



**Tableau Desktop Training – Advanced
Finance Activity Hub (FINAH)
University of California San Diego
2020**

UC San Diego

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Chapter 1 – Using Multiple Data Sources

In this chapter we learn how to use multiple data sources in Tableau.

“Multiple data sources” can mean different files or databases, or different worksheets or tables, respectively.

In either case, the Tableau report author wants to connect information residing in one tabular set of data with the data in another tabular set of data.

The four data connection options in Tableau are:

- **Join:** use when two or more tables are related by specific fields.
- **Cross Database Join:** use to combine data in two files/databases on a common field in different databases or workbooks, or directories, typically a primary key field.
- **Blend:** use to supplement data from one database with columns of data from another data source usually when:
 - A cross-database join is not supported
 - Data is at different levels of detail
 - Data needs cleaning, preventing a correct join
 - Joins cause duplicate data
 - There's lots of data
- **Union:** use to add more rows of data from the same connection to an existing table.

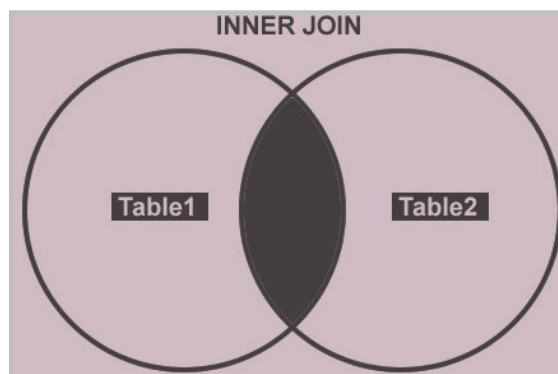
Joining Data – Same Data Source

With joins, a common field or fields, not necessarily named the same, exist between two tables in the same data source. The rows are related by the expression of the relationship; this expression usually refers to the primary and foreign keys of the underlying tables.

Join relationships typically are either Inner or Left.

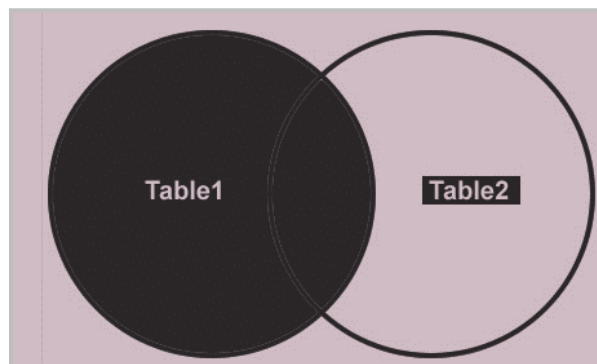
Inner Join

An Inner Join returns rows when there is at least one match in both tables:



Left Join

A Left Join returns all the rows from one table in conjunction with the matching rows from the other table. The diagram below identifies a Left Outer Join in which all records in Table 1 are returned, and records with a common key in Table 2 are added.

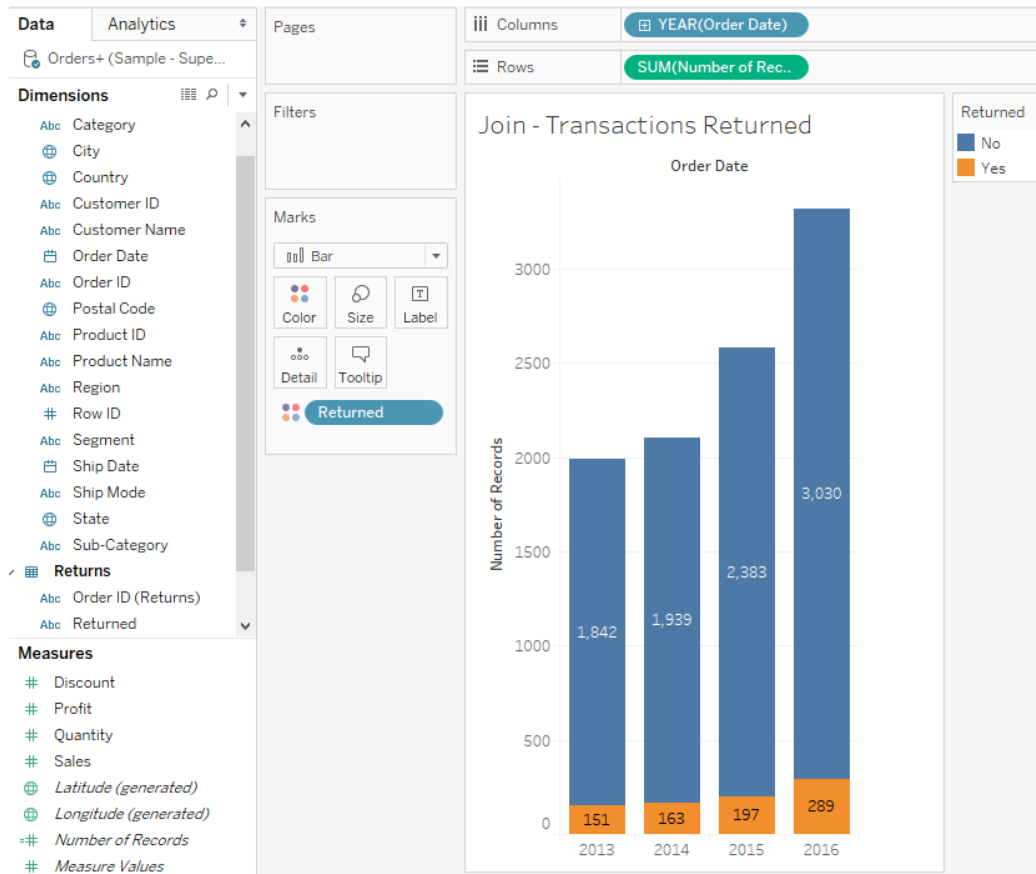


Chapter 1 – Using Multiple Data Sources

In the following lesson, we join the Orders and Returns tables in the Superstore data source so that we can see:

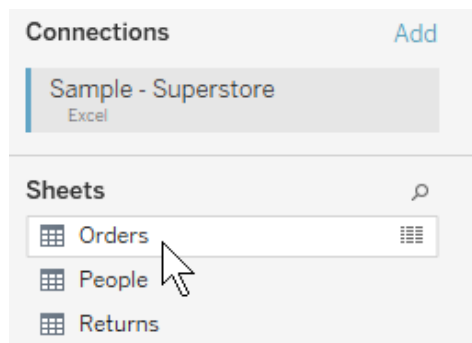
- All orders
- Return information for each order, if it exists

We also create a visualization that quickly shows the number of returned vs. non-returned orders by year:

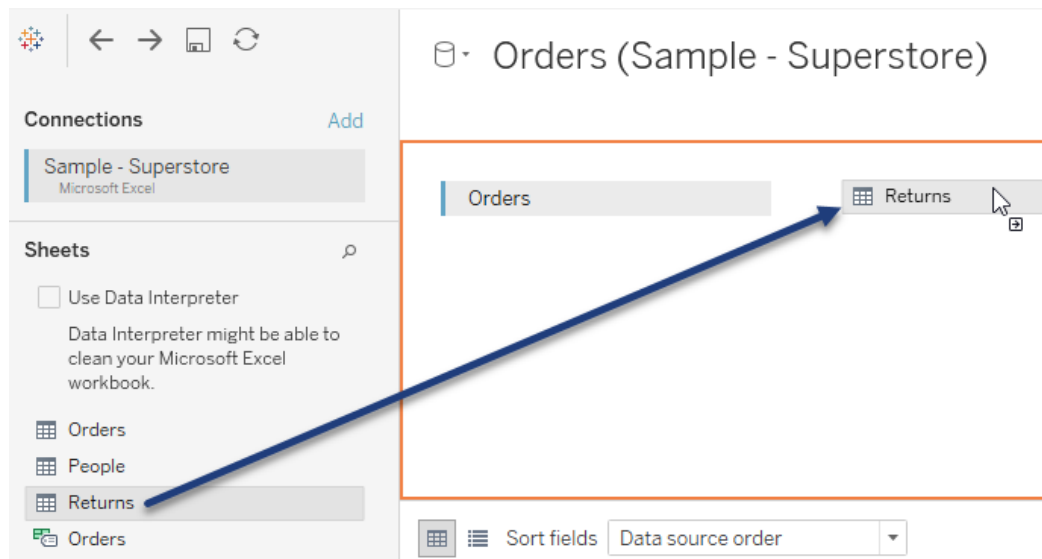


Exercise: Creating a Join

1. Create a new Tableau workbook and connect to the **Sample – Superstore.xls** file.
2. In the Sheets section, double-click **Orders**:

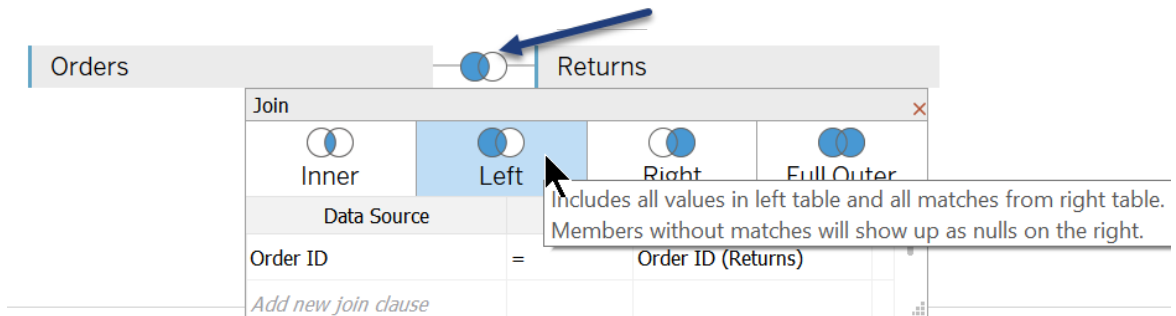


3. Drag the **Returns** sheet to the right of Orders in the canvas:



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- Click the intersecting ring icon between the two tables and click the **Left** icon:



In the Preview pane, scroll all the way to the right and notice the two new fields from the Returns table:

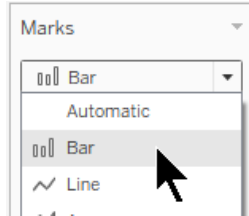
Show aliases Show hidden fields 1,000 rows

#	#	Abc	Abc
Orders	Orders	Returns	Returns
Discount	Profit	Returned	Order ID (Returns)
2	0.000000	41.91	null
3	0.000000	219.58	null
2	0.000000	6.87	null
5	0.450000	-383.03	null
2	0.200000	2.52	null
7	0.000000	14.17	null
4	0.000000	1.97	null

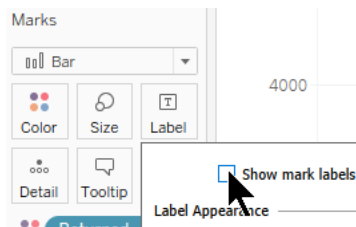
- Click **Sheet1**.
- From Dimensions, drag **Order Date** to the Columns shelf.
- From Measures, drag **Number of Records** to the Rows shelf.

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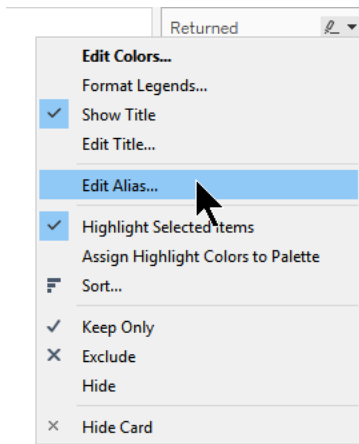
8. In the marks pane, change the mark type to **Bar**:



9. From Dimensions, under Returns, drag **Returned** to the **Color** button on the Marks card.
10. On the Marks card, click the **Label** button and click **Show mark labels**:



11. In the Returned legend, right-click the **Null label** and click **Edit Alias**:



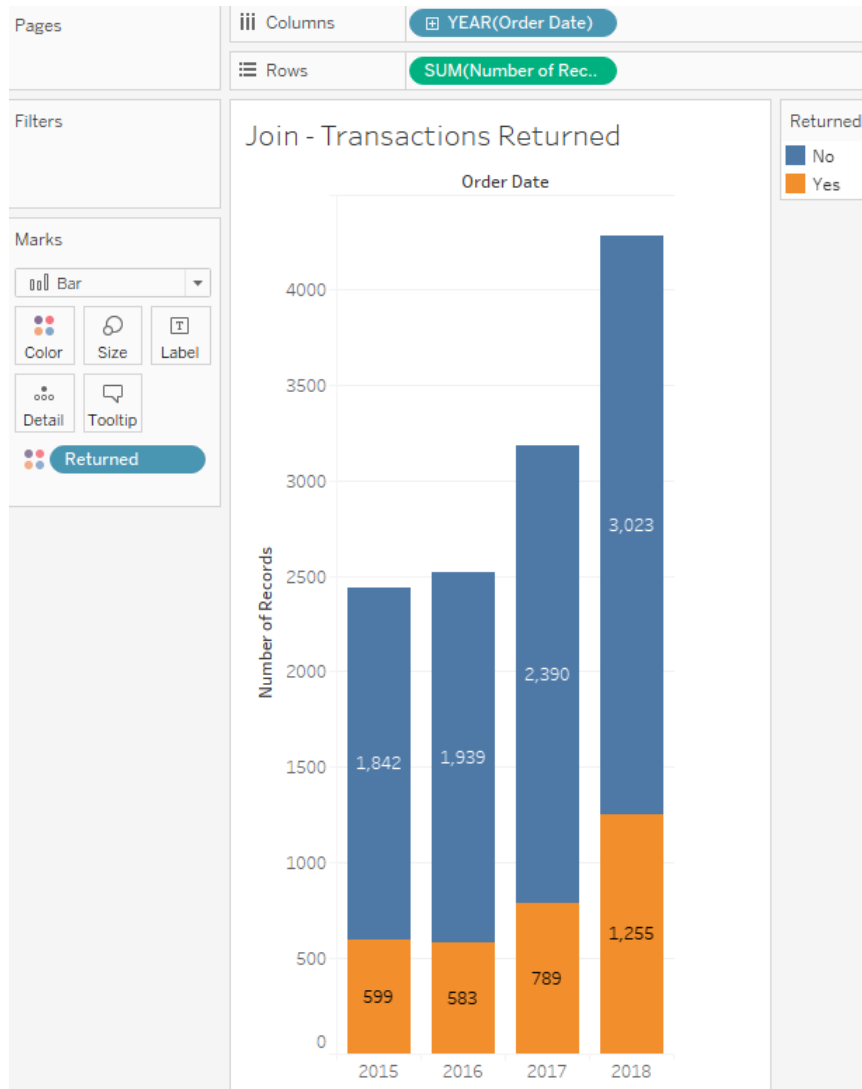
12. In the Edit Alias dialog box, type "No". Click OK.
13. Double-click the **Sheet 1** tab and rename it "Join – Transactions Returned".

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14. In the Toolbar click **Save**.

15. Save the workbook as a .twb file with the name “Join”.

The finished visualization looks as follows:



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Joining Data – Different Data Connections (Cross Database Joins)

Cross database joins act the same as standard joins, but link tables that reside in different files or databases on a common field. The joins are performed at the row (i.e., transaction) level.

In this scenario, the Sample – Superstore – Fact table.xls does not contain fields for Customer Name and Segment Name. But we do have two .csv files that do have the descriptions (aka Lookup tables).

To generate a single data source to build visualizations on, we use a cross database join to create data connections between the three tables.

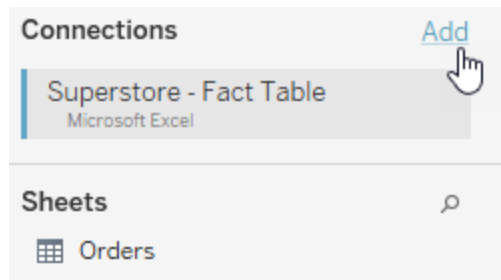
D	E	F	G	H	I
Ship Date	Ship Mode	Customer ID	Segment ID	Country	City
1/7/2014	Standard Class	BA-13000	CNS	United States	Houston
1/8/2014	Standard Class	PO-19195	HOF	United States	Naperville
1/8/2014	Standard Class	PO-19195	HOF	United States	Naperville
1/8/2014	Standard Class	PO-19195	HOF	United States	Naperville
1/12/2014	Standard Class	MB-18085	CNS	United States	Philadelphia
1/7/2014	First Class	JO-15145	CRP	United States	Athens
1/8/2014	Second Class	LS-17230	CNS	United States	Los Angeles
1/10/2014	Standard Class	ME-17320	HOF	United States	Henderson
1/10/2014	Standard Class	ME-17320	HOF	United States	Henderson
1/10/2014	Standard Class	ME-17320	HOF	United States	Henderson
1/10/2014	Standard Class	ME-17320	HOF	United States	Henderson
1/10/2014	Standard Class	ME-17320	HOF	United States	Henderson
1/10/2014	Standard Class	ME-17320	HOF	United States	Henderson

Cust Num	Customer Name
AA-10315	Alex Avila
AA-10375	Allen Arnold
AA-10480	Andrew Allen
AA-10645	Anna Andreadi
AB-10015	Aaron Bergman
AB-10060	Adam Bellavance
AB-10105	Adrian Barton
AB-10150	Aimee Bixby
AB-10165	Alan Barnes

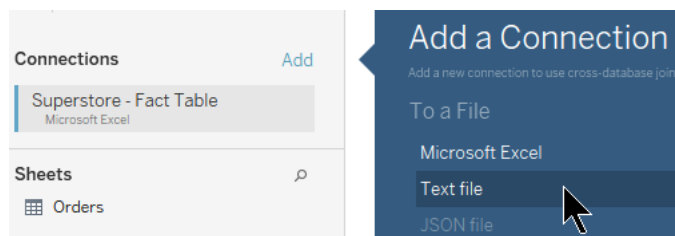
Seg ID	Segment Name
CNS	Consumer
CRP	Corporate
HOF	Home Office

Exercise: Creating a Cross Database Join

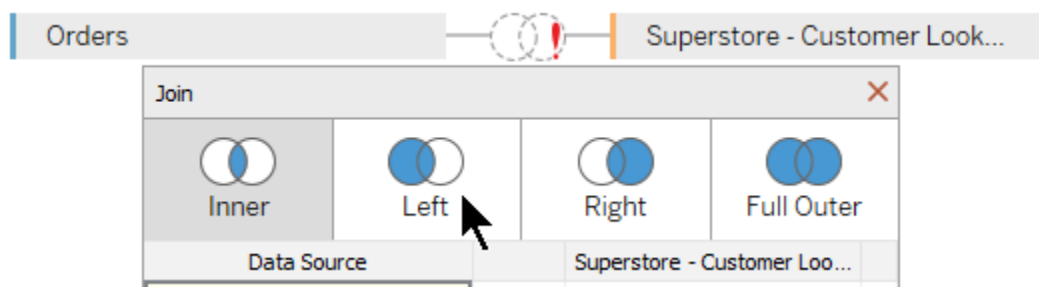
1. Open a new Tableau workbook and connect to the **Superstore - Fact Table.xls** file.
2. Next to Connections click **Add**:



3. Click **Text file**:

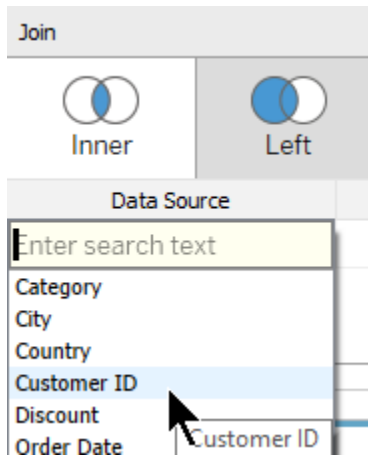


4. Locate the **Superstore – Customer Lookup.csv** file and double-click on it.
5. Click the **Left** join symbol between the connections:

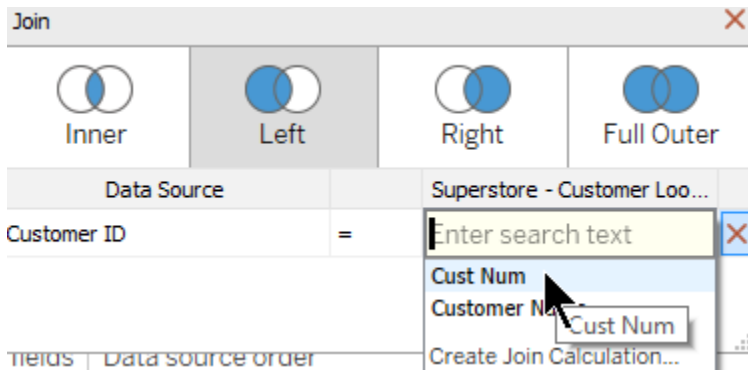


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6. In the left Data Source list, click **Customer ID**:



7. In the right Superstore – Customer Lookup list, click **Cust Num**:

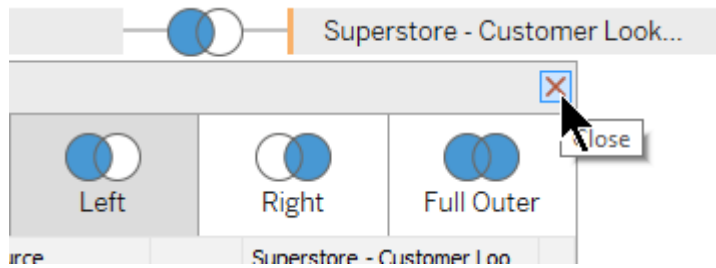


8. Scroll to the far right of the preview pane and notice the additional joined fields:

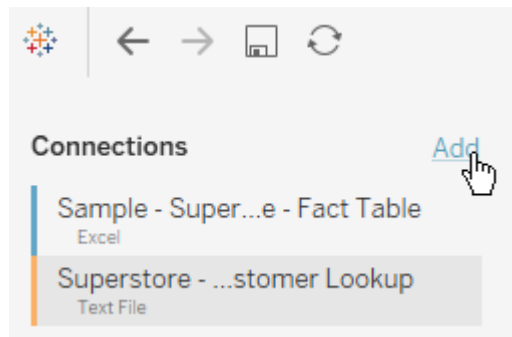
#	#	Abc	Abc
Orders	Orders	Superstore - Customer...	Superstore - Customer Lookup...
Discount	Profit	Cust Num	Customer Name
2	0.000000	6.26	AA-10315
3	0.000000	7.02	AA-10315
			Alex Avila
			Alex Avila

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9. Close the Join window:



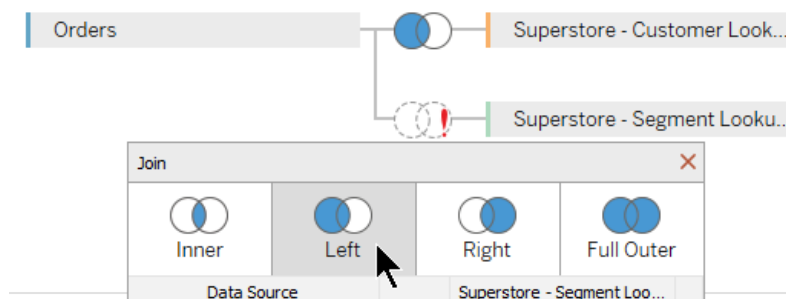
10. Next to Connections click **Add**:



11. Click **Text file**.

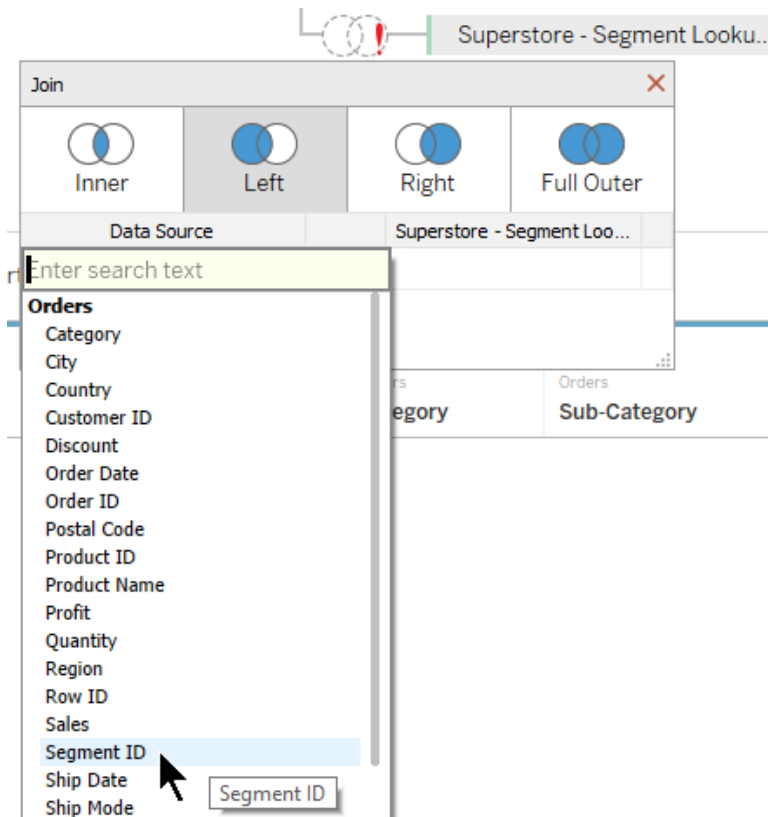
12. Locate the **Superstore – Segment Lookup.csv** file and double-click on it.

13. Click the **Left** join symbol between the connections:

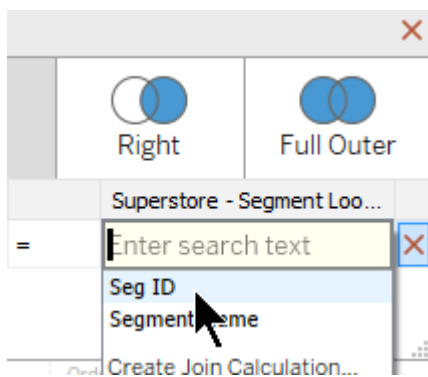


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14. In the left Data Source list, click **Segment ID**:



15. In the right Superstore – Segment Lookup list, click **Seg ID**:

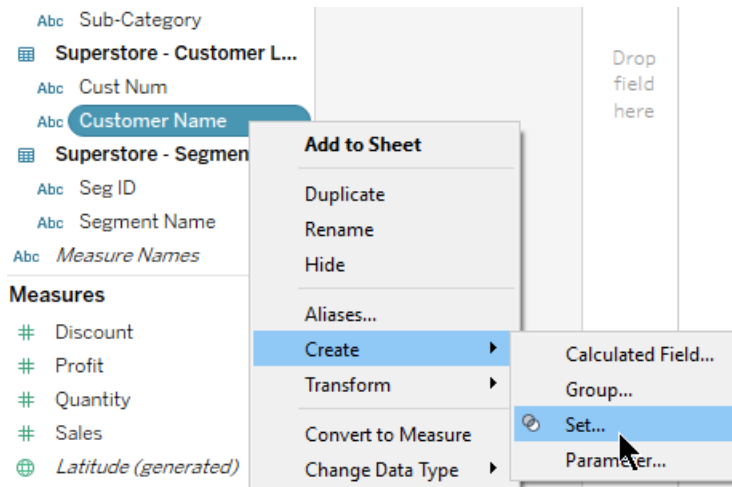


16. Close the Join window.

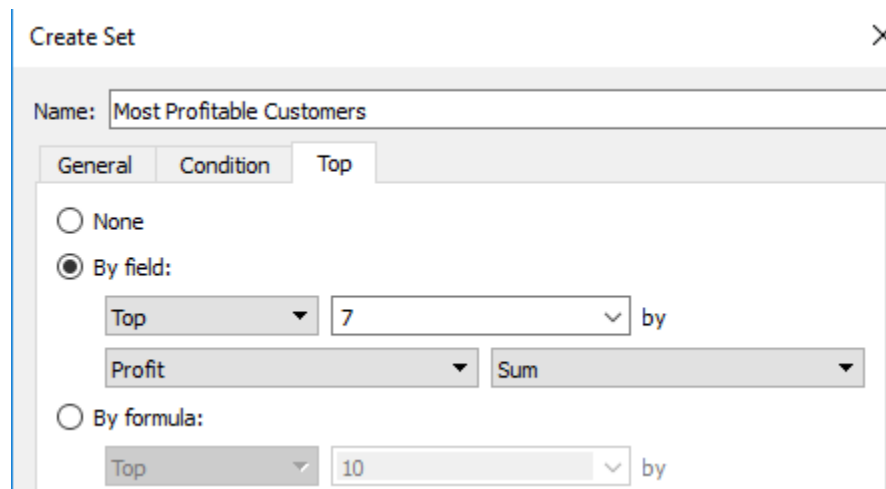
17. Click on the **Sheet 1** tab.

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18. Under Dimensions, in the **Superstore – Customer Lookup** data connection, right-click on **Customer Name**, click **Create** and click **Set**:



19. In the Create Set window, do the following:
- Type “Most Profitable Customers” in the Name field
 - Click the **Top** tab
 - Click the **By field** radio button
 - Type “7” for the number
 - Select **Profit** in the dropdown list
 - Click OK:

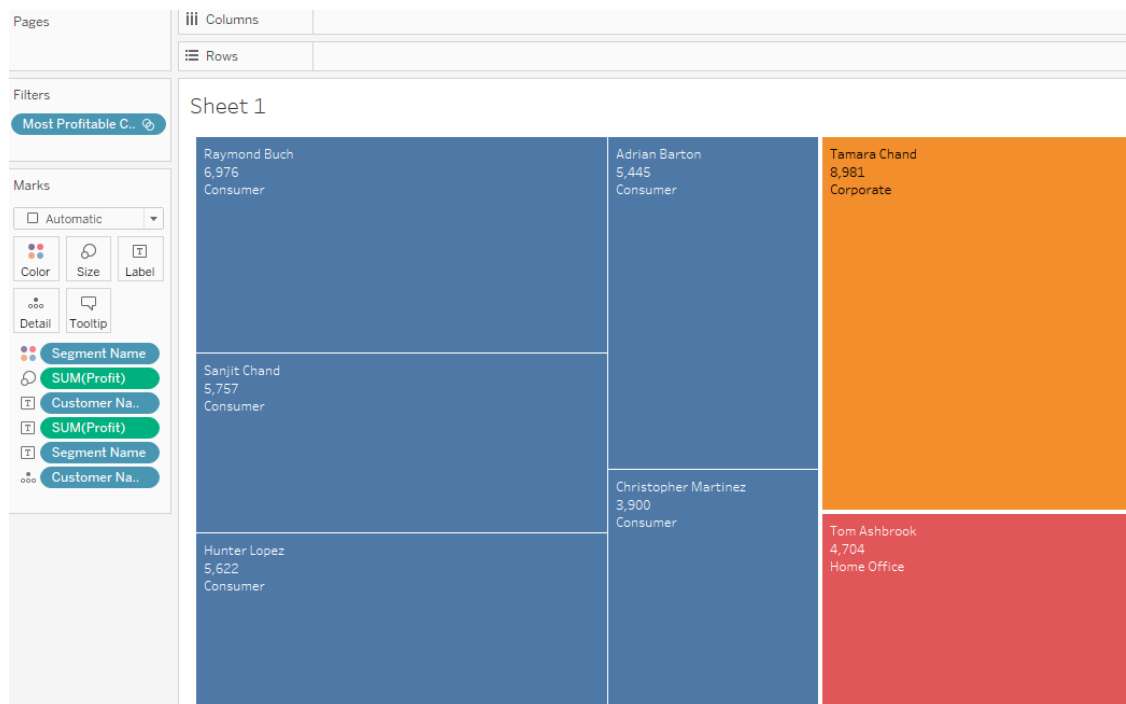


20. From Sets, drag **Most Profitable Customers** to the Filters shelf.
21. From Dimensions, in the **Superstore – Customer Lookup** data connection, drag **Customer Name** to the **Detail** button on the Marks card.
22. From Measures, drag **Profit** to the **Size** button on the Marks card.

