

# Book Report

## Power BI

---

221071077

Megha Wadher  
SY BTECH( Computer Engineering )

<b>Introduction</b>	<b>2</b>
<b>Topics</b>	<b>5</b>
Data importing	5
Data Importing in CSV	5
Creating Data from Scratch	5
Data Importing from Web	8
Data Importing from Excel	8
Creating Relationships and Purpose	9
Custom Relationships	11
1. Advanced Relationship Types:	11
2. Cross-Filtering:	11
3. Role-Playing Dimensions:	11
4. Advanced Data Analysis:	11
Active and Inactive	11
Transitive Relationship	11
Report Properties	12
Adding Visualization to the Report	12
Style Manipulations on a Report	12
Exploring Charts:	14
Card and Gauge Charts	14
Bar Chart	14
Pie Chart	14
Funnel and Waterfall Charts	14
Exploring Symbols and Navigation	15
Introduction to DAX Measures and Columns	18
Syntax and Indentation	18
SUM Function:	18
AVERAGE Function:	18
COUNT Function:	18
Edit interactions	21
Overview of Filters and its Types	22
Visual Level	22



Page and Report Level	22
Include and Exclude	22
Using Slicer as a Filter	22
Exploring Power Query Editor	26
Data Quality Optimization and Applied Steps	26
Duplicate vs Reference	28
Working with Columns:	29
Conditional Column	29
Indexed and Duplicate	29
Column from Examples	29
Custom Column	30
Replace, Fill Up, Fill Down, and Remove	35
GROUP BY	35
Date Functions	38
Common Date Functions:	38
Create a Date Table and Establish a Relationship	38
Table Functions	38
Row level Context	41
Use of Calculate function	41
Advanced Functions	42
ALL	42
RELATED	42
LOOKUP VALUE	42
<b>Conclusion</b>	
Certificate	<b>43</b>

# Introduction

## What is Power BI?

Business Analytics Tool:

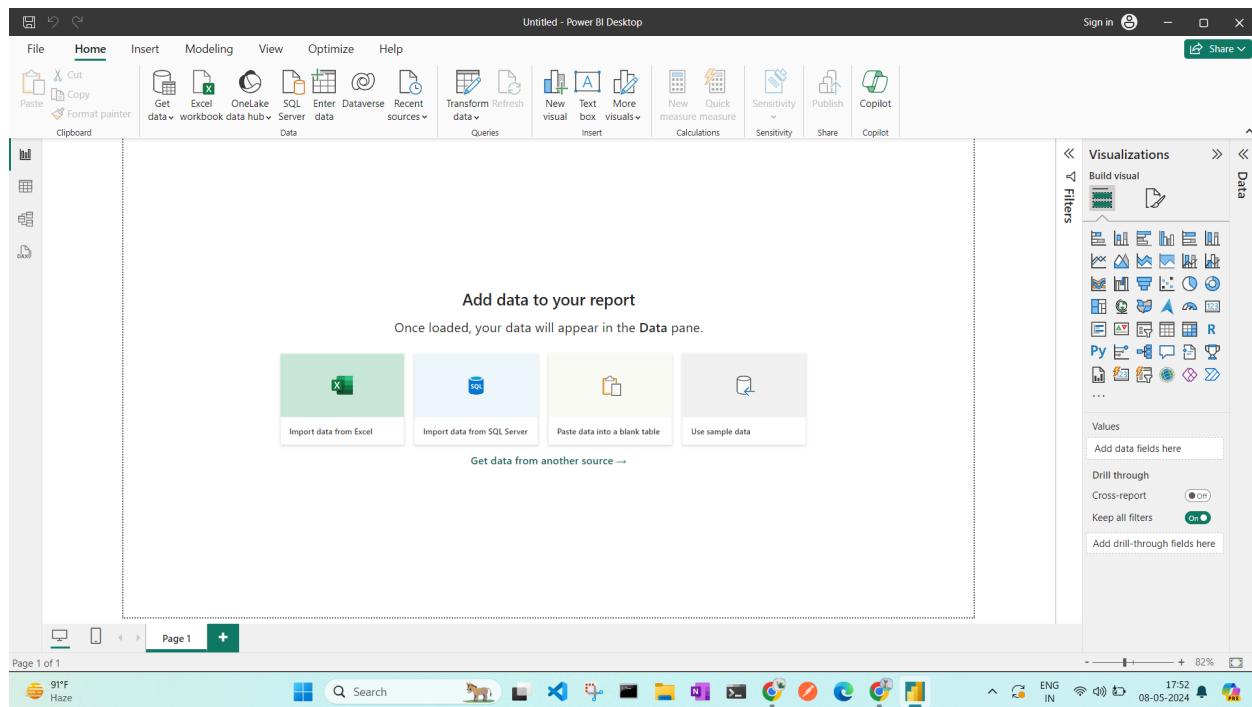
- Power BI is a business analytics tool developed by Microsoft, allowing users to visualize and share insights from their data.
- It helps in transforming raw data into interactive and visually appealing reports and dashboards.

## Features of Power BI :

1. Data Visualization: Power BI offers a wide range of data visualization tools, including charts, graphs, maps, and gauges, allowing users to represent their data in various formats to gain insights quickly.
2. Data Modeling: Create data models by defining relationships between different data tables, adding calculated columns and measures.
3. AI and Machine Learning: Power BI incorporates artificial intelligence (AI) and machine learning (ML) capabilities, such as natural language processing (NLP) for querying data using plain language and automated insights to identify trends and patterns in the data.
4. Data Connectivity: Power BI offers connectivity to a wide range of data sources, including databases, Excel files, web sources, and cloud services like Azure.
5. Data Exploration and Analysis: Features like interactive visualizations, ad-hoc querying, and advanced analytics enables users to uncover insights and trends hidden within their data.
6. Collaboration and Sharing: Power BI facilitates collaboration by allowing users to share reports and dashboards with colleagues, either internally within an organization or externally with clients and partners. This promotes data-driven decision-making across teams.

# Topics

## Data importing



1. Power BI allows users to import data from various sources including databases, Excel files, web services, and cloud platforms.
2. This brings a copy of the data into the Power BI environment for analysis.
3. Alternatively, users can choose to connect live to the data source, where Power BI queries the data source directly without importing it.

### Data Importing in CSV

Power BI allows users to import data from CSV (Comma-Separated Values) files directly into Power BI Desktop or Power BI Service.

### Creating Data from Scratch

Power BI offers tools for creating data from scratch, such as the "Enter Data" feature in Power BI Desktop.

## Data importing from CSV

The screenshot shows the 'Import Data' dialog in Power BI Desktop. The file 'spotify-2023.csv' is selected. The 'Delimiter' is set to 'Comma' and 'Data Type Detection' is enabled. A preview of the data is shown, including columns like 'track\_name', 'artist(s)\_name', and 'released\_year'. The 'Load' button is at the bottom right.

## Data importing from Scratch

The screenshot shows the 'Create Table' dialog in Power BI Desktop. A table is being defined with two columns: 'registration\_id' and 'marks'. There are 5 rows in the table, each labeled with a number (1, 2, 3, 4, 5). The 'Load' button is at the bottom right.

## Data importing from Web

### Navigator

The screenshot shows the Power BI Navigator interface. On the left, there's a tree view of available data sources:

- HTML Tables [7]**
  - Age table
  - Multiplication table
  - Fire diamond
  - Risk levels of hazardous materials in this f...
  - Table 1
  - Table 2** (selected)
  - Table 3
- Suggested Tables [7]**
  - Table 4
  - Table 5
  - Table 6
  - Table 7
  - Table 8
  - Table 9
  - Table 10
- Text [2]**
  - HTML Code
  - Displayed Text

On the right, a preview pane titled "Table View" shows the contents of "Table 2". The table has two columns: "Column1" and "Column2". The data includes historical figures and their names.

Column1	Column2
Pre-19th century	Edmond Halley Charles-René de Fourcroy Joseph Priestley Gaspard Monge
19th century	Charles Dupin Adolphe Quetelet André-Michel Guerry William Playfair Auguste Comte
Early 20th century	Edward Walter Maunder Otto Neurath W. E. B. Du Bois Henry Gantt Arthur H. Cole
Mid 20th century	Jacques Bertin Rudolf Modley Arthur H. Robinson John Tukey Mary Eleanor Bowes
Late 20th century	Borden Dent Nigel Holmes William S. Cleveland George G. Robertson Mauro MacCandless
Early 21st century	Ben Fry Hans Rosling Christopher R. Johnson David McCandless Mauro MacCandless

At the bottom, there are buttons for "Load", "Transform Data", and "Cancel".

## Data importing from Excel

The screenshot shows the Power BI Desktop interface with the title bar "Untitled - Power BI Desktop". The ribbon menu includes File, Home, Insert, Modeling, View, Optimize, and Help.

The "Navigator" pane on the left shows the file "Netflix-Movies-Data-for-Analysis.xlsx [2]" selected, with "Movies" and "Sheet1" listed under it. Below that, "Suggested Tables [1]" is shown, with "Netflix Movies Data (Movies)" selected.

The main workspace displays a table titled "Netflix Movies Data (Movies)". The table contains the following data:

Name	Year	Age Rating	Duration	Category	IMDb Rating
Casablanca	1942	PG	102 mins	Drama/Romance	8.5
Psycho	1960	R	109 mins	Horror/Thriller	8.5
The Godfather	1972	R	175 mins	Crime/Drama	9.2
Star Wars: Episode IV - A New Hope	1977	PG	121 mins	Action/Adventure	8.6
E.T. the Extra-Terrestrial	1982	PG	115 mins	Family/Sci-Fi	7.8
Terminator 2: Judgment Day	1991	R	137 mins	Action/Sci-Fi	8.5
Forrest Gump	1994	PG-13	142 mins	Drama/Romance	8.8
Titanic	1997	PG-13	135 mins	Drama/Romance	7.8
The Matrix	1999	R	136 mins	Action/Sci-Fi	8.7
Gladiator	2000	R	155 mins	Action/Drama	8.5
The Lord of the Rings: The Fellowship of the Ring	2001	PG-13	178 mins	Adventure/Drama	8.8
Spirited Away	2001	PG	125 mins	Animation/Adventure	8.6
The Dark Knight	2008	PG-13	152 mins	Action/Crime	9
Inception	2010	PG-13	148 mins	Action/Adventure	8.8
The Avengers	2012	PG-13	143 mins	Action/Adventure	8
Django Unchained	2012	R	165 mins	Drama/Western	8.4
Frozen	2013	PG	102 mins	Animation/Adventure	7.4
Interstellar	2014	PG-13	169 mins	Adventure/Drama	8.6
The Martian	2015	PG-13	144 mins	Adventure/Sci-Fi	8
La La Land	2016	PG-13	128 mins	Comedy/Drama	8
Get Out	2017	R	104 mins	Horror/Mystery	7.7
The Shape of Water	2017	R	123 mins	Adventure/Drama	7.3
Black Panther	2018	PG-13	134 mins	Action/Adventure	7.3
Joker	2019	R	122 mins	Crime/Drama	8.4

At the bottom, there are buttons for "Load", "Transform Data", and "Cancel".

The screenshot shows the Power BI Navigator interface. On the left, there's a sidebar with a search bar, 'Display Options' dropdown, and a tree view of data sources. Under 'Tokyo-Olympic-Data-for-Analysis.xlsx [1]', 'Tokyo Olympic' is selected. Below it, 'Suggested Tables [1]' contains 'Tokyo Olympic Data (Tokyo Olympic)'. On the right, the main area displays a table titled 'Tokyo Olympic Data (Tokyo Olympic)' with the following data:

Rank	Team/NOC	Gold	Silver	Bronze	Total	Rank by Total
1	United States of America	39	41	33	113	1
2	People's Republic of China	38	32	18	88	2
3	Japan	27	14	17	58	5
4	Great Britain	22	21	22	65	4
5	ROC	20	28	23	71	3
6	Australia	17	7	22	46	6
7	Netherlands	10	12	14	36	9
8	France	10	12	11	33	10
9	Germany	10	11	16	37	8
10	Italy	10	10	20	40	7
11	Canada	7	6	11	24	11
12	Brazil	7	6	8	21	12
13	New Zealand	7	6	7	20	13
14	Cuba	7	3	5	15	18
15	Hungary	6	7	7	20	13
16	Republic of Korea	6	4	10	20	13
17	Poland	4	5	5	14	19
18	Czech Republic	4	4	3	11	23
19	Kenya	4	4	2	10	25
20	Norway	4	2	2	8	29
21	Jamaica	4	1	4	9	26
22	Spain	3	8	6	17	17
23	Sweden	3	6	0	9	26
24	Switzerland	3	4	6	13	20

At the bottom right are buttons for 'Load', 'Transform Data', and 'Cancel'.

## Data Importing from Web

1. Users can connect to web pages, web APIs, or HTML tables on websites to extract data for analysis.
2. Power BI provides a Web Data Connector feature that allows users to create custom connectors for importing data from web sources that are not supported out-of-the-box.

## Data Importing from Excel

1. Excel is a powerful, flexible tool for every analytics activity. Combine it with Power BI to get broad data analytics and visualization capabilities.

## New relationship

Select tables and columns that are related.

