Exercise 1: Introduction to Tableau

1. Course Introduction

1.1 What is Tableau?

Tableau is a **visual analytics platform** that enables organizations and individuals to explore, analyze, and visualize data interactively. It simplifies complex data analysis through **drag-and-drop functionality** and supports various chart types, dashboards, and reports for data-driven decision- making.

1.2 Features of Tableau

- **No Coding Required** – Users can create visualizations without programming knowledge.
- **Data Connectivity** –Connects to multiple sources, databases, Excel, and cloud platforms.
- **Interactive Visualizations** – Enables users to explore data dynamically.
- **Advanced Analytics** – Provides forecasting, clustering, and AI-driven insights.
- **Collaboration & Sharing** – Allows publishing reports for teams.
- **Customization** – Supports calculated fields and user-defined metrics.
- **Mobile Accessibility** – Optimized for mobile and desktop devices.
- **Performance Optimization** – Handles large datasets efficiently.

1.3 Advantages of Using Tableau

- **User-Friendly Interface** – Intuitive drag-and-drop tools.
- **Powerful Data Visualization** – High-quality, interactive reports.
- **Broad Data Compatibility** – Connects to numerous databases and file formats.
- **Advanced Analytics** – AI/ML-driven insights, trends, and predictions.
- **High Performance** – Optimized for big data processing.
- **Collaboration & Sharing** – Secure data sharing with teams.
- **Cost & Time Efficiency** – Saves manual effort in data analysis.
- **Industries Benefiting from Tableau**
    - Business Intelligence (BI)
    - Education
    - Finance
    - Manufacturing
    - Marketing & Sales
    - Sports & Entertainment
    - Supply Chain & Operations
    - Healthcare

2. Getting started with Tableau Desktop

2.1 Download & Installation Steps

- Visit **Tableau Academic Portal**.
- Find the **free academic license** and click to apply.
- Complete the **eligibility form** to unlock the free license.
- After verification, you will receive an email with a **product key**.
- Download Tableau Desktop from the website.
- Click on **Tableau Public** and follow the installation steps.
- After installation, enter the **product key** if required.
- Launch Tableau, and you will see the **Tableau icon with version 2024.3**.

2.2 Exploring Tableau Window Interface

Step 1: Open Tableau

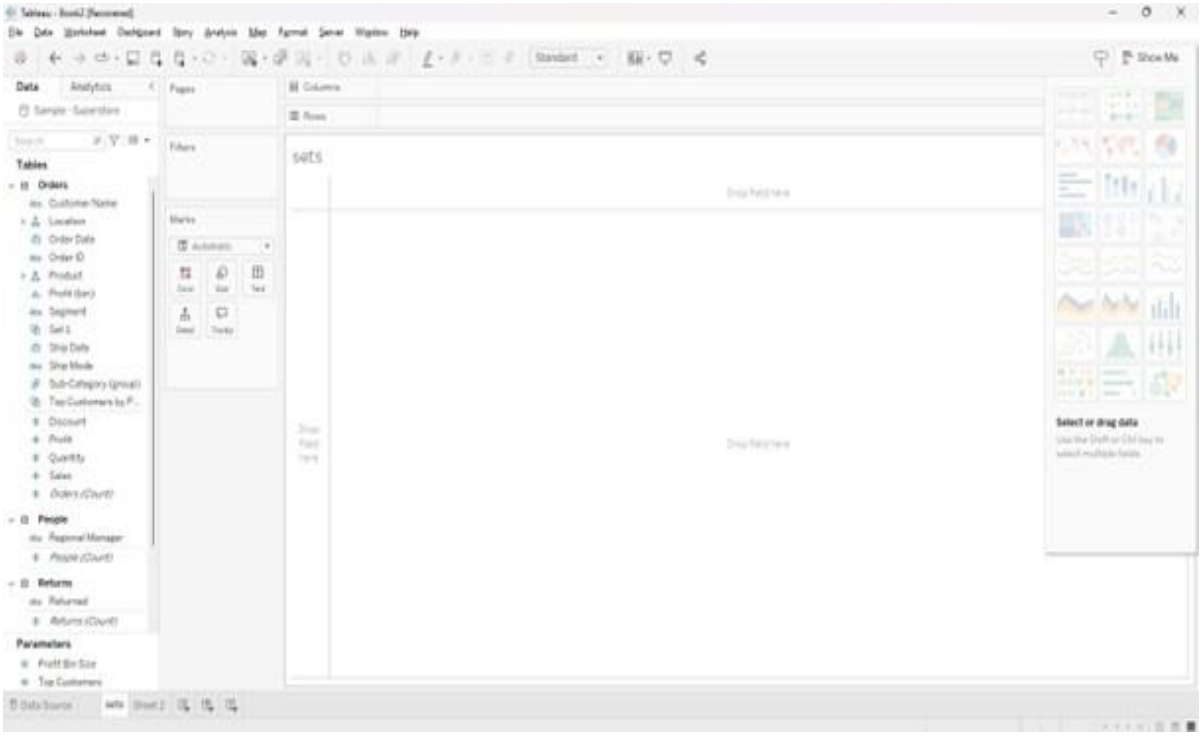
- Launch **Tableau Desktop** or **Tableau Public**.
- The **Start Page** appears with options to:
    - **Connect to Data**
    - **Open Recent Workbooks**
    - **Create New Workbooks**

Step 2: Understanding the Main Workspace

- **Menu Bar** – Provides options for file operations, data management, and analysis.
- **Toolbar** – Contains quick actions like Undo, Save, and Add Sheet.
- **Data Pane** – Displays **Dimensions** (categories) and **Measures** (numeric data).
- **Analytics Pane** – Offers tools for **trends, clustering, and forecasting**.
- **Visualization Area** – The workspace where charts are created.
- **Marks Card** – Used for **color, size, labels, and tooltips**.
- **Filters Shelf** – Allows filtering data dynamically.
- **Pages Shelf** – Enables step-through animation of visualizations.
- **Sheets Tab** – Switch between **worksheets, dashboards and stories**.

Step 3: Dashboard & Storyboard

- **Dashboard** – A collection of multiple visualizations in one view.
- **Storyboard** – A sequence of visualizations to tell a data story.



3. Connecting to the Tutorial Dataset

Step 1: Download and Prepare Data

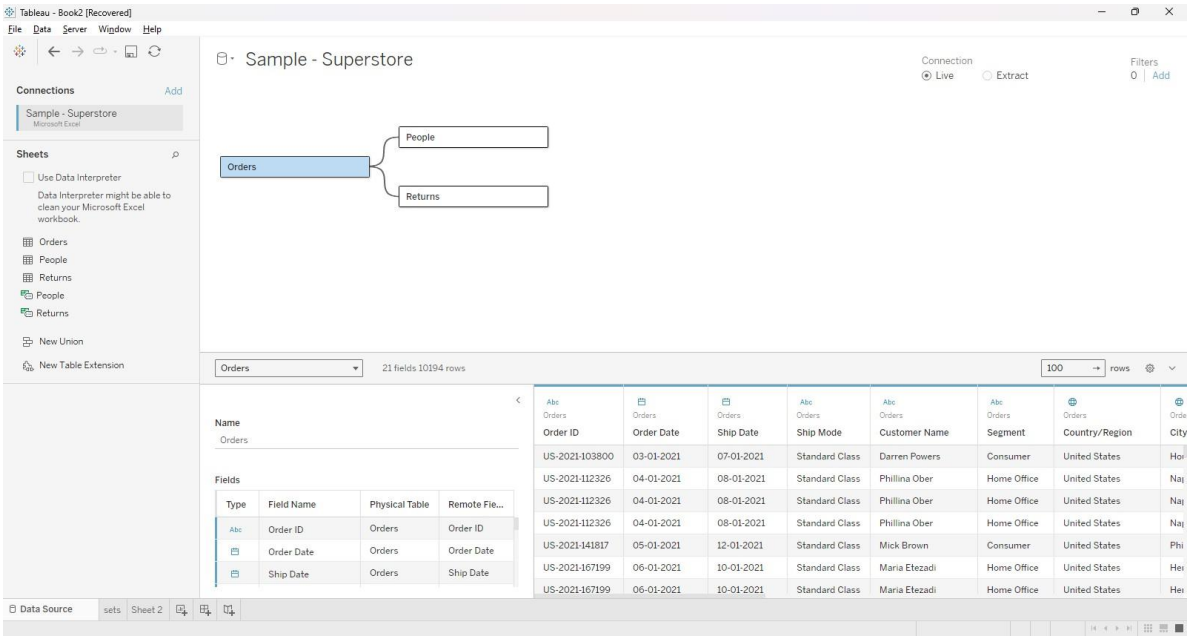
1. Download the **Sample Superstore dataset** from Tableau's website.
2. Save the file in an accessible location.

Step 2: Connect to Data in Tableau

1. **Open Tableau Desktop.**
2. Click **Connect to Data** and select the data source type (Excel, Text, etc.).
3. Browse and select **Sample Superstore.xlsx**.
4. Drag the sheet **Orders** into the **Data Source** tab.
5. Click **Go to Worksheet** to start creating visualizations.

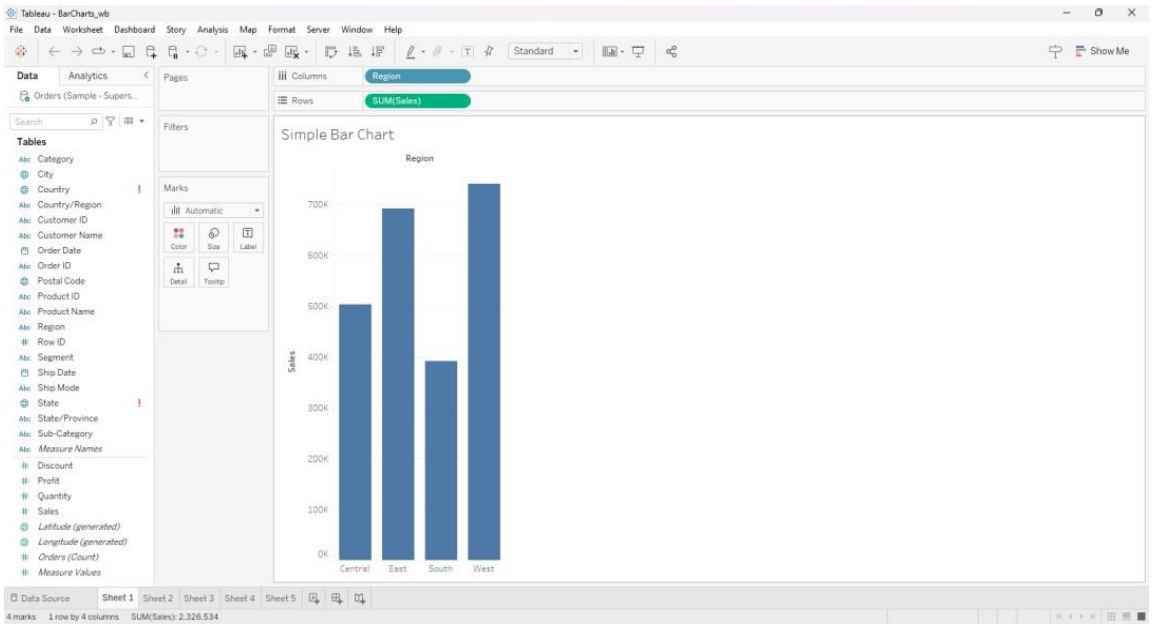
4. Tableau File Types

- **.twb (Tableau Workbook)** – Stores visualizations without data.
- **.twbx (Tableau Packaged Workbook)** – Contains visualizations with embedded data.
- **.tde/.hyper (Tableau Data Extracts)** – Extracted datasets for performance optimization.
- **.tds (Tableau Data Source)** – Saves connection settings without storing data.



5. Creating the First Charts

1. Open **a new worksheet**.
2. Drag **Sales** to **Rows** and **Category** to **Columns**.
3. Tableau will create a **bar chart** by default.
4. Modify the visualization using the **Marks card**.



Exercise 2: Connecting to Data Sources

In this exercise, we will explore how to connect different data sources to Tableau, including text files (.csv, .txt), Excel files, and Microsoft Access databases. Properly connecting to data sources is crucial because it determines how Tableau reads, interprets, and visualizes the data.

1. **Text Files**
2. **Excel Files**
3. **Access files**

1. Connecting to Text Files (.CSV, .TXT)

Text files, especially CSV (Comma-Separated Values) and TXT (Tab-Delimited) files, are widely used for storing structured data. Tableau provides seamless integration with these file types.

Step 1: Import a Text File into Tableau

1. **Open Tableau Desktop**
    - **Launch Tableau Desktop from your system.**
    - **You will see the Start Page with various data connection options.**
2. **Click "Connect to Data" → Select "Text File"**
    - **Under the "Connect" pane on the left, click Text File.**
    - **This will allow you to import files with .csv, .txt, or .tsv extensions.**
3. **Browse and Select the Text File**
    - **Navigate to the location of your CSV or TXT file.**
    - **Click Open to load the data into Tableau.**
4. **Verify the Data in the Data Source Tab**
    - **The data will appear in the Data Source tab, where you can preview it.**
    - **Check for issues such as missing values, incorrect data types, or delimiter mismatches.**
    - **If needed, adjust column settings (e.g., changing text to numbers, merging columns).**

Step 2: Perform Basic Data Preparation

- **Rename Columns – Click on column names to change them.**
- **Change Data Types – Ensure columns have the correct format (e.g., Date, String, Number).**
- **Extract Data – You can create an extract file for faster performance.**
- **Join Multiple Files – If necessary, combine multiple CSV files using joins or unions**

2.Connecting to Excel Files (.XLSX, .XLS, .CSV)

Microsoft Excel is a common data storage format used in various industries. Tableau allows users to connect to Excel files and work with multiple sheets within a workbook.

Step 1: Connect to an Excel File in Tableau

1. **Open Tableau Desktop.**
    - **Launch Tableau and ensure you are on the Start Page.**
2. **Click "Connect to Data" → Select "Microsoft Excel"**
    - **Under the "Connect" pane, click Microsoft Excel.**
    - **This will allow you to import .xlsx and .xls files.**
3. **Browse and Select the Excel File**
    - **Navigate to the location of your Excel file.**
    - **Click Open to load the data into Tableau.**
4. **Drag the Necessary Sheets into the Data Source Tab**
    - **Excel files often contain multiple sheets.**
    - **Drag and drop the required sheet(s) into the Data Source tab.**
    - **If the data is stored in a table format, Tableau will detect it automatically.**

Step 2: Configure the Excel Data Connection

- **Rename Columns & Rows – Modify column names for better readability.**
- **Define Joins & Relationships – If you have multiple sheets, set relationships between them.**
- **Pivot Data (If Necessary) – Convert wide data into long format for better visualization.**
- **Extract Data for Performance – Save an extract to improve speed and efficiency. Step 3: Proceed to Worksheet**
- **Click on Sheet 1 to start building visualizations.**
- **Your Excel data is now ready for analysis in Tableau!**

3.Connecting to an Access Database

Microsoft Access is a relational database system used to store structured data with relationships between multiple tables. Tableau supports direct connections to Access databases for seamless integration.

Step 1: Connect to an Access Database

1. **Open Tableau Desktop**
    - **Start Tableau and go to the Start Page.**

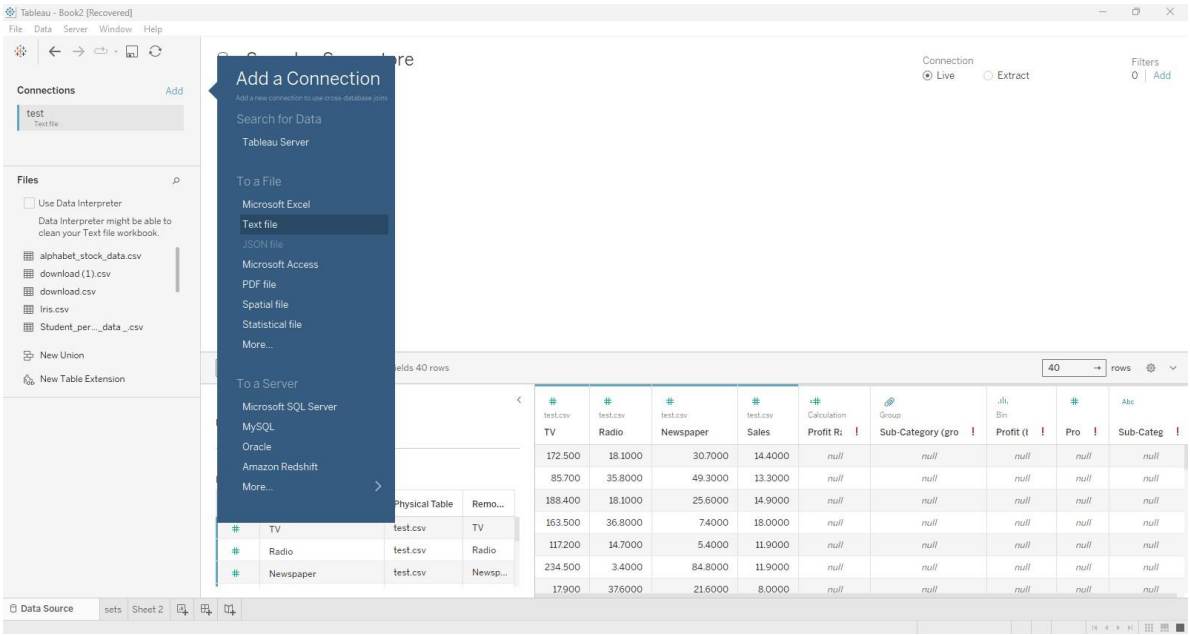
2. **Click "Connect to Data" → Select "Microsoft Access"**
    - **Under the "Connect" pane, select Microsoft Access.**
    - **This option allows you to work with .accdb and .mdb files.**
3. **Browse and Select the Access Database File**
    - **Navigate to your Access database file location.**
    - **Click Open to establish the connection.**
4. **Drag Tables into the Data Source Tab**
    - **Microsoft Access databases store data in multiple tables.**
    - **Drag and drop the necessary tables into the Data Source tab.**
    - **Verify data structure and relationships between**

tables. Step 2: Configure Table Relationships in Tableau

- **Primary & Foreign Keys: Access databases follow a relational model where tables are linked using keys. Tableau automatically detects relationships, but you can manually define them.**
- **Joins & Unions: If necessary, perform INNER, LEFT, RIGHT, or FULL OUTER JOINS between tables to merge data correctly.**

Step 3: Verify Data and Proceed to Worksheet

- **Preview Data – Check for missing or incorrect values.**
- **Adjust Data Types – Ensure fields are formatted correctly.**
- **Proceed to Worksheet – Click Sheet 1 to begin data visualization.**



Exercise 3: Creating Basic Charts and Graphs

In this exercise, we will learn how to create and customize different types of charts in Tableau. The **number of measures and dimensions** used in each chart type is also specified for better understanding.

Creating a Pie Chart Creating a Bar
Chart Creating a Line Graph
Discovering Scatter Plot

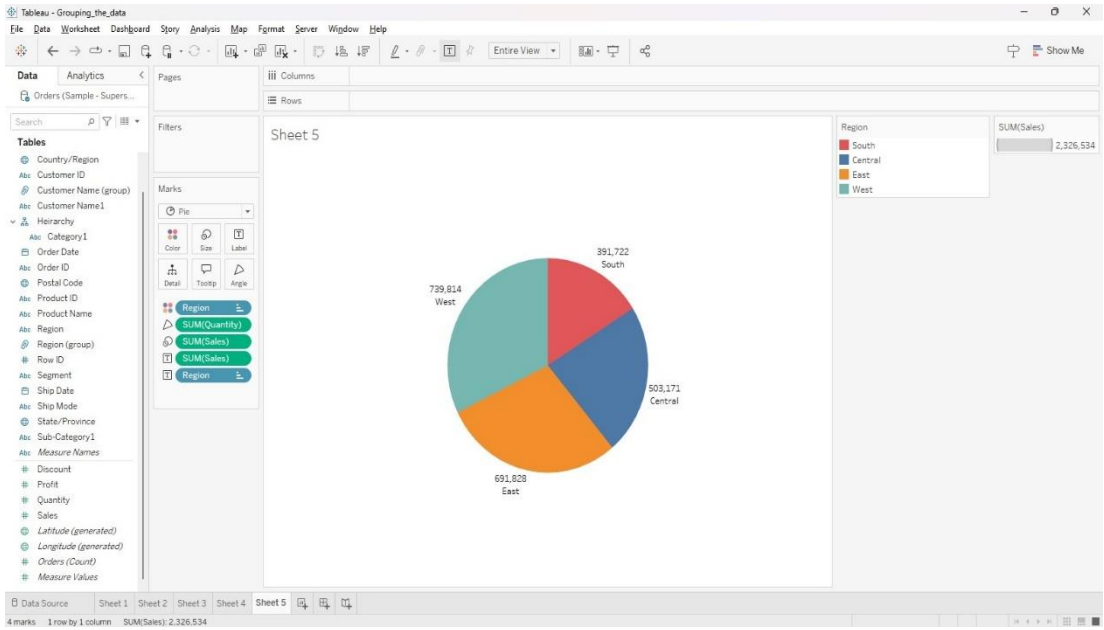
1. Creating a Pie Chart

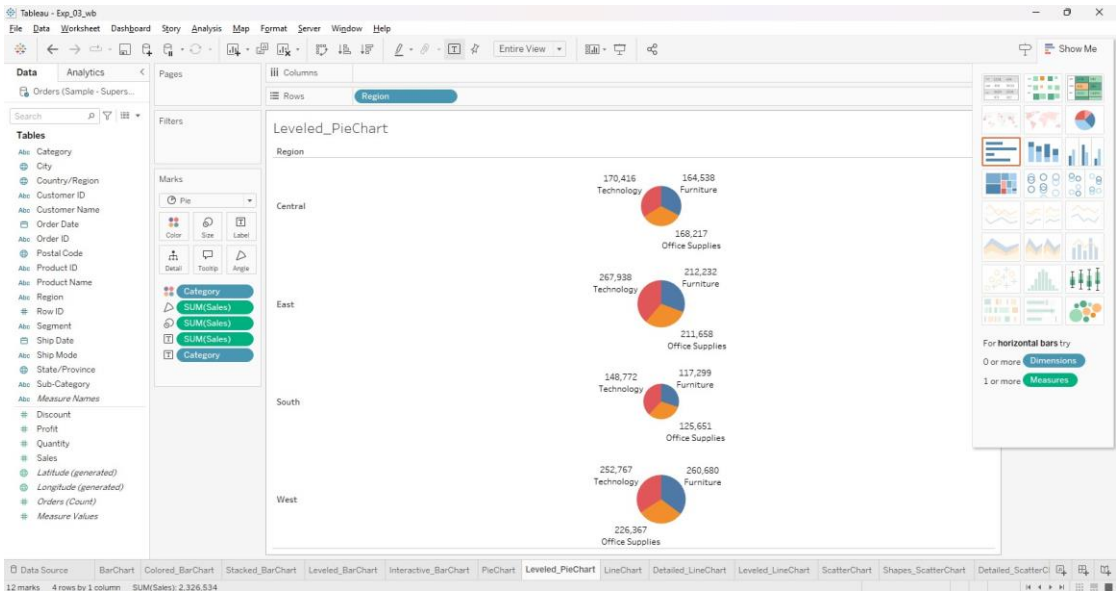
A **Pie Chart** is used to **represent categorical data** in a circular format, where each slice corresponds to a proportion of the total. It is useful when analyzing **market share, distribution, or composition** of data.

Number of Measures: 1 (Sales)
Number of Dimensions: 1 (Category)

Step 1: Build a Pie Chart

1. **Open Tableau Desktop** and load a dataset (e.g., Sample Superstore).
2. **Go to a new worksheet** by clicking the **"+" icon**.
3. **Drag "Category" to Columns** – This defines the segments in the pie chart.
4. **Drag "Sales" to Size** – This determines the size of each slice.
5. **Drag "Profit" to Angle** – This controls the proportion of the pie slices.
6. **Change the Marks type to Pie**:
    - In the **Marks** pane, click the dropdown and select **Pie**.
7. **Customize the Pie Chart**:
    - Click **Label** to add **Sales and Profit values** to each segment.
    - Drag **Category** to **Color** to distinguish segments visually.
    - Use **Filters** to display specific categories if required.





2.Creating a Bar Chart

A **Bar Chart** is one of the most widely used charts in Tableau, used to compare different categories. It is useful when analyzing **sales performance, revenue by category, and comparisons between different groups**.

Number of Measures: 1 (Sales)
Number of Dimensions: 1 (Region)

Step 1: Build a Basic Bar Chart

- **Go to a new worksheet**.
- **Drag "Region" to Columns** – This defines different bars for each region.
- **Drag "Sales" to Rows** – This determines the height of the bars.
- **By default, Tableau creates a Horizontal Bar Chart.**
- **To switch to a Vertical Bar Chart:**
  - Click **Swap Rows & Columns** (Toolbar button with two arrows).

Step 2: Customize the Bar Chart

- **Drag "Category" to Color** to differentiate categories.
- **Drag "Profit" to Label** to display values on bars.
- **Sort Bars in Descending Order** – Click on the **Sales axis** and select **Sort Descending**.
- **Apply Filters** – If you want to focus on a specific region, drag **Region** to Filters.

Use bar charts when comparing values across categories. Avoid using them for time-based data, as line graphs are more effective for trends.

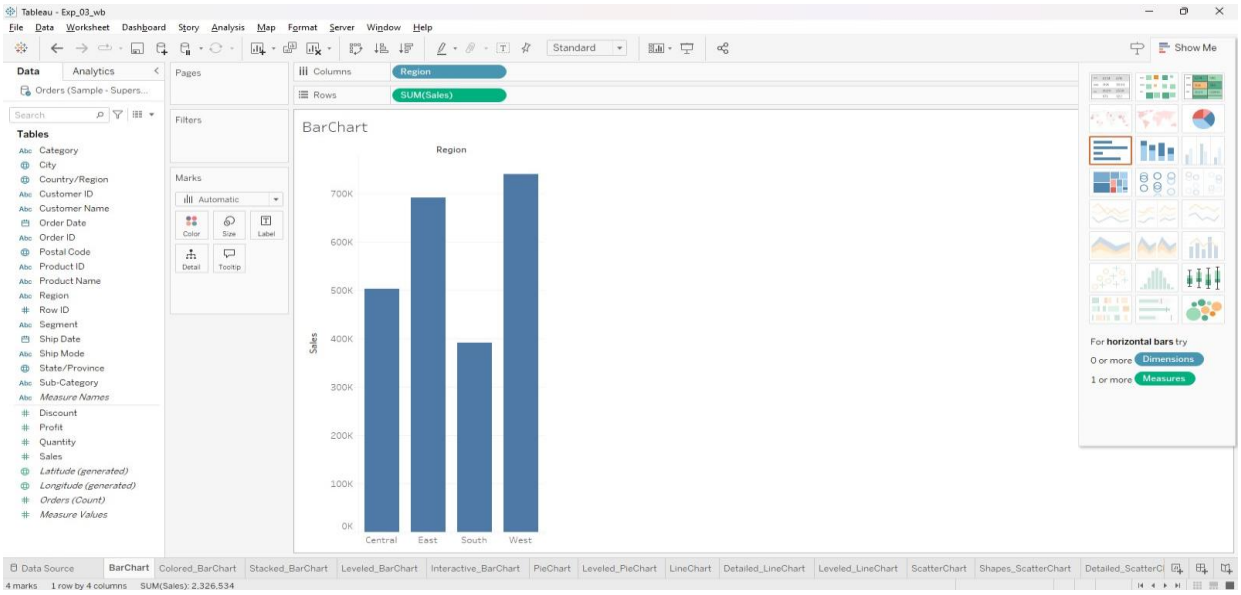


Tableau - Exp_03_wb
BarChart
Region
Sales
700K
600K
500K
400K
300K
200K
100K
0K
Central
East
South
West
For horizontal bars try
0 or more Dimensions
1 or more Measures

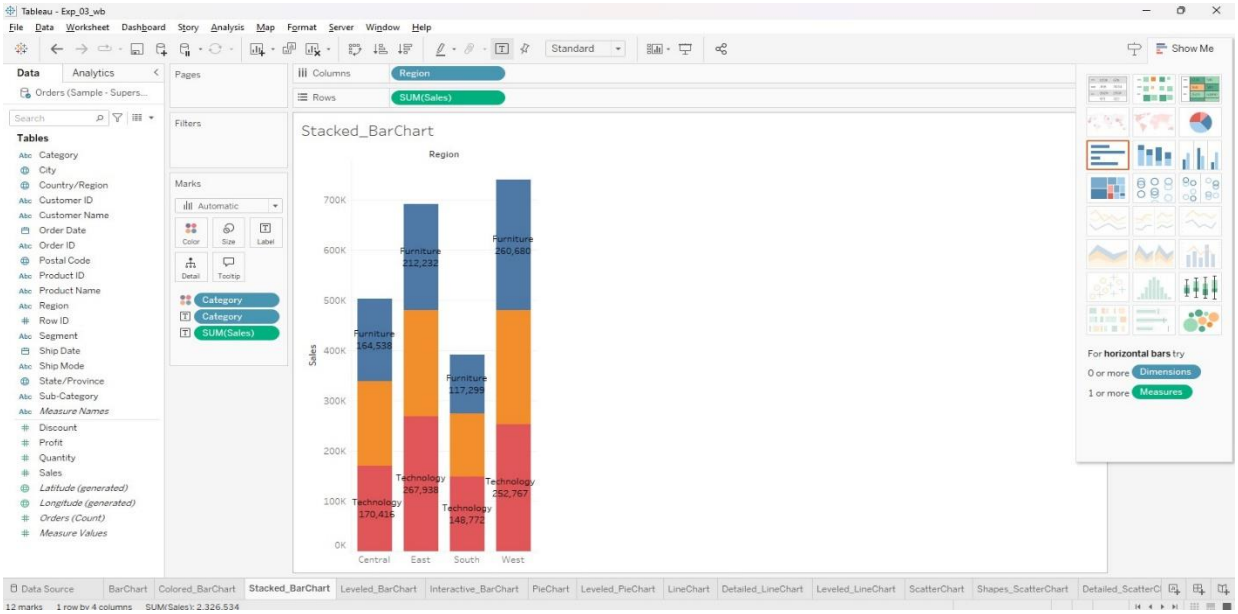


Tableau - Exp_03_wb
Stacked_BarChart
Region
Sales
Furniture 164,538
Furniture 212,232
Furniture 117,299
Furniture 260,680
Technology 170,416
Technology 267,938
Technology 148,772
Technology 252,767
Central
East
South
West
For horizontal bars try
0 or more Dimensions
1 or more Measures

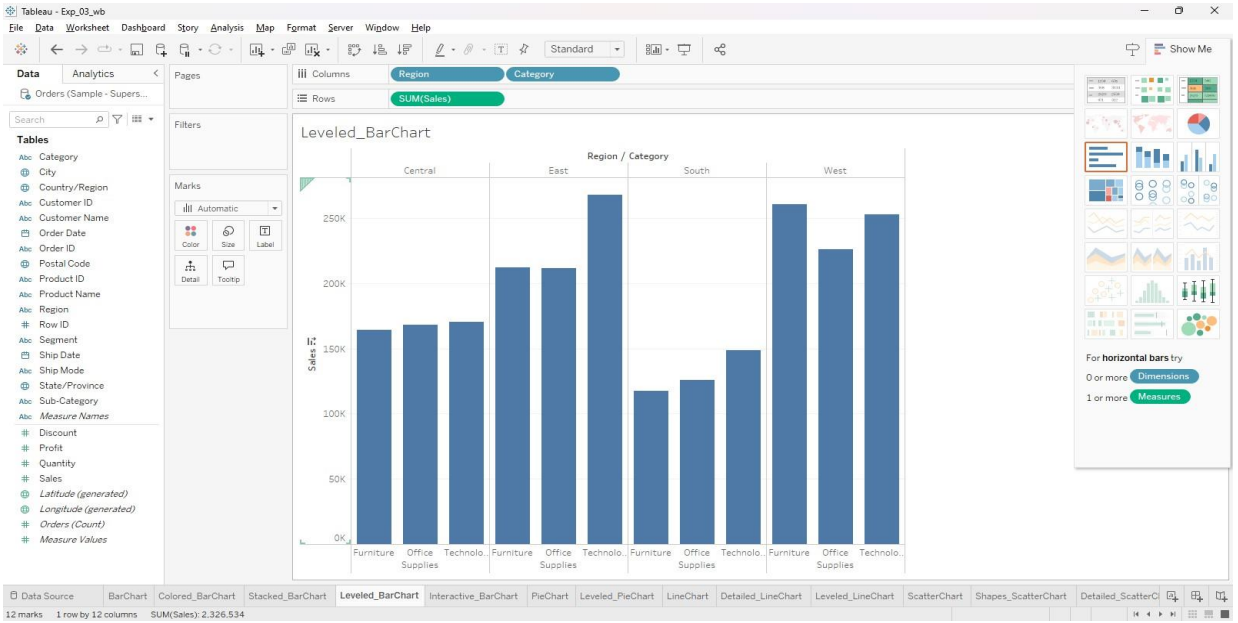


Tableau - Exp_03_wb
Leveled_BarChart
Region / Category
Central
East
South
West
Furniture
Office Supplies
Technolo..
For horizontal bars try
0 or more Dimensions
1 or more Measures

3.Creating a Line Graph

A **Line Graph** is used to visualize trends over time. It is useful for **tracking performance, identifying patterns, and analyzing seasonal variations**.

Number of Measures: 1 (Sales)
Number of Dimensions: 1 (Order Date)

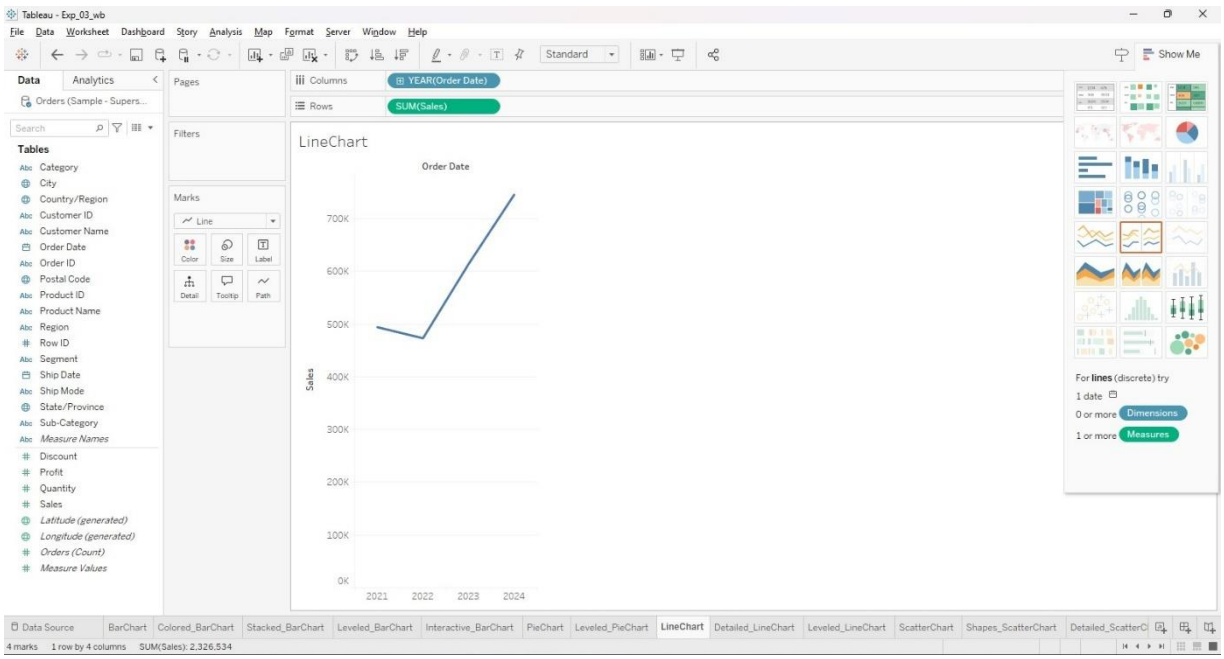
Step 1: Build a Line Graph

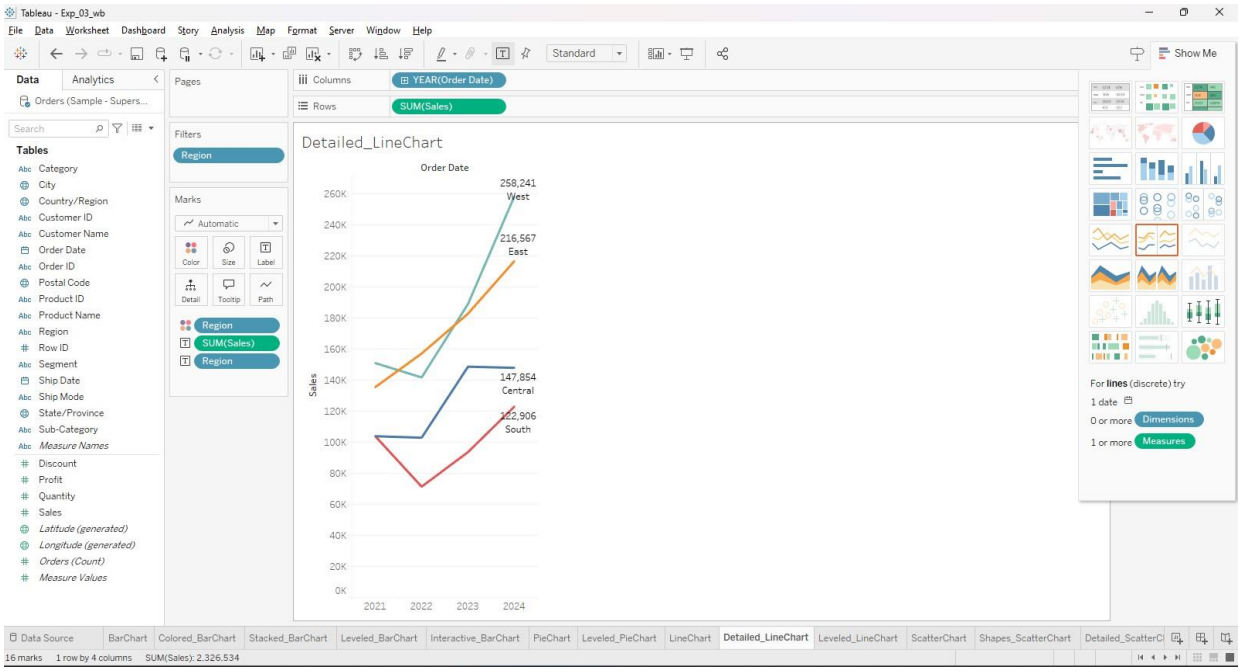
8. **Go to a new worksheet**.
9. **Drag "Order Date" to Columns** – This creates a time-based axis.
10. **Drag "Sales" to Rows** – This defines the trend line.
11. **Click on Marks → Line** to switch to a line chart.
12. **Drag "Region" to Color** – This will create separate trend lines for each region.

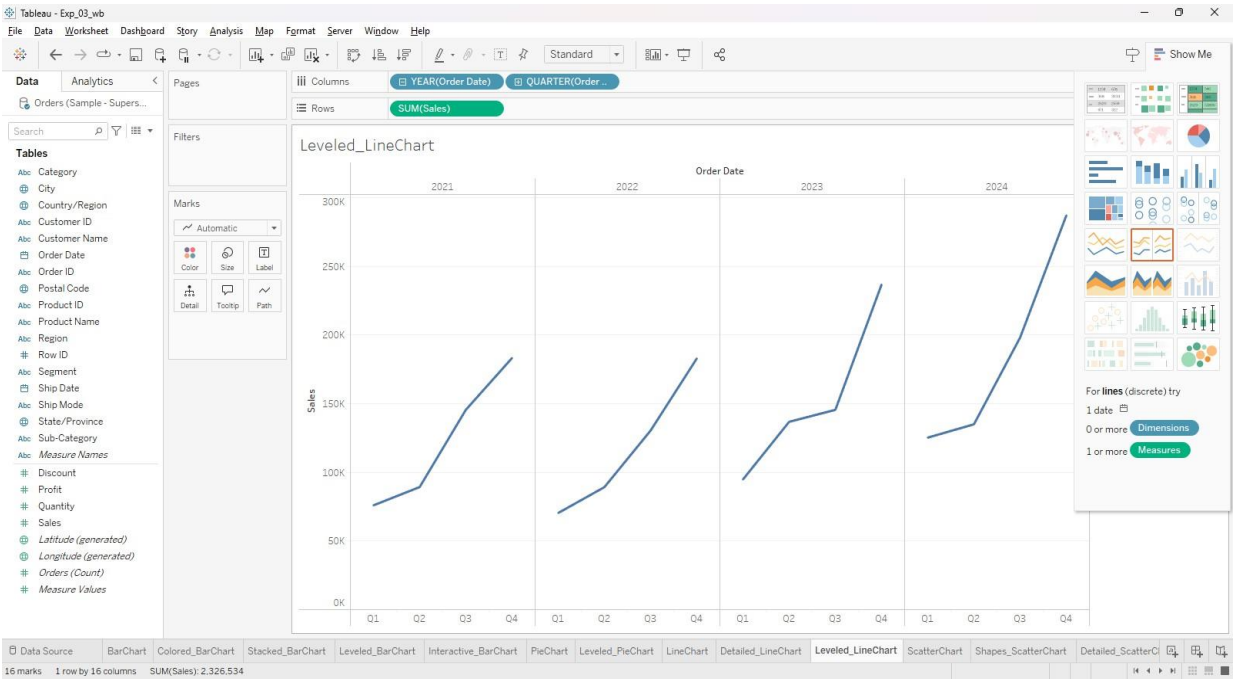
Step 2: Customize the Line Graph

- **Change Date Aggregation** – Right-click on Order Date and select **Year, Quarter, Month, or Day**.
- **Add Trend Lines** – Click **Analytics Pane → Drag Trend Line** onto the chart.
- **Label Key Points** – Click on **Label → Show Marks for Highs & Lows**.

Line graphs are best for showing trends and patterns over time. Avoid using them for non-sequential categories.







4.Discovering Scatter Plot

A **Scatter Plot** is used to analyze relationships between two numerical variables. It helps in identifying **correlations, clusters, and outliers**.

Number of Measures: 2 (Profit, Sales)
Number of Dimensions: 1 (Region)

Step 1: Create a Scatter Plot

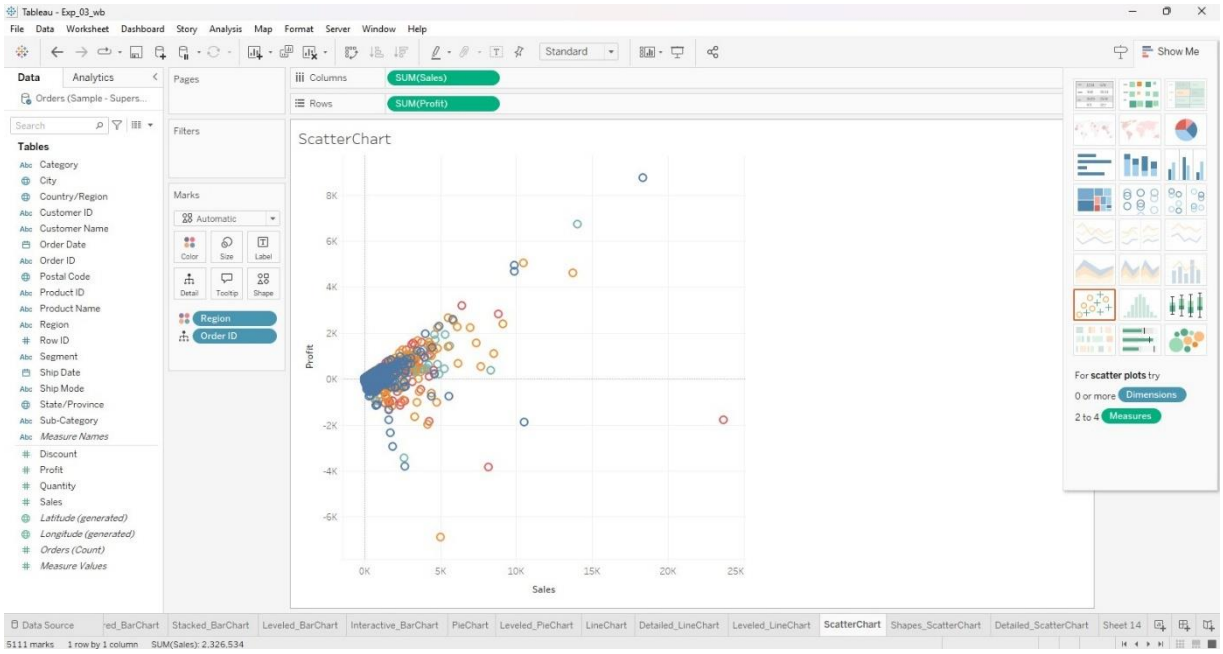
- **Go to a new worksheet**.
- **Drag "Profit" to Columns** – This defines the X-axis.
- **Drag "Sales" to Rows** – This defines the Y-axis.
- **Drag "Region" to Shape** – This will differentiate points based on regions

- **Change Marks type to Circle** for better visualization.

Step 2: Customize the Scatter Plot

- **Color by Category** – Drag **Category to Color**.
- **Adjust Transparency** – Reduce opacity for overlapping points (Marks → Color → Transparency).
- **Add Trend Line** – Go to **Analytics → Drag Trend Line** onto the chart.

Scatter plots are best for correlation analysis and identifying outliers. They are ineffective when used for categorical data.



Exercise 4: Data Management

Data management is a critical part of Tableau, as it helps in refining and structuring data for analysis. This exercise covers essential data management techniques like **filtering, sorting, grouping, sets, and working with dates**.

1. Filtering Data using Context Filters

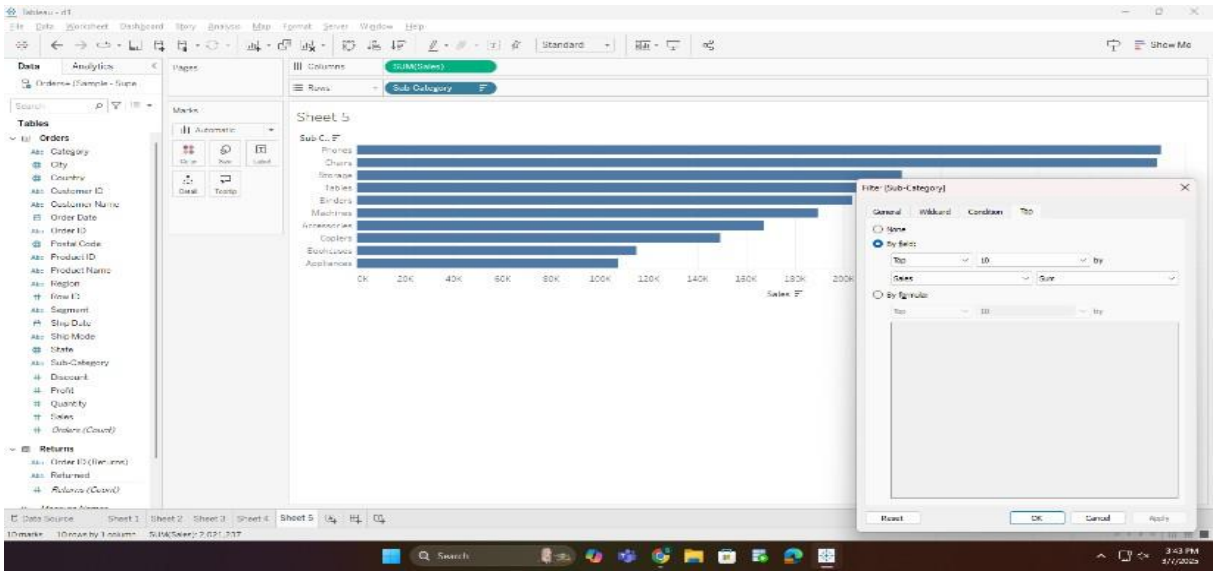
Filters in Tableau help refine the data displayed in visualizations. **Context filters** allow you to set one filter as a primary filter so that all subsequent filters apply only to the data returned by it.

Number of Measures: N/A (Depends on filtered field)
Number of Dimensions: 1 (Category)

Appling a Context Filter

1. **Go to a worksheet** where a visualization is created.
2. **Drag "Category" to the Filters shelf** – A filter dialog box appears.
3. **Choose specific values to filter** – Select the desired categories to include.
4. **Right-click on the filter → Select "Add to Context"** –
    - The filter turns **gray**, indicating that it is now a context filter.
5. **Apply Additional Filters** (Optional) – Any subsequent filters will now work only on the context filter results.

Context filters are useful when filtering large datasets where one filter needs to be applied before others.



2. Implementing Sorting

Sorting helps organize data in a structured manner, allowing easier comparisons and analysis. You can sort data in **ascending or descending order** based on measure values.

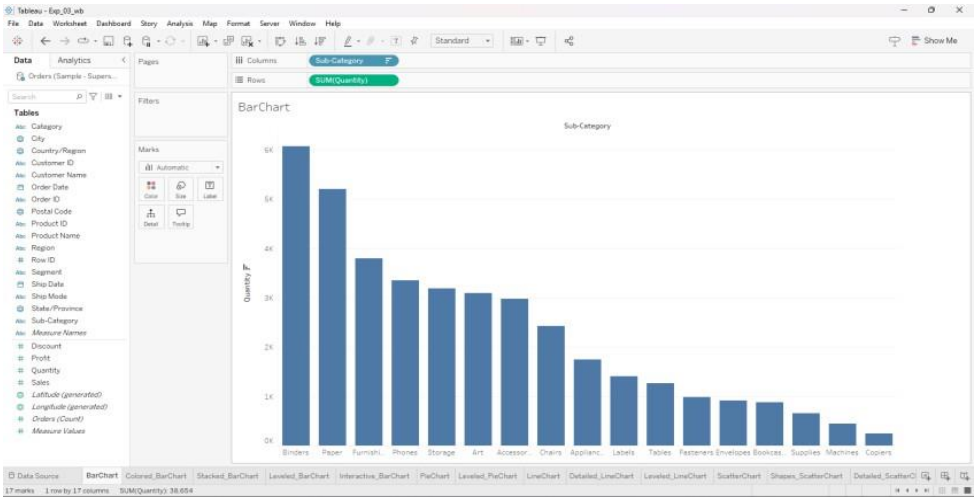
Number of Measures: 1 (Sales)
Number of Dimensions: 1 (Category or Region)

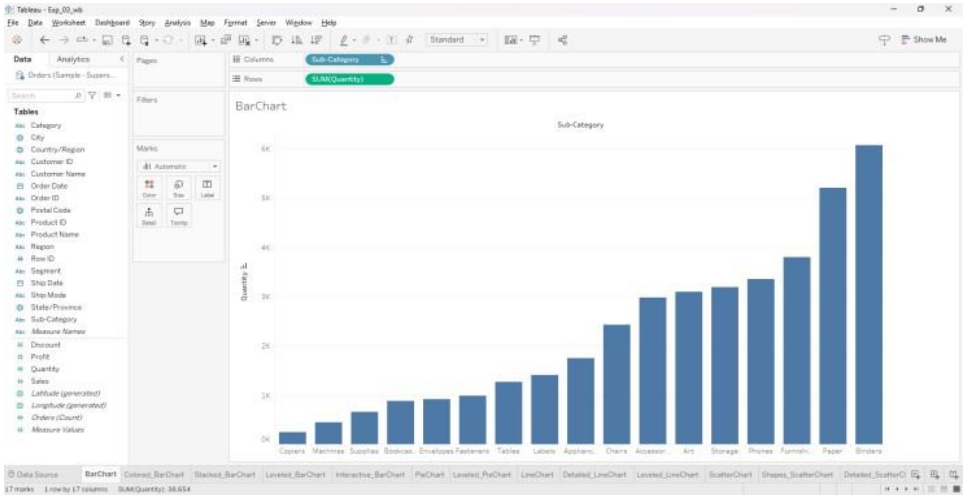
Appling Sorting in a Bar Chart

1. **Create a Bar Chart:**
    - Drag **Region** to Columns and **Sales** to Rows.
2. **Click on "Sales" in the chart** – Sorting options appear.
3. **Click the Sort Icon** – Sort in **Ascending Order** (Lowest to Highest).

   Sort in **Descending Order** (Highest to Lowest).
4. **Custom Sorting (Optional)** – Right-click on **Sales → Sort**.

   Choose a **Manual, Alphabetical**





3.Grouping Data

Grouping allows you to combine multiple values within a dimension into a single category. This is particularly useful for simplifying data analysis by merging similar values. Instead of analyzing data for multiple smaller categories, grouping enables you to consolidate them into broader, more meaningful categories.

Key Characteristics of Grouping

- **Number of Measures: Not applicable (Grouping works only on dimensions).**
- **Number of Dimensions: Requires at least one categorical field (e.g., region, product category, department, etc.).**

Steps to Create Groups

1. **Select Multiple Values:**
    - Identify a dimension in your dataset that contains multiple values.
    - From the chart or data panel, select multiple values that you want to group together**.**
2. **Create a Group:**
    - Right-click on the selected values.
    - Choose the "Create Group" option from the context menu.
    - A dialog box will appear, allowing you to define the group**.**
3. **Rename the Group:**
    - Provide a meaningful name for the new group to represent the combined values.
    - Example: If you are grouping "**East**" and "**South**" regions, you can rename the group as **"Eastern Regions."**
4. **Apply the Group:**
    - Once you have named the group, click OK or Apply to save it.
    - The new group is now available as a dimension in your dataset.
    - This grouped category can be used for filtering, visualization, or further analysis.
5. **Modify Grouping (Optional):**
    - If you need to update the group, you can modify it later.
    - Right-click on the grouped field and select "Edit Group."
    - You can add or remove items from the group as required
      .

Benefits of Grouping Data

- Simplifies analysis by reducing the number of distinct categories.
- Enhances visualization clarity by combining similar items.
- Improves reporting efficiency by focusing on broader trends rather than individual small variations.
- Useful for business insights, such as grouping products into major categories, merging regional data, or consolidating multiple service types.

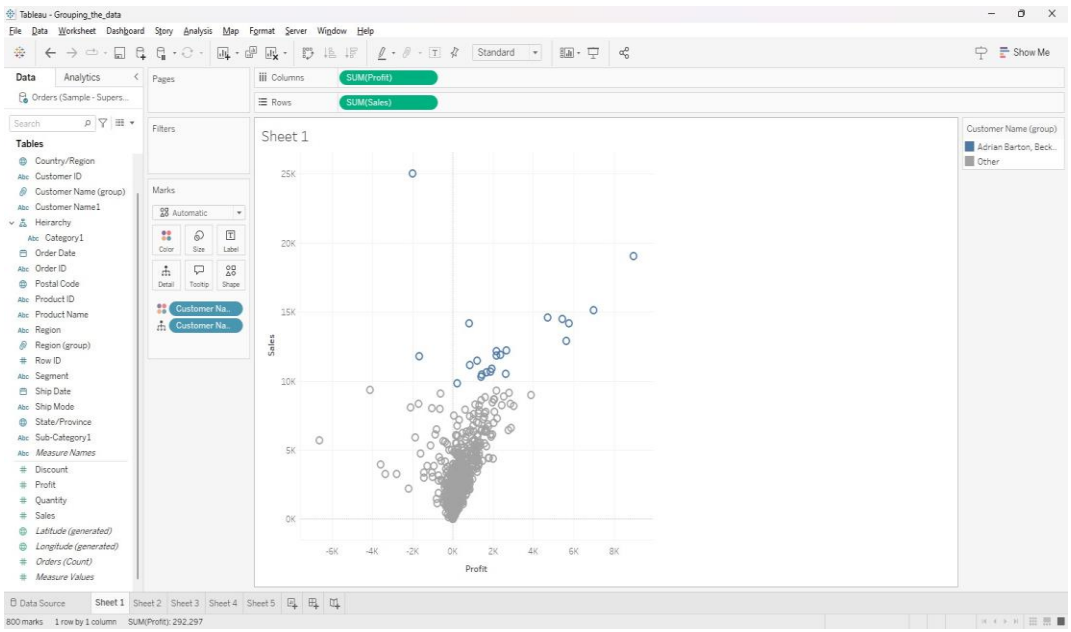


Tableau - Grouping_the_data
Sheet 1
SUM(Profit)
SUM(Sales)
Profit
Sales

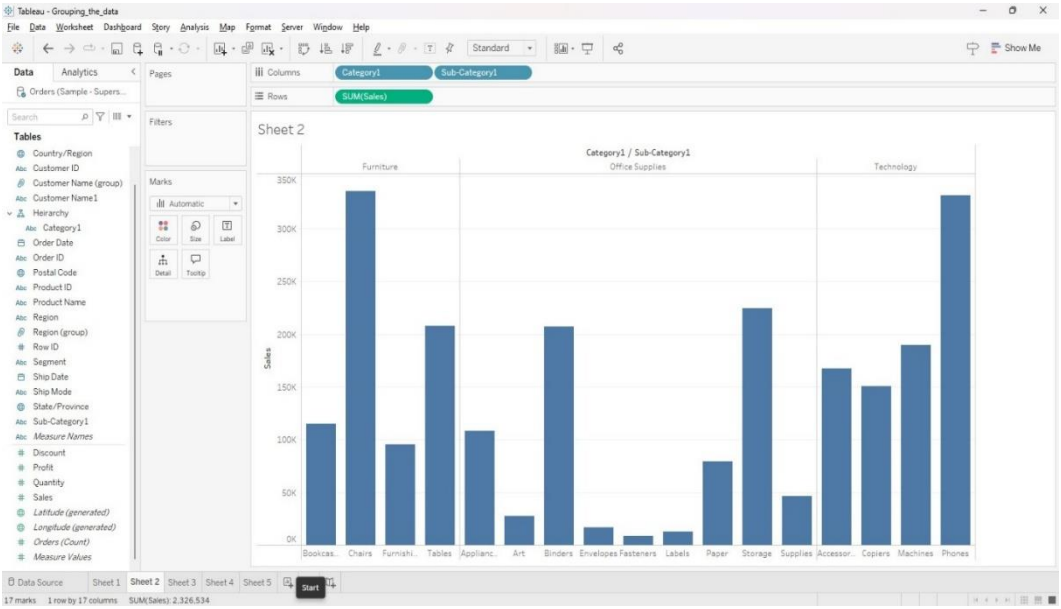


Tableau - Grouping_the_data
Sheet 2
Category1
Sub-Category1
SUM(Sales)
Furniture
Office Supplies
Technology
Bookcas...
Chairs
Furnishi...
Tables
Applianc...
Art
Binders
Envelopes
Fasteners
Labels
Paper
Storage
Supplies
Accessor...
Copiers
Machines
Phones

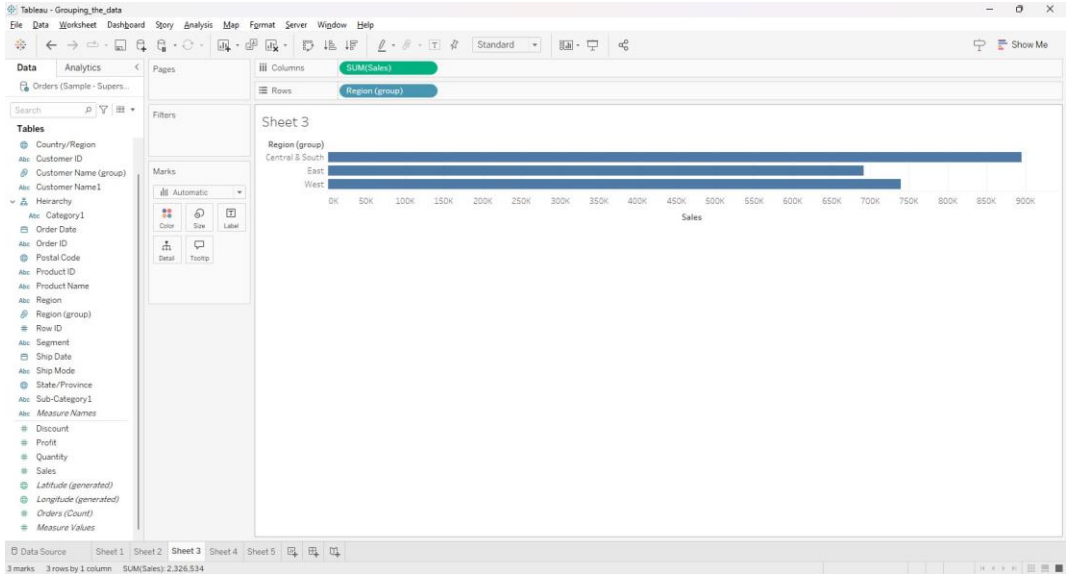


Tableau - Grouping_the_data
Sheet 3
SUM(Sales)
Region (group)
Central & South
East
West
Sales

4.Manipulating Sets

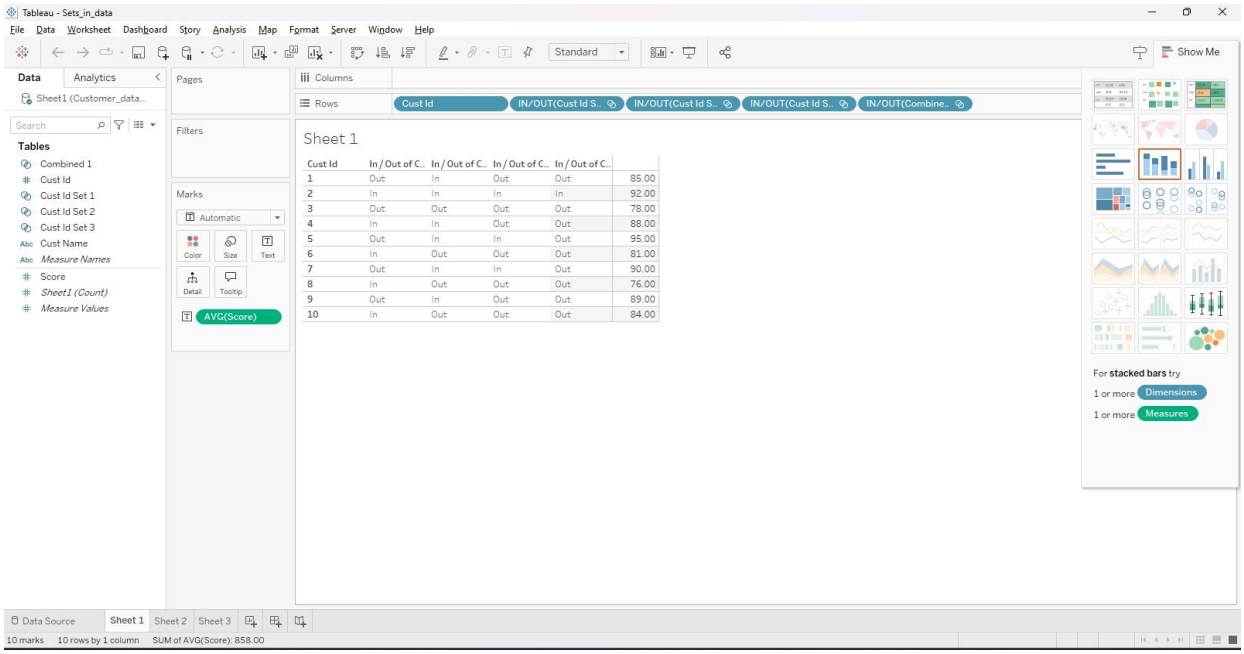
Sets in Tableau are dynamic or static subsets of data based on specific conditions. They allow deeper insights by categorizing data into "IN" (included) and "OUT" (excluded).

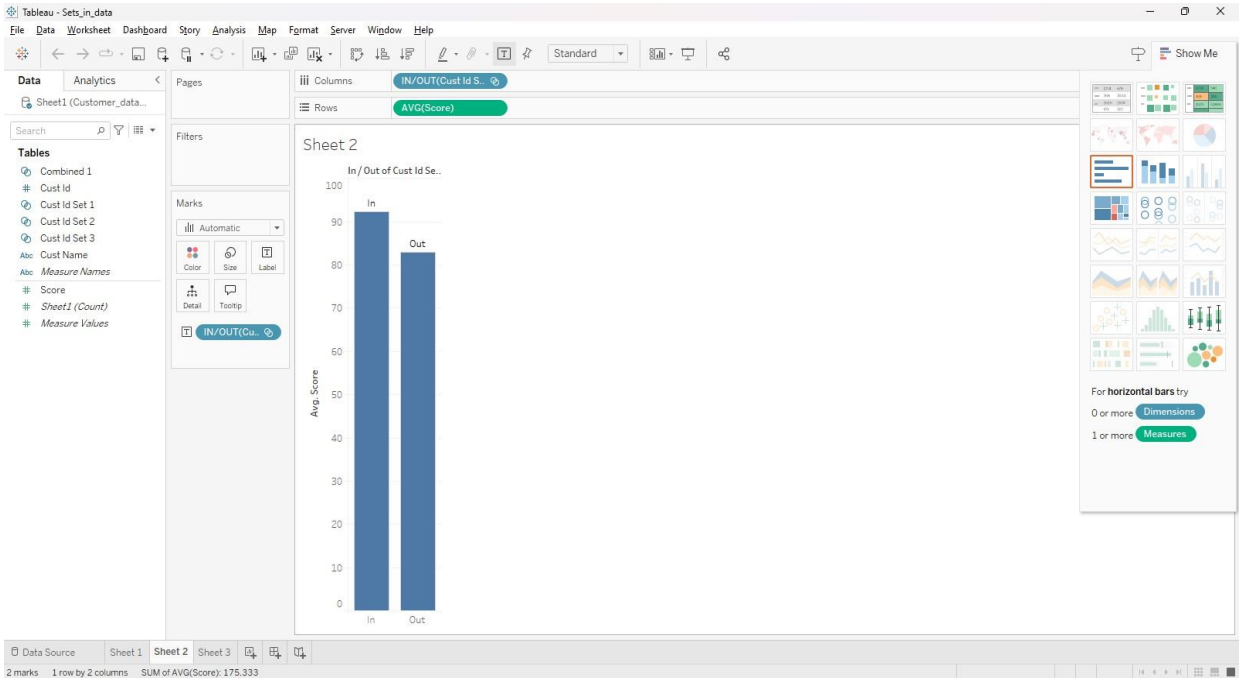
Number of Measures: N/A (Depends on set conditions)
Number of Dimensions: 1 (Any categorical field)

Creating a Dynamic Set

5. **Go to the Data Pane** → Right-click on a **Dimension** (e.g., Category).
6. **Click "Create" → "Set"** – A dialog box opens.
7. **Define Conditions** – Select:
    - **Top N values** (e.g., Top 10 Sales).
    - **A specific condition** (e.g., Profit > $5000).
8. **Click OK** – The set appears under the Data Pane.
9. **Apply the Set in a Visualization** –
    - Drag the **Set** into the **Rows or Columns shelf**.
    - The visualization now categorizes data as **IN (part of the set) and OUT (not part of the set)**.

Sets are useful when comparing a subset of data (e.g., Top 10 Customers vs. Others).





5.Working with Dates (Discrete & Continuous)

In Tableau, dates can be treated in two ways:

- **Discrete Dates** – Categorizes dates into fixed groups (e.g., Year, Quarter, Month).
- **Continuous Dates** – Displays dates as a timeline with continuous values.

Number of Measures: 1 (Date-based measure like Sales)
Number of Dimensions: 1 (Order Date)

Step 1: Change Date Type (Discrete or Continuous)

1. **Drag "Order Date" to Columns** – A timeline appears.

2. **Right-click on "Order Date"** – Select **Convert to Discrete** or **Convert to Continuous**.

Step 2: Understanding the Differences

- **Discrete Dates**:
    - Groups data into **fixed periods (Year, Quarter, Month, etc.)**.
    - Example: Sales data grouped by **Years 2021, 2022, 2023**.
- **Continuous Dates**:
    - Creates a **smooth timeline** without grouping data.
    - Example: A **trend line showing daily sales growth**.

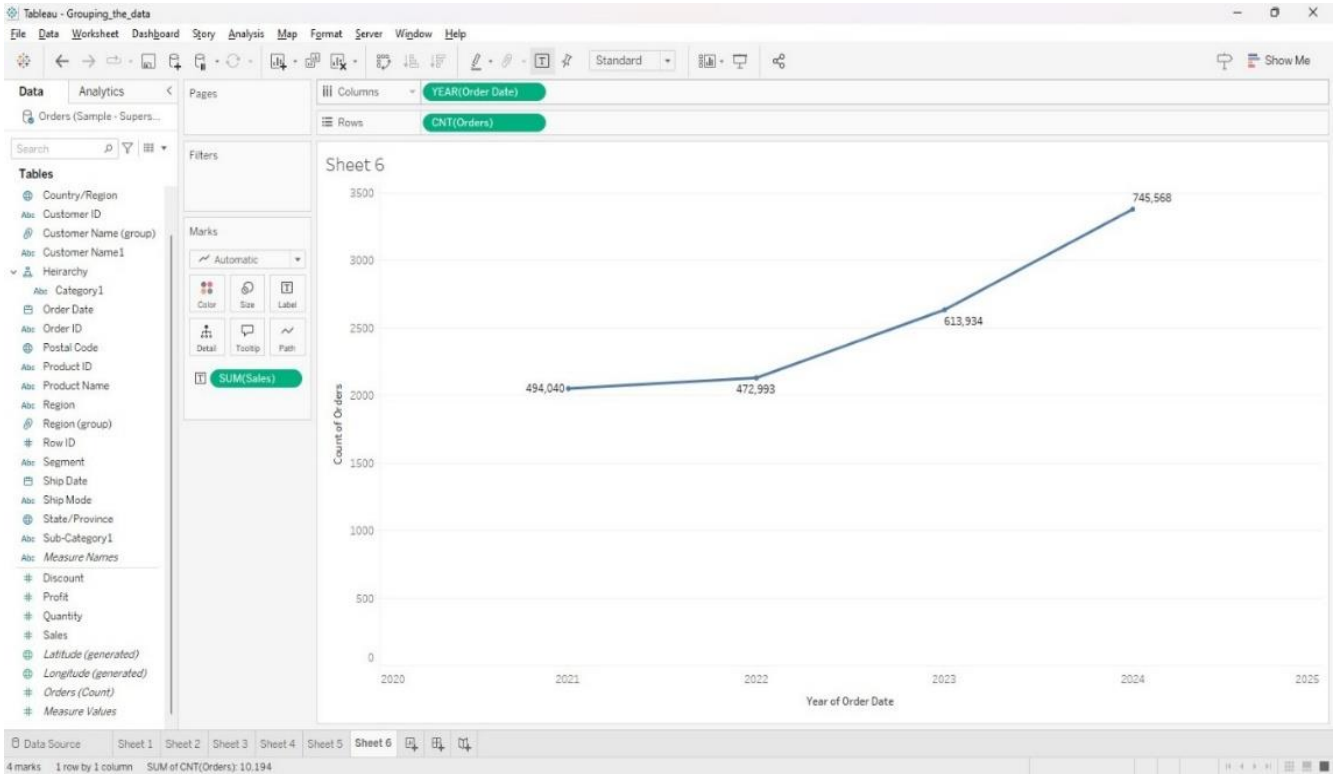


Tableau - Grouping_the_data
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Data Analytics
Orders (Sample - Supers...
Tables
Country/Region
Customer ID
Customer Name (group)
Customer Name1
Heirarchy
Category1
Order Date
Order ID
Postal Code
Product ID
Product Name
Region
Region (group)
Row ID
Segment
Ship Date
Ship Mode
State/Province
Sub-Category1
Measure Names
Discount
Profit
Quantity
Sales
Latitude (generated)
Longitude (generated)
Orders (Count)
Measure Values
Pages
Filters
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Path
SUM(Sales)
Columns
YEAR(Order Date)
Rows
CNT(Orders)
Sheet 6
Count of Orders
Year of Order Date
494,040
472,993
613,934
745,568
Data Source
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
4 marks
1 row by 1 column
SUM of CNT(Orders): 10,194

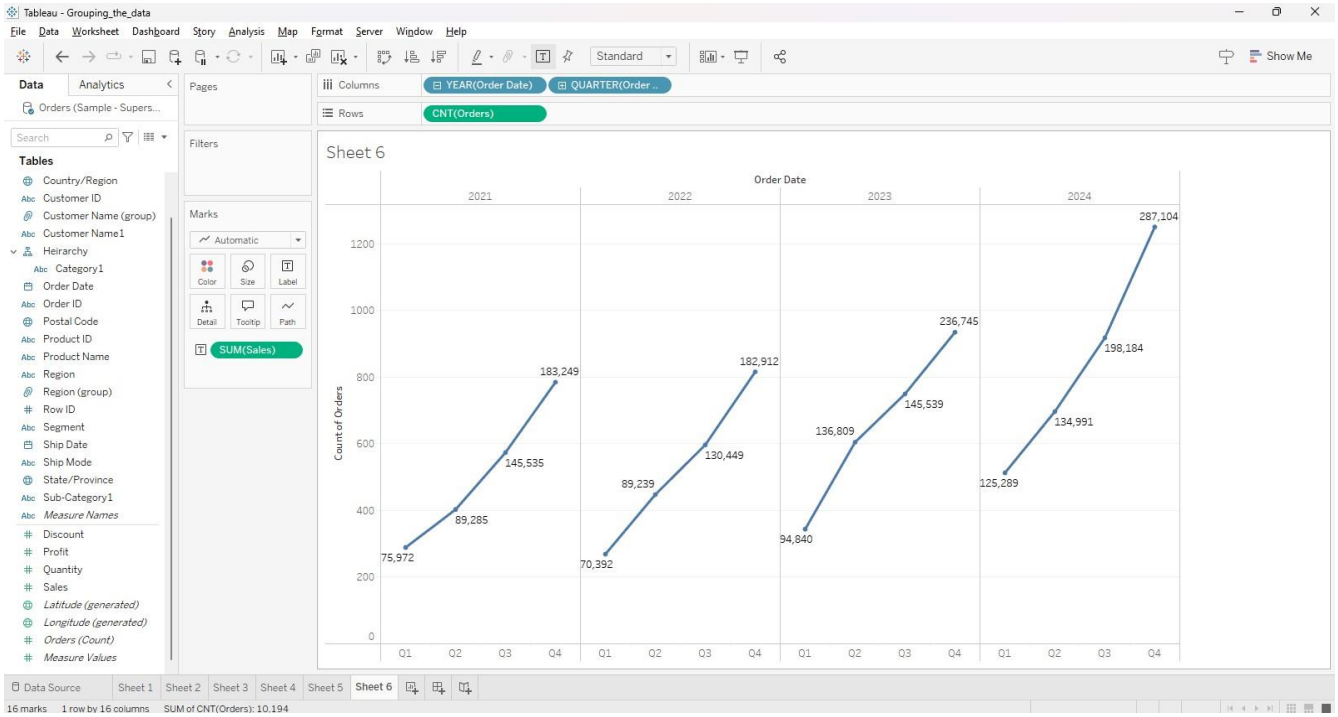


Tableau - Grouping_the_data
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Data Analytics
Orders (Sample - Supers...
Tables
Country/Region
Customer ID
Customer Name (group)
Customer Name1
Heirarchy
Category1
Order Date
Order ID
Postal Code
Product ID
Product Name
Region
Region (group)
Row ID
Segment
Ship Date
Ship Mode
State/Province
Sub-Category1
Measure Names
Discount
Profit
Quantity
Sales
Latitude (generated)
Longitude (generated)
Orders (Count)
Measure Values
Pages
Filters
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Path
SUM(Sales)
Columns
YEAR(Order Date)
QUARTER(Order ...
Rows
CNT(Orders)
Sheet 6
Order Date
2021
2022
2023
2024
Count of Orders
75,972
89,285
145,535
183,249
70,392
89,239
130,449
182,912
94,840
136,809
145,539
236,745
125,289
134,991
198,184
287,104
Q1
Q2
Q3
Q4
Data Source
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
16 marks
1 row by 16 columns
SUM of CNT(Orders): 10,194

DATE functions in Tableau:

1. DATEADD

Purpose: Adds a specified number of date parts (days, months, years, etc.) to a given date.

Steps to Use DATEADD in Tableau:

1. Open Tableau and connect to a dataset with a date field.
2. Go to the Data Pane and create a calculated field.
3. Enter the following formula:

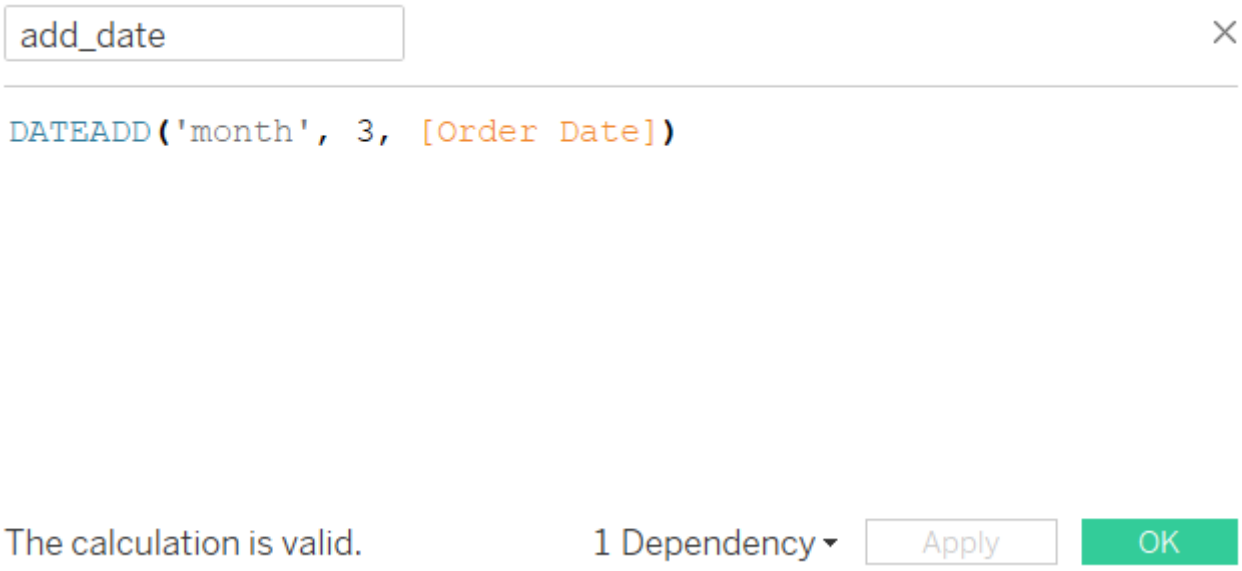
   DATEADD('month', 3, [Order Date])

This adds 3 months to the Order Date field.

4. Click OK to save the calculated field.
5. Drag this field into the Columns, Rows, or Marks pane to use it in your visualization.

Example Uses:

- Add 7 days to a date: DATEADD('day', 7, [Order Date])



2. DATENAME

Purpose: Returns the name of the specified part of the date (e.g., month name, weekday name).

Steps to Use DATENAME in Tableau:

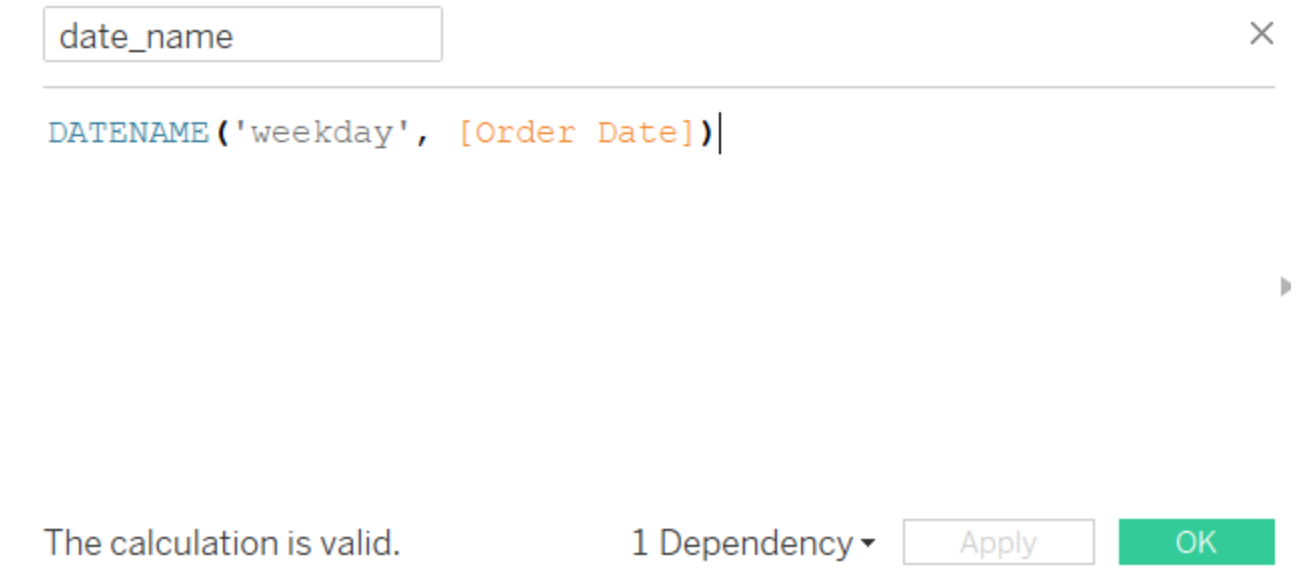
1. Create a calculated field.
2. Enter the following formula:

   DATENAME('month', [Order Date])

3. Click OK to save the calculated field.
4. Drag this field into Rows, Columns, or Filters to categorize data by month name.

Example Uses:

- Get the year as a string: DATENAME('year', [Order Date]) → ("2023", "2024")



3. DATEPART

Purpose: Returns a numeric value representing a specific part of the date (e.g., month number, day number).

Steps to Use DATEPART in Tableau:

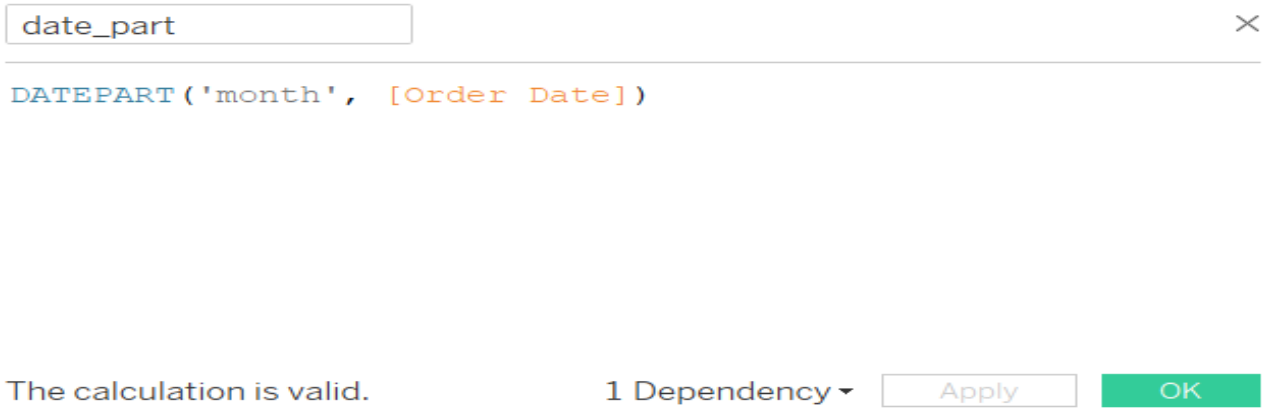
1. Create a calculated field.
2. Enter the following formula:
3. DATEPART('month', [Order Date])

This returns the month as a number (1 = January, 2 = February, etc.).

4. Click OK and drag this field into the visualization.

Example Uses:

- Extract the day of the week (1 = Sunday, 2 = Monday):
  DATEPART('weekday', [Order Date])



4. DATETRUNC

Purpose: Truncates a date to the specified date part (e.g., round down to the beginning of the month, year, etc.).

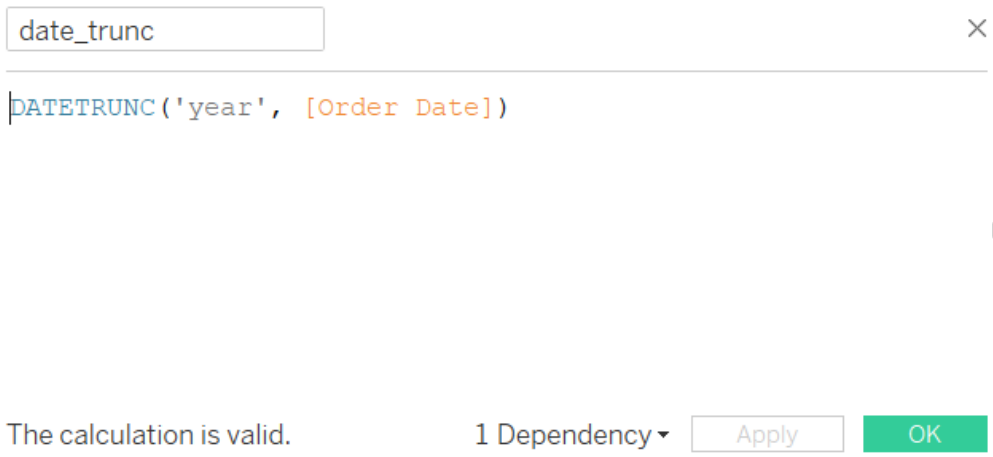
Steps to Use DATETRUNC in Tableau:

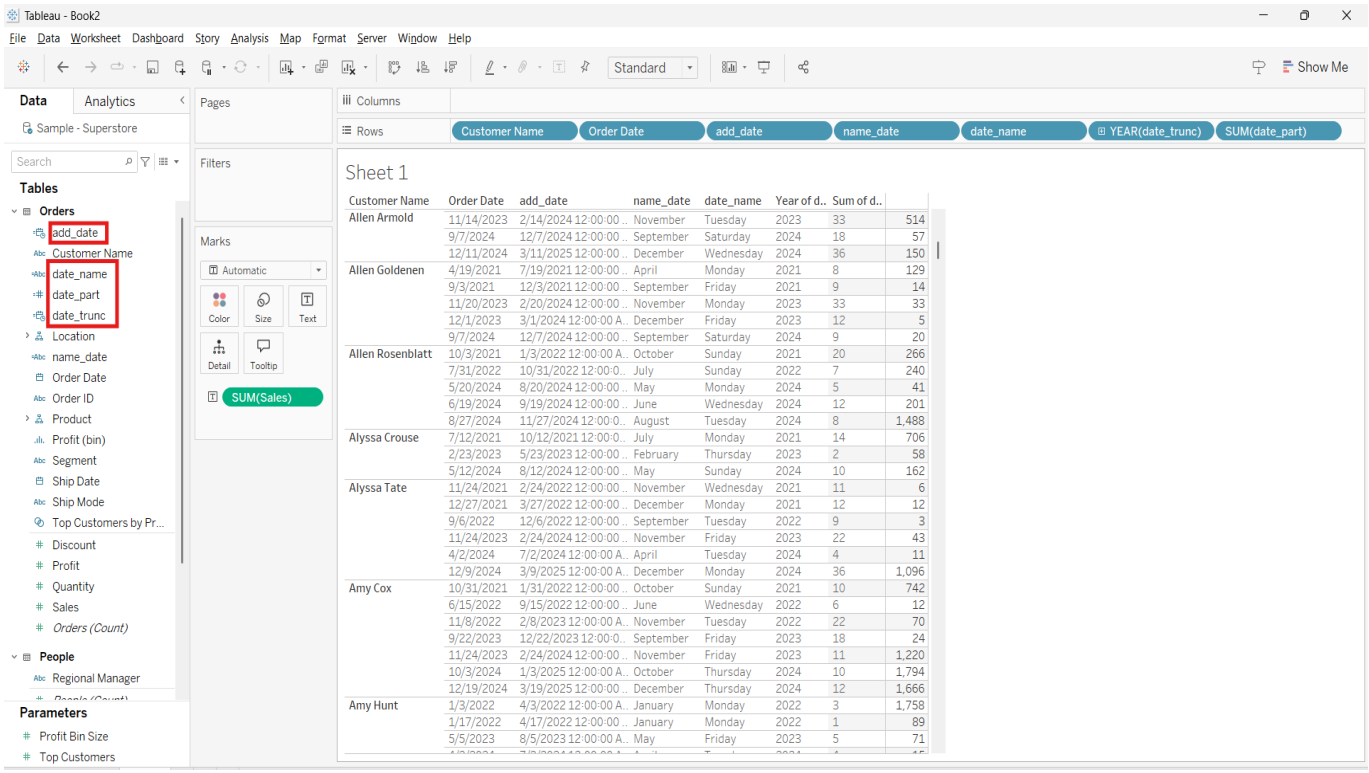
1. Create a calculated field.
2. Enter the following formula:

   DATETRUNC('month', [Order Date])

This returns the first day of the month for each Order Date (e.g., "2024-03-01").

3. Click OK and use it in your visualization.





Exercise 5: Table Calculations

Table calculations in Tableau are used to **perform operations on the values within a visualization**. Unlike calculated fields, which apply formulas at the **data source level**, table calculations operate only on **visible data** in a view.

This exercise covers two key concepts:

- **Creating Simple Calculations (Calculated Fields)**
- **Applying Table Calculations**

1.Creating Simple Calculations in Tableau

Number of Measures: 1 or more (Sales, Profit)

Number of Dimensions: N/A (Depends on calculation logic)

Step 1: Create a Calculated Field

Calculated fields allow users to define **custom formulas** to create new metrics.

- **Open Tableau Desktop** and go to an existing worksheet.
- Click on **Analysis → Create Calculated Field**.
- A dialog box appears where you can enter a formula.
- **Enter the following formula to calculate "Cost"**:

  Cost=SUM([Sales]) - SUM([Profit])
- Click **OK** – The new calculated field appears under **Measures** in the Data Pane.

Step 2: Use the Calculated Field in a Visualization

1. **Drag "Category" to Columns** and **Sales to Rows**.
2. Drag the newly created **"Cost" field to Rows** next to Sales.
3. The table now displays **Sales, Profit, and Cost** side by side.

Calculated fields help create new metrics, such as profit margins, discount percentages, and customer segmentation.

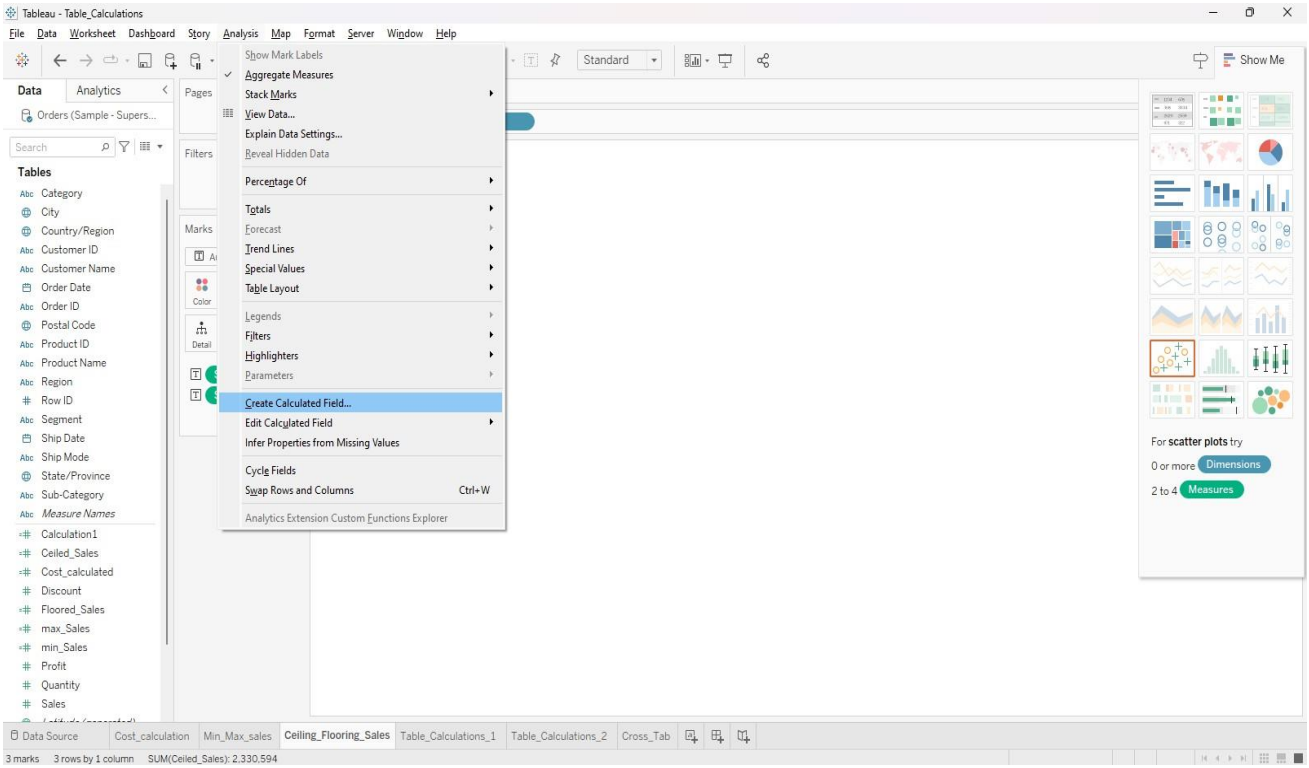


Tableau - Table_Calculations
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Show Mark Labels
Aggregate Measures
Stack Marks
View Data...
Explain Data Settings...
Reveal Hidden Data
Percentage Of
Totals
Forecast
Trend Lines
Special Values
Table Layout
Legends
Filters
Highlighters
Parameters
Create Calculated Field...
Edit Calculated Field
Infer Properties from Missing Values
Cycle Fields
Swap Rows and Columns Ctrl+W
Analytics Extension Custom Functions Explorer
Show Me
For scatter plots try
0 or more Dimensions
2 to 4 Measures
Data Source
Cost_calculation
Min_Max_sales
Ceiling_Flooring_Sales
Table_Calculations_1
Table_Calculations_2
Cross_Tab
3 marks
3 rows by 1 column
SUM(Ceiled_Sales): 2,330,594

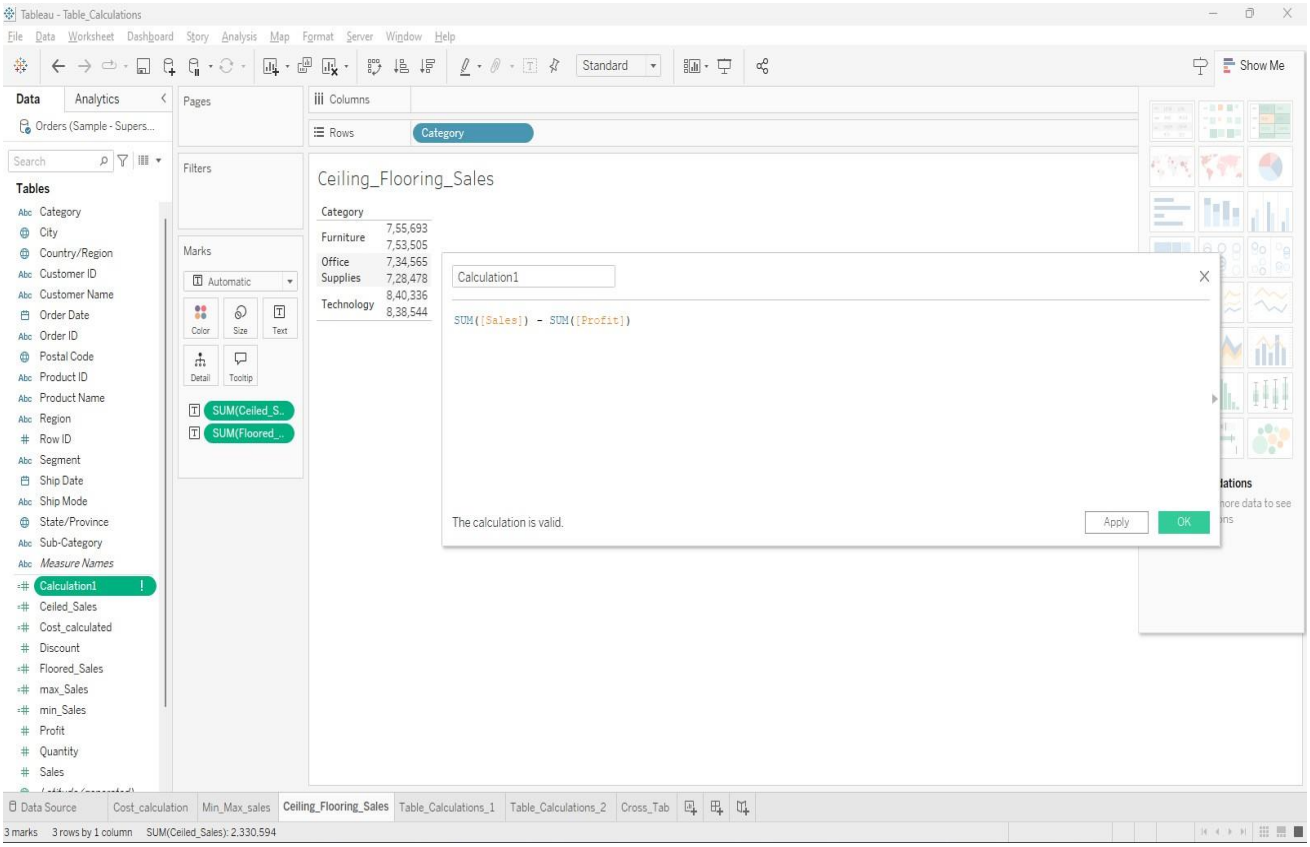


Tableau - Table_Calculations
Columns
Rows
Category
Ceiling_Flooring_Sales
Furniture 7,55,693
7,53,505
Office 7,34,565
Supplies 7,28,478
8,40,336
Technology 8,38,544
Calculation1
SUM([Sales]) - SUM([Profit])
The calculation is valid.
Apply
OK
Data Source
Cost_calculation
Min_Max_sales
Ceiling_Flooring_Sales
Table_Calculations_1
Table_Calculations_2
Cross_Tab
3 marks
3 rows by 1 column
SUM(Ceiled_Sales): 2,330,594

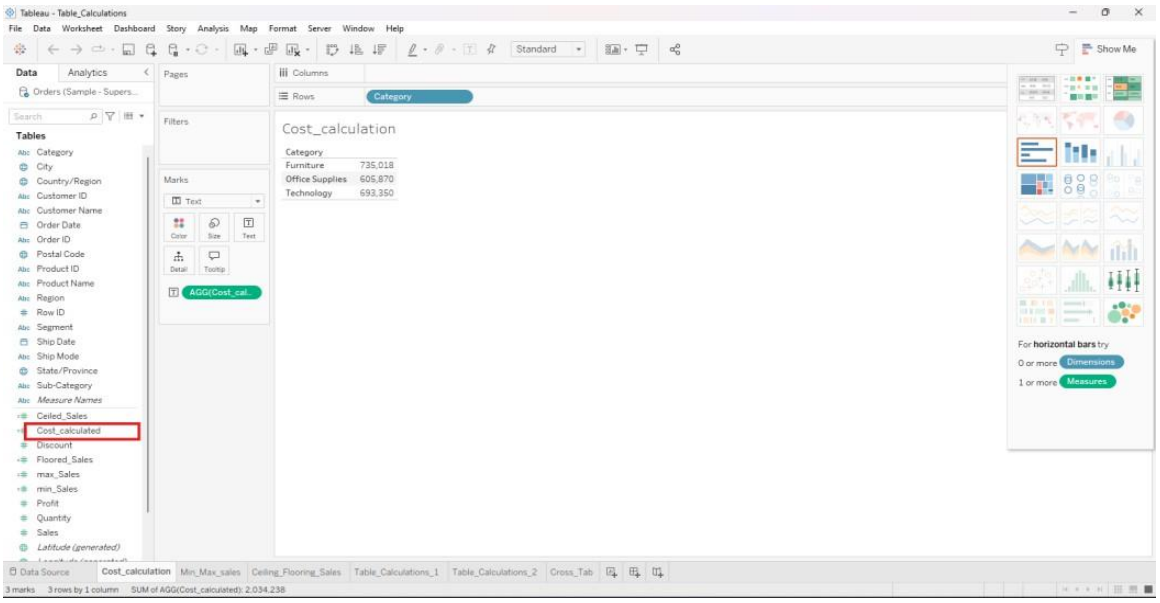


Tableau - Table_Calculations
Cost_calculation
Category
Furniture 735,018
Office Supplies 605,870
Technology 693,350
Cost_calculated
AGG(Cost_cal..
For horizontal bars try
0 or more Dimensions
1 or more Measures
3 marks 3 rows by 1 column SUM of AGG(Cost_calculated): 2,034,238

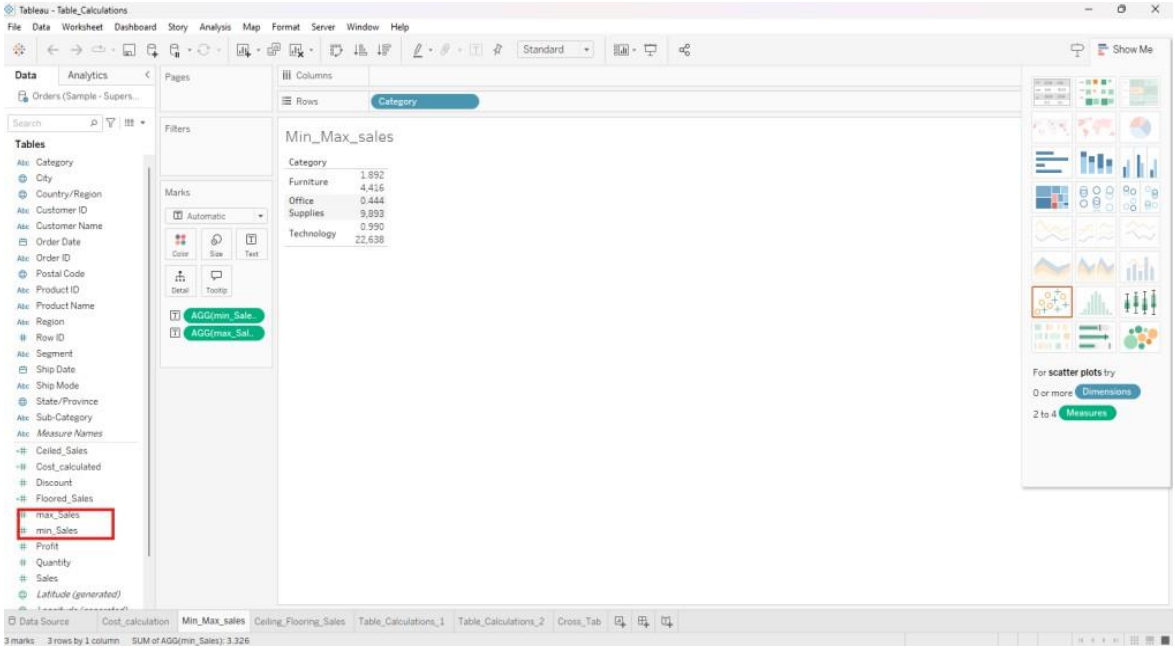


Tableau - Table_Calculations
Min_Max_sales
Category
Furniture 1,892
4,416
Office 0.444
Supplies 9,893
Technology 0.990
22,638
AGG(min_Sale..
AGG(max_Sal..
For scatter plots try
0 or more Dimensions
2 to 4 Measures
3 marks 3 rows by 1 column SUM of AGG(min_Sales): 3.326

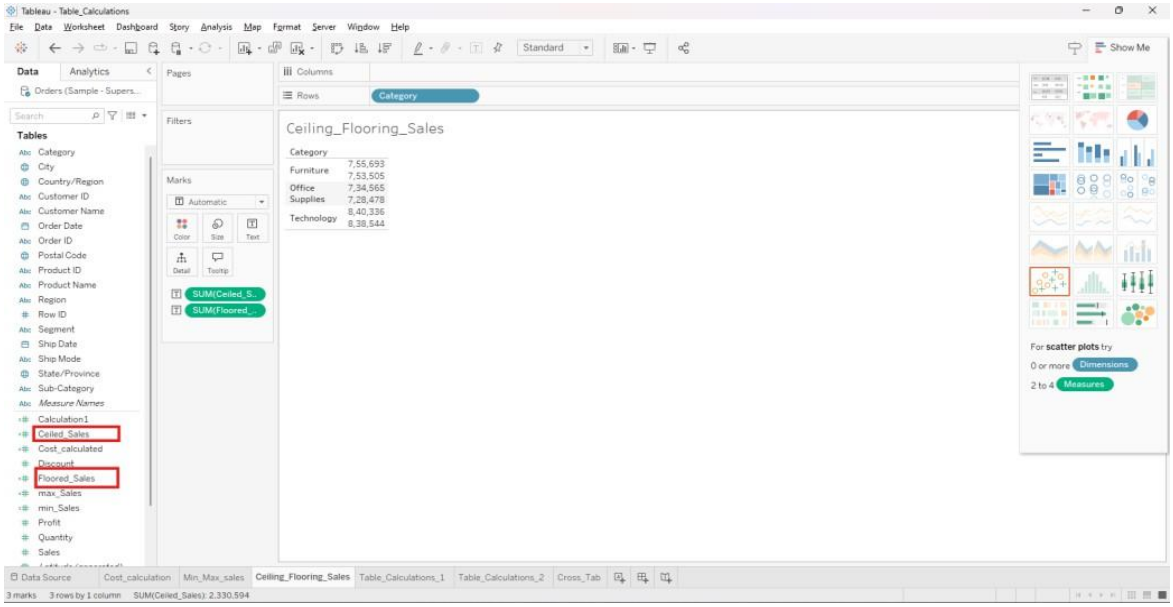


Tableau - Table_Calculations
Ceiling_Flooring_Sales
Category
Furniture 7,55,693
7,53,505
Office 7,34,565
Supplies 7,28,478
Technology 8,40,336
8,38,544
SUM(Ceiled_S..
SUM(Floored_..
For scatter plots try
0 or more Dimensions
2 to 4 Measures
3 marks 3 rows by 1 column SUM(Ceiled_Sales): 2,330,594

1. Using Table Calculations

Table calculations allow users to perform **secondary aggregations** like running totals, percentages, rankings, and moving averages.

Number of Measures: 1 or more (Sales, Profit)
Number of Dimensions: 1 or more (Category, Region)

Step 1: Apply Table Calculations

Create a Bar Chart:

- Drag **Region** to Columns.
- Drag **Sales** to Rows.

2. **Right-click on "Sales" → Quick Table Calculation**.
3. Choose one of the following table calculations:
   - **Percent of Total** – Shows sales contribution for each region as a percentage.
   - **Rank** – Ranks regions based on sales values.

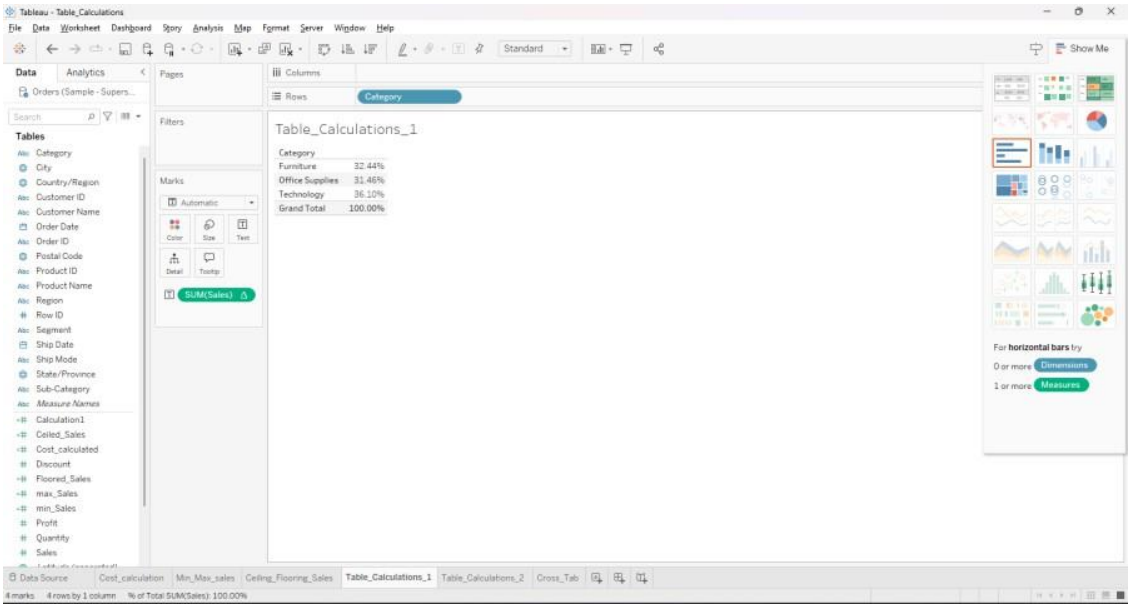
Step 2: Modify Table Calculation Settings

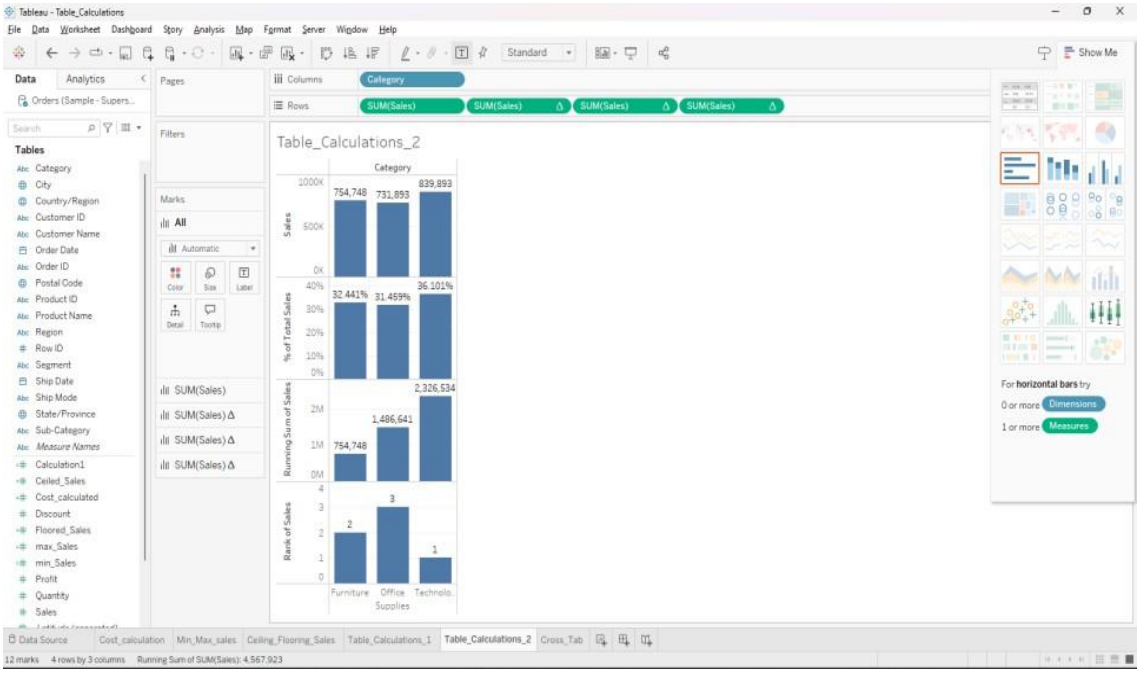
1. Click on **Edit Table Calculation** to adjust settings.
2. Select **Compute Using**:
   - **Table (Across)** – Calculates across the table horizontally.
   - **Table (Down)** – Calculates down the table vertically.
   - **Specific Dimension** – Applies calculation based on a particular field.

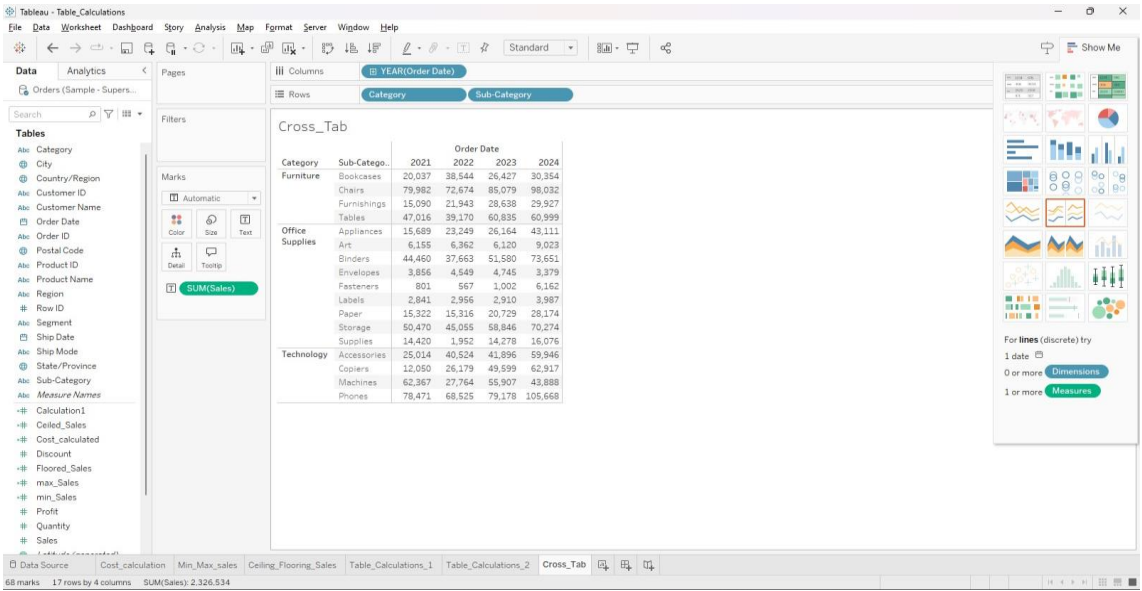
Step 3: Use Table Calculations in a Visualization

1. **Percent of Total Calculation:**
2. **Drag Sales to Rows.**
   - Apply **Percent of Total**.
   - Convert the axis to **Percentage Format** by right-clicking → **Format**.
3. **Rank Calculation:**

   Drag **Sales** to Rows.
   - Apply **Rank Calculation**.
   - The values update to show **ranked order** instead of raw sales figures.


Table_Calculations_1
Category
Furniture 32.44%
Office Supplies 31.46%
Technology 36.10%
Grand Total 100.00%


Table_Calculations_2
Category
754,748
731,893
839,893
32.441%
31.459%
36.101%
754,748
1,486,641
2,326,534
Furniture
Office Supplies


Cross_Tab
Order Date
Category
Sub-Catego..
2021
2022
2023
2024
Furniture
Bookcases 20,037 38,544 26,427 30,354
Chairs 79,982 72,674 85,079 98,032
Furnishings 15,090 21,943 28,638 29,927
Tables 47,016 39,170 60,835 60,999
Office Supplies
Appliances 15,689 23,249 26,164 43,111
Art 6,155 6,362 6,120 9,023
Binders 44,460 37,663 51,580 73,651
Envelopes 3,856 4,549 4,745 3,379
Fasteners 801 567 1,002 6,162
Labels 2,841 2,956 2,910 3,987
Paper 15,322 15,316 20,729 28,174
Storage 50,470 45,055 58,846 70,274
Supplies 14,420 1,952 14,278 16,076
Technology
Accessories 25,014 40,524 41,896 59,946
Copiers 12,050 26,179 49,599 62,917
Machines 62,367 27,764 55,907 43,888
Phones 78,471 68,525 79,178 105,668

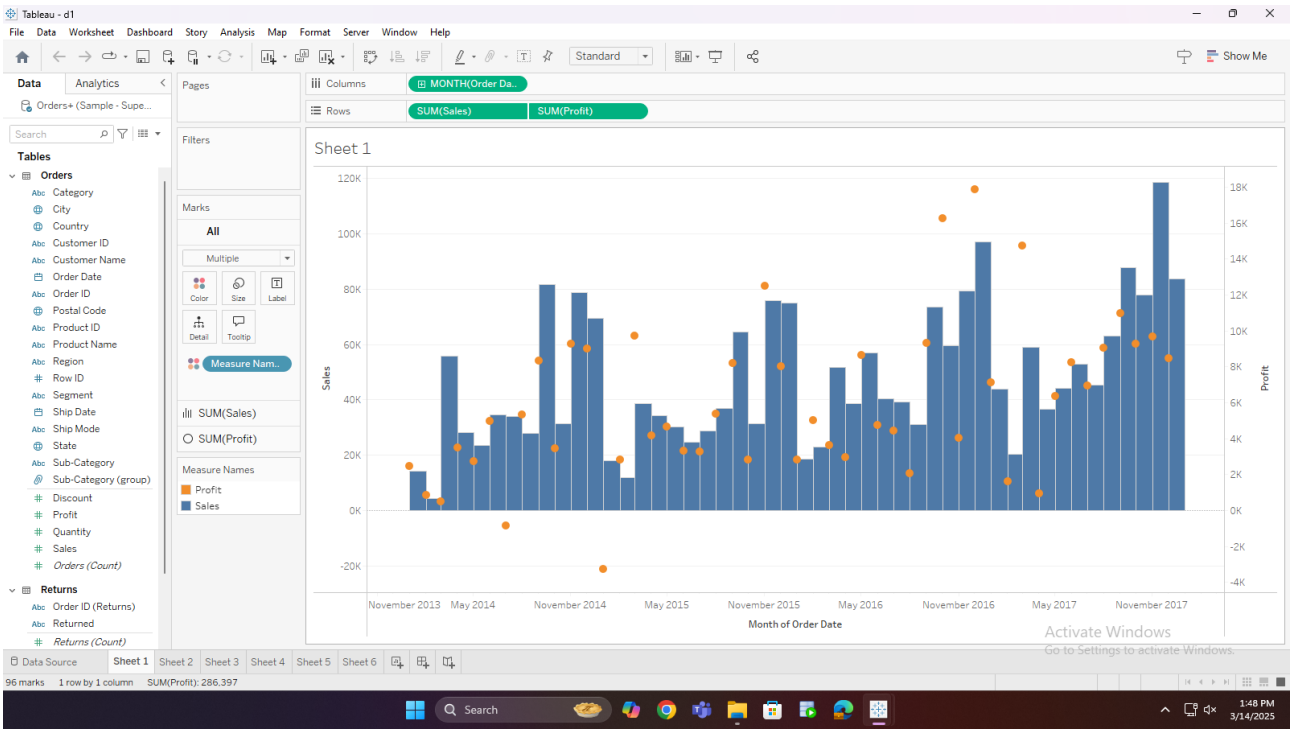
Exercise 6: Advanced Charts

1.Dual Axis Chart

A **Dual Axis Chart** allows you to compare two different measures on the same graph with different scales.

Steps to create a Dual Axis Chart in Tableau:

1. **Connect to Data Source**
   - Open Tableau and connect to the dataset.
2. **Drag the First Measure to Rows Shelf**
   - For example, drag Sales to the **Rows shelf**.
3. **Drag the Second Measure to Rows Shelf**
   - Drag another measure, e.g., Profit, to the **Rows shelf** below the first one.
   - Tableau will create two separate graphs.
4. **Click on the Second Measure and Select "Dual-Axis"**
   - Right-click on the second measure in the **Rows shelf** and select **Dual-Axis**.
   - The two graphs will now overlap.
5. **Synchronize Axes (Optional)**
   - Right-click on the second axis (on the right) and select **Synchronize Axis**.
6. **Customize the Chart**
   - Change the marks for each measure (e.g., bar for sales, line for profit).
   - Add colors or labels if needed.
7. **Format the Chart**
   - Adjust axis ranges, colors, labels, and tooltips to improve readability.

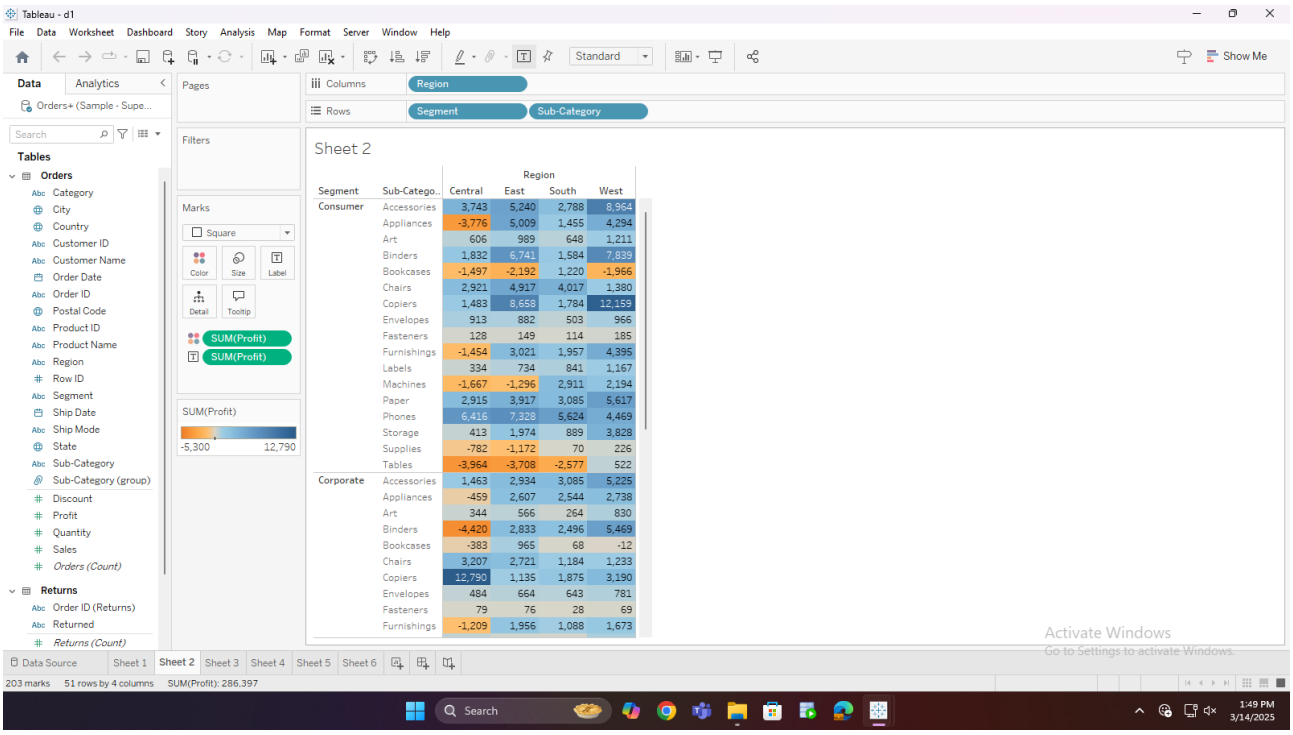


2. Heat Map

A **Heat Map** is useful for visualizing variations across multiple variables using color intensity.

Steps to create a Heat Map in Tableau:

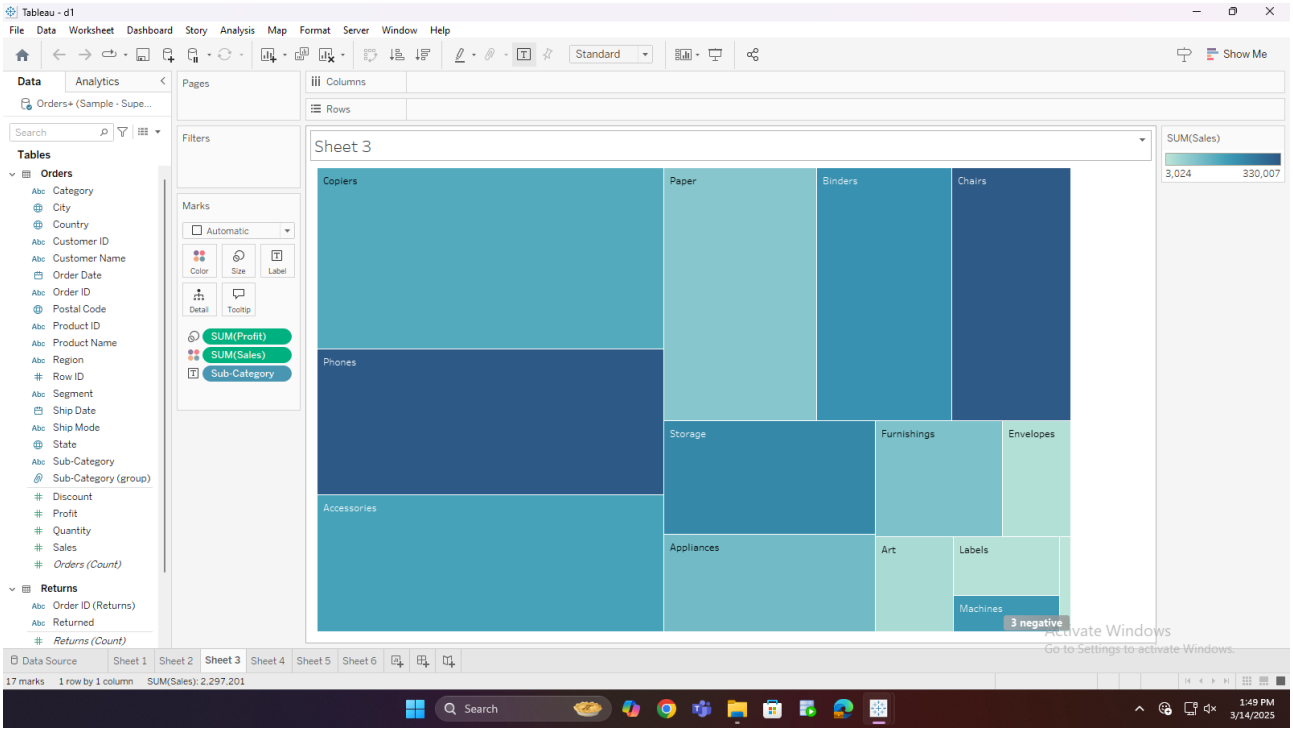
1. **Connect to Data Source**
   - Open Tableau and connect to your dataset.
2. **Drag Dimension to Columns and Rows Shelf**
   - Example: Drag Region to the **Columns shelf**.
   - Drag Product Category to the **Rows shelf**.
3. **Drag a Measure to the Color Shelf**
   - Example: Drag Sales to the **Color** shelf on the **Marks card**.
   - This will assign colors based on sales values.
4. **Change the Marks Type to "Square"**
   - Click on the **Marks card** and select **Square**.
5. **Adjust Color Intensity**
   - Click on **Color** in the Marks card and adjust the color range.
6. **Add Labels (Optional)**
   - Drag the measure (Sales) to **Label** to display exact values.



3. Tree Map

A **Tree Map** displays hierarchical data using nested rectangles, where size represents a measure.
Steps to create a Tree Map in Tableau:

1. **Connect to Data Source**
   - Open Tableau and load the dataset.
2. **Drag a Dimension to Columns or Rows Shelf**
   - Example: Drag Category to the **Rows shelf**.
3. **Drag a Measure to the Size Shelf**
   - Example: Drag Sales to the **Size** shelf in the **Marks card**.
4. **Change the Marks Type to "Tree Map"**
   - Click on the **Marks card** and select **Tree Map**.
5. **Add Color Encoding**
   - Drag another measure, e.g., Profit, to the **Color** shelf to represent profit margins.
6. **Add Labels (Optional)**
   - Drag Category and Sales to **Label** to display category names and sales values.
7. **Customize and Format**
   - Adjust text size, label placement, and color scheme.

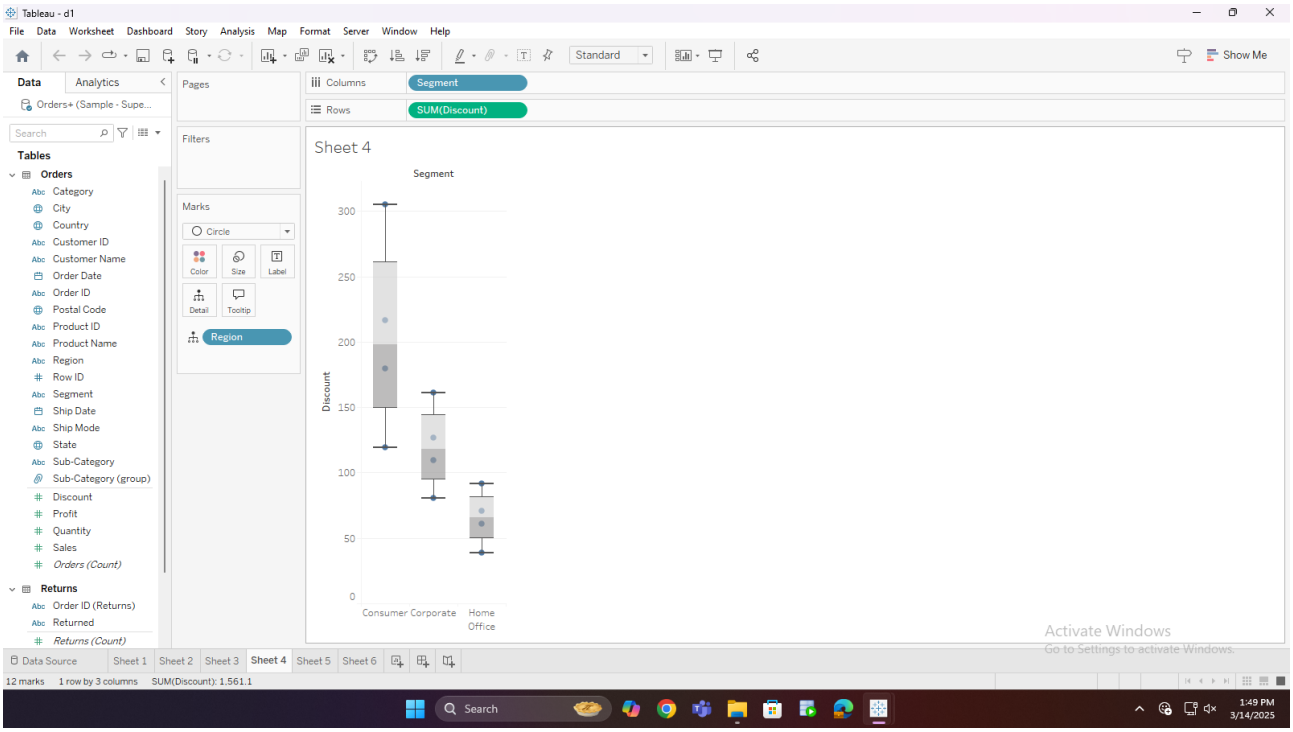


4. Box Plot

A **Box Plot** (also known as a **box-and-whisker plot**) is used to show the distribution of a dataset.

Steps to create a Box Plot in Tableau:

1. **Connect to Data Source**
   - Open Tableau and load the dataset.
2. **Drag a Dimension to the Columns Shelf**
   - Example: Drag Region to the **Columns shelf**.
3. **Drag a Measure to the Rows Shelf**
   - Example: Drag Profit to the **Rows shelf**.
4. **Change the Marks Type to Box Plot**
   - Click on the **Analytics pane** (next to Data pane).
   - Drag **Box Plot** onto the graph.
5. **Customize the Box Plot**
   - Click on the box plot to format **whiskers, quartiles, and outliers**.
   - Adjust the **axis range** if necessary.
6. **Add Colors or Labels (Optional)**
   - Drag Region to **Color** if you want different colors for each category.

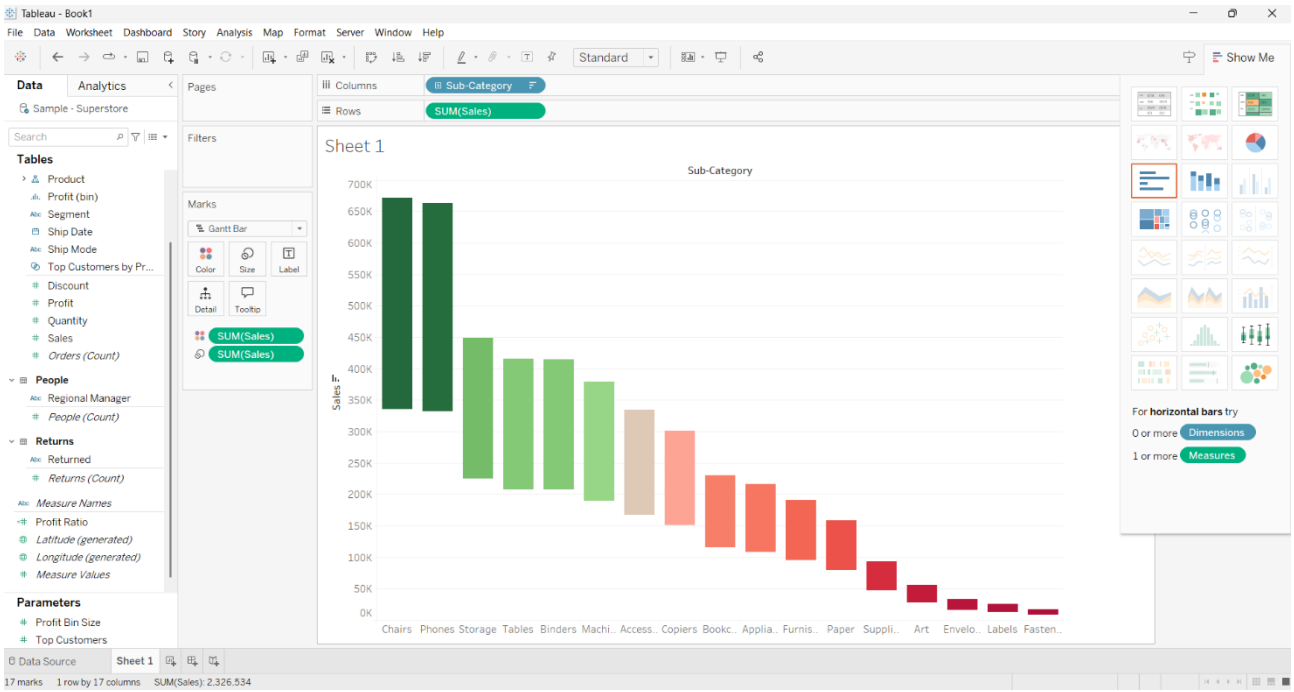


5. Waterfall Chart

A **Waterfall Chart** helps in visualizing cumulative changes in a measure over time.

Steps to create a Waterfall Chart in Tableau:

1. **Connect to Data Source**
   - Open Tableau and load the dataset.
2. **Drag a Dimension to the Columns Shelf**
   - Example: Drag Month or Category to the **Columns shelf**.
3. **Drag a Measure to the Rows Shelf**
   - Example: Drag Profit to the **Rows shelf**.
4. **Convert the Graph to a Gantt Bar Chart**
   - Click on the **Marks card** and change the type to **Gantt Bar**.
5. **Create a Running Total**
   - Click on the Profit measure and select **Quick Table Calculation → Running Total**.
6. **Add the "Difference" Measure**
   - Drag Profit again to **Size** in the Marks card.
7. **Customize Colors**
   - Drag Profit to **Color** and set positive values to green and negative values to red.
8. **Format and Refine**
   - Adjust axis labels, tooltips, and gridlines for clarity.



6. Level of Detail (LOD) Expressions in Tableau

LOD expressions control the **granularity** of data aggregation in a visualization. It determines at what level the data should be aggregated, independent of the current view.

Example of Granularity:

- **Country → State → City**
  - At each level, you decide how the data should be aggregated.

Two Key Questions for LOD:

1. What is the level of detail you need?
2. What aggregation method should be applied (SUM, AVG, MIN, etc.)?

Types of LOD Expressions

1.FIXED LOD (Independent of the View)

- The **FIXED** LOD expression aggregates data at the specified level, regardless of the filters and dimensions in the visualization.
- It is **independent** of what is in the view

Example:

{ FIXED [Region] : SUM([Sales]) }

- Calculates total sales **per Region**, unaffected by any other dimensions.

Use Cases:

- Find **total sales per region**, ignoring other breakdowns.
- Find the **last transaction date for each customer**:
  { FIXED [Customer Name] : MAX([Order Date]) }

2.INCLUDE LOD (Depends on the View)

- The **INCLUDE** LOD expression **includes additional dimensions from the view** while calculating the aggregation at the specified level.
- It is useful when you want to **keep flexibility** in your visualization.

Example:

{ INCLUDE [Customer Name] : AVG([Sales]) }

- Calculates **average sales per customer**, adjusting dynamically to new dimensions in the visualization.

Use Cases:

- Find **average sales per customer per region**.
- Count **orders per customer within a category**.

3.EXCLUDE LOD (Ignores Certain Dimensions in View)

- The **EXCLUDE** LOD expression removes certain dimensions from the aggregation, helping in **avoiding over-grouping** when unnecessary.
- This is useful when you want to calculate a **higher-level summary while keeping finer details in the visualization**

Example:

{ EXCLUDE [State] : SUM([Sales]) }

- Aggregates sales **at the Region level**, ignoring State-level details.

Use Cases:

- Find **total sales per region, ignoring state breakdown**.
- Calculate **average revenue per country, ignoring product categories**

Creating LOD Expressions

1.How can I determine the first order date for each customer?

Steps to Solve:

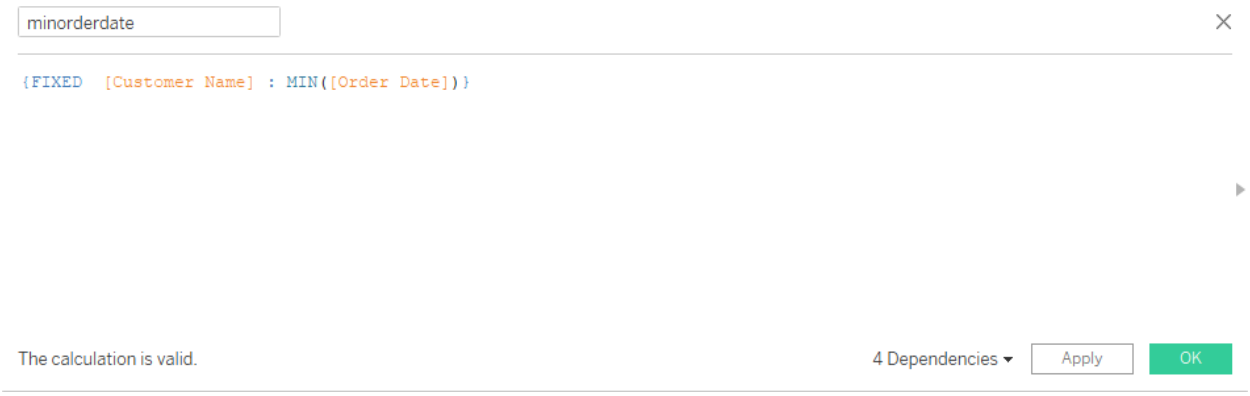
1. Open Tableau and connect to your dataset containing Customer Name and Order Date.

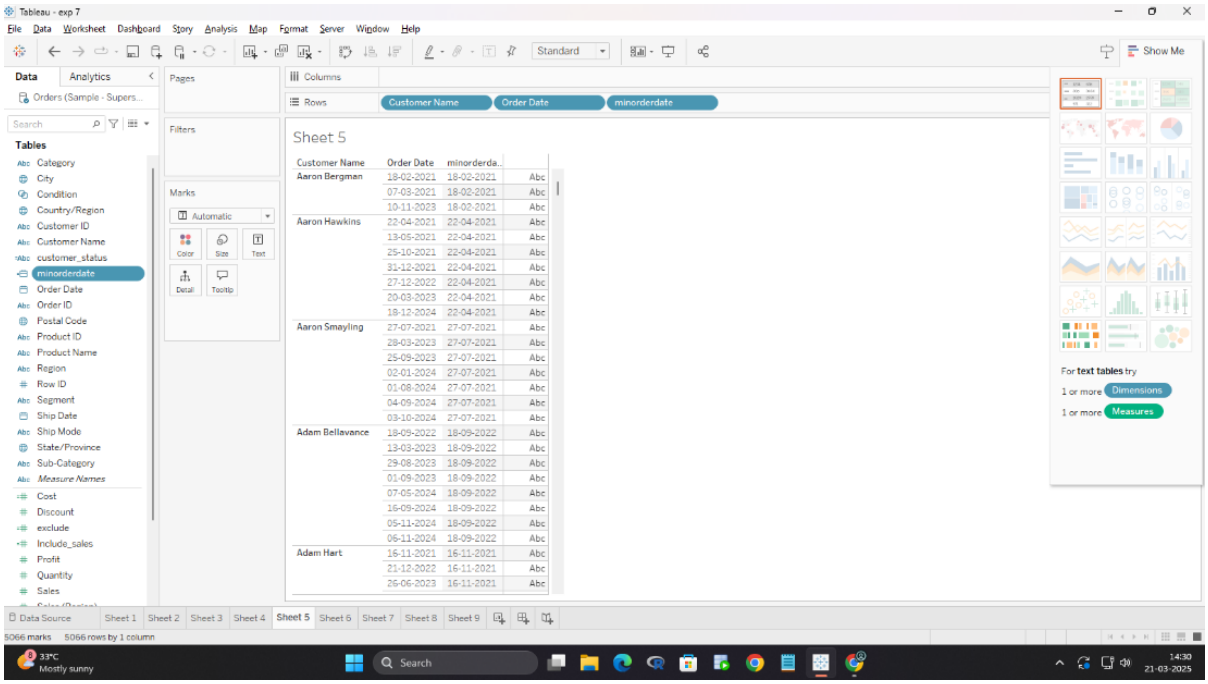
2. Go to a new Calculated Field:
   - Click on Analysis > Create Calculated Field.
   - Name the field as First Order Date.
   - Use the formula:
     { FIXED [Customer Name]: MIN([Order Date]) }

3. Breakdown of the Calculation:
   - { FIXED [Customer Name]: MIN([Order Date]) } is a LOD (Level of Detail) Expression.
   - It fixes the calculation at the Customer Name level.
   - MIN([Order Date]) finds the earliest order date for each customer.

4. Drag and Drop Fields into a Worksheet:
   - Place [Customer Name] in Rows.
   - Place the newly created First Order Date field in Columns.

5. Verify the Output:
   - Check if each customer has only one minimum order date.
   - Compare with the original dataset if needed.





2.How can I classify customers as 'NEW CUSTOMER' or 'OLD CUSTOMER' based on their first order year?

Steps to Solve:

Step 1: Create the First Order Date Calculation

1. Open **Tableau** and go to **Analysis > Create Calculated Field**.
2. Name it **"First Order Date"** and enter:
   { FIXED [Customer Name]: MIN([Order Date]) }
3. Click **OK**.

Step 2: Create the Customer Classification Calculation

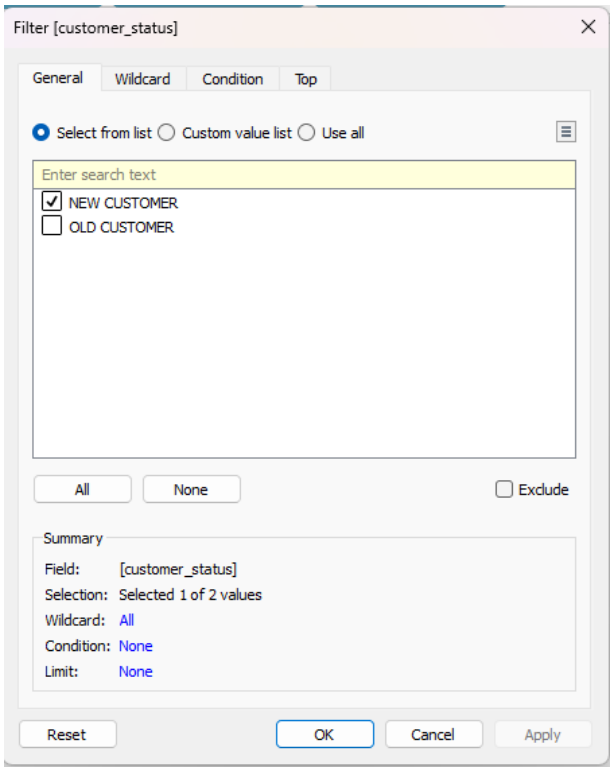
1. Create another **Calculated Field** and name it **"Customer Type"**.
2. Enter the formula:

   IF YEAR([First Order Date]) = MAX(YEAR([Order Date])) THEN "NEW CUSTOMER"
   ELSE "OLD CUSTOMER"
   END

3. Click **OK**.

Step 3: Use the Calculation in a Worksheet

1. Drag **[Customer Name]** into **Rows**.
2. Drag **[Customer Type]** into **Columns** or **Color** (in Marks).
3. Ensure **[Order Date]** is in **Filters** or **Context** to avoid calculation scope issues.
4. Verify results:
   - If the **first order year** of a customer matches the **latest year in the dataset**, they are a **"NEW CUSTOMER"**.
   - Otherwise, they are classified as **"OLD CUSTOMER"**.


Filter [customer_status]
General
Wildcard
Condition
Top
Select from list
Custom value list
Use all
Enter search text
NEW CUSTOMER
OLD CUSTOMER
All
None
Exclude
Summary
Field: [customer_status]
Selection: Selected 1 of 2 values
Wildcard: All
Condition: None
Limit: None
Reset
OK
Cancel
Apply

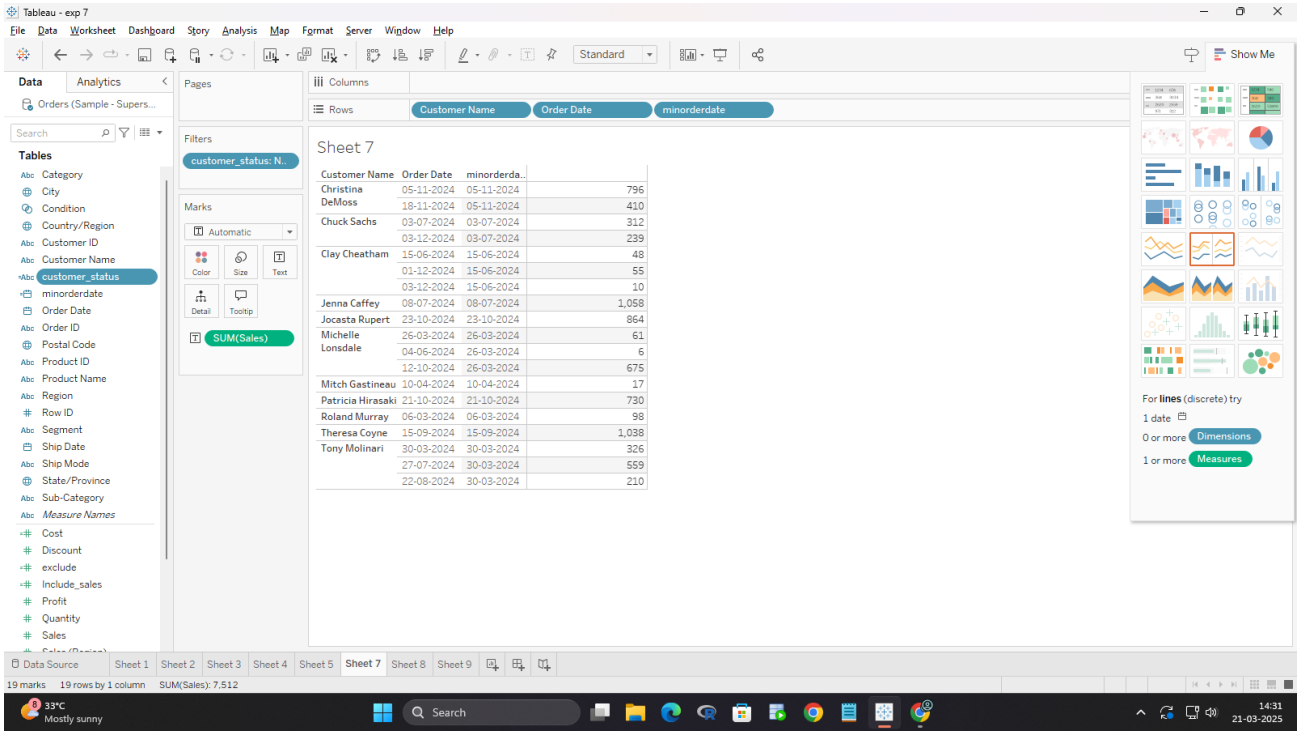


Tableau - exp 7
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Data
Analytics
Tables
Category
City
Condition
Country/Region
Customer ID
Customer Name
customer_status
minorderdate
Order Date
Order ID
Postal Code
Product ID
Product Name
Region
Row ID
Segment
Ship Date
Ship Mode
State/Province
Sub-Category
Measure Names
Cost
Discount
exclude
Include_sales
Profit
Quantity
Sales
Pages
Filters
customer_status: N..
Marks
Automatic
Color
Size
Text
Detail
Tooltip
SUM(Sales)
Columns
Rows
Customer Name
Order Date
minorderdate
Sheet 7
Customer Name | Order Date | minorderda.. |
Christina DeMoss | 05-11-2024 | 05-11-2024 | 796
18-11-2024 | 05-11-2024 | 410
Chuck Sachs | 03-07-2024 | 03-07-2024 | 312
03-12-2024 | 03-07-2024 | 239
Clay Cheatham | 15-06-2024 | 15-06-2024 | 48
01-12-2024 | 15-06-2024 | 55
03-12-2024 | 15-06-2024 | 10
Jenna Caffey | 08-07-2024 | 08-07-2024 | 1,058
Jocasta Rupert | 23-10-2024 | 23-10-2024 | 864
Michelle Lonsdale | 26-03-2024 | 26-03-2024 | 61
04-06-2024 | 26-03-2024 | 6
12-10-2024 | 26-03-2024 | 675
Mitch Gastineau | 10-04-2024 | 10-04-2024 | 17
Patricia Hirasaki | 21-10-2024 | 21-10-2024 | 730
Roland Murray | 06-03-2024 | 06-03-2024 | 98
Theresa Coyne | 15-09-2024 | 15-09-2024 | 1,038
Tony Molinari | 30-03-2024 | 30-03-2024 | 326
27-07-2024 | 30-03-2024 | 559
22-08-2024 | 30-03-2024 | 210
Show Me
For lines (discrete) try
1 date
0 or more Dimensions
1 or more Measures
Data Source
Sheet 1
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 7
Sheet 8
Sheet 9
19 marks
19 rows by 1 column
SUM(Sales): 7,512
33°C
Mostly sunny
Search
14:31
21-03-2025

3.How can I calculate the average sales per customer while including individual customer-level details?

Steps to Solve:

Step 1: Understand the Calculation

- { INCLUDE [Customer Name]: AVG([Sales]) } is a Level of Detail (LOD) expression.
- INCLUDE dynamically adjusts based on the dimensions in the view.
- It ensures that the calculation considers individual customer-level sales averages, even if [Customer Name] is not explicitly in the visualization.

Step 2: Create the Calculated Field

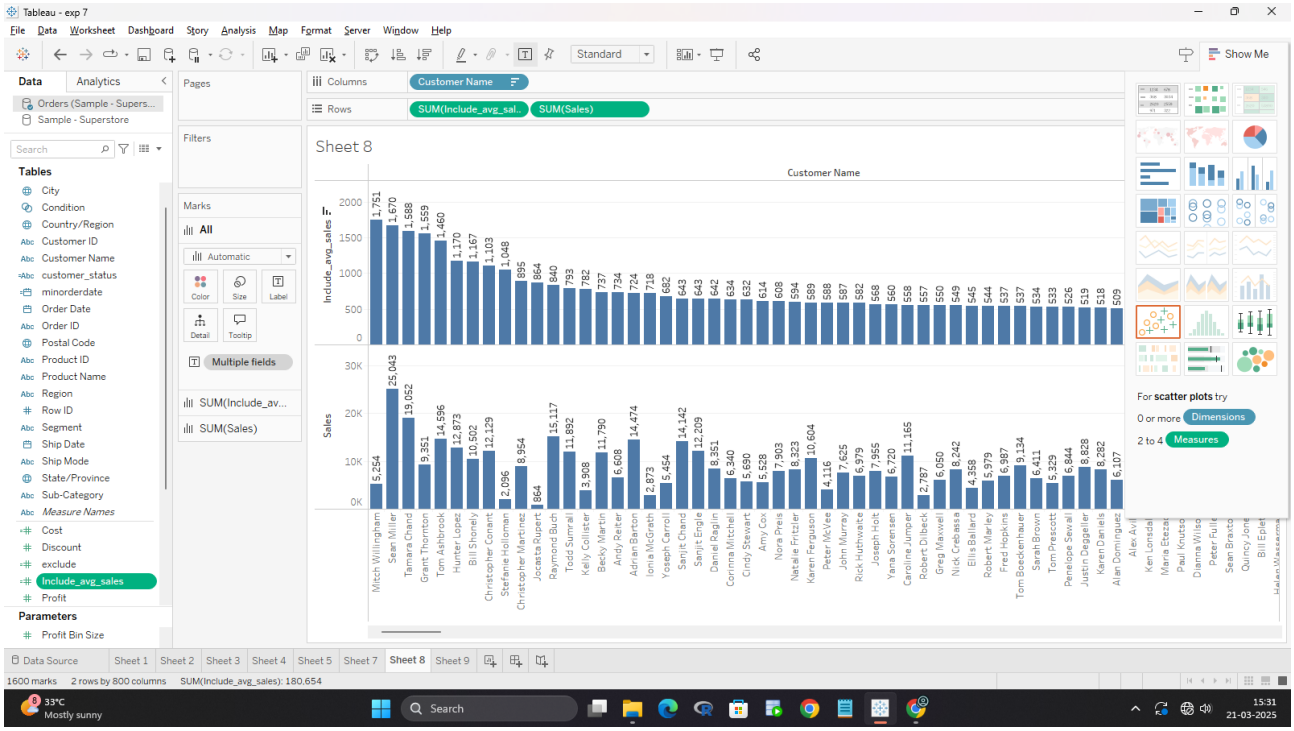
1. Open Tableau and go to Analysis > Create Calculated Field.
2. Name it "Average Sales per Customer".
3. Enter the formula:
   { INCLUDE [Customer Name]: AVG([Sales]) }
4. Click OK.

Step 3: Use the Calculation in a Worksheet

1. Drag [Region] or [Category] into Rows (or any dimension of interest).
2. Drag [Average Sales per Customer] into Columns.
3. Tableau will compute average sales per customer within the selected dimension (e.g., per region or per category).
4. If you remove [Customer Name] from the view, the calculation will still consider it in the background due to INCLUDE.

Expected Output Behavior

- The calculation adapts based on the fields in the view.
- If you add [Customer Name] to the visualization, you will see each customer's average sales.
- If you remove [Customer Name], Tableau still includes it in the calculation, showing the average sales per customer within broader dimensions.



4.How can I calculate the total sales while excluding the regional breakdown?

Steps to Solve:

Step 1: Understand the Calculation

- { EXCLUDE [Region]: SUM([Sales]) } is a Level of Detail (LOD) expression.
- EXCLUDE removes [Region] from the calculation while keeping other dimensions in the view.
- This means the total sales will be calculated without considering the Region field, even if [Region] is in the visualization.

Step 2: Create the Calculated Field

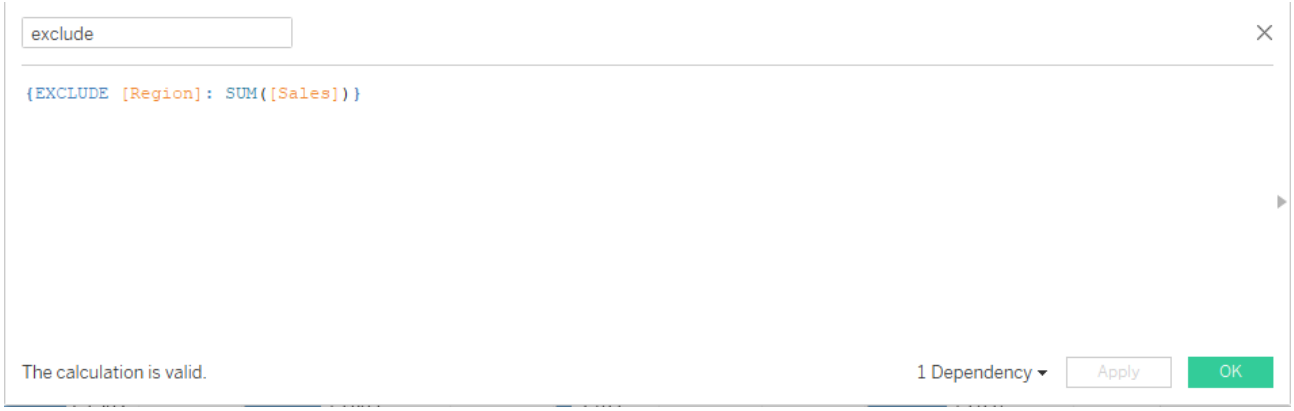
1. Open Tableau and go to Analysis > Create Calculated Field.
2. Name it "Total Sales (Excluding Region)".
3. Enter the formula:
   { EXCLUDE [Region]: SUM([Sales]) }
4. Click OK.

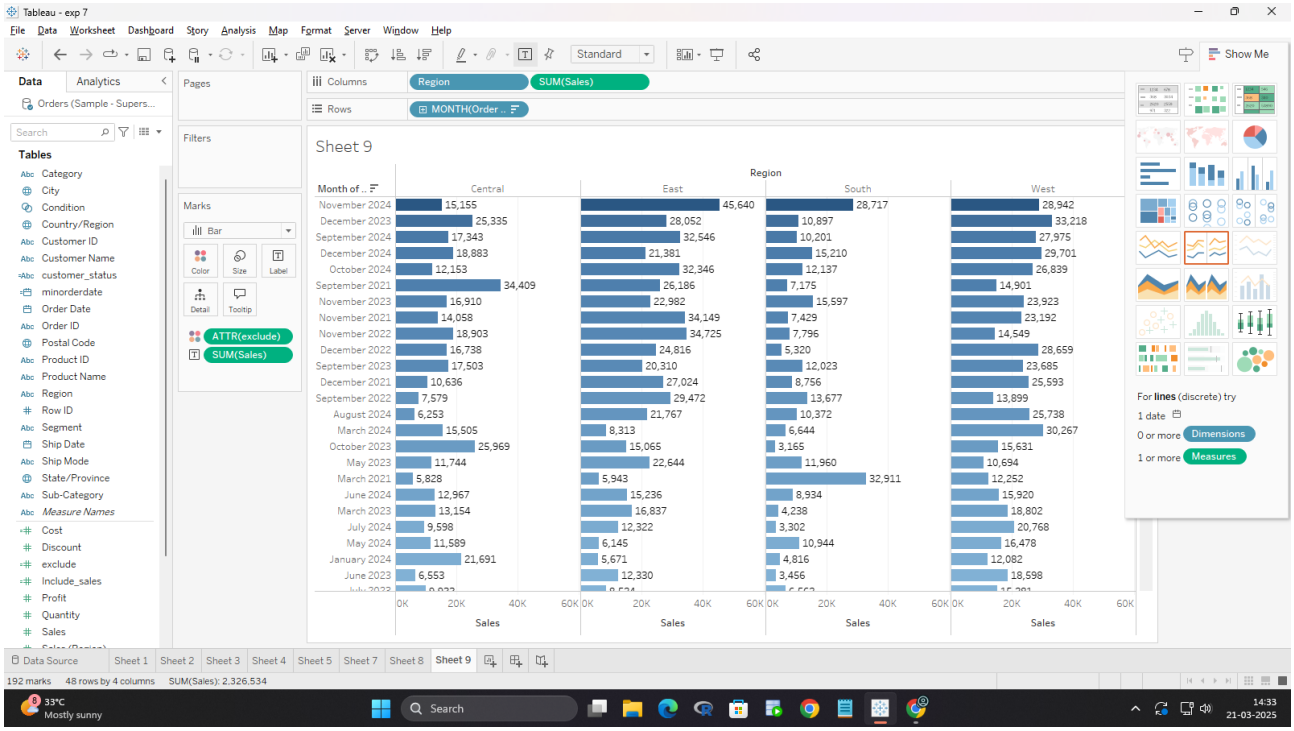
Step 3: Use the Calculation in a Worksheet

1. Drag [Region] into Rows.
2. Drag [Total Sales (Excluding Region)] into Columns.
3. Tableau will display the same total sales value across all regions, as [Region] is excluded from the calculation.
4. If you add another dimension like [Category], the sales will still be computed per category but without the region-specific breakdown.

Expected Output Behavior

- Each row for different regions will show the same total sales, as [Region] is excluded from the aggregation.
- If you add another dimension (e.g., [Category]), sales will be aggregated by category without region-specific details.





Exercise 7: Dashboards

Dashboard in Tableau

A dashboard in Tableau is a collection of multiple visualizations displayed in a single view. It allows users to interact with data, explore insights, and make data-driven decisions.

Key Features of a Tableau Dashboard:

1. Multiple Visualizations – Combine different charts (bar, line, pie, maps) in a single view.
2. Interactive Elements – Use filters, parameters, and actions to make the dashboard dynamic.
3. Data Storytelling – Summarize complex data into easy-to-understand insights.
4. Real-time Data – Connect to live data sources for real-time updates.
5. Custom Layouts – Arrange elements using floating or tiled layouts.
6. User-friendly UI – Improve user experience with tooltips, colors, and labels.

Types of Dashboards in Tableau

1. **Strategic Dashboards –** High-level insights for decision-makers.
   Example: Executive Sales Performance Dashboard
2. **Operational Dashboards** – Track daily business operations.
   Example: Customer Support Response Time Dashboard
3. **Analytical Dashboards** – Drill down into complex data for analysis.
   Example: Marketing Campaign Analysis Dashboard
4. **Tactical Dashboards** – Monitor team performance with KPIs.
   Example: Employee Productivity Tracker

Dashboard Components

1. Worksheets – Individual visualizations that make up a dashboard.
2. Filters – Allow users to control displayed data dynamically.
3. Actions – Enable interactivity between different sheets.
4. Parameters – Provide flexibility in user input (e.g., selecting a region).
5. Containers – Help in designing layouts (floating or tiled elements).
6. Legends & Tooltips – Enhance data interpretation.

Steps to Build an Interactive Dashboard in Tableau:

1. **Connect to Data Source**
    - **Open Tableau Desktop.**
    - **Click "Connect" and choose a data source (Excel, SQL Server, CSV, etc.).**
    - **Load the dataset into Tableau.**
2. **Create Individual Sheets**
    - **Navigate to the "Sheet" tab.**
    - **Drag and drop required dimensions and measures onto the rows/columns.**
    - **Create visualizations such as bar charts, line graphs, maps, etc.**
    - **Repeat this for multiple sheets (each representing a different visualization).**
3. **Create a Dashboard**
    - **Click on the "Dashboard" tab at the bottom.**
    - **Drag and drop sheets (visualizations) onto the dashboard.**
    - **Adjust layout using containers for better design.**
4. **Add Interactivity**
    - **Use Filters: Drag filters to the dashboard to allow dynamic selection.**
    - **Use Actions:**
        - **Click on Dashboard > Actions.**
        - **Choose Filter, Highlight, or URL Action to link sheets.**
        - **Example: Clicking a bar chart filters another visualization.**
5. **Enhance UI/UX**
    - **Use Titles and Tooltips for better user experience.**
    - **Adjust color schemes for clarity.**
    - **Use Floating Elements for better alignment.**
6. **Test the Dashboard**
    - **Interact with filters and actions to check responsiveness.**
    - **Make necessary modifications for smooth navigation.**
7. **Publish and Share**
    - **Click "Server > Tableau Public" (or Tableau Online/Server).**
    - **Share the link or embed the dashboard in a web page.**