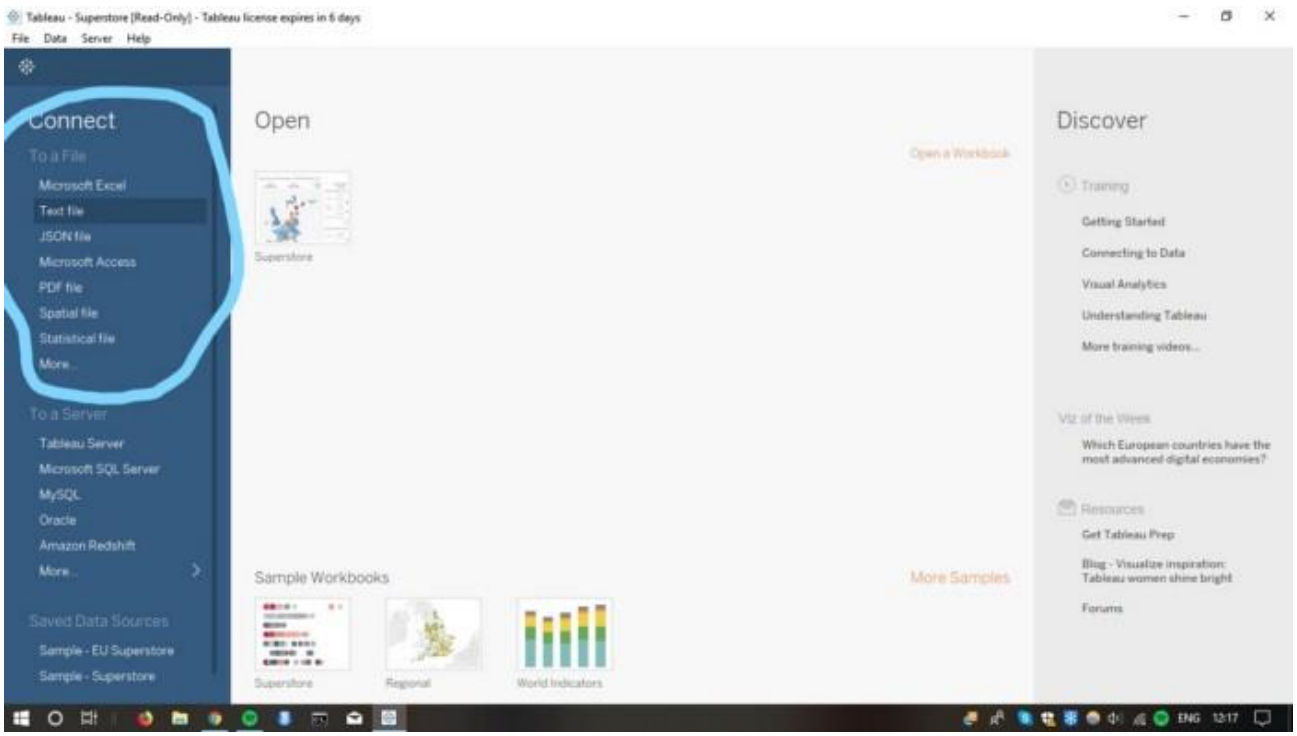
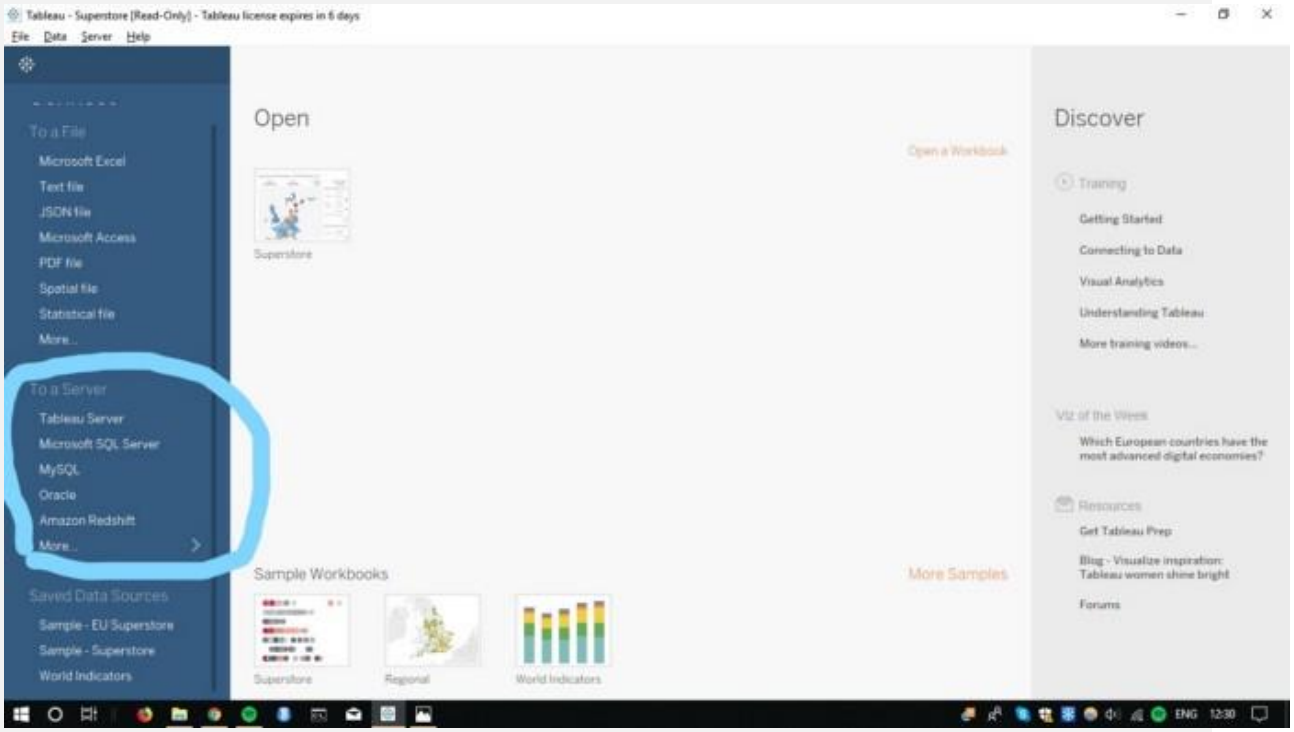
Tableau Desktop Specialist

Part 1: Connecting to and Preparing Data

Create and save data connections

- Create a live connection to a data source





You can save a data source to either of the following formats:

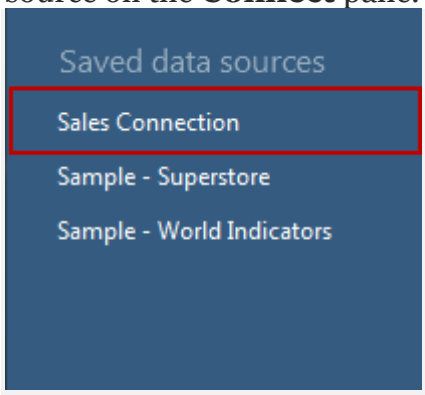
Packaged Data Source (.tdsx) — contains all information in the data source (.tds) file, as well as a copy of any local file-based data or extracts.

A packaged data source is a single zipped file. Use this format if you want to share your data source with people who do not have access to the underlying data that is defined in the connection information.

Save a data source

1. In Tableau Desktop, open the workbook that has the connection to the data you want to save as a file.
2. At the top of the **Data** pane, right-click (Control-click on Mac) the name of the data source, and then select **Add to Saved Data Sources**.
3. Enter a file name, select the file type (.tds or .tdsx), and then click **Save**.

By default, Tableau saves .tds and .tdsx files to the **Datasources** folder under your Tableau repository. When you use the default location, you can connect to the data source on the **Connect** pane.



If you specified a different location, you can connect to the data source by selecting **File** > **Open** and navigating to it.

If you move a local data file that a .tds file contains a reference to, when you try to open the data source in Tableau, you will be prompted to locate or replace the original data source. If you replace the original data source, the replacement data must be of the same type (for example, Excel or MySQL). To avoid saving a specific file path, save the data source as a .tdsx file.

A Tableau data source is the link between your data and Tableau. It is essentially the sum of your data, the connection information, and the customizations that you make on top of data to work with it in Tableau. The data source can contain:

- Information about where the data is located, such as a file name and path or a network location. Or, details on how to connect to your data, such as database server name and server sign-in information.
- The names of any tables in the connection, as well as information about how the tables relate to each other.
- A layer of customizations that you make on top of your data but that are not part of the original data itself, such as calculations, groups, and renamed fields. For details, see Organize and Customize Fields in the Data Pane.

After you connect to your data and select the first table to interact with from your database, a basic data source is created for you.

- **Explain the differences between using live connections versus extracts**

"Extract" is a word you're going to hear a lot in Tableau. Extracts are one of the most powerful but overlooked tools in Tableau's arsenal.

Tableau Data Extracts are snapshots of data optimized for aggregation and loaded into system memory to be quickly recalled for visualization. Extracts tend to be much faster than live connections, especially in more complex visualizations with large data sets, filters, calculations, etc.

For a deep dive into how Tableau extracts are created, check out Gordon Rose's fantastic blog post on the subject.

When you create an extract from a local file (such as a .csv or an Excel workbook) or an on-premise database, you're speeding up the workbook through optimization. As a result, Tableau doesn't need the database to build the visualization. Instead, Tableau's in-memory data engine queries the extract directly.

However, because an extract is a snapshot of the data, the extract will need to be refreshed to receive updates from the original data source, whether it is a local file or an on-premise database.

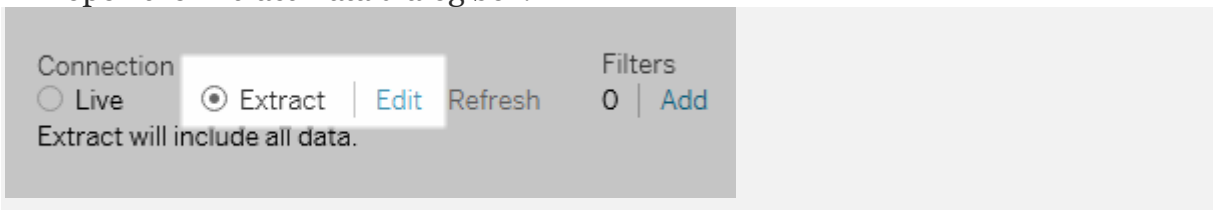
Live connections offer the convenience of real-time updates, with any changes in the data source reflected in Tableau. But live connections also rely on the database for all queries. And unlike extracts, databases are not always optimized for fast performance. With live connections, your data queries are only as fast as the database itself.

There are also more variables at play when using a live connection. Workbook speeds are affected by a variety of factors, including your network speed, traffic on that network, and any custom SQL.

- **Create an extract**

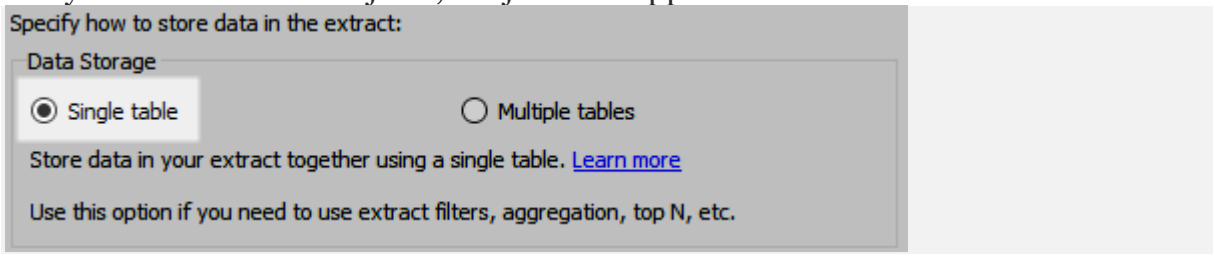
Though there are a number of places in your Tableau work flow where you can create an extract, the primary method is described below.

1. After you connect to your data and set up the data source on the Data Source page, in the upper-right corner, select **Extract**, and then click the **Edit** link to open the Extract Data dialog box.



2. (Optional) Configure one or more of the following options to tell Tableau how to store, define filters for, and limit the amount of data in your extract:

- **Decide how the extract data should be stored**
- You can choose to have Tableau store the data in your extract using one of two structures (schemas): single table (denormamlized schema) or multiple tables (normalized schema). The option you choose depends on what you need.
- Single table: Select **Single table** when you want to limit the amount of data in your extract with additional extract properties like extract filters, aggregation, etc.; or when your data uses pass-through functions (RAWSQL). This is the default structure Tableau uses to store extract data. If you use this option when your extract contains joins, the joins are applied when the extract is created.



- Multiple tables: Select **Multiple tables** if your extract is comprised of tables combined with one or more equality joins and meets the Conditions for using the "Multiple tables" option listed below. If you use this option, joins are performed at query time.

- This option can potentially improve performance and help reduce the size of the extract file. For more information about how Tableau recommends you use the "Multiple tables" option, see Tips for using the "Multiple tables" option. In some cases, you can also use this option as a workaround for row-level security. For more information about row-level security using Tableau, see Restrict Access at the Data Row Level.

- Conditions for using the "Multiple tables" option

- To store your extract using the "Multiple tables" option, the data in your extract must meet all of the conditions listed below.

- All joins between tables are equality (=) joins

- Data types of the join columns are identical

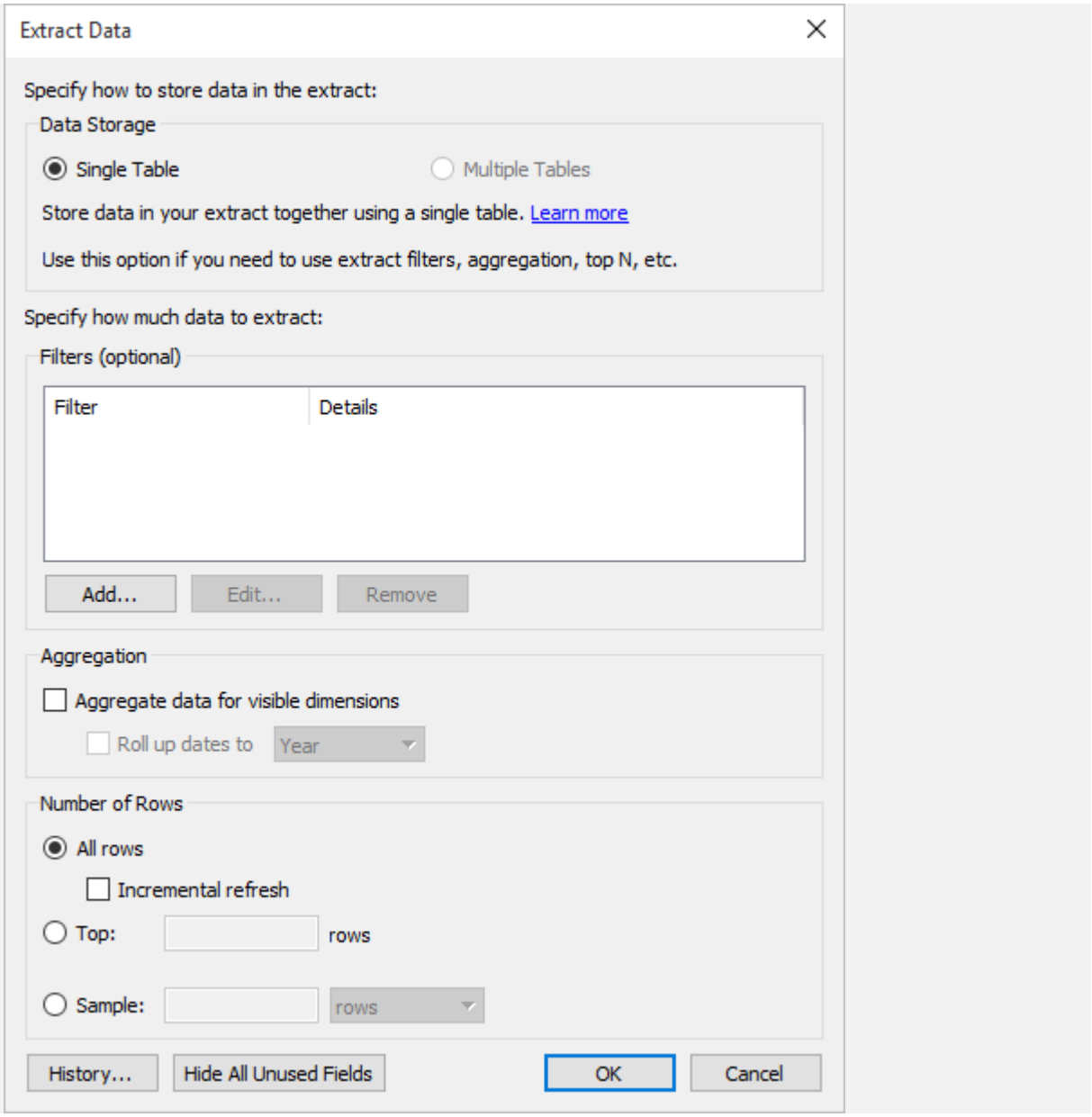
- No pass-through functions (RAWSQL) used

- No incremental refresh configured

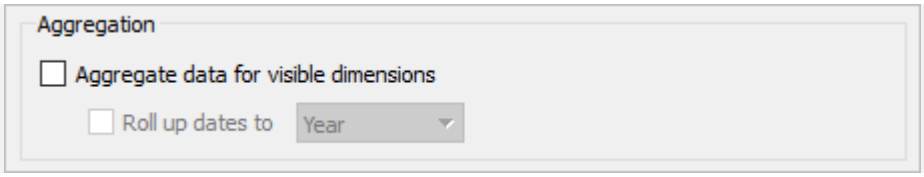
- No extract filters configured

- No top N or sampling configured

- When the extract is stored as “Multiple tables,” you cannot append data to it.
- **Note:** Both the “Single table” and “Multiple tables” options only affect how the data in your extract is stored. The options do not affect how tables in your extract are displayed on the Data Source page.
- For example, suppose your extract is comprised of three tables. If you directly open the extract (.hyper) file that has been configured to use the default option, “Single table,” you see one table listed on the Data Source page. However, if you open the extract using the packaged data source (.tdsx) file or the data source (.tdsx) file with its corresponding extract (.hyper) file, you see all three tables that comprise the extract on the Data Source page.
- **Determine how much data to extract**
- Click **Add** to define one or more filters to limit how much data gets extracted based on fields and their values.



- **Aggregate the data in the extract**
- Select **Aggregate data for visible dimensions** to aggregate the measures using their default aggregation. Aggregating the data consolidates rows, can minimize the size of the extract file, and increase performance.
- When you choose to aggregate the data, you can also select **Roll up dates** to a specified date level such as Year, Month, etc. The examples below show how the data will be extracted for each aggregation option you can choose.



- **Original data**

	A	B	C
1	**Date**	**Region**	**Sales**
2	1/1/2009	South	$500
3	1/1/2009	West	$200
4	1/1/2009	West	$100
5	1/1/2009	East	$300
6	1/2/2009	South	$600
7	1/2/2009	South	$400
8	1/2/2009	East	$100
9			

- Each record is shown as a separate row. There are seven rows in your data.**Aggregate data for visible dimensions**

- *(no roll up)*

	A	B	C
1	**Date**	**Region**	**Sales**
2	1/1/2009	East	$300
3	1/1/2009	South	$500
4	1/1/2009	West	$300
5	1/2/2009	East	$100
6	1/2/2009	South	$1,000
7			

- Records with the same date and region have been aggregated into a single row. There are five rows in the extract.**Aggregate data for visible dimensions** *(roll up dates to Month)*

	A	B	C	D
1	**Date**	**Region**	**Sales**	
2	1/1/2009	East	$400	
3	1/1/2009	South	$1,500	
4	1/1/2009	West	$300	
5				

- Dates have been rolled up to the Month level and records with the same region have been aggregated into a single row. There are three rows in the extract.
- **Choose the rows to extract**
- Select the number of rows you want to extract.
- You can extract **All rows** or the **Top***N* rows. Tableau first applies any filters and aggregation and then extracts the number of rows from the filtered and aggregated results. The number of rows options depend on the type of data source you are extracting from.
- **Notes:**
- Not all data sources support sampling. Therefore, you might not see the **Sampling** option in the Extract Data dialog box.
- Any fields that you hide first in the Data Source page or on the sheet tab will be excluded from the extract. Click the **Hide All Unused Fields** button to remove these hidden fields from the extract

1. When finished, click **OK**.
2. Click the sheet tab. Clicking the sheet tab initiates the creating of the extract.
3. In the subsequent dialog box, select a location to save the extract, give the extract file a name, and then click **Save**.

- **Save metadata properties in a . TDS**

Data Source (.tds) — contains only the information you need to connect to the data source, including the following:

- Data source type
- Connection information specified on the data source page; for example, database server address, port, location of local files, tables
- Groups, sets, calculated fields, bins
- Default field properties; for example, number formats, aggregation, and sort order

Use this format if everyone who will use the data source has access to the underlying file or database defined in the connection information. For example, the underlying data is a CSV file on your computer, and you are the only person who will use it; or the data is hosted on a cloud platform, and your colleagues all have the same access you do.

Modify data connections

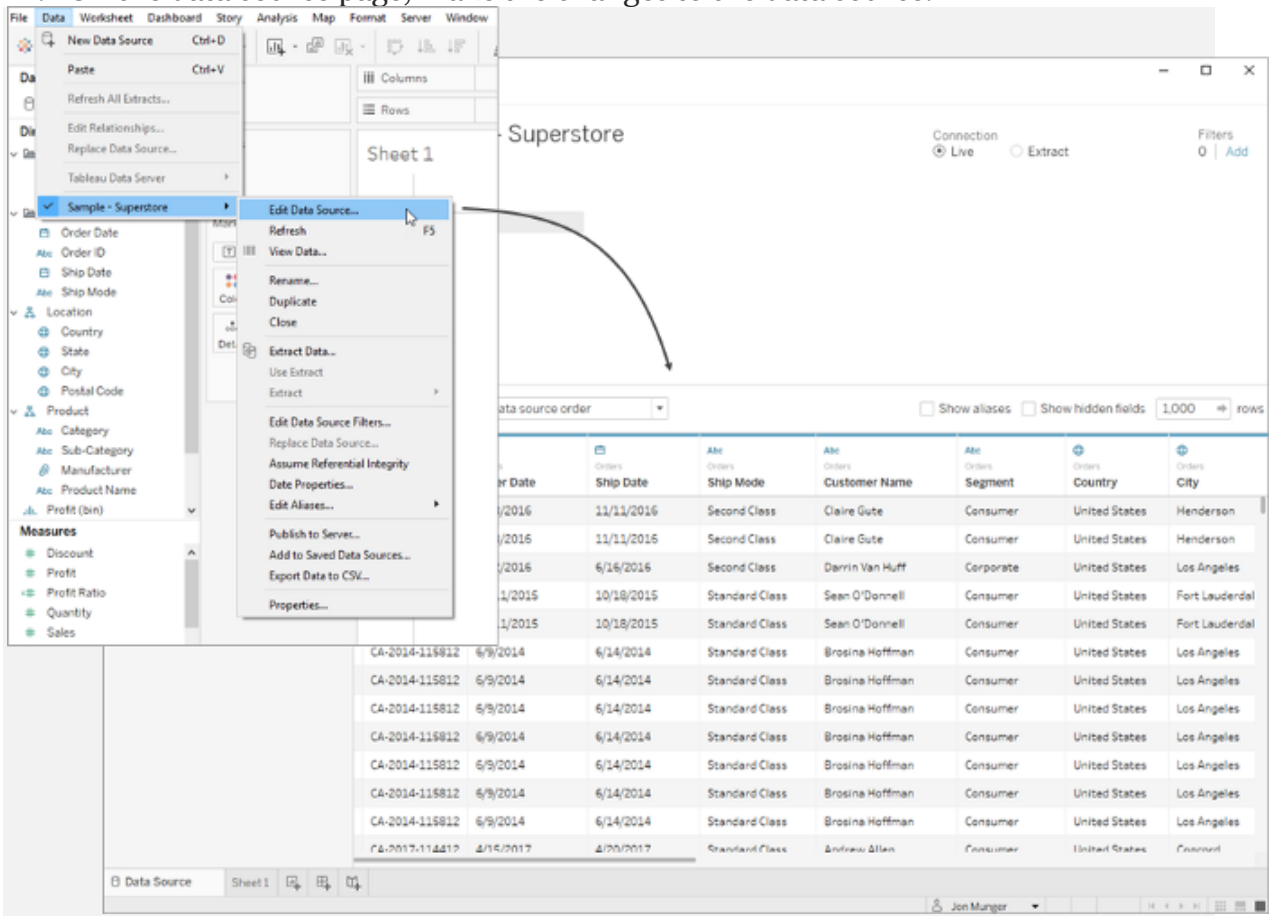
If your data comes from multiple tables in different databases, you also can connect to your data and then combine the tables in Tableau. But before combining the tables, you must decide between setting up:

- an individual data source for each connection to the database that contains the tables that you need for your analysis, or
- a single data source with multiple independent connections to all the tables you need for your analysis.

When your data is stored in tables from different databases, you can choose from the following methods to combine data:

- Data blending — supports one connection per data source, and one data source per database (or Excel or text file)
- Cross-database join — allows two or more connections per data source

1. On the **Data** menu, select a data source, and then select **Edit Data Source**.
2. On the data source page, make the changes to the data source.



- Add a join

Overview of join types

In general, there are four types of joins that you can use to combine your data in Tableau: inner, left, right, and full outer. The tables you can join and the different join types you can use depend on the database or file you connect to. You can tell which join types your data supports by checking the join dialog after you've connected to your data and have at least two tables on the canvas.

Inner

When you use an inner join to combine tables, the result is a table that contains values that have matches in both tables.

Left

When you use a left join to combine tables, the result is a table that contains all values from the left table and corresponding matches from the right table.

When a value in the left table doesn't have a corresponding match in the right table, you see a null value in the data grid.

Right

When you use a right join to combine tables, the result is a table that contains all values from the right table and corresponding matches from the left table.

When a value in the right table doesn't have a corresponding match in the left table, you see a null value in the data grid.

Full outer

When you use a full outer join to combine tables, the result is a table that contains all values from both tables.

When a value from either table doesn't have a match with the other table, you see a null value in the data grid.

Union

Though union is not a type of join, union is another method for combining two or more tables by appending rows of data from one table to another. Ideally, the tables that you union have the same number of fields, and those fields have matching names and data types. For more information about union, see Union Your Data.

Combine tables from the same database

If the tables you need to analyze are from the same database, or workbook (for Excel), or directory (for text) then use the following procedure to combine tables. Combining tables that are from the same database require only a single connection in the data source. Typically, joining tables from the same database yields better performance. This is because querying data that is stored on the same database takes less time and leverages the native capabilities of the database to perform the join.

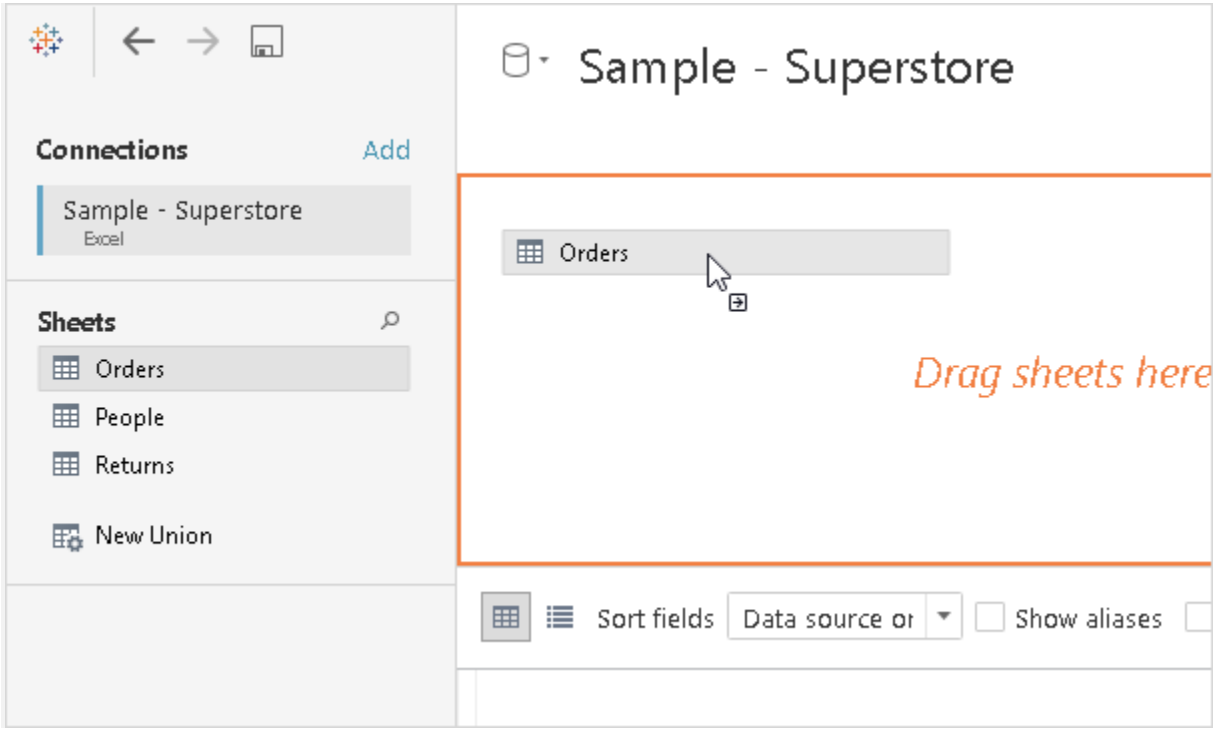
Note: Depending on the level of detail of the tables you want to combine, you might consider data blending instead. For more information, see Blend Your Data.

To join tables

1. **In Tableau Desktop:** on the start page, under **Connect**, click a connector to connect to your data. This step creates the first connection in the Tableau data source.

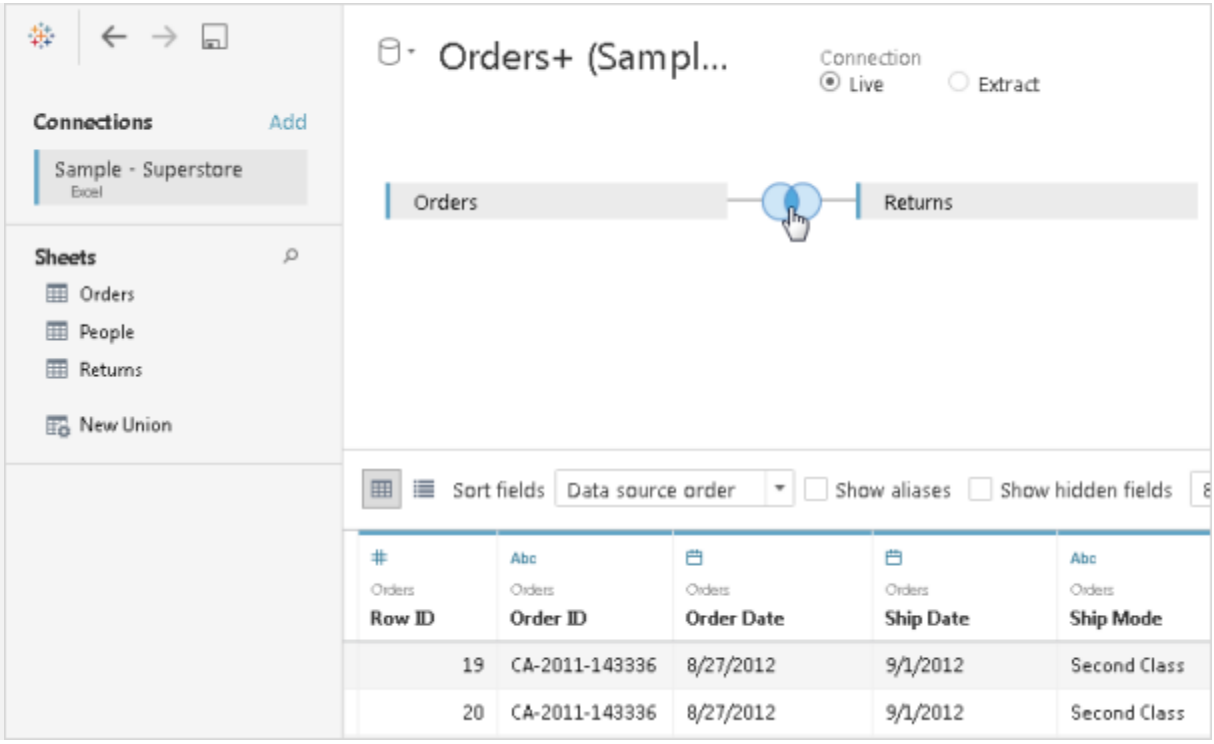
2. **In web authoring**: Select New Workbook and connect to your data. This step creates the first connection in the Tableau data source.

3. Select the file, database, or schema, and then double-click or drag a table to the canvas.



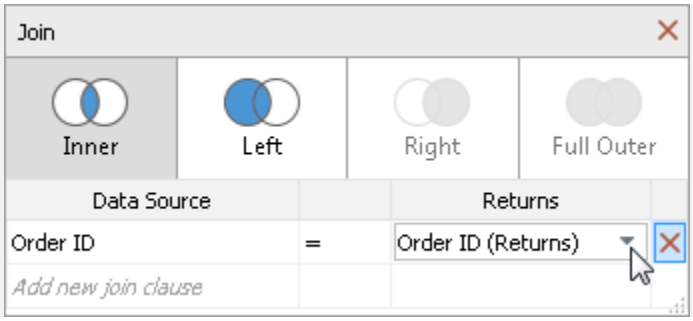
1. **Note:** If you're authoring on the web or signed in to Tableau Server (from Tableau Desktop) while you are setting up the data source, you have access to recommended tables to help make combining your data easier. For more information, see Use Certified and Recommended Data Sources and Tables.

2. Double-click or drag another table to the canvas, and then click the join relationship to add join clauses and select your join type.



1. Add one or more join clauses by selecting a field from one of the available tables used in the data source, a join operator, and a field from the added table. Inspect the join clause to make sure it reflects how you want to connect the tables.

2. For example, in a data source that has a table of order information and another for returns information, you could use an inner join to combine the two tables based on the **Order ID** field that exists in both tables.



1. **Note:** You can delete an unwanted join clauses by clicking the "x" that displays when you hover over the right side of the join clause.

2. When you are finished, close the Join dialog.

After you've created a join, review the data grid to make sure that the join produces the results that you expect. For more information, see Review join results in the data grid. To troubleshoot your join, see Troubleshoot joins.

Continue to prepare your data source for analysis. You can rename and reset fields, create calculations, clean your data with Data Interpreter, change the data types of fields, and so on.

Combine tables from different databases

Beginning with Tableau version 10.0, if the tables you need to analyze are stored in different databases, or workbooks (for Excel), or directories (for text), use the following procedure to combine tables using a *cross-database join*.

Cross-database joins require that you first set up a multi-connection data source — that is, you create a new connection to each database before you join tables. When you connect to multiple databases, a data source becomes a multi-connection data source. Multi-connection data sources can be advantageous when you need to analyze data for an organization that uses different internal systems or when you need to work with data that is managed separately by both internal and external groups.

Note: In many cases, using a cross-database join is the primary method for combining your data. However, there are some cases that you might need to combine your data using data blending instead. For more information, see Blend Your Data.

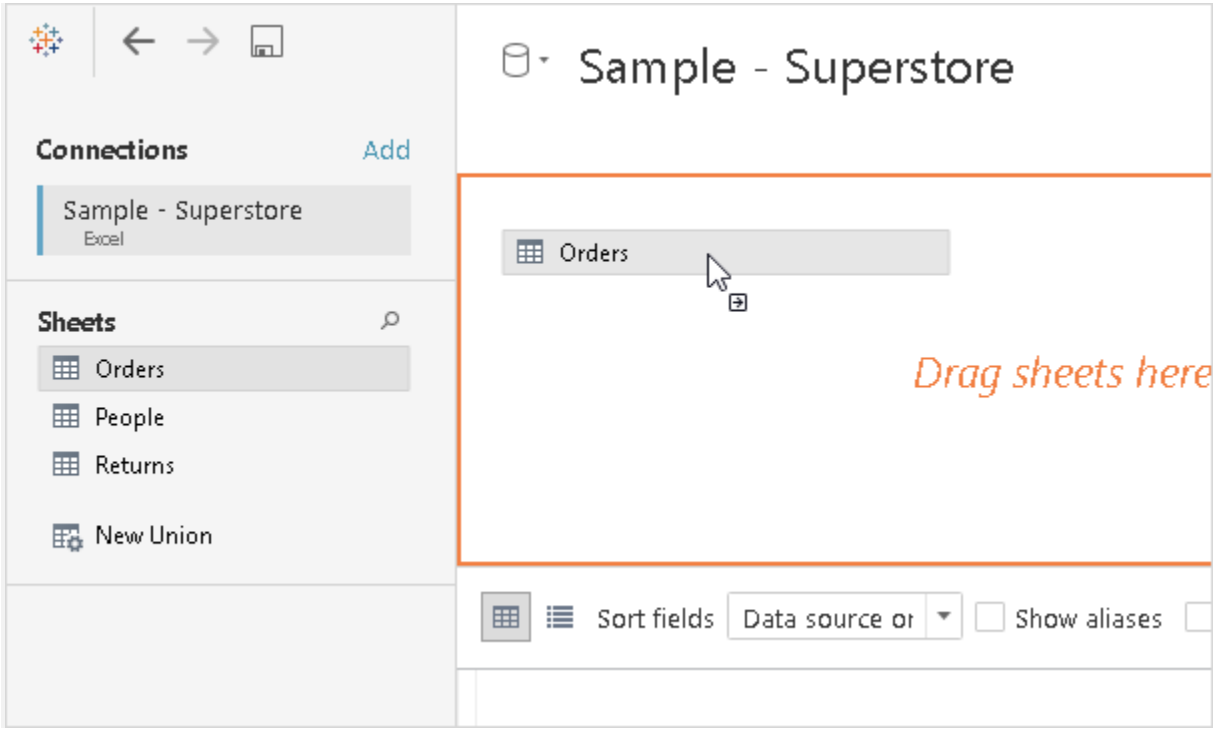
After you've combined tables using a cross-database join, Tableau colors the tables in the canvas and the columns in the data grid to show you which connection the data comes from.

To join tables from different databases

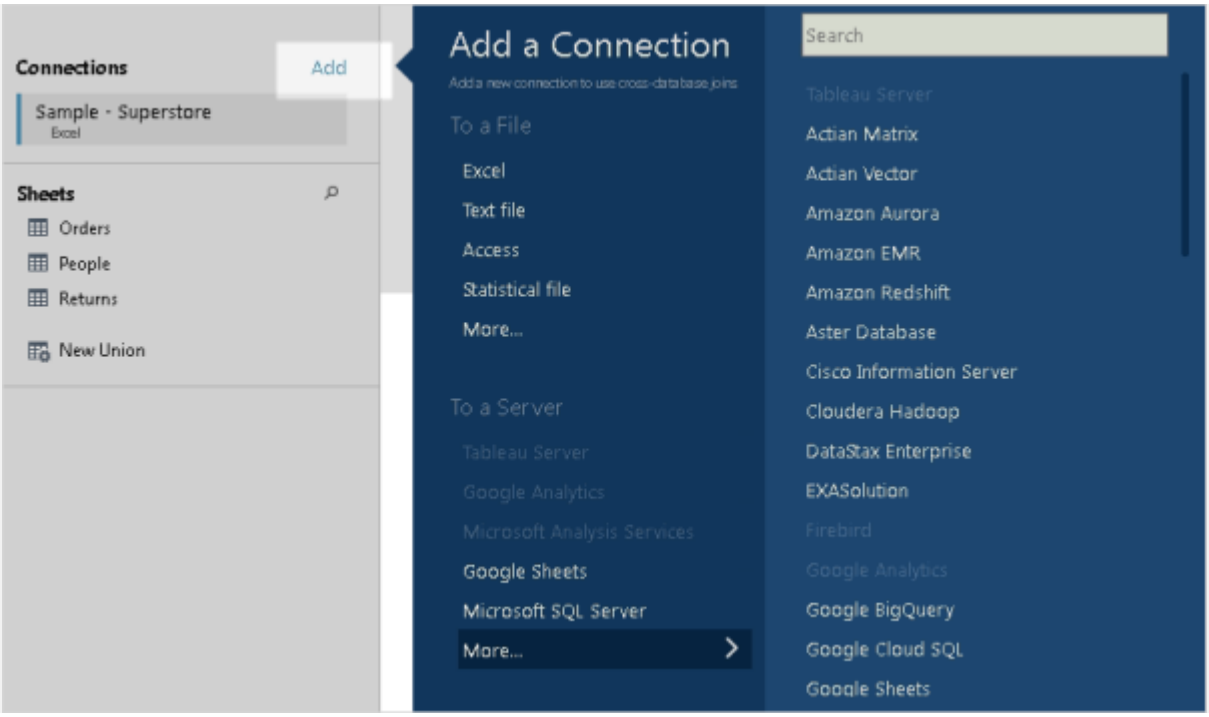
1. In **Tableau Desktop**: On the Start page, under **Connect**, click a connector to connect to your data. This step creates the first connection in the Tableau data source.

2. In **web authoring**: Select New Workbook and connect to your data. This step creates the first connection in the Tableau data source.

3. Select the file, database, or schema, and then double-click or drag a table to the canvas.



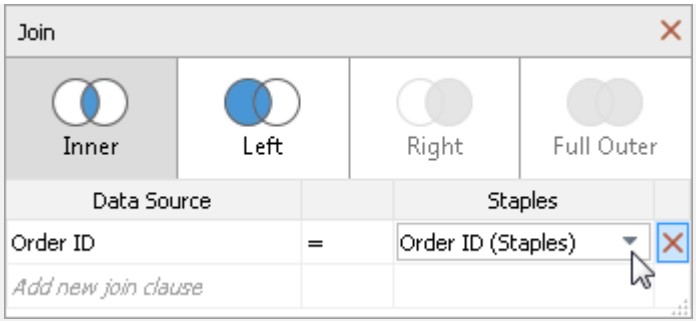
1. In the left pane, under **Connections**, click the **Add** button (+ in web authoring) to add a new connection to the Tableau data source. A new connection is required if you have related data stored in another database.



1. **Note:** If the connector you want is not available from the **Connect** list, cross-database joins are not supported for the combination of sources that you want to join. This includes connections to cube data (e.g., Microsoft Analysis Services), most extract-only data (e.g., Google Analytics and OData), and Tableau Server data sources. Instead of joining tables, consider using data blending. For more information, see Blend Your Data.

2. Add one or more join clauses by selecting a field from one of the available tables used in the data source, a join operator, and a field from the added table. Inspect the join clause to make sure it reflects how you want to connect the tables.

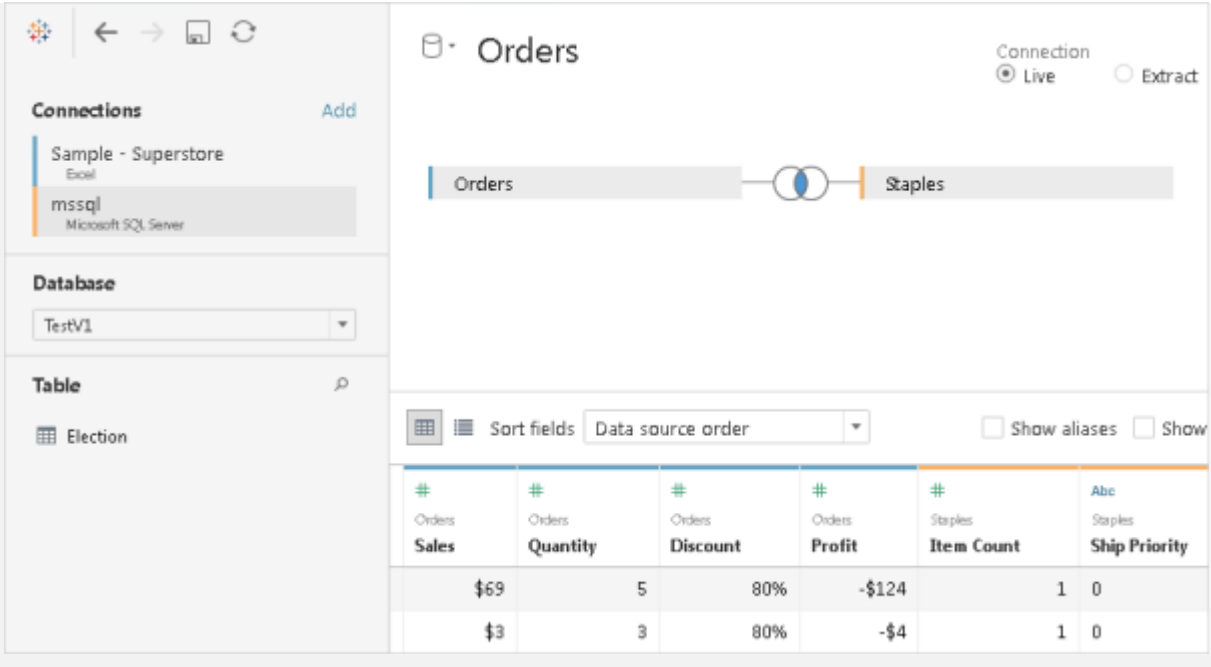
3. For example, in a data source that has a table of order information and another table of returns information, you could join the two tables based on the **Order ID** field that exists in both tables. Select the type of join.



1. **Note:** You can delete an unwanted join clause by clicking the "x" that displays when you hover over the right-side of the join clause.

2. When you are finished, close the Join dialog box.

3. Tables and columns are colored to show you which connection the data comes from.



After you've created a cross-database join, continue to prepare your multi-connection data source for analysis. You can rename and reset fields, create calculations, clean your data with Data Interpreter, change the data types of fields, and so on.

- Add a blend

Use data blending instead of joins under the following conditions:

- **Data needs cleaning.**
- If your tables do not match up with each other correctly after a join, set up data sources for each table, make any necessary customizations (that is, rename columns, change column data types, create groups, use calculations, etc.), and then use data blending to combine the data.
- **Joins cause duplicate data.**
- Duplicate data after a join is a symptom of data at different levels of detail. If you notice duplicate data, instead of creating a join, use data blending to blend on a common dimension instead.
- **You have lots of data.**
- Typically joins are recommended for combining data from the same database. Joins are handled by the database, which allows joins to leverage some of the database's native capabilities. However, if you're working with large sets of data, joins can put a strain on the database and significantly affect performance. In this case, data blending might help. Because Tableau handles combining the data after the data is aggregated, there is less data to combine. When there is less data to combine, generally, performance improves.

Blend your data

You can use data blending when you have data in separate data sources that you want to analyze together on a single sheet. The following example demonstrates how to blend data from two data sources: an Excel data source and an SQL Server data source.

Step 1: Connect to your data and set up the data sources

1. Connect to a set of data and set up the data source on the data source page. This example uses the **Sample — Superstore** data source.
2. Select **Data** > **New data source**, connect to the second set of data, and then set up the data source. This example uses a SQL Server data source that contains information about forecasted sales, called Sales Plan.
3. Click the sheet tab to start building your view.

Step 2: Designate a primary data source

Drag at least one field from your primary data source into the view to designate it as the primary data source.

1. In the **Data** pane, click the data source that you want to designate as the primary data source. In this example, **Sample — Superstore** is selected.
2. Drag the fields you want to use from the data source into the view. In this example, a view is created that shows Sales by Segment and Category.

Step 3: Designate a secondary data source

Any fields used in the view from data sources that are not the primary data source or active links automatically designate subsequent data sources as the secondary data source.

1. In the **Data** pane, click the data source that you want to designate as the secondary data source. In this example, the Sales Plan data source is selected.

2. When you complete this step, an orange bar displays down the left side of the Data pane. The orange bar indicates the secondary data source. In addition to the orange bar, broken link icons display next to potential linking fields.

3. Click a broken link icon (

</>

1.) to establish a relationship between the secondary and primary data sources. This is the field that determines the level of detail that Tableau should aggregate to. In this example, Segment is the linking field.

2. If a broken link icon does not appear next to the field that should be the linking field or no broken links appear, see Step 4: (Optional) Define or edit relationships .

3. Drag the fields you want to use from the secondary data source into the view. In this example, Sales Plan field is used on the **Detail** card to change the level of detail of the view.

Step 4: (Optional) Define or edit relationships

Tableau detects when a field from the primary data source also exists in a secondary data source, and indicates that the fields are potential linking fields by marking them with a broken link icon in the **Data** pane. You click a broken link icon to establish a relationship between the primary and secondary data sources, and have Tableau blend data from both data sources on a single sheet.

You must have at least one linked field in order to use data from the secondary data source.

1. Select **Data** > **Edit Relationships**.
2. In the Relationships dialog box, verify that the primary data source is selected from the **Primary data source** drop-down list. In this example, the **Sample — Superstore** data source is selected.
3. Select the secondary data source in the **Secondary data source** pane, select **Custom** in the relationships list, and then click the **Add** button. In this example, the Sales Plan data source is selected.
4. In the Add/Edit Field Mapping dialog box, do the following:
5. Select a field from the primary data source.
6. Select a field from the secondary data source to establish the linking field or the relationship between the data sources even though the fields do not have the same name.
7. Click **OK**.
8. In this example, a relationship between **Segment** field in the Superstore — Sample data source is selected and **Customer Segment** field in the Sales Plan data source is selected. You can map these two fields to create a relationship even though they don't have the same name.
9. (Optional) Continue to add and remove as many relationships as necessary and then click **OK**.
10. The related fields are shown in the secondary data source as potential linking fields.
11. Click the broken link icon (

1.) next to these fields in the data pane to make the relationship between the primary and secondary data sources active. In this case, the broken link icon next to Customer Segment is made into an active link icon (

1.).

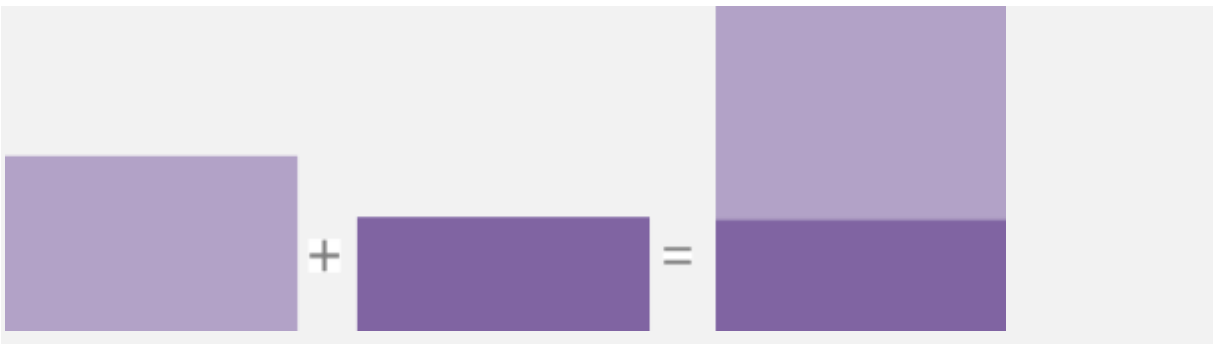
2. If the related field from the primary data source is used in the view, the link becomes active automatically.

When data blending, the relationship matches values based on the member aliases. You can fix fields that don't match by editing the aliases. For example, when you map a **Segment** field in the primary data source to the **Segment** field in the secondary data source, "Small Business" will not map correctly to "S. Business". You must edit the aliases in one of the data sources. For more information, see Create Aliases to Rename Members in the View.

You can also use a secondary data source to re-alias the field values in a primary data source. For more information, see Alias Field Values Using Data Blending.

- Add a union

Unioning is a method for appending values (that is, rows) to tables. You can union tables if they have the same columns. The result of combining data using a union is a virtual table that has the same columns but extends vertically by adding rows of data.



You can union your data to combine two or more tables by appending values (rows) from one table to another. To union your data in Tableau data source, the tables must come from the same connection.

Supported connectors

If your data source supports union, the **New Union** option displays in the left pane of the data source page after you connect to your data. You can also refer to the following lists to verify that your data source supports union:

Tableau Desktop

- Excel
- Text File
- Google Sheets
- JSON File
- PDF File
- Amazon Redshift
- Aster Database

- Cloudera Hadoop
- Google BigQuery
- Hortonworks Hadoop
- Vertica
- IBM DB2
- IBM PDA (Netezza)
- Microsoft SQL
- MySQL
- Oracle
- PostgreSQL
- Pivotal Greenplum Database
- SAP Sybase ASE
- SAP Sybase IQ
- Teradata

Web authoring (Tableau Online and Tableau Server)

- Excel
- Text File
- Amazon Aurora

- Amazon Redshift
- Google Cloud SQL
- IBM BigInsights
- IBM DB2
- IBM PDA (Netezza)
- MemSQL
- Microsoft SQL
- MySQL
- Pivotal Greenplum Database
- PostgreSQL
- SAP Sybase ASE
- SAP Sybase IQ
- Vertica

For best results, the tables that you combine using a union must have the same structure. That is, each table must have the same number of fields, and related fields must have matching field names and data types.

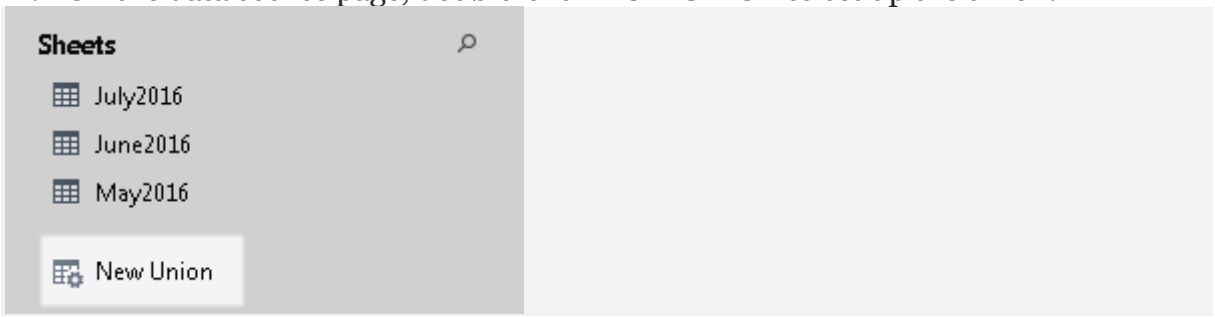
For example, suppose you have the following customer purchase information stored in three tables, separated by month. The table names are “May2016,” “June2016,” and “July2016.”

Union tables manually

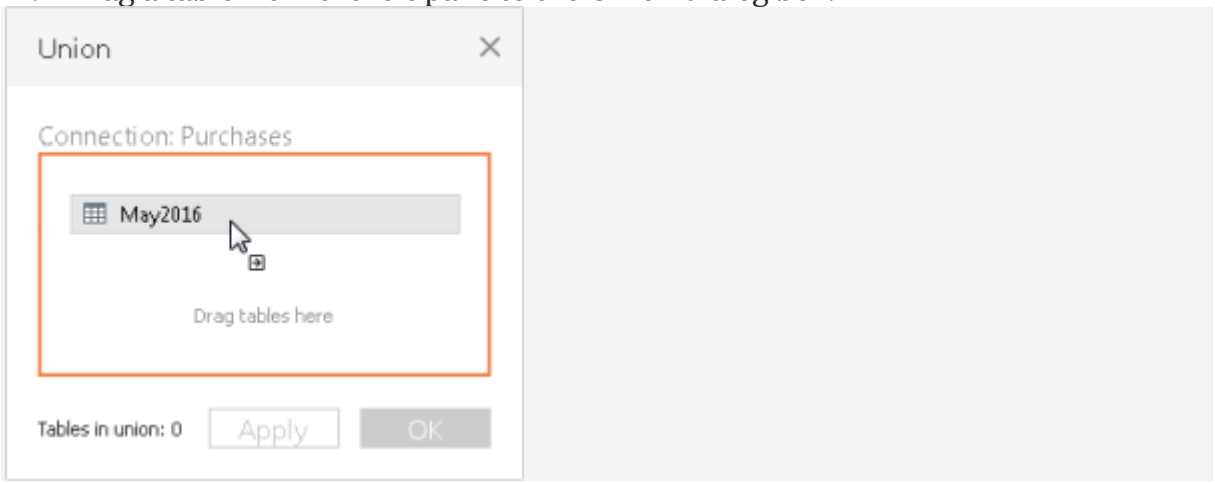
Use this method to manually union distinct tables. This method allows you to drag individual tables from the left pane of the Data Source page and into the Union dialog box.

To union tables manually

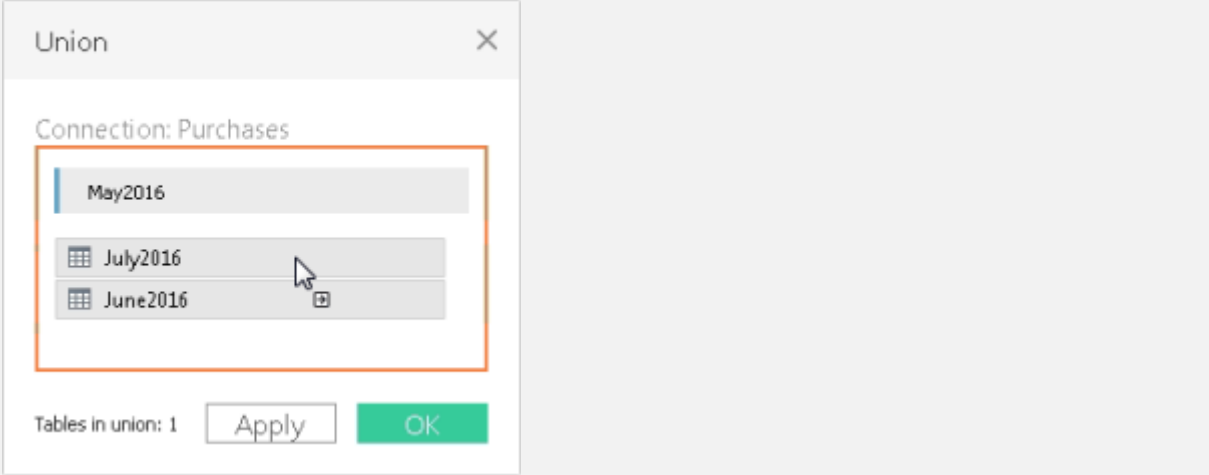
1. On the data source page, double-click **New Union** to set up the union.



1. Drag a table from the left pane to the Union dialog box.



1. Select another table from the left pane and drag it directly below the first table.



1. **Tip:** To add multiple tables to a union at the same time, press **Shift** or **Ctrl**(**Shift** or **Command** on a Mac), select the tables you want to union in the left pane, and then drag them directly below the first table.

2. Click **Apply** or **OK** to union.

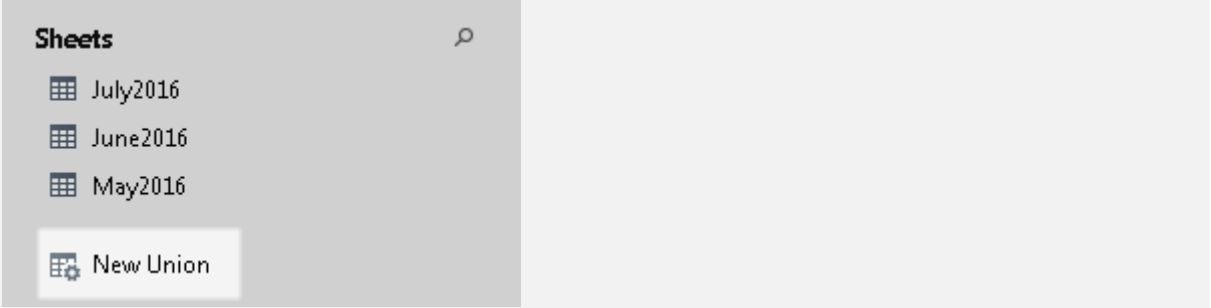
Union tables using wildcard search (Tableau Desktop)

Use this method to set up search criteria to automatically include tables in your union. Use the wildcard character, which is an asterisk (*), to match a sequence or pattern of characters in the Excel workbook and worksheet names, Google Sheets workbook and worksheet names, text file names, JSON file names, .pdf file names, and database table names.

When working with Excel, text file data, JSON file, .pdf file data, you can also use this method to union files across folders, and worksheets across workbooks. Search is scoped to the selected connection. The connection and the tables available in a connection are shown on the left pane of the Data source page.

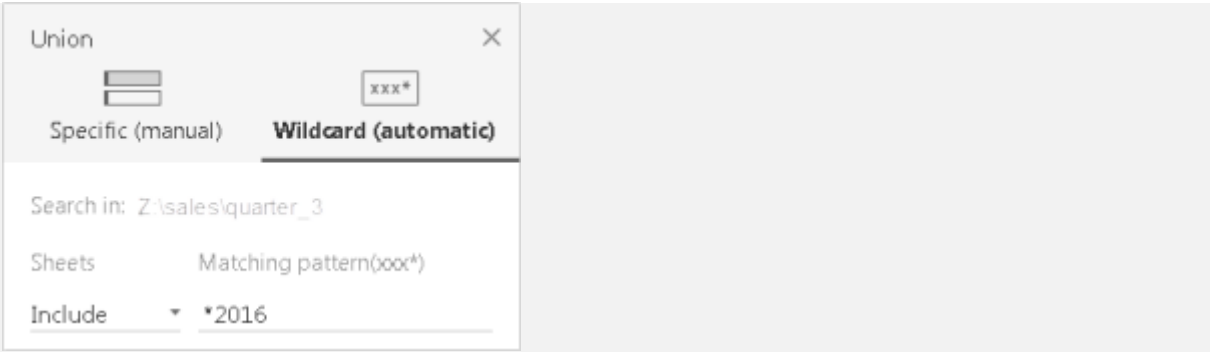
To union tables using wildcard search

1. On the data source page, double-click **New Union** to set up the union.



1. Click **Wildcard (automatic)** in the Union dialog box.

1. Enter the search criteria that you want Tableau to use to find tables to include in the union.



1. For example, you can enter ***2016** in the **Include** text box to union tables in Excel worksheets that end with "2016" in their names. Search criteria like this will result in the union of May2016, June2016, and July2016 tables (Excel worksheets), from the selected connection. In this case, the connection is called

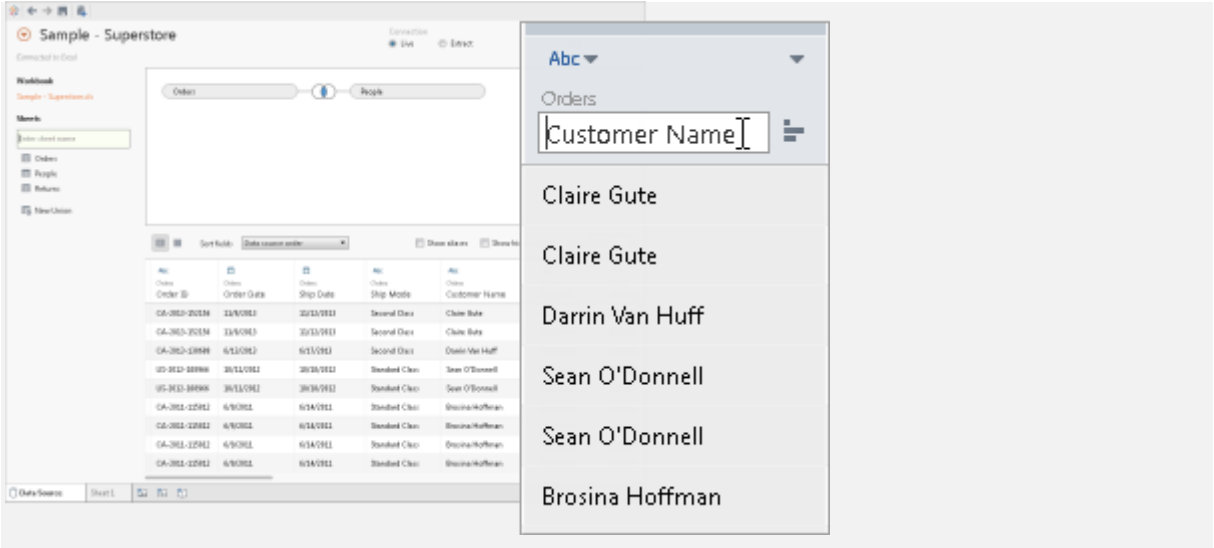
Sales, and the connection made to the Excel workbook containing the worksheets you wanted was in the quarter_3 folder in the sales directory (e.g., Z:\sales\quarter_3).

2. Click **Apply** or **OK** to union.

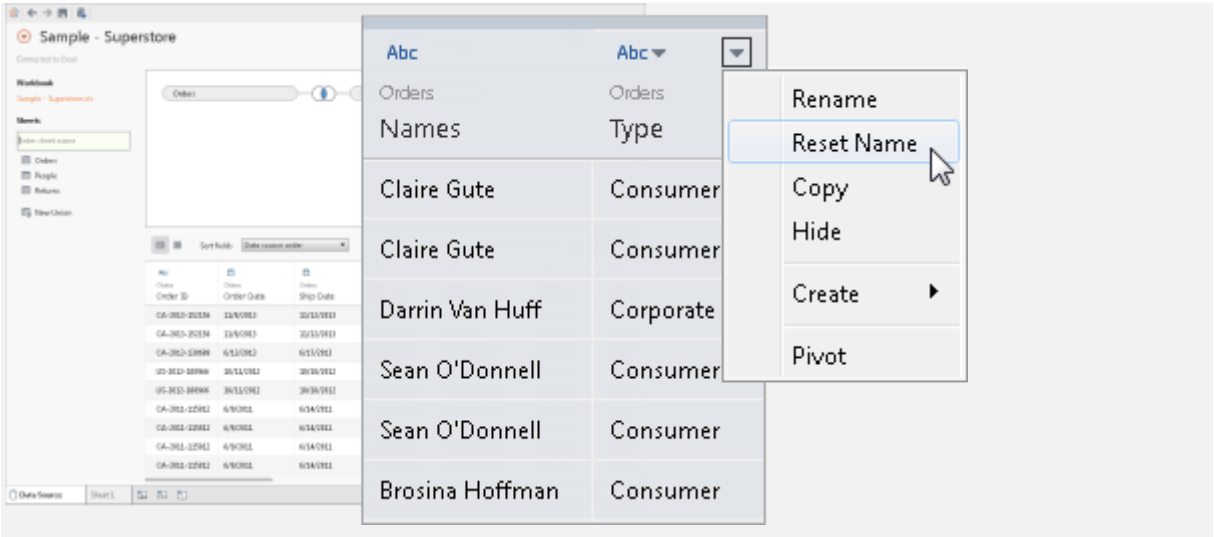
Manage data properties

- Rename a data field

Rename column: Double-click the name of the column to rename the field.



Reset name: If you've renamed a field, click the column drop-down menu, and then select **Reset Name** to revert back to the original name of the field. You can also select multiple columns and perform the same action.



*Original name indicates the name specified in the underlying data. You can use the **Revert** command to reset field names that have changed as a result of naming improvements Tableau has automatically made to the data source. For more information, see*

- Assign an alias to a data value

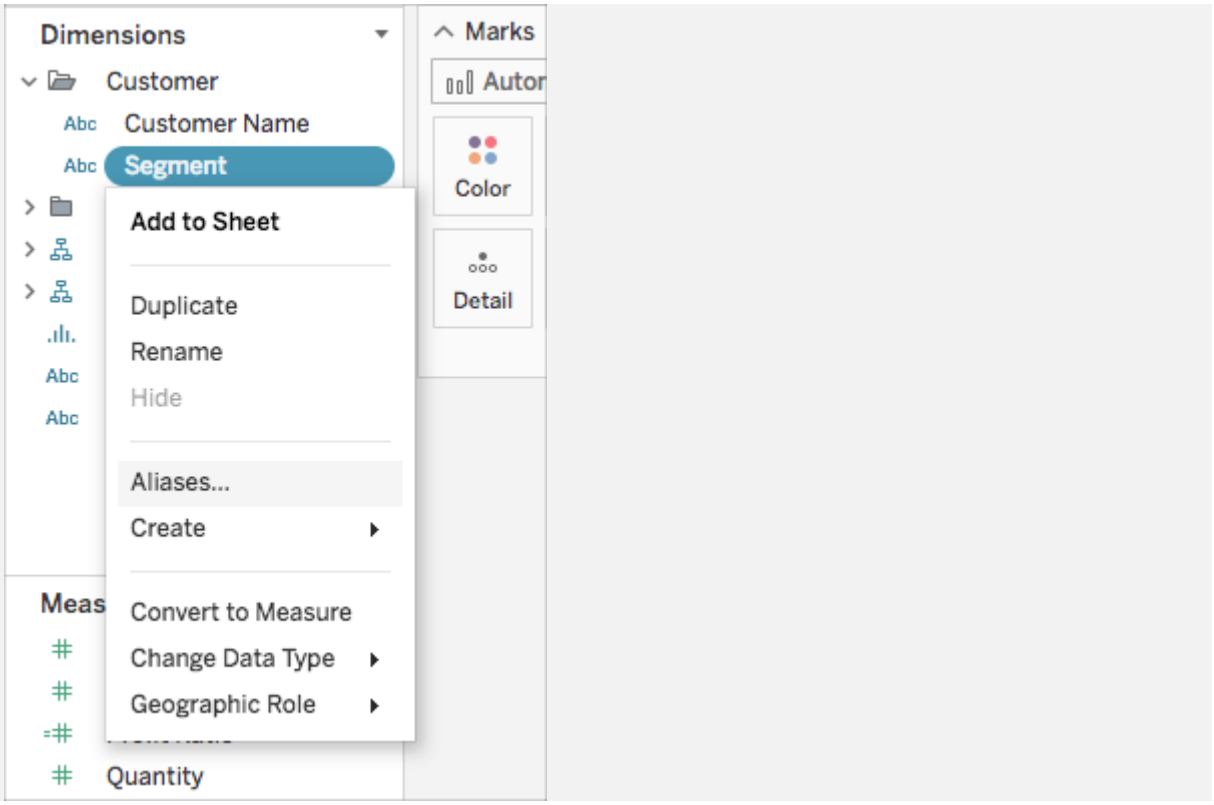
You can create aliases (alternate names) for members in a dimension so that their labels appear differently in the view.

Aliases can be created for the members of discrete dimensions only. They cannot be created for continuous dimensions, dates, or measures.

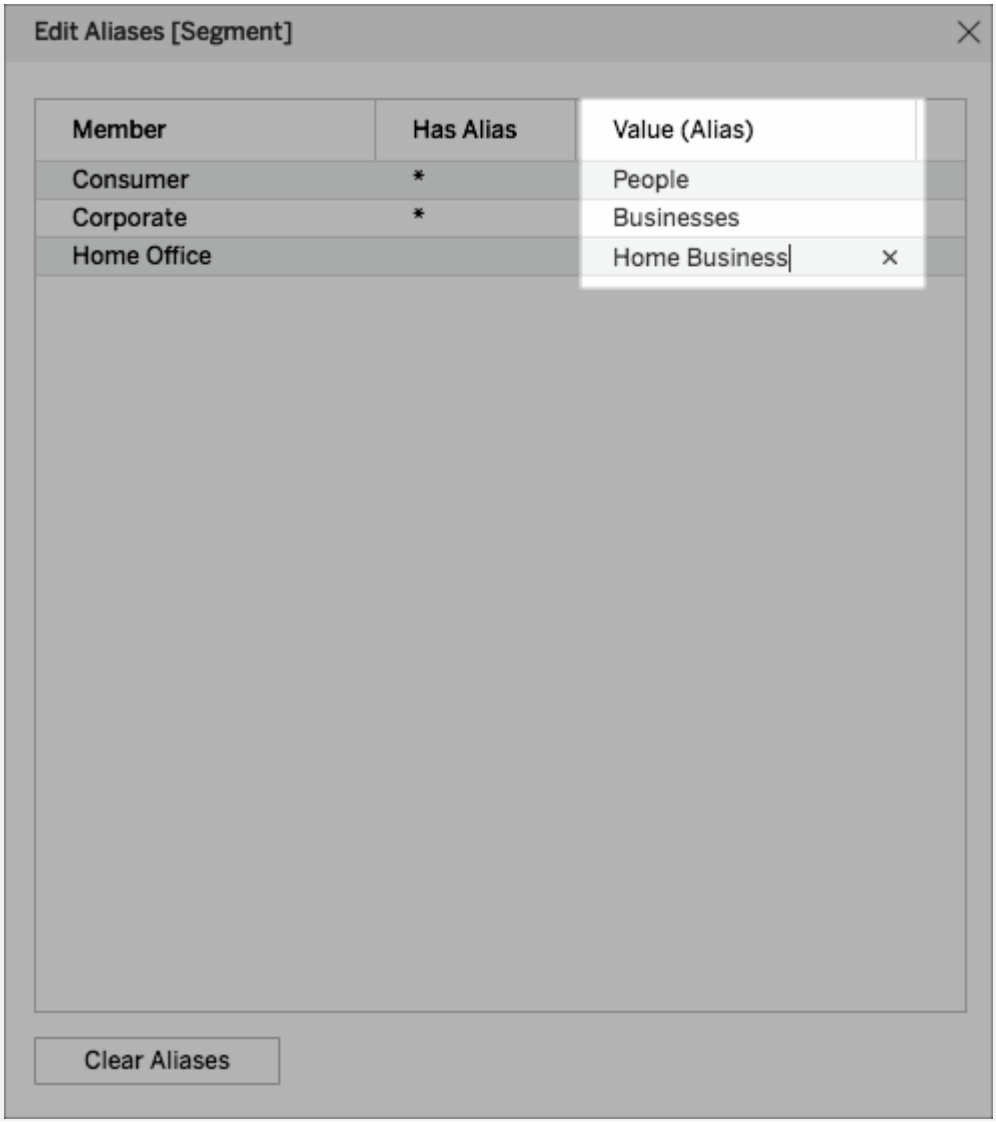
Note: When using a published data source, you cannot create or edit aliases.

To create an alias:

1. In the Data pane, right-click a dimension and select **Aliases**.



1. In the Edit Aliases dialog box, under **Value (Alias)**, select a member and enter a new name.



1. **Tip**: To reset the member names back to their original names, click **Clear Aliases**.

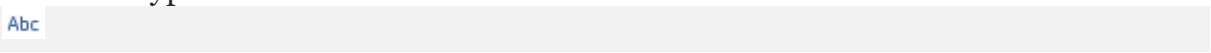
2. To submit your changes:

- In Tableau Desktop, click **OK**.
- On Tableau Server or Tableau Online, click the **X** icon in the top-right corner of the dialog box.
- Change data type for a data field (number, date, string, boolean, etc.)

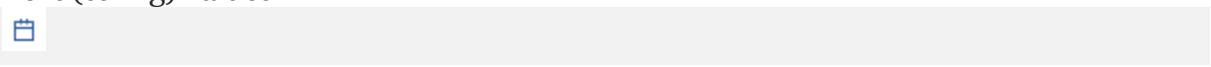
All fields in a data source have a data type. The data type reflects the kind of information stored in that field, for example integers (410), dates (1/23/2015) and strings (“Wisconsin”). The data type of a field is identified in the Data pane by one of the icons shown below.

Data type icons in Tableau

IconData type



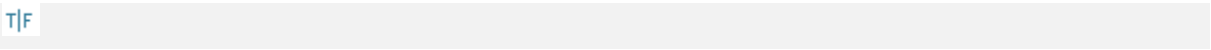
Text (string) values



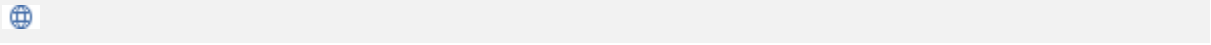
Date values

Date & Time values

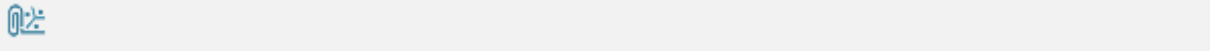
Numerical values



Boolean values (relational only)



Geographic values (used with maps)



Cluster Group (used with Find Clusters in Data)

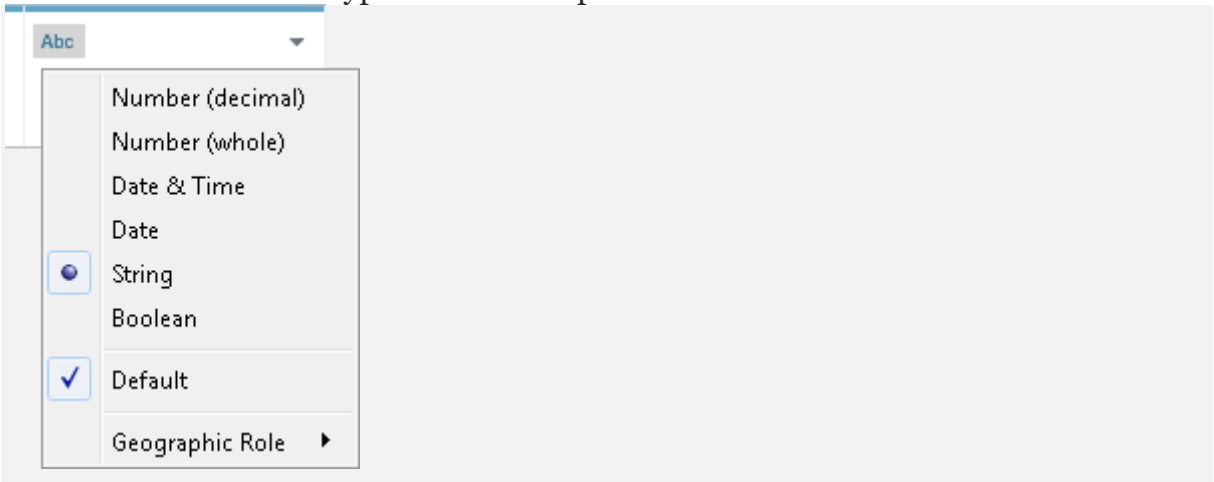
You can change the data type for a field either on the **Data Source** page or in the **Data**pane.

Change the data type for a field in the Data Source page

Sometimes Tableau incorrectly interprets the data type of a field. For example, Tableau might interpret a field that contains dates as an integer data type, rather than a date data type.

You can change the data type for a field that was part of the original data source (as opposed to a calculated field created in Tableau) on the **Data Source** page.

1. Click the data type icon for the field (as shown in the table above).
2. Choose a new data type from the drop-down list:



Tip: Be sure to change data types before you create an extract. Otherwise, your data may not be accurate. For example, if a floating-point field in the original data source is interpreted as an integer by Tableau, and you create your extract before you change the field's data type, the resulting floating-point field in Tableau will have some of its precision truncated.

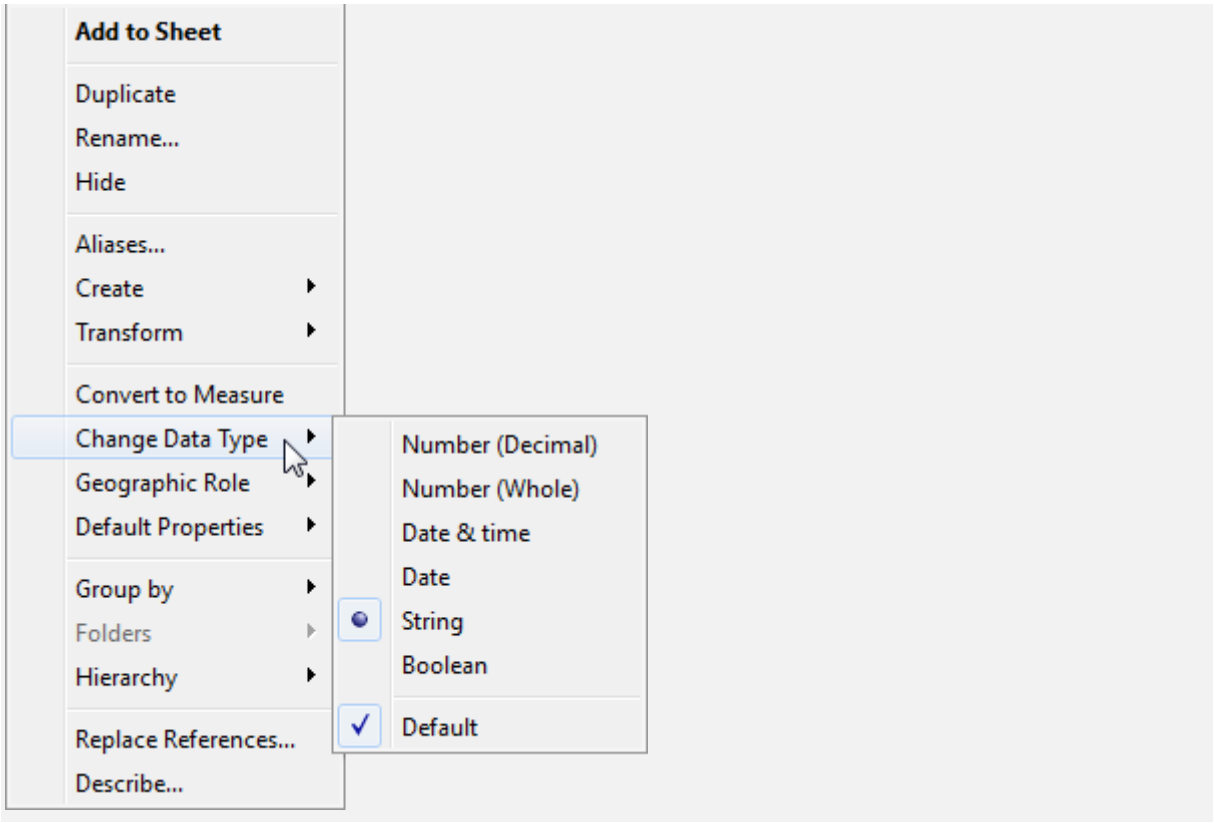
For information on changing data types on the **Data Source** page, see Data Source Page.

Change the data type for a field in the Data pane

To change the data type of a field in the **Data** pane, click the icon to the left of the field name, and then choose a new data type from the drop-down list.

Change the data type for a field in the view

To change a field's data type in a view, right-click (control-click on a Mac) the field in the **Data** pane, choose **Change Data Type**, and then select the appropriate data type from the drop-down list.



Note: Sometimes the data in your database is more precise then Tableau can model. When you add these values to the view, a precision warning appears in the right corner of the status bar. See Status Bar Information

- **Change default properties for a data field (number format, aggregation, color, date format, etc.)**

When you drag fields to shelves, the data is represented as marks in the view. The fields and their marks are displayed initially based on their default settings. You can control these default settings by clicking the drop-down arrow on a field.

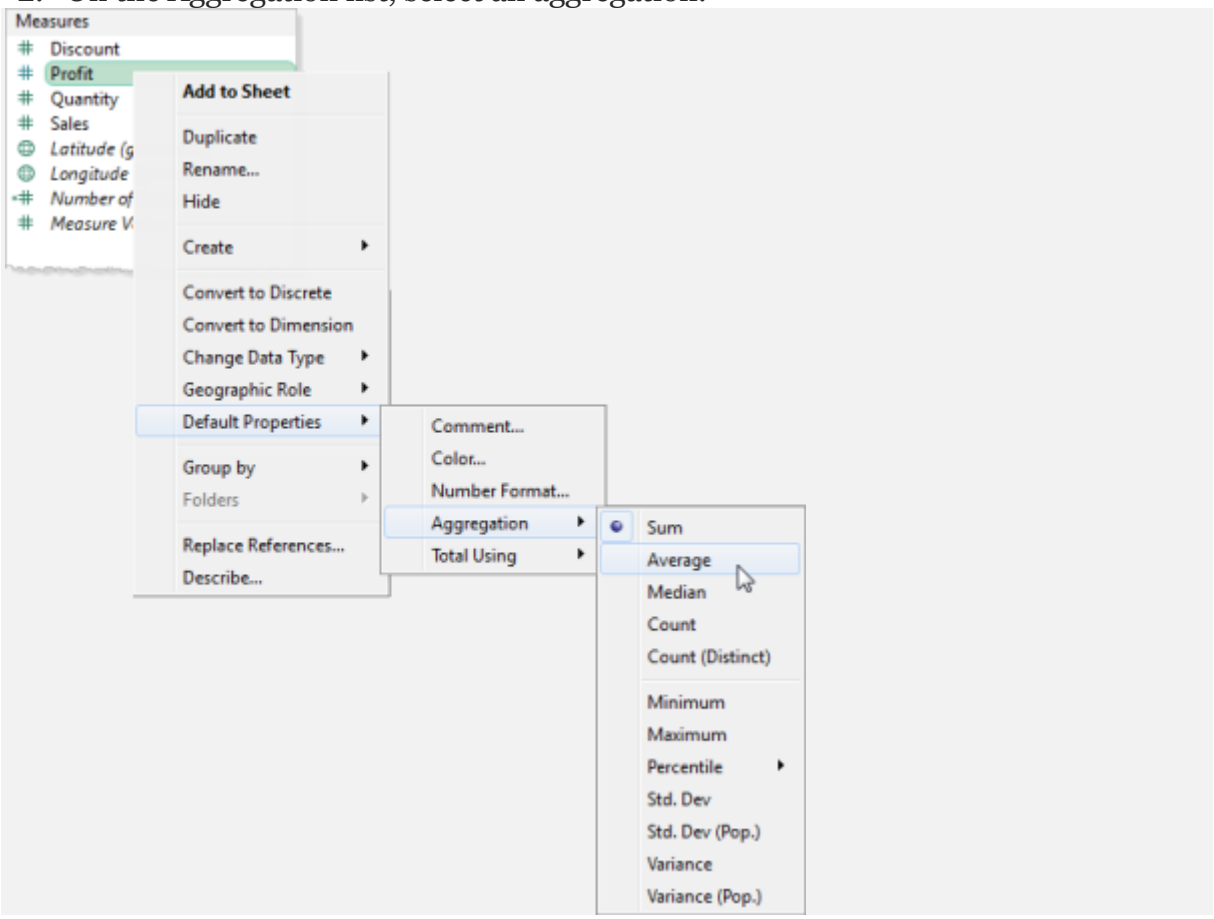
The **Default Properties** menu includes default settings for aggregation, comments, number formatting, color, shape, and totals (based on the type of field).

Set the default aggregation for a measure

You can specify a default aggregation for any measure. The default aggregation will be used automatically when the measure is first totaled in the view.

1. Right-click (control-click on a Mac) any measure in the Data pane and select **Default Properties > Aggregation**.

2. On the Aggregation list, select an aggregation.



1. Whether you are specifying the aggregation for a field on a shelf or the default aggregation in the Data pane, you can select from several aggregations. See Data Aggregation in Tableau to learn about each type of aggregation.

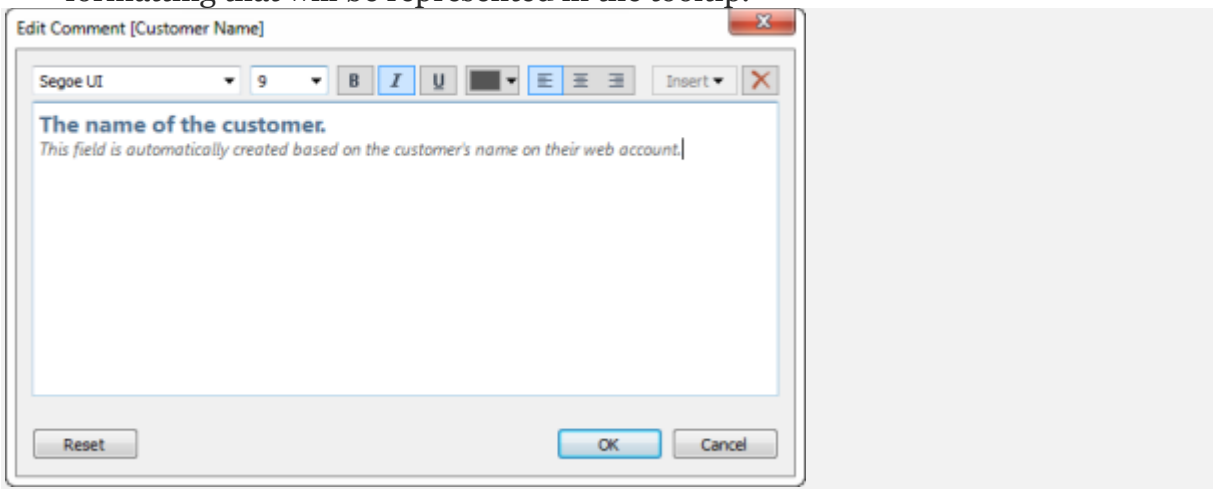
Add default comments for specific fields

Fields can have comments that describe them. The comments display in a tooltip in the Data pane and in the Calculated fields dialog box. Field comments are a good way to give more context to the data in your data source. Comments are especially useful when you are building a workbook for others to use.

To add a default comment for a field

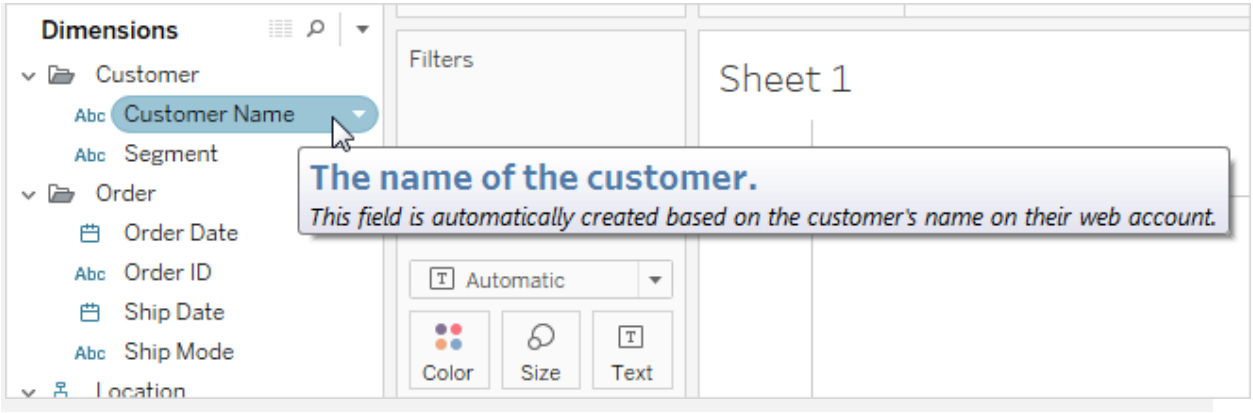
1. Right-click (control-click on a Mac) a field in the Data pane and select **Default Properties** > **Comment**.

2. Write a comment in the subsequent dialog box. Comments support rich text formatting that will be represented in the tooltip.



1. When finished, click **OK**.

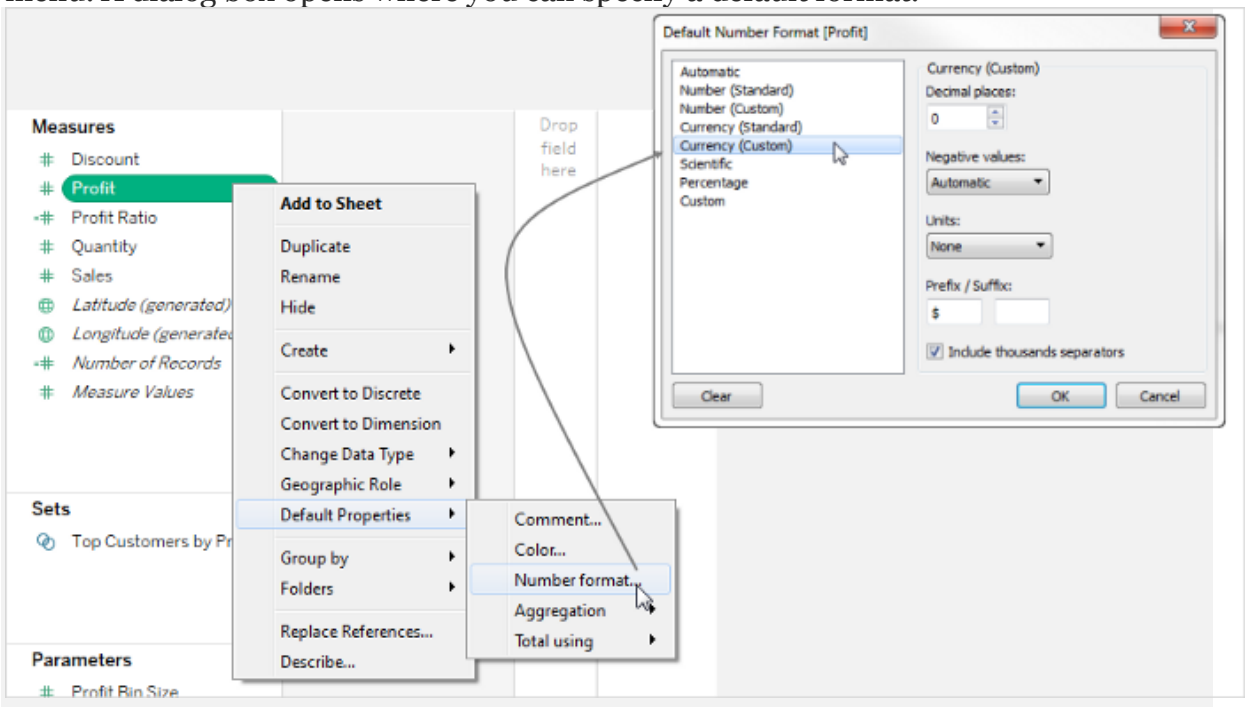
2. Now when you hover the cursor over the field in the Data pane, you see the comment.



Set the default number format

You can set the default number format for date and number fields. For example, you may want to always show the Sales values as currency using the U.S. dollar sign and two decimal places. Or you may want to always show Discount as a percentage.

To set the default formats, right-click (control-click on Mac) a date or number field and select either **Date Format** or **Number Format** on the Default Properties menu. A dialog box opens where you can specify a default format.



Set the default color

When you use a dimension to color encode the view, default colors are assigned to the field's values. Color encodings are shared across multiple worksheets that use the same data source to help you create consistent displays of your data. For example, if you define the Western region to be green, it will automatically be green in all other views in the workbook. To set the default color encodings for a field, right-click (control-click on Mac) the field in the Data pane and select **Default Properties** > **Color**.

For information about color properties, and how to configure and customize colors in Tableau, see Color Palettes and Effects,

Set the default shape

When you use a dimension to shape encode the view, default shapes are assigned to the field's values. Shape encodings are shared across multiple worksheets that use the same data source to help you create consistent displays of your data. For example, if you define that Furniture products are represented with a square mark, it will automatically be changed to a square mark in all other views in the workbook.

To set the default shape encodings for a field, right-click (control-click on Mac) the field in the Data pane and select **Default Properties** > **Shape**.

Set the default sort order for the values within a categorical field

You can set a default sort order for the values within a categorical field so that every time you use the field in the view, the values will be sorted correctly. For example, let's say you have an Order Priority field that contains the values High, Medium, and Low. When you place these in the view, by default they will be listed as High, Low, Medium

because they are shown in alphabetical order. You can set a default sort so that these values are always listed correctly.

To set the default sort order, right-click (control-click on a Mac) a dimension and select **Default Properties** > **Sort**. Then use the sort dialog box to specify a sort order.

Part 2: Exploring and Analysing Data

- **Create a bar chart**

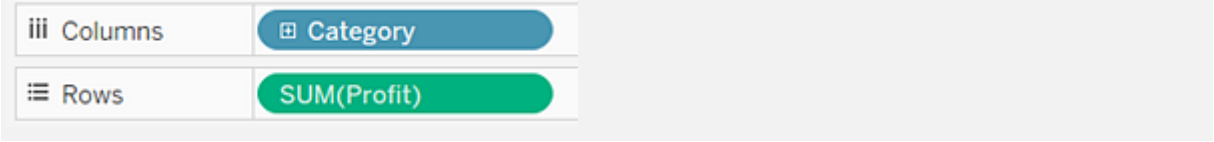
Use bar charts to compare data across categories. You create a bar chart by placing a dimension on the **Rows** shelf and a measure on the **Columns** shelf, or vice versa.

A bar chart uses the **Bar** mark type. Tableau selects this mark type when the data view matches one of the two field arrangements shown below. You can add additional fields to these shelves.

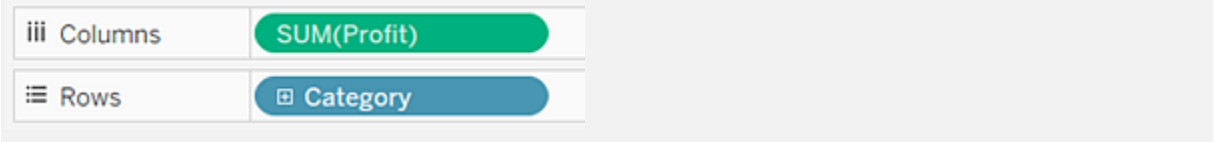
For more information about the **Bar** mark type, see Bar mark.

Note: At the end of the procedure is an extra step you can take to display totals at the tops of the bars.

Creates Vertical Bars

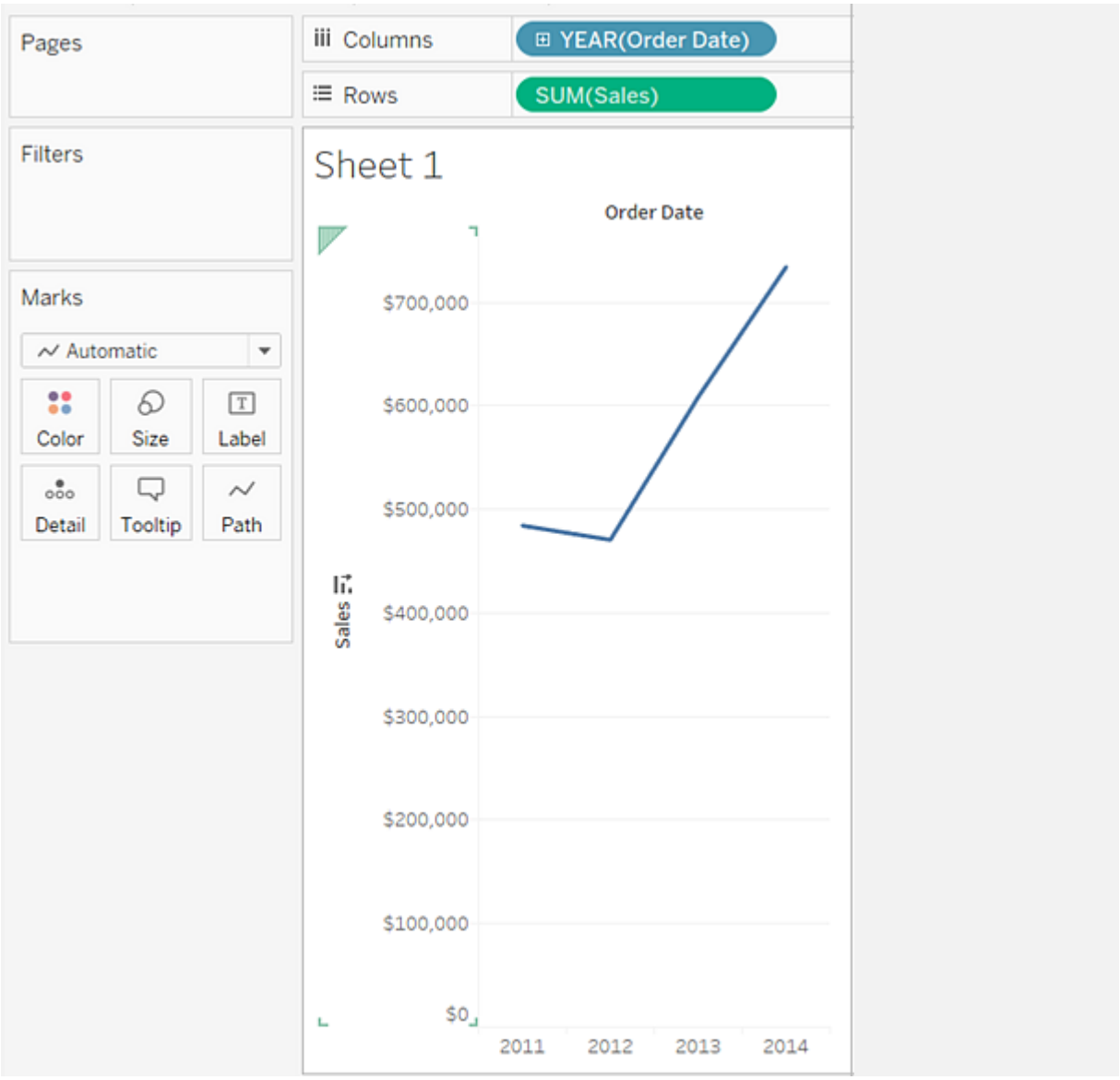


Creates Horizontal Bars

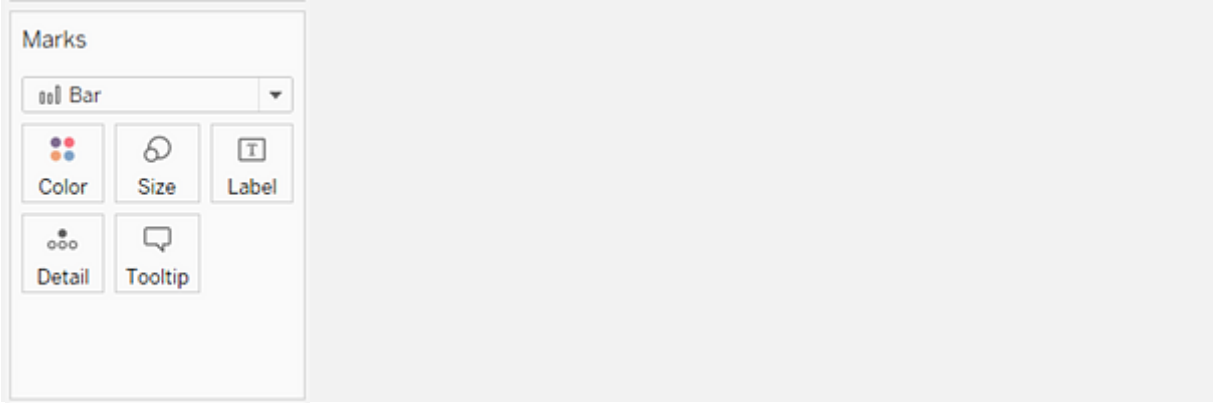


To create a bar chart that displays total sales over a four-year period, follow these steps:

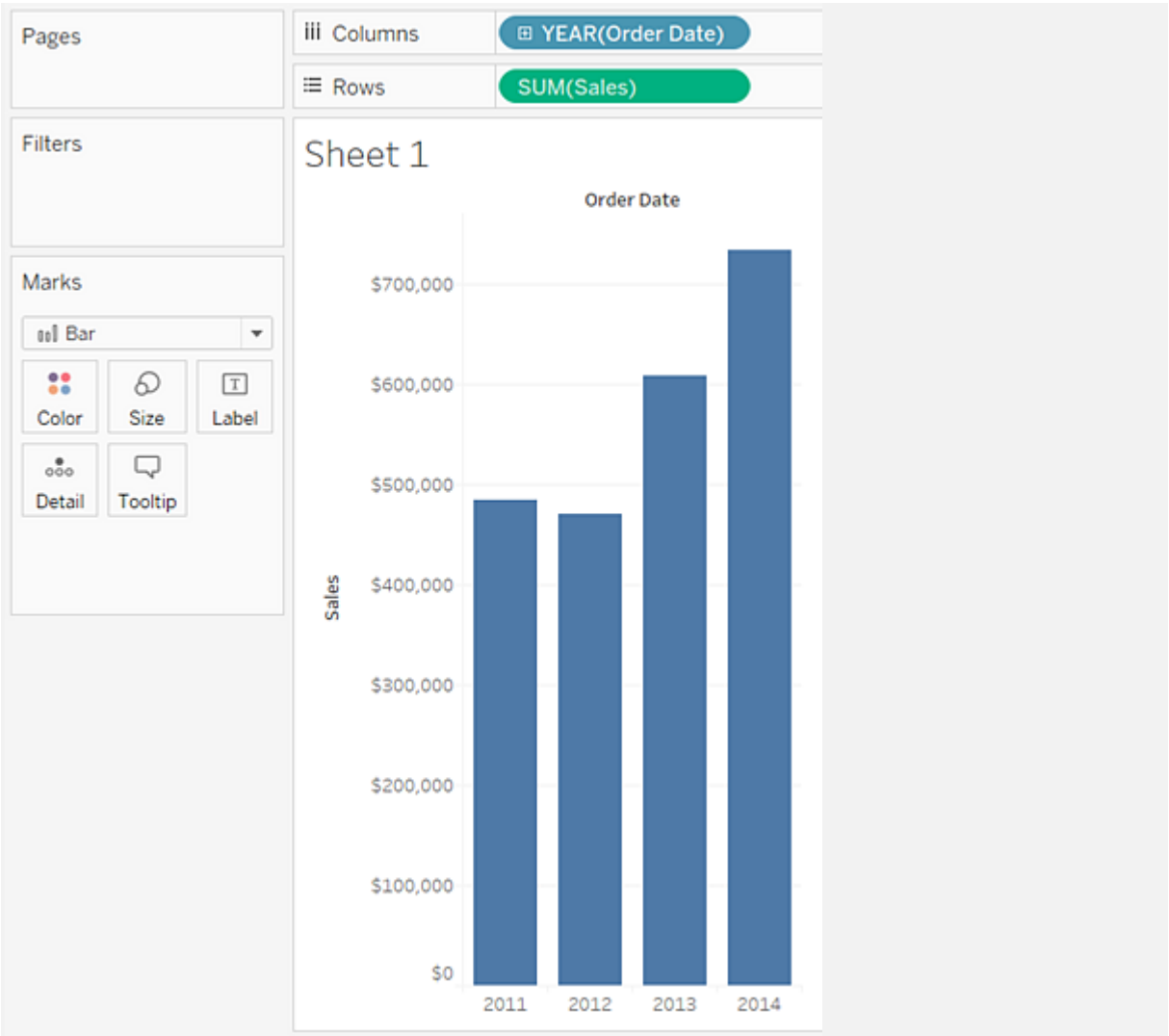
1. Connect to the **Sample — Superstore** data source.
2. Drag the **Order Date** dimension to **Columns**.
3. The data is aggregated by year and column headers appear.
4. Drag the **Sales** measure to **Rows**.
5. The measure is aggregated as a sum and an axis is created. The column headers move to the bottom of the view.
6. Tableau uses **Line** as the mark type because you added the date dimension.



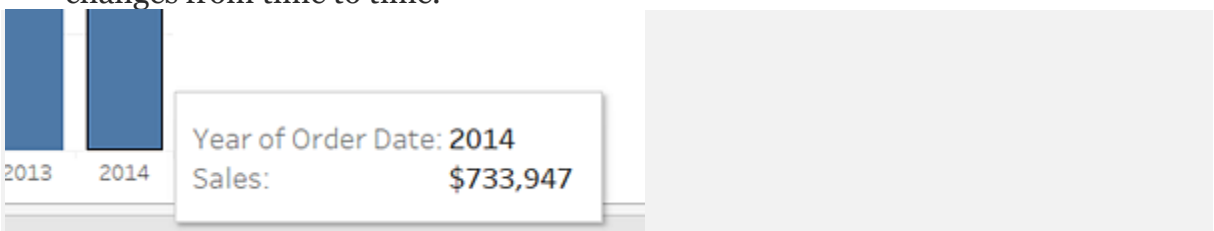
1. On the **Marks** card, select **Bar** from the drop-down list.



1. The view changes to a bar chart.

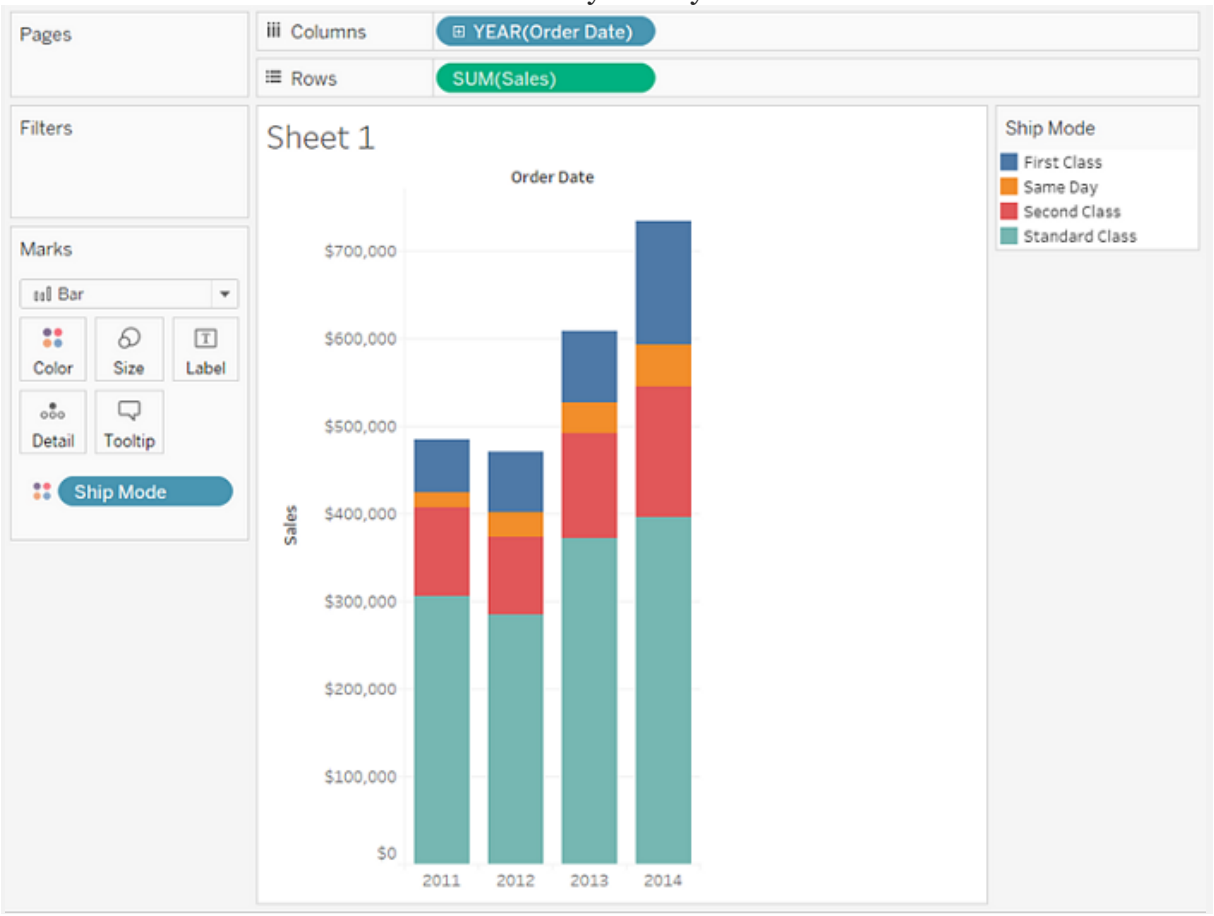


1. The marks (which are bars in this case) are vertical because the axis is vertical. The length of each mark represents the sum of the sales for that year. The actual numbers you see here might not match the numbers you see — the sample data changes from time to time.

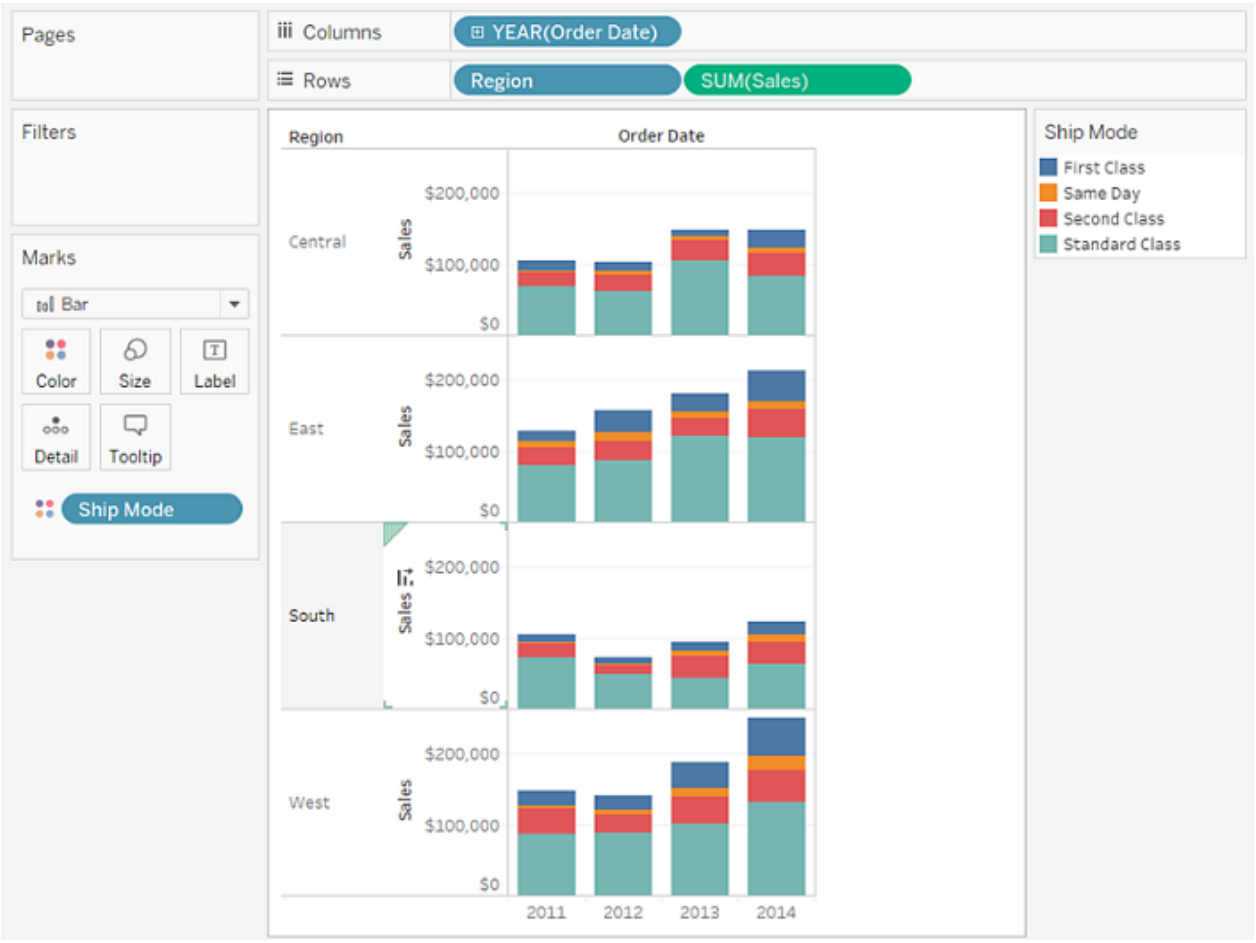


1. Drag the **Ship Mode** dimension to **Color** on the **Marks** card.

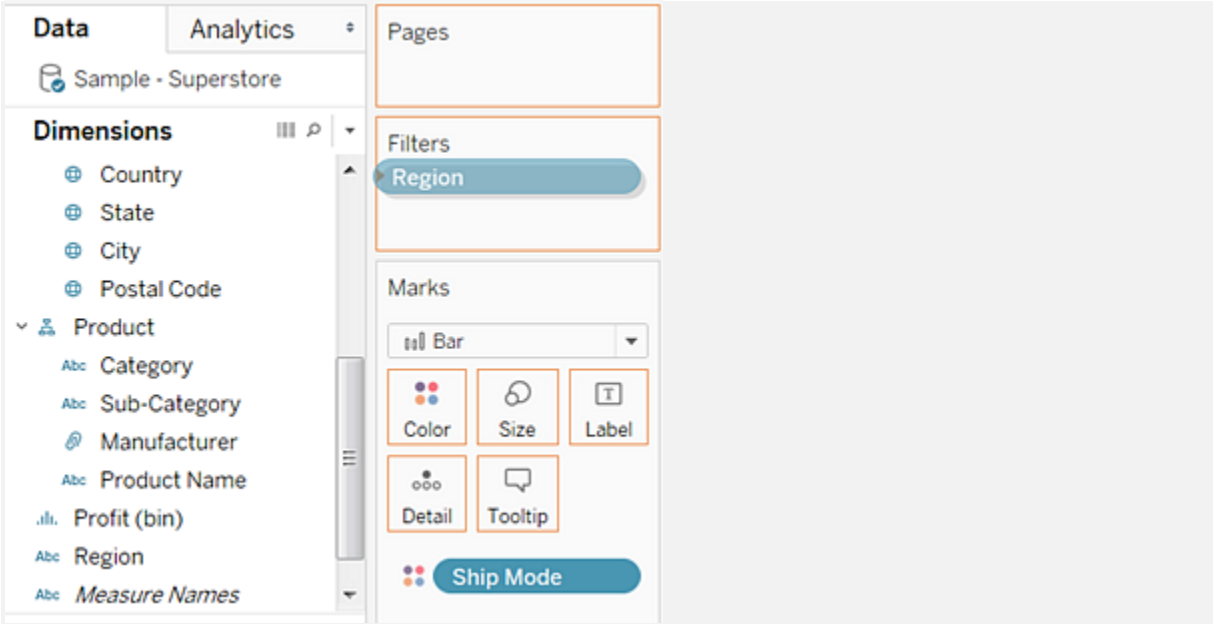
2. The view shows how different shipping modes have contributed to total sales over time. The ratios look consistent from year to year.



1. Drag the **Region** dimension to **Rows**, and drop it to the left of **Sales** to produce multiple axes for sales by region.



1. To view data in the West region only, you can filter out the other regions. To do this, drag the **Region** dimension again, this time from the **Data** pane to the **Filters** shelf.

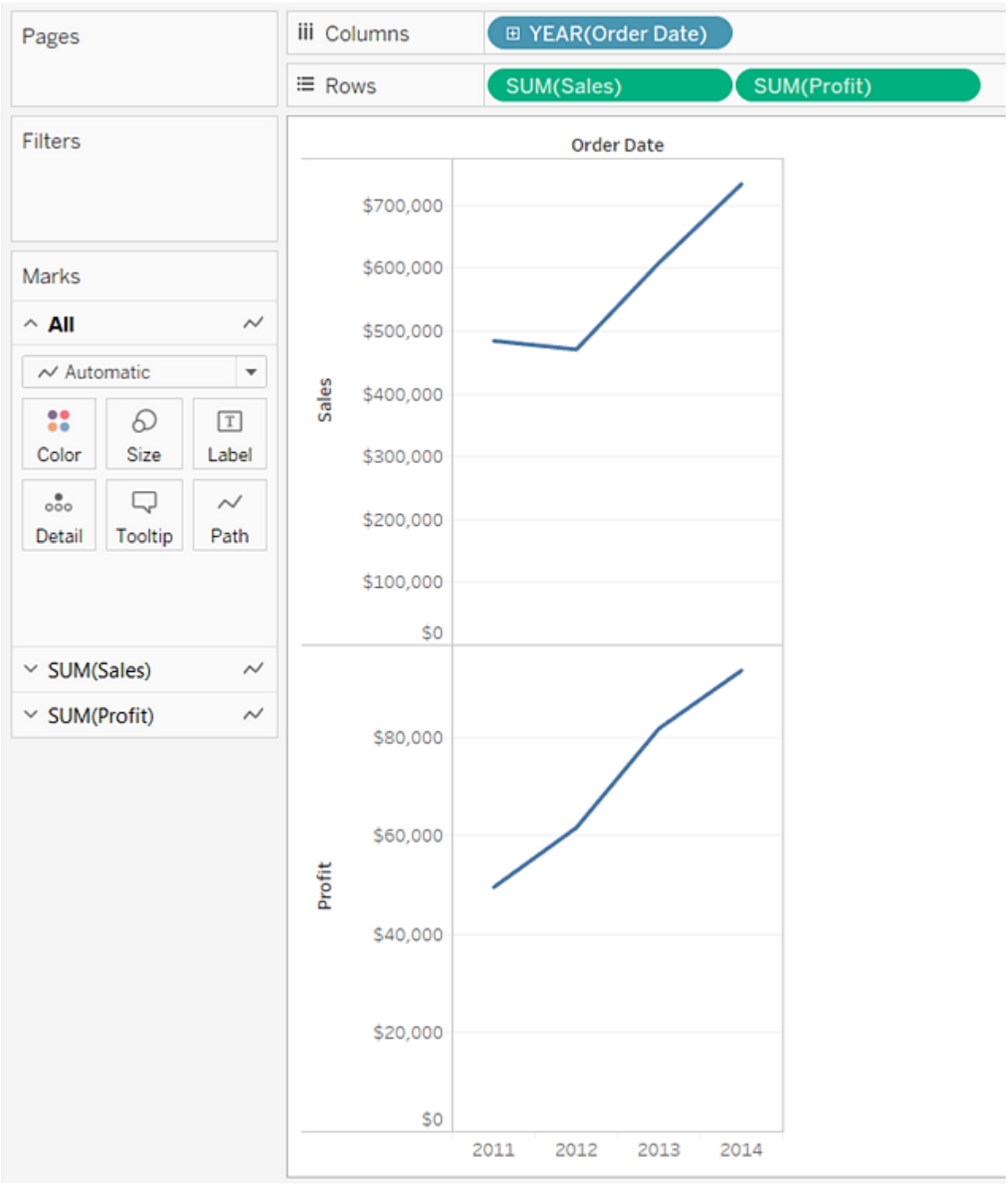


1. In the Filter [Region] dialog box, clear the **Central**, **East**, and **South** check boxes, and then click **OK**.

- **Create a line chart**

To create a view that displays the sum of sales and the sum of profit for all years, and then uses forecasting to determine a trend, follow these steps:

1. Connect to the **Sample — Superstore** data source.
2. Drag the **Order Date** dimension to **Columns**.
3. Tableau aggregates the date by year, and creates column headers.
4. Drag the **Sales** measure to **Rows**.
5. Tableau aggregates **Sales** as SUM and displays a simple line chart.
6. Drag the **Profit** measure to **Rows** and drop it to the right of the **Sales** measure.
7. Tableau creates separate axes along the left margin for **Sales** and **Profit**.



1. Notice that the scale of the two axes is different — the **Sales** axis scales from $0 to $700,000, whereas the **Profit** axis scales from $0 to $100,000. This can make it hard to see that sales values are much greater than profit values.

2. When you are displaying multiple measures in a line chart, you can align or merge axes to make it easier for users to compare values.

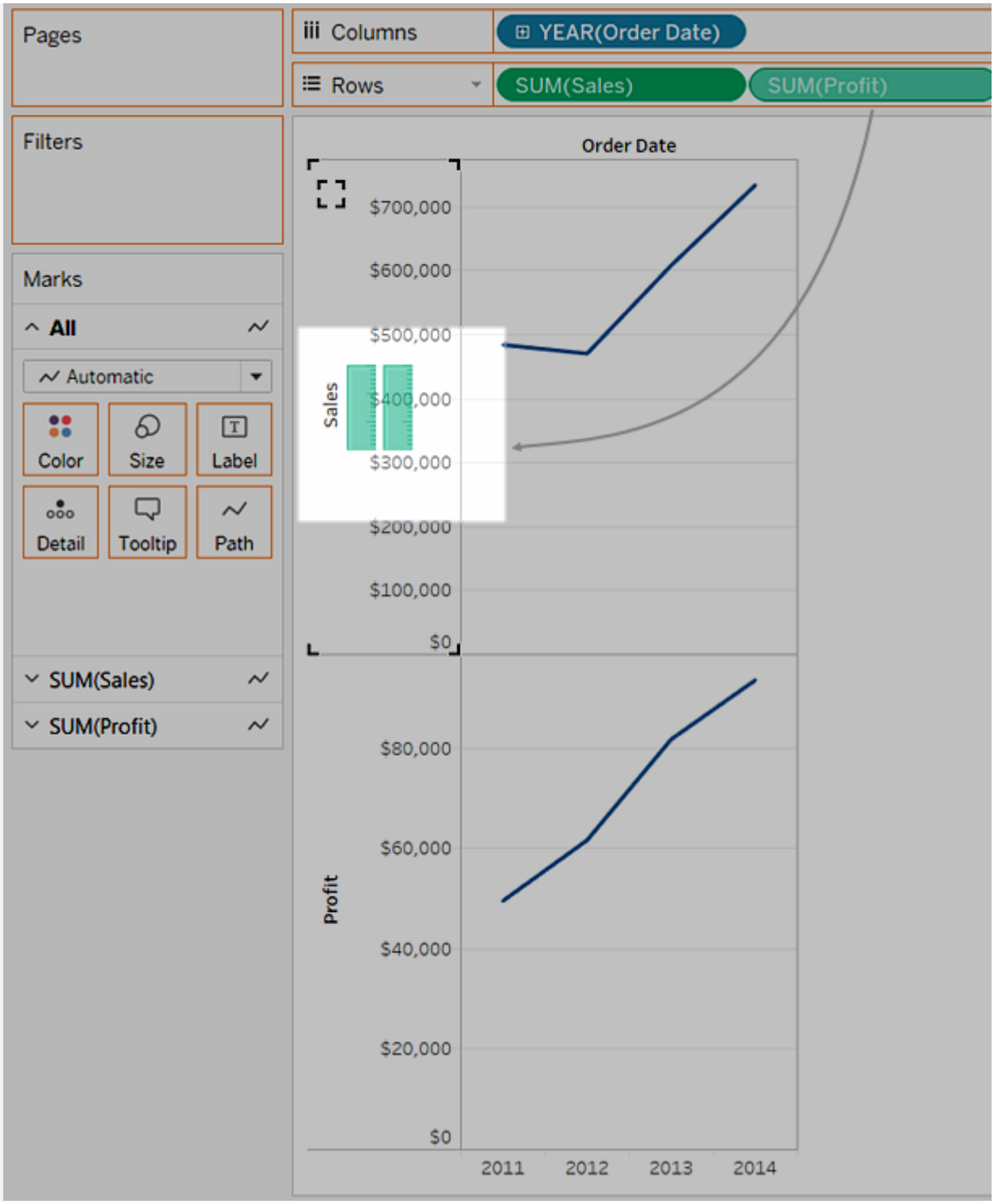
3. For more information about aligning the axes, see Compare two measures using dual axes.

4. For more information about enforcing a single axis across multiple measures, see Blend axes for multiple measures into a single axis.

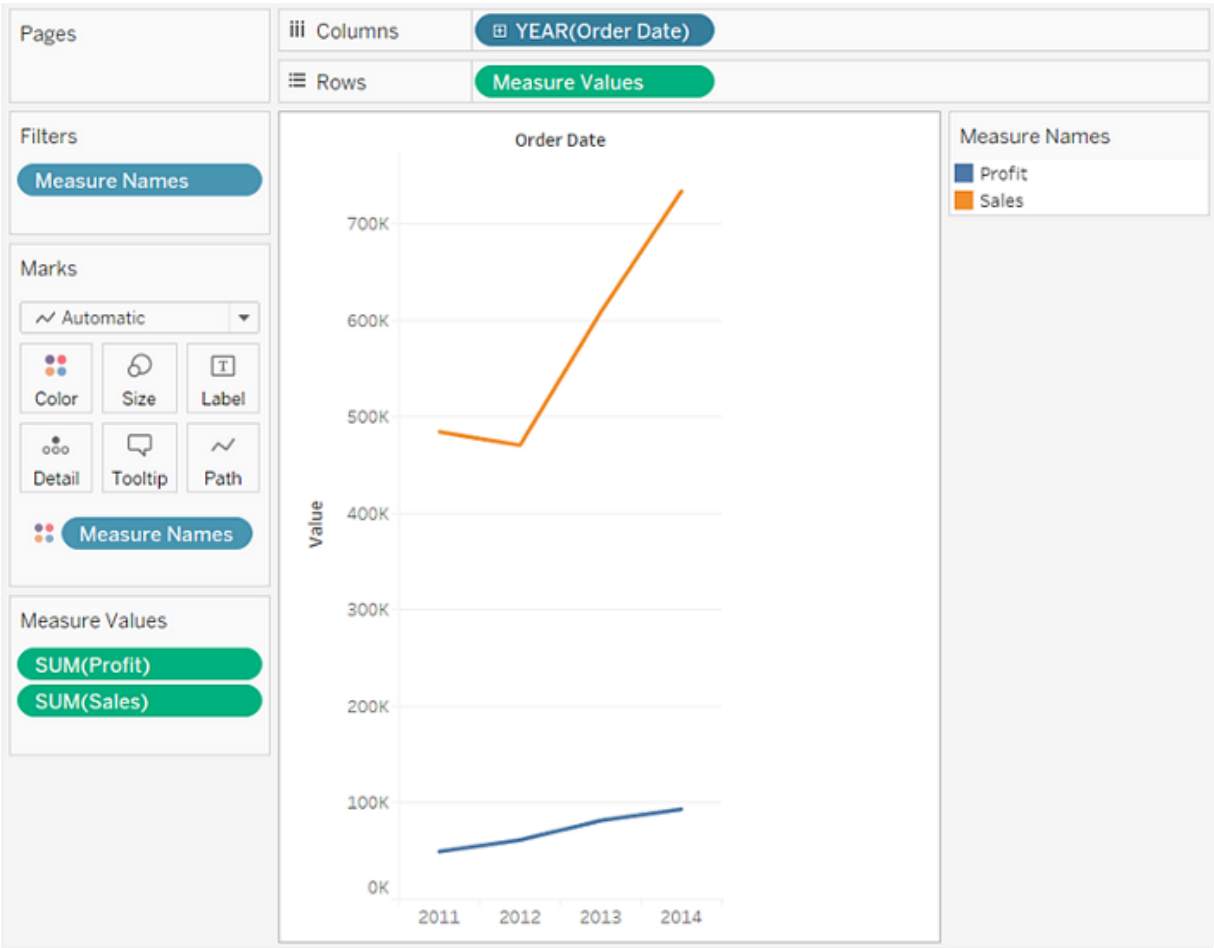
5. With either of these options, you can create a combination chart to change the mark type for one of your measures.

6. For more information, see Create a combo chart (assign different mark types to measures).

7. Drag the **SUM(Profit)** field from **Rows** to the **Sales** axis to create a blended axis. The two pale green parallel bars indicate that **Profit** and **Sales** will use a blended axis when you release the mouse button.

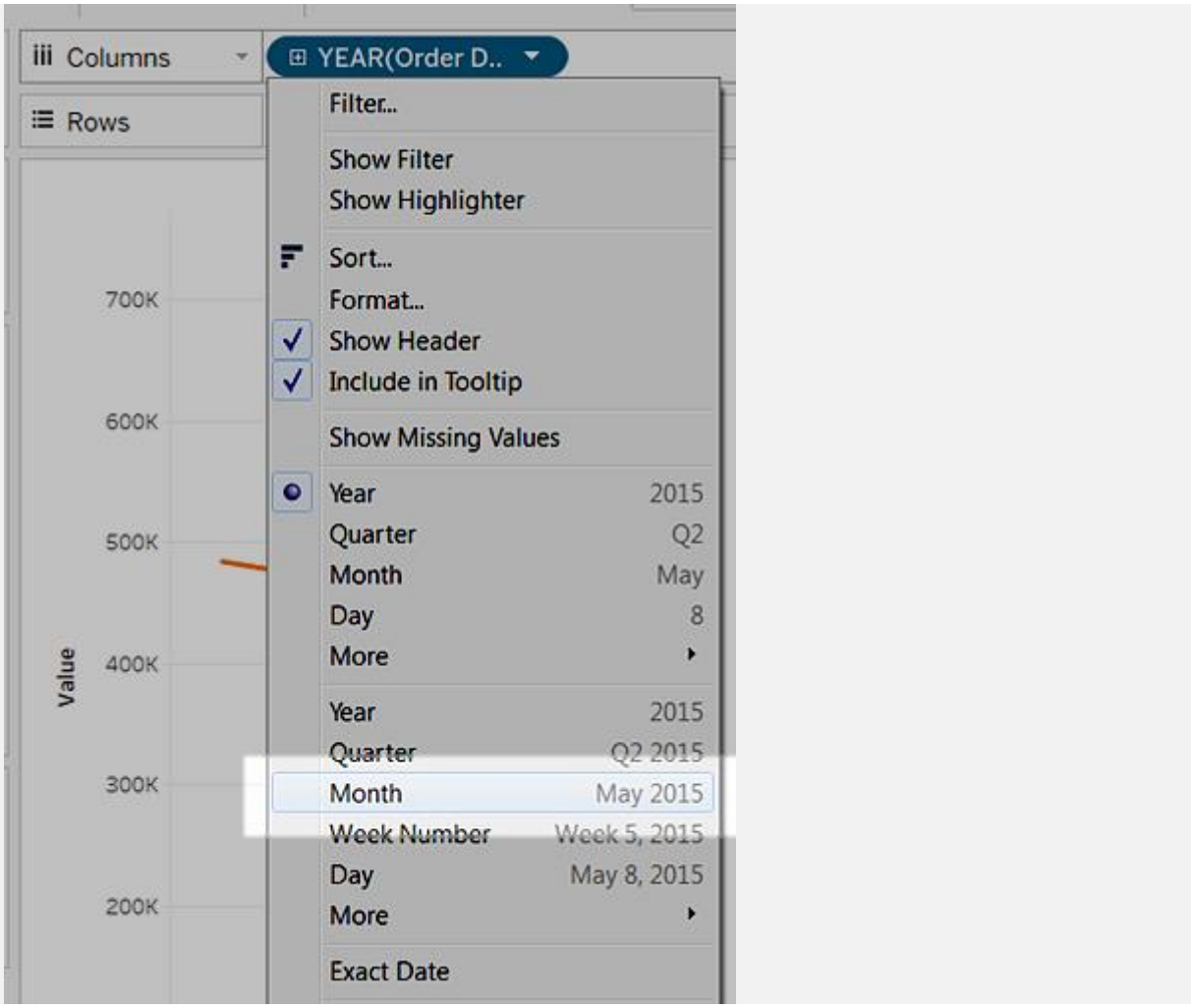


1. The view updates to look like this:

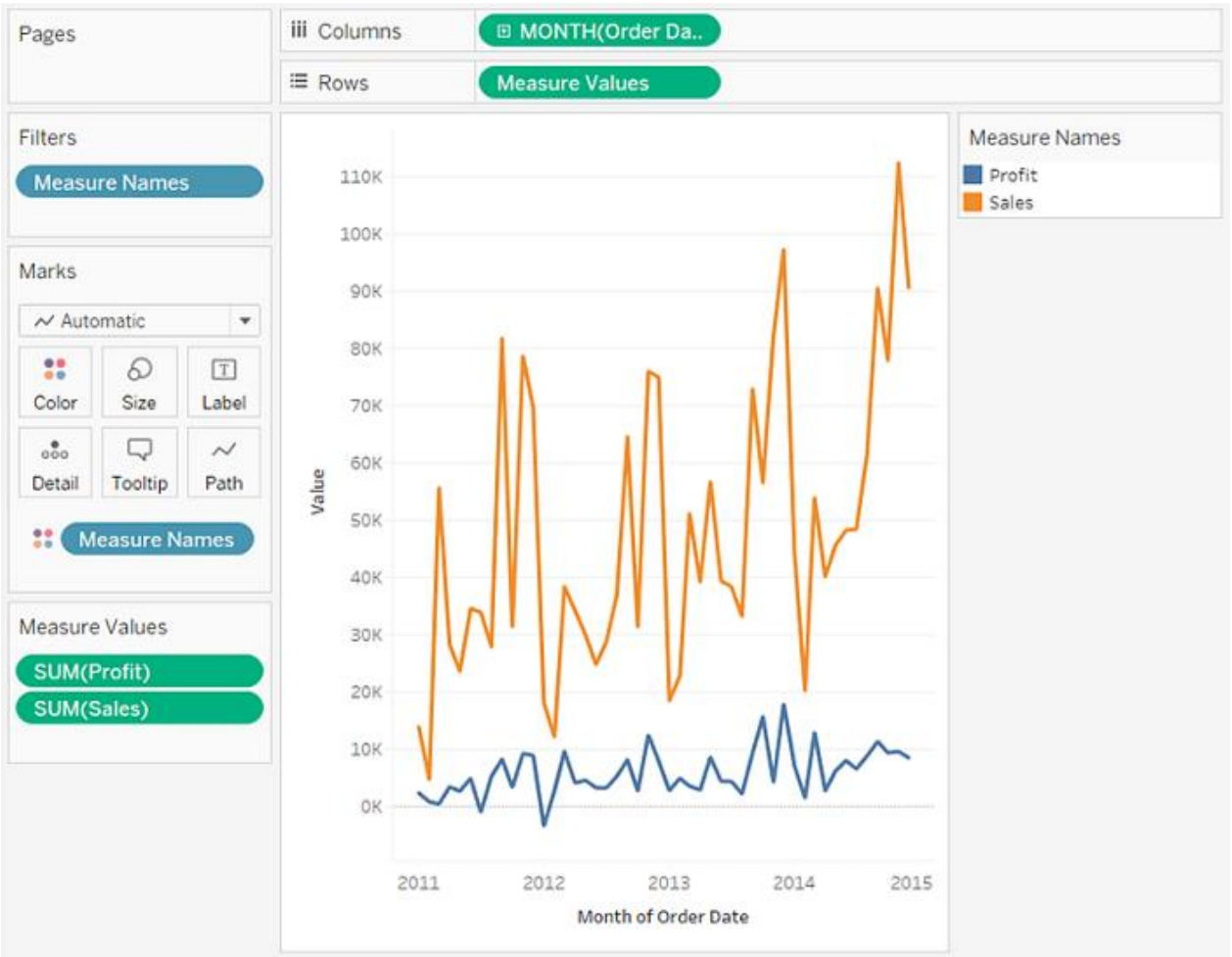


1. The view is rather sparse because we are looking at a summation of values on a per-year basis.

2. Click the drop-down arrow in the **Year(Order Date)** field on the **Columns** shelf and select **Month** in the lower part of the context menu to see a continuous range of values over the four-year period.

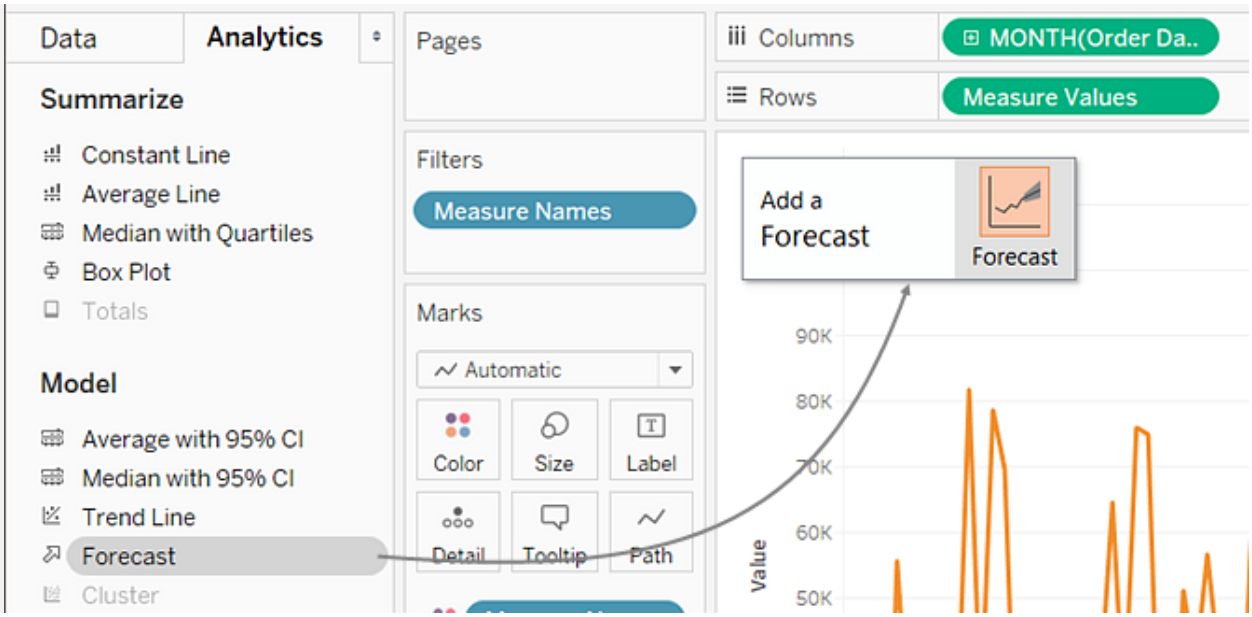


1. The resulting view is a lot more detailed than the original view:

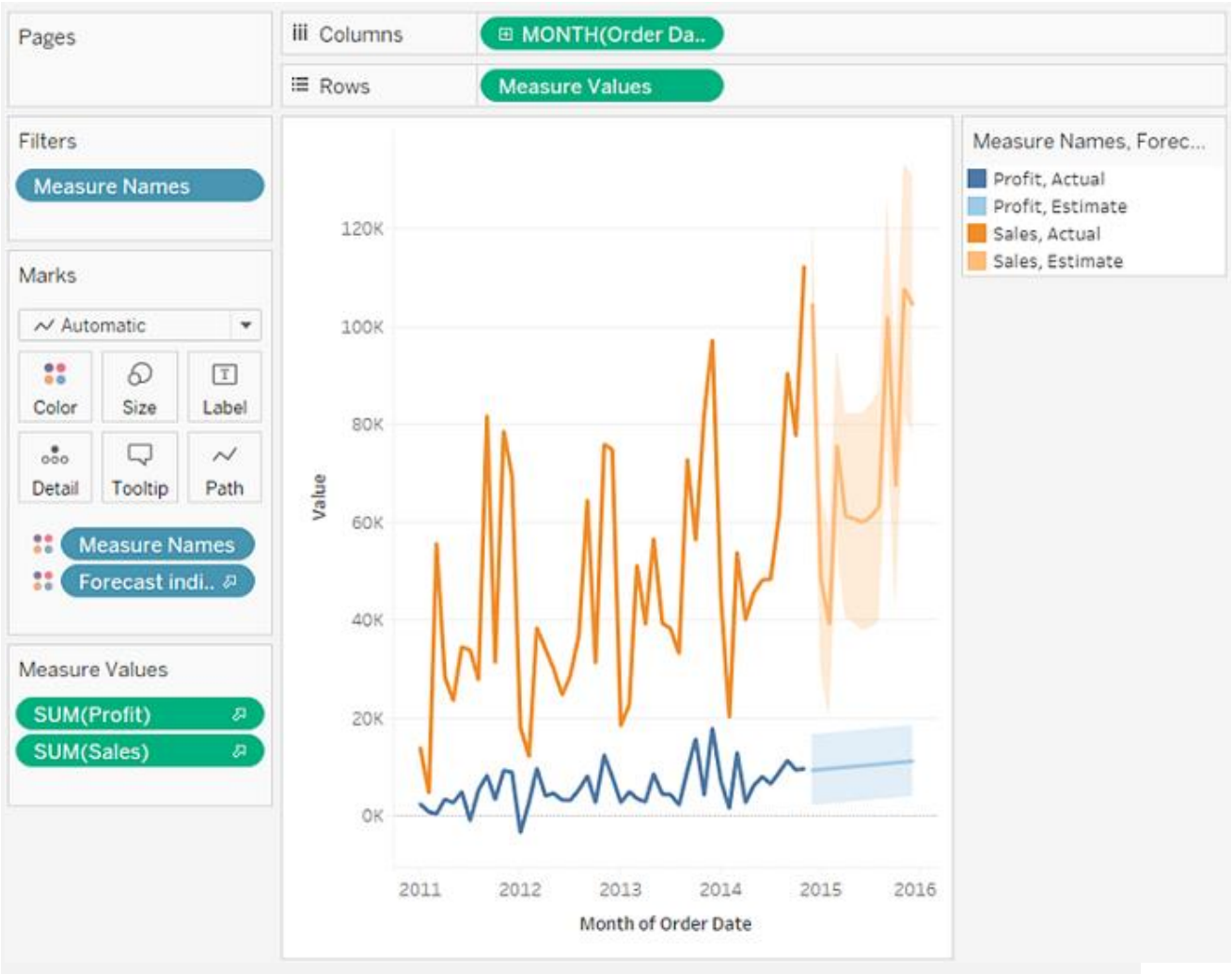


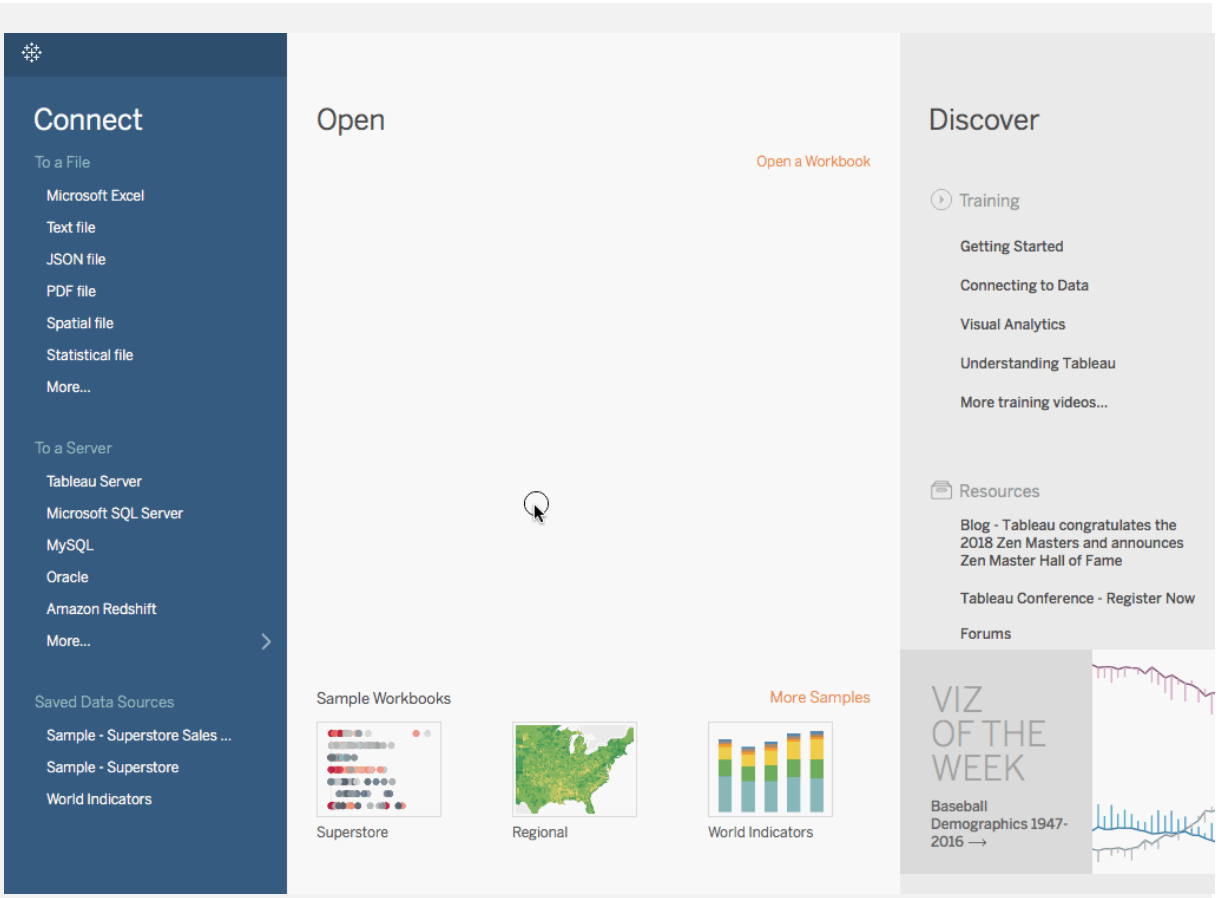
1. Notice that the values seem to go much higher just before the end of each year. A pattern like that is known as *seasonality*. If we turn on the forecasting feature in the view, we can see whether we should expect that the apparent seasonal trend will continue in the future.

2. To add a forecast, in the **Analytics** pane, drag the **Forecast** model to the view, and then drop it on **Forecast**.



1. We then see that, according to Tableau forecasting, the seasonal trend does continue into the future:




Connect
To a File
Microsoft Excel
Text file
JSON file
PDF file
Spatial file
Statistical file
More...
To a Server
Tableau Server
Microsoft SQL Server
MySQL
Oracle
Amazon Redshift
More...
Saved Data Sources
Sample - Superstore Sales ...
Sample - Superstore
World Indicators
Open
Open a Workbook
Sample Workbooks
More Samples
Superstore
Regional
World Indicators
Discover
Training
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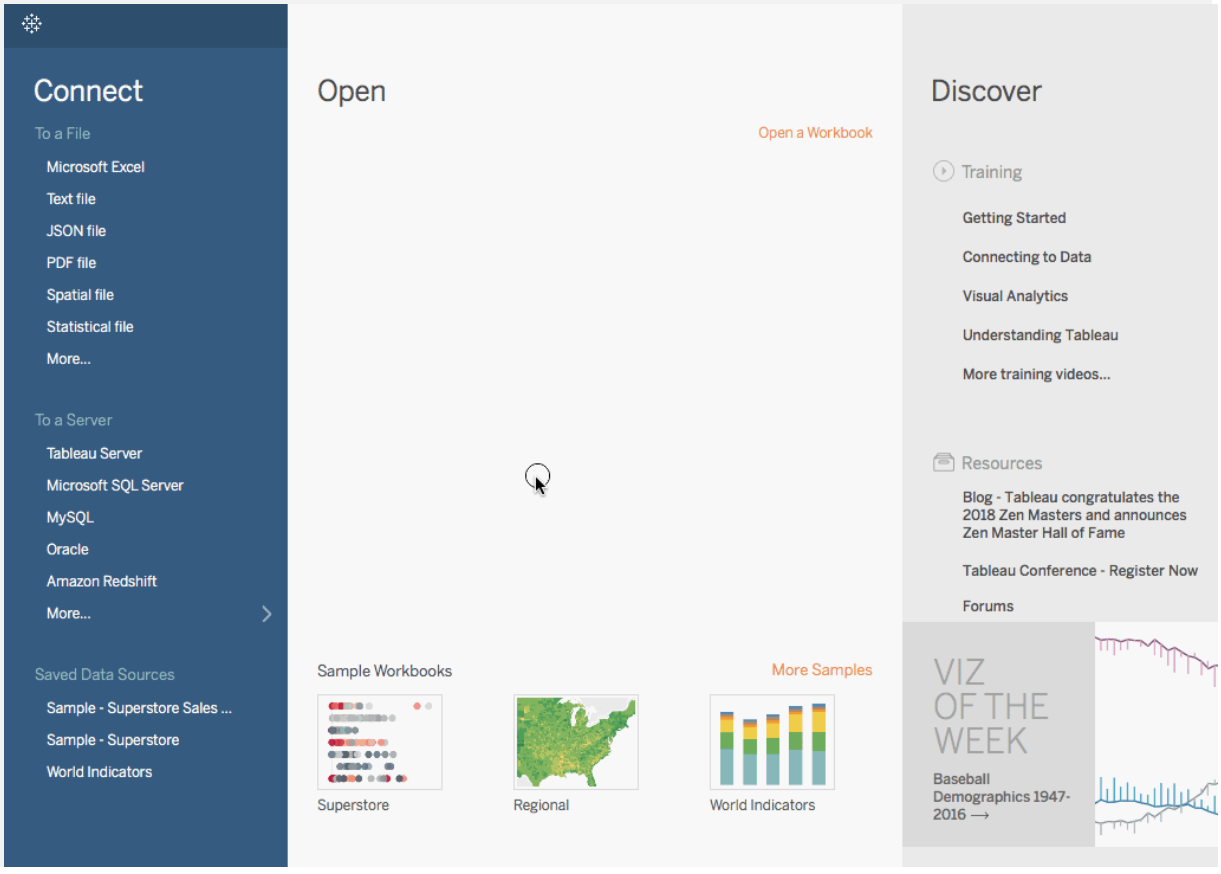
Connect
To a File
Microsoft Excel
Text file
JSON file
PDF file
Spatial file
Statistical file
More...
To a Server
Tableau Server
Microsoft SQL Server
MySQL
Oracle
Amazon Redshift
More...
Saved Data Sources
Sample - Superstore Sales ...
Sample - Superstore
World Indicators
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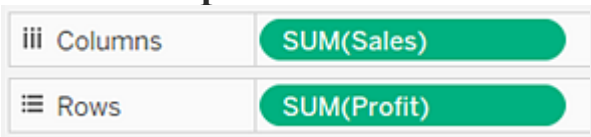
- **Create a scatterplot**

Use scatter plots to visualize relationships between numerical variables.

In Tableau, you create a scatter plot by placing at least one measure on the **Columns** shelf and at least one measure on the **Rows** shelf. If these shelves contain both dimensions and measures, Tableau places the measures as the innermost fields, which means that measures are always to the right of any dimensions that you have also placed on these shelves. The word "innermost" in this case refers to the table structure.

Creates Simple Scatter Plot



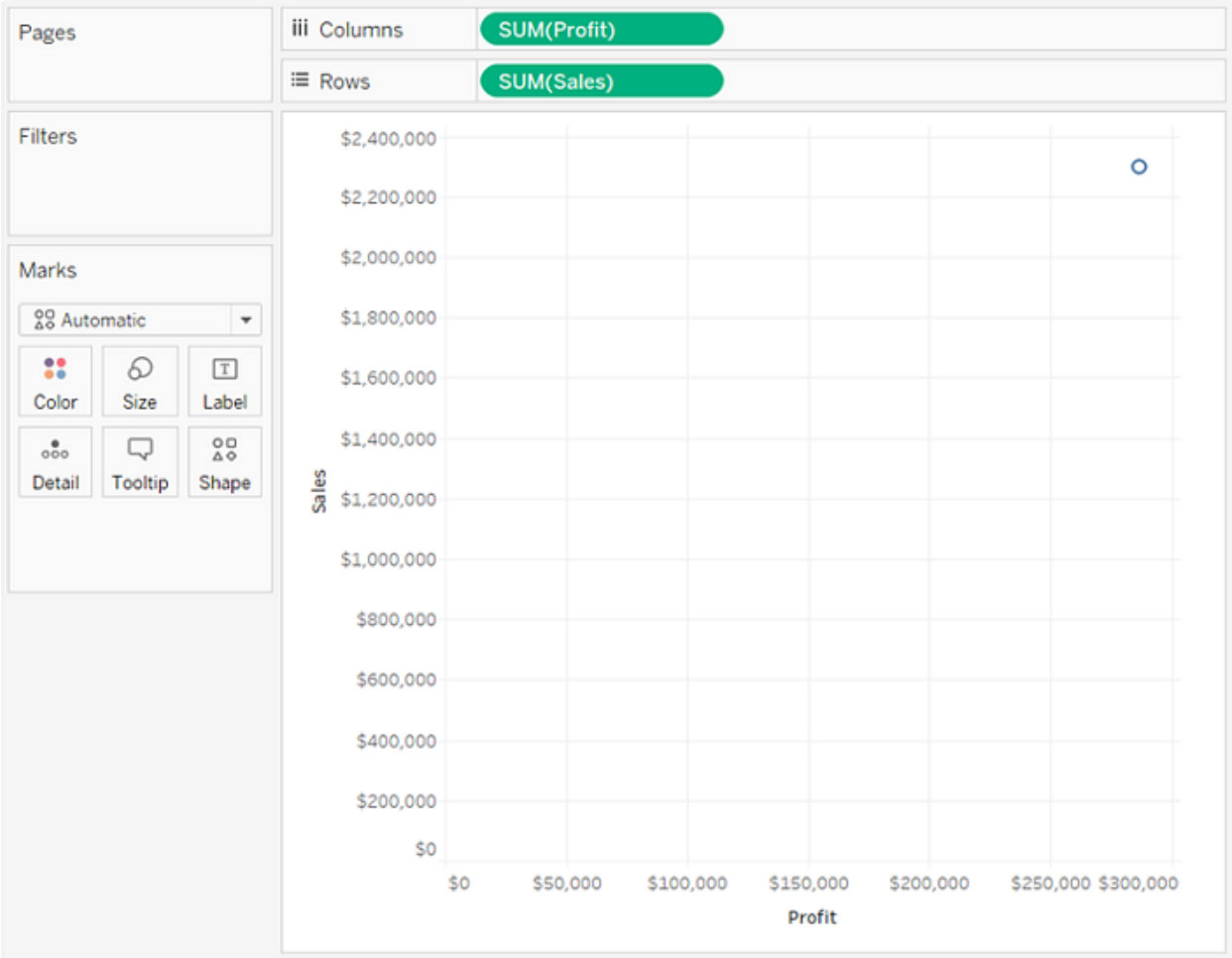
Creates Matrix of Scatter Plots

To use scatter plots and trend lines to compare sales to profit, follow these steps:

1. Open the **Sample — Superstore** data source.
2. Drag the **Profit** measure to **Columns**.
3. Tableau aggregates the measure as a sum and creates a horizontal axis.
4. Drag the **Sales** measure to **Rows**.
5. Tableau aggregates the measure as a sum and creates a vertical axis.

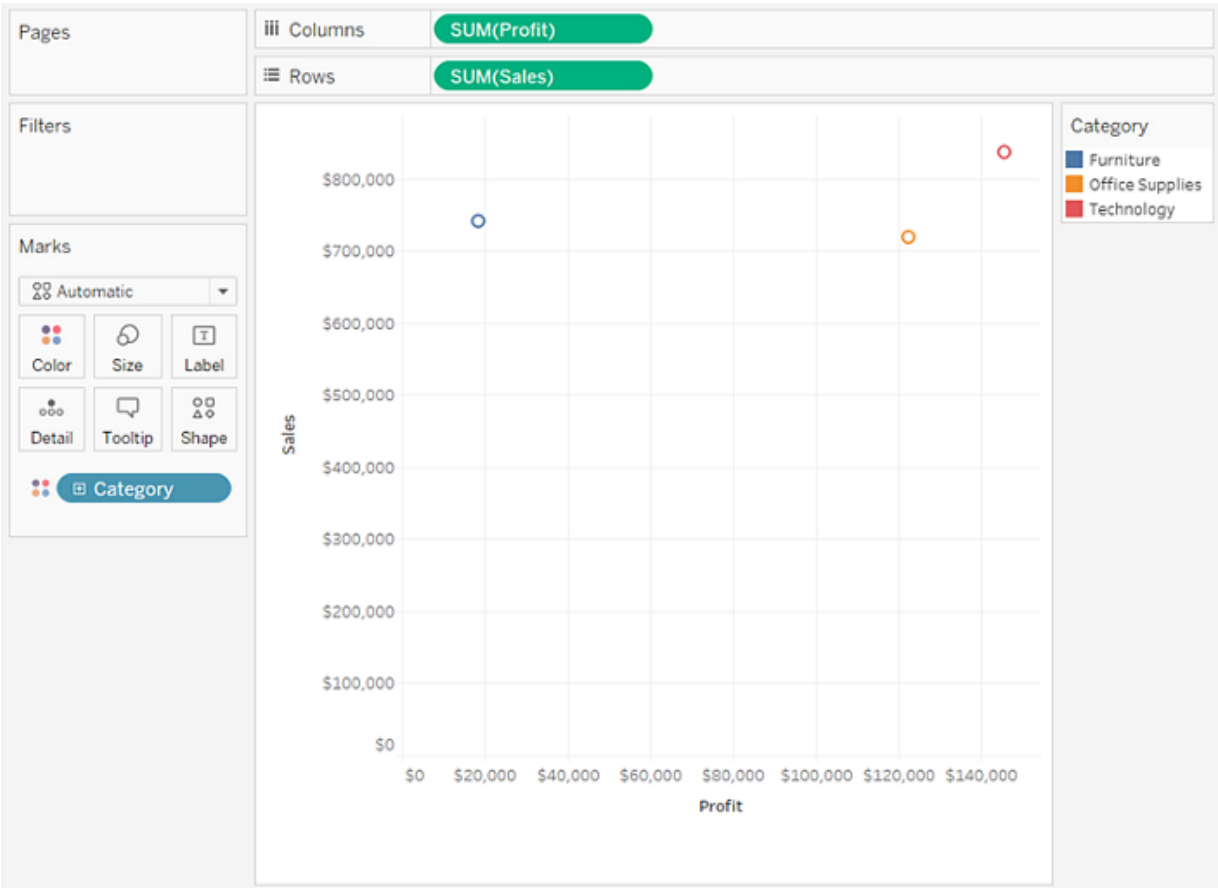
6. Measures contain continuous numerical data. When you plot one number against another, you are comparing two numbers; the resulting chart is analogous to a Cartesian chart, with x and y coordinates.

7. Now you have a one-mark scatter plot:



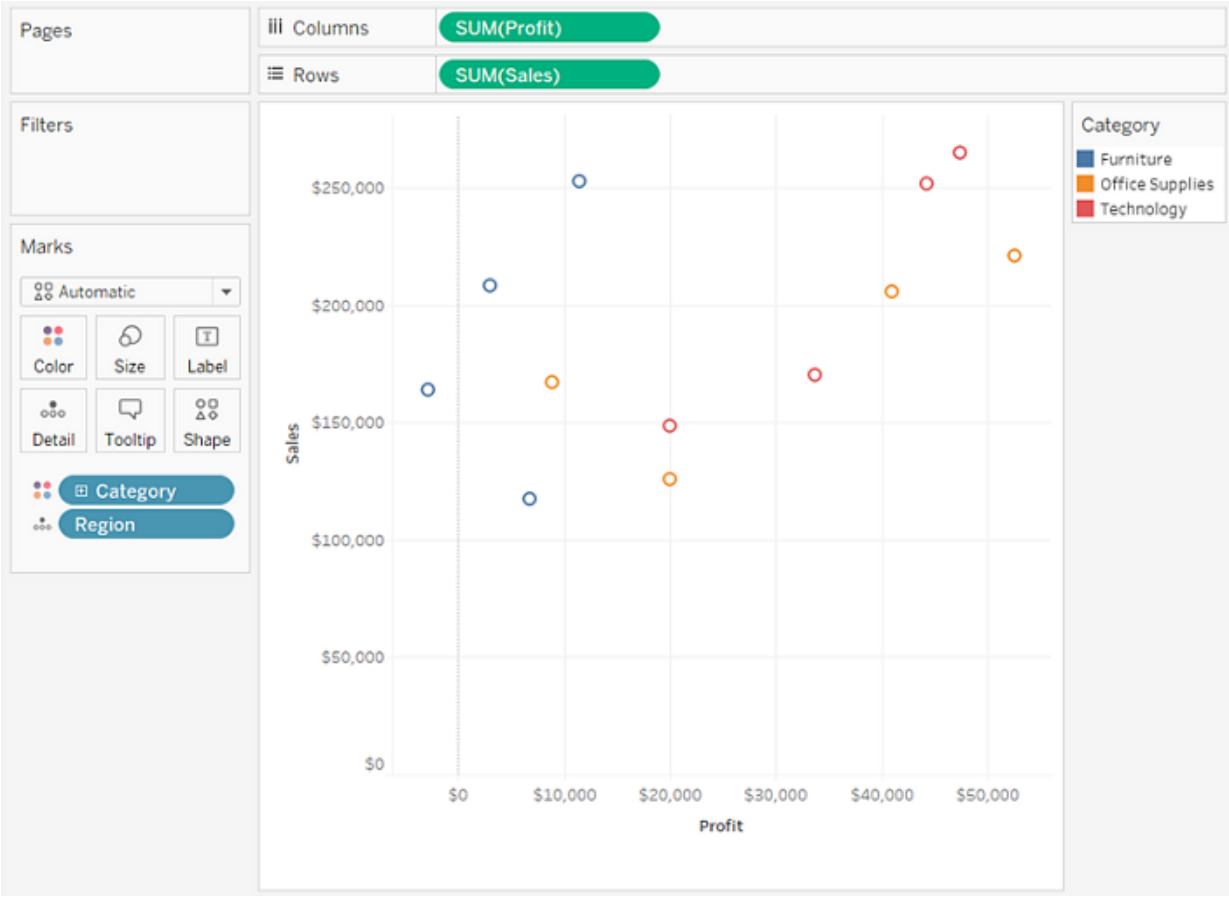
1. Drag the **Category** dimension to **Color** on the Marks card.

2. This separates the data into three marks — one for each dimension member — and encodes the marks using color.

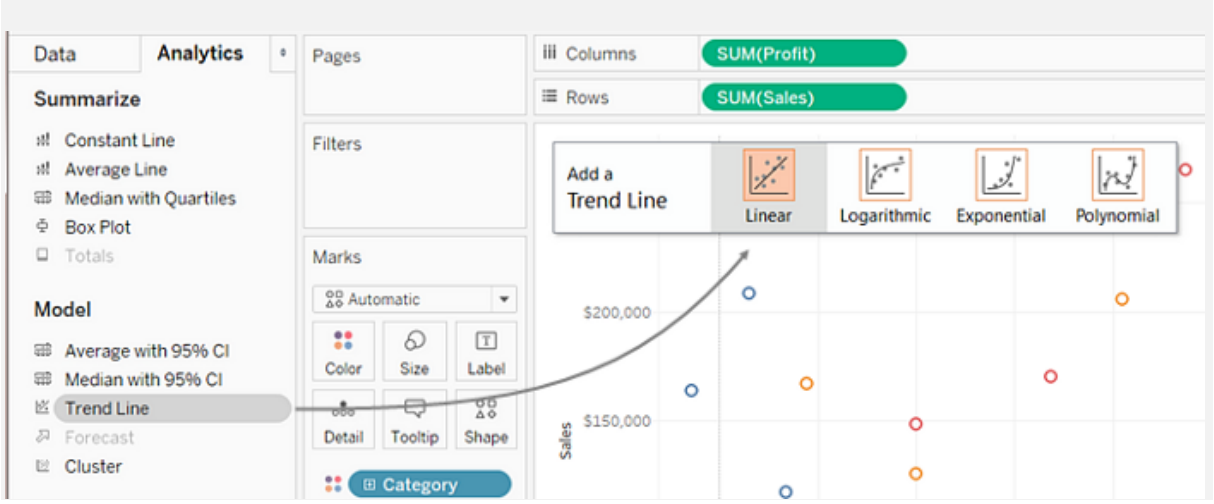


1. Drag the **Region** dimension to **Detail** on the **Marks** card.

2. Now there are many more marks in the view. The number of marks is equal to the number of distinct regions in the data source multiplied by the number of departments. (If you're curious, use the **Undo** button on the toolbar to see what would have happened if you'd dropped the **Region** dimension on **Shape** instead of **Detail**.)



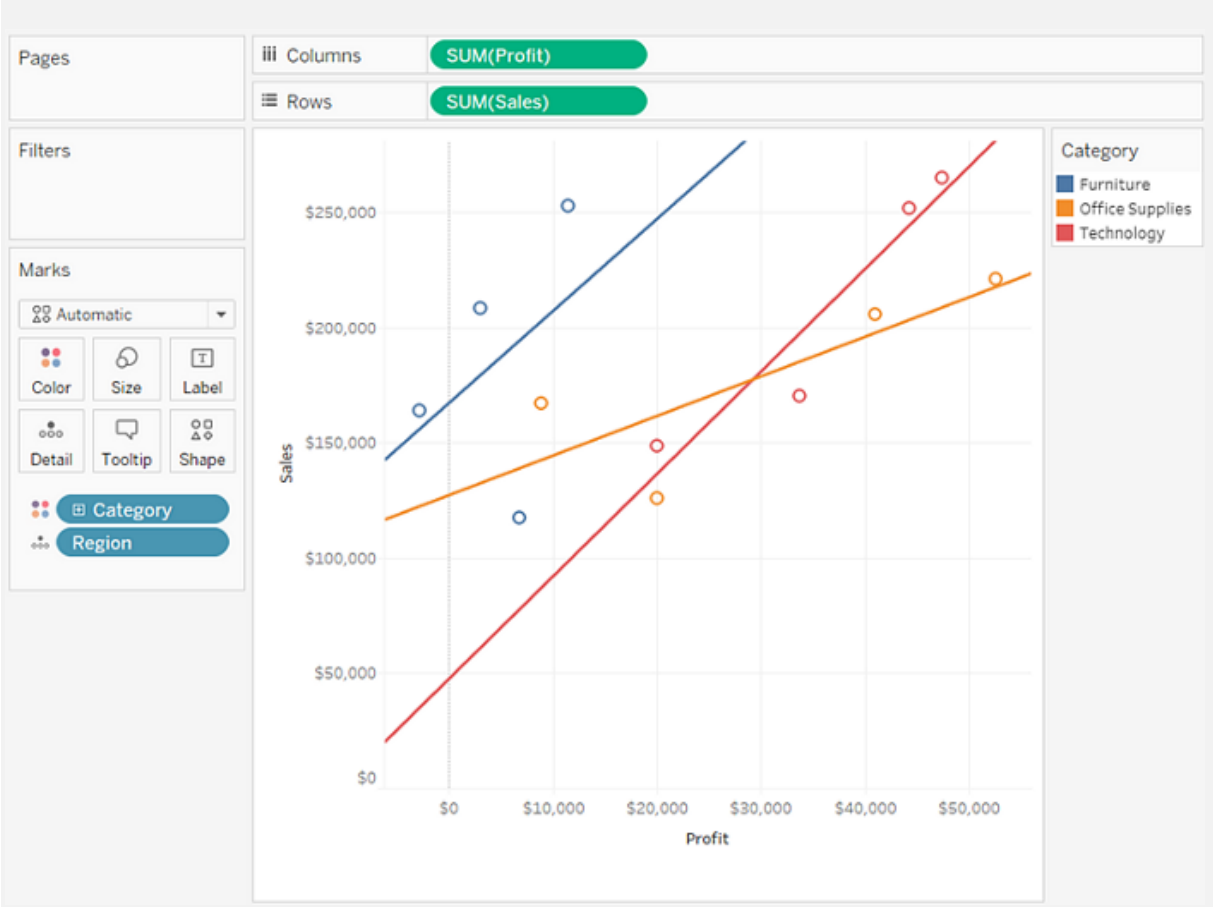
1. To add trend lines, from the **Analytics** pane, drag the **Trend Line** model to the view, and then drop it on the model type.



1. A trend line can provide a statistical definition of the relationship between two numerical values. To add trend lines to a view, both axes must contain a field that

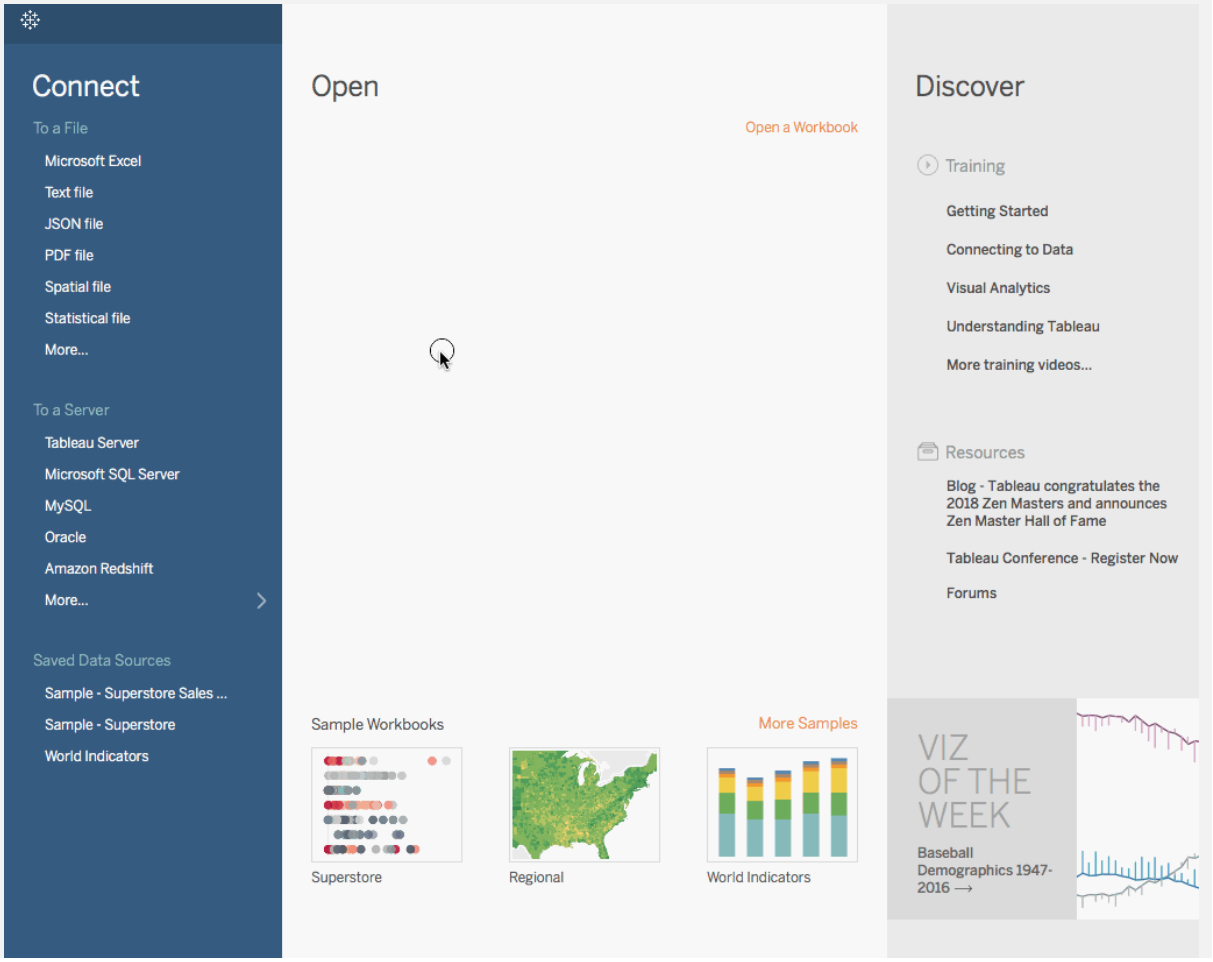
can be interpreted as a number — by definition, that is always the case with a scatter plot.

2. Tableau adds three linear trend lines — one for each color that you are using to distinguish the three categories.



1. Hover the cursor over the trend lines to see statistical information about the model that was used to create the line:

1. For more information, see Assess Trend Line Significance. You can also customize the trend line to use a different model type or to include confidence bands. For more information, see Add Trend Lines to a Visualization.

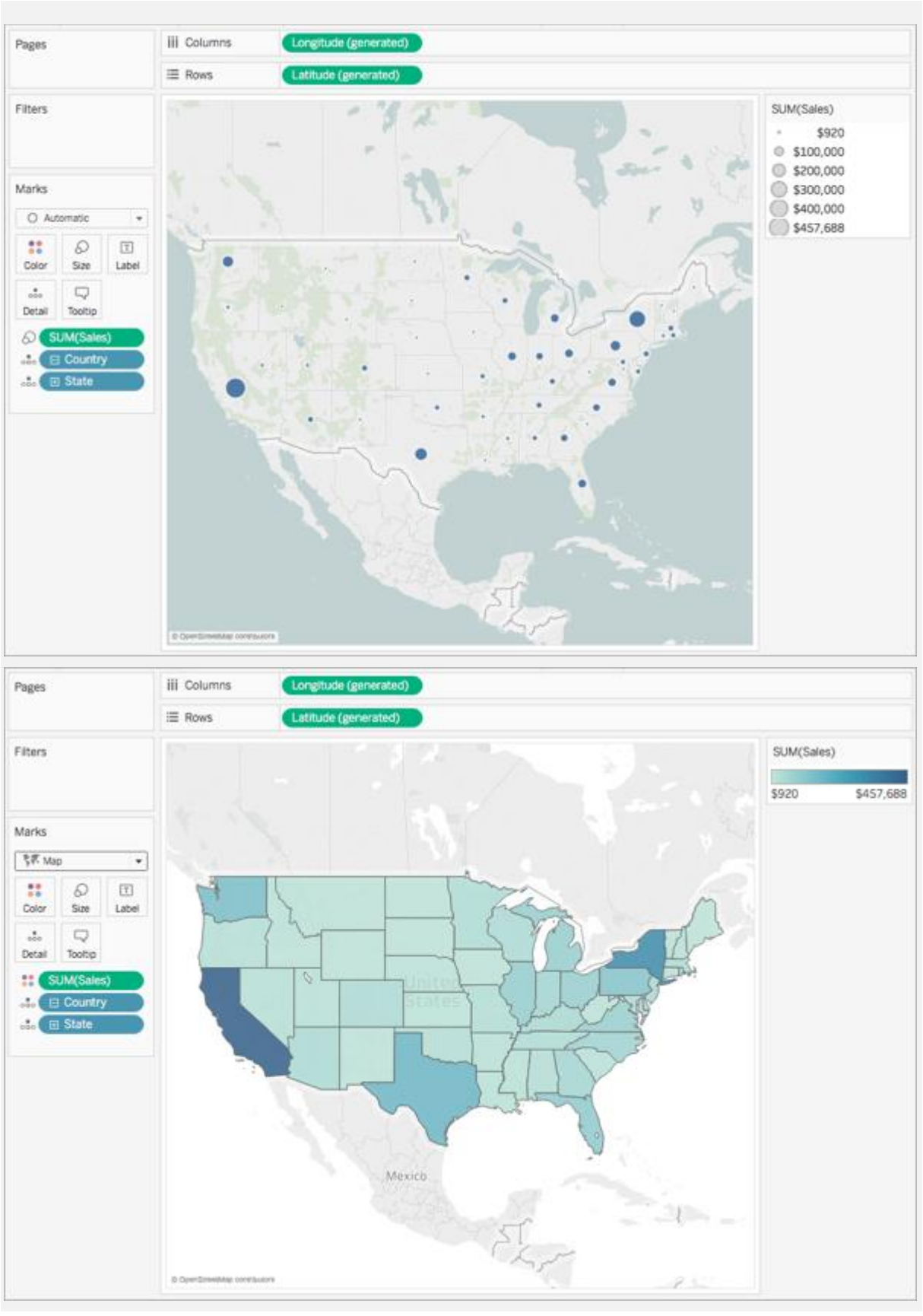


- **Create a map using geographic data**

You can build several different types of maps for your geographic analysis in Tableau. If you're new to maps, or simply want to take advantage of the built in mapping capabilities that Tableau provides, you can create a simple point or filled (polygon) map similar to the examples below.

Prerequisites: To build a simple map, your data source must contain location data (location names, or latitude and longitude coordinates). If your data source does not

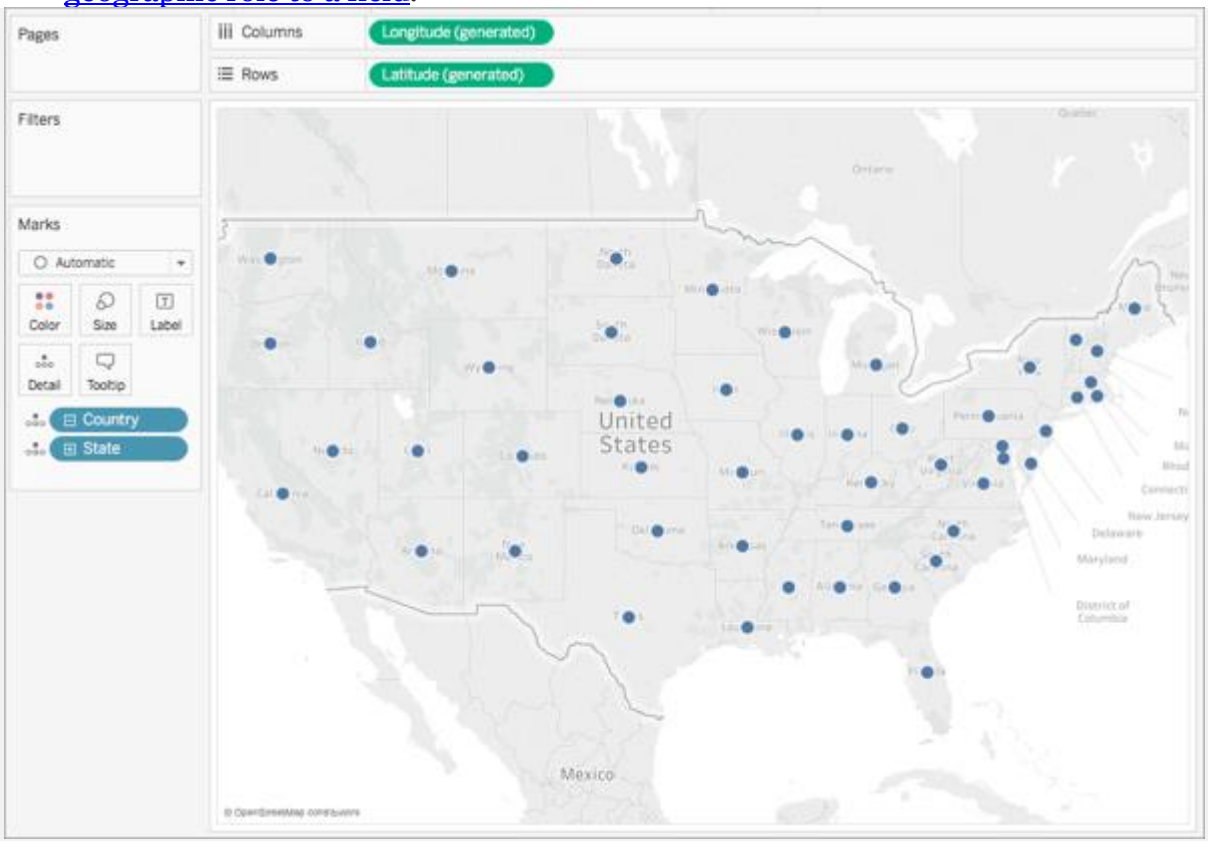
contain location data, see the Map Data section for ways you can connect to location data.



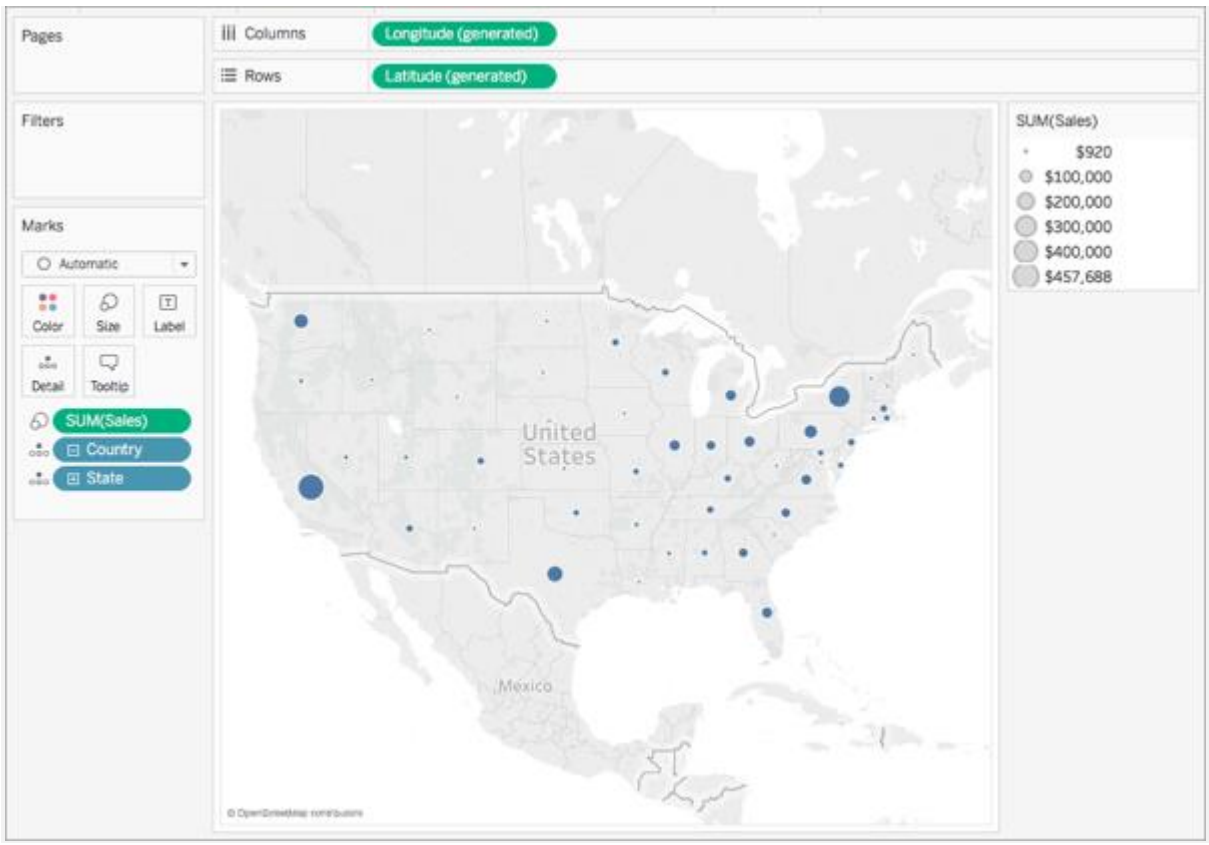
This topic illustrates how to create a simple map using an example. To follow along with the example below, open Tableau Desktop and connect to the **Sample-Superstore** data source, which comes with Tableau.

Build a simple point map

1. Navigate to a worksheet.
2. In the **Data** pane, under Dimensions, double-click **State**.
3. A map view is automatically created because the State field is a geographic field. To learn more about geographic fields and how to create them, see Assign a geographic role to a field.



1. From Measures, drag **Sales** to **Size** on the Marks card.
2. The data points on the map update to show the amount of sales proportionally.

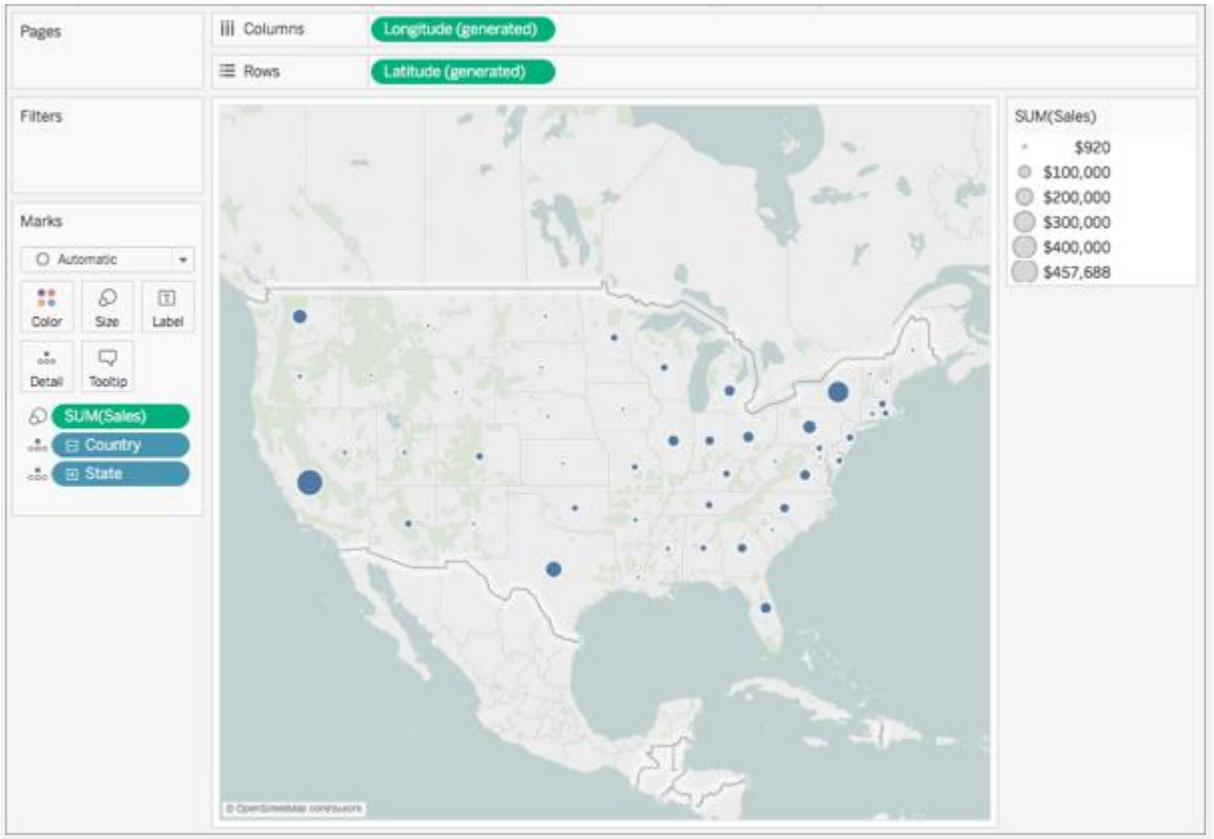


1. Select **Maps** > **Map Layers**.

2. In the Map Layers pane, do the following:

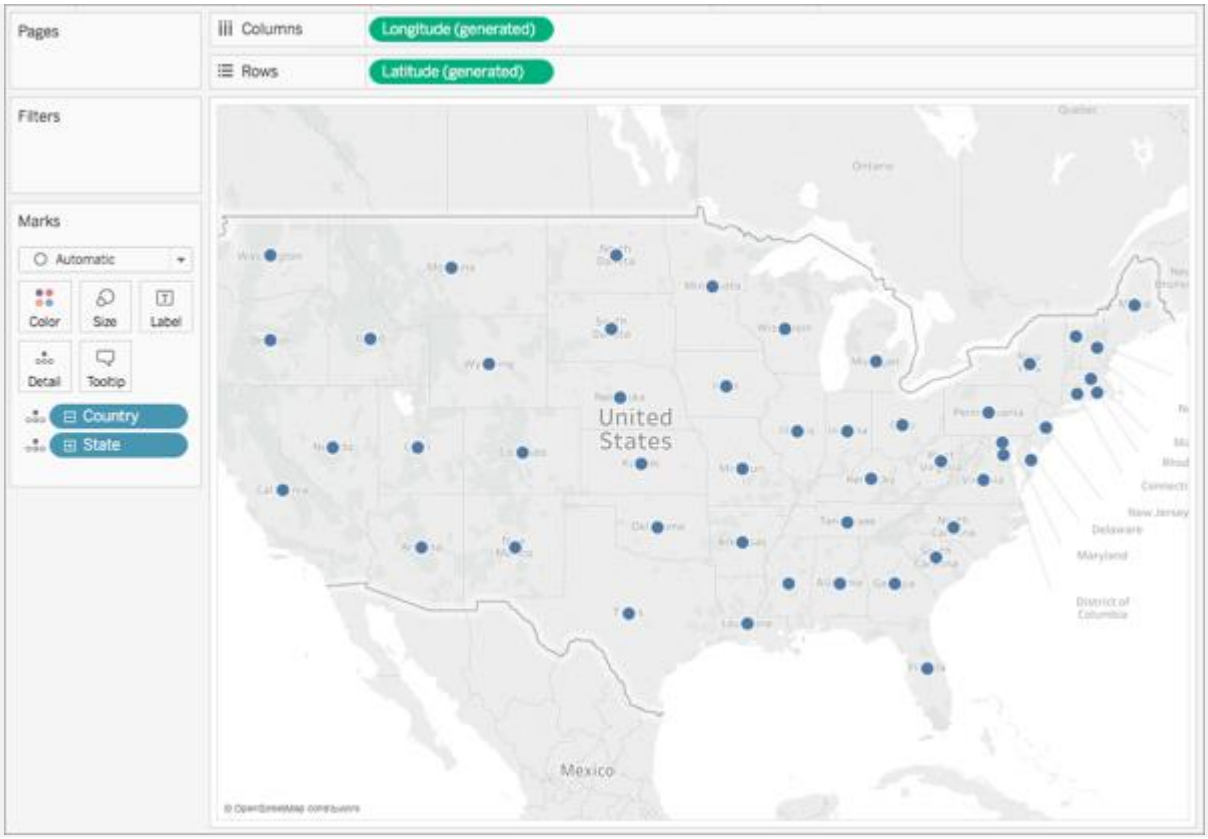
- Click the Style drop-down and select **Normal**.
- Under Map Layers, clear **Country/Region Names**.

1. The background map updates with the new settings.

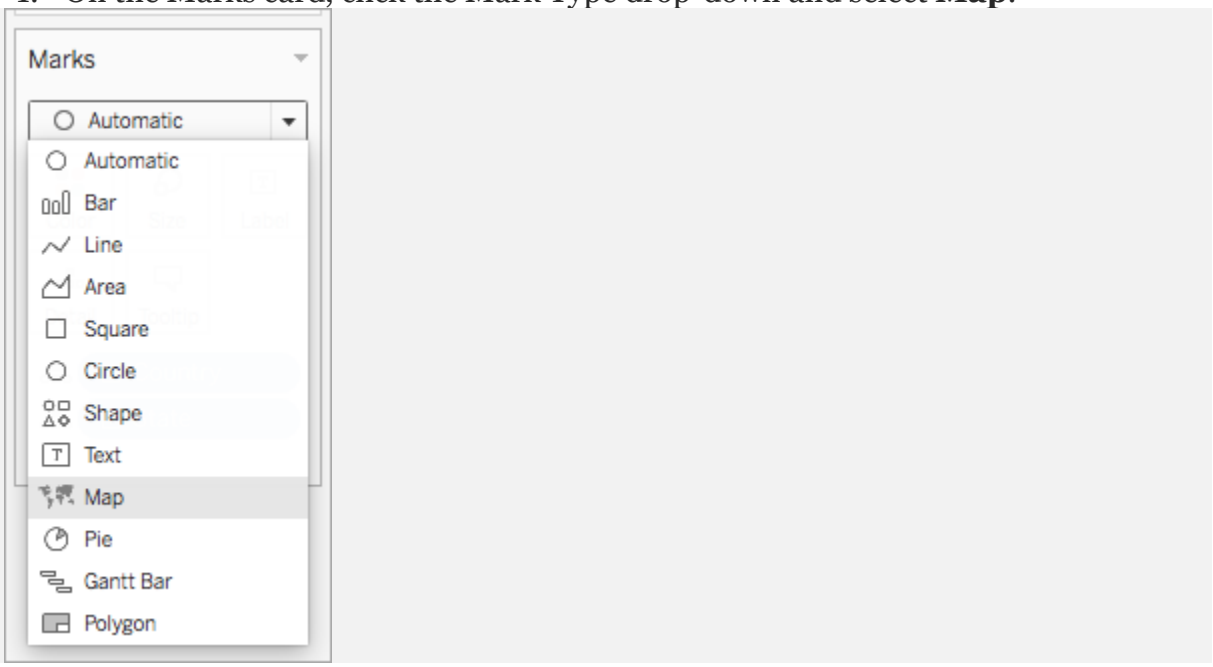


Build a simple filled (polygon) map

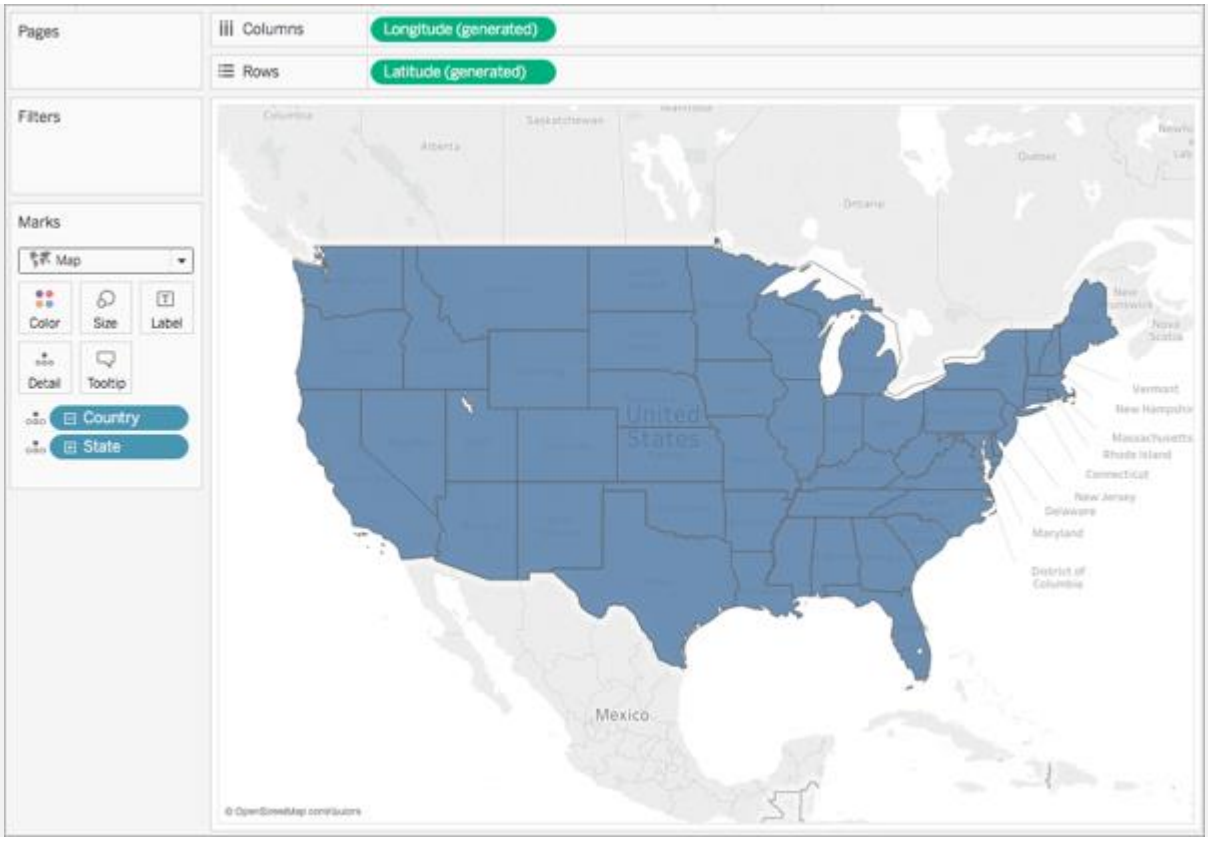
1. Navigate to a new worksheet.
2. In the **Data** pane, under Dimensions, double-click **State**.
3. A map view is automatically created.



1. On the Marks card, click the Mark Type drop-down and select **Map**.

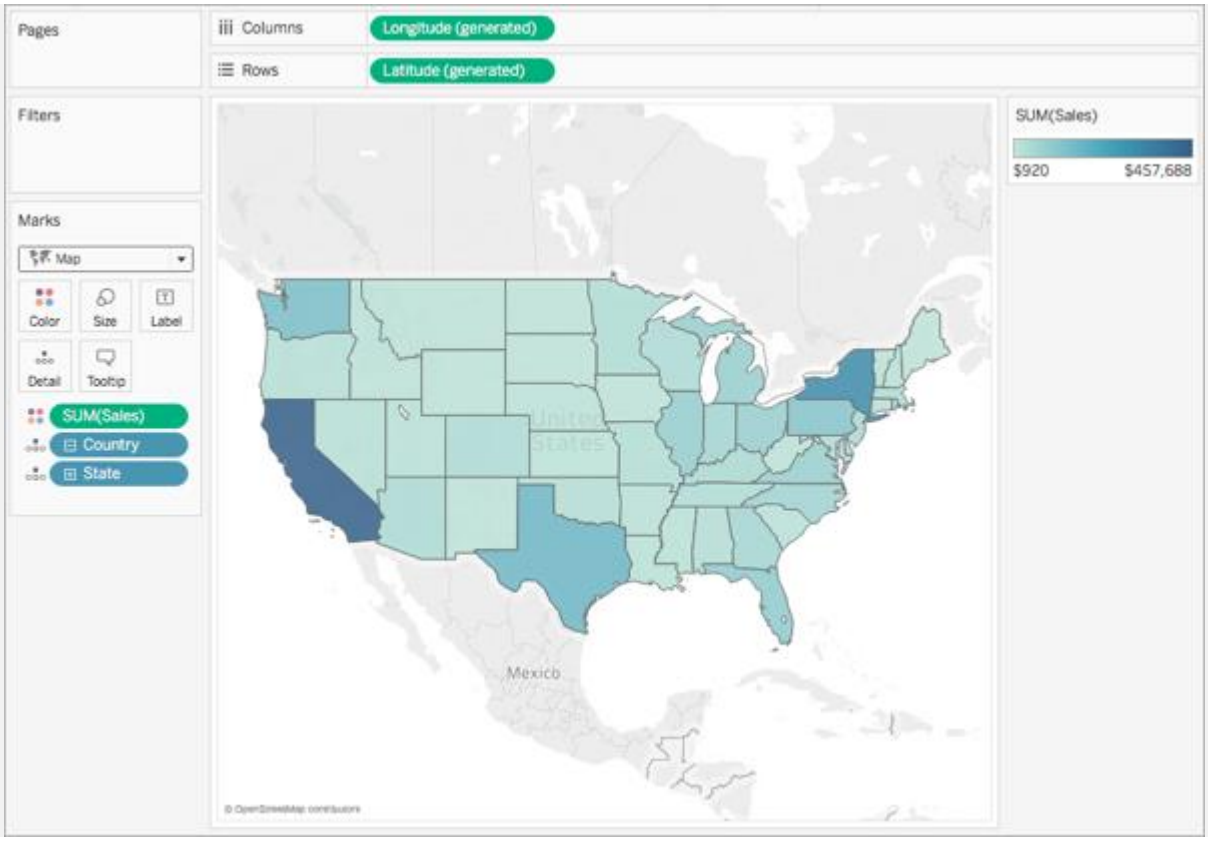


1. The map view updates to a filled (polygon) map.



1. From Dimensions, drag **Sales** to **Color** on the Marks card.

2. The polygons on the map update to show the amount of sales using color.



- **Create a combined axis chart**

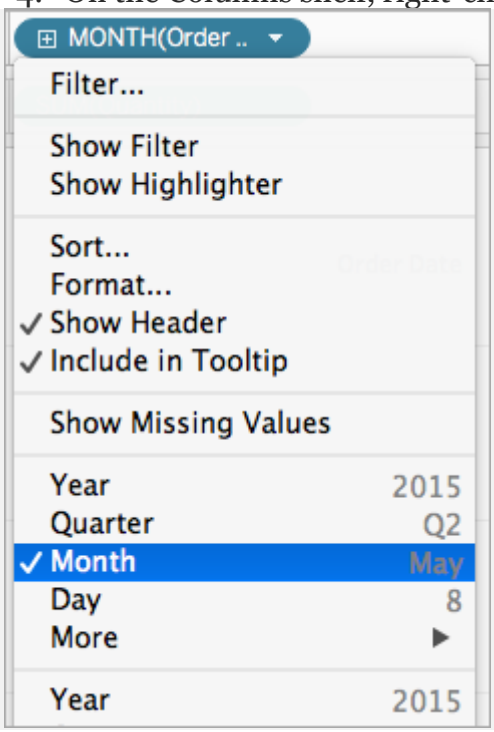
Combination charts are views that use multiple mark types in the same visualization. For example, you may show sum of profit as bars with a line across the bars showing sum of sales. You can also use combination charts to show multiple levels of detail in the same view. For example, you can have a line chart with individual lines showing average sales over time for each customer segment, then you can have another line that shows the combined average across all customer segments.

To create a combination chart, follow the steps below:

1. Open Tableau Desktop and connect to the **Sample — Superstore** data source.
2. Navigate to a new worksheet.

3. From the **Data** pane, under Dimensions, drag **Order Date** to the **Columns** shelf.

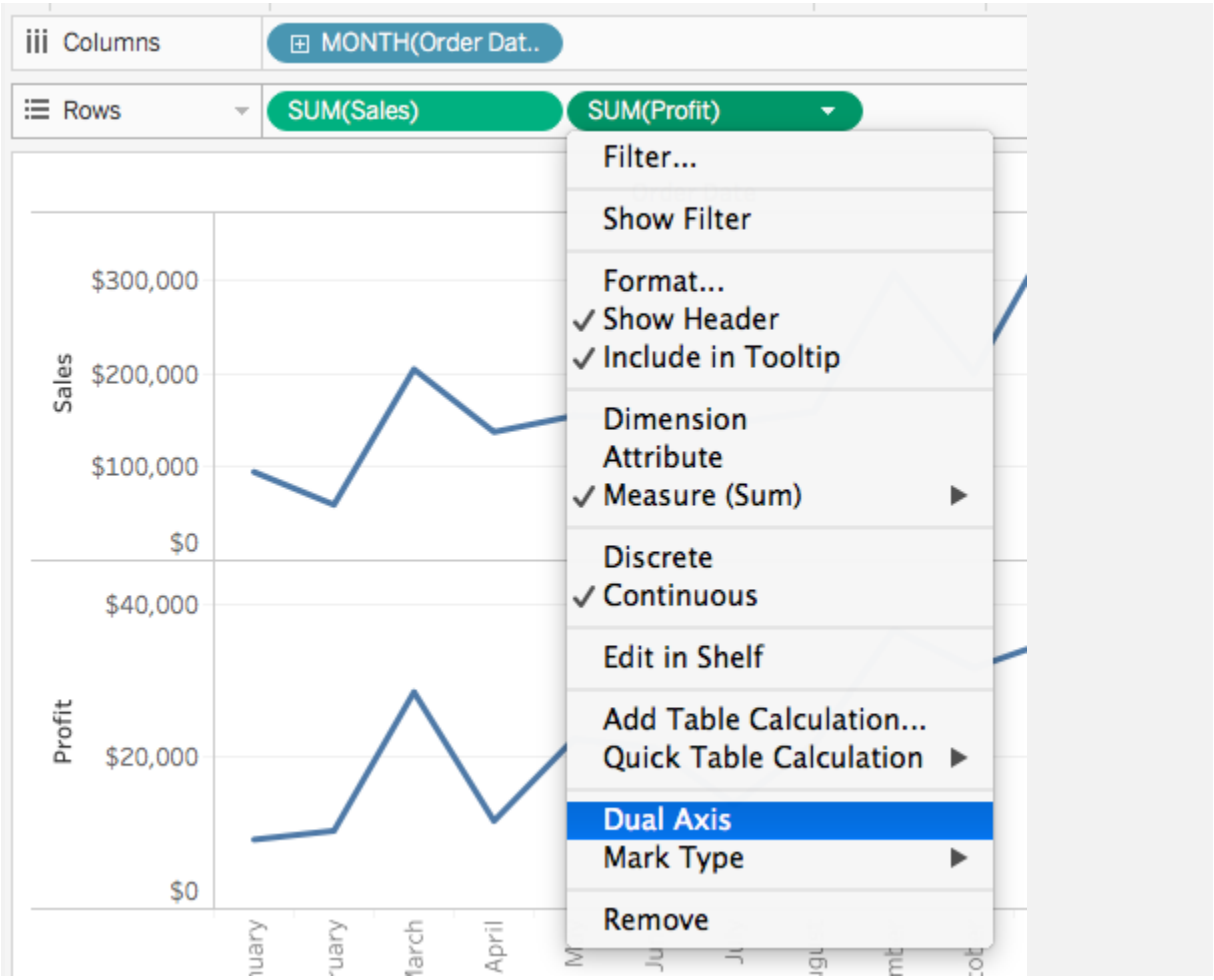
4. On the Columns shelf, right-click **YEAR(Order Date)** and select **Month**.



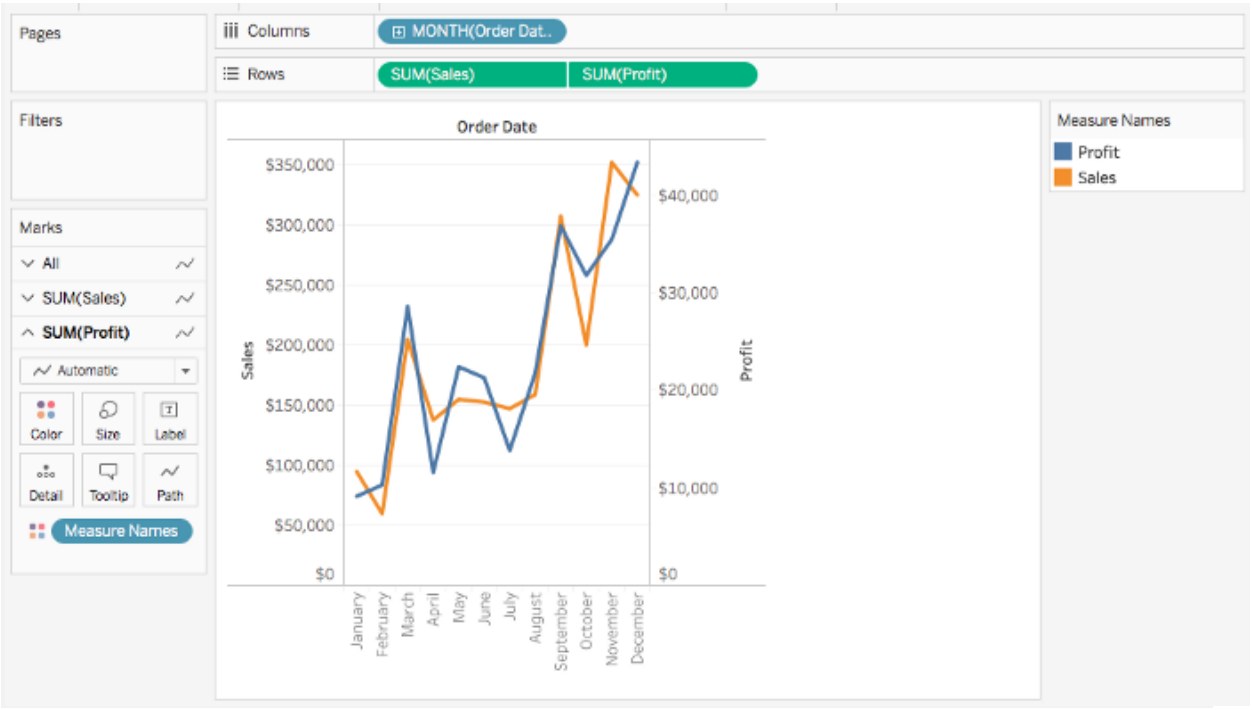
1. From the **Data** pane, under Measures, drag **Sales** to the **Rows** shelf.

2. From the **Data** pane, under Measures, drag **Profit** to the **Rows** shelf and place it to the right of SUM(Sales).

3. On the Rows shelf, right-click **SUM(Profit)** and select **Dual-Axis**.

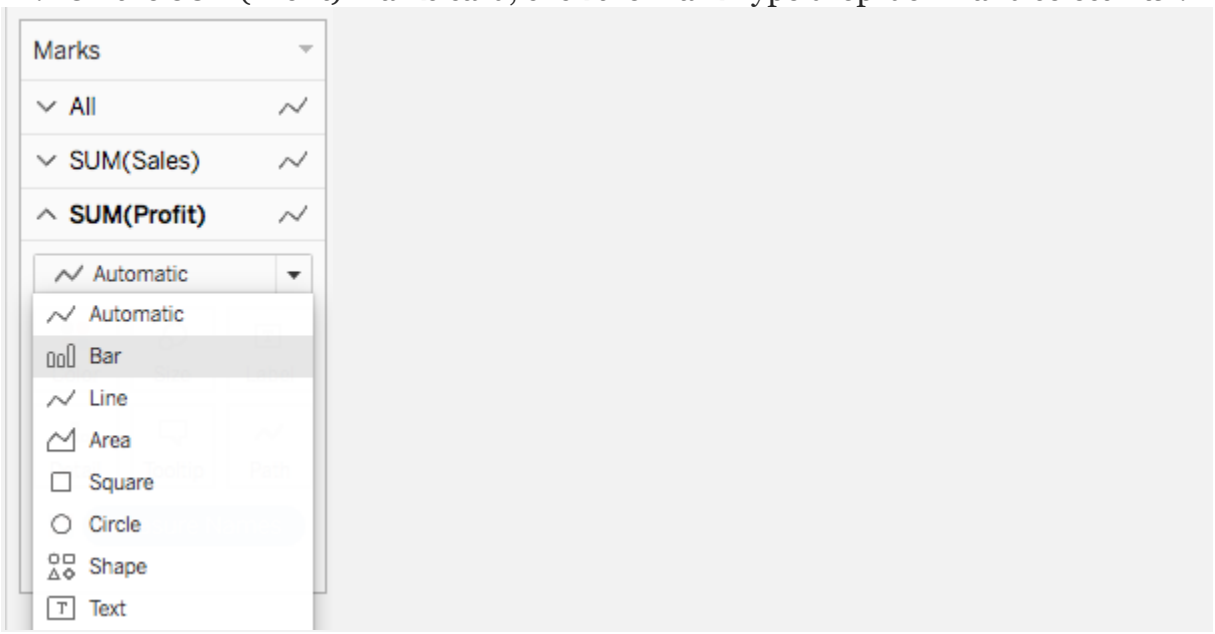


1. The view updates to look like the following. Measure Names is added to Color on the Marks card to differentiate the lines.

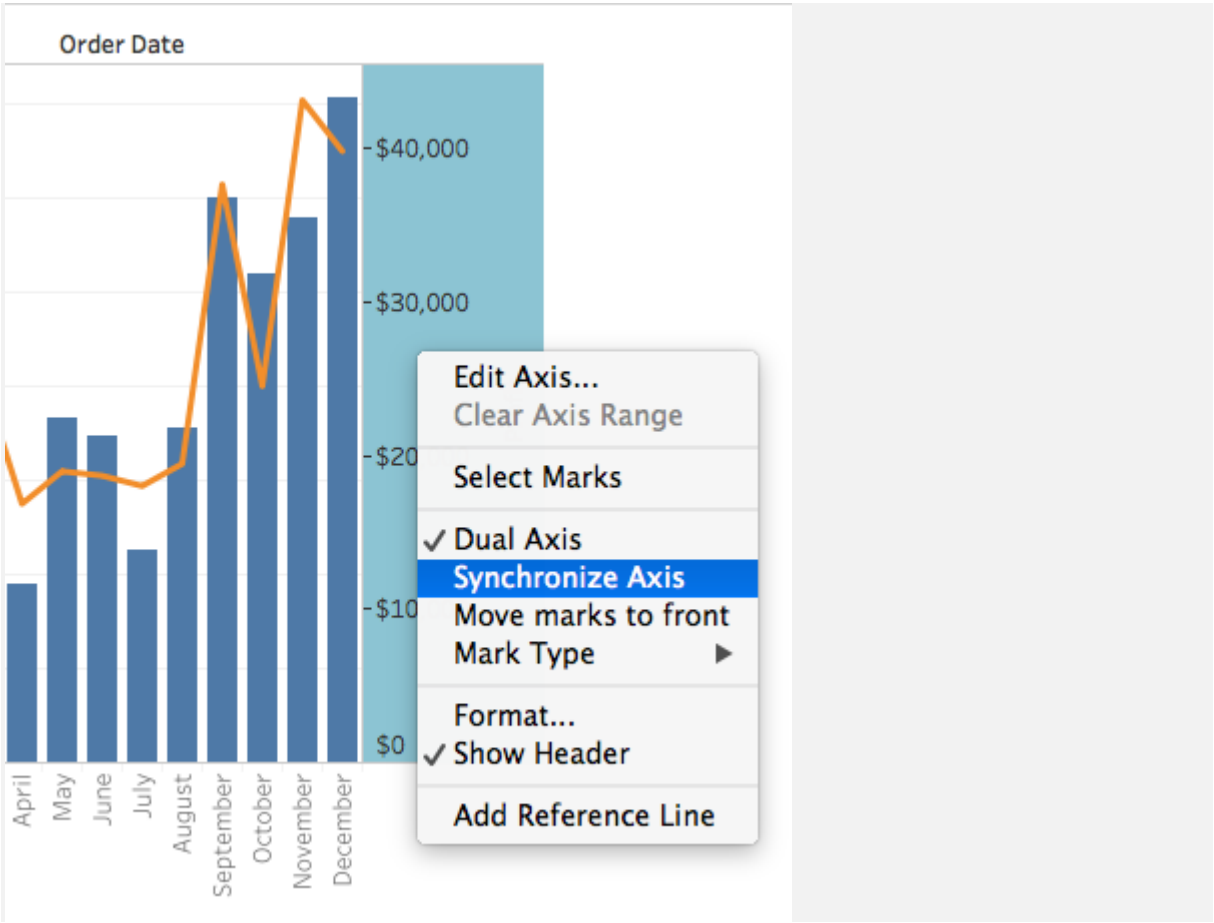


1. **Note**: Some marks can be hidden behind others. To move the marks forward or backward, right-click one of the axes in the visualization and select Move Marks to Back or Move Marks to Front.

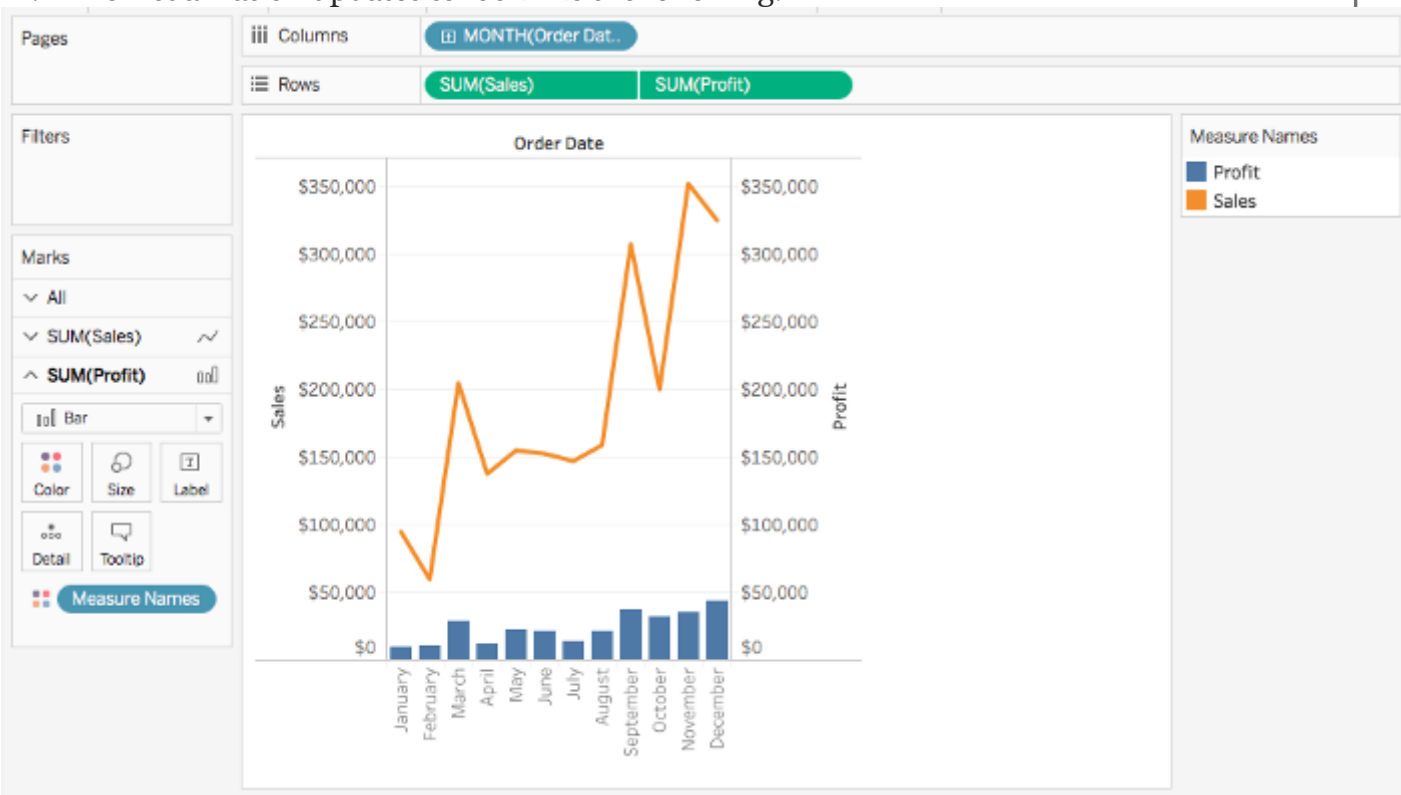
2. On the SUM(Profit) Marks card, click the Mark Type drop-down and select **Bar**.



1. In the visualization, right-click the **Profit** axis and select **Synchronize Axis**.



1. The visualization updates to look like the following.



- **Create a dual axis chart**

Option 1

1. Move two Measures (not Dimensions) to the **Rows** shelf.
2. Right-click the second measure on the **Rows** shelf, and select **Dual Axis**.
3. On the Marks card labeled **All**, set the mark type to **Bar**.
4. Use the slider on the Marks card for each measure to adjust the size of each bar, so that the one layered on top is narrower than the one on the bottom.
5. Right-click the right-side axis and select **Synchronize Axis**.
6. Optionally, right-click the right-side axis and select **Show Header** to toggle off the labels on the right side.
7. Switch one measure from one side to the other in the Rows shelf to move one measure foward.

Option 2

1. Drag Order Date to **Columns**
2. Drag Sales and Profit to **Rows**.
3. Click the top right corner arrow on Profit and select **Dual Axis**.

- Alternatively, you can right click on Profit and select **Dual Axis** in the view directly.

1. Right click on the Profit Axis and select **Synchronize axis**

2. Change the mark type as desired

Option 3

1. Drag Order Date to **Columns**
2. Drag Sales to **Rows**.
3. Drag and drop other Measures to the Value axis

- **Create a stacked bar**

Option 1: Use a separate bar for each dimension

1. Drag a dimension to **Columns**.
2. Drag **Measure Names** to **Color** on the Marks card.
3. On **Color**, right-click **Measure Names**, select **Filter**, select the check boxes for the measures to display, and then click **OK**.
4. From the Measures pane, drag **Measure Values** to **Rows**.
5. On the Marks card, change the mark type from Automatic to **Bar**. For more information, see Bar Mark.

Option 2: Use a separate bar for each measure

1. Drag a dimension to the **Color** shelf.
2. Drag **Measure Names** to **Columns**.
3. On the **Columns** shelf, right-click **Measure Names**, select **Filter**, select the check boxes for the measures to display, and then click **OK**.

4. From the Measures pane, drag **Measure Values** to **Rows**.

- **Create a chart to show specific values (crosstab, highlight table)**

Use highlight tables to compare categorical data using color.

In Tableau, you create a highlight table by placing one or more dimensions on the **Columns** shelf and one or more dimensions on the **Rows** shelf. You then select **Square** as the mark type and place a measure of interest on the **Color** shelf.

You can enhance this basic highlight table by setting the size and shape of the table cells.

To create a highlight table to explore how profit varies across regions, product sub-categories, and customer segments, follow these steps:

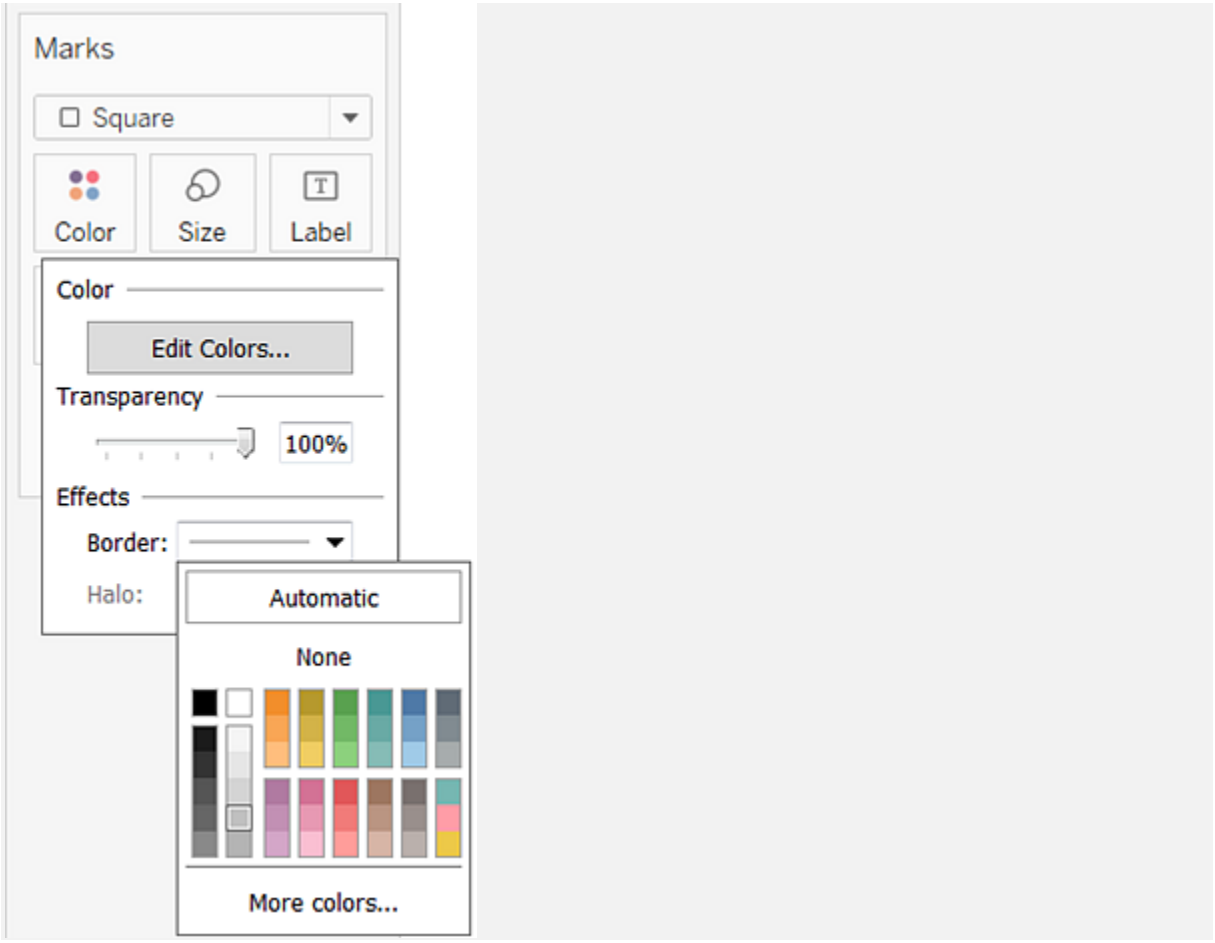
1. Connect to the **Sample — Superstore** data source.
2. Drag the **Segment** dimension to **Columns**.
3. Tableau creates headers with labels derived from the dimension member names.
4. Drag the **Region** and **Sub-Category** dimensions to **Rows**, dropping **Sub-Category** to the right of **Region**.
5. Now you have a nested table of categorical data (that is, the **Sub-Category**dimension is nested within the **Region** dimension).
6. Drag the **Profit** measure to **Color** on the **Marks** card.

7. Tableau aggregates the measure as a sum. The color legend reflects the continuous data range.

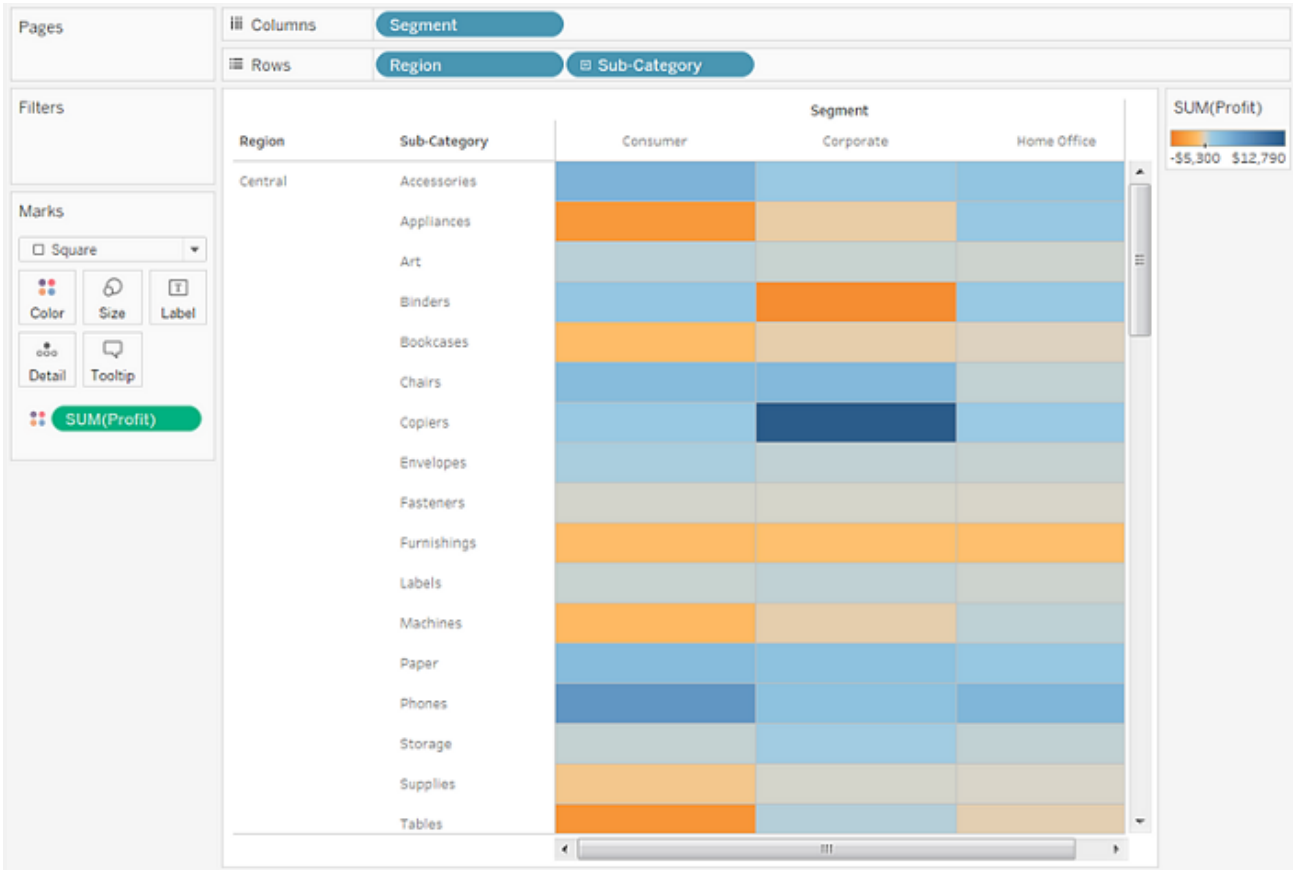
1. In this view, you can see data for only the Central region. Scroll down to see data for other regions.

2. In the Central region, copiers are shown to be the most profitable sub-category, and binders and appliances the least profitable.

3. Click **Color** on the **Marks** card to display configuration options. In the **Border** drop-down list, select a medium gray color for cell borders, as in the following image:



1. Now it's easier to see the individual cells in the view:



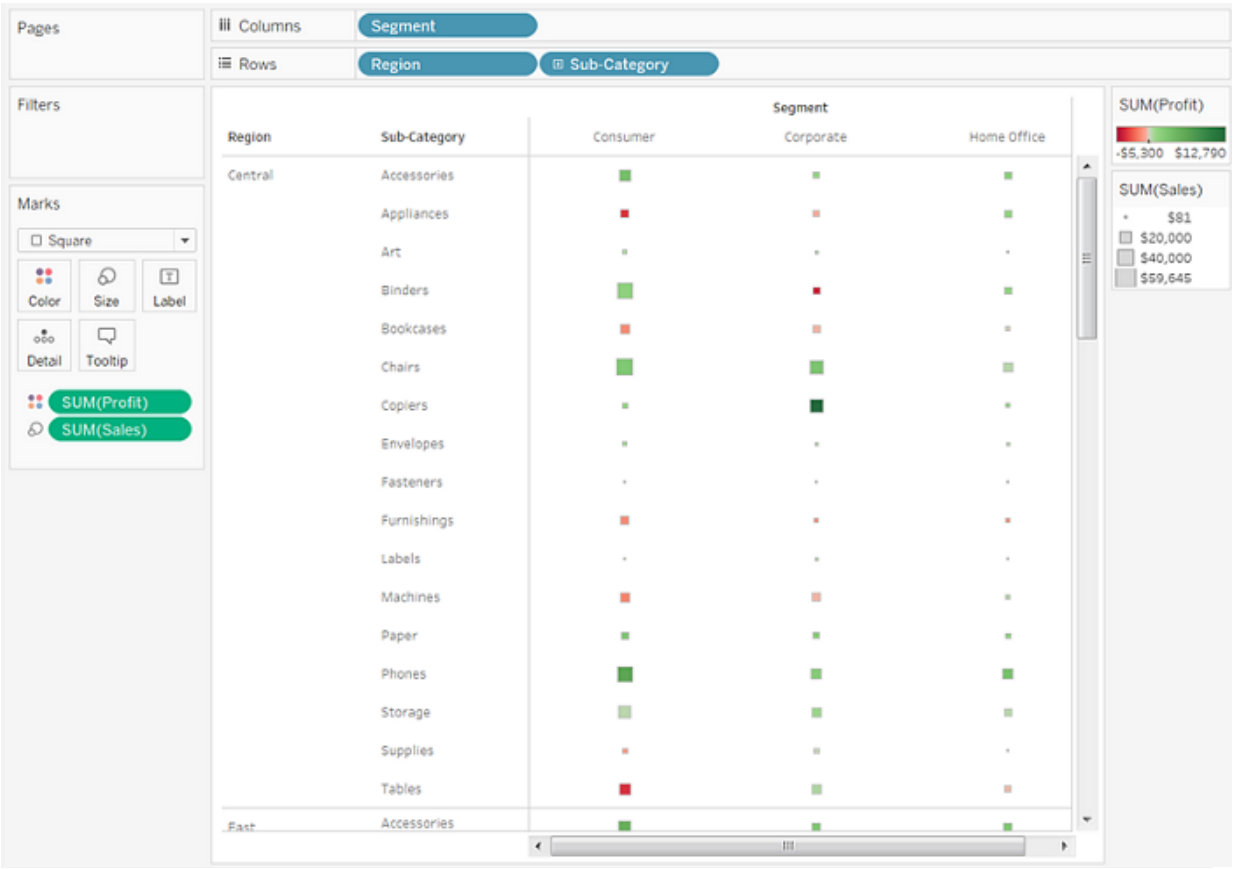
1. The default color palette is Orange-Blue Diverging. A Red-Green Diverging palette might be more appropriate for profit. To change the color palette and to make the colors more distinct, do the following:

- Hover over the **SUM(Profit)** color legend, then click the drop-down arrow that appears and select **Edit Colors**.
- In the **Edit Colors** dialog box, in the **Palette** field, select **Red-Green Diverging**from the drop-down list.
- Select the **Use Full Color Range** check box and click **Apply** and then click **OK**.

- When you select this option, Tableau assigns the starting number a full intensity and the ending number a full intensity. If the range is from -10 to 100, the color representing negative numbers changes in shade much more quickly than the color representing positive numbers.
- When you do not select **Use Full Color Range**, Tableau assigns the color intensity as if the range was from -100 to 100, so that the change in shade is the same on both sides of zero. The effect is to make the color contrasts in your view much more distinct.
- For more information about color options, see Color Palettes and Effects.

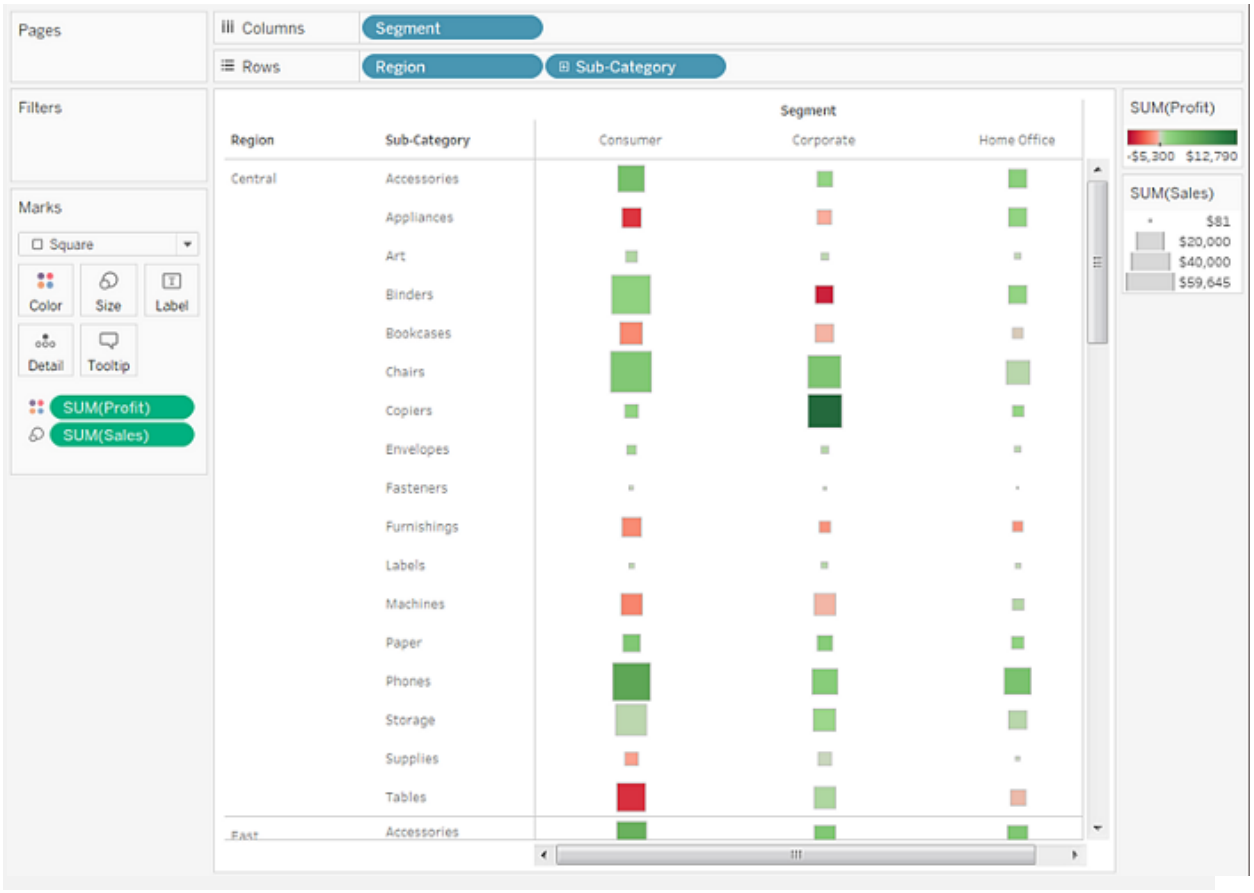
1. Drag the **Sales** measure to **Size** on the **Marks** card to control the size of the boxes by the Sales measure. You can compare absolute sales numbers (by size of the boxes) and profit (by color).

2. Initially, the marks look like this:

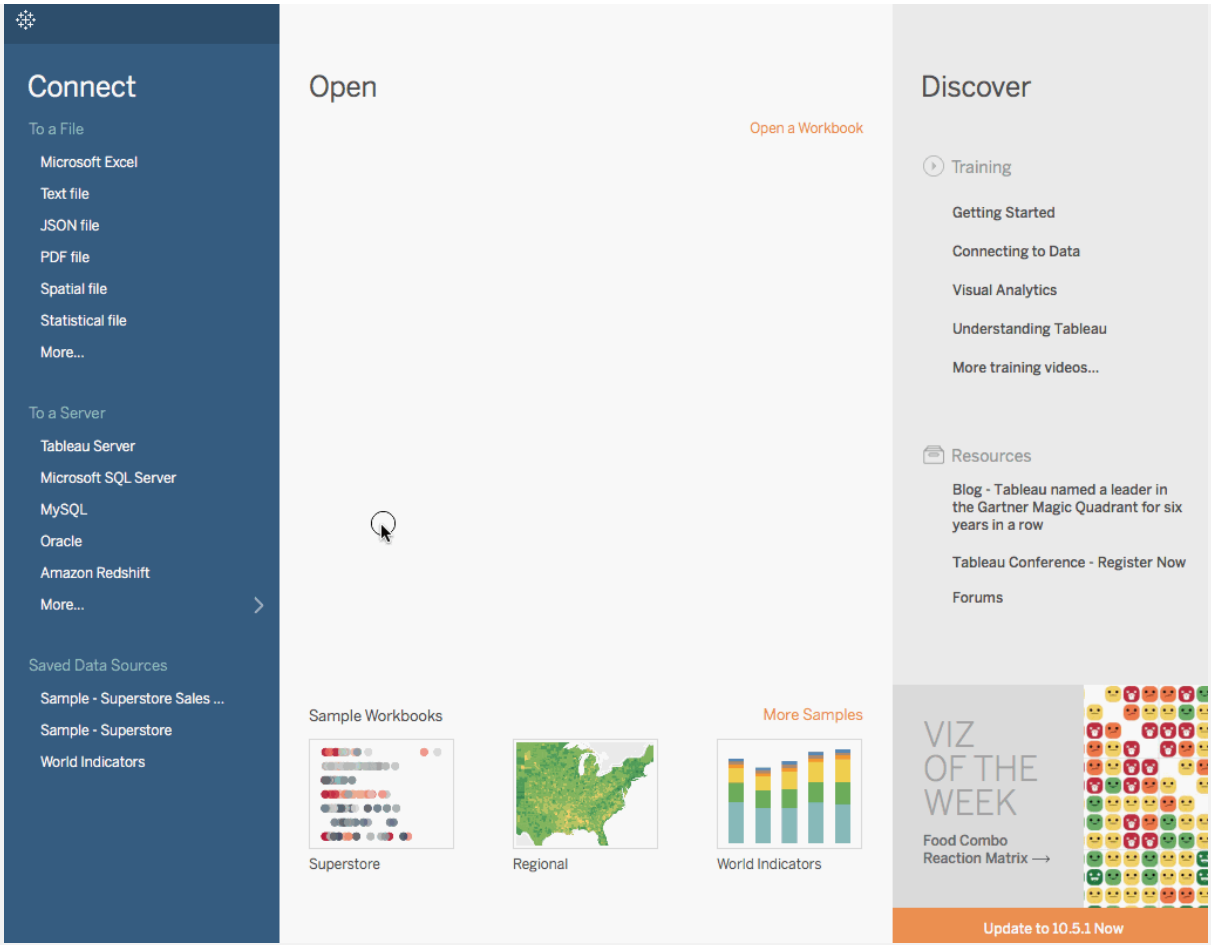


1. To enlarge the marks, click **Size** on the **Marks** card to display a size slider:

1. Drag the slider to the right until the boxes in the view are the optimal size. Now your view is complete:



Check your work! Watch steps 1–9 below:



- Create a chart to show specific values

Organize data and apply filters

You can create filters on a data source, thereby reducing the amount of data in the data source.

If you create an extract from a data source that already has data source filters in place, those filters are automatically recommended as extract filters, and will appear in the Extract dialog. Those recommended filters are not required to be part of the Extract filter list, and can safely be removed without affecting the existing set of data source filters.

Data source filters can be useful for restricting the data users can see when you publish a workbook or data source. When you publish a data source to Tableau Server, the data source and any associated files or extracts are transported in entirety to the Server. As you publish a data source you can define access permissions for downloading or modifying the data source, and you can also choose the users and groups who can remotely issue queries through Tableau Server against that data source. When users have query permission and no download permission, you can share a rich data model having calculated fields, aliases, groups, sets and more — but only for querying.

Furthermore, users who query published data source will never be able to see or modify any data source filters present on the originally published data source, but all of the users' queries will be subject to those data source filters. This is a great way to offer a restricted subset of your data, for example by filtering dimensions for specific users and groups, or by defining data source filters based on a fixed or relative date range. This is often useful for data security, and it also allows you to manage performance of the remote database which Tableau Server will ultimately query on a user's behalf. For systems that rely heavily on partitions or indexing, data source filters may yield tremendous control over the performance of queries issued by Tableau.

Create a data source filter

The primary way to create a data source filter is from the data source page.

To create a data source filter

1. On the data source page, click **Add** in the Filters section in the upper-right corner of the page.

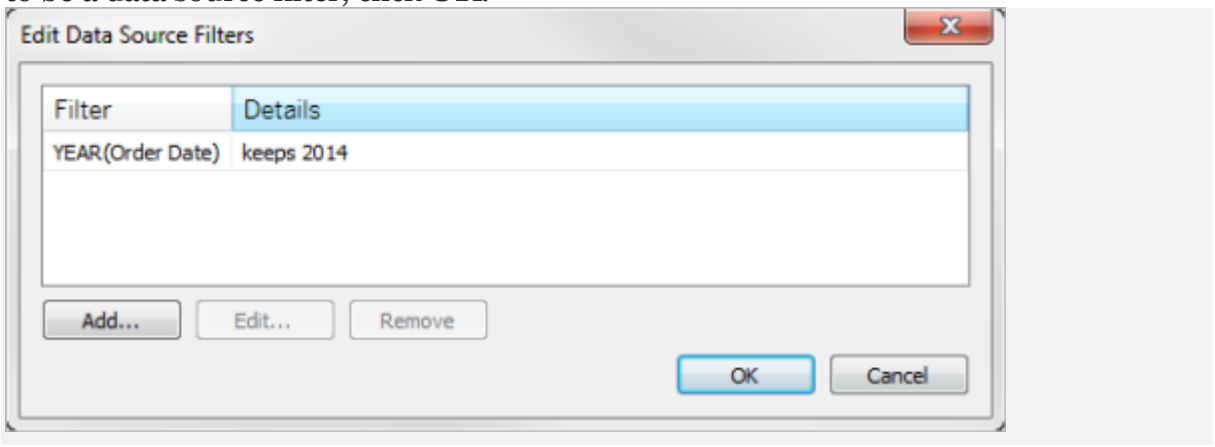
2. Click **Add** to open an Add Filter dialog box listing all fields in the data source.

3. Click to select a field to filter; then specify how the field should be filtered, just as you would for a field on the Filters shelf.

4. To add an additional data source filter, repeat this procedure.

Global filters and data source filters

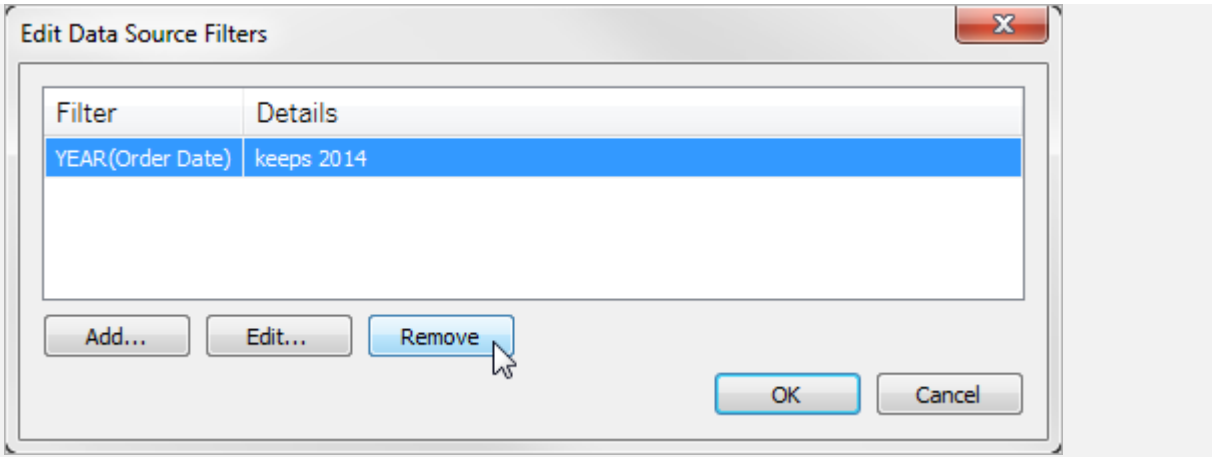
When you create a data source filter, any global filters that use that data source are displayed automatically in the **Edit Data Source Filters** dialog box to make it easy for you to promote a global filter to be a data source filter. To promote the global filter to be a data source filter, click **OK**.



If you promote a global filter to be a data source filter, that global filter will no longer be visible in worksheets of the workbook (because it becomes a data source filter).

Important: Be aware that you do not need to select a global filter in the **Edit Data Source Filters** dialog box to promote it. When you click **OK**, all global filters in the list will be promoted.

To prevent a global filter from being promoted to a data source filter, select the global filter in the **Edit Data Source Filters** dialog box, and then click **Remove**.



- **Create a visual group**

You can create a group to combine related members in a field. For example, if you are working with a view that shows average test scores by major, you might want to group certain majors together to create major categories. English and History might be combined into a group called Liberal Arts Majors, while Biology and Physics might be grouped as Science Majors.

Groups are useful for both correcting data errors (e.g., combining CA, Calif., and California into one data point) as well as answering "what if" type questions (e.g., "What if we combined the East and West regions?).

Create a group

There are multiple ways to create a group. You can create a group from a field in the **Data** pane, or by selecting data in the view and then clicking the group icon.

Create a group by selecting data in the view

1. In the view, select one or more data points and then, on the tooltip that appears, click the group icon .

2. **Note**: You can also select the group icon on the toolbar at the top of the workspace.

3. If there are multiple levels of detail in the view, you must select a level to group the members. You can select to group all dimensions, or just one.

Create a group from a field in the Data pane

1. In the **Data** pane, right-click a field and select **Create** > **Group**.

2. In the Create Group dialog box, select several members that you want to group, and then click **Group**.

The selected members are combined into a single group. A default name is created using the combined member names.

To rename the group, select it in the list and click **Rename**.

Tip: You can search for members using the **Find** option near the bottom-right of the dialog box. (Tableau Desktop only)

Include an Other Group

When you create groups in Tableau, you have the option to group all remaining, or non-grouped members in an Other group.

The Include Other option is useful for highlighting certain groups or comparing specific groups against everything else. For example, if have a view that shows sales versus profit product category, you might want to highlight the high and low

performing categories in the view, and group all the other categories into an “Other” group.

Includes OtherDoes not include Other

To include an Other group:

1. In the **Data** pane, right-click the group field and select **Edit Group**.
2. In the Edit Group dialog box, select **Include ‘Other’**.

Edit a Group

After you have created a grouped field, you can add and remove members from the groups, create new groups, change the default group names, and change the name of the grouped field. You can make some changes directly in the view, and others through the Edit Group dialog box.

To add members to an existing group:

- In the **Data** pane, right-click the group field, and then click **Edit Group**.
- In the Edit Group dialog box, select one or more members and drag them into the group you want.
- Clik **OK**.

To remove members from an existing group:

- In the **Data** pane, right-click the group field, and then click **Edit Group**.

- In the Edit Group dialog box, select one or more members, and then click **Ungroup**.
- The members are removed from the current group. If you have an Other group, the members are added to it.
- Click **OK**.

To create a new group in a group field:

- In the **Data** pane, right-click the group field, and then click **Edit Group**.
- In the Edit Group dialog box, select one or more members, and then click **Group**.
- Click **OK**.

Note: To rename a group, select the group in the Edit Group dialog box, and then click **Rename**.

- **Create a group using labels**
- **Create a set**

Create a dynamic set

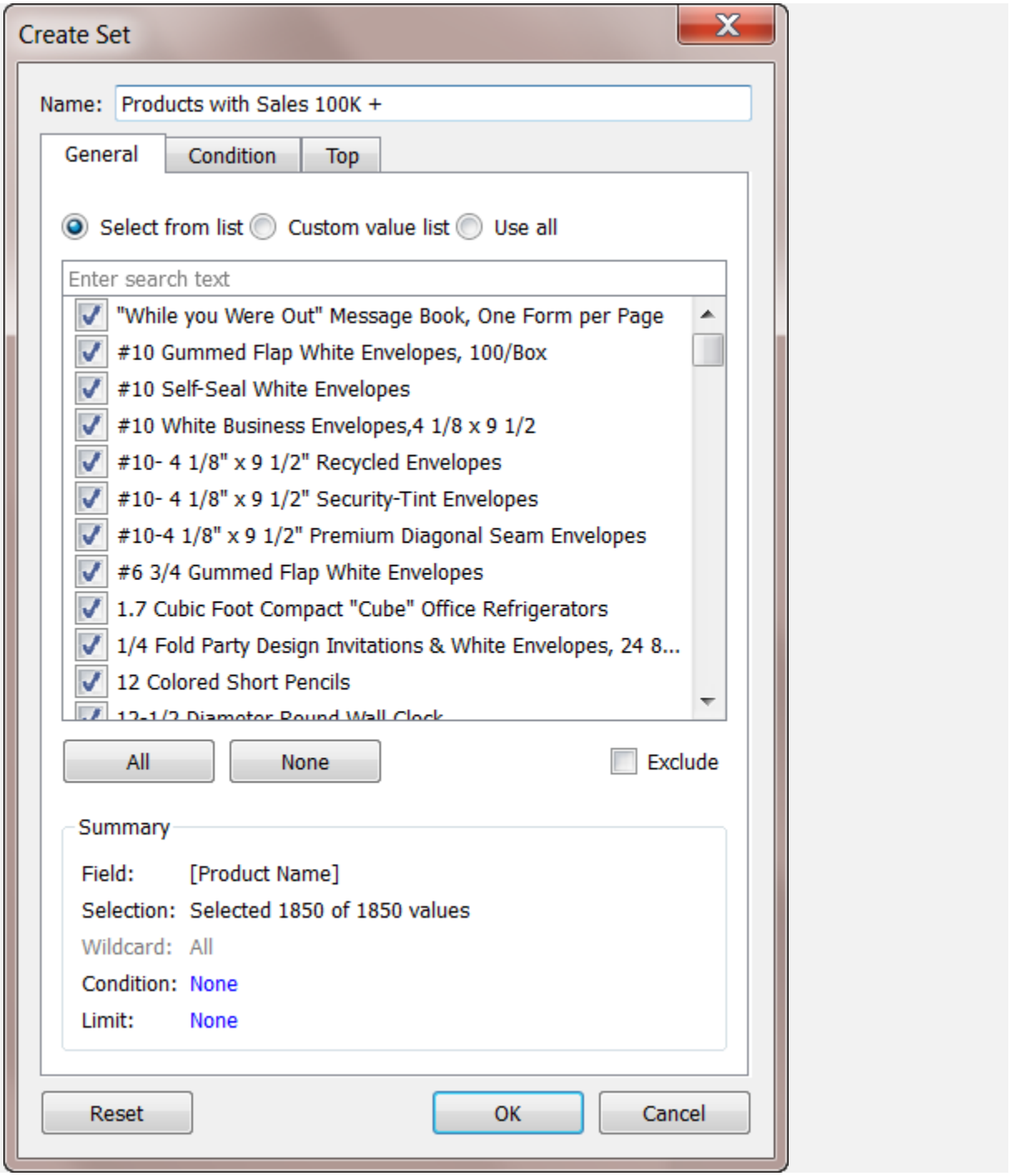
The members of a dynamic set change when the underlying data changes. Dynamic sets can only be based on a single dimension.

To create a dynamic set:

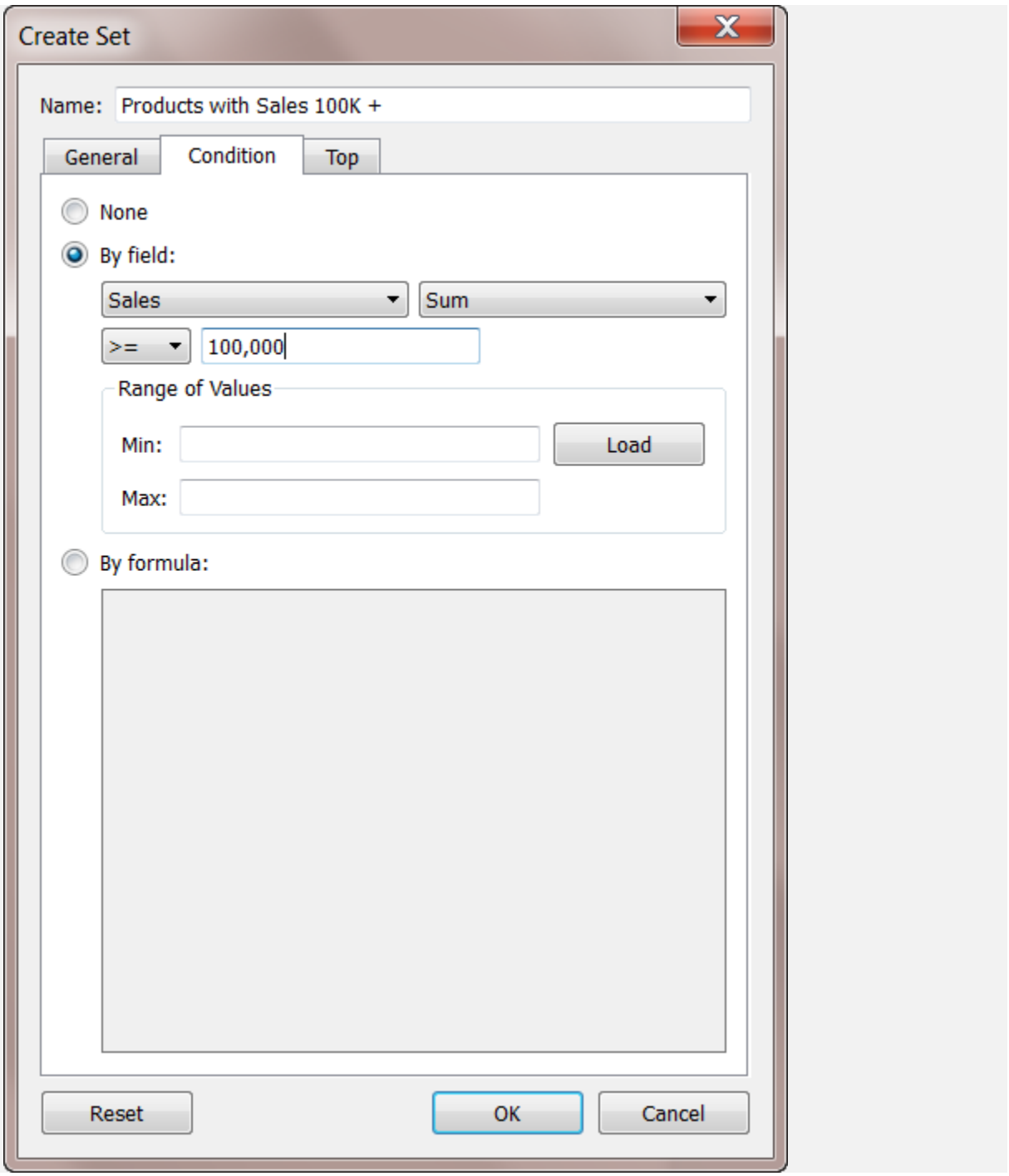
1. In the Data pane, under Dimensions, right-click a field and select **Create** > **Set**.

2. In the Create Set dialog box, configure your set. You can configure your set using the following tabs:

- **General**: Use the General tab to select one or more values that will be considered when computing the set.
- You can alternatively select the **Use all** option to always consider all members even when new members are added or removed.



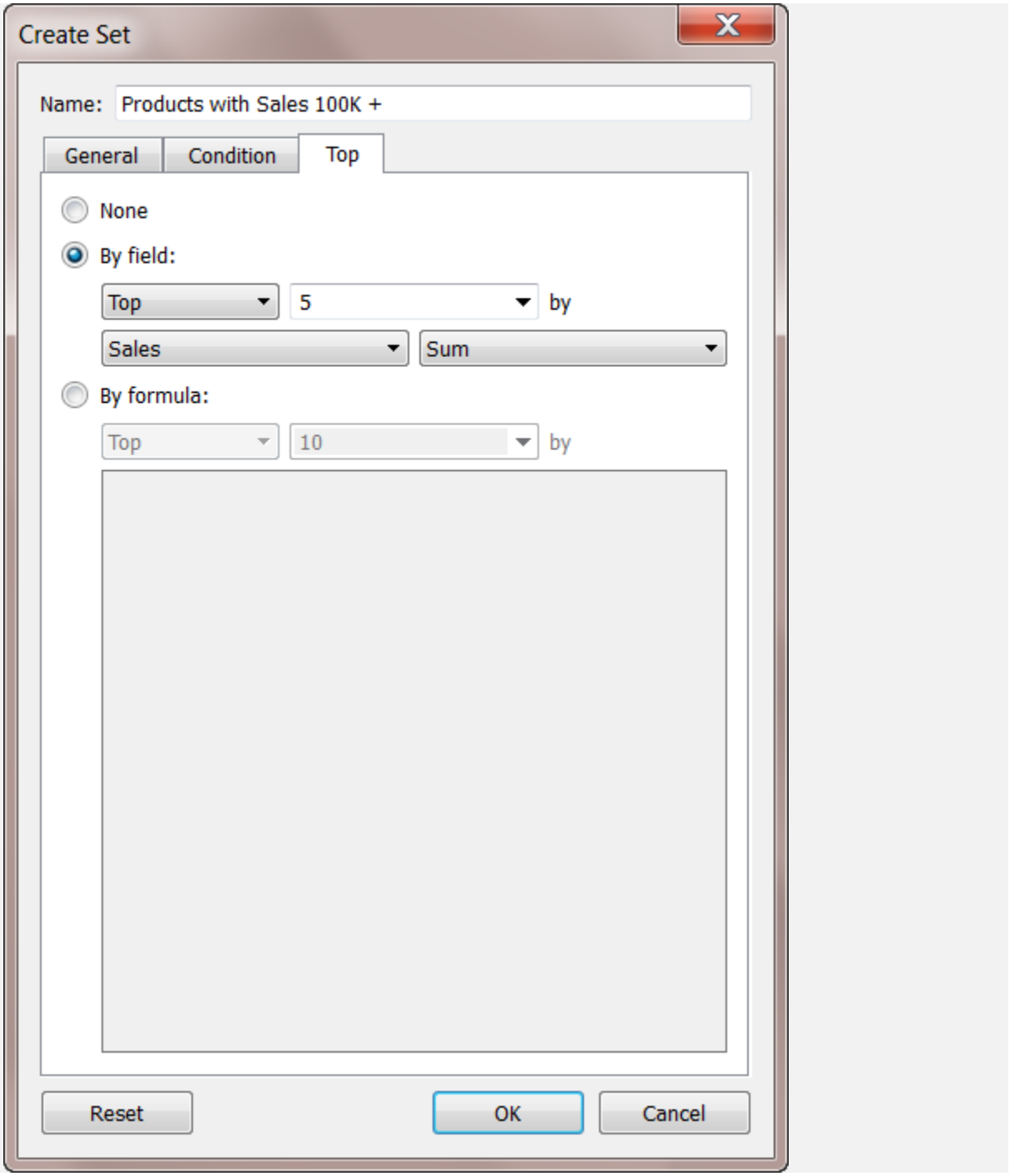
- **Condition**: Use the Condition tab to define rules that determine what members to include in the set.
- For example, you might specify a condition that is based on total sales that only includes products with sales over $100,000.



- **Note**: Set conditions work the same as filter conditions. See [Filter Data from Your Views] to learn more.

- **Top**: Use the Top tab to define limits on what members to include in the set.

- For example, you might specify a limit that is based on total sales that only includes the top 5 products based on their sales.

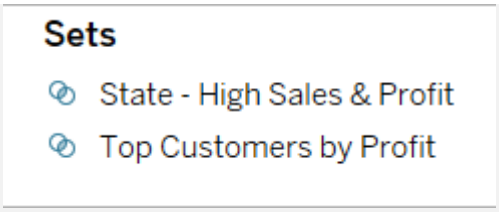


- **Note**: Set limits work the same as Filter limits. See Filter Data from Your Views to learn more.

1. When finished, click **OK**.

2. The new set is added to the bottom of the Data pane, under the Sets section. A set icon

1. indicates the field is a set.



Create a fixed set

The members of a fixed set do not change. A fixed set can be based on a single dimension or multiple dimensions.

To create a fixed set:

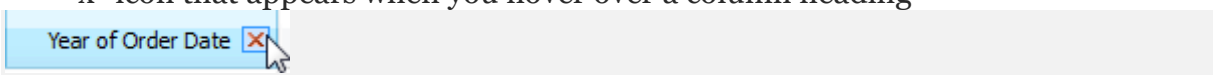
1. In the visualization, select one or more marks (or headers) in the view.
2. Right-click the mark(s) and select **Create Set**.

1. In the Create Set dialog box, type a name for the set.

2. Optionally complete any of the following:

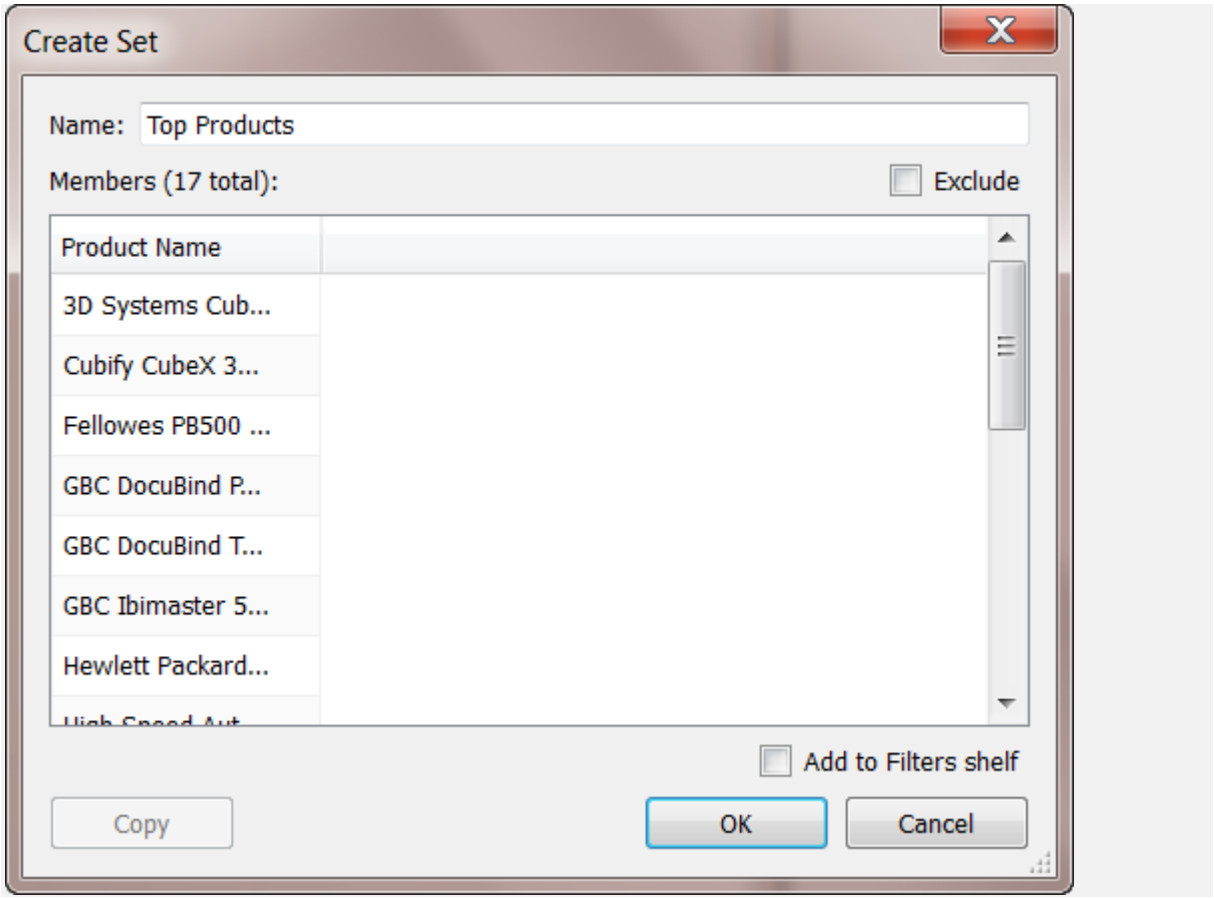
- By default, the set includes the members listed in the dialog box. You can select the option to **Exclude** these members instead. When you exclude, the set will include all of the members you didn't select.

- Remove any dimensions that you don't want to be considered by clicking the red "x" icon that appears when you hover over a column heading

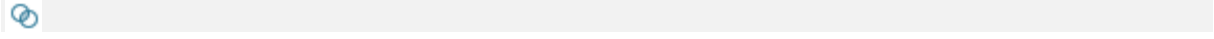


- Remove any specific rows that you don't want to include in the set by clicking the red "x" icon that appears when you hover over the row

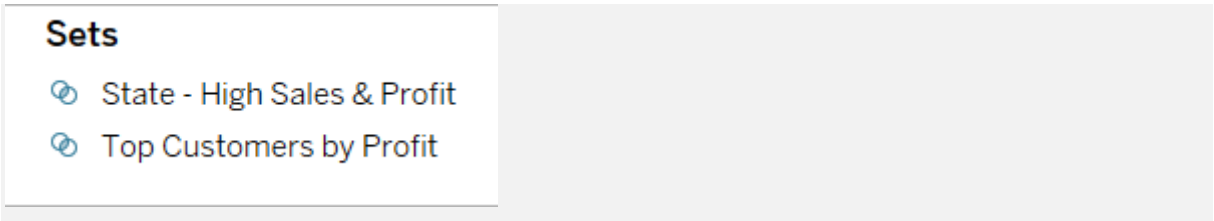
- If the marks you selected represent multiple dimensions, each member of the set will be a combination of those dimensions. You can specify the character that separates the dimension values. To do so, for **Separate members by**, enter a character of your choice.
- Select **Add to Filters shelf** to automatically move the set to the Filters shelf once it is created.



1. When finished, click **OK**.
2. The new set is added to the bottom of the Data pane, under the Sets section. A set icon



1. indicates the field is a set.

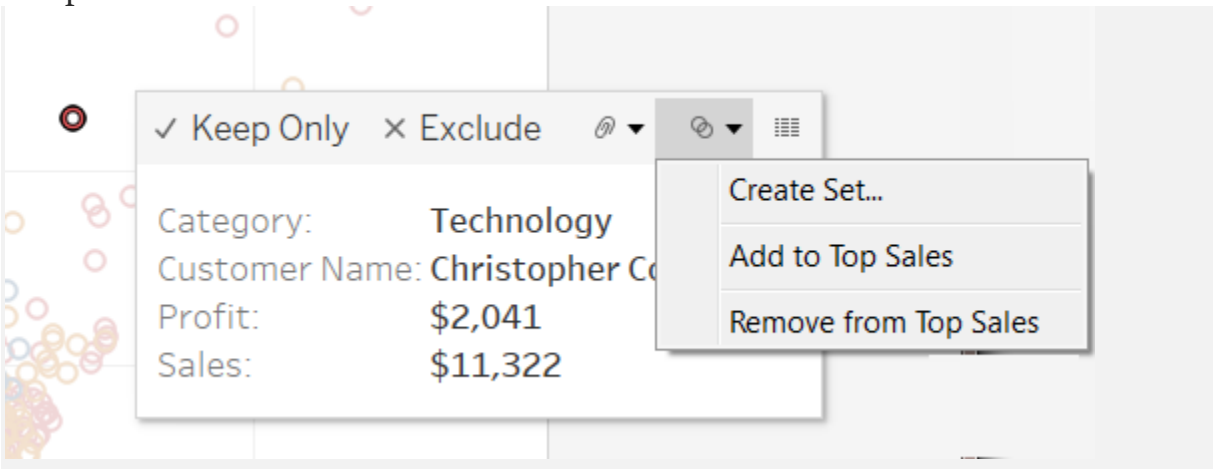


Add or remove data points from sets

If you created a set using specific data points, you can add more data to or subtract data from the set.

To add or remove data points from a set:

1. In the visualization, select the data points you want to add or remove.
2. In the tooltip that appears, click the Sets drop-down icon, and then click **Add to [set name]** or **Remove from [set name]** to add or remove data from a particular set.



Use sets in the visualization

After you create a set, it displays at the bottom of the Data pane in the Sets section. You can drag it into the viz like any other field.

When you drag a set to the viz in Tableau Desktop, you can choose to show the members of the set or aggregate the members into In/Out categories.

In Tableau Server or Tableau Online you can only aggregate the members of the set into In/Out categories.

Show In/Out members in a set

In most cases, when you drag a set to the viz, Tableau displays the set using the In/Out mode. This mode separates the set into two categories:

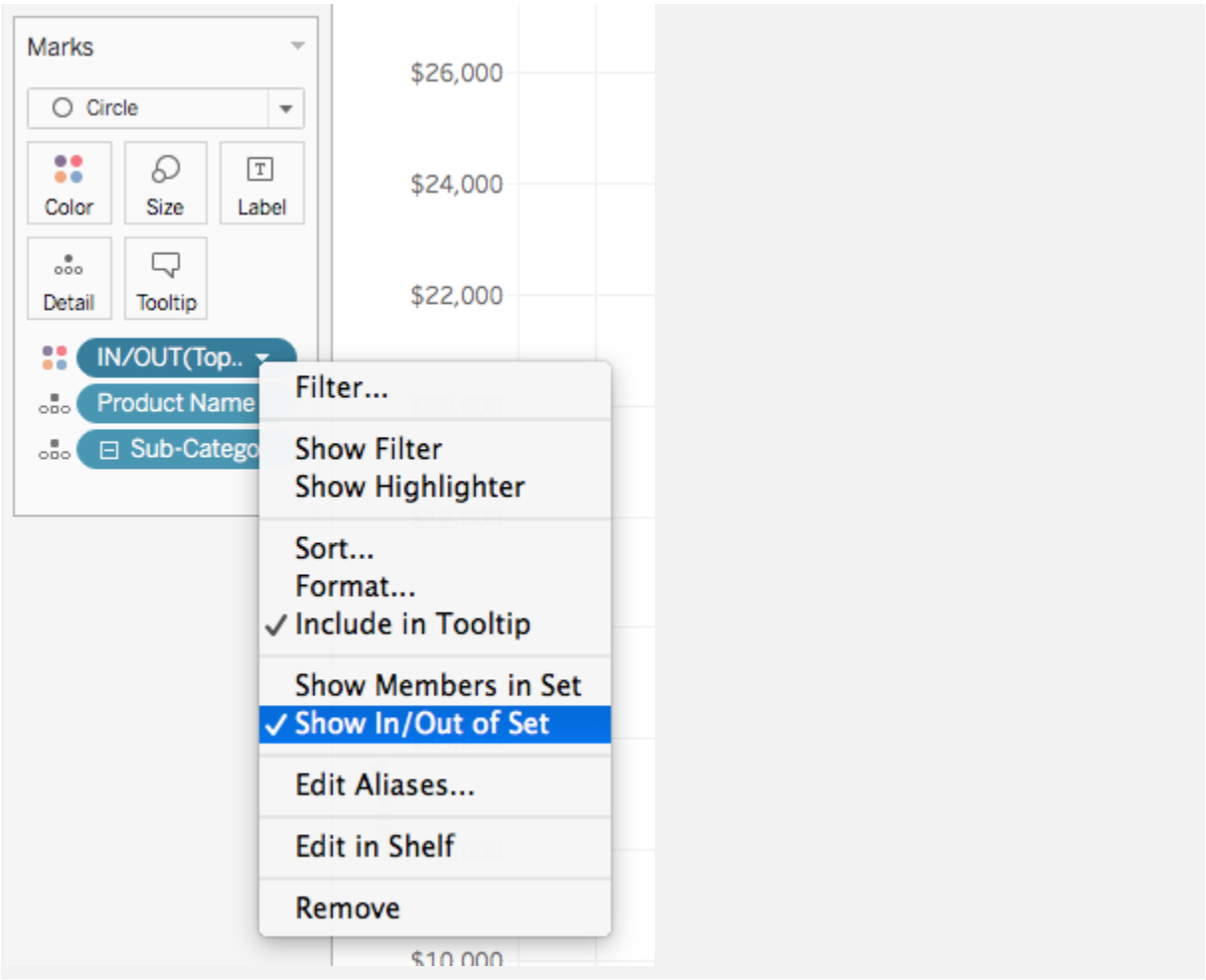
- In — The members in the set.
- Out — Any members that are not part of the set.

For example, in a set defined for the top 25 customers, the top customers would be part of the In category and all other customers would be part of the Out category.

Using the In/Out mode makes it easy to compare the members in the set to everything else.

To show In/Out members in the visualization:

- In Tableau Desktop, right-click the set in the visualization workspace and select **Show In/Out of Set**.



When a set is in In/Out mode, the field on the shelf is prefaced by the text, “IN/OUT” followed by the set name.

Note: In/Out mode is not available in workbooks created before version 8.2 that use Microsoft Excel or text file data sources, workbooks that use the legacy connection, or workbooks that use Microsoft Access data sources.

Show members in a set

As an alternative to showing the set using In/Out mode, you can list the members in the set. Showing the members in the set automatically adds a filter to the view that includes only the members of the set.

To switch a set to list the individual members:

- In the visualization workspace, right-click the set and select **Show Members in Set**.

Note: To display the fully qualified member names for cubes, right-click the set in the Data pane and select **Qualify Member Names**.

Let users change set values

You can use set actions to give your audience more control over their analysis of your visualization.

Set actions take an existing set and update the values contained in that set based on a user's action in the viz. As the author, you can use a set or sets that you have already created to define the scope of the set action.

For details on how to create and use set actions, see Set Actions.

Combine sets

You can combine two sets to compare the members. When you combine sets you create a new set containing either the combination of all members, just the members that exist in both, or members that exist in one set but not the other.

Combining sets allows you to answer complex questions and compare cohorts of your data. For example, to determine the percentage of customers who purchased both last year and this year, you can combine two sets containing the customers from each year and return only the customers that exist in both sets.

To combine two sets, they must be based on the same dimensions. That is, you can combine a set containing the top customers with another set containing the customers that purchased last year. However, you cannot combine the top customers set with a top products set.

To combine sets:

1. In the Data pane, under Sets, select the two sets you want to combine.
2. Right-click the sets and select **Create Combined Set**.
3. In the Create Set dialog box, do the following

- Type a name for the new combined set.
- Verify that the two sets you want to combine are selected in the two drop-down menus.
- Select one of the following options for how to combine the sets:
- **All Members in Both Sets** — the combined set will contain all of the members from both sets.
- **Shared Members in Both Sets** — the combined set will only contain members that exist in both sets.
- **Except Shared Members** — the combined set will contain all members from the specified set that don't exist in the second set. These options are equivalent to subtracting one set from another. For example, if the first set contains Apples, Oranges, and Pears and the second set contains Pears and Nuts; combining the first set except the shared members would contain just Apples and Oranges. Pears is removed because it exists in the second set.

- Optionally specify a character that will separate the members if the sets represent multiple dimensions.

1. When finished, click **OK**.

Examples of sets

There are many ways you can use sets to answer complex questions and compare cohorts of data. Below are some examples of ways you can use sets to define and compare subsets of data.

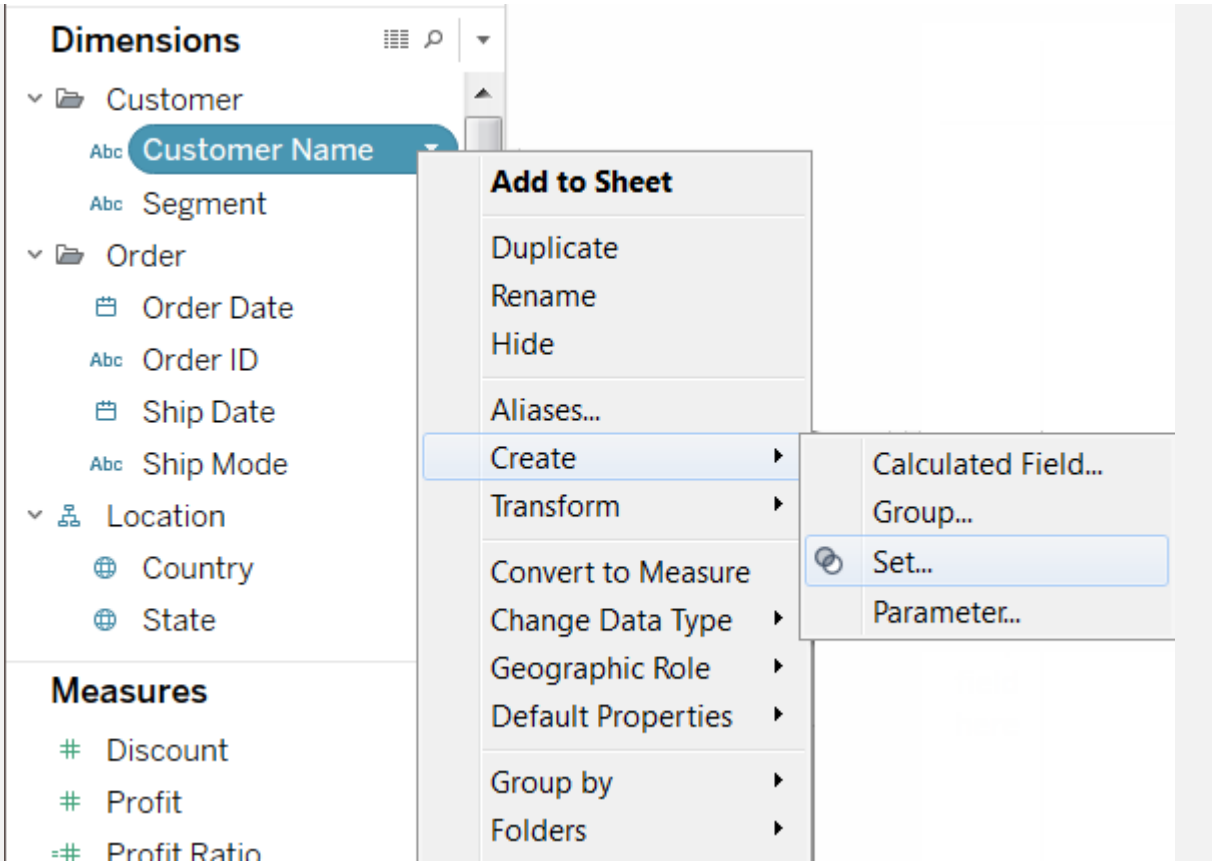
How do members of a set contribute to the total?

You may have all kinds of questions surrounding how the members in a set contribute to the overall total. For example, what percent of total sales come from repeat customers? You can answer these types of questions using the IN/OUT mode for a set.

The example below uses sales data to create a set for customers who have purchased 5,000 USD or more in products.

Create the set

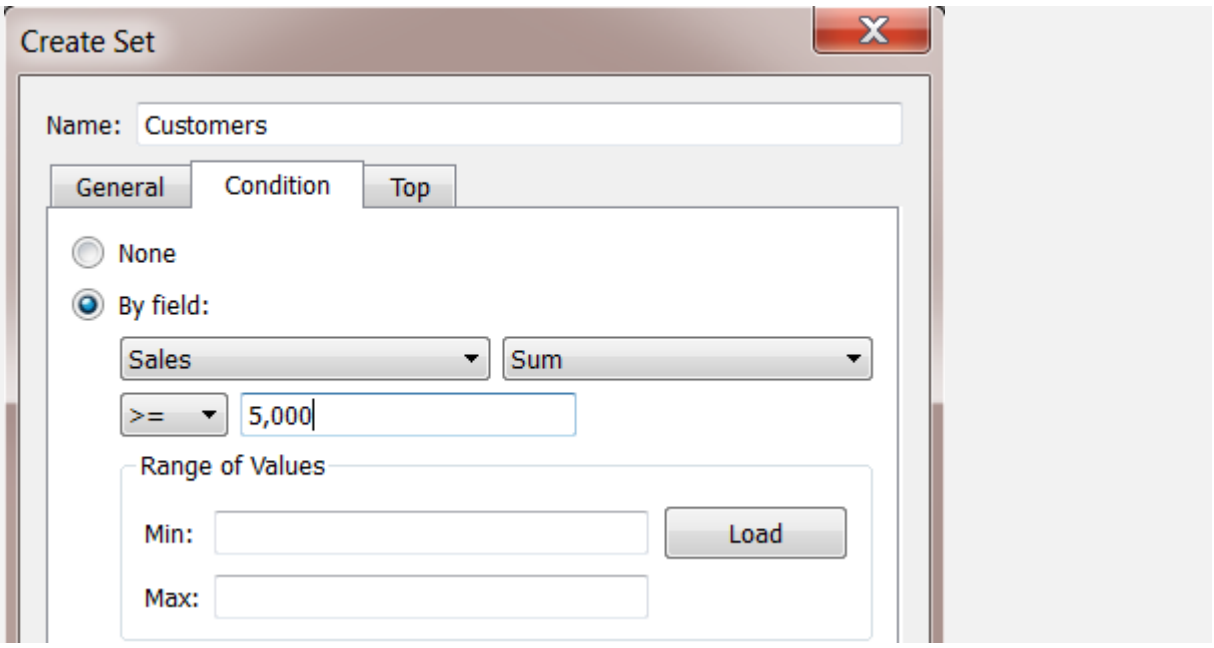
1. Right-click (control-click on Mac) the **Customer Name** dimension in the Data pane and select **Create** > **Set**.



1. In the Create Set dialog box, type a name for the set. In this example, we'll call the set, "Customers"

2. Select the **Use all** option so the condition always applies to all values even when new customers are added.

3. On the Condition tab, click **By field**, and then define a condition that only includes customers when **Sum** of **Sales** is greater than or equal to **5,000**.

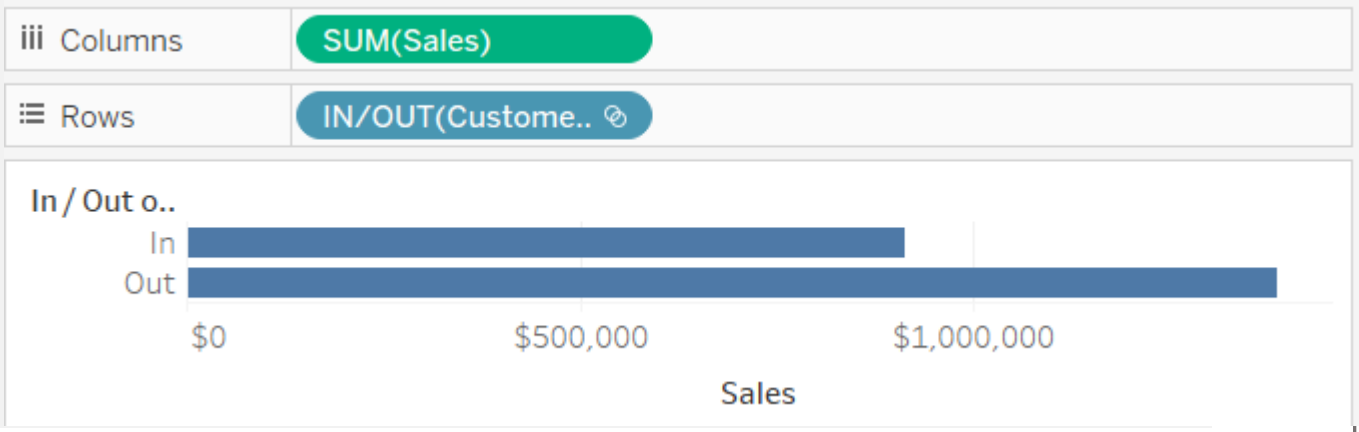


1. Click **OK**.

Create the visualization

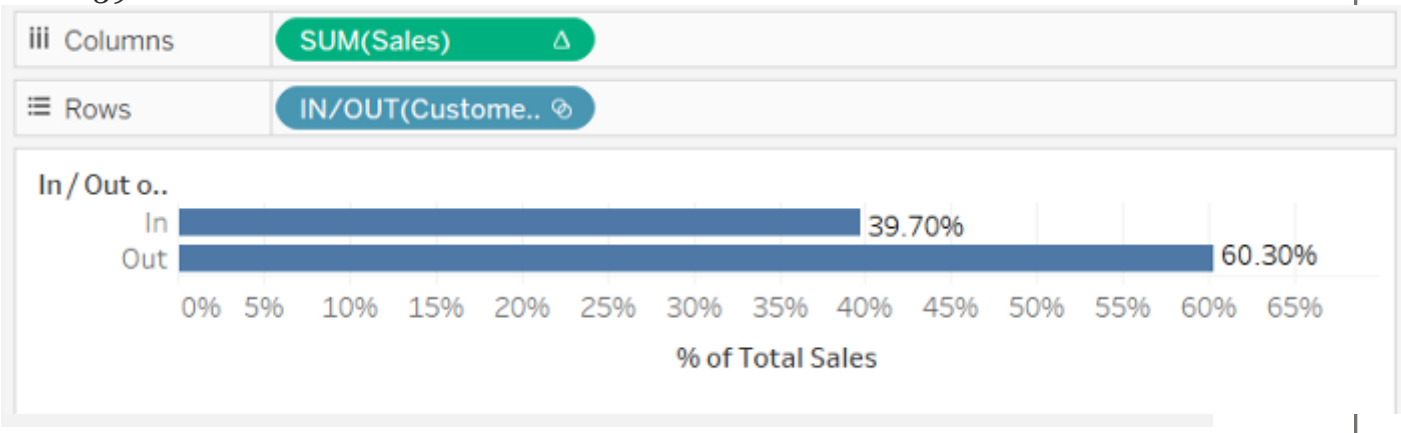
1. Drag the new set from the **Sets** area at the bottom of the **Data** pane to the **Rows** shelf.

2. From Measures, drag **Sales** to the **Columns** shelf. The view now shows the total sales for customers who have purchased more than 5,000 USD of product and the total sales for all other customers.



1. Finally, click on the drop-down arrow on the **Sum (Sales)** field on the Column shelf and select **Quick Table Calculation** > **Percent of Total** on the context menu.

The view now shows that customers with sales greater than or equal to 5,000 make up about 39% of the overall sales.



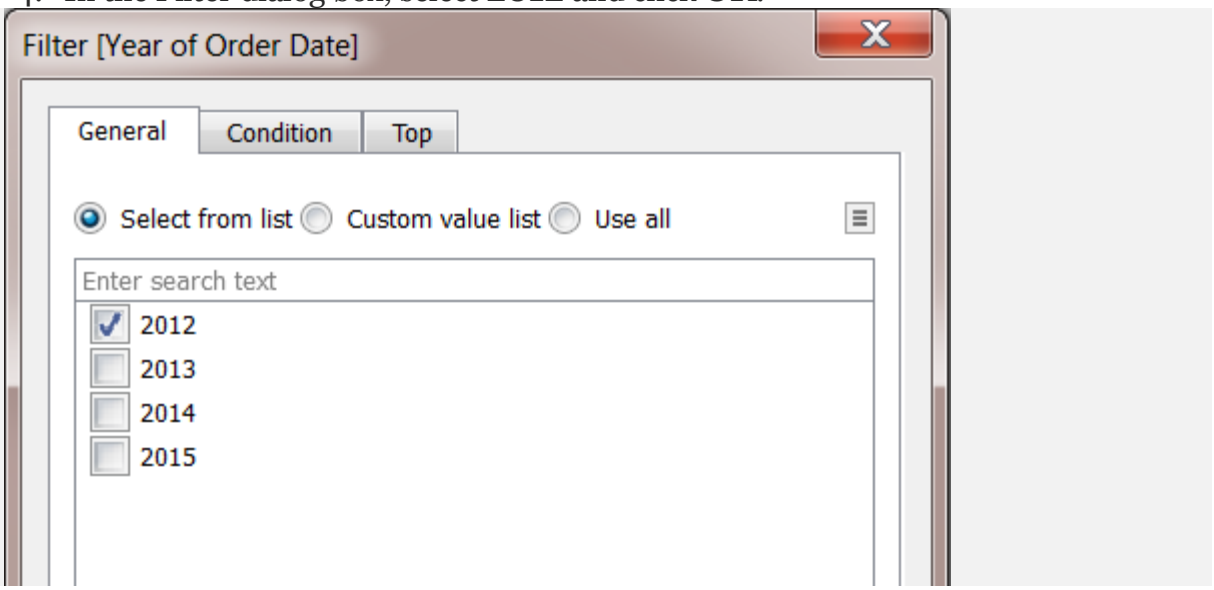
How many members of a set exist in another set?

Another common use of sets is to compare subsets of data or cohorts. For example, you may wonder how many customers that purchased last year also purchased this year. Or if a customer purchased a specific product, what other products did they buy? You can answer these types of questions by creating multiple sets and combining them. The example below uses sales data to determine how many customers who purchased in 2012 also purchased in 2013.

Create a combined set

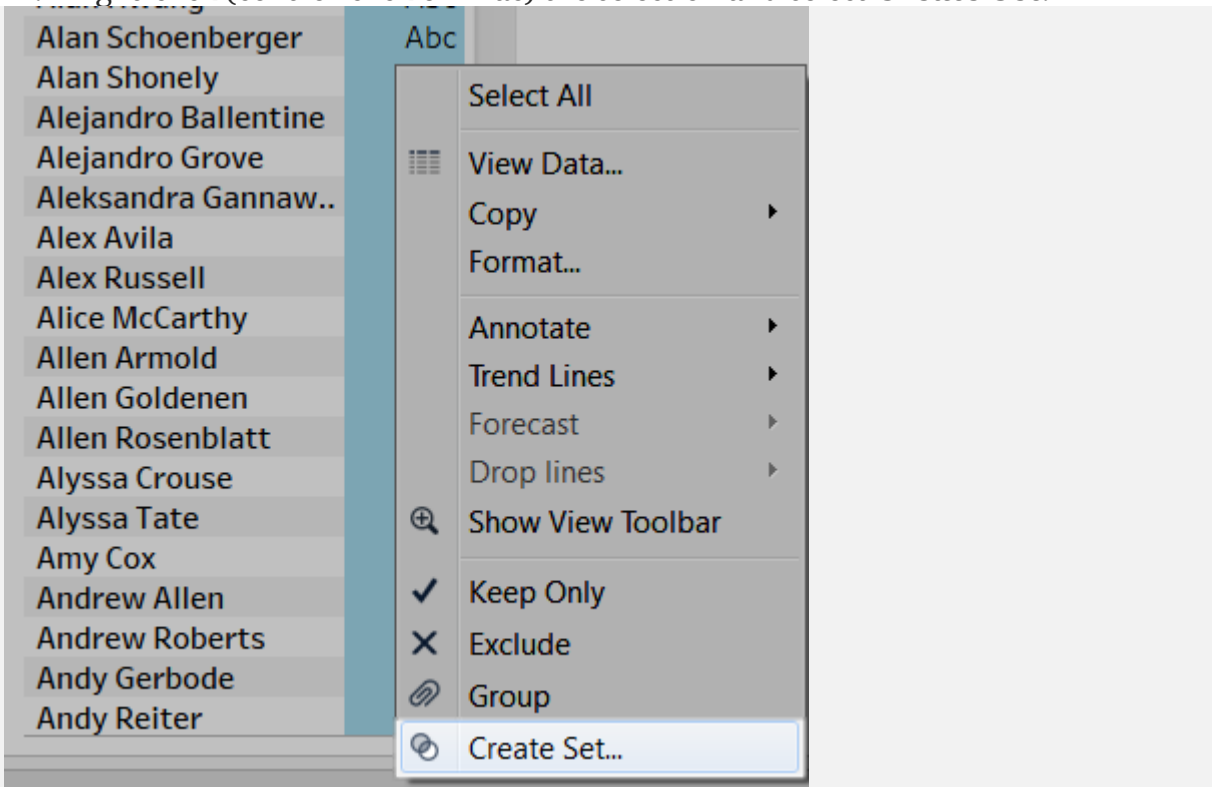
1. Drag the **Customer Name** field to the Rows shelf.
2. Drag the **Order Date** field to the Filters shelf.
3. In the Filter Field dialog box, select **Years** and click **Next**.

4. In the Filter dialog box, select **2012** and click **OK**.



1. Back in the view, press CTRL + A (Command-A on a Mac) on your keyboard to select all of the customers.

2. Right-click (control-click on Mac) the selection and select **Create Set**.

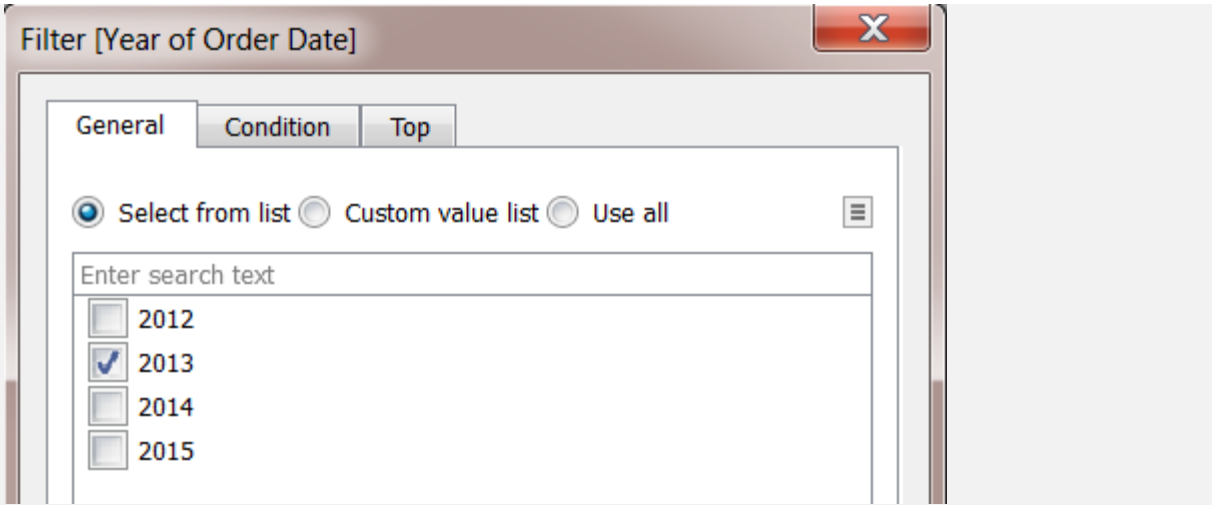


1. In the Create Set dialog box that opens, type a name for the set. In this example, we'll call the set "Customers (2012)".

2. Click **OK**.

3. On the **Filters** shelf, right-click (control-click on Mac) **Order Date** and select **Edit Filter**.

4. In the Filter dialog box, change the filter to only include **2013** instead of **2012**, and then click **OK**.



1. Again, press CTRL + A (Command-A on a Mac) on your keyboard to select all of the customers.

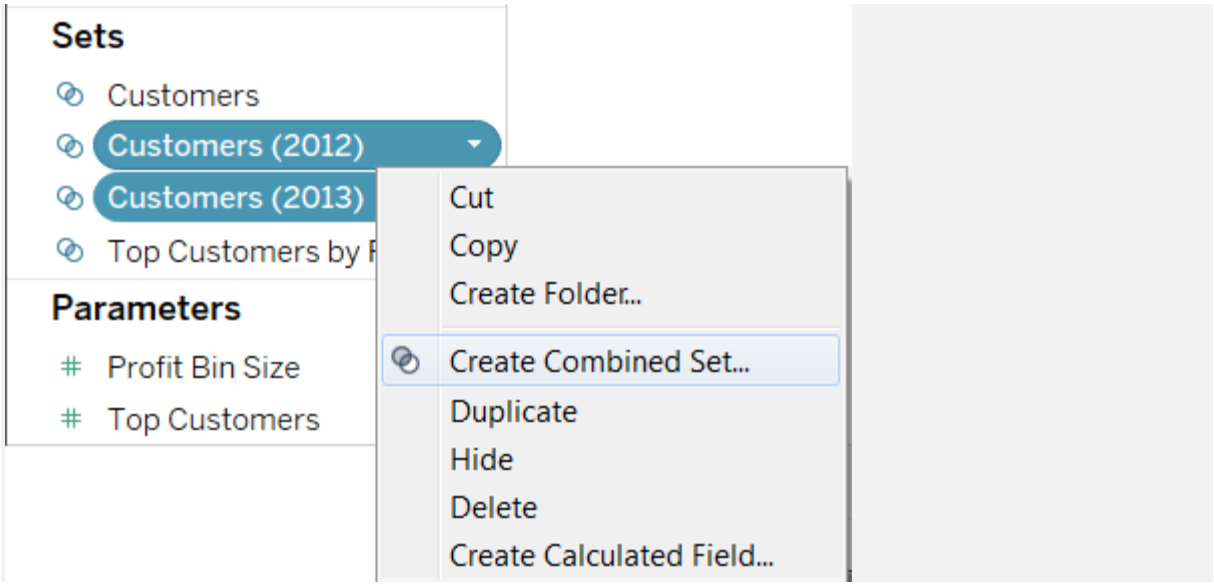
2. In the view, right-click (control-click on Mac) the selection and select **Create Set**.

3. In the Create set dialog box that opens, type a name for the set. This set will be called "Customers (2013)".

4. Click **OK**.

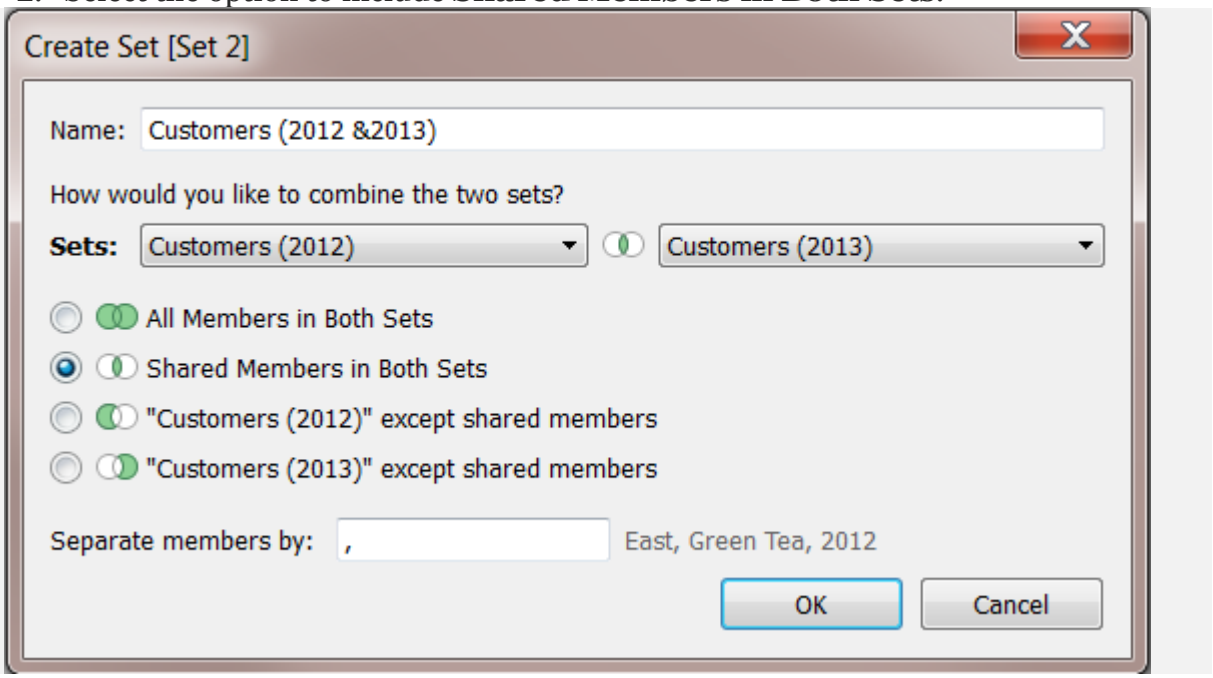
5. In the **Data** pane, select both the **Customers 2012** and **Customers 2013** by holding the Ctrl key (Command key on a Mac) on your keyboard as you select.

6. Right-click (control-click on Mac) the selection and select **Create Combined Set**.



1. In the Create Set dialog box, type a name for the new set. In this example, we'll call the set "Customers (

2. Select the option to include **Shared Members in Both Sets**.



1. Click **OK**.

Create the visualization

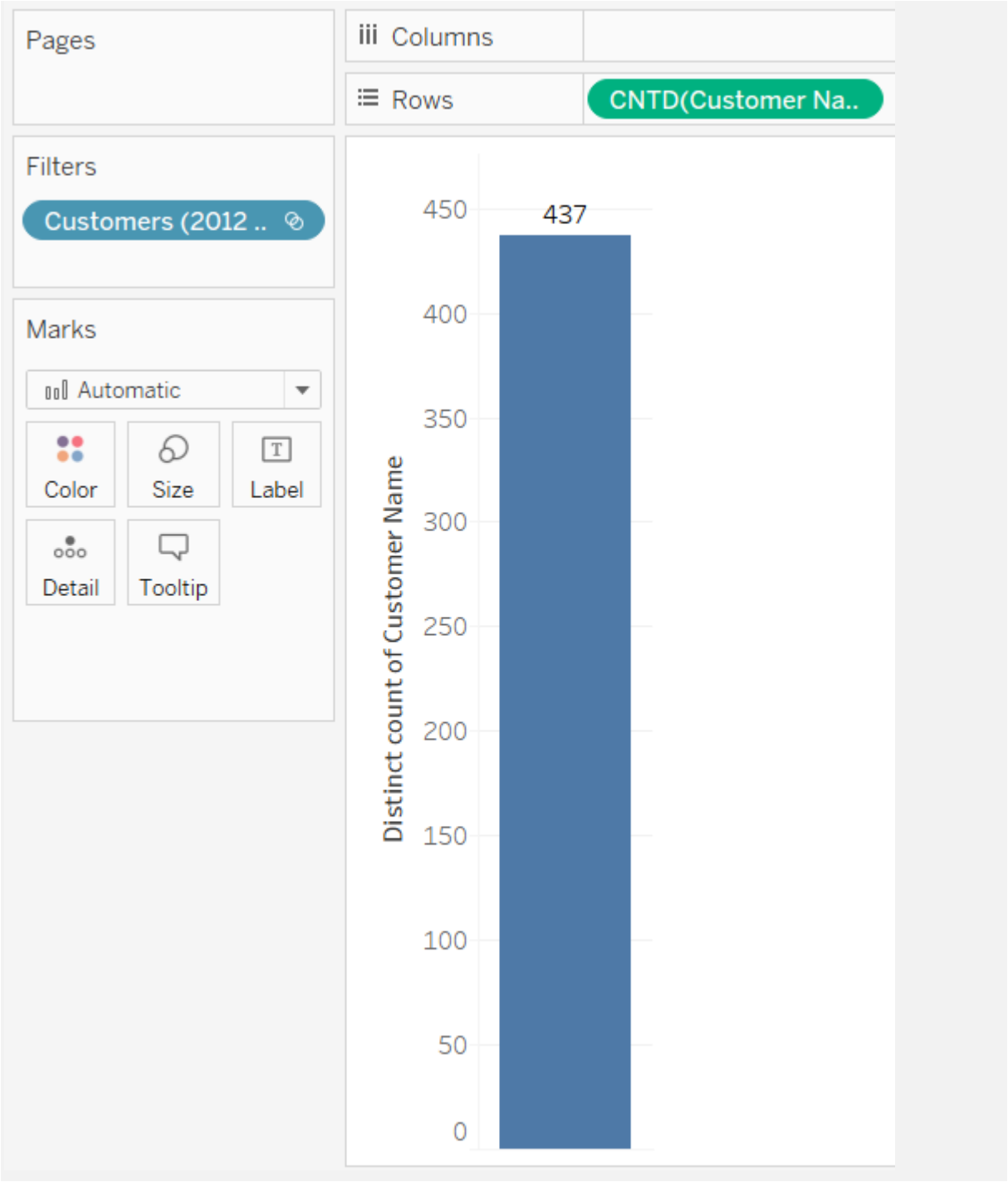
1. At the bottom of the workbook, click the New Worksheet

1. icon.

2. In the new worksheet, drag the **Customer Name** dimension to the **Rows** shelf.

3. Click the drop-down arrow on the Customer Name field on the Rows shelf and select **Measure** > **Count (Distinct)** from the context menu.

4. Finally, from the **Sets** area of the **Data** pane, drag the **Customers (2012 & 2013)** field to the **Filters** shelf. You can see that 437 customers purchased products in both 2012 and 2013.

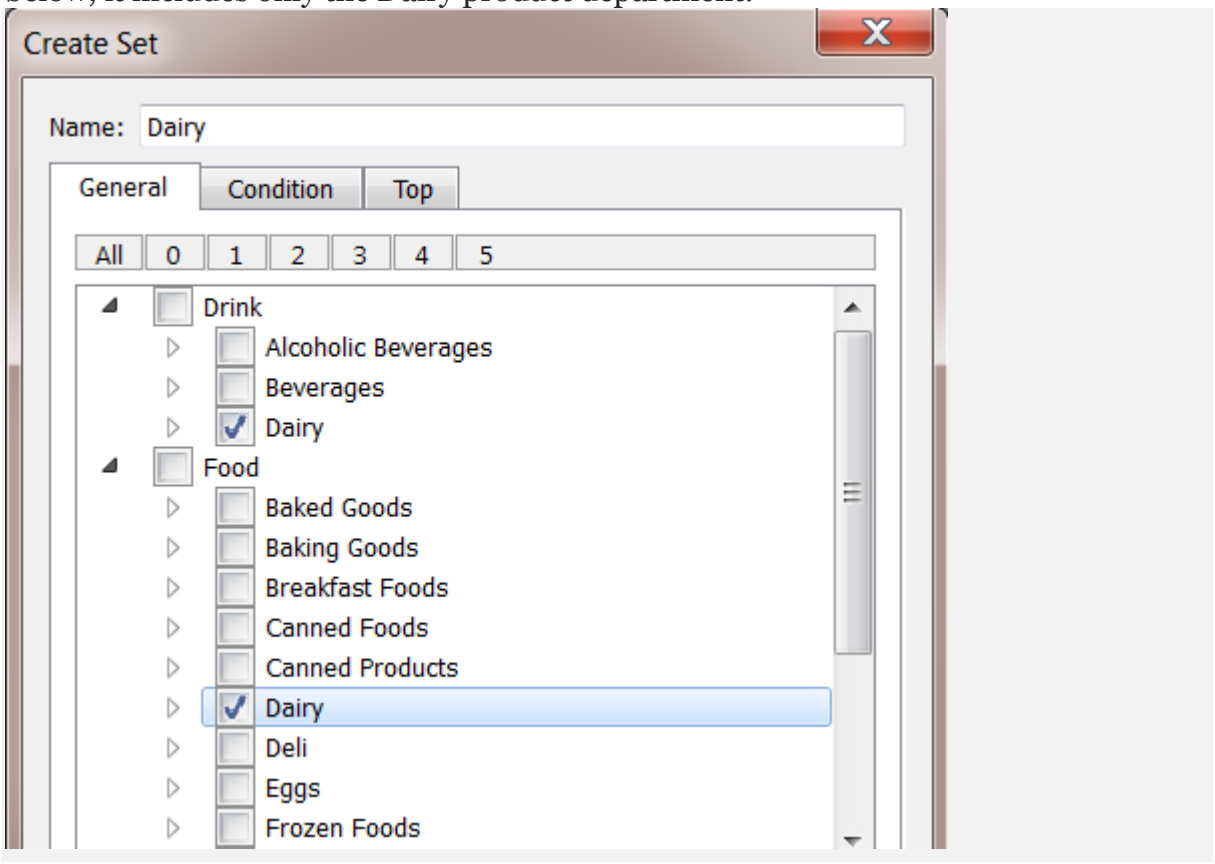


Hierarchical sets and descendants

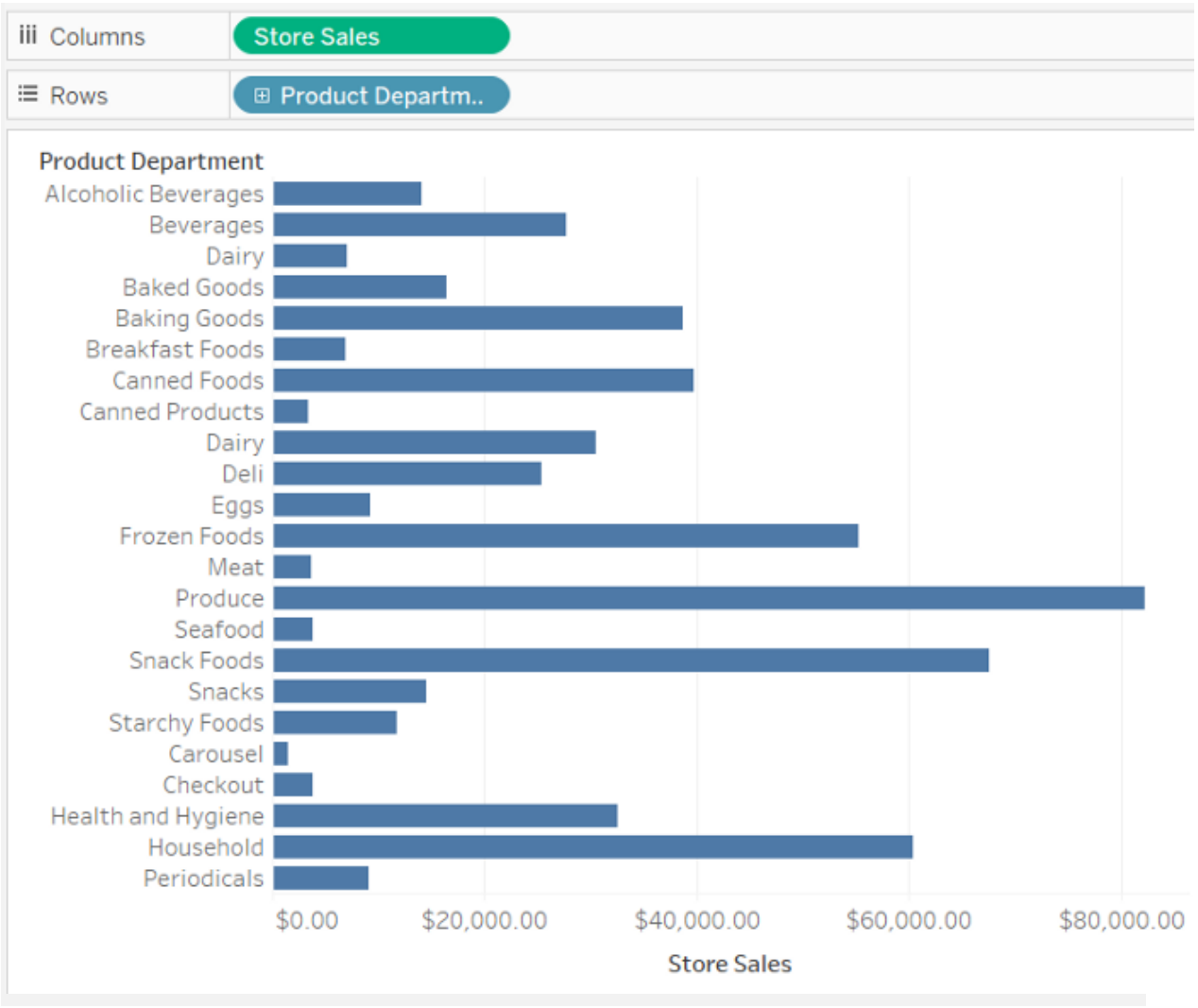
A hierarchical set filters data to the selected members and all of their descendants. They are unique to multidimensional (cube) data sources and are defined within the data source prior to connecting to Tableau Desktop.

When you create sets in Tableau from a cube data source, descendants and any hierarchical structures are automatically included with the selected members.

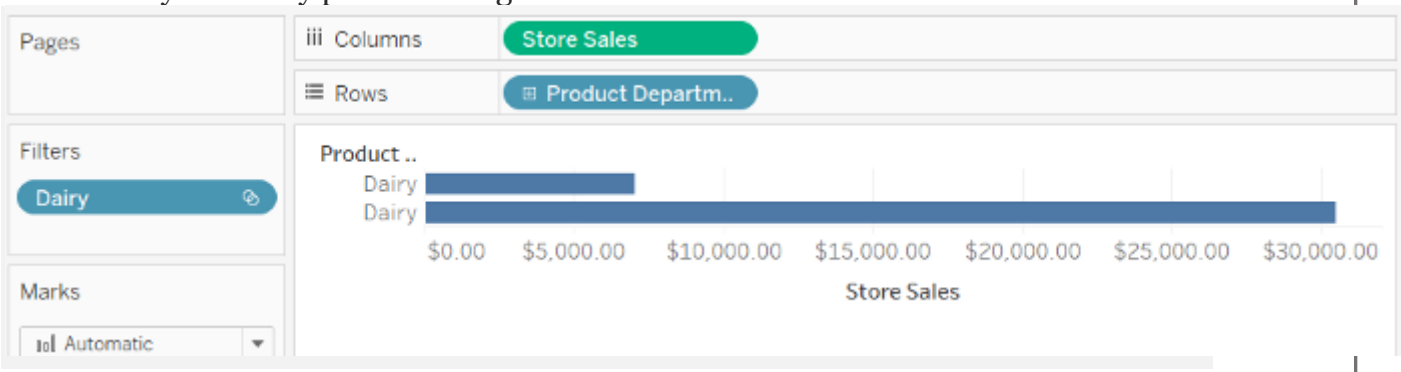
For example, a set named **Dairy** is created from the **Product** hierarchy. As shown below, it includes only the Dairy product department.



Consider the following view. The **Product Department** dimension is placed on the **Rows** shelf and the **Store Sales** measure is placed on the **Columns** shelf.

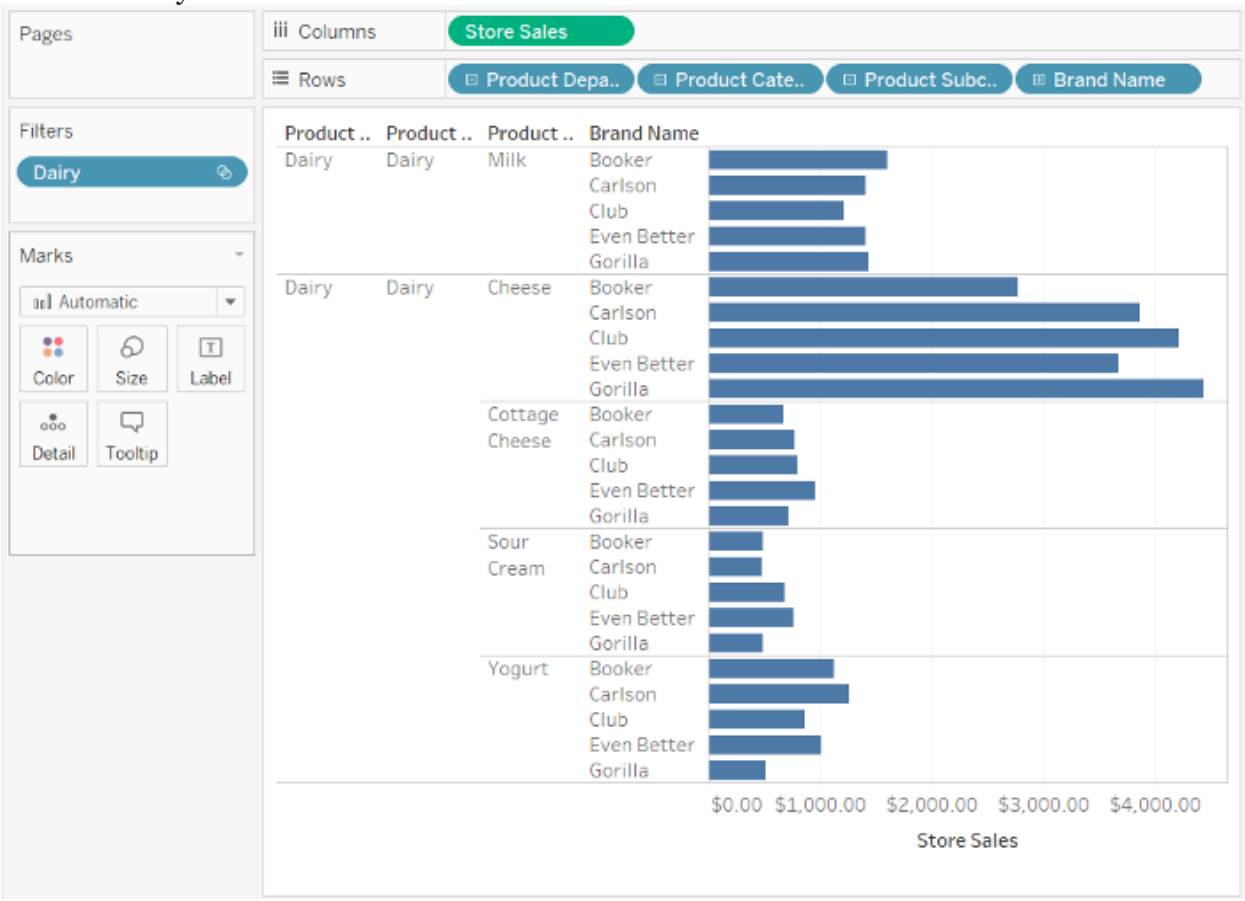


If you place the **Dairy** set on the **Filters** shelf, you can see that the view is filtered to include only the Dairy product categories.



As shown below, you can drill down into **Product Department** to reveal the **Product Category**, **Product Subcategory**, and **Brand Name** levels. As these

descendants are revealed, row headers are added to the view. This is because a set filter allows you to view the levels of detail contained within the filtered members.



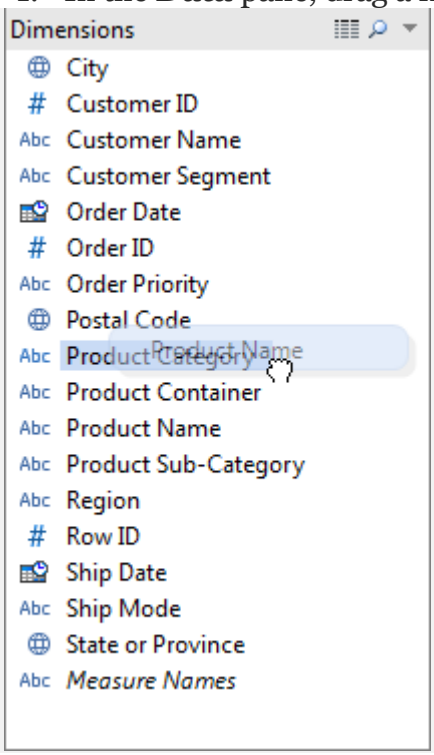
- **Organize dimensions into a hierarchy**

When you connect to a data source, Tableau automatically separates date fields into hierarchies so you can easily break down the viz. You can also create your own custom hierarchies. For example, if you have a set of fields named Region, State, and County, you can create a hierarchy from these fields so that you can quickly drill down between levels in the viz.

Create a hierarchy

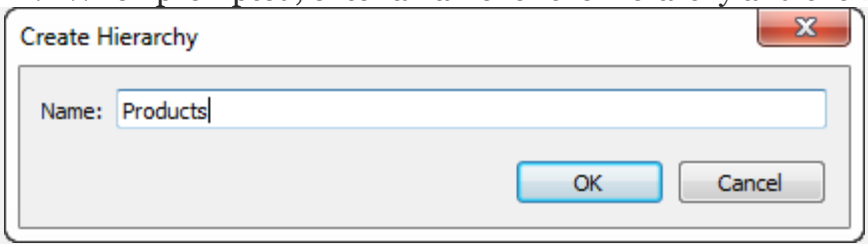
To create a hierarchy:

1. In the **Data** pane, drag a field and drop it directly on top of another field.

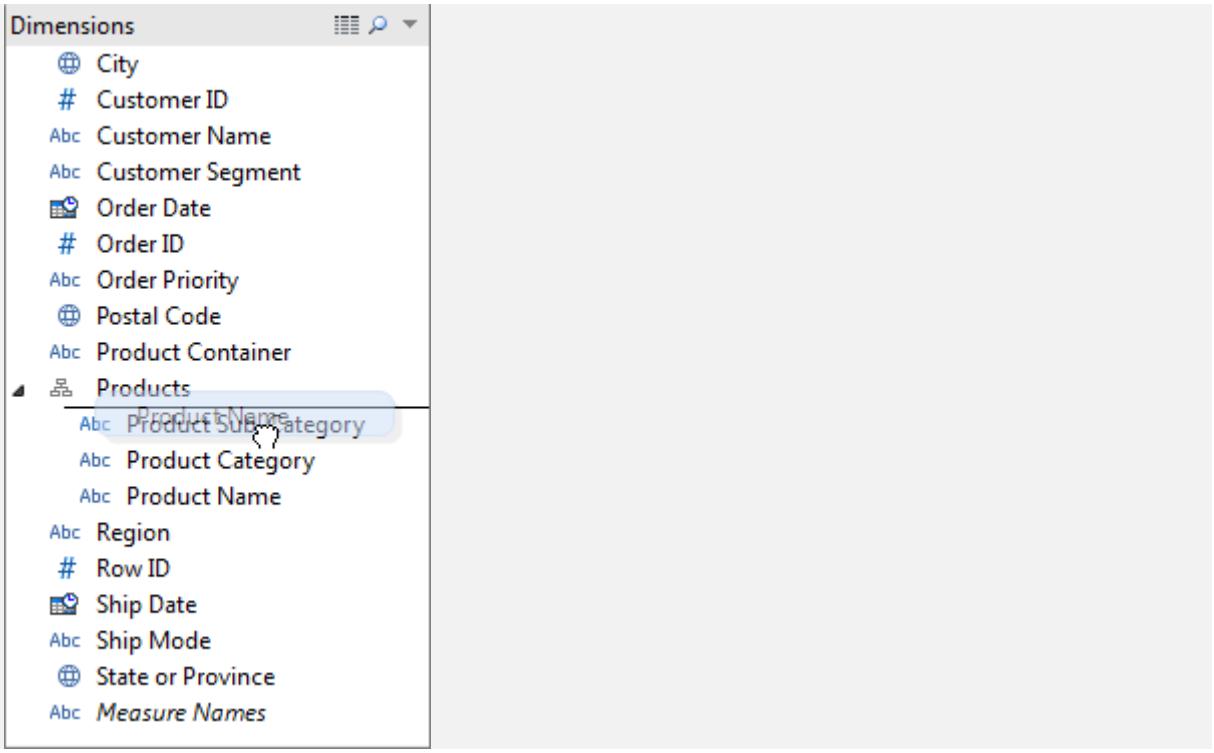


1. **Note:** When you want to create a hierarchy from a field inside a folder, right-click (control-click on a Mac) the field and then select **Create Hierarchy**.

2. When prompted, enter a name for the hierarchy and click **OK**.



1. Drag any additional fields into the hierarchy. You can also re-order fields in the hierarchy by dragging them to a new position.

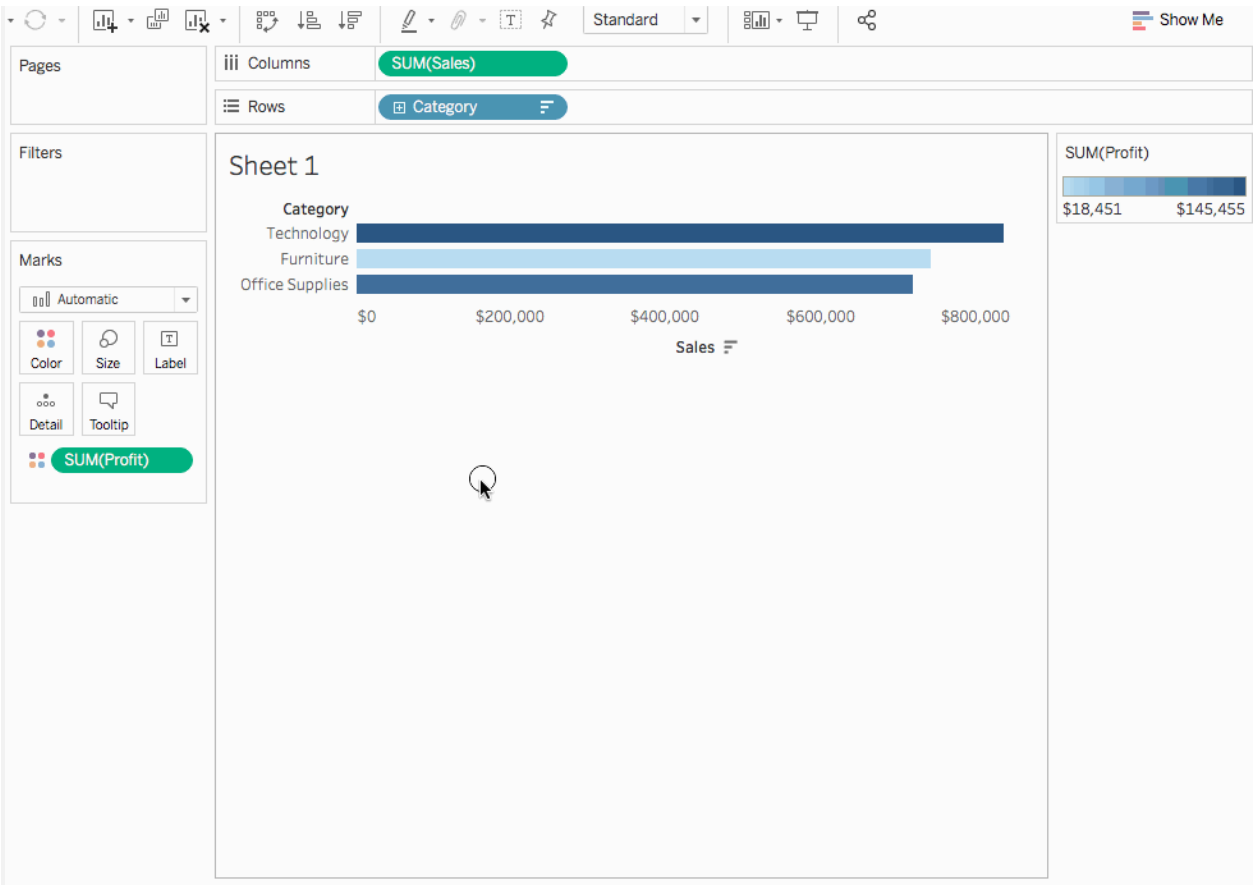


- Drill up or down in a hierarchy

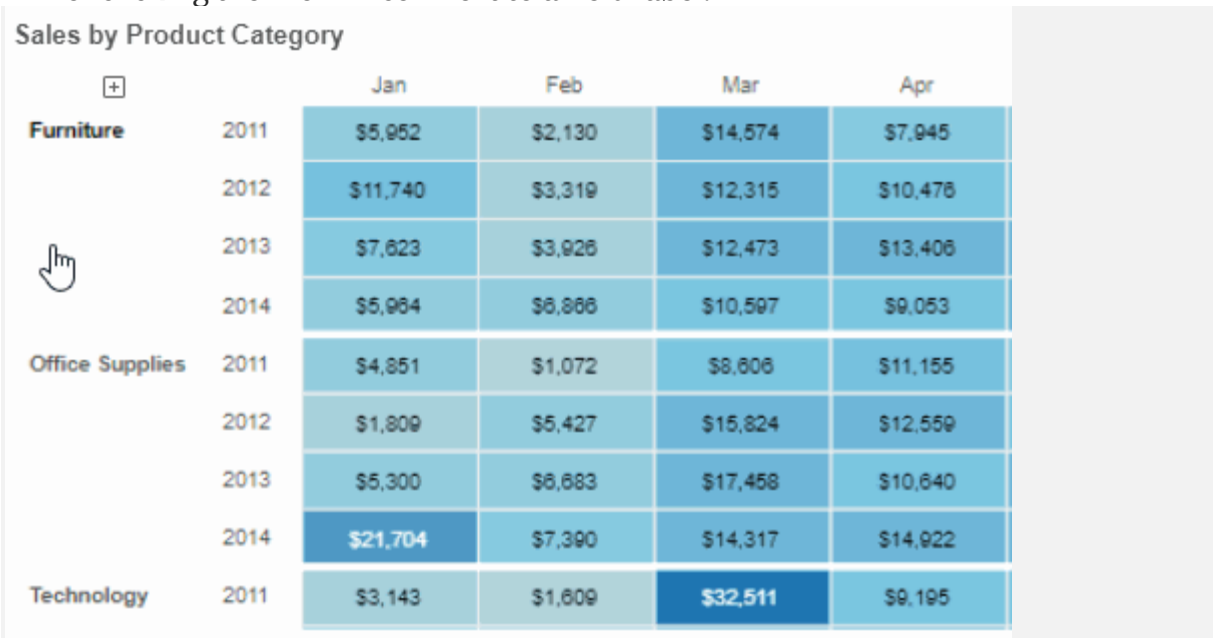
1. When you add a field from a hierarchy to the visualization, you can quickly drill up or down in the hierarchy to add or subtract more levels of detail.

2. To drill up or down in a hierarchy in Tableau Desktop or in web authoring:

- In the visualization, click the + or — icon on the hierarchy field.



- When you are editing or viewing the visualization on the web, you have the option of clicking the + or — icon next to a field label.



- Remove a hierarchy

1. To remove a hierarchy:

- In the **Data** pane, right-click (control-click on a Mac) the hierarchy and select **Remove Hierarchy**.
- The fields in the hierarchy are removed from the hierarchy and the hierarchy disappears from the Data pane.
- **Add a filter to the view**

Filtering is an essential part of analyzing data. This article describes the many ways you can filter data from your view. It also describes how you can display interactive filters in the view, and format filters in the view.

Filtering Order of Operations

Before you begin filtering data in Tableau, it's important to understand the order in which Tableau executes filters in your workbook.

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:

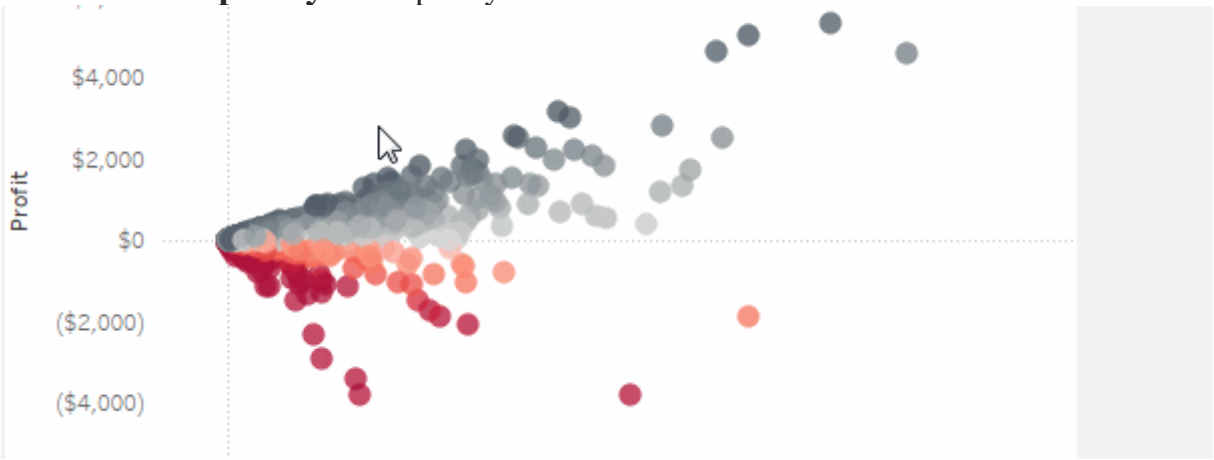
1. Extract filters
2. Data source filters
3. Context filters
4. Filters on dimensions (whether on the Filters shelf or in filter cards in the view)
5. Filters on measures (whether on the Filters shelf or in filter cards in the view)

Select to keep or exclude data points in your view

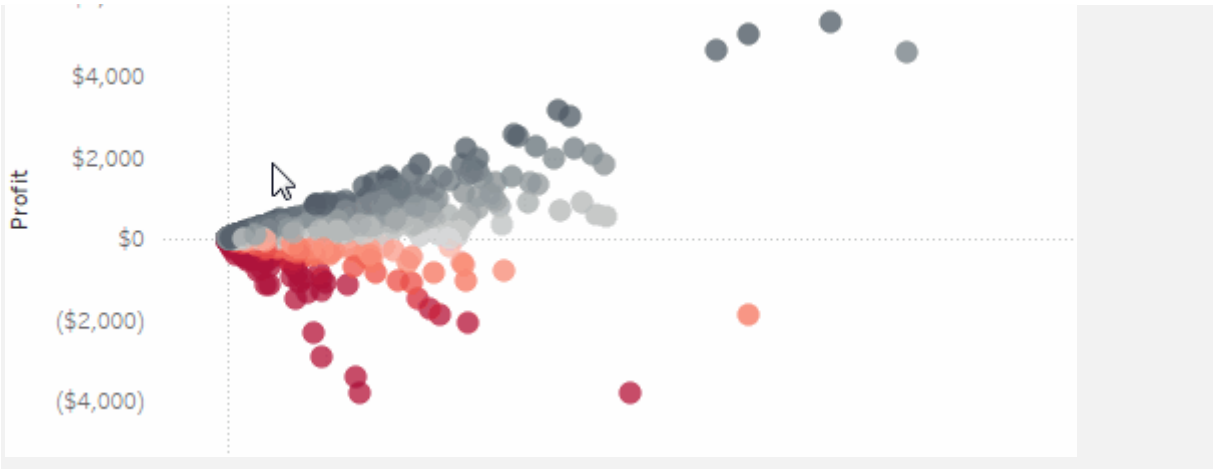
You can filter individual data points (marks), or a selection of data points from your view. For example, if you have a scatter plot with outliers, you can exclude them from the view so you can better focus on the rest of the data.

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. See Drag dimensions, measures, and date fields to the Filters shelf to learn more about Wildcard Match filters.

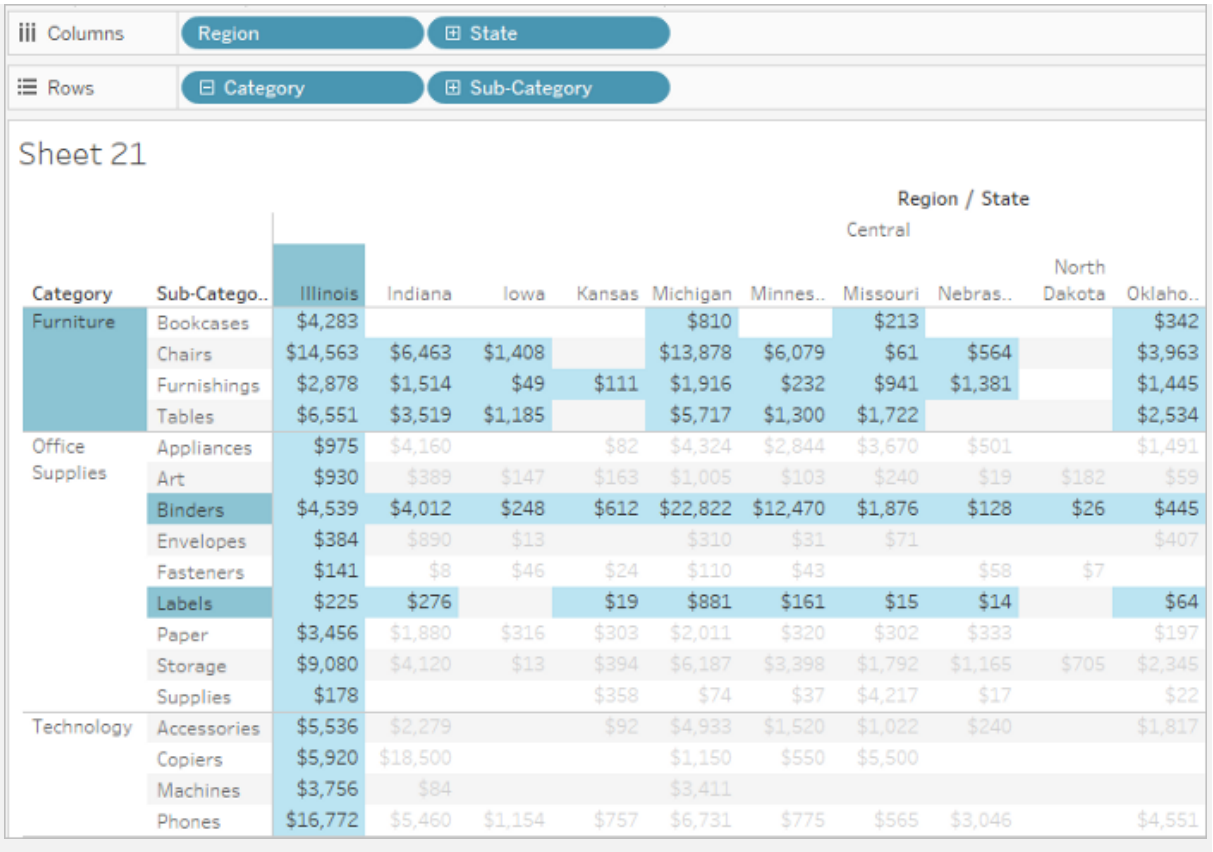
Select headers to filter data

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.



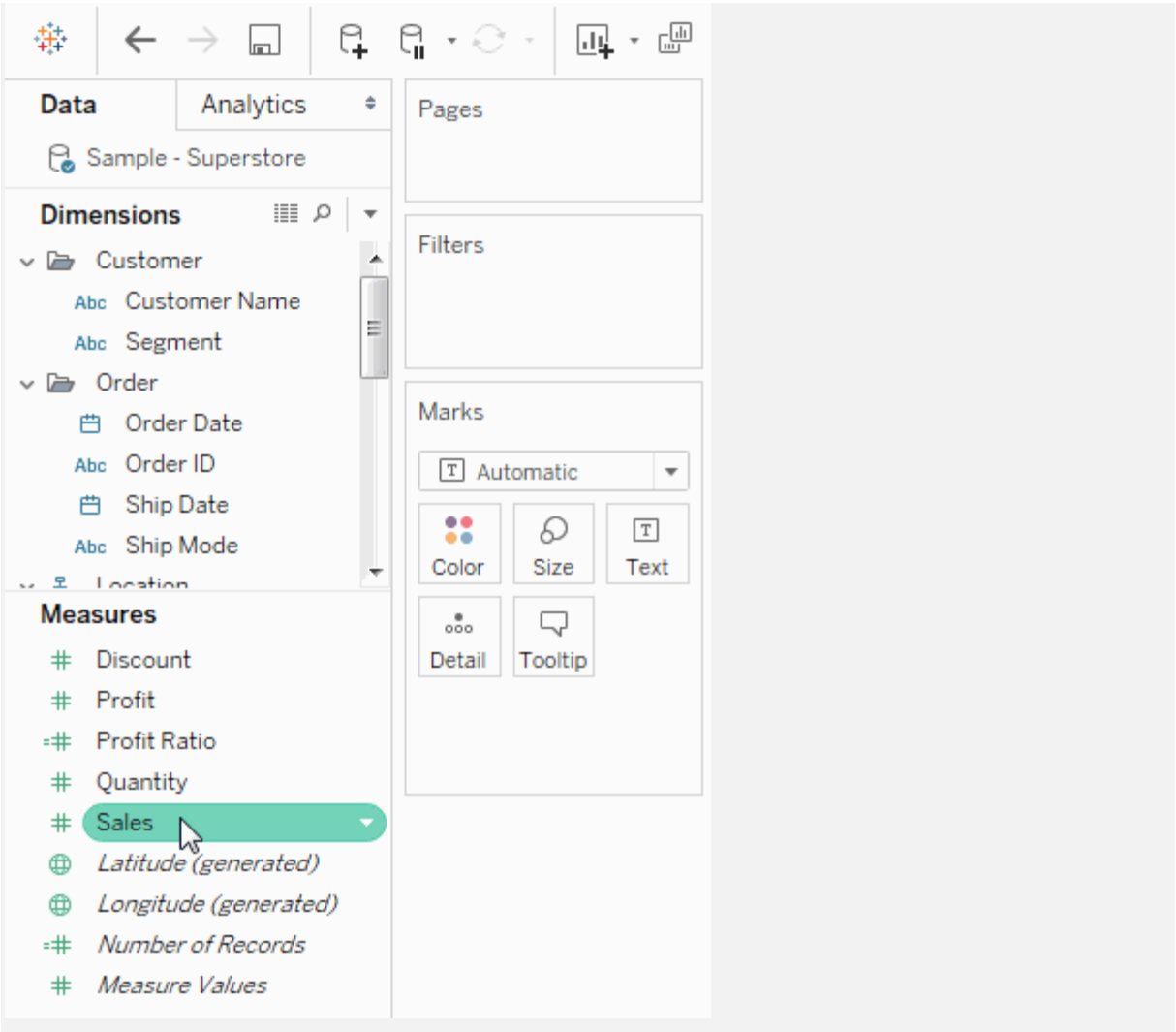
		Region / State									
								Central			
Category	Sub-Catego..	Illinois	Indiana	Iowa	Kansas	Michigan	Minnes..	Missouri	Nebras..	North Dakota	Oklaho..
Furniture	Bookcases	$4,283				$810		$213			$342
	Chairs	$14,563	$6,463	$1,408		$13,878	$6,079	$61	$564		$3,963
	Furnishings	$2,878	$1,514	$49	$111	$1,916	$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.

In Tableau Desktop, 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.

In web authoring, when you add a field to the Filters shelf, an interactive filter appears in the view.

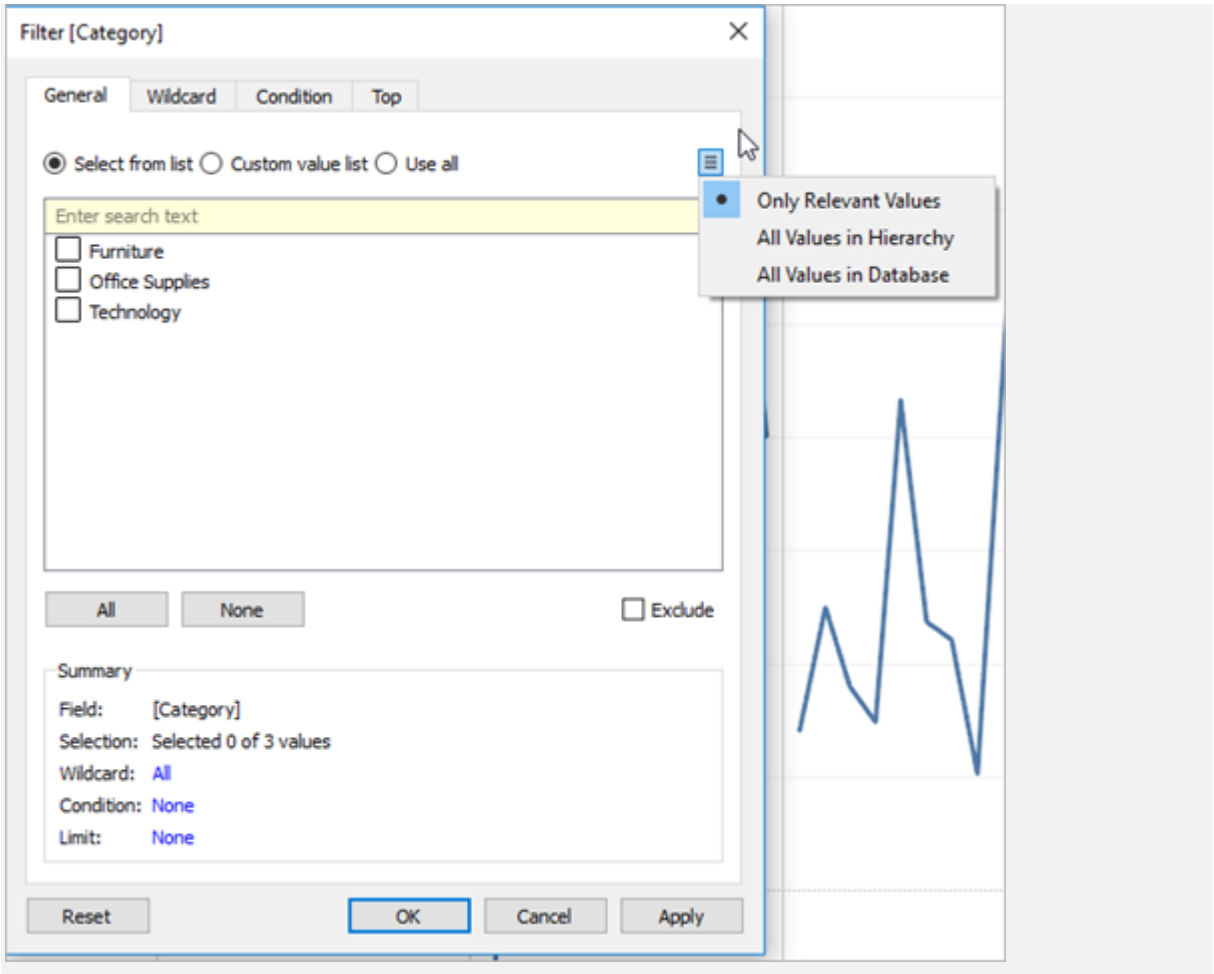


Filter categorical data (dimensions)

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

In Tableau Desktop

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



There are four tabs in the dialog box:

- **General**: Use the General tab to select the values you want to include or exclude.
- **Wilcard**: 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 products by Sales. Rather then 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.

In web authoring

When you drag a dimension from the Data pane to the Filters shelf in web authoring, an interactive filter appears in the view.

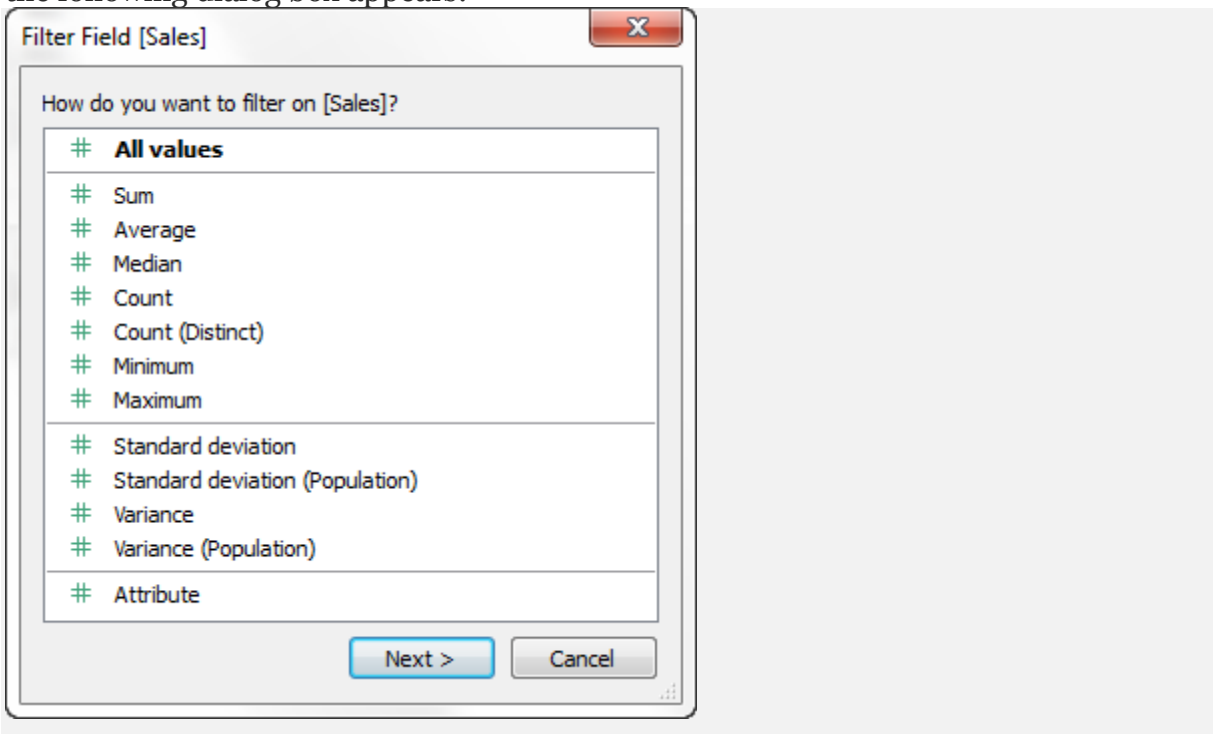
You can then select the items you want to include or exclude in the view.

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.

In Tableau Desktop

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 (Tableau Desktop only): 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. For more information about creating sets, see Create Sets.

In web authoring

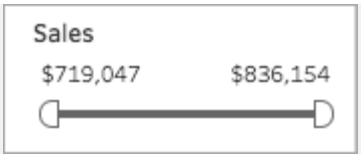
When you drag a measure from the Data pane, to the Filters shelf in web authoring, the field is automatically aggregated as a SUM and an interactive filter appears in the view.

To change the aggregation of the filter:

- On the Filters shelf, right-click the field, select Measure, and then select an aggregation.

To change the type of quantitative filter in the view:

- Click the filter card drop-down and select from the following:
- **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.



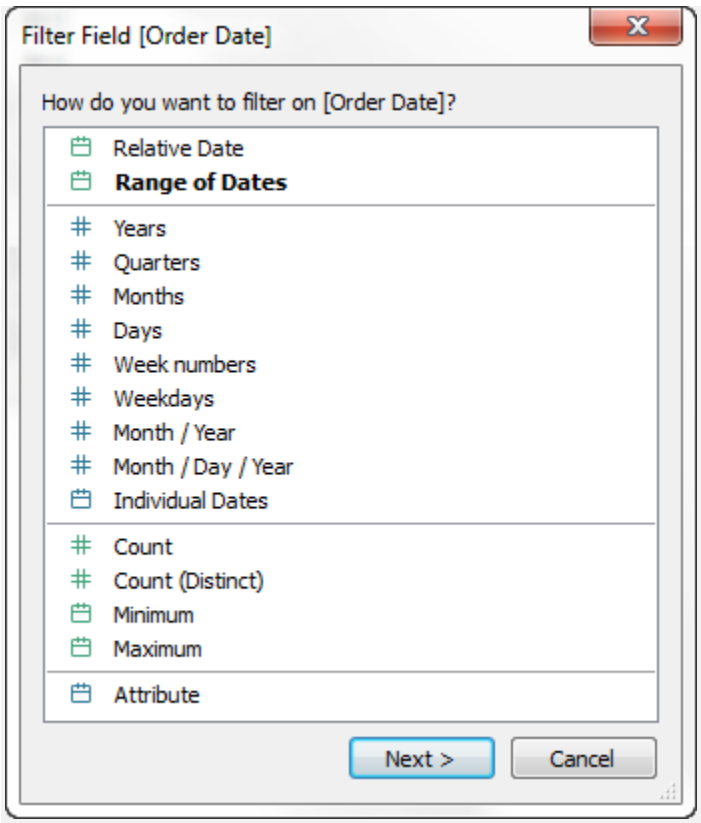
- **At Least**: Select the At Least option to include all values that are greater than or equal to a specified minimum value. This type of filter is useful when the data changes often so specifying an upper limit may not be possible.

- **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.

Filter dates

In Tableau Desktop

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

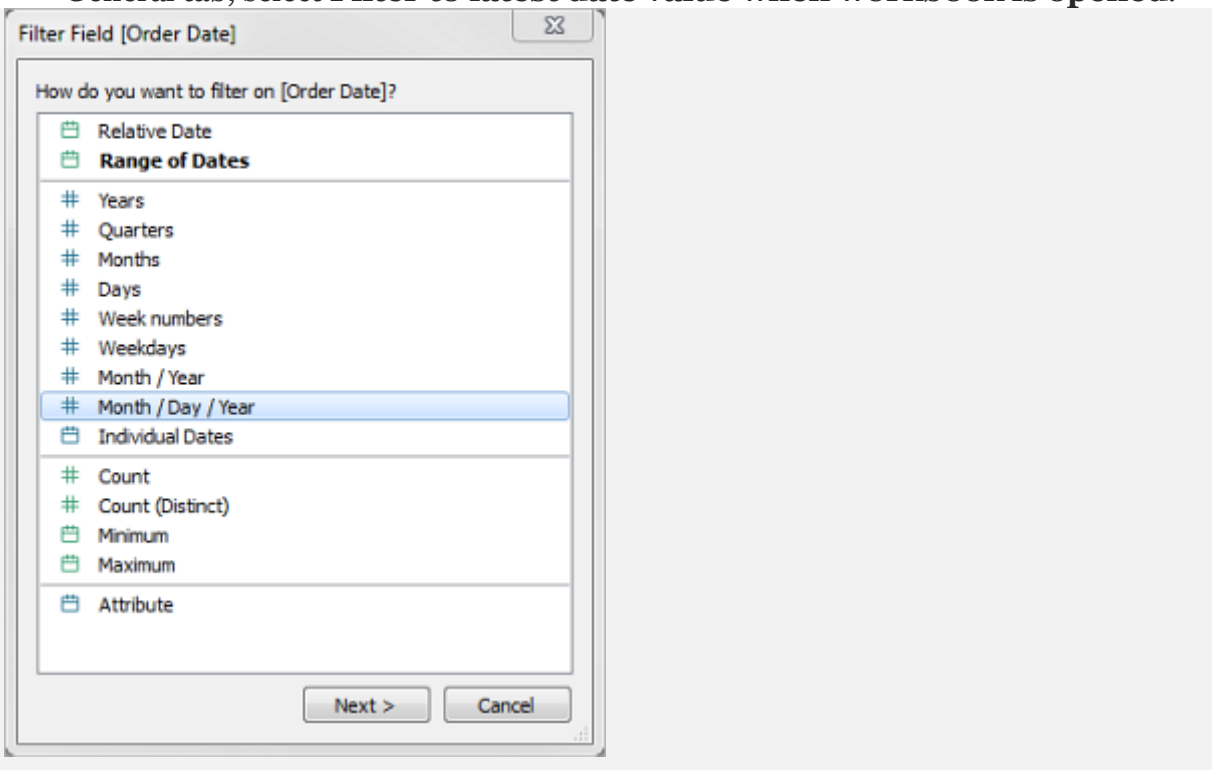


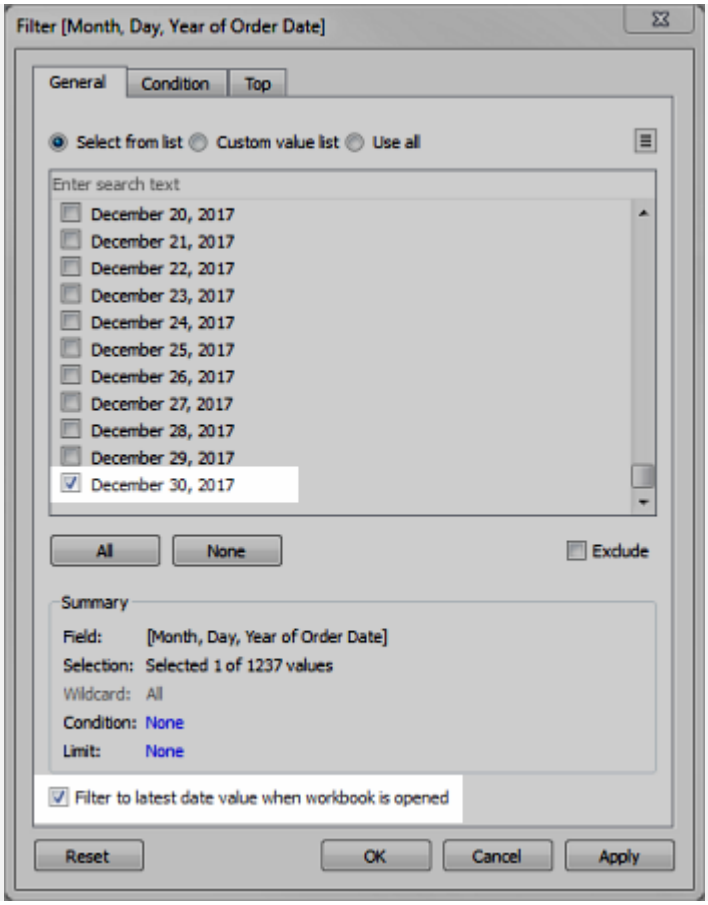
You can select whether you want to filter on a relative date; filter between a range of dates; or select discrete dates or individual dates to filter from the view.

- **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 (including relative date filters and context filters), 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.

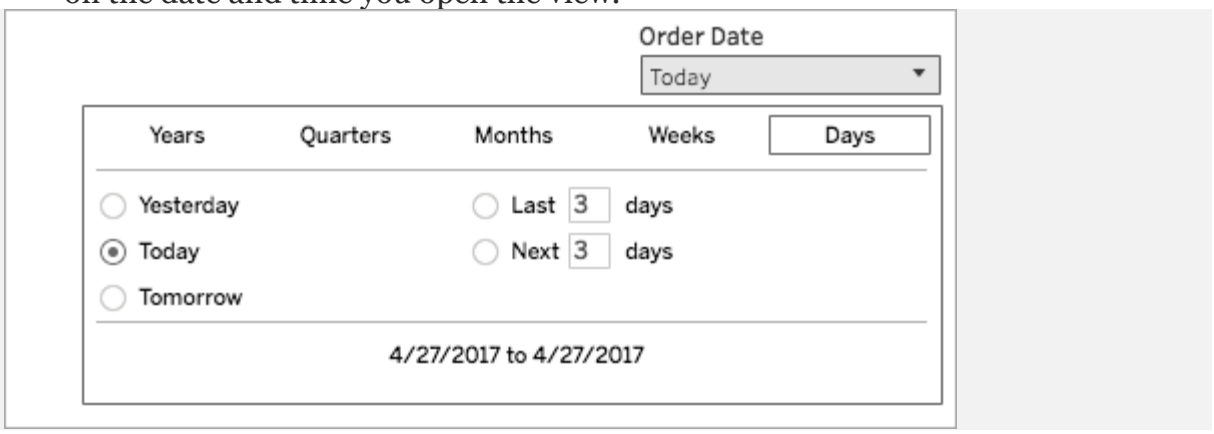
- On Tableau Server and Tableau Online, presets are applied when the view first loads in the browser, but not when the browser or data is refreshed.
- **Filter individual dates**: Select Individual dates to filter specific dates from your view.
- **Additional date filter options**: When you select Relative 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.

In web authoring

When you drag a date field from the Data pane to the Filters shelf in web authoring, a date range filter appears in the view.

To change the type of filter, click the filter card drop-down and select from the following:

- **Relative Date**: Click Relative dates to define a range of dates that updates based on the date and time you open the view.



- **Range of Dates**: Select Range of dates to define a fixed range of dates to filter

- **Start Date**: Select Start date to define a fixed start date to filter on.

- **End Date** : Select End date to define a fixed end date to filter on.

- **Browse Periods**: Select browse periods to select a period of time to filter by, such as one day, one week, one month, one year, five years, etc.

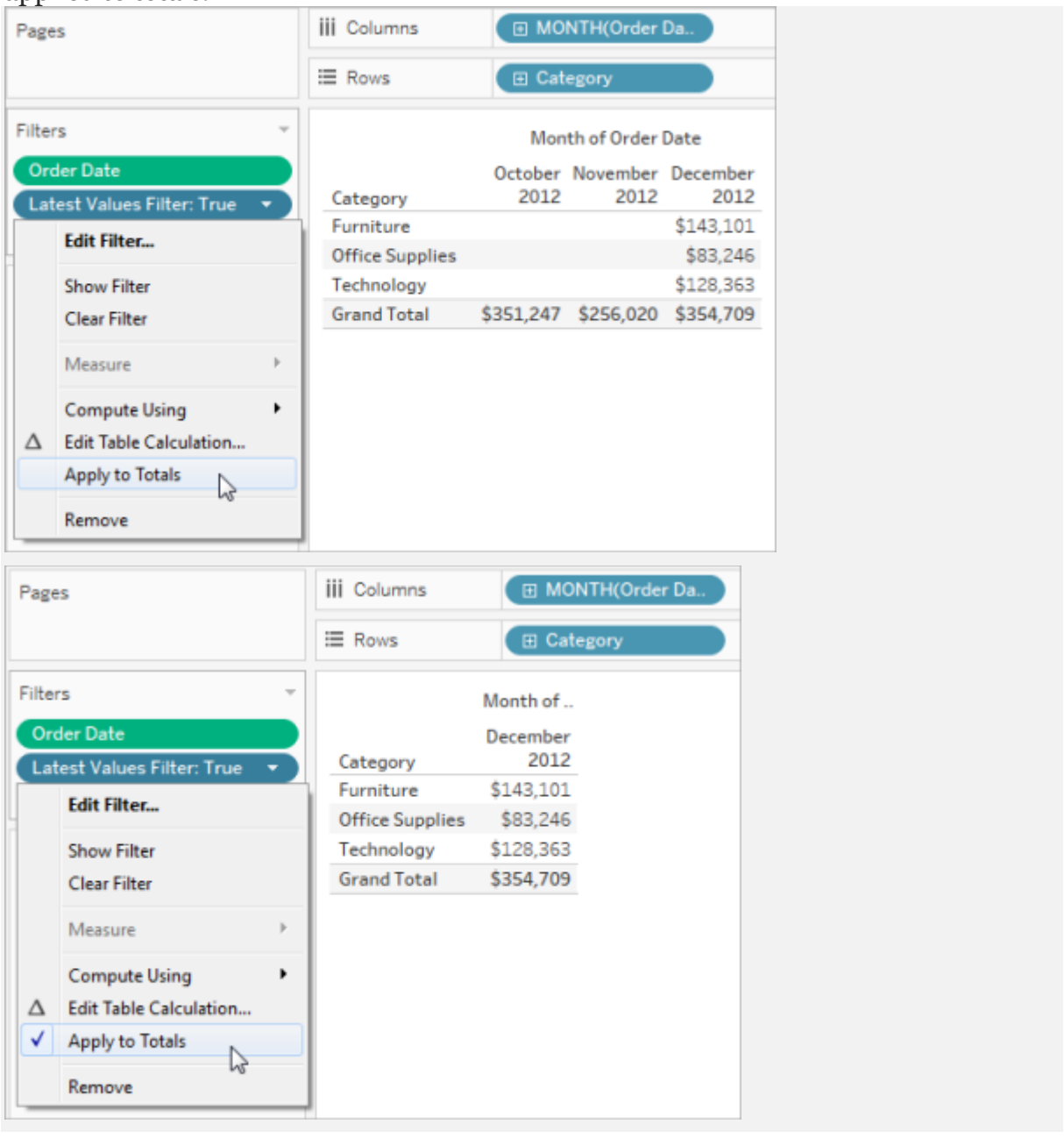
Filter table calculations

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.

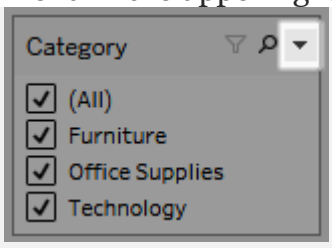
To show a filter in the view:

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

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 Online.

Here are some of the general filter card options:

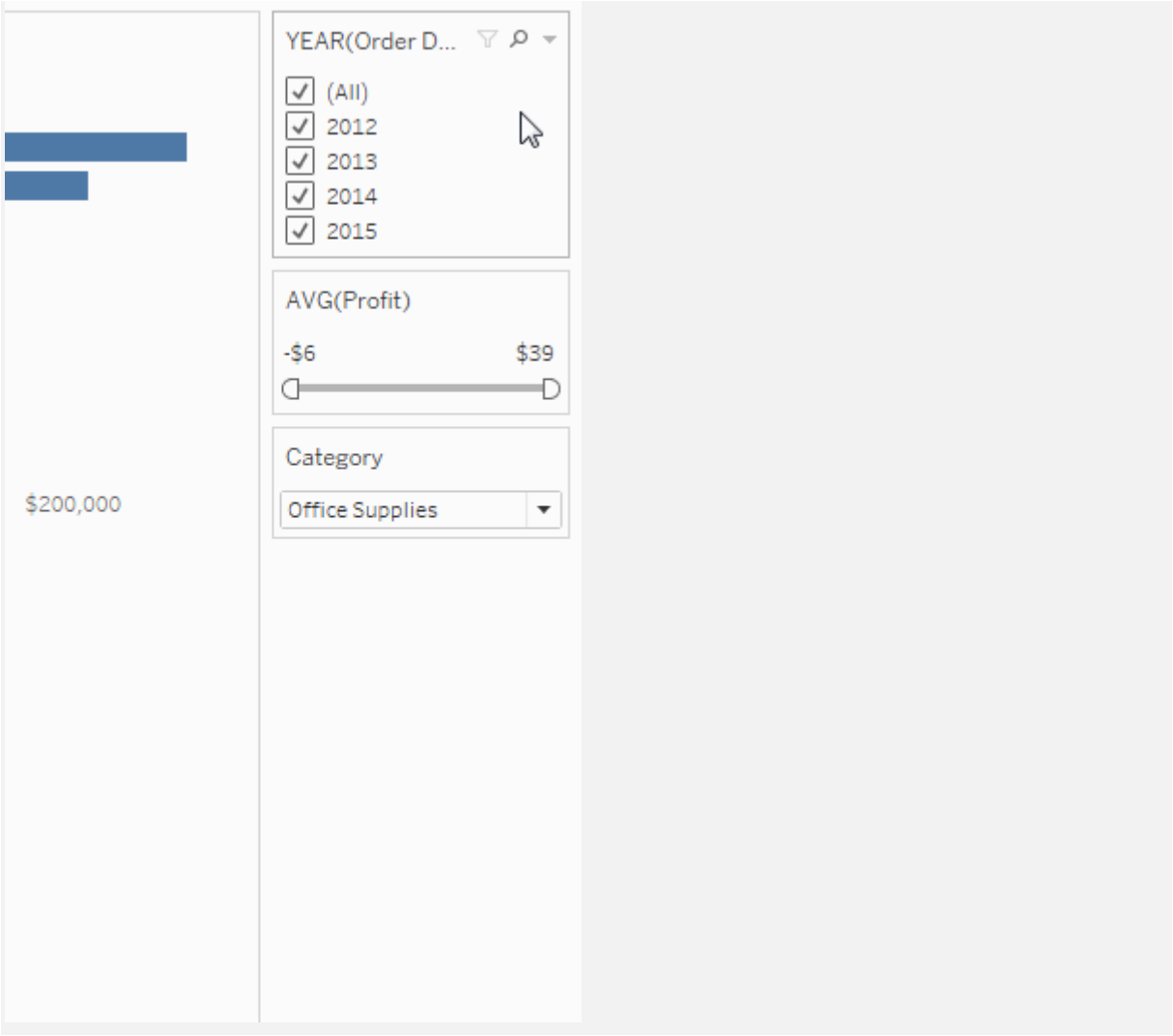
- **Edit Filter** (Tableau Desktop only) — This option opens the main Filter dialog box so you can further refine the filter by adding conditions and limits.
- **Remove Filter** (Tableau Desktop only)- Removes the filter from the Filters shelf and removes the filter card from the view.
- **Apply to worksheets** — Allows you to specify whether the filter should apply to only the current worksheet or be shared across multiple worksheets. For more information, see Apply Filters to 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. For more information, see Improve View Performance with Context Filters.
- **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.

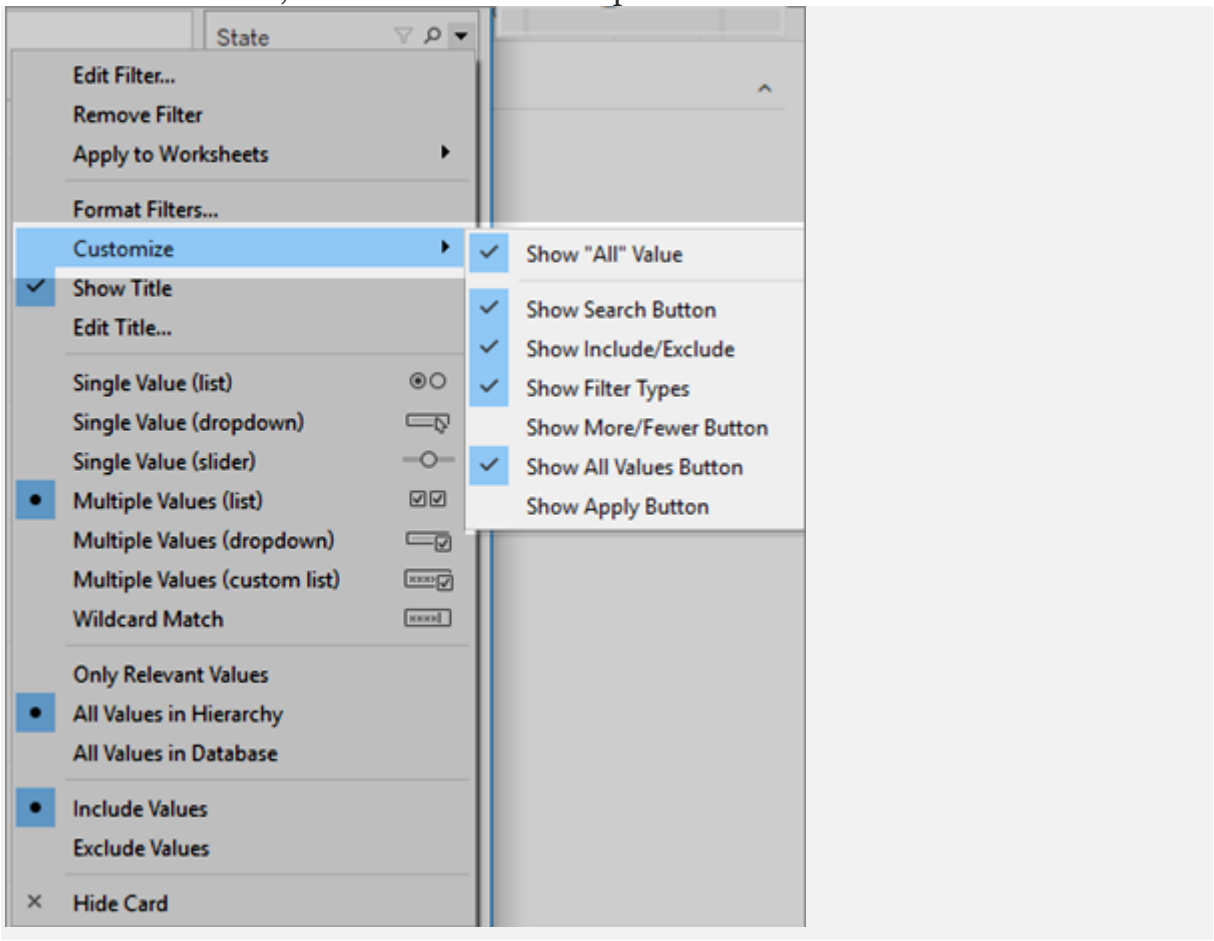
- **Browse periods**: shows common date ranges such as past day, week, month, three months, one year, and five years. This option is only available for filters on continuous date fields.

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. For information on Measure Values and Measure Names, see Measure Values and Measure Names.

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.

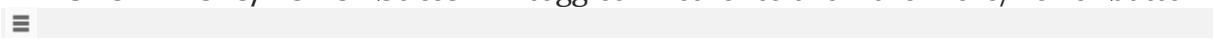
To customize filters, click the filter card drop-down menu and select **Customize**.



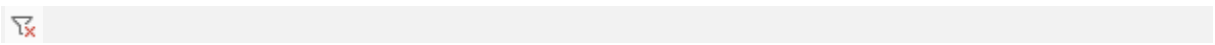
You can select from the following options:

- **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 Filter 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 Online.
- **Add a context filter**
- **Add a date filter**

Apply analytics to a worksheet

Drag reference lines, box plots, trend lines forecasts, and other items into your view from the **Analytics** pane, which appears on the left side of the workspace. Toggle between the **Data** pane and the **Analytics** pane by clicking the tabs at the top of the side bar.

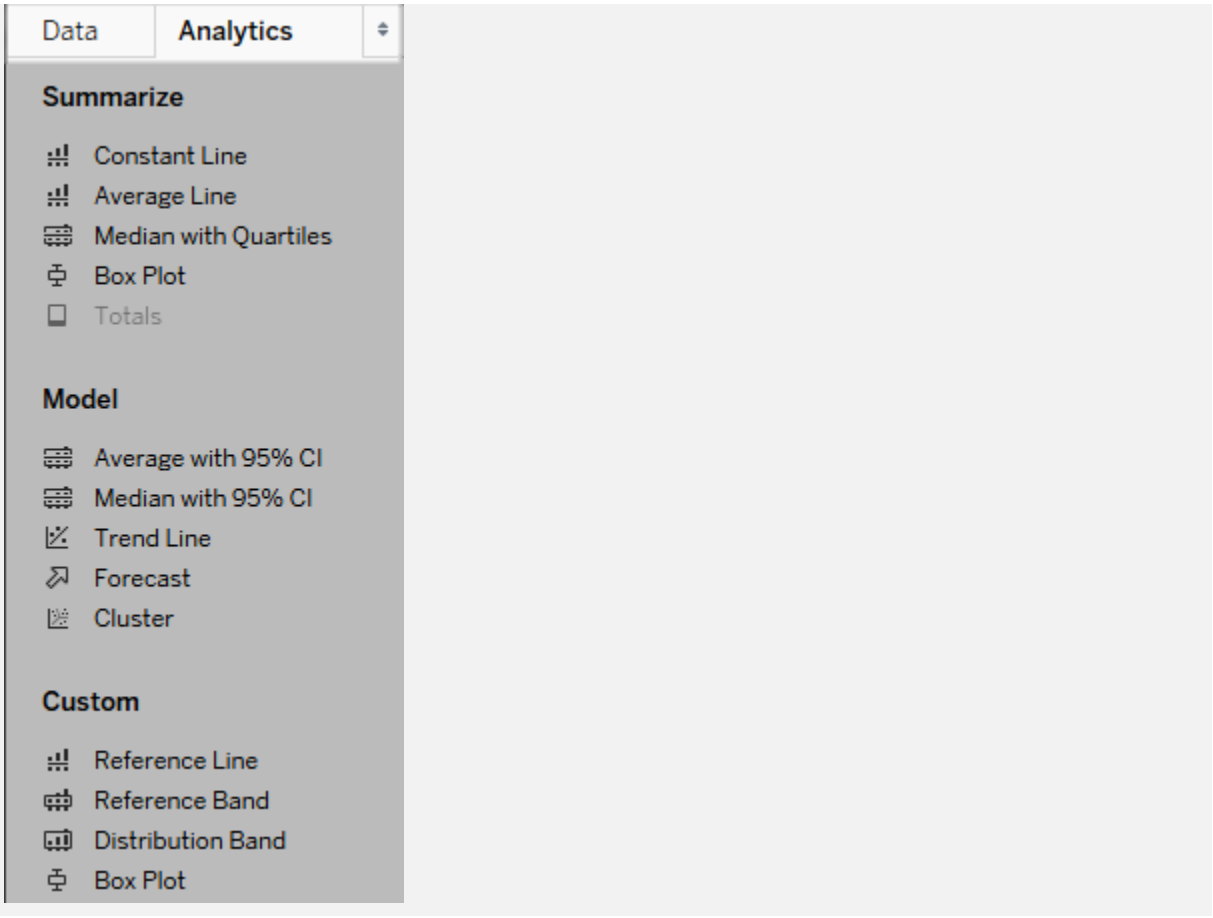


Tableau Desktop Analytics pane

In Tableau Desktop, options for adding Analytics objects to the view are available the **Analytics** pane or menu, or in context in the view. For example, reference lines and bands are available when you edit an axis, and trend lines and forecasts are available from the Analysis menu.

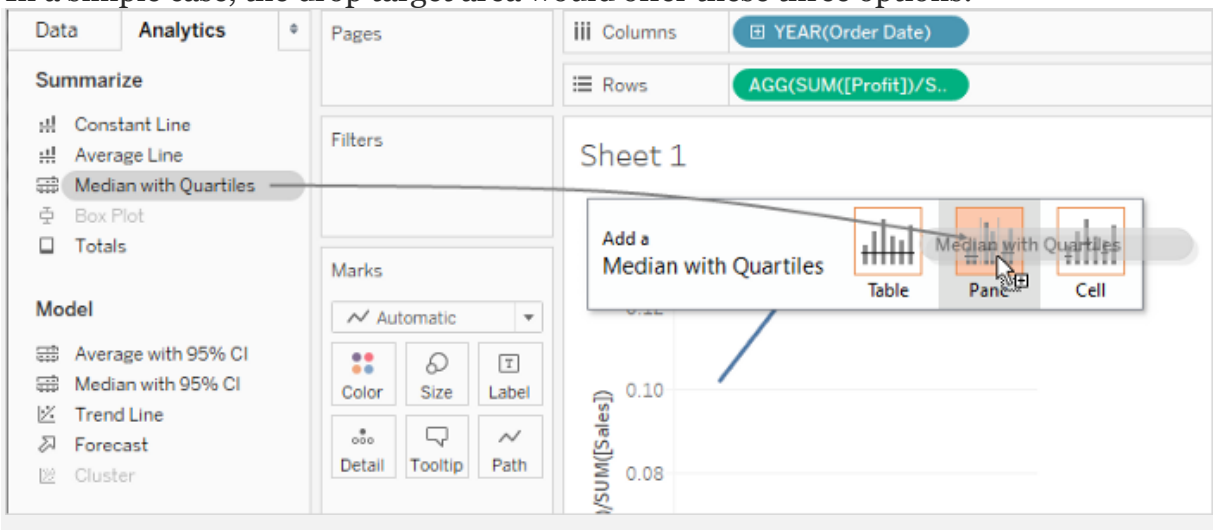
The **Analytics** pane provides drag-and-drop access for the various options.

On the web, most Analytics objects are available from the Analytics pane.

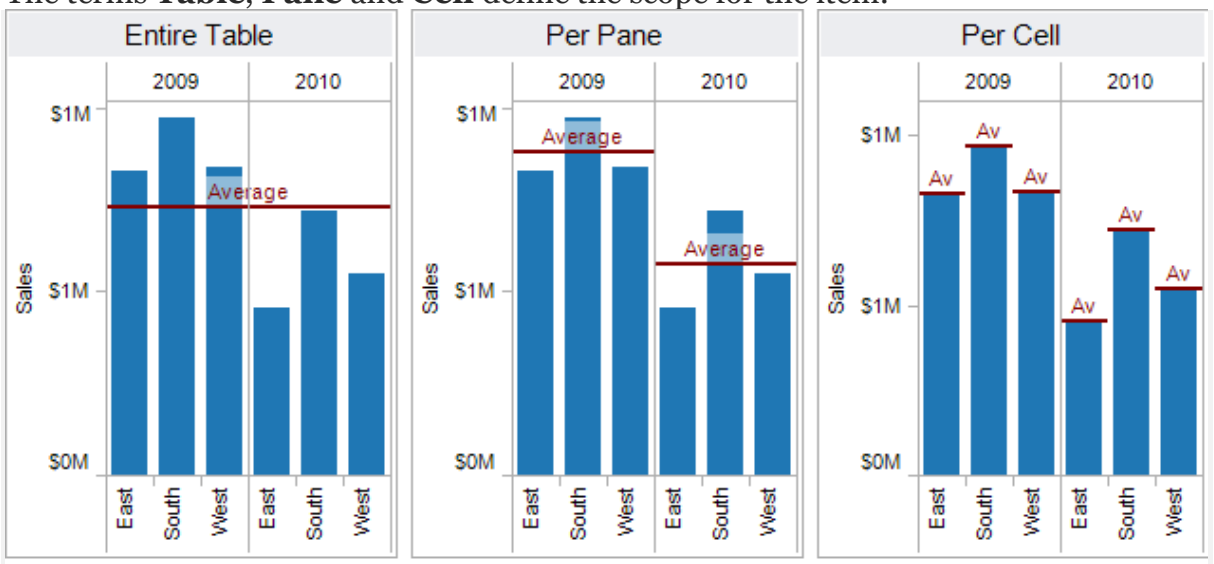
Add an analytics object to the view

To add an item from the **Analytics** pane, drag it into the view. When you drag an item from the **Analytics** pane, Tableau shows the possible destinations for that item. The range of choices varies depending on the type of item and the current view.

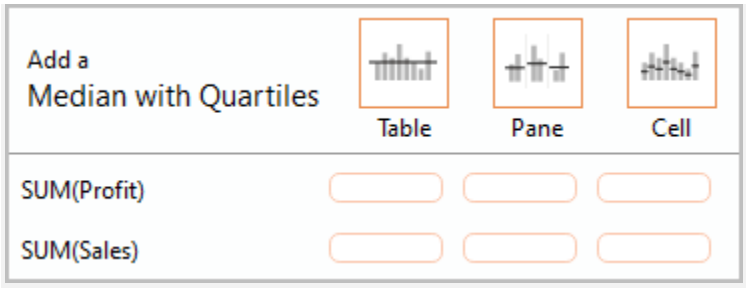
In a simple case, the drop target area would offer these three options:



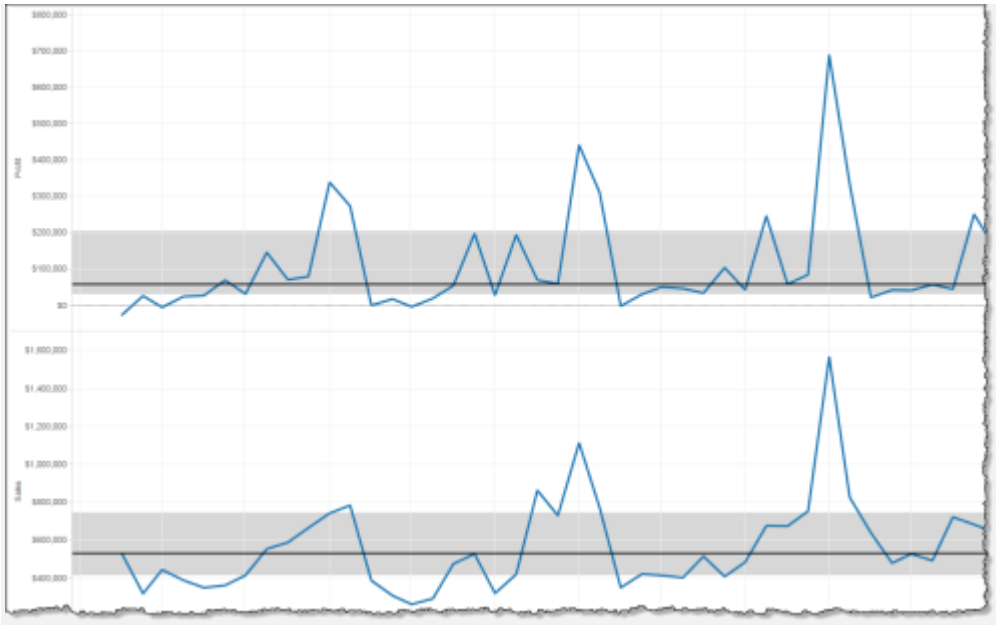
The terms **Table**, **Pane** and **Cell** define the scope for the item:



For a more complicated view — for example, if the view contained a line chart with multiple or dual axes — Tableau would show you a drop target area that looked like this:



If you dropped the item in one of the three larger boxes in the header at the top of the drop target area — for example, the Table box — a separate median with quartiles would be added for each axis:



But if you drop the item in any of the six lower boxes aligned with a specific measure, the median with quartiles would only be added on the corresponding axis, with the specified scope.

Delete an analytics object from the view

You can delete an analytics object from the view by clicking Undo, or drag the object off the view to delete it.

You can also click on an item and choose **Remove** from the tooltip.

Note: Some **Analytics** pane items (**Median with Quartiles** and **Average with 95% CI**) add both a reference line and a reference distribution. Unless you are using Undo, you would need to delete these items separately.

Edit an analytics object in the view

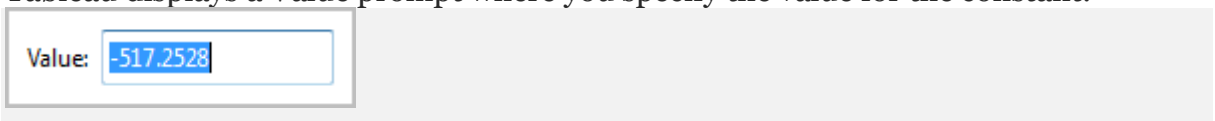
To edit an item you have added from the Analytics pane, click on the item and select **Edit**from the tooltip. For additional editing options, see the section for a particular item type under Analytics object definitions, below.

Analytics object definitions

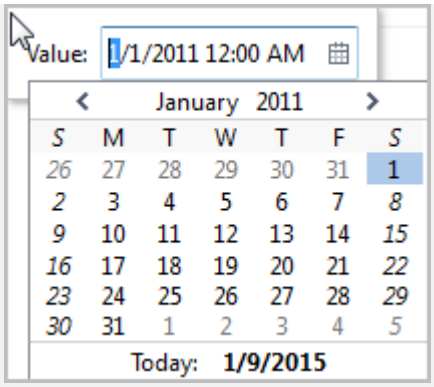
The following items can be dragged from the **Analytics** pane and dropped in the view. If an analytics object cannot be applied to the current configuration of fields in the view, it isn't available.

Constant Line

Adds one or more constant lines to the view. You can add a constant line for a specific measure, for all measures, or for date dimensions. When you add a constant line, Tableau displays a Value prompt where you specify the value for the constant:



In Tableau Desktop, the Value prompt for a date value is a calendar control:



You can click on a resulting constant line and choose **Edit** or **Remove**. In Tableau Desktop there is a third option: **Format**. Choosing **Edit** opens the Edit Reference Line dialog box. For details, see Edit Existing Reference Lines, Bands, and Distributions in the **Reference Lines, Bands, Distributions, and Boxes** article. Another way to edit a line in Tableau Desktop is to right-click (control-click on Mac) the relevant axis and choose **Edit Reference Line**.

Average Line

Adds one or more average lines to the view. You can add an average line for a specific measure or for all measures.

You can click on a resulting average line and choose a different aggregation, such as Total or Sum. You can also choose **Edit** or **Remove**. In Tableau Desktop there is a third option: **Format**. Choosing **Edit** opens the Edit Reference Line dialog box. For details, see Edit Existing Reference Lines, Bands, and Distributions in the **Reference Lines, Bands, Distributions, and Boxes** article. Another way to edit a line in Tableau Desktop is to right-click (control-click on Mac) the relevant axis and choose **Edit Reference Line**.

Median with Quartiles

Adds one or more sets of median lines and distribution bands to the view. You can add a median with quartiles for a specific measure or for all measures.

The distribution bands are computed as quartiles; the middle two quartiles are shaded.

You can click on a resulting median line or distribution and choose **Edit** or **Remove**. In Tableau Desktop there is a third option: **Format**. Median lines and distributions must be edited, formatted, or removed separately. Choosing **Edit** opens the Edit Reference Line dialog box. You must click on the outer edge of a distribution band to see the options — clicking in the middle of the band has no effect. For details, see Edit Existing Reference Lines, Bands, and Distributions in the **Reference Lines, Bands, Distributions, and Boxes**article. Another way to edit a line or distribution in Tableau Desktop is to right-click (control-click on Mac) the relevant axis and choose **Edit Reference Line**. A submenu will offer you two choices: **Quartiles** and **Median**.

For information on distribution types, including quartiles, see Add Reference Distributions in the **Reference Lines, Bands, Distributions, and Boxes** article.

Box Plot

Adds one or more box plots to the view. You can add box plots for a specific measure or for all measures. The scope for a box plot is always **Cell** (and never **Table** or **Pane**).

Click or hover over any of the horizontal lines in the box plot to see statistical information about the whiskers, quartiles, and median.

You can also choose **Edit** or **Remove** when you click on a line. In Tableau Desktop there is a third option: **Format**. Choosing **Edit** opens the Edit Reference Line dialog box. Another way to edit a box plot in Tableau Desktop is to right-click (control-click on Mac) the relevant axis and choose **Edit Reference Line**.

Note: In Tableau Desktop, there are two items named **Box Plot** in the Analytics pane. For the Box Plot option in the Summarize section, Tableau will automatically add a box plot for the specified target. For the Box Plot option in the Custom section, Tableau will open the Edit Reference Line, Band, or Box dialog box after you specify a target.

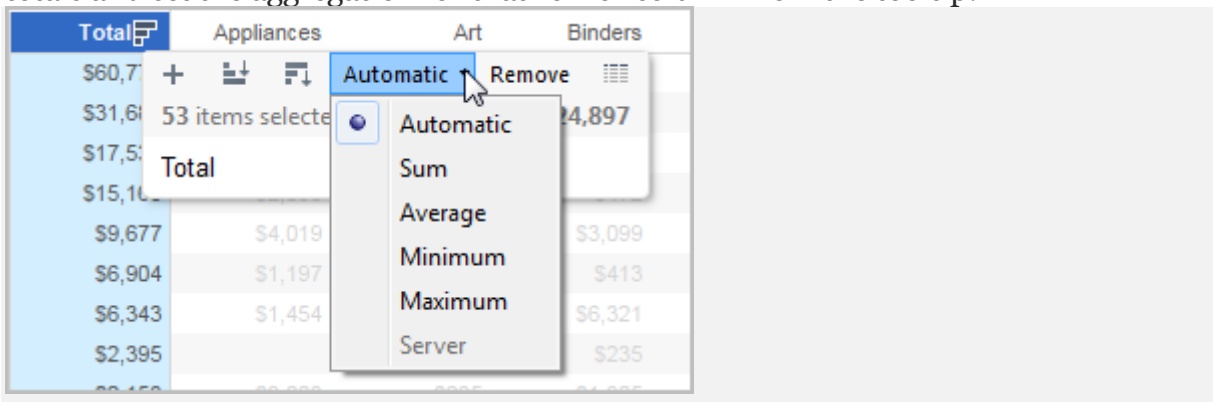
Totals

Adds totals to the view. When you add totals, the drop options are **Subtotals**, **Column Grand Totals**, and **Row Grand Totals**.

For details, see Show Totals in a Visualization.

To remove totals, click the relevant column or row header and choose **Remove**.

In Tableau Desktop, you can also click on a totals column or row header after adding totals and set the aggregation for that row or column from the tooltip:



Average with 95% CI

Adds one or more sets of average lines with distribution bands; the distribution bands are configured at a 95% confidence interval. You can add these items for a specific measure or for all measures.

The confidence interval distribution bands shade the region in which the population average will fall 95% of the time.

You can click on a resulting average line or distribution and choose **Edit** or **Remove**. In Tableau Desktop there is a third option: **Format**. Choosing **Edit** opens the Edit Reference Line dialog box. The average lines and distributions must be edited, formatted, or removed separately. You must click on the outer edge of a distribution band to see the options — clicking in the middle of the band has no effect. Another way to edit a line or distribution in Tableau Desktop is to right-click (control-click on Mac) the relevant axis and choose **Edit Reference Line**. A submenu will offer you two choices: **Average** and **95% Confidence Interval**.

You can also remove lines and bands by dragging them off the view.

Median with 95% CI

Adds one or more sets of median lines with distribution bands; the distribution bands are configured at a 95% confidence interval. You can add these items for a specific measure or for all measures.

The confidence interval distribution bands shade the region in which the population median will fall 95% of the time.

You can click on a resulting median line or distribution and choose **Edit**, **Format**, or **Remove**. In Tableau Desktop there is a third option: **Format**.
Choosing **Edit** opens the Edit Reference Line dialog box. The median lines and distributions must be edited, formatted, or removed separately. You must click on the outer edge of a distribution band to see the options — clicking in the middle of the band has no effect. Another way to edit a line or distribution in Tableau Desktop is to right-click (control-click on Mac) the relevant axis and choose **Edit Reference Line**. A submenu will offer you two choices: **Median** and **95% Confidence Interval**.

You can also remove lines and bands by dragging them off the view.

Trend Line

Adds one or more trend lines to the view. When you add trend lines, the drop options identify the trend line model types available in
Tableau: **Linear**, **Logarithmic**, **Exponential**, and **Polynomial**. For some views, only a subset of these options is available.

For details, see Trend Line Model Types

Click on a trend line to remove or edit it, or to see a statistical definition. You can also remove a trend line by dragging it off the view.

Forecast

Adds a forecast to the view. This option is only available in Tableau Desktop — not when you edit a view on the web. Forecasting is only possible when there is at least one measure in the view.

Forecasting is not supported for views based on multidimensional data sources. In addition, the view cannot contain any of the following:

- Table calculations
- Disaggregated measures
- Percent calculations
- Grand Totals or Subtotals
- Date values with aggregation set to Exact Date

A time series containing null values also imposes constraints.

For details, see Forecasting.

To remove, edit, or read a description of the current forecast, go to the Analysis menu and choose **Forecast**.

Custom Reference Line

You can add reference lines for a specific measure or for all measures in the view.

After you drag a reference line from the **Analytics** pane and drop it on a target, Tableau automatically opens an edit dialog box. See Add a Reference Line in the **Reference Lines, Bands, Distributions, and Boxes** article for information on the available options. To return to this dialog box later, click on the line and choose **Edit**.

Custom Reference Band

You can add reference bands for a specific measure or for all measures in the view.

After you drag a reference band from the **Analytics** pane and drop it on a target, Tableau automatically opens the Edit Reference Line, Band, or Box dialog box. See Add Reference Bands in the **Reference Lines, Bands, Distributions, and Boxes** article for information on the available options. To return to this dialog box later, click on the band and choose **Edit**. You must click on the outer edge of a reference band to see the options — clicking in the middle of the band has no effect.

Custom Distribution Band

You can add reference distributions for a specific measure or for all measures in the view.

After you drag a reference distribution from the **Analytics** pane and drop it on a target, Tableau automatically opens Edit Reference Line, Band, or Box dialog box. See Add Reference Distributions in the **Reference Lines, Bands, Distributions, and Boxes** article for information on the available options. To return to this dialog box later, click on the band and choose **Edit**. You must click on the outer edge of a distribution band to see the options — clicking in the middle of the band has no effect.

Custom Box Plot

In Tableau Desktop — but not when you edit a view on the web — you can drag a box plot from the Custom section of the **Analytics** pane and drop it on a target. (But keep in mind that on the web, you can add a box plot from the Summarize section on the Analytics pane.) When you drag Box Plot from the Custom section, Tableau automatically opens Edit Reference Line, Band, or Box dialog box. See Add a Box Plot in the **Reference Lines, Bands, Distributions, and Boxes** article for

information on the available options. The scope for a box plot is always **Cell** (and never **Table** or **Pane**).

Click any of the horizontal lines in the box plot to see statistical information about the whiskers, quartiles, and median.

To return to this dialog box later, click on the band and choose **Edit**.

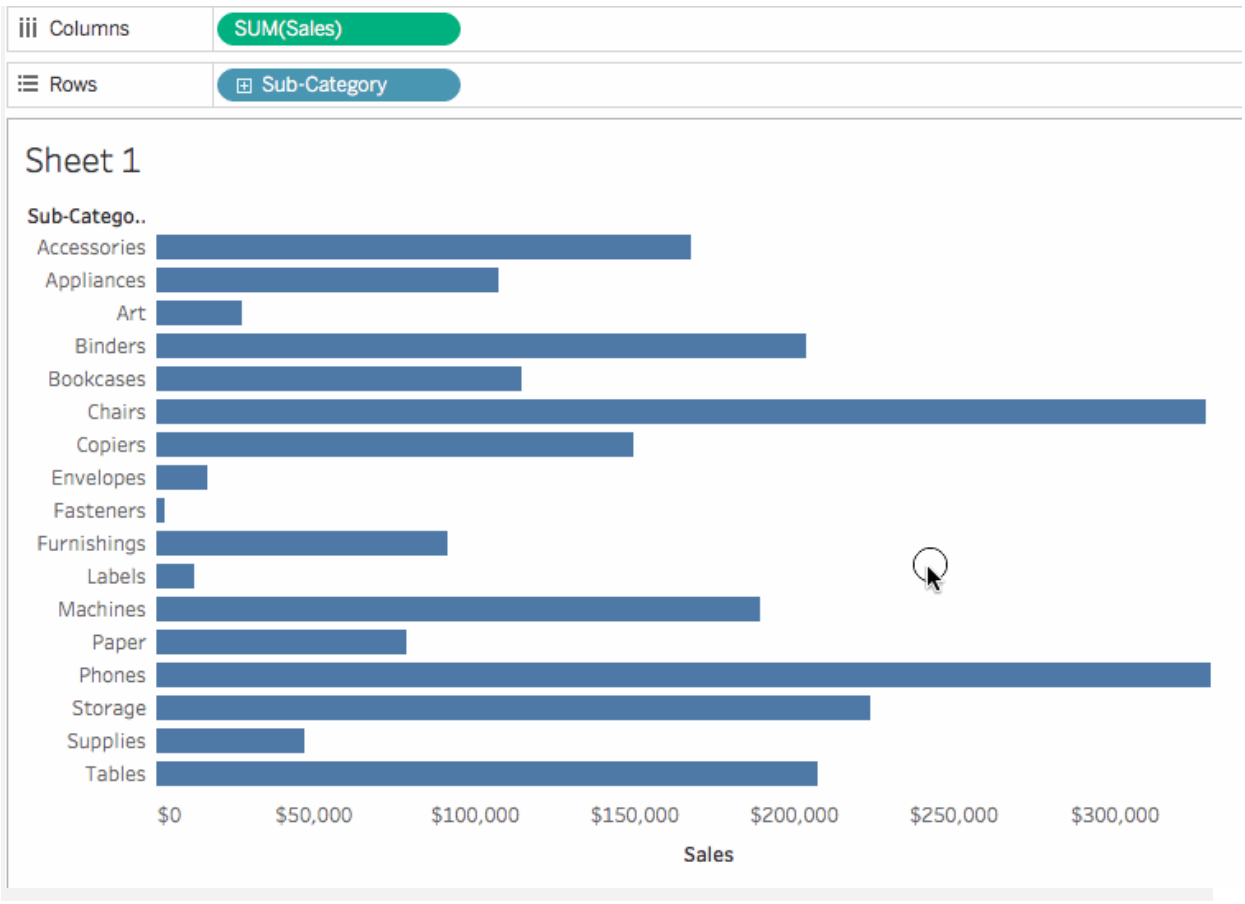
- **Add a manual or a computed sort**

There are many ways to sort data in a visualization in Tableau. This article demonstrates all the ways to sort data in a visualization.

Sort data on an axis

A quick way to sort data is to use the sort buttons on an axis. To do so:

1. In a worksheet, hover over a viz axis.
2. Click the sort icon that appears.
3. **One** click sorts the data in ascending order. **Two** clicks sorts it in descending order. **Three** clicks clears the sort.



The sort will update correctly if the underlying data changes.

Sort specific fields in the viz

To sort a specific field in the visualization:

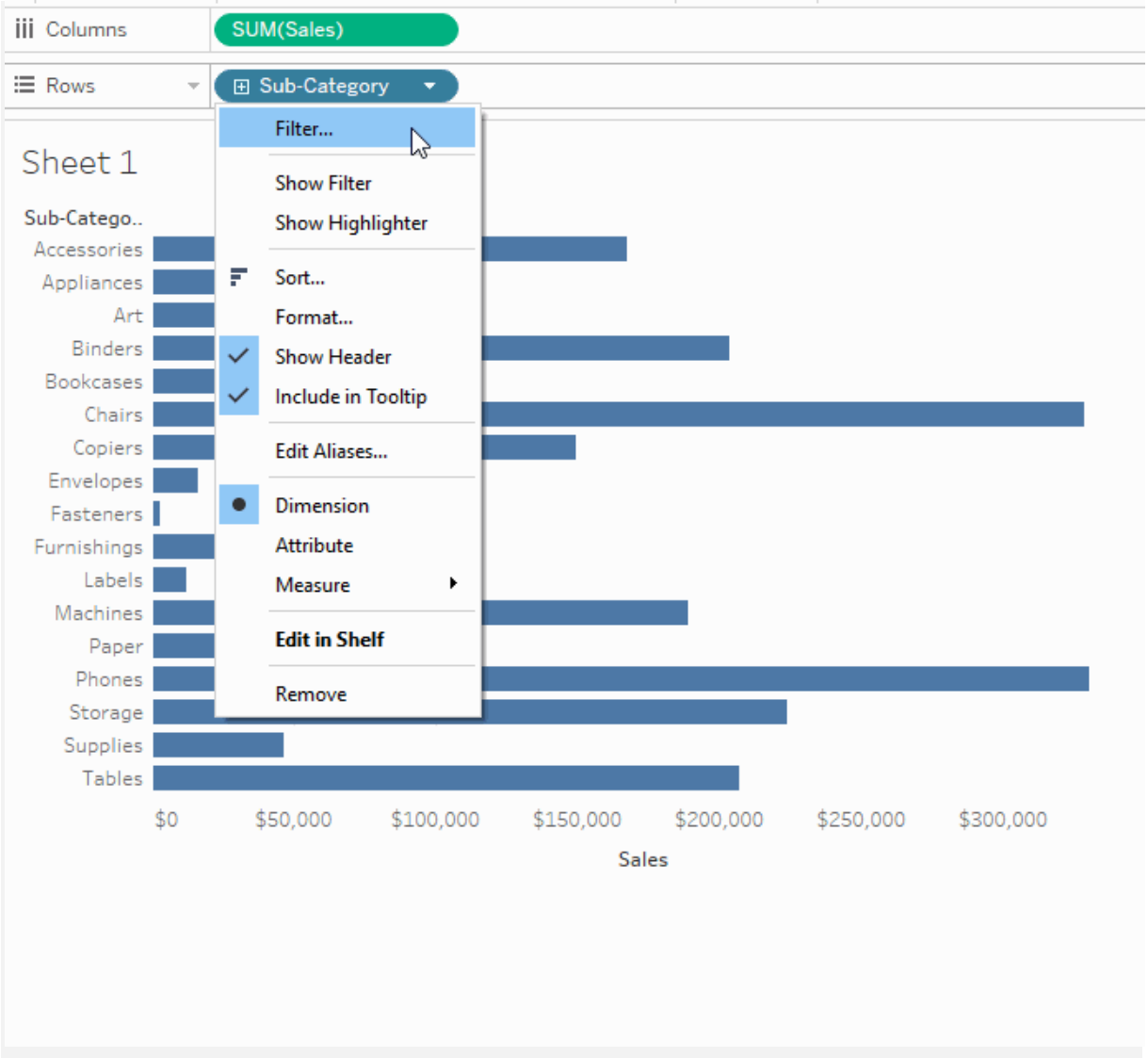
1. In a worksheet, right-click (control-click on Mac) the field you want to sort and select **Sort**.
2. **Note**: You can only sort dimensions.
3. In the **Sort** dialog box that opens, do the following:

- For **Sort order**, select one of the following options:

- **Ascending** — sorts the data in ascending order from lowest to highest or least to most.
- **Descending** — sorts the data in descending order from highest to lowest or most to least.
- For **Sort by**, select one of the following options:
- **Data source order** — the order that the data source naturally orders the data. Generally for relational data sources, this tends to be in alphabetical order — more specifically, in natural sort order, which is identical to alphabetical order, except that multi-digit numbers are ordered as a single character. So, for example, in alphabetical sorting, "z11" comes before "z2" because "1" is evaluated as being smaller than "2", whereas in natural sorting "z2" comes before "z11" because "2" is evaluated as being smaller than "11".
- If you are using a cube, this order is the defined hierarchal order of the members within a dimension.
- **Alphabetic** — sorts the data alphabetically.
- **Note**: This sort is case sensitive. It will sort [A-Z] before [a-z].
- To create a non-case sensitive sort, create a calculated field using the `UPPER()` or `LOWER()` functions to transform your strings into a consistent case. For more information, see String Functions.
- **Field** — sorts the data based on values in another field. For example, you can select to sort by the Sales field, using the average aggregation.
- **Manual** — allows you to manually sort the data in the order you prefer. For example, if you want to sort high school years in order: Freshman, Sophomore, Junior, Senior.

1. When finished, click **OK**.

2. The visualization updates with the new sorting.



You should keep the following rules in mind when interpreting the sort results:

- Tableau computes the sort across the entire table using the specified criteria. SeeSort Data in a Visualization for more information.

- Sorts do not break the dimension hierarchy. Sorted fields are always displayed within the ordered context already set forth by the fields on the Rows and

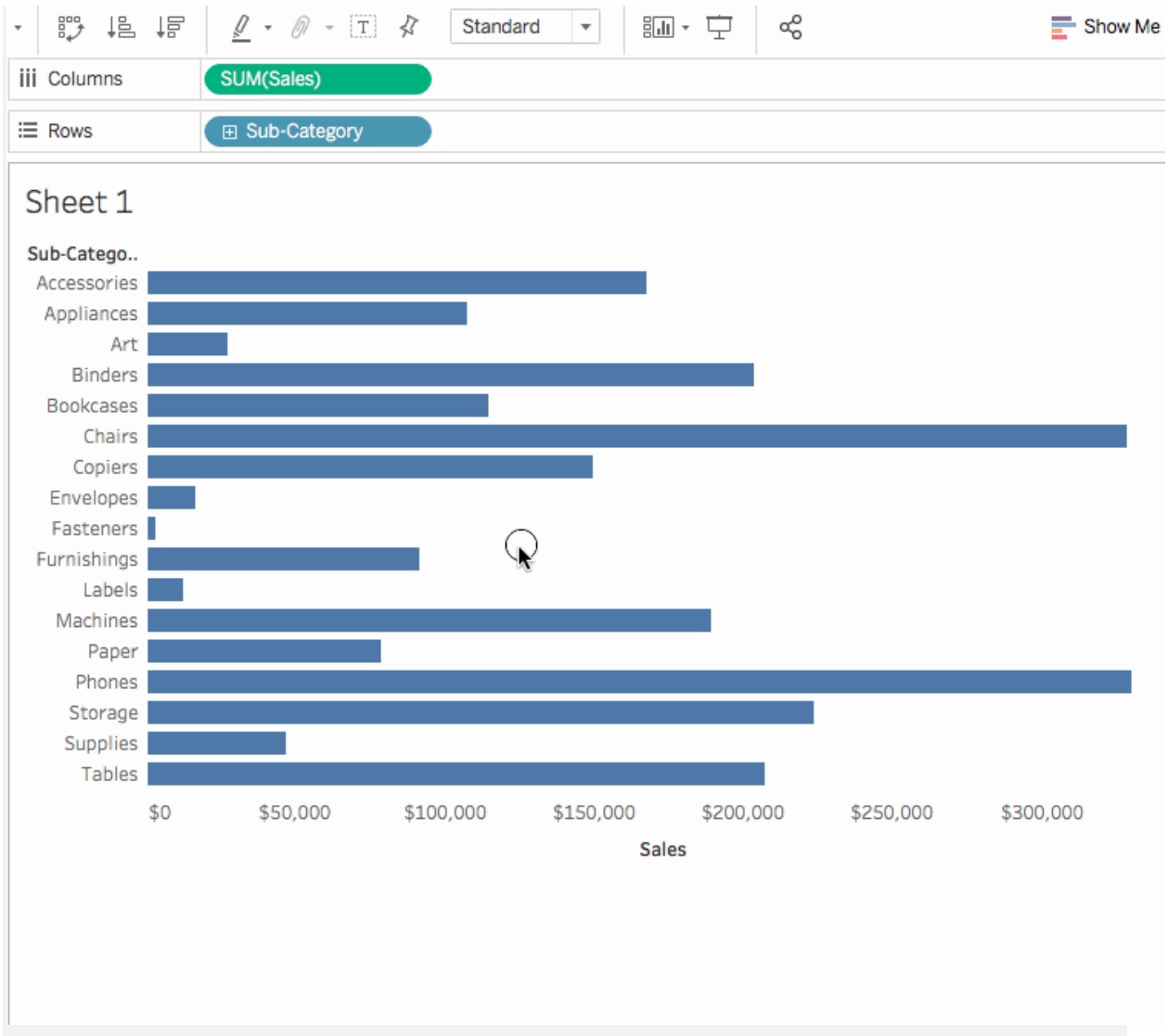
Columns shelves. This means that Tableau will not rearrange any of the headers of the fields that appear before (to the left of) the sorted field.

- If you want to break the dimension hierarchy when sorting a multidimensional data source, place only the hierarchy level that you want sorted on the Rows or Columns shelf.

Sort data using the toolbar

You can quickly sort data in ascending or descending order using the toolbar. To do so:

- In a worksheet, on the toolbar located just above the Columns shelf, click the Descending sort icon to sort data from highest/most to lowest/least, or the Ascending icon to sort data from lowest/least to highest/most.

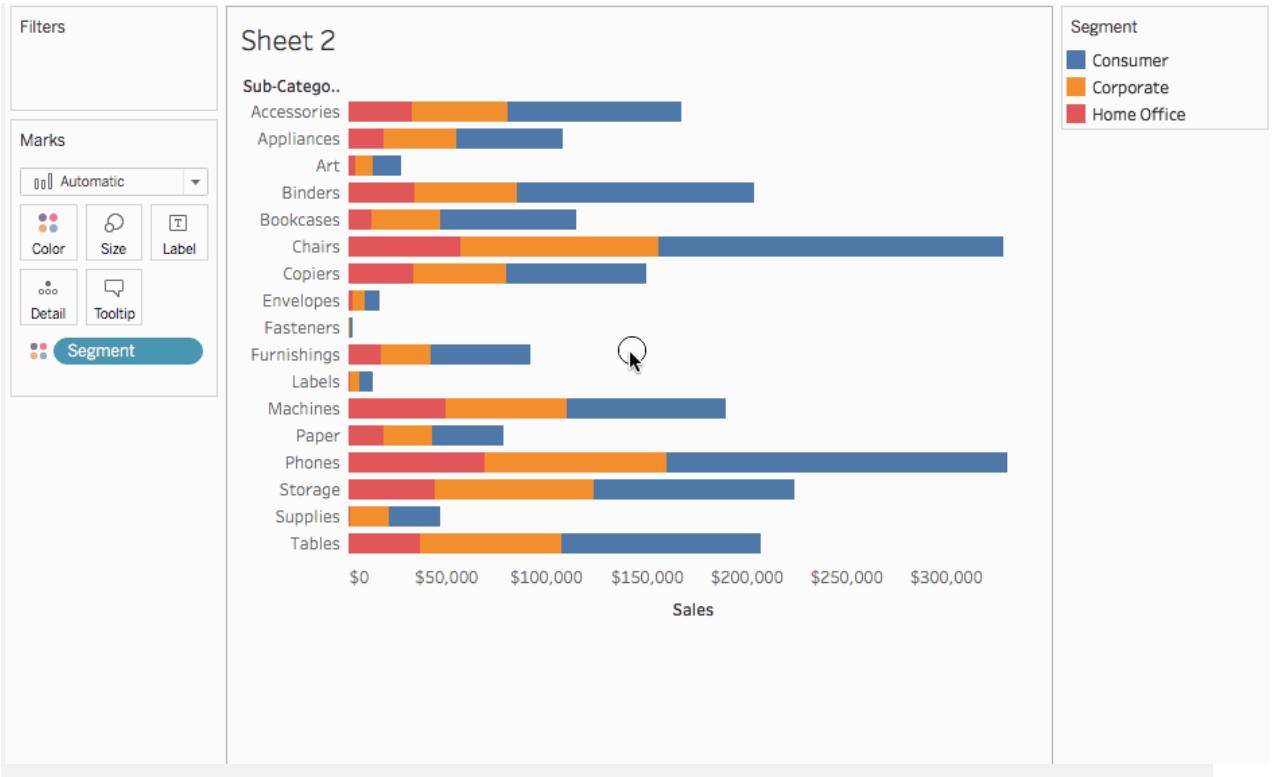


Sort data using headers or legends

You can manually sort data in your visualization by dragging and dropping members in a header or legend, such as a color or shape legend.

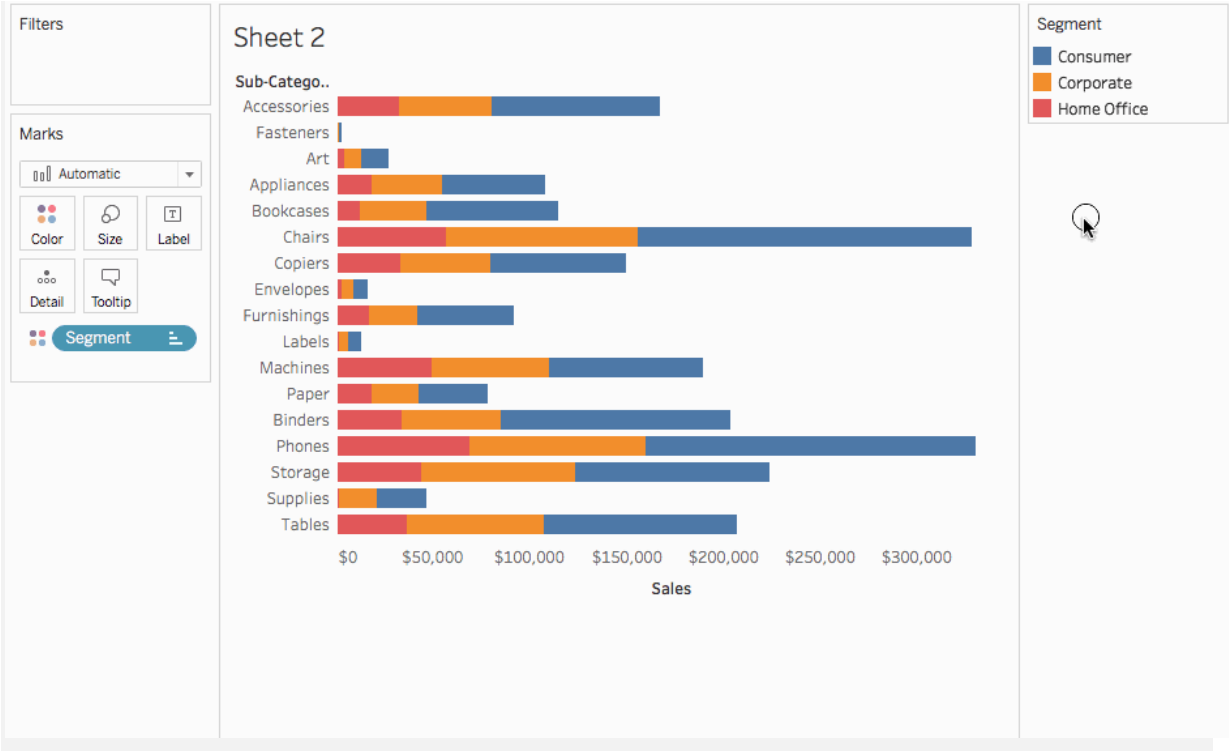
To manually sort data using a header:

- In a worksheet, select a member in a header and drag it up or down.
- The viz updates with the new sort.



To manually sort data using a legend:

- In a worksheet, select a member in a legend and drag it up or down.
- The viz updates with the new sort. Notice that the order the data points in the view appear also updated.



Create a nested sort

With the release of Tableau Desktop 2018.2, you can now create a nested sort without any additional calculated fields or combined dimensions.

Suppose you are looking at sales sub-categories for all regions in your country. In the view below, you can see that the Central region sells more products in the Chairs subcategory than any other subcategory. However it's harder to compare how Chairs ranked in other regions.

To see which subcategories ranked the highest in each region, you might want to sort the subcategories within each region instead. You can do this with nested sorting.

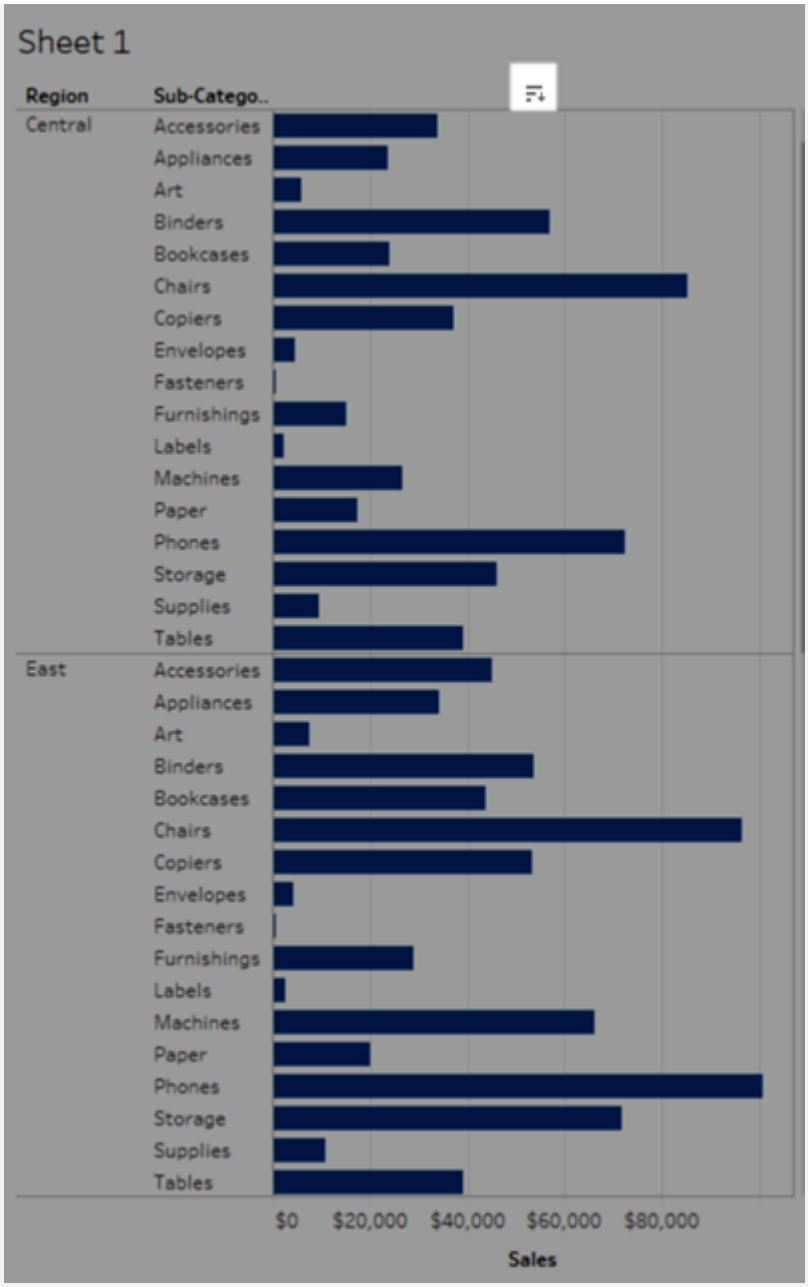
Set up the view

1. In Tableau Desktop, open a new workbook and connect to the **Sample Superstore**data source that comes with Tableau.

2. Navigate to a new worksheet.
3. From Measures, drag **Sales** to the **Columns** shelf.
4. From Dimensions, drag **Region** to the **Rows** shelf.
5. From Dimensions, drag **Sub-Category** to the **Rows** shelf, to the right of the Region field.

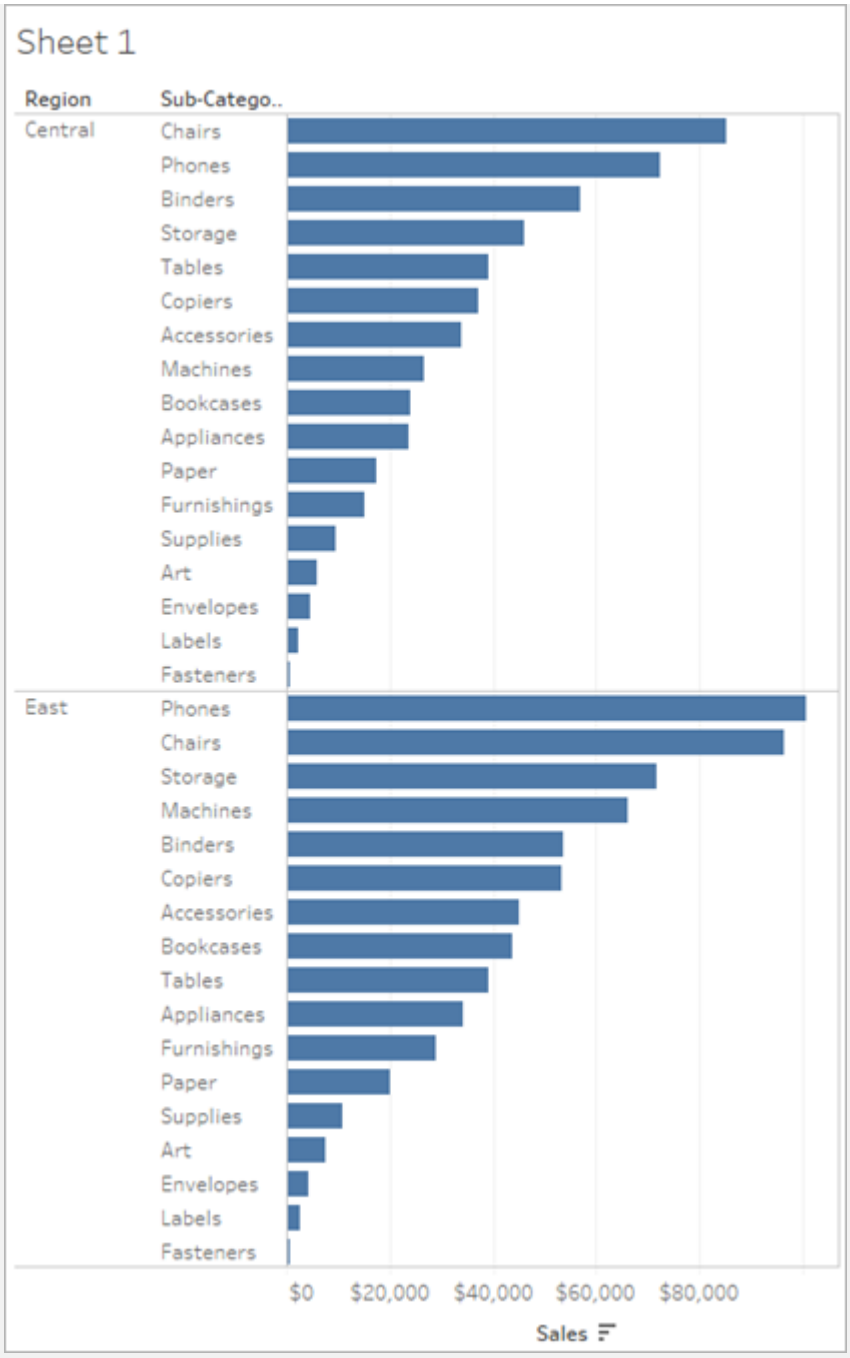
Create a nested sort using the header

On the worksheet, hover over a viz axis.



Click the sort icon that appears at the top of the view.

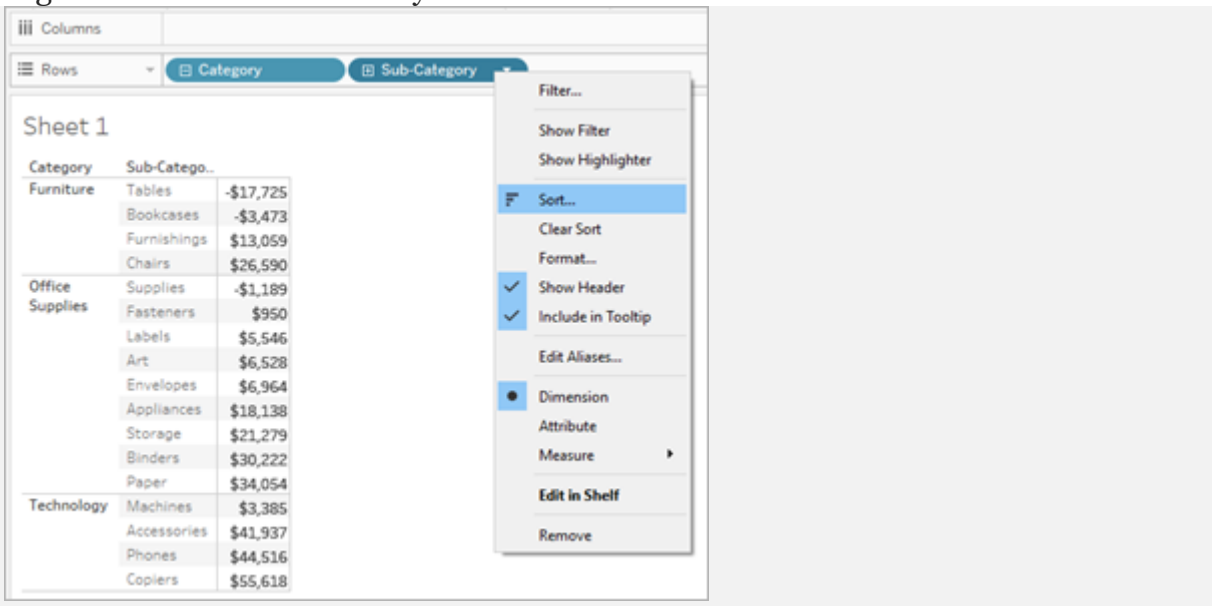
One click sorts the data in ascending order. **Two** clicks sorts it in descending order. **Three**clicks clears the sort.



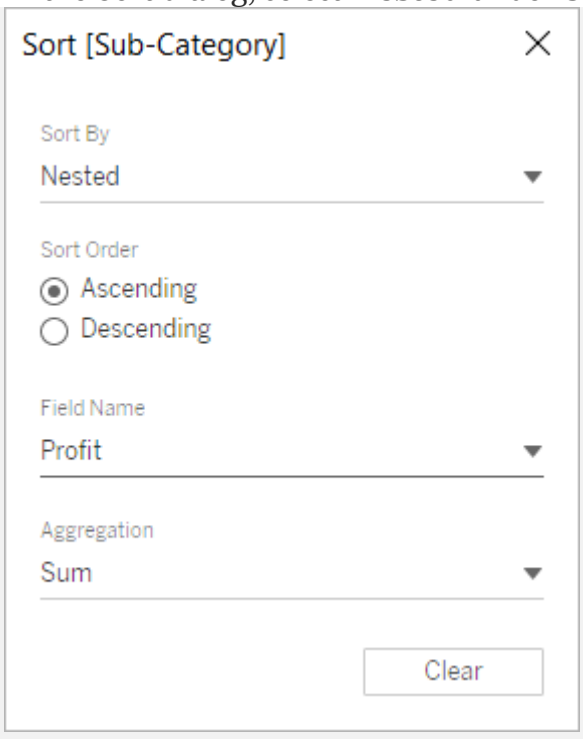
Now you have a nested sort where the subcategories are listed in descending order of sum of sales within each region. You can see that Chairs are the highest selling subcategory in the Central region, but in the East region, Phones are the best selling product; Chairs are the second-best selling product.

Create a Nested Sort using the Sort menu

Right click on the dimension you wish to sort and select Sort.



In the Sort dialog, select **Nested** under **Sort By**.



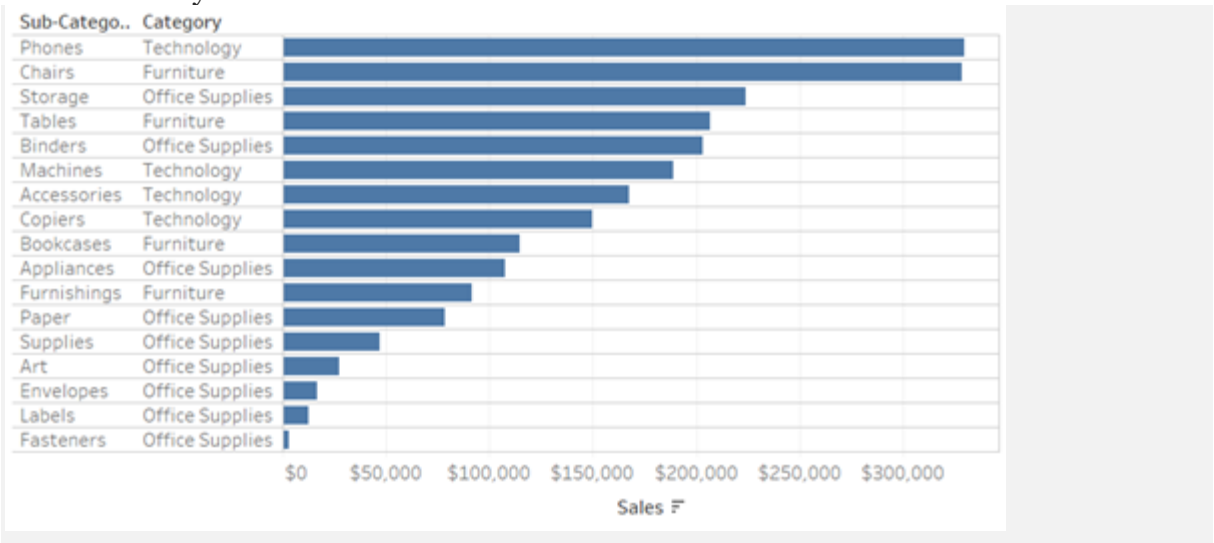
When using the Sort menu to create a nested sort, you can define the field and aggregation you wish to sort by. For example, you could sort the view by Profit even if Sales is the only measure in the view.

It is possible to create a nested sort on both the rows and columns shelves using this method.

Note: When creating a nested sort, the sort will propagate when you drill down through the dimensions. For example, a nested sort on Sub-Category will apply to Manufacturer and Item if you drill down to that level.

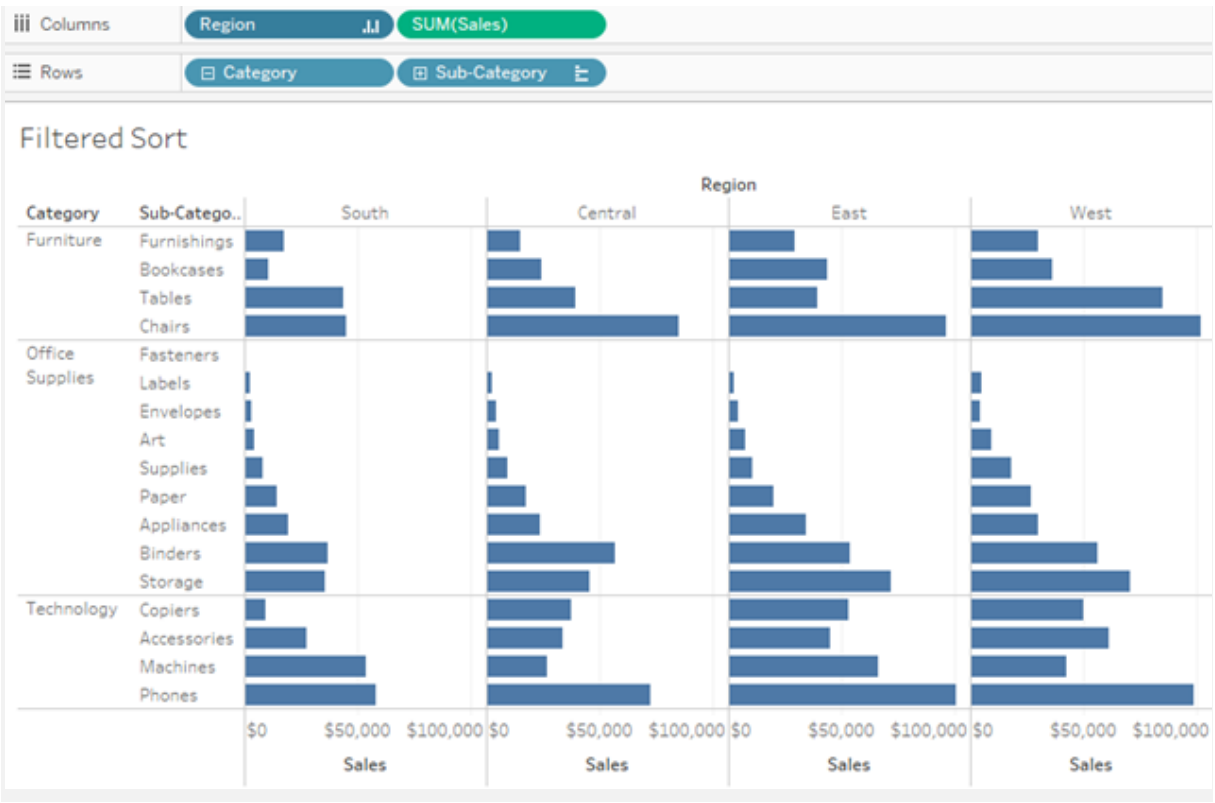
Sorting with one mark per pane

If your visualization is only one mark per pane, you can use the same processes as above to sort your data.



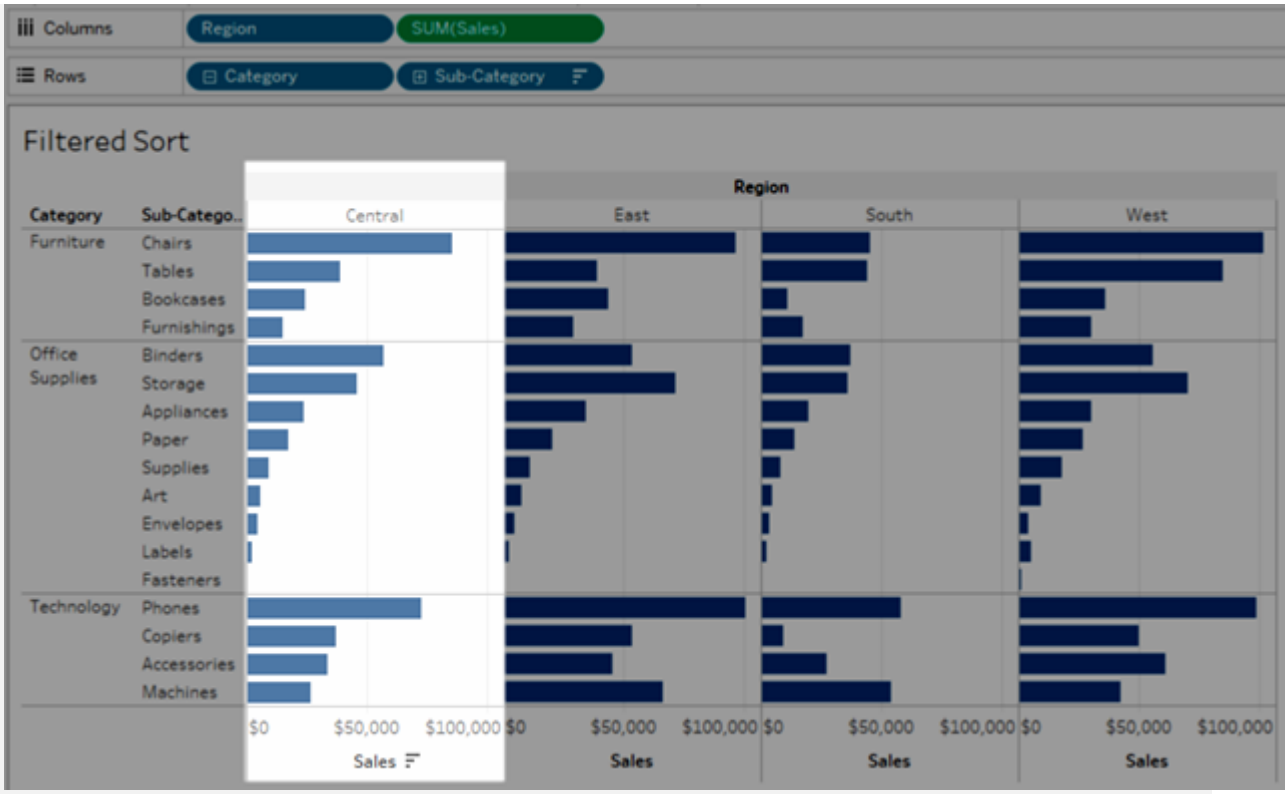
Create a Filtered Nested Sort

When you have dimensions on both the rows and columns shelf, a nested sort on both shelves might not produce clear results. The nested sort will apply on the columns shelf as if the data on the rows shelf was aggregated, and the nested sort on the rows shelf will apply as if the data on the columns shelf was aggregated.



Instead of sorting across all fields in a view, we can filter down to a single field and maintain the nested sort.

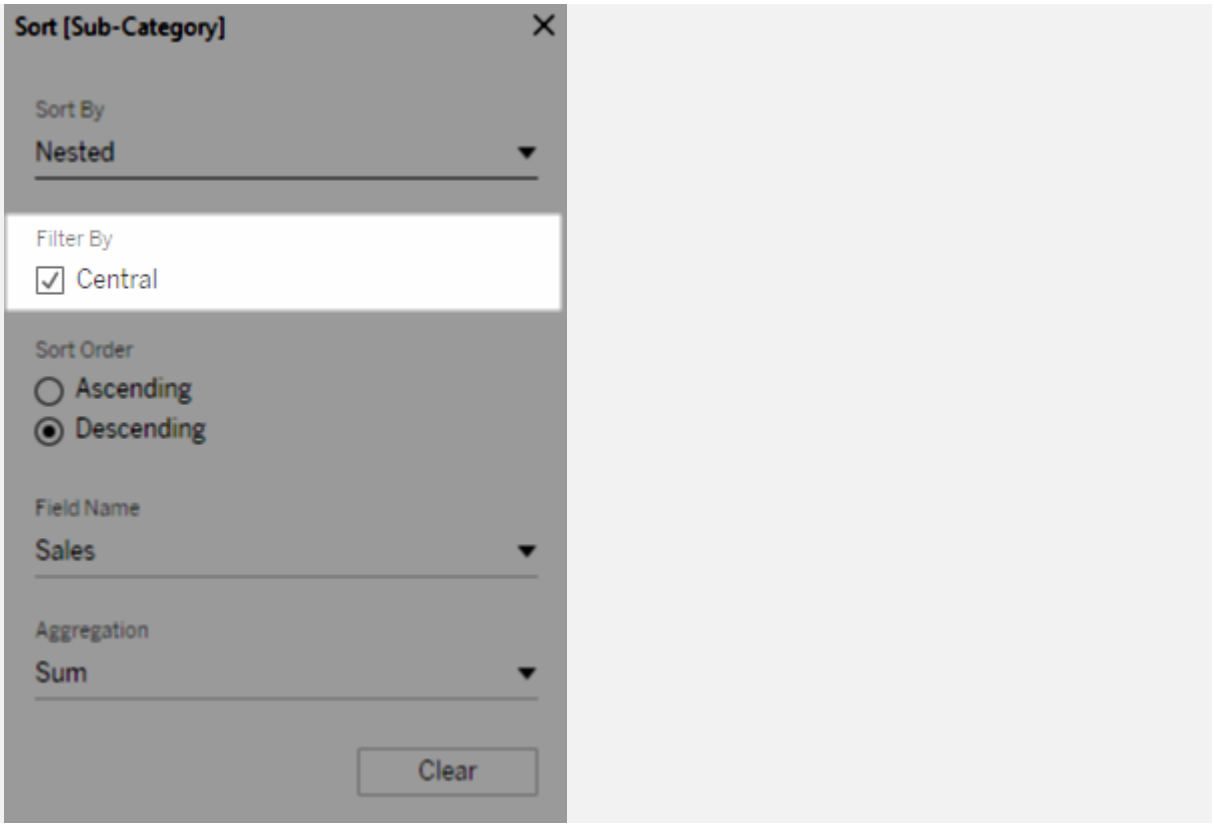
In the worksheet, hover over the lower viz axis of the dimension member you want to sort on. Click the Sort icon that appears next to the Dimension name.



The Nested sort will now apply only to that field.

To remove the Filtered Nested Sort, right click on the Dimension in the rows shelf and select Sort.

In the dialog that appears, click the X next to the filtered field. Then select Apply.



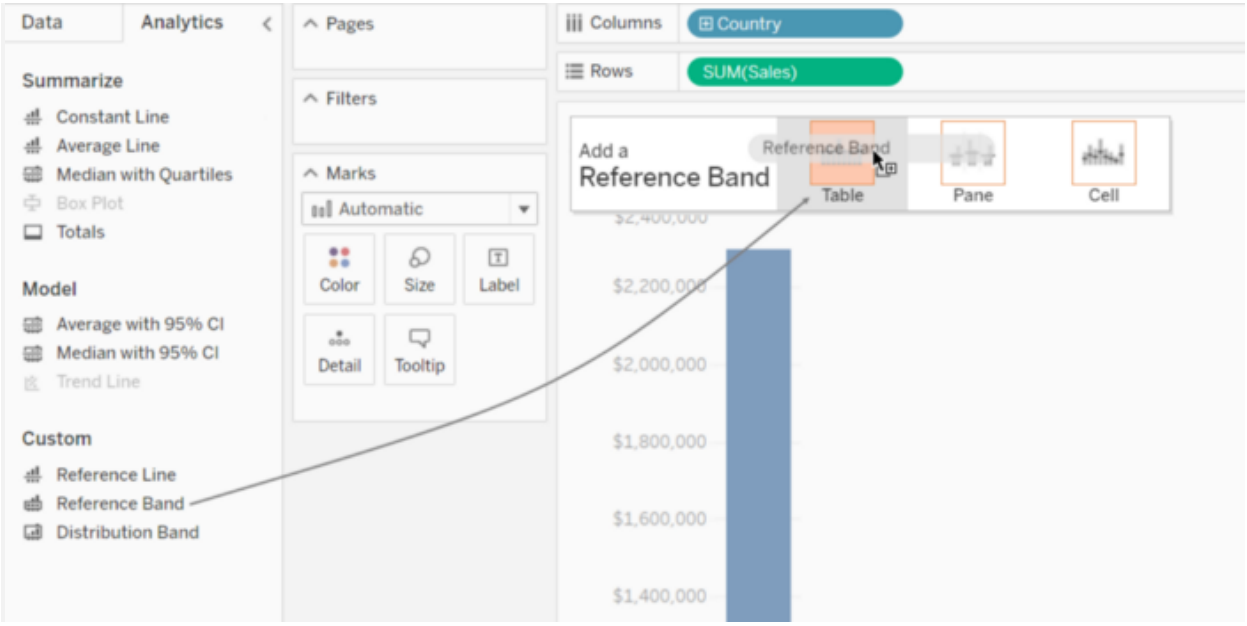
- **Add a reference line or trend line**

You can add a reference line to any continuous axis in the view.

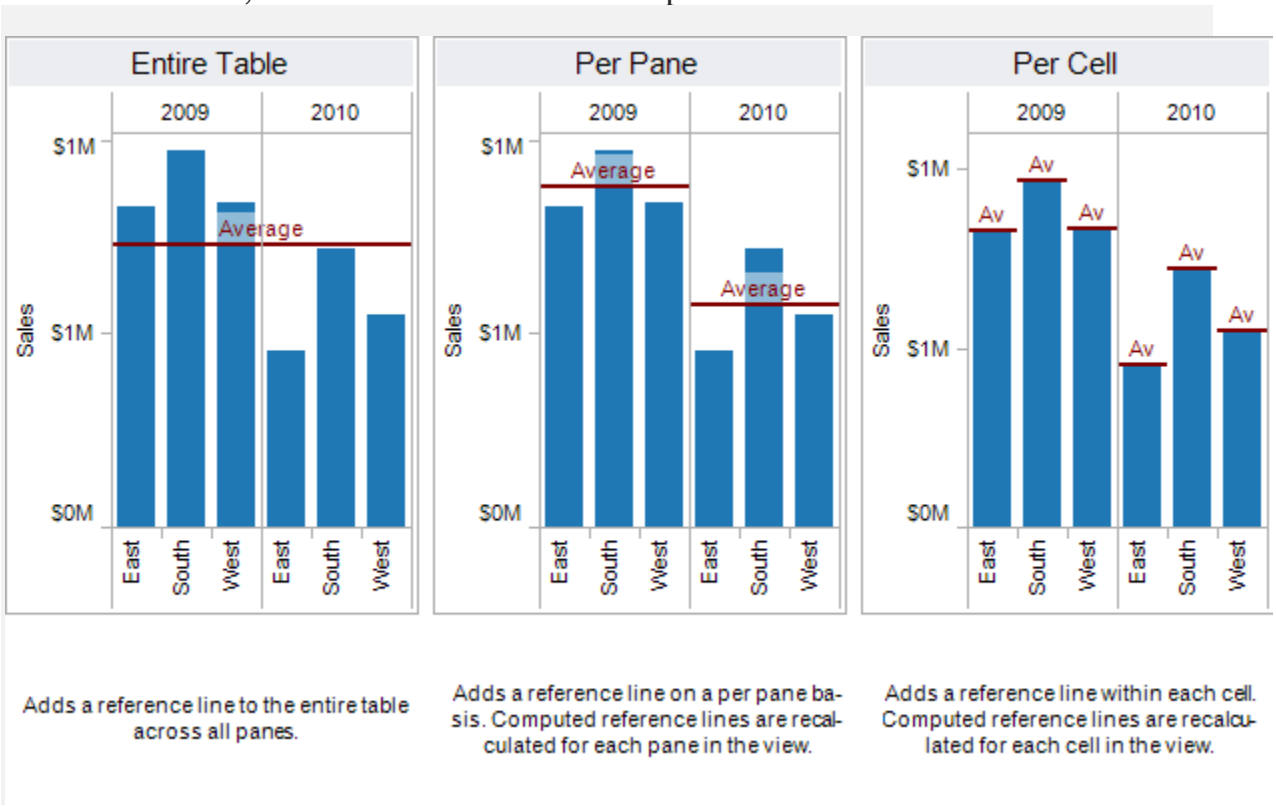
To add a reference line:

1. Drag **Reference Line** from the **Analytics** pane into the view. Tableau shows the possible destinations. The range of choices varies depending on the type of item and the current view.

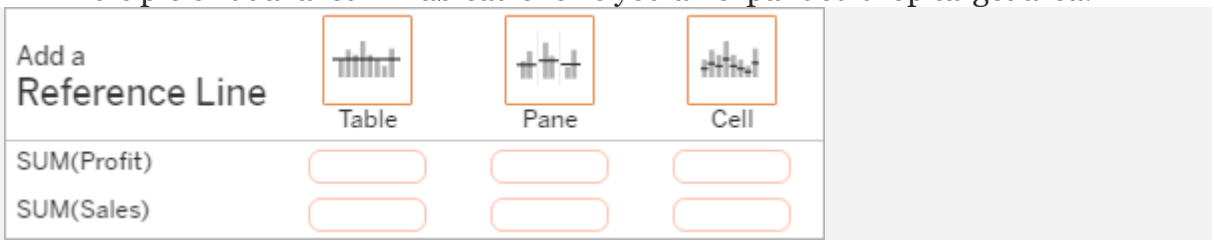
2. In a simple case, the drop target area offers three options:



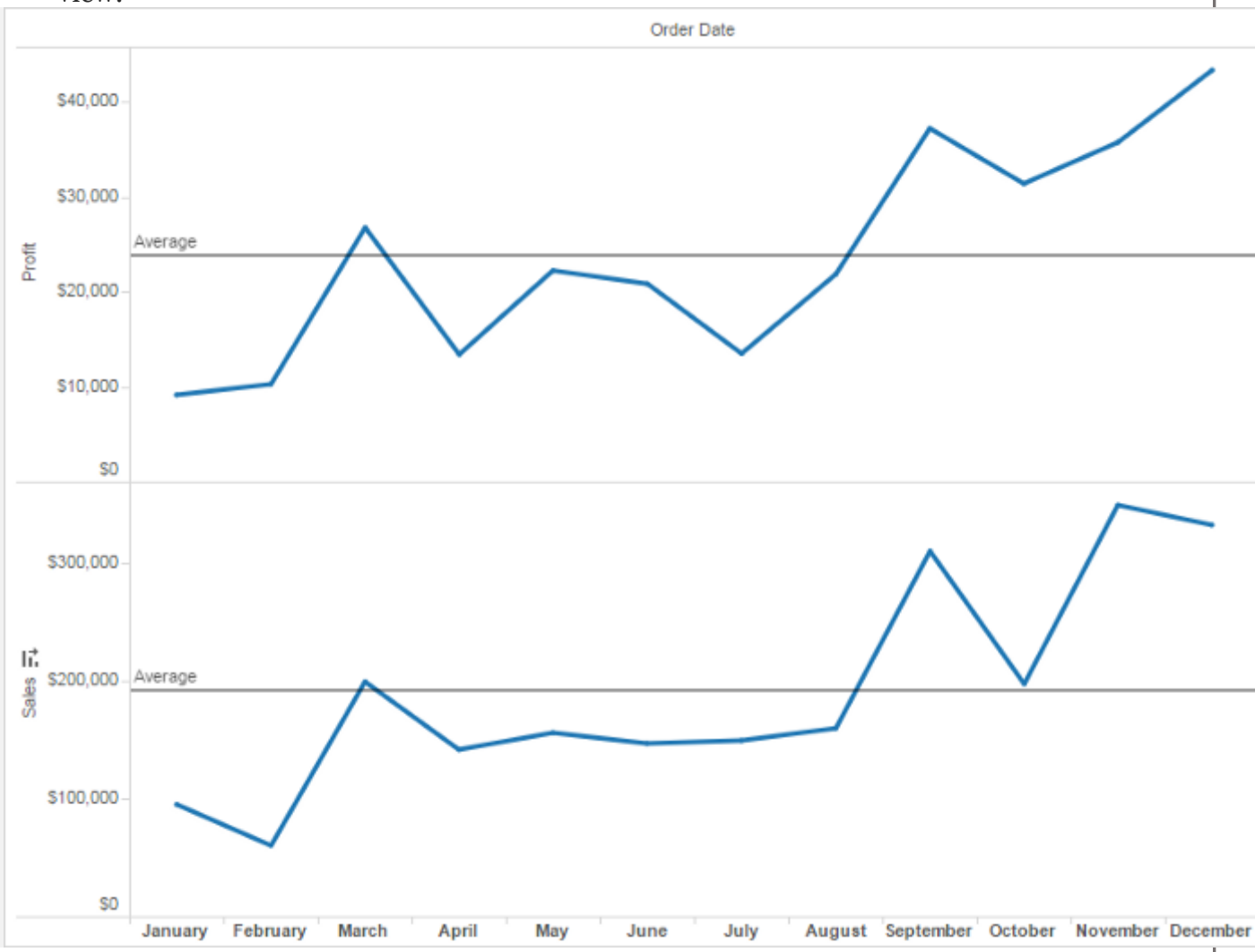
1. The view above is from a web editing session. In Tableau Desktop, the process is the same but the user interface looks a bit different. The terms **Table**, **Pane** and **Cell**define the scope for the item:



1. For a more complicated view — for example, if the view contains a line chart with multiple or dual axes — Tableau shows you an expanded drop target area:



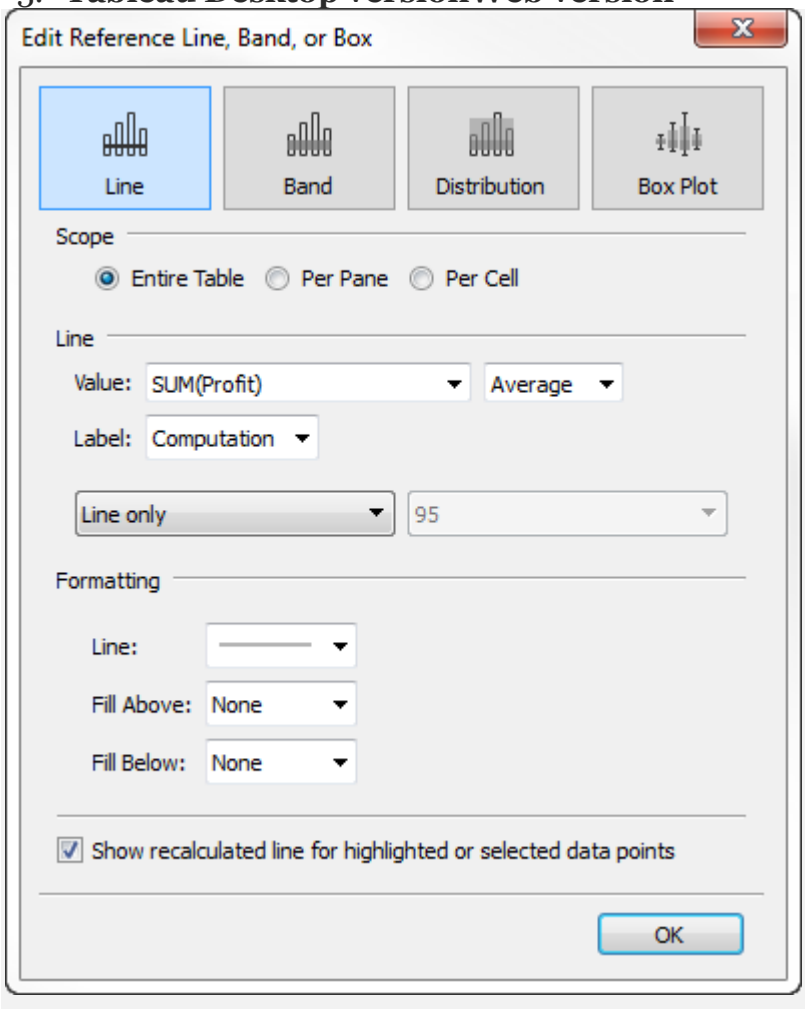
1. If you drop the item in one of the three larger boxes in the header (for example, the **Table** box), a separate reference line is added for each continuous field in the view:

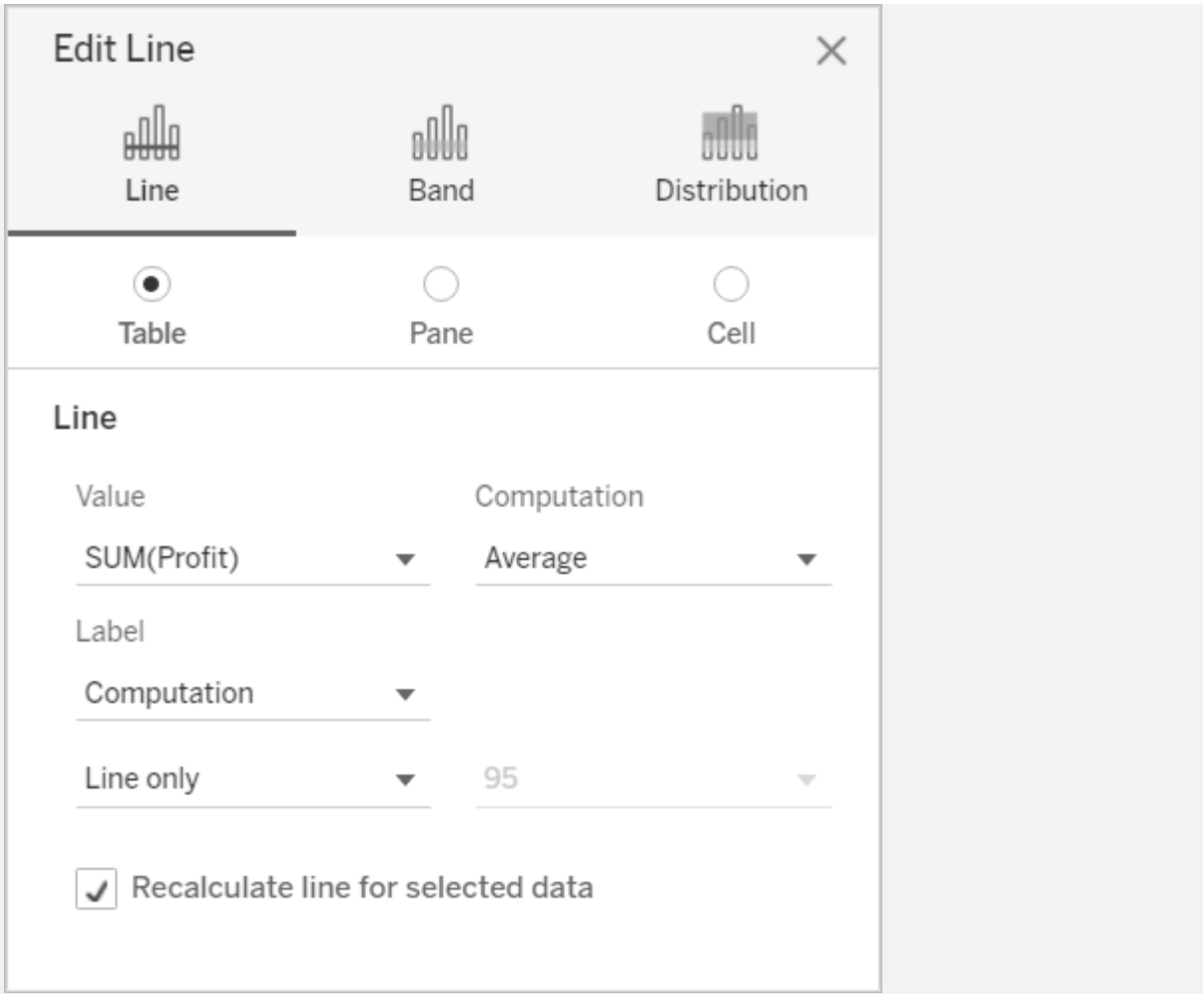


1. But if you drop the item in any of the lower boxes that are aligned with a specific continuous field, the line is added on the corresponding axis, with the specified scope.

2. When you drop the line in the target area, Tableau displays a dialog box:

3. **Tableau Desktop versionWeb version**





1. The **Line** option is already selected at the top of the dialog box.
2. Select a continuous field from the **Value** field to use as the basis for your reference line. You can also select a parameter.
3. You cannot select a continuous field that isn't currently in the view as the basis for your reference line. If you want to use such a continuous field, do the following:
4. Drag the continuous field from the Data pane to the Details target on the Marks card.
5. Change the continuous field's aggregation if necessary.

6. This will not change the view, but it will allow you to use that continuous field as the basis for your reference band.

7. Click o the reference line in the view and choose **Edit** to re-open the **Edit Line**dialog box.

8. Select an aggregation. The aggregations that are displayed depend on the continuous field you select:

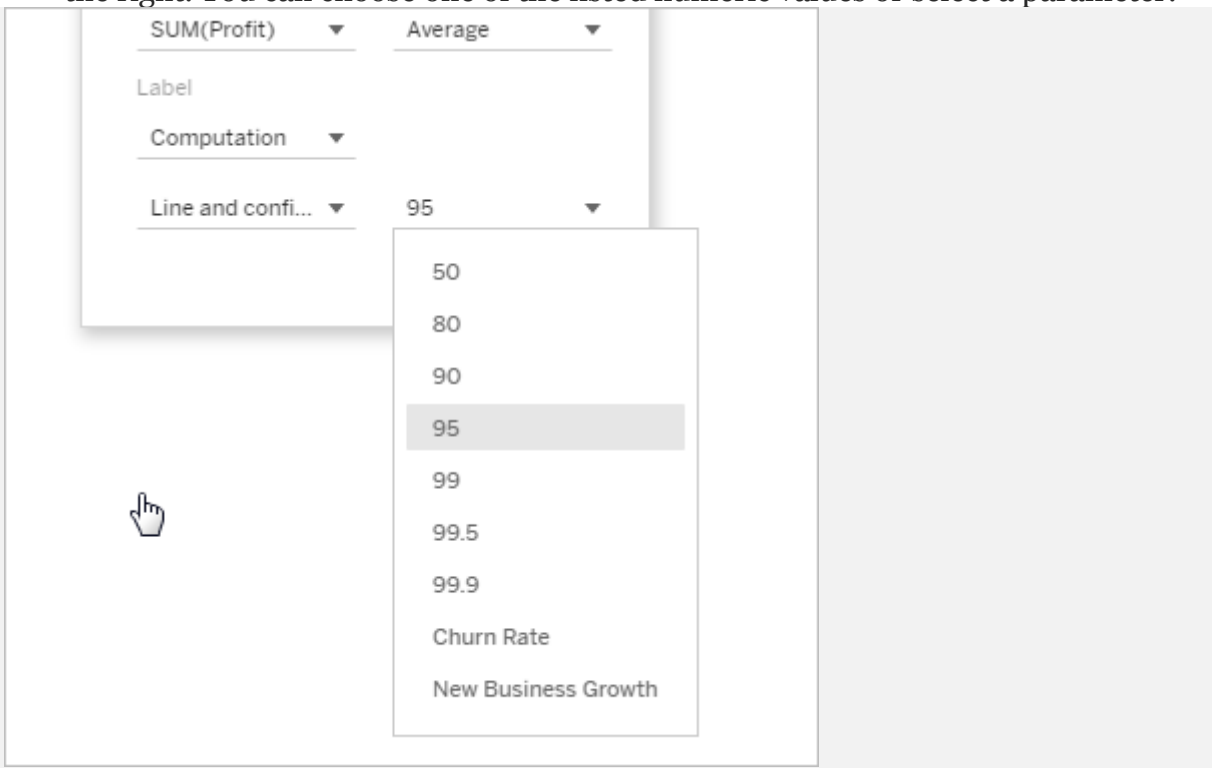
- **Total** — places a line at the aggregate of all the values in either the cell, pane, or the entire view. This option is particularly useful when computing a weighted average rather than an average of averages. It is also useful when working with a calculation with a custom aggregation. The total is computed using the underlying data and behaves the same as selecting one of the totals option the Analysis menu.
- **Sum** — places a line at the SUM of all the values in either the cell, pane, or entire view.
- **Costant**- places a line at the specified value on the axis.
- **Minimum** — places a line at the minimum value.
- **Maximum** — places a line at the maximum value.
- **Average** — places a line at the average value along the axis.
- **Median**- places a line at the median value.

1. Select how you want to label the line:

- **None** –select this option to not show a label for the reference line.

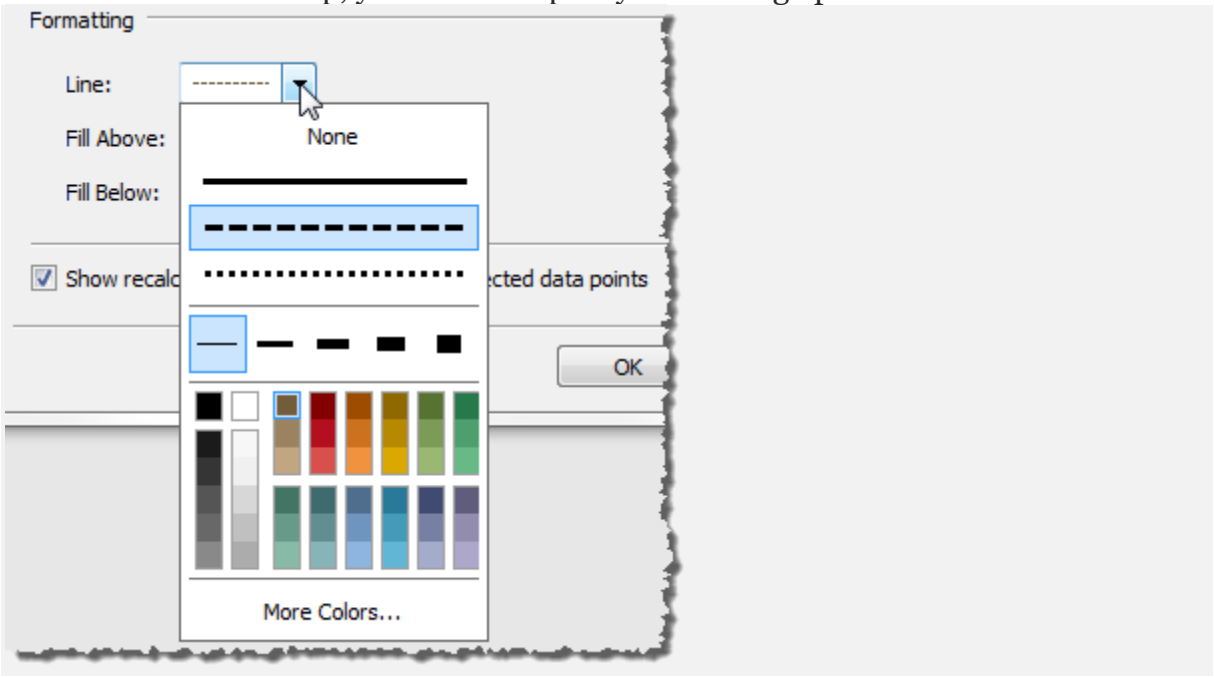
- **Value** — select this option to show a label corresponding to the line's value on the axis.
- **Computation** — select this option to display the name of the continuous field that is the basis for your reference line and any computation that is performed.
- **Custom** — select this option to build a custom label in the text box. You can use the menu to the right of the text box to insert values such as the computation or the value. You can also type text directly into the box, so you could create a value such as `<Field Name> = <Value>`.

1. Specify whether to display the line with a confidence interval, just the line, or just the confidence interval.
2. Confidence interval distribution bands shade the region in which the population average will fall *n* of the time, where *n* is the value you select in the drop-down on the right. You can choose one of the listed numeric values or select a parameter:

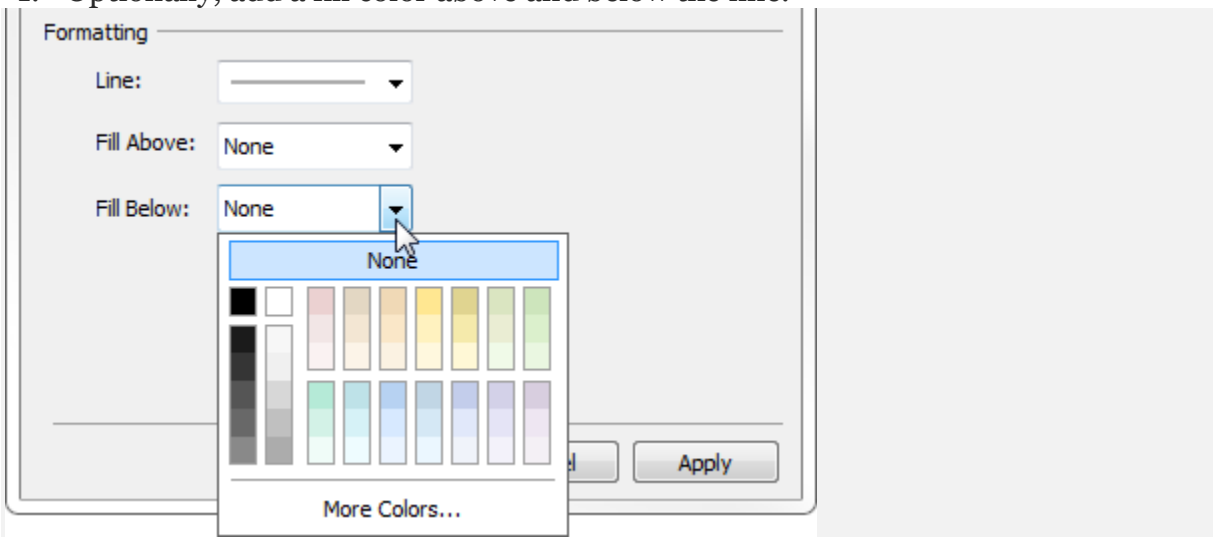


1. The higher the value you select, the wider the bands will be.

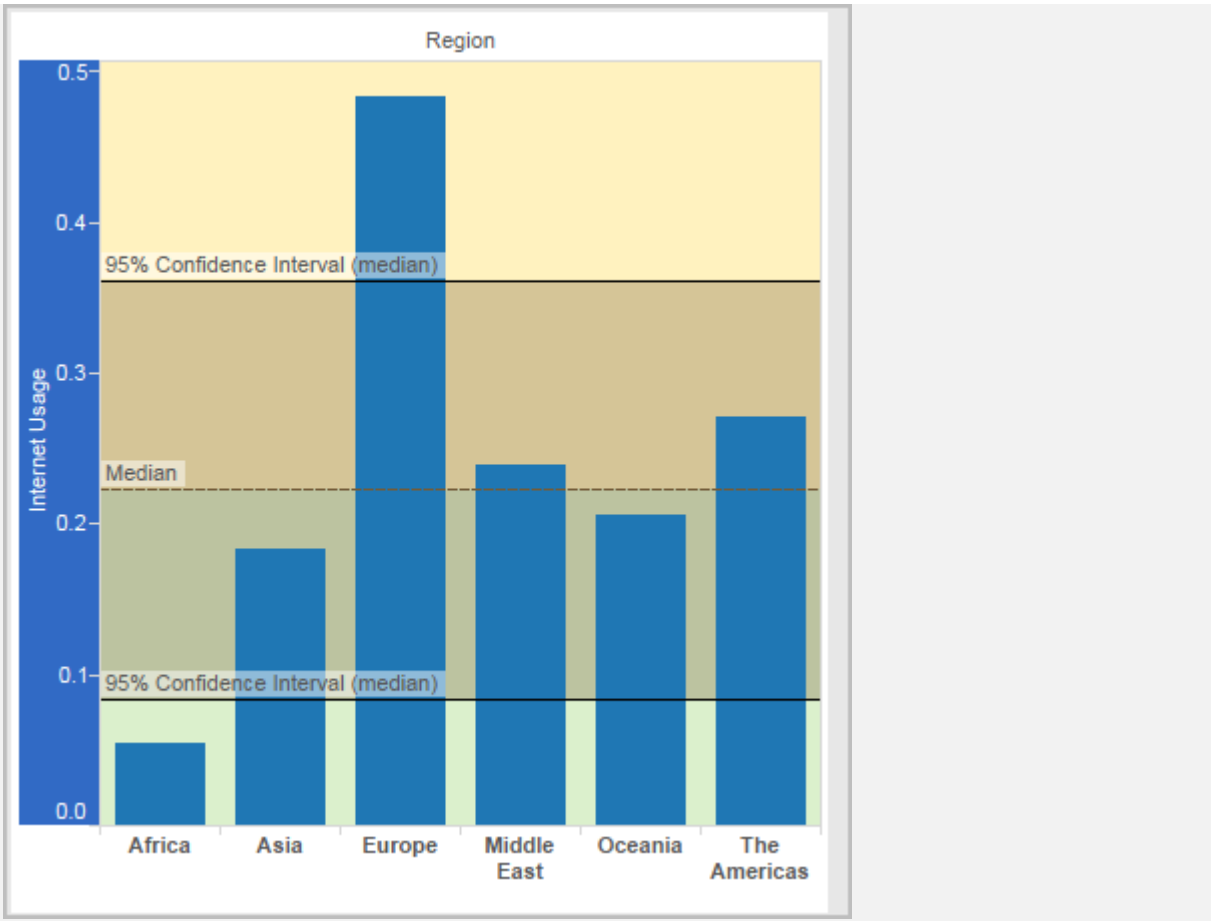
2. In Tableau Desktop, you can also specify formatting options for the line.



1. Optionally, add a fill color above and below the line.



1. When you are displaying a line and a confidence interval, the shading will be darker within the confidence interval, and lighter beyond it:



1. When you are displaying a confidence interval without a line, the fill colors are disregarded, though your settings are retained and then applied if you decide later to show a line.

2. Specify whether to **Show recalculated line for highlighted or selected data points**. For more information, see Compare marks data with recalculated lines.

- **Use a table calculation**

Transform Values with Table Calculations

Version: 2019.1 Applies to: Tableau Desktop, Tableau Online, Tableau Public, Tableau Server

This article explains the basics of table calculations and how to create them in Tableau.

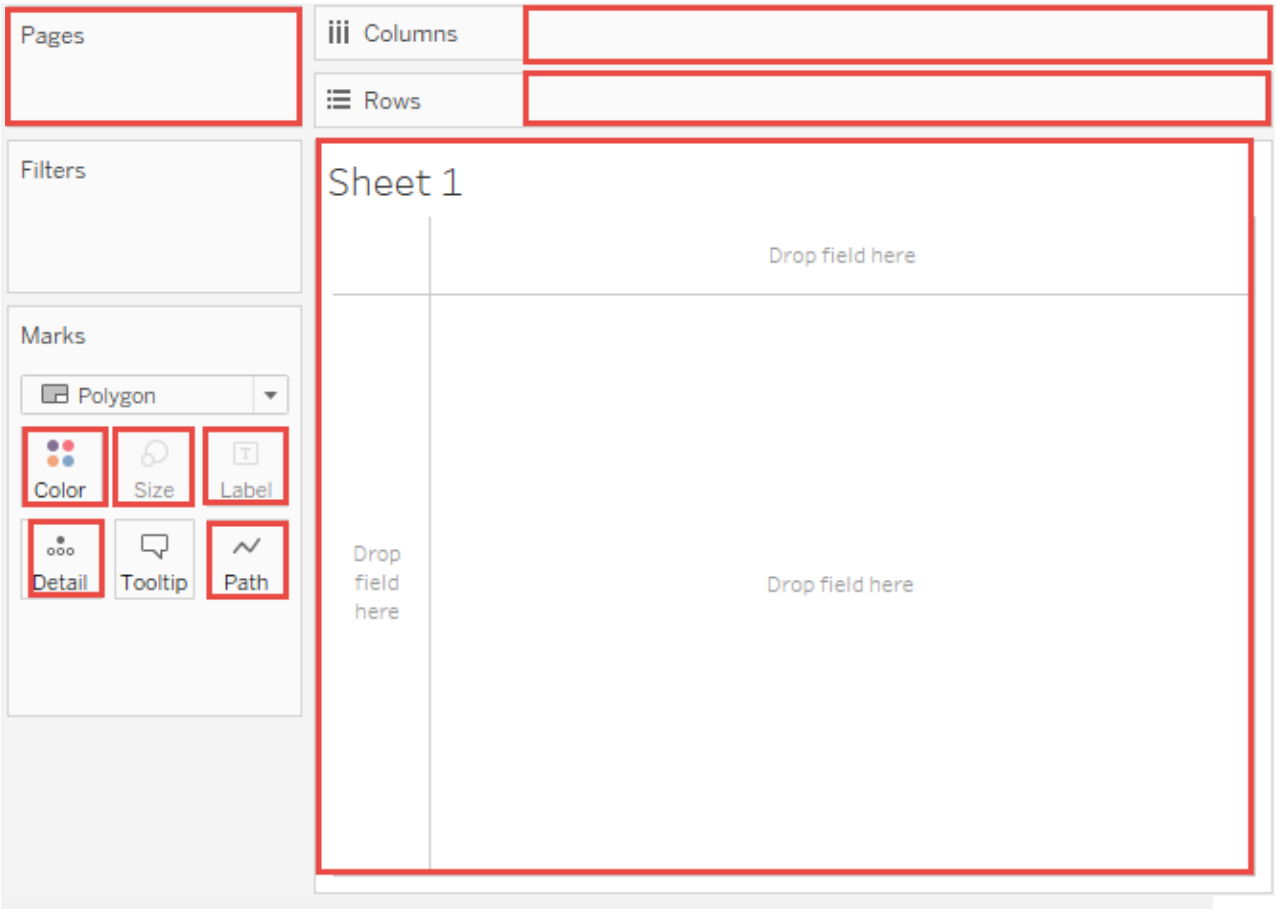
What is a table calculation?

A table calculation is a transformation you apply to the values in a visualization. Table calculations are a special type of calculated field that computes on the local data in Tableau. They are calculated based on what is currently in the visualization and do not consider any measures or dimensions that are filtered out of the visualization.

You can use table calculations for a variety of purposes, including:

- Transforming values to rankings
- Transforming values to show running totals
- Transforming values to show percent of total

For any Tableau visualization, there is a virtual table that is determined by the dimensions in the view. This table is not the same as the tables in your data source. Specifically, the virtual table is determined by the dimensions within the "level of detail," which means the dimensions on any of the following shelves or cards in a Tableau worksheet:



The basics: addressing and partitioning

When you add a table calculation, you must use all dimensions in the level of detail either for partitioning (scoping) or for addressing (direction).

The dimensions that define how to group the calculation (the scope of data it is performed on) are called **partitioning fields**. The table calculation is performed separately within each partition.

The remaining dimensions, upon which the table calculation is performed, are called **addressing fields**, and determine the direction of the calculation.

Partitioning fields break the view up into multiple sub-views (or sub-tables), and then the table calculation is applied to the marks within each such partition. The direction

in which the calculation moves (for example, in calculating a running sum, or computing the difference between values) is determined by the addressing fields. So when you order the fields in the Specific Dimensions section of the Table Calculation dialog box from top to bottom, you are specifying the direction in which the calculation moves through the various marks in the partition.

When you add a table calculation using the Compute Using options, Tableau identifies some dimensions as addressing and others as partitioning automatically, as a result of your selections. But when you use Specific Dimensions, then it's up to you to determine which dimensions are for addressing and which for partitioning.

Table (across)

Computes across the length of the table and restarts after every partition.

For example, in the following table, the calculation is computed across columns (YEAR(Order Date)) for every row (MONTH(Order Date)).

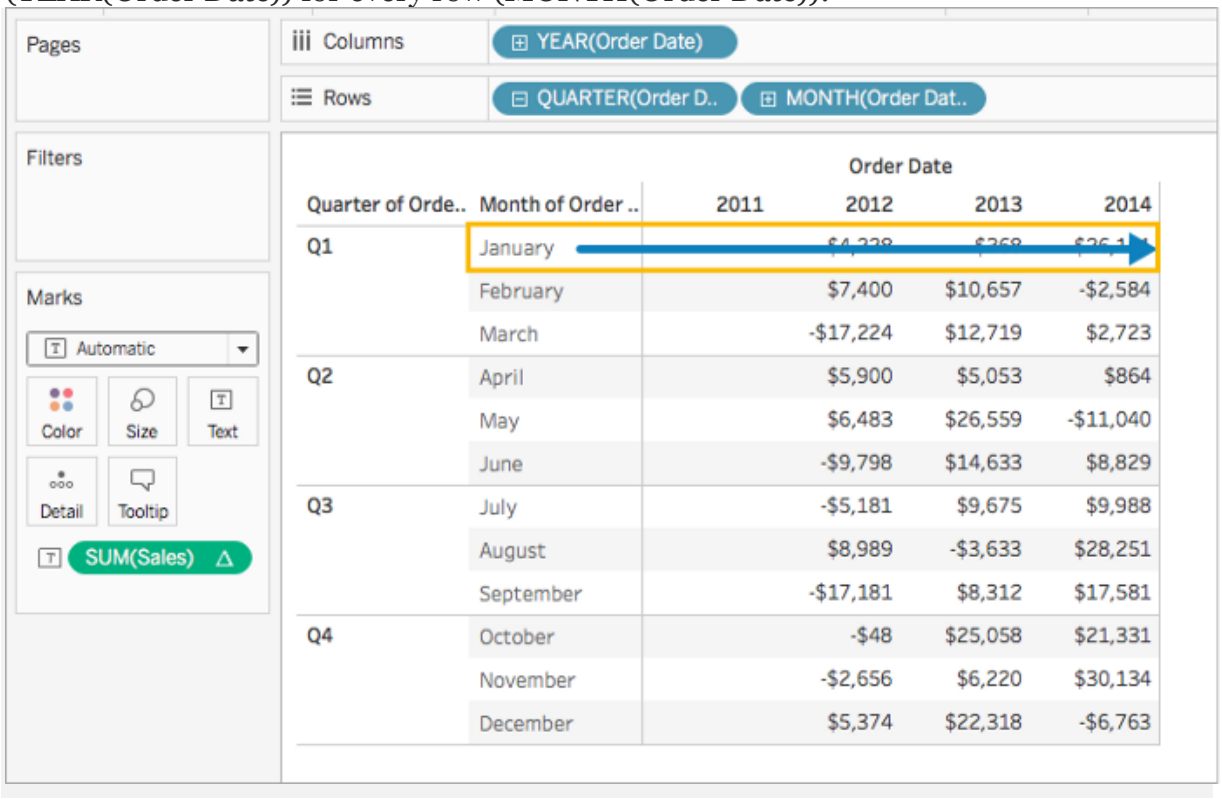


Table (down)

Computes down the length of the table and restarts after every partition.

For example, in the following table, the calculation is computed down rows (MONTH(Order Date)) for every column (YEAR(Order Date)).

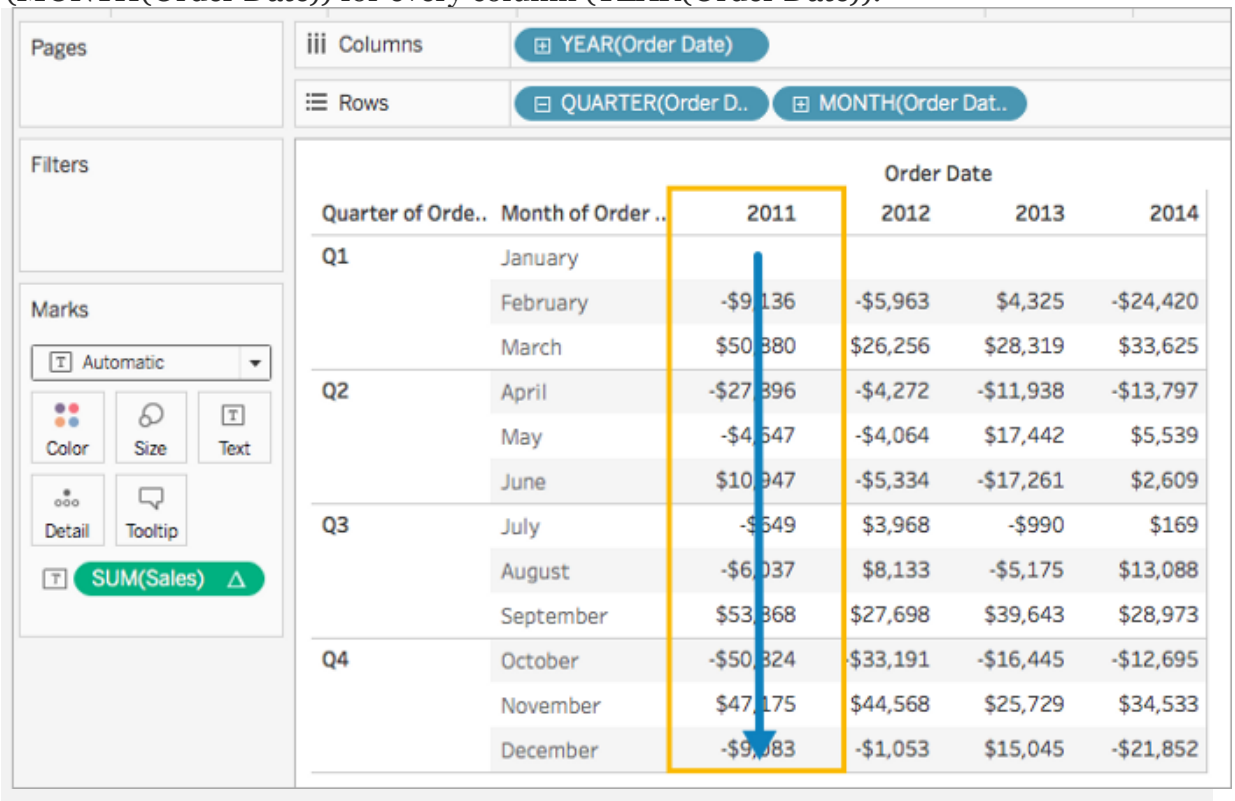


Table (across then down)

Computes across the length of the table, and then down the length of the table.

For example, in the following table, the calculation is computed across columns (YEAR(Order Date)), down a row (MONTH(Order Date)), and then across columns again for the entire table.

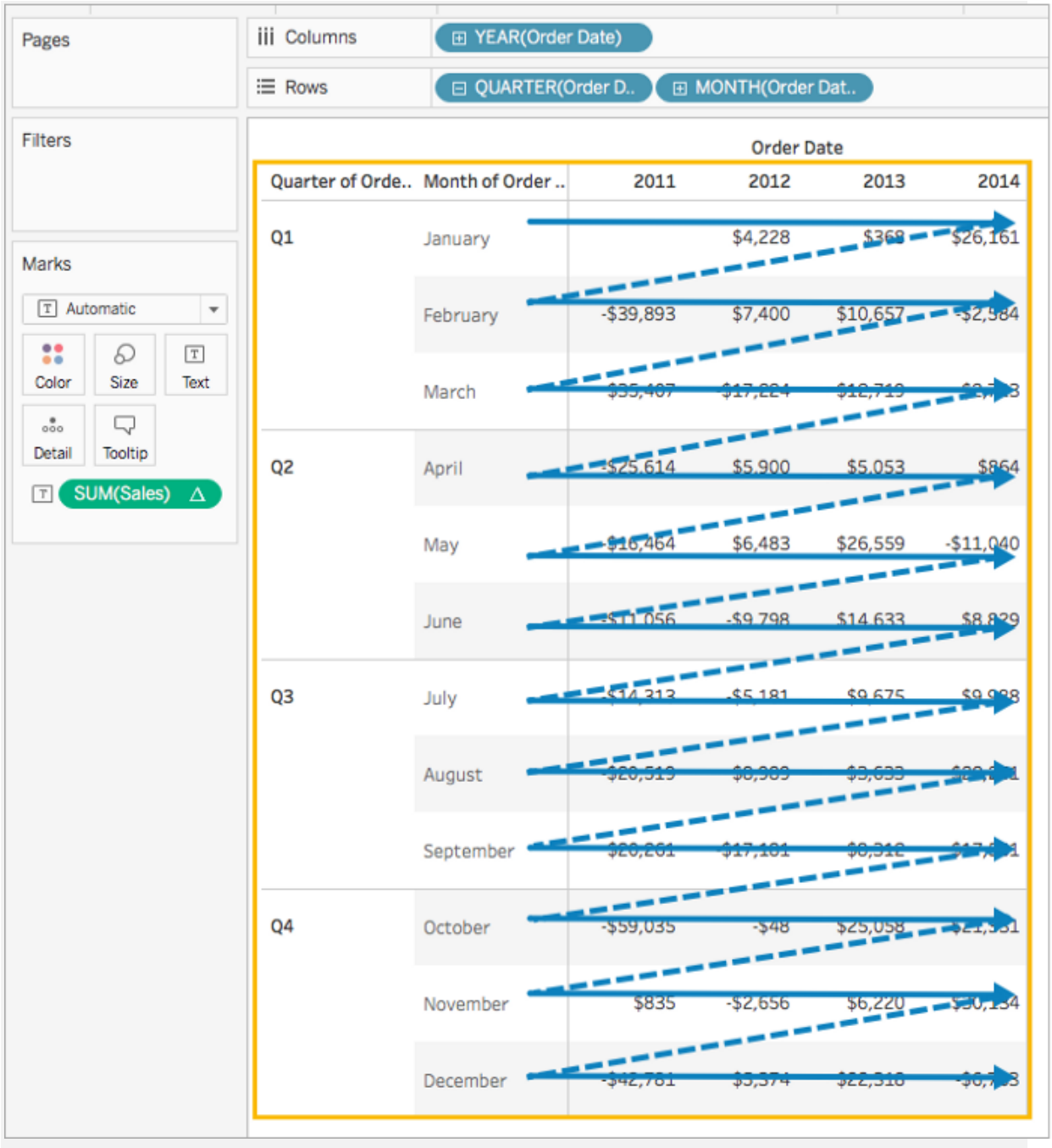
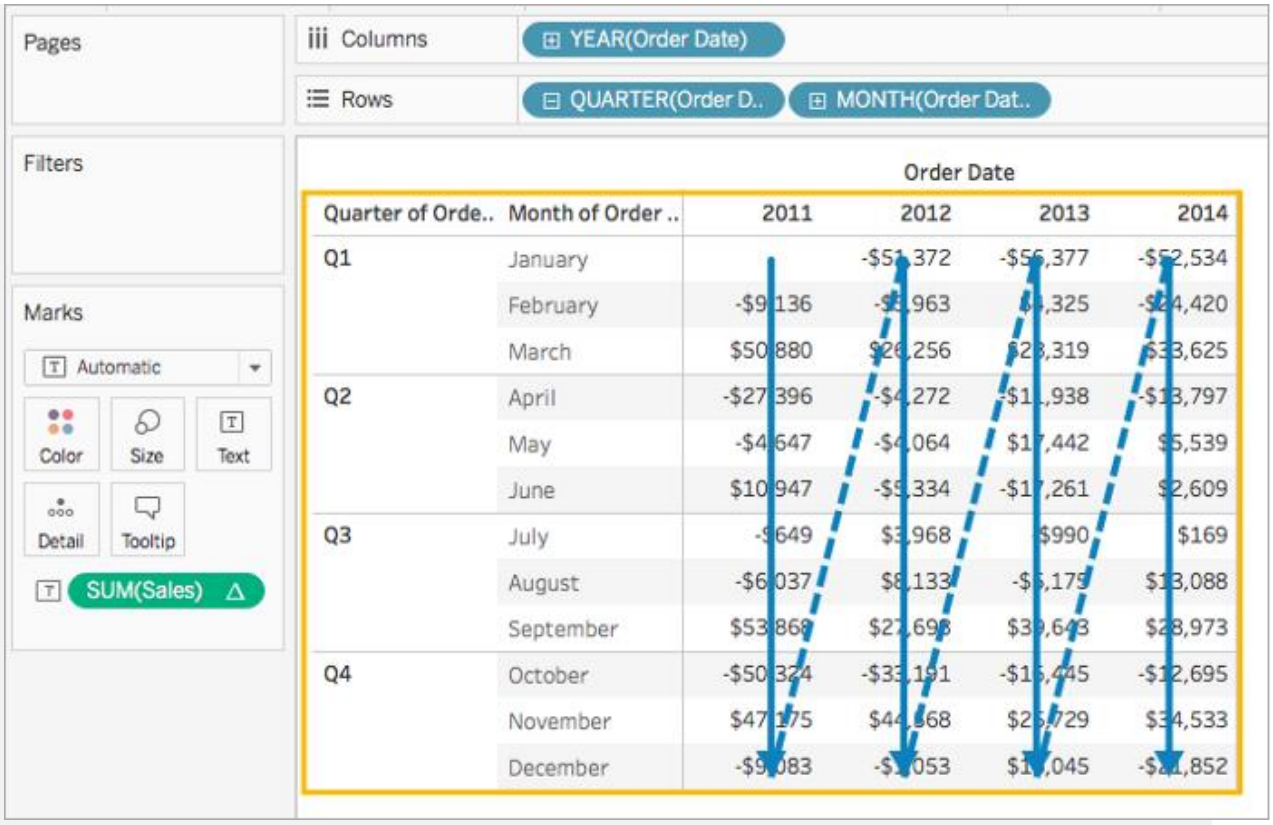


Table (down then across)

Computes down the length of the table, and then across the length of the table.

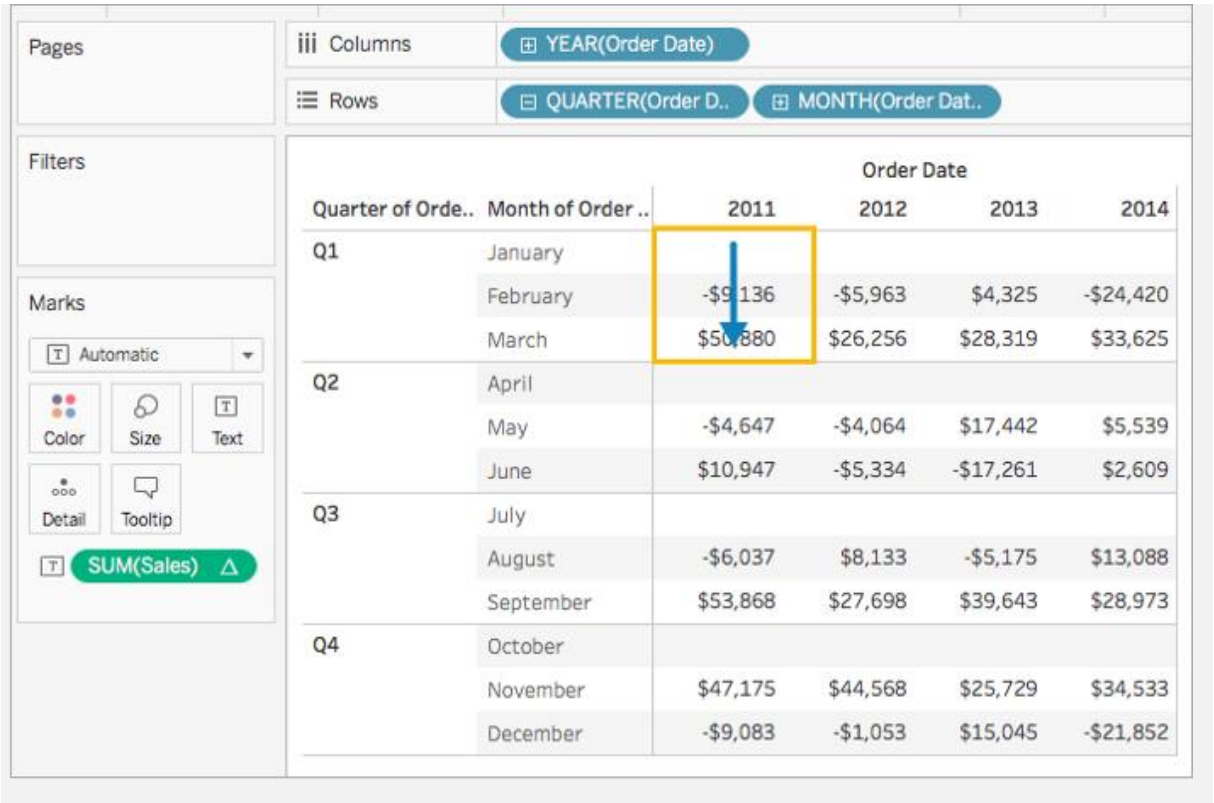
For example, in the following table, the calculation is computed down rows (MONTH(Order Date)), across a column (YEAR(Order Date), and then down rows again.



Pane (down)

Computes down an entire pane.

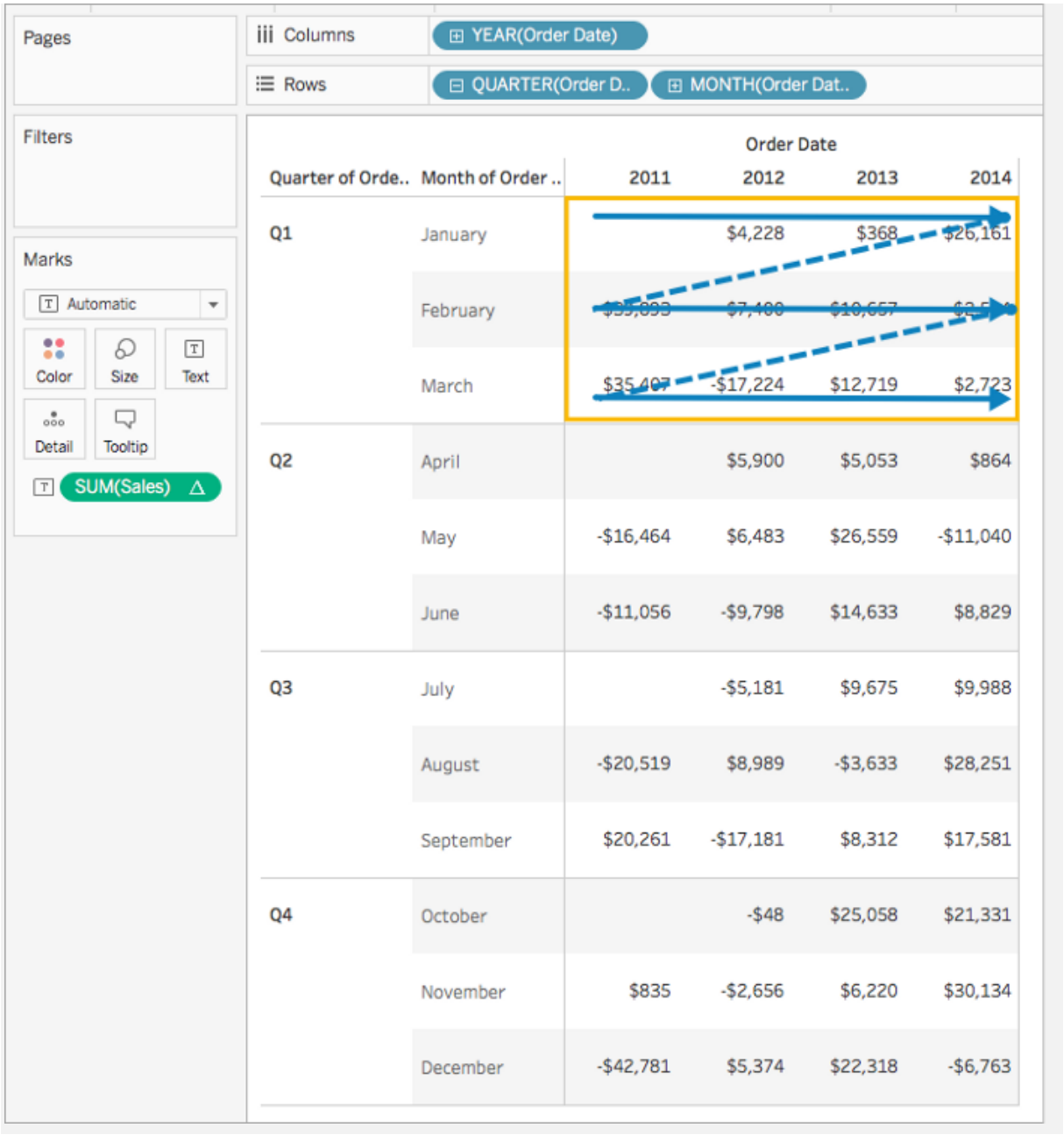
For example, in the following table, the calculation is computed down rows (MONTH(Order Date)) for a single pane.



Pane (across then down)

Computes across an entire pane and then down the pane.

For example, in the following table, the calculation is computed across columns (YEAR(Order Date)) for the length of the pane, down a row (MONTH(Order Date)), and then across columns for the length of the pane again.

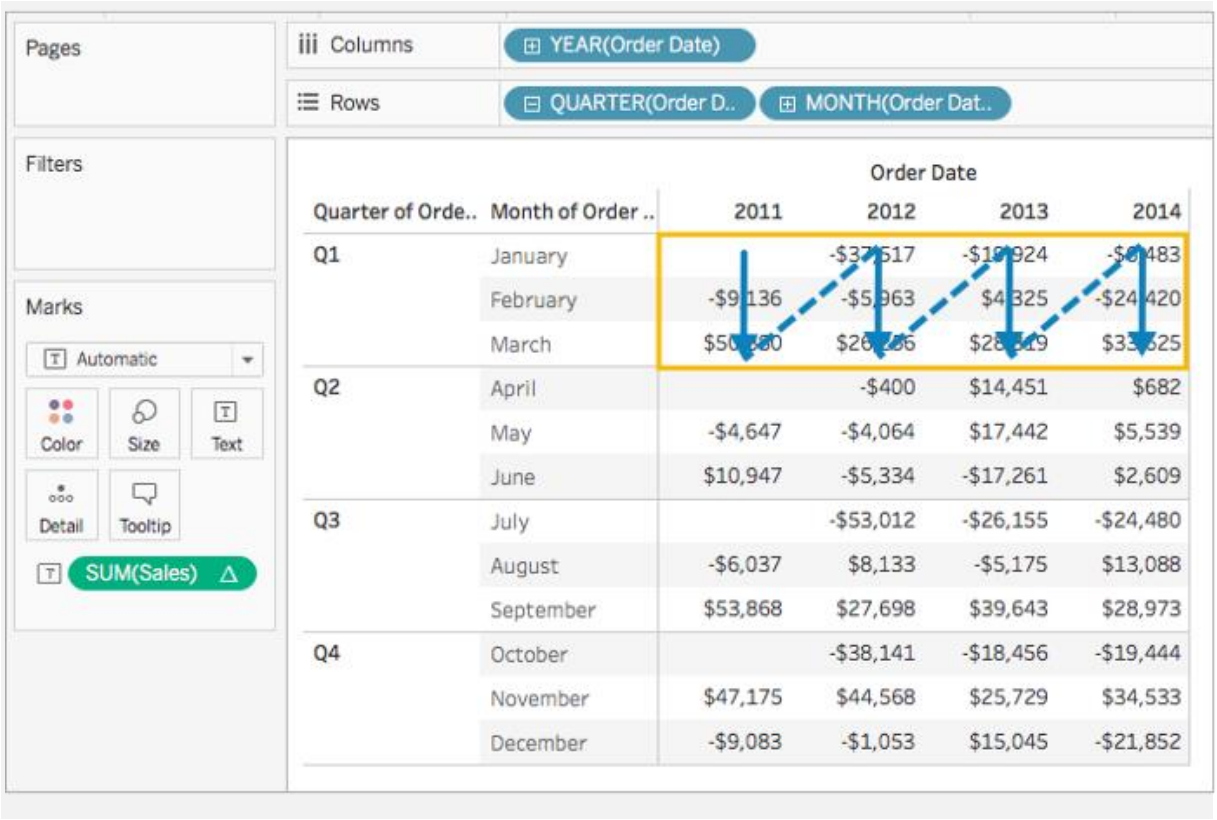


		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January		$4,228	$368	$26,161
	February				
	March	$35,407	-$17,224	$12,719	$2,723
Q2	April		$5,900	$5,053	$864
	May	-$16,464	$6,483	$26,559	-$11,040
	June	-$11,056	-$9,798	$14,633	$8,829
Q3	July		-$5,181	$9,675	$9,988
	August	-$20,519	$8,989	-$3,633	$28,251
	September	$20,261	-$17,181	$8,312	$17,581
Q4	October		-$48	$25,058	$21,331
	November	$835	-$2,656	$6,220	$30,134
	December	-$42,781	$5,374	$22,318	-$6,763

Pane (down then across)

Computes down an entire pane and then across the pane.

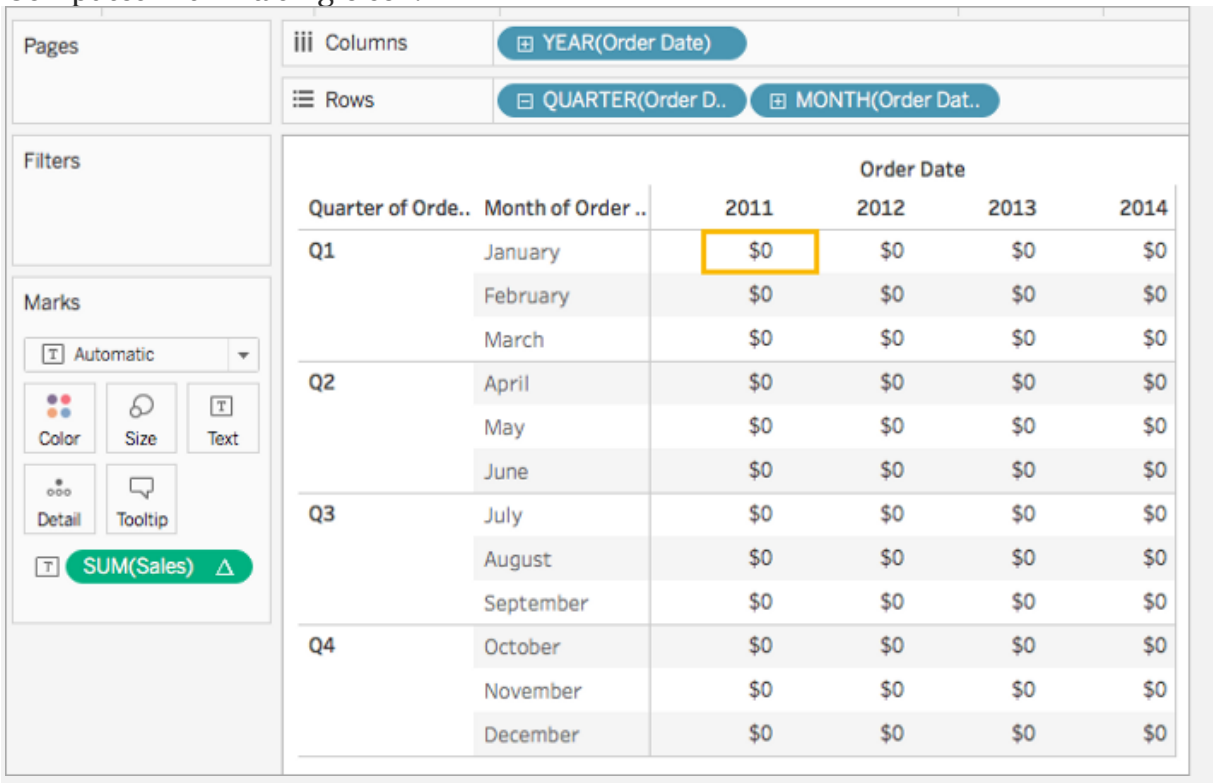
For example, in the following table, the calculation is computed down rows (MONTH(Order Date)) for the length of the pane, across a column (YEAR(Order Date)), and then down the length of the pane agian.



		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January		-$37,617	-$19,924	-$6,483
	February	-$9,136	-$5,963	$4,325	-$24,420
	March	$50,280	$26,286	$28,249	$33,625
Q2	April		-$400	$14,451	$682
	May	-$4,647	-$4,064	$17,442	$5,539
	June	$10,947	-$5,334	-$17,261	$2,609
Q3	July		-$53,012	-$26,155	-$24,480
	August	-$6,037	$8,133	-$5,175	$13,088
	September	$53,868	$27,698	$39,643	$28,973
Q4	October		-$38,141	-$18,456	-$19,444
	November	$47,175	$44,568	$25,729	$34,533
	December	-$9,083	-$1,053	$15,045	-$21,852

Cell

Computes within a single cell.



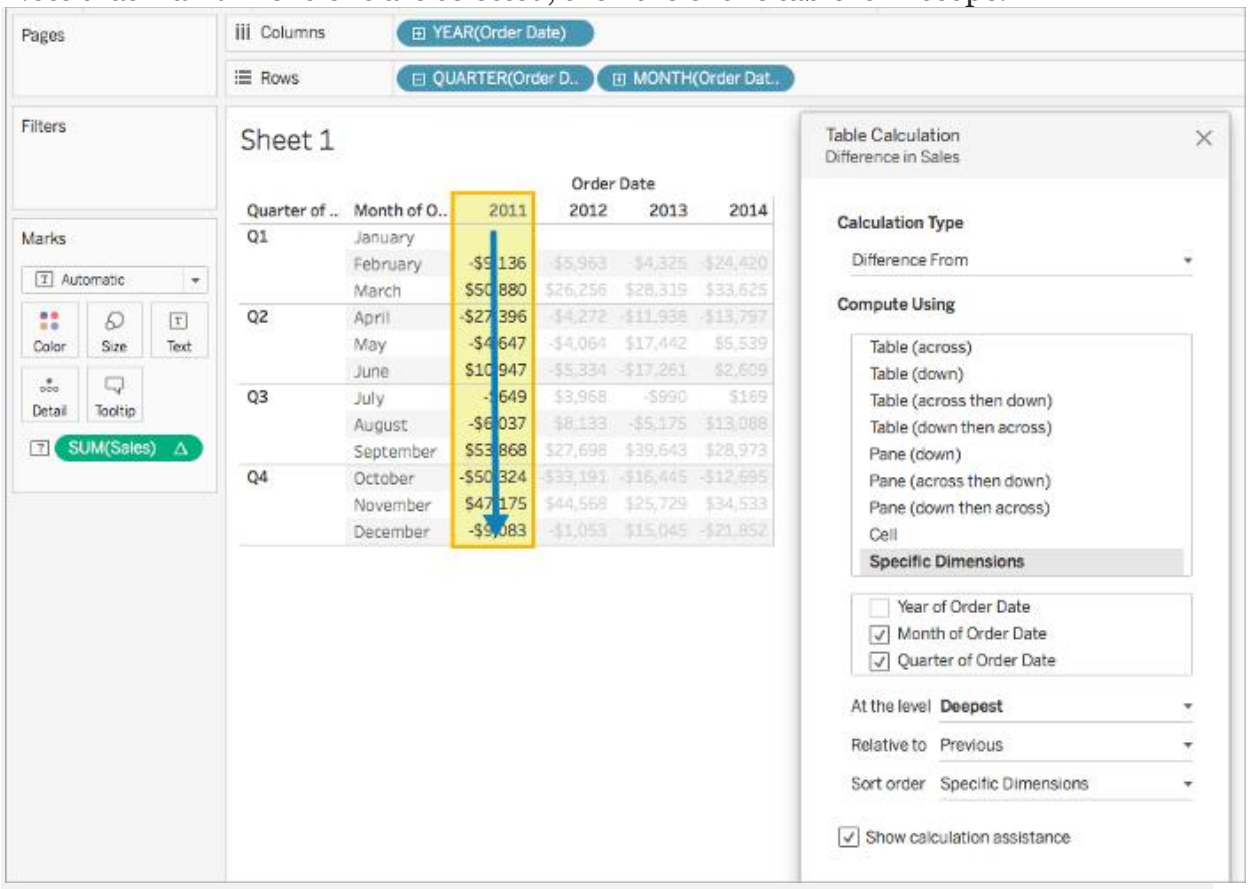
		Order Date			
Quarter of Orde..	Month of Order ..	2011	2012	2013	2014
Q1	January	$0	$0	$0	$0
	February	$0	$0	$0	$0
	March	$0	$0	$0	$0
Q2	April	$0	$0	$0	$0
	May	$0	$0	$0	$0
	June	$0	$0	$0	$0
Q3	July	$0	$0	$0	$0
	August	$0	$0	$0	$0
	September	$0	$0	$0	$0
Q4	October	$0	$0	$0	$0
	November	$0	$0	$0	$0
	December	$0	$0	$0	$0

Specific Dimensions

Computes only within the dimensions you specify.

For example, in the following visualization the dimensions, Month of Order Date and Quarter of Order Date, are the addressing fields (since they are selected), and Year of Order Date is the partitioning field (since it is not selected). So the calculation transforms the difference from each month across all quarters within a year. The calculation starts over for every year.

Note that if all dimensions are selected, then the entire table is in scope.



At the level

The **At the level** option is only available when you select **Specific Dimensions** in the Table Calculations dialog box, and when more than one dimension is selected in

the field immediately below the **Compute Using** options — that is, when more than one dimension is defined as an addressing field.

This option is not available when you're defining a table calculation with **Compute Using**, because those values establish partitions by position. But with **Specific Dimensions**, because the visual structure and the table calculation are not necessarily aligned, the **At the level** option is available to let you fine-tune your calculation.

Use this setting to set a break (that is, restart of the calculation) in the view, based on a particular dimension. How is this different from just using that dimension for partitioning? In fact, it is partitioning, but it's partitioning by position rather than by value, which is how partitioning is defined with the **Compute Using** options.

The choices available from the At the level drop-down list in the example above are:

DeepestSpecifies that the calculation should be performed at the level of finest granularity. This is the default option.**Quarter of Order Date**Specifies that the calculation should be performed at the quarter level.**Month of Order Date**

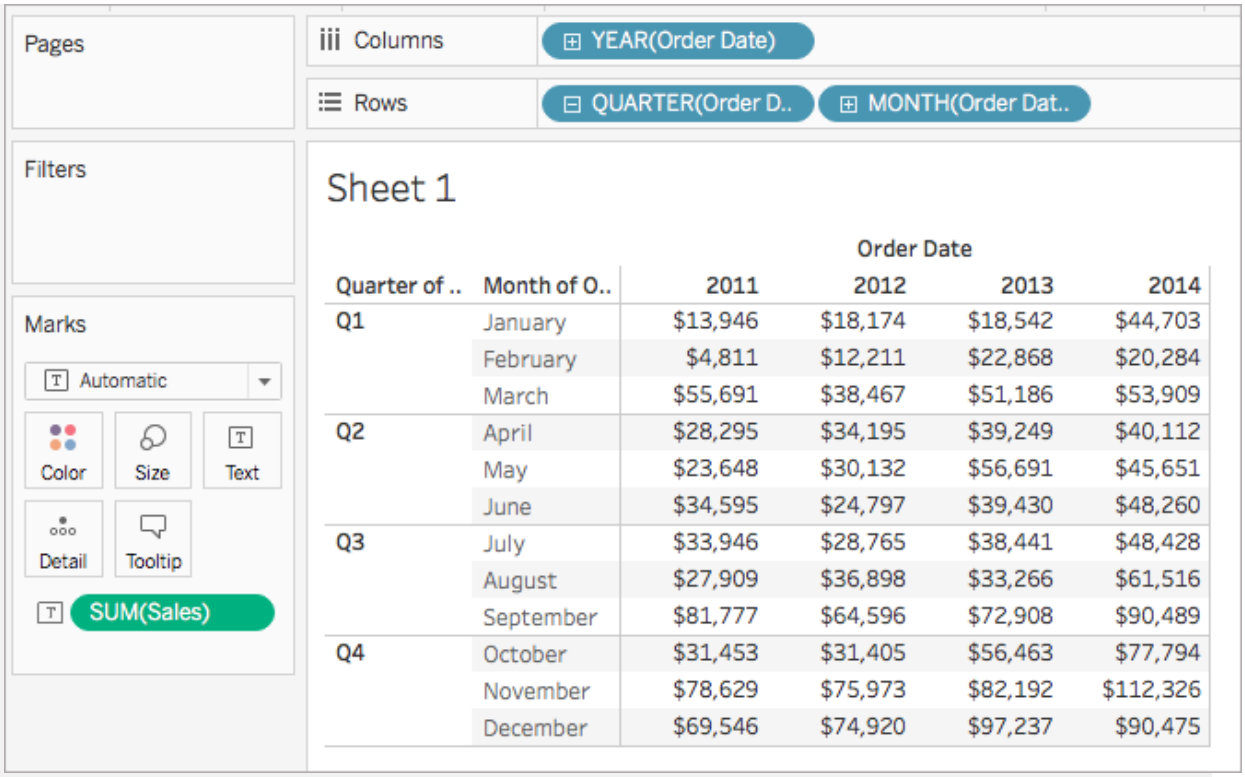
Specifies that the calculation should be performed at the month level.

Create a table calculation

To learn how to create a table calculation, follow along with the steps in the example below. To learn how to create quick table calculations, see Quick Table Calculations.

Step 1: Build the visualization

1. Open Tableau and connect to the **Sample-Superstore** saved data source.
2. Navigate to a new worksheet.
3. From the **Data** pane, under Dimensions, drag **Order Date** to the **Rows** shelf.
4. The dimension updates to YEAR(Order Date).
5. On the Rows shelf, right-click **YEAR(Order Date)** and select **Quarter**.
6. On the Rows shelf, click the + icon on **QUARTER(Order Date)**.
7. MONTH(Order Date) is added to the shelf.
8. From the **Data** pane, under Dimensions, drag **Order Date** to the **Columns** shelf.
9. The dimension updates to YEAR(Order Date) again.
10. From the **Data** pane, under Measures, drag **Sales** to **Text** on the Marks card.
11. The updates to look like this:



		Order Date			
Quarter of ..	Month of O..	2011	2012	2013	2014
Q1	January	$13,946	$18,174	$18,542	$44,703
	February	$4,811	$12,211	$22,868	$20,284
	March	$55,691	$38,467	$51,186	$53,909
Q2	April	$28,295	$34,195	$39,249	$40,112
	May	$23,648	$30,132	$56,691	$45,651
	June	$34,595	$24,797	$39,430	$48,260
Q3	July	$33,946	$28,765	$38,441	$48,428
	August	$27,909	$36,898	$33,266	$61,516
	September	$81,777	$64,596	$72,908	$90,489
Q4	October	$31,453	$31,405	$56,463	$77,794
	November	$78,629	$75,973	$82,192	$112,326
	December	$69,546	$74,920	$97,237	$90,475

Step 2: Add the table calculation

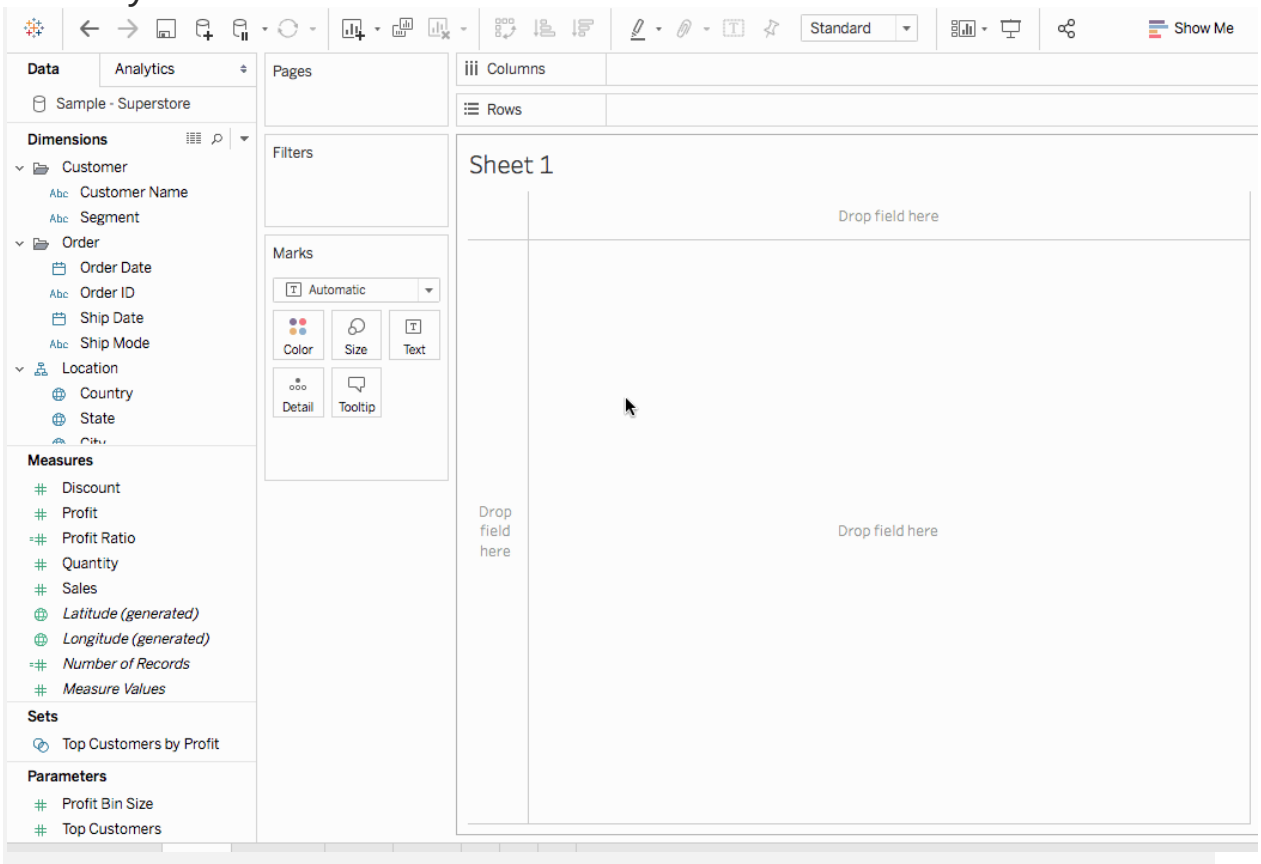
1. On the Marks card, right-click SUM(Sales) and select **Add Table Calculation**.
2. In the Table Calculation dialog box that opens, do the following:

- For **Calculation Type**: select **Difference From**.
- For more information about the types of table calculations you can use in Tableau, and how you can configure them, see Table Calculation Types.
- For **Compute Using**, select **Table (across)**.
- For more information about these options, see The basics: addressing and partitioning section.
- Note that as you select how to compute the calculation, the visualization updates with visual indicators to guide you.

- When finished, click the X in the top corner of the Table Calculation dialog box to exit it.

- The calculation is applied to the values in the visualization.

Check your work!



Edit a table calculation

To edit a table calculation:

1. Right-click the measure in the view with the table calculation applied to it and select **Edit Table Calculation**.

2. In the Table Calculation dialog box that appears, make your changes.

3. When finished, click the X in the top corner of the Table Calculation dialog box to exit it.

Remove a table calculation

To remove a table calculation:

- Right-click the measure in the view with the table calculation applied to it and select **Clear Table Calculation**.
- The table calculation is removed from the measure and the visualization updates with the original values.
- **Use bins and histograms**

Sometimes it's useful to convert a continuous measure (or a numeric dimension) into bins.

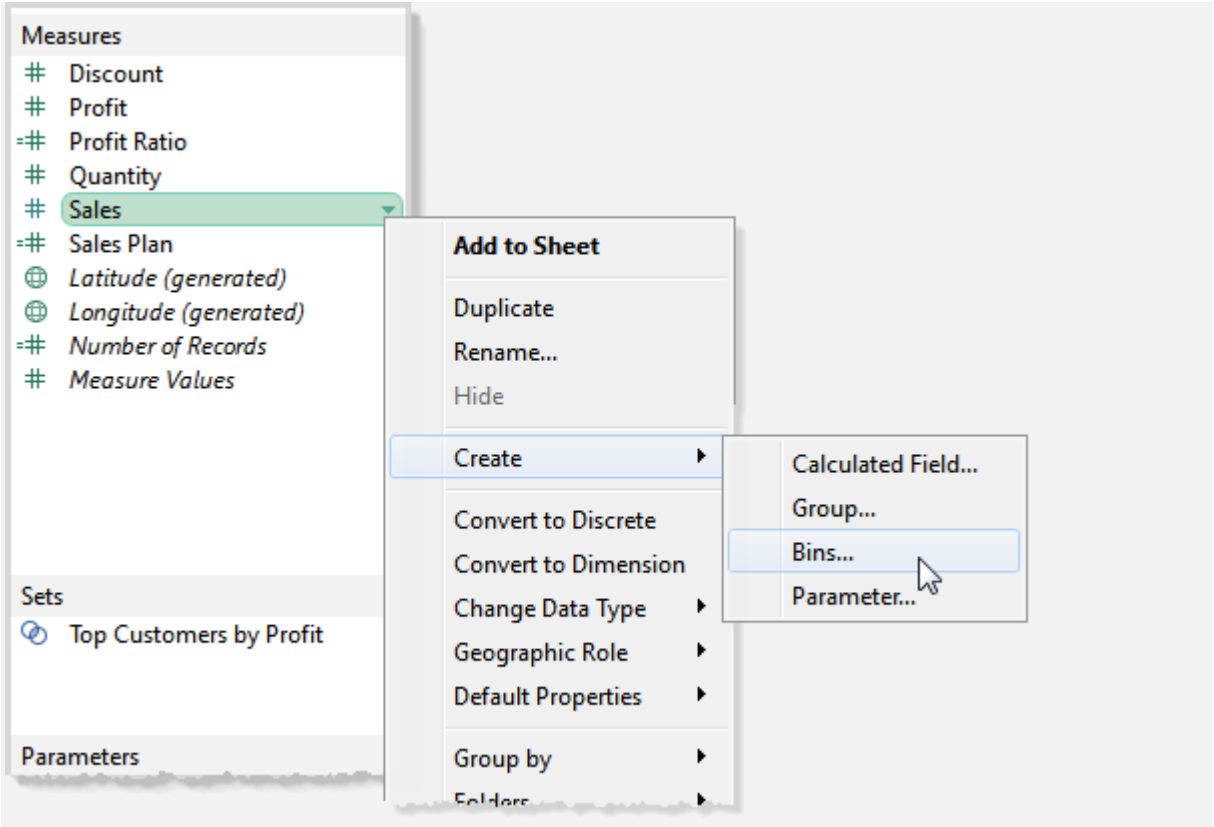
Any discrete field in Tableau can be considered as a set of bins. For example, suppose you create a view with **Profit** on **Rows** and **State** on **Columns**. You could consider the **State** field as a set of bins — each profit value is sorted into a bin corresponding to the state from which the value was recorded. But if you want to see values for **Profit** assigned to bins without reference to a dimension, you can create a numeric bin, with each individual bin corresponding to a range of values.

Note: You can bin data only for relational data sources and binned fields cannot be used in calculations. However, it is possible to create a calculated field that will replicate a bin of a specific size. For example: `(FLOOR([Sales]/1000)*1000)` will create bins with a size of 1000. By dragging this calculation to the dimensions pane, you can use these bins with cube data sources and calculated fields.

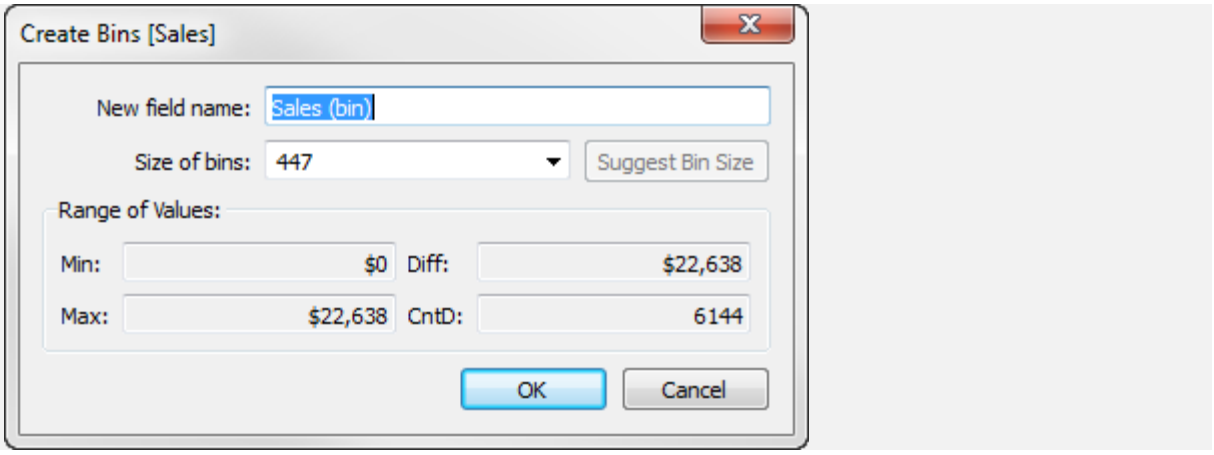
When you create bins from a measure you create a new dimension. That's because you are creating a field with a limited and discrete set of possible values out of a field with an unlimited, continuous range of values. However, once the dimension is created, you can convert it to a continuous dimension. This can be useful, for example, if you want to create a histogram. See Create a Histogram from a Binned Dimension.

Create a Binned Dimension:

1. In the **Data** pane, right-click (control-click on Mac) a measure and select **Create** > **Bins**.



1. In the Create Bins dialog box, accept the proposed New field name or specify a different name for the new field.



1. On the web, the dialog box is named Edit Bins and has a slightly different appearance, but the options are the same.

2. Either enter a value in the **Size of bins** field or have Tableau calculate a value for you.

3. If Tableau can perform the optimizing calculation quickly enough, the value you see initially in **Size of bins** is Tableau's estimate of the optimal bin size.

4. If Tableau cannot perform the optimizing calculation quickly, the **Size of bins** field defaults to 10. In this case you can click **Suggest Bin Size** to have Tableau perform the optimizing calculation.

5. The formula that Tableau uses to calculate an optimal bin size is

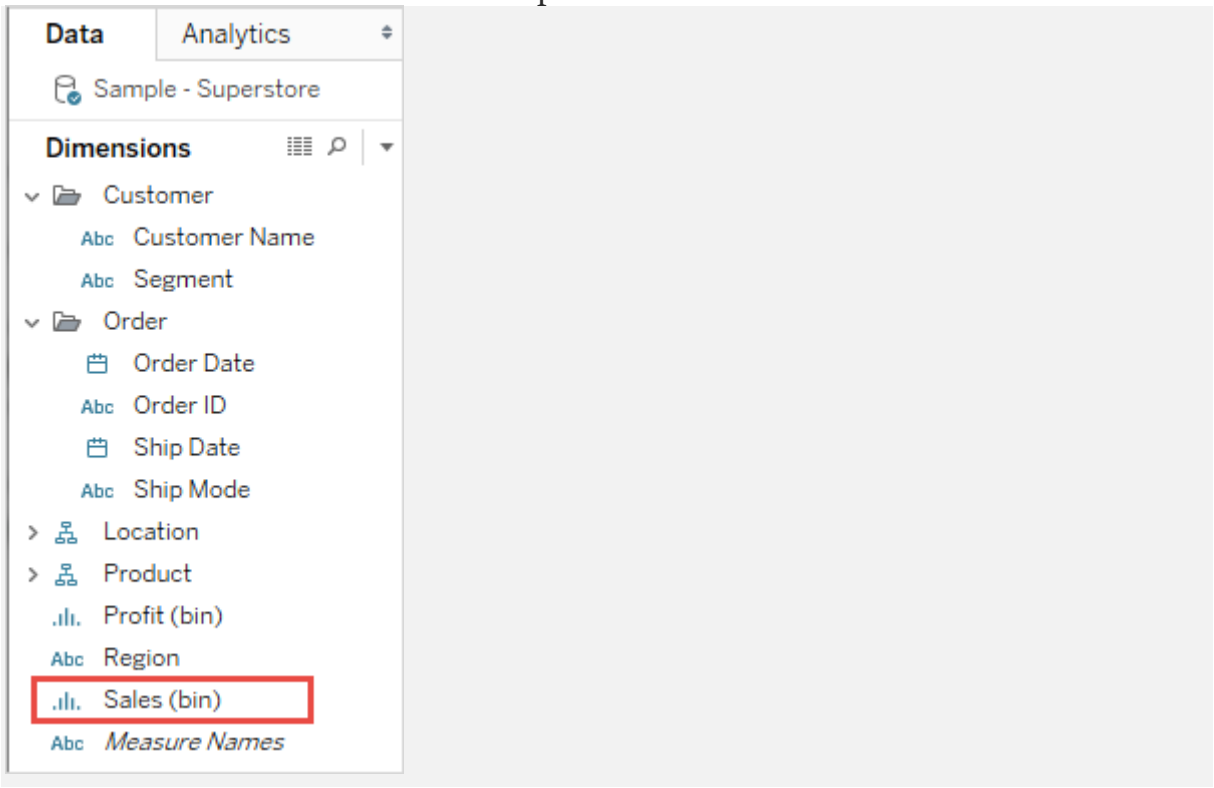
6. `Number of Bins = 3 + log2(n) * log(n)`

7. In the formula, *n* is the number of distinct rows in the table. The size of each bin is determined by dividing the difference between the smallest and the largest values by the number of bins.

The four read-only fields in the lower part of the Create Bins dialog box show you the data that Tableau uses to suggest a bin size. You can also consider these values if you want to set a bin size manually. The values are:

MinThe field's minimum value.MaxThe field's maximum value.DiffThe difference between the field's minimum and maximum values.CntDThe number of distinct values (rows) in the data.

After you click **OK** to dismiss the Create Bins dialog box, a new binned field appears in the **Dimensions** area of the **Data** pane.



When you add a binned dimension to the view, each bin acts as an equal-sized container that summarizes data for a specific range of values. Column or row headers are created, where each bin label designates the lower limit of the range of numbers that is assigned to the bin. Note that the lower limit is inclusive.

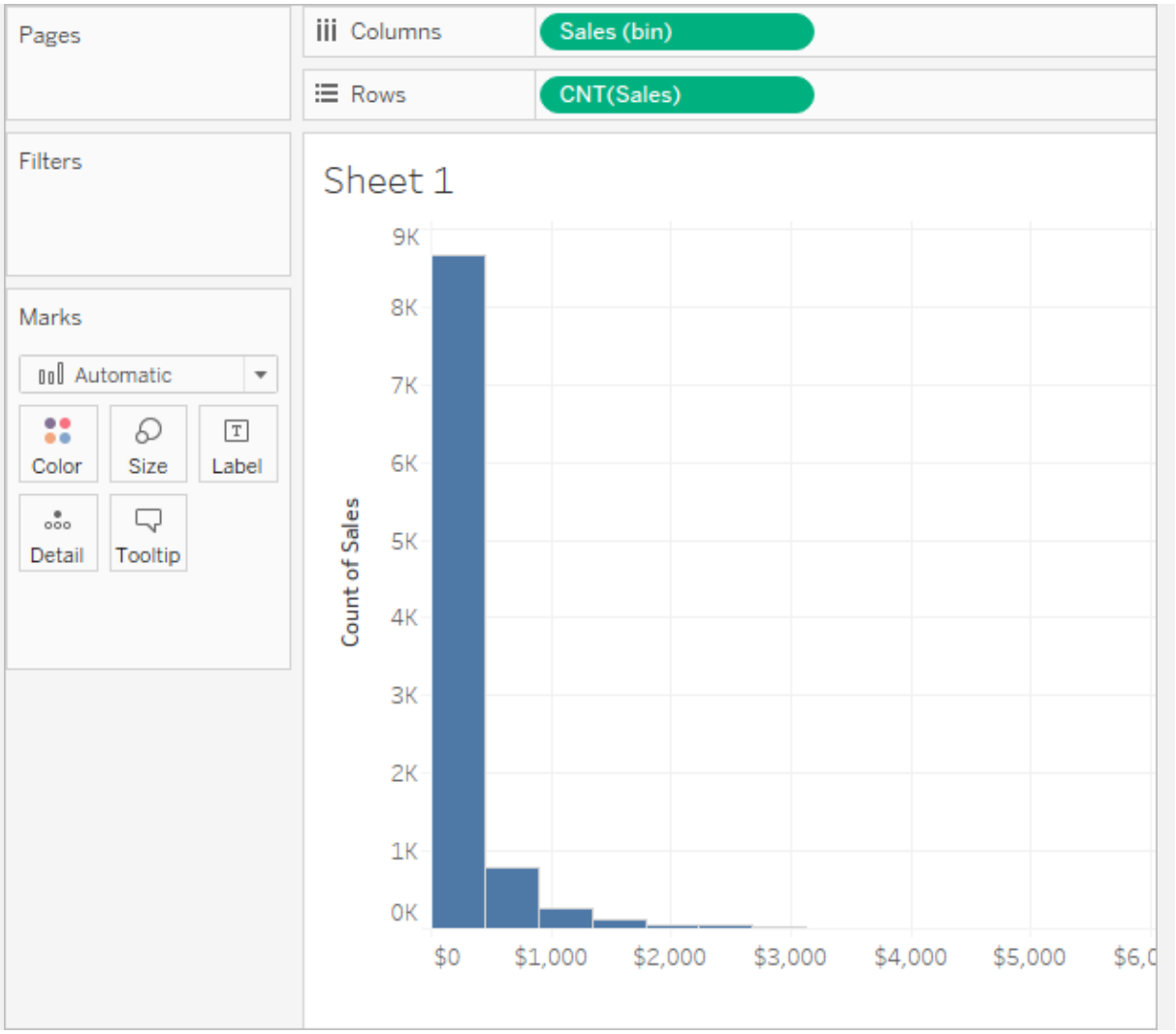
Create a Histogram from a Binned Dimension

If you create a binned dimension, you can use it as the starting point for creating a histogram. Using the **Sales (bin)** dimension created according to the instructions above, use the following steps to create a histogram.

Note: A quicker way to create a histogram is using Show Me. See Build a Histogram in the Build-It-Yourself Exercises section for information on creating a histogram using Show Me.

1. Click the **Sales (bin)** dimension in the Data pane and choose **Convert to continuous**.
2. Drag the **Sales (bin)** dimension from the Data pane and drop it on the **Columns**shelf.
3. Drag the original **Sales** field from the Measures area of the Data pane and drop it on the **Rows** shelf.
4. Click **SUM(Sales)** on **Rows** and change the aggregation from Sum to Count.

The result is a histogram:



- **Create a calculated field (e.g. string, date, simple arithmetic)**

Sometimes your data source does not contain a field (or column) that you need for your analysis. For example, your data source might contain fields with values for Sales and Profit, but not for Profit Ratio. If this is the case, you can create a calculated field for Profit Ratio using data from the Sales and Profit fields.

This topic demonstrates how to create a simple calculated field using an example.

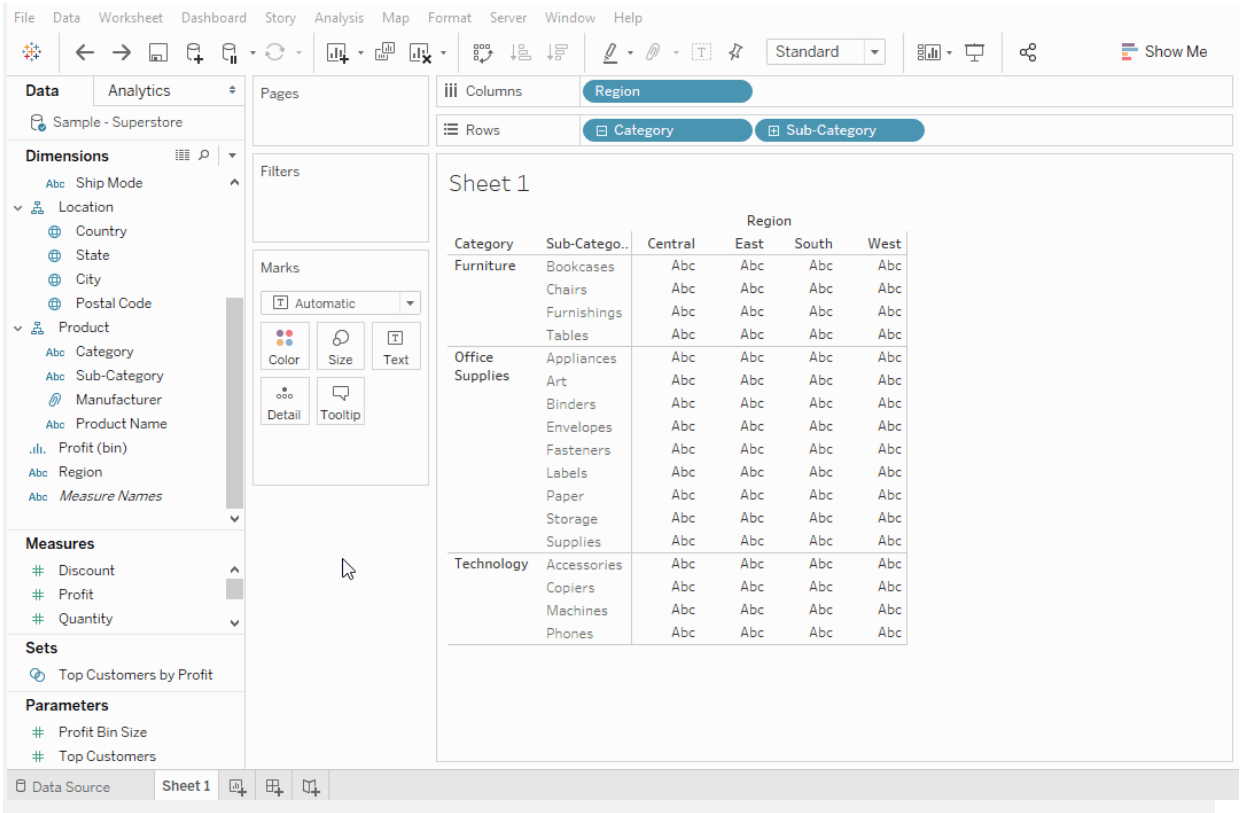
Step 1: Create the calculated field

1. In a worksheet in Tableau, select **Analysis** > **Create Calculated Field**.
2. In the Calculation Editor that opens, give the calculated field a name.
3. In this example, the calculated field is called Profit Ratio.

Step 2: Enter a formula

1. In the Calculation Editor, enter a formula.
2. This example uses the following formula:
3. `SUM([Profit])/SUM([Sales])`
4. Formulas use a combination of functions, fields, and operators. To learn more about creating formulas in Tableau, see Formatting Calculations in Tableau and Functions in Tableau.
5. When finished, click **OK**.
6. The new calculated field is added to the Data pane. If the new field computes quantitative data, it is added to Measures. If it computes qualitative data, it is added to Dimensions.
7. You are now ready to use the calculated field in the view.

Check your work! Watch how to create a simple calculated field in action:



See Also

- **Add a parameter Sharing Insights**

Parameters are useful when you want to add interactivity and flexibility to a report, or to experiment with what-if scenarios. Suppose you are unsure which fields to include in your view or which layout would work best for your viewers. You can incorporate parameters into your view to let viewers choose how they want to look at the data.

When you work with parameters, consider the following two things that are important in making them useful:

- They need to be used in calculations.
- The parameter control needs to be displayed so that viewers can interact with it.

Before you begin, decide which fields you want to make interactive. For example, you could allow users to view the categories within a dimension by color, or to view sales data over a period of time that they choose, and so on. The example described here sets up a table for which users can select the dimensions to display in the columns and rows.

Tip: To learn how to create parameters for what-if and other common scenarios, see the on-demand training video Parameters on the Tableau website. Also see Use Parameters to Add Multiple Views to Your Viz and Using a parameter to change the view in a dashboard.

Create the parameters and calculated fields

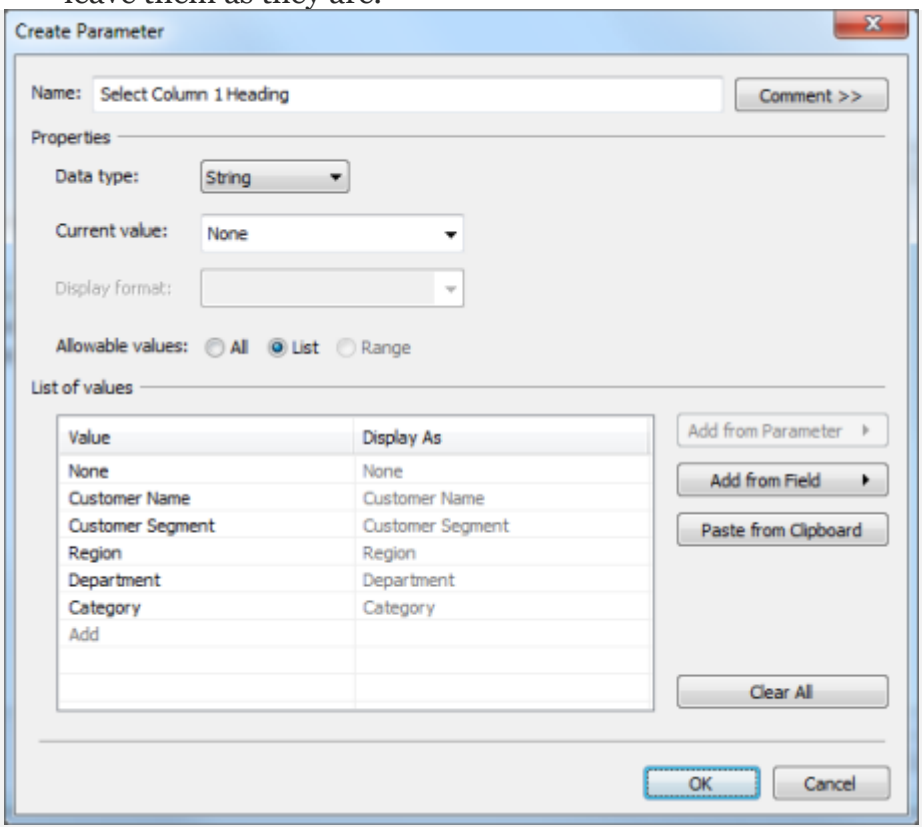
These steps use the Superstore sample to create a new parameter while you build the calculated field that will take advantage of it.

1. Select **Analysis** > **Create Calculated Field**.
2. In the Calculated Field dialog box, for **Name**, type **Column 1 Category**.
3. Next to **Parameters**, click **Create**, and in the **Create Parameter** dialog box, complete the following steps:
4. Name the parameter appropriately so that viewers can tell what changing it will do. This example uses **Select Column 1 Heading**.
5. For **Data type**, select **String**.
6. For **Allowable Values**, select **List**, type **None** as the first value in the list, and then press **Enter**.

7. Complete the list by typing the names of the additional dimension fields that you want to expose through the parameter.

8. **Note:** This example uses the customer name, customer segment, region, department, and category fields. These are all dimensions of the same data type (string). If you wanted to include a measure such as profit in this list, one option would be to convert the measure to a string value. You would do this when you build the calculated field, using the `STR()` function. This article covers only the single data type scenario.

9. The **Display As** aliases default to the field name, and for this exercise you can leave them as they are.

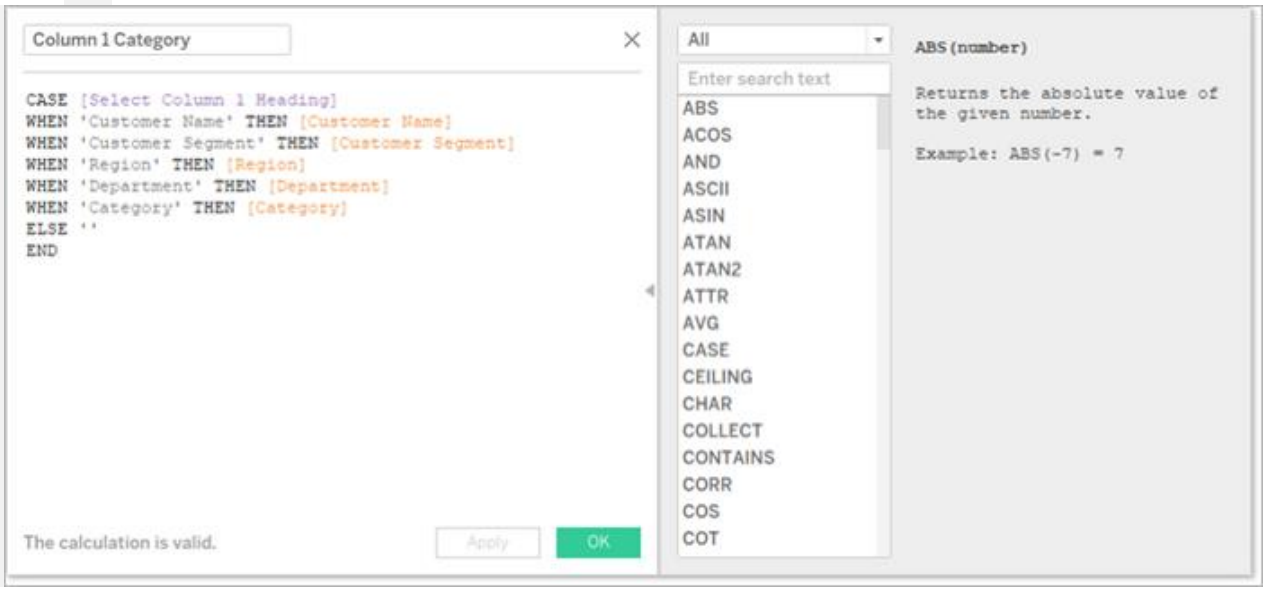


1. Click **OK** to return to the Calculated Field dialog box.

2. Repeat the previous step to create the following additional parameters:

- Select Column 2 Heading
- Select Row 1 Heading
- Select Row 2 Heading

1. **Tip:** Instead of typing each value in the list, click **Add from Parameter** to add them from **Select Column 1 Heading**.
2. In the Calculated Field dialog box, for **Formula**, build the following calculation:
3.
```
CASE [Select Column 1 Heading]
WHEN 'Customer Name' THEN [Customer Name]
WHEN 'Customer Segment' THEN [Customer Segment]
WHEN 'Region' THEN [Region]
WHEN 'Department' THEN [Department]
WHEN 'Category' THEN [Category]
ELSE ''
END
```



1. Confirm that the status message indicates that the formula is valid, and then click **OK**.

2. **Note:** ELSE accounts for the **None** value that you included in the parameter, and it returns an empty string.

3. Create three more calculated fields, one for each of the additional parameters you created:

4. Parameter nameCalculated field nameSelect Column 2 HeadingColumn 2 CategorySelect Row 1 HeadingRow 1 CategorySelect Row 2 HeadingRow 2 Category

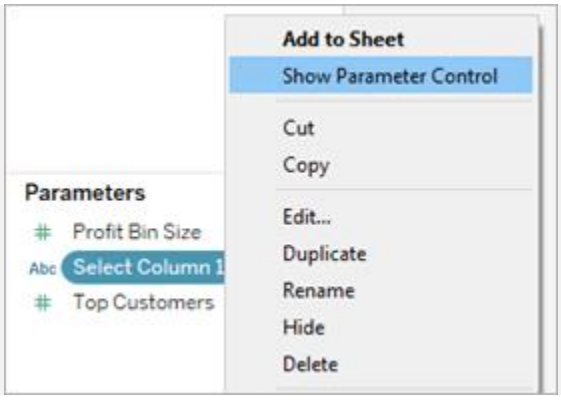
5. The basic formula for each calculated field is the same as in the previous step, except that you reference a different parameter in each `CASEstatement.`

Give viewers a way to interact with views

Next, expose the parameter control so users can select the categories they want to display.

1. For each parameter you created, do the following:

2. In the Parameters pane, right-click the parameter and select **Show Parameter Control**.



1. From the Dimensions pane, drag the calculated fields you created to the Columns and Rows shelves.

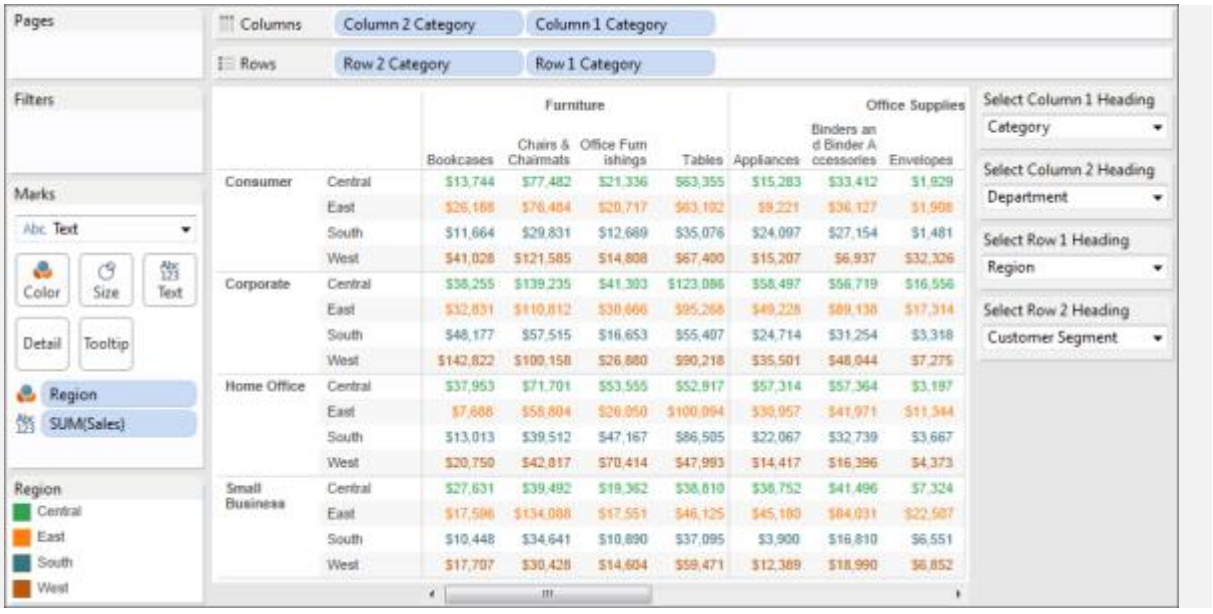
2. From the Measures pane, drag a measure to the view. In this example, **Sales** is placed on **Label** on the Marks card.

3. Test your parameters by selecting fields in the parameter controls.

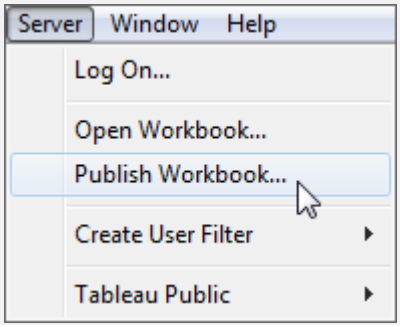
4. **Tips:**

- Sort the dynamic dimension fields alphabetically.

- Hide field labels for rows and columns.



1. Reset all parameters to **None** and publish the workbook to Tableau Server.



1. Viewers can set up their own reports, save their parameter settings, and share views with others.

Part 3: Sharing Insights

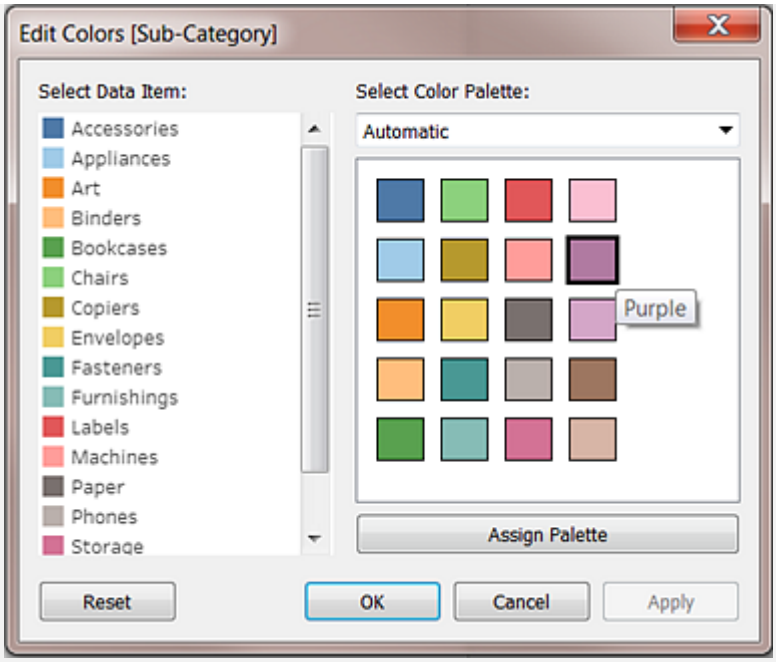
- **Use color**

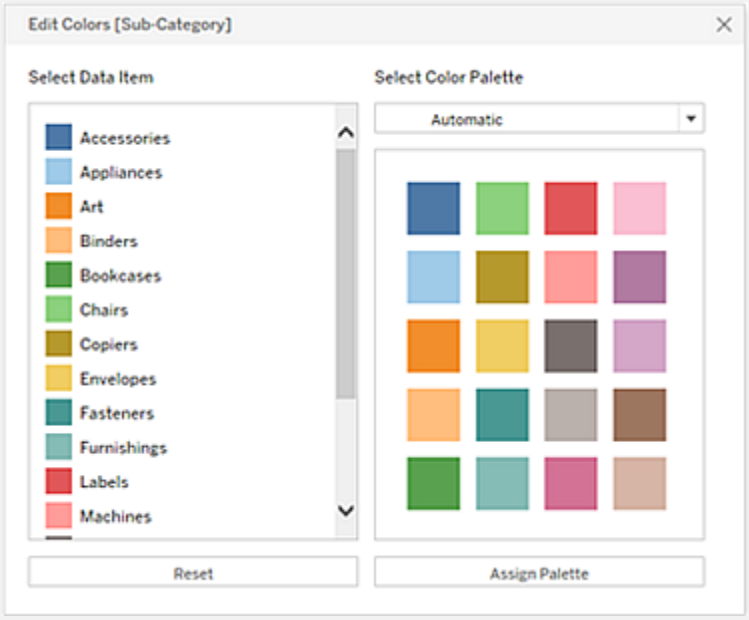
Categorical Palettes

When you drop a field with discrete values (typically a dimension) on **Color** on the **Marks**card, Tableau uses a categorical palette and assigns a color to each value of the field. Categorical palettes contain distinct colors that are appropriate for fields with values that have no inherent order, such as departments or shipping methods.

To change colors for values of a field, click in the upper-right corner of the color legend. In Tableau Desktop, select **Edit Colors** from the context menu. In Tableau Server or Tableau Online, the Edit Colors dialog opens automatically.

Tableau Desktop versionWeb version





Change the color for a value

1. Click on an item on the left, under **Select Data Item**.

2. Click a new color in the palette on the right. In Tableau Desktop you can hover over a swatch to identify the color.

3. Repeat for as many values that you want to change.

4. In Tableau Desktop, click **OK** to exit the Edit Colors dialog box. In Tableau Server or Tableau Online, simply close the dialog box.

Select a different palette

The **Select Color Palette** drop-down list in the Edit Colors dialog box provides color palettes that you can use for discrete fields. The list contains both categorical and ordinal palettes.

At the top of the list are categorical palettes, such as *Tableau 10*. As noted above, categorical palettes are appropriate for discrete fields with no inherent order.

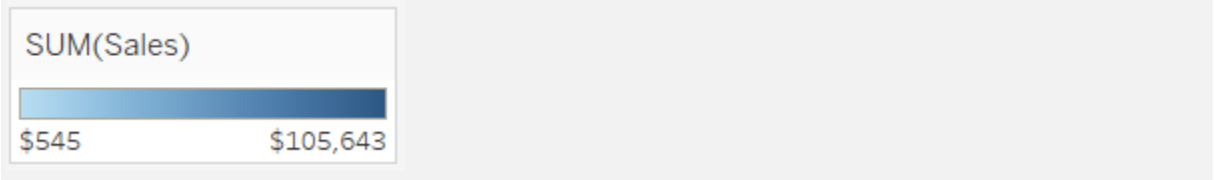
At the bottom of the list are ordinal palettes such as *Orange*. Ordinal palettes contain a range of related colors and are appropriate for fields that have an associated order, such as dates or numbers.

After you select a palette, click **Assign Palette** to automatically assign the new palette colors to the members in the field.

To return to the Automatic palette and the default color assignments, click **Reset** in the Edit Colors dialog box.

Quantitative Palettes

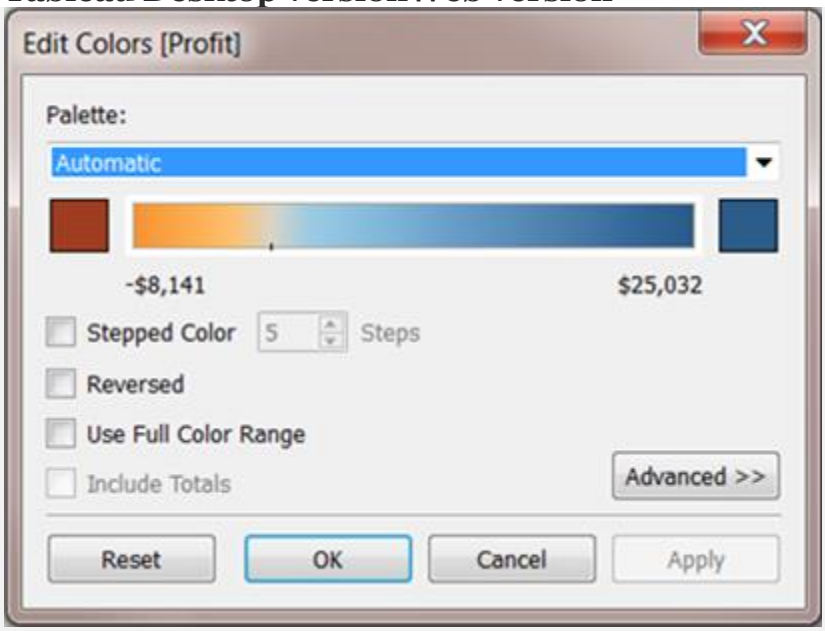
When you drop a field with continuous values on the **Marks** card (typically a measure), Tableau displays a quantitative legend with a continuous range of colors.

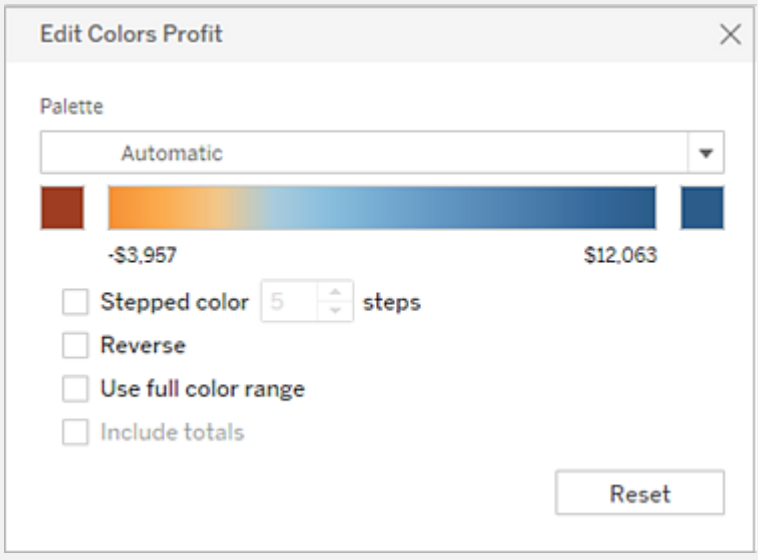


You can change the colors used in the range, the distribution of color, and other properties. To edit colors, click in the upper right of the color legend. In Tableau Desktop, select **Edit Colors** from the context menu. In Tableau Server or Tableau Online, the Edit Colors dialog opens automatically.

When there are both negative and positive values for the field, the default range of values will use two color ranges and the Edit Colors dialog box for the field has a square color box on either end of the range. This is known as a diverging palette.

Tableau Desktop versionWeb version

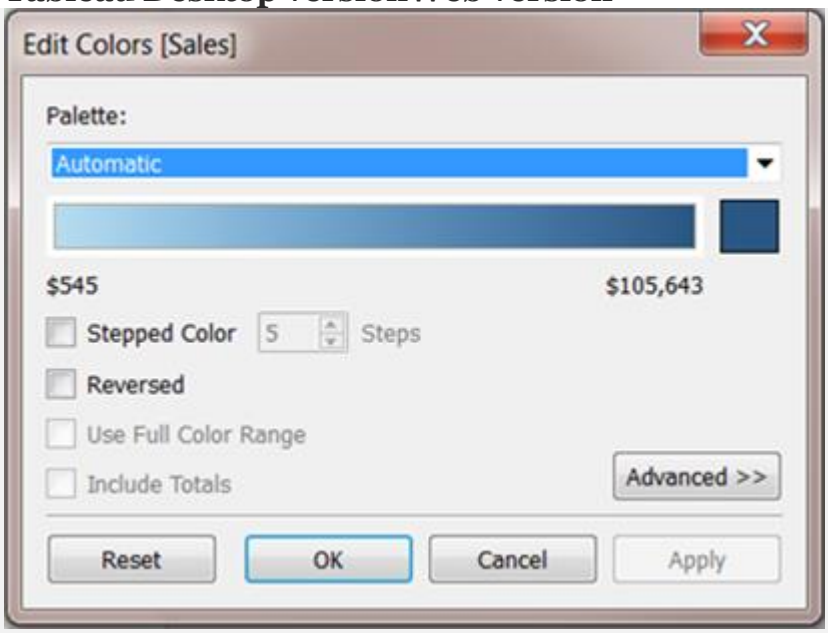


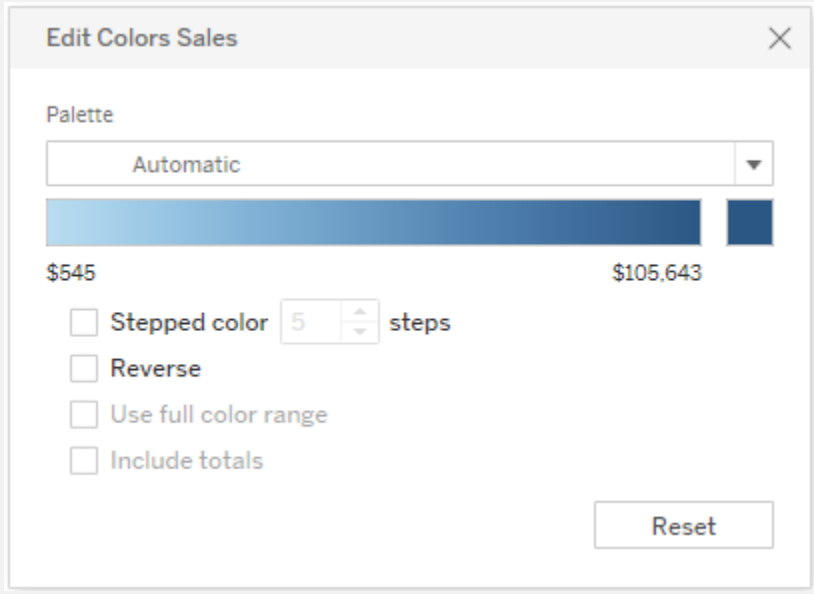


Edit Colors dialog box for a diverging palette

When all values are either positive or negative, the default range of values will use a single color range and the Edit Colors dialog box for the field has a square color box only at the right end of the range. This is known as a sequential palette.

Tableau Desktop versionWeb version





Edit Colors dialog box for a sequential palette

You can specify whether Tableau uses a diverging or a sequential palette for a continuous field on **Color**, and also configure the range of colors for the field's values.

The **Palette** drop-down list provides a range of color palettes from which you can choose. There are two types of quantitative palettes available for continuous fields:

- All palettes with *Diverging* in the name are diverging quantitative palettes — for example, *Orange-Blue Diverging*. You can choose a diverging palette for any continuous field — it isn't necessary for the range of values to contain both positive and negative numbers.
- To change the colors for a diverging palette, click one of the square color boxes at either end of the palette spectrum. Depending on whether you are authoring in Tableau Desktop or on the web, do one of the following:
- In Tableau Desktop, in the color configuration dialog box (which is part of your computer's operating system), select a color from the color picker or enter custom values.
- In Tableau Server or Tableau Online, enter a custom Hex value in the **Custom Color** field. If the value isn't valid, no changes are made.
- All other palettes are sequential quantitative palettes. To change the colors for a sequential palette, click the square color box at the right end of the palette spectrum to either open the color configuration dialog box (Tableau Desktop), or enter a custom Hex value in the **Custom Color** field (Tableau Server or Tableau Online).

Options for quantitative palettes

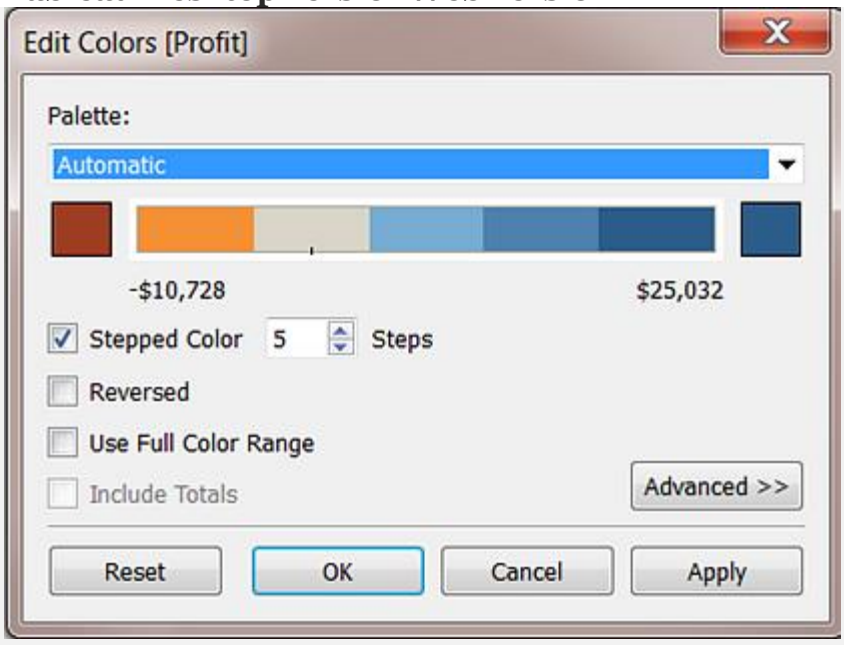
The following options are available in the Edit Colors dialog box for a continuous field.

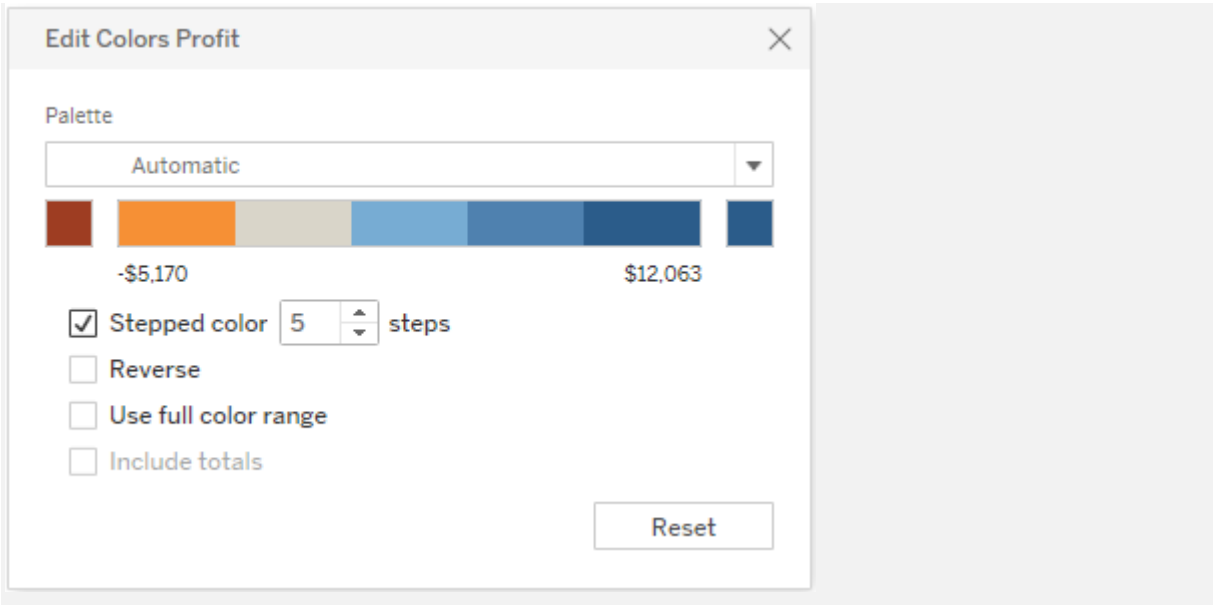
Note: Options differ where noted for Tableau Server and Tableau Online.

Stepped Color

Select **Stepped Color** to group values into uniform bins, where each bin is associated with a color. Use the spin control to specify how many steps (bins) to create. For example, for a range of values from 0 to 100 you could specify five steps to sort values into five bins (0–20, 20–40, etc.).

Tableau Desktop versionWeb version





If a diverging color palette is selected, the point where the palette transitions between colors is shown on the color ramp with a small black tick mark. When the number of steps is odd, the mark is placed in the middle of the transitional step. When the number of steps is even, the mark is placed at the boundary between the steps where the color changes.

Reversed

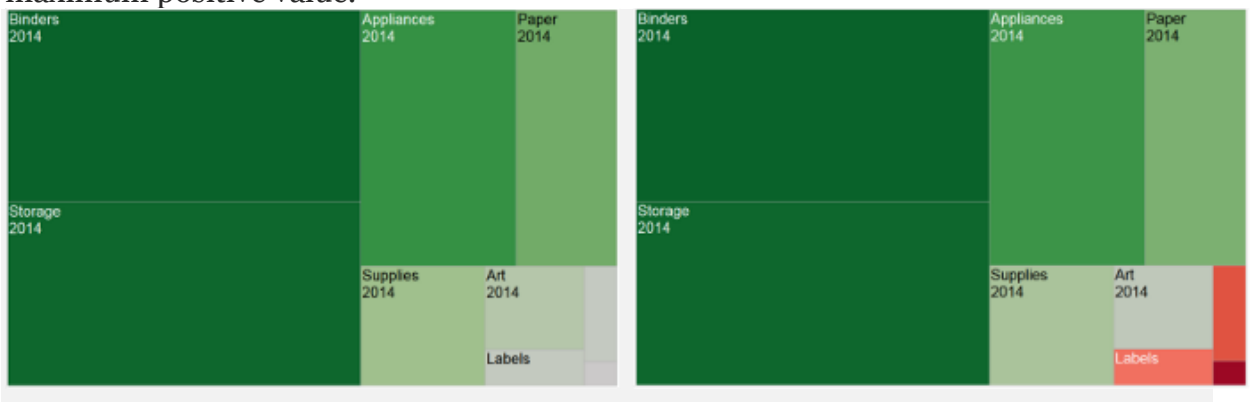
Select **Reversed** to invert the order of colors in the range. For example, if you want lower values to have a darker intensity in a sequential palette, reverse the palette. For a diverging palette, reversing the color palette means swapping the two colors in the palette, in addition to inverting the shades within each color range.

Use Full Color Range

With a diverging (two-color) palette, you can select to **Use Full Color Range**. Tableau assigns both the starting number and the ending number a full intensity for both color ranges. So if the range is from -10 to 100, the color representing negative numbers will be adjusted to change in shade much more quickly than the color representing positive numbers. If you don't select **Use Full Color Range**, Tableau

assigns the color intensity as if the range of values was from -100 to 100, so that the change in shade is the same on both sides of zero. This means there will be much less change on the negative side, where actual values only range from -10 to 0, than on the positive side, where values range from 0 to 100.

The image on the left below shows a red-green diverging color palette for values from -858 to 72,986. Without using the full color range, -858 (associated with the small box at the lower right of the chart) shows as gray, because -858 is only about 1% as far to the negative side as 72,986 is to the positive side. When the full color range is used, as in the image on the right, -858 shows as a dark red, equal in intensity to the maximum positive value.



Include totals

Select **Include Totals** to include totals, sub-totals and grand totals in the color encoding. This option only applies when total values are included in the view.

Limit the color range

In Tableau Desktop, when you click **Advanced** in the Edit Colors dialog box, you can choose to specify the start, end, and center values for the range by selecting the check box and typing a new value into the field and the color ramp is adjusted accordingly.

The **Start** value is the lower limit in the range, the **End** value is the upper limit, and the **Center** value is where the neutral color is located on a diverging color palette.

Note: This option is not currently available in Tableau Server or Tableau Online.

Reset the color range

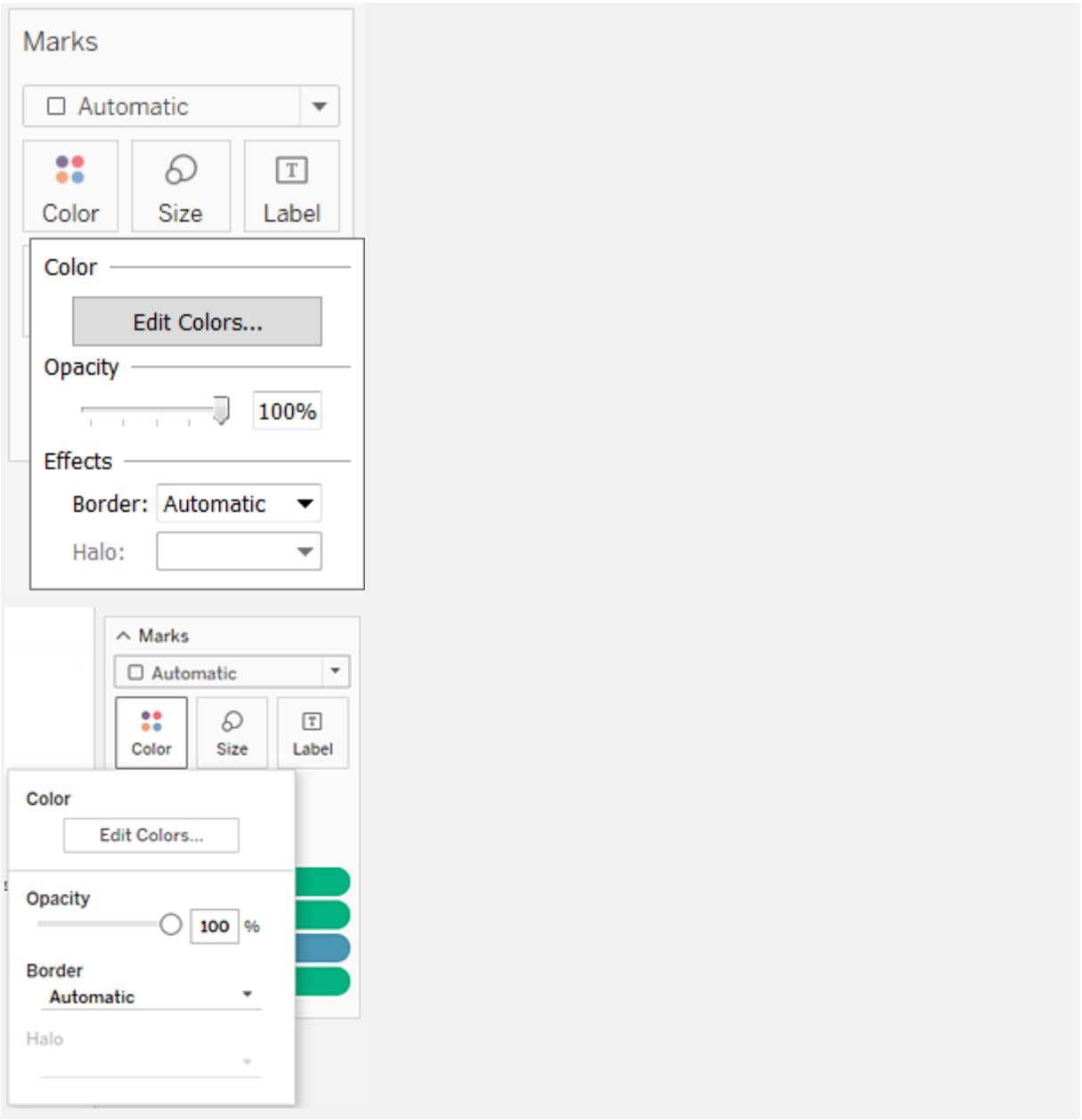
To return to the Automatic palette and the default color assignments, click **Reset** in the Edit Colors dialog box.

Note: If you are in web authoring mode and click **Reset**, the color palette will return to the default settings. Any options that were set in the **Advanced** option will also be reset. To undo this action, you can click **Undo** in the top menu. If your changes have already been saved, you must change the Advanced options in Tableau Desktop and republish the view.

Configure Color Effects

Click the **Color** drop down on the **Marks** card to configure additional **Color** settings not related to the actual colors shown.

Tableau Desktop versionWeb version



Opacity

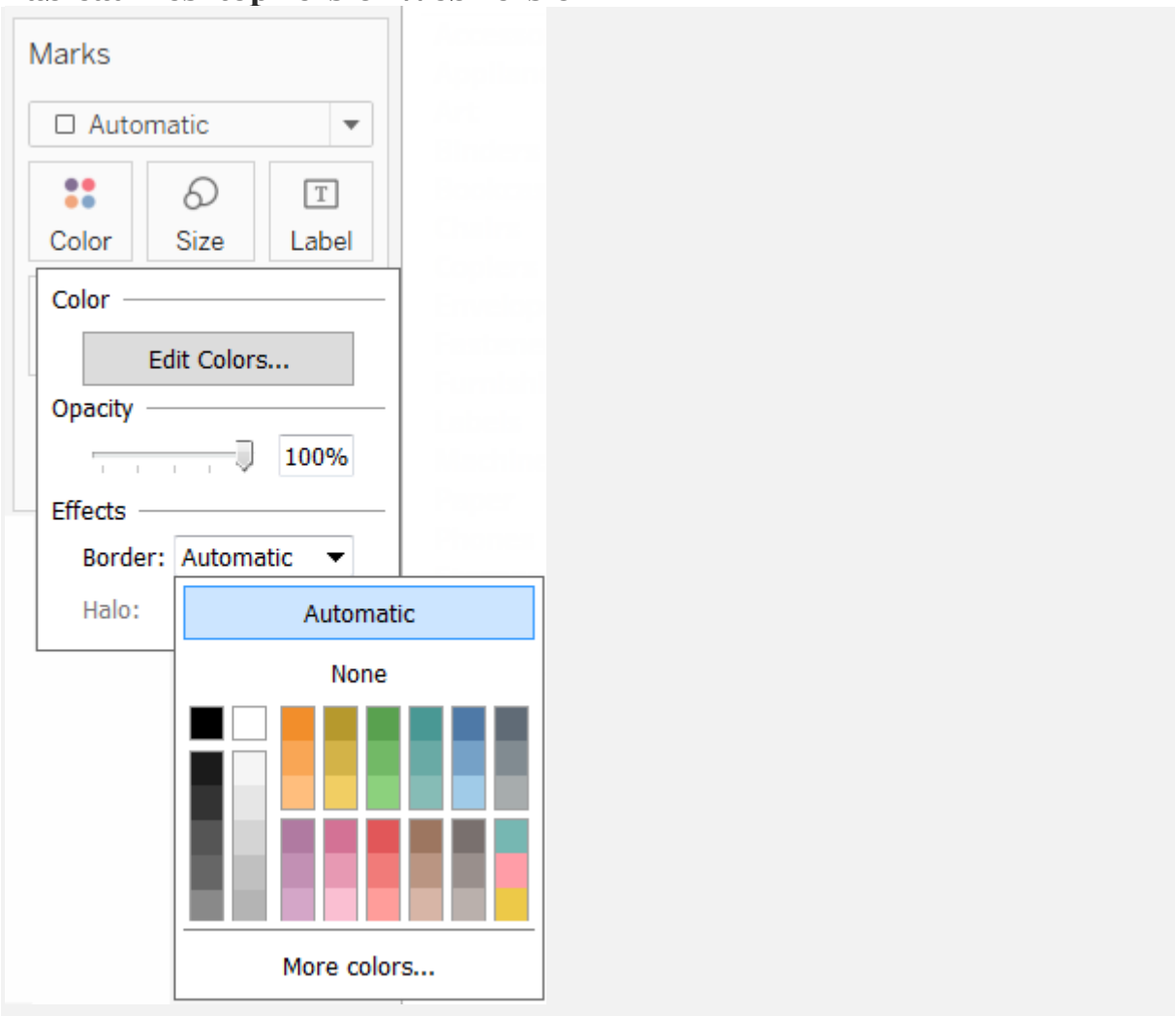
Modify the opacity of marks by moving the slider.

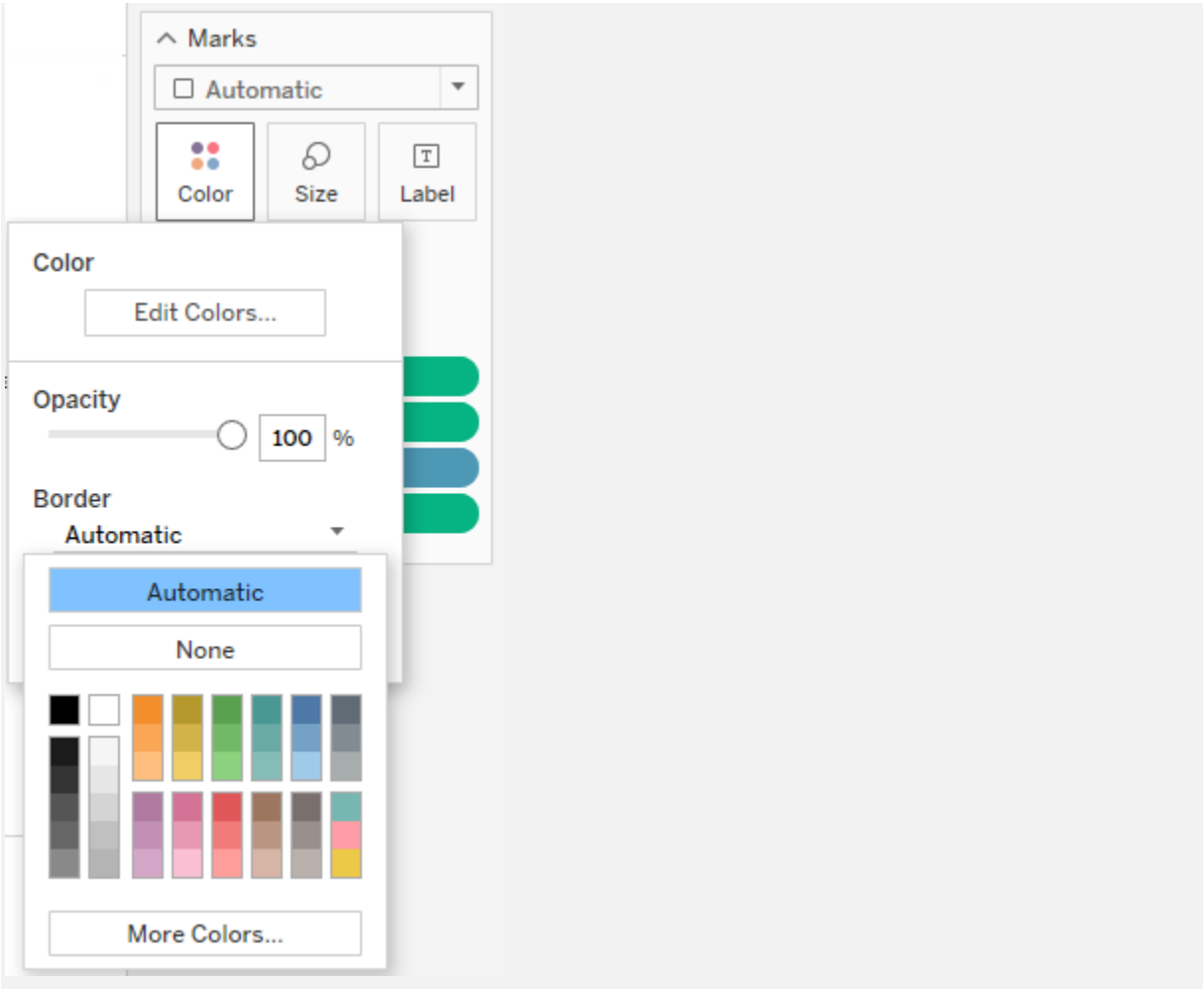
Adjusting opacity is especially useful in dense scatter plots or when you are looking at data overlaying a map or background image. As you slide the slider toward the left, marks become more transparent.

Mark borders

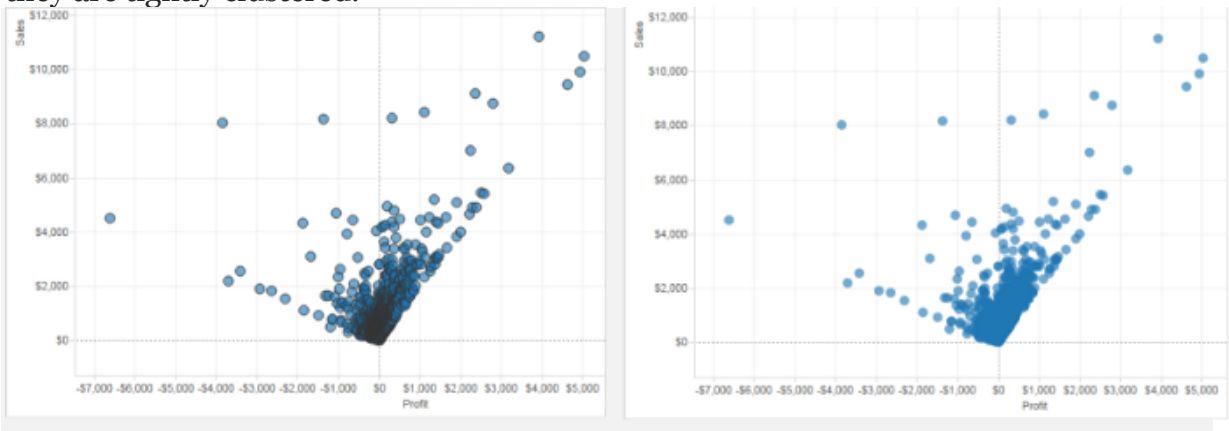
By default, Tableau displays all marks without a border. You can turn on mark borders for all mark types except text, line, and shape. On the **Color** drop-down control, select a mark border color.

Tableau Desktop versionWeb version





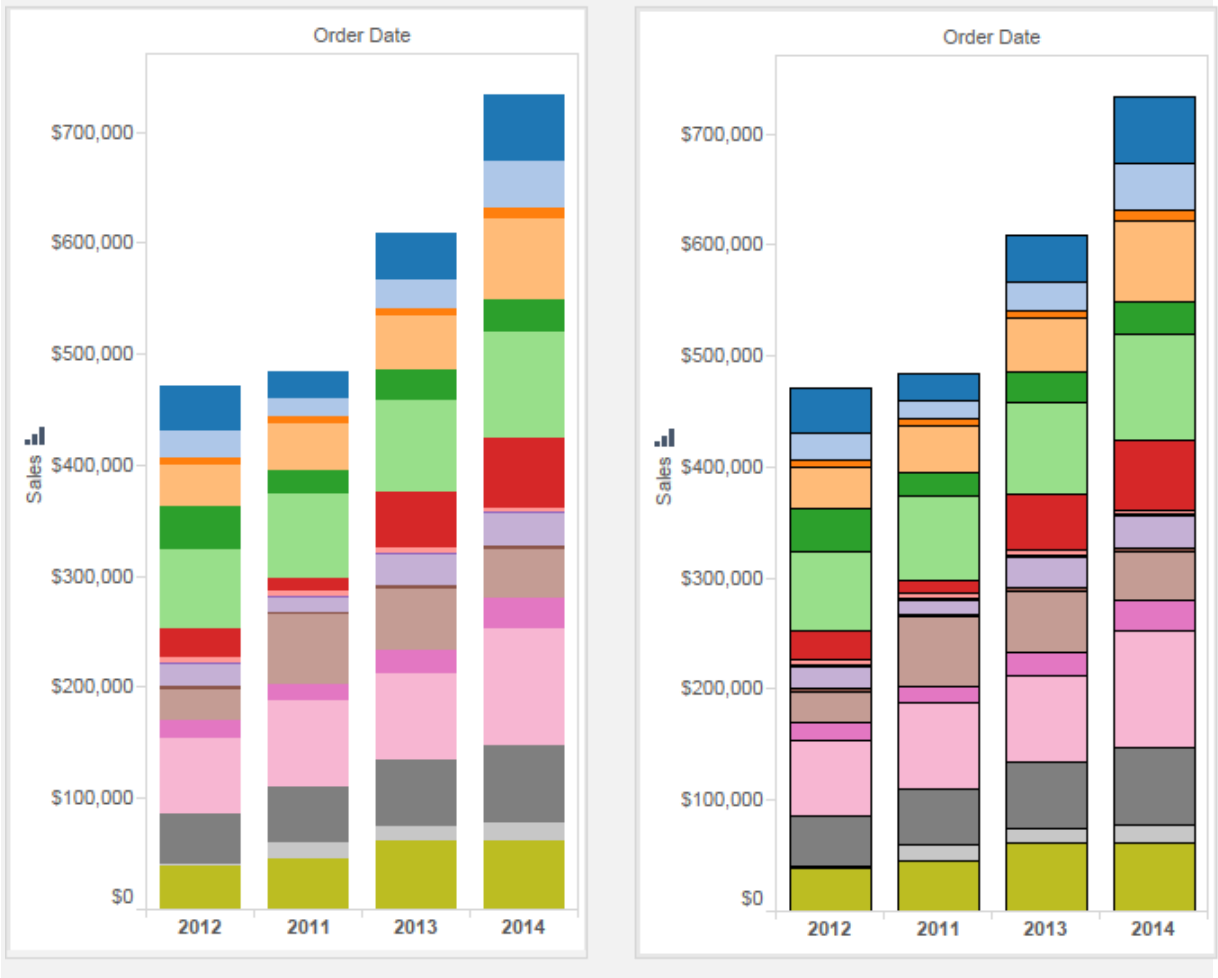
Borders can be useful for visually separating closely spaced marks. For example, the views below show a scatterplot with mark borders turned on (left) and turned off (right). When borders are turned on, marks are easier to distinguish in areas where they are tightly clustered.



Note: You can also use the opacity setting to show the density of marks.

When you are viewing a large number of color-encoded small marks, it is usually better to leave mark borders off. Otherwise borders can dominate the view, making it difficult to see the color encoding.

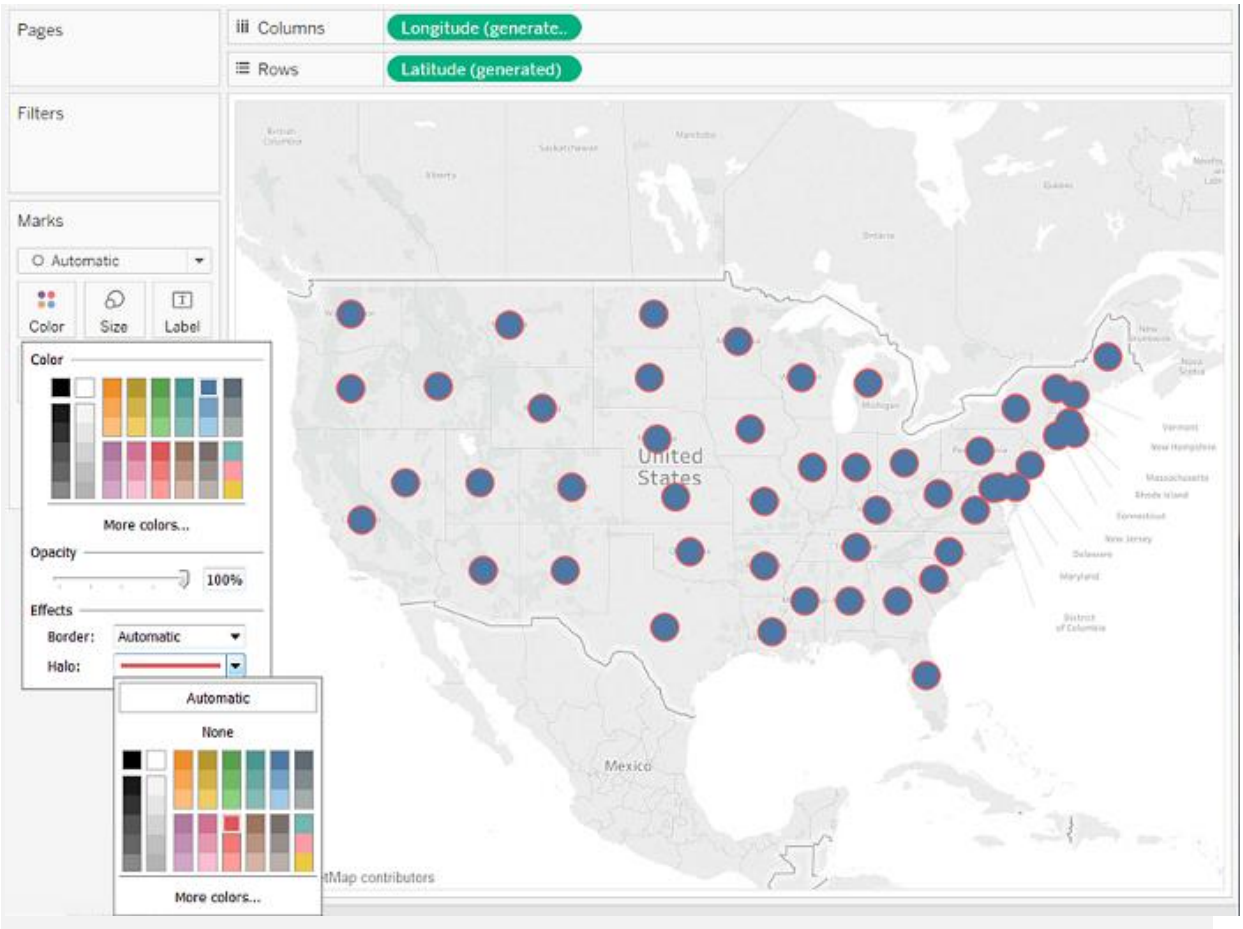
For example, the views below show bars that are segmented by a large number of color-encoded dimension members. With mark borders turned on (right), some of the narrower marks are difficult to identify by color. With borders turned off (left), the marks are easy to distinguish.



Mark halos

To make marks more visible against a background image or map, surround each mark with a solid contrasting color called a halo. Mark halos are available when you have a

background image or a background map. On the **Color** drop-down control, select a mark halo color.



Markers

In Tableau Desktop, when you are using the Line mark type, you can add a marker effect to show or hide points along the line. You can show selected points, all points, or no points. On the **Color** drop-down control, select a marker in the **Effects** section.

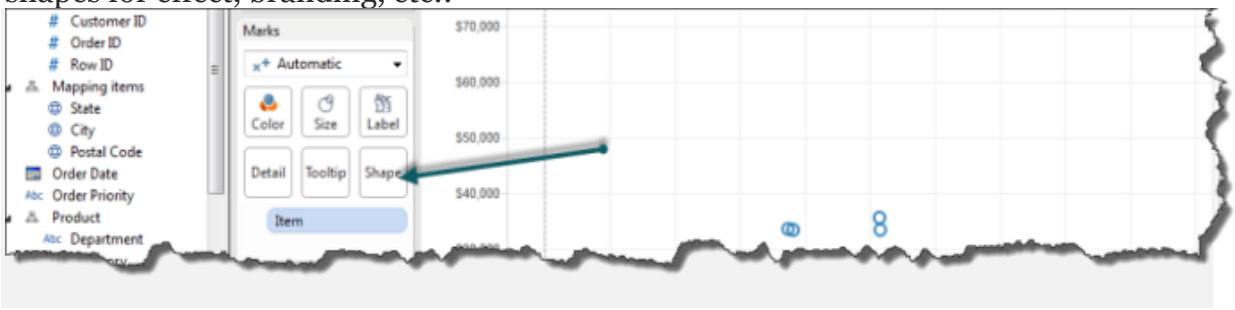
Note: This option is not currently available in Tableau Server or Tableau Online.

- **Use bolding**

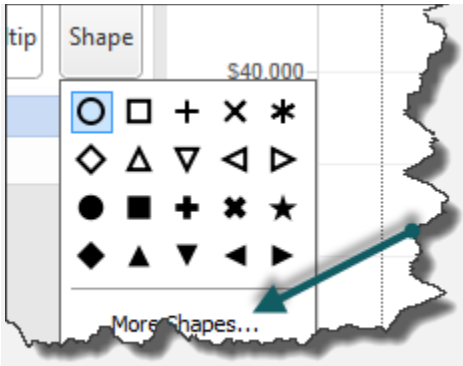
Calculated fields just generate text. The formatting can be done in the container holding the text. E.g. if this will be in a tooltip, insert Customer Num into tooltip, then select and use the editor to format (color, font, bold….).

- **Use shapes**

Custom shapes in Tableau are fast and easy to use and provide the user unlimited control over mark shapes. Tableau shapes and controls can be found in the marks card to the right of the visualization window. There are plenty of options built into Tableau that can be found in the shape palette, but what if you want to use custom shapes for effect, branding, etc.?

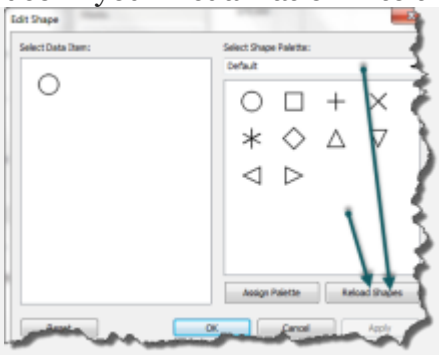


To select additional shapes, click “more shapes”, and the window you will see looks like this:



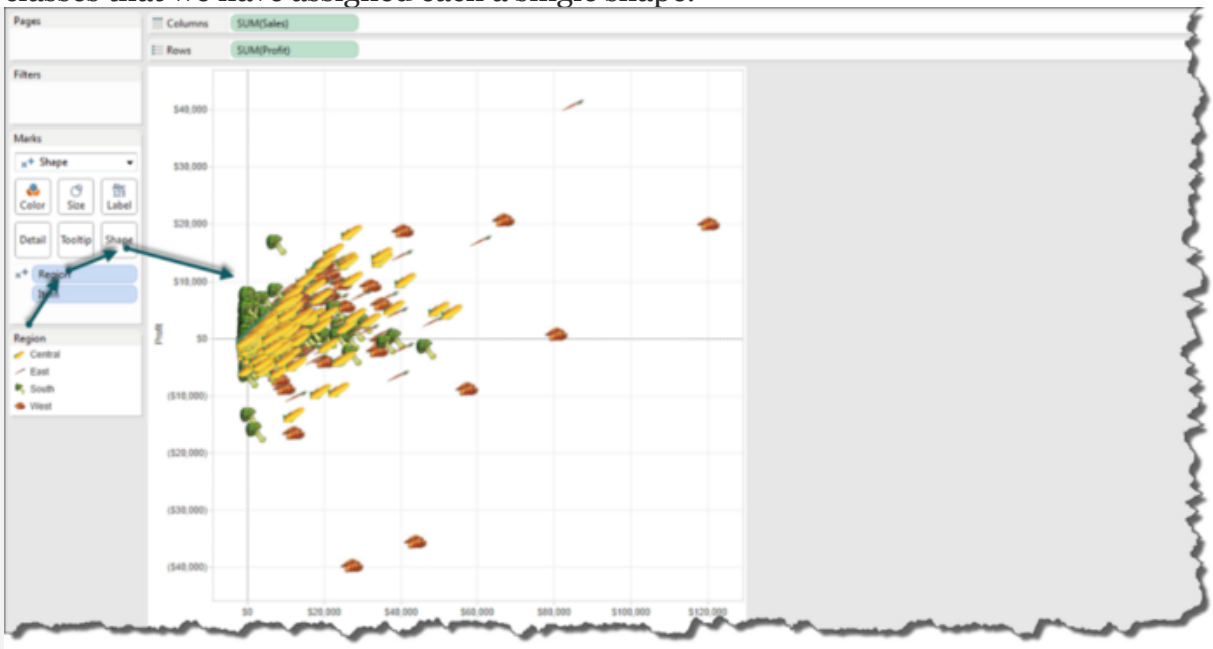
There is a folder in “My Documents” called “My Tableau Repository” where you can find a shapes folder. Within this shapes folder, simply create a new folder for your

shapes and name it an informative name. Save any custom shapes you would like to use in your visualization into this file.



To load your shapes, hit reload in your shapes palette and then select the new shapes folder from the drop down menu.

Here you can see our custom produce folder where we are going to assign vegetable shapes to our scatter plot. Our scatter plot has a category, “regions”, that has four classes that we have assigned each a single shape.



Custom shapes are powerful when telling a story with your visualizations. You can create unlimited shape combinations to show mark points and create custom formatting.

Be careful, however, to not over use shapes. The customization is available to help better inform your reader and over involving custom shapes can convolute your end visualization and hinder your end-user from interpreting the data correctly and efficiently. It is best practice to always check Tableau's shapes before importing custom shapes; years of research have gone into Tableau's selection of custom shapes based on industry best practices.

- **Change size of marks**

Change the size of marks

To change the size of marks in the view, do one of the following:

- On the Marks card, click **Size**, and then move the slider to the left or right.

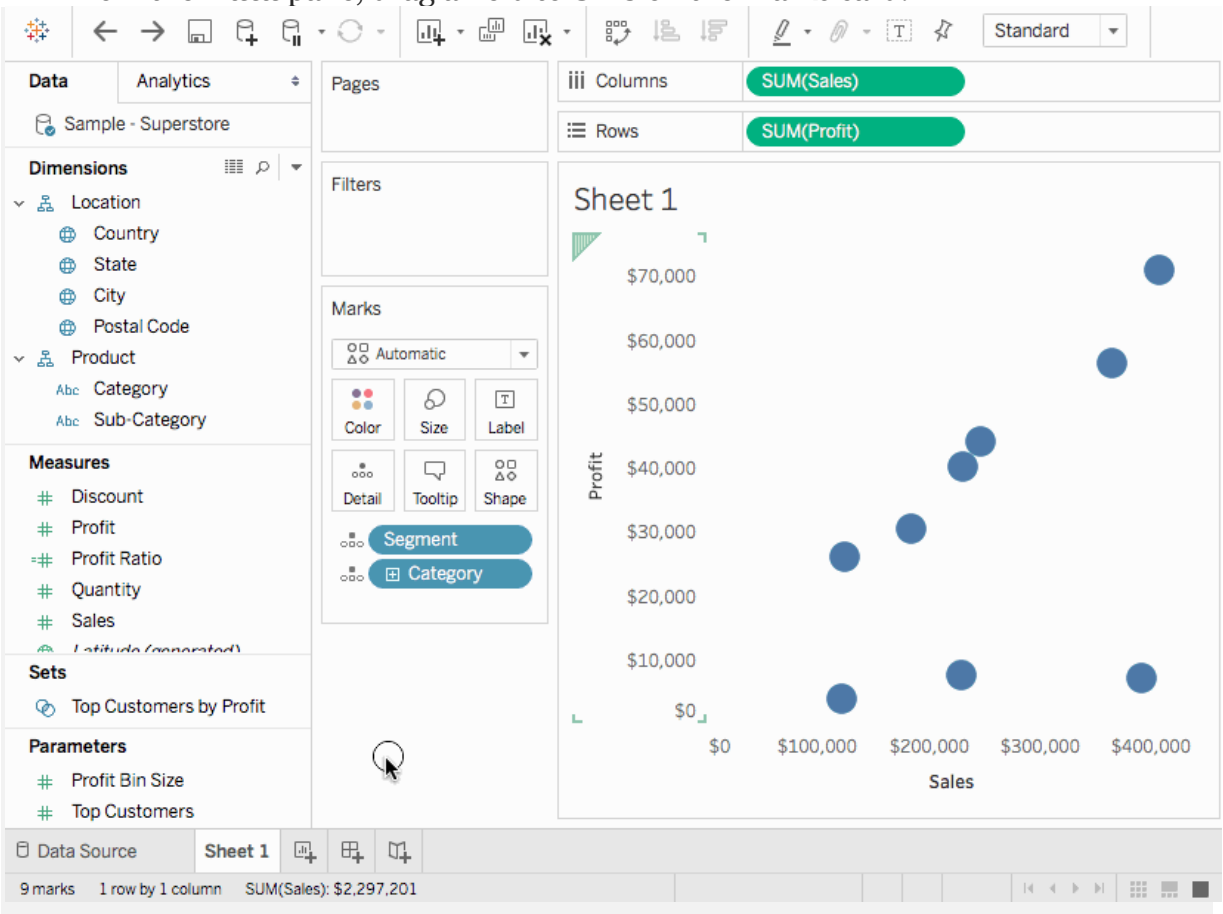
- The Size slider affects different marks in different ways, as described in the following table.

- MARK TYPEDESCRIPTIONCircle, Square, Shape, TextMakes the mark bigger or smaller.Bar, Gantt BarMakes bars wider or narrower.LineMakes lines thicker or

thinner.PolygonYou cannot change the size of a polygon.PieMakes the overall size of the pie bigger and smaller.

- The size of your data view is not modified when you change marks using the **Size**slider. However, if you change the view size, the mark size might change to accommodate the new formatting. For example, if you make the table bigger, the marks might become bigger as well.

- From the **Data** pane, drag a field to **Size** on the Marks card.



When you place a discrete field on **Size** on the **Marks** card, Tableau separates the marks according to the members in the dimension, and assigns a unique size to each member. Because size has an inherent order (small to big), categorical sizes work best for ordered data like years or quarters.

Size-encoding data with a discrete field separates the marks in the same way as the **Detail** property does, and then provides additional information (a size) for each mark. For more information, see Separate marks in the view by dimension members . When you add categorical size encoding to a view, Tableau displays a legend showing the sizes assigned to each member in the field on the **Size** target. You can modify how these sizes are distributed using the Edit Sizes dialog box.

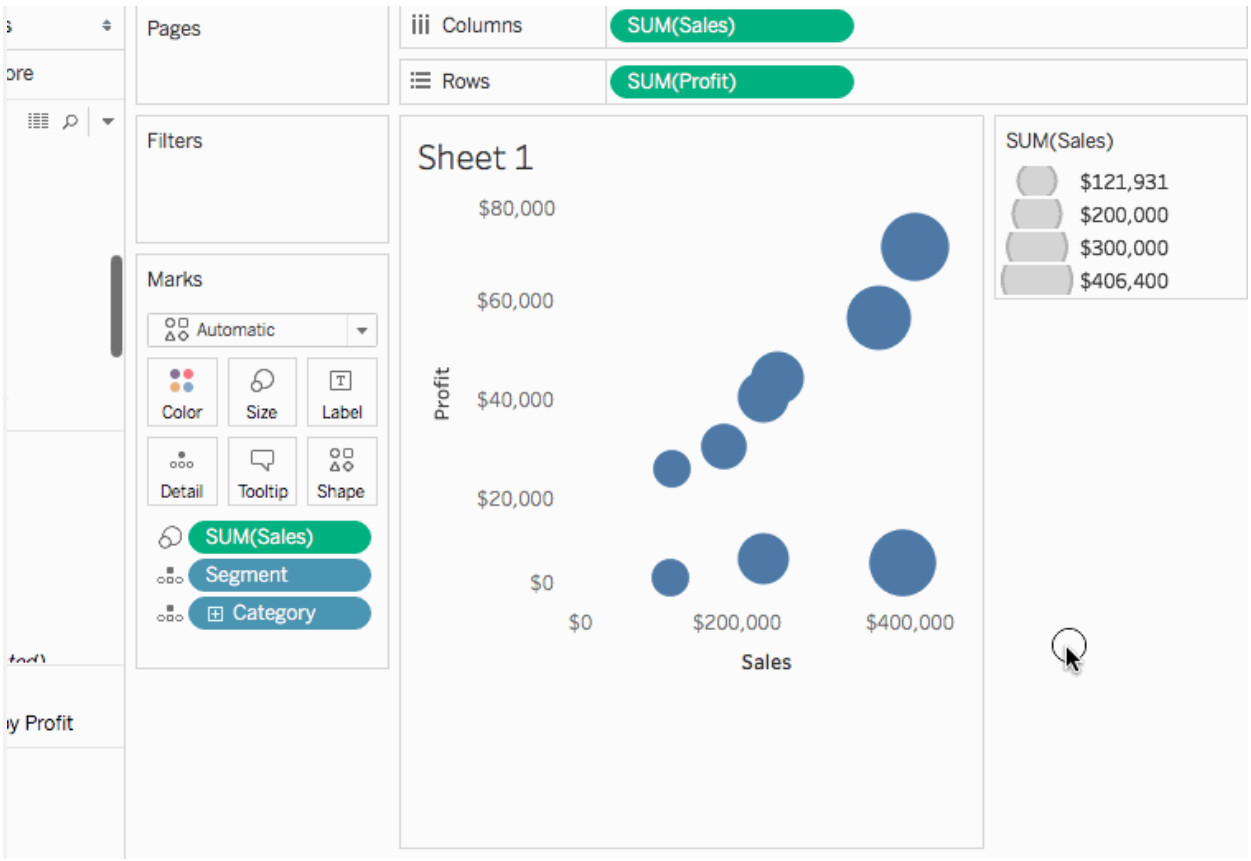
When you place a continuous field on **Size** on the **Marks** card, Tableau draws each mark with a different size using a continuous range. The smallest value is assigned the smallest sized mark and the largest value is represented by the largest mark.

When you add quantitative size encoding to the view, Tableau displays a legend showing the range of values over which sizes are assigned. You can modify how these sizes are distributed using the Edit Sizes dialog box.

Edit marks sizes

To edit the size of marks, or change how size is being applied to marks in the view:

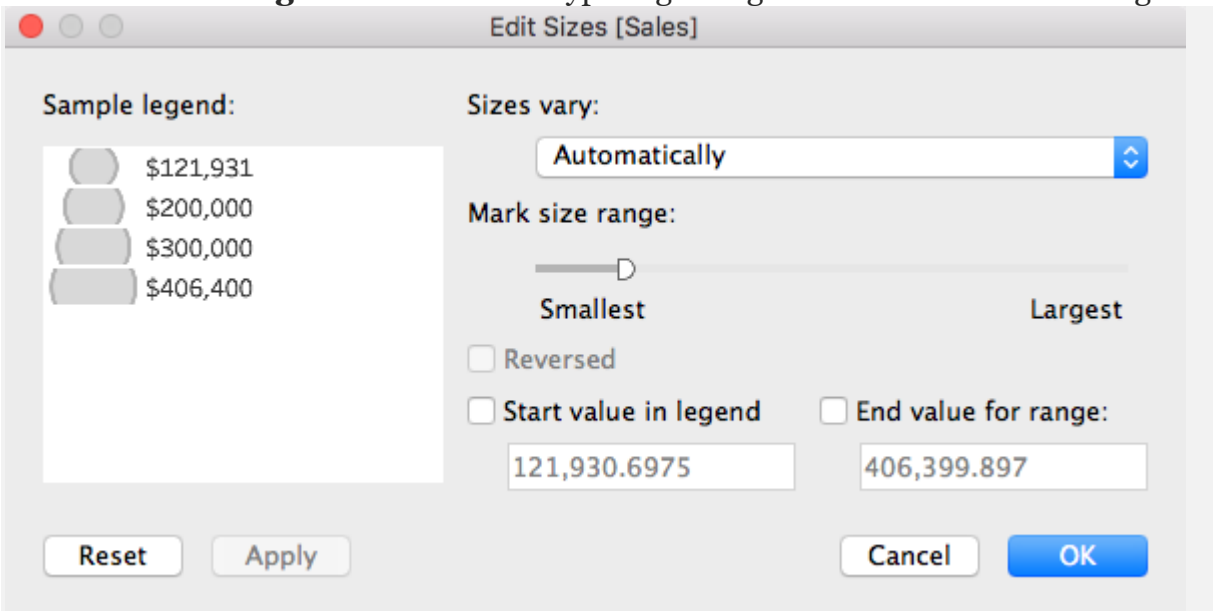
1. On the Size legend card (which appears when you add a field to Size on the Marks card), click the drop-down arrow in the right-hand corner and select **Edit Sizes**.



1. For more information about legends, see Legends.
2. In the Edit Sizes dialog box that appears, make your changes and then click **OK**.
3. The options available depend on whether the field being applied to Size is a continuous or discrete field.
4. For continuous fields, you can do the following:

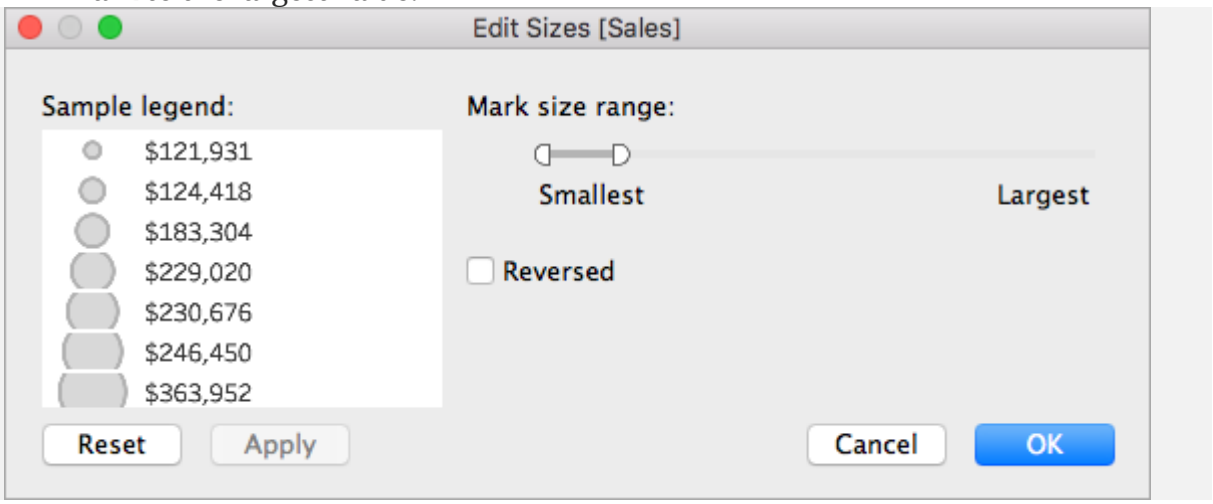
- For **Sizes vary**, click the drop-down box and select one of the following:
- **Automatically** — Selects the mapping that best fits your data. If the data is numeric and does not cross zero (all positive or all negative), the From zero mapping is used. Otherwise, the By range mapping is used.

- **By range** — Uses the minimum and maximum values in the data to determine the distribution of sizes. For example, if a field has values from 14 to 25, the sizes are distributed across this range.
- **From zero** — Sizes are interpolated from zero, assigning the maximum mark size to the absolute value of the data value that is farthest from zero.
- Use the range slider to adjust the distribution of sizes. When the From zero mapping is selected from the Sizes vary drop-down menu, the lower slider is disabled because it is always set to zero.
- Select **Reversed** to assign the largest mark to the smallest value and the smallest mark to the largest value. This option is not available if you are mapping sizes from zero because the smallest mark is always assigned to zero.
- To modify the distribution of sizes, select the **Start value in legend** and **End value for range** check boxes and type beginning and end values for the range.



- **For discrete fields, you can do the following:**
- Use the range slider to adjust the distribution of sizes.

- Select **Reversed** to assign the largest mark to the smallest value and the smallest mark to the largest value.

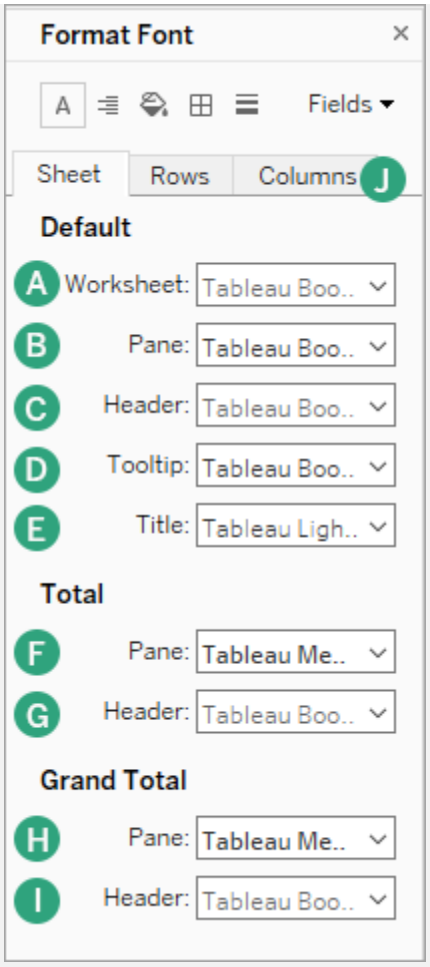


- **Select fonts**

Format fonts

Select **Format** > **Font** . A **Format Font** control pane will open. This control pane will let you customize the text in the view.

Click the letters below for more information.



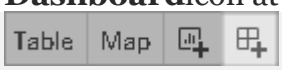
Create and modify a dashboard

- **Create a dashboard layout**

Open a dashboard sheet

You create a dashboard in much the same way you create a new worksheet. After you create a dashboard you can add views and objects.

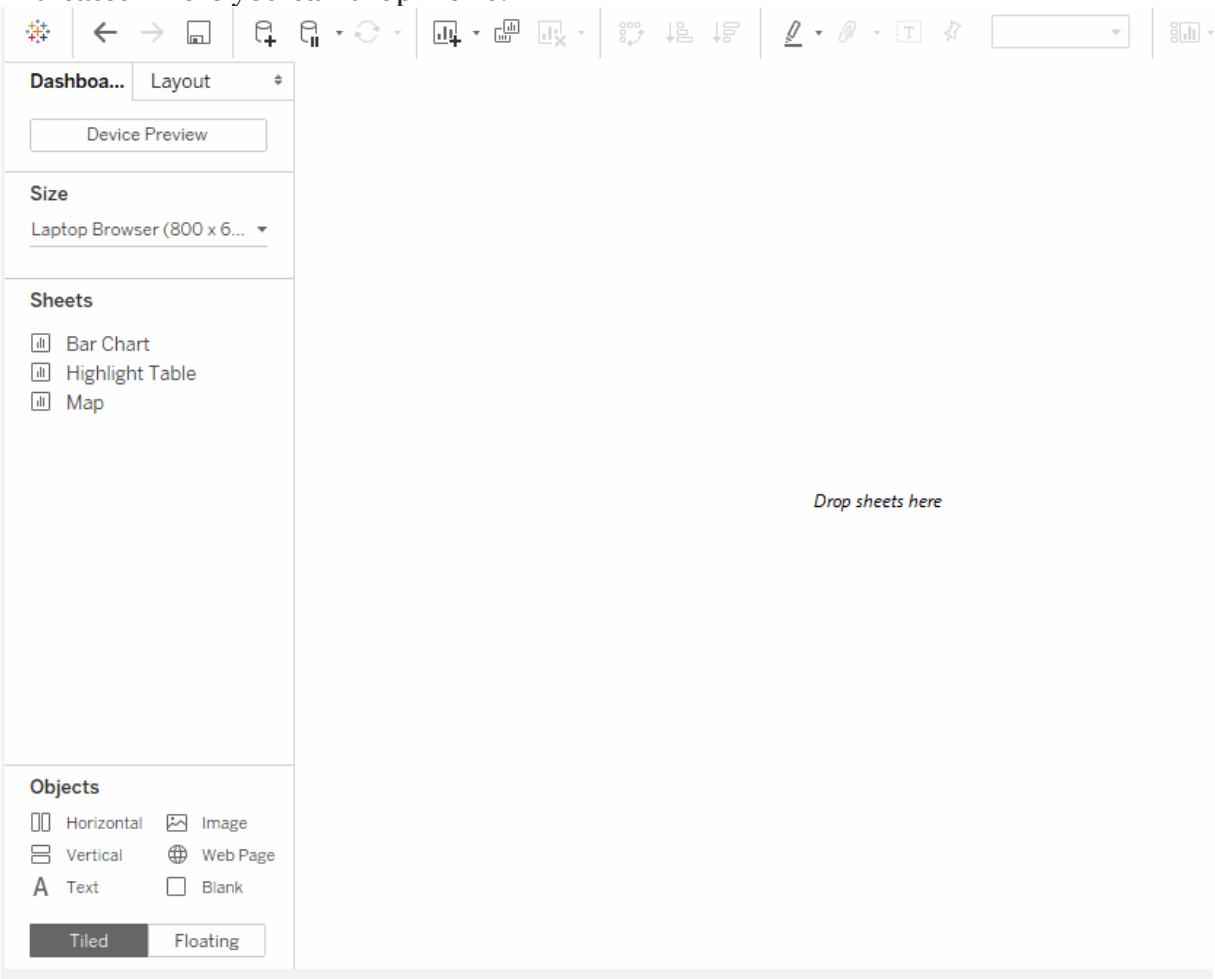
To open a new dashboard sheet and start creating a dashboard, click the **New Dashboard**icon at the bottom of the workbook:



The **Dashboard** area appears on the left and lists the sheets in your workbook.

Add views

After you have a dashboard sheet, click the views you built (listed under **Sheets** on the left) and drag them to your dashboard sheet on the right. A gray, shaded area indicates where you can drop views:



Click the image to replay it.

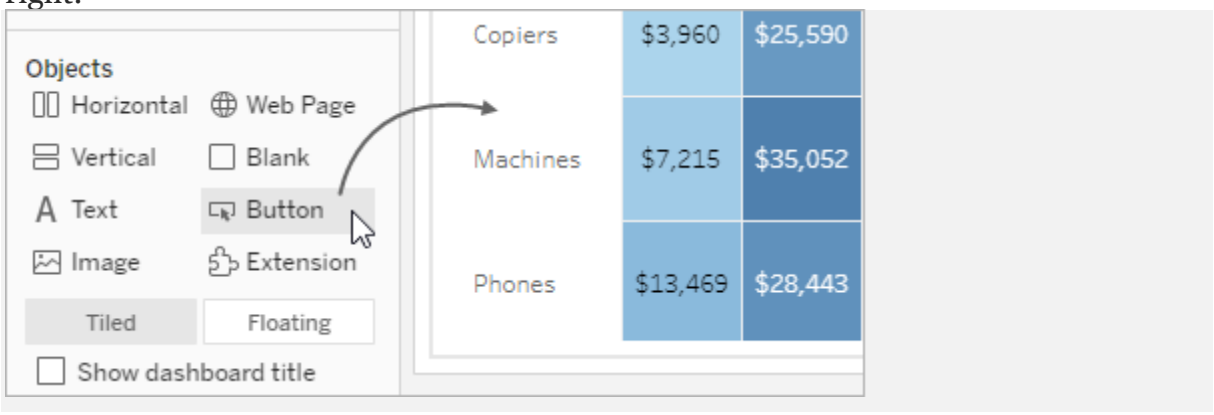
Add and edit objects

In addition to adding views to your dashboard, you can add 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.
- 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 — Google is one example.
- Blank objects help you adjust spacing between dashboard items.
- Button objects let your audience navigate from one dashboard to another, or to other sheets or stories. Add custom images and tooltip text to reveal a button's destination to your users.
- Image objects add to the visual flavor of a dashboard, and you can link them to specific target URLs.
- Extension objects let you add unique features to dashboards or integrate them with applications outside Tableau.

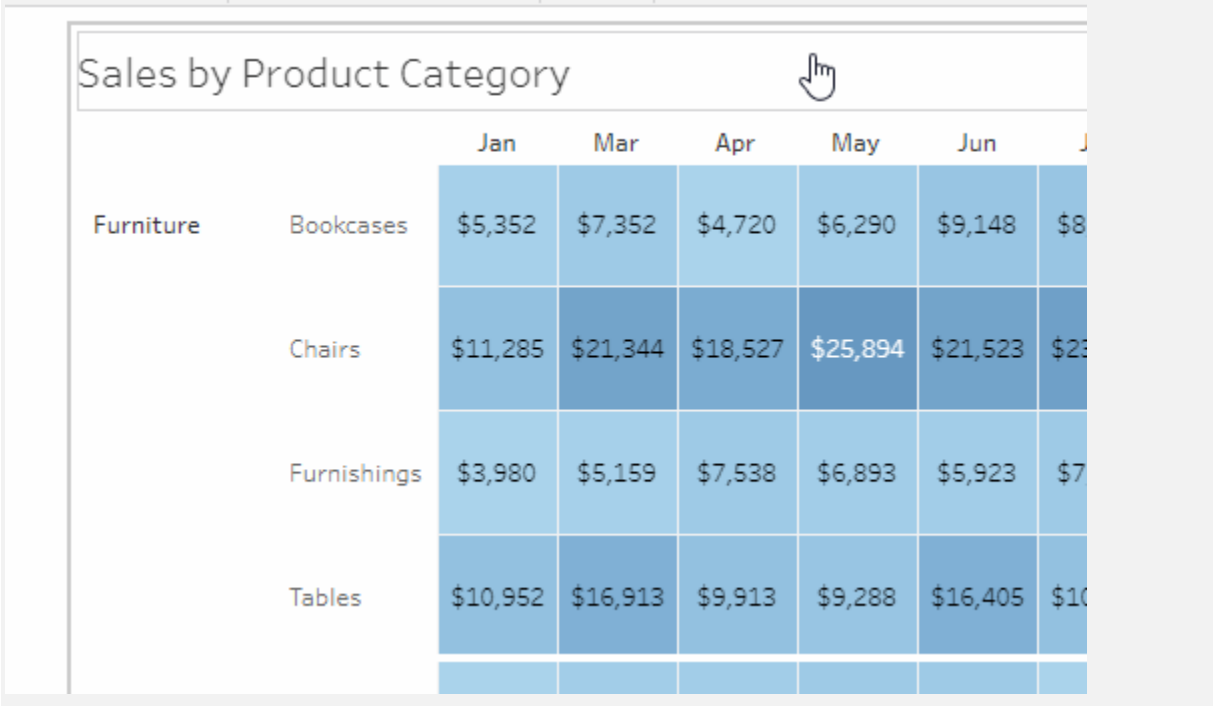
Add an object

Select an item under **Objects** on the left, and drag it to the dashboard sheet on the right:



Edit an object

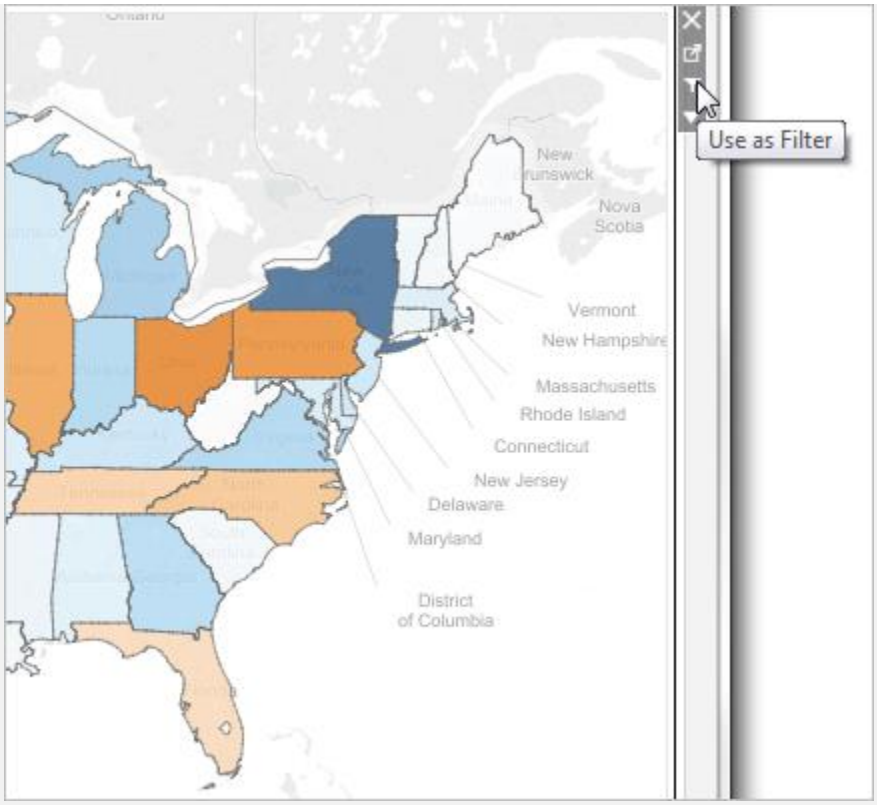
Click the object container to select it. Then click the arrow in the upper corner to open the shortcut menu. (The menu options vary depending on the object.)



Add interactivity

Part of the power of dashboards is that you can set up filters and interactivity to associate the different views on your sheet and enhance your users' analysis. The people looking at your dashboard can stay in a single spot — they don't need to click outside the world you've created for them.

In a dashboard you can use the **Use as Filter** option to make one of the views act as a filter on all the other views in the dashboard. To do this, select the filter button.

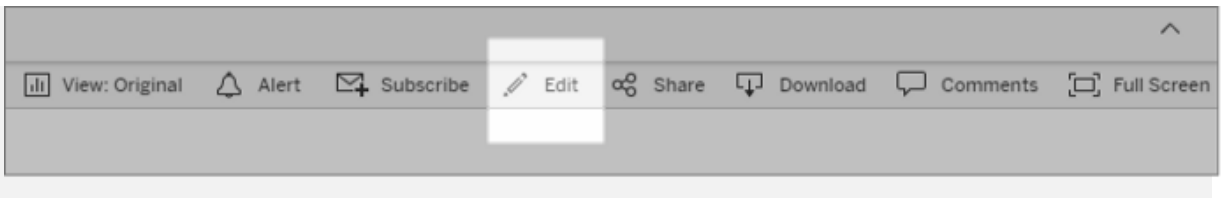


If you're using Tableau Desktop, there are many other actions you can add to your dashboard. For details, see Actions and Dashboards and Using Field and Filter Values in Actions.

Edit a web dashboard (Tableau Server and Tableau Online only)

On the Views page in Tableau Server or Tableau Online, you can open a dashboard for editing in the following ways:

- In list view, select the check box for the dashboard, then select **Actions** > **Edit Sheet**.
- Click a dashboard to open it, and then click **Edit**.



- **Note**: If you don't see the **Edit** option, ask the content owner or your administrator for web editing permissions. (The Save options available to you also depend on your permissions.)

Although it's possible to edit a workbook that has device layouts, it's not advised. Because device layouts inherit their content, formatting, and action from the parent (that is, from the default dashboard), editing the default dashboard can impact a device layout. You'll be able to see any issues in a device layout, but because device layouts are read-only, you won't be able to edit it. To edit a dashboard that has device layouts, download the dashboard to Tableau Desktop and make your edits there.

- **Add interactive or explanatory elements**
- **Add dashboard actions**

Actions often have unique behavior when the source or destination is a dashboard. Because a dashboard can contain multiple views, a single filter or highlight action can have broad impact. Dashboards can also contain web page objects, which you can target with interactive URL actions.

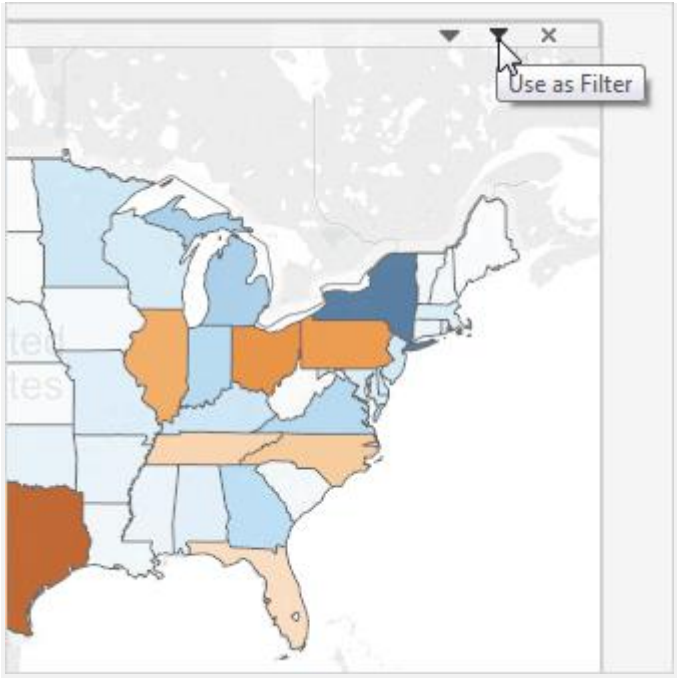
Use a single view to filter other views in a dashboard

Imagine you have a dashboard that contains three views about profitability: a map, a bar chart, and a table of customer names. You can use a filter action to make one of

the views in your dashboard, such as the map, the “master.” When your users select a region in the map, the data in the other views is filtered so that it relates to just that region.

1. On the dashboard, select the view you want to use as a filter.
2. On the view’s shortcut menu, choose **Use as Filter**. You can perform the same action by clicking the Use as Filter icon

1.



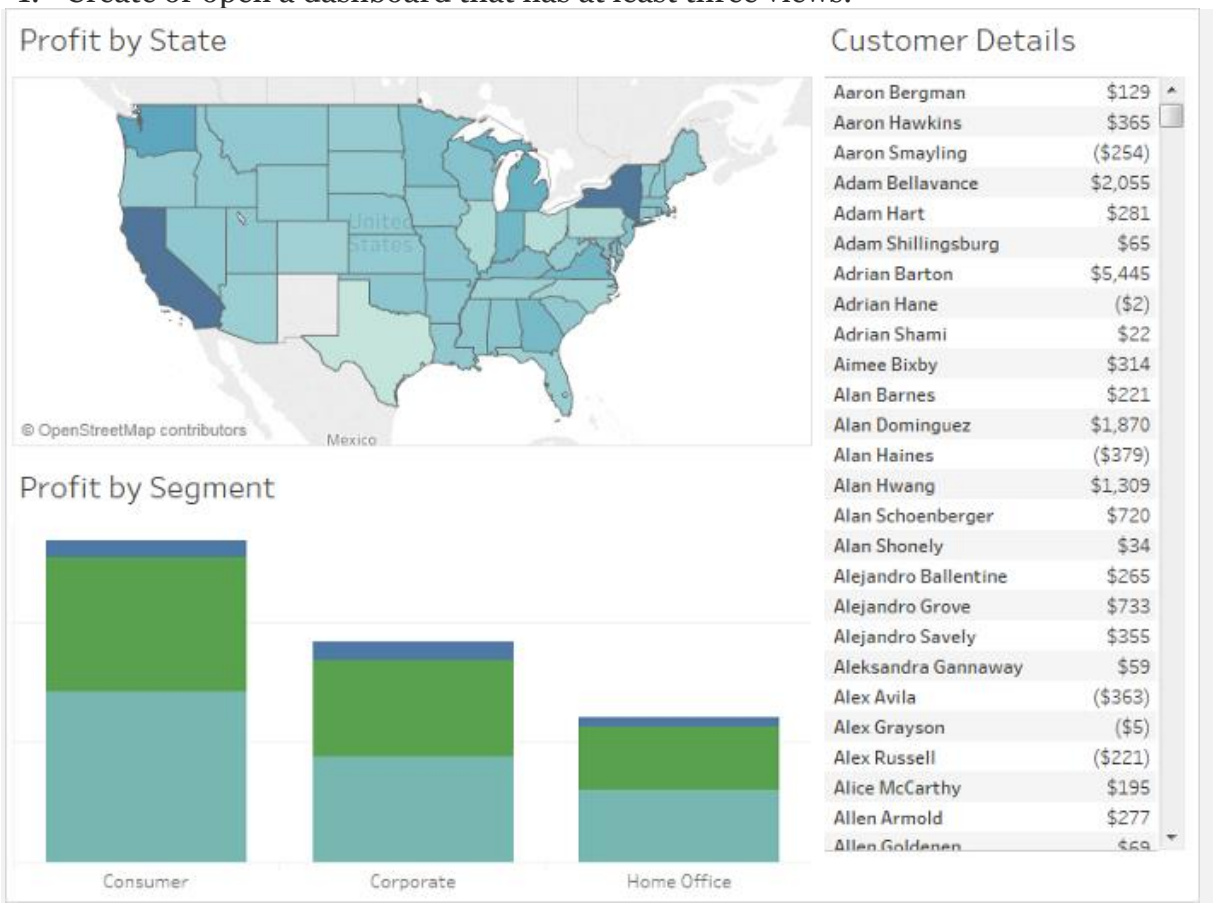
You can also use filter actions to filter the data on a dashboard when the data comes from multiple data sources. For more information, see Filtering Across Multiple Data Sources Using a Parameter in the Tableau Knowledge Base.

For more information about filter actions, see Filter Actions.

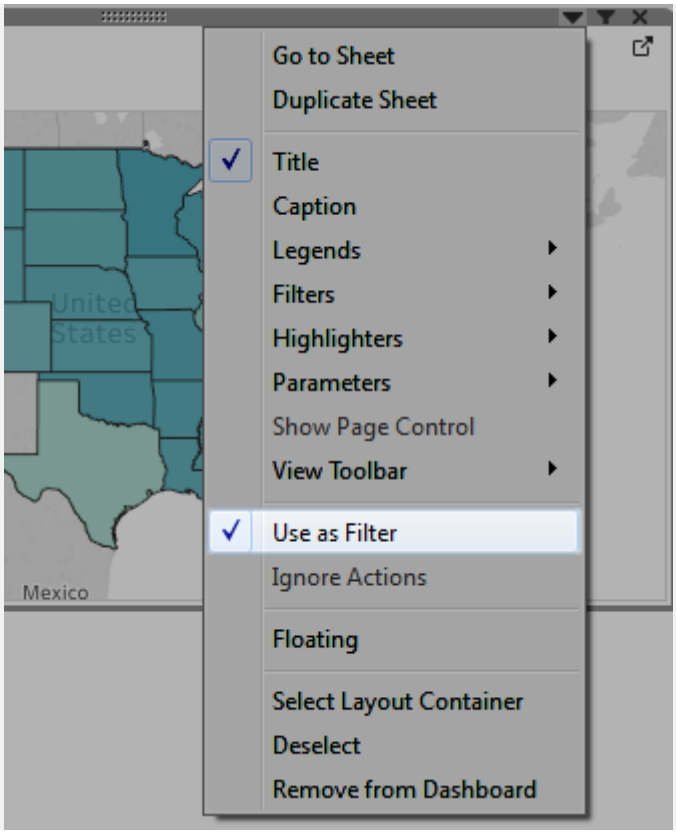
Use multiple views to filter other views in a dashboard

Similar to how you can use a single view to filter other views in a dashboard, you can also use multiple views as a filter. This is sometimes called having a “multi-master” dashboard. The trick is to not only use the master views as filters, but to also disable their ability to be filtered themselves.

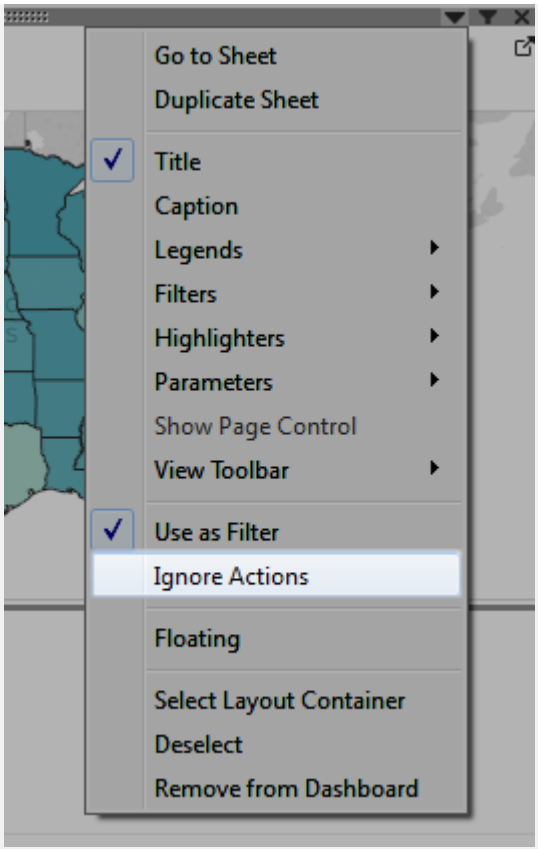
1. Create or open a dashboard that has at least three views.



1. Select the first view that you want to use as a filter (such as a map), and from its shortcut menu, select **Use as Filter**.

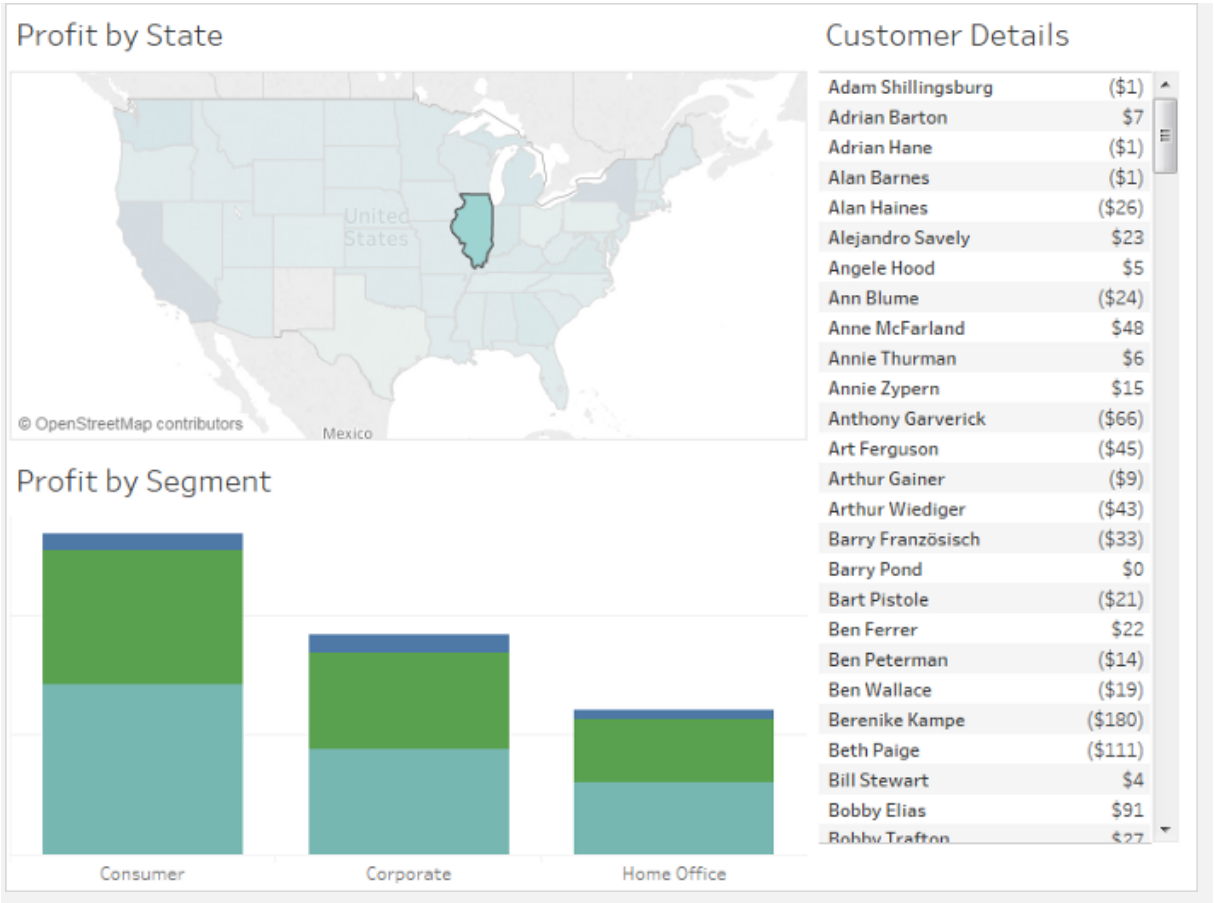


1. Open the same view's shortcut menu again and select **Ignore Actions**. This ensures that other filter actions, including the one you'll create next, will not affect this view.



1. Repeat the steps 2 and 3 for any other views you want to use as a filter.

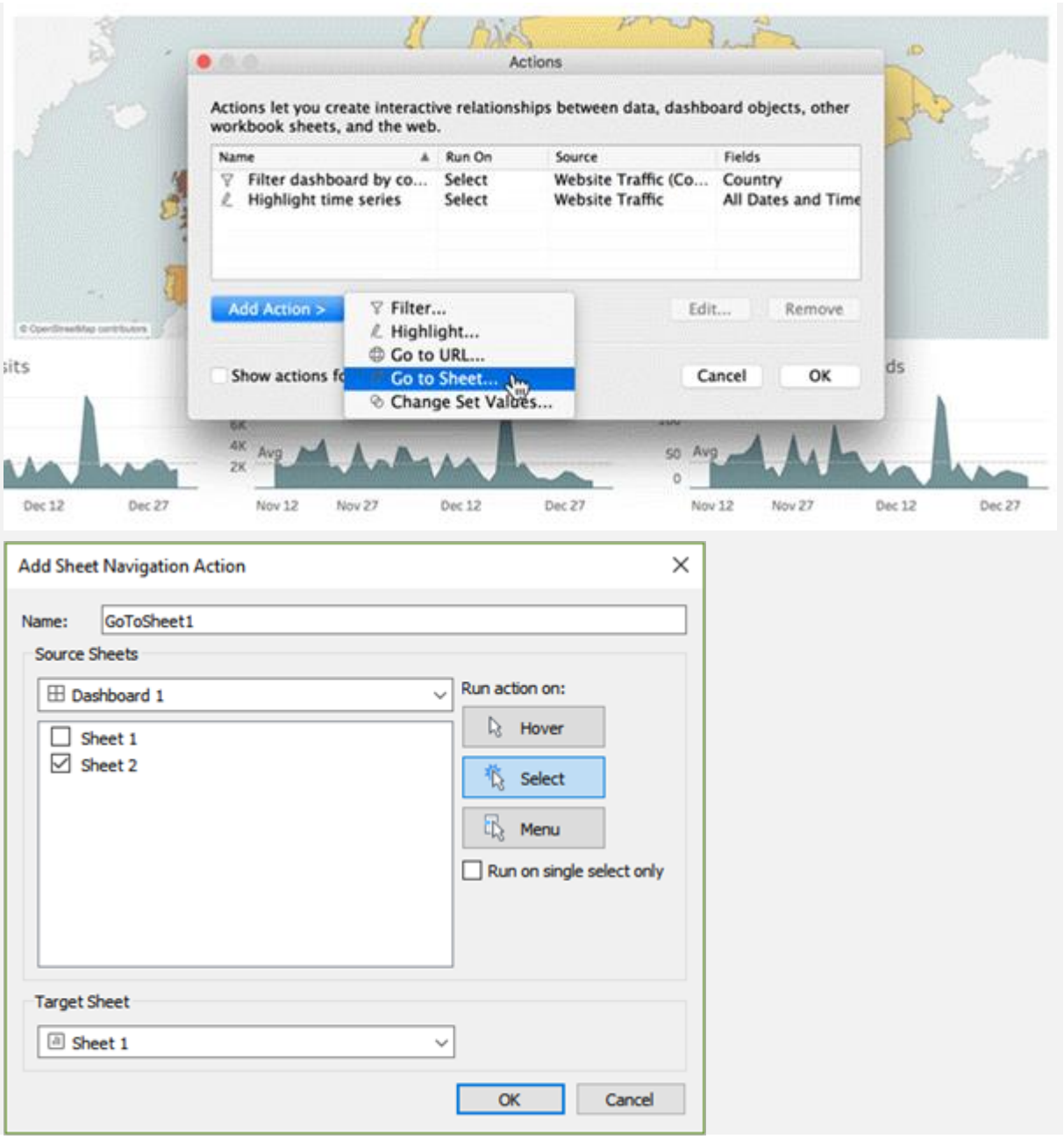
2. Now, selecting marks in a master view filters data in one or more detail views — all without affecting any other masters.



Navigate from one view to another view, dashboard, or story (Create in Tableau Desktop)

Use the Go to Sheet action to let users quickly navigate to a related visualization — a dashboard, sheet, or story — when they click on a mark or a tooltip menu item in the original view.

Note: To simply navigate from one dashboard to another, without requiring users to interact with data, consider using the Button object.



1. From your dashboard, select **Dashboard** > **Actions**.
2. In the Actions dialog box, click **Add Action** and then select **Go to Sheet**.
3. Specify a name for action. (If you choose to run the action using a menu, the name you specify here is what's displayed.)
4. Under Source Sheets, select the view that will initiate the action.

5. Specify how people viewing your dashboard will run the action. **Select** or **Menu** are the best choices for a navigation action.

6. If you choose **Select**, consider selecting the **Run on single select** option so users won't navigate away from the view when exploring multiple marks.

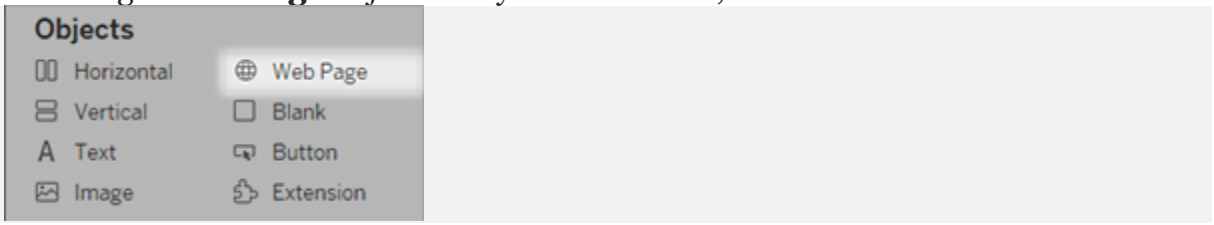
7. For Target Sheet, select the navigation destination that appears when users click marks or tooltip menu items in the source sheet. Then click **OK**.

Interactively display a web page in a dashboard (Create in Tableau Desktop)

To interactively display information from the web inside a dashboard, you can use a URL action with a web page object. For example, you might have a dashboard that shows profits by country. In addition to showing the profit data in your dashboard, you also want to display supplemental information about the countries from a web site.

Tip: To easily organize and target multiple web page objects in a dashboard, rename them.

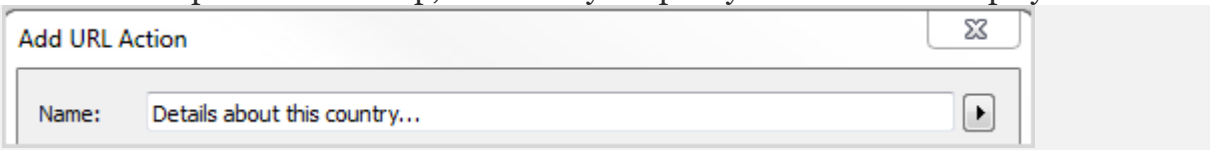
1. Drag a **Web Page** object onto your dashboard, and enter a URL.



1. From your dashboard, select **Dashboard** > **Actions**.

2. In the Actions dialog box, click **Add Action** and then select **Go to URL**.

3. Specify a name for the link. If you choose to run the action using a menu, such as a menu option on a tooltip, the name you specify here is what's displayed.



1. Under Source Sheets, select the view or data source that will initiate the action. For example, if you want the action to be initiated when a user clicks a link on a map's tooltip, select the map view.

2. Specify whether people viewing your dashboard will run the action on hover, select, or menu. For details, see Running Actions.

3. Enter the URL, starting with the http:// or https:// prefix, such as `http://www.example.com`.

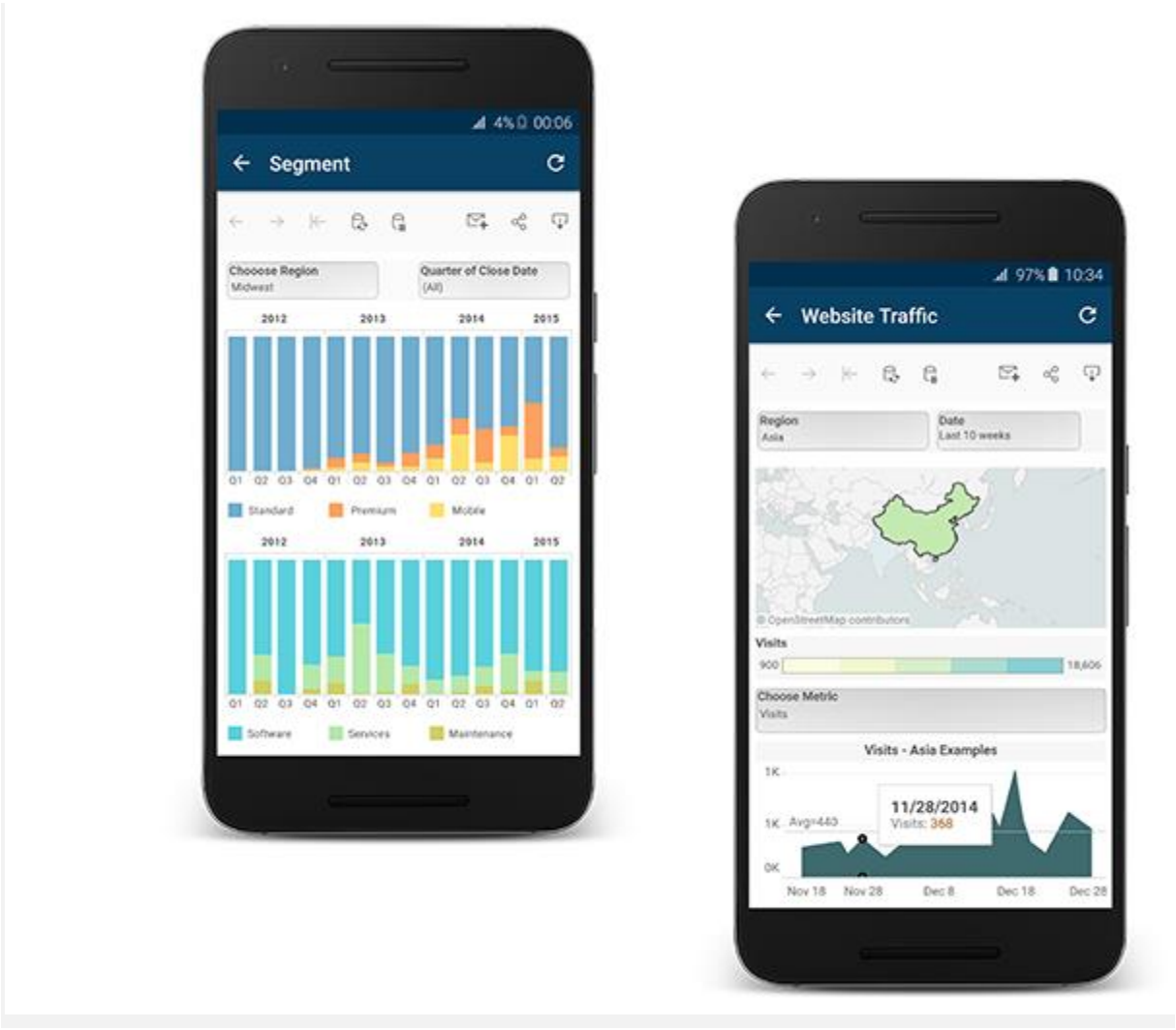
4. You can use field values as parameters in your URL. For example, if Country is a field used by a view in your dashboard, you can use `<Country>` as a parameter in your URL. For details, see URL Actions.

1. For URL Target, select **Web Page Object**, and select the object you created in step 1.

2. When you launch the action, a web page automatically loads within the dashboard rather than opening a separate browser window.

- **Modify existing dashboard layout for mobile devices**

Dashboards can include layouts for different types of devices that span a wide range of screen sizes. When you publish these layouts to Tableau Server or Tableau Online, people viewing your dashboard experience a design optimized for their phone, tablet, or desktop. As the author, you only have to create a single dashboard and deliver a single URL.



Tip: In addition to optimizing layouts for mobile, optimize workbook performance to better meets the needs of mobile users, who often have limited bandwidth and are in a hurry.

How the default dashboard relates to device layouts

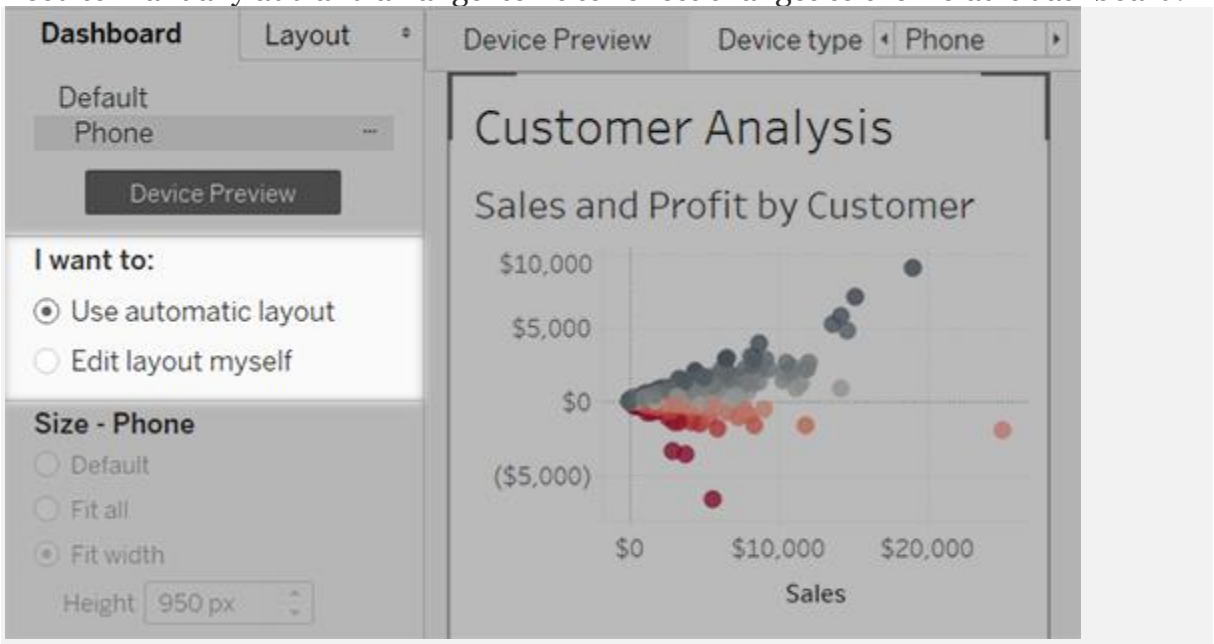
Device layouts appear on the Dashboard tab, under Default. Initially, each device layout contains every item in the Default dashboard and derives its size and layout from Default as well.

Think of the Default dashboard as the parent, and the device layouts (desktop, tablet, and phone) as its children. Any view, filter, action, legend or parameter that you want to add to a device layout must first exist in the Default dashboard.

Phone layouts and the Default dashboard

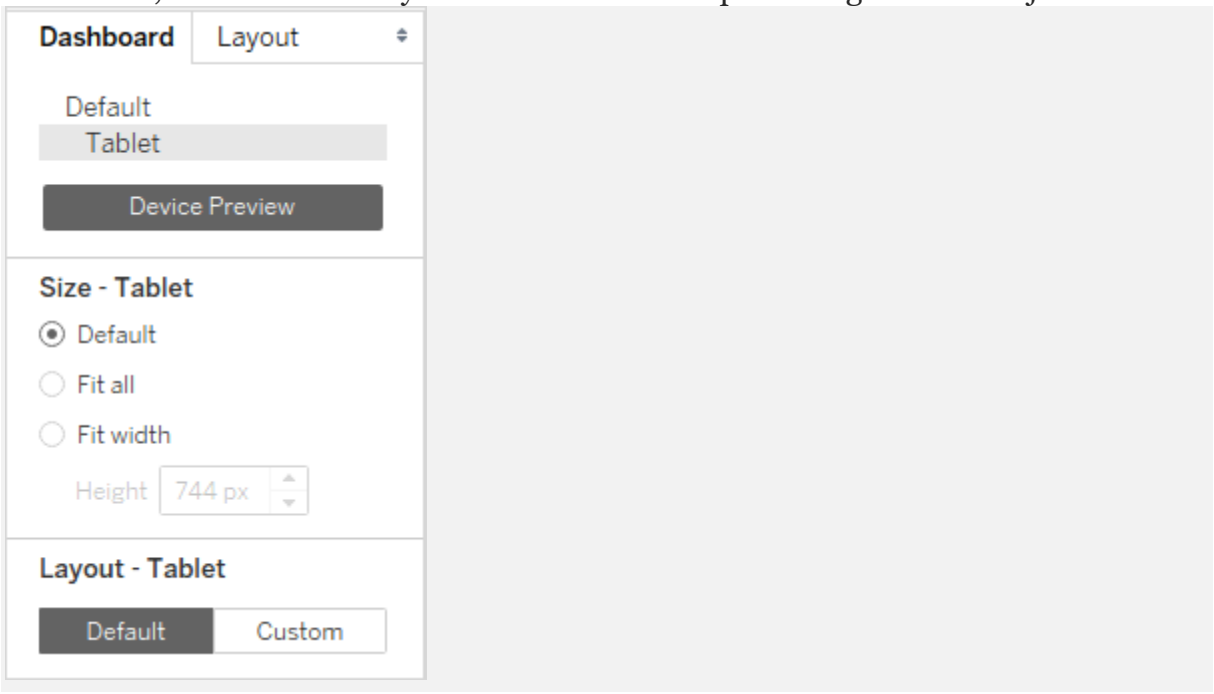
By default, Phone layouts are automatically generated whenever you create a new dashboard. To create them only for specific dashboards, from the **Dashboard** menu, deselect **Auto-Generate Phone Layouts**.

Phone layouts provide a unique **Use automatic layout** option, which automatically synchronizes any changes to the Default dashboard, saving you time. If you instead choose **Edit layout myself**, the Phone layout becomes fully independent, so you'll need to manually add and arrange items to reflect changes to the Default dashboard.



Desktop and Tablet layouts and the Default dashboard

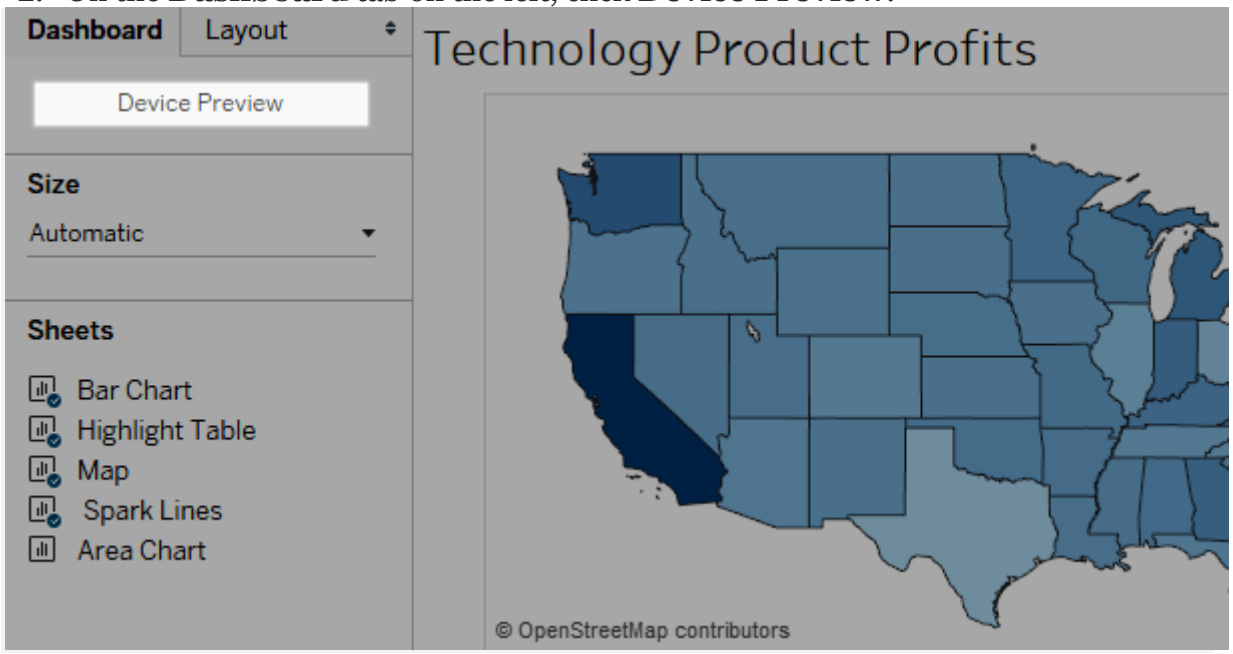
Unlike Phone layouts, you need to manually add Desktop and Tablet layouts to a dashboard. Desktop and Tablet layouts are always fully independent from the Default dashboard, so each device layout can contain a unique arrangement of objects.



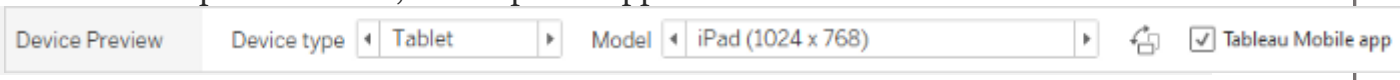
Preview and add device layouts

1. Open a dashboard.

2. On the **Dashboard** tab on the left, click **Device Preview**.



1. In device preview mode, these options appear above the dashboard:

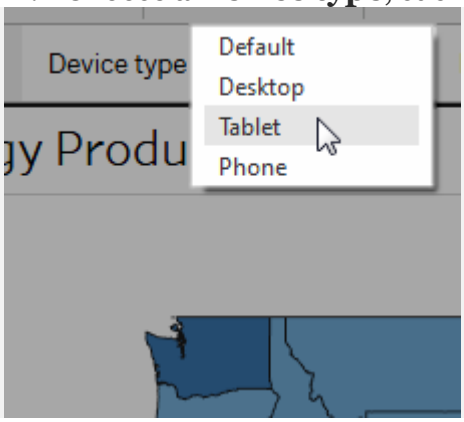


1. Take a moment to click through the **Device types** and **Models** and explore the different screen sizes. Then set these options:

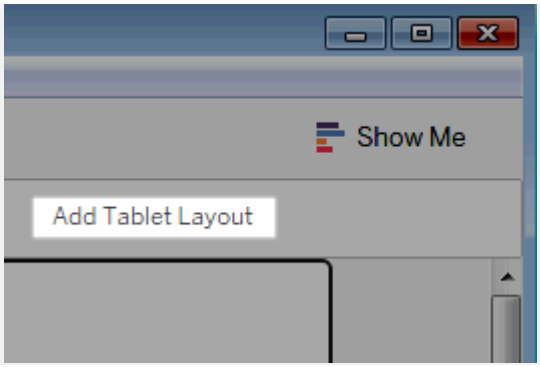
- To see how the dashboard will look in landscape vs. portrait mode, click

- . Usually, landscape is optimal for tablets and portrait is best for phones.
- Select **Tableau Mobile app** to see how the dashboard will look with the app instead of the browser. This option is available for iOS or Android devices and shrinks the dashboard slightly, leaving space for the app controls.

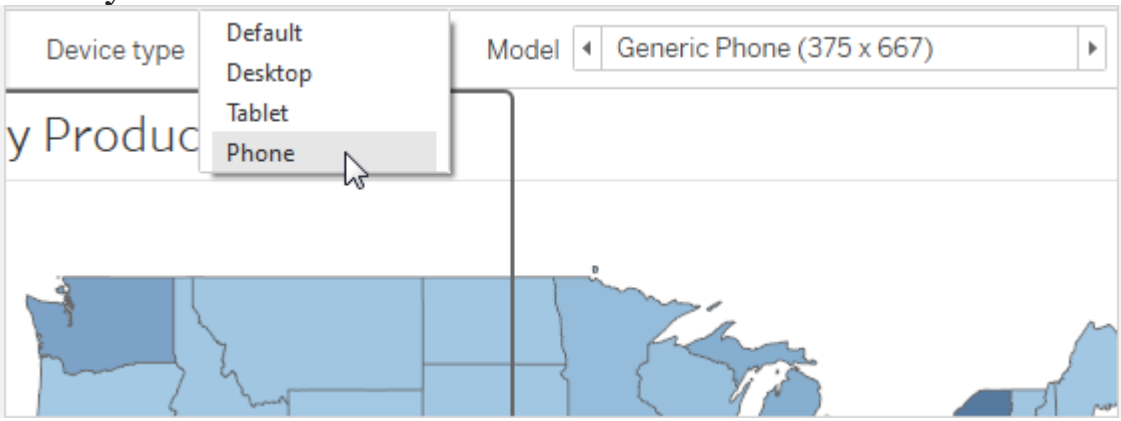
1. Choose a **Device type**, such as **Tablet**.



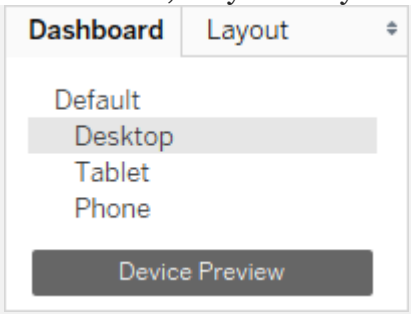
1. In the upper-right corner, click the **Add Layout** button for the device type you selected (for example, **Add Tablet Layout**).



1. Add an additional layout by selecting a new **Device type** and clicking **Add Layout**.



1. Creating a layout for each device type gives you the most control over your users' experience as they view your dashboard from different devices. After you publish a dashboard with all three layouts, users won't see the default dashboard layout; instead, they'll always see the appropriate device-specific layout.

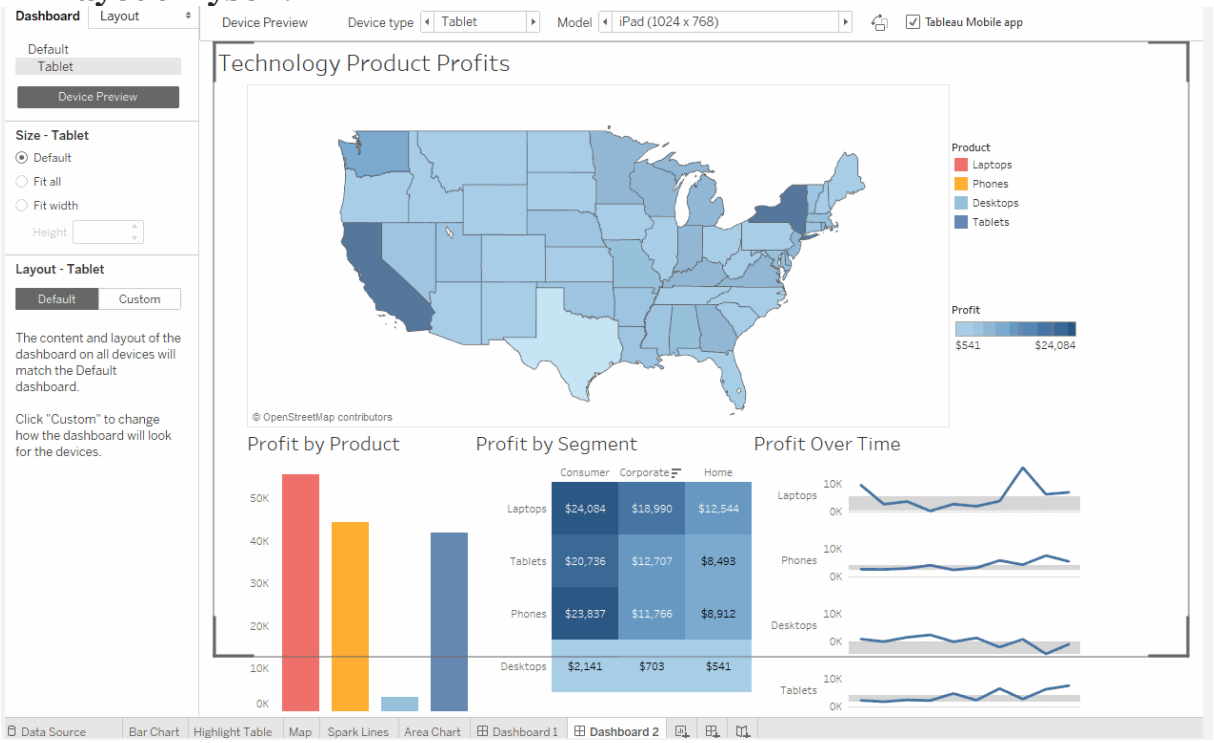


Note: If you make changes to a view, double-check related devices layouts to ensure that they look as you expect.

Customize a device layout

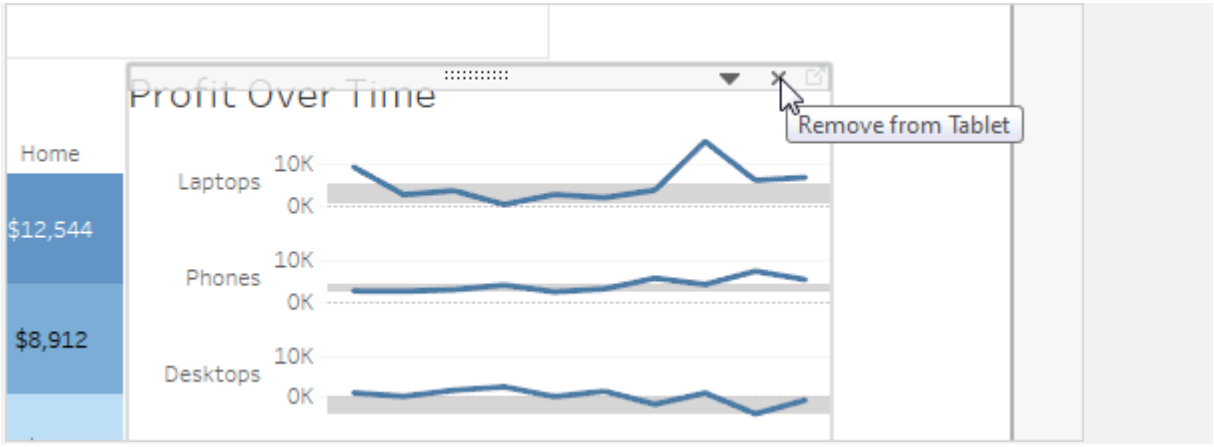
After you've added a device layout to your dashboard, you can start rearranging objects to create the look you want.

1. For Desktop and Tablet layouts, click **Custom**. For Phone layouts, click **Edit layout myself**.

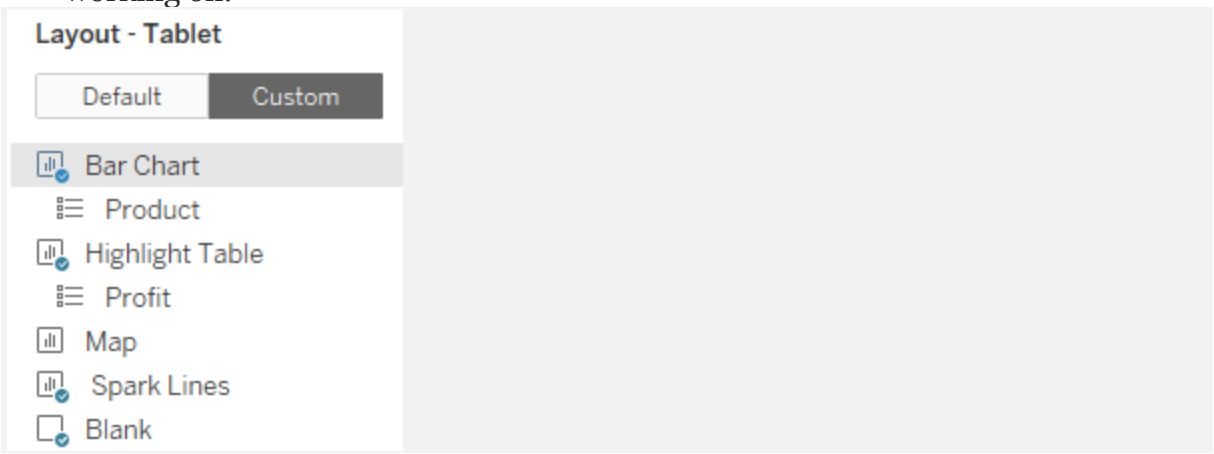


1. *Click the image to replay it.*

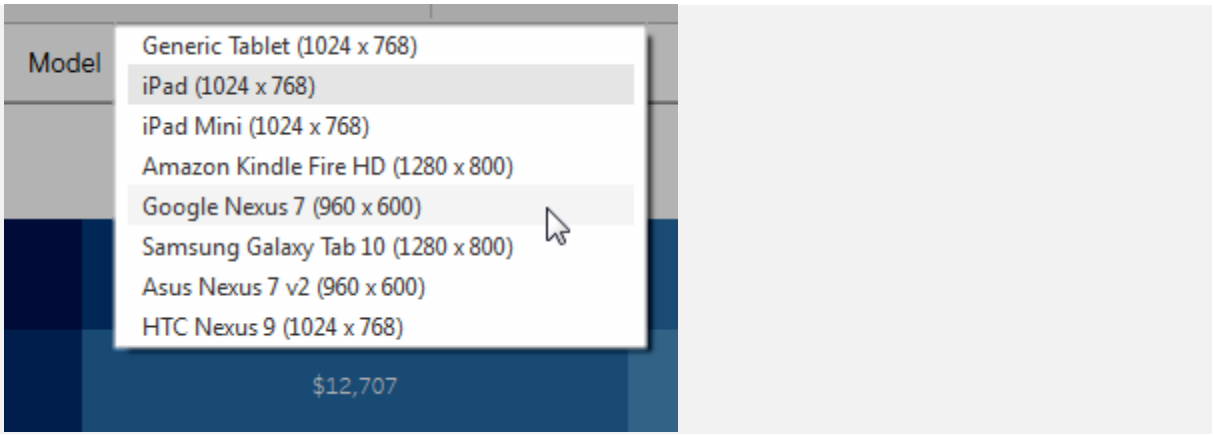
2. If you remove an item from the device layout, it's only removed from that layout. It still exists on the default dashboard and can be added back to the device layout again.



1. Anything you can add to your layout is listed on the left, under **Layout**. If an item has a blue check mark, it means that it's part of the device layout you're currently working on.

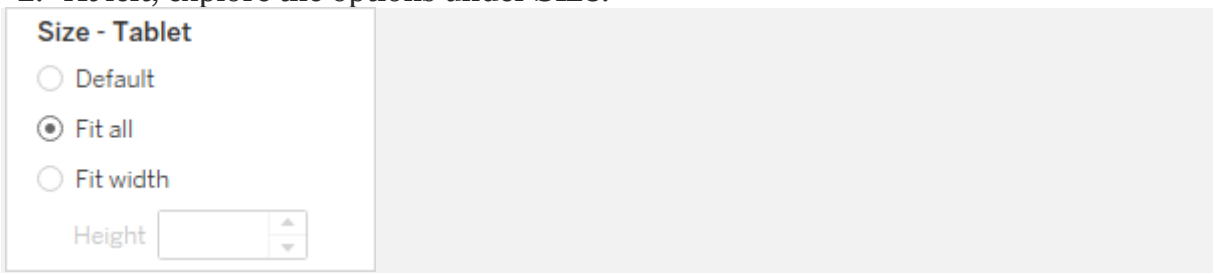


1. Click through the **Device model** options to see how the layout will appear on different models.



1. Ultimately, it's the size of the web browser that loads the dashboard that determines which layout appears on the device. For details, see Confirm which layout a device will display.

2. At left, explore the options under **Size**.



1. **Default**: The height and width of the device layout mimics whatever the default dashboard is using. For example, if you're creating a tablet layout and the default dashboard is set to a fixed size of Desktop Browser (1000 x 800), setting Size to Default for the tablet layout will make it use 1000 x 800 as well.

2. **Fit all**: All items are automatically resized to fit the device frame size. The device frame size is determined by the Device type, Model, and orientation (portrait or landscape) settings.

3. **Fit width** (recommended for phones): Items are automatically resized to fit the width of the device frame, but the height is fixed. This is a great option for phone layouts and vertical scrolling.

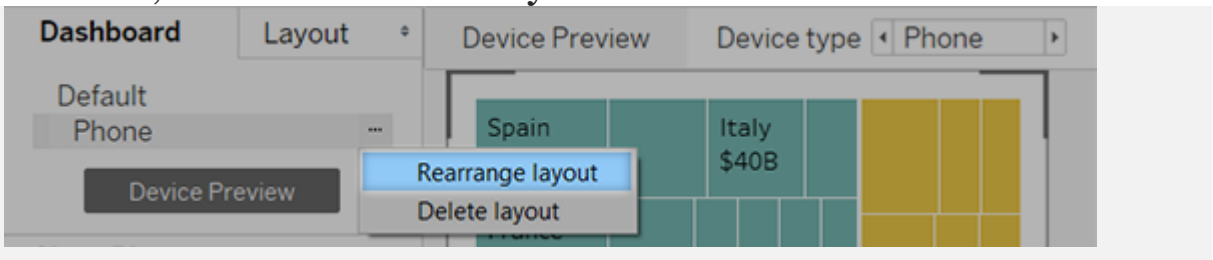
Optimize for phones

The small screens of mobile phones benefit from further optimization. Try these techniques.

Optimize manual phone layouts

If you've chosen to edit a phone layout yourself, you can quickly optimize the placement of filters, remove white space, and more. On the **Dashboard** tab, click the pop-up menu to the right of **Phone**, and select **Rearrange layout**.

Be aware that this command only rearranges items currently in the phone layout. If you want to continuously update the phone layout to reflect all changes to the default dashboard, select **Use automatic layout**.



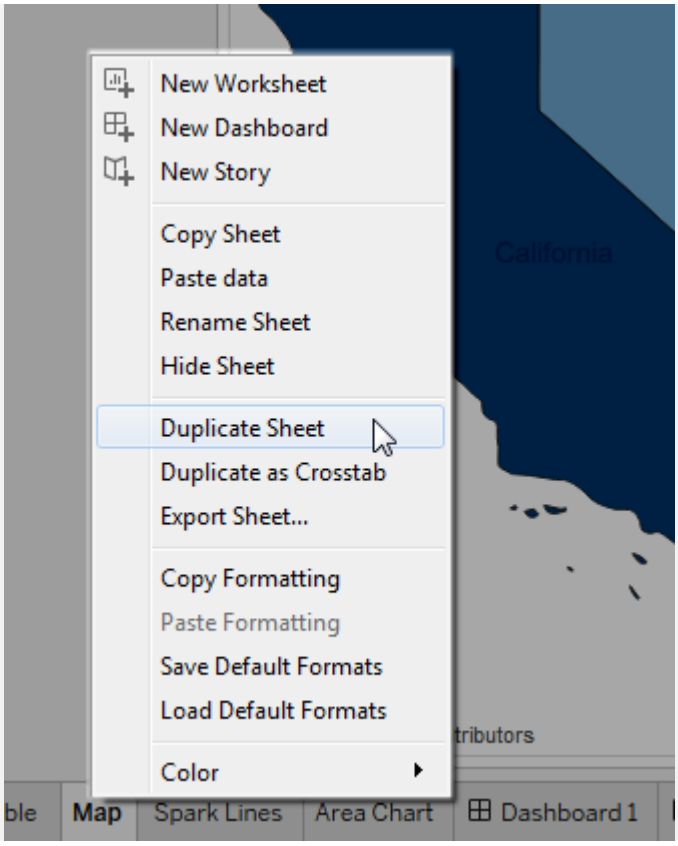
Add links that trigger instant messages and phone calls

To let phone users quickly contact key people about dashboard content, add URL actionsto objects that automatically trigger SMS messages and telephone calls. Use the link format `sms:phone-number` or `tel:phone-number`. Be sure to include country and area codes if necessary.

Create phone-specific versions of views

Create duplicates of certain views in the default dashboard — one optimized for desktop viewing and a second optimized for phones.

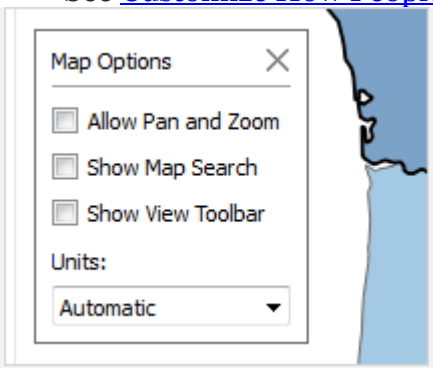
1. Go to the worksheet for a view, click its tab, and select **Duplicate Sheet**.



1. Customize the view for mobile viewing.

2. For maps for example, you may want to zoom in to a specific region by default, or you may want to disable panning, zooming, and other functionality.

   See [Customize How People Interact with your Map].



1. Now add the new view to the default dashboard so that it can be available to the device layouts you're creating.

Shorten titles

Short titles work best for mobile viewing. To edit a title, double-click it.

Optimize white space

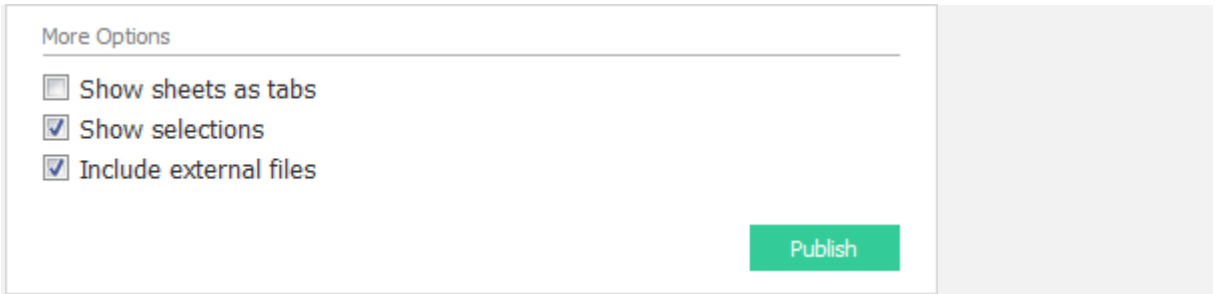
White space is another visual element to consider. While screen real estate on a phone is scarce and you want to make the most of it, you may also want to provide additional safe places for your users to tap or initiate scrolling, so they don't select filters and other items unintentionally.

To add white space, use padding or Blank objects. For more information, see Size and Lay Out Your Dashboard.

Publish the dashboard

1. Click **Server** > **Publish Workbook**. If you're not already signed in, you're prompted for your credentials.

2. In the Publish Workbook to Tableau Server dialog box, make sure the **Show sheets as tabs** check box is cleared.



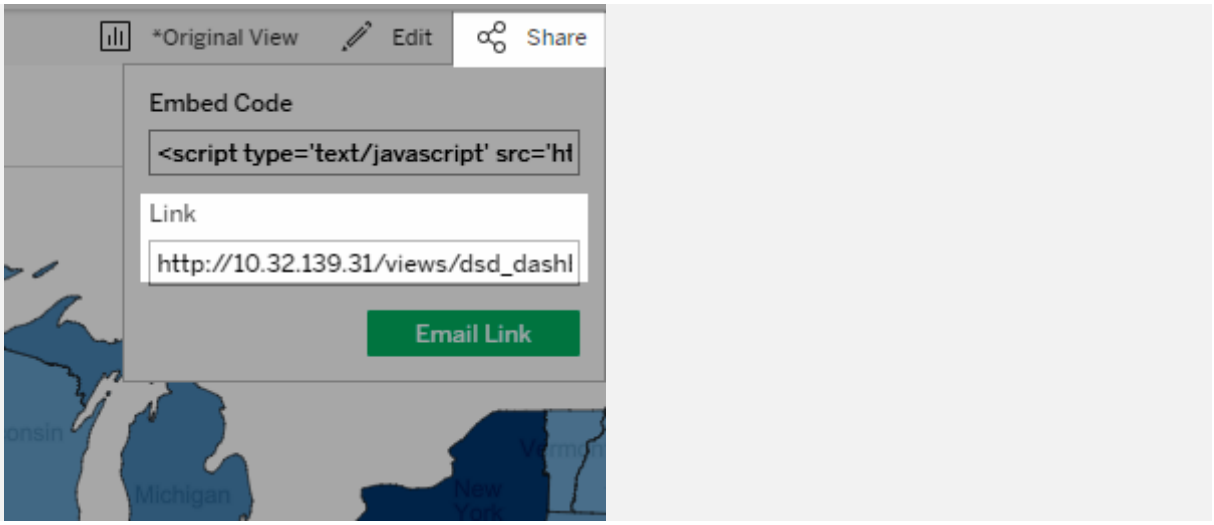
1. When this check box is selected for device-specific dashboards, the tabs' sizing requirements interfere with the server's ability to correctly detect the size of the web browser and load the correct layout.

2. Click **Publish**.

Test the dashboard

After you publish the dashboard to Tableau Server or Tableau Online, test the dashboard by viewing it from different browser sizes.

1. Open the dashboard on Tableau Server or Tableau Online.
2. In the upper-right corner of the page, click **Share** and copy the contents of the **Link**text box.



1. Paste the string into a web browser URL. The string should include the following: `embed=y`
2. With the embed code string as your browser URL, test the different layouts by changing the size of your web browser window and refreshing it.

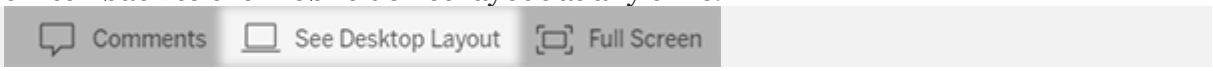
Confirm which layout a device will display

The dashboard layout a device displays is based on the smallest dimension (height or width) of the iframe in which the Tableau view appears. Sometimes Desktop, Tablet,

or Phone layouts may appear on other types of devices. For example, a Tablet layout may appear on a desktop computer if the display or browser window is small.

If the smallest iframe dimension is ...This device layout appears ...500 pixels or lessPhoneBetween 501 and 800 pixelsTabletGreater than 800 pixelsDesktop

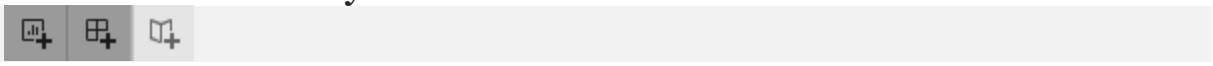
If Tableau Online and Tableau Server users find a Phone or Tablet layout too limiting, they can click **See Desktop Layout** in the toolbar. This toggle button lets users switch back to the mobile device layout at any time.



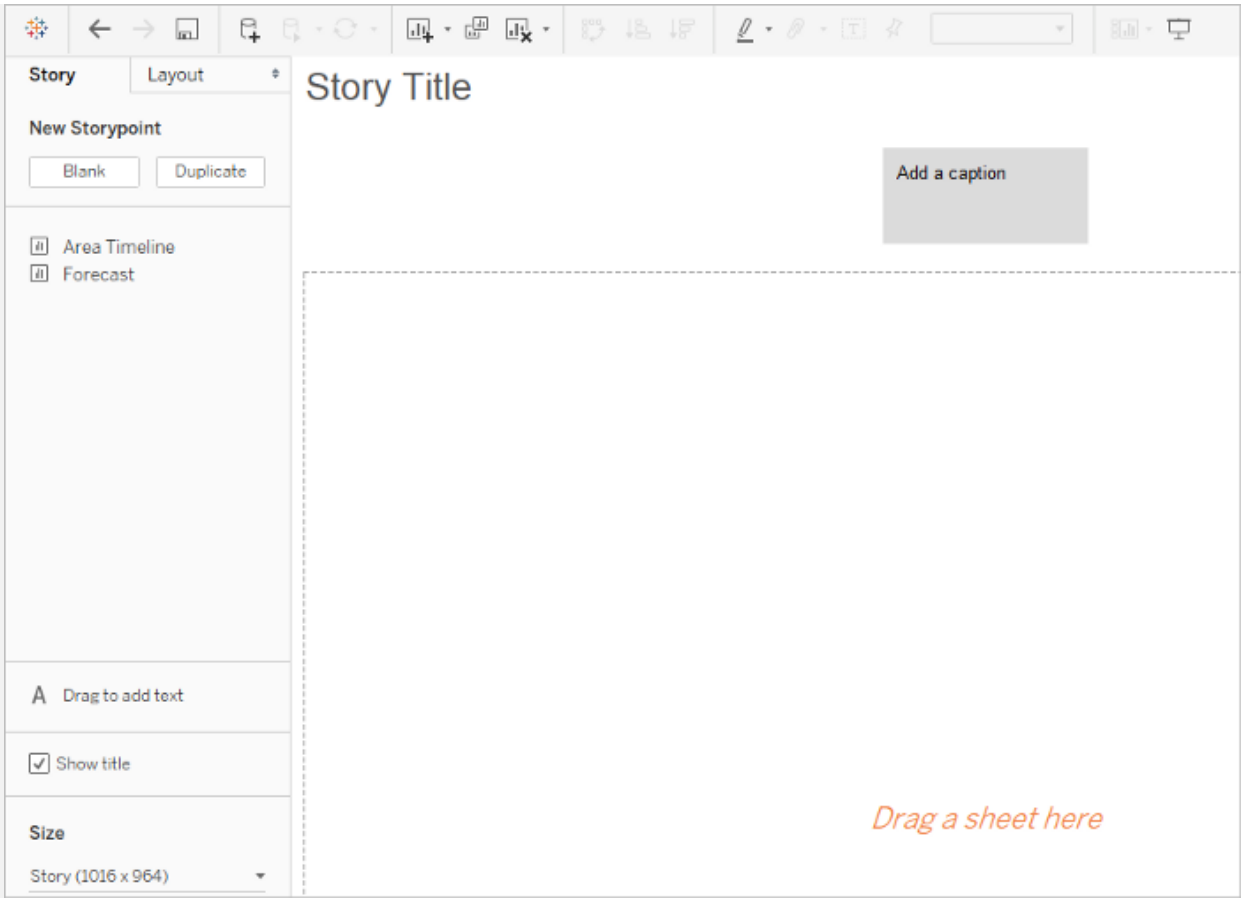
- **Create a story using dashboards or views**

Create a story point

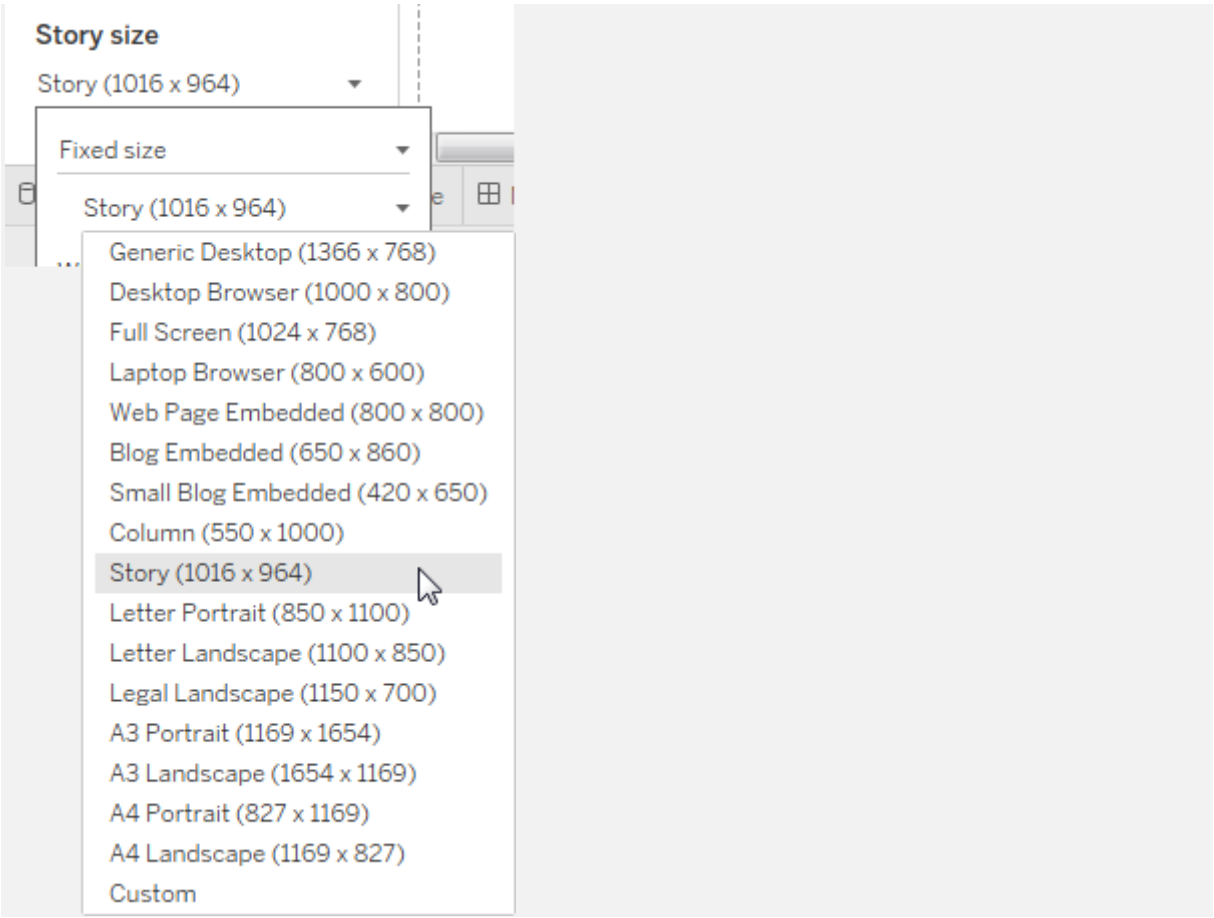
1. Click the **New Story** tab.



1. Tableau opens a new story as your starting point:



1. 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:



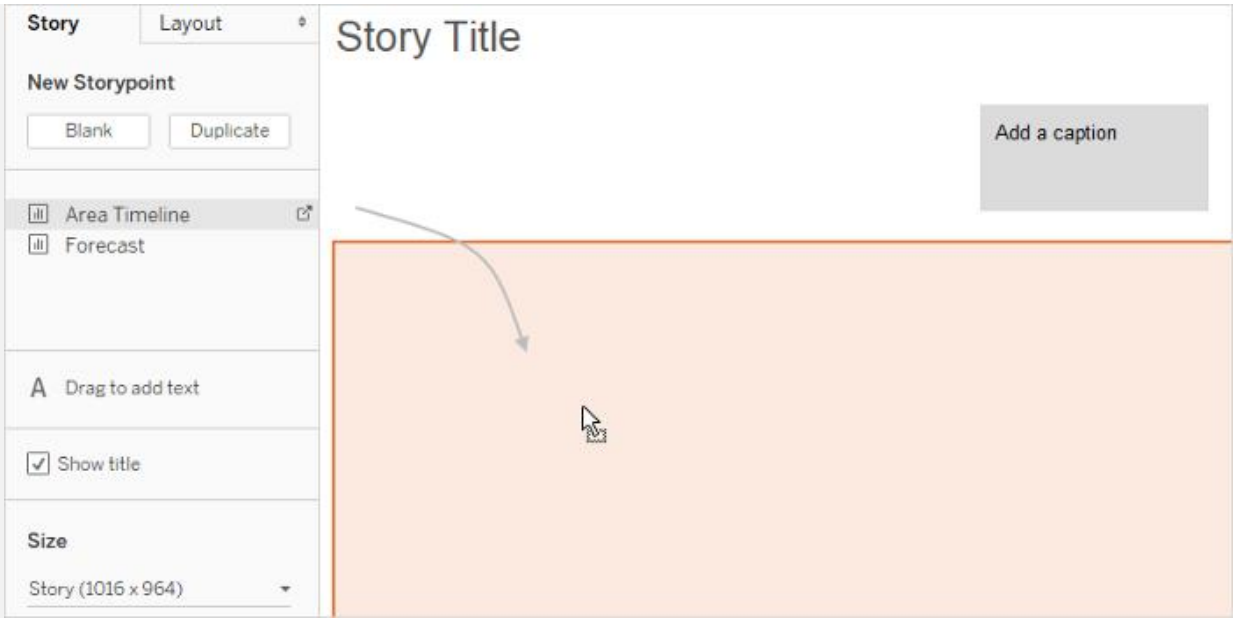
1. **Note:** Choose the size your story will be viewed at, not the size you're authoring in.

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

3. 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.

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



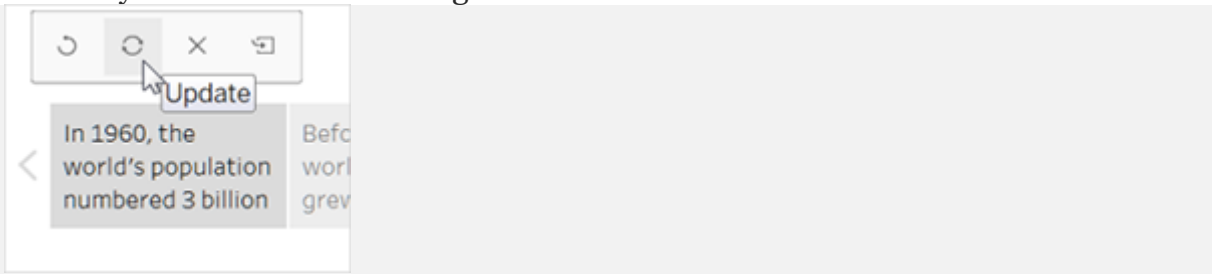
1. When you add a sheet to a story point, that sheet remains connected to the original sheet. If you modify the original sheet, your changes will automatically be reflected on the story points that use it.

2. If you are using Tableau Server or Tableau Online to author on the web and the original sheet has **Pause Auto Updates** enabled, the story sheet will be blank until auto-updates are resumed.

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

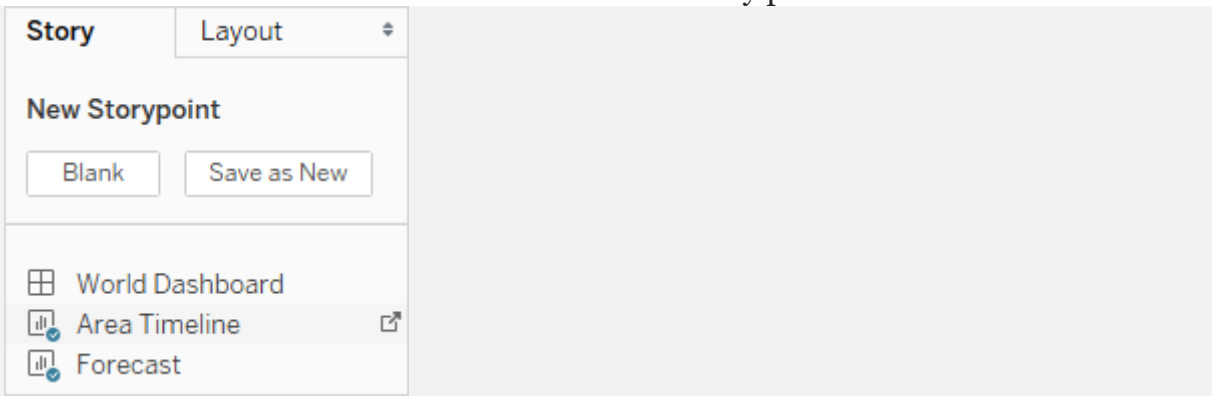
4. In Tableau Desktop, you can highlight a key takeaway for your viewers by dragging a text object to the story worksheet and typing a comment.

5. 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:

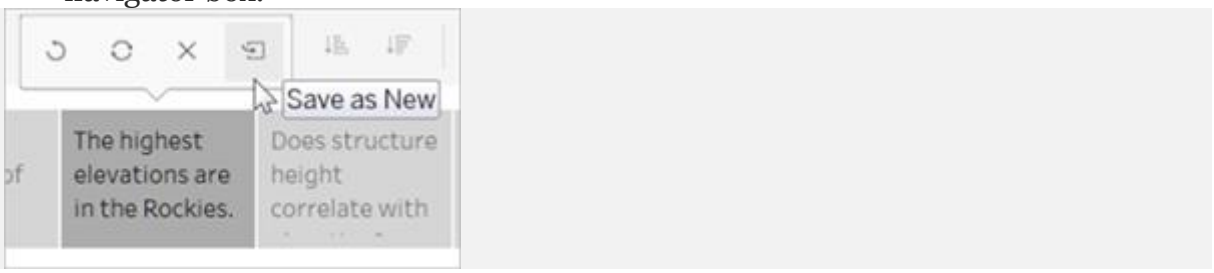


1. Add another story point by doing one of the following:

- 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.

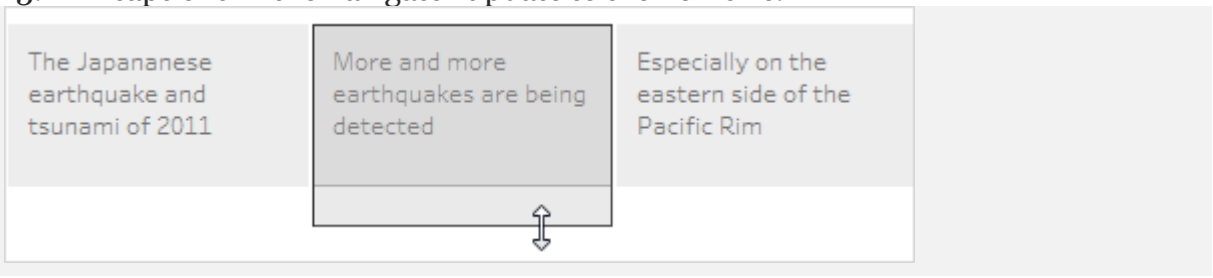
1. Click the **Layout** tab.
2. Choose a navigator style that best suits your story, and show or hide the next and previous arrows.

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.
3. All captions in the navigator update to the new size.

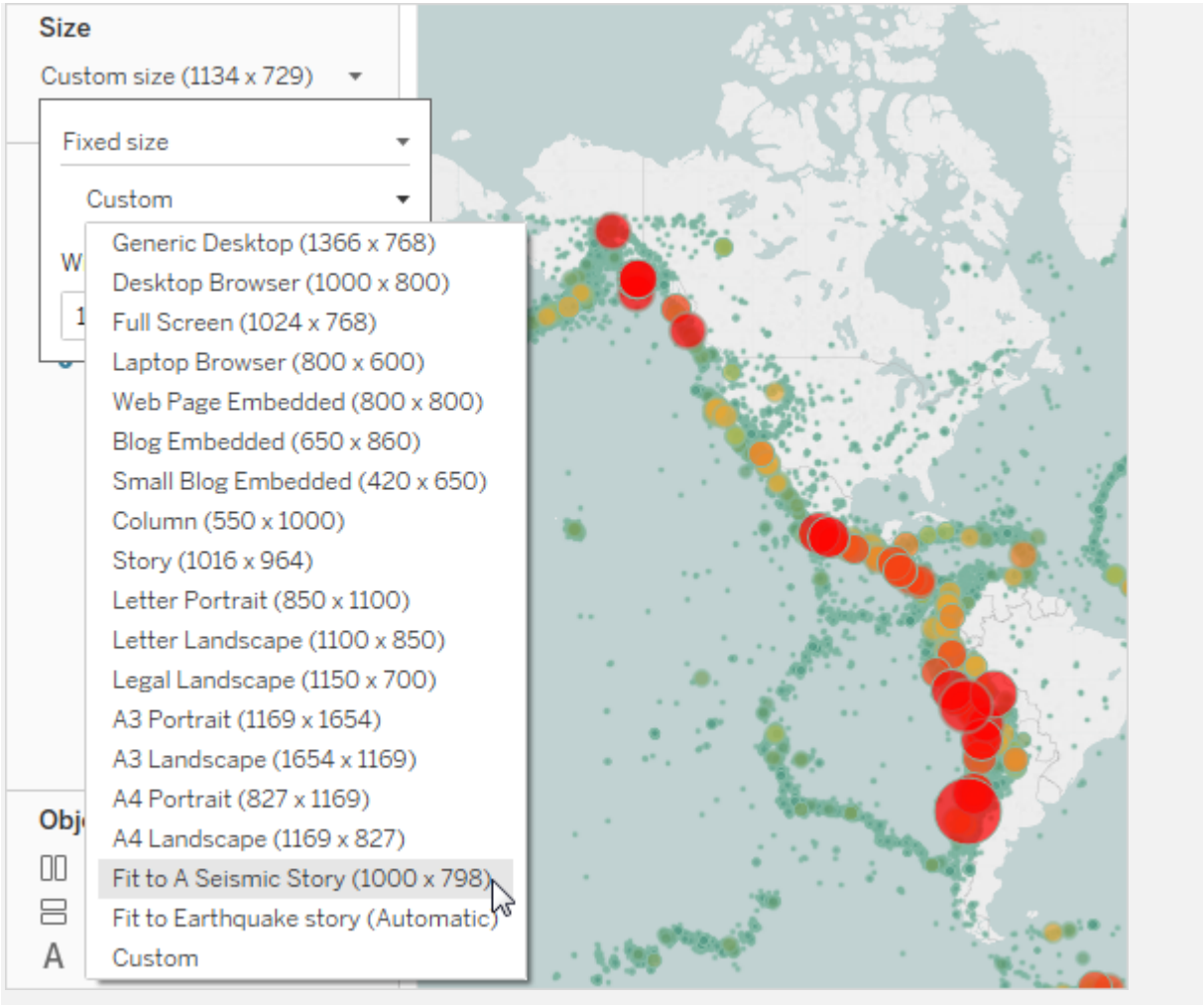


When you resize a caption, you can only select the left, right, or bottom border of the caption.

Fit a dashboard to a story

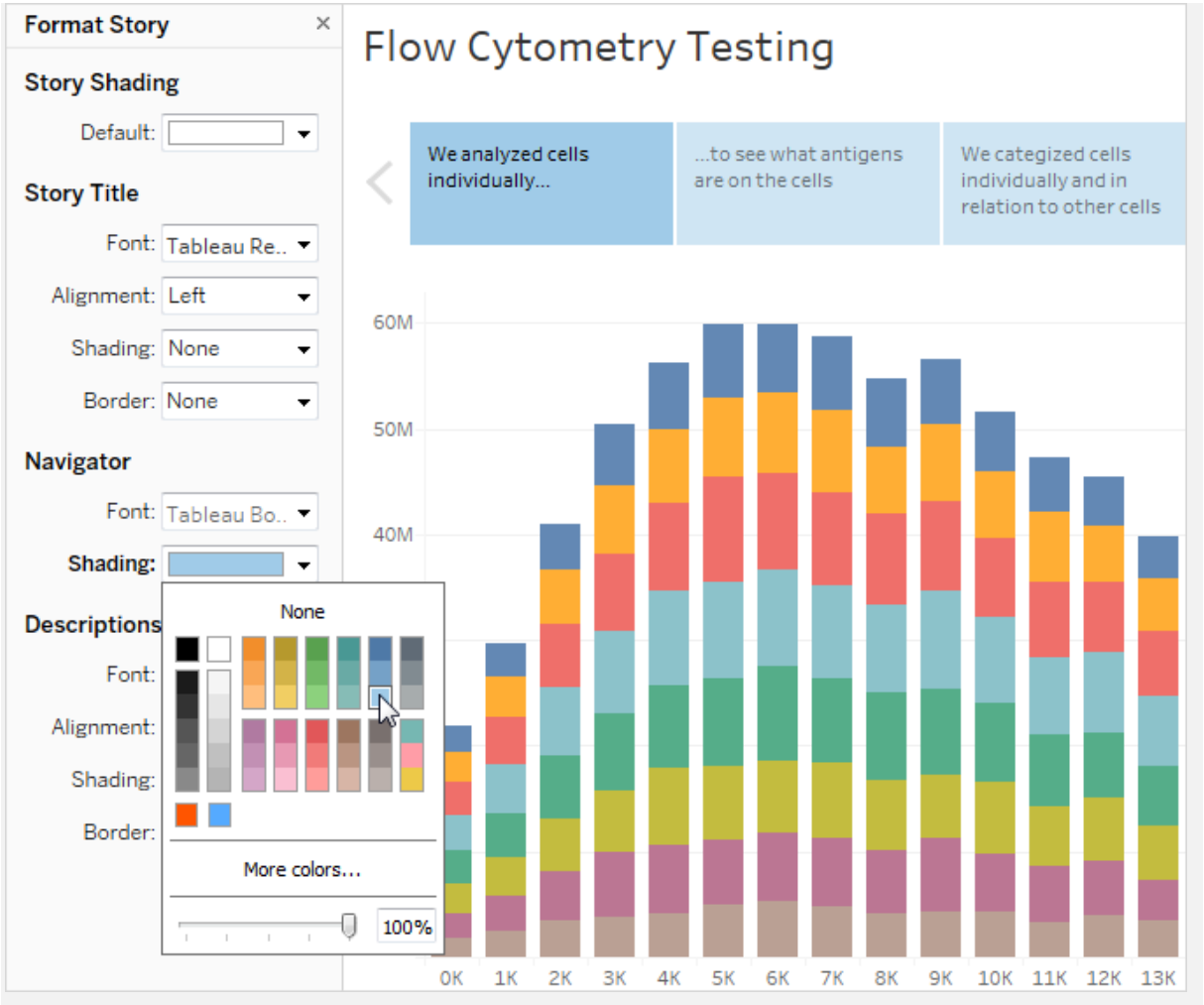
You can fit a dashboard to the exact size of a story. For example, if your story is exactly 800 by 600 pixels, you can shrink or expand a dashboard to fit inside that space.

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



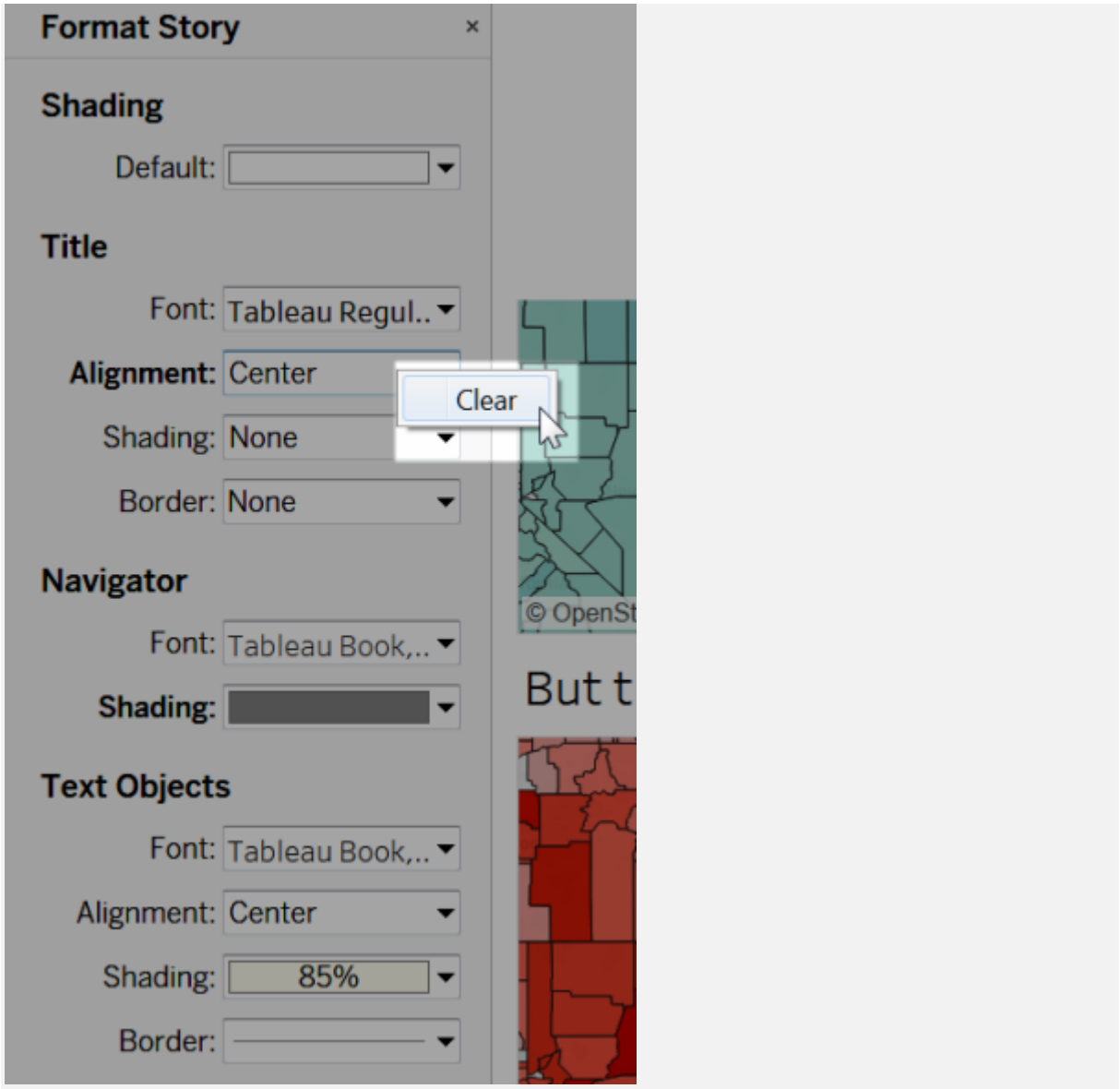
Format a story's shading, title, and text objects (Tableau Desktop only)

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

1. on the toolbar. Or, publish the story to Tableau Online 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**.

- **Share a twbx as a PDF**

PDF by selecting **File > Print to PDF.**

- **Share a twbx as an image**

1. Select **Worksheet** > **Export**> **Image**.
2. In the Copy Image dialog box, select the contents you want to include in the image and the legend layout (if the view contains a legend).
3. Click **Save**.
4. In the Save Image dialog box, navigate to where you want to save the image file and type a file name into the text box. Select a file format from the Save as type drop-down menu.
5. Click **Save**.

- Share a twbx as a PDF

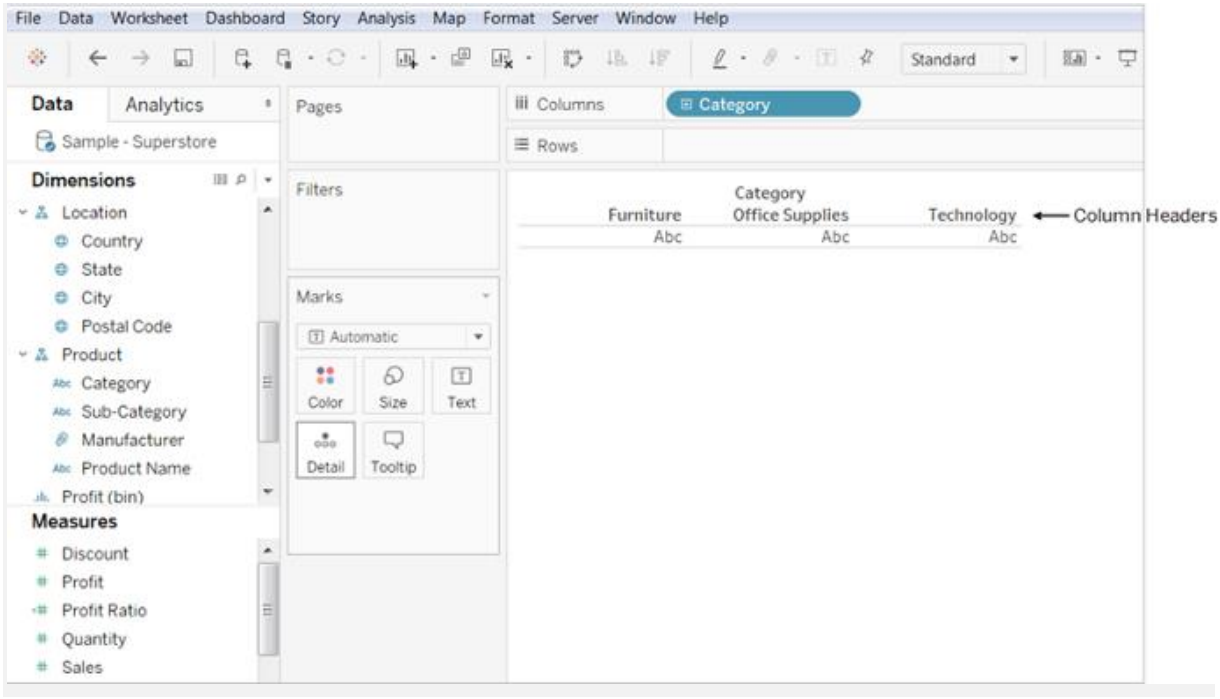
You can publish one or more views to PDF by selecting **File > Print to PDF.**These static views can be embedded in PowerPoint presentations or Microsoft Word documents or sent in an email.

- Share a twbx as an image
- To create a BMP on Windows or a TIFF on a Mac **Worksheet > Copy** > **Image**
- On MS Windows, save the image as Enhanced Metafile (*.emf) **Worksheet > Export > Image**

Part 4: Understanding Tableau Concepts

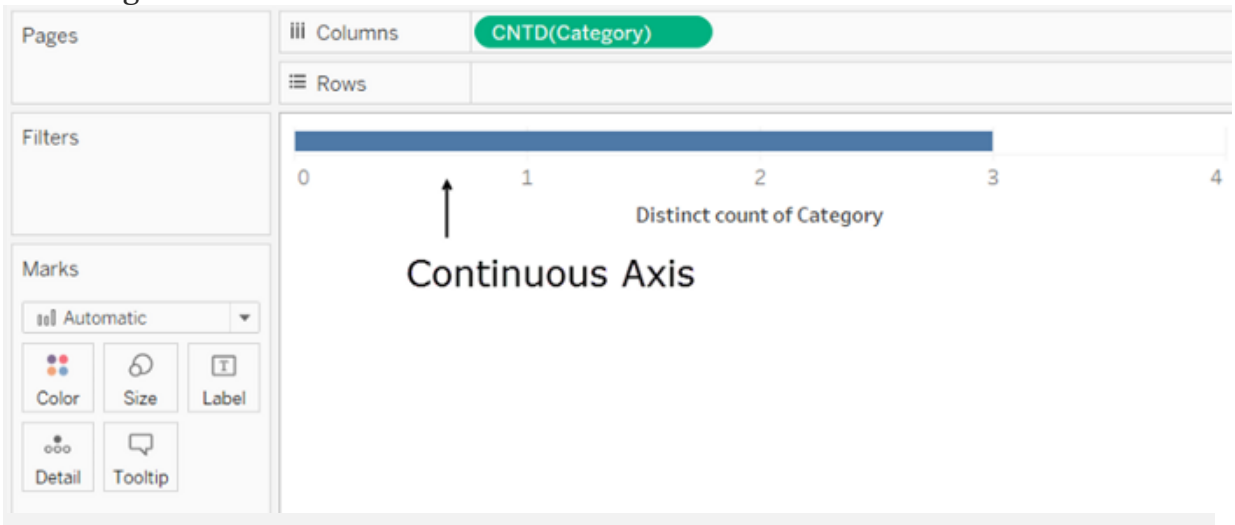
Dimension fields in the view

When you click and drag a discrete dimension field from the **Dimensions** area to **Rows** or **Columns**, Tableau creates column or row headers.



In many cases, fields from the **Dimension** area will initially be discrete when you add them to a view, with a blue background. Date dimensions and numeric dimensions can be discrete or continuous, and all measures can be discrete or continuous.

After you drag a dimension to **Rows** or **Columns**, you can change the field to a measure just by clicking the field and choosing **Measure**. Now the view will contain a continuous axis instead of column or row headers, and the field's background will become green:



Date dimensions can be discrete or continuous. Dimensions containing strings or Boolean values cannot be continuous.

Tableau does not aggregate dimensions. For a discussion of the different types of aggregation Tableau can perform, see List of Predefined Aggregations in Tableau.

In Tableau queries, dimensions in the view are expressed in SQL as "Group By" clauses.

For details on converting fields between continuous and discrete, see Convert Fields between Discrete and Continuous.

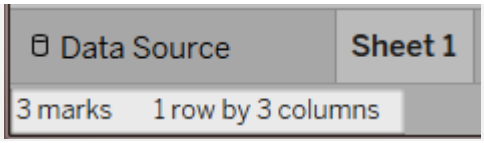
How dimensions affect the level of detail in the view

The level of detail in a view refers to how granular the data is given the dimension and measure data in the view.

As you add dimensions to **Rows** or **Columns**, the number of marks in the view increases.

To understand why adding dimensions increases the number of marks in the view, do the following:

1. Drag **Segment** to **Columns**.
2. The status bar at the bottom of the Tableau window shows you that there are now three marks in the view:



1. Those marks just contain placeholder text, `Abc`, because you are only building the view's structure at this point.

2. Drag **Region** to **Columns**.

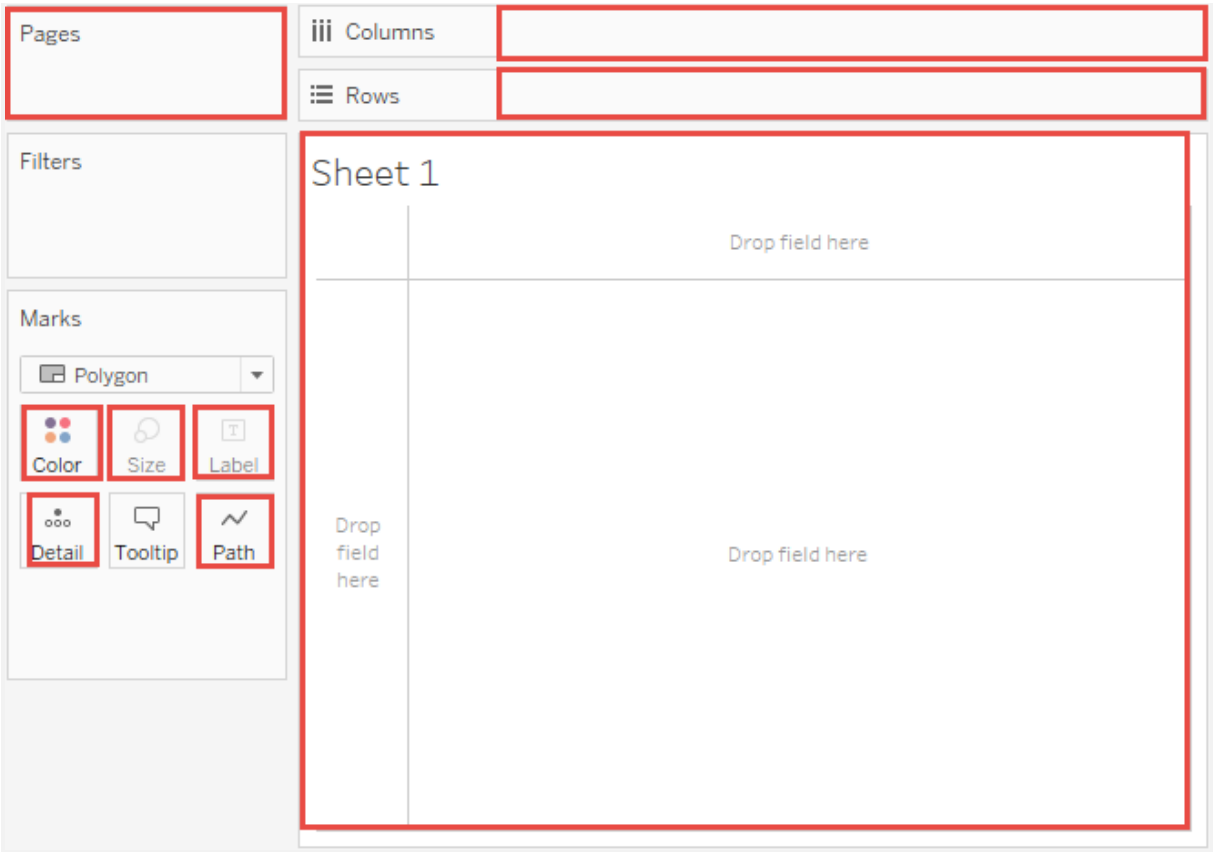
3. Now there are 12 marks. Three values in **Segment** multiplied by four values in **Region** is 12.

4. Drag [**Ship Date**] to **Rows**.

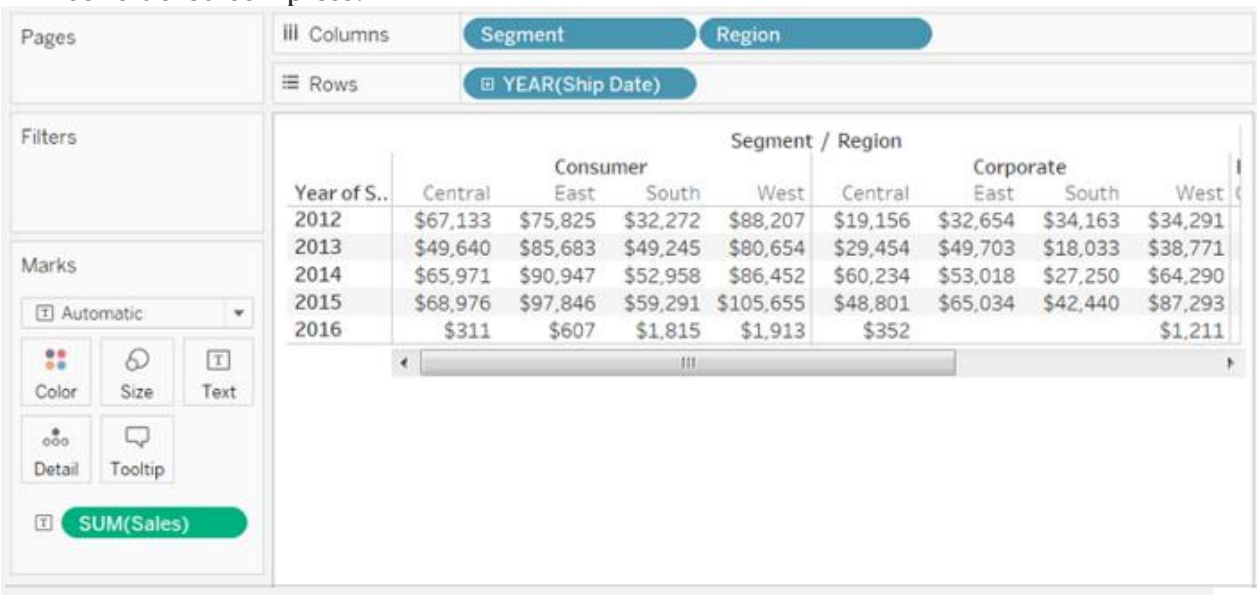
5. The total is now 57 marks (three segments by four regions by five years is 60, but there are three combinations of the dimensions in the view for which there is no data in the data source).

6. We could continue adding dimensions to **Rows** and **Columns** and observe as the number of total marks continues to increase. Dragging a dimension to a location on the Marks card such as Color or Size will also increase the number of marks, though it will not increase the number of headings in the view. The process of adding dimensions to the view to increase the number of marks is known as setting the *level of detail*.

7. Adding a dimension to any of the following locations in Tableau affects the level of detail:



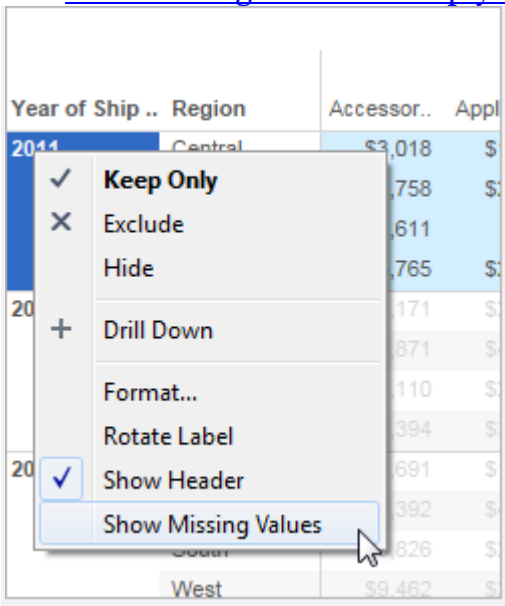
1. The view now contains 57 separate instances of `Abc`—the view is all structure and no content. Rectify this by dragging **Sales** to Text. The view can now be considered complete:



Notes

- In some cases, adding a measure to the view can increase the number of marks in the view. For example, if you dropped **Sales** on **Rows** in the view above, the number of marks would be 57. But if you then also dropped **Profit** on **Rows**, the number of marks would increase to 114. But this is not the same as changing the view's level of detail.

- The number of marks in the view is not guaranteed to correspond to the number you would get by multiplying the number of dimension values in each of the dimensions that make up the level of detail. There are multiple reasons why the number of marks could be lower. To increase the number of marks in this view from 57 to 60 in the view above, right-click (Control-click on a Mac) on one of the Date headers in the view and the date or bin headers and choose **Show Missing Values**. For more information about how to show missing values, see Show or Hide Missing Values or Empty Rows and Columns.

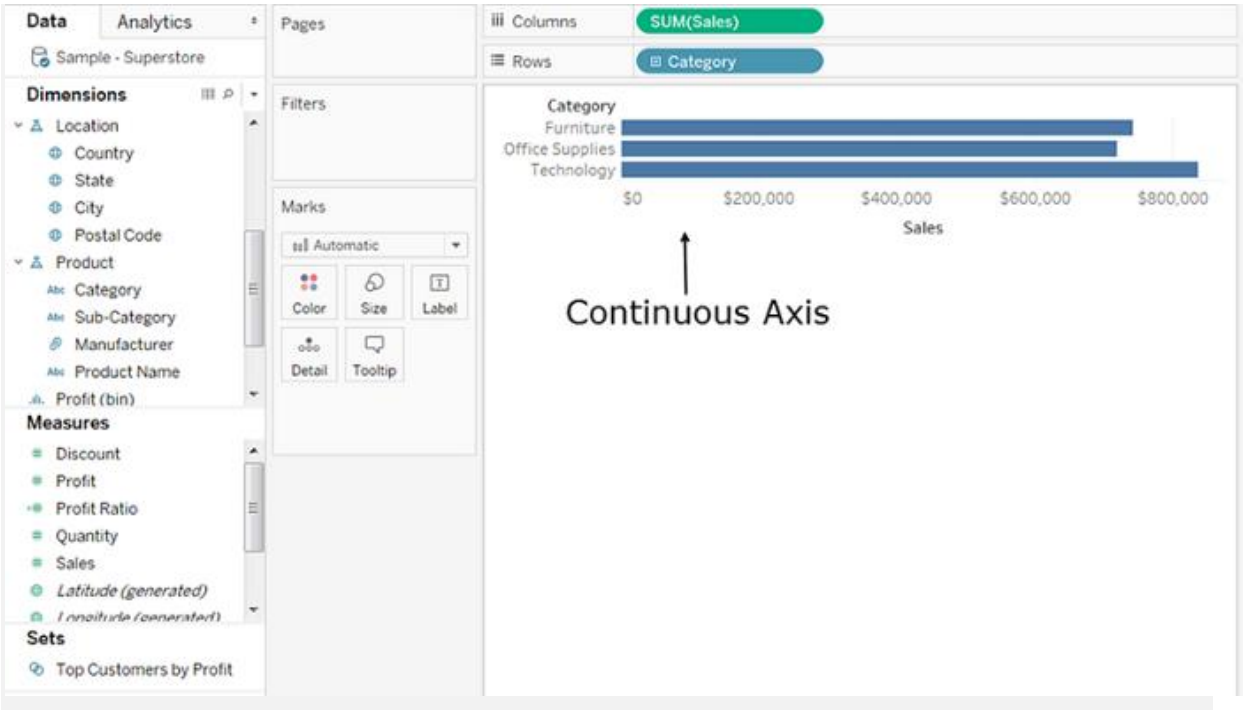


Measure fields in the view

When you drag a measure to the view, it is aggregated by default. The type of aggregation will vary depending on the type of view. You should always check the aggregation and change it if necessary. For details, see "Change the default

aggregation" in Edit Default Settings for Fields. For more details about aggregation, see Data Aggregation in Tableau.

When you drag a continuous field from the Measures area to **Rows** or **Columns**, Tableau creates a continuous axis for that field.



If you click the field and change it to **Discrete**, the values become column headers.

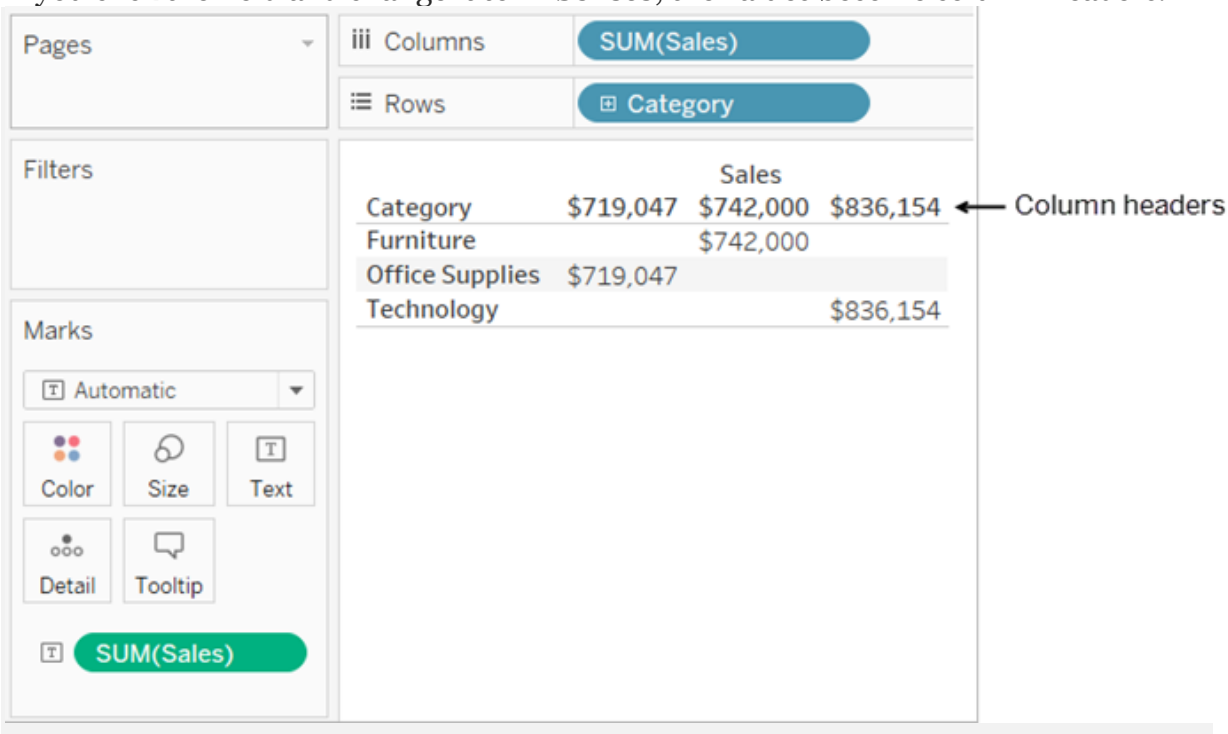


Tableau continues to aggregate values for the field, because even though the field is now discrete, it is still a measure, and Tableau aggregates measures by default.

In cases where Tableau has misclassified a field as a dimension or a measure, possibly because of the data type, you can convert it and change its role. If a measure contains numbers that don't need to be aggregated (such as a field that contains date values), you may want to convert it to be a dimension.

For related details, see Convert a Measure to a Dimension.

For details on converting fields between continuous and discrete, see Convert Fields between Discrete and Continuous.

How continuous and discrete fields change the view

Continuous and *discrete* are mathematical terms. Continuous means "forming an unbroken whole, without interruption"; discrete means "individually separate and distinct."

In Tableau, fields can be either continuous or discrete. When you drag a field from the **Measures** area to **Columns** or **Rows**, the values are continuous by default and Tableau creates an axis. When you drag a field from the **Dimensions** area of the **Data** pane to **Columns** or **Rows**, the values are discrete by default and Tableau creates column or row headers.

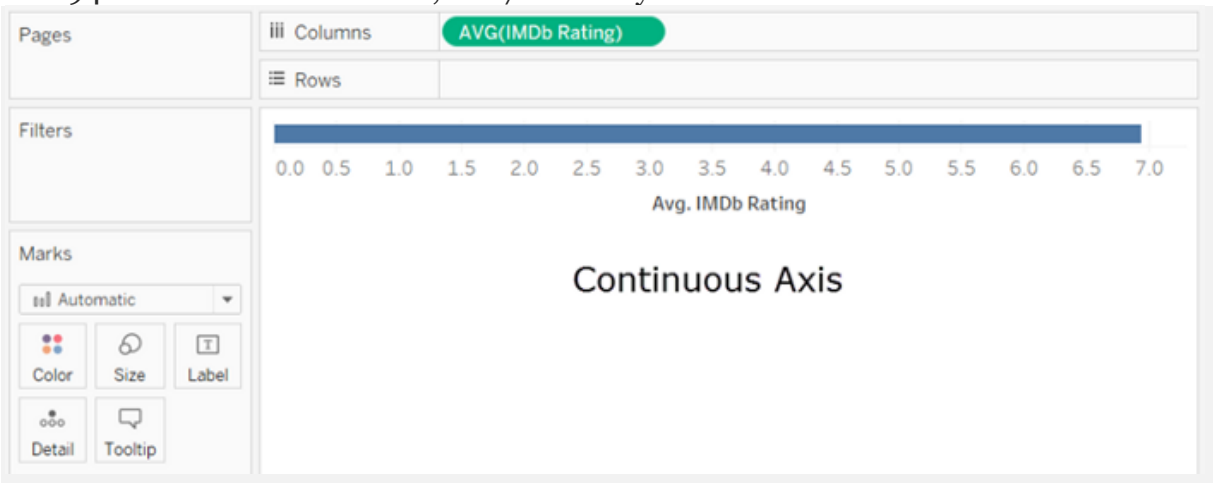
Continuous fields produce axes

If a field has values that are numbers that can be added, averaged, or otherwise aggregated, Tableau assigns that field to the **Measures** area of the **Data** pane when you first connect to a data source. Tableau is assuming that the values are continuous.

Tableau displays an axis when you drag a continuous field to **Rows** or **Columns**. An axis is a measuring line that shows values between a minimum and a maximum. Rulers and analog thermometers are examples of physical objects that display axes.

Tableau must be able to show a range of actual and potential values, because in addition to the initial values in the data source, it is always possible that new values will emerge as you work with a continuous field in the view.

While there are value labels on a continuous axis (0, 0.5, … 3.0 in the following image), actual marks don't have to align with these labels as they would with column headers. For example, in the following image, the blue bar actually extends to a value of 6.940 on the horizontal axis, not 7.0 exactly.



The number of potential values for continuous fields is impossible to anticipate. For example, if you have a field named **Ratings** and the initial values are 1, 3, 3.5, 3.6, and 4, that's five distinct values. But if you drop **Ratings** on **Rows**, Tableau automatically aggregates that value as SUM (which you would then immediately

change to AVG, because it's more logical to average grades than to add them), and that would then create a sixth value (3.02) that didn't exist until you added the field to the view. And if you then applied a filter that eliminated two of the initial values, the average would change as well, so that would be yet another value. And then if you changed the aggregation, … You get the idea. The number of potential values is, if not infinite, then certainly immense.

The fact that a field contains numbers does not automatically indicate that those values are continuous. Postal codes are the classic example: though they are often composed entirely of numbers, they are actually string values which shouldn't be added or averaged. If Tableau assigns such a field to the **Measures** area, you should drag it up to the **Dimensions** area.

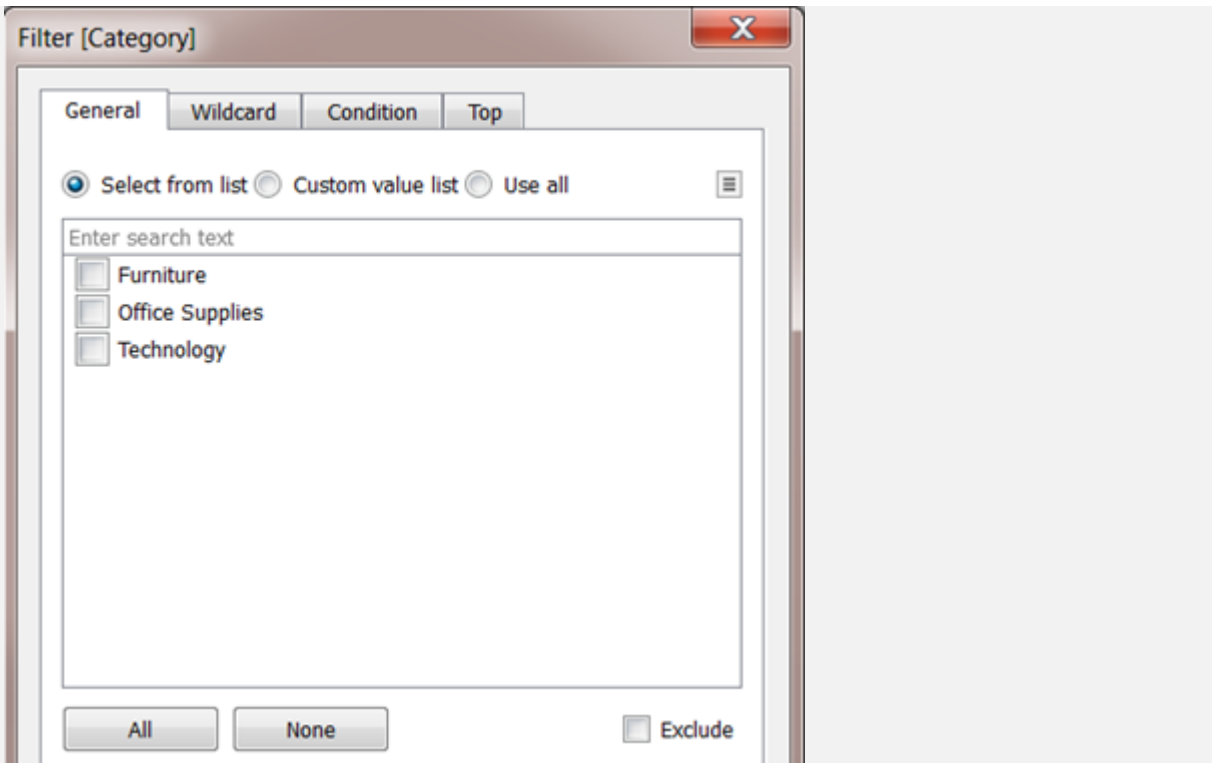
Discrete fields create headers

If a field contains values that are names, dates, or geographical locations — anything other than numbers — Tableau assigns that field to the **Dimensions** area of the **Data** pane when you first connect to a data source. Tableau treats the values as discrete.

Tableau creates headers when you drag a discrete field to **Columns** or **Rows**. The individual values for a discrete field become the row or column headings. Because these types of values are never aggregated, no new field values are created as you work with your view, so there is no need for an axis.

Discrete versus continuous fields on filters

- When you drop a discrete dimension field on the **Filters** shelf, Tableau prompts you to choose which "members" of the discrete field to include in the view.



- When you drop a Date field on Filters, the result can be a discrete filter or a continuous filter. For more information, see Filter dates .
- When you drop a continuous measure on Filters, Tableau first prompts you to choose an aggregation for the filter, and then prompts you to specify how to filter the continuous range of values.
- When you drop a continuous dimension on Filters (other than a Date), Tableau prompts you to specify how to filter the continuous range of values.

For more on filtering various types of fields, see Drag dimensions, measures, and date fields to the Filters shelf .

Discrete versus continuous fields on color

When you drop a discrete field on Color in the Marks card, Tableau displays a categorical palette and assigns a color to each value of the field.

When you drop a continuous field on Color, Tableau displays a quantitative legend with a continuous range of colors.

For more information about color palettes, see Color Palettes and Effects.

When you connect to a new data source, Tableau assigns each field in the data source to either the **Dimensions** area or the **Measures** area of the Data pane, depending on the type of data the field contains. You use these fields to build views of your data.

About data field roles and types

Data fields are made from the columns in your data source. Each field is automatically assigned a data type (such as integer, string, date), and a role: Discrete Dimension or Continuous Measure (more common), or Continuous Dimension or Discrete Measure (less common).

- *Dimensions* contain qualitative values (such as names, dates, or geographical data). You can use dimensions to categorize, segment, and reveal the details in your data. Dimensions affect the level of detail in the view.
- *Measures* contain numeric, quantitative values that you can measure. Measures can be aggregated. When you drag a measure into the view, Tableau applies an aggregation to that measure (by default).
- **Explain what kind of information dimensions usually contain**

Possible combinations of fields in Tableau

This table shows examples of what the different fields look like in the view. People sometimes call these fields “pills”, but we refer to them as “fields” in Tableau help documentation.

Discrete Dimensions

Continuous Dimensions (dimensions with a data type of String or Boolean cannot be continuous)

Discrete Measures

Continuous Measures

Note: With a cube (multidimensional) data source, the options for changing data roles are limited. In Tableau Desktop, cubes are supported only on Windows.) You can change some measures from continuous to discrete, but in general, you cannot change data roles for fields in cube data sources. For related details, see Cube Data Sources.

A visual cue that helps you know when a field is a measure is that the field is aggregated with a function, which is indicated with an abbreviation for the aggregation in the field name, such as:

. To learn more about aggregation, see List of Predefined Aggregations in Tableau and Aggregate Functions in Tableau.

But there are exceptions:

- If the entire view is disaggregated, then by definition no field in the view is aggregated. For details, see How to Disaggregate Data.
- If you are using a multidimensional data source, fields are aggregated in the data source and measures fields in the view do not show that aggregation.

Note: You can set the default aggregation and other properties and settings for fields. For details on the many ways you can customize the fields in the Data pane, see Organize and Customize Fields in the Data Pane, Edit Default Settings for Fields, and Work with Data Fields in the Data Pane.

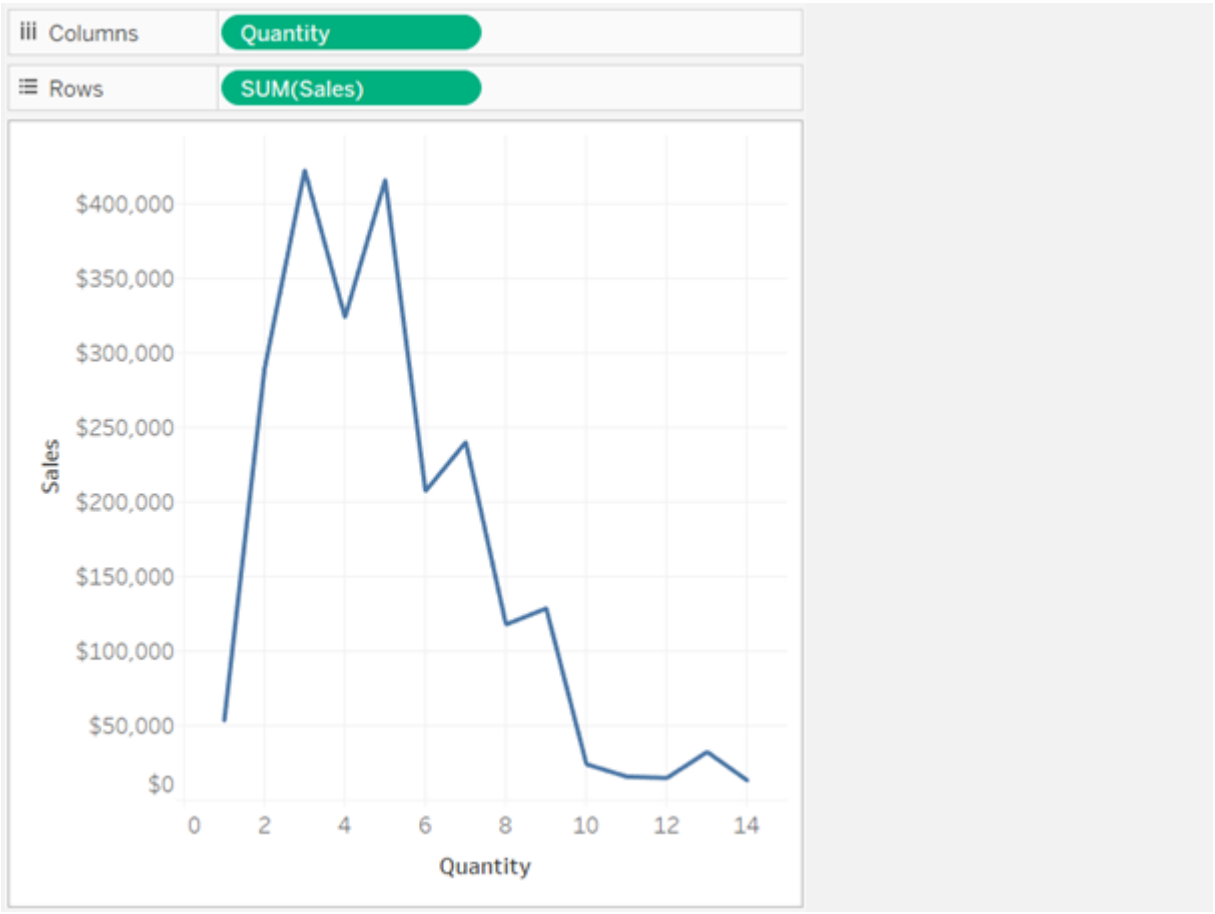
- **Explain what kind of information measures usually contain**
- **Discrete and continuous fields**

In both examples, the **Sales** field is set to **Continuous**. It creates a vertical axis because it continuous and it's been added to the Rows shelf. If it was on the Columns shelf, it would create a horizontal axis. The green background and aggregation function (in this case, SUM) help to indicate that it's a measure.

The absence of an aggregation function in the **Quantity** field name help to indicate that it's a dimension.

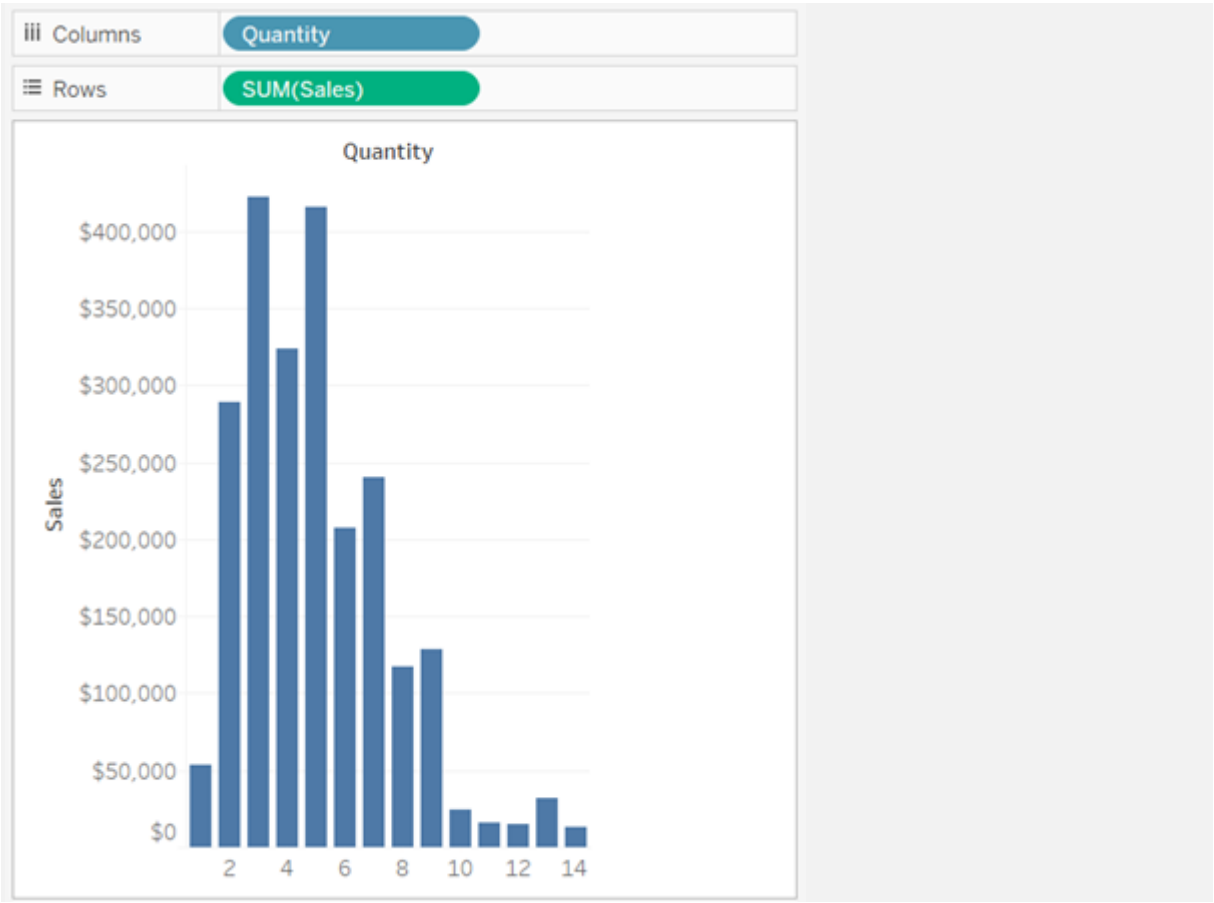
- **Explain how discrete fields are displayed in Tableau**

blue



- **Explain how continous fields are displayed in Tableau**

green



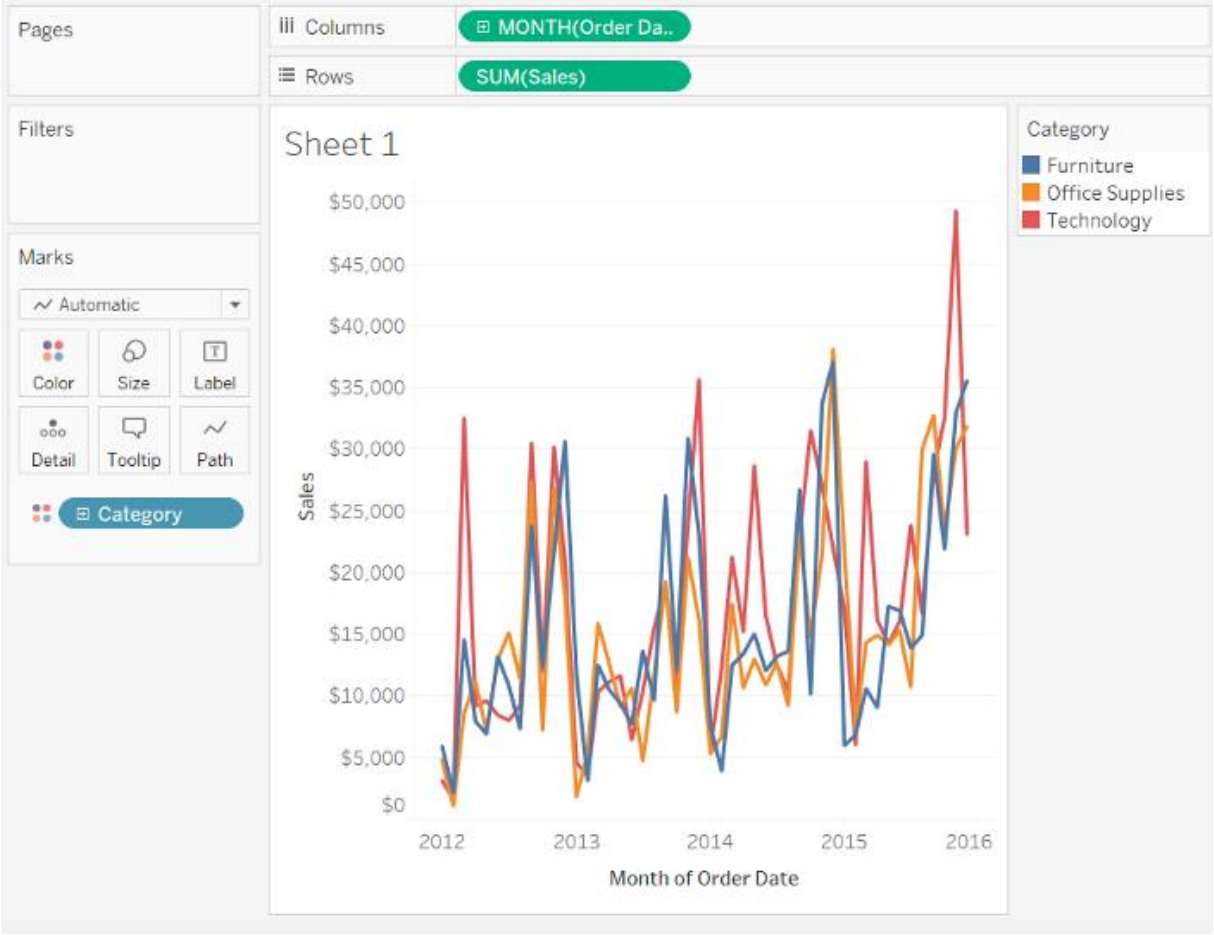
- **Explain the difference between discrete date parts and continous date values in Tableau**

Continuous Dates

Version: 2019.1 Applies to: Tableau Desktop, Tableau Online, Tableau Public, Tableau Server

You can treat a date as a continuous quantity after placing the field on a shelf. You do this by selecting one of the Continuous date options on the field's context menu (lower list of date levels). Continuous dates draw a quantitative axis for the date values.

For example, the view below displays the sales as a function of a continuous order date and is color-encoded by category. As you can see, the color of the **Order Date** field changes from blue to green after it is converted to a continuous quantity.



Treating dates as a continuous quantity is particularly useful when you use Gantt bars or want to see trends using line charts as shown above.

By default, date dimensions are discrete fields for which Tableau automatically selects a date level when it is placed on a shelf. To make a date dimension continuous by default, right-click (control-click on Mac) the field in the **Data** pane and select **Convert to Continuous**. The field turns green and is automatically converted to a continuous field when you drag it to a shelf. To revert to discrete again, right-click (control-click on Mac) the field in the **Data** pane and select **Convert to Discrete**.

Aggregation

Data Aggregation in Tableau

Version: 2019.1 Applies to: Tableau Desktop

In Tableau, you can aggregate measures or dimensions, though it is more common to aggregate measures. Whenever you add a measure to your view, an aggregation is applied to that measure by default. The type of aggregation applied varies depending on the context of the view.

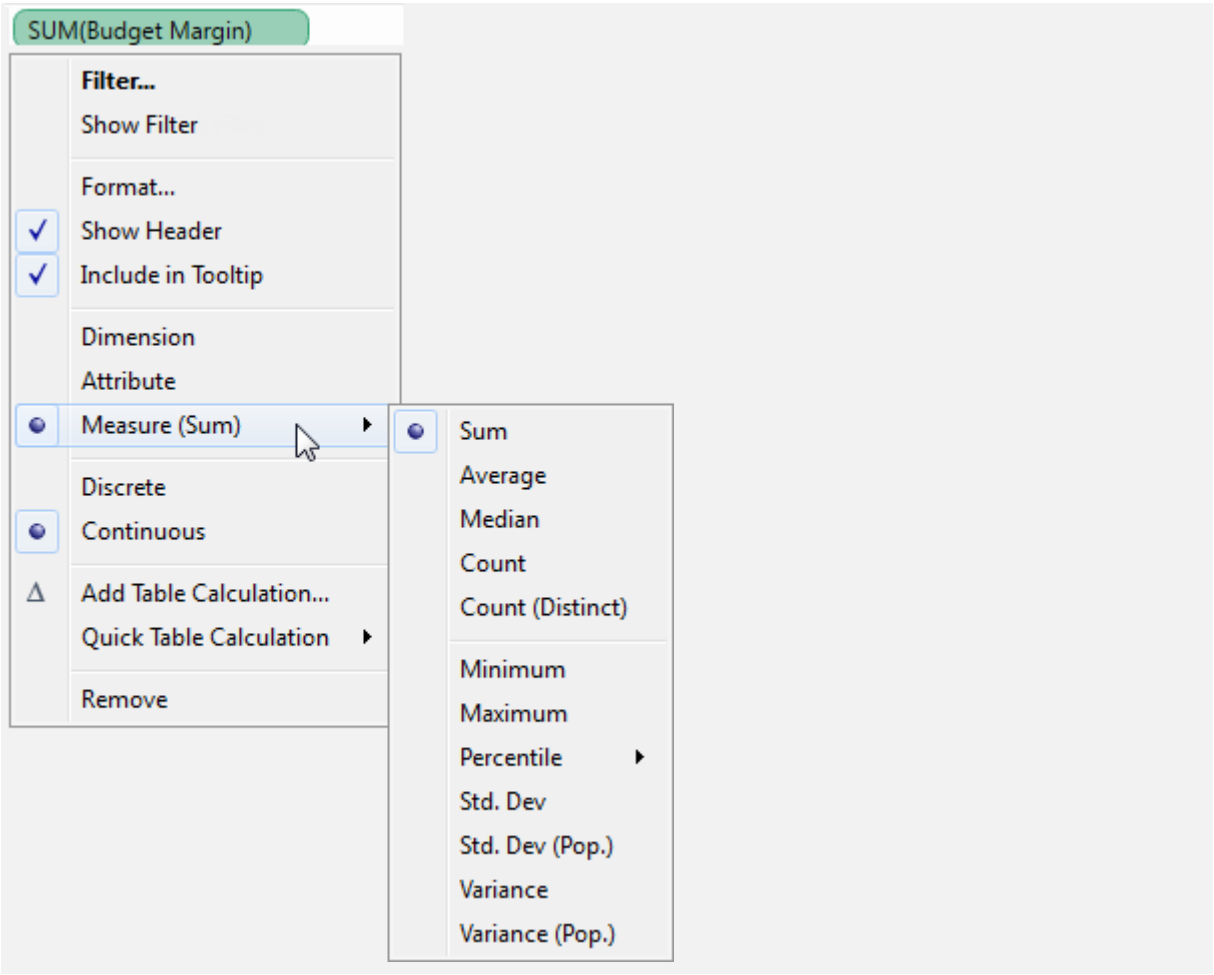
Change the Aggregation of a Measure in the View

When you add a measure to the view, Tableau automatically aggregates its values. Sum, average, and median are common aggregations; for a complete list, see List of Predefined Aggregations in Tableau.

The current aggregation appears as part of the measure's name in the view. For example, **Sales** becomes **SUM(Sales)**. Every measure has a default aggregation which is set by Tableau when you connect to a data source. You can view or change the default aggregation for a measure — see Set the Default Aggregation for a Measure.

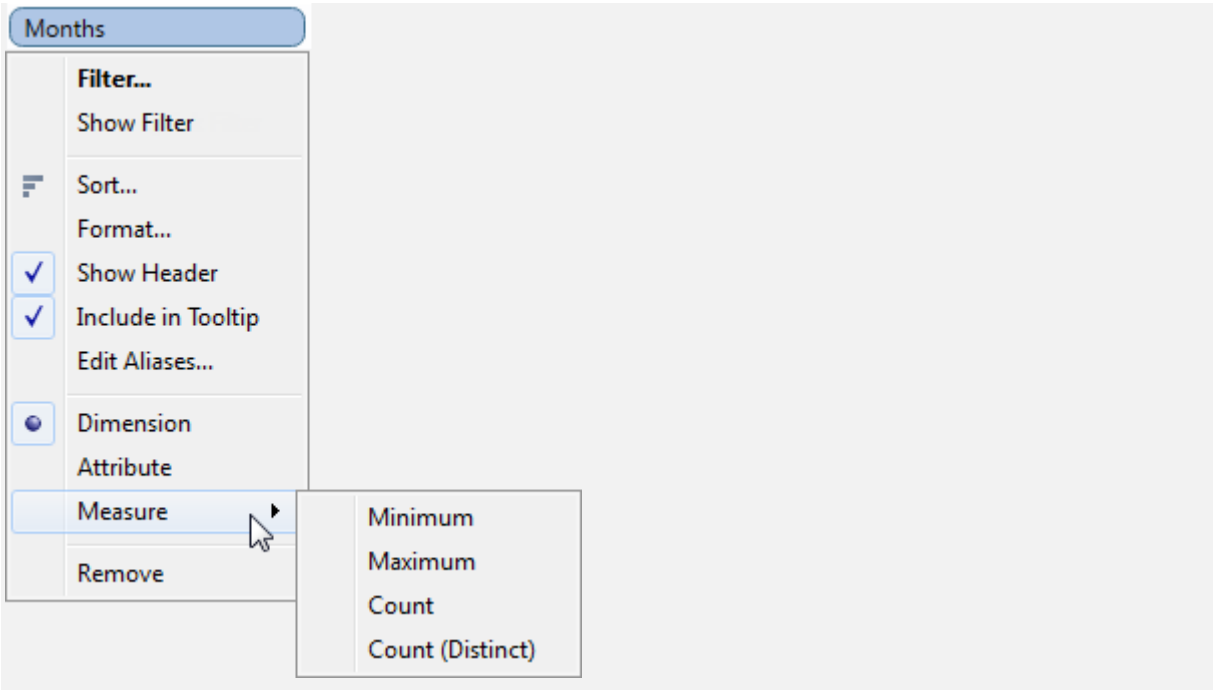
You can aggregate measures using Tableau only for relational data sources. Multidimensional data sources contain data that is already aggregated. In Tableau, multidimensional data sources are supported only in Windows.

You can change the aggregation for a measure in the view from its context menu:



Aggregating Dimensions

You can aggregate a dimension in the view as **Minimum**, **Maximum**, **Count**, or **Count (Distinct)**. When you aggregate a dimension, you create a new temporary measure column, so the dimension actually takes on the characteristics of a measure.



Note: The **Count (Distinct)** aggregation is not supported for Microsoft Access data sources, and for Microsoft Excel and Text File data sources using the legacy connection. If you are connected to one of these types of data sources, the **Count (Distinct)** aggregation is unavailable and shows the remark "Requires extract." If you save the data source as an extract, you will be able to use the **Count (Distinct)**aggregation.

Another way to view a dimension is to treat it as an Attribute. Do this by choosing **Attribute** from the context menu for the dimension.
The **Attribute** aggregation has several uses:

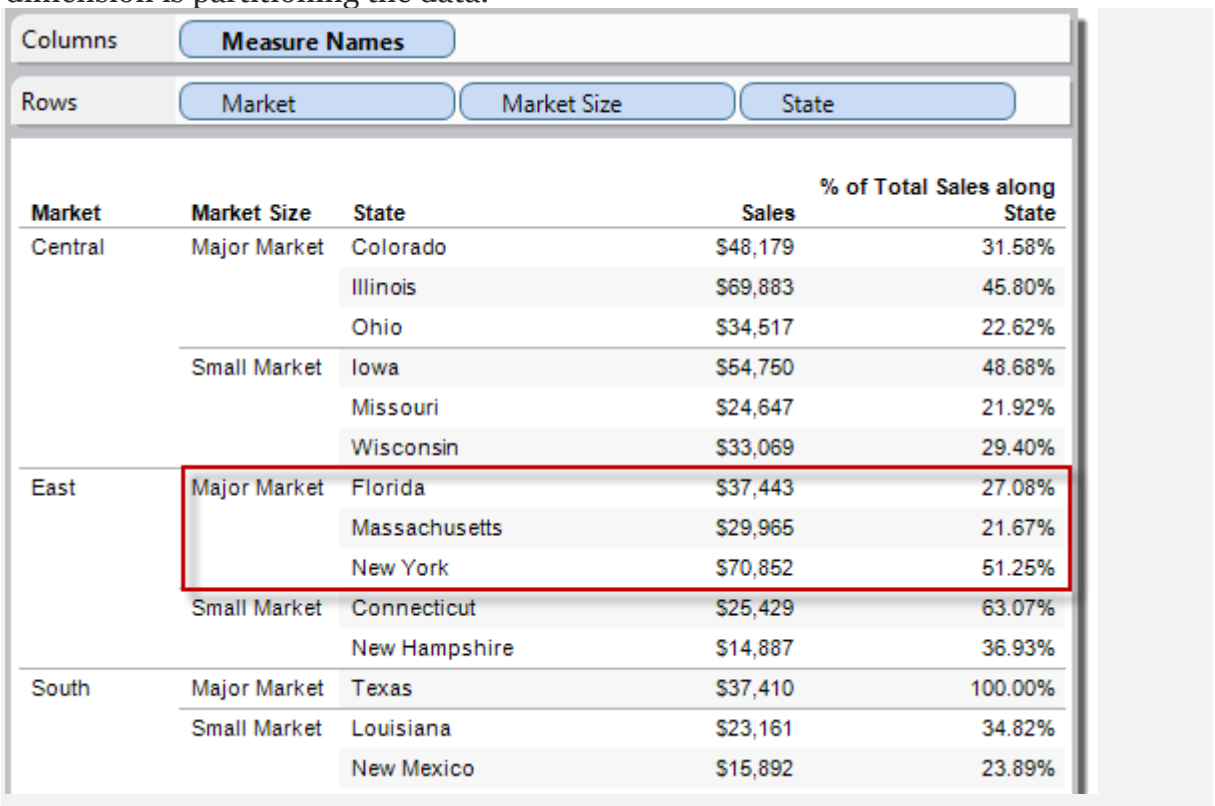
- It can ensure a consistent level of detail when blending multiple data sources.
- It can provide a way to aggregate dimensions when computing table calculations, which require an aggregate expression.
- It can improve query performance because it is computed locally.

Tableau computes Attribute using the following formula:

```
IF MIN([dimension]) = MAX([dimension]) THEN MIN([dimension]) ELSE "*" END
```

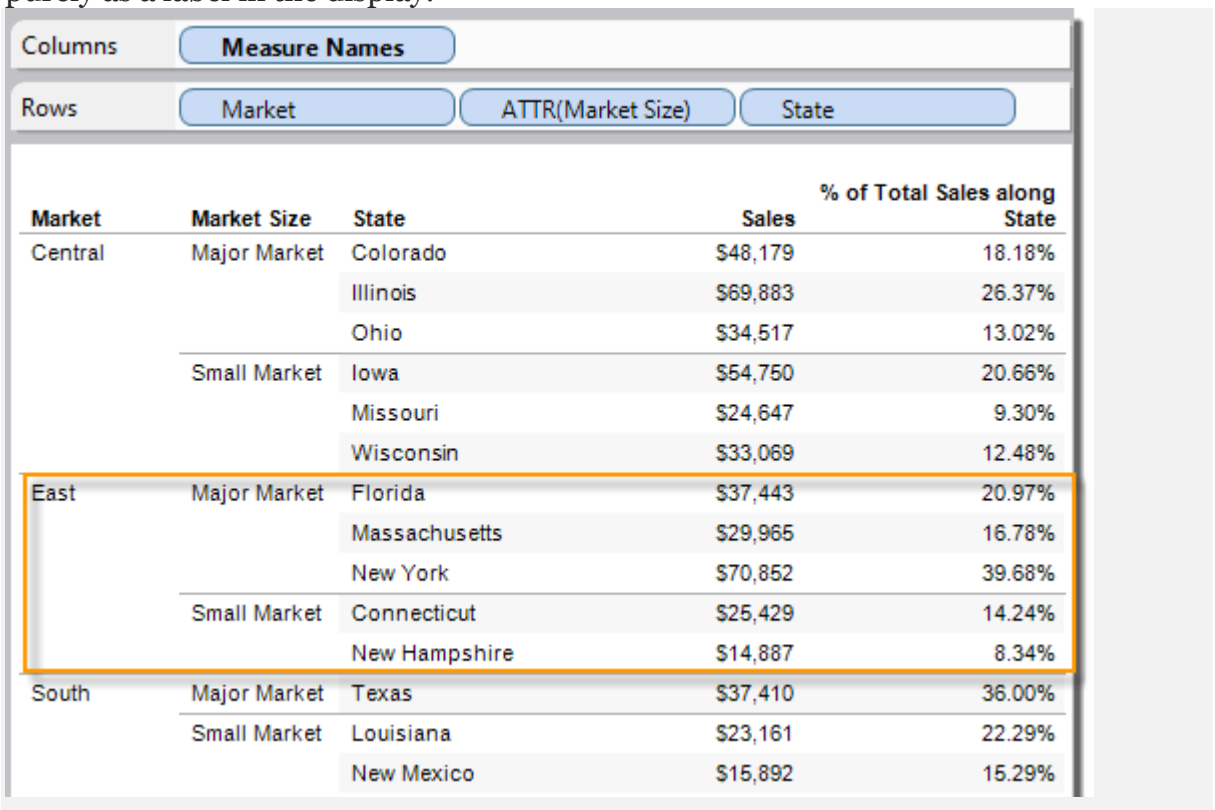
The formula is computed in Tableau after the data is retrieved from the initial query. The asterisk (*) is actually a visual indicator of a special type of Null value that occurs when there are multiple values. See Troubleshoot Data Blending to learn more about the asterisk.

Below is an example of using Attribute in a table calculation. The table shows sales by market, market size, and state. Suppose you wanted to compute the percent of total sales each state contributed to the market. When you add a Percent of Total quick table calc (see Quick Table Calculations) that computes along State, the calculation computes within the red area shown below. This is because the Market Size dimension is partitioning the data.



Market	Market Size	State	Sales	% of Total Sales along State
Central	Major Market	Colorado	$48,179	31.58%
		Illinois	$69,883	45.80%
		Ohio	$34,517	22.62%
	Small Market	Iowa	$54,750	48.68%
		Missouri	$24,647	21.92%
		Wisconsin	$33,069	29.40%
East	Major Market	Florida	$37,443	27.08%
		Massachusetts	$29,965	21.67%
		New York	$70,852	51.25%
	Small Market	Connecticut	$25,429	63.07%
		New Hampshire	$14,887	36.93%
South	Major Market	Texas	$37,410	100.00%
	Small Market	Louisiana	$23,161	34.82%
		New Mexico	$15,892	23.89%

When you aggregate Market Size as an Attribute, the calculation is computed within the Market (East, in the following image), and the Market Size information is used purely as a label in the display.



Market	Market Size	State	Sales	% of Total Sales along State
Central	Major Market	Colorado	$48,179	18.18%
		Illinois	$69,883	26.37%
		Ohio	$34,517	13.02%
	Small Market	Iowa	$54,750	20.66%
		Missouri	$24,647	9.30%
		Wisconsin	$33,069	12.48%
East	Major Market	Florida	$37,443	20.97%
		Massachusetts	$29,965	16.78%
		New York	$70,852	39.68%
	Small Market	Connecticut	$25,429	14.24%
		New Hampshire	$14,887	8.34%
South	Major Market	Texas	$37,410	36.00%
	Small Market	Louisiana	$23,161	22.29%
		New Mexico	$15,892	15.29%

List of Predefined Aggregations in Tableau

Sometimes it is useful to look at numerical data in an aggregated form such as a summation or an average. The mathematical functions that produce aggregated data are called aggregation functions. Aggregation functions perform a calculation on a set of values and return a single value. For example, a measure that contains the values 1, 2, 3, 3, 4 aggregated as a sum returns a single value: 13. Or if you have 3,000 sales transactions from 50 products in your data source, you might want to view the sum of sales for each product, so that you can decide which products have the highest revenue.

You can use Tableau to set an aggregation only for measures in relational data sources. Multidimensional data sources contain aggregated data only.

Note: Using floating-point values in combination with aggregations can sometimes lead to unexpected results. For details, see Understanding data types in calculations.

Tableau provides a set of predefined aggregations that are shown in the table below. You can set the default aggregation for any measure that is not a calculated field that itself contains an aggregation, such as `AVG([Discount])`. See Set the Default Aggregation for a Measure. You can also set the aggregation for a field already in the view. For details, see Change the Aggregation of a Measure in the View.

AGGREGATIONDESCRIPTIONRESULT FOR MEASURE THAT CONTAINS 1, 2, 2, 3Attribute

Returns the value of the given expression if it only has a single value for all rows in the group, otherwise it displays an asterisk (*) character. Null values are ignored. This aggregation is particularly useful when aggregating a dimension. To set a measure in the view to this aggregation, right-click (control-click on Mac) the measure and choose **Attribute**. The field then changes to show the text ATTR:

N/ADimensionReturns all unique values in a measure or dimension.3 values (1, 2, 3)SumReturns the sum of the numbers in a measure. Null values are ignored.1 value (8)AverageReturns the arithmetic mean of the numbers When applied to a dimension, Tableau creates a new temporary column that is a measure because the result of a count is a number. You can count numbers, dates, booleans, and strings. Null values are ignored in all cases.1 value (4)Count (Distinct)

Returns the number of unique values in a measure or dimension. When applied to a dimension, Tableau creates a new temporary column that is a measure because the

result of a count is a number. You can count numbers, dates, booleans, and strings. Null values are ignored in all cases.

This aggregation is not available for the following types of workbooks:

- Workbooks created before Tableau Desktop 8.2 and that use Microsoft Excel or Text File data sources.
- Workbooks that use legacy connections.
- Workbooks that use Microsoft Access data sources.

If you are connected to a workbook that uses of one of these types, Count (Distinct) is unavailable and Tableau shows the message “Requires extract.” To use this aggregation, extract your data. See Extract Your Data.

1 value (3)MinimumReturns the smallest number in a measure or continuous dimension. Null values are ignored.1 value (1)MaximumReturns the largest number in a measure or in the given expression based on a sample population. Null values are ignored. Returns a Null if there are fewer than 2 members in the sample that are not Null. Use this function if your data represents a sample of the population.1 value (0.8165)Std. Dev (Pop.)Returns the standard deviation of all values in the given expression based on a biased population. Assumes that its arguments consist of the entire population. Use this function for large sample sizes.1 value (0.7071)VarianceReturns the variance of all values in the given expression based on a sample. Null values are ignored. Returns a Null if there are fewer than 2 members in the sample that are not Null. Use this function if your data represents a sample of the population.1 value (0.6667)Variance (Pop.)Returns the variance of all values in the given expression based on a biased population. Assumes that its arguments consist of

the entire population. Use this function for large sample sizes.1 value (0.5000)Disaggregate

Returns all records in the underlying data source. To disaggregate all measures in the view, select **Aggregate Measures** from the Analysis menu (to clear the check mark).

Tableau allows you to view data in disaggregated form (relational databases only). When data are disaggregated, you can view all of the individual rows of your data source. For example, after discovering that the sum of sales for rubber bands is $14,600, you might want to see the distribution of individual sales transactions. To answer this question, you need to create a view that shows individual rows of data. That is, you need to disaggregate the data (see How to Disaggregate Data). Another way to look at disaggregated data is to view the underlying data for all or part of a view. For more details, see View Underlying Data.

4 values (1, 2, 2, 3)

You can also define custom aggregations as described in Aggregate Functions in Tableau. Depending on the type of data view you create, Tableau will apply these aggregations at the appropriate level of detail. For example, Tableau will apply the aggregation to individual dimension members (the average delivery time in the East region), all members in a given dimension (the average delivery time in the East, West, and Central regions), or groups of dimensions (the sum of sales for all regions and for all markets).

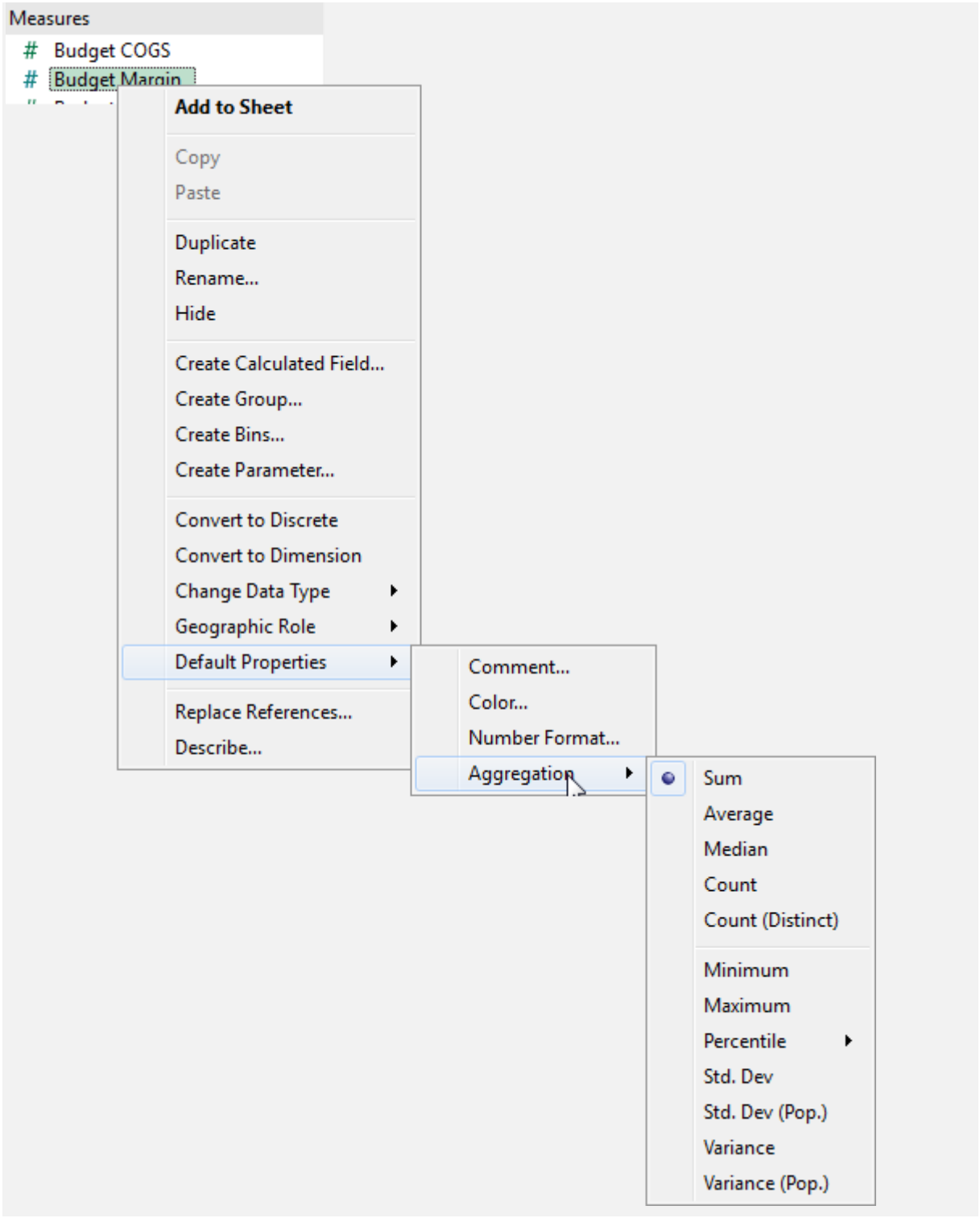
Set the Default Aggregation for a Measure

You can set the default aggregation for any measure that is not a calculated field that itself contains an aggregation, such as `AVG([Discount])`. A default aggregation is a

preferred calculation for summarizing a continuous or discrete field. The default aggregation is automatically used when you drag a measure to a view.

To change the default aggregation:

Right-click (control-click on Mac) a measure in the Data pane and select **Default Properties** > **Aggregation**, and then select one of the aggregation options.



Note: You can use Tableau to aggregate measures only with relational data sources. Multidimensional data sources contain aggregated data only.

You cannot set default aggregations for published data sources. The default aggregation is set when the data source is initially published. Create a Local Copy of the published data source to adjust the default aggregation.

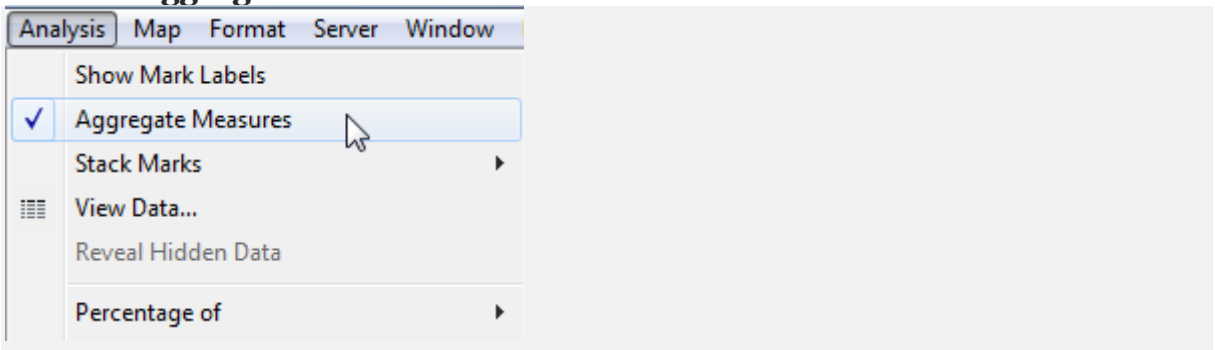
How to Disaggregate Data

Whenever you add a measure to your view, an aggregation is applied to that measure by default. This default is controlled by the **Aggregate Measures** setting in the **Analysis**menu.

If you decide you want to see all of the marks in the view at the most detailed level of granularity, you can disaggregate the view. Disaggregating your data means that Tableau will display a separate mark for every data value in every row of your data source.

To disaggregate all measures in the view:

- Clear the **Analysis >Aggregate Measures** option. If it is already selected, click **Aggregate Measures** once to deselect it.



When **Aggregate Measures** is selected, Tableau will attempt to aggregate measures in the view by default. This means that it collects individual row values from your data source into a single value (which becomes a single mark) adjusted to the level of detail in your view.

The different aggregations available for a measure determine how the individual values are collected: they can be added (SUM), averaged (AVG), or set to the maximum (MAX) or minimum (MIN) value from the individual row values.

For a complete list of the available aggregations, List of Predefined Aggregations in Tableau.

The level of detail is determined by the dimensions in your view — for information about the concept of level of detail, see How dimensions affect the level of detail in the view.

Disaggregating your data can be useful for analyzing measures that you may want to use both independently and dependently in the view. For example, you may be analyzing the results from a product satisfaction survey with the Age of participants along one axis. You can aggregate the **Age** field to determine the average age of participants or disaggregate the data to determine at what age participants were most satisfied with the product.

Disaggregating data can be useful when you are viewing data as a scatter plot.
See Example: Scatter Plots, Aggregation, and Granularity.

Note: If your data source is very large, disaggregating the data can result in a significant performance degradation.

Example: Scatter Plots, Aggregation, and Granularity

If you place one measure on the **Rows** shelf and another measure on the **Columns** shelf, you are asking Tableau to compare two numerical values.

Typically, Tableau chooses a scatter plot as the default visualization in such cases. The initial view will most likely be single mark, showing the sum for all values for the two measures. This is because you need to increase the level of detail in the view.

Start building the scatter plot

There are various ways to add detail to a basic scatter plot: **you can use dimensions to add detail**, you can add additional measures and/or dimensions to the Rows and Columns shelves to create multiple one-mark scatter plots in the view, or you can **disaggregate the data**. And, you can also use any combination of these options. This topic looks at these alternatives using the **Sample-Superstore** data source.

To create the initial view, follow these steps:

1. Place the **Sales** measure on the **Columns** shelf.
2. Place the **Profit** measure on the **Rows** shelf.

The measures are automatically aggregated as sums. The default aggregation (SUM) is indicated in the field names. The values shown in the tooltip show the sum of sales and profit values across every row in the data source.

Follow the steps below to use dimensions to add detail to the view and to disaggregate data.

Use dimensions to add detail

Follow these steps to develop the scatter plot view you created above by adding dimensions to show additional levels of detail.

1. Drag the **Category** dimension to **Color** on the Marks card.
2. This separates the data into three marks — one for each dimension member — and encodes the marks using color.
3. Drag the **State** dimension to **Detail** on the Marks card.
4. Now there are many more marks in the view. The number of marks is equal to the number of distinct states in the data source multiplied by the number of categories.

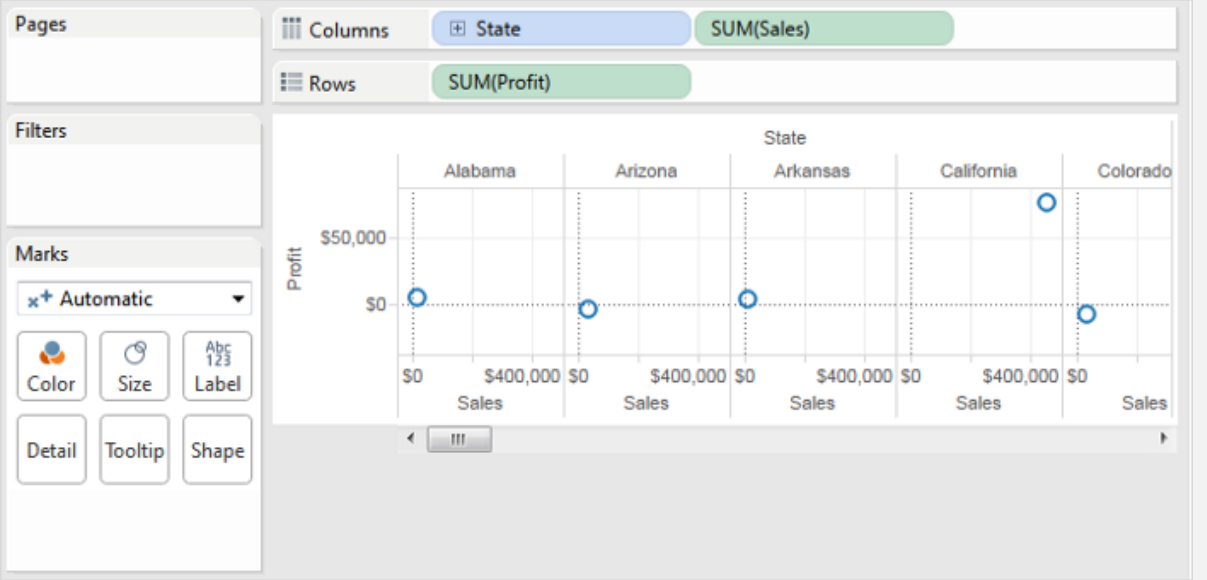
Although more marks are now displayed, the measures are still aggregated. So regardless of whether there is one row in the data source where State = North Dakota and Category= Furniture, or 100 such rows, the result is always a single mark.

Maybe this process is developing the view in a direction you find useful, or maybe you prefer to go in a different direction — for example, by adding a time dimension to the view, or by introducing trend lines or forecasting. You decide what questions to ask.

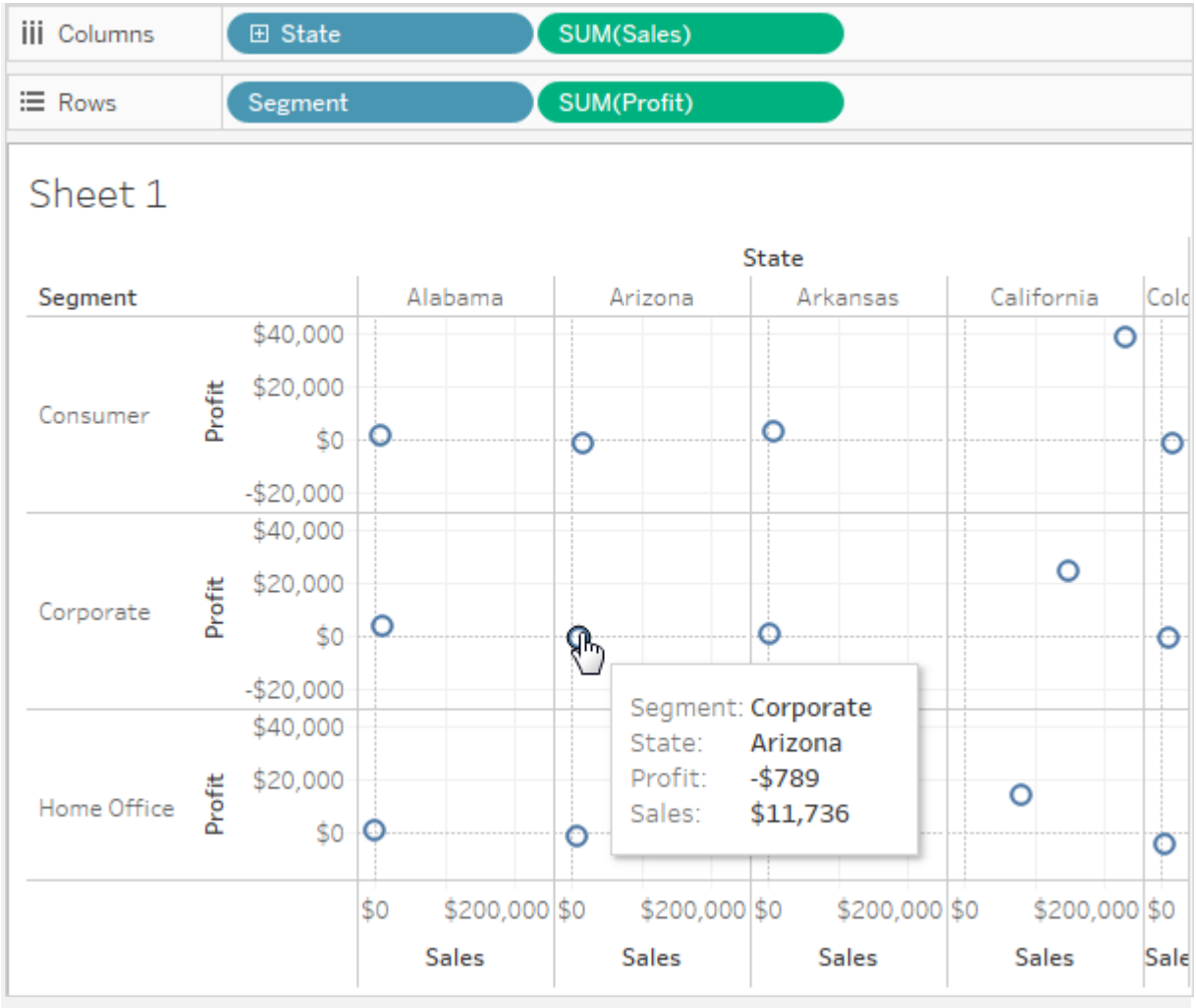
Try adding more fields to the rows and columns shelves

Revert to the original one-mark view and follow these steps to develop the scatter plot view by adding fields to the **Rows** and **Columns** shelves.

1. Drag the **State** dimension to the **Columns** shelf.
2. Even if you drop **Continent** to the right of **SUM(Sales)**, Tableau moves it to the left of **SUM(Sales)**. This is because you cannot insert a dimension within a continuous axis. Instead, your view shows a separate axis for each member of the dimension.



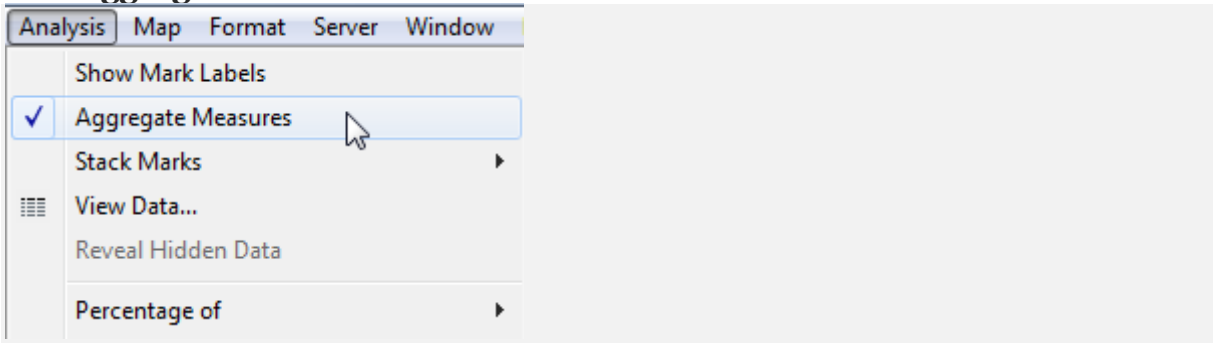
1. Drag the **Segment** dimension to the **Rows** shelf.
2. You now have a view that provides an overview of Sales and Profit across states and customer segments. It can be interesting to hover over the marks in the view to see tooltip data for various segments:



Try disaggregating the data

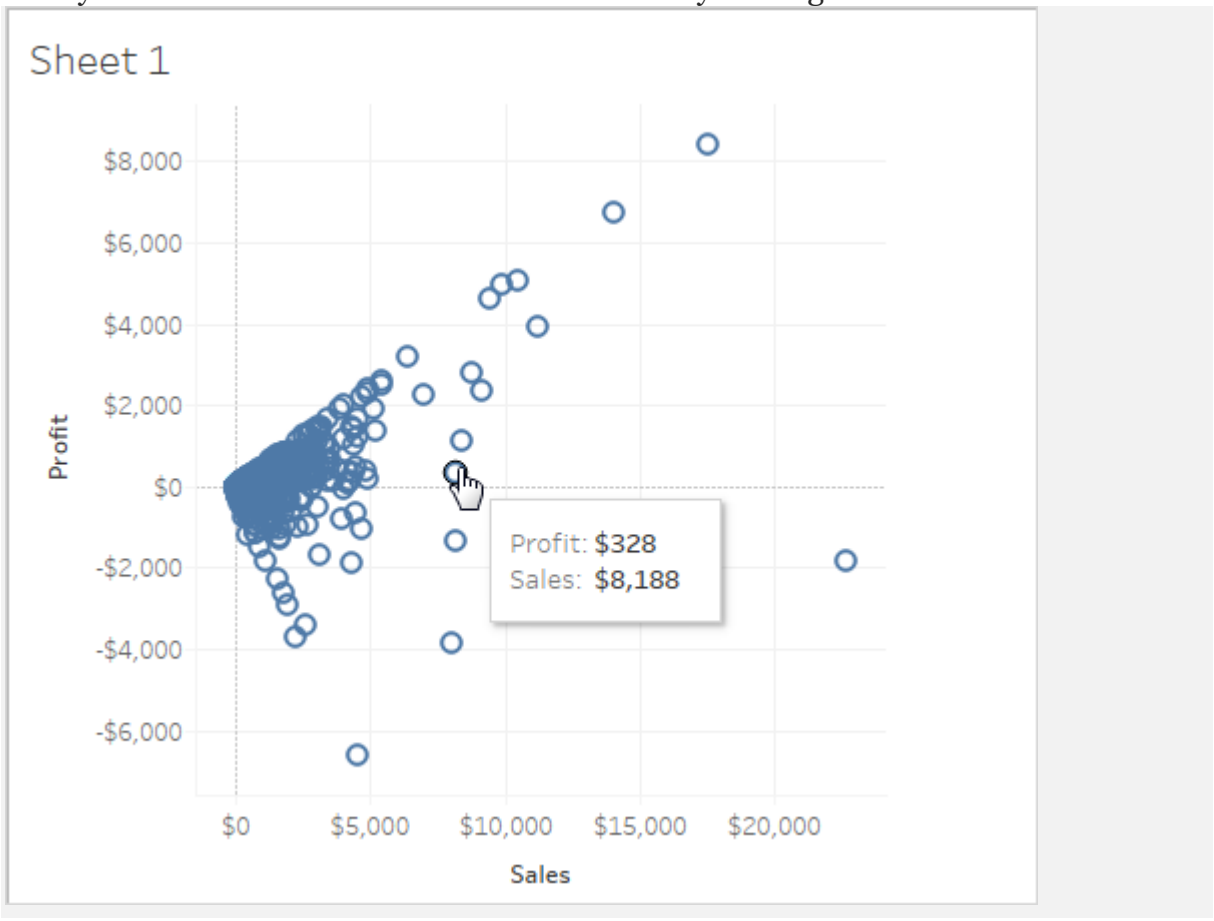
Another way to modify your original one-mark scatter plot to display more marks is by disaggregating the data.

Clear the **Analysis >Aggregate Measures** option. If it is already selected, click **Aggregate Measures** once to deselect it.



What you have actual done is to dis-aggregate the data, because this command is a toggle that was originally selected (check mark present). Tableau aggregates data in your view by default.

Now you see a lot of marks — one for each row in your original data source:



When you disaggregate measures, you no longer are looking at the average or sum for the values in the rows in the data source. Instead, the view shows a mark for every row in the data source. Disaggregating data is a way to look at the entire surface area of the data. It's a quick way to understand the shape of your data and to identify outliers. In this case, the disaggregated data shows that for many rows in the data, there is a consistent relationship between sales income and profit — this is indicated by the line of marks aligned at a forty-five degree angle.

- **Explain why Tableau aggregates measures**
- **Describe how an aggregated measure changes when dimensions are added to the view**