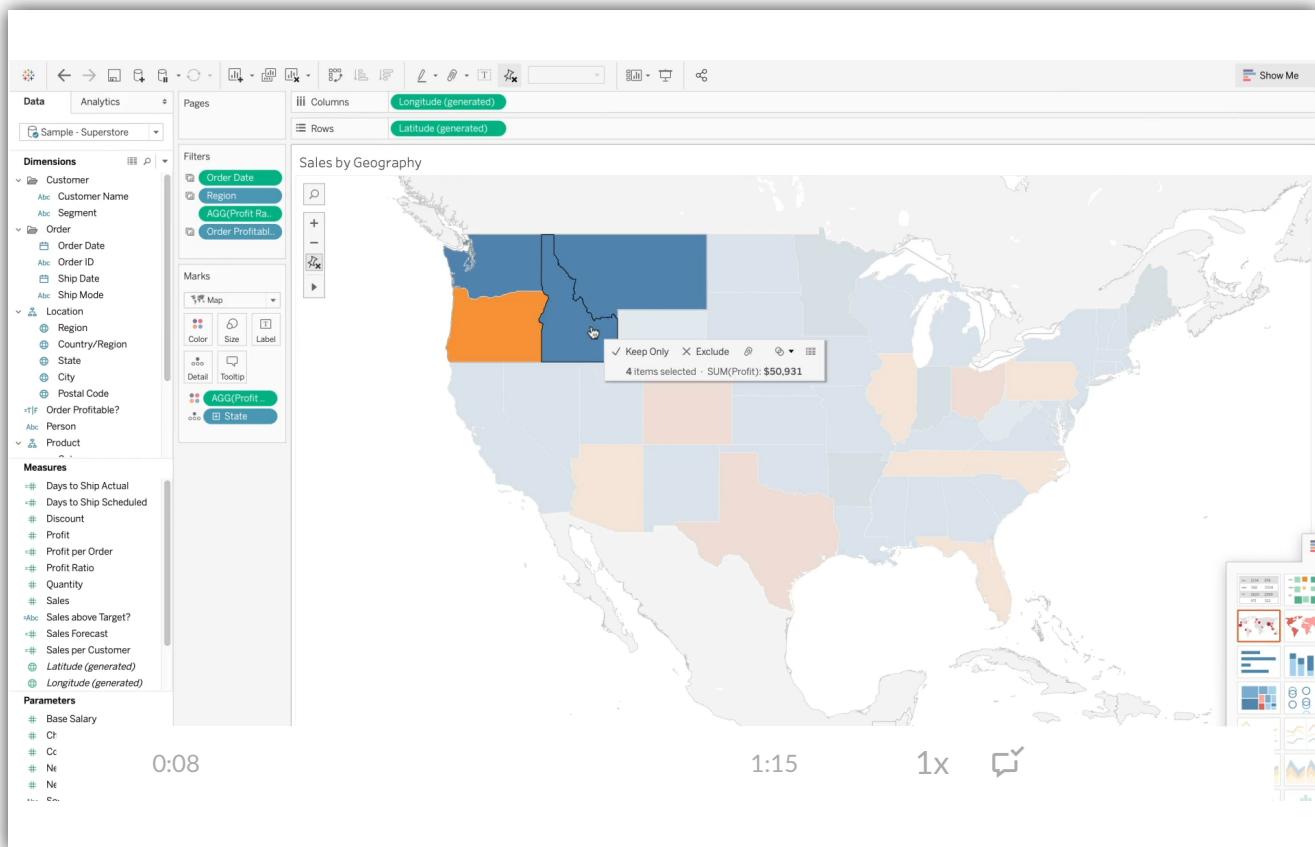


14.0.1: Tableau Basics

In this module, you'll be introduced to Tableau, one of the most popular data visualization tools today. The following video provides an overview of Tableau and how it can be used to transform your data into an engaging story for any audience.



14.0.2: Module 14 Roadmap

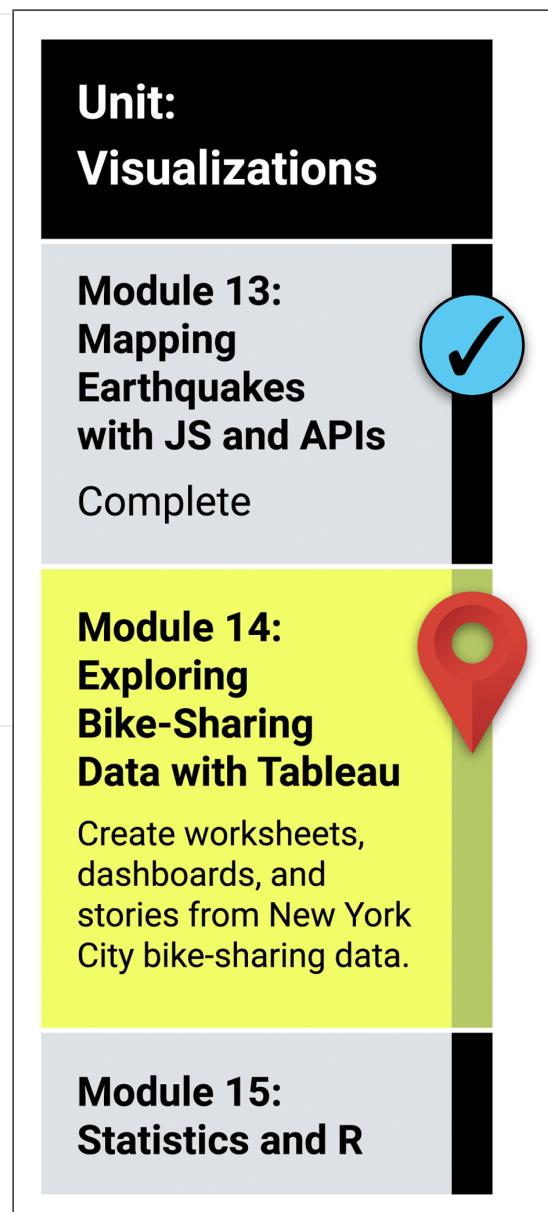
Looking Ahead

In this module, you'll work with data visualization software called Tableau to present a business proposal for a bike-sharing company. First, you'll learn how to import, style, and portray data accurately. Then, you'll create worksheets, dashboards, and stories to visualize key data from a New York Citi Bike dataset.

What You Will Learn

By the end of this module, you will be able to:

- Import data into Tableau.
- Create and style worksheets, dashboards, and stories in Tableau.
- Use Tableau worksheets to display data in a professional way.
- Portray data accurately using Tableau dashboards.



Planning Your Schedule

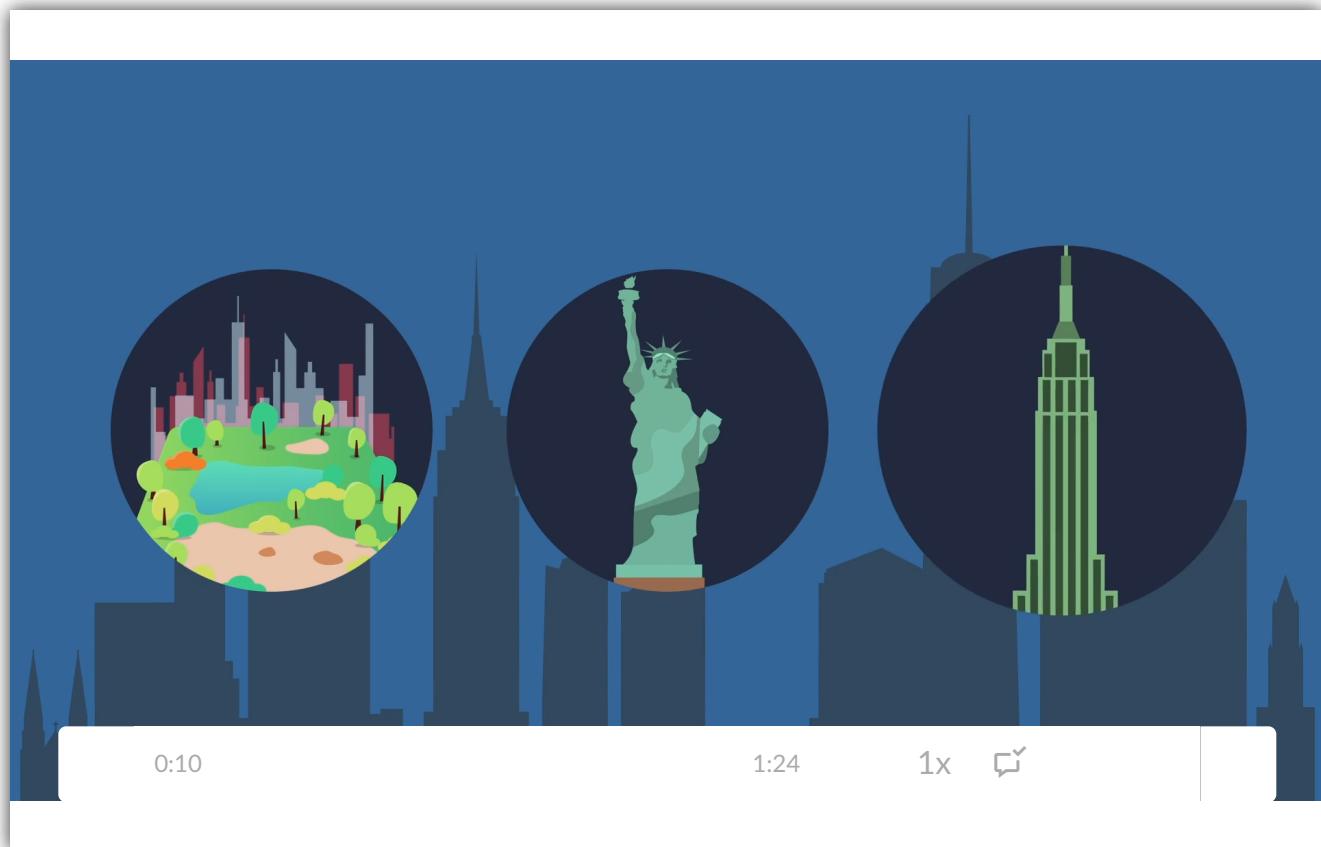
Here's a quick look at the lessons and assignments you'll cover in this module.

You can use the time estimates to help pace your learning and plan your schedule.

- Introduction to Module 14 (15 minutes)
- Tableau Basics (1 hour)
- Tableau Worksheets, Part 1 (1 hour)
- Tableau Worksheets, Part 2 (2 hours)
- Tableau Dashboards (1 hour)
- Final Presentation (1 hour)
- Challenge (5 hours)

14.0.3: Citi Bike Cruisin'

So how exactly will you use Tableau in this module? The following video gives some background on your next project: using Tableau to visualize bike-sharing data.



14.1.1: Install Tableau Desktop

In order to perform your analysis, you need to first download the tool that you'll be using. For your work this week, you'll take a deep dive into Tableau Desktop, so download this tool now.

Download Tableau Desktop

One thing to note about Tableau Desktop is that it does cost money every month. However, you can choose to do a 14-day free trial, which will allow you to complete the work in this module without being charged.

First, go to the [Tableau website](#)

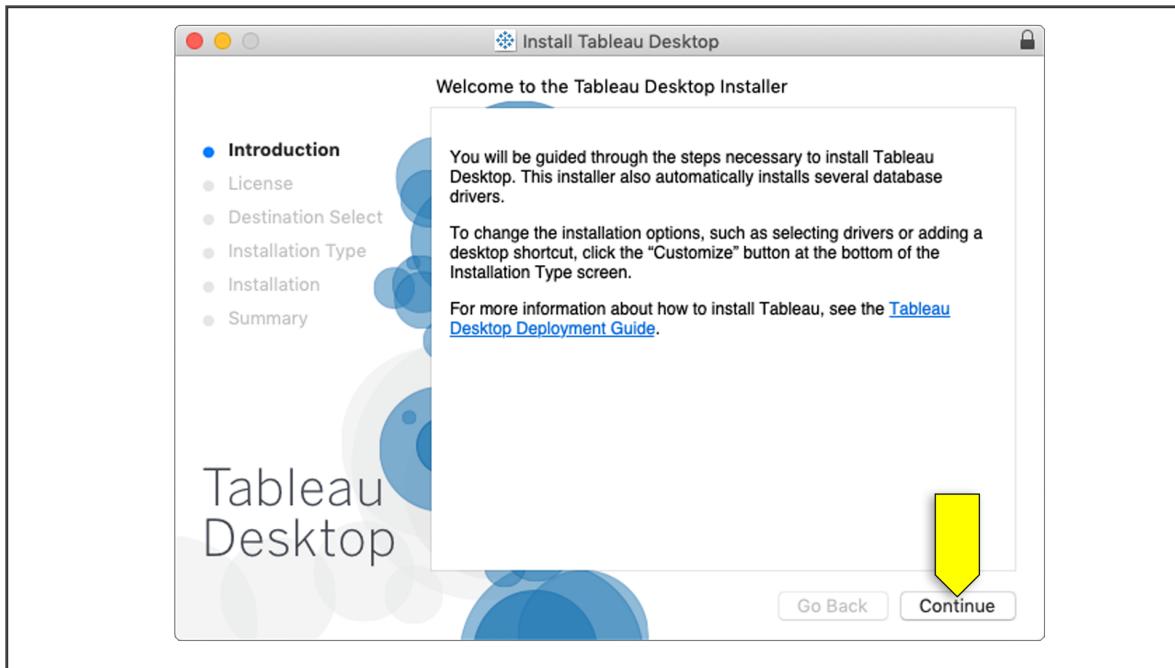
(<https://www.tableau.com/products/desktop/download>) and enter your email. You will also be required to enter some contact information, but you can always unsubscribe from communications. You will also need to click "Download Free Trial" in order to get Tableau Desktop.

Install Tableau Desktop

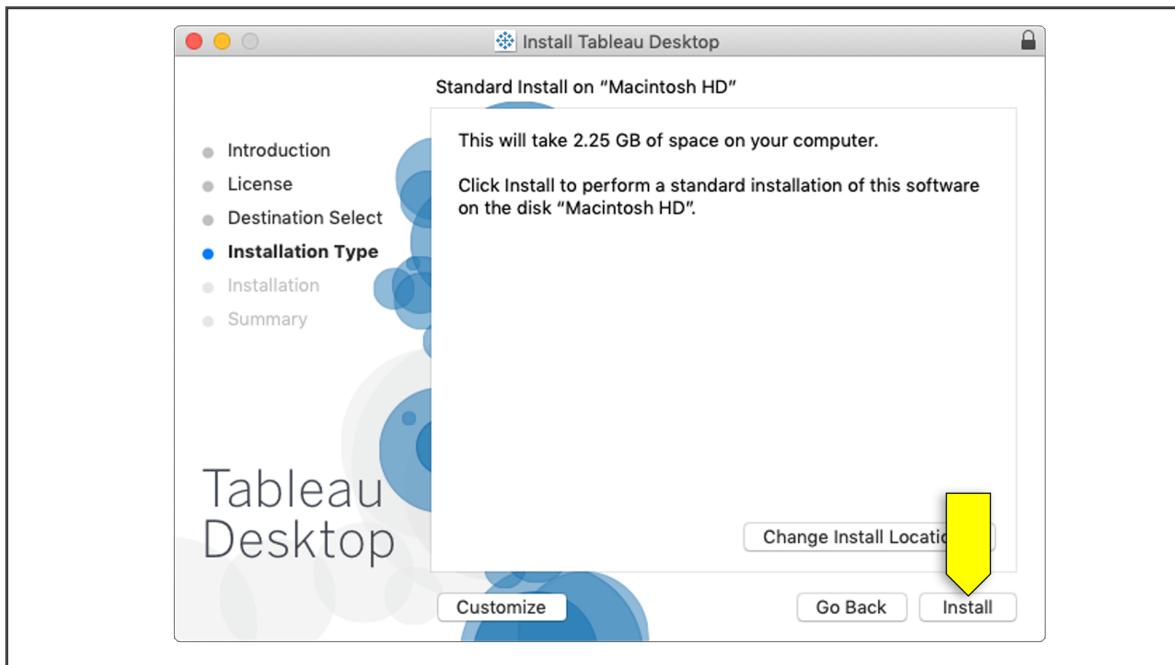
Once you have downloaded Tableau Desktop, we can start the process of installing Tableau Desktop. The process of installing Tableau Desktop is very similar to installing most other programs.

After it's finished downloading, click to open the file and then follow the on-screen instructions. This is the first screen you will see as part of the installation. Go

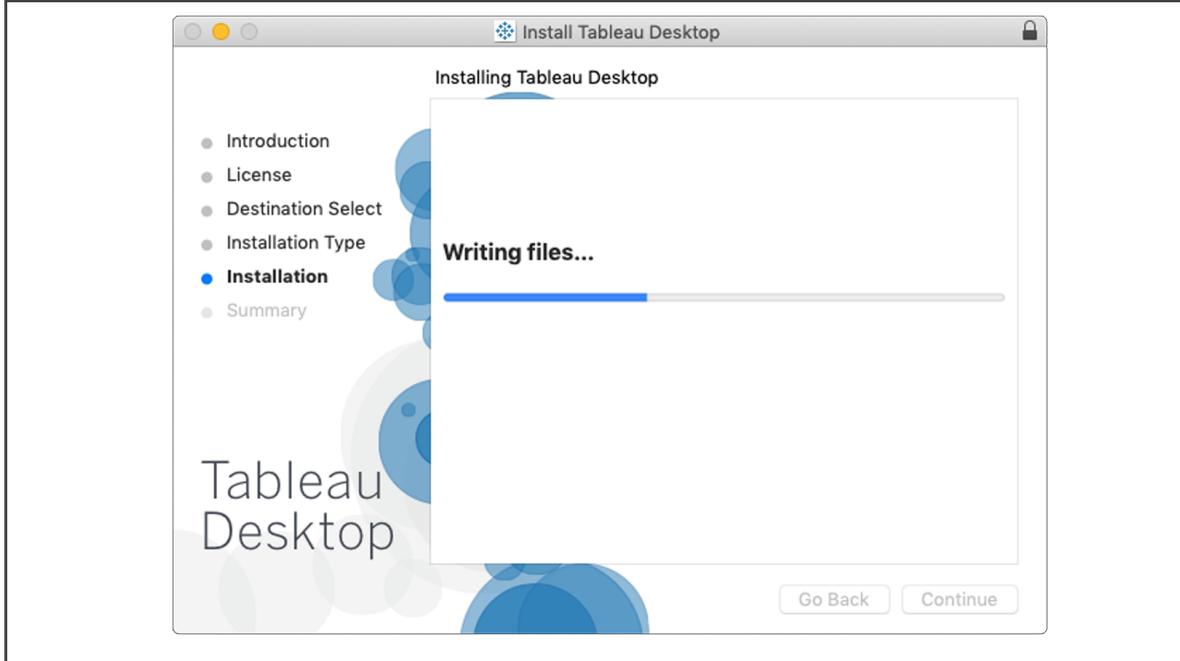
ahead and click "Continue."



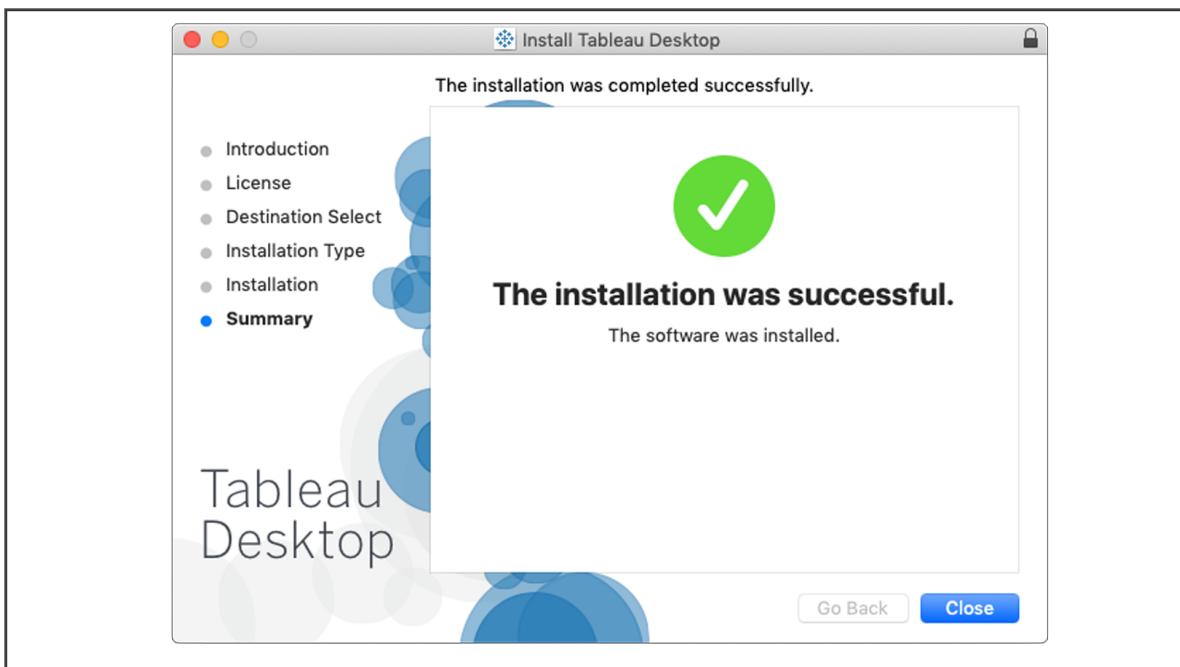
Once you click "Continue," you should see the following screen. Click "Install."



This process may take a few minutes. This is what your window should look like:



When the installation is complete, you will see this window confirming that the software was installed successfully:



Now that Tableau is installed, let's get started with downloading the data we'll need.

14.1.2: Download the Data

Kate suggests that you use Citi Bike data that has been released to the public for your analysis. You agree, but then remind her that you must be cautious when looking at the data, as it applies specifically to New York City—Des Moines is quite different!

You're excited to find out which data will and will not apply to Des Moines, drawing on both your data expertise and critical thinking skills. You'll also need to rely on Kate's salesmanship during the investor conversations. Kate can sell almost anything, but it's up to you to make sure she's selling something viable.

Before we can download our data, we need to create a file structure on our computer. Let's start by navigating to GitHub to create a new repository.

CREATE YOUR REPO

Create a new repository for this module named “bikesharing” and clone the empty repo into your class folder.

Download Data

For this project, we'll use data from the Citi Bike program in New York City. This data includes a variety of fields, which we'll get to shortly. The data you'll

download will be contained in a flat file, a CSV.

Go to the [Citi Bike System Data page](https://www.citibikenyc.com/system-data) (<https://www.citibikenyc.com/system-data>) .

In the “Citi Bike Trip Histories” section, click the link that says “downloadable files of Citi Bike trip data,” as shown in the following image:

Citi Bike Trip Histories

We publish [downloadable files of Citi Bike trip data](#). The data includes:

- Trip Duration (seconds)
- Start Time and Date
- Stop Time and Date
- Start Station Name
- End Station Name
- Station ID
- Station Lat/Long
- Bike ID
- User Type (Customer = 24-hour pass or 3-day pass user; Subscriber = Annual Member)
- Gender (Zero=unknown; 1=male; 2=female)
- Year of Birth

This data has been processed to remove trips that are taken by staff as they service and inspect the system, trips that are taken to/from any of our “test” stations (which we were using more in June and July 2013), and any trips that were below 60 seconds in length (potentially false starts or users trying to re-dock a bike to ensure it's secure).

[→ Download Citi Bike trip history data](#)

This link will take you to an index of trip data. Scroll down the list to [201908-citibike-tripdata.csv.zip](#).

| | | | |
|---|----------------------------|-----------|----------|
| 201811-citibike-tripdata.csv.zip | Dec 4th 2018, 10:27:25 am | 53.73 MB | ZIP file |
| 201812-citibike-tripdata.csv.zip | Jan 8th 2019, 02:51:08 pm | 43.61 MB | ZIP file |
| 201901-citibike-tripdata.csv.zip | Feb 11th 2019, 08:43:30 am | 41.47 MB | ZIP file |
| 201902-citibike-tripdata.csv.zip | Mar 4th 2019, 10:21:38 am | 40.47 MB | ZIP file |
| 201903-citibike-tripdata.csv.zip | Apr 15th 2019, 01:34:41 pm | 57.20 MB | ZIP file |
| 201904-citibike-tripdata.csv.zip | May 6th 2019, 02:07:32 pm | 75.70 MB | ZIP file |
| 201905-citibike-tripdata.csv.zip | Jun 11th 2019, 02:37:54 pm | 82.18 MB | ZIP file |
| 201906-citibike-tripdata.csv.zip | Jul 15th 2019, 12:42:08 pm | 91.08 MB | ZIP file |
| 201907-citibike-tripdata.csv.zip | Aug 5th 2019, 04:34:01 pm | 93.36 MB | ZIP file |
| 201908-citibike-tripdata.csv.zip | Sep 18th 2019, 03:33:14 pm | 100.02 MB | ZIP file |
| 201909-citibike-tripdata.csv.zip | Oct 11th 2019, 02:42:04 pm | 104.19 MB | ZIP file |
| 201910-citibike-tripdata.csv.zip | Nov 5th 2019, 04:10:55 pm | 89.20 MB | ZIP file |
| JC-201509-citibike-tripdata.csv.zip | Apr 6th 2017, 04:01:34 pm | 125 KB | ZIP file |
| JC-201510-citibike-tripdata.csv.zip | Apr 6th 2017, 04:01:35 pm | 357 KB | ZIP file |
| JC-201511-citibike-tripdata.csv.zip | Apr 6th 2017, 04:01:37 pm | 281 KB | ZIP file |
| JC-201512-citibike-tripdata.csv.zip | Apr 6th 2017, 04:01:38 pm | 222 KB | ZIP file |

This zip file contains all the August 2019 data. We'll use data from August because there is likely more traffic during the summer months. You will need to

scroll down and find the file named [201908-citibike-tripdata.csv.zip](#). Save this file to your “bikesharing” folder.

When the file is downloaded and saved on your computer, you can move on to setting up your Tableau environment.

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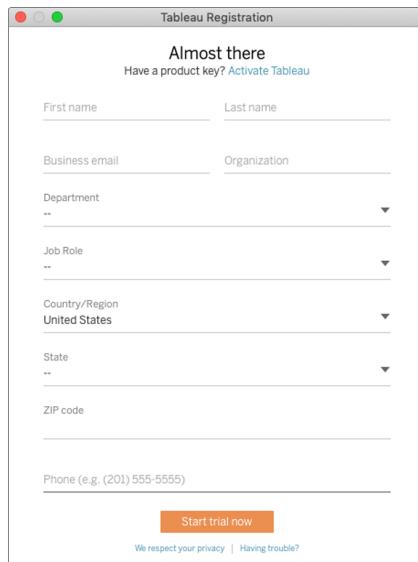
14.1.3: Set Up the Tableau Environment

Kate suggests you use the analytic tool Tableau for this project. A few of her coworkers have used Tableau before, and she thinks it might be a perfect proof of concept for the business. You already have your data downloaded and Tableau Desktop installed, so now it's time to get your Tableau environment up and running.

Tableau is an excellent tool for data visualization. It has a very specific purpose: to provide data visualization that is easy to use and understand. Also, while other data visualization tools may require you to write code, with Tableau you don't have to write much, if any, code, which is just one of the reasons it's such a popular visualization tool.

Let's get started by setting up our Tableau environment. First, we'll open Tableau and sign in to make sure we can access the Tableau visualization environment, which is where the data source window is located. The visualization environment will also contain the visualizations you'll create later in this module.

When you first open Tableau, you will see a Registration window for the trial version of Tableau that requests some information from you. It will look something like the image below. In the Organization field, you can enter "Student."

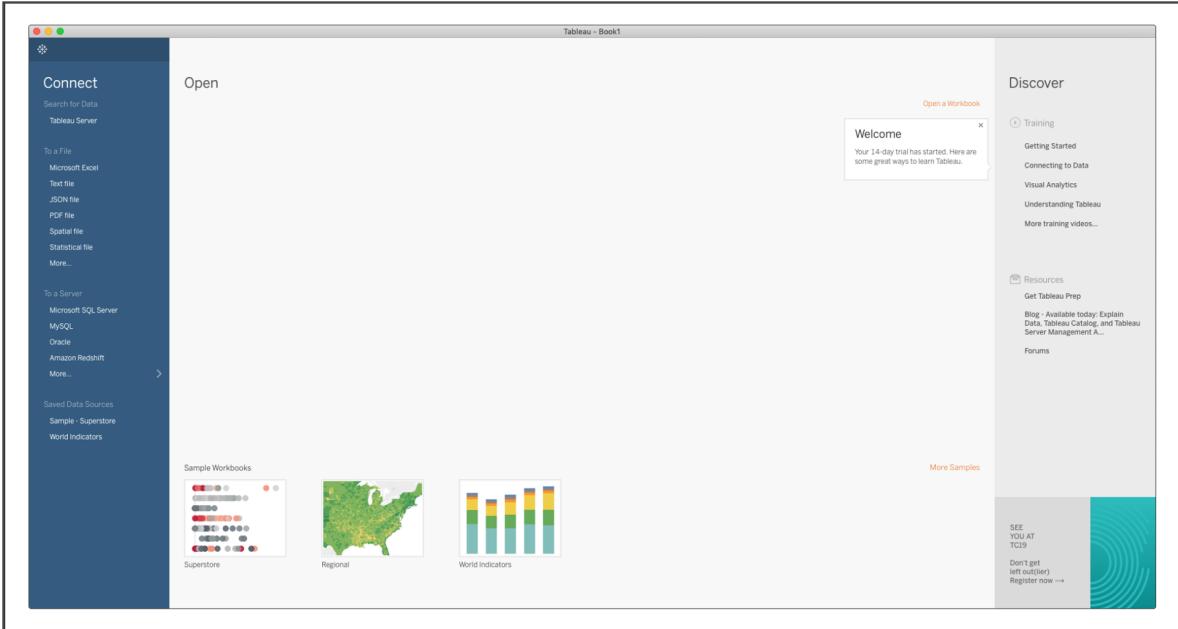


IMPORTANT

You need to provide the requested information before you can continue. Note that you can use the Tableau Desktop free of charge for two weeks, and you will not be asked for any payment information when you sign up for this free trial.