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23. From Dimensions, in the **Superstore – Segment Lookup** data connection, drag **Segment Name** to the **Color** button on the Marks card.
24. To populate the mark labels, drag the following to the **Labels** button on the Marks card:
 - **Customer Name**
 - **Profit**
 - **Segment Name**
25. In the Toolbar click **Save**, saving the file as a .twbx file with the name “Cross Database Join”.

The finished visualization looks as follows:



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Blending

Use data blending when you have data in separate data sources that you want to analyze together on a single sheet.

Data blending is useful when:

- A cross-database join is not supported
- Data is at different levels of detail
- Data needs cleaning, preventing a correct join
- Joins cause duplicate data
- There is a lot of data

In the following lesson, we have a Sales Target file for 2018 that contains a single line for each product Sub-Category. We have another file that contains all 2018 transactions (approximately 3,300 transactions):

SubCat	Order Date Year	Sales Target
Tables	2018	\$ 55,132
Supplies	2018	\$ 14,553
Storage	2018	\$ 79,952
Phones	2018	\$ 91,032
Paper	2018	\$ 24,325
Machines	2018	\$ 41,558
Labels	2018	\$ 2,114
Furnishings	2018	\$ 26,781
Fasteners	2018	\$ 622
Envelopes	2018	\$ 3,124
Copiers	2018	\$ 59,887
Chairs	2018	\$ 93,254
Bookcases	2018	\$ 31,999
Binders	2018	\$ 75,132
Art	2018	\$ 7,321
Appliances	2018	\$ 39,524
Accessories	2018	\$ 52,354

Sub-Category	Product Name	Order Date	Sales
Storage	Adjustable Depth Letter/Legal Cart	11/9/2018	\$ 1,633.14
Storage	Tennsco Single-Tier Lockers	8/15/2018	\$ 1,801.63
Storage	Tennsco 16-Compartment Lockers with Coat Rack	4/8/2018	\$ 2,591.56
Phones	Polycom CX600 IP Phone VoIP phone	4/9/2018	\$ 2,399.60
Phones	ClearOne CHATAttach 160 - speaker phone	7/15/2018	\$ 2,479.96
Phones	Samsung Galaxy Mega 6.3	3/17/2018	\$ 2,939.93

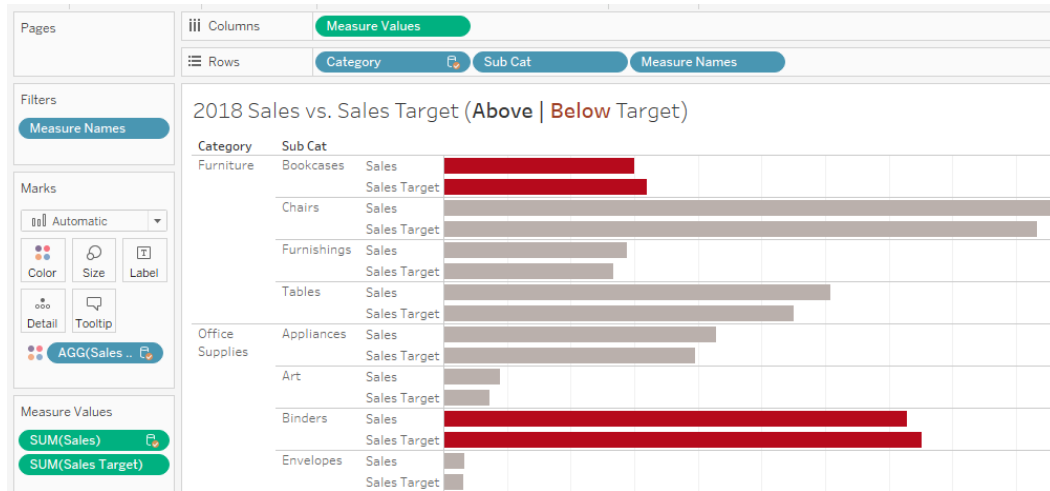
If we perform a join on the SubCat and Sub-Category fields, we will see duplicate values (the same Sales Target value for each transaction):

Sub-Category	Product Name	Order Date	Sales	Order Date Year	Sales Target
Storage	Adjustable Depth Letter/Legal Cart	11/9/2018	\$ 1,633.14	2018	\$ 79,952
Storage	Tennsco Single-Tier Lockers	8/15/2018	\$ 1,801.63	2018	\$ 79,952
Storage	Tennsco 16-Compartment Lockers with Coat R	4/8/2018	\$ 2,591.56	2018	\$ 79,952
Phones	Polycom CX600 IP Phone VoIP phone	4/9/2018	\$ 2,399.60	2018	\$ 91,032
Phones	ClearOne CHATAttach 160 - speaker phone	7/15/2018	\$ 2,479.96	2018	\$ 91,032
Phones	Samsung Galaxy Mega 6.3	3/17/2018	\$ 2,939.93	2018	\$ 91,032

To bring both the Sales Target and Transaction files to the same level of detail (total amounts by Sub-Category), we use blending. We want to see quickly which Sub-Categories had actual sales that surpassed or fell short of target sales.

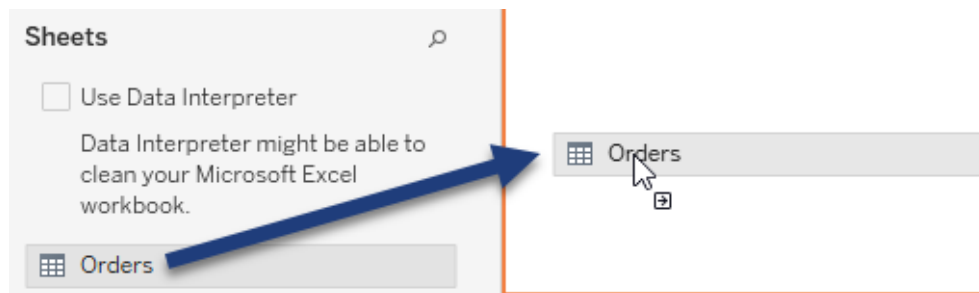
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The finished visualization looks as follows:

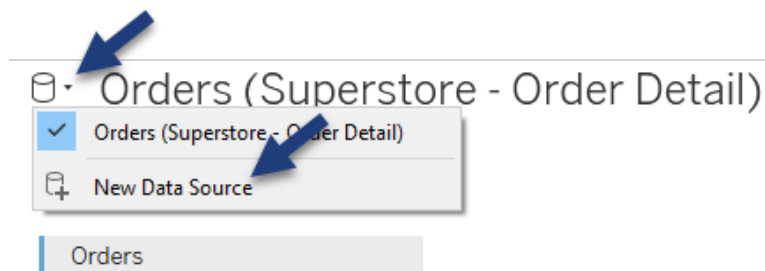


Exercise: Creating a Blend

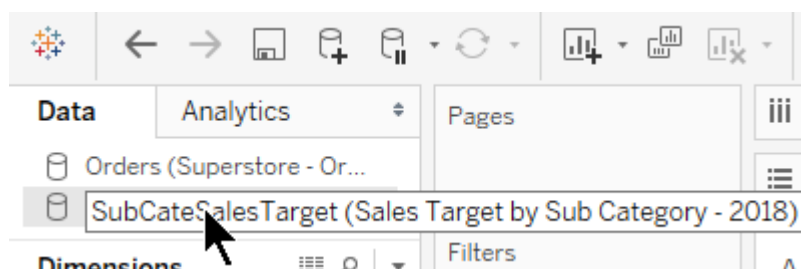
1. Create a new workbook and connect to the **Superstore - Order Detail - 2018.xlsx** file.
2. Add the Orders worksheet to the canvas:



3. Click **Change Data Source**  and click **New Data Source**:



4. Click **Microsoft Excel**, navigate to the **Sales Target by Sub Category - 2018.xlsx** location and double-click the file.
5. At the bottom of the Tableau Desktop screen, click **Sheet 1**.
6. Double-click the new worksheet tab and type "Actual vs Target Sales" to rename it.
7. At the top of the Data pane, click the **SubCateSalesTarget (Sales Target by Sub Category - 2018)** data source:

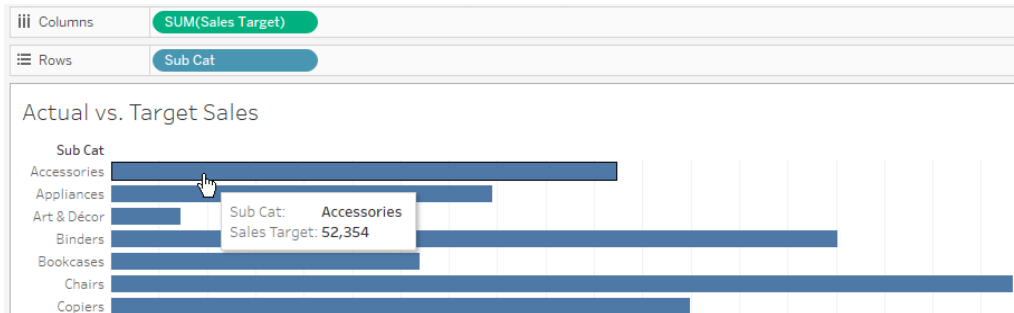


8. From Dimensions, double-click on **Sub Cat**.

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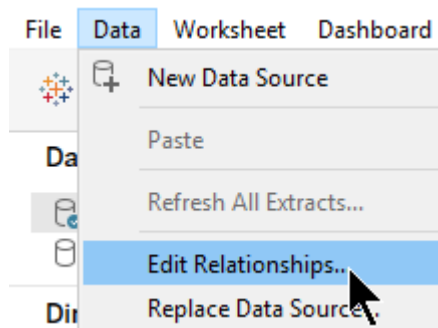
9. From Measures, drag **Sales Target** to the Columns shelf.

The viz currently shows the sales target amounts for 2018, by Sub-Category.



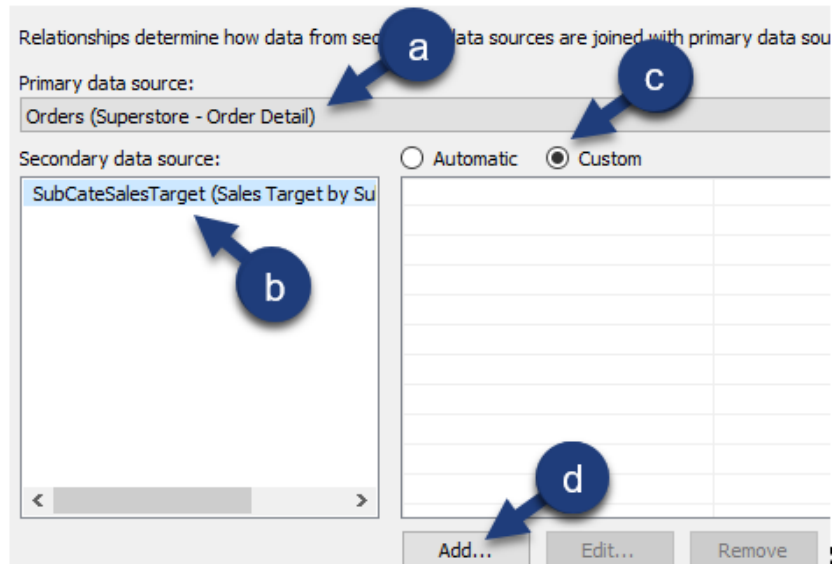
Next, we add the actual sales information for each Sub-Category, as well as category information.

10. In the Menu bar, click **Data** and then click **Edit Relationships**:



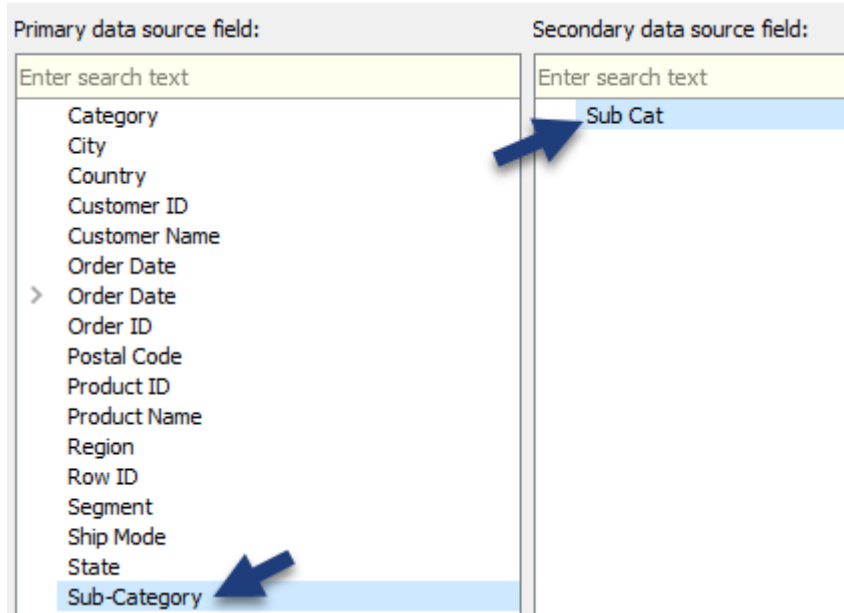
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11. In the Relationships dialog box, do the following:
- Ensure that the Primary data source is **Orders (Superstore – Order Detail)**
 - Ensure that the Secondary data source is **SubCateSalesTarget (Sales Target by Sub Category – 2018)**
 - Click the **Custom** radio button
 - Click the **Add** button:

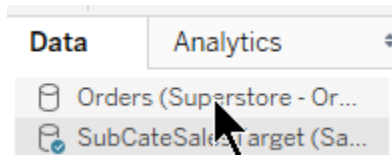


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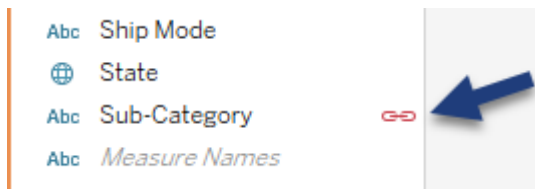
12. In the Add/Edit Field Mapping dialog box, do the following:
 - a. Under Primary data source field, click **Sub-Category**
 - b. Under Secondary data source field, click **Sub Cat**
 - c. Click OK twice (not shown):



13. In the Data pane, click the **Orders (Superstore – Order Detail)** data source:



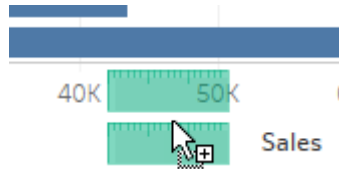
Under Dimensions, notice the red link icon (indicates that the two data sources are connected on the indicated field):



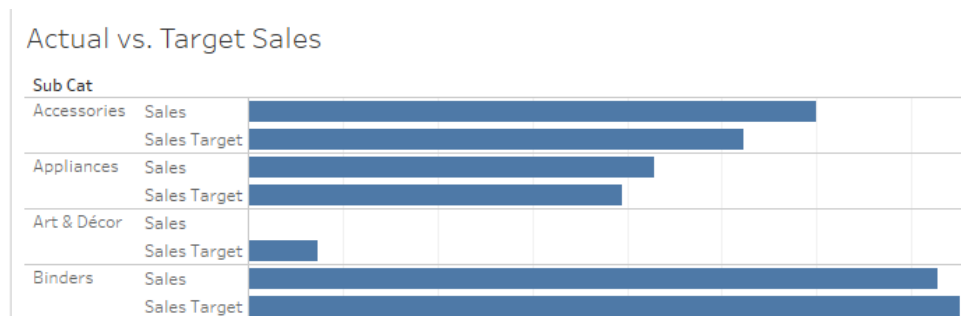
If a broken link icon  appears, click on it to enable the link.

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14. With the **Orders (Superstore – Order Detail)** data source still selected, from Measures drag **Sales** to the Sales Target axis, creating a combined axis viz:

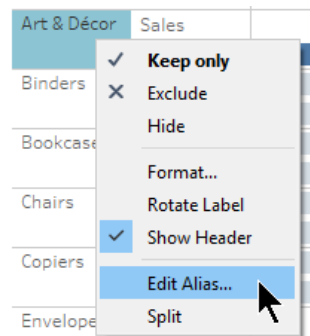


Recall that the Sales Target by Sub Category – 2018 file contains one record per Sub-Category. The Superstore – Order Detail file contains a record for the 3,300+ transactions made in 2018. Blending summed Sales to both the Sub-Category and Sub Cat level, giving us one number from each data source to compare:



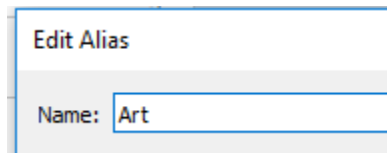
We have a “null” problem to fix, as indicated by the **2 nulls** icon in the lower-right corner of the viz. We have another glimpse of the problem by the missing Sales values for two Sub-Categories. The reason: The Sub-Category names do not match in two instances.

15. Right-click on the **Art & Décor** row header and click **Edit Alias**:



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16. In the Edit Alias window, change the name to “Art”. Click **OK**:



Actual Sales values appear!

Art	Sales		
	Sales Target		
Binders	Sales		
	Sales Target		

Sub Cat: Art
Sales: 8,863

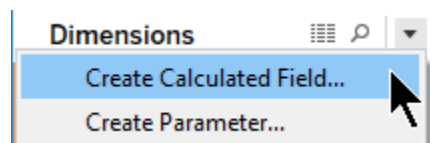
17. Right-click on the **Machine** row header and click **Edit Alias**.

18. Change the alias to “Machines” and click **OK**.

19. From Dimensions, drag **Category** to the Rows shelf, in front of all other pills.

While we now have an informative viz in which we can compare actual vs. target Sales amounts, we can improve it by distinguishing the marks for Sub-Categories with actual Sales that did not meet Target Sales. For this, we'll use a Boolean expression to test whether sales beat the target and apply the field to color.

20. In the Data pane, next to the Dimensions header, click the **dropdown arrow** and click **Create Calculated Field**:



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21. In the expression window, do the following:
 - a. Name the field “Sales beat Target?”
 - b. In the expression builder area, type the SUM function
 - c. Type “sa” in the parentheses
 - d. Click the Sales item in the dropdown list:



22. Still in the expression window, in the expression builder area, do the following:
 - a. Type a “>” after the SUM([Sales]) text
 - b. Start typing “sa” after the > symbol
 - c. Click on the **Sales Target** field in the list of suggested items
 - d. Click **OK** (not shown):

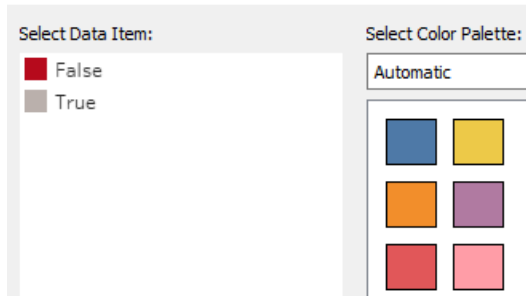


23. From Measures, drag **Sales beat Target?** to the **Color** button on the Marks card.
24. On the Marks card, click on the **Color** button and then click **Edit Colors**.

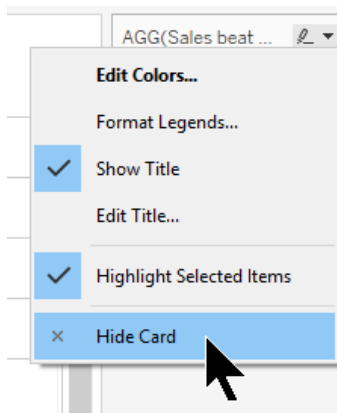
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25. In the Edit Colors window, select a grey color for the True data items and a deep red color for the False data items. Click OK:

Edit Colors [Sales beat Target?]



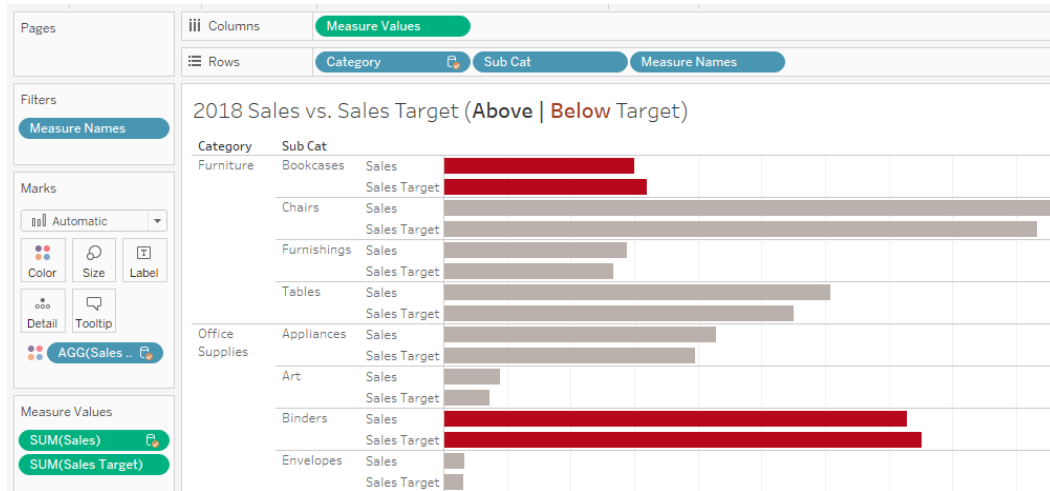
26. Edit the viz title to something informative, adding color coding to replace the need for a color legend.
27. Remove the AGG(Sales beat Target?) legend:



28. Save the workbook in the .twbx format with the name "Blending".

Chapter 1 – Using Multiple Data Sources

The finished, blended visualization looks like this:



Chapter 1 – Using Multiple Data Sources

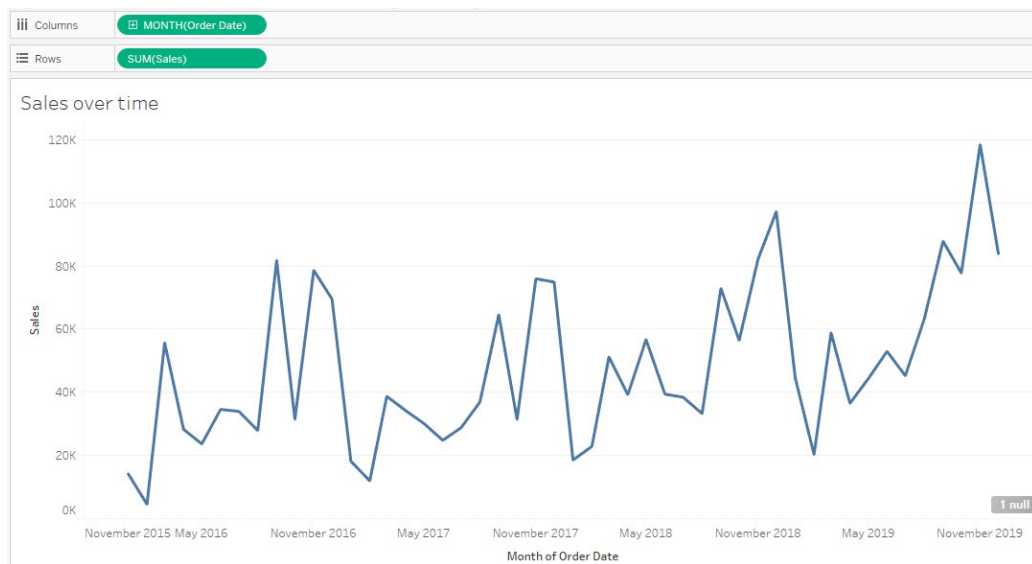
Unions

Where joins add columns to tables, unions add rows to an existing table.

Unions are common when an additional period of transactions is added to another period of transactions, where both tables contain the same fields.

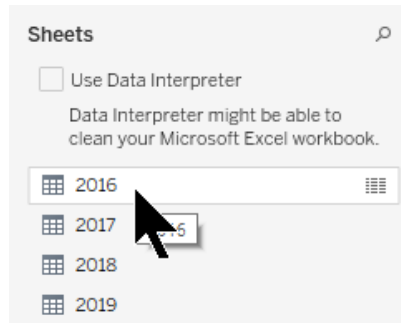
In the following exercise, we are asked to create a single Order table out of four separate Order tables (one for each year of transactions). We also create a visualization that displays the total sales made over the four-year period, by month.

The finished visualization looks as follows:



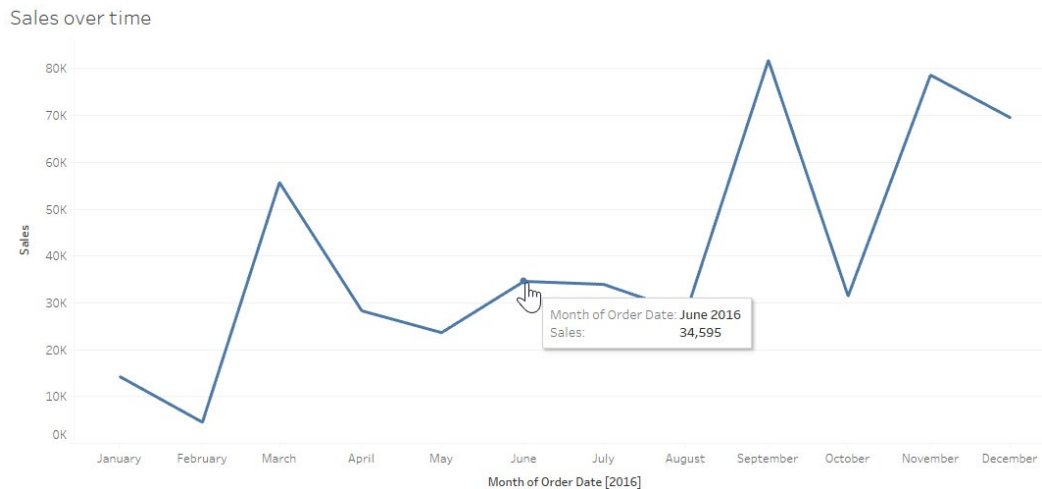
Exercise: Creating a Union

1. Open a new Tableau workbook and connect to the **Sample – Superstore - Union.xls** file.
2. Under Sheets, double-click the **2016** sheet to add it to the data source canvas:

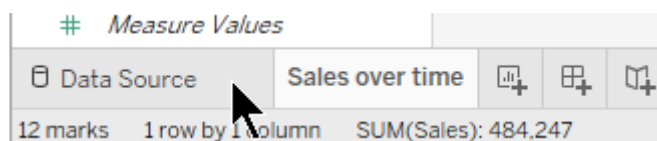


3. Click **Sheet 1** and rename it “Sales over time”.
4. From Dimensions, drag **Order Date** to the Columns shelf.
5. From Measures, drag **Sales** to the Rows shelf.
6. On the Columns shelf right-click the **YEAR(Order Date)** pill and click the continuous **Month** option.

Notice that only one year of Sales data is shown:

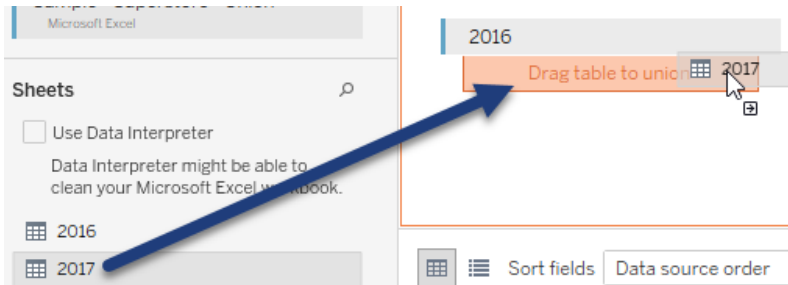


7. Click on the **Data Source** tab:

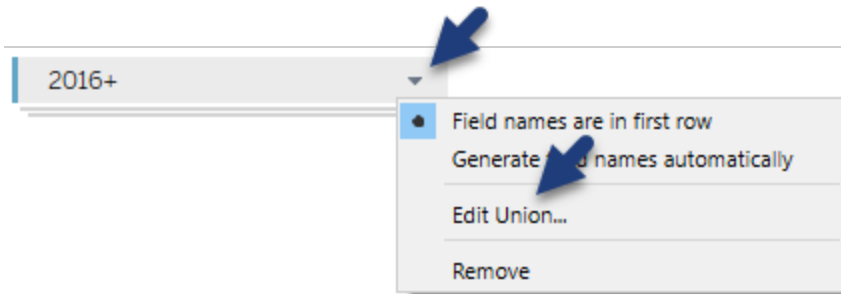


Chapter 1 – Using Multiple Data Sources

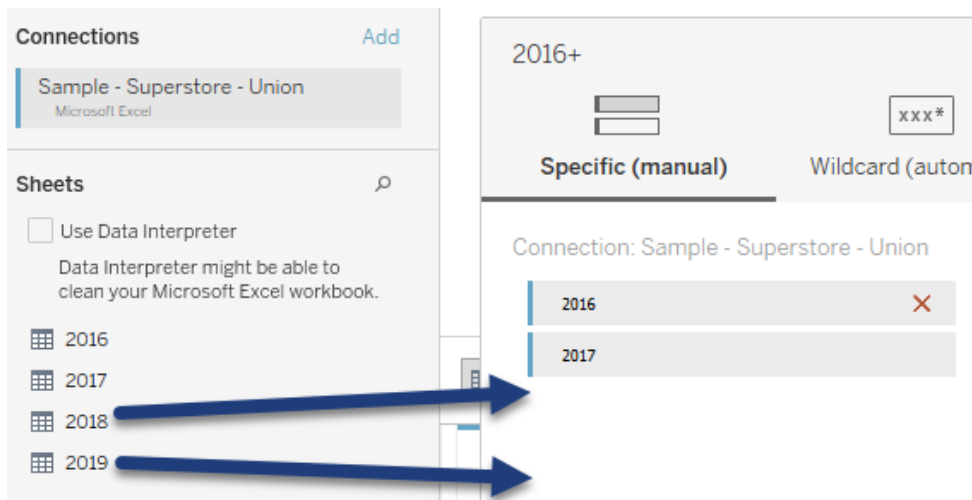
8. Drag the **2017** sheet into the canvas and drop it underneath the 2016 table – look for the **Drag table to union** text – and release the mouse button:



9. Hover over the **2016+** table in the canvas, click on the arrow and click **Edit Union**:



10. Drag the **2018** and **2019** sheets into the 2013+ window, then click OK:



Chapter 1 – Using Multiple Data Sources

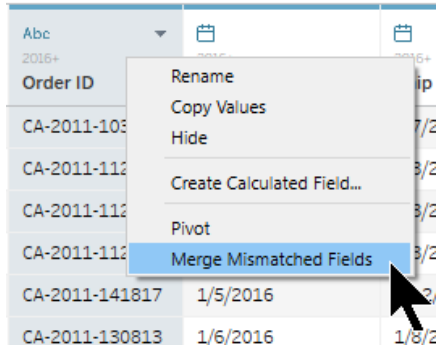
Scroll to the right of the preview pane and notice the fields with null values:

Abc 2016+ Order Num	Abc 2016+ Customer Num
<i>null</i>	<i>null</i>
<i>null</i>	<i>null</i>
<i>null</i>	<i>null</i>
<i>null</i>	<i>null</i>

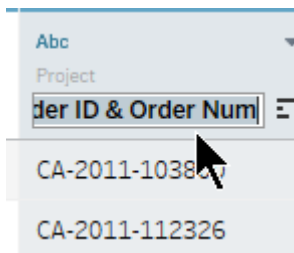
Chapter 1 – Using Multiple Data Sources

The Order ID field in the 2016-2018 sheets was renamed to Order Num in the 2019 sheet. Similarly, the Customer ID field in previous years was renamed to Customer Num in the 2019 sheet. Let's merge these mismatched fields and adjust the new column name appropriately.

