Guided PowerBI Workshop - Part 2

Objectives:

- Understand the basic concepts of data modeling.

- Create and manage relationships between data tables.

- Use DAX to create formulas and complex calculations.

- Create and customize data visualizations.

Part1: Understanding Data Modeling :

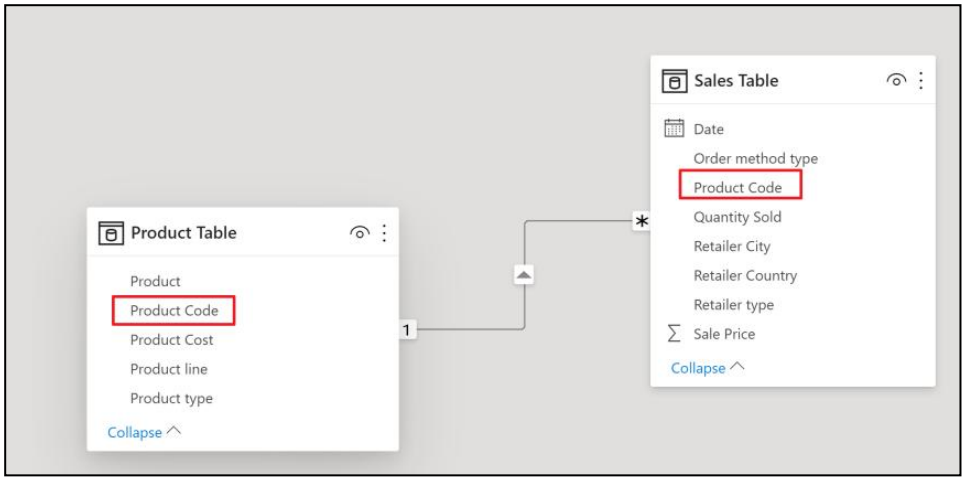
Data Modeling is the process of creating relationships between multiple datasets. These Relationships are established by relating the Primary Key and Foreign Key. Once relationships are in place, these datasets act as a single data model which can be used for the purpose of visualization and reporting.

- **Primary Keys (or a Unique Identifier):**

The Primary Key is the field that uniquely identifies each row in the table. In our case, Product Code in the Product Table will act as a Primary Key.

- **Foreign Keys:**

A Foreign Key is the field that refers to the Primary Key in another table. Foreign keys can have duplicates. In our case, Product Code in the Sales Table will act as a Foreign Key for the Product Code in the Product Table.



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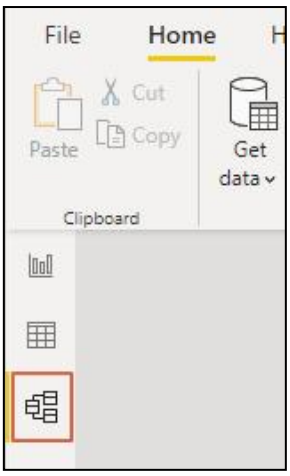
==> Tables having Primary keys are referred to as **Dimension Tables** or **Lookup Tables.** Tables having foreign keys are referred to as **Fact Tables** or **Data Tables.** Usually, in a data model, there is a single **Fact Table** surrounded by multiple **Dimension Tables.**

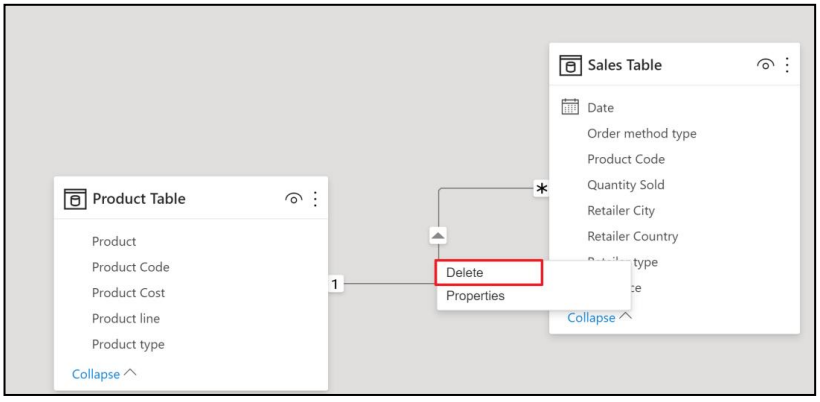
1. Deleting Relationships :

Relationships between data sets are auto-detected by Power BI based on columns/field names and values. However, sometimes this guesswork by Power BI can be incorrect. Let us discuss how you can delete and re-establish the relationship to rectify the error.

