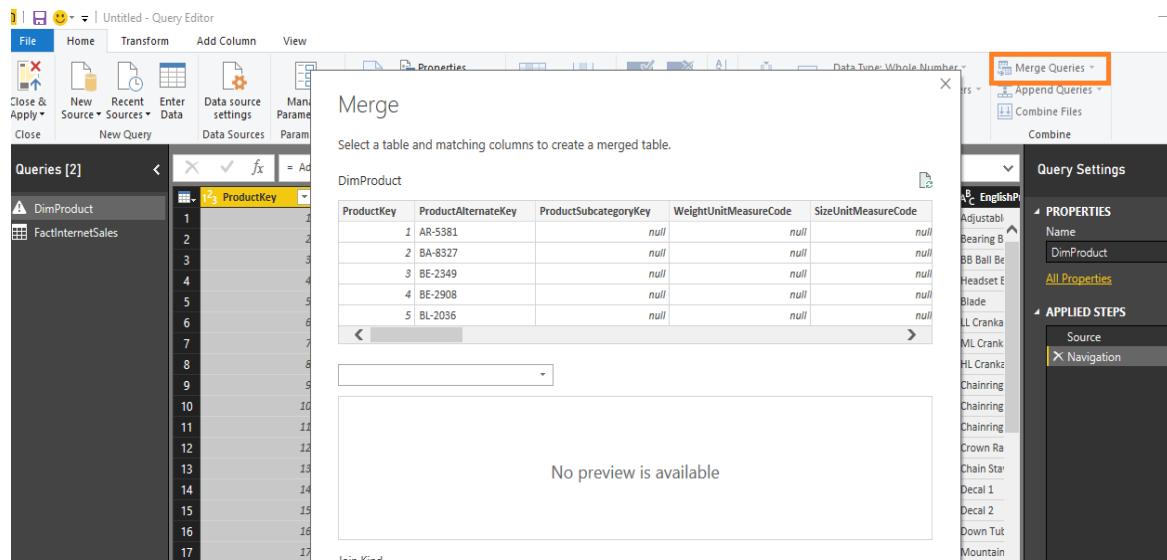


The screenshot shows the 'Replace Values' dialog box. It has a title 'Replace Values' and a sub-instruction 'Replace one value with another in the selected columns.' There are two input fields: 'Value To Find' and 'Replace With'. Below these fields is a preview of the data, showing rows 1 through 14 of the DimProduct table. The preview shows values like CR-9981, CS-2812, and DC-8732. At the bottom right of the dialog box are 'OK' and 'Cancel' buttons. The 'OK' button is highlighted with a red box.

MERGE QUERIES

This will be used to join two datasets/tables in PowerBI. We can do different types of joins like

- INNER JOIN
- LEFT OUTER JOIN
- RIGHT OUTER JOIN
- FULL OUTER JOIN



Merge

Select a table and matching columns to create a merged table.

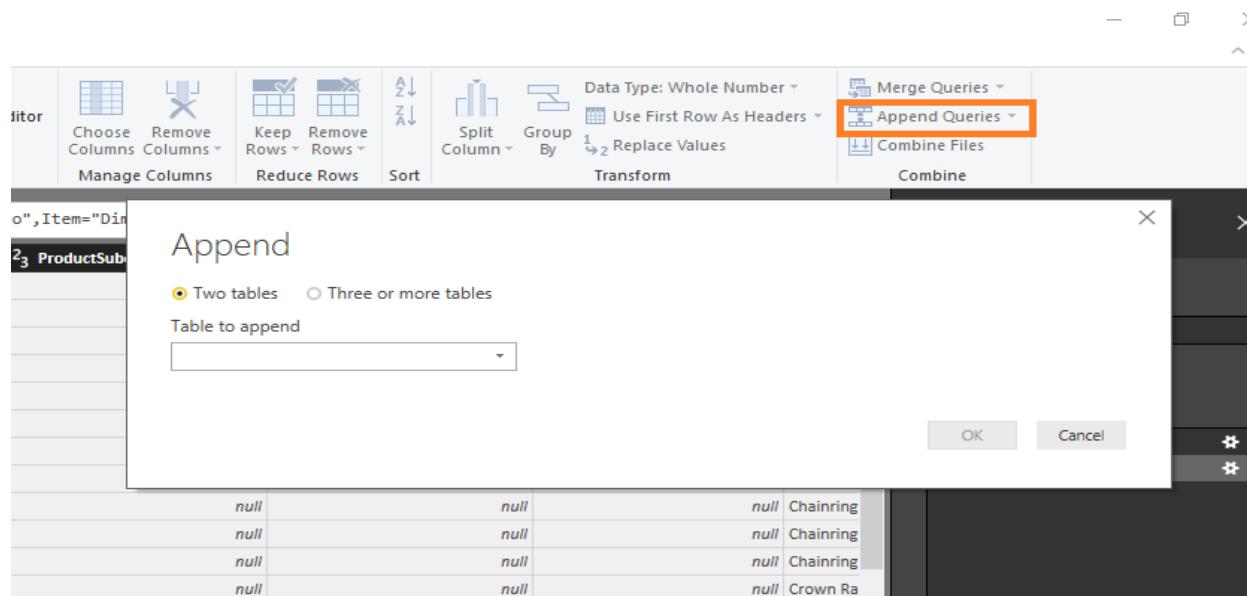
DimProduct

ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode
1 AR-5381		null	null	null
2 BA-8327		null	null	null
3 BE-2349		null	null	null
4 BE-2908		null	null	null
5 BL-2036		null	null	null

No preview is available

APPEND QUERIES

This is used to union two or more datasets/tables in Power BI.



Append

Two tables Three or more tables

Table to append

null	null	null	Chainring
null	null	null	Chainring
null	null	null	Chainring
null	null	null	Crown Ra

COMBINE FILES

This will combine two or more files in Power BI.

The screenshot shows the Power BI Advanced Editor interface. The top ribbon has tabs for Home, Insert, Page, and Transform. The Transform tab is selected, indicated by a blue background. The ribbon also includes sections for Properties, Advanced Editor, Manage, and Query.

The main area displays a table with columns: ProductSubcategoryKey, WeightUnitMeasureCode, SizeUnitMeasureCode, and EnglishProductLineName. The EnglishProductLineName column contains several null values and some specific product names like "Adjustable", "Bearing", etc.

The Query Settings pane on the right shows the following details:

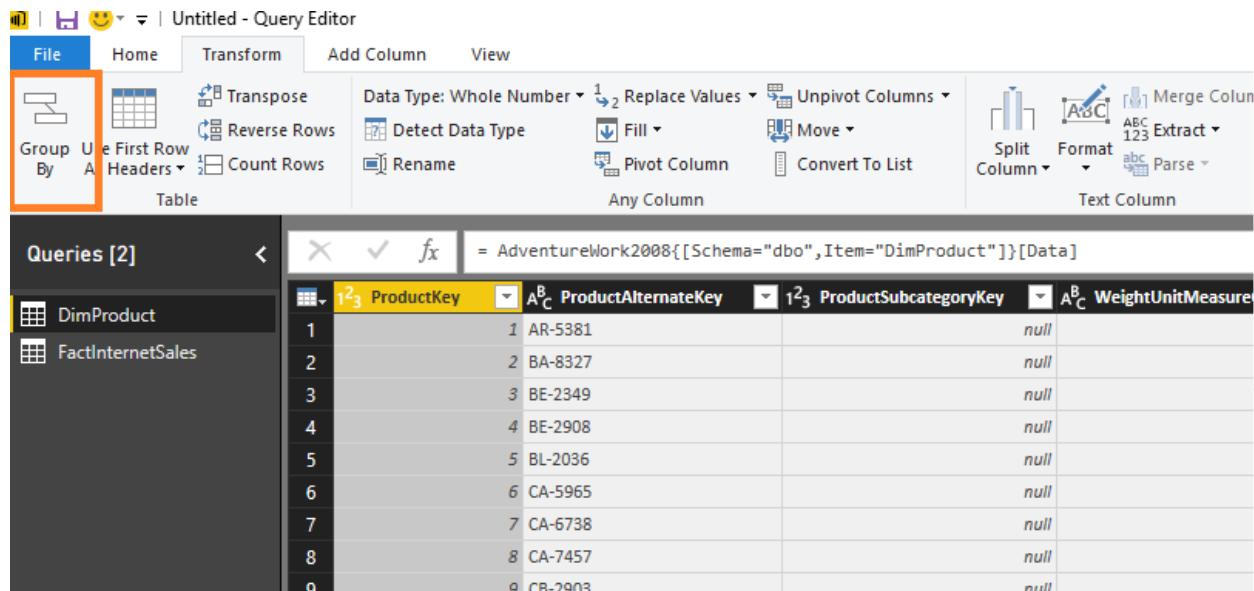
- PROPERTIES**: Name is DimProduct, with a link to All Properties.
- APPLIED STEPS**: Source is listed.

CHAPTER 6: POWER BI – ADVANCE TRANSFORMATIONS

In this chapter, we will explore advance capabilities of Power BI Data Transformation

GROUP BY

This is used to apply Group By clause on the tabular data.

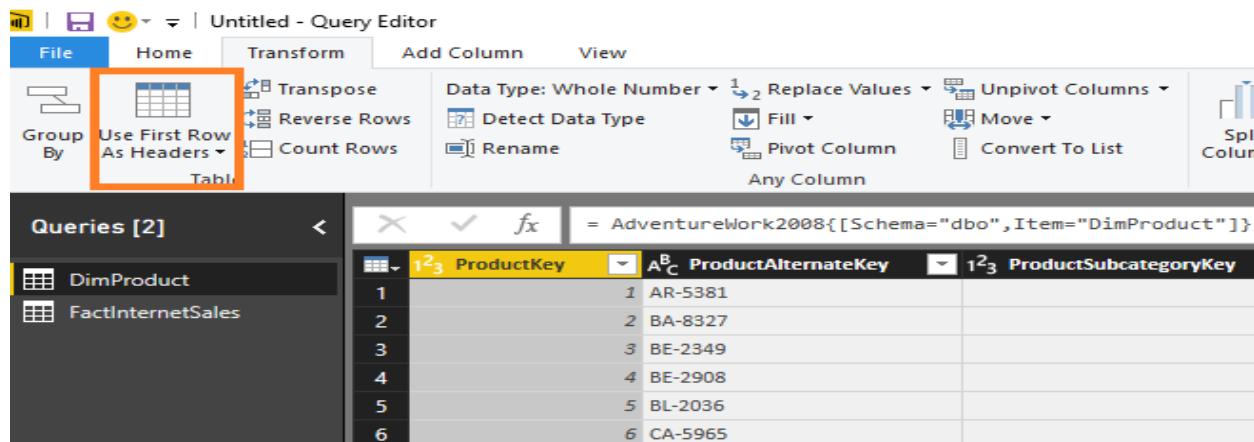


The screenshot shows the Power BI Query Editor interface. The 'Transform' tab is selected. In the toolbar, the 'Group By' icon (a table with a summary bar) is highlighted with an orange box. The 'Queries [2]' pane lists 'DimProduct' and 'FactInternetSales'. The main area displays a table with columns: ProductKey, ProductAlternateKey, ProductSubcategoryKey, and WeightUnitMeasure. The first few rows of data are:

	ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasure
1	AR-5381			null
2	BA-8327			null
3	BE-2349			null
4	BE-2908			null
5	BL-2036			null
6	CA-5965			null
7	CA-6738			null
8	CA-7457			null
9	CR-2903			null

USE FIRST ROW AS HEADER

This is used to make the first row as the header row.

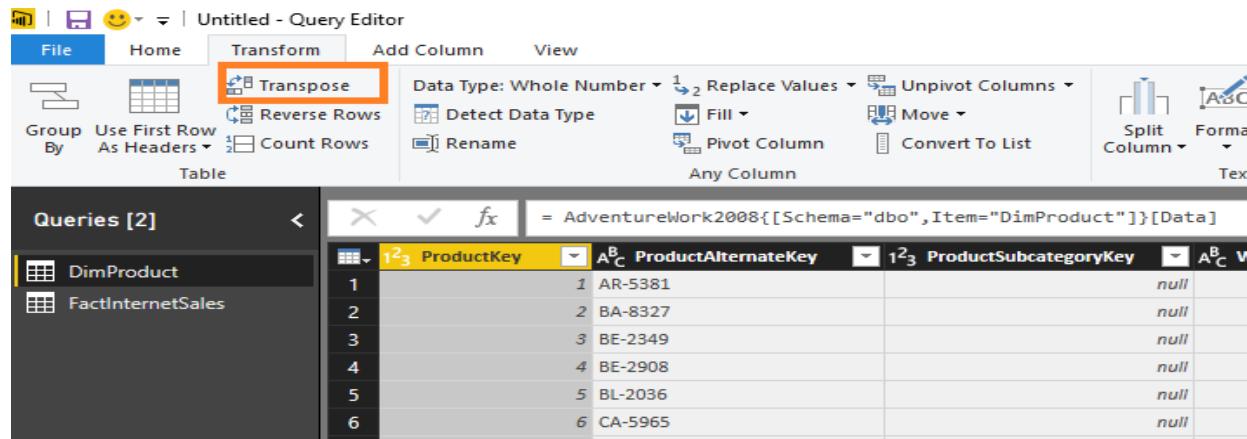


The screenshot shows the Power BI Query Editor interface. The 'Transform' tab is selected. In the toolbar, the 'Use First Row As Headers' icon (a table with a summary bar) is highlighted with an orange box. The 'Queries [2]' pane lists 'DimProduct' and 'FactInternetSales'. The main area displays a table with columns: ProductKey, ProductAlternateKey, and ProductSubcategoryKey. The first few rows of data are:

	ProductKey	ProductAlternateKey	ProductSubcategoryKey
1	AR-5381		
2	BA-8327		
3	BE-2349		
4	BE-2908		
5	BL-2036		
6	CA-5965		

TRANSPOSE

Transpose the table, treating rows as column and column as rows.

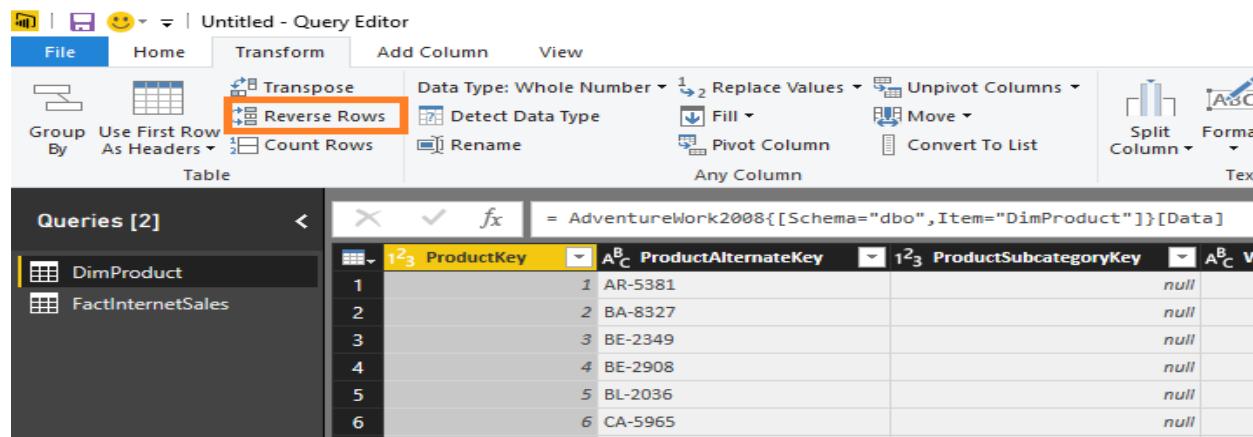


The screenshot shows the Power BI Query Editor interface. The 'Transform' tab is selected, and the 'Transpose' button is highlighted with a red box. The query editor displays a table from the Adventureworks database with columns: ProductKey, ProductAlternateKey, and ProductSubcategoryKey. The data consists of six rows of product keys. The 'Queries [2]' pane on the left shows two queries: DimProduct and FactInternetSales.

	ProductKey	ProductAlternateKey	ProductSubcategoryKey	
1	1	AR-5381		null
2	2	BA-8327		null
3	3	BE-2349		null
4	4	BE-2908		null
5	5	BL-2036		null
6	6	CA-5965		null

REVERSE ROWS

This will reverse the rows of the table. Will take the bottom rows to the top rows.

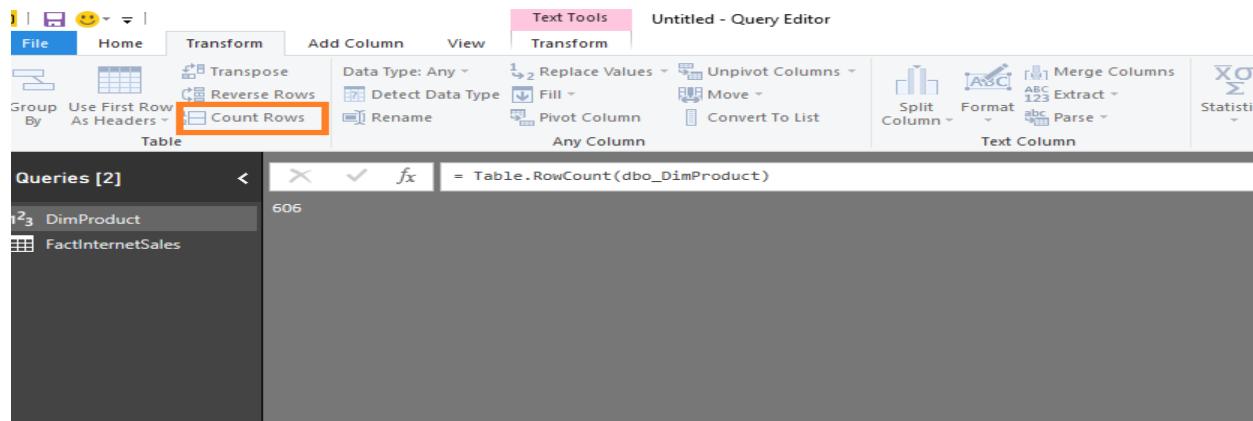


The screenshot shows the Power BI Query Editor interface. The 'Transform' tab is selected, and the 'Reverse Rows' button is highlighted with a red box. The query editor displays the same table from the Adventureworks database. The data consists of six rows of product keys. The 'Queries [2]' pane on the left shows the same two queries: DimProduct and FactInternetSales.

	ProductKey	ProductAlternateKey	ProductSubcategoryKey	
1	1	AR-5381		null
2	2	BA-8327		null
3	3	BE-2349		null
4	4	BE-2908		null
5	5	BL-2036		null
6	6	CA-5965		null

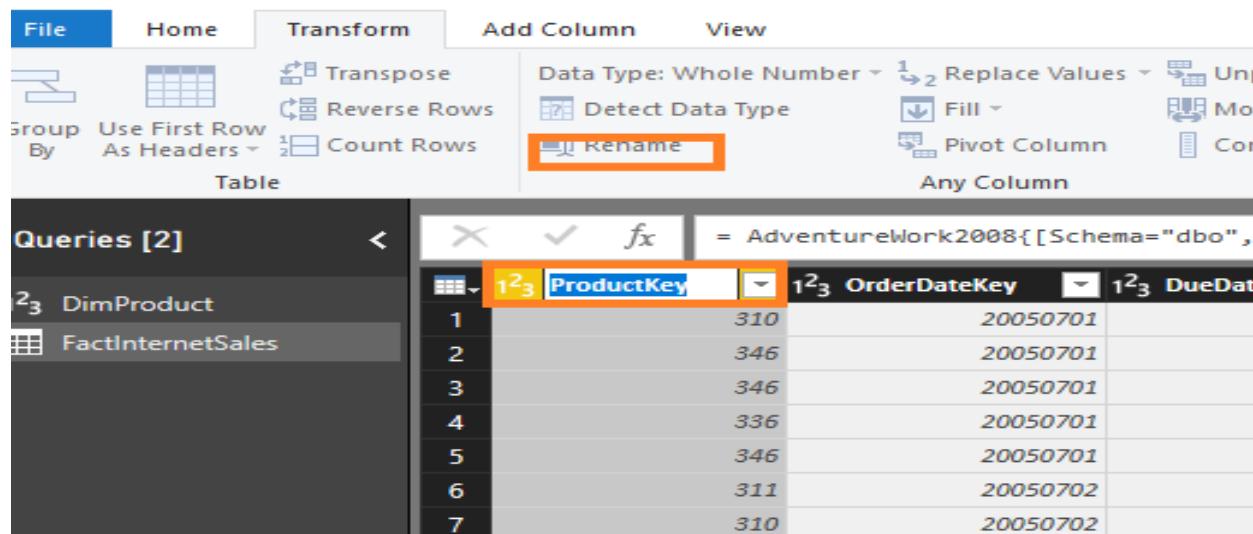
COUNT ROWS

This will count the no of rows



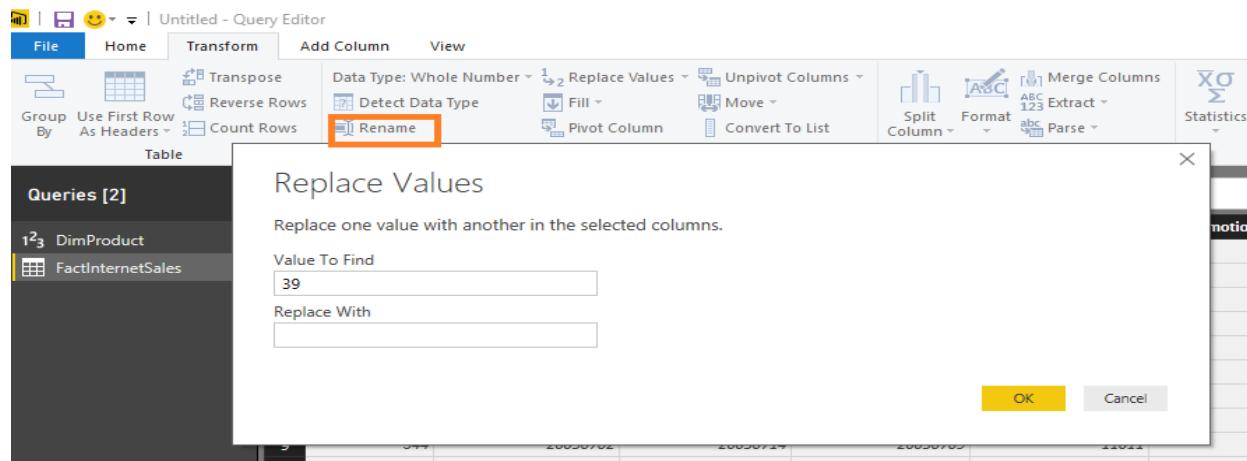
RENAME

This will rename the column names of the tabular data.



