Tableau Desktop I: Fundamentals

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Class Agenda

Pacing will be shared by your instructor and will vary based on class schedule.

1. Introduction to Tableau
2. Tableau Workflow
3. Setting Up Connections and Data Sources
4. Simplifying and Sorting Your Data
5. Organizing Your Data
6. Viewing Specific Values
7. Slicing Your Data by Date
8. Using Multiple Measures in a View
9. Showing the Relationship Between Numerical Values
10. Mapping Data Geographically
11. Customizing Your Data
12. Analyzing Data with Quick Table Calculations
13. Showing Breakdowns of the Whole
14. Making Your Views Available

How to Use the Class Materials

- Practice Guide
  - High-level goals and images
  - Direction steps
  - Detailed solution steps in the back of the book
- **Practices** folder
  - **Data** folder, with data sources for reference
  - **Workbooks** folder, with starter and solution .twbx files
  - **Workbooks_menu.htm** page, for easy access to starter and solution .twbx files

Selecting your Tableau Environment for Class

Course activities can be completed in the Tableau Desktop application or in the browser.
Refer to your registration email details and instructor guidance to select the best tools.

Authoring in Tableau Desktop
Using Tableau Desktop installed on your Computer

Using Tableau Desktop in class is most common

- Install Tableau Desktop
  Follow instructions to download a fully-licensed or trial version.
- Verify your version aligns with course
  Course activities assume you are using the same version as listed in the manual. If desired, download a trial.
- Confirm your active license
  Your Tableau Administrator can help you obtain a license or you can use a trial.

Authoring in the Browser
Using Tableau Cloud or Tableau Server

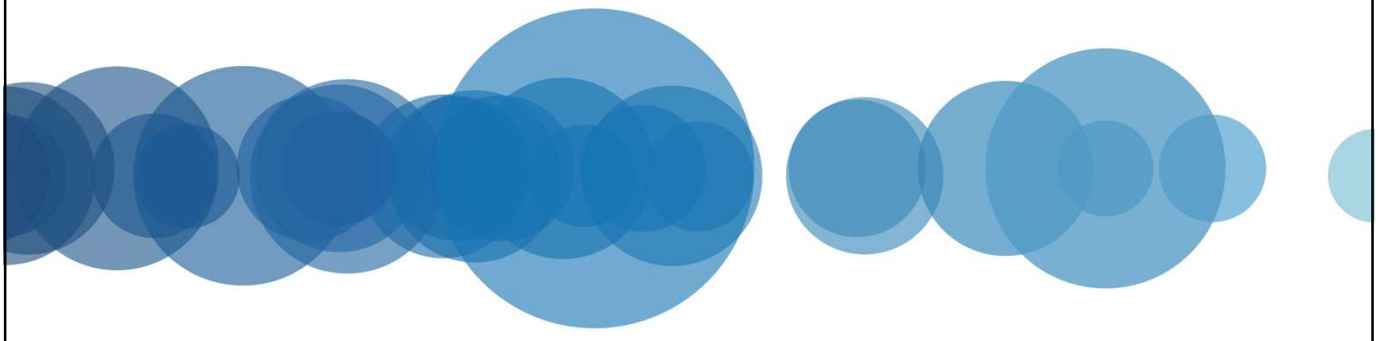
- Obtain Tableau Administrator approval
  Approval to use a company-owned site for training purposes is recommended. Alternatively, use a trial.
- Confirm **Creator** role and publish permissions
  Check your site role in My Account Settings. Explorer or Viewer roles may not be able to complete practices.
- Select a project folder you'll use in class
  Use your Personal Space or request a Sandbox/Test project from your Tableau Administrator.

For additional instructions, see the **Reference** section of your practice manual.

For Mac Users: Keyboard and Mouse Differences

Windows-based instruction	Difference on a Mac
CTRL + click	Press and hold the Command ⌘ key while you click.
Right-click	When using a mouse with no right-click button, press and hold the control key while you click.
Right-click and drag	Press the Option ⌥ Alt) key, and hold it down while you click and drag.
Press CTRL	Press Command ⌘.
Press CTRL + Left Arrow	Press Command ⌘ + Control + Left Arrow

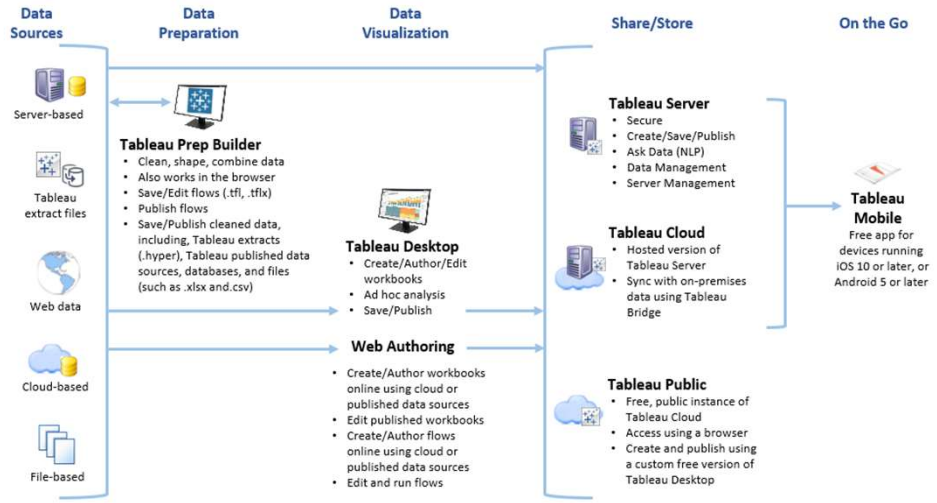
Introduction to Tableau



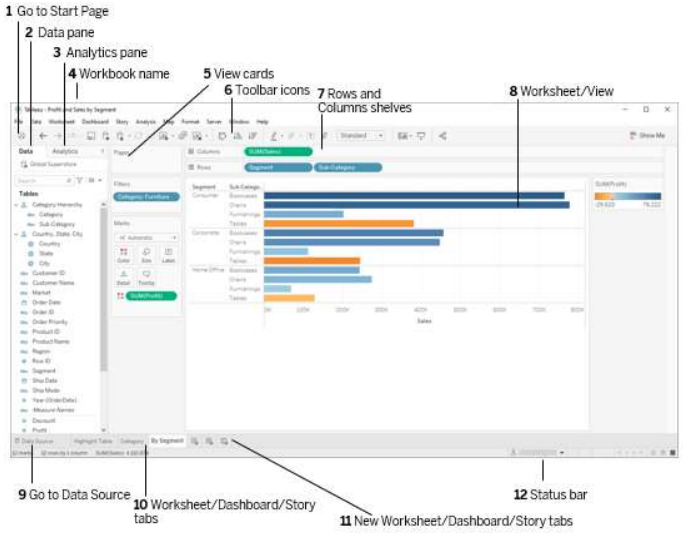
Introduction to Tableau: Fundamentals

- The Tableau Platform
- Application Terminology (2 slides)
- Visual Cues for Fields (3 slides)

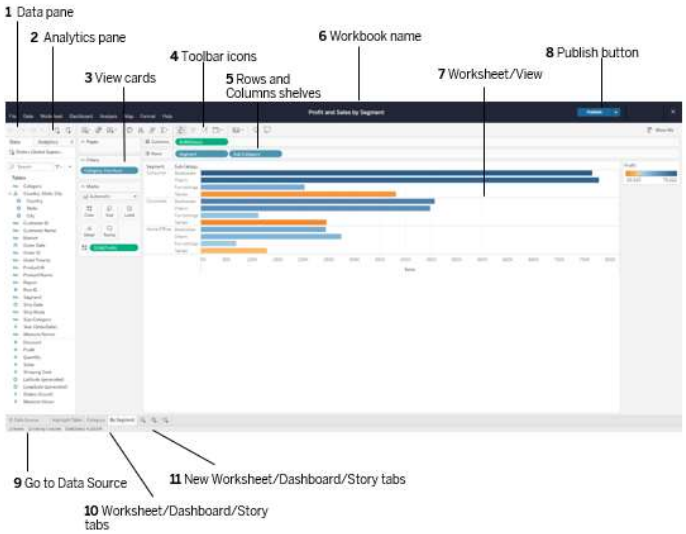
The Tableau Platform



Application Terminology (Desktop application)



Application Terminology (Browser)



Visual Cues for Fields (1/3)

Modifiers

Modifier	Description
Abc	Blue icons indicate the field is discrete.
#	Green icons indicate the field is continuous.
=#	Icons preceded by the equal sign (=) indicate the field is a user-defined calculation or a copy of another field.
Abc Neighborhood !	An exclamation mark next to a field in the Data pane indicates the field is invalid.

Visual Cues for Fields (2/3)

Fields in the Data pane

Icon	Description
Abc	Text values
#	Numeric values
T|F	Boolean (true/false) values
	Geographic data
	Group
	Date and time/Date only values
	Set

Visual Cues for Fields (3/3)

Fields on Shelves

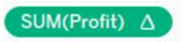
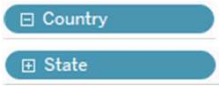
Icon or visual cue	Description
	A blue field on a shelf indicates a discrete field.
	A green field on a shelf indicates a continuous field.
	A SORT icon indicates a sorted field.
	The delta icon indicates that the field has a table calculation applied to it.
	The plus and minus controls appear when the field is part of a hierarchy in which you can drill up and down.

Tableau Workflow

Tableau Workflow

- Understanding the Tableau Workflow
- Elements of a Visualization
- Getting Started in Tableau (3 slides)
- Practice: Exploring Tableau and the Data

Understanding the Tableau Workflow

Workflow step	Description
Connect	Connect to nearly any database or text file available.
Analyze	Use dimension fields and measure fields to build the visualizations that allow you to see your data.
Share	Build a dashboard or a story you can share with others, or for your deeper data exploration.

As you become an advanced user, your workflow becomes less linear and more iterative.

Elements of a Visualization

Use **Show Me** to get a recommendation for a view.

—or—

Drag fields to **Columns**, **Rows** and the **Marks** card to build your own.

- For most of the views in this course, you will build your own.

Getting Started (1/3): Data Pane

Component	Description
Dimensions	Fields that contain qualitative, categorical data such as text and dates. Dimensions typically set the level of aggregation for numeric data, and they create labels in a view.
Measures	Fields that contain numbers that can be aggregated. Measures typically create numerical axes in a view.
Parameters	Dynamic variables that can replace constant values, and which allow view consumers to control the view in some way.
Sets	Subsets of data that you define.

Getting Started (2/3): Analytics Pane

Component	Description
Summarize	Includes options to add pre-defined components such as constant and average lines, medians with quartiles, box plots, and totals.
Model	Adds modeling information to your view, such as trend lines and average distribution bands.
Custom	Add custom lines and bands.

Getting Started (3/3): View Components

Component	Description
Columns and Rows	Drag dimension and measure fields to these shelves to define how you want the data shown in the view.
Pages	Show data changes over time or across discrete dimensions.
Filter	Use filters to limit the data shown. Use on a dashboard to allow others to control how the data is displayed in the visualization.
Marks	Data as shown in the visualization. Bars, circles, pies, text, and lines are examples of marks.
Marks Card	Use to change the appearance of mark types.
Worksheets	Tabs across the bottom of the view correspond to the worksheets contained within the workbook.

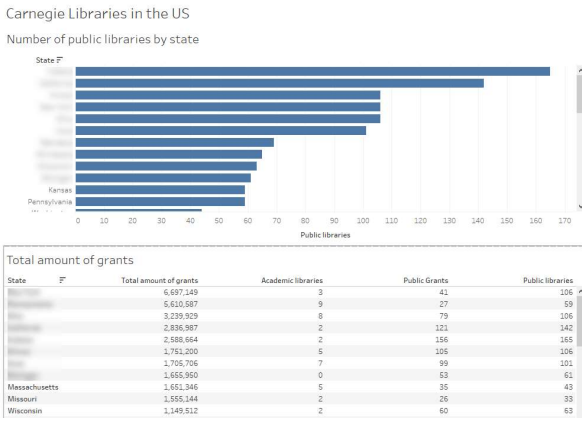
Practice: Exploring Tableau and the Data

libraries.xlsx

- Connect to the data.
- Analyze the data and build two views.
- Build a dashboard.

Questions:

- Which state has the most Carnegie public libraries?
- Which state was granted the most money for libraries overall?