Financials

Account	Business Unit	Currency	Year	Scenario	Jan	Feb	Mar	Apr
Sales	Software	USD	2012	Actuals	90924002	82606134	72780220	52943701
Cost of Goods Sold	Software	USD	2012	Actuals	-41623278	-40464347	-30806326	-21412962
Commissions Expense	Software	USD	2012	Actuals	-4454359	-3386032	-3389705	-2149257

Netflix Movies Data (Movies)

Name	Year	Age Rating	Duration	Category	IMDb Rating
Casablanca	1942	PG	102 mins	Drama/Romance	8.5
Psycho	1960	R	109 mins	Horror/Thriller	8.5
The Godfather	1972	R	175 mins	Crime/Drama	9.2

Cardinality

Many to many (\*:\*)

Many to one (\*:1)

One to one (1:1)

One to many (1:\*)

Many to many (\*:\*)

Cross filter direction

Both

Apply security filter in both directions

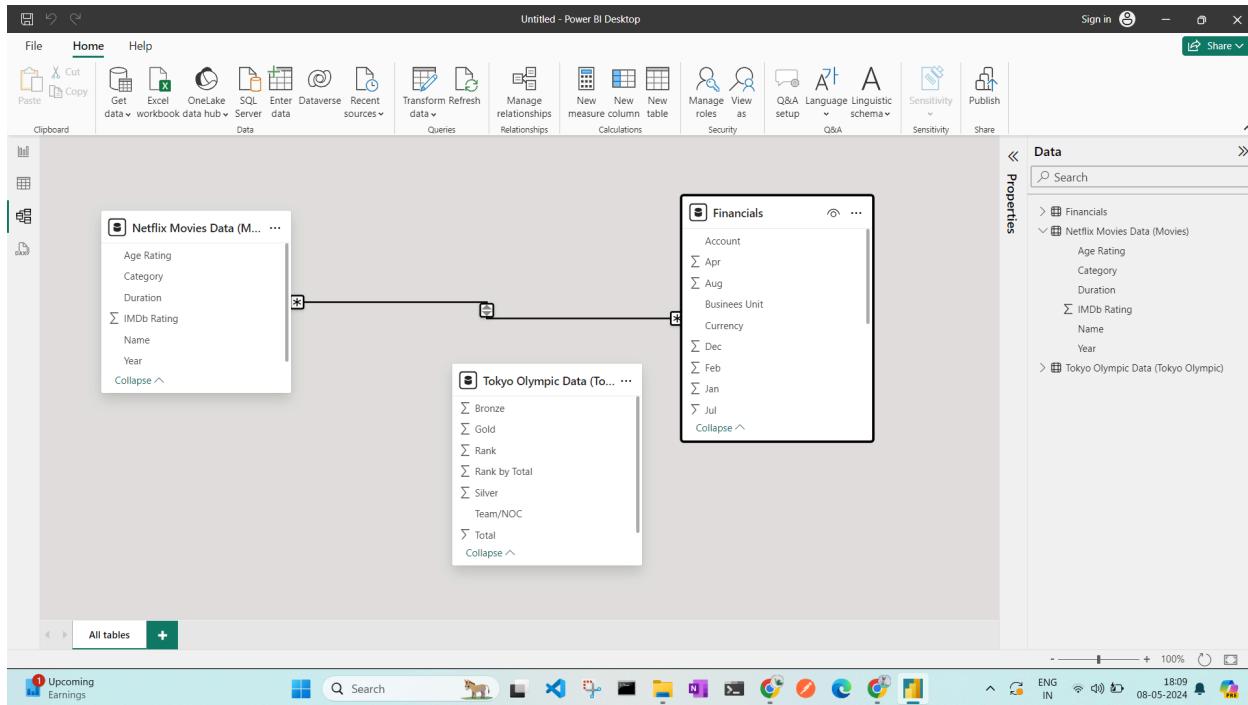
This relationship has cardinality Many-Many. This should only be used if it is expected that neither column (Year and Year) contains unique values, and that the significantly different behavior of Many-many relationships is understood. [Learn more](#)

OK Cancel

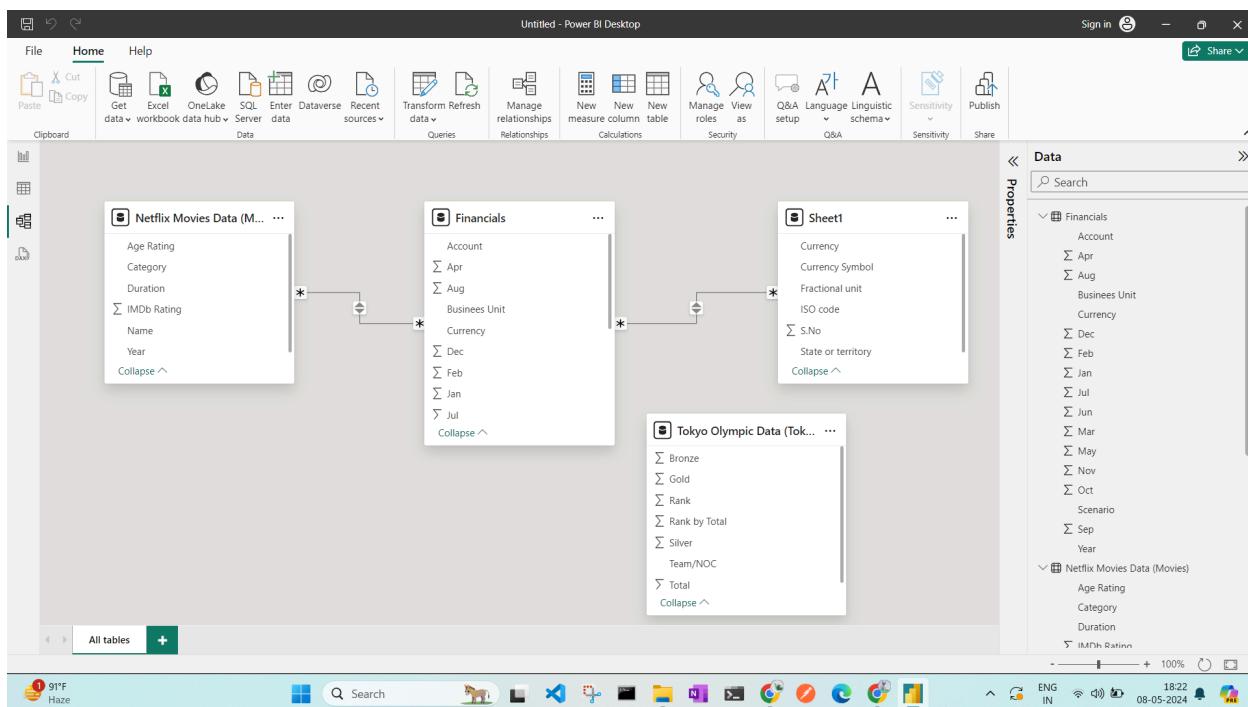
## Creating Relationships and Purpose

- Relationships are established between tables to connect related data and enable accurate analysis and visualization.
- Relationships define how tables are linked based on common fields, such as primary and foreign keys, ensuring data integrity and consistency.
- Users can create relationships between tables in Power BI Desktop by identifying matching fields in each table and defining the relationship type (e.g., one-to-many, many-to-many).

## Custom relationships



## Transitive relationships



## **Custom Relationships**

1. Advanced Relationship Types:  
Users can define many-to-one, one-to-one, and bi-directional relationships based on their specific data model requirements.
2. Cross-Filtering:  
When filtering one table affects the data displayed in related tables, Users can customize the direction of filtering to control how filters propagate across linked tables.
3. Role-Playing Dimensions:  
When a dimension table is used multiple times in a data model with different relationships, This allows users to create multiple relationships between the same tables, each serving a different purpose.
4. Advanced Data Analysis:  
Users have greater flexibility in modeling their data and can implement advanced analytical scenarios requiring custom relationship logic.

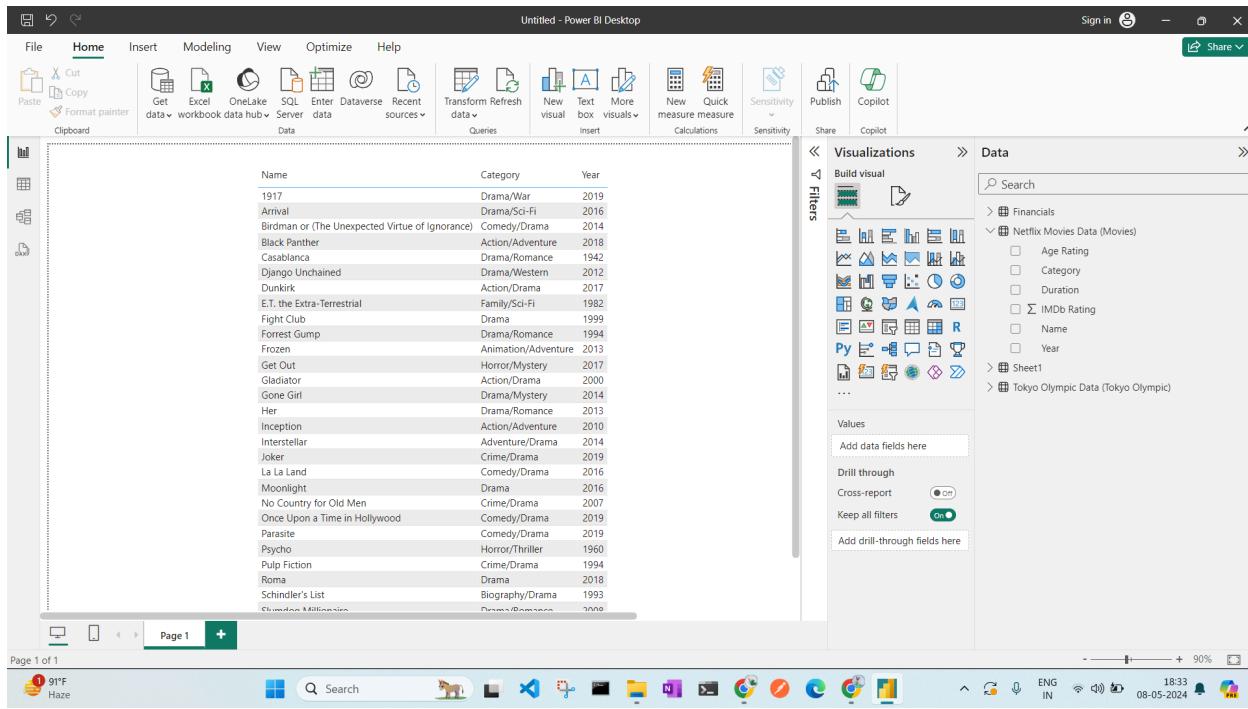
## **Active and Inactive**

1. Active relationships are the primary relationships used for filtering and data analysis.
2. Inactive relationships provide flexibility in data modeling by allowing users to create alternative paths for analysis without impacting the default filtering behavior.

## **Transitive Relationship**

1. Transitive relationship exists when there is an indirect relationship between two tables through a third table.
2. This means that although there is no direct relationship between the two tables, they are related through a common intermediary table.

## Table visualization



The screenshot shows the Power BI Desktop interface with a table visualization titled "Untitled - Power BI Desktop". The table contains data about movies, including their names, categories, and years. The interface includes a ribbon with Home selected, various data source and modeling options, and a visualizations pane on the right.

Name	Category	Year
1917	Drama/War	2019
Arrival	Drama/Sci-Fi	2016
Birdman or (The Unexpected Virtue of Ignorance)	Comedy/Drama	2014
Black Panther	Action/Adventure	2018
Casablanca	Drama/Romance	1942
Django Unchained	Drama/Western	2012
Dunkirk	Action/Drama	2017
E.T. the Extra-Terrestrial	Family/Sci-Fi	1982
Fight Club	Drama	1999
Forrest Gump	Drama/Romance	1994
Frozen	Animation/Adventure	2013
Get Out	Horror/Mystery	2017
Gladiator	Action/Drama	2000
Gone Girl	Drama/Mystery	2014
Her	Drama/Romance	2013
Inception	Action/Adventure	2010
Interstellar	Adventure/Drama	2014
Joker	Crime/Drama	2019
La La Land	Comedy/Drama	2016
Moonlight	Drama	2016
No Country for Old Men	Crime/Drama	2007
Once Upon a Time in Hollywood	Comedy/Drama	2019
Parasite	Comedy/Drama	2019
Psycho	Horror/Thriller	1960
Pulp Fiction	Crime/Drama	1994
Roma	Drama	2018
Schindler's List	Biography/Drama	1993
Cloud Atlas	Drama/Science	2012

## Report Properties

1. Report properties allow users to set a title and description for the report, providing context and clarity to viewers about the report's content and purpose.
2. Users can define metadata properties such as author, creation date, and last modified date for the report.

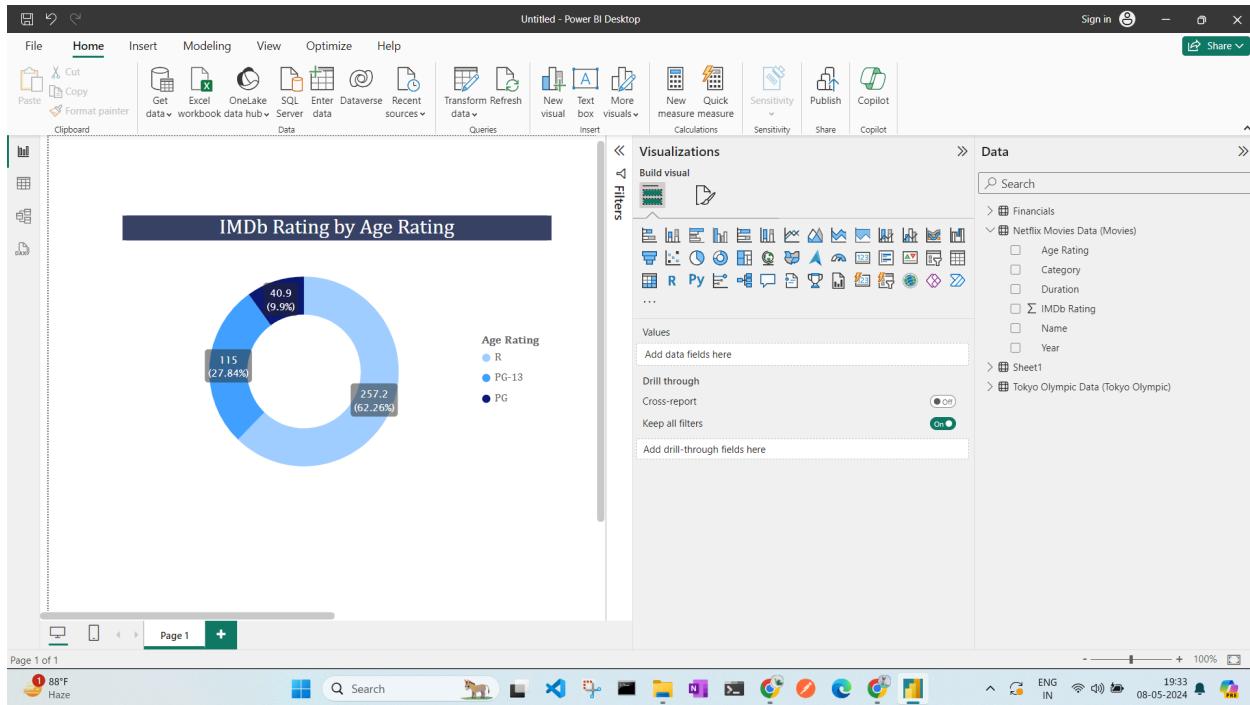
## Adding Visualization to the Report

1. Users can add various types of visualizations to the report, including charts, graphs, maps, tables, and matrices, to present data in a meaningful and engaging way.