1. Switch over to the **Relationships** tab from the left pane by clicking on the Relationships icon shown in the screenshot.



2. Click on the connecting line between the two tables.
3. Right-click using the mouse and select **Delete**, or press the delete key on the Keyboard



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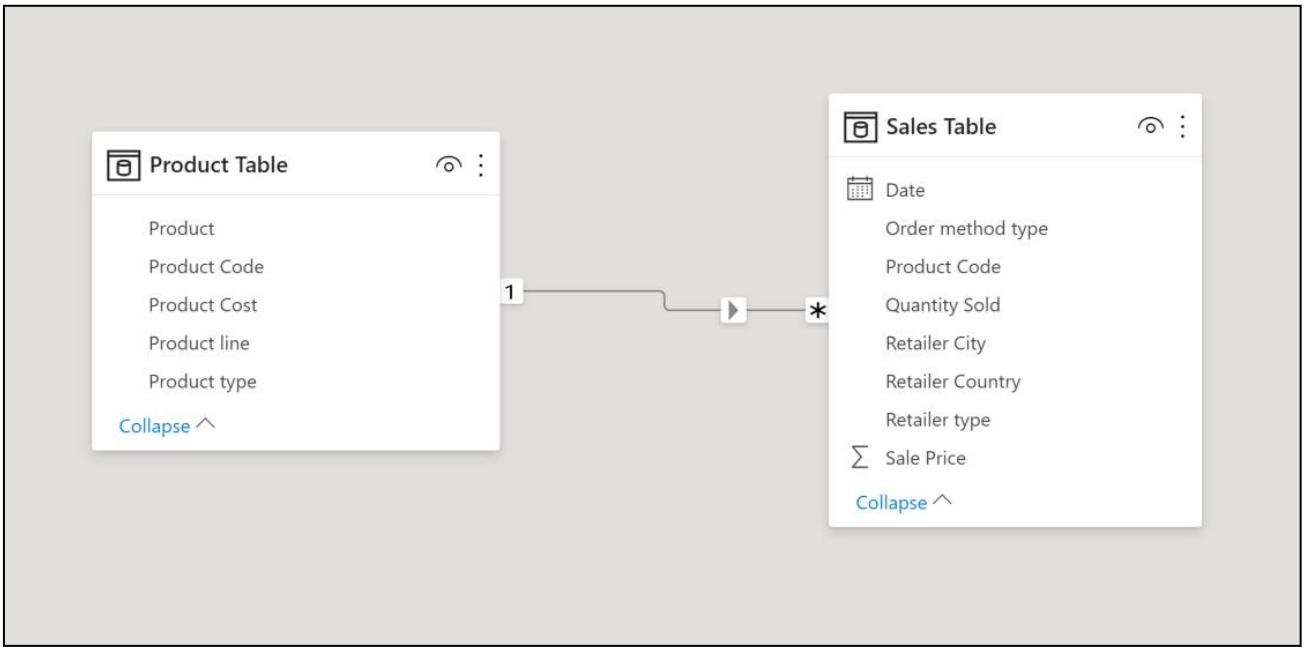
2. Creating New Relationships: Drag and Drop

To create a relationship between two tables a simple drag and drop method can be used.
We will discuss the **Drag and Drop** method here.
To create relationships using this method:

1. Click on the **Product Code** field in the **Product Table** and keep the mouse button clicked.
2. Drag the mouse to the **Product Code** field in **the Sales Table** still holding the mouse button.
3. Release the mouse click while on the **Product Code** field in the **Sales Table**.



