Tableau Essentials

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About Trainer

- KG to PG (Physics)
- Physics to Management (IIM Ahmedabad) specializing in Operations Research
- Management to Electrical Engineering (IIT Bombay)
- Cofounded Kie Square Consulting
- Founder Director of startup Business schools and Dean of first Liberal school in India
- Startups to Marketing Strategy
- Marketing Strategy to Artificial Intelligence & Deep Learning in Fintech, Telecom & Banking

Published in Public Health, Electricity Markets, Telecom, Advertising & Communication Strategies

Worked on assignments with International Monetary Fund, Royal Netherland Embassy etc.

Conducts training in

- Python (Pandas, NumPy, SciPy, Matplotlib, Bokeh)
- R (dplyr, rstanarm, knitR, ggplot2)
- Data Visualization (Tableau, Qlik, MicroStrategy, D3.js)
- Machine Learnng (Reinforced Learning, Scikit Learn)
- Deep Learning (Tensorflow, Theano, CNN, RNN)

Agenda

D1 M1: Data Visualization Overview

- Data Visualization Overview
- Where Tableau fits in the data analysis ecosystem
- Tableau File Types
- Tableau Interface

D1 M2: Tableau Overview

- Worksheets, Dashboard, Stories
- Dimensions & Measures
- Continuous Vs Discrete Data
- Folders, Hierarchies

Agenda

D1 M3: Getting Data in Tableau

- Data Import Export
- Data Join
- Data Extracts
- Data Blending
- Data Source Filters

D1 M4: Processing Data for Visualization

- Data Transformation
- Data Interpreter
- Data field merge and split
- Data Pivot
- Groups & Sets

Exercise Files

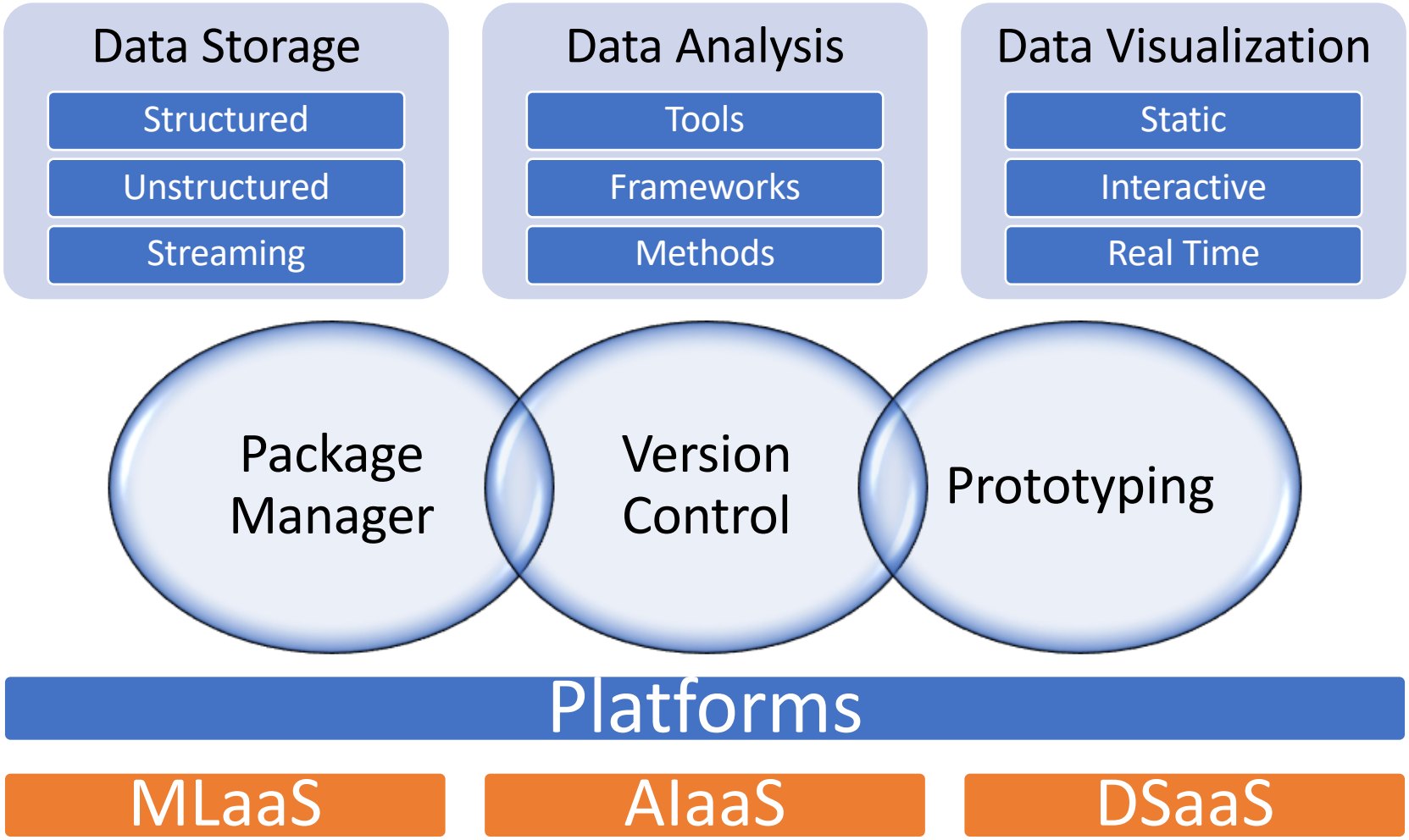
Please download the exercise and data files from

https://github.com/dearbharat/tableauEssential

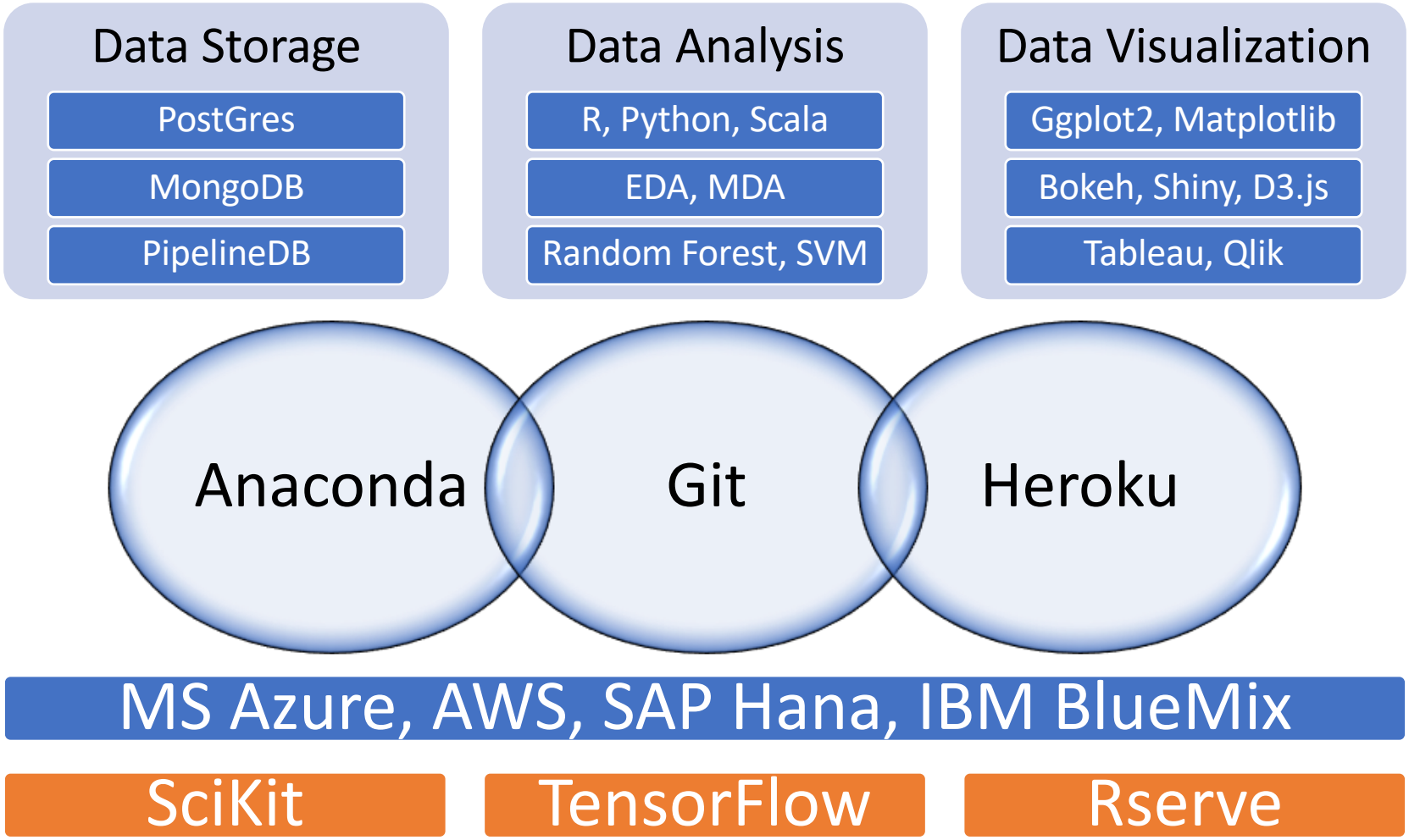
D1 M1 Data Visualization Overview

- Data Visualization Overview
- Where Tableau fits in the data analysis ecosystem
- Tableau File Types
- Tableau Interface

Data Analytics Ecosystem



Data Analytics Ecosystem



What is Tableau?

- Tableau is a data visualization software created by Tableau Software.
- Tableau connects to nearly any data source, such as Excel, Oracle, Amazon...
- Tableau allows for instantaneous insight by transforming data into visually appealing, interactive visualizations called dashboards.

Tableau Website

- http://www.tableau.com/

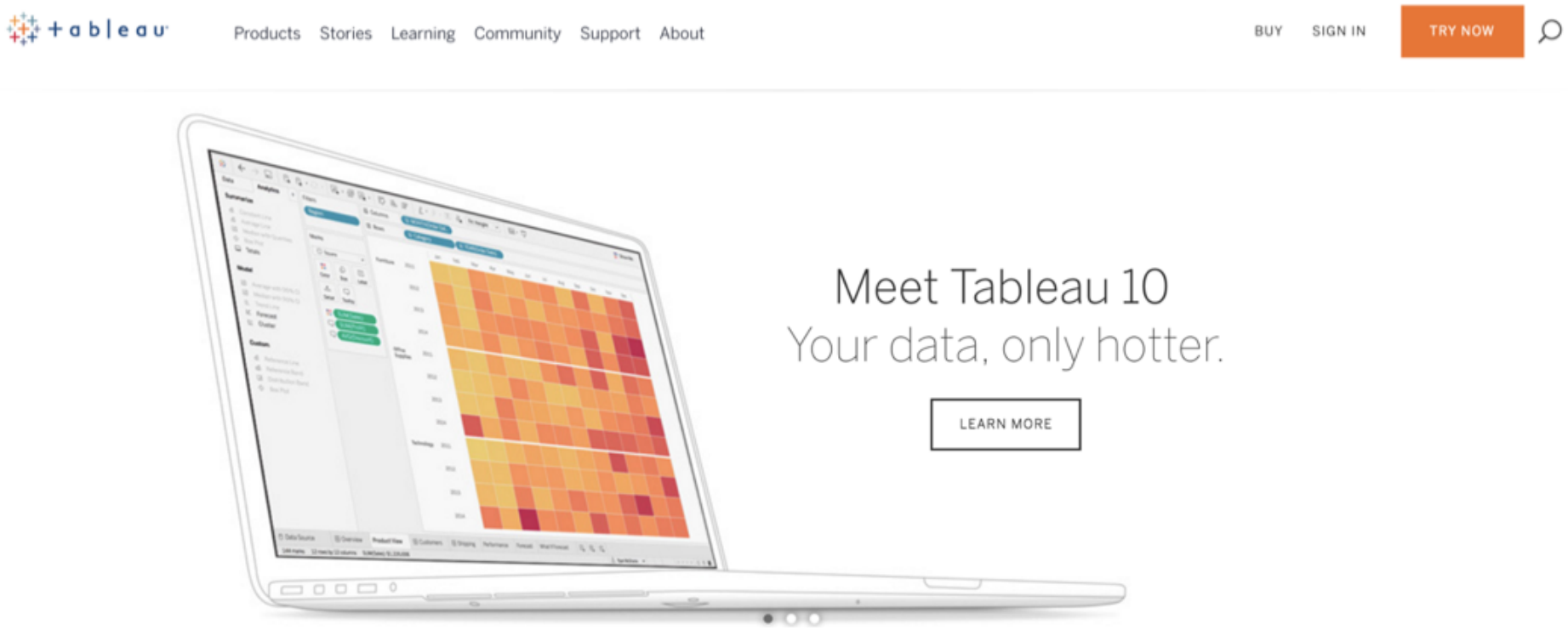


Tableau Desktop

- http://www.tableau.com/products/desktop

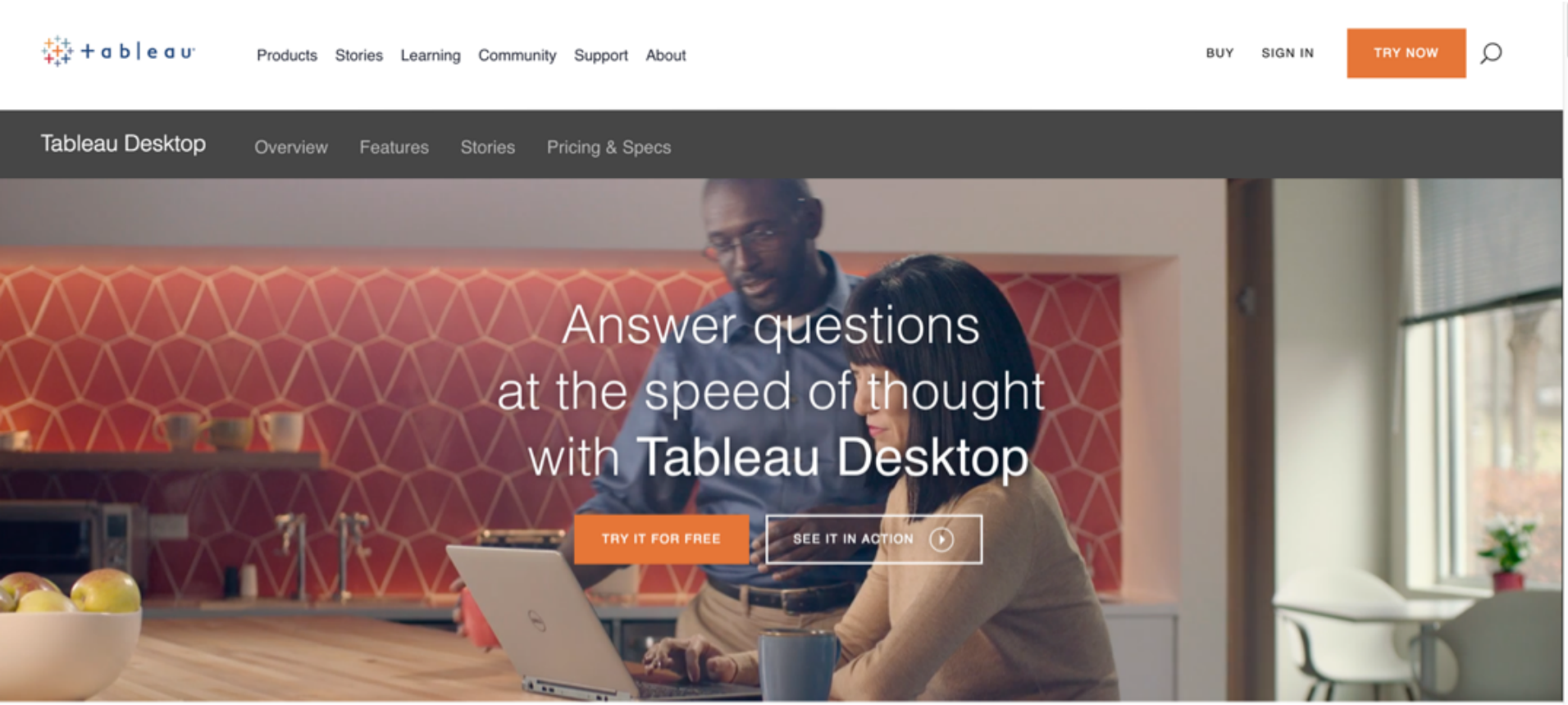


Tableau Online

- http://www.tableau.com/products/cloud-bi

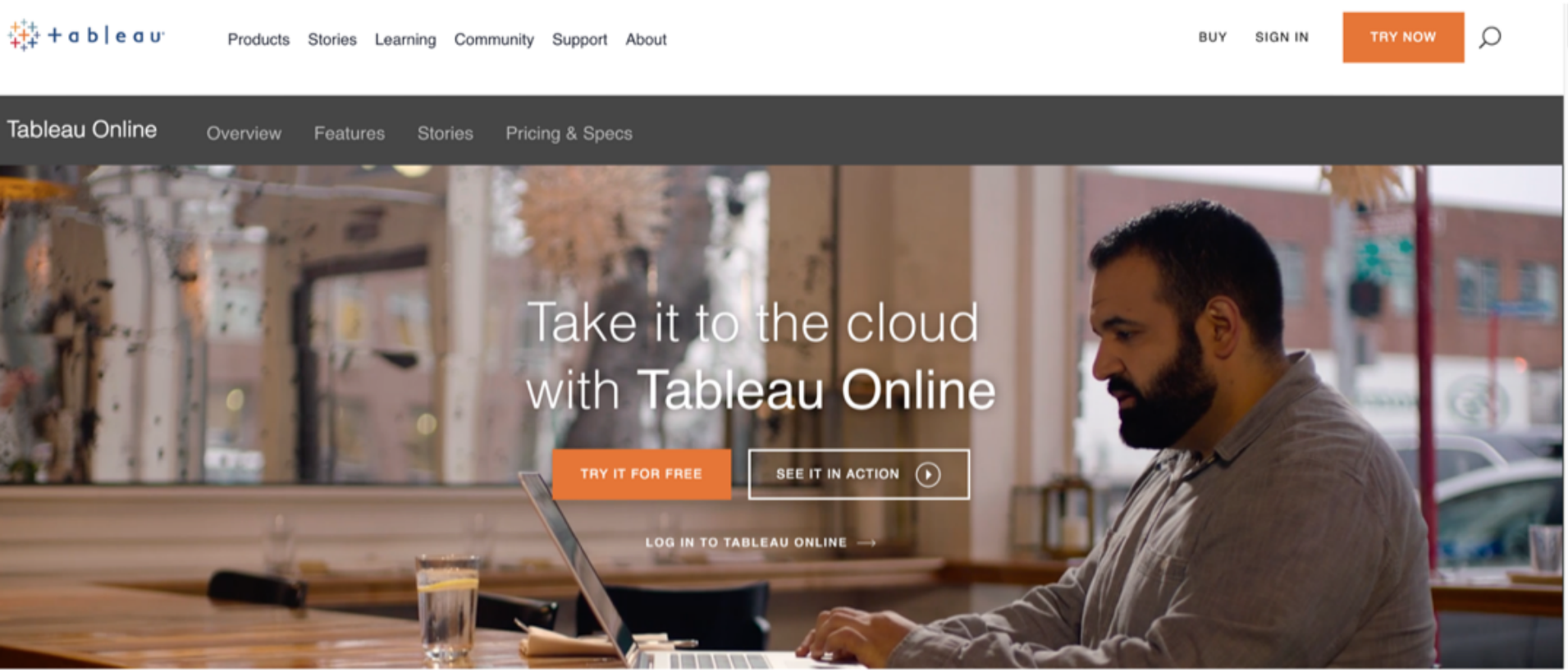


Tableau Server

- http://www.tableau.com/products/server

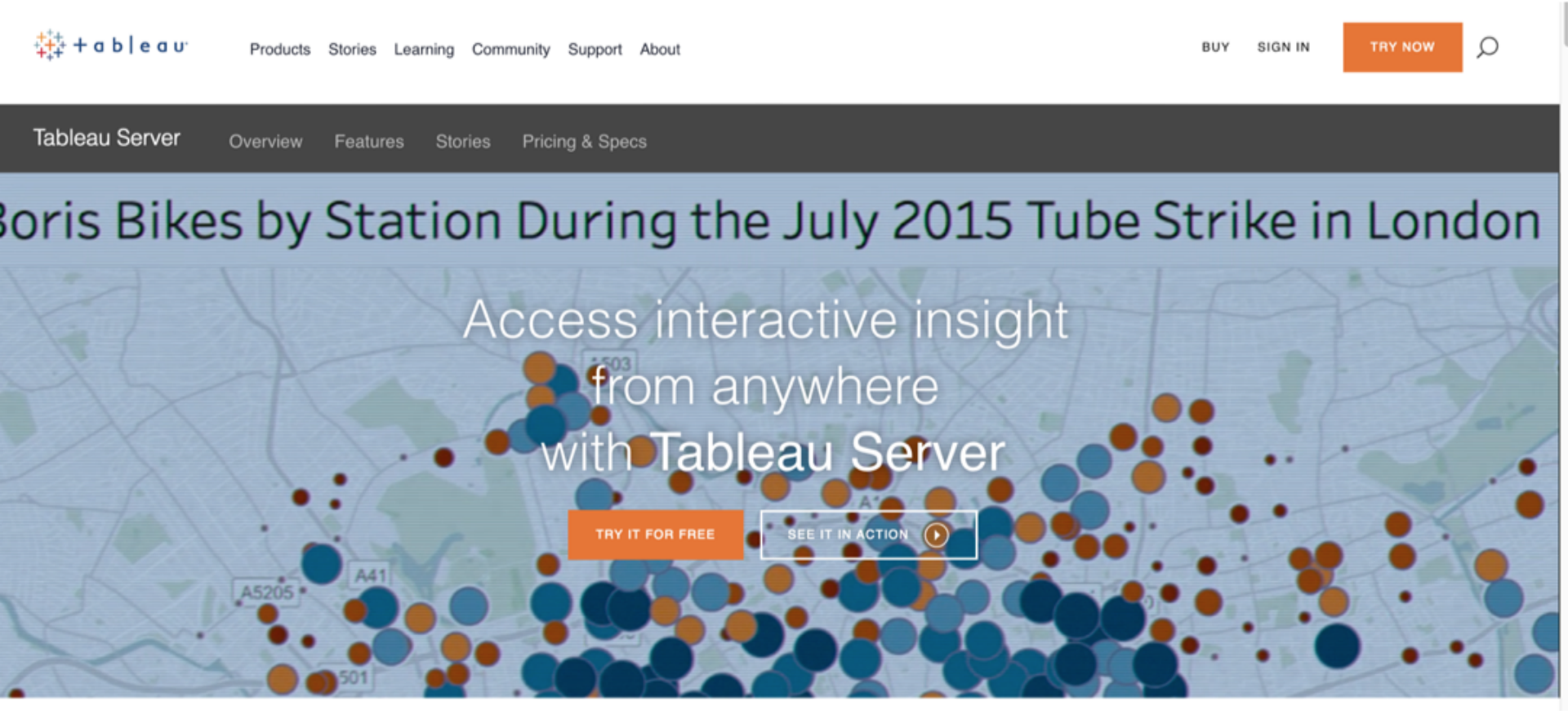


Tableau Server/Online Sign In

- To use Tableau Server, Sign in from
- Server -> Sign In

Tableau Public

- Free Tableau software. Same as Tableau desktop except less data sources and not able to save data locally, only publicly.
- https://public.tableau.com/

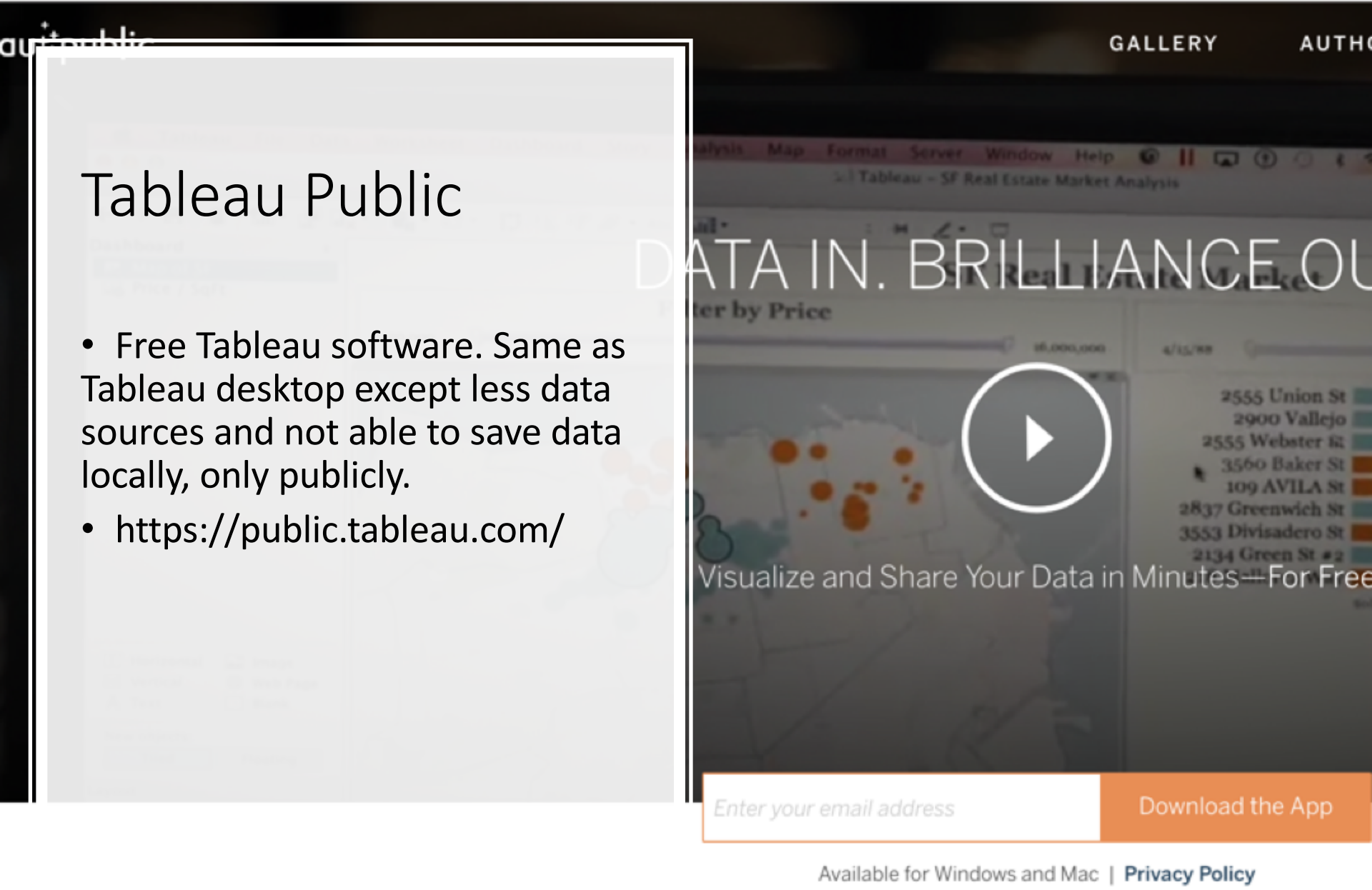
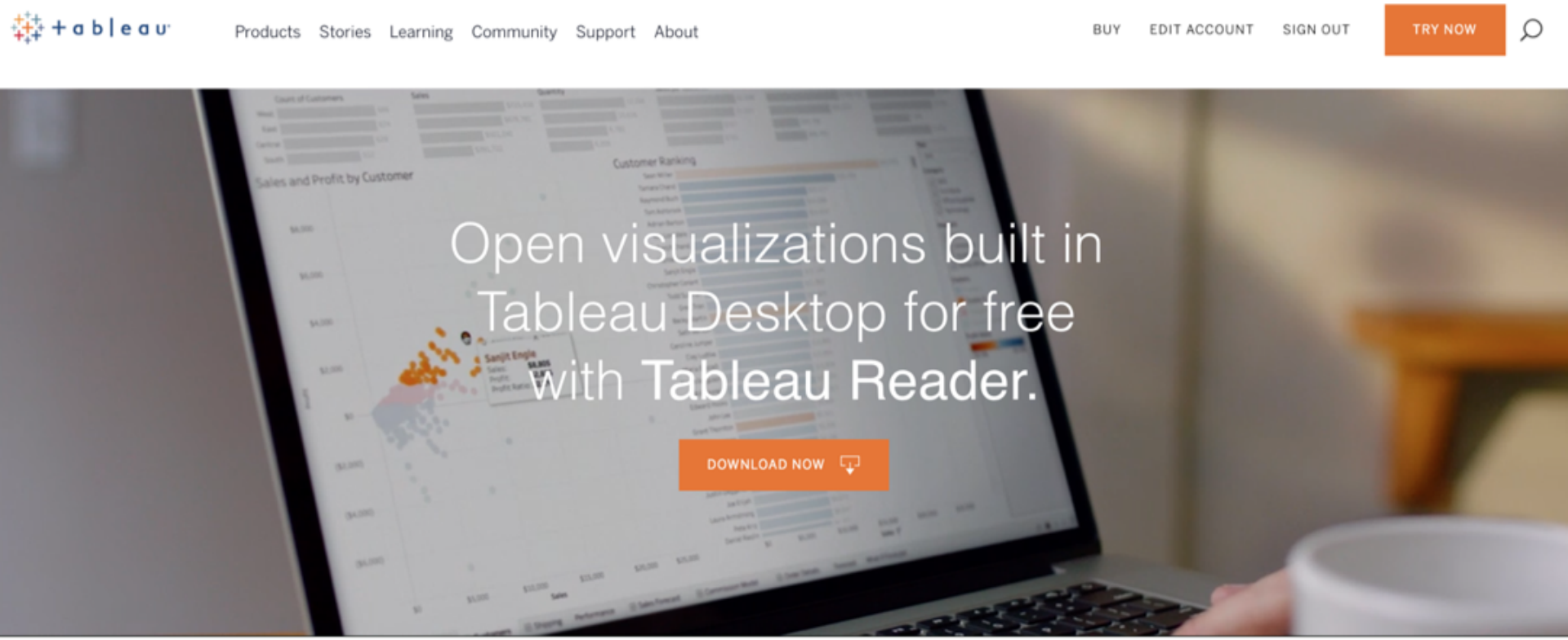


Tableau Public Account

- To use Tableau Public, need to create a Tableau Public account and profile
- https://public.tableau.com/profile/dearbharat#!/

Tableau Reader

- To open Tableau Packaged Workbook (twbx file)
- http://www.tableau.com/products/reader



D1 M2 Tableau Overview

Worksheets,
Dashboard, Stories
Dimensions &
Measures
Continuous Vs Discrete
Data
Folders, Hierarchies

Tableau File Types

Tableau Workbook (.twb)

- Stores a visualization without source data

Tableau Data Source (.tds)

- Stores the server address, password and other information required to access a data source

Tableau Bookmark (.tbm)

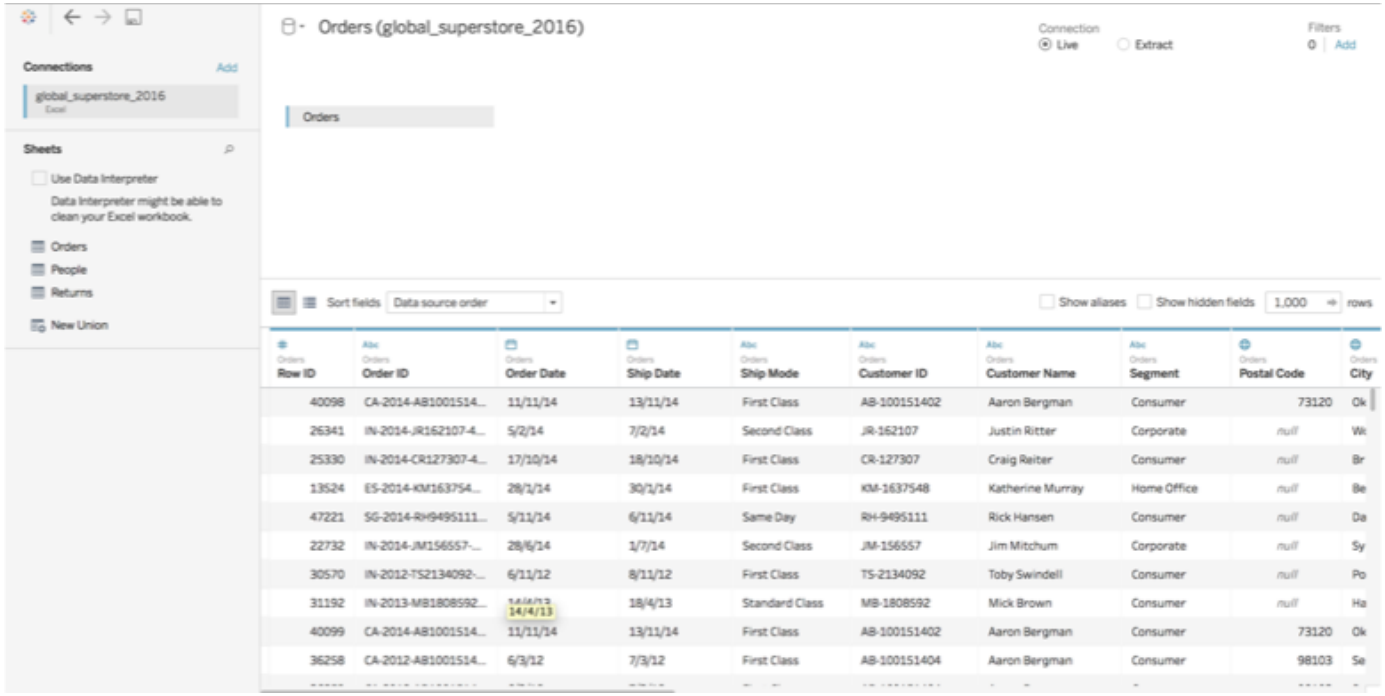
- Stores a connection to a worksheet in another Tableau workbook

Tableau Data Extract (.tde)

- Stores Tableau data as a filtered and aggregated extract

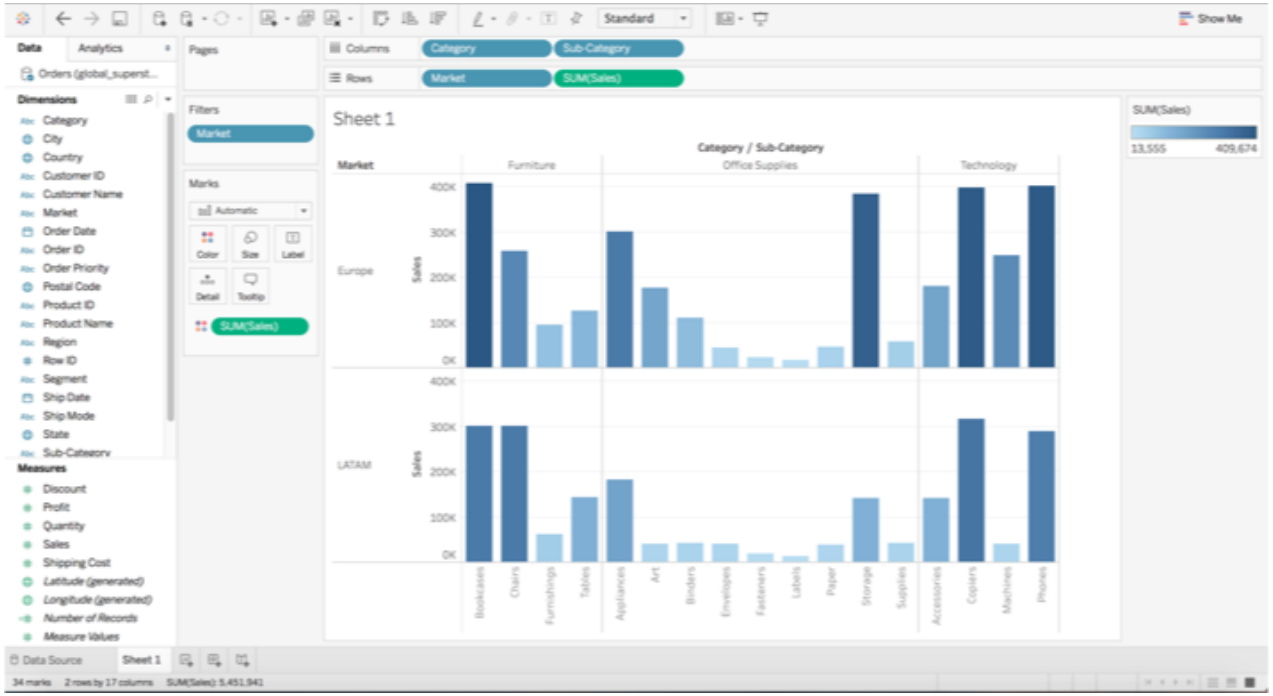
Tableau Packaged Workbook (.twbx)

- Stores extracted data and visualizations for viewing in Tableau or Tableau Reader



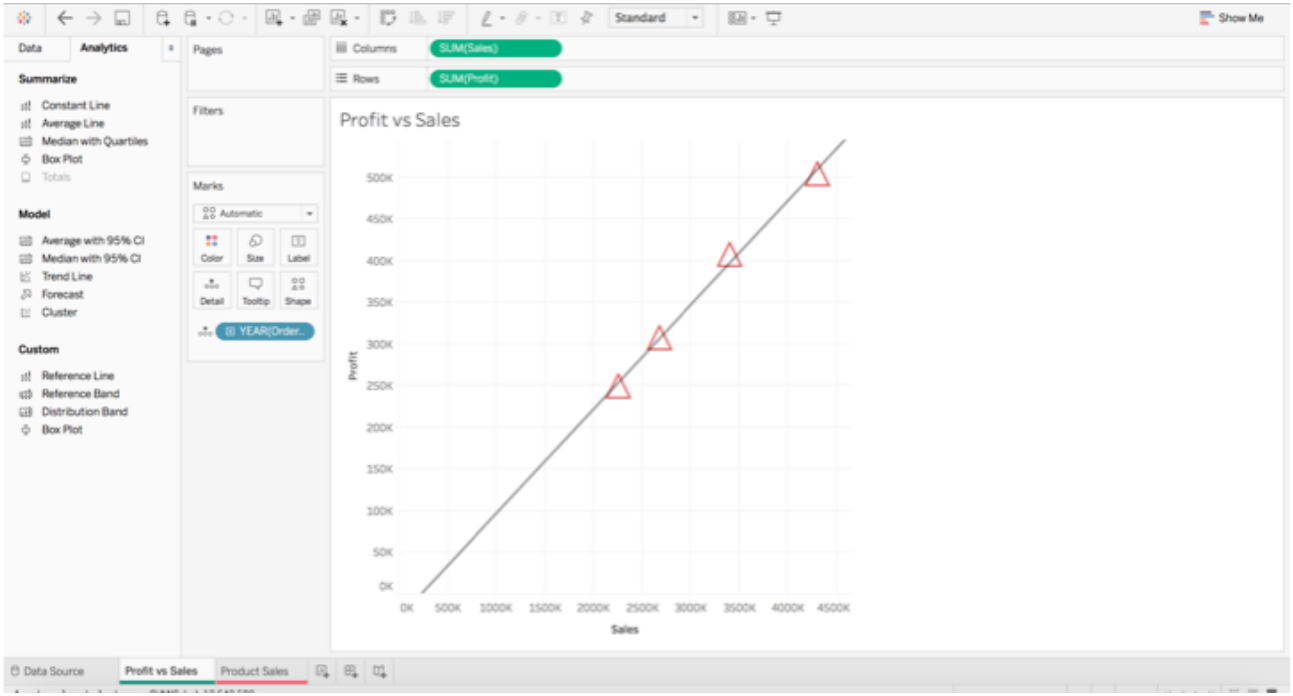
Explore Tableau Interface

Open global_superstore_2016.twb



Create Your First Viz

Q: How is the sales across categories and market?



Another Viz

Q: Is profit increasing with sales over the years?

Worksheet Basics

- Create new Worksheet (CTRL/CMD T)
- Rename Worksheet
- Duplicate Worksheet
- Delete Worksheet
- Reorder Worksheet
- Change Color
- CTRL Z to undo

Worksheet Basics

- Dimension and Measure fields
- Continuous and Discrete fields
- Hide/Show worksheet elements
- Hide/Show shelf elements
- Organize elements into folder
- Organize elements into hierarchy

Dimension and Measure

- If a field has values that are numbers that can be added, averaged, or otherwise aggregated, Tableau assigns that field to the Measures area of the Data pane when you first connect to a data source. Tableau is assuming that the values are continuous.
- If a field contains values that are names, dates, or geographical locations, Tableau assigns that field to the Dimensions area of the Data pane when you first connect to a data source. Tableau treats the values as discrete.

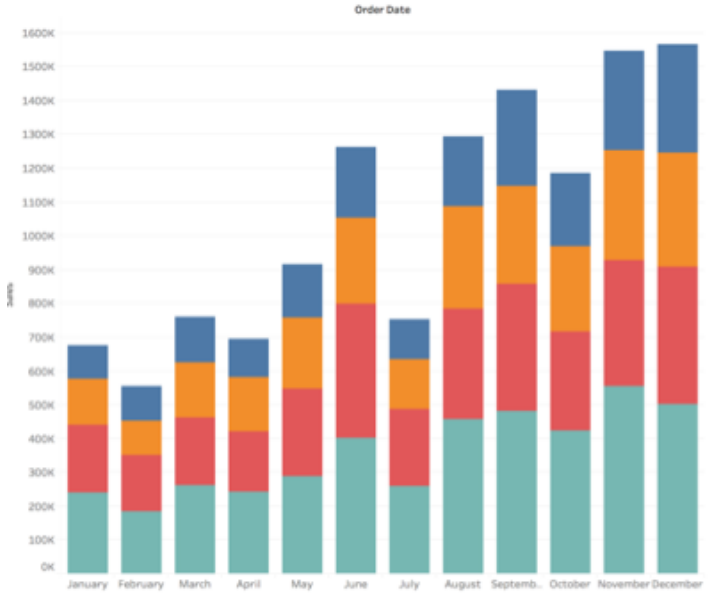
Continuous and Discrete Data

- When you drag a field from the Measures area to Columns or Rows, the values are continuous by default and Tableau creates an axis
- When you drag a field from the Dimensions area of the Data pane to Columns or Rows, the values are discrete by default and Tableau creates column or row headers.
- If a field is continuous, the background color is green.
- If it is discrete, the background color is blue.

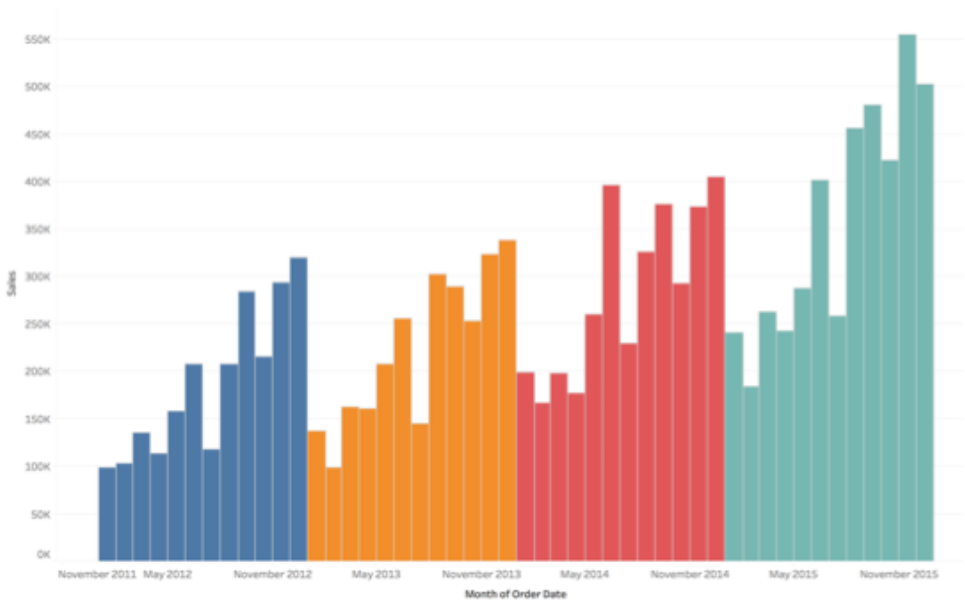
Discrete vs Continuous Data

- Open global_superstore_2016.twb
- Plot Sales vs Month (Order Date)
- Change Month from Discrete to Continuous Data from the dropdown

Discrete



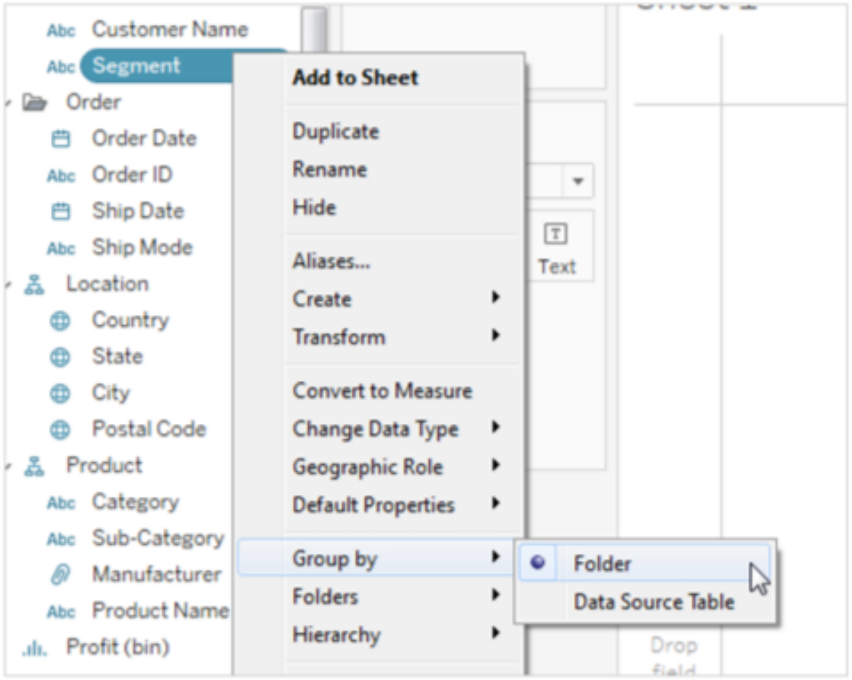
Continuous

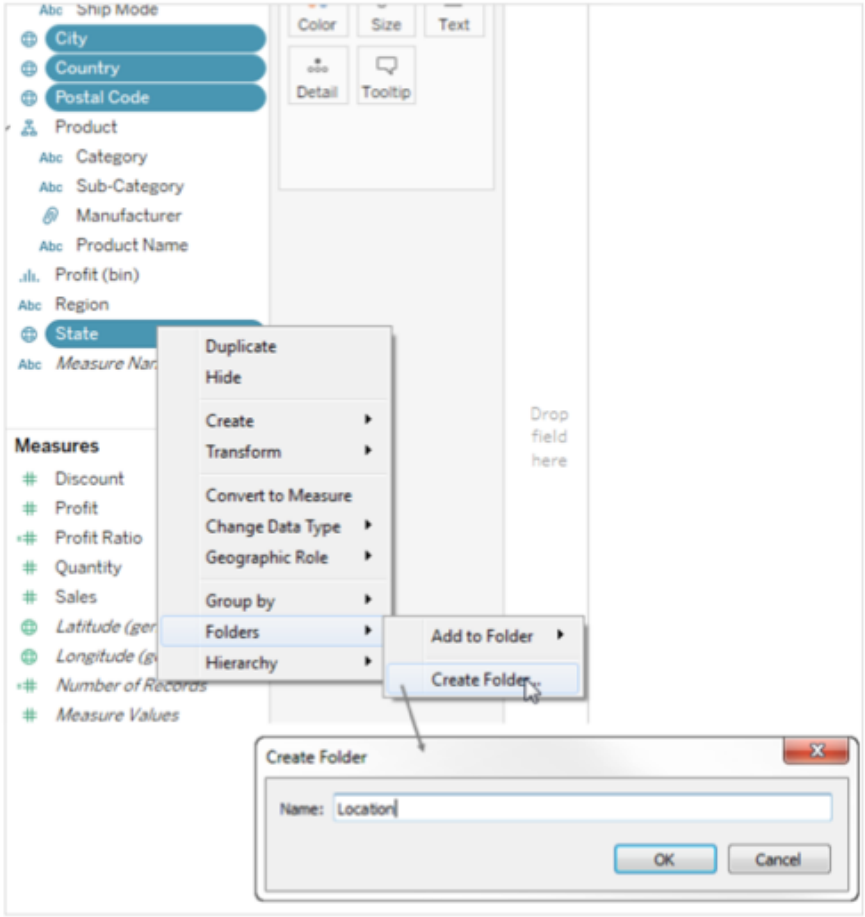


Create Folder

- To make data sources with many fields easier to work with, you can organize the Data pane items into folders
- The Group by Folder option can be accessed from the Data pane menu.
- In the Data pane, select Create Folder.
- When prompted, name the new folder.
- Drag a field on top of the folder name to add the field to the folder

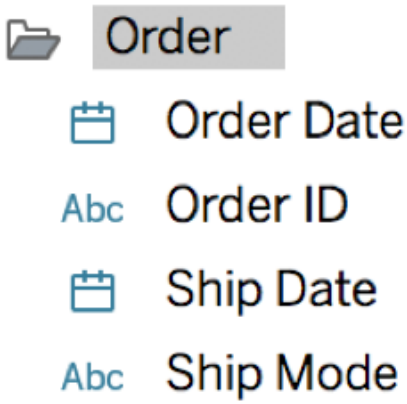
Create Folder





Ex: Create Folder

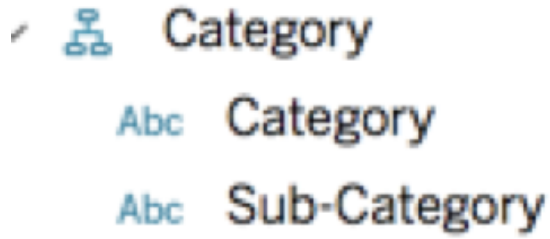
- Open global_superstore_2016.twb
- Create a folder Order
- Group Order Date, Order ID, Ship Date, Ship Mode under Order folder



Time : 5 mins

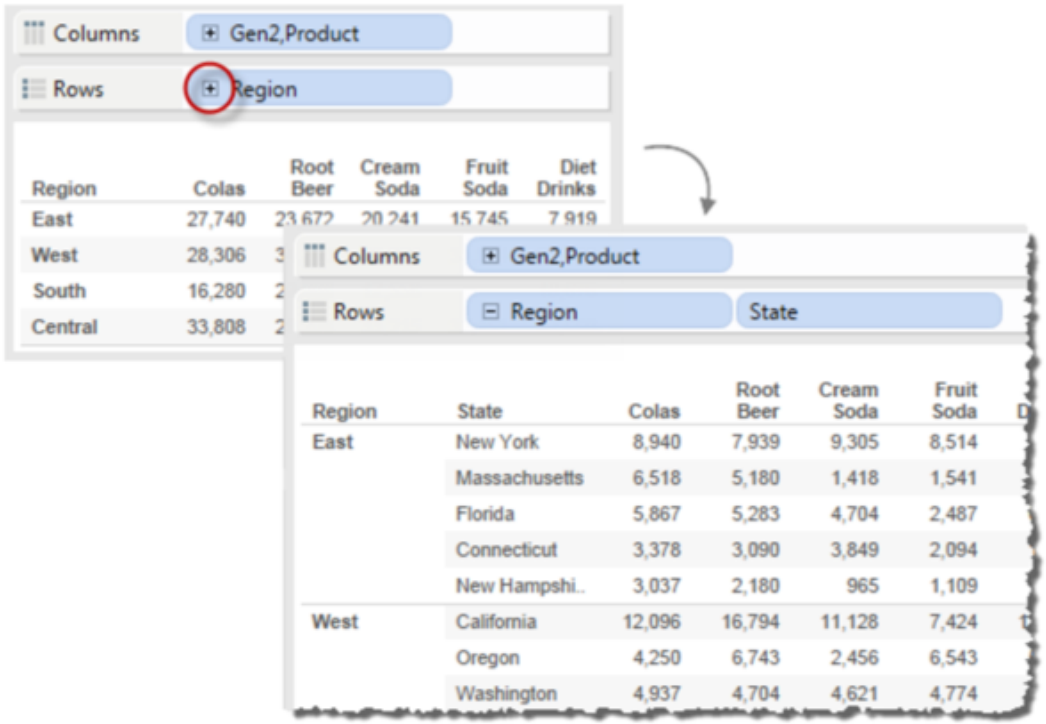
Create Hierarchy

- Drag and drop one dimension to another dimension
- Select Create Hierarchy
- When prompted, name the new hierarchy



Drilling Down and Up

- You can drill down or drill up by clicking on a dimension that is placed on any shelf



Ex: Hierarchy

- Open global_superstore_2016.twb
- Create a hierarchy for Location - Country, State, City, Postal Code
- Plot Sales vs Country, further drill down to City

Time: 5 mins

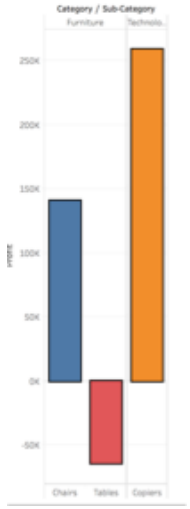
Data Visualization

Show Me:

- Bar Chart
- Table
- Map
- Box plot
- Line plot
- Pie chart
- Histogram
- Heat map
- Tree map

Bar Chart

- On the Dimensions pane, open Product and drag Category, then Sub-Category to the Columns shelf. From the Measures pane, drag Profit to the Rows shelf.
- Plot color and select columns to keep only
- To display each bar as a separate color, drag Sub-Category to the Color card. As a final touch, click the Color card to edit the color palette and choose Blue.



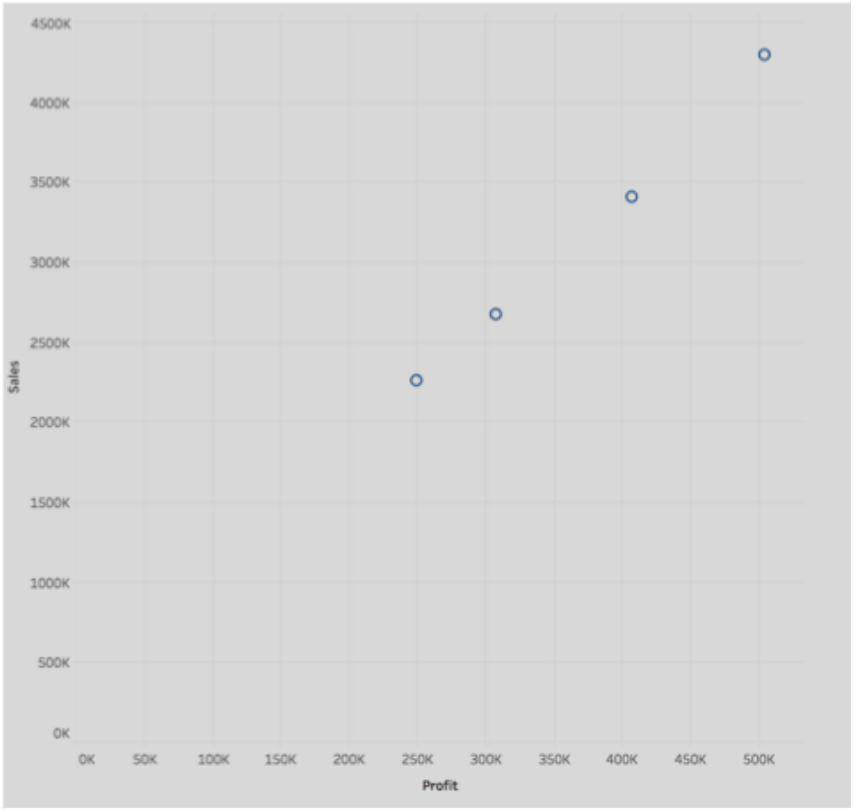
Table

- Drag Segment to the Columns and Category and Sub-Category to the Rows, then drag Profit to the Text card
- From Dimensions, drag Segment to the Columns shelf and Category and Sub-Category to the Rows shelf, then drag Profit to the Text card

		Segment		
Category	Sub-Catego..	Consumer	Corporate	Home Office
Furniture	Bookcases	79,222	54,677	28,025
	Chairs	72,672	45,370	22,354
	Furnishings	26,469	13,200	7,176
	Tables	-24,730	-29,520	-9,833
Office Supplies	Appliances	65,568	52,185	23,810
	Art	33,042	14,265	10,523
	Binders	40,220	18,572	13,641
	Envelopes	14,977	9,236	4,637
	Fasteners	6,821	4,586	2,437
	Labels	7,664	4,519	2,806
	Paper	27,624	17,180	13,308
	Storage	47,644	38,573	22,200
	Supplies	9,603	8,471	4,486
Technology	Accessories	60,273	45,534	23,820
	Copiers	124,216	83,622	50,730
	Machines	28,372	15,504	14,991
	Phones	129,585	45,235	41,897

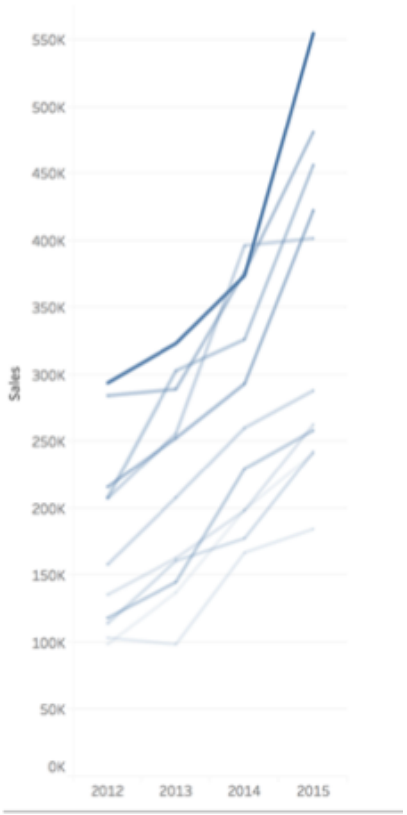
Scatter Plot

- Drag Sales to Columns and Profit to Rows
- Disable Aggregate Measures from Analysis menu
- Drag Order Date to Detail Shelf



Motion Chart

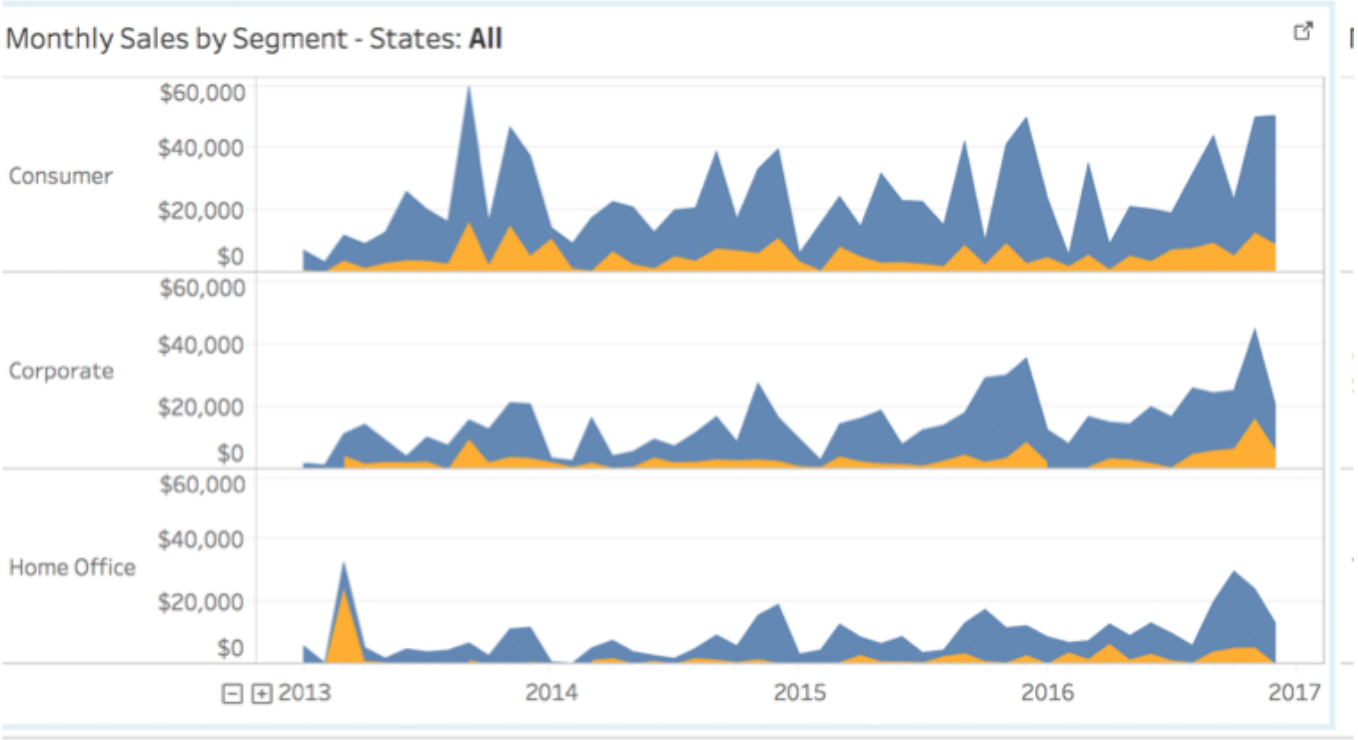
- Drag Order Date to Columns and Sales to Rows
- Drag Order Date to Page Shelf, Change to Month
- Check Show History and Select All



Ex: View

- Open global_superstore_2016.twb
- Plot Monthly Sales by Segment

Time: 5 mins



Saving Workbook

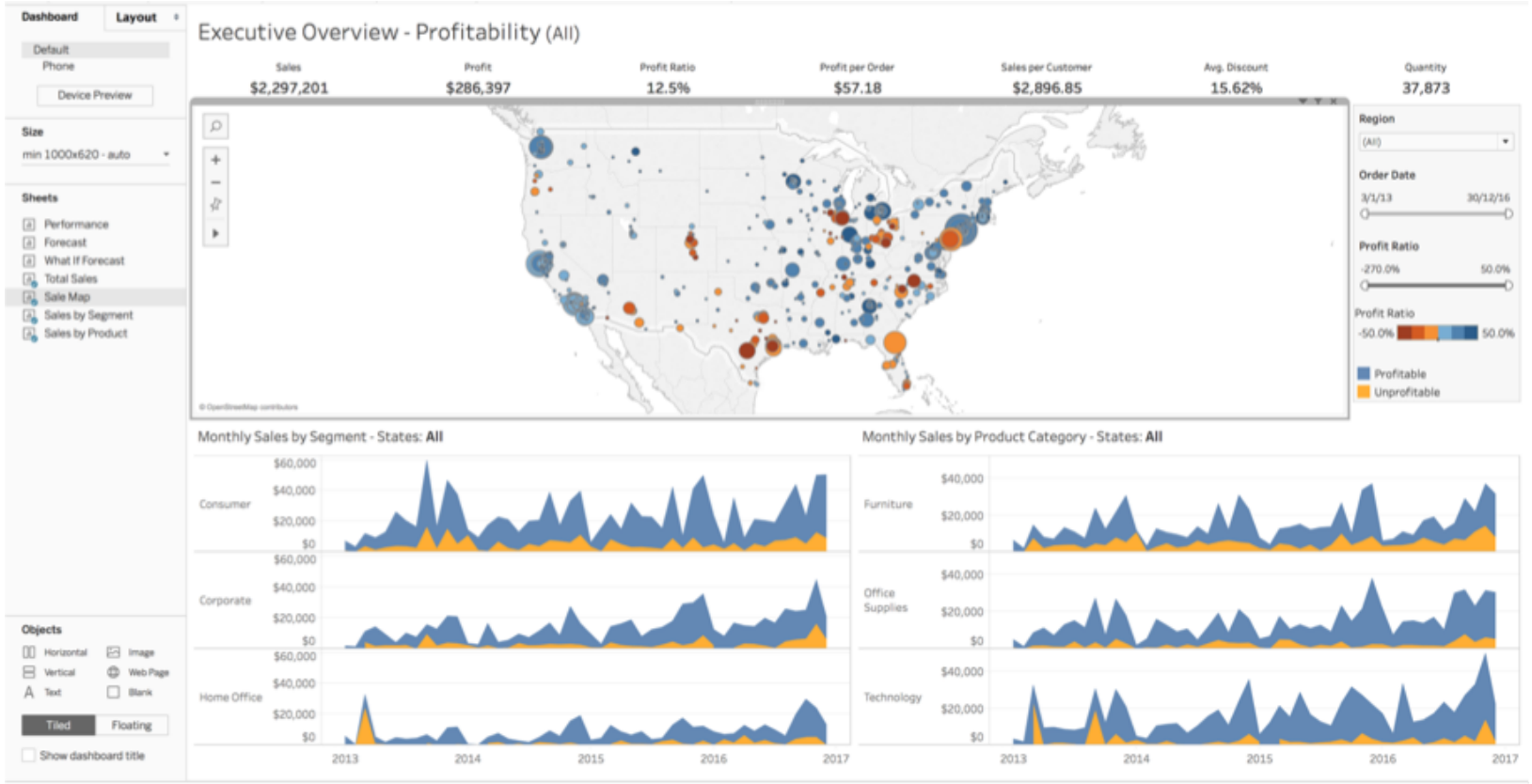
- File -> Save As -> Either twb and twbx.
- File -> Export Packaged Workbook

Dashboard

- A dashboard is a collection of several worksheets and supporting information shown in a single place so you can compare and monitor a variety of data simultaneously
- Each view you add to the dashboard is connected to its corresponding worksheet. That means when you modify the worksheet, the dashboard is updated and when you modify the view in the dashboard, the worksheet is updated.

Dashboard

- Dashboard is good for displaying all relevant data and info on one page



Dashboard Basics

- Drag and hold to drop sheet to desired location
- Add Objects - Layout Container, Image, Web page, Text
- Tiled vs Floating object
- Fit - Standard, Fit width, Fit height, Entire
- Filter - Apply to worksheet
- Device Designer Default/ Desktop/ Laptop/ Phone (Only can view on Tableau Online/Service)

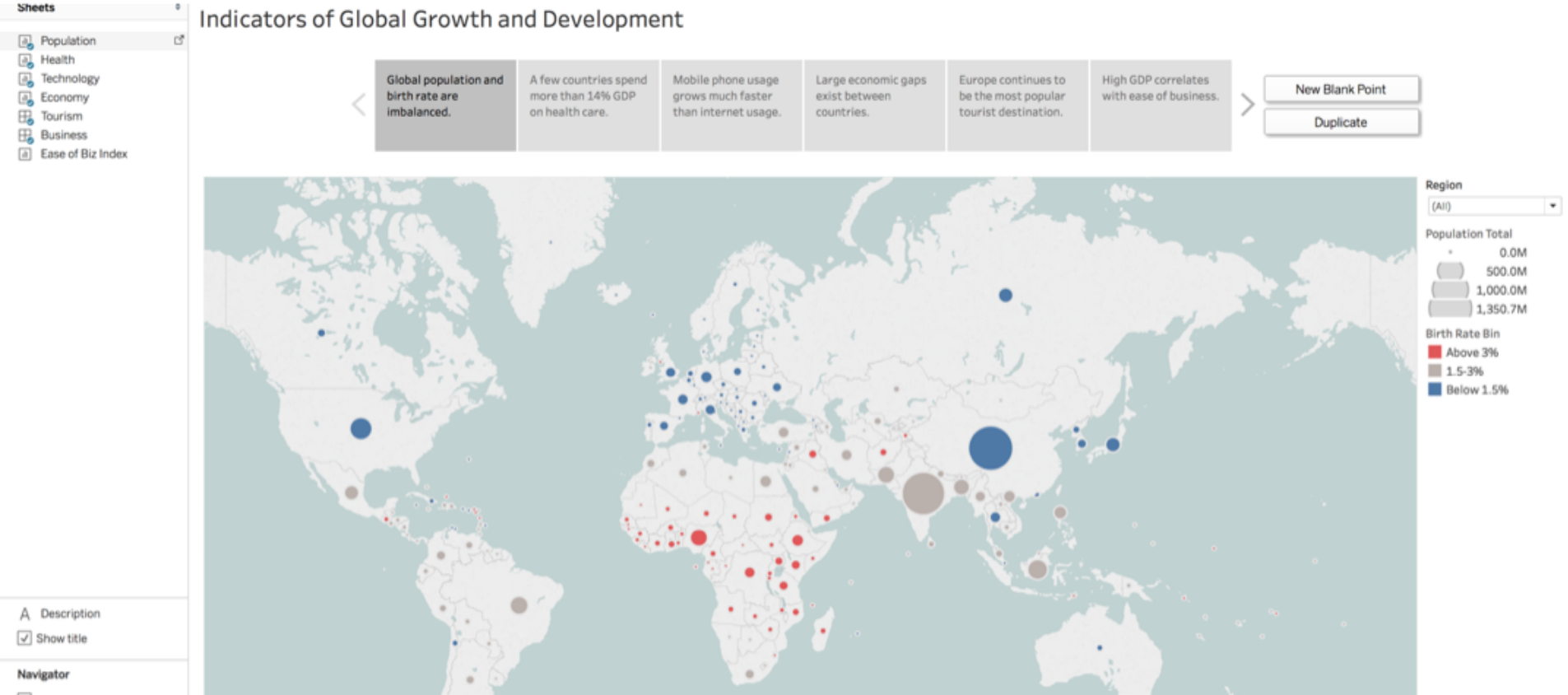
Ex: Dashboard

- Open global_superstore_2016.twb.
- Add a Table view, Bar Chart view and map view to the dashboard
- Add Filter action to create interaction amond the worksheets

Time: 5 mins

Story

- A story is a sheet that contains a sequence of worksheets or dashboards that work together to convey information



Story Basics

- Add sheets to blank story point
- Rename the caption
- Resize captions
- Rearrange the story point
- Delete story point
- Add a filter and update
- Add a description
- Any changes to story will not affect the worksheet

Ex: Story

- Open global_superstore_2016.twb
- Present a story on how the company sales has expanded globally over the years

Time : 5 mins

D1 M3 Getting Data in Tableau

Data Import Export

Data Join

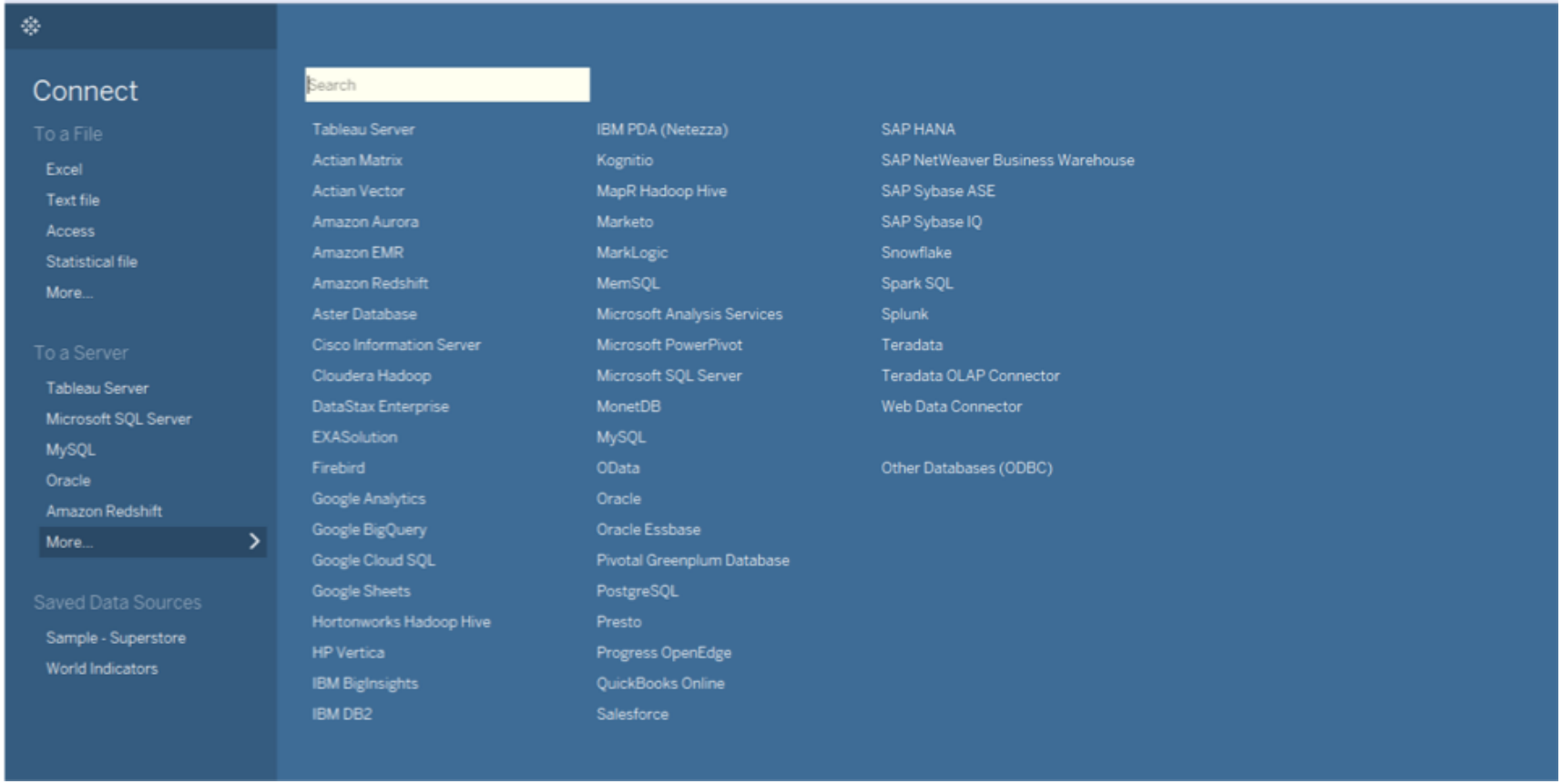
Data Extracts

Data Blending

Data Source Filters

Data Sources

- Tableau can connect to wide variety of data sources such as Excel, Google, Oracle...

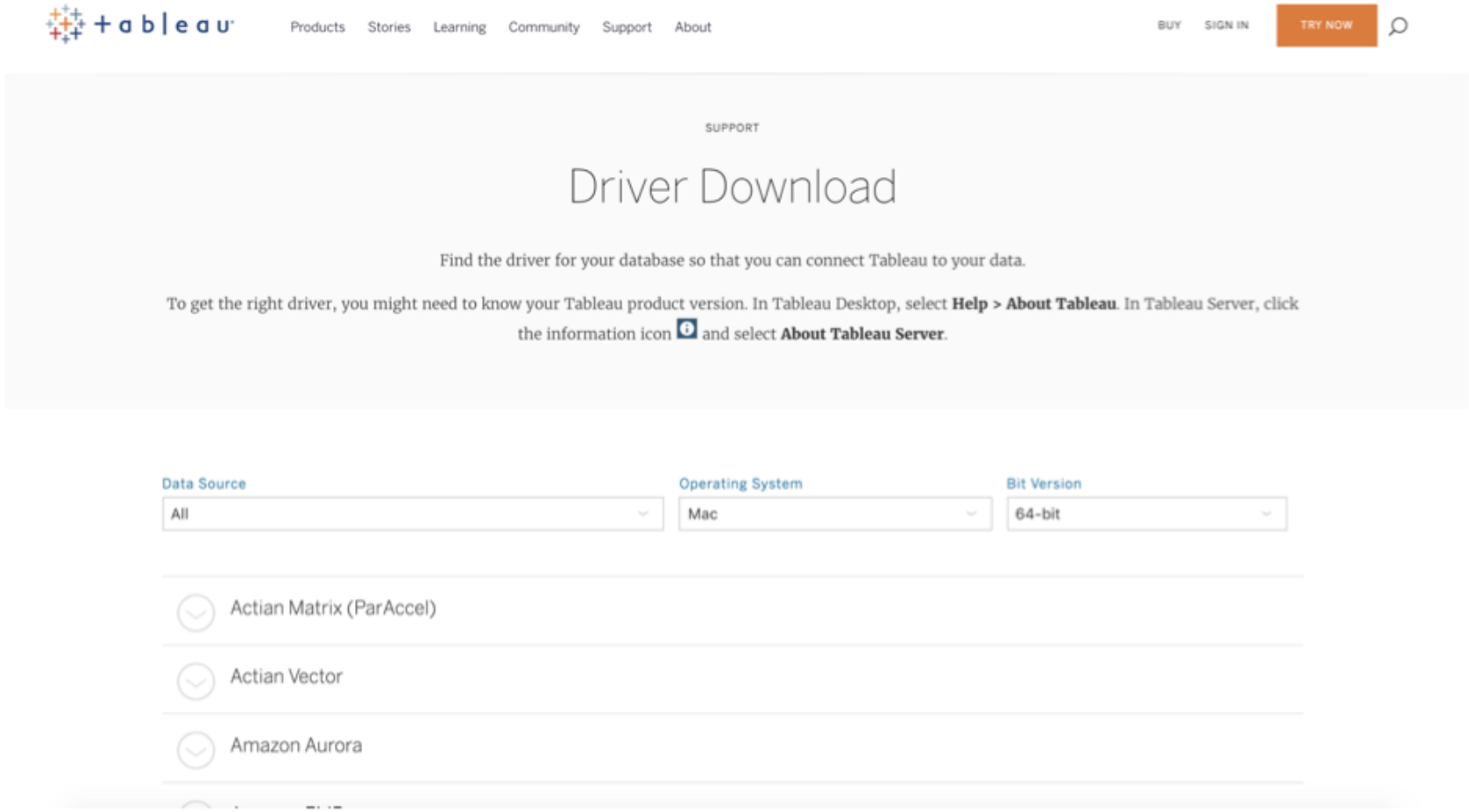


Connect to Excel

- Connect to global_superstore_2016.xls
- Various ways to connect to the data sources
  - Menu -> New Data Sources
  - Toolbar -> Click on New Data Sources icon
  - Shortcut key -> CTRL(CMD) D
- Edit the Sheet name, Field name, Filter the data

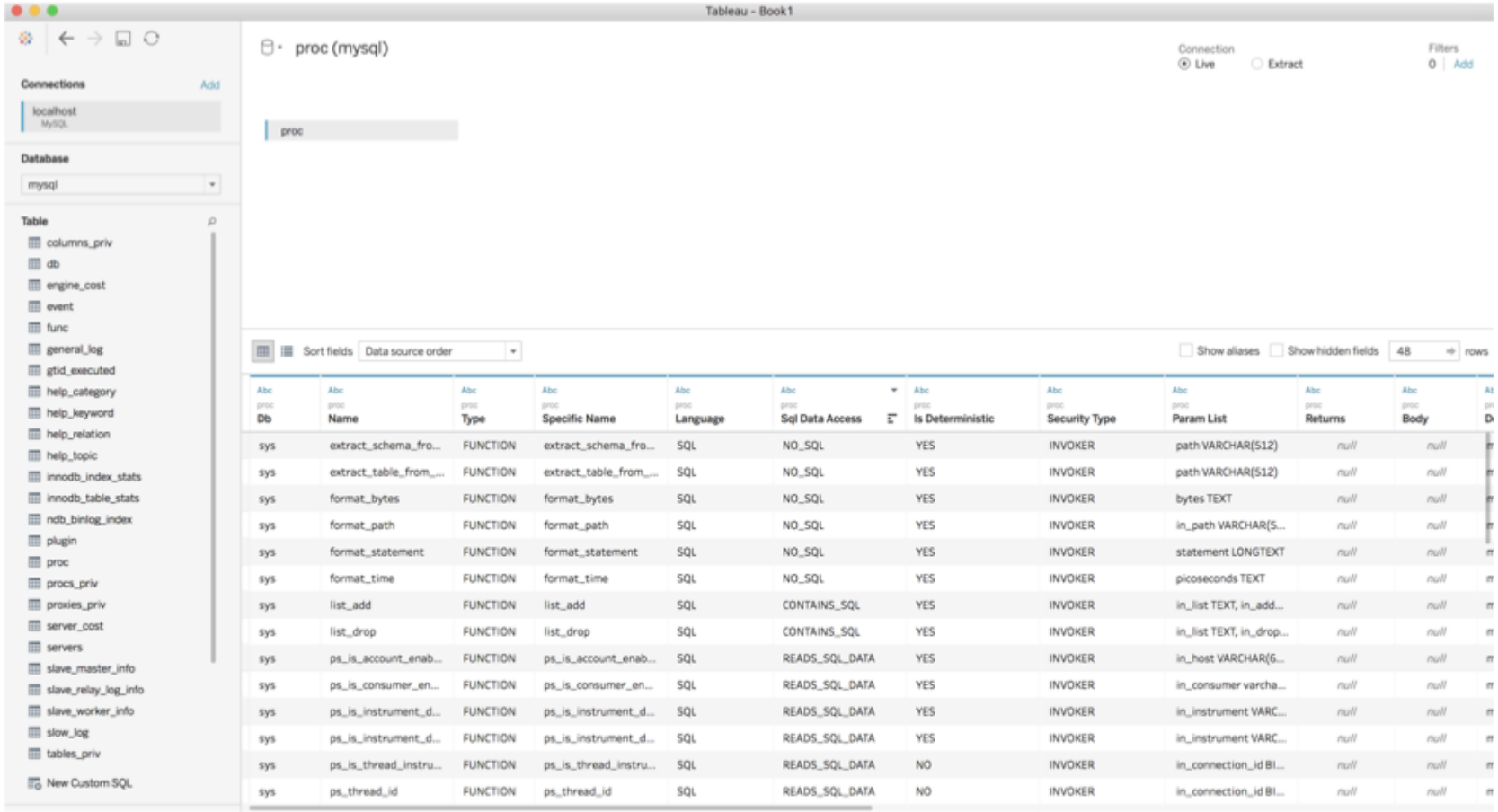
Installing Tableau Driver

- https://www.tableau.com/support/drivers



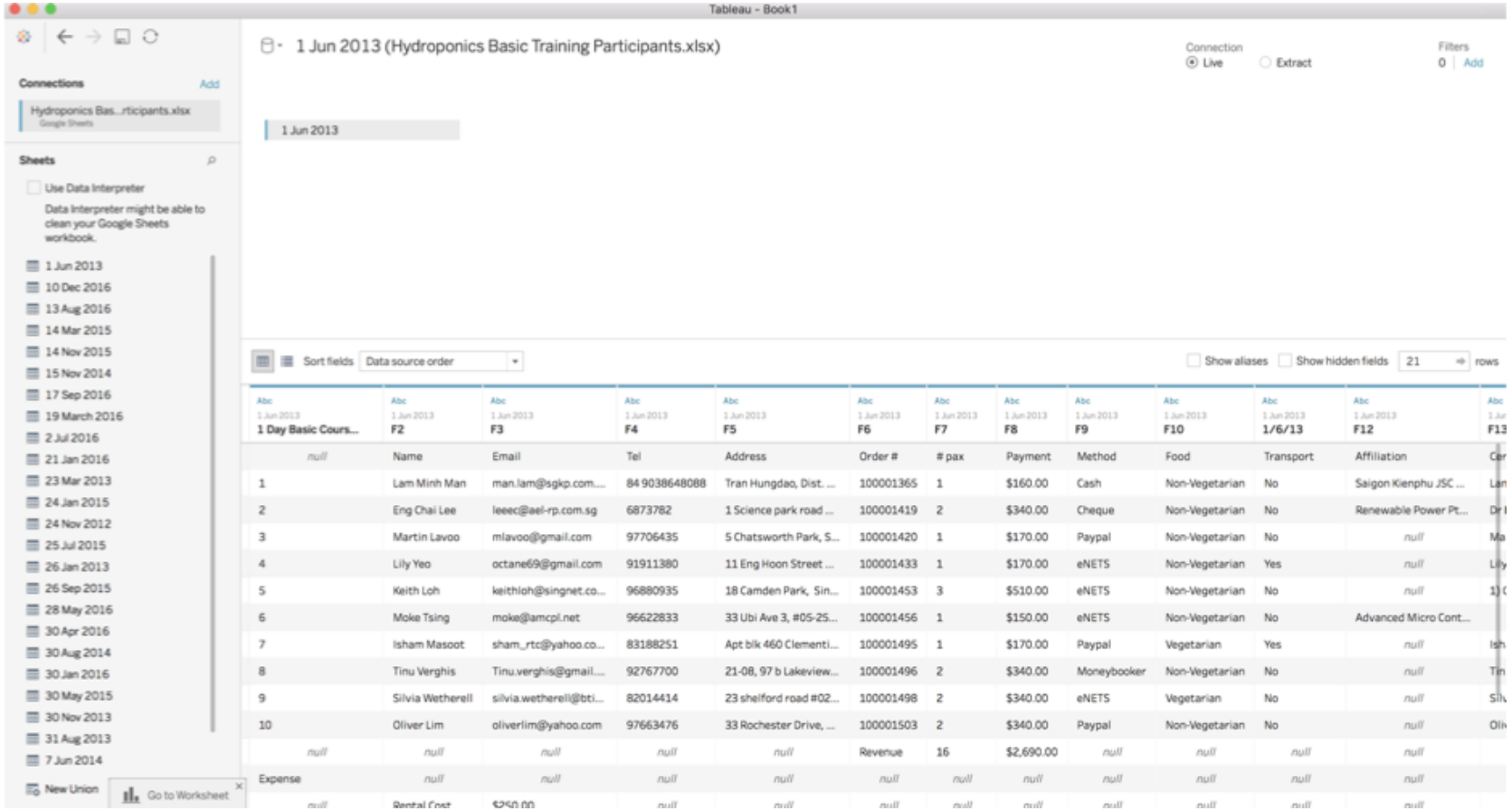
Connect to MySQL DB

- Install MySQL Driver



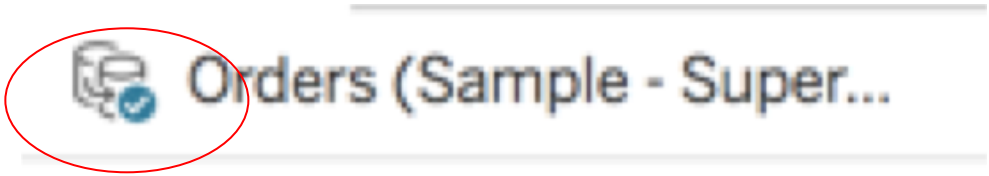
Connect to Google Sheet

- Allow Tableau to access your Google Sheet



Extract

- External source can be slow
- Use Extract to create a local copy
- Save the extract to your Tableau Repository (File -> Repository Location)
- To reload the changes from original data source, Menu->Data->Refresh All Extracts
- Or in the Visualization dashboard, right click the data source -> Refresh



Data Source Filters

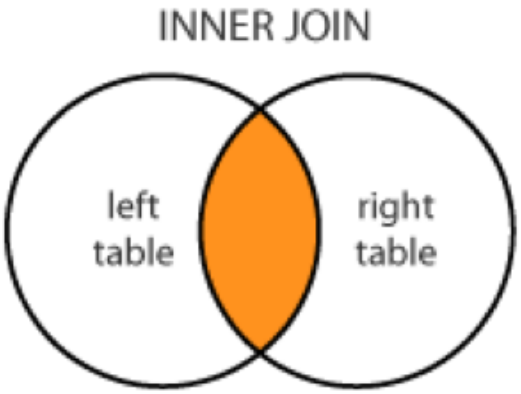
- Two ways to filter the extract
  - Click the Filter button on the Data Source
  - Right click the data source on Visualization dashboard -> Extract Data -> Add Filters

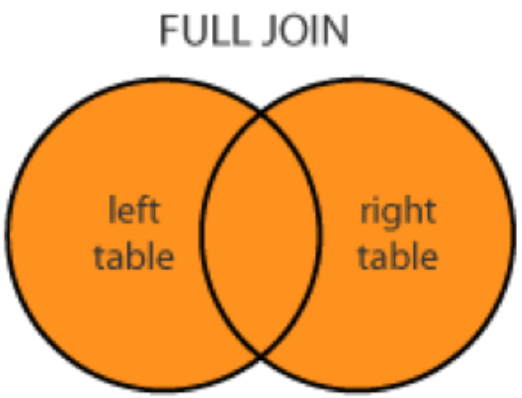
Ex: Extract

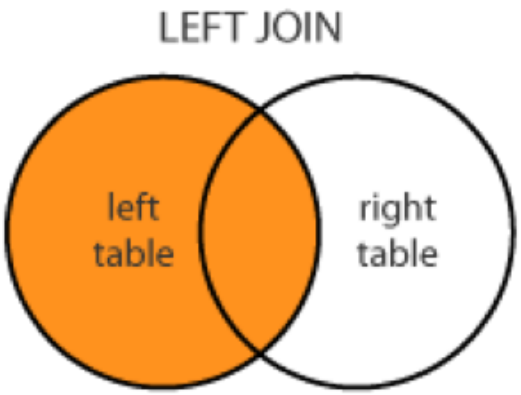
- Load Module 4 Sales 2016.xls
- Change Live data connection to Extract
- Filter a few product IDs
- Rename source name
- Refresh the extract

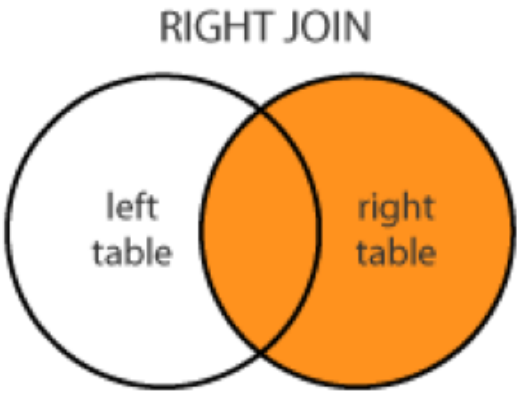
Time: 5 mins

Data Join Types









Data Join Type Definitions

Inner Join: Returns all rows when there is at least one match in BOTH tables

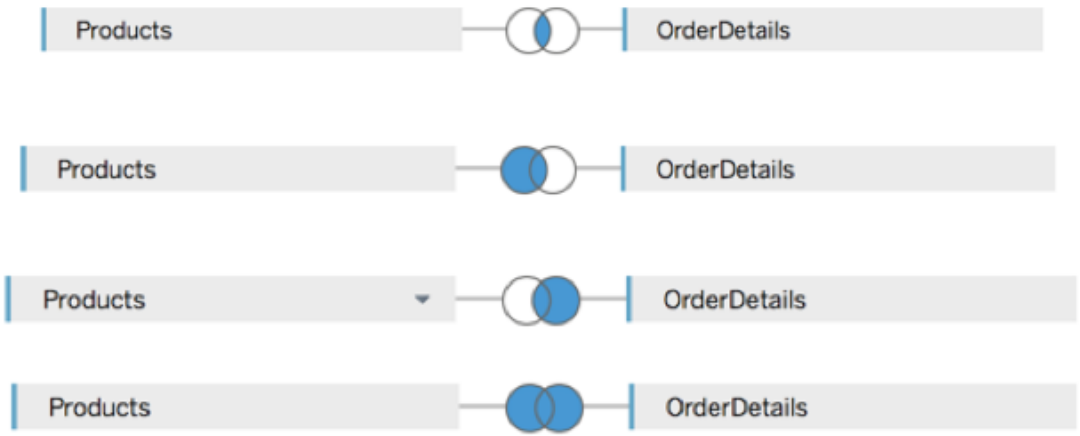
Left Join: Return all rows from the left table, and the matched rows from the right table

Right Join: Return all rows from the right table, and the matched rows from the left table

Full (Outer) Join: Return all rows when there is a match in ONE of the tables

Data Join Demo

- Connect global_superstore_2016.xls
- Create a Inner Join for Orders, People and Returns data sources
- Change to Left Join, Right Join and Full Join



Ex: Data Join

- Connect to Module 4 Sales 2016.xlsx and Product 2016.csv
- Do a Left Join
- Plot Sales vs Category and Sub-Category, breakdown by Years.

Time: 5 mins

Joining Related Fields with Different Names

- Connect Module 4 DifferentNames.xls
- Do a Inner Join for Product and OrderDetails
- Select Product ID (Left) and Prod ID (Right)

D1 M4 Data Processing in Tableau

Data Transformation

Data Interpreter

Data field merge & split

Data Pivot

Groups & Sets

Excel Data Interpreter

- Connect to Module 5 MonthlyData.xlsx
- Data is not uploaded correctly
- Use Data Interpreter to clean up the data

Ex: Data Interpreter

- Connect to Module 5 GlobalVehicleSales.xls
- Open the excel file to see whether it match to excel file
- Clean up the data using data interpreter

Time: 2 mins

Split Fields

- Connect to Module 5 acrossthebay10k.xlsx
- Split the Name to First Name, Last Name
- Custom Split the Overall by "/" to Position and Total
- Split can be done on the Data Source or Visualization dashboard

Ex: Split Fields

- Connect Module 5 CombinedData.xls
- Custom split the Category Name to Category and Product
- Visualize the price for various category and product

Time: 2 mins

Merge Fields

- Connect to Module 5 Weather.xls
- Combine 4 sheets to one sheet with Union
- Merge mismatched fields to Rainfall and Month
- Plot Rainfall vs Month

Pivot Data

- Connect to Module 5 GlobalVehicleSales.xlsx
- Clean up using data interpreter
- Select all the years
- Select Pivot -> Generate 2 fields
- Rename the 2 pivot fields

Ex: Pivot Data

- Open GlobalVehicleSales.xlsx from Module 5 exercise folder
- In the Data Source, select 2005 to 2014, right click and select Pivot
- Rename the pivot fields to Year and Sales
- Goto Worksheet, drag Year to Column, Sales to Row
- Create a Pivot Table of Year (Col) and Region (Row)
- Analysis -> Totals -> Show Grand Totals

Time: 5 mins

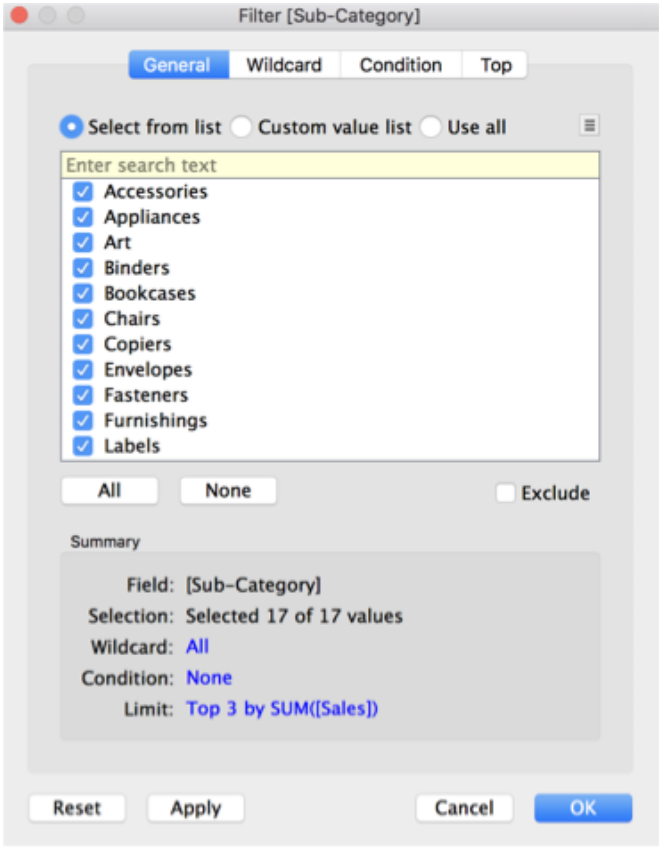
Filter Data

- Filtering is the process of removing certain values or range of values from a result set
- Tableau can do 3 types of filtering
  - Filter Dimensions
  - Filter Measures
  - Filter Date

Filter Dimension

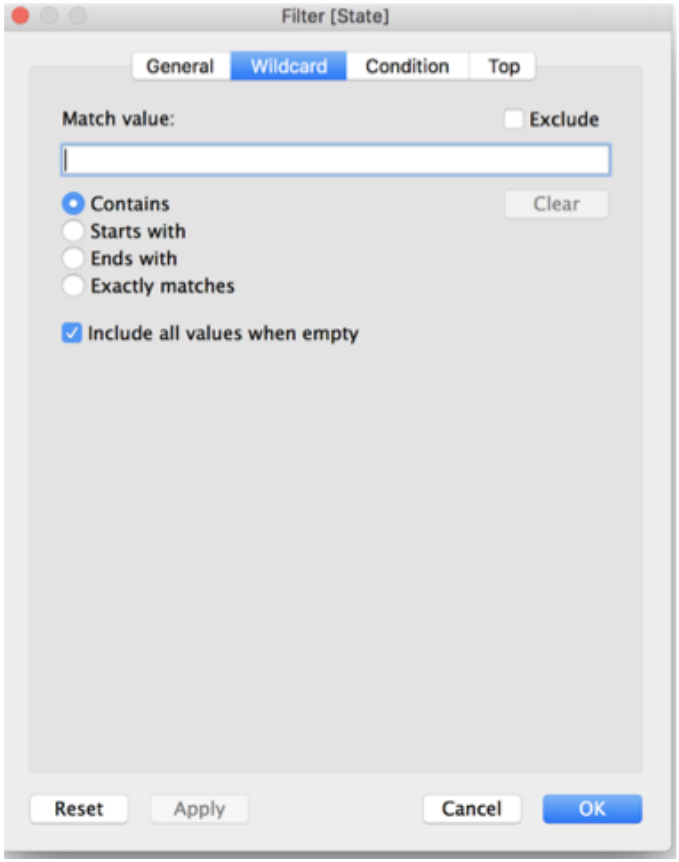
Tableau offers the following types of filters for dimensions.

- General Filter
- Wildcard Filter
- Condition Filter
- Top Filter



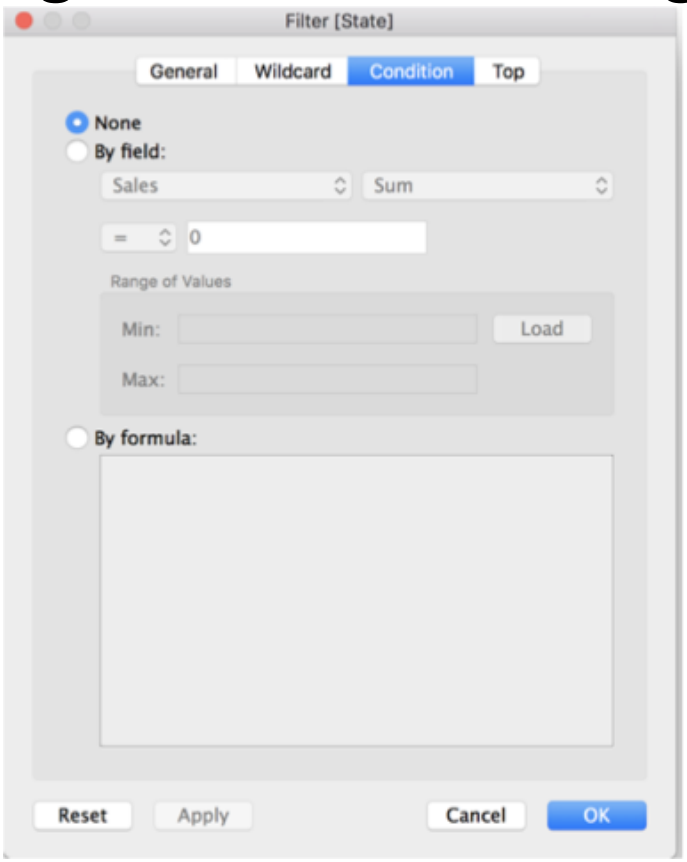
Wildcard Filter

- Use wildcard filter to select states



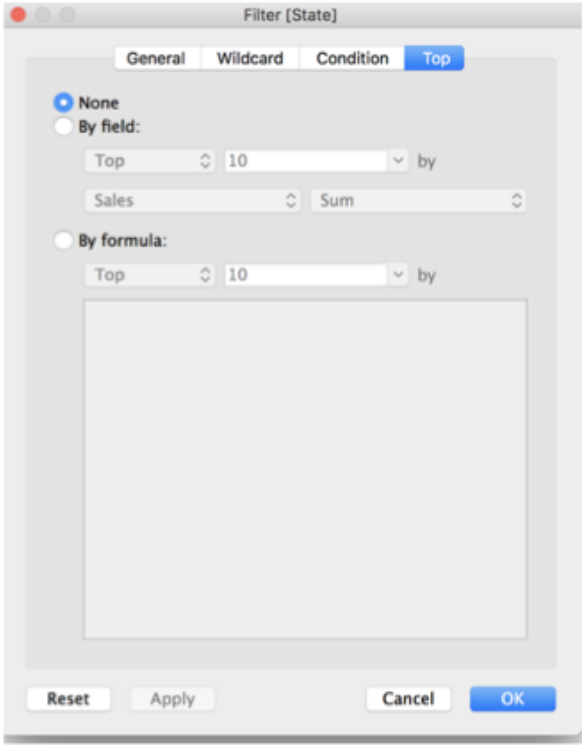
Condition Filter

- Use condition filter to apply some conditions to a filter eg Add a condition eg Quantity Sum < 100



Top Filter

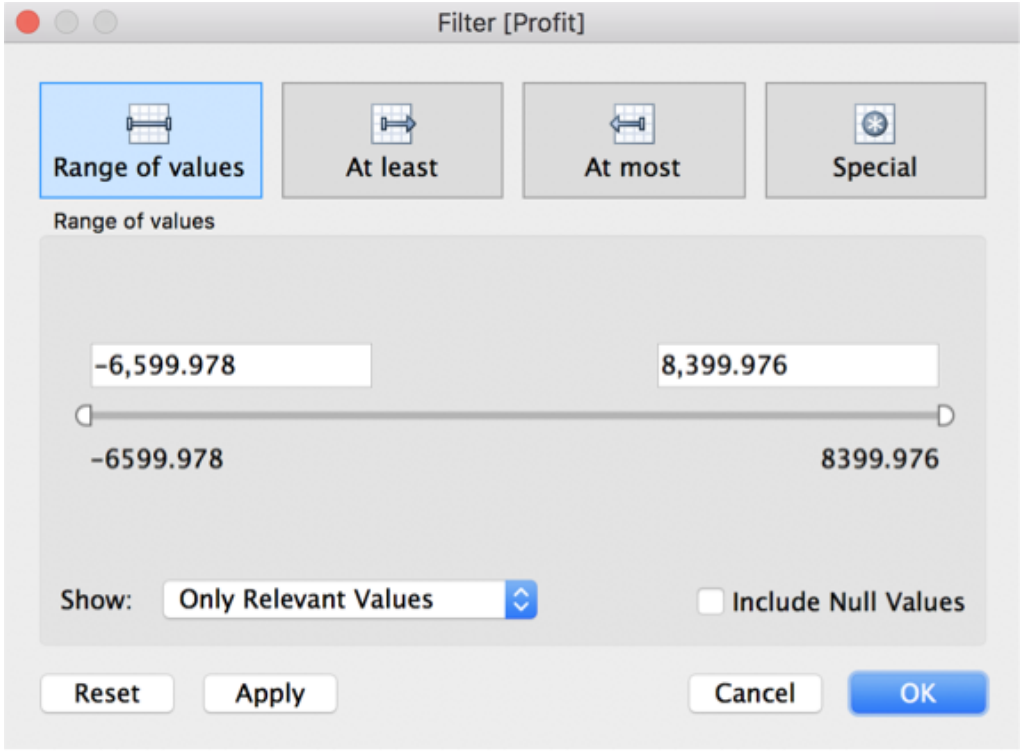
- Use top filter to limit the result set from a filter. For example, from a large set of records on sales we want only the top 10 values.



Filter Measure

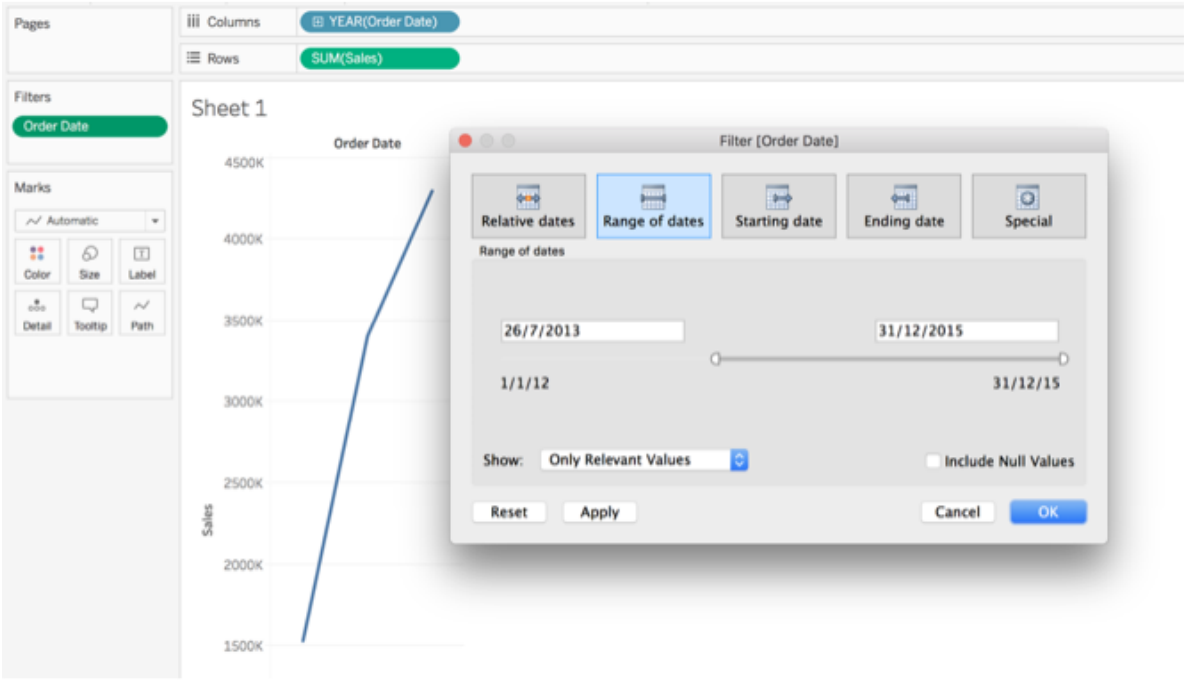
Tableau offers the following types of filters for measures:

- Range of Values
- At Least
- At Most
- Special



Filter Date

- Connect to global_superstore_2016.xls
- Show Sales vs Category
- Drag the "order date" field to the filter



Ex: Filter Data

- Connect to global_superstore_2016.xls
- Create a Filter for Sales vs region
  - Include only East and West regions
  - Sales above 100K
  - Show only 2014 to 2016

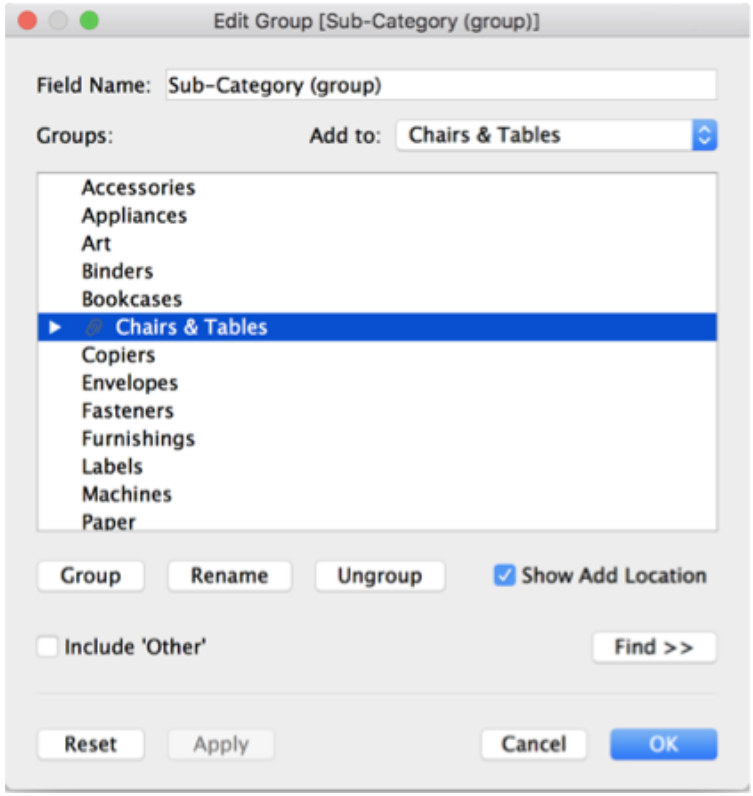
Time: 5 mins

Group

- Plot Sales vs Country
- Filter the ASEAN countries - Singapore, Malaysia, Indonesia, Philippines, Lao, Cambodian
- Right Click and Choose the Group Icon

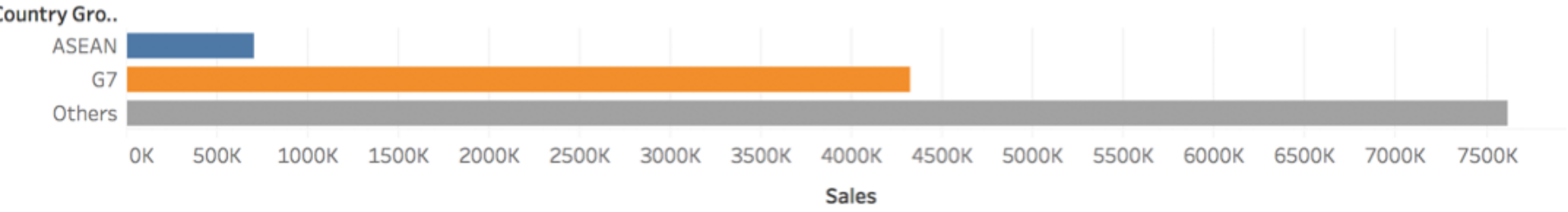
Edit Group

- Select the group on data pane
- Right Click and Edit Group
- Group, Rename & Ungroup
- Include 'Other'



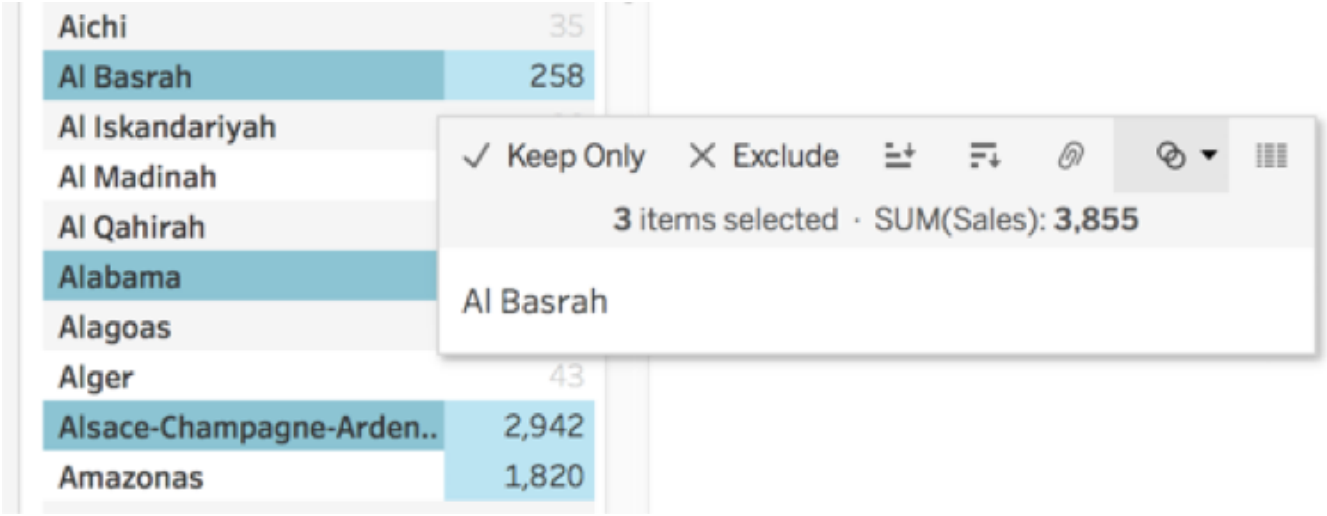
Ex: Group Data

- Connect to global_superstore_2016.xls
- Create a G7 Group of countries: US, Canada, France, Germany, Italy, Japan, Russia



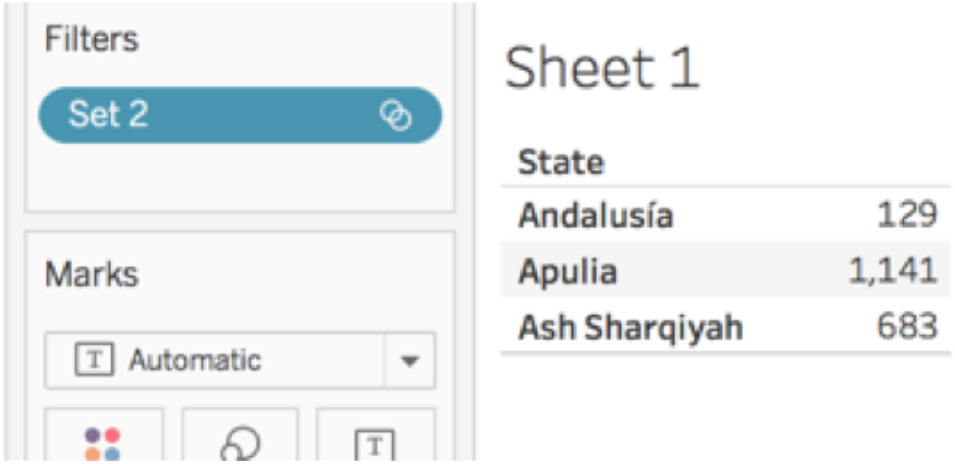
Set

- Select the elements
- Right Click and Choose the Set Icon



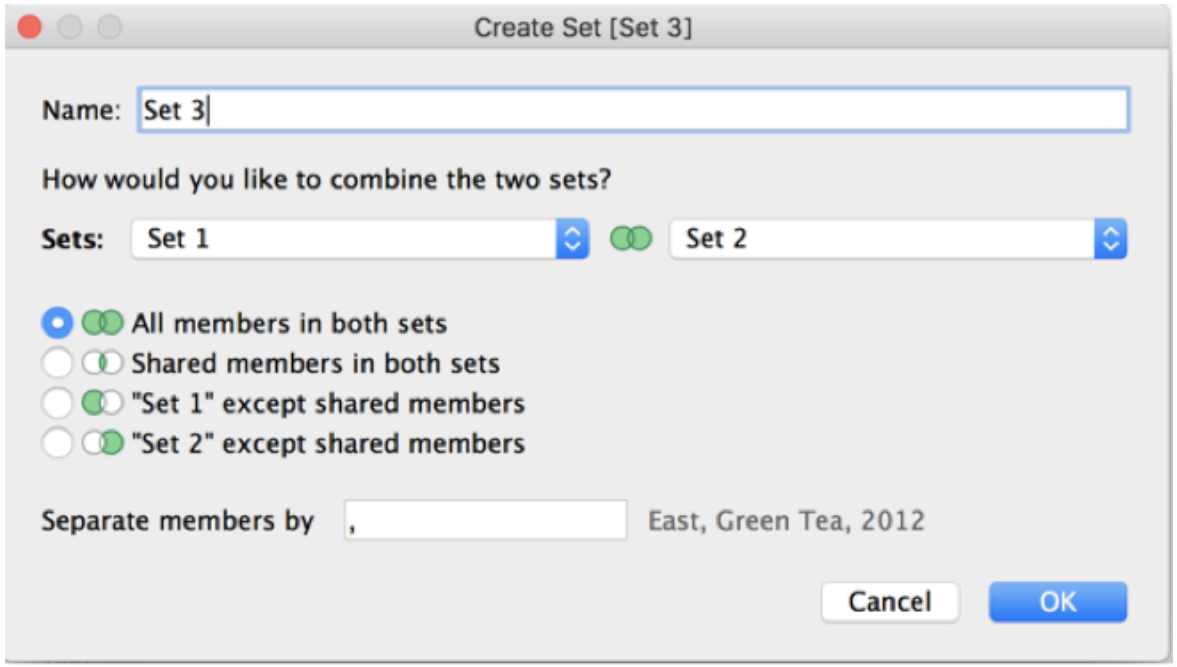
Filter by Set

- Drag the Set to the Filters



Combine Sets

- Select 2 sets
- Right Click to select Combine Sets
- Combine by Union, Intersection, Subtraction



Ex: Organize Data

- Connect to global_superstore_2016.xls
- Create a office items- Chairs, Tables, Binders, Papers
- Plot office items vs others
- Create a combined set office items - Chairs, Tables, Binders, Papers
- Filter the office items

Time: 5 mins

Q&A
Feedback

Thank You!

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