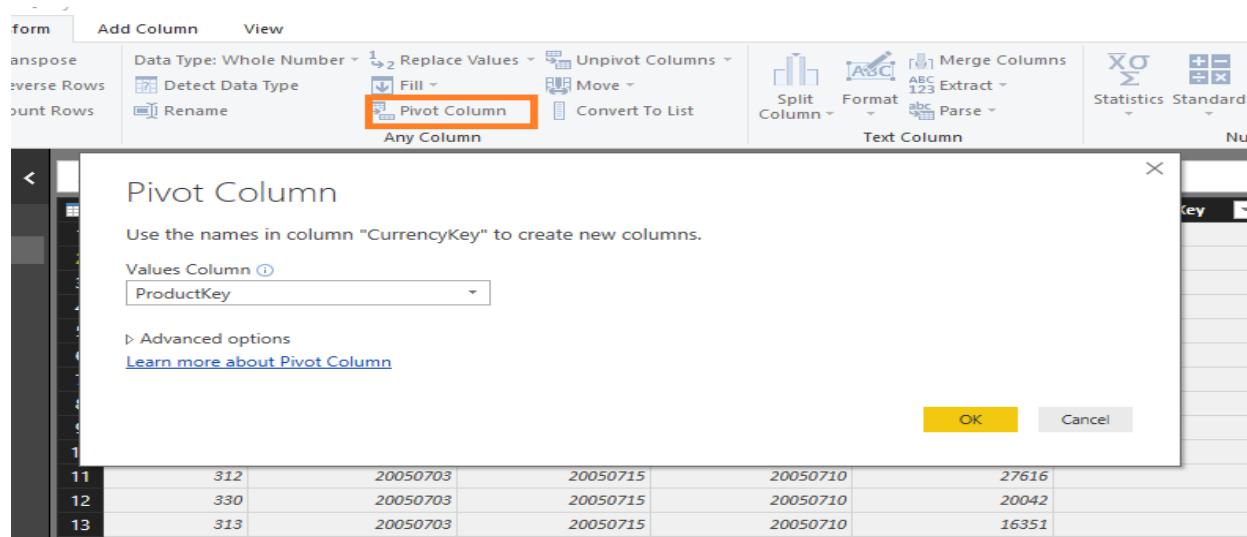
REPLACE VALUES

This will replace the values of the table



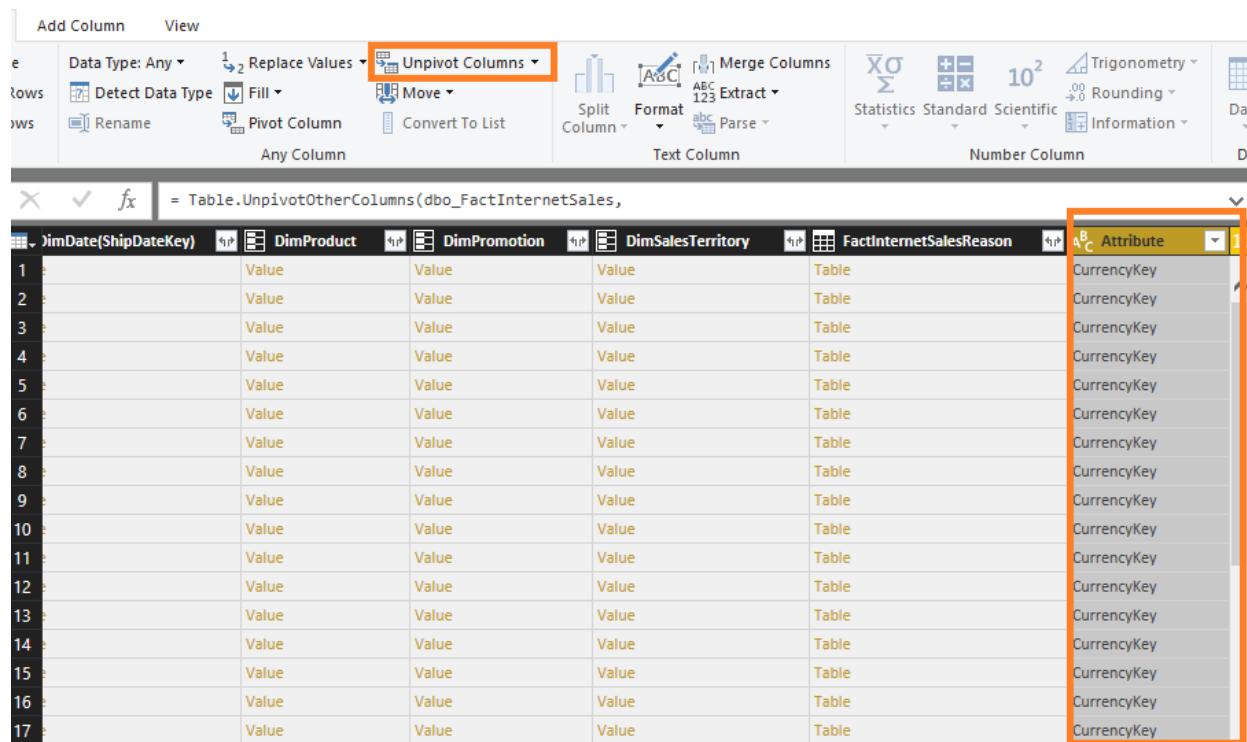
PIVOT COLUMN

This will apply Pivot on the data of Power BI.



UNPIVOT COLUMNS

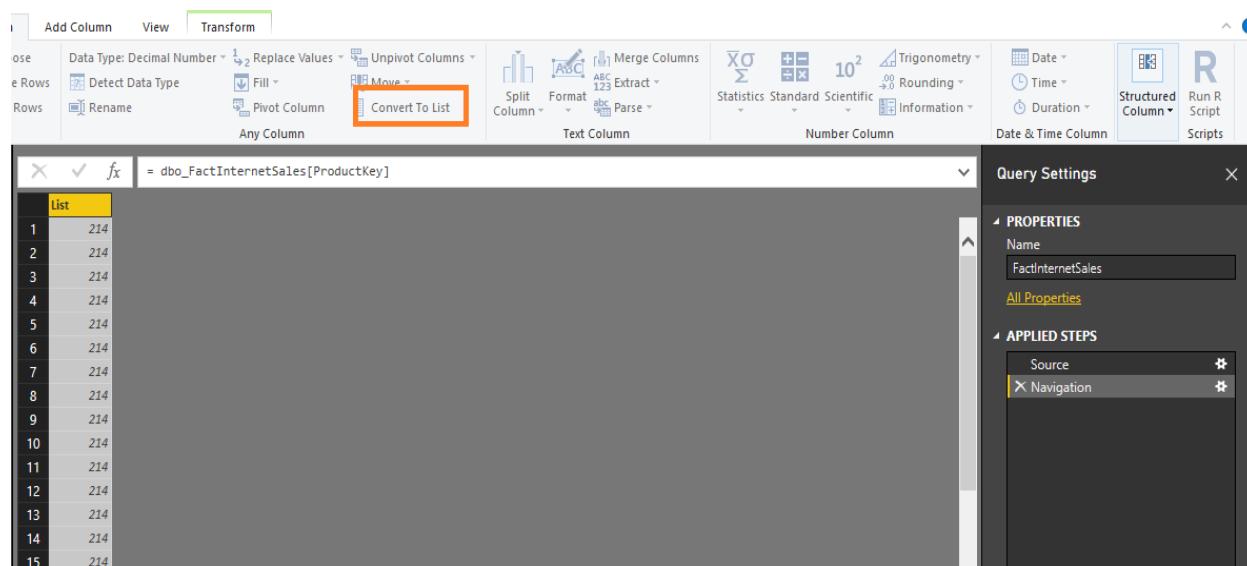
This will apply UnPivot on the data of Power BI.



The screenshot shows the Power BI Query Editor interface. The ribbon at the top has 'Add Column' and 'View' selected. The 'Transform' tab is active. The formula bar shows a query starting with 'Table.UnpivotOtherColumns(dbo_FactInternetSales,'. The 'Rows' section shows a list of columns: 'DimDate(ShipDateKey)', 'DimProduct', 'DimPromotion', 'DimSalesTerritory', 'FactInternetSalesReason', and 'Attribute'. The 'Attribute' column is highlighted with a yellow background. The 'Unpivot Columns' button in the toolbar is highlighted with a red box. A dropdown menu for 'Attribute' is open, listing 'CurrencyKey' repeated 17 times.

CONVERTTOLIST

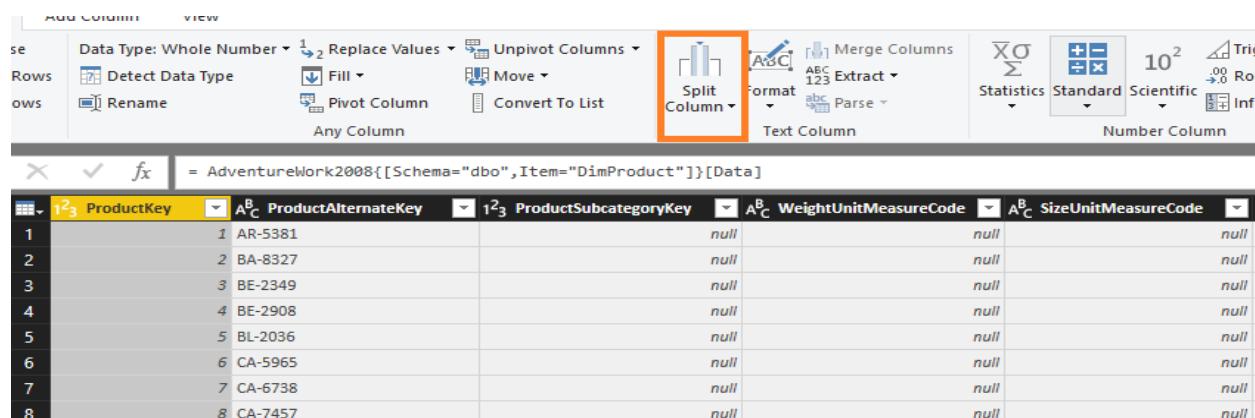
This will create the DataTable column values to List from the data of PowerBI.



The screenshot shows the Power BI Query Editor interface. The ribbon at the top has 'Add Column', 'View', and 'Transform' selected. The 'Transform' tab is active. The formula bar shows a query starting with '= dbo_FactInternetSales[ProductKey]'. The 'Rows' section shows a list of values: '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214', '214'. The 'Convert To List' button in the toolbar is highlighted with a red box. A 'Query Settings' pane on the right shows the 'Name' field set to 'FactInternetSales' and the 'Source' field set to 'Navigation'.

SPLIT COLUMN

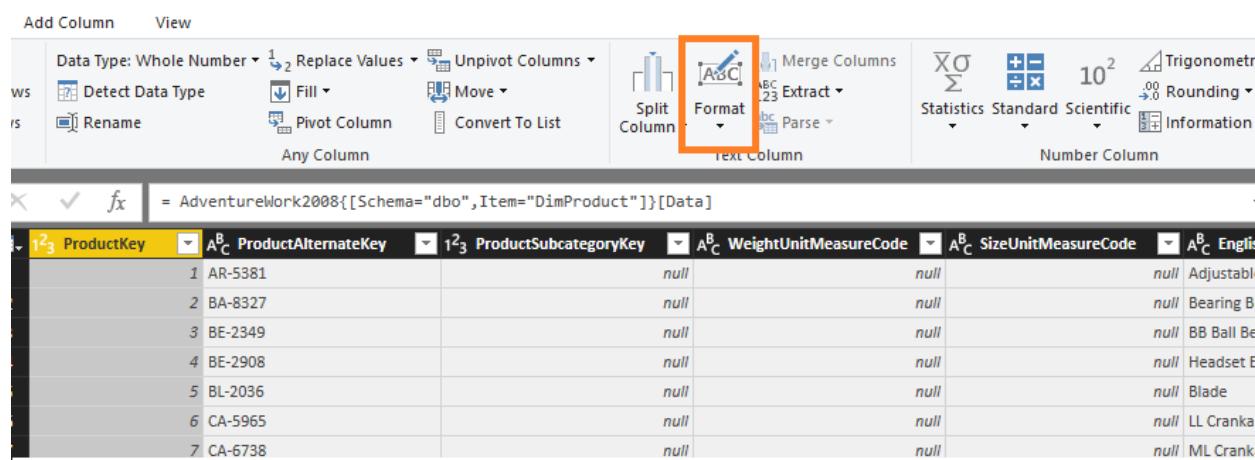
This will split the column into multiple columns based upon a split character.



The screenshot shows the Power BI desktop interface with the 'Format' ribbon tab selected. The 'Text Column' icon in the ribbon is highlighted with a red box. Below the ribbon, a table from the AdventureworksDW database is displayed, showing columns for ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, and SizeUnitMeasureCode. All rows in these columns contain the value 'null'.

FORMAT

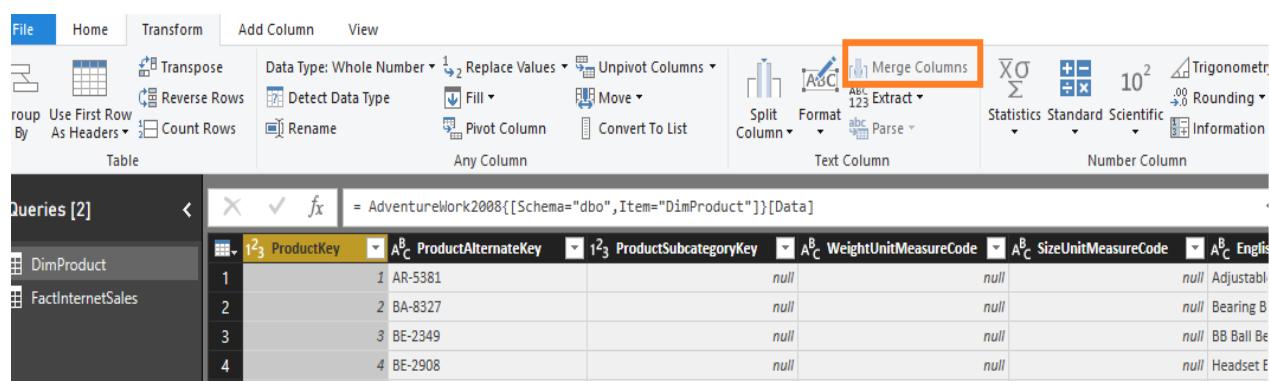
This will apply format function to the tabular data.



The screenshot shows the Power BI desktop interface with the 'Format' ribbon tab selected. The 'Text Column' icon in the ribbon is highlighted with a red box. Below the ribbon, a table from the AdventureworksDW database is displayed, showing columns for ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, SizeUnitMeasureCode, and EnglishName. The EnglishName column contains descriptive text values like 'Adjustable', 'Bearing', 'BB Ball Be', etc., which are the results of applying a format function to the original 'null' values.

MERGE COLUMNS

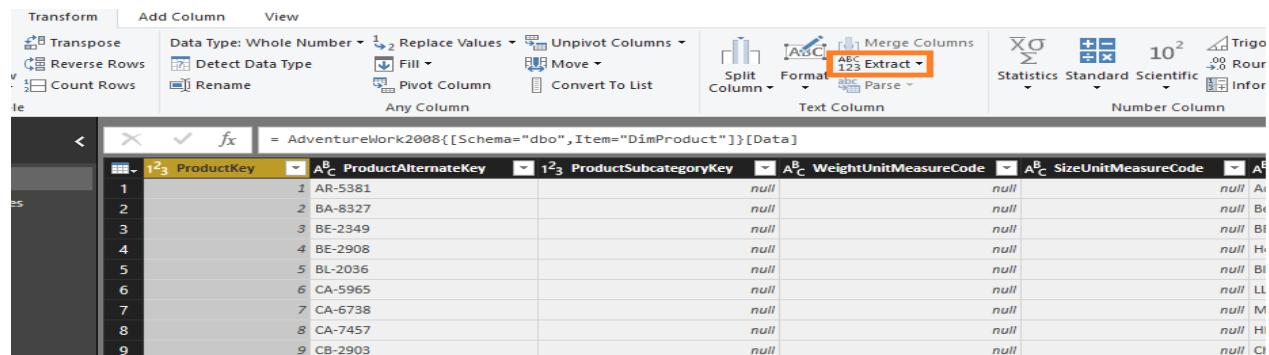
This will merge multiple columns into a single columns



The screenshot shows the Power BI desktop interface with the 'Transform' ribbon tab selected. The 'Merge Columns' icon in the ribbon is highlighted with a red box. Below the ribbon, a table from the AdventureworksDW database is displayed, showing columns for ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, SizeUnitMeasureCode, and EnglishName. The EnglishName column has been merged into the ProductSubcategoryKey column, resulting in a single column with combined text values.

EXTRACT

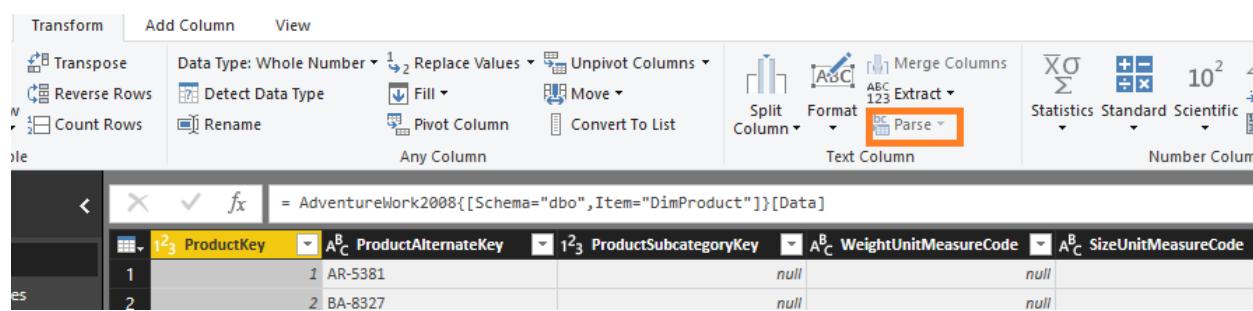
Extract character from text value



The screenshot shows the Power BI Data Editor interface. The ribbon at the top has 'Transform' selected. In the 'Text Column' section of the ribbon, the 'Extract' button is highlighted with a red box. Below the ribbon is a preview pane showing the first 10 rows of a table named 'AdventureWork2008{[Schema="dbo",Item="DimProduct"]}[Data]'. The columns are ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, and SizeUnitMeasureCode. The 'ProductAlternateKey' column contains values like 'AR-5381', 'BA-8327', etc., while the other columns have 'null' values.

PARSE

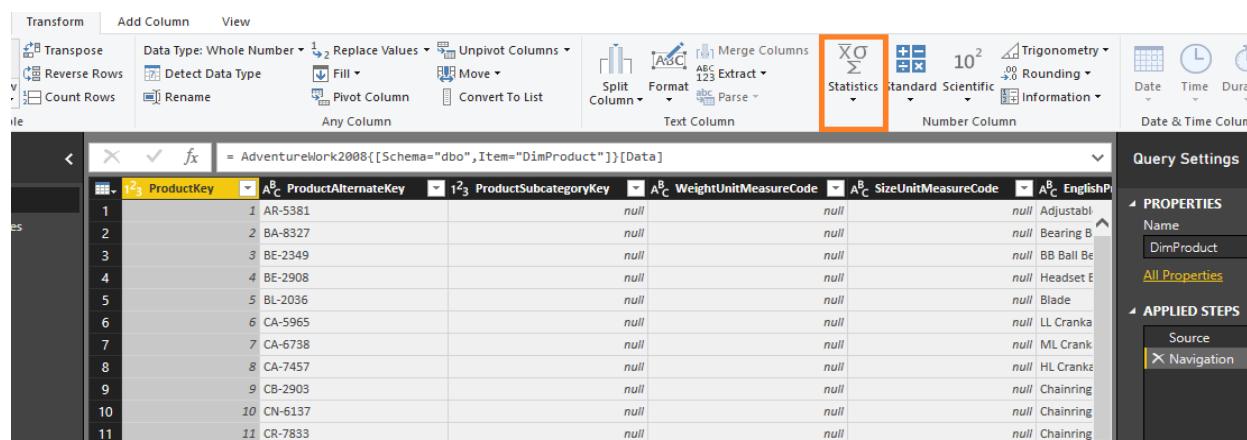
Extract rows and column from XML or JSON format texted



This screenshot shows the same Power BI Data Editor interface as the previous one, but the 'Parse' button in the 'Text Column' ribbon section is highlighted with a red box. The preview pane shows the same table structure, but only the first two rows are visible. The 'ProductAlternateKey' column now displays the extracted parts of the string, such as 'AR' and '5381' for the first row.

STATISTICS

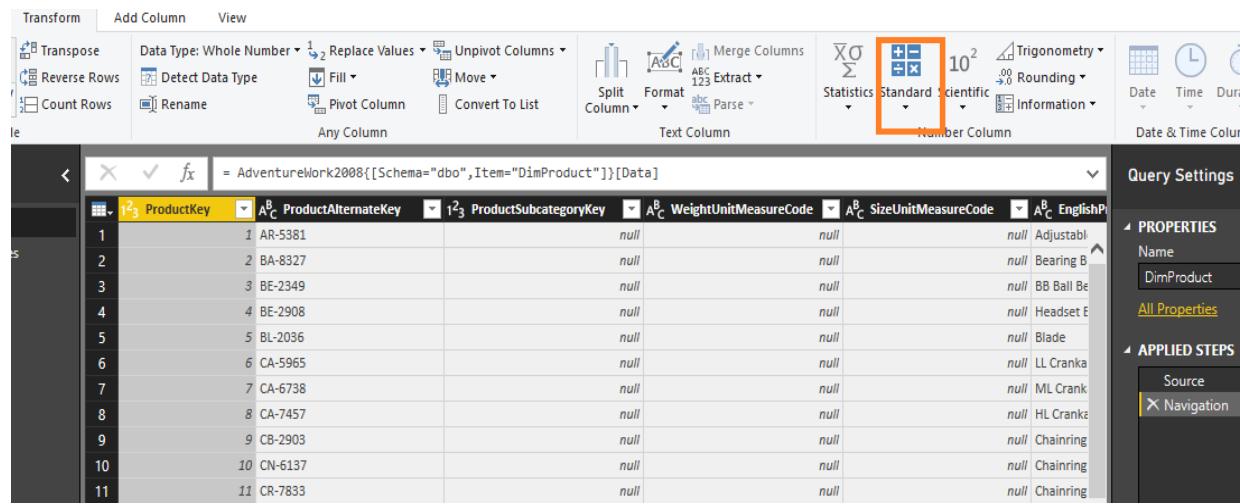
Perform statistical operations.



In this screenshot, the 'Statistics' button in the 'Number Column' ribbon section is highlighted with a red box. The preview pane shows the same table, and the 'SizeUnitMeasureCode' column now displays numerical values corresponding to the categories in the original text data. A 'Query Settings' pane on the right side of the editor shows the 'Properties' section with 'Name' set to 'DimProduct' and the 'Applied Steps' section showing a single step named 'Navigation'.

