

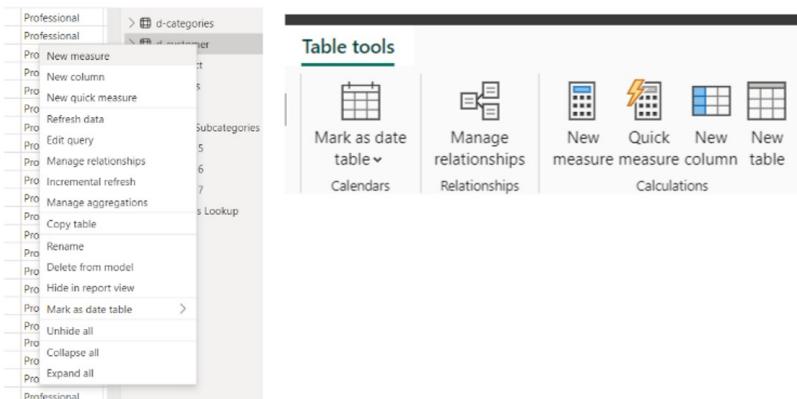
DAX - 1

10 September 2024 22:30

DAX - 1



Calculated Column		Measure	
<ul style="list-style-type: none">Create a new columnUnderstand row contextCan be seen in both data view and report viewIncrease file size		<ul style="list-style-type: none">Create a newly calculated valueUnderstand filter contextCan be seen only in the report viewDoes not increase file size	



A screenshot of the Power BI Data View. At the top, there is a table with a new column named "Target Customer" highlighted in yellow. The formula for this column is: `Target Customer = IF("d-customer"["AnnualIncome"] > 50000 , "YES" , "NO")`. Below the table, there is a video call interface showing a person in a video conference.

A screenshot of Power BI Desktop showing a table of customer data. The table includes columns for Gender, EmailAddress, AnnualIncome, TotalChildren, EducationLevel, Occupation, HomeOwner, Full Name, and Target Customer 1. The side panel displays a list of DAX functions such as IF, AND, OR, NOT, COUNT, SUM, AVERAGE, MAX, MIN, etc., with their descriptions.

```
Target Customer 2 = IF(AND('d-customer'[AnnualIncome] > 50000 , 'd-customer'[Gender] = "M" , "Yes" , "No")
```

A screenshot of Power BI Desktop showing a table of customer data. The table includes columns for Gender, EmailAddress, AnnualIncome, TotalChildren, EducationLevel, Occupation, HomeOwner, Full Name, and Target Customer 1. The side panel displays a list of DAX functions such as IF, AND, OR, NOT, COUNT, SUM, AVERAGE, MAX, MIN, etc., with their descriptions.

```
Target Customer 1 = IF('d-customer'[AnnualIncome] > 50000 , "YES" , "NO")
```

```
Target Customer 2 = IF(AND('d-customer'[AnnualIncome] >= 50000 , 'd-customer'[Gender] = "M") , "Yes" , "No")
```

A screenshot of Power BI Desktop showing the Data Type and Structure panes. The 'AnnualIncome' column is selected. The Data Type pane shows it is a 'Fixed decimal number'. The Structure pane shows a table with columns: Gender, EmailAddress, and AnnualIncome. The data in the table includes rows for M, emmanuel15@adventure-works.com, \$20,000.00; M, dalton31@adventure-works.com, \$20,000.00; M, julio18@adventure-works.com, \$20,000.00; M, bradley19@adventure-works.com, \$20,000.00; and M, clarance28@adventure-works.com, \$20,000.00.

M VS. DAX

M and DAX are two distinct functional languages used within Power BI Desktop:

- M is used in the Power Query editor, and is designed specifically for extracting, transforming and loading data.
- DAX is used in the Power BI front-end, and is designed specifically for analyzing relational data models

M CODE

A screenshot of the Power Query Editor. The Properties pane shows a 'Territory Lookup' under 'Name'. The Applied Steps pane shows a 'Source' step and a 'Promoted Headers' step.

DAX

A screenshot of a Report View showing a table with columns: Category Name, Total Returns, and Bike Returns. The data includes: Accessories (Total Returns: 1,115, Bike Returns: 427); Bikes (Total Returns: 427, Bike Returns: 427); Clothing (Total Returns: 267); and a summary row (Total: 1,809, Bike Returns: 427).

```

    #"Changed Type" = Table.TransformColumnTypes(
        #"Promoted Headers", // after we promoted headers
        {
            {"SalesTerritoryKey", Int64.Type}, // that changes column datatypes
            {"Region", type text},
            {"Country", type text},
            {"Continent", type text}
        }
    )

```

```

    1 Bike Returns =
    2 CALCULATE(
    3     [Total Returns],
    4     'Product Categories Lookup'[Category Name] = "Bikes" // filtered for bikes only
    5 )

```

CALCULATED COLUMNS

Calculated columns allow you to add new, formula-based columns to tables in a model

- Calculated columns refer to entire tables or columns (no A1-style cell references).
- Calculated columns generate values for each row, which are visible within tables in the Data view.
- Calculated columns understand row context; they're great for defining properties based on information in each row, but generally useless for aggregation (sum, count, etc.)

HEY THIS IS IMPORTANT!

As a rule of thumb, use calculated columns to "stamp" static, fixed values to each row in a table (or go upstream and use the Query Editor!) DO NOT use calculated columns for aggregation – this is what measures are for!

PRO TIP:

Calculated columns are typically used for filtering & grouping data, rather than creating aggregate numerical values

EXAMPLE: CALCULATED COLUMNS

Email Address	Annual Income	Total Children	Education Level	Parent
emma32@adventure-works.com	70000	5	Bachelors	Yes
barry20@adventure-works.com	40000	5	High School	Yes
martha13@adventure-works.com	70000	5	High School	Yes
tamara16@adventure-works.com	40000	5	High School	Yes
gerald21@adventure-works.com	130000	5	Bachelors	Yes
alexa8@adventure-works.com	40000	5	High School	Yes
jack53@adventure-works.com	70000	5	Graduate Degree	Yes

The screenshot shows a Power BI interface with a table containing several columns. One column, 'Customer Lookup', has a tooltip displayed over it. The tooltip lists five properties: Annual Income, Birth Date, Customer Key, Education Level, and First Name. The 'First Name' property is highlighted with a yellow border. The table data includes columns for Email Address and Total Children.

			Total Children	Customer Lookup
martina3@adventure-works.com	40000	5	High School	Yes
tamara16@adventure-works.com	40000	5	Bachelors	Yes
gerald21@adventure-works.com	130000	5	High School	Yes
alex8@adventure-works.com	40000	5	Graduate Degree	Yes
jack53@adventure-works.com	70000	5	Bachelors	Yes
ricky1@adventure-works.com	100000	5	Partial College	Yes
keith4@adventure-works.com	70000	5	Bachelors	Yes
latoya19@adventure-works.com	70000	5	Bachelors	Yes

- Since calculated columns understand row context, a new value is calculated in each row based on the value in the [Total Children] column.
- This is a valid use of calculated columns; it creates a new row "property" that we can use to filter or segment any related data within the model.

Here we're using an aggregation function (SUM) to calculate a new column named Total Quantity

- Since this is an aggregation function, the same grand total is returned in every row of the table
- This is not a valid use of calculated columns; these values are statically "stamped" onto the table and can't be filtered, sliced, etc.

DAX MEASURES

Measures are DAX formulas used to generate new calculated values

- Like calculated columns, measures reference entire tables or columns (no A1-style cell references).
- Unlike calculated columns, measures aren't visible within tables; they can only be "seen" within a visualization like a chart or matrix (similar to a calculated field in a PivotTable).
- Measures evaluate based on filter context, which means they recalculate when the fields or filters around them change.

HEY THIS IS IMPORTANT!

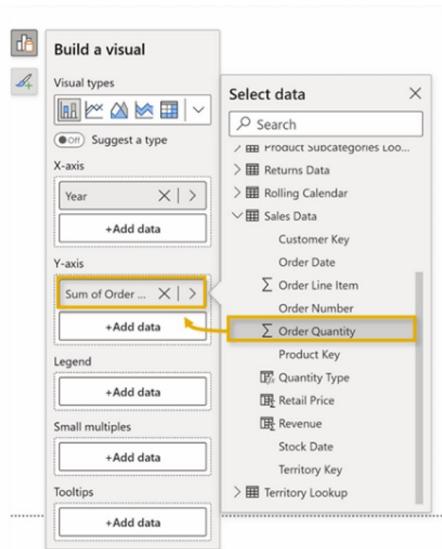
As a rule of thumb, use measures when a single row can't give you the answer, or when you need to aggregate values across multiple rows in a table

aggregate values across multiple rows in a table

PRO TIP:

Use measures to create numerical, calculated values that can be analyzed in the "values" field of a report visual

IMPLICIT VS. EXPLICIT MEASURES



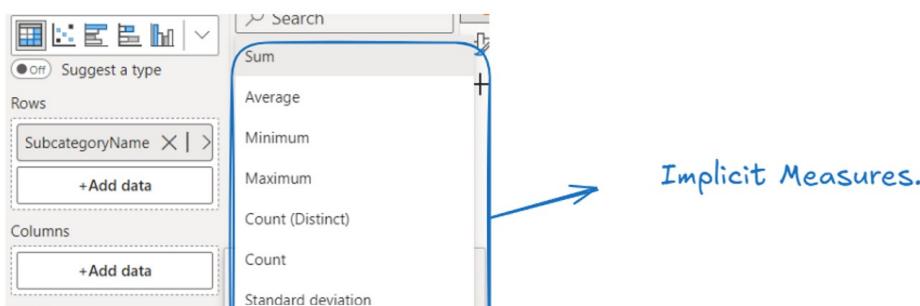
Example of an implicit measure

Explicit measures are created when you actually write a DAX formula and define a new measure that can be used within the model

HEY THIS IS IMPORTANT!

Implicit measures are only accessible within the specific visualization in which they were created, and cannot be referenced elsewhere.

Explicit measures can be used anywhere in the report, and referenced by other DAX calculations to create "measure trees".



The screenshot shows the Power BI Data View interface. On the left, under 'Columns', there is a 'Sum of OrderQuantity' column and a 'Sum of ReturnQuantity' column, both with '+Add data' buttons. On the right, under 'Count (Distinct)', there is a 'Count' button, followed by 'Standard deviation', 'Variance', 'Median', and a 'Sum' button.

RECAP: CALCULATED COLUMNS VS. MEASURES

CALCULATED COLUMNS

- Values are calculated based on information from each row of a table (row context)
- Appends static values to each row in a table and stores them in the model (which increases file size)
- Recalculate on data source refresh or when changes are made to component columns
- Primarily used for filtering data in reports

MEASURES

- Values are calculated based on information from any filters in the report (filter context)
- Does not create new data in the tables themselves (doesn't increase file size)
- Recalculate in response to any change to filters within the report

The screenshot shows a Power BI table with columns: Birth Date, Marital Status, Email Address, Annual Income, Total Children, Education Level, and Parent. A yellow box highlights the 'Parent' column. Below the table, the text 'Calculated columns "live" in tables' is written with an arrow pointing to the table.