11. Ctrl-click on the **Order ID** and **Order Num** field headers.
12. Right-click on one of the highlighted columns and click **Merge Mismatched Fields**:



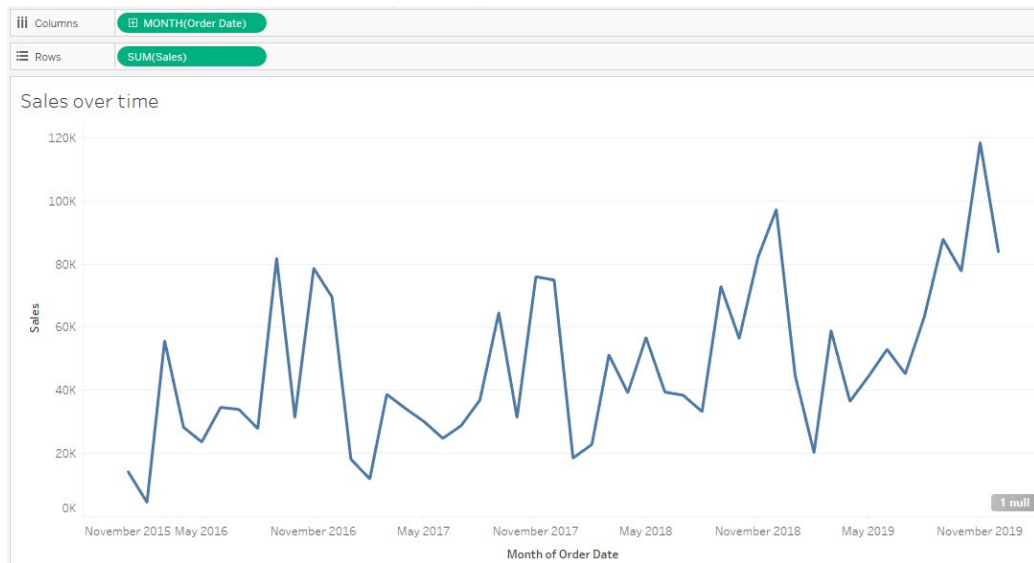
13. Double-click on the Order ID & Order Num column header and rename it to "Order Num":



14. Repeat the above steps to merge the **Customer ID** and **Customer Num** fields.
15. Rename the field "Customer Num".
16. In the Toolbar click **Save**.
17. Save the file as a .twbx with the name "Union".

Chapter 1 – Using Multiple Data Sources

The finished visualization looks as follows:



Chapter 2 – Advanced Table Calculations

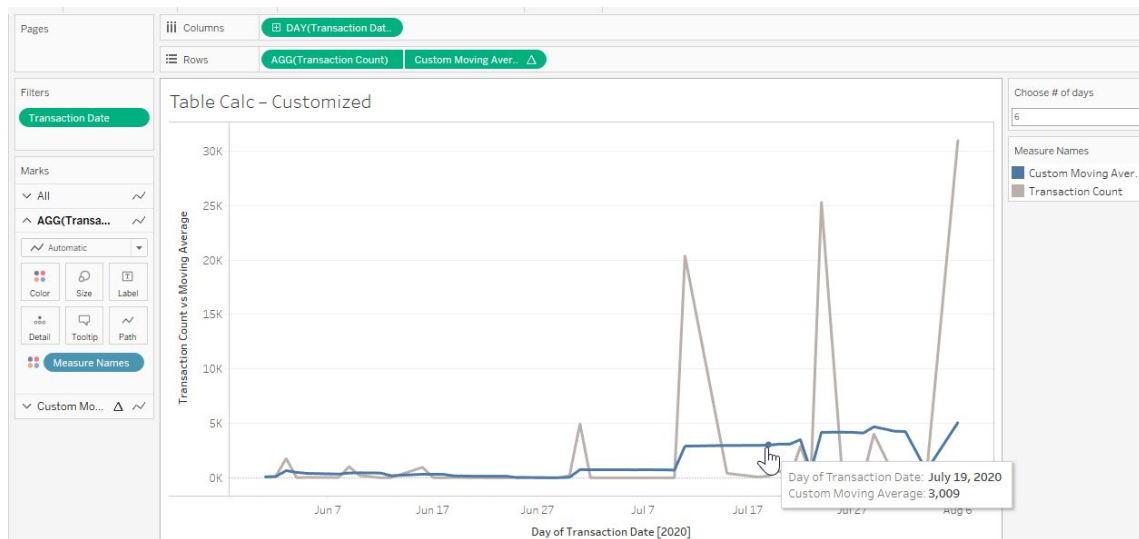
Customized Table Calculations

Creating a table calculation using either a Quick Table Calculation or Add Table Calculation are great places to start. If we want to save that exact table calculation and/or further customize it, we drag it to the Data pane. In the next exercise, we apply a moving average table calculation and bring a copy of that pill to the data pane to refine it.

We are interested in seeing total **Transaction Count** over time. We also want to see the moving average of Transaction Count in the same visualization to better identify seasonal trends.

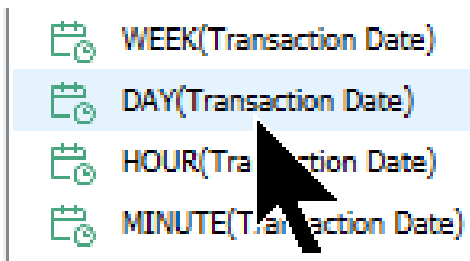
Finally, we customize the moving average table calculation so that the report user can control the number of periods (days) via a parameter control.

The finished visualization looks as follows:



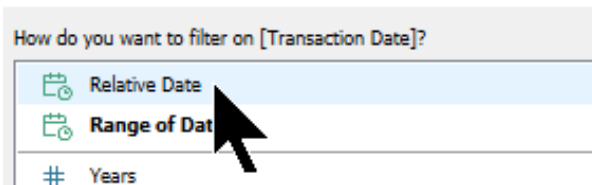
Exercise: Using Customized Table Calculations

1. Open the **UCSD - FINAH 3 Advanced - Starter.twb** workbook.
2. Save it as a .twb with the name “UCSD - FINAH Advanced”.
3. Create a new worksheet and name it “Table Calc – Customized”.
4. From Dimensions, right-click and drag **Transaction Date** to the **Columns** shelf.
5. In the Drop Field window, click on the continuous **DAY(Transaction Date)** option towards the bottom of the window:

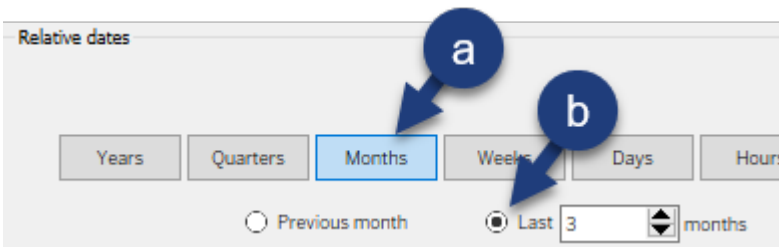


6. From Measures, drag **Transaction Count** to the **Rows** shelf.
7. From the Columns shelf, Ctrl-drag the **DAY(Transaction Date)** pill to the **Filters** card.
8. Towards the top of the Filter Field window, click **Relative Date** and click **Next**:

Filter Field [Transaction Da...



9. In the Filter window, do the following:
 - a. Click the **Months** button.
 - b. Click the **Last** radio button.
 - c. Click OK:

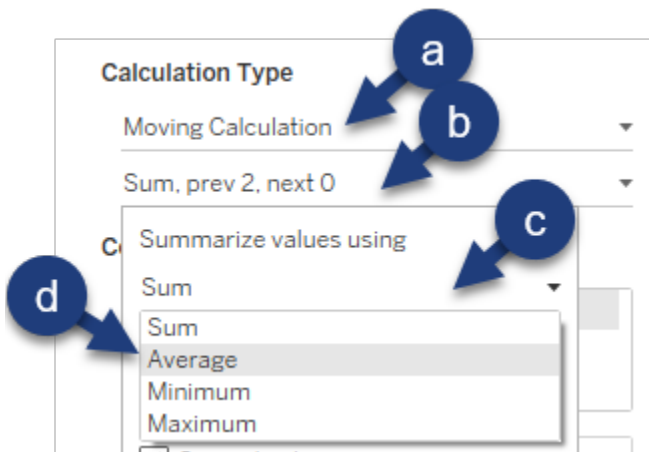


Chapter 2 – Advanced Table Calculations

10. On the Rows shelf, Ctrl-drag the **AGG(Transaction Count)** pill to the right of itself (creates a second chart):

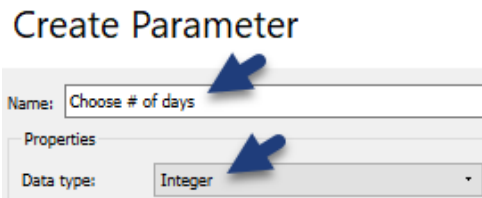


11. Right-click on the second **AGG(Transaction Count)** pill on the Rows shelf and click **Add Table Calculation**.
12. In the Table Calculation window, do the following:
 - a. Change the Calculation Type to **Moving Calculation**
 - b. Click the **Sum, prev 2, next 0** field under Moving Calculation.
 - c. Click the **Sum** option.
 - d. In the dropdown list, click **Average**
 - e. Close the window:



We now create a parameter before adding our table calculation pill to the data pane. We then edit the new field so that it is controlled by the parameter.

13. Create a parameter as follows, and click OK:

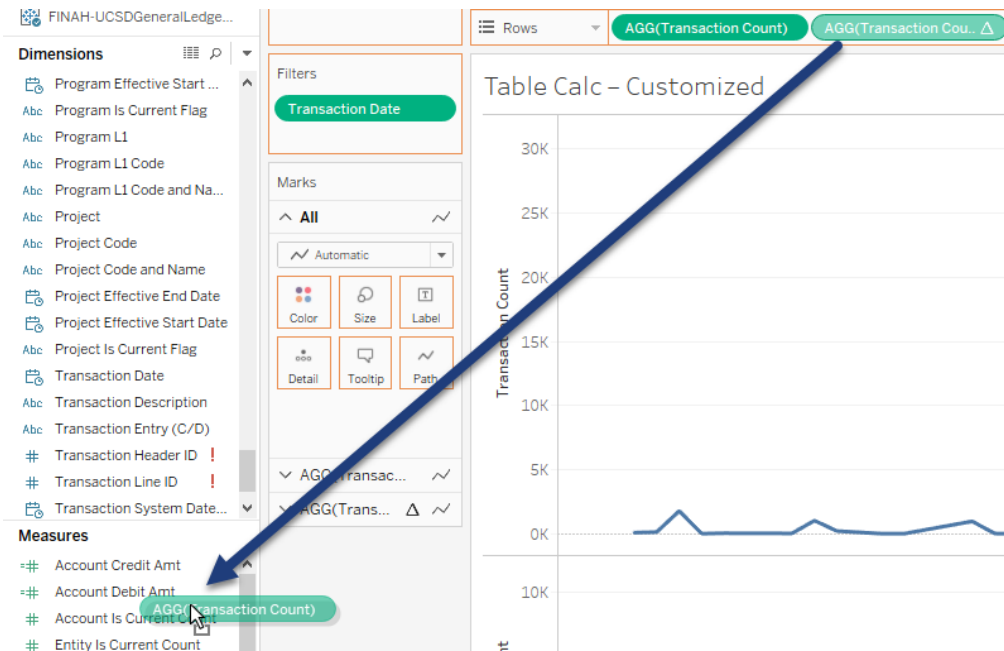


14. In the Data pane, under Parameters, right-click the **Choose # of days** parameter and click **Show Parameter Control**.

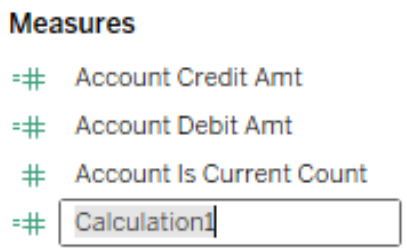
Chapter 2 – Advanced Table Calculations

Next, we customize the AGG(Transaction Count) moving average table calculation, controlling it with our parameter.

15. From rows, Ctrl-drag the **AGG(Transaction Count)** moving average table calculation pill to the Measures section in the data pane:



16. Under Measures, rename the new **Calculation1** field “Custom Moving Average”:

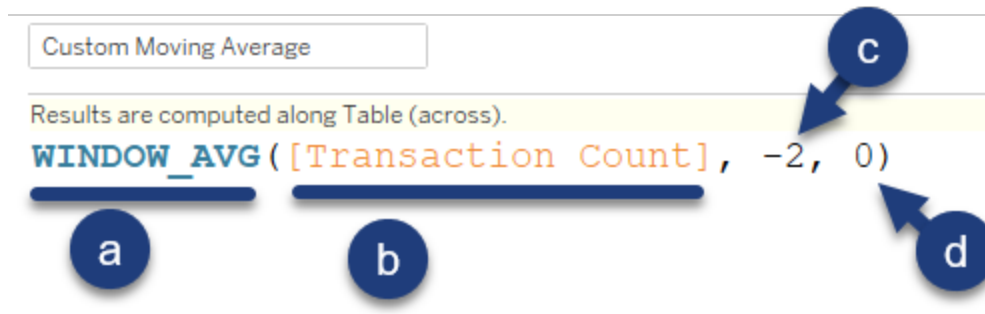


17. Under Measures, right-click and edit **Custom Moving Average**.

Chapter 2 – Advanced Table Calculations

In this case, we converted an aggregated measure pill with a table calculation applied to it, to a calculated field. The components of this calculated field are as follows:

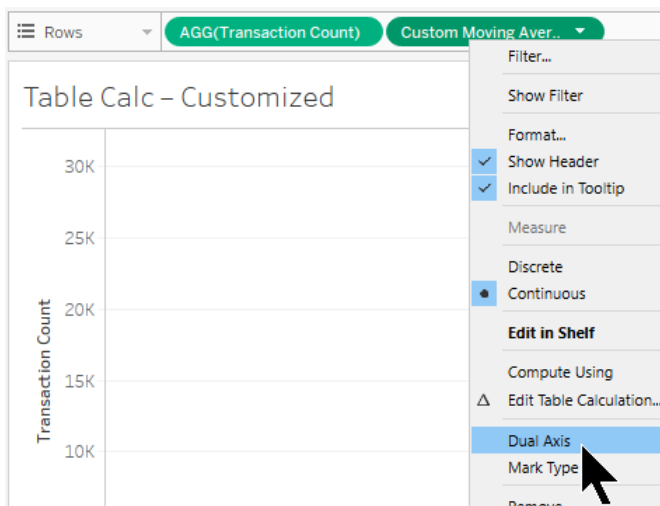
- WINDOW_AVG**: Returns the average of the expression in the window, including place holders for the start and end.
- Transaction Count**: the aggregated measure we are applying a WINDOW_AVG against.
- 2**: Our starting point in the window. Recall from the initial table calculation window, we accepted the default 2 previous values.
- 0**: Our ending point in the window. Recall from the initial table calculation window, we accepted the default 0 next values.



18. In the Custom Moving Average expression editor, replace the **2** with the **Choose # of days** parameter. Click OK:

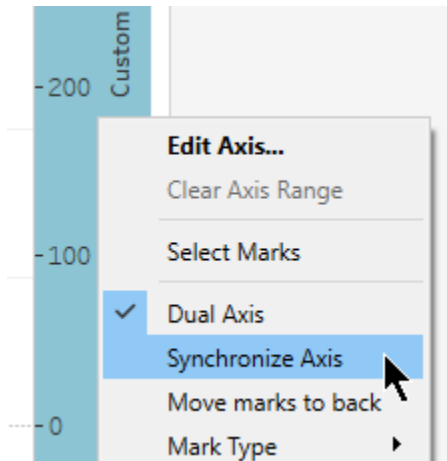
Results are computed along Table (across).
`WINDOW_AVG([Transaction Count], -[Choose # of days], 0)`

19. On the Rows shelf, right-click the **Custom Moving Average** pill and click **Dual Axis**:

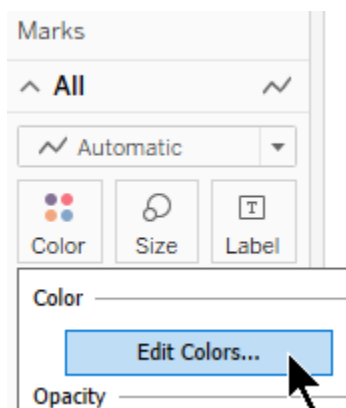


Chapter 2 – Advanced Table Calculations

20. In the view, right-click the **Custom Moving Average** axis and click **Synchronize Axis**:



21. On the **All** marks card, click on the **Color** button and on **Edit Colors**:

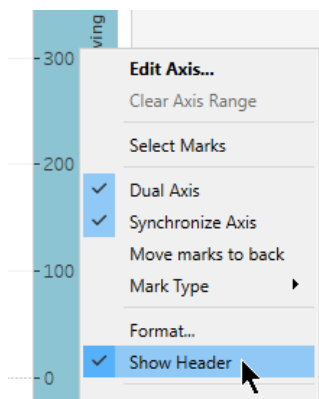


22. In the Edit Colors window, click on the **Transaction Count** data item, then click on the gray color. Click OK:

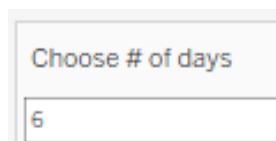
Chapter 2 – Advanced Table Calculations



23. In the view, right-click the right-side **Custom Moving Average** axis and click **Show Header** to hide the axis:



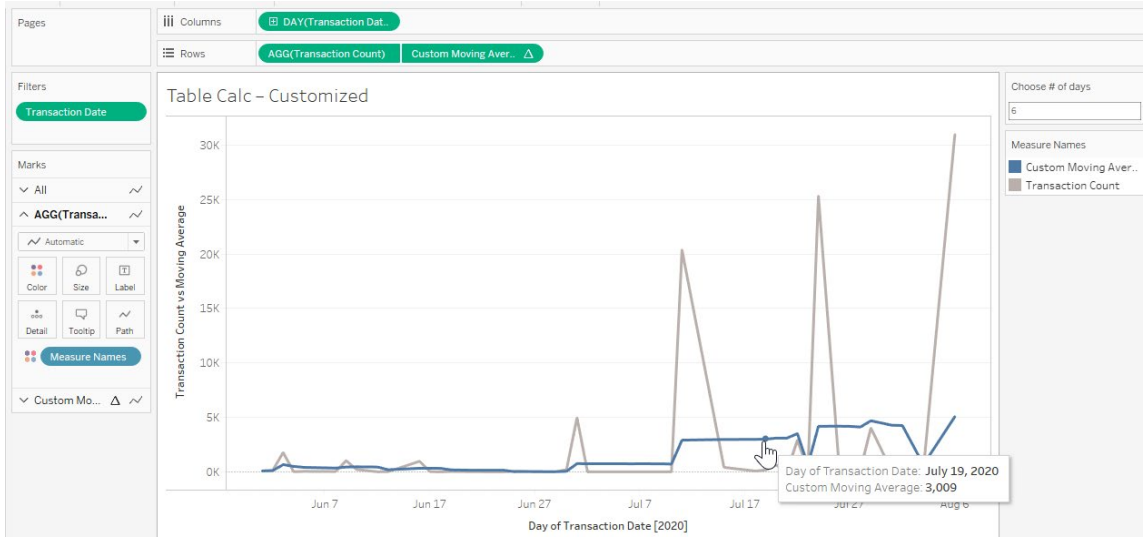
24. In the view, right-click the left-side **Transaction Count** axis and click **Edit Axis**.
25. Replace the title of the axis with “Transaction Count vs Moving Average”. Close the Edit Axis window.
26. In the **Choose # of days** parameter control, replace the text with “6” and hit **Enter** on your keyboard:



27. Save the workbook.

Chapter 2 – Advanced Table Calculations

The finished visualization looks as follows:



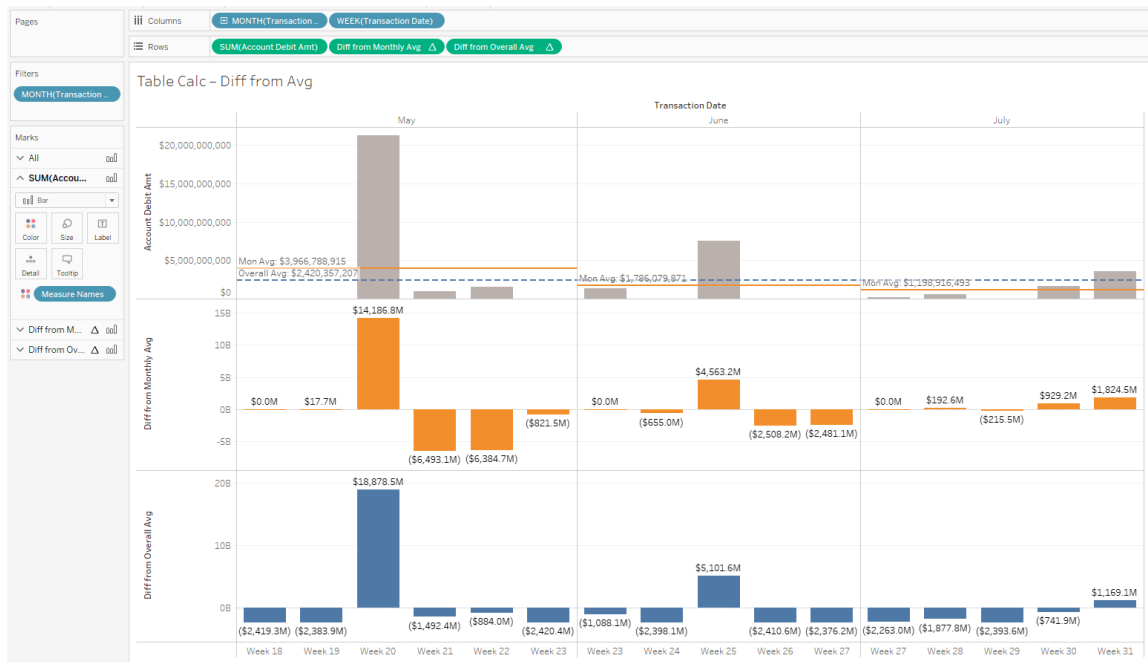
Chapter 2 – Advanced Table Calculations

Difference from Average

In this exercise we build a visualization composed of three bar charts that display:

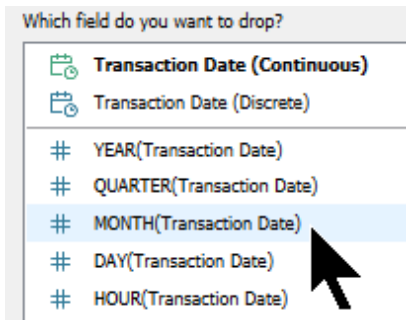
- Account Debit Amount by week, by month.
- The weekly Account Debit Amount difference from monthly average.
- The weekly Account Debit Amount difference from the average over all time (three months in this case).
- Reference lines for the average total Account Debit Amount each month and the average overall weekly Account Debit Amount.

The finished visualization looks as follows:

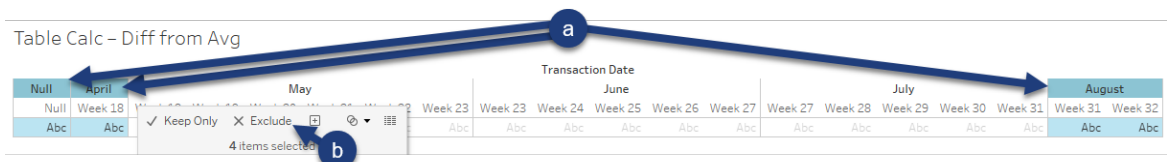


Exercise: Understanding Difference from Average

1. Continue in the **UCSD – FINAH Advanced** workbook.
2. Create a new worksheet and name it “Table Calc – Diff from Avg”.
3. From Dimensions, right-click-drag **Transaction Date** to the **Columns** shelf.
4. In the Drop Field window, click the discrete **MONTH(Transaction Date)** option and click OK:



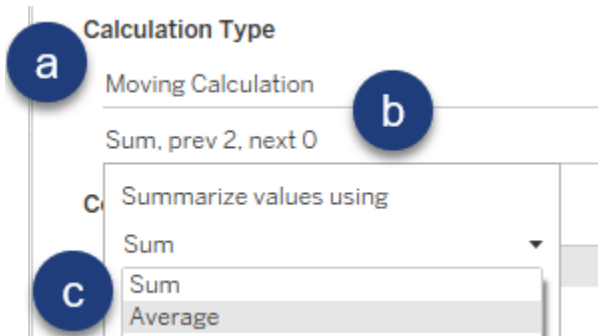
5. From Dimensions, right-click-drag **Transaction Date** to the **Columns** shelf, to the right of the MONTH(Transaction Date) pill.
6. In the Drop Field window, click the discrete **WEEK(Transaction Date)** option and click OK:
7. In the view, do the following:
 - a. Ctrl-click on the **Null**, **April**, and **August** headers.
 - b. Hover over one of the highlighted marks and click **Exclude**:



8. From Measures, drag **Account Debit Amount** to the **Rows** shelf.
9. Change the mark type to **Bar**.
10. On the Rows shelf, Ctrl-drag the **SUM(Account Debit Amt)** pill to the right of itself.
11. On the Rows shelf, right-click on the second **SUM(Account Debit Amt)** pill and click **Add Table Calculation**.

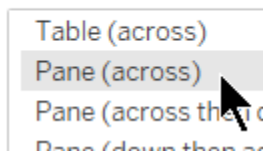
Chapter 2 – Advanced Table Calculations

12. In the Table Calculation window, do the following:
- Change Calculation Type to **Moving Calculation**
 - Click the **Sum, prev 2, next 0** field.
 - Change Summarize values using to **Average**:



13. **Still** in the Table Calculation window, click **Pane (across)** and close the window:

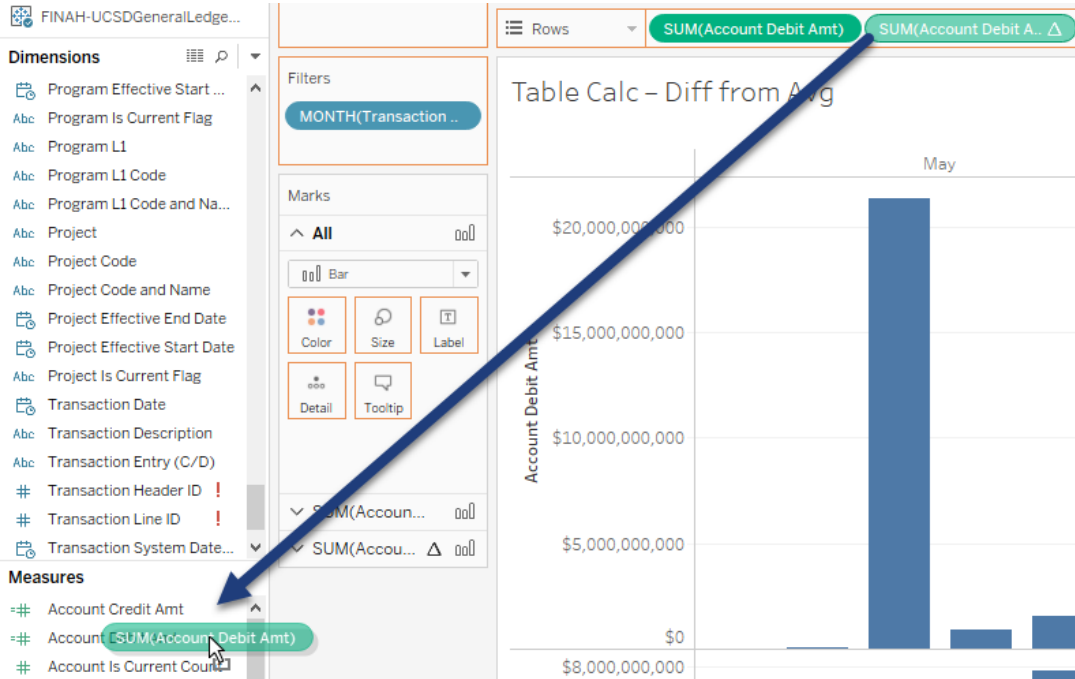
Compute Using



Chapter 2 – Advanced Table Calculations

Now, let's customize the new table calculation.

- From the Rows shelf, Ctrl-drag the second **SUM(Account Debit Amt)** pill into Measures area of the data pane (creating a new calculated field):



- Rename the new calculation under Measures to “Diff from Monthly Avg”.
- Edit the **Diff from Monthly Avg** calculated field as follows:

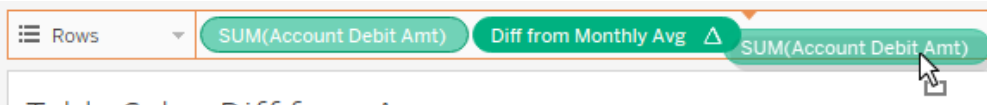
Diff from Monthly Avg

Results are computed along Pane (across).

```
SUM([Account Debit Amt]) -
WINDOW_AVG(SUM([Account Debit Amt]), FIRST(), LAST())
```

Next, we add a third set of bars, comparing the total Account Debit Amt in each week to the average Account Debit Amt each week, across all three years.

