



**Fundamentals of  
Data Visualisation  
Training Exercises  
(Tableau)**



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## Exercise 1: Connect to Data Sources

You are able to connect to the following Data sources:

Need not require additional installation of ODBC	May Require Additional installation of ODBC
Excel	MySQL
Tableau Extract	Oracle
Microsoft Access	Microsoft SQL Server
Text File	IBM DB2
Import from Tableau	.... Etc

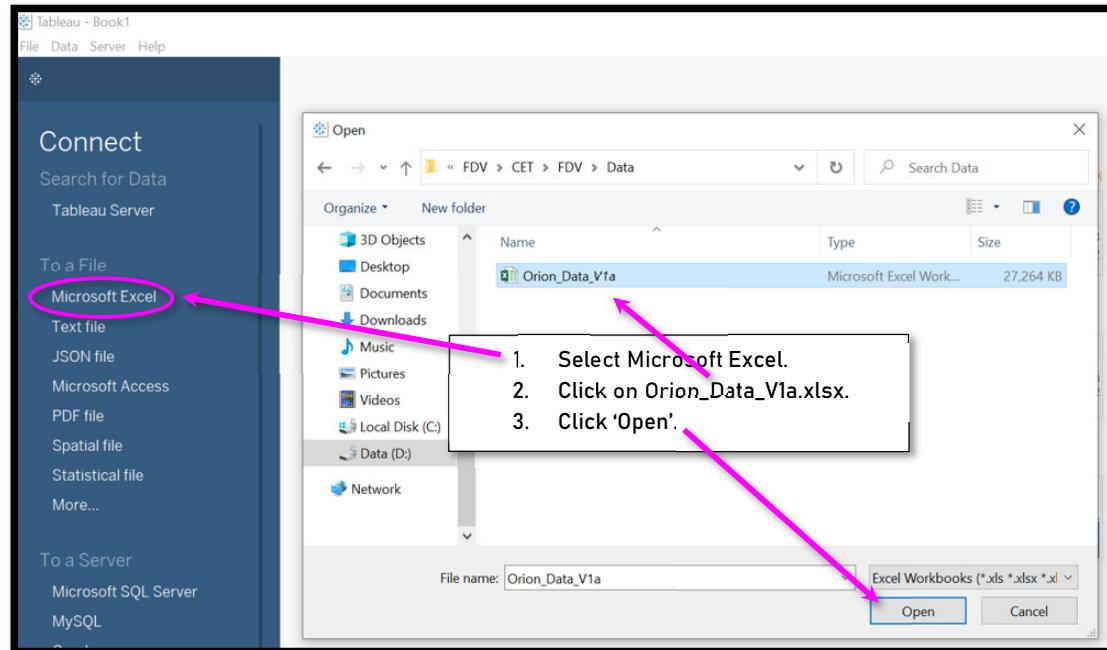
For this course, we will be using the Orion\_Data\_V1a.xlsx as the data source.

CUST_ORDERS	Country_Lookup	Customer	Product
<b>CustomerID</b> EmployeeID Order_Date Delivery_Date Order_ID OrderType <b>Product_ID</b> Quantity Total_Retail_Price CostPrice per Unit	<b>country_key</b> <b>country_name</b>	<b>Customer_ID</b> <b>Customer_Country</b> Customer_Gender Customer_FirstName Customer_LastName Customer_BirthDate Customer_Type Customer_Group	<b>Product_ID</b> Product_Line Product_Group Product_Name Supplier_Country Supplier_Name Supplier_ID

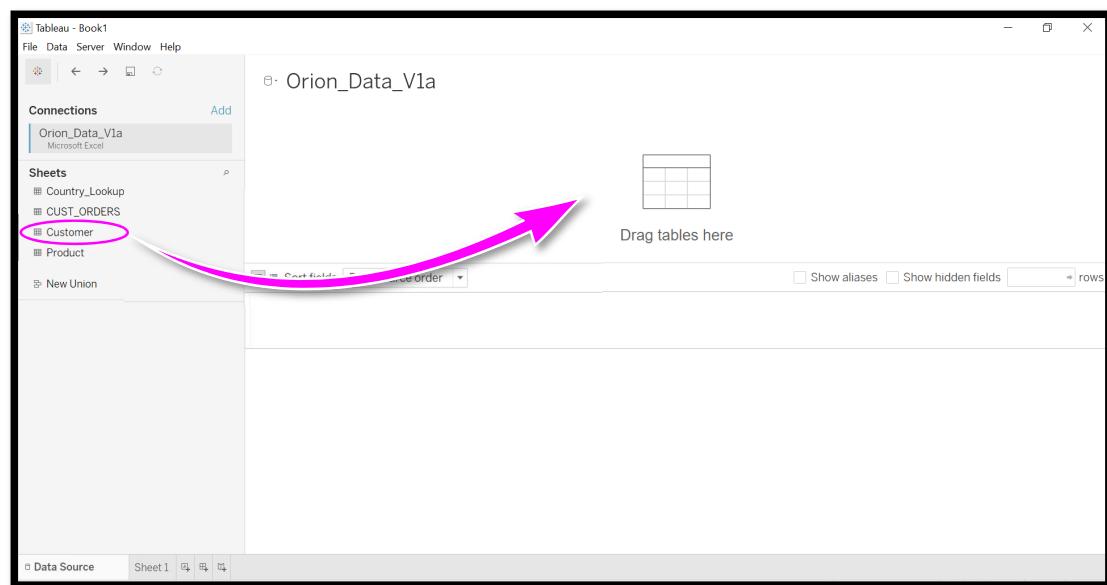


1. Activate the Tableau Software with the product key provided by your course trainer.

2. Select the connection to 'Microsoft Excel' and open the file as below:

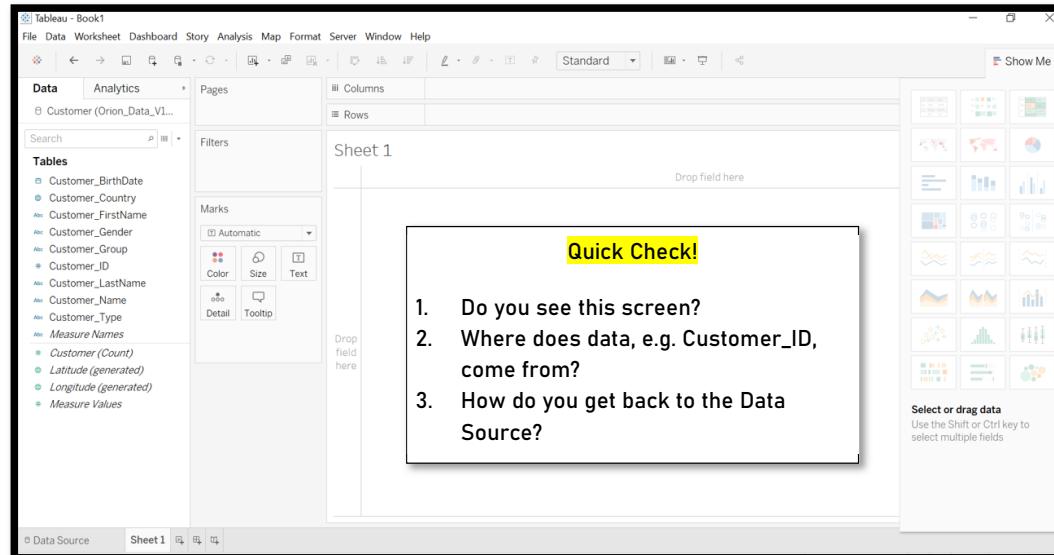
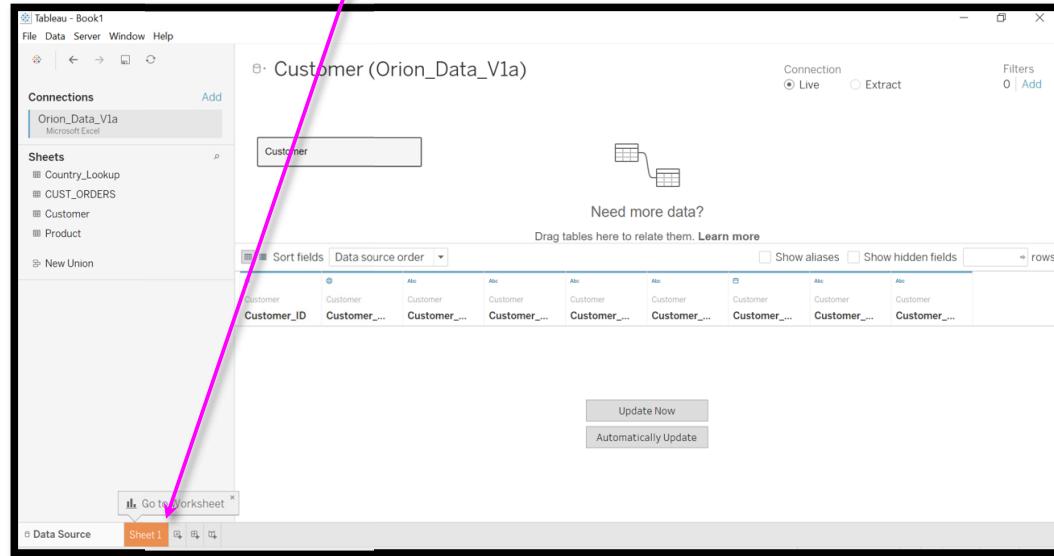


3. Select the Customer sheet and drag it into the space as shown:





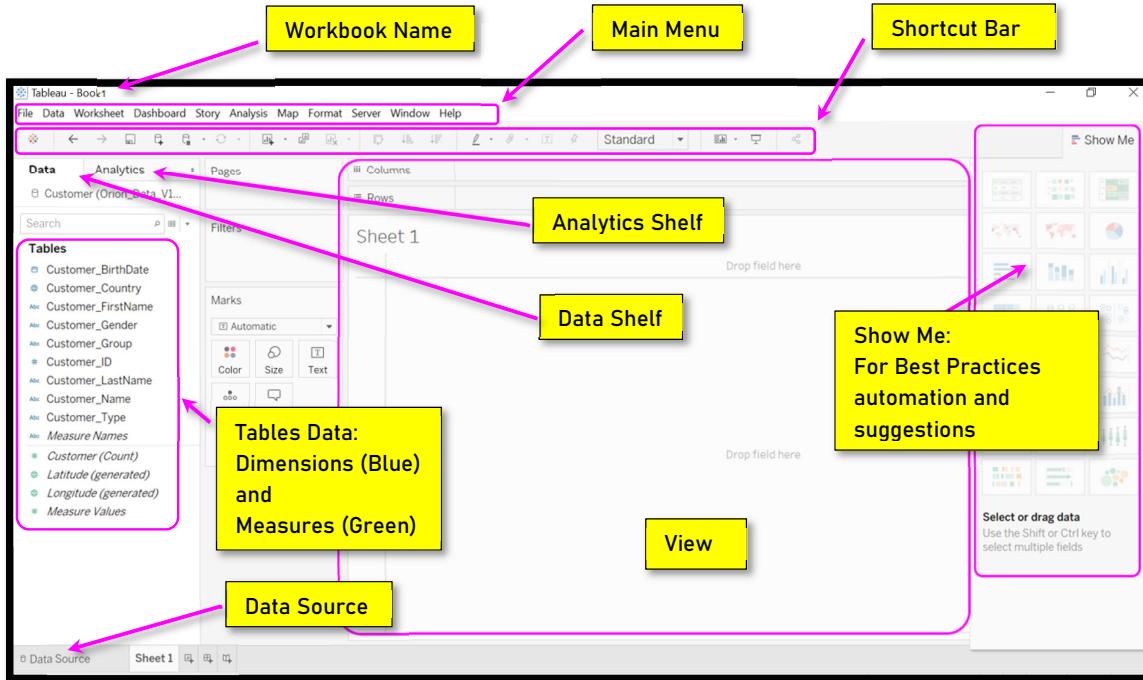
4. You will see the 'Go to Worksheet' prompt. Click on the highlighted 'Sheet1'.





## Exercise 2: Explore the Workspace

### Navigating the Tableau Interface



- *Dimensions* (in Blue) contain qualitative values (such as names, dates, or geographical data). You can use dimensions to categorise, segment, and reveal the details in your data. Dimensions affect the level of detail in the view. Examples include Country name, gender, customer name, etc.
- *Measures* (*Italics* in Green) contain numeric or quantitative values that you can measure and count. Measures can be aggregated. When you drag a measure into the view, Tableau applies an aggregation to that measure (by default). An example is the Customer (Count) which aggregates the total number of customers.



## Exercise 3: Tabulate the Data

Any visualization (aka viz) created in Tableau is known as a view. Before creating a viz, start with a business question, i.e. what do you want to know from the data? The viz created should help to answer the question visually.

### Exercise 3a: Creating the Table View

1. Select the 'Customer\_Gender' from the Dimension Shelf and drag into Rows.
2. Select the *Customer (Count)* and drag into Sheet 1 - Abc column.

The screenshot shows the Tableau desktop application. On the left, the 'Tables' shelf lists various dimensions and measures, including 'Customer\_Gender' and 'Customer (Count)'. A pink arrow labeled '(1)' points from the 'Customer\_Gender' entry to the 'Rows' shelf at the top, where it is selected. Another pink arrow labeled '(2)' points from the 'Customer (Count)' entry in the 'Tables' shelf to the 'Marks' card, specifically to the 'Text' icon, indicating it is being dragged into the 'Abc' column of the worksheet.

3. You should see the screen as follows:

The screenshot shows the Tableau desktop application after the steps have been completed. The 'Tables' shelf remains the same. The 'Marks' card now shows 'Text' selected. The 'Sheet 1' area displays a single horizontal bar chart with two segments. The first segment, corresponding to 'F', has a value of 33. The second segment, corresponding to 'M', has a value of 52. The text 'CNT(Customer)' is displayed below the bars. The status bar at the bottom of the interface shows '2 marks' and 'SUM of CNT(Customer): 85'.



## Change the Name of the Worksheet

1. Right-click on 'Sheet 1' tab. (Note: You can also double-click on the 'Sheet 1' tab).
2. Click on 'Rename' and change the name to 'Ex. 3a - Breakdown of Customers by Gender'.

A screenshot of the Tableau interface. The 'Sheet 1' tab is selected at the bottom left. A context menu is open over the tab, with the 'Rename' option highlighted. A pink arrow points from the text 'a. Right-click on Sheet 1.' to the 'Rename' option in the menu. Another pink arrow points from the text 'b. Click on \'Rename\'.' to the same option. To the right of the menu, a callout box contains these two steps. The main workspace shows a simple data view with 'Customer\_Gender' in the Rows shelf and 'Customer' in the Columns shelf. The data table shows F: 33 and M: 52.

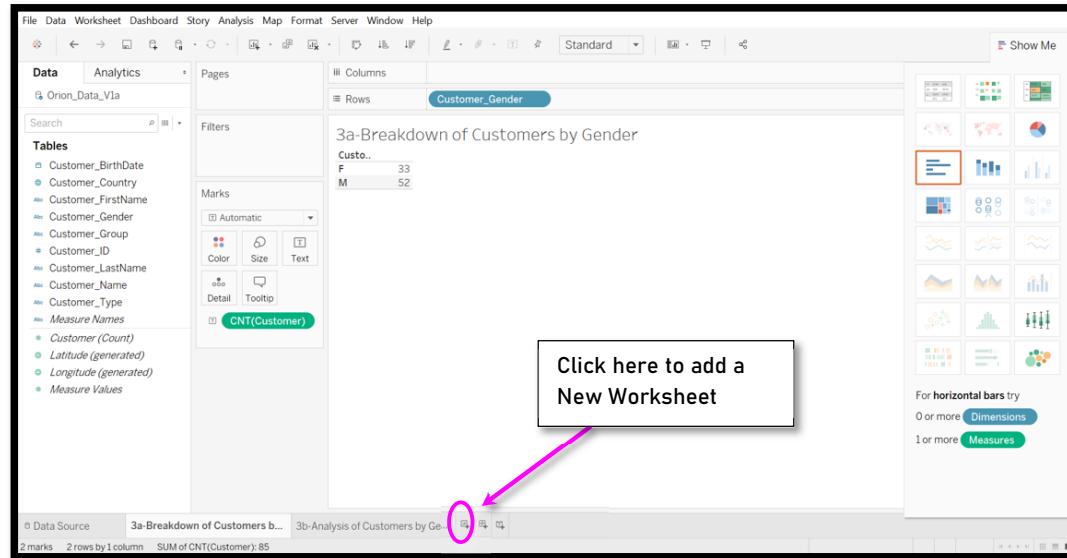
Note that the worksheet title has also changed accordingly.

A screenshot of the Tableau interface showing the result of renaming. The 'Sheet 1' tab has been renamed to '3a-Breakdown of Customers by Gender'. A pink circle highlights this new tab name. A pink arrow points from the text 'Note that the worksheet title has also changed accordingly.' to the renamed tab. The workspace shows the same data structure as before, with 'Customer\_Gender' in the Rows shelf and 'Customer' in the Columns shelf, displaying the same data: F: 33 and M: 52.



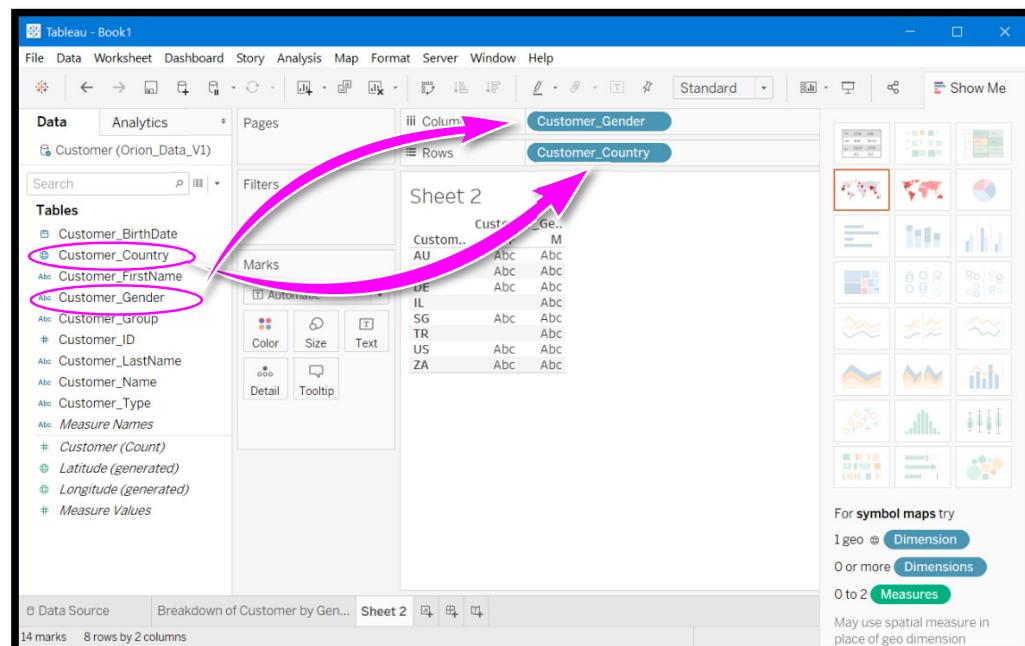
## Exercise 3b: Table Representation

1. Add another worksheet by clicking on the  icon at the bottom tab.



The screenshot shows the Tableau interface with two worksheets visible: "3a-Breakdown of Customers by Gender" and "3b-Analysis of Customers by Ge...". A callout box with a pink arrow points to the "New Worksheet" icon (a plus sign inside a square) located at the bottom of the tabs. A tooltip box says "Click here to add a New Worksheet". The right side of the interface shows the "Show Me" feature with various visualization options.

