



Data Visualization

Dr. Ken Kwong-Kay Wong

Boston, MA
Feb 28, 2023







Data Visualization

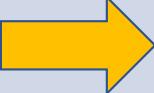
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Course Schedule (Day 2)

Class	Topics
Tues, Feb 28, 2023:	
2 	<p>Introduction to Tableau</p> <ul style="list-style-type: none">1. Overview of the Tableau Ecosystem<ul style="list-style-type: none">a. Tableau Prep Builderb. Tableau Desktopc. Tableau Serverd. Tableau Cloude. Tableau Publicf. Tableau Readerg. Tableau Mobile2. Exploring Tableau Desktop <ul style="list-style-type: none">3. Tableau Desktop Demonstration:<ul style="list-style-type: none">a. Word Cloudb. Forecastc. Cluster Analysis (Segmentation)4. Publishing to Tableau Public5. Storytelling in Tableau Desktop<ul style="list-style-type: none">a. Understanding the Sequence in Data Visualizationb. Dashboard Overviewc. Dashboard Actionsd. Story Points6. Chart and Graph Selection Guide



Course Schedule (Day 3)

Class	Topics
Wed, Mar 1, 2023:	
3	Data Preparation & Maps 1. Data Interpreter in Tableau Desktop 2. Cleaning Messy Survey Data in Excel 3. Exploring Tableau Prep Builder a. Reshaping Data from Wide to Tall b. Joining Data 4. Unions in Tableau Desktop 5. Different kinds of Joins in Tableau Desktop 6. Creating Maps a. Symbol Map b. Filled Map c. Density Map d. Map Layers e. Pie Chart Map f. Dual Axis Map g. Viz in Tooltips on Map h. Mapbox



Course Schedule (Day 4)

Class	Topics
Thurs, Mar 2, 2023:	
4	Different Types of Visual in Business Communications <ul style="list-style-type: none">1. Comparison<ul style="list-style-type: none">a. Column Chartb. Bar Chartc. Bullet Chartd. Lollipop Charte. Line Chartf. Step Chartg. Highlight Tableh. Heatmaps2. Composition<ul style="list-style-type: none">a. Pie Chartb. Donut Chartc. Treemapd. Packed Bubble Charte. Area Chartf. Cumulative Sum with Waterfall Chart3. Relationship<ul style="list-style-type: none">a. Scatterplot4. Distribution<ul style="list-style-type: none">a. Box-and-whisker Plotb. Likert Scale Chart



Course Schedule (Day 5)

Class	Topics
Fri, Mar 3, 2023:	
5	Ethical Considerations in Data Visualization <ol style="list-style-type: none">1. Ethics in Data Visualization<ol style="list-style-type: none">a. Unethical Data Visualizationb. The Misleading Data Dashboardc. 10 Data Visualization Mistakes to Avoidd. A Code of Ethics for Data Visualization Professionals2. Sharing and Publishing Data<ol style="list-style-type: none">a. E-mailing Tableau Workbook fileb. Publishing to Tableau Serverc. Publishing to Tableau Online<ul style="list-style-type: none">- Using the “Ask Data” Functiond. Publishing to Tableau Publice. Publishing to Web Sites and Blogs via HTML Embeddingf. Using Tableau Reader and Tableau Mobile App

Course Schedule (Day 6)

Class	Topics
Mon, Mar 6, 2023:	
6	Calculated Field, Parameters, and Quick Table <ul style="list-style-type: none">1. Create Calculated Field Using Text Operators:<ul style="list-style-type: none">a. SPLITb. LEFT and RIGHTc. LOWER and UPPERd. REPLACEe. DATEADDf. DATEDIFFg. DATEPARTh. DATEPARSEi. CASEj. IF-THEN-ELSE / Group Creationk. IIFl. IFNULL2. Create Parameters<ul style="list-style-type: none">a. What If Analysisb. Text Fields Search3. Quick Table<ul style="list-style-type: none">a. Running Totalb. Cohort Analysis4. The Analytics Pane<ul style="list-style-type: none">a. Constant, Average, and Reference Lineb. Trend Line5. Advanced Visualization Techniques<ul style="list-style-type: none">a. Timelinesb. Gantt Chartc. Bar-in-bar Chartd. Radar Charte. Interactive View: Top 5 Clients



Course Schedule (Day 7)

Class	Topics
Tues, Mar 7, 2023:	
7	Elevating Your Tableau Knowledge <ul style="list-style-type: none">1. What's next after QTM-6032?<ul style="list-style-type: none">a. The Tableau Communityb. The Tableau Conferencec. The Iron Viz competitiond. Blogs about DataVize. Tableau Zen Master2. Fun Stuff – Arts3. Team Presentation

Class 2:

Introduction to Tableau

Feb 28, 2023



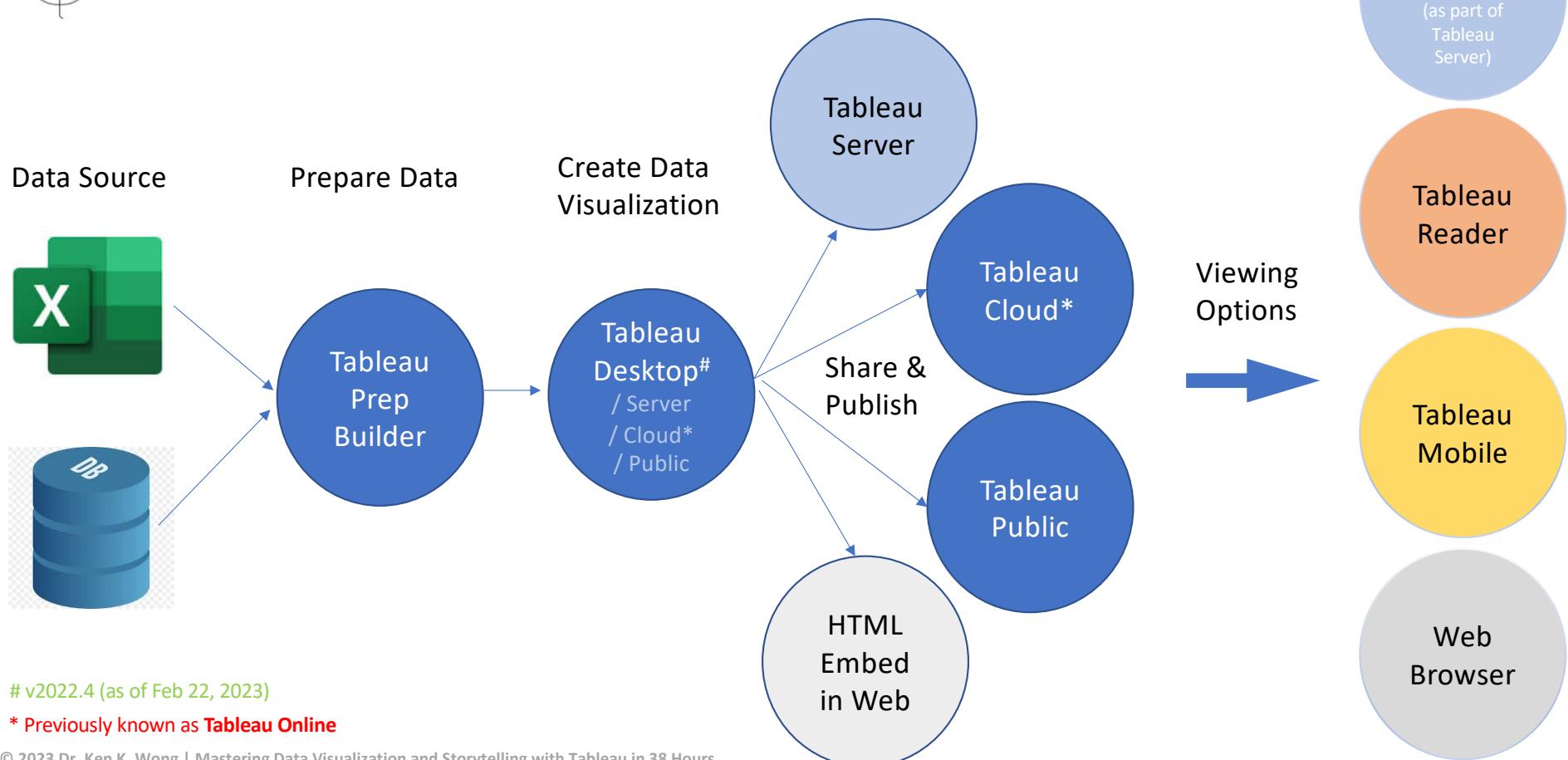
Video: What is Tableau?



1. Overview of the Tableau Ecosystem

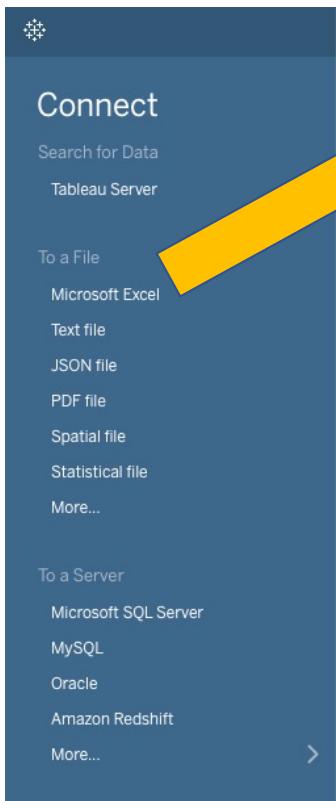


1. Exploring the Tableau Ecosystem





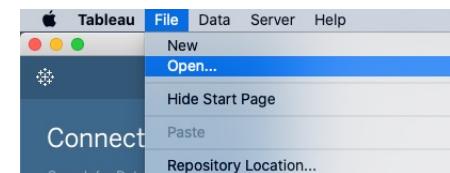
1. Adding data



- Connecting to a file:

- Microsoft Excel (.xls, .xlsx, .xlsm)
- Text file (.txt, .csv, .tab, .tsv)
- PDF
- Spatial file (.json, .mif, .tab)
- Statistical file: SPSS (.sav), SAS (.sas7bdat), r (.rdata, .rda)
- Tableau Workbooks (.twb), Packaged Workbooks (.twbx), Data Sources (.tds), Packaged Data Sources (.tdsx), Data Extracts (.hyper, .tde)

Alternatively, go to File → Open...





New or Add?

This screenshot shows the Tableau interface after performing a 'File > Open'. The main window title is 'Tableau - Book1'. The 'Connections' pane on the left lists 'Hult - Cellphone Brand' (selected) and 'Hult - Superstore'. The 'Sheets' pane shows 'Sheet1' and 'New Union'. A central workspace is titled 'Tableau - Book2' and contains a 'Connections' section for 'Hult - Superstore' and a 'Drag tables here' area.

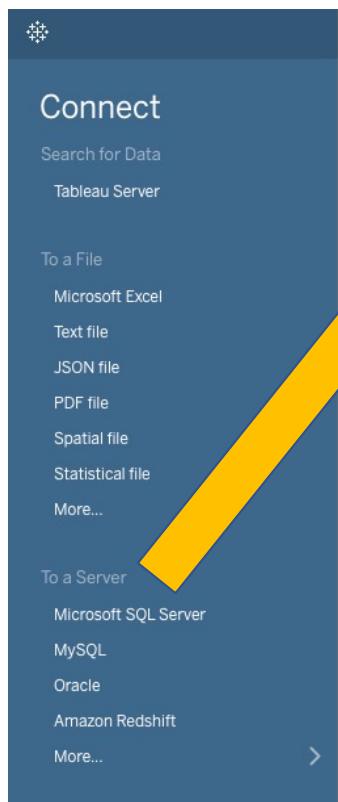
File → Open : Hult – Cellphone Brand [Book 1]
File → New : Hult – Superstore [Book 2]

This screenshot shows the Tableau interface after performing a 'File > New'. The main window title is 'Tableau - Book1'. The 'Connections' pane on the left lists 'Hult - Cellphone Brand' (selected) and 'Hult - Superstore'. The 'Sheets' pane shows 'Sheet1' and 'New Union'. A central workspace is titled 'Tableau - Book2' and contains a single 'Sheet1' entry.

File → New : Hult – Cellphone Brand [Book 1]
Connections “Add”: Hult – Superstore [Book 1]



1. Adding data (via 83 connectors)



- Connecting **to a server**:
 - Rational database, data cubes, Hadoop clusters, and data warehouses
 - If you can't find the connector for your specific database, try:
 - Other Database (JDBC) – Generic Java Database Connectivity
 - Other Database (ODBC) – Open Database Connectivity
- Connecting to cloud services: Google Drive, Google Analytics, Google BigQuery, Amazon Redshift, and Salesforce
 - If you can't find the connect for your specific cloud service, try:
 - Generic web data connector (WDC)



1. File type

- Save as **.twbx** which is the Tableau Packaged Workbook
- It contains both the original data set and visualizations and metadata.
- Other people can view **.twbx** using Tableau Reader (or if they've got the license, in Tableau Desktop)



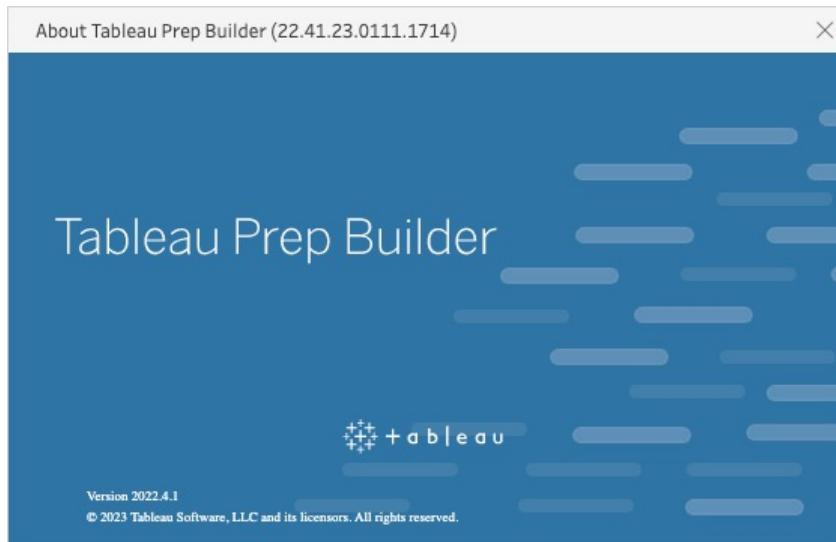
1. Note: How Tableau handles data file

- Data files are not opened in Tableau. Instead, the software connects to a file or database and creates a new Tableau workbook
- Tableau reads in the data, but **it does not write back to the original file or database**
- This means you don't have to worry about accidentally overwriting your data.
- This also means Tableau is not able to create or edit data tables.
- **That's why data preparation is SOOOOOO important.**



1a. Tableau Prep Builder

- Formerly known as Project Maestro
- Use it to combine, shape, and clean their data before using them in Tableau Desktop/Server/Cloud/Public



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1a. Tableau Prep Builder

The screenshot shows the Tableau Prep Builder interface with the following details:

- Connections:** Hult - Superstore.xls (Microsoft Excel)
- Tables:** Orders (selected), People, Returns
- Input:** Multiple Files (selected), Single table (radio button selected), Wildcard union (radio button unselected). The Table dropdown shows Orders.
- Flow pane:** Orders (Fields selected: 21 of 21) with a "Filter Values..." button.
- Sample Values table:** A grid showing field mappings and sample values for 12 fields. The columns are Type, Field Name, Original Field Name, Changes, and Sample Values.

Type	Field Name	Original Field Name	Changes	Sample Values
#	Row ID	Row ID	1, 2, 3	
Abc	Order ID	Order ID	CA-2018-152156, CA-2018-138688	
Abc	Order Date	Order Date	2018-11-08, 2018-06-12	
Abc	Ship Date	Ship Date	2018-11-11, 2018-06-16	
Abc	Ship Mode	Ship Mode	Second Class	
Abc	Customer ID	Customer ID	CG-12520, DV-13045	
Abc	Customer Name	Customer Name	Claire Gute, Darrin Van Huff	
Abc	Segment	Segment	Consumer, Corporate	
Abc	Country/Region	Country/Region	United States	
Abc	City	City	Henderson, Los Angeles	
Abc	State	State	Kentucky, California	
#	Postal Code	Postal Code	42,420, 90,036	
Abc	Region	Region	South, West	

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1b. Tableau Desktop

Tableau Desktop is the full developer software. There **used to be** two separate versions:

1. In Tableau Desktop (Professional edition): you can connect to all the data sources listed to the left.
2. In Tableau Desktop (Personal edition): you can only connect to the "In a file" data sources, and can't publish to Online or Server

However, the Personal edition is no longer available starting 2020, so **you'll be using the Professional edition.**



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1b. Tableau Desktop

A screenshot of the Tableau Desktop application. The window title is "Tableau - Book1". On the left, the "Connections" pane shows a single connection named "Hult - Superstore" from "Microsoft Excel". Below it, the "Sheets" pane lists several sheets: "Orders", "People", "Returns", and "New Union". The main workspace is titled "Orders (Hult - Superstore)" and contains a single data source named "Orders". A small icon of a bar chart with a line graph is displayed next to the data source. A message at the bottom says "Need more data? Drag tables here to relate them. Learn more". The data view shows a table with 13 rows of data. The columns are labeled: #, Order ID, Order Date, Ship Date, Ship Mode, Customer ID, Customer Name, Segment, Country/Region, City, and State. The data includes various order details such as CA-2018-152156, 2018-11-08, Second Class, CG-12520, Claire Gute, Consumer, United States, Henderson, Kentucky, and CA-2016-115812, 2016-06-09, Standard Class, BH-11710, Brosina Hoffman, Consumer, United States, Los Angeles, California. At the bottom of the data view, there are buttons for "Data Source", "Sheet 1", "Sheet 2", and other navigation controls.

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1b. Tableau Desktop

The screenshot shows the Tableau Desktop interface. On the left, the Data pane lists various dimensions and measures from the 'Orders (Hult - Superstore)' data source. The main area, titled 'Sheet 2', contains two blank white canvases with placeholder text 'Drop field here'. To the right of the canvases is the 'Show Me' sidebar, which displays a grid of icons representing different chart types such as bar charts, line graphs, and maps. Below the sidebar, a note says 'Select or drag data' and 'Use the Shift or Cmd key to select multiple fields'. The bottom navigation bar includes tabs for 'Data Source', 'Sheet 1', and 'Sheet 2', along with other standard desktop application controls.



1b. Tableau Desktop

Tableau Desktop



You can create beautiful visualizations using this App.

Tableau Desktop



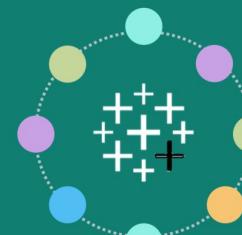
Data Scientists, BI Developers & BI professionals.

Tableau Desktop



Unlimited Rows of Data can be Stored, Processed & Shared.

Tableau Desktop



All listed data sources can be connected to using this App.

Tableau Desktop



Nobody can see your reports unless provided with an access.



1c. Tableau Server

- **Tableau Server** is an application used to create, share and interact with visualizations securely across an organization.
 - Create workbook with its **web authoring environment**
- You want more security, collaboration, governance and performance
- **Tableau Server is installed on a Windows server** and accessible to users via a browser.

The screenshot shows the Tableau Server interface with the 'Data Sources' tab selected. The top navigation bar includes 'Projects 27', 'Workbooks 3,397', 'Views 12,323', and 'Data Sources 464'. On the left, there is a sidebar with 'General Filters' and dropdown menus for 'Project', 'Owner', 'Tag', 'Modified on or after', 'Modified on or before', and 'Has an alert'. The main area displays a table of data sources with columns for 'Name', 'Connection type', and 'Connects to'. The data includes various sources like Excel, Microsoft SQL Server, Amazon Redshift, MySQL, Google Analytics, Cloudera Hadoop, Tableau Data Extract, Splunk, and multiple entries for Salesforce and Oracle Essbase.

Name	Connection type	Connects to
Tradeshow Attendance	Excel	Tradeshow.xlsx
Marketing Campaign Members	Microsoft SQL Server	alpo-db.tsi.lan
Marketing Nurture Activity	Amazon Redshift	bizsysredshift02.cepi73el69nz.us-west-2
Survey Responses	MySQL	pedigree
Google Analytics - Conversions	Google Analytics	
Impala Users	Cloudera Hadoop	impala.tableausoftware.com
APAC Quota - Sales Person	Tableau Data Extract	APACQuota.tde
Backgrounder Jobs	Splunk	https://splunk.tsi.lan
Node Configuration	MySQL	zhruston.tsi.lan
Sales Opportunity	Salesforce	login.salesforce.com
Calendar	Web Data Connector	http://tableau.github.io:80/webdata
Essbase Workload	Oracle Essbase	essbase-zola.test.tsi.lan
Utilization Calculations	Salesforce	login.salesforce.com



1c. Tableau Server

- Tableau Server has built in security and permissions that are at a "project" level (projects are like secured folders).
- To implement Tableau Server business-wide every user that is going to view a visualization needs a license.

The screenshot shows the 'Permissions' section of the Tableau Server interface. It displays a grid of users and groups with their respective permissions for a specific view. The columns represent View, Interact, and Edit permissions. A search bar at the top allows for finding users by name. Below the main grid, there is a section titled 'User Permissions' for the 'Managers (11)' group, showing detailed permission settings for individual users.

User / Group	Permissions	View	Interact	Edit
All Users (122)	...	✓ ✓ ✗ ✓ ✓	✓ ✗ ✗	✓
Managers (11)	...	✓ ✓ ✓ ✓ ✓	✓ ✗ ✓ ✓	✓ ✓
Partners (19)	...	✓ ✓ ✓ ✓ ✓	✓	✓
A.A. Milne (122)	...	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓
Agatha Christie (11)	...	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✗ ✓
Alan Moore (19)	...	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	✓

User	Role	View	Interact	Edit
Albert Camus	Administrator	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓
Aldous Huxley	Administrator	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓
Alexander Smith	Administrator	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓
Alexander Pushkin	Custom	✓ ✓ ✗ ✗ ✗	✓ ✗ ✗ ✗ ✗	✓ ✗ ✗
Alexandre Dumas	Administrator	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓
Alice Walker	Administrator	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓
Alistair MacLean	Custom	✓ ✗ ✗ ✗ ✗	✓ ✗ ✗ ✗ ✗	✓ ✗ ✗
Allen Ginsberg	Custom	✓ ✗ ✗ ✗ ✗	✓ ✗ ✗ ✗ ✗	✓ ✗ ✗



Tableau Server License Types

License types

\$ USD ▾

Tableau Creator

Connect your data, build vizzes, and publish dashboards in Tableau Desktop. Every deployment requires one Creator.



\$70

User/month
Billed annually



\$70

User/month
Billed annually

Tableau Explorer

Edit existing dashboards. Available for teams and organizations.



\$42

User/month
Billed annually



\$35

User/month
Billed annually

Tableau Viewer

Access existing dashboards. Available for teams and organizations.



\$15

User/month
Billed annually



\$12

User/month
Billed annually

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1c. Tableau Server

Do I still need to use Tableau Desktop if I've got Tableau Server?

“Yes” if these limitations bother you:

1. In Tableau Server, the administrator must grant web-edit permissions to users or groups **to enable web authoring**.
 - Once users have the permissions, they can create new workbooks from published data sources or modify existing workbooks.
2. New data sources can only be published from Tableau Desktop.
3. Data source editing is limited in Tableau Server.



1c. Tableau Server

4. Tableau Desktop provides analytic capabilities not found in Tableau Server's web authoring environment.
 - For example, the **forecast and cluster features are missing** in Tableau Server's analytics pane. In addition, users can't edit their trend lines in Tableau Server.
5. In Tableau Server you can't double click on a worksheet title to edit it.
6. **Tooltips editing and formatting is limited** in Tableau Server. In addition, the creation of Tableau's "Viz in a tooltip" is only available in Tableau Desktop.



1c. Tableau Server

7. Dashboard actions can only be created in Tableau Desktop.
8. You can't specify formatting at the dashboard level or worksheet level in Tableau Server.

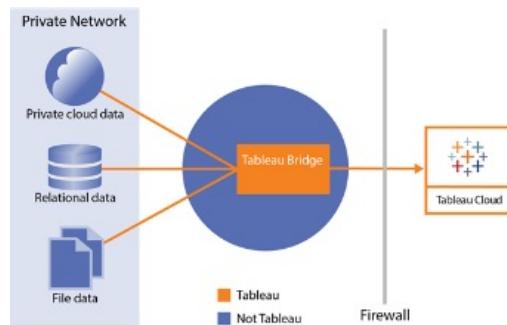
That said, future version of Tableau Server “may” address these issues.



1d. Tableau Cloud

(formally known as *Tableau Online*)

- **Tableau Cloud** has the same functionality of Tableau Server but this SaaS is **hosted by Tableau** in their cloud.
- Tableau Cloud is used for **small data set** not very large like Tableau Server.
- Need to use Tableau Bridge for access to local systems



Sign in to Tableau Cloud

Email address

Remember me [Forgot password](#)

Sign In

[Sign Up](#)

LOGIN: <https://sso.online.tableau.com/public/idp/SSO>



1d. Tableau Cloud

The screenshot shows the Tableau Online home page. The left sidebar includes links for Home, Explore (which is highlighted with a blue arrow), Favorites, Recents, Shared with Me, Recommendations, External Assets, Users, Groups, Schedules, Jobs, Tasks, Site Status, and Settings. The main content area features a "Welcome to your Tableau site" banner with a search bar and user profile icon. Below it is a "Recents" section displaying four dashboard thumbnails: "Stocks" (2 weeks ago), "Economy" (2 weeks ago), "Flight Delays" (2 weeks ago), and "Global Temperatures" (2 weeks ago). At the bottom is a "Dashboard Starters" section with a "Start" button.

Explore Top-Lev

The screenshot shows the "Explore" section of the Tableau Cloud interface. It includes a "New" dropdown, a "Project" button, a "Workbook" button (which is highlighted with a blue arrow), and an "Upload Workbook" button. There is also a "Select All" link at the top right.



1d. Tableau Cloud

New Workbook

File Data Help

Connections

Hult - Superstore Microsoft Excel

Sheets

Orders People Returns

Orders (Hult - Superstore)

Orders

Need more data?

Drag tables here to relate them. [Learn more](#)

#	Abc Orders Row ID	Abc Orders Order ID	Abc Orders Order Date	Abc Orders Ship Date	Abc Orders Ship Mode	Abc Orders Customer ID	Abc Orders Customer Name	Abc Orders Segment	Abc Orders Country/Region	Abc Orders City	Abc Orders State	Abc Orders Postal Code	Abc Orders Region	Abc Orders Product ID
1	CA-2018-152156	11/8/2018	11/11/2018	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-BO-1	
2	CA-2018-152156	11/8/2018	11/11/2018	Second Class	CG-12520	Claire Gute	Consumer	United States	Henderson	Kentucky	42420	South	FUR-CH-1	
3	CA-2018-138688	6/12/2018	6/16/2018	Second Class	DV-13045	Darrin Van Huff	Corporate	United States	Los Angeles	California	90036	West	OFF-LA-1	
4	US-2017-108966	10/11/2017	10/18/2017	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	Florida	33311	South	FUR-TA-1	
5	US-2017-108966	10/11/2017	10/18/2017	Standard Class	SO-20335	Sean O'Donnell	Consumer	United States	Fort Lauderdale	Florida	33311	South	OFF-ST-1	
6	CA-2016-115812	6/9/2016	6/14/2016	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-FU-1	
7	CA-2016-115812	6/9/2016	6/14/2016	Standard Class	BH-11710	Brosina Hoffman	Consumer	United States	Los Angeles	California	90032	West	FUR-FU-1	

Data Source Sheet 1



1d. Tableau Cloud

The screenshot shows the Tableau Online interface. At the top, there's a navigation bar with tabs for File, Data, Worksheet, Dashboard, Analysis, Map, Format, and Help. Below the navigation bar is a toolbar with various icons for data manipulation. On the left side, there's a sidebar titled 'Tables' which lists numerous data fields such as Category, City, Country/Region, Customer ID, Customer Name, Order Date, Order ID, Postal Code, Product ID, Product Name, Region, Row ID, Segment, Ship Date, Ship Mode, State, Sub-Category, Measure Names, Discount, Profit, Quantity, Sales, Latitude (generated), Longitude (generated), Orders (Count), and Measure Values. The main workspace is titled 'Sheet 1' and contains a placeholder text 'Drop field here'. To the right of the workspace is a large palette titled 'Show Me' containing a grid of icons representing different chart types like bar charts, line graphs, and maps. Below the palette, there's a section with instructions for creating symbol maps. A red circle with a question mark is located in the bottom right corner of the workspace.

