**What is Power BI?**

Microsoft Power BI is a self-service business intelligence platform which includes both desktop and web based applications for connecting, modelling and visualizing data.

It allows users to create interactive reports and dashboards, making it easier to understand and analyze information for better decision-making in organizations.

It allows users to connect multiple data sources. It is a powerful tool for data analysis and visualization.

**Advantages:**

* Makes easy for businesses to spot trends, track performance and make data driven decisions
* Real-time information
* Frequent and consistent updates
* Integration with a wide array of data sources
* Excel integration

**Why power bi?**

* It can connect, transform and load millions of row data.
* Build relational models to blend data from multiple sources.
* Define complex calculations using Data Analysis Expressions (DAX).
* Bring data to life with interactive dashboards and reports.

**Applications of power bi :**

**Visualizing data:**

Power BI tools allow users to visualize key data points from various sources in a single dashboard.

**Creating dashboards :**

Power BI contains dashboarding functions that can help users automate their work and create visuals for complex data.

**Generating reports :**

Power BI can help users generate charts and other visual reports to get instant feedback.

**Collaborating**

Power BI allows users to create collections of dashboards, workbooks, and paginated reports that have a common purpose into workspaces. Users can also share ownership and manage reports, dashboards, datasets, and workbooks.

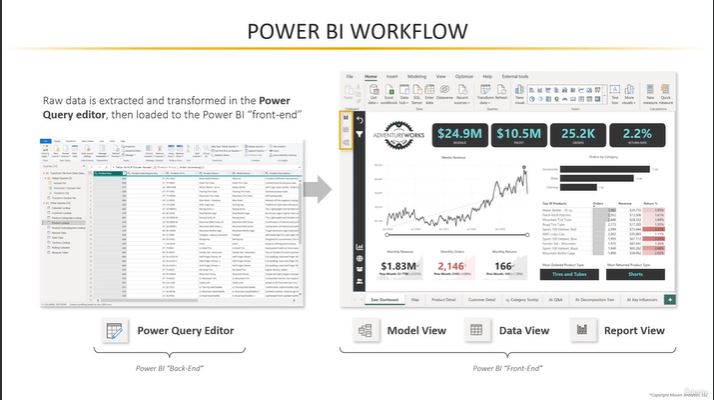
**Linking to applications**

Power BI can be linked to applications by authenticating using Azure AD. This allows users to get real-time insights about their application on the Power BI dashboard.

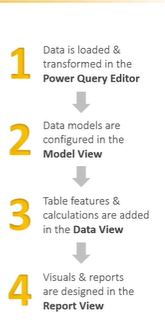
**Install Power BI desktop**

1. Through Microsoft store.
2. Through web

[**www.powerbi.com**](http://www.powerbi.com)

**SSTE**

**Steps need to perform:**

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**Extract:** we can extract or get data from various sources like excel, sql, notepad, and various platforms. Through sql we can extract data by two ways: import and direct query.  
**Import:** by using this directly we can import data from sql by giving credentials .it has benefit of showing metadata in the table view

**Direct query:** by using this,we unable to see meta data(table info) But we create reports based on sql statements that we provided while extraction.it mainly used for large data sets where we can apply conditions to filter the data.

**Power bi dashboard:**

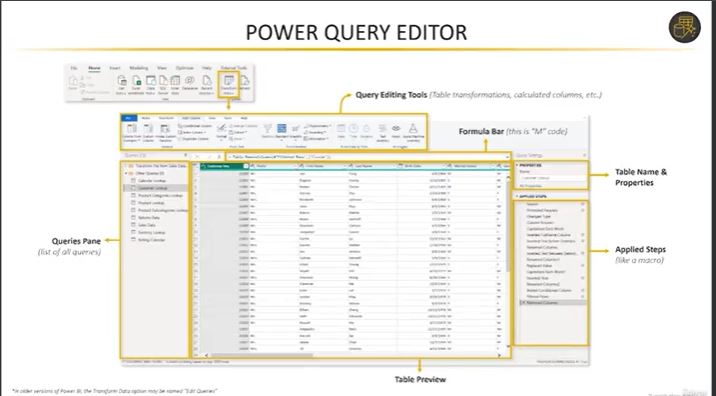
1. **Report view:** it is used to create reports on tables on the right side tables that can be shown as data. And we can see filters and visualization tabs.
2. **Table view** : extracted data can be shown in the form of tables
3. **Model view:** it gives relationships between the tables

Power bi in and as front-end and backend

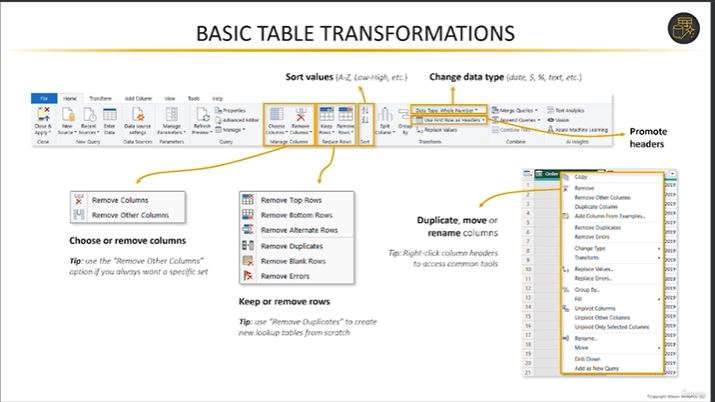
**Front-end:** it includes data, model and report where modelling, analyzing and visualization takes place.

**Back-end:** it includes power query editor where raw data is extracted, transformed and loaded to the front-end in the (ETL) format.

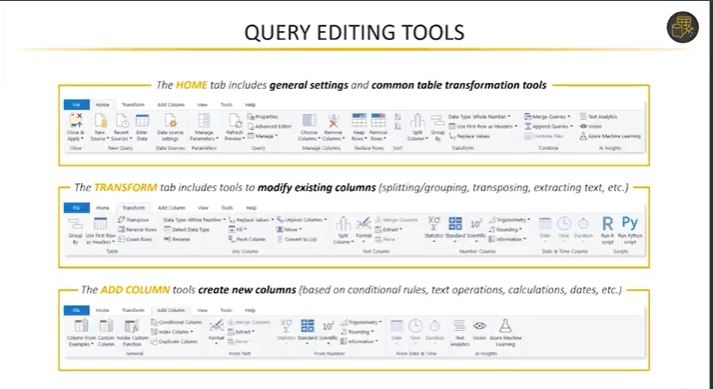
**Power query editor**

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Basic query tools:



Query editing tools:



**Power Query Editor:**

**Data Cleaning:**

Remove duplicates, filter rows, rename columns, or perform other data cleaning tasks.

**Data Transformation:**

Apply transformations such as splitting columns, merging tables, or pivoting data.

**Query Settings:**

Manage query settings, including source options, query dependencies, and formula auditing.

**1. Home Tab:**

**Source:** Connect to different data sources, including files, databases, online services, and more.

**Recent Sources**: Displays recently used data sources for quick access.

**Close & Apply:** Close the Power Query Editor and apply changes to the data model.

**2. Transform Tab:**

**Data Types:**

**Detect Data Type**: Automatically detects and sets the data type for each column.

**Change Type:** Manually change the data type of one or more columns. Common types include Text, Whole Number, Decimal Number, Date/Time, etc.

**2. Column Operations:**

**Remove Columns:** Delete unnecessary columns from the dataset.

**Choose Columns:** Select specific columns to include in the dataset.

**Duplicate Column:** Create a duplicate of a selected column.

**Rename:** Change the name of a column.

**Move Columns:** Adjust the order of columns in the dataset.

**Replace Values:** Replace specific values in a column with new values.

**3. Group By:**

**Group By Columns**: Choose columns to group by.

**Aggregations:** Perform aggregate functions (Sum, Average, Count, etc.) on grouped data.

**New Column Names:** Specify names for new aggregated columns.

**4. Format:**

**Text and Number Format**: Change the display format of text and numeric columns.

**Date/Time Format**: Modify the format of date and time columns.

**Locale Options**: Adjust regional settings for date and time formats.

**5. Transpose:**

**Transpose Table:** Switch rows and columns in the dataset.

**Use First Row as Headers**: Promote the first row as column headers.

**6. Pivot:**

**Pivot Column**: Convert unique values in a column into separate columns.

Values Column: Select the column containing values for the pivot operation.

**7. Unpivot:**

**Unpivot Columns**: Transform columns into rows, making data more suitable for analysis.

Attribute and Value Columns: Specify columns for the unpivoting operation.

**8. Text Column:**

**Split Column**: Divide a column into multiple columns based on a delimiter.

**Extract:** Extract text based on specified conditions.

**Combine:** Merge text columns into a single column.

**9. Number Column:**

**Standard and Scientific Notation**: Convert numbers to standard or scientific notation.

**Round:** Round numeric values to a specified number of decimal places.

**10. Date/Time Column:**

**Age:** Calculate the age based on a date column.

**Duration:** Calculate the duration between two date/time columns.

**11. Add Column:**

Access additional options for adding custom columns, such as Index, Conditional Column, and Custom Column.

**12. Transformations History:**

View a list of applied transformations in the order they were performed.

Edit or delete specific steps in the transformation process.

**3. Add Column Tab:**

**Index Column:**

**From 0, From 1:** Adds an index column starting from either 0 or 1.

**Custom:** Allows you to specify a custom starting value for the index.

Ascending, Descending: Determines the order of the index.

**2. Custom Column:**

**Column Name:** Enter a name for the new column.

**Formula Bar:** Write a DAX (Data Analysis Expressions) formula to define the calculation for the new column.

**Available Functions:** Access a list of available functions and operators to use in your formula.

Examples: View examples of commonly used formulas.

**3. Conditional Column:**

**New Column Name:** Specify a name for the new column.

**Add Rule:** Define conditions and corresponding values for the new column based on existing column values.

**Show Example Values**: Preview sample values for the new column based on the defined conditions.

**4. Date/Time/Duration Column:**

**Date:** Create a new column based on the current date.

**Time:** Create a new column based on the current time.

**Duration:** Create a new column with a specified duration.

**5. From Examples:**

Add Column: Allows you to add a column based on examples provided by the user.

**Examples:** Enter sample values in rows to let Power Query generate a transformation based on the pattern.

**6. Math Operations:**

**Basic Arithmetic Operations**: Perform mathematical operations on columns to create new calculated columns.

**7. Text Operations:**

**Text Concatenation**: Combine text values from different columns into a single column.

**Text Length:** Calculate the length of text in a column.

**8. Number Column:**

**Absolute Value:** Create a new column with the absolute values of the numbers.

**Square Root:** Calculate the square root of numeric values in a column.

**9. Date/Time Operations:**

**Date/Time Zone:** Adjust the time zone of a date/time column.

**Day/Month/Year Operations**: Extract or perform operations on the day, month, or year of a date column.

**10. Statistical Operations:**

Median, Mode, Min, Max: Calculate statistical measures based on numeric columns.

**11. Rounding:**

Round Up, Round Down: Round numeric values in a column up or down.

**12. Scientific:**

**Scientific Notation:** Convert numeric values to scientific notation.

**13. Multiplication and Division:**

Multiply, Divide: Perform multiplication or division on numeric columns.

**14. Advanced Operations:**

Bitwise Operations: Perform bitwise operations on numeric columns.

**15. Add a Query:**

From Query: Add a column based on the result of another query in the workbook.

**4. View Tab:**

**Advanced Editor:** Access the M code for advanced users.

**Formula Bar:** Displays the formula for the selected step.

**Model view**

In this tab we manage relationships between the tables. By using one-many or other relationship based on the tables that are present which are used to make reports.

**DAX(Data Analysis Expressions)**

Data Analysis Expressions (DAX) is a formula language designed for use in Power BI, Excel, and SQL Server Analysis Services (SSAS).

**Purpose:** DAX is used to create custom formulas for calculations and aggregations in data models, enabling users to derive insights from their data.

**Calculated Columns:**

**Definition**: Calculated columns are columns added to tables that contain formula-based calculations.

**Use Cases**: Useful for creating new attributes or performing row-level calculations.

**Measures:**

**Definition:** Measures are calculations applied to the entire dataset, typically used for aggregations and calculations based on summarized data.

**Use Cases:** Create Key Performance Indicators (KPIs), totals, averages, etc.

**c. Tables and Relationships:**

**Definition**: DAX works with tables and their relationships. Tables store data, and relationships define how tables are related.

**Use Cases:** Essential for complex calculations involving data from multiple tables.

**Math and Trigonometry Functions:**

**a. SUM:**

**Example:**

Total Sales = SUM('Sales'[Amount])

**b. AVERAGE:**

**Example:**

Average Price = AVERAGE('Products'[Price])

**c. ROUND:**

**Example:**

Rounded Revenue = ROUND('Sales'[Revenue], 2)

**2. Statistical Functions:**

**a. COUNTROWS**:

Example:

Number of Orders = COUNTROWS('Orders')

**b. MINX and MAXX:**

**Example:**

Earliest Date = MINX('Sales', 'Sales'[OrderDate]) Latest Date = MAXX('Sales', 'Sales'[OrderDate])

**3. Text Functions:**

**a. CONCATENATE:**

**Example:**

full Name = CONCATENATE('Customers'[First Name], " ", 'Customers'[Last Name])

**LEFT and RIGHT:**

**Example:**

First 3 Characters = LEFT('Products'[ProductName], 3) Last 5 Characters = RIGHT('Products'[ProductName], 5)

**4. Date and Time Functions:**

**a. TODAY:**

**Example:**

Current Date = TODAY()

**b. YEAR and MONTH:**

**Example:**

Order Year = YEAR('Sales'[OrderDate]) Order Month = MONTH('Sales'[OrderDate])

**c. DATESBETWEEN:**

**Example:**

Sales in 2022 = CALCULATE(SUM('Sales'[Amount]), DATESBETWEEN('Calendar'[Date], DATE(2022,1,1), DATE(2022,12,31)))

**5. Filter and Evaluation Functions**:

**a. CALCULATE:**

**Example:**

Total Sales (Filtered) = CALCULATE(SUM('Sales'[Amount]), 'Products'[Category] = "Electronics")

**7. Time Intelligence Functions:**

**TOTALYTD:**

**Description**: Calculates a running total of a measure across a specified date column, typically used for Year-to-Date calculations.

**Example:**

Total Sales YTD = TOTALYTD(SUM('Sales'[Amount]), 'Calendar'[Date])

**TOTALQTD:**

**Description:** Similar to TOTALYTD, but calculates a running total for Quarter-to-Date.

**Example:**

Total Sales QTD = TOTALQTD(SUM('Sales'[Amount]), 'Calendar'[Date])

**TOTALMTD:**

**Description:** Calculates a running total for Month-to-Date.

**Example:**

Total Sales MTD = TOTALMTD(SUM('Sales'[Amount]), 'Calendar'[Date])

**DATESYTD:**

**Description:** Returns a table of dates for the Year-to-Date period.

**Example:**

Sales YTD = CALCULATE(SUM('Sales'[Amount]), DATESYTD('Calendar'[Date]))

**DATESBETWEEN:**

**Description:** Returns a table of dates between the specified start and end dates.

**Example:**

Sales Between Dates = CALCULATE(SUM('Sales'[Amount]), DATESBETWEEN('Calendar'[Date], DATE(2022,1,1), DATE(2022,12,31)))

**TOTALOVER:**

**Description:** Applies a context transition to a table expression, aggregating it over a specified column.

**Example:**

Total Sales Over Category = TOTALOVER('Products'[Category], SUM('Sales'[Amount]))

**FIRSTDATE and LASTDATE:**

**Description**: Returns the first and last date in a table or column.

**Example:**

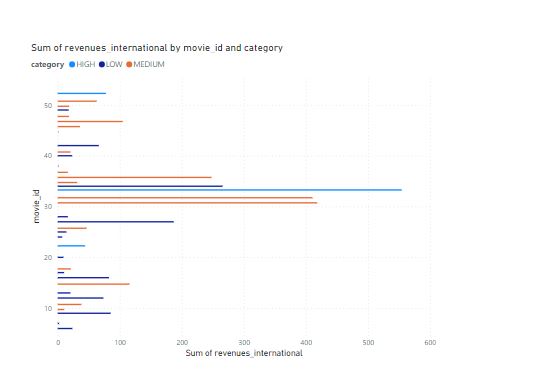
First Sale Date = FIRSTDATE('Sales'[OrderDate])

