Lab 1. Taking Off with Tableau

This lab introduces the foundational principles of Tableau. We'll go through a series of examples that will introduce you to the basics of connecting to data, exploring and analyzing data visually, and finally putting it all together in a fully interactive dashboard. These concepts will be developed far more extensively in subsequent labs. However, *don't skip this lab*, as it introduces key terminology and concepts, including the following:

- Connecting to data
- Foundations for building visualizations
- Creating bar charts
- Creating line charts
- Creating geographic visualizations
- Using Show Me
- Bringing everything together in a dashboard

Let's begin by looking at how you can connect Tableau to your data.

Connecting to data

Tableau connects to data stored in a wide variety of files and databases. This includes flat files, such as Excel documents, spatial files, and text files; relational databases, such as SQL Server and Oracle; cloud-based data sources, such as Snowflake and Amazon Redshift; and **Online Analytical Processing** (**OLAP**) data sources, such as Microsoft SQL Server Analysis Services. With very few exceptions, the process of analysis and creating visualizations will be the same, no matter what data source you use.

In this lab, we'll connect to a text file derived from one of the sample datasets that ships with Tableau: `Superstore.csv` . **Superstore** is a fictional retail chain that sells various products to customers across the United States and the file contains a record for every line item of every order with details on the customer, location, item, sales amount, and revenue.

Note:

Please use the supplied `Superstore.csv` data file instead of the Tableau sample data, as there are differences that will change the results.

The `Chapter 1` workbooks, included with the code files bundle, already have connections to the file; however, for this example, we'll walk through the steps of creating a connection in a new workbook:

1. Open Tableau. You should see the home screen with a list of connection options on the left and, if applicable, thumbnail previews of recently edited workbooks in the center, along with sample workbooks at the bottom.
2. Under **Connect** and **To a File**, click on **Text File**.
3. In the **Open** dialog box, navigate to the `tableau-2020\Lab 01` directory and select the `Superstore.csv` file.

You will now see the data connection screen, which allows you to visually create connections to data sources. We'll examine the features of this screen in detail in the *Connecting to data* section of *Chapter 2*, *Connecting to Data in Tableau*. For now, Tableau has already added and given a preview of the file for the connection:
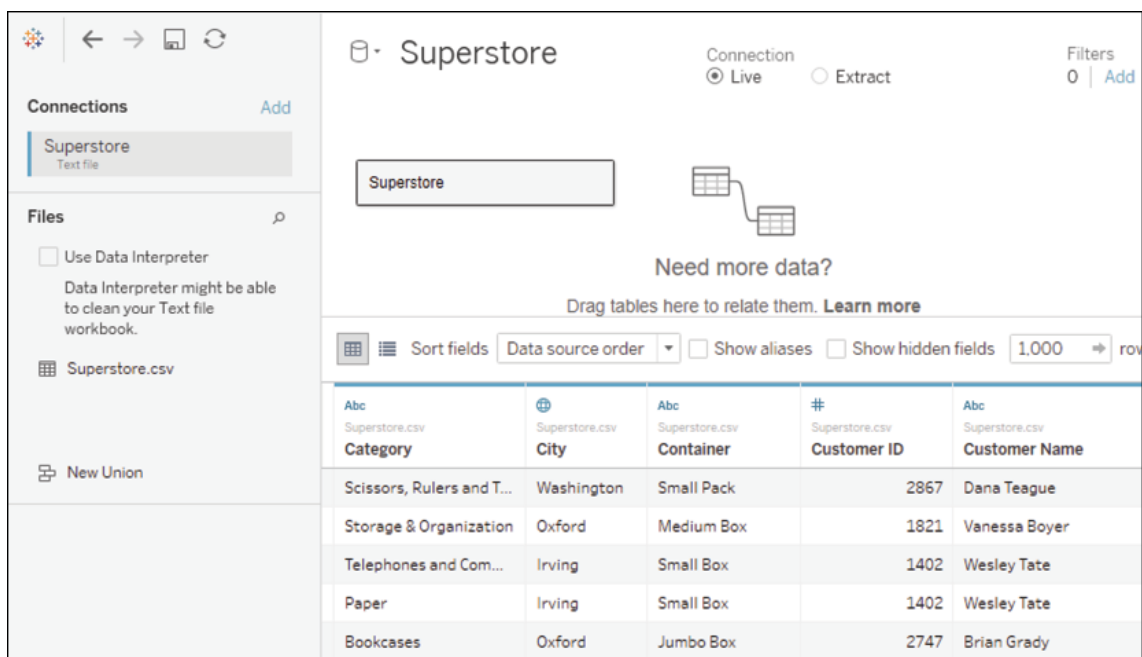
Figure 1.1: The data connection screen allows you to build a connection to your data

For this connection, no other configuration is required, so simply click on the **Sheet 1** tab at the bottom to start visualizing the data! You should now see the main work area within Tableau, which looks like this:
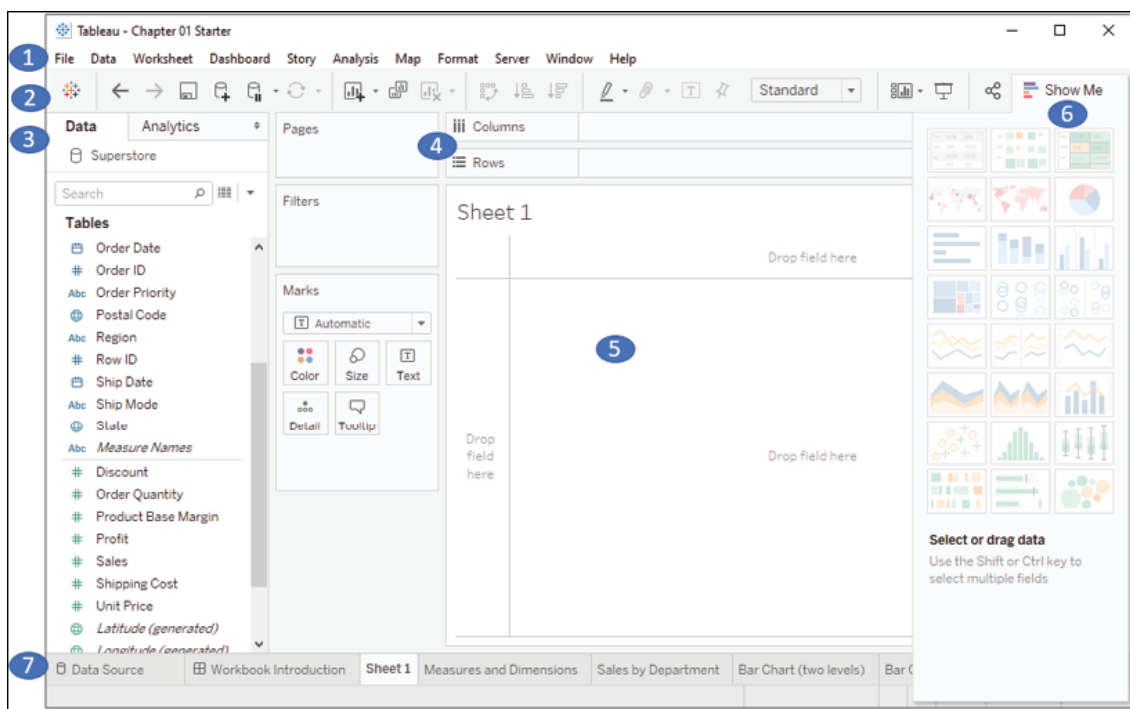

Figure 1.2: Elements of Tableau's primary interface, numbered with descriptions below

We'll refer to elements of the interface throughout the book using specific terminology, so take a moment to familiarize yourself with the terms used for various components numbered in the preceding screenshot:

1. The **menu** contains various menu items for performing a wide range of functions.

2. The **toolbar** allows common functions such as undo, redo, save, add a data source, and so on.

3. The **Data** pane is active when the **Data** tab is selected and lists all tables and fields of the selected data source. The **Analytics** pane is active when the **Analytics** tab is selected and gives options for supplementing visualizations with visual analytics.

4. Various shelves such as **Pages**, **Columns**, **Rows**, and **Filters** serve as areas to drag and drop fields from the data pane. The **Marks** card contains additional shelves such as **Color**, **Size**, **Text**, **Detail**, and **Tooltip**. Tableau will visualize data based on the fields you drop onto the shelves. **Note:**

   Data fields in the **Data** pane are available to add to a view. Fields that have been dropped onto a shelf are called *in the view* or *active fields* because they play an active role in the way Tableau draws the visualization.

5. The **canvas** or **view** is where Tableau will draw the data visualization. In addition to dropping fields on shelves, you may also drop fields directly on to the view. A **title** is located at the top of the canvas. By default, the title displays the name of the sheet, but it can be edited or hidden.

6. **Show Me** is a feature that allows you to quickly iterate through various types of visualizations based on data fields of interest. We'll look at **Show Me** toward the end of the lab.

7. The tabs at the bottom of the window give you options for editing the data source, as well as navigating between and adding any number of sheets, dashboards, or stories. Often, any tab (whether it is a sheet, a dashboard, or a story) is referred to generically as a **sheet**.

Tip:

A Tableau workbook is a collection of data sources, sheets, dashboards, and stories. All of this is saved as a single Tableau workbook file (`.twb` or `.twbx`). A workbook is organized into a collection of tabs of various types:

- A sheet is a single data visualization, such as a bar chart or a line graph. Since sheet is also a generic term for any tab, we'll often refer to a sheet as a **view** because it is a single view of the data.
- A **dashboard** is a presentation of any number of related views and other elements (such as text or images) arranged together as a cohesive whole to communicate a message to an audience. Dashboards are often designed to be interactive.
- A **story** is a collection of dashboards or single views that have been arranged to communicate a narrative from the data. Stories may also be interactive.

Along the bottom of the screen, you'll notice a few other items. As you work, a **status bar** at the bottom left will display important information and details about the view, selections, and the user. Various controls at the bottom right allow you to navigate between sheets, dashboards, and stories, as well as to view the tabs with **Show Filmstrip** or switch to a sheet sorter showing an interactive thumbnail of all sheets in the workbook.

Now that you have connected to the data in the text file, we'll explore some examples that lay the foundation for data visualization and then move on to building some foundational visualization types. To prepare for this, please do the following:

1. From the menu, select **File | Exit**.
2. When prompted to save changes, select **No**.
3. From the `tableau-2020\Lab 01` directory, open the file `Chapter 01 Starter.twbx.` This file contains a connection to the `Superstore` data file and is designed to help you walk through the examples in this lab.

Note:

The files for each lab include a `Starter` workbook that allows you to work through the examples given in this book. If, at any time, you'd like to see the completed examples, open the `Complete` workbook for the lab.

Having made a connection to the data, you are ready to start visualizing and analyzing it. As you begin to do so, you will take on the role of an analyst at the retail chain. You'll ask questions of the data, build visualizations to answer those questions, and ultimately design a dashboard to share the results. Let's start by laying some foundations for understanding how Tableau visualizes data.

Foundations for building visualizations

When you first connect to a data source such as the `Superstore` file, Tableau will display the data connection and the fields in the **Data** pane. Fields can be dragged from the data pane onto the canvas area or onto various shelves such as **Rows**, **Columns**, **Color**, or **Size**. As we'll see, the placement of the fields will result in different encodings of the data based on the type of field.

Measures and dimensions

The fields from the data source are visible in the **Data** pane and are divided into **Measures** and **Dimensions**. In older versions of Tableau, these are separate sections in the **Data** pane. In newer versions, each table will have **Measures** and **Dimensions** separated by a line:
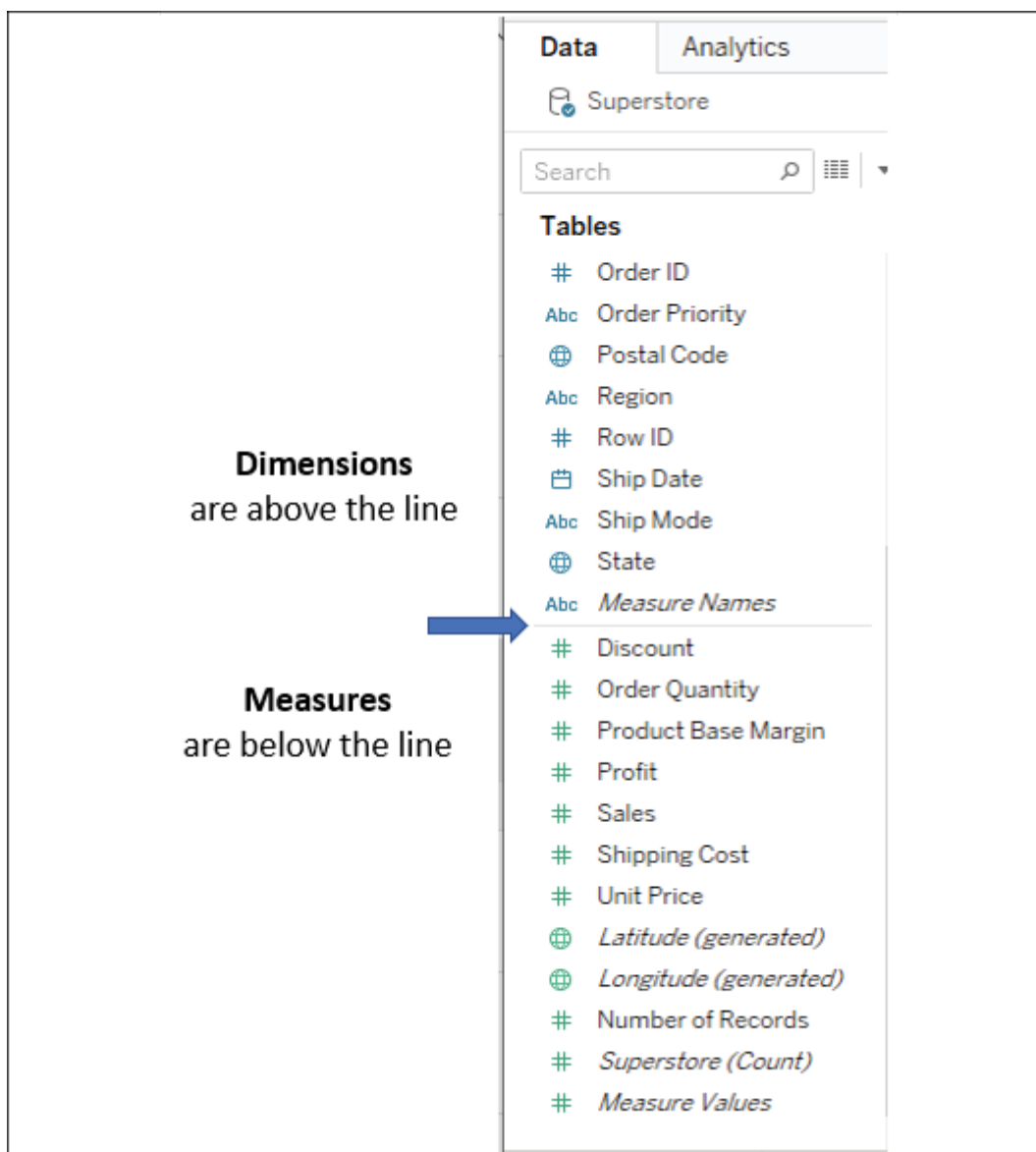
Figure 1.3: Each table (this data source only has one) has dimensions listed above the line and measures listed below the line

The difference between **Measures** and **Dimensions** is a fundamental concept to understand when using Tableau:

- **Measures** are values that are aggregated. For example, they are summed, averaged, counted, or the result is the minimum or maximum value.
- **Dimensions** are values that determine the level of detail at which measures are aggregated. You can think of them as slicing the measures or creating groups into which the measures fit. The combination of dimensions used in the view defines the view's basic level of detail.

As an example (which you can view in the `Chapter 01 Starter` workbook on the **Measures and Dimensions** sheet), consider a view created using the `Region` and `Sales` fields from the `Superstore` connection:
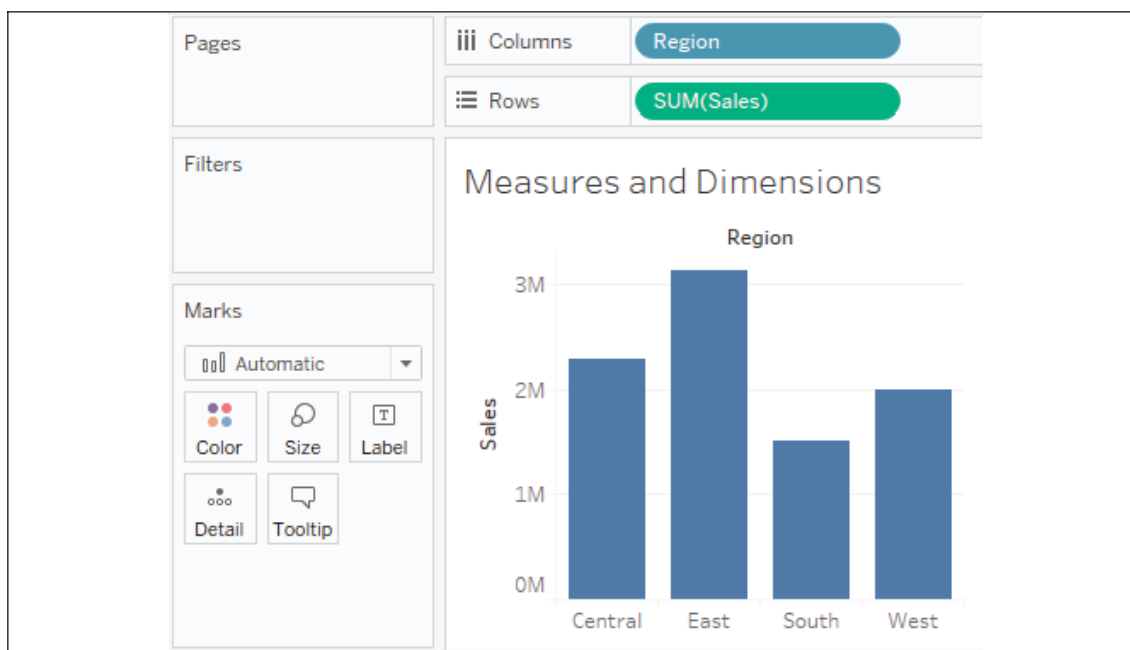
Figure 1.4: A bar chart demonstrating the use of Measures and Dimensions

The `Sales` field is used as a measure in this view. Specifically, it is being aggregated as a sum. When you use a field as a measure in the view, the type aggregation (for example, `SUM`, `MIN`, `MAX`, and `AVG`) will be shown on the active field. Note that, in the preceding example, the active field on **Rows** clearly indicates the sum aggregation of `Sales` : `SUM(Sales)` .

The `Region` field is a dimension with one of four values for each record of data: **Central**, **East**, **South**, or **West**. When the field is used as a dimension in the view, it slices the measure. So, instead of an overall sum of sales, the preceding view shows the sum of sales for each region.

Discrete and continuous fields

Another important distinction to make with fields is whether a field is being used as **discrete** or **continuous.** Whether a field is discrete or continuous determines how Tableau visualizes it based on where it is used in the view*.* Tableau will give a visual indication of the default value for a field (the color of the icon in the **Data** pane) and how it is being used in the view (the color of the active field on a shelf). Discrete fields, such as `Region` in the previous example, are blue. Continuous fields, such as `Sales` , are green.

Discrete fields

Discrete (blue) fields have values that are shown as distinct and separate from one another. Discrete values can be reordered and still make sense. For example, you could easily rearrange the values of `Region` to be `East` , `South` , `West` , and `Central` , instead of the default order in *Figure 1.4*.

When a discrete field is used on the **Rows** or **Columns** shelves, the field defines headers. Here, the discrete field `Region` defines the column headers:
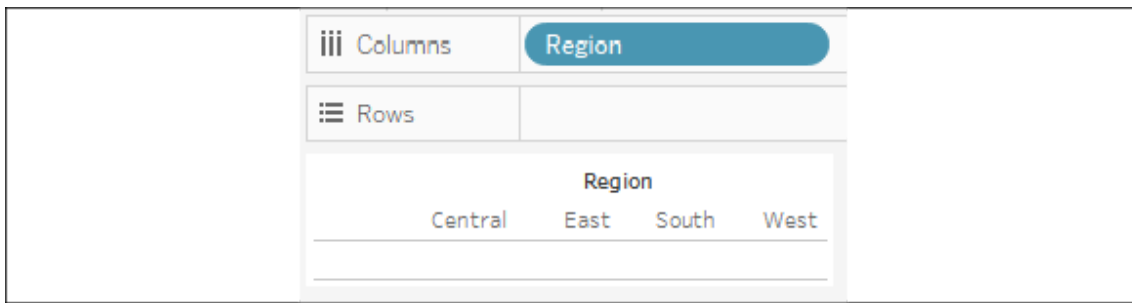
Figure 1.5: The discrete field on Columns defines column headers

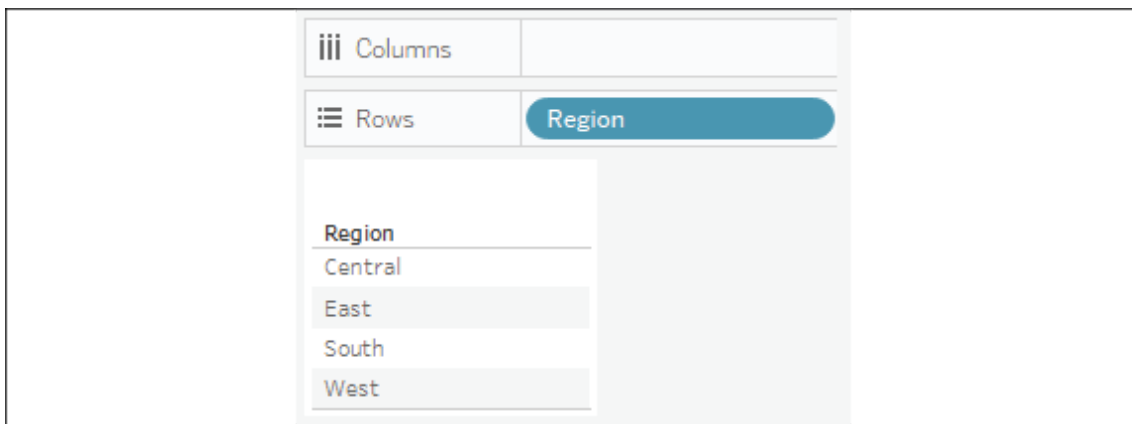Here, it defines the row headers:

Figure 1.6: The discrete field on Rows defines row headers

When used for **Color**, a discrete field defines a discrete color palette in which each color aligns with a distinct value of the field:
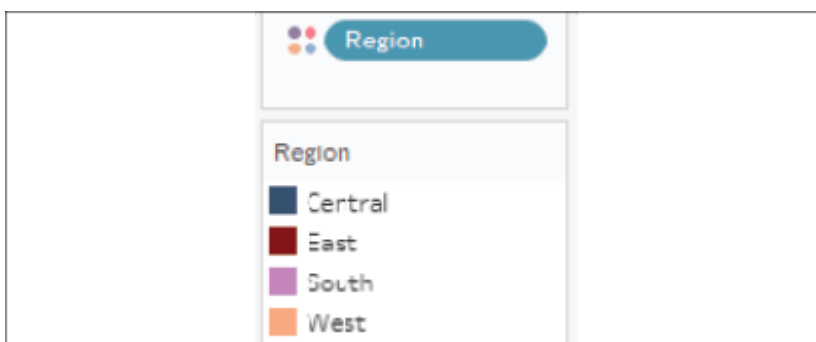

Figure 1.7: The discrete field on Color defines a discrete color palette

Continuous fields

Continuous (green) fields have values that flow from first to last as a continuum. Numeric and date fields are often (though, not always) used as continuous fields in the view. The values of these fields have an order that it would make little sense to change.

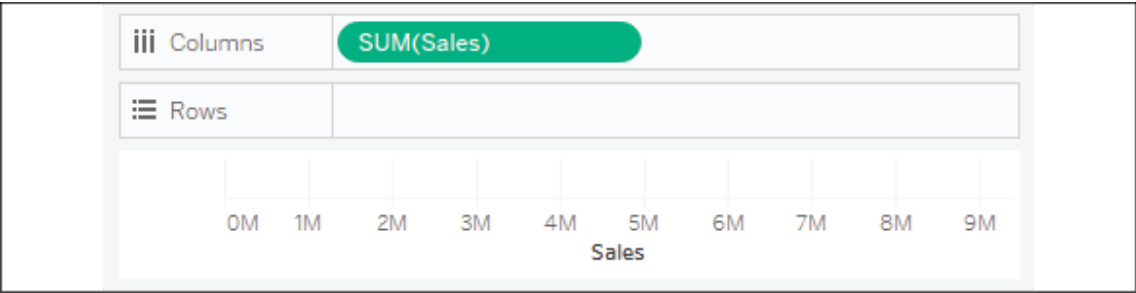When used on **Rows** or **Columns**, a continuous field defines an axis:

Figure 1.8: The continuous field on Columns (or Rows) defines an axis

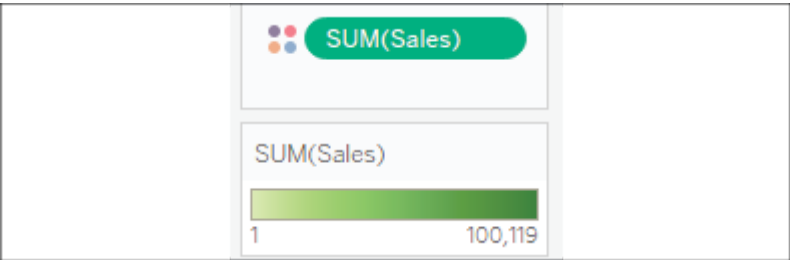When used for **color**, a continuous field defines a gradient:

Figure 1.9: The continuous field on Color defines a gradient color palette

It is very important to note that continuous and discrete are different concepts from measure and dimension. While most dimensions are discrete by default, and most measures are continuous by default, it is possible to use any measure as a discrete field and some dimensions as continuous fields in the view, as shown here:

Figure 1.10: Measures and Dimensions can be discrete or continuous

Note:

To change the default of a field, right-click on the field in the **Data** pane and select **Convert to Discrete** or **Convert to Continuous**.

To change how a field is used in the view, right-click on the field in the view and select **Discrete** or **Continuous**. Alternatively, you can drag and drop the fields between **Dimensions** and **Measures** in the **Data** pane.

In general, you can think of the differences between the types of fields as follows:

- Choosing between a dimension and measure tells Tableau *how to slice or aggregate* the data.
- Choosing between discrete and continuous tells Tableau *how to display* the data with a header or an axis and defines individual colors or a gradient.

As you work through the examples in this book, pay attention to the fields you are using to create the visualizations, whether they are dimensions or measures, and whether they are discrete or continuous. Experiment with changing fields in the view from continuous to discrete, and vice versa, to gain an understanding of the differences in the visualization. We'll put this understanding into practice as we turn our attention to visualizing data.

Visualizing data

A new connection to a data source is an invitation to explore and discover! At times, you may come to the data with very well-defined questions and a strong sense of what you expect to find. Other times, you will come to the data with general questions and very little idea of what you will find. The visual analytics capabilities of Tableau empower you to rapidly and iteratively explore the data, ask new questions, and make new discoveries.

The following visualization examples cover a few of the most foundational visualization types. As you work through the examples, keep in mind that the goal is not simply to learn how to create a specific chart. Rather, the examples are designed to help you think through the process of asking questions of the data and getting answers through iterations of visualization. Tableau is designed to make that process intuitive, rapid, and transparent.

Note:

Something that is far more important than memorizing the steps to create a specific chart type is understanding how and why to use Tableau to create a chart and being able to adjust your visualization to gain new insights as you ask new questions.

Bar charts

Bar charts visually represent data in a way that makes the comparison of values across different categories easy. The length of the bar is the primary means by which you will visually understand the data. You may also incorporate color, size, stacking, and order to communicate additional attributes and values.

Creating bar charts in Tableau is very easy. Simply drag and drop the measure you want to see on to either the **Rows** or **Columns** shelf and the dimension that defines the categories on to the opposing **Rows** or **Columns** shelf.

As an analyst for **Superstore**, you are ready to begin a discovery process focused on sales (especially the dollar value of sales). As you follow the examples, work your way through the sheets in the `Chapter 01 Starter` workbook. The `Chapter 01 Complete` workbook contains the complete examples so that you can compare your results at any time:

1. Click on the **Sales by Department** tab to view that sheet.

2. Drag and drop the `Sales` field from **Measures** in the **Data** pane on to the **Columns** shelf. You now have a bar chart with a single bar representing the sum of sales for all of the data in the data source.

3. Drag and drop the `Department` field from **Dimensions** in the **Data** pane to the **Rows** shelf. This slices the data to give you three bars, each having a length that corresponds to the sum of sales for each department:
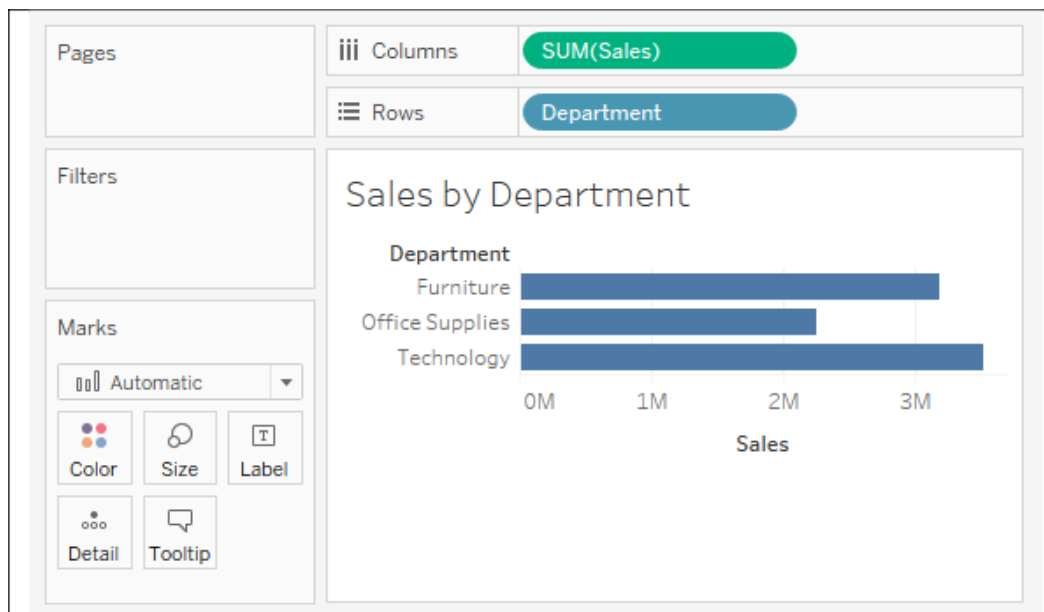
Figure 1.11: The view Sales by Department should look like this when you have completed the preceding steps

You now have a horizontal bar chart. This makes comparing the sales between the departments easy. The **type** drop-down menu on the **Marks** card is set to **Automatic** and indicates that Tableau has determined that bars are the best visualization given the fields you have placed in the view. As a dimension, `Department` slices the data. Being discrete, it defines row headers for each department in the data. As a measure, the `Sales` field is aggregated. Being continuous, it defines an axis. The mark type of bar causes individual bars for each department to be drawn from `0` to the value of the sum of sales for that department.

Note:

Typically, Tableau draws a mark (such as a bar, a circle, or a square) for every combination of dimensional values in the view. In this simple case, Tableau is drawing a single bar mark for each dimensional value (`Furniture` , `Office Supplies` , and `Technology`) of `Department` . The type of mark is indicated and can be changed in the drop-down menu on the **Marks** card. The number of marks drawn in the view can be observed on the lower-left status bar.

Tableau draws different marks in different ways; for example, bars are drawn from 0 (or the end of the previous bar, if stacked) along the axis. Circles and other shapes are drawn at locations defined by the value(s) of the field that is defining the axis. Take a moment to experiment with selecting different mark types from the drop-down menu on the **Marks** card. A solid grasp of how Tableau draws different mark types will help you to master the tool.

Iterations of bar charts for deeper analysis

Using the preceding bar chart, you can easily see that the **Technology** department has more total sales than either the **Furniture** or **Office Supplies** departments. What if you want to further understand sales amounts for departments across various regions? Follow these two steps:

1. Navigate to the **Bar Chart (two levels)** sheet, where you will find an initial view that is identical to the one you created earlier.
2. Drag the `Region` field from **Dimensions** in the **Data** pane to the **Rows** shelf and drop it to the left of the `Department` field already in view.

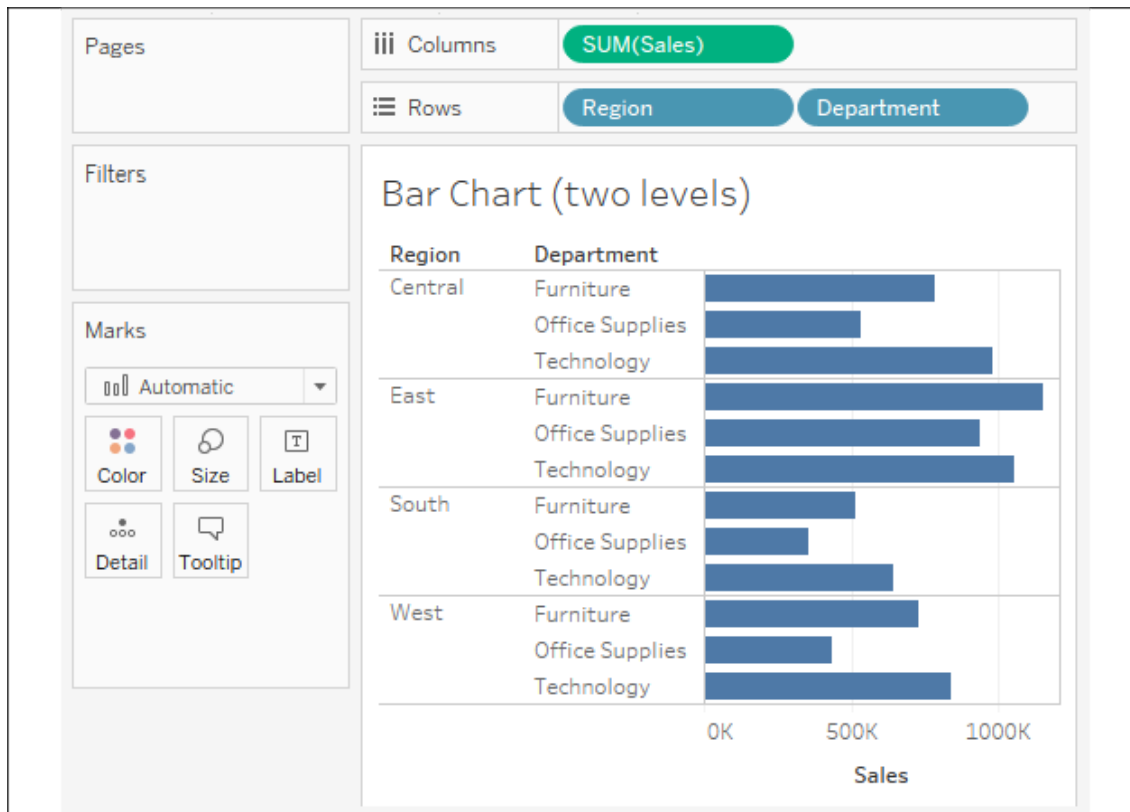You should now have a view that looks like this:

Figure 1.12: The view Bar Chart (two levels) should look like this when you have completed the preceding steps

You still have a horizontal bar chart, but now you've introduced `Region` as another dimension that changes the level of detail in the view and further slices the aggregate of the sum of sales. By placing `Region` before `Department`, you can easily compare the sales of each department within a given region.

Now you are starting to make some discoveries. For example, the **Technology** department has the most sales in every region, except in the **East**, where **Furniture** had higher sales. **Office Supplies** never has the highest sales in any region.

Consider an alternate view, using the same fields arranged differently:

1. Navigate to the **Bar Chart (stacked)** sheet, where you will find a view that is identical to the original bar chart.

2. Drag the `Region` field from the **Rows** shelf and drop it on to the **Color** shelf:
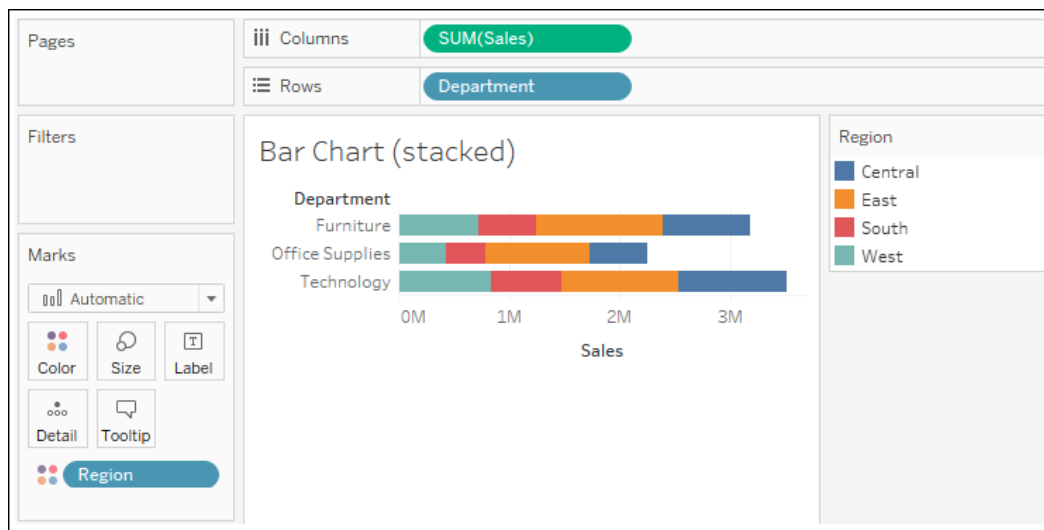
Figure 1.13: The view Bar Chart (stacked) should look like this

Instead of a **side-by-side bar chart**, you now have a **stacked bar chart**. Each segment of the bar is color-coded by the `Region` field. Additionally, a color legend has been added to the workspace. You haven't changed the level of detail in the view, so sales are still summed for every combination of `Region` and `Department`:

Note:

The **view level of detail** is a key concept when working with Tableau. In most basic visualizations, the combination of values of all dimensions in the view defines the lowest level of detail for that view. All measures will be aggregated or sliced by the lowest level of detail. In the case of most simple views, the number of marks (indicated in the lower-left status bar) corresponds to the number of unique combinations of dimensional values. That is, there will be one mark for each combination of dimension values.

- If `Department` is the only field used as a dimension, you will have a view at the department level of detail, and all measures in the view will be aggregated per department.
- If `Region` is the only field used as a dimension, you will have a view at the region level of detail, and all measures in the view will be aggregated per region.
- If you use both `Department` and `Region` as dimensions in the view, you will have a view at the level of department and region. All measures will be aggregated per unique combination of department and region, and there will be one mark for each combination of department and region.

Stacked bars can be useful when you want to understand part-to-whole relationships. It is now easier to see what portion of the total sales of each department is made in each region. However, it is very difficult to compare sales for most of the regions across departments. For example, can you easily tell which department had the highest sales in the **East** region? It is difficult because, with the exception of the **West** region, every segment of the bar has a different starting place.

Now take some time to experiment with the bar chart to see what variations you can create:

1. Navigate to the **Bar Chart (experimentation)** sheet.

2. Try dragging the `Region` field from **Color** to the other various shelves on the **Marks** card, such as **Size**, **Label**, and **Detail**. Observe that in each case the bars remain stacked but are redrawn based on the visual encoding defined by the `Region` field.

3. Use the **Swap** button on the toolbar to swap fields on **Rows** and **Columns**. This allows you to very easily change from a horizontal bar chart to a vertical bar chart (and vice versa):

Figure 1.14: Swap Rows and Columns button

4. Drag and drop `Sales` from the **Measures** section of the **Data** pane on top of the `Region` field on the **Marks** card to replace it. Drag the `Sales` field to **Color** if necessary, and notice how the color legend is a gradient for the continuous field.

5. Experiment further by dragging and dropping other fields on to various shelves. Note the behavior of Tableau for each action you take.

6. From the **File** menu, select **Save**.

Note:

If your OS, machine, or Tableau stops unexpectedly, then the **Autosave** feature should protect your work. The next time you open Tableau, you will be prompted to recover any previously open workbooks that had not been manually saved. You should still develop a habit of saving your work early and often, though, and maintaining appropriate backups.

As you continue to explore various iterations, you'll gain confidence with the flexibility available to visualize your data.

Line charts

Line charts connect related marks in a visualization to show movement or a relationship between those connected marks. The position of the marks and the lines that connect them are the primary means of communicating the data. Additionally, you can use size and color to communicate additional information.

The most common kind of line chart is a **time series**. A time series shows the movement of values over time. Creating one in Tableau requires only a date and a measure.

Continue your analysis of Superstore sales using the `Chapter 01 Starter` workbook you just saved:

1. Navigate to the **Sales over time** sheet.

2. Drag the `Sales` field from **Measures** to **Rows**. This gives you a single, vertical bar representing the sum of all sales in the data source.

3. To turn this into a time series, you must introduce a date. Drag the `Order Date` field from **Dimensions** in the **Data** pane on the left and drop it into **Columns**. Tableau has a built-in date hierarchy, and the default level of `Year` has given you a line chart connecting four years. Notice that you can clearly see an increase in sales year after year:
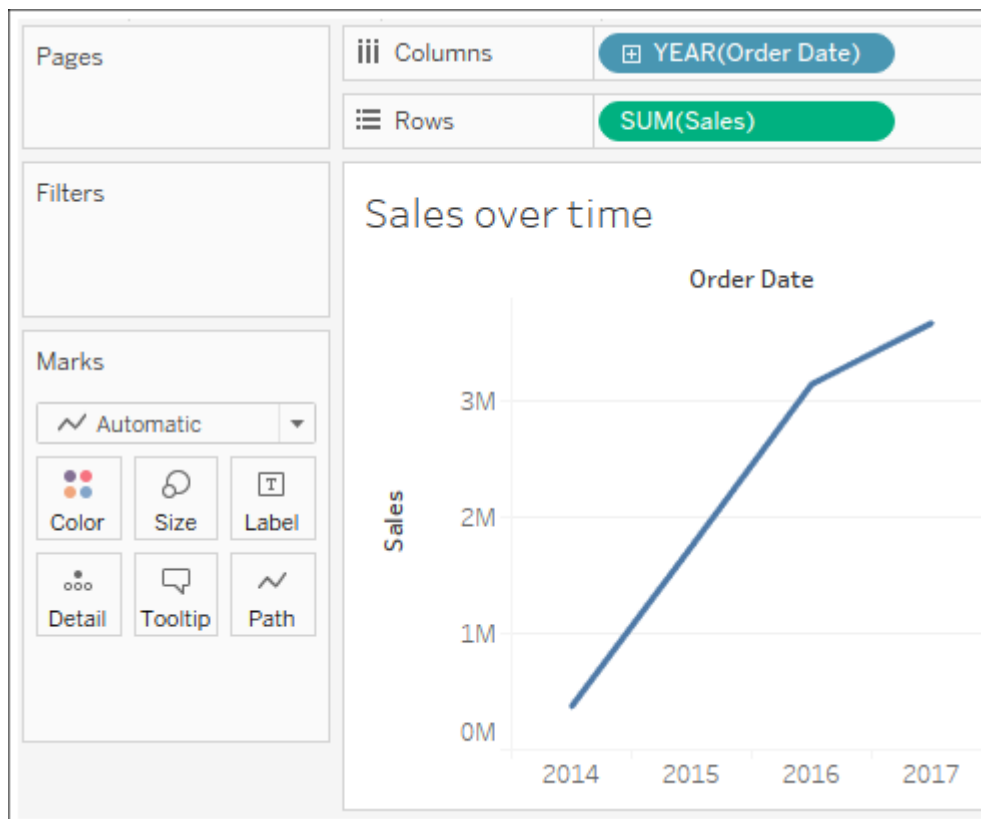
Figure 1.15: An interim step in creating the final line chart; this shows the sum of sales by year

4. Use the drop-down menu on the `YEAR(Order Date)` field on **Columns** (or right-click on the field) and switch the date field to use **Quarter**. You may notice that **Quarter** is listed twice in the drop-down menu. We'll explore the various options for date parts, values, and hierarchies in the *Visualizing Dates and Times* section of *Chapter 3*, *Moving Beyond Basic Visualizations*. For now, select the second option:
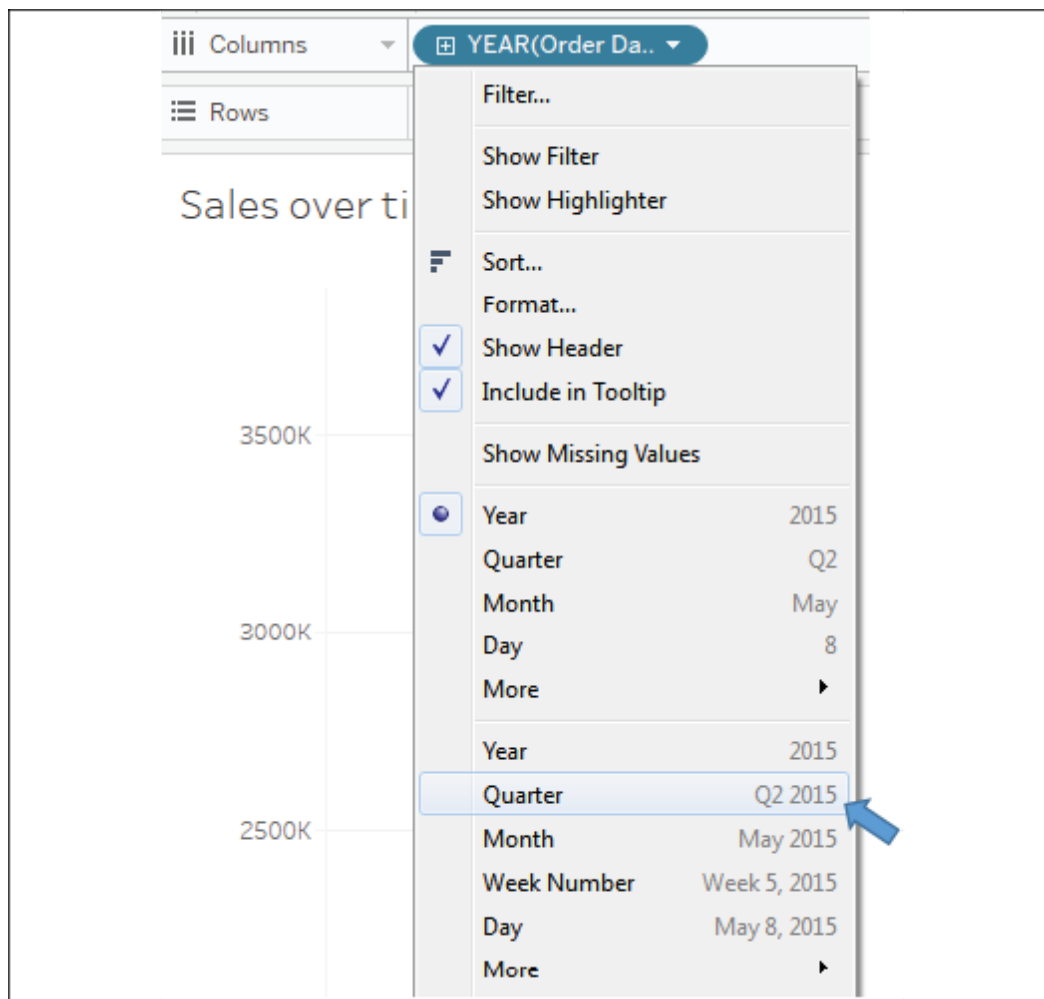
Figure 1.16: Select the second Quarter option in the drop-down menu.

Notice that the cyclical pattern is quite evident when looking at sales by quarter:
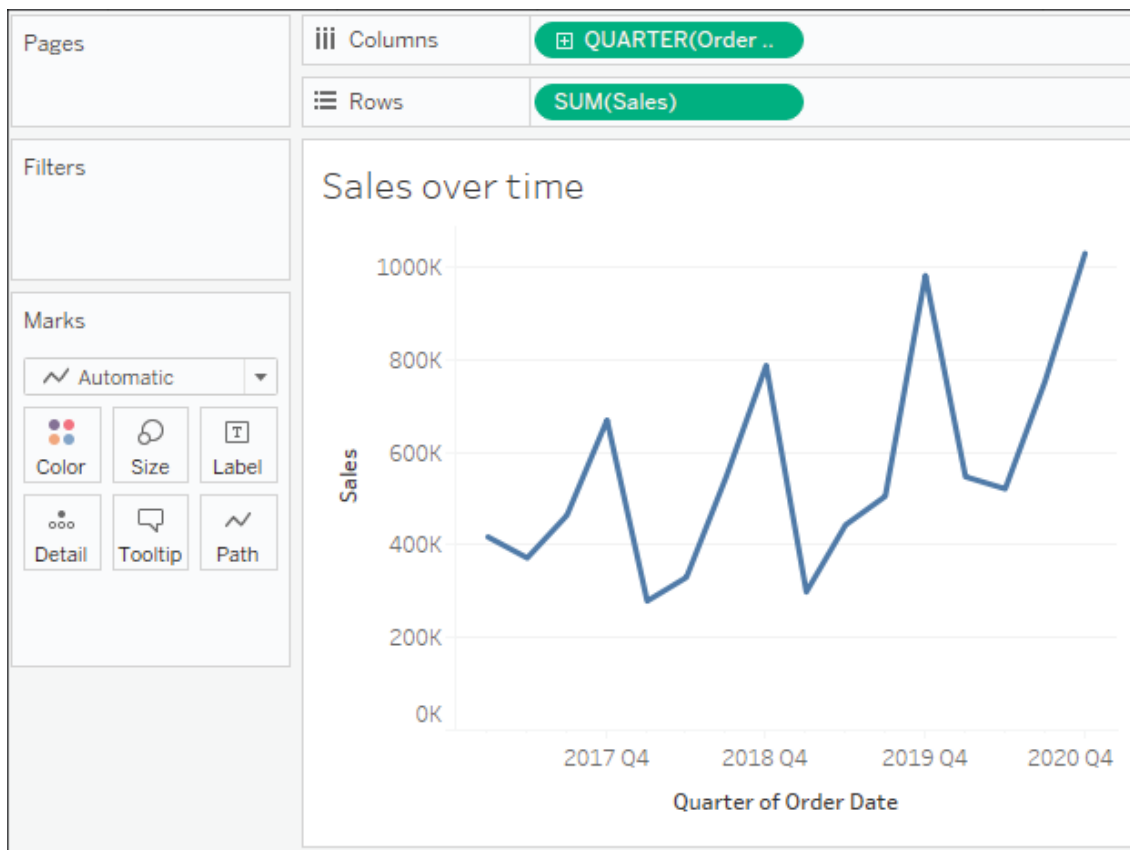
Figure 1.17: Your final view shows sales over each quarter for the last several years.

Let's consider some variations of line charts that allow you to ask and answer even deeper questions.

Iterations of line charts for deeper analysis

Right now, you are looking at the overall sales over time. Let's do some analysis at a slightly deeper level:

1. Navigate to the **Sales over time (overlapping lines)** sheet, where you will find a view that is identical to the one you just created.

2. Drag the `Region` field from **Dimensions** to **Color**. Now you have a line per region, with each line a different color, and a legend indicating which color is used for which region. As with the bars, adding a dimension to **color** splits the marks. However, unlike the bars, where the segments were stacked, the lines are not stacked. Instead, the lines are drawn at the exact value for the sum of sales for each region and quarter. This allows easy and accurate comparison. It is interesting to note that the cyclical pattern can be observed for each region:
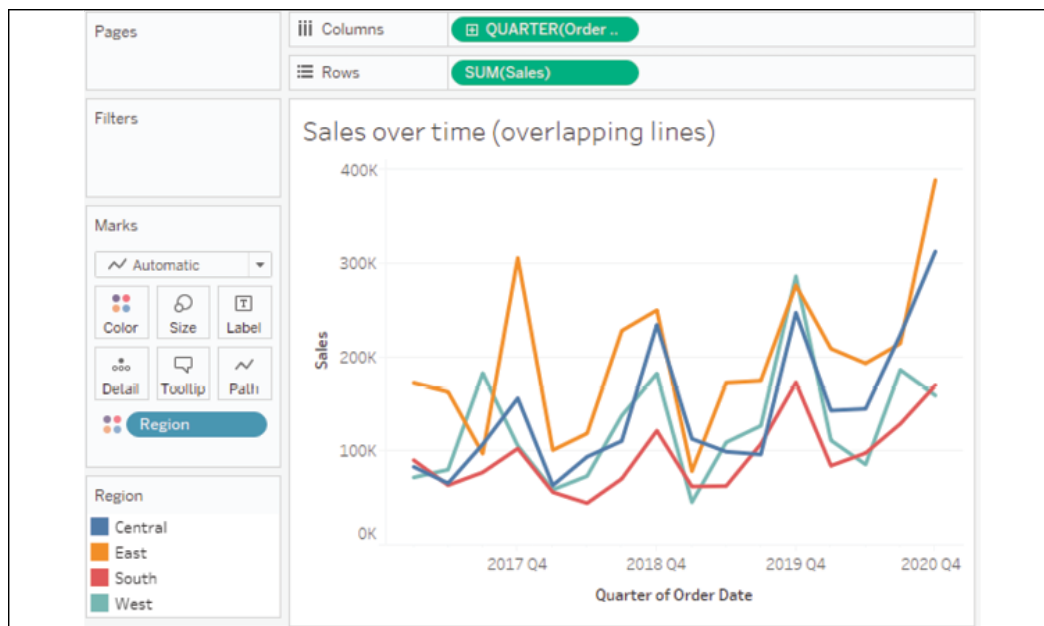
Figure 1.18: This line chart shows sum of sales by quarter with different colored lines for each region

With only four regions, it's relatively easy to keep the lines separate. But what about dimensions that have even more distinct values? Let's consider that case in the following example:

1. Navigate to the **Sales over time (multiple rows)** sheet, where you will find a view that is identical to the one you just created.

2. Drag the `Category` field from **Dimensions** and drop it directly on top of the `Region` field currently on the **Marks** card. This replaces the `Region` field with `Category` . You now have 17 overlapping lines. Often, you'll want to avoid more than two or three overlapping lines. But you might also consider using color or size to showcase an important line in the context of the others. Also, note that clicking on an item in the **Color** legend will highlight the associated line in the view. Highlighting is an effective way to pick out a single item and compare it to all the others.

3. Drag the `Category` field from **Color** on the **Marks** card and drop it into **Rows**. You now have a line chart for each category. Now you have a way of comparing each product over time without an overwhelming overlap, and you can still compare trends and patterns over time. This is the start of a spark-lines visualization that will be developed more fully in *Chapter 10*, *Advanced Visualizations*:
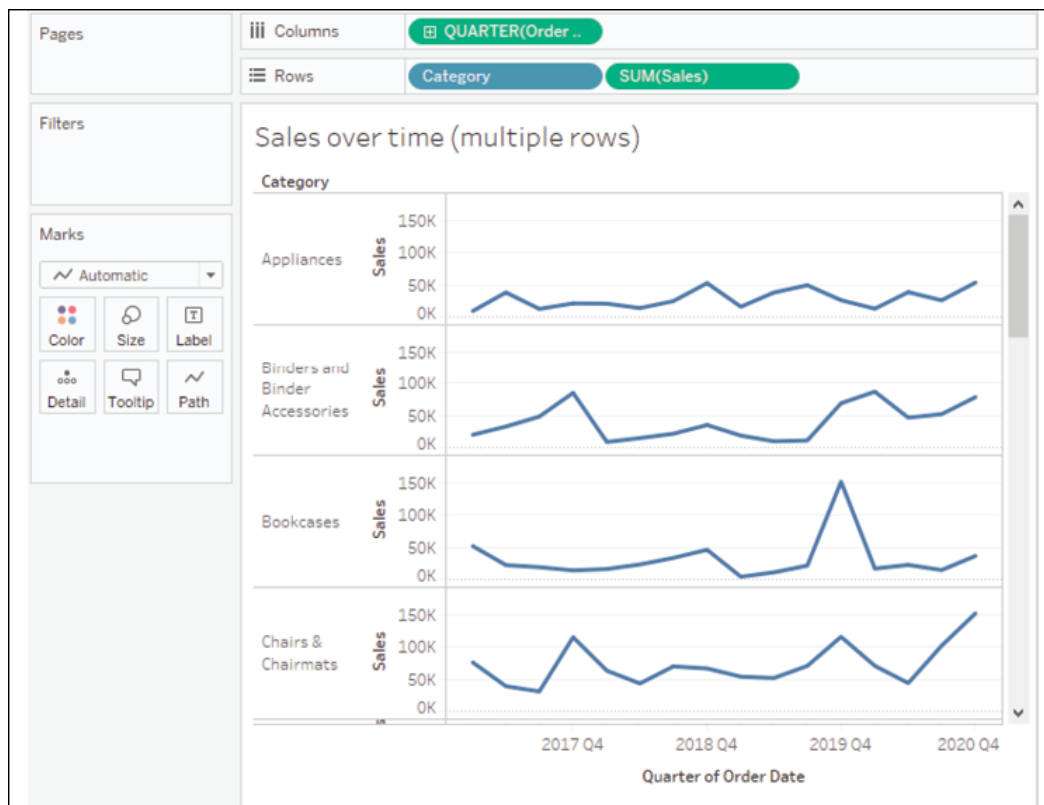
Figure 1.19: Your final view should be a series of line charts for each Category

The variations in lines for each `Category` allow you to notice variations in the trends, extremes, and the rate of change.

Geographic visualizations

In Tableau, the built-in geographic database recognizes geographic roles for fields such as `Country`, `State`, `City`, `Airport`, `Congressional District`, or `Zip Code`. Even if your data does not contain latitude and longitude values, you can simply use geographic fields to plot locations on a map. If your data does contain latitude and longitude fields, you may use those instead of the generated values.

Tip:

Tableau will automatically assign geographic roles to some fields based on a field name and a sampling of values in the data. You can assign or reassign geographic roles to any field by right-clicking on the field in the **Data** pane and using the **Geographic Role** option. This is also a good way to see what built-in geographic roles are available.

Geographic visualization is incredibly valuable when you need to understand where things happen and whether there are any spatial relationships within the data. Tableau offers several types of geographic visualization:

- Filled maps
- Symbol maps
- Density maps

Additionally, Tableau can read spatial files and geometries from some databases and render spatial objects, polygons, and more. We'll take a look at these and other geospatial capabilities in *Chapter 12, Exploring Mapping and Advanced Geospatial Features.* For now, we'll consider some foundational principles for geographic visualization.

Filled maps

Filled maps fill areas such as countries, states, or ZIP codes to show a location. The color that fills the area can be used to communicate measures such as average sales or population as well as dimensions such as region. These maps are also called **choropleth maps**.

Let's say you want to understand sales for Superstore and see whether there are any patterns geographically.

Note:

Note: If your regional settings are not US, you may need to use the **Edit Locations** option to set the country to the **United States**.

You might take an approach like the following:

1. Navigate to the **Sales by State** sheet.

2. Double-click on the `State` field in the **Data** pane. Tableau automatically creates a geographic visualization using the `Latitude (generated)`, `Longitude (generated)`, and `State` fields.

3. Drag the `Sales` field from the **Data** pane and drop it on the **Color** shelf on the **Marks** card. Based on the fields and shelves you've used, Tableau has switched the automatic mark type to **Map**:
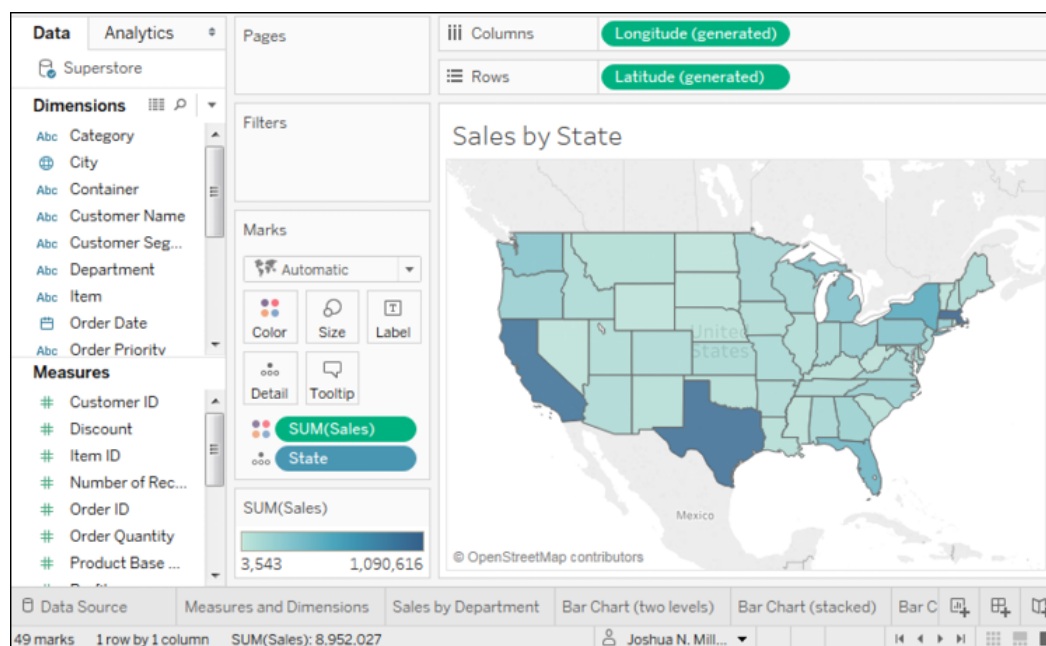

Figure 1.20: A filled map showing the sum of sales per state

The filled map fills each state with a single color to indicate the relative sum of sales for that state. The color legend, now visible in the view, gives the range of values and indicates that the state with the least sales had a total of **3,543** and the state with the most sales had a total of **1,090,616**.

When you look at the number of marks displayed in the bottom status bar, you'll see that it is **49**. Careful examination reveals that the marks consist of the lower 48 states and Washington DC; Hawaii and Alaska are not shown. Tableau will only draw a geographic mark, such as a filled state, if it exists in the data and is not excluded by a filter.

Observe that the map does display Canada, Mexico, and other locations not included in the data. These are part of a background image retrieved from an online map service. The state marks are then drawn on top of the background image. We'll look at how you can customize the map and even use other map services in the *Mapping Techniques* section of *Chapter 12*, *Exploring Mapping and Advanced Geospatial Features*.

Filled maps can work well in interactive dashboards and have quite a bit of aesthetic value. However, certain kinds of analyses are very difficult with filled maps. Unlike other visualization types, where size can be used to communicate facets of the data, the size of a filled geographic region only relates to the geographic size and can make comparisons difficult. For example, which state has the highest sales? You might be tempted to say Texas or California because the larger size influences your perception, but would you have guessed Massachusetts? Some locations may be small enough that they won't even show up compared to larger areas. Use filled maps with caution and consider pairing them with other visualizations on dashboards for clear communication.

Symbol maps

With symbol maps, marks on the map are not drawn as filled regions; rather, marks are shapes or symbols placed at specific geographic locations. The size, color, and shape may also be used to encode additional dimensions and measures.

Continue your analysis of Superstore sales by following these steps:

1. Navigate to the **Sales by Postal Code** sheet.
2. Double-click on `Postal Code` under **Dimensions**. Tableau automatically adds `Postal Code` to the **Detail** of the **Marks** card and `Longitude (generated)` and `Latitude (generated)` to **Columns** and **Rows**. The mark type is set to a circle by default, and a single circle is drawn for each postal code at the correct latitude and longitude.
3. Drag `Sales` from **Measures** to the **Size** shelf on the **Marks** card. This causes each circle to be sized according to the sum of sales for that postal code.
4. Drag `Profit` from **Measures** to the **Color** shelf on the **Marks** card. This encodes the mark color to correspond to the sum of profit. You can now see the geographic location of profit and sales at the same time. This is useful because you will see some locations with high sales and low profit, which may require some action.

The final view should look like this, after making some fine-tuned adjustments to the size and color:
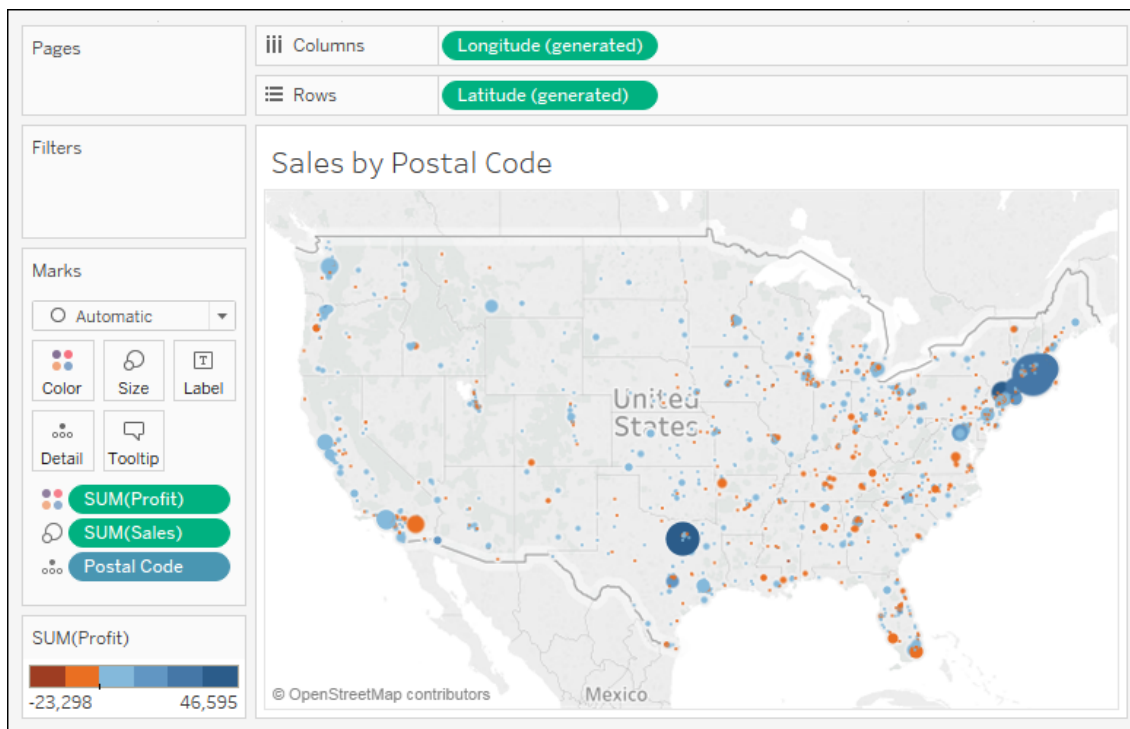
Figure 1.21: A symbol map showing the sum of profit (encoded with color) and the sum of sales (encoded with size) per Postal Code

Sometimes, you'll want to adjust the marks on a symbol map to make them more visible. Some options include the following:

- If the marks are overlapping, click on the **Color** shelf and set the transparency to somewhere between **50%** and **75%**. Additionally, add a dark border. This makes the marks stand out, and you can often better discern any overlapping marks.
- If marks are too small, click on the **Size** shelf and adjust the slider. You may also double-click on the **size** legend and edit the details of how Tableau assigns size.
- If the marks are too faint, double-click on the **Color** legend and edit the details of how Tableau assigns color. This is especially useful when you are using a continuous field that defines a color gradient.

A combination of tweaking the size and using **Stepped Color** and **Use Full Color Range**, as shown here, produced the result for this example:
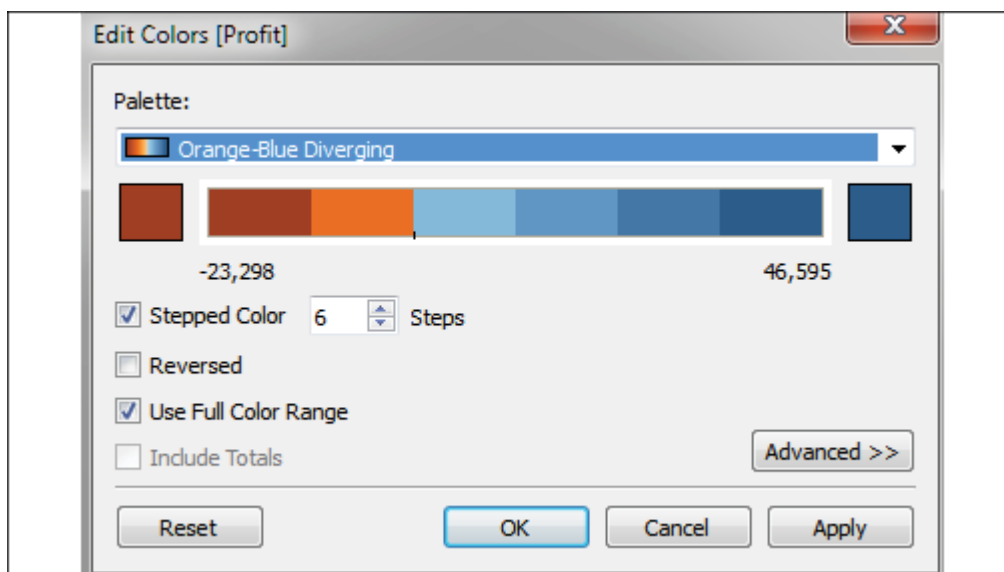
Figure 1.22: The Edit Colors dialog includes options for changing the number of steps, reversing, using the full color range, including totals, and advanced options for adjusting the range and center point

Unlike filled maps, symbol maps allow you to use size to visually encode aspects of the data. Symbol maps also allow greater precision. In fact, if you have latitude and longitude in your data, you can very precisely plot marks at a street address-level of detail. This type of visualization also allows you to map locations that do not have clearly defined boundaries.

Sometimes, when you manually select **Map** in the **Marks** card drop-down menu, you will get an error message indicating that filled maps are not supported at the level of detail in the view. In those cases, Tableau is rendering a geographic location that does not have built-in shapes.

Other than cases where filled maps are not possible, you will need to decide which type best meets your needs. We'll also consider the possibility of combining filled maps and symbol maps in a single view in later labs.

Density maps

Density maps show the spread and concentration of values within a geographic area. Instead of individual points or symbols, the marks blend together, showing greater intensity in areas with a high concentration. You can control the **Color**, **Size**, and **Intensity**.

Let's say you want to understand the geographic concentration of orders. You might create a density map using the following steps:

1. Navigate to the **Density of Orders** sheet.

2. Double-click on the `Postal Code` field in the **Data** pane. Just as before, Tableau automatically creates a symbol map geographic visualization using the `Latitude (generated)`, `Longitude (generated)`, and `State` fields.

3. Using the drop-down menu on the **Marks** card, change the mark type to **Density**. The individual circles now blend together showing concentrations:
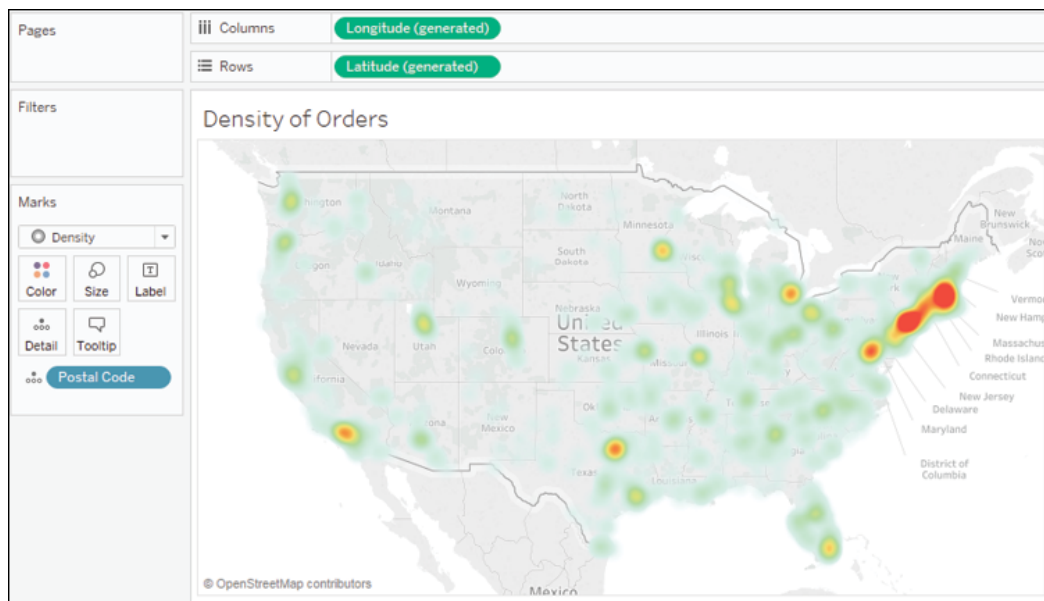
Figure 1.23: A density map showing concentration by Postal Code

Try experimenting with the **Color** and **Size** options. Clicking on **Color**, for example, reveals some options specific to the **Density** mark type:
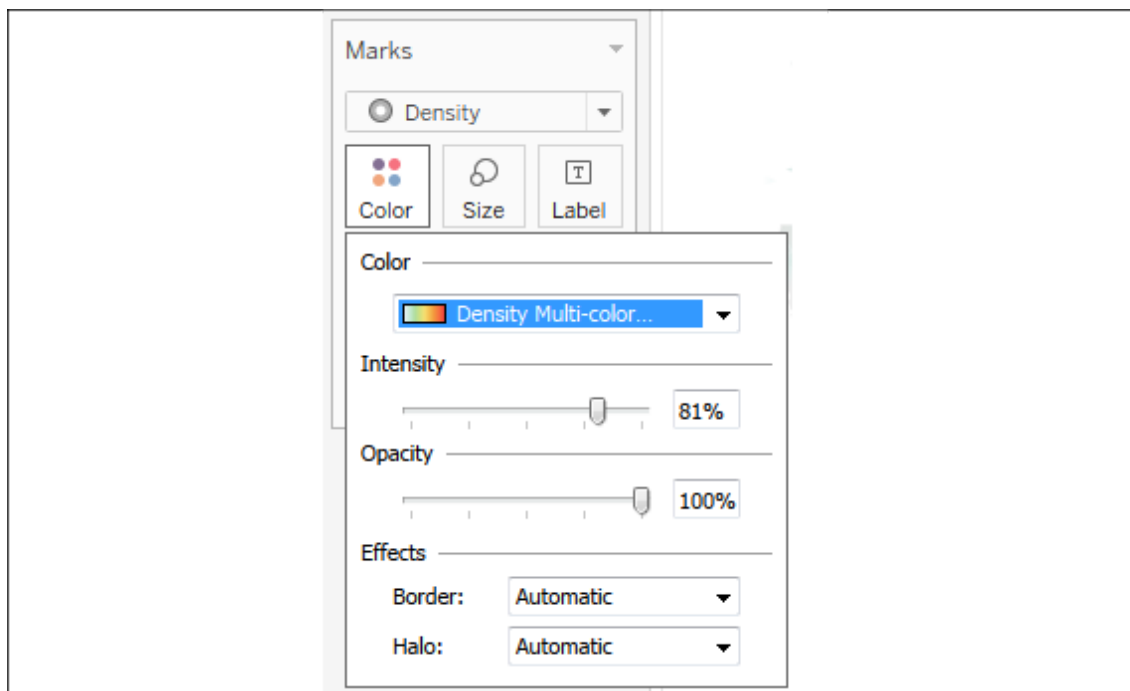

Figure 1.24: Options for adjusting the Color, Intensity, Opacity, and Effects for Density marks

Several color palettes are available that work well for density marks (the default ones work well with light color backgrounds, but there are others designed to work with dark color backgrounds). The **Intensity** slider allows you to determine how intensely the marks should be drawn based on concentrations. The **Opacity** slider lets you decide how transparent the marks should be.

This density map displays a high concentration of orders from the east coast. Sometimes, you'll see patterns that merely reflect population density. In such cases, your analysis may not be particularly meaningful. In this case, the concentration on the east coast compared to the lack of density on the west coast is intriguing.

Using Show Me

Show Me is a powerful component of Tableau that arranges selected and active fields into the places required for the selected visualization type. The **Show Me** toolbar displays small thumbnail images of different types of visualizations, allowing you to create visualizations with a single click. Based on the fields you select in the **Data** pane and the fields that are already in view, **Show Me** will enable possible visualizations and highlight a recommended visualization.

Explore the features of **Show Me** by following these steps:

1. Navigate to the **Show Me** sheet.

2. If the **Show Me** pane is not expanded, click on the **Show Me** button in the upper right of the toolbar to expand the pane.

3. Press and hold the *Ctrl* key while clicking on the `Postal Code`, `State`, and `Profit` fields in the **Data** pane to select each of those fields. With those fields highlighted, **Show Me** should look like this:
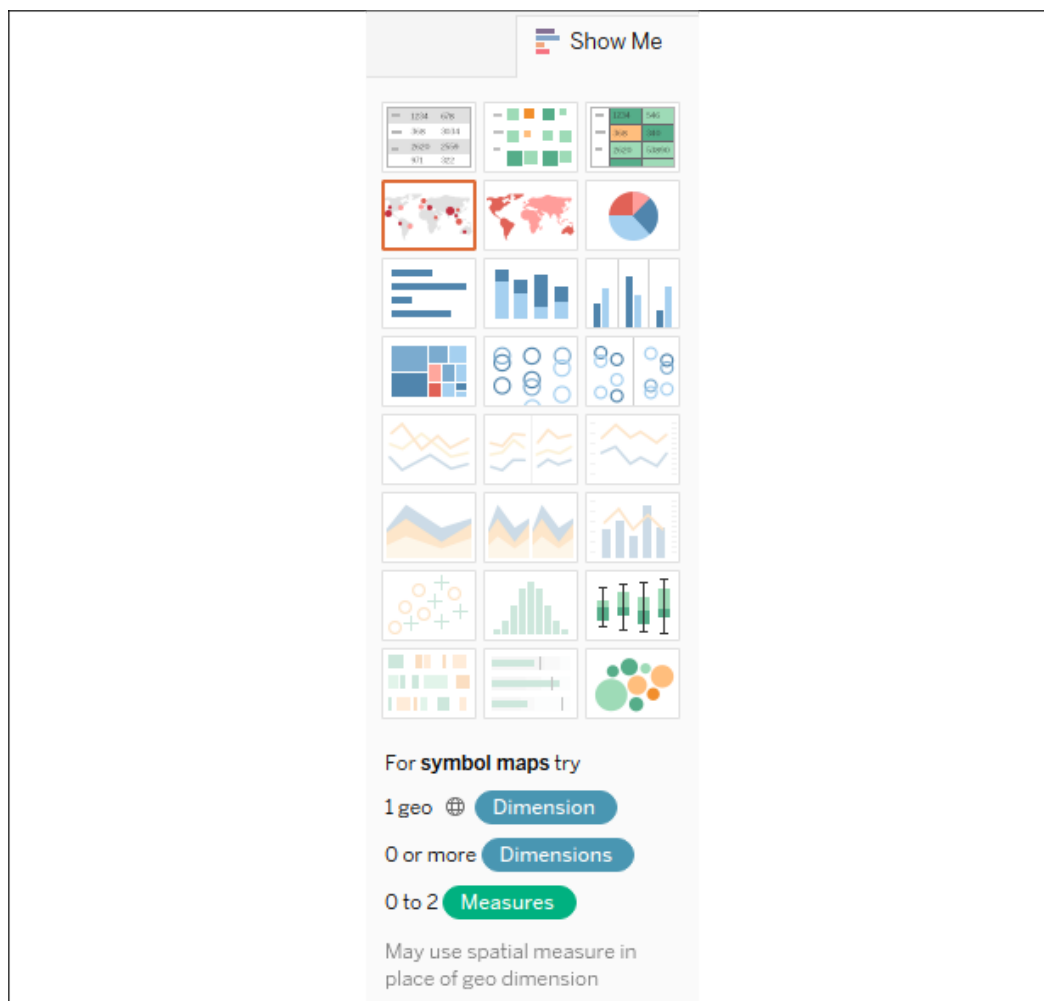
Figure 1.25: The Show Me interface

Notice that the **Show Me** window has enabled certain visualization types such as **text tables**, **heat maps**, **symbol maps**, **filled maps**, and **bar charts**. These are the visualizations that are possible given the fields already in the view, in addition to any selected in the **Data** pane. Show Me highlights the recommended visualization for the selected fields and gives a description of what fields are required as you hover over each visualization type. Symbol maps, for example, require one geographic dimension and 0 to 2 measures.

Other visualizations are grayed out, such as **lines**, **area charts**, and **histograms**. Show Me will not create these visualization types with the fields that are currently in the view and are selected in the **Data** pane. Hover over the grayed out line charts option in Show Me. It indicates that line charts require one or more measures (which you have selected) but also require a date field (which you have not selected).

Tip:

Tableau will draw line charts with fields other than dates. Show Me gives you options for what is typically considered good practice for visualizations. However, there may be times when you know that a line chart would represent your data better. Understanding how Tableau renders visualizations based on fields and shelves instead of always relying on Show Me will give you much greater flexibility in your visualizations and will allow you to rearrange things when Show Me doesn't give you the exact results you want. At the same time, you will need to cultivate an awareness of good visualization practices.

Show Me can be a powerful way in which to quickly iterate through different visualization types as you search for insights into the data. But as a data explorer, analyst, and storyteller, you should consider Show Me as a helpful guide that gives suggestions. You may know that a certain visualization type will answer your questions more effectively than the suggestions of Show Me. You also may have a plan for a visualization type that will work well as part of a dashboard but isn't even included in Show Me.

You will be well on your way to learning and mastering Tableau when you can use Show Me effectively but feel just as comfortable building visualizations without it. Show Me is powerful for quickly iterating through visualizations as you look for insights and raise new questions. It is useful for starting with a standard visualization that you will further customize. It is wonderful as a teaching and learning tool.

However, be careful to not use it as a crutch without understanding how visualizations are actually built from the data. Take the time to evaluate why certain visualizations are or are not possible. Pause to see what fields and shelves were used when you selected a certain visualization type.

End the example by experimenting with Show Me by clicking on various visualization types, looking for insights into the data that may be more or less obvious based on the visualization type. **Circle views** and **box-and-whisker plots** show the distribution of postal codes for each state. Bar charts easily expose several postal codes with negative profit.

Now that you have become familiar with creating individual views of the data, let's turn our attention to putting it all together in a dashboard.

Putting everything together in a dashboard

Often, you'll need more than a single visualization to communicate the full story of the data. In these cases, Tableau makes it very easy for you to use multiple visualizations together on a dashboard. In Tableau, a **dashboard** is a collection of views, filters, parameters, images, and other objects that work together to communicate a data story. Dashboards are often interactive and allow end users to explore different facets of the data.

Dashboards serve a wide variety of purposes and can be tailored to suit a wide variety of audiences. Consider the following possible dashboards:

- A summary-level view of profit and sales to allow executives to take a quick glimpse at the current status of the company
- An interactive dashboard, allowing sales managers to drill into sales territories to identify threats or opportunities
- A dashboard allowing doctors to track patient readmissions, diagnoses, and procedures to make better decisions about patient care
- A dashboard allowing executives of a real-estate company to identify trends and make decisions for various apartment complexes
- An interactive dashboard for loan officers to make lending decisions based on portfolios broken down by credit ratings and geographic location

Considerations for different audiences and advanced techniques will be covered in detail in *Chapter 8, Telling a Data Story with Dashboards*.

The dashboard interface

When you create a new dashboard, the interface will be slightly different than it is when designing a single view. We'll start designing your first dashboard after a brief look at the interface. You might navigate to the **Superstore Sales** sheet and take a quick look at it yourself.

The dashboard window consists of several key components. Techniques for using these objects will be detailed in *Chapter 8, Telling a Data Story with Dashboards.* For now, focus on gaining some familiarity with the options that are available. One thing you'll notice is that the left sidebar has been replaced with dashboard-specific content:
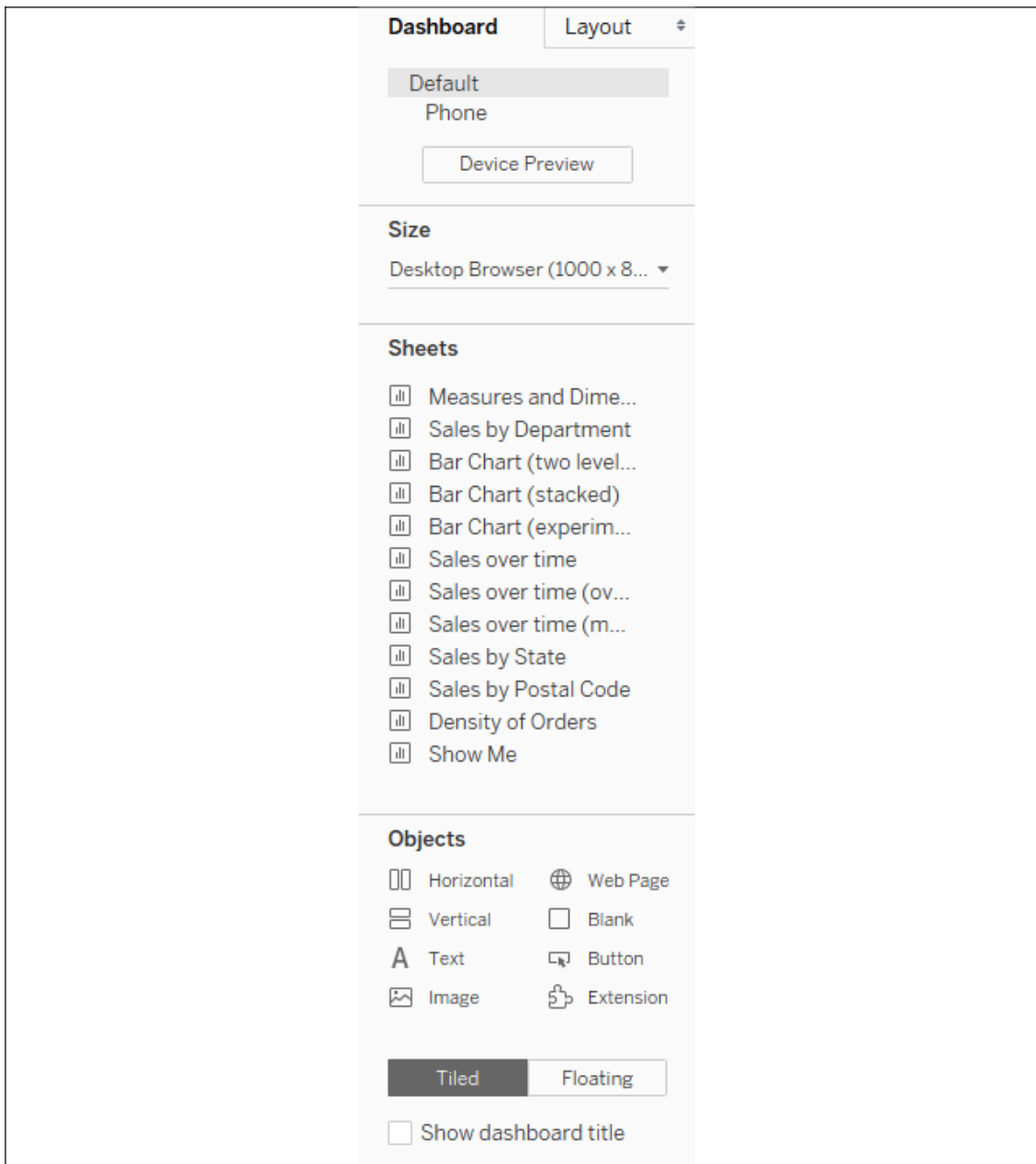
Figure 1.26: The sidebar for dashboards

The left sidebar contains two tabs:

- A **Dashboard** tab, for sizing options and adding sheets and objects to the dashboard.
- A **Layout** tab, for adjusting the layout of various objects on the dashboard.

The **Dashboard** pane contains options for previewing based on the target device along with several sections:

- A **Size** section, for dashboard sizing options.
- A **Sheets** section, containing all sheets (views) available to place on the dashboard.
- An **Objects** section with additional objects that can be added to the dashboard.

You can add sheets and objects to a dashboard by dragging and dropping. As you drag the view, a light-gray shading will indicate the location of the sheet in the dashboard once it is dropped. You can also double-click on any

sheet and it will be added automatically.

In addition to adding sheets, the following objects may be added to the dashboard:

- **Horizontal** and **Vertical** layout containers will give you finer control over the layout.
- **Text** allows you to add text labels and titles.
- An **Image** and even embedded **Web Page** content can be added.
- A **Blank** object allows you to preserve blank space in a dashboard, or it can serve as a placeholder until additional content is designed.
- A **Navigation** object allows the user to navigate between dashboards.
- An **Export** button allows end users to export the dashboard as a PowerPoint, PDF, or image.
- An **Extension** gives you the ability to add controls and objects that you or a third party have developed for interacting with the dashboard and providing extended functionality.

Using the toggle, you can select whether new objects will be added as **Tiled** or **Floating**. **Tiled** objects will snap into a tiled layout next to other tiled objects or within layout containers. **Floating** objects will float on top of the dashboard in successive layers.

When a worksheet is first added to a dashboard, any legends, filters, or parameters that were visible in the worksheet view will be added to the dashboard. If you wish to add them at a later point, select the sheet in the dashboard and click on the little drop-down caret on the upper-right side. Nearly every object has the drop-down caret, providing many options for fine-tuning the appearance of the object and controlling behavior.

Take note of the various controls that become visible for selected objects on the dashboard:
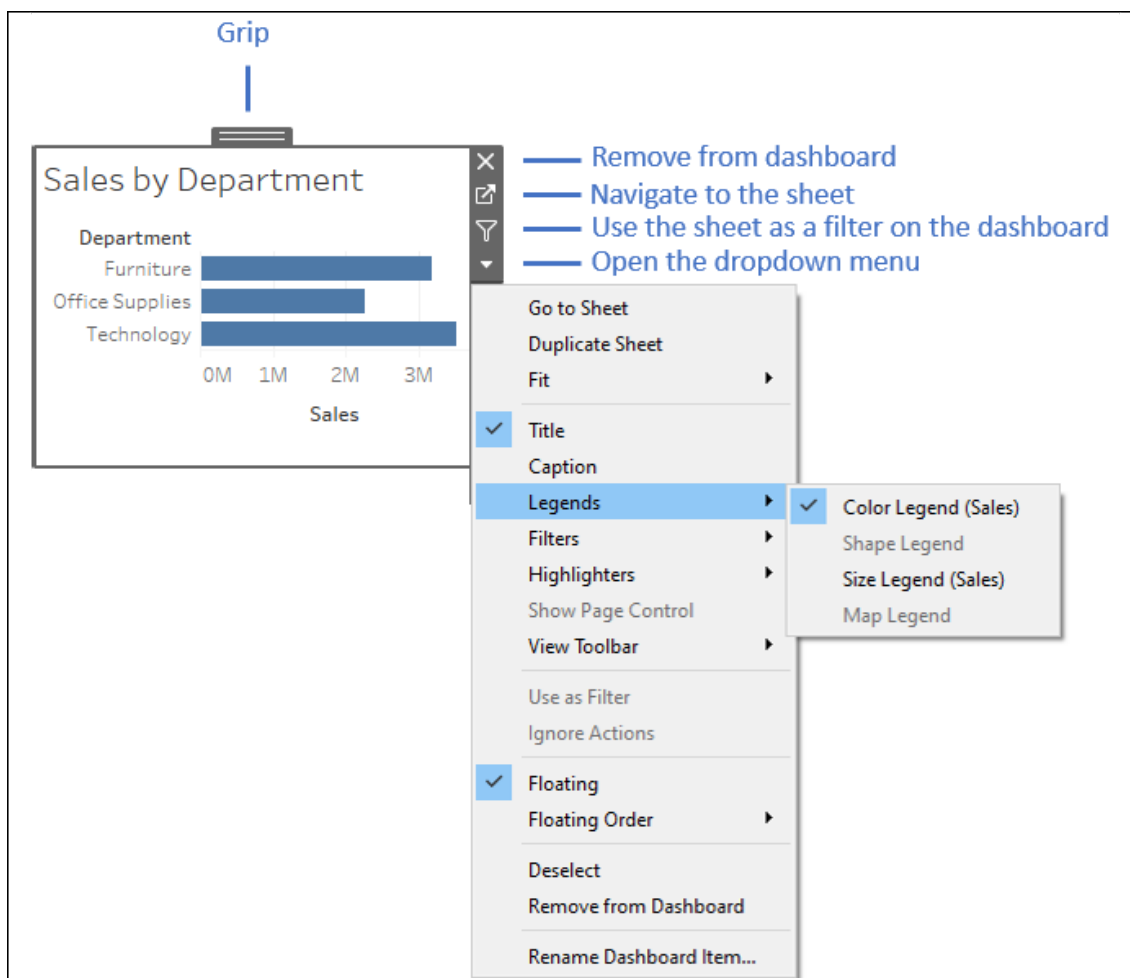
Figure 1.27: Various controls and UI elements become visible when selecting an object on a dashboard

You can resize an object on the dashboard using the border. The **Grip**, labelled in *Figure 1.27*, allows you to move the object once it has been placed. We'll consider other options as we go.

Building your dashboard

With an overview of the interface, you are now ready to build a dashboard by following these steps:

1. Navigate to the **Superstore Sales** sheet. You should see a blank dashboard.

2. Successively double-click on each of the following sheets listed in the **Dashboard** section on the left: **Sales by Department**, **Sales over time**, and **Sales by Postal Code**. Notice that double-clicking on the object adds it to the layout of the dashboard.

3. Add a title to the dashboard by checking **Show Dashboard title** at the lower left of the sidebar.

4. Select the **Sales by Department** sheet in the dashboard and click on the drop-down arrow to show the menu.

5. Select **Fit | Entire View**. The **Fit** options describe how the visualization should fill any available space. **Tip:**

   Be careful when using various fit options. If you are using a dashboard with a size that has not been fixed, or if your view dynamically changes the number of items displayed based on interactivity, then what might

have once looked good might not fit the view nearly as well.

6. Select the **Sales** size legend by clicking on it. Use the **X** option to remove the legend from the dashboard:
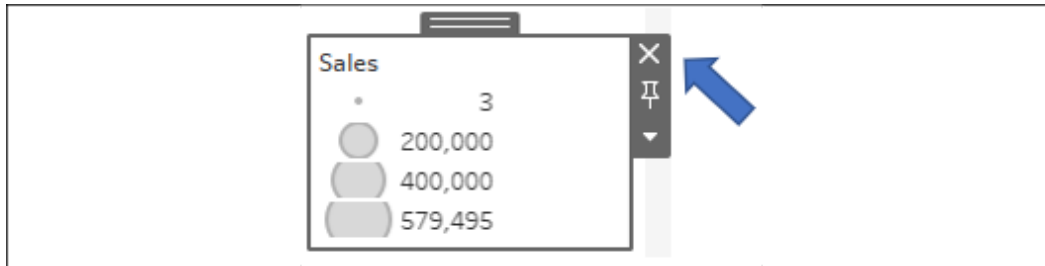

Figure 1.28: Select the legend by clicking on it, then click the X to remove it from the dashboard

7. Select the **Profit** color legend by clicking on it. Use the **Grip** to drag it and drop it under the map.

8. For each view (**Sales by Department**, **Sales by Postal Code**, and **Sales over time**), select the view by clicking on an empty area in the view. Then, click on the **Use as Filter** option to make that view an interactive filter for the dashboard:
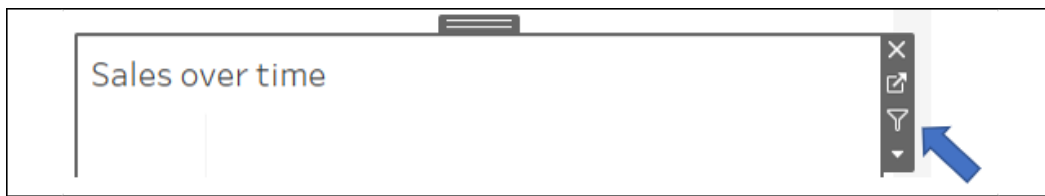

Figure 1.29: Click on the Use as Filter button to use a view as a filter in a dashboard

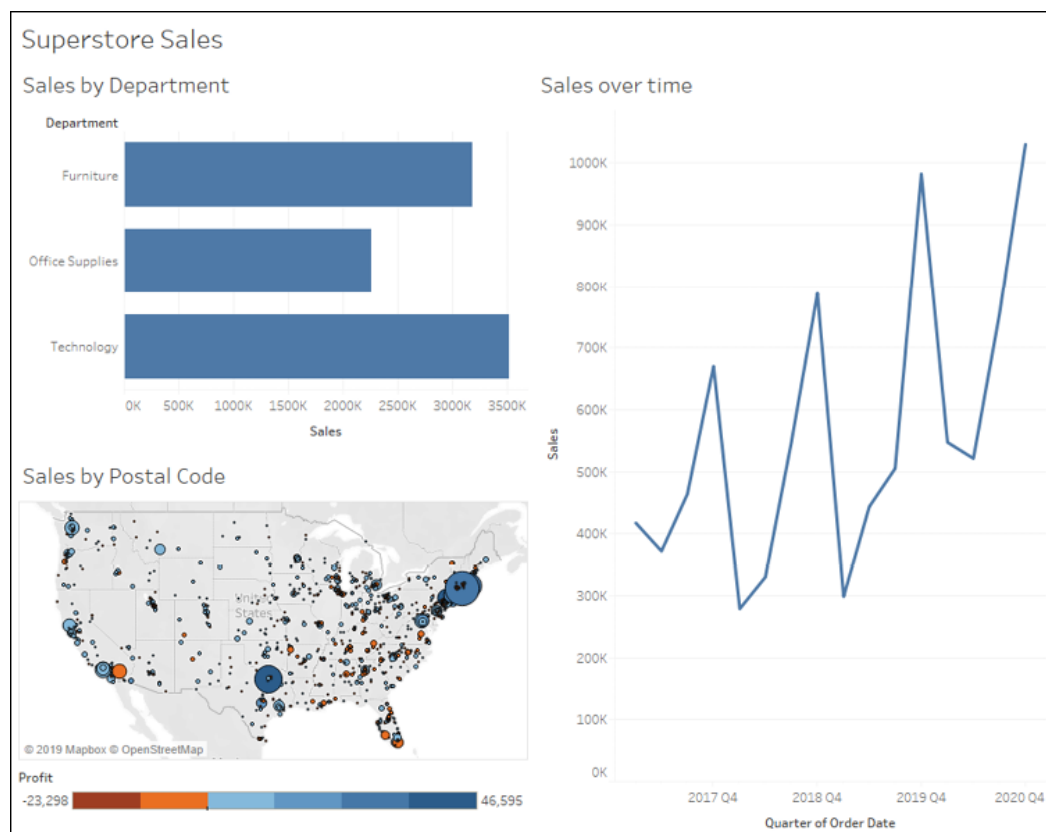Your dashboard should look like this:

Figure 1.30: The final dashboard consisting of three views

1. Take a moment to interact with your dashboard. Click on various marks, such as the bars, states, and points of the line. Notice that each selection filters the rest of the dashboard. Clicking on a selected mark will deselect it and clear the filter. Also, notice that selecting marks in multiple views causes filters to work together. For example, selecting the bar for **Furniture** in **Sales by Department** and the **2019 Q4** in **Sales over time** allows you to see all the ZIP codes that had furniture sales in the fourth quarter of 2019.

Congratulations! You have now created a dashboard that allows you to carry out interactive analysis!

As an analyst for the Superstore chain, your visualizations allowed you to explore and analyze the data. The dashboard you created can be shared with members of management, and it can be used as a tool to help them see and understand the data to make better decisions. When a manager selects the furniture department, it immediately becomes obvious that there are locations where sales are quite high, but the profit is actually very low. This may lead to decisions such as a change in marketing or a new sales focus for that location. Most likely, this will require additional analysis to determine the best course of action. In this case, Tableau will empower you to continue the cycle of discovery, analysis, and storytelling.

Summary

Tableau's visual environment allows a rapid and iterative process of exploring and analyzing data visually. You've taken your first steps toward understanding how to use the platform. You connected to data and then explored and analyzed the data using some key visualization types such as bar charts, line charts, and geographic visualizations. Along the way, you focused on learning the techniques and understanding key concepts such as the difference between measures and dimensions, and discrete and continuous fields. Finally, you put all of the pieces together to create a fully functional dashboard that allows an end user to understand your analysis and make discoveries of their own.

In the next lab, we'll explore how Tableau works with data. You will be exposed to fundamental concepts and practical examples of how to connect to various data sources. Combined with the key concepts you just learned about building visualizations, you will be well equipped to move on to more advanced visualizations, deeper analysis, and telling fully interactive data stories.