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1d. Tableau Cloud

Tableau Cloud	Tableau Cloud Maintenance - Canada - Quebec - (prod-ca-a)	Inbox - ken.wong@senecacoll...	10/15/22
Tableau Cloud	Tableau Cloud Maintenance - Canada - Quebec - (prod-ca-a)	Inbox - ken.wong@senecacoll...	10/15/22
Tableau Cloud	Tableau Cloud Maintenance - Canada - Quebec - (prod-ca-a)	Inbox - ken.wong@senecacoll...	10/13/22
Tableau Cloud	Tableau Cloud Maintenance - Canada - Quebec - (prod-ca-a)	Inbox - ken.wong@senecacoll...	9/29/22



Tableau Cloud Maintenance - Canada - Quebec - (prod-ca-a)

Thu, 29-Sep 11:56 PM UTC:

The Tableau Cloud - Canada - Quebec - (prod-ca-a) environment will undergo scheduled maintenance on Oct 15 15:00 – 21:00 UTC. During this time, customers will not be able to log in to their Tableau Cloud sites. Scheduled background tasks such as extract refreshes



Tableau Cloud Maintenance - Canada - Quebec - (prod-ca-a)

Sat, 15-Oct 02:58 PM UTC:

The Tableau Cloud - Canada - Quebec - (prod-ca-a) environment is under scheduled maintenance. During this time, customers will not be able to log in to their Tableau Cloud sites. Scheduled background



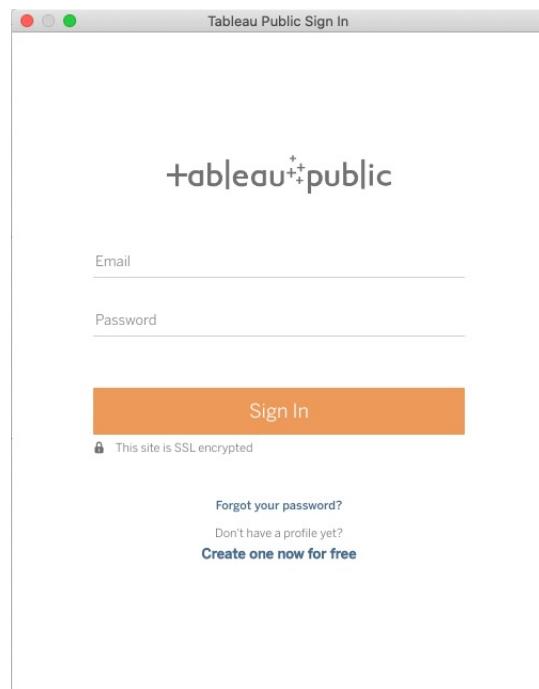
1e. Tableau Public



- Officially, It's Tableau Desktop (Public Edition)
- **Tableau Public** is a **free download** from Tableau's website.
- <https://public.tableau.com/en-us/s/download>
- By "public" it means that anyone can find your visualization online; there is **no ability to save workbooks locally** to your computer.
- That is, you work on your computer, and publish the result on the public web.



1e. Tableau Public



- <http://public.tableau.com>
- Note: Separate account from Tableau Online and Tableau Desktop/Prep Builder
- *In summer 2023, these accounts will be merged for Single Sign On (SSO).*

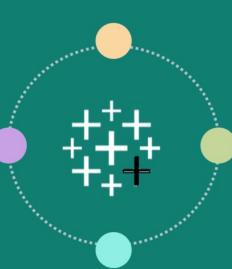


1e. Tableau Public

- Although they can view your visualization, there is an option to prevent anyone from downloading the workbook and having the raw data.
- Tableau Public has **most** of the functionalities of Tableau Desktop when creating visualizations and is a great option if your data can be shared.
- Tableau public can be used for development and sharing.



1e. Tableau Public

 <p>You can create beautiful visualizations using this App.</p>	 <p>Beginners in the field of Data Analysis & BI Enthusiasts.</p>	 <p>1 Million Rows of Data can be Stored, Processed & Shared.</p>	 <p>Only Excel and text files can be connected to using this App.</p>	 <p>All the Reports are public once they're published.</p>
--	--	--	--	--



1f. Tableau Reader

- **Tableau Reader** is a **free application** that can be downloaded from Tableau's website.
- This application is used to view and interact with workbooks that have been saved as **.twbx** (packaged workbook).



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1f. Tableau Reader

- A packaged workbook saves the workbook and a snapshot (static view) of the data and puts it into one file.
- One thing to mention about using Tableau Reader is that **there is essentially no security**; anyone who receives the workbook can use Tableau Reader to open it.



1f. Tableau Reader



Tableau Reader

You cannot create/edit visualizations using this App.



Tableau Reader

CxO level Professionals who only need to Read Data.

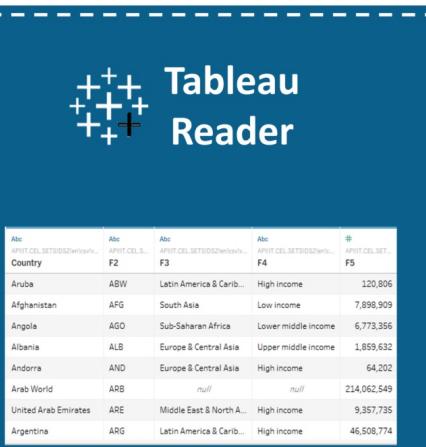


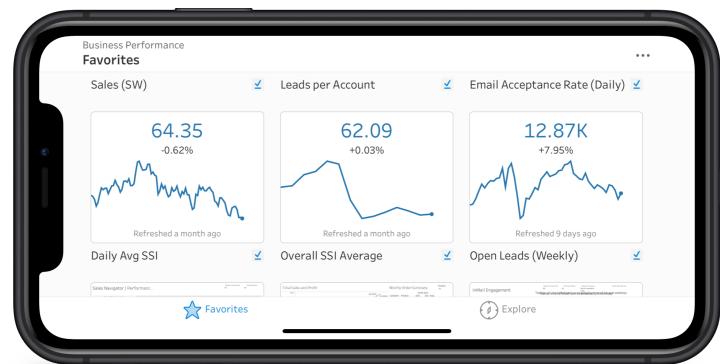
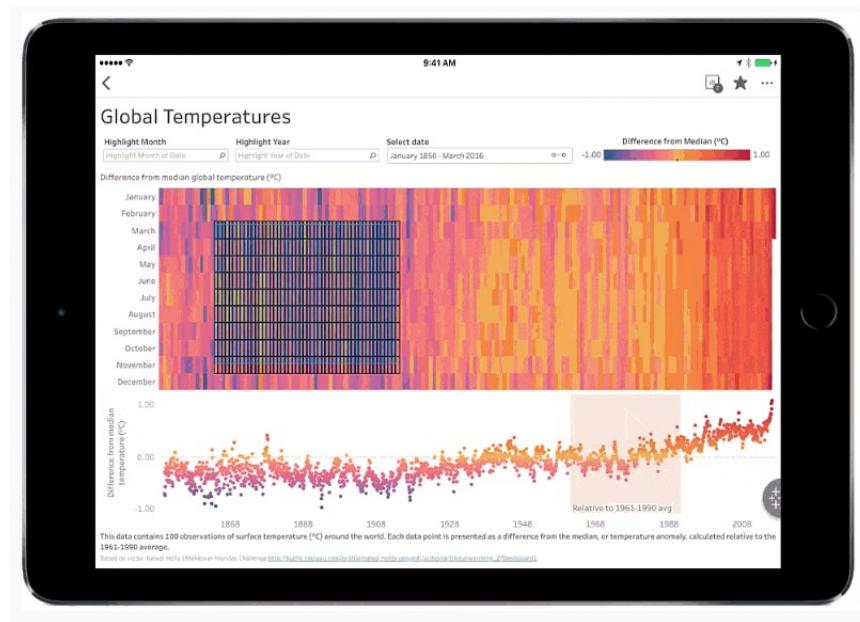
Tableau Reader

Unlimited Rows of Data can be **Read in Static View.**

Abc # APPLY CEL SET TO DSO View... Country	F2	F3	Abc # APPLY CEL SET TO DSO View... F4	F5 APPLY CEL SET TO DSO View...
Aruba	ABW	Latin America & Carib...	High income	120,806
Afghanistan	AFG	South Asia	Low income	7,898,909
Angola	AGO	Sub-Saharan Africa	Lower middle income	6,773,356
Albania	ALB	Europe & Central Asia	Upper middle income	1,859,632
Andorra	AND	Europe & Central Asia	High income	64,202
Arab World	ARB	null	null	214,062,549
United Arab Emirates	ARE	Middle East & North A...	High income	9,357,735
Argentina	ARG	Latin America & Carib...	High income	46,508,774



1g. Tableau Mobile



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2. Exploring Tableau Desktop



2. Installing Tableau Desktop

The screenshot shows the Tableau website at www.tableau.com/products/desktop/download?domain=worldvision.ca&eid=CTBLS0. The page features a navigation bar with links for Products, Solutions, Learning, Community, Support, About, and COVID-19. It includes buttons for TRY NOW and BUY NOW, and a search icon. The main content area is titled "Tableau Desktop: Start your free 14-day trial". It has fields for "Business E-mail" and a prominent "DOWNLOAD FREE TRIAL" button. Below these are links for "WE RESPECT YOUR PRIVACY | HAVING TROUBLE?", "STUDENT OR TEACHER? GET A FREE 1-YEAR LICENSE. LEARN MORE →", and a "VIEW SYSTEM REQUIREMENTS" link. A large image of the Tableau software interface is displayed, showing a dashboard with a bar chart titled "Real Forward 12 Months Return" and various data exploration tools.

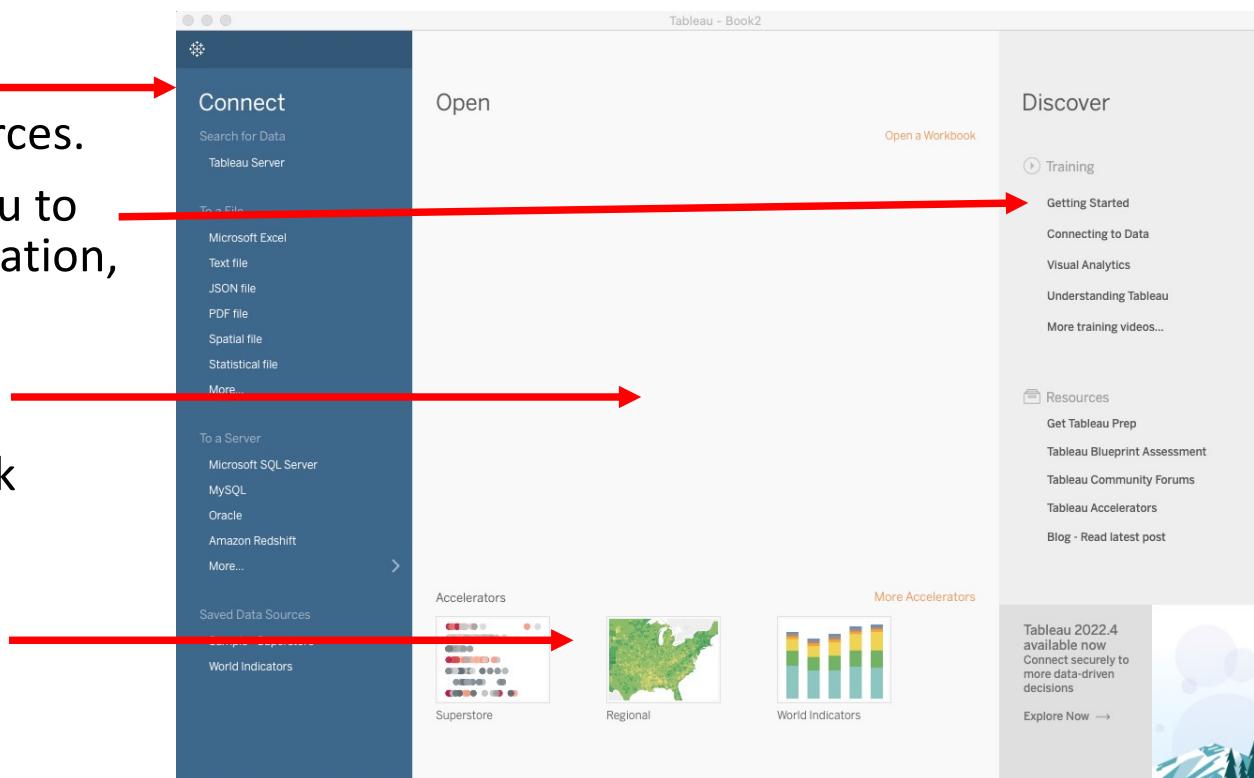
Ryan Ch3

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2. Tour of the Tableau Desktop user interface

- **Connect:** A long list of native connections to various data sources.
- **Discover:** This pane connects you to various Tableau training, visualization, and other resources.
- **Open:** As you create your own workbooks, recently opened workbooks appear here for quick access.
- **Accelerators:** These are default sample workbooks provided by Tableau.





2. Hult - superstore Excel training file

- <http://www.presentria.ca/hult-boston>

AutoSave OFF Home Insert Draw Page Layout Formulas Data Review View

MS Sans Serif 10 A⁺ B I U \$ % , 0.00 General Conditional Formatting Insert Format as Table Delete Cell Styles Editing Ideas Sensitivity

A2

Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer I	Customer I Segment	Country/Region	City	State	Postal Cod Region	Product ID	Category	Sub-Catag	Product Nr	Sales	Quantity	Discount
1	CA-2018-152156	2018-11-08	2018-11-11	Second	Ci-CG-12520	Claire Gute Consumer	United Sta	Henderson	Kentucky	42420 South	FUR-BO-1C Furniture	Bookcases	Bush Sovr	261.96	2		
2	CA-2018-152156	2018-11-08	2018-11-11	Second	Ci-CG-12520	Claire Gute Consumer	United Sta	Henderson	Kentucky	42420 South	FUR-CH-1C Furniture	Chairs	Hon Deluxi	731.94	3		
3	CA-2018-138688	2018-06-12	2018-06-16	Second	Ci-DV-13045	Darin Van Corporate	United Sta	Los Angeles	California	90036 West	OFF-LA-10 Office Sup	Labels	Self-Adhes	14.82	2		
4	US-2017-108966	2017-10-11	2017-10-18	Standard	CS-20335	Sean O'Do Consumer	United Sta	Fort Lauderdale	Florida	33311 South	FUR-TA-10 Furniture	Tables	Bretford Cr	957.5775	5	0.1	
5	US-2017-108966	2017-10-11	2017-10-18	Standard	CS-20335	Sean O'Do Consumer	United Sta	Fort Lauderdale	Florida	33311 South	OFF-ST-10 Office Sup	Storage	Eldon Fold	22.368	2	0	
6	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	FUR-FU-10 Furniture	Furnishing	Eldon Exp	48.86	7		
7	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	OFF-AR-1C Office Sup	Art	Newell 322	7.28	4		
8	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	TEC-PH-1C Technologi	Phones	Mitel 5320	907.152	6	0	
9	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	OFF-BI-10 Office Sup	Binders	DXL Angle	18.504	3	0	
10	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	OFF-BI-10 Office Sup	Binders	Appliance Bed	114.9	5		
11	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	OFF-FA-10 Office Sup	Appliance Bed	Chromax	1700.94	9	0	
12	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	TEC-PH-1C Technologi	Paper	Kontiki 254	911.424	4	0	
13	CA-2016-115812	2016-08-09	2016-08-14	Standard	CBH-11710	Brosina Ho Consumer	United Sta	Los Angeles	California	90032 West	OFF-PA-1C Office Sup	Paper	Xerox 196i	15.552	3	0	
14	CA-2019-114412	2019-04-15	2019-04-20	Standard	CA-AA-10480	Andrew All Consumer	United Sta	Concord	North Care	28027 South	OFF-FA-10 Furniture	Tables	Wilson Jon	22.72	4	0	
15	CA-2018-161389	2018-12-05	2018-12-10	Standard	CM-15070	Irene Mad Consumer	United Sta	Seattle	Washington	98103 West	OFF-BI-10 Office Sup	Binders	Fellowes P	407.976	3	0	
16	US-2017-118983	2017-11-22	2017-11-26	Standard	HP-14815	Harold Pav Home Offic	United Sta	Fort Worth	Texas	76106 Central	OFF-AP-1C Office Sup	Appliances	Homes Re	68.81	5	0	
17	US-2017-118983	2017-11-22	2017-11-26	Standard	HP-14815	Harold Pav Home Offic	United Sta	Fort Worth	Texas	76106 Central	OFF-BI-10 Office Sup	Binders	Storox Dur	2.544	3	0	
18	CA-2016-105893	2016-11-11	2016-11-18	Standard	PK-19075	Pete Kirz Consumer	United Sta	Madison	Wisconsin	53711 Central	OFF-ST-10 Office Sup	Storage	Stur-D-Stor	665.88	6		
19	CA-2016-167164	2016-05-13	2016-05-15	Second	Ci-AG-10270	Alejandro I Consumer	United Sta	West Jorda	Utah	84084 West	OFF-ST-10 Office Sup	Storage	Fellowes S	55.5	2		
20	CA-2016-143336	2016-08-27	2016-09-01	Second	Ci-ZD-21925	Zuschuss I Consumer	United Sta	San Fran	California	94109 West	OFF-AR-1C Office Sup	Art	Newell 341	8.56	2		
21	CA-2016-143336	2016-08-27	2016-09-01	Second	Ci-ZD-21925	Zuschuss I Consumer	United Sta	San Fran	California	94109 West	TEC-PH-1C Technologi	Phones	Cisco SPA	213.48	3	0	
22	CA-2016-143336	2016-08-27	2016-09-01	Second	Ci-ZD-21925	Zuschuss I Consumer	United Sta	San Fran	California	94109 West	OFF-BI-10 Office Sup	Binders	Wilson Jon	22.72	4	0	
23	CA-2018-137330	2018-12-09	2018-12-13	Standard	KB-16586	Ken Black Consumer	United Sta	Fremont	Nebraska	68025 Central	OFF-AR-1C Office Sup	Art	Newell 318	19.46	7		
24	CA-2018-137330	2018-12-09	2018-12-13	Standard	KB-16586	Ken Black Consumer	United Sta	Fremont	Nebraska	68025 Central	OFF-AP-1C Office Sup	Appliances	Acco Six-X	60.34	7		
25	US-2019-669918	2019-07-18	2019-07-18	Standard	OFP-20080	Samuel C Consumer	United Sta	Philadelphia	Pennsylvan	19102 East	OFF-FA-10 Furniture	Tables	Bretford Cr	717.72	2	0	
26	US-2017-106320	2017-09-25	2017-09-30	Standard	CEB-13870	Sammy Burn Consumer	United Sta	Orem	Utah	84057 West	FUR-TA-10 Furniture	Tables	Bretford Cr	1544.63	3		
27	CA-2018-121755	2018-01-16	2018-01-20	Second	Ci-EH-13945	Eric Hoffm Consumer	United Sta	Los Angeles	California	90049 West	OFF-BI-10 Office Sup	Binders	Wilson Jon	11.648	2	0	
28	CA-2018-121755	2018-01-16	2018-01-20	Second	Ci-EH-13945	Eric Hoffm Consumer	United Sta	Los Angeles	California	90049 West	TEC-AC-1C Technologi	Accessorie	Imation 8G	90.57	3		
29	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	FUR-BO-1C Furniture	Bookcases	Riverside F	3083.43	7	0	
30	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	OFF-BI-10 Office Sup	Binders	Avery Recy	9.618	2	0	
31	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	FUR-FU-10 Furniture	Furnishing	Howard Mil	124.2	3	0	
32	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	OFF-EN-1C Office Sup	Envelopes	Poly String	3.264	2	0	
33	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	OFF-AR-1C Office Sup	Art	BOSTON N	86.304	6	0	
34	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	OFF-BI-10 Office Sup	Binders	Acco Pres	6.858	6	0	
35	US-2017-150630	2017-09-17	2017-09-21	Standard	CTB-21520	Tracy Blum Consumer	United Sta	Philadelphia	Pennsylvan	19140 East	OFF-AD-1C Office Sup	General	Lumber Co	15.78	2	0	

Orders People Returns +

OFF-AP-1C Office Sup Appliances Bed Acco Six-X

OFF-FA-10 Furniture Bookcases Bush Sovr

OFF-AR-1C Office Sup Art Chromax

OFF-PA-1C Office Sup Paper Kontiki 254

OFF-FA-10 Furniture Tables Bretford Cr

OFF-BI-10 Office Sup Binders Wilson Jon

TEC-AC-1C Technologi Accessorie Imation 8G

FUR-TA-10 Furniture Tables Bretford Cr

OFF-BO-1C Furniture Bookcases Riverside F

OFF-BI-10 Office Sup Binders Avery Recy

OFF-FU-10 Furniture Furnishing Howard Mil

OFF-EN-1C Office Sup Envelopes Poly String

OFF-AR-1C Office Sup Art BOSTON N

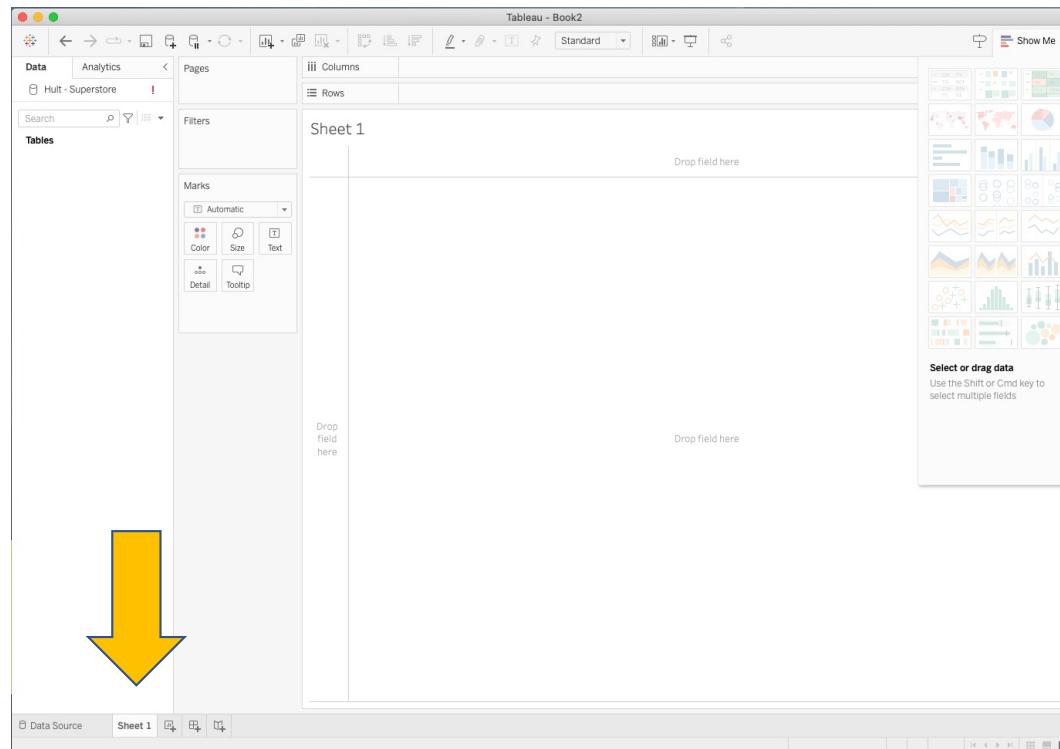
OFF-BI-10 Office Sup Binders Acco Pres

OFF-AD-1C Office Sup General Lumber Co



2. Tableau Interface

- Go to “Sheet 1” in the lower-left hand corner



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2. Tableau Interface

There are 5 basic elements to the Tableau interface:

1. Menus and toolbar

- Remember to save, as there's no auto-save

2. Data/Analytics tab

3. Pages, Filters, Marks, and Show Me card

4. Columns (x-axis) and Rows (Y-axis)

- Tips: Put your dependent variable like sales in Rows (Y-axis)

5. Data Source, Sheet 1, new Sheet, new Dashboard, new Story

The screenshot shows the Tableau desktop application with the following numbered elements:

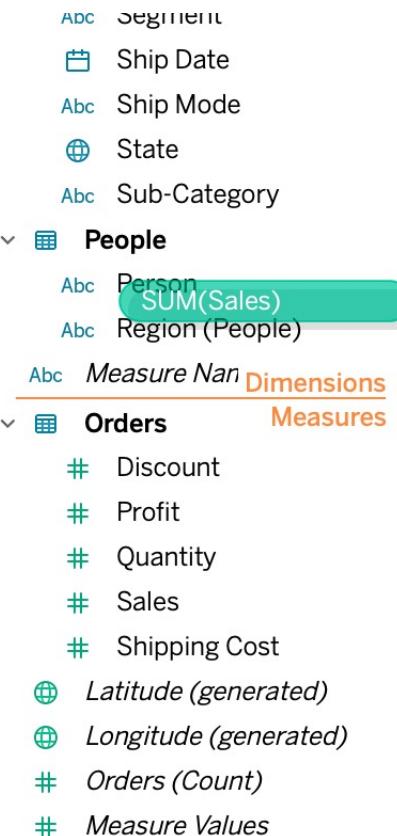
1. The top menu bar: Tableau, File, Data, Worksheet, Dashboard, Story, Analysis, Map, Format, Server, Window, Help.
2. The Data pane on the left, which includes the Analytics tab, a search bar, and a list of tables and fields. Fields under the 'Orders' table are highlighted.
3. The Marks card in the center, which shows options for Color, Size, and Text.
4. The Columns and Rows shelves at the top of the visualization area.
5. The bottom navigation bar with icons for Data Source, Sheet 1, and other sheet controls.

The visualization area contains a single sheet titled 'Sheet 1' with two 'Drop field here' placeholder boxes. A 'Show Me' card is visible on the right side of the interface.



2. Dimensions and Measures

- **Dimensions** (the top part, in blue) are categories
- **Measures** (the bottom part, in green) are fields you can do math with
- To convert a measure to a dimension, just drag it up.