Last Sale Date = LASTDATE('Sales'[OrderDate])

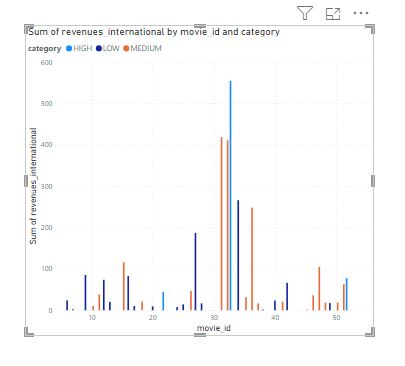
**Visualizations:**

There are different types of charts are present that are used to build visualization. Some of them are :

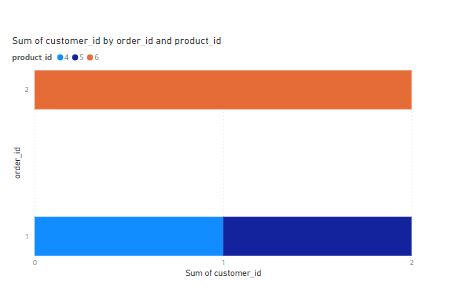
1. **Clustered bar chart**



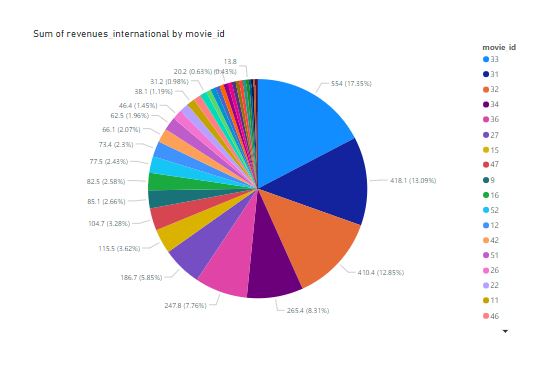
1. **Clustered column chart**



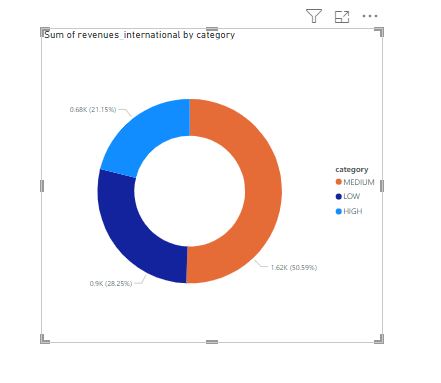
1. **Stacked bar chart**



* 1. **Pie chart**



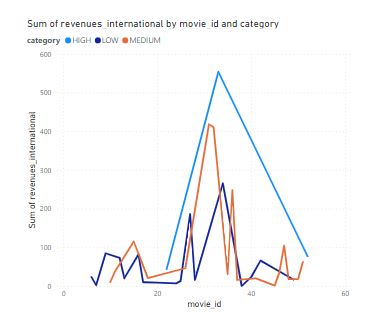
1. **Donut chart**



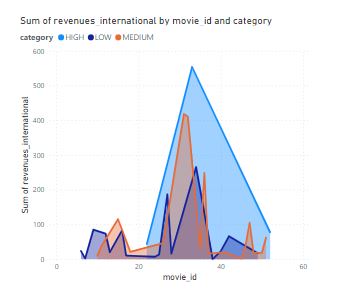
1. **Ribbon chart**



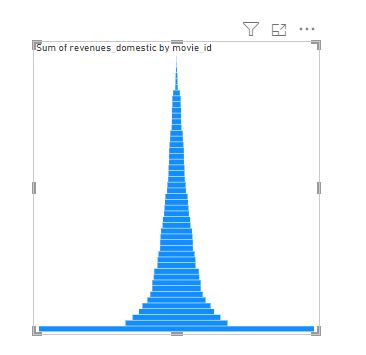
1. **Line chart**



1. **stacked area chart**

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1. **Funnel**



1. Multi-row card