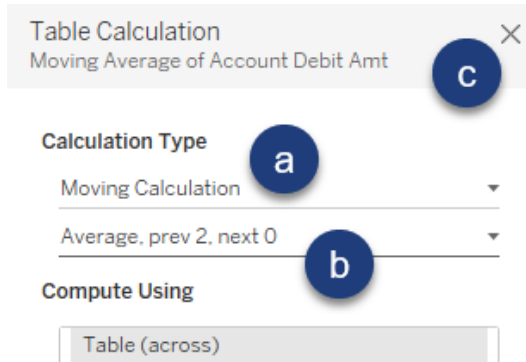
- On the Rows shelf, Ctrl-drag the first **SUM(Account Debit Amt)** pill to the right of the two pills on the Rows shelf:



- On the Rows shelf, right-click on the far right **SUM(Account Debit Amt)** pill and click **Add Table Calculation**.

Chapter 2 – Advanced Table Calculations

19. In the Table Calculation window, do the following:
 - a. Change Calculation Type to **Moving Calculation**
 - b. Change Summarize values using to **Average**
 - c. Close the window:



20. From the Rows shelf, Ctrl-drag the third pill, **SUM(Account Debit Amt)** into the Measures area of the data pane (creating a new calculated field).
21. Rename the new calculation under Measures to "Diff from Overall Avg".
22. **Edit** the **Diff from Overall Avg** calculated field as follows:

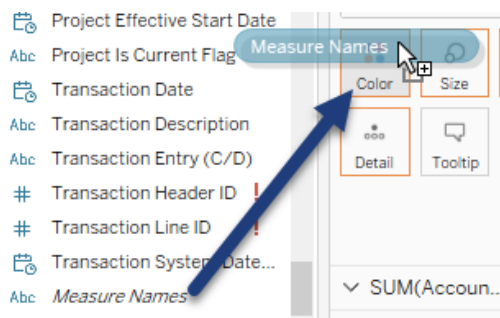
Diff from Overall Avg

Results are computed along Table (across).

```
SUM([Account Debit Amt]) -  
WINDOW_AVG(SUM([Account Debit Amt]))
```

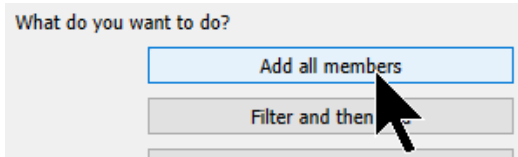
Finally, let's format the viz.

23. Expand the **All Marks** card and drag **Measure Names** from Dimensions to the **Color** button:



Chapter 2 – Advanced Table Calculations

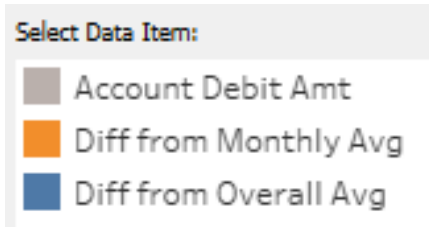
24. If you see a warning message, click **Add all members**:



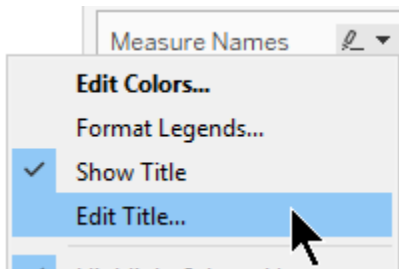
25. On the All Marks card, click the **Color** button and then click on **Edit Colors**.

26. In the Edit Colors window, do the following:

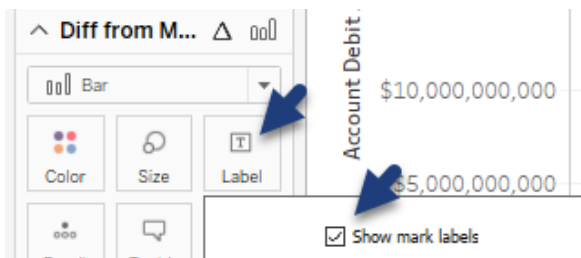
- Change **Account Debit Amt** to **gray**.
- Change **Diff from Monthly Avg** to **orange**.
- Change **Diff from Overall Avg** to **blue**.
- Click OK:



27. Edit the Measure names card title, changing it “Color legend”:

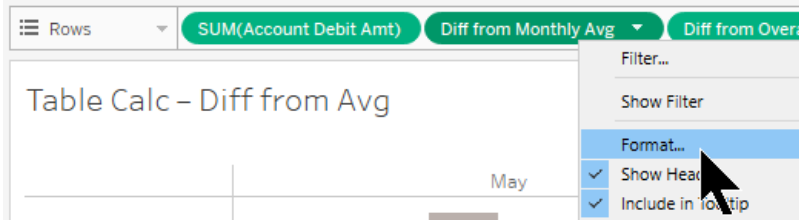


28. Expand the **Diff from Monthly Avg** Marks card and **Show mark labels**:

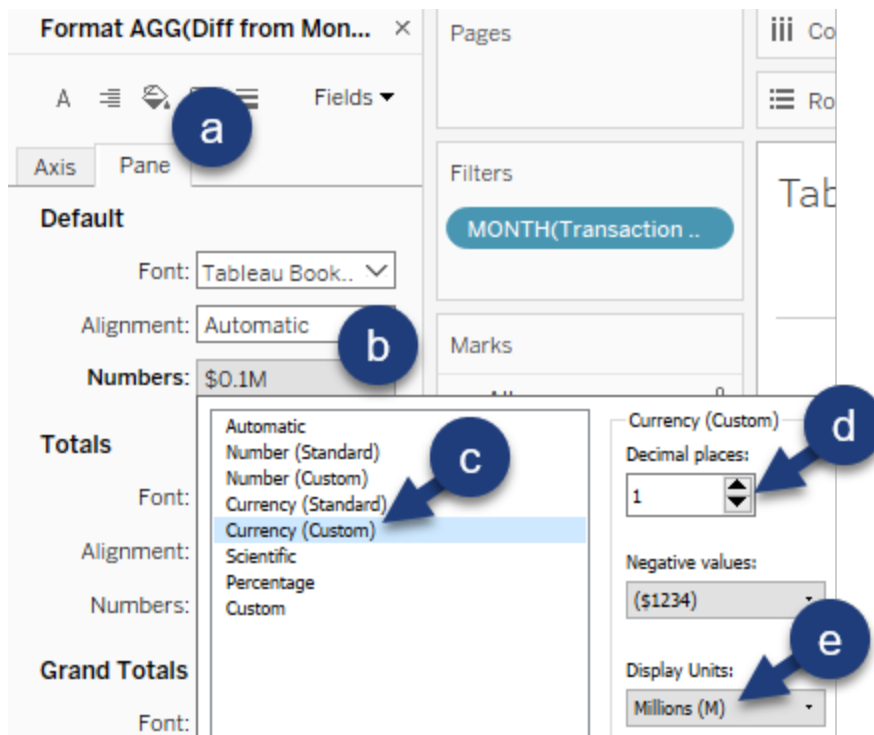


Chapter 2 – Advanced Table Calculations

29. On the Rows shelf, right-click the **Diff from Monthly Avg** pill and click **Format**:

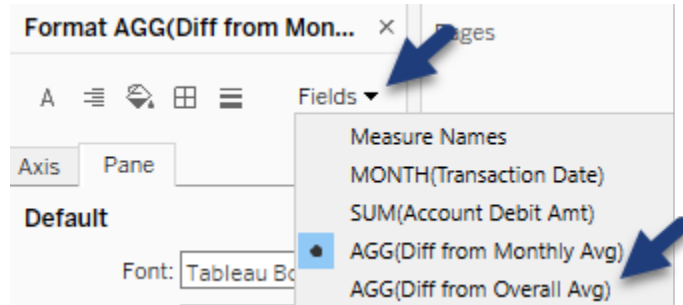


30. In the Format pane, do the following:
- Click on the **Pane** tab.
 - In the Default section, click on the **Numbers** field.
 - Click **Currency (Custom)**.
 - Drop the number of **Decimal places** to 1.
 - Change the **Display Units** to **Millions (M)**:

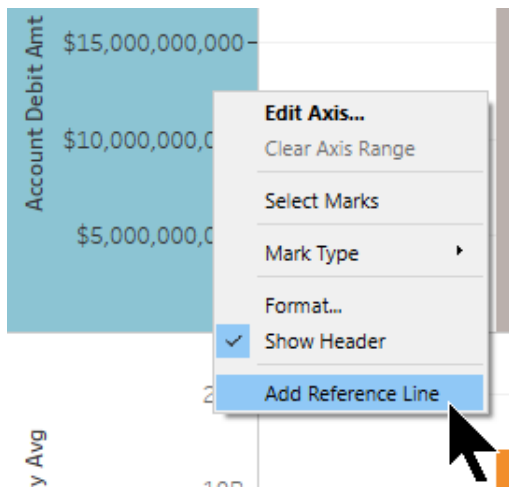


Chapter 2 – Advanced Table Calculations


31. Still in the Format pane, click the **Fields** dropdown arrow and click **AGG(Diff from Overall Avg)**:

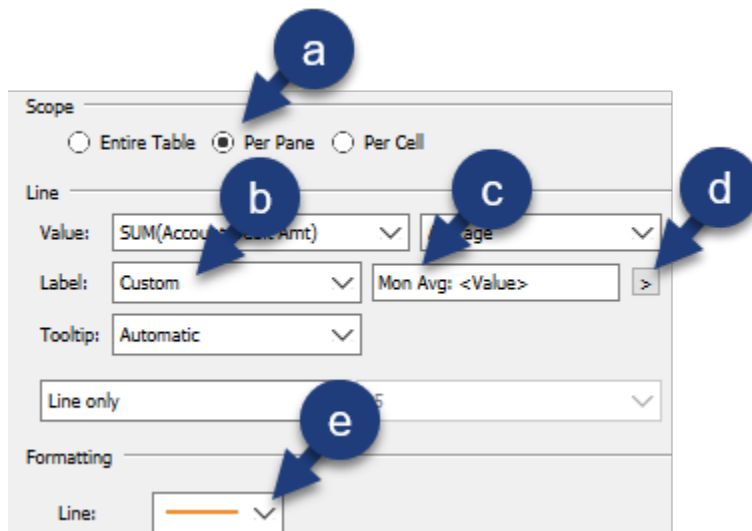


32. Change the default Numbers format as follows:
- Currency (Custom).**
 - 1** decimal place.
 - Millions (M)** as unit type.
33. Expand the **Diff from Overall Avg** Marks card and **Show mark labels**.
34. In the view, in the top bar chart, right-click on the axis and click **Add Reference Line**:




Chapter 2 – Advanced Table Calculations

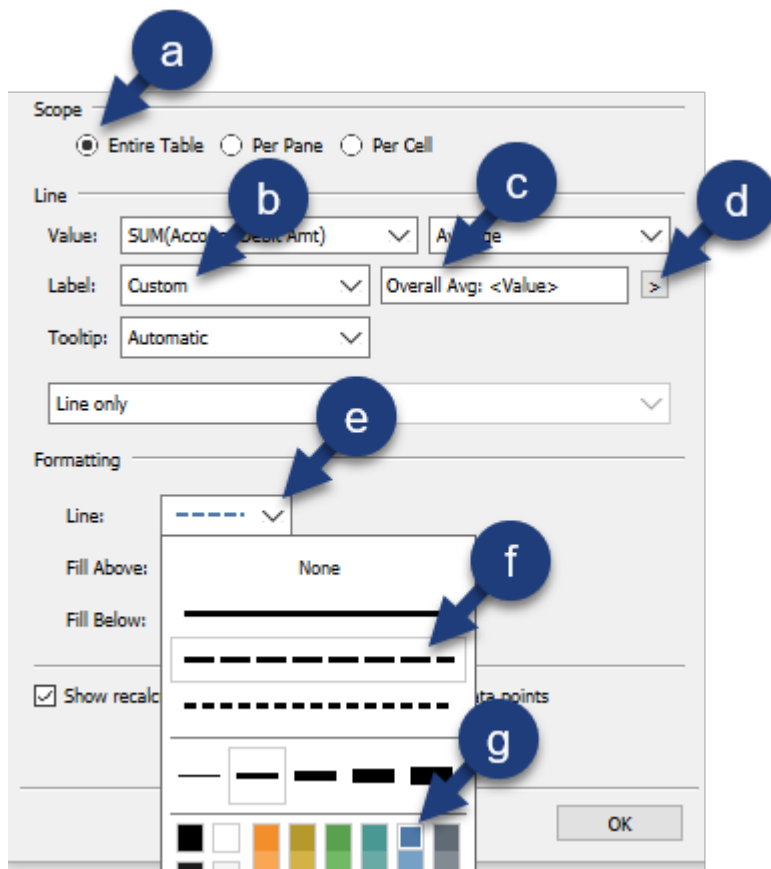
35. In the Add Reference Line window, do the following:
- Ensure scope is set to **Per Pane**
 - Change the Label to **Custom**
 - In the next label box, type “Month Avg: “
 - Click the  icon and click **Value** (not shown)
 - Change the line color to **orange** (tying our reference line the orange bars in the viz)
 - Click OK (not shown):



36. In the view, in the top bar chart, right-click on the axis and click **Add Reference Line**.

Chapter 2 – Advanced Table Calculations

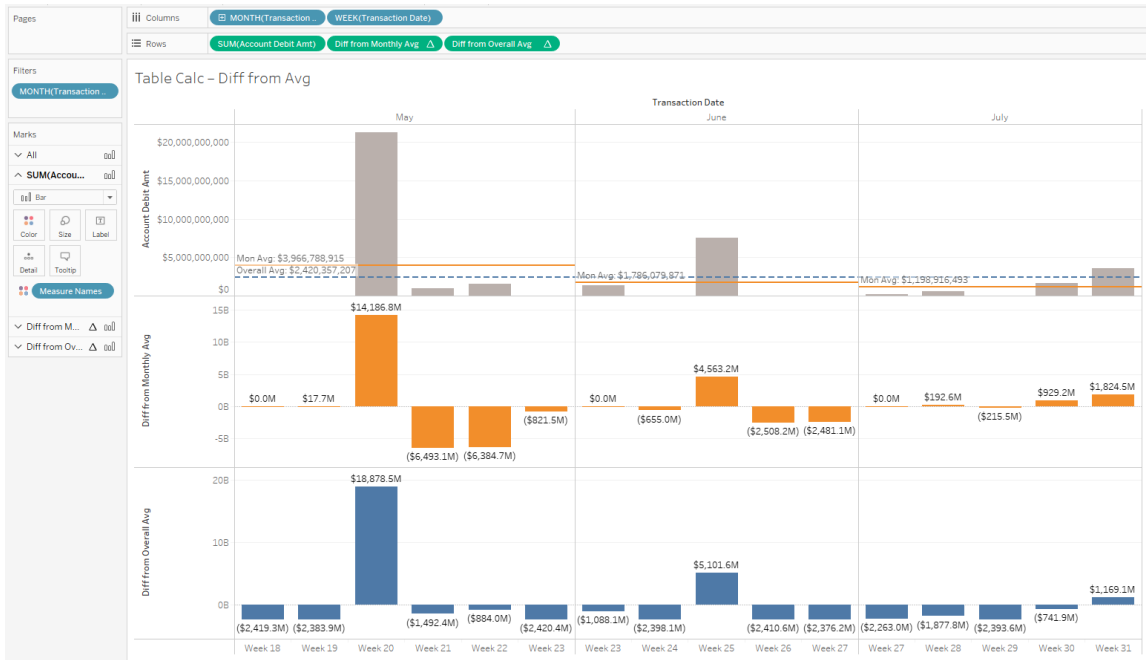
37. In the Add Reference Line window, do the following:
- Change the scope to **Entire Table**
 - Change the Label to **Custom**
 - In the next label box, type “Overall Avg: “
 - Click the  icon and click **Value**
 - Click the **Line** button in the Formatting section.
 - In the dropdown window, click the dashed line.
 - In the same dropdown window, click the deepest shade of blue.
 - Click OK (not shown):



38. Take a few minutes to apply an attractive format to the following numbers:
- Axes.
 - Reference lines.
39. Close the format pane.
40. In the Toolbar, click the **Fit** dropdown and click **Entire View**.
41. Save the workbook.

Chapter 2 – Advanced Table Calculations

The finished viz looks as follows:



Chapter 3 – Additional Functionality

Additional Functionality:

- Slope Chart
- Set Actions

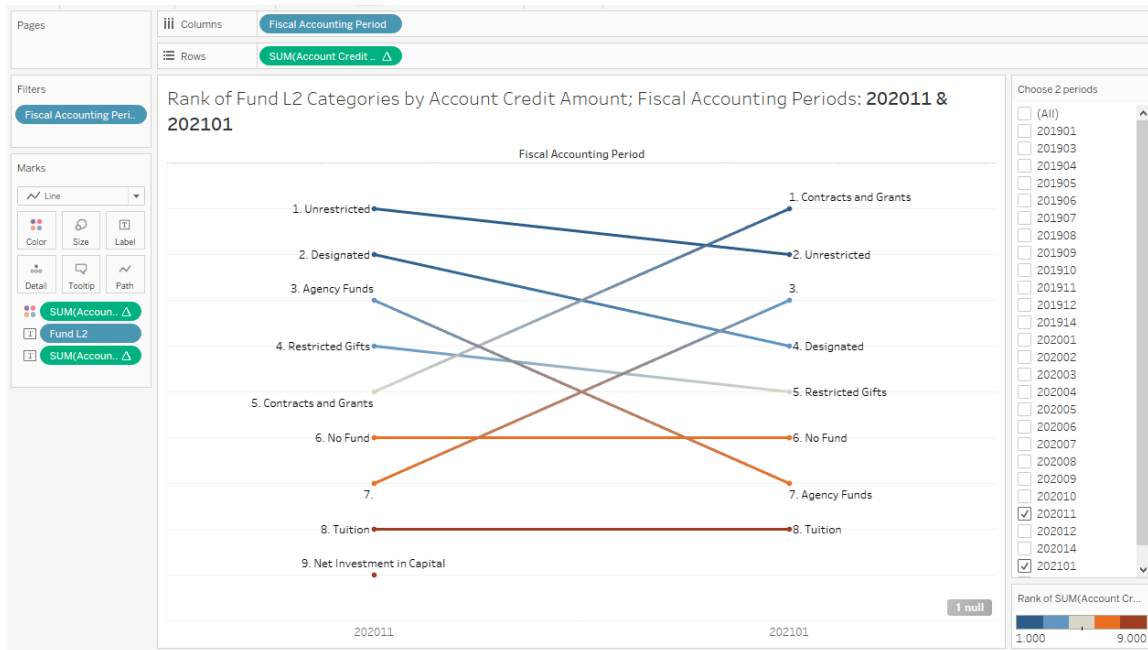
Slope Chart

Slope charts help us quickly identify changes in rank of dimension members between the two points in time. The amount of the increase or decrease in rank is indicated by the slope of the line connecting the start and end points.

In the next exercise, we create a slope chart to identify how the **Fund L2** categories rank against each other (by Account Credit Amt), one year vs another year. The slope of the line connecting the Rank of each Fund L2 category in the two years determines the degree of change.

We add a year quick filter allowing the user to compare any two years in the dataset.

The finished visualization looks as follows:

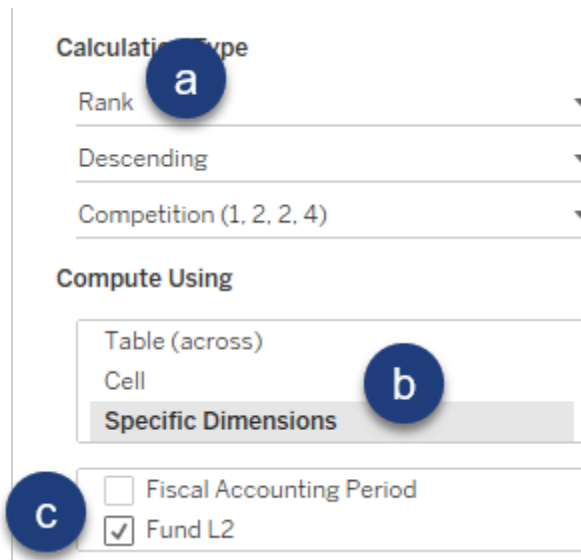


Exercise: Building a Slope Chart

1. Continue in the **UCSD – FINAH Advanced.twb** workbook.
2. Create a new worksheet and name it “Slope Chart”.
3. From Dimensions, drag **Fiscal Accounting Period** to the **Columns** shelf.
4. From Measures, drag **Account Credit Amt** to the **Rows** shelf.
5. Change the mark type to **Line**.
6. In the Toolbar, change the **Fit** type to **Fit Width**.

Next, add Fund L2 information to the view.

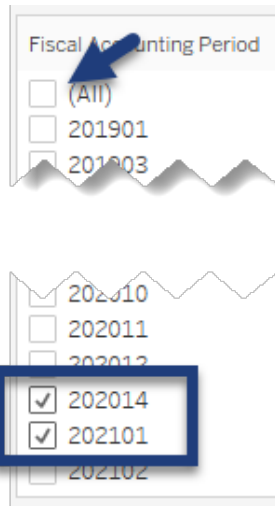
7. From Dimensions, drag **Fund L2** to the **Label** button on the Marks card.
8. On the Rows shelf, right-click on the **SUM(Account Credit Amt)** pill and click **Add Table Calculation**.
9. In the Table Calculation window, do the following:
 - a. Change Calculation Type to **Rank**
 - b. Change Compute Using to **Specific Dimensions**
 - c. **Ensure** the only dimension checked is **Fund L2**.
 - d. Close the window (not shown):



10. On the Columns shelf, right-click on the **Fiscal Accounting Period** pill and click **Show Filter**.

Chapter 3 – Additional Functionality

11. In the **Fiscal Accounting Period** quick filter, do the following:
 - a. Clear the **All** check box.
 - b. Check the boxes for **202014** and **202101**:



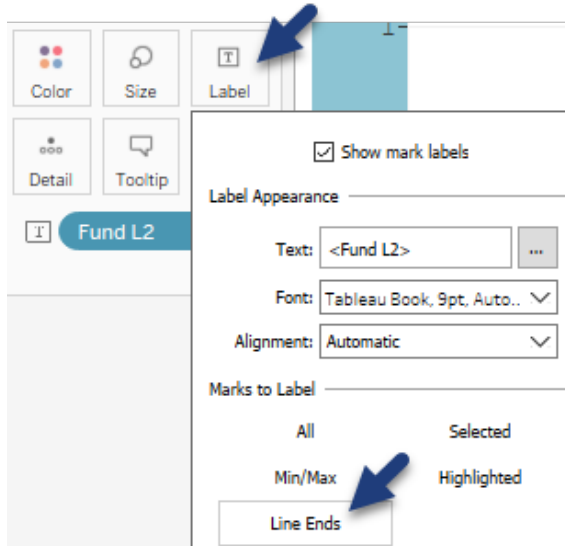
12. On the left side of the view, right-click the axis and click **Edit Axis**.
13. In the Edit Axis window, in the Scale section, check the box for **Reversed**. Close the window:

Scale

- Reversed
 Logarithmic

Chapter 3 – Additional Functionality

14. On the Marks card, click the **Label** button and click **Line Ends**. Click outside of the pop-up window to close it:

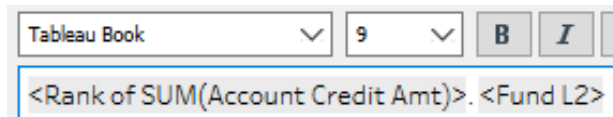


Next, we add rank and format the view.

15. On the Rows shelf, Ctrl-drag the **SUM(Account Credit Amt)** pill to the **Label** button on the Marks card.
16. Edit the label by clicking on the **Label** button on the Marks card and clicking on the **...** button:



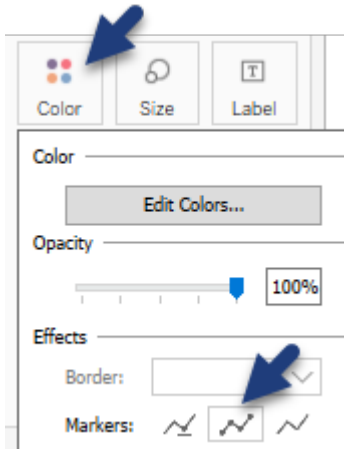
17. In the Edit Label window, adjust the label as follows. Click OK:



18. From the Rows shelf, Ctrl-drag **SUM(Account Credit Amt)** to the **Color** button on the Marks card.

Chapter 3 – Additional Functionality

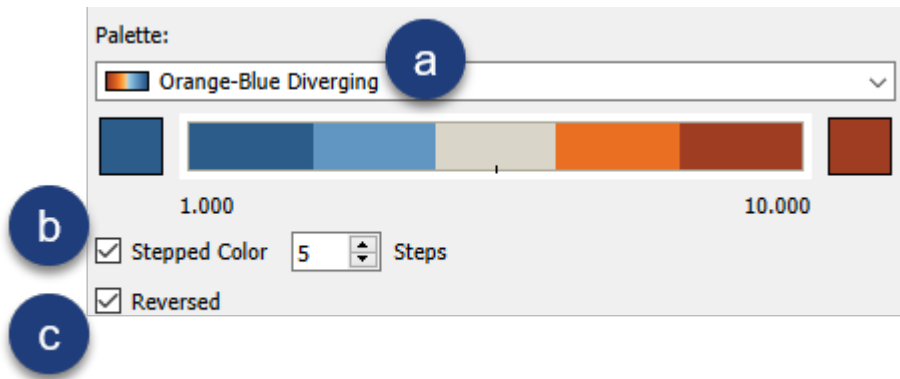
19. On the Marks card, click the **Color** button and change the Markers to **All**.



20. With the Color pop-out Menu still open, click on **Edit Colors**.

21. In the Edit Colors window, do the following:

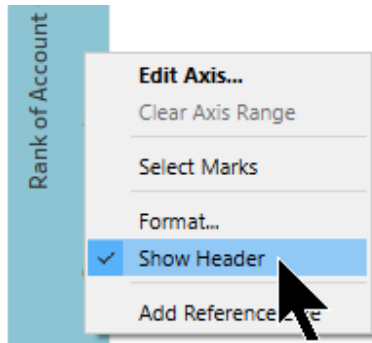
- Change the Palette to **Orange-Blue Diverging**.
- Check the box for **Stepped Color** (leave the number of steps at 5).
- Check the box for **Reversed**.
- Click OK (not shown):



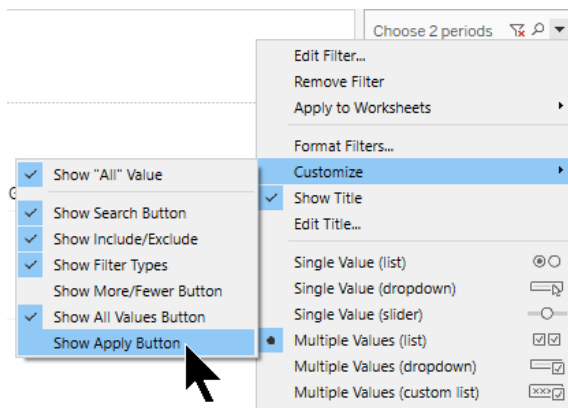
Chapter 3 – Additional Functionality

Finally, we perform a few more formatting steps to clean up the visualization.

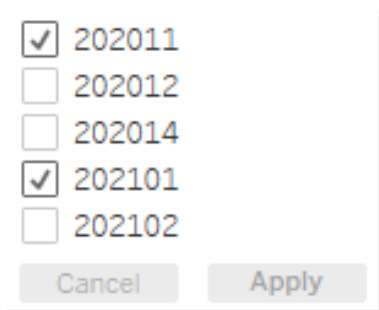
22. On the left side of the view, right-click on the axis and click **Show Header** (to hide the axis):



23. Edit the title of the **Fiscal Accounting Period** quick filter to “Choose 2 periods”.
24. Hover over the **Fiscal Accounting Period** quick filter and do the following:
- Click the dropdown arrow.
 - Hover over **Customize**.
 - Click **Show Apply Button**:

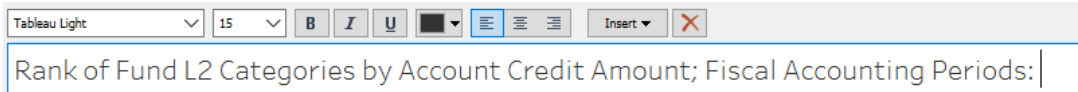


25. In the **Fiscal Accounting Period** quick filter, uncheck **202014** and check **202011**. Click **Apply**:

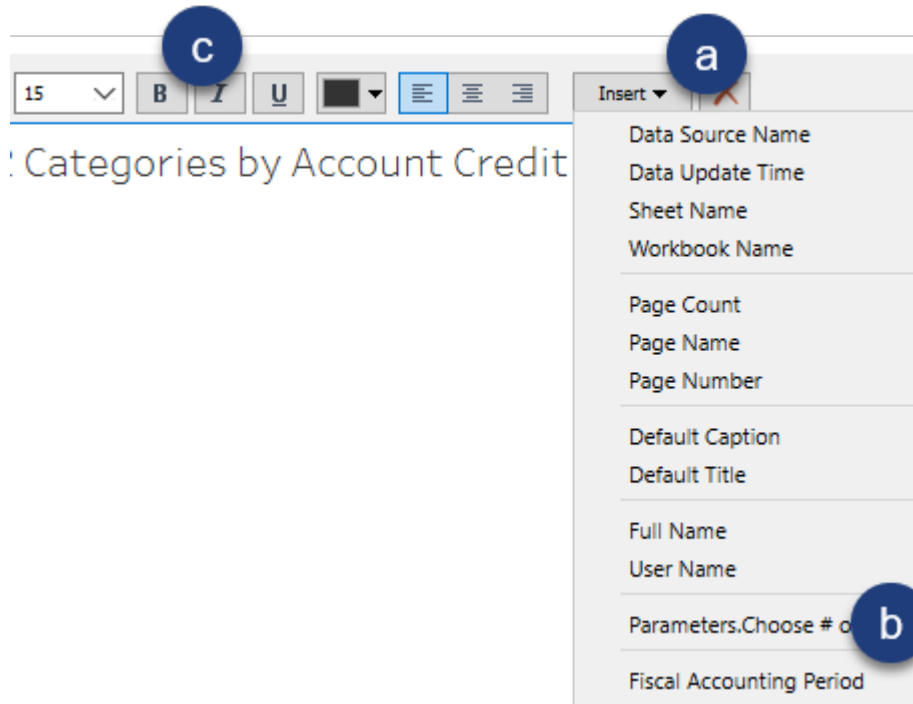


Chapter 3 – Additional Functionality

26. In the view, double-click the title.
27. In the Edit Title window, type the following:



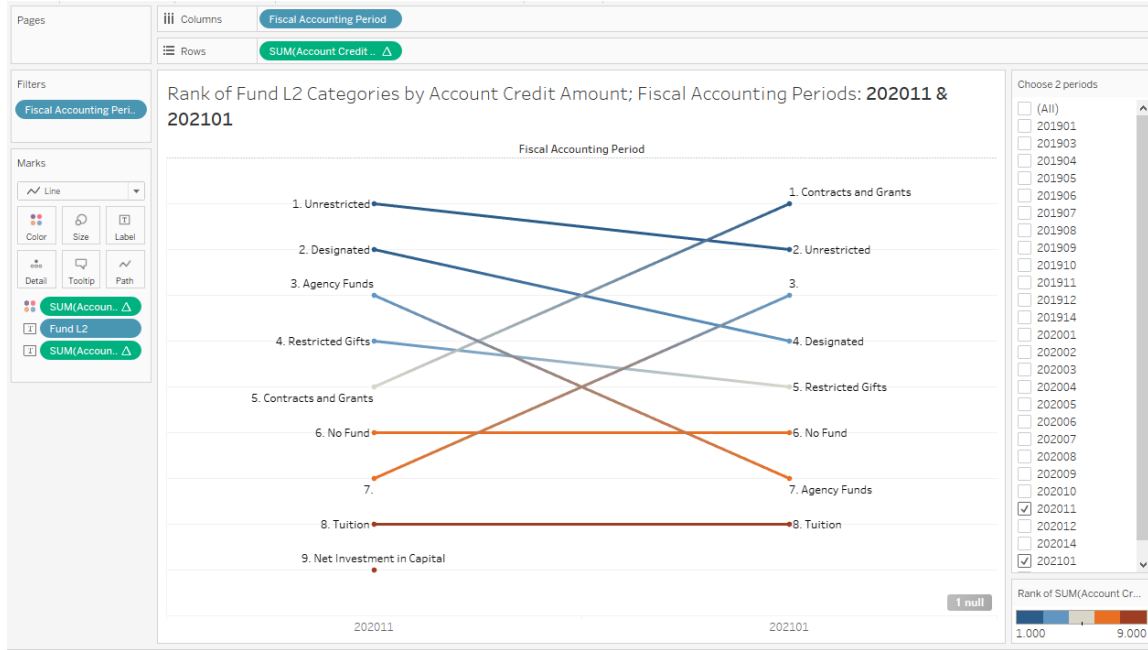
28. Still in the Edit Title window, do the following:
 - a. Click the **Insert** button in the toolbar.
 - b. Click **Fiscal Accounting Period**.
 - c. Bold the new **<Fiscal Accounting Period>** text (not shown).
 - d. Click OK (not shown):



29. Save the workbook.

Chapter 3 – Additional Functionality

The finished viz look as follows:



Chapter 3 – Additional Functionality

Set Actions

Set actions are similar to parameters in that they allow the user to control their analysis experience. We use an existing set and update it based on user actions in the visualization.