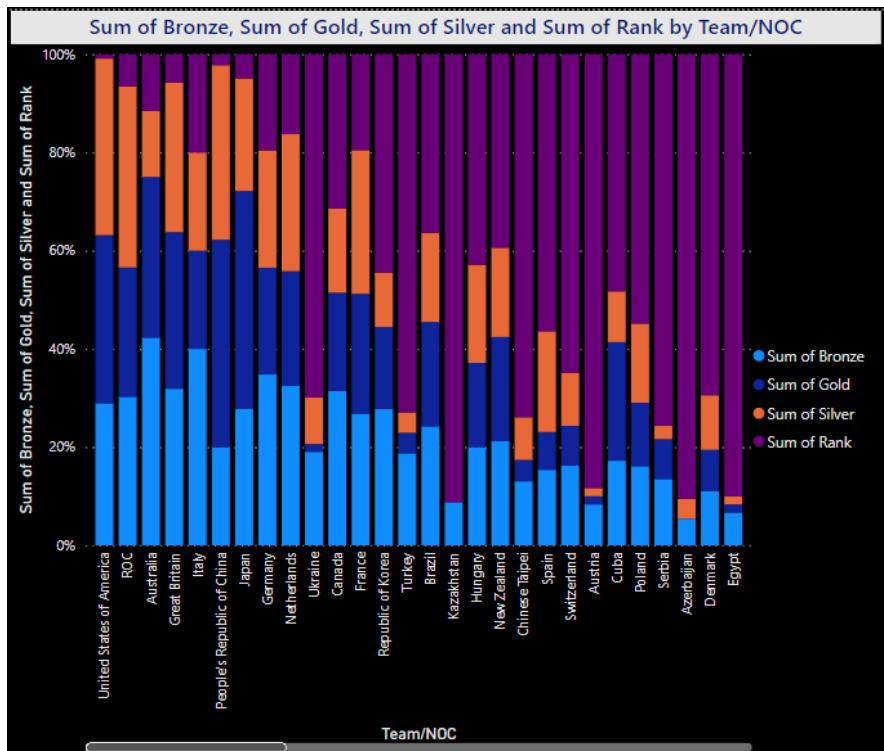
## Style Manipulations on a Report

1. Users can add header and footer elements to the report, such as report title, page numbers, and company logo, to provide additional context and branding.
2. Users can choose from a predefined color palette or define custom colors to set the color scheme for the report.

## Style Manipulations on a Report



## Setting Colors and Background



---

## Exploring Charts:

### Card and Gauge Charts

1. Card Chart: A card chart in Power BI displays a single value or metric in a visually prominent and compact format, making it easy to highlight key performance indicators (KPIs) or summary statistics.
2. Gauge Chart: A gauge chart visually represents a single value within a range of values, similar to a speedometer or thermometer. It provides a quick and intuitive way to assess performance against targets or thresholds.

### Bar Chart

1. A bar chart in Power BI represents data using rectangular bars of varying lengths, where the length of each bar corresponds to the value of a data category.
2. Bar charts are commonly used to compare values across categories.
3. Grouped and Stacked Layouts: Power BI supports both grouped and stacked layouts for bar charts.
4. In a grouped layout, bars for different categories are displayed side by side, making it easy to compare values within each category.
5. In a stacked layout, bars are stacked on top of each other, allowing users to compare the total values across categories.

### Pie Chart

1. A pie chart in Power BI represents data as slices of a circular pie, where each slice corresponds to a category or group and the size of each slice represents the proportion of that category relative to the whole.
2. It's ideal for displaying the distribution of categorical data.

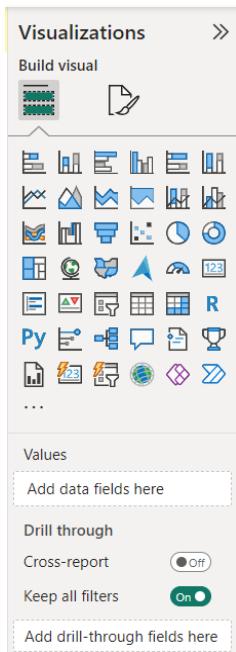
### Funnel and Waterfall Charts

1. Funnel Chart: A funnel chart in Power BI represents stages in a process or conversion funnel, where each segment of the funnel represents a stage and the size of each segment corresponds to the quantity or value associated with that stage.
2. It's commonly used in sales and marketing to visualize conversion rates.

3. Waterfall Chart: A waterfall chart displays the cumulative effect of sequentially introduced positive or negative values, similar to a flowing waterfall.
4. It helps users visualize the incremental impact of each value on a starting point, such as financial data or budget analysis.

## Exploring Symbols and Navigation

1. Symbols and Icons: Power BI allows users to incorporate symbols and icons into reports and dashboards to enhance data visualization and communication. Users can choose from a library of predefined symbols or upload custom images to represent data points or categories.
2. Interactive Navigation: Power BI reports support interactive navigation features such as bookmarks, drill-through, and tooltips, allowing users to explore data dynamically and drill down into details for deeper analysis.
3. Bookmarks: Bookmarks in Power BI enable users to capture and save the current state of a report, including filters, slicers, and visualizations. Users can create multiple bookmarks to save different views of the data and navigate between them easily.
4. Drill-Through and Tooltips: Drill-through enables users to navigate from a summary report to a detailed report for specific data points, while tooltips provide additional context and information when hovering over visualizations.



## Card

The screenshot shows the Power BI Desktop interface with a card visualization on the left. The card displays the text "Sum of Jan" above a large value "289.85M". Above the card, there is a table titled "Account" with the following data:

Account	Sum of Jan
Commissions Expense	-7,09,21,460.00
Consulting Expense	-8,95,14,228.00
Cost of Goods Sold	-70,68,47,017.00
Marketing Expense	-3,53,30,001.00
Payroll Expense	-17,78,27,327.00
R&D Expense	-7,23,32,061.00
Sales	1,58,45,46,698.73
Software/Hardware Expense	-12,42,03,897.00
Travel & Entertainment Expense	-1,77,19,721.00
<b>Total</b>	<b>28,98,50,986.73</b>

The ribbon at the top shows the "Column tools" tab is selected. The data pane on the right lists various financial categories under the "Financials" folder.

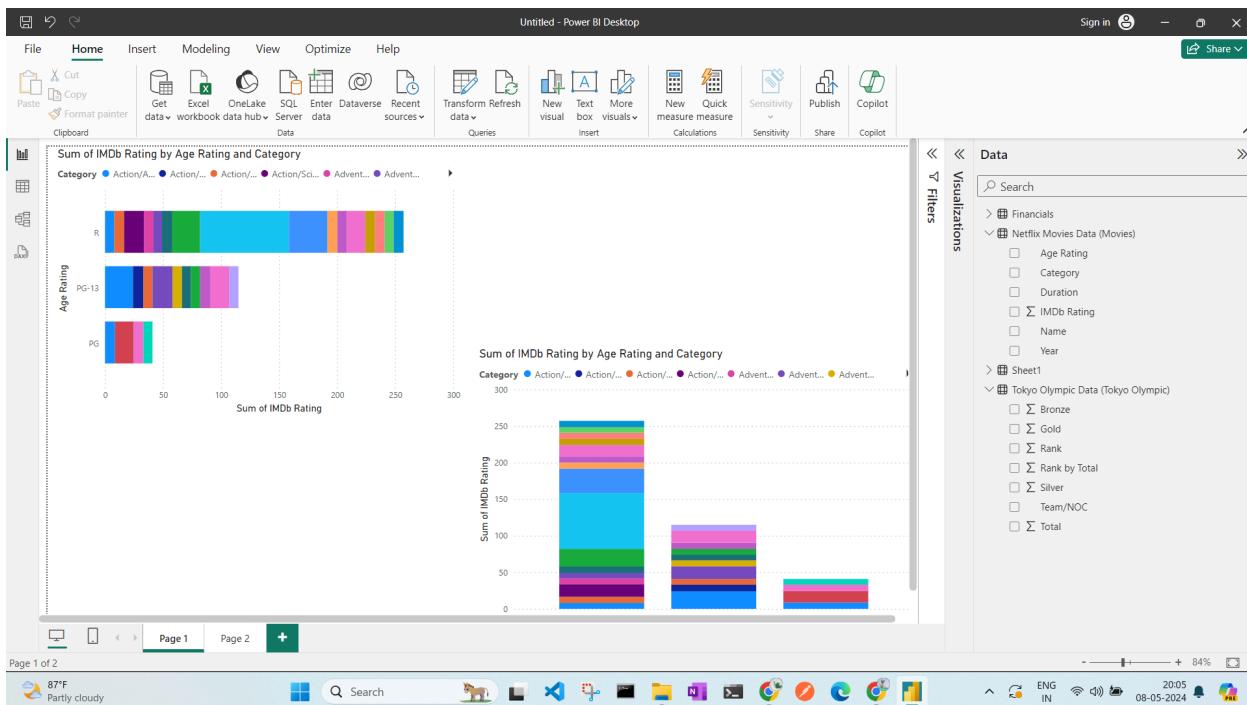
## Gauge

The screenshot shows the Power BI Desktop interface with a gauge visualization on the left. The gauge has a blue arc from 0.00M to 289.85M, a white arc from 289.85M to 579.70M, and a grey arc from 579.70M back to 0.00M. The value "289.85M" is displayed in the center. Above the gauge, there is a table titled "Account" with the following data:

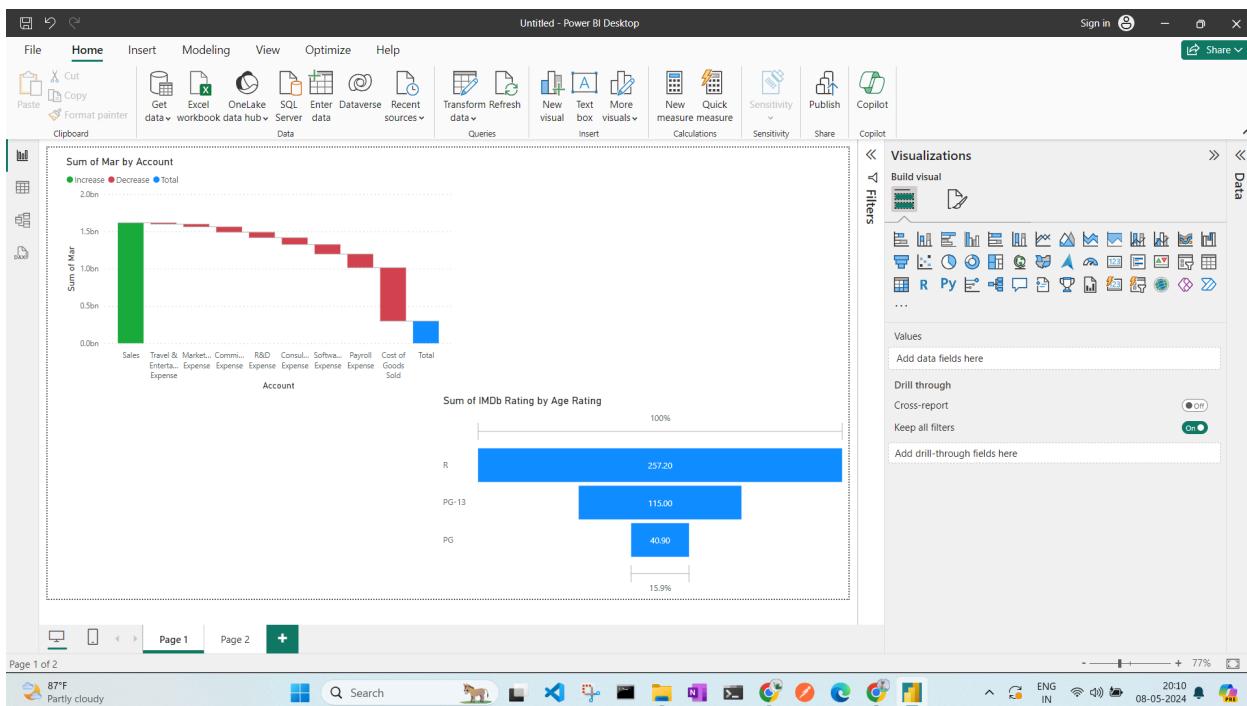
Account	Sum of Jan
Commissions Expense	-7,09,21,460.00
Consulting Expense	-8,95,14,228.00
Cost of Goods Sold	-70,68,47,017.00
Marketing Expense	-3,53,30,001.00
Payroll Expense	-17,78,27,327.00
R&D Expense	-7,23,32,061.00
Sales	1,58,45,46,698.73
Software/Hardware Expense	-12,42,03,897.00
Travel & Entertainment Expense	-1,77,19,721.00
<b>Total</b>	<b>28,98,50,986.73</b>

The ribbon at the top shows the "Home" tab is selected. The data pane on the right lists various financial categories under the "Financials" folder.

