Lab 2: Data Preparation: Using Tableau Desktop

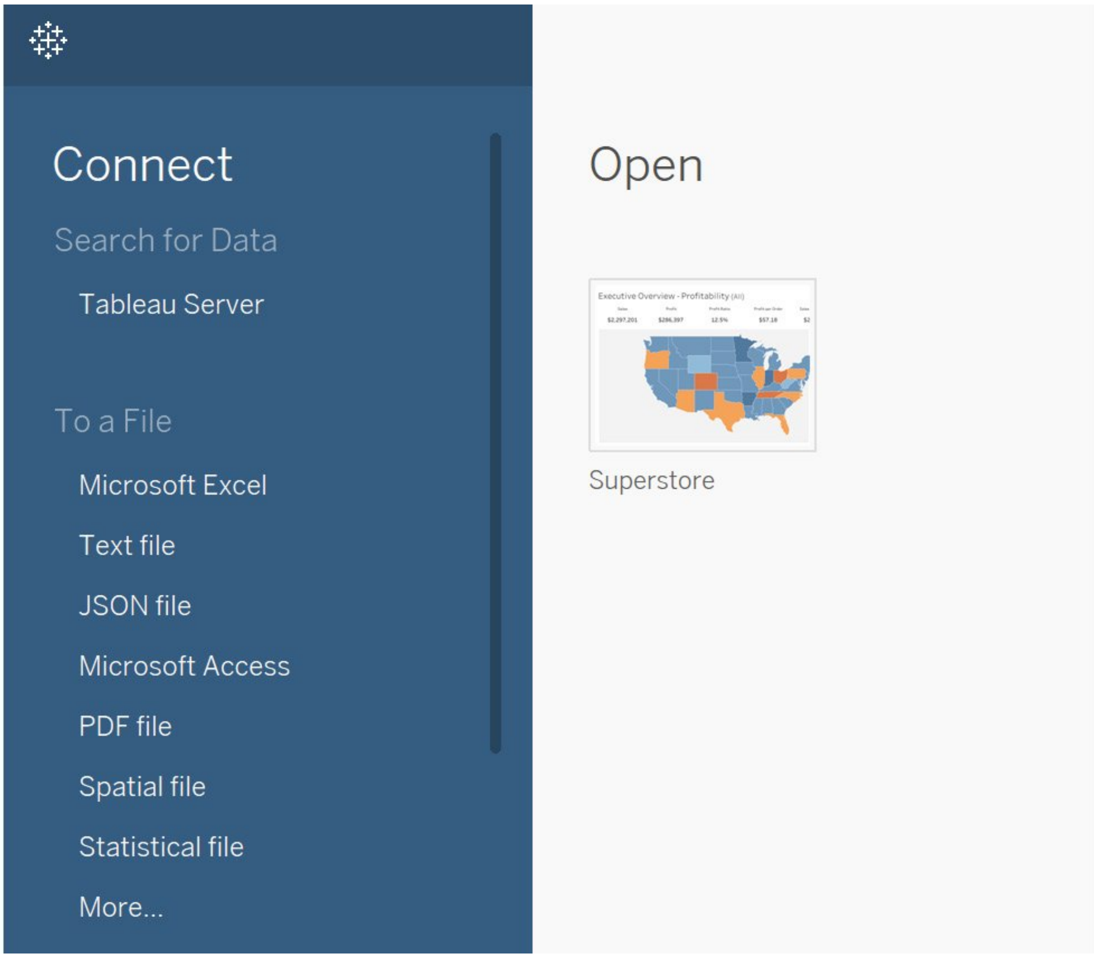
Overview

In this lab, you will learn to use various tools for data preparation in Tableau Desktop and join different data sources using various options. This will equip you with the knowledge required to perform data manipulation activities, data transformation, and data blending, and provide options to manage various data sources. By the end of this lab, you will be able to extract and filter data and use aliases for the clean presentation of data.

Connecting to a Data Source

For any visualization, you need to have an underlying data source that contains all the information you wish to show. This is the first step of any data visualization task.

The very first thing that you will see when you open Tableau Desktop is the `Connect` pane. Here, you can connect to a variety of data sources and perform various tasks related to data handling, which you will study in this lab. The following figure shows the screen that comes up when you start Tableau Desktop:



Depending on the version, this screen might look slightly different, but it should remain this way for the most part: you can observe that you can connect to multiple file options such as Excel, text, and JSON files. You can also connect to server-based data sources such as MySQL and Oracle. `Saved Data Sources` provides sample data sources that are available with Tableau Desktop.

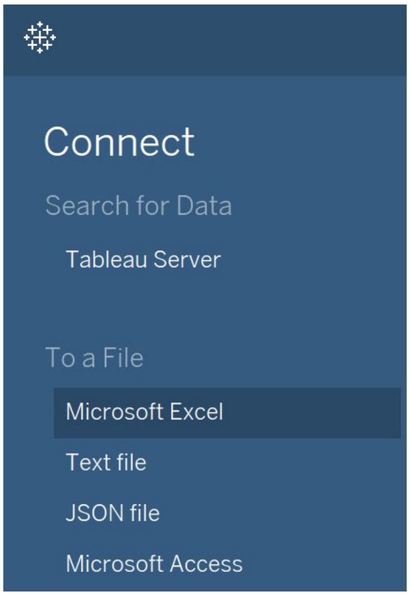
In the following exercise, you will connect to an Excel file named `Sample - Superstore`, which is available with Tableau Desktop. This file contains an `Orders` sheet, which consists of information for various orders, based on attributes such as order ID, order category, ship mode, and customer details. It also has a `Returns` sheet, which consists of orders that were returned. You will use all of this data to perform various operations throughout this lab, and visualize the data in Tableau Desktop.

Exercise 2.01: Connecting to an Excel File

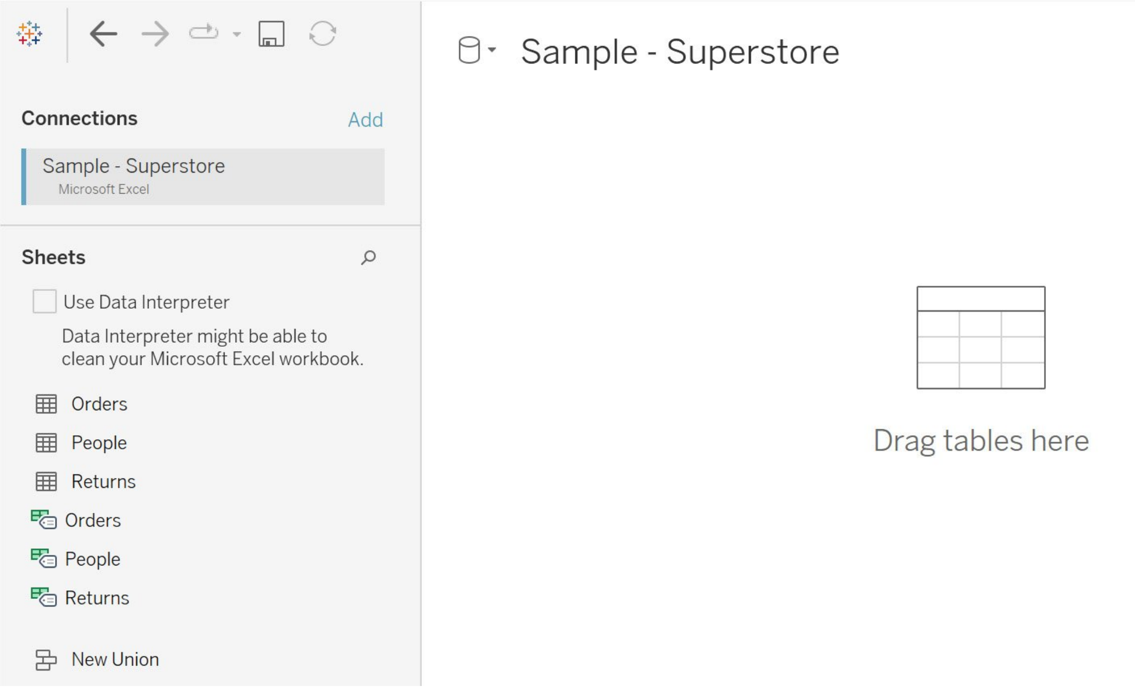
In this exercise, you will connect to your very first data source in Tableau, the `Sample - Superstore` Excel file. This file is automatically accessible to you if you have installed Tableau as mentioned in *Lab 1*, *Introduction to Tableau*. It contains three sheets, comprising order-level information stored in the `Orders` sheet, customer information stored in the `People` sheet, and order returns stored in the `Returns` sheet, and can be quickly downloaded from the GitHub repository for this lab at https://github.com/fenago/tableau-advanced. Make sure to download this file on your system before proceeding with the exercise.

Perform the following steps to complete this exercise:

1. Under the `Connect` pane, select the `Microsoft Excel` option.



1. This will open up the file menu where you can select the Excel file from the file explorer. Navigate to the location where you have saved this file locally and then select to open the `Sample-Superstore.xls` file. You will see the following screen once the file is loaded:



Sample - Superstore

Connections Add

Sample - Superstore
Microsoft Excel

Sheets

□ Use Data Interpreter

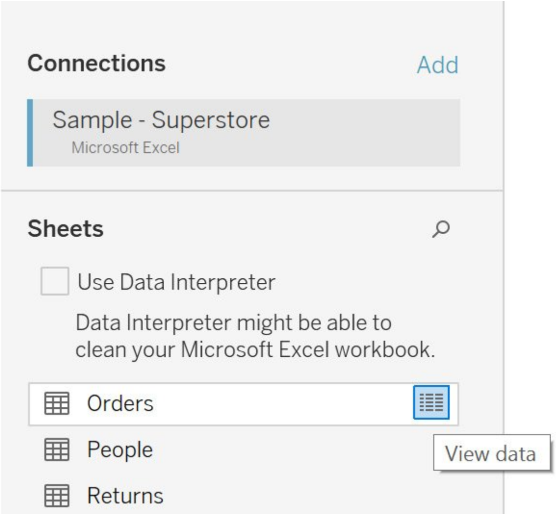
Data Interpreter might be able to clean your Microsoft Excel workbook.

- Orders
- People
- Returns
- Orders
- People
- Returns

New Union

Drag tables here

1. Hover over the table to get the `View data` option (as highlighted in the following figure) and preview the data:



Connections Add

Sample - Superstore
Microsoft Excel

Sheets

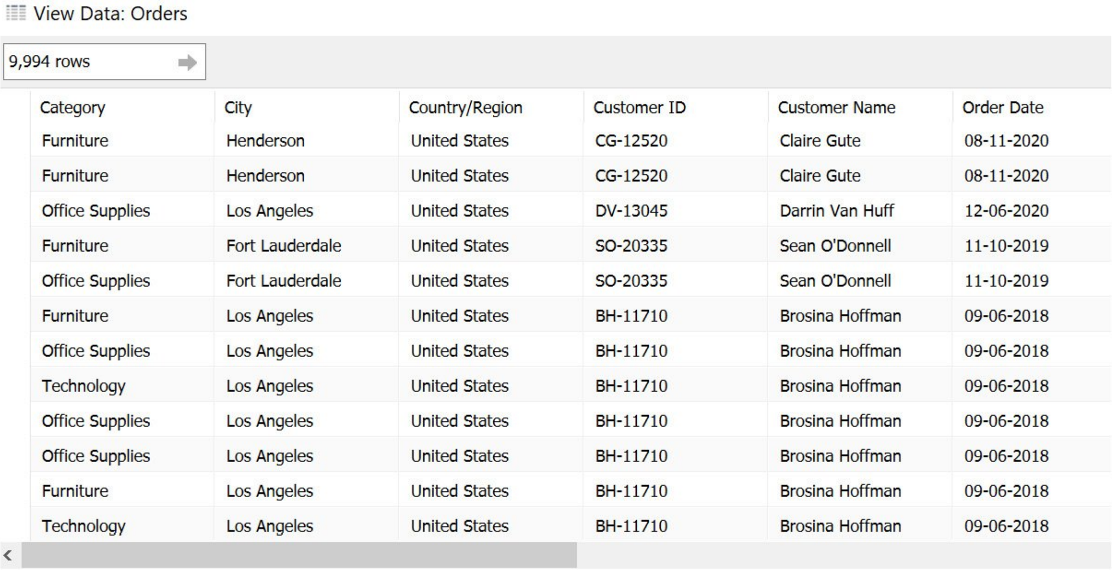
□ Use Data Interpreter

Data Interpreter might be able to clean your Microsoft Excel workbook.

- Orders
- People
- Returns

View data

The following figure shows the data preview:



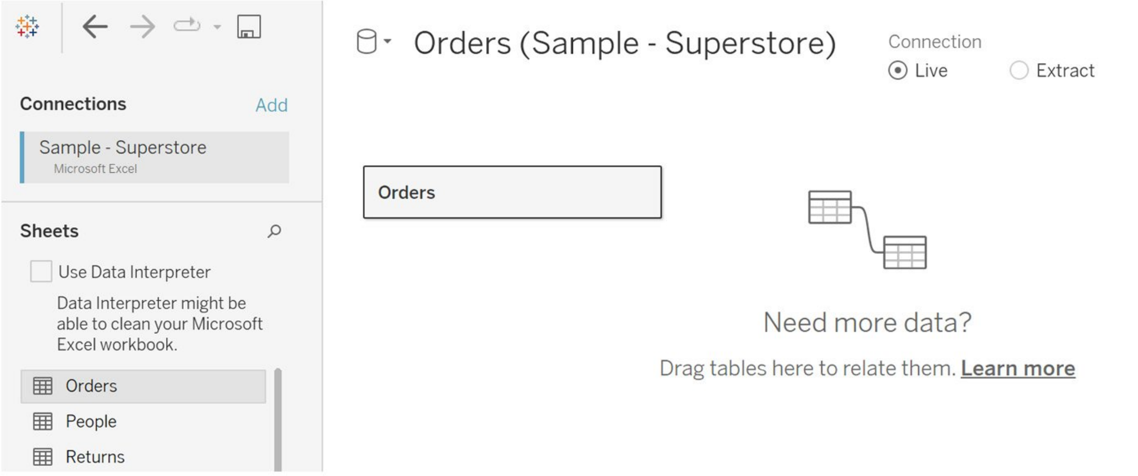
View Data: Orders

9,994 rows

Category	City	Country/Region	Customer ID	Customer Name	Order Date
Furniture	Henderson	United States	CG-12520	Claire Gute	08-11-2020
Furniture	Henderson	United States	CG-12520	Claire Gute	08-11-2020
Office Supplies	Los Angeles	United States	DV-13045	Darrin Van Huff	12-06-2020
Furniture	Fort Lauderdale	United States	SO-20335	Sean O'Donnell	11-10-2019
Office Supplies	Fort Lauderdale	United States	SO-20335	Sean O'Donnell	11-10-2019
Furniture	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018
Office Supplies	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018
Technology	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018
Office Supplies	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018
Office Supplies	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018
Furniture	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018
Technology	Los Angeles	United States	BH-11710	Brosina Hoffman	09-06-2018

Figure 2.5: View Data window showing the data preview

1. Now, drag the `Orders` sheet onto the `Drag sheets here` area. This is also known as the canvas.
2. The sheet should now have been imported into Tableau. Preview the data, as shown in the following figure:

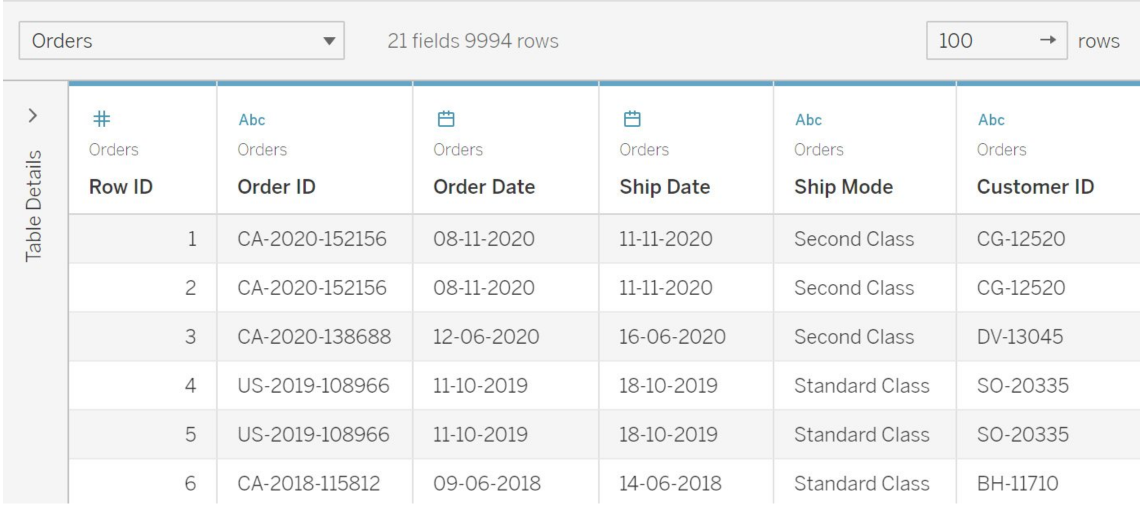


□ Use Data Interpreter

Data Interpreter might be able to clean your Microsoft Excel workbook.

Need more data?

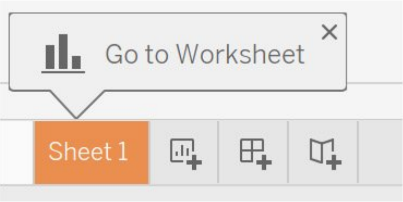
Drag tables here to relate them. Learn more



Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID
1	CA-2020-152156	08-11-2020	11-11-2020	Second Class	CG-12520
2	CA-2020-152156	08-11-2020	11-11-2020	Second Class	CG-12520
3	CA-2020-138688	12-06-2020	16-06-2020	Second Class	DV-13045
4	US-2019-108966	11-10-2019	18-10-2019	Standard Class	SO-20335
5	US-2019-108966	11-10-2019	18-10-2019	Standard Class	SO-20335
6	CA-2018-115812	09-06-2018	14-06-2018	Standard Class	BH-11710

You have thus connected and imported the data in Tableau.

1. Hovering over `Sheet 1`, you can see the active `Go to Worksheet` option, which means that you can navigate to `Sheet 1` and start creating visualizations.



Once the data is imported, you can start the visualization development by clicking on that option, as you will see later in the course.

In this exercise, you saw how you can connect to an Excel file. Tableau also allows you to connect to data that is stored on servers. In the next section, you will learn how this can be done.

Different Types of Joins

Tableau offers four types of joins. You will learn more about these join types in detail in the following exercises.

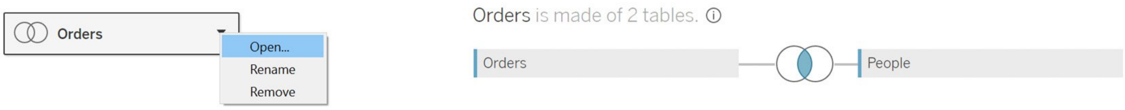
Exercise 2.02: Creating an Inner Join Dataset

As an analyst, you might come across scenarios in which you need to display the common records between two tables. This exercise aims to show how to join two different sheets into a single data source in Tableau.