Set actions differ from parameter actions in that they can be invoked by selecting dimension members in the viz rather than using the parameter control variables.

In this exercise, we build a viz that shows the user **Account Debit Amt** by **Account L2** and, if desired, the associated **Account L3** Account Debit amounts for a particular Account L2.

When finished, our viz will look as follows:

The screenshot displays a Tableau visualization titled "Account Debit Amount by Account L2 and Account L3". The interface includes a "Columns" shelf with "Account L2" and "Account L3 Drill-to" buttons. The "Marks" shelf is set to "SUM(Account D...)" with a green pill. The "Rows" shelf is empty. The main view shows a table with the following data:

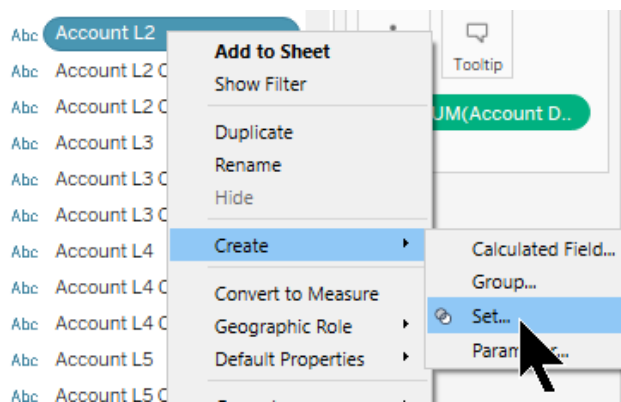
Account L2	Account L3 Drill-to	
Additional Non Operating ..		\$45,962
Appropriations		\$958
Contracts and Grants (Non Capital)	Federal Contracts and Grants	\$151,732
	Intercampus Subcontract Revenue	\$482,746
	Local Contracts and Grants	\$346
	Private Contracts and Grants	\$45,868
	State Contracts and Grants	\$60,102
Current Assets		\$18,608,673,068
Current Liabilities		\$4,952,988,354
Deferred Inflows		\$7,460,000

Exercise: Create Set Actions

1. Continue in the **UCSD -FINAH Advanced.twb** workbook.
2. Create a new worksheet and name it "Set Actions".
3. From Dimensions, drag **Account L2** to the **Rows** shelf.
4. From Measures, drag **Account Debit Amount** the **Text** button on the Marks card.

We now create a set on the on the Account L2 field, then create a calculated field that is invoked when an Account L2 type is click on in the viz.

5. Under Dimensions, right-click on the **Account L2** field, hover over **Create**, and click **Set**:



6. In the Create Set window, replace the name with "Account L2 Set". Click OK.
7. Create the following calculated field:

Account L3 Drill-to

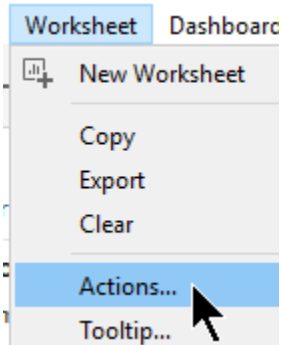
```
IF [Account L2 Set]
THEN [Account L3]
ELSE ""
END
```

```
//If an Account L2 header is clicked on in the viz,
//show the associated Account L3 headers
```

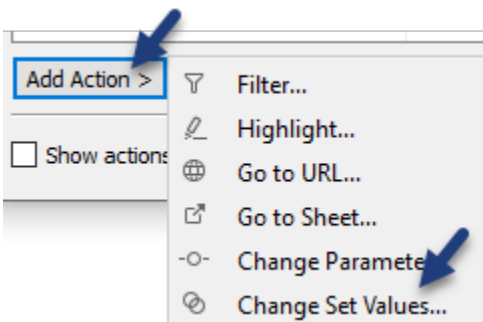
8. From Dimensions, drag **Account L3 Drill-to** to the Rows shelf, to the right of the existing pill.

Chapter 3 – Additional Functionality

9. In the menu bar, click **Worksheet** and click **Actions**:



10. In the Actions window, click the **Add Action** button and click **Change Set Values**:



Chapter 3 – Additional Functionality

11. In the Add Set Action window, do the following:
 - a. Change the name to “Account L2 to Account L3”.
 - b. In the Source Sheets section, click the **FINAH-UCSDGeneralLedger-View-QA** data source.
 - c. Ensure that the only worksheet checked is **Set Actions**.
 - d. In the Target Set section, change the second field **Account L2 Set**.
 - e. In the Target Set section, Clearing the selection will: **Remove all values from set**.
 - f. Click OK twice (not shown):

The screenshot shows the 'Add Set Action' dialog box. The 'Name' field is set to 'Account L2 to Account L3'. The 'Source Sheets' section has a dropdown menu showing 'FINAH-UCSDGeneralLedger-View-QA'. Below this, a list of worksheets is shown with checkboxes: 'Set Actions' (checked), 'Slope Chart', 'Table Calc - Customized', and 'Table Calc - Diff from Avg'. To the right of this list are three buttons: 'Hover', 'Select', and 'Menu'. Below these buttons is a checkbox for 'Run on single select only'. The 'Target Set' section has two dropdown menus: the first is 'FINAH-UCSDGeneralLedger-View-QA' and the second is 'Account L2 Set'. To the right of these dropdowns are three radio buttons under the heading 'Clearing the selection will:': 'Keep set values', 'Add all values to set', and 'Remove all values from set' (which is selected).

a Name: Account L2 to Account L3

b Source Sheets: FINAH-UCSDGeneralLedger-View-QA

c Set Actions
 Slope Chart
 Table Calc - Customized
 Table Calc - Diff from Avg

Run action on:

 Run on single select only

d Target Set: FINAH-UCSDGeneralLedger-View-QA
Account L2 Set

e Clearing the selection will:
 Keep set values
 Add all values to set
 Remove all values from set

Chapter 3 – Additional Functionality

12. In the view, click on the **Current Assets** header:

Account L2	Account L3
Additional Non Operating ..	
Appropriations	
Contracts and Grants (No..	
Current Assets	
Current Liabilities	
Deferred Inflows	

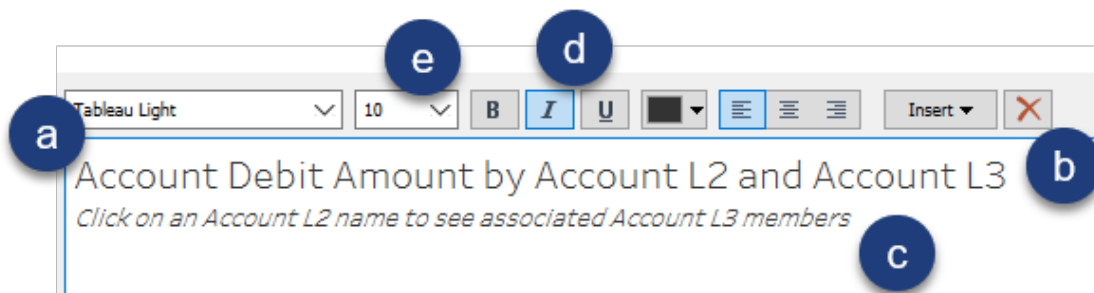
Your view displays only the Account L3 dimension members belonging to Account L2:

Account L2	Account L3 Drill-to	
Additional Non Operating ..		\$45,962
Appropriations		\$958
Contracts and Grants (No..		\$740,793
Current Assets		
	Accounts Receivable	\$9,580,865,224
	Cash	\$8,912,068,025
	Inventory	\$52,982,824
	Notes and Mortgages Rec..	\$6,361,643
	Other Current Assets	\$53,868,124
	Pledges Receivable Curre..	\$1,637,711
	Short Term Investments	\$889,518

13. Double-click the worksheet title.

14. In the Edit Title window:

- Replace the current text with “Account Debit Amount by Account L2 and Account L3”.
- Hit Enter.
- Type “Click on an Account L2 name to see associated Account L3 members”.
- Highlight the bottom line text and click the **Italics** button.
- Change the font size to **10**.
- Click OK:



15. Save your workbook.

Chapter 3 – Additional Functionality

Only the job functions associated with the Audit Compliance and Ethics job family show. Feel free to click on different Job Families. Your view should look similar to the following:

Account L2		Account L3 Drill-to	
Account Debit Amount by Account L2 and Account L3			
<i>Click on an Account L2 name to see associated Account L3 members</i>			
Additional Non Operating ..			\$45,962
Appropriations			\$958
Contracts and Grants (Non Capital)	Federal Contracts and Grants		\$151,732
	Intercampus Subcontract Revenue		\$482,746
	Local Contracts and Grants		\$346
	Private Contracts and Grants		\$45,868
	State Contracts and Grants		\$60,102
Current Assets			\$18,608,673,068
Current Liabilities			\$4,952,988,354
Deferred Inflows			\$7,460,000

Chapter 4 – Parameters

Parameters can be exact values, date parts, or other data points. Parameters allow you to adjust the data in the view based on data that may not be present in the view. In this chapter, we focus on the following features:

- Adjustable Reference Lines
- Date Filter Parameters

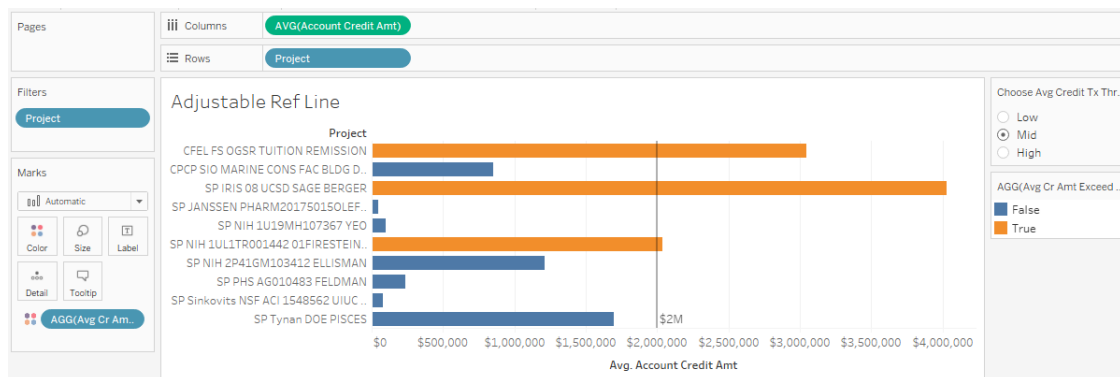
Adjustable Reference Lines

Reference lines are particularly helpful in bar charts to compare the length/height of each bar against some measure. The reference line measure may be a fixed value, such as a desired threshold, or it could be an aggregation (e.g., max, min, average) for all bars in the viz.

An adjustable reference line gives users the ability to adjust the reference line. When adding a calculated field that compares the adjusted value (using a parameter control) to the bars on the chart, and applying that calculated field to the Color button, we immediately see which bars are above or below the reference line.

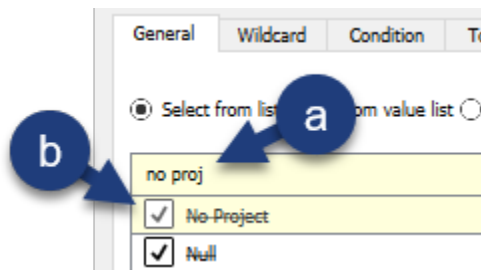
In the next exercise, we create a bar chart that shows average **Account Credit Amt** by our top 10 **Projects** (by total Account Credit Amt). We then create a parameter that is tied to a reference line to quickly determine if the Avg Credit Transaction Amount for each Project falls above or below the thresholds we create.

The finished visualization looks as follows:

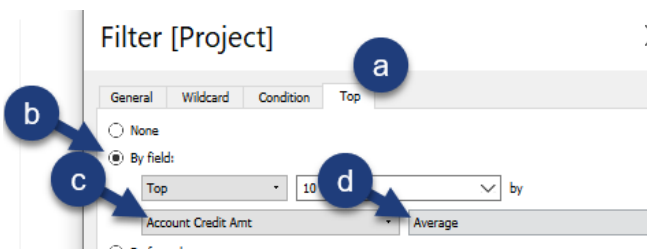


Exercise: Creating an Adjustable Reference Line

1. Continue in the **UCSD – FINAH Advanced.twb** workbook.
2. Create a new worksheet and name it “Adjustable Ref Line”.
3. From Dimensions, drag **Project** to the **Rows** shelf.
4. From Measures, drag **Account Credit Amt** to the **Columns** shelf.
5. On the Columns shelf, right-click the **SUM(Account Credit Amt)** pill, hover over **Measure (Sum)** and select **Average**.
6. In the view, right-click on the **Null** header and click **Exclude**.
7. In the Filters card, right-click on the Project pill and click **Edit Filter**.
8. In the Filter window, do the following:
 - a. Click in the search field and type “no proj.
 - b. Check the box for **No Project**.



9. Still in the Filter window, do the following:
 - a. Click on the **Top** tab.
 - b. Click the **By field** radio button.
 - c. Choose **Account Credit Amt** field list.
 - d. Choose **Average** from the aggregation type dropdown.
 - e. Click OK (not shown):



10. Create the following parameter:
 - a. Type the name “Choose Avg Credit Tx Threshold”.
 - b. Click **List** for Allowable values.
 - c. Populate the List of values section.
 - d. Click OK (not shown):

Create Parameter

Name: Choose Avg Credit Tx Threshold

Properties

Data type: Float

Current value: Low

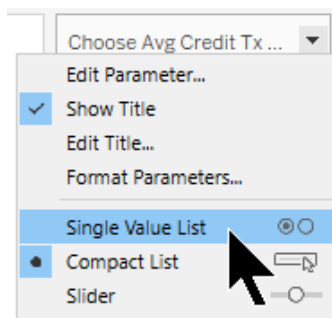
Display format: Automatic

Allowable values: All List Range

List of values

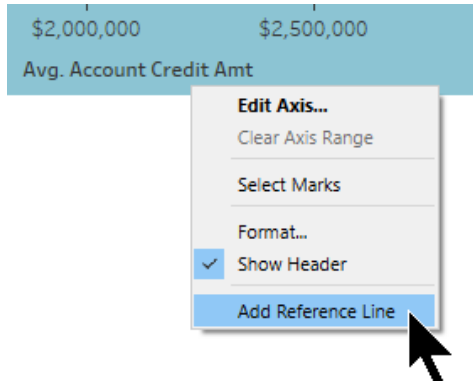
Value	Display As
1,000,000	Low
2,000,000	Mid
3,000,000	High

11. At the bottom of the Data pane, in the Parameters section, right-click on **Choose Avg Credit Tx Threshold** and click **Show Parameter Control**.
12. Change the **Choose Avg Credit Tx Threshold** parameter to the **Single Value List** format:



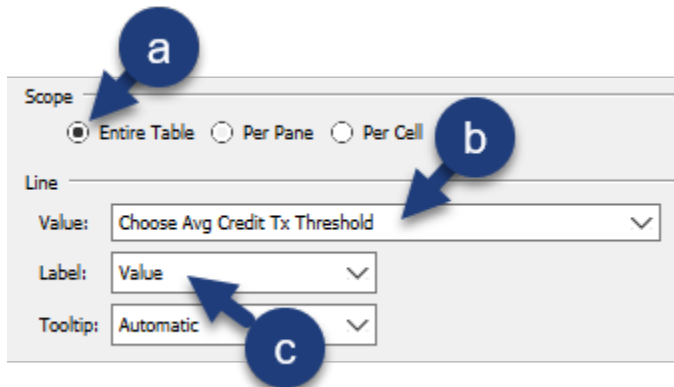
Chapter 4 – Parameters

13. At the bottom of the view, right-click on the axis and click **Add Reference Line**.



14. In the Add Reference Line window, do the following:

- Click the **Entire Table** radio button.
- Choose **Choose Avg Credit Tx Threshold** in the Value field.
- Choose **Value** in the Label field.
- Click OK:



15. In the **Choose Avg Credit Tx Threshold** parameter control, click the **Low**, **Mid** and **High** radio buttons and observe the effect on your viz.

Chapter 4 – Parameters

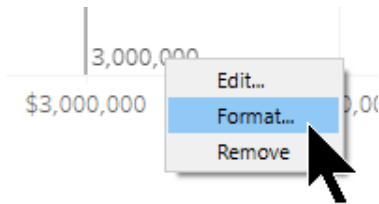
Next, we create a calculated field that tests whether or not our parameter “threshold” has been met, then drag that new field to the Color button on the Marks card. This will change the color of each mark in the view based on the parameter selected.

16. Create the following calculated field (named “Avg Cr Amt Exceed Threshold?”):

Avg Cr Amt Exceed Threshold?

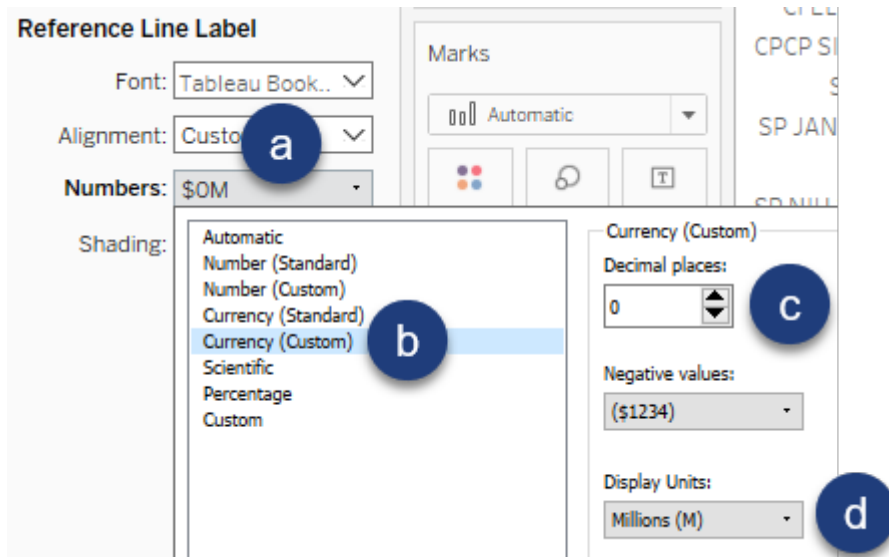
```
AVG([Account Credit Amt])  
>=  
[Choose Avg Credit Tx Threshold]
```

17. From Measures, drag your new boolean calculated field **Avg Cr Amt Exceed Threshold?** to the **Color** button on the Marks card.
18. In the **Avg Cr Amt Exceed Threshold?**, click the **Low**, **Mid** and **High** radio buttons and observe the effect on your viz.
19. Right-click the value label for the reference line and click **Format**:



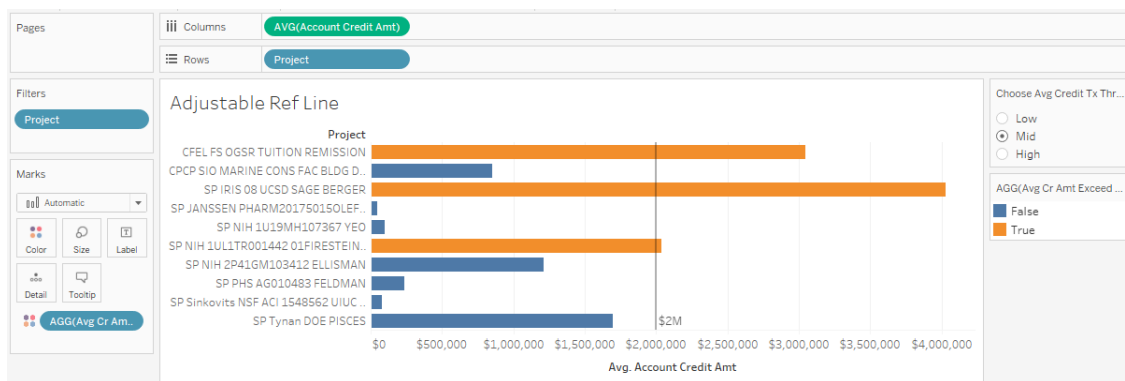
Chapter 4 – Parameters

20. In the Format pane, do the following:
- Click on the Numbers box.
 - Choose **Currency (Custom)**.
 - Change the number of decimals to **0**.
 - Change Display Units to **Millions (M)**.
 - Close the Format pane:



21. Save your workbook.

Your visualization should look as follows:

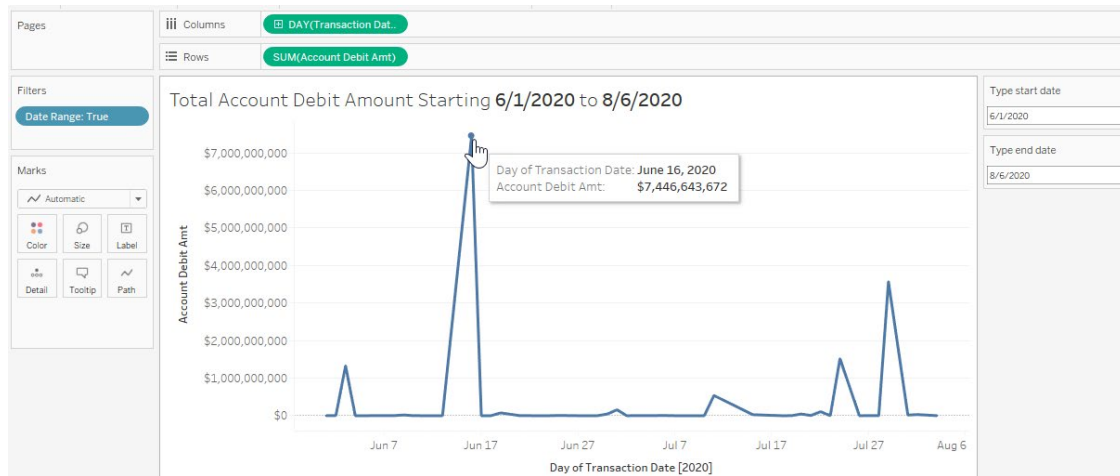


Chapter 4 – Parameters

Date Filter Parameter

For parameter controls to work, they must be tied to a calculated field or filter. In the next exercise, we list the total **Account Debit Amt** by **Transaction Date**. In addition, we give the user parameter controls in order to change his/her desired start and end dates.

The finished visualization looks as follows:



Exercise: Using a Date Filter Parameter

1. Continue in the **UCSD – FINAH Advanced** workbook.
2. Create a new worksheet and name it “Date Filter Parameter”.
3. From Measures, drag **Account Debit Amt** to the **Rows** shelf.
4. From Dimensions, drag **Transaction Date** to the **Columns** shelf.
5. On the Columns shelf, right-click **YEAR(Transaction Date)** and change it to continuous day (2nd day option).
6. Create a parameter as follows:
 - a. Update the Name to “Type start date”.
 - b. Choose **Date** for Date type.
 - c. Type “5/1/2020” for the Current value.
 - d. Click **Range** for Allowable values.
 - e. Check the box for **Minimum**.
 - f. Adjust the Minimum date to “5/1/2020”.
 - g. Check the box for **Step size**.
 - h. Click OK:

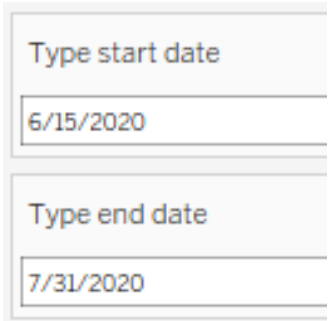
The screenshot shows the configuration dialog for a parameter named "Type start date". The dialog is divided into several sections:

- Name:** Type start date (labeled 'a')
- Properties:**
 - Data type:** Date (labeled 'b')
 - Current value:** 5/1/2020 (labeled 'c')
 - Display format:** Automatic (labeled 'd')
 - Allowable values:** Radio buttons for All, List, and Range. The **Range** option is selected (labeled 'd').
- Range of values:**
 - Minimum:** 5/1/2020 (labeled 'e' and 'f')
 - Maximum:** 11/14/2020
 - Step size:** 1 (labeled 'g') Days

7. Duplicate the **Type start date** parameter control.
8. Rename the **Type start date (copy)** parameter control to “Type end date”. Click OK.
9. Under Parameters, show both the **Type start date** and **Type end date** parameter controls.

Chapter 4 – Parameters

10. Edit the start and end dates in the parameter controls as follows:



The image shows two stacked input fields. The top field is labeled 'Type start date' and contains the text '6/15/2020'. The bottom field is labeled 'Type end date' and contains the text '7/31/2020'.

Again, notice that the view is not updated. We will embed our parameters inside a calculated field and then apply that calculated field to our worksheet.

11. Create the following calculated field. Click OK:

Date Range

```
[Transaction Date] >= [Type start date]
and
[Transaction Date] <= [Type end date]
```

12. From Dimensions, drag **Date Range** to the **Filter** card.

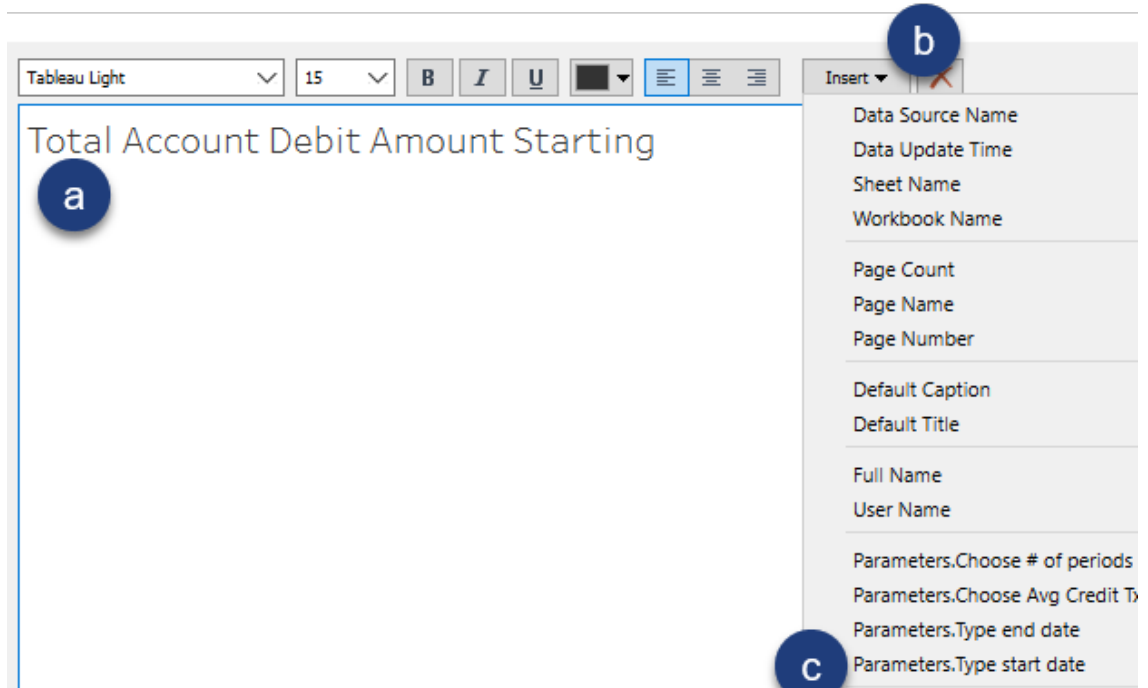
13. In the Filter window, check the box for **True** and click OK.

Now that our base visualization works as planned, let's clean up our viz formatting.

