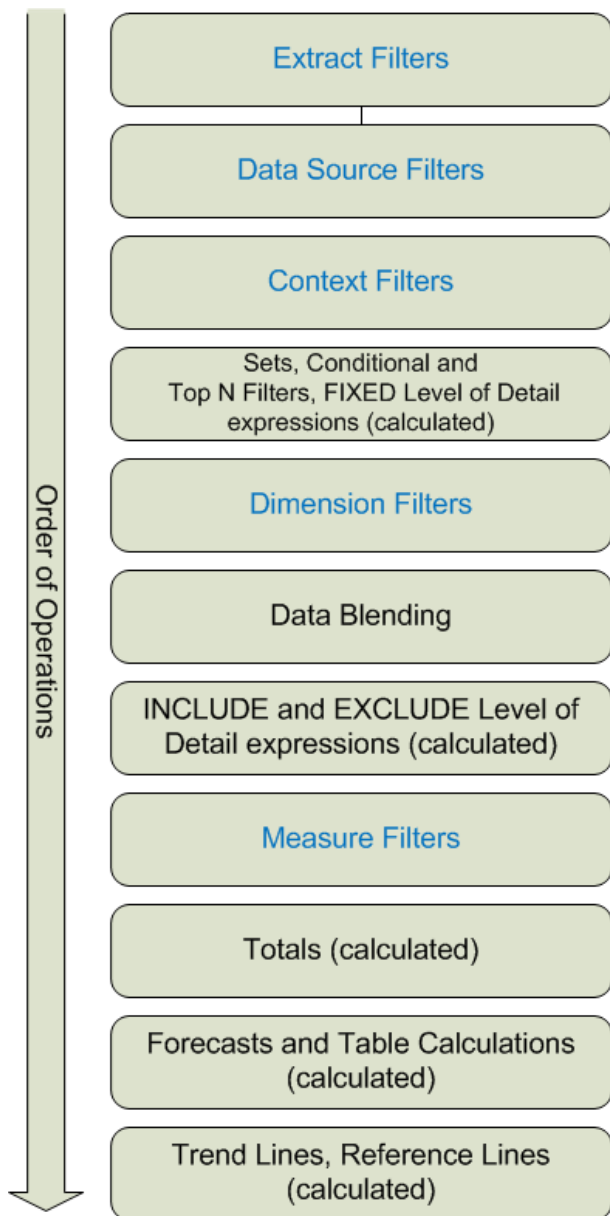# Advanced Test Drive

Topics to be covered:

When/where are things computed in Tableau?

What are the different types of calculations available?

Why/when should I use each?

Tableau's Query Pipeline:

Order of Operations

- Extract Filters
- Data Source Filters
- Context Filters
- Sets, Conditional and Top N Filters, FIXED Level of Detail expressions (calculated)
- Dimension Filters
- Data Blending
- INCLUDE and EXCLUDE Level of Detail expressions (calculated)
- Measure Filters
- Totals (calculated)
- Forecasts and Table Calculations (calculated)
- Trend Lines, Reference Lines (calculated)

Why should I learn this?

To troubleshoot why Tableau is acting a certain way
- Top Filters not working
- Data not being filtered

To utilize the order of operations to achieve added analysis
- Dynamic Hide as opposed to filtering
- Calculate values post / prior to filtering

Row Level Calculations

Any calculation that doesn't aggregate in the Tableau syntax.

- Use this calc if the answer to "Can I have my results computed for every row *and then* use the Tableau interface to choose my aggregation?" is **yes**

- Ex: [Profit] / [Sales]

- Should be used over all other calculations if the desired result can be achieved

- Results can be materialized in a Tableau Data Extract (optimize) so that the logic never needs to be run again

- Often leads to performance gains as it is calculated by the database (or Tableau Data Engine)

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Aggregate Calculations

Any calculation that explicitly defines aggregation in the syntax, but doesn't utilize any Table functions or LOD functions.

- Use this calc if the answer to "Can I have my results computed for every row *and then* use the Tableau interface to choose my aggregation?" is **no**

- Ex: SUM([Profit]) / SUM([Sales])

- Should be used when row level calculations cannot be used.

- Cannot be materialized in the Tableau Data Extract because results rely on the [Dimensions] used in the view.

- Often leads to performance gains as it is calculated by the database (or Tableau Data Engine).

