DATA VISUALIZATION LAB

LABORATORY MANUAL

B.TECH CSE

(II YEAR–I SEM)(2024-2025)

PREPARED BY
Mrs.A.SWATHI

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

BALAJI INSTITUTE OF TECHNOLOGY & SCIENCE

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, andengineering sciences.

3. Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance : Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

DEPARTMENT OF COMPUTER SCIENCE & INFORMATIONTECHNOLOGY

GENERAL LABORATORY INSTRUCTIONS

1. Students are advised to come to the laboratory at least 5 minutes before (to the starting time), those who come after 5 minutes will not be allowed intothe lab.

2. Plan your task properly much before to the commencement, comeprepared to the lab with the synopsis / program / experiment details.

3. Student should enter into the laboratory with:
   a. Laboratory observation notes with all the details (Problem statement, Aim, Algorithm, Procedure, Program, Expected Output, etc.,) filled in for thelab session.
   b. Laboratory Record updated up to the last session experiments andother utensils (if any) needed in the lab.
   c. Proper Dress code and Identity card.

4. Sign in the laboratory login register, write the TIME-IN, and occupy thecomputer system allotted to you by the faculty.

5. Execute your task in the laboratory, and record the results / output in thelab observation notebook, and get certified by the concerned faculty.

6. All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.

7. Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.

8. Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviors with thestaff and systems etc., will attract severe punishment.

9. Students must take the permission of the faculty in case of any urgency to go out; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.

10. Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

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1.Introduction to various Data Visualization tools

Understanding Data: Data refers to raw facts, statistics, or information collected or stored in various formats, such as numbers, text, images, audio, or video. Data can be categorized into two main types:

1. **Structured Data:** This type of data is organized and follows a clear format, such as data in a spreadsheet, database, or table. Each data point has a specific category or field, making it easy to analyze.
2. **Unstructured Data:** Unstructured data lacks a specific format and can include text documents, emails, social media posts, images, and videos. Analyzing unstructured data can be more challenging because it doesn't fit neatly into rows and columns.

Where to Find Data: There are various sources to find data, depending on your needs:

1. **Open Data Portals:** Many governments and organizations publish datasets for public use. Examples include data.gov, the World Bank's data portal, and data sources provided by universities and research institutions.
2. **Websites and APIs:** Some websites and online services provide APIs (Application Programming Interfaces) that allow you to access their data programmatically. For example, Twitter offers an API for accessing tweets.
3. **Data Marketplaces:** There are platforms like Kaggle, Data.gov, and AWS Data Exchange where you can find a wide range of datasets for different purposes.
4. **Web Scraping:** You can gather data from websites by using web scraping tools and libraries like BeautifulSoup or Scrapy (make sure to respect website terms of use and legal restrictions).
5. **Surveys and Research:** Conducting your own surveys or research is another way to collect data tailored to your specific needs.

Foundations for Building Data Visualizations: Before creating data visualizations, it's important to lay a solid foundation:

1. **Define Your Purpose:** Clearly understand why you're creating the visualization. What message or insight do you want to convey to your audience?
2. **Know Your Audience:** Consider who will be viewing your visualization. Tailor it to their level of expertise and expectations.
3. **Data Cleaning and Preprocessing:** Ensure your data is clean and ready for analysis. This may involve handling missing values, outliers, and transforming data if necessary.
4. **Select the Right Visualization Type:** Choose the most appropriate chart or graph type for your data and message. Common types include bar charts, line charts, pie charts, scatter plots, and heatmaps.
5. **Design Principles:** Follow design principles such as simplicity, clarity, and consistency. Use appropriate colors, labels, and legends.
6. **Interactivity:** Consider adding interactive elements to your visualization, such as tooltips or filters, to enhance user engagement and understanding.
7. **Accessibility:** Ensure your visualizations are accessible to all users, including those with disabilities. Use alt text for images and provide text alternatives when necessary.

Creating Your First Visualization:

To create your first data visualization, follow these steps:

1. **Choose a Tool:** Select a data visualization tool or library that suits your needs. Popular options include **Excel, Tableau, Power BI, Python libraries likeMatplotlib or Seaborn**, and JavaScript libraries like D3.js.
2. **Load Your Data:** Import your data into the chosen tool, whether it's from a file, database, or API.
3. **Select the Visualization Type:** Based on your data and purpose, choose the appropriate chart type. For example, if you have time-series data, a line chart might be suitable.
4. **Create the Visualization:** Use the tool's features to design and create your visualization. Input your data, customize the appearance, and add labels and titles.
5. **Analyze and Iterate:** Analyze the visualization to ensure it effectively communicates your message. Make adjustments as needed to improve clarity and impact.
6. **Share Your Visualization:** Export or share your visualization with your target audience, whether it's through a report, presentation, or interactive web page.
7. **Gather Feedback:** Collect feedback from viewers to refine your visualization and make it more informative and engaging.

What is Data Visualization?

Data visualization is a graphical representation of quantitative information and data by using visual elements like graphs, charts, and maps.

Data visualization convert large and small data sets into visuals, which is easy to understand and process for humans.

Data visualization tools provide accessible ways to understand outliers, patterns, and trends in the data.

In the world of Big Data, the data visualization tools and technologies are required to analyze vast amounts of information.

Data visualizations are common in your everyday life, but they always appear in the form of graphs and charts. The combination of multiple visualizations and bits of information are still referred to as Info graphics.

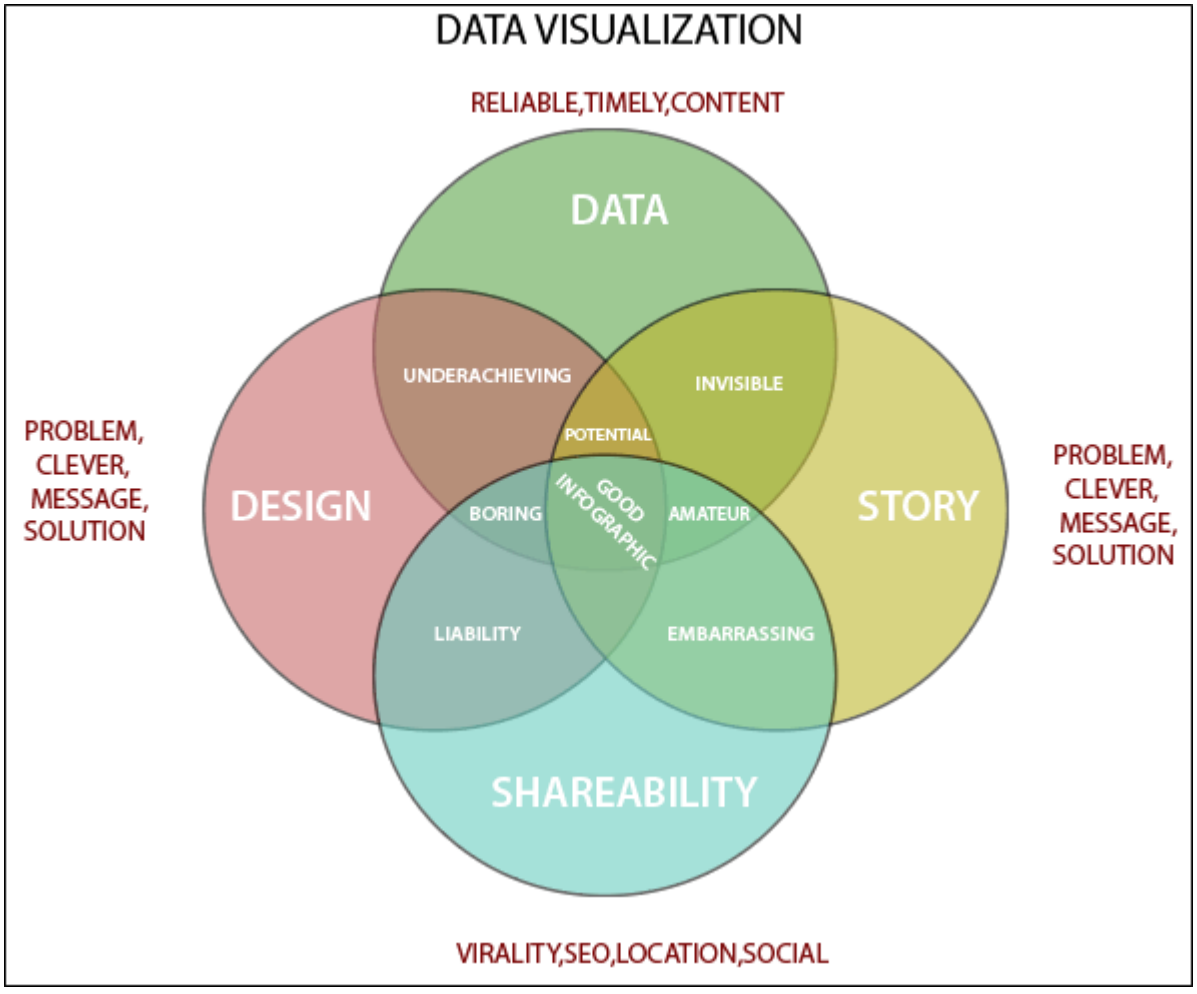
Data visualizations are used to discover unknown facts and trends. You can see visualizations in the form of line charts to display change over time. Bar and column charts are useful for observing relationships and making comparisons. A pie chart is a great way to show parts-of-a-whole. And maps are the best way to share geographical data visually.

Today's data visualization tools go beyond the charts and graphs used in the Microsoft Excel spreadsheet, which displays the data in more sophisticated ways such as dials and gauges, geographic maps, heat maps, pie chart, and fever chart.

What makes Data Visualization Effective?

Effective data visualization are created by communication, data science, and design collide. Data visualizations did right key insights into complicated data sets into meaningful and natural.

American statistician and Yale professor **Edward Tufte** believe useful data visualizations consist of ?complex ideas communicated with clarity, precision, and efficiency.



To craft an effective data visualization, you need to start with clean data that is well-sourced and complete. After the data is ready to visualize, you need to pick the right chart.

After you have decided the chart type, you need to design and customize your visualization to your liking. Simplicity is essential - you don't want to add any elements that distract from the data.

Importance of Data Visualization

Data visualization is important because of the processing of information in human brains. Using graphs and charts to visualize a large amount of the complex data sets is more comfortable in comparison to studying the spreadsheet and reports.

Data visualization is an easy and quick way to convey concepts universally. You can experiment with a different outline by making a slight adjustment.

Data visualization have some more specialties such as

- Data visualization can identify areas that need improvement or modifications.
- Data visualization can clarify which factor influence customer behavior.
- Data visualization helps you to understand which products to place where.
- Data visualization can predict sales volumes.

Data visualization tools have been necessary for democratizing data, analytics, and making data-driven perception available to workers throughout an organization. They are easy to operate in comparison to earlier versions of BI software or traditional statistical analysis software. This guide to a rise in lines of business implementing data visualization tools on their own, without support from IT.

Why Use Data Visualization?

1. To make easier in understand and remember.
2. To discover unknown facts, outliers, and trends.
3. To visualize relationships and patterns quickly.
4. To ask a better question and make better decisions.
5. To competitive analyze.
6. To improve insights.

Tableau is available in two ways:-

- Tableau Public (Free)
- Tableau Desktop (Commercial)
- Here is a comparison between the Tableau Public and Tableau Desktop

Tableau Public

- Tableau Public is a free and open-source.
- Tableau public data source can connect to Excel and Text files.
- Tableau public can be installed on Window and Mac operating system.
- Data and Visualizations are not secured in the Tableau public because it is available in public.
- In Tableau public, data cannot be obtained from different data sources as it is limited to connect only Excel and Text files.
- Tableau public uses the details at Personal level.

Tableau Desktop

- Tableau Desktop is a paid source, personal edition- $35 per month and professional edition- $70 per month.
- Tableau desktop data source can connect to any data source file, including databases, web applications, and more.
- Tableau desktop can also install on Window and Mac operating system.
- Data and Visualization are secured in Tableau desktop.
- In Tableau desktop, data can extract from various data sources and stored as Tableau extract file.
- Tableau desktop uses the details at Professional and Enterprise level.

2. Getting started with Tableau Software using Data file formats, connecting your Data to Tableau, creating basic charts(line, bar charts, Tree maps),Using the Show me panel

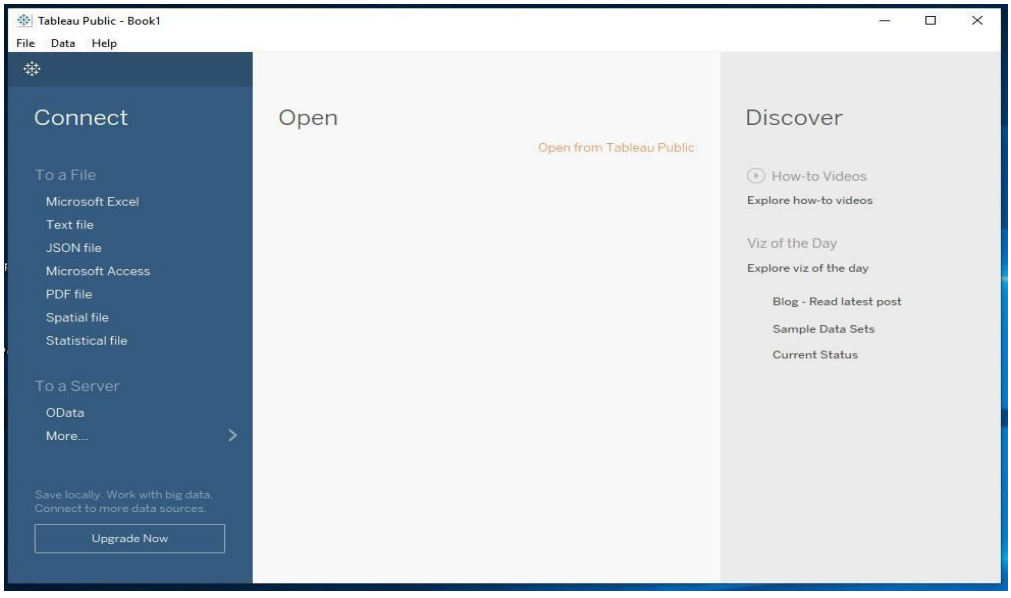
Introduction to Tableau and Installation

Tableau is a data visualization tool that provides pictorial and graphical representations of data. It is used for data analytics and business intelligence. Tableau provides limitless data exploration without interrupting flow of analysis. With an intuitive drag and drop interface, user can uncover hidden insights in data and make smarter decisions faster.

Tableau can be downloaded from the following website

after downloading, the following is the screen appears.

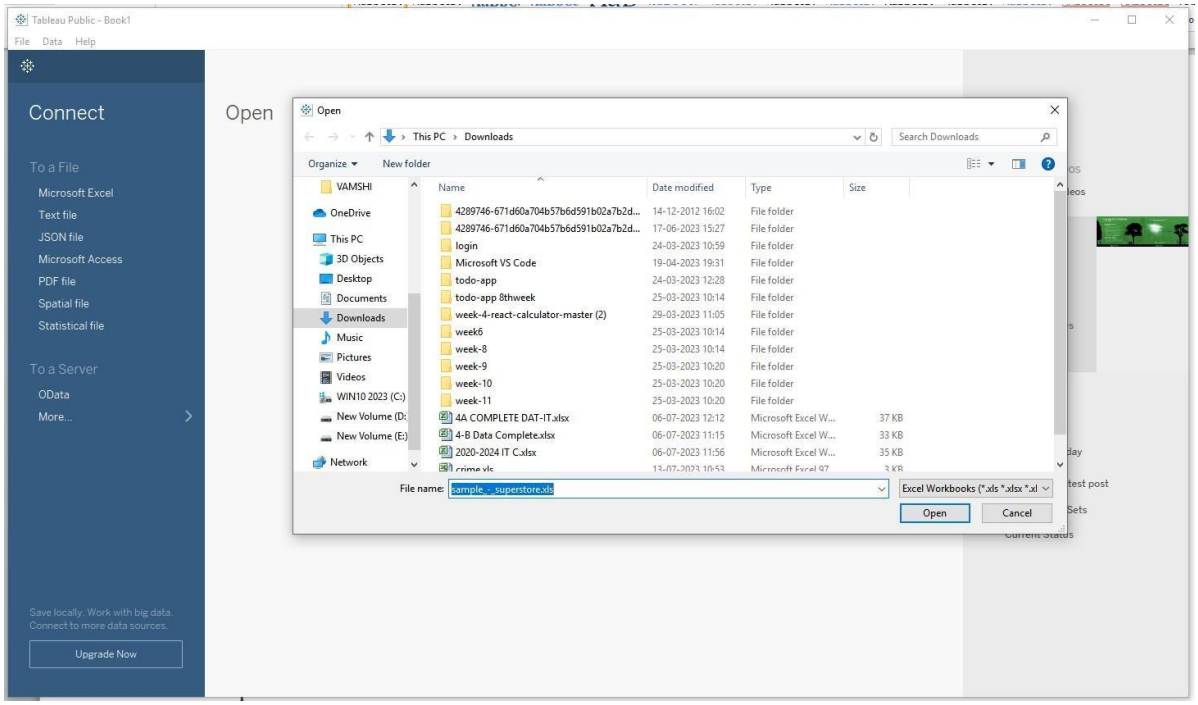
Click the licence agreement checkbox and then click on install button. After installation, click on Tableau Public icon to run Tableau. Following is the Tableau Public home screen.



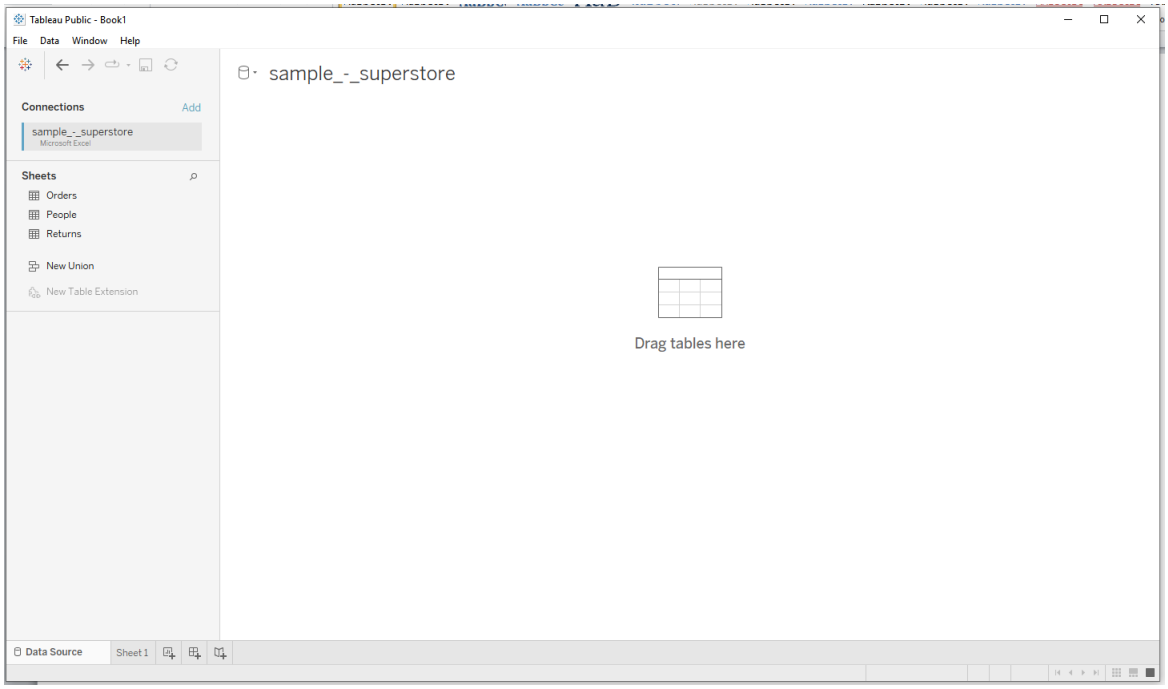
Connecting to Data and preparing data for visualization in Tableau

Tableau supports connecting to a wide variety of data, stored in a variety of places. For example, data might be stored on computer in a spread sheet or a text file, or in a big data, relational, or cube (multidimensional) database on a server in enterprise or the data can be from a public domain available on the web.

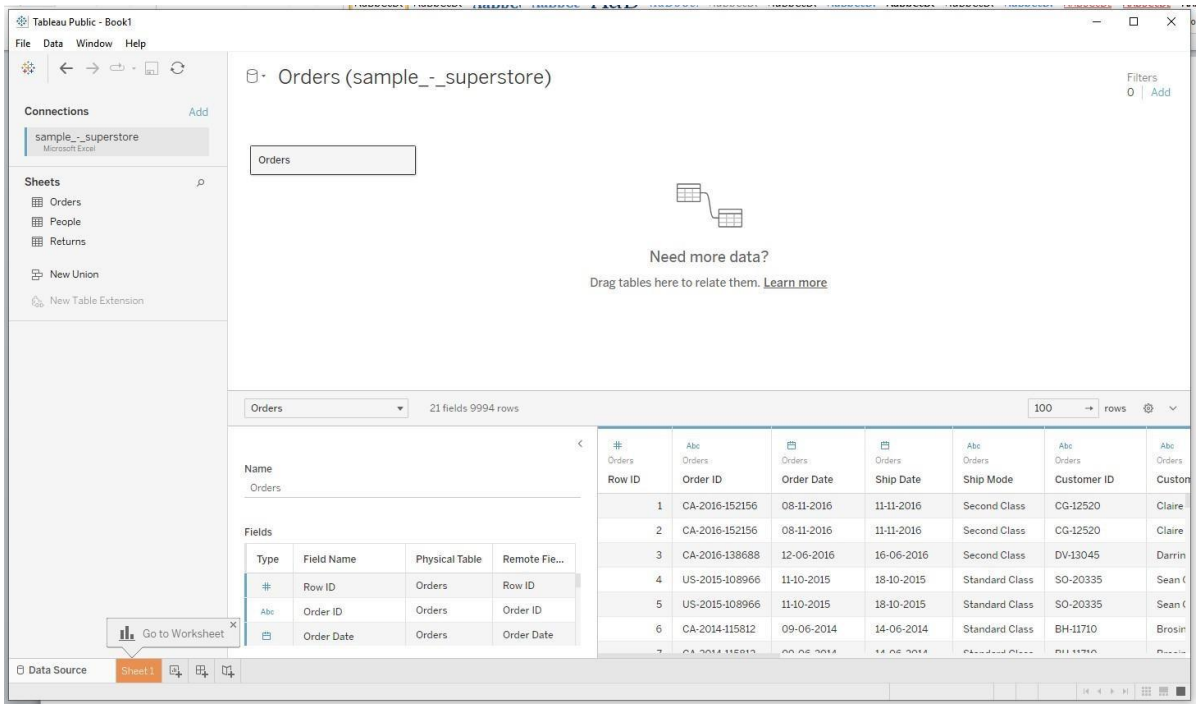
Data can be imported in Tableau Public from Connect panel on left side. For example, an Excel sample data set was loaded into Tableau as follows:



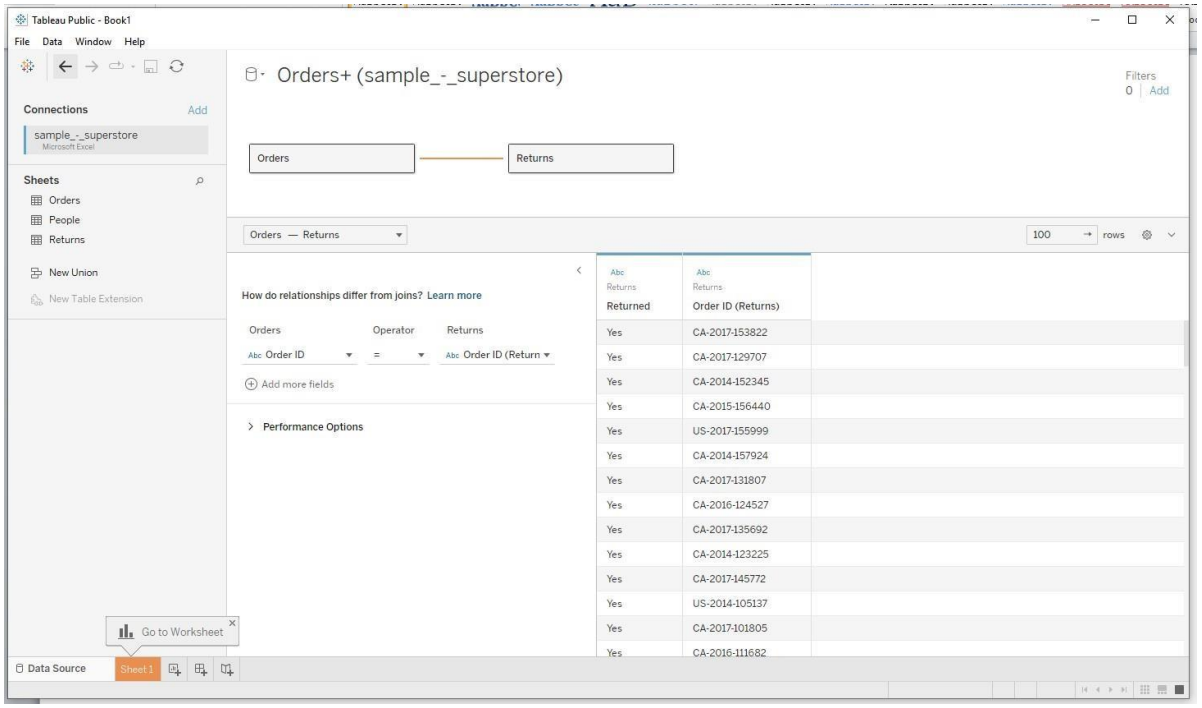
After clicking on open, screen is as follows:



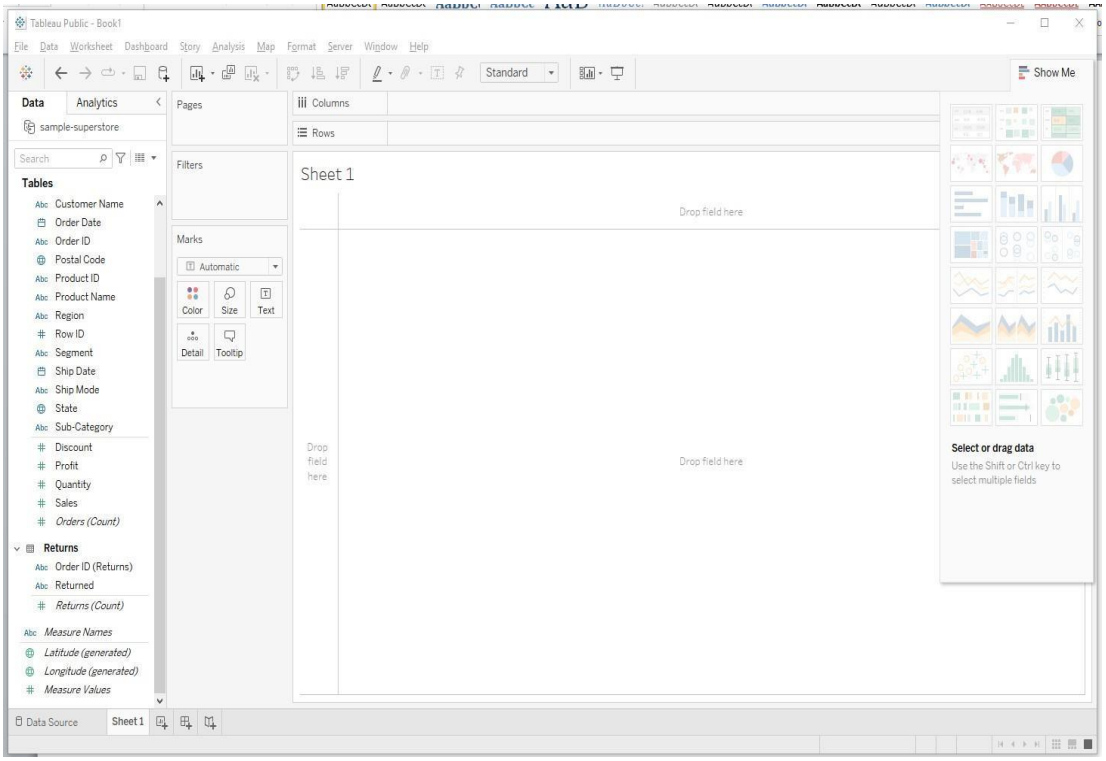
The data store page appears as above. The left pan shows that above dataset consists of 3 worksheets. If we drag orders table, screen appears as follows: Tableau automatically identifies the data type of each column.



Now drag Returns table onto the Canvas to the right of Orders table. This shows the relation between the two tables Orders and Returns.



If we click on the link between Orders and Returns table names at the top gives the summary of the relationship between the tables. Now rename the data store and click on Sheet1 at the bottom left to proceed. This step creates a data extract which improves query performanc



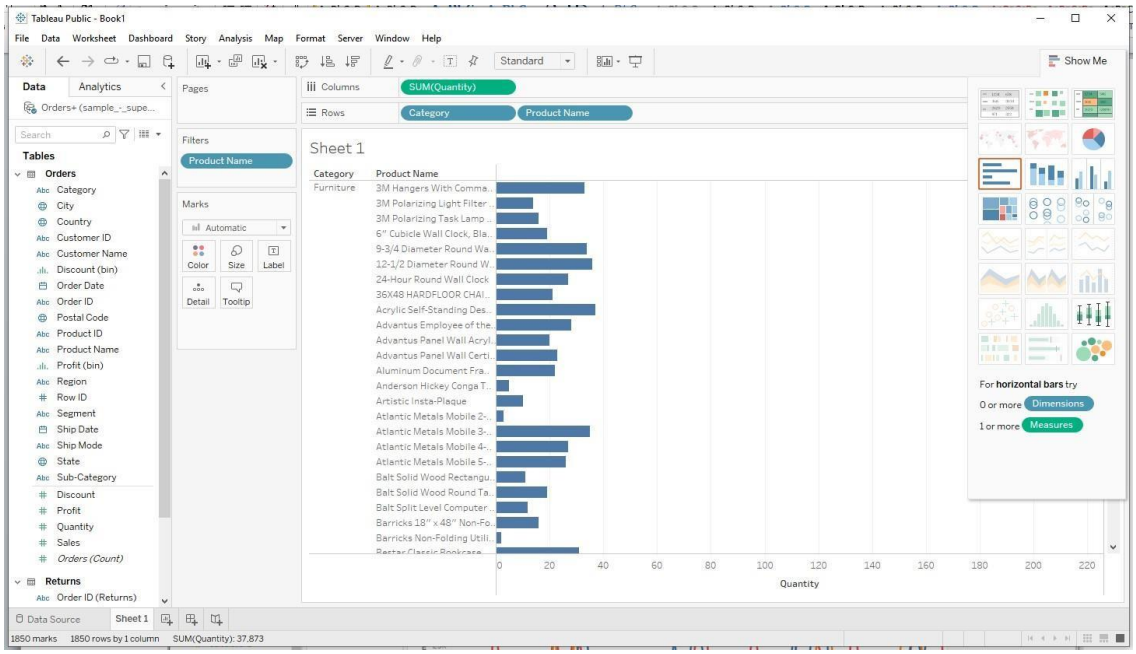
Data Visualization

We can perform various visualization operations on data in Tableau. Some of them are bar cart, histogram, bubble chart, gantt chart, scatter plot, heat map etc.

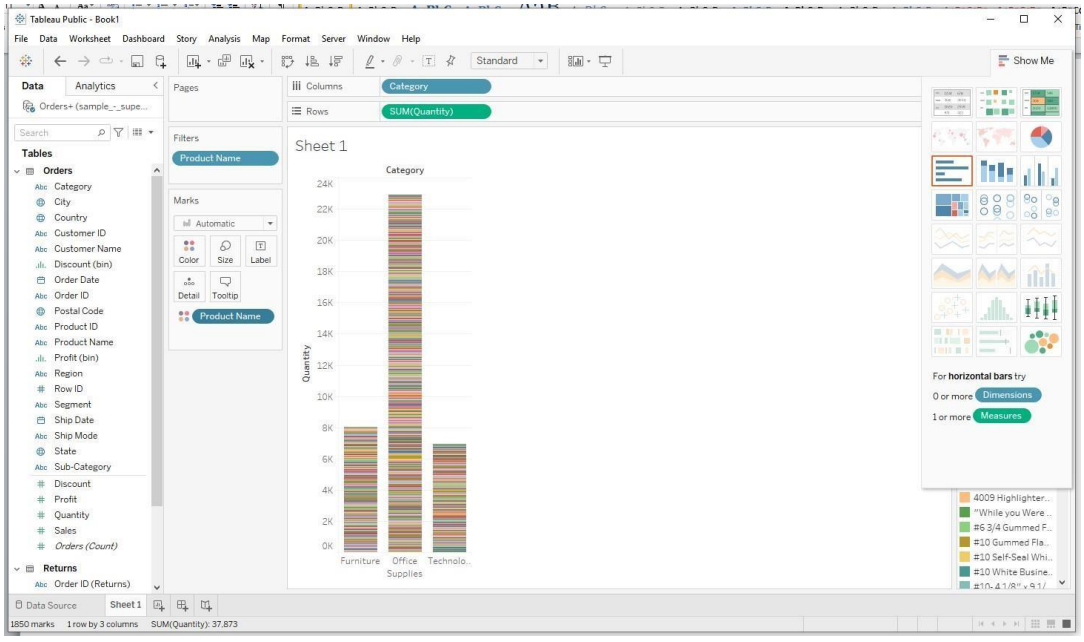
Bar chart:

Bar charts can be created in 3 variations in Tableau: Horizontal bars, stacked bars, side-by-side bars.

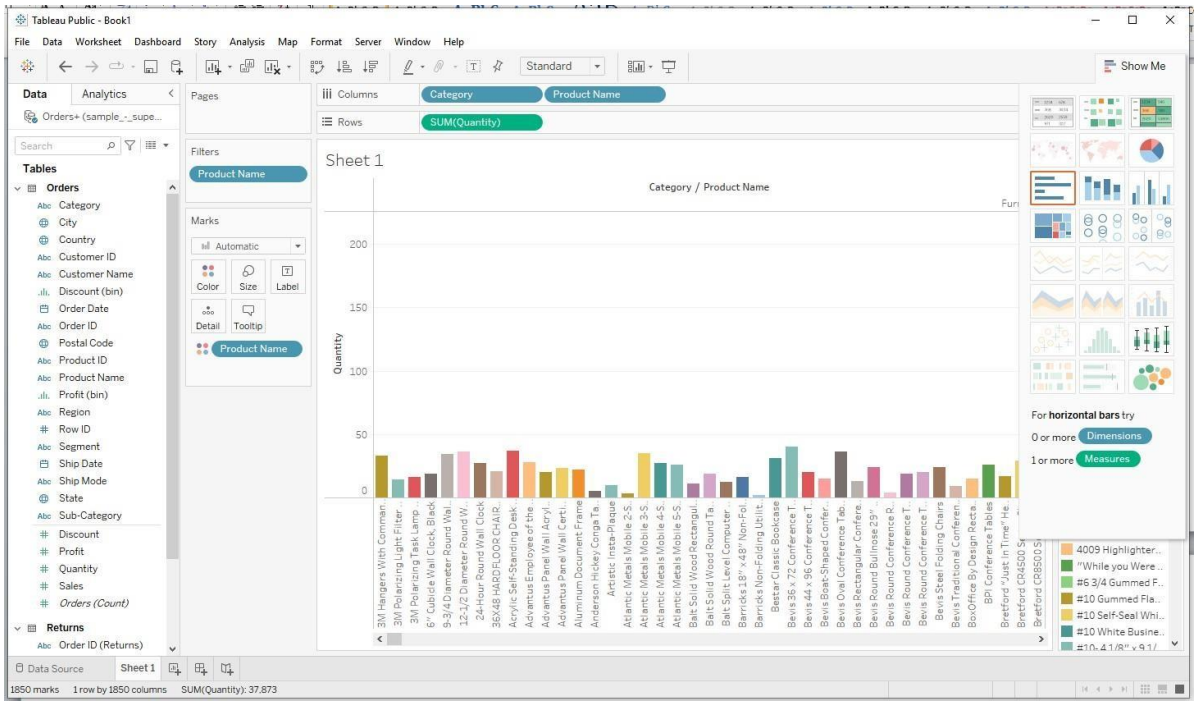
Horizontal bars can be created by selecting that type of chart from Show Me menu on right hand side of Canvas. The type of chart in box on right hand side represents horizontal bar graph.



In similar to above, stacked bar graph can be created and the result is shown below.

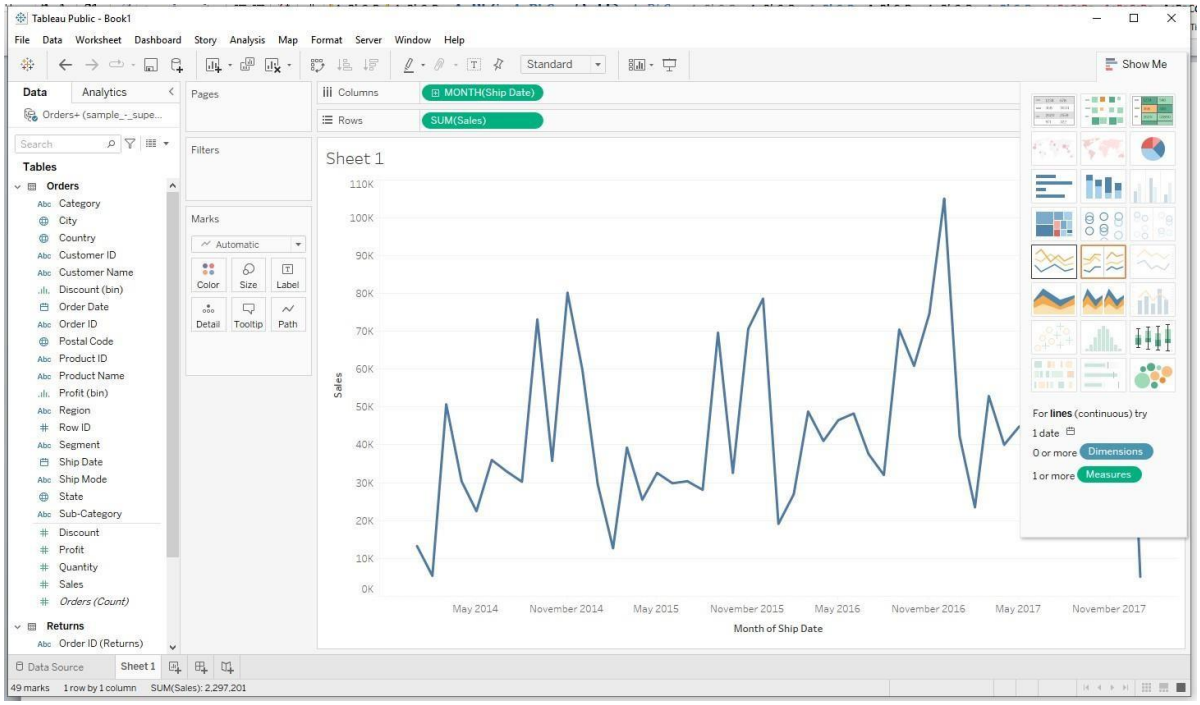


Side-by-side bar chart can be created in following way.

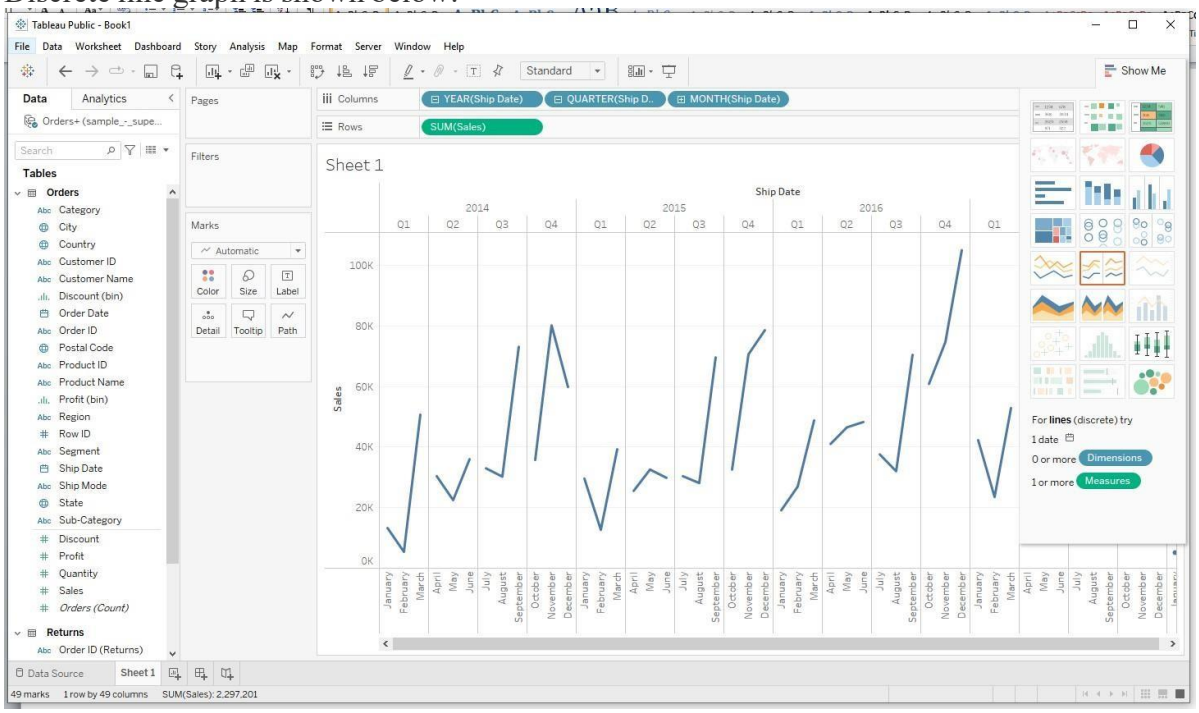


Line graph: Line graph can be continuous or discrete.

