Dax Expressions

Objective

After completing this chapter, you will be able to know;

- Dax Expressions In Power BI
- Table Dax, Calculated column, DAX measure and difference

Introduction to DAX

- Data Analysis Expressions (DAX) is a formula expression language used in Analysis Services, Power BI, and Power Pivot in Excel. DAX formulas include functions, operators, and values to perform advanced calculations and queries on data in related tables and columns in tabular data models.
- There are three different types of calculations, and each are defined by using DAX:
    1. Calculated columns