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Row vs Aggregate Level Calculations
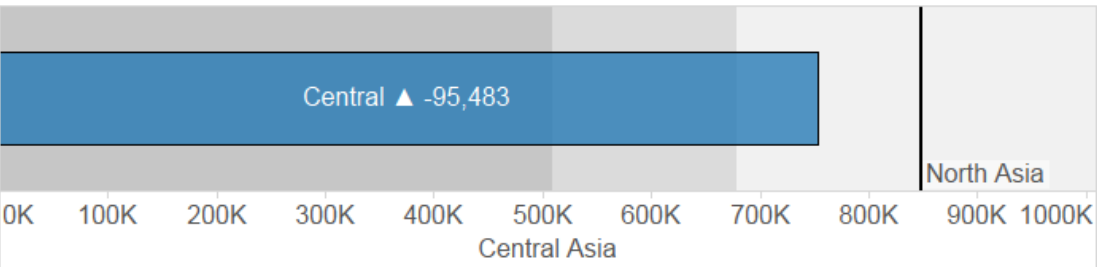
Demo + Performance Recorder

Row Level Exercise

Find the [Sales] for Furniture Category
Find the [Sales] for Office Supplies
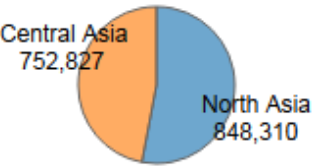Find the difference in [Sales] between those two Categories

Row Level Exercise 1

Central Asia	752,827
North Asia	848,310
Central vs North Delta	-95,483

Extra Credit: Turn the text table on the left to something more visual.
Below are some examples to try:

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Aggregate Calculation Exercise

Show me this year QTD [Sales] vs Last Year QTD [Sales] as percentage, but do not use a table calculation.