STANDARD

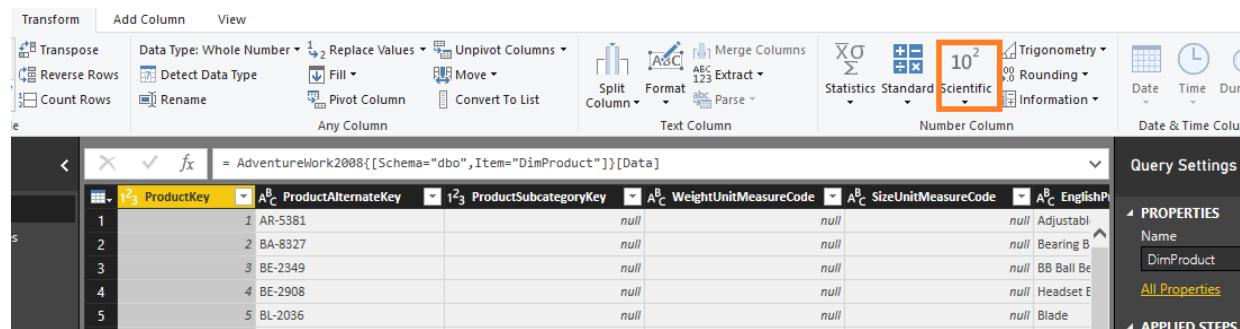
Performs basic math operations



The screenshot shows the Power BI Data Editor interface. The ribbon at the top has tabs for Transform, Add Column, and View. The Transform tab is active. On the right side, there's a ribbon bar with various icons. The 'Number Column' section of the ribbon is highlighted with a red box. Below the ribbon is a preview pane showing a table of data from the AdventureworksDW database. The preview pane includes a formula bar with '= AdventureWork2008{[Schema="dbo",Item="DimProduct"]}[Data]' and a column selector bar above the table. To the right of the preview pane is a 'Query Settings' sidebar.

SCIENTIFIC

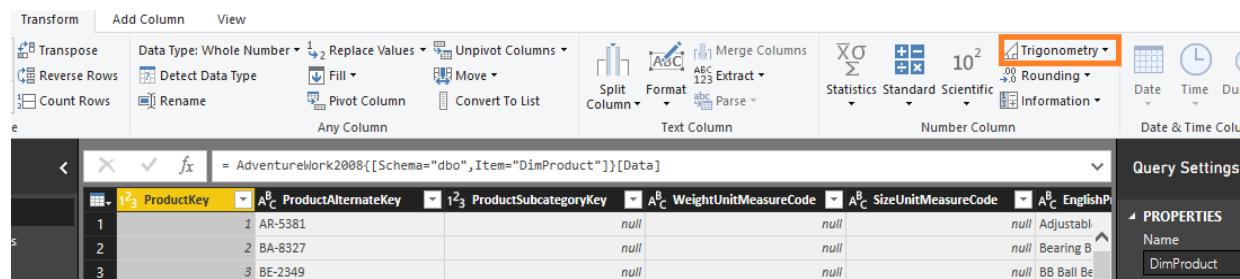
Performs scientific operations



This screenshot is identical to the one above, except the 'Scientific' tab in the ribbon is highlighted with a red box instead of 'Standard'. The preview pane and Query Settings sidebar remain the same.

TRIGONOMETRY

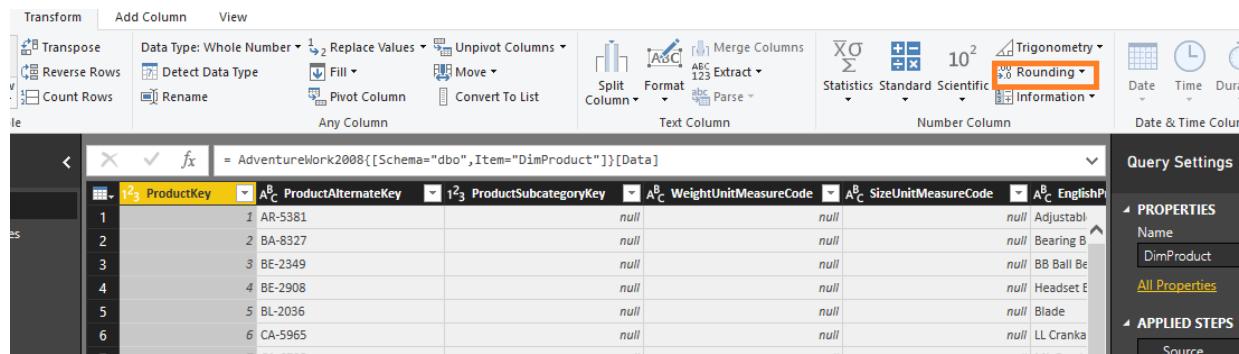
Performs trigonometric operations



This screenshot is identical to the ones above, except the 'Trigonometry' tab in the ribbon is highlighted with a red box. The preview pane and Query Settings sidebar remain the same.

ROUNDING

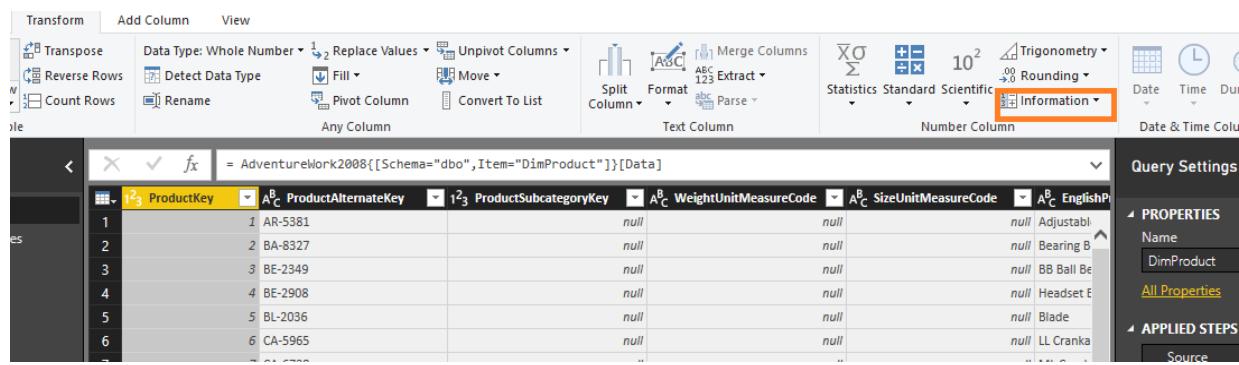
Perform rounding on number values



The screenshot shows the Power BI Data Editor interface. The ribbon at the top has the 'Transform' tab selected. In the 'Number Column' section of the ribbon, the 'Rounding' button is highlighted with a red box. The main area displays a table of data from the Adventureworks database, specifically the DimProduct table. The columns shown are ProductKey, ProductAlternateKey, ProductSubcategoryKey, WeightUnitMeasureCode, SizeUnitMeasureCode, and EnglishProductName. The 'SizeUnitMeasureCode' column contains numerical values like 10^2, which are being rounded. The 'Properties' pane on the right shows the query name as 'DimProduct' and the 'Applied Steps' pane shows the 'Source' step.

INFORMATION

Extract information about a column

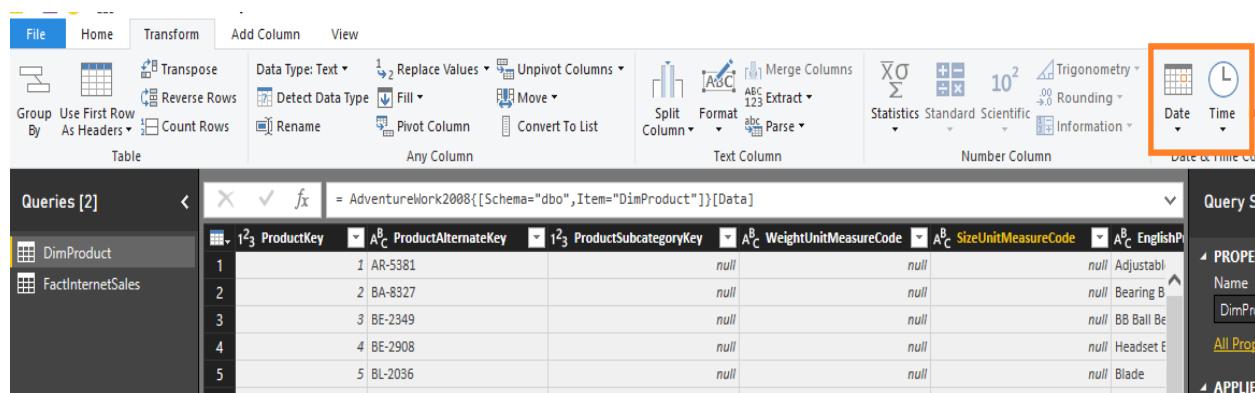


This screenshot is identical to the previous one, showing the Power BI Data Editor with the 'Transform' tab selected. The 'Information' button in the ribbon is highlighted with a red box. The main area shows the same DimProduct table data. The 'Properties' pane and 'Applied Steps' pane are also visible on the right side.

DATE & TIME COLUMN

Date column-Format data value or extract elements of date values

Date column- Format time value or extract elements of time values



The screenshot shows the Power BI Data Editor with the 'Transform' tab selected. The 'Date & Time' button in the ribbon is highlighted with a red box. The main area shows the DimProduct table data. The 'Properties' pane and 'Applied Steps' pane are visible on the right side.

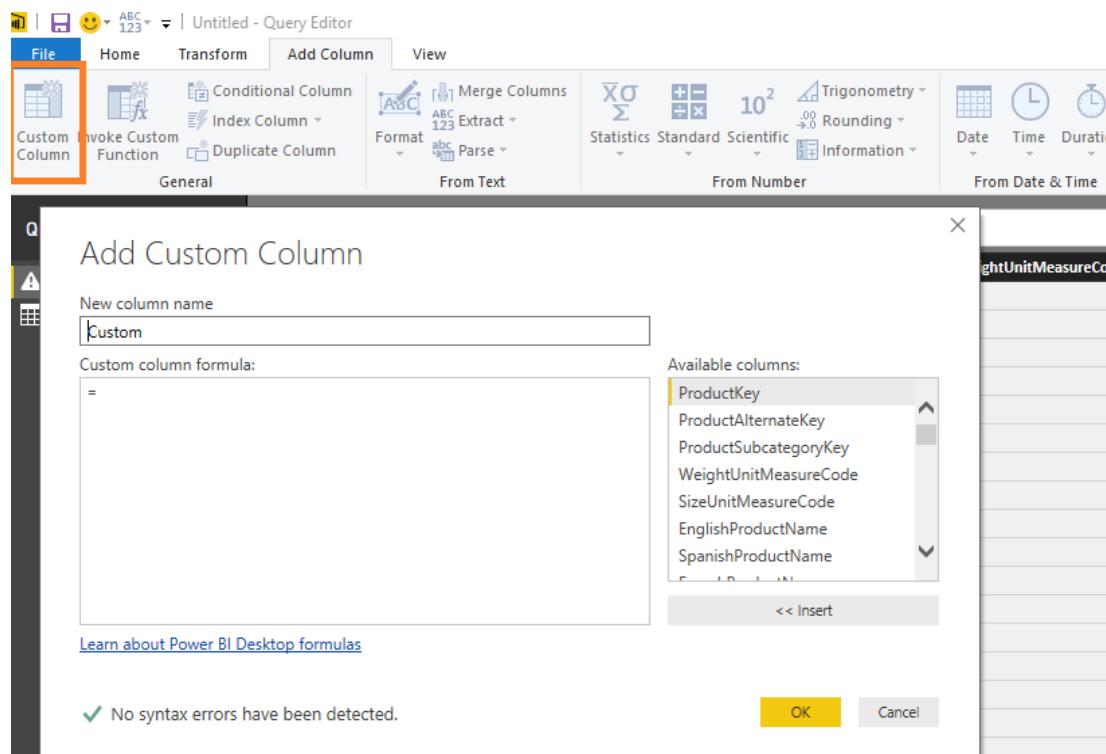
CHAPTER 7: CALCULATED COLUMNS IN DATA TRANSFORMATION

In this Chapter, will explore different types of Calculations in Power BI. We will understand how to add different types of columns in Data Transformation of Power BI.

Power BI Supports different types of calculations for create new calculated columns in the existing data.

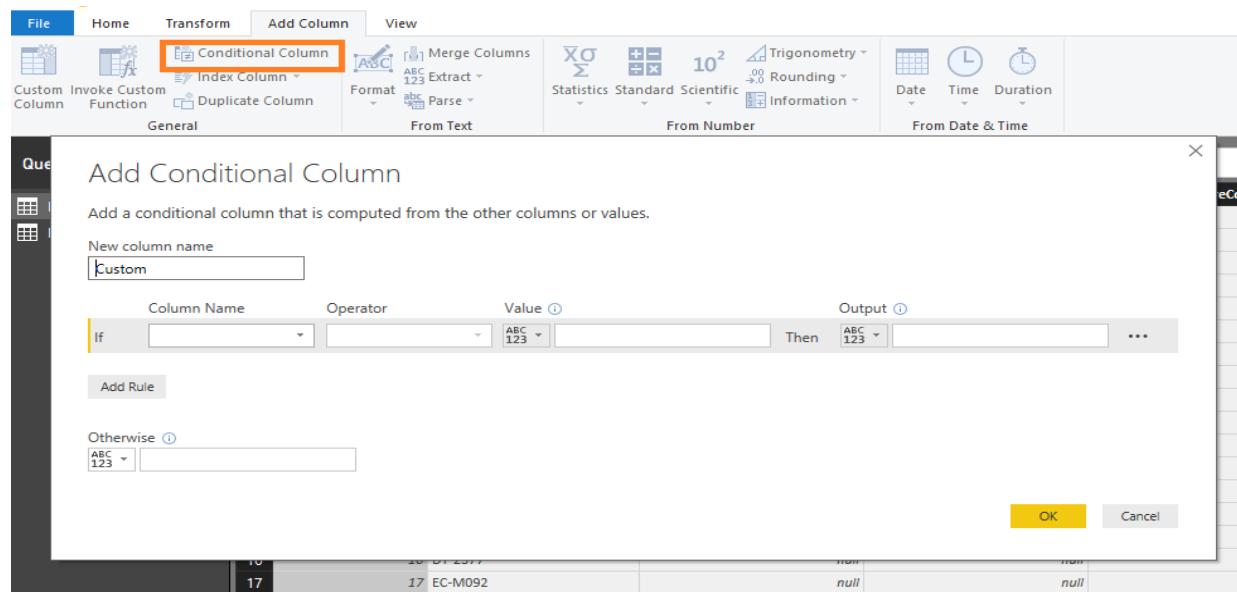
CUSTOM COLUMN

Create new column on this table based on the custom formula.



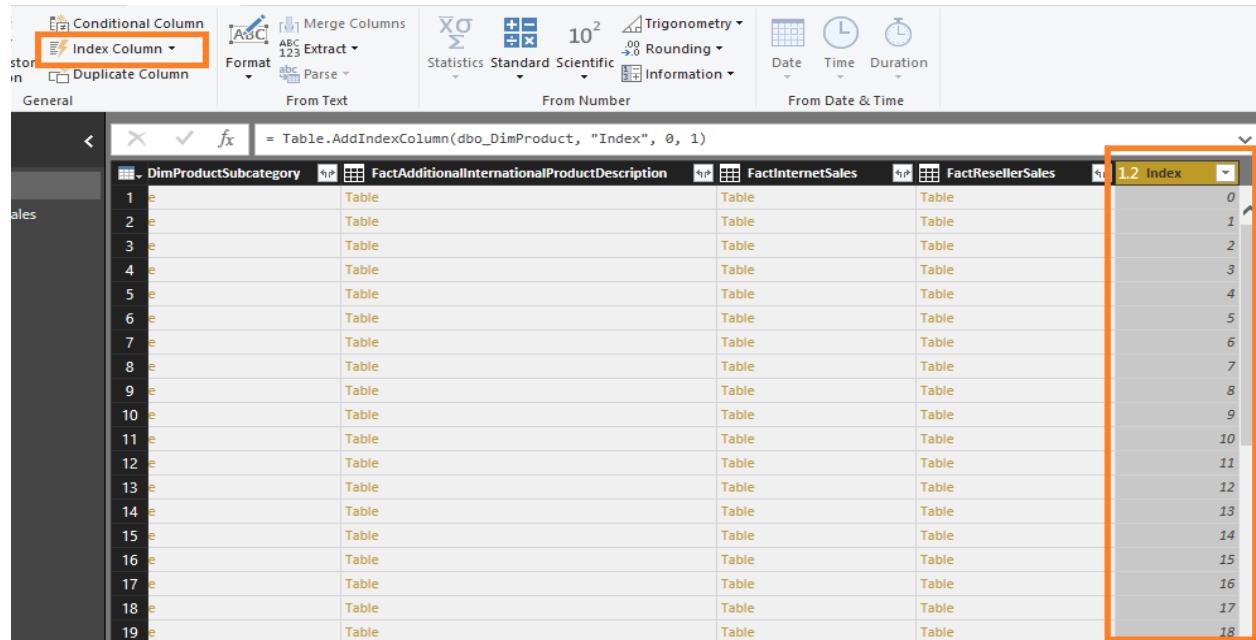
CONDITIONAL COLUMN

Create new column that conditionally add the values in the currently selected column



INDEX COLUMN

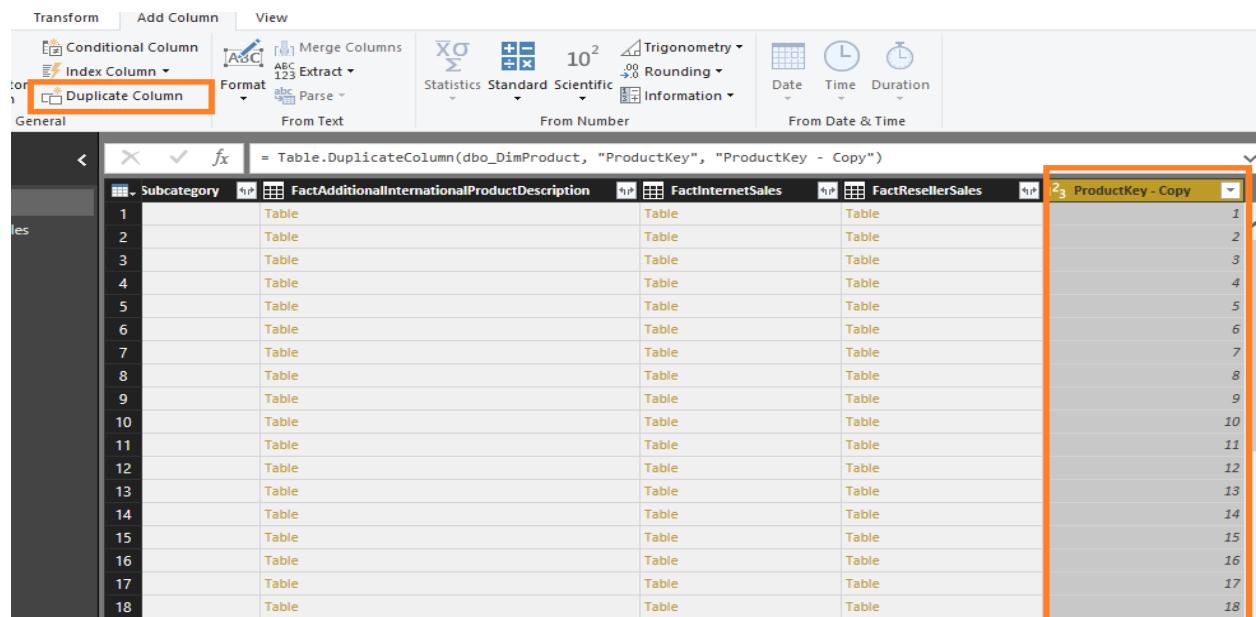
Creates a new column with an index starting at 0



The screenshot shows the Power BI Data Editor interface. The ribbon at the top has 'Transform' selected. The 'Add Column' tab is active, showing options like 'Conditional Column', 'Index Column' (which is highlighted with an orange box), and 'Duplicate Column'. Below the ribbon is a formula bar with the expression `= Table.AddIndexColumn(dbo_DimProduct, "Index", 0, 1)`. The main area displays a table with four columns: Subcategory, FactAdditionalInternationalProductDescription, FactInternetSales, and FactResellerSales. A new column titled '1.2 Index' is added to the right, containing numerical values from 0 to 18. An orange box highlights this new column.

DUPLICATE COLUMN

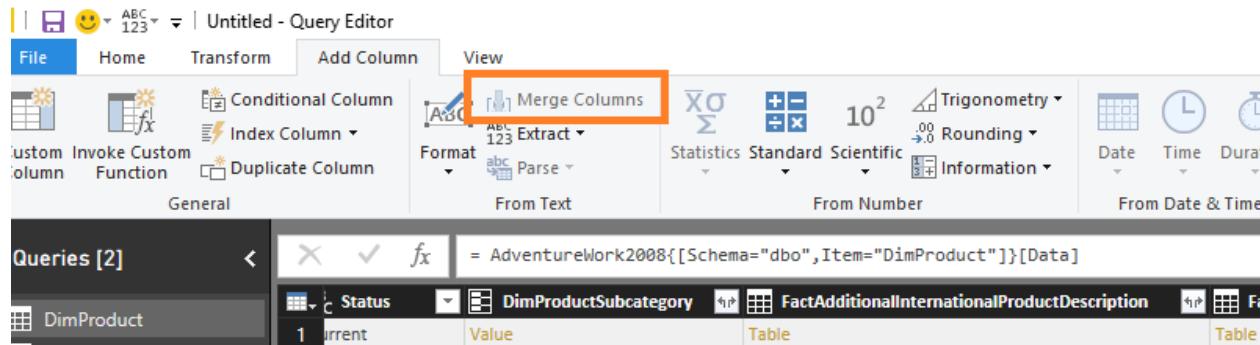
Create new column that duplicates the value in the currently selected column



The screenshot shows the Power BI Data Editor interface. The ribbon at the top has 'Transform' selected. The 'Add Column' tab is active, showing options like 'Conditional Column', 'Index Column', and 'Duplicate Column' (which is highlighted with an orange box). Below the ribbon is a formula bar with the expression `= Table.DuplicateColumn(dbo_DimProduct, "ProductKey", "ProductKey - Copy")`. The main area displays a table with four columns: Subcategory, FactAdditionalInternationalProductDescription, FactInternetSales, and FactResellerSales. A new column titled '2.3 ProductKey - Copy' is added to the right, containing identical values as the original 'ProductKey' column. An orange box highlights this new column.