After the two-week period, your service will be suspended, and you will either have to pay for the month-to-month subscription or use Tableau Public. Tableau Public is similar to Tableau Desktop, but you can't use as many different data sources for it.

Once your Tableau account is set up, you will be able to see the opening page for Tableau Desktop, which looks like the following:



Nice work! Now let's import our data sources.

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14.1.4: Import Data into Tableau

Tableau is downloaded, open, and ready to go. Now you need to get some relevant data that you can use to help predict if your bike-share company idea could work in Des Moines. For this you'll need to turn to your data source: the Citi Bike data.

Now that our Tableau environment is set up, we can import our data. Let's look at the kind of data we can use, how to connect the data to Tableau, and then how to do some basic data transformations.

Import Citi Bike Data

In Tableau, you have a variety of different options when it comes to data sources. You can have flat files such as CSV, PDF, and TXT files, as well as other data sources like databases and data streams. (These will mostly be SQL databases.)

There are two primary ways that Tableau connects to the data you provide: through live data or extract data. Both have their benefits and uses, so let's dive a little deeper into each.

Live data is primarily databases such as MySQL and Microsoft SQL Server. Live data is just what it sounds like: live data. This type of data is updated every time

you view the dashboard, since it's possible that the data has changed in your database.

Extract data is primarily when you use files such as CSV, TXT, or PDF. These files remain unchanged unless you pull a new extract of the data. For example, if you update the file, you would have to update it in Tableau as well.

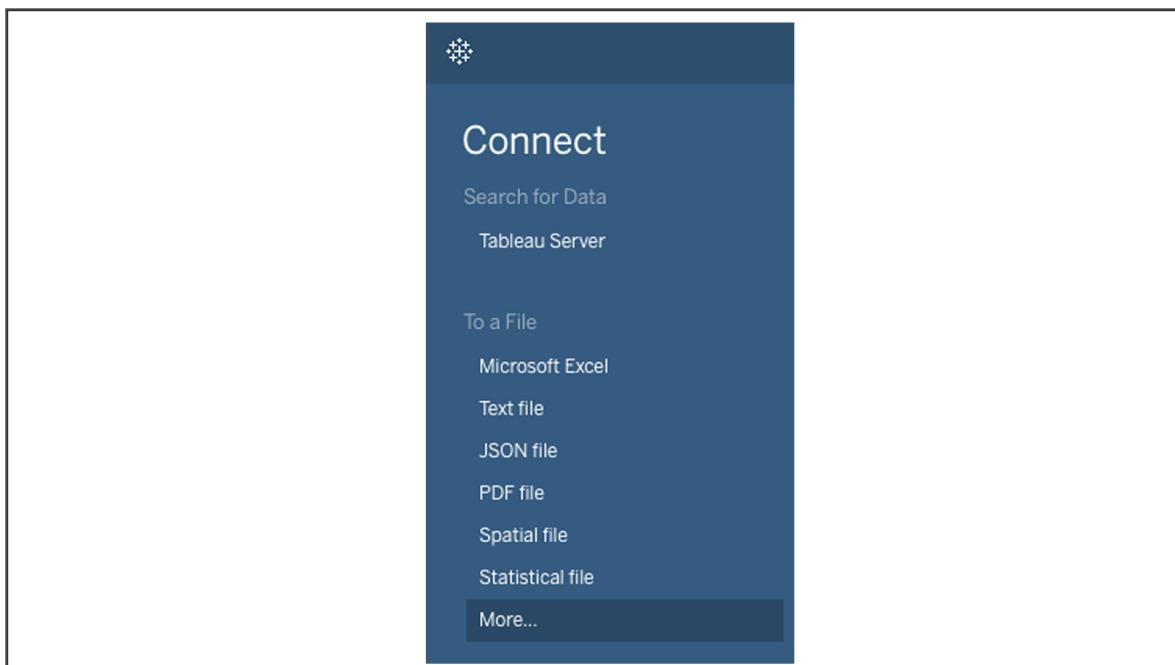
For our analysis, we'll import the CSV file, which contains all the data we'll need for this project. Therefore, we'll technically be working with extract data for our project.

NOTE

If you ever need to create another Tableau dashboard with a different data source, you would follow essentially the same process as the one we are about to do. The only difference is the type of data source you select for importing.

First, open the Tableau application. You should see a list of data source options. Since our Citi Bike data is a CSV file, you will need to select the "More..." option in the "To a File" section.

Once you do this, you will have imported your data and will be ready to go.



Available Data Sources

There are numerous types of data sources that you can use. We'll select our data source in a moment. For now, you should be familiar with the data sources you can use for other projects.

- The most popular flat files are Excel files, text files, JSON, PDF, Spatial, and Statistical.
- The most popular databases are Microsoft SQL Server, MySQL, Oracle, and Amazon Redshift.

For more information about data sources, refer to the [Tableau website](https://help.tableau.com/current/pro/desktop/en-us/exampleconnections_overview.htm) (https://help.tableau.com/current/pro/desktop/en-us/exampleconnections_overview.htm)

Connect Data Sources

Now we can start connecting our data to Tableau so that we can access it. Let's connect our CSV file. Click "More..." and then find the CSV file you downloaded in your local file system.

When you open the CSV file, you should see all of the data start to show up in your window. Here's a glimpse at what it should look like.

The screenshot shows the Tableau Data Source interface. At the top, there are connection options ('Connection' with 'Live' selected, 'Extract', and 'Filters' with '0 | Add'). Below this is a file selection dropdown containing '201908-citibike-tripdata.csv'. The main area displays a preview of the data with 1,000 rows shown. The columns are: Tripduration, Starttime, Starttime, Stoptime, Start Station Id, Start Station Name, Start Station Latiti..., Start Station Long..., End Station Id, End Station Name, End Station Latitu..., End Station Long..., and Bikeid. The data consists of various bike trip records with their start and end locations and times.

Nice work—the data is imported! Let's move on to the next step: modifying our data.

Modify the Data

Now we need to make a few modifications so that our data is represented accurately when we view it: rename the columns, change the data types of columns, and join data sources.

Rename Columns

When data is imported into Tableau, column names can sometimes look incorrect or be difficult to read. In this case, you'll need to change the column names by right-clicking the column name and selecting “Rename.”

201908-citibike-tripdata.csv

End Station Latitude

40.727434
40.718939
40.684751
40.724947
40.758985
40.777058
40.760875
40.735877
40.733143
40.719392
40.769155

40.727434
40.718939
40.684751
40.724947
40.758985
40.777058
40.760875
40.735877
40.733143
40.719392
40.769155

-73.982050
-73.975739
-74.002472
-73.981918

14,962
38,662
25,966
20,156

Rename
Reset Name
Copy Values
Hide
Create Calculated Field...
Create Group...
Create Bins...
Pivot (select multiple fields)
Describe...

Change Data Types of Columns

Tableau tries to infer what kind of data you are importing. For example, if you have integer values in one column, Tableau might think they are string values. You will have to change that in order for Tableau to work properly. You can change the column data type by clicking on the top left icon in the column, and then selecting the correct data type.

201908-citibike-tripdata.csv

End Station Latitude

40.727434
40.718939
40.684751
40.724947
40.758985
40.777058
40.760875
40.735877
40.733143
40.719392
40.769155

40.727434
40.718939
40.684751
40.724947
40.758985
40.777058
40.760875
40.735877
40.733143
40.719392
40.769155

-73.982050
-73.975739
-74.002472
-73.981918

14,962
38,662
25,966
20,156

✓ Number (decimal)
Number (whole)
Date & Time
Date
String
Boolean
✓ Default
Geographic Role ►

Why is it important that the data type of the column is correct?

- It's not important.
- If the data type is not correct, worksheets will not work as intended.

Check Answer

Finish ►

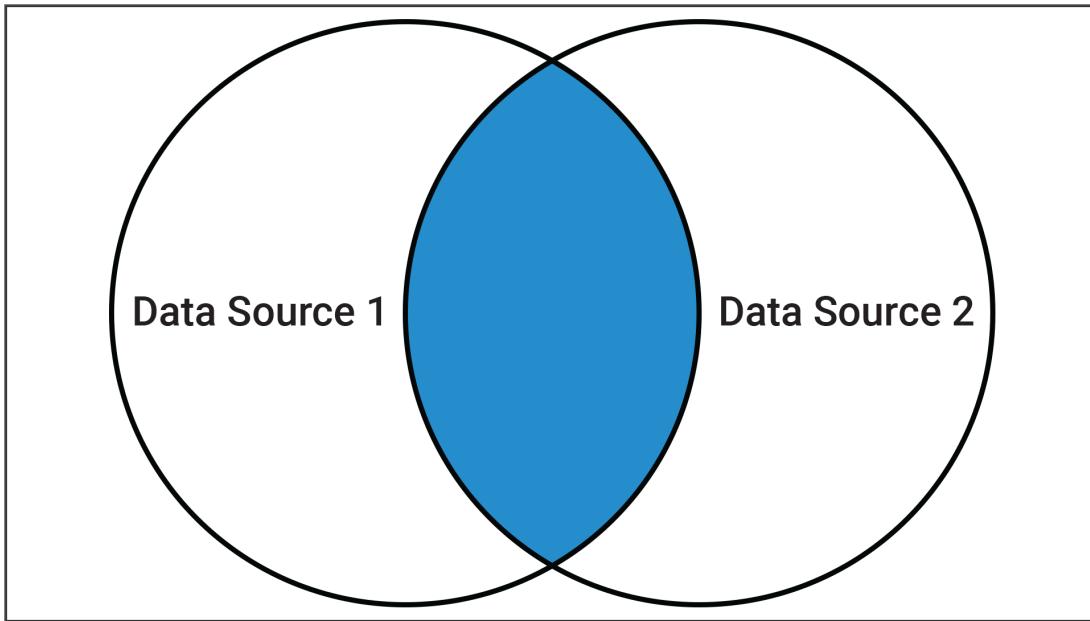
Join Data Sources

One of the best parts about Tableau is that you can join multiple different data sources within Tableau itself. Previously, you learned about joins in SQL. You can use some of the same joins here as well. While we won't need to join any data for our project, you should be familiar with how joins work in Tableau.

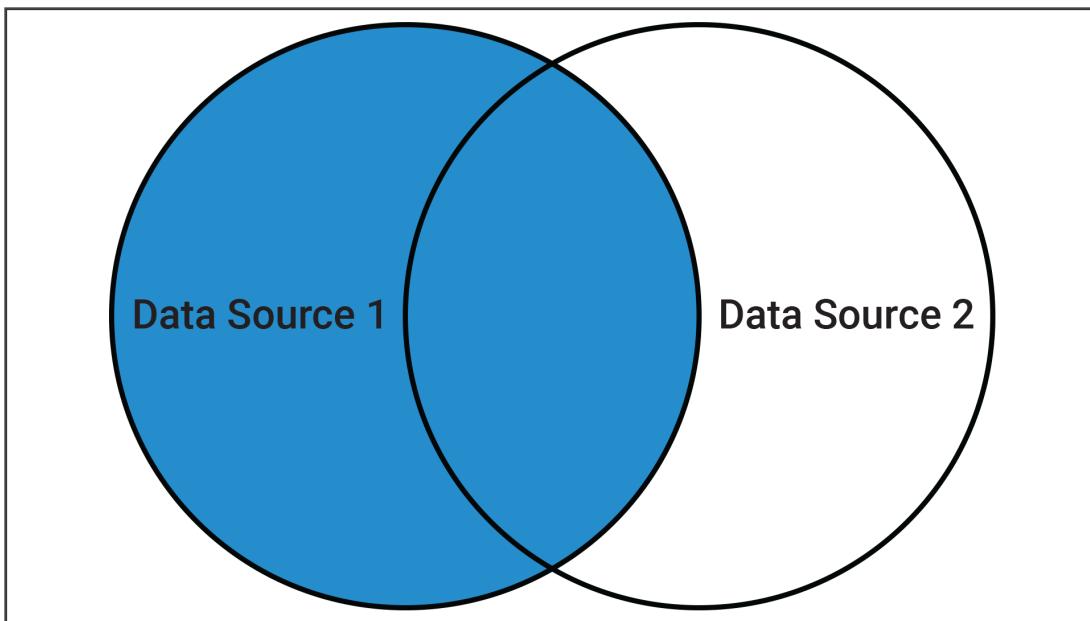
You can perform four joins in Tableau: **inner join**, **left join**, **right join**, and **outer join**.

REWIND

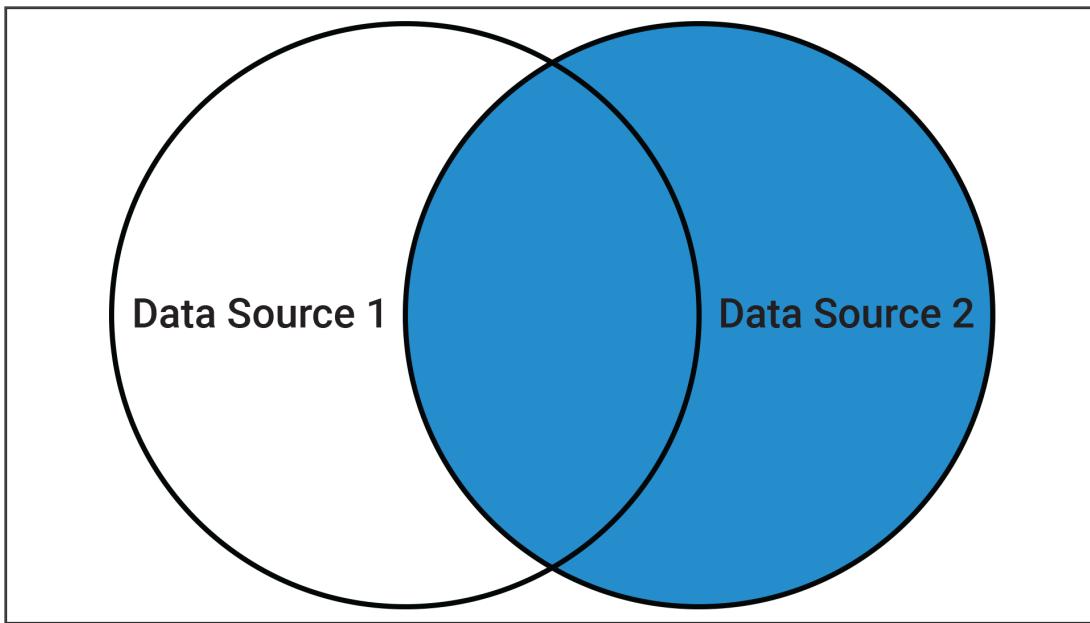
An **inner join** is the combination of Data Source 1 and Data Source 2. The result of the join is the data that exists in both data sources.



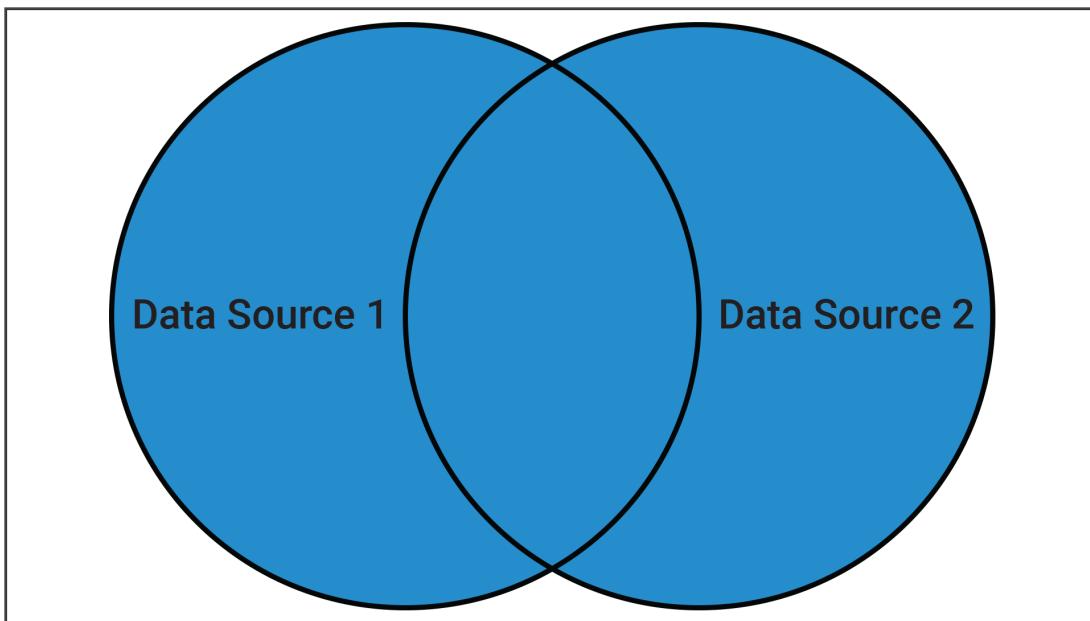
A **left join** is the combination of Data Source 1 and Data Source 2, but where data from Data Source 1 is kept. It also includes the data that's in both data sources.



A **right join** is the combination of both data sources, but where the data from Data Source 2 is retained. It also includes data that is in both data sources.



A **full outer join** is the combination of all the data in both data sources.



Great work with joins! Next, let's start to look at the different software aspects of Tableau.

14.1.5: Overview of Tableau

You've been meaning to dig into Tableau for a few months now: Kate's been talking about how much her coworkers love it, and you've seen it referenced in a lot of job posts lately. You know it's a powerful, complex tool, and you're excited to start playing around. Of course, you're a seasoned data professional, so you know a little bit of work up front to understand the tool itself can pay off in a lot of saved time down the road.

Tableau is a complex tool with a lot of helpful features. But with all of these features, the bigger picture of how it all works can become somewhat confusing. So let's get an overview of the major components.

Tableau Desktop

You are currently using Tableau Desktop, but it's important to understand how it fits into the bigger picture. Tableau Desktop allows you to create visualizations that are easy to read and understand. Everything you do with Tableau Desktop occurs on your computer.

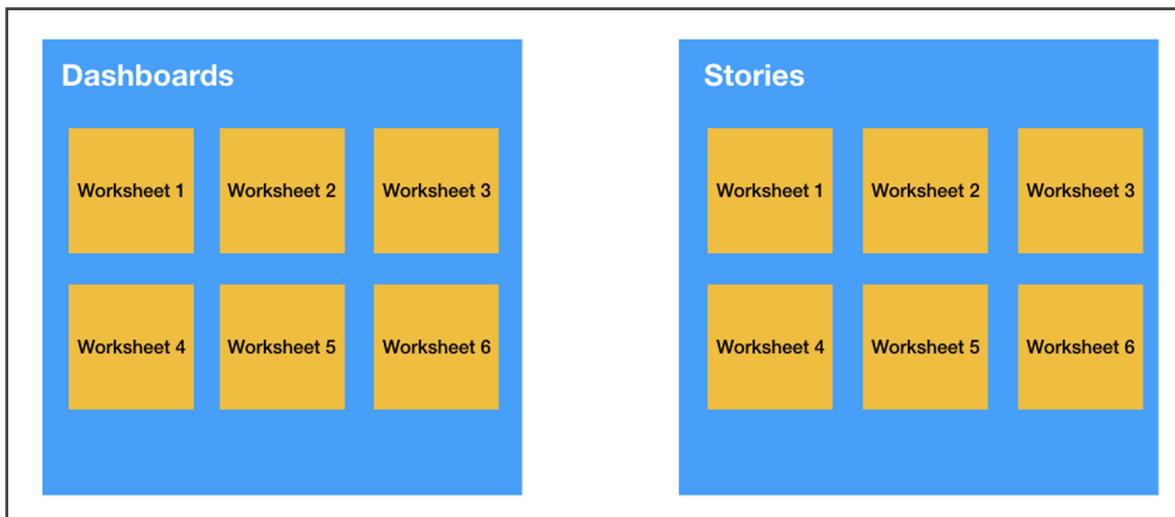
Tableau Server

Tableau Server allows you to privately share your visualizations with others. You can create your visualizations locally in Tableau Desktop and then you can upload your visualizations to Tableau Server.

Sheets, Dashboards, and Stories

In Tableau, there are three primary formats you need to be familiar with: worksheets, dashboards, and stories.

Worksheets are essentially the building block of the visualizations you will create. Worksheets are made from a variety of plots and graphs. Typically, worksheets will have just one plot or graph each. Dashboards and stories are made up of the worksheets you create. Here's what this looks like at a high level:



Let's go a little deeper into each of these components.

Worksheets are the building blocks of our visualizations from which we are able to create dashboards and stories. A worksheet is made up of a single graph or plot, which we will learn how to create later on. Worksheets are customizable, but require almost no actual code.

You may have seen a visualization dashboard before, whether in Tableau, PowerBI, or a number of other popular tools. In Tableau, **dashboards** are a collection of worksheets formatted to present data in a way that is easy to read. There are many things you can do with Tableau dashboards, which we'll discuss later.

Tableau **stories** are simply Tableau dashboards that include narration of what is occurring with the data. We'll dive deeper into stories later, but for now you should know that they are extremely helpful for identifying important analytic points.

NOTE

As you work on your project in Tableau, you should be aware of the resources available to you. The [Tableau support website](https://www.tableau.com/support) (<https://www.tableau.com/support>) contains many helpful articles, FAQs, and documentation. If you can't find answers to your questions, read their [search tips](https://www.tableau.com/support/site-search-tips) (<https://www.tableau.com/support/site-search-tips>). You can also consult Stack Overflow or do a simple Google search to get the answers you're looking for.

14.2.1: Set Up Your Tableau Workspace

Great work on getting the data all set up! Next, we need to take a deeper dive into our analytic tool, Tableau. Your investors are excited to see what you've been working on, so let's transform those ideas into visualizations.

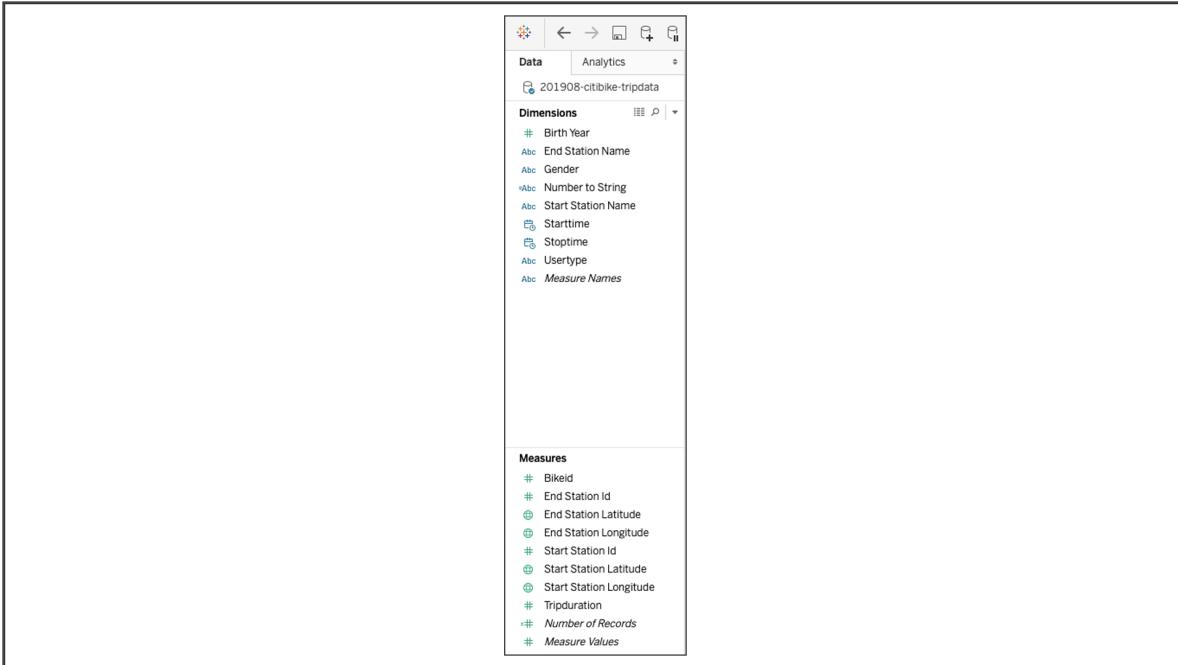
Now that you have a basic understanding of Tableau's main features, you can begin to get acquainted with the Tableau workspace. The Tableau workspace is where you will create your visualization.

Data Pane

The first part of the workspace you need to be familiar with is the data fields pane. This is where you'll add all of your columns into the workspace and view them, and then you can add the columns to your worksheets.

There are two types of data fields: dimensions and measures. **Dimensions** are the qualitative values in your dataset, such as names, dates, and geographical data. **Measures** are the quantitative values in your dataset, which are usually numerically measured.

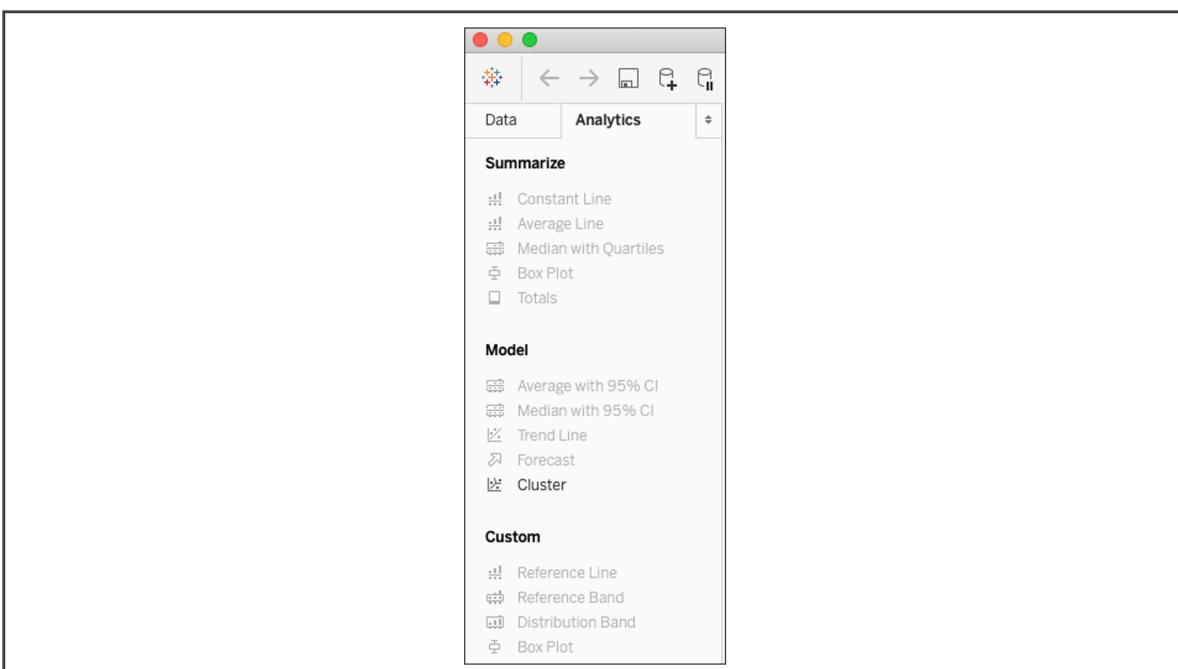
You should be able to see all of the dimensions and measures for the Citi Bike data in the data fields pane. This is what you should see:



Once we've verified that the dimensions and measures are correct, turn your attention to the Analytics pane.

Analytics Pane

The Analytics Pane is Inside the data field pane. Within this pane are Summarize, Model, and Custom categories, as shown in the following image:



Take a look at the options in each category. Note that grayed-out text indicates the option is not available for the data you have selected. If the option is not grayed out, you can use that method of analysis for your data. We won't use these analytics right now, but it's important to know that they are there.

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14.2.2: Introduction to Tableau Worksheets

In order for your visualizations to have graphs or plots, you will need to create worksheets. As you've already learned, worksheets are the foundation of everything we'll be creating in Tableau. Take some time now to get more familiar with Tableau worksheets.

As with most parts of Tableau, you will need to start with creating a worksheet. Once you have a worksheet complete, you can add it to a dashboard or story. Let's walk through the basics that you'll need to get started with Tableau worksheets.

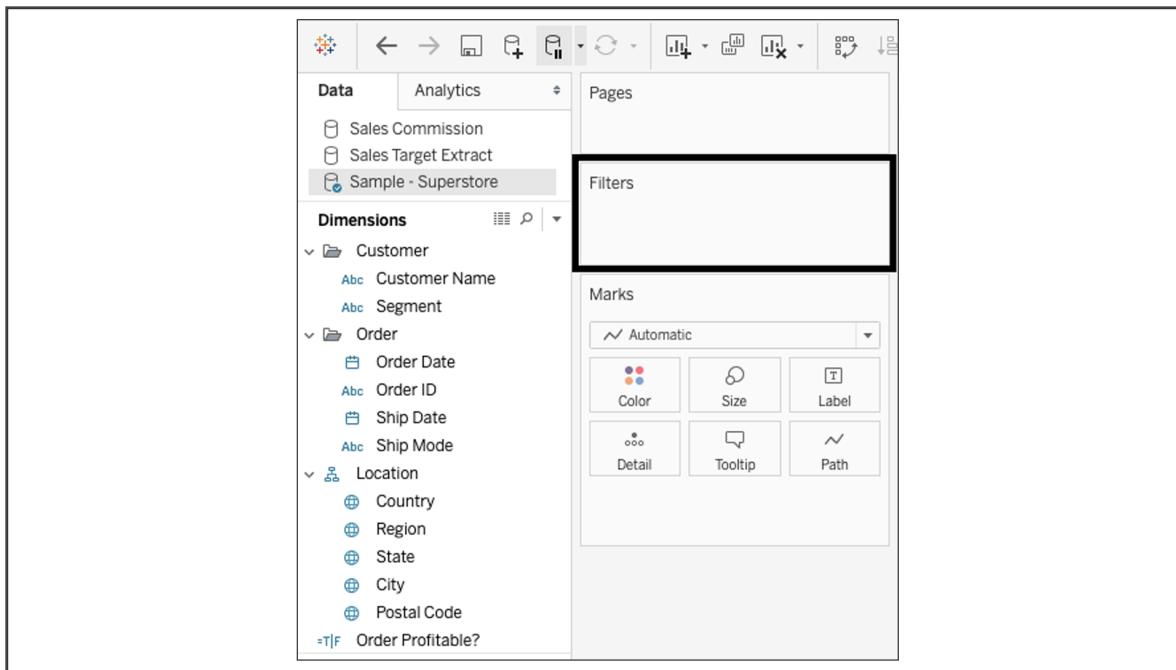
Drag and Drop

In Tableau, you'll need to drag and drop the measures or dimensions into the worksheet. While you may have needed to write code in other analytic platforms, this is not required in Tableau. You simply just drag the data you want into the workspace, and then make sure it's represented correctly.