QTD vs Last Year QTD

Last Year QTD	111,220
This Year QTD	101,502
% Attainment	91.26%

Extra Credit: Make it visual!
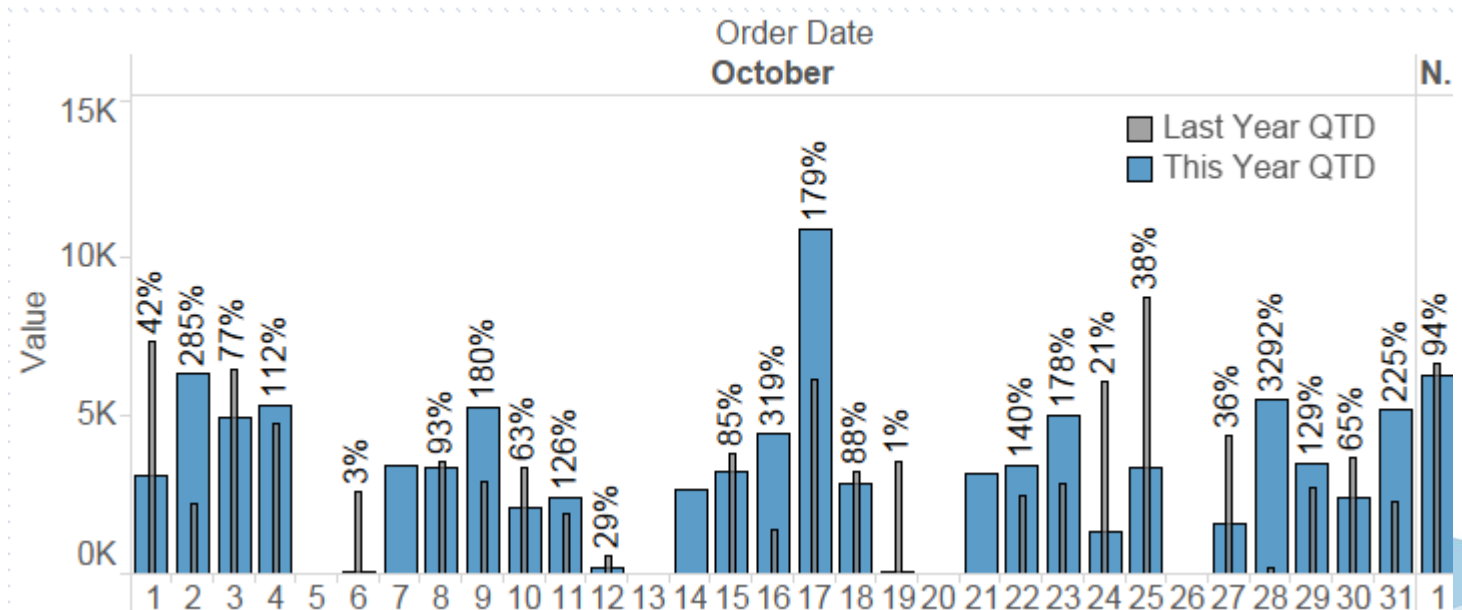

Visual QTD Attainment
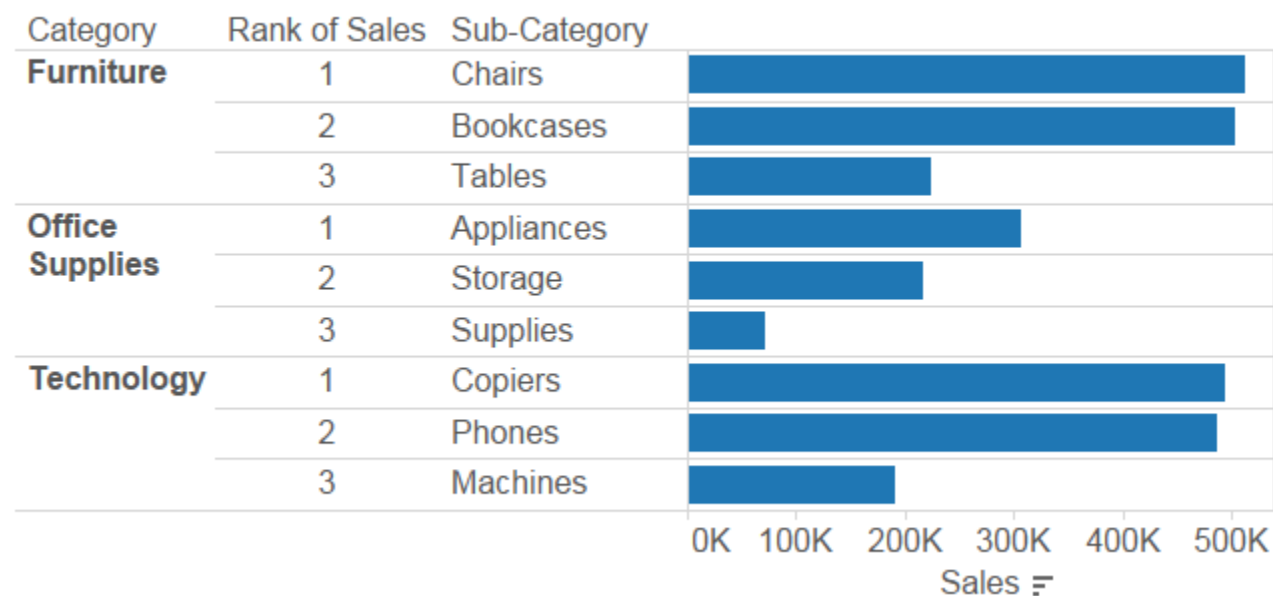
Table Calculations

A special Tableau calculation that allows additional calculations to be ran on top of the result set from an existing aggregated calculation.

- Use this calc if the answer to "Do I have all the relevant Dimensions needed for this calculation already in the view?" is **yes.**

- Results of an aggregated calculation are initially calculated by the database (or Tableau Data Engine). Those results are then loaded into RAM and the additional Table Calculation logic is then performed on that result set.

- Ex: WINDOW_AVG(SUM([Sales]))

- Performance relies heavily on the size of the result set, not necessarily the speed of the initial query going to the database.

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Table Calculation Exercise

Rank the top 3 [Sub-Categories] within each [Category].

Extra Credit: Give the end user the ability to adjust the top N within each Category

Level of Detail Calculations

To be used when aggregation needs to be done at a level that is either on or not on the view.

- Use this calc if the answer to "Do I have all the relevant Dimensions needed for this calculation already in the view?" is **no**… OR **yes**.

- Ex: { FIXED [Customer Name]: AVG([Quantity])}

- In many cases, these are interchangeable with Table Calculations.

- Calculations are done at the database level and can be expensive. Most LOD calculations use sub-select in the queries and there are occasions where we will perform cross joins.

LOD Exercise – Average Order by Customer

Show me the average order size (in [Sales]) by [Customer Name].

HINT:
I need the total [Sales] for each customer and then I need to find the average of that.

Average Order Size by Customer

4,510

Extra Credit: Solve using both a Table Calculation, Reference Line and a LOD Calculation.

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