MERGE COLUMNS

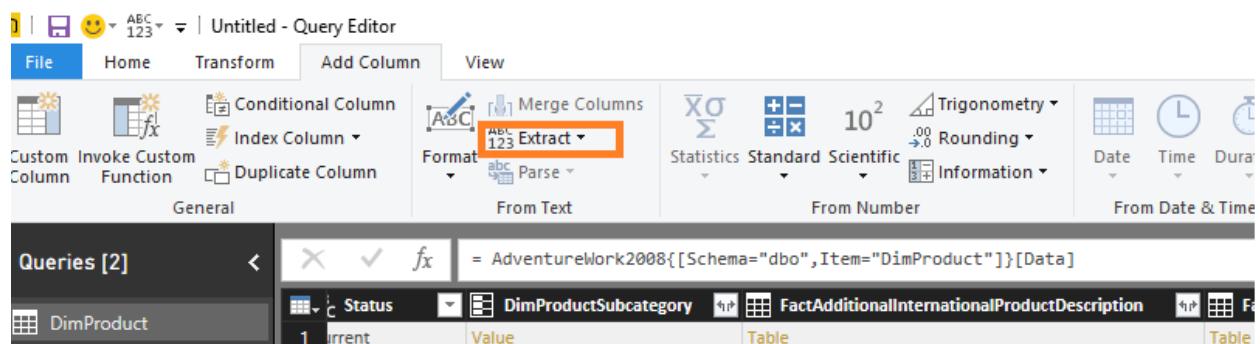
Create new column based on the concatenation of the currently selected column



The screenshot shows the Power BI Query Editor interface. The ribbon is visible at the top with the 'Transform' tab selected. In the 'Merge Columns' section of the ribbon, the 'Merge Columns' button is highlighted with a red box. Below the ribbon, the 'Queries [2]' pane shows two tables: 'DimProduct' and 'DimProductSubcategory'. The 'DimProduct' table is currently selected, and its details are shown in the bottom pane.

EXTRACT

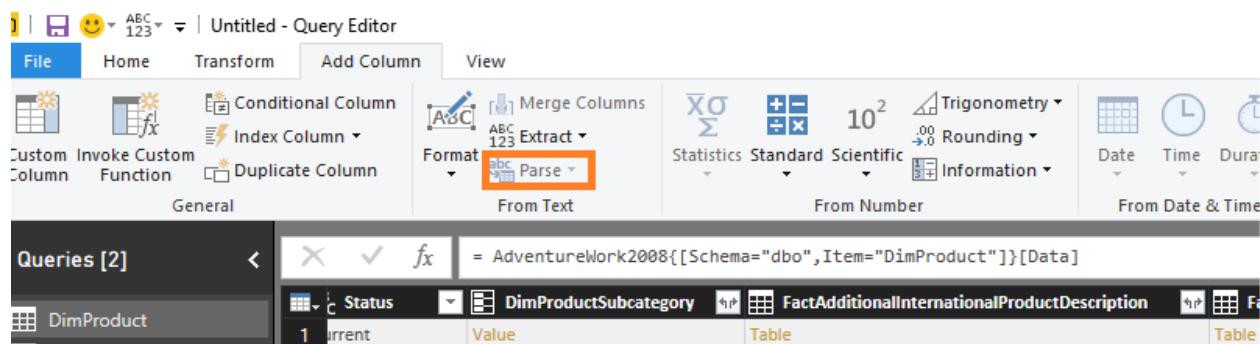
Extract character from text value



The screenshot shows the Power BI Query Editor interface. The ribbon is visible at the top with the 'Transform' tab selected. In the 'Extract' section of the ribbon, the 'Extract' button is highlighted with a red box. Below the ribbon, the 'Queries [2]' pane shows two tables: 'DimProduct' and 'DimProductSubcategory'. The 'DimProduct' table is currently selected, and its details are shown in the bottom pane.

PARSE

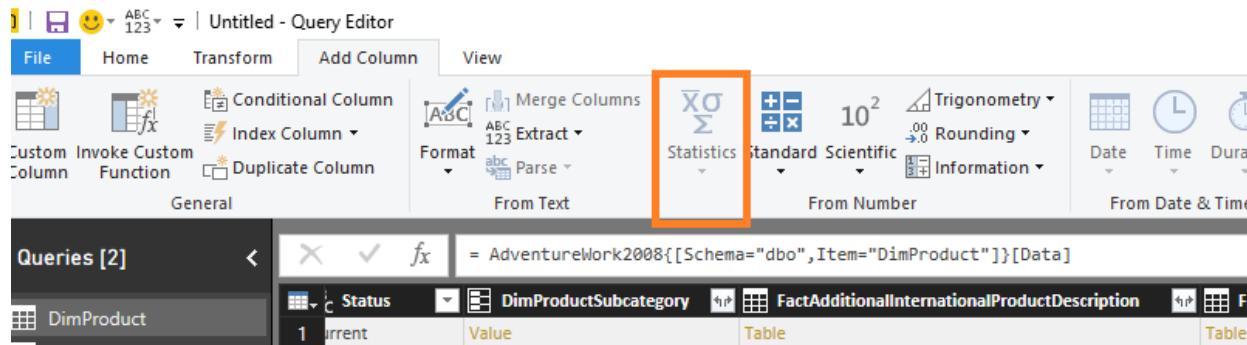
Extract rows and column from XML or JSON format texted



The screenshot shows the Power BI Query Editor interface. The ribbon is visible at the top with the 'Transform' tab selected. In the 'Parse' section of the ribbon, the 'Parse' button is highlighted with a red box. Below the ribbon, the 'Queries [2]' pane shows two tables: 'DimProduct' and 'DimProductSubcategory'. The 'DimProduct' table is currently selected, and its details are shown in the bottom pane.

STATISTICS

Perform statistical operations.

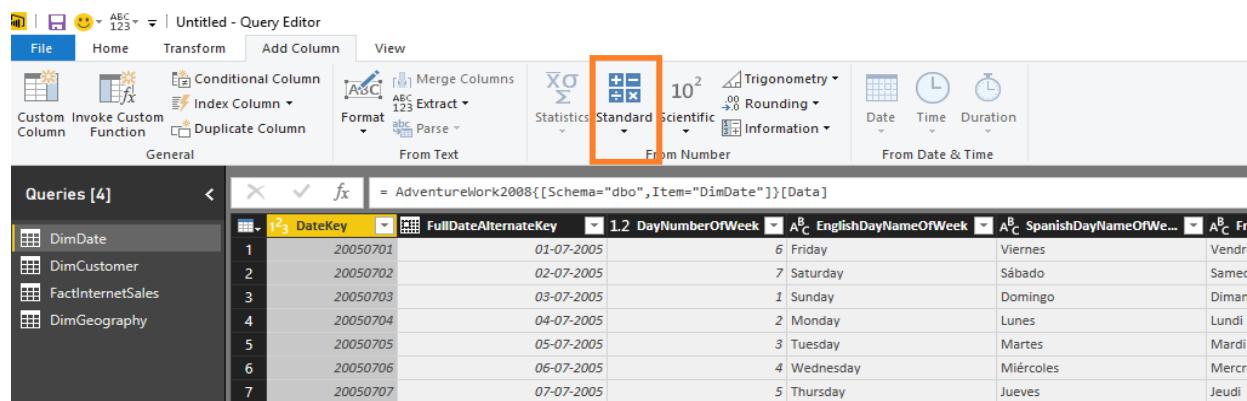


The screenshot shows the Power BI Query Editor interface. The ribbon has tabs: File, Home, Transform, Add Column, View. The View tab is selected. On the far right of the ribbon, there are several icons: Trigonometry, Rounding, Information, Date, Time, Duration, From Date & Time. In the center of the ribbon, there is a group of icons labeled 'Format' with sub-options: Statistics, Standard, Scientific, From Number. The 'Statistics' icon is highlighted with a red box. Below the ribbon, the 'Queries [2]' pane shows two queries: 'DimProduct' and 'DimProductSubcategory'. The main area displays the DimProduct query results:

	Status	DimProductSubcategory	FactAdditionalInternationalProductDescription
1	Current	Value	Table

STANDARD

Perform statistical operations.

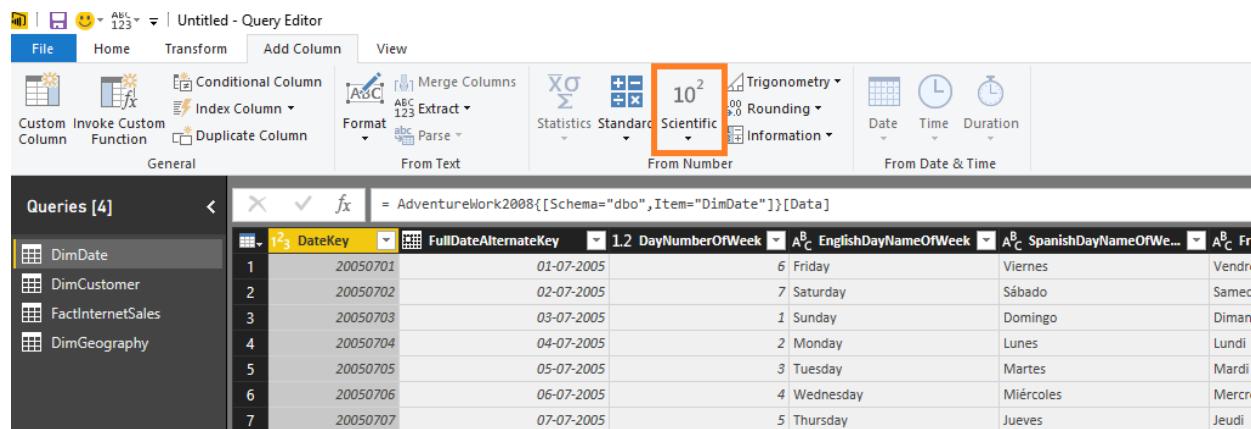


The screenshot shows the Power BI Query Editor interface. The ribbon has tabs: File, Home, Transform, Add Column, View. The View tab is selected. On the far right of the ribbon, there are several icons: Trigonometry, Rounding, Information, Date, Time, Duration, From Date & Time. In the center of the ribbon, there is a group of icons labeled 'Format' with sub-options: Statistics, Standard, Scientific, From Number. The 'Standard' icon is highlighted with a red box. Below the ribbon, the 'Queries [4]' pane shows four queries: 'DimDate', 'DimCustomer', 'FactInternetSales', and 'DimGeography'. The main area displays the DimDate query results:

DateKey	FullDateAlternateKey	DayNumberOfWeek	EnglishDayNameOfWeek	SpanishDayNameOfWeek	FrenchDayNameOfWeek
20050701	01-07-2005	6	Friday	Viernes	Vendre
20050702	02-07-2005	7	Saturday	Sábado	Samedi
20050703	03-07-2005	1	Sunday	Domingo	Dimanc
20050704	04-07-2005	2	Monday	Lunes	Lundi
20050705	05-07-2005	3	Tuesday	Martes	Mardi
20050706	06-07-2005	4	Wednesday	Miércoles	Mercre
20050707	07-07-2005	5	Thursday	Jueves	Jeudi

SCIENTIFIC

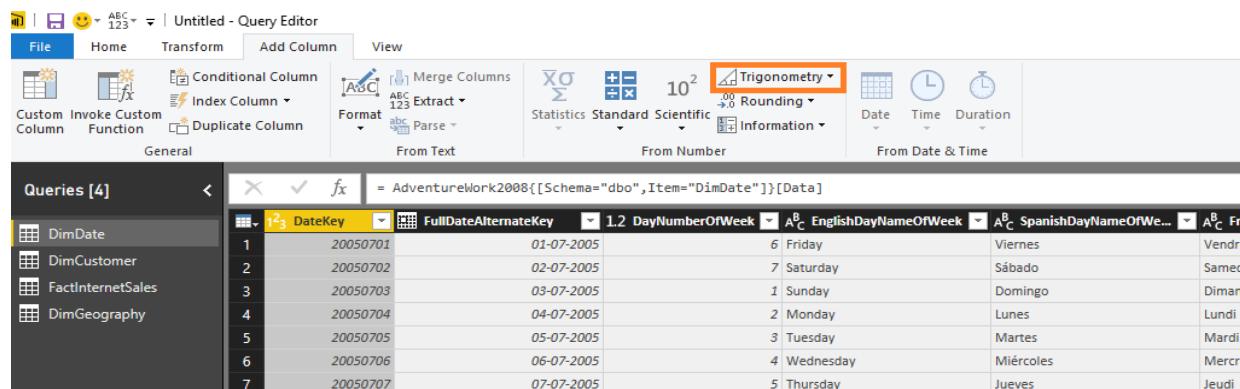
Performs scientific operations



The screenshot shows the Power BI Query Editor interface. The ribbon at the top has tabs for File, Home, Transform, Add Column, and View. Under the View tab, there are several buttons: Conditional Column, Merge Columns, Statistics, Standard, Scientific (which is highlighted with a red box), Trigonometry, Rounding, Date, Time, Duration, and From Date & Time. Below the ribbon is a list of queries: DimDate, DimCustomer, FactInternetSales, and DimGeography. The main area displays a table of data from the DimDate query. The columns are: DateKey, FullDateAlternateKey, DayNumberOfWeek, EnglishDayNameOfWeek, SpanishDayNameOfWeek, and FrenchDayNameOfWeek. The data shows dates from July 1, 2005, to July 7, 2005, with corresponding day names in English, Spanish, and French.

TRIGONOMETRY

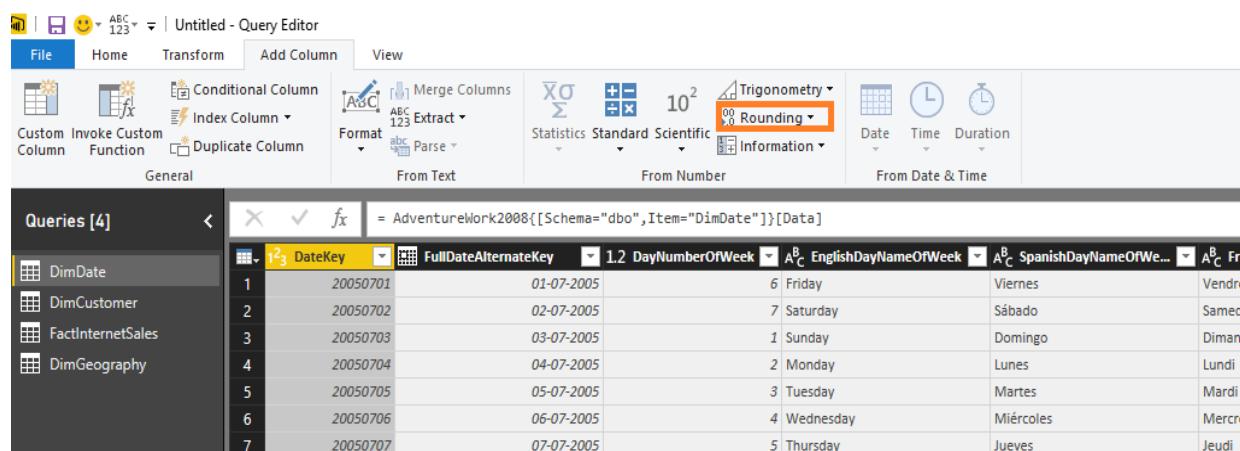
Performs trigonometric operations



This screenshot is identical to the one above, showing the Power BI Query Editor with the Trigonometry button highlighted in the ribbon's View tab. The data table for DimDate remains the same, displaying the days of the week from July 1 to July 7, 2005.

ROUNDING

Perform rounding on number values



This screenshot is identical to the previous ones, showing the Power BI Query Editor with the Rounding button highlighted in the ribbon's View tab. The data table for DimDate is the same, showing the days of the week from July 1 to July 7, 2005.

INFORMATION

Extract information about a column

The screenshot shows the Power BI Query Editor interface. A date column named 'DateKey' is selected. A context menu is open over the column header, with the 'Information' option highlighted. The menu also includes options like 'Conditional Column', 'Index Column', 'Format', 'Parse', and various numerical and trigonometric functions.

DateKey	FullDateAlternateKey	DayNumberOfWeek	EnglishDayNameOfWeek	SpanishDayNameOfWeek	FrenchDayNameOfWeek
20050701	01-07-2005	6	Friday	Viernes	Vendredi
20050702	02-07-2005	7	Saturday	Sábado	Samedi
20050703	03-07-2005	1	Sunday	Domingo	Dimanche
20050704	04-07-2005	2	Monday	Lunes	Lundi
20050705	05-07-2005	3	Tuesday	Martes	Mardi
20050706	06-07-2005	4	Wednesday	Miércoles	Mercredi
20050707	07-07-2005	5	Thursday	Jueves	Jeudi

DATE

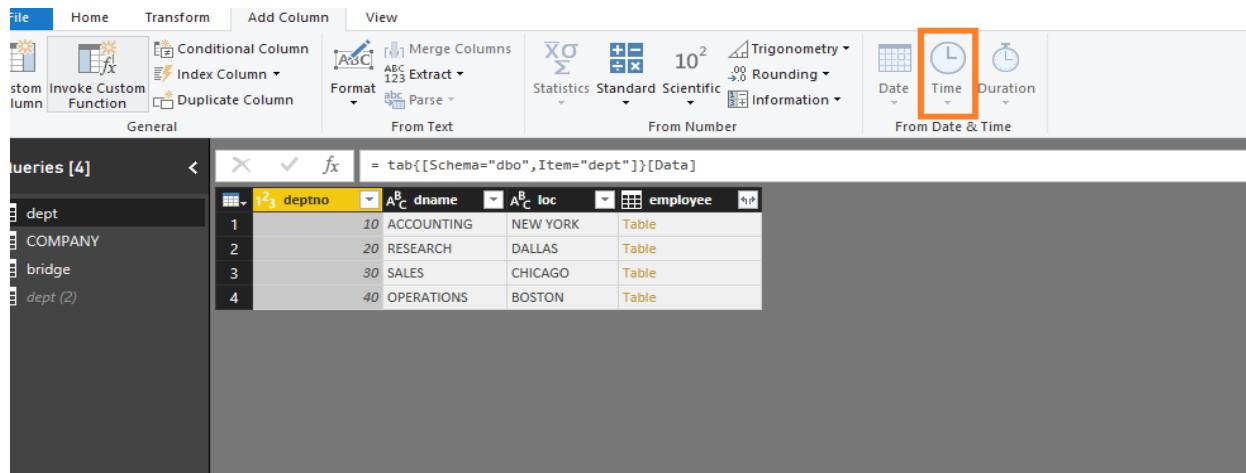
Date column-Format data value or extract elements of date values

The screenshot shows the Power BI Query Editor interface. A department column named 'dept' is selected. A context menu is open over the column header, with the 'Date' option highlighted. The menu also includes options like 'Conditional Column', 'Index Column', 'Format', 'Parse', and various numerical and trigonometric functions.

deptno	dname	loc	employee
10	ACCOUNTING	NEW YORK	Table
20	RESEARCH	DALLAS	Table
30	SALES	CHICAGO	Table
40	OPERATIONS	BOSTON	Table

TIME

Date column- Format time value or extract elements of time values



The screenshot shows the Power BI Desktop interface. The ribbon at the top has tabs for File, Home, Transform, Add Column, View, and several data manipulation icons. Below the ribbon is a context menu for a selected table named 'dept'. The preview pane on the right displays the 'dept' table with four rows and columns: deptno, dname, loc, and employee. The 'deptno' column contains values 10, 20, 30, and 40, while 'dname' contains ACCOUNTING, RESEARCH, SALES, and OPERATIONS respectively. The 'loc' column contains NEW YORK, DALLAS, CHICAGO, and BOSTON. The 'employee' column contains the word 'Table' repeated four times. A red box highlights the 'Time' icon in the ribbon's Date & Time group.

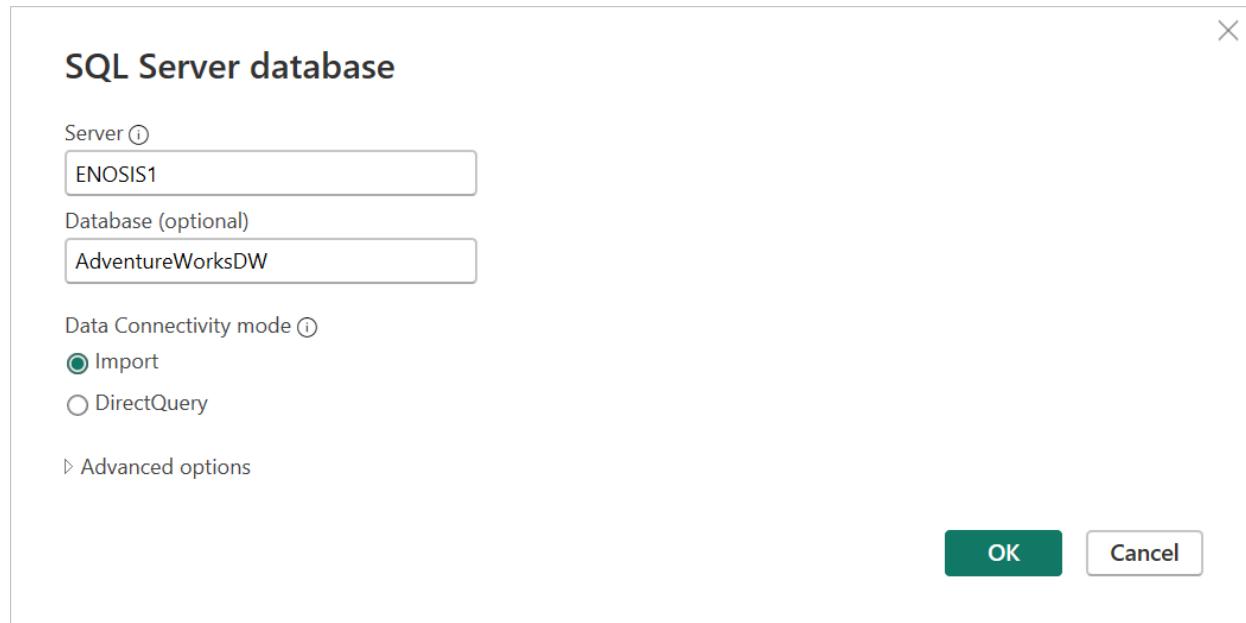
CHAPTER 8: DATA ANALYSIS EXPRESSION (DAX)

In this Chapter, will explore how to use DAX in Power BI.

DAX is a formula language. It is the collection of functions, operators and constants that can be used in a formula or expression to calculate and return one or more value .