==> A relationship line will appear connecting the Product Table and the Sales Table

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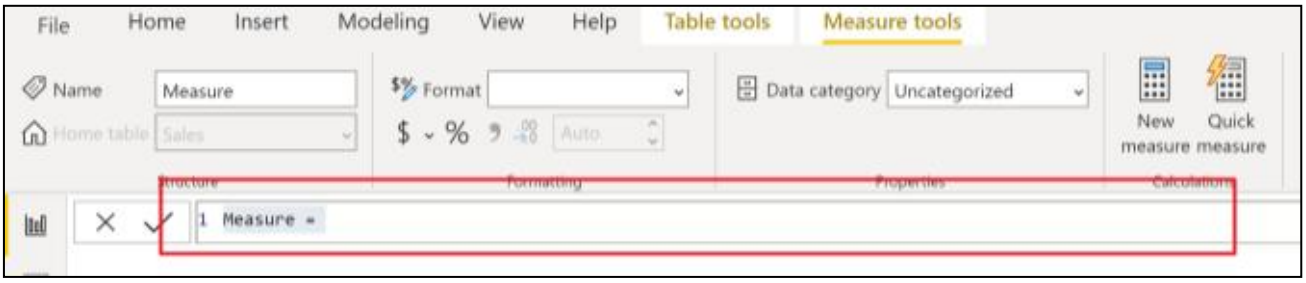
Part 2 : DAX :

DAX is used and applied in many Microsoft tools and platforms such as:
- ✓ Power BI
- ✓ Microsoft Power Pivot for Excel
- ✓ SSAS Tabular

DAX is a formula language which means there is one formula call with many parameters. This function call can also contain other function calls as parameters. All the DAX code is typed in the formula bar shown below. The measure/column tool additionally provides all the information related to the measure or column respectively.

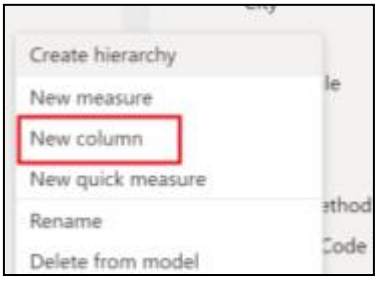


A DAX expression consists of a formula followed by a measure or a column reference.

1. Defining Calculated Columns :

We can also calculate additional columns from existing columns so that these can then be used to create various visuals. This enriches your data set and enables you to perform in depth analysis.

To create Calculated Columns:
1. Right click on the **Sales Table**.
2. Click on **New Column**.



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Let's get **Product Cost** in the **Sales Table** from the **Product Table**.
3. Type in the following **DAX formula** in Formula Bar**.**

- **Product Cost (CC) = RELATED('Product Table'[Product Cost])**

```
Product Cost (CC) = RELATED('Product Table'[Product Cost])
```

Now, Let's Create a **Revenue** column by multiplying **Quantity Sold** by **Sale Price**.
4. Right click on the **Sales Table**.
5. Click on **New Column**.
6. Type in the following DAX formula in **Formula Bar**.

- **Revenue (CC) = 'Sales Table'[Quantity Sold]*'Sales Table'[Sale Price]**

```
Revenue (CC) = 'Sales Table'[Quantity Sold]*'Sales Table'[Sale Price]
```

Now let's create a **Total Cost** column by multiplying **Quantity Sold** by **Product Cost.**
7. Right click on the **Sales Table.**
8. Click on **New Column.**
9. Type in the following **DAX** formula in **Formula Bar.**

- **Total Cost (CC) = 'Sales Table'[Quantity Sold]*'Sales Table'[Product Cost (CC)]**

All the three columns i.e., **Total Cost (CC)** column**, Revenue (CC)** column and the **Product Cost (CC)** column have been created, giving values for which row of the table.

Transaction Date	Retailer City	Retailer type	Product Code	Sale Price	Quantity Sold	Product Cost (CC)	Revenue (CC)	Total Cost (CC)
01/01/2016 12:00:00 am	Brisbane	Outdoors Shop	S48	5	340	$1.79	$1,700.00	$608.60
09/01/2016 12:00:00 am	Montreal	Outdoors Shop	S48	5	322	$1.79	$1,610.00	$576.38
14/01/2016 12:00:00 am	Londonn	Outdoors Shop	S48	5	372	$1.79	$1,860.00	$665.88
19/01/2016 12:00:00 am	Liverpool	Outdoors Shop	S48	5	435	$1.79	$2,175.00	$778.65
22/01/2016 12:00:00 am	London	Outdoors Shop	S47	5	206	$1.95	$1,030.00	$401.70
01/02/2016 12:00:00 am	Glasgow	Outdoors Shop	S47	5	193	$1.95	$965.00	$376.35
08/02/2016 12:00:00 am	Geneva	Outdoors Shop	S49	5	435	$1.86	$2,175.00	$809.10
19/02/2016 12:00:00 am	Basel	Outdoors Shop	S47	5	141	$1.95	$705.00	$274.95
20/02/2016 12:00:00 am	Canberra	Outdoors Shop	S50	5	327	$1.96	$1,635.00	$640.92
21/02/2016 12:00:00 am	Liverpool	Outdoors Shop	S50	5	256	$1.96	$1,280.00	$501.76
07/03/2016 12:00:00 am	London	Outdoors Shop	S49	5	707	$1.86	$3,535.00	$1,315.02
25/03/2016 12:00:00 am	Houston	Outdoors Shop	S47	5	268	$1.95	$1,340.00	$522.60
01/04/2016 12:00:00 am	Shenzhen	Outdoors Shop	S50	5	657	$1.96	$3,285.00	$1,287.72