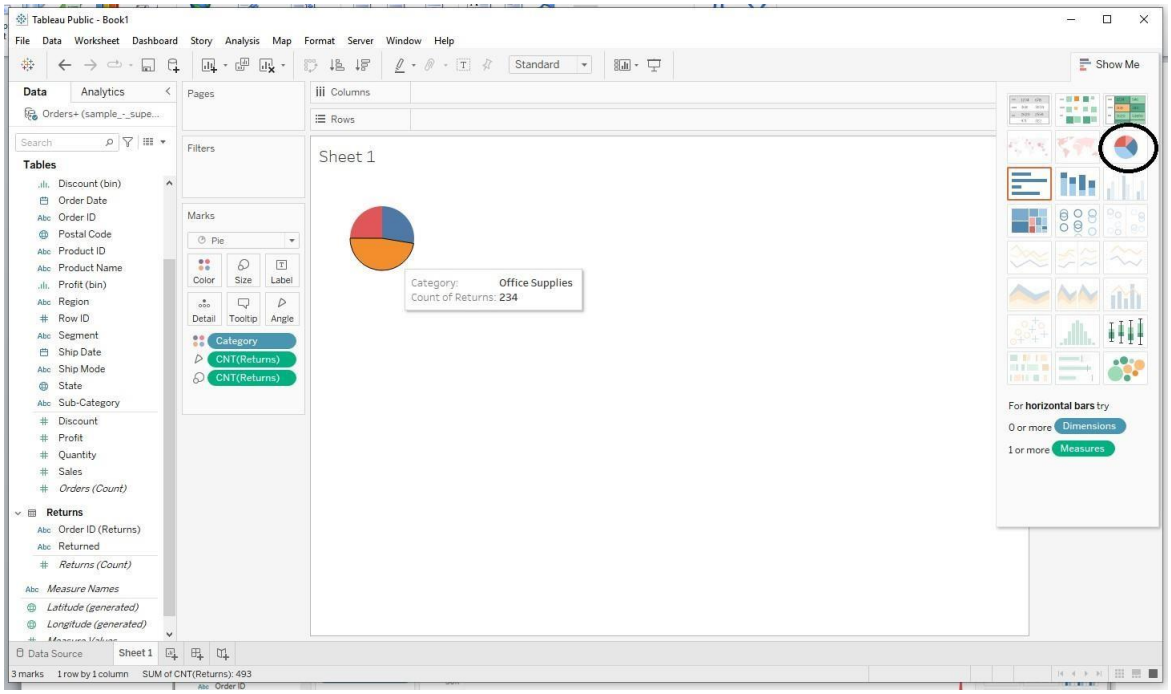
Continuous line graph is shown below:



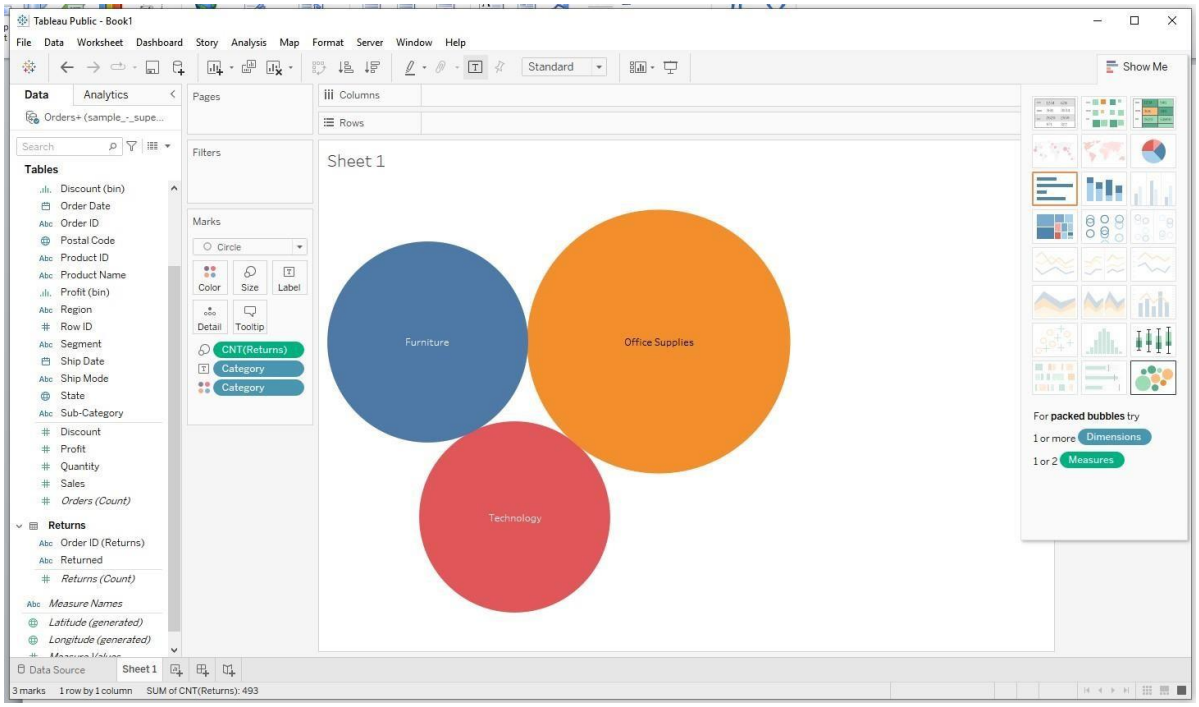
Discrete line graph is shown below:



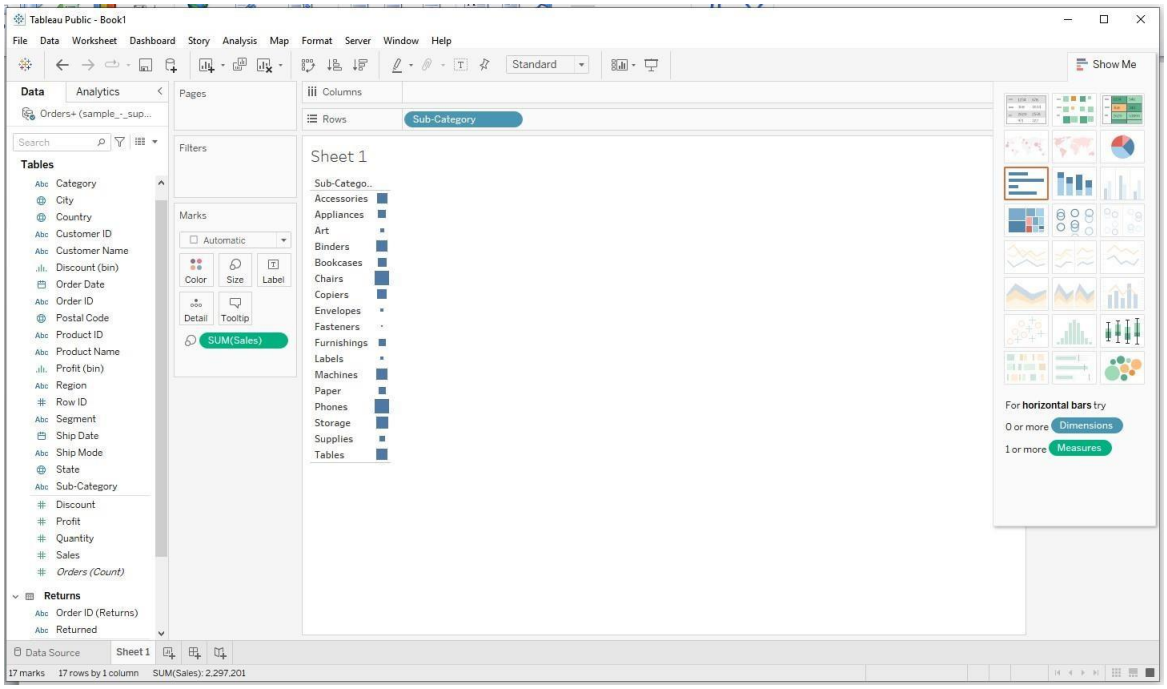
Pie chart:



Bubble chart:



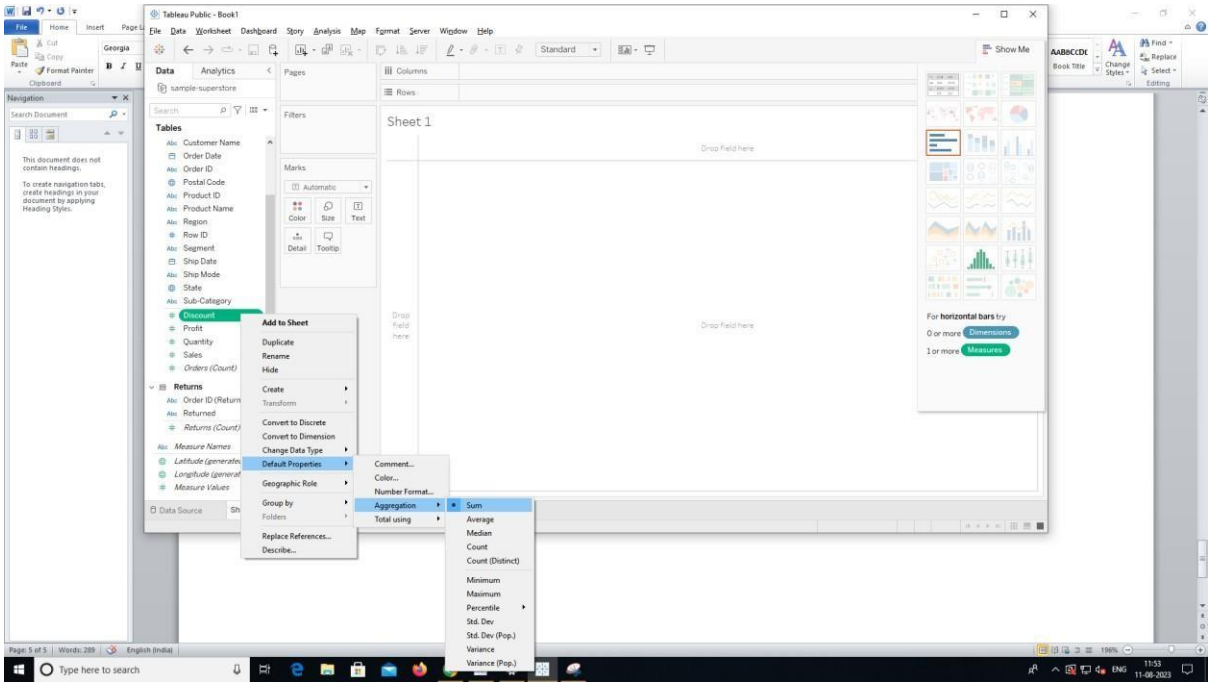
Heat map:



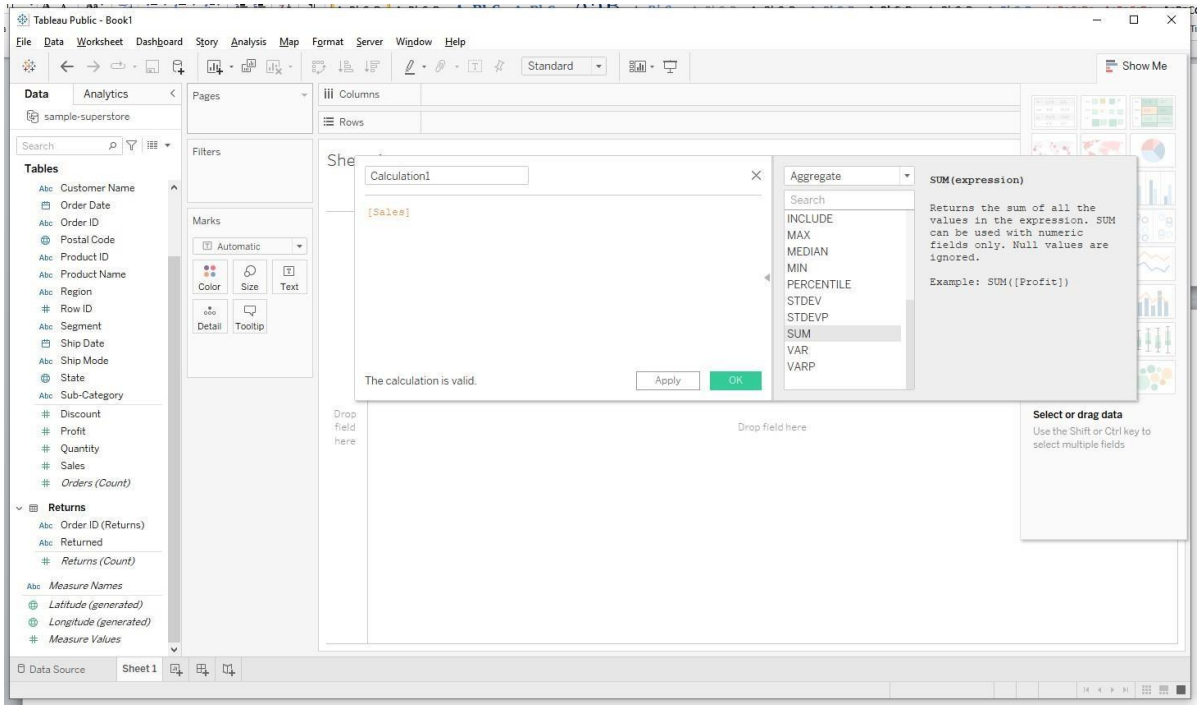
3.Tableau Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields

Data aggregation and statistical functions:

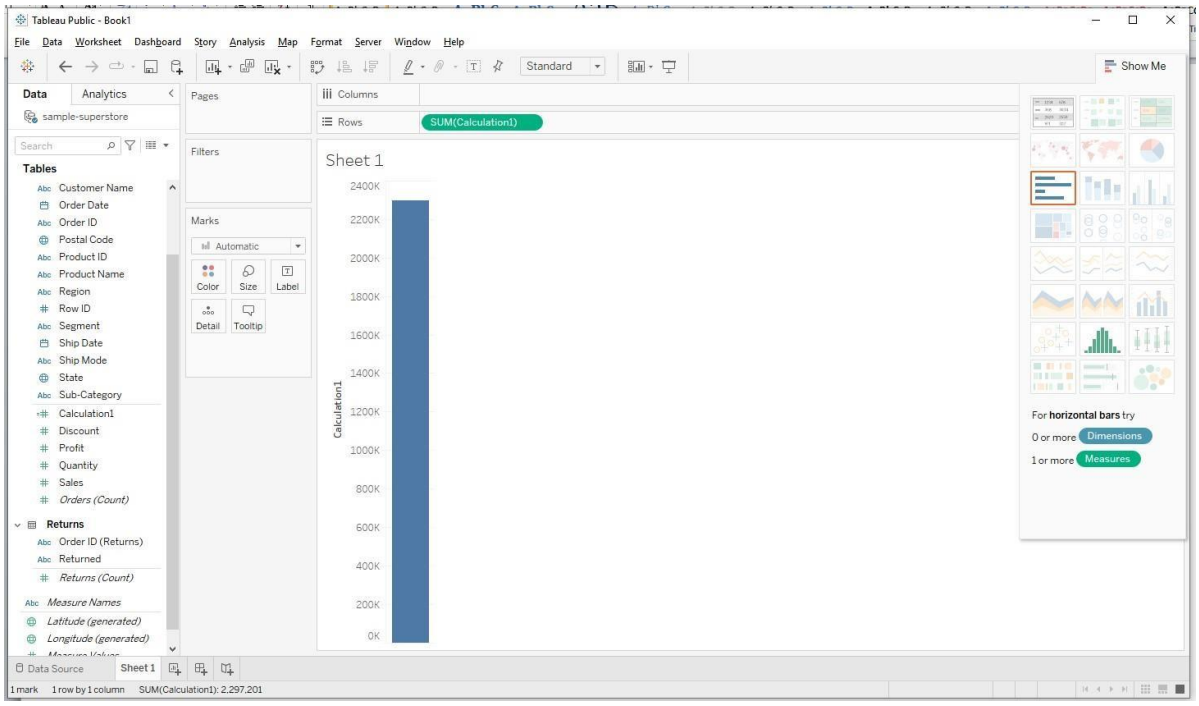
We can apply various aggregation and statistical functions on data such as count, minimum, maximum, standard deviation, variance etc. This is shown below. This can be done by right clicking on the required field of dataset, click on Default properties and click on aggregation.



Or the above operation can be done by creating a calculated field as shown below. To create a calculated field, click on the down arrow button beside search tab above Tables panel, drag a field to that calculated field window.



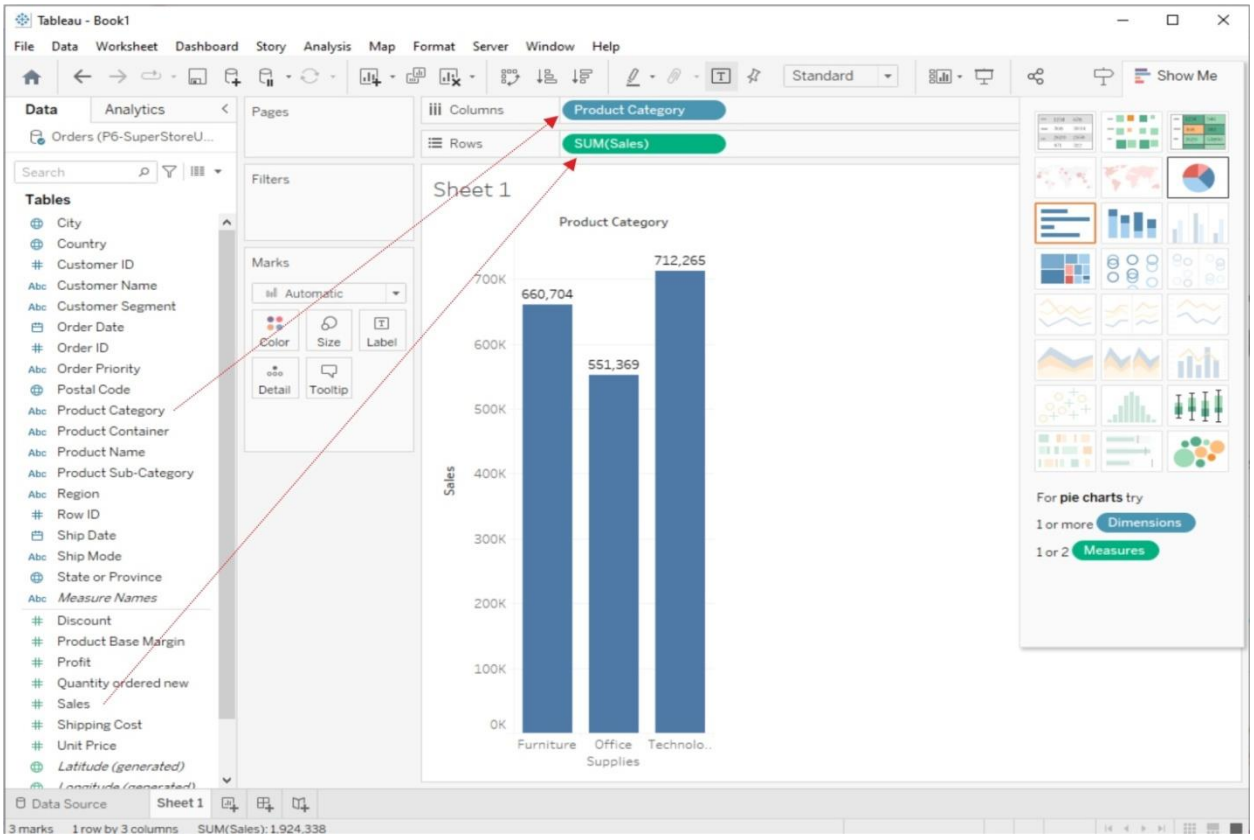
Then click on apply and results are shown below:



In the same way we can apply any aggregate or statistical function on data with the help of calculated fields.

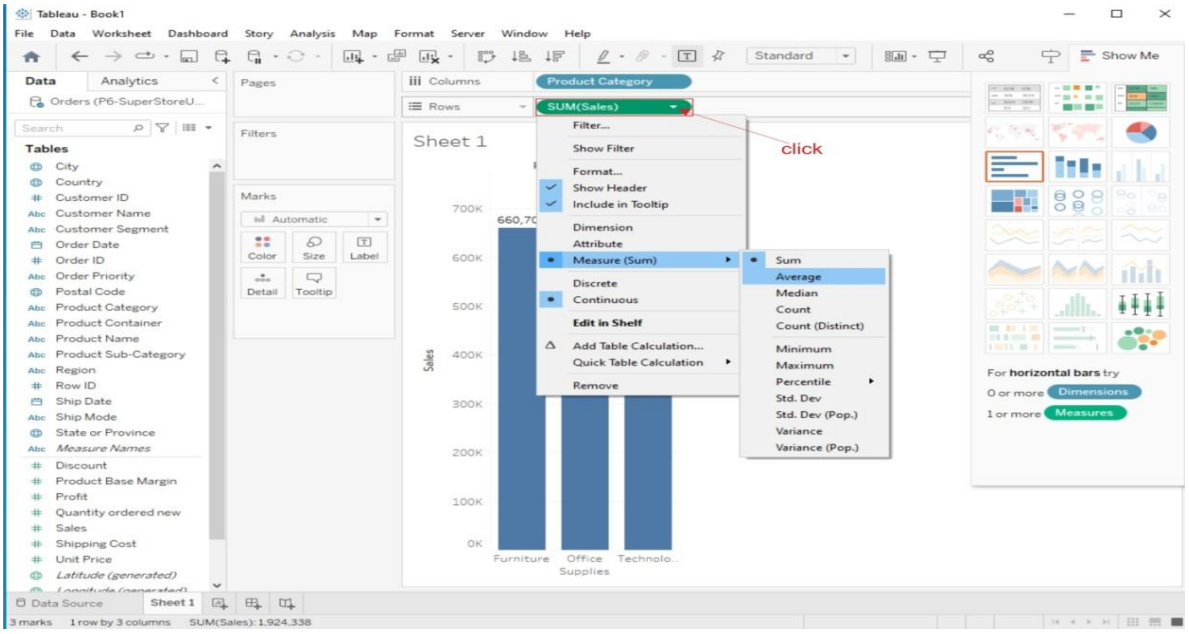
SUM Function

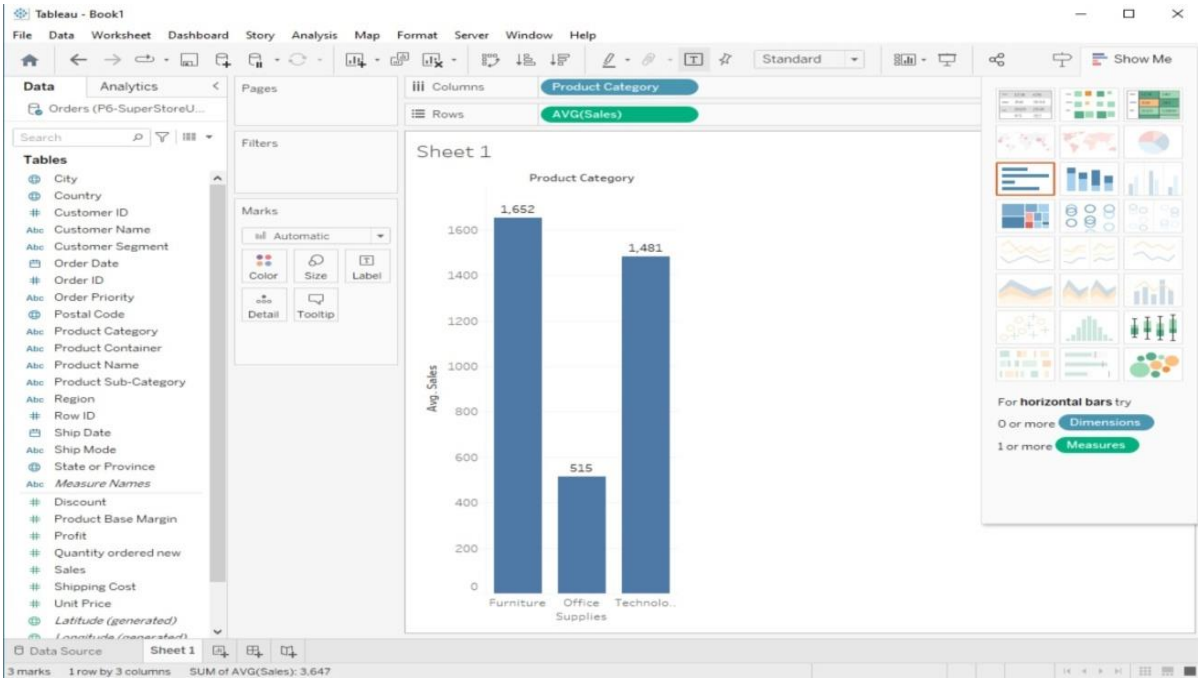
The SUM function in Tableau calculates the total sum of a numeric field. You can use it to find the sum of values in a column or as part of a more complex calculation. To use SUM, simply drag and drop a numeric field into the "SUM" shelf, or you can create a calculated field using the SUM function.



AVG (Average) Function

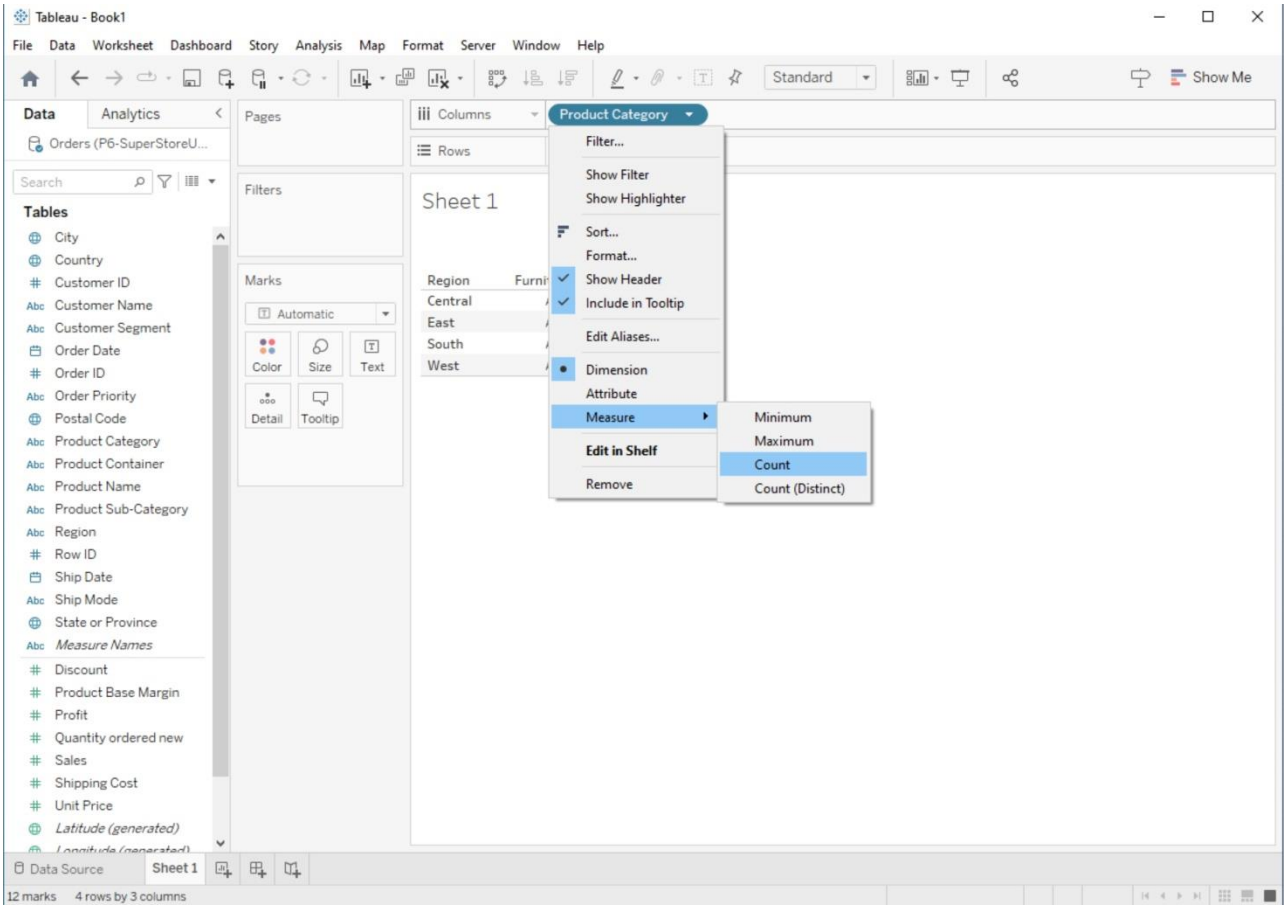
The AVG function calculates the average (mean) value of a numeric field. Like SUM, you can use it by dragging a numeric field into the "AVG" shelf or creating a calculated field with the AVG function.





Aggregate Functions:

Tableau provides a range of aggregate functions that allow you to perform calculations on groups of data. Common aggregate functions include SUM, AVG, COUNT, MIN (minimum value), and MAX (maximum value). These functions are particularly useful when you want to analyze data at different levels of granularity (e.g., by category, region, or time period).



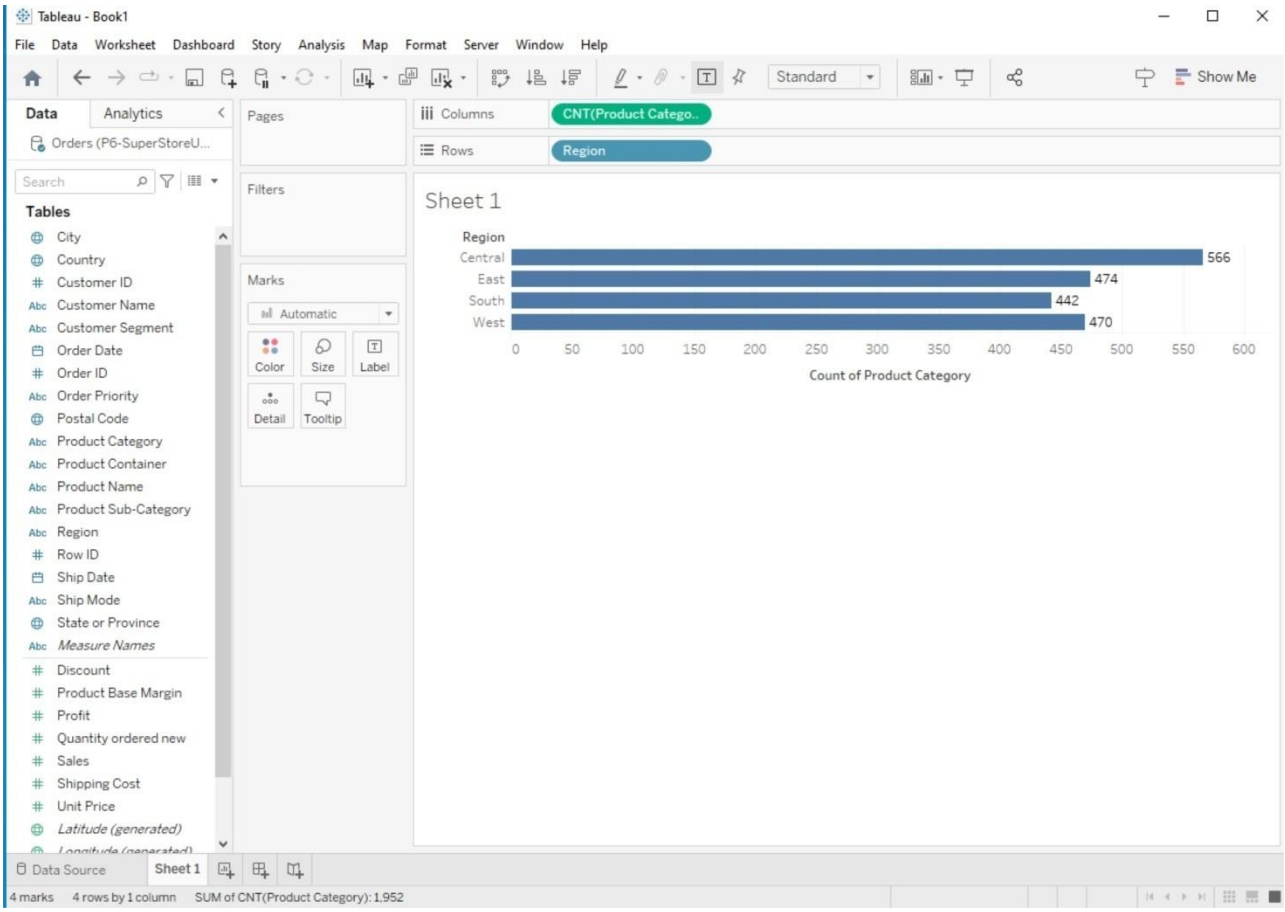


Tableau - Book1
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Data
Analytics
Orders (P6-SuperStoreU...
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City
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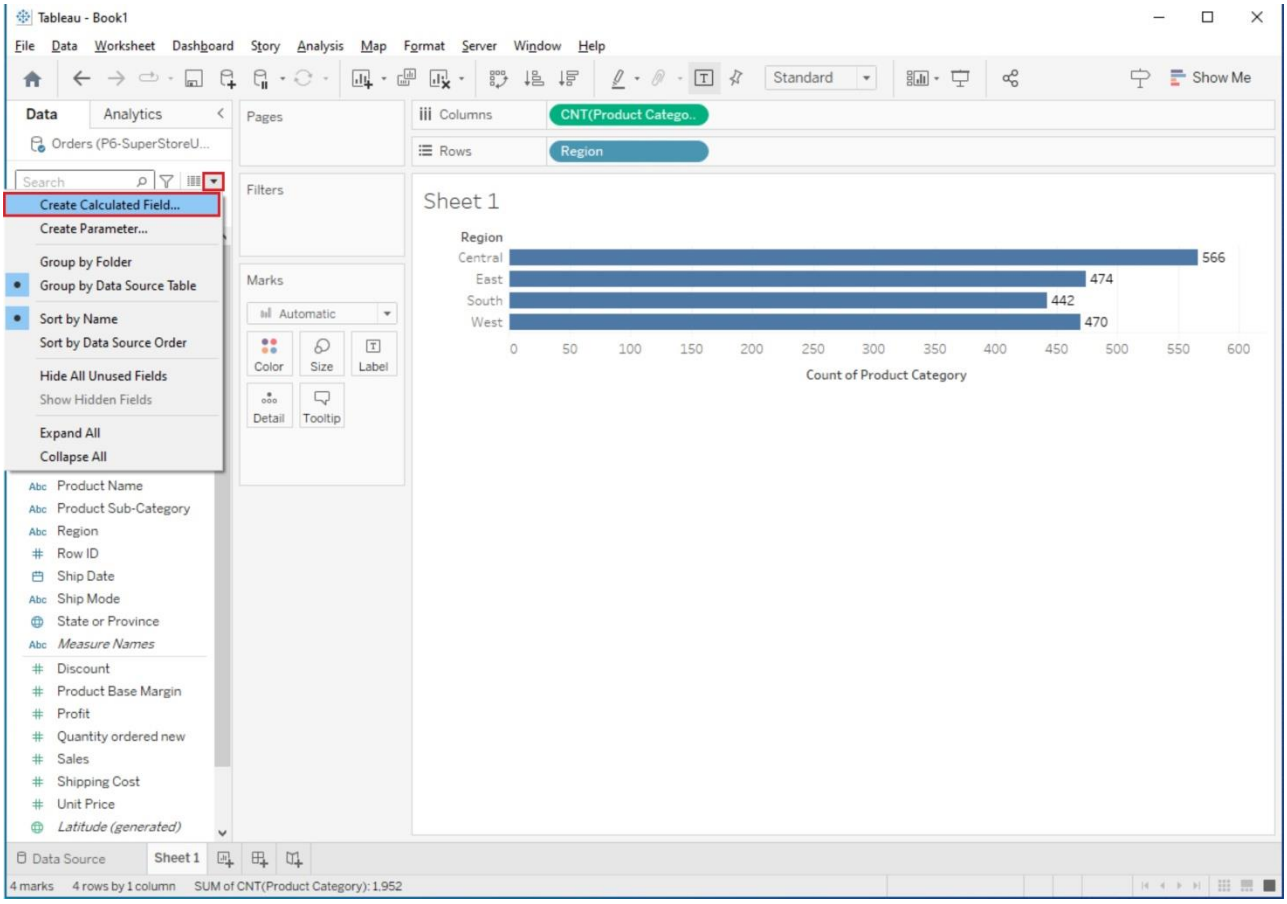
Customer ID
Customer Name
Customer Segment
Order Date
Order ID
Order Priority
Postal Code
Product Category
Product Container
Product Name
Product Sub-Category
Region
Row ID
Ship Date
Ship Mode
State or Province
Measure Names
Discount
Product Base Margin
Profit
Quantity ordered new
Sales
Shipping Cost
Unit Price
Latitude (generated)
Pages
Filters
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Columns
CNT(Product Catego..
Rows
Region
Sheet 1
Region
Central
East
South
West
566
474
442
470
0 50 100 150 200 250 300 350 400 450 500 550 600
Count of Product Category
Data Source
Sheet 1
4 marks
4 rows by 1 column
SUM of CNT(Product Category): 1,952

Creating Custom Calculations

Tableau allows you to create custom calculations using calculated fields. Here's how to create a custom calculation:

1. Create a New Calculated Field

In the Data Source Pane, right-click on your data source and select "Create Calculated Field".



Alternatively, you can create a calculated field by right-clicking on a shelf in your worksheet and choosing "Create Calculated Field".

2. Enter Your Calculation:

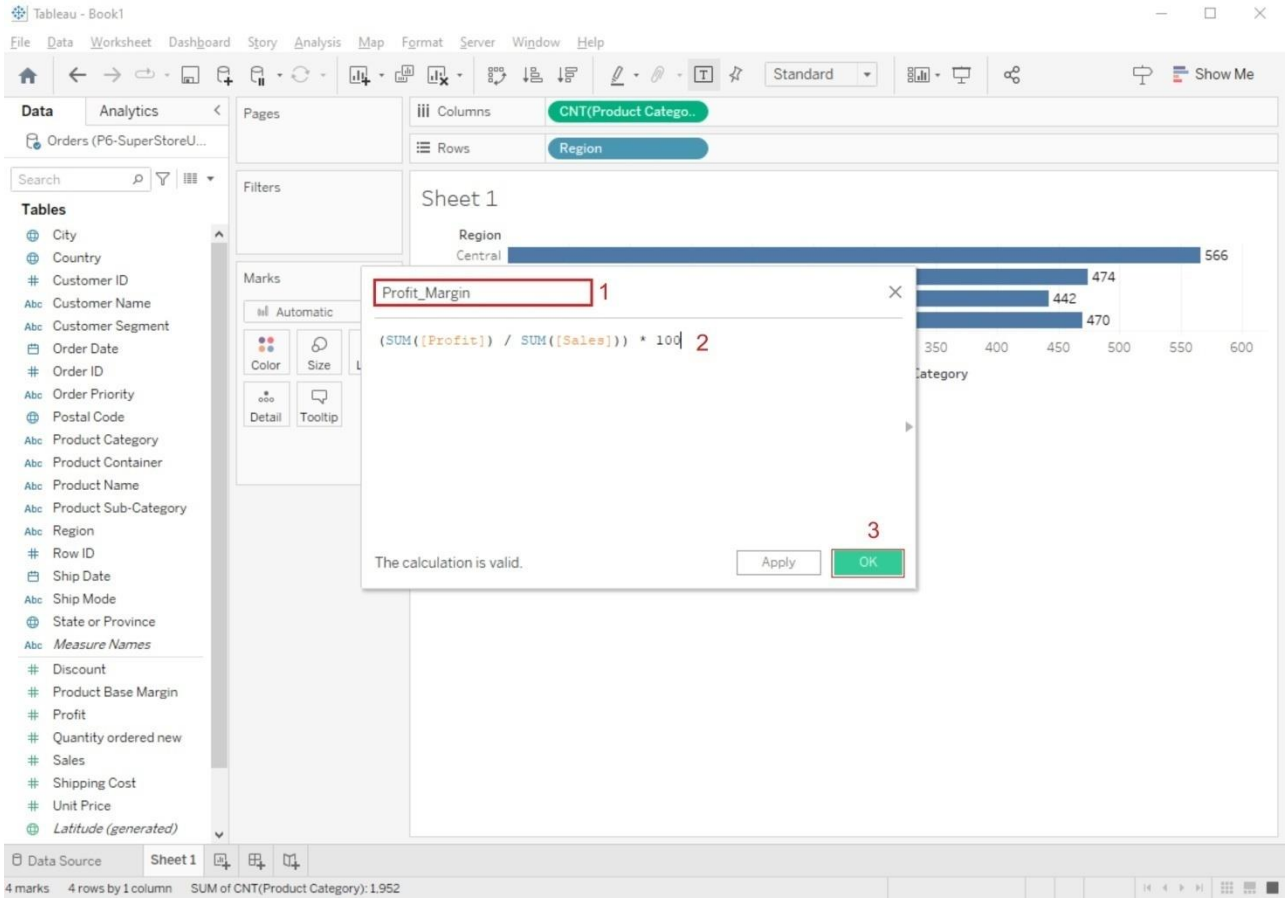
In the calculated field editor, you can use functions, operators, and field references to define your calculation.

For example, you can create a calculated field to calculate profit margin as (SUM([Profit]) / SUM([Sales])) * 100.

3. Name and Save the Calculated Field:

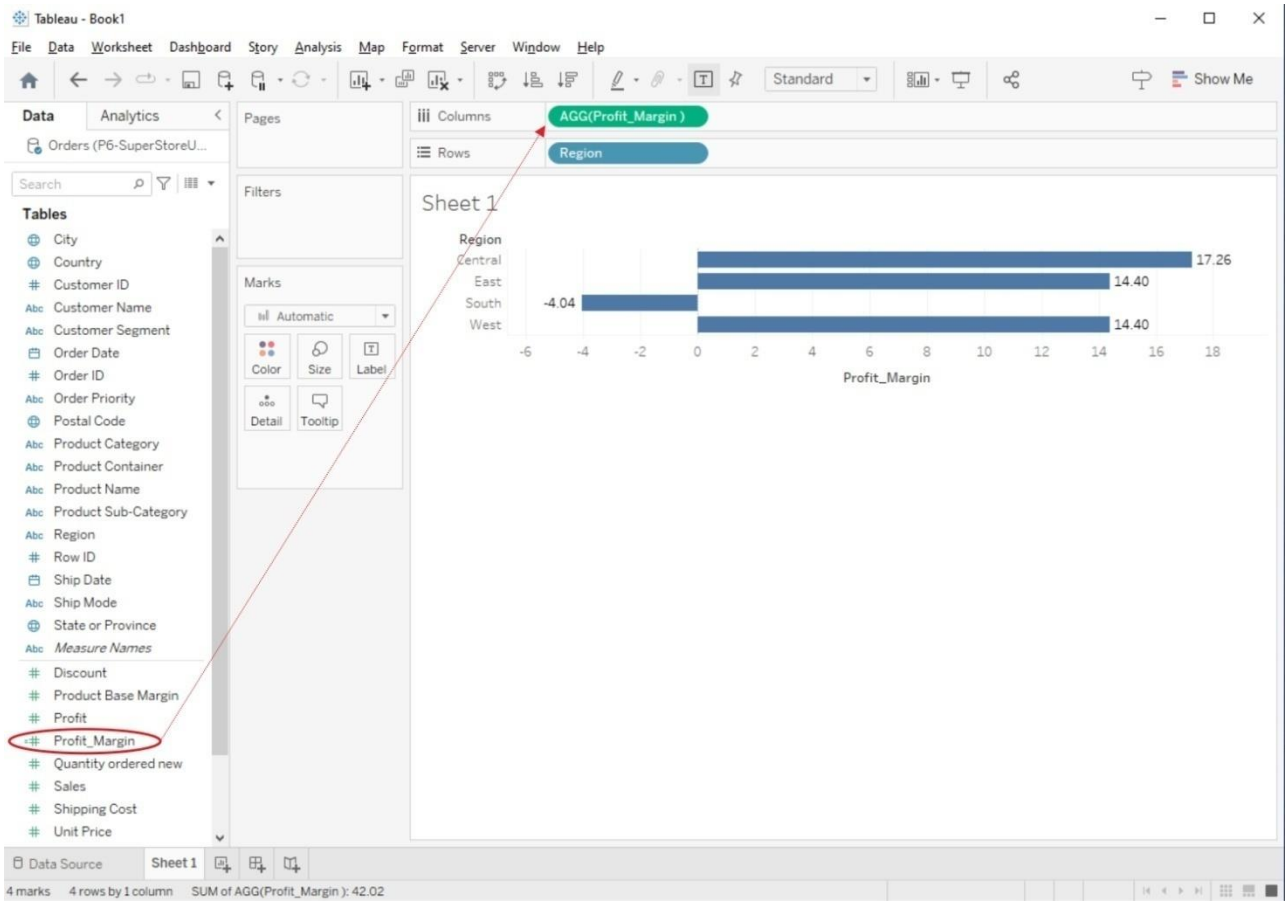
Give your calculated field a meaningful name.

Click the "OK" or "Apply" button to save the calculated field.



4. Use the Calculated Field in Your Worksheet:

You can now use the calculated field like any other field in your worksheet. Drag it to the Rows or Columns shelf, use it in filters, or create visualizations based on it.