Filters

There are many ways to filter your data in Tableau. The following image shows the section for Tableau filters. To filter by a specific dimension, measure, or data field,

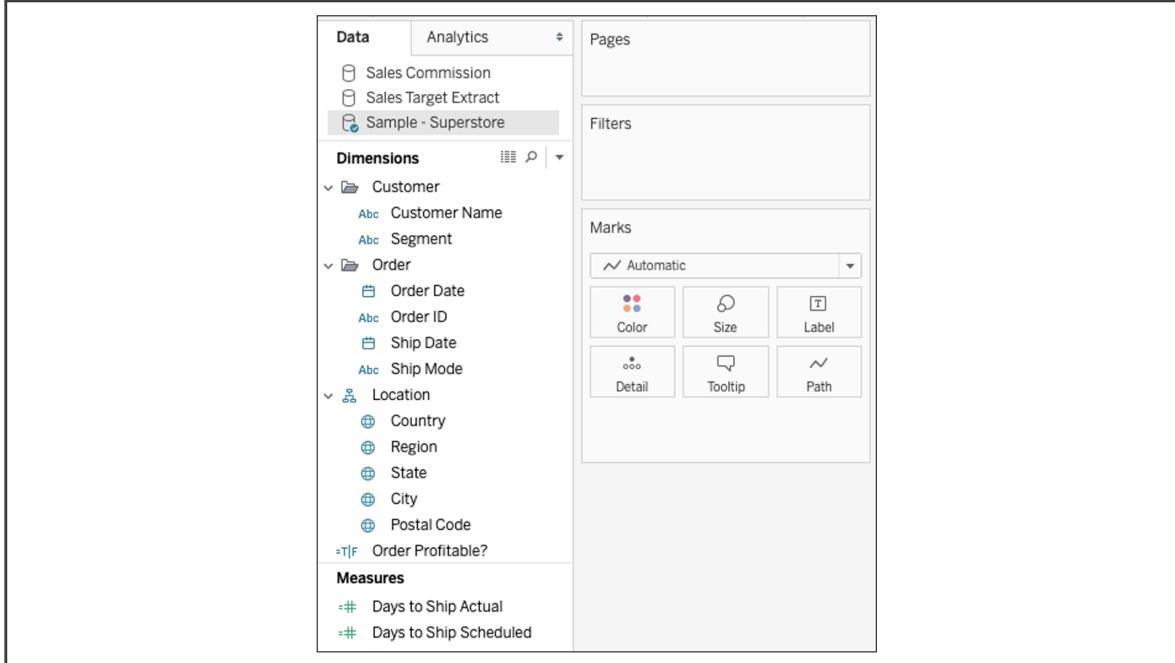
you can drag it to the filters section. There are other ways to filter as well, but we'll discuss those later on.



Marks

Marks in Tableau are essentially how you format your graph or plot. You can change several aspects of any graph you create, including the color, size, text, detail, and tooltip. Be sure to explore each of these options, as they can greatly improve the quality of your worksheets.

Here's what the Marks section looks like. Note that you can drag dimensions from the left to the Marks section.

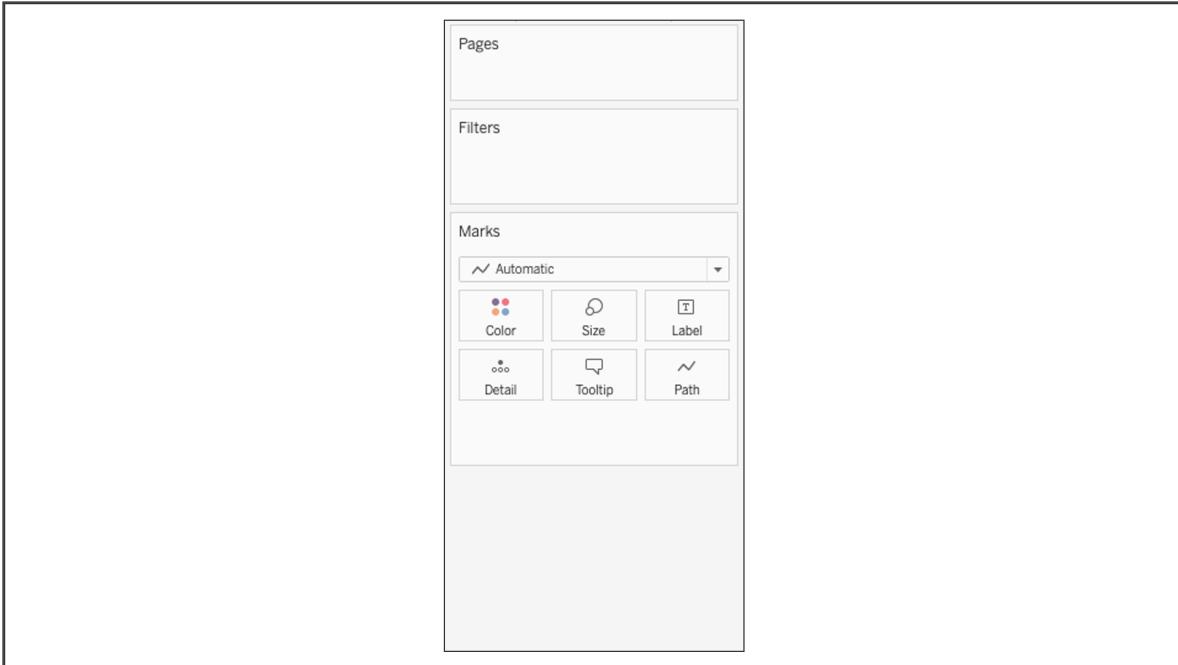


Tooltip

Another useful tool in Tableau are tooltips, which appear as a popup window when you place your cursor over specific pieces of data. Tableau often creates tooltips automatically for you, but you can also create and customize your own. The following is an example of a tooltip.



You can change most of the fonts and styles for the tooltip as well as add data. To edit the tooltip, go to the worksheet you are viewing and then click the tooltip icon in the Marks section, as shown in the following image.



When you click the icon, you'll see a screen where you can edit the contents of a specific tooltip.

What is tooltip used for?

- Sharing data
- Displaying data in a summarized way
- Filtering the data in the worksheet

Check Answer

Finish ►

Measures

Earlier we learned that Tableau has measures and dimensions. Within measures, there are discrete measures and continuous measures.

Discrete measures are treated as finite values, since there is a countable amount of a given measure. The discrete measures, which are labeled in blue, add headers to the worksheet. An example of a discrete measure is the total number of rides.

Continuous measures are essentially measures that are infinite and add axes to the worksheet. Continuous measures are labeled in green. Time is one example of a continuous measure, since there is no defined end.

Sheet Tabs

Worksheets, dashboards, and stories will show up as tabs at the bottom of your Tableau workspace. You can switch between these tabs as you would in a web browser, which allows you to more easily manage multiple worksheets, dashboards, and stories much easier.

The three tabs are denoted by icons, as shown in the following image. The first icon with the “+” (plus sign) and an image that looks like a graph is the worksheet tab. The middle icon, with a grid and a plus sign, is for dashboards. The last icon that resembles a book along with a plus sign, is for stories.



Renaming Worksheets

At times you will need to rename the worksheets to accurately describe your project. To do this, you have two choices. First, you can double-click on the tab and then edit the name of the tab. The second option is to right-click on the tab and then change the name. You can choose either method—there is no right or wrong way.

When naming worksheets, dashboards, and stories, choose a name that accurately represents the data in the tab. Also, since tabs are fairly small, you

should choose a name that is concise.

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14.2.3: Worksheet Best Practices

One thing that came to your mind was that the investors might want the visualizations to look good. You were wondering if there are best practices to be considered while working on these worksheets.

Designing data visualizations is a huge field within the data industry, with some jobs devoted to making visualizations look better. While you don't need to know everything about designing worksheets, you should be familiar with some best practices. The Tableau website provides information about [**best practices for effective dashboards**](https://help.tableau.com/current/pro/desktop/en-us/dashboards_best_practices.htm) (https://help.tableau.com/current/pro/desktop/en-us/dashboards_best_practices.htm), which is a good starting point. You can also find plenty of articles and resources on the [**Tableau website**](https://public.tableau.com/en-us/gallery/?tab=viz-of-the-day&type=viz-of-the-day) (<https://public.tableau.com/en-us/gallery/?tab=viz-of-the-day&type=viz-of-the-day>) to help you design better worksheets.

Note that there are some areas of worksheet design that you should be aware of, such as accessibility and user experience. We won't go into this topic much in this module, but you should know that a key aspect of worksheet design is making sure they are easy to understand and use.

14.2.4: Using and Portraying Data to Answer Questions

You know that you want to use Tableau to create effective visualizations from the Citi Bike data, which Kate can then use to impress potential investors. You also know that the key to getting a good visualization—and, really, any good data analysis—is to start with a question. But what is the right question to ask and how do you portray the answer accurately?

Generally speaking, when we think about all of the data we have available to us from Citi Bike, we can come up with several questions that we would want a Tableau visualization to help answer. We need to think critically about which questions are the most important for our analysis. This is an important skill to master.

The core issue we need to think about is what we absolutely need to know in order to create our bike-sharing program in Des Moines.

Once you know the questions you want to ask, the next thing you need to think about is how your audience will perceive the data you present. You want to share your findings in a way that reduces your personal bias and accurately represents what the data is saying.

Honesty and integrity in regard to your data is an important concept in data science. A person's opinion can be swayed based on how the data is represented, so you need to consider how your audience will perceive and interpret the results and visualization that you show them.

This skill won't come right away; it takes practice. Eventually, you'll be able to determine how others will perceive your work. As you begin creating visualizations in this module, ask your peers how they perceive your designs. Having input from others will help you understand what works and what you may need to change.

SKILL DRILL

What questions would you want answered if you were opening a bike-sharing business? Write the questions down.

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14.2.5: Determine the Number of Trips

After thinking through various questions, you settle on the first question you would like the data to answer: how many bike trips were recorded during the month of August? Since August is a beautiful time of the year to rent a bike, we want to use this data as a starting point to determine how many rides we could expect in the city of Des Moines.

We've established that one of our primary goals when using Tableau is to answer questions using data. We want to create a visualization that ultimately answers our question or leads us closer to answering the original question. Our first question is, "how many trips were recorded during the month of August?"

To answer this question, we need to create a Tableau worksheet that shows the number of trips recorded during our time period. We won't need a plot; we'll simply display the number of recorded rides.

How Many Trips Were Recorded During the Month of August?

Let's start by creating the worksheet. Click on the far-left tab of the three shown below. These three tabs can be found in the toolbar near the bottom of your workspace:



After clicking, your workspace will look like the following:

You'll notice that the worksheet is currently named "Sheet 2," so we'll need to change it to something both concise and applicable to the data we'll be analyzing. Let's rename the worksheet "Number of Records."

NOTE

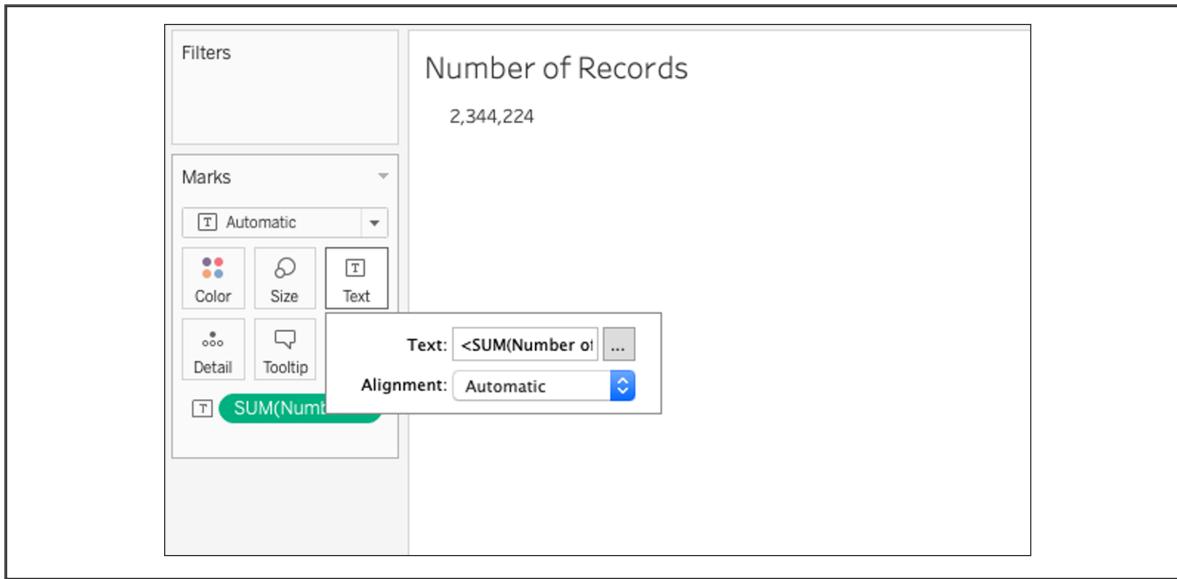
Note that when we talk about "number of records" and "number of rides," we are using the terms synonymously.

To rename the worksheet, go to the bottom tab, double-click on "Sheet 2," and type "Number of Records." This will change the title at the top of your worksheet.

Next, go to the left side of the workspace and look at the Measures section. You should see a measure called Number of Records. Drag the "Number of Records" measure into the Text box in the Marks section. You'll see that the worksheet is updated with the number of records, so that it looks like this:



Now click the Text box again to edit the formatting of the number. By clicking on the icon with three dots, you can change the size, color, and style of the number. At this point, all we need to do is make the text larger so it's easier to read. Refer to the following image:



Great work! You've found the total number of trips in August: 2,344,224. Now it's time to focus on the next question: how does ridership grow over time?

14.2.6: Find the Proportion of Short-Term Customers to Annual Subscribers

Another piece of data you'll want to look into is the number of short-term customers and annual subscribers to the Citi Bike service. This will help us determine the types of customers we could expect for a bike-sharing company in Des Moines. Specifically, you want to find out how the proportion of short-term customers to annual subscribers has changed.

Now that we know the total number of trips for August, next we want to explore the types of customers. In particular, we want to find the proportion of short-term customers of the bike service to the annual subscribers. For this we'll create a pie chart.

What Is the Proportion of Short-Term Customers to Annual Subscribers?

Let's start by creating a worksheet named "customers." We'll use this worksheet to create our pie chart.

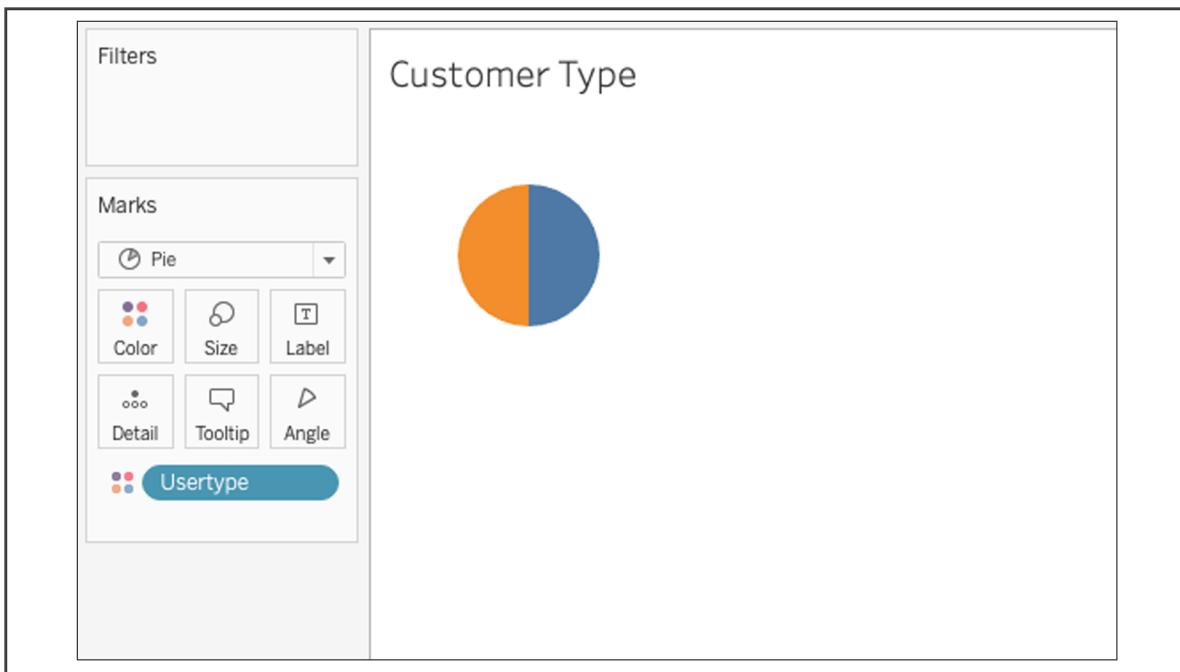
Click the worksheet tab in the toolbar. (Remember, this is the tab on the left.)



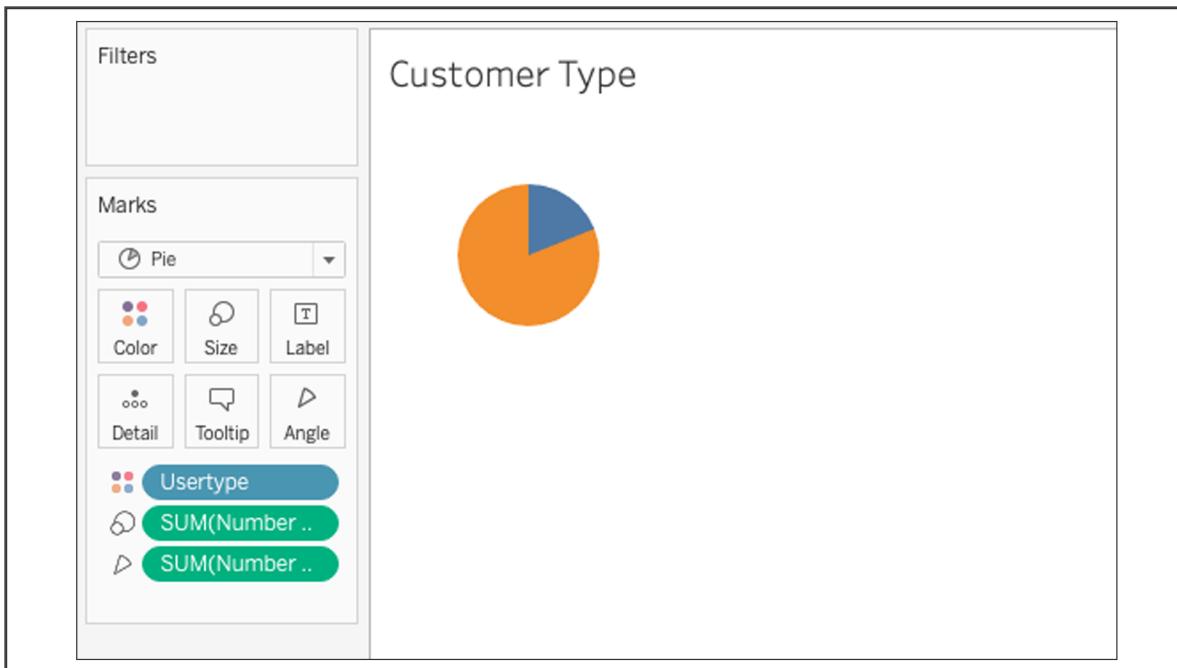
Change the name of the worksheet to “customers.”

For our pie chart, we’ll need the “Usertype” dimension and the “Number of Records” measure. Within the Usertype dimension, you’ll notice that there are two types of users: subscribers and customers. “Subscribers” refers to annual subscribers of the bike-sharing service, while “customers” are the short-term riders.

Next, add the Usertype Dimension to the “Color” mark, as shown in the following image:



Now we can add the “Number of Records” measure. This will update the wedges of our pie chart to reflect the percentages of customer types. Drag the “Number of Records” measure into the Size mark and the Angle mark. Here’s what the worksheet will now look like:



Once these marks are in place, you can place your cursor over the pie wedges to see more details about them. In this case, we can see how many rides were recorded for each type of customer.

How many customers are annual subscribers?

- 443,865
- 1,900,359

[Check Answer](#)

[Finish ►](#)

We now know the breakdown of rider types in New York City, which will help us predict the customer breakdown in Des Moines and, in turn, propose a business model to investors.

14.2.7: Find the Peak Riding Hours in August

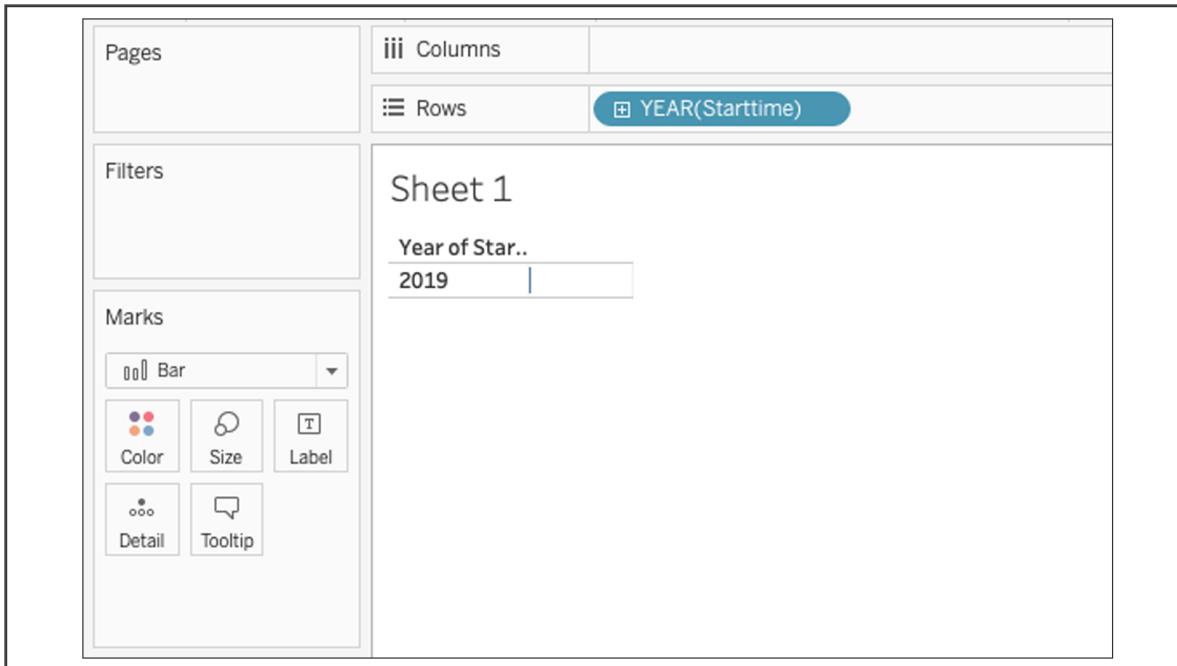
Since August can be a good month to visit New York City, next we'll figure out the peak hours for bike trips during the month of August. This will help our investors get a ballpark estimate of how many bikes we might need in Des Moines.

A key piece of data we need is the peak usage hours for the month of August. This will help us get a better idea of how many bikes we might need in Des Moines, as well as figure out during which parts of the day we'll need the most bikes. For example, if we need to do maintenance on a bike, knowing the peak usage hours will help us plan for the best time to do that.

What Are Peak Riding Hours in the Month of August?

Let's create a plot to show the peak hours in August. The first step is to create a worksheet named "August Peak Hours."

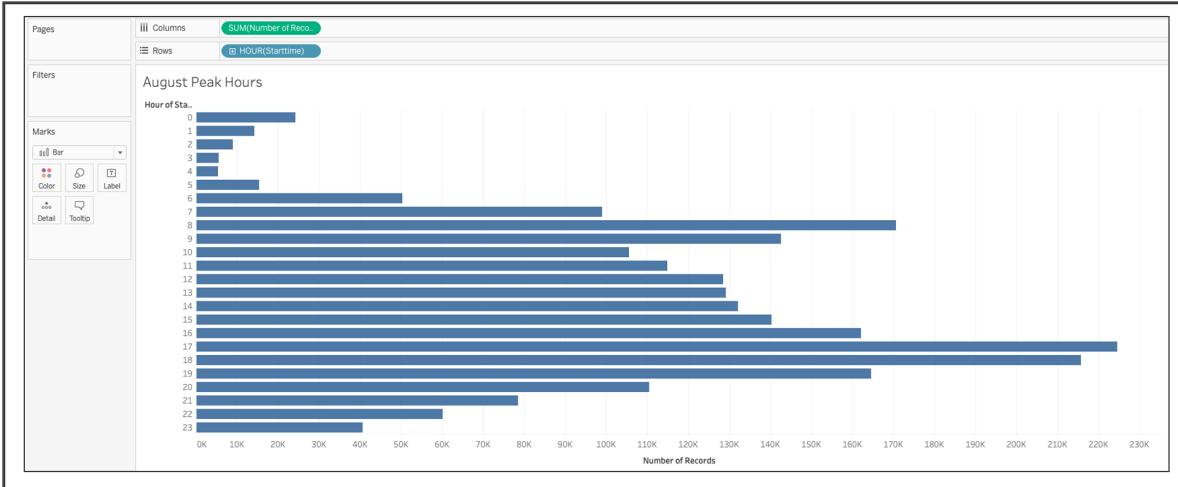
In the worksheet, we'll look at the "Starttime" dimension, as this is a good indicator of when customers tend to begin their bike rides. Drag this dimension to the "Rows" section, as shown in the following image:



Since we want to find the peak hours, we need to change “Year” to “Hour” for the Starttime. To do this, click the arrow, scroll down to “More,” and select “Hour,” as shown in the following image:



Next, we need to add the Number of Records measure. We want the sum of all records, so if Tableau doesn’t automatically change it to “SUM,” click the arrow and select “Measure (Sum).” Here’s what your workspace should now look like:



If your workspace doesn't look like this, make sure that you have selected the correct type of graph. You can change the graph type by clicking "Show Me" in the top right of your workspace, and then selecting the bar chart option:



Nice work! We now have a plot for the peak riding hours in August. We can move on to finding the top starting location for Citi Bike rides.

Based on your bar chart, what are the top riding hours during August in New York City?

- 5:00 a.m. to 7:00 a.m.
- 10:00 a.m. to 12:00 p.m.
- 5:00 p.m to 7:00 p.m.

Check Answer

Finish ►

Based on the data in your bar chart, when would you suggest bike maintenance be performed?

- 2:00 a.m. to 5:00 a.m.
- 7:00 p.m. to 10:00 p.m.

Check Answer

Finish ►

14.3.1: Find Top Starting Locations

You've answered two questions about the data using Tableau: (1) what is the breakdown of annual subscribers vs. short-term customers, and (2) what are the peak hours for bike rentals? These answers will help you broker a strategic conversation with investors. There are more questions to ask the data, however. For example, what are the highest-traffic locations? Understanding both when and where people use Citi Bike will help you plan your pilot in Des Moines. So you decide to find the top locations for starting a bike journey among Citi Bike customers.

Now we're going to use the data to find the most popular stations in the city for starting a bike journey. We'll start by creating a worksheet.

What Are the Top Bike Stations in the City for Starting a Journey?

Create a new worksheet by following the steps you completed previously.

The following steps are required to create a worksheet in Tableau. In what order should these steps be followed?

1. Rename the worksheet to “Top Starting Locations.”
2. Click on Sheet 1.
3. Click on worksheet icon.

- 1, 2, 3
- 2, 1, 3
- 3, 2, 1

[Check Answer](#)

[Finish ▶](#)

Look at the bottom of your workspace and find the sheet you just created. Double-click the text in the tab, and then type “Top Starting Locations.”

We'll be creating a basic symbol map to visualize the top 10 starting locations. A **symbol map** is a map with symbols that correlate to the numeric value of the map location. The most popular starting locations will be marked by larger symbols on the map.