In this Chapter we will use the AdventureWorksDW database to explore DAX operations, functions etc. Will load the FactInternetSales, DimDate, DimCustomer, DimGeography, DimProductCategory, DimProductSubCategory, DimProduct ,DimSalesTerritory table

Go to Power BI DeskTop and Connect to SQL SERVER AND Connect to the AdventureWorksDW Database



Connect

Navigator

Display Options ▾

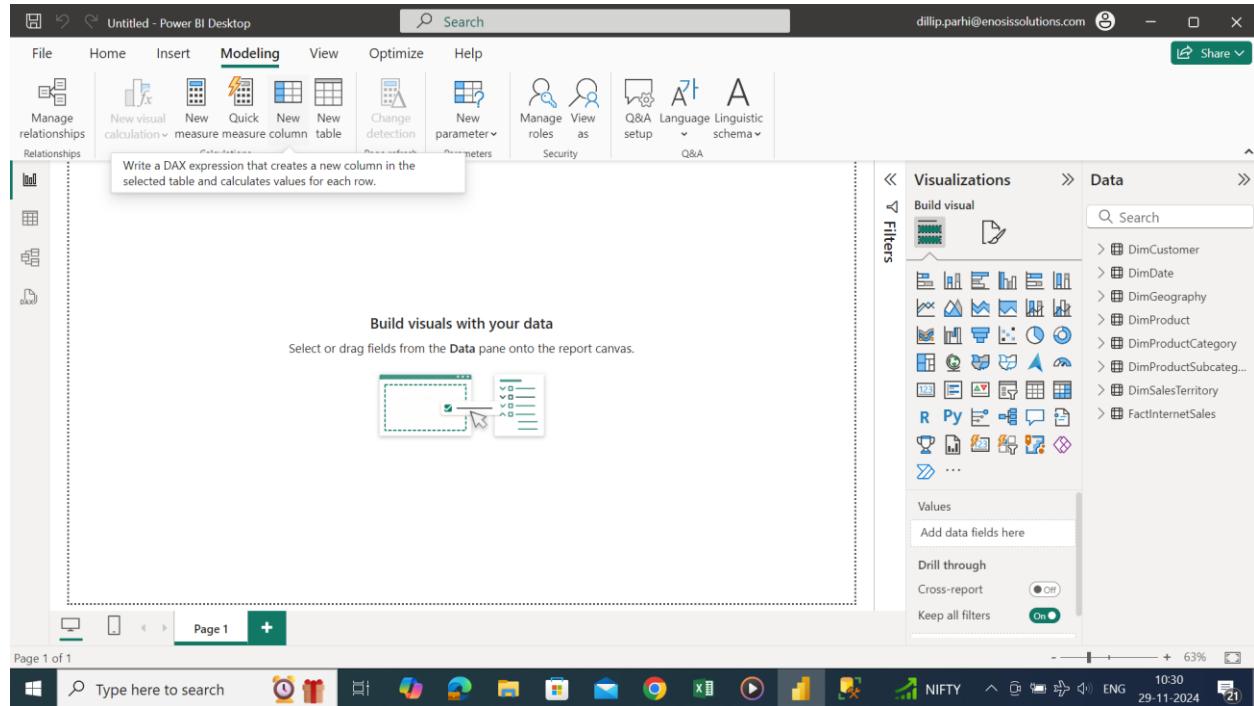
- DimCustomer
- DimDate
- DimDepartmentGroup
- DimEmployee
- DimGeography
- DimOrganization
- DimProduct
- DimProductCategory
- DimProductSubcategory
- DimPromotion
- DimReseller
- DimSalesReason
- DimSalesTerritory
- DimScenario
- FactAdditionalInternationalProductDes...
- FactCallCenter
- FactCurrencyRate
- FactFinance
- FactInternetSales

DimGeography

GeographyKey	City	StateProvinceCode	StateProvinceName	Count
1	Alexandria	NSW	New South Wales	AL
2	Coffs Harbour	NSW	New South Wales	AL
3	Darlinghurst	NSW	New South Wales	AL
4	Goulburn	NSW	New South Wales	AL
5	Lane Cove	NSW	New South Wales	AL
6	Lavender Bay	NSW	New South Wales	AL
7	Malabar	NSW	New South Wales	AL
8	Matraville	NSW	New South Wales	AL
9	Milsons Point	NSW	New South Wales	AL
10	Newcastle	NSW	New South Wales	AL
11	North Ryde	NSW	New South Wales	AL
12	North Sydney	NSW	New South Wales	AL
13	Port Macquarie	NSW	New South Wales	AL
14	Rhodes	NSW	New South Wales	AL
15	Silverwater	NSW	New South Wales	AL
16	Springwood	NSW	New South Wales	AL
17	St. Leonards	NSW	New South Wales	AL
18	Sydney	NSW	New South Wales	AL
19	Wollongong	NSW	New South Wales	AL
20	Brisbane	QLD	Queensland	AL
21	Caloundra	QLD	Queensland	AL
22	East Brisbane	QLD	Queensland	AL

Select Related Tables
Load
Transform Data
Cancel

Go To Modelling section in Power BI Desktop to load the data



TIME INTELLIGENCE FUNCTION:

Time Intelligence functions in DAX are a set of functions that give you insight from the date and time dimensions

YEAR TO DATE: The Year to date calculation is an aggregation of value from the beginning of the year to the specified date.

Example :

```
YTD salesamt= TOTALYTD(SUM(FactInternetSales [salesamount]), FactInternetSales[OrderDate])
```

SAMEPERIODLASTYEAR : This will goback to previous year to do the calculation for the previous year, compared with the current year.

Example:

```
LY YTD = CALCULATE ( [YTD salesamt], SAMEPERIODLASTYEAR('Date'[Date-2]))
```

YTD Sales Var = [YTD salesamt] - [LY YTD]

YTD Sales Var % = DIVIDE [YTD Sales Var] , [LY YTD]

QUARTER TO DATE CALCULATION:

The Quarter to date calculation is an aggregation of value from the beginning of the quarter to the specified date in the quarter.

Sales QTD = TOTALQTD(SUM(FactInternetSales[SalesAmount]),FactInternetSales[OrderDate].[Date])

MONTH TO DATE CALCULATION:

The Month to date calculation is an aggregation of value from the beginning of the quarter to the specified date in the quarter.

Sales MTD = TOTALMTD(SUM(FactInternetSales[SalesAmount]), FactInternetSales[OrderDate].[Date])

TEXT FUNCTION:

COMBINES TWO STRING

fullname = DimCustomer[FirstName]&DimCustomer[LastName]

COMBINES TWO STRING SEPERATED BY SPACE

fullname = DimCustomer[FirstName]&" "&DimCustomer[LastName]

FILTER FUNCTION

FILTERED_YEARLYINCOME =
 CALCULATE(SUM(FactInternetSales[SalesAmount]),FILTER(DimCustomer,DimCustomer[YearlyIncome]<70000))

AUSTRALIA AND CANADA sales =

CALCULATE(SUM(FactInternetSales[SalesAmount]),FILTER(DimGeography,DimGeography[EnglishCountryRegionName]="AUSTRALIA" || DimGeography[EnglishCountryRegionName]="CANADA"))

INFORMATION FUNCTIONS

Dax information functions look at the row that is provided as an argument and tells you whether the values matches the expected type

contains: Returns true if values for all referred columns exist, or are contained, in those columns.
 Otherwise, returns false

contains= CONTAINS(DimProductCategory,DimProductCategory[EnglishProductName],"BIKES")

isblank: Checks whether a value is blank, and returns TRUE or FALSE

default = ISBLANK(DimProduct[ProductSubcategoryKey])

iserror: Returns TRUE if number is even, or FALSE if number is odd
Checks whether a value is an error, and returns TRUE or FALSE

SALES_ERROR = ISERROR(SALES[ERROR])

DATE & TIME FUNCTIONS

These functions helps you create calculations based on dates and time.

Calender: Returns a table with a single column named “Date” between start date and end date

CALENDAR(DATE(2005,1,1),DATE(2015,12,31))

Calenderauto : Returns a table with a single column named “Date” calculated from model automatically

CALENDERAUTO()

DATE : Returns specified date in datetime format

DATE(2005,1,1)

DATEVALUE : Convert a date in the form of text to a date in datetime format.

DATEVALUE(DATE)

CHAPTER 9: DEPLOYING, SECURING, AND UPDATING POWER BI REPORTS

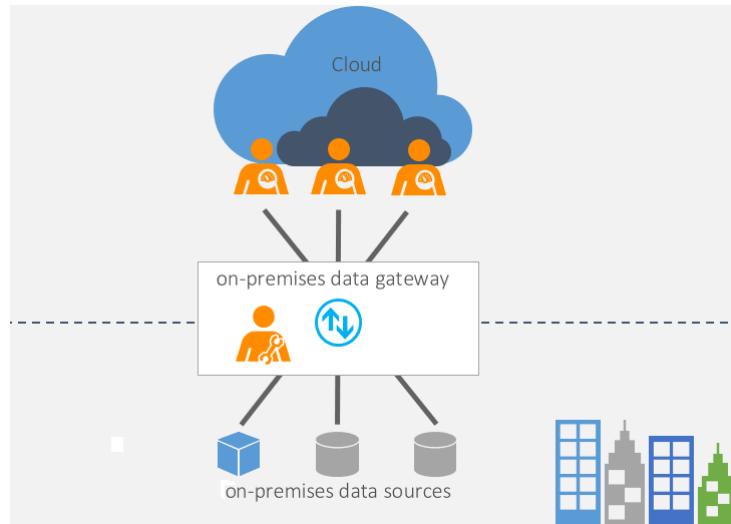
Power BI was designed to take the liberation that Excel pioneered to the max, by allowing 'power' users to not only to create Power BI desktop reports, graphics and visualizations in Power BI App, but then link and publish these to the Power BI app.

These in turn can be given row level security and have their underlying data kept up-to-date so that users can log in and see the relevant and appropriate data in a browser.

Power BI app (Browser) is used to provide updateable visualizations of an organization's business data; its graphs, plots, tables, reports and other types of visualization.

It is designed to make it easier and quicker to deploy summarizations of business data for that business to gain insights from.

Once your dashboard is deployed to the Power BI app, it can be viewed from anywhere, at any time.



The Power BI app also supports row-level security to secure the data access.

In addition, you can, with periodic data refresh, update the report dynamically with the latest data.

To achieve all this functionality, your data or dashboard should be in the Power BI app, and you will need to use the Power BI Gateway too

Topics

Create and publish a Power BI desktop report in Power BI App,

Components and accounts are needed to link and publish Power BI desktop dashboard to the Power BI app.

Refresh Power BI dashboard periodically and explain how to connect Power BI app and Power BI desktop.

Finally, we will create user roles in Power BI desktop and assign roles to users in Power BI app to implement row level security.

Components Required of Power BI Cloud Server

- **Power BI Gateway:** to act as a bridge between Power BI app and the data source.
- **Power BI App:** which is a Web-based visualization tool to view your data anytime, anywhere.
- **SQL Server Database:** to create an example database table. You can create this table using some other data source as well.
- **An organizational email account:** to sign in Power BI app and both Power BI desktop and gateway.

<https://powerbi.microsoft.com/en-us/pricing/>

Components of Power BI App

Major Components			
WorkSpace	A workspace is similar to a projects or folder created in Power BI Apps where we can deploy the power bi reports.		
DashBoard	A Dashboard is the main page of the Power BI Report.		
WorkBooks			
Report	A report is a pbix file which is created on Power BI DeskTop and which can be deployed in Power BI Web App.		
Datasets	A Dataset is the set of Source data which have been used to create the reports.		

Some of Export Options of Power BI Apps

Export Options	Description
Analyze in Excel	
Export to Power Point	The Power BI Report will be exported into PPT with all the pages.
Export to PDF	The Power BI Report will be exported into PDF with all the pages.
DownLoad PBIX	The Power BI Report will be downloaded as PBIX files which can be used in desktop version of Power BI.
Embed in HTML	The Power BI Report will be converted into html version.

Other Major Functionality of Power BI Apps

Components	Description
Share Reports	This functionality is used to share reports with other users.
Subscriptions	This functionality is used to subscribe reports.
Gateway	The Gateway is a bridge between local machine and Power BI Cloud App. Using the bridge we can transfer data between local machine and Power BI Cloud App.
Data Refresh	The Data Refresh is used to refresh the data from local machine to the Power BI Cloud App.
Scheduled Refresh	Scheduled refresh will refresh the data at regular intervals at scheduled time.

Alerts	
Security	

Power BI Desktop

Using Power BI desktop, we can connect to different type of data sources and in one report we can connect to more than one data source , create relationship between data objects, massage the data using DAX query, perform real-time data analysis, integrate R script (For details about integrating R packages into SQL server, Please refer this [link](#)), and create rich visualizations. Power BI app provides the means of giving your colleagues access to these.

Power BI App:

Power BI App is a web-based application; a place to view your published application. Using Power BI app, you can share your application to many people. Power BI App uses HTML5 technology, so your application is compatible with mobile devices. In Power BI app, we can also edit the existing report or dashboard.

Example : Publishing a Power BI Desktop Report in Power BI App

Here we will create a report in Power BI desktop and deploy it in Power BI Cloud App.

To create any chart, we need some data. We will run the following SQL script in a SQL database. It creates an employee table and adds few records in table.

```

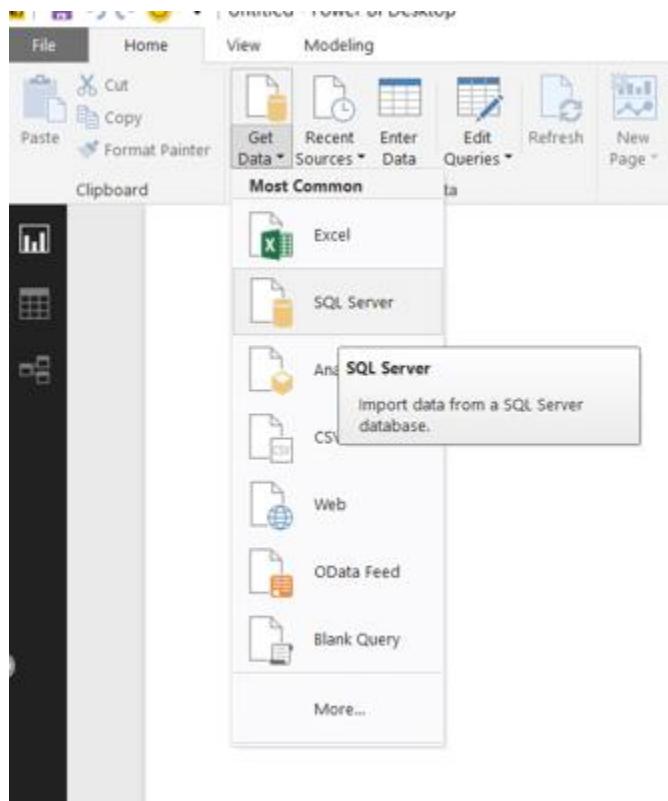
CREATE TABLE [dbo].[employee](
  [name] [varchar](50) NOT NULL,
  [lastname] [varchar](50) NOT NULL,
  [salary] [int] NULL,
  JobCategory [varchar](50) NOT NULL,
)

INSERT INTO [employee]([name],[lastname],[salary],JobCategory)VALUES('Tom','Kelle',500,'Doctor')
INSERT INTO
[employee]([name],[lastname],[salary],JobCategory)VALUES('Mike','Moore',150,'Plumbing')
INSERT INTO [employee]([name],[lastname],[salary],JobCategory)VALUES('Sara','Davis',500,'Lawyer')
INSERT INTO [employee]([name],[lastname],[salary],JobCategory)VALUES('Natala','Smith',250,'Nurse')
INSERT INTO
[employee]([name],[lastname],[salary],JobCategory)VALUES('Mitchelle','Taylor',200,'Roof')
INSERT INTO
[employee]([name],[lastname],[salary],JobCategory)VALUES('Tom','Anderson',200,'clerk')
INSERT INTO
[employee]([name],[lastname],[salary],JobCategory)VALUES('Peter','Williams',300,'business')

```

Step1:

To create a report, we need to bring our data into Power BI desktop. Open Power BI desktop and click on 'Get Data' and select 'SQL server' as the data source.



Connect to the database in Power BI, and then select the **employee** table.

Navigator

The screenshot shows the Power BI Desktop interface. On the left, the 'Navigator' pane lists datasets: empForecast, emplInfo, employee (selected), employee_sd, Mydata, and Mydata1. On the right, the 'employee' dataset is displayed as a table:

name	lastname	salary	JobCategory
Tom	Kelle	500	Doctor
Mike	Moore	150	Plumbing
Sara	Davis	500	Lawyer
Natala	Smith	250	Nurse
Mitchelle	Taylor	200	Electrician
Tom	Anderson	200	clerk
Peter	Williams	300	business

Your Power Bi desktop screen should look like the screenshot below.

Step2:

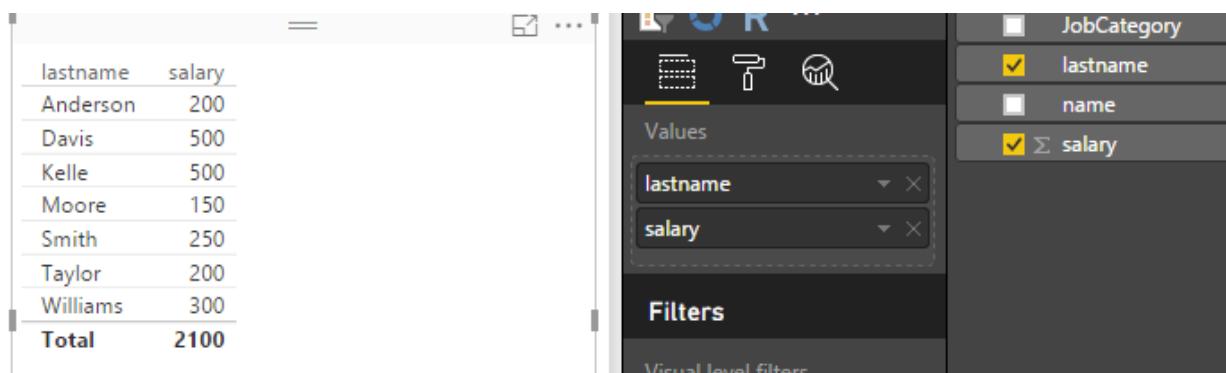
Now we can create a Power BI report using various visualization components.

The screenshot shows the Power BI Desktop ribbon with tabs like Home, Insert, Transform, etc., and a 'Visualizations' pane on the right containing various chart and table icons. A 'Fields' pane on the right lists fields from the 'employee' dataset: JobCategory, lastname, name, and salary.

Here we will use a plain 'straight' table. Double-click on '*'straight table'*'. A blank table will display in the report section. Select the appropriate fields in the straight table. Check '**'lastname'** and '**'salary'**' fields from the dataset.



Selected fields appear in the report area. It is very easy to load data and create visualization in Power BI. Power BI also identifies the dimension and measure from the dataset. Based on the data type of the field, Power BI identified the 'salary' field as a measure, as you'll see from the Σ symbol in 'salary' field.



The screenshot shows a table visualization on the left with data for employees Anderson, Davis, Kelle, Moore, Smith, Taylor, and Williams, along with a total row. On the right is the 'Fields' pane. Under 'Values', 'lastname' and 'salary' are selected. In the 'Filters' section, there is a note about 'Visual level filters'. On the far right, a legend indicates checked fields: JobCategory (unchecked), lastname (checked), name (unchecked), and salary (checked with a Σ symbol).

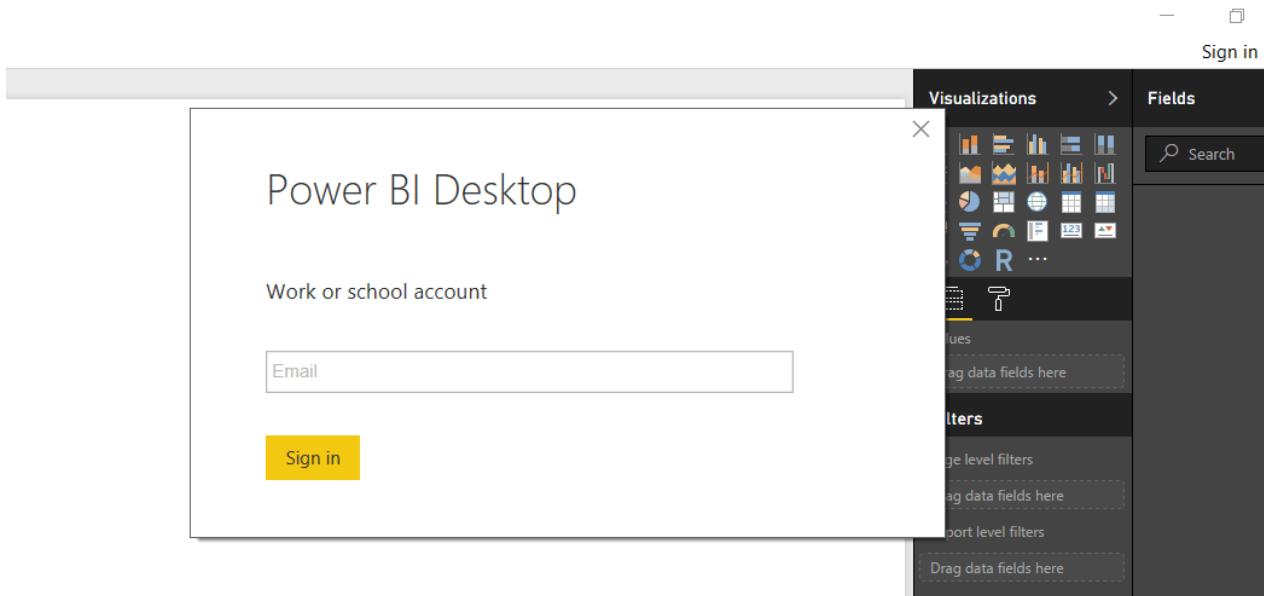
In table format, you can see the employee 'salary' based on employee 'last name'. We can now save the Power BI desktop report with the name "employee". In this example, the dataset name is also "employee". This duplication of name does not matter. The Name of the Report and dataset can be the same.

Once we have Power BI desktop, Power BI app and the account set up, we then follow these next steps to publish dashboard to Power BI app.

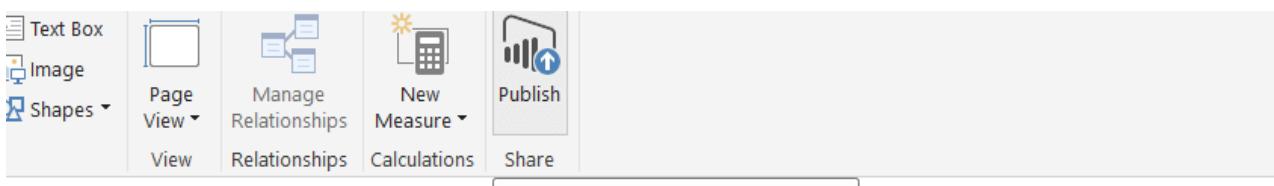
Step3:

Publish the app.

First, open Power BI desktop and sign in to Power BI desktop.



To sign in, use your org/school account in power BI desktop and in Power BI app. From 'home' tab, click on 'publish' button.



lastname	salary
Anderson	200
Davis	500
Kelle	500
Moore	150
Smith	250
Taylor	200
Williams	300
Total	2100



Publishing to Power BI

- Publishing 'Employee.pbix' to Power BI

Cancel

Now Power BI desktop reports that the dashboard is published.



Publishing to Power BI

✓ Success!