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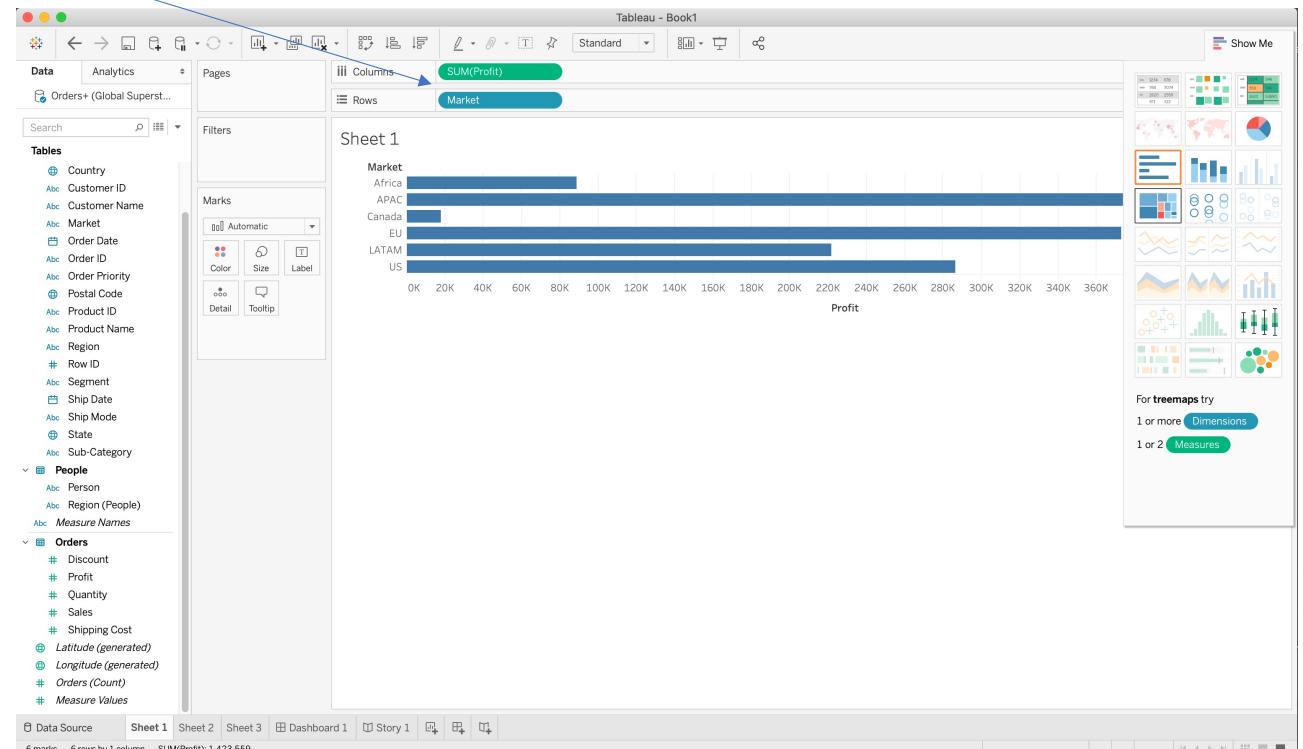
2. Color pills/field/measure/bullet

- Green pills are continuous [e.g., profit]

Measures

- Blue pills are discrete variables [e.g., markets]

Dimensions





2. Data field

- CONNECT
 - To a file > Microsoft Excel
 - Open “Hult – Superstore.xls”
- Drag “Orders” to the data connection canvas to the right.
- In the table, you can do a few things, such as
 - Top-right: “Rename” column name
 - Top-left: change data type
 - Bottom-right: sort data

The screenshot shows the Tableau Data Source interface. On the left, the 'Connections' pane displays a single connection named 'Hult - Superstore' (Microsoft Excel). Below it, the 'Sheets' pane lists several tables: Orders, People, Returns, and a newly created 'Orders' table via a 'New Union'. A blue arrow points from the 'Orders' table in the 'Sheets' list towards the main data preview area. The main area is titled 'Tableau - Book1' and shows the 'Orders' table with 13 rows of data. The columns are: Row ID, Atc Orders Order ID, Atc Orders Order Date, Atc Orders Ship Date, Abc Orders Ship Mode, Abc Orders Customer ID, Abc Orders Customer Name, Abc Orders Segment, and Abc Orders Country/R. The data includes various order details like shipping mode, date, and customer information. The bottom of the interface shows standard Tableau navigation and filter controls.

#	Orders Row ID	Atc Orders Order ID	Atc Orders Order Date	Atc Orders Ship Date	Abc Orders Ship Mode	Abc Orders Customer ID	Abc Orders Customer Name	Abc Orders Segment	Abc Orders Country/R
1	CA-2018-152156	2018-11-08	2018-11-11	Second Class	CG-12520	Claire Gute	Consumer	United S	
2	CA-2018-152156	2018-11-08	2018-11-11	Second Class	CG-12520	Claire Gute	Consumer	United S	
3	CA-2018-138688	2018-06-12	2018-06-16	Second Class	DV-13045	Darrin Van Huff	Corporate	United S	
4	US-2017-108966	2017-10-11	2017-10-18	Standard Class	SO-20335	Sean O'Donnell	Consumer	United S	
5	US-2017-108966	2017-10-11	2017-10-18	Standard Class	SO-20335	Sean O'Donnell	Consumer	United S	
6	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
7	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
8	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
9	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
10	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
11	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
12	CA-2016-115812	2016-06-09	2016-06-14	Standard Class	BH-11710	Brosina Hoffman	Consumer	United S	
13	CA-2019-114412	2019-04-15	2019-04-20	Standard Class	AA-10490	Andrew Allen	Consumer	United S	



3. Tableau Desktop Demonstration

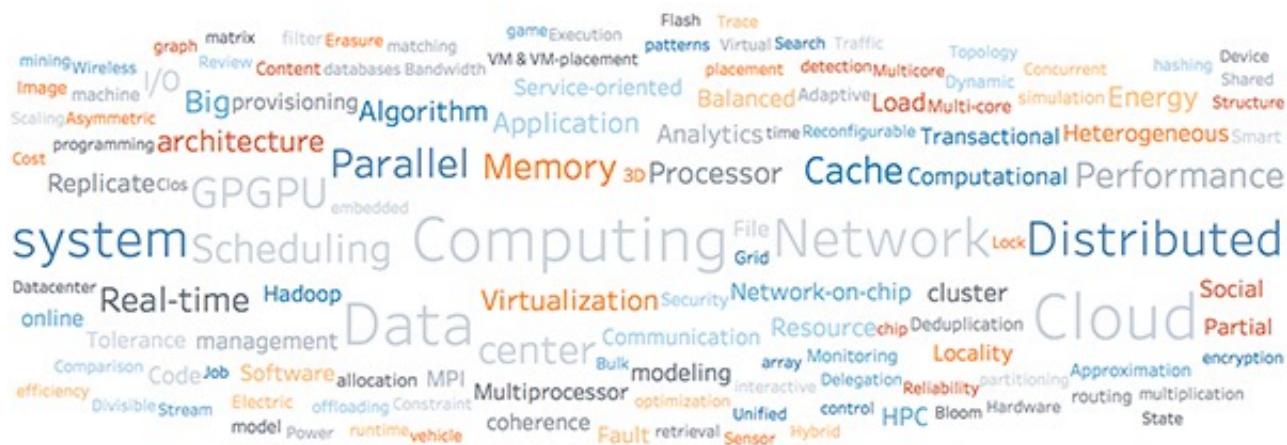


3. Word Cloud

- Word clouds can make great bookends to presentations to incite interest or leave a lasting impression on an audience

Keyword Word Cloud

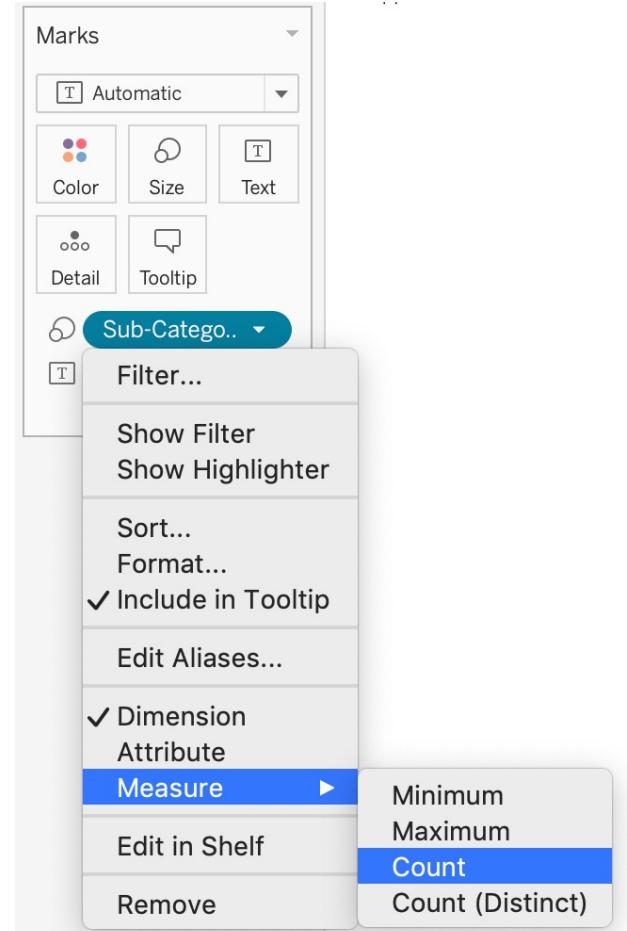
Keywords used in computing journal articles.





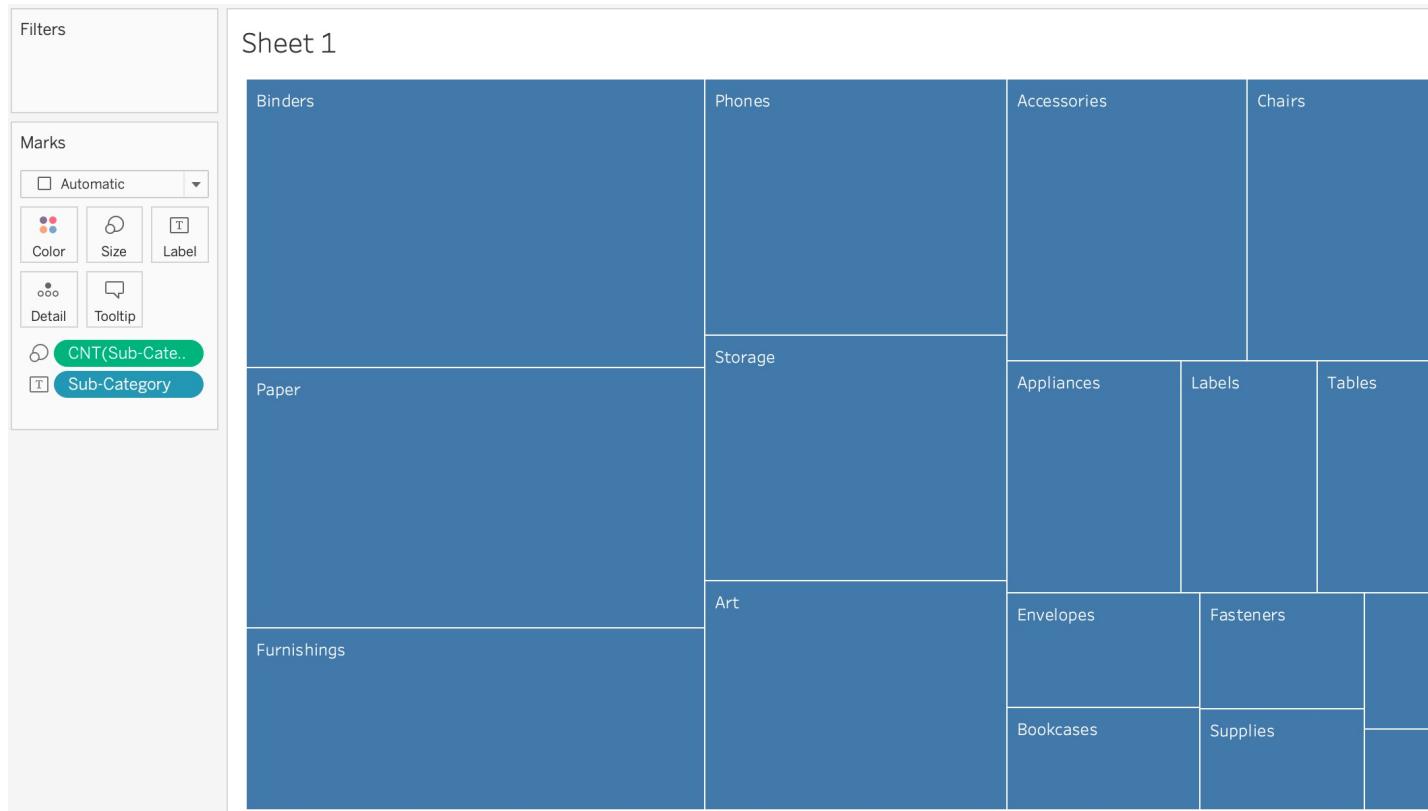
3. Word Cloud

- Using **Hult – Superstore.xls**.
- Let's say we want to see how often people buy certain sub-category
- Drag “**Order**” to the Canvas
- Go to “Sheet 1”, call it “**Word Cloud**”
- Drag “**Sub-Category**” to **Text** on the **Marks** card.
- Drag “**Sub-Category**” to **Size** on the **Marks** card.
- On the Marks card, right-click “Sub-Category” **Size** and select **Measure > Count**.





3. Word Cloud

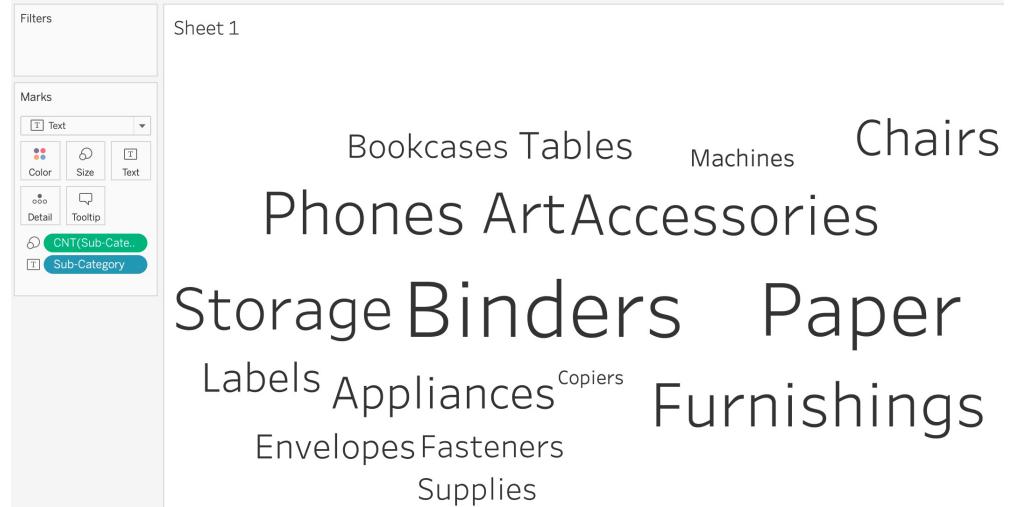
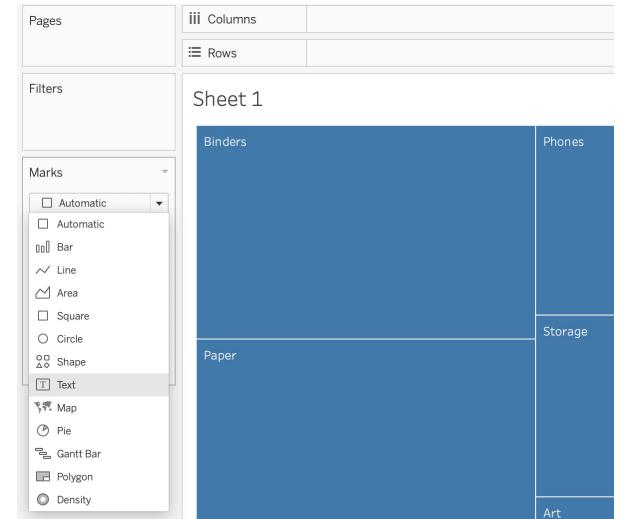


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3. Word Cloud

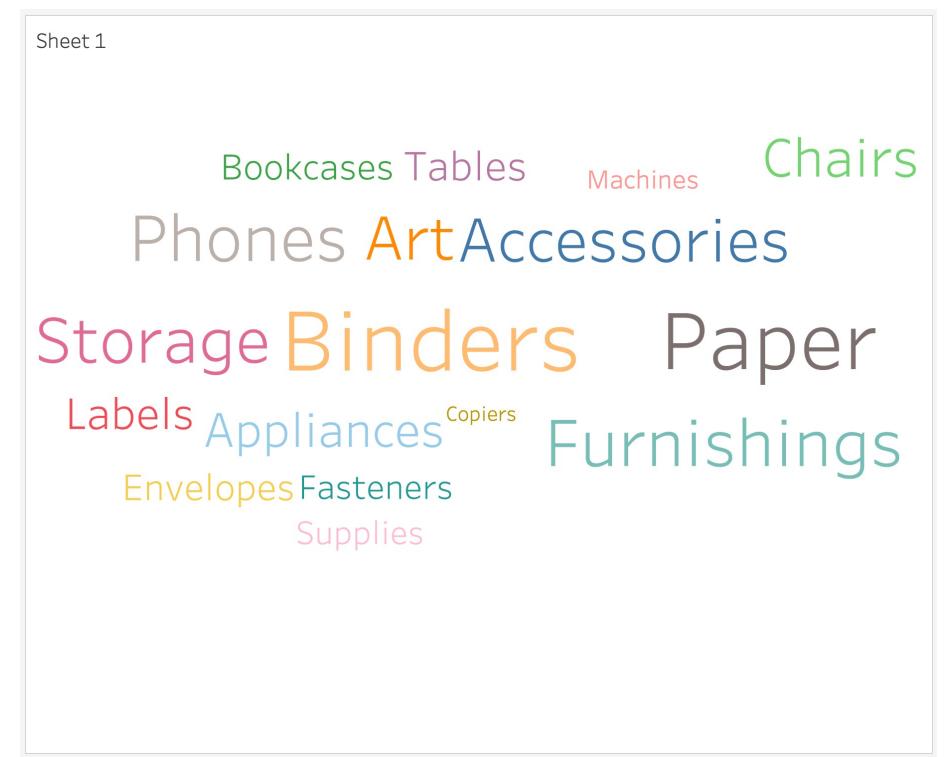
- Change the Mark type from **Automatic** to **Text**.
- To add color, drag “**Sub-Category**” to **Color** on the **Marks** card.





3. Word Cloud

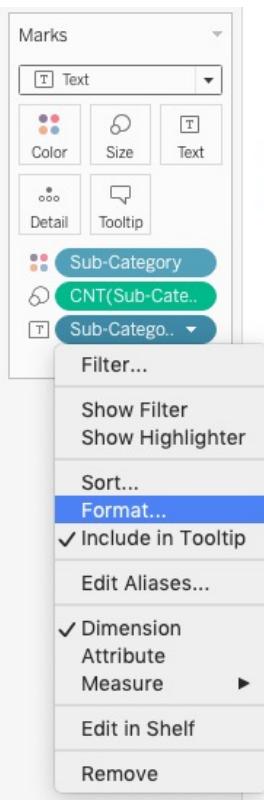
- Go to the Sub-Category Card on the right-hand size. Click the down arrow > **Hide Card**.
- Almost...





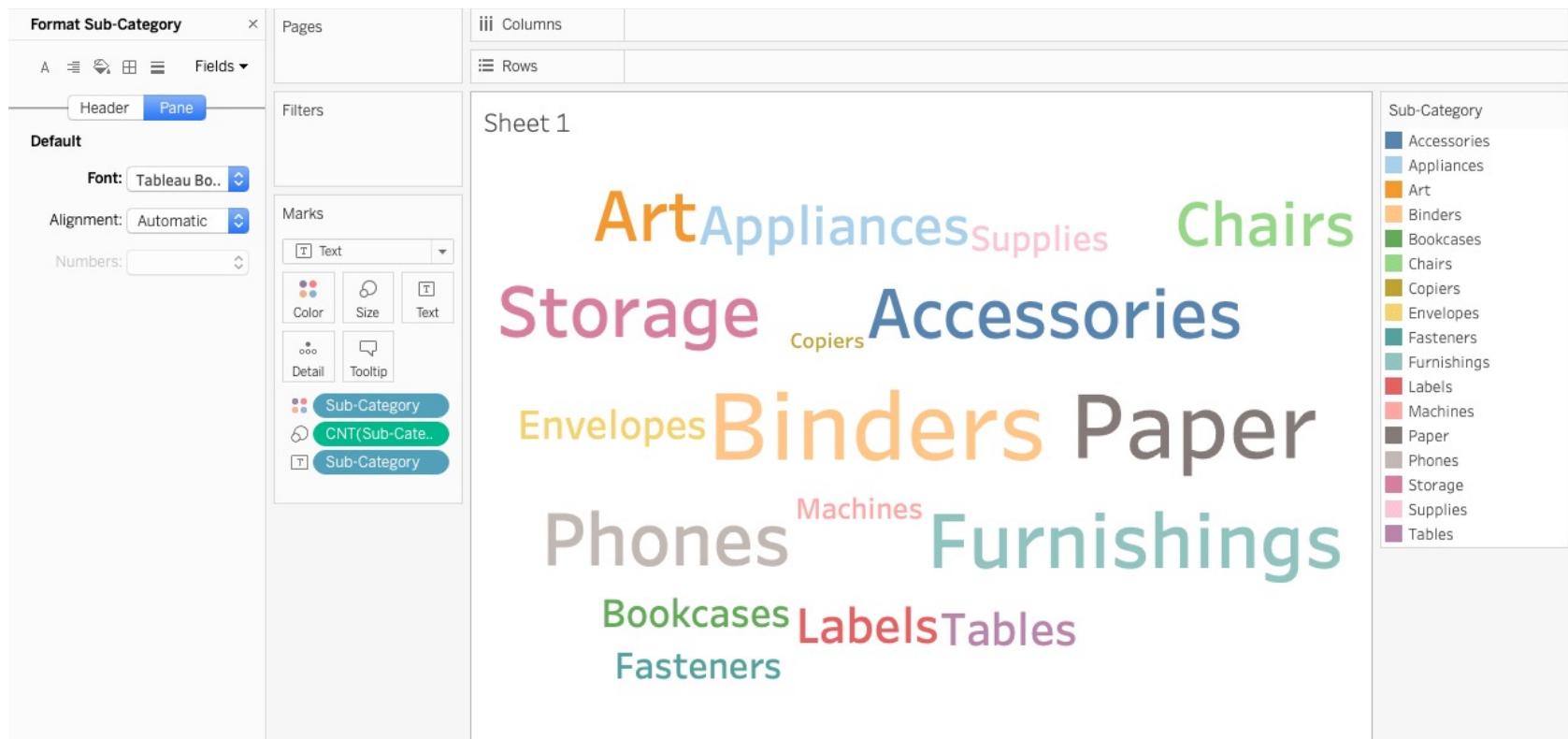
3. Word Cloud

- To change the color of text, click the **Color** icon in the **Marks** card.
 - Click the “Edit Colors...” button, select item, apply.
- To change the typeface of text, go to the “**Sub-Category**” text pill, select “Format...”
 - Click the “**Pane**” tab, then adjust the settings





3. Word Cloud



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3. Advanced Analytics: Forecasts

- Let's say we want to predict sales revenue for the next year using the **Hult – Superstore.xls** dataset.
- Tableau extrapolates future values of a time series based on its historical value, allowing you to attempt to predict the evolution of a measure.
- *Tableau utilizes exponential smoothing in forecast.*



3. Advanced Analytics: Forecasts

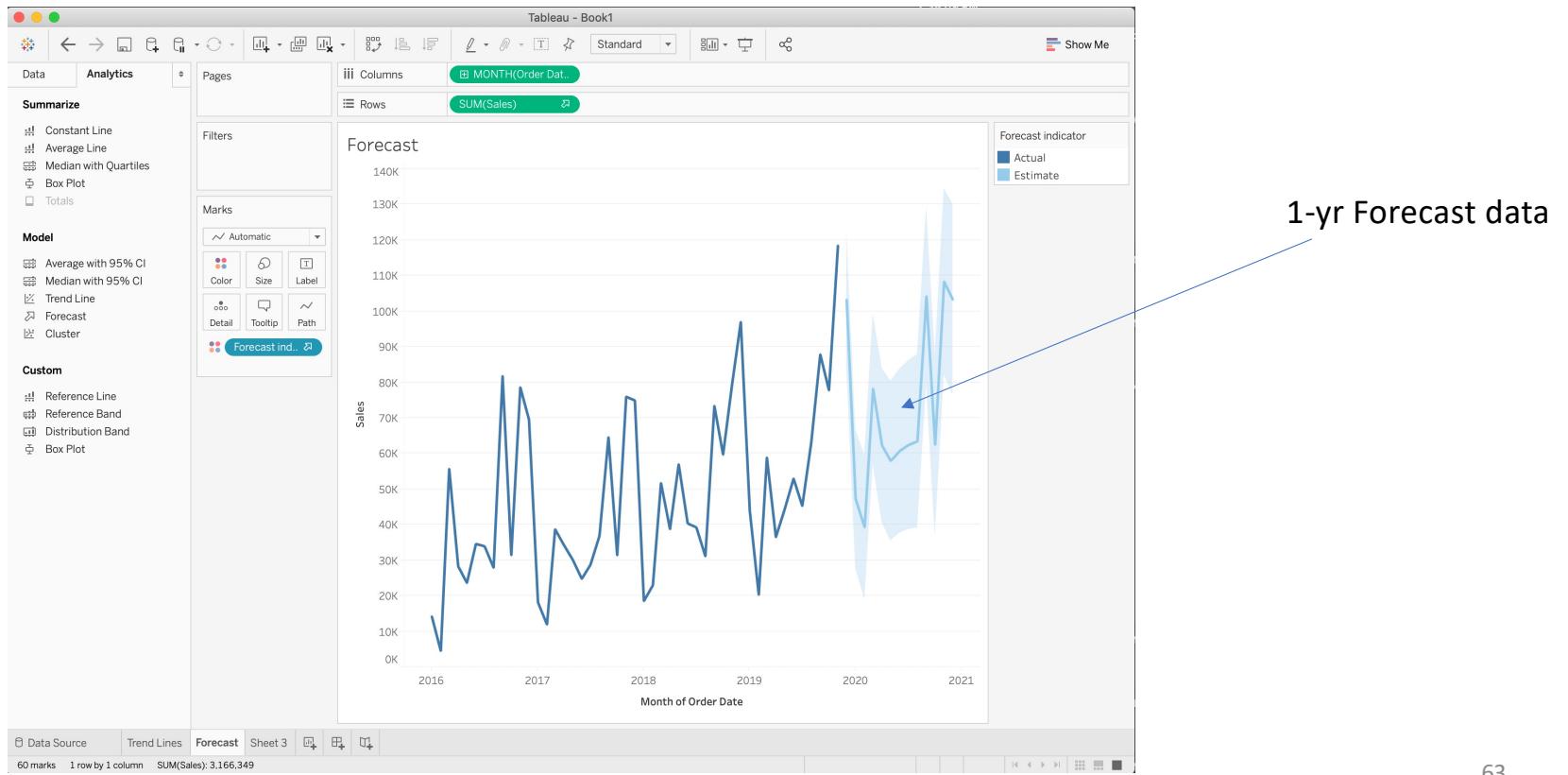
- Data Source, remove People from the linkage
- New sheet, call it “**Forecast**”
- Create a **line chart**
 - Sales > Rows [Y-axis]
 - Order Date > Columns [X-axis]
 - Click the down arrow to see the context menu, select the 2nd Month. It will change to Continuous automatically
- Both pills should be in green color
- Go to the **Analytics** pane
- Drag “**Forecast**” to the canvas
- Chart will be expanded, and the forecasted values are shown in a lighter color



The screenshot shows the context menu for the 'MONTH(Order Dat.)' pill in the Analytics pane. The 'Continuous' option is highlighted with a blue selection bar. Other options visible include 'Filter...', 'Show Filter', 'Format...', 'Show Header', 'Include in Tooltip', 'Show Missing Values', 'Standard Gregorian ISO-8601 Week-Based', 'Year 2015', 'Quarter Q2', 'Month May', 'Day 8', 'More ▾', 'Year 2015', 'Quarter Q2 2015', 'Month May 2015', 'Week Number Week 5, 2015', 'Day May 8, 2015', 'More ▾', 'Exact Date', 'Attribute Measure', 'Discrete', 'Continuous' (which is checked), 'Edit in Shelf', and 'Remove'.



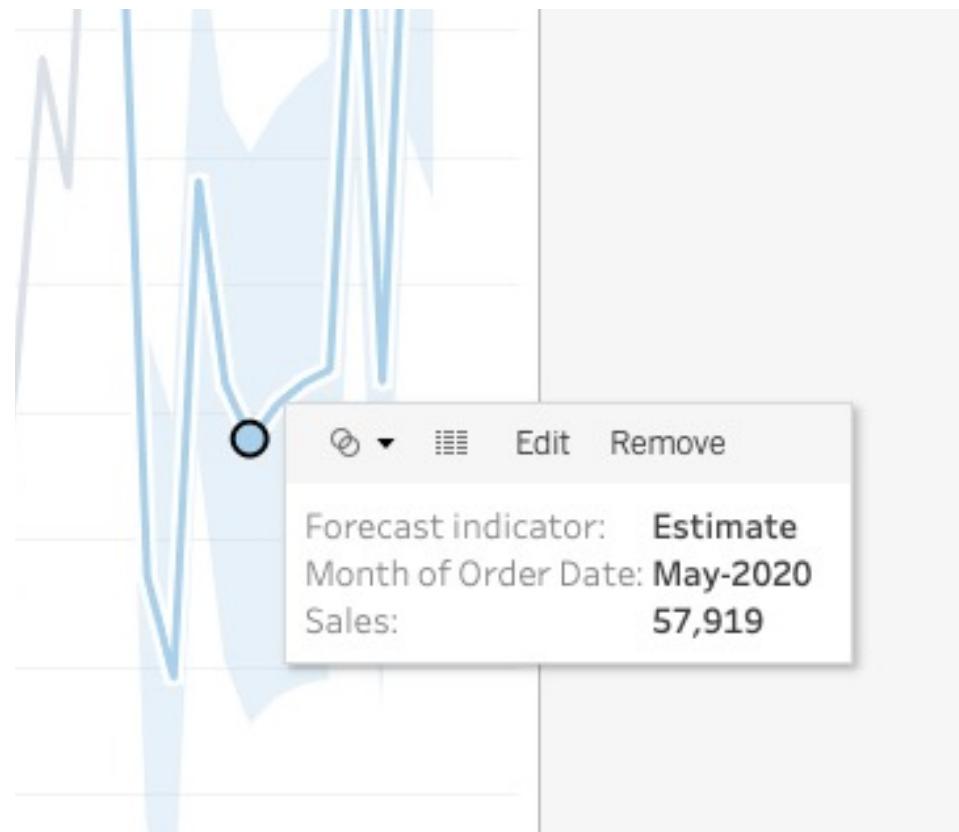
3. Advanced Analytics: Forecasts



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3. Advanced Analytics: Forecasts

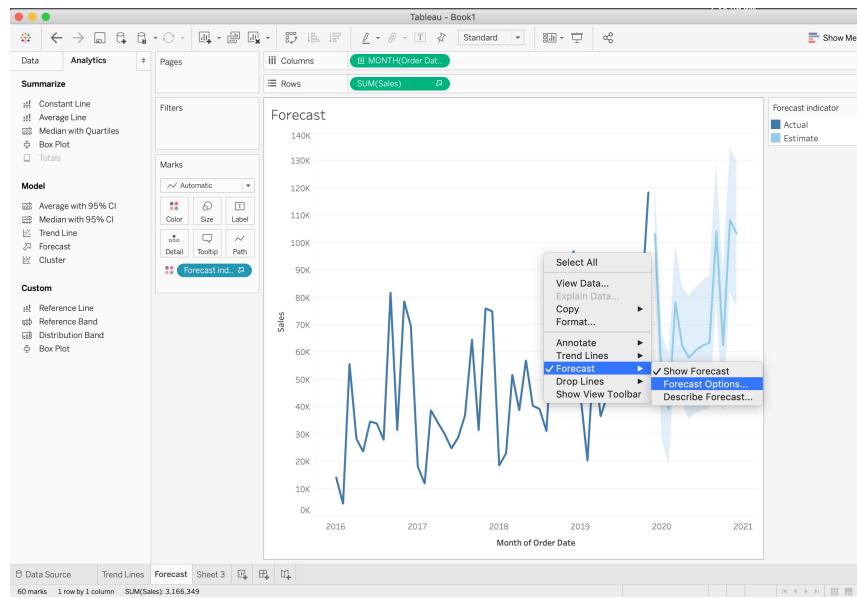


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3. Advanced Analytics: Forecasts

- Now, let's fine tune the forecast
- Right-click on the chart, select **Forecast > Forecast Options...**

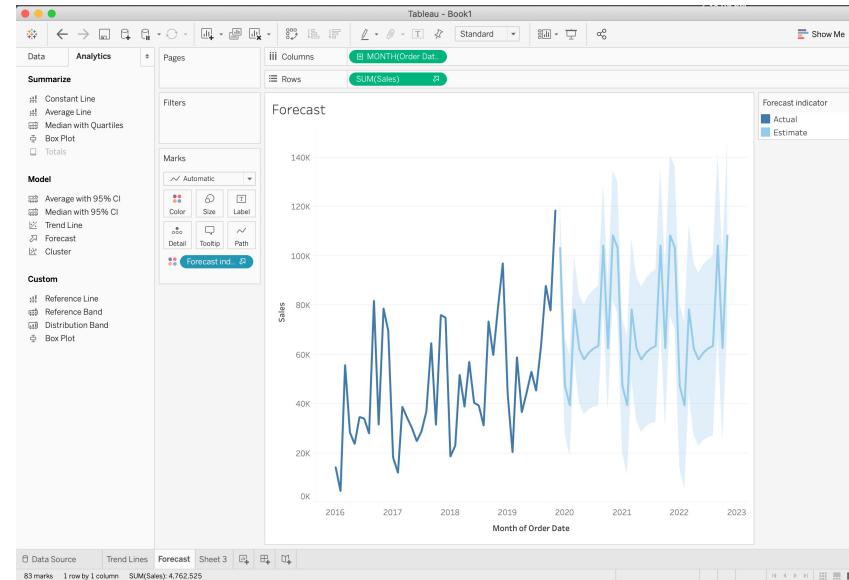
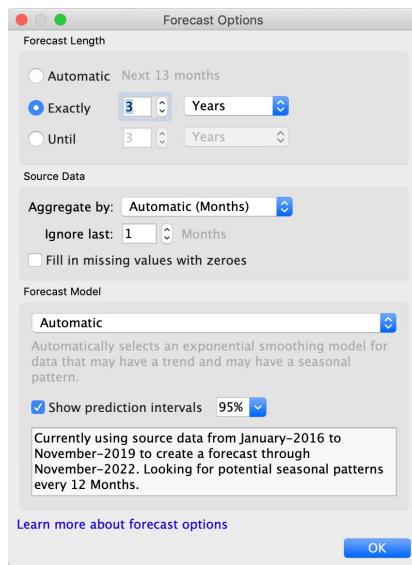


65



3. Advanced Analytics: Forecasts

- Let's say you want to have a 3-year forecast, then you change it from automatic to Exactly 3 years in the Forecast Length section at the top.

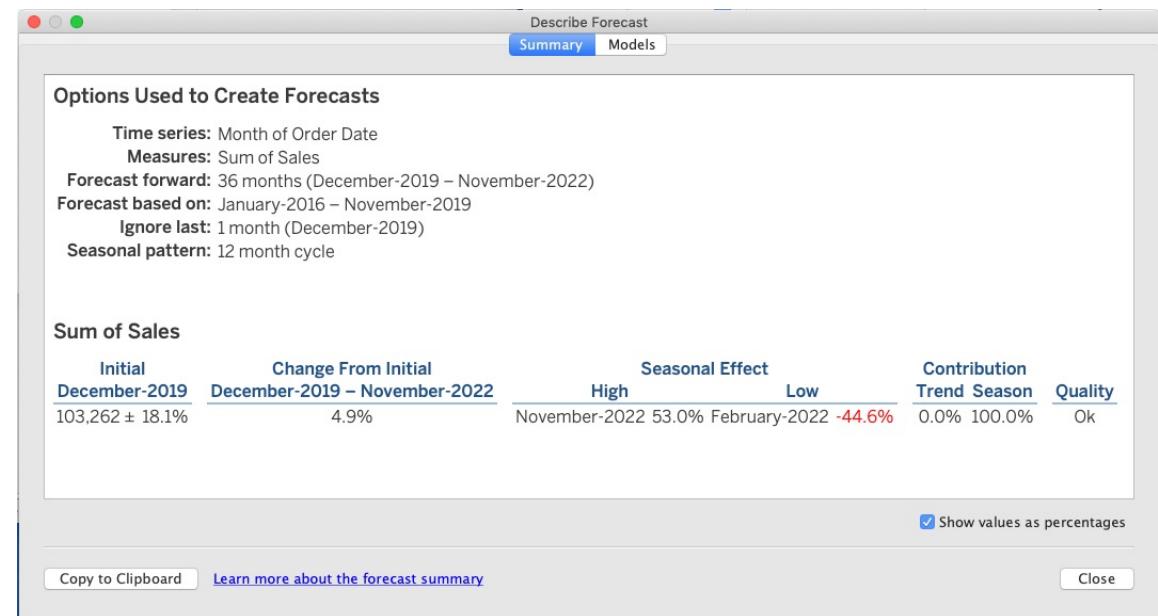
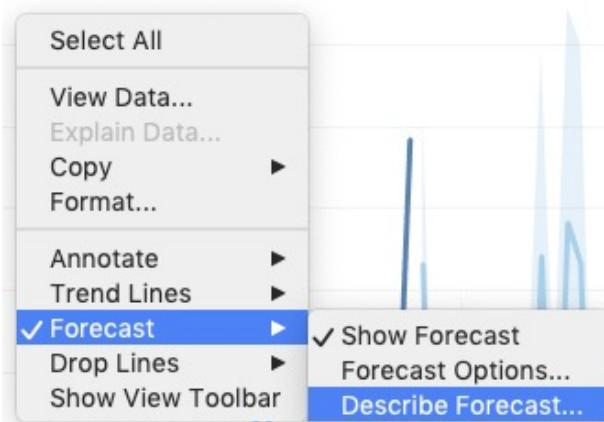


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3. Advanced Analytics: Forecasts

- Right-click on Canvas, Forecast > Describe Forecast...





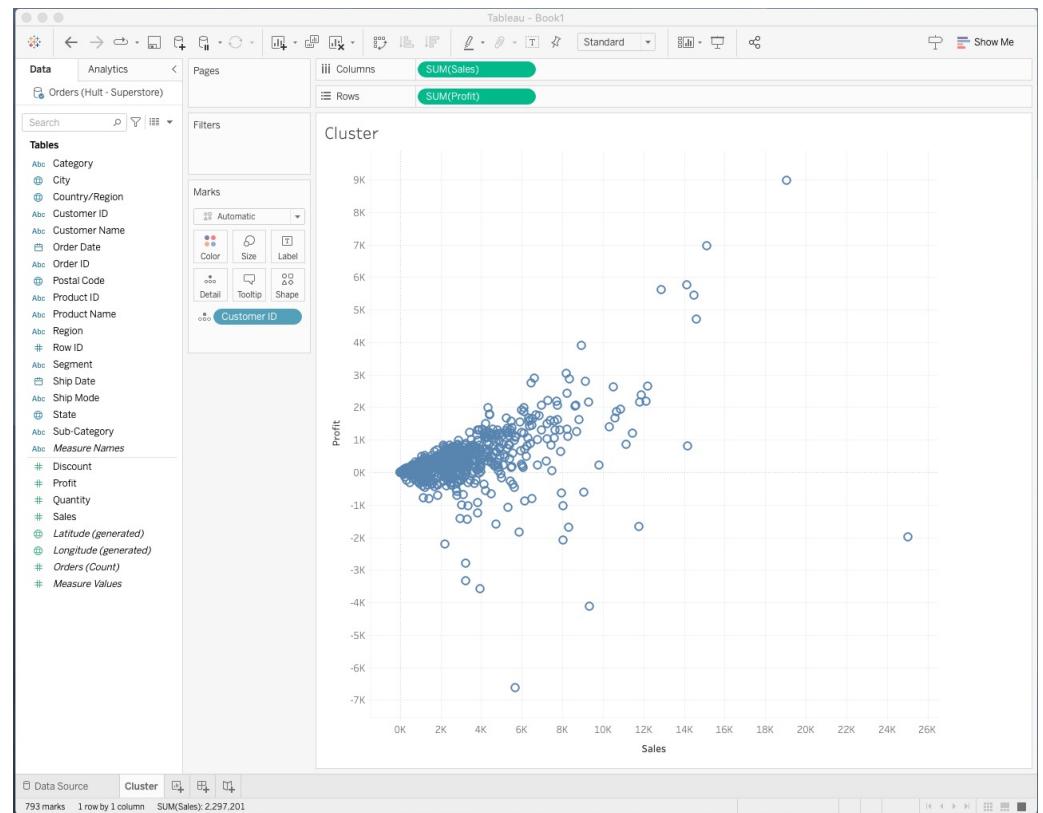
3. Advanced Analytics: Cluster Analysis (Segmentation)

- Cluster analysis helps you to **find groupings** in your data. Good example is **customer segmentation**.
- *Tableau utilizes the k-mean algorithm, which is the most popular one for clustering.*
 - *It works by assigning n number of observations to k number of clusters, so that each observation is part of the cluster with the nearest cluster mean!*
- In Tableau, this can be demonstrated using the **Scatterplot**.



3. Advanced Analytics: Cluster Analysis (Segmentation)

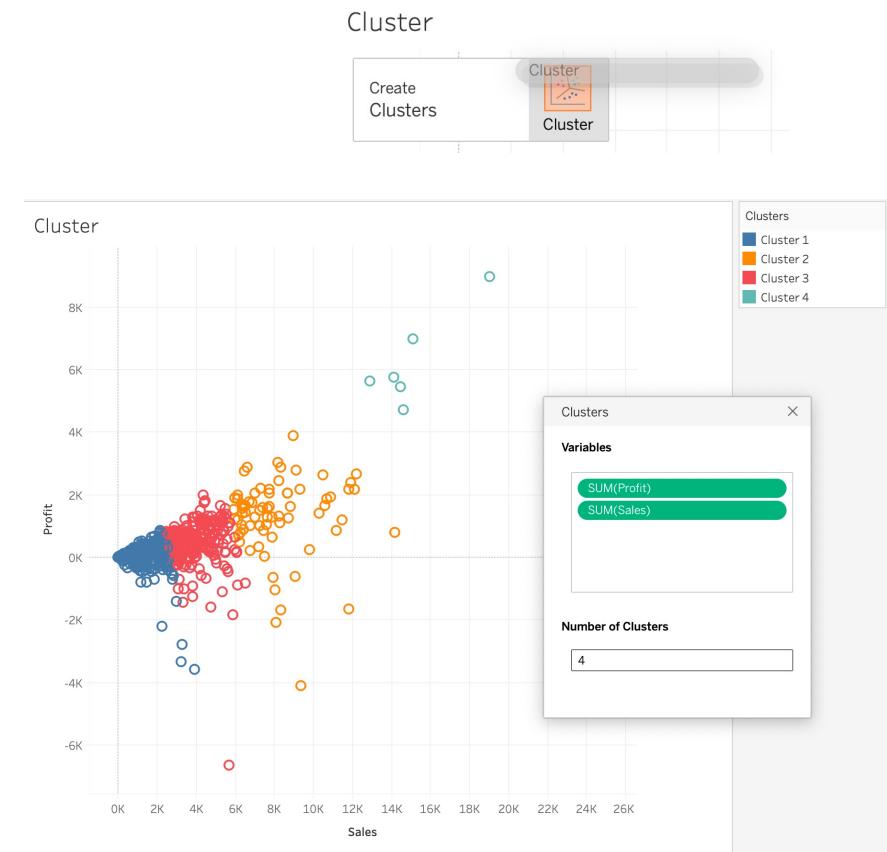
- Create a new sheet, call it “Cluster”
- Profit > Rows
- Sales > Columns
- Since I don’t care about the individual ID, I use Detail instead of Text this time.
- Drag Customer ID to Detail on the Marks card, so that one mark per customer
- Here, it’s just a bunch of dots





3. Advanced Analytics: Cluster Analysis (Segmentation)

- Go to the **Analytics** pane
- Drag “**Cluster**” to scatterplot.
 - If there’s no change of color, make sure you drag it again to touch the “Cluster” square icon
- Tableau will make a good guess and come up with 2 clusters. If you want to have more clusters, type the number (e.g., 4) in the pop-up Clusters window
 - If you can’t see the pop-up window, it’s probably in your other screen/monitor





3. Advanced Analytics: Cluster Analysis (Segmentation)

Next, you need to save the result.

- Click the “**Data**” pane
- Drag the newly created **Clusters** pill (field) from the Marks card to the **Data pane**
- You can now find the field in the **Tables** section of the Data pane.
- Once that's done, you can use such dimension in other graphics or analysis.
 - Create new sheet, call it “**Bar chart with clusters**”
 - **Sales > Rows**
 - **Region > Columns**
 - **Customer ID (clusters) > Columns**

The screenshot shows the Tableau Data pane with the 'Tables' section open. The 'Customer ID (clusters)' field is highlighted with a blue border and a red arrow points to it from the bottom right. Other fields listed include Category, City, Country/Region, Customer ID, Customer Name, Order Date, Order ID, Postal Code, Product ID, Product Name, Region, Row ID, Segment, and Sales Date.

The screenshot shows the Tableau shelf with the 'Columns' and 'Rows' sections. The 'Customer ID (clusters)' field is selected in the 'Columns' section, and 'SUM(Sales)' is selected in the 'Rows' section.

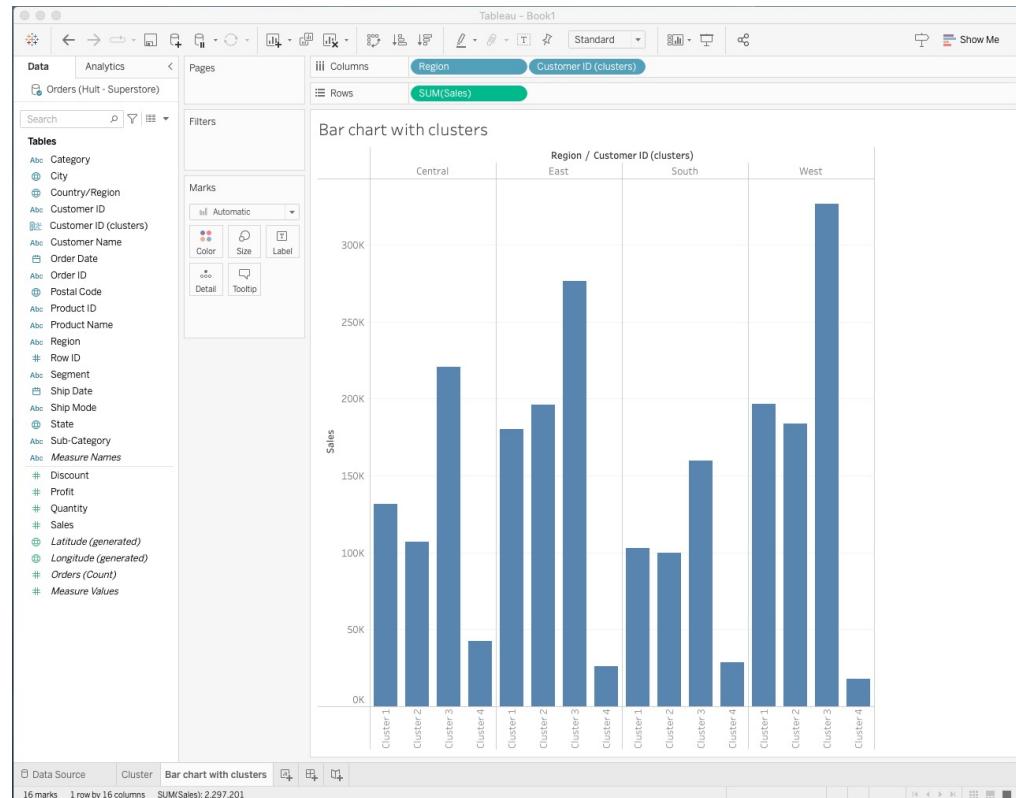
71



3. Advanced Analytics: Cluster Analysis (Segmentation)

Result:

Almost..



72



3. Advanced Analytics: Cluster Analysis (Segmentation)

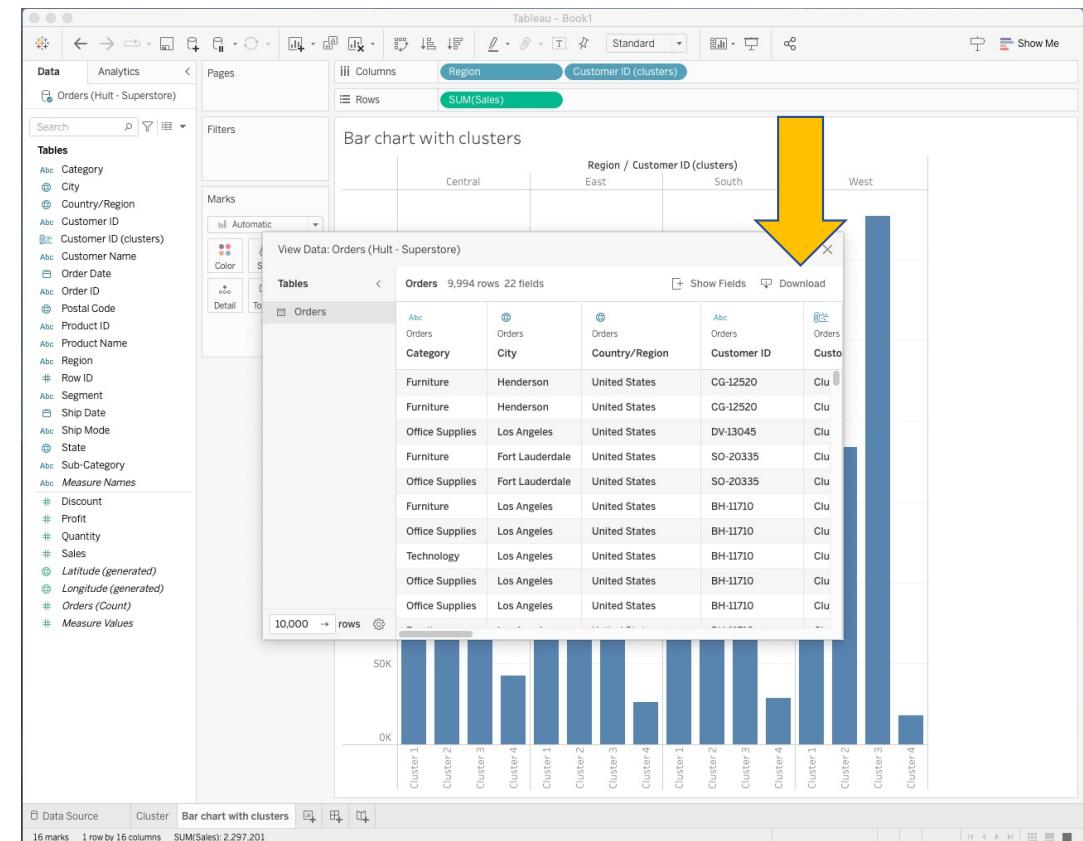
- Finally, let's export the data (with cluster details) into a **.csv file**, so that we can use it later in Excel.
- In the **Data** pane, click the “**View Data**” icon in the upper left-hand corner.

The screenshot shows the Tableau desktop application interface. The top navigation bar includes icons for file operations like Open, Save, and Print, as well as tabs for Data, Analytics, and Pages. A yellow arrow points down to the 'View Data' icon, which is located in the top right corner of the Data pane. The Data pane itself lists various data fields under 'Tables' and 'Marks'. Under 'Tables', there are 14 items: Category, City, Country/Region, Customer ID, Customer ID (clusters), Customer Name, Order Date, Order ID, Postal Code, Product ID, Product Name, Region, and Row ID. Under 'Marks', there are four options: Automatic, Color, Size, and Label, with Detail and Tooltip also listed below them.



3. Advanced Analytics: Cluster Analysis (Segmentation)

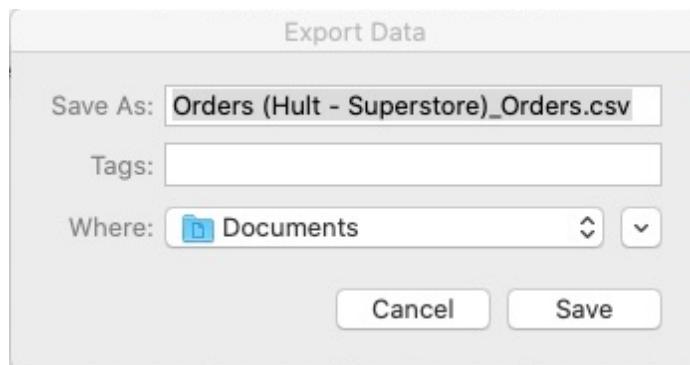
- A window will be popped up
- Click the “Download” button in the upper-right hand corner of that window.
 - Note: In older versions of Tableau, this button is called “Export All”





3. Advanced Analytics: Cluster Analysis (Segmentation)

- Export the data by pressing the “**Save**” button



Done!



3. Advanced Analytics: Cluster Analysis (Segmentation)

- Open it in Excel and you'll find your data being sorted into different clusters (groups)
 - Look at the 5th column titled “Customer ID (clusters)”
 - Data > Sort... > Sort by: Customer ID (cluster)
- Perfect for market segmentation analysis!

	A	B	C	D	E	F	G	H	I	J	K	L
1	Category	City	Country/Region	Customer ID	Customer ID (clusters)	Customer No	Order Date	Order ID	Postal Code	Product ID	Product Name	Region
2	Furniture	Henderson	United States	CG-12520	Cluster 1	Claire Gute	11/8/18	CA-2018-152	42420	FUR-B0-100	Bush Somer	South
3	Furniture	Henderson	United States	CG-12520	Cluster 1	Claire Gute	11/8/18	CA-2018-152	42420	FUR-CB-100	Delivery S	South
4	Office Supplies	Las Vegas	United States	DU-30405	Cluster 1	Sean O'Donn	10/11/17	US-2017-106	33311	OFF-ST-100	Eldon Fold S	West
5	Furniture	Fort Lauderdale	United States	DO-20335	Cluster 1	Sean O'Donn	10/11/17	US-2017-106	33311	FUR-TA-100	Chair CM S	South
6	Office Supplies	Fort Lauderdale	United States	DO-20335	Cluster 1	Sean O'Donn	10/11/17	US-2017-106	33311	OFF-ST-100	Eldon Fold S	South
7	Office Supplies	Concord	United States	AA-10480	Cluster 1	Andrew Allen	4/15/19	CA-2019-114	28027	OFF-PA-100	Xerox 1967	South
8	Office Supplies	Fort Worth	United States	HP-14815	Cluster 1	Harold Powl	3/12/17	US-2017-113	76127	OFF-PR-100	Holmes Regt Central	Central
9	Office Supplies	Fort Worth	United States	HP-14815	Cluster 1	Harold Powl	3/12/17	US-2017-113	76127	OFF-PR-100	Holmes Regt Central	Central
10	Office Supplies	San Francisco	United States	ZD-21925	Cluster 1	Zachus Dos	8/27/16	CA-2016-143	94109	OFF-PR-100	Newell 341	West
11	Technology	San Francisco	United States	ZD-21925	Cluster 1	Zachus Dos	8/27/16	CA-2016-143	94109	TEC-PH-100	Cisco SPA 50	West
12	Office Supplies	San Francisco	United States	ZD-21925	Cluster 1	Zachus Dos	8/27/16	CA-2016-143	94109	OFF-PR-100	Wilson Jone	West
13	Furniture	Philadelphia	United States	SF-20065	Cluster 1	Sandra Flan	7/16/19	US-2019-145	19140	FUR-CH-100	Global Delux East	East
14	Office Supplies	Los Angeles	United States	EH-1945	Cluster 1	Eric Hoffmar	7/16/19	US-2019-145	19000	OFF-PR-100	Imation 868	West
15	Technology	Los Angeles	United States	EH-1945	Cluster 1	Eric Hoffmar	7/16/19	US-2019-145	19000	TEC-AC-100	Imation 868	West
16	Technology	Richardson	United States	GH-14485	Cluster 1	Gene Hale	12/6/18	CA-2018-117	75080	TEC-PH-100	GE 30524EP	Central
17	Furniture	Richardson	United States	GH-14485	Cluster 1	Gene Hale	12/6/18	CA-2018-117	75080	FUR-FU-100	Electric Arch	Central
18	Technology	Eagan	United States	OH-18715	Cluster 1	Odella Nelsc	3/11/18	CA-2018-118	55122	TEC-AC-1000	Verbatim 25	Central
19	Office Supplies	Eagan	United States	OH-18715	Cluster 1	Odella Nelsc	3/11/18	CA-2018-118	55122	OFF-PR-100	Verbatim 25	Central
20	Office Supplies	Westland	United States	OH-18705	Cluster 1	Perry O'Dow	3/11/18	CA-2018-118	55122	OFF-PR-100	Verbatim 25	Central
21	Technology	Dover	United States	UH-16900	Cluster 1	Lena Hernan	6/20/18	CA-2018-169	48185	OFF-ST-100	Gould Plastic Central	Central
22	Technology	Dover	United States	UH-16900	Cluster 1	Lena Hernan	6/20/18	CA-2018-169	48185	TEC-AC-1000	Imation 868	East
23	Office Supplies	New Albany	United States	DP-13000	Cluster 1	Darren Powe	4/18/17	CA-2017-115	47150	OFF-BI-1000	U-Peel 8 Central	Central
24	Office Supplies	New Albany	United States	DP-13000	Cluster 1	Darren Powe	4/18/17	CA-2017-115	47150	OFF-FU-100	U-Peel 8 Central	Central
25	Furniture	New Albany	United States	DP-13000	Cluster 1	Darren Powe	4/18/17	CA-2017-115	47150	FUR-FU-100	U-Peel 8 Central	Central
26	Furniture	New Albany	United States	DP-13000	Cluster 1	Darren Powe	4/18/17	CA-2017-115	47150	FUR-OH-100	Global Lenth	Central
27	Office Supplies	New York City	United States	JM-15265	Cluster 1	Janet Molina	3/21/18	CA-2018-105	10024	OFF-PR-100	Adventus AT&T	East
28	Technology	New York City	United States	JM-15265	Cluster 1	Janet Molina	3/21/18	CA-2018-105	10024	TEC-PH-1000	AT&T C834K	East
29	Office Supplies	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	OFF-PR-100	Home/Office East	East
30	Office Supplies	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	OFF-PR-100	Imation 868	East
31	Furniture	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	FUR-CH-100	Novmetra Tuck	East
32	Office Supplies	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	OFF-PR-100	Array Purch	East
33	Technology	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	TEC-AC-1000	Imation 868	East
34	Office Supplies	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	OFF-BI-1000	Plastic Bind	East
35	Office Supplies	Troy	United States	TB-21055	Cluster 1	Ted Butterfie	6/17/18	CA-2018-111	12180	OFF-PR-100	Prang Dustle	East



4. Publishing to Tableau Public



4. Publishing to Tableau Public

- <https://public.tableau.com/profile/ken.wong1538#!/>

The screenshot shows Ken Wong's Tableau Public profile. At the top, there is a placeholder profile picture, followed by the name "Ken Wong" and a "Edit" link. Below this, it says "5 viz'es 4 followers 0 following". The main area displays five published visualizations:

- Exercise 1**: A treemap visualization with 2 views.
- Testing**: A map visualization with 2 views.
- Sheet 1**: A map visualization with 9 views.
- Book5**: A map visualization with 9 views.
- Dual Axis Map**: A map visualization with 10 views.

At the bottom, there is a dark footer bar with the Tableau logo, copyright information ("© 2020 Tableau Software, LLC. A Salesforce Company. All Rights Reserved."), and links to "Products", "Legal", "About", and social media icons for Twitter, Facebook, and LinkedIn.

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4. Publishing to Tableau Public

Important steps before publishing!

- Go to “Data Source” tab
- Upper right-hand corner, Connection: click “Extract”
 - “Extract will include all data” appears

The screenshot shows the Tableau Public interface with the 'Orders' sheet selected. In the top right, there's a 'Connection' section with 'Extract' checked. Below it, a message says 'Extract will include all data.' A large yellow arrow points downwards towards this area. The main view shows the 'Orders' table with 24 fields and 9994 rows. The table includes columns like Row ID, Order ID, Order Date, Ship Date, and Ship Mode.

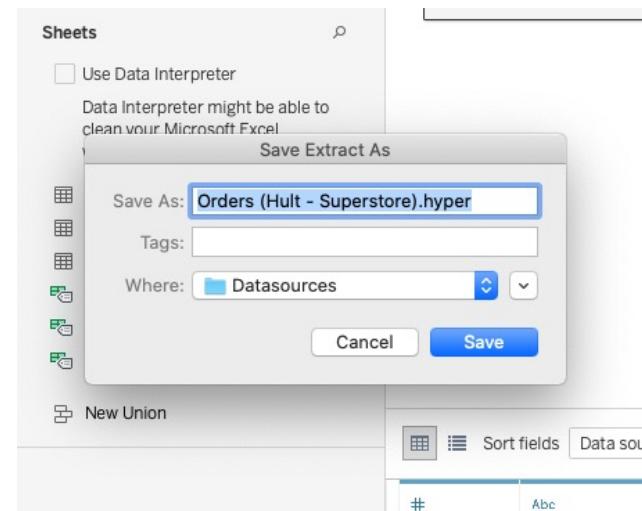
Row ID	Order ID	Order Date	Ship Date	Ship Mode
1	CA-2018-152156	11/8/2018	11/11/2018	Second Class
2	CA-2018-152156	11/8/2018	11/11/2018	Second Class
3	CA-2018-138688	6/12/2018	6/16/2018	Second Class
4	US-2017-108966	10/11/2017	10/18/2017	Standard Class
5	US-2017-108966	10/11/2017	10/18/2017	Standard Class
6	CA-2016-115812	6/9/2016	6/14/2016	Standard Class
7	CA-2016-115812	6/9/2016	6/14/2016	Standard Class
8	CA-2016-115812	6/9/2016	6/14/2016	Standard Class
9	CA-2016-115812	6/9/2016	6/14/2016	Standard Class
10	CA-2016-115812	6/9/2016	6/14/2016	Standard Class



4. Publishing to Tableau Public

Important steps before publishing!

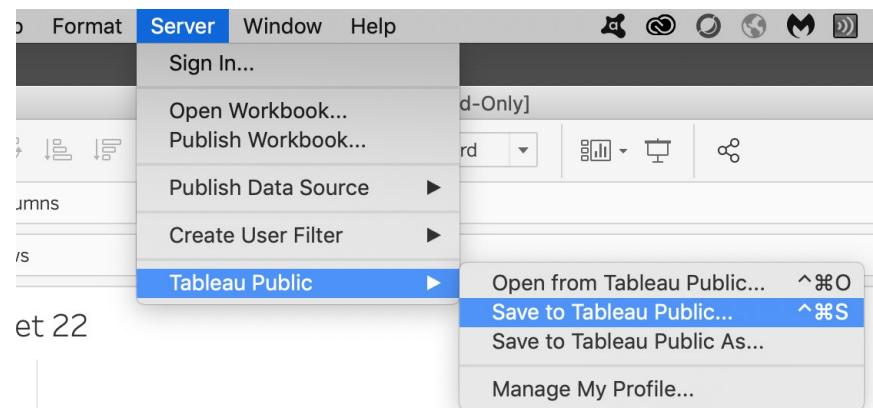
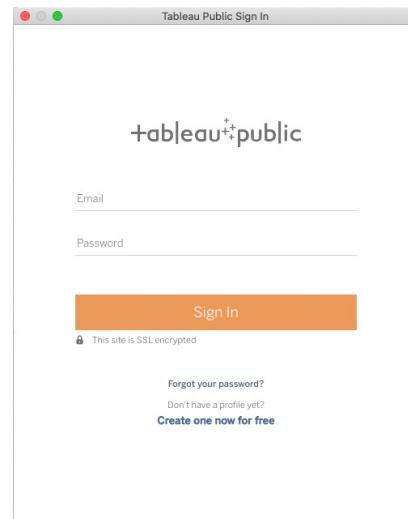
- Go back to your page, such as “Word Cloud”
 - A “Save Extract As” window will be popped up
 - Click the “Save” button to temporarily store this .hyper file onto your computer.





4. Publishing to Tableau Public

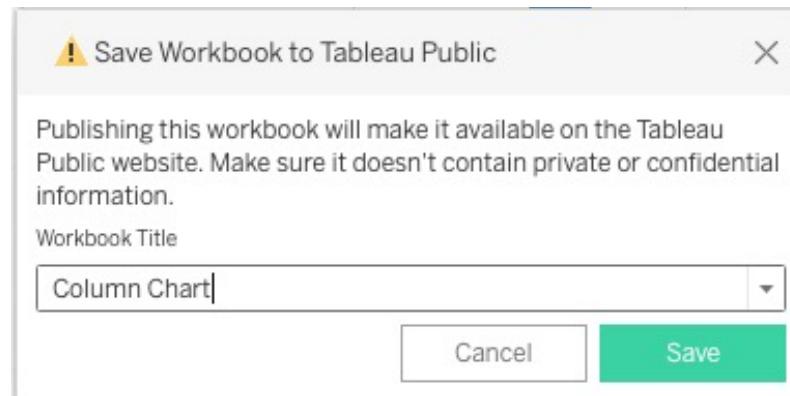
- In Tableau Desktop, Server menu > Tableau Public > Save to Tableau Public As...
- Log into Tableau Public





4. Publishing to Tableau Public

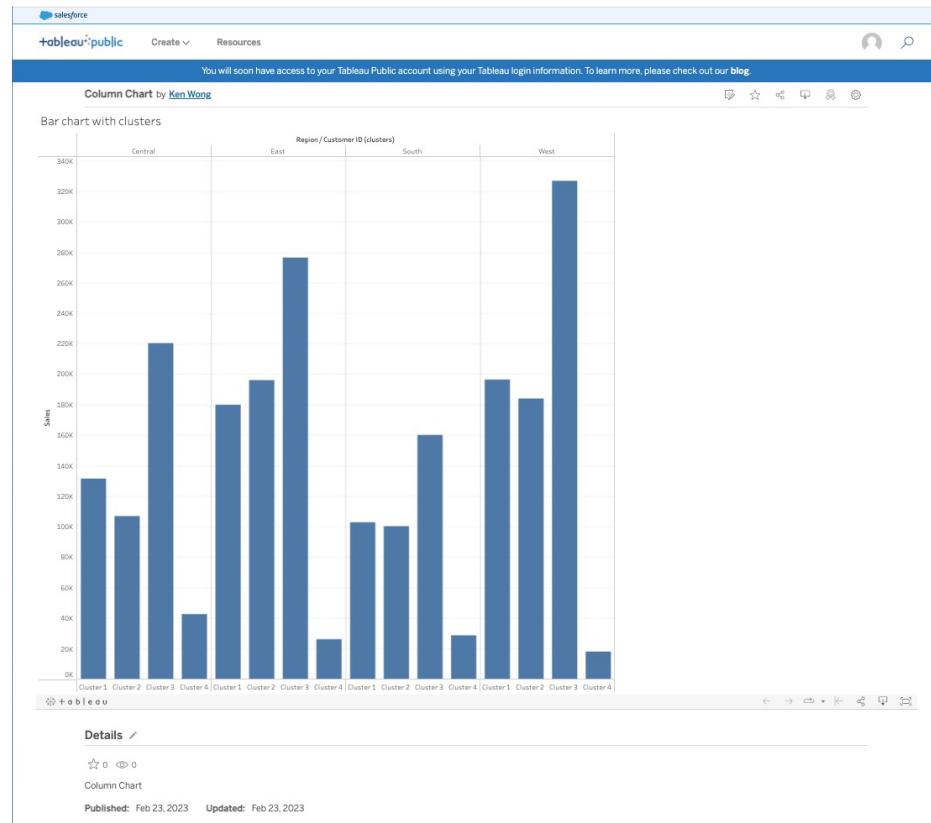
- Name your Workbook Title, such as “Column Chart”, **Save**





4. Publishing to Tableau Public

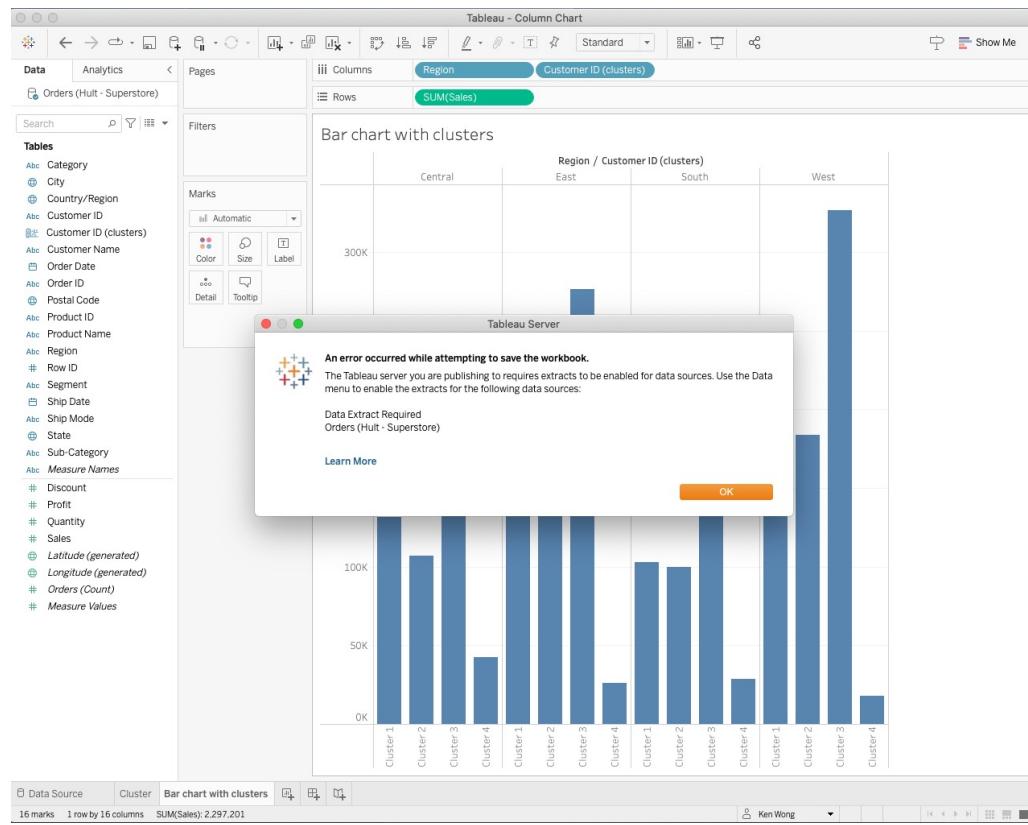
- Done!



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4. Common error if you don't do the “Extract”



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4. Publishing to Tableau Public

- Fun Stuff: Tableau Public Profile
- Your viz is shown in your personal profile.
- “You favorite a viz by clicking the star icon” and to lists of authors you follow and those who follow you.



4. Data Source

- Sample datasets at Tableau Public:
(<https://public.tableau.com/app/resources/sample-data>)
- Data is Plural (<https://www.data-is-plural.com/>)
 - A list of interesting public data from around the world
- Kaggle (<https://www.kaggle.com/datasets>)
 - Free registration required
- UN Data (<https://data.un.org>)
- Data.gov (<https://www.data.gov>)



4. Data Source – Analyze Boston

- 236 Datasets
- <https://data.boston.gov>

The screenshot shows the homepage of Analyze Boston. At the top, there's a navigation bar with 'ANALYZE BOSTON' and a city seal, along with links for 'DATASETS', 'NEWS', 'TIPS', 'LOG IN', 'SIGN UP', and 'CONTACT'. Below the header is a large banner featuring a photograph of filing cabinets labeled with years like '1882-1891' and '1901-1910'. The banner text reads: 'Welcome to ANALYZE BOSTON. Analyze Boston is the City of Boston's open data hub. We invite you to explore our datasets, read about us, or see our tips for users.' A search bar below the banner contains the placeholder 'Search from 236 Datasets' with a magnifying glass icon. Underneath the banner is a section titled 'SHOWCASES' with the subtitle 'See what our users are doing with open data.' It features four cards: 'Canopy Change Assessment: 2014-2019', 'Our Progress Toward Carbon Neutrality', 'Beantown Solar', and 'Climate Ready Boston Map Explorer'.

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4. Data Source - ChatGPT

“Can you show me the number of smoker in the us over the past 10 years?”

The screenshot shows a web browser window for chat.openai.com/chat. The user has asked, "can you show me the number of smoker in the us over the past 10 years?" ChatGPT responds by providing a table of estimated adult smokers in the US from 2012 to 2021. The table is as follows:

Year	Percentage of Adult Smokers	Estimated Number of Adult Smokers
2012	18.1%	43.8 million
2013	17.8%	42.2 million
2014	16.8%	40.0 million
2015	15.1%	36.5 million
2016	15.5%	37.8 million
2017	14.0%	34.3 million
2018	13.7%	33.7 million
2019	13.7%	33.2 million
2020	14.0%	34.1 million
2021	Data not yet available	Data not yet available

Below the table, a note states: "Please note that these estimates are based on self-reported data and may not be exact, but they do provide a general idea of the number of smokers in the US over the past decade."

The sidebar on the left includes links for "New chat", "US adult smoker trend", "US election data visualization", "Rolex 116000 Value", "Omichannel Retail Textbook", "MCQ Target Marketing", "Christian Faith Essay", "Presentria Definition Inquiry", "Presentria Explanation Sough", "Clear conversations", "Upgrade to Plus", "Dark mode", "Updates & FAQ", and "Log out".

5. Storytelling in Tableau Desktop

a. Understanding the Sequence in Data Visualizations



5. Understanding the Sequence in Data Visualizations

- The process of constructing a data narrative involves
 1. Visually exploring **data**
 2. Building purposeful **visualizations**
 3. Organizing them to tell a **story**
- Specially, you need to figure out...
 - how to build a **sequence** of data visualizations
 - how to build **dashboards** and organize them as well as individual visualizations in **story points**
 - how to make use of some of Tableau's storytelling features.



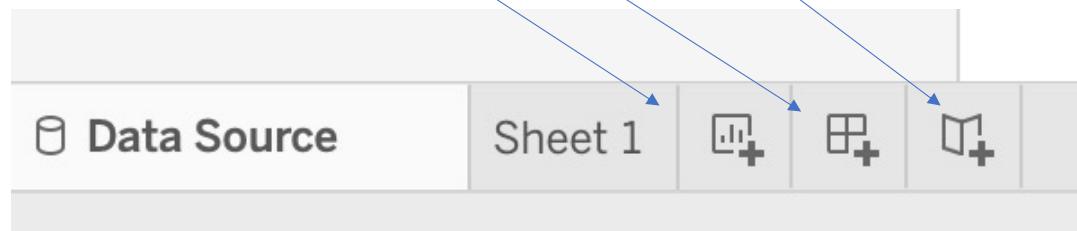
Ryan ch8

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5. Understanding the Sequence in Data Visualizations

- You can build stories using
 - (i) Tableau **sheets** (individual visualizations)
 - (ii) **dashboards** (multiple visualizations)
 - (iii) **story points** (multiple sheets and/or dashboards)



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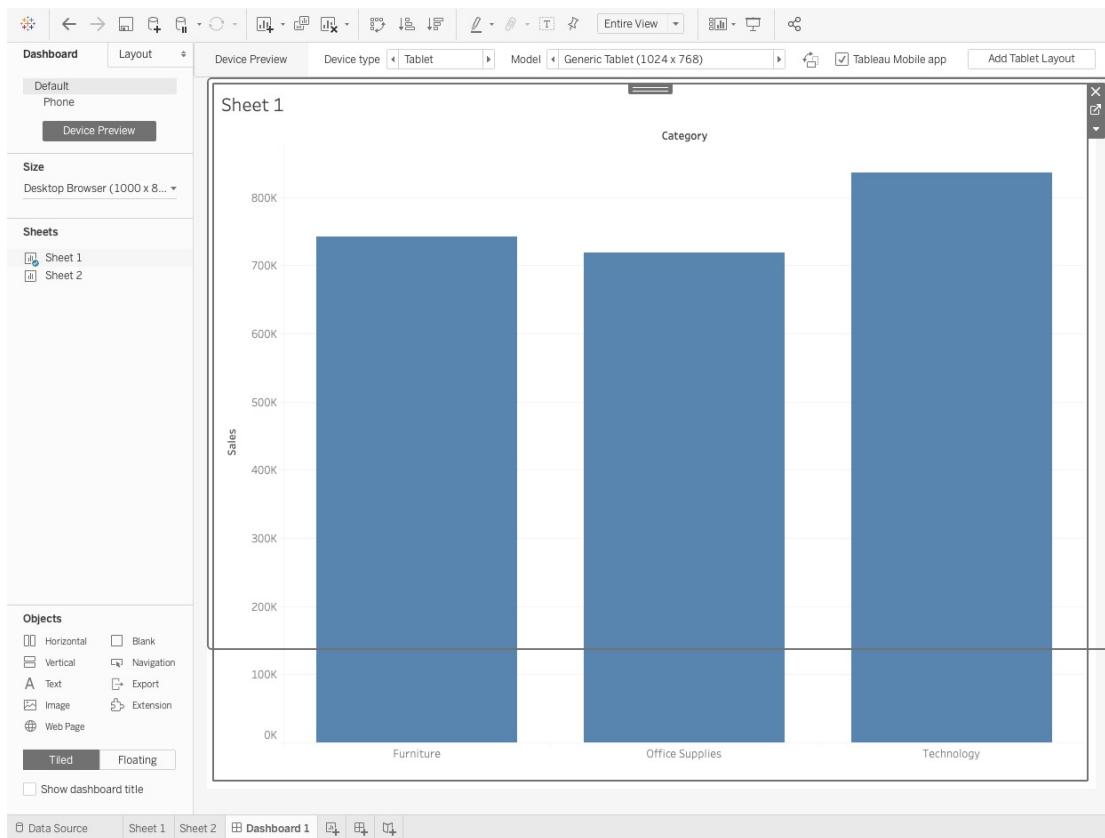
5. Understanding the Sequence in Data Visualizations

- Which one to use depends on your audience, your display, your presentation style, and other context.
- **Do not overload a dashboard**
- Be aware of the impact of sizing, layout, and positioning, and make sure the view you've curated on your screen is consistent with your audience's.
 - **The Device Preview functionality** in Tableau supports this practice.



5. Understanding the Sequence in Data Visualizations

Device Preview



E.g., Too big for a tablet screen

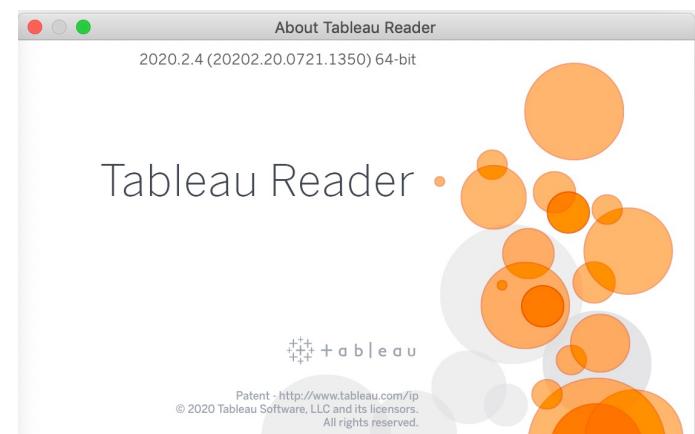
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5. Understanding the Sequence in Data Visualizations

- Instead of presenting static graph in PowerPoint, try **Tableau Reader**, which is a simple, free download that lets everyone appreciate Tableau views at their best, including the ability to “touch” your data as you present.

This application is used to view and interact with workbooks that have been saved as .twbx (packaged workbook).



- ## 5. Storytelling in Tableau Desktop
- a. Understanding the Sequence in Data Visualizations
 - b. Dashboard Overview



5. Dashboard Overview

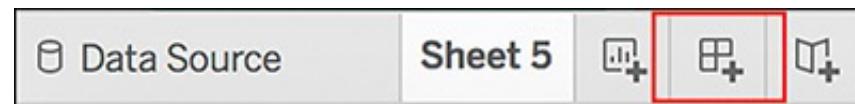


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5. Dashboard Overview

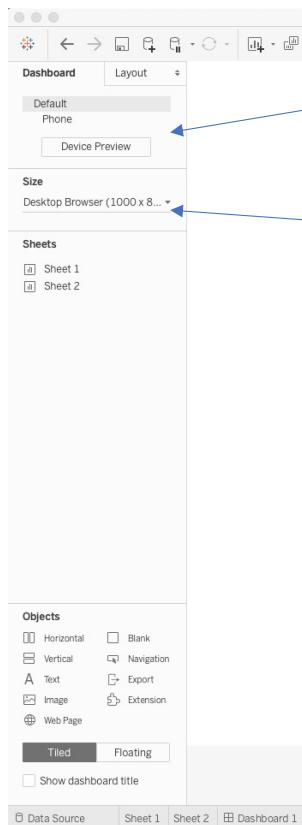
- **Dashboard** is a collection of several worksheets shown in a single screen. To create one, just click the dashboard button



- Imagine you click the bar of a specific category could filter the map to only show the sales of that particular product. Adding such interactivity helps bring the data alive!



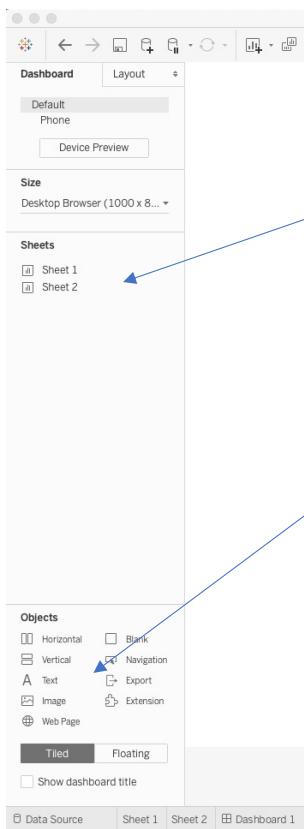
5. Dashboard Overview



- **Device Preview:** This option allows you to see your dashboard as it will appear on the form factor selected in Size.
- **Size:** This is an important aspect to think about before you start building a dashboard, and these options let you select from a pre-programmed list of fixed display sizes while the Canvas adjusts accordingly.
 - Desktop Browser (1000 x 800) seems to work well
 - An “Automatic” option allows the dashboard display to dynamically resize to any display it is presented on,
 - It has certain ramifications for things like floating legends, because these will move around as the screen resizes.



5. Dashboard Overview



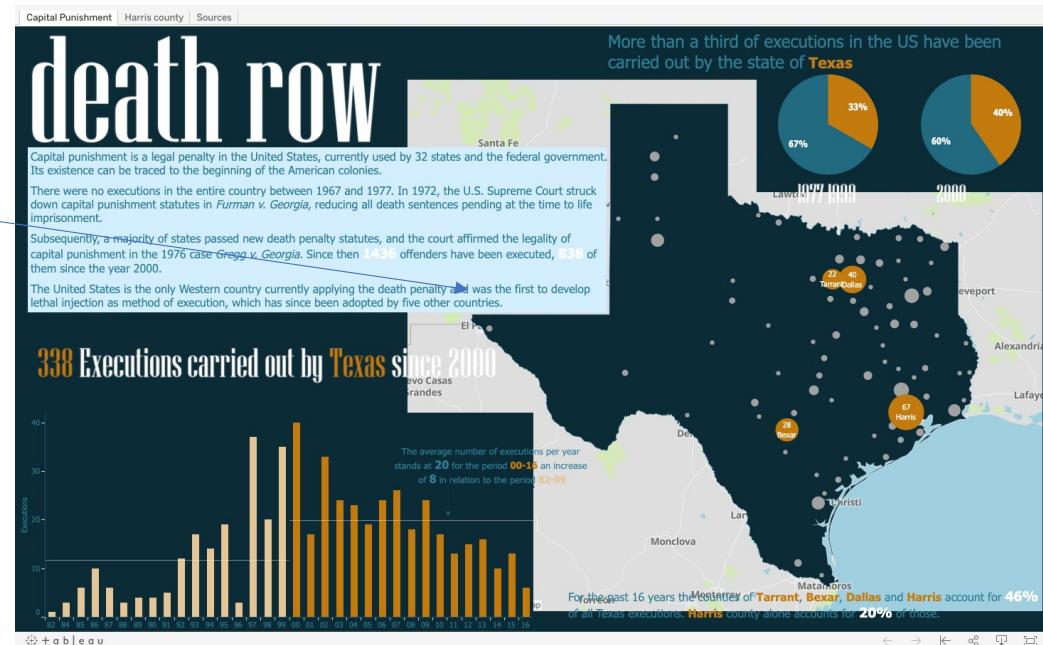
- **Sheets:** This area provides you with a list of all sheets in the workbook.
- **Objects:** This area offers a list of additional elements, such as logos or images, that you may elect to add into your dashboard from outside of Tableau.

Beginners are suggested to use “Tiled layout” at first. Floating option requires more work to re-size and place elements accurately



5. Dashboard Overview – Tiled vs. Floating

- Tiled: No overlapping
- Floating: You can overlap the graphs and put them on top of each other



Floating example

<https://public.tableau.com/en-us/s/blog/2016/08/dashboard-design-tiled-vs-floating-layouts>

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5. Dashboard Overview

- Hult – Superstore.xlsx
- Create 3 sheets: “Sales”, ‘Forecast’, and “Map”

“Sales” Sheet:

- Sales > Columns
- Region > Columns
- Category > Rows
- Profit > Color in Marks



Loth ch8

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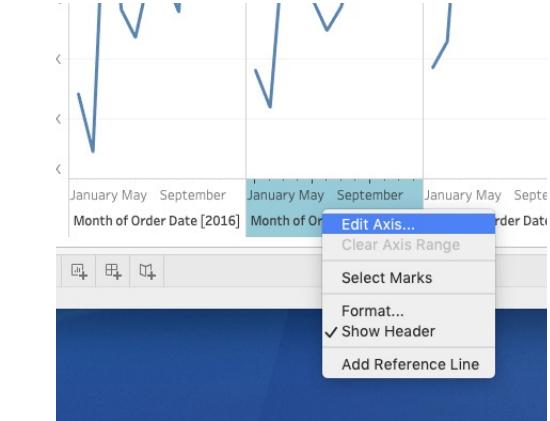


5. Dashboard Overview

“Forecast” Sheet:

- Sales > Rows
- Order date > Columns
- Press the “+” sign in front of YEAR(Order Date)
- Go to the 2nd pill, change QUARTER(Order Date) to MONTH(Order Date)
 - (2nd month, continuous)
- Analytics pane
 - Forecast to canvas
 - Right-click on bottom title > Edit Axis, Remove title, X

Loth ch8

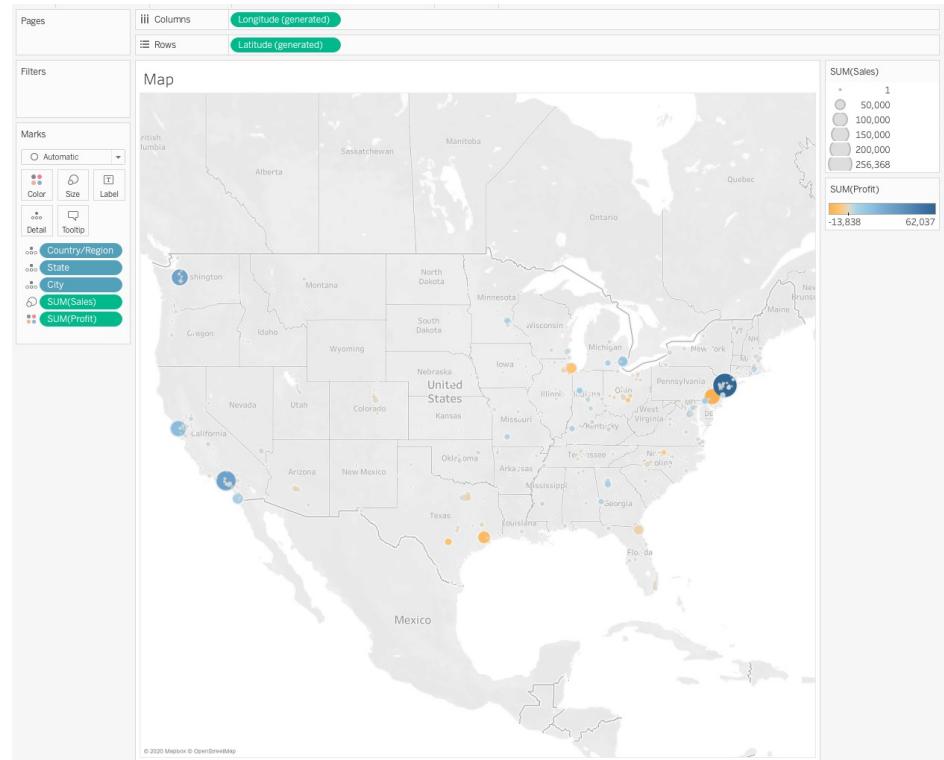




5. Dashboard Overview

“Map” Sheet

- Double-click:
 - Country/Region
 - State
 - City
 - Sales
 - Profit
- Adjust “Size” in Marks card.

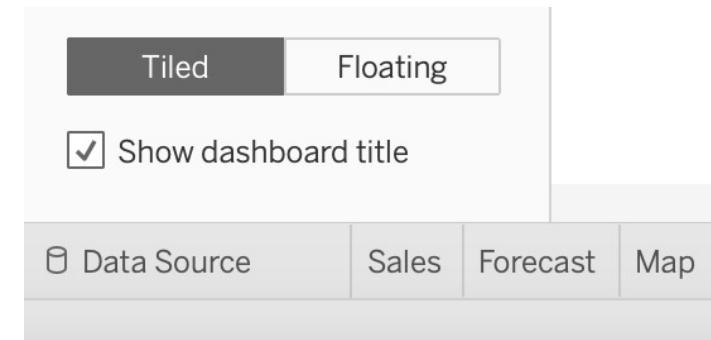


Loth ch8



5. Dashboard Overview

- Create a new Dashboard “**Sales Overview**”
- “**Sales**” > Canvas
- “**Forecast**” > Canvas
 - Place it below Sales
- “**Map**” > Canvas
 - Place it on the right-hand side, between Sales and the Profit section
- Check “Show dashboard title” in the lower left-hand corner

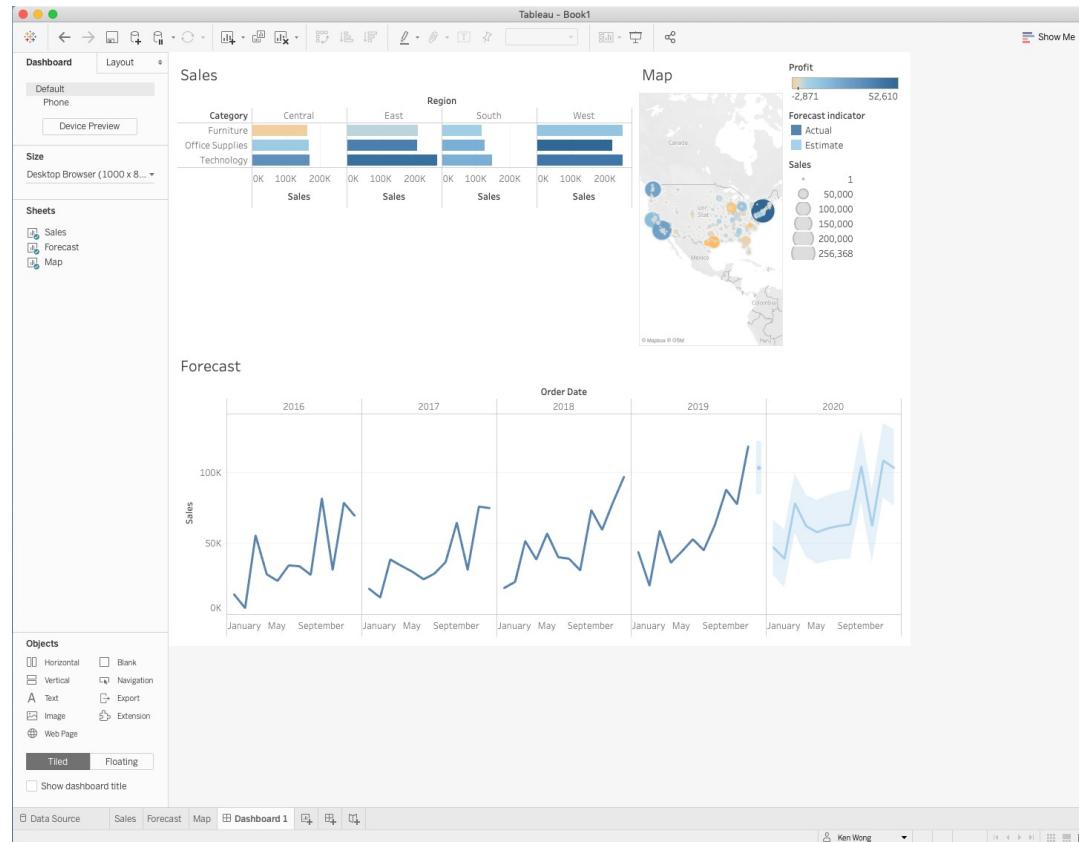


Loth ch8

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5. Dashboard Overview



Loth ch8

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5. Dashboard – Navigation Button

- In the “Objects” field on the lower-left hand corner, first scroll down.
- Then, drag the “Navigation” object to the right-hand side of the dashboard to create a navigation button, so that viewer can move from one dashboard to another dashboard, worksheet, or story.

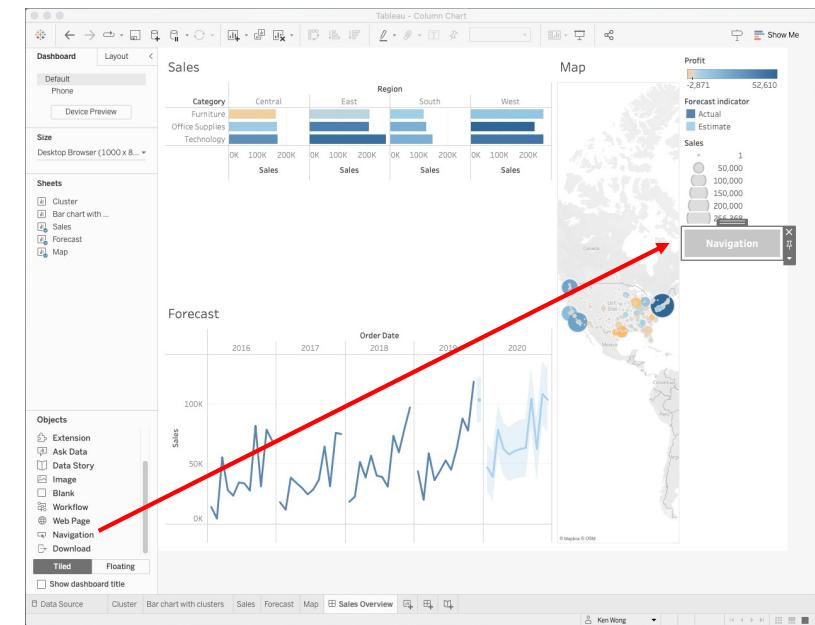
Loth ch8

Objects

- Extension
- Ask Data
- Data Story
- Image
- Blank
- Workflow
- Web Page
- Navigation
- Download

Tiled Floating

Show dashboard title





5. Dashboard – Navigation Button

- Right-click on that button, **Edit Button..**, and select the target sheet (e.g., Sales)
- Button Style: **Image**
- **OK**
- You can create and place more than 1 button on a dashboard
- Click the **presentation mode icon** in the upper-right hand corner

Loth ch8



The screenshot shows the Tableau interface with a dashboard titled "Sales". The dashboard contains several visualizations: a bar chart for "Sales" by "Category" and "Region", a line chart for "Forecast" sales in 2016, and a map of North America with sales data. A context menu is open over a button labeled "Navigation" on the map visualization. The menu is titled "Edit Button" and includes options like "Navigate to", "Button Style" (set to "Image"), "Image" (with a "Choose" button), "Border" (set to "None"), "Background" (set to "None"), and "Tooltip" (with a text input field). The "OK" button is visible at the bottom right of the menu. The top navigation bar shows "Tableau - Column Chart" and the "Show Me" icon. The bottom navigation bar includes links for "Data Source", "Cluster", "Bar chart with clusters", "Sales", "Forecast", "Map", "Sales Overview", and other dashboard controls.

5. Storytelling in Tableau Desktop

- a. Understanding the Sequence in Data Visualizations
- b. Overview of Dashboard
- c. **Dashboard Actions**



5. Dashboard Actions

- To help the end user to explore the data, you can set these dashboard actions:
 - i. **Filter actions**
 - ii. **Highlight actions**
 - iii. **URL actions**
 - iv. *Set actions: change the values within a manually defined subset of your data*
 - v. *Go-to-sheet actions: take user to another sheet or dashboard based on the selection in the source chart (similar to navigation button)*

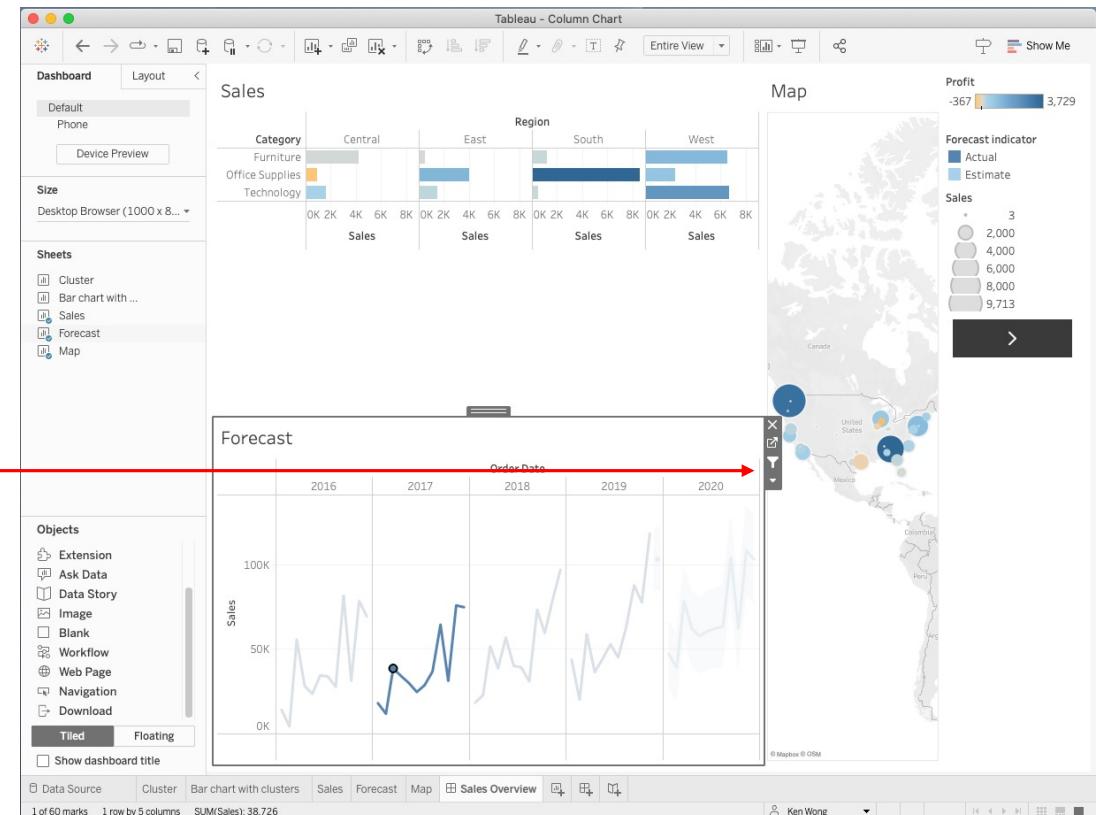


5. Dashboard Actions: (i) Filter actions

2 steps to create **filter** actions:

- Click your selected sheet (graph) on your dashboard as “source” for the filter action
 - In the grey frame, open the small menu that appears beside it.
 - In **Forecast**, click the third button from the top that looks like a funnel icon, labeled “Use As Filter”. It will turn solid. _____
- Select a year (e.g., **2017**)
- Note: If it's a map, click the “Search Map” field first to see the grey frame.

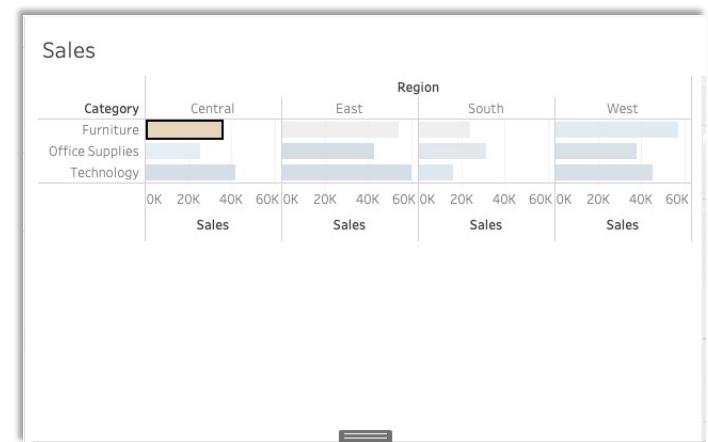
Loth ch8





5. Dashboard Actions: (i) Filter actions

- You can set the 2nd set of filters
- Click the **Sales** graph and make the **funnel icon** solid.
- Let's say we only want to show 2017 data from the "**Furniture**" category and "**Central**" region only, so we select that **orange bar**.
- All of the data in other sheets are now changed to reflect the furniture sales data from the Central region in 2017.



- You can set more than 1 filter in a sheet.
- You can disable the filter by pressing that funnel icon again

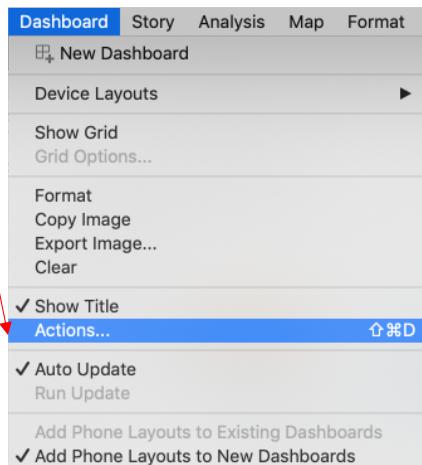
Loth ch8

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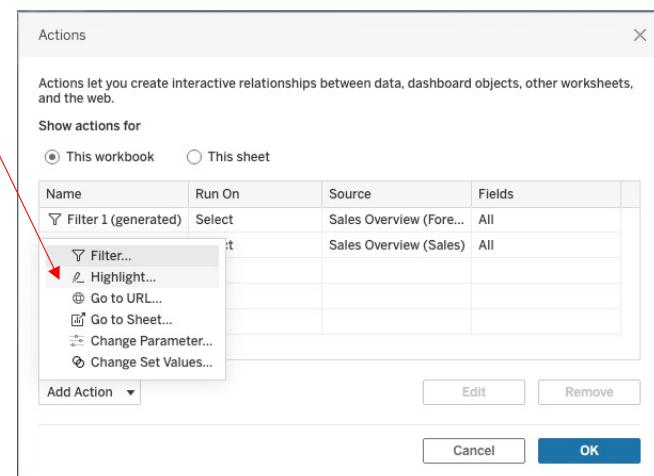


5. Dashboard Actions: (ii) Highlight actions

- In addition to filter, there's the “Highlight...” option under the “Dashboard” menu > Action...
- Click “Add Action >”, select “Highlight...”
- It highlight marks according to the selection in the source chart



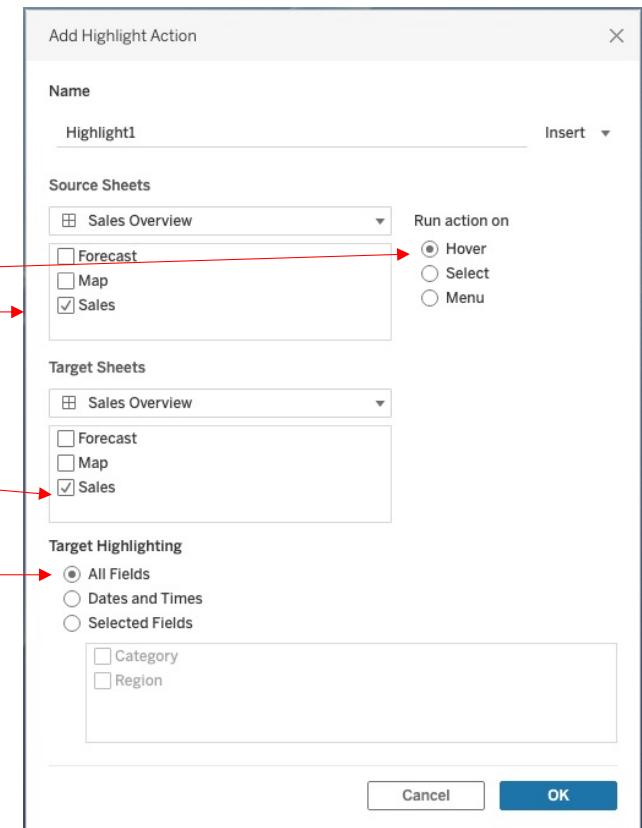
Loth ch8





5. Dashboard Actions: (ii) Highlight actions

- Let's say you want to highlight both the region and category when you hover around the bar graph in Sales
 - Source Sheets:
 - Choose "Sales" and run action on "Hover"
 - Target Sheets:
 - Choose "Sales"
 - Target highlighting:
 - "All Fields" because I want to highlight both region and category.



Loth ch8



5. Dashboard Actions: (ii) Highlight actions

- OK, go back to the Sales viz, hover around the bars to see how the Region and category names are being highlighted in yellow color.

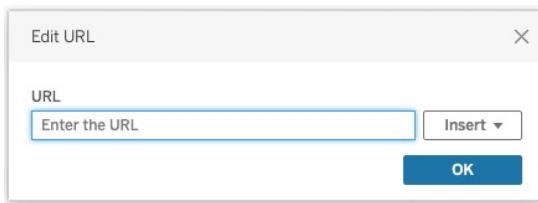
The image shows two screenshots from Tableau. On the left is the 'Actions' dialog box, which allows users to create interactive relationships between data, dashboard objects, other worksheets, and the web. It lists three actions: 'Filter 1 (generated)', 'Filter 2 (generated)', and 'Highlight1'. 'Highlight1' is selected and set to 'Hover' on 'Sales Overview (Sales)' with 'All' fields. On the right is a 'Sales' dashboard showing a stacked bar chart with categories Furniture, Office Supplies, and Technology across regions Central, East, South, and West. A tooltip is shown for the 'Office Supplies' bar in the 'East' region, displaying data for Category: Office Supplies, Region: East, Profit: 11,041, and Sales: 42,655. Red arrows point from the 'Highlight1' action entry in the dialog to the highlighted 'Office Supplies' bar in the dashboard.

Loth ch8

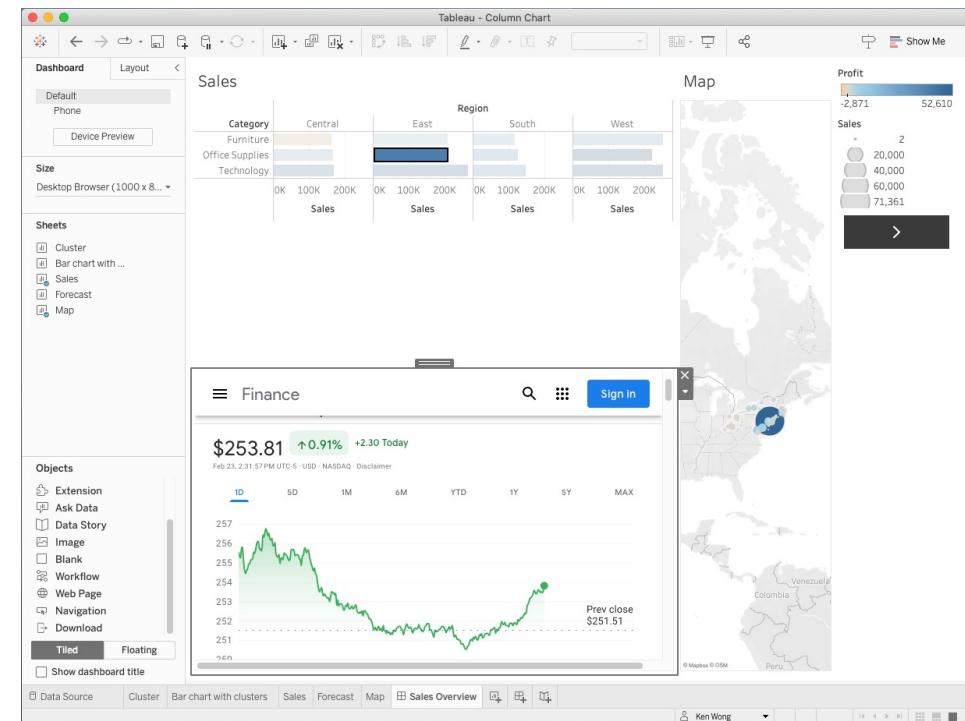


5. Dashboard Actions: (iii) URL actions

- You may want to display real-time web content (e.g., MSFT's stock quote) on your dashboard.
- Delete the **Forecast** sheet to give room.
- Objects section (lower left), drag the **“Web Page” icon** to the empty space and enter the URL
 - E.g., <https://google.com/finance/quote/MSFT:NASDAQ>



Loth ch8

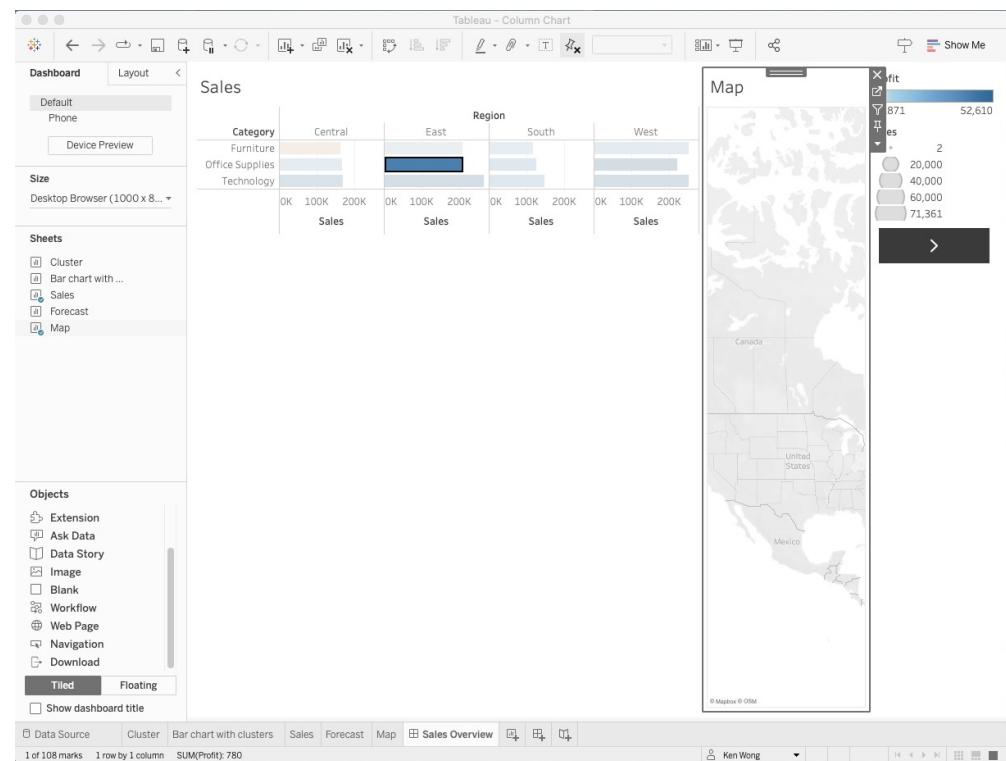


Done!



5. Dashboard Actions: (iii) URL actions

- You can also show web content (e.g., Wikipedia info) based on your dashboard mark (e.g., city in the map)
- First, **delete that MSFT stock content** by clicking the “X” icon.
- Drag “**Web Page**” to the bottom of the dashboard
- Leave that URL box empty, to create an empty white field, **OK**.



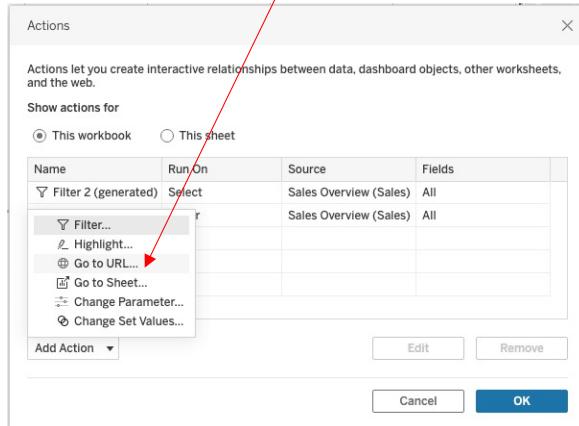
Loth ch8

© 2023 Dr. Ken K. Wong | Mastering Data Visualization and Storytelling with Tableau in 38 Hours

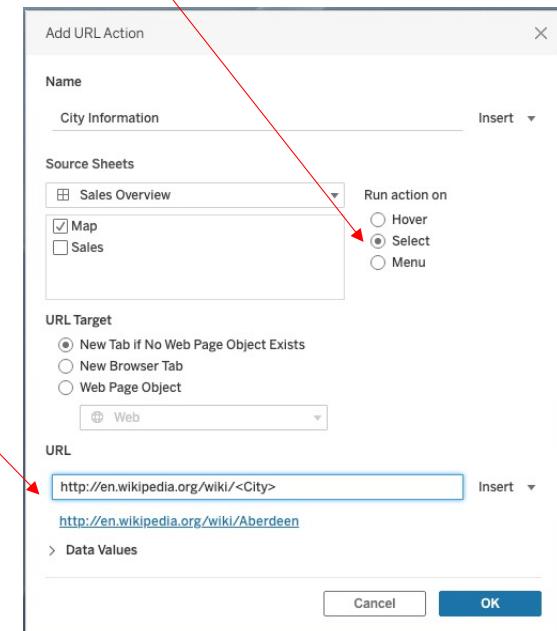


5. Dashboard Actions: (iii) URL actions

- Then, go to Dashboard menu at the top, **Actions...**
 - Add Action >, **Go to URL...**, called it “**City Information**”.
- Check “**Map**” as it contains the City mark, Run action on “**Select**”
- Set the URL as **http://en.wikipedia.org/wiki/<City>**



Loth ch8





5. Dashboard Actions: (iii) URL actions

<http://en.wikipedia.org/wiki/<City>>

The screenshot shows a Tableau dashboard titled "Sales". It features a bar chart comparing sales across four regions: Central, East, South, and West. The East region has the highest sales at 200K. To the right is a map of North America with a circular marker over New York City. A Wikipedia window is overlaid on the map, displaying the page for "New York City". The page includes a thumbnail image of the city skyline and its coordinates: 40°42'46"N 74°00'22"W.

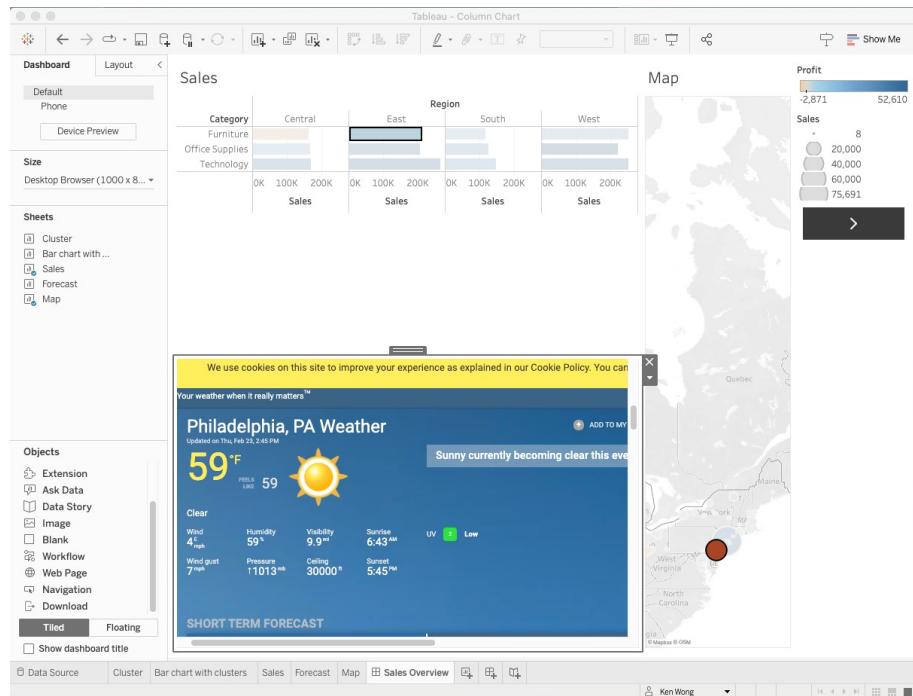
Loth ch8

- Now, click any **circular City mark** on the Map
- The corresponding Wiki information about that city will be shown



5. Dashboard Actions: (iii) URL actions

- How about? <https://www.theweathernetwork.com/us/weather/<State>/<City>>





5. A Storytelling Dashboard

- There are different kinds of dashboards. A storytelling dashboard is created to present a story. Its characteristics include:
 1. Have **more descriptive titles and lead-in paragraphs**, often including legends (like color or size) within their design
 2. Have simplified and streamlined views of a **fewer number of visualizations**
 3. Include prominent legends, simplified color schemes, and limited views of data, including **only that which supports the narrative** (that is, filters or parameters)
 4. Be devoid of interactive elements that might affect the narrative, such as quick filters or other actions (this often depends on whether the presentation will be narrated or left to the audience)
 5. Include **explanatory annotations to point out specific “story points”** the narrator deems of interest to the audience



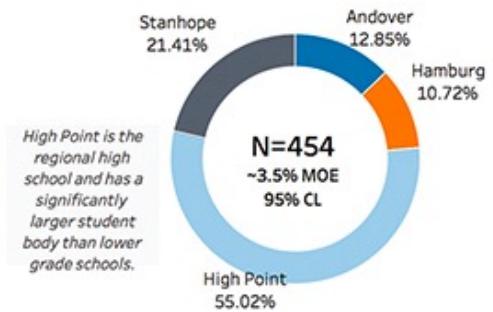
5. A Storytelling Dashboard

4 major graphs on a dashboard

Sussex Co Regional Schools Survey Demographics Dashboard

Sussex County Regional Schools

Representative samples were collected from each district with student populations contributing by grade: 6-8 (45%) and 9-12 (55%).



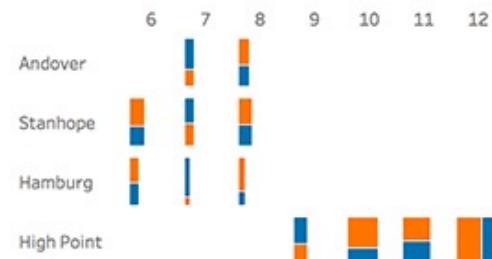
Demographics by Gender

A relatively equal distribution of male and female students responded per school. A small portion (3.3% of total students) chose not to self-identify.



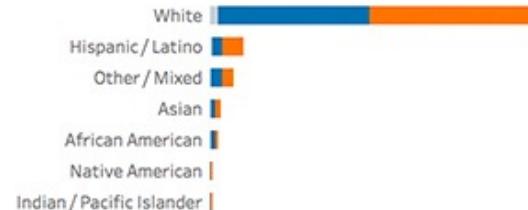
Demographics By Grade

An approximately equal distribution of male and female students are reflected by grade, though participation by grade is not equivalent across schools.
Students who chose not to self-identify are excluded.



Demographics by Ethnicity

Approximately 80% of the student population surveyed identified as White, which is reflective of the region's overall racial demographics.



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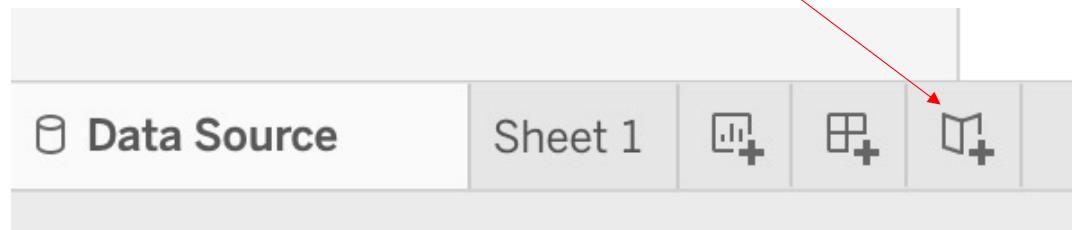


Story Points



5. Story Points

- You can build stories using
 - (i) Tableau sheets (individual visualizations)
 - (ii) dashboards (multiple visualizations)
 - (iii) **story points** (multiple sheets and/or dashboards)



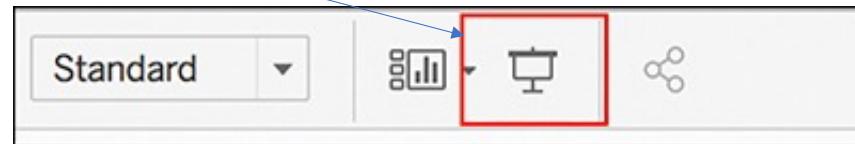
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5. Story Points

- **Story Points** allows you to highlight certain insights or provide content, as well as break the story into pieces using visualizations (whether as worksheets or dashboards) in a series of click-through sequences for easy consumption
 - They are not static images: Presenters or audiences can explore or expand on the data using actions such as quick filters within the narrative
- Similar to PowerPoint, you present stories (in Tableau Desktop only) by clicking the **Presentation Mode button** on the toolbar at the top.

https://help.tableau.com/current/pro/desktop/en-us/story_create.htm

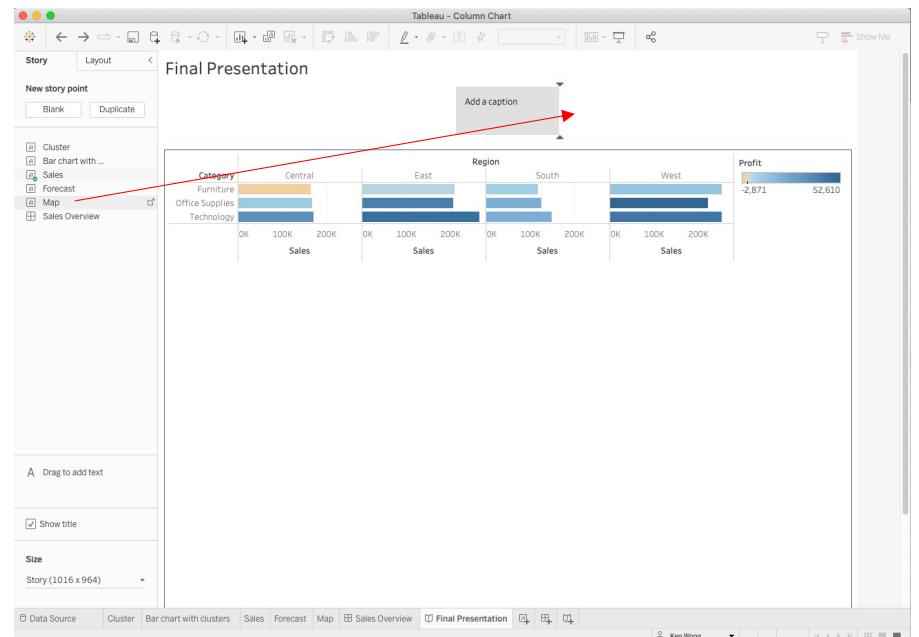


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5. Story Points

- Create a **new Story**, rename it as “Final Presentation”
- Drag “**Sales**” to Canvas, this is your first slide
- To create the next slide, drag “**Map**” to the right-hand side of the grey-color rectangular box at the top.

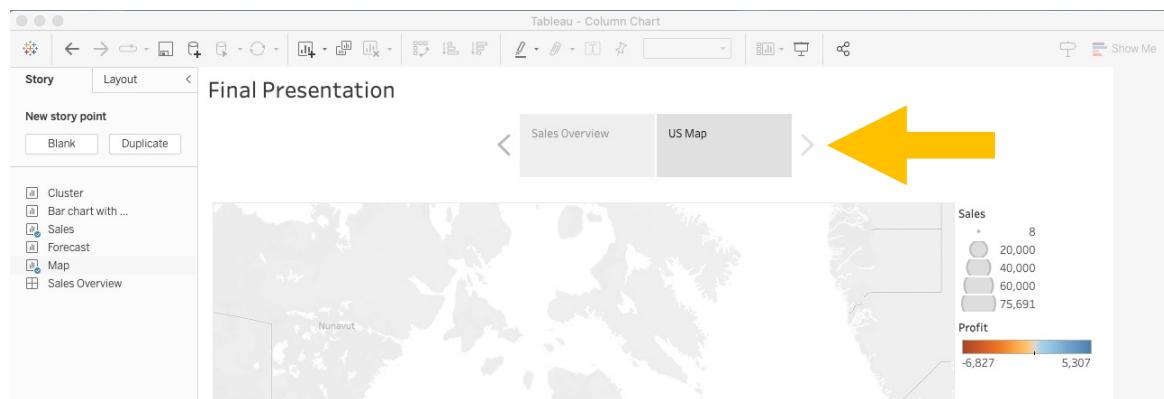


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5. Story Points

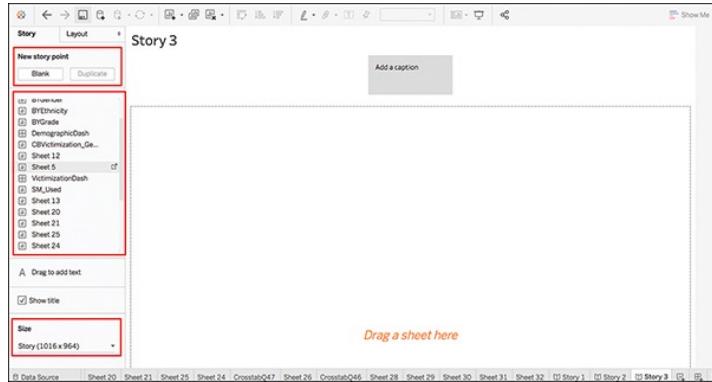
- The 2nd slide (map) is now added. Using this method, you can add other workbooks and/or dashboards to your story presentation.
- Double click “**Add a caption**” of the first slide to call it “**Sales Overview**”. Then, double click on the 2nd slide and call it “**US Map**”
- Click the **presentation mode icon** in the upper-right hand corner to start your presentation. Click “<” and “>” to change the slides.



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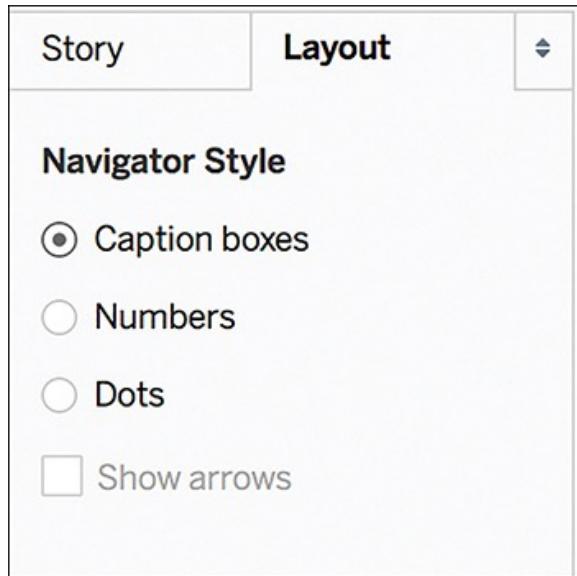
5. Story Points



- **New Story Point:** You may insert a blank or duplicate a story point.
- **Story Pane:** This box contains all the worksheets and dashboards in your workbook that can be added as a story point.
- **Size:** Again, size is important. This option lets you resize your storytelling canvas.



5. Story Points



- The Layout pane provides further options intended to help you format the style of navigation for the text boxes. Navigation can be formatted as Caption Boxes (default), Numbered, or Dots



6. Chart and Graph Selection Guideline

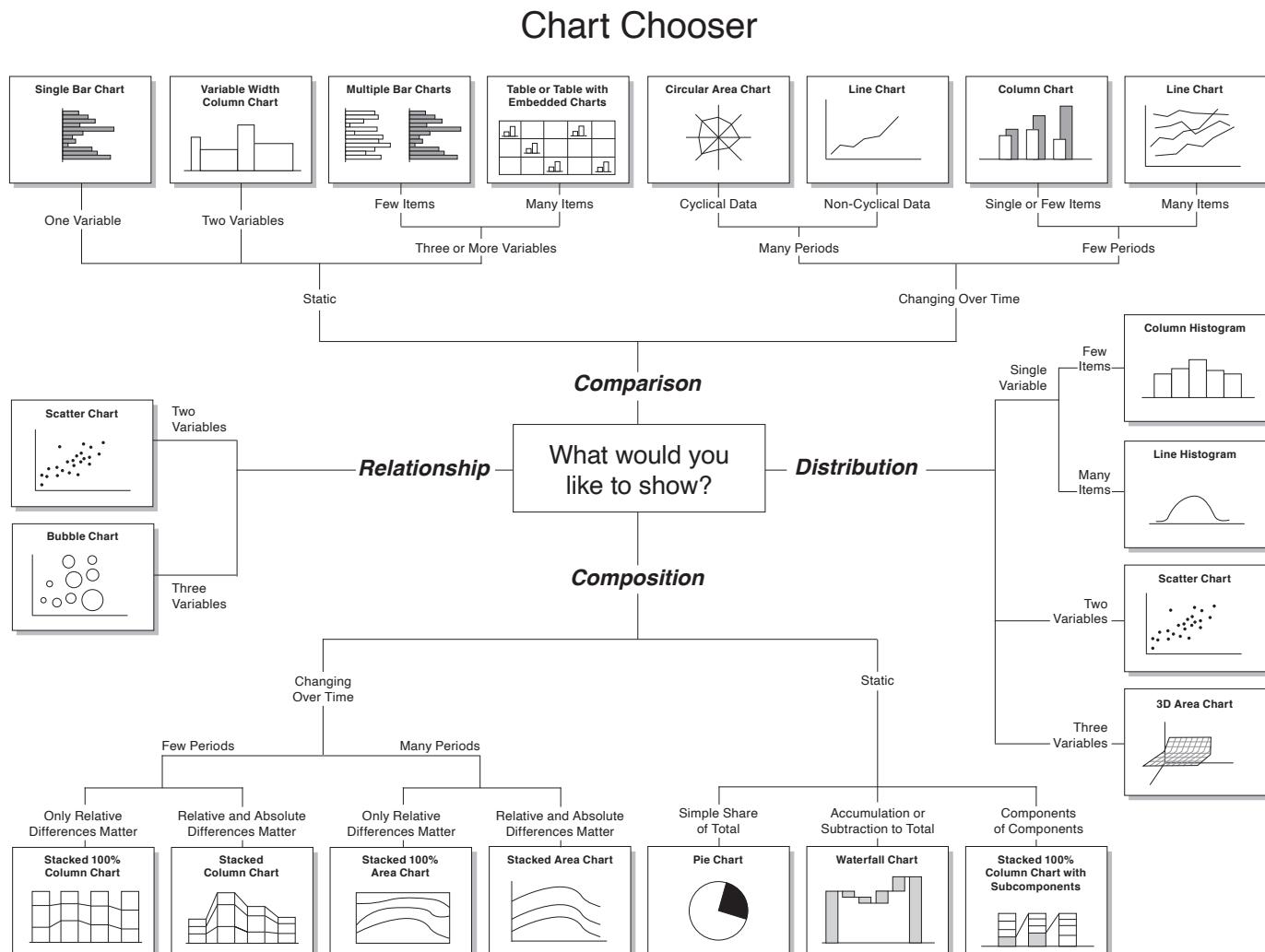


6. Which Chart to Use?

- Each visualization type is intended to represent different types of data in specific ways to best represent its insight.
- A clear goal:
 - Convey a message
 - Answer questions
 - Provoke new questions and discussions

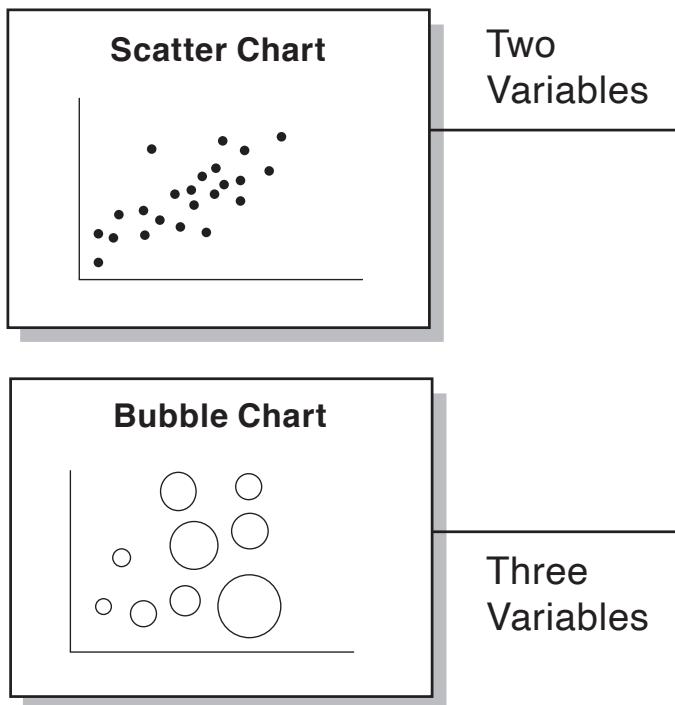


6. Which Chart to Use?





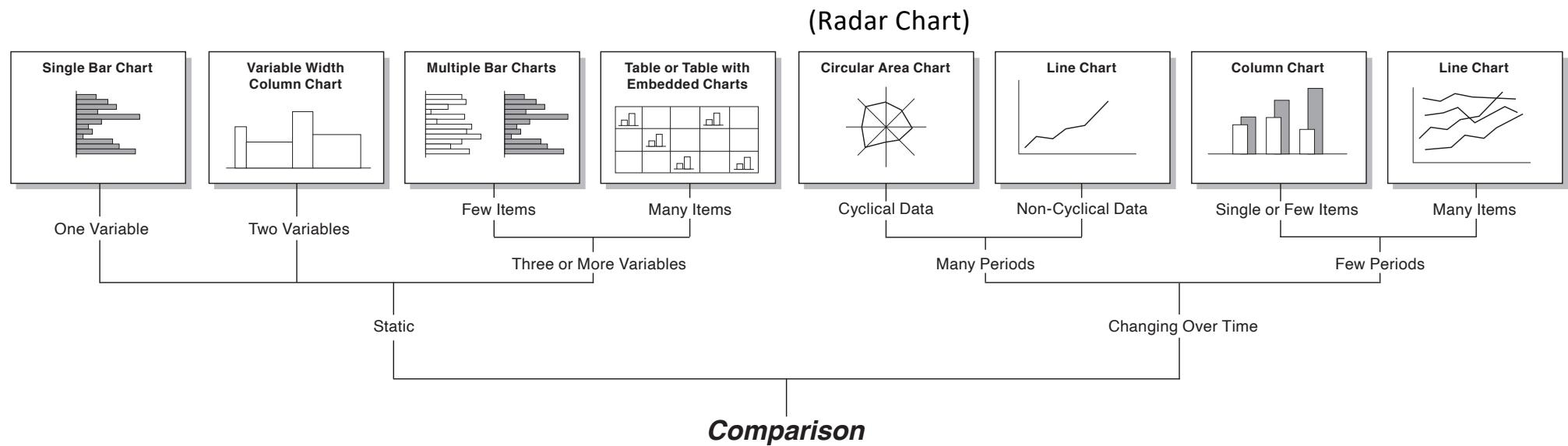
6. Relationship



Relationship —



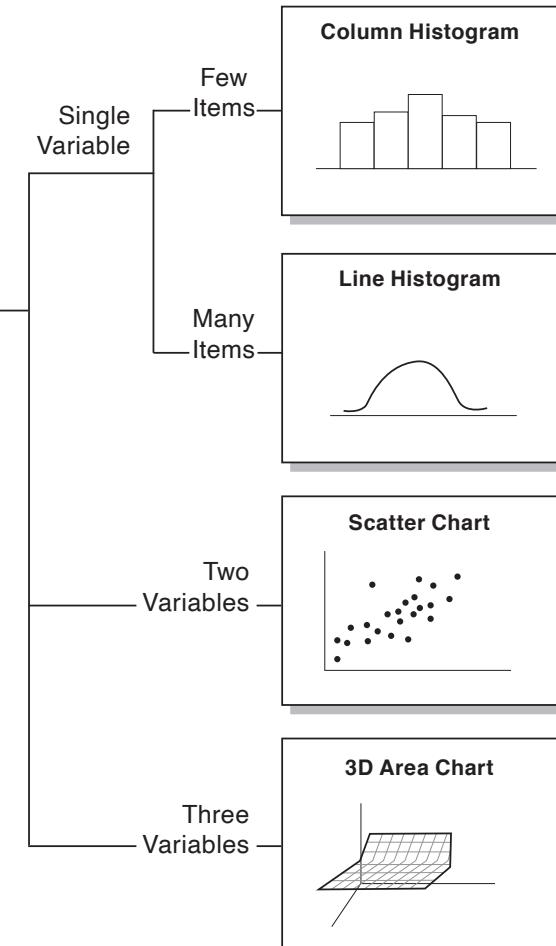
6. Comparison





6. Distribution

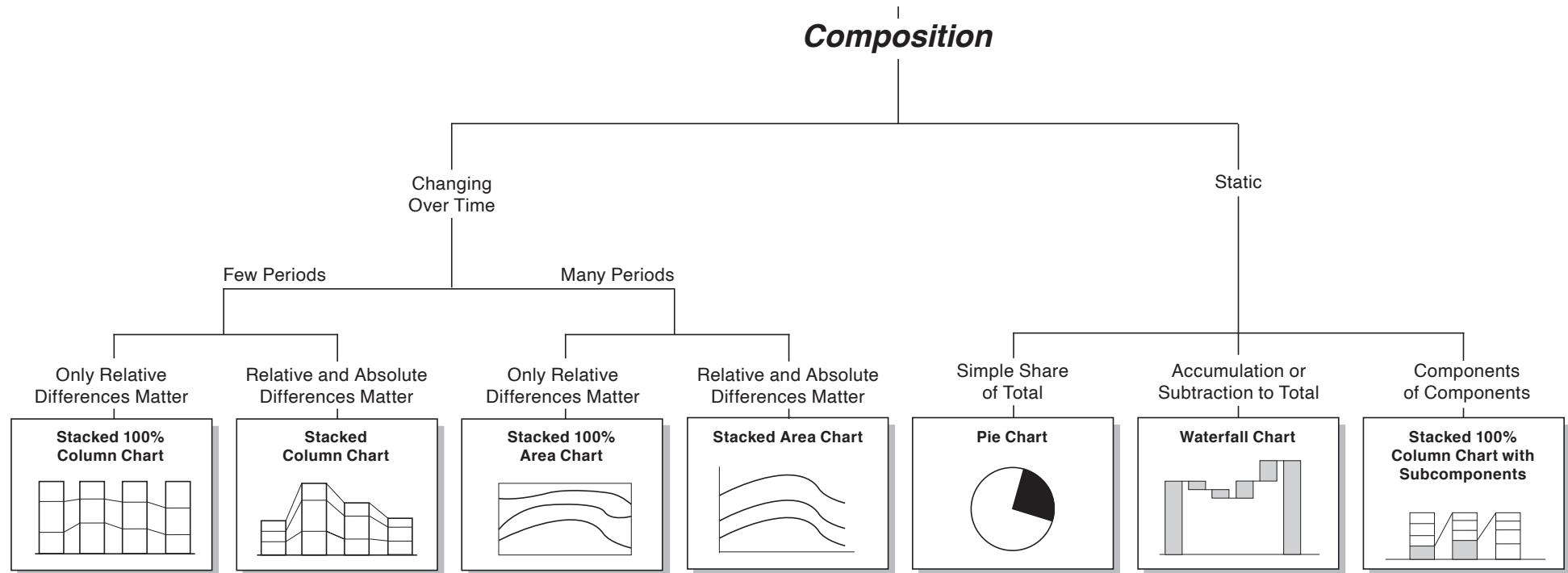
Distribution



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6. Composition

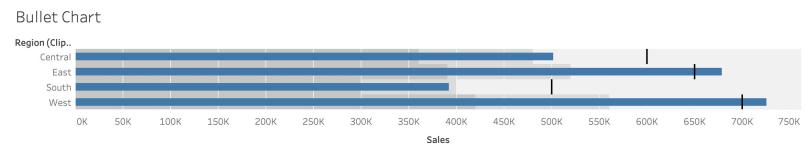
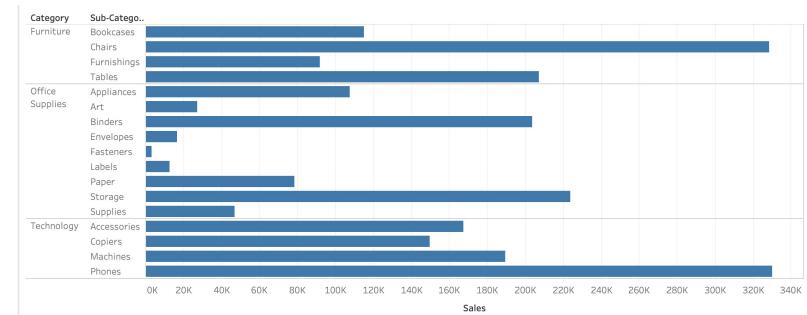


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6. Chart and Graph Selection Guideline

- Bar Chart (incl. Bullet Chart)
 - Bar charts are one of the most common data visualizations.
 - You can use them to quickly compare data across categories, highlight differences, show trends and outliers, and reveal historical highs and lows at a glance.
 - Bar charts are especially effective when you have **data that can be split into multiple categories**.



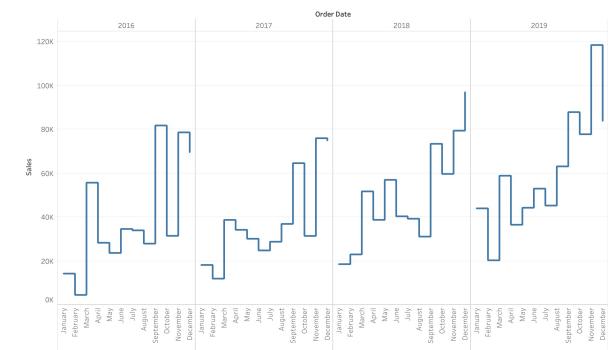
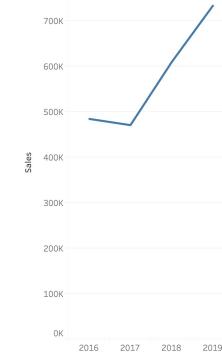
<https://www.tableau.com/learn/whitepapers/which-chart-or-graph-is-right-for-you>

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6. Chart and Graph Selection Guideline

- Line Chart (incl. Step Chart)
 - The line chart connects several distinct data points, presenting them as one continuous evolution.
 - Use line charts to view trends in data, **usually over time**.
 - The result is a simple, straightforward way to visualize changes in one value relative to another.

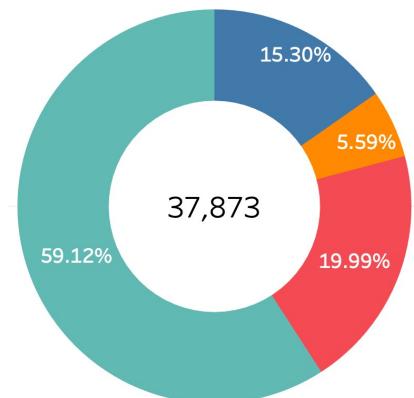
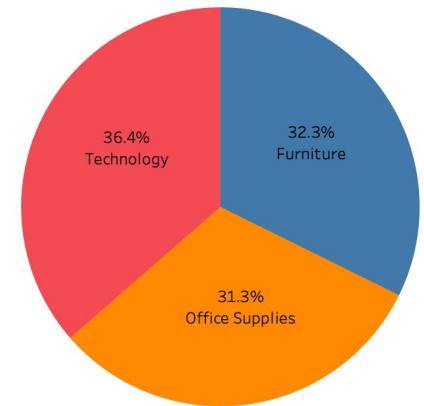


<https://www.tableau.com/learn/whitepapers/which-chart-or-graph-is-right-for-you>



6. Chart and Graph Selection Guideline

- Pie Chart (incl. Donut Chart)
 - Pie charts are powerful for adding detail to other visualizations.
 - However, a pie chart **doesn't give the viewer a way to quickly and accurately compare information.**
 - Instead of making a pie chart the focus of your dashboard, try using them to drill down on other visualizations.
 - A good alternative is to use a Donut Chart to show the key message in the centre of the chart

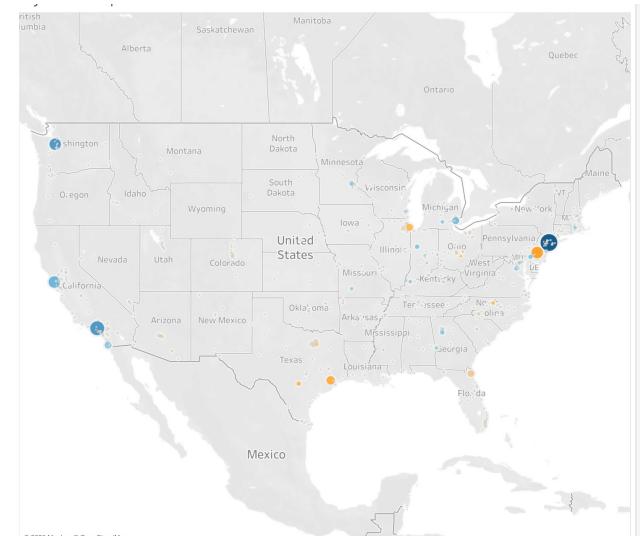


<https://www.tableau.com/learn/whitepapers/which-chart-or-graph-is-right-for-you>



6. Chart and Graph Selection Guideline

- Maps
 - If you have geographic information associated with your data, maps are a simple and compelling way to show how location correlates with trends in your data.

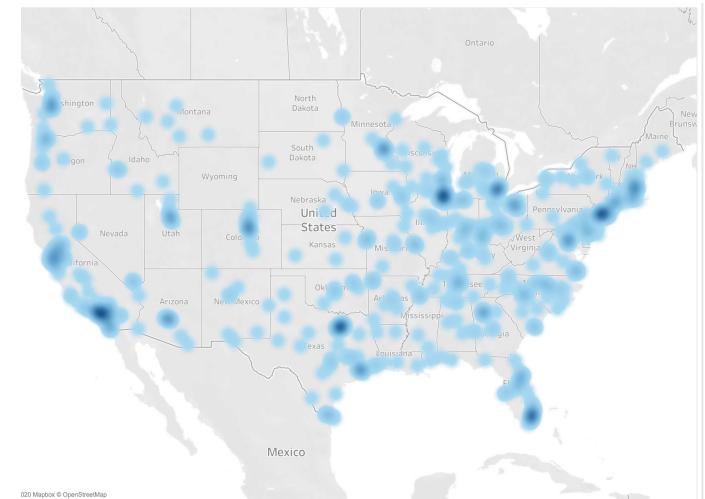


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6. Chart and Graph Selection Guideline

- Density Maps
 - Density maps reveal patterns or relative concentrations that might otherwise be hidden due to an overlapping mark on a map—helping you identify locations with greater or fewer numbers of data points.
 - Density maps are most **effective when working with a data set containing many data points** in a small geographic area.



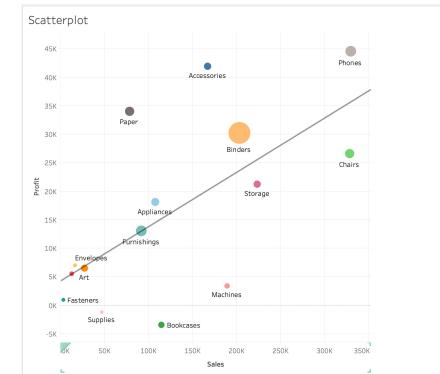
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6. Chart and Graph Selection Guideline

- Scatter Plot

- Scatter plots are an effective way to investigate the relationship between different variables, showing if one variable is a good predictor of another, or if they tend to change independently.
- A scatter plot presents lots of distinct data points on a single chart. The chart can then be enhanced with analytics like cluster analysis or trend lines.

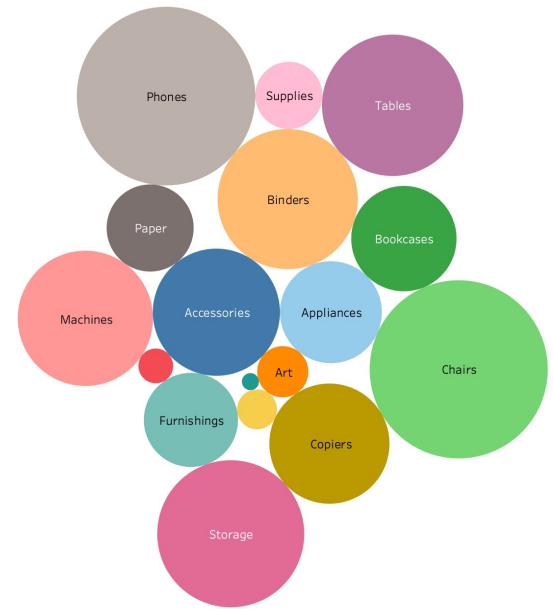


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6. Chart and Graph Selection Guideline

- Bubble Chart
 - Show the relationship between **three or more measures**.
 - Varying the **size** and **color** of circles creates visually compelling charts that present large volumes of data at once.

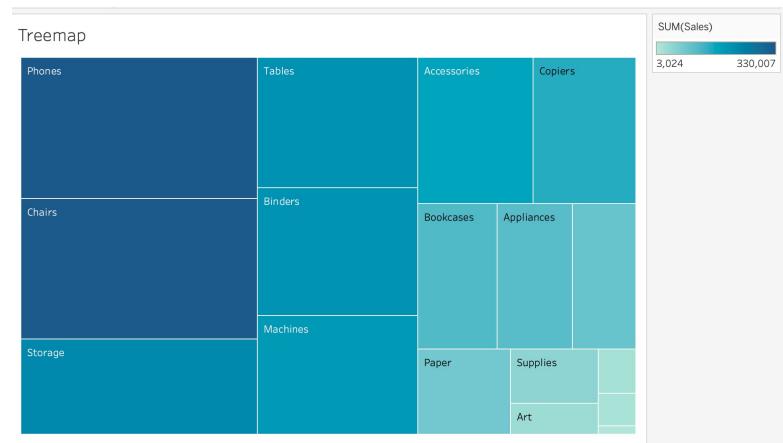


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6. Chart and Graph Selection Guideline

- Treemap
 - Treemaps relate different segments of your data to the whole.
 - As the name of the chart suggests, each rectangle in a **treemap is subdivided into smaller rectangles based on its proportion to the whole.**
 - They make efficient use of space to show percent total for each category.

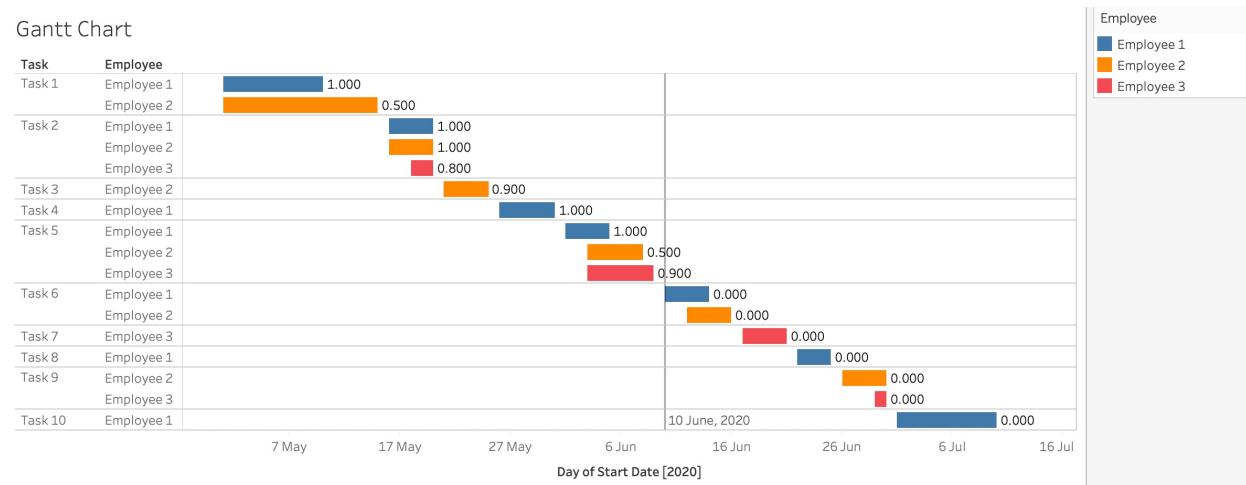


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6. Chart and Graph Selection Guideline

- Gantt Chart It displays a **project schedule or show changes in activity over time**. A Gantt chart shows steps that need to be completed before others can begin, along with resource allocation.



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Overview of Assignments



- A1: (Individual): Data-Driven Strategic Recommendations and Business Report **60%**
 - Mar 11, 11:59pm Boston Time



- A2: (Team): Visual Data Storytelling **30%**
 - Mar 7, 11:59pm Boston Time



- A3: (Individual): Tableau Chart Building Exercise **10%**
 - Mar 10, 11:59pm Boston Time



A1: (Individual): Data-Driven Strategic Recommendations and Business Report 60%



- Mar 11, 11:59pm Boston Time
- Let's assume that you're the marketing director of a company and would like to **spend some advertising dollars to boost the sales of those products that are not selling well**. The company just sold California's operation last week to its competitor, so you don't need to worry about that market.
- You need to deliver a presentation to your boss for the budget approval. Your boss is interested in knowing about the sales situation of the sub-category over the **most recent 24-month period** (according to the dataset).



A1: (Individual): Data-Driven Strategic Recommendations and Business Report 60%



- Use the “**Hult – Superstore.xlsx**” dataset to **build a 4-page story point (title page included, if applicable) using interactive dashboard** to show how sales in each sub-category are performing across the USA (except California), over the most recent 24-month period.
- These 4 pages should be linked together using the **story point** function.
- You are also required to **make use of at least 2 of the following actions** in your dashboard:
 1. Filter actions
 2. Highlight actions
 3. URL actions



A1: (Individual): Data-Driven Strategic Recommendations and Business Report 60%



- In addition to publishing the interactive dashboard on Tableau Public for your boss to view (and submitting screenshots of each part to Canvas), you are also required to write a short business report for your boss to tell him/her which sub-category and which cities (or states) you are planning on spending most of your advertising budget.
- Length: 1,000-2,000 words.
- Significant marks will be deducted if you write less than 1000 words.
- **Failure to publish your dashboard on Tableau Public will result in a zero (F) grade for this deliverable, even if you have written the report.**
 - If you only publish individual charts and not a dashboard/story point, significant grades will be deducted because dashboard is a requirement for this assignment.

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A1: (Individual): Data-Driven Strategic Recommendations and Business Report 60%



- General Dashboard Design
- Use of at least 2 actions in dashboard
- Story Point Function
- Story Business Report

Data-Driven Strategic Recommendations and Business Report						
Criteria	Ratings					Pts
General Dashboard Design	25 pts Excellent Dashboard is well designed with excellent combination of graphics and text.	18 pts Good Dashboard has good combination of graphs and text, with a few minor errors.	10 pts Satisfactory Some errors have been detected in the dashboard design. The choice of graphs and texts can be better.	5 pts Unsatisfactory Poor choice of graphs and text. The dashboard does not deliver message properly to the audience.	0 pts No Marks Wholly fails to demonstrate knowledge of a dashboard.	25 pts
Use of at least 2 actions in dashboard	25 pts Excellent Excellent use of 2 or more actions in the dashboard, with no errors.	18 pts Good Good use of 2 or more actions in the dashboard, with some minor errors.	10 pts Satisfactory Use of 2 or more actions in the dashboard, with some significant errors.	5 pts Unsatisfactory There is only one action in the dashboard and the choice of action can be better.	0 pts No Marks No action is being used in the dashboard.	25 pts
Story Point Function	25 pts Excellent Excellent use of the story point function. The slides were presented well in the right sequence.	18 pts Good Good use of the story point function. The sequence and content of the slides can still be improved.	10 pts Satisfactory There is evidence of the use of the story point function. The slide sequence should be improved and the content has some errors.	5 pts Unsatisfactory The story point function was used incorrectly, with confusing slide sequence and problematic content.	0 pts No Marks No story point function has been demonstrated in the published work.	25 pts
Story Business Report	25 pts Excellent Organized and well written. Presents an insightful and thorough analysis of all identified issues.	18 pts Good Organized and clearly written in most places. Presents a good analysis of most of the issues, but lacks depth in many areas.	10 pts Satisfactory Somewhat lacking in organization and clarity. Presents an adequate analysis of most of the issues, but lacks depth in many areas.	5 pts Satisfactory The report is poorly written. Present an incomplete analysis of some of the identified issues.	0 pts No Marks Analysis is missing or entirely inadequate.	25 pts



A2: (Group): Visual Data Storytelling 30%



- Mar 7, 11:59pm Boston Time
- The objective of this assignment is to help students master the concept of visual data storytelling through the analysis of a dataset.
- In this assignment, the dataset comes from the Office for Diversity, Inclusion, and Belonging at Harvard University. The office surveyed **3 major groups of community members**, namely (i) Academic/Faculty, (ii) Staff, and (iii) Students. The purpose of this survey was to measure their perception about inclusion and belonging at Harvard.
- The survey asked approximately 20,600 community members to indicate their agreements on **9 different statements (questions)**. The dataset is attached. [pilot_pulse_survey_ib_data_tables.xlsx](#)



A2: (Group): Visual Data Storytelling 30%



1. I feel like I belong at Harvard.
2. My relationships at Harvard are as satisfying as I would want them to be.
3. I feel like I can be my authentic self at Harvard.
4. The academic/professional goals I have for myself are being met at Harvard.
5. I know what constitutes good performance in my role.
6. I receive meaningful recognition for doing good work.
7. I feel comfortable expressing my opinions to others at Harvard.
8. I believe Harvard leadership will take appropriate action in response to incidents of harassment and discrimination.
9. I have the skills to address hostile behavior that I witness.



A2: (Group): Visual Data Storytelling 30%



- Let's assume that you're the prime for this project at the Office for Diversity, Inclusion, and Belonging. **You're invited to the President's Office at Harvard to give a 15-minute presentation on the key findings of this survey.** The senior academic administrative team is interested in identifying the specific demographic groups that gave **low scores** on the survey, so that the university can use such insights to guide their future priorities, programs, policies, and procedures.

DO NOT CREATE A POWERPOINT FILE. Please publish your work on Tableau Public.

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A2: (Group): Visual Data Storytelling 30%



- In this assignment, each team is required to perform the following tasks with this dataset:
 - Get rid of irrelevant data.
 - Prepare data to make it Tableau-friendly.
 - Visualize data using relevant charts.
 - Analyze these charts to generate insights.
 - Create a Tableau “presentation” (10 pages max, including the cover page, if applicable) using a combination of charts, dashboards, and story points. Then, publish it on Tableau Public.
 - Students should demonstrate their understanding of the storytelling process when preparing this 15-minute presentation.
 - Deliver the presentation in class on Session 7.

¹

DO NOT CREATE A POWERPOINT FILE. Please publish your work on Tableau Public.

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A2: (Group): Visual Data Storytelling 30%



- In addition to publishing the data on Tableau Public, each team should also submit to Canvas a MSWord (or PDF) file that includes (i) the **URL of their Tableau Public site** and (ii) **screenshots** of these presentation pages for auditing/grading purpose.
- No written narrative or explanation is required in this file.



A2: (Group): Visual Data Storytelling 30%



- Composition
- Subject Knowledge
- Analysis

Team Deliverable					
Criteria	Ratings				
	30 pts Excellent	25 pts Good	20 pts Satisfactory	15 pts Unsatisfactory	0 pts No Marks
Deliverable Composition	Organized and well written. Underlying logic is clearly articulated and easy to follow. Words expressed the intended meaning and supported reader comprehension. Sentences were grammatical with few spelling errors.	Organized and clearly written in most places. In some areas, the logic and flow of ideas is difficult to follow. Sentences were mostly grammatical and only a few spelling errors were present but did not hinder the reader.	Somewhat lacking in organization and clarity, making the logic and flow of ideas difficult to follow. Sentences include grammatical and spelling errors that occasionally hinder the reader.	The reader had to make considerable effort to understand logic and flow of ideas due to the grammatical and spelling errors.	The deliverable was largely unintelligible due to the flow of logic, grammar, and/or spelling.
Deliverable Subject Knowledge	Deliverable demonstrated knowledge of course content, and integrated many major and minor concepts. There is evidence of extensive research and depth of thinking about the topic.	Deliverable demonstrated knowledge of course content, integrated major concepts, and demonstrated evidence of some research and thinking about the topic.	Deliverable partially demonstrated knowledge of course content, partially integrated major concepts, and demonstrated limited evidence of some research and thinking about the topic.	Deliverables struggle to demonstrate knowledge of course content and concepts that could be shown through evidence, research or original thinking about the topic.	Wholly fails to demonstrate knowledge of course content and concepts.
Deliverable Analysis	Presents an insightful and thorough analysis of all identified issues. Includes all necessary evidence and/or calculations.	Presents a good analysis of most of the issues, but lacks depth in some areas. Is missing some necessary evidence and/or calculations.	Presents an adequate analysis of most of the issues, but lacks depth in many areas. Is missing some necessary evidence and/or calculations.	Presents an incomplete analysis of some of the identified issues. Omits necessary evidence and/or calculations.	Analysis is missing or entirely inadequate.

Total Points: 100

155



A3: (Individual): Tableau Chart Building 10%



- Mar 10, 11:59pm Boston Time

1. Use the “Hult – Cellphone Brand.xlsx” file to create a **word cloud** graphic to show the phone brands that are used by the 100 employees in the company. Each word should be shown in different color and BOLD.
2. Use the “Hult – Superstore.xlsx” file to create a **line chart** that includes a “2-year forecast” of sales. [Y-axis: “Sales”; X-axis: “Month of Order Date”]
3. Use the “Hult – Superstore.xlsx” file to create a **scatterplot** that includes 5 clusters. [Y-axis: “Profit”; X-axis: “Sales”]
4. Use the “Hult – Superstore.xlsx” file to create a **dual axis map** that combines a filled map (showing “Profits”) and a pie chart map (showing revenue and the 3 categories: Furniture, Office Supplies, and Technology).
5. Use the “Hult – Superstore.xlsx” file to create a **waterfall chart**. [Y-axis: Running Sum of Sales; X-axis: Sub-Category]. The bars should be moving upwards to the right just like my example.



A3: (Individual): Tableau Chart Building 10%



6. Use the “Hult – Superstore.xlsx” file to create **highlight table** that includes a white border around each cell. The cells should be in yellow (or Orange-Gold) color and the text should be shown in Brown color. [Y-axis: Sub-Category; X-axis: Order Date].
7. Use the “Hult – Superstore.xlsx” file to create a **donut chart**, showing the ship mode on the outer arc together with the percentage of total sales revenue right next to each segment. In the middle of the donut chart, it should show the total sales revenue figure.
8. Use the “Hult – Superstore.xlsx” file to create a **box-and-whisker plot**. [Y-axis: Sales; X-axis: Sub-category]. I need to see the dots in light green color in the background.
9. Use the “Hult – Gantt Chart.xlsx” file to create a **Gantt chart**, in which the first column displays “Task”, the 2nd column displays “Employee”, and that there is a reference line of “May 30, 2020” in the chart. The date “May 30, 2020” has to be displayed next to the reference line.
10. Use the “Hult – Linkert Restaurant” file to create a **Likert scale chart**. The Y-axis should show the 5 survey statements. Also, you must display the Gantt Percent on the X-axis, with the value -100% showing clearly on the left and 100% on the right of the X-axis.



A3: (Individual): Tableau Chart Building 10%



Important notes:

1. Publish the charts on your Tableau Public Profile, this is a requirement.
You'll receive a zero if you don't publish your charts online.
2. You also do a screen capture of each chart and paste it onto a MSWord or PDF file, and then upload it to Canvas for auditing purpose.
3. In this MSWord or PDF file, you list your Tableau Public URL at the beginning of the file. **Failure to include this link in your file will result in 1 level grade reduction.**
4. There are 10 graphs that you need to draw in this A3 assignment. Each graph is worth 10 points for a total of 100 points.



A3: (Individual): Tableau Chart Building 10%



Tableau Chart Building Exercise



Criteria	Ratings												Pts
	100 pts 10 graphs plotted correctly	90 pts 9 graphs plotted correctly	80 pts 8 graphs plotted correctly	70 pts 7 graphs plotted correctly	60 pts 6 graphs plotted correctly	50 pts 5 graphs plotted correctly	40 pts 4 graphs plotted correctly	30 pts 3 graphs plotted correctly	20 pts 2 graphs plotted correctly	10 pts 1 graph plotted correctly	0 pts 0 graphs plotted correctly		
General Data Visualization Design	Data visualization is well designed with excellent combination of graphs and text.	Data visualization is well designed with excellent combination of graphs and text, with a few minor errors.	Data visualization has good combination of graphs and text, with a few minor errors.	Data visualization has good combination of graphs and text, with a few minor errors.	Data visualization design. The choice of graphs and text can be better.	Data visualization design. The choice of graphs and text can be better.	Data visualization design. The choice of graphs and text can be better.	Data visualization design. The choice of graphs and text can be better.	Data visualization design. The choice of graphs and text can be better.	Data visualization design. The choice of graphs and text can be better.	Data visualization design. The choice of graphs and text can be better.	100 pts	

Total Points: 100

159



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Session Number (Required) _____

Student ID (Optional) _____

Student Name (Optional) _____

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Thank You