14. Double-click on the title bar (Date Filter Parameter).

Chapter 4 – Parameters

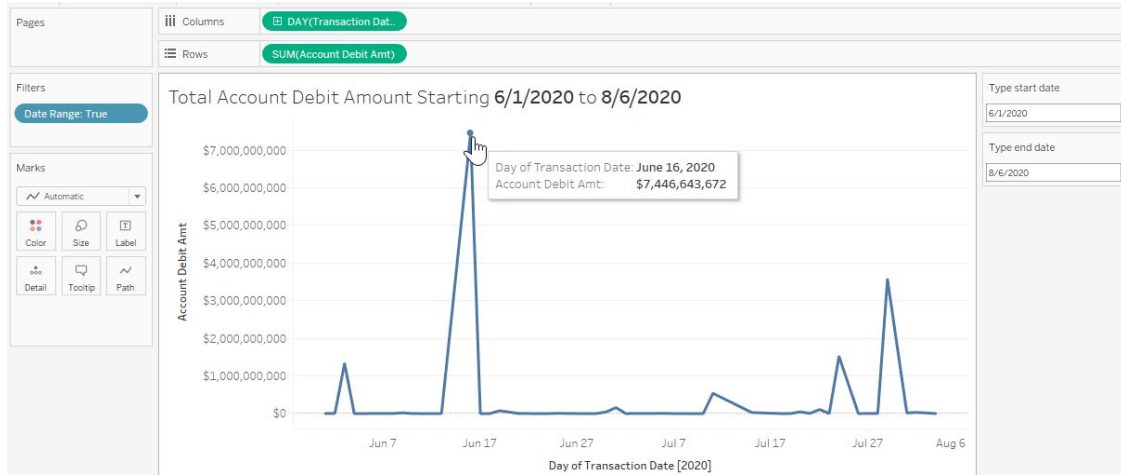
15. In the Edit Title window, do the following:
 - a. Replace the text with “Total Account Debit Amount Starting “.
 - b. Click the **Insert** button.
 - c. Click on **Parameters.Type start date**:



16. Still in the Edit Title window, do the following:
 - a. At the end of the text, type “ to “.
 - b. Click the **Insert** button.
 - c. Click on **Parameters.Type end date**.
17. Still in the Edit Title window, bold both the two parameter references in the title. Click OK.
18. Save the workbook.

Chapter 4 – Parameters

The finished visualization looks as follows:



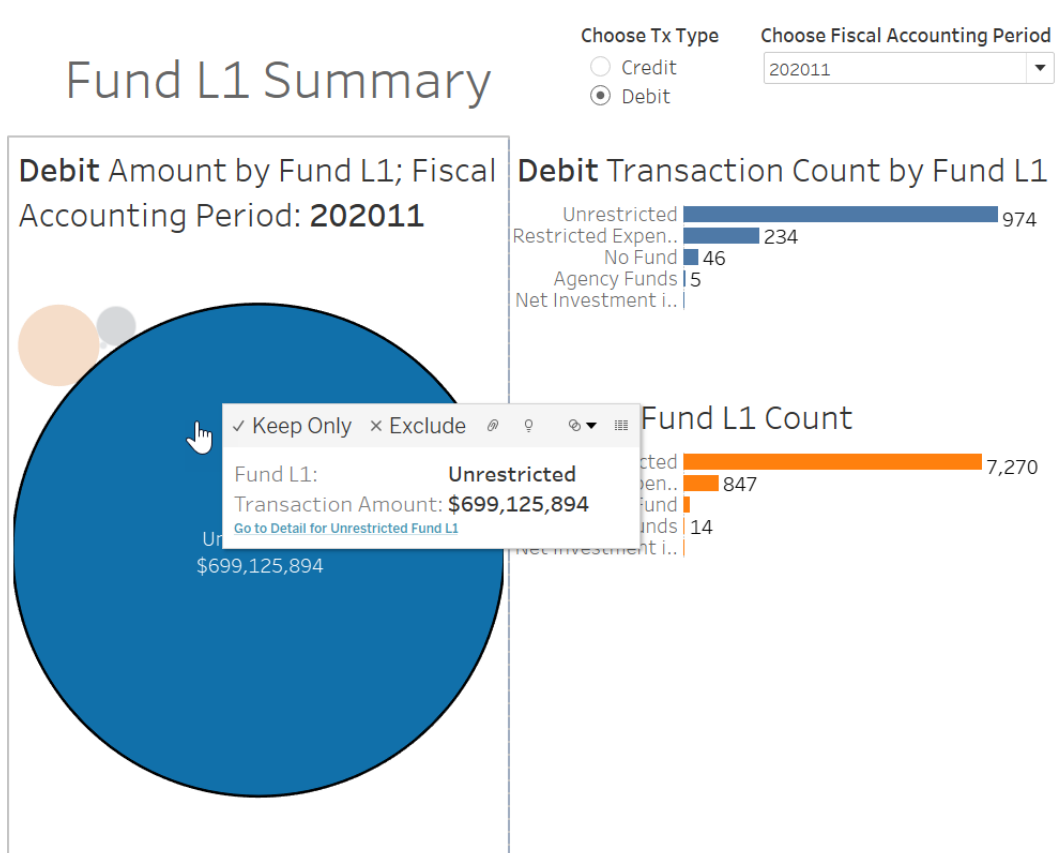
Chapter 5 – Dashboard Techniques

In this chapter, we build on existing Tableau experience to experiment with the following:

- Dashboard actions
- BANA & dashboard best practices

Dashboard Actions

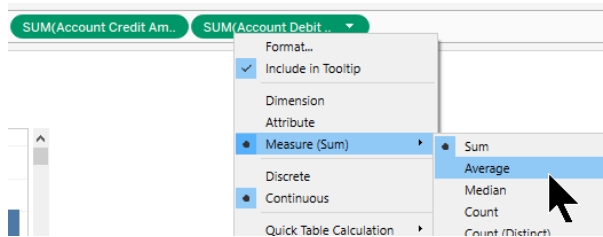
In the following Dashboard Action lesson, we are asked to enhance the interactivity of an existing dashboard by adding navigation to details for each L1 Fund. We then provide a navigation button to go back to the Summary Dashboard.



Exercise: Enhancing Dashboard Actions

In this first part, we create a detail worksheet that displays amount and transaction count information for the different Funds.

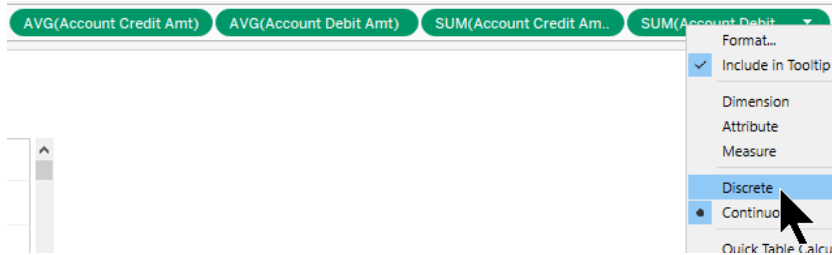
1. In the menu bar, click **File** and **Open** to open an existing workbook.
2. Navigate to and open the **UCSD – FINAH Advanced – Dashboard Action Starter.twb** workbook.
3. In the menu bar, click on File and Save as. Save the file as “UCSD – FINAH Advanced – Dashboard Action”.
4. Create a new worksheet named “Fund Detail”.
5. From Dimensions, drag **Fund** to the **Rows** shelf:
6. From Measures, drag the following to the **Rows** shelf:
 - a. **Account Credit Amt.**
 - b. **Account Debit Amt.**
7. On the Rows shelf, do the following:
 - a. Ctrl-click the **SUM(Account Credit Amt)** and the **SUM(Account Debit Amt)** pills.
 - b. Right-click on one of the highlighted pills.
 - c. Hover over **Measure (Sum)**.
 - d. Click **Average**:



8. From Measures, drag the following to the **Rows** shelf:
 - a. **Account Credit Amt.**
 - b. **Account Debit Amt.**

Chapter 5 – Dashboard Techniques

9. On the Rows shelf, do the following:
 - a. Ctrl-click on the four green pills.
 - b. Right-click on any of the four highlighted pills.
 - c. Click **Discrete**:

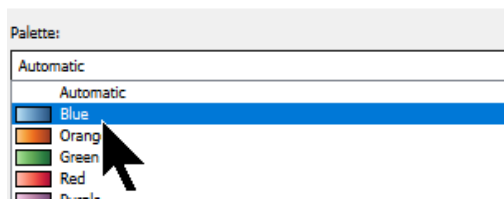


10. The Rows shelf should look as follows:



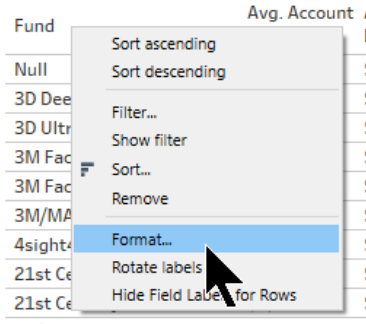
11. Under Measures, double-click **Transaction Count**.
12. From Dimensions, drag **Measure Names** to the **Columns** shelf.
13. From the Marks card, Ctrl-drag the **AGG(Transaction Count)** to the **Color** button.
14. On the Marks card, change the mark type to **Square**.
15. On the Marks card, click the **Color** button and **Edit Colors**.
16. Change the Palette to **Blue**:

Edit Colors [Transaction Count]



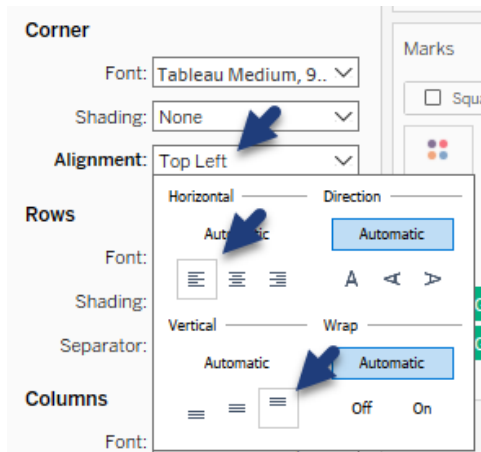
Chapter 5 – Dashboard Techniques

17. Right-click the **Fund** header and click **Format**:



18. In the Corner section, click the **Alignment** option:

- Choose the **Left** aligned button.
- Choose the **Top** aligned button:



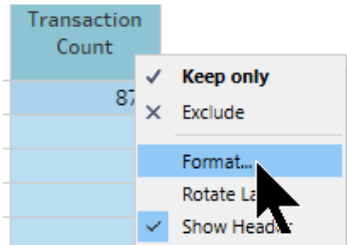
19. In the view, adjust the width and height of the columns and headers so the text is displayed better:

A screenshot of a Tableau table with a double-headed arrow indicating the width of the 'Transaction Count' column. The table has two columns: 'Account Debit Amt' and 'Transaction Count'. The 'Transaction Count' column is highlighted in blue.

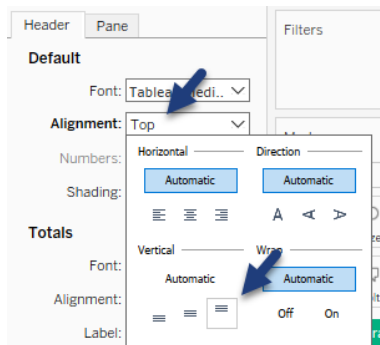
Account Debit Amt	Transaction Count
\$2,034,103,269	841
\$25,540	6
\$486	1
\$15,000	1

Chapter 5 – Dashboard Techniques

20. In the view, right-click on the **Transaction Count** header and click **Format**:



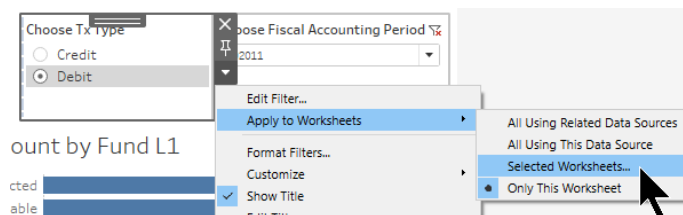
21. In the Format pane, do the following:
- Click the **Alignment** field in the Default section.
 - Click **Top** in the Vertical section.
 - Close the Format pane (not shown):



Now that we have our base “detail” worksheet completed, let’s work on the filters and actions in our Fund L1 Summary dashboard.

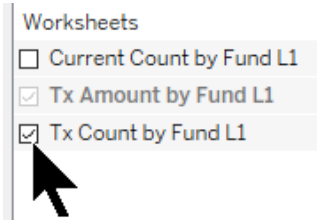
First, let’s adjust what the two quick filters affect in the dashboard.

22. Click on the **Fund L1 Summary** dashboard tab.
23. In the top-right corner of the dashboard:
- Click the dropdown arrow on the border of the **Choose Tx Type** quick filter.
 - Hover over **Apply to Worksheets**.
 - Click **Selected Worksheets**:

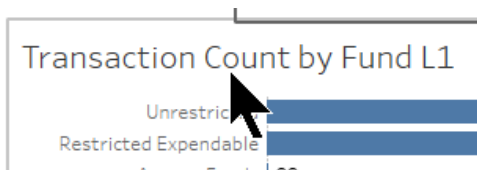


Chapter 5 – Dashboard Techniques

24. In the Apply Filter window, check the box for **Tx Count by Fund L1**. Click OK:



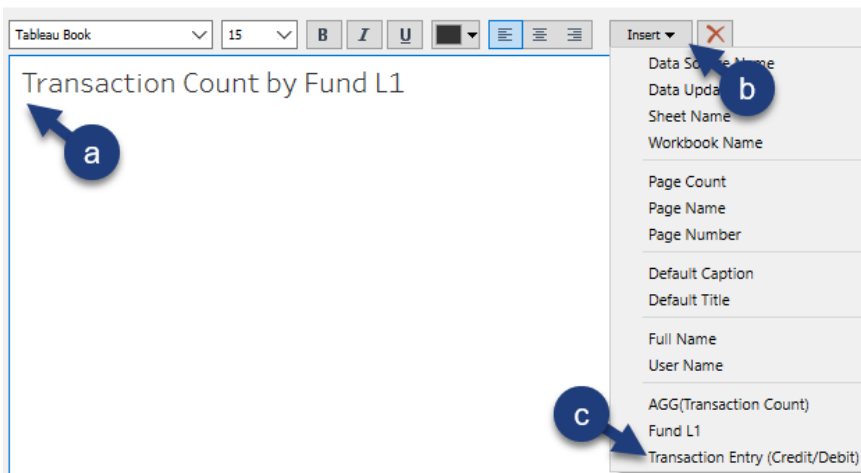
25. Double-click on the **Transaction Count by Fund L1** bar chart title:



26. In the Edit Title window, do the following:

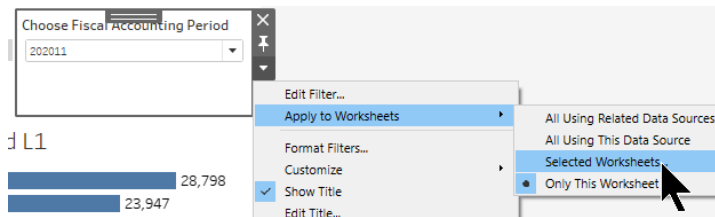
- Insert a space at the front of the text and place your cursor at the beginning of the line.
- Click the **Insert** button.
- Click **Transaction Entry (Credit/Debit)**.
- Bold the **< Transaction Entry (Credit/Debit)>** text (not shown).
- Click OK:

Edit Title

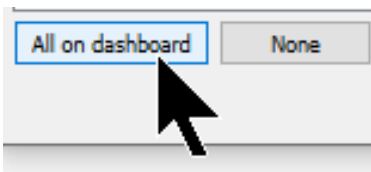


Chapter 5 – Dashboard Techniques

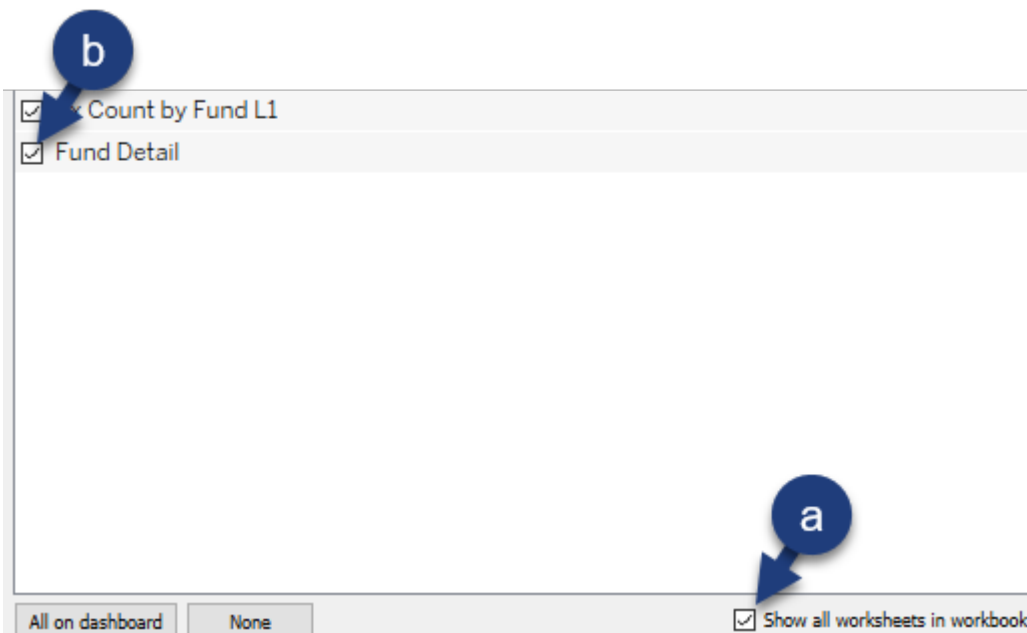
27. In the top-right corner of the dashboard, click on the **Choose Fiscal Accounting Period** quick filter and do the following:
- Click the dropdown arrow on the border of the quick filter.
 - Hover over **Apply to Worksheets**.
 - Click **Selected Worksheets**:



28. In the bottom-left corner of the Apply Filter window, click the **All on dashboard** button. Click OK:

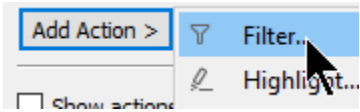



29. Still in the Apply Filter window, do the following:
- Check the box for **Show all worksheets in workbook**.
 - Check the box for the **Fund Detail** worksheet.
 - Click OK:

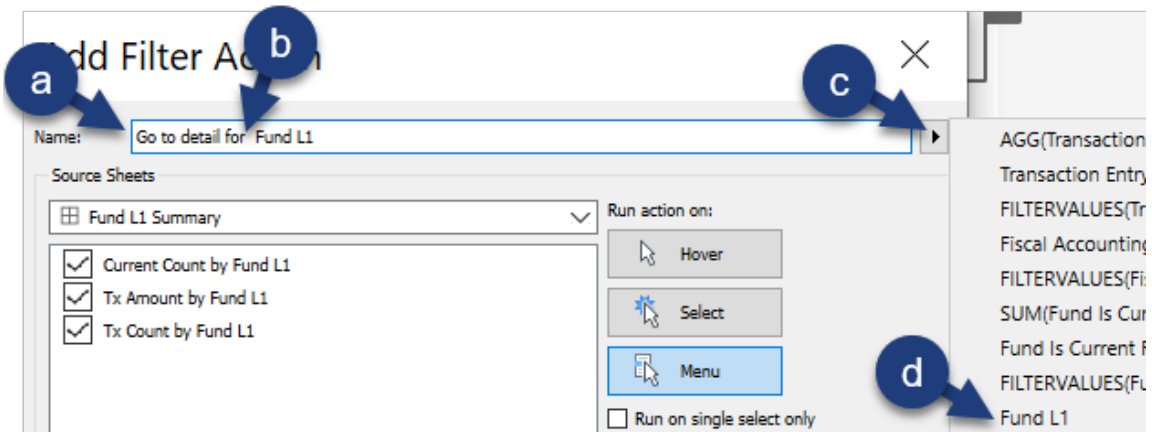


Chapter 5 – Dashboard Techniques

30. In the **Choose Fiscal Accounting Period** quick filter, select **202012**.
31. In the menu bar, click on **Dashboard** and click on **Actions**.
32. In the Actions window, click on **Add Action** and click on **Filter**:



33. In the Add Filter Action window, do the following:
 - a. Type "Go to detail for Fund L1" in the Name field.
 - b. Place your cursor in between the double spaces before the word **Fund L1**.
 - c. Click the  icon.
 - d. In the pop-out menu, click on **Fund L1**:



Chapter 5 – Dashboard Techniques

34. Still in the Add Filter Action window, do the following:
- Under Source Sheets, ensure that only the **Tx Amount by Fund L1** box is checked.
 - For Target Sheets, select **Fund Detail**.
 - Click the **Selected Fields** radio button.
 - Click the **Add Filter** button:

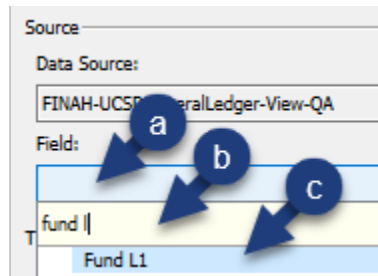
The screenshot shows the 'Add Filter Action' window with the following configuration:

- Name:** Go to detail for <Fund L1> Fund L1
- Source Sheets:** Fund L1 Summary (selected).
 - Current Count by Fund L1
 - Tx Amount by Fund L1
 - Tx Count by Fund L1
- Run action on:** Hover, Select, Menu (Menu is selected).
 - Run on single select c
- Target Sheets:** Fund Detail (selected).
 - Clearing the selection will:
 - Leave the filter
 - Show all values
 - Exclude all values
- Target Filters:** Selected Fields (selected), All Fields (unselected).
- Table:**

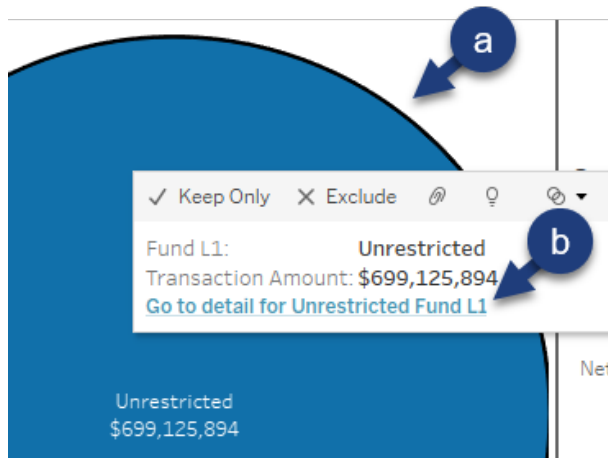
Source Field	Target Field	Target Data Source
- Buttons:** Add Filter... (highlighted with 'd'), Edit...

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35. In the Add Filter window, do the following:
- a. Click on the first Field dropdown list.
 - b. Type “fund l” in the search area.
 - c. Click on **Fund L1**.
 - d. Click OK three times (not shown):



36. Back on the dashboard, in the bubble chart, click on the **Unrestricted** bubble and then click on the text **Go to detail for Unrestricted Fund L1**:



You are taken to the Fund Detail worksheet:

Fund Detail

Fund	Avg. Account Credit Amt	Avg. Account Debit Amt	Account Credit Amt	Account Debit Amt	Transaction Count
Academic Operating Funds	\$16,726	\$5,835	\$18,766,350	\$25,509,869	582
Academic Removal - Loan	\$10,028	\$20,057	\$20,057	\$20,057	3
Accentcare LLC	Null	\$206,682	Null	\$206,682	1
ACO (Accountable Care Or..	\$4,072,837	\$4,070,264	\$4,072,837	\$4,070,264	2
ACT Department IT	\$16,855	\$7,613	\$4,752,970	\$4,856,992	85

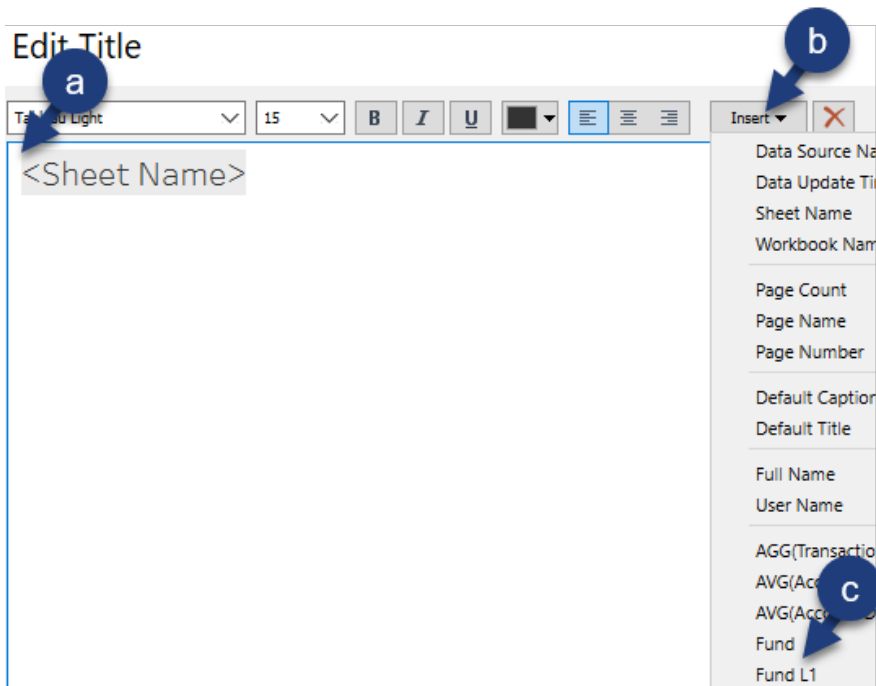
Chapter 5 – Dashboard Techniques

While we can assume that we are looking at details for the Unrestricted Fund let's update the title to reflect this.

37. Double-click on the title.

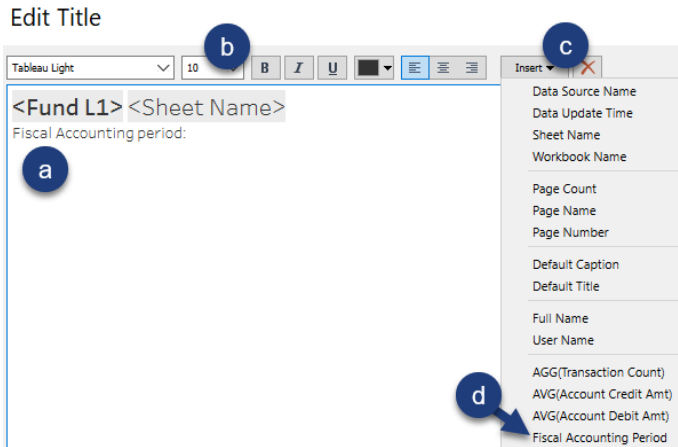
38. In the Edit Title window, do the following:

- a. Type a space at the front of the first line and place your cursor at the beginning of the line..
- b. Click the **Insert** button.
- c. Click **Fund L1**.
- d. Bold the **<Fund L1>** text (not shown).
- e. Click OK:



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39. Still in the Edit Title window, do the following:
- Add a second line of text, “Fiscal Accounting Period: “.
 - Highlight the second line of text and change it to **10** point font.
 - With your cursor at the end of the second line of text, click the **Insert** button.
 - In the dropdown menu, click **Fiscal Accounting Period**.
 - Click OK:



Your viz updates, informing you that you are looking at a particular Fund L1's information:

Unrestricted Fund Detail

Fiscal Accounting period: 202012

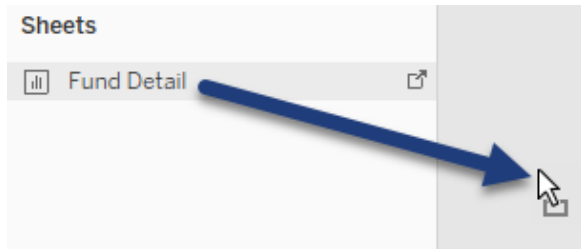
Fund	Avg. Account Credit Amt	Avg. Account Debit Amt	Account Credit Amt	Account Debit Amt	Transaction Count
Academic Operating Funds	\$10,522	\$3,607	\$10,542,827	\$10,535,811	377
ACT Department IT	\$10,835	\$4,922	\$2,361,979	\$2,465,995	71
ASC-AHP	\$33,807	\$7,876	\$8,316,615	\$8,316,742	212
ASC-Call Coverage	\$14,148	\$7,686	\$5,248,943	\$5,249,536	114
ASC-Fellows	\$7,233	\$4,262	\$1,077,704	\$1,078,280	57
ASC-Medical Director	\$12,404	\$5,244	\$5,557,154	\$5,558,550	190
ASC-Other	\$5,042	\$2,482	\$1,668,967	\$1,670,164	114
ASC-Residency Director	\$2,593	\$1,317	\$632,655	\$633,485	88

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Now we add a navigation feature to allow users to easily return to the Fund L1 Summary dashboard.