Create a Symbol Map

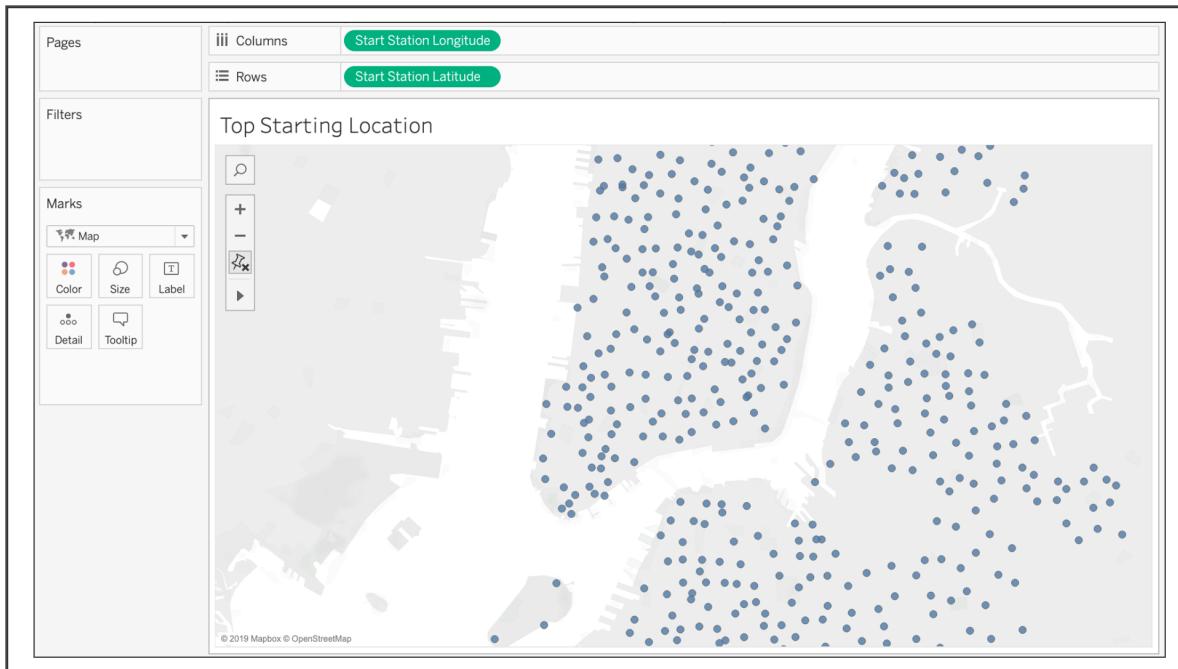
Let's begin by identifying the dimensions and measures we need. The measures we'll need for our map are the Start Station Latitude and Start Station Longitude. These measures will provide the geographic location of the bike rental starting points. We'll also need the Number of Records dimension.

Drag the “Start Station Longitude” measure to the Columns section and “Start Station Latitude” to the Rows section. Note that you will need to change these to dimensions by clicking the arrow for each item and selecting “Dimension.” The following image shows what your window will look like after dragging the

measures to the Columns and Rows sections. Note that “Start Station Latitude” and “Start Station Longitude” should not be preceded by “AVG” or “SUM.”



When the measures are in place, we need to move them over to the Marks section. The type of plot may be set to “Automatic,” which should be changed to “Map.” Here’s what the symbol map will now look like:

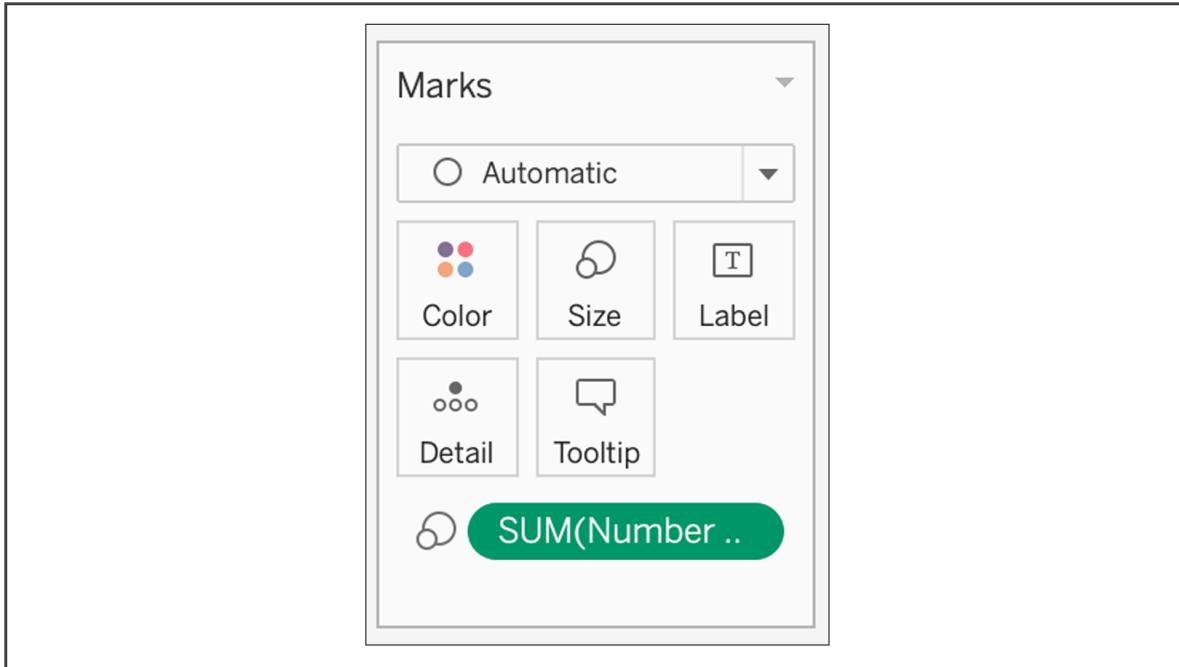


Notice that all of the symbols are the same size. Remember that we want the most popular starting locations, which means we need to adjust the size and color to represent the popularity of a given location.

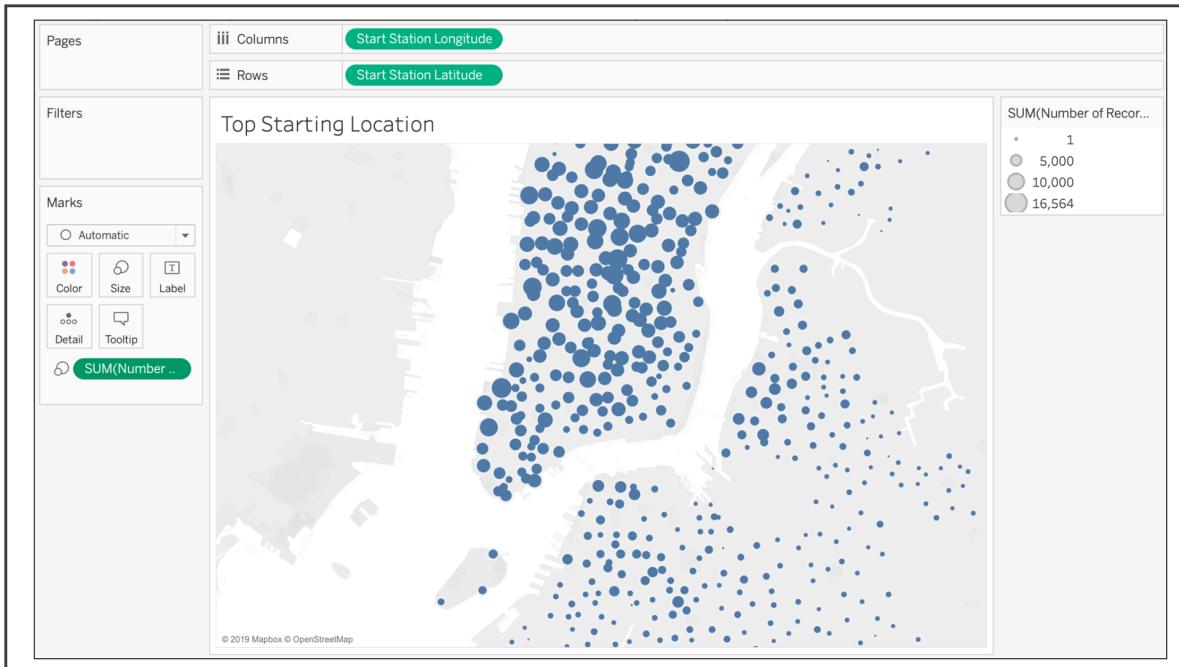
Adjust Size and Color of the Symbols

First, we’ll adjust the size of the symbols so we can determine the most popular locations at a glance.

Drag the “Number of Records” measure into the Size button within the Marks section. You’ll see that “SUM” precedes “Number of Records,” as shown in the following image:



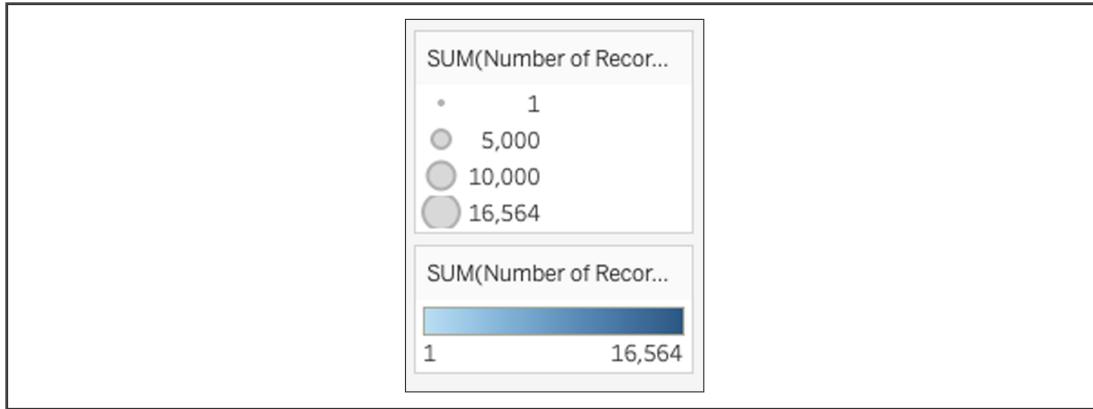
When the sizing mark is added, your symbol map will look like the following:



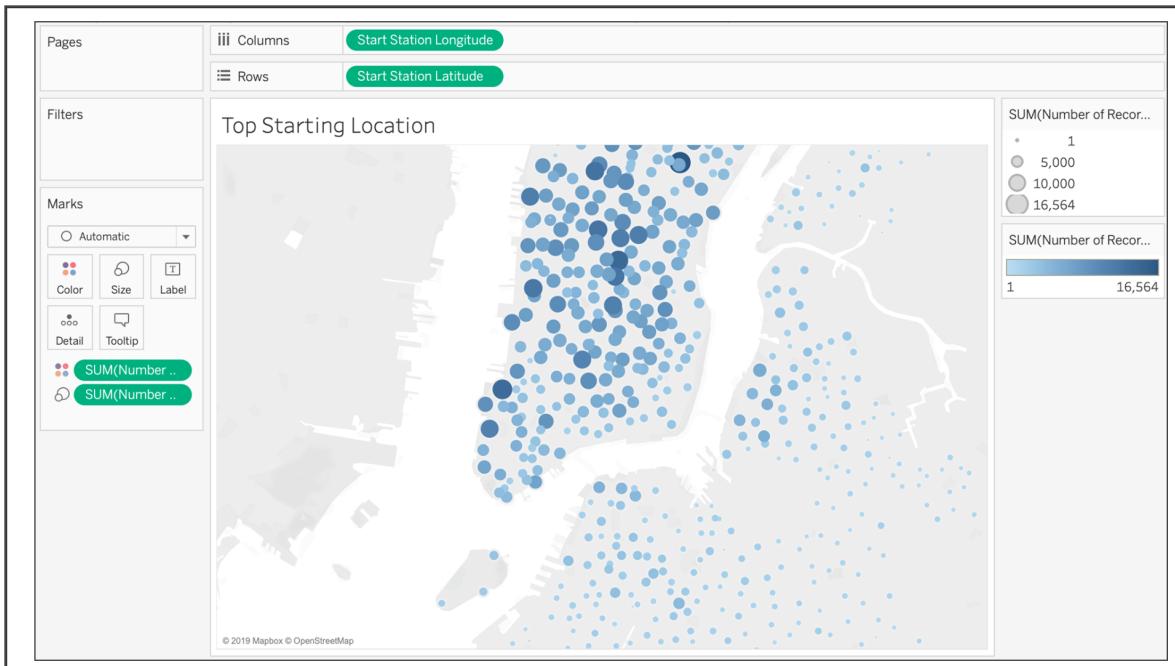
NOTE

If you look to the right of the symbol map, you’ll notice another box with a legend that visually explains what the dots represent. This is important, as

you'll need to understand what the dots convey to your audience.



Now that the symbol size has been adjusted, let's work on the colors. We want to adjust the colors to help us differentiate between the most popular locations and less popular locations. To do this, drag the “Number of Records” measure into the Color mark. The map should now look like this:



Great work! We've created our first symbol map, which will allow us to tell a story with our data later. Next, let's create a symbol map for the most popular bike ride ending locations.

14.3.2: Find Top Ending Locations

Now we know where customers are beginning their bike rental journeys. But where do they drop off the bikes? Time to ask Tableau some more questions!

We successfully created a symbol map for the top starting locations for bike rides, according to our Citi Bike data. Now let's do the same thing for the most popular places to end a bike ride.

What Are the Top Bike Stations for Ending a Journey?

Start by creating a new worksheet and naming it "Top Ending Locations."

As we did before, the next step is to identify the dimensions and measures we'll need. For our geographic coordinates, we want the "End Station Latitude" and "End Station Longitude" measures. To correspond with our coordinates, we'll need the "Number of Records" dimension as well.

Next, drag the "End Station Latitude" to the Rows section and change it to a dimension. Then drag "End Station Longitude" to the Columns section and change it to a dimension as well. Here's what you should see in your workspace:

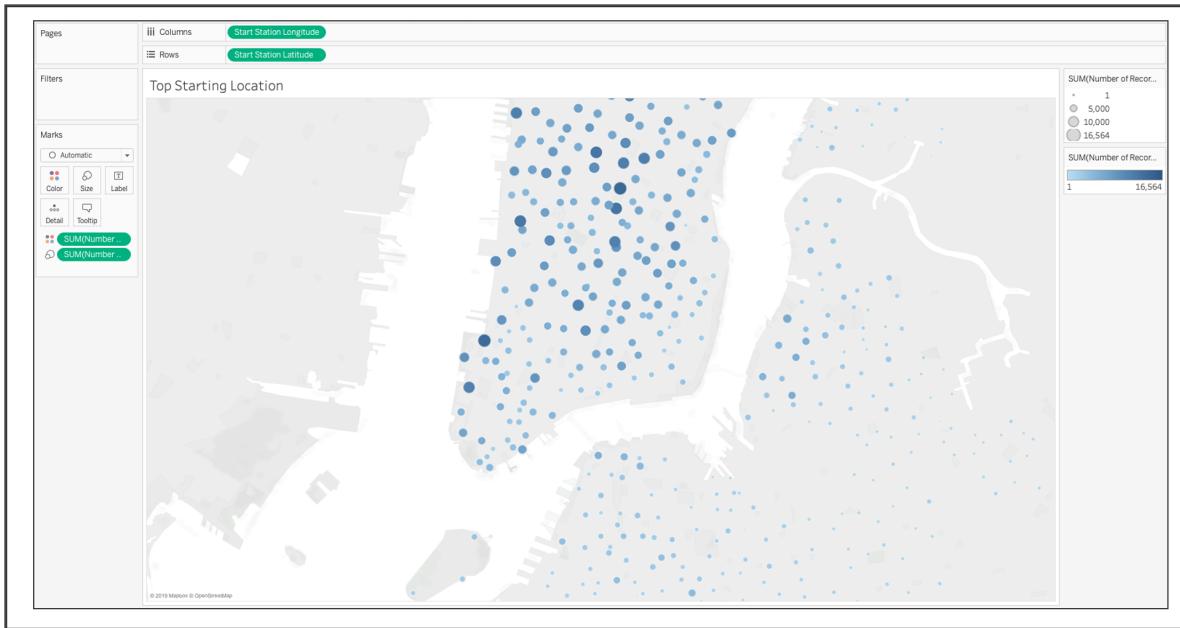
| | |
|-------------|-----------------------|
| iii Columns | End Station Longitude |
| Rows | End Station Latitude |

Now we need to add the Number of Records measure to the Size mark. You should see a symbol map that looks like the following image:

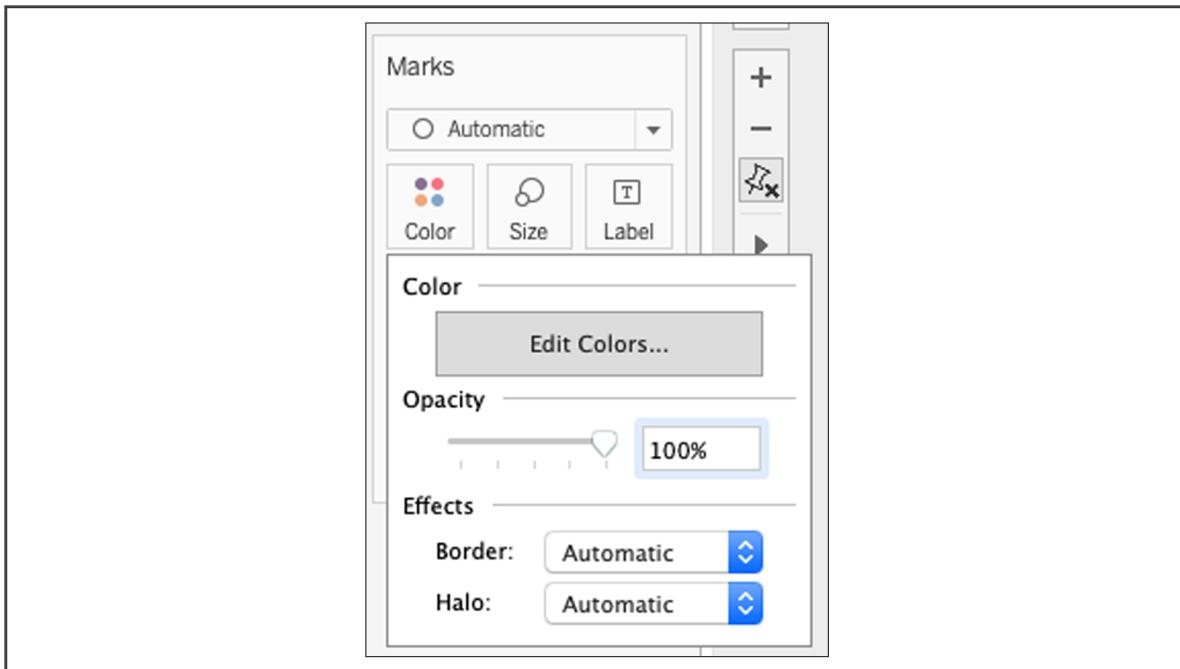


The size of the symbols now correspond to the popularity of a given location, which is exactly what we want. Now we just need to add the “Number of Records” to the Color mark. This will adjust the color of the symbols so that they represent the most popular ending locations. As before, the darker the color, the more popular the location is.

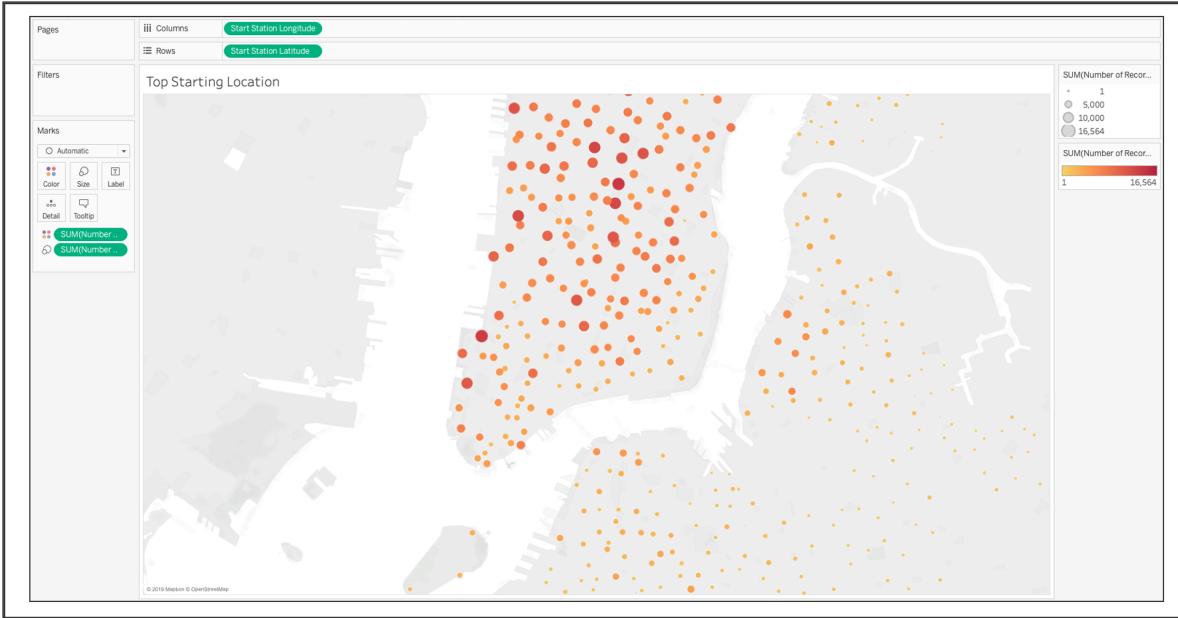
Your worksheet will now look like the following:



Now, for this worksheet, we're going to change the colors so that we can determine at a glance if a symbol is popular or not. To do this, first click the Color mark to expand the options, as shown in the following image:



Click "Edit Colors," and then select the palette dropdown. Choose the red-gold color scheme. If the location is more popular, it will be red; if it's less popular, it will be gold. Your symbol map should now look like the following:



Nice work! The symbol map for top ending locations is complete. Now let's take a look at what the data says about gender and bike rides.

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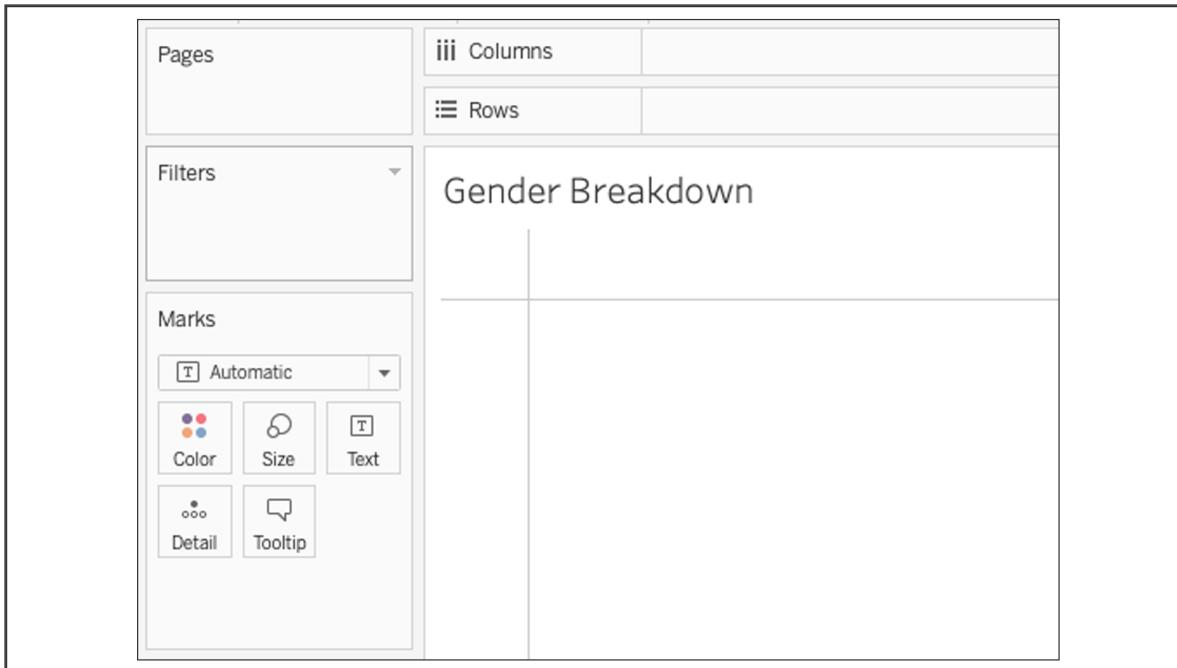
14.3.3: Find the Number of Rides by Gender

Another question we have for the data—beyond the where and when—is the who. What can the data tell us about the riders themselves? Often, the first place we start when understanding a population is gender.

We now want to know the gender breakdown of Citi Bike riders to help us learn a little more about the customers.

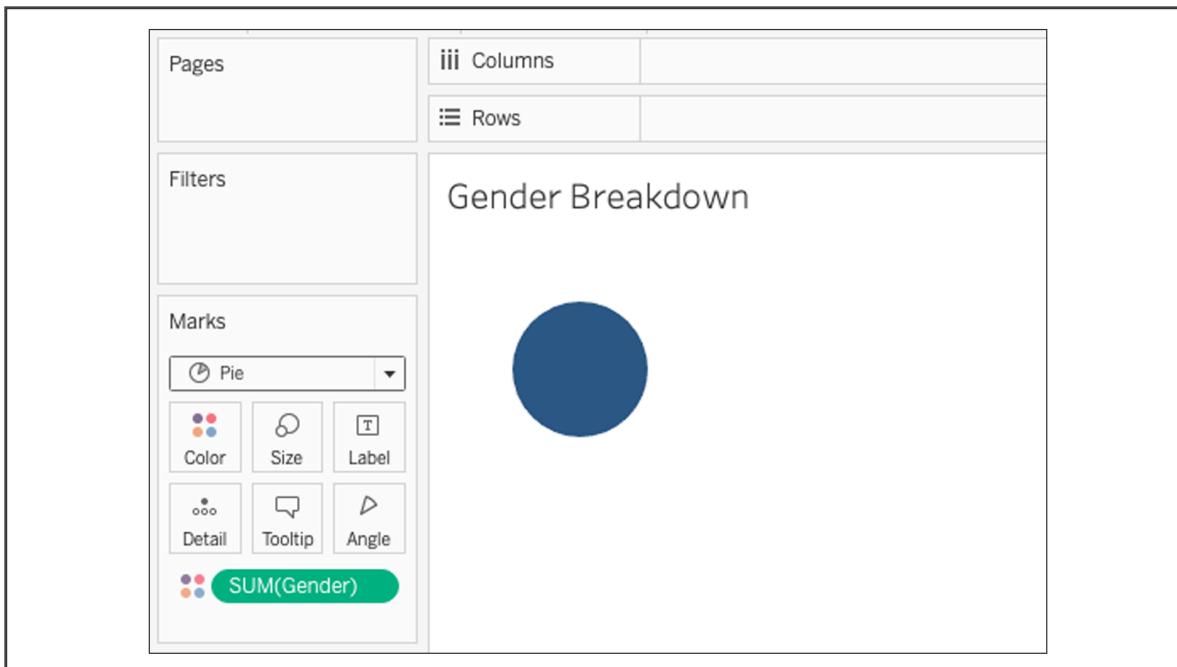
What Is the Gender Breakdown of Active Riders?

Create a new worksheet and name it “Gender Breakdown.” We’ll use this worksheet to create a pie chart for our data to show the gender breakdown. At this point, here’s what your workspace should look like:



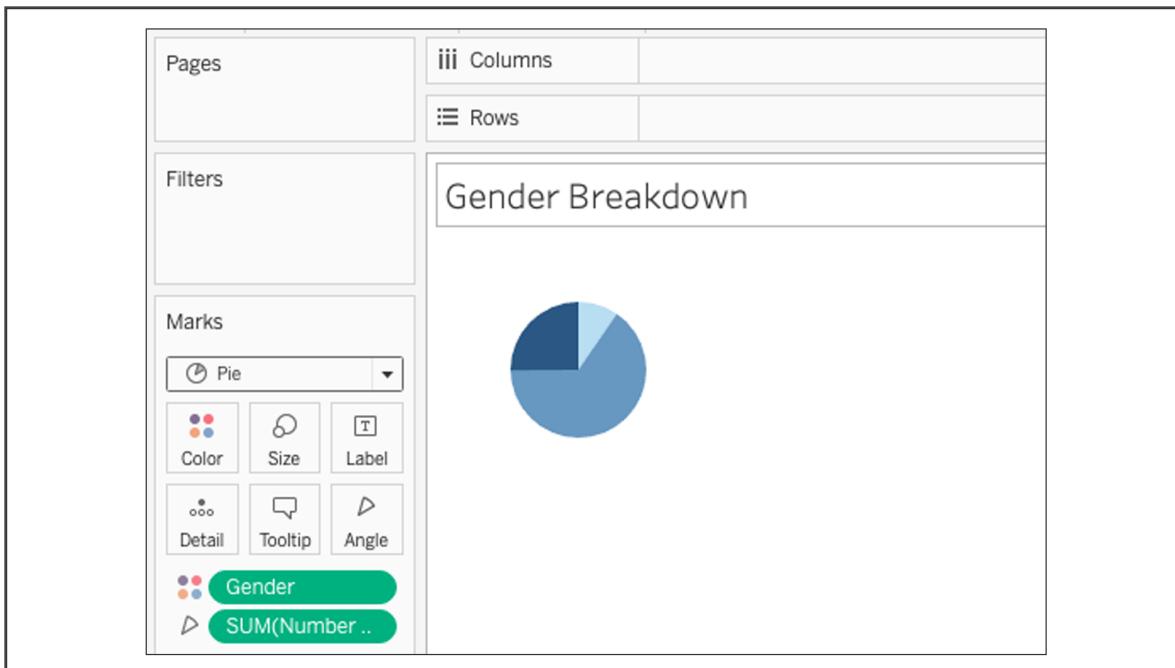
Next, identify the measures and dimensions needed for this worksheet: Gender and Number of Records measures.

Drag the Gender measure to the Color mark. Your worksheet should look like the following:



In the Marks section, you'll notice Gender is within a "SUM" function. We'll want to change this to a dimension, as this will allow it to be the sum of all gender rows we have in our data. Place your cursor over "SUM(Gender)." Click the arrow and select the dimension button.

Next, drag the “Number of Records” measure to the Angle mark. Your worksheet will be updated to look like the following:



If you place your cursor over each piece of the pie, you will see 0, 1, and 2. If you go back to where we downloaded our data, Citi Bike tells us that 0 represents “Unknown,” 1 represents “Male,” and 2 represents “Female.” But remember, even though we have this information, the audience viewing our data likely will not. Therefore, we need a calculated field.