## Stacked bar and stacked column chart



## Waterfall and Funnel



## Introduction to DAX Measures and Columns

1. Data Analysis Expressions (DAX): DAX is a formula language used in Power BI for creating calculated columns, measures, and queries.
2. Calculated Columns: Calculated columns in Power BI are columns that are computed based on expressions defined by users. They are computed row by row in the data model and stored in the dataset.
3. Measures: Measures in Power BI are calculations that are evaluated based on the context of the visualization or filter context. They are typically used for aggregations, calculations, and business logic.

### Syntax and Indentation

1. DAX Syntax: Data Analysis Expressions (DAX) in Power BI follows a specific syntax similar to Excel formulas but optimized for working with relational data models. This syntax includes functions, operators, and constants used to define calculations and manipulate data.
2. Clear Indentation: Proper indentation in DAX formulas enhances readability and maintainability. Users should use consistent indentation to organize their formulas logically, making it easier to understand the structure and flow of calculations.

### SUM Function:

The SUM function in Power BI is used to calculate the sum of values in a column or expression. It adds up all the numeric values within the specified column or expression, providing a total value.

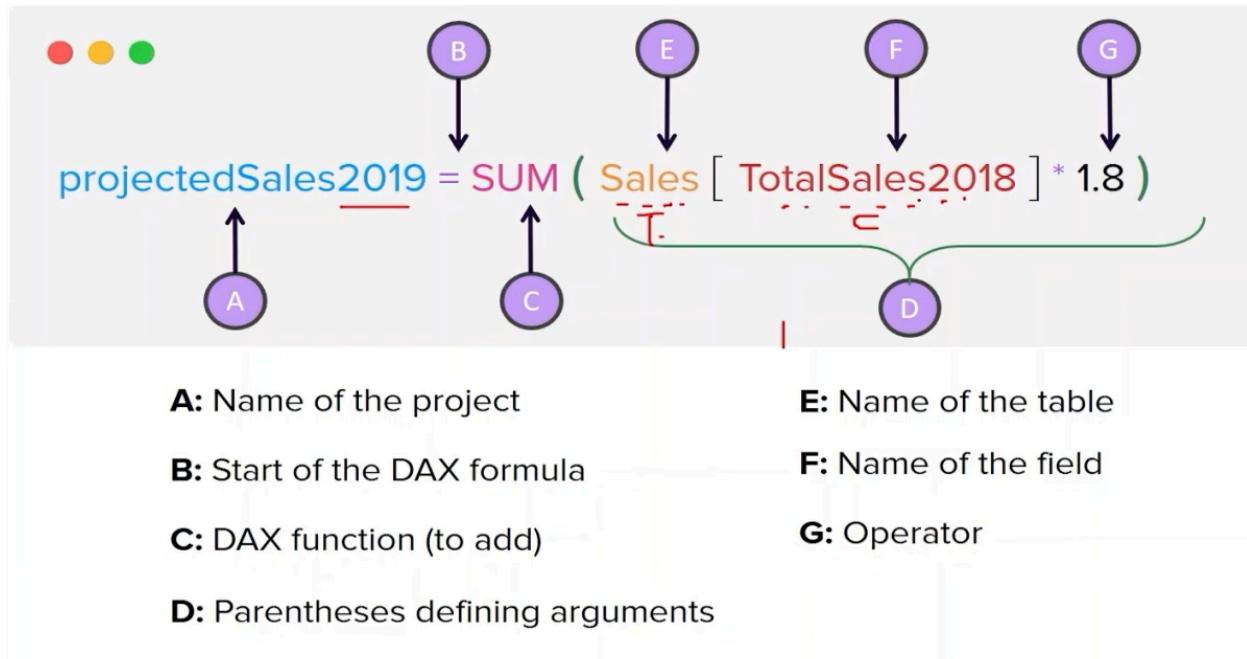
### AVERAGE Function:

AVERAGE calculates the arithmetic mean of a set of values, providing the average value. It's useful for calculating average sales, average scores, or average durations.

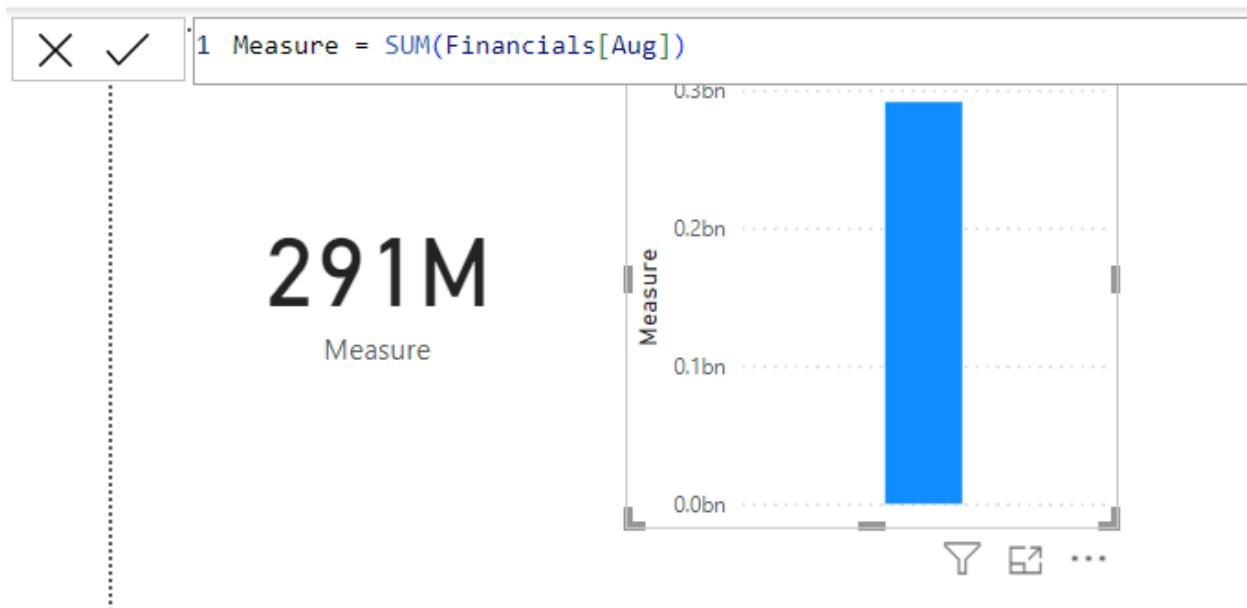
### COUNT Function:

COUNT, on the other hand, counts the number of non-blank values within a column or expression. It provides a count of how many values exist in the specified column, excluding blank or null values.

## SYNTAX



## SUM



## SUM

```
1 Total_medals = SUM('Tokyo Olympic Data (Tokyo Olympic)'[Gold]) *  
2 SUM('Tokyo Olympic Data (Tokyo Olympic)'[Silver]) * SUM('Tokyo Olympic Data (Tokyo Olympic)'[Bronze])
```

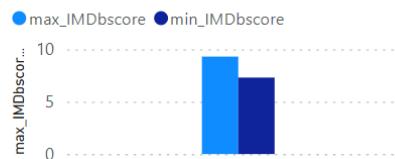


## MIN and MAX

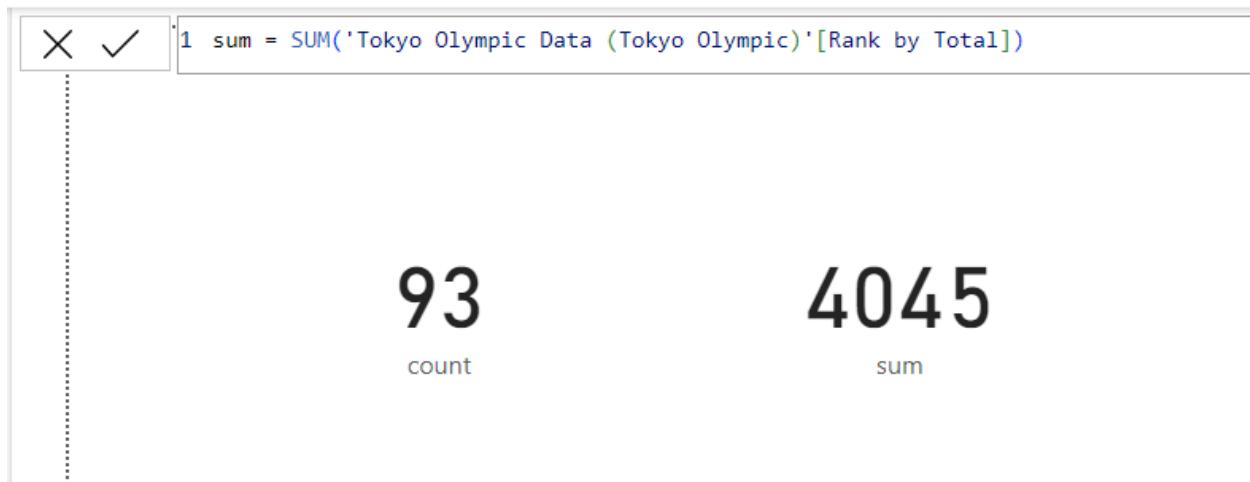
X ✓ 1 max\_IMDbscore = MAX('Netflix Movies Data (Movies)'[IMDb Rating])

7.30  
min\_IMDbscore      9.30  
max\_IMDbscore

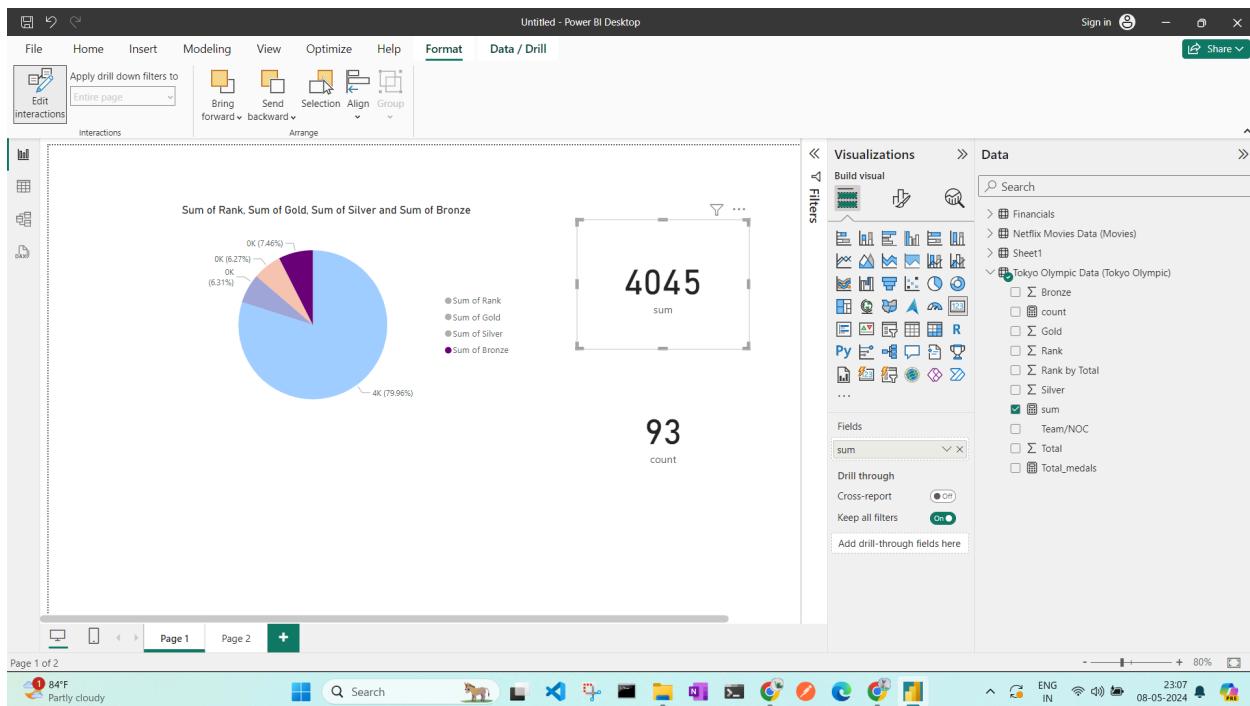
### max\_IMDbscore and min\_IMDbscore



## Difference between SUM and COUNT



## Edit interactions



1. Edit interactions in Power BI allow users to control how visualizations interact with each other on a report page.
2. Users can specify which visualizations affect others when users interact with them, enhancing the interactive experience.

## **Overview of Filters and its Types**

1. Data Filtering: Filters in Power BI allow users to focus on specific subsets of data by temporarily hiding or highlighting data points based on defined criteria. Filters play a crucial role in data analysis, enabling users to drill down into details and extract meaningful insights.
2. Types of Filters:

### **Visual Level**

1. Visual Level Filters: Users can define specific criteria to include or exclude data from a visualization, controlling which data points are displayed within that visualization.

### **Page and Report Level**

1. Page Level Filters: Users can define filtering criteria that affect the entire page, controlling which data points are visible across all visualizations on that page.
2. Report Level Filters: Users can define filtering criteria at the report level, ensuring consistent filtering behavior across the entire report.

### **Include and Exclude**

1. Include Filters: Include filters in Power BI specify criteria to include specific data points or categories in the visualization. These filters restrict the data displayed to only include the selected data points, allowing users to focus on specific subsets of data.
2. Exclude Filters: Exclude filters define criteria to exclude certain data points or categories from the visualization. These filters remove the selected data points from the visualization, allowing users to exclude outliers or irrelevant data from their analysis.

### **Using Slicer as a Filter**

1. Slicers allow users to filter data interactively. Users can select values from slicers to apply filters to one or more visualizations on a report page.