40. Create a new dashboard and rename it “Fund Detail DB”.

41. From the Sheets section, drag **Fund Detail** to the dashboard canvas:



42. In the dashboard, do the following:

- Click the **Floating** button.
- Drag the **Button** (or **Navigation**, depending on your version of Tableau) object to the right of the viz title:

Unrestricted Fund Detail
Fiscal Accounting Period: 202012

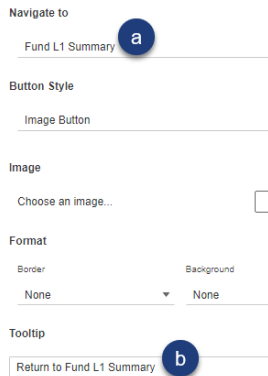
Fund	Avg. Account Credit Amt	Avg. Account Debit Amt	Account Credit Amt	Account Debit Amt	Transaction Count
Academic Operating Funds	\$10,522	\$3,607	\$10,542,827	\$10,535,811	377
ACT Department IT	\$10,835	\$4,922	\$2,361,979	\$2,465,995	71
ASC-AHP	\$33,807	\$7,876	\$8,316,615	\$8,316,742	212
ASC-Call Coverage	\$14,148	\$7,686	\$5,248,943	\$5,249,536	114
ASC-Fellows	\$7,233	\$4,262	\$1,077,704	\$1,078,280	5
ASC-Medical Director	\$12,404	\$5,244	\$5,557,154	\$5,558,550	190
ASC-Other	\$5,042	\$2,482	\$1,668,967	\$1,670,164	114
ASC-Residency Director	\$2,593	\$1,317	\$632,655	\$633,485	88
ASSA Administrative Over...	\$248,659	\$161	\$2,237,927	\$1,446	17
Auxiliary Operating Fund	\$16,260	\$4,357	\$11,202,883	\$11,633,476	453
Be Smart About Safety	\$1,094	\$975	\$53,622	\$53,622	10
BFS- Misc Inc (Rebates)	\$19,914	\$9,351	\$8,383,876	\$8,322,518	110
BFS- Unclaimed Cks, Prop...	\$24,605	\$23,395	\$1,427,116	\$1,427,116	12
Campus Core Funds	\$87,751	\$40,128	\$15,970,759	\$15,970,759	54
Capital Construction Univ...	\$48,274	\$51,722	\$724,114	\$724,114	12
Central Campus Operatio...	\$2,490	\$18,108	\$2,740,060	\$4,182,876	27
Chancellors Associates	\$89	\$89	\$1,333	\$1,333	6
Chancellors Associates Ch...	\$67,466	\$134,932	\$134,932	\$134,932	3
Chancellors Associates Ch...	\$2,100	\$2,100	\$63,009	\$63,009	6
Chancellors Associates Ch...	\$78	\$74	\$1,475	\$1,475	6
Chancellors Distinguished...	\$1,035	\$1,006	\$69,427	\$69,427	6
Clinical Consulting Agree...	\$1,358	\$932	\$560,860	\$589,957	111
Clinical Operating Fund	\$12,143	\$3,895	\$10,345,864	\$10,585,937	437
Clinical Service Agree...	\$17,863	\$5,714	\$13,915,620	\$14,097,637	394
College Orientation Fund	\$1,653	\$892	\$67,791	\$67,787	20
College Student Activities...	\$6,740	\$2,965	\$1,058,150	\$1,052,730	43
Colleges' Activity Fees	\$96	\$96	\$1,155	\$1,155	4
Community Care	\$12,160	\$6,786	\$3,185,852	\$4,573,483	296
Concurrent Enrollment Fe...	\$2,968	\$2,798	\$195,868	\$195,868	12
Conference Revenue Fund	\$954	\$627	\$283,402	\$301,585	107
Department of Orthopaed...	\$3,356	\$3,454	\$117,448	\$117,448	7
Dept Payroll Default	\$24,201	\$14,837	\$605,032	\$637,981	23
DIFF INC RESV - CENTRAL...	\$126	\$251	\$504	\$501	3
Dr. James Y Chan Presiden...	\$103	\$103	\$1,230	\$1,230	4

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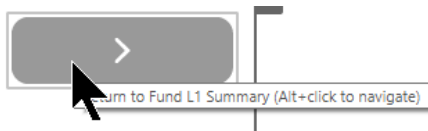
43. After clicking on the new button object, click the dropdown arrow and click **Edit Button**:



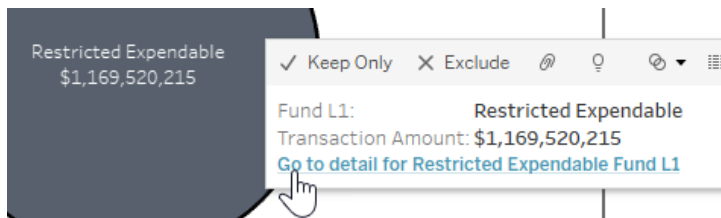
44. In the Edit Button window, do the following:
- Select **Fund L1 Summary** in the Navigate to dropdown list.
 - Type "Return to Fund L1 Summary" in the Tooltip field.
 - Click OK:

A screenshot of the 'Edit Button' configuration window. It has several sections: 'Navigate to' with a dropdown menu showing 'Fund L1 Summary' and a blue circle 'a' next to it; 'Button Style' with a dropdown menu showing 'Image Button'; 'Image' with a 'Choose an image...' button and a small square icon; 'Format' with 'Border' and 'Background' dropdown menus, both set to 'None'; and 'Tooltip' with a text input field containing 'Return to Fund L1 Summary' and a blue circle 'b' next to it.

45. Hover over the button on your dashboard to see the tooltip. While holding the Alt key down, click on the button to return to the summary dashboard:

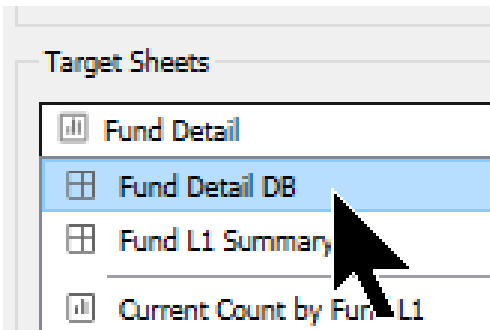


46. Back on the **Fund L1 Summary** Dashboard, in the bubble chart, click on **Restricted Expendable** bubble and click **Go to Detail for Restricted Expendables Fund L1** in the tooltip:

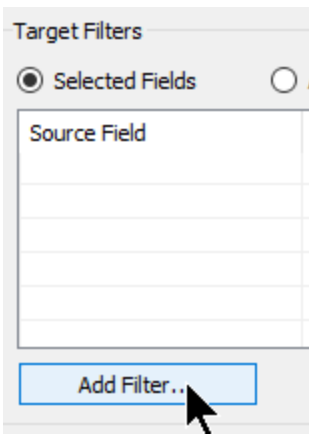


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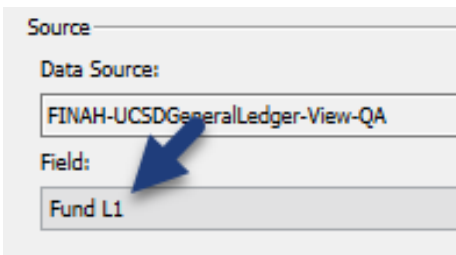
47. Click on the **Fund L1 Summary** dashboard tab at the bottom of the screen.
48. In the menu bar, click on **Dashboard** and click on **Actions**.
49. In the Actions menu, double-click on the **Go to detail for...** action.
50. In the Edit Filter Action window, click on the **Target Sheet** selector and click on **Fund Detail DB**:



51. Still in the Edit Filter Action window, in the bottom Target Filters section, click **Add Filter** (the filter attached to our detail worksheet dropped):

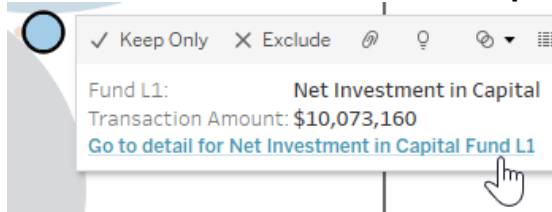


52. In the Add Filter window, in the Source section, click on the **Fund L1** field. Click OK three times:



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53. In the bubble chart, click on the **Net Investment in Capital** bubble and click **Go to Detail for Net Investment in Capital Fund L1**:

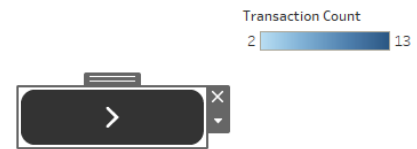


54. Save your workbook.

Your dashboard should look as follows:

Net Investment in Capital Fund Detail
Fiscal Accounting Period: 202012

Fund	Avg. Account Credit Amt	Avg. Account Debit Amt	Account Credit Amt	Account Debit Amt	Transaction Count
NICA - Med Ctr	\$2,406	\$2,406	\$7,219	\$7,219	2
NICA-Other	\$592,114	\$592,114	\$10,065,940	\$10,065,940	13



Integrating BANs & Dashboard Best Practices

Tableau recommends the following steps in planning and building your dashboard:

- Define your purpose and audience
- Sketch your plan
- Build and test your dashboard
- Make the dashboard interactive
- Apply visual best practices to the final dashboard

What are BANs?

Before we start digging into the above steps, let's have a quick chat about BANs.

Short for **Big Angry Numbers**, BANs are large numbers, typically located in the top left corner of the dashboard, that display KPIs (key performance indicators), such as the following:

Credit Transaction Amount	Debit Transaction Amount	Transaction Count	Account Count
\$958,679	\$7,173,519	46	11

To help you identify the BANs for your dashboard, think about a particular user, who only has a few seconds to spend on the dashboard. Ask yourself, "What are the most important numbers they want to see?"

Define Purpose and Audience

Your purpose and audience frequently drives how much time you devote to your dashboard development. Per Tableau, start by defining your needs:

- Share data for discovery – create an interactive dashboard that allows the user to ask and answer their own data questions.
- Provide an overview of information – keep your dashboard highly aggregated, providing a clean interface of top key performance indicators (KPIs).
- Draw attention to specific insights about the data – tell a story with your data, drawing attention to areas of interest.

Next, per Tableau, identify your audience. If you, or a small group of teammates, will use your dashboard for exploring data regularly, you may not need to spend a great deal of time applying visual best practices to your dashboard. However, if your audience is executive management, or the world (posting your dashboard on a website), it is a good idea to display your information in a clean, easy to understand, and highly interactive format.

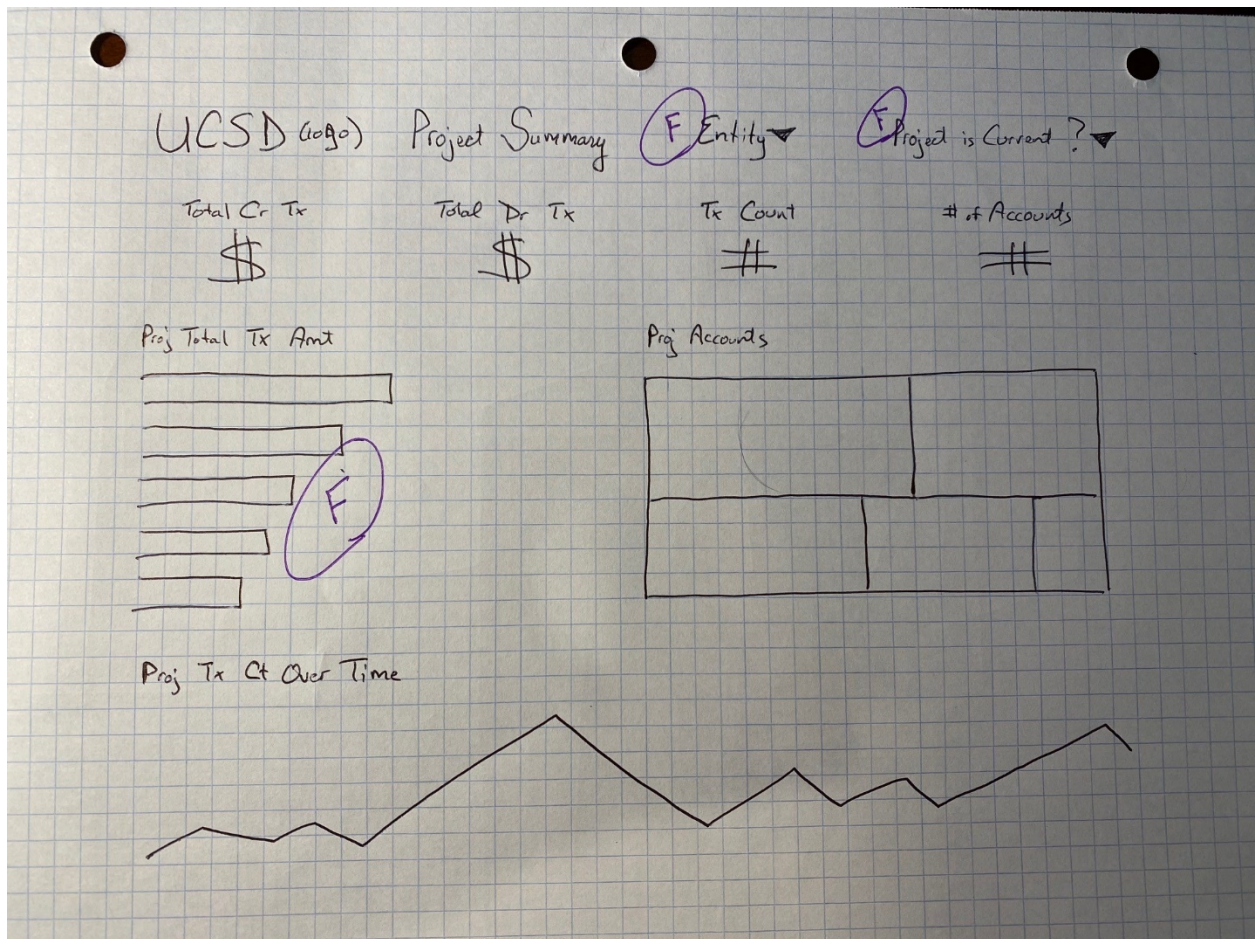
Sketch Your Plan

As an example, you may write down a list of information and functionality you want to see in your final dashboard:

- Create 3 core vizs: profit by city (possibly a bar chart), profit by product (possibly another bar chart), and sales, profit and profit margin over time by month, and sales, profit and profit margin over time.
- Display two dashboard-wide filters:
 - Year (slider format)
 - Sub-Category (single value dropdown)
- Create a BAN viz displaying sales, profit, average discount, and profit margin.
- Add a map viz allowing the user to click on a region to further filter the dashboard.

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Next, make a sketch of the dashboard in order to guide your development process. For example (“F” denotes “filter”):



Build and Test Your Dashboard

We recommend using an iterative process in developing your dashboard. Put one together that you feel roughly meets the needs of your audience. Ask some of those users for input on your rough draft before spending time making it perfect.

Make Your Dashboard Interactive

By giving your users options to filter the dashboard based on exactly what they want to see, you build “stickiness”. By stickiness, we mean that you build a product that users want to spend more time exploring.

Apply Visual Best Practices to the Final Dashboard

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Once you have sign-off from some of your targeted users, spend time to make your dashboard aesthetically pleasing with the feature of conveying its core message after a few moments of viewing.

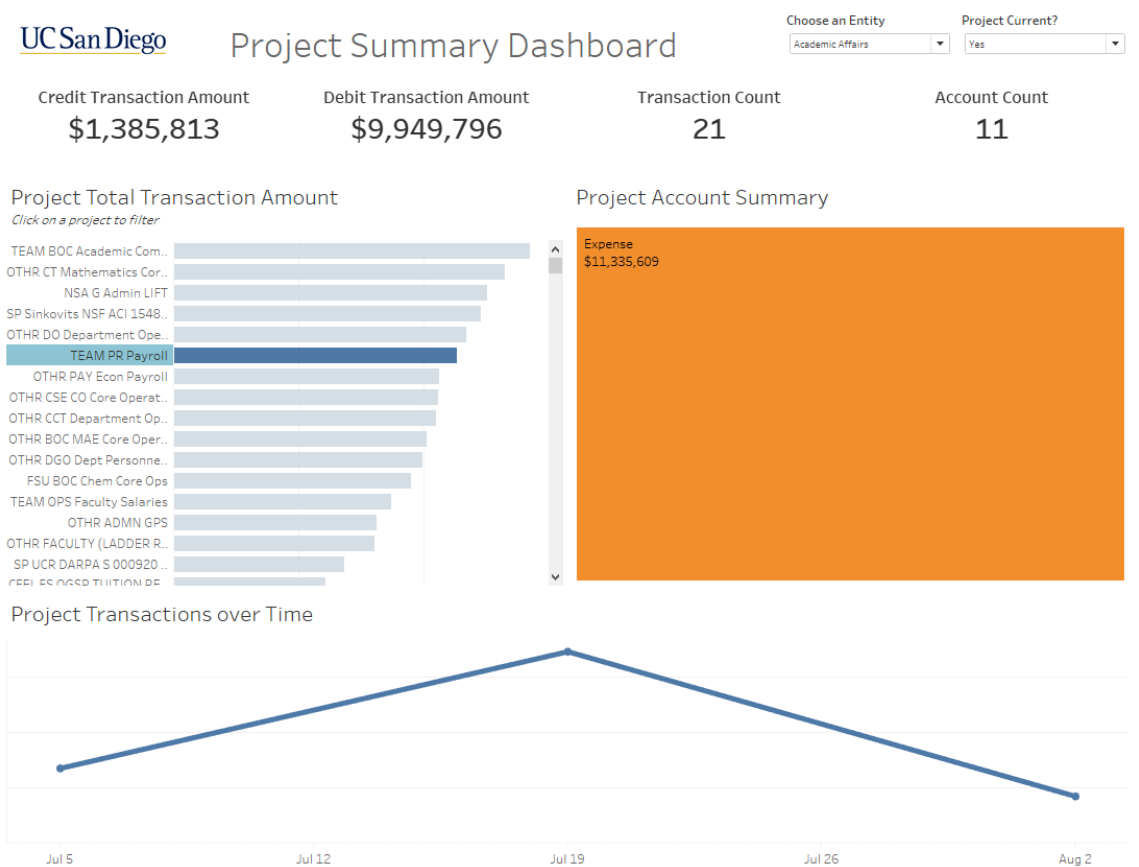
Source: Tableau Desktop II: Intermediate training manual.

In this exercise, we enhance a dashboard with the use of containers and KPI BANs:

- **Total Account Credit Amount \$**
- **Total Account Debit Amount \$**
- **Transaction Count**, and
- **Account Count**

We then adjust our dashboard so existing dashboard actions, as well as any quick filters update the BANs.

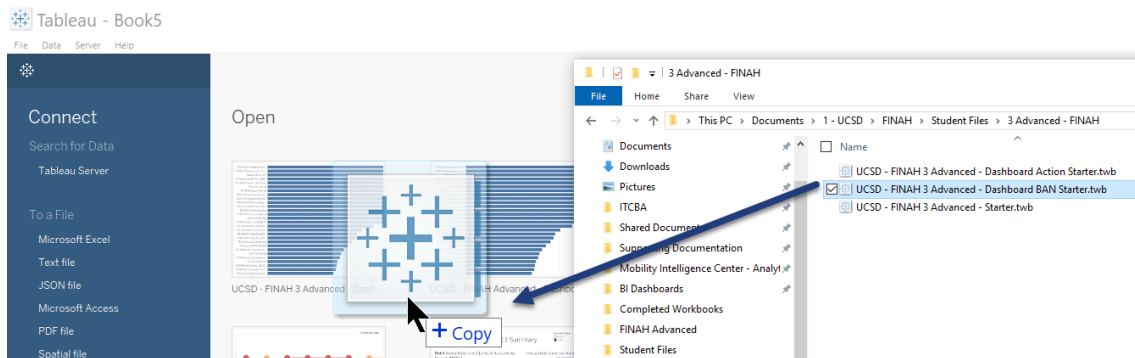
The finished dashboard looks as follows:



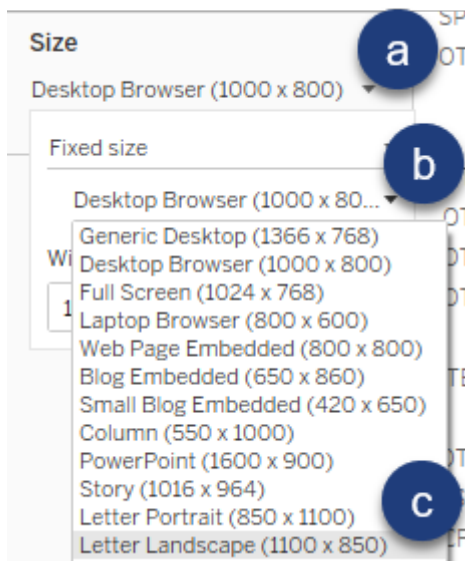
Chapter 5 – Dashboard Techniques

Exercise: Build an Project Summary Dashboard

1. Open a new Tableau Desktop 2019.4 window.
2. From your computer, drag the **UCSD - FINAH 3 Advanced - Dashboard BAN Starter.twb** file into your new Tableau Desktop window:

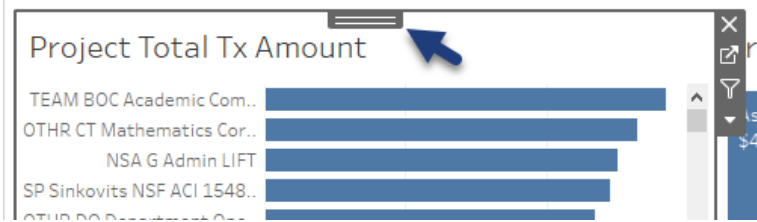


3. In the menu bar, click **File** and **Save As**.
4. Name the file "UCSD - FINAH 3 Advanced - Dashboard BAN".
5. Click on the **Dashboard 1** tab.
6. Change the size of your dashboard (Dashboard 1 tab) to 1,100 x 850 by doing the following:
 - a. In the Size section, click **Desktop Browser (1000 x 800)**.
 - b. In the pop-out menu, click **Desktop Browser (1000 x 800)**.
 - c. In the dropdown list, click **Letter Landscape (1100 x 850)**:

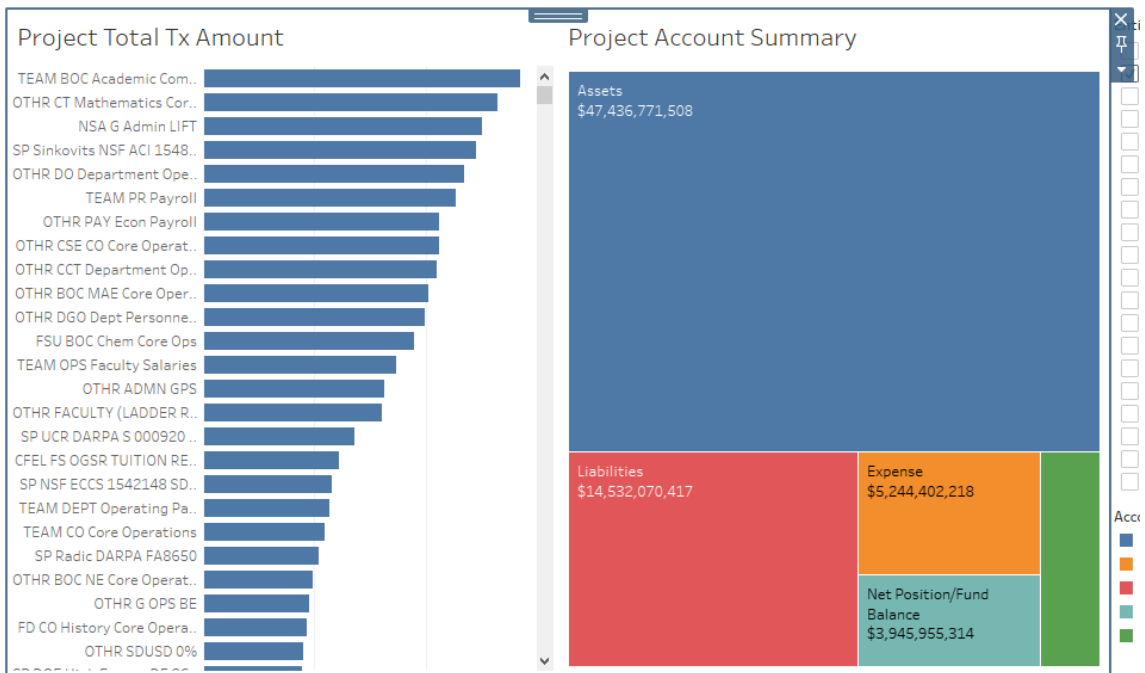


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- Click in the top-left bar chart viz and double-click on the handle (to see the container the bar chart worksheet is in):



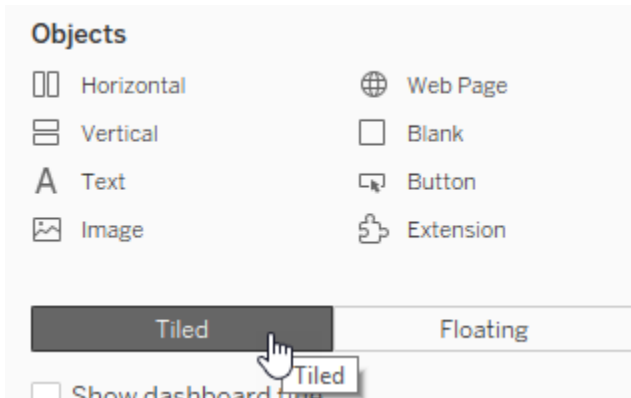
Notice the blue border surrounding the top two visualizations. This indicates that two of the three visualizations are contained within a single container. Containers give us more control over where visualizations, objects, quick filters and parameter controls are located on a dashboard:



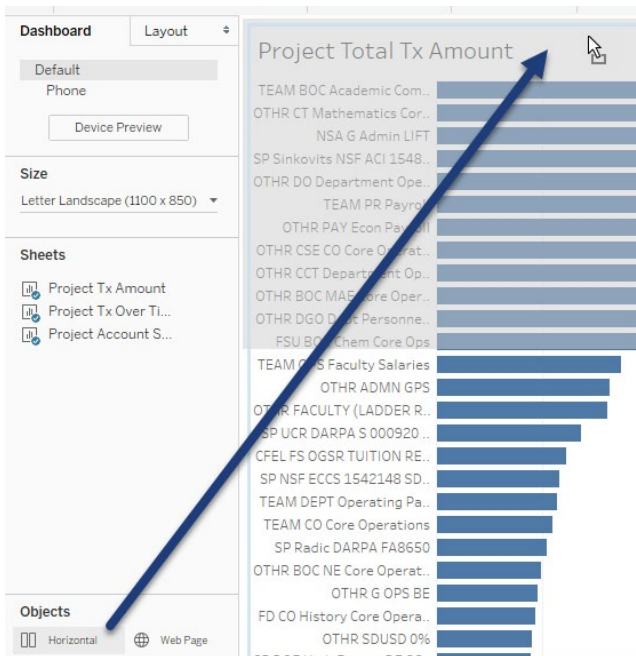
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We add a horizontal container that will hold our new title and two quick filters.

8. Under the Objects section, click on the **Tiled** button:

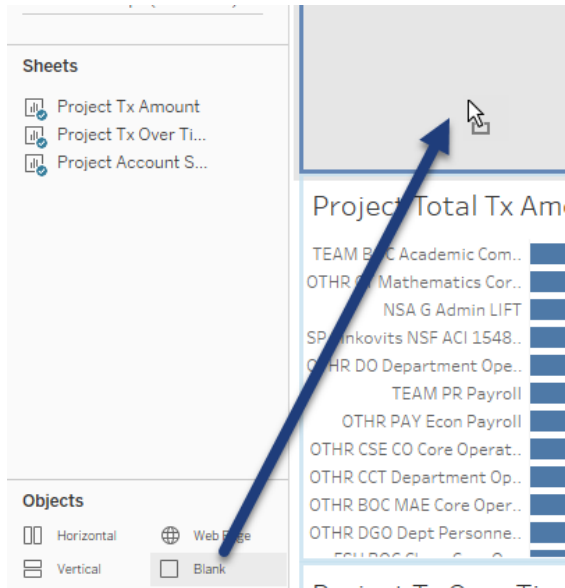


9. From the Objects section, drag **Horizontal** above the existing container on the dashboard canvas:

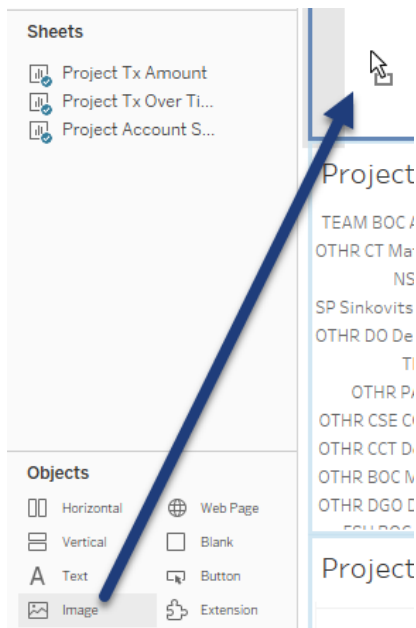


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10. From the Objects section, drag **Blank** into the new container at the top of your canvas:



11. From the Objects section, drag **Image** to the left of the blank object in the top container:



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12. In the Edit Image Object window, do the following:
 - a. Click the **Choose** button, navigate to, then double-click on the **UCSD – FINAH 3 Advanced – Logo.jpg** file:
 - b. Check the box for **Fit Image**.
 - c. Click OK (not shown):



We want to give our users the control on whether they want to see current, non current or both types of projects. Let's do the following:

- Create a calculated field that contains better verbiage
- Add it to one of our worksheets
- Add the new filter to our dashboard.

13. Click on the **Project Tx Amount** worksheet tab.

14. Under Dimensions, right-click on **Project is Current Flag** and click **Show Filter**.

Notice the poor naming convention in the quick filter. We want to replace the Null values with the word "No".

15. On the Filters card, drag the **Project is Current Flag** pill off.

16. Create the following calculated field:

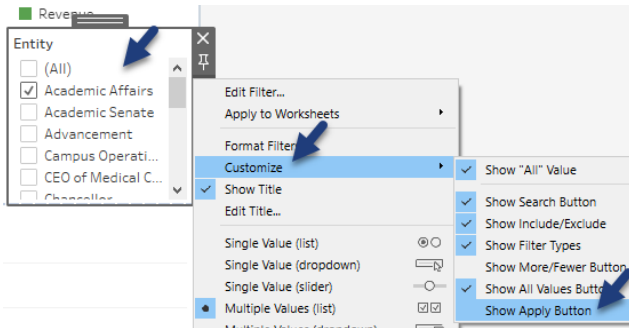
```
Project Current?  
-----  
IF [Project Is Current Flag] = "Yes"  
THEN "Yes"  
ELSE "No"  
END
```

17. Under Dimensions, right-click on **Project Current?** and click **Show Filter**.

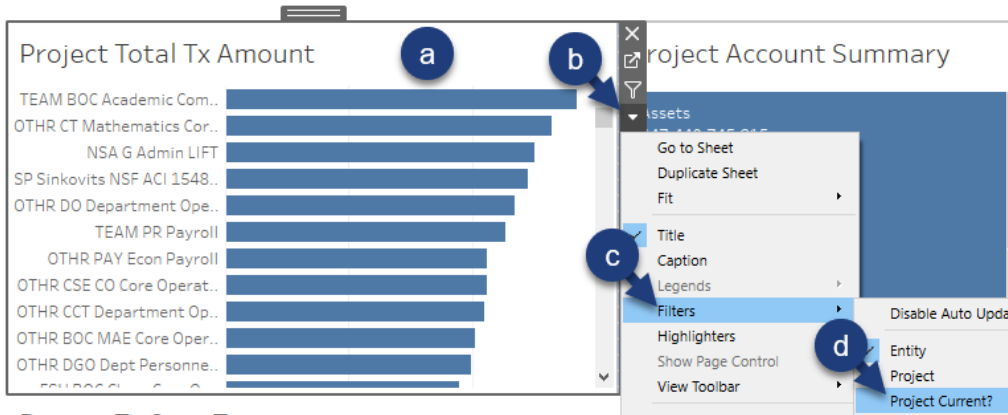
18. Click on the **Dashboard 1** tab.

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19. To format the Entity quick filter, do the following:
- Click the **Entity** quick filter.
 - Click the dropdown arrow.
 - Click **Show Apply Button**:



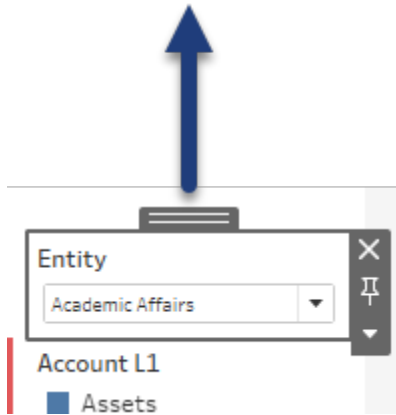
20. Change the Entity quick filter into a multiple values dropdown format by:
- Click the dropdown arrow.
 - Click **Multiple Values (dropdown)**.
21. To make the updated Project Current? filter appear on the dashboard, do the following:
- Click on the **Project Total Tx Amount** worksheet.
 - Click the dropdown arrow on the border.
 - Hover over **Filters**.
 - Click **Project Current?**:



22. Change the **Project Current?** quick filter to a **Single Value (dropdown)** list and get rid of the **(All)** option.