Total amount of grants

State	Total amount of grants	Academic libraries	Public Grants	Public libraries
	6,697,149	3	41	106
	5,610,587	9	27	59
	3,239,929	8	79	106
	2,836,987	2	121	142
	2,588,664	2	156	165
	1,751,200	5	105	106
	1,705,706	7	99	101
	1,655,960	0	53	61
Massachusetts	1,651,346	5	35	43
Missouri	1,555,144	2	26	33
Wisconsin	1,149,512	2	60	63

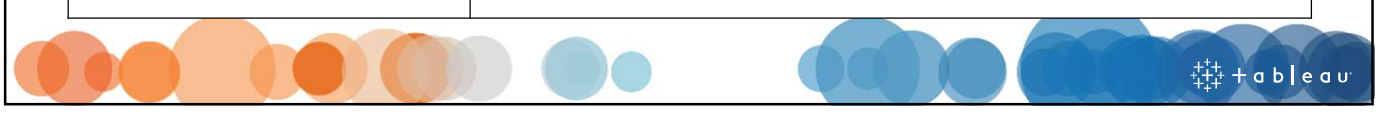
Setting Up Connections and Data Sources

Setting up Connections and Data Sources

- Tableau File Types and Extensions
- Creating a Live Data Connection
- Saving and Editing a Data Source
- Modifying Data Attributes
- Understanding Changes to Data
- Practice: Creating and Saving a Data Connection

Tableau File Types and Extensions
(applies to Desktop application)

File Type and Extension	Description
Tableau Workbooks (.twb)	Contain one or more worksheets and dashboards and always refer to data outside of the workbook itself.
Tableau Packaged Workbooks (.twbx)	Contain a workbook along with any supporting local file data sources and background images. This format is the best way to package your work for sharing with others who don't have access to the data.
Tableau Bookmark (.tbm) files	Contain a single worksheet and are an easy way to quickly share work between workbooks.
Tableau Data Extract files (.hyper or legacy .tde)	Local copy of an entire data source or a subset that you can use to share data or work offline.
Tableau Data Connection (.tds) files	Shortcuts for data sources used often. Contain just the information you need to connect to the data sources such as data source type, location, and custom fields.

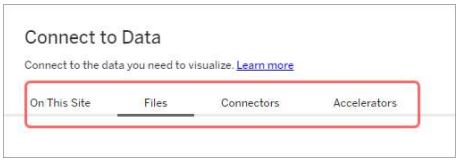


Creating a Live Data Connection

Types of connections

- Connect to a file
- Connect to a server
- Connect to a saved (or published) data source

From the Desktop application



From the browser

Saving and Editing a Data Source
(from the Desktop application)

Tableau Data Source (.tds) file contains:

- Modifications you've made to a data source, such as changing default properties or renaming a field (but not the data itself),
- Parameters, calculated fields, groups, hierarchies, bins, or sets you've created.

Saving options:

Locally for personal use:

- Changes to data source are not inherited.

Exported to Tableau Server/Cloud for work group sharing:

- Subsequent workbooks can inherit data source changes.

Modifying Data Attributes

Examples:

- Rename fields.
- Organize dimensions and measures with folders.
- Change a measure to a dimension, or a dimension to a measure.
- Assign geographic roles.
- Create an alias for a value.
- Change the default aggregation for a measure.

Understanding Changes to Data

Impact of data connection type:

Live—changes reflected immediately

Extracts—changes require a refresh

Impact of type of data change:

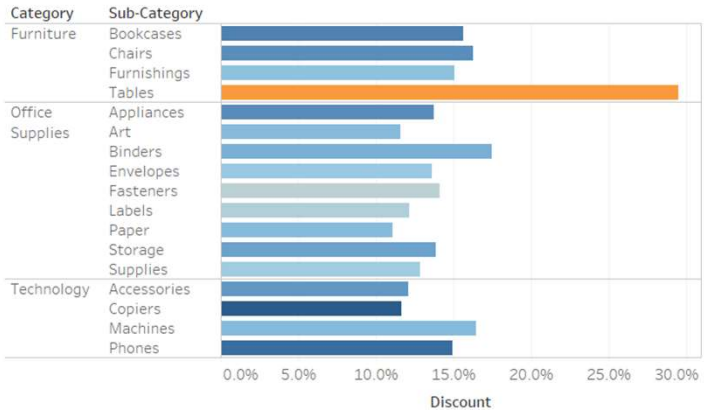
Changes to data values will be reflected

Structural changes (such as removing columns or changing the data type or name) may break the visualization

Practice: Creating and Saving a Data Connection

Data Connection Practice.xlsx

- Connect to data source, edit attributes
- Save changes
- Create a visualization



Simplifying and Sorting Your Data

Simplifying and Sorting Your Data

- Data Filtering (3 slides)
- Practice: Filtering
- Creating Date Filters
- Sorting (2 slides)
- Practice: Sorting

Data Filtering (1/3)

Narrows the data shown in a view to focus on relevant information

Filters shelf shows which filters are in use

Options vary by field type (dimension, measure, date)

Filter appearance and behavior

Data Filtering (2/3) – Filter on a Dimension

Filter Option	Description
General	Shows members of the dimensions you can select for inclusion or exclusion.
Wildcard	Sets up a wildcard inclusion or exclusion of members matching the value entered.
Condition	Filters values based on specific conditions. Can be determined by fields, range of values, or formula.
Top	Filter by top (or bottom) "N" when N is determined by the value of specified fields or by formula (for example, Top 10 Cities by Profit).

Data Filtering (3/3) – Filter on a Measure

Filter Option	Description
Range of Values	Include all values within the specified range
At Least	Include all values above a specified value
At Most	Include all values below a specified value
Special	Set filter for null or non-null values

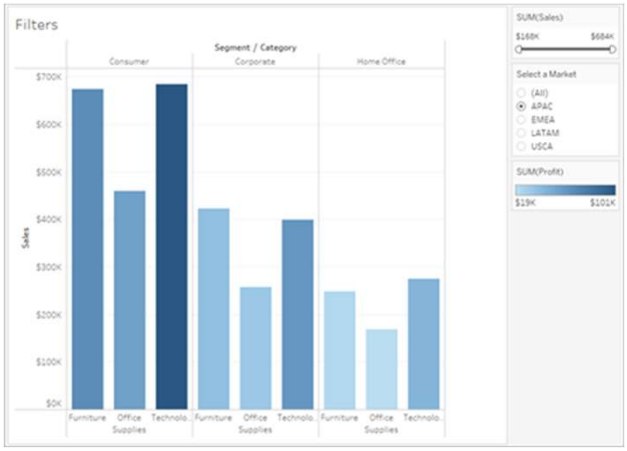
Practice: Filtering

Filtering_Starter.twbx

- Add a filter for Market, displayed as a single value list titled "Select a Market".
- Add a filter on SUM(Sales), formatted as a slider.

Question:

- Which Segment / Category had the greatest sales for the EMEA Market when the SUM(Sales) was between $300K and $800K?



Creating Date Filters

Relative date filters

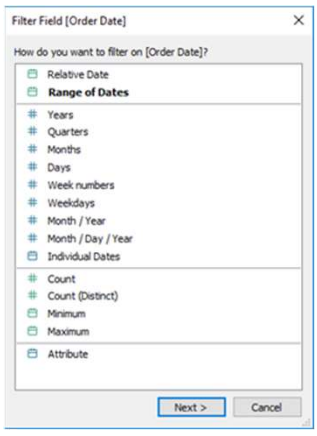
- Update data dynamically with time
- Example: 3 months before or after the current date

Range of dates

- Specify a definite span of time
- Define starting or ending dates

Specific date field values

- Examples: years, weekdays



Sorting (1/2) – Computed Sorts

Organize data by applying rules

- Examples: alphabetical, ascending/descending order

Change dynamically as data changes

Can be set as a default for a dimension

Sorting (2/2) – Manual Sorts

Organize data in a fixed order

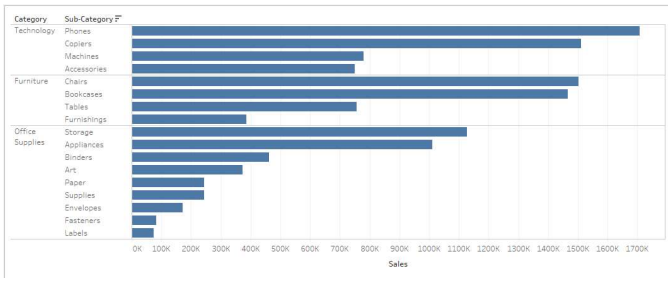
- Example: show a particular region first

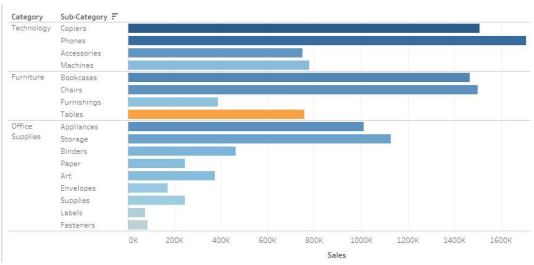
Do not change dynamically (maintained even when data changes)

Can be set as a default for a dimension

Practice: Sorting

Sorting_Starter.twbx





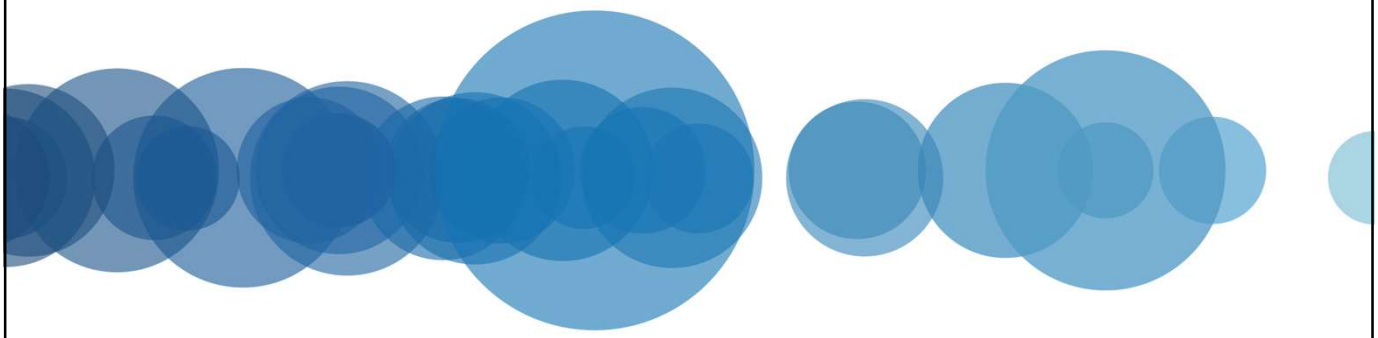
View One:

- Use a computed sort in the view to order Sub-Category by SUM(Sales) in descending order.
- Use a manual sort for Category in this order: Technology, Furniture, and Office Supplies.

View Two:

- Duplicate the first worksheet with bars color encoded by Profit.
- Use a computed sort on Sub-Category to sort the SUM(Profit) in descending order.

Organizing Your Data



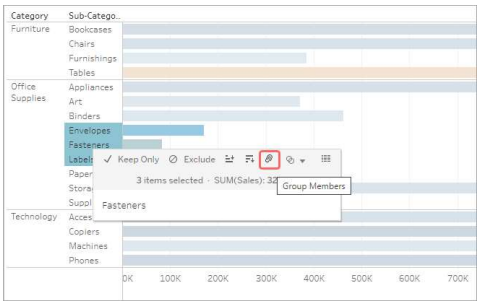
Organizing Your Data

- Using Groups
- Creating and Using Hierarchies (2 slides)
- Practice: Creating Groups and Hierarchies

Using Groups

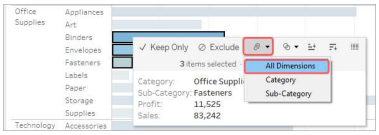
A group is a set of dimension members combined into higher level categories

- Example: states grouped as a region or similar products grouped as a category



Methods to create groups:

- From the view by selecting dimension labels and using the group icon on the tooltip
- From the data pane
- Visually by selecting marks



Creating and Using Hierarchies (1/2)

Use hierarchies to organize data from general to specific

- Example: country > region > state > postal code

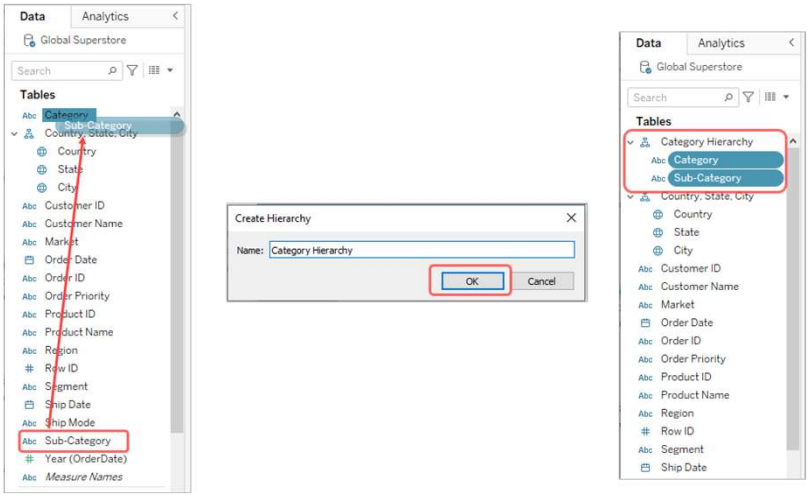
Use when data does not contain logical levels of aggregation.