[Open 'Employee.pbix' in Power BI](#)

[Get Quick Insights](#)

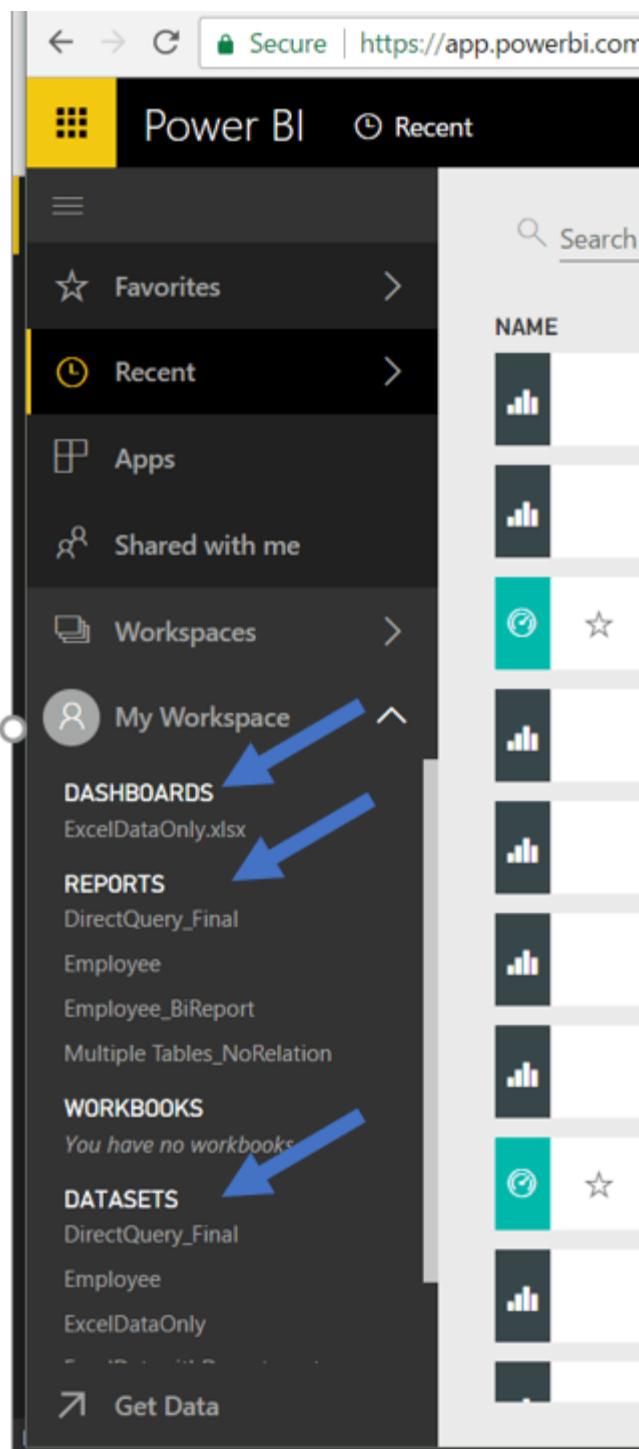
Got it

Step4:

Verifying that the published report has been properly published

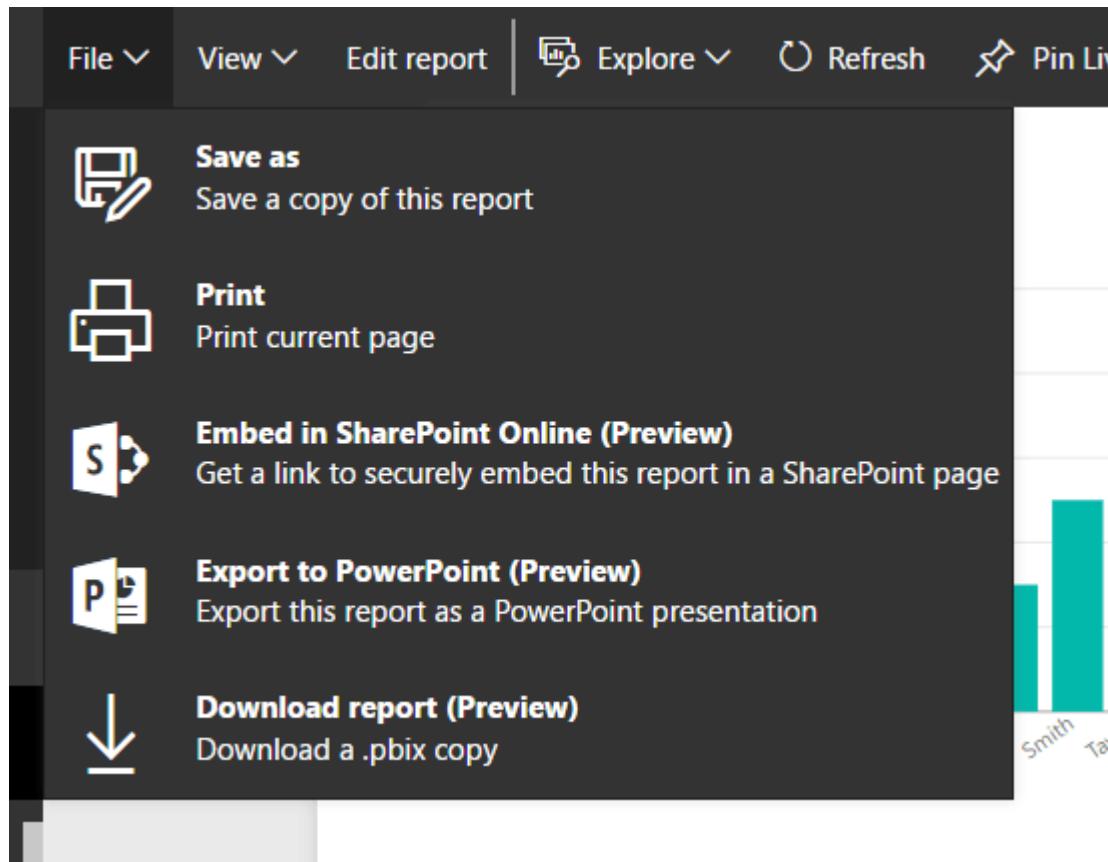
We now verify that all is working. Follow these steps to make sure that we can see our Power BI desktop report in the Power BI app.

- Open your browser and type [app.Power BI.com](#); then login to your account. We will need to use the same account on Power BI desktop and Power BI app so that the document created in Power BI desktop is available in the Power BI app.
- In the left panel, you will see '*My workspace*'.



- Under '*My Workspace*', you will see a few options.
 - '*Datasets*': Our dataset name "*Employee*" will display under *Datasets* section.
 - '*Reports*': Our report name '*employee*' will show under *Reports* section. Open the Employee Report from File menu. You can print the report, and export the report to PowerPoint.

- ‘Workbooks’: If we deploy an Excel workbook to Power BI app, ‘Excel file’ will show under the ‘workbook’ section.
- ‘Dashboards’: we can create a dashboard using one or more reports.



- Go to ‘Reports’ “Employee Report” and click ‘pin visual icon from any chart’ .



- click on ‘new dashboard’, giving the dashboard the name “Employee Scorecard” and click “PIN”. From multiple different reports, we can pin the chart and create a new dashboard in Power BI app.

salary

BY LASTNAME, NAME, INDUSTRY

lastname	name	Industry
Williams	Peter	Non Health...
Taylor	Mitchelle	Non Health...
Smith	Natala	Healthcare
Moore	Mike	Non Health...
Kelle	Tom	Healthcare
Davis	Sara	Non Health...

Pin to dashboard

Select an existing dashboard or create a new one.

Where would you like to pin to?

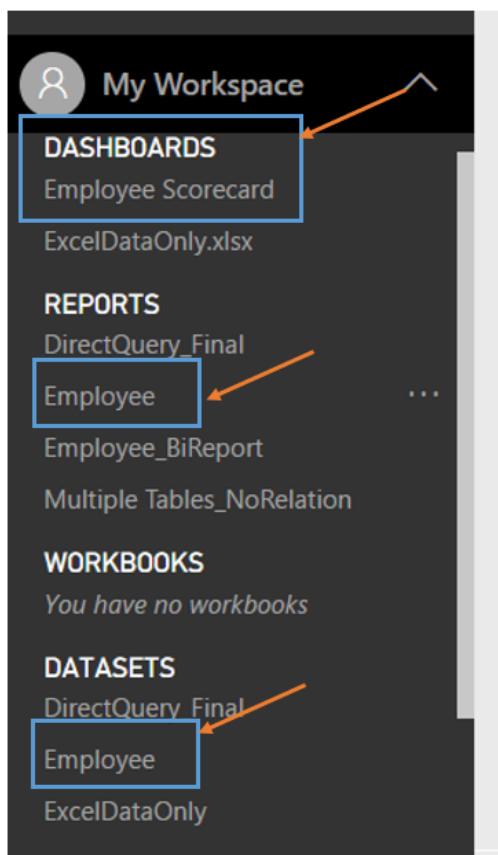
- Existing dashboard
- New dashboard

Employee Scorecard

Pin

Cancel

- In the Power BI app, you can see the dashboard, report and dataset that we have created.



Schedule refresh in Power BI

Now that we have deployed the dashboard to Power BI App, we can set the dashboard data to refresh periodically and the business users can then see latest data. If we do not refresh report data in Power BI app then data will be stale in the Power BI app. To have the latest data in a report, it is far better to automate the refresh process rather than relying on a business user to login to the Power BI app every day and perform a manual refresh.

In the Power BI app, we can schedule this refresh action, but to schedule the refresh, Power BI app needs to connect to Power BI desktop and to the data sources of Power BI desktop. We need Power BI gateway for this connectivity.

This is very smart way to connect data. Your data remains within your data center, Power BI gateway is also within your premises. To retrieve data, Power BI app connects to Power BI gateway.

Installing Power BI Gateway

Power BI Gateway is a bridge between on-premise data source and Power BI App. To retrieve data from the data source, we need to install Power BI gateway.

- In Power BI App, there is an option to install Power BI gateway. Open app.powerbi.com and click on download button on right side and you will see the '*data gateway*' option.
- Once you click on the '*Data Gateway*' option, the new window will open and you can install the Data gateway.



There are two modes in Power BI gateway, 'On-Premise data gateway' can be shared and used by several people, while 'personal gateway' is used by only you.

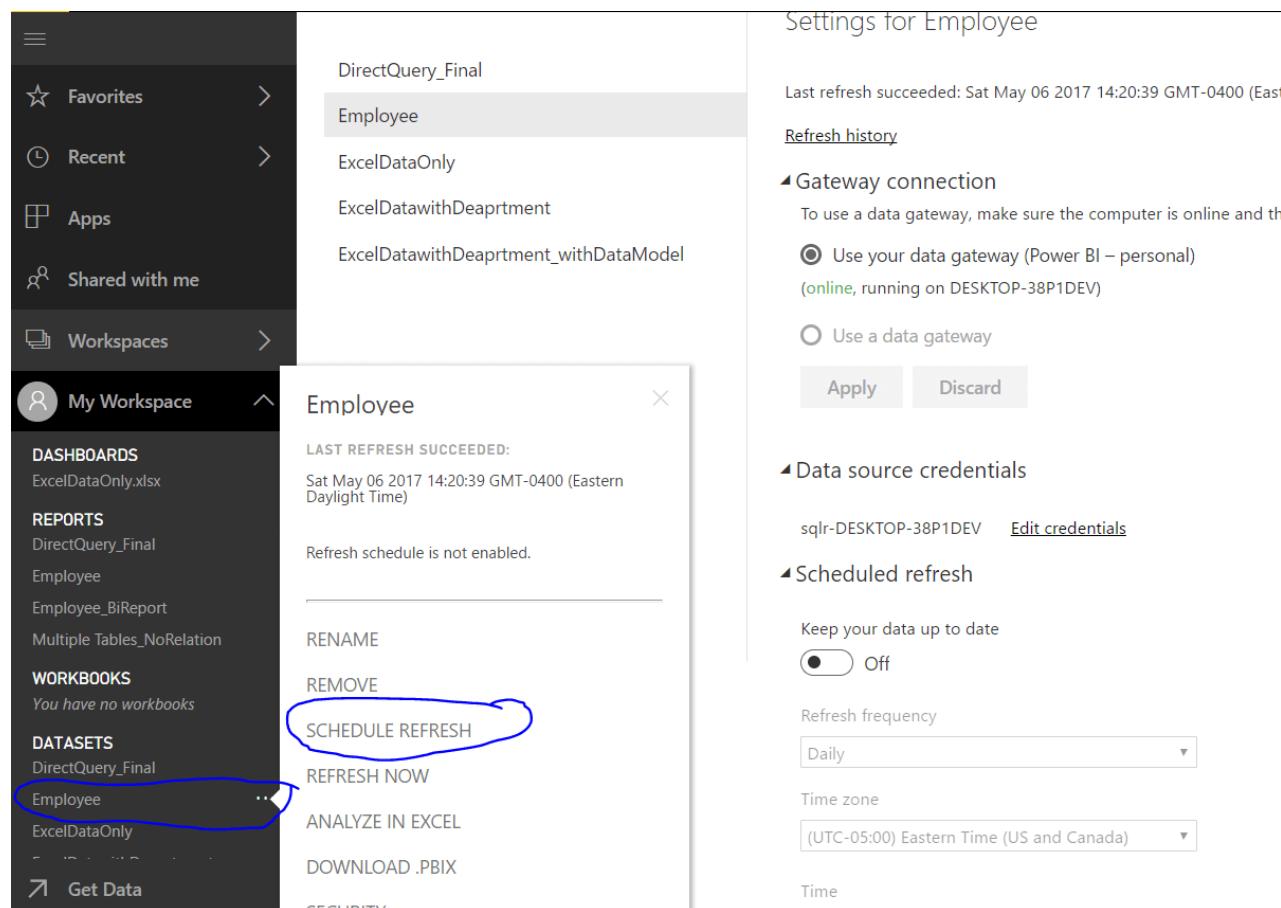
While installing Power BI gateway, you need to provide service name under which gateway service will run.

At the end of installation, you need to provide Power BI app account details. Power BI gateway can be installed on the same machine, where your data source is located or can be installed on different machine.

Scheduling a Report:

Once Power BI gateway is installed, we can now schedule a report. Scheduling, in the Power BI app, will help us to refresh our data and keep the report data up-to-date.

- Open app.Power BI.com, sign in with your work or school account.
- In left panel, you need to navigate to '*My workspace*' '*database*'
- Click the ellipse(...) on '*Employee*' dataset
- Click on '*schedule refresh*'



The screenshot shows the Power BI app interface. On the left, the navigation pane is visible with sections like Favorites, Recent, Apps, Shared with me, Workspaces, and My Workspace. Under My Workspace, there are sections for Dashboards, Reports, Workbooks, and Datasets. The 'Employee' dataset under Datasets is selected and highlighted with a blue oval. A context menu is open over the dataset, with the 'SCHEDULE REFRESH' option circled in red. The main content area shows the 'Employee' dataset details, including its last refresh time (Sat May 06 2017 14:20:39 GMT-0400 (Eastern Daylight Time)) and a note that the refresh schedule is not enabled. To the right, the 'Settings for Employee' pane is open, showing various configuration options for scheduling, data source credentials, and scheduled refreshes. The 'SCHEDULE REFRESH' section in the settings pane also has 'SCHEDULE REFRESH' circled in red.

Now we need to configure various schedule properties

Gateway Connections

There are two options, '*Use your data gateway*' and '*Use a data gateway*'

- '*Use your data gateway
- '*Use a data gateway**

DirectQuery_Final

Employee

ExcelDataOnly

ExcelDatawithDeaprtment

ExcelDatawithDeaprtmentWithDataModel

Settings for Employee

Last refresh succeeded: Sat May 06 2017 14:20:39 GMT-0400 (Eastern Daylight Time)
Next refresh: Sun May 07 2017 08:23:46 GMT-0400 (Eastern Daylight Time)

[Refresh history](#)**▲ Gateway connection**

To use a data gateway, make sure the computer is connected to the Internet.

Use your data gateway (Power BI – persona account online, running on DESKTOP-38P1DEV)

Use a data gateway

[Apply](#)[Discard](#)

Data Source Credentials

Data source credential is useful to connect to report data source.

Under Data Source credentials, click edit and provide data source connections. Once these credentials are provided, click the 'Sign in' button.

[General](#) [Dashboards](#) [Datasets](#)

DirectQuery_Final

Employee

ExcelDataOnly

ExcelDatawithDeaprtment

ExcelDatawithDeaprtment_withDataMod

Configure Employee

Server

DESKTOP-38P1DEV

Database

sqlr

Authentication method

Windows

For Windows authentication, you don't need to provide your Windows credentials.

[Sign in](#)[C](#)[Apply](#)[Discard](#)

▲ Data source credentials

sqlr-DESKTOP-38P1DEV [Edit credentials](#)

Scheduled Refresh

Schedule the '*refresh frequency*' drop-down list to be either daily or weekly; Select the time zone and the time to start refreshing the data. The '*Time zone*' set up will help to refresh data based on preferred time zone. Finally, click the '*Apply*' button to schedule the refresh.

► Scheduled refresh

Keep your data up to date



On

Click to select refresh frequency: daily/weekly

Refresh frequency

Daily



Click to select Time Zone

Time zone

(UTC-05:00) Eastern Time (US and Canada)



Time

[Add another time](#)



If the gateway is not running, then the request from Power BI app to the data source will fail and you will get this message.

General Dashboards Datasets Workbooks Alerts Subscriptions

Settings for Employee

DirectQuery_Final

Employee

⚠ Your data gateway (Power BI – personal) is offline. To set refresh scheduling, make sure your gateway is online.

In order to start or stop the gateway, Open the Command prompt with administrator access and run this command to start the service ...

`net start PBIEgwService`

... or this command to stop the service:

`net stop PBIEgwService`

```
Administrator: Command Prompt
```

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.
```

```
C:\Windows\system32>net start PBIEgwService
The requested service has already been started.
```

```
More help is available by typing NET HELPMSG 2182.
```

```
C:\Windows\system32>net stop PBIEgwService
The On-premises data gateway service service is stopping.....
The On-premises data gateway service service was stopped successfully.
```

```
C:\Windows\system32>net start PBIEgwService
The On-premises data gateway service service is starting.
The On-premises data gateway service service was started successfully.
```

You can also open “On Premised data gateway” desktop app and start/stop the service.

If you have followed these steps correctly, your Power BI app should connect to the data source using Power BI gateway and so the Power BI app should auto-refresh the data at the scheduled time.

Data Security using Power BI Desktop

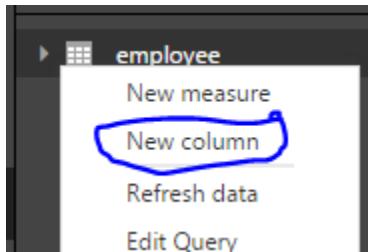
Once you have created the dashboard in Power BI desktop and published the dashboard to Power BI App, the next step is to share the dashboard with several users. Before you do this, you need to implement data security. Power BI supports row-level security. Defining row-level security is a two-step process. First you must create a User Role in Power BI Desktop and then you can assign users to the user role in the Power BI app

Define Role with filter criteria.

You can create and manage roles only in Power BI desktop. You cannot create Roles in Excel and use them in Power BI app. In this example, we will create a user role and determine access based on the “industry” field. This ‘industry’ field is not available in our data source. Power BI desktop allows us to create this as a new derived column.

Step1 : Add New Column

In Power BI desktop, click ellipse(...)next to the table name and select 'New column'.



Create a new calculated field. Use the following DAX expression.

```
Industry = if(employee[JobCategory]
="Doctor","Healthcare",if(employee[JobCategory]="Nurse","Healthcare","Non Healthcare"))
```