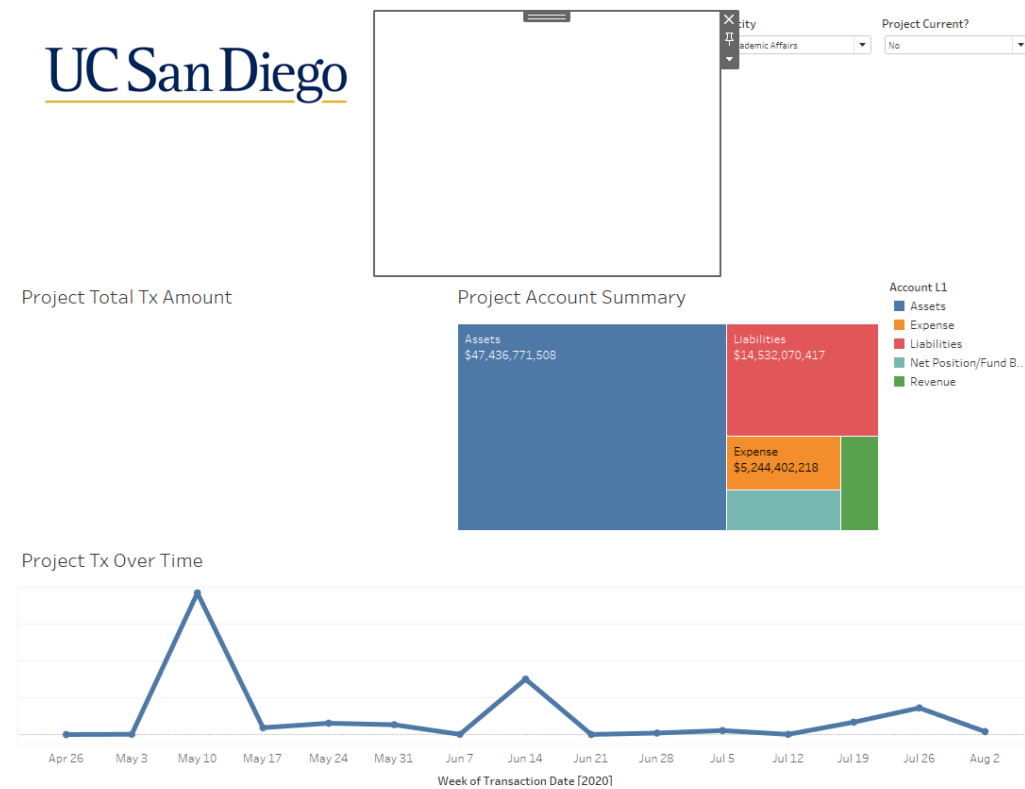
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23. On the right side of the dashboard canvas, click on the **Entity** quick filter and drag it into the top horizontal container, to the right of the blank object:



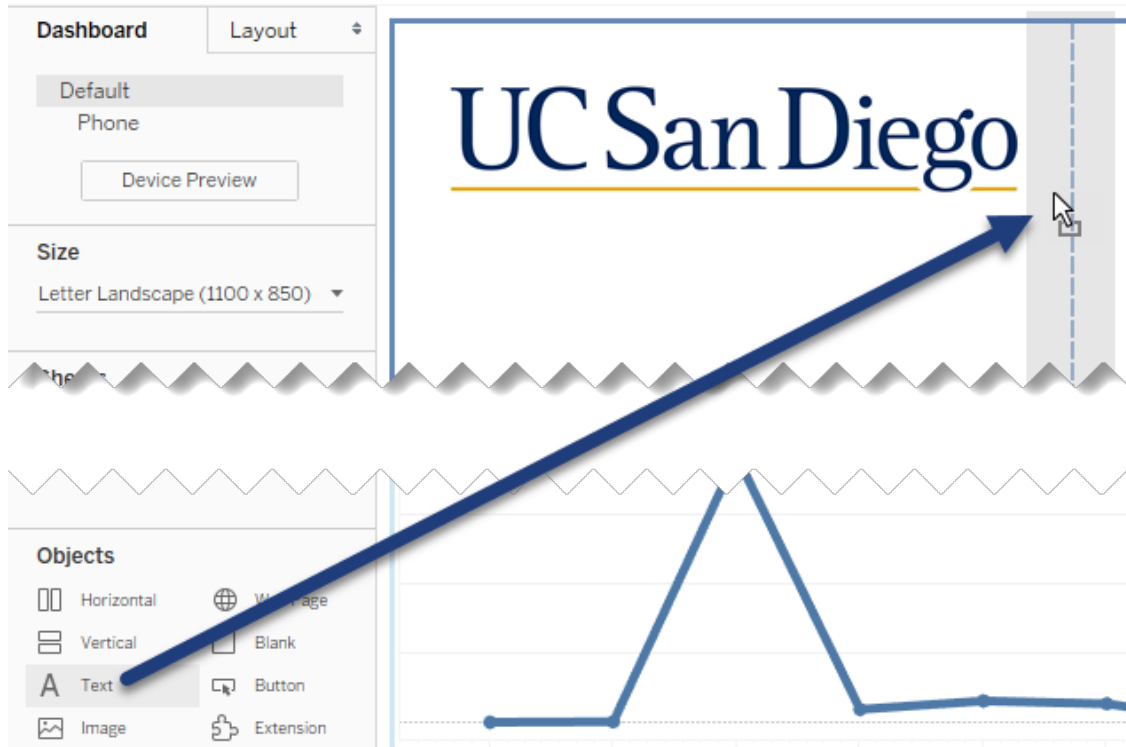
24. Drag the **Project Current?** quick filter to the right of the Entity quick filter, in the horizontal container.

Your dashboard should look as follows:

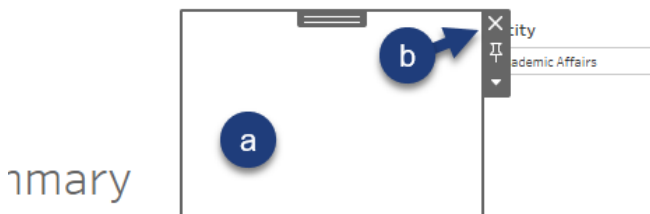


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25. From the bottom left Objects section in the Dashboard pane, drag a **Text** object into the top horizontal layout container, between the UCSD logo and the blank object:



26. In the Edit Text window, type “Project Summary Dashboard” and increase the font size to **24**.
27. In the top horizontal container, remove the blank object:

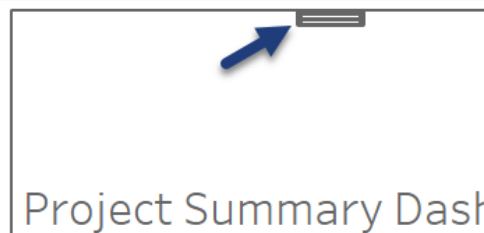


28. To make all text show up, click on the UCSD logo object and drag the handle a bit to the left:

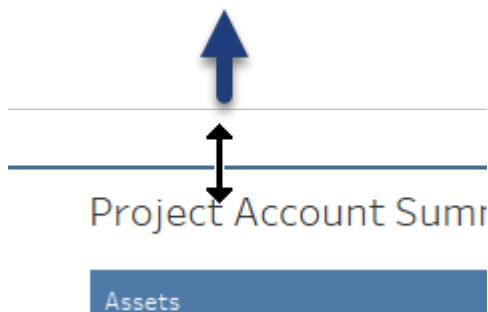


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29. To select the top container, double-click on the text object handle:



30. Drag the lower border of the container up so it is approximately 1" tall:



Next, we create our four KPI BANs and add them to our dashboard. If our BANs can be created by using one dimension and one measure, say number of students by Gender, we could create a single worksheet with the following KPIs:

Female	Male	Other	Grand Total
2,385	2,800	18	5,203

However, with our financial data set, we use four separate measures. We create a worksheet per BAN, then bring all four together in a horizontal container in our dashboard:

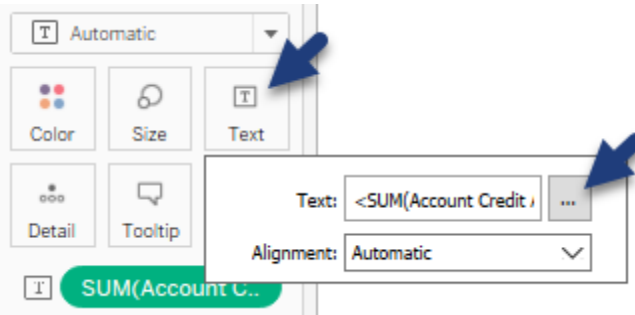
- **Total Account Credit Amount \$**
- **Total Account Debit Amount \$**
- **Transaction Count**, and
- **Account Count**

31. Create a new worksheet named "BAN Cr Tx".

32. From Measures, drag **Account Credit Amt** to the **Text** button on the Marks card.

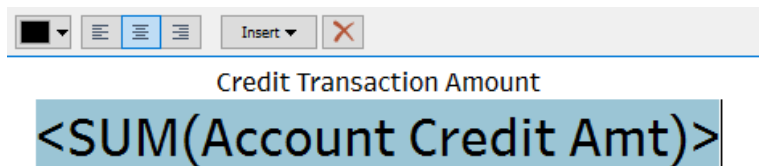
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33. On the Marks card, click the **Text** button and click the  icon:



34. In the Edit Label window, do the following:
- At the beginning of the text, hit Enter.
 - In the blank top line, type "Credit Transaction Amount".
 - Bold all text.
 - Change the font size of the top **Credit Transaction Amount** text to **12**.
 - Change the font size of the bottom **<SUM(Account Credit Amt)>** text to **22**.

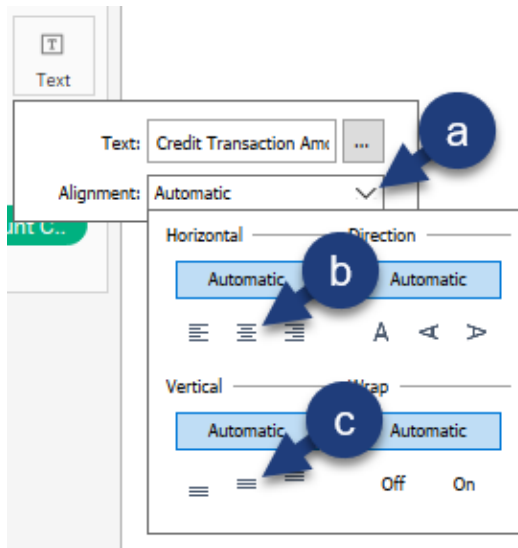
Your Edit Label window should look as follows:



35. Click OK to close the Edit Label window.

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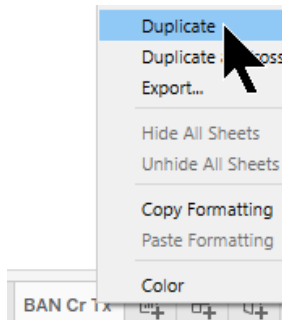
36. With the Text pop-out window still open, do the following:
- Click the **Alignment** field.
 - Change the **Horizontal** alignment to **Center**.
 - Change the **Vertical** alignment to **Middle**.
 - Click outside of the pop-out window:



37. In the toolbar, click the **Fit** menu and click **Fit Width**:

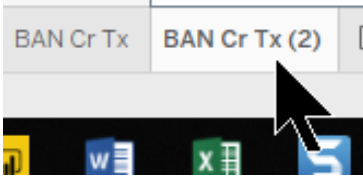


38. Right-click on the **BAN Cr Tx** tab and click **Duplicate**:

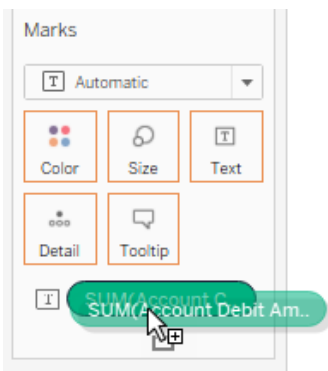


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39. Rename the tab “BAN Dr Tx”:



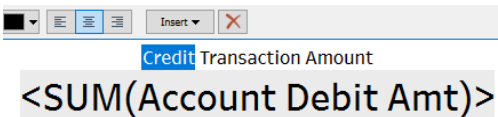
40. From Measures, drag **Account Debit Amt** to the Marks card, on top of the **SUM(Account Credit Amt)** pill:



41. On the Marks card, click the **Text** button and click the elipses button:



42. In the Edit Label window, change the Credit text in the first line to “Debit”. Click OK:



43. Duplicate the **BAN Dr Tx** worksheet and rename the tab “BAN Tx Count”.

44. From Measures, drag **Transaction Count** to the Marks card, on top of the **SUM(Account Debit Amt)** pill.

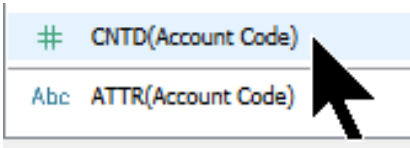
45. On the Marks card, click the Text button and click the elipses button.

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46. In the Edit Label window, change the first line of text to “Transaction Count”.
Click OK:

Transaction Count
<AGG(Transaction Count)>

47. Duplicate the **Tx Count** worksheet and rename the tab “BAN Account Count”.
48. From Dimensions, right-click-drag the **Account Code** field to the Marks card, on top of the **AGG(Transaction Count)** pill.
49. In the Drop Field window, click **CNTD(Account Code)**. Click OK:



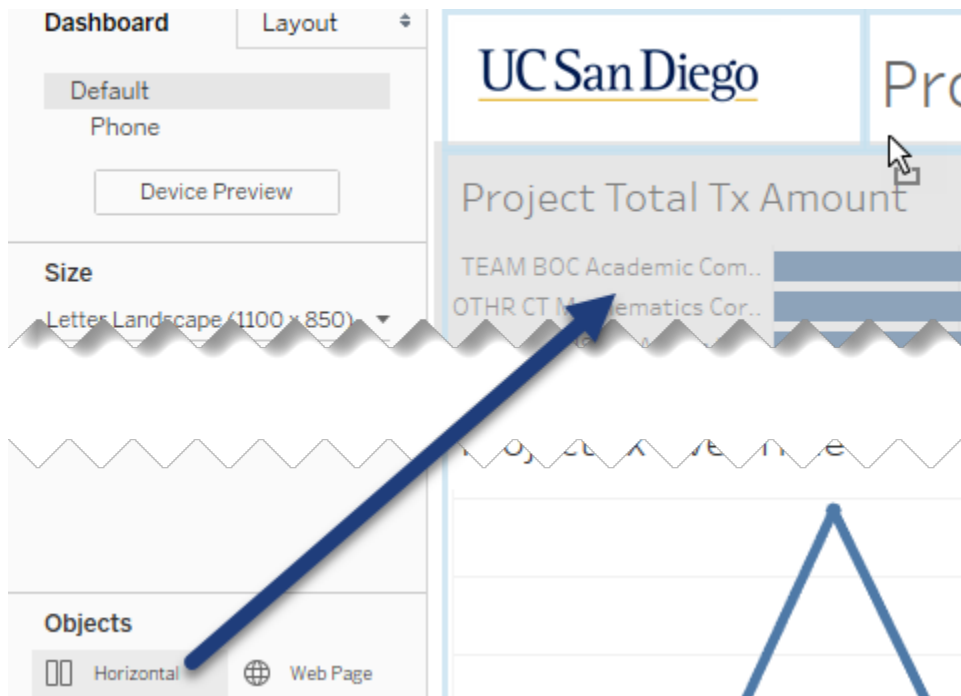
50. Edit the text label to list “Account Count”:

Account Count
<CNTD(Account Code)>

51. Click on the **Dashboard 1** tab.

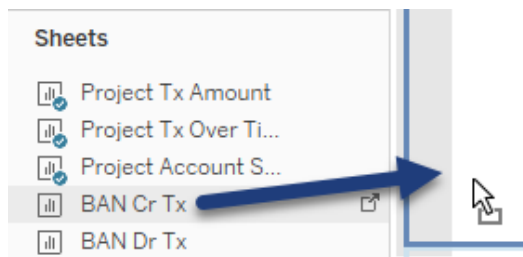
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52. From Objects, drag **Horizontal** (a container) to the top half of the visualizations, below the top container:



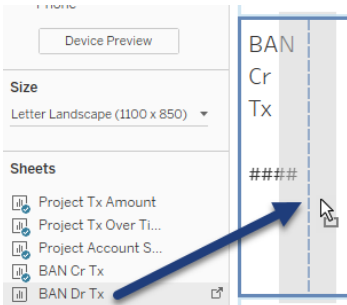
53. From Objects, drag **Blank** into the new container.

54. From Sheets, drag **BAN Cr Tx** to the left of the Blank object in the new container:



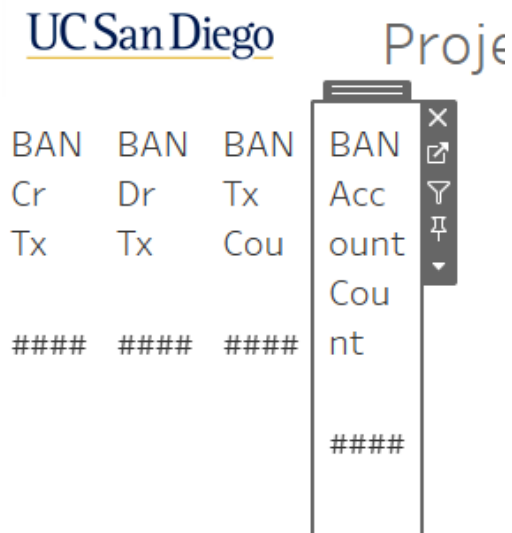
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55. From Sheets, drag **BAN Dr Tx** inbetween the BAN Cr Tx worksheet and the Blank object in the new container:

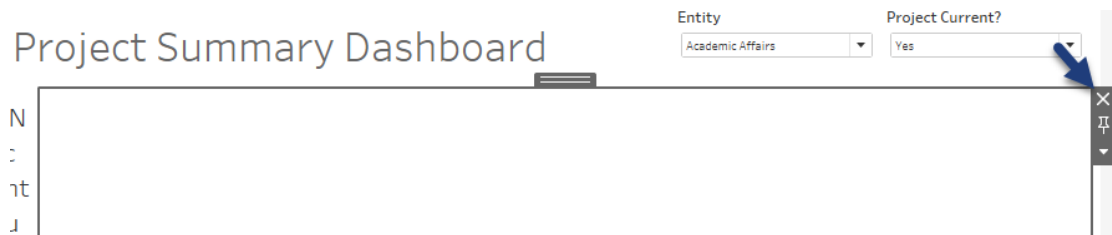


56. From Sheets, drag **BAN Tx Count** inbetween the BAN Dr Tx worksheet and the Blank object in the new container.
57. From Sheets, drag **BAN Account Count** inbetween the BAN Tx Count and the Blank object in the new container.

Your dashboard should look similar to the following:

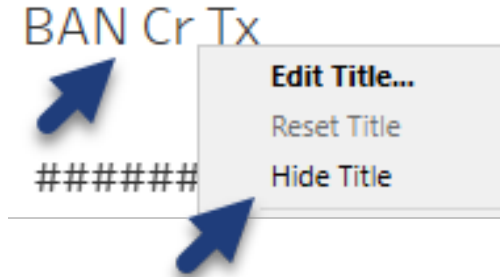


58. In the new container, remove the blank object:



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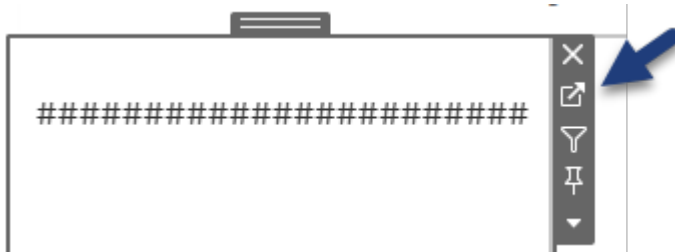
59. In the **BAN Cr Tx** worksheet, right-click on the title and click **Hide Title**:



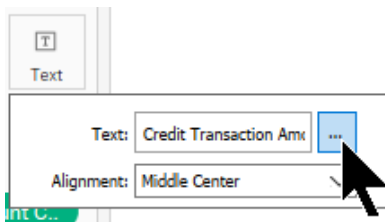
60. Hide the titles of the other three BAN worksheets.

Not all values show up in the BANs. Reduce the BAN size to 20.

61. Click on the leftmost BAN worksheet and click the **Go to Sheet** button:

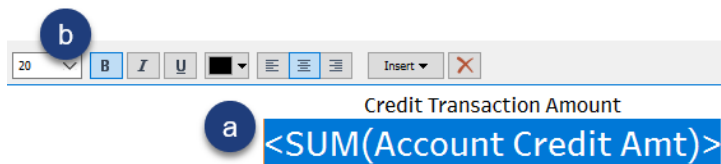


62. In the BAN Cr Tx worksheet, in the Marks card, click the Text button and click the ellipses button:

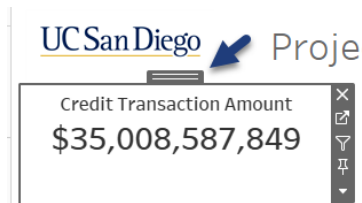


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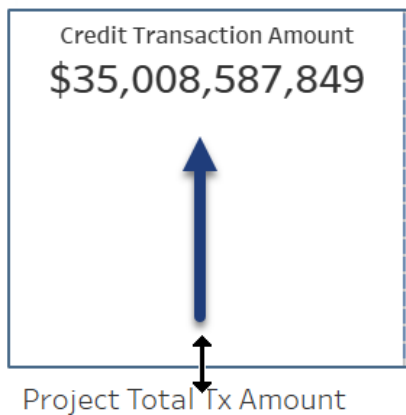
63. In the Edit Label window, do the following:
- Select the second line of text.
 - Change the size to **20**.
 - Click OK:



64. Repeat the above text resizing on the other three BAN worksheets (for a consistent look in your dashboard).
65. Click on the **Dashboard 1** tab.
66. In the new container, double-click on the handle for one of the four BAN worksheets (this selects the whole container):

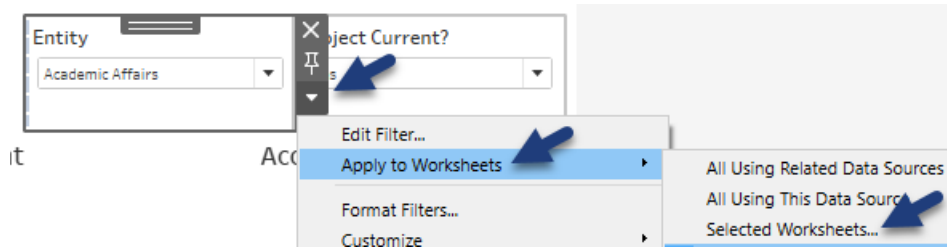


67. Hover over the bottom of the new container until double arrows appear, then drag the bottom border up to just below the BAN worksheet text:

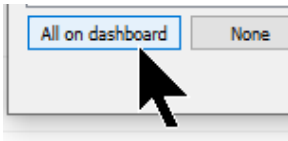


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68. To have the Entity quick filter apply to the new BAN worksheets as well as all other worksheets on the dashboard, do the following:
- Click the **Entity** quick filter.
 - Click the dropdown arrow in the border toolbar.
 - Hover over **Apply to Worksheets**.
 - Click **Selected Worksheets**:



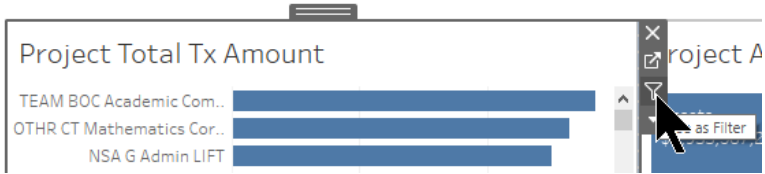
69. At the bottom of the Apply Filter window, click the **All on dashboard** button. Click OK:



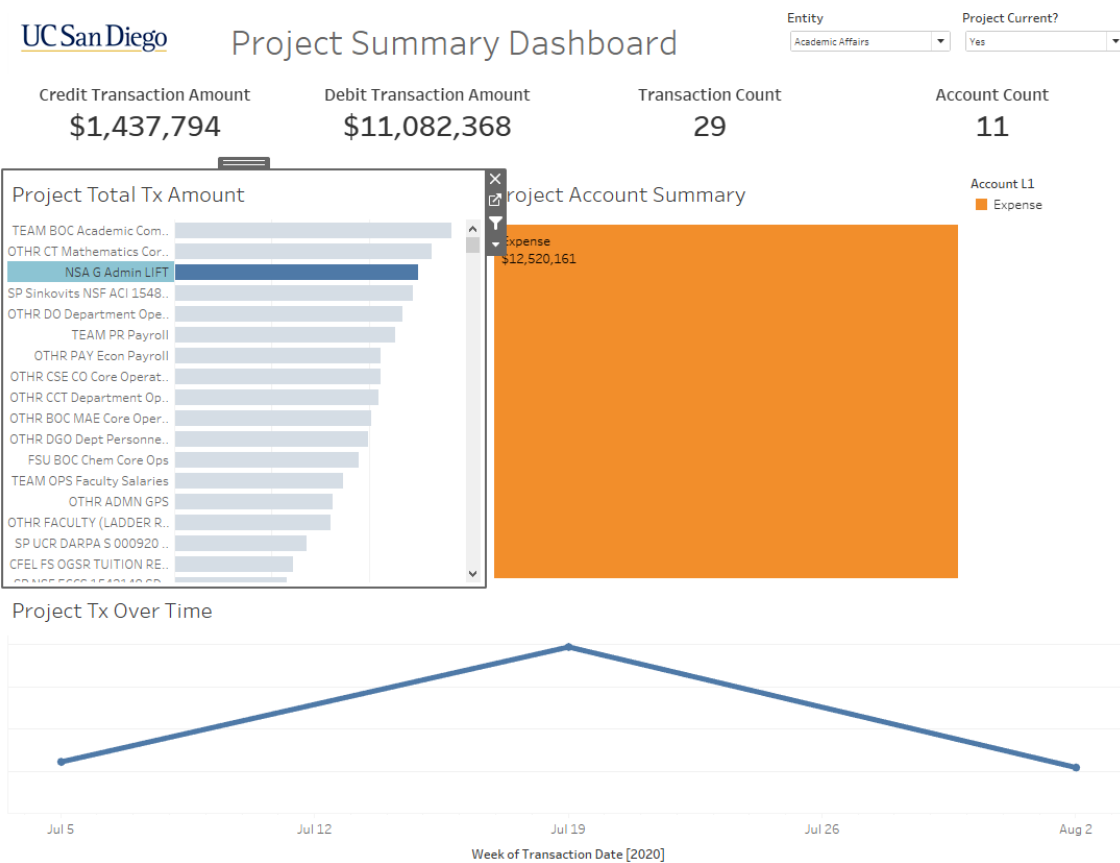
70. Apply the above steps on the **Project Current?** quick filter.
71. Change the value in the **Project Current?** quick filter to **Yes**.

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72. Make the Project Total Tx Amount bar chart a filter:



73. In the Project Total Tx Amount bar chart, click on the **NSA G Admin Lift** header or mark. Notice how the dashboard elements update:

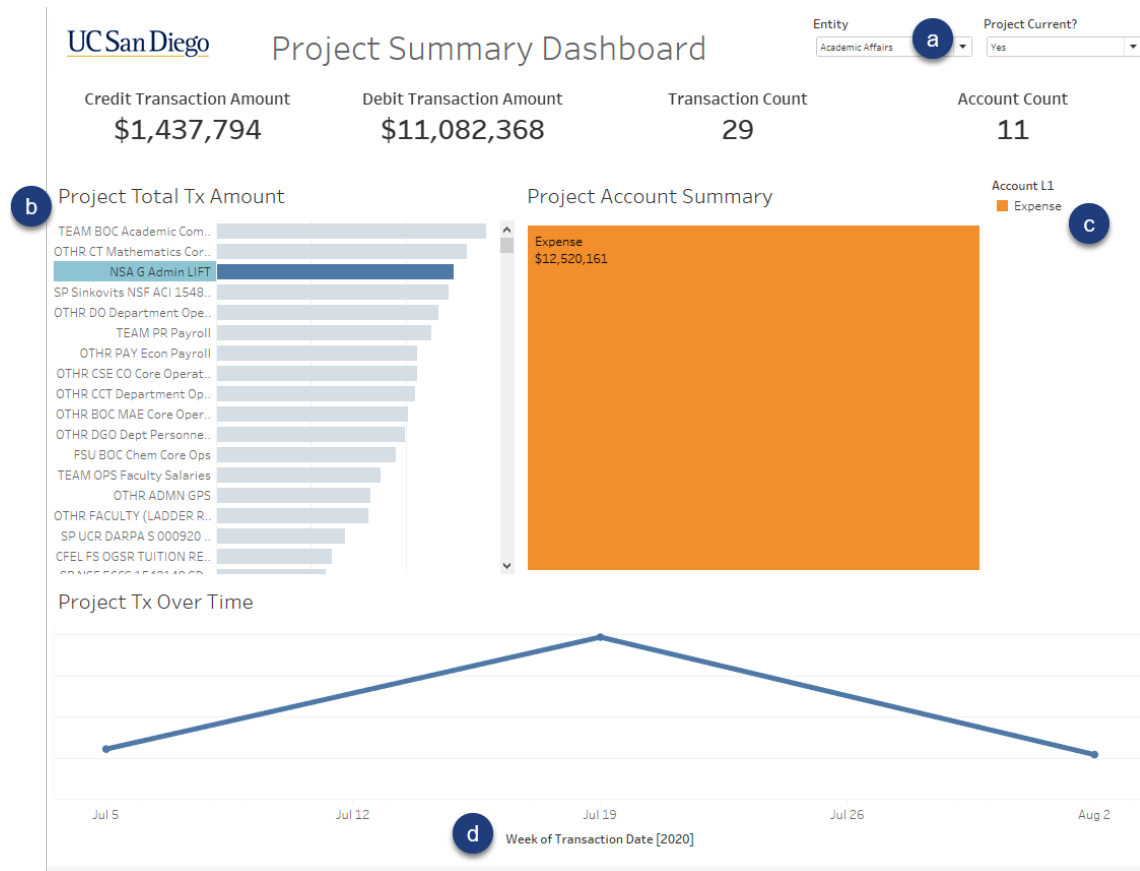


Knowing what we've learned so far in this class, and from your personal experience, what are some additional "tweaks" we can make to our dashboard to improve its cleanliness and understandability?

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While not an exhaustive list, here are some items that can be refined:

- Change the Entity quick filter title to “Choose an Entity”.
- Update the title to include a second small line of italicized text to the title such as, “*Click on a project to filter*”.
- Remove this unnecessary card.
- Edit the timeline axis to not display an axis title.



74. Save your workbook.

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Your dashboard should look as follows:

