

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY GREATER NOIDA-201306

(An Autonomous Institute)

**School of Computer Sciences & Engineering in Emerging
Technologies**

Department of CSE (Data Science)

Session (2022 – 2023)

LAB FILE
ON

Business Intelligence and Data Visualization Lab (ACSDS - 0652) (6th Semester)

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PROGRAM 1

TABLEAU

OVERVIEW

Tableau is an excellent data visualization and business intelligence tool used for reporting and analyzing vast volumes of data. It is an American company that started in 2003—in June 2019, Salesforce acquired Tableau. It helps users create different charts, graphs, maps, dashboards, and stories for visualizing and analyzing data, to help in making business decisions.

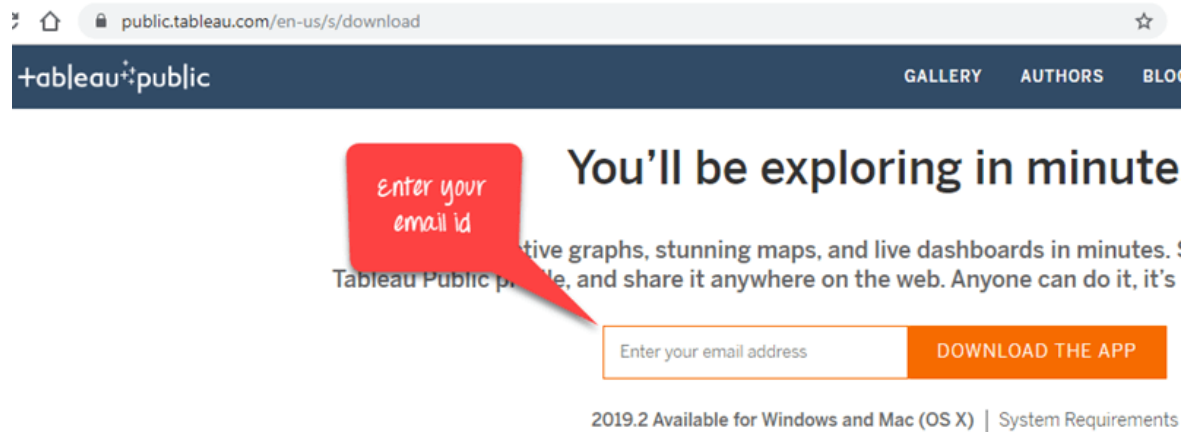
Tableau has a lot of unique, exciting features that make it one of the most popular tools in business intelligence (BI). Let's learn more about some of the essential Tableau Desktop features. Now that we know what is tableau exactly, let us understand some of its salient features.

WHY TABLEAU?

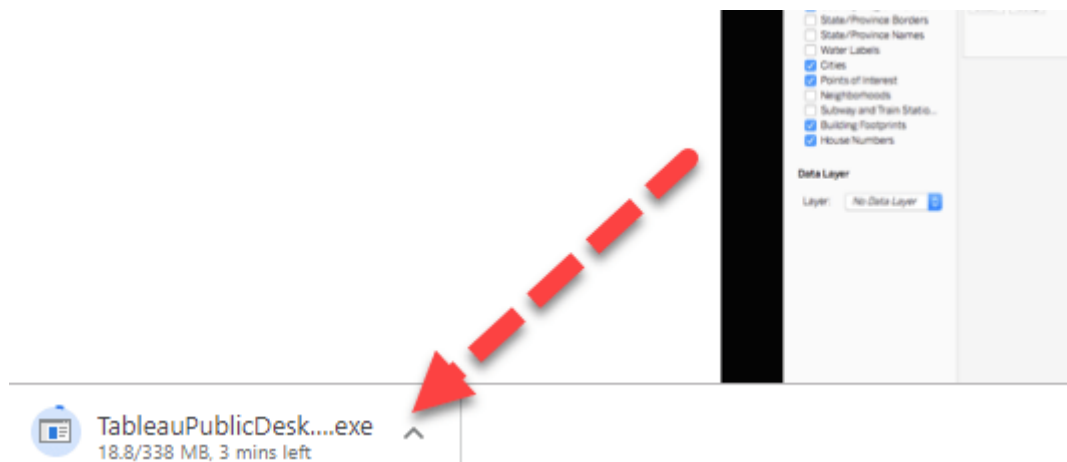
Tableau is greatly used because data can be analyzed very quickly with it. Also, visualizations are generated as dashboards and worksheets. Tableau allows one to create dashboards that provide actionable insights and drive the business forward. Tableau products always operate in virtualized environments when they are configured with the proper underlying operating system and hardware. Tableau is used by data scientists to explore data with limitless visual analytics.

INSTALLATION OF TABLEAU PUBLIC

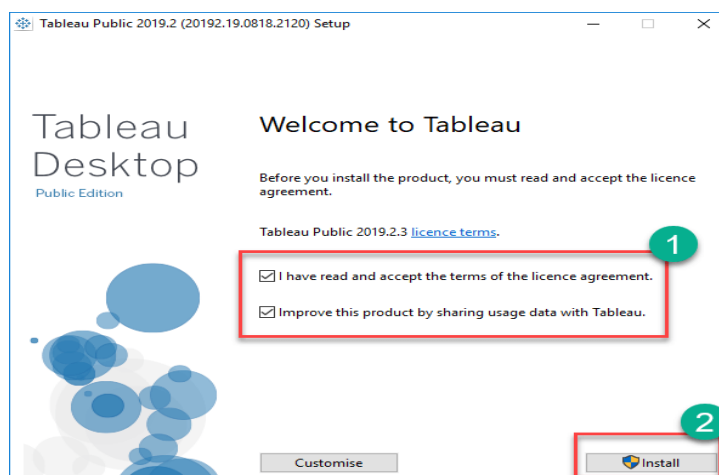
Step 1) Go to <https://public.tableau.com/en-us/s/download> on your web browser. Now you need to enter your email id and click on “**DOWNLOAD THE APP**” button.



Step 2) This will start downloading the .exe file for Windows by default, and you can see the downloading process in the bottom left corner of the website.



Step 3) Open the downloaded file. Accept the terms and conditions and click on “Install” button.



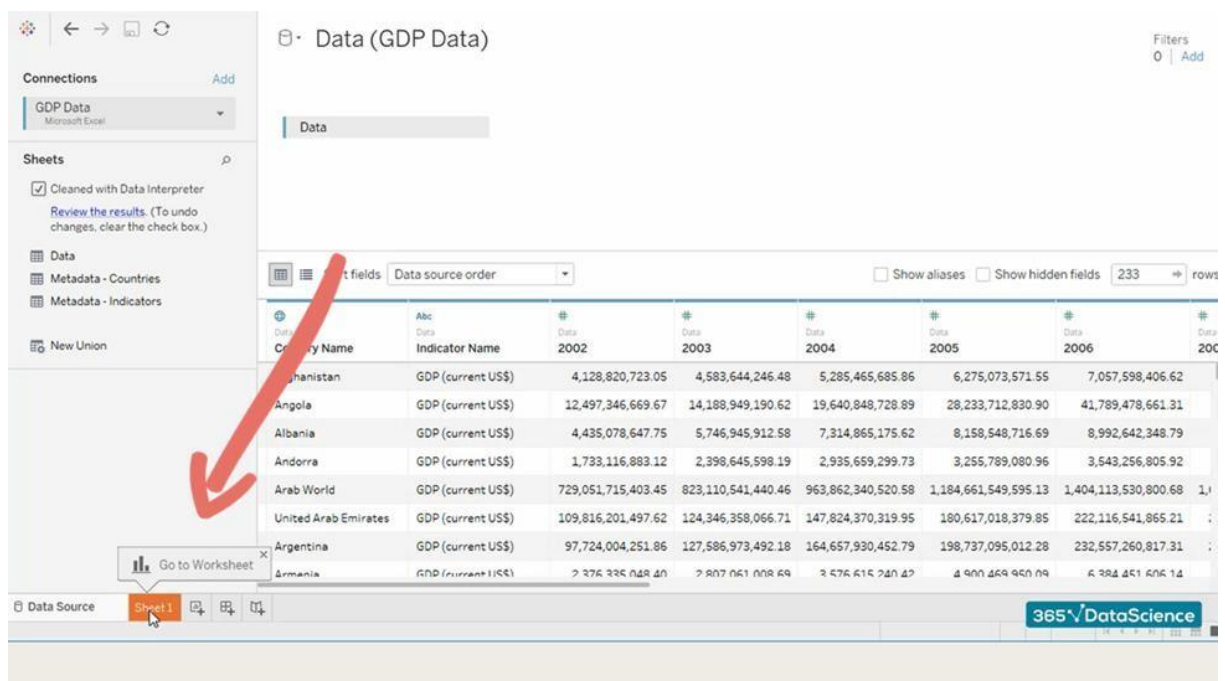
Step 4) After installation Start Screen of Tableau is shown



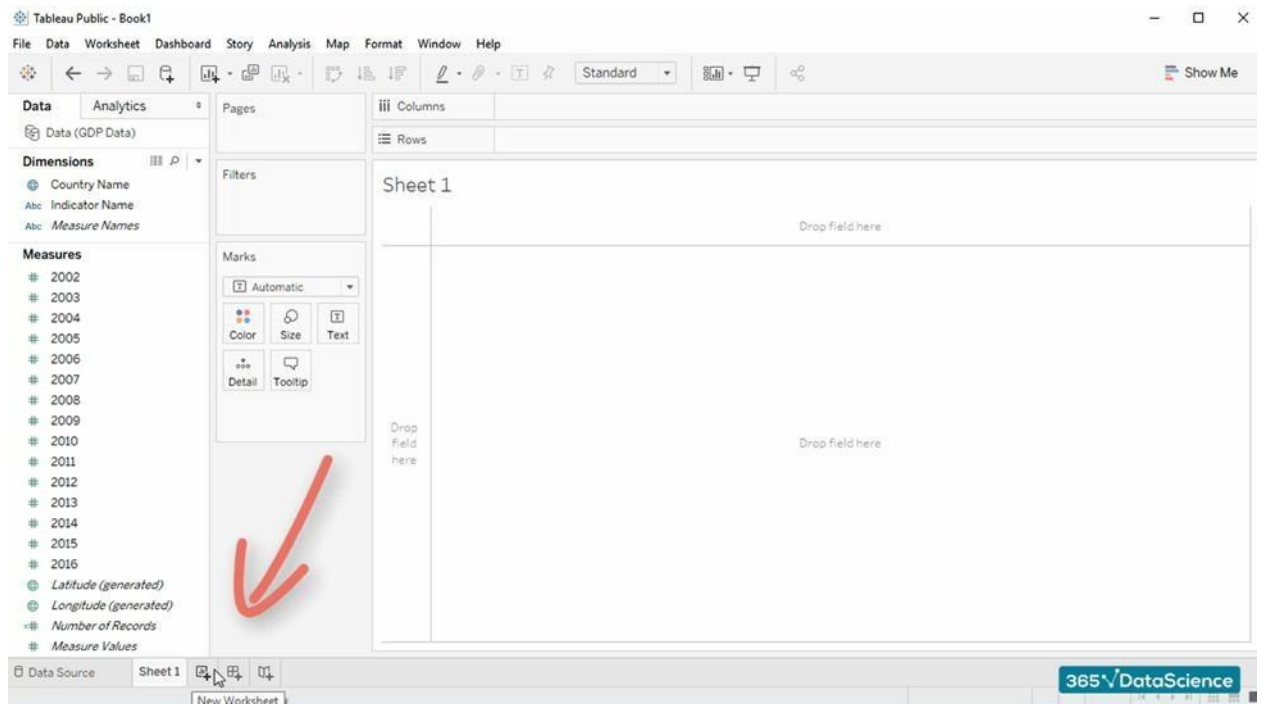
User interface

The Tableau Interface: Creating a New Sheet

So, you've installed Tableau and wondering what to do. Let's create our first sheet. It's really easy to do and resembles how we create a sheet in Excel or pretty much every other spreadsheet software. All we have to do is click on 'Sheet 1':



This is what a Tableau sheet looks like. We can have as many of them as we want; simply click on the little icon at the bottom and a new worksheet will be added:

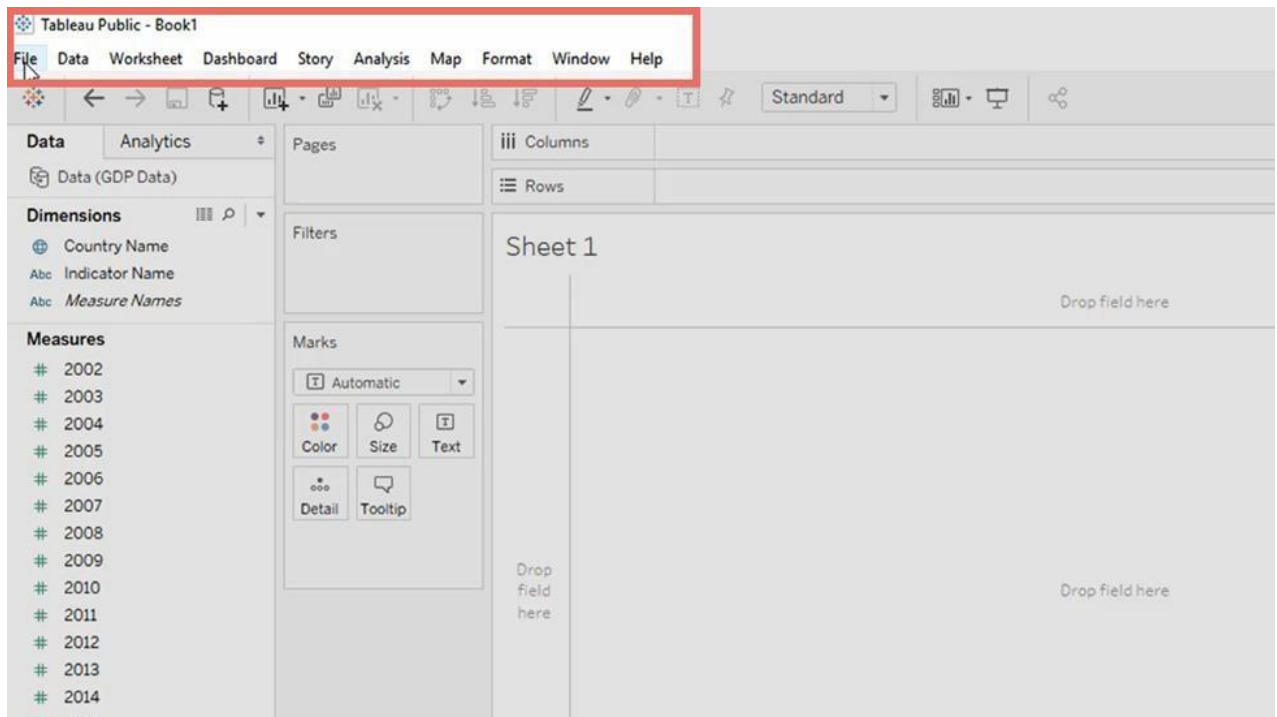


The other two icons in the same row are for creating a new dashboard and a new story, respectively.

The Tableau Interface: The Ribbon

The so-called “ribbon” is the top-most menu that you see on almost all software programs. In this case, we have 10 different tabs on Tableau’s default ribbon:

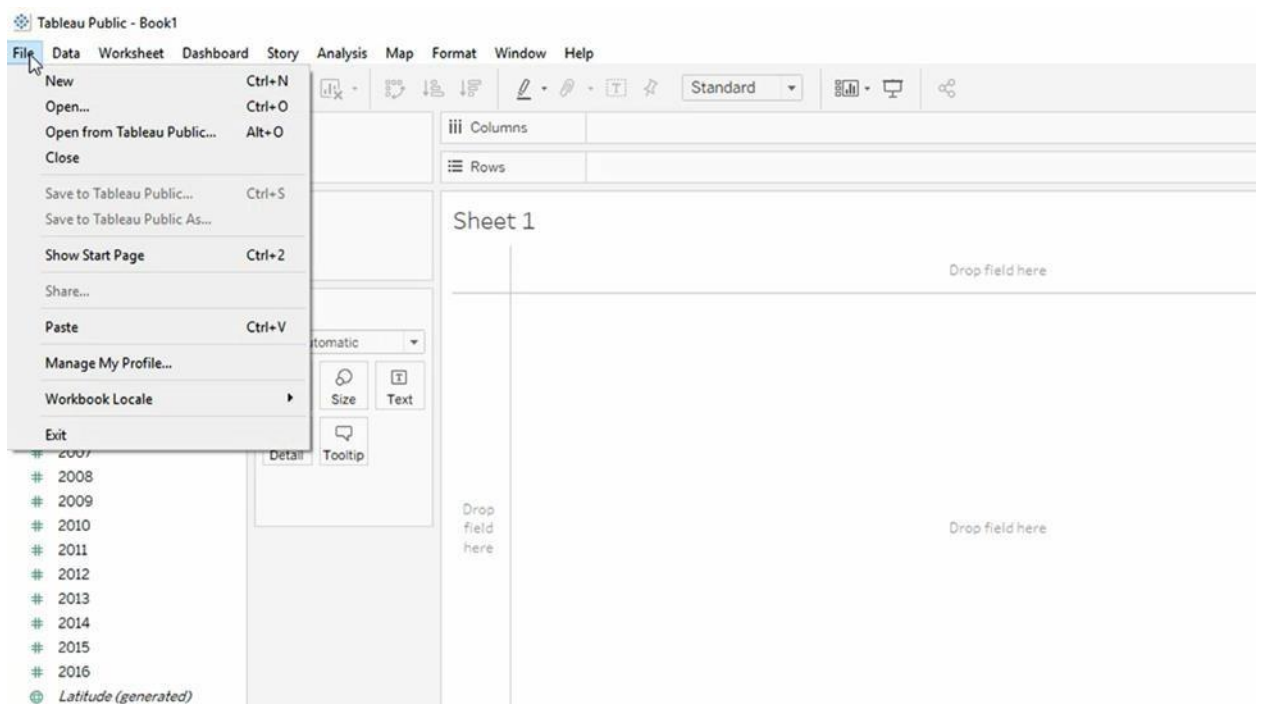
- File
- Data
- Worksheet
- Dashboard
- Story
- Analysis
- Map
- Format
- Window
- Help



Let's quickly go through each of them.

File

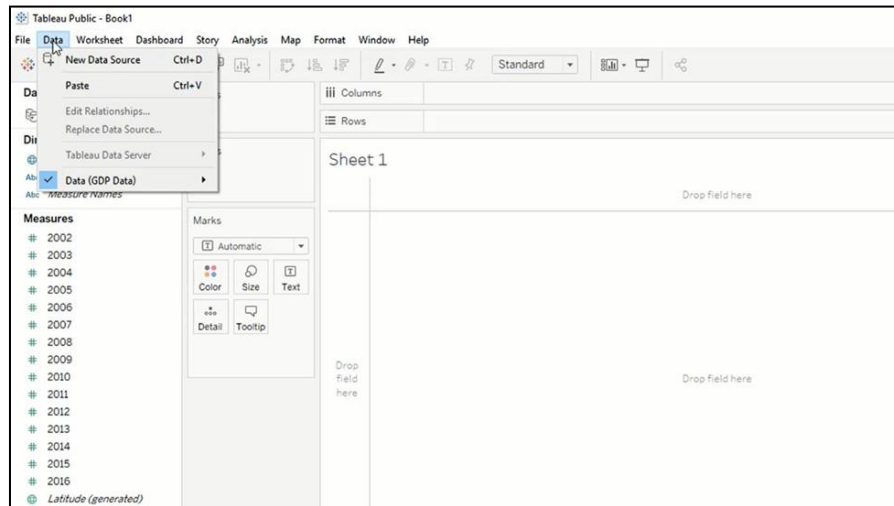
As with most programs, the File tab contains functionalities related to opening, closing, and saving files:



If you would like to, you can also exit Tableau from here, but you don't need to do that now – we're just getting started.

Data

Data, on the other hand, is the place in the Tableau interface where you will find functionalities

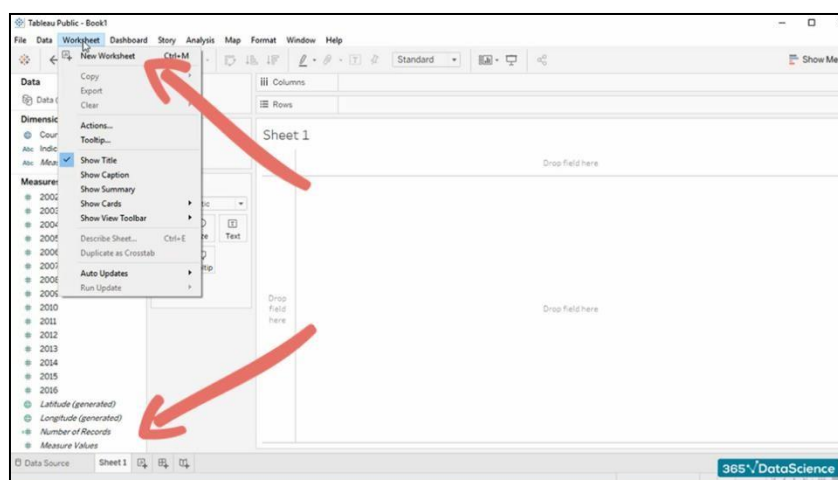


related to the data source you are using:

Here you can add a new data connection. For example, you may connect an SQL file. Further, you can replace an existing one, or simply edit the data source of the worksheet you are working with.

Worksheet

Next, we have the worksheet tab. It can be helpful when we want to create a new Tableau sheet, hide or show a chart's title, caption, summary, and so on.

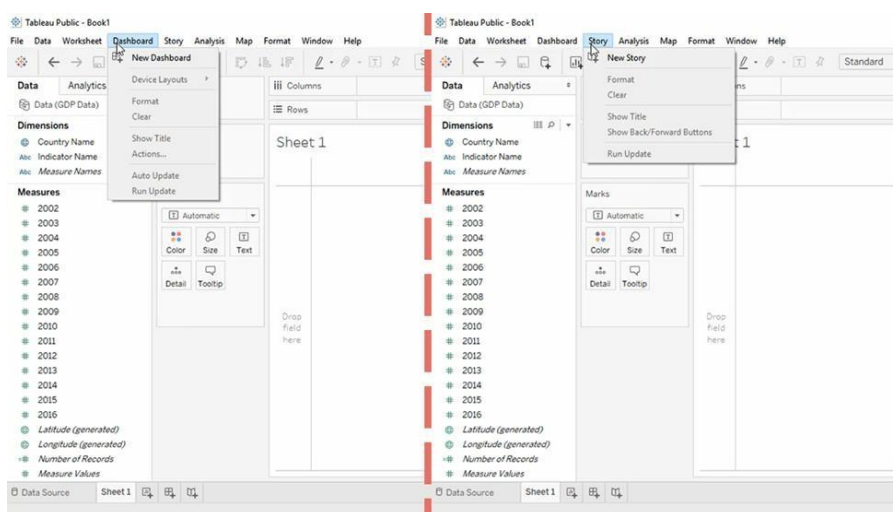


We already have a new sheet (created using the little icon at the bottom left corner). You can do the same thing from the worksheet tab as well. Such repetition is common for most programs.

Functionalities available in the ribbon can be accessed in other places of the Tableau interface. In fact, you will rarely use the ribbon, but it is good to have an overview and be aware that these functions are there as well.

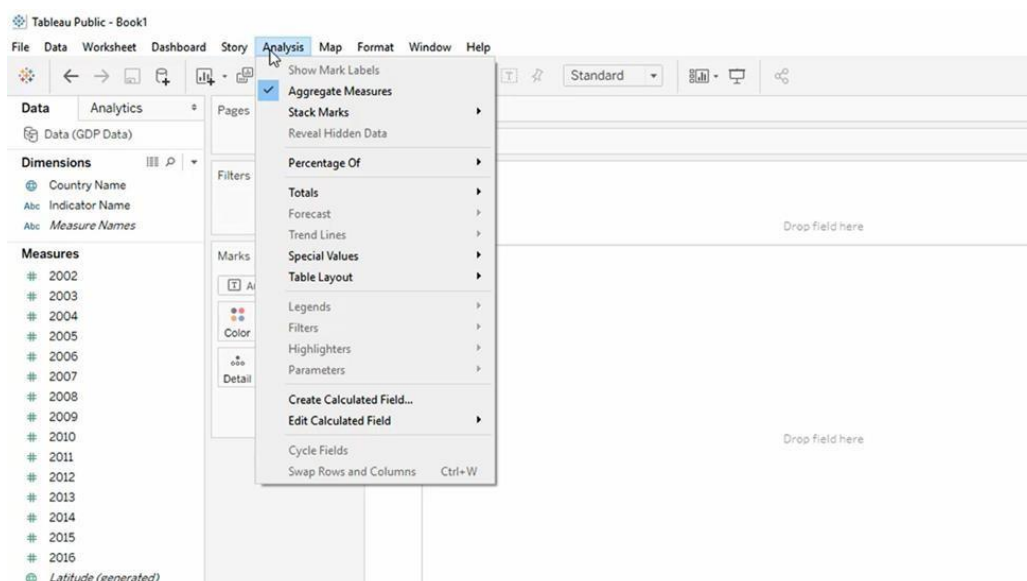
Dashboard and Story

Next, we have the Dashboard and Story tabs, but we won't dwell on them for too long.



Analysis

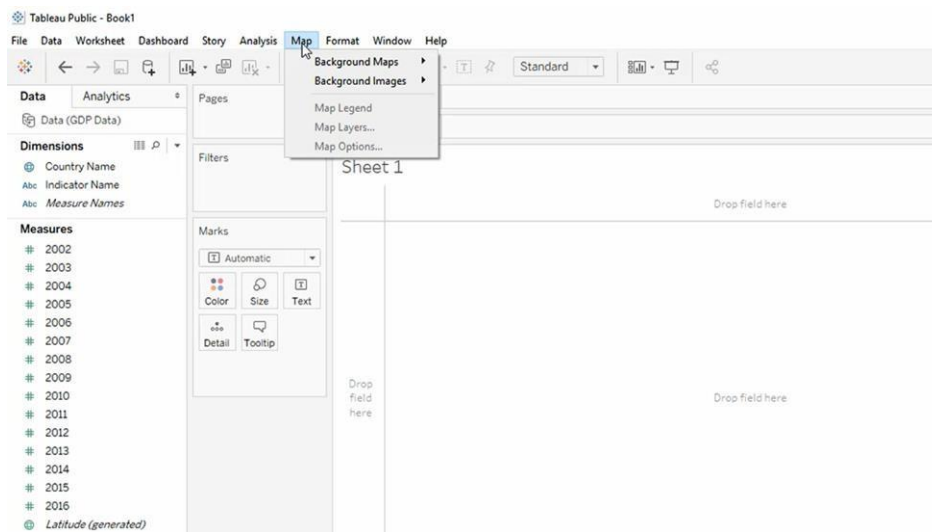
The Analysis tab is where you can tweak your visualization in terms of labels, show figures as a percentage of the total, add trend lines, legends, filters, and more.



Here, we have some interesting functionalities related to the way we perform our analysis and some of the tools we'll incorporate into it.

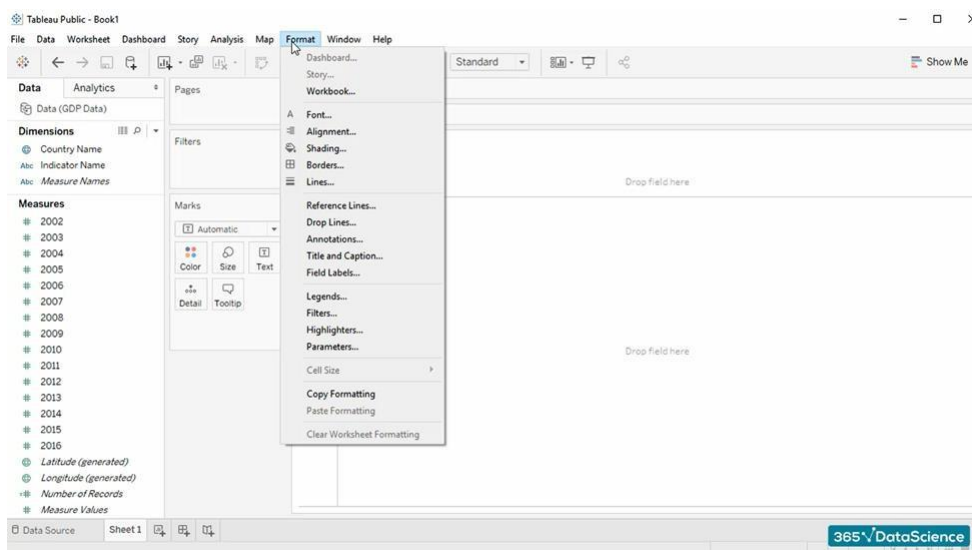
Map

'Map' is a tab that is helpful when we use Tableau's geographic visualization capabilities. This is one of the most powerful and impressive features the software has to offer, so chances are that you will be using it soon.



Format

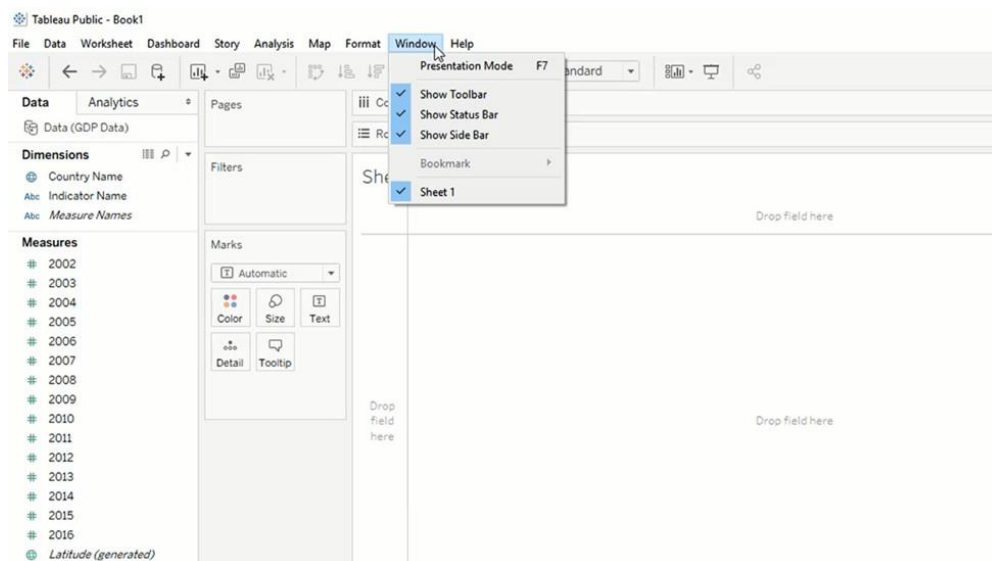
Through the Format tab, we adjust the way our visualization appears.



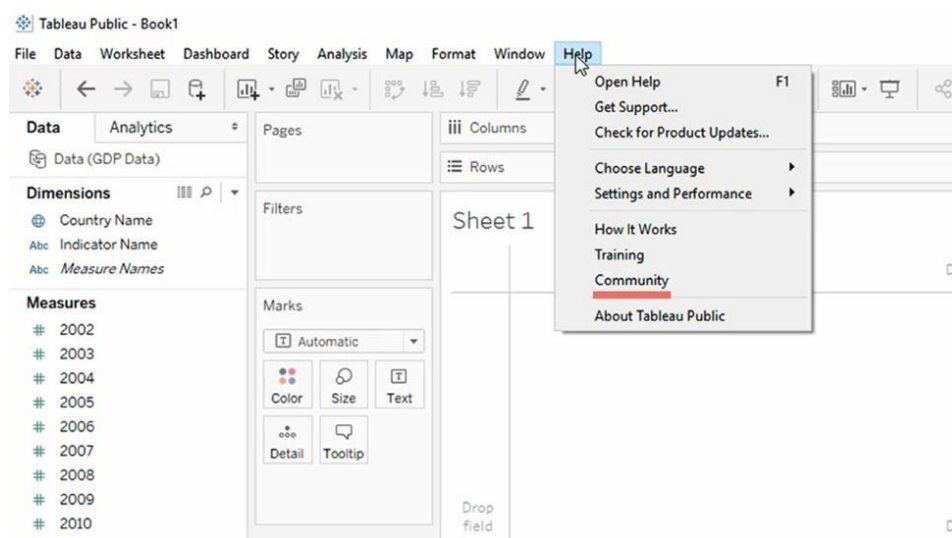
From here, we can modify its font, font size, axis, backgrounds, labels, size, and so much more.

Window and Help

Window and Help are two of the standard tabs in Tableau's interface that we find in most programs as well. For this reason, we are not going to spend much time on them.



However, one thing we should mention is that Tableau Public has a nice and open community full of users who will be able to help you and whose work you can look at if needed:



All users of Tableau Public who save their work make it publicly available. Therefore, this can be a useful place where you can search for a given issue you need help with and see what comes up. For example, if you click on “Community” and search for “Geography”, you’ll be able to see what work others have saved previously.

The Tableau Interface: The Toolbar

Next up, we have the Toolbar ribbon. Essentially, this is a row of buttons that will be useful when conducting your data analysis. Some of the commands you'll find here are:

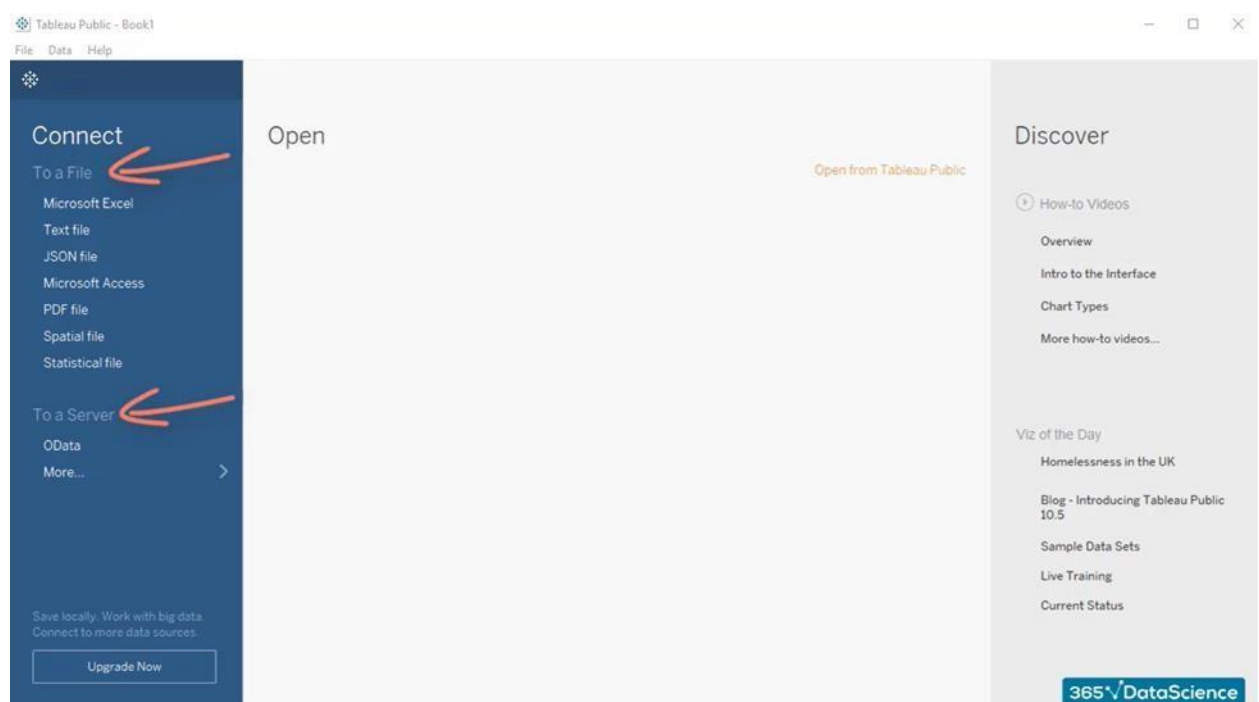
- Show Start Page
- Undo and Redo
- New Data Source
- New Worksheet
- Clear Sheet

These are just some of the functionalities, however, so feel free to Program as you go. Hover over a button you're curious about with your cursor and you'll see its purpose, as well as a handy shortcut you can access the functionality with more efficiency.

Show Start Page

The Show Start Page button will take you to – you guessed it – the start page in the Tableau interface. You can open your most recent workbooks, as well as connect Tableau with sources like Excel, or even integrate programming servers.

If you've just downloaded Tableau, the Start page will be empty. Think of it as a blank canvas you can fill in with all your fascinating data viz projects.



This screen should be somewhat familiar to you as many other software programs use the same convention – most notably, most of the Microsoft Office package, including Excel.

Editing Data Connection and Data Sources; Live mode vs, Extract mode

Live Connection

In this connection Tableau creates a live communication path between data source and tableau. In Live communication path whenever data is changing in original data source it will be reflected on the tableau with a refresh.



Live Connection

Steps :-

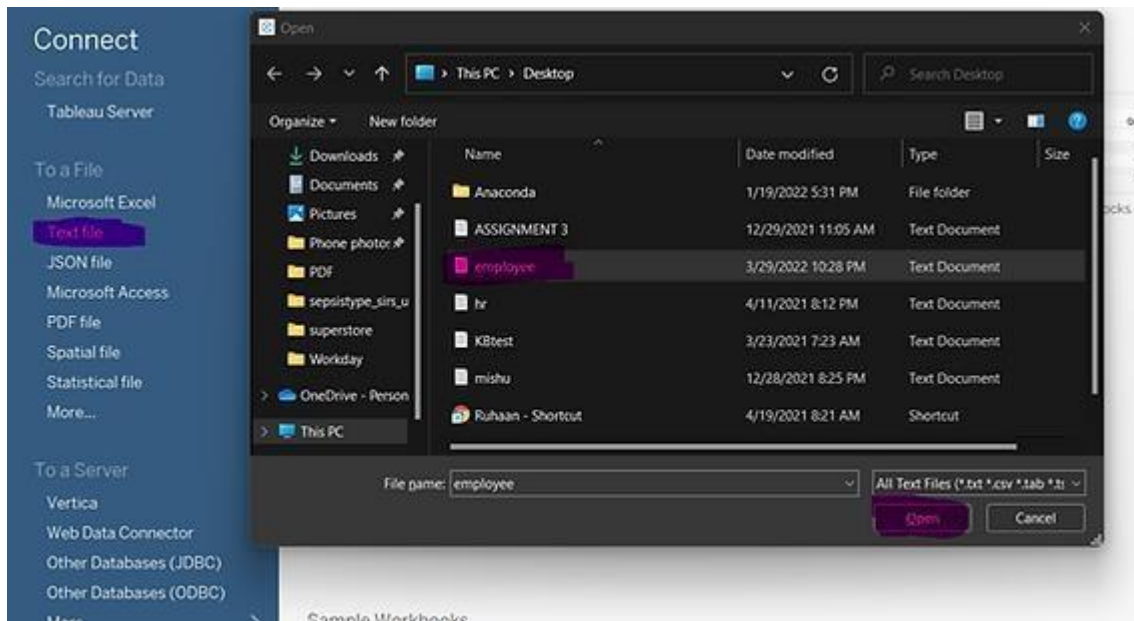
Create a text file “Employee” in Notepad then in tableau click to link connect to data.

```
employee - Notepad
File Edit View

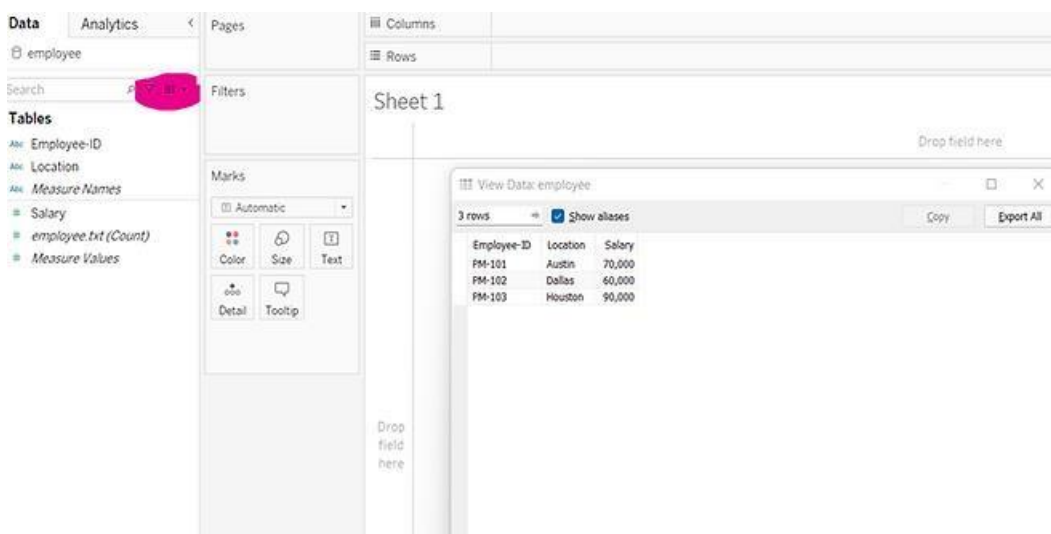
Employee-ID,Location,salary
PM-101,Austin,70000
PM-102,Dallas,60000
PM-103,Houston,90000
```

The screenshot shows a Notepad window with a menu bar (File, Edit, View) and a text area containing a table of employee data. The table has three columns: Employee-ID, Location, and salary. The data rows are: PM-101, Austin, 70000; PM-102, Dallas, 60000; and PM-103, Houston, 90000.

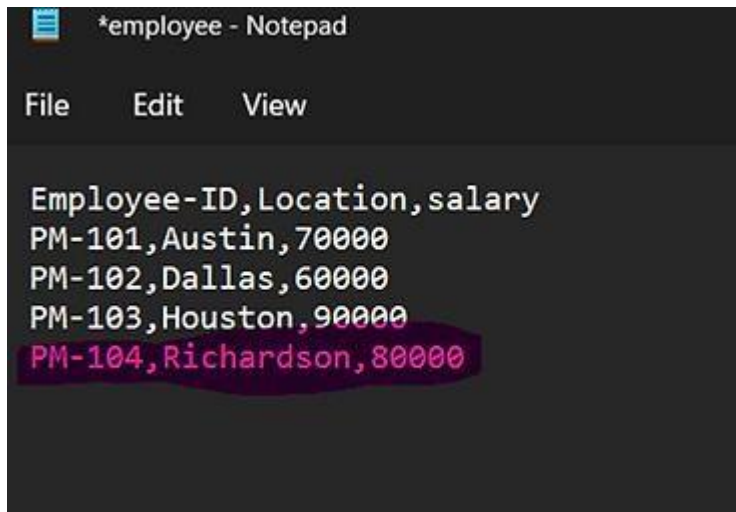
Then click on text file and then open employee file .



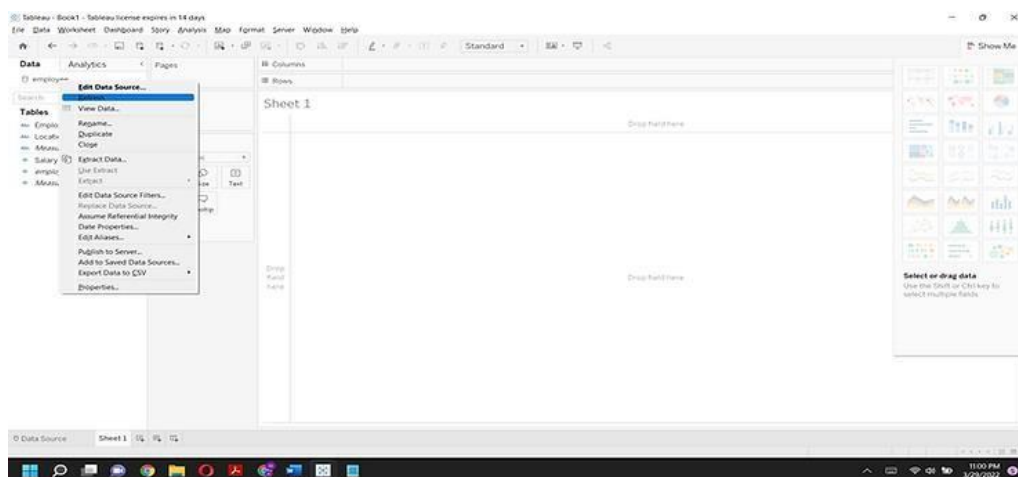
Select the connection type Live and click on view data. Then it will display data as below.



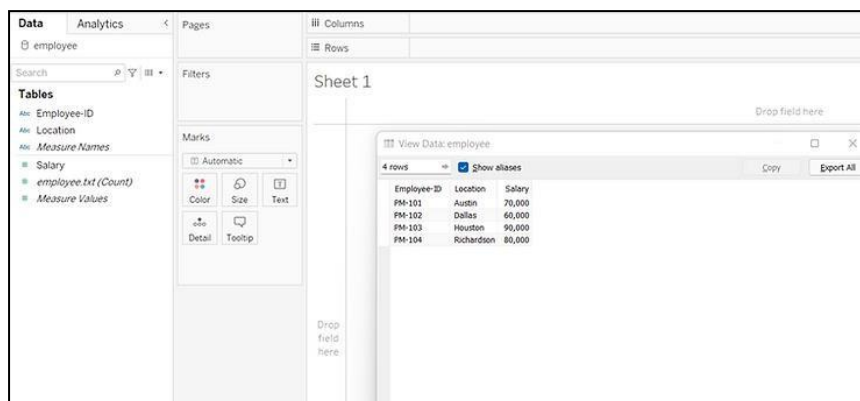
Adding a new row in the Employee text file and save it.



If we click on view data again it will not show the new row even though it's a live connection for that we need to refresh. For that right click on the Employee data, then refresh and then again click on view data . Only then we can see the updated data.



Updated data:-



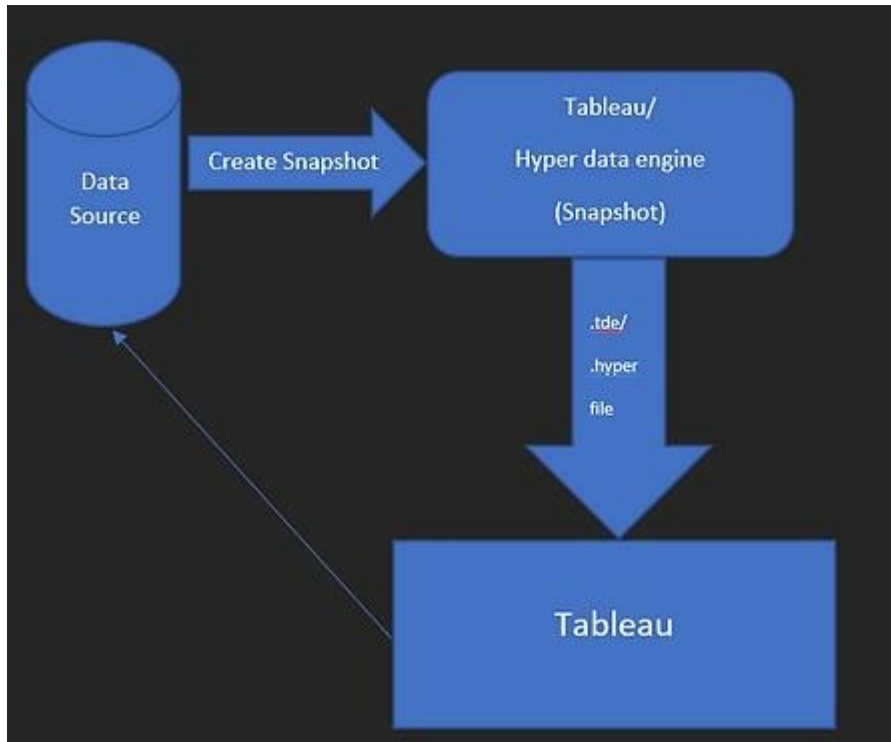
Extract Connection

In the extract connection whenever tableau connected with data source it creates a snap shot of data and place that snapshot in the component called Hyper analytic database engine.

Tableau data engine reads the data from snapshot and it creates a file known as Tableau Data Extract (.tde) or HYPER (.hyper)

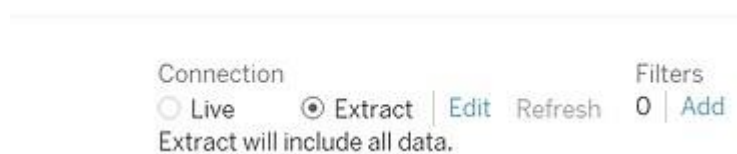
Whenever tableau connects with data its actually connect with .tde/.hyper file instead of actual data.

Mechanism of Extract connection

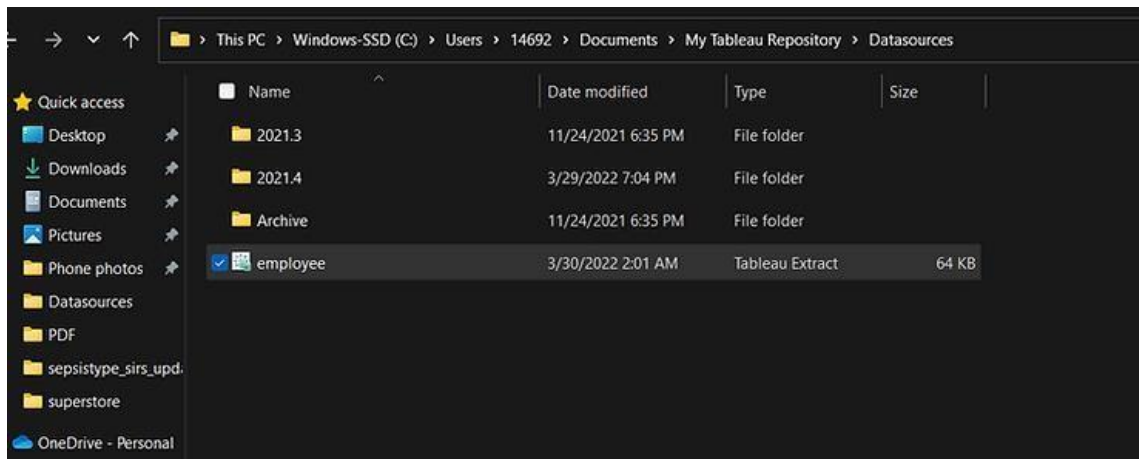


Steps:-

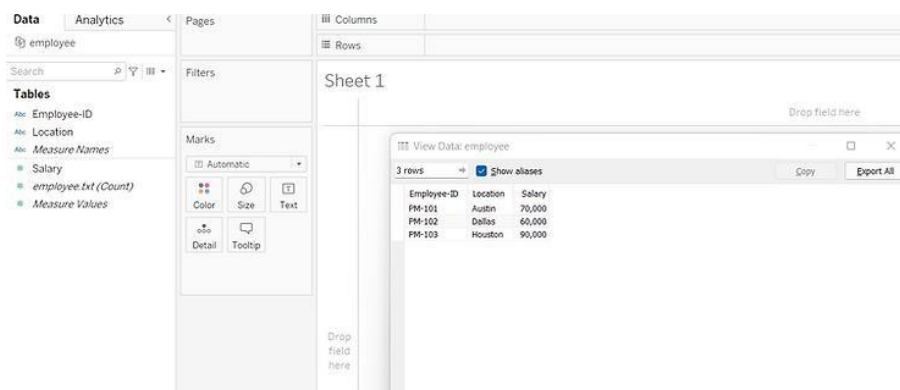
In this again we need to connect employee file with tableau but instead of Live connection we will do Extract



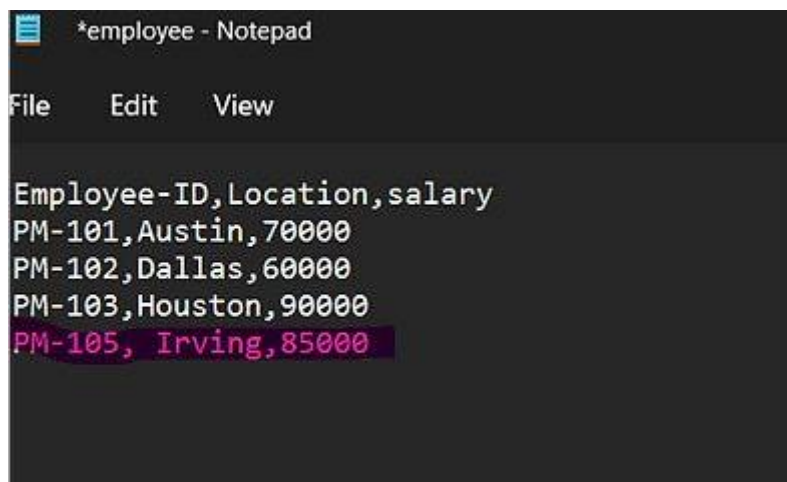
It will automatically create a .tde/.hyper file and saves into Datasources of My Tableau Repository.



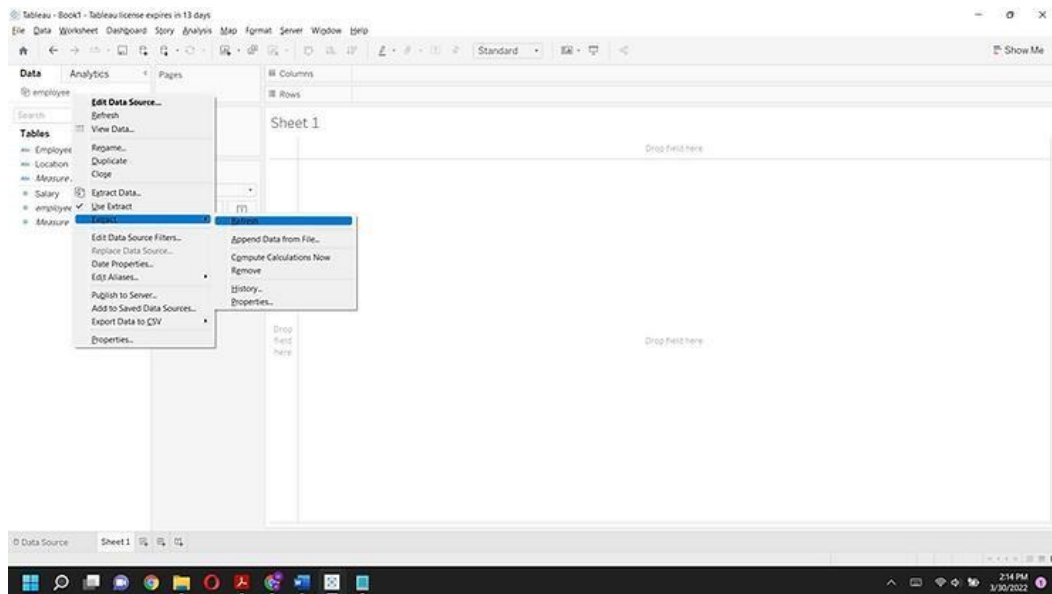
Again click on view data.



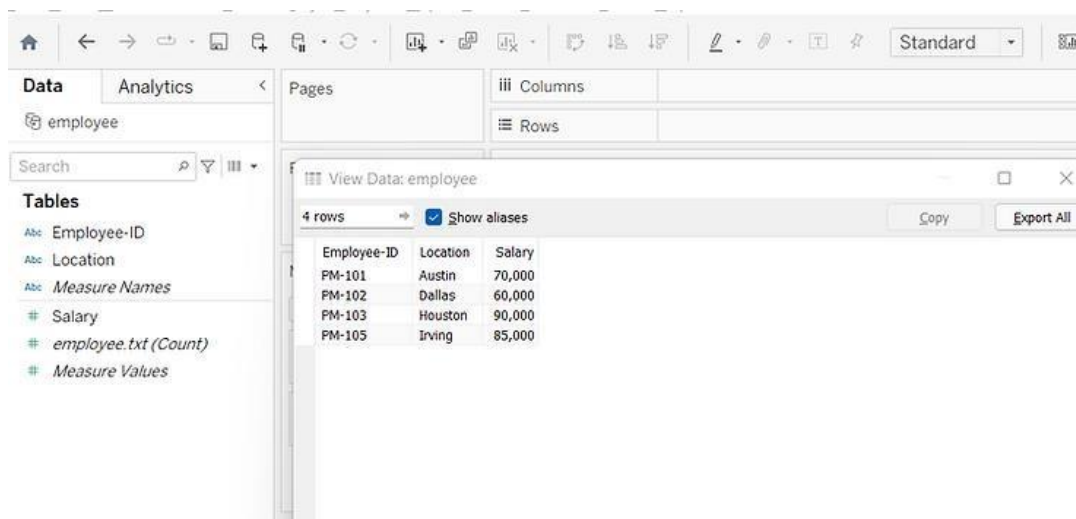
Updating one more row in employee text file .



It will not update automatically . For that we need to right click Employee data then go to Extract and then Refresh.



Once we refresh the data file we will get the update file.



How to use data interpreter

Notice when you connect data that contains things like titles, empty cells or notes right before the actual data, in most cases Tableau is unable to interpret the data correctly. A good example is when connecting to the sample excel file in the snapshot below – which has some empty rows and notes right before the actual table (data) you're interested to use in Tableau.

1	Competitor Stores		
2			
3	The data below shows the geo-location information for different competitor stores, which can be used when evaluating the proximity of competitor store to own stores.		
4			
5			
6			
7	Competitor Stores	Latitude	Longitude
8	Store P	-1.31536	36.7975
9	Store Q	-1.313	36.7971
10	Store R	-1.31338	36.7965
11	Store S	-1.31479	36.8002
12	Store T	-1.31292	36.7972
13	Store U	-1.31647	36.7949
14	Store V	-1.31334	36.7985
15			
16			
17			

Connecting the above data results to the view below.

The screenshot shows the Power BI Desktop interface. On the left, the 'Connections' pane lists 'Competitor stores' as a Microsoft Excel connection. The 'Sheets' pane shows 'Competitor Stores' as the selected sheet. The main area displays a preview of the data table. The table has three columns: 'Name', 'Latitude', and 'Longitude'. The 'Name' column contains store names (Store P, Store Q, etc.), and the 'Latitude' and 'Longitude' columns contain numerical values. A red box highlights the column headers, and a red arrow points to them with the text 'Column headers (not properly interpreted)'.

(Which doesn't correctly interpret the column headers)

This can be easily corrected using the interpreter feature – which bypasses the empty cells and notes in this data to identify the actual data you're interested in.

To use the data interpreter feature – on the left pane check the box **Use Data Interpreter**.

Competitor Stores (Competitor stores)

Competitor Stores

Need more data?

Competitor Stores

3 fields 7 rows

Name

Competitor Stores

Fields

Type	Field Name	Physic...	Rem...
Abc	Comp...	Compet...	Comp...
+	Latitude	Compet...	Latitu...
+	Longit...	Compet...	Longit...

Competitor Stores	Latitude	Longitude
Store P	-1.31536000	36.79750000
Store Q	-1.31300000	36.79710000
Store R	-1.31338000	36.79650000
Store S	-1.31479000	36.80020000
Store T	-1.31292000	36.79720000
Store U	-1.31647000	36.79490000
Store V	-1.31334000	36.79850000

Notice once the data interpreter does its margin - the data will be correctly interpreted as expected.

Review Your Results

Before you can jump-in and begin your analysis. First take time to review how the data cleaning process took place - by clicking on the **review the results** link right below the data interpreter option.

Competitor Stores

Need more data?

Competitor Stores

3 fields 7 rows

Name

Competitor Stores

Fields

Type	Field Name	Physic...	Rem...
Abc	Comp...	Compet...	Comp...
+	Latitude	Compet...	Latitu...
+	Longit...	Compet...	Longit...

Competitor Stores	Latitude	Longitude
Store P	-1.31536000	36.79750000
Store Q	-1.31300000	36.79710000
Store R	-1.31338000	36.79650000
Store S	-1.31479000	36.80020000
Store T	-1.31292000	36.79720000
Store U	-1.31647000	36.79490000
Store V	-1.31334000	36.79850000

PROGRAM - 2

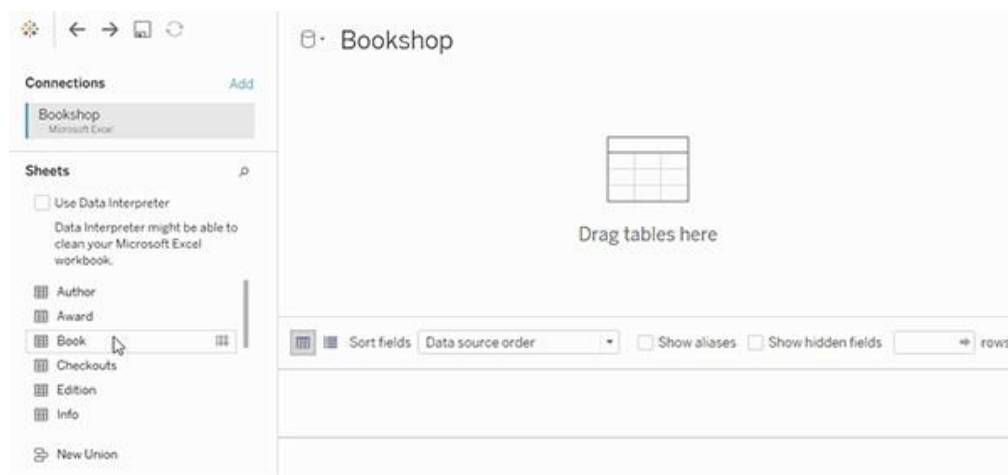
Create a join

1. To create a join, connect to the relevant data source or sources. See [Connect to Your Data](#).

These can be in the same data source (such as tables in a database or sheets in an Excel spreadsheet) or different data sources (this is known as a cross-database join). If you combined tables using a cross-database join, Tableau colors the tables in the canvas and the columns in the data grid to show you which connection the data comes from.

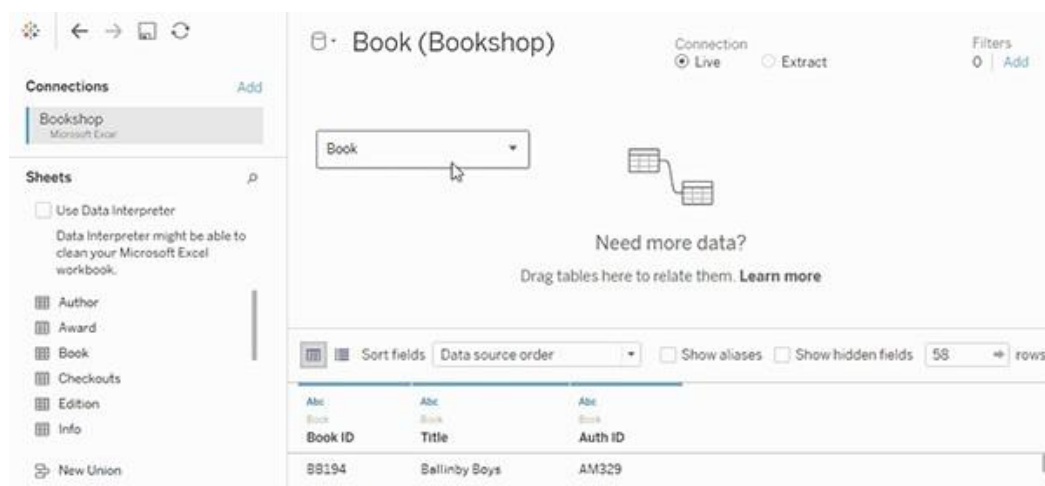
Note: Not all data sources support cross-database joins, including published Tableau data sources. To combine published data sources, edit the original data sources to natively contain the join or use a data blend.

2. Drag the first table to the canvas.



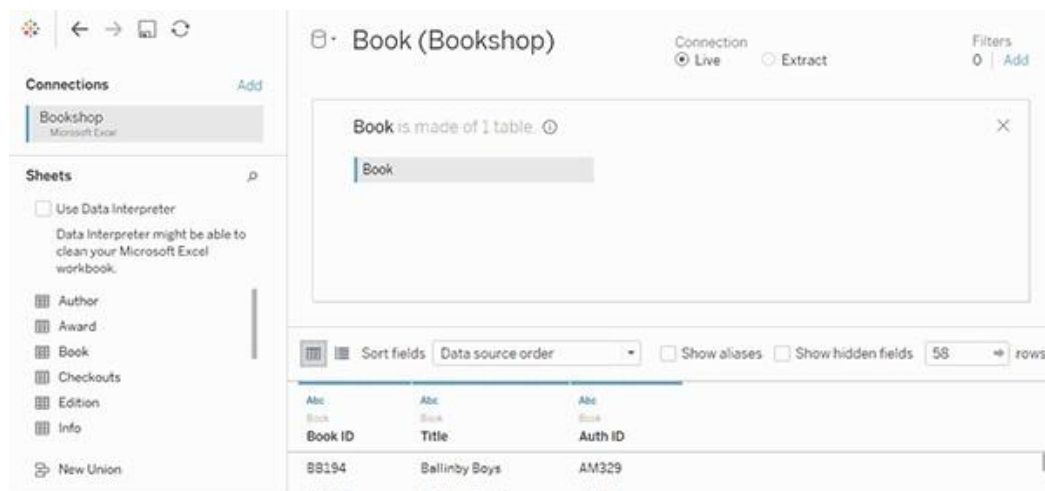
Note that if you drag out a second table at this point a relationship will form.

3. Select Open from the menu or double-click the first table to open the join canvas (physical layer).



Double-clicking a table on the relationship canvas opens the join canvas

- Double-click or drag another table to the join canvas.



If your next table is from another data source entirely, in the left pane, under **Connections**, click the **Add** button (+ in web authoring) to add a new connection to the Tableau data source. With that connection selected, drag the desired table to the join canvas.

- Click the join icon to configure the join. Add one or more join clauses by selecting a field from one of the available tables used in the data source, choosing a join operator, and a field from the added table.



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

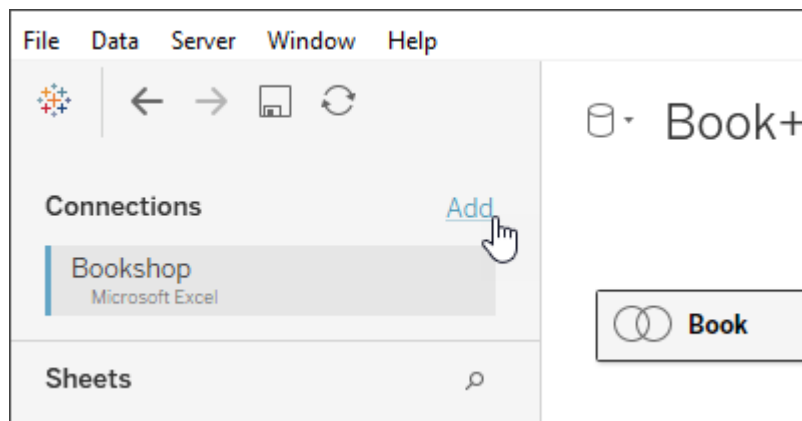
- When finished, close the join dialog and join canvas.

After you've created a join, [Join Your Data](#). To troubleshoot your join, see [Join Your Data](#).

Cross-database joins

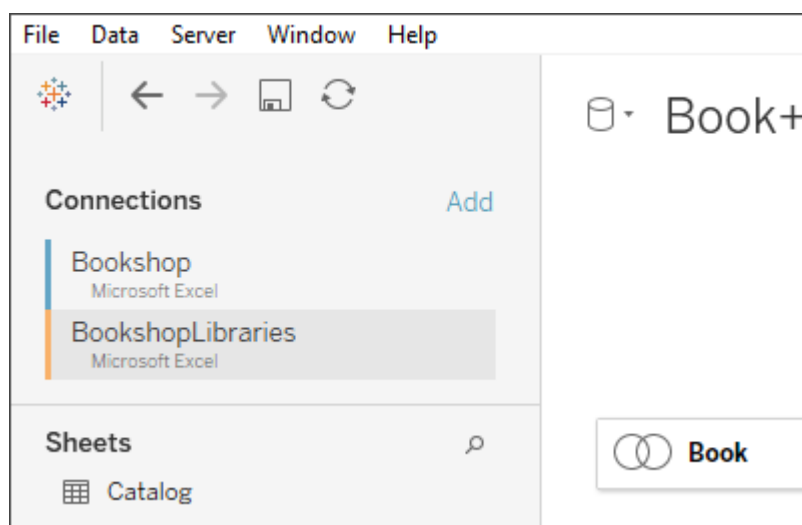
Tableau allows joins from tables in different data sources, albeit with some limitations from the database side on which platforms are compatible. Cross-database joins require a multi-connection data source—that is, you create a new *connection* to each database before you join the tables.

1. Once you've connected to the first source of data, use the Add option in the data pane to add another connection.

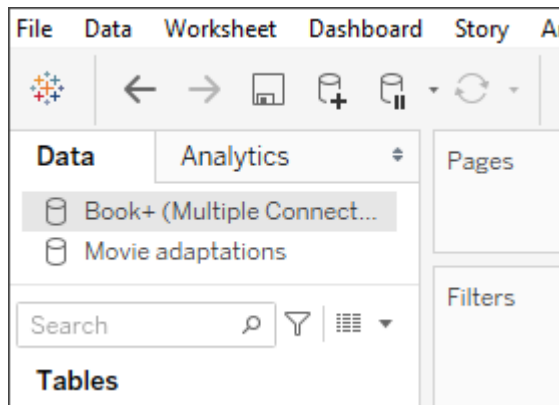


Note: If the connector you want is not available from the **Connect** list when you're trying to add another connection, cross-database joins are not supported for the combination of sources that you want to join. This includes connections to cube data (e.g., Microsoft Analysis Services), most extract-only data (e.g., Google Analytics and OData), and published Tableau Server data sources.

2. This creates a second connection rather than an entirely different data source. You can switch between the two (or more) connections while on the data source tab.



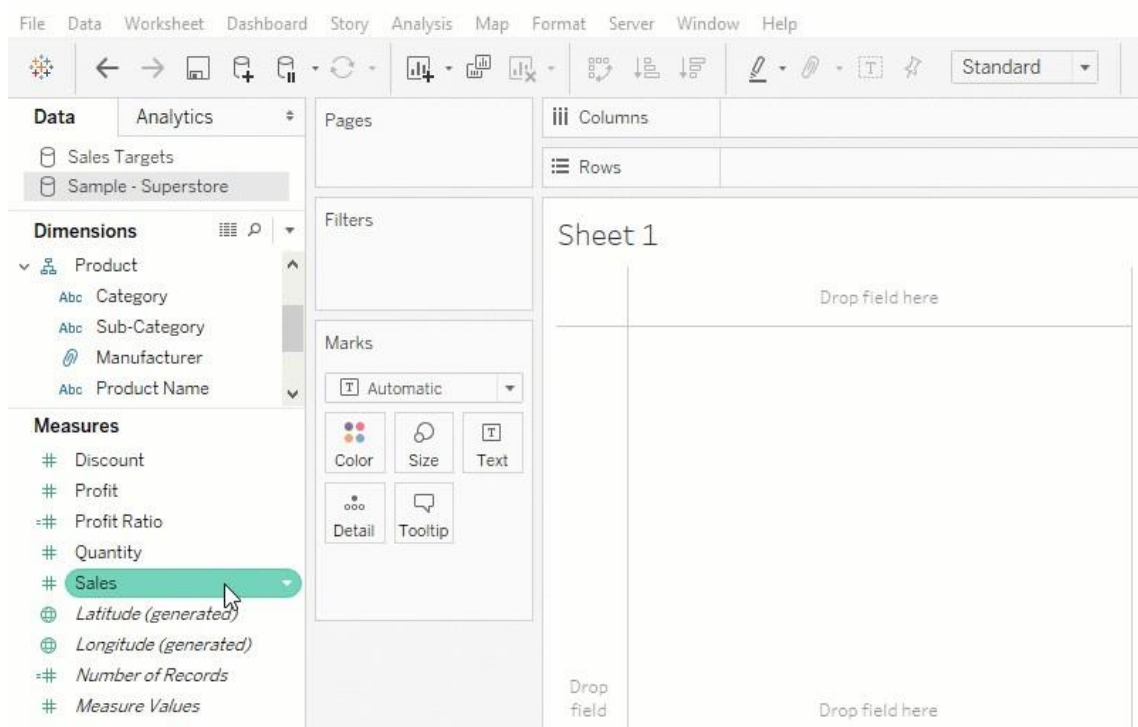
3. Once you move to a worksheet and begin analysis, the data source functions as a single, combined data source. This is in contrast to two independent data sources that can be toggled between on a worksheet.



Data Blending

Data blending is performed on a sheet-by-sheet basis and is established when a field from a second data source is used in the view.



To create a blend in a workbook, you need to connect to at least two data sources. Then bring a field from one data source to the sheet—it becomes the primary data source. Switch to the other data source and use a field on the same sheet—it becomes a secondary data source. A linking icon



will appear in the data pane, indicating which field(s) are being used to blend the data sources.

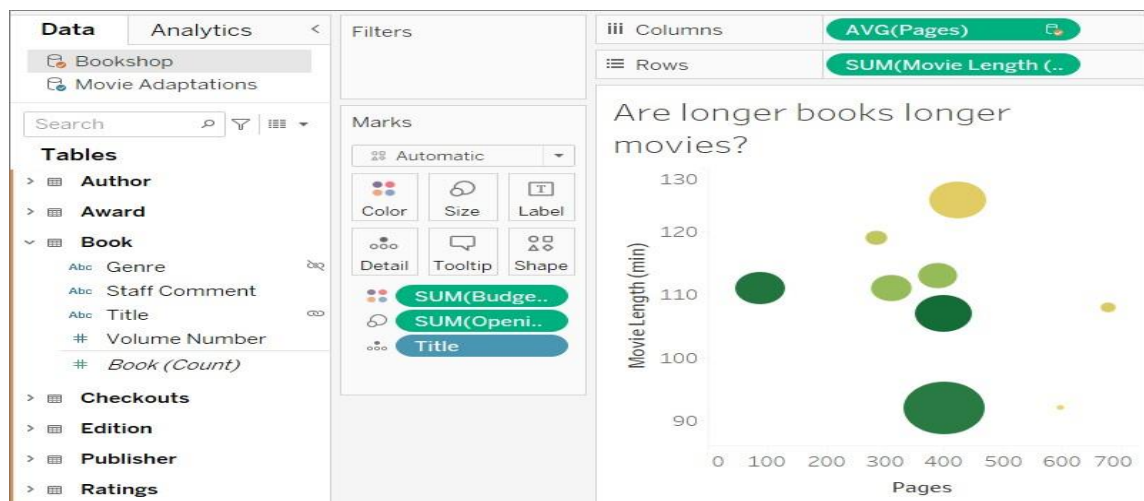
1. Ensure that the workbook has multiple data sources. The second data source should be added by going to **Data > New data source**.

Tip: Blending requires two or more distinct data sources, listed independently in the Data pane. Adding another *connection* to the first data source enables relationships and joins on the Data Source page.

2. Drag a field to the view. This data source will be the primary data source.
3. Switch to another data source and verify there is a blend relationship to the primary data source.
 - If there is a linking field icon (), the data sources are automatically linked. As long as there is at least one active link, the data can be blended.
 - If there are broken link icons (), click the icon next to the field that should link the two data sources. The slash will go away, representing an active link.
 - If a link icon does not appear next to the desired field, see [Define blend relationships for blending](#).
4. Drag a field into the view from the secondary data source.

As soon as this second data source is used in the same view, a blend is established. In the example below, our primary data source is **Movie Adaptations** and the secondary data source is **Bookshop**.

- The primary data source is indicated with a blue check mark on the data source. Fields from the primary data source used in the view have no indication.
- The secondary data source is indicated with an orange check mark on the data source and an orange bar down the side of the Data pane. Fields from the secondary data source used in the view have an orange check mark.



PROGRAM – 3

Basic Functionalities Of Tableau Public

1. Filtering

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

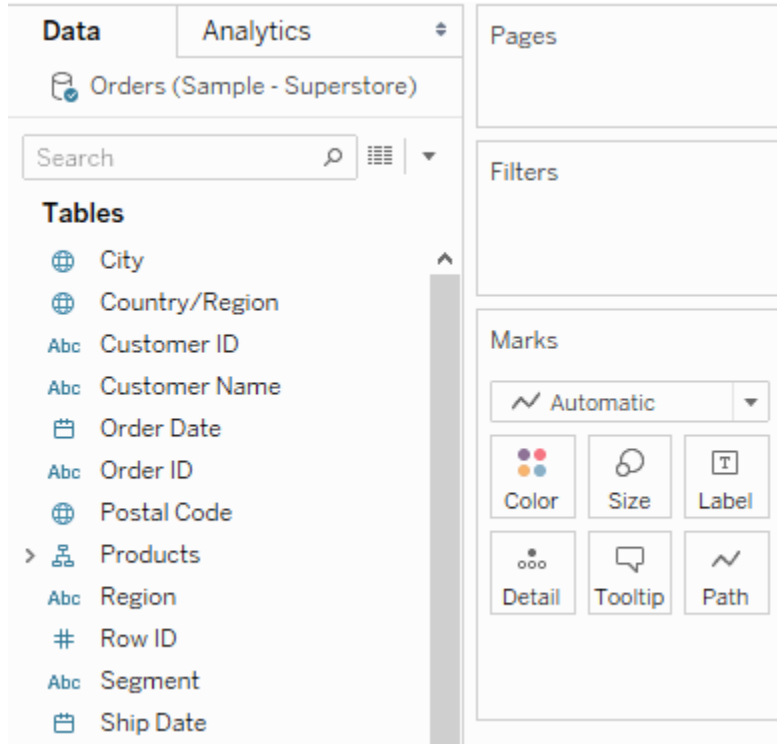
Filtering Order of Operation

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

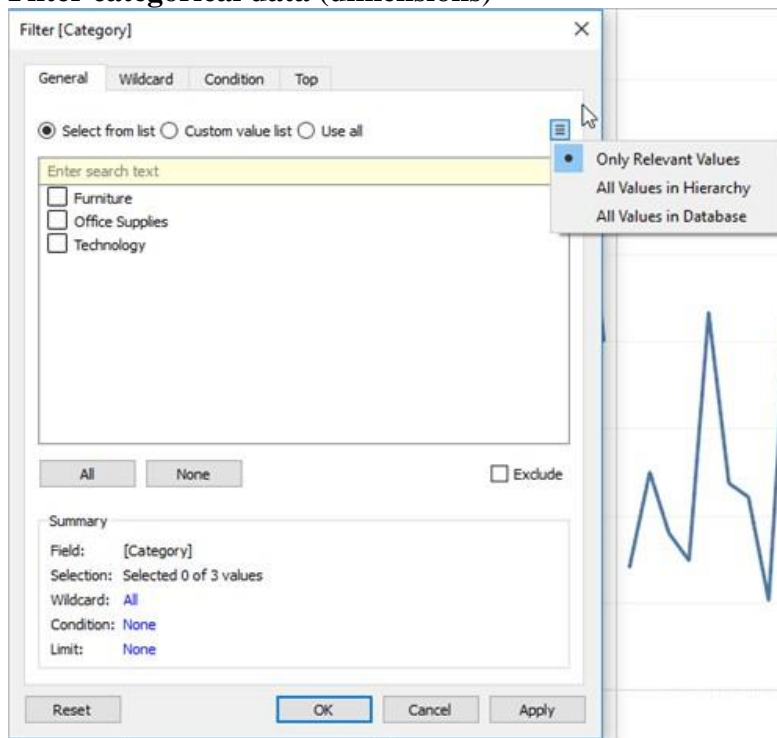
Select headers to filter data

Columns		Region / State									
Rows		Category									
Sheet 21		Sub-Category									
Category	Sub-Category	Illinois	Indiana	Iowa	Kansas	Michigan	Minnes..	Missouri	Nebras..	North Dakota	Oklaho..
Furniture	Bookcases	\$4,283				\$810		\$213			\$342
	Chairs	\$14,563	\$6,463	\$1,408		\$13,878	\$6,079	\$61	\$564		\$3,963
	Furnishings	\$2,878	\$1,514	\$49	\$111	\$1,916	\$232	\$941	\$1,381		\$1,445
	Tables	\$6,551	\$3,519	\$1,185		\$5,717	\$1,300	\$1,722			\$2,534
Office Supplies	Appliances	\$975	\$4,160		\$82	\$4,324	\$2,844	\$3,670	\$501		\$1,491
	Art	\$930	\$388	\$147	\$163	\$1,005	\$103	\$240	\$19	\$182	\$59
	Binders	\$4,539	\$4,012	\$248	\$612	\$22,822	\$12,470	\$1,876	\$128	\$26	\$445
	Envelopes	\$384	\$890	\$13		\$310	\$31	\$71			\$407
	Fasteners	\$141	\$8	\$46	\$24	\$110	\$43		\$58	\$7	
	Labels	\$225	\$276		\$19	\$881	\$161	\$15	\$14		\$64
	Paper	\$3,456	\$1,880	\$316	\$303	\$2,011	\$320	\$302	\$333		\$197
	Storage	\$9,080	\$4,120	\$13	\$394	\$6,187	\$3,398	\$1,792	\$1,165	\$705	\$2,345
	Supplies	\$178			\$358	\$74	\$87	\$4,217	\$17		\$22
Technology	Accessories	\$5,536	\$2,279		\$92	\$4,933	\$1,520	\$1,022	\$240		\$1,817
	Copiers	\$5,920	\$18,500			\$1,150	\$550	\$5,500			
	Machines	\$3,756	\$84			\$3,411					
	Phones	\$16,772	\$5,460	\$1,154	\$767	\$6,731	\$775	\$565	\$3,046		\$4,551

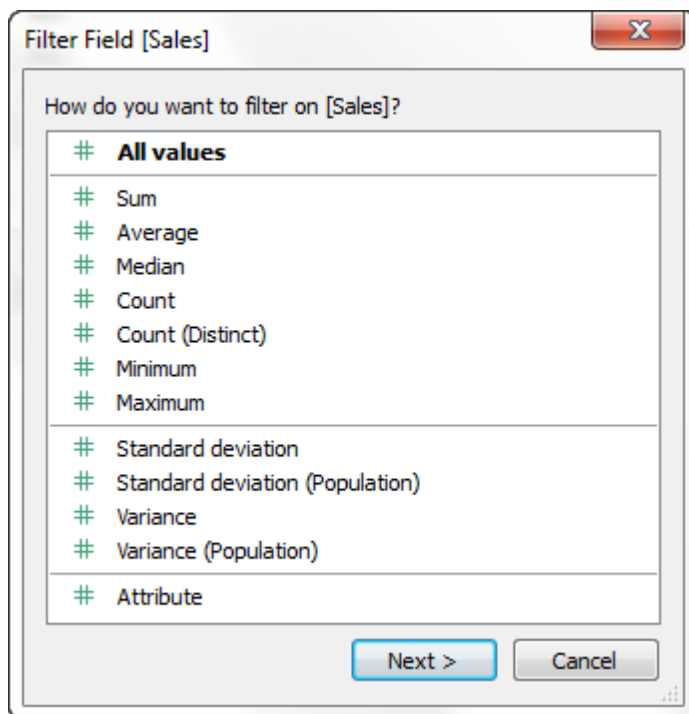
Drag dimensions, measures, and date fields to the Filters shelf



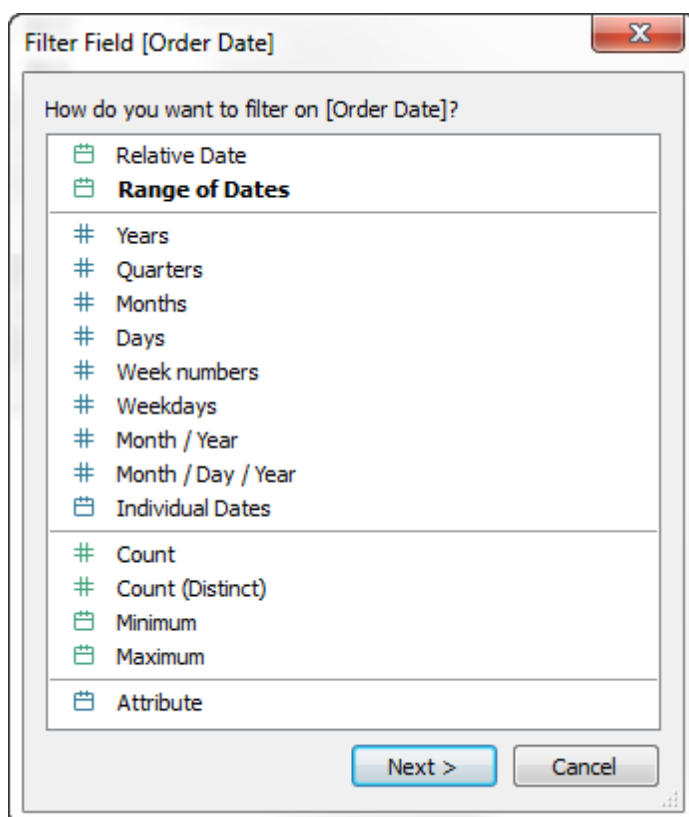
Filter categorical data (dimensions)

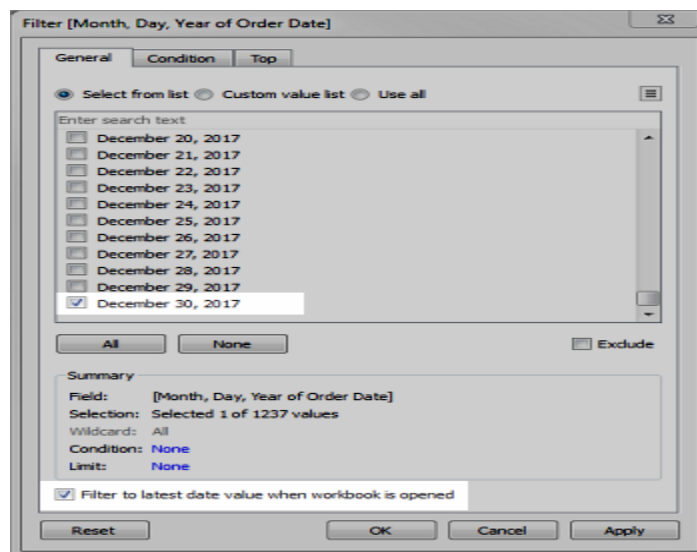
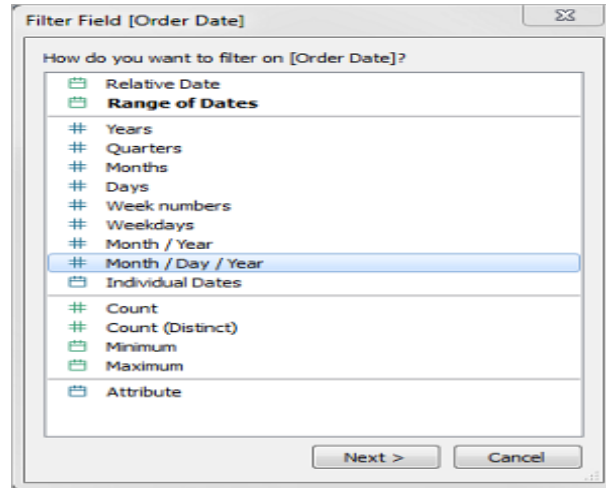


Filter quantitative data (measures)




Filter dates



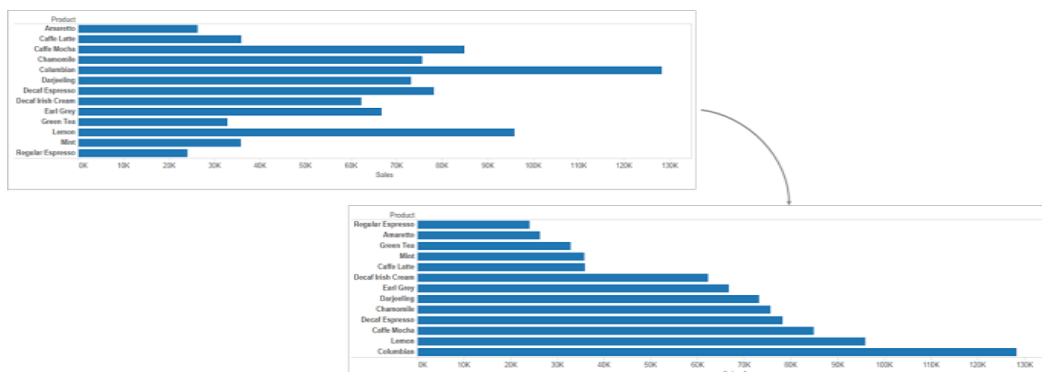


Sorting Data

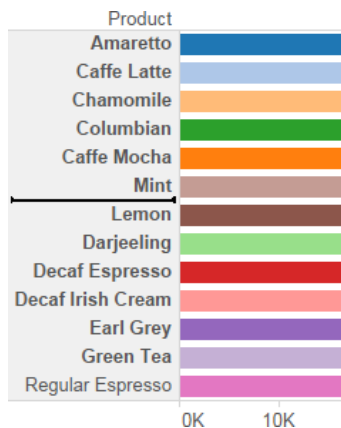
To sort items in a table:

1. Select the items you want to sort.
2. Click one of the sort buttons  on the toolbar.

For example, click the Sort Ascending button to reorder the bars in the chart from lowest sales to highest sales, as shown below.




You can also sort items by dragging the field labels in a column. In the example below, Regular Espresso is dragged to move below Mint. The new location is indicated by the black line.



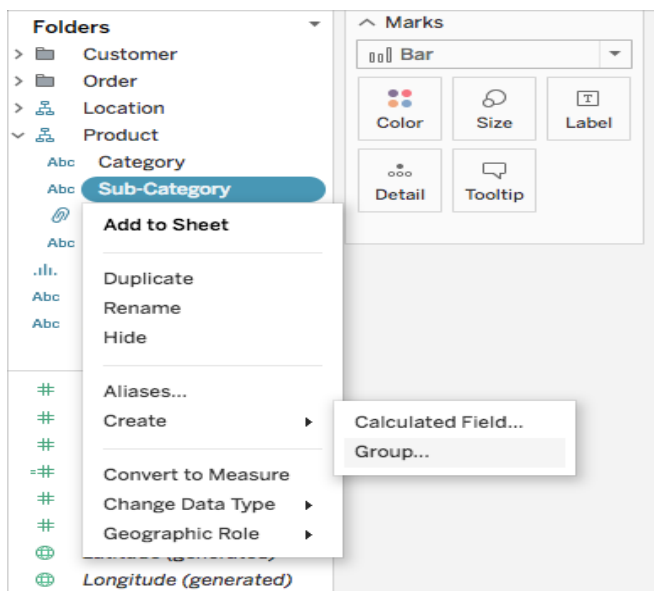
. Grouping

Create a group by selecting data in the view

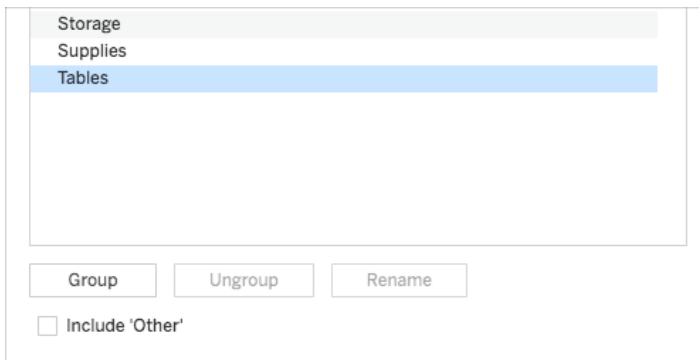
1. In the view, select one or more data points and then, on the tooltip that appears, click the group icon 

Create a group from a field in the Data pane

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



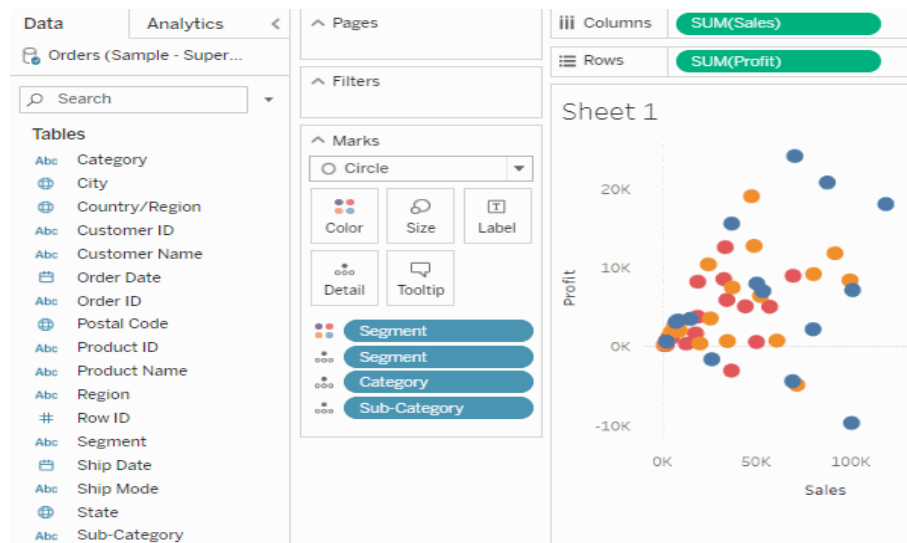
In the Create Group dialog box, select several members that you want to group, and then click **Group**.



Create a hierarchy

To create a hierarchy:

1. In the Data pane, drag a field and drop it directly on top of another field.
2. When prompted, enter a name for the hierarchy and click OK.
3. Drag additional fields into the hierarchy as needed. You can also re-order fields in the hierarchy by dragging them to a new position.

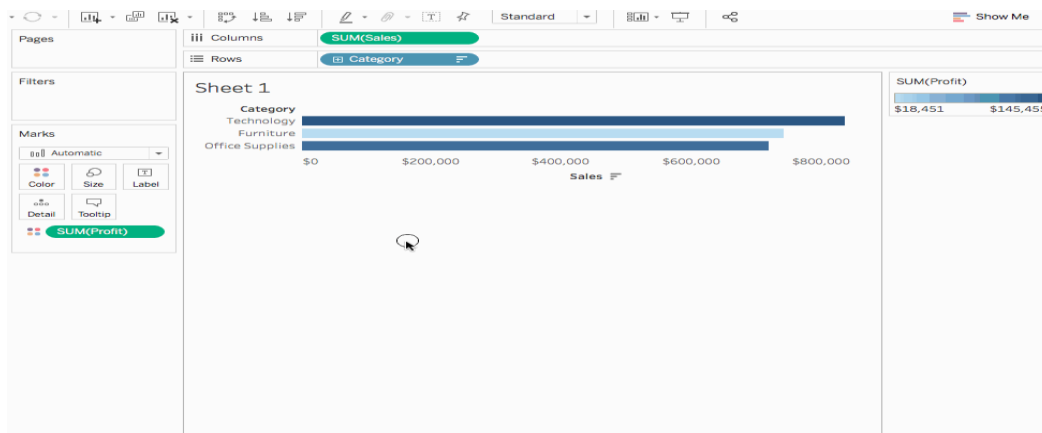


Drill up or down in a hierarchy

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

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

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



Create Sets

You can use sets to compare and ask questions about a subset of data. Sets are custom fields that define a subset of data based on some conditions.

Create a dynamic set

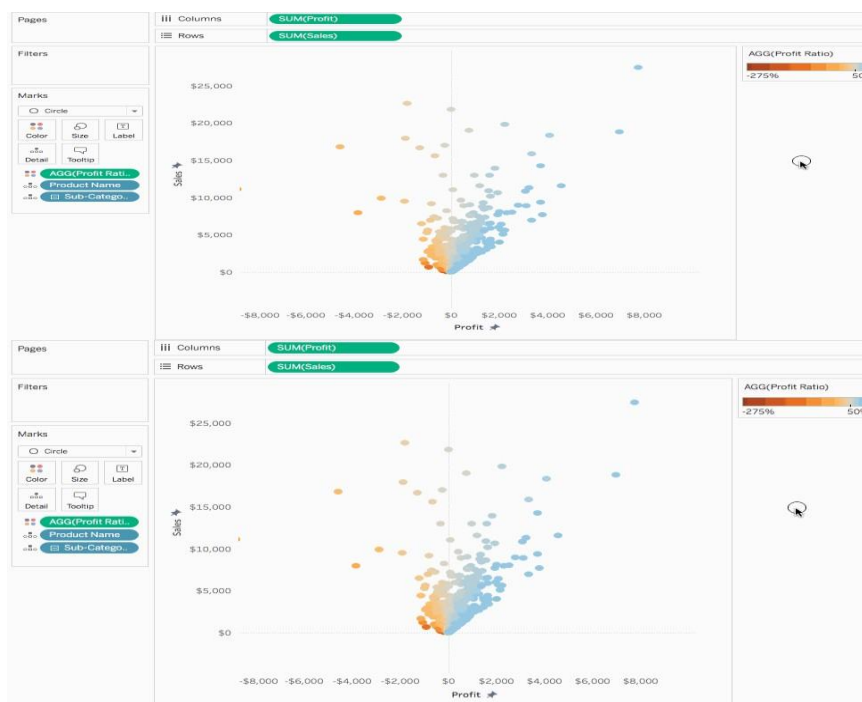
There are two types of sets: dynamic sets and fixed sets. The members of a dynamic set change when the underlying data changes. Dynamic sets can only be based on a single dimension.

To create a dynamic set:

1. In the Data pane, right-click a dimension and select **Create > Set**.
2. In the Create Set dialog box, configure your set. You can configure your set using the following tabs:

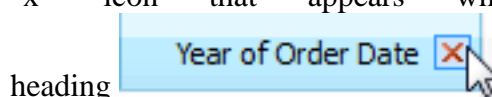
General: Use the General tab to select one or more values that will be considered when computing the set.


You can alternatively select the Use all option to always consider all members even when new members are added or removed.



3. In the Create Set dialog box, type a name for the set.
4. Optionally complete any of the following:
 - By default, the set includes the members listed in the dialog box. You can select the option to Exclude these members instead. When you exclude, the set will include all of the members you didn't select.

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





- Remove any specific rows that you don't want to include in the set by clicking the red "x" icon that appears when you hover over the row .
- If the marks you selected represent multiple dimensions, each member of the set will be a combination of those dimensions. You can specify the character that separates the dimension values. To do so, for Separate members by, enter a character of your choice.

Select Add to Filters shelf to automatically move the set to the Filters shelf once it is created. When finished, click OK.

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

Sets

-  State - High Sales & Profit
-  Top Customers by Profit

Types of dates – Continuous vs Discrete Pivot tables

Continuous means "forming an unbroken whole, without interruption"; discrete means "individually separate and distinct."

- Green measures **SUM(Profit)** and dimensions **YEAR(Order Date)** are continuous. Continuous field values are treated as an infinite range. Generally, continuous fields add axes to the view.
- Blue measures **SUM(Profit)** and dimensions **Product Name** are discrete. Discrete values are treated as finite. Generally, discrete fields add headers to the view.

Possible combinations of fields in Tableau

This table shows examples of what the different fields look like in the view. People sometimes call these fields "pills", but we refer to them as "fields" in Tableau help documentation.

Discrete Dimensions

Continuous Dimensions (dimensions with a data type of String or Boolean cannot be continuous)

Discrete Measures

Continuous Measures

A visual cue that helps you know when a field is a measure is that the field is aggregated with a function, which is indicated with an abbreviation for the aggregation in the field name, such as: **SUM(Profit)**. To learn more about aggregation, see [List of Predefined Aggregations in Tableau](#) and [Aggregate Functions in Tableau](#).

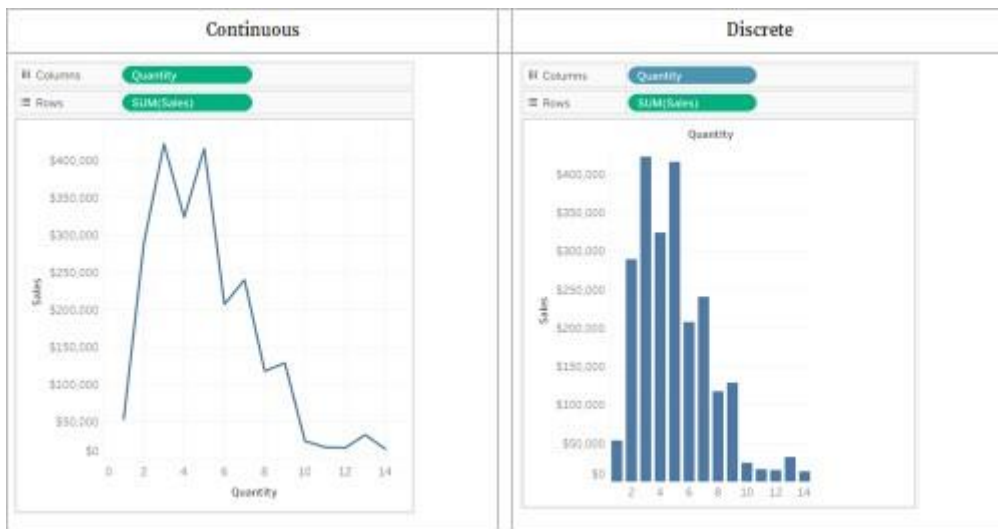
But there are exceptions:

- If the entire view is disaggregated, then by definition no field in the view is aggregated. For details, see [How to Disaggregate Data](#).
- If you are using a multidimensional data source, fields are aggregated in the data source and measures fields in the view do not show that aggregation.

Examples of continuous and discrete fields used in a view

In the example on the left (below), because the Quantity field is set to Continuous, it creates a horizontal axis along the bottom of the view. The green background and the axis help you to see that it's a continuous field.

In the example on the right, the Quantity field has been set to Discrete. It creates horizontal headers instead of an axis. The blue background and the horizontal headers help you to see that it's discrete.



In both examples, the Sales field is set to Continuous. It creates a vertical axis because it's continuous and it's been added to the Rows shelf. If it was on the Columns shelf, it would create a horizontal axis. The green background and aggregation function (in this case, SUM) help to indicate that it's a measure.

The absence of an aggregation function in the Quantity field name helps to indicate that it's a dimension.

Dimension fields in the view

When you drag a discrete dimension field to **Rows** or **Columns**, Tableau creates column or row headers.



In many cases, fields from the **Dimension** area will initially be discrete when you add them to a view, with a blue background. Date dimensions and numeric dimensions can be discrete or continuous, and all measures can be discrete or continuous.

After you drag a dimension to **Rows** or **Columns**, you can change the field to a measure just by clicking the field and choosing **Measure**. Now the view will contain a continuous axis instead of column or row headers, and the field's background will become green:



Date dimensions can be discrete or continuous. Dimensions containing strings or Boolean values cannot be continuous.

Tableau does not aggregate dimensions. For a discussion of the different types of aggregation Tableau can perform, see List of Predefined Aggregations in Tableau.

In Tableau queries, dimensions in the view are expressed in SQL as "Group By" clauses.

For details on converting fields between continuous and discrete, see Convert Fields between Discrete and Continuous.

How dimensions affect the level of detail in the view

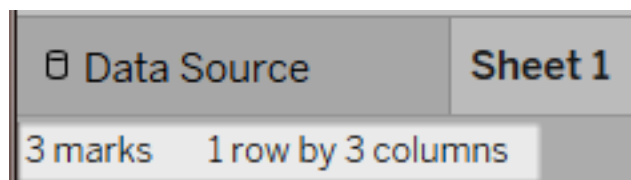
The level of detail in a view refers to how granular the data is given the dimension and measure data in the view.

As you add dimensions to **Rows** or **Columns**, the number of marks in the view increases.

To understand why adding dimensions increases the number of marks in the view, do the following:

1. Drag **Segment** to **Columns**.

The status bar at the bottom of the Tableau window shows you that there are now three marks in the view:



Those marks just contain placeholder text, Abc, because you are only building the view's structure at this point.

2. Drag **Region** to **Columns**.

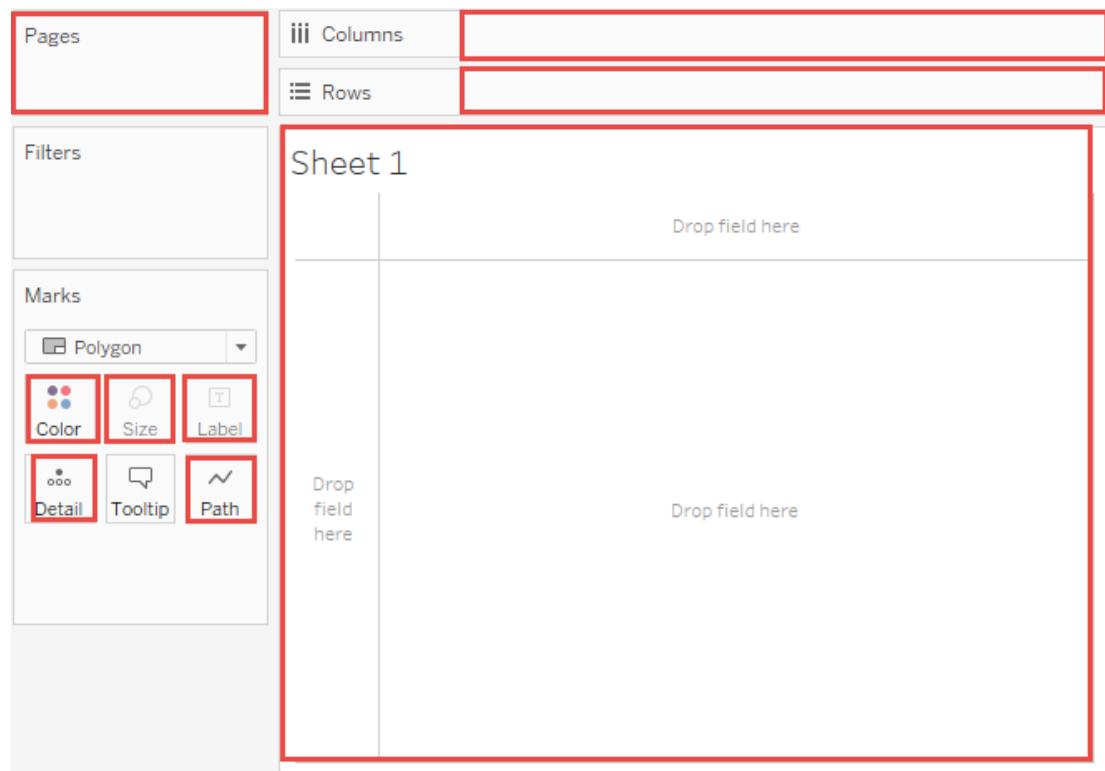
Now there are 12 marks. Three values in **Segment** multiplied by four values in **Region** is 12.

3. Drag [**Ship Date**] to **Rows**.

The total is now 57 marks (three segments by four regions by five years is 60, but there are three combinations of the dimensions in the view for which there is no data in the data source).

We could continue adding dimensions to **Rows** and **Columns** and observe as the number of total marks continues to increase. Dragging a dimension to a location on the Marks card such as Color or Size will also increase the number of marks, though it will not increase the number of headings in the view. The process of adding dimensions to the view to increase the number of marks is known as setting the *level of detail*.

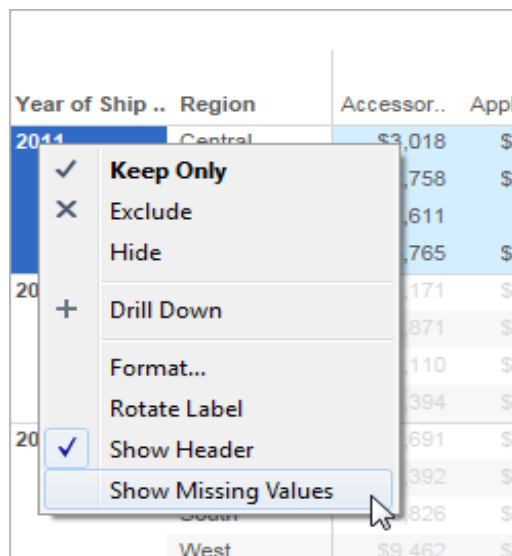
Adding a dimension to any of the following locations in Tableau affects the level of detail:



4. The view now contains 57 separate instances of the view is all structure and no content. Rectify this by dragging Sales to Text. The view can now be considered complete:

Year of S..	Segment / Region							
	Consumer				Corporate			
	Central	East	South	West	Central	East	South	West
2012	\$67,133	\$75,825	\$32,272	\$88,207	\$19,156	\$32,654	\$34,163	\$34,291
2013	\$49,640	\$85,683	\$49,245	\$80,654	\$29,454	\$49,703	\$18,033	\$38,771
2014	\$65,971	\$90,947	\$52,958	\$86,452	\$60,234	\$53,018	\$27,250	\$64,290
2015	\$68,976	\$97,846	\$59,291	\$105,655	\$48,801	\$65,034	\$42,440	\$87,293
2016	\$311	\$607	\$1,815	\$1,913	\$352			\$1,211

- In some cases, adding a measure to the view can increase the number of marks in the view. For example, if you dropped Sales on Rows in the view above, the number of marks would be 57. But if you then also dropped Profit on Rows, the number of marks would increase to 114. But this is not the same as changing the view's level of detail.
- The number of marks in the view is not guaranteed to correspond to the number you would get by multiplying the number of dimension values in each of the dimensions that make up the level of detail. There are multiple reasons why the number of marks could be lower. To increase the number of marks in this view from 57 to 60 in the view above, right-click (Control-click on a Mac) on one of the Date headers in the view and the date or bin headers and choose Show Missing Values. For more information about how to show missing values, see Show or Hide Missing Values or Empty Rows and Columns.



Measure fields in the view

When you drag a measure to the view, it is aggregated by default. The type of aggregation will vary depending on the type of view. You should always check the aggregation and change it if necessary. For details, see "Change the default aggregation" in Edit Default Settings for Fields. For more details about aggregation, see Data Aggregation in Tableau.

When you drag a continuous field from the **Data** pane to **Rows** or **Columns**, Tableau creates a continuous axis for that field.



If you click the field and change it to **Discrete**, the values become column headers.

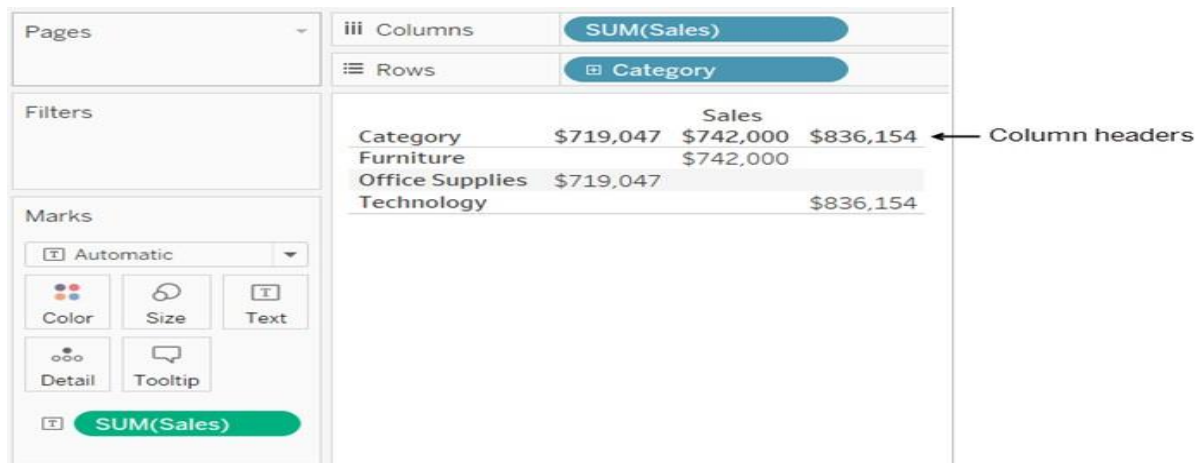


Tableau continues to aggregate values for the field, because even though the field is now discrete, it is still a measure, and Tableau aggregates measures by default.

In cases where Tableau has misclassified a field as a dimension or a measure, possibly because of the data type, you can convert it and change its role. If a measure contains numbers that don't need to be aggregated (such as a field that contains date values), you may want to convert it to be a dimension.

For related details, see [Convert a Measure to a Dimension](#).

For details on converting fields between continuous and discrete, see [Convert Fields between Discrete and Continuous](#).

How continuous and discrete fields change the view

Continuous and *discrete* are mathematical terms. Continuous means "forming an unbroken whole, without interruption"; discrete means "individually separate and distinct."

In Tableau, fields can be either continuous or discrete. When you drag a field from the Data pane to Columns or Rows, the values are continuous by default and Tableau creates an axis.

PROGRAM - 4

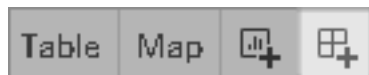
Dashboards and Stories

.Building Dashboards

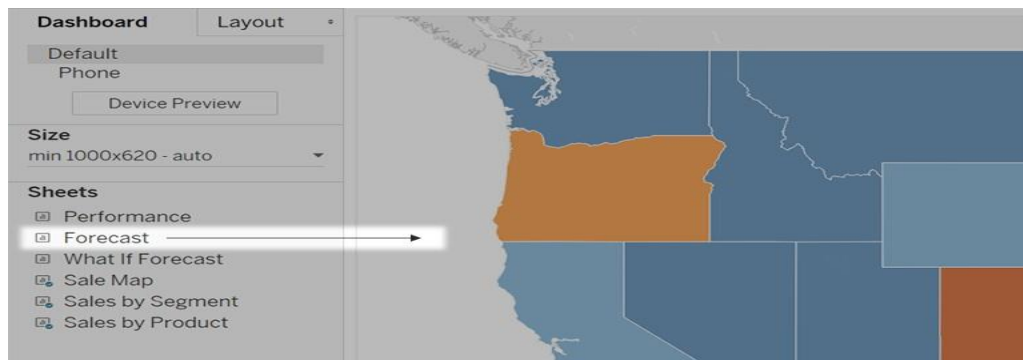
Create a dashboard, and add or replace sheets

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

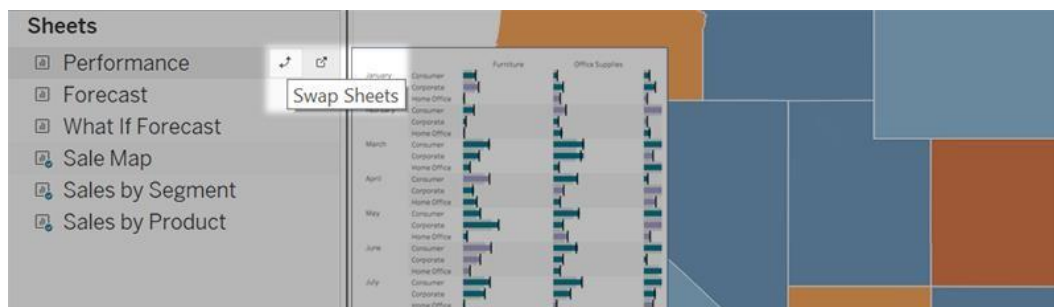
1. At the bottom of the workbook, click the **New Dashboard** icon:



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



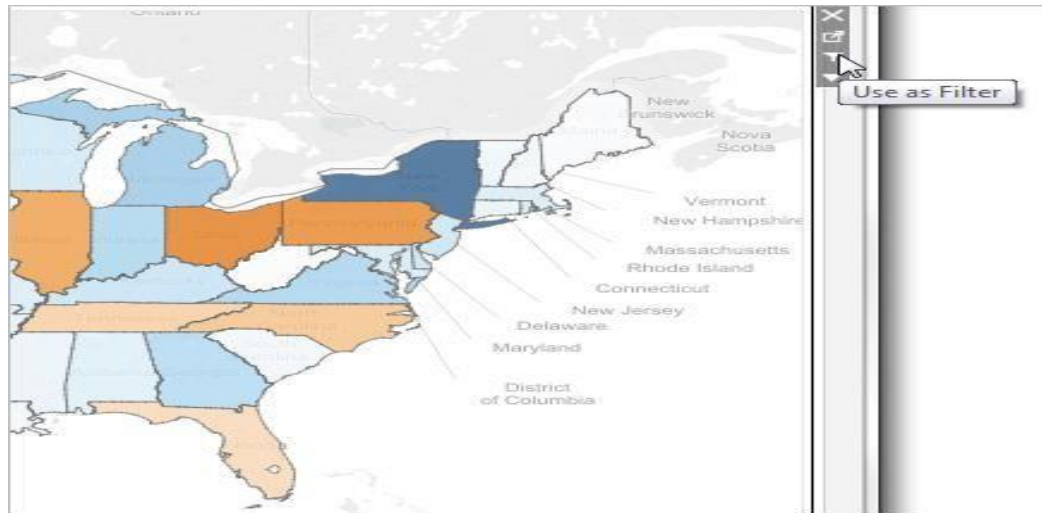
3. To replace a sheet, select it in the dashboard at right. In the Sheets list at left, hover over the replacement sheet, and click the **Swap Sheets** button.



Add interactivity

You can add interactivity to dashboards to enhance users' data insights. Try these techniques:

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



- When authoring in Tableau Desktop, add actions to use multiple sheets as filters, navigate from one sheet to another, display web pages, and more. For details, see Actions and Dashboards.

.Dashboard objects

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

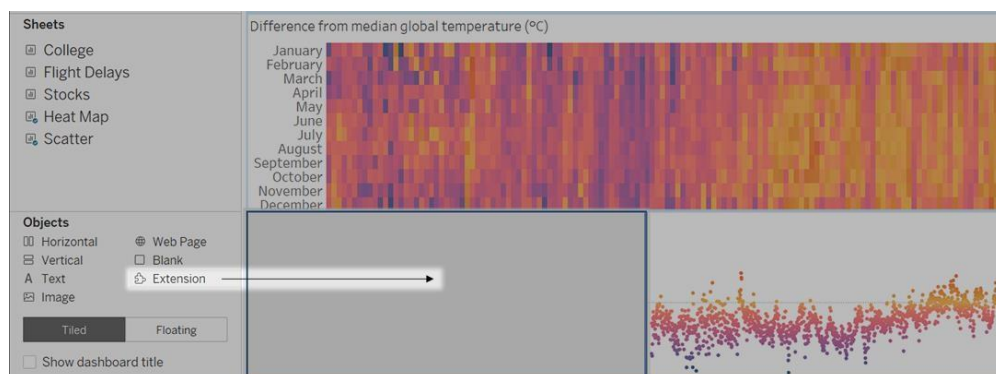
- **Horizontal** and **Vertical** objects provide layout containers that let you group related objects together and fine-tune how your dashboard resizes when users interact with them.
- **Text** objects can provide headers, explanations, and other information.
- **Image** objects add to the visual flavor of a dashboard, and you can link them to specific target URLs. (While Web Page objects can also be used for images, they are better for complete web pages. The Image object provides image-specific fitting, linking, and alt-text options.)
- **Web Page** objects display target pages in the context of your dashboard. Be sure to review these web security options, and be aware that some web pages don't allow themselves to be embedded—Google is one example.
- **Blank** objects help you adjust spacing between dashboard items.
- **Navigation** objects let your audience navigate from one dashboard to another, or to other sheets or stories. You can display text or an image to indicate the button's destination to your users, specify custom border and background colors, and provide informational tooltips.
- **Download** objects let your audience quickly create a PDF file, PowerPoint slide, or PNG image of an entire dashboard, or a crosstab of selected sheets. Formatting options are similar to Navigation objects.

Note: Crosstab download is possible only after publishing to Tableau Cloud or Tableau Server.

- **Extension** objects let you add unique features to dashboards or integrate them with applications outside Tableau.
- **Ask Data** objects let users enter conversational queries for specific data source fields, which authors optimize for specific audiences such as sales, marketing, and support staff.
- **Dashboard Formatting**
 - Choosing the right formatting is important to both your analysis and your presentation. You can change the formatting for almost everything you see on a worksheet, including fonts, shading, alignment, borders, and graph lines. For example, in a text table, you can add banded shading to help you visually separate consecutive groups of rows or fields.
 - In a scatter view with reference lines, you can change the line thickness and color. All of these settings can be changed using the Format pane. You can specify format settings for the entire worksheet, all rows, or all fields. You can also format individual parts of the view. For example, you can format a single field, resize cells and tables, and edit individual axes.

Add an extension to a dashboard

1. In a Tableau workbook, open a dashboard sheet.
2. From the **Objects** section, drag **Extension** to the dashboard.



3. In the “Add an Extension” dialog box, do either of the following:
 - Search for and select an extension.
 - Click **Access Local Extensions**, and navigate to a trex file you previously downloaded.

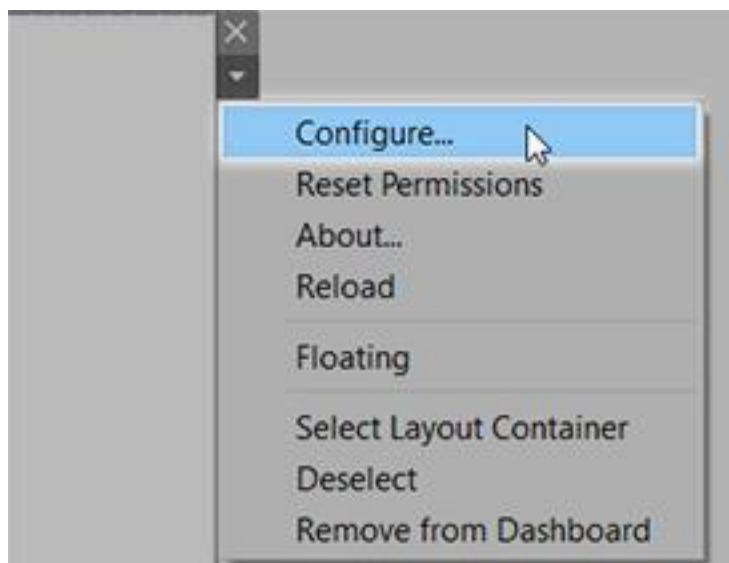
4. If prompted, allow or deny the dashboard extension access to data in the workbook. For more information, see Data security, Network-enabled, and Sandboxed extensions.

If you allow access, follow any on screen instructions for configuring the extension.

Configure a dashboard extension

Some dashboard extensions provide configuration options that let you customize features.

1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose **Configure**.
2. Follow the on-screen instructions to configure the extension.



Reload a dashboard extension

If a dashboard extension becomes unresponsive, you might need to reload it, which is similar to refreshing a web page in a browser.

1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose Reload.

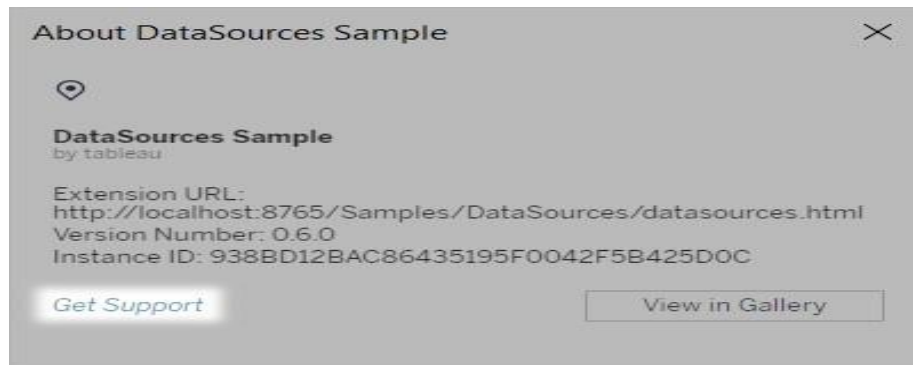
The dashboard extension is refreshed and set to its original state.

2. If reloading the extension fails to return it to a useable state, try removing it from the dashboard and adding it again.

Get support for dashboard extensions

To get help for an extension, you'll need to contact the developer or company who created it.

1. Select the extension in the dashboard, and from the drop-down menu in the upper-right corner, choose About.
2. Click Get Support to go to the support page of the extension developer.

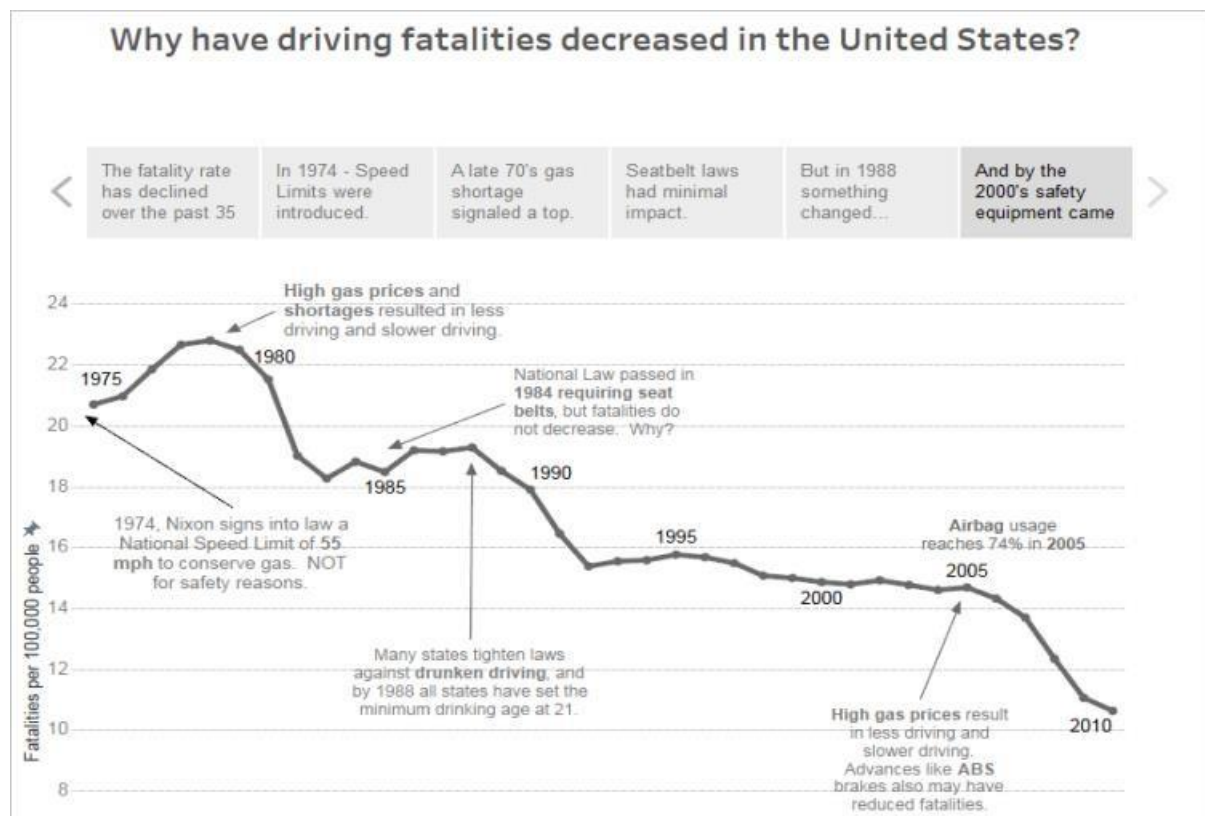


Stories

In Tableau, a story is a sequence of visualizations that work together to convey information. You can create stories to tell a data narrative, provide context, demonstrate how decisions relate to outcomes, or to simply make a compelling case.

A story is a sheet, so the methods you use to create, name, and manage worksheets and dashboards also apply to stories (for more details, see Workbooks and Sheets). At the same time, a story is also a collection of sheets, arranged in a sequence. Each individual sheet in a story is called a story point.

When you share a story—for example, by publishing a workbook to Tableau Public, Tableau Server, or Tableau Cloud—users can interact with the story to reveal new findings or ask new questions of the data.



PROGRAM – 5

Calculations in Tableau

- Syntax

• Components	Syntax	Example
Functions	See Tableau Functions (Alphabetical)(Link opens in a new window) for examples of how to format all functions in Tableau.	SUM
Fields	A field in a calculation is often surrounded by brackets []. See Field syntax for more information.	[Sales]
Operators	+, - , *, /, %, ==, =, >, <, >=, <=, !=, <>, ^, AND, OR, NOT, (). See Operator syntax for information on the types of operators you can use in Tableau calculation and the order they are performed in a formula.	[Profit]
Literal expressions	Numeric literals are written as numbers. String literals are written with quotation marks. Date literals are written with the # symbol. Boolean literals are written as either true or false. Null literals are written as null. See Literal expression syntax for more information.	1.3567 or 27 "Unprofitable" true or false Null
Parameters	A parameter in a calculation is surrounded by brackets []. See Create Parameters for more information.	[Profit size]
Comments	To enter a comment in a calculation, type two forward slashes //. See Add comments to a calculation for more information. Multi-line comments can be added by typing /* to start the comment and */ to end it.	SUM/SUM

- **Table Calculations**

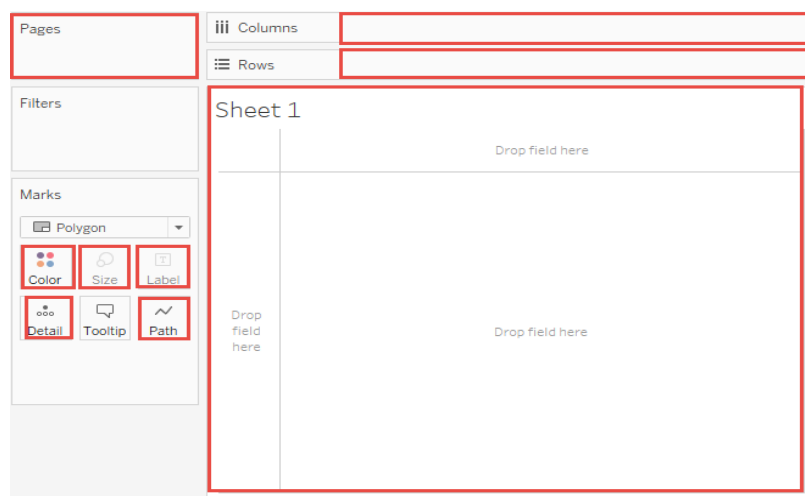
What is a table calculation?

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

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

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

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



Level of Detail expressions

Level of Detail expressions (also known as LOD expressions) allow you to compute values at the data source level and the visualization level. However, LOD expressions give you even more control on the level of granularity you want to compute. They can be performed at a more granular level (INCLUDE), a less granular level (EXCLUDE), or an entirely independent level (FIXED).

This article explains the types of LOD expressions you can use in Tableau, as well as when to use them, and how to format them. It also uses an example to demonstrate how to create a simple LOD expression.

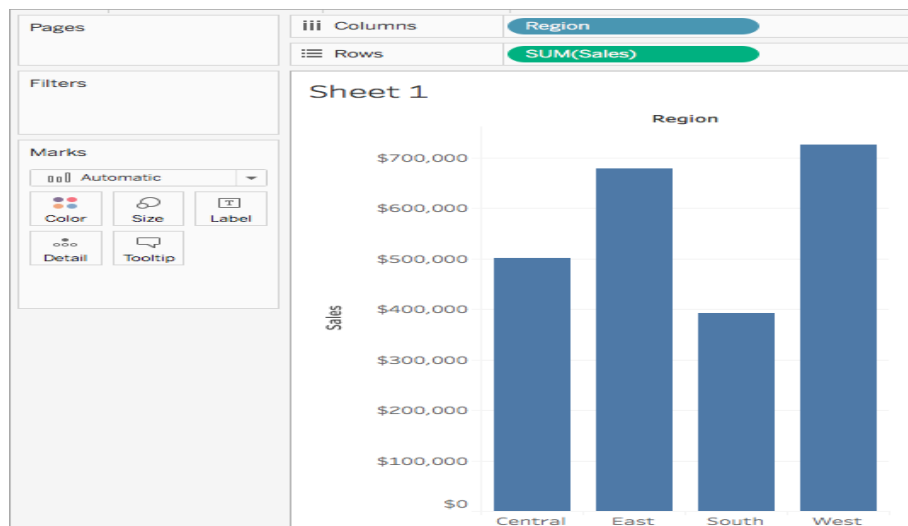
How to create LOD expressions

Follow along with the steps below to learn how to create and use an LOD expression in Tableau.

Step 1: Set up the Visualization

1. Open Tableau Desktop and connect to the Sample-Superstore saved data source.
2. Navigate to a new worksheet.
3. From the Data pane, under Dimensions, drag Region to the Columns Shelf.
4. From the Data pane, under Measures, drag Sales to the Rows Shelf.

A bar chart showing the sum of sales for each region appears.



Step 2: Create the LOD expression

Instead of the sum of all sales per region, perhaps you want to also see the average sales per customer for each region. You can use an LOD expression to do this.

1. Select **Analysis > Create Calculated Field**.
2. In the Calculation editor that opens, do the following:
 - Name the calculation, Sales Per Customer.
 - Enter the following LOD expression:


```
{INCLUDE [Customer Name]: SUM([Sales]) }
```

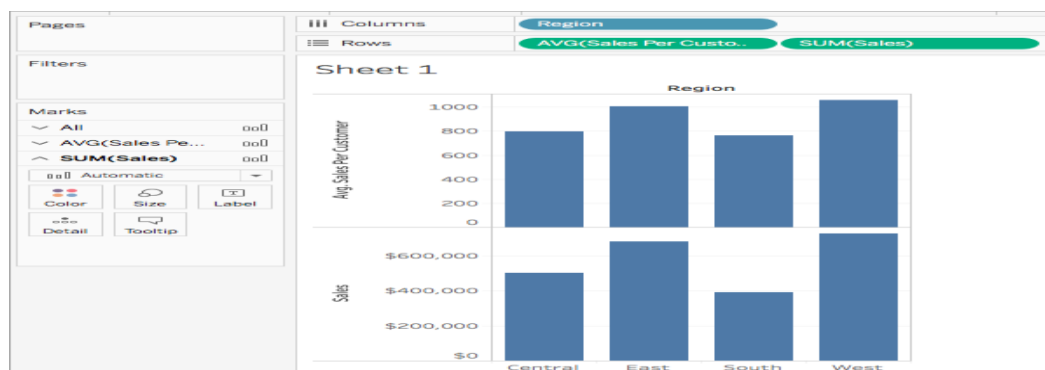
3. When finished, click **OK**.

The newly created LOD expression is added to the Data pane, under Measures. To learn more about the types of LOD expressions you can use, see the Types of LOD expressions section.

Step 3: Use the LOD expression in the visualization

1. From the **Data** pane, under Measures, drag **Sales Per Customer** to the **Rows** shelf and place it to the left of SUM(Sales).
2. On the Rows shelf, right-click **Sales Per Customer** and select **Measure (Sum) > Average**.

You can now see both the sum of all sales and the average sales per customer for each region. For example, you can see that in the Central region, the sales totaled approximately 500,000 USD with an average sale for each customer being approximately 800 USD.



Use a Quick LOD expression

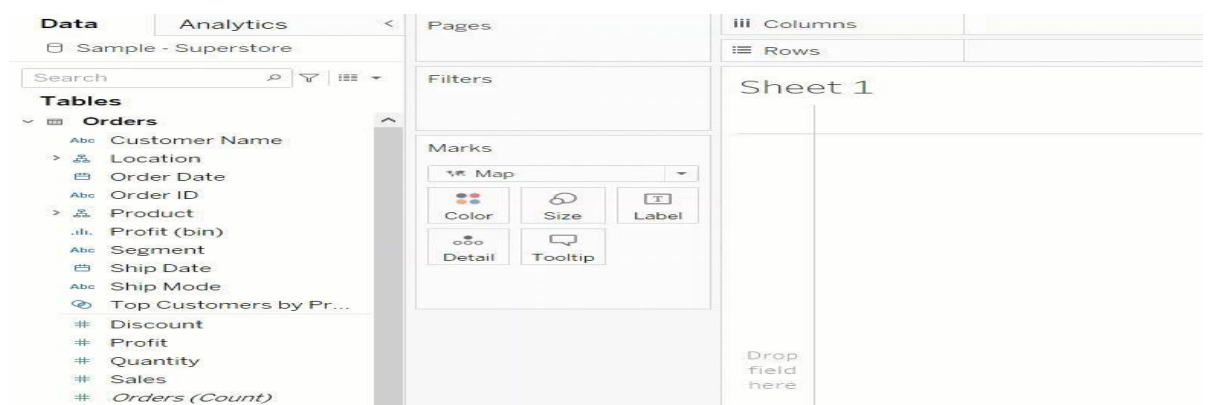
As of Tableau 2021.1, you can create a FIXED LOD expression without needing to enter the full calculation into the calculation dialog.

There are two ways to create a quick LOD calculation.

1. Control-click (or Command-click on a Mac) the measure you want to aggregate and drag it to the dimension you want to aggregate on. A new field will appear with a new FIXED LOD calculation.



2. As a second option, select the measure you want to aggregate and then Control-click (or Command-click on a Mac) to select the dimension you want to aggregate on.
 - Right-click on the selected fields and select **Create > Quick LOD**.
 - Select **OK** in the calculation dialog that appears to finish creating the LOD.



FIXED level of detail expressions compute a value using the specified dimensions, without reference to the dimensions in the view.

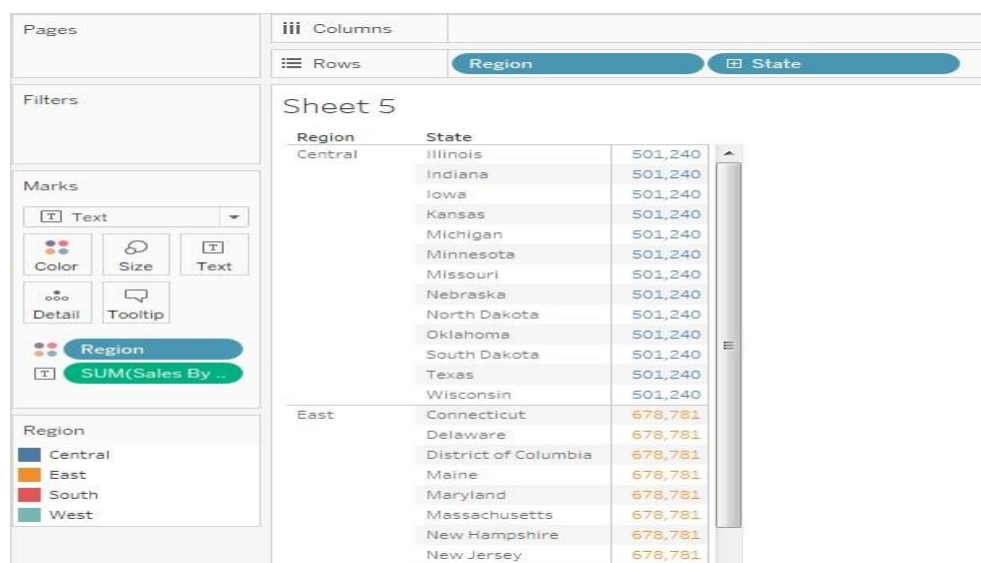
Example

The following FIXED level of detail expression computes the sum of sales per region:

```
{FIXED [Region]: SUM([Sales])}
```

This level of detail expression, named **[Sales by Region]**, is then placed on Text to show total sales per region.

The view level of detail is **[Region]** plus **[State]**, but because FIXED level of detail expressions do not consider the view level of detail, the calculation only uses the dimension referenced in the calculation, which in this case is Region. Because of this, you can see that the values for the individual states in each region are identical. For more information about why this happens, see Aggregation and Level of Detail Expressions.



If the INCLUDE keyword had been used in the level of detail expression instead of FIXED, the values would be different for each state, because Tableau would add the dimension in the expression (**[Region]**) with any additional dimensions in the view (**[State]**) when determining values for the expression. The result would be as follows:



INCLUDE

INCLUDE level of detail expressions compute values using the specified dimensions in addition to whatever dimensions are in the view.

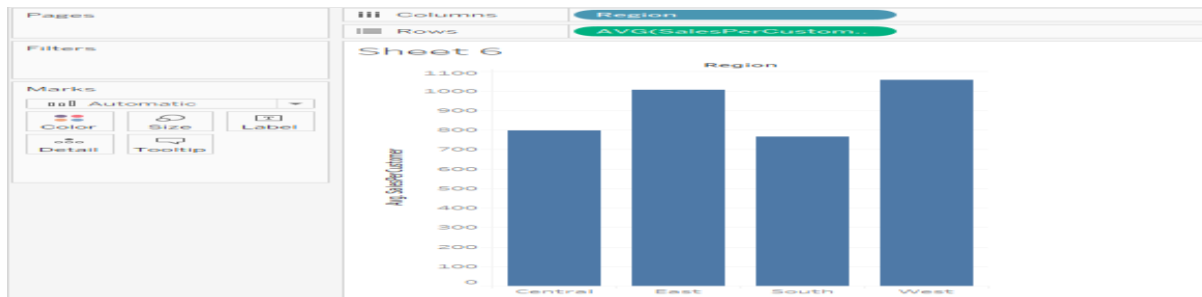
INCLUDE level of detail expressions can be useful when you want to calculate at a fine level of detail in the database and then re-aggregate and show at a coarser level of detail in your view. Fields based on INCLUDE level of detail expressions will change as you add or remove dimensions from the view.

Example 1

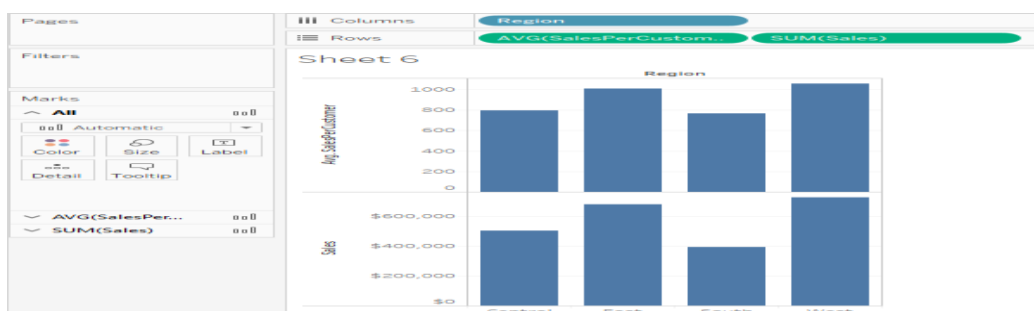
The following INCLUDE level of detail expression computes total sales per customer:

```
{INCLUDE [Customer Name] : SUM([Sales]) }
```

When that calculation is placed on the **Rows** shelf, aggregated as AVG, and the **[Region]** dimension is placed on the **Columns** shelf, the view shows the average customer sales amount per region:



If the **[Sales]** measure is then dragged to the **Rows** shelf, the result illustrates the difference between the total sale for each region and the average sale per customer for each region:



When **Segment** is added to the **Columns** shelf and the calculation is moved to **Label**, the LOD expression results update. Now you can see how the average sum of sales per state varies across categories and segments.

- Aggregate Date, Logic,String, Number,Type calculations

Follow along with the steps below to learn how to create an aggregate calculation.

1. In Tableau Desktop, connect to the **Sample - Superstore** saved data source, which comes with Tableau.
2. Navigate to a worksheet and select **Analysis > Create Calculated Field**.
3. In the calculation editor that opens, do the following:
 - Name the calculated field **Margin**.
 - Enter the following formula:

```
IIF(SUM([Sales])!=0, SUM([Profit])/SUM([Sales]), 0)
```

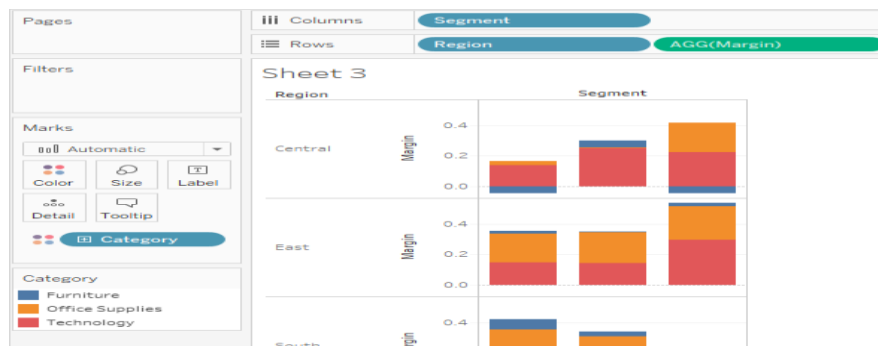
Note: You can use the function reference to find and add aggregate functions and other functions (like the logical IIF function in this example) to the calculation formula. For more information, see Use the functions reference in the calculation editor.

- When finished, click **OK**.

The new aggregate calculation appears under **Measures** in the **Data** pane. Just like your other fields, you can use it in one or more visualizations.

Note: Aggregation calculations are always measures.

When **Margin** is placed on a shelf or card in the worksheet, its name is changed to **AGG(Margin)**, which indicates that it is an aggregate calculation and cannot be aggregated any further.



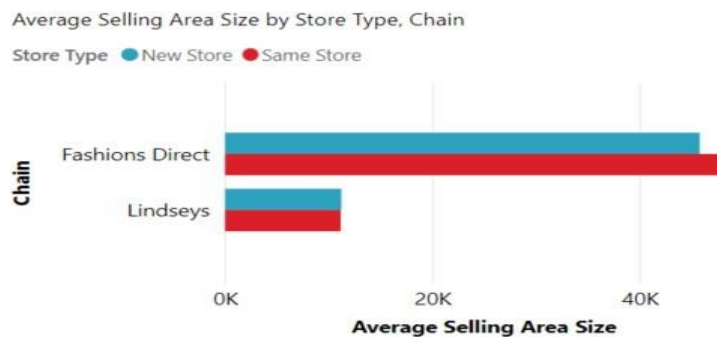
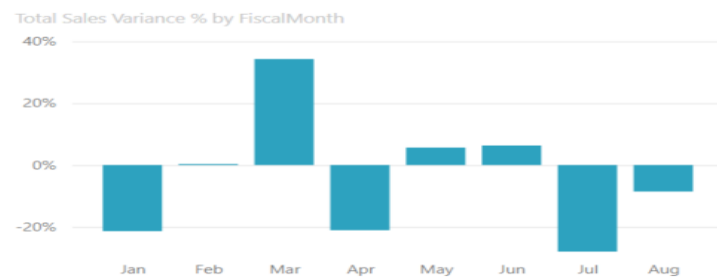
- Built-in Chart types/ Visualizations

Line charts



Line charts emphasize the overall shape of an entire series of values, usually over time

Bar and column charts



Bar charts are the standard for looking at a specific value across different categories.

Combo charts



A combo chart combines a column chart and a line chart. Combining the two charts into one lets you make a quicker comparison of the data. Combo charts can have one or two Y axes, so be sure to look closely.

Combo charts are a great choice:

- When you have a line chart and a column chart with the same X axis.
- To compare multiple measures with different value ranges.
- To illustrate the correlation between two measures in one visual.
- To check whether one measure meets the target which is defined by another measure.

PROGRAM - 7

Aim : - Custom Chart Types:

- **KPI matrix**

KPI

Total Units This Year and Total Units Last Year by Month



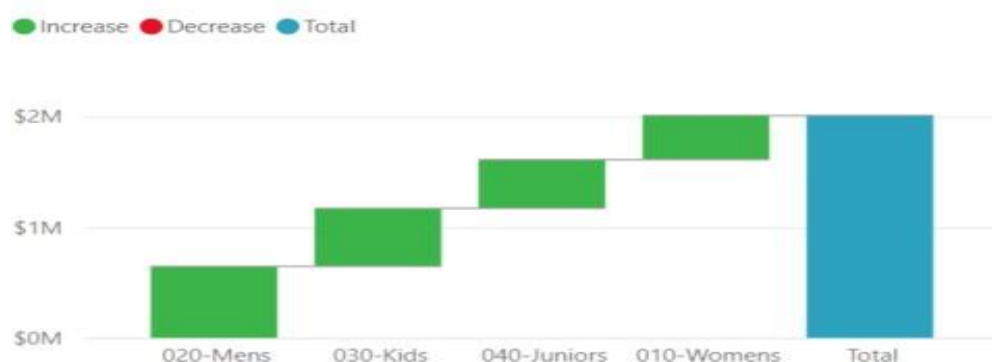
A Key Performance Indicator (KPI) is a visual cue that communicates the amount of progress made toward a measurable goal.

KPIs are a great choice:

- To measure progress (what am I ahead or behind on?).
- To measure distance to a metric (how far ahead or behind am I?).

Waterfall charts

Total Units Last Year by Category



A waterfall chart shows a running total as values are added or subtracted. It's useful for understanding how an initial value (for example, net income) is affected by a series of positive and negative changes.

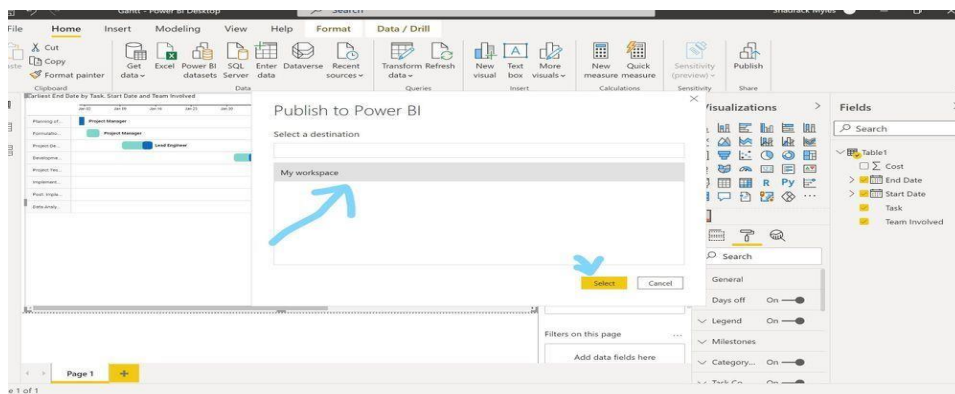
The columns are color coded so you can quickly tell increases and decreases. The initial and the final value columns often start on the horizontal axis, while the intermediate values are floating columns. Because of this "look", waterfall charts are also called bridge charts.

Waterfall charts are a great choice:

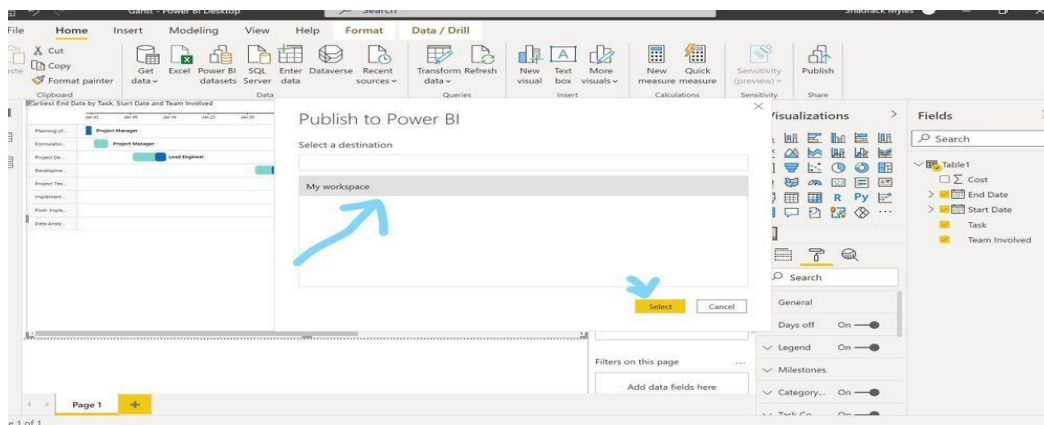
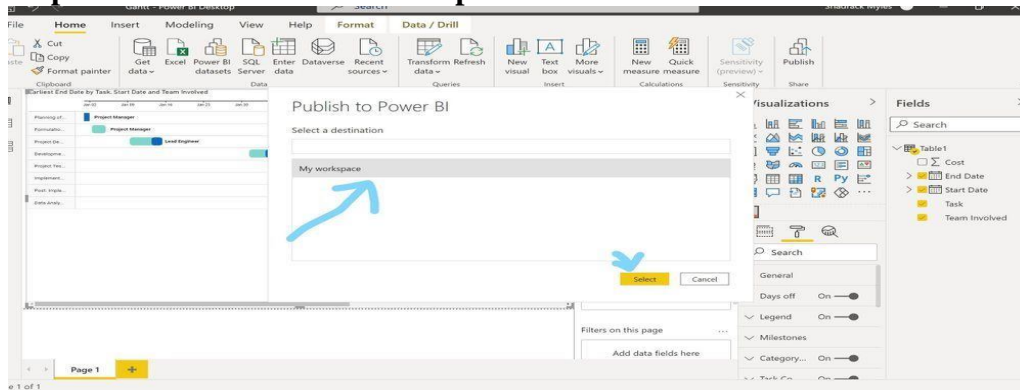
- When you have changes for the measure across time or across different categories.
- To audit the major changes contributing to the total value.
- To plot your company's annual profit by showing various sources of revenue and arrive at the total profit (or loss).
- To illustrate the beginning and the ending headcount for your company in a year.
- To visualize how much money you make and spend each month, and the running balance for your account.

• **Gantt Chart**

Step 1: Using your excel table Gantt chart data You first need to format your excel datasheet into a table. To format as a table select the datasheet> on the home tab click on format as table. Once you have done so save the file



Step 2: Launch Power BI Desktop.

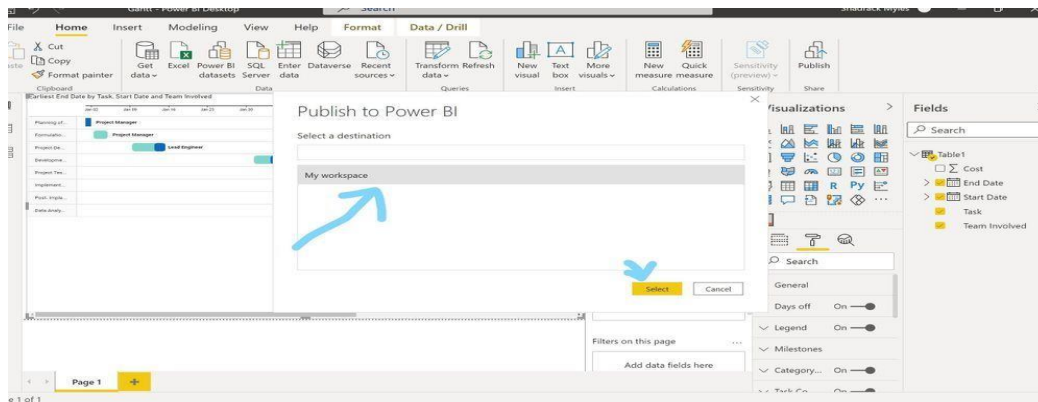


By default, get these visualizations, so to access more visuals need a license to them.

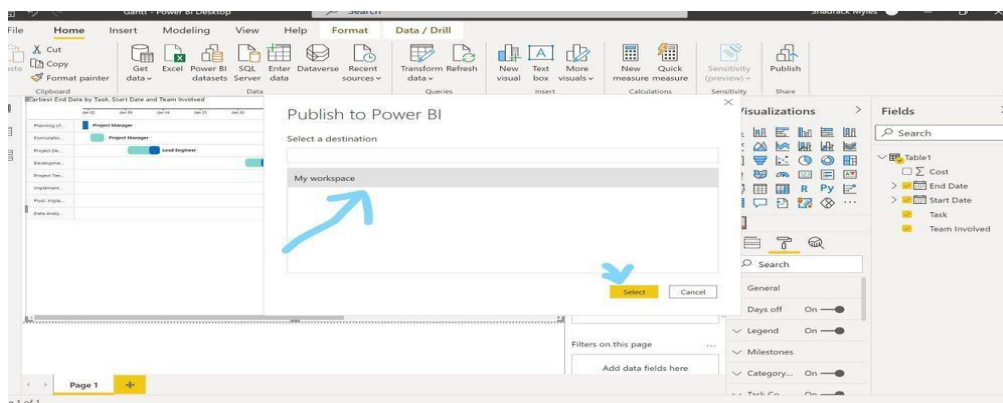
Sign in with your office account (school or work account) to Power BI.

Once we are signed in let's import our Gantt chart visual.

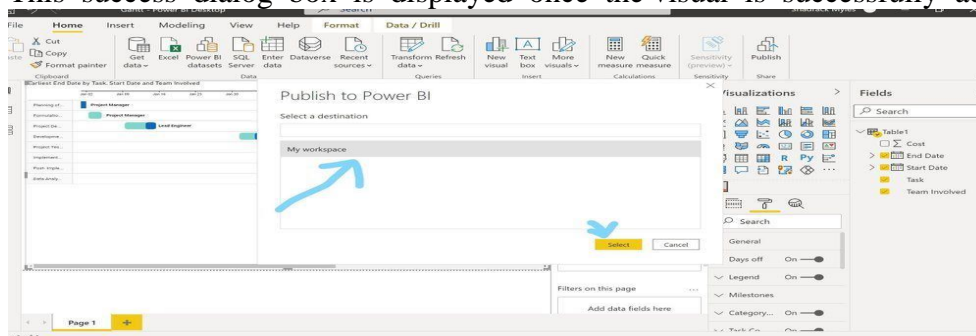
Step 3: Import Gantt Chart visual to Power BI - On the visualizations pane click on the three dots (ellipsis) and select **get more visuals**.



Search **Gantt chart**, then click **Add**.



This success dialog box is displayed once the visual is successfully added. All good to go



But first let's discuss the properties of a Gantt chart since this will come handy for the next steps and will really help you match the properties you have on the excel sheet with the properties in Gantt.

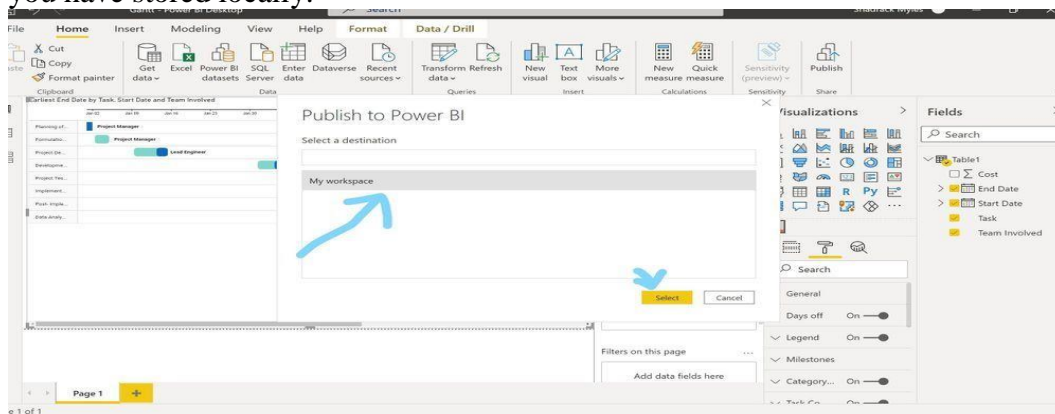
1. Legend- this displays which category the project is,
2. Task- this basically describes the project work to be done in a specified period of time
3. Parent- this takes a summary of the child tasks that have in your project
4. Start Date- this describes the starting date of the project are working on
5. End Date- this describes the end date of the project are working on
6. Duration- timeframe for working on a particular project i.e., 3 months, 6 months etc.
7. % Completion- the amount of task that has been completed in terms of percentage

8. Resource - This is what you use in the project. For instance, have developer resource, program manager resource, Business analyst resource etc.
9. Tooltips - Text boxes that are displayed when a timeline or data grids are hovered over
10. Milestones - this refers to the important or specific pointers in your project that describe the improvements or backlogs in a project

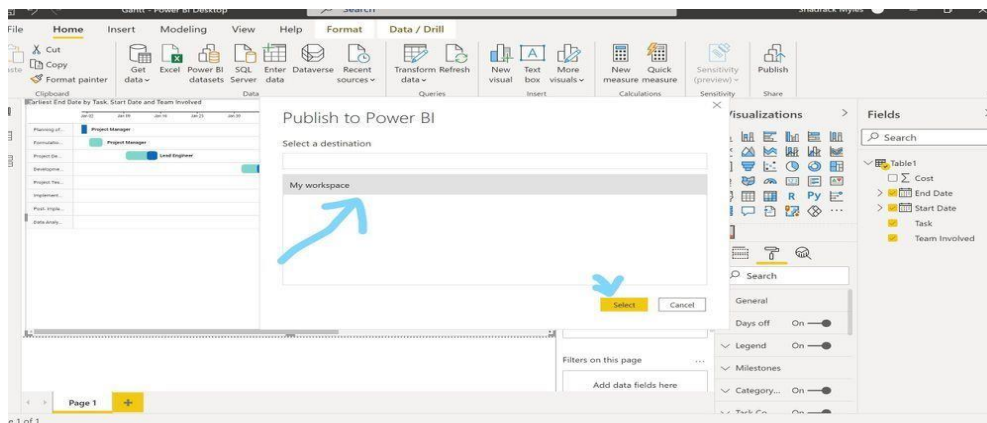
These properties basically define the timelines, start date, etc. of the whole project,

Step 4: Lets import our data

On the Home tab and click on get data> choose Excel as your data source. Import the excel sheet you have stored locally.

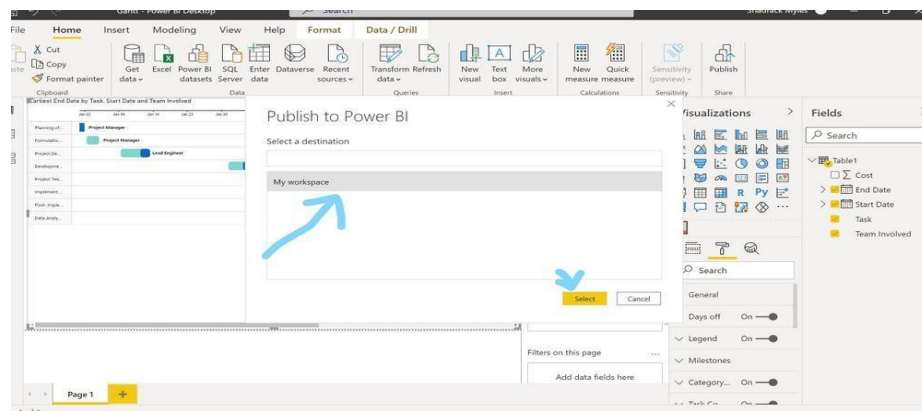
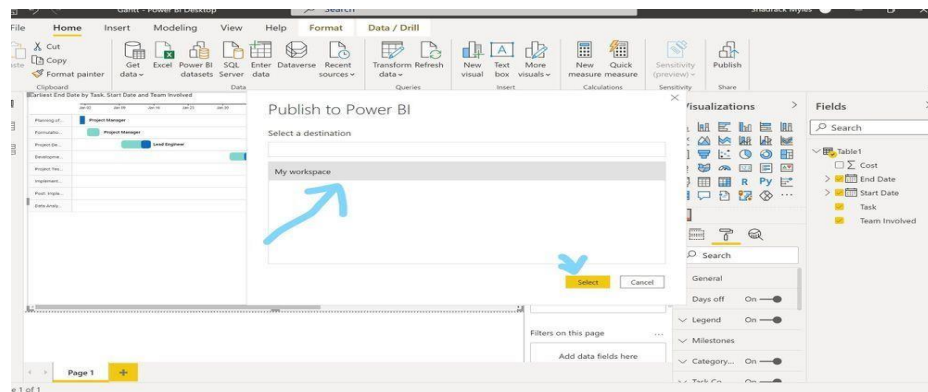
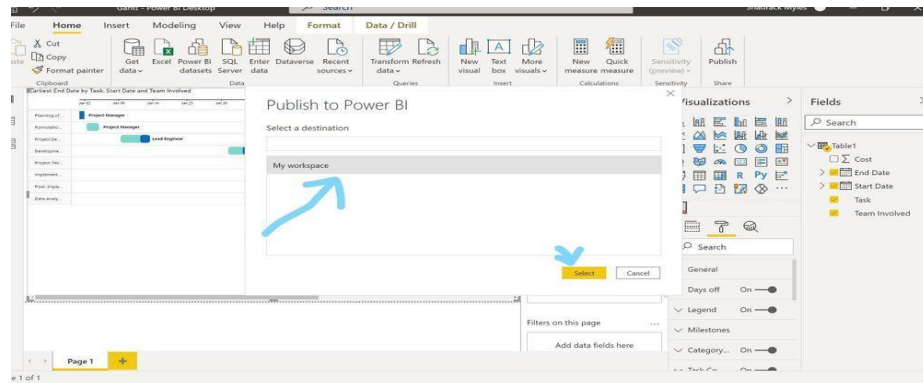


Select the table had formatted to load data into Power BI. Once select the table will see a preview of the data. Select **load** once have ascertained the data is in the correct format. In case you would like to alter the format of the data, click **Transform Data** which will open the Power BI Query Editor on a separate window for to modify your data before loading it into the Power BI project.

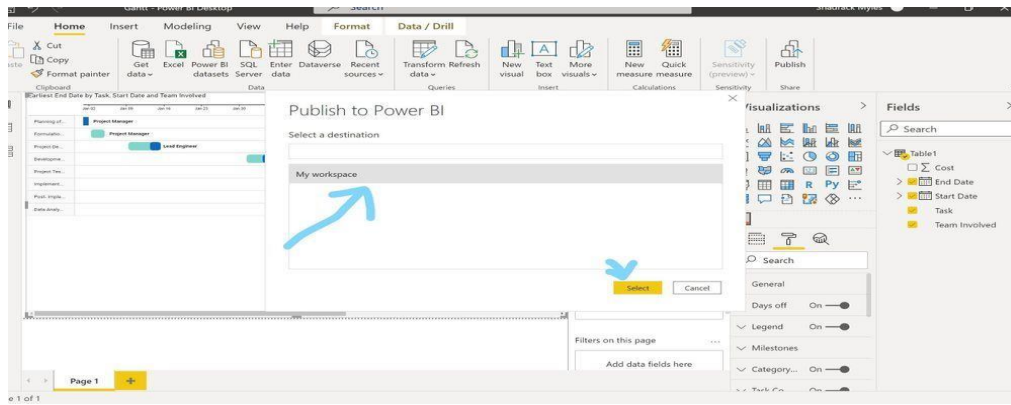


We are all set!

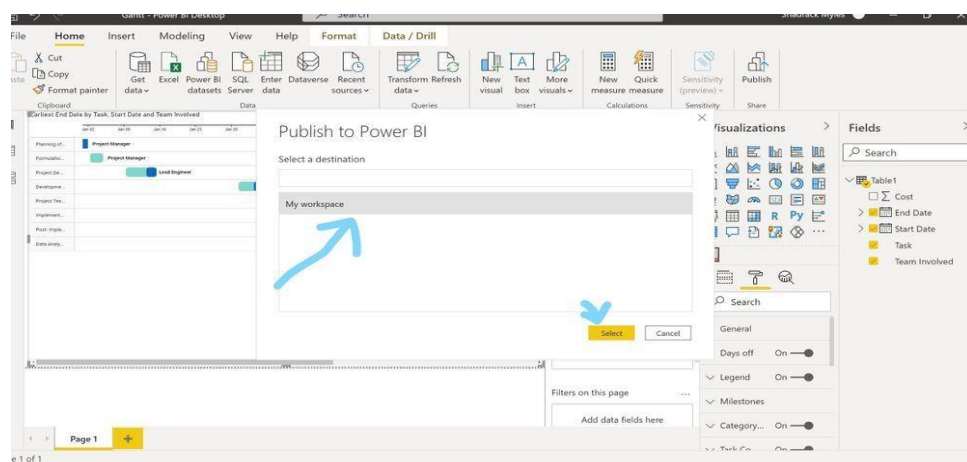
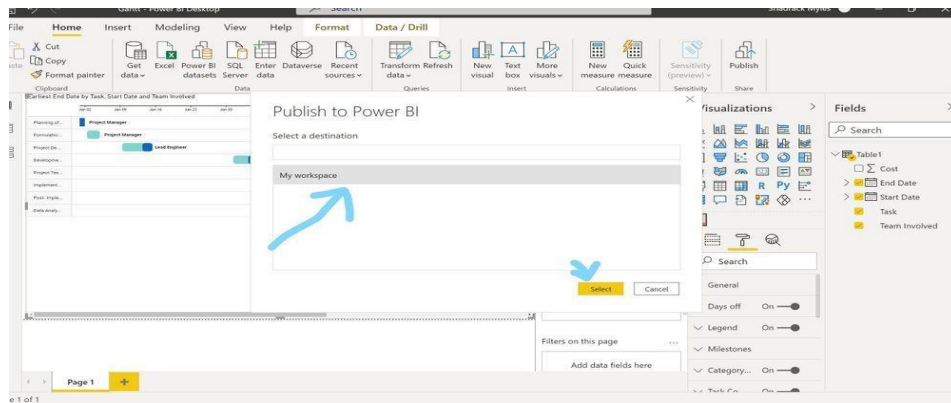
Step 5. Time to visualize! On the visualizations pane select Gantt chart to display a blank chart. Once you are done, we can now link our excel data to the properties of the Gantt chart. i.e., task (Excel) to match with task (Gantt), start date (Excel) and start date (Gantt) etc. This will depend on how you have named your excel columns



Step 6: All done - We have been able to build our Gantt chart using Power BI. This will enable us to track the tasks that we have against time and the team members playing the different roles on different tasks. You can customize your chart further on other properties such as the title of the chart, background color, date type, data labels by using the tabs below the visualizations pane.



Step 7: Save, Publish and Share - We can now share the chart with our colleagues. Save the chart and publish to desired workspace on Power BI Service. This will enable your workmate's view and collaborate on the chart you have shared with them.



Program – 8

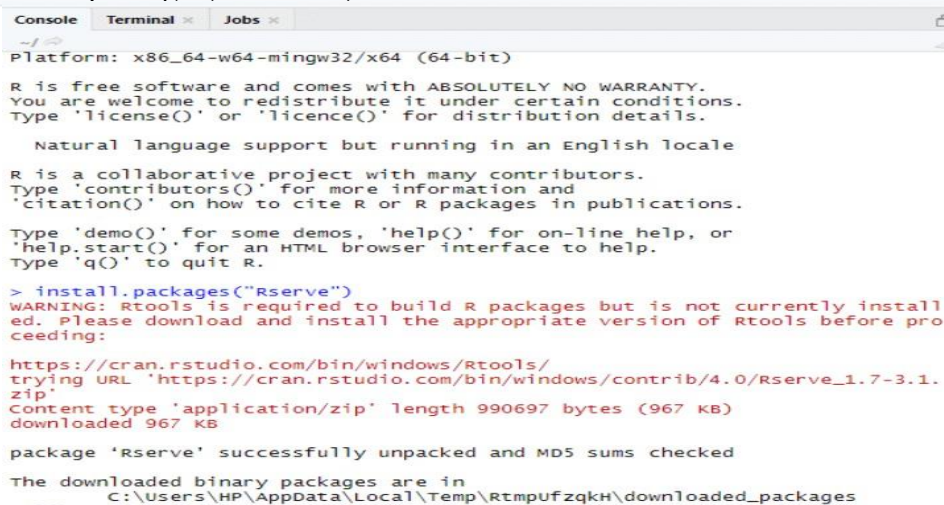
Aim :- Using R within Tableau

- Step 1: Install the Reserve Package
- Step 2: Integrate R and Tableau

Step 1: Install the Reserve Package

The Reserve package will let Tableau connect to R and use its functions, packages, libraries, and models. The package can be installed by running a single command on the R console. Open Rstudio on your computer and run the following command:

```
install.packages("Rserve")
```



The screenshot shows the RStudio console with the following output for the command `install.packages("Rserve")`:

```
Platform: x86_64-w64-mingw32/x64 (64-bit)
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

  Natural language support but running in an English locale
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> install.packages("Rserve")
WARNING: Rtools is required to build R packages but is not currently installed. Please download and install the appropriate version of Rtools before proceeding:
https://cran.rstudio.com/bin/windows/Rtools/
trying URL 'https://cran.rstudio.com/bin/windows/contrib/4.0/Rserve_1.7-3.1.zip'
Content type 'application/zip' length 990697 bytes (967 KB)
downloaded 967 KB

package 'Rserve' successfully unpacked and MD5 sums checked
The downloaded binary packages are in
  C:\Users\HP\AppData\Local\Temp\RtmpufzqkH\downloaded_packages
```

The command should install the package without raising issues. To use the package, you must load it using the following command:

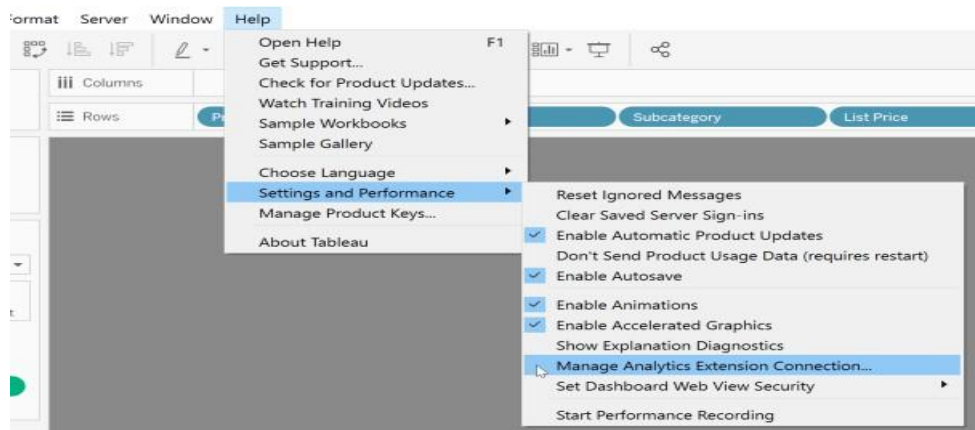
```
library(Rserve)
```

You should now be able to use the Reserve package. Let's move to the next step.

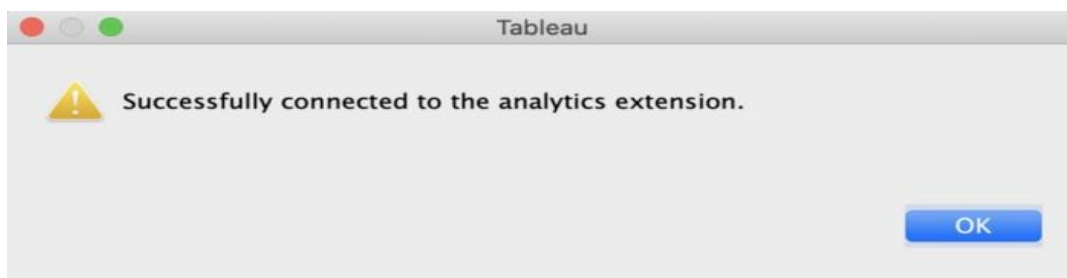
Step 2: Integrate R and Tableau

It's now time to connect Tableau to R. Follow the steps given below:

- Open Tableau.
- Click **“Help”** from the menu, choose **“Settings and Performance”**, and then **“Manage Analytics Extension Connection...”**.



- The “**Analytics Extension Connection**” window will be opened. Choose “Rserve” as the Analytics Extension and enter the server name and the port. Since you are running both on your computer, enter “**localhost**” for the server name. Once done, click the “**Test Connection**” button.
- You should get a message showing that the connection was established successfully.



If you get the above message, it means that you are done with connecting R and Tableau. You can now start to use R scripts in Tableau.

Program – 9

Create and Format reports using the Power BI desktop

- **Describe the use of Page Backgrounds and Tempelates**

Use Background Images in Views

Background images are images that display underneath our data in order to add more context to the marks in the view. A common use of background images is adding custom map images that correspond to a coordinate system in our data.

For example, might have data that corresponds to several floors in a building. You can use background images to overlay that data on the actual floor plan of the building to give more context. Other examples of using background images include showing a model of the sea floor, images of web pages for analyzing web logs, and even levels from video games to visualize player statistics.

While Tableau allows you to load dynamic maps from the online and offline provider, background images allow you to use your own custom images whether they are special maps or any other image that corresponds to your data.

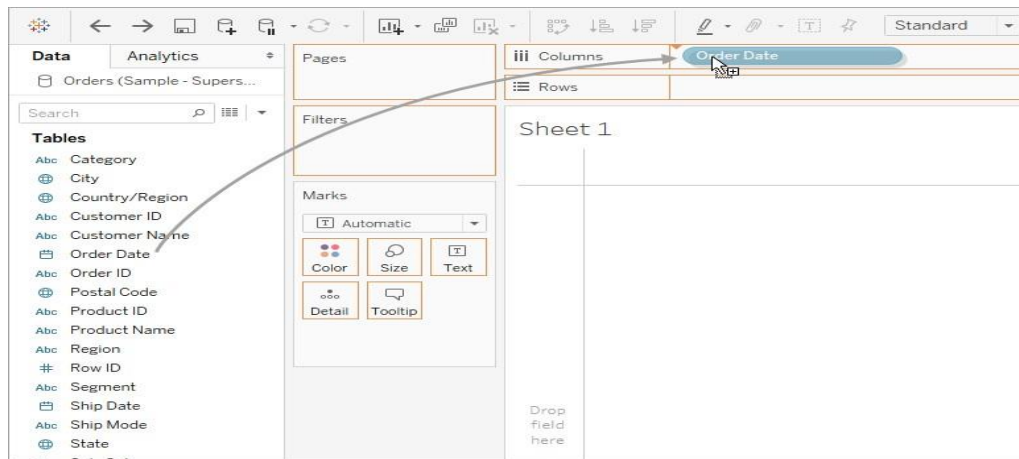
- **The Use of Templates in tableau**
- Dashboard templates and examples can be a hugely impactful method to successfully embedding Tableau into a business. They allow users to forget about one of the more tedious Tableau tasks (formatting), and allow them to get their analysis in-front of stakeholders, in a presentable manner, quickly.
- From an audience/consumer perspective, a consistent look and feel will make navigation and interaction much easier as we get an understanding of where to look for those key aspects.
- Create Visualizations to display the data in tableau

Build a view from scratch

These steps show how to build a basic view that shows year-by-year profit.

1. From the **Dimensions** area in the **Data** pane, drag the **Order Date** field to the **Columns** shelf. You might need to expand the Order hierarchy to see Order Date.

When you drag a field over a shelf, a plus sign indicates that the shelf can accept the field.



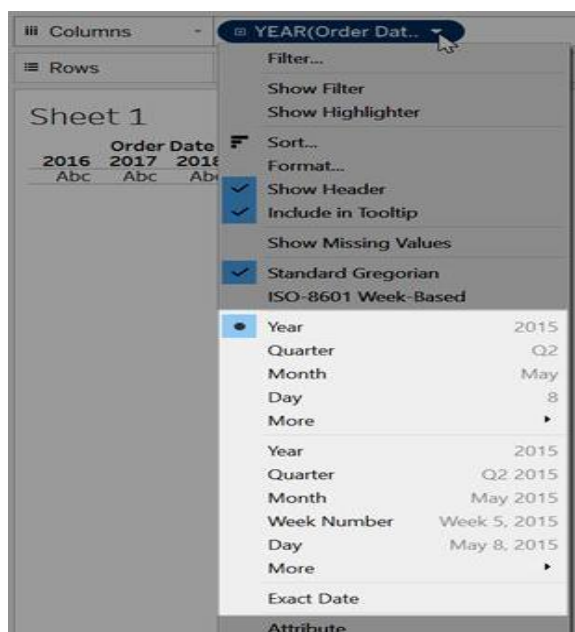
The resulting table has four columns and one row. Each column header represents a member of the Order Date field (the default date level is YEAR). Each cell contains an “Abc” label, which indicates that the current mark type for this view is text.

Order Date			
2016	2017	2018	2019
Abc	Abc	Abc	Abc

Notice that the field is colored blue, which indicates that it is *discrete*. For more information, see Dimensions and Measures, Blue and Green.

The default date level is determined by the highest level that contains more than one distinct value (for example, multiple years and multiple months). That means that if [Order Date] contained data for only one year but had multiple months, the

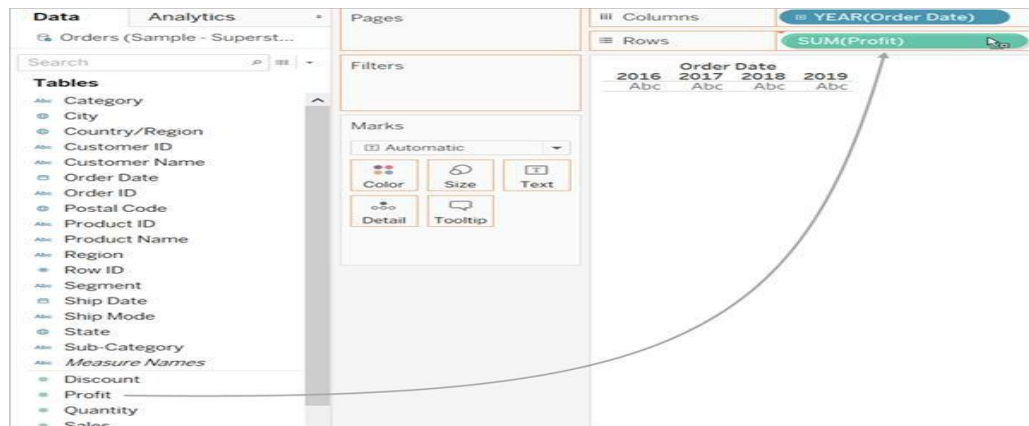
default level would be month. You can change the date level using the field menu.



If you're wondering why there are two sets of date levels (from Year down to Day), the first set of options uses date parts and the second set of options uses date values. For more information, see Change Date Levels.

Tip: To hide the title on the sheet, select the drop-down to the right of the title (Sheet 1), and select **Hide Title**.

2. From the **Data** pane, drag the **Profit** field to the **Rows** shelf.

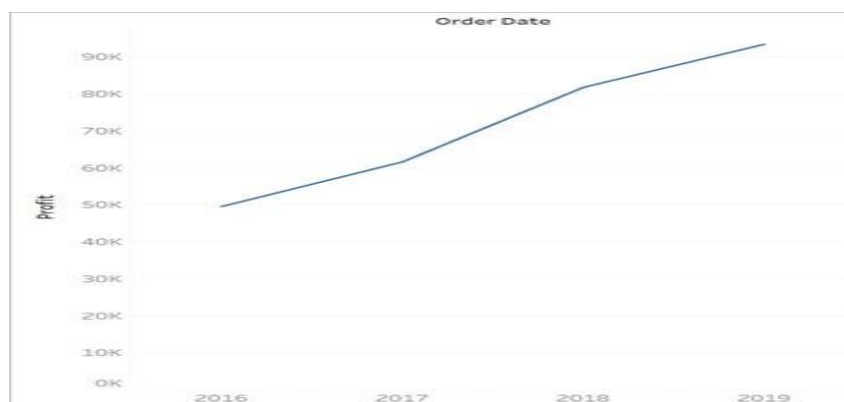


The **Profit** field is coloured green on the **Rows** shelf, indicating that it is continuous. Also, the field name changes to **SUM(Profit)**. That's because measures are automatically aggregated when you add them to the view, and the default aggregation for this measure is SUM. For more information on what happens when you add a measure to a view—and why—see Dimensions and Measures, Blue and Green.

Tableau transforms the table into a line chart and creates a vertical axis (along the left side) for the measure.

A line chart is a great way to compare data over time and identify trends effectively.

This line chart shows profit over time. Each point along the line shows the sum of profit for the corresponding year.




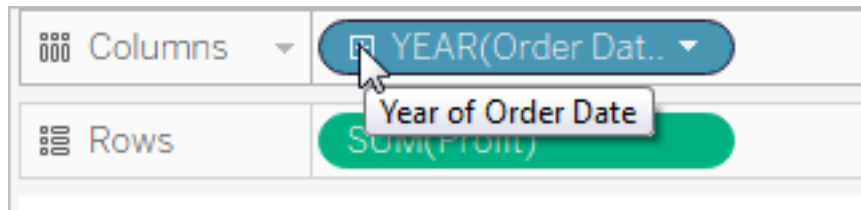
- Apply drill through and through drill down

Drill into the data

This step shows how you can modify the view to show quarters in addition to years. As you drill down into the hierarchy, the view changes to become a nested table.

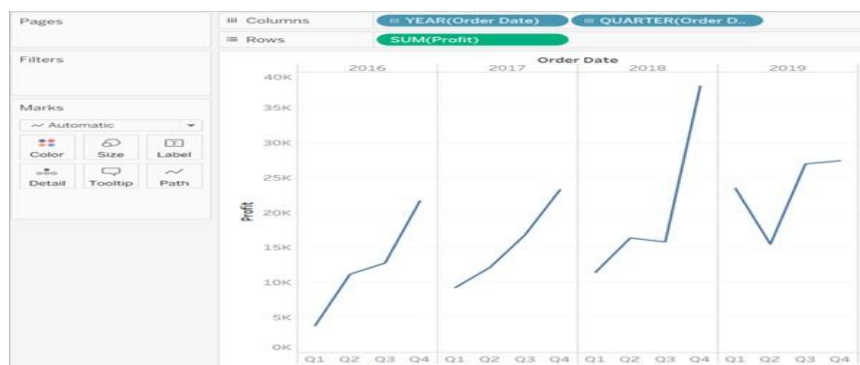
You can show [**Order Date**] by quarters using either of the following methods:

- Click the plus button  on the left side of the field **YEAR(Order Date)** field on Columns.



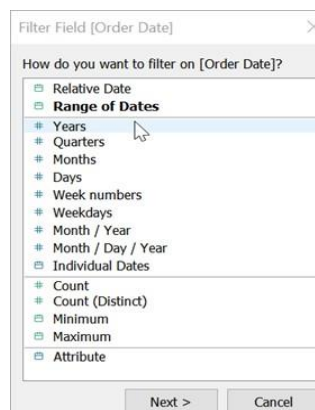
- Drag the **Order Date** field (again) from the Data pane and drop it on the **Columns** shelf to the right of **Year(Order Date)**.

The new dimension divides the view into separate panes for each year. Each pane, in turn, has columns for quarters. This view is called a nested table because it displays multiple headers, with quarters nested within years. The word "headers" might be a bit misleading because while the year headers remain at the "head" of the view (that is, the top), the quarter headers are at the foot (that



is, the bottom). So it might be more accurate to call them *footers*.

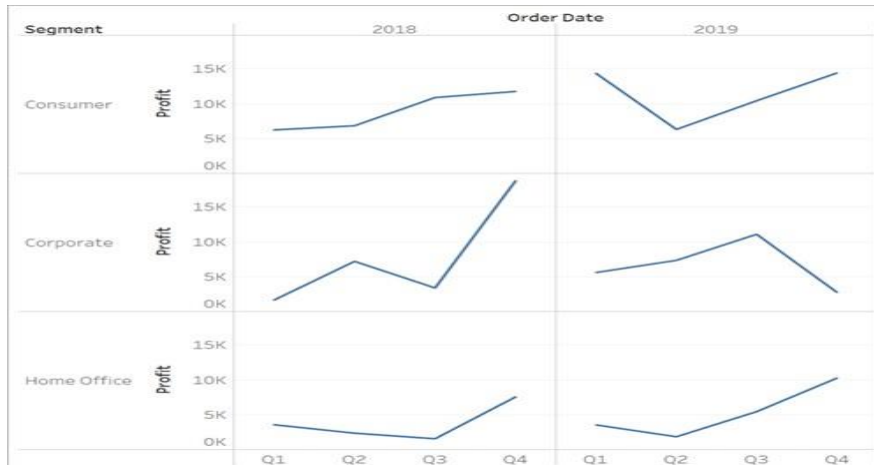
1. Drag the **Order Date** measure from the **Data** pane and drop it on the **Filters** shelf.



2. In the Filter Field dialog box, choose the date level you want to filter on—**Years**. Then click **Next**.

3. In the next pane, clear any two years that you do not want to include in the view.
4. When you are finished, click **OK**.

The view updates to only show data rows where Order Date is 2018 or 2019. Tableau can now allocate more space to the data that interests you.



Next, you will increase the detail in your data exploration by dragging a field to Color on the Marks card.

- [explore visual interactions in tableau](#)

When you build a view, you add fields from the **Data** pane. You can do this in different ways.

For example:

- Drag fields from the **Data** pane and drop them onto the cards and shelves that are part of every Tableau worksheet.
- Double-click one or more fields in the **Data** pane.
- Select one or more fields in the **Data** pane and then choose a chart type from **Show Me**, which identifies the chart types that are appropriate for the fields you selected. For details, see [Use Show Me to Start a View](#) .
- Drop a field on the **Drop field here** grid, to start creating a view from a tabular perspective.



As you start exploring data in Tableau, you will find there are many ways to build a view. Tableau is extremely flexible, and also very forgiving. As you build a view, if you ever take a path that isn't answering your question, you can always undo to a previous point in your exploration.

- To undo or redo, click undo  or redo  on the toolbar.

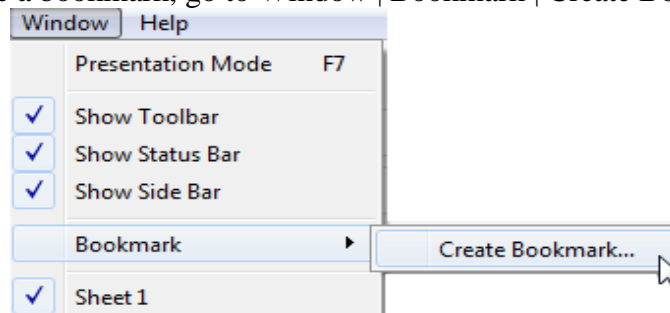
You can undo all the way back to the last time you opened the workbook. You can undo or redo an unlimited number of times.

- Review Bookmarks

Tableau Bookmark

Tableau Bookmark (TBM) can be used to save the individual worksheet of a workbook. It can include data connections and formatting. The major benefit of bookmarks is that they allow two or more developers to work on the same data, where they can then collate their worksheets to a single workbook. Bookmarks can be accessed from any workbook using the Bookmark menu if they are saved in the Tableau repository:

1. To save a bookmark, go to Window | Bookmark | Create Bookmark:

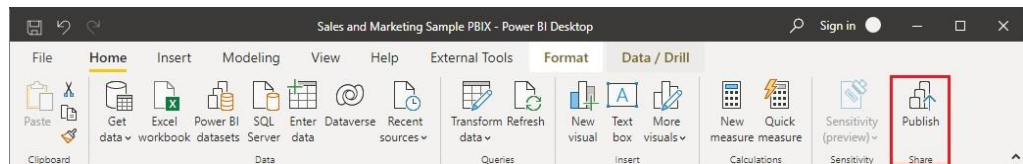


2. To access a bookmark, go to Window | Bookmark and find them listed under the Create Bookmark... option:

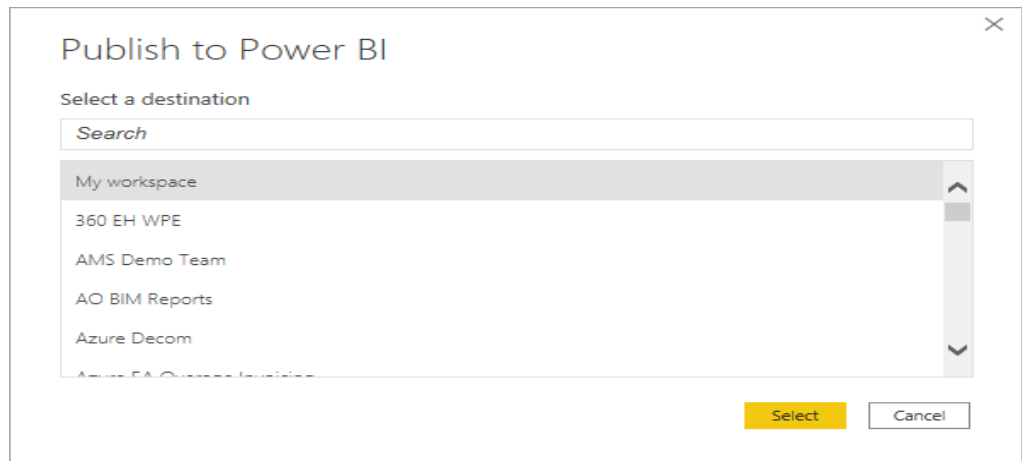
- Publish the report to the Power BI Service

To publish a Power BI Desktop dataset and reports

1. In Power BI Desktop, choose **File > Publish > Publish to Power BI** or select **Publish** on the **Home** ribbon.



2. Sign in to Power BI if you aren't already signed in.
3. Select the destination. You can search your list of available workspaces to find the workspace into which we want to publish. The search box lets you filter our workspaces. Select the workspace, and then click the **Select** button to publish.



When publishing is complete, receive a link to our report. Select the link to open the report in our Power BI site.