Calculated Columns have a distinct icon, as seen in the screenshot, to differentiate them from other data entities.

2. Defining a Calculated Measure :

Measures are lightweight alternatives to Calculated Columns. Reason being, they do not appear in the data set, hence do not occupy any physical memory. Measures are only calculated when used within a visual and this property takes the efficiency of your data model to a next level.
Let's Calculate **Profit** by subtracting **Product Cost** from **Revenue :**

1. While in the **Data tab** on the left pane, click on the Table Tools ribbon on the top navigation and select **Sales Table** from the Fields pane on the right.
2. Select **New Measure**.

3. Type in below mentioned *DAX formula* in Formula Bar.

- **Profit (CM) = SUM('Sales Table'[Revenue (CC)]) - SUM('Sales Table'[Total Cost (CC)])**

Calculated Measures have a distinct icon as seen in the screenshot to differentiate them from other data entities.

Part 3 : DATA VISUALIZATION :

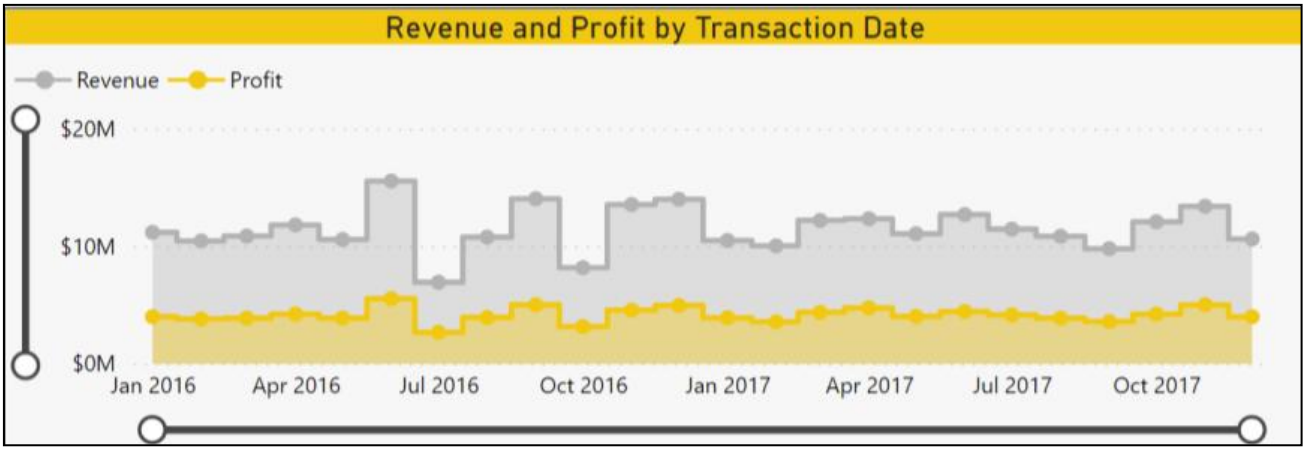
1. Creating a Card Visual :

As we have got ourselves familiar with different panels in the report section. It is time to discuss some of the visual types and their usage.
Card visuals are used /to display key metrics of your data.
To create a Card Visual:
1. Click on **Card** visualization.
2. Drag **Total Cost (CC)** value from **Sales Table** to the **Field** area.
3. Click on **Total Cost (CC)** in the Sales Table.
Column tools open.
4.Click on "$" and type 2 in the text area.