Create a Calculated Field

A calculated field essentially allows us to write code to customize our data. In this case, we'll customize so that the pie chart has a tooltip that displays Unknown, Male, and Female.

To create a calculated field, return to the data source tab, as shown in the following image. You can do this by clicking the data source tab at the bottom of your workspace:

Connection
 Live Extract

201908-citibike-tripdata.csv

Sort fields Modified

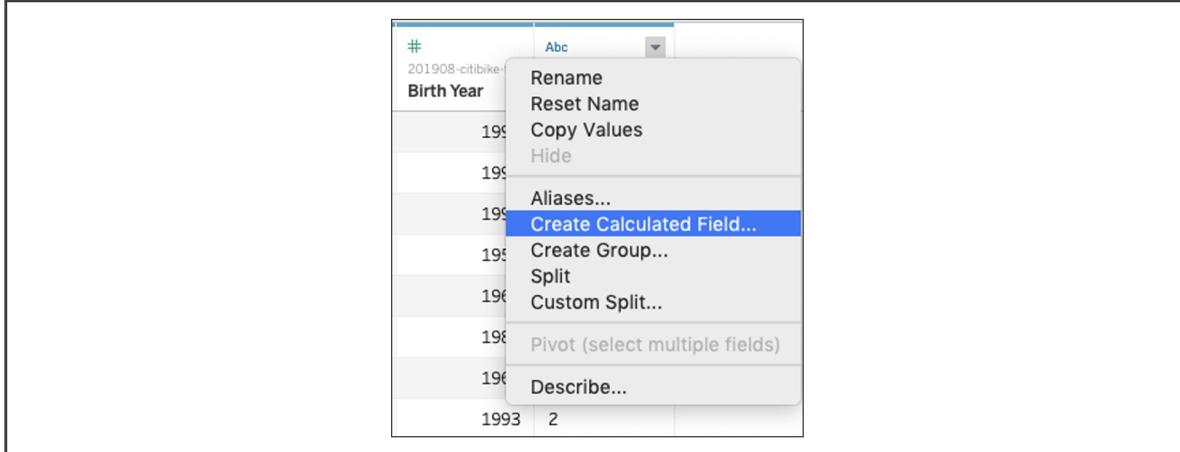
| # | 201908-citibike-tripdata.csv | Starttime | 201908-citibike-tripdata.csv | Stoptime | 201908-citibike-tripdata.csv | Start Station Id | 201908-citibike-tripdata.csv | Start Station Name | 201908-citibike-tripdata.csv | Start Station Lat... | 201908-citibike-tripdata.csv | Start Station Long... | 201908-citibike-tripdata.csv | End Station Id | 201908-citibike-tripdata.csv | End Station Name | 201908-citibike-tripdata.csv | End Station Latitu... | 201908-citibike-tripdata.csv | End S... |
|-------|------------------------------|---------------------|------------------------------|-----------------------|------------------------------|------------------|------------------------------|--------------------|------------------------------|----------------------|------------------------------|-----------------------|------------------------------|----------------|------------------------------|------------------|------------------------------|-----------------------|------------------------------|----------|
| 1,473 | 8/1/2019 6:44:52 PM | 8/1/2019 7:09:26 PM | 3,233 | E 48 St & 5 Ave | | 40.757246 | | -73.978059 | | 229 | Great Jones St | | 40.727434 | | | | | | | |
| 1,818 | 8/1/2019 6:44:53 PM | 8/1/2019 7:15:11 PM | 3,110 | Meserole Ave & Man... | | 40.727086 | | -73.952991 | | 531 | Forsyth St & Broome ... | | 40.718639 | | | | | | | |
| 371 | 8/1/2019 6:44:53 PM | 8/1/2019 6:51:04 PM | 3,382 | Carroll St & Smith St | | 40.680611 | | -73.994758 | | 3,315 | Henry St & Degrav St | | 40.684751 | | | | | | | |
| 908 | 8/1/2019 6:44:53 PM | 8/1/2019 7:00:01 PM | 442 | W 27 St & 7 Ave | | 40.746647 | | -73.939315 | | 3,467 | W Broadway & Sprin... | | 40.724947 | | | | | | | |
| 2,038 | 8/1/2019 6:44:53 PM | 8/1/2019 7:18:51 PM | 505 | 6 Ave & W 33 St | | 40.749013 | | -73.988484 | | 3,236 | W 42 St & Dyer Ave | | 40.758985 | | | | | | | |
| 828 | 8/1/2019 6:44:53 PM | 8/1/2019 6:58:42 PM | 477 | W 41 St & B Ave | | 40.756405 | | -73.990026 | | 3,164 | Columbus Ave & W 7... | | 40.777058 | | | | | | | |
| 1,534 | 8/1/2019 6:44:53 PM | 8/1/2019 7:10:28 PM | 363 | West Thames St | | 40.708347 | | -74.017134 | | 514 | 12 Ave & W 40 St | | 40.760875 | | | | | | | |
| 807 | 8/1/2019 6:44:53 PM | 8/1/2019 6:58:21 PM | 518 | E 39 St & 2 Ave | | 40.747804 | | -73.973442 | | 461 | E 20 St & 2 Ave | | 40.735877 | | | | | | | |
| 556 | 8/1/2019 6:44:53 PM | 8/1/2019 6:54:09 PM | 2,017 | E 43 St & 2 Ave | | 40.750224 | | -73.971214 | | 487 | E 20 St & FDR Drive | | 40.733143 | | | | | | | |
| 416 | 8/1/2019 6:44:54 PM | 8/1/2019 6:51:50 PM | 279 | Peck Slip & Front St | | 40.707873 | | -74.001670 | | 257 | Lispenard St & Broad... | | 40.719392 | | | | | | | |
| 2,172 | 8/1/2019 6:44:54 PM | 8/1/2019 7:21:06 PM | 3,467 | W Broadway & Sprin... | | 40.724947 | | -74.001659 | | 499 | Broadway & W 60 St | | 40.769155 | | | | | | | |
| 756 | 8/1/2019 6:44:54 PM | 8/1/2019 6:57:30 PM | 532 | S 5 Pl & S S St | | 40.710451 | | -73.960876 | | 3,668 | Leonard St & Nassau ... | | 40.723957 | | | | | | | |
| 330 | 8/1/2019 6:44:54 PM | 8/1/2019 6:50:25 PM | 3,453 | Devoe St & Lorimer St | | 40.713352 | | -73.949103 | | 3,767 | Powers St & Olive St | | 40.713230 | | | | | | | |
| 462 | 8/1/2019 6:44:55 PM | 8/1/2019 6:52:38 PM | 533 | Broadway & W 38 St | | 40.752996 | | -73.987216 | | 450 | W 49 St & B Ave | | 40.762272 | | | | | | | |
| 227 | 8/1/2019 6:44:55 PM | 8/1/2019 6:48:43 PM | 236 | St Marks Pl & 2 Ave | | 40.728419 | | -73.987140 | | 3,711 | E 13 St & Avenue A | | 40.729667 | | | | | | | |

Number of Records Customer Type Top Starting Location Top Ending Location Gender Breakdown

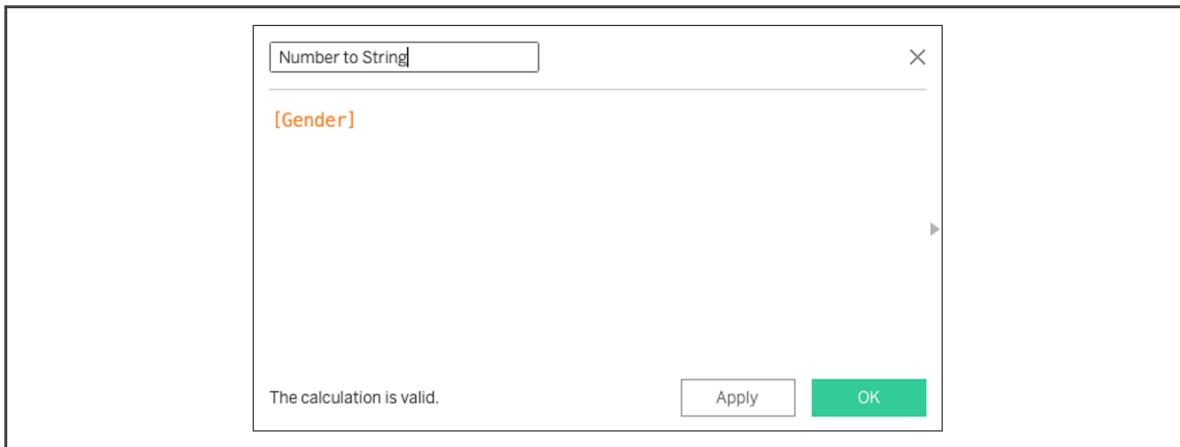
Scroll over to the Gender dimension in your data and click the number sign. Then select the String option. Note that we need to complete this step to ensure the calculated field works correctly:

| # | 201908-citibike-tr... | Gender |
|---|-----------------------|-------------|
| | 1992 | 201908-citi |
| | 1994 | 2 |
| | 1992 | 1 |
| | 1959 | 1 |
| | 1964 | 1 |
| | 1987 | 1 |
| | 1961 | 2 |

With the data type changed, we can start looking at the calculated field. Click the arrow in the Gender dimension and select “Create Calculated Field,” as shown in the following image.



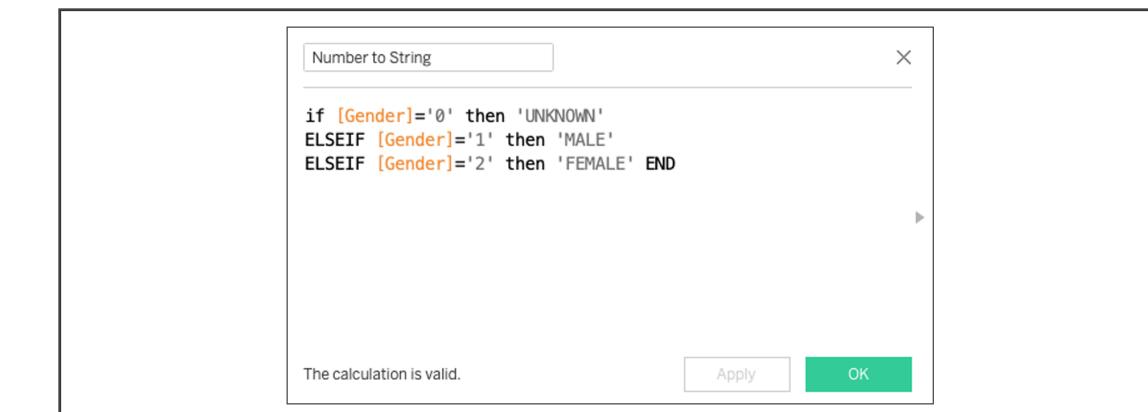
The image below shows the window that will pop up after selecting “Create Calculated Field.” Change the name of the calculated field to “Number to String.”



Remember that we want to convert all numbers in the Gender dimension to the string version of unknown, male, or female.

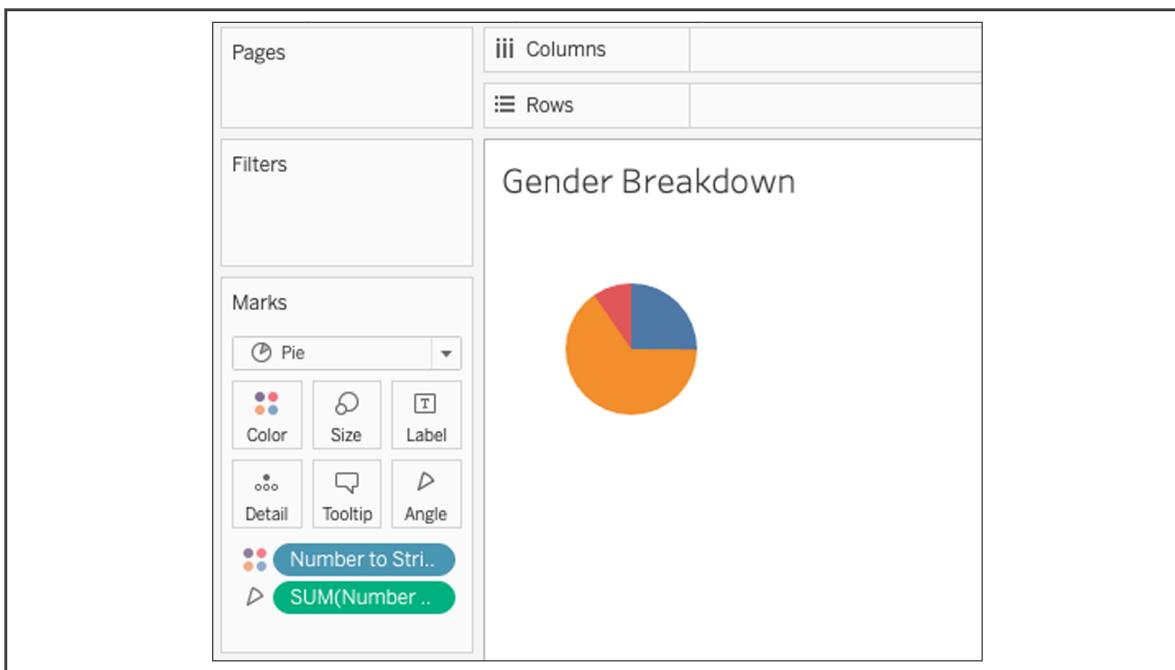
SKILL DRILL

Use your coding and Google search skills to convert the numbers in the Gender dimension to unknown, male, or female.



Once this code has been entered, click OK. Your pie chart will be updated so that you can see the number for each gender.

Now return to your worksheet and drag the “Number to String” dimension to the Color mark. This is what your worksheet will look like now.



Great work! Remember that you can place your cursor over each of the pie slices to see which gender tends to use bike sharing the most.

14.3.4: Find the Average Trip Duration by Age

You think about other questions the data can help answer. You've unpacked the when, the where, and the who, but what about "how long"? You need to determine the average ride duration.

We know the breakdown of riders by gender, but learning other details about the riders will further assist our analysis. Let's take a look at the average duration of a bike ride, by age. This will help us set expectations for trip duration in Des Moines.

What Is the Average Trip Duration by Age?

Begin by creating a new worksheet named "Average Trip Duration." The next step is to identify the measures and dimensions needed.

Which of the following measures and dimensions are needed to find average trip duration by age?

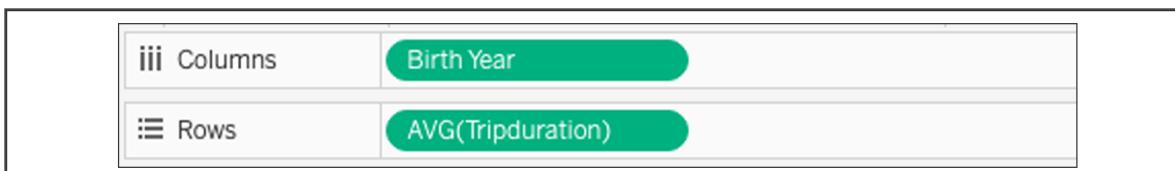
- Tripduration, Birth Year
- Tripduration, Number of Records
- Tripduration, Number of Records, Birth Year

Check Answer

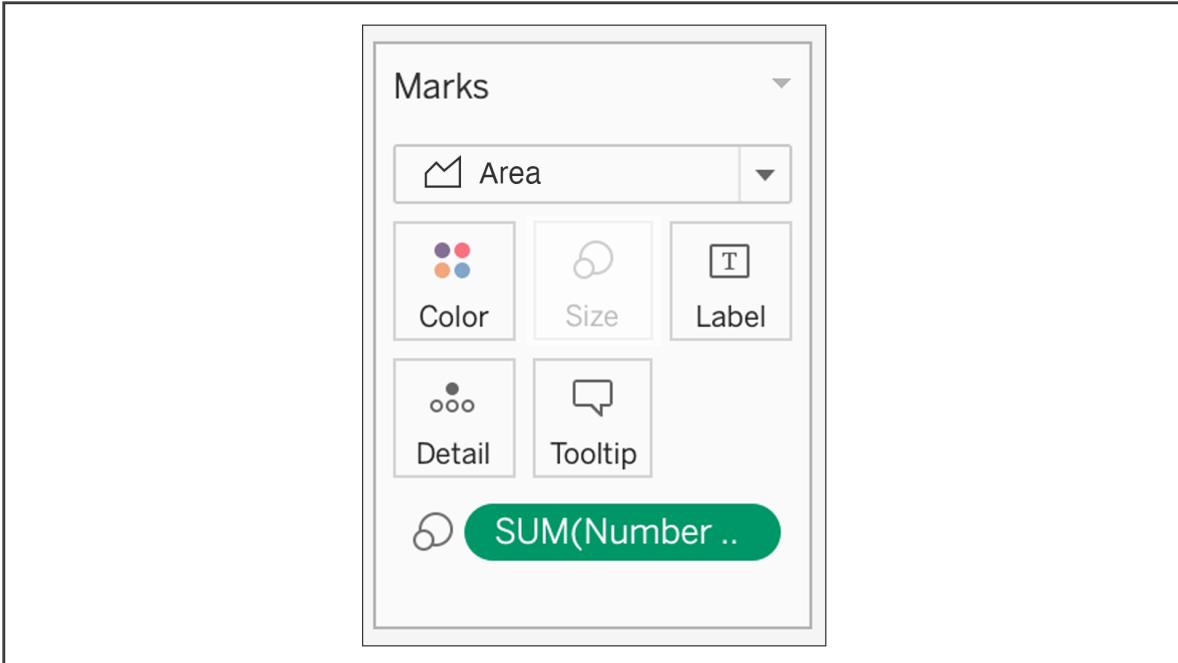
Finish ►

Nice work! We have the measures and dimensions we need. Drag Tripduration and Birth Year to the worksheet.

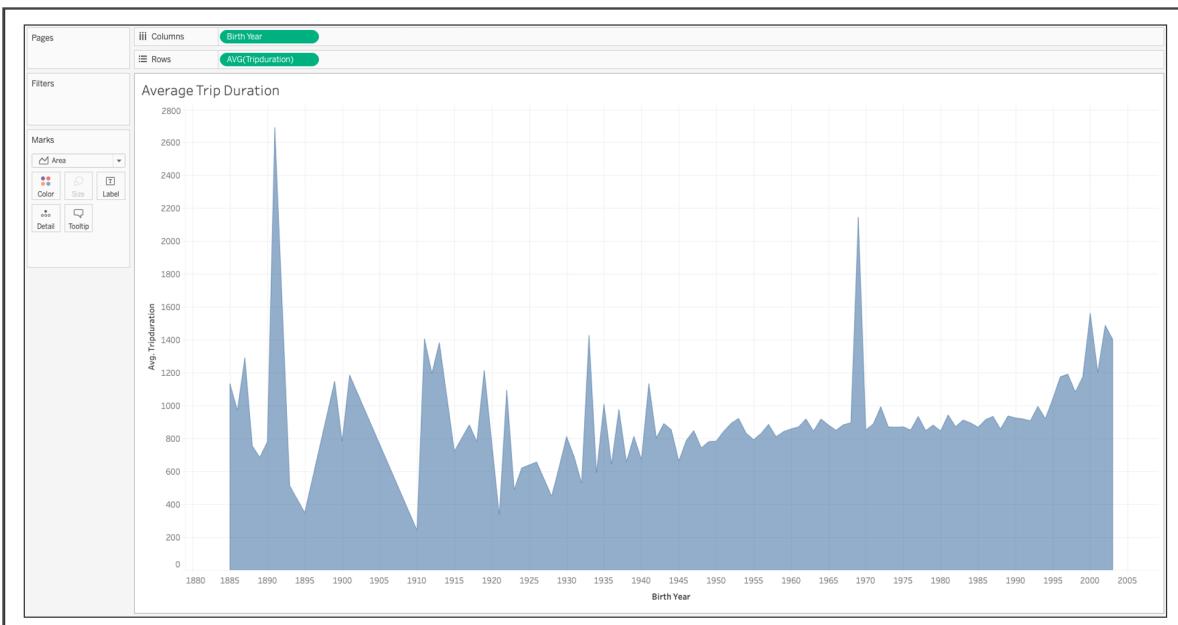
We'll create an area chart, which will best represent this data. Area charts in Tableau are essentially line charts that are filled in below the line. Get started by dragging the Birth Year dimension into the Columns section, and the Tripduration measure into the Rows section. Be sure to change the Tripduration to be the average rather than the sum, as shown in the following image:



Next, go to the Marks section and change the visualization type to Area:



Your worksheet will now look like the following:



Great job—we have a plot that represents our data well. Take a moment to view the worksheet and think about what the data is telling us. How is birth year related to the length of a bike ride?

In general, what is the relationship between birth year and trip length, according to the data?

- In general, the later the birth year, the longer the ride duration.
- In general, the later the birth year, the shorter the ride duration.
- In general, the earlier the birth year, the longer the ride duration.

Check Answer

Finish ►

14.3.5: Determine the Bikes Due for Repair

Kate is trusting you to put together a strong presentation for the investors, so you're trying to think like one. What might the key costs be in a bike-share business? You mull over this question until inspiration strikes: beyond the initial setup, bike maintenance will likely be one of the biggest expenses. So, what can the data tell us about the upkeep bikes might need?

A likely concern of investors is the cost of bike upkeep. The bikes used most frequently will probably be the ones that require the most maintenance, so we'll need to determine which bikes have the highest sum of "Number of Records."

Which Bikes Are Most Likely Due for Repair?

Begin by creating a worksheet called "Bike Repairs." Now identify the measures and dimensions needed.

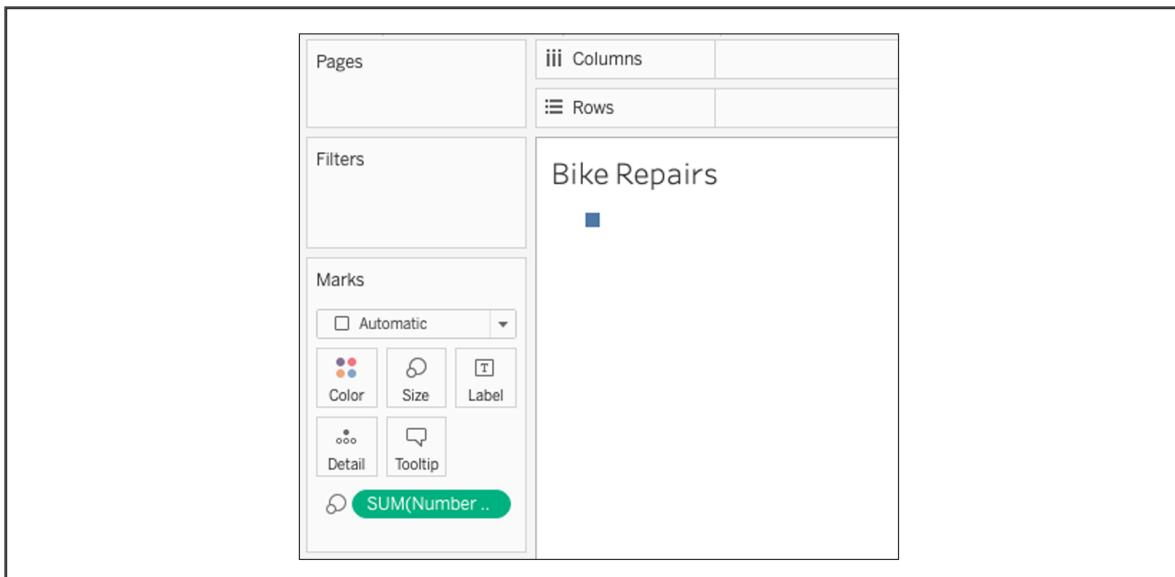
What are the measures and dimensions we will need for this worksheet?

- Measure Values, Bikeid
- Bikeid, Tripduration
- Bikeid, Number of Records

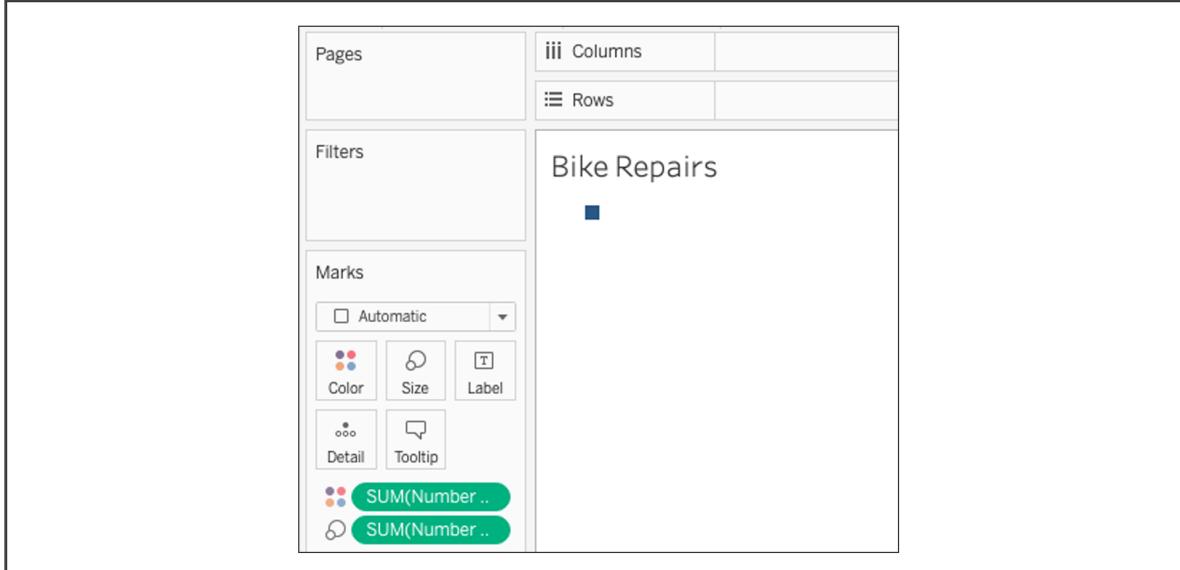
Check Answer

Finish ►

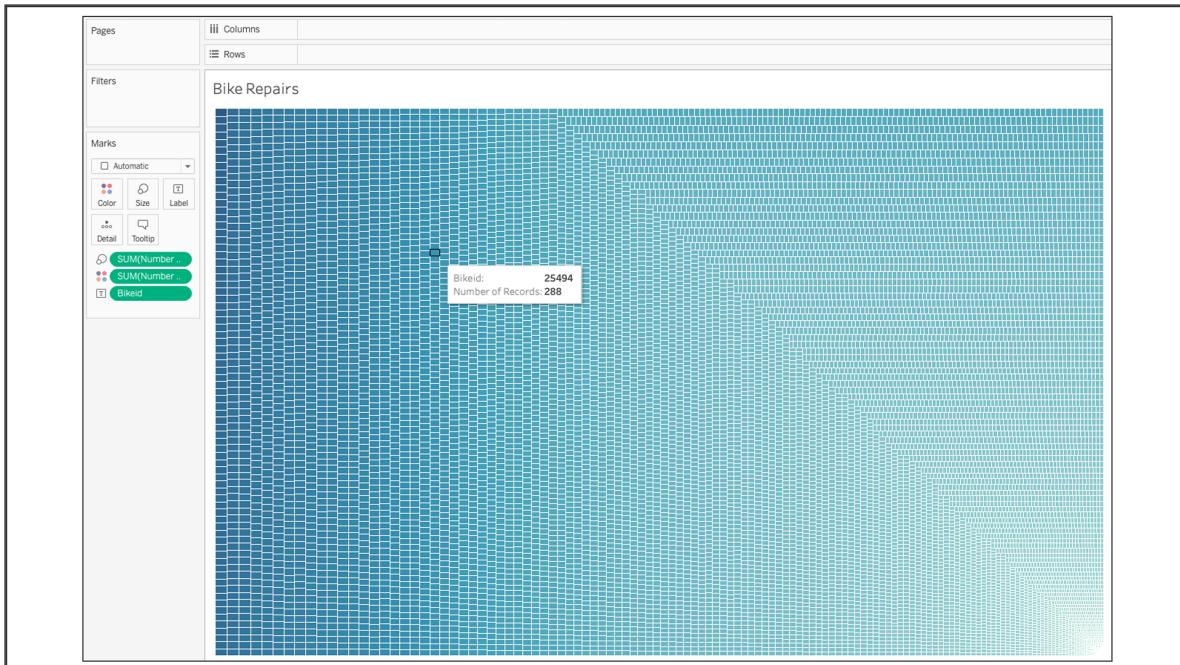
Now let's create a treemap. Start by dragging the "Number of Records" measure to the Size mark. Note that "Number of Records" should be preceded by SUM, as shown in the image below:



Next, drag the Number of Records measure to the Color mark. Here's what that will look like:



Finally, drag the Bikeid measure to the Text mark. You will need to change the Bikeid to a dimension by clicking the arrow in the “Bikeid” box and selecting dimension. The worksheet will now look like the following:



Good work! Now we can look at our treemap to get an idea of how often each bike is used, and then note which ones are used most frequently.

SKILL DRILL

Consider how this data might be better represented. Then redesign the worksheet to more clearly represent the bikes that might need the most

repairs. In order to redesign the worksheet, you may need to look at other visualizations that might be a better fit.