Click the plus (+) sign and drill into the data with the path defined by the hierarchy.

Reorder fields in the hierarchy by dragging and dropping.

Creating and Using Hierarchies (2/2)

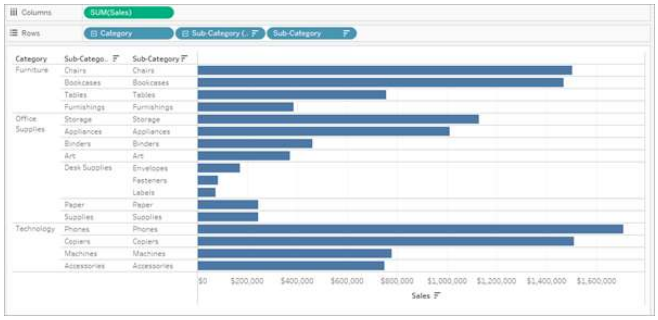
Drag and drop fields to create:



Practice: Creating Groups and Hierarchies

Creating_Groups_and_Hierarchies_Starter.twbx

- Create a group to compare sales of desk supplies to other products in the same category
- Create a product hierarchy to quickly drill up and down for comparing sales



Viewing Specific Values

Viewing Specific Values

- Creating Crosstabs (2 slides)
- Grand Totals, Subtotals, and Changing Aggregation
- Practice: Totals and Aggregation
- Creating Highlight Tables
- Practice: Highlight Table

Creating Crosstabs (1/2)

Use when specific numeric values need to be represented in the view.

To create:

- One dimension on columns
- One dimension on rows
- One measure to the **Abc** placeholders in the view

	Segment		
Region	Consumer	Corporate	Home Office
Africa	423,767	204,939	155,067
Canada	35,719	19,314	11,895
Caribbean	162,349	104,538	57,394
Central	1,479,981	850,364	491,957
Central Asia	369,055	235,540	148,231
East	350,908	200,409	127,464
EMEA	406,745	250,571	148,845
North	643,955	394,226	209,984
North Asia	407,395	265,747	175,168
Oceania	579,550	322,827	197,807
South	824,890	496,015	280,002
Southeast Asia	460,753	254,352	169,319
West	362,881	225,855	136,722

From an existing view:

- Right-click the tab for the worksheet you want to use, and choose **Duplicate as Crosstab.**

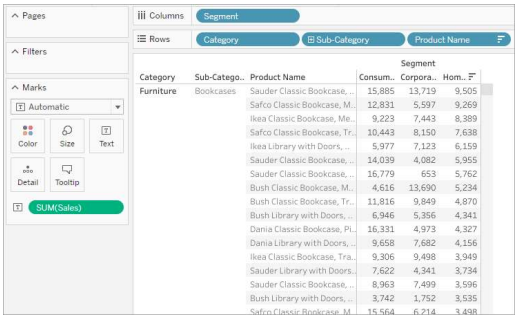
Creating Crosstabs (2/2)

Sort your table column:

Nested or **Field** sort columns containing a single value per pane, or columns having discrete measures.

To create:

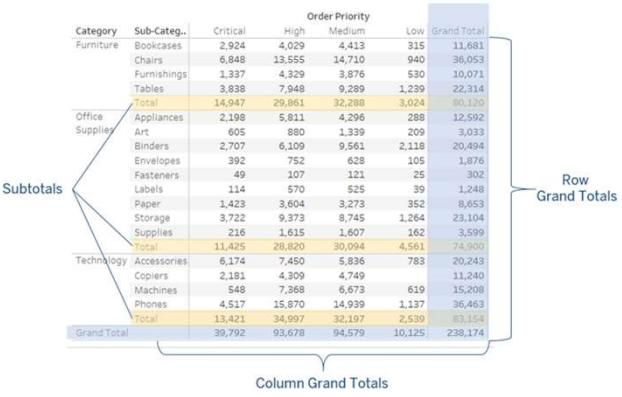
- One dimension to **Columns**
- Several dimensions to **Rows**
- One measure to text on the **Marks** card
- On **Rows**, right-click a dimension and choose **Sort**.
  - In the dialog box, choose **Field**, **Ascending**, **Sales** and **Sum**.



Grand Totals, Subtotals, and Changing Aggregations

Add row and column grand totals and subtotals to help users interpret data.

- Change the display positions as needed.
- Adjust the aggregation.



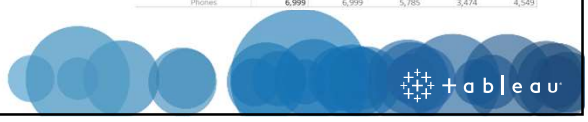
Practice: Totals and Aggregation

Global Superstore.xlsx

- Create a crosstab that shows **total** product sales broken down by category, sub-category, and market.
- Optional: Create a second crosstab for **maximum** product sales. Change the location of totals.

		Market				
Category	Sub-Categ..	APAC	EMEA	LATAM	USCA	Grand Total
Furniture	Bookcases	504,823	538,720	302,415	120,614	1,466,572
	Chairs	512,974	354,836	302,219	331,652	1,501,682
	Furnishings	101,038	129,571	62,456	92,514	385,578
	Tables	225,099	179,248	144,880	207,815	757,042
	Total	1,343,934	1,202,374	811,971	752,595	4,110,874
Office Supplies	Appliances	307,621	405,896	182,075	115,473	1,011,064
	Art	63,008	236,661	41,185	31,238	372,092
	Binders	63,527	148,743	43,140	206,502	461,912
	Envelopes	52,112	60,392	41,357	17,044	170,904
	Fasteners	28,097	32,497	19,145	3,504	83,242
	Labels	22,323	24,618	13,555	12,908	73,404
	Paper	59,901	66,202	38,190	79,999	244,292
	Storage	216,076	534,543	142,036	234,431	1,127,086
	Supplies	71,655	80,197	43,239	47,983	243,074
	Total	884,320	1,589,749	563,921	749,081	3,787,070
Technology	Accessories	186,235	249,410	141,739	171,854	749,237
	Copiers	494,594	541,527	316,322	156,994	1,509,436
	Machines	190,307	354,299	40,941	193,513	779,060
	Phones	486,354	590,665	289,711	340,093	1,706,824
	Total	1,357,490	1,735,901	788,714	862,453	4,744,557
Grand Total		3,585,744	4,528,024	2,164,605	2,364,129	12,642,502

		Market				
Category	Sub-Category	Grand Total	APAC	EMEA	LATAM	USCA
Grand Total		22,638	6,999	7,959	3,474	22,638
Furniture	Total	5,760	5,760	5,729	3,473	4,416
	Bookcases	5,668	5,668	3,499	2,751	4,405
	Chairs	5,760	5,760	5,729	3,473	4,416
	Furnishings	1,519	880	1,519	785	1,336
	Tables	5,451	5,451	5,451	3,117	4,298
Office Supplies	Total	9,893	4,864	7,959	3,243	9,893
	Appliances	7,959	4,864	7,959	3,243	2,625
	Art	1,113	513	769	479	1,113
	Binders	9,893	609	720	434	9,893
	Envelopes	605	486	570	435	605
	Fasteners	271	226	271	119	116
	Labels	786	160	158	104	786
	Paper	734	498	677	315	734
	Storage	2,963	1,981	2,963	1,455	2,934
	Supplies	8,188	540	667	431	8,188
Technology	Total	22,638	6,999	5,785	3,474	22,638
	Accessories	3,450	3,079	3,450	2,298	3,347
	Copiers	17,500	4,448	5,301	2,366	17,500
	Machines	22,638	2,195	2,910	1,601	22,638
	Phones	6,999	6,999	5,785	3,474	4,549



Creating Highlight Tables

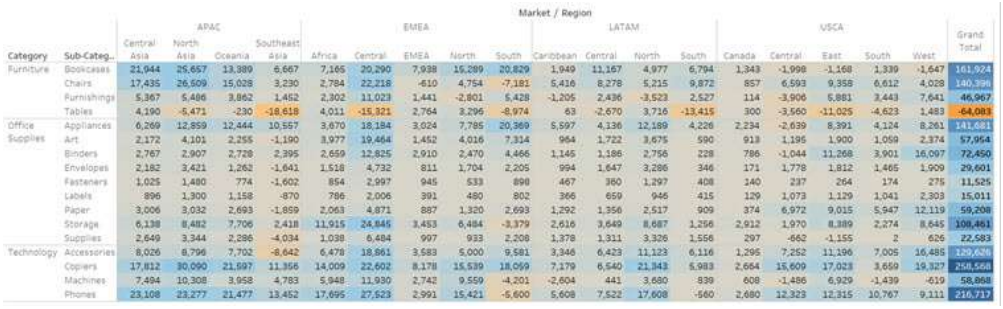
A color-encoded crosstab that calls attention to very high or low data values:

- Show detailed values in text.
- Emphasize outliers in color.
- Include totals, color-encoded or not, as desired.

		Ship Mode / Order Priority											
		First Class			Same Day			Second Class			Standard Class		
Segment	Market	Critical	High	Medium	Critical	High	Medium	Critical	High	Medium	High	Low	Medium
Consumer	APAC	9,399	18,412	5,884	2,796	6,541	1,929	5,348	15,516	15,419	34,558	5,111	101,905
	EMEA	8,827	9,074	12,244	2,766	8,856	8,403	12,579	18,997	27,065	43,272	16,536	93,373
	LATAM	2,477	7,964	6,935	-371	936	2,022	2,765	10,262	13,729	14,025	5,818	54,070
	USCA	4,186	6,317	12,954	2,891	6,526	1,159	6,213	15,303	6,409	10,653	-5,017	76,203
Corporate	APAC	8,369	3,594	3,291	1,788	2,866	1,480	7,667	6,945	12,738	18,117	3,997	58,885
	EMEA	9,159	7,050	6,515	-487	2,372	4,874	3,526	6,961	22,633	17,255	12,276	64,448
	LATAM	2,625	6,534	3,566	1,554	3,006	-359	1,056	1,910	3,499	7,151	4,908	22,424
	USCA	2,477	6,805	5,589	157	-1,382	3,122	3,755	9,421	6,543	13,115	6,114	41,301
Home Office	APAC	2,414	1,077	6,471	932	3,098	-2,712	-122	4,602	9,438	14,202	2,056	41,989
	EMEA	1,248	3,180	-906	3,529	-702	1,660	3,050	7,178	9,998	8,136	3,782	46,873
	LATAM	1,397	6,698	2,865	2,097	5	577	1,289	1,553	2,983	6,338	1,686	15,646
	USCA	3,255	7,240	2,919	1,774	2,098	369	1,838	5,931	8,587	10,807	1,390	17,194

Practice: Highlight Table

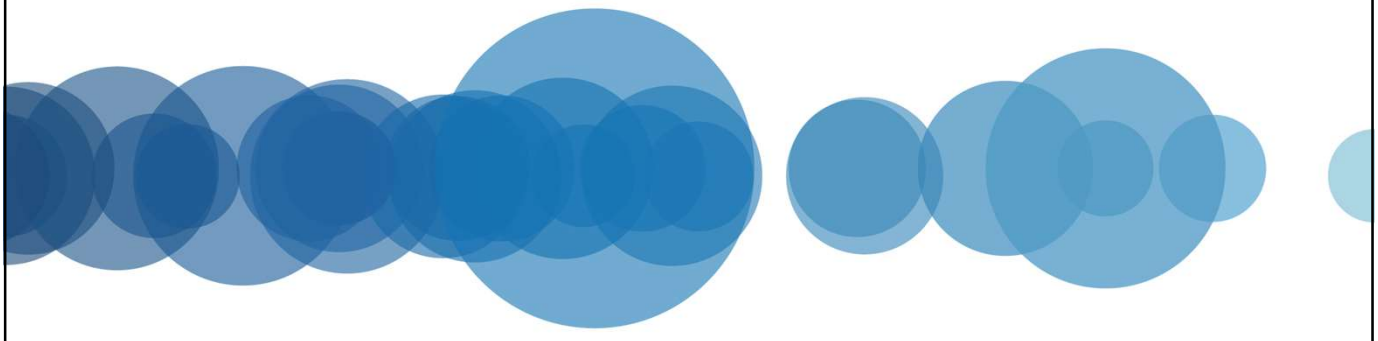
Global Superstore.xlsx



		Market / Region																		
		APAC				EMEA					LATAM				USCA					Grand Total
Category	Sub-Categ..	Central Asia	North Asia	Oceania	Southeast Asia	Africa	Central	EMEA	North	South	Caribbean	Central	North	South	Canada	Central	East	South	West	
Furniture	Bookcases	21,944	25,657	13,389	6,667	7,165	20,290	7,938	15,289	20,829	1,949	11,167	4,977	6,794	1,343	-1,998	-1,168	1,339	-1,647	161,924
	Chairs	17,435	26,509	15,028	3,230	2,784	22,218	-610	4,754	-7,181	5,416	8,278	5,215	9,872	857	6,593	9,358	6,612	4,028	140,396
	Furnishings	5,367	5,486	3,862	1,452	2,302	11,023	1,441	-2,801	5,428	-1,205	2,436	-3,523	2,527	114	-3,906	5,881	3,443	7,641	46,967
	Tables	4,190	-5,471	-230	-18,618	4,011	-15,321	2,764	3,296	-8,974	63	-2,670	3,716	-13,415	300	-3,560	-11,025	-4,623	1,483	-64,083
Office Supplies	Appliances	6,269	12,859	12,444	10,557	3,670	18,184	3,024	7,785	20,369	5,597	4,136	12,189	4,226	2,234	-2,639	8,391	4,124	8,261	141,681
	Art	2,172	4,101	2,255	-1,190	3,977	19,464	1,452	4,016	7,314	964	1,722	3,675	590	913	1,195	1,900	1,059	2,374	57,964
	Binders	2,767	2,907	2,728	2,395	2,659	12,825	2,910	2,470	4,466	1,145	1,186	2,756	228	786	-1,044	11,268	3,901	16,097	72,450
	Envelopes	2,182	3,421	1,262	-1,641	1,518	4,732	811	1,704	2,205	994	1,647	3,286	346	171	1,778	1,812	1,465	1,909	29,601
	Fasteners	1,025	1,480	774	-1,602	854	2,997	945	533	898	467	360	1,297	408	140	237	264	174	275	11,525
	Labels	896	1,300	1,158	-870	786	2,006	391	480	802	366	659	946	415	129	1,073	1,129	1,041	2,303	15,011
	Paper	3,006	3,032	2,693	-1,859	2,063	4,871	887	1,320	2,693	1,292	1,356	2,517	909	374	6,972	9,015	5,947	12,119	59,208
	Storage	6,138	8,482	7,706	2,418	11,915	24,845	3,453	6,484	-3,379	2,616	3,649	8,687	1,256	2,912	1,970	8,389	2,274	8,645	108,461
	Supplies	2,649	3,344	2,286	-4,034	1,038	6,484	997	933	2,208	1,378	1,311	3,326	1,556	297	-662	-1,155	2	626	22,583
Technology	Accessories	8,026	8,796	7,702	-8,642	6,478	18,861	3,583	5,000	9,581	3,346	6,423	11,123	6,116	1,295	7,252	11,196	7,005	16,485	129,626
	Copiers	17,812	30,090	21,697	11,356	14,009	22,602	8,178	15,539	18,059	7,179	6,540	21,343	5,983	2,664	15,609	17,023	3,659	19,327	258,568
	Machines	7,494	10,308	3,958	4,783	5,948	11,930	2,742	9,559	-4,201	-2,604	441	3,680	839	608	-1,486	6,929	-1,439	-619	58,868
	Phones	23,108	23,277	21,477	13,452	17,695	27,523	2,991	15,421	-5,600	5,608	7,522	17,608	-560	2,680	12,323	12,315	10,767	9,111	216,717

- Show profit for category and sub-category by market and region.
- Include row grand totals in the color encoding.

Slicing Your Data by Date



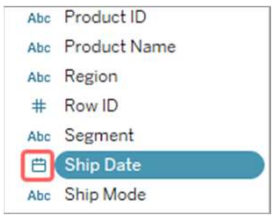
Slicing Your Data by Date

- Working with Dates in Tableau
- Using Discrete Date Parts and Continuous Date Values
- Practice: Date Parts and Date Values

Working with Dates in Tableau

Dates are automatically placed in the dimensions area of the data pane:

- Date/time fields are identified by the calendar icon.



Automatic hierarchy is created for dates:

- Begins at the highest level in the data, usually year.

The standard Gregorian calendar is used by default:

- The ISO-8601 week-based calendar can be selected for any data source.

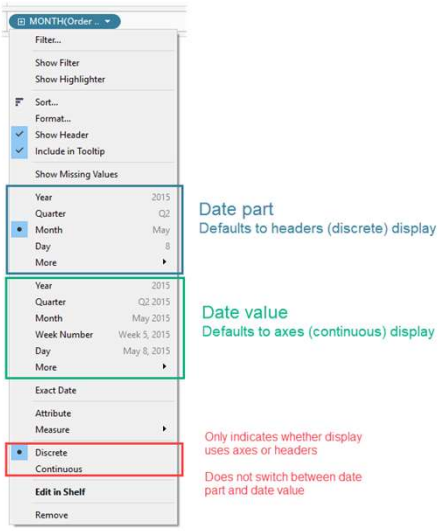
Discrete Date Parts and Continuous Date Values

Discrete dates are organized as discrete date parts, independent of linear time

- Organized by date units, such as aggregated data for all Novembers over several years.

Continuous date values represent the chronological progression of time

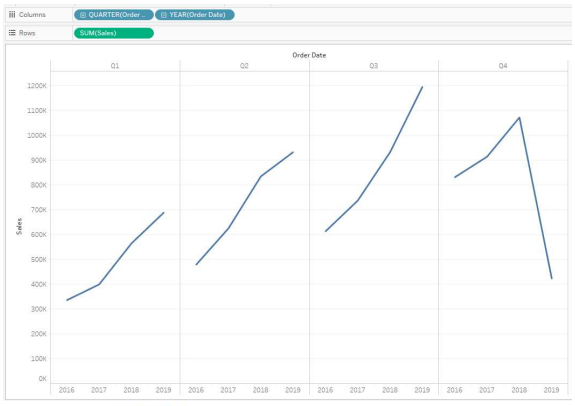
- Create an axis as a timeline.



Using Discrete Date Parts

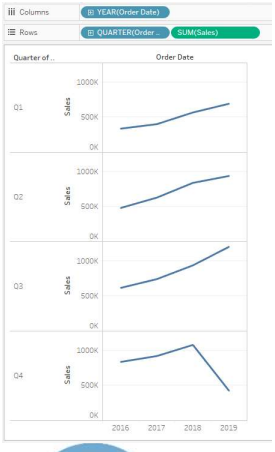
Reorder date hierarchy:

- Place quarter before year



Place date parts on different shelves:

- Year on columns
- Quarter on rows



Practice: Date Parts and Date Values

Global Superstore.xlsx

- Create a bar chart to show seasonal trends by discrete month of over date
- Create a line chart to show sales for each month in a continuous timeline

Using Multiple Measures in a View

Using Multiple Measures in a View

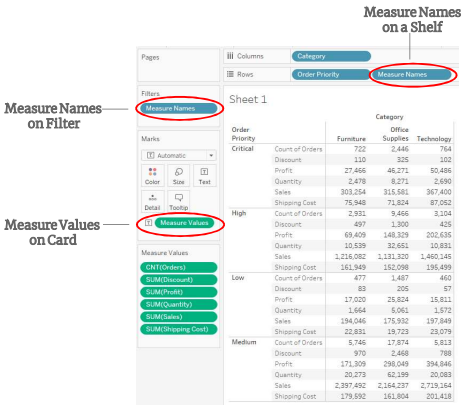
- Using Measure Values and Measure Names in a View
- Combined or Shared Axis Charts
- Practice: Combined Axis Chart
- Creating Dual Axis Charts
- Practice: Dual Axis Chart

Measure Values and Measure Names

Tableau-generated fields that serve as containers for more than one measure

- Measure names—at the bottom of each table's Dimensions
- Measure values—at the bottom of each table's Measures

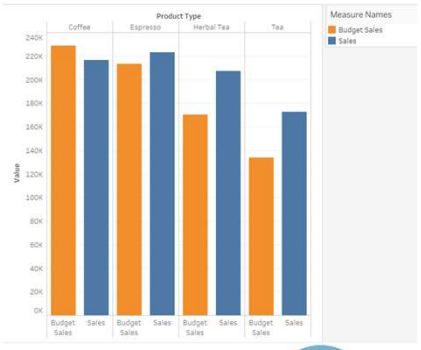
They display for each related table.

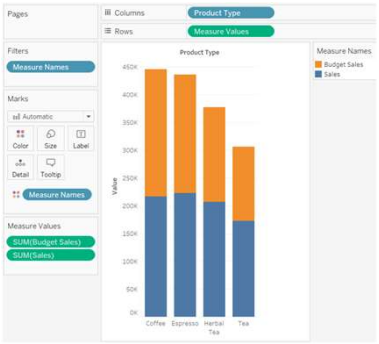


Combined or Shared Axis Charts

More than one measure on the same axis

- Use for comparing multiple measures in a single view.
- Highlight the relationship between the two measures.
- Show marks side-by-side or stacked.

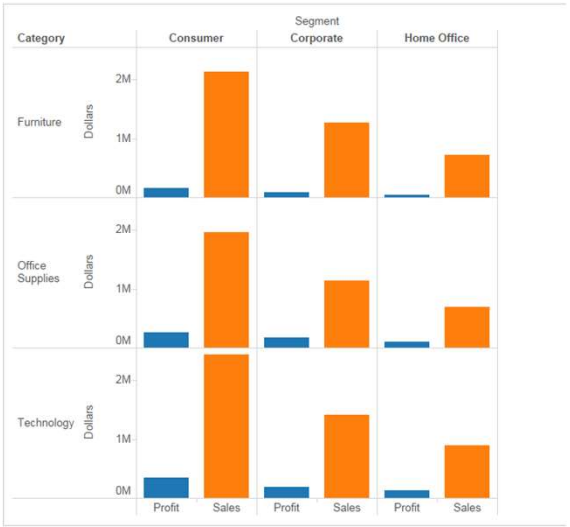




Practice: Combined Axis Chart

Global Superstore.xlsx

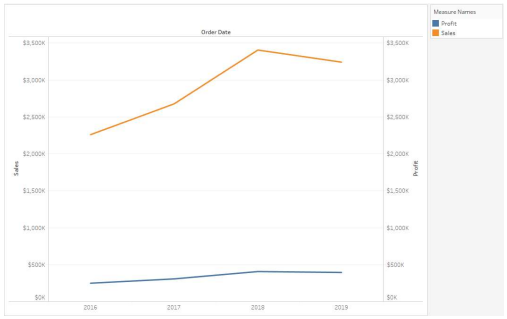
- Create a bar chart broken down by Segment and Category that shows Profit and Sales on the same axis.
- Use your chart to compare measures within dimensions.