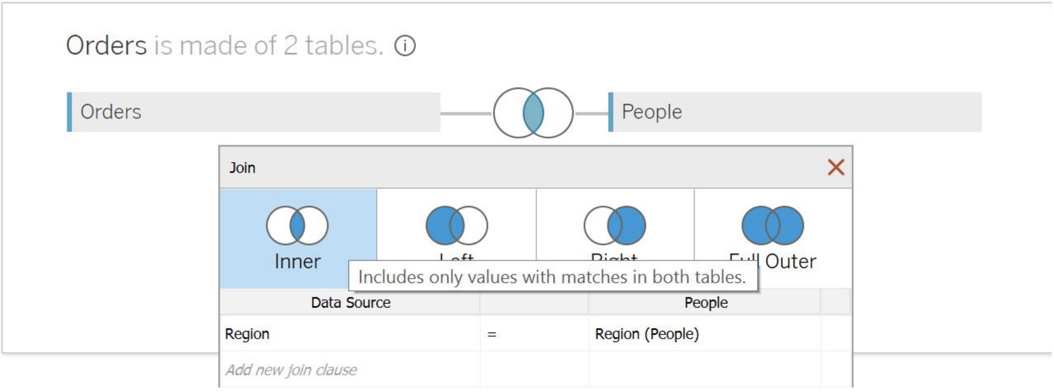
You will join the `Orders` table with the `People` table using an inner join. By doing so, you will be able to identify the customer records present in the `People` table along with the order information from the `Orders` table, which will help you to understand customers' buying preferences.

Perform the following steps to complete this exercise:

1. Load the `Sample - Superstore` dataset into your Tableau instance as you did in *Exercise 2.01*.
2. Drag the `Orders` table first, followed by the `People` table, from the `Sheets` area to the `Drag Sheets here` area. Alternatively, to add these sheets, you can double-click on them, and they will be added automatically to the canvas area. Tableau will auto-join the two tables using an inner join, as shown in the following figure:



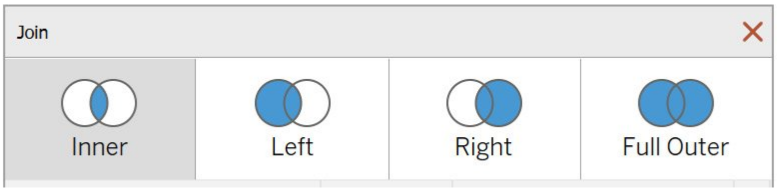
1. Click on the `Join` symbol to open the `Join` menu:



Includes only values with matches in both tables.

Data Source		People
Region	=	Region (People)
Add new join clause		

Note the various ways to join data. By default, Tableau performs an inner join on the common field names:



1. If there are no common names, select the columns manually to enable the join. Since you are joining the `Orders` and `People` tables, join on `Customer Name` from `Orders` and `Person` from `People`.

First, de-select `Region`, which is auto-selected by Tableau. To do this, click on `Region` and select `Customer Name` from the dropdown, as you can see in the following figure:

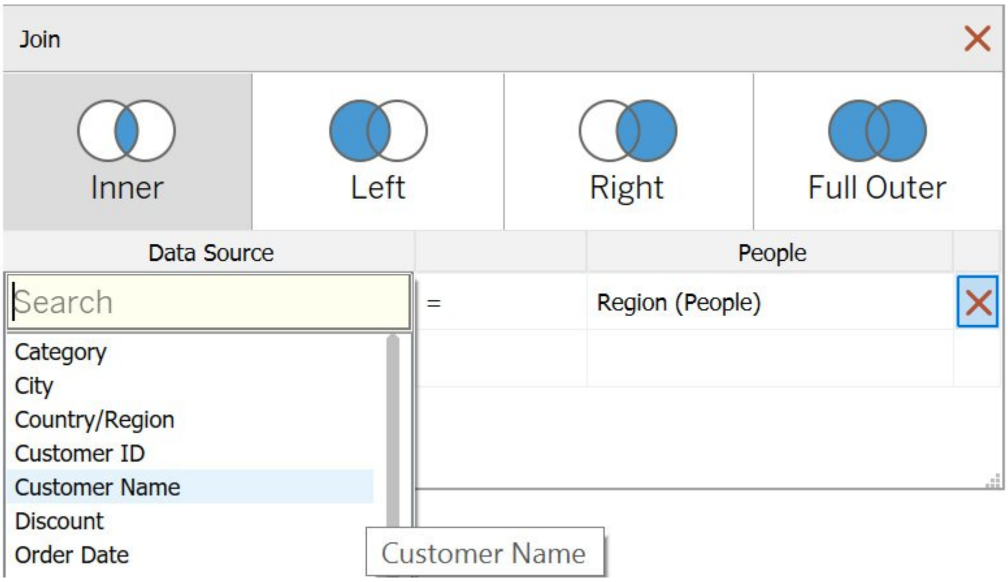


Figure 2.17: Changing the join column

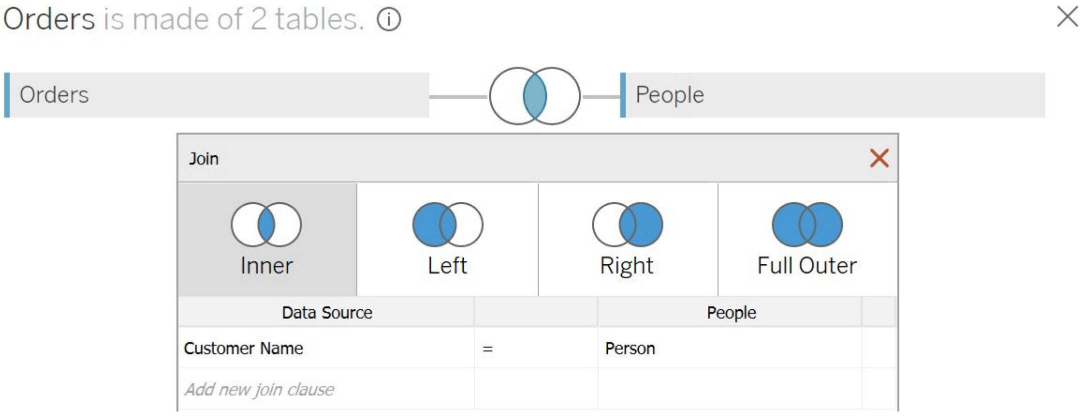
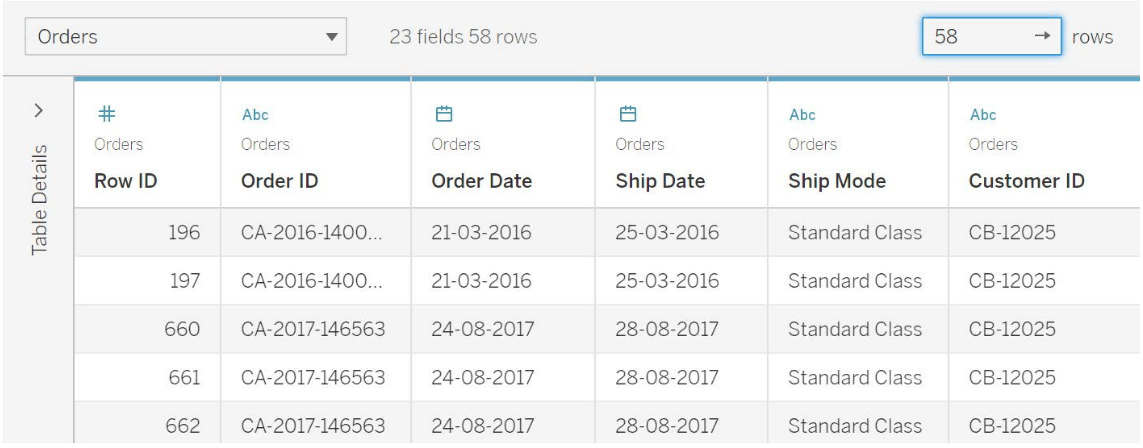


Figure 2.18: Final result of the inner join

1. Repeat the same for the `People` table and select `Person` as the joining column. Your joined columns should be as follows:



Orders ▾ 23 fields 58 rows 58 → rows

Orders Row ID	Orders Order ID	Orders Order Date	Orders Ship Date	Orders Ship Mode	Orders Customer ID
196	CA-2016-1400...	21-03-2016	25-03-2016	Standard Class	CB-12025
197	CA-2016-1400...	21-03-2016	25-03-2016	Standard Class	CB-12025
660	CA-2017-146563	24-08-2017	28-08-2017	Standard Class	CB-12025
661	CA-2017-146563	24-08-2017	28-08-2017	Standard Class	CB-12025
662	CA-2017-146563	24-08-2017	28-08-2017	Standard Class	CB-12025

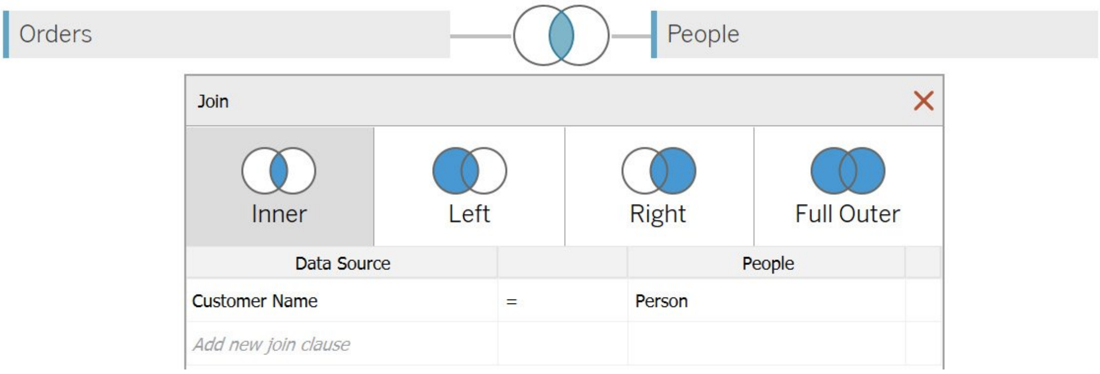
Now it's time to validate the results. This can be observed in the data grid screen in the bottom section.

You can see that you get only `58` rows in the joined dataset. Here, only the values from the `Orders` table's `Customer Name` column that match with values from the `People` table's `Person` column will be returned in the final dataset. Since the `Person` table has only four values, only those values from the `Customer Name` column that match these four are returned from the `Orders` table.

In this exercise, you used inner join and analyzed the results returned by using this join type. Next, you will learn about the left join type.

Exercise 2.03: Creating a Left Join Dataset

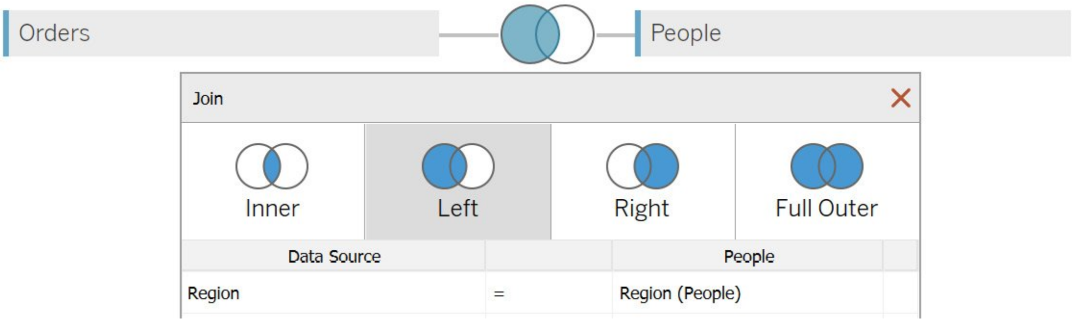
In this exercise, you will join the `Orders` table with the `People` table in a left join. The objective of the left join is to verify how much customer information is present in the `People` table. This will help identify and update the `People` table so that you can expand the customer database, to drive better sales:



Data Source		People
Customer Name	=	Person
Add new join clause		

Figure 2.20: Join screen for the Orders and People tables

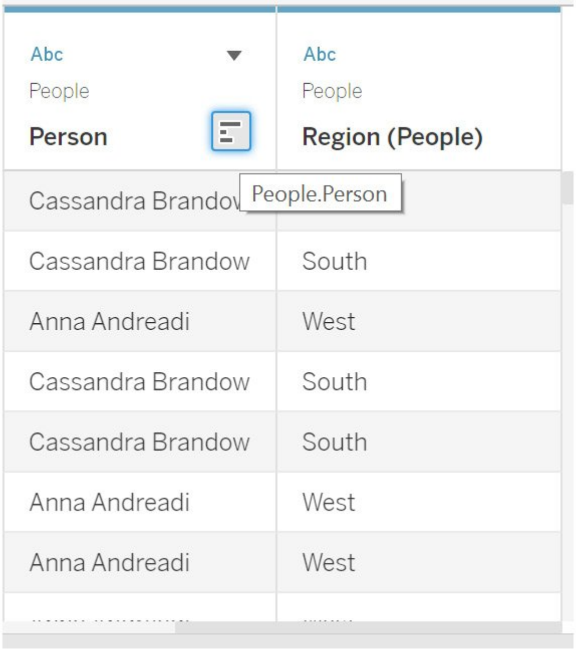
1. Repeat the same step from the previous exercise of dragging the `Orders` and `People` tables to the canvas. Once done, you should see the join options, as follows:
2. Change the join type to `Left` :



Data Source		People
Region	=	Region (People)

Figure 2.21: Selecting the Left join

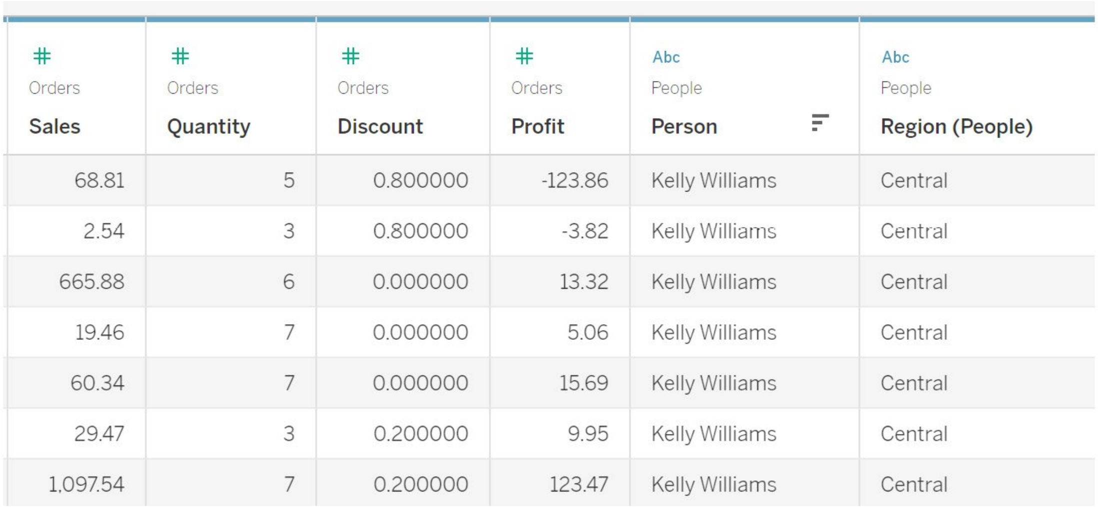
1. Now, in the data preview (as shown in the following figure), scroll toward the right side. You will see two columns from the `People` table, `Person` and `Region`. Use the `Sort` icon to sort the values, as highlighted in the following figure:



Person	Region (People)
Cassandra Brandov	
Cassandra Brandow	South
Anna Andreadi	West
Cassandra Brandow	South
Cassandra Brandow	South
Anna Andreadi	West
Anna Andreadi	West

Figure 2.22: Analyzing the left join results

1. Scroll down to see what happens if the `Customer` names do not match any values in the `Person` column.



Orders	Orders	Orders	Orders	People	People
Sales	**Quantity**	**Discount**	**Profit**	**Person**	**Region (People)**
68.81	5	0.800000	-123.86	Kelly Williams	Central
2.54	3	0.800000	-3.82	Kelly Williams	Central
665.88	6	0.000000	13.32	Kelly Williams	Central
19.46	7	0.000000	5.06	Kelly Williams	Central
60.34	7	0.000000	15.69	Kelly Williams	Central
29.47	3	0.200000	9.95	Kelly Williams	Central
1,097.54	7	0.200000	123.47	Kelly Williams	Central

Figure 2.23: Nulls in the join result

You will observe that the rows where a match is not found are replaced by a `null` value, which means the `Person` table does not contain information for these customers. This means that you can add this customer information to the `People` table to improve the data quality.

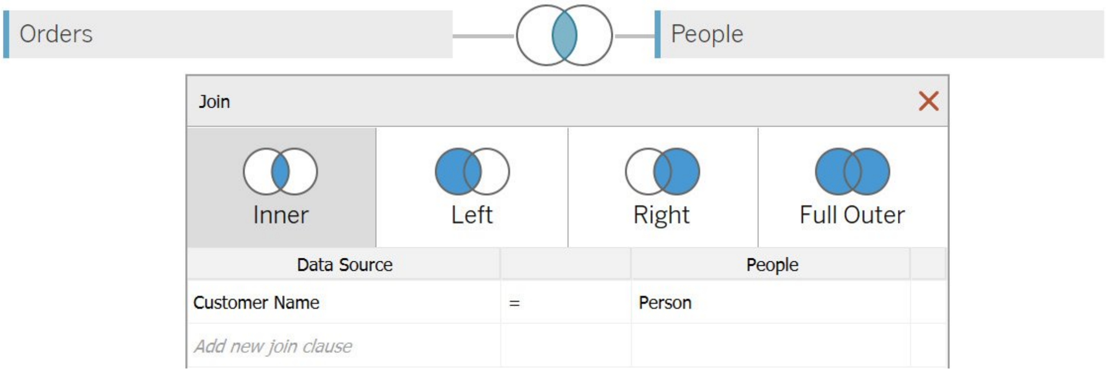
In this exercise, you learned how to perform a left join and how data is matched between the two tables. Next, you will learn about the right join type.

Exercise 2.04: Creating a Right Join Dataset

In this exercise, you will join the `Orders` table with the `People` table in a right join. Consider a scenario wherein the `People` table consists of all the customers who have previously bought your company's products, and you want to fetch a complete list of the products a customer has bought, using information from the `Orders` table. This will help you understand the buying habits of customers based on their past purchases.

The steps to complete this exercise are as follows:

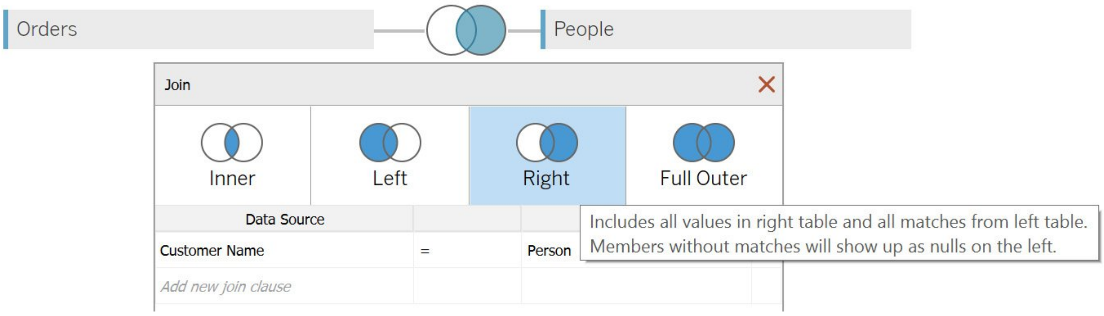
1. Drag the `Orders` and `People` tables similar to how you did in the previous exercises so that you can see the following on your screen:



Data Source		People
Customer Name	=	Person
Add new join clause		

Figure 2.24: Join screen for the Orders and People tables

1. Select the `Right` join, as shown in the following figure:

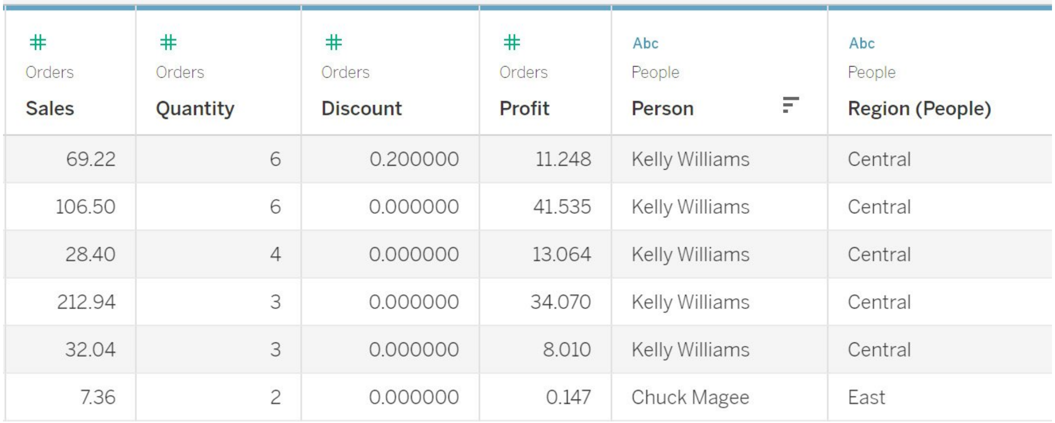


Includes all values in right table and all matches from left table. Members without matches will show up as nulls on the left.

Data Source		
Customer Name	=	Person
Add new join clause		

Figure 2.25: Selecting the Right join

1. Now, in the data preview, scroll toward the right side. You will see the `Person` and `Region` columns from the `People` table. Use the `Sort` icon to sort the values, as highlighted in the following figure:



Orders Sales	Orders Quantity	Orders Discount	Orders Profit	People Person	People Region (People)
69.22	6	0.200000	11.248	Kelly Williams	Central
106.50	6	0.000000	41.535	Kelly Williams	Central
28.40	4	0.000000	13.064	Kelly Williams	Central
212.94	3	0.000000	34.070	Kelly Williams	Central
32.04	3	0.000000	8.010	Kelly Williams	Central
7.36	2	0.000000	0.147	Chuck Magee	East

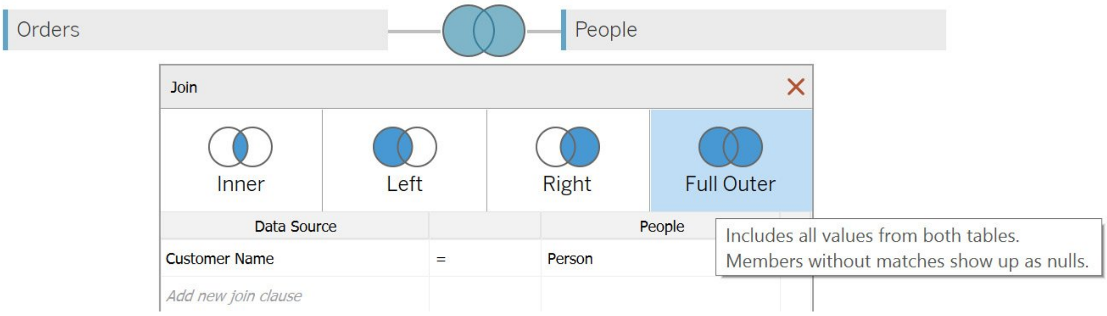
2.

Figure 2.26: Analyzing the right join results

You will observe that the rows from the `People` table contain information about customers with past orders. This can now help you to analyze what products a person tends to buy often, and accordingly, you can suggest similar products to them, for a better-targeted sales strategy.

In this exercise, you performed a right join on two tables and saw how to use the right join results to analyze data. Next, you will learn about a full outer join.

A full outer join would combine the results of both the joining tables into a single dataset. To do that in Tableau, you can use the join properties and change the join type to `Full Outer`.


Orders
People
Join
Inner
Left
Right
Full Outer
Includes all values from both tables.
Members without matches show up as nulls.

Data Source		People
Customer Name	=	Person
Add new join clause		

Figure 2.27: Selecting the Full Outer join

The next thing to cover is the union operation. In a union, the new table will be appended below the previous table in the final dataset. Usually, unions are used when you want to combine datasets with a common structure of columns. For example, order information for 2021 can be combined using a union with the order information for 2020 to get a unified dataset.

In the next exercise, you will learn how to implement a union in Tableau.

Exercise 2.05: Creating a Combined Dataset Using Union

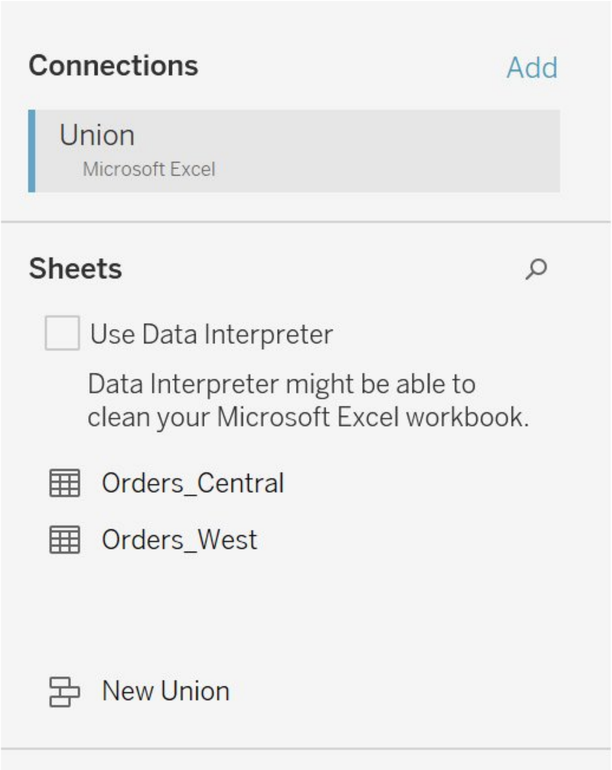
Consider a scenario related to a large retailer such as Walmart or Amazon, operating in multiple regions. In such a case, it makes more sense to store the data at the regional level so that it can contain products customized to that specific region. If you were to compare how the different regions perform among each other, you would need to combine these different data sources into one. This is where the concept of a union comes into play.

In this exercise, you will use the `Orders` table, which is split by region. The files for different regions follow a similar column structure as the `Orders` table but are segregated into different sheets based on their regions, as you can see from the following figure:

Figure 2.28: Input data for the Orders table preview stored as different tabs

You have the data for two regions: `Central` and `West`. You can implement a union to combine these two regions into a single dataset, as outlined in the following steps:

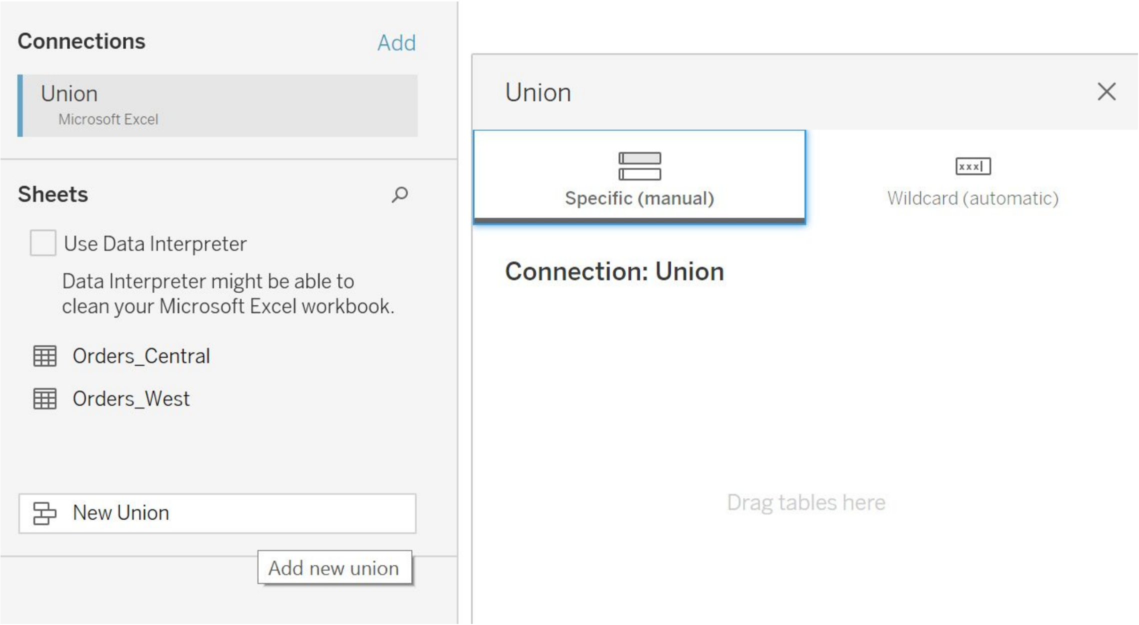
1. Save the files on your local machine. Load the `Union` Excel file using the `Connect` option from the location where the files are saved, as done for the previous exercises. Once the file is imported, you should see the following screen:



Data Interpreter might be able to clean your Microsoft Excel workbook.

Figure 2.29: Orders table for the Central and West regions

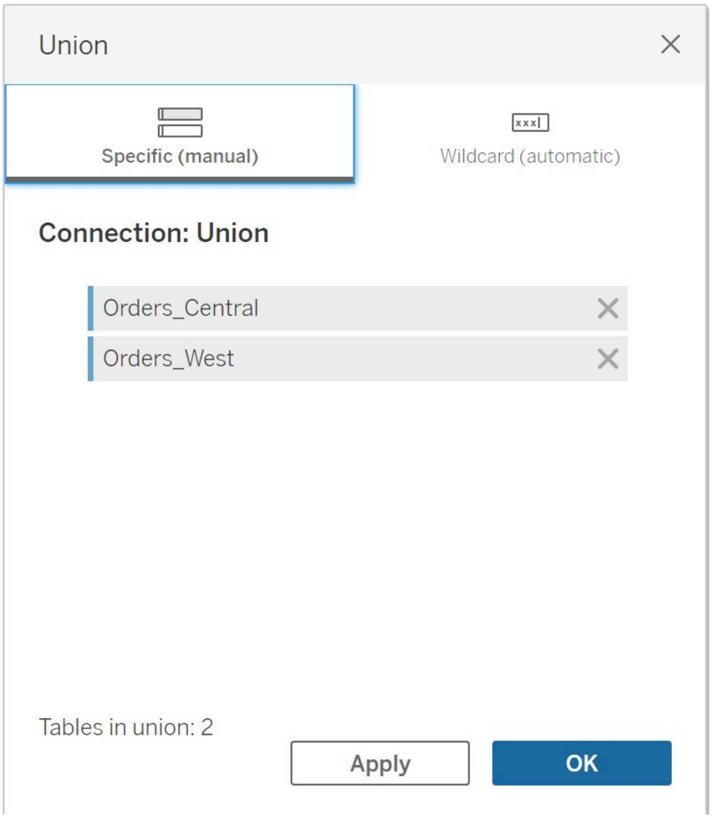
1. Double-click on the `New Union` option to open the `Union` popup, as shown in the following figure:



Data Interpreter might be able to clean your Microsoft Excel workbook.

Figure 2.30: New Union popup

1. Drag the two order tables onto the `Union` popup, as follows:



Union

Specific (manual)

Wildcard (automatic)

Connection: Union

Orders_Central

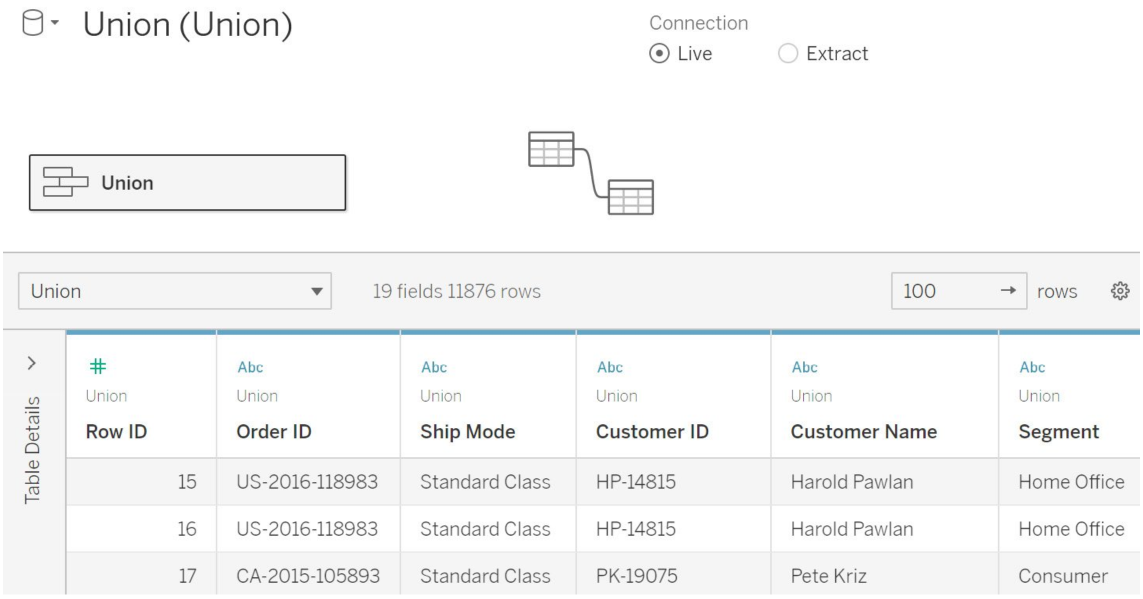
Orders_West

Tables in union: 2

Figure 2.31: Adding tables in a union

1. Click on `OK` to add the union to the data grid.

You can now preview the data in the bottom section. Tableau will combine the data from both tables into a single data source.



Union (Union)

Connection
● Live ○ Extract

Union

Union

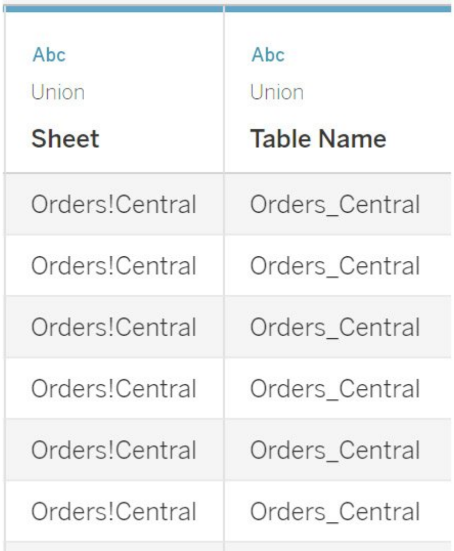
19 fields 11876 rows

100 rows

# Union Row ID	Abc Union Order ID	Abc Union Ship Mode	Abc Union Customer ID	Abc Union Customer Name	Abc Union Segment
15	US-2016-118983	Standard Class	HP-14815	Harold Pawlan	Home Office
16	US-2016-118983	Standard Class	HP-14815	Harold Pawlan	Home Office
17	CA-2015-105893	Standard Class	PK-19075	Pete Kriz	Consumer

Figure 2.32: Union data preview

1. Scroll to the right side of the data preview. You will see two additional columns---namely `Sheet` and `Table Name`. `Sheet` signifies which Excel file sheet this data belongs to and `Table Name` refers to the table names in Tableau. This can be used to quickly identify which columns come from which sheets and tables.

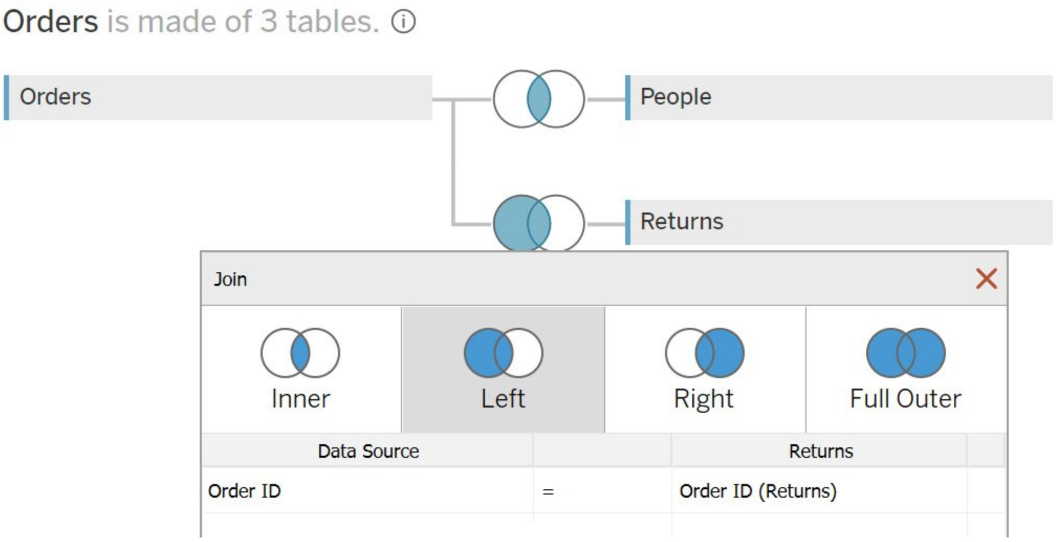


Abc Union Sheet	Abc Union Table Name
Orders!Central	Orders_Central
Orders!Central	Orders_Central
Orders!Central	Orders_Central
Orders!Central	Orders_Central
Orders!Central	Orders_Central
Orders!Central	Orders_Central

Figure 2.33: Table identification columns in the union result

In this exercise, you learned how to perform a union of multiple data sources.

In all the preceding exercises, you joined on only two data sources. It is possible to add more than two data sources. You will just need to specify in the join connection how the tables join to each other.



Orders is made of 3 tables.

Data Source		Returns
Order ID	=	Order ID (Returns)

Figure 2.34: Joining with more than two tables

The preceding figure shows an example join on the `Orders` table with the `People` and `Returns` tables. If there were a common field between the `Returns` and `People` tables, you could also join these two tables as per your requirements.

This completes the various ways you can join multiple tables in Tableau and concludes the discussion on the various ways to combine data from multiple sources together. The following sections will deal with preparing your data for your desired task.

Data Transformation in the Data Pane

Once you finish combining the data, you may also need to make some data adjustments, such as renaming certain columns or limiting the data to use in your visualizations. These are some common examples of data transformation.

Data transformations are a key step in preparing data for effective visualization. In this section, you will learn about some commonly used ways of transforming data. In particular, you will learn about the following:

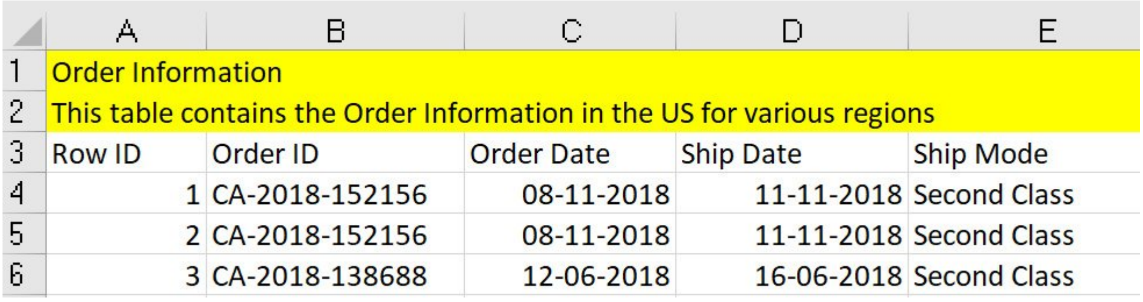
- Data Interpreter
- Renaming data sources
- Live and extract connections
- Filters
- Data grid options

The following sections will define these one by one.

Data Interpreter

Data Interpreter is an option available within Tableau that extracts only the actual rows and columns by removing titles, headers, and extra empty rows from the Excel data source.

You may sometimes add extra rows describing what kind of data the sheet contains, or some empty columns to improve the readability of the sheet. Consider the following example. Suppose you add certain comments to your `Sample - Superstore` file, as follows:

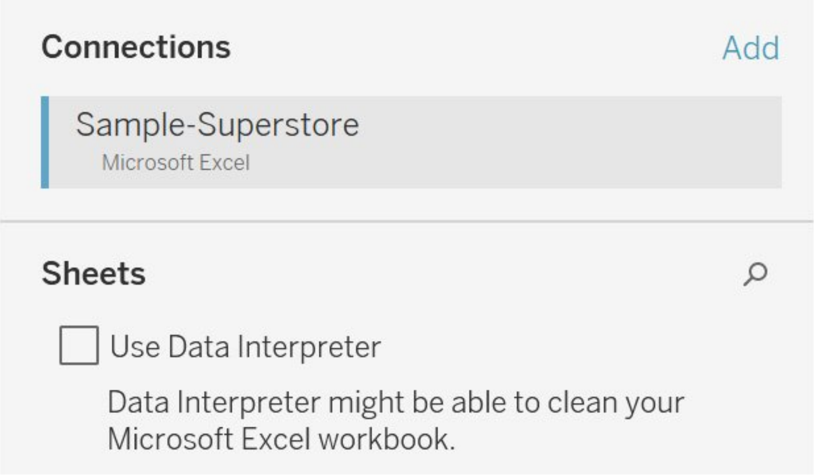


	A	B	C	D	E
1	Order Information				
2	This table contains the Order Information in the US for various regions				
3	Row ID	Order ID	Order Date	Ship Date	Ship Mode
4	1	CA-2018-152156	08-11-2018	11-11-2018	Second Class
5	2	CA-2018-152156	08-11-2018	11-11-2018	Second Class
6	3	CA-2018-138688	12-06-2018	16-06-2018	Second Class

Figure 2.35: Understanding Data Interpreter

From a data visualization point of view, rows 1 to 3 are meaningless as they don't belong to the actual data and are simply headers. Tableau can automatically remove these rows by using Data Interpreter.

Data Interpreter can be enabled by selecting the `Use Data Interpreter` option.:



Connections

Add

Sample-Superstore

Microsoft Excel

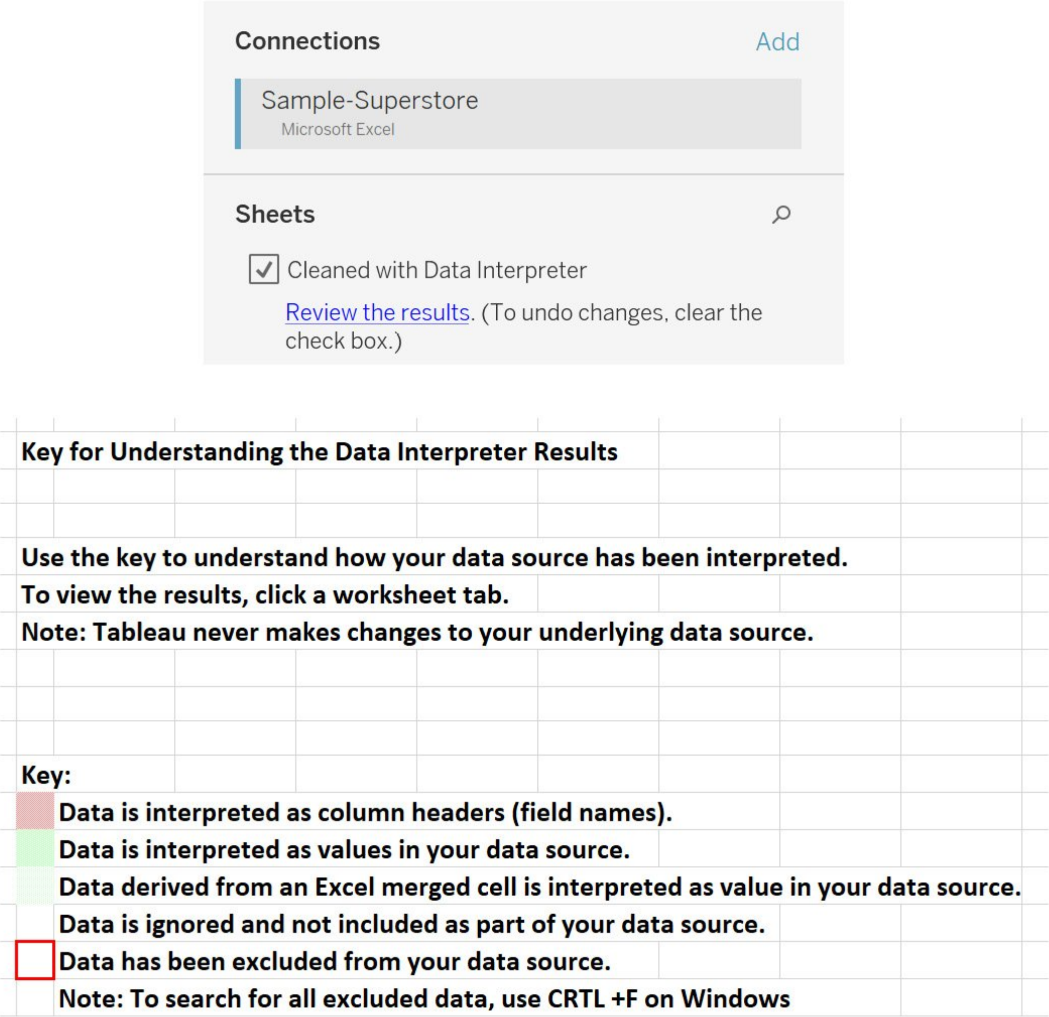
Sheets

□ Use Data Interpreter

Data Interpreter might be able to clean your Microsoft Excel workbook.

Figure 2.36: Enabling Data Interpreter

Once enabled, Data Interpreter will give you an option, `Review the results`. Clicking on `Review the results` will open up an Excel sheet of all the changes made by Data Interpreter, as can be seen in the following figure:



Connections Add

Sample-Superstore
Microsoft Excel

Sheets

☑ Cleaned with Data Interpreter

Review the results. (To undo changes, clear the check box.)

Key for Understanding the Data Interpreter Results

Use the key to understand how your data source has been interpreted.

To view the results, click a worksheet tab.

Note: Tableau never makes changes to your underlying data source.

Key:

🟥 **Data is interpreted as column headers (field names).**

🟩 **Data is interpreted as values in your data source.**

▨ **Data derived from an Excel merged cell is interpreted as value in your data source.**

Data is ignored and not included as part of your data source.

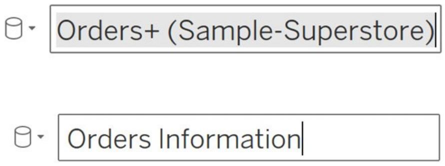
□ **Data has been excluded from your data source.**

Note: To search for all excluded data, use CRTL +F on Windows

Figure 2.37: Reviewing the results of Data Interpreter

Renaming the Data Source

The data source can be renamed on the `Connect` screen just by clicking on it and entering the name of your choice.



Orders+ (Sample-Superstore)

Orders Information

Figure 2.38: Renaming a data source

When working with data sources, you want to quickly identify the tables you are working with. Renaming tables allows you to give custom names so that it becomes easier to work with them.

Live and Extract Connections

This is a very important concept for data visualization in Tableau. This option decides how the data is connected to the visualizations.

Live connections allow Tableau worksheets to be updated in real time based on any changes made in the underlying data sources. This may be a good solution when the data must be updated on a real-time basis, such as stock market data.

However, when developing the visualizations in a live connection, the database will be queried for any changes performed in the view related to the data. This may consume more time.

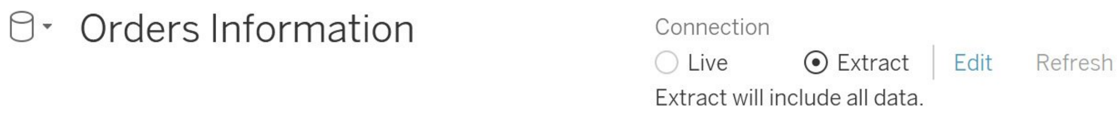
Tableau Data Extracts (**TDEs**), or **extracts**, are a compressed and optimized way to bring all the source data into Tableau's memory. TDEs improve the efficiency of the data query, which tends to increase the speed of executions while working with the data in the visualizations and performing user interactive activities such as filtering and sorting over the data.

When developing the visualizations in an extract connection, the database is also extracted into Tableau's local memory. Thus, any visualization development will be much faster compared to a live connection.

Exercise 2.06: Creating an Extract for Data

In the preceding exercises, you connected to the data using a live connection. Now, you will create an extract for it. The following steps should be performed to create a data extract for the `Orders` table:

1. Load the `Sample - Superstore` dataset in your Tableau instance as done in the previous exercises.
2. Drag the `Orders` table to the canvas.
3. Choose the `Extract` option, as shown in the following figure:



Orders Information

Connection

○ Live ● Extract | Edit Refresh

Extract will include all data.

Figure 2.39: Creating an extract

1. Once done, click on `Sheet 1` at the bottom of the page to navigate to that sheet.

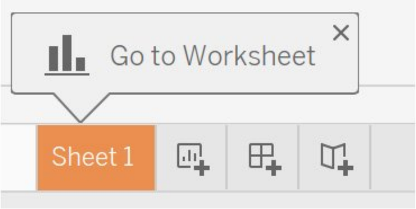
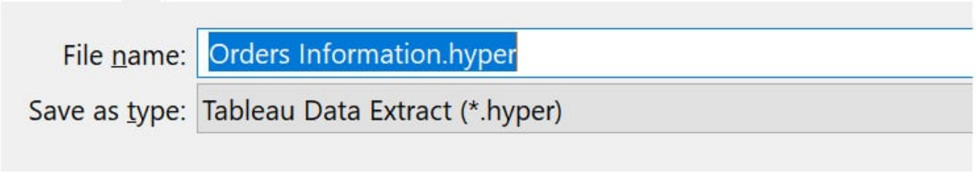


Figure 2.40: Navigating to a worksheet

1. This will open a popup to save the extract locally. Select a destination of your choice to save the extract.



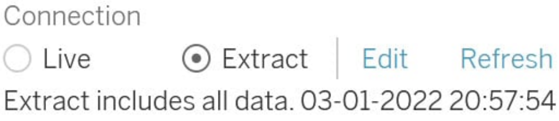
File name: Orders Information.hyper

Save as type: Tableau Data Extract (*.hyper)

Figure 2.41: Extract creation and save

Clicking on `Save` will create the extract and save it at the specified location. There is also the `Edit` option, which can be used to edit the properties of the extract. You will study these in the next section.

1. Refresh your extracts using the `Edit` or `Refresh` option if your data changes, as shown in the following figure:



Connection

○ Live ● Extract

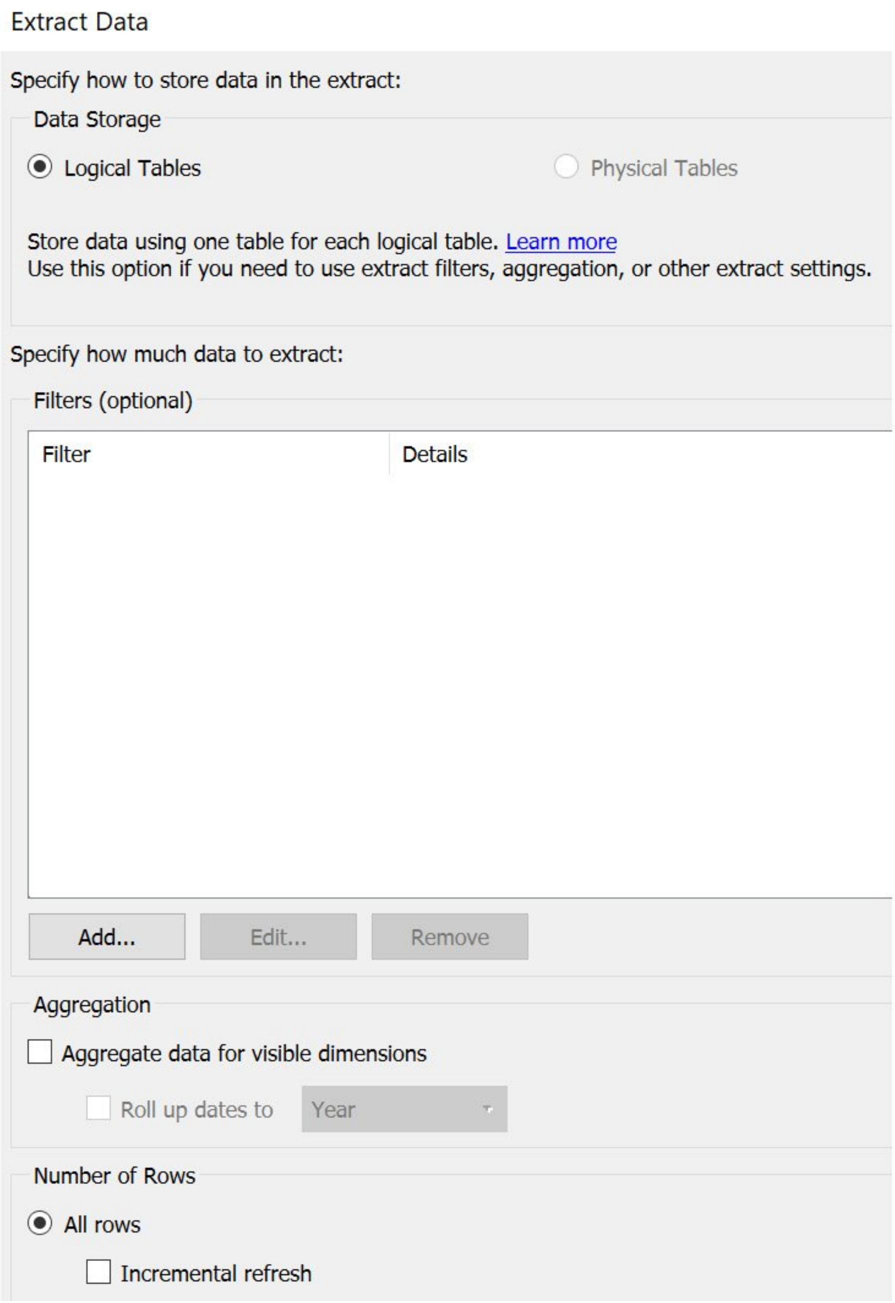
Extract includes all data. 03-01-2022 20:57:54

Figure 2.42: Extract Edit and Refresh options

In this exercise, you created an extract using Tableau Desktop.

Extract Properties

To access the extract properties, you can click on the `Edit` option next to `Extract`, as shown in *Figure 2.42*, to open the following window:



Extract Data

Specify how to store data in the extract:

Data Storage

● Logical Tables ○ Physical Tables

Store data using one table for each logical table. Learn more
Use this option if you need to use extract filters, aggregation, or other extract settings.

Specify how much data to extract:

Filters (optional)

Filter	Details

Aggregation

□ Aggregate data for visible dimensions

□ Roll up dates to Year

Number of Rows

● All rows

□ Incremental refresh

Figure 2.43: Extract edit properties

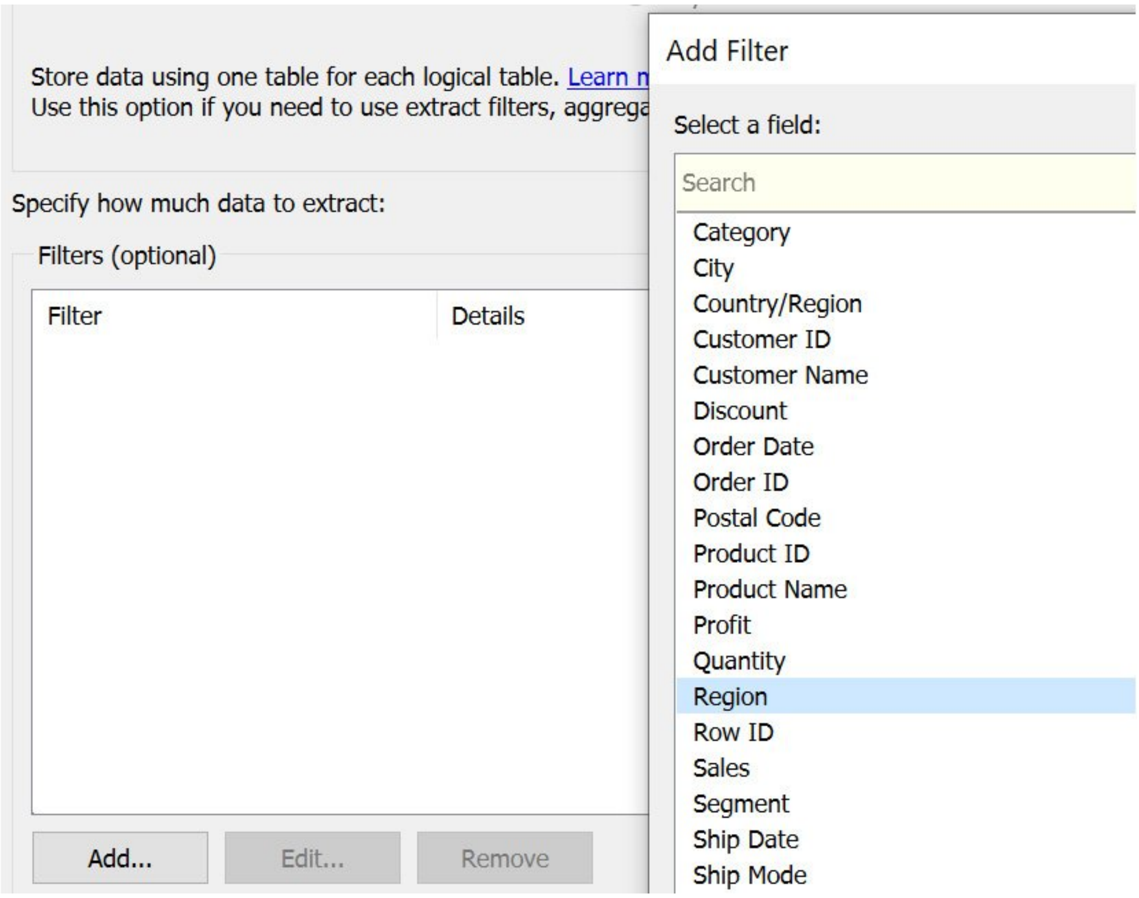
The following sections will describe this window and its fields in detail.

The Data Storage field

If you have multiple tables, the `Multiple tables` option will be enabled. For now, since you have a single table, the `Single table` option is enabled.

The Filters field

You can restrict the data in the extract using filters. For example, suppose you want only the data for the `Central` and `East` regions; you can easily do that using the `Add…` option. Select `Region` as the column to filter and select the `Central` and `East` values to add them as the filter condition.



Store data using one table for each logical table. Learn m
Use this option if you need to use extract filters, aggrega

Specify how much data to extract:

Filters (optional)

Filter	Details

Add... Edit... Remove

Add Filter

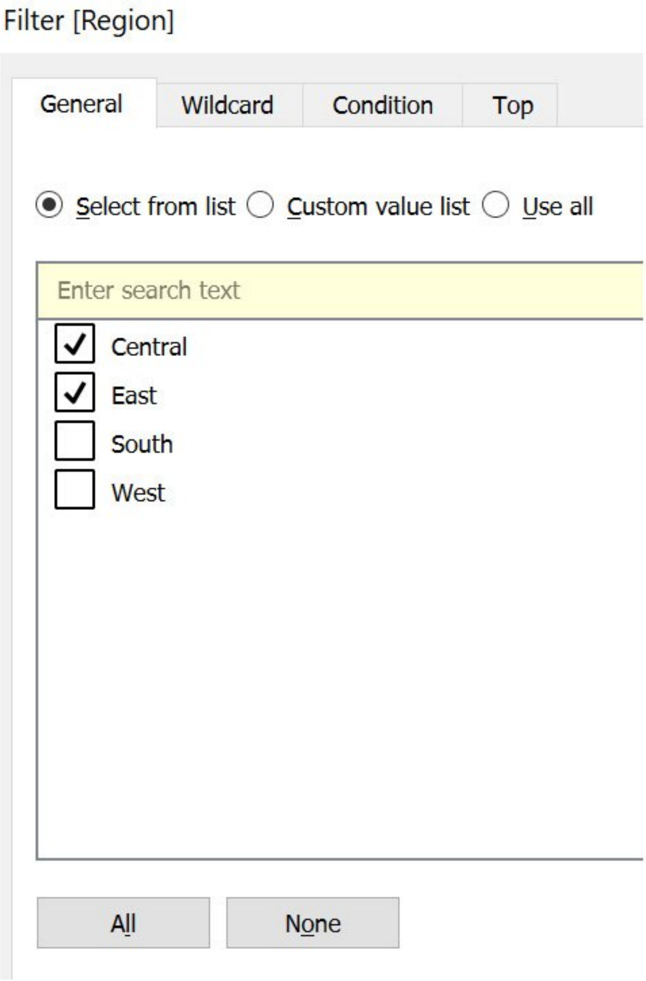
Select a field:

Search

Category
City
Country/Region
Customer ID
Customer Name
Discount
Order Date
Order ID
Postal Code
Product ID
Product Name
Profit
Quantity
Region
Row ID
Sales
Segment
Ship Date
Ship Mode

Figure 2.44: Adding a filter condition

As shown in the following figure, `Central` and `East` regions should be selected:



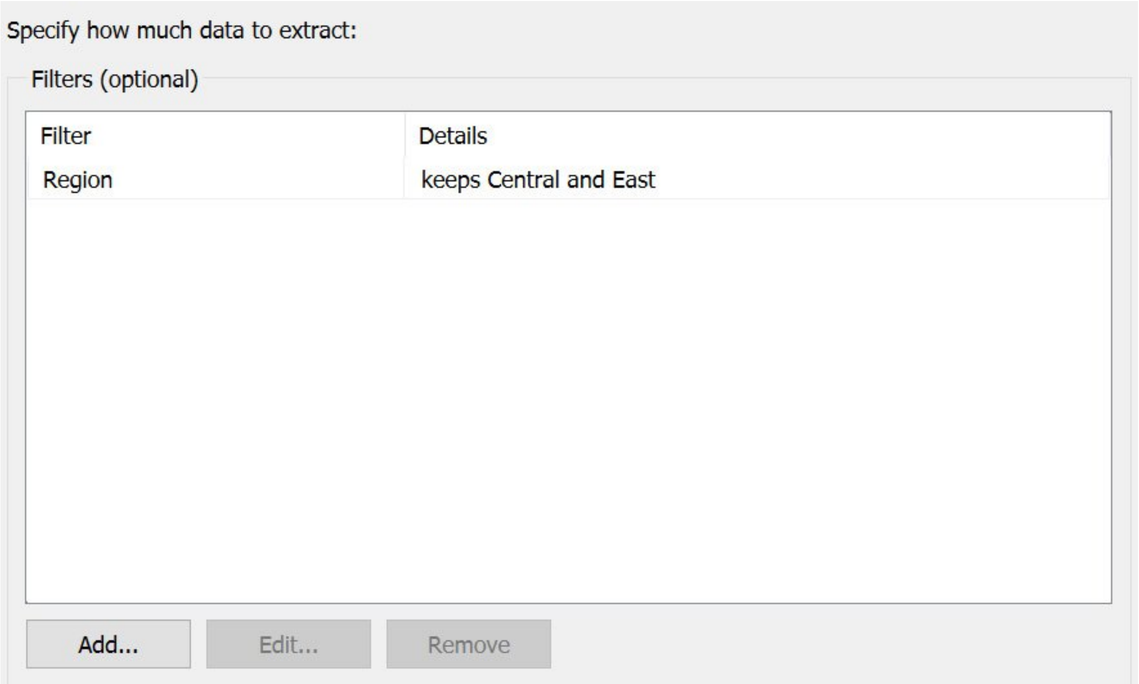
Filter [Region]

● Select from list ○ Custom value list ○ Use all

Enter search text

☑ Central
☑ East
□ South
□ West

Figure 2.45: Selecting Central and East regions



Specify how much data to extract:

Filters (optional)

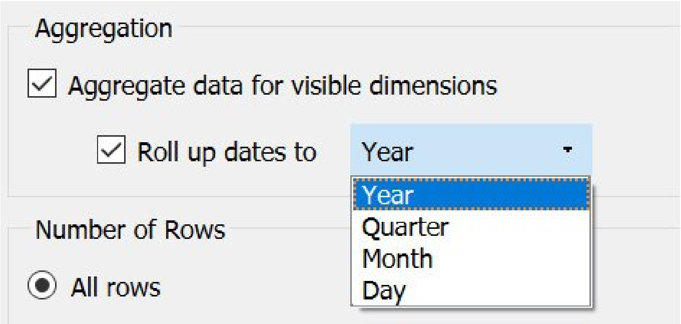
Filter	Details
Region	keeps Central and East

Figure 2.46: Creating extract filters using the Region column

You will learn more about these filters as you progress through this lab.

The Aggregation Field

You can also change the granularity of the data using this option. If you have dates in the dataset on a `Day` level, you can roll them up or aggregate them to a higher level using a different option, such as `Month` or `Year`. You will learn more about aggregations later in the course.



Aggregation

☑ Aggregate data for visible dimensions

☑ Roll up dates to Year

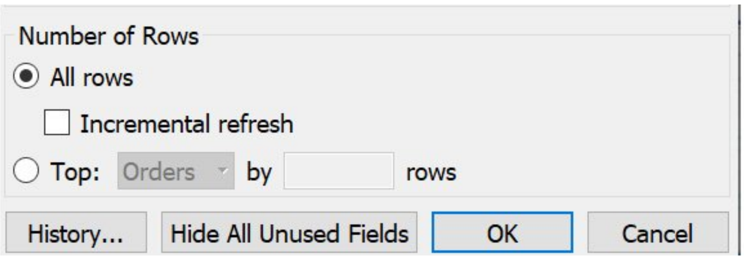
Number of Rows

● All rows

Figure 2.47: Transforming the data aggregation level

The Number of Rows Field

Using this option, you can choose the number of rows the extract should contain. `All rows` will include all the rows, `Top` will include only the specified number of rows, and `Sample` will contain a sample of specified rows. This is useful when you are working on a very large dataset, but for development purposes, you just need a sample of the data.


Number of Rows

● All rows

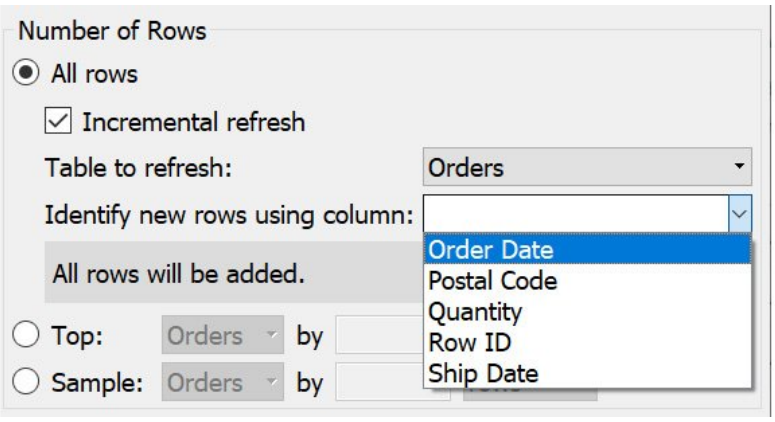
□ Incremental refresh

○ Top: Orders by rows

Figure 2.48: Sample selection using the number of rows

On selecting `All rows`, you will also get an option called `Incremental refresh`. Instead of refreshing the data every day, you can use this option to specify which field can be used to identify new rows so that only the specified section of the data is refreshed. This option is helpful when you have a very large dataset that updates at regular intervals wherein the old data does not change.

Consider the case of banking transactions. The bank will never modify the old data but would keep adding new data to maintain the historic data. In this case, an incremental refresh would be very helpful during extract refreshes.


Number of Rows

● All rows

☑ Incremental refresh

Table to refresh: Orders

Identify new rows using column:

All rows will be added.

○ Top: Orders by

○ Sample: Orders by

Figure 2.49: Identifying the column for performing refresh

Now that you understand what values to add in these fields, you'll review what factors to determine when choosing the type of connection.

Which Connection Is Better -- Live or Extract?

Ideally, in most projects, an extract is the ideal approach, but there may be a need to showcase live data as in the example you saw before. The following points should be considered before choosing an extract or a live connection:

- **Updated or delayed data**: If you have a requirement for which you need the most up-to-date information whenever you view the dashboard, you would need a live connection. Otherwise, if you are comfortable with some delay in the latest data, an extract is a better choice.
- **Data volume**: If your data volume is very large, it is ideal to use a data extract instead of a live connection as it might take a lot of time to develop dashboards on live connections.

With these points in mind, you can choose the right type of connection for your project.

Filters

This option is similar to the `Extract Filter` property you learned about before. These filters are also known as data source filters because they filter data at the source. You will further study various filters later in the course.

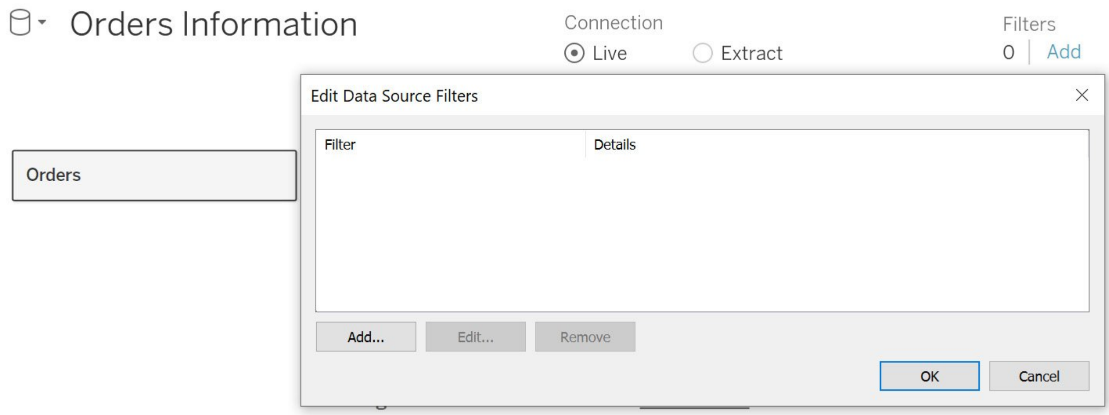
Consider the example of a large retailer such as Amazon, where the data has a large volume. Suppose you want to analyze the data for a specific region. In this case, it is not prudent to pull the whole data in Tableau as it would make the dashboard slower, and also, you would not have any use for the data other than that for your target region.

For such a case, you can use the `Data Source Filter` option. This would restrict the data at the source itself and only bring in the required data based on the filtering criterion specified.

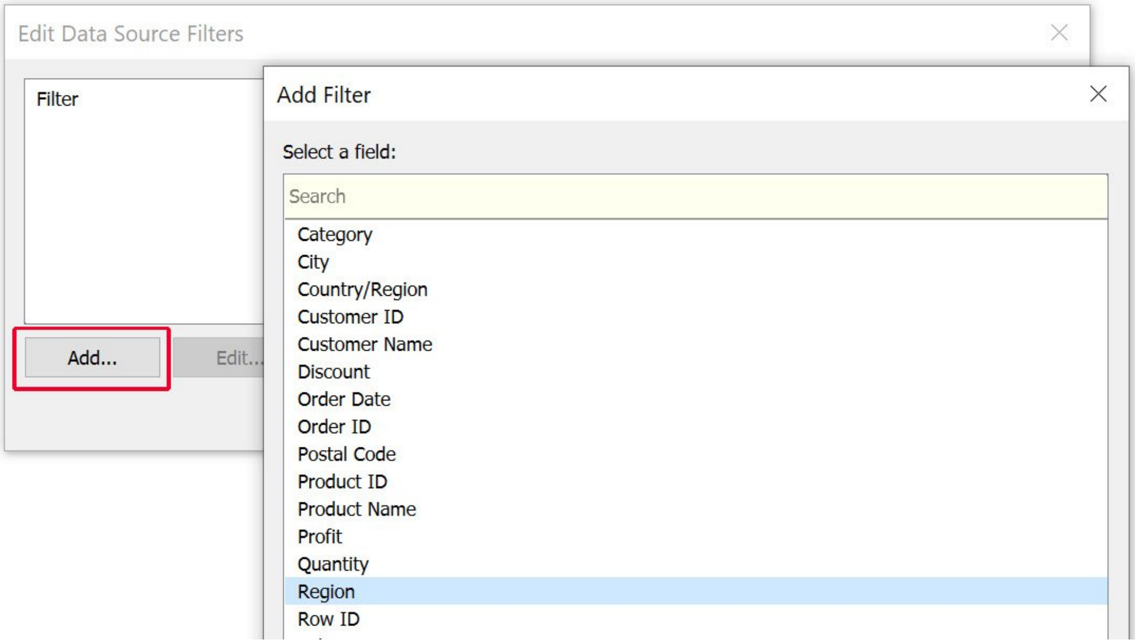
Exercise 2.07: Adding a Region Filter on the Orders Table

Consider that you want to add a `Region` filter on the `Orders` table, to bring the data for the `Central` and `East` regions only. You can do so by following these steps:

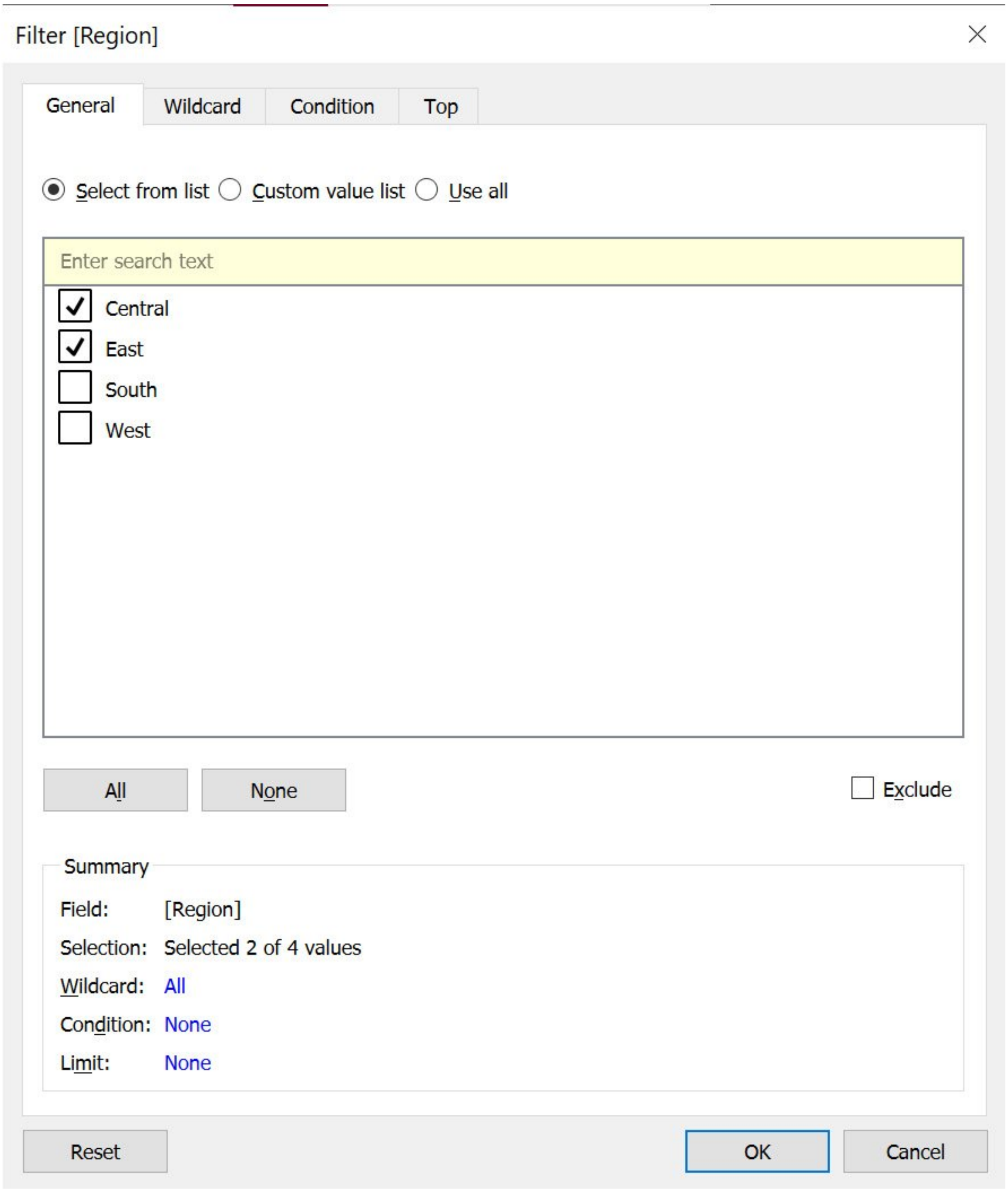
1. Load the `Sample - Superstore` dataset in your Tableau instance.
2. Drag the `Orders` table onto the canvas.
3. To add a filter, click on the `Filters` | `Add` option to open the popup:



1. Click on `Add...` to open the columns list. Select `Region` as the column:



1. Select `Central` and `East` as the regions that will be kept in the data. Click `OK` to add the filter, as follows:



● Select from list ○ Custom value list ○ Use all

☑ Central
☑ East
□ South
□ West

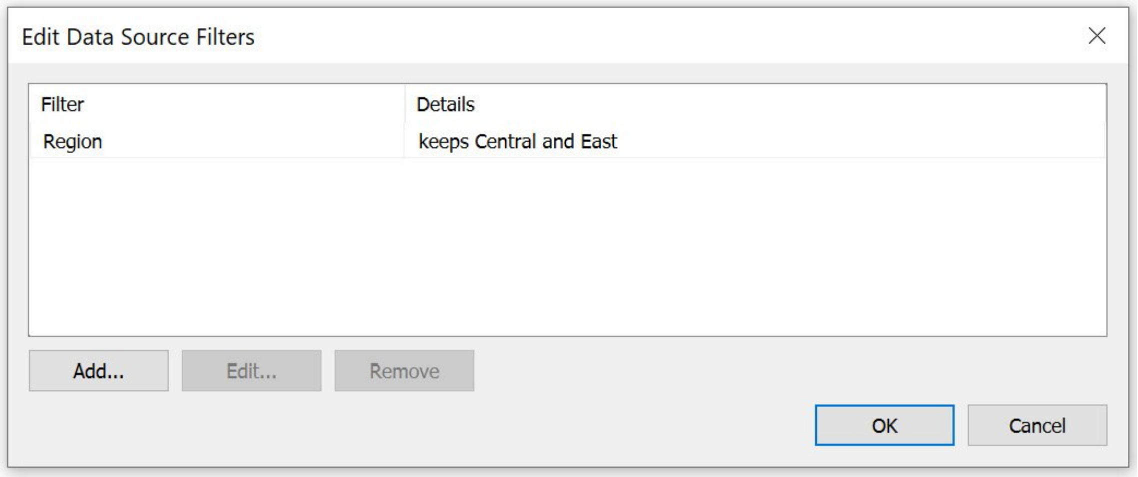
□ Exclude

Summary

Field: [Region]
Selection: Selected 2 of 4 values
Wildcard: All
Condition: None
Limit: None

You can similarly add more filters by clicking on the `Add…` option and repeating the previous steps.

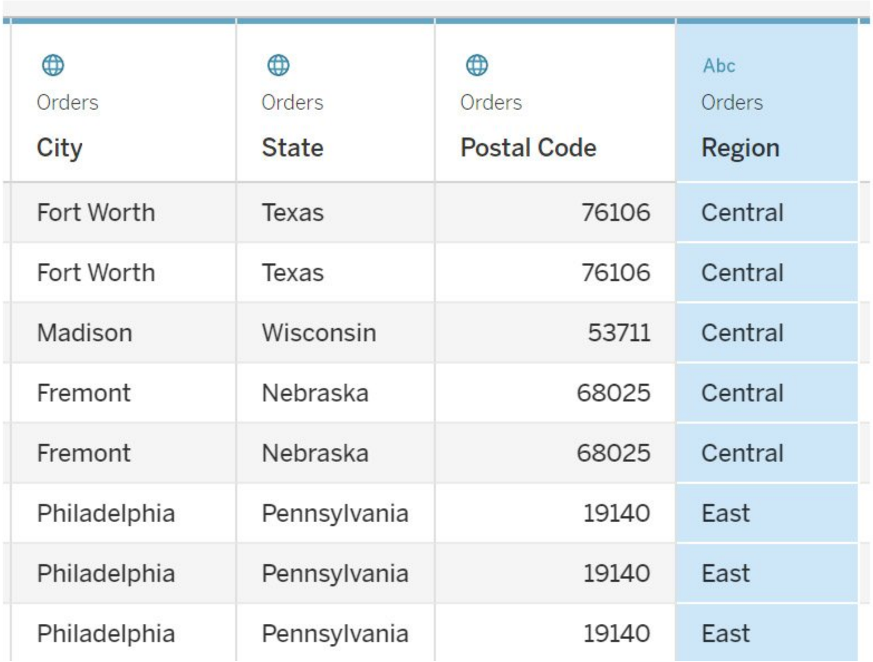
1. You can also edit and remove the existing filters. To do that, select the filter you want to edit or remove and then select the required option, as shown in the following figure:



Edit Data Source Filters

Filter	Details
Region	keeps Central and East

1. Once you have added the filter, preview the data in the data grid. You will observe that you only have data for the `Central` and `East` regions, as expected.



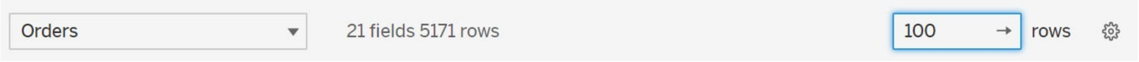
🌐 Orders City	🌐 Orders State	🌐 Orders Postal Code	Abc Orders Region
Fort Worth	Texas	76106	Central
Fort Worth	Texas	76106	Central
Madison	Wisconsin	53711	Central
Fremont	Nebraska	68025	Central
Fremont	Nebraska	68025	Central
Philadelphia	Pennsylvania	19140	East
Philadelphia	Pennsylvania	19140	East
Philadelphia	Pennsylvania	19140	East

In this exercise, you learned how to apply a filter and the various properties associated with a data source filter. In the next section, you will learn how to transform data using the data grid.

Data Grid Options

The data grid allows you to preview data. You have been using it so far just to check the number of rows the data contains, but it also contains several other options to transform data before you start with the visualization development. In this section, you will learn about these options and how to use them to better understand the data transformations.

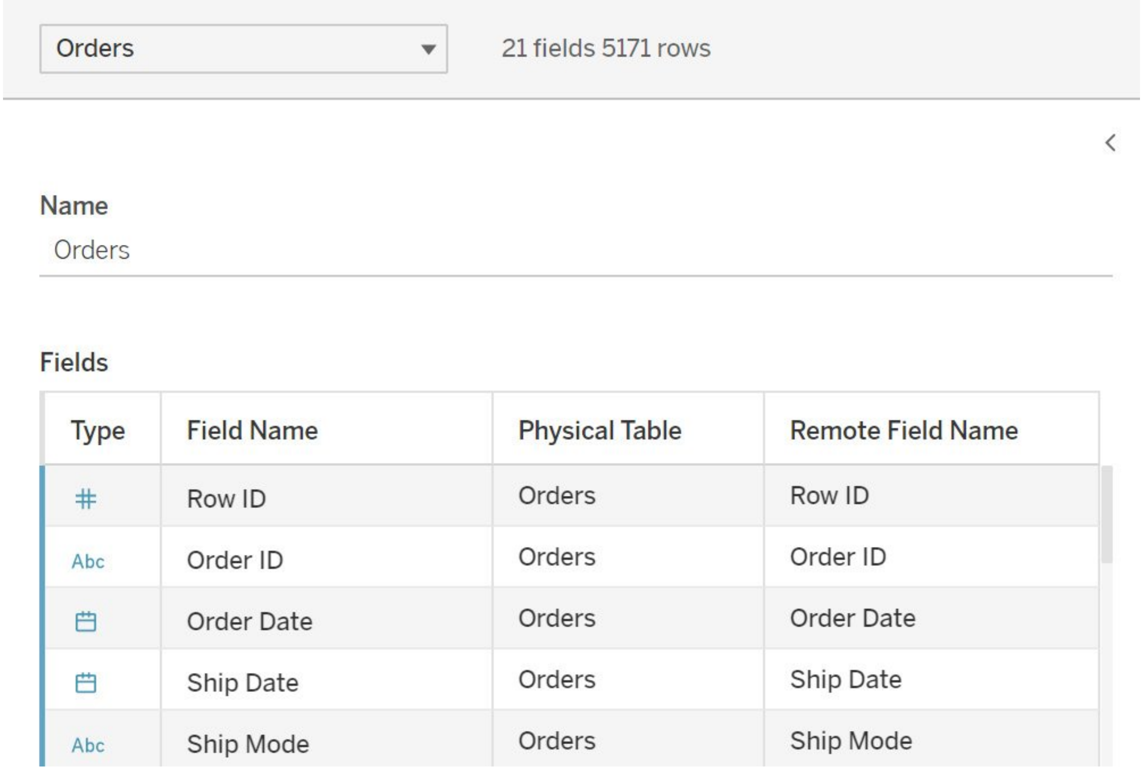
Data preview: You can use this to preview the data. You can also select the number of rows to be displayed, by specifying the number in the box on the right, as can be seen in the following figure:



Orders ▾ 21 fields 5171 rows 100 → rows

Metadata: Metadata provides information about the source, such as the table name. Toggling to the metadata view, you can see all the metadata about the data. You can view the various columns, the table they come from, and the remote field name.

If you rename a field here, the remote field name will show the original field name pulled from the data.



Orders ▾ 21 fields 5171 rows

Name
Orders

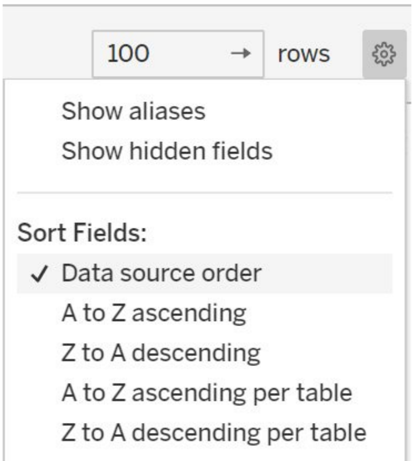
Fields

Type	Field Name	Physical Table	Remote Field Name
#	Row ID	Orders	Row ID
Abc	Order ID	Orders	Order ID
📅	Order Date	Orders	Order Date
📅	Ship Date	Orders	Ship Date
Abc	Ship Mode	Orders	Ship Mode

Note

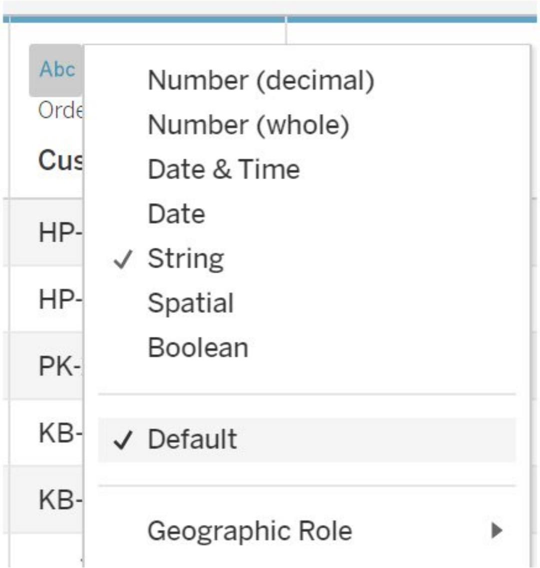
In Tableau version 2021.4, the metadata is automatically available beside the preview, and you will not have to choose between these options.

The `Sort fields` option will sort the data as per the option you select. You can try changing these options and observe how the data preview changes.

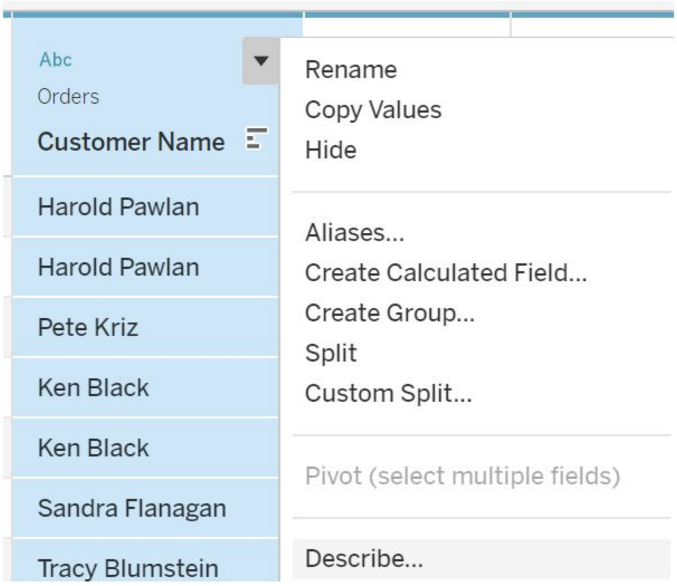


Now, consider the following data transformation options.

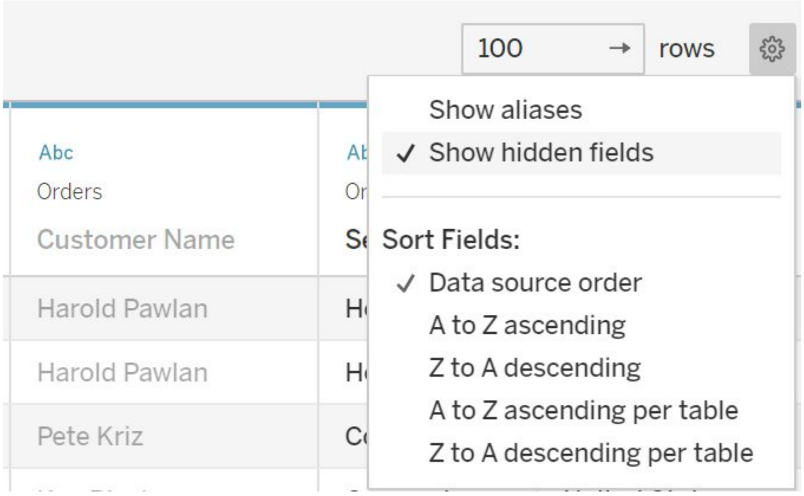
Change data type: Using this option, you can change the data type of a column. By clicking on the `Abc` icon (see the following figure), you can select the required data type from the drop-down box for the column. A common example is the `Customer ID` field being stored as a number where you might want it to be a string:



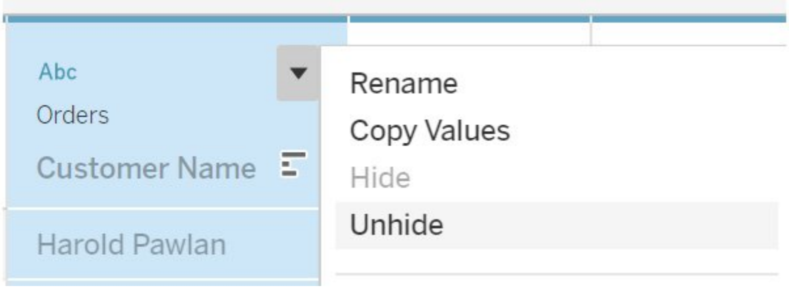
Data transformation: When you click on the drop-down icon, as shown in the following figure, you can see the options to transform the data, such as creating calculated fields on existing columns and creating groups. All these options are also available after you load the data. These will be covered in detail later in the course:



The `Rename` option allows you to rename the column. You can also hide a column if it's not required in the data visualization. You can select the `Show hidden fields` checkbox to view any hidden columns. Hidden columns are grayed out in the view, as indicated in the following figure:

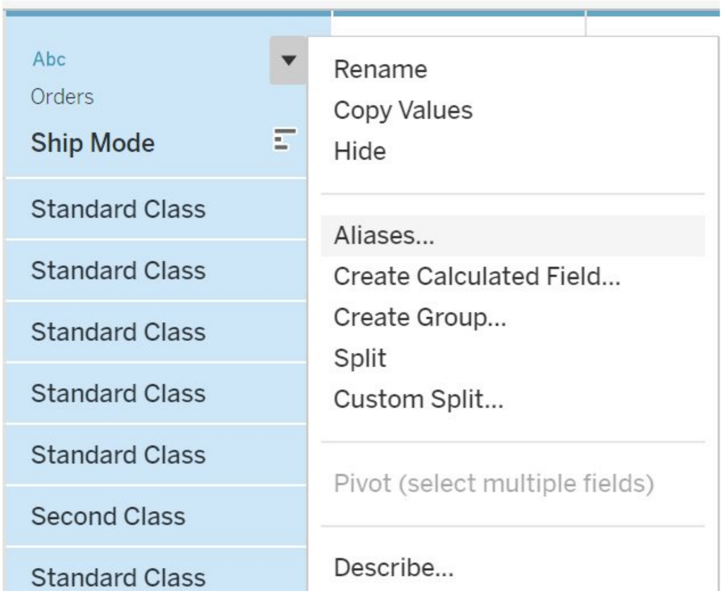


Hidden columns cannot be used in the visualization. If you want to use a column after hiding it, you need to first unhide the column to use it in the visualization. This can be done by clicking on the dropdown and selecting the `Unhide` option.

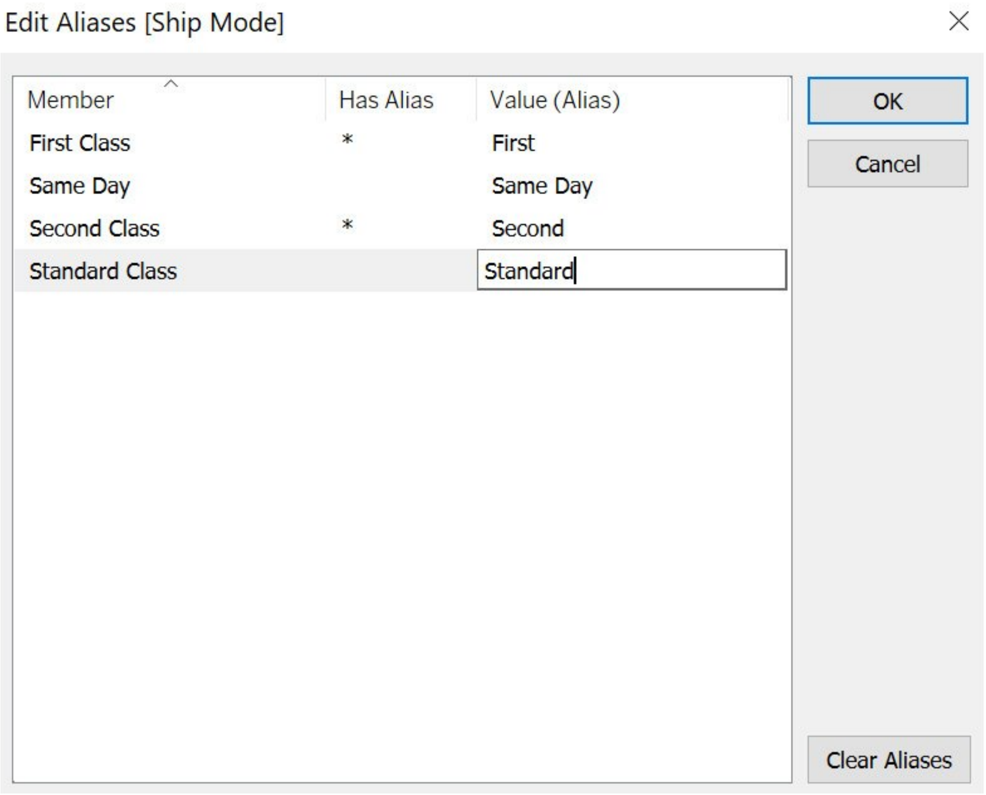


Aliases: Aliases are a very effective way to present data in the visualization with a different name.

Observe the `Ship Mode` column in the data preview. You can see that the word `Class` is repeated for the different `Ship Mode` values, and it does not add any value; so you can exclude this word from all the values. This can be done using the `Aliases` option, which will help you to display the values as a different name. To add aliases on the column, click on the dropdown and select `Aliases…` , as shown in the following figure:



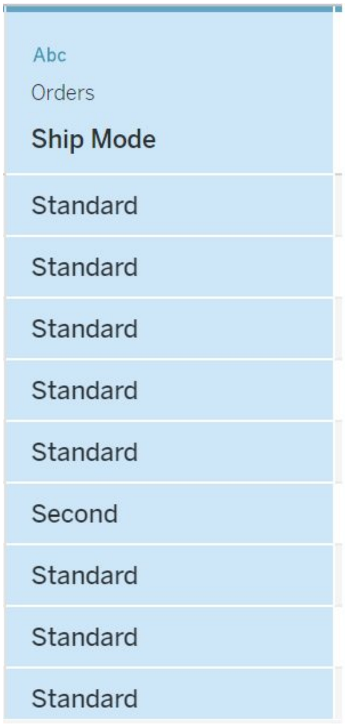
This will open the popup to rename the values. Remove the word `Class` . Click on `OK` to add it to the data. You can also clear the aliases using the `Clear Aliases` option.



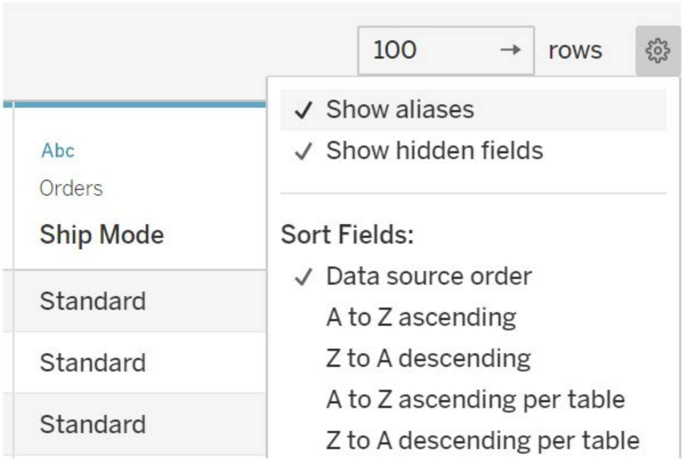
Edit Aliases [Ship Mode]

Member	Has Alias	Value (Alias)
First Class	*	First
Same Day		Same Day
Second Class	*	Second
Standard Class		Standard

You can use the `Show aliases` toggle to switch between the original names and the aliases. Aliases are generally used to rename null records to blank or columns containing long value names.



Abc Orders Ship Mode
Standard
Standard
Standard
Standard
Standard
Second
Standard
Standard
Standard



All these options are also accessible after you load the data in the worksheet.

In this view, you learned how to perform data transformations before pulling the data in the worksheets.

In all the exercises previously, you just joined on two data sources. But it is also possible to add more than two data sources. You will just need to specify in the join connection how the tables join to each other.

This completes the various ways you can join multiple tables in Tableau.

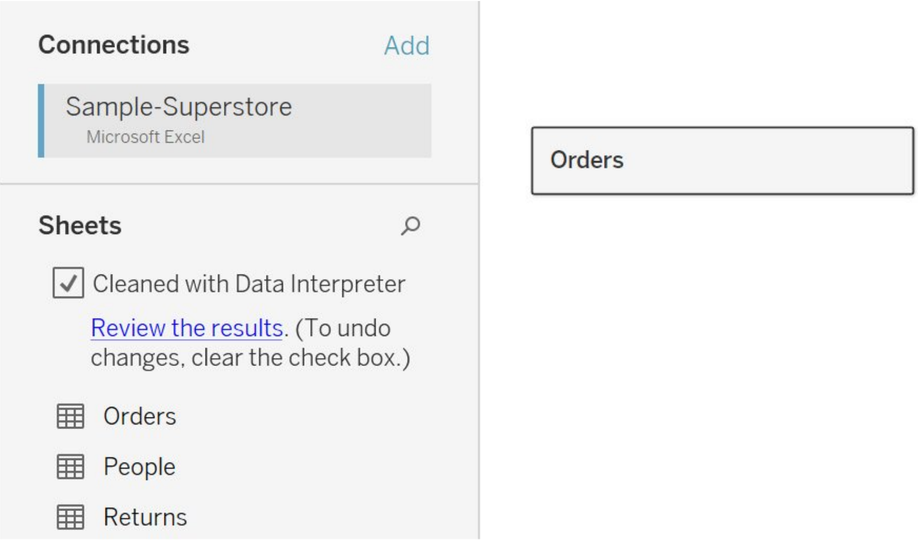
Data Blending

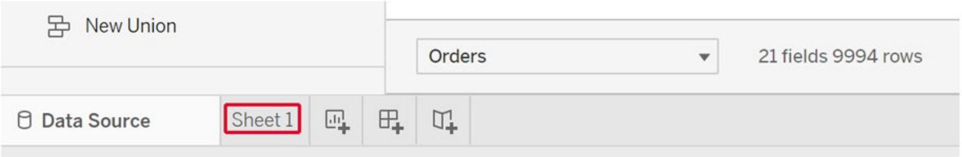
In data blending, you query the data between the two data sources and then combine the result at the aggregation level defined in the worksheet of the primary data source. The primary data source will be the one from which the first dimension or measure is added in the view. Also, the results would be similar to a left join since all the records from the primary data will appear in the worksheet.

Exercise 2.08: Creating a Data Blend Using the Orders and People Tables

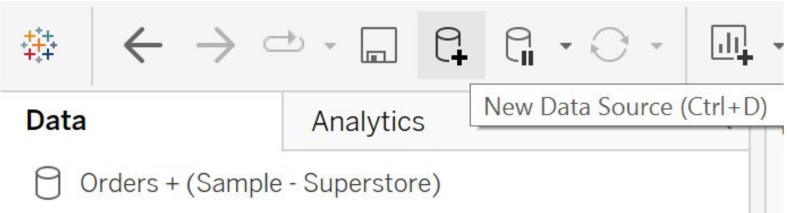
In this exercise, you will learn how to create a data blend for the `Orders` table with the `People` table. The following steps will help you complete this exercise:

1. Load the `Sample - Superstore` dataset in your Tableau instance.
2. Connect to the `Orders` table and go to `Sheet 1`.

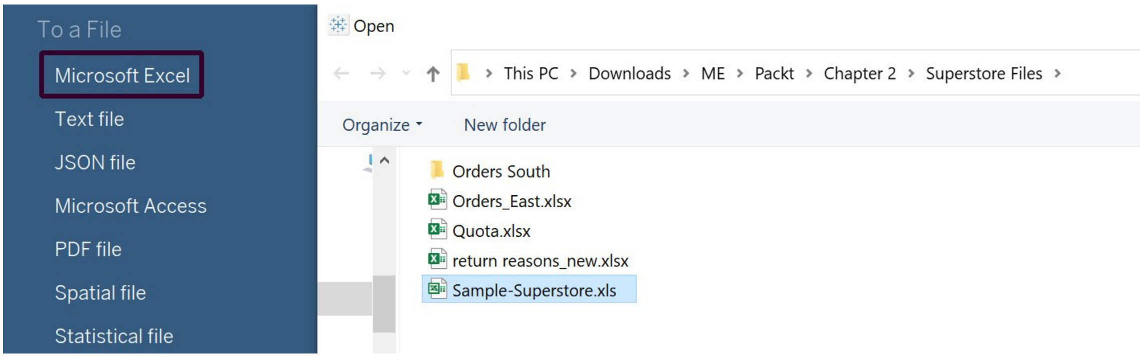

Connections
Add
Sample-Superstore
Microsoft Excel
Sheets
☑ Cleaned with Data Interpreter
Review the results. (To undo changes, clear the check box.)
Orders
People
Returns
Orders



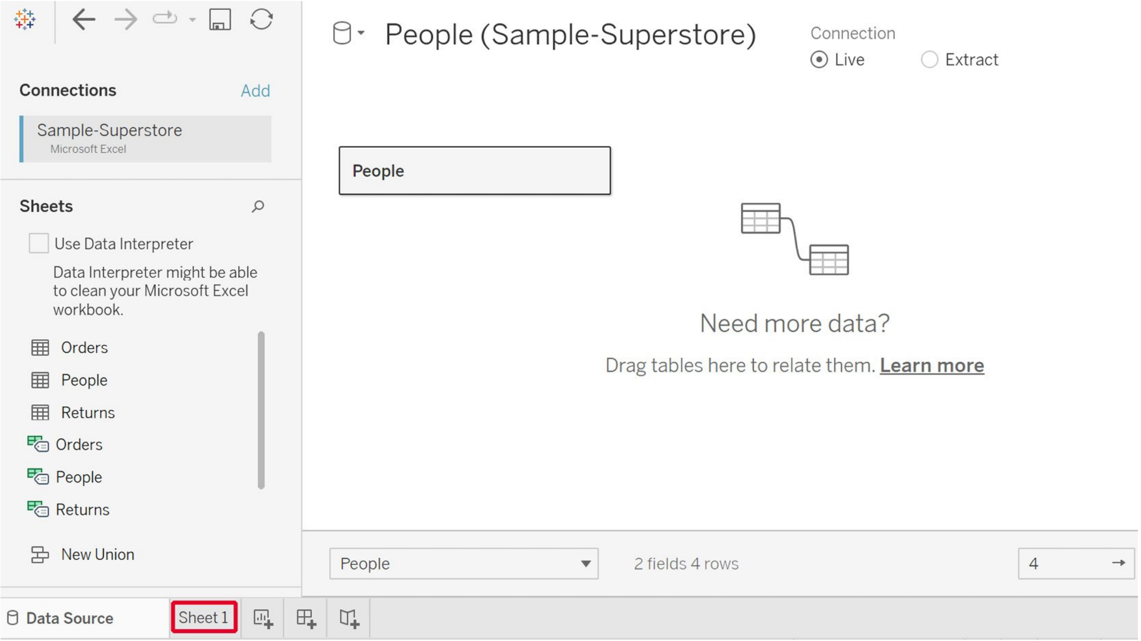
1. In a data blend, create the linking at the worksheet level and not at the data source level. Inside the worksheet, you will be able to see the `Orders` table and its columns. Add a new data source, as follows (see the highlighted option):



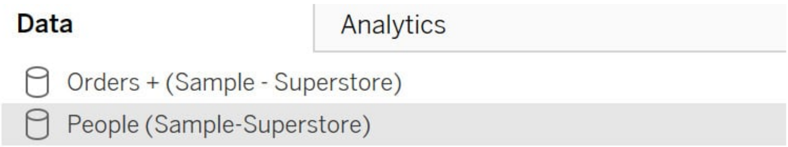
1. This should lead to the same menu that you get for connecting to a data source. Click on `Microsoft Excel`, navigate to the location of the `Sample - Superstore.xls` Excel file, and click on `Open` to open the `Connect` pane.



1. Now, drag the `People` table to the canvas and go to `Sheet 1` like before:



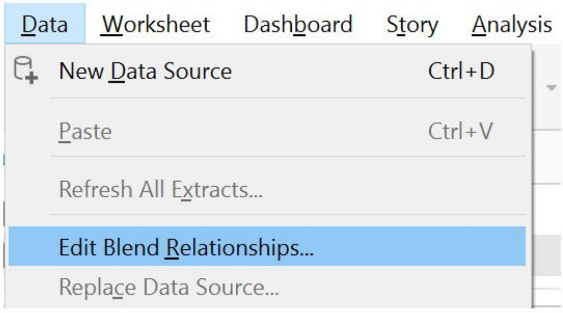
Now, you will be able to see the two data sources, as follows:

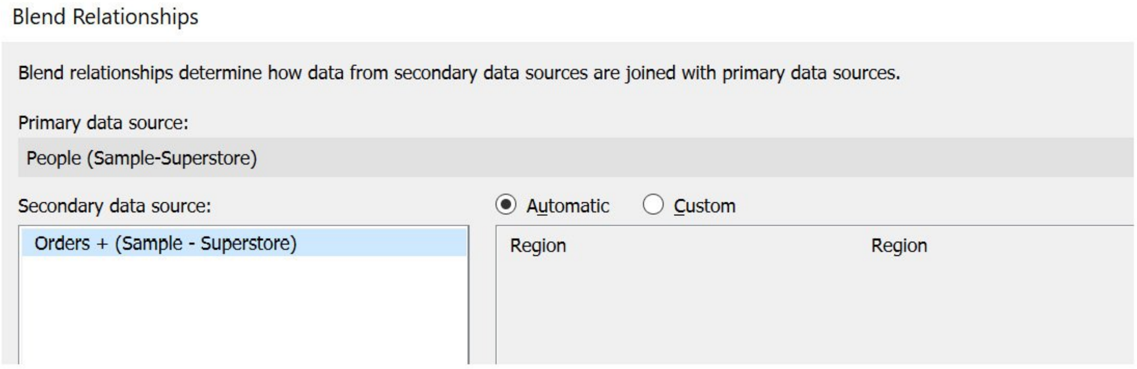


1. Add a relationship between these data sources to use them. To do that, click on `Data` | `Edit Relationships…` to open the popup.

   Note

   If you are using a Tableau version later than 2020.1, this may be called `Edit Blend Relationships...` to differentiate between relationships made directly in the `Data Source` tab.




Blend Relationships

Blend relationships determine how data from secondary data sources are joined with primary data sources.

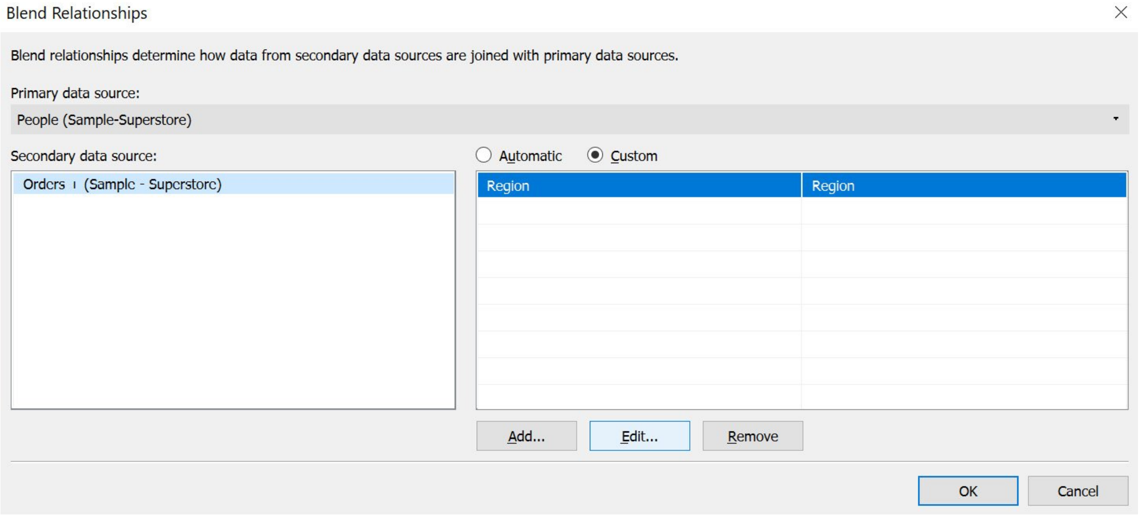
Primary data source:
People (Sample-Superstore)

Secondary data source:
Orders + (Sample - Superstore)

● Automatic ○ Custom

Region	Region

1. Based on the field names, the relationship can be set to `Automatic` by default. To change it, click on `Custom` and add the relationship. Edit the relationship to `Customer Name` and `Person`, as highlighted in the following figure. Select `Region` and then `Edit…` before making the selections in the popup. Click `OK` to add the relationship:


Blend Relationships

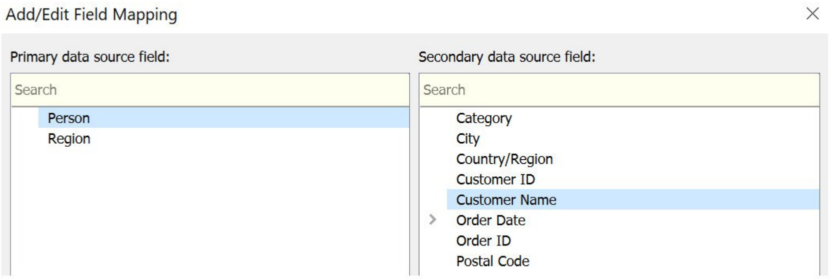
Blend relationships determine how data from secondary data sources are joined with primary data sources.

Primary data source:
People (Sample-Superstore)

Secondary data source:
Ordcrs ı (Samplc - Supcrstorc)

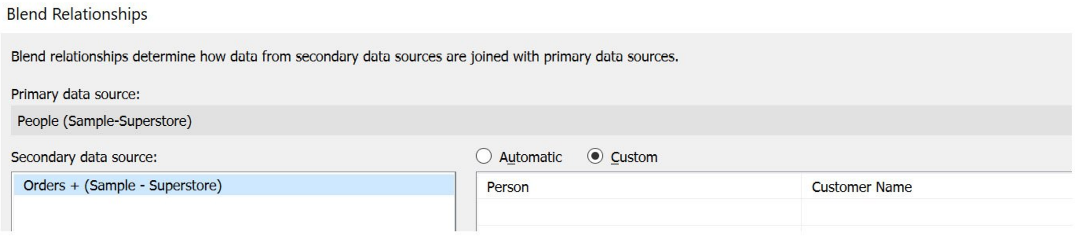
○ Automatic ● Custom

Region	Region


Add/Edit Field Mapping

Primary data source field:
Search
Person
Region

Secondary data source field:
Search
Category
City
Country/Region
Customer ID
Customer Name
Order Date
Order ID
Postal Code


Blend Relationships

Blend relationships determine how data from secondary data sources are joined with primary data sources.

Primary data source:
People (Sample-Superstore)

Secondary data source:
Orders + (Sample - Superstore)

○ Automatic ● Custom

Person	Customer Name

Thus, you have successfully blended the two data sources and can visualize your data in the next exercise.

Exercise 2.09: Visualizing Data Created from a Data Blend

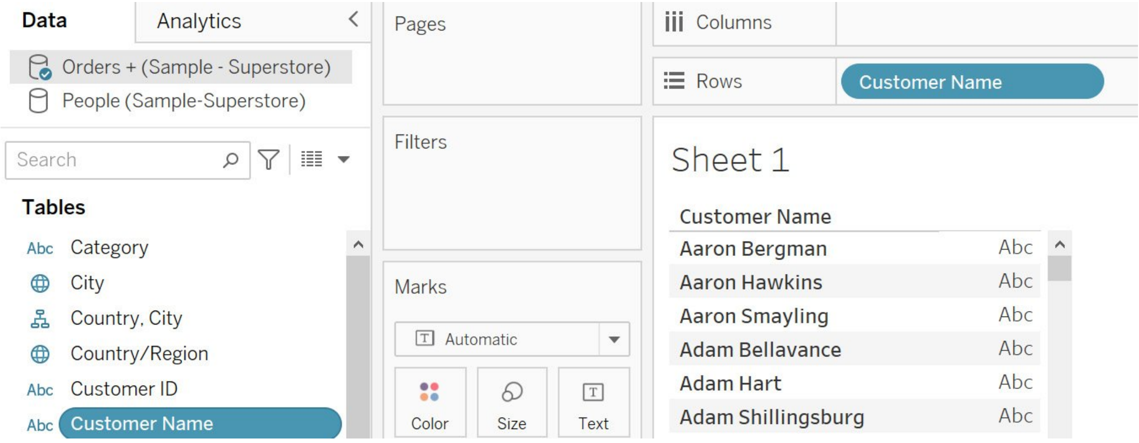
In the previous exercise, you learned how to perform data blending between two data sources. In this exercise, you will create a visualization on the blended data to understand the application of a data blend -- again, you will continue using the `Orders` table and the `People` table for this purpose. Note that a blend will only be active if you use the fields from these two data sources; otherwise, it will remain inactive.

Perform the following steps to complete this exercise:

1. On the `Orders` data, click and drag `Customer Name` to `Rows` .

   Note

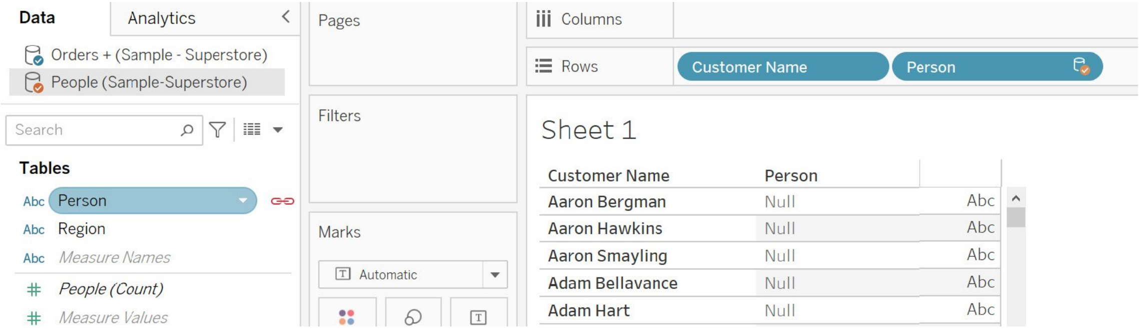
   Tableau versions later than 2020.1 may give a warning at this step that the field may contain more than 1000 rows. If this is the case, select `Add all members` to proceed.



Customer Name	
Aaron Bergman	Abc
Aaron Hawkins	Abc
Aaron Smayling	Abc
Adam Bellavance	Abc
Adam Hart	Abc
Adam Shillingsburg	Abc

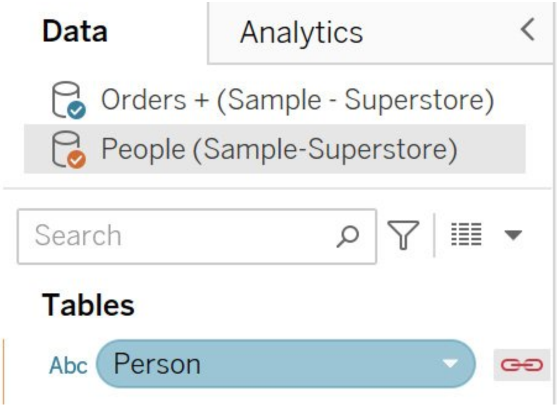
This will now become your primary data source, indicated by the blue tick on the data source.

1. Repeat the step for the `People` data source.

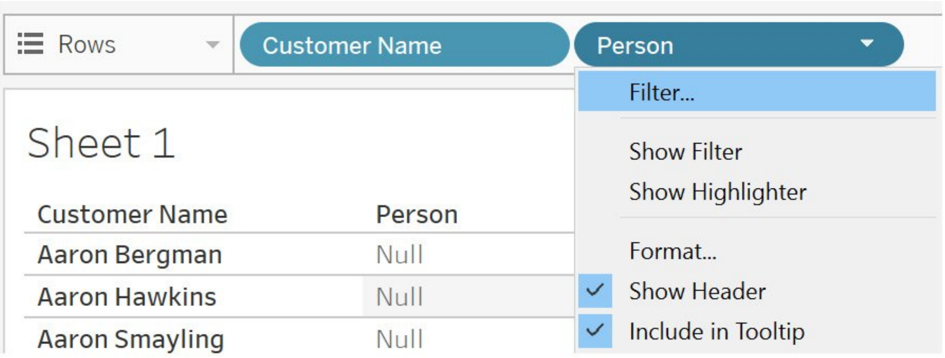


Customer Name	Person	
Aaron Bergman	Null	Abc
Aaron Hawkins	Null	Abc
Aaron Smayling	Null	Abc
Adam Bellavance	Null	Abc
Adam Hart	Null	Abc

This will become your secondary data source, indicated by the orange tick on the data source. Also, notice the red linking icon that is used to link the two data sources.

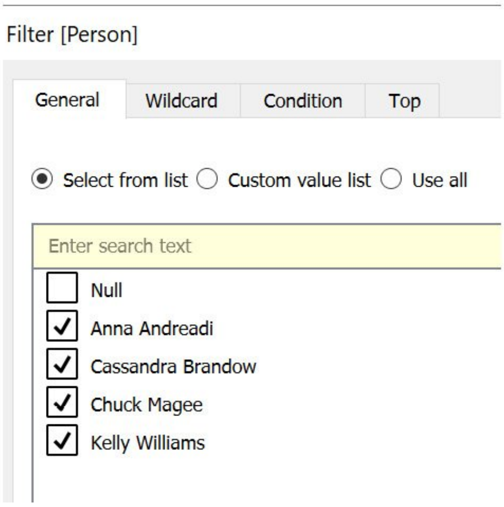


1. When you filter on `Person` for the four people that you have in the `People` data, you will see that you have linked these values between these data sources. Click on the `Person` column dropdown and then `Filter...`, uncheck the `Null` value, and click `OK` to add the filter.



Sheet 1

Customer Name	Person
Aaron Bergman	Null
Aaron Hawkins	Null
Aaron Smayling	Null

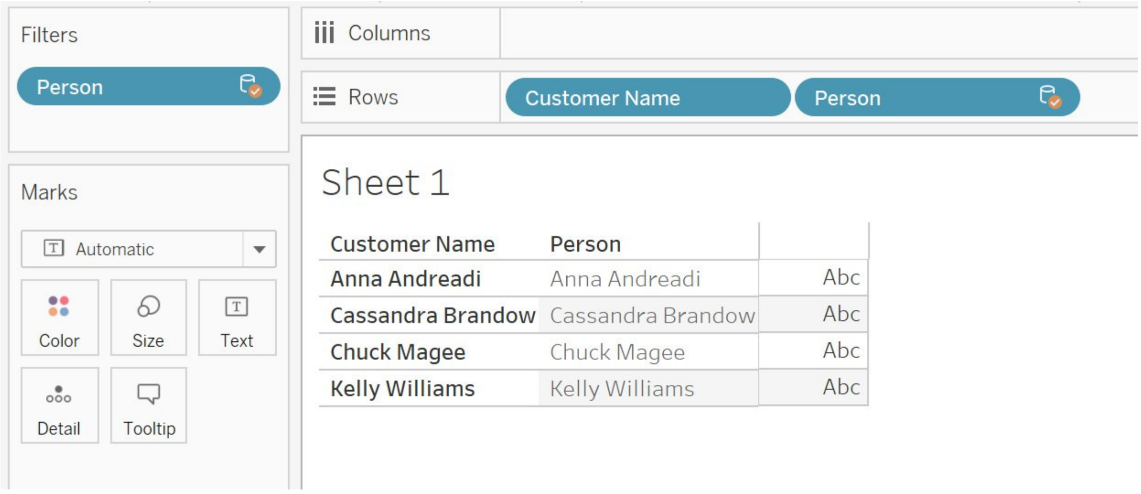


Filter [Person]

● Select from list ○ Custom value list ○ Use all

□ Null
☑ Anna Andreadi
☑ Cassandra Brandow
☑ Chuck Magee
☑ Kelly Williams

You will get the following output, which shows the customer name matching `Person`:



Sheet 1

Customer Name	Person	
Anna Andreadi	Anna Andreadi	Abc
Cassandra Brandow	Cassandra Brandow	Abc
Chuck Magee	Chuck Magee	Abc
Kelly Williams	Kelly Williams	Abc

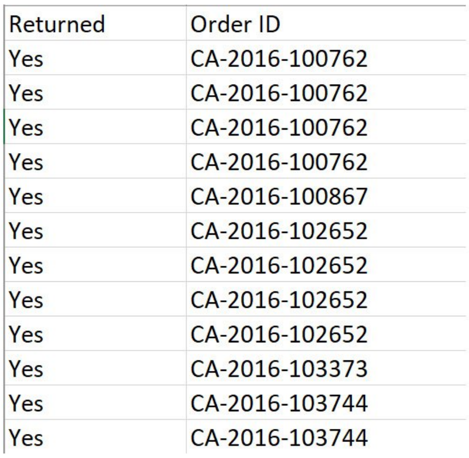
Activity 2.01: Identifying the Returned Orders

As an analyst, you may encounter a situation where you would like to assess business performance by sales. It is therefore important to understand how many orders are fulfilled and how many are returned. If certain products are being returned frequently, it is a point of investigation as it can have serious consequences on the business.

Usually, order information is kept separate from returns information. Hence, to bring this information together, you need to join the two data sources.

For this activity, you will use the `Orders` and `Returns` tables from the `Sample - Superstore` Excel file. You are already aware of the `Orders` table.

The `Returns` table consists of the `Order ID` and `Returned` columns. `Order ID` is the ID that would match with the `Orders` table. The `Returned` column indicates `Yes` for the order ID.



Returned	Order ID
Yes	CA-2016-100762
Yes	CA-2016-100762
Yes	CA-2016-100762
Yes	CA-2016-100762
Yes	CA-2016-100867
Yes	CA-2016-102652
Yes	CA-2016-102652
Yes	CA-2016-102652
Yes	CA-2016-102652
Yes	CA-2016-103373
Yes	CA-2016-103744
Yes	CA-2016-103744

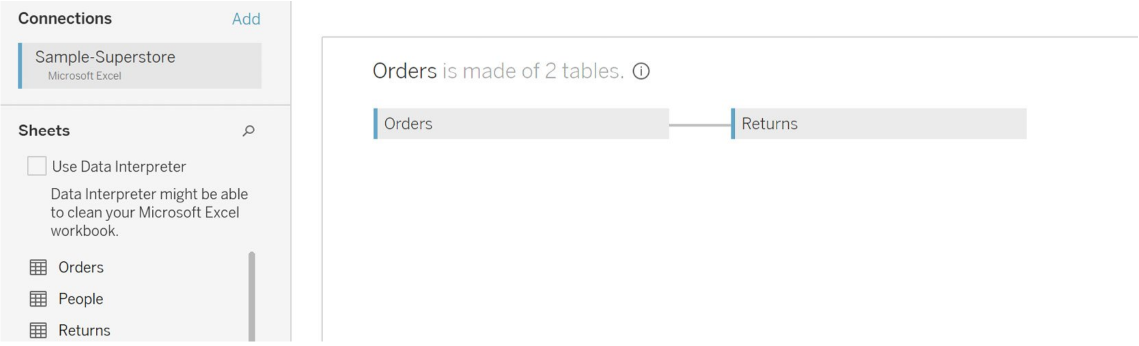
Figure 2.78: Returns sheet columns

The objective is to identify the returned orders after combining them with the main `Orders` table so that you may determine which orders were both fulfilled and returned.

The steps are as follows:

1. Open the `Sample - Superstore` dataset in your Tableau instance.
2. Rename the data source to `Activity 1`.
3. Drag the `Orders` table onto the canvas.
4. Repeat the same steps for the `Returns` table.
5. You need to bring all the `Orders` and `Returns` table values into the combined dataset. Can you identify the correct join based on the requirement? Remember that for an order to be returned, it should always be completed first. What can be interpreted if you change the join types to left, right, or full outer in this case?
6. Identify how many products were returned from the data grid. (An order can have multiple products clubbed in it.)

Final Output Expected:


Connections Add

Sample-Superstore
Microsoft Excel

Sheets

□ Use Data Interpreter

Data Interpreter might be able to clean your Microsoft Excel workbook.

Orders
People
Returns

Orders is made of 2 tables.

Orders — Returns

In this activity, you strengthened your knowledge of various joins and their outputs. You also learned how to interpret the results by changing the join types.

Activity 2.02: Preparing Data for Visualization

Now that you have joined the data, the next step is to make sure that the data is ready for visualization. This involves performing data transformation activities such as cleaning the data by removing the null values. You may also be required to rename certain columns or add aliases, split the columns, and so on.

In this activity, you will perform some data transformation steps based on the left join output of the previous activity.

This activity will help you to strengthen the concepts of data transformation in Tableau. This is a very important process in any Tableau project. Hence, it becomes crucial that you are well experienced in doing these in Tableau.

The objective of this activity is to transform the data into a cleaned form for visualization. You need to first create an extract for this data source. Then you need to display the data only for the `Furniture` and `Office Supplies` categories. Is there a way to do this using the extract properties? You will also clean up the final data by changing any nulls to blanks. Let's also remove repeated terms such as `Class` from the `Ship Mode` column.

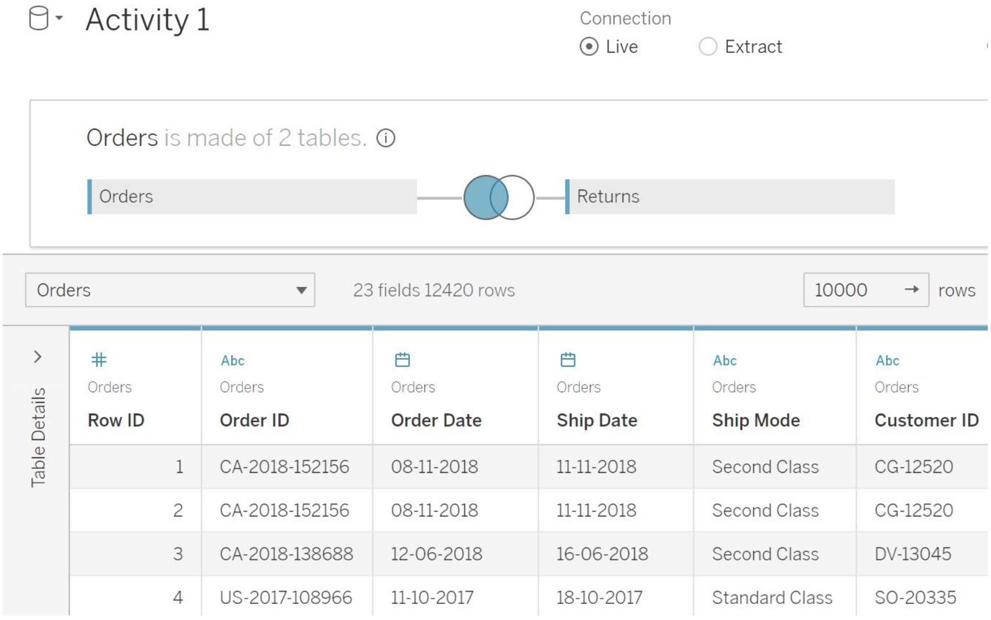
Once done, your data should be ready for visualization.

Continuing from Activity 2.01, the following steps will help you complete this activity:

1. Open the `Sample - Superstore` dataset in your Tableau instance.
2. Create a data extract for this data.
3. Add a filter on the data to pull the `Furniture` and `Office Supplies` categories. Check the row count.
4. Transform the data by aliasing a few columns.
5. Alias the null values from the columns of the `Returns` table to blanks.
6. Remove the word `Class` from the `Ship Mode` column.

Once completed, you should get the following output:

Final Output Expected:



Activity 1

Connection

● Live ○ Extract

Orders is made of 2 tables.

Orders — Returns

Orders ▾ 23 fields 12420 rows 10000 → rows

Table Details

# Orders Row ID	Abc Orders Order ID	Orders Order Date	Orders Ship Date	Abc Orders Ship Mode	Abc Orders Customer ID
1	CA-2018-152156	08-11-2018	11-11-2018	Second Class	CG-12520
2	CA-2018-152156	08-11-2018	11-11-2018	Second Class	CG-12520
3	CA-2018-138688	12-06-2018	16-06-2018	Second Class	DV-13045
4	US-2017-108966	11-10-2017	18-10-2017	Standard Class	SO-20335

In this activity, you learned how to extract the data. You also added filters for the `Category` column to just pull the selected categories. Many times, you will work on projects that require the data to be segregated at the beginning, such as regional data. These filters help you to achieve exactly this. You also transformed the data using aliases, making it much cleaner by removing repeated words and nulls.

Summary

In this lab, you learned how to connect to various data sources, which is the foremost step in data analysis in Tableau. Next, you learned about the various join options that Tableau provides and data transformation options to optimize the data for the final visualization. Joining tables is one of the most common requirements in practical data analysis. For instance, if you have two tables for employee details and department details, to find the number of employees per department, you would use a join key to get the required information.

You also learned about some advanced data joining options of blending and custom SQL. The key takeaway from this lab is how to connect data most efficiently based on the requirements and also how to transform the data so that it becomes more suitable for the visualization activity. The next lab continues with the topic of data preparation in Tableau Prep.