## Types of filter visual level : advanced and basic filtering

The screenshot shows the Power BI Desktop interface with three pie charts on the canvas:

- Top Left:** Sum of IMDb Rating by Age Rating and Category. A donut chart showing the distribution of ratings. Legend: PG-13 (blue), R (orange), PG (purple). Data: PG-13 (8.9%, 2.15%), R (8.6%, 12.88%), PG (17.2%, 25.71%).
- Top Right:** Sum of IMDb Rating by Age Rating and Category. A pie chart showing the distribution of ratings. Legend: PG-13 (blue), R (orange), PG (purple). Data: PG-13 (24.1%, 36.02%), R (17.2%, 25.71%), PG (8%, 11.96%).
- Bottom:** Sum of IMDb Rating by Age Rating and Category. A pie chart showing the distribution of ratings. Legend: PG-13 (blue), R (orange). Data: PG-13 (8.9%, 53.61%), R (7.7%, 46.39%).

The **Data pane** on the right shows filters applied to the visual:

- Filters on this visual:**
  - Age Rating is (All)
- Category:** contains 'a' and conta...
- Filter type:** Advanced filtering
- Show items when the value:**
  - contains: a (And)
  - contains: h (Or)
- Sum of IMDb Rating is (All)**

## Included and Excluded

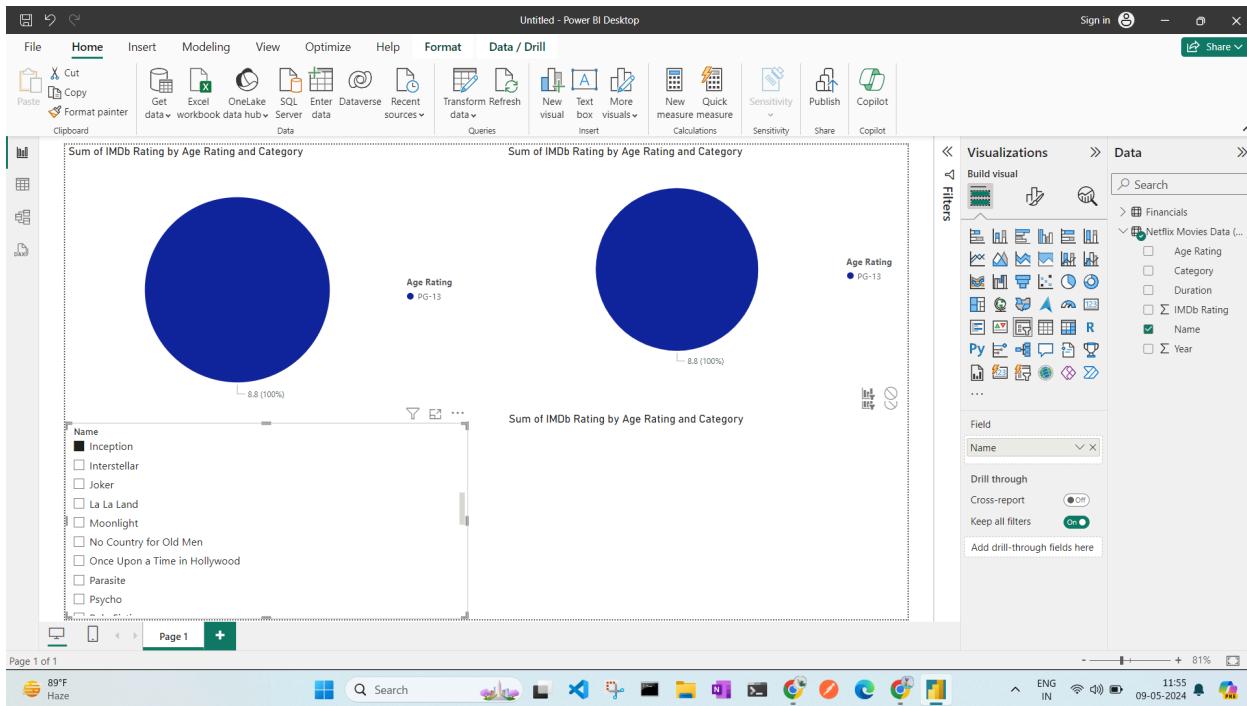
The screenshot shows the Power BI Desktop interface with three pie charts on the canvas:

- Top Left:** Sum of IMDb Rating by Age Rating and Category. A large orange circle representing 17.2 (100%) of the data.
- Top Right:** Sum of IMDb Rating by Age Rating and Category. A pie chart showing the distribution of ratings. Legend: PG-13 (blue), R (orange), PG (purple). Data: PG-13 (17.2%, 25.71%), R (8%, 11.96%), PG (8.6%, 12.88%).
- Bottom:** Sum of IMDb Rating by Age Rating and Category. A pie chart showing the distribution of ratings. Legend: PG-13 (blue), R (orange). Data: PG-13 (8.9%, 53.61%), R (7.7%, 46.39%).

The **Data pane** on the right shows filters applied to the visual:

- Filters on this visual:**
  - Age Rating is (All)
  - Category is (All)
  - Included (1):** R (Age Rating) + Action/S...
- Sum of IMDb Rating is (All)**
- Filters on this page:**
  - Add data fields here
- Filters on all pages:**
  - Add data fields here

## Slicer



Drill Through lets you click on that data point and delve deeper into the underlying details. This helps you understand the reasons behind the trends you observe in your reports.

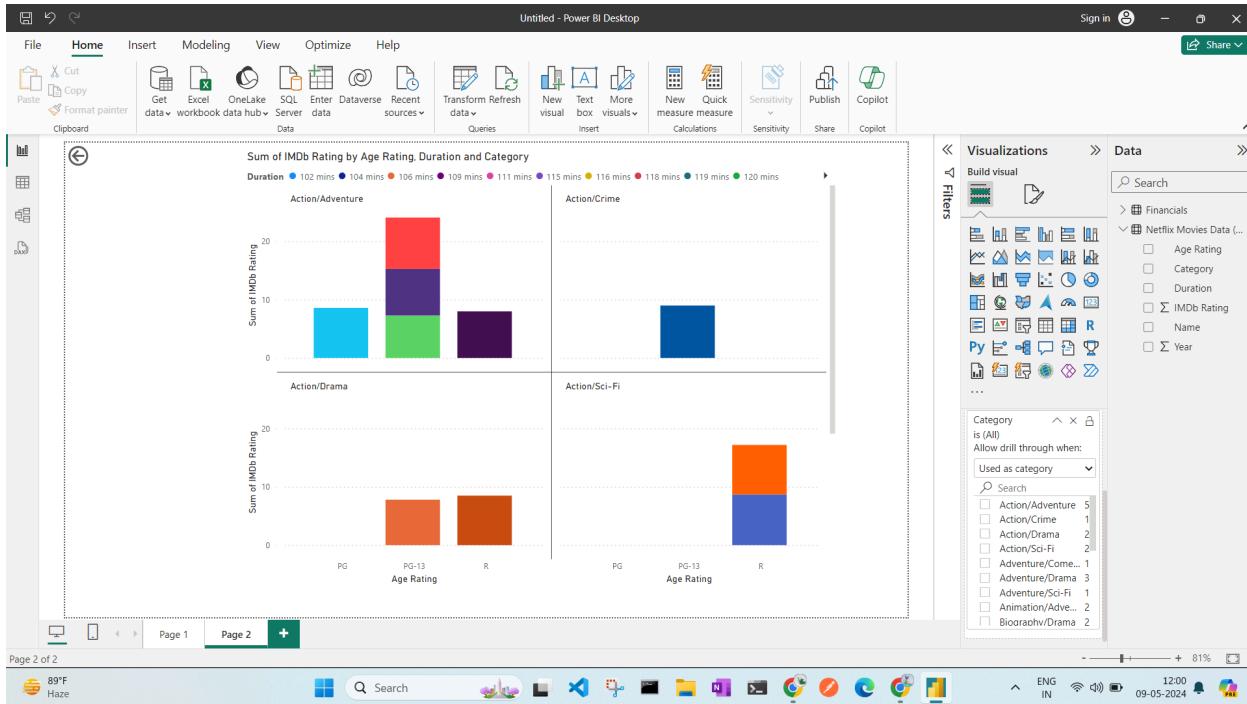
Drill Through involves two key elements:

- Source Visual:** This is the initial visualization (chart, table, etc.) that displays summarized data.
- Target Page:** This is a separate report page or visual that contains the detailed information for the selected data point.

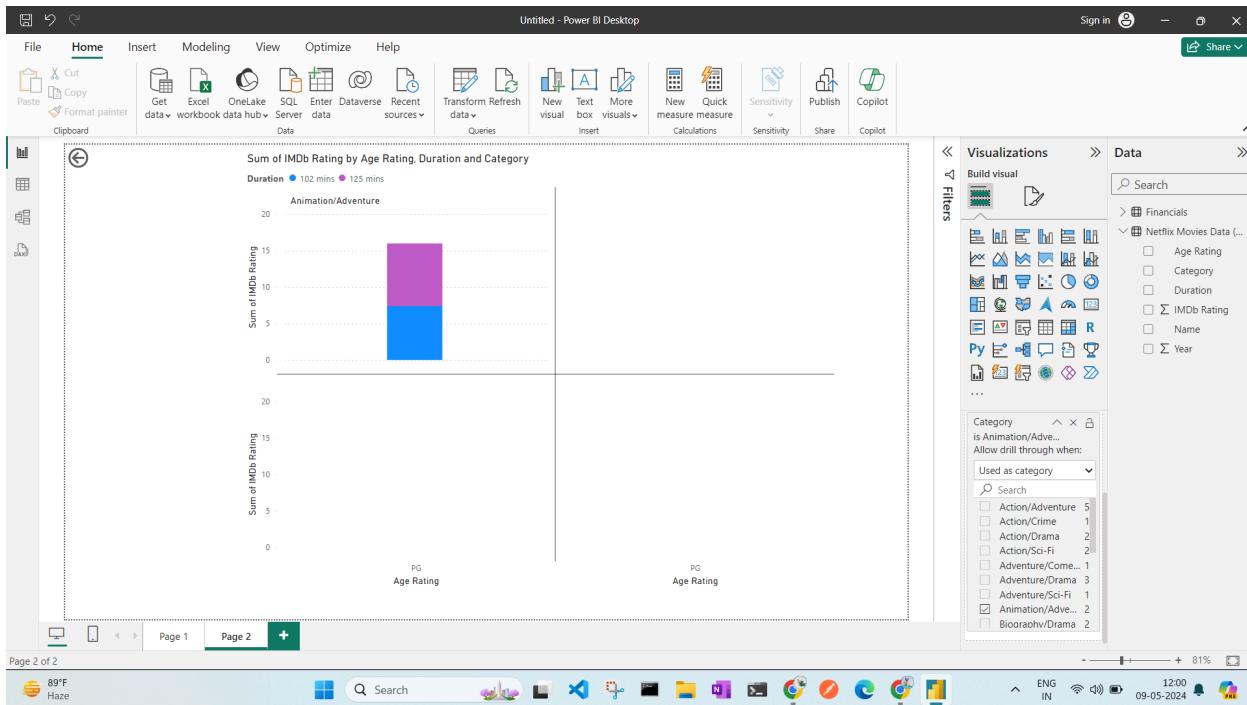
Here's a breakdown of the drill-through process:

- User Interaction:** You click on a specific data point in the source visual.
- Context Recognition:** Power BI recognizes the selection and identifies the corresponding details to be displayed.
- Navigation:** Power BI automatically navigates you to the target page, displaying the breakdown for the chosen data point.

## Before Applying Drill Through



## After Applying Drill Through



## Exploring Power Query Editor

PQE acts as a data wrangling workbench, allowing you to:

1. **Import Data:** Connect to various data sources (Excel files, databases, web APIs) and bring your data into Power BI.
2. **Data Cleaning:** Cleanse your data by removing duplicates, correcting errors, and formatting values consistently.
3. **Data Transformation:** Transform your data using a variety of tools and techniques. This includes filtering, merging tables, pivoting data, and creating custom columns.
4. **Data Shaping:** Reshape your data structure to meet the specific requirements of your analysis in Power BI reports.

## Data Quality Optimization and Applied Steps

### 1. Data Profiling and Assessment:

- **Understand Your Data**
- **Identify Errors and Inconsistencies**

### 2. Data Cleaning and Transformation:

- **Filling Missing Values:** Replace missing values with appropriate strategies (e.g., averages, medians, or custom logic).
- **Correcting Formatting:** Ensure consistent data formats (e.g., date formats, currency symbols).
- **Removing Duplicates:** Identify and eliminate duplicate data points.
- **Data Transformation:** Reshape your data structure as needed for analysis (e.g., pivoting tables, creating calculated columns).

### 3. Implementing Data Validation Rules:

- Set data type restrictions, define acceptable value ranges, or enforce specific data patterns.

### 4. Data Monitoring and Refreshing:

**Schedule Regular Data Refreshes:** Ensure your reports reflect the latest and most accurate data by scheduling regular refresh processes.

## Applying Power Query Editor

The screenshot shows the Power BI Desktop application with the Power Query Editor open. The 'Applied Steps' pane on the right lists the 'Promoted Headers' step. The 'Properties' pane shows the query name as 'Netflix Movies Data (Movies)'. The main area displays a table of movie data with columns: Name, Year, Age Rating, Duration, and Category.

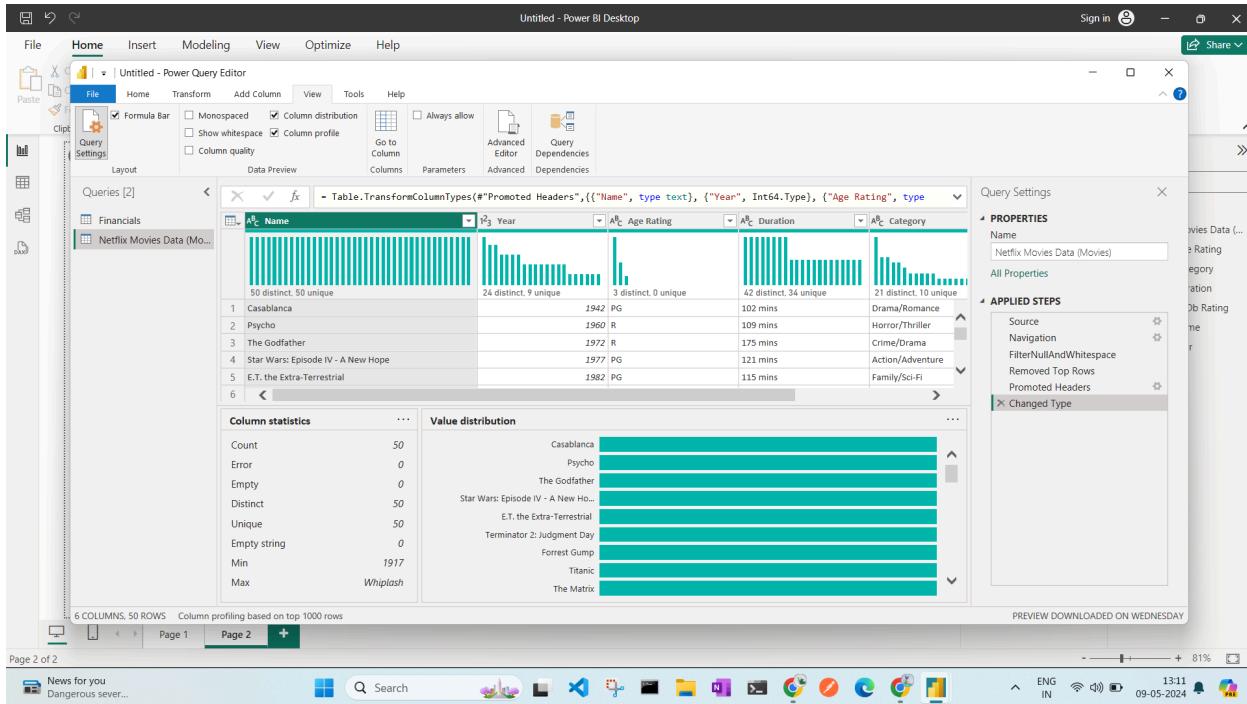
Name	Year	Age Rating	Duration	Category
Casablanca	1942	PG	102 mins	Drama/Romance
Psycho	1960	R	109 mins	Horror/Thriller
The Godfather	1972	R	175 mins	Crime/Drama
Star Wars: Episode IV - A New Hope	1977	PG	121 mins	Action/Adventure
E.T. the Extra-Terrestrial	1982	PG	115 mins	Family/Sci-Fi
Terminator 2: Judgment Day	1991	R	137 mins	Action/Sci-Fi
Forrest Gump	1994	PG-13	142 mins	Drama/Romance
Titanic	1997	PG-13	195 mins	Drama/Romance
The Matrix	1999	R	136 mins	Action/Sci-Fi
Gladiator	2000	R	155 mins	Action/Drama
The Lord of the Rings: The Fellowship of the Ring	2001	PG-13	178 mins	Adventure/Drama
Spirited Away	2001	PG	125 mins	Animation/Adventure
The Dark Knight	2008	PG-13	152 mins	Action/Crime
Inception	2010	PG-13	148 mins	Action/Adventure
The Avengers	2012	PG-13	143 mins	Action/Adventure
Django Unchained	2012	R	165 mins	Drama/Western
Frozen	2013	PG	102 mins	Animation/Adventure
Interstellar	2014	PG-13	169 mins	Adventure/Drama
The Martian	2015	PG-13	144 mins	Adventure/Sci-Fi
...	...	...	...	...

## Data Quality Optimization and Applied Steps

The screenshot shows the Power BI Desktop application with the Power Query Editor open. The 'Applied Steps' pane on the right lists the 'Changed Type' step. The 'Properties' pane shows the query name as 'Netflix Movies Data (Movies)'. The main area displays a table of movie data with columns: Name, Year, Age Rating, Duration, and Category. The 'Query Settings' pane is also visible.

Name	Year	Age Rating	Duration	Category
Casablanca	1942	PG	102 mins	Drama/Romance
Psycho	1960	R	109 mins	Horror/Thriller
The Godfather	1972	R	175 mins	Crime/Drama
Star Wars: Episode IV - A New Hope	1977	PG	121 mins	Action/Adventure
E.T. the Extra-Terrestrial	1982	PG	115 mins	Family/Sci-Fi
Terminator 2: Judgment Day	1991	R	137 mins	Action/Sci-Fi
Forrest Gump	1994	PG-13	142 mins	Drama/Romance
Titanic	1997	PG-13	195 mins	Drama/Romance
The Matrix	1999	R	136 mins	Action/Sci-Fi
Gladiator	2000	R	155 mins	Action/Drama
The Lord of the Rings: The Fellowship of the Ring	2001	PG-13	178 mins	Adventure/Drama
Spirited Away	2001	PG	125 mins	Animation/Adventure
The Dark Knight	2008	PG-13	152 mins	Action/Crime
Inception	2010	PG-13	148 mins	Action/Adventure
The Avengers	2012	PG-13	143 mins	Action/Adventure
Django Unchained	2012	R	165 mins	Drama/Western
Frozen	2013	PG	102 mins	Animation/Adventure
Interstellar	2014	PG-13	169 mins	Adventure/Drama
The Martian	2015	PG-13	144 mins	Adventure/Sci-Fi
...	...	...	...	...

## Column Distribution and Column Profile



## Duplicate vs Reference

### Duplicates:

- Duplicate data points represent exact copies of a row within a table. They contain identical values across all columns.
- Duplicates can inflate data counts and skew your analysis.
- They also create data redundancy, increasing storage requirements and potentially impacting performance.

### References:

- References occur when a table in your data model points to another table containing the actual data.
- The referencing table holds a "foreign key" that links it to the primary key of the referenced table.
- References promote data integrity and consistency.
- Changes made to the referenced table are automatically reflected in all referencing tables, eliminating the need to update data in multiple locations.

## **Working with Columns:**

### **Conditional Column**

- Conditional columns leverage a formula language called DAX (Data Analysis Expressions) in Power BI Desktop.
- You define a set of conditions within the formula, and based on whether those conditions are met, the formula assigns a specific value to each row in the new column.

### **Indexed and Duplicate**

### **Indexing Columns:**

- An index acts like a table of contents for a column in Power BI.
- It arranges the data in a specific order to improve query performance.

### **Duplicate Values in Columns:**

- Duplicate data points within a column can lead to inaccurate analysis and inflated data counts.
- They also increase storage requirements and potentially impact report performance.
- Power BI Desktop offers functionalities within Power Query Editor (PQE) to identify and remove duplicate rows based on specific criteria (e.g., matching values across all columns in the table).

### **Column from Examples**

1. **Identify the Pattern:** In PQE, select the existing column containing the data you want to use for the new column (e.g., customer names).
2. **Provide Examples:** In the "Add Column" tab, select "Column from Examples." PQE will display a mini table with two rows: "Sample" and "Output." Here, you provide examples.
3. **Define the Output:** In the "Output" row, type the desired output format for the new column (e.g., "Mr. John Smith" or "Ms. Jane Doe").
4. **Apply the Pattern:** In the "Sample" row, type a few examples from your existing data that demonstrate the pattern you want the new column to follow (e.g., "John Smith" or "Jane Doe") and then generate the column.

## Custom Column

Custom columns leverage a formula language called DAX (Data Analysis Expressions) in Power BI Desktop. DAX offers a rich set of functions and operators that enable you to perform various transformations on your data.

### Creating a Custom Column:

**Power BI Desktop:** Navigate to the "Modeling" tab.

**New Table Column:** Right-click on any existing table and select "New Column."

**DAX Formula:** Enter a DAX formula that defines your desired transformation for the new column.

## Reference and Duplicates

The screenshot shows the Power BI Desktop interface with the 'Power Query Editor' open. The 'Applied Steps' pane on the right side displays a single step named 'Removed Columns'. This indicates that a column was removed from the query. The main area shows a table with 16 columns and 351 rows, with the top row labeled 'Table.RemoveColumns("Changed Type",("Currency"))'. The table contains various financial data points like Sales, Cost of Goods Sold, and Marketing Expense, categorized by Business Unit and Scenario. The status bar at the bottom right shows 'PREVIEW DOWNLOADED ON WEDNESDAY' and the date '09-05-2024'.

## Referenced table : When Currency column deleted from main table also deletes in referenced

The screenshot shows the Power BI Desktop interface with the 'Untitled - Power BI Desktop' window open. The 'Home' tab is selected. In the center, there is a 'Data Preview' grid for a query named 'Financials (2)'. The columns are labeled 'Account', 'Business Unit', 'Year', 'Scenario', and 'Jan'. The data consists of 351 rows of financial data. On the right side of the screen, the 'Query Settings' pane is visible, showing the 'APPLIED STEPS' section which includes a step named 'Source'. The status bar at the bottom indicates 'PREVIEW DOWNLOADED ON WEDNESDAY 09-05-2024'.

## Duplicate table : When Currency column deleted from main table does not delete in duplicate

The screenshot shows the Power BI Desktop interface with the 'Untitled - Power BI Desktop' window open. The 'Home' tab is selected. In the center, there is a 'Data Preview' grid for a query named 'Financials (3)'. The columns are labeled 'Account', 'Business Unit', 'Currency', 'Year', and 'Scenario'. The data consists of 351 rows of financial data. On the right side of the screen, the 'Query Settings' pane is visible, showing the 'APPLIED STEPS' section which includes steps named 'Source', 'Navigation', and 'Promoted Headers'. The status bar at the bottom indicates 'PREVIEW DOWNLOADED ON WEDNESDAY 09-05-2024'.

## Conditional Column

**Add Conditional Column**

Add a conditional column that is computed from the other columns or values.

New column name: Rating

Column Name	Operator	Value	Output
If	[IMDb Rating]	is greater than or... <input type="text" value="9"/>	[Rating] = Excellent
Else If	[IMDb Rating]	is greater than or... <input type="text" value="8.5"/>	[Rating] = Very Good
Else If	[IMDb Rating]	is greater than or... <input type="text" value="8"/>	[Rating] = Good
Else	<input type="text" value="12.5"/>	Average	

OK Cancel

File Home Transform Add Column View Tools Help

Queries [2]

Financials Netflix Movies Data (Mo...

- Table.ReorderColumns(#"Added Conditional Column", {"Year", "Age Rating", "Duration", "Category", "Name", "IMDb Rating", "Rating", "Category", "Name", "IMDb Rating"} )

Category	Name	IMDb Rating	Rating	Year	Duration	Category	Name	IMDb Rating
Drama/Romance	Casablanca	8.5	Very Good	1942	101 mins	Drama/Romance	Casablanca	8.5
Horror/Thriller	Psycho	8.5	Very Good	1960	104 mins	Horror/Mystery	Psycho	8.5
Crime/Drama	The Godfather	9.2	Excellent	1972	175 mins	Crime/Drama	The Godfather	9.2
Action/Adventure	Star Wars: Episode IV - A New Hope	8.6	Very Good	1977	134 mins	Action/Adventure	Star Wars: Episode IV - A New Hope	8.6
Family/Sci-Fi	E.T. the Extra-Terrestrial	7.8	Average	1982	122 mins	Crime/Drama	E.T. the Extra-Terrestrial	7.8
Action/Sci-Fi	Terminator 2: Judgment Day	8.5	Very Good	1991	132 mins	Comedy/Drama	Terminator 2: Judgment Day	8.5
Drama/Romance	Forrest Gump	8.8	Very Good	1994	142 mins	Comedy/Drama	Forrest Gump	8.8
Drama/Romance	Titanic	7.8	Average	1997	195 mins	Romantic	Titanic	7.8
Action/Sci-Fi	The Matrix	8.7	Very Good	1999	136 mins	Action/Sci-Fi	The Matrix	8.7
Action/Drama	Gladiator	8.5	Very Good	2000	155 mins	Action/Drama	Gladiator	8.5
Adventure/Drama	The Lord of the Rings: The Fellowship of the Ring	8.8	Very Good	2001	202 mins	Adventure/Drama	The Lord of the Rings: The Fellowship of the Ring	8.8
Animation/Adventure	Spirited Away	8.6	Very Good	2002	135 mins	Animation/Adventure	Spirited Away	8.6
Action/Crime	The Dark Knight	9	Excellent	2008	158 mins	Action/Crime	The Dark Knight	9
Action/Adventure	Inception	8.8	Very Good	2010	148 mins	Action/Adventure	Inception	8.8
Action/Adventure	The Avengers	8	Good	2012	143 mins	Action/Adventure	The Avengers	8
Drama/Western	Django Unchained	8.4	Good	2013	165 mins	Drama/Western	Django Unchained	8.4
Animation/Adventure	Frozen	7.4	Average	2013	114 mins	Animation/Adventure	Frozen	7.4
Adventure/Drama	Interstellar	8.6	Very Good	2014	169 mins	Adventure/Drama	Interstellar	8.6
Adventure/Sci-Fi	The Martian	8	Good	2015	140 mins	Adventure/Sci-Fi	The Martian	8
Comedy/Drama	La La Land	8	Good	2016	125 mins	Comedy/Drama	La La Land	8
Horror/Mystery	Get Out	7.7	Average	2017	101 mins	Horror/Mystery	Get Out	7.7
Adventure/Drama	The Shape of Water	7.3	Average	2017	135 mins	Adventure/Drama	The Shape of Water	7.3
Action/Adventure	Black Panther	7.3	Average	2018	180 mins	Action/Adventure	Black Panther	7.3
Crime/Drama	Joker	8.4	Good	2019	152 mins	Crime/Drama	Joker	8.4
Comedy/Drama	Parasite	8.6	Very Good	2019	128 mins	Comedy/Drama	Parasite	8.6
Drama	The Shawshank Redemption	9.3	Excellent	2019	142 mins	Drama	The Shawshank Redemption	9.3
Crime/Drama	Pulp Fiction	8.9	Very Good	2019	154 mins	Crime/Drama	Pulp Fiction	8.9

7 COLUMNS, 50 ROWS Column profiling based on top 1000 rows

Query Settings Properties Applied Steps

Name: Netflix Movies Data (Movies)

Applied Steps: Reordered Columns

PREVIEW DOWNLOADED ON WEDNESDAY, 09-05-2024

## Indexed Column

The screenshot shows the Power BI Desktop interface with the 'Home' tab selected. In the center, a table preview is displayed with columns: Index, Account, Year, Scenario, and Date. The 'Index' column contains values from 1 to 20. The 'Year' column shows '2012 Actuals'. The 'Scenario' column shows '1.2 Jan'. The 'Date' column shows dates like '90924002', '4163278', etc. The 'Applied Steps' pane on the right lists the steps taken: 'Source', 'Navigation', 'Promoted Headers', 'Changed Type', 'Removed Columns', 'Added Index', 'Reordered Columns', 'Added Index1', and 'Added Index2'. The 'Added Index2' step is currently highlighted.

## Custom Column

The screenshot shows the Power BI Desktop interface with the 'Home' tab selected. A 'Custom Column' dialog box is open over the main workspace. It prompts to add a column computed from other columns. The 'New column name' field is set to 'Custom'. The 'Custom column formula' field contains the formula '= [May] \* [Jul]'. To the right, a list of available columns is shown: Apr, May, Jun, Jul, Aug, Sep, Oct. Below the formula, a note says 'Learn about Power Query formulas' and 'No syntax errors have been detected'. The 'OK' button is visible at the bottom of the dialog. The main workspace shows a table with columns: Month, Sales, Profit, and Date. The 'Month' column has values like 'May', 'Jun', 'Jul', etc. The 'Sales' and 'Profit' columns show numerical values. The 'Date' column shows dates like '90924002', '4163278', etc. The 'Applied Steps' pane on the right lists the steps taken: 'Source', 'Navigation', 'Promoted Headers', 'Changed Type', 'Removed Columns', 'Added Index', 'Reordered Columns', 'Added Index1', and 'Added Index2'. The 'Added Index2' step is currently highlighted.

## ADD COLUMN FROM EXAMPLES

The screenshot shows the Power BI Desktop interface with the 'Add Column From Examples' dialog open. The dialog box contains a table with columns: Year, Age Rating, Duration, Category, and Column1. The 'Column1' column is currently empty. Below the table, there is a text input area where examples are entered. The examples provided are:

- 1942 PG 102 mins Drama/Romance
- 1960 R 109 mins Horror/Thriller
- 1972 R 175 mins Crime/Drama
- 1977 PG 121 mins Action/Adventure
- 1982 PG 115 mins Family/Sci-Fi
- 1991 R 137 mins Action/Sci-Fi
- 1994 PG-13 142 mins Drama/Romance
- 1997 PG-13 195 mins Drama/Romance
- 1999 R 136 mins Action/Sci-Fi
- 2000 R 155 mins Action/Drama
- 2001 PG-13 178 mins Adventure/Drama
- 2008 PG-13 125 mins Animation/Adventure
- 2010 PG-13 152 mins Action/Crime
- 2010 PG-13 148 mins Action/Adventure
- 2012 PG-13 143 mins Action/Adventure
- 2012 R 165 mins Drama/Western
- 2013 PG 102 mins Animation/Adventure
- 2014 PG-13 169 mins Adventure/Drama

The 'APPLIED STEPS' pane on the right shows the 'Column From Examples' step has been added to the list of applied steps.

This screenshot shows the same Power BI Desktop environment after applying the transformation. The 'Column1' column has been renamed 'Merged'. The 'Merged' column now contains descriptive strings for each movie, such as 'Casablanca movie with an 8.5 rating', 'Psycho movie with an 8.5 rating', etc. The 'APPLIED STEPS' pane shows the transformation step: 'Transform: Text.Combine([Name], "movie with an ", Text.From([IMDb Rating]), "en-IN"), " ", Text.Lower(Text.Trim([Age Rating])), "ating")'.

## Replace, Fill Up, Fill Down, and Remove

1. Replace: This operation allows you to replace specific values in a column with another value. You can replace text, numbers, or even null values with other values. It's useful for cleaning up data by correcting errors or standardizing formats.
2. Fill Up: The "Fill Up" operation fills empty cells in a column with the value from the nearest non-empty cell above it. This is useful when you have missing data in a column and want to fill those gaps with the most recent available value.
3. Fill Down: Conversely, "Fill Down" fills empty cells in a column with the value from the nearest non-empty cell below it. This is helpful when you have data that repeats and want to fill in the gaps with the most recent value.
4. Remove: The "Remove" operation allows you to remove columns, rows, or even specific values from your dataset. This is useful for cleaning up unnecessary or redundant data before loading it into your data model.

## GROUP BY

- In Power BI, the "Group By" operation in Power Query Editor allows you to group rows of data based on one or more columns and perform aggregations or transformations within each group.
  - This operation is useful for summarizing data, creating hierarchical structures, or aggregating data at different levels.
1. Select your data: Start by selecting the columns you want to group by and the columns you want to perform aggregations on.
  2. Click on "Group By": In the "Transform" group, you'll find the "Group By" button. Click on it to open the "Group By" dialog box.
  3. Specify grouping and aggregations: In the "Group By" dialog box, you can specify the columns you want to group by. You can also define aggregations for each group, such as sum, average, count, etc., for the columns you selected.
  4. Click "OK" to apply: Once you've configured the grouping and aggregations, click "OK" to apply the changes. This will create a new table with the grouped data based on your specifications.
  5. Load the grouped data: Once you're satisfied with the results, you can load the grouped data into your data model for further analysis and visualization in Power BI.

## FILL UP

Screenshot of Power BI Desktop showing the Power Query Editor. A context menu is open over a table named "Reordered Columns". The menu path "Applied Steps > Reordered Columns > Fill" is highlighted. The table contains columns: Index, State or territory, Currency, and Currency Symbol.

Index	State or territory	Currency	Currency Symbol
1	Abkhazia	Abkhazian apsar	none
2	null	Russian ruble	₽
3	Afghanistan	Afghan afghani	؋
4	Akrotiri and Dhekelia	Euro	€
5	Albania	Albanian lek	L
6	Alderney	Alderney pound	£
7	null	British pound	£
8	null	Guernsey pound	£
9	Algeria	Algerian dinar	₾
10	Andorra	Euro	€
11	Angola	Angolan kwanza	Kz
12	Anguilla	East Caribbean dollar	\$
13	Antigua and Barbuda	East Caribbean dollar	\$
14	Argentina	Argentine peso	\$
15	Armenia	Armenian dram	₾
16	Aruba	Aruban florin	f
17	Ascension Island	Ascension pound	£
18	null	Saint Helena pound	£
19	Australia	Australian dollar	\$
20	Austria	Euro	€
21	Azerbaijan	Azerbaijani manat	₼
22	Bahamas, The	Bahamian dollar	\$
23	Bahrain	Bahraini dinar	BHD
24	Bangladesh	Bangladeshi taka	৳
25	Barbados	Barbadian dollar	BBD
26	Belarus	Belarusian ruble	Br
27	Belgium	Euro	€
28	Belize	Belize dollar	\$
29	Benin	West African CFA franc	Fr
30	Botswana	Botswana pula	P

Screenshot of Power BI Desktop showing the Power Query Editor. A context menu is open over a table named "Filled Up". The menu path "Applied Steps > Filled Up" is highlighted. The table contains columns: Index, State or territory, Currency, Currency Symbol, and ISO code.

Index	State or territory	Currency	Currency Symbol	ISO code
1	Abkhazia	Abkhazian apsar	none	none
2	null	Russian ruble	₽	RUB
3	Afghanistan	Afghan afghani	؋	AFN
4	Akrotiri and Dhekelia	Euro	€	EUR
5	Albania	Albanian lek	L	ALL
6	Alderney	Alderney pound	£	none
7	null	British pound	£	GBP
8	null	Guernsey pound	£	GPP
9	Algeria	Algerian dinar	₾	DZD
10	Andorra	Euro	€	EUR
11	Angola	Angolan kwanza	Kz	AOA
12	Anguilla	East Caribbean dollar	\$	XCD
13	Antigua and Barbuda	East Caribbean dollar	\$	XCD
14	Argentina	Argentine peso	\$	ARS
15	Armenia	Armenian dram	₾	AMD
16	Aruba	Aruban florin	f	AWG
17	Ascension Island	Ascension pound	£	none
18	null	Saint Helena pound	£	SHP
19	Australia	Australian dollar	\$	AUD
20	Austria	Euro	€	EUR
21	Azerbaijan	Azerbaijani manat	₼	AZN
22	Bahamas, The	Bahamian dollar	\$	BSD
23	Bahrain	Bahraini dinar	BHD	BHD
24	Bangladesh	Bangladeshi taka	৳	BDT
25	Barbados	Barbadian dollar	BBD	BBD
26	Belarus	Belarusian ruble	Br	BYR
27	Belgium	Euro	€	EUR
28	Belize	Belize dollar	\$	BZD
29	Benin	West African CFA franc	Fr	XOF
30	Botswana	Botswana pula	P	PKP

## GROUP BY

Screenshot of Power BI Desktop showing the 'Group By' dialog box.

**Group By Dialog:**

- Specify the column to group by and the desired output.
- Basic (radio button selected)
- New column name: January Expense
- Operation: Sum
- Column: Jan

**Applied Steps:**

- Renamed Columns (highlighted)

**Table Data:**

Index	Account	Year	Scenario	Jan	Mar
1	0 Sales	2012 Actuals		90924002	
2	1 Cost of Goods Sold	2012 Actuals		-41623278	
3	2 Commissions Expense	2012 Actuals		-1365874	
4	3 Payroll Expense	2012 Actuals		-3625840	
5	4 Travel & Entertainment Expense	2012 Actuals		-404102	
6	5 R&D Expense	2012 Actuals		-1468035	
7	6 Consulting Expense	2012 Actuals		-1854144	
8	7 Software/Hardware Expense	2012 Actuals		-2454740	
9	8 Marketing Expense	2012 Actuals		-713163	
10	9 Sales	2012 Actuals		32732640.72	
11	10 Cost of Goods Sold	2012 Actuals		-15174996	
12	11 Commissions Expense	2012 Actuals		-1365874	
13	12 Payroll Expense	2012 Actuals		-3625840	
14	13 Travel & Entertainment Expense	2012 Actuals		-404102	
15	14 R&D Expense	2012 Actuals		-1468035	
16	15 Consulting Expense	2012 Actuals		-1854144	
17	16 Software/Hardware Expense	2012 Actuals		-2454740	
18	17 Marketing Expense	2012 Actuals		-713163	
19	18 Sales	2012 Actuals		32732640.72	
20	19 Cost of Goods Sold	2012 Actuals		-15174996	
21	20 Commissions Expense	2012 Actuals		-1365874	
22	21 Payroll Expense	2012 Actuals		-3625840	
23	22 Travel & Entertainment Expense	2012 Actuals		-404102	
24	23 R&D Expense	2012 Actuals		-1468035	
25	24 Consulting Expense	2012 Actuals		-1854144	
26	25 Software/Hardware Expense	2012 Actuals		-2454740	
27	26 Marketing Expense	2012 Actuals		-713163	
28	27 Sales	2013 Actuals		62935397	
29	28 Cost of Goods Sold	2013 Actuals		-26494815	
30	29 Commissions Expense	2013 Actuals		-35330001	

Screenshot of Power BI Desktop showing the result of the 'Group By' operation.

**Table Data:**

Account	January Expense
1 Sales	1584546699
2 Cost of Goods Sold	-706847017
3 Commissions Expense	-70921460
4 Payroll Expense	-177827327
5 Travel & Entertainment Expense	-17179721
6 R&D Expense	-72332061
7 Consulting Expense	-8914228
8 Software/Hardware Expense	-124203897
9 Marketing Expense	-35330001

## Date Functions

### Common Date Functions:

- YEAR(date): Extracts the year from a date value.
- MONTH(date): Returns the month as a number (1-12) from a date value.
- DAY(date): Extracts the day of the month (1-31) from a date value.
- WEEKDAY(date): Returns the day of the week (1-7) from a date value, with 1 being Sunday.
- DATEDIFF(interval, start\_date, end\_date): Calculates the difference between two dates based on a specified interval (e.g., days, months, years).

### Create a Date Table and Establish a Relationship

1. Identify the Link: Find a date column in your main data table (e.g., "Order Date") that corresponds to the dates in your date table.
2. Create the Relationship: In Power BI Desktop, right-click on the date column in your main table and select "Manage Relationships." Choose your date table and the corresponding date column to create a one-to-many relationship. This essentially links each row in your main table to the relevant date in your date table.

## Table Functions

- FILTER(table, expression): Filters a table based on a specified condition (expression). This allows you to focus on a specific subset of data for further analysis.
- DISTINCT(column): Returns a table with only the unique values from a specific column. This helps eliminate duplicates and streamline your data.
- VALUES(column): Creates a single-column table containing all the distinct values from a specified column. This can be useful for creating drop-down menus in your reports.
- SUMMARIZE(table, columns\_to\_summarize, [summarization\_expression]): Creates a new table that summarizes data based on specific columns. You can calculate sums, averages, or other aggregations for each unique combination of values in the chosen columns.

## Exploring Further:

Power BI offers a diverse range of table functions beyond these core examples. As your analytical skills develop, you might encounter functions like:

- **VAR(table)**: Creates a temporary table within a DAX expression for complex calculations.
- **GENERATE SERIES(start\_num, end\_num, [step])**: Generates a sequence of numbers within a specified range.
- **RELATED(table)**: Establishes relationships between rows in different tables based on common attributes.

## Date Function

The screenshot shows the Power BI Desktop interface. The top navigation bar includes File, Home, Help, Table tools, and Column tools. The Column tools tab is selected, displaying options for Name, Data type (set to Date/time), Format (set to 2001 (yyyy)), Summarization (set to Don't summarize), Data category (set to Uncategorized), and various sorting and grouping tools. Below the ribbon, a table named "CalendarTable" is visible, containing a single column named "Date" with all entries set to 1990. To the right of the table is a "Data" pane showing the structure of the data model, including a "CalendarTable" node with a "Date" child node, and other nodes like "Financials" and "Netflix Movies Data (Movies)". The bottom of the screen shows the Windows taskbar with various pinned icons and system status information.

## Establishing relationships with Date Table

The screenshot shows the Power BI Desktop interface with the Data view selected. Three tables are visible in the main area:

- Financials**: Contains columns like Account, Apr, Aug, Business Unit, Currency, Dec, Feb, Jan, Jul, and Year.
- Netflix Movies Data (Movies)**: Contains columns like Age Rating, Category, Duration, IMDb Rating, Name, and Year.
- CalendarTable**: Contains the Date column.

A relationship is shown between the Netflix Movies Data (Movies) and CalendarTable tables, both connected to the Year column. The Properties pane on the right shows the relationship settings. The status bar at the bottom indicates "16:50 09-05-2024".

## Table Function : FILTER

The screenshot shows the Power BI Desktop interface with the Table tools tab selected. A query editor window displays a table named "Movies\_2014" with the following data:

Name	Year	Age Rating	Duration	Category	IMDb Rating
Interstellar	2014	PG-13	169 mins	Adventure/Drama	8.6
The Grand Budapest Hotel	2014	R	99 mins	Adventure/Comedy	8.7
Whiplash	2014	R	106 mins	Drama/Music	8.5
Birdman or (The Unexpected Virtue of Ignorance)	2014	R	119 mins	Comedy/Drama	7.7
Gone Girl	2014	R	149 mins	Drama/Mystery	8.1

The Properties pane on the right shows the "Movies\_2014" table. The status bar at the bottom indicates "17:18 09-05-2024".

## Row level Context

Understanding row level context is essential to ensure your DAX formulas produce the intended results. Misinterpreting the context can lead to misleading calculations and inaccurate insights.

- SUMX Function: When using SUMX to iterate through rows and calculate a sum, the context of each row (e.g., specific product, department) defines which values are included in the final sum.
- Calculated Columns: The calculation for a specific row in a calculated column depends on the values in other columns for that same row.

## Use of Calculate function

It allows you to modify the existing filter context (the rows considered for calculations) and perform calculations based on specific criteria.

### How Does It Work?

The CALCULATE function takes two main arguments:

1. Expression: This is the calculation you want to perform, such as SUM, AVERAGE, or any other DAX function.
2. Filters: Here you define the modifications to the filter context. You can specify conditions to include or exclude certain rows based on specific columns or values.

### Benefits of Using CALCULATE:

- Conditional Calculations: Perform calculations based on specific criteria, allowing for more nuanced analysis.
- Filter Overrides: Temporarily override existing filters to isolate specific data subsets for calculations.
- Dynamic Analysis: Create dynamic measures that adapt to user-applied filters in your reports.

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Measure Format: \$% Data category: Uncategorized

Home table: Inventory Records... \$ % Auto New Quick measure measure Calculations

Structure: Product ID Product Name Opening Stock Purchase/Stock in Number of Units Sold Hand-In-Stock Cost Price Per Unit (USD)

1 Total Cost = SUM('Inventory Records Data (Inventory Records Data)'[Cost Price Per Unit (USD)]) \* SUM('Inventory Records Data (Inventory Records Data)'[Number of Units Sold])

Product ID	Product Name	Opening Stock	Purchase/Stock in	Number of Units Sold	Hand-In-Stock	Cost Price Per Unit (USD)
P101	Laptop	50	20	10	60	1200
P102	Monitor	40	15	5	50	500
P103	Keyboard	60	25	15	70	50
P104	Headphones	30	10	3	37	100
P105	Smartphone	70	30	20	80	900
P106	Tablet	45	18	8	55	700
P107	Router	55	22	12	65	150
P108	External Hard Drive	25	12	5	32	200
P109	Wireless Earbuds	35	15	7	43	80
P110	Webcam	40	20	10	50	60
P111	Desk Chair	20	8	3	25	150
P112	Desk Lamp	30	15	7	38	30
P113	USB Flash Drive	50	25	12	63	20
P114	Ethernet Cable	60	30	15	75	10
P115	Power Strip	40	20	8	52	25
P116	Wireless Mouse	35	15	5	45	40
P117	Gaming Keyboard	25	10	4	31	100
P118	Gaming Mouse	30	12	6	36	80
P119	Gaming Headset	20	8	3	25	120
P120	Gaming Chair	15	6	2	19	200
P121	Gaming Monitor	25	10	4	29	400
P122	Graphics Card	40	18	9	49	600
P123	CPU	30	15	7	38	350
P124	Motherboard	25	12	5	32	200
P125	RAM	50	22	11	61	80
P126	SSD	45	20	8	57	120
P127	HDD	60	25	12	73	60

Table: Inventory Records Data (Inventory Records Data) (46 rows) Column: Measure (0 distinct values)

89°F Haze ENG IN 18:26 09-05-2024

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Total Cost M Format: Whole number Data category: Uncategorized

Home table: Inventory Records... \$ % 0 New Quick measure measure Calculations

Structure: Product ID Product Name Opening Stock Purchase/Stock in Number of Units Sold Hand-In-Stock Cost Price Per Unit (USD)

1 Total Cost M = SUMX('Inventory Records Data (Inventory Records Data)', 'Inventory Records Data (Inventory Records Data)'[Number of Units Sold] \* 'Inventory Records Data (Inventory Records Data)'[Cost Price Per Unit (USD)])

Product ID	Product Name	Opening Stock	Purchase/Stock in	Number of Units Sold	Hand-In-Stock	Cost Price Per Unit (USD)
P101	Laptop	50	20	10	60	1200
P102	Monitor	40	15	5	50	500
P103	Keyboard	60	25	15	70	50
P104	Headphones	30	10	3	37	100
P105	Smartphone	70	30	20	80	900
P106	Tablet	45	18	8	55	700
P107	Router	55	22	12	65	150
P108	External Hard Drive	25	12	5	32	200
P109	Wireless Earbuds	35	15	7	43	80
P110	Webcam	40	20	10	50	60
P111	Desk Chair	20	8	3	25	150
P112	Desk Lamp	30	15	7	38	30
P113	USB Flash Drive	50	25	12	63	20
P114	Ethernet Cable	60	30	15	75	10
P115	Power Strip	40	20	8	52	25
P116	Wireless Mouse	35	15	5	45	40
P117	Gaming Keyboard	25	10	4	31	100
P118	Gaming Mouse	30	12	6	36	80
P119	Gaming Headset	20	8	3	25	120
P120	Gaming Chair	15	6	2	19	200
P121	Gaming Monitor	25	10	4	29	400
P122	Graphics Card	40	18	9	49	600
P123	CPU	30	15	7	38	350
P124	Motherboard	25	12	5	32	200
P125	RAM	50	22	11	61	80
P126	SSD	45	20	8	57	120
P127	HDD	60	25	12	73	60

Table: Inventory Records Data (Inventory Records Data) (46 rows) Column: Total Cost M (0 distinct values)

Finance headline Financial regulat... ENG IN 18:30 09-05-2024

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: CAL\_Laptop Format: Whole number Data category: Uncategorized

Home table: Inventory Records ... \$ % 0

Structure Formatting Properties New Quick measure Calculations

**Measure tools**

**Product ID** **Product Name** **Opening Stock** **Purchase/Stock in** **Number of Units Sold** **Hand-In-Stock** **Cost Price Per Unit (USD)**

Product ID	Product Name	Opening Stock	Purchase/Stock in	Number of Units Sold	Hand-In-Stock	Cost Price Per Unit (USD)
P101	Laptop	50	20	10	60	1200
P102	Monitor	40	15	5	50	500
P103	Keyboard	60	25	15	70	50
P104	Headphones	30	10	3	37	100
P105	Smartphone	70	30	20	80	900
P106	Tablet	45	18	8	55	700
P107	Router	55	22	12	65	150
P108	External Hard Drive	25	12	5	32	200
P109	Wireless Earbuds	35	15	7	43	80
P110	Webcam	40	20	10	50	60
P111	Desk Chair	20	8	3	25	150
P112	Desk Lamp	30	15	7	38	30
P113	USB Flash Drive	50	25	12	63	20
P114	Ethernet Cable	60	30	15	75	10
P115	Power Strip	40	20	8	52	25
P116	Wireless Mouse	35	15	5	45	40
P117	Gaming Keyboard	25	10	4	31	100
P118	Gaming Mouse	30	12	6	36	80
P119	Gaming Headset	20	8	3	25	120
P120	Gaming Chair	15	6	2	19	200
P121	Gaming Monitor	25	10	4	29	400
P122	Graphics Card	40	18	9	49	600
P123	CPU	30	15	7	38	350
P124	Motherboard	25	12	5	32	200
P125	RAM	50	22	11	61	80
P126	SSD	45	20	8	57	120
P127	HDD	60	25	12	73	60

Table: Inventory Records Data (Inventory Records Data) (46 rows) Column: CAL\_Laptop (0 distinct values)

89°F Haze Search ENG IN 18:37 09-05-2024

## Advanced Functions

### ALL

- The ALL function allows you to temporarily remove all filters from a specific column within your DAX expression.
- This can be helpful when you want to perform calculations based on the entire data set, regardless of the existing filters.

### ALL SELECTED

- The ALL Selected function allows you to perform calculations based on the current selections made in those slicers.
- This is particularly useful when you want to analyze data within the context of user-applied filters.

### RELATED

The RELATED function takes two arguments:

1. **Column Name:** Specify the column from the related table (e.g., "Products") that contains the desired data.
2. **Filter Expression (Optional):** You can optionally include a filter expression to further refine the data retrieved from the related table.

### LOOKUP VALUE

The LOOKUPVALUE function takes four arguments:

1. **Result Column:** Specify the column from the lookup table (e.g., "Products") that contains the value you want to retrieve (e.g., product name).
2. **Lookup Table:** This is the table where the search will be conducted (e.g., "Products").
3. **Lookup Column:** Specify the column in the lookup table that contains the values to be searched (e.g., product ID).
4. **Search Value:** This is the value you want to match in the lookup column (e.g., the product ID from the "Sales" table).

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Ignore\_Product

Home table: Inventory Records Data

Format: Whole number

Data category: Uncategorized

Structure: Ignore\_Product = CALCULATE([Total Cost M], ALL('Inventory Records Data'[Product Name]))

Product ID Product Name Opening Stock Purchase/Stock in Number of Units Sold Hand-In-Stock Cost Price Per Unit (USD)

Product ID	Product Name	Opening Stock	Purchase/Stock in	Number of Units Sold	Hand-In-Stock	Cost Price Per Unit (USD)
P101	Laptop	50	20	10	60	1200
P102	Monitor	40	15	5	50	500
P103	Keyboard	60	25	15	70	50
P104	Headphones	30	10	3	37	100
P105	Smartphone	70	30	20	80	900
P106	Tablet	45	18	8	55	700
P107	Router	55	22	12	65	150
P108	External Hard Drive	25	12	5	32	200
P109	Wireless Earbuds	35	15	7	43	80
P110	Webcam	40	20	10	50	60
P111	Desk Chair	20	8	3	25	150
P112	Desk Lamp	30	15	7	38	30
P113	USB Flash Drive	50	25	12	63	20
P114	Ethernet Cable	60	30	15	75	10
P115	Power Strip	40	20	8	52	25
P116	Wireless Mouse	35	15	5	45	40
P117	Gaming Keyboard	25	10	4	31	100
P118	Gaming Mouse	30	12	6	36	80
P119	Gaming Headset	20	8	3	25	120
P120	Gaming Chair	15	6	2	19	200
P121	Gaming Monitor	25	10	4	29	400
P122	Graphics Card	40	18	9	49	600
P123	CPU	30	15	7	38	350
P124	Motherboard	25	12	5	32	200
P125	RAM	50	22	11	61	80
P126	SSD	45	20	8	57	120
P127	HDD	60	25	12	73	60
P128	Dove Cuckoo	25	15	6	44	100

Table: Inventory Records Data (Inventory Records Data) (46 rows) Column: Ignore\_Product (0 distinct values)

80°F Haze

Search

ENG IN 09-05-2024 18:41

## Conclusion

1. Data Importing: I've become proficient in importing data from diverse sources such as CSV files, Excel spreadsheets, and even web sources. Additionally, I've learned how to craft data from scratch when necessary.
2. Creating Relationships: I now understand the significance of establishing connections between different datasets. I've delved into both standard and custom relationship types, exploring advanced concepts like role-playing dimensions and transitive relationships.
3. Visualization and Report Design: My skills in creating impactful reports have been enhanced. I've learned how to add visualizations to reports and fine-tune their appearance for clarity and effectiveness. Various chart types and techniques for interactive navigation within reports are now at my fingertips.
4. DAX Measures and Columns: I've been introduced to the powerful world of DAX. From basic functions like SUM, AVERAGE, and COUNT to more advanced ones like ALL, RELATED, and LOOKUPVALUE, I've gained the ability to conduct complex data analysis efficiently.
5. Data Quality Optimization: I've explored techniques to ensure my data is of the highest quality. From handling duplicate data to applying transformations using the Power Query Editor, I've learned to optimize data for analysis.
6. Filtering and Interactions: Understanding different filter types and how to apply them at visual, page, and report levels has been pivotal. I've also learned how to edit interactions to tailor the behavior of visuals within my reports.
7. Advanced Functions and Techniques: Delving into advanced functions such as GROUP BY, date functions, and row-level context has equipped me with sophisticated tools for data manipulation and analysis.

In conclusion, my journey through these topics has equipped me with a robust skill set for harnessing the power of Power BI. From importing and cleaning data to crafting insightful visualizations and conducting advanced analysis, I'm now well-prepared to leverage Power BI effectively for data-driven decision-making across various business scenarios.