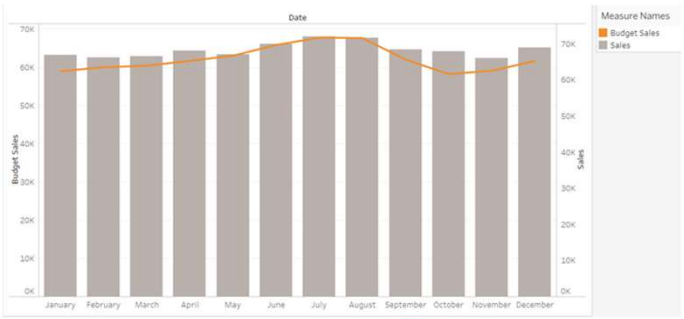


Creating Dual Axis Charts

Useful for showing how two different measures compare

- Different measurement units (for example, dollars and number of days)
- Same unit of measure, but on two different scales
- Can be shown with different mark types

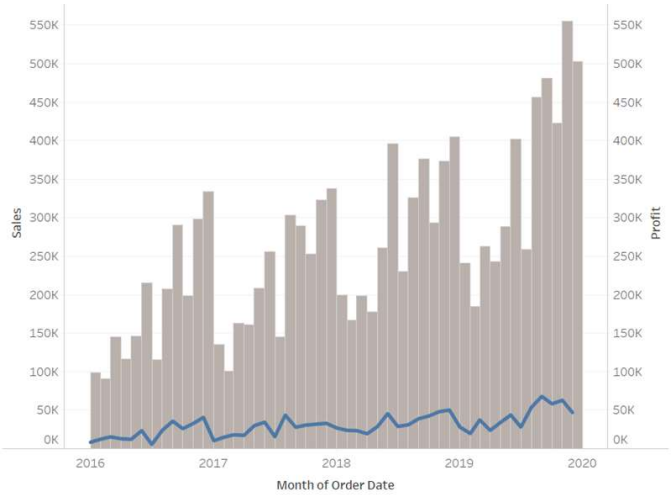




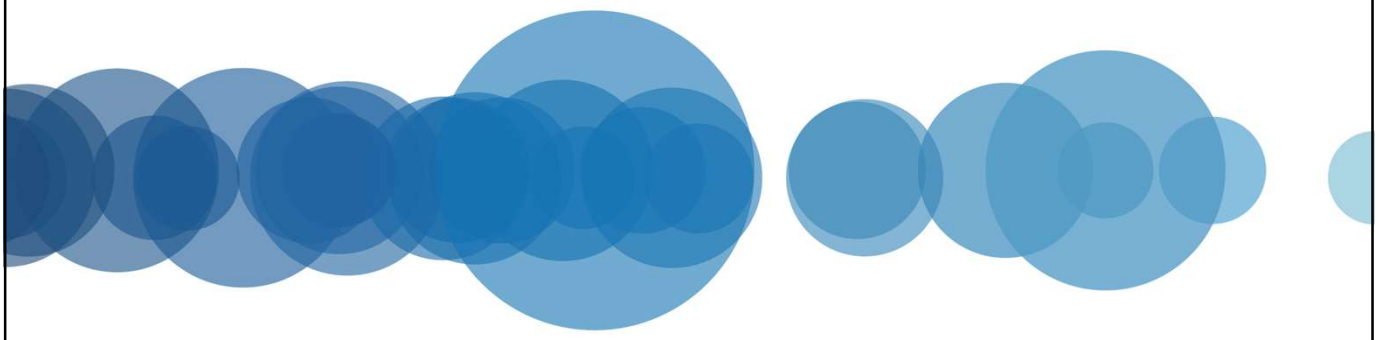
Practice: Dual Axis Chart

Global Superstore.xlsx

- Show Sales as bars.
- Show Profit as a line by month.
- Synchronize axes.



Showing the Relationship Between Numerical Values

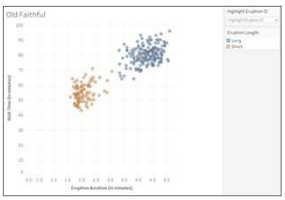


Showing the Relationship Between Numerical Values

- Showing Correlations and Outliers with Scatter Plots
- Create a Scatter Plot
- Analyze Using the Highlighter
- Analyze an Outlier Using Explain Data
- Using the Analytics Pane
- Trend Lines and Trend Model (2 slides)
- Reference Lines and Bands (3 slides)
- Practice: Marketing Expenses Scatter Plot

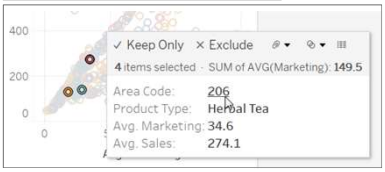
Showing Correlations and Outliers with Scatter Plots

A graph of plotted points to compare two measures and to show patterns across data sets.



Scatter plots can:

- Answer questions about relationships between variables (correlations).
- Visualize data that deviates from the primary trend (outliers).



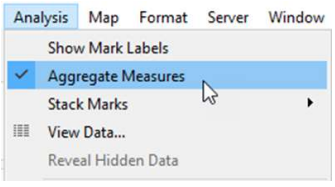
Highlighters and/or tooltip selections are useful for analysis. Explain Data can also be used.

Create a Scatter Plot

Compare two measures on opposite (x and y) axes, or on rows and columns.

Use dimensions to see how the measures compare when sliced differently.

Disaggregate the measures to see all records in the data set.



Click to disaggregate

Analyze Using the Highlighter

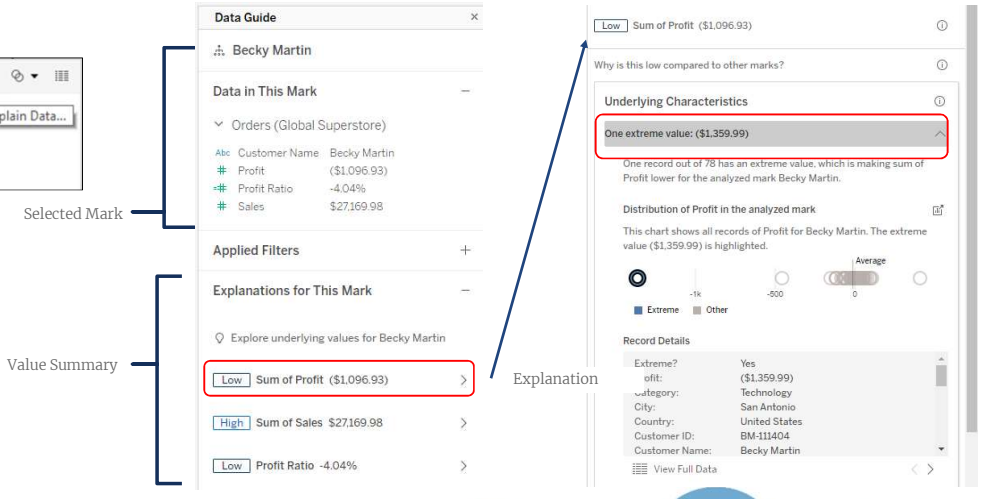
Use the highlighter to perform ad-hoc analysis of the data in scatter plots:

- Use a discrete field (dimension) that is included in the view and impacts the level of detail in the view.
- Right-click the field on the **Marks** card, and then click **Show Highlighter.**

Analyze an Outlier Using Explain Data

- Select a mark and run Explain Data:

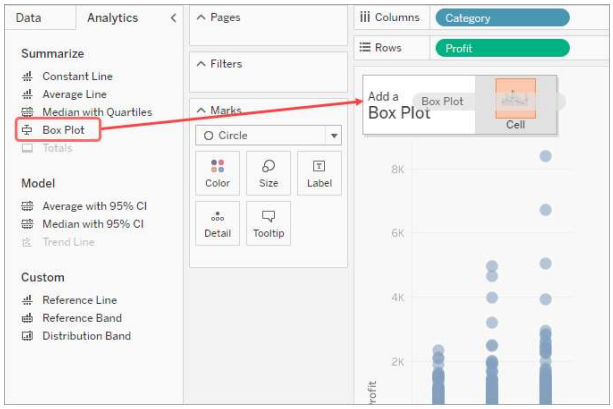
- View results in the **Data Guide** pane:



Using the Analytics Pane

Access common data analysis tools

Simple drag and drop action onto a scope or calculation option



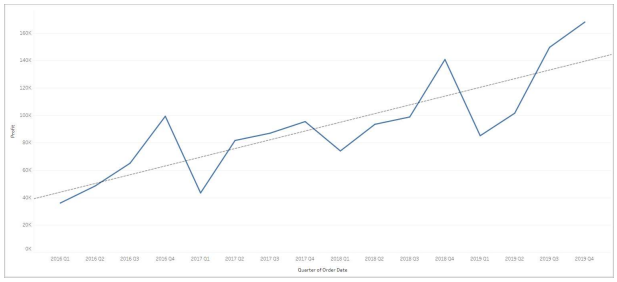
Trend Lines

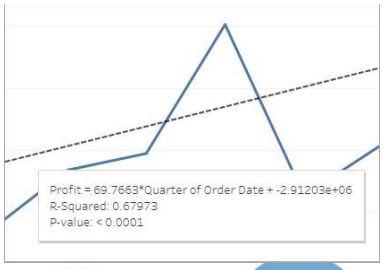
Use to make predictions about your data

Both axes must contain a field that can be interpreted as a number

Can also be a date / time field

Hover over any part of the trend line to view a description (R-squared and P-values)



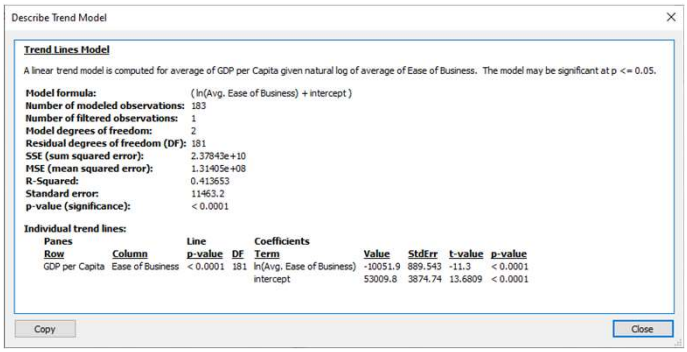


Trend Model (Desktop application only)

Adding trend lines builds a statistical model

Description lists all the trend lines along with their p-value (significance of results) and formula used

- Calculated probability
- Quick way to gain insight into which (if any) trend lines are statistically significant
- Trend data can be exported

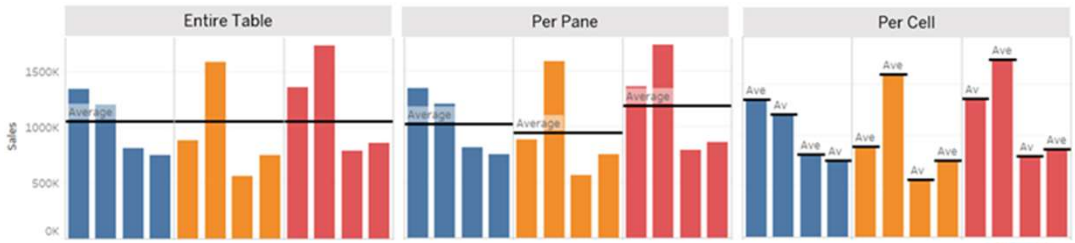


Using Reference Lines

Add reference lines to mark specific values or regions on an axis:

- Example: average sales for a quarter or year
- Based on constant or computed values.

Reference line scope can be the entire table, per pane, or per cell.



Reference Line Options

Values you can use as a reference line:

- Average
- Constant
- Maximum/Minimum
- Median
- Sum
- Total

Labels you can use:

- None
- Value
- Computation
- Custom

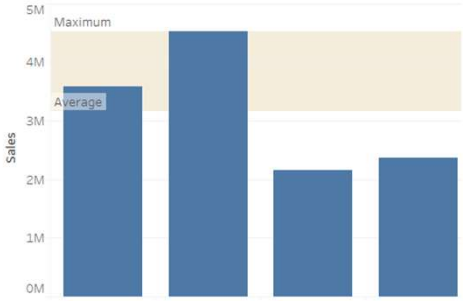
Tooltips you can use:

- None
- Automatic
- Custom

Reference Bands

Reference bands show data that falls within a certain window value:

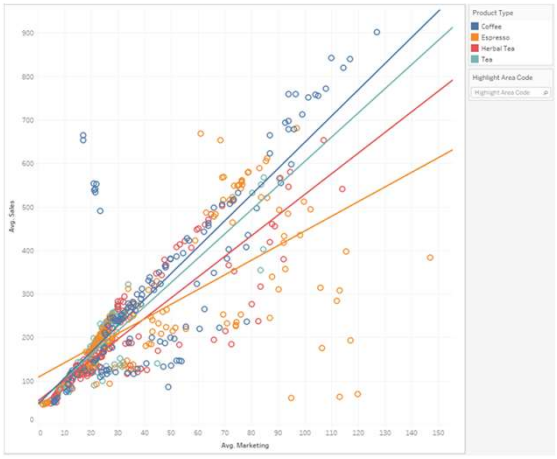
- Shown as shaded areas behind the marks on the axis.
- Band between two constant or computed values.



Practice: Marketing Expenses Scatter Plot

CoffeeChain_Query.xlsx

- Create a scatter plot to compare average sales with average marketing expenses, broken down by area code and product type.
- Add a highlighter to analyze the data and to examine outliers.
- Add a constant line and an average line.
- Use Explain Data to examine outliers.
- Duplicate the view and add trend lines.



Mapping Data Geographically

Mapping Data Geographically

- Mapping in Tableau
- Navigation and Selection in Maps
- Practice: Airport Geographic Mapping

Mapping in Tableau

Create views using maps to show data distributions by geographic locations.

Fields in your data with geographic information display in the data pane with a globe icon. For example: State

Latitude and longitude fields are automatically generated for many geographic information types.

Navigation and Selection in Maps

Maps created in Tableau have several navigation, search, and selection options for user interaction:

Map Search

Zoom and Pan

Reset Axes

Desktop application

Browser

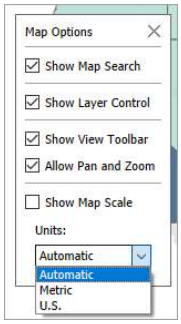
Zoom area

Pan

Rectangular selection

Radial selection

Lasso selection

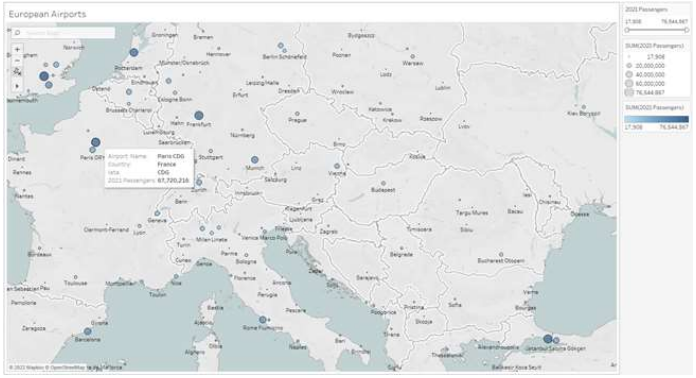


Use Map Options to show or hide various options, or to choose map units.

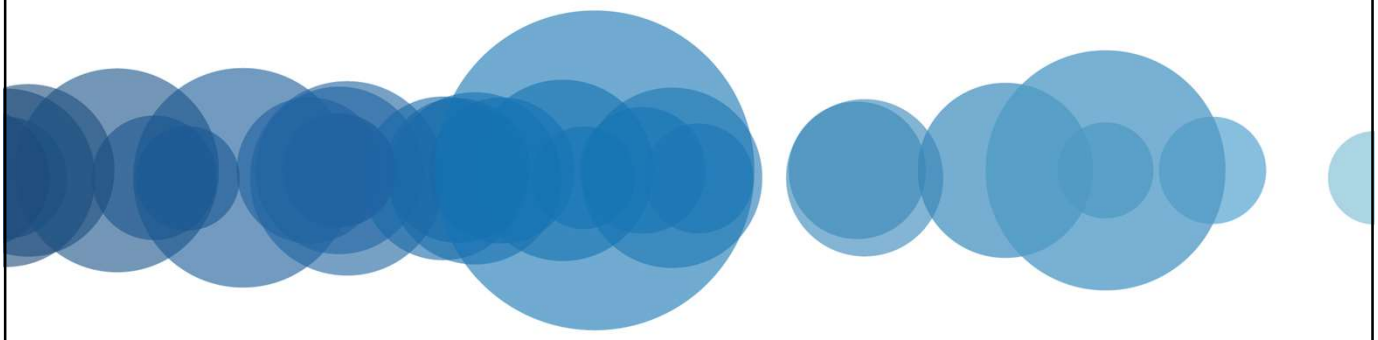
Practice: Airport Geographic Mapping

European Airports 2021.xlsx

- Use IATA codes to show European airports.
- Use size and color to compare number of passengers at each airport in 2021.
- Use a filter to determine which airports were the busiest.



Customizing Your Data



Customizing Your Data

- Using Calculations in Tableau
- Calculation Types
- Creating and Editing Calculated Fields
- Formula Editor Conventions
- Types of Calculated Fields – Examples
- Calculations and Aggregations
- Practice: Calculations and Aggregations in Profit Ratio
- String Functions
- Split and Custom Split
- Type Conversions
- Practice: Using String and Type Conversion Calculations
- Date Calculations – Examples
- Practice: Using Date Calculations

Using Calculations in Tableau

Use when your underlying data does not contain all the values you need for your analysis.

A calculation can include some or all of these components:

Component	Description
Fields	Contains all data source fields and calculated fields.
Functions	Functions you can use to create a formula, which are available from the drop-down menu, organized into categories.
Operators	Operators must be typed manually. Use standard operators, such as addition (+), subtraction (–), multiplication (*), modulo (%) and division (/) as well as comparisons (==,=,>,<,>=,<=,!=,<>), and logical (AND, IN, NOT, OR).
Parameters	Placeholder variables that can be inserted into calculations to replace constant values.
Comments	Insert custom comments for your calculations as a means of annotation for later review. To add a comment to a calculation, type two forward slash characters (//) into the formula pane.

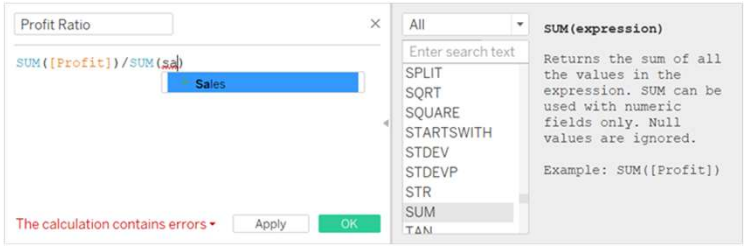
Calculation Types

Calculation	Description
Calculated Fields	Custom calculations created using the calculated field editor and computed in the underlying data source.
Table Calculations, including Quick Table Calculations	Calculations applied after data is returned (created locally in Tableau). Some predefined table calculations are available as quick table calculations, but you can also specify the components of the formula.
Row and Column Totals	Predefined calculations available on the **Analysis** menu, including subtotals and grand totals. These are a type of table calculation.

Creating and Editing Calculated Fields

Type directly on columns, rows, or the **Marks** card (ad-hoc calculations).

Use the Calculated Field editor (choose **Create Calculated Field** from the **Analysis** menu).



Formula Editor Conventions

Color or Symbol	Description
Red squiggly line	Syntax error. Hover over the error to see directions to fix it.
`//Gray Text`	Comments. These are ignored by the calculation but are useful for documenting the calculation logic.
`[Orange Text]`	Field names.
`Blue Text ( )`	Functions.
`[Purple Text]`	Parameters.
`Bold Text`	Calculation is computed locally within Tableau on the aggregated results.
`Plain Text (not bold)`	Calculation is computed at the database level.

- ENTER, RETURN, SPACE and UPPER/lowercase (except for field names) are ignored.
- Use " or ' for string fields

Types of Calculated Fields

Math operations across numbers
- Addition or subtraction

Logic statements
- IF/ELSE or CASE
- IN

Aggregating data
- Average or maximum

Manipulating strings
- Putting strings together or breaking them down

Date formulas
- Pulling out a date part or the difference between two dates

Calculations and Aggregations

Aggregating in calculated fields can affect the formula's order of operations:

- Can therefore return different (and potentially incorrect) results.
- Calculations occur in the data source.
- Tableau will aggregate the results of individual transactions.
- For example, when computing averages, you should apply an overall aggregate before computing ratios.

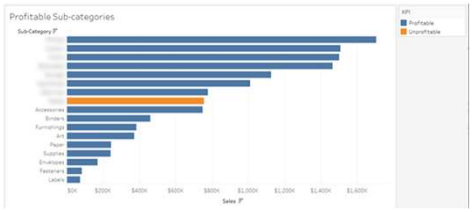
[Profit] / [Sales] is not the same as **SUM([Profit]) / SUM([Sales])**

Practice: Calculations and Aggregations in Profit Ratio

Calculations_and_Aggregations_Starter.twbx

- Create a view showing the profit by year and department.
- Create an ad-hoc calculated field named "Profit Ratio" using the formula **[Profit]/[Sales]** with a format of Percentage.
- Does the Profit Ratio field seem to return the correct results?
- Edit the calculation to be **SUM([Profit])/SUM([Sales])** and re-examine the results.
- Use your calculated field in a logic calculation.

	Category		
Year of Order Date	Furniture	Office Supplies	Technology
2016	7.10%	12.73%	13.20%
2017	6.77%	12.99%	14.26%
2018	7.52%	14.77%	13.59%
2019	6.48%	13.78%	14.54%



String Functions

When using string fields, the plus sign (+) is the concatenation operator.

Spaces and additional text can be included, but should be in quotes (" ").

Example:

```
"First Name" + " Last Name"
```

(Note the extra space before the word `Last`*.)*

Split and Custom Split

SPLIT is a string function used in calculated fields to split separated (delimited) strings in a column to create new columns.

Split dimensions are calculated fields and have the same characteristics and limitations:

- Are materialized in extracts,
- Can be used for blends, but not for joins,
- Not available for pivot/unpivot functionality.

In the Desktop application, you can also use the UI on the Data Source page to create a split or a custom split. A custom split allows you to specify the delimiter used.

Type Conversions

In a formula, if a plus sign is used between a string and a numeric field, an error results:

- A plus concatenates strings, but a plus is also used to perform addition on numbers.
- The calculation engine isn't sure what to do.

Use a type conversion function to convert the number to a string:

```
"Customer Number " + STR([Customer Number]) + ", " + [Customer Name]
```

Note the use of extra spaces.

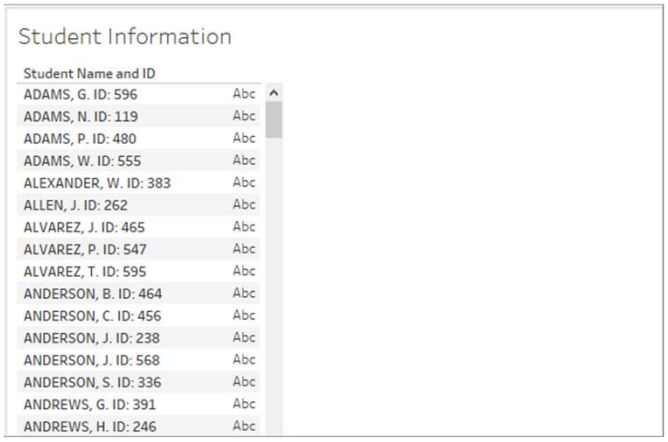
Resulting string output:

```
Customer Number 10, Bob Spencer
```

Practice: Using String and Type Conversion Calculations

Student Age, ID, and GPA.xlsx

- Create a calculated field called Student Name and ID that contains:
  - The student's last name in all capitals
  - The student's first initial
  - The student's ID
  - A comma and a space after the last name, a period after the initial, and the fixed string "ID:" and a space before the ID number.



Date Calculations - Examples

DateDiff

- Calculate a difference between dates.

DateAdd

- Add some amount of time to an existing date field.

```
DateAdd('month',3,[Order Date])
```

Date Part to add to | Amount to add | Field to add to

Date part calculations

- Use year, month, day, hour, minute, or second.

DateParse

- Change a string into a recognized date field.
- Sometimes unavailable depending on the type of data connection being used.

```
DATEPARSE("MMMM,dd,yy","September,4,12") = 9/4/2012
```

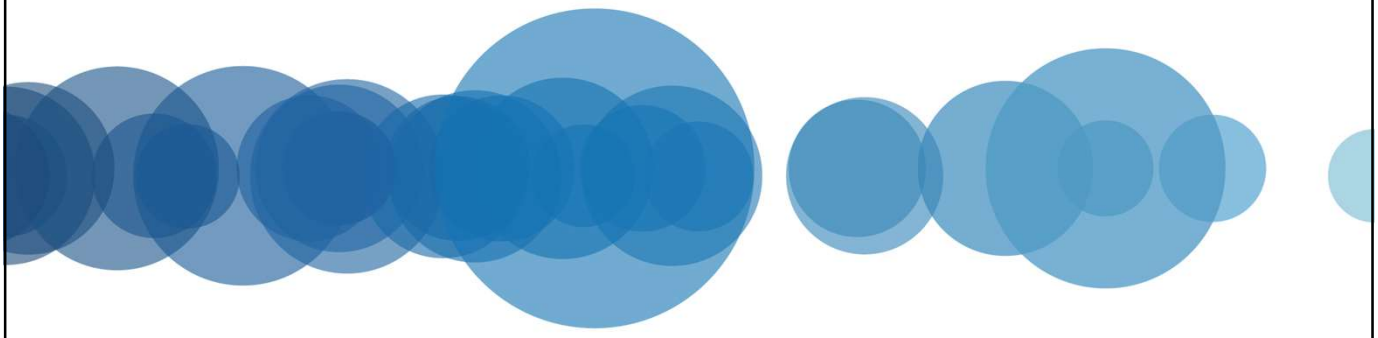
Practice: Using Date Calculations

Global Superstore.xlsx

- Use the DATEDIFF function to calculate the days to ship.
- Create a crosstab chart to compare the average days to ship and the average shipping cost for customer segment and order priority.

Order Priority	Segment	Avg. Days to Ship	Avg. Shipping Cost
Critical	Consumer	1.8	$58.25
	Corporate	1.9	$62.07
	Home Office	1.6	$60.10
High	Consumer	3.0	$33.34
	Corporate	3.1	$32.52
	Home Office	3.1	$32.05
Medium	Consumer	4.5	$18.02
	Corporate	4.5	$19.02
	Home Office	4.5	$18.67
Low	Consumer	6.5	$26.26
	Corporate	6.5	$27.41
	Home Office	6.5	$28.47

Analyzing Data with Quick Table Calculations



Analyzing Data with Quick Table Calculations

- Table Calculation Overview
- Using Quick Table Calculations
- Practice: Running Total of Sales
- Using Rank to Show Biggest to Smallest
- Practice: Nested Sorting with Rank

Table Calculation Overview

Computations applied to the values for a measure in the view

Computed locally, after query results return,
allowing for a second pass aggregation.

Table calculations have scope and direction:

- **Scope** defines the area where the calculation is performed or defines each group for which the calculation is computed.
- **Direction** specifies how the calculation moves through the area.

Using Quick Table Calculations

Predefined computations for data in your view

Utilize default direction for operation, such as "Table (across)"

- A field used in a table calculation displays with an icon: SUM(Sales) Δ

Examples:

- Running total
- Difference
- Percent difference
- Percent of total
- Rank
- Percentile
- Moving average
- YTD Total
- Compound growth rate
- Year over year growth
- YTD Growth

Practice: Running Total of Sales

Running_Total_of_Sales_Starter.twbx

- Crosstab shows yearly sales by category and quarter.
- Add a running total by quarter.
- Restart the total for each category.
- Duplicate the view and use a Percent of Total calculation.

Quarterly Sales by Category

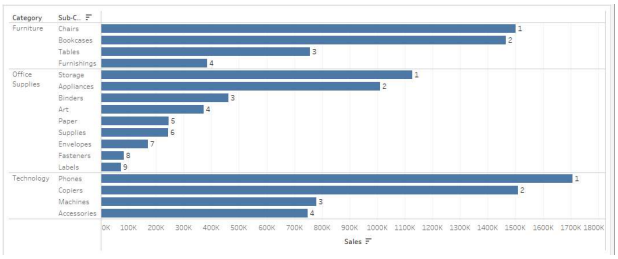
		Order Date							
		2016		2017		2018		2019	
Category1	Quarter of Order Date	Sales	Running Sum of Sal..	Sales	Running Sum of Sal..	Sales	Running Sum of Sal..	Sales	Running Sum of Sal..
Furniture	Q1	109,885	109,885	135,479	135,479	206,246	206,246	217,208	217,208
	Q2	154,694	264,579	199,144	334,623	244,284	450,530	305,043	522,250
	Q3	196,399	460,978	222,301	556,924	311,870	762,399	384,429	906,679
	Q4	295,214	756,192	301,978	858,903	355,324	1,117,724	471,377	1,378,056
Office Supplies	Q1	90,199	90,199	125,283	125,283	178,544	178,544	209,414	209,414
	Q2	157,863	248,062	180,773	306,056	241,935	420,479	299,630	509,044
	Q3	200,995	449,057	222,450	528,506	274,183	694,663	366,765	875,809
	Q4	226,550	675,606	266,589	795,095	316,055	1,010,718	429,842	1,305,652
Technology	Q1	135,696	135,696	138,606	138,606	180,229	180,229	262,585	262,585
	Q2	166,313	302,009	245,676	384,282	348,621	528,850	328,314	590,899
	Q3	215,913	517,922	293,017	677,299	346,984	875,834	445,289	1,036,188
	Q4	309,730	827,652	346,143	1,023,442	401,471	1,277,305	579,970	1,616,159

Using Rank to Show Biggest to Smallest

Scope can be edited for the rank table calculation to change a view

- If the member data for nested dimensions is only listed one time

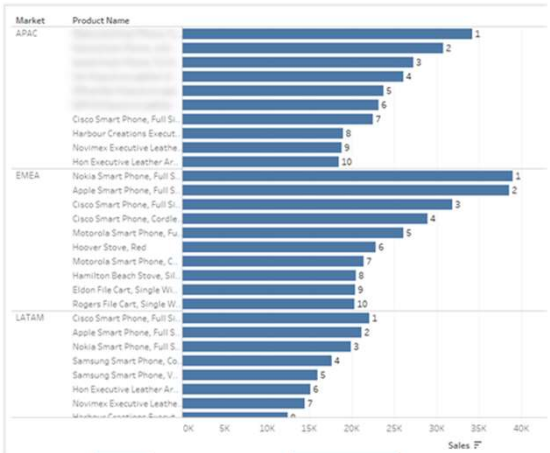
More complex if rank is nested and members are shared between multiple dimensions



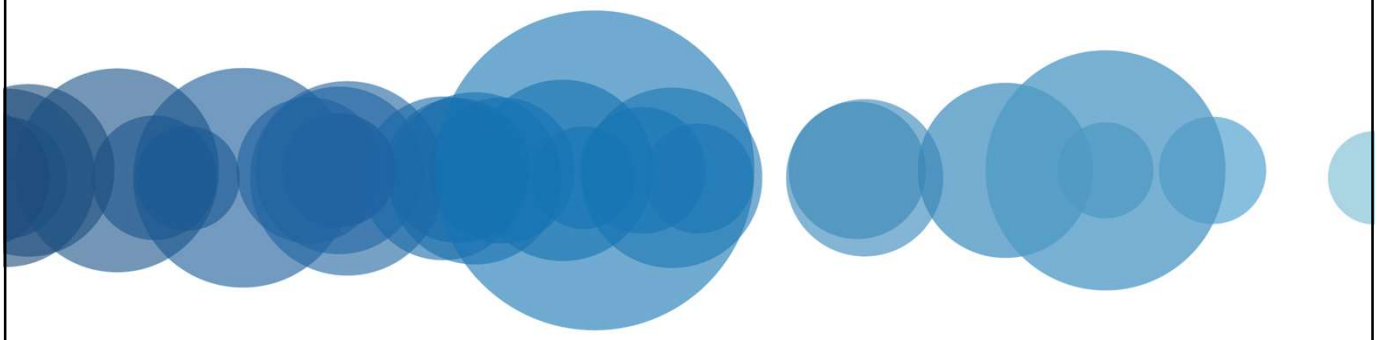
Practice: Nested Sorting for Top N with Rank

Global Superstore.xlsx

- Create a bar chart showing **Sales** by **Market** and **Product Name**.
- Use nested sorting to show the top 10 best-selling products within each market.



Showing Breakdowns of the Whole



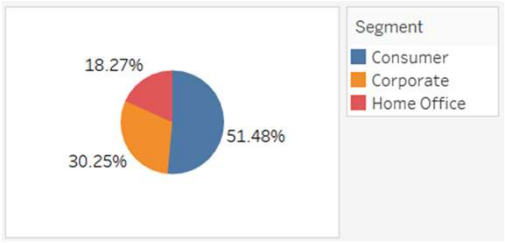
Showing Breakdowns of the Whole

- Pie Charts and Parts of the Whole
- Practice: Percent of Total Sales
- Creating Tree Maps
- Practice: Tree Map

Pie Charts and Parts of the Whole

Helpful under the right circumstances:

- Be aware of the limitations of our perceptual system; our perceptual system does not compare areas or angles accurately.
- Limit the number of members and add labels to help your audience.



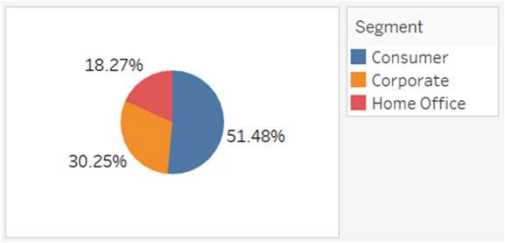
Pie charts are useful for:

- Filtering or highlighting sections of a dashboard.
- Showing high-level breakdown of a measure with a small number of members.

Practice: Percent of Total Sales

Global Superstore.xlsx

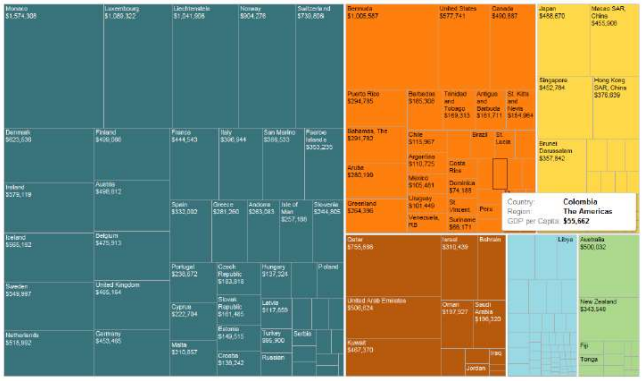
- Create a pie chart to show how sales for each segment compare as a percentage of total sales.



Creating Tree Maps

Use to show part-to-whole relationships at a glance:

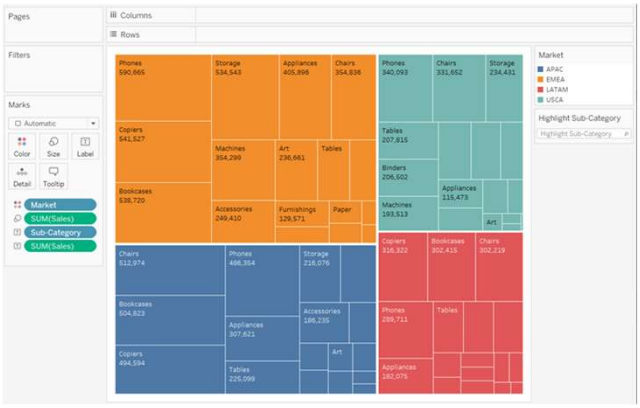
- Read from top left to bottom right.
- Use color to differentiate categories.
- Add labels to show number value.
- Good for data sets with long tails.
- Especially good for hierarchical, categorical data.
- Can use a highlighter to search and compare data.



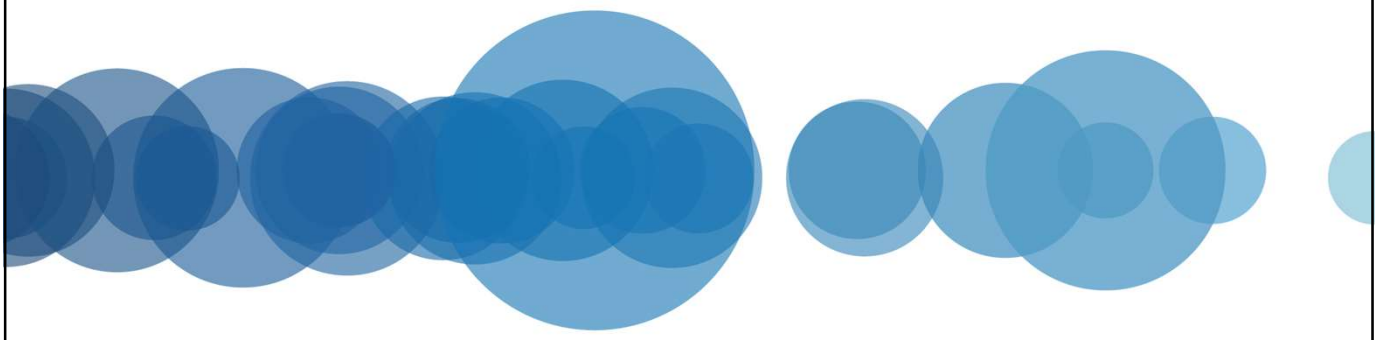
Practice: Tree Map

Global Superstore.xlsx

- Create a tree map that uses color for each market and size to visualize sales.
- Add a highlighter to compare sales for specific sub-categories.



Making Your Views Available



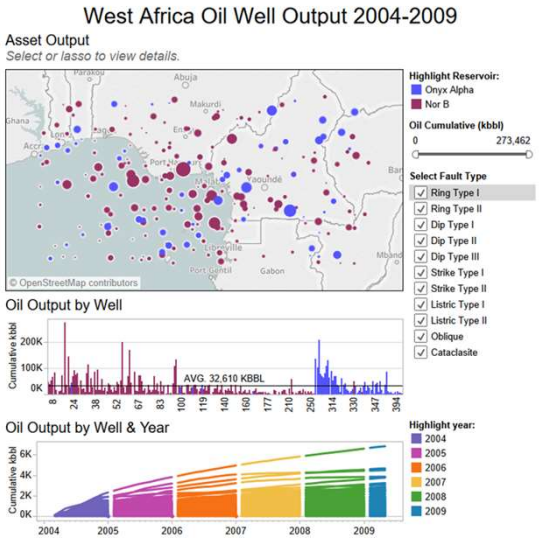
Making Your Views Available

- Dashboards
- Practice: Building a Dashboard
- Dashboard Actions (5 slides)
- Practice: Creating an Interactive Dashboard
- Publish Your Dashboard Online

Dashboards

Show a collection of worksheets and supporting information in a single window.

Use to compare and monitor a variety of data simultaneously.



Relation between Dashboards and Worksheets

Views in a dashboard are connected to the worksheets they represent:

- Changes to the worksheet update the dashboard.
- Changes to the dashboard affect the worksheet.

From the dashboard, you can:

- Go to a sheet.
- Hide a sheet.

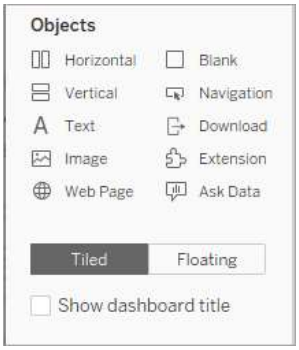
Tiled or Floating Objects

Tiled objects:

- Arranged in a grid.
- Can change how positioned or distributed within layout container.

Floating objects

- Can be layered on top of other objects.
- Make the selection in the dashboard window before the sheet is selected.
- Floating objects can be reordered and resized.

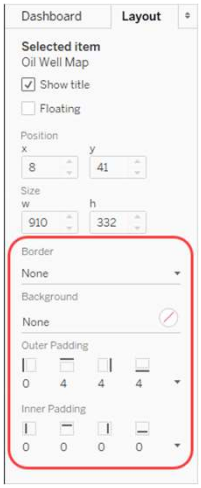


Shift+drag to change an object from tiled to floating.

Formatting Components

Objects on a dashboard can be formatted in the following ways:

- Adding a border
- Adding a background color
- Setting the inner and outer padding



Dashboard Device Layouts

Create layouts specific to particular device types, and optionally different models:

- Desktop
- Tablet
- Phone

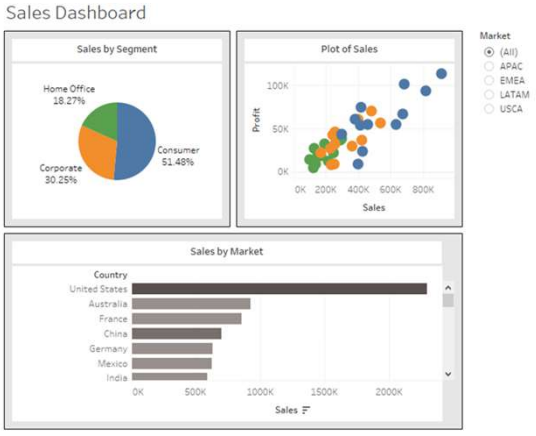
Hierarchical relationship—default dashboard is parent and device specific layouts are children:

- Tailor composition and contents according to different browser window sizes.
- Allow users to experience a dashboard expressly designed for their screen display.
- Create and maintain only a single parent dashboard.

Practice: Building a Dashboard

Building_a_Dashboard_Starter.twbx

- Make the worksheets in the starter workbook display together in a single dashboard.
- Use the market filter as a global filter.
- Use the pie chart worksheet as a filter by segment.



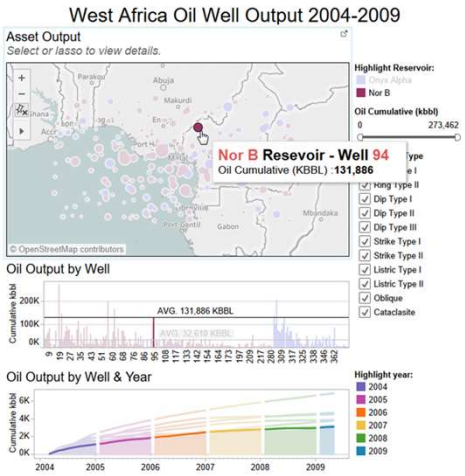
Dashboard Actions (1/5): Highlight

Actions add context and interactivity to your data.

Use highlights to call attention to marks of interest.

Use color to highlight select marks and to dim all others.

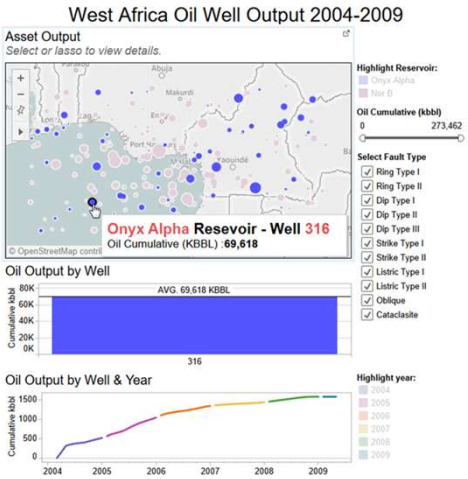
Allow user to select marks in the view or to click on the legend.



Dashboard Actions (2/5): Filter

Use to send information between worksheets:

- Example: selecting a mark on one worksheet filters data on related worksheets to show only data related to the selected item.



Dashboard Actions (3/5): URL

Include a hyperlink that points to a webpage, file, or other web-based resource outside of Tableau.

To make the link relevant to your data, add field values of a selection into the URL as parameters.

Dashboard Actions (4/5): Additional Actions

Action	Used to
Go to Sheet	Navigate from one sheet or dashboard to another.
Change Set Values	Change the values in a set when a user interacts with marks in a view.
Change Parameter	Change the values in a parameter when a user interacts with marks in a view.

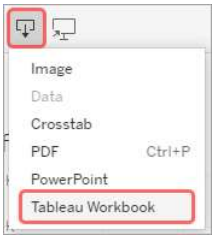
Dashboard Actions (5/5): Options for Running

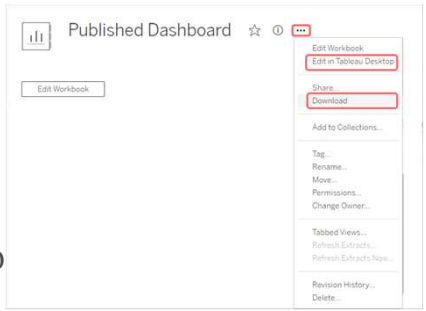
For this field	Action	Works well for
Hover	Rest the pointer over a mark in the view to run the action.	Highlighting and filtering actions within a dashboard
Select	Click on a mark in the view to run the action.	All types of actions
Menu	Click a mark in the view and then select an option on the tooltip context menu.	Filter and URL actions

Publish Your Dashboard Online

Publish Your Work to Share with Others:

- Tableau Cloud
- Tableau Server
- Tableau Public



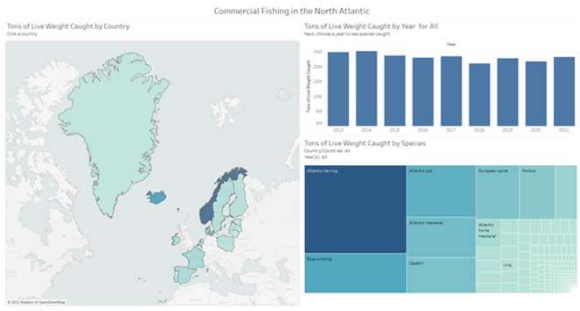


Use the Download menu on the dashboard's toolbar (all environments) or the More Actions menu on the dashboard's page (Tableau Server/Tableau Cloud) to download the workbook to open in Tableau Desktop.

Practice: Creating an Interactive Dashboard

Creating_an_Interactive_Dashboard_Starter.twbx

- Create a dashboard.
- Add dashboard filters to:
  - Filter all other worksheets when you select a mark on the map.
  - Filter the treemap when you select a mark on the bar chart.
  - Show a web page with information about fish species
  - Edit titles to support user interaction



Bonus Material

Bonus Material

- Creating Custom Dates
- Bonus Practice: Creating Custom Dates
- Creating Geographic Groups
- Bonus Practice: Creating Geographic Groups

Creating Custom Dates

Custom dates are calculated date parts that you can save.

- Example: reuse the custom date part or value without having to override the default behavior for each use.

Can be used to "break" the automatic date hierarchy or to create elements to use in defining a new one.

- Example: new dimension for just the month of order data

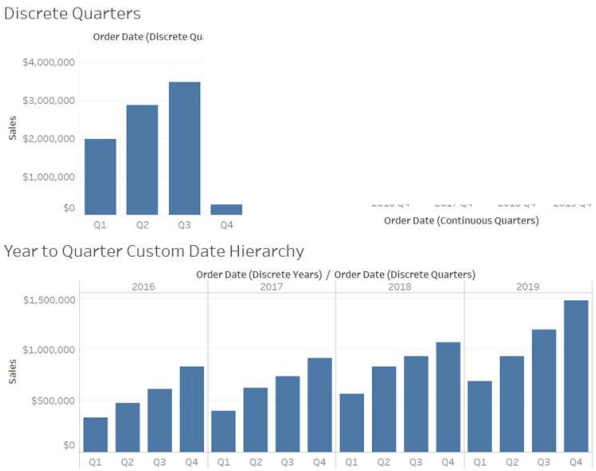
Allow for each field to represent just itself.

Can be continuous date values or discrete date parts.

Bonus Practice: Custom Dates

Bonus Practice_Custom_Dates_Starter.twbx

- Create a bar chart that shows sales by order date using a custom discrete date in quarters.
- Create a bar chart that shows a Year to Quarter custom date hierarchy.



Creating Geographic Groups

Create geographic groups using fields.

- Examples: postal codes, counties, states

Use to show custom sales territories or to explore data regionally.

Create by visually grouping locations or by using the data pane.

Groups of groups (nested groups) can also be created.

- Examples: hierarchical territories or divisions

Bonus Practice: Creating Geographic Groups

school data.xlsx

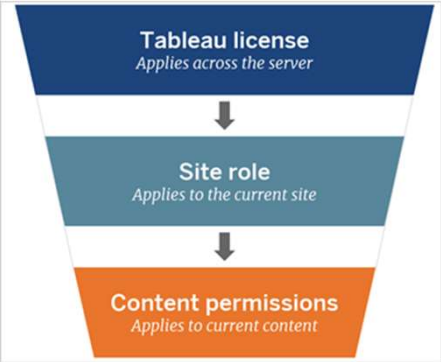
- Use geographic groups to show the total number of schools in custom sales territories.

Reference

Permissions in Tableau

When working in the browser using Tableau Cloud or Tableau Server, there are three factors that impact what actions a user can perform on a site:

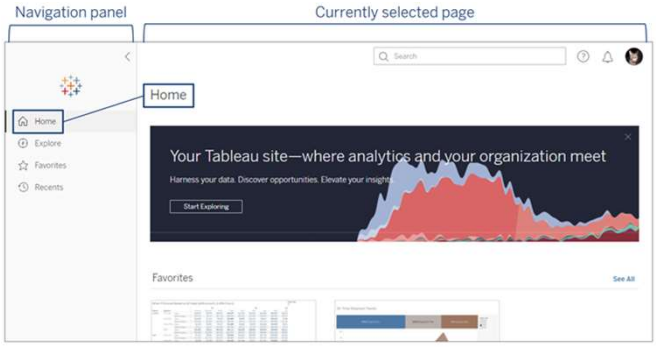
- The Tableau license assigned to the user
- A user's current site role
- The actual permissions set on the content



Navigating a Tableau Site

See your practice manual to learn how to navigate a site on Tableau Server or Tableau Cloud, including:

- The User Interface (Navigation panel and Explore page)
- Content Types
- Creating New Content
- Finding Help



Resources

Support

- Desktop - tableau.com/products/desktop
- Learning Paths – tableau.com/learn/learning-paths
- Classroom – tableau.com/learn/classroom
- Whitepapers – tableau.com/learn/whitepapers
- Blueprint – tableau.com/blueprint
- Visual Gallery – tableau.com/solutions/gallery
- Tableau Public – public.tableau.com/s/
- Online Help – tableau.com/support/consulting, tableau.com/support/help, tableau.com/support/knowledgebase

Community

- community.tableau.com/welcome

Ready to take the next step?

Continuing your Tableau journey through instructor-led training helps you get up-to-speed quicker!

Search for a course at:
https://www.tableau.com/learn/classroom/

Be a data
ROCK STAR

Certifications

Supercharge your career by getting Tableau Certified

Exam	Exam Focus
Tableau Desktop Specialist	Prove your core understanding of Tableau Desktop.
Tableau Certified Data Analyst	Prove you can solve business problems with the power of the Tableau Platform.
Tableau Server Certified Associate	Prove your Tableau Server and site administration skills.

Find out more at tableau.com/certification.

Use eLearning to continue your learning path!

The learning doesn't have to stop here!

Tableau eLearning is designed to boost your productivity and support your organization's journey to becoming data-driven.

With eLearning, you can:

- Take assessments to earn Skill Badges and share them on your social feeds
- Expand your Tableau skills across unique Learning Paths
- Get additional hands-on experience with fun learning activities

Find out more at: https://www.tableau.com/learn/learning-paths

Training Feedback Survey – Please complete!

- **Option 1:** Click the Training Feedback Survey link in the **Practices** folder.
- **Option 2:** Go to https://www.tableau.com/training-csat
- **Option 3:** Use the QR code and complete the survey on your mobile device.

Be sure to enter the **class code** provided by your instructor, and the **email address** you used to register for the class.

Thank you!