5. Click on **Paint Roller** Icon to access Format options.
6. Set the **Category Label > Off, Border > On, Title > On, Title Text> "Total Cost", Title Text Size > 15, Title Alignment > Centre, Title Background Color > Black and Title Font Color > White**

2. Creating an Area Chart

Area charts emphasize the magnitude of change over time, and can be used to draw attention to the total value across a trend. For example, data that represents profit over time can be plotted in an area chart to emphasize the total profit.
To create an Area chart:
1. Click on the **Area Chart** visualization.
2. Drag **Transaction Date** from **Sales Table** to the **Axis** field.
3. Drag **Revenue (CC)** and **Profit (CM)** from **Sales Table** to the **Values** field.
4. Click on the **Paint Roller** icon to access the **Format** options.
5. Set the **Title Text > Revenue and Profit by Transaction Date, Zoom slicer > On.**



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3. Creating a Bubble Map Visual

A bubble map is used to display geographical data with different sized bubbles. The size of the Bubble is directly proportional to the numerical value it indicates.
To create a Bubble Map:
1. Click on the **Map** visualization.
2. Drag **Retailer City** from **Sales Table** to the **Location** field.
3. Drag **Total Cost (CC)** from **Sales Table** to the **Size** field.
4. Click on **Paint Roller** icon to access the **Format** options.
5. Set the **Bubbles > Size > 15, Title > On, Title Text > Total Cost by Retailer City, Title Text Size > 15, Title Alignment > Centre, Title Background Color > #F2C811, Data Colors > #F2C811, Map Styles > Dark, Background > On, Background Color > #F2C811 and Border > On.**

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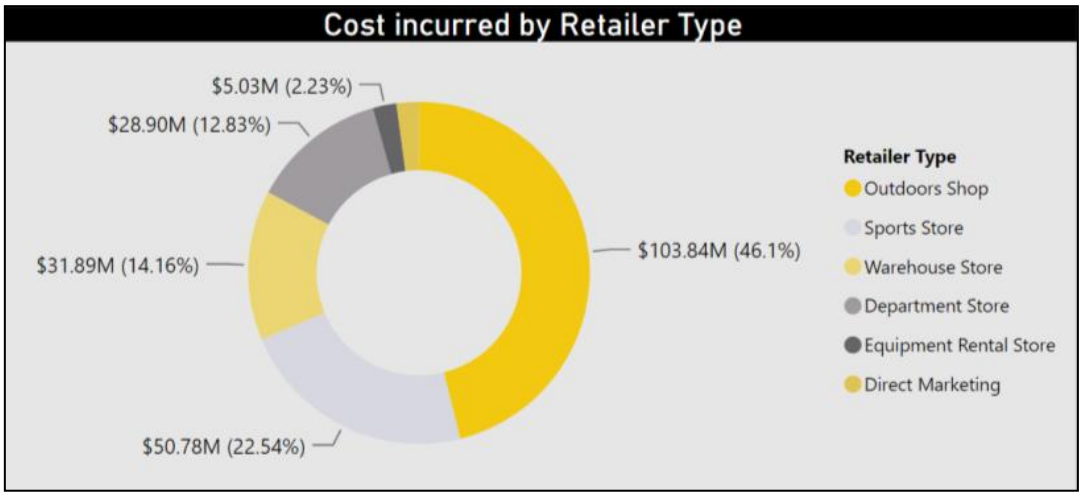
4. Creating a Donut Chart

A donut chart is a variation of the pie chart and is generally used to show the proportions of categorical data, with the size of each segment representing the proportion of each category.
To create a Donut Chart:
1. Select **Donut Chart**.
2. Drag **Retailer Type** from Sales Table to Legend field.
3. Drag **Total Cost (CC)** from Sales Table to Value field.
4. Click on Paint Roller Icon to access Format options.
5. Set the **Title > Cost incurred by Retailer Type**.



5. Creating a Slicer

Slicer is an alternate way of filtering, that narrows the other visualizations in a report. Unlike filters, the slicers are present as a visual on the report.
To create a Slicer:
1. Click on **Slicer**.
2. Drag **Product Line** from **Product Table** to the **Field** area.
3. Click on **Paint Roller** Icon to access Format options.
4. Set the **Slicer Header > On** and **Slicer Title > Off.**
5. To filter the whole report for **Camping Equipment,** click on its checkbox