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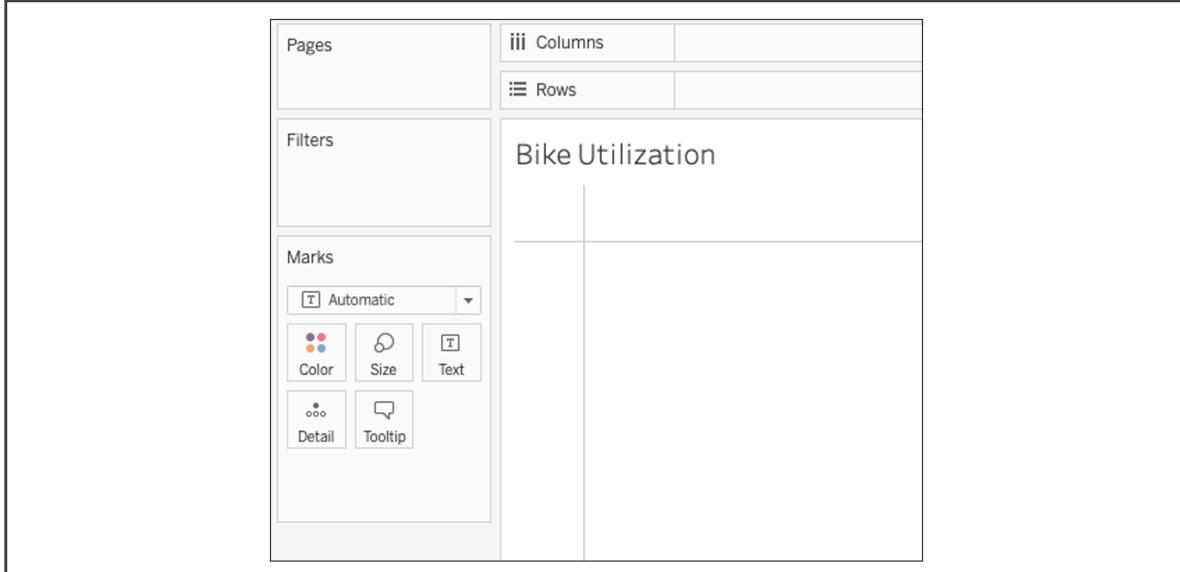
14.3.6: Determine Bike Utilization

Your investors are curious about the bike utilization during the month of August. You'll need to show the utilization of each Citi Bike in New York City. This will continue to help you understand the needs of a bike-sharing business in Des Moines. For this task you'll use the bike ID as a metric for determining which bikes have the highest utilization.

Now that we've found the number of trips per bike during the month of August, we should figure out how long those rides are and if there are bikes that need more attention than others. We'll use the bike ID as a metric for this part of the analysis and create a packed bubbles visualization.

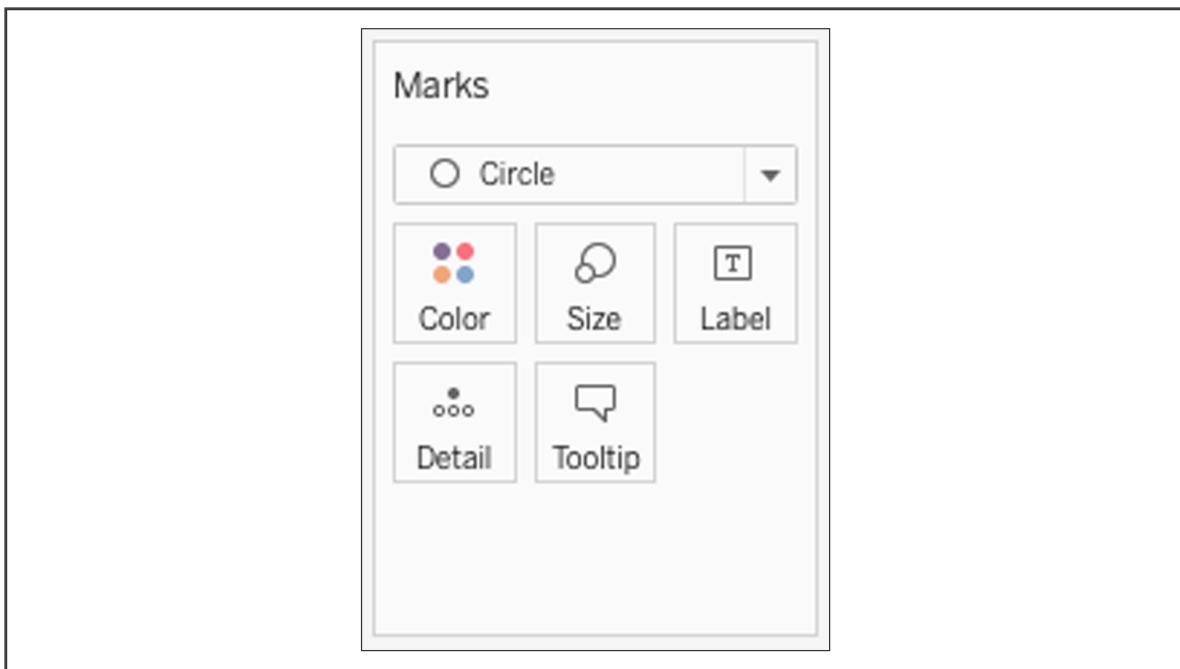
How Variable Is Bike Utilization?

Begin by creating a new worksheet named Bike Utilization. Here's what your workspace will look like after creating the worksheet:

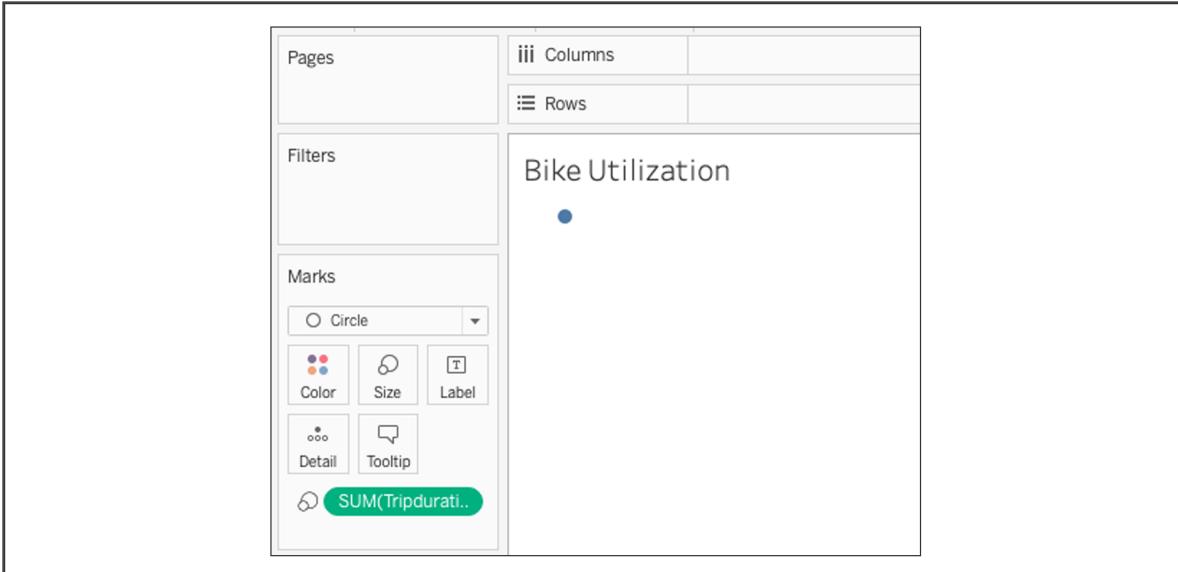


Next, identify the measures and dimensions needed to create the packed bubbles visualization: Tripduration and Bikeid. These will allow us to view the total usage time per bike, as well as which bikes are used the most frequently, which will give us insight into which bikes may need repairs.

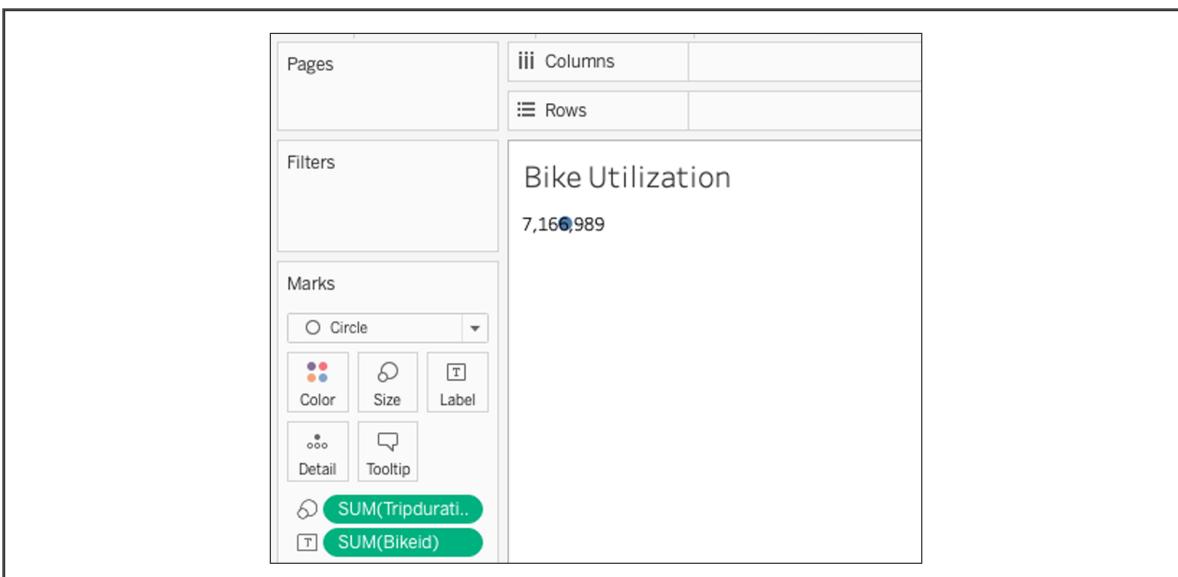
Go to the dropdown menu in the Marks section and select Circle, as shown in the following image:



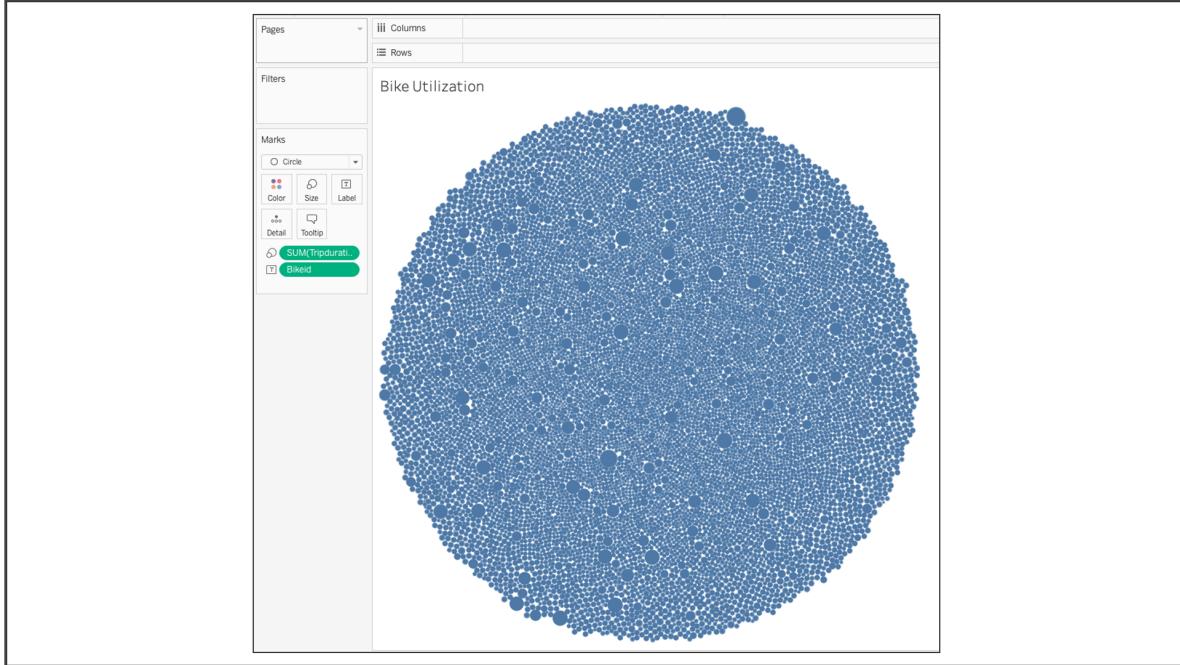
Next, drag the Tripduration measure into the Size mark, so that your workspace looks like this:



Then drag the **Bikeid** into the Text mark:



You may notice that the plot doesn't look quite right. There is only one point in the visualization, which is not what we want. To fix it, change the **Bikeid** to a dimension. Now the plot will look like the following:



Nice work! The bubbles in this plot show the bike utilization levels. If a bike has a higher utilization level, it will be a larger bubble. Feel free to change the colors to make the more utilized bikes stand out more.

Now that we've got our bike utilization by **Bikeid**, we can start to piece together some of the questions that we've answered. Let's dive deeper into this.

14.4.1: Introduction to Dashboards

Kate calls you with exciting news: the potential investors have agreed to an in-person pitch!! You quickly review your findings and decide they aren't quite polished enough for a full-fledged, real-time, big-deal pitch. You want to put something together that both eloquently answers investors' questions and that really pops. So it's on to the next Tableau tool: dashboards.

Now that we've started to answer some questions with our data, we need to begin piecing it all together. Each of these pieces will lead us closer to being able to tell a story with our data. Let's explore the role of Tableau dashboards in the data storytelling process.

In Tableau, dashboards can help us identify areas that might need to be explored more deeply. For example, if one map seems to have more popular locations, we may need to look more closely at how many bikes are stationed in those areas and whether there are enough of them. Let's review how dashboards will help us accomplish these kinds of tasks.

Dashboard Overview

Dashboards in Tableau are simply collections of worksheets. You can arrange the worksheets however you like within the dashboard. Dashboards allow you to

simultaneously view multiple worksheets. When you modify a worksheet, it automatically updates the dashboard.

Benefits of Dashboards

In Tableau, dashboards and stories are similar, so it's important to understand their key differences and functions.

The primary function of dashboards is not necessarily to tell a story, but rather to organize and view data in a central location. Dashboards allow us to share data in a way our audience will easily understand, rather than simply showing them a bunch of worksheets.

Now let's cover some best practices for creating and using dashboards.

14.4.2: Dashboard Best Practices

You want to ensure that the work you present to investors is high-quality, in order to instill confidence in your business proposal. It's time to dive into some best practices for creating dashboards in Tableau.

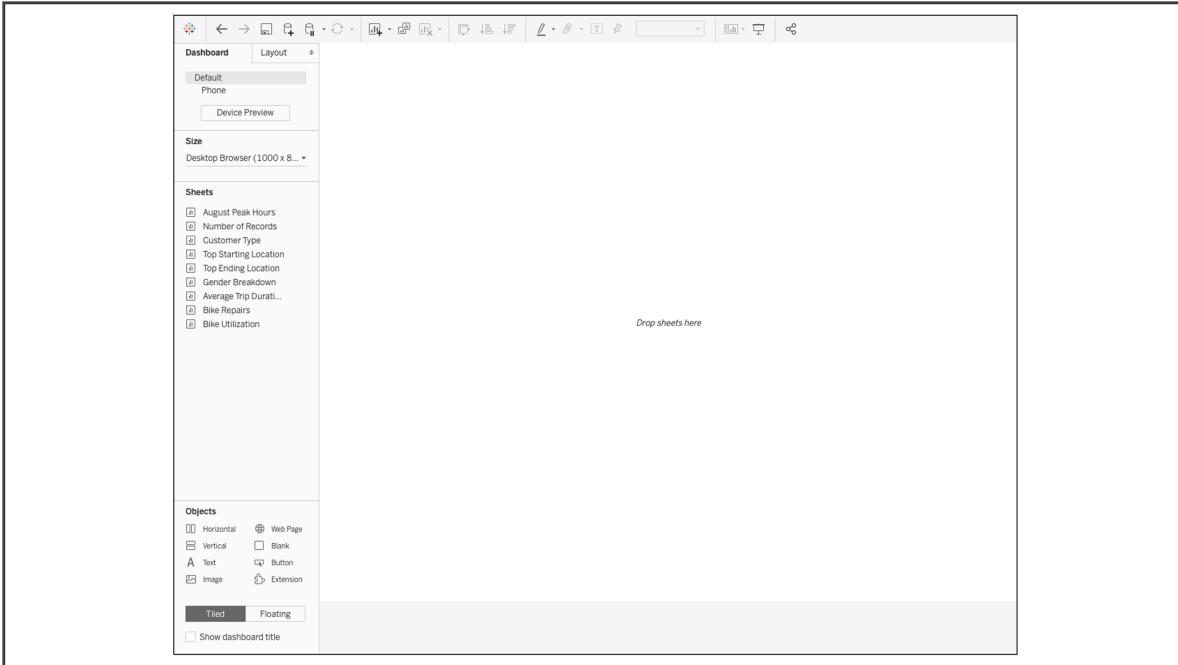
In order to explore dashboard best practices, we need to actually create a dashboard and then design it. Let's create our first dashboard!

Creating a Dashboard

To create a dashboard, click the middle tab (that looks like a grid with a plus sign) at the bottom of your workspace, as shown below:



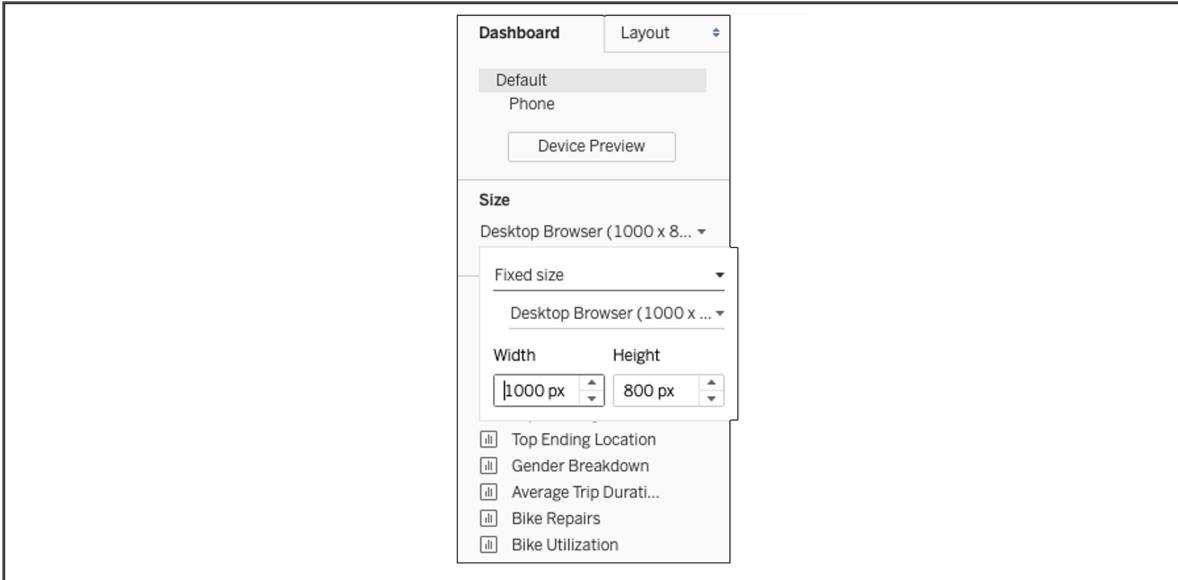
You will see the following screen:



At the moment, your dashboard is likely named something like **Dashboard 1**. Let's rename the dashboard to reflect what we'll be using it for. (Remember, you can rename your dashboard at any time depending on how it changes.) For now we'll call it "NYC Citi Bike." Rename it following the same steps you used to change the titles of worksheets.

Next, decide the size of the dashboard. Depending on the audience and how they'll be viewing the dashboard, you may want to consider changing the size to better fit their devices.

Look in the top left of the dashboard workspace where you should see a dropdown of options, as shown in the following image:



You can either choose a fixed size, automatic, or range. Generally, you'll want to stick with fixed size or automatic. If you don't know what devices your audience will have, it might be better to choose automatic. However, if you know your audience will have about the same computer screen size, you can choose the fixed size.

For simplicity's sake, let's choose the fixed size for a generic browser.

Designing the Dashboard

Dashboards provide a way for us to display all of the worksheets that we've already created, in order to piece together the bigger picture. The main purpose of a dashboard is not necessarily to tell a story, but rather to display data in a readable format.

When designing a dashboard, it's important to prioritize which worksheets go on the dashboard first. Generally, the first worksheet will be the most prominent and show the most informative data, so be sure to get the data you care the most about on the page first.

Let's look at a few key aspects of designing a dashboard: purpose and audience, filtering, highlighting, and objects.

Purpose and Audience

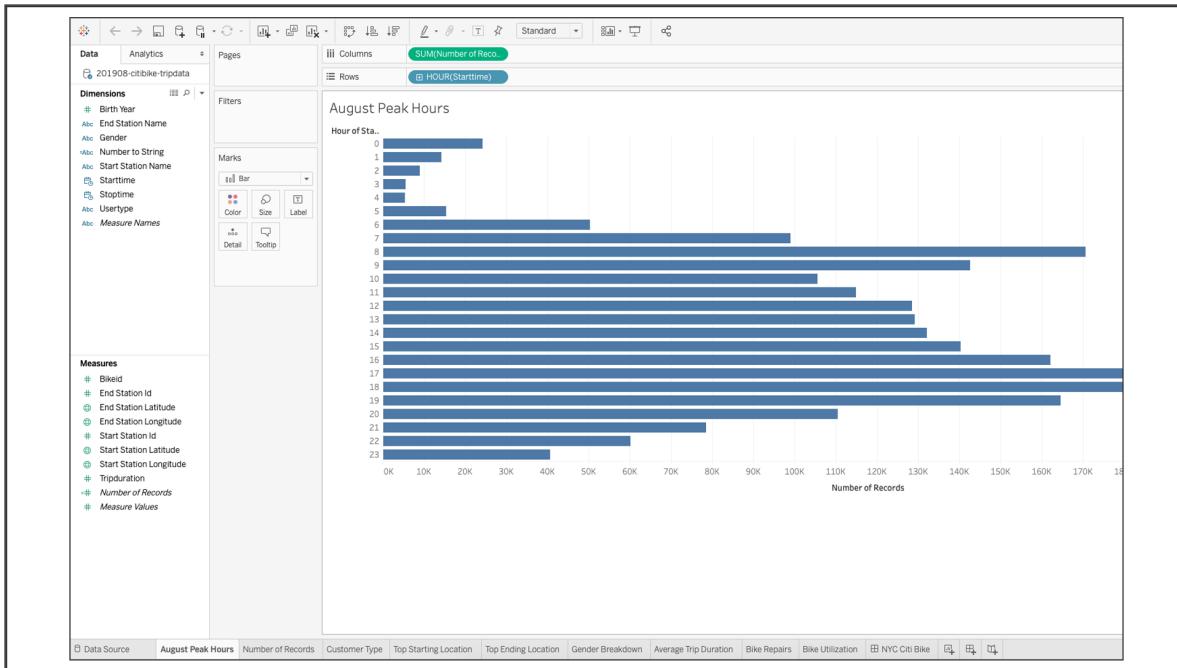
It's important to understand who your audience is when creating a dashboard in order to ensure the data is relevant to them. For example, an executive may be more interested in the specific locations where bikes will be stored, while a developer may want to know specific data about the site, like the location, number of people using it, and more.

Filtering

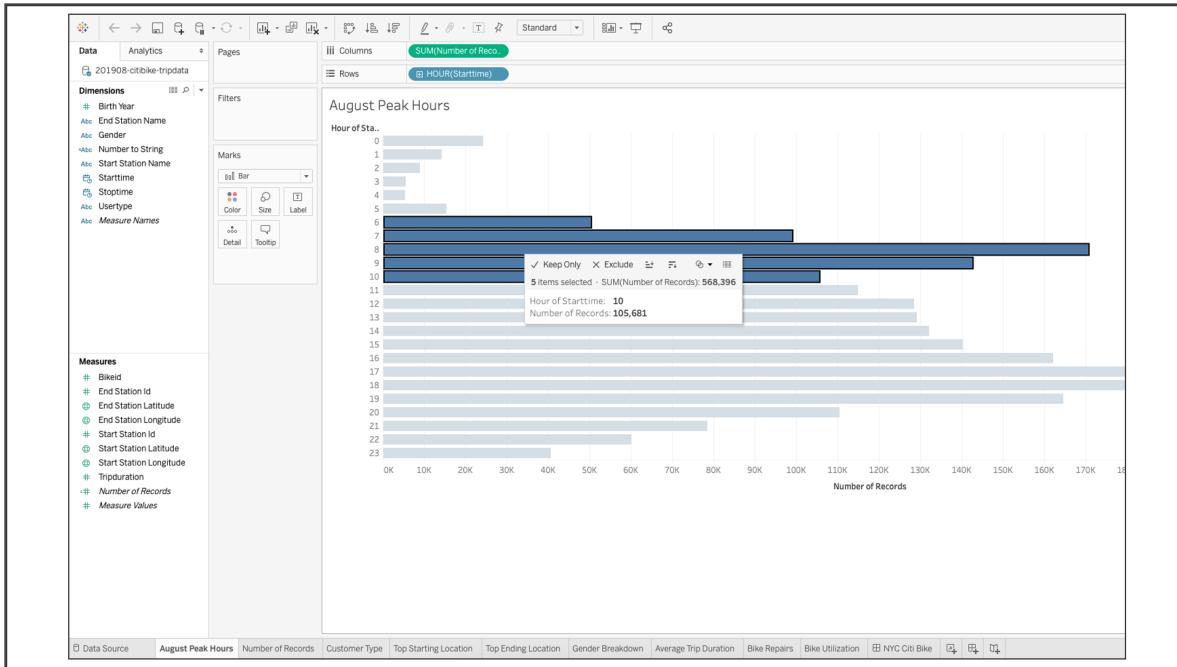
Filtering plays a big role in operability of your dashboard. You can use filters to display certain subsets of data.

Highlighting

The highlighting feature allows you to select subsets of data. To highlight, drag your mouse over a data subset, which will essentially filter out everything but the data you selected. For example, take a look at the August Peak Hours worksheet:



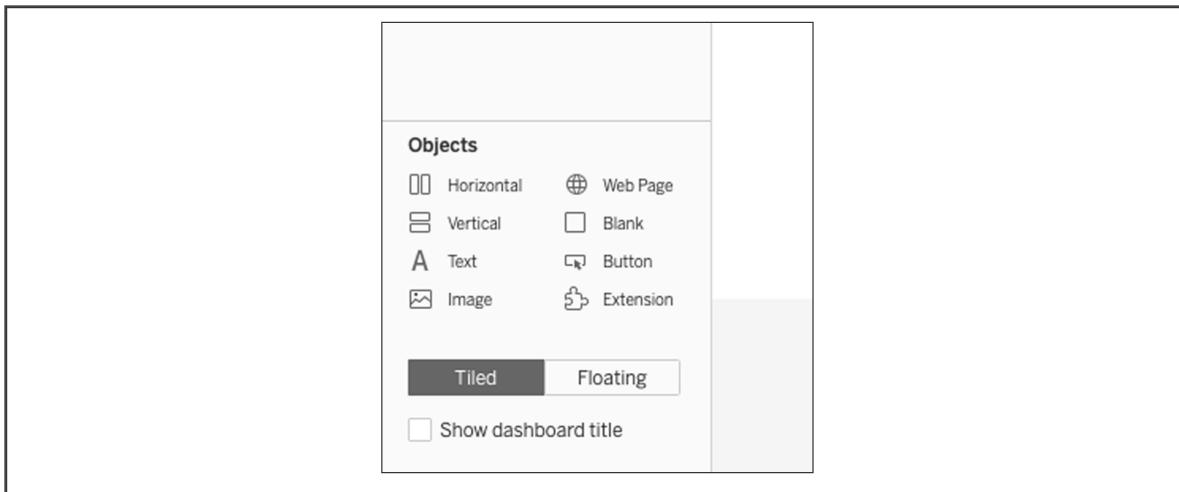
Suppose we want to find the number of rides from 6:00 a.m. to 10:00 a.m. To do this, click the 6:00 a.m. bar and then drag to the 10:00 a.m. bar, as shown in the following image:



If you place your mouse over the hours, you'll see that the sum and the number of items are selected. Select a subset of the hours in the bar chart. Try looking at other dashboards to see the kinds of insights you can get by highlighting subsets of data.

Objects

Most of the time, you'll add worksheets to your dashboard, but occasionally you may need to add links or photos. For example, you may want to add your company logo at the top of a worksheet, or add a link to an external website. You can add both of these items to your dashboard using the objects, which is shown in the following image:



You can drag these objects into your dashboard. You should be aware of two types of objects: tiled objects and floating objects. **Tiled objects** are essentially a structured way to arrange your dashboard. **Floating objects** allow you to change the size of the object and can overlap with other objects. Try both now to see the differences.

Structuring Worksheets in a Dashboard

Worksheets in your dashboard should be structured in an organized, thoughtful way. Include a title for your worksheet, and put the most important data in the top left corner. This is where your eyes will gravitate to first, so make it easy to read.

After adding the most important information in the top left, you can add more information on the right. Most of the time, your audience will read the information in the dashboard from left to right. Then, place the rest of the worksheets around your primary worksheet.

Remember, structuring worksheets is a muscle that you will build over time—but it takes practice!

Ensure Fast Load Times

Something you need to consider is the load time for your data, which can be affected by the data source you're using. For example, if you're using a database from a database server, Tableau will need to query the database. Depending on how much data there is, your dashboard can be slowed down significantly.

For this project, you don't need to worry about optimizing your dashboard. But if you are interested in learning more on this subject, see this article on [tips to make your dashboards more performant](https://www.tableau.com/about/blog/2016/1/5-tips-make-your-dashboards-more-performant-48574) (<https://www.tableau.com/about/blog/2016/1/5-tips-make-your-dashboards-more-performant-48574>).

14.4.3: Add Worksheets to the Citi Bike Dashboard

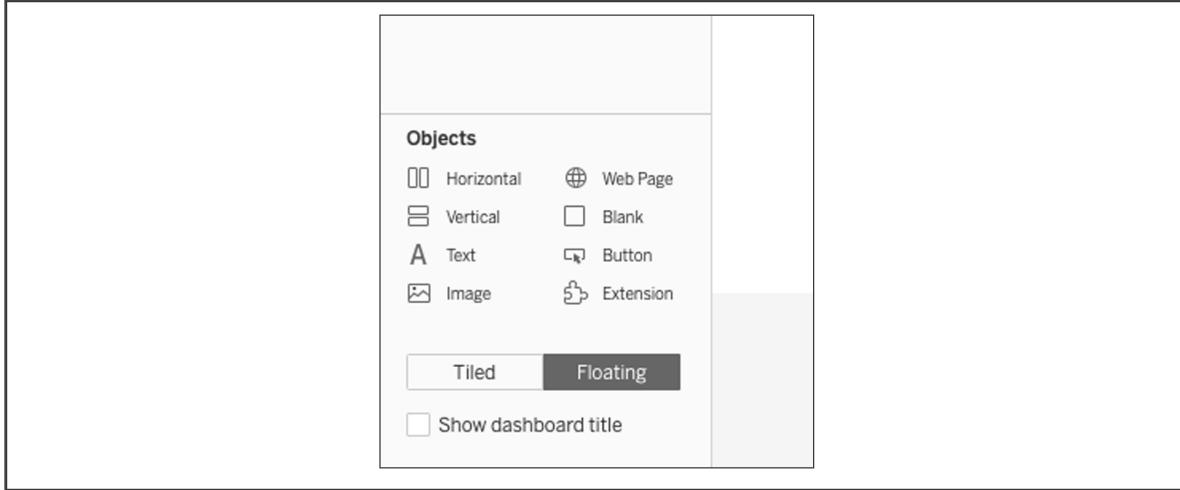
Now that you've explored some best practices for Tableau dashboards, it's time to build out the dashboard you'll present to investors.

As we begin to build our dashboard, consider our main objective: we want to show investors the most important relevant data so that they will support the Des Moines bike-sharing business.

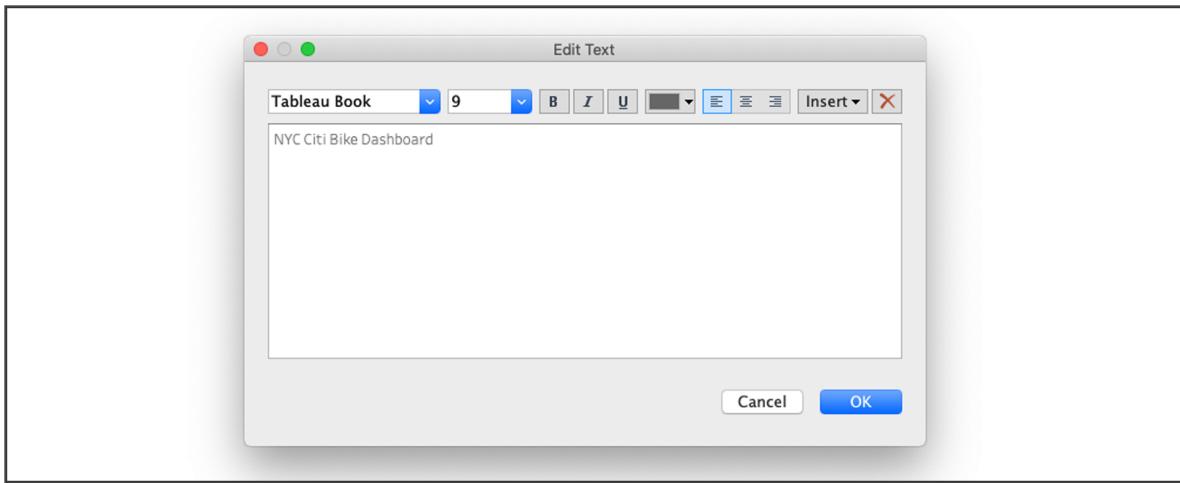
We'll create a sample dashboard to understand the overall process. Once you feel comfortable adding worksheets, feel free to add as many as you like. Also, while this process requires creativity, keep in mind the goal you are trying to accomplish. Finally, remember that your dashboard won't look exactly like those of your peers, and that's a good thing. Let's get started!

Add a Title

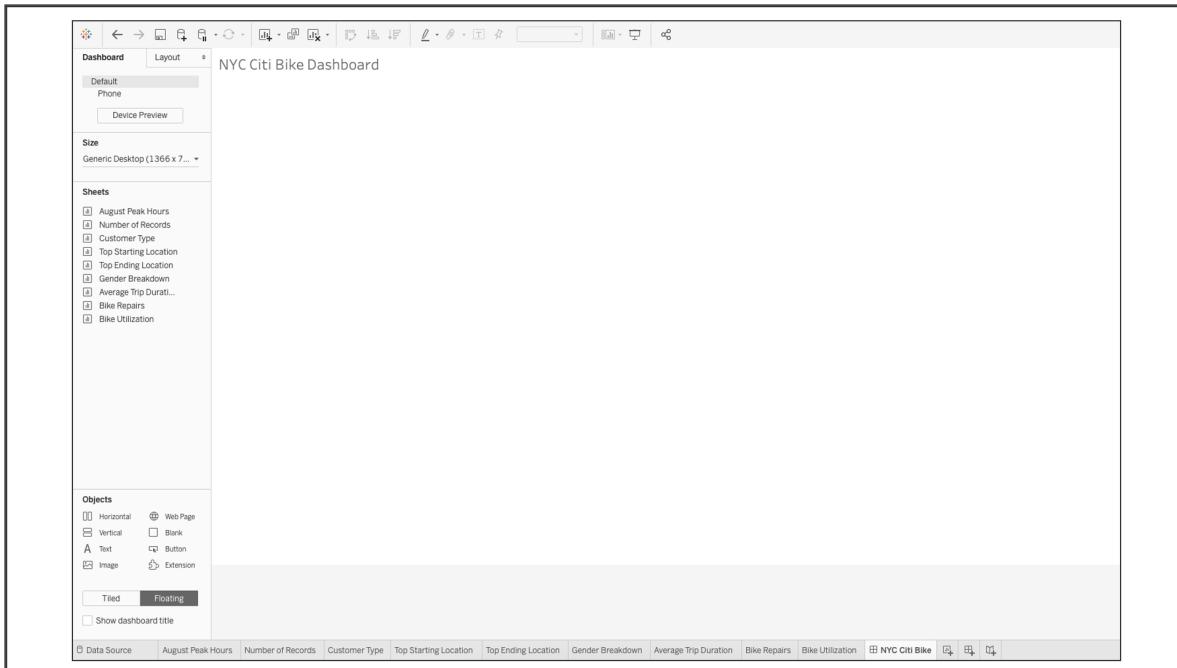
Start by adding a title to the "NYC Citi Bike" dashboard. We can call it "NYC Citi Bike Dashboard" for now. To do this, click the Floating button.



Next, drag the Text object to anywhere on the screen. This will open a window where you can edit the title of the dashboard, as shown in the following image:



Change the size of the title to 16, and move the title to the top left-side of the page so that it looks like this:



Nice! Now let's look at our worksheet options.

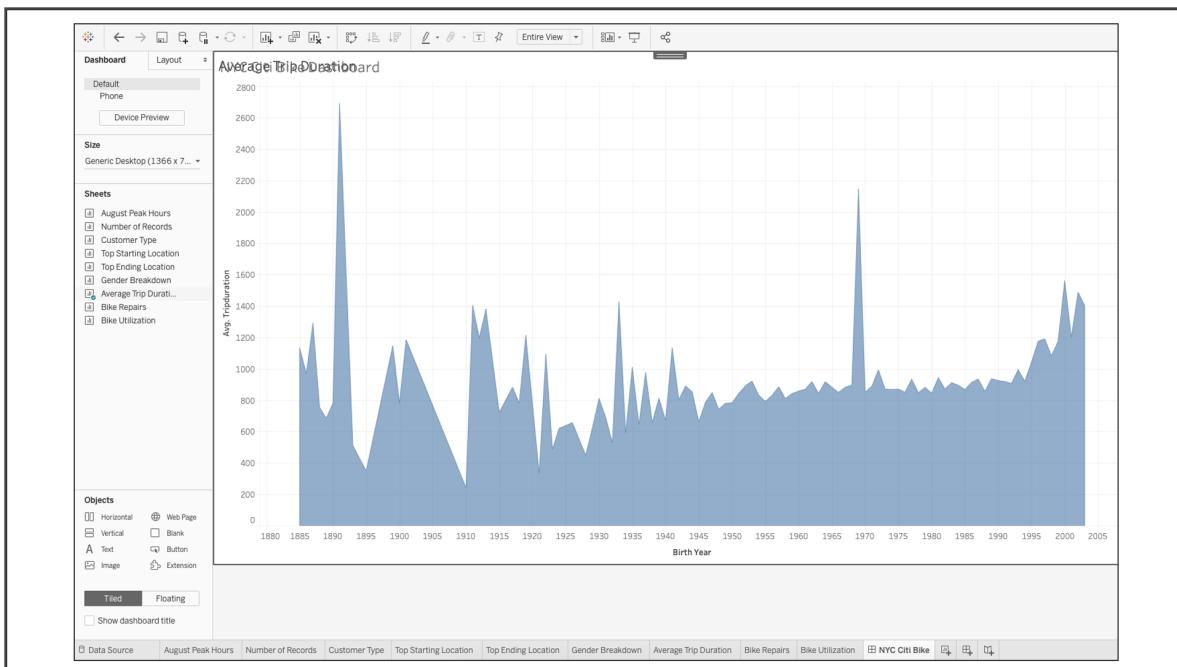
Select Worksheets to Add

Look through the worksheets you've created so far. Which ones are the most relevant for our audience? Consider again the data that we want to present and what our audience is most interested in. Our audience—the investors—want to learn how the Citi Bike program works during the month of August in New York City.

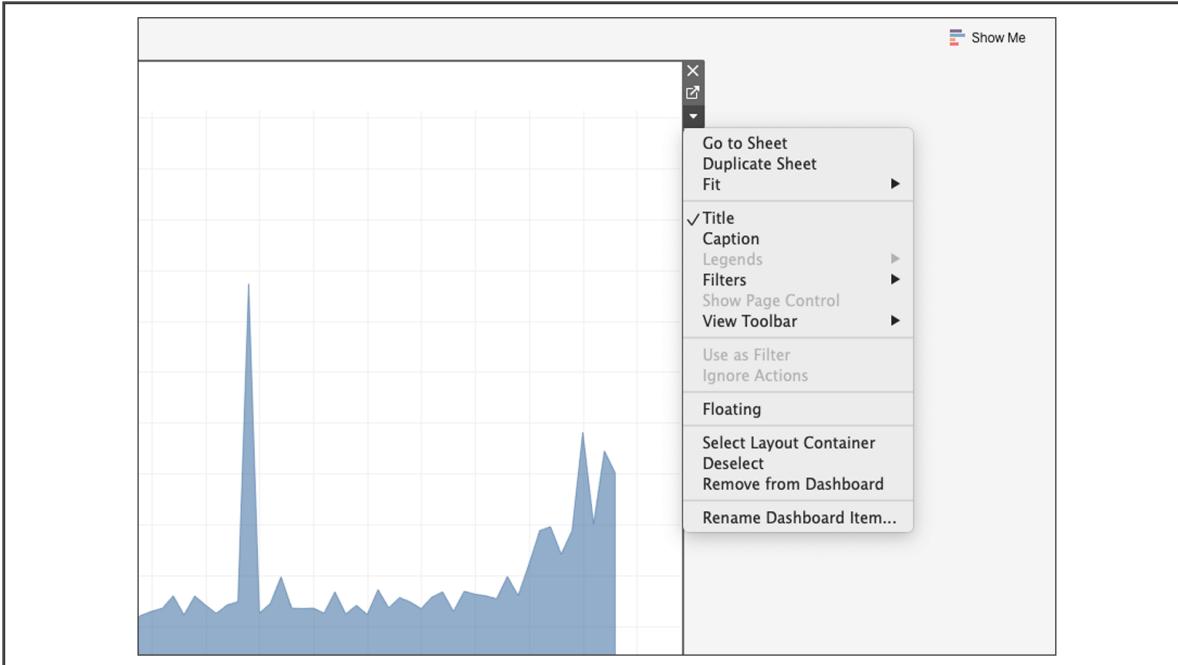
First look at the Average Trip Duration worksheet. This worksheet is a good candidate for the primary spot on our dashboard. You will need to select 'Tiled' before we can move forward. Now, your dashboard should look like this.

This screenshot shows the dashboard creation interface. On the left, there's a sidebar with sections for 'Dashboard' (Default, Phone, Device Preview), 'Size' (Generic Desktop), 'Sheets' (listing various reports like August Peak Hours, Number of Records, Customer Type, etc.), and 'Objects' (Horizontal, Vertical, Text, Image, Web Page, Blank, Button, Extension). Below these are 'Tiled' and 'Floating' buttons, and a 'Show dashboard title' checkbox. At the bottom of the sidebar are tabs for 'Data Source' and several reports. The main area is titled 'NYC Citi Bike Dashboard' and contains a large, empty white space.

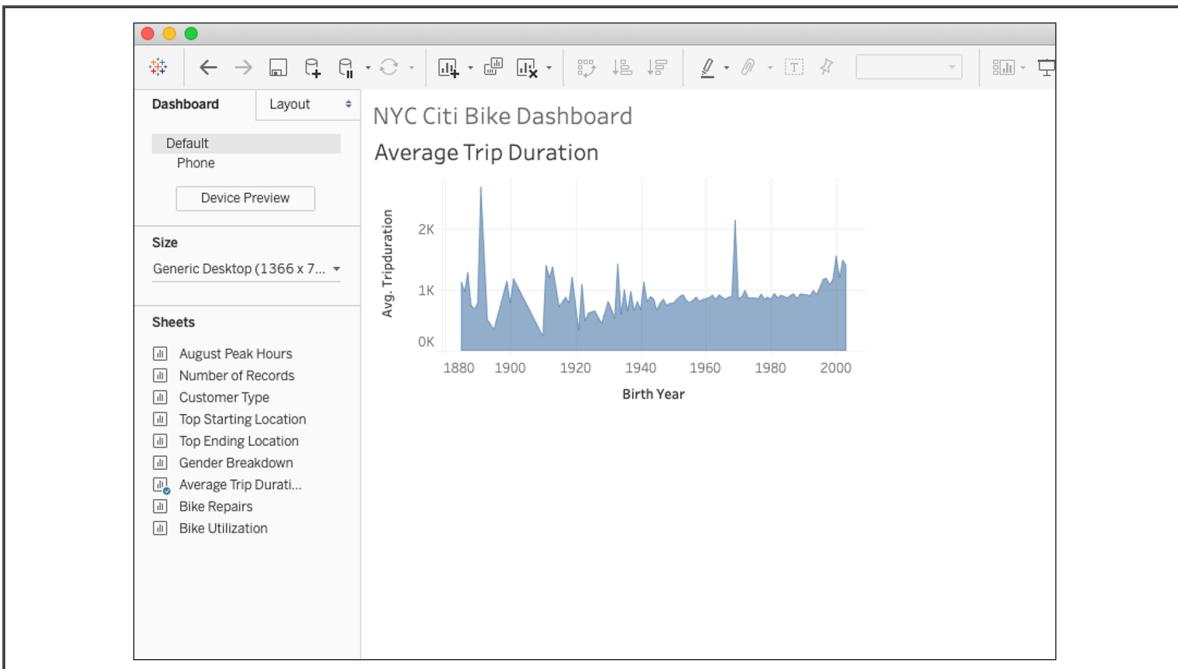
Drag Average Trip Duration worksheet to the dashboard:



You'll notice that the worksheet is taking up most of the screen, which is not what we want—we want to be able to add other worksheets to the dashboard. To fix this, click the arrow in the top right of the worksheet, and then select "Floating," as shown in the following image. This will reduce the size of the worksheet so that you can easily adjust and move it around as you see fit. When you are adding a worksheet, you can always just select "Tiled" or "Floating" first, then drag your worksheet onto the dashboard.

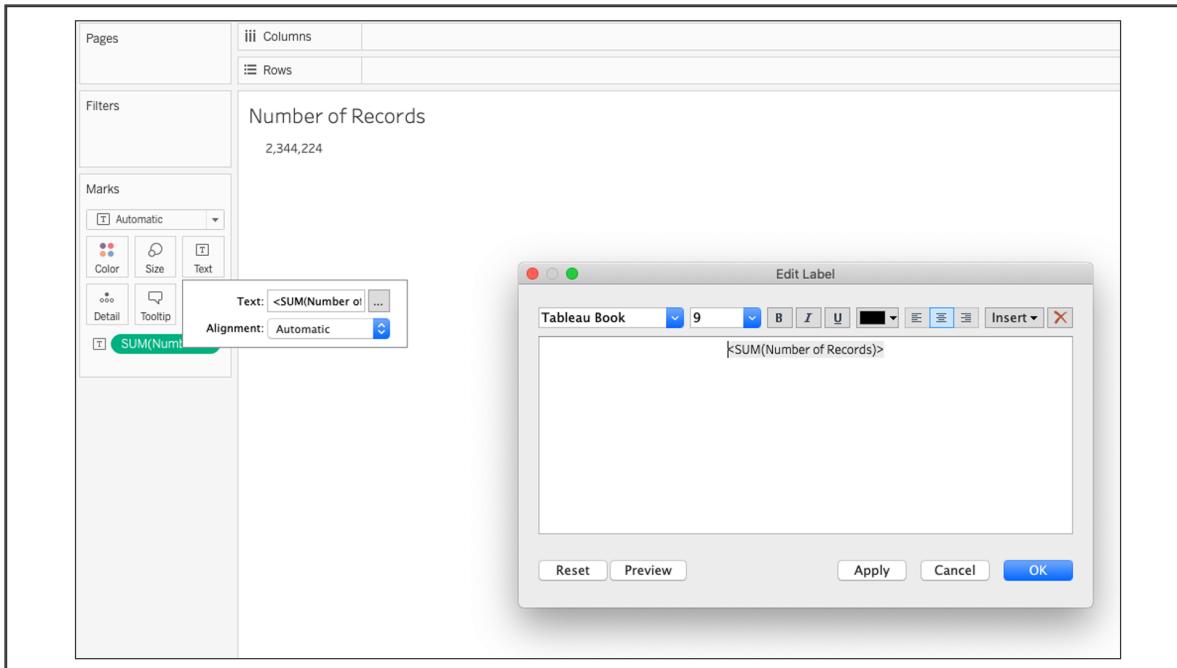


When you change the worksheet to “Floating,” here’s what you should see:



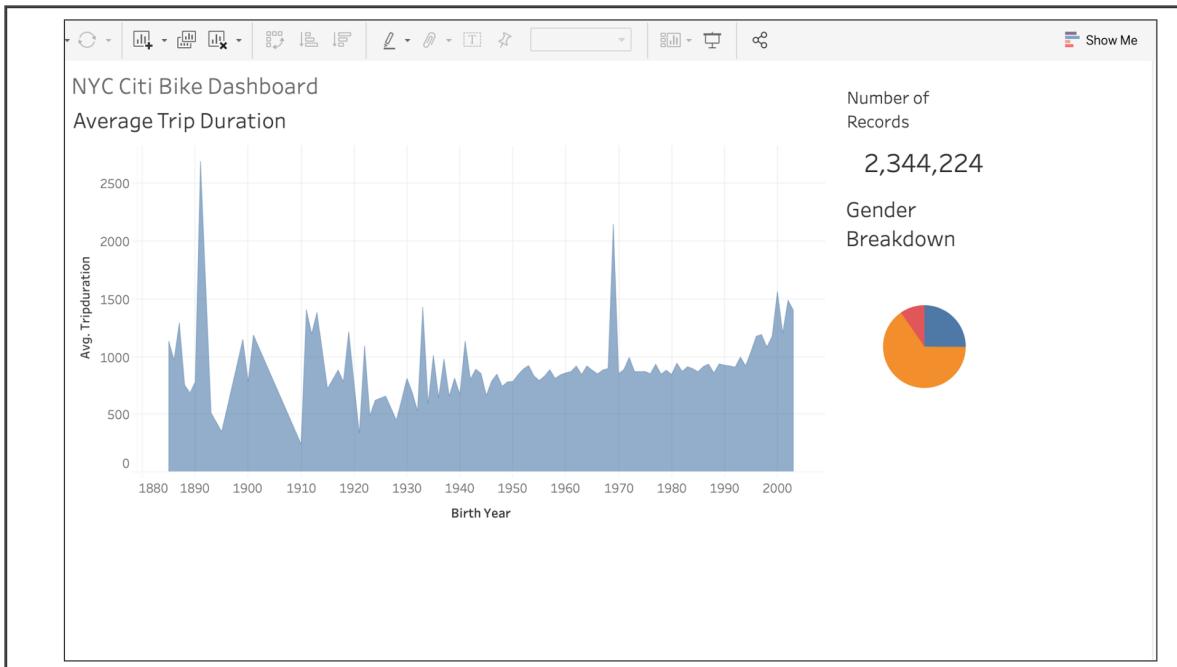
Next, we need to identify the total number of rides during the month of August. We'll use the Number of Records worksheet for this, so drag the worksheet to your dashboard. Be sure to change it to “floating.”

You may notice that the font size is relatively small, so let's change it. Return to the worksheet and click the Text button in the Marks section, and then increase the font size so that it's more readable. See the following image:



Go back to the dashboard and adjust the size of the worksheet window. Use your best judgment to reposition it.

Next, let's add the Gender Breakdown worksheet by dragging it to the dashboard. Remember to change it to a floating worksheet. Here's what your dashboard should look like now:

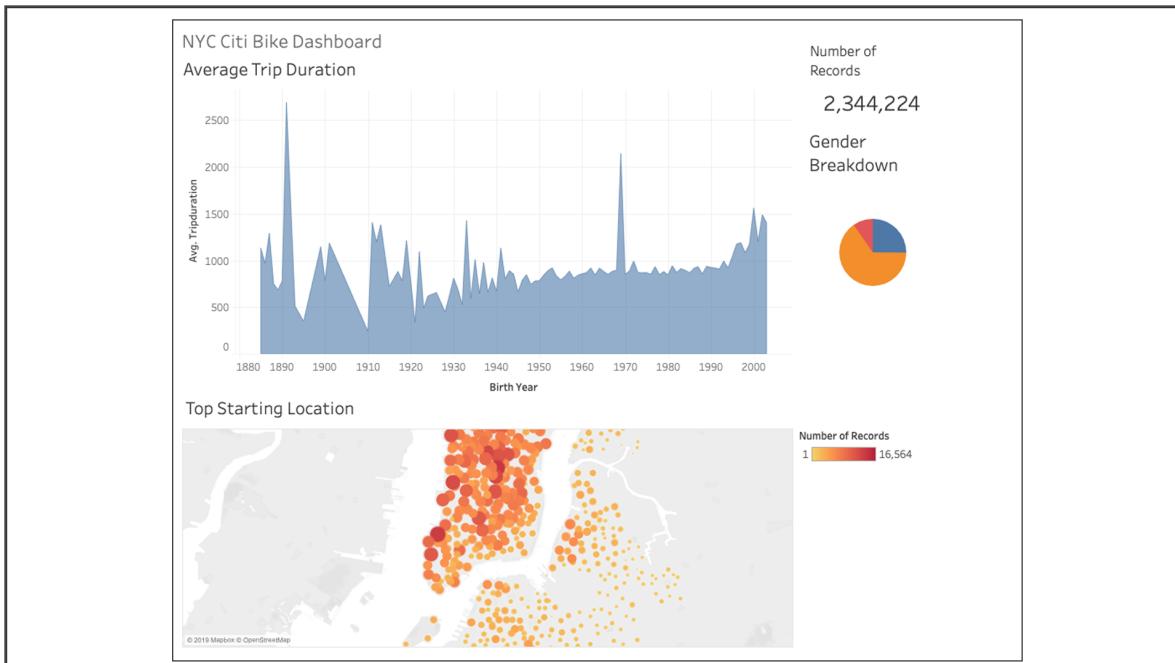


Let's add one more worksheet: Top Starting Location.

NOTE

Remember, the dashboard we're building is just an example. You are free to use different worksheets that you feel better fit your needs, but aim to have three to four worksheets in your dashboard.

Drag the worksheet to your dashboard and position it as you see fit. Here's what your dashboard might look like now, depending on where you placed it.



You've created your first dashboard—nice work! There's a lot you can do in a dashboard, so the best way to optimize the design is to keep playing around with the features. Feel free to keep adjusting your dashboard, and remember that yours may not look like your peers' dashboards—and that's okay!

Styling Dashboards

Dashboards not only need to be informative, but also aesthetically pleasing. Most of the cosmetic changes occur in the worksheets, but you should still structure the dashboards so that they are easy to read and understand.

Consider how you could improve the current design and structure of your dashboard right now. Maybe you could add or remove a title of a worksheet, or make one worksheet more prominent than the others. And if you do want to make one worksheet more prominent, consider why.

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14.5.1: Introduction to Tableau Stories

Congratulations—your investors were impressed with your work on the NYC Citi Bike Dashboard. The data was readable and digestible. Now they want something that tells a story about the data you presented. It's time to convince them that this bike-sharing idea could work in Des Moines, Iowa.

Tableau Dashboards vs. Tableau Stories

Earlier we discussed how dashboards and stories are similar but have key differences. Dashboards are intended as a way to view data side by side. Stories also allow us to view different data simultaneously, but their main purpose is to tell a story, share a point of view, or convince an audience to take a particular stance.

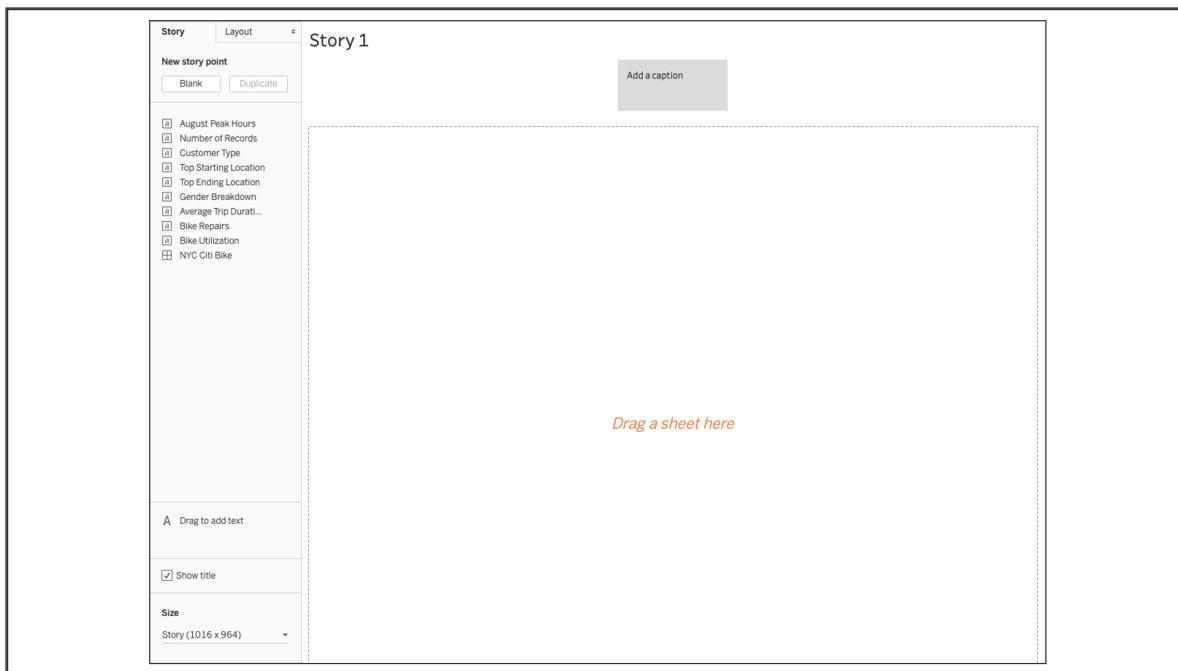
Stories do this by **sequencing** visualizations to help the audience understand the bigger picture. In our case, we want to create a story that explains why you think, given the data, that starting a bike sharing company in Des Moines is a good idea. For this we'll use data from our worksheets with additional elements that provide more context. These additional elements could be boxes, text, arrows, and more.

Before we can do this, let's get a quick overview of the story workspace and create our first story.

Create a Story

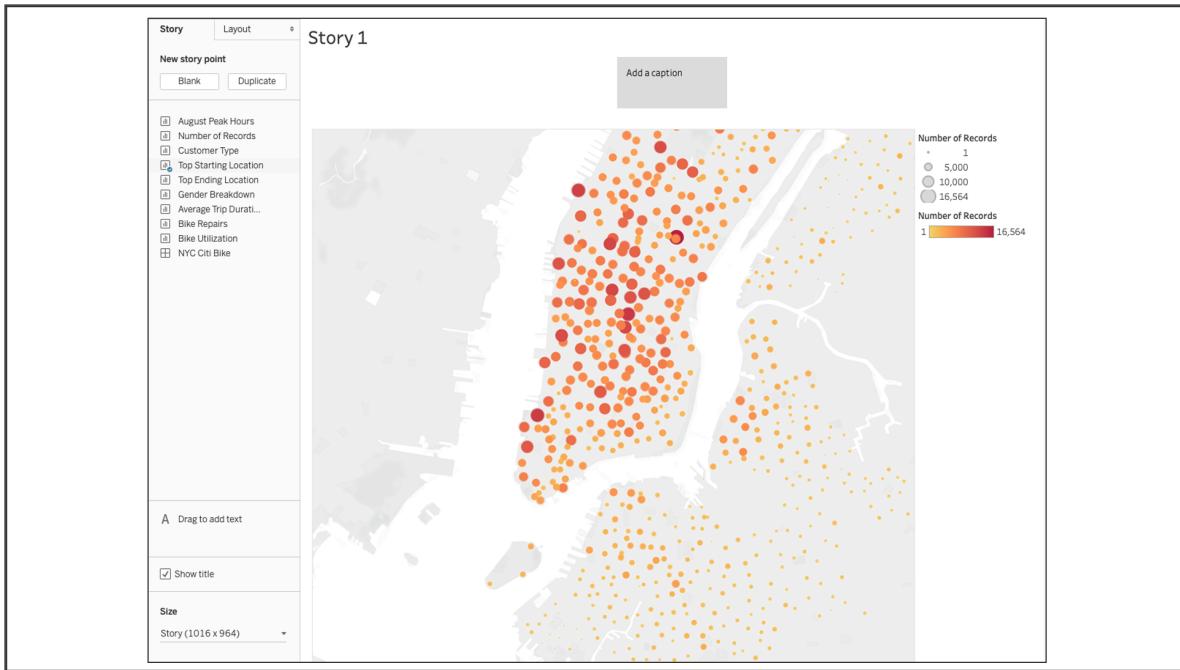
In Tableau, the story workspace is similar to the dashboard workspace but with a few small differences. We'll go over those differences, but first let's take a look at how the workspace is laid out. You will need to create a new story by clicking the story icon at the bottom of the Tableau workspace.

Here's what an empty story workspace looks like:

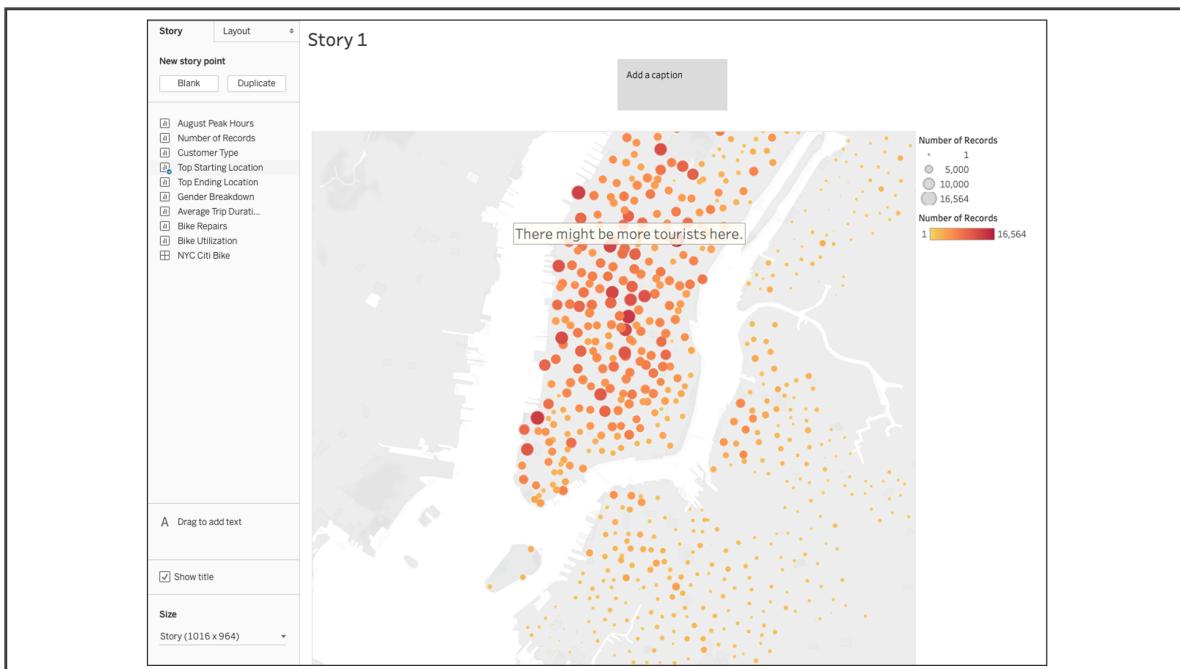


The story workspace is fairly straightforward. You can drag a worksheet or dashboard into the workspace, and then you can add a caption or comments about the story.

As an example, let's drag the Top Starting Locations worksheet into our story, which will look like the following:



Now you can add a caption or text description. Text descriptions are used for describing certain parts of the story and should be used to clarify certain outliers in the data, or why certain data makes the most sense. Let's add text over Manhattan to indicate this area may have more bike rides due to the number of tourists.

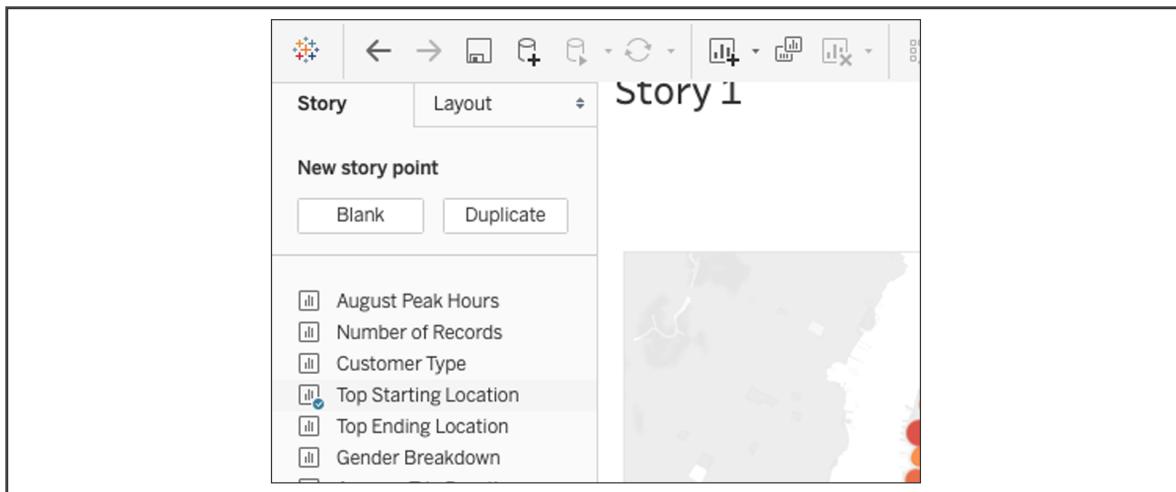


Great work! You've created your first story. Next, let's move on to story points.

Add Story Points

Tableau stories have a feature called story points. **Story points** are simply different points you would like to make about your data. Think of them like the pages in a graphic novel. No image is the same, but they are all part of the larger story. This is the goal of story points, which we'll go into more detail about later. For now, let's create a story point so you know the process.

To create a story point, click the Blank button on the Story tab, as shown in the following image. This will allow you to drag another worksheet into the story point here.



Great work so far with story points! Now your skills in the following Skill Drill.

SKILL DRILL

Work on finishing the story you want to tell with the data. Add a few more story points to make the story complete.

Data Visualization Process

When creating Tableau stories, or data visualizations in general, there's a general process that should be followed. You can use this process for most visualizations you'll create.

1. **Select your questions.** During this step, you'll consider which results you want to share with your audience. What do they want to see? How can we use that information to make their decision making process easier?
2. **Execute independent research.** You'll need to look at other relevant pieces of information to build a bigger picture. Search other sources to find information that will make your visualization more powerful.
3. **Craft your Tableau story.** This is when you create your story, primarily from worksheets and other visuals, with descriptions for each of them.
4. **Create a written analysis.** The written analysis is intended to provide additional insight into what we're trying to convey to our audience. This is a good place to add extra detail so that everyone can get on the same page.

After you've practiced creating Tableau stories, let's create a story for our investors. The purpose of this story is to help them determine whether they should invest in a bike-sharing program in Des Moines.

Module 14 Challenge

[Submit Assignment](#)

Due Apr 19 by 11:59pm

Points 100

Submitting a text entry box or a website url

Now that we've gotten a good idea how to create our story, we can start to form a story to tell to our investors.

Our goal is to convince investors that a bike-sharing program in Des Moines is a solid business proposal. So we want to format our story so it's persuasive! We'll also want to include information about both New York City and Des Moines—after all, the investors will need to understand how the Citi Bike data for New York City applies to our proposal.

For this portion of the presentation, you will work with a team that is trying to answer core questions about opening a bike-sharing business in Des Moines.

In this challenge, you will put together your final presentation and analysis for investors. You'll select the questions you want to answer, conduct independent research, craft your story in Tableau, and then create your written analysis.

Background

The moment has come to put together the final presentation for the investors. You've asked your data a lot of questions: the who, what, where, and how long. The CitiBike data is ready to help you tell a story, but it's up to you and the team to deliver a compelling story. Your final deliverable might look different from a peer's deliverable, and that's okay.

To craft this narrative for the investors, you'll do the following.

- 1. Select your questions.** During this step, you'll consider which results you want to share with your audience. What do they want to see? How can we use that information to make their decision making process easier?
 - 2. Execute independent research.** You'll need to look at other relevant pieces of information to build a bigger picture. Search other sources to find information that will make your visualization more powerful.
 - 3. Craft your Tableau story.** This is when you create your story, primarily from worksheets and other visuals, with descriptions for each of them.
 - 4. Create a written analysis.** The written analysis is intended to provide additional insight into what we're trying to convey to our audience. This is a good place to add extra detail so that everyone can get on the same page.
-

Objectives

The goals of this challenge are for you to:

- Display data professionally and accurately.
 - Professionally style a Tableau story.
 - Utilize previously created Tableau worksheets to create a new story.
 - Create a Tableau story based on starting a bike sharing company in Des Moines.
-

Instructions

The tasks for this challenge are broken up into four key steps: select your questions, do independent research, craft your story, and write an analysis.

Step 1: Select Your Questions

When putting together an analysis, the first thing to consider is what question you will try to answer. To select your question, consider the analysis you have done on the NYC Citi Bike data and consider what investors might want to know about Des

Moines in order to decide whether a bike-sharing program would work there. The questions your team has landed on are below. Choose one to focus on in your analysis.

- What is the population of Des Moines? How does its population compare to the population of New York City? Does the population affect the number of people who will use the bike-sharing program?
- What is the gender diversity of Des Moines? How does it compare to the gender diversity of New York City? What effect does it have on possible business in Des Moines?
- What is the density of McDonald's in New York City versus Des Moines? Does this affect where people go in the city? If so, how?

Step 2: Execute Independent Research

The next critical step is conducting independent research. In this case, consult various resources to help you get a better picture of what a bike-sharing business would look like in Des Moines.

The goal is to find key pieces of information that are relevant to the question you selected and will help investors arrive at a decision more easily. Here are a few resources you might look at:

- Des Moines Census Data (<https://www.census.gov/quickfacts/desmoinescityiowa>)
- Des Moines Tourism Website (<https://www.catchdesmoines.com/things-to-do/>)
- New York and Des Moines McDonald's dataset.

Step 3. Craft Your Tableau Story

Create a Tableau story answering the question you selected. Use story points and arrows to describe your findings.

If you would like more specifics for creating a great story, see Tableau's Best Practices for Creating Great Stories (https://help.tableau.com/current/pro/desktop/en-us/story_best_practices.htm).

Then publish your Tableau story and dashboards to Tableau Public. Tableau Public is a way to share dashboards or stories that you have created online.

NOTE

Note that Tableau Public should not be used for dashboards containing potentially private data; for this you should use Tableau Server. Private data is generally data that would have an impact to a business or person if it were released into the public.

Since the data you're using is not considered private data, you can use Tableau Public.

You can publish your analysis to Tableau Public through the Tableau app. Follow these steps.

1. Go to the Server dropdown menu and select Tableau Public.
2. Click "Save to Tableau Public."
3. To publish your analysis, log in to your Tableau account.

For more information, see [Tableau's documentation on saving workbooks to Tableau Public](https://help.tableau.com/current/pro/desktop/en-us/publish_workbooks_tableaupublic.htm) (https://help.tableau.com/current/pro/desktop/en-us/publish_workbooks_tableaupublic.htm).

Next, copy the link to use in your written analysis.

Step 4: Create a Written Analysis

The goal of your written analysis is to share additional thoughts with your audience, expanding on details and clarifying points that they may not understand. Stories in Tableau can be fairly open-ended, so a written analysis allows you to further share your insights and interpretation of the data in order to help your case.

Length

There is no official guideline for how long a written analysis should be, but you should write enough to convey your points.

Content

Your written analysis can include all or some of the following:

- A summary of your analysis
- A summary of each page in the Tableau story
- Clarifying any data that is unclear or complex

Format

Write your analysis in a markdown file named `citibike_analysis.md`, using VS Code. Your document should include a title. There are different sizes, or levels, of headings that correspond to the number of "#" signs preceding the title. For example:

```
# NYC Citi Bike Analysis
## Smaller Title
### Even Smaller Title
```

The following image shows what your file will look like with text added below the title.

```
# NYC Citi Bike Analysis
This is a summary of the analytic work that I did with the NYC Citi Bike data.
## Smaller Title
### Even Smaller Title
```

When you put `citibike_analysis.md` in GitHub, here's what it will look like:

[INSERT IMAGE 1 HERE]

Alt-Text: The GitHub interface displaying the citibike_analysis.md file.

For more information, see [GitHub's Markdown Cheatsheet](https://github.com/adam-p/markdown-here/wiki/Markdown-Cheatsheet) (<https://github.com/adam-p/markdown-here/wiki/Markdown-Cheatsheet>) .

Submission

As part of your submission for this module, embed the Tableau Public link in your Markdown document. You can do this in a few ways, but here are the two most popular ones:

```
[link to dashboard](LINK GOES HERE)  
[link to dashboard](LINK GOES HERE "link to dashboard")
```

ADD, COMMIT, PUSH

Great work—you've officially created Tableau stories and dashboards that represent your analysis! The investors are excited to review your work.

Now that you've completed the challenge, remember to add, commit, and push your work to GitHub.

Rubric

Please [download the detailed rubric](#)  to access the assessment criteria.

Note: You are allowed to miss up to two Challenge assignments and still earn your certificate. If you complete all Challenge assignments, your lowest two grades will be dropped. If you wish to skip this assignment, click Submit then indicate you are skipping by typing “I choose to skip this assignment” in the text box.

| Criteria | Ratings | | | | | Pts |
|---|----------------------------|--|--------------------------------|-----------------------------|------------------------------|----------|
| Written Analysis Please see detailed rubric linked in Challenge description. | 50.0 pts Mastery | 38.0 pts Approaching Mastery | 26.0 pts Progressing | 14.0 pts Emerging | 0.0 pts Incomplete | 50.0 pts |
| Tableau Story Please see detailed rubric linked in Challenge description. | 40.0 pts Mastery | 30.0 pts Approaching Mastery | 20.0 pts Progressing | 10.0 pts Emerging | 0.0 pts Incomplete | 40.0 pts |
| Independent Research Please see detailed rubric linked in Challenge description. | 10.0 pts Mastery | 7.5 pts Approaching Mastery | 5.0 pts Progressing | 2.5 pts Emerging | 0.0 pts Incomplete | 10.0 pts |
| Total Points: 100.0 | | | | | | |

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Module 14 Career Connection

Welcome back to another Career Connection! This week you explored Tableau, a data analysis tool that is used throughout the data visualization world. In fact, it's so popular because it allows us to create materials that are simple and straightforward enough for nontechnical audiences like recruiters, CEOs, and nontechnical hiring managers.

The job title “technical recruiter” can be confusing. While these recruiters hire technical folks, they aren’t always technically trained themselves. This means that when you “talk tech” with recruiters, you should keep it at a basic level. We regularly run a workshop on this exact topic, “Talking Tech with Recruiters.” You can check it out on the [**Career Services Online Events page**](#) (<https://careerservicesonlineevents.splashthat.com/>) .

Look at it this way: When you’re sitting in a room with the hiring manager or your prospective colleagues, you can pull up Jupyter Notebook or send them a link, and they’ll know how to navigate it. But before you can get to that point, you usually have to go through a recruiter or general HR screening just so they can see what you can do.

The same goes for putting together a presentation for a VP or manager in your company who is not a developer. Tableau allows us to put together these charts in a way that can help us successfully communicate our work and findings with technical recruiters, HR personnel, or other key nontechnical stakeholders in the company.



It's time for you to boost your profile and make yourself a little bit more marketable by employing some **Employer Competitive** strategies. Consider how you can use the material you've learned this week to become more employer-competitive.

1. **Link to your Tableau Public profile.** According to [this article on the Tableau website](https://www.tableau.com/about/blog/2018/7/ways-get-started-tableau-community-90975) (<https://www.tableau.com/about/blog/2018/7/ways-get-started-tableau-community-90975>), "Tableau Public is an open platform where Tableau users globally share their analysis on various topics of interest." You can use Tableau Public to build a profile to showcase the work you've done. Link to your Tableau Public profile from your portfolio and resume. Get started by [creating an account](https://public.tableau.com/en-us/s/) (<https://public.tableau.com/en-us/s/>) and setting up your first visualization.

Whenever you have a recruiting or HR screening call in the future, let them know you have some amazing visualizations for them to check out at your Tableau Public profile. Tell them the link is on your resume, but you can also email it to them directly. (This is the perfect post-interview follow-up opportunity!)

2. **Highlight your Tableau skills.** Add Tableau as a skill in your "Technical Skills" section of your resume. It should be sitting there nice and shiny ready to let prospective employers know that you are already onboarded and ready to go with some of the industry's most-loved technology platforms.

Technical Interview Preparation

We keep telling you that technical interviewing is a skill that requires constant practice and development—and now you get to practice this skill a little more.

Important: Remember, employers are not only looking for the right answer, they're also observing your process and how you approach a topic or problem. So even if you don't know the right answer, it's not the end of the world! Use the opportunity

to demonstrate how you tackle questions for which you don't immediately know the answer.

Read the following sample interview questions. Before viewing the answer, brainstorm some possible responses and write them down.

1. What is data visualization?

Clearly, this question will require your response to go beyond Tableau. However, if you know the company uses Tableau, this is a perfect opportunity to explain how Tableau and data visualization go together, as well as why you are the perfect candidate for the job.

If you're stuck on how to answer this question, consult Google and write a succinct definition (2 or 3 sentences) of data visualization. Refer to this definition regularly to remind yourself.

2. What are filters? How many filters does Tableau have available?

Filters can restrict unnecessary data from your visualization. In other words, they allow us to display only the data that is absolutely necessary to demonstrate our argument or conclusion.

Tableau provides a different ways to filter. Be sure to check these out if you're not familiar with them already.

3. What is your daily work process in Tableau?

Everyone's work process is slightly different, but questions like these help the interviewer determine whether you have an established workflow. Are you organized and know what you want to do each day? Do you approach your work methodically? Do you understand "the why" of what you do and why you do it in a particular way? Your answer to this question will also help the company determine if you are a good fit for the team.

Here's an example of a workflow:

- Understand the project requirements.
 - Fetch the required data for the project.
 - Create a storyboard.
 - Create visualizations in Tableau.
 - Present the data to your client or the public for review.
-

Case Study

Global is a leading multinational bank based in Europe. It's the largest investment bank in the Eurozone and has recently invested in the North American market.

As a result, the company produces a huge amount of data—especially with its recent expansion into the North American market—leading to a need for a robust data analytics and visualization solution.

While operating in the Eurozone, Global invested in various business investment tools and self-developed systems that gave company executives everything they needed. However, these tools are no longer able to meet the company's needs.

After much research, Global has opted to implement Tableau as its core self-service data governance tool across both its European and North American branches. As part of this implementation, they are hiring 50 new data visualization experts and developers to work on Tableau.

You are interviewing for one of these positions. Your Tableau Public profile impressed recruiters and the HR screening. You've made it to the second round, when you'll meet with your prospective manager, also a data visualization expert, who is charged with hiring experts like you to lead the next phase of development.

Consider responses to the following questions, which are focused on helping the hiring manager understand how you work at both the individual and team levels, and how this will affect the company's goals and strategies. Note that these questions are open-ended—there is no single correct answer.

- **How do you think Tableau could help establish stronger customer relationships?**

Visualizations that display customer satisfaction at different points of the customer journey (e.g., application, user, closing account, dealing with problems, investments, checking and savings account usage) can help the marketing operations team make decisions around website design and UX/UI.

- **How else might you create data visualizations that assist our marketing teams?**

Visualizations can be used to analyze population data in order to help the marketing teams target campaigns for specific populations and determine which platform is the most appropriate (social media, radio, TV, billboards, etc.).

- **How could we develop visualizations that help our branch managers improve customer service on the ground?**

Visualizations can integrate customer data and satisfaction scores with in-branch experiences. Then, the information can be displayed in a way that allows nontechnical branch managers to determine at a glance the areas that need improvement.

Continue to Hone Your Skills



Career Services Online Events

If you're interested in learning more about the technical interviewing process and practicing algorithms in a mock interview setting, check out our [upcoming workshops.](https://careerservicesonlineevents.splashthat.com/) (<https://careerservicesonlineevents.splashthat.com/>)

Career Services Next Step: [Link Milestone 5](#)

(<https://courses.bootcampspot.com/courses/138/assignments/1740>)

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Unit Assessment: Visualization

You are about to complete the Visualization Unit Assessment! This Unit Assessment allows you to check your knowledge, as well as demonstrate your competency in key concepts from Modules 10 through 14.

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Some of the questions on this assessment require specific resources which are referenced in those questions.

Unit Assessment: Visualization

Please click **Start** when you are ready to begin the activity.

Start

Unit Assessment: Visualization

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Unit Assessment: Visualization

1 of 20



On a webpage with several `<p>` elements but only one class of “location,” which of the following lines will correctly scrape only that element?

- `location = BeautifulSoup.find("p", class_="location")`
- `location = BeautifulSoup.find("p", class="location")`
- `location = BeautifulSoup.find("div", class="location")`
- `location = BeautifulSoup.find("p", id="location")`

▶ Item 1

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Next ▶

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Unit Assessment: Visualization

2 of 20



Which of the following scenarios would be a good use case for Chrome DevTools?

- To check the responsiveness of a website through different viewports.
- To search for particular HTML elements, tags, or classes for web scraping.
- To look at the properties of each HTML element (such as padding or margin).
- All of the above.

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▶ Item 2

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Unit Assessment: Visualization

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Of the following options, which line of code has an error?

- `Click here to search!`
- ``
- `<div class="col-md-10"></div>`
- `<div class="container"></div>`

Item 1

Item 2

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Unit Assessment: Visualization

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What is one of the differences between HTML class and id attributes?

- The `id` attribute is for CSS and `class` is for HTML.
- `id` should be used when assigning to multiple elements, `class` should be used when assigning to a unique element.
- The `class` attribute can only be applied to certain elements and tags, but the `id` attribute can be assigned to anything.
- `class` should be used when assigning to multiple elements, `id` should be used when assigning to a unique element.

Item 1

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Unit Assessment: Visualization

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Using the following array, which forLoop will correctly log each animal to the console?

```
const zooAnimals = ["Zebra", "Rhino", "Giraffe", "Owl"]

for (i = 0; i < zooAnimals.length; i++) {
    console.log(zooAnimals[i]);
}

for (i = 0; i < zooAnimals.size; i++) {
    console.log(zooAnimals[i]);
}

for (i = 0; i < zooAnimals; i++) {
    console.log(zooAnimals[i]);
}

for i = 0; i < zooAnimals.length ; i++ {
    console.log(zooAnimals[i]);
}
```

Item 1

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Unit Assessment: Visualization

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Unit Assessment: Visualization

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Which of the following is an example of using `forEach` to iterate through the same `zooAnimals` array?

- `array.forEach(animal => console.log(animal));`
- `forEach.zooAnimals(animal => console.log(animal))`
- `zooAnimals.forEach(console.log(animal));`
- `zooAnimals.forEach(animal => console.log(animal))`

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Unit Assessment: Visualization

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Of the following functions, which one will correctly log the second item in an array to the console when called?

`function printIndex() {
 console.log(array);
}`

`function printIndex(i) {
 console.log(i[1]);
}`

`function printIndex(i) {
 console.log(i[2]);
}`

`function printIndex(i)
 console.log(i);`

Item 1

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Unit Assessment: Visualization

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Unit Assessment: Visualization

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If the above function was converted to an arrow function, which of the following is the correct syntax?

- `printIndex = (i) => console.log(i[1]);`
- `printIndex(i) => console.log(i[1]);`
- `printIndex = () => console.log(i[1]);`
- `printIndex = {(i)} => console.log(i[1]);`

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Unit Assessment: Visualization

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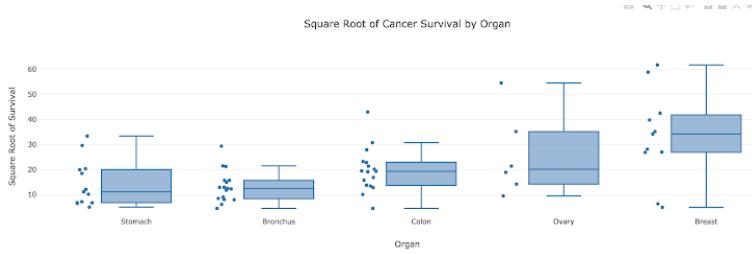
Some of the questions on this assessment require specific resources which are referenced in those questions.

Unit Assessment: Visualization

9 of 20



The following code, `Plotly.newPlot("a", b, c);` creates the plot below. Which argument, directly or indirectly, refers to the data in the plot?



- "a"
- b
- c
- None of the above

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Unit Assessment: Visualization

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Unit Assessment: Visualization

10 of 20



Given the following array of numbers in javascript

```
myArray = [132, 3, 45, 87, 22]
```

What is the correct way to sort the numbers in ascending order?

- myArray.sort()
- myArray.sort(ascending=True)
- myArray.sort((a, b) => b - a);
- myArray.sort((a, b) => a - b);

Item 1

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▶ Item 10



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Unit Assessment: Visualization

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Unit Assessment: Visualization

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You are given a JavaScript array containing 300 numerical values. Without knowing the values the array contains, which functions/attributes combination could you use to get the count of numbers over 180?

- `filter()` , `length`
- `sort()` , `filter()`
- `filter()` , `count`
- `filter()` , `slice()`

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Unit Assessment: Visualization

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Unit Assessment: Visualization

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Examine the code below. Which of the following best describes the significance of `selectItem(this.value)` ?

- ```
<select id="dropdown" onchange="select(this.value)"></s>
```
- When a dropdown menu item is selected, its value is displayed on the page.
  - When a dropdown menu item is selected, its value is instantly transformed on the page.
  - When a dropdown menu item is selected, the dropdown menu itself is selected.
  - When a dropdown menu item is selected, the dropdown menu itself is selected.

Item 1

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# Unit Assessment: Visualization

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## Unit Assessment: Visualization

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Your boss has asked you to create a new branch called "ES6-testing." On this branch you will replace the ES5 code with ES6 code for a file named, `logic.js`. Once updated, push the new branch to GitHub.

What is the order of steps to create and add files to the branch using terminal or GitBash?

≡ Update `logic.js` with ES6 javascript.

≡ `git add logic.js`

≡ `git push origin ES6-testing`

≡ `git commit -m "updated logic.js with ES6"`

≡ `git checkout -b ES6-testing`

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# Unit Assessment: Visualization

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## Unit Assessment: Visualization

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A week ago you updated a `logic.js` file with ES6 code on a branch called “ES6-testing.”

Since then, the branch has been confirmed ready to be merged into the company's master branch on GitHub.

What are the steps you should follow to properly merge the `ES6-testing` branch into master?

- ≡ Create a pull request on GitHub to merge into the master branch.
- ≡ Delete the `ES6-testing` branch
- ≡ Await approval of pull request.
- ≡ Click "Confirm Merge" button
- ≡ Click "Merge Pull Request" button.

|         |
|---------|
| Item 3  |
| Item 4  |
| Item 5  |
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| Item 8  |
| Item 9  |
| Item 10 |
| Item 11 |
| Item 12 |

# Unit Assessment: Visualization

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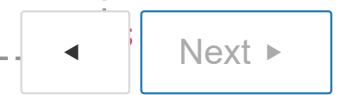
If we access the California zip codes as follows in a `logic.js`:

```
let califZips =
 https://raw.githubusercontent.com/OpenDataDE/State-zip-
```

ip.

Complete the code to create a popup marker that displays the zip code when each zip code area is clicked on the map.

```
d3.json(
 "https://raw.githubusercontent.com/OpenDataDE/State-zip/
 ip/california-zip-codes.geojson")
 .then(function(data) {
 L.geoJSON(data,
 {
 onEachFeature: function(feature, layer) {
 layer.bindPopup("Zip code: " +
 feature.properties.ZCTA5CE10);
 }
 }).addTo(map);
 });
```



Next ►

■ califZips

■ feature

■ feature.properties.ZCTA5CE10

■ data

■ layer

Item 6

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Item 11

Item 12

Item 13

Item 14

Item 15

# Unit Assessment: Visualization

You are about to complete the Visualization Unit Assessment! This Unit Assessment allows you to check your knowledge, as well as demonstrate your competency in key concepts from Modules 10 through 14.

After submitting the assessment, you will see a summary of your performance. While you will not be able to see your performance on individual questions, you are allowed unlimited attempts to complete the assessment.

Some of the questions on this assessment require specific resources which are referenced in those questions.

## Unit Assessment: Visualization

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What are two primary ways that Tableau connects to the data you provide?

- Live and pull.
- Connect and extract.
- Live and extract.
- Connect and pull.

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## Unit Assessment: Visualization

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What are the relationships between stories, dashboards, and worksheets?

- Worksheets are comprised of dashboards and stories. Dashboards are comprised of both worksheets and stories.
- Dashboards are comprised of stories.
- Stories are comprised of worksheets and dashboards.

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## Unit Assessment: Visualization

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Tableau has two types of data fields: dimensions and measures. What are the two types of measures?

- Discrete:** Values that are treated as finite. Generally, discrete fields add headers to the view.
- Continuous:** Field values that are treated as an infinite range. Generally, continuous fields add axes to the view.
- 
- Blue:** Values that are treated as finite. Generally, discrete fields add headers to the view.
- Green:** Field values that are treated as an infinite range. Generally, continuous fields add axes to the view.
- 

**Discrete:** Field values that are treated as an infinite range. Generally, continuous fields add axes to the view.

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## Unit Assessment: Visualization

20 of 20



Tableau is a data visualization tool known to be easy to use that does not require much code, however, there is one specific field that allows us to code. What is the name of that field?

- VizQL field.
- Calculated field.
- Formula field.
- Code field.

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Finish ►