```
Industry = if(employee[JobCategory] ="Doctor","Healthcare",if(employee[JobCategory] ="Nurse","Healthcare","Non Healthcare"))
```

salary by lastname

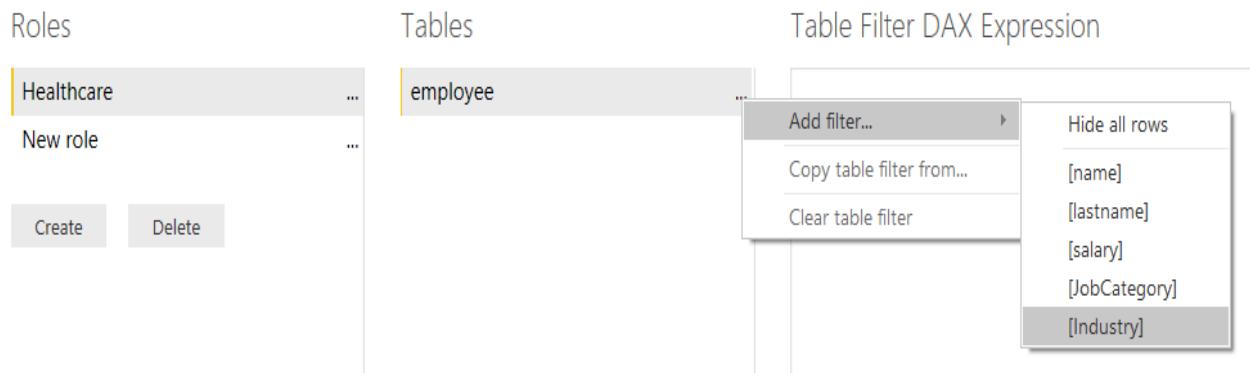
Step2 : Create Role Column

Now, in Power BI desktop, click on the 'Modelling' tab on top. You will then see two options under the security section, called 'Manage Roles' and 'View as Roles'. First, click on 'Manage Roles' and a new popup window will open. In this popup windows click on the 'create' button and on the left side of window and then assign a role name.

Click on the ellipse(...)icon next to table name and click on 'Add Filter'.

Here, I am creating a '*Healthcare*' Role using the '*Industry*' field.

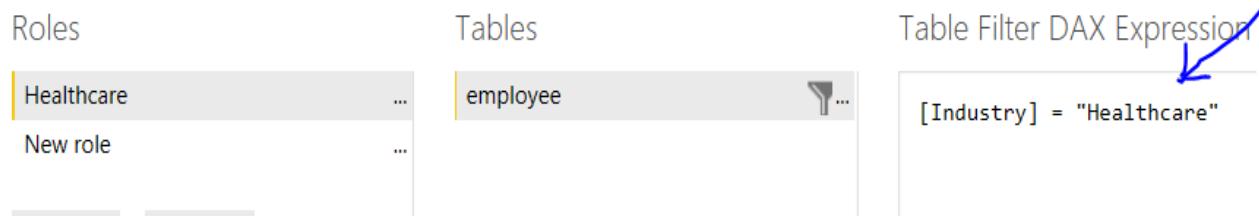
Manage roles



The screenshot shows the 'Manage roles' screen in Power BI. On the left, under 'Roles', there is a list with 'Healthcare' selected. Below it are 'New role' and 'Create' and 'Delete' buttons. In the center, under 'Tables', there is a list with 'employee' selected. A context menu is open over the 'employee' table, with 'Add filter...' highlighted. A sub-menu shows various DAX expression options: 'Hide all rows', '[name]', '[lastname]', '[salary]', '[JobCategory]', and '[Industry]'. The '[Industry]' option is also highlighted.

In the DAX expression in the '*Table Filter DAX Expression*' column, we are applying a healthcare filter.

Manage roles



The screenshot shows the 'Manage roles' screen. The 'Healthcare' role is now listed under 'Roles'. Under 'Tables', the 'employee' table has a filter icon. In the 'Table Filter DAX Expression' column, the expression '[Industry] = "Healthcare"' is shown, with a blue arrow pointing to it.

Similar way, I have created Non Healthcare role, where my DAX expression is Industry <> "Healthcare". We are not adding any filter in the '*admin*' role.

Manage roles

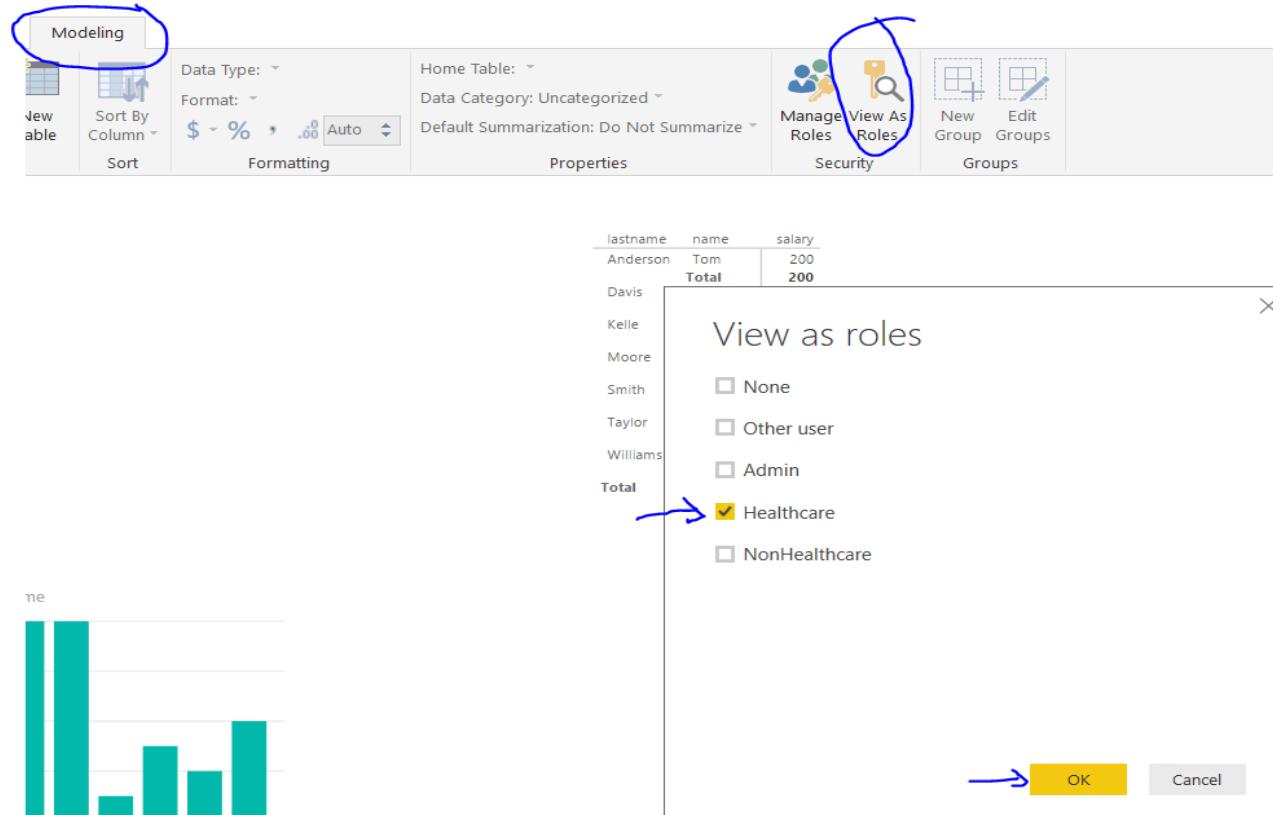


The screenshot shows the 'Manage roles' screen. There are three roles listed: 'Admin', 'Healthcare', and 'NonHealthcare'. Under 'Tables', the 'employee' table has a filter icon. In the 'Table Filter DAX Expression' column, the expression '[Industry] <> "Healthcare"' is shown.

Now, once all Roles are defined, we can verify our Role script within Power BI desktop only

Go to 'Modelling' Click on "View as Role" and select 'Healthcare'.

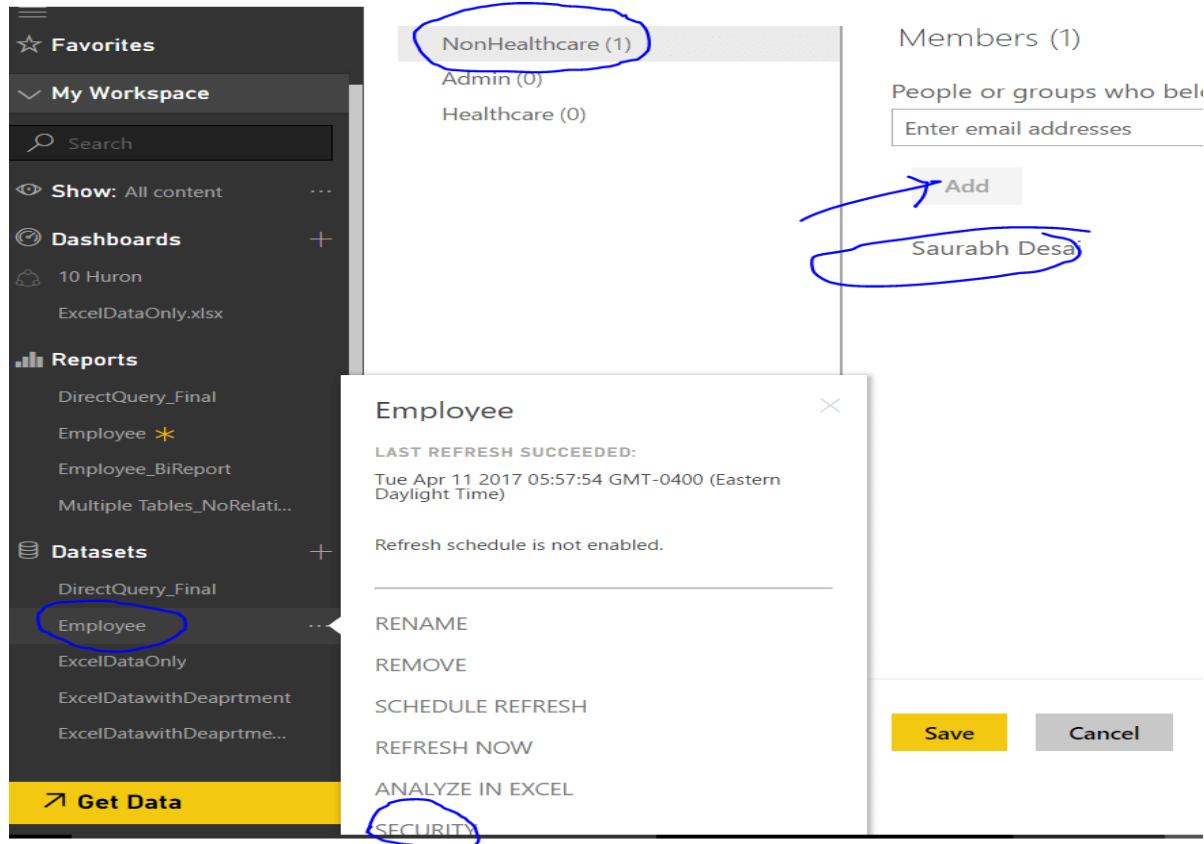
- Once you click the 'OK' button, the data will filter only for the healthcare industry.
- Once everything looks ok, please save the report and publish the report to Power BI app.



Associate users to one or more roles.

The next step is to assign one or more roles to users. Role assignment to user is not possible in Power BI desktop, this feature is available only in the Power BI app.

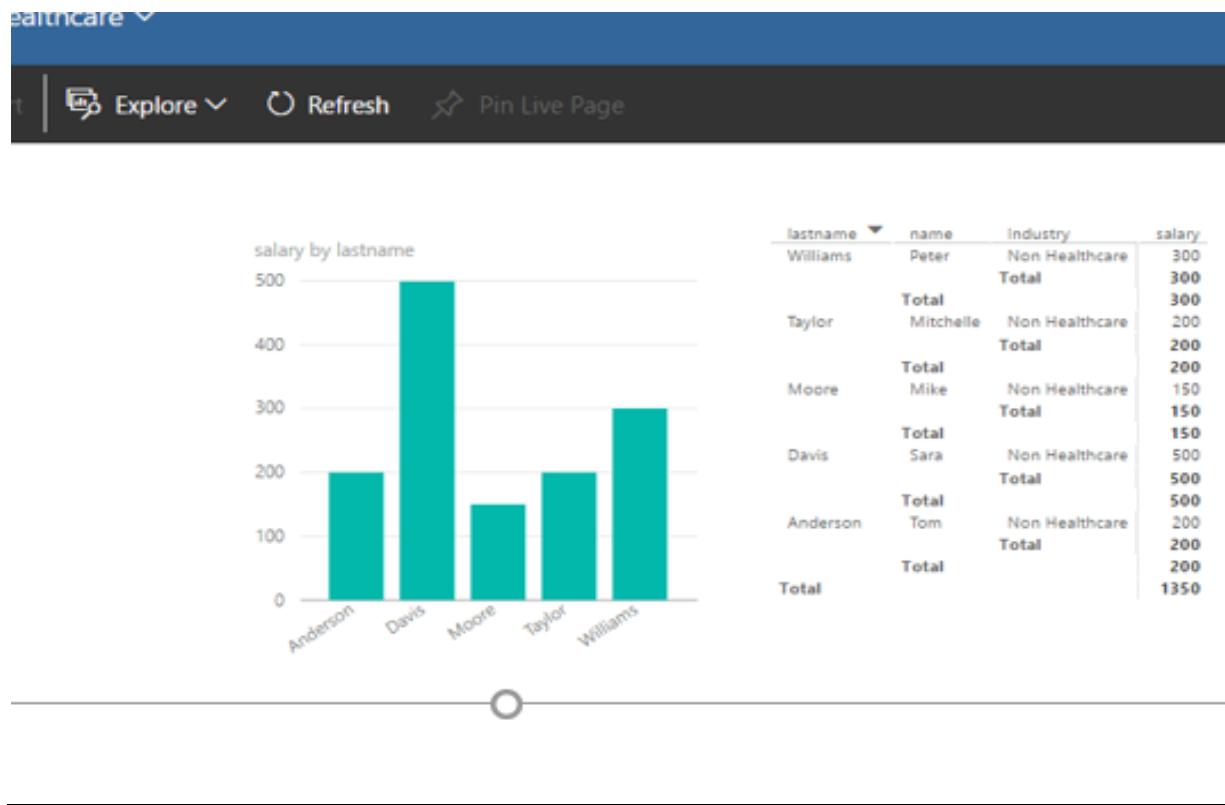
- Go to Power BI app. Open app.Power BI.com, login using your account.
- In left side panel, you will see dataset and Report name '*Employee*'.
- Click on 'Dataset' '*Employee*' ellipse(...) icon 'Security'
- Select a role name under which we would like to add users. In Email address field, we can see only those email address which are part of our organization.
- Type the user's email address and click the 'Add' button. Once we are done with adding users, click the 'save' button.



- To validate the Roles in Power BI app, click on 'Role Name' and select 'Test as Role'.



We can see only non-Healthcare data in our dashboard. We have successfully implemented row level security in our dashboard.



ROW-LEVEL SECURITY (RLS) WITH POWER BI

- Row-level security (RLS) with Power BI can be used to restrict data access for given users.
- Row Level Security enables you to apply security to roles and adds users to each role
- For example when you want people from one branch, city, department, or store to be able to only see their part of the data and not the whole data set. Power BI applies that through a row level security configuration on the Power BI model itself. So regardless of what source you are importing your data from, you can apply row level security on it.

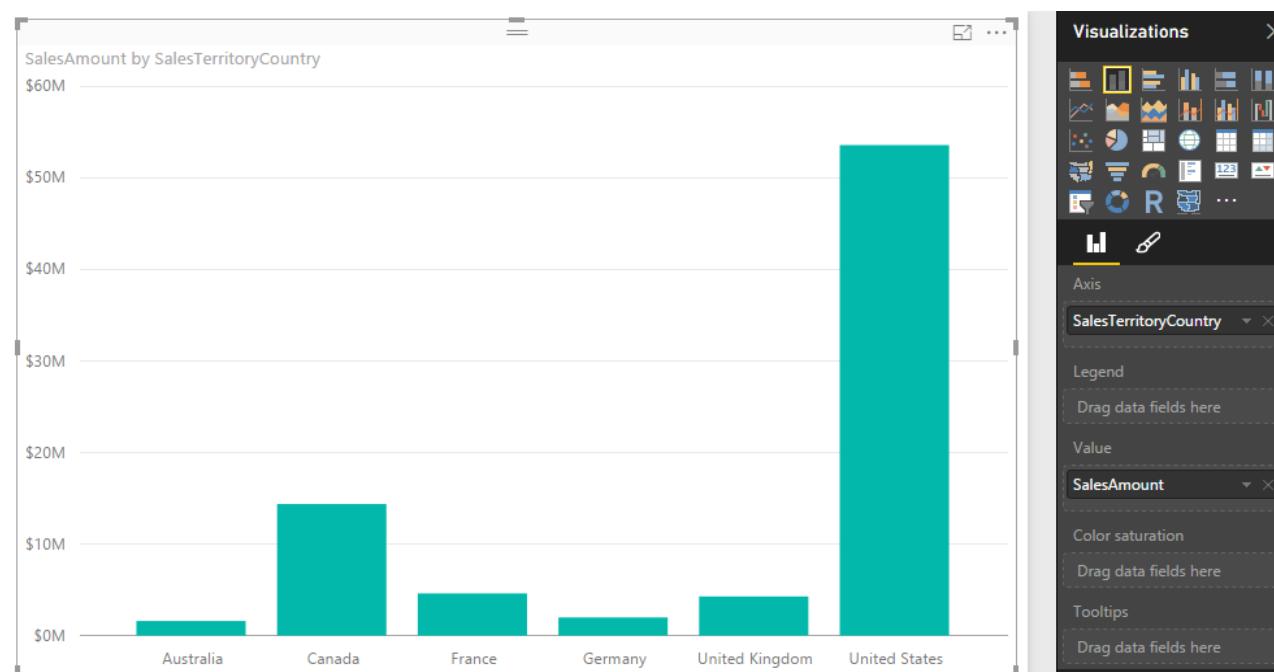
Let us take an example of adventure works to understand row level security

- Let's start with creating a sample report in Power BI Desktop. I will only select DimSalesTerritory, and FactResellerSales for this example;

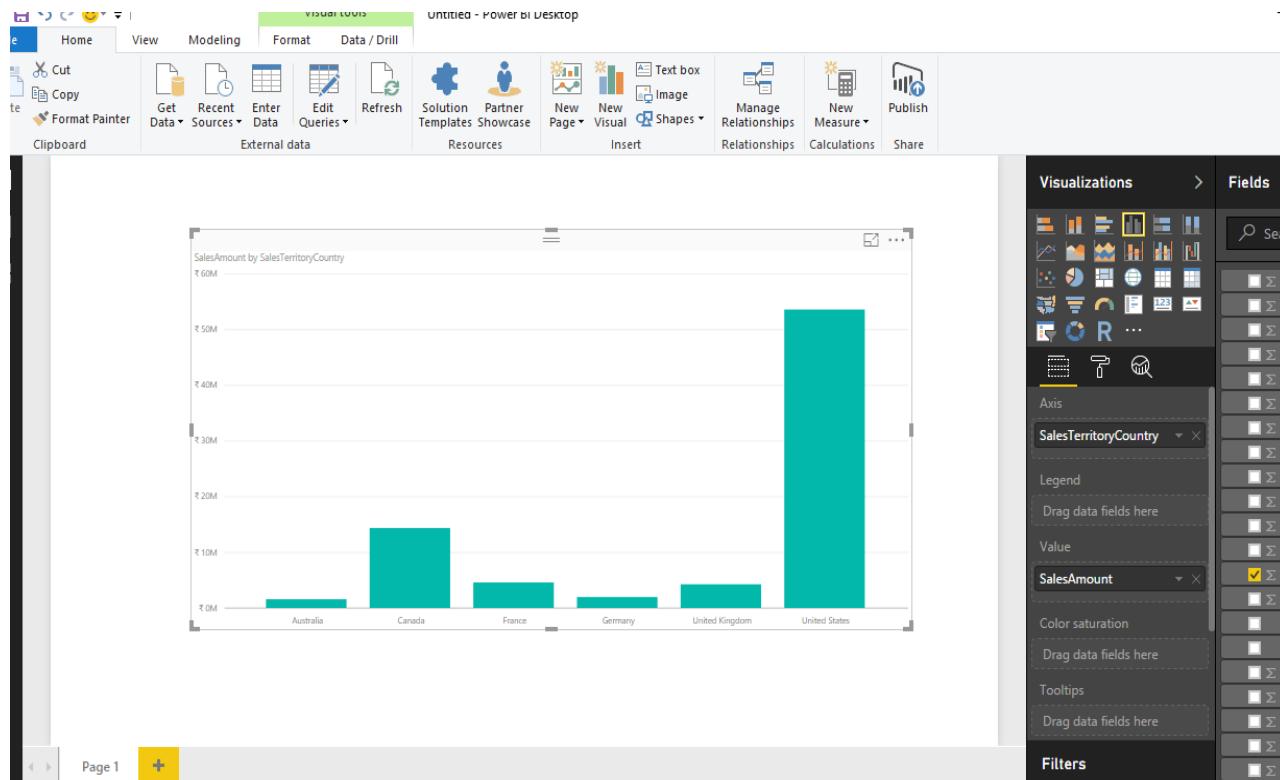
The screenshot shows the Power BI Desktop interface. In the top left, there's a ribbon with 'View' and 'Modeling' tabs. Below the ribbon is a toolbar with icons for 'Get Data' and 'Recent Sources'. The main area is titled 'Navigator' and contains a list of data tables. Several tables are checked: 'DimSalesTerritory', 'FactResellerSales', and 'SalesTerritoryCountry'. To the right of the Navigator is a preview pane for 'FactResellerSales' showing a list of ProductKeys and their corresponding SalesAmount values.

ProductKey	SalesAmount
349	350
351	344
345	346
347	229
235	218
223	220
326	319
319	300

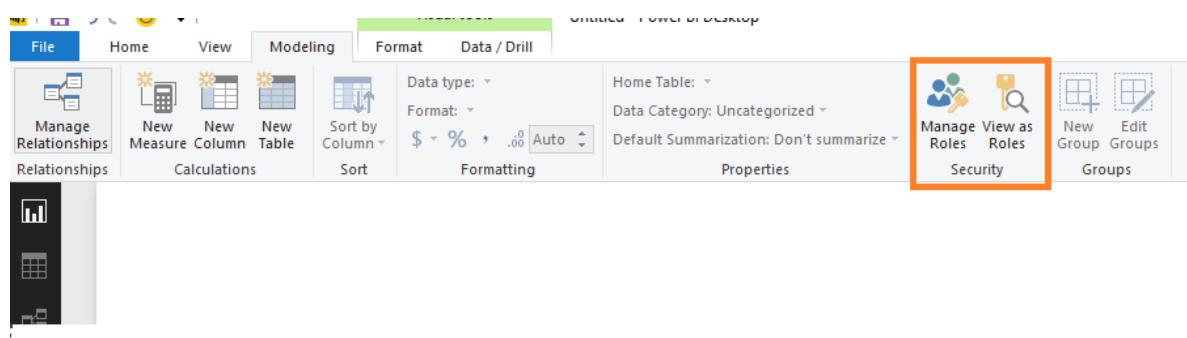
let's load it in the report, and build a simple column chart with Sales Amount (from FactResellerSales), and Country (from DimSalesTerritory).

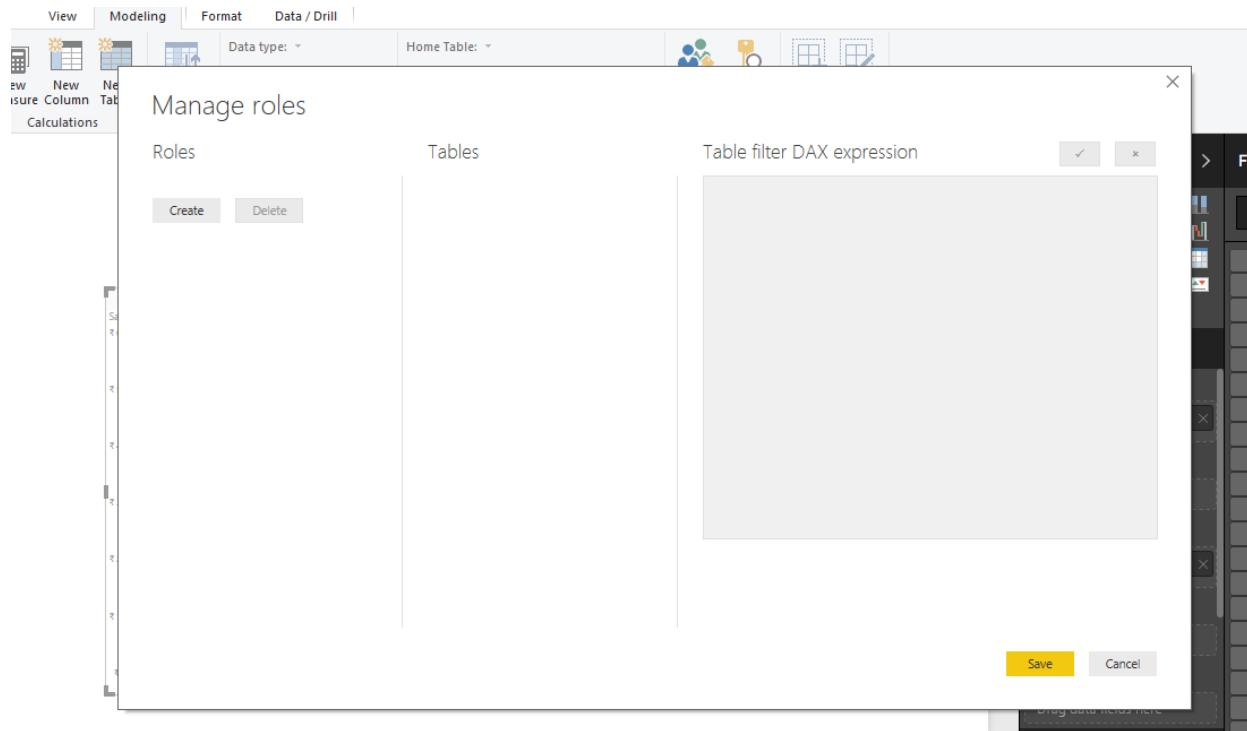


The chart shows sales amount by countries, which can be used for creating row level security on Geo-location information.

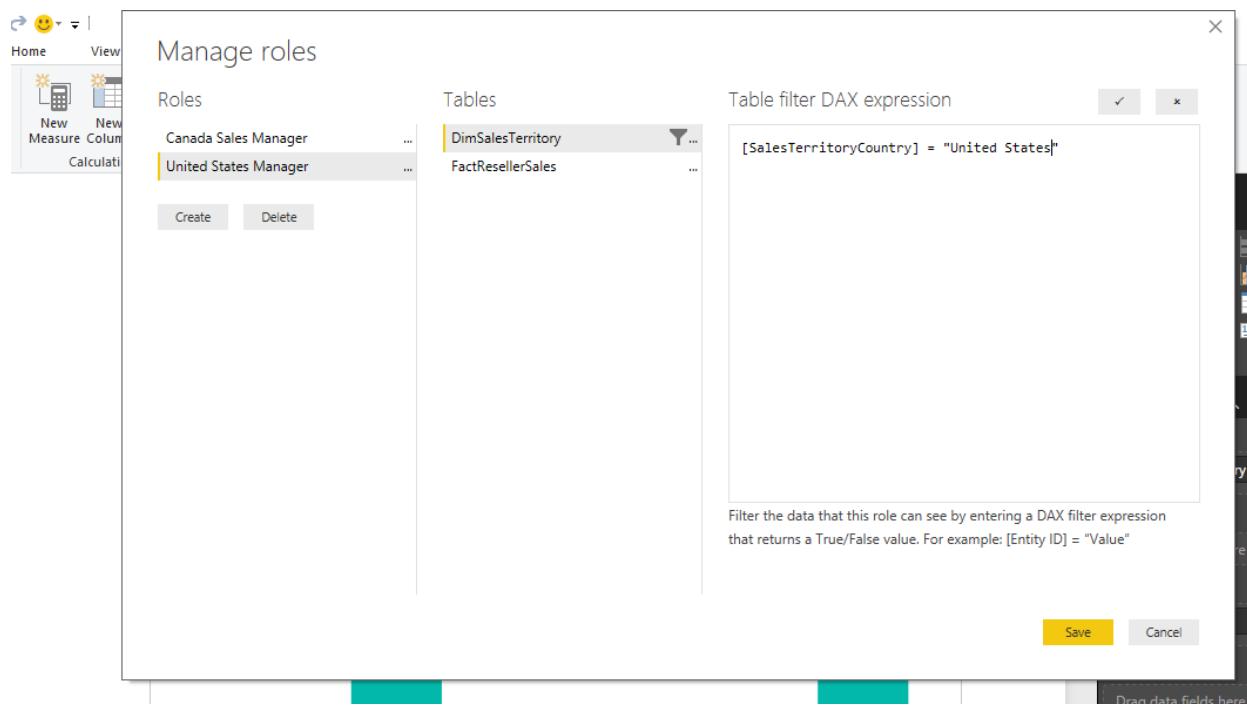


- Now let's create roles . Our aim is to build roles for sales manager of USA, and Europe. They should see their group or country in the data set. For creating roles go to Modeling tab
→ Security ->Manage roles



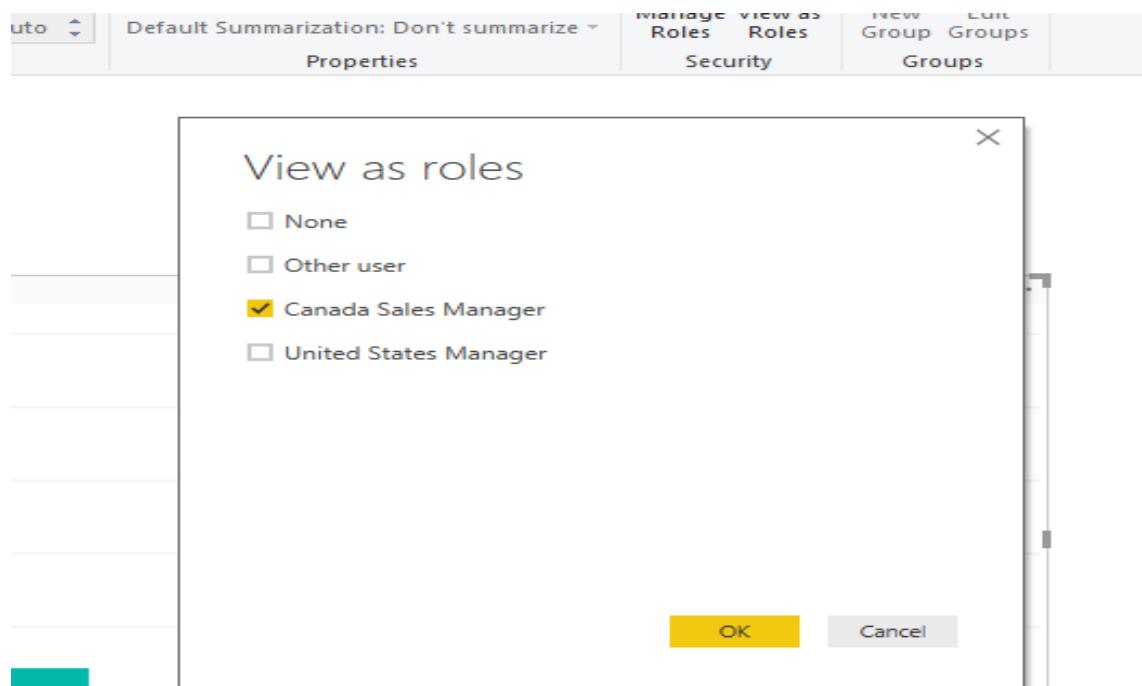


Now Create a Role, and name it as “CANADA Sales Manager” and UNITED STATES Manager, you will see two tables in the Tables section: FactResellerSales, and DimSalesTerritory. With a click on ellipsis button on each table, you can create DAX filters for each column. From DimSalesTerritory create a filter for Country.

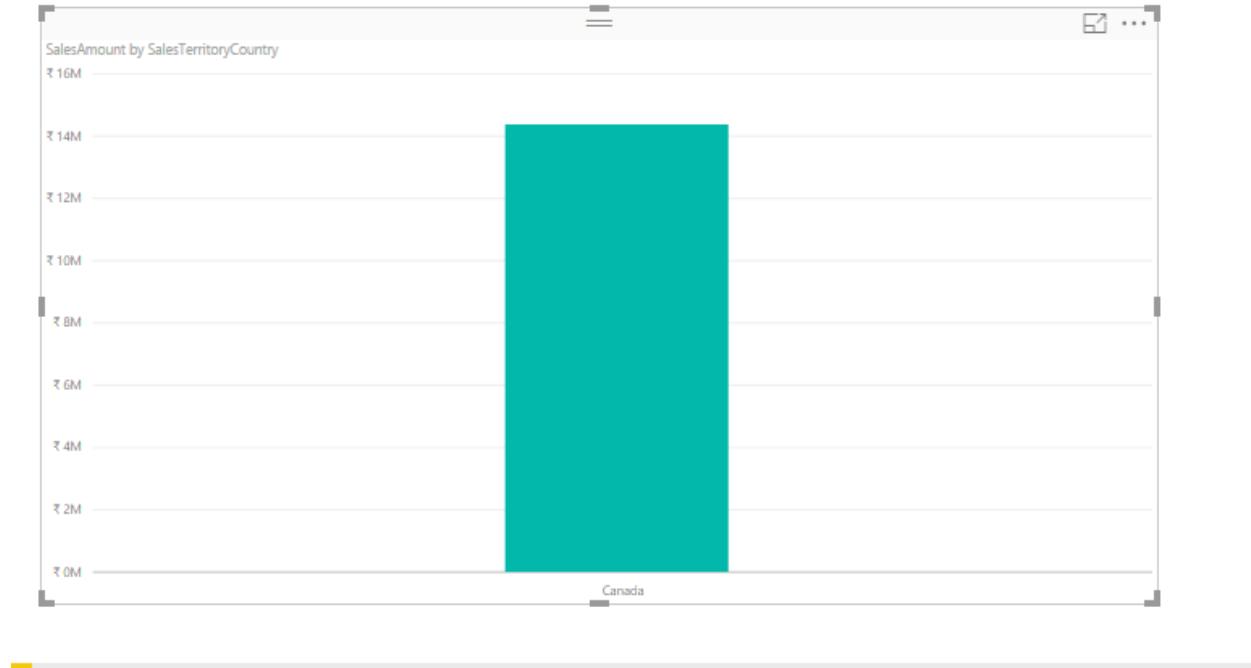


Now in the DAX Filter expression, you will see an expression created automatically as [SalesTerritoryCountry] = "Value", change the value to the United States, and apply

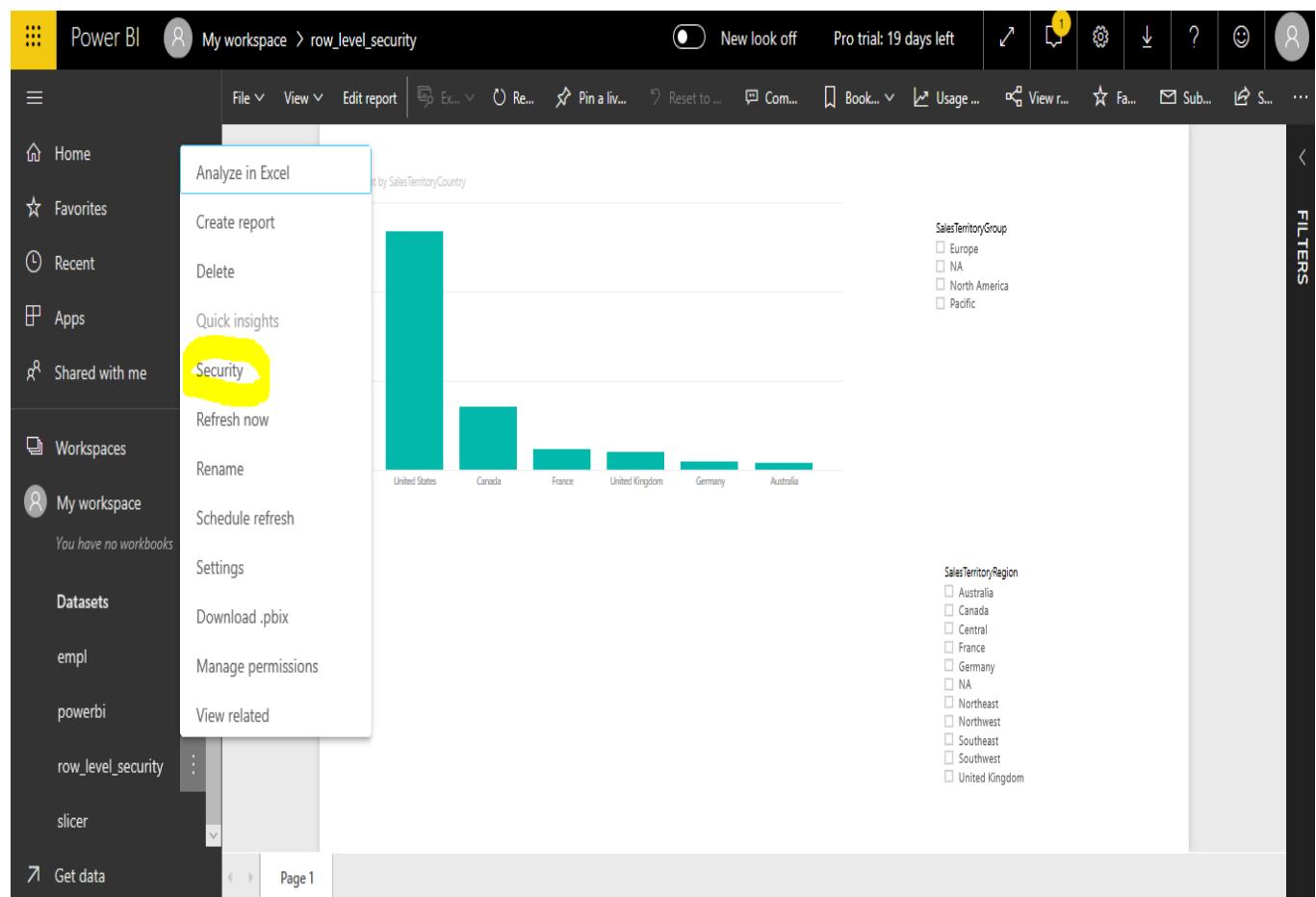
- Now let us test our report. Go to Modeling tab, and choose View as Role option.



Choose for CANADA .You will see sales for USA.



- Roles should be assigned to Power BI users and this part should be done in Power BI Service. Save and publish the report into Power BI by the name of Row_level_security . You can name it whatever you want. After publishing the report, click on Security for the data set

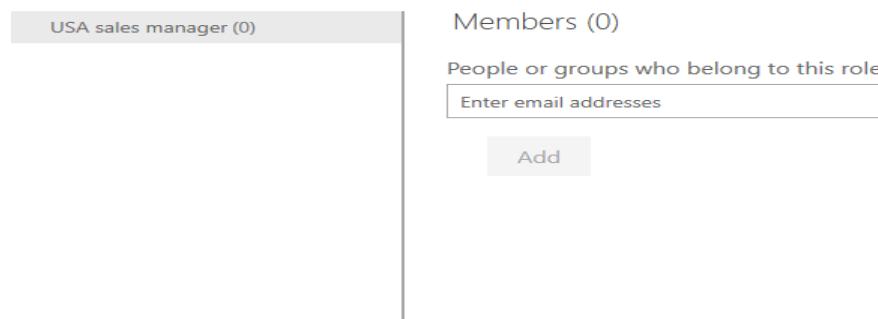


The screenshot shows the Power BI desktop interface. A context menu is open over a report titled "row_level_security". The "Security" option in the menu is highlighted with a yellow box. The menu also includes options like "Analyze in Excel", "Create report", "Delete", "Quick insights", "Refresh now", "Rename", "Schedule refresh", "Settings", "Download .pbix", "Manage permissions", and "View related". To the right of the menu, there is a bar chart titled "SalesTerritoryCountry" showing sales by country. Below the chart are two legend tables: "SalesTerritoryGroup" and "SalesTerritoryRegion", each listing categories with corresponding color swatches.

SalesTerritoryGroup	Europe
NA	North America
Pacific	

SalesTerritoryRegion	Australia
Canada	Central
France	Germany
NA	Northeast
Northwest	Southeast
Southeast	Southwest
Southwest	United Kingdom

Row-Level Security



The screenshot shows the "Members" section for the "USA sales manager" role. On the left, there is a sidebar with the title "USA sales manager (0)". The main area displays the heading "Members (0)" and a sub-section titled "People or groups who belong to this role". Below this is a text input field with the placeholder "Enter email addresses" and a "Add" button.

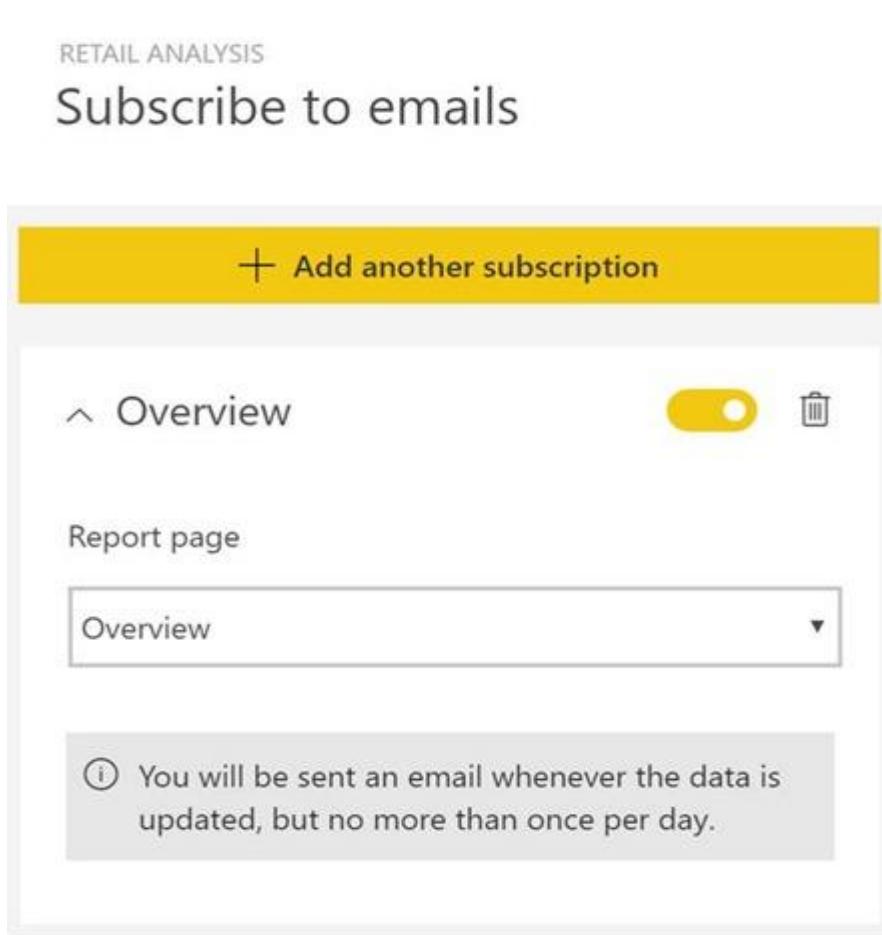
CHAPTER 10 : POWER_BI REPORT SUBSCRIPTION

Schedules Report Delivery

- ❖ Report delivered directly to your inbox
- ❖ Report are delivered as an image
- ❖ Delivery can be configured for daily or weekly
- ❖ You are sent an email whenever the data is updated but no more than once per day

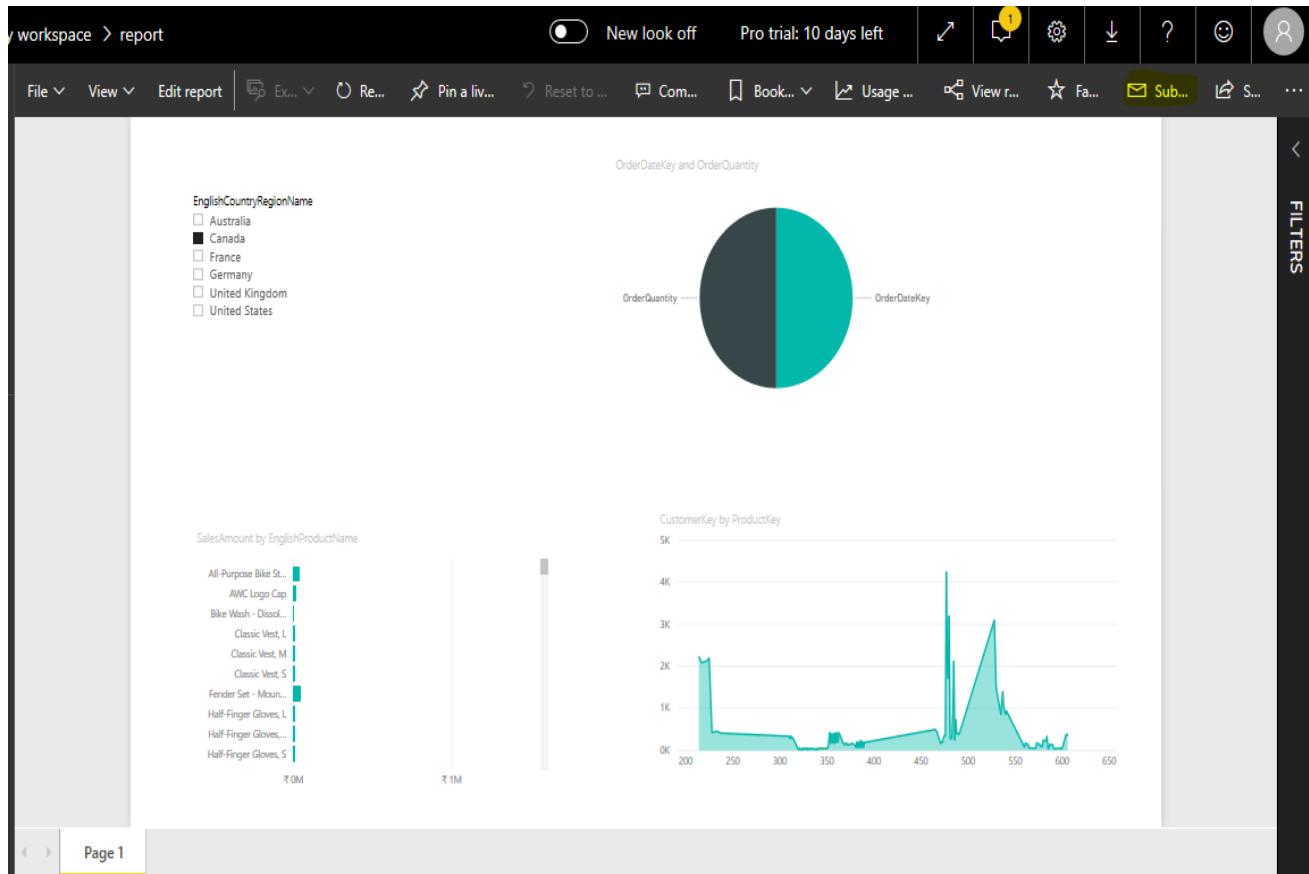
RETAIL ANALYSIS

Subscribe to emails



1.PUBLISH THE REPORT

2.SUBSCRIBE (HIGHLIGHTED IN YELLOW)



workspace > report

New look off Pro trial: 10 days left

File View Edit report Export Re... Pin a live... Reset to ... Com...

Subscribe to emails

REPORT

OrderQuantity

EnglishCountryRegionName

- Australia
- Canada**
- France
- Germany
- United Kingdom
- United States

SalesAmount by EnglishProductName

All-Purpose Bike St... AWC Logo Cap Bike Wash - Dissol... Classic Vest, L Classic Vest, M Classic Vest, S Fender Set - Mount... Half-Finger Gloves, L Half-Finger Gloves, S Half-Finger Gloves, S

₹ 0M ₹ 1M

CustomerKey

OrderQuantity

Custom SK

4K
3K
2K
1K
0K

Report page

Manage all subscriptions

Page 1 Run Now On Add another subscription

Subscribe elizabeth e Enter email addresses

Also give access to this report

Subject Subject

Include an optional message...

Save and close Cancel

3.Save and close

workspace > report

New look off Pro trial: 10 days left

File View Edit report Export Re... Pin a live... Reset to ... Book... Usage... View r... Fa... Sub... S...

Subscription set

You'll receive an email based on the frequency you selected.

OrderDateKey and OrderQuantity

OrderQuantity

OrderDateKey

CustomerKey by ProductKey

CustomerKey

OrderQuantity

Custom SK

5K
4K
3K
2K
1K
0K

200 250 300 350 400 450 500 550 600 650

Page 1

You can manage your subscription using manage all subscription