2. Drag the 'Customer\_Gender' from the Dimension Shelf into the Columns.
3. Drag the 'Customer\_Country' into the Rows.



The screenshot shows the Tableau interface with a new worksheet titled "Sheet 2". A pink arrow points from the "Customer\_Gender" dimension in the dimension shelf to the "Columns" shelf. Another pink arrow points from the "Customer\_Country" dimension in the dimension shelf to the "Rows" shelf. The data in the sheet is as follows:

Customer_Country	Customer_Gender	Ge..
AU	Abc	Abc
DE	Abc	Abc
IL	Abc	Abc
SG	Abc	Abc
TR	Abc	Abc
US	Abc	Abc
ZA	Abc	Abc



4. Select the '*Customer (Count)*' and drag it to the Abc columns under the F and M.

The screenshot shows the Tableau Data Editor interface. On the left, the 'Tables' pane lists various dimensions and measures, including 'Customer (Count)' which is circled in pink. In the center, the 'Marks' card shows a table with columns 'Customer\_Gender' (F and M) and rows for countries AU, CA, DE, IL, SG, TR, US, and ZA. The data values are all 'Abc'. A large pink arrow points from the circled 'Customer (Count)' measure in the 'Tables' pane to the 'Customer\_Gender' column in the 'Marks' card.

Customer_Gender	F	M
AU	Abc	Abc
CA	Abc	Abc
DE	Abc	Abc
IL		Abc
SG	Abc	Abc
TR		Abc
US	Abc	Abc
ZA	Abc	Abc

5. Name the worksheet as 'Ex. 3b - Analysis of Customers by Gender by Country'.

6. You should see the following:

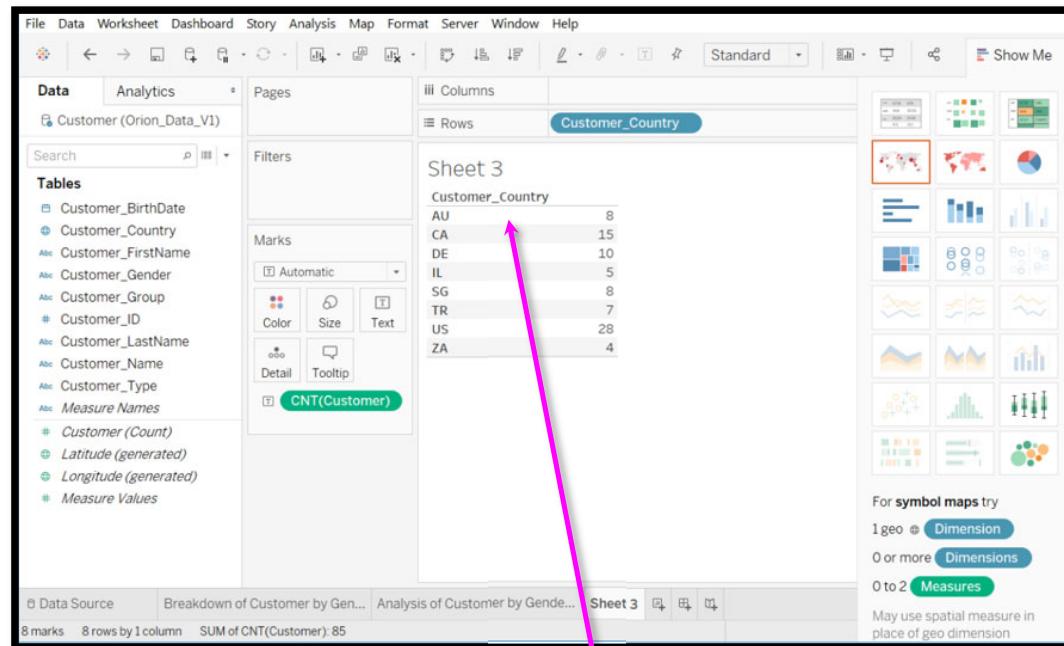
The screenshot shows the final Tableau visualization titled '3b-Analysis of Customers by Gender by Country'. The visualization is displayed in the 'Standard' view. It features a table with columns 'Customer\_Gender' (F and M) and rows for countries AU, CA, DE, IL, SG, TR, US, and ZA. The data values are 3, 5, 8, 7, 3, 7, 13, 15, and 3, 1 respectively. The 'Show Me' panel on the right shows various chart and map options. The status bar at the bottom indicates '14 marks' and '8 rows by 2 columns'.

Customer_Gender	F	M
AU	3	5
CA	8	7
DE	3	7
IL		5
SG	3	5
TR		7
US	13	15
ZA	3	1



## Exercise 4: Create Table and World Map

1. Add a new worksheet and generate a table that will show the number of customers by country as shown below.



2. Drag the column so that the field label "Customer\_Country" is shown in full.
3. Name the worksheet as 'Ex. 4 - Breakdown of Customers by Country'.

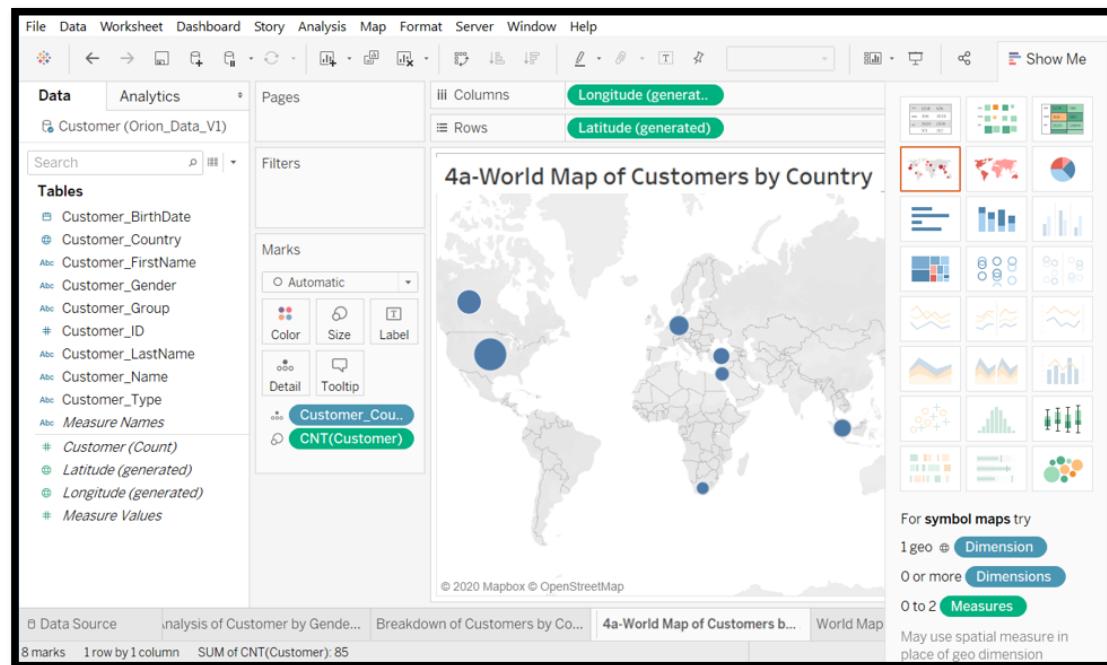
**Hint:**

- a) Drag the Customer\_Country dimension to the Rows.
- b) Drag the Customer (Count) measure into the ABC column.



## Challenge Exercise 4a: World Map

- Duplicate the worksheet from Exercise 4 and use the World Map to represent the table instead as shown below.



- Name the worksheet as 'Ex. 4a - World Map of Customers by Country'.
- What are the advantages and disadvantages of using a World Map to represent the data?




## Challenge Exercise 4b: Additional World Map Enhancements

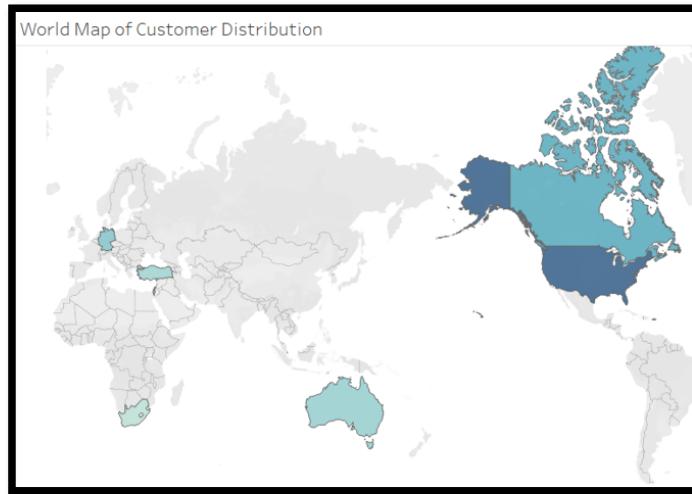
1. Increase or decrease the size of all the bubbles evenly for better visualisation of the data.



2. What happens if you increase the size of the bubbles too much?


(Hint: Use Size in the Marks card.)

3. Duplicate and use the other World Map feature in Show Me. Is the visualisation better or worse?



Is the visualisation better or worse?




## Exercise 5: Generate a Tabular Report

1. Add a new worksheet and create a tabular report showing the breakdown of Customer Type against Countries.
2. Name the worksheet as 'Ex. 5 - Breakdown of Customer Type by Country'.

Custo..	Customer_Type						
	Internet/ Catalog Customers	Orion Club Gold members high activity	Orion Club Gold members low activity	Orion Club Gold members medium activity	Orion Club members high activity	Orion Club members low activity	Orion Club members medium activity
	AU	1			1	2	2
CA	1	1	2		2	3	6
DE	1	3	1	1	1	2	1
IL	1	1			2		1
SG	2	1	1		2		2
TR		1			2	4	
US	4	3	1	4	2	6	8
ZA		1	1				2

### Hints:

- a) Drag the 'Customer\_Country' dimension to Rows.
- b) Drag the 'Customer\_Type' dimension to Columns.
- c) Drag the 'Customer (Count)' measure into the Abc columns under 'Customer\_Type'.



## Challenge Exercise 5a: Highlight Table

1. Duplicate the worksheet from the above exercise and use the Highlight Table  in Show Me to represent the report generated.
2. What are the advantages and disadvantages of using a Highlight Table to represent the data? In what situations will this come in useful or not useful?


3. Name the worksheet as "Ex. 5a - Highlight Table of Customer Type by Country".

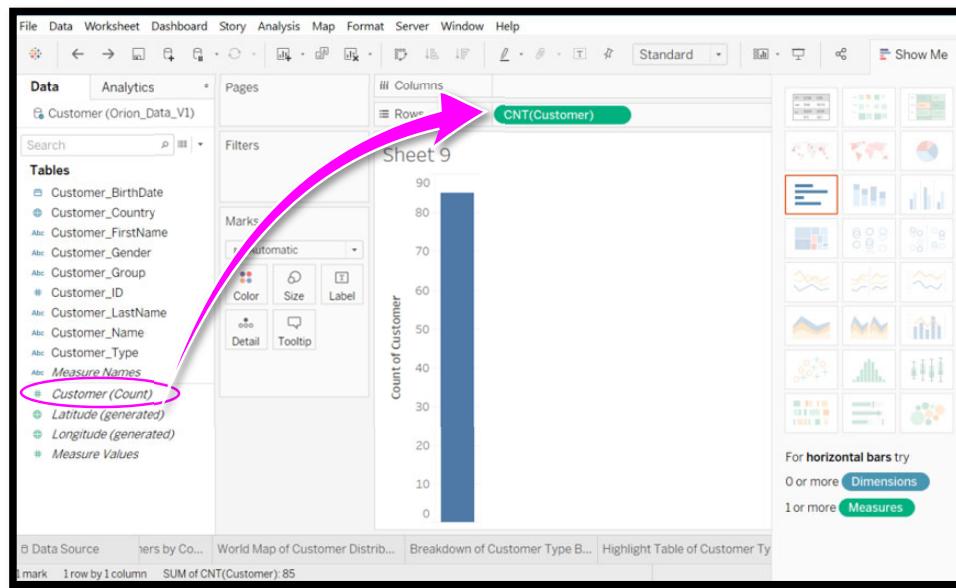
Customer Type	Customer Country							
	AU	CA	DE	IL	SG	TR	US	ZA
Internet/Catalog Customers	1	1	1	1	2		4	
Orion Club Gold members high activity		1	3	1	1	1	3	1
Orion Club Gold members low activity	2		1		1		1	1
Orion Club Gold members medium acti...	1			1			4	
Orion Club members high activity	2	2	1	2	2	2	2	
Orion Club members low activity	2	3	2			4	6	
Orion Club members medium activity	2	6	1	1	2		8	2

Note: Remember to click on the 'SAVE' button to save your work regularly.

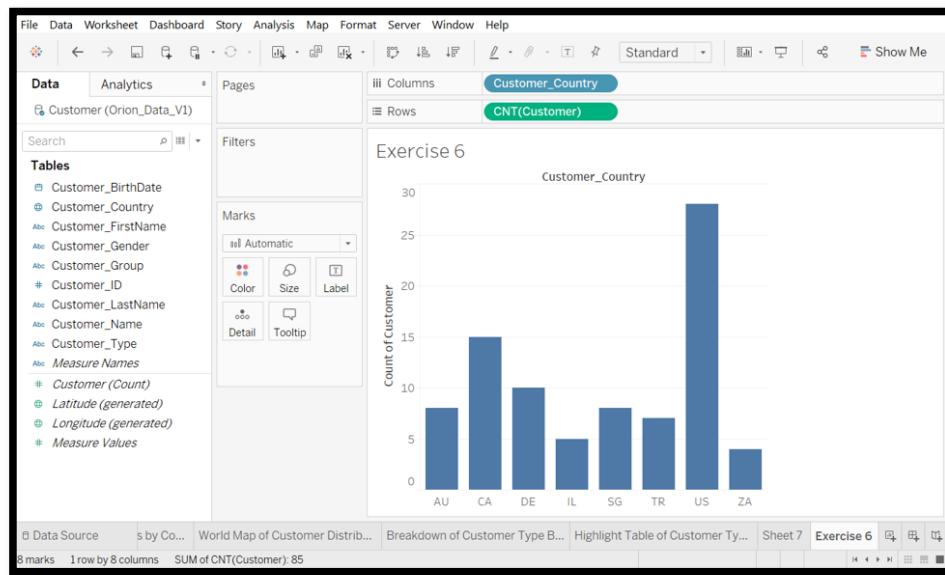


## Exercise 6: Generate a Visual Report using a Bar Chart

1. Add a new worksheet.
2. Select the *Customer (Count)* from the Measure Shelf and drag it to Rows.

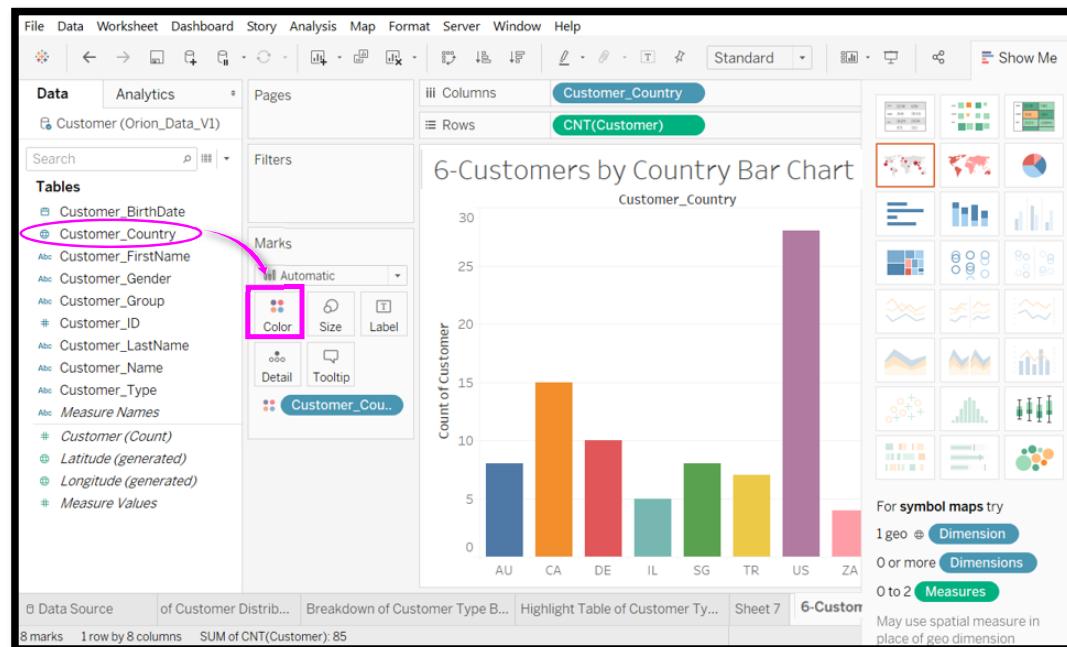


3. Select the Customer\_Country and drag it to Columns. You should get the following:

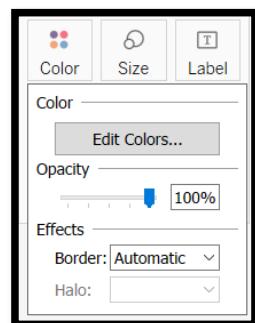




4. Change the colour of the individual bar by selecting the 'Customer\_Country' from 'Dimension' Shelf and dropping it into 'Color' in the Marks card. You will get individual colours for the different countries as shown below:



5. Explore how to change the colour of the bars by double-clicking on the Color box.

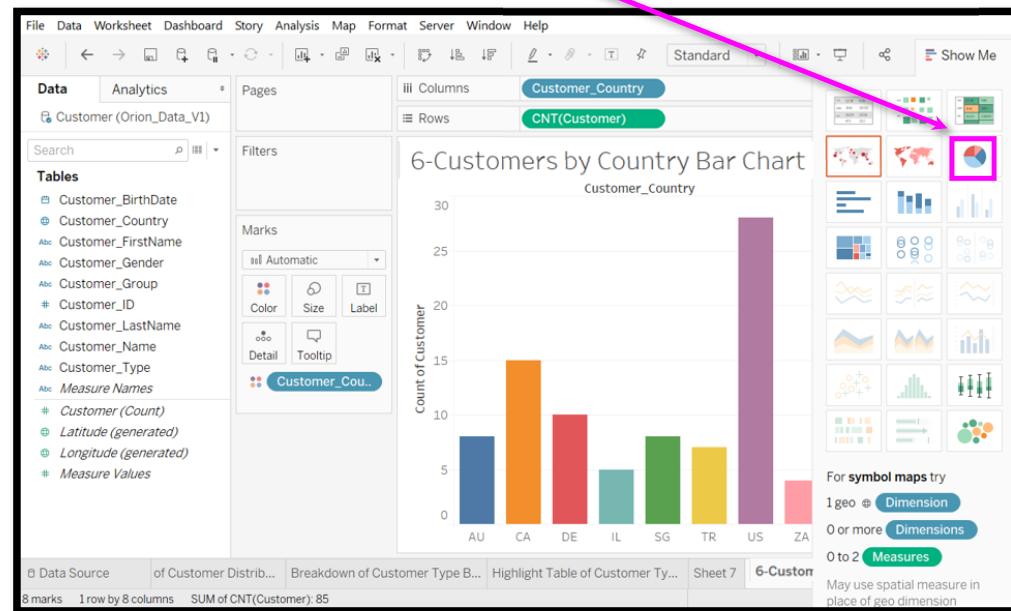


6. Name the worksheet as 'Ex. 6 - Customers by Country Bar Chart'.  
Is this a good visualisation? Why or why not?

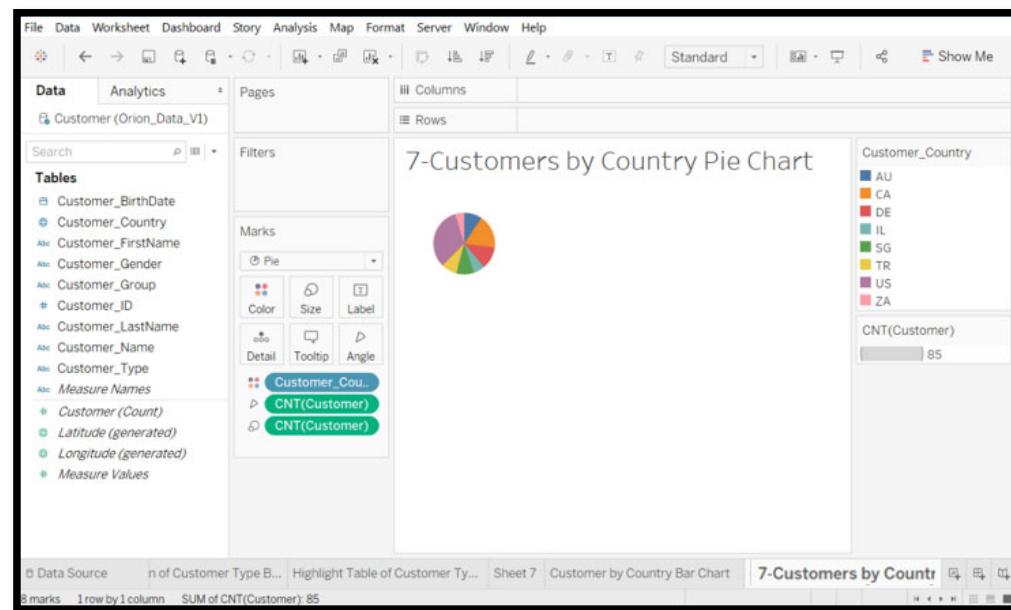



## Exercise 7: Generate other Visual Reports

1. Make a duplicate of the worksheet in Exercise 6.
2. Click on the Pie Chart icon in the 'Show Me' menu as shown:



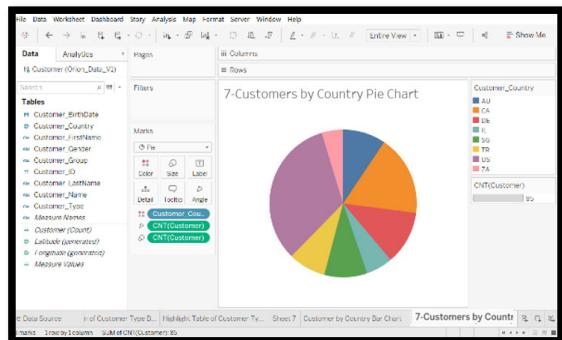
3. Name the worksheet as 'Ex. 7 - Customers by Country Pie Chart'.





## Challenge Exercise 7a: Change the Pie Chart Sizes and Labels

1. Increase or decrease the size of the Pie Chart to fit into the page for better visualisation of the data.

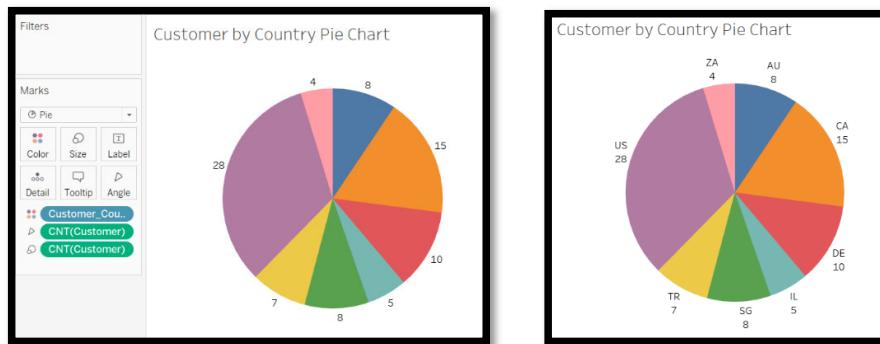


What happens when you make the Pie Chart too large?

How do you fit the whole Pie Chart into the sheet?

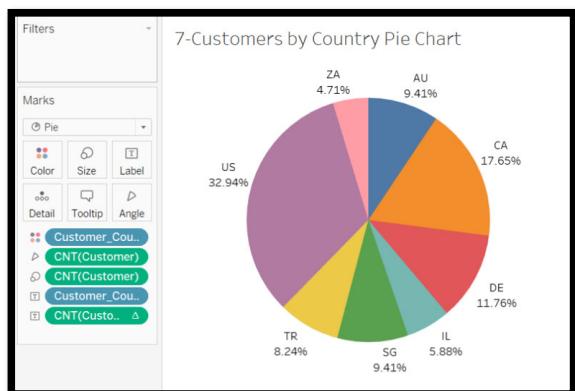
Hint: Change 'Standard View' to 'Entire View' in the Menu Bar.

2. Add the actual values to the various segments of the Pie Chart.



3. Add the names of the countries to the various segments of Pie Chart.

4. Instead of the actual values, change it to a Percentage of the Table.



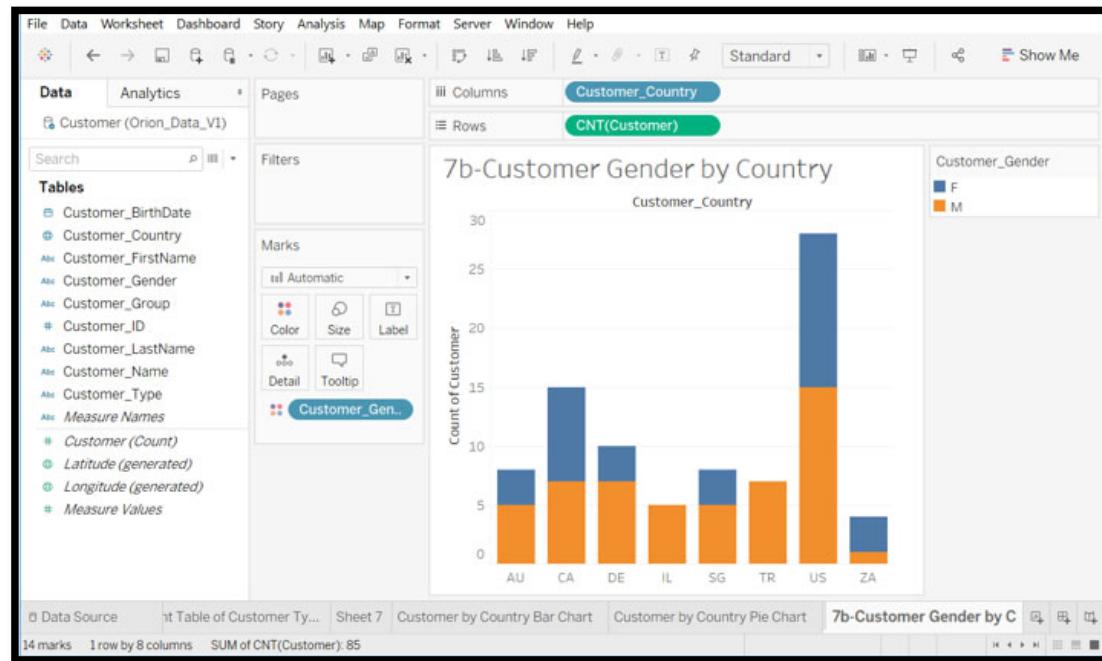
Hint:

Check out 'Analysis' available at the top of the screen.



## Challenge Exercise 7b: Create Stacked Bar Chart

1. Start with a new worksheet.
2. Create a Stacked Bar Chart as follows on Customer Gender by Country:

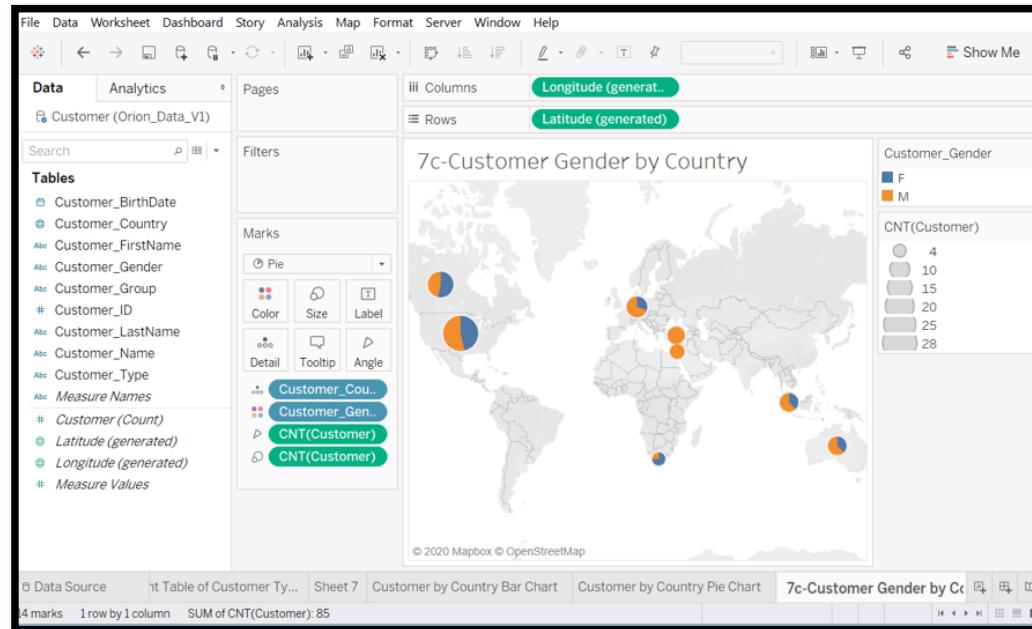


3. What are the advantages and disadvantages of a Stacked Bar Chart?  
What immediate inferences can you derive from the chart above?




## Challenge Exercise 7c: Add Pie Chart inside a World Map

1. Plot the distribution of Customer\_Gender on a World Map as follows:



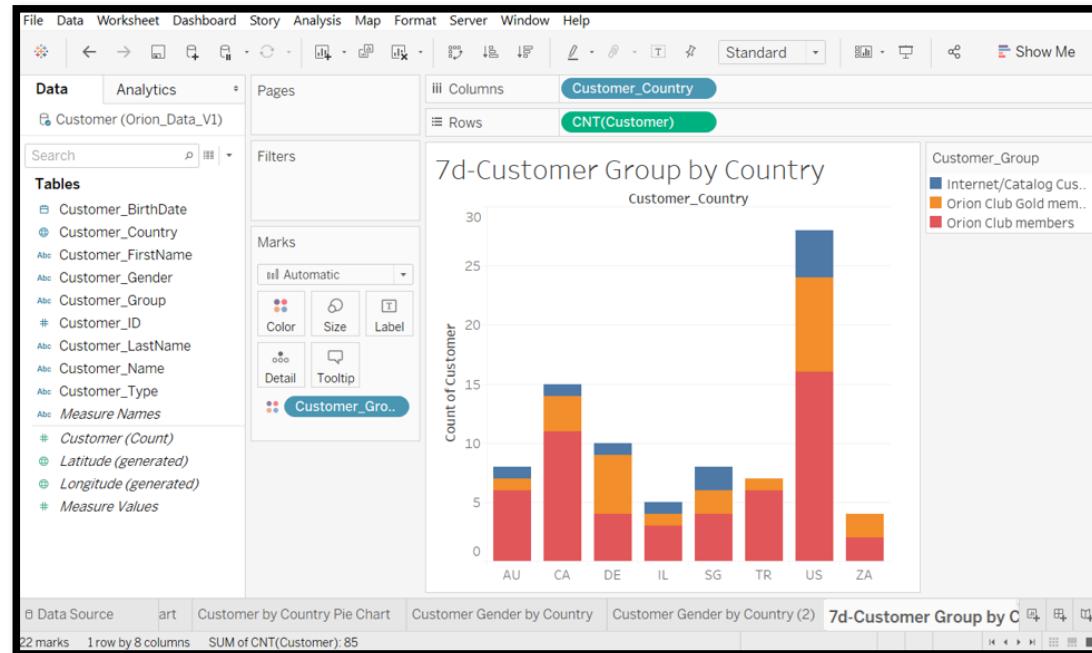
2. Can you think of situations where you would want to use a Pie Chart on a World Map?


(Hint: Example: Covid-19 Total infections vs. Death/Recovery.)



## Challenge Exercise 7d: Analyse using Stacked Bar Chart

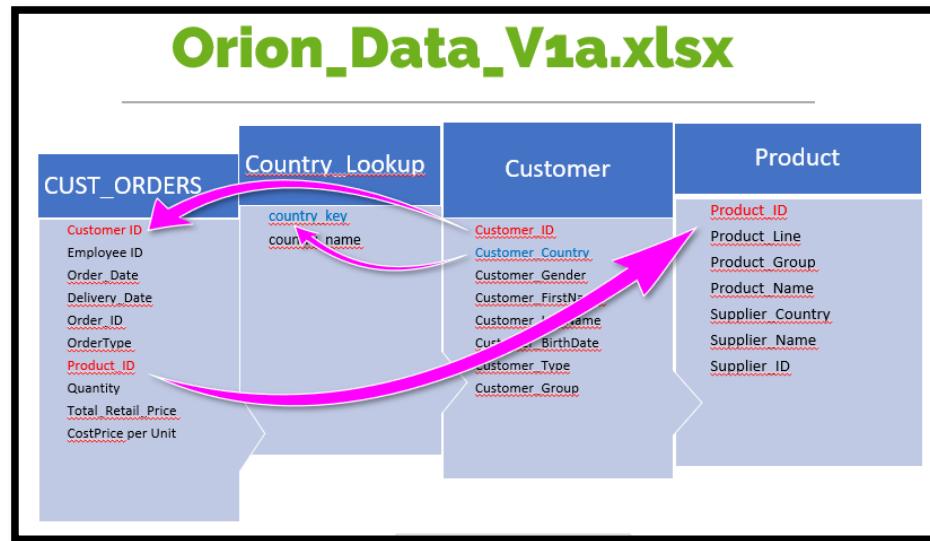
- Instead of 'Customer\_Gender', create a Stacked Bar on the Count of Customer Group by Country as below:



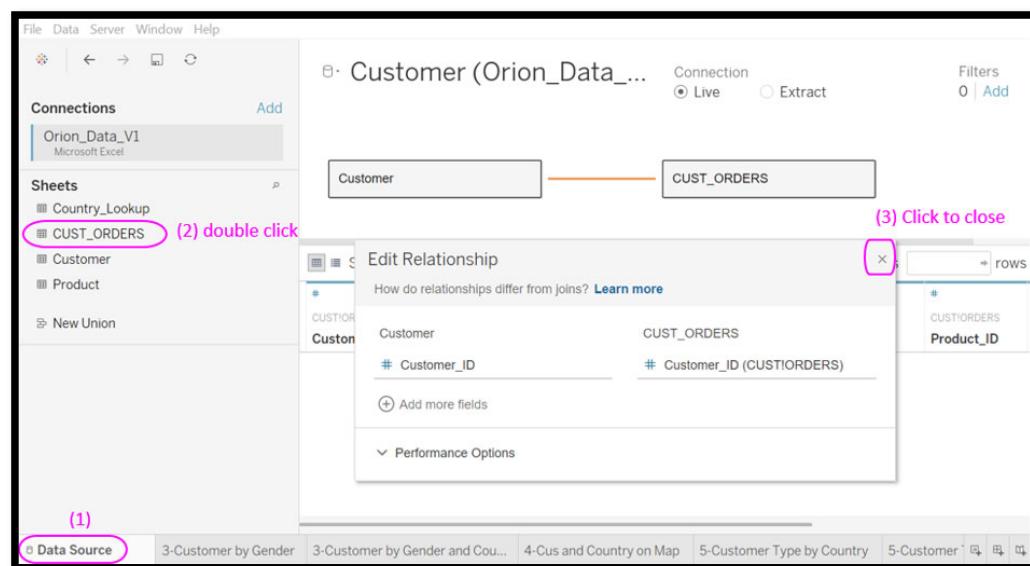
- What immediate inferences can you derive from the chart?




## Exercise 8: Add New Data Sources via Relationships

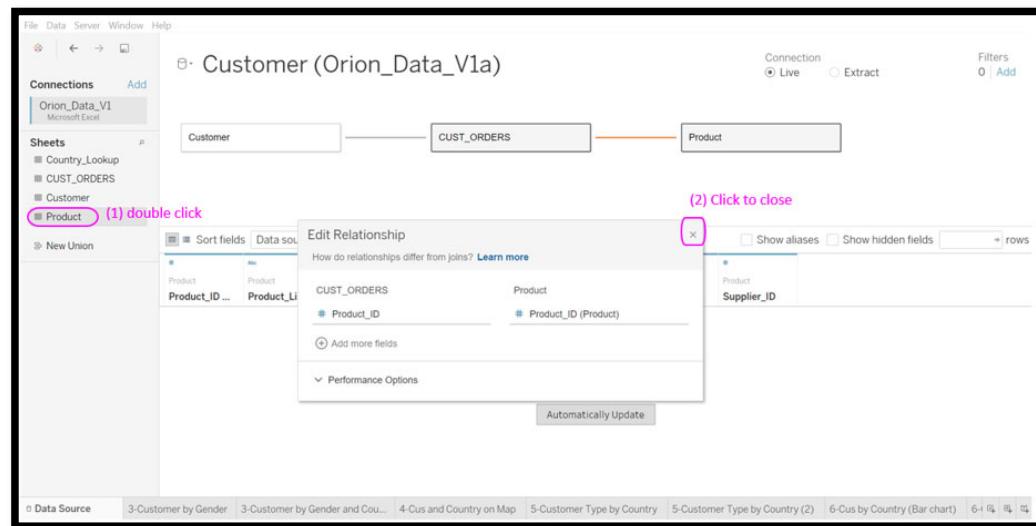


1. At the bottom left, click on “Data Source”.
2. Double-click on the CUST\_ORDERS sheet. Tableau will suggest a relationship between Customer and CUST\_ORDERS based on matching field names and existing key constraints. You can overwrite or add more fields to establish the relationship, if required.
3. Accept the suggested relationship field ‘Customer\_ID’ by closing the ‘Edit Relationship’ window.

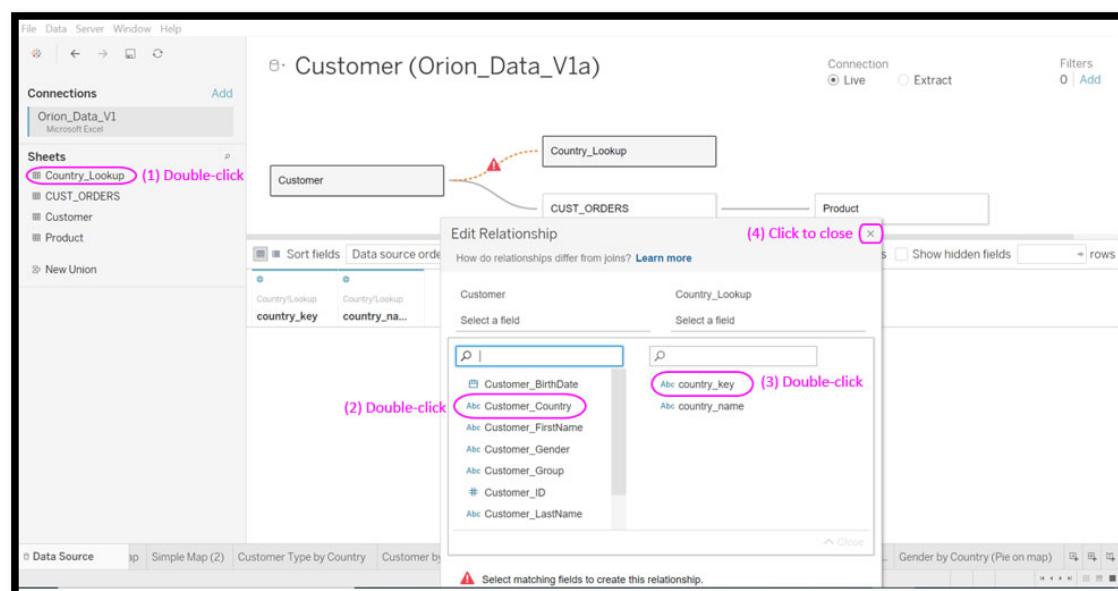




4. Double-click on the Product sheet and accept the suggested relationship field 'Product\_ID' by closing the 'Edit Relationship' window.

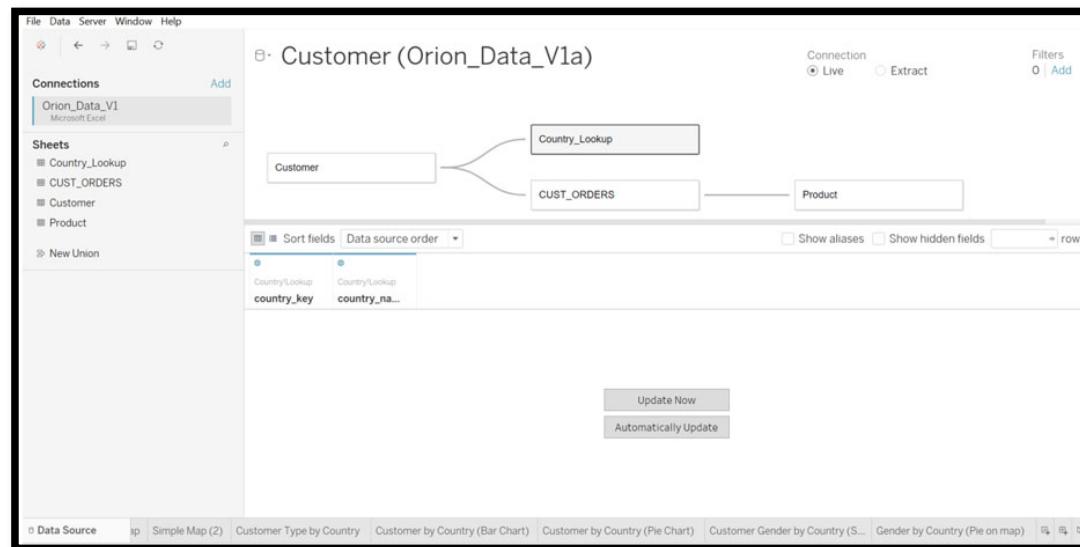


5. Perform the following steps to include the Country\_Lookup sheet.
- Step 1: Double-click on the Country\_Lookup sheet.
  - Step 2: In the 'Edit Relationship' dialogue box, double-click to select 'Customer\_Country' under Customer.
  - Step 3: Under Country\_Lookup, double-click to select 'Country\_Key' to form the relationship between the 2 tables.
  - Step 4: Click to close the 'Edit Relationship' dialogue box.





6. The current set of relationships between the 4 tables are defined as shown below:

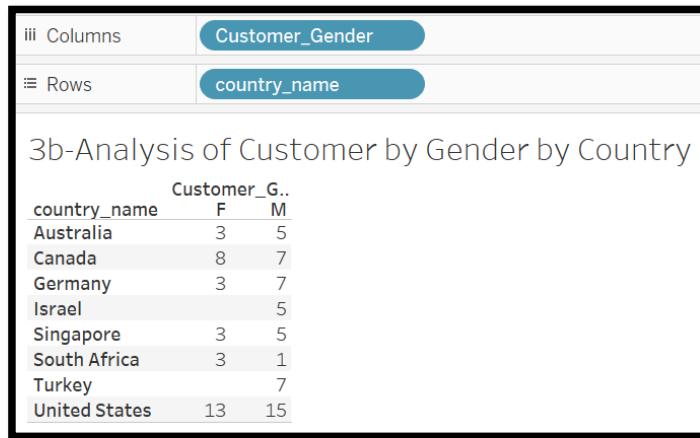


7. Add a new sheet. Now, you will see 4 tables added to the Data pane. Save your file.

The screenshot shows the Tableau Data pane. On the left, under 'Tables', there are four entries: 'Country\_Lookup', 'CUST\_ORDERS', 'Customer', and 'Product'. The 'CUST\_ORDERS' entry is highlighted with a pink rectangle. The main workspace is titled 'Sheet 10' and contains a 'Marks' card with options for 'Automatic', 'Color', 'Size', and 'Text'. There are two 'Drop field here' areas on the right side of the workspace.



8. Repeat Exercise 3b. In this case, use 'Country Name' from the 'Country\_Lookup' instead of from 'Customer'. Observe the difference between the two charts.



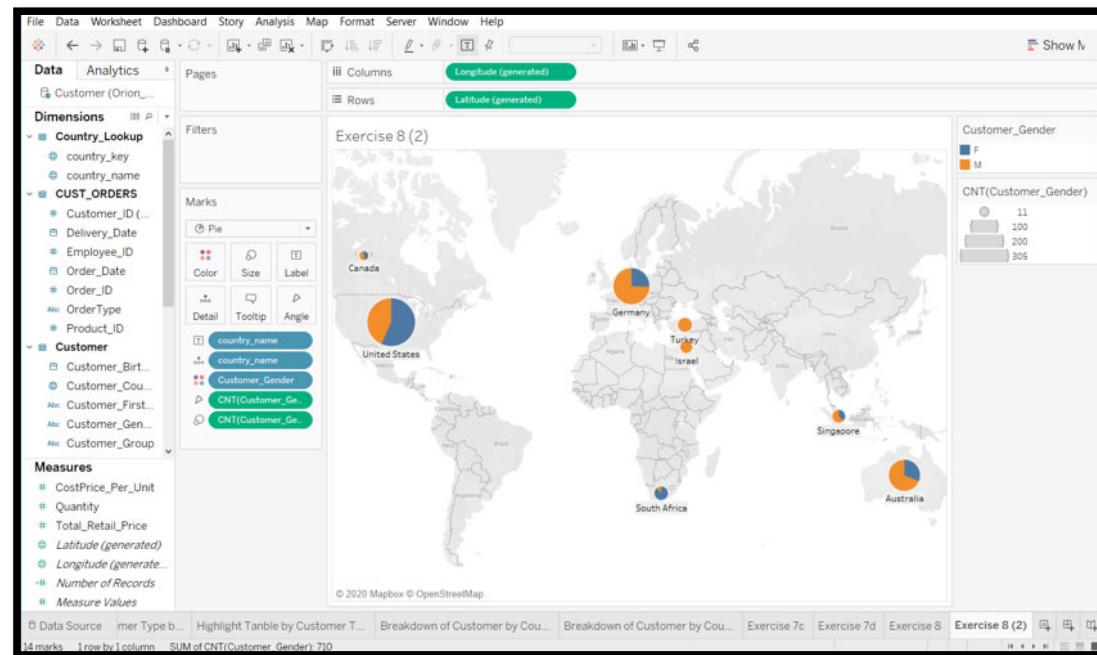
The screenshot shows a Tableau data source interface. At the top, there are two buttons: 'Columns' containing 'Customer\_Gender' and 'Rows' containing 'country\_name'. Below this, the title '3b-Analysis of Customer by Gender by Country' is displayed. The data table has three columns: 'country\_name', 'Customer\_G..', 'F', and 'M'. The data rows are:

country_name	Customer_G..	F	M
Australia		3	5
Canada		8	7
Germany		3	7
Israel			5
Singapore		3	5
South Africa		3	1
Turkey			7
United States		13	15



## Challenge Exercise 8a: Update World Map with Country Labels

1. Make a duplicate of the worksheet created in Exercise 7c.
2. Plot the distribution of Customer Gender on a World Map as follows, with the country name in full:



### Hints:

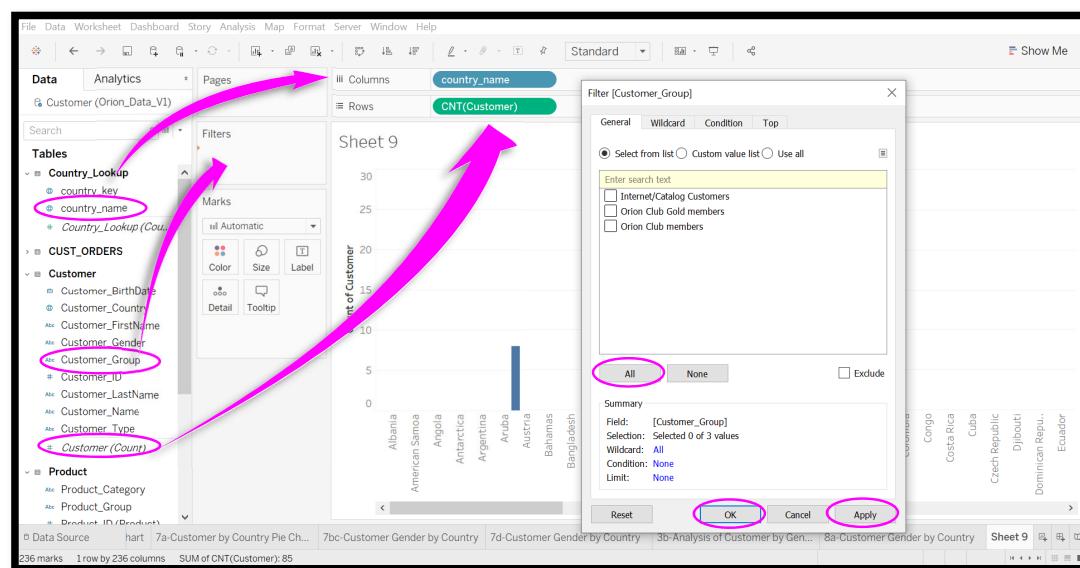
1. Click on the World Map icon in the Show Me panel to create the World Map.
2. Use the Size function to change the sizes of the Pie Charts.
3. Drag the Country Name (from the Country\_Lookup) to the Label function in the Marks card.



## Exercise 9: Use of Filters

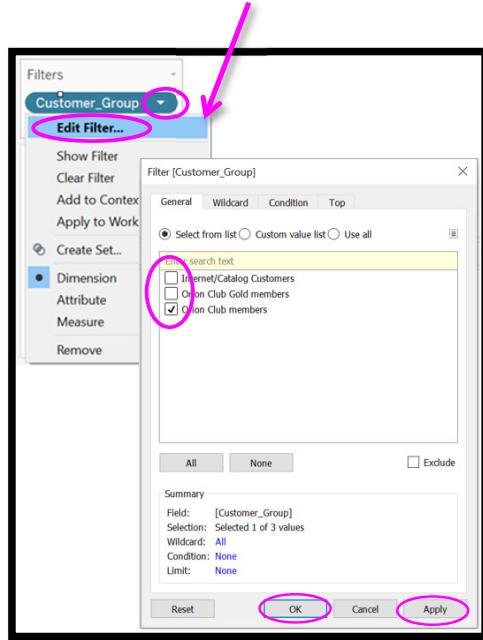
The purpose of filtering is to create a view comprising of a subset of the data that is relevant to the user.

1. Add a new worksheet.
2. Drag the 'Country Name' from the Country\_Lookup table into the Columns.
3. Drag the 'Customer (Count)' from the Customer table into the Rows.
4. Drag the 'Customer\_Group' from the Customer table into the Filters Shelf.
5. Click the 'All' button to select all the values in the 'Filter [Customer\_Group]' dialogue box, click "Apply" and then 'OK'.

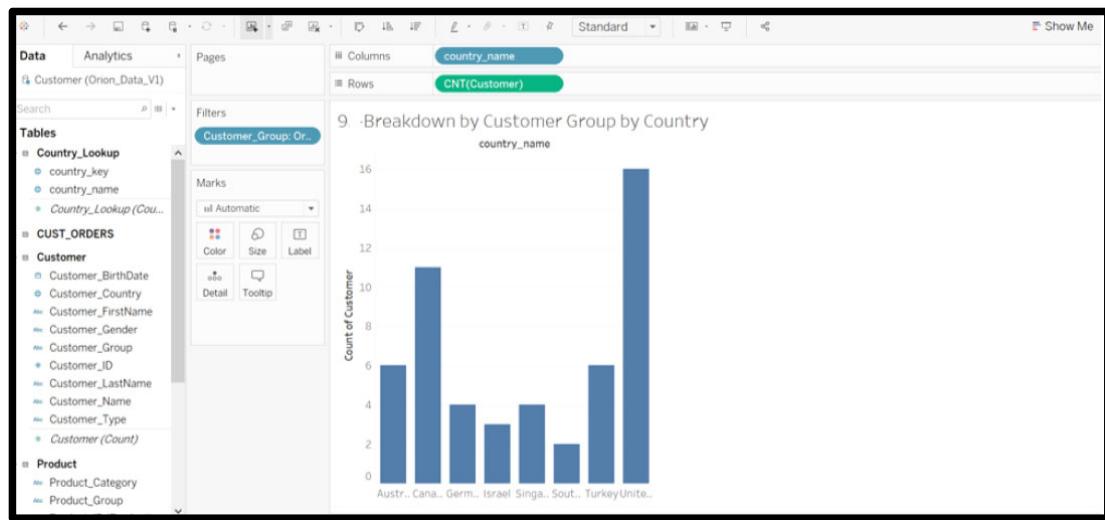




6. You can edit the Filter to select a subset of Customer\_Group of your choice (e.g. 'Orion Club members' or any combination of choices) for your viz by clicking on the down arrow and then selecting Edit Filter.



7. If you have filtered for 'Orion Club members' only, your viz will look as follows:

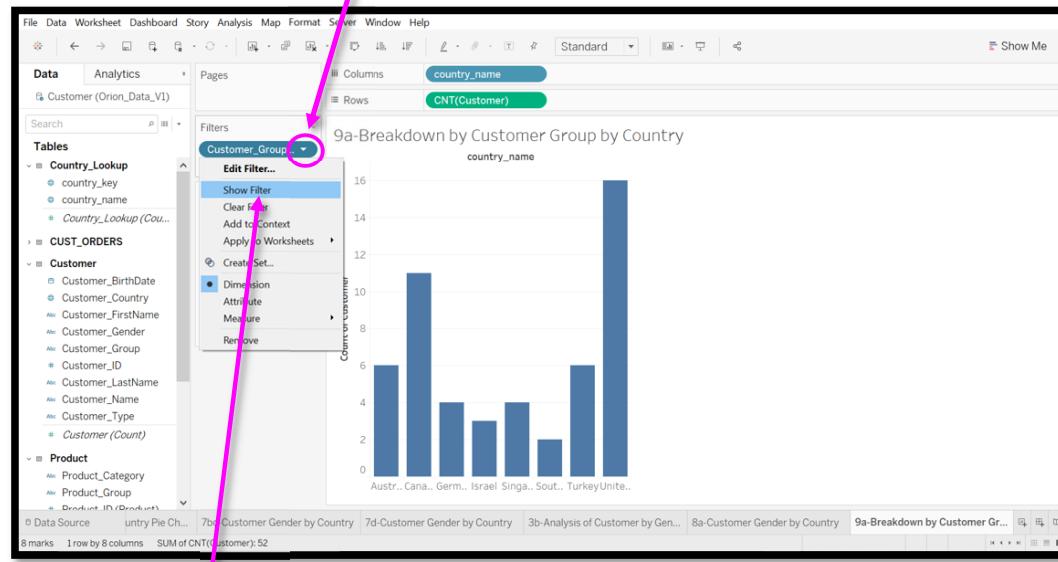


8. Name the worksheet as 'Ex. 9 - Breakdown by Order Type by Country'.

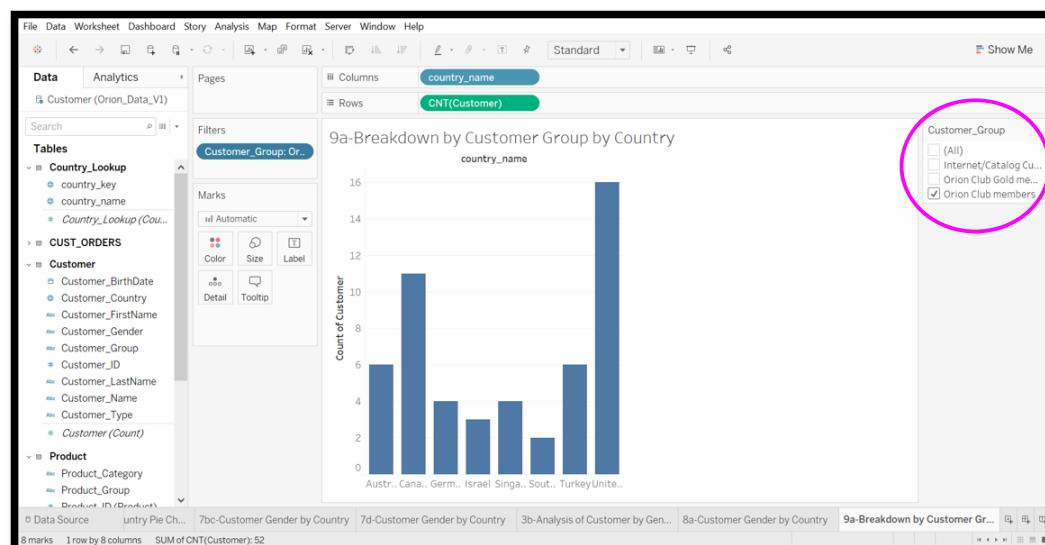


## Exercise 9a: Show Filter for Interactivity

1. Duplicate the worksheet created from Exercise 9.
2. Right-click on 'Customer\_Group' or click on the down arrow as below:

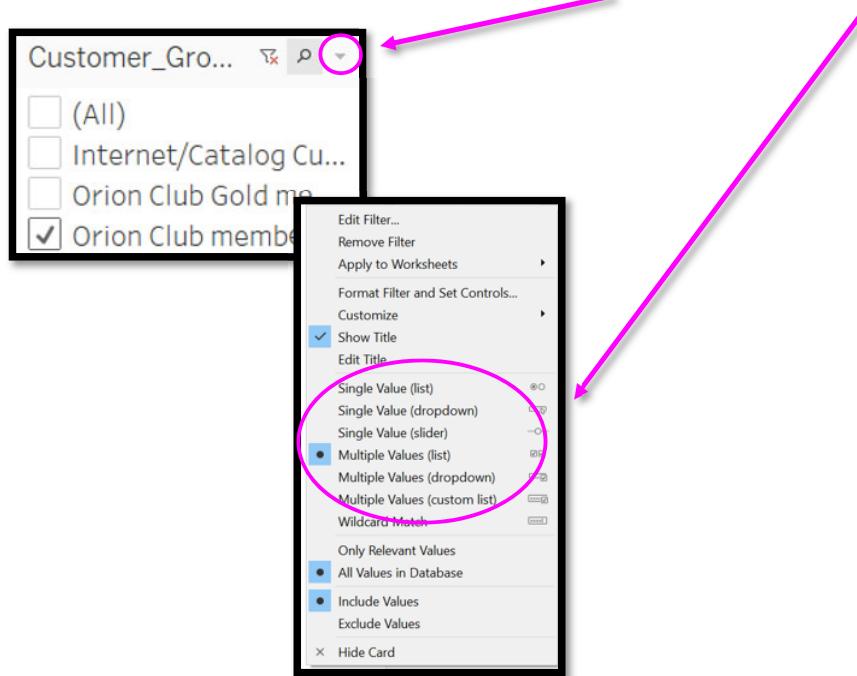


3. Click on 'Show Filter' to select this option.
4. The interactive selection panel is now shown on the right-hand side of the worksheet as shown:  
[ Hint: Turn off the 'Show Me' panel.]





5. To change the filter selection option, click on the down arrow for the option menu.





## Challenge Exercise 9b: Use Multiple Filters

- Continuing from Exercise 9a, display the Filters for BOTH the 'Country Name' and the 'Customer Group' on the right-hand side as follows:

The screenshot shows a Tableau dashboard with a bar chart titled "9c-Breakdown by Customer Group by Country". The chart displays the "Count of Customer" for various countries. The data is as follows:

Country	Count of Customer
Austr...	6
Cana...	11
Germ...	4
Israel	3
Singa...	4
Sout...	2
Turkey	6
Unite...	16

The "country\_name" filter is set to include Australia, Canada, Germany, Israel, Singapore, South Africa, Turkey, and United States. The "Customer\_Group" filter is set to include Internet/Catalog Customers, Orion Club Gold members, and Orion Club members.

**Hints:**

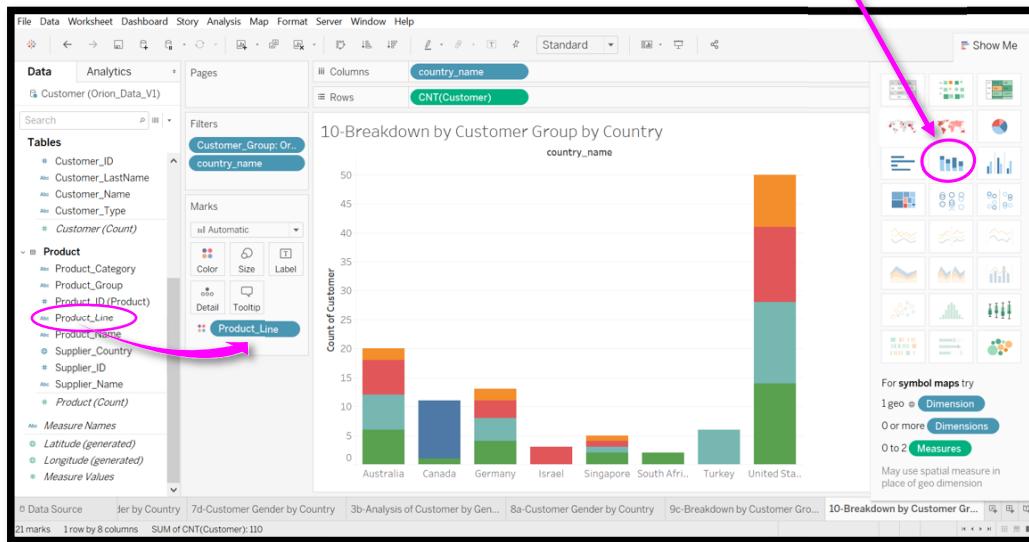
Remember to enable 'Show Filter'.  
Edit the filter configuration to 'Only Relevant Values' option.



## Exercise 10: Use the Keep Only Function

The purpose of the Keep Only function is to do ad-hoc filtering of only ONE variable so as to zoom in and focus on only this variable.

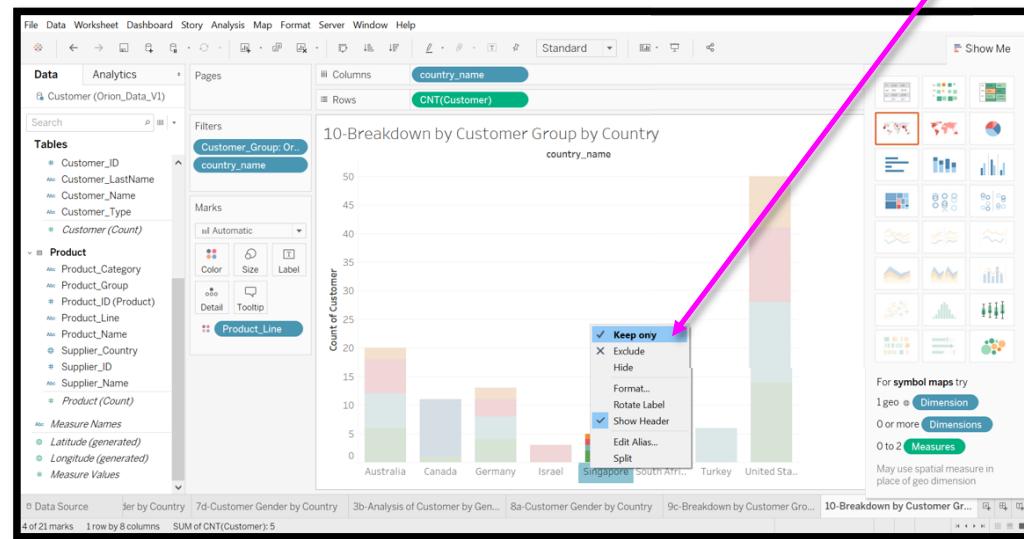
1. Create a duplicate from Exercise 9b with filter for 'Customer Group' set to 'Orion Club members'.
2. Drag the 'Product Line' to the Marks card and then click on the Stacked Bar icon. You should see the screen as below:



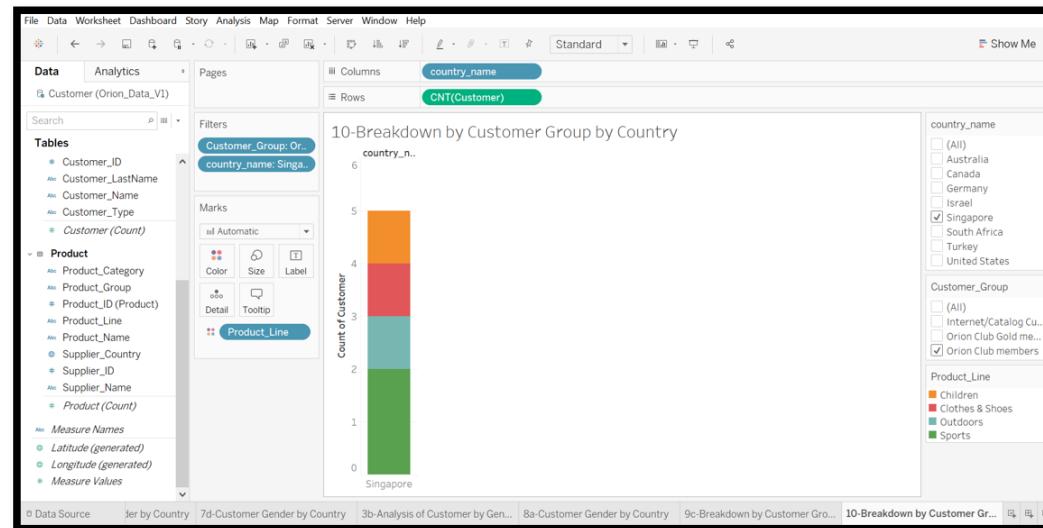
3. As there is now too much information shown, you can focus on a particular country (e.g. Singapore) using the 'Keep Only' function.



4. Right-click on any country on the X-axis (e.g. Singapore) and select the 'Keep Only' option.



5. Now you are able to drill down to just one country.





## Challenge Question 10a: Revert the Keep Only function

1. How do you now go back to the original Stacked Bar containing all the countries in the chart or select a new set of countries e.g. Singapore and Australia?
2. What are the advantages and disadvantages of the 'Keep Only' function?


Hint:

Remember the Filter on the right-hand side?

To revert to all the countries, just click on (All) in the Country Name Filter box.



## Exercise 11: Assign Alias to Values

Alias is to change a code value to a more meaningful description.

- For example, if the month value is represented numerically (e.g. 01, 02), you can change the value to Jan, Feb, Mar, etc.

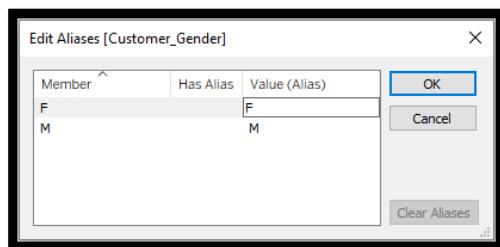
It can also be used for grouping when there are too many possible values.

- For example, customer's age could range from 9 to 80. You may like to categorize them into age groups of 9 to 15, 16 to 20 etc.

- Add a new worksheet.
- Drag the 'Customer Gender' into the Columns.
- Drag the 'Customer (Count)' into the Rows.
- Click on the 'Customer Gender' down arrow.

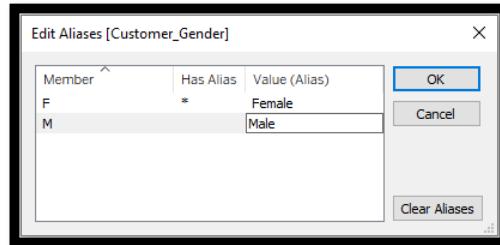
The screenshot shows a Tableau interface with a bar chart titled 'Sheet 14'. The chart displays the count of customers by gender, with 'F' having a value of approximately 32 and 'M' having a value of approximately 55. In the top-left corner, the 'Data' pane is open, showing a hierarchy under the 'Customer' table. The 'Customer\_Gender' field is expanded, and its context menu is open, with the 'Aliases...' option highlighted. The rest of the menu includes 'Create', 'Transform', 'Convert to Measure', 'Change Data Type', 'Geographic Role', 'Default Properties', 'Group by', 'Folders', and 'Hierarchy'.

- Select 'Aliases...'

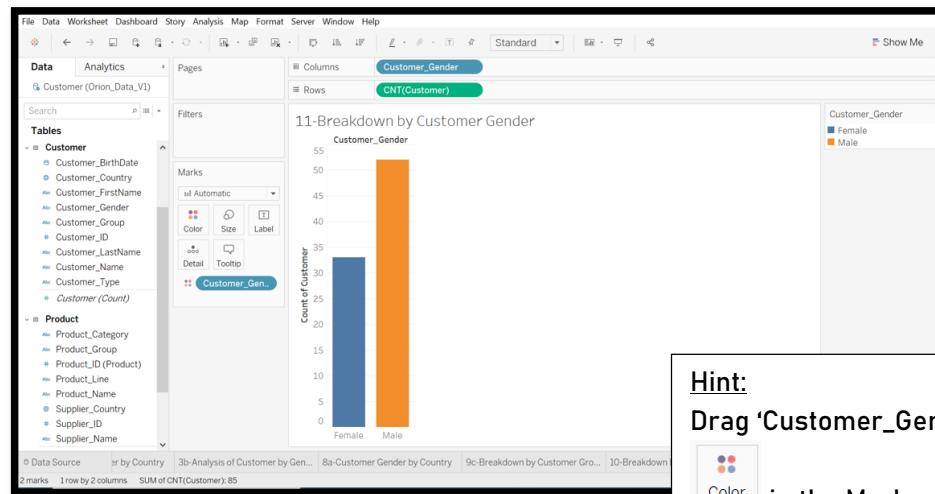




6. Click on the Value (Alias) and change the values to accordingly:  
E.g. F -> Female, M-> Male.



7. Your viz may look as follows, with 'Customer Gender' differentiated by colours:



**Hint:**  
Drag 'Customer\_Gender' to  
in the Marks card.



## Exercise 12: Create a One-Way Frequency Table with Filter

A One-way Frequency table is a table that contains the frequency (i.e. Count) of one particular variable.

- For example, gender and the total number of males and females.

1. Add a new Worksheet.
2. Drag the 'OrderType' into Rows.
3. Drag the 'CUST\_ORDERS(Count)' into the Abc column.

The screenshot shows the Tableau interface with the following details:

- Data View:** The left sidebar lists three tables: Country\_Lookup, CUST\_ORDERS, and Customer. The CUST\_ORDERS table is expanded, showing fields like OrderID, OrderType, ProductID, CostPrice\_Per\_Unit, Quantity, Total\_Fixed\_Price, and CUST\_ORDERS(Count). The OrderType field is highlighted with a red oval, and the CUST\_ORDERS(Count) field is also highlighted with a red oval.
- Marks View:** The right side shows the 'Marks' shelf with 'Automatic' selected. It includes options for Color, Size, and Text. The 'Text' option is highlighted with a pink box.
- Rows View:** The top navigation bar has 'Rows' selected, and the field 'OrderType' is highlighted with a blue box.
- Sheet Preview:** The main preview area titled 'Sheet 15' shows a single row of data with three columns. The first column is labeled 'OrderType' and contains the values 'Customer Sale', 'Internet Sale', and 'Retail Sale'. The second column is labeled 'Abc' and contains the values 'Abc', 'Abc', and 'Abc'. The third column is labeled 'CUST\_ORDERS(Count)' and contains the values '1', '1', and '1'.



4. Drag the Order Type into the Filters Shelf, then show the filter on the right of the screen. This will provide flexibility to the user to select the OrderType of choice.

The screenshot shows the Tableau interface with the 'Data' tab selected. In the Data pane, the 'OrderType' field is highlighted with a red oval. A pink arrow points from this oval to the 'Filters' shelf, where 'OrderType' is now listed. The 'Marks' shelf shows 'Automatic' and 'CNT(CUST\_ORDERS)'. The 'Columns' shelf has 'OrderType' selected. The 'Rows' shelf also has 'OrderType'. The 'Sheet 15' view displays a summary of sales by OrderType: Catalogue Sale (54,031), Internet Sale (45,505), and Retail Sale (308,333). On the right, a filter panel titled 'OrderType' shows checkboxes for '(All)', 'Catalogue Sale', 'Internet Sale', and 'Retail Sale', all of which are checked.

**Hint:**  
Right-click on 'OrderType' in the Filters Shelf, then select 'Show Filter' from the drop-down list.

5. By dragging other fields from the Data pane (e.g. Product\_Category) into Columns, the data will be tabulated accordingly.

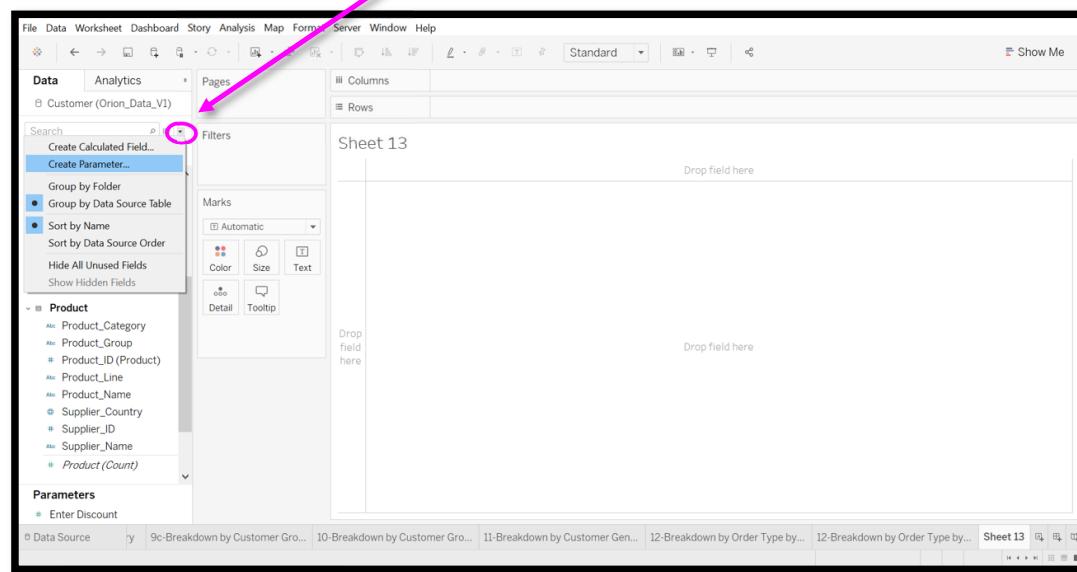
The screenshot shows the Tableau interface with the 'Data' tab selected. The Data pane lists 'Customer' and 'Product' tables. The 'Columns' shelf has 'Product\_Category' selected. The 'Rows' shelf has 'OrderType'. The 'Marks' shelf shows 'Automatic' and 'CNT(CUST\_ORDERS)'. The main view displays a table titled '12-Breakdown by Order Type by Product Category' with columns for Product\_Category (Assort., Children, Clothes, Golf, Indoor, Outdo., Racket., Runnin., Shoes, Swim S., Team S., Winter) and OrderType (Catalogue S., Internet Sale, Retail Sale). The filter panel on the right shows checkboxes for '(All)', 'Catalogue Sale', 'Internet Sale', and 'Retail Sale', all of which are checked.



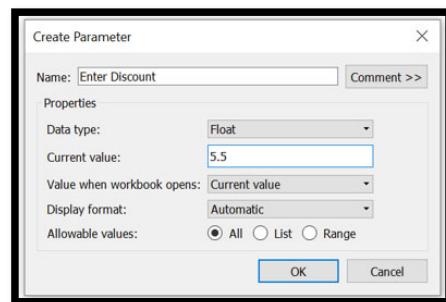
## Exercise 13: Create a Parameter

A parameter is a dialog box that allows the user to key in a specific condition or a set of value(s) which can then be used, say for further computations in the viz.

1. Add a new worksheet.
2. From the Data pane, click on the arrow and select 'Create Parameter'.



3. In the dialog box, type in 'Enter Discount' and input/select the rest of the fields as shown in the following diagram, then click 'OK':



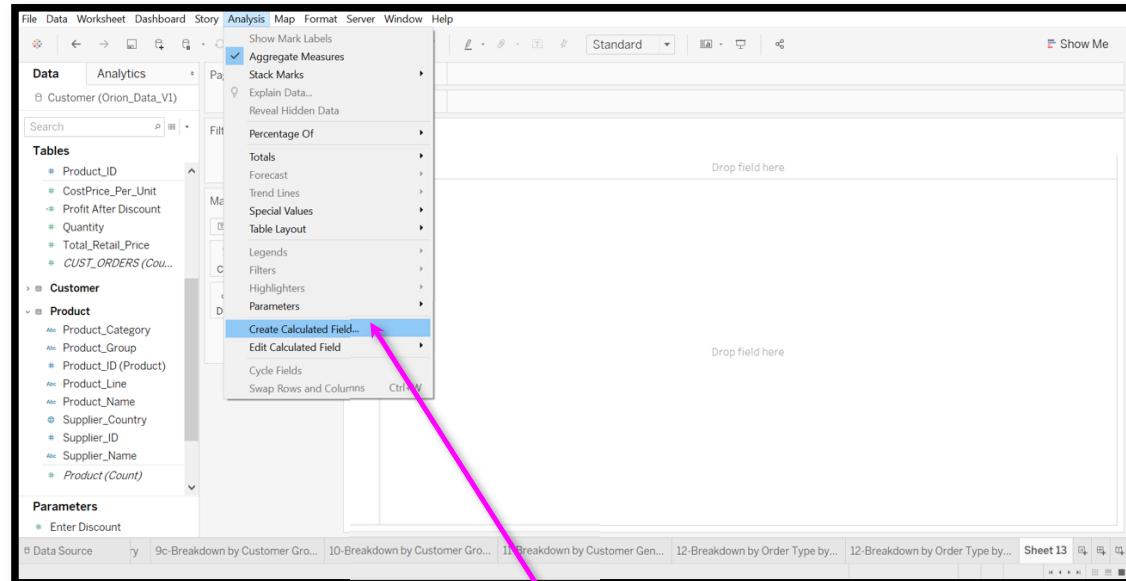
Note:

NAME – represents the name of the dialog box.

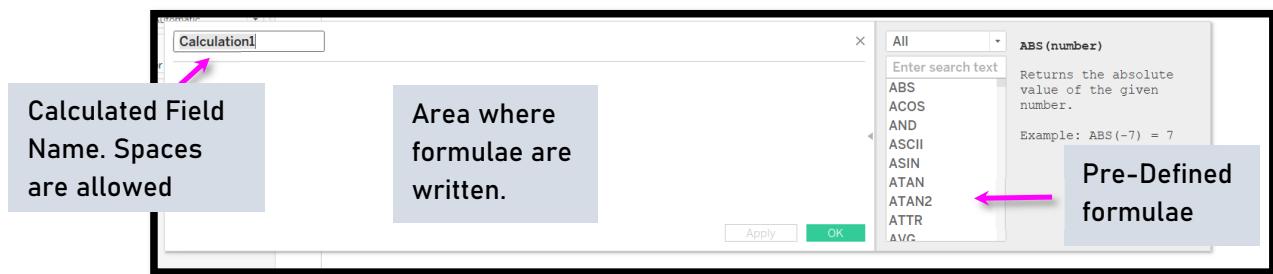
DATA TYPE – represents the type of data you are expecting (e.g. Integer, String, Float, Date and Date Time).



4. From the Main Menu, click on the 'Analysis' function.



5. In the drop-down menu, select the 'Create Calculated Field' option. The following screen will be displayed:



6. Create a Calculated Field named 'Profit After Discount'.



7. In the formula workspace, type in the formula as follows:

[As you type the formula, Tableau will assist you with the relevant fields displayed for you to select.]

[Total\_Retail\_Price] \* (1 - ([Enter Discount] / 100)) - [Quantity] \* [CostPrice\_Per\_Unit]

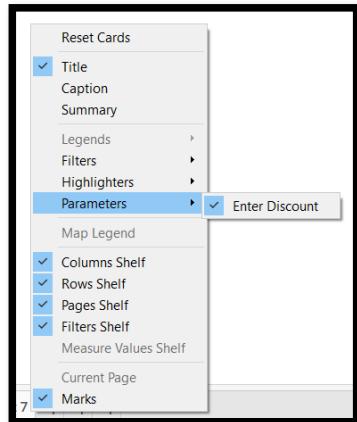


8. Make sure you see this prompt, then click 'OK'. Else, check to ensure that the formulae you have entered is correct.
9. Drag the 'Product\_Category' to the Rows, followed by 'Profit After Discount' to Text in the Marks card.

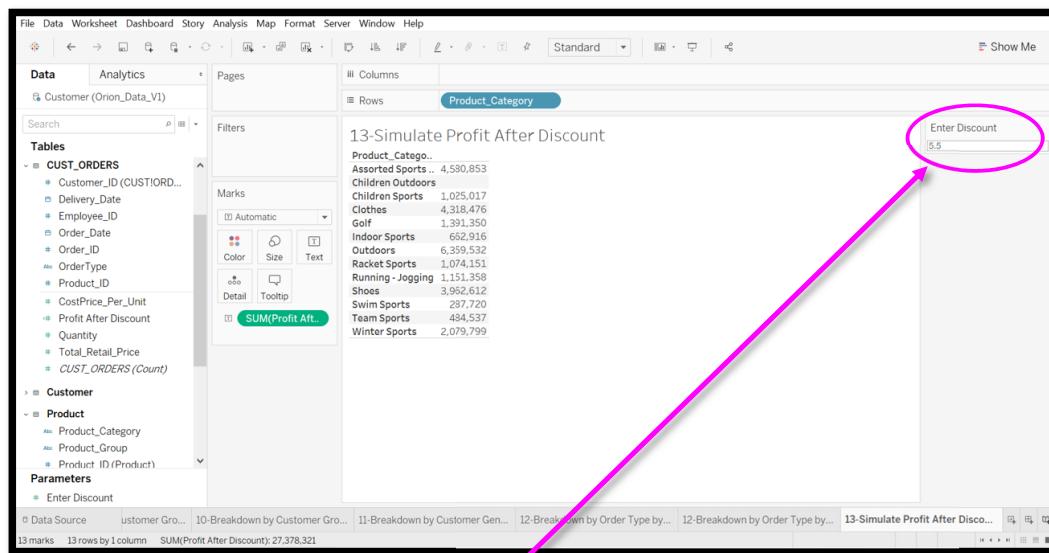
Product_Cat...	Assorted Sports...	4,550
Children Outdoors	Children Sports	1,040
Clothes	Golf	4,150
Indoor Sports	Indoor Sports	2,916
Outdoors	Racket Sports	2,532
Racket Sports	Running	3,074,151
Running	Shoes	1,151,358
Shoes	Swimwear	3,962,612
Swimwear	Tennis Sports	287,720
Tennis Sports	Total Sports	484,537
Total Sports		2,079,799



10. Next, right-click anywhere on the canvas. From the 'Parameters' option in the drop-down list, select the Parameter you have created earlier ('Enter Discount') by clicking on it.



11. You should get the following screen:



12. When you change the value for 'Discount', the values in the column change accordingly.



## Challenge Exercise 13a: Play with What-if Scenarios

Scenario: What is the maximum discount (in integer) you can give for Swim Sports to avoid being unprofitable?


( Hint: Edit 'Enter Discount' to be of data type integer, with allowable values from 1 to 100, step size of 1. )

( Stretch the challenge a little more: Create a slider for the user to select the discount value.)



## Exercise 14: Create a New Field – Part 1

A new field can be created for analysis by deriving its value from existing data in the data set.

- For example, height and weight are found in the data set, but not BMI. So, you can derive a new field called BMI.

- At the main menu, click on the 'Analysis' tab, select 'Create Calculated Field'.
- Create a new field named 'Profit'.
- Enter the formula as shown below:

The formula is: **[Total Retail Price] - ([CostPrice Per Unit] \* [Quantity])**.



- Ensure you see this prompt, then click 'OK'.

The Profit Formula will be used in Exercise 15.

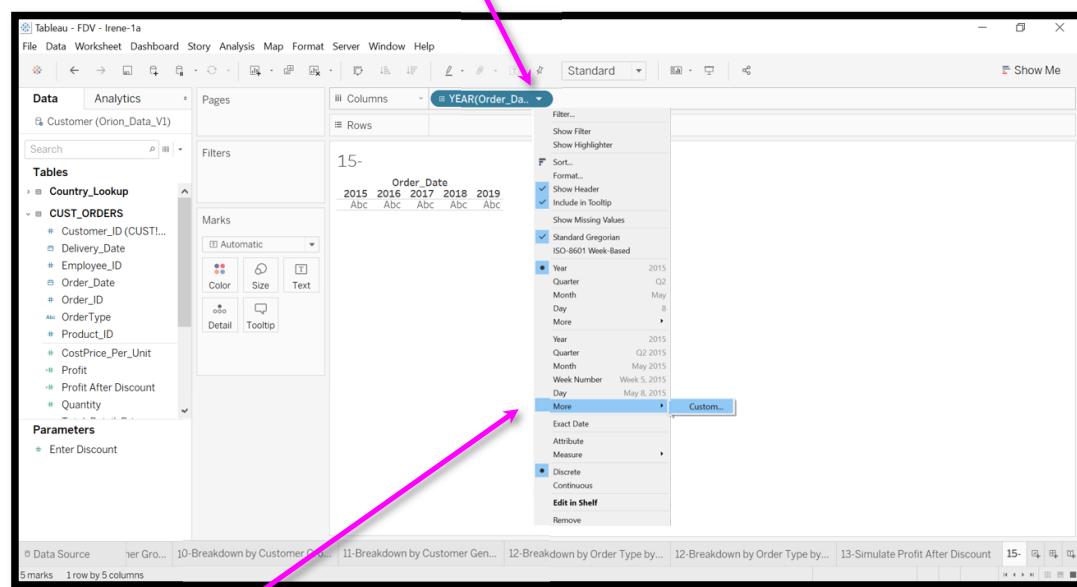


## Exercise 15: Generate a Dual Line Chart

Tableau allows for the customisation of a Date field:

- Day
- Month
- Quarter
- Year
- Other Custom:
  - Month/Year
  - Etc.

1. Add a new worksheet.
2. Drag the 'Order Date' into Columns.
3. Click on 'YEAR(Order Date)' in Columns.



4. Click on the 'More' option followed by the 'Custom' option.

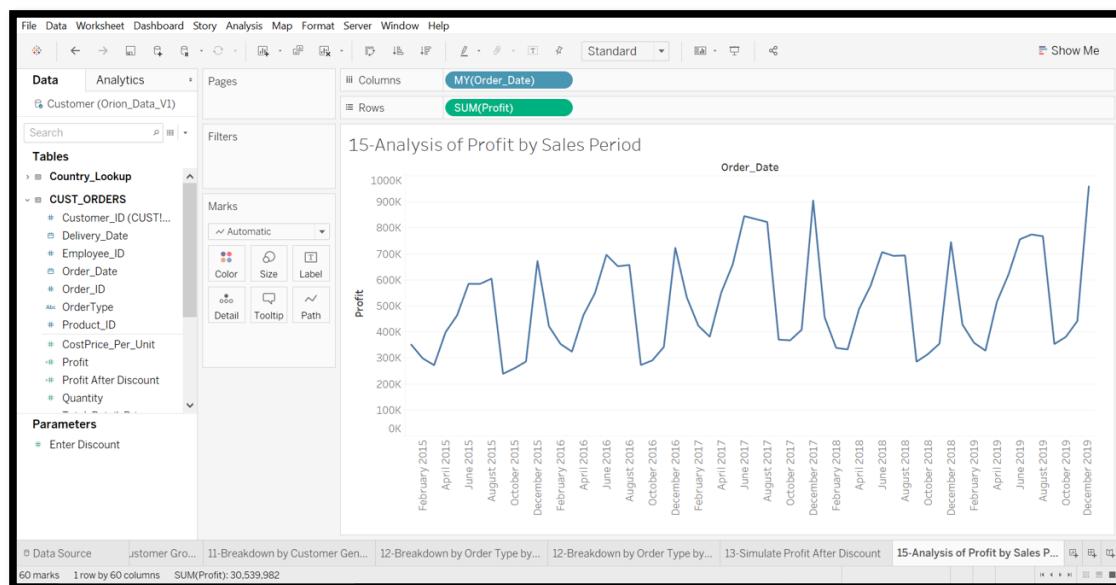


5. In the Custom Dialog box, select 'Month/Year' from the selection menu.



6. Click on the 'OK' button.

7. Drag the 'Profit' into the ROWS – Tableau will automatic add the 'Sum' aggregate function.

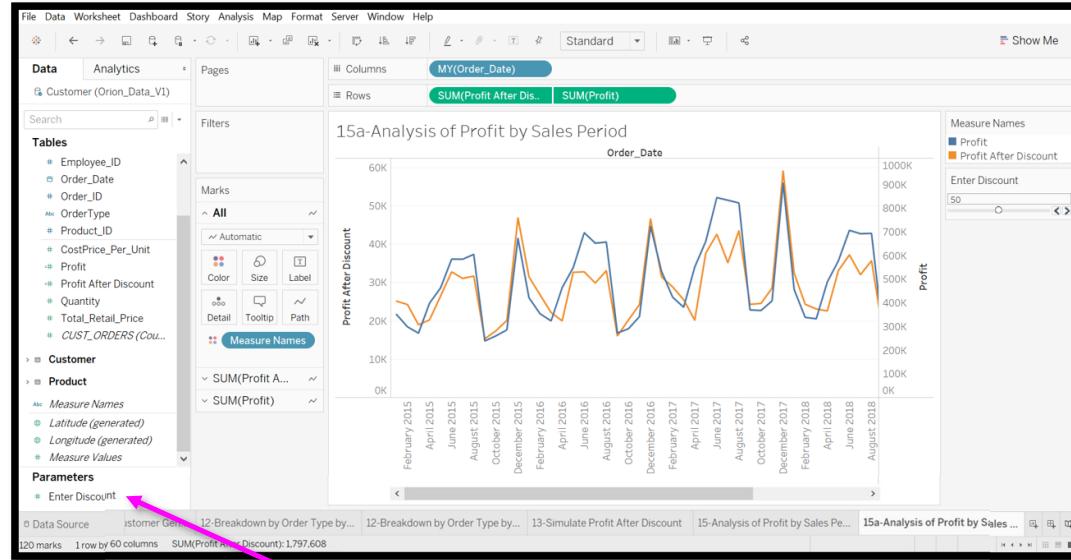


8. Name the worksheet as 'Ex. 15-Analysis of Profit by Sales Period'.



## Challenge Exercise 15a: Combine Line Charts

1. Combine both the 'Profit' and the 'Profit After Discount' line charts together in one viz.



### Hints:

1. Duplicate the worksheet from Exercise 15.
2. Drag Profits After Discount into the Rows.
3. Click on the Dual Lines Icon  in Show Me.
4. At the bottom of the Data pane, under 'Parameters', right-click on 'Enter Discount' and select 'Show Parameter' from the drop-down list.
5. Click on the Y-Axis and select 'Synchronize Axis' to ensure that the scales of the Profit and the Profit After Discount are the same.

2. Play What-if scenarios by using the slider to input different values in the 'Enter Discount' parameter and observe the changes in the chart.

Note that in Exercise 13a, we have redefined "Enter Discount" to accept only whole number.



## Exercise 16: Create a New Field – Part 2

Tableau provides built-in functions for use in the Calculated Fields:

- Number Functions
- String Functions
- Date Functions
- Logical Functions
- Aggregate Functions
- And more .....

The following 2 exercises use Tableau Functions DateDiff and If..Then Else...Else....End.

1. Click on the Analysis, followed by 'Create Calculated Fields'.
2. Create a calculated field called 'Customer Age'.
3. It is important to determine the criteria that calculate the age of customer when an order was placed (i.e. as of Order Date). In this exercise, the age is:  
**Order Date – Birth Date**
4. In the formula workspace, add in the following formula:  
**DATEDIFF('year', [Customer BirthDate], [Order Date] )**
5. Important point to know about this pre-defined formula used (From the help screen):

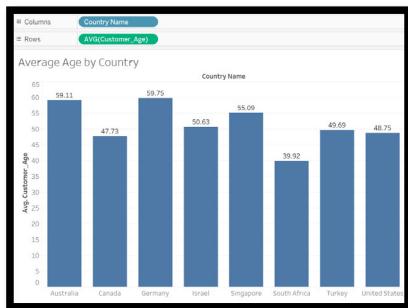
**DATEDIFF(date\_part, start\_date, end\_date, [start\_of\_week])**

Returns the difference between two dates where start\_date is subtracted from end\_date. The difference is expressed in units of date\_part. If start\_of\_week is omitted, the week start day is determined by the start day configured for the data source.

Example: DATEDIFF('month', #2004-07-15#, #2004-04-03#, 'sunday') = -3

Date\_Part is the unit in which the return value will be in. In the case of our exercise, it will return the year value. The Start\_Of\_Week parameter in the formula is optional.

6. Try to create a bar chart to display the average age by country as below:



Hint:

Remember to select  
Average in the Measure!



## Challenge Exercise 16a: Create Age Group Using Logical Function

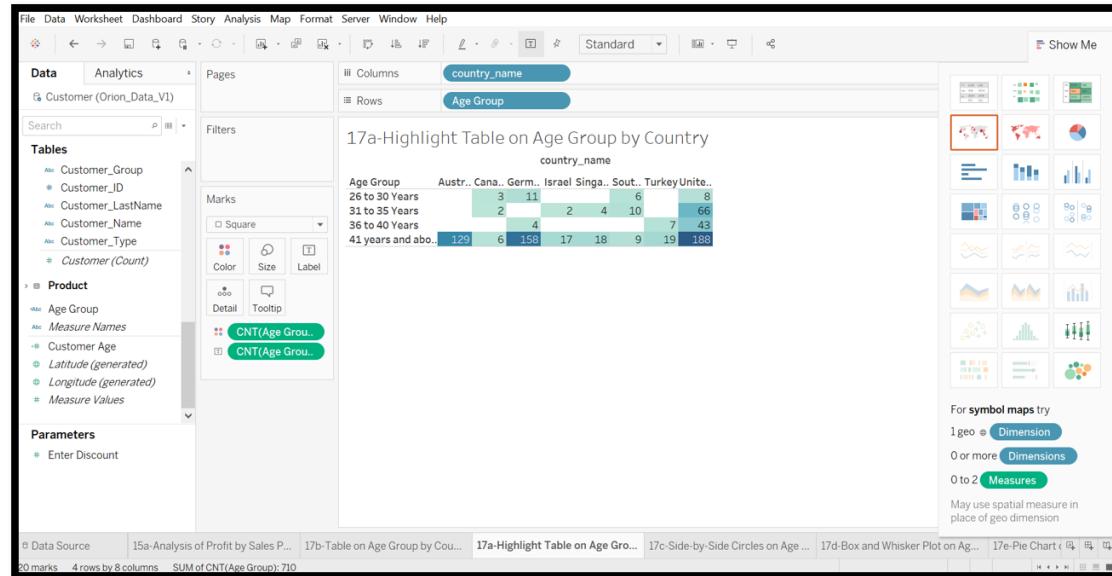
1. To create the Age Group fields, click on 'Analysis' in Main menu followed by the 'Create Calculated Field'.
2. In the 'Create Calculated Field' name space, type in 'Age Group' as the name of this new field.
3. In the workspace, type in the following formula:

```
If [Customer Age] >= 5 AND [Customer Age] <= 10 then
    '5 to 10 Years'
elseif [Customer Age] >= 11 and [Customer Age] <=15 then
    '11 to 15 Years'
elseif [Customer Age] >= 16 and [Customer Age] <=20 then
    '16 to 20 Years'
elseif [Customer Age] >= 21 and [Customer Age] <=25 then
    '21 to 25 Years'
elseif [Customer Age] >= 26 and [Customer Age] <=30 then
    '26 to 30 Years'
elseif [Customer Age] >= 31 and [Customer Age] <=35 then
    '31 to 35 Years'
elseif [Customer Age] >= 36 and [Customer Age] <=40 then
    '36 to 40 Years'
else
    '41 years and above'
end
```



## Exercise 17: Edit Formula

1. Create a Highlight Table on Age Group by Country as below:



### Hints:

1. Drag 'Country\_Name' in Columns and 'Age Group' in Rows.
2. Drag 'Age Group' into Text under the Marks card, then right-click on 'Age Group' to select 'Measure', then select 'Count'.
3. Select 'Highlight Table' from Show Me.



## Challenge Exercise 17a: Edit Formula

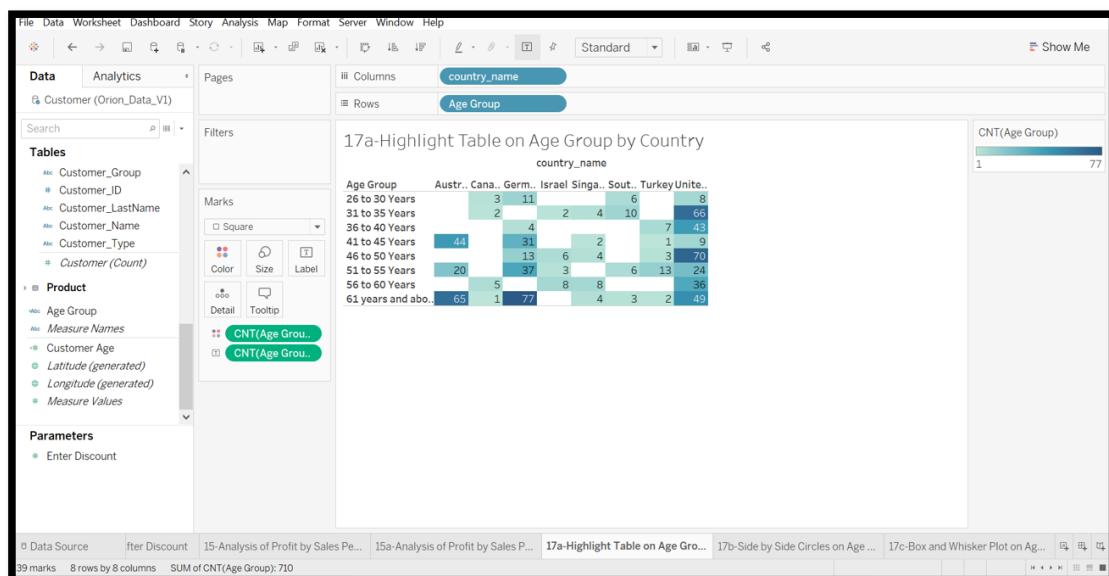
1. The formula in the calculated field (e.g. Age Group) can be edited by right-clicking on it from the Data pane, and select 'Edit' in the drop-down list to amend as follows:

The screenshot shows the Tableau Data pane with various tables and parameters listed. The 'Age Group' calculated field is selected and highlighted with a blue border. A context menu is open over this field, with the 'Edit...' option highlighted in blue. Two pink arrows point from the text above to this 'Edit...' option and to the 'Edit the formula as follows:' box on the right.

Edit the formula as follows:

```
elseif [Customer Age] >= 41 and [Customer Age] <=45 then  
    '41 to 45 Years'  
elseif [Customer Age] >= 46 and [Customer Age] <=50 then  
    '46 to 50 Years'  
elseif [Customer Age] >= 51 and [Customer Age] <=55 then  
    '51 to 55 Years'  
elseif [Customer Age] >= 56 and [Customer Age] <=60 then  
    '56 to 60 Years'  
else  
    '61 years and above'  
End
```

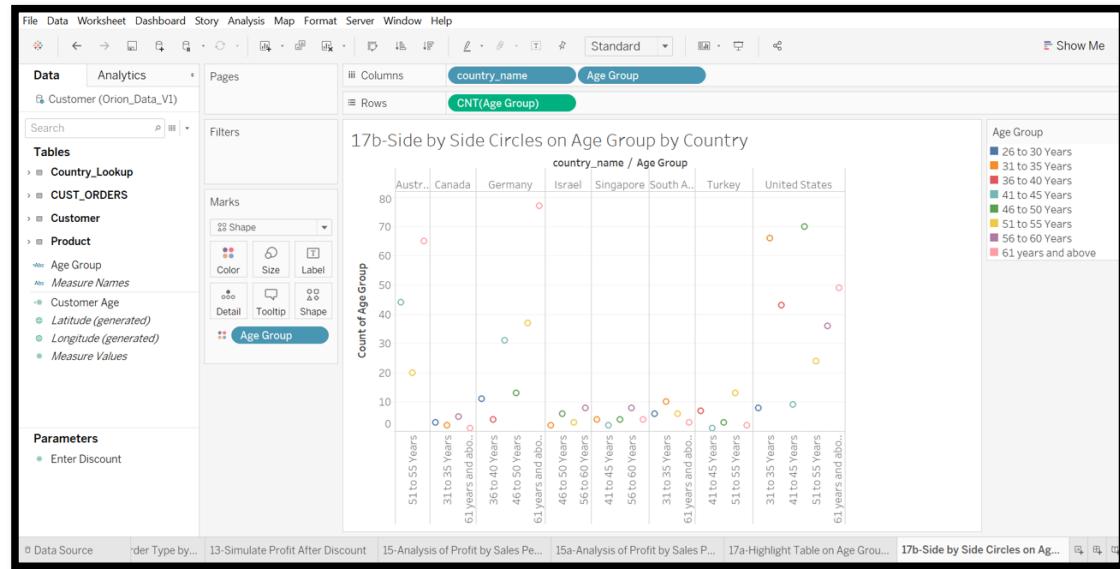
2. The Highlight Table will be updated automatically as below:





## Challenge Exercise 17b: Create Side-by-Side Circles

1. Create a Side-by-Side Circles Chart on the Distribution of Age Group by Country as below:

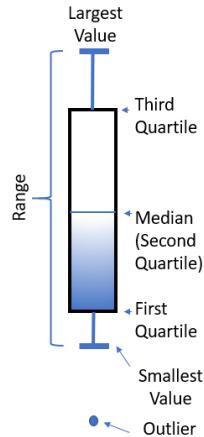


### Hints:

1. To create the above, duplicate the worksheet from the previous exercise on Highlight Table.
2. Select 'Side-by-Side Circles' from Show Me.
3. Under Columns, place 'Country\_Name', followed by 'Age Group'.
4. Drag 'Age Group' to Colour in the Marks card.



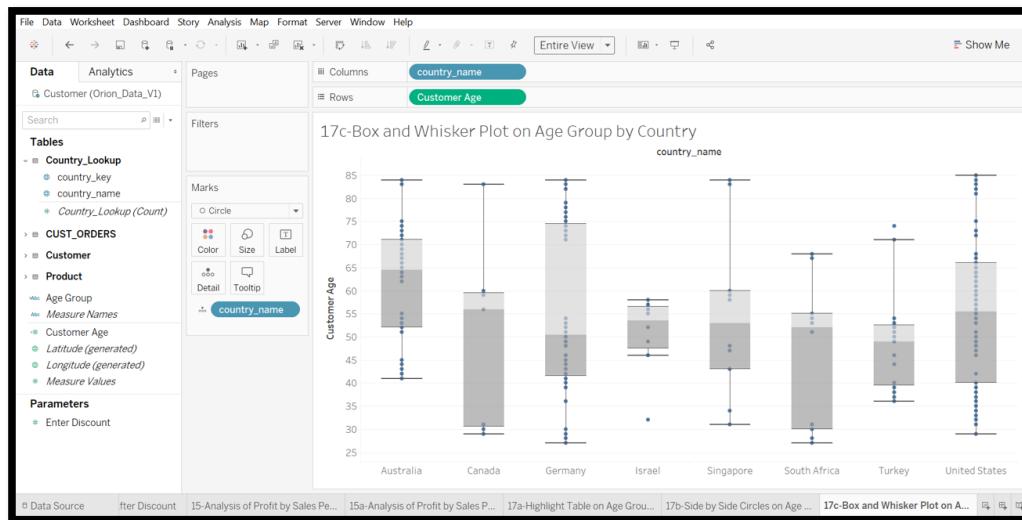
## Challenge Exercise 17c: Create Box and Whisker Plot



- There are 5 components in a box plot:  
The lower end of the line (also called the whisker) represents the minimum value and the upper end of the line represents the maximum value .
- When a box plot is built, it generally separates the outliers from the data. These outliers (if any) are represented by dots.

*Additional Reading:* <https://www.excel-easy.com/examples/box-whisker-plot.html>

### 1. Create a Box and Whisker Plot on the Spread of Customer Age by Country as follows:



#### Hints:

1. Add a new worksheet.
2. Drag 'Country\_Name' to Columns.
3. Drag 'Customer Age' to Rows.
4. Select 'Box-and-Whisker Plots' from Show Me.
5. Drag 'Country\_Name' to Columns.
6. Under Rows, right-click on 'Customer Age' to select 'Dimension' from the drop-down list.
7. From the menu bar, change 'Standard View' to 'Entire View'

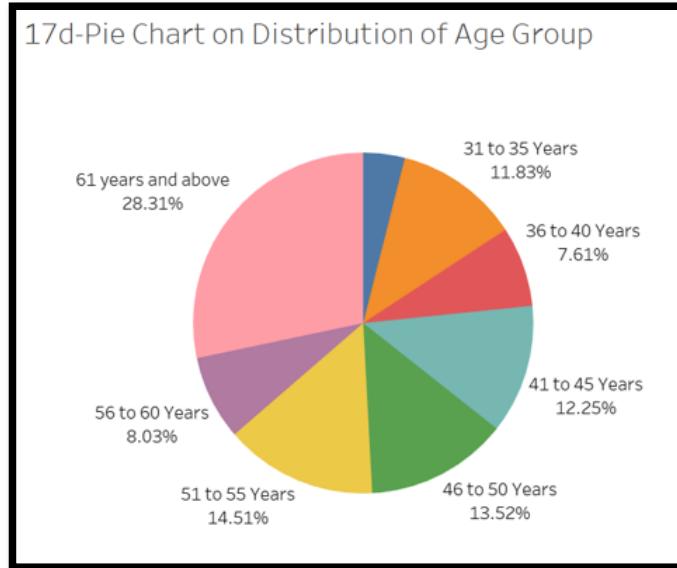


2. What immediate inferences can you derive from the charts generated from Challenge Exercises 17b & 17c? When would you use these charts?




## Challenge Exercise 17d: Create Pie Chart

1. Create a Pie Chart o the Distribution of Age Group



### Hints:

#### To create a pie chart

1. Drag Age Group to Columns.
2. Drag Age Group to Text under the Marks card.
3. Right-click on Age Group in the Marks card, then from the drop-down list, select Measure, followed by select Count.
4. Select Pie Chart from Show Me.
5. To enlarge the pie chart, press <Shift><Ctrl><B>. To shrink the pie chart, press <Ctrl><B>.

#### To label the pie chart

1. Drag Age Group to Label in the Marks card.
2. Drag 'CNT(Age Group)' from the Marks Card to Label to display the count on the pie chart.
3. Click Analysis, select 'Percentage Of', then select 'Table'.

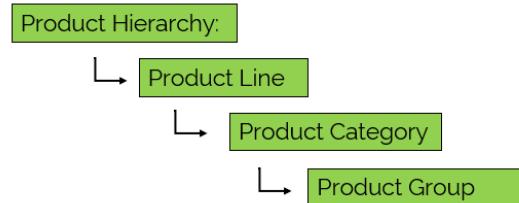


## Exercise 18: Create a Hierarchy

Creating a Data Hierarchy allows for analysis of data from different perspectives.

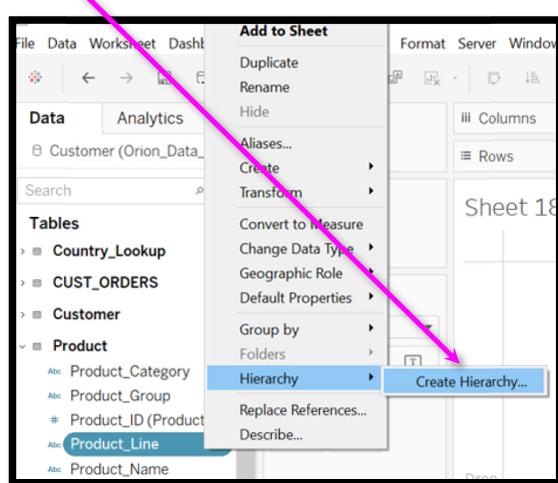
For example:

- A product can belong to particular product line (e.g. Children, Clothes, shoes)
- Each product line has different product categories (e.g. Children Outdoor, Children sport)
- Each category has different product groups (e.g. Outdoor Things, Bathing Suits)



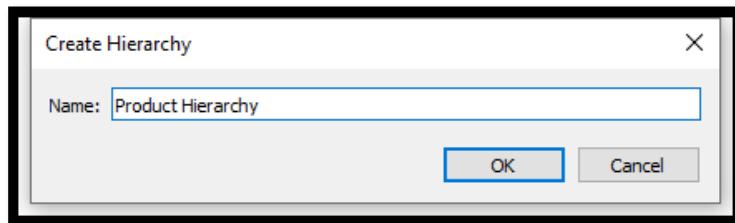
Having a hierarchy allows the management to drill down to the next level of detail or roll up to a higher level of detail in the viz.

1. Right-click on 'Product Line' from the Data pane, select 'Hierarchy', followed by 'Create Hierarchy' option from the menu.

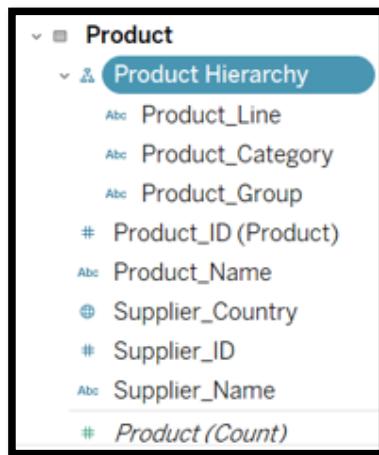




2. Type in the name of the Hierarchy (e.g. Product Hierarchy) and click 'OK'.



3. Drag 'Product Category' and 'Product Group' into 'Product Hierarchy' in the sequence as shown:



4. In this example, 'Product Line' is the highest in the hierarchy, followed by 'Product Category', and finally 'Product Group'.
5. You can change the hierarchy level by dragging the field to the required level.
6. Add a new Worksheet and drag the 'Product Hierarchy' into the Rows.
7. Drag 'Product(Count)' to the Abc column.



8. Hover over 'Product Line' in Rows and click on the '+' symbol to drill down to lower levels.  
Hover over 'Product Category' and do the same.

The screenshot shows a Tableau interface with the following details:

- Pages:** Shows 'Sheet 18'.
- Filters:** None.
- Marks:** Set to 'Automatic'. The 'Color' button is highlighted with a pink circle.
- Rows:** Contains the field 'Product\_Line'.
- Sheet 18 Data:**

Product_Line	CNT(Product)
Children	772
Clothes & Shoes	2,021
Outdoors	357
Sports	2,354
- Bottom Panel:** Shows the calculated field 'CNT(Product)'.

9. Your screen will be as follows with the drill downs:

The screenshot shows a more detailed Tableau interface with the following details:

- Data Source:** Customer (Orion\_Data\_V1).
- Tables:** Customer, Product.
- Marks:** Set to 'Automatic'. The 'Color' button is highlighted with a pink circle.
- Rows:** Contains fields 'Product\_Line', 'Product\_Catgo...', and 'Product\_Group'.
- Sheet Title:** 18-Breakdown of Products by Product Line, Product Category and Product Group.
- Sheet Data:**

Product_Line	Product_Catgo...	Product_Group	Count
Children	Children	Children Outdoors & Indoor Things,...	50
Children	Children	A-Team, Kids	19
Children	Children	Bathing Suits, Kl...	32
Children	Children	Eclipse, Kid's Clo...	125
Children	Children	Eclipse, Kid's Sh...	96
Children	Children	Lucky Guy, Kids	19
Children	Children	N.D. Gear, Kids	133
Children	Children	Ollsons, Kids	20
Children	Children	Orion Kid's Cloth...	3
Children	Children	Osprey, Kids	53
Children	Children	Tracker Kid's Clo...	211
Children	Children	Ypsilon, Kids	11
Clothes & Shoes	Clothes	Edgars Clothing	637
Clothes & Shoes	Clothes	Green Tomato	22
Clothes & Shoes	Clothes	Knitwear	42
Clothes & Shoes	Clothes	Leisure	32
Clothes & Shoes	Clothes	LSF	31
Clothes & Shoes	Clothes	Massif	5
Clothes & Shoes	Clothes	Orion	57
Clothes & Shoes	Clothes	Orion Clothing	100
Clothes & Shoes	Clothes	Osprey	39
Clothes & Shoes	Clothes	Shorts	7
Clothes & Shoes	Clothes	Stockings & Socks	39
Clothes & Shoes	Clothes	Street Wear	36
Clothes & Shoes	Clothes	T-shirt	76
- Bottom Panel:** Shows the calculated field 'CNT(Product)'.

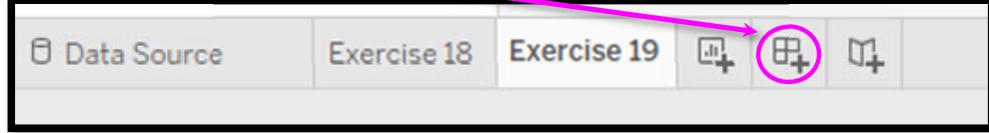


## Exercise 19: Create a Dashboard

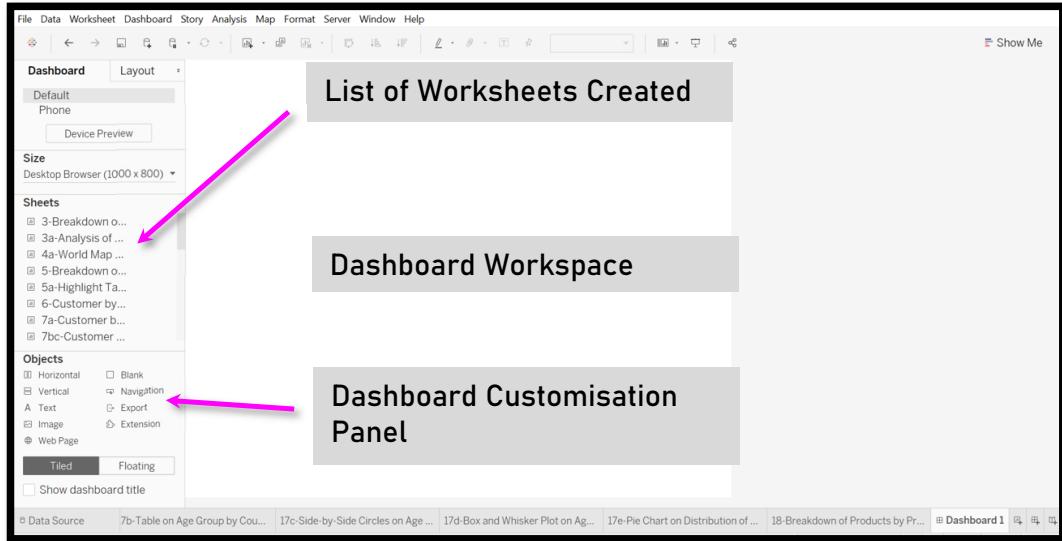
A dashboard is a collection of key data visualisations put together in a single space for quick analysis to answer key business questions, or monitor KPIs and metrics at a glance.

The visualisations we have created using Tableau worksheets in our exercises thus far can be selected as views in a dashboard, together with text areas, web pages and images. If required, multiple dashboards can be created to serve an intent.

1. Along the tabs at the bottom, there is an icon  that creates the Dashboard
2. Click on the icon.

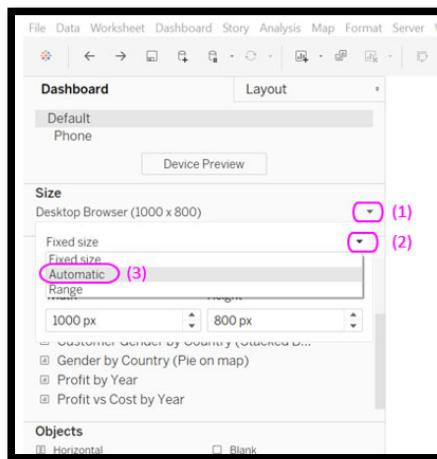


3. The following is the Dashboard workspace:

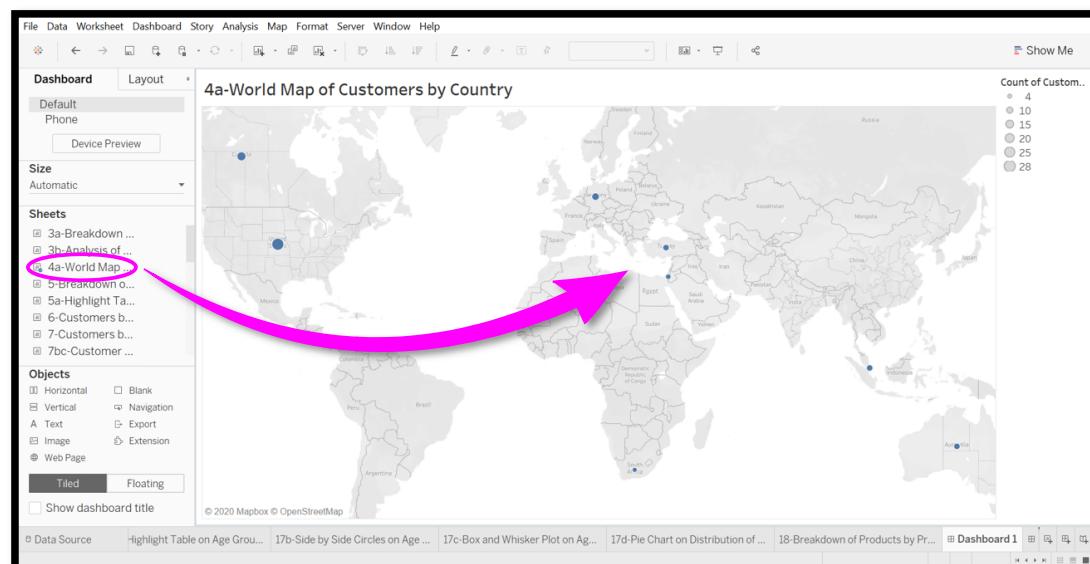




4. Before you start creating a Dashboard, it is a good practice to set the Size to Automatic.



5. From the Sheets list on the left, drag a worksheet (e.g. from Exercise 4a) into the Dashboard workspace.



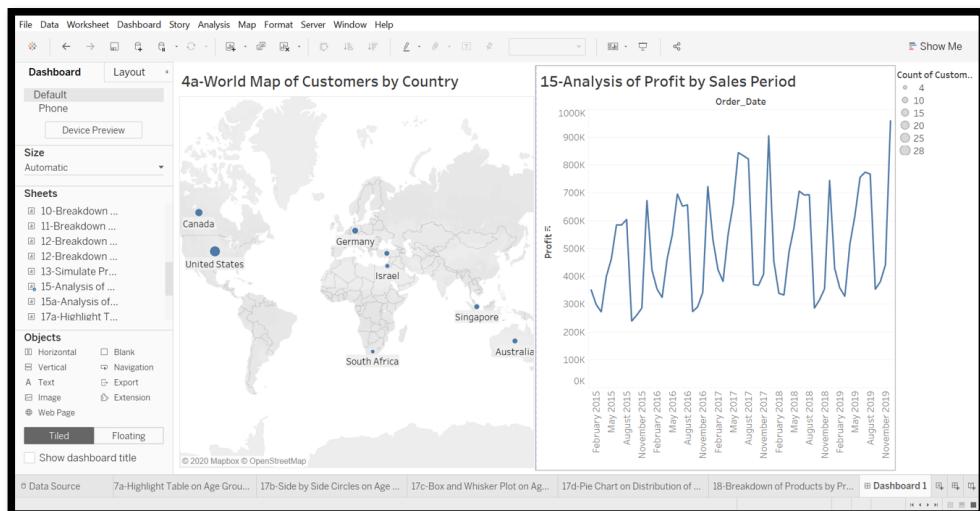


6. Click on the sheet and options menu will appear at the corner. Click on to go to the original worksheet to add in the full country name.

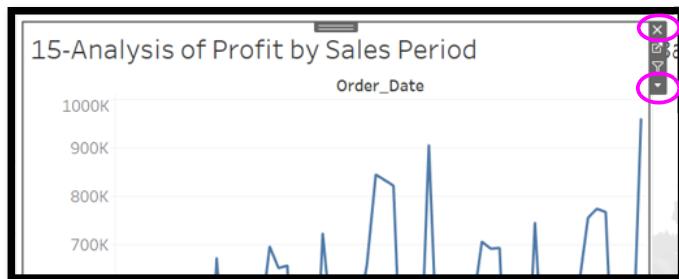
(Hint: On the original worksheet of Exercise 4a, drag 'Country\_Name' to Labels. The updated worksheet with the full country name is also displayed at the dashboard.)



7. At the dashboard, drag another worksheet (e.g. from Exercise 15) into the Dashboard area. Mouse over the Dashboard area, some gridlines will appear. You can click and use your mouse to adjust the height or width of the area.

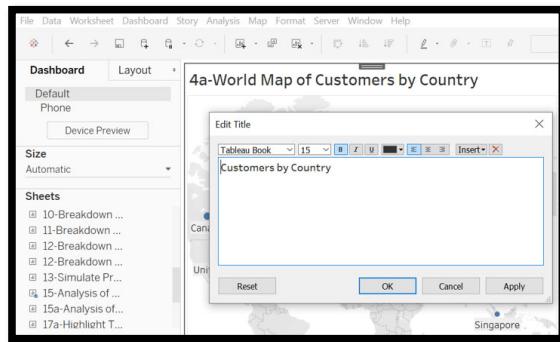


8. Click on the sheet and the options menu will appear at the corner. If needed, click on 'X' to remove the worksheet from the Dashboard. Click on the triangular down arrow for more options. Explore the different options available.

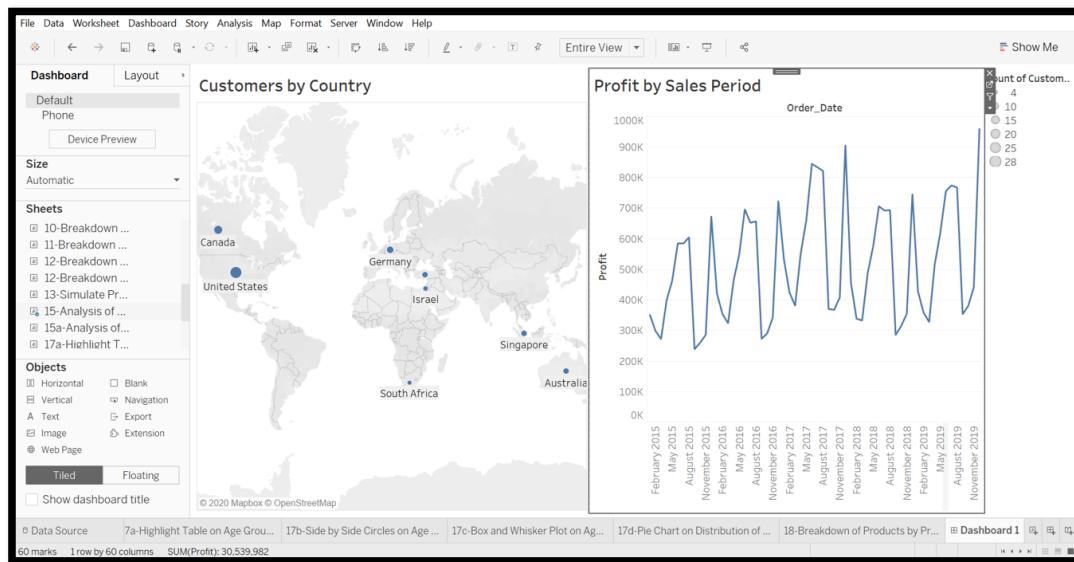




9. Double-click to edit the Title of each view on the Dashboard. Click 'Apply', followed by 'OK' when done.



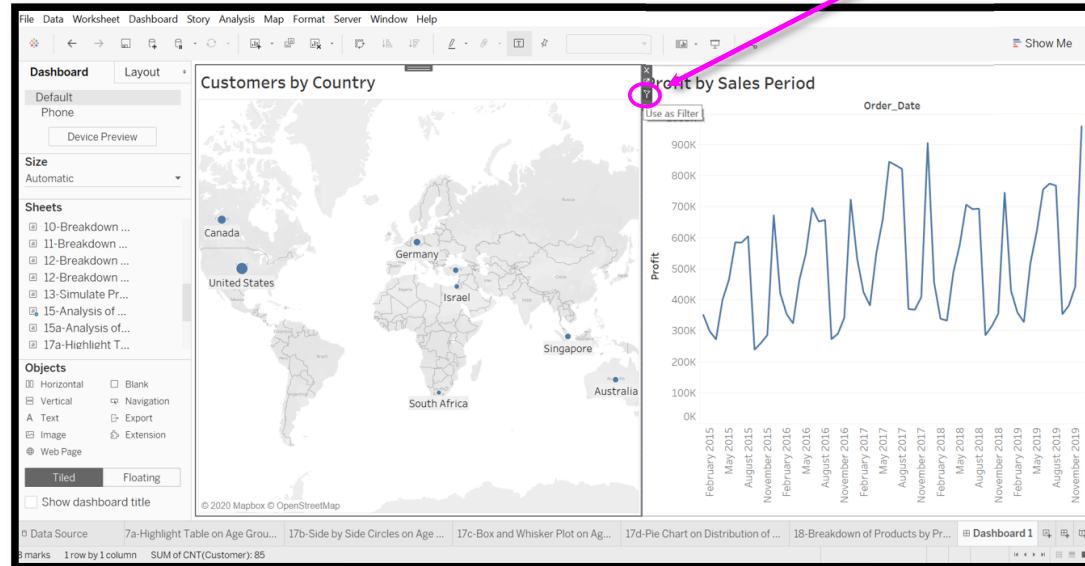
10. Rename all the graphs/charts the Dashboard. Now it may look as below. How do you remove the legend on 'Count of Customer'?  
( Hint: Similar to how you remove worksheet from the dashboard. )





11. How do you allow a user to select any part of the line graph from the view on the left, so that the data in the other view on the right is also correspondingly filtered, and vice versa?

( Hint: Click on the view 'Customers by Country' to make it active, then select  'Use as Filter'. Do the same for 'Profit by Sales Period'.)





## Exercise 20: Create a Story

In Tableau, a story is a sheet comprising of worksheets and/or dashboards sequenced as story points to guide the audience in a step-by-step process to draw the insights you have made and to help them to understand how you have come to your conclusion.

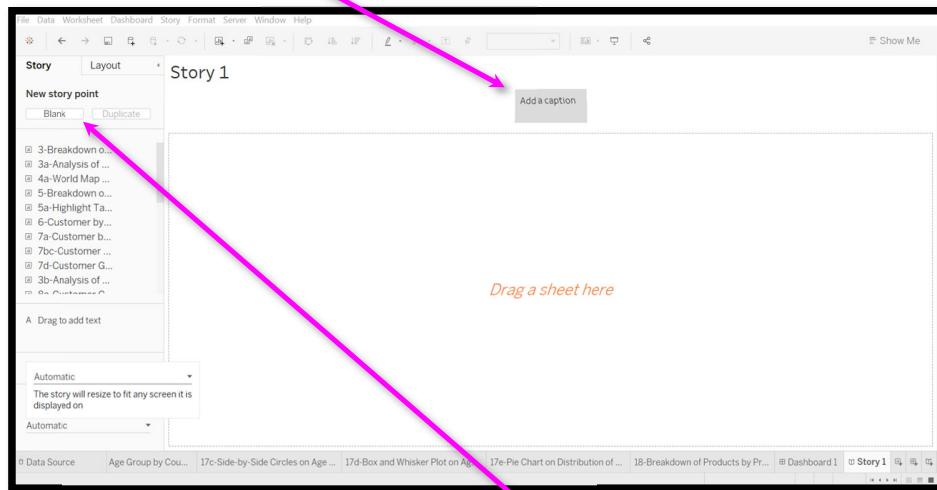
Text annotations and/or filters can be applied to support the narrative.

### Tips to create story points:

- Set the context in the first story point in a story.
- Build on the insights from the previous story points to help the user to gain increased context and understanding.
- Allow the user to interact with the story points (e.g. incorporate filters and sliders).
- Ask a question about the data to lead the user to click the next story point for answers.



1. To start a story, click on the Story icon at the bottom status bar.
2. Again, it is a good practice to change the Size to Automatic.
3. Simply drag a pre-created Workbook or Dashboard from the left pane.
4. Click on the [Add a caption] button to add a story point or the title of your page.



5. To add a new page in the Story, click on the [Blank] button under the New story point.



6. Repeat steps 3 to 5 to add new pages and titles to your Story.
7. You can also add text to annotate your tables or charts in the page using the [Drag to add text] button on the left panel.

*~ End of Training Exercises ~*