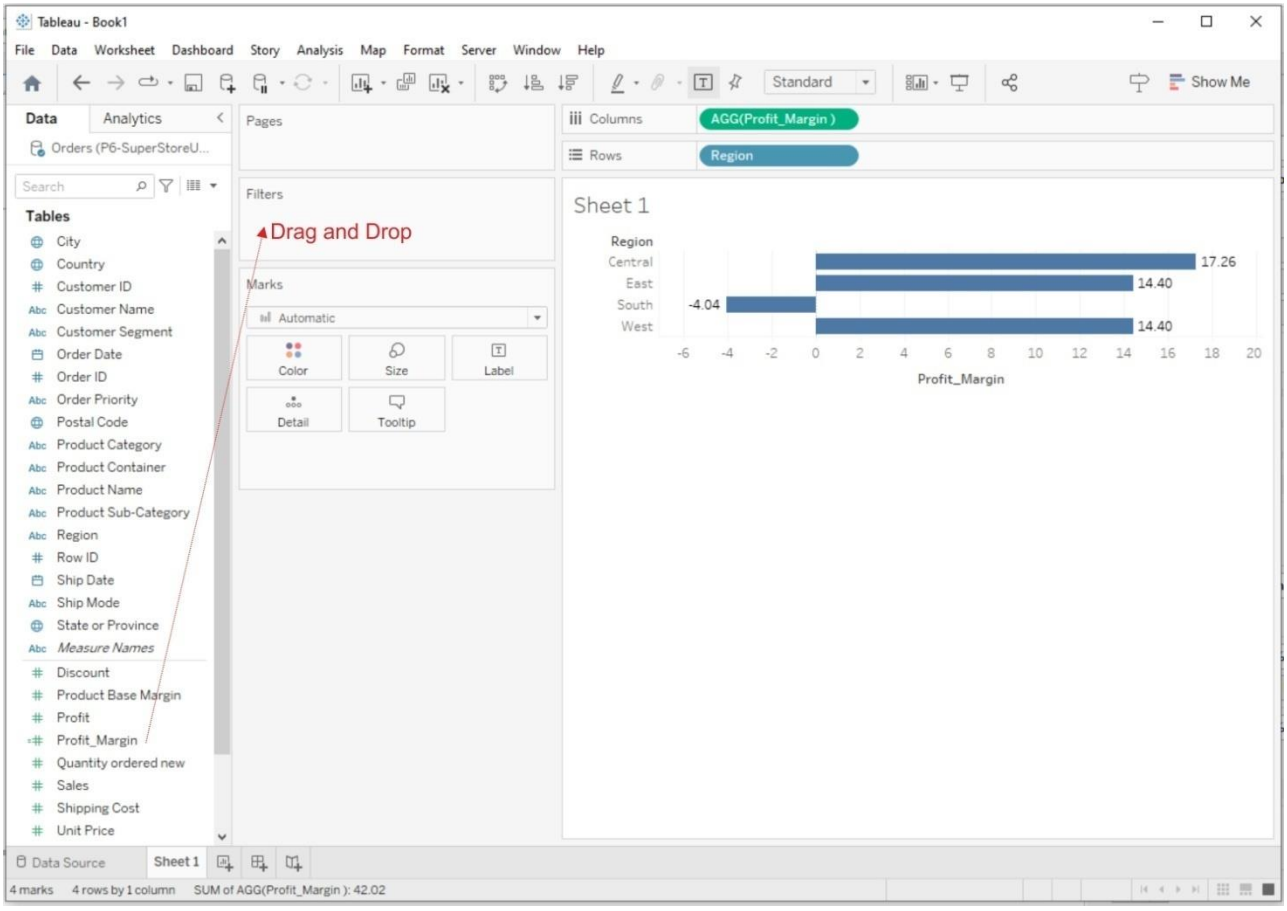
4)Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Toolsand Menus, Formatting specific parts of the view.

Solution :

Applying New Data Calculations to Visualizations

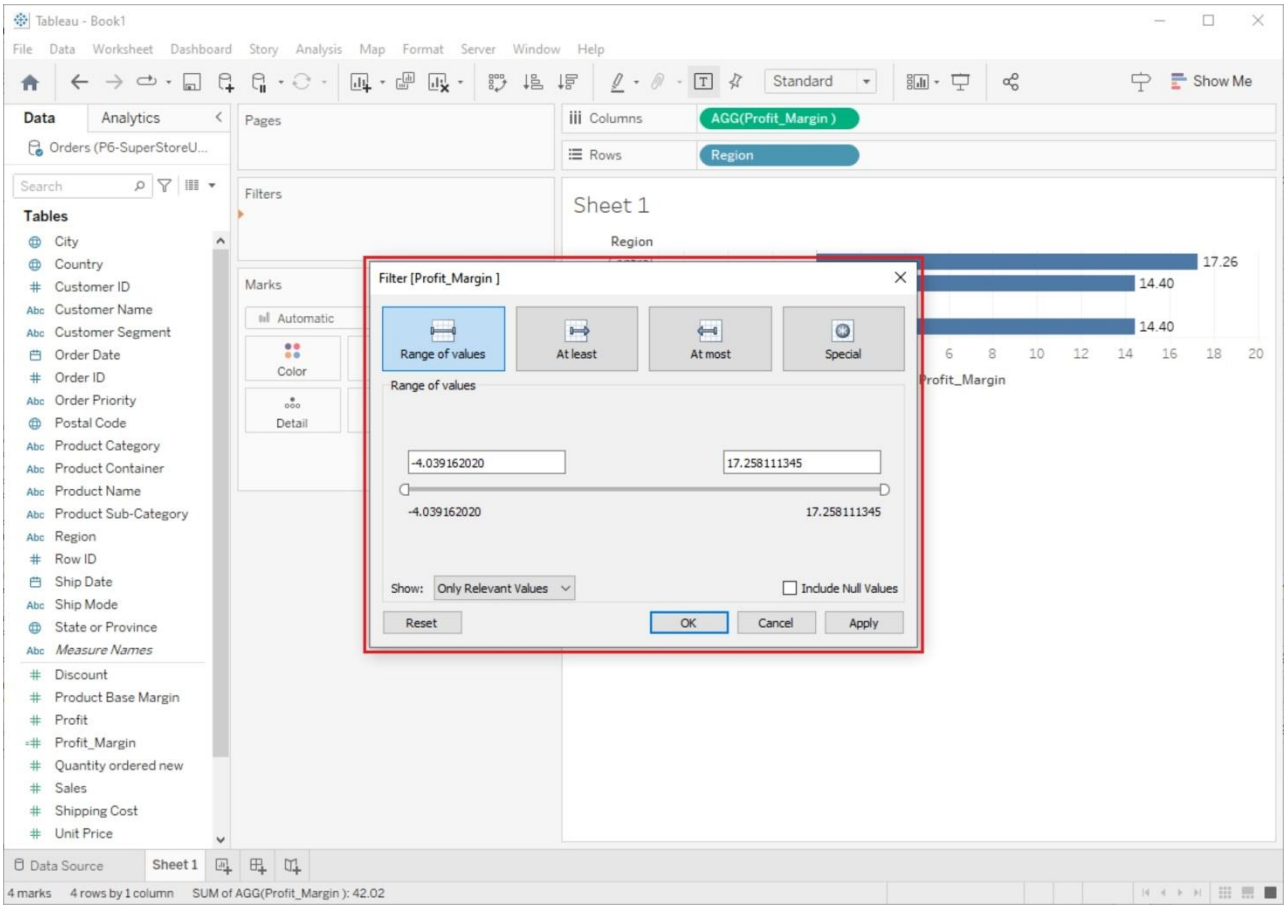
1. Drag and Drop Calculated Fields:

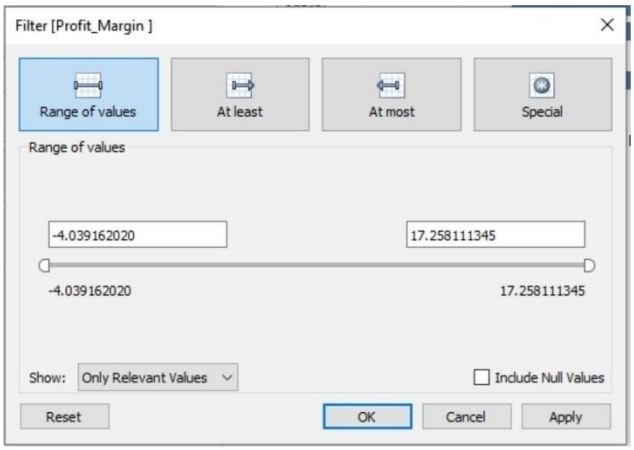
To apply your newly created calculated fields to a visualization, simply drag and drop them onto the appropriate shelves in your worksheet. For example, you can drag a calculated field to the Rows or Columns shelf, use it in filters, or place it on the Marks card to control the appearance of marks.

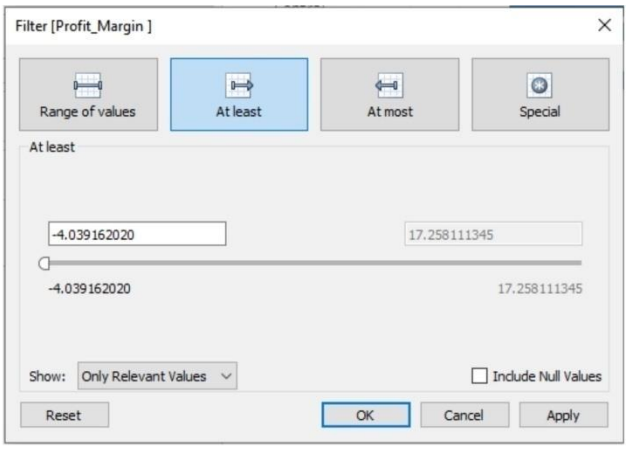


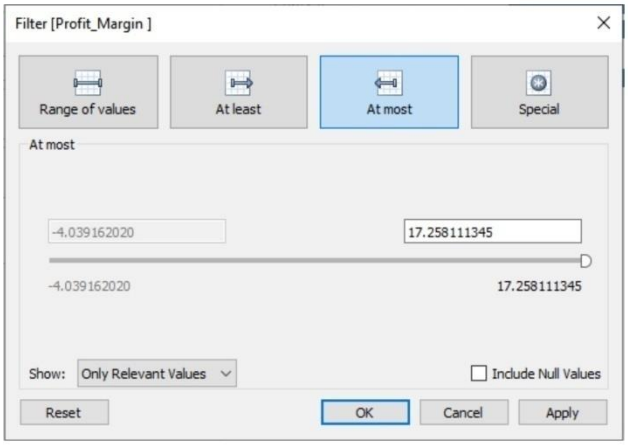
2. Filter with Calculated Fields:

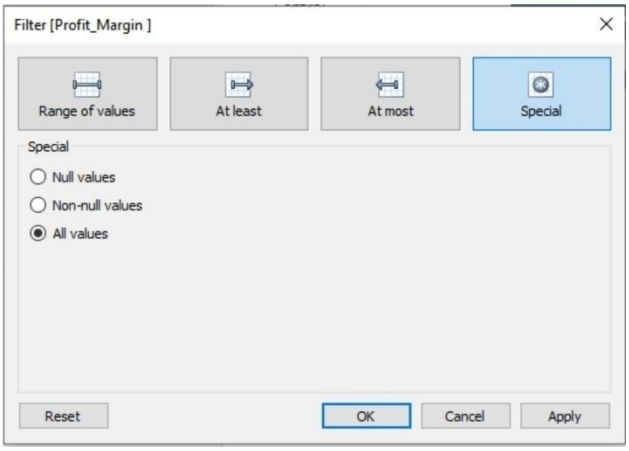
Create filters using calculated fields to control which data points are displayed in your visualization. You can use calculated fields to filter by specific criteria, such as a calculated date range or a custom ranking.




Filter [Profit_Margin]
Range of values
At least
At most
Special
Range of values
-4.039162020
17.258111345
-4.039162020
17.258111345
Show:
Only Relevant Values
Include Null Values
Reset
OK
Cancel
Apply


Filter [Profit_Margin]
Range of values
At least
At most
Special
At least
-4.039162020
17.258111345
-4.039162020
17.258111345
Show:
Only Relevant Values
Include Null Values
Reset
OK
Cancel
Apply


Filter [Profit_Margin]
Range of values
At least
At most
Special
At most
-4.039162020
17.258111345
-4.039162020
17.258111345
Show:
Only Relevant Values
Include Null Values
Reset
OK
Cancel
Apply


Filter [Profit_Margin]
Range of values
At least
At most
Special
Special
Null values
Non-null values
All values
Reset
OK
Cancel
Apply

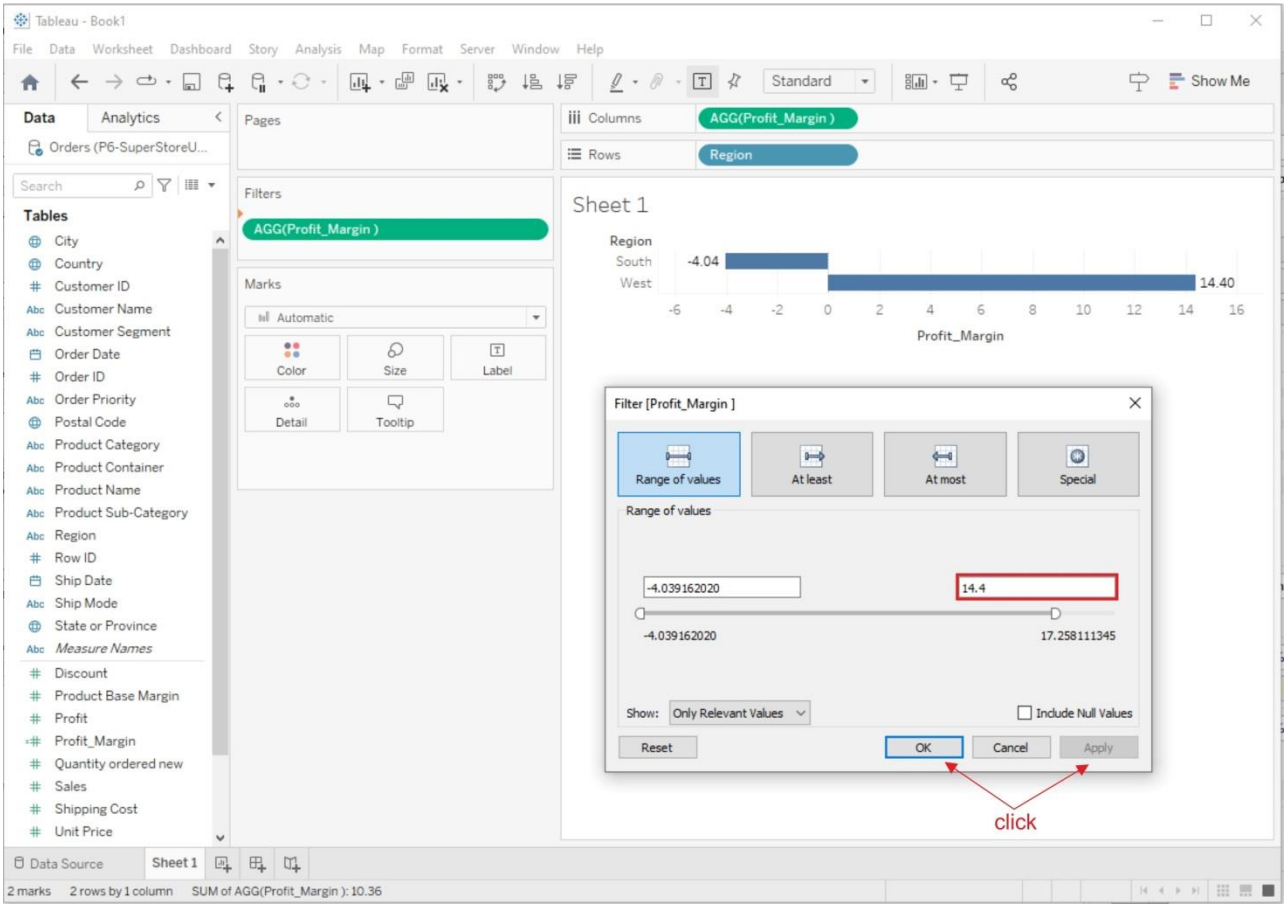


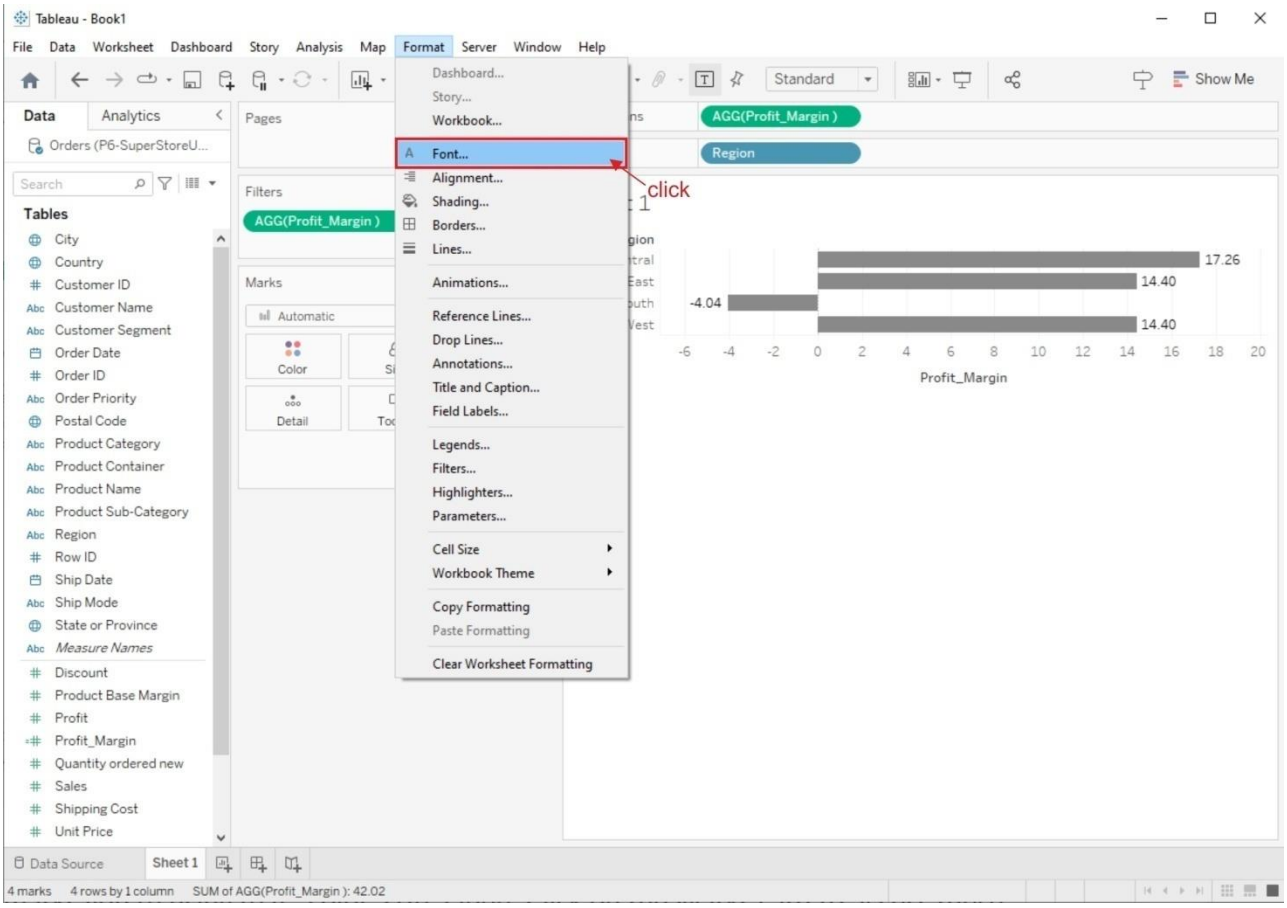
Tableau - Book1
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Show Me
Data
Analytics
Orders (P6-SuperStoreU...
Search
Tables
City
Country
Customer ID
Customer Name
Customer Segment
Order Date
Order ID
Order Priority
Postal Code
Product Category
Product Container
Product Name
Product Sub-Category
Region
Row ID
Ship Date
Ship Mode
State or Province
Measure Names
Discount
Product Base Margin
Profit
Profit_Margin
Quantity ordered new
Sales
Shipping Cost
Unit Price
Pages
Filters
AGG(Profit_Margin)
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Columns
AGG(Profit_Margin)
Rows
Region
Sheet 1
Region
South
West
-4.04
14.40
-6 -4 -2 0 2 4 6 8 10 12 14 16
Profit_Margin
Filter [Profit_Margin]
Range of values
At least
At most
Special
Range of values
-4.039162020
14.4
-4.039162020
17.258111345
Show:
Only Relevant Values
Include Null Values
Reset
OK
Cancel
Apply
click
Data Source
Sheet 1
2 marks
2 rows by 1 column
SUM of AGG(Profit_Margin): 10.36

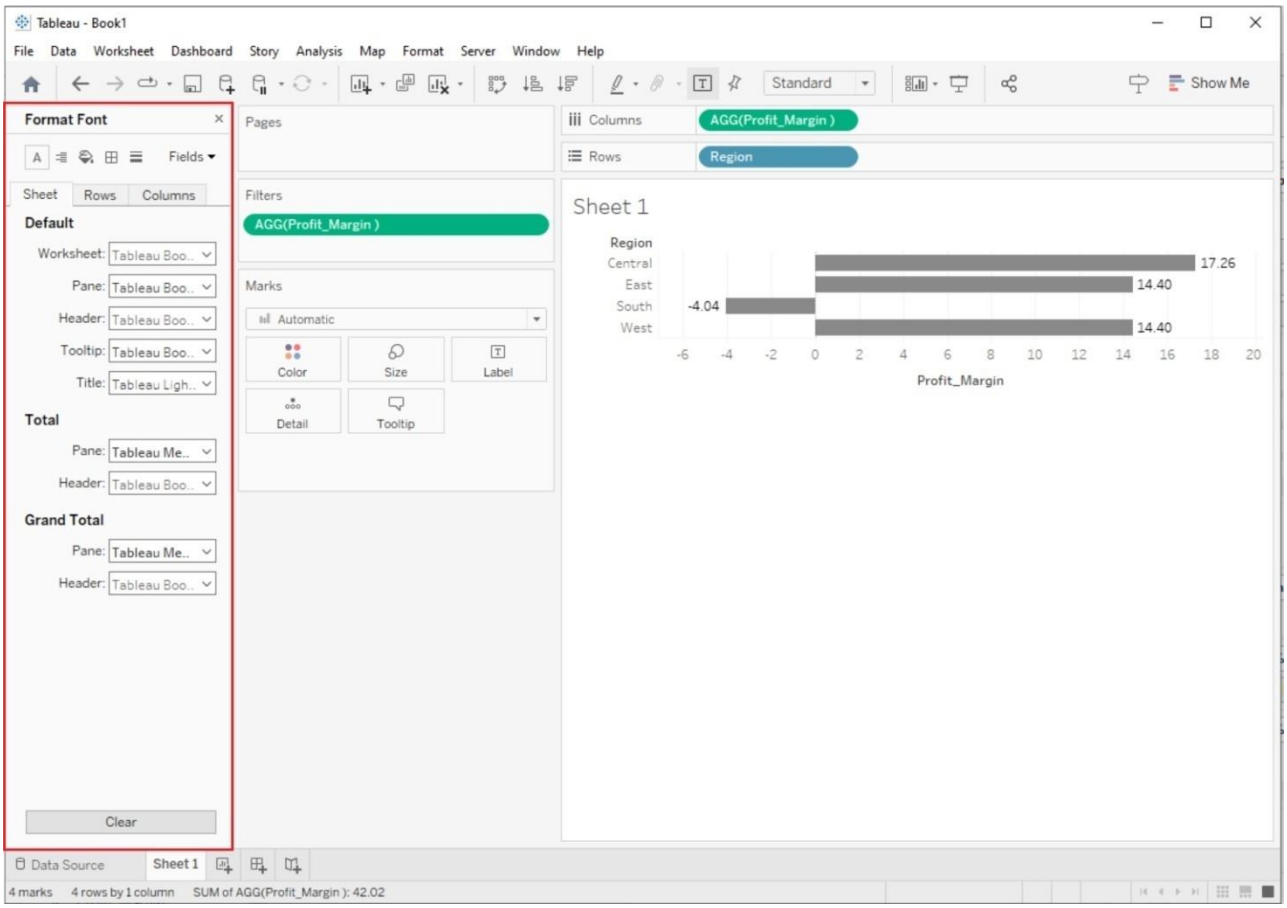
Formatting Visualizations

Tableau provides a wide range of formatting options to make your visualizations more appealing and informative:

1. Format Pane:

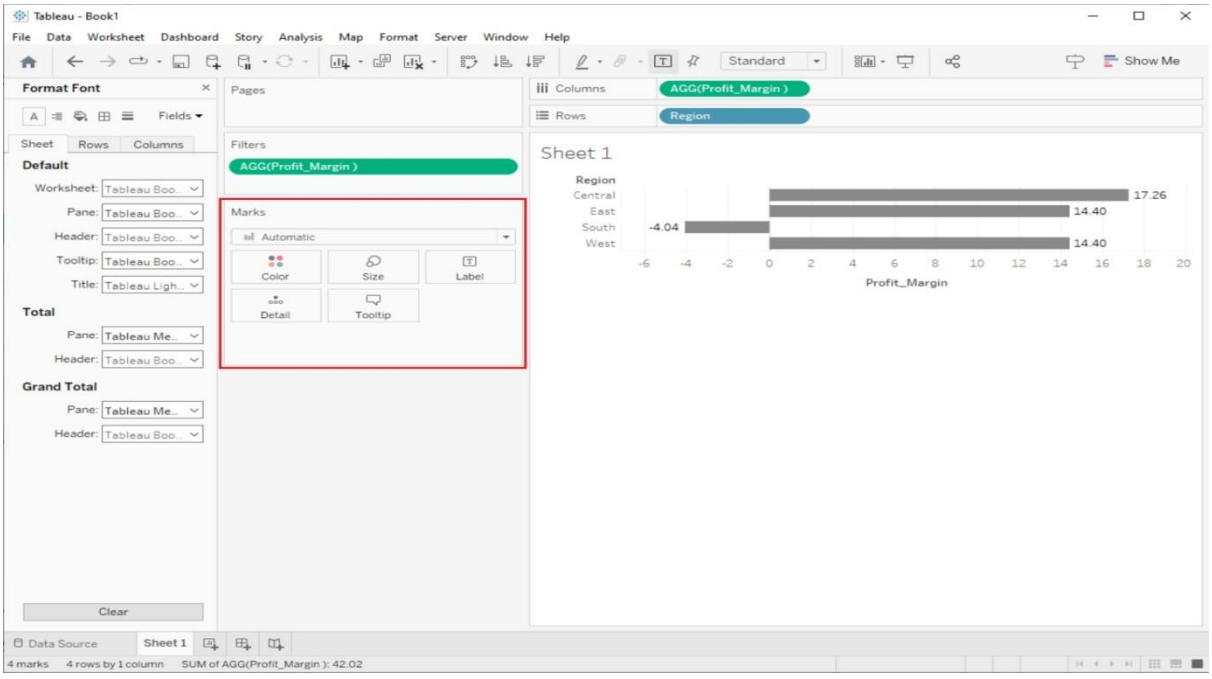
On the left side of the Tableau interface, you'll find the Format pane. It allows you to format various aspects of your visualization, such as fonts, colors, lines, shading, and borders. Simply select the element you want to format and use the options in the Format pane to make changes.





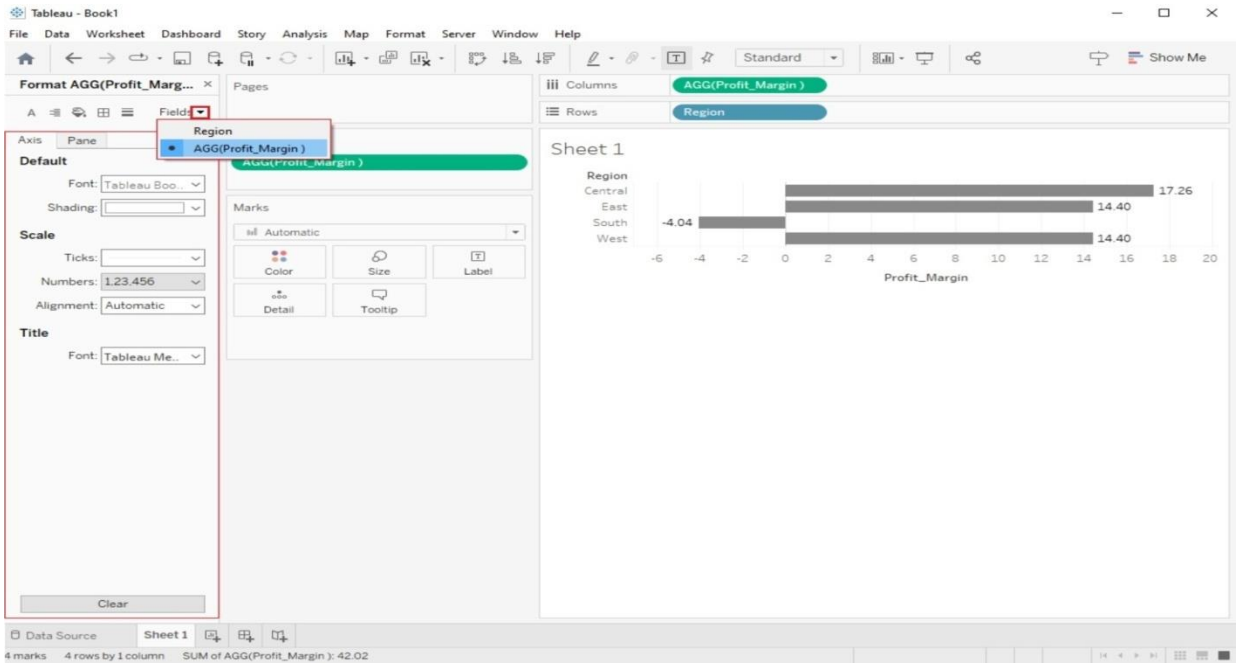
2. Marks Card:

The Marks card, located above your visualization, offers formatting options specific to the type of marks you're using (e.g., color, size, label). Click on the Marks card to access these options and modify how your data is represented.



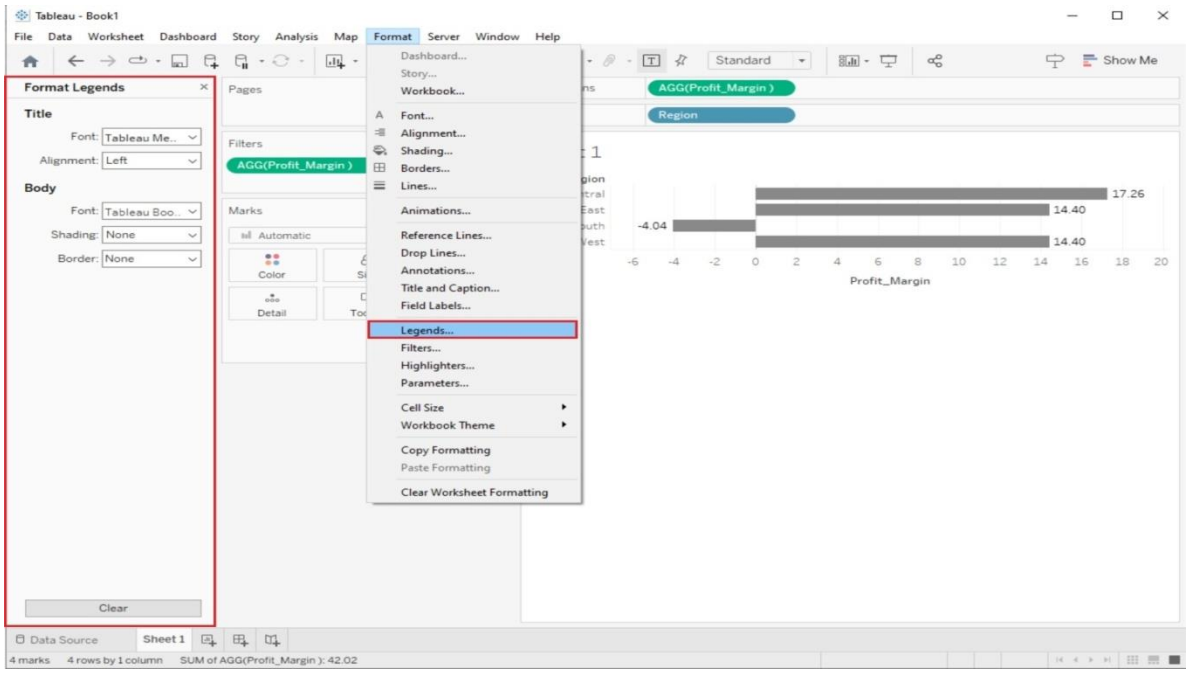
3. Axis and Gridlines:

You can format axis labels, titles, and gridlines to improve the readability of your visualization. Right-click on an axis or gridline to access formatting options.



4. Legends and Color Scales:

Customize legends and color scales to provide context for your visualizations. You can change colors, labels, and the position of legends to match your data.

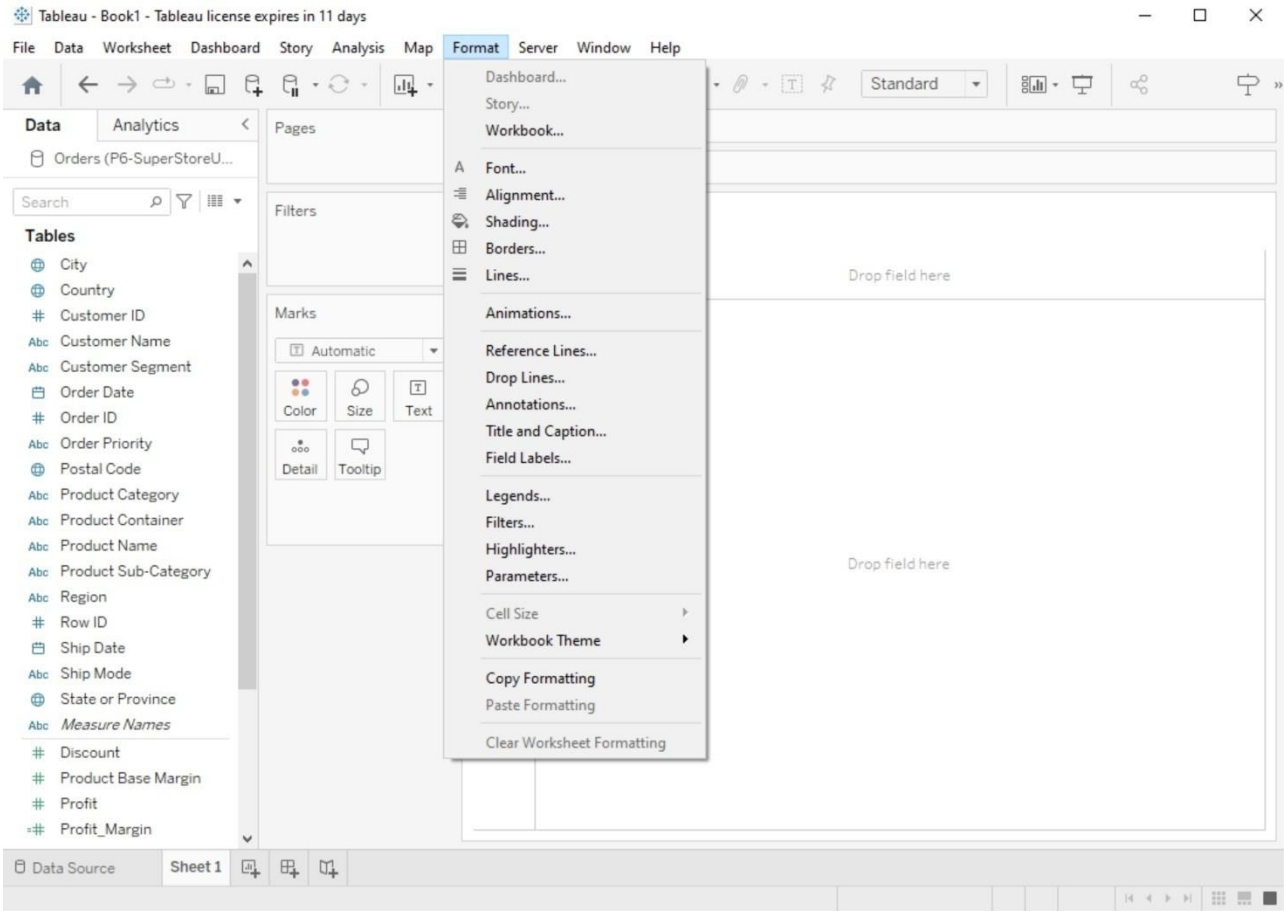


Formatting Tools and Menus

Tableau provides several formatting tools and menus to help you refine the appearance of your visualizations:

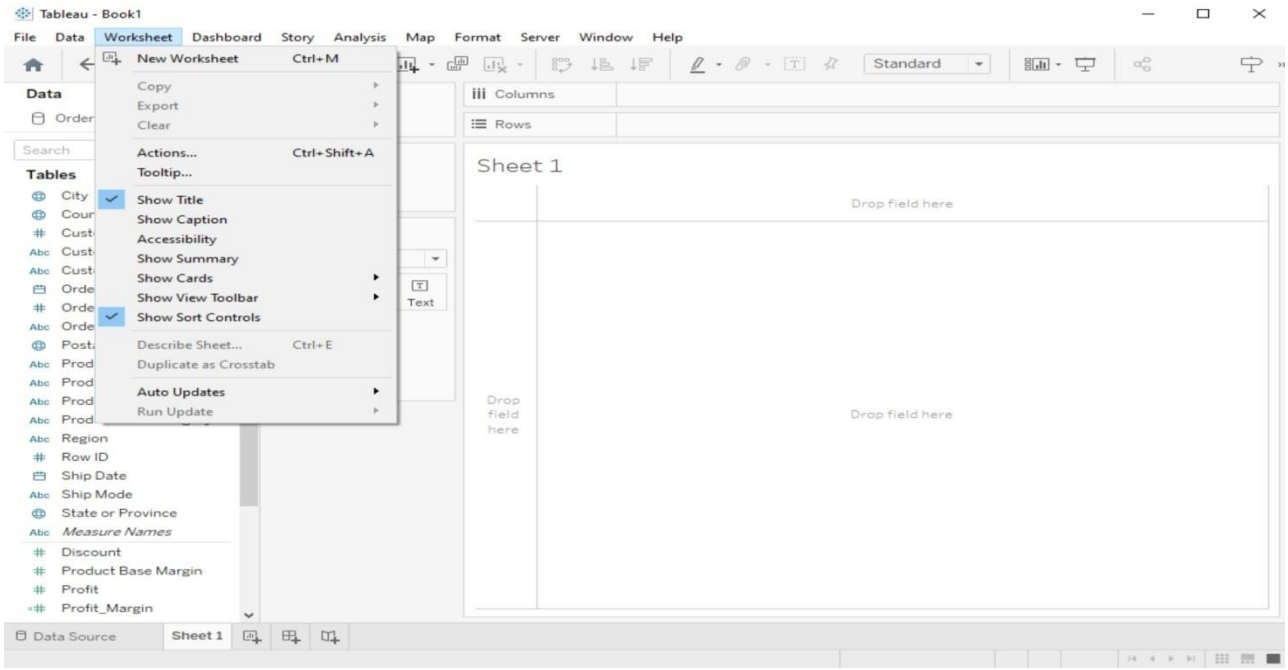
1. Format Menu:

The Format menu at the top of the Tableau interface provides access to various formatting options, including font styles, shading, borders, alignment, and more. You can use this menu to format text, labels, and other elements.



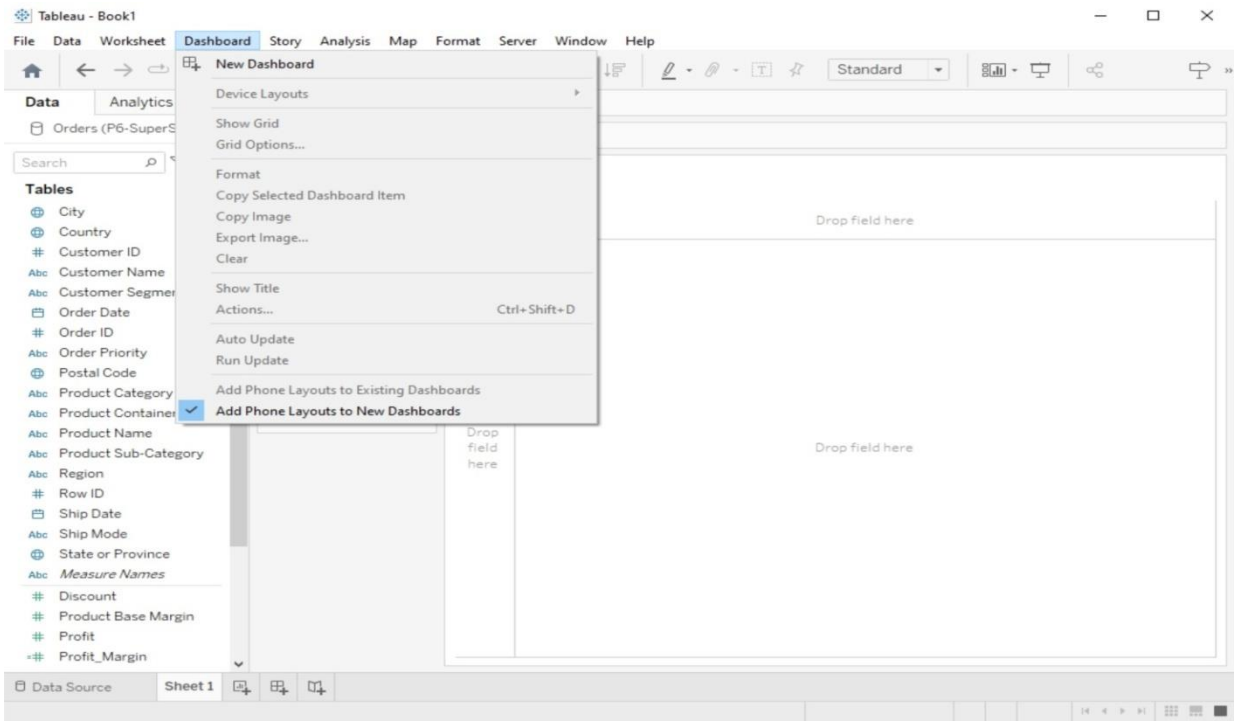
2. Worksheet Menu:

In the Worksheet menu, you'll find options to format the entire worksheet, including background color, borders, and worksheet title. You can also adjust the worksheet size.



3. Dashboard Menu:

If you're working with dashboards, the Dashboard menu allows you to format the entire dashboard layout, including background, size, and title.

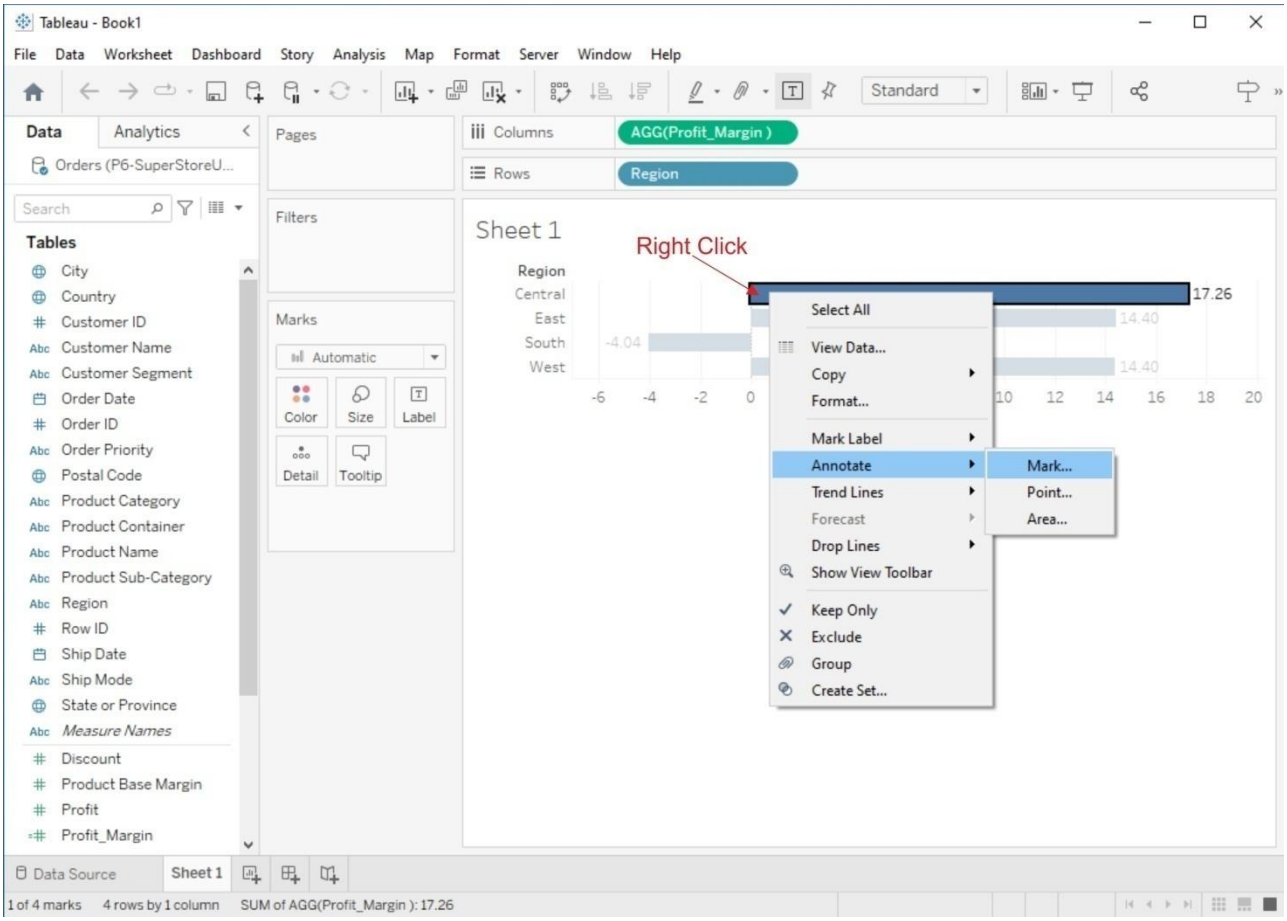


Formatting Specific Parts of the View

Tableau lets you format specific elements of your visualization:

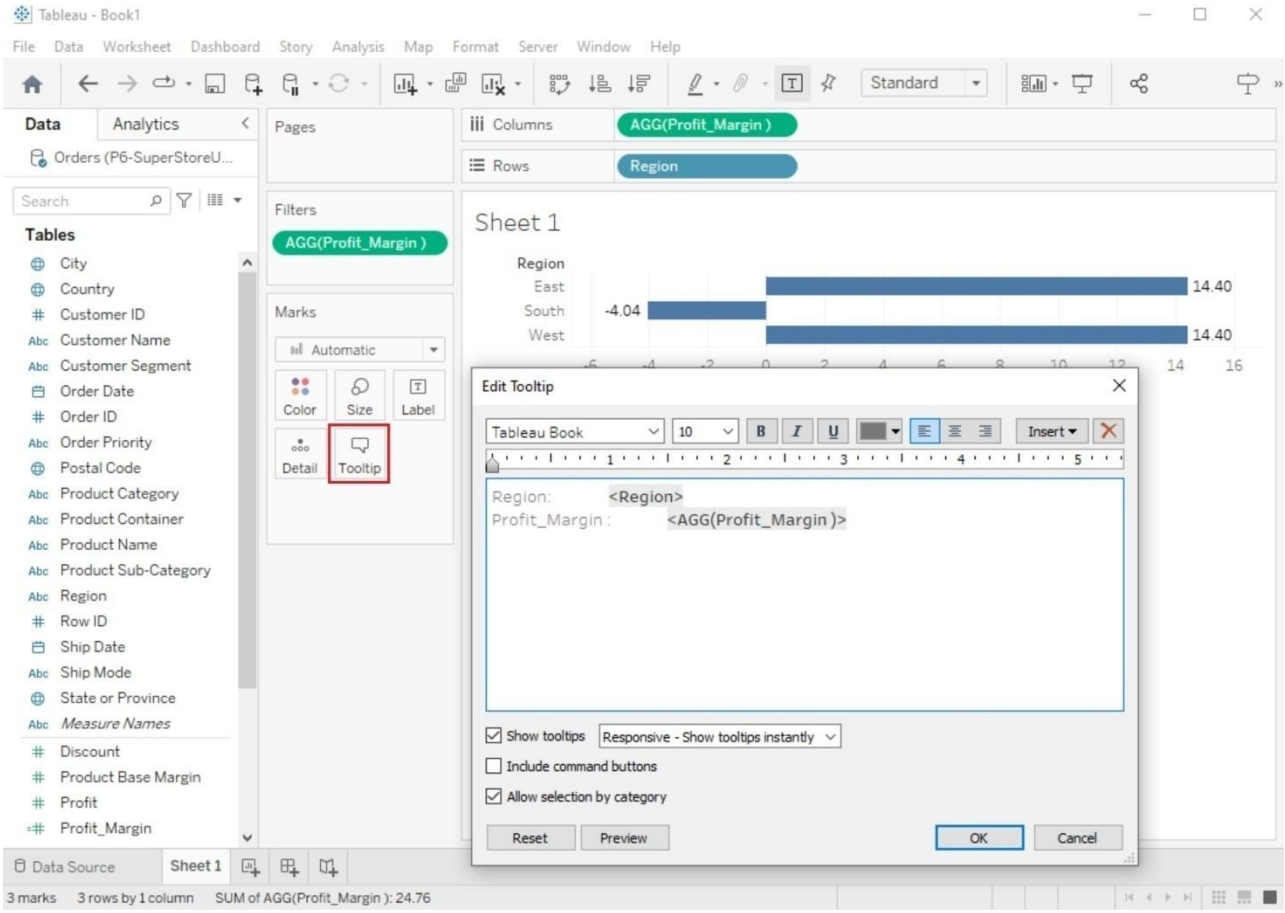
1. Annotations:

You can add annotations to your visualizations to highlight important points or provide additional context. Format these annotations using the options available when you right-click on an annotation.



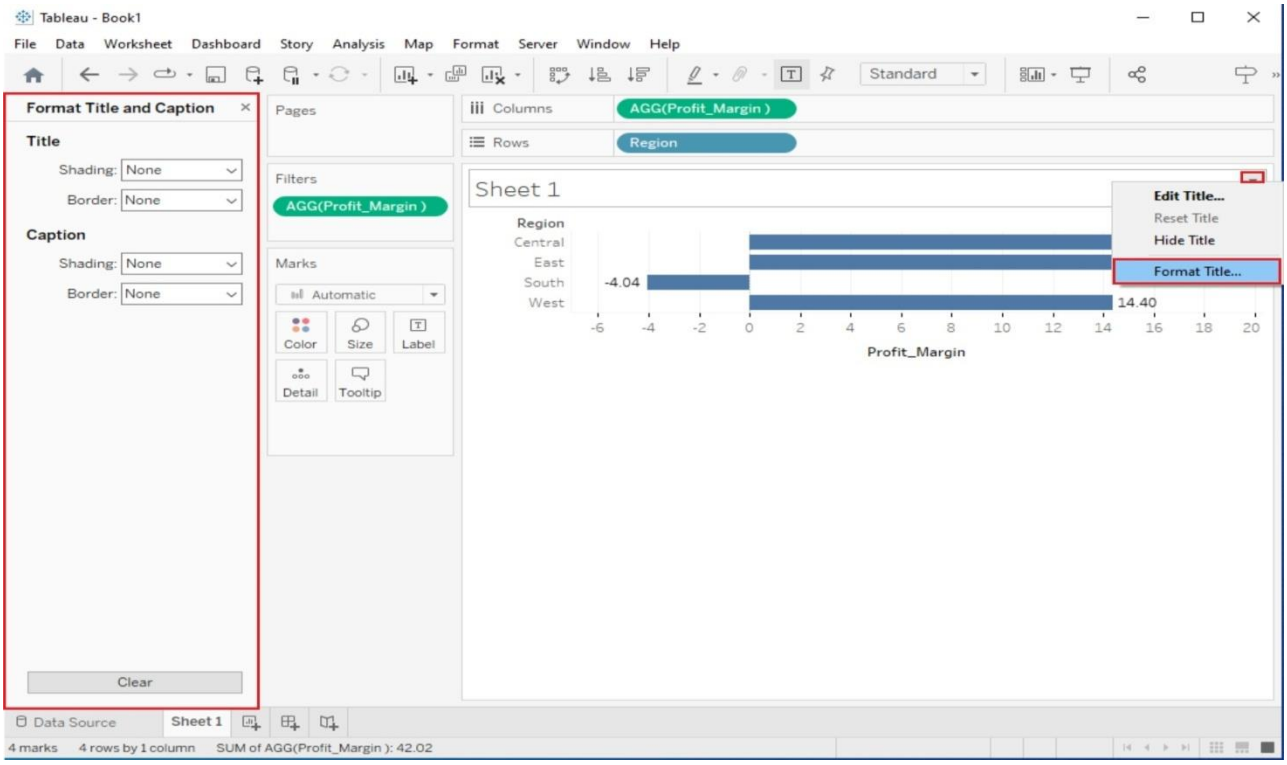
2. Tooltips:

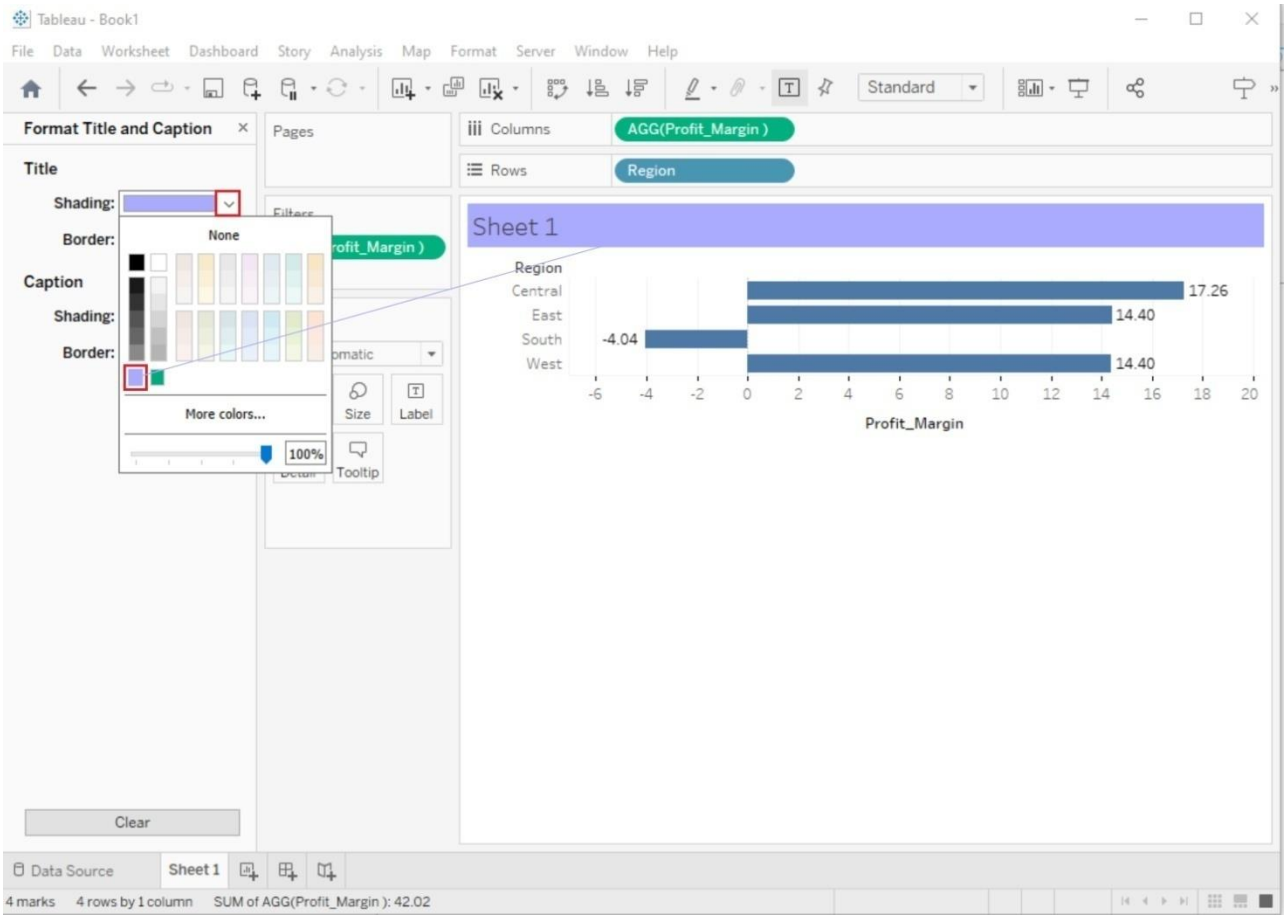
Customize tooltips to display relevant information when users hover over data points. You can format tooltips to show or hide specific fields and control their appearance.



3. Headers and Titles:

Format headers, titles, and subtitles for clarity and consistency. Use the Format pane or the Format menu to adjust text formatting, alignment, and shading.





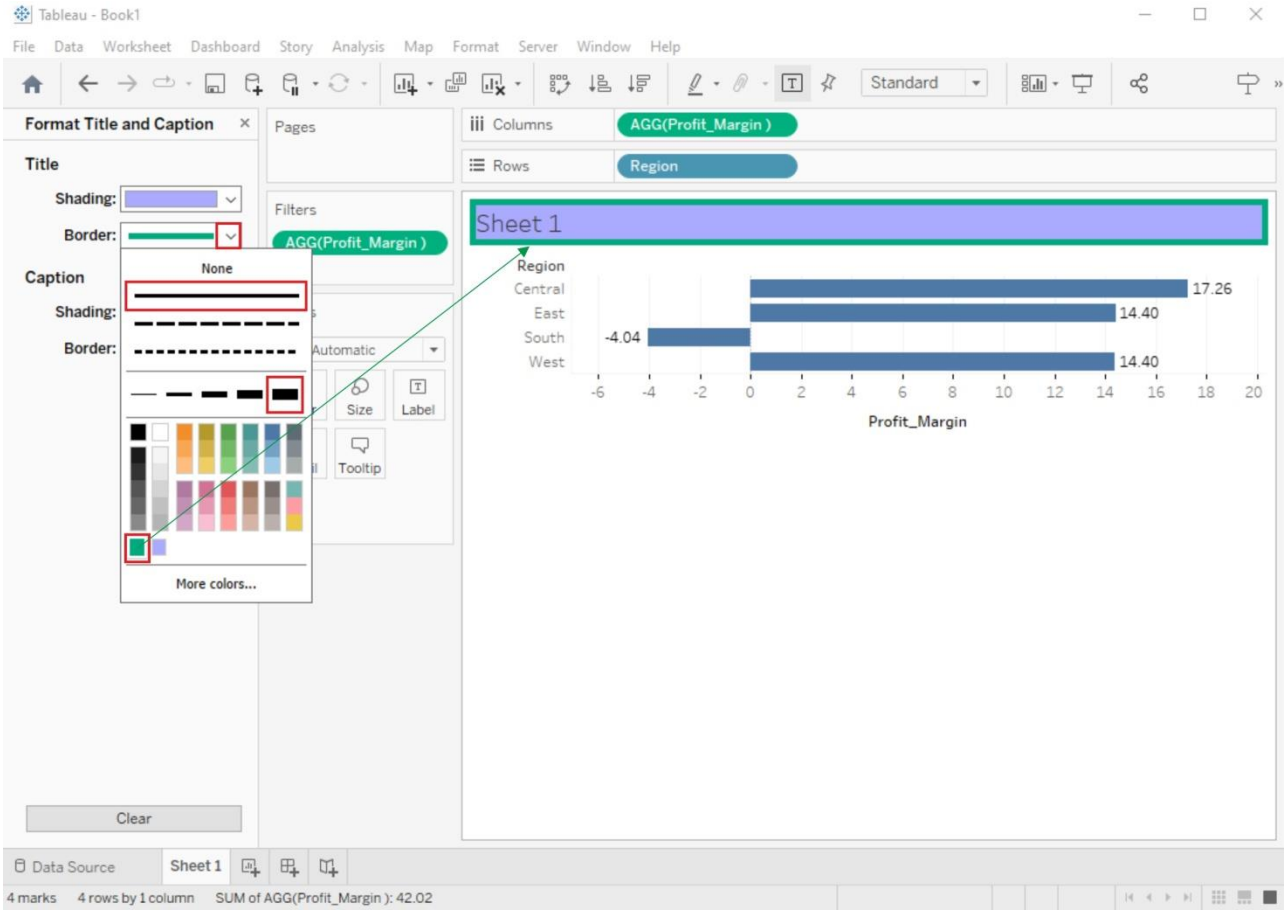
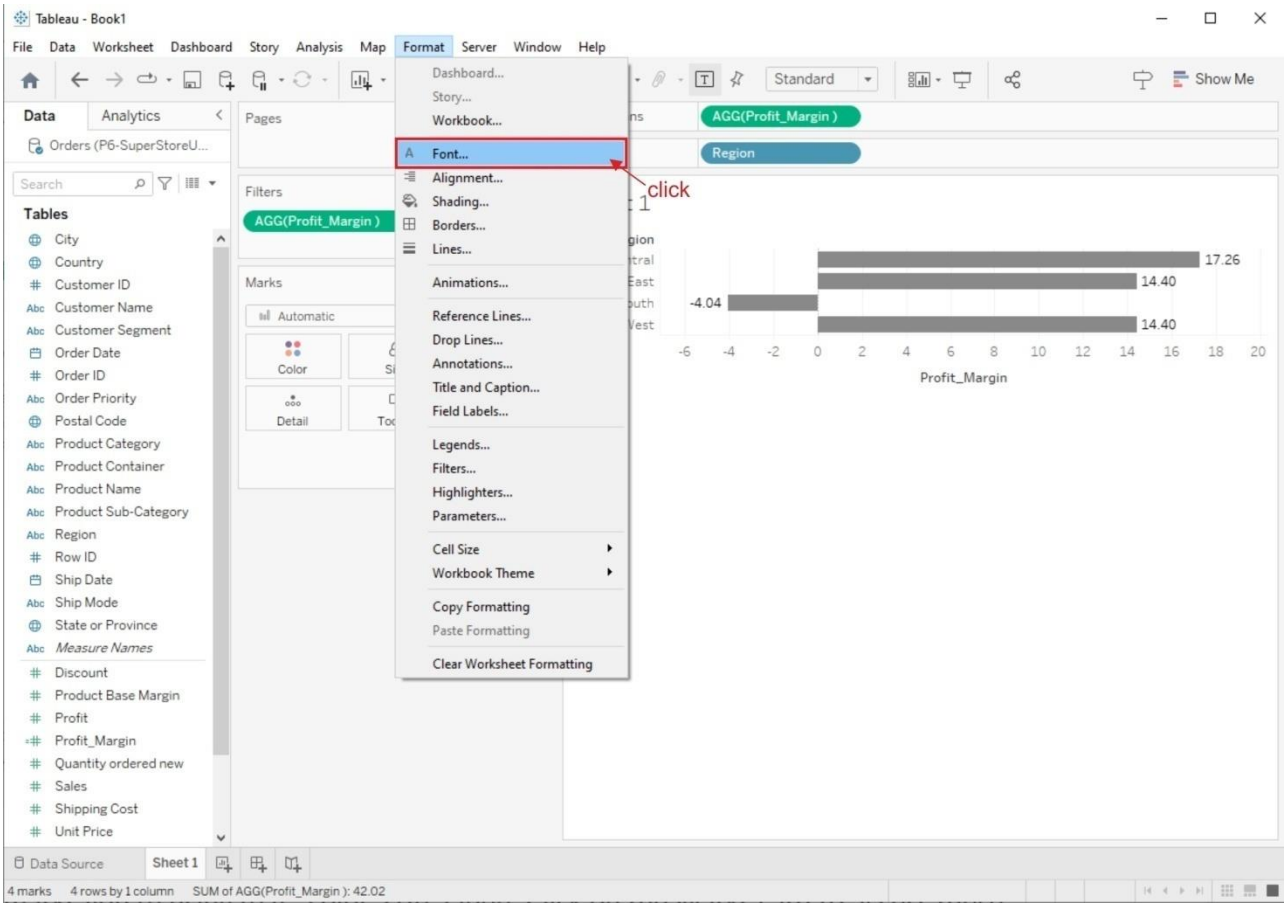


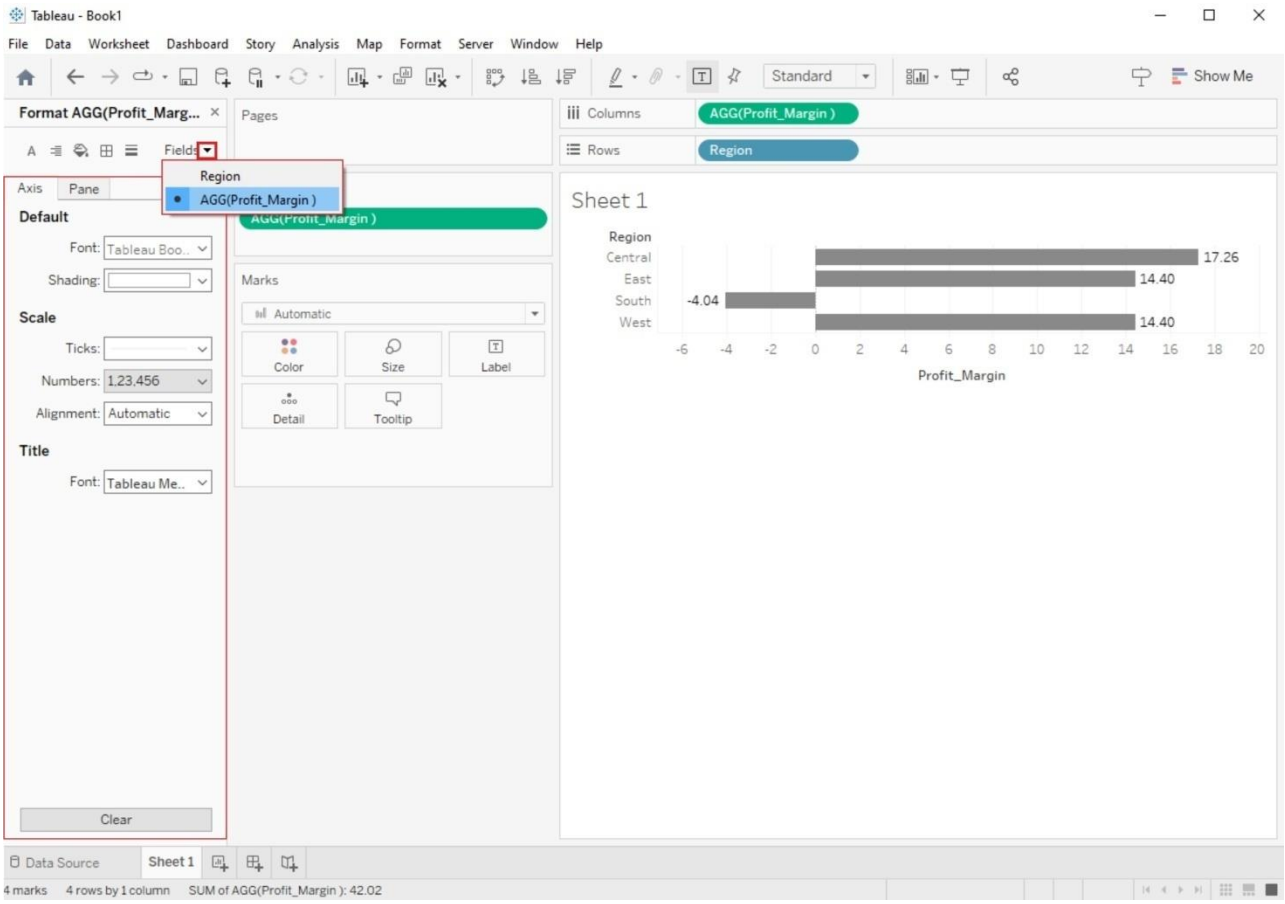
Tableau - Book1
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Format Title and Caption
Title
Shading:
Border:
Caption
Shading:
Border:
None
More colors...
Pages
Filters
AGG(Profit_Margin)
Automatic
Size
Label
Tooltip
Clear
Columns
AGG(Profit_Margin)
Rows
Region
Sheet 1
Region
Central
East
South
West
17.26
14.40
-4.04
14.40
-6 -4 -2 0 2 4 6 8 10 12 14 16 18 20
Profit_Margin
Data Source
Sheet 1
4 marks
4 rows by 1 column
SUM of AGG(Profit_Margin): 42.02

5.Editing and Formatting Axes, Manipulating Data in Tableau data, Pivoting Tableau data.

Solution :

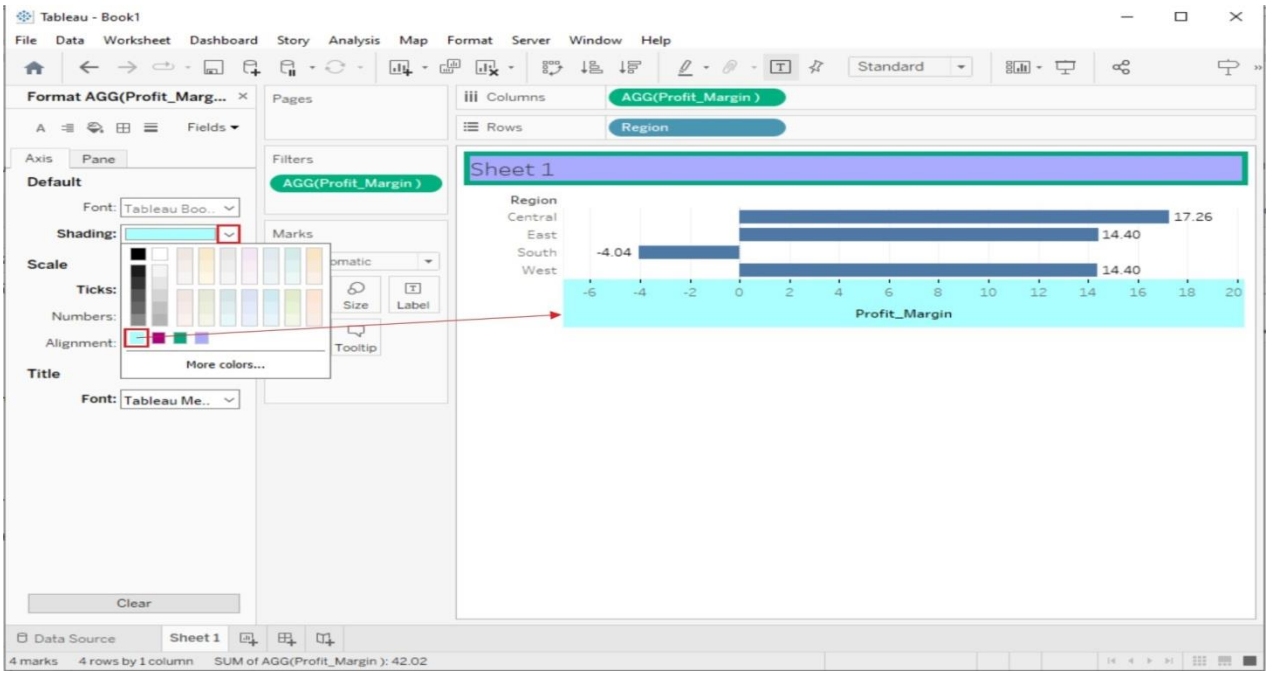
Editing and Formatting Axes:

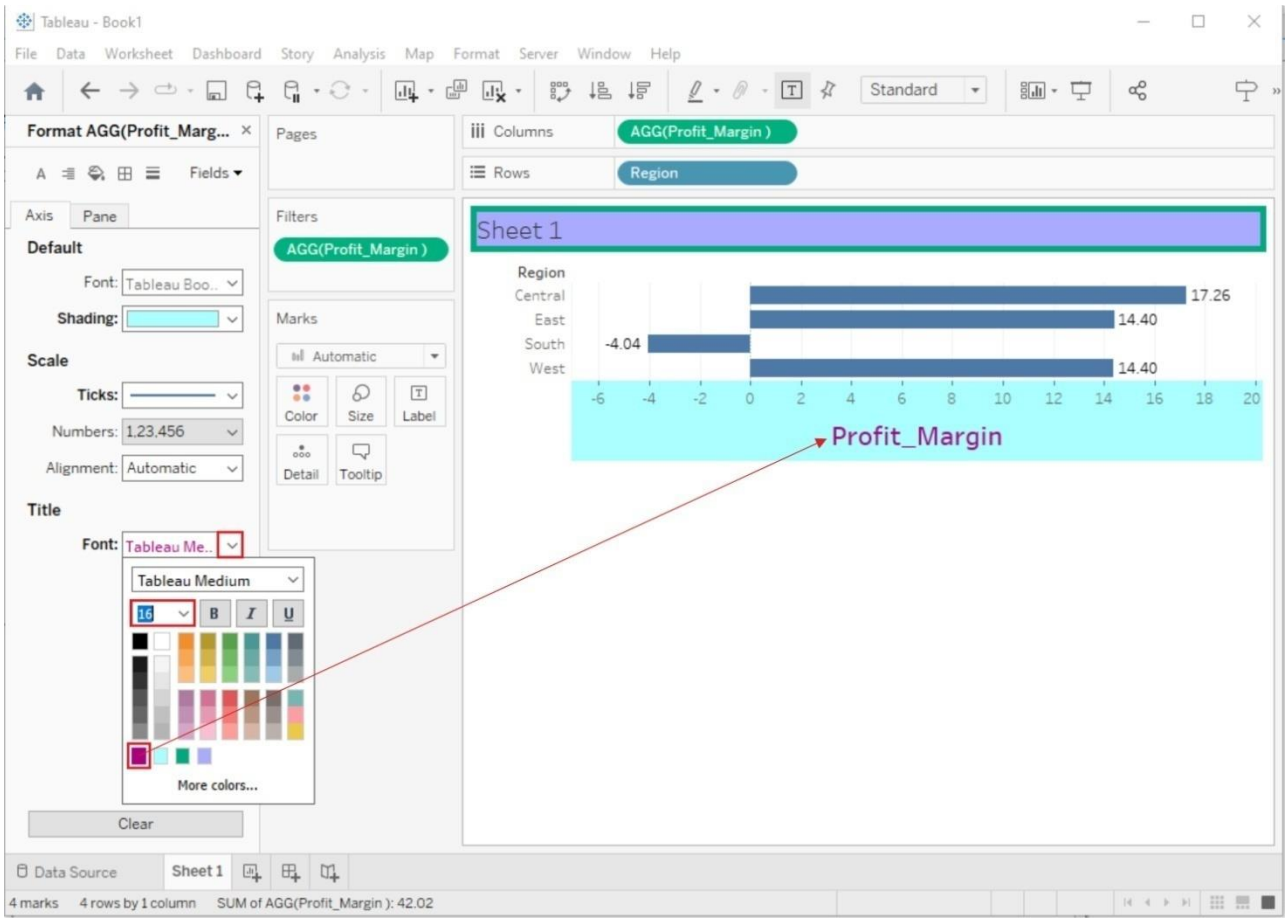




1. Edit Axis Title:

- Click on the axis title you want to edit.
- You can now modify the title text, font, size, color, and alignment using the Format pane or the toolbar at the top.



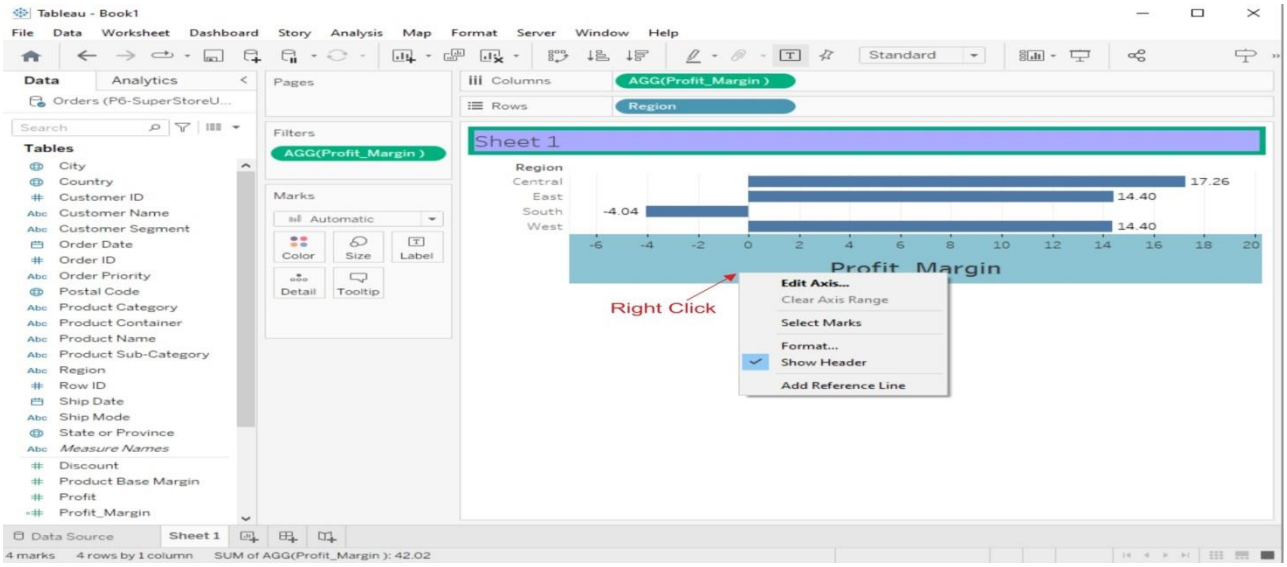


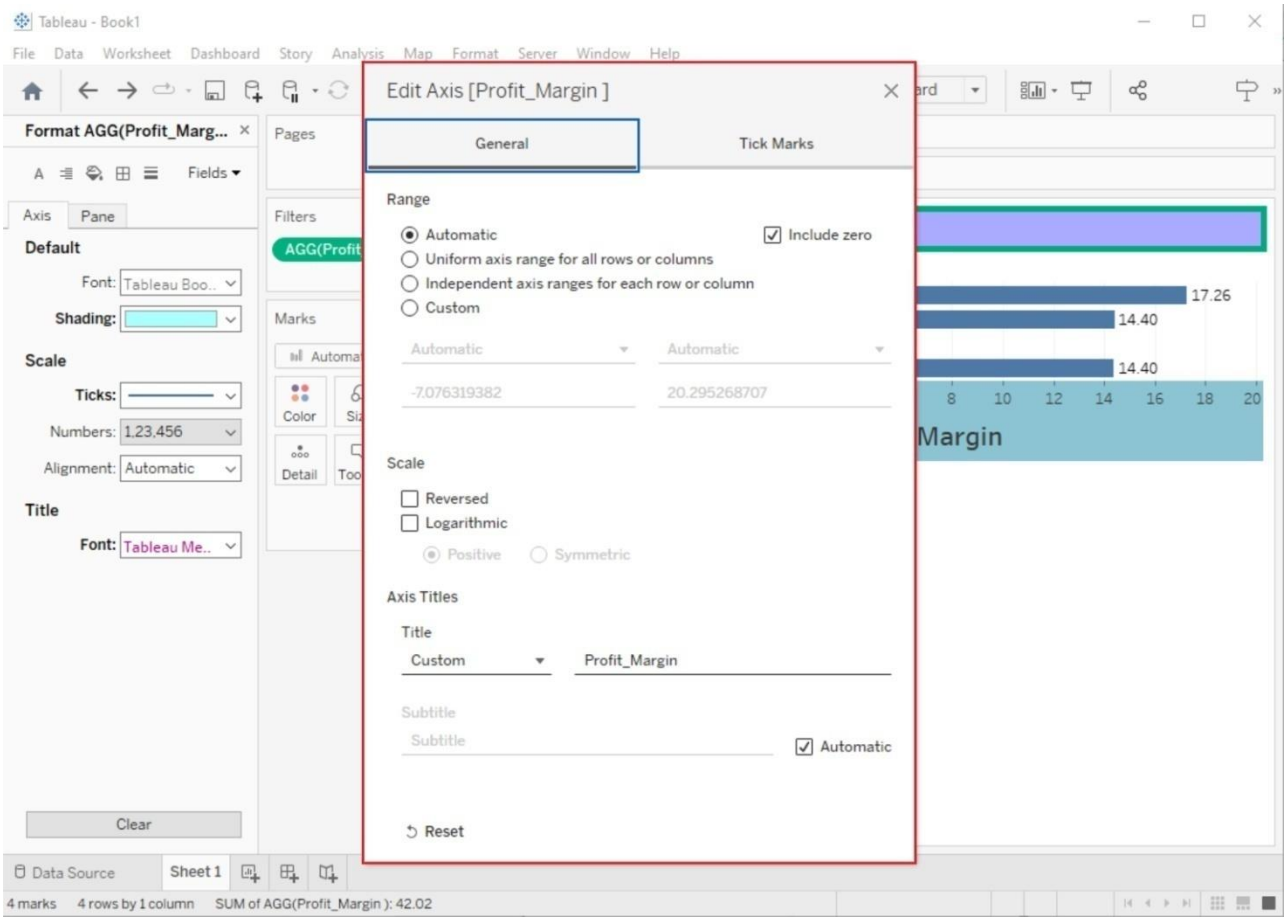
2. Edit Axis Labels:

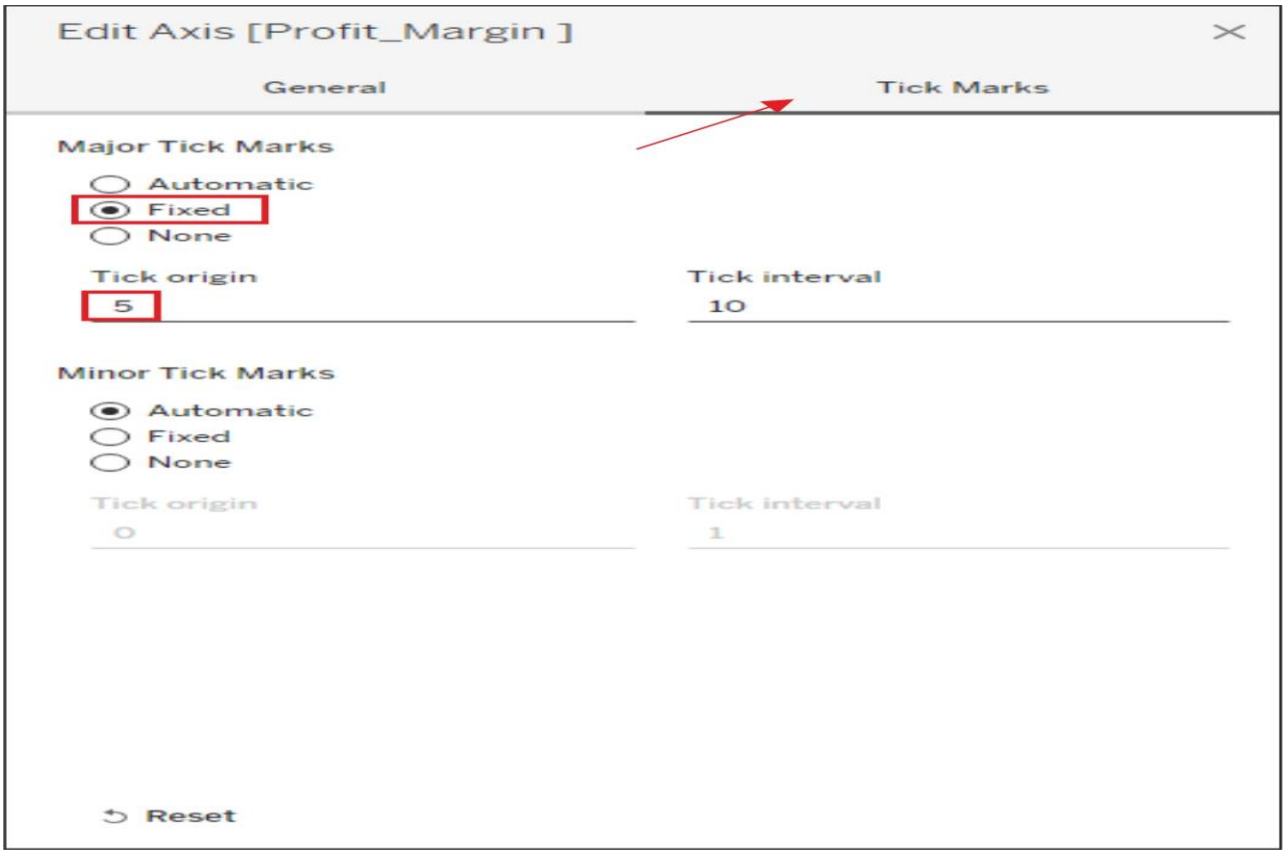
- Right-click on an axis and select "Edit Axis."
- In the Edit Axis dialog box, you can change the formatting of labels, tick marks, and other axis-related properties.

3. Scale and Range:

- To change the scale or range of an axis, right-click on it and select "Edit Axis."
- In the dialog box, adjust the Minimum and Maximum values, scale, or range according to your needs.






Edit Axis [Profit_Margin]
General
Tick Marks
Major Tick Marks
Automatic
Fixed
None
Tick origin
5
Tick interval
10
Minor Tick Marks
Automatic
Fixed
None
Tick origin
0
Tick interval
1
Reset

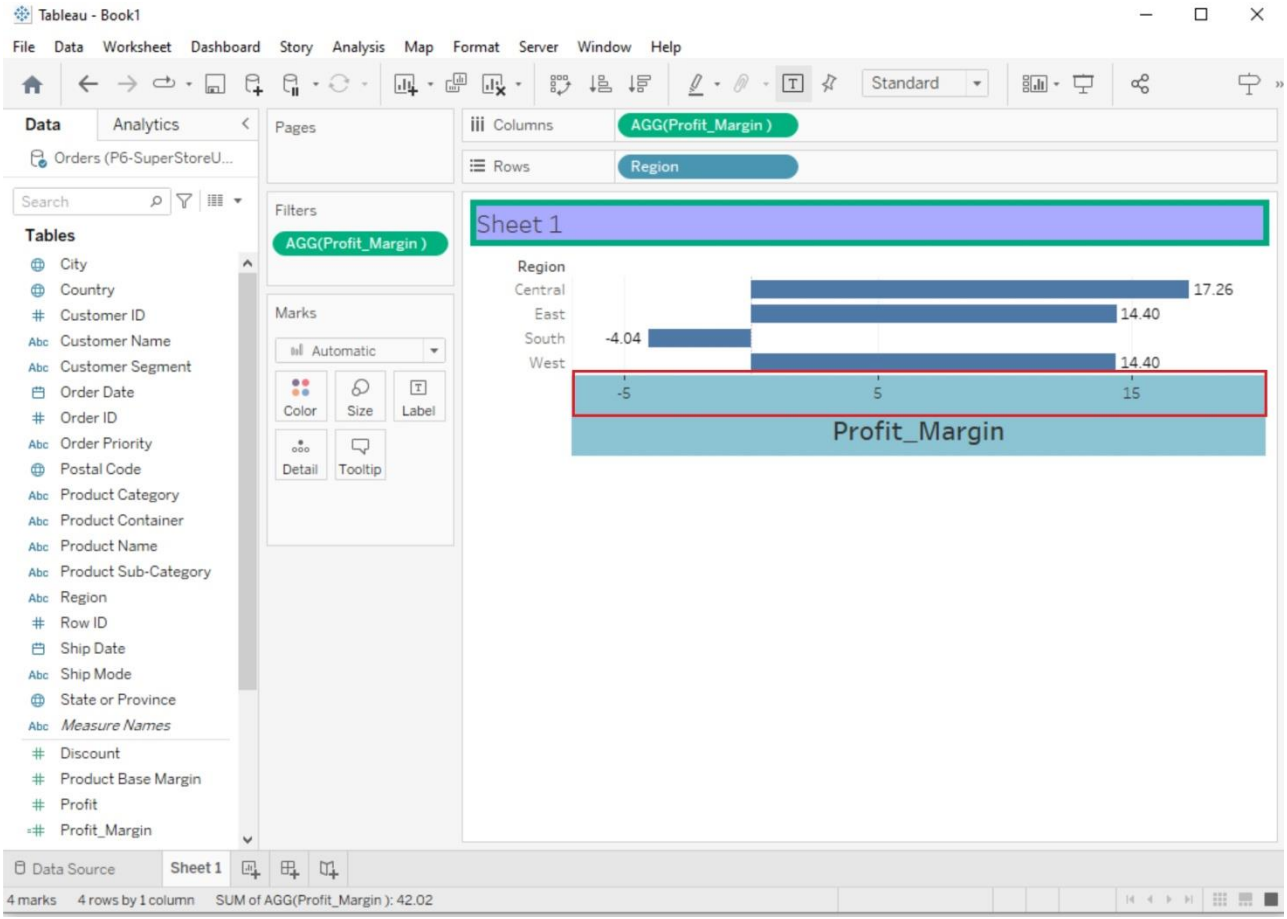
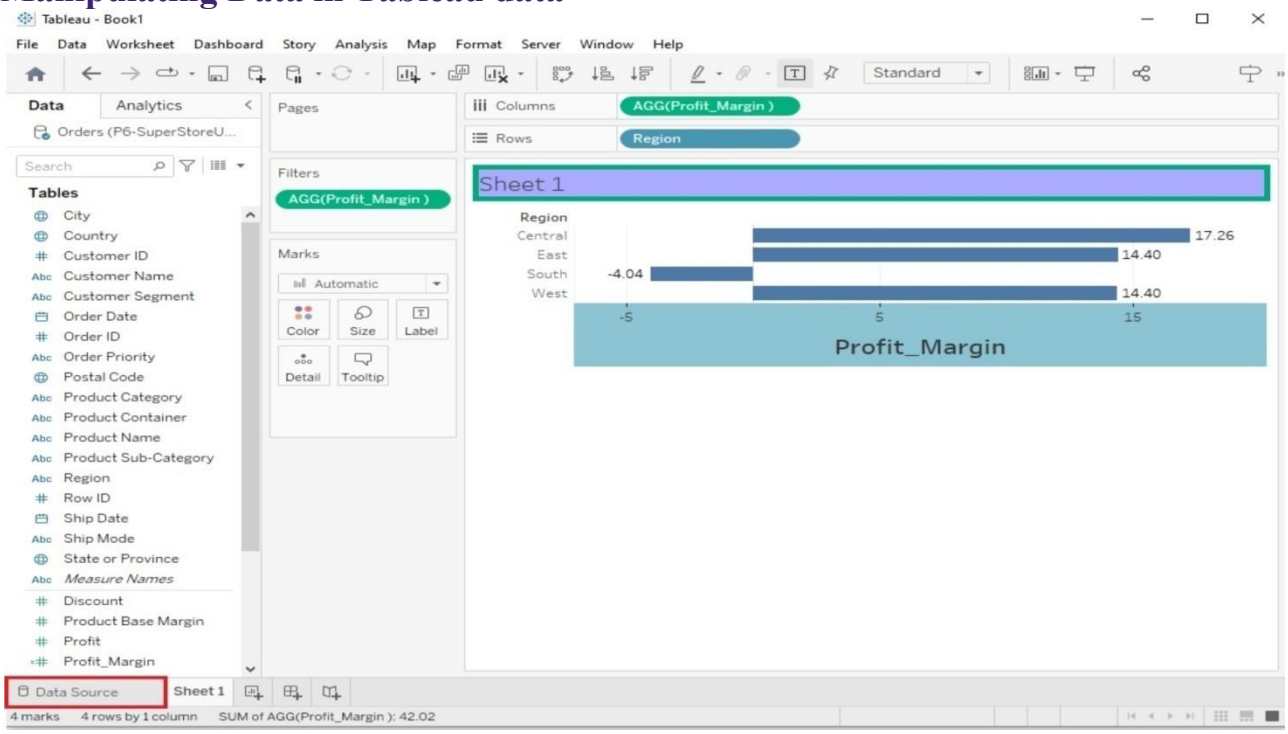


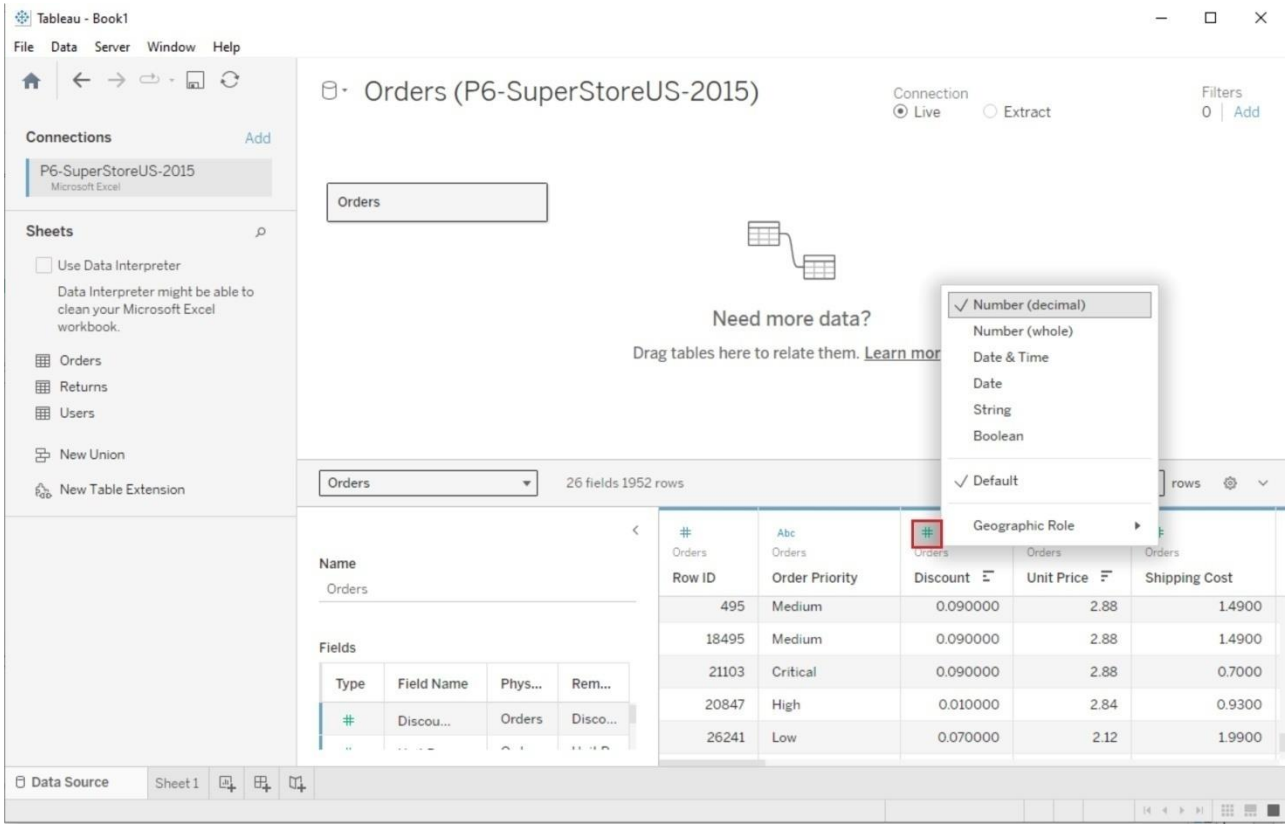
Tableau - Book1
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Standard
Data
Analytics
Orders (P6-SuperStoreU...
Search
Tables
City
Country
Customer ID
Customer Name
Customer Segment
Order Date
Order ID
Order Priority
Postal Code
Product Category
Product Container
Product Name
Product Sub-Category
Region
Row ID
Ship Date
Ship Mode
State or Province
Measure Names
Discount
Product Base Margin
Profit
Profit_Margin
Pages
Filters
AGG(Profit_Margin)
Marks
Automatic
Color
Size
Label
Detail
Tooltip
Columns
AGG(Profit_Margin)
Rows
Region
Sheet 1
Region
Central
East
South
West
17.26
14.40
-4.04
14.40
-5
5
15
Profit_Margin
Data Source
Sheet 1
4 marks
4 rows by 1 column
SUM of AGG(Profit_Margin): 42.02

Manipulating Data in Tableau data



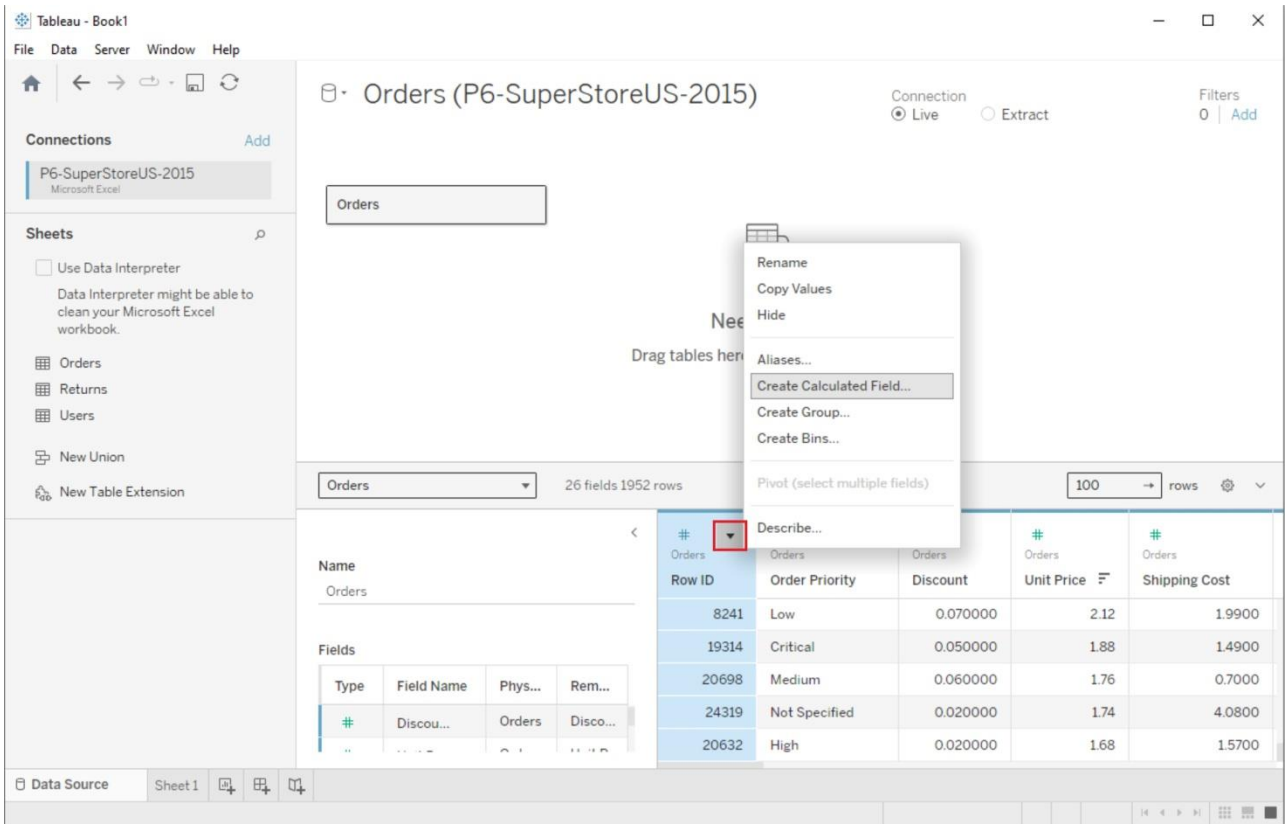
Change Data Type

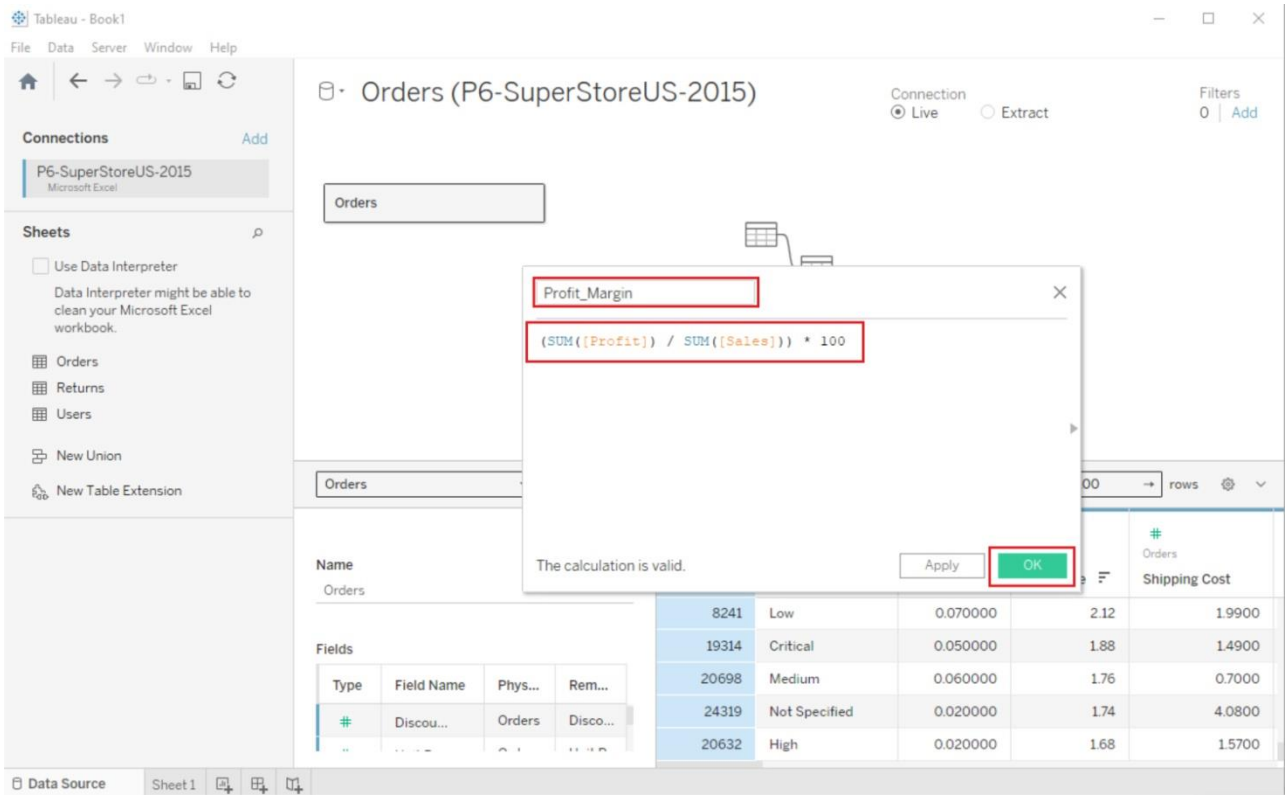
If Tableau has inferred a wrong data type for a column, the data type can be changed by clicking on the data type symbol in the column header

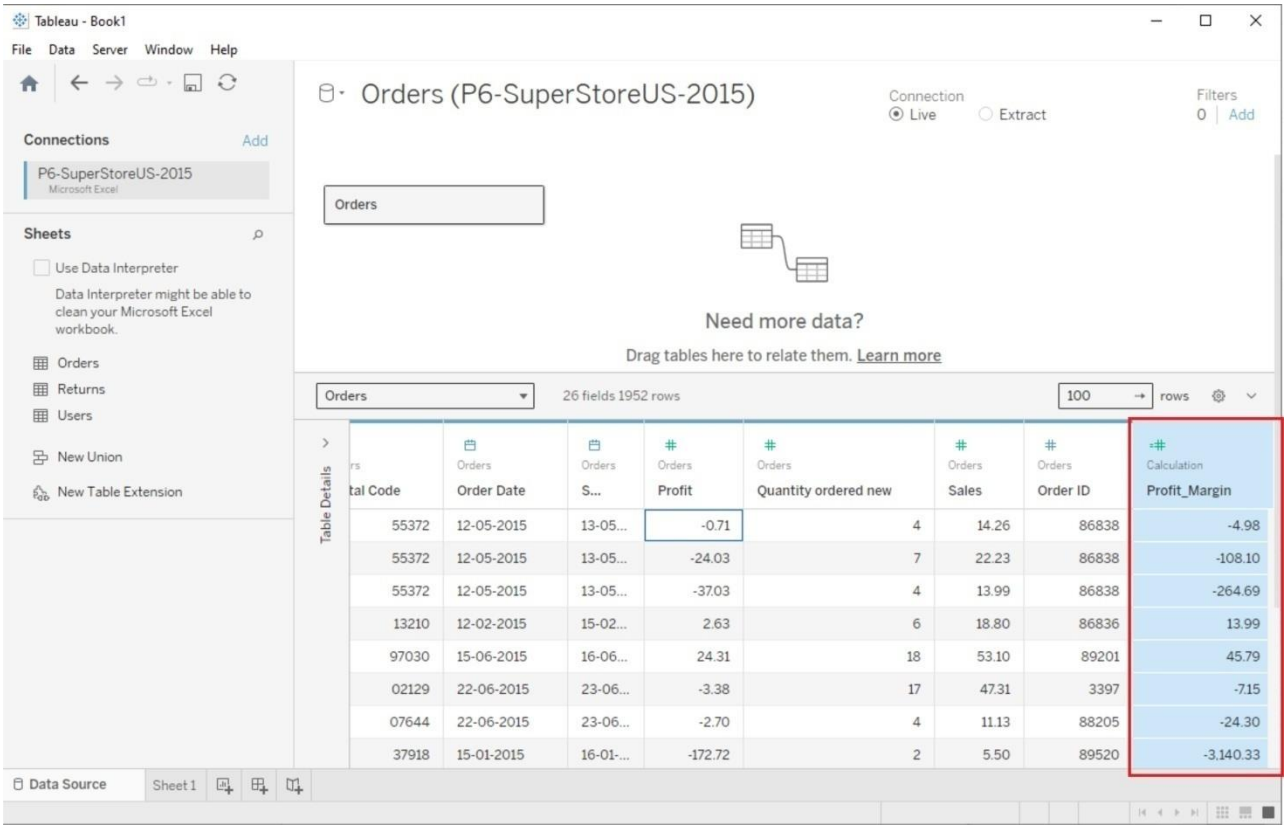


New Column(Calculated Fields)

Calculated fields can be used if you need to create customized logic for manipulating certain data types or data values. There are a large-range of functions available in Tableau that can used individually or collectively for data manipulation

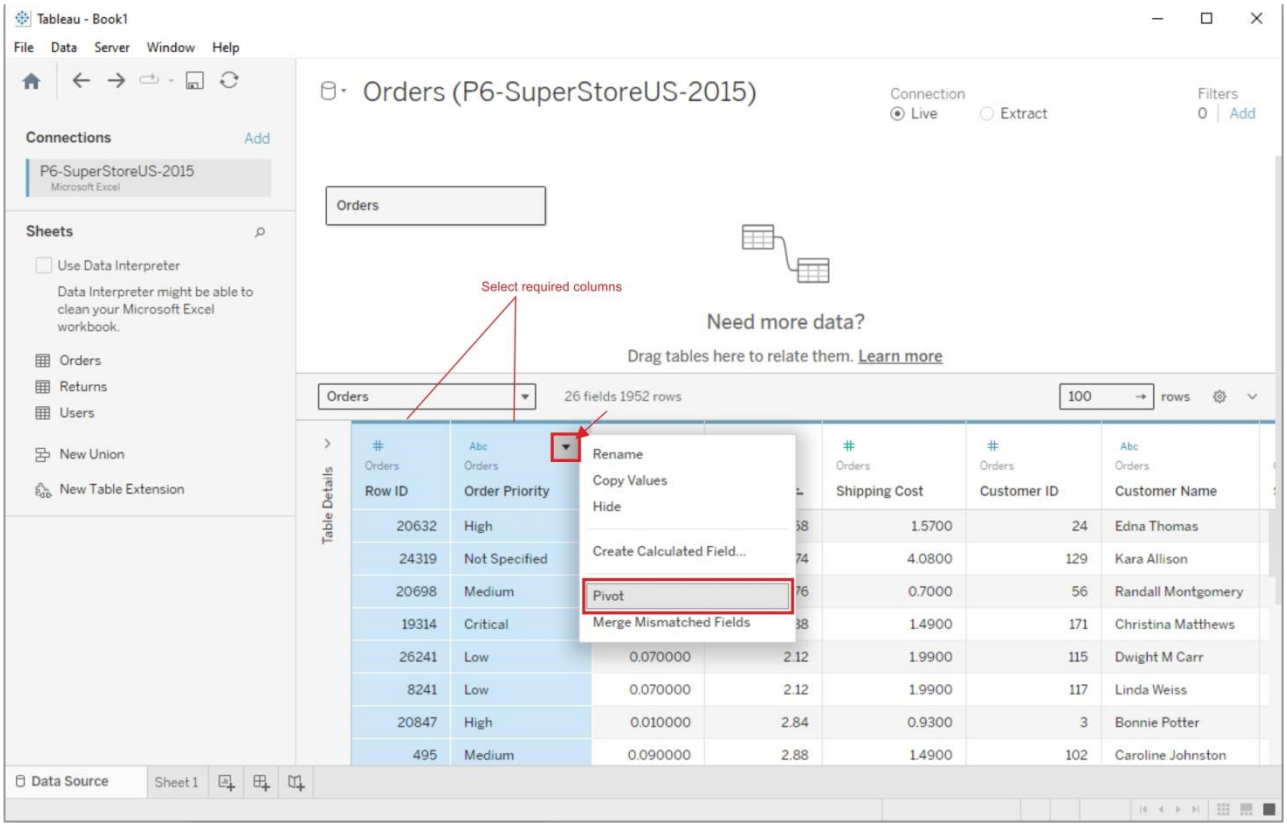


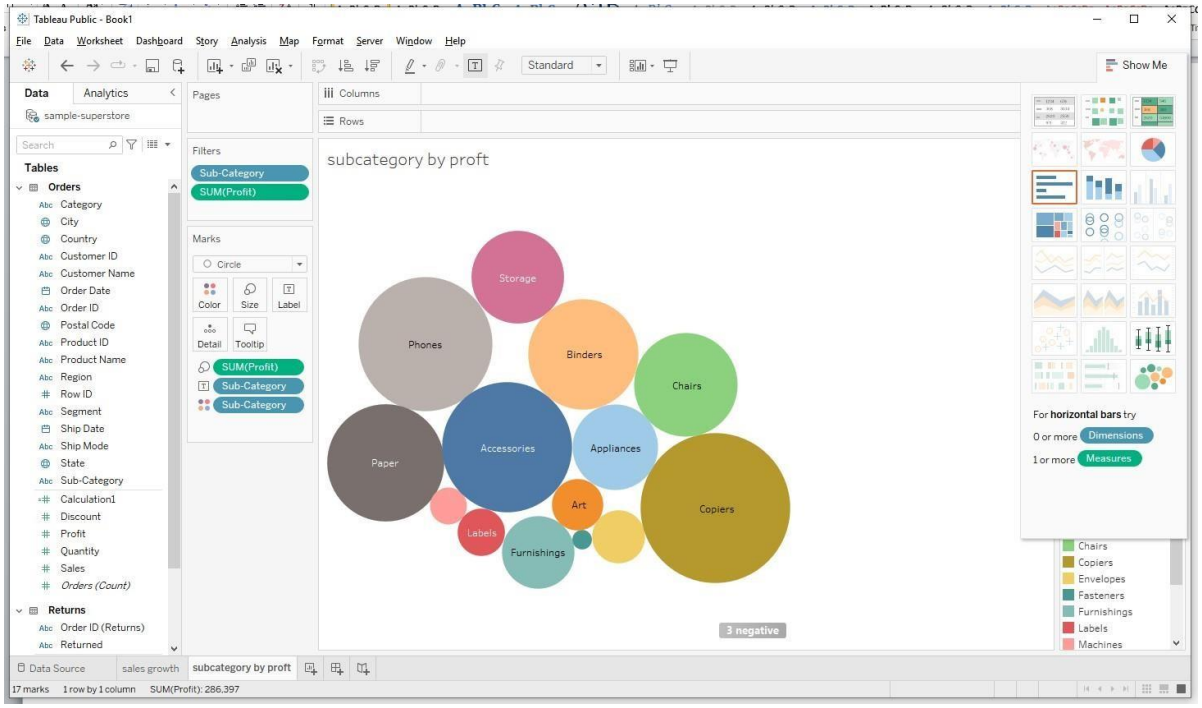




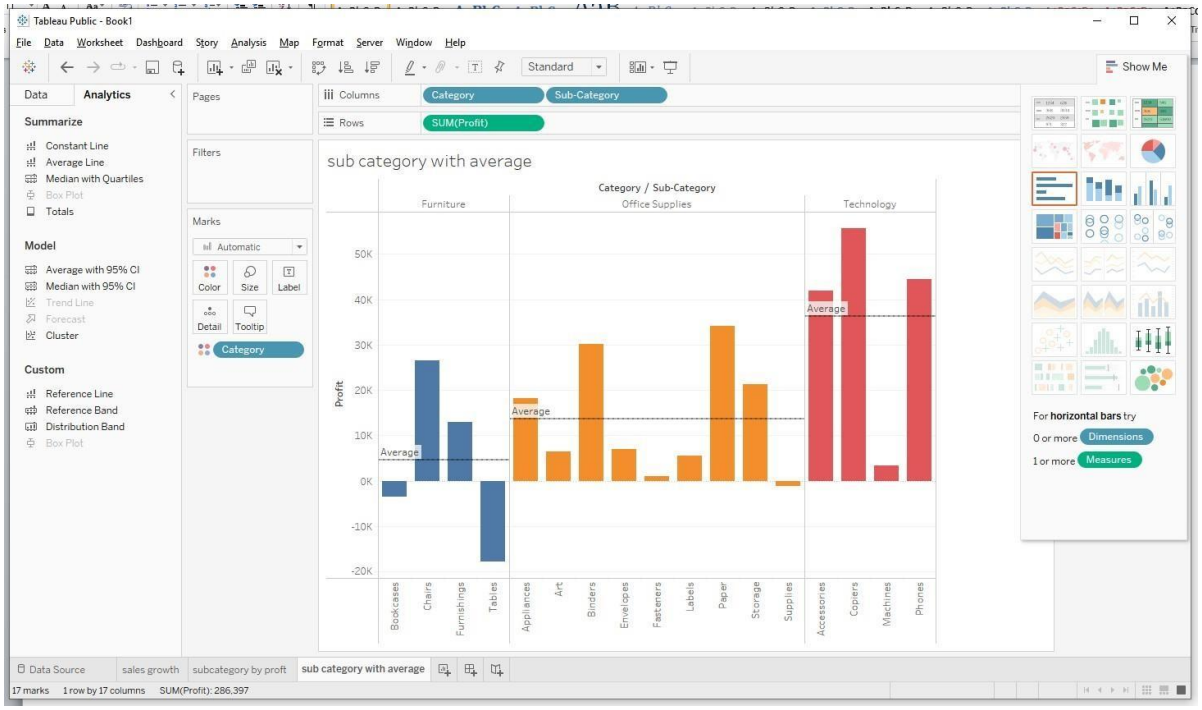
Pivoting Tableau data

Data pivoting enables you to rearrange the columns and rows in a report so you can view data from different perspectives

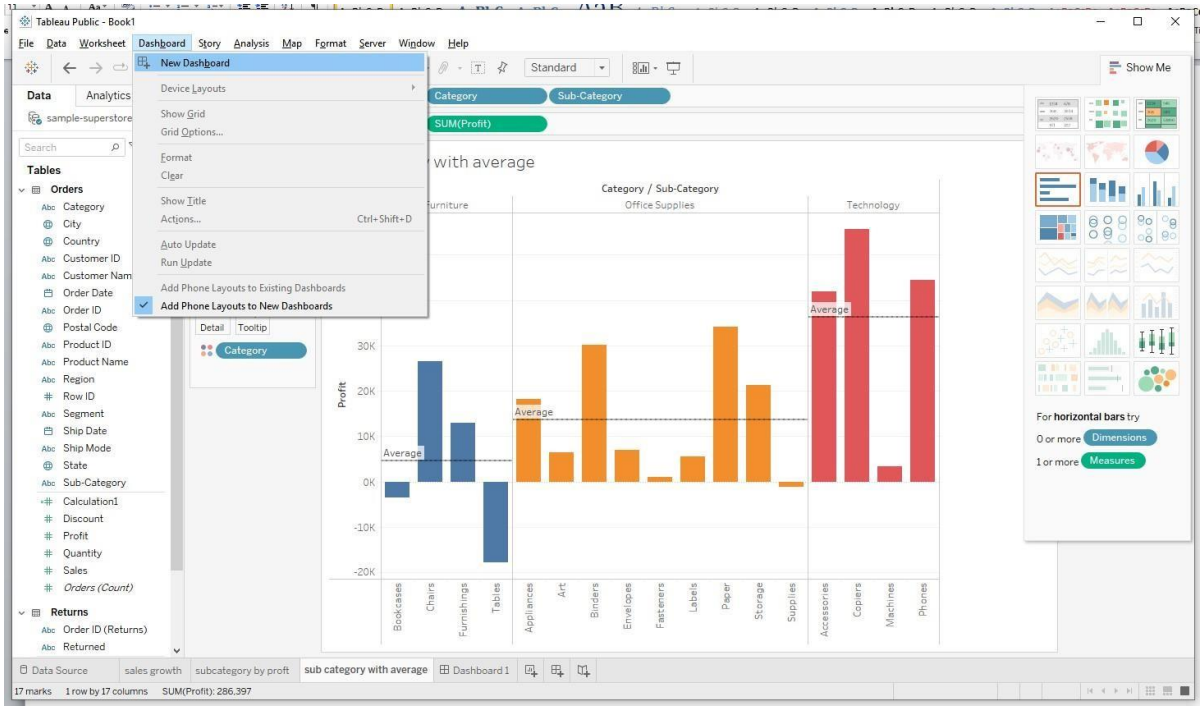




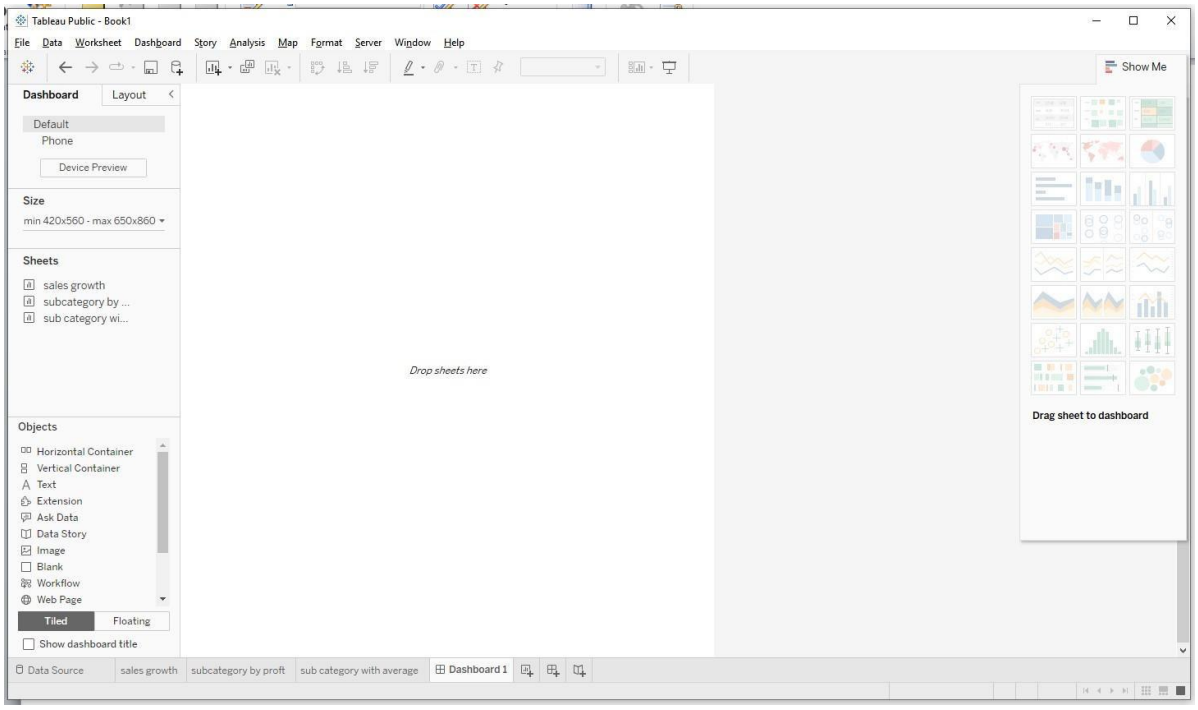
Next 3rd view is created as follows for profit for each subcategory in the category with averages.



After creating individual views, now a Dashboard can be created by clicking on create dashboard at the toolbar.



after clicking on new dashboard option, the screen is shown below.



now the sheets or views which are created earlier can be drag and dropped on this dashboard. The above three created views are placed in the dashboard as follows. One can follow their own way of importing sheets on the dashboard. After creating dahsboard, title can be given to the dashboard from Dashboard tab. Dahsboard can be customized in terms of its appearance by the user if requied. Dashboard once created can be saved on users system and can be retrieved whenever required.

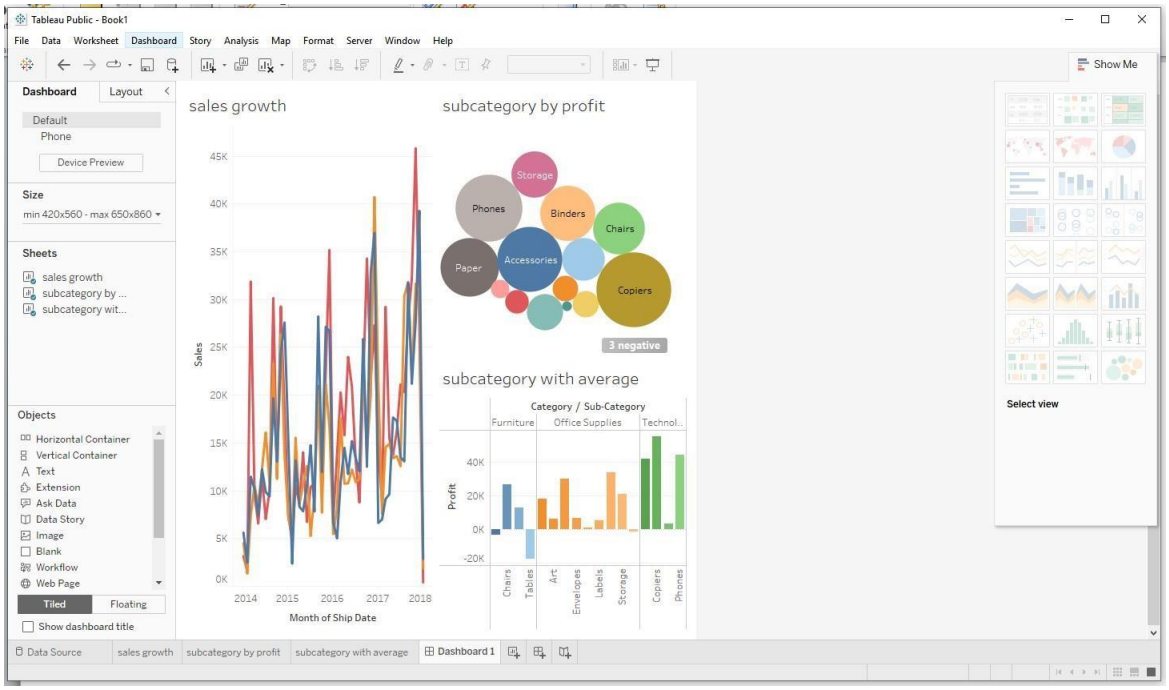


Tableau Public - Book1
File Data Worksheet Dashboard Story Analysis Map Format Server Window Help
Show Me
Dashboard Layout
Default
Phone
Device Preview
Size
min 420x560 - max 650x860
Sheets
sales growth
subcategory by ...
subcategory wit...
Objects
Horizontal Container
Vertical Container
Text
Extension
Ask Data
Data Story
Image
Blank
Workflow
Web Page
Tiled Floating
Show dashboard title
sales growth
45K
40K
35K
30K
25K
20K
15K
10K
5K
0K
Sales
2014 2015 2016 2017 2018
Month of Ship Date
subcategory by profit
Storage
Phones
Binders
Chairs
Paper
Accessories
Copiers
3 negative
subcategory with average
Category / Sub-Category
Furniture
Office Supplies
Technol..
Profit
40K
20K
0K
-20K
Chairs
Tables
Art
Envelopes
Labels
Storage
Copiers
Phones
Select view
Data Source
sales growth
subcategory by profit
subcategory with average
Dashboard 1

6.Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data

Structure Data for Analysis:

Data preparation is the process of getting well formatted data into a single table or multiple related tables so it can be analyzed in Tableau. This includes both the structure, i.e. rows and columns, as well as aspects of data cleanliness, such correct data types and correct data values.

How structure impacts analysis

The structure of our data may not be something we can control. The rest of this topic assumes that we have access to the raw data and the tools needed to shape it, such as Tableau Prep Builder. However, there may be situations when we can't pivot or aggregate our data as desired. It is often still possible to perform the analysis but we may need to change your calculations or how we approach the data. For an example of how to perform the same analysis with different data structures.

Data Structure

Tableau Desktop works best with data that is in tables formatted like a spreadsheet. That is, data stored in rows and columns, with column headers in the first row.

What is a row?

A row, or record, can be anything from information around a transaction at a retail store, to weather measurements at a specific location, or stats about a social media post.

It's important to know what a record (row) in the data represents. This is the *granularity* of the data.

Here, each record is a day

Date	Max TemperatureF	Mean Tempera
1/1/2015	42	
1/2/2015	42	
1/3/2015	41	
1/4/2015	51	
1/5/2015	54	
1/6/2015	54	
1/7/2015	46	
1/8/2015	46	
1/9/2015	50	
1/10/2015	46	

Here, each record is a month

Date	Max TemperatureF	Mean Temperat
January	63	
February	62	
March	69	
April	77	
May	82	
June	92	
July	95	
August	92	
September	81	
October	74	
November	60	

Tip:A best practice is to have a unique identifier (UID), a value that identifies each row as a unique piece of data. Think of it like the social security number or URL of each record. In Superstore, that would be Row ID. Note that not all data sets have a UID but it can't hurt to have one.

Aggregation and Granularity

What is a field or column?

A *column* of data in a table comes into Tableau Desktop as a *field* in the data pane, but they are essentially interchangeable terms. A field of data should contain items that can be grouped into a larger relationship. The items themselves are called *values* or *members* (only discrete dimensions contain members).

The values which are allowed in a given field are determined by the *domain* of the field .For example, a column for "grocery store departments" might contain the members "deli" "bakery", "produce", etc., but it wouldn't include "bread" or "salami" because those are items, not departments. Phrased another way, the domain of the department field is limited to just the possible grocery store departments.

Additionally, a well-structured data set would have a column for "Sales" and a column for "Profit", not a single column for "Money", because profit is a separate concept from sales.

- The domain of the Sales field would be values ≥ 0, since sales cannot be negative.
- The domain of the Profit field, however, would be all values, since profit can be negative.

Note: *Domain* can also mean the values present in the data. If the column "grocery store department" erroneously contained "salami", by this definition, that value would be in the domain of the column.

Categorizing fields

Each column in the data table comes into Tableau Desktop as a field, which appears in the **Data** pane. Fields in Tableau Desktop must be either a dimension or either discrete or continuous .

- *Dimensions* are qualitative, meaning they can't be measured but are instead described. Dimensions are often things like city or country, eye color, category, team name, etc. Dimensions are usually discrete.
- *Measures* are quantitative, meaning they can be measured and recorded with numbers. Measures can be things like sales, height, clicks, etc. In Tableau Desktop, measures are automatically aggregated; the default aggregation is SUM. Measures are usually continuous.
- *Discrete* means individually separate or distinct. Toyota is distinct from Mazda. In Tableau Desktop, discrete values come into the view as a label and they create panes.
- *Continuous* means forming an unbroken, continuous whole. 7 is followed by 8 and then it's the same distance to 9, and 7.5 would fall midway between 7 and 8. In Tableau Desktop, continuous values come into the view as an axis.
- Dimensions are usually discrete, and measures are usually continuous. However, this is not always the case. Dates can be either discrete or continuous.
    - Dates are dimensions and automatically come into the view as discrete (. A trend line applied to a timeline with discrete dates will be broken into multiple trend lines, one per pane.
    - We can chose to use continuous dates if preferred .A trend line applied to a timeline with continuous dates will have a single trend line for the entire date axis.

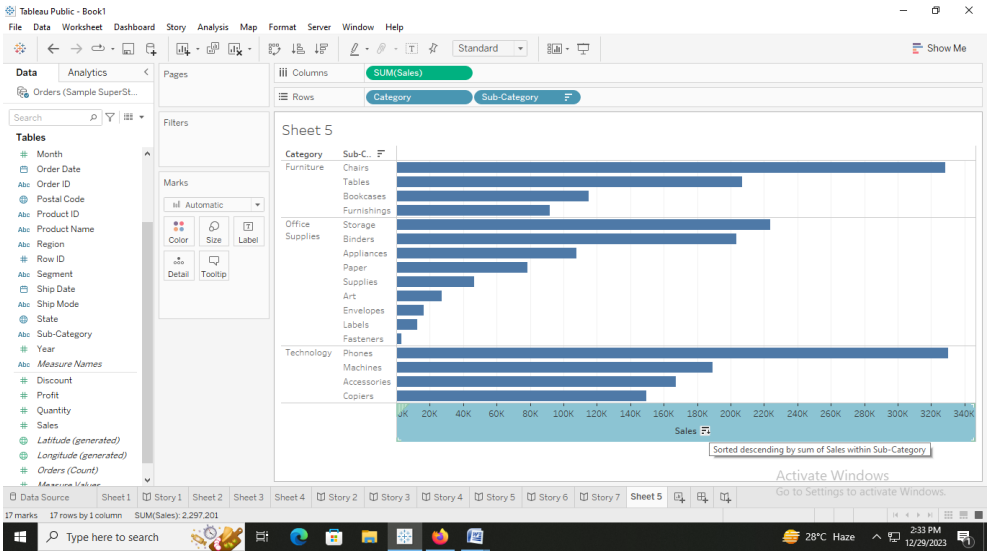
In Tableau Prep, no distinction is made for dimensions or measures. Understanding the concepts behind discrete or continuous are important, for things like the detail versus summary presentation of data in the profile pane.

- Detail: the detail view shows every domain element as a discrete label and has a visual scrollbar to provide a visual overview of all the data.
- Summary: the summary view shows the values as binned on a continuous axis as a histogram.

Sorting:

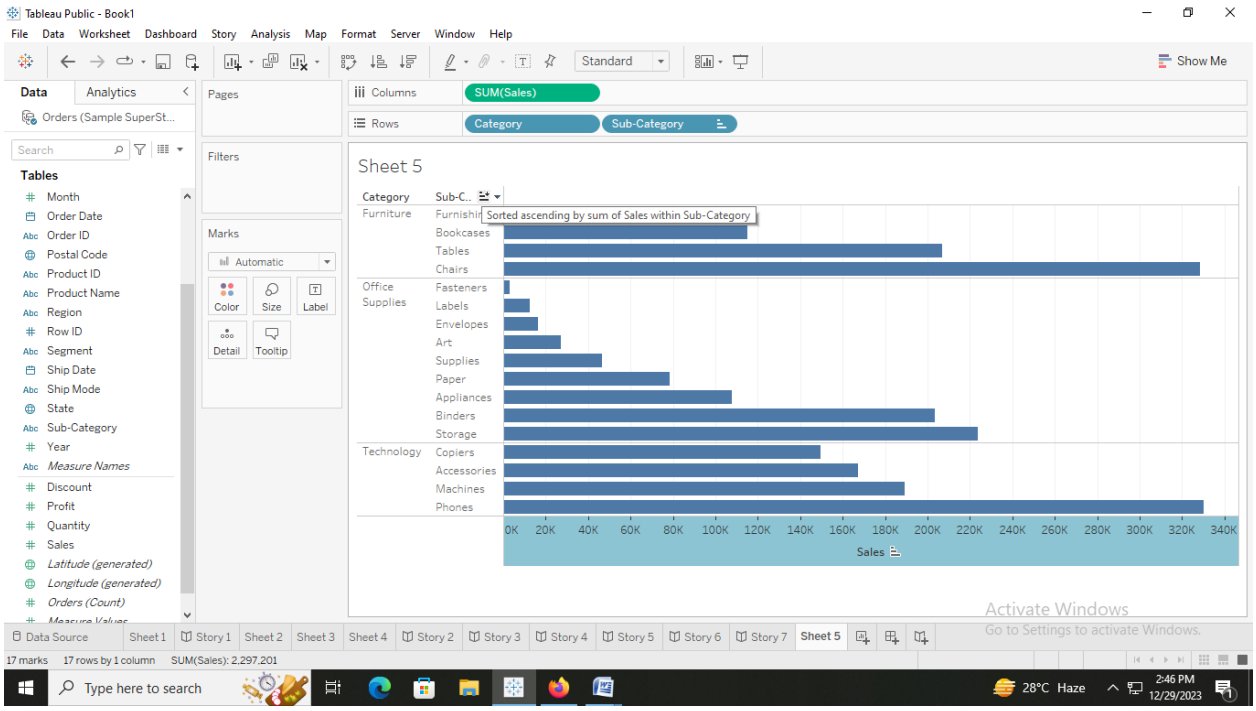
- There are many ways to sort data in Tableau. When viewing a visualization, data can be sorted using single click options from an axis, header, or field label. In the authoring environment, additional sorting options include sorting manually in headers and legends, using the toolbar sort icons, or sorting from the sort menu.

- There are multiple ways to sort a visualization with single click sort buttons.
- In all cases, **one** click sorts descending, **two** clicks sorts ascending, and **three** clicks clear the sort.



Sort from an axis

1. Hover over a numerical axis to bring up the sort icon.
2. Click the icon to sort.



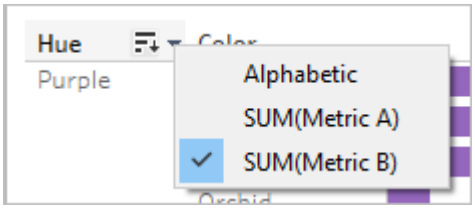
Sort from a header

1. Hover over a header to bring up the sort icon.
2. Click the icon to sort.

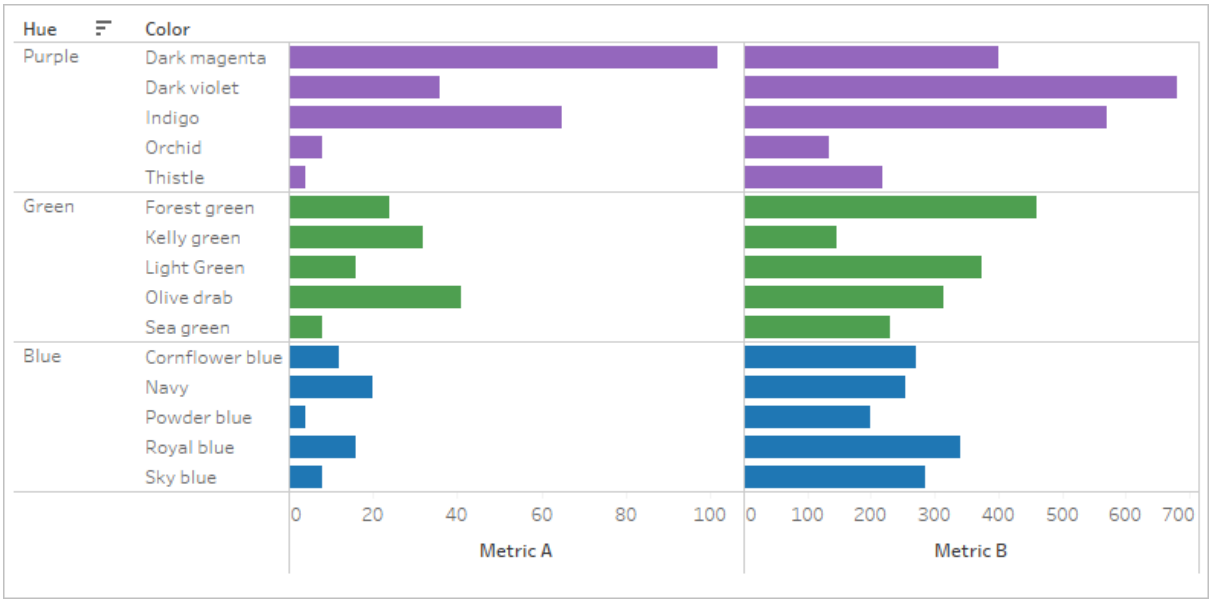
Sort from a field label

1. Hover over a field label to bring up the sort icon.

   The sort icon for a field label is slightly different from a header or axis. The default option is alphabetical sorting, but there's also a menu where you can choose to sort by a field in the view.



2.Click the A-Z icon to sort alphabetically. Or, click the menu to select a field to sort by. The icon switches to the bar icon and you can click to sort.



Sort: Hues are arranged in descending order by Metric B.

In this example, the sort is applied to the outermost dimension (Hue) based on total Metric B. (Metric B is aggregated for all the colors within each hue and Hue is sorted. Therefore, Purple is first, then Green, then Blue.)

Missing sort icons

If the sort icons don't appear, this functionality may have been turned off or it might not be possible to sort the view. Sort icons aren't available on the axes in scatterplots or for table calculations. For example, scatterplots can't be sorted from a numerical axis because the positions of the marks are fully determined by the data.

Sort options while authoring

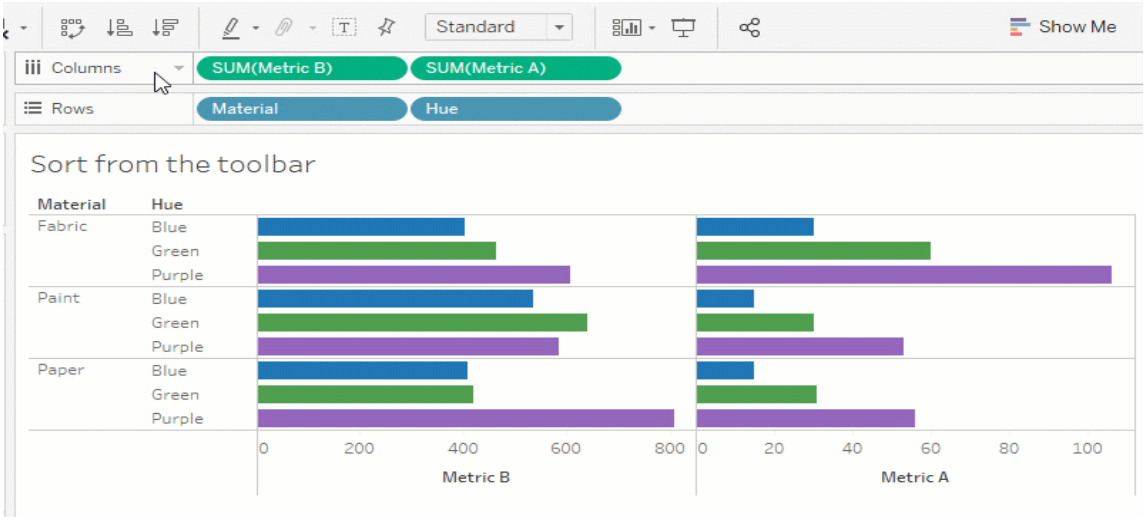
In an authoring environment, additional options are available.

Sort from the toolbar

1. Select the dimension you wish to sort.

   If you don’t select a field before sorting, the default behavior is to sort the deepest dimension.

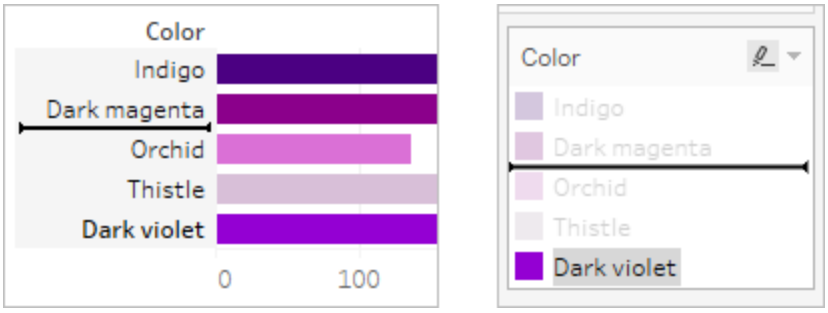
2. Choose the appropriate sort button (ascending or descending) in the toolbar.



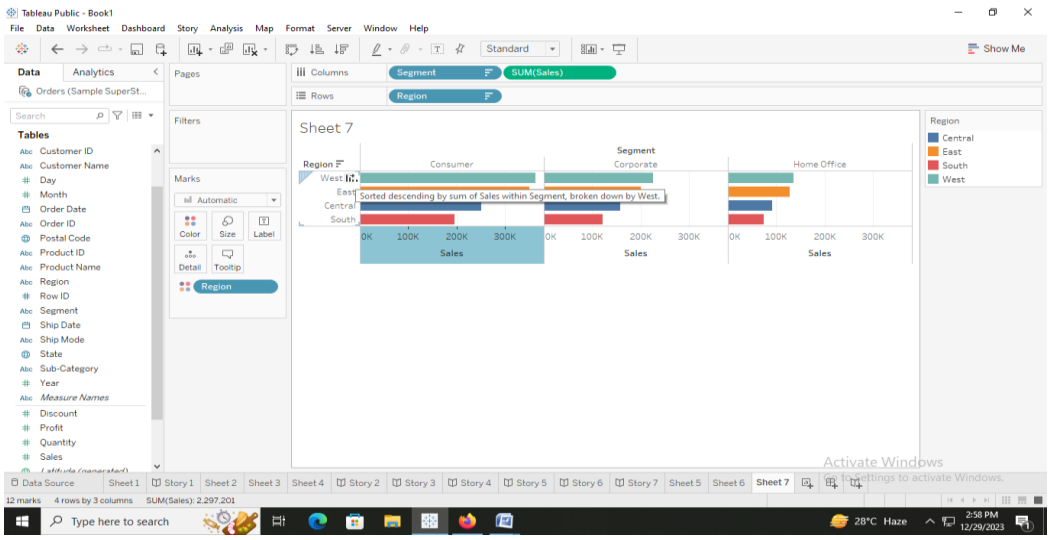
In this example, the sort is applied to **Hue** unless the **Material** field is selected before sorting. The toolbar sort also applies to the leftmost measure, in this case Metric B. To sort by Metric A, it would be necessary to reverse their order on the Columns shelf or use another method of sorting. This example demonstrates the effect of sorting by Material. Hue is removed from the view.

Sort by drag and drop:

To manually sort, select a header in a viz or on a legend and drag it to the correct location—a heavy black line indicates where to drop the header.



Note: Sorting on a legend also changes the order of the marks, not simply how the legend is displayed. Whatever is bottommost in the legend becomes the bottommost mark in the viz. This can either mean closest to the axis or header, or actually underneath in the case of scatterplots and other viz types that may have overlapping marks.



Filter Data from Your Views

Applies to: Tableau Cloud, Tableau Desktop, Tableau Server

Filtering is an essential part of analyzing data.

Filtering Order of Operations

Tableau performs actions on your view in a very specific order; this is called the Order of Operations. Filters are executed in the following order:

1. Extract filters
2. Data source filters
3. Context filters
4. Filters on dimensions (whether on the Filters shelf or in filter cards in the view)
5. Filters on measures (whether on the Filters shelf or in filter cards in the view).

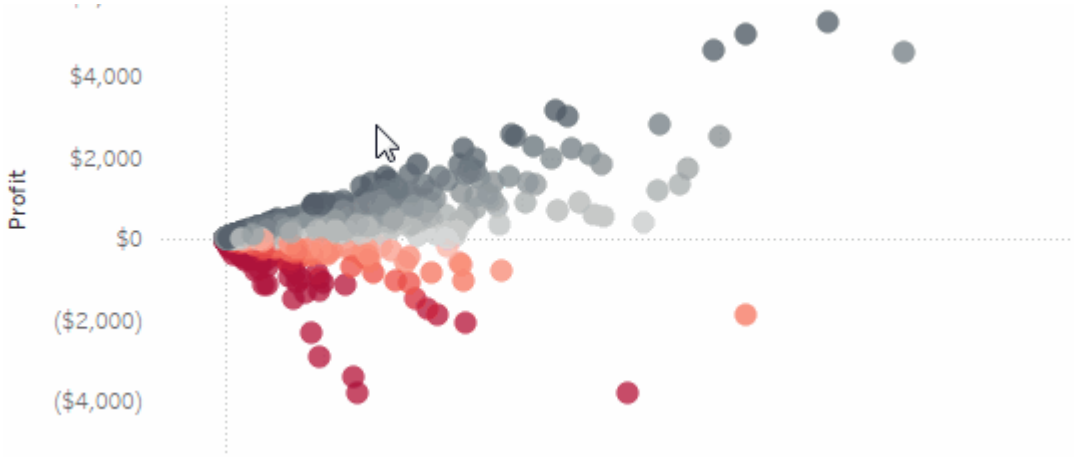
Note: When you drag a discrete dimension to the Filters shelf, the Filter dialog box offers four tabs for filtering: General, Wildcard, Condition, and Top. The settings on each of these tabs are additive starting with the General tab; what you set on each tab will affect the filter results on each tab to the right.

Select to keep or exclude data points in your view:

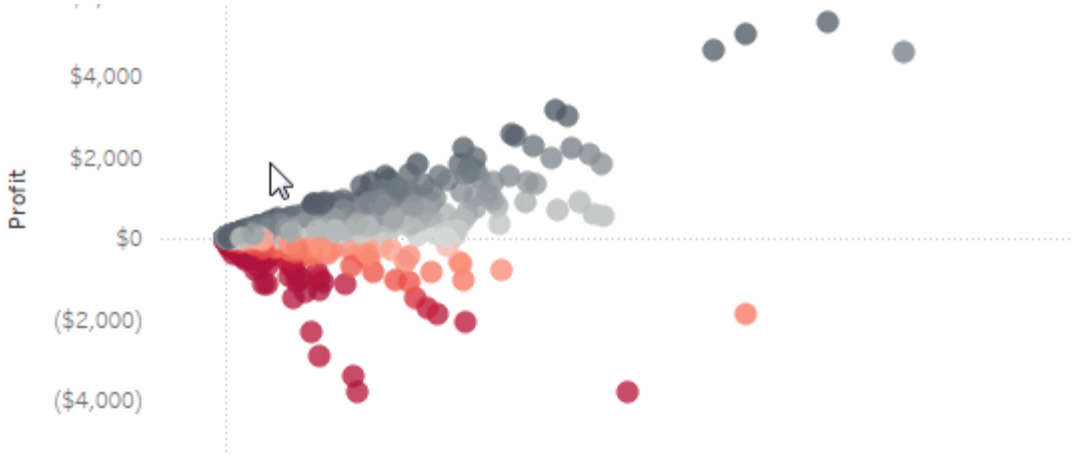
You can filter individual data points (marks), or a selection of data points from your view. For example, if you have a scatter plot with outliers, you can exclude them from the view so you can better focus on the rest of the data.

To filter marks from the view, select a single mark (data point) or click and drag in the view to select several marks. On the tooltip that appears, you can:

- Select Keep Only to keep only the selected marks in the view.



- Select Exclude to remove the selected marks from the view.



Note: These filtering options are not available if a Wildcard Match filter is already specified for the same field.

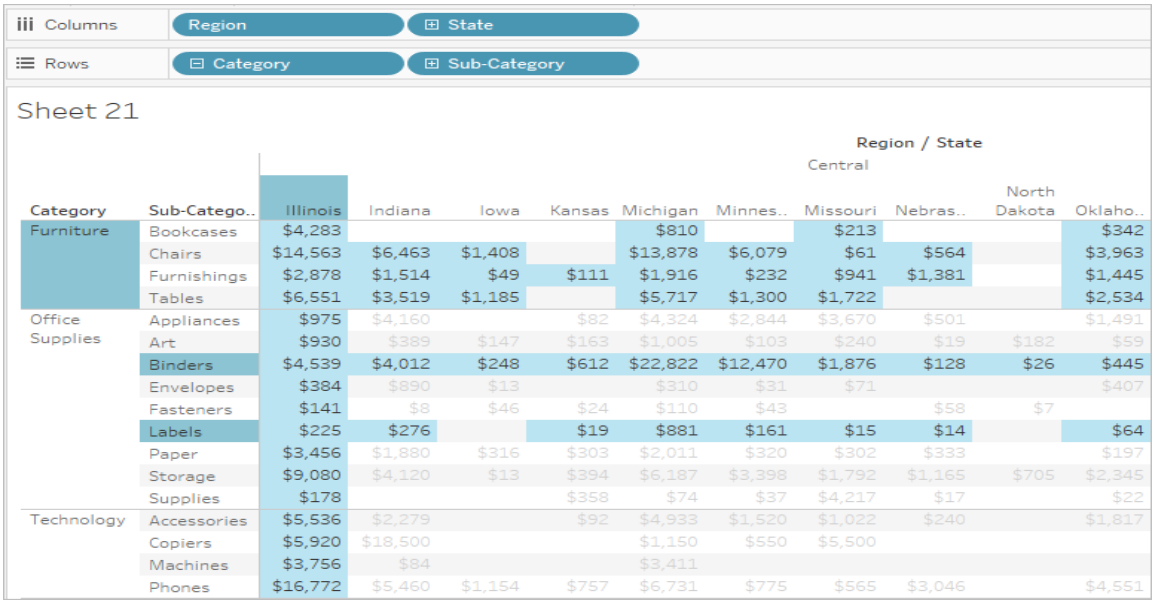
Select headers to filter data:

You can also select headers to filter them from your view.

To filter entire rows or columns of data from your view, select the header in the view. On the tooltip that appears, select to Exclude or Keep Only the selected data.

When you select a table header that is part of a hierarchy, all of the next level headers are also selected. For example, the view shown below consists of two unrelated dimensions placed on the Columns shelf, and two levels of the same hierarchy placed on the Rows shelf.

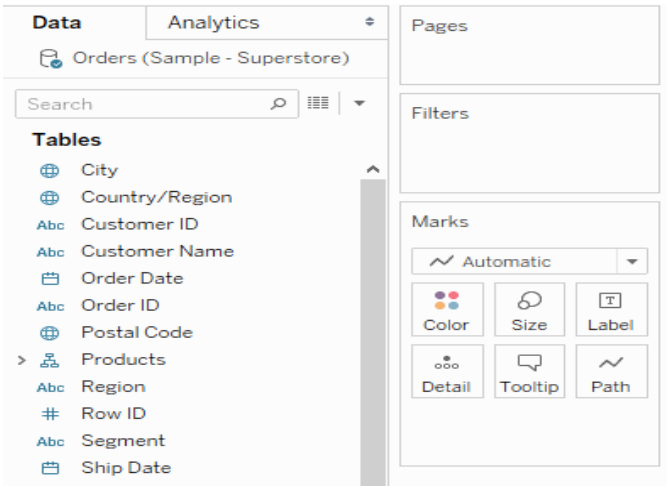
The selected row headers include the Furniture member of the Category dimension, and the Binders and Labels members of the Sub-category dimension. When Furniture is selected, all members from the next (inner) level in the hierarchy are automatically selected. In this case, that means the Bookcases, Chairs, Furnishings, and Tables members.



		Region / State									
								Central		North	
Category	Sub-Catego..	Illinois	Indiana	Iowa	Kansas	Michigan	Minnes..	Missouri	Nebras..	Dakota	Oklaho..
Furniture	Bookcases	$4,283				$810		$213			$342
	Chairs	$14,563	$6,463	$1,408		$13,878	$6,079	$61	$564		$3,963
	Furnishings	$2,878	$1,514	$49	$111	$1,916	$232	$941	$1,381		$1,445
	Tables	$6,551	$3,519	$1,185		$5,717	$1,300	$1,722			$2,534
Office Supplies	Appliances	$975	$4,160		$82	$4,324	$2,844	$3,670	$501		$1,491
	Art	$930	$389	$147	$163	$1,005	$103	$240	$19	$182	$59
	Binders	$4,539	$4,012	$248	$612	$22,822	$12,470	$1,876	$128	$26	$445
	Envelopes	$384	$890	$13		$310	$31	$71			$407
	Fasteners	$141	$8	$46	$24	$110	$43		$58	$7	
	Labels	$225	$276		$19	$881	$161	$15	$14		$64
	Paper	$3,456	$1,880	$316	$303	$2,011	$320	$302	$333		$197
	Storage	$9,080	$4,120	$13	$394	$6,187	$3,398	$1,792	$1,165	$705	$2,345
	Supplies	$178			$358	$74	$37	$4,217	$17		$22
Technology	Accessories	$5,536	$2,279		$92	$4,933	$1,520	$1,022	$240		$1,817
	Copiers	$5,920	$18,500			$1,150	$550	$5,500			
	Machines	$3,756	$84			$3,411					
	Phones	$16,772	$5,460	$1,154	$757	$6,731	$775	$565	$3,046		$4,551

Drag dimensions, measures, and date fields to the Filters shelf :

Another way to create a filter is to drag a field directly from the Data pane to the Filters shelf.

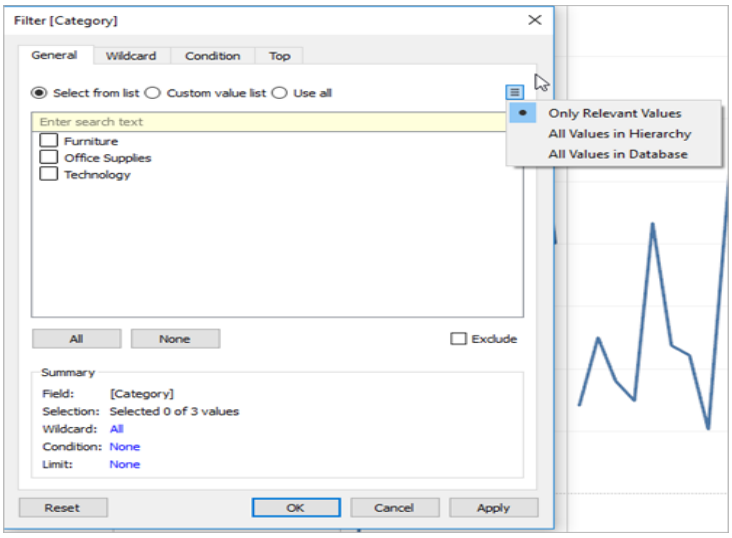


When you add a field to the Filters shelf, the Filter dialog box opens so you can define the filter. The Filter dialog box differs depending on whether you are filtering categorical data (dimensions), quantitative data (measures), or date fields.

Filter categorical data (dimensions):

Dimensions contain discrete categorical data, so filtering this type of field generally involves selecting the values to include or exclude.

When you drag a dimension from the Data pane to the Filters shelf in Tableau Desktop, the following Filter dialog box appears:



- **General**: Use the General tab to select the values you want to include or exclude.
- **Wildcard** (Tableau Desktop only): Use the Wildcard tab to define a pattern to filter on. For example, when filtering on email addresses you might want to only include emails from a specific domain. You can define a wildcard filter that ends with "@gmail.com" to only include Google email addresses.
- **Condition**: Use the Condition tab in the Filter dialog box to define rules to filter by. For example, in a view showing the average Unit Price for a collection of products, you may want to only show the Products that have an average unit price that is greater than or equal to $25. You can use the built-in controls to write a condition or you can write a custom formula.
- **Top**: Use the Top tab in the Filter dialog box to define a formula that computes the data that will be included in the view. For example, in a view that shows the average Time to Ship for a collection of products, you can decide to only show the top 15 (or bottom) products by Sales. Rather than having to define a specific range for Sales (e.g., greater than $100,000), you can define a limit (top 15) that is relative to the other members in the field (products).

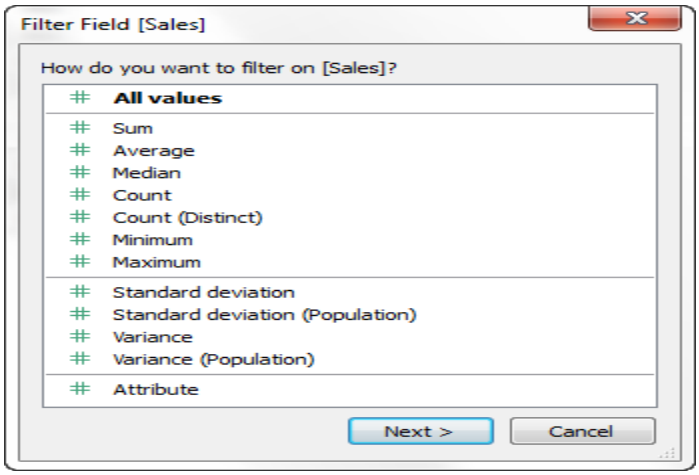
Important Note: Each tab adds additional definitions to your filter. For example, you can select to exclude values under the General tab, and also add limits under the Top tab. Selections and configurations from both tabs are applied to your filter.

At any time, you can see the definitions of your filter under Summary on the General tab.

Filter quantitative data (measures):

Measures contain quantitative data, so filtering this type of field generally involves selecting a range of values that you want to include.

When you drag a measure from the Data pane to the Filters shelf in Tableau Desktop, the following dialog box appears:



Select how you want to aggregate the field, and then click Next.

In the subsequent dialog box, you're given the option to create four types of quantitative filters:

Range of Values: Select the Range of Values option to specify the minimum and maximum values of the range to include in the view. The values you specify are included in the range.

At Least: Select the At Least option to include all values that are greater than or equal to a specified minimum value. This type of filter is useful when the data changes often so specifying an upper limit may not be possible.

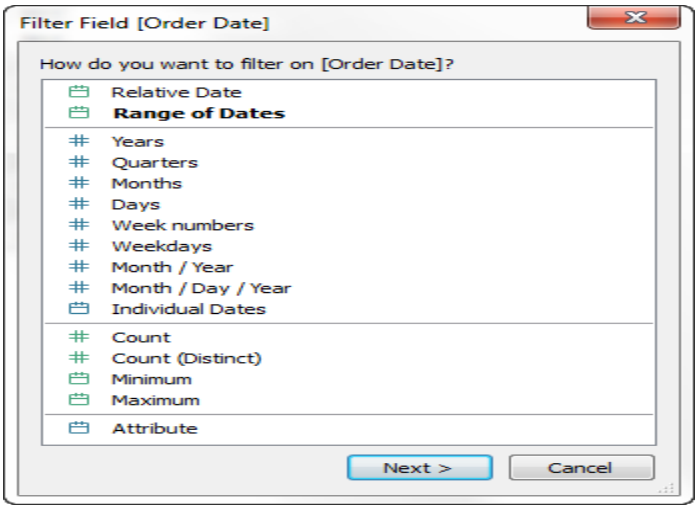
At Most: Select the At Most option to include all values that are less than or equal to a specified maximum value. This type of filter is useful when the data changes often so specifying a lower limit may not be possible.

Special: Select the Special option to filter on Null values. Include only Null values, Non-null values, or All Values.

Note: If you have a large data source, filtering measures can lead to a significant degradation in performance. It is sometimes much more efficient to filter by creating a set containing the measure and then apply a filter to the set

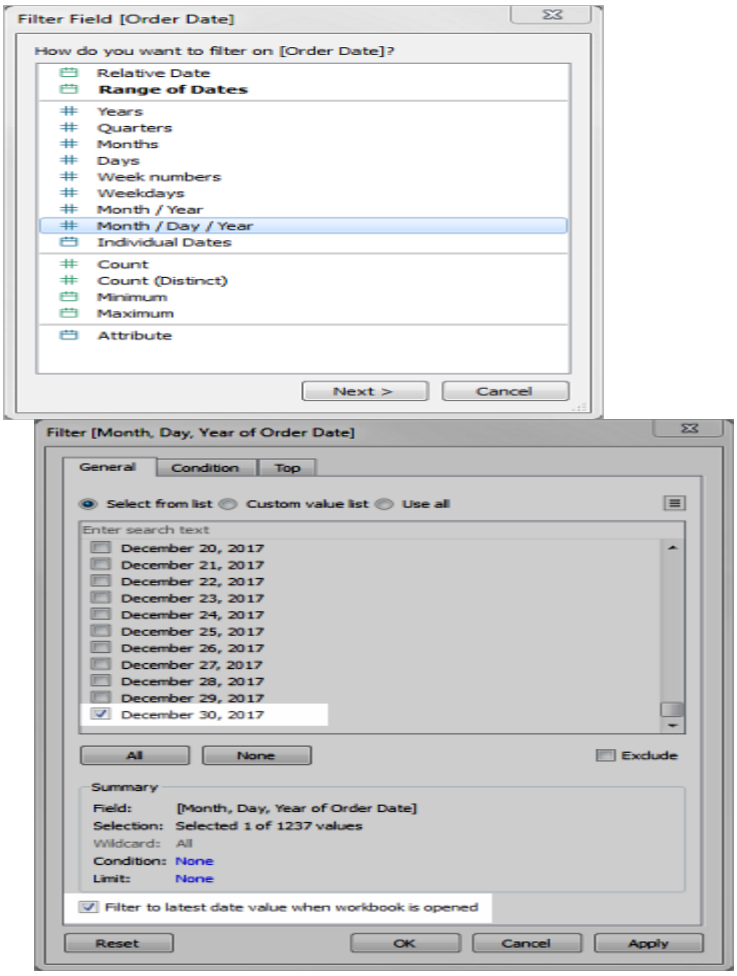
Filter dates :

When you drag a date field from the Data pane to the Filters shelf in Tableau Desktop, the following Filter Field dialog box appears:



You can select whether you want to filter on a relative date; filter between a range of dates; or select discrete dates or individual dates to filter from the view.

- **Filter relative dates**: Click Relative dates to define a range of dates that updates based on the date and time you open the view. For example, you may want to see Year to Date sales, all records from the past 30 days, or bugs closed last week. Relative date filters can also be relative to a specific anchor date rather than today.
- **Filter a range of dates**: Select Range of dates to define a fixed range of dates to filter. For example, you may want to see all orders placed between March 1, 2009 and June 12, 2009.
- **Filter discrete dates**: Select a discrete date value in the dialog box if you want to include entire date levels. For example, if you select Quarters, you can choose to filter specific quarters (e.g. Q1, Q2, Q3, Q4) from your view, regardless of the year.
- **Latest date preset**: If you want to ensure that only the most recent date in a data source is selected in the filter when the workbook is shared or opened, select a discrete date such as Month/Day/Year or Individual Dates and then, on the General tab, select Filter to latest date value when workbook is opened.



Notes: When you filter to the latest date value, this setting applies only to data source filters in a workbook.

In the order of operations, the latest date filter is global to the workbook, while context filters apply per worksheet. The latest date is determined just after the workbook opens for first use, after data source filters, but before context filters. At that point the date is set, and the latest date preset is used as a dimension filter.

If you are using additional filters in views, the latest date value setting may result in an empty view with no data when those additional filters do not select data from the latest date in the database.

On Tableau Server and Tableau Cloud, presets are applied when the view first loads in the browser, but not when the browser or data is refreshed.

- **Filter individual dates**: Select Individual dates to filter specific dates from your view.
- **Additional date filter options**: When you select Relative dates or Range of dates, the Filter dialog box opens. In that dialog box, you can define a Starting date or Ending date. You can also select Special to include null dates, non-null dates, or all dates.

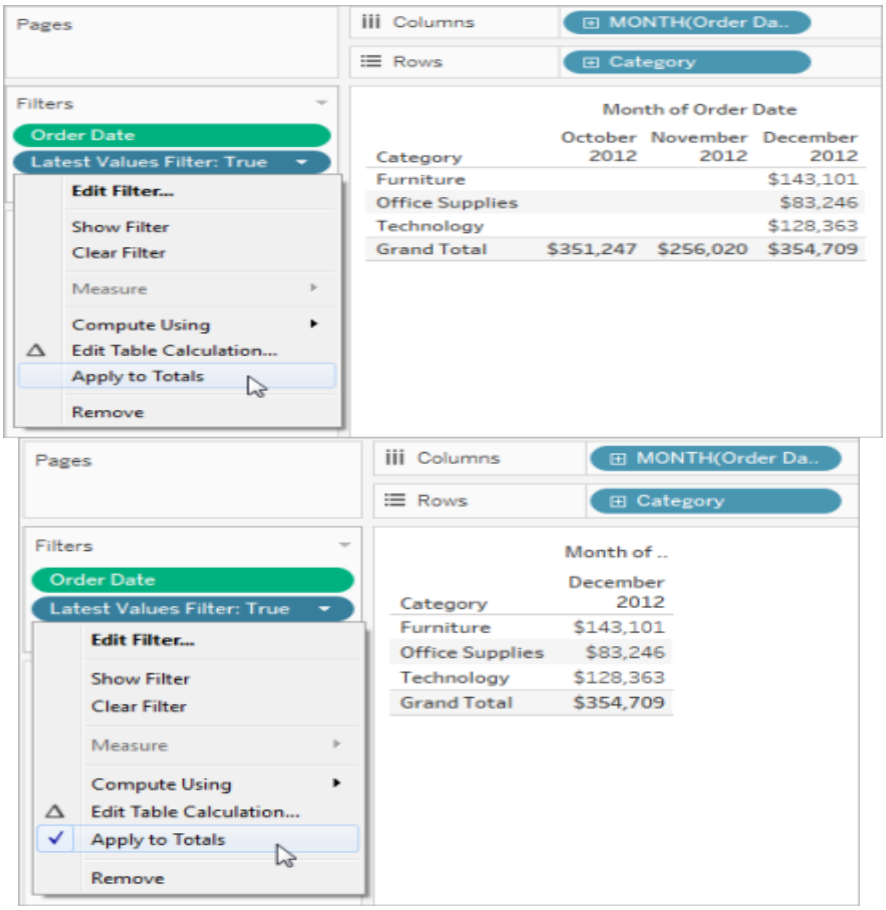
Filter table calculations:

To create a table calculation filter, create a calculated field, and then place that field on the Filters shelf.

Filters based on table calculations do not filter out underlying data in the data set, because table calculation filters are applied last in the order of operations. This means Tableau evaluates any table calculations in the view first, and then applies table calculation filters on the results in the current view.

Apply table calculation filter to totals

When you show totals in a view and you want a table calculation filter to apply to the totals, you can select Apply to totals in the drop-down menu for that filter (on the Filters shelf). This option lets you decide when a table calculation filter should be applied to totals.



This options is available when you show totals in the view, and you add a table calculation filter to the view. Select Apply to totals to apply the table calculation filter to all of the results in the table, including the totals.

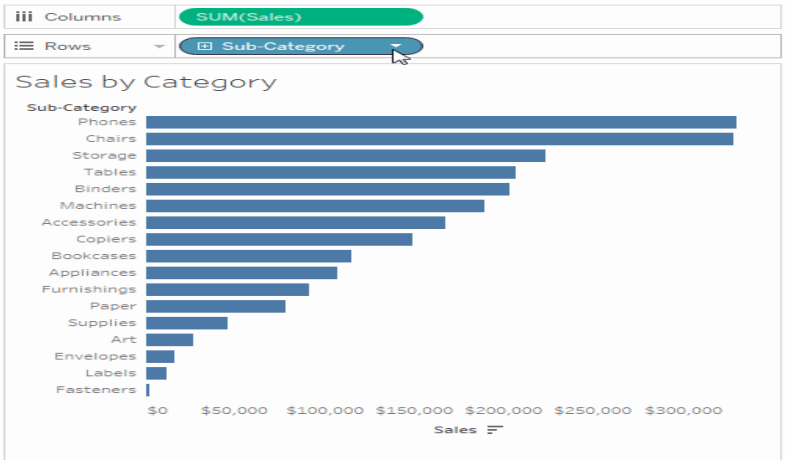
Display interactive filters in the view:

When an interactive filter is shown, you can quickly include or exclude data in the view.

Note: In web authoring, interactive filters are automatically added to the view when you drag a field to the Filters shelf.

To show a filter in the view:

1. In the view, click the field drop-down menu and select Show Filter.

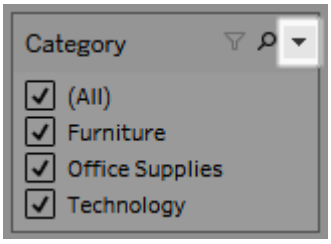


The field is automatically added to the Filters shelf (if it is not already being filtered), and a filter card appears in the view. Interact with the card to filter your data.

Note: In Tableau Desktop, you can add an interactive filter to the view for a field that is not currently used in the view. To do so, In the Data pane, click the field drop-down menu, and then select Show Filter.

Set options for filter card interaction and appearance:

After you show a filter, there are many different options that let you control how the filter works and appears. You can access these options by clicking the drop-down menu in the upper right corner of the filter card in the view.



Some options are available for all types of filters, and others depend on whether you're filtering a categorical field (dimension) or a quantitative field (measure).

You can customize how filters appear in the view, in dashboards, or when published to Tableau Server or Tableau Cloud.

Here are some of the general filter card options:

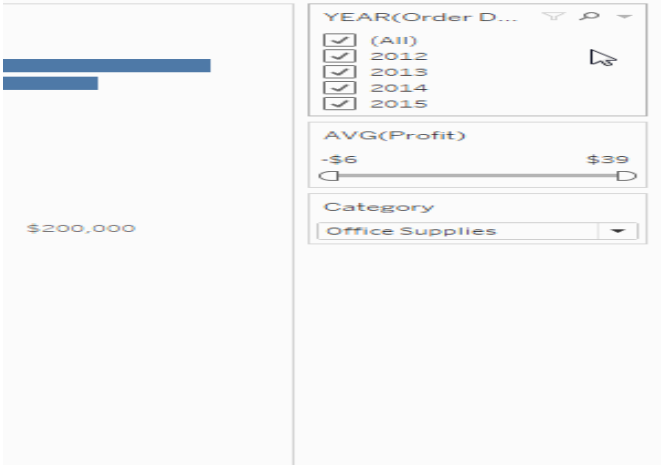
- Edit Filter - This option opens the main Filter dialog box so you can further refine the filter by adding conditions and limits.
- Remove Filter - Removes the filter from the Filters shelf and removes the filter card from the view.
- Apply to worksheets - Allows you to specify whether the filter should apply to only the current worksheet or be shared across multiple worksheets.
- Format Filters (Tableau Desktop only) - Customize the font and colors of all your filter cards in the view.

- Only relevant values - Specifies which values to show in the filter. When you select this option other filters are considered and only values that pass these filters are shown. For example, a filter on State will only show the Eastern states when a filter on Region is set. You can use the toggle at the top of the filter card to switch between this option and the All Values in Database option.
- All values in hierarchy - Specifies which values to show in the filter. When you create a filter from a hierarchical field, this option is selected by default. Filter values are displayed based on relevance of the parent/child relationships in the hierarchy.
- All values in database - Specifies which values to show in the filter. When you select this option all values in the database are shown regardless of the other filters on the view.
- All values in context (Tableau Desktop only) - When one of the filters in the view is a context filter, select this option on a different filter to only display values that pass through the context filter.
- Include values - When this option is selected, the selections in the filter card are included in the view.
- Exclude values - When this option is selected, the selections in the filter card are excluded from the view.
- Hide Card (Tableau Desktop only) - Hides the filter card but does not remove the filter from the Filters shelf.

Filter card modes

You can control the appearance and interaction of your filter card in the view by selecting a filter card mode.

To select a filter card mode, in the view, click the drop-down menu on the filter card and then select a mode from the list.



The types of filter card modes you see in the list of options depend on whether your filter is on a dimension or a measure. Below you can find brief descriptions of the types of filter card modes available for dimensions and measures.

For dimensions, you can choose from the following filter modes:

- **Single Value (List)**: Displays the values of the filter as a list of radio buttons where only a single value can be selected at a time.
- **Single Value (Dropdown)**: Displays the values of the filter in a drop-down list where only a single value can be selected at a time.

- **Single Value (Slider)**: Displays the values of the filter along the range of a slider. Only a single value can be selected at a time. This option is useful for dimensions that have an implicit order such as dates.
- **Multiple Values (List)**:Displays the values in the filter as a list of check boxes where multiple values can be selected.
- **Multiple Values(Dropdown)**: Displays the values of the filter in a drop-down list where multiple values can be selected.
- **Multiple Values (Custom List)**: Displays a text box where you can type a few characters and search for the value. Alternatively, you can type or paste a list of values into the text box to create a custom list of values to include.
- **Wildcard Match**: Displays a text box where you can type a few characters. All values that match those characters are automatically selected. You can use the asterisk character as a wildcard character. For example, you can type "tab*" to select all values that begin with the letters "tab". Pattern Match is not case sensitive. If you are using a multidimensional data source, this option is only available when filtering single level hierarchies and attributes.

For measures, you can choose from the following filter modes:

- **Range of Values/Dates**: shows the filtered values as a pair of sliders that you can adjust to include or exclude more values. Click on the upper and lower limit readouts to enter the values manually.

  The darker area inside the slider range is called the data bar. It indicates the range in which data points actually lie in the view. Use this indicator to determine a filter that makes sense for the data in your data source. For example, you may filter the Sales field to only include values between $200,000 and $500,000 but your view only contains values between $250,000 and $320,000. The range of data you can see in the view is indicated by the data bar while the sliders show you the range of the filter.

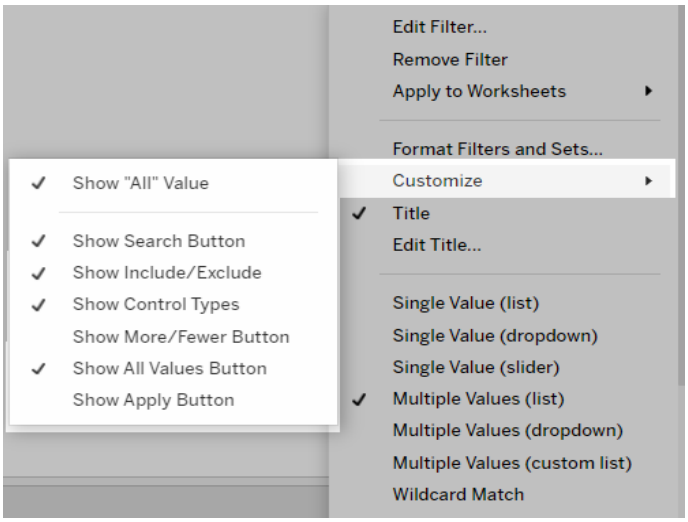
- **Note:** Data bars only show in filters where the filtered field is also used in the view (e.g., on Columns, Rows, or on the Marks card, and son on) and are at the same aggregation level as the field on the Filters shelf. For example, a filter on SUM(Sales) will only display data bars if the SUM(Sales) field is used in the view. It won't show if AVG(Sales) is used in the view. Even though in both scenarios, the filtered field, Sales is used in the view; in the latter case the aggregation is different than the aggregation of the filter.
- **At Least/Starting Date**: shows a single slider with a fixed minimum value. Use this option to create a filter using an open ended range.
- **At Most/Ending Date**: shows a slider with a fixed maximum value. Use this option to create a filter using an open ended range.
- **Relative to Now**: this option shows a control where you can define a dynamic date range that updates based on when you open the view. The option is only available for filters on continuous date fields.
- **Browse periods**: shows common date ranges such as past day, week, month, three months, one year, and five years. This option is only available for filters on continuous date fields.

Note: When you expose a filter for Measure Values or Measure Names as a single value list, selecting All will automatically convert the filter to a multiple values list.

Customize filter cards

In addition to the general filter options and the filter modes, you control how your filter appears in the worksheet, on dashboards, or when published to the web even further in Tableau Desktop.

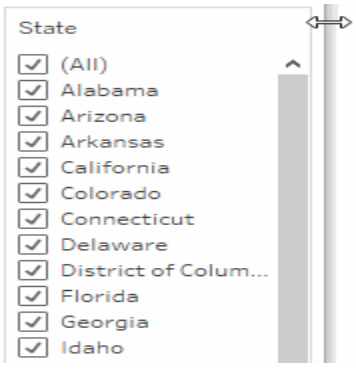
To customize filters, click the filter card drop-down menu and select Customize.



You can select from the following options:

- **Show "All" Value** - toggles whether to show the "All" option that displays by default in multiple values and single value lists.
- **Show Search Button** - toggles whether to show the search button at the top of the filter.
- **Show Include/Exclude** - toggles whether to show the Include Values and Exclude Values commands on the filter card menu. When shown, users can switch the filter between include and exclude modes.
- **Show Control Types** - toggles whether to let users change the type of quick filter shown. For example, when shown, a user can change a multiple values list to a compact list.
- **Show More/Fewer button** - toggles whether to show the More/Fewer button ≡ at the top of the filter.
- Show All Values button - toggles whether to display the Show All Values button on the filter card.

  Whenever data is excluded in the filter, the small red "x" appears on the Show All Values button. When all values are showing, the red "x" disappears.



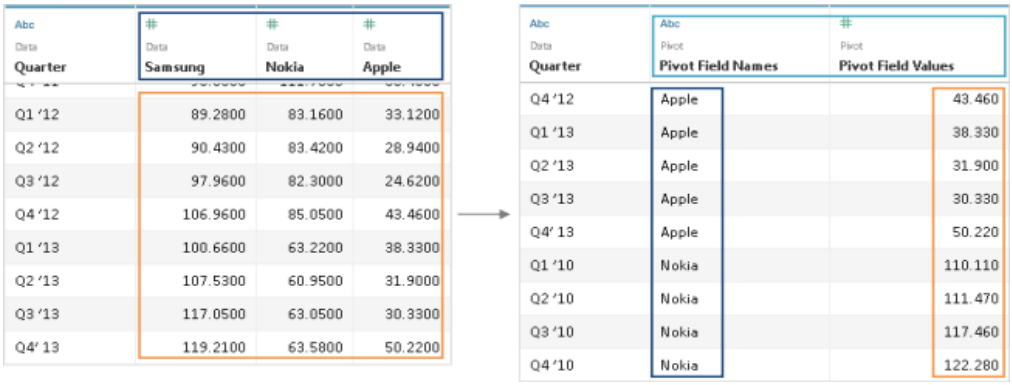
- **Show Apply Button** - toggles whether to show the Apply button at the bottom of the filter. When shown, changes to the filter are only applied after you click the button. Pending changes are indicated with a green color. This option is only available in multiple values lists and dropdowns. This options is available in web authoring.

- Show Readouts - controls whether the minimum and maximum values are displayed as text above a range of values. The readouts can be used to manually type a new value instead of using the sliders.
- Show Slider - controls whether the slider displays. When this option is cleared, the filter only displays the readouts.
- Show Null Controls - shows a drop-down list that lets you control how the filter handles null values. You can select from values in a range; values in a range and null values; null values only, non-null values, or all values.
- **Note:** Not all of the above options are available for views published to Tableau Server or Tableau Cloud.

Pivot Data from Columns to Rows:

Sometimes, analyzing data that is stored in a crosstab format can be difficult in Tableau. When working with Microsoft Excel, text file, Google Sheets, and .pdf data sources, you can Pivot using custom SQL (Tableau Desktop).

For example, suppose you have the number of devices sold by quarter for three vendors in three separate fields. You can pivot your data so that the vendor is in one field and the number of devices sold is in another field.

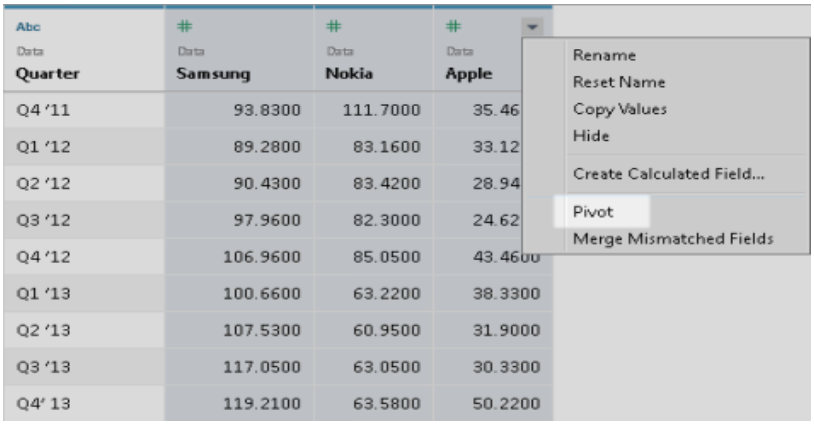


Quarter	Samsung	Nokia	Apple
Q1 '12	89.2800	83.1600	33.1200
Q2 '12	90.4300	83.4200	28.9400
Q3 '12	97.9600	82.3000	24.6200
Q4 '12	106.9600	85.0500	43.4600
Q1 '13	100.6600	63.2200	38.3300
Q2 '13	107.5300	60.9500	31.9000
Q3 '13	117.0500	63.0500	30.3300
Q4' 13	119.2100	63.5800	50.2200

Quarter	Pivot Field Names	Pivot Field Values
Q4 '12	Apple	43.460
Q1 '13	Apple	38.330
Q2 '13	Apple	31.900
Q3 '13	Apple	30.330
Q4' 13	Apple	50.220
Q1 '10	Nokia	110.110
Q2 '10	Nokia	111.470
Q3 '10	Nokia	117.460
Q4 '10	Nokia	122.280

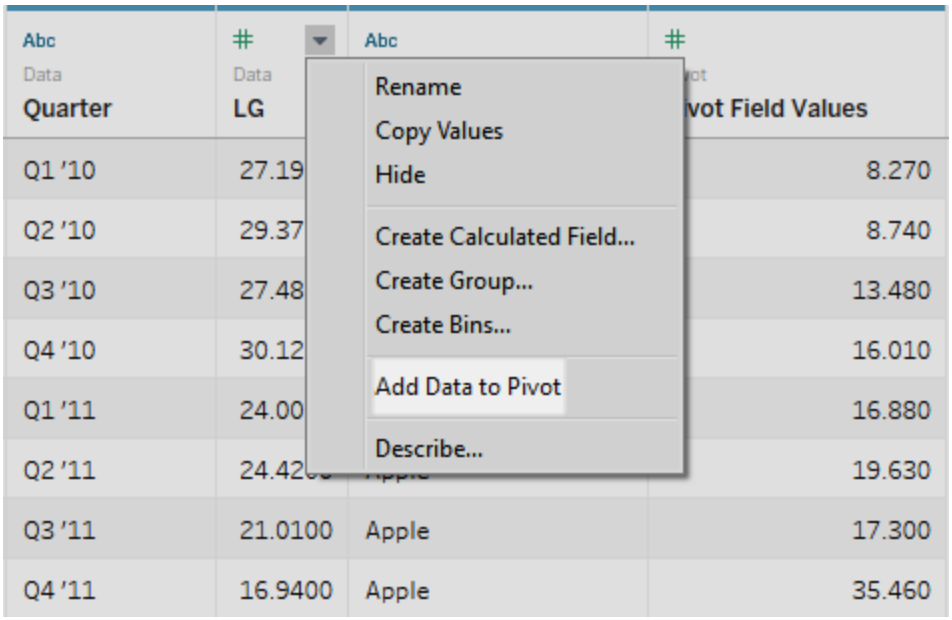
Pivot the data

After you have set up the data source, in the grid, select two or more columns. Click the drop-down arrow next to the column name, and then select **Pivot**. New columns called "Pivot field names" and "Pivot field values" are created and added to the data source. The new columns replace the original columns that you selected to create the pivot.



Add to the pivot

To add more data to the pivot, select another column, click the drop-down arrow next to the column name, and then select **Add Data to Pivot**. Make sure that the pivot columns and values look as expected before you begin your analysis.



*To remove a pivot, click the drop-down arrow next to the name of a pivot column, and then select **Remove Pivot**.*

- **Red fields in the view and fields with exclamation points in the Data pane**: Because the original fields are replaced with new pivot fields, any references to the original fields in the view will no longer work. They cause fields to become red in the view or show a red exclamation point next to the field in the **Data** pane.
- **Null values in the grid:** If all of the original fields used in the pivot are removed, for example in an extract refresh, null values display in the pivot fields.
- **No pivot option**: Pivot appears when you select two or more columns in a single Microsoft Excel, text file, Google Sheets, and .pdf data source. If using a different data source in Tableau Desktop, you can use custom SQL to pivot.

Pivot using custom SQL (Tableau Desktop)

You can also use custom SQL to pivot your data, even if you aren't working Excel, text file, Google Sheets, and .pdf data sources. When you use the UNION ALL operator in a custom SQL query, you can take values from distinct columns and put them into a new column.

For example, suppose you have a table called **Contest**.

Contest

Runner	Start Time	End Time

Runner	Start Time	End Time
Amanda	9/3/2016 3:04 PM	9/3/2016 3:25 PM
Oscar	9/3/2016 3:04 PM	9/3/2016 3:21 PM
William	9/3/2016 3:04 PM	9/3/2016 3:16 PM

To optimize your analysis of this data in Tableau, you can use the following custom SQL query to pivot the "Start Time" and "End Time" columns so that their values are in a single column.

```
Select [Runner]
, 'Start' as [Action]
, [Start Time] as [Time]
From [Contest]
Union ALL
Select [Runner]
, 'End' as [Action]
, [End Time] as [Time]
From [Contest]
```

The above custom SQL query does the following:

- Pivots the **Start Time** column header into a string value called **Start** and adds that value to a new column called **Action**.
- Pivots the **End Time** column header into a string value called **End** and adds that value to a new column called **Action**.
- Pivots the **Start Time** and **End Time** columns so that their values are in a new column called **Time**.

The following table shows the results of this custom SQL query.

Runner	Action	Time
Amanda	Start	9/3/2016 3:04 PM
Oscar	Start	9/3/2016 3:04 PM
William	Start	9/3/2016 3:04 PM
Amanda	End	9/3/2016 3:25 PM
Oscar	End	9/3/2016 3:21 PM
William	End	9/3/2016 3:16 PM

To pivot data using custom SQL

1. Connect to your data.
2. Double-click the **New Custom SQL** option in the left pane. For more information, see Connect to a Custom SQL Query.

3. In the **Edit Custom SQL** dialog box, copy and paste the following custom SQL query and replace the contents with information about your table:

```
Select [Static Column]
, 'New Value (from Column Header 1)' as [New Column Header]
, [Pivot Column Values 1] as [New Values]
From [Table]
Union ALL
Select [Static Column]
, 'New Value (from Column Header 2' as [New Column Header]
, [Pivot Column Values 2] as [New Values]
From [Table]
Union ALL
Select [Static Column]
, 'New Value (from Column Header 3' as [New Column Header]
, [Pivot Column Values 3] as [New Values]
From [Table]
```

Where the following is true:

- *Static Column*: A comma-delimited list of the columns from *Table*, both dimensions and measures, which should not be included in the pivot.
- *New Value (from Column Header 1-3)*: New names that you give to the original column headers, which are used as row values in the pivot.
- *Pivot Column Values 1-3*: The columns whose values need to be pivoted into a single column.
- *New Column Header*: The name you give the new column that contains the new row values from *New Value (from Column Header 1-3)*.
- *New Values*: The name give the new column that contains the original values from *Pivot Column Values 1-3*.
- *Table*: The table that you connected to.

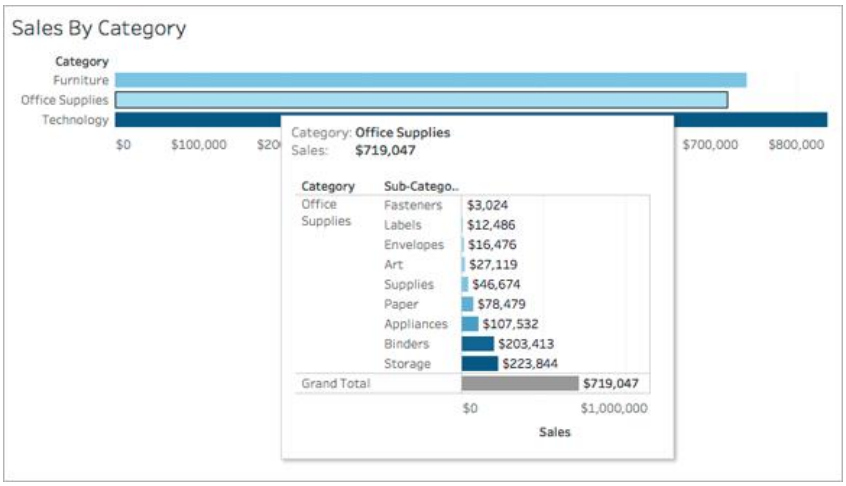
4. Click **OK**.

7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors:

Create Views in Tooltips (Viz in Tooltip)

Applies to: Tableau Cloud, Tableau Desktop

As you craft views and look for ways to reveal more details about data to your audience, you can embed visualizations within tooltips—also known as "Viz in Tooltip."



When a user hovers over a mark, the tooltip displays relevant data and details from another visualization filtered to that mark.

You can show related vizzes in tooltips to help your audience engage with the data at a different or deeper level, while keeping them in the current context and maximizing the space available for the current view.

General steps to create a Viz in Tooltip

1. Create a visualization in the *source* worksheet in Tableau.

2. Create a visualization in a *target* worksheet view to serve as the Viz in Tooltip. Give the worksheet a name that helps you identify it as a Viz in Tooltip.

4. In the source worksheet, click Tooltip in the Marks card. In the Tooltip Editor, insert a reference to the Viz in Tooltip target worksheet.

   Optional: Hide the target sheet for the Viz in Tooltip.

5. Test the resulting Viz in Tooltip by hovering over different marks in the source worksheet view. If the Viz in Tooltip is too large for the tooltip window, adjust the height and width of the target worksheet visualization. You might also consider simplifying the structure and detail in the target visualization.

   Note: By default, Viz in Tooltip is filtered on *All Fields*. Change the level of detail for Viz in Tooltip by defining a filter on *Selected Fields*.

Configure a Viz in Tooltip

You will need a *source* worksheet visualization and a *target* worksheet visualization to create a Viz in Tooltip.

These steps use the example of a source view that is a map showing sales profits by state, and a target sheet with a chart that shows profits by product sub-category.

Create the source and target visualizations in a worksheet

1. In Tableau, figure out the worksheet that you want to use as your source visualization. Or build a new visualization on a new worksheet. This will be your source view.

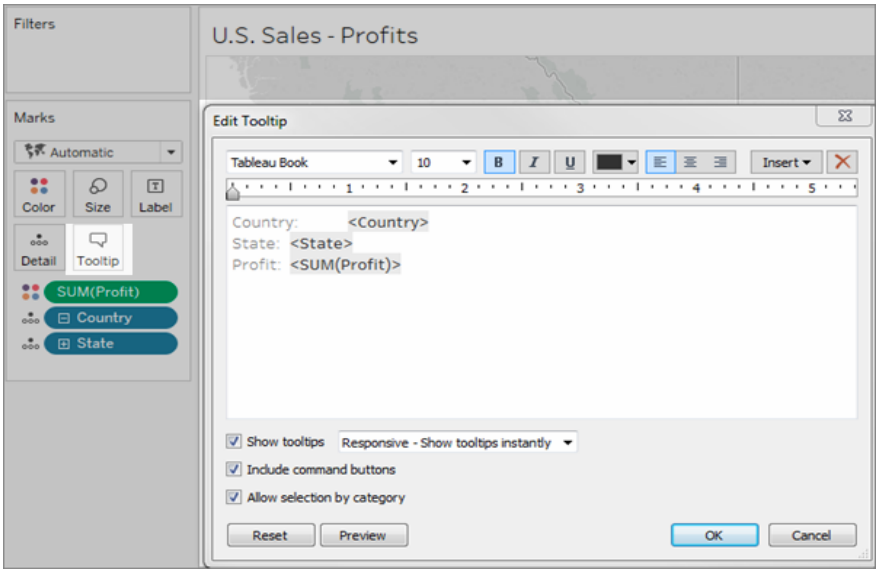
2. Create a new worksheet to serve as the target visualization.

   Keep the number of filters used in the target view to a minimum.

3. Name the target view so that you will be able to identify it in a list of other sheets.

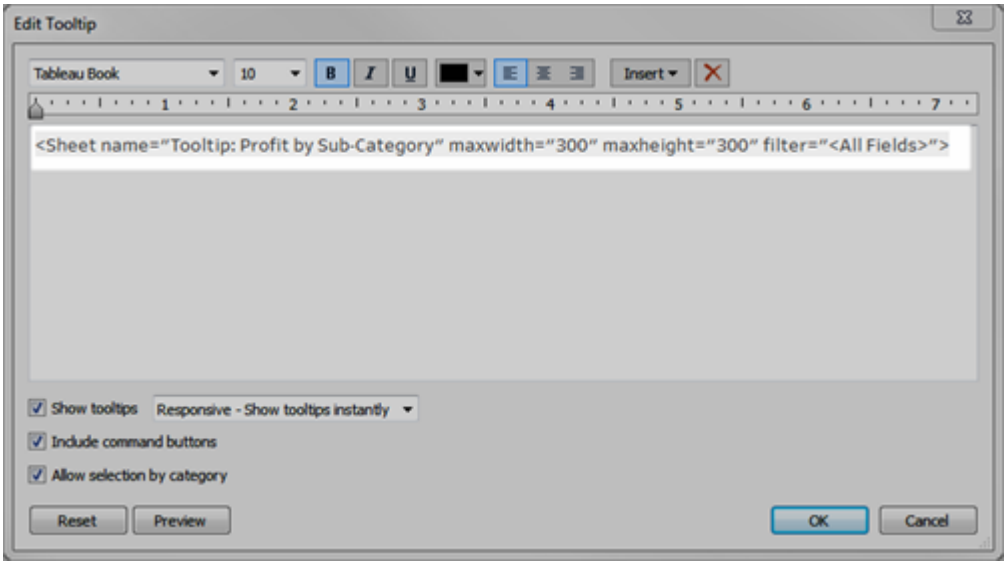
Insert a reference to the target worksheet in the source worksheet tooltip

1. In the source sheet, click the Tooltip button in the Marks card to open the Tooltip Editor.



2. Click the Insert menu in the Tooltip Editor. In the Insert menu, select Sheets, and then select a target sheet.

The markup for the Viz in Tooltip is automatically added. (In this example, the original markup fields have been removed.)



Example of markup automatically generated for Viz in Tooltip

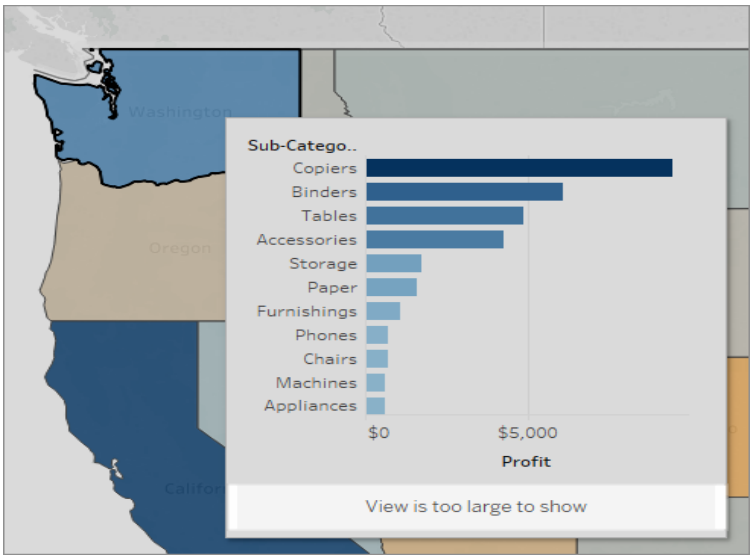
This is the resulting markup for this example:

<Sheet name="Tooltip: Profit by Sub-Category" maxwidth="300" maxheight="300" filter="<All Fields>">

By default, the Viz in Tooltip is filtered on All Fields (filtered on all fields possible, and on the most specific level of detail).

Click OK.

3. Go back to the source sheet and test the Viz in Tooltip. Hover over different marks to see the resulting Viz in Tooltip. Make adjustments to the target view as necessary to improve the Viz in Tooltip.



The Viz in Tooltip in this example shows a message that indicates that some of the data in the target view is not being shown. If you see this message, you can adjust the height and width settings in the parameters for the Viz in Tooltip to make the view size larger.

Change the size of the Viz in Tooltip

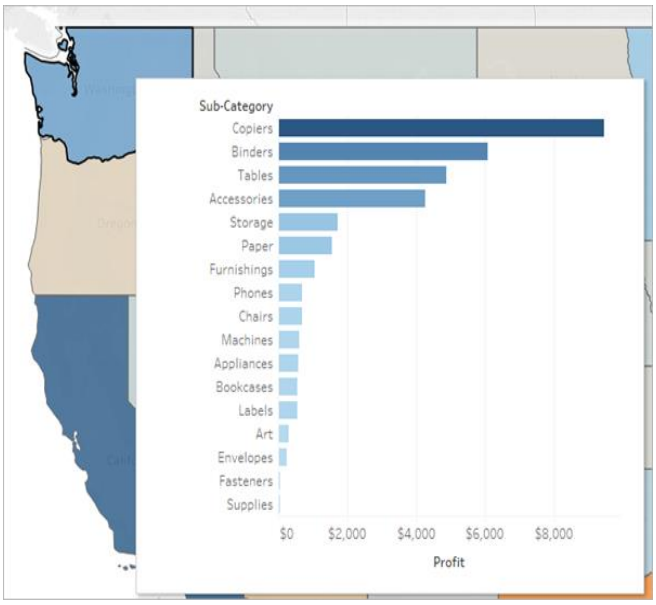
You can manually change the maxwidth and maxheight values to resize the Viz in Tooltip. The default size is 300 by 300 pixels. To change the size, manually replace "300" with another value. If you need to set the value greater than 600 pixels, you might want to reconsider whether the target view is a good candidate for Viz in Tooltip.

1. In the source sheet, click the Tooltip button in the Marks card to open the Tooltip Editor.

2. Select the number value for maxwidth and maxheight and type a different value to replace it. For example:

   <Sheet name="Tooltip: Profit by Sub-Category" maxwidth="500" maxheight="500" filter="<All Fields>">

3. Click OK



Example of a Viz in Tooltip set to 500 pixels width and height. The author also created more space for the header text in the in the target sheet view.

Change the filter for the Viz in Tooltip

By default, Viz in Tooltip is filtered on *All Fields*. This means the view is filtered on all dimensions in the current view (not including fields on the Filters shelf), at the most specific level of detail.

You can change the level of detail for Viz in Tooltip by defining a filter on selected fields, similar to filtering on Selected Fields in Filter Actions.

1. In the source sheet, click the Tooltip button in the Marks card to open the Tooltip Editor.

2. Place your cursor within the filter value (filter="<*place cursor here*>"), and then click the Insert menu to select an available field. Or, manually replace the <*All Fields*> value with the name of a field in the view. For example:

   <Sheet name="Tooltip: Profit by Sub-Category" maxwidth="300" maxheight="500" filter="<State>">

   You can also filter more than one selected field by separating the field names with a comma. For example:

   <Sheet name="Tooltip: Profit by Sub-Category" maxwidth="300" maxheight="500" filter="<Country>,<State>">

   To filter on date level, you will need to include the string that specifies the date level with the field name. For example:

   <Sheet name="Tooltip: Profit by Month" maxwidth="300" maxheight="300" filter="<MONTH(Order Date)>">

   Note: The date filter in the Viz in Tooltip script must match exactly the date level of the field in the view.

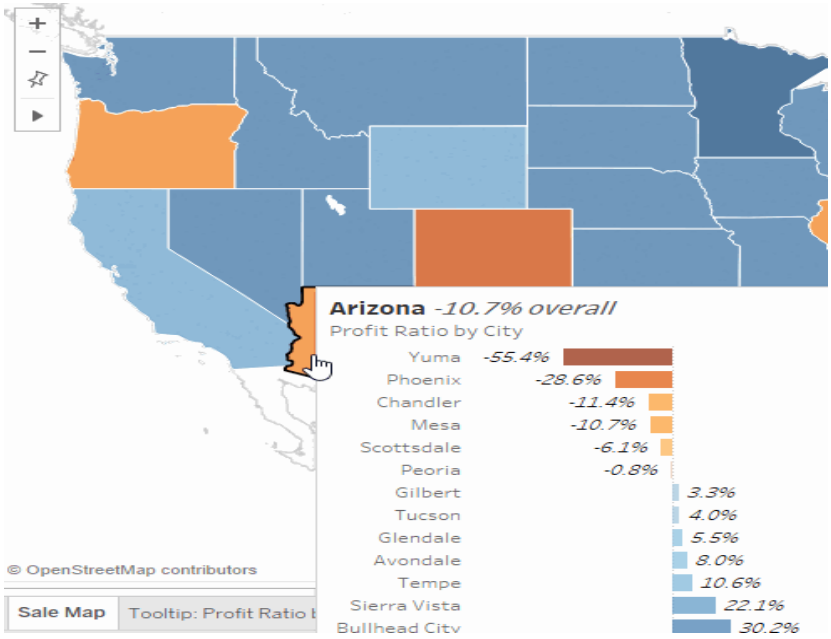
Hide or show a Viz in Tooltip worksheet

You can hide and show a worksheet used for Viz in Tooltip with options similar to those for dashboards and stories.

Hide a Viz in Tooltip worksheet

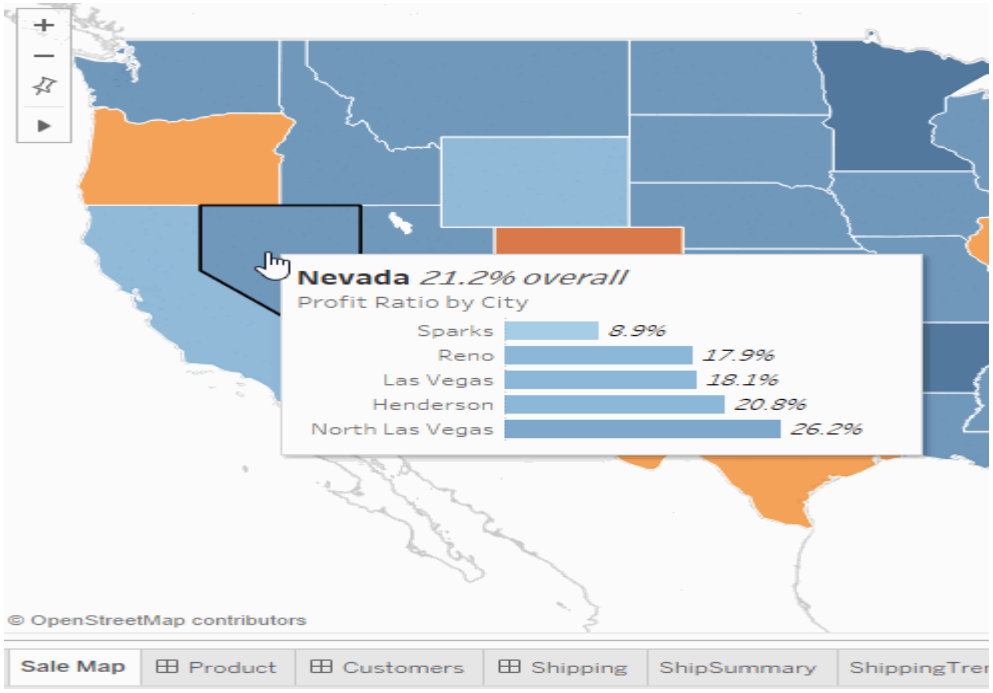
Note: If the source sheet is hidden for a dashboard, you will first need to first unhide that worksheet from its dashboard to access it.

To hide a Viz in Tooltip worksheet, from the tab for the target worksheet that is the Viz in Tooltip, select Hide.



Show a Viz in Tooltip worksheet

To show a Viz in Tooltip worksheet, from the tab for the source worksheet, select Unhide All Sheets.

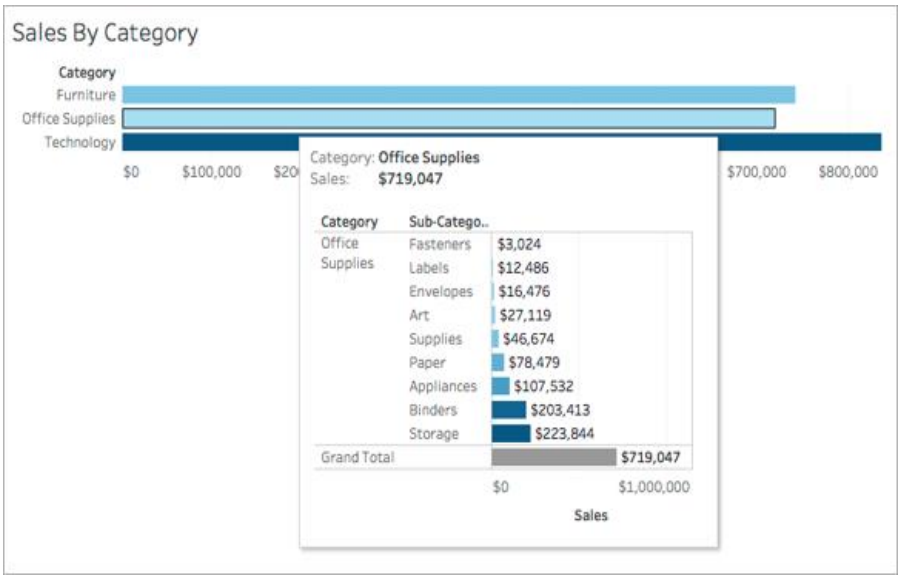


Examples of Viz in Tooltip

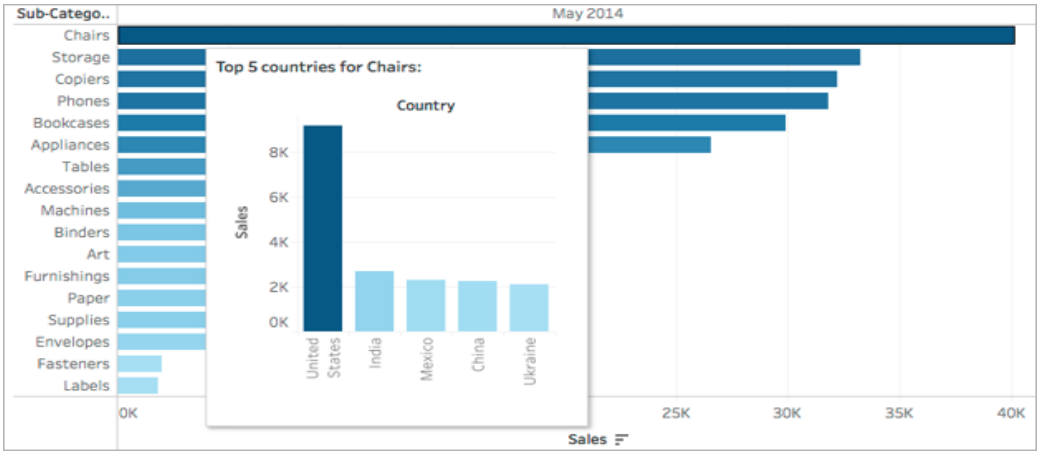
When you create a Viz in Tooltip, users can hover over a mark to examine details-on-demand, within the context of the original view. A Viz in Tooltip is a static image of data from another view that is relevant to a mark in the current view. Hovering over or selecting the mark reveals data from another sheet—filtered for that mark—in its tooltip.

Use Viz in Tooltip to show:

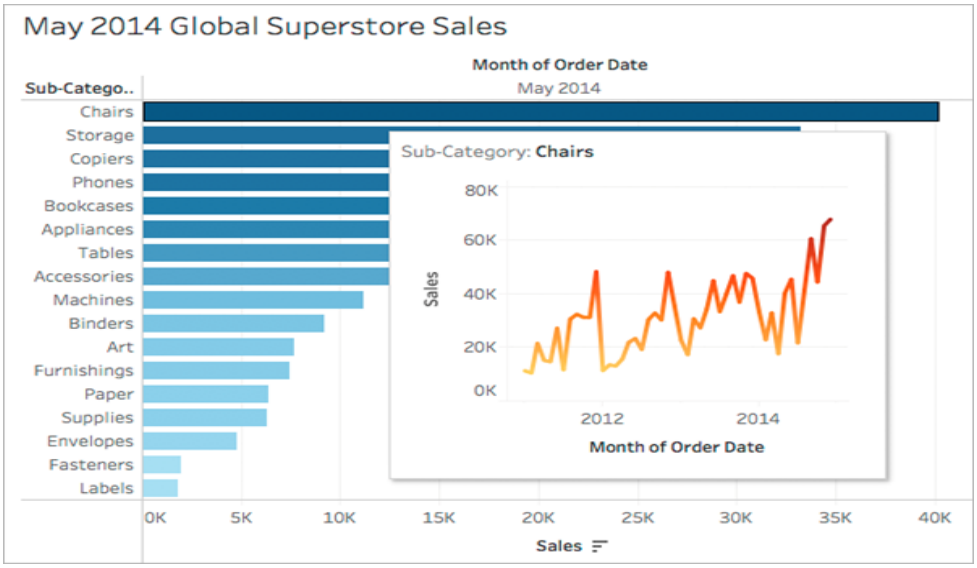
- Data at another level of detail



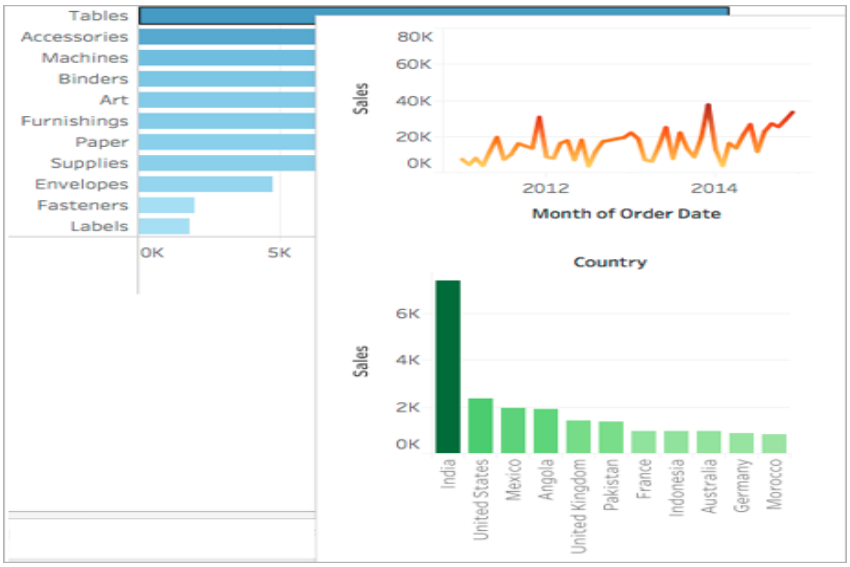
- Different, but relevant data



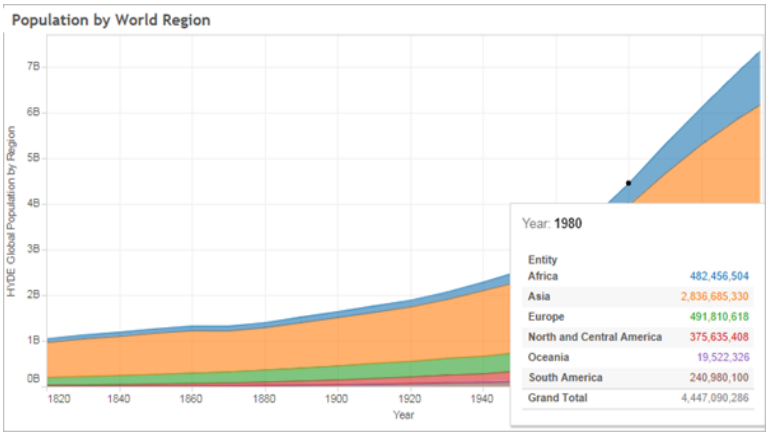
- How the value of a mark changes over time



- Multiple visualizations in one tooltip



- A legend for the main view



When you show related views in tooltips, you can help your audience engage with the data at a deeper level, while maximizing the space available for the current view.

Tips and notes on using and configuring Viz in Tooltip

- You can use worksheets to create a Viz in Tooltip, but you cannot use dashboards or stories to create a Viz in Tooltip.
- A Viz in Tooltip is a static image of a target view, not an interactive sheet. A Viz in Tooltip cannot have its own Viz in Tooltip.
- You will need a *source* worksheet visualization and a *target* worksheet visualization to create a Viz in Tooltip. You will need to create a target view to make it available in the Tooltip Editor.
- Use a standard naming scheme for the target sheets you plan to show in tooltips, such as Tooltip: *Name of View*. Using a standard naming scheme will help you keep track of views that you are using in tooltips.
- For the target view, consider the size of the view data and how the view will look in the tooltip. You will be able to specify the size for the Viz in Tooltip when you configure it, but you will need to check to see how it is displaying and possibly make adjustments to the view before you publish it.

Remember that the target view is displayed in the context of the source view. Keeping the target visualization simple can help with performance and reduce cognitive load.

- If you click Show Me in the source sheet and it changes the view structure, all tooltip edits including Viz in Tooltip references will be reset. You will need to reconfigure the Viz in Tooltip.
- One target sheet can be referenced by one Viz in Tooltip source sheet at a time, because filters are applied directly to the referenced sheet. When a sheet is already being used as a target sheet in a tooltip, it becomes unavailable for selection in the Tooltip Editor.

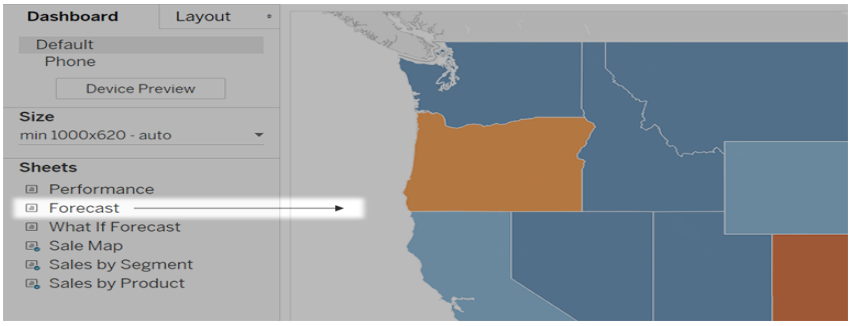
8.Creating dashboard and story telling,creating your first dashboard and story,design for different displays,add interactivity to your dashboard, distributing and publishing your visualization.

Create a Dashboard
Create a dashboard, and add or replace sheets

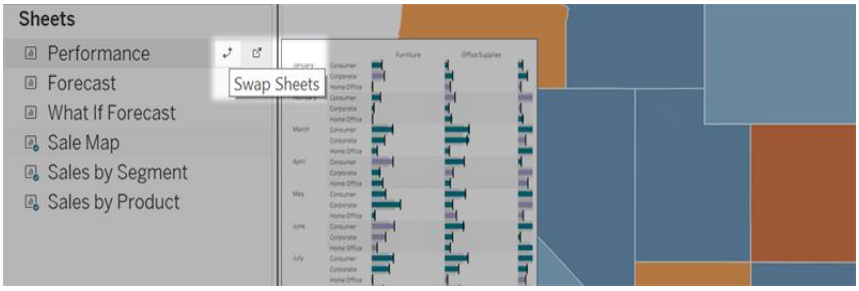
You create a dashboard in much the same way you create a new worksheet.

1. At the bottom of the workbook, click the **New Dashboard** icon:

2. From the **Sheets** list at left, drag views to your dashboard at right.

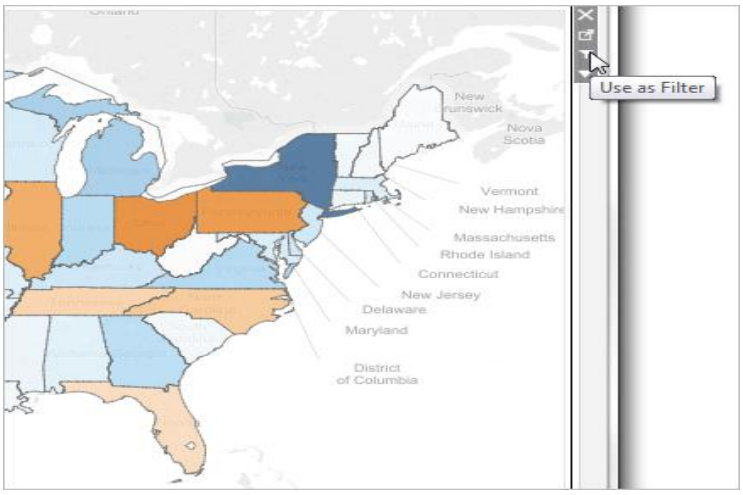


3. To replace a sheet, select it in the dashboard at right. In the Sheets list at left, hover over the replacement sheet, and click the Swap Sheets button.



Add interactivity

- In the upper corner of sheet, enable the Use as Filter option to use selected marks in the sheet as filters for other sheets in the dashboard.



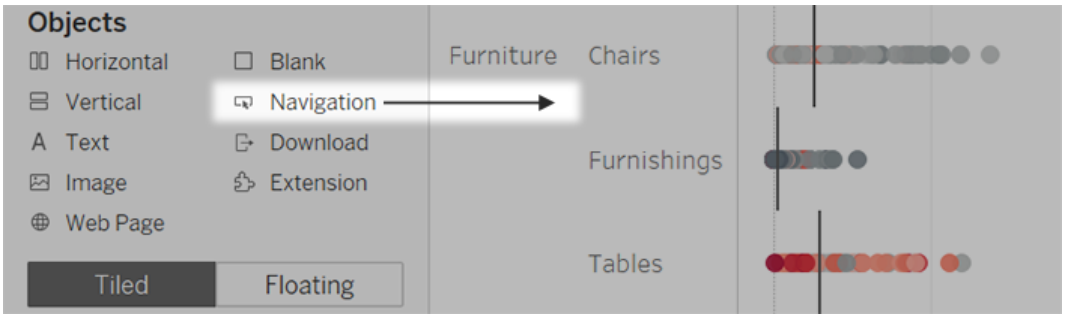
Add dashboard objects and set their options

In addition to sheets, you can add dashboard objects that add visual appeal and interactivity. Here's guidance about each type:

- **Horizontal** and **Vertical** objects provide layout containers that let you group related objects together and fine-tune how your dashboard resizes when users interact with them.
- **Text** objects can provide headers, explanations, and other information.
- **Image** objects add to the visual flavor of a dashboard, and you can link them to specific target URLs.
- **Web Page** objects display target pages in the context of your dashboard. Be sure to review these web security options, and be aware that some web pages don't allow themselves to be embedded
- **Blank** objects help you adjust spacing between dashboard items.
- **Navigation** objects let your audience navigate from one dashboard to another, or to other sheets or stories. You can display text or an image to indicate the button's destination to your users, specify custom border and background colors, and provide informational tooltips.
- **Download** objects let your audience quickly create a PDF file, PowerPoint slide, or PNG image of an entire dashboard, or a crosstab of selected sheets. Formatting options are similar to Navigation objects.
- **Extension** objects let you add unique features to dashboards or integrate them with applications outside Tableau.
- **Ask Data** objects let users enter conversational queries for specific data source fields, which authors optimize for specific audiences such as sales, marketing, and support staff.

Add an object

From the **Objects** section at left, and drag an item to the dashboard on the right:



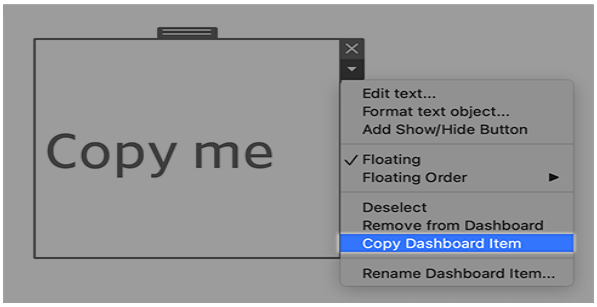
Copy objects

You can copy and paste objects either within the current dashboard, or from dashboards in other sheets and files. You can even copy objects between Tableau Desktop and Tableau in your web browser.

You can't, however, copy the following:

- Sheets in a dashboard
- Items that rely on a specific sheet, such as filters, parameters, and legends
- Layout containers with something you can't copy inside them, like a sheet or filter
- Objects on a device layout
- Dashboard titles

1. Select a dashboard object, and from the object menu, select **Copy Dashboard Item**. Or from the main menu, select **Dashboard** > **Copy Selected Dashboard Item**.



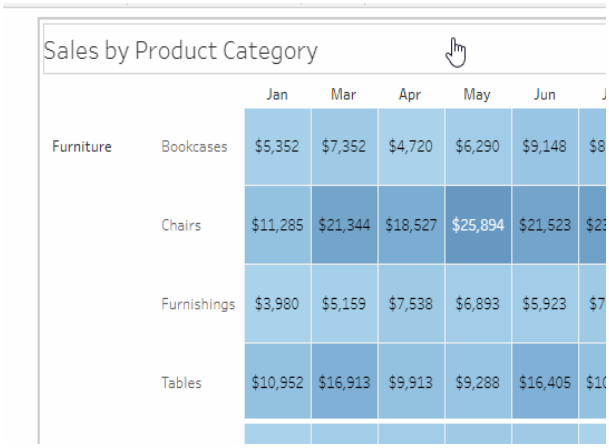
2. Go to the dashboard where you want to paste the object. Then either select nothing to paste in the upper-left corner of the dashboard, or select an existing item to paste next to.

3. In Tableau Desktop, choose **File** > **Paste**. In a browser, either choose **Edit** > **Paste** or use the keyboard shortcut for pasting.

4. The object is pasted 10 pixels below and to the right of the upper-left corner of the dashboard or the selected object. To move the pasted object, drag the handle at the top.

Set options for objects

Click the object to select it. Then click the arrow in the upper corner to open the shortcut menu.



Detailed options for Image objects

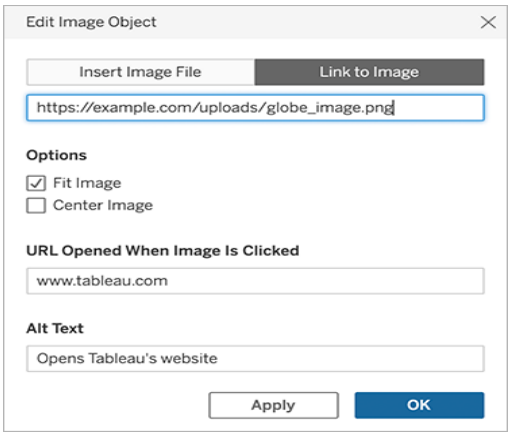
With the Image object, you can either insert image files into dashboards or link to images posted on the web. In either case, you can specify a URL the image opens when clicked, adding interactivity to your dashboard.

1. From the Objects section at left, drag an Image object to your dashboard at right. Or, on an existing Image object in a dashboard, click the pop-up menu in the upper corner, and choose **Edit Image**.

2. Click either **Insert Image File** to embed an image file into the workbook or **Link to Image** to link to a web-based image.

   Consider linking to a web-based image when:

- The image is very large and your dashboard audience will view it in a browser
- The image is an animated GIF file.

- 

3. If you're inserting an image, click **Choose** to select the file. If you're linking to an image, enter its web URL.

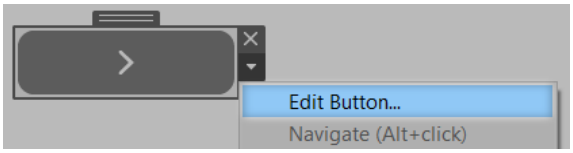
4. Set remaining image fitting, URL linking, and alt text options. (Alt text describes the image in screen-reading applications for improved accessibility.)

Detailed options for Navigation and Download objects

Navigation and Download objects have several unique options that help you visually indicate a navigation destination or file format.

A navigation button using text for the button style

1. In the upper corner of the object, click the object menu, and choose **Edit Button**.



2. Do one of the following:
   - From the **Navigate to** menu, choose a sheet outside the current dashboard.
   - From the **Export to** menu, choose a file format.

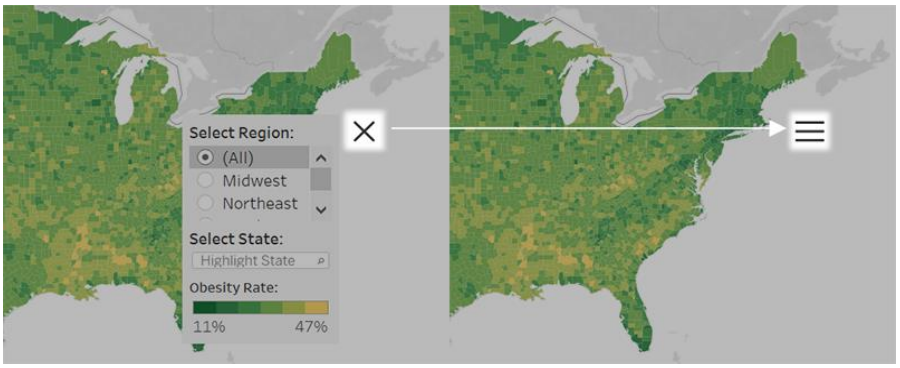
3. Choose image or text for **Button Style**, specify the image or text you want to appear, and then set related formatting options.

4. For **Tooltip text**, add explanatory text that appears when viewers hover over the button. This text is optional and typically best used with image buttons. Show and hide objects by clicking a button

Show/Hide buttons let dashboard viewers toggle the visibility of dashboard objects, revealing them only when necessary.

How hidden objects affect layouts

When a floating object is hidden, it simply reveals any objects beneath it. Show/Hide buttons can be particularly helpful when you want to temporarily hide a floating group of filters to reveal more of a visualization.



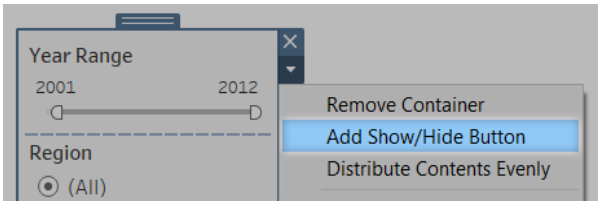
When a tiled object is hidden, the results depend on the object's level in the layout hierarchy.

- In most cases, you'll want to place objects you plan to hide in a Horizontal or Vertical layout container, because hidden objects will have their space filled in by other objects in the container.
- By contrast, in the Tiled layout container at the very top of the layout hierarchy, a hidden object leaves blank space behind.

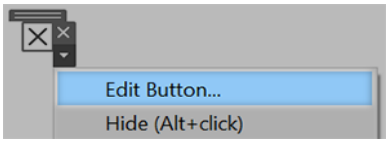
Add and configure a Show/Hide button

1. Select a dashboard object.

2. From the pop-up menu in the upper corner of the object, select **Add Show/Hide Button**.



3. From the button menu, choose **Edit Button**.



4.Set these options:

- **Dashboard Item to Show/Hide** specifies the target object. (An object can be the target of only one Show/Hide button at a time. Choose **None** if you want to target the object with another Show/Hide button.)
- **Button Style** specifies whether image or text displays for the button.
- **Button Appearance** specifies how the button looks when the item is both shown and hidden. Click **Item Shown** and **Item Hidden** to choose different images or text for each state.
- **Tooltip text** provides explanatory text that appears when viewers hover over the button. (For example, you might enter "Show or hide filters" for a container with filter menus.)

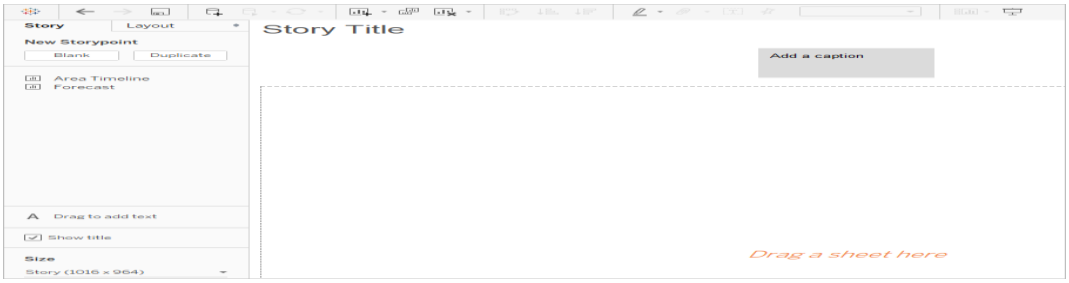
5. If necessary, drag the button to a different location or resize it to better fit your layout.

Create a Story

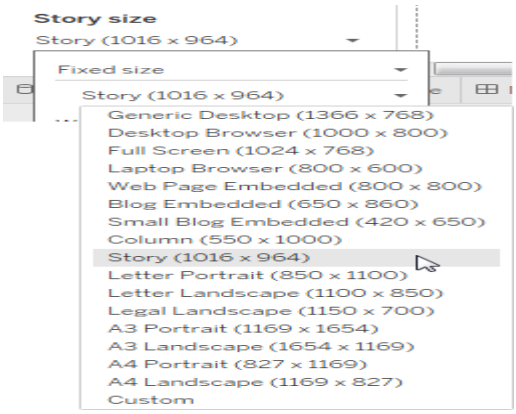
Create a story point

1. Click the **New Story** tab.

Tableau opens a new story as your starting point:



2. In the lower-left corner of the screen, choose a size for your story. Choose from one of the predefined sizes, or set a custom size, in pixels:

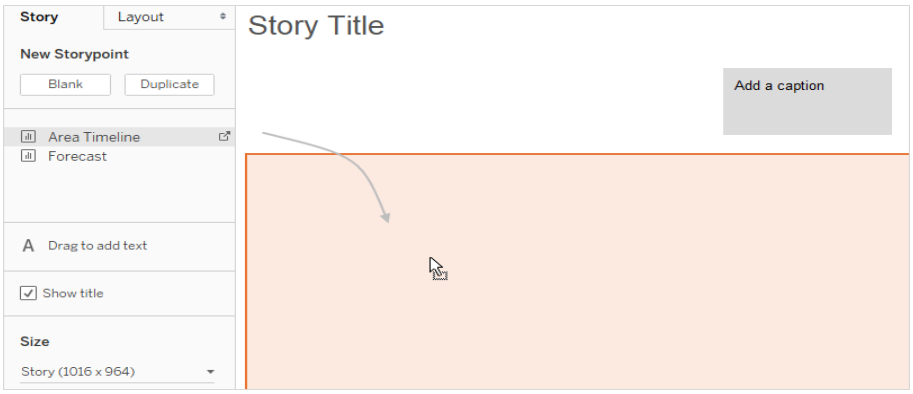


3. By default, your story gets its title from the sheet name. To edit it, right-click the sheet tab, and choose **Rename Sheet**.

   If you're using Tableau Desktop, you can also rename a story by double-clicking the title.

4. To start building your story, double-click a sheet on the left to add it to a story point.

   In Tableau Desktop, you can also drag sheets into your story point.



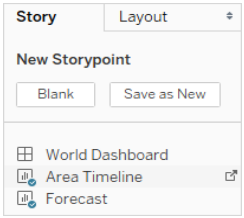
   When you add a sheet to a story point, that sheet remains connected to the original sheet. If you modify the original sheet, your changes will automatically be reflected on the story points that use it.

5. Click **Add a caption** to summarize the story point.

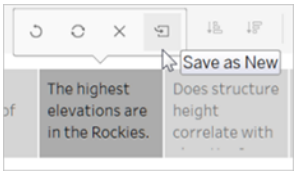
   In Tableau Desktop, you can highlight a key takeaway for your viewers by dragging a text object to the story worksheet and typing a comment.

6. To further highlight the main idea of this story point, you can change a filter or sort on a field in the view. Then save your changes by clicking **Update** on the story toolbar above the navigator box:

7. Add another story point by doing one of the following:
   - Click **Blank** to use a fresh sheet for the next story point.



   - Start customizing a story point and click **Save as New** on the toolbar above the navigator box.



- Click **Duplicate** to use the current story point as the basis for a new one.

Explore layout options

You can refine the look of your story using the options on the **Layout** tab.

1. Click the **Layout** tab.
2. Choose a navigator style that best suits your story, and show or hide the next and previous arrows.

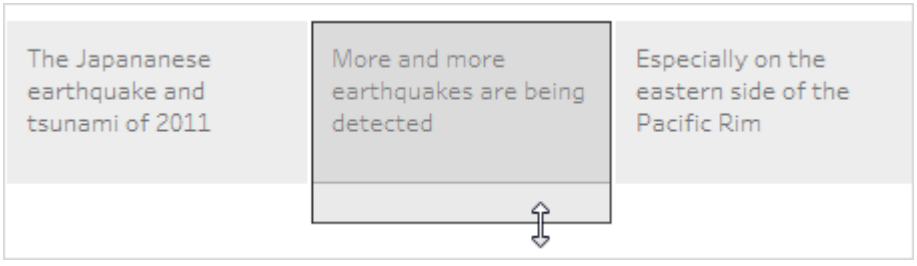
Format a story

Resize captions (Tableau Desktop only)

Sometimes the text in one or more of your captions is too long to fit inside the height of the navigator. In this case, you can re-size the captions vertically and horizontally.

1. In the navigator, select a caption.
2. Drag the border left or right to resize the caption horizontally, down to resize vertically, or select a corner and drag diagonally to resize the caption both horizontally and vertically.

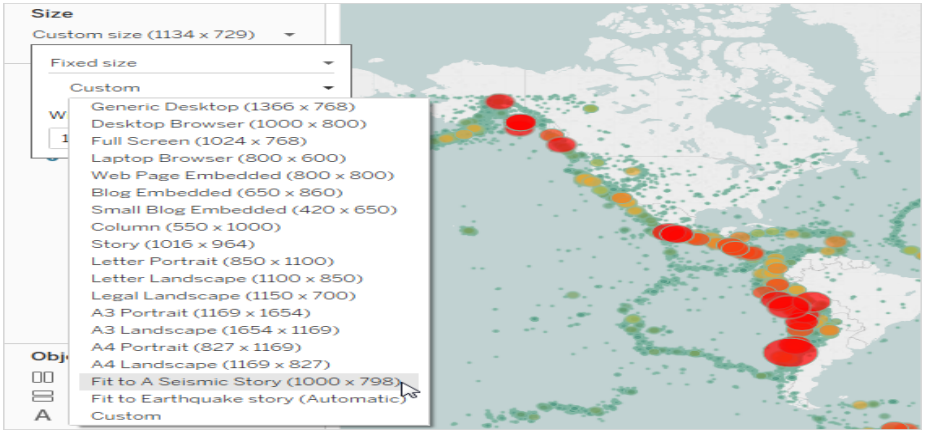
   All captions in the navigator update to the new size.



Fit a dashboard to a story

You can fit a dashboard to the exact size of a story. For example, if your story is exactly 800 by 600 pixels, you can shrink or expand a dashboard to fit inside that space.

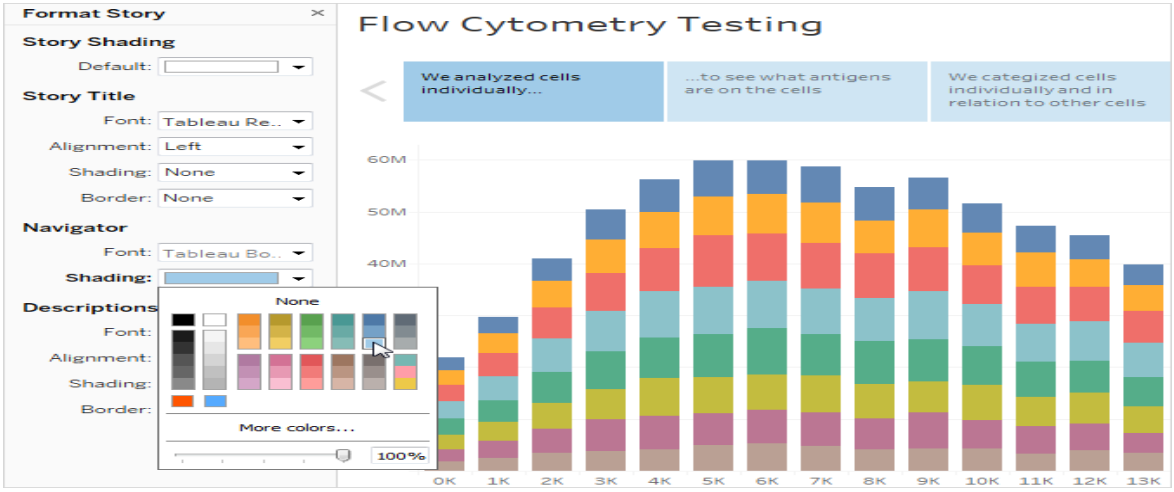
Click the **Size** drop-down menu and select the story you want the dashboard to fit inside.



-

Format a story's shading, title, and text objects (Tableau Desktop only)

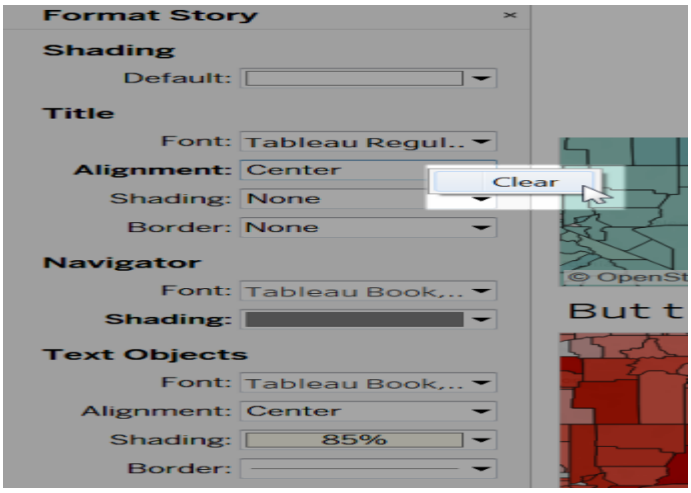
To open the **Format Story** pane, select **Format** > **Story**.



Clear all formatting (Tableau Desktop only)

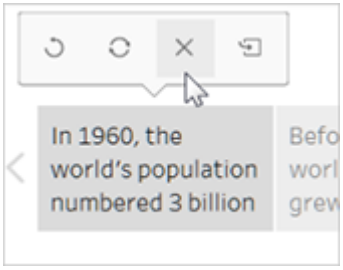
- To reset a story to its default format settings, click the **Clear** button at the bottom of the **Format Story** pane.
- To clear a single format setting, right-click (Windows) or control-click (macOS) the format setting you want to undo in the **Format Story** pane. Then select **Clear**.

  For example, if you want to clear the alignment of the story title, right-click (control-click on Mac) **Alignment** in the **Title** section, and then select **Clear**.



Delete a story point

Click the X in the toolbar above the point's caption:



Present your story

1. In Tableau Desktop, click the **Presentation Mode** button on the toolbar. Or, publish the story to Tableau Cloud or Tableau Server, and click the **Full Screen** button in the upper-right corner of the browser.

2. To step through your story, click the arrow to the right of the story points. Or, in Tableau Desktop, use the arrow keys on your keyboard.

3. To exit Presentation or Full Screen mode, press **Esc**

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9.Tableau file types, publishing to Tableau Online, Sharing your visualizations, printing, and Exporting.

Tableau File Types :

- **Workbooks (.twb)** – Tableau workbook files have the .twb file extension. Workbooks hold one or more worksheets, plus zero or more dashboards and stories.
- **Bookmarks (.tbm)** – Tableau bookmark files have the .tbm file extension. Bookmarks contain a single worksheet and are an easy way to quickly share your work.
- **Extract (.hyper)** – Tableau extract files have the .hyper extension. Extract files are a local copy of a subset or entire data set that you can use to share data with others, when you need to work offline, and improve performance.
- **Data Source (.tds)** – Tableau data source files have the .tds file extension. Data source files do not contain the actual data but rather the information necessary to connect to the actual data as well as any modifications you've made on top of the actual data

Changing the Repository Location

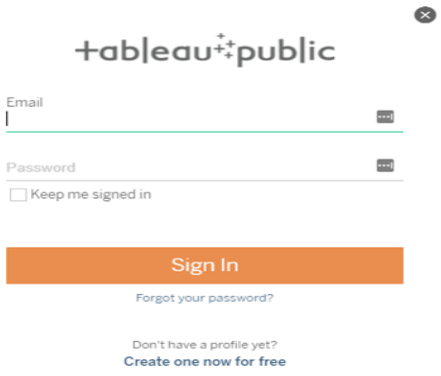
1. Select **File** > **Repository Location**.
2. Select a new folder that will act as the new repository location in the Select a Repository dialog box.
3. Restart Tableau so that it uses the new repository.

Share your findings:

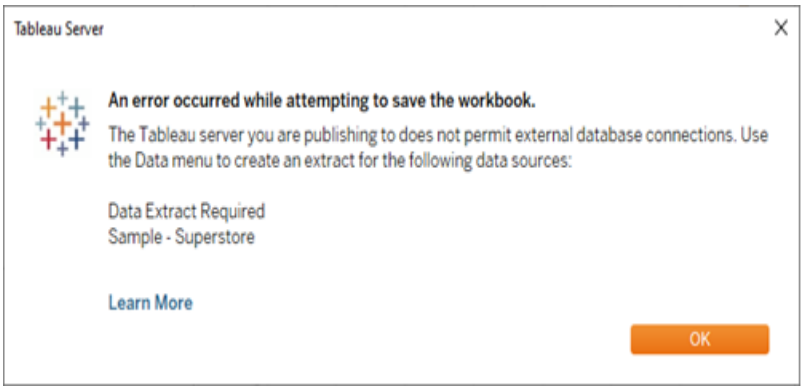
Use Tableau Public:

1. Select **Server** > **Tableau Public** > **Save to Tableau Public**.

2. Enter your Tableau Public credentials in the dialog box.

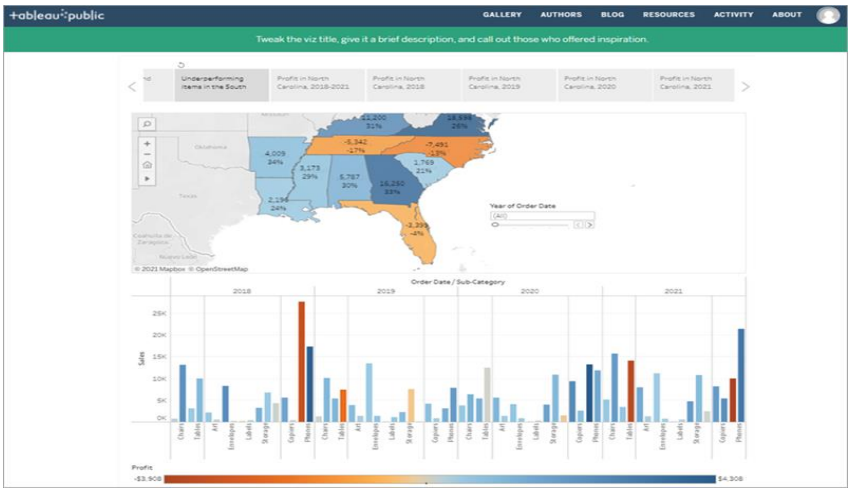


If you don't have a Tableau Public profile, click **Create one now for free** open the Data Source page. Then in the top-right corner, change the **Connection** type from **Live** to **Extract**.



4. For the second (and last) time, select **Server** > **Tableau Public** > **Save to Tableau Public**.

5. When your browser opens, review your embedded story. It will look like this:



6. Click **Edit Details** to update the title of your viz, add a description, and more.

7. Click **Save**.

8. To share with colleagues, click **Share** at the bottom of your viz.

9. To share your story:

   a. Copy the **Embed Code** and paste it in your web page HTML.

   b. Copy the **Link** and send the link to your colleagues.

   c. Send an email using your default email client by clicking the email icon.

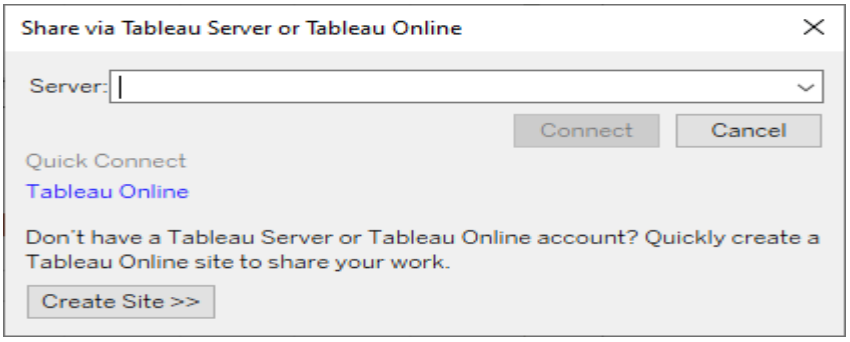
   d. Share on Twitter or Facebook by clicking the appropriate icon.

Use Tableau Server:

Publish to Tableau Server:

1. Select **Server** > **Publish Workbook** or click **Share** on the toolbar.

2. Enter the name of the server (or IP address) that you want to connect to in the dialog box and click **Connect**.



3. In the Name field, enter **Improve Profits in the South**.

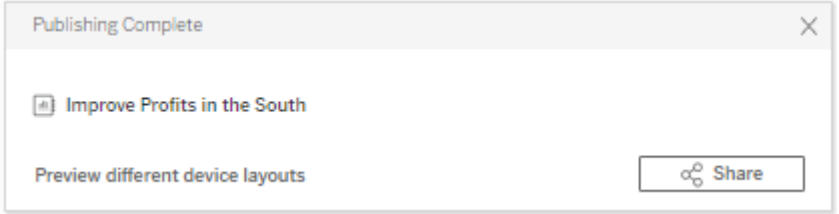
4. If you want, enter a description for reference, for example "Take a look at the story I built in Tableau Desktop!"

5. Under **Sheets**, click **Edit**, and then clear all sheets except **Improve Profits in the South**.

6. Click **Publish**.

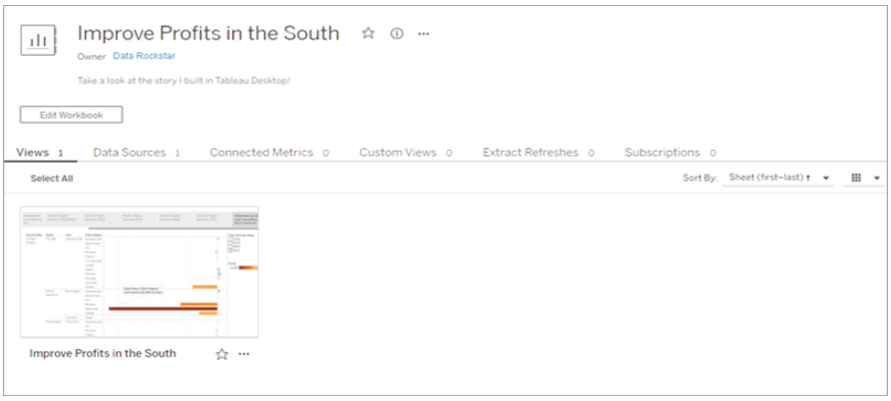
   If prompted, enter your server credentials.

   The Publishing Complete dialog box lets you know that your story is ready to view.



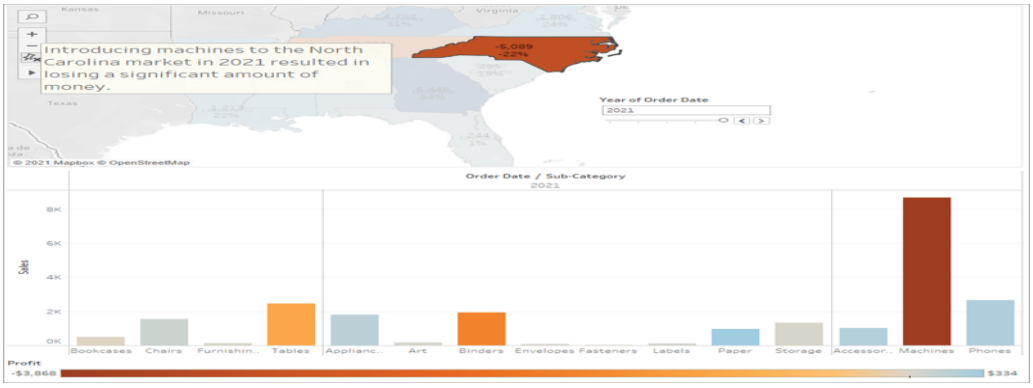
Send a link to your work:

1. navigate to the Improve Profits in the South story that you published.

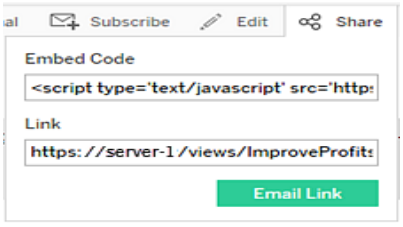


2. Click **Improve Profits in the South**.

   Your screen will update to look like this:



3. From the menu, select **Share**.



4. To share your story:

   a. **By** copying the **Embed Code** and pasting it in your web page HTML.

   b. Send a link by copying the **Link** and sending the link to your colleagues.

   c. Send an email by using your default email client: Click the email icon.

Print Views from Tableau Desktop:
Set up the page:

To begin, select **File** > **Page Setup**.

General settings :

- **Show** - Show or hide the title, view, caption, color legend, shape legend, size legend, and map legend.
- **Headers and Breaks** - Control the appearance of these table elements.
  - Repeat headers and legends on each page - adds table row and column headers at the top of each printed page when a view breaks across several pages.
  - Break pages on pane boundaries - prevents page breaks in the middle of a table cell.
- **Pages Shelf** - If the view uses the Pages Shelf, specify whether to print the current page or all pages.

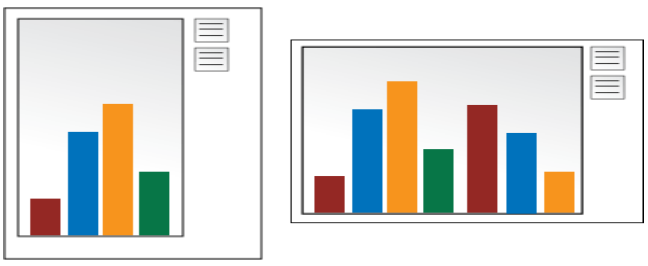
Layout settings:

- **Legend Layout** - If you include one or more legends, select how you want the legends to appear on the printed page.
- **Margins** - Specify top, bottom, left, and right margins by typing values into the text boxes.
- **Centering** - Optionally, select whether to center the view horizontally or vertically—or both—on the page.

Print Scaling settings:

- **Print Scaling** - Scale a view to fit within a single page or print across multiple pages. Select from the following options:
  - Automatic – Scales the view automatically based on the paper size.
  - Scale to – Scales the view to the specified percentage of its original size.
  - Fit to – Scales the view to fit within the specified area. Select the number of printed pages across and down. For example, if you have a really wide view that is not very tall, you can specify three pages across by one page down.
- **Page Orientation** -
  - Use Printer Setting – Use the page orientation that is already specified by the printer.
  - Portrait – Presents the view so that it is oriented vertically on the printed page.
  - Landscape – Presents the view so that it is oriented horizontally on the printed page.

  The following diagram shows the difference between portrait and landscape page orientations.



Print a view

After Page Setup settings, select **File** > **Print**

Show Selections:

When this option is selected any selections you've made in the views will be maintained while printing.

Change the Print Range:

Select from the following print ranges:

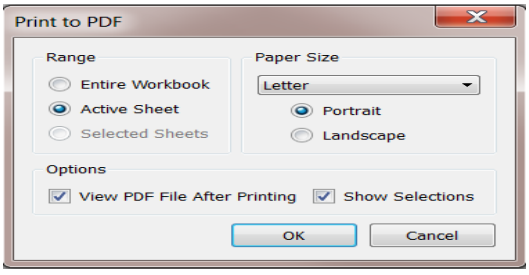
- **Entire Workbook** - Prints all the worksheets in the workbook.
- **Active Sheet** - Prints only the sheet currently displayed in the workbook.
- **Selected Sheets** - Prints the selected sheets.

Print to PDF

Print to PDF using a Windows computer:

1. Specify page setup options for each sheet in your workbook.

2. Select **File** > **Print to PDF**.



3. In the Print to PDF dialog box, select the print Range:
   - Entire Workbook ,Active Sheet ,Selected Sheets

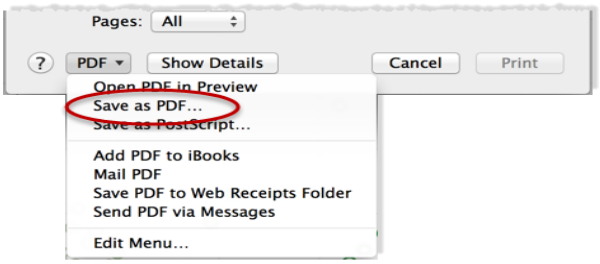
4. Select a **Paper Size**. If you select Unspecified, the paper size will expand to the necessary size to fit the entire view on a single page.

6. Select **View PDF File After Printing** if you want to automatically open the PDF after creating it.
7. Select whether to **Show Selections**. When this option is selected the selections in the views are maintained in the PDF.

8. Click **OK** and specify where you want to save the PDF. Then click **Save**.

Print to PDF using a Mac computer

1. Specify page setup options for each sheet in your workbook.
2. Select **File** > **Print**.
3. In the Print dialog box, click **Show Details** to select a print range:
   - Entire Workbook,, Active Sheet, Selected Sheets
4. Click **PDF** > **Save as PDF**.



5. Specify where you want to save the PDF, then click **Save**.

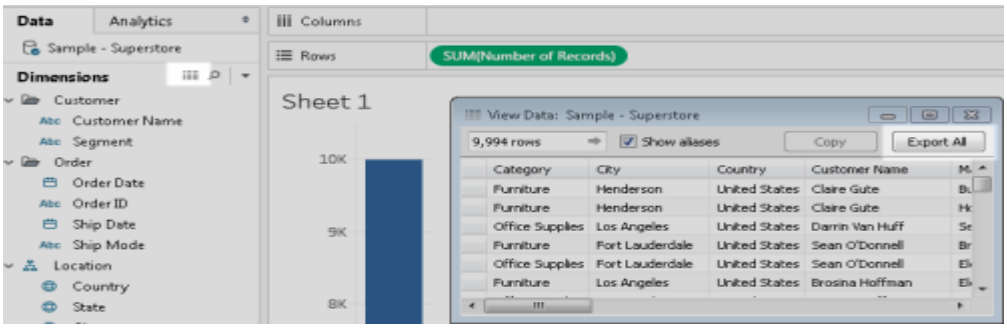
Export Data from Tableau Desktop
Export data in the data source

Export your data to .csv file

Exporting your data in the Tableau data source using this format creates an independent data set and can be a convenient and flexible way to share your data with others.There are two primary ways you can export your data in the data source to a .csv file in Tableau:

From the Data Source page: On the Data Source page, select **Data** > **Export Data to CSV** to export all the data in your data source to .csv file.

From the view: On the sheet tab, drag a field to the Columns or Rows shelf, click the View Data icon in the Data pane, and click the **Export All** button.



Extract your data

Another way to export all of your data or a subset of your data in the data source is to create an extract (.hyper) file. An extract functions as an independent data.

Export the data source

After you connect to your data, you can export and save your data source as a Tableau data source (.tds) file. Saving the data source creates a shortcut to your remote data

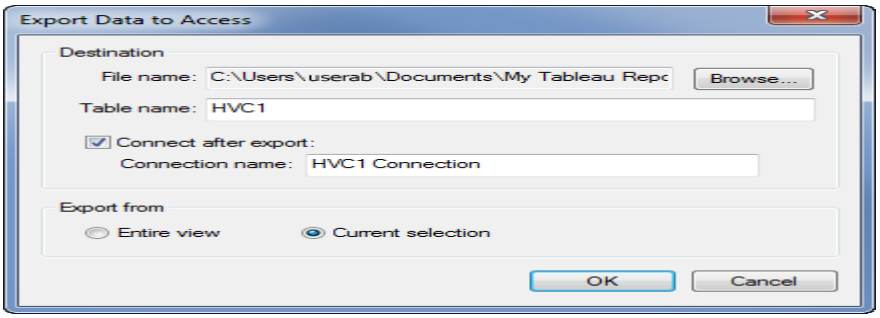
Export data used in the view

Export data in the view to Microsoft Access or .csv

Export the data that is used to generate the view as an Access database (Windows only) or .csv file (Mac only).

1. In Tableau Desktop, select **Worksheet** > **Export** > **Data**.
2. Select a location and type a name for your Access database or .csv file.
3. Click **Save**.

   If you're on Windows, the Export Data to Access dialog box displays to give you the option to immediately use the new Access database and continue working in Access without interrupting your work flow.



Export crosstab of data in the view to Excel

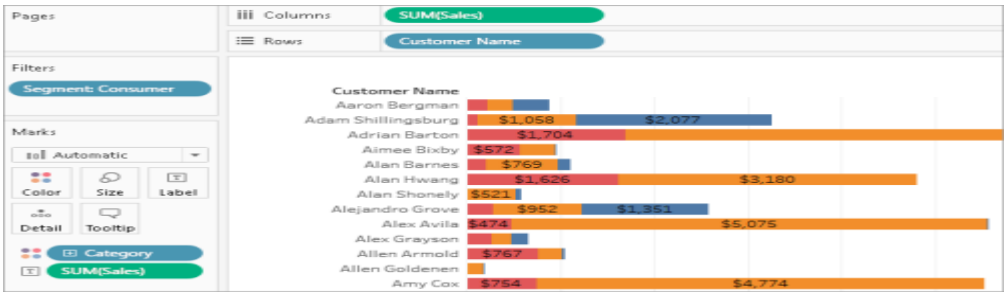
If the view you are exporting contains a lot of data, In this case, if you choose to exclude the formatting from the export, performance of the export might improve.

- In Tableau Desktop: select **Worksheet** > **Export** > **Crosstab to Excel**.
  If you're using a Mac, this option opens a dialog box where you can save the file. You must then manually open the file in Excel.
- In Tableau Server or Tableau Cloud, open a view or dashboard and select **Download** > **Crosstab**.
  Select which sheets from the workbook to export data from.

Copy data in the view to clipboard

Copy the data used to generate the view so that you can paste it into another application.

1. Create a view.



2. Select **Worksheet** > **Copy** > **Data**.

3. Open another application, such as Word, and paste the data into the document.

Category	Customer Name	Sales
Furniture	Aaron Bergman	$391
Furniture	Adam Shillingsburg	$2,077
Furniture	Adrian Barton	$1,280
Furniture	Aimee Bixby	$16
Office Supplies	Aaron Bergman	$274
Office Supplies	Adam Shillingsburg	$1,058

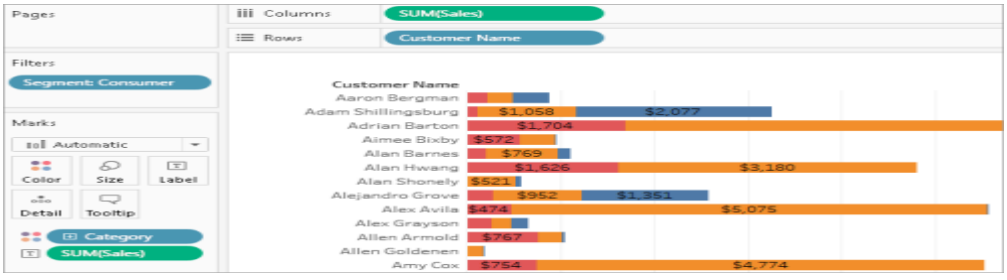
Copy crosstab of data in the view to clipboard

Copying a crosstab is restricted by some general conditions:

- You must copy all records in the view. You cannot copy a subset of records.
- This option is valid for aggregated views only. It cannot be used on disaggregated views of data because a crosstab is by definition an aggregated view of data. This means the **Aggregate Measures** option on the Analysis menu must be selected in order for copying a crosstab to work properly.
- You cannot copy a crosstab if the view contains continuous dimensions such as continuous dates and times.
- Other restrictions may apply depending on the data in your view.

After the general conditions are met, copy the crosstab.

1. Create a view.



2. Select **Worksheet** > **Copy** > **Crosstab**.

3. Open another application, such as Excel, and paste the crosstab.

	A	B	C	D	E
1		Category	Category	Category	
2	Customer Name	Furniture	Office Sup	Technology	
3	Aaron Bergman	$391	$274	$222	
4	Adam Shillingsburg	$2,077	$1,058	$120	
5	Adrian Barton	$1,280	$11,489	$1,704	
6	Aimee Bixby	$16	$379	$572	
7	Alan Barnes	$131	$769	$213	

10.Creating custom charts,cyclical data and circular area charts,dual axis charts

Creating custom charts :

Set up configuration

Each time you use this extension you'll want it to be based on different data found on different worksheets so, we'll let the dashboard author pick which worksheets and fields should be used in a configuration pop-up window. We'll need to build four inputs and a button. We need to collect: the source worksheet to build the chart from, the dimension and measure fields to use on that worksheet, and the worksheet we want to filter when you click on the chart.

Set up the canvas

we'll need to get the dashboard data and create the chart, let's set up the canvas where it will be drawn. Make sure to bring in the Tableau Extensions API and the Chart.js library to your index.html page. Then set up a canvas element we can use to draw the chart as well as a container to help with styling and positioning of the canvas.

Get the chart data

In order to build the chart, we'll need to get data from the dashboard, specifically from the worksheets and fields selected in the configuration. Once you get the worksheet data you can loop through the selected columns that contain the necessary values to plot in the next step.

Draw the chart

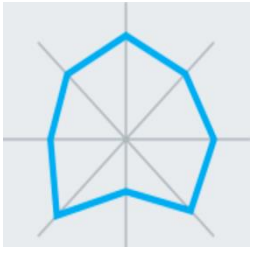
Now that we have the data let's pass it to Chart.js to plot a chart. Specifically, you can build a polar area chart. This will require you to pass the data as well as some options on how you want the chart to appear. This is where you can start to add additional customization to your chart.

Filter the dashboard

You may want to be able to use the custom chart to filter the rest of your dashboard. We can do this by adding an event that triggers whenever a mark is selected in our Chart.js polar area chart. Once the event is triggered we can use the data received to apply a filter to the rest of the dashboard.

cyclical data and circular area charts

WHAT IS A CIRCULAR AREA CHART?



It Also known as the Spider or Radar Chart, the Circular Area Chart, this chart shows the different dimensions such as scores and rankings of one item. The further out a point is from the center, the higher it ranks in a category.

WHEN TO USE A CIRCULAR AREA CHART

Circular area charts are a great way to compare members of a dimension in a function of several metrics.

Dual Axis charts:
What is a Dual Axis Chart?

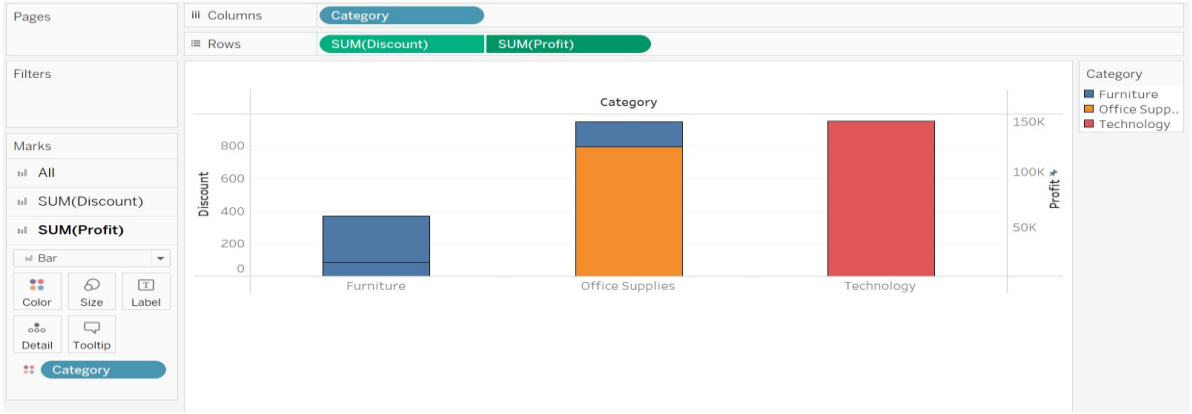
Dual-axis charts are a combination of two charts. It is used to visualize two or more different measures in two different chart types i.e. it depicts the relationship between two variables with different amplitude and scale.

To create a dual-axis chart we must have one date column and two measures.

steps to create a Dual Axis Chart

- Connect a file
- Drag and Drop **Category** into the column shelf
- Drag and Drop **Profit and Discount** into the row shelf
  - Here, we have two charts present on multiple axes

- Right-click on Sum (Profit)
  - Select Dual-axis from the drop-down
  - We get the desired dual-axis chart



- In the Mark pane, you will get SUM(Discount) and SUM(Profit)

- Select the required chart from the drop-down
  - In SUM(Discount) select Bar chart
  - In SUM(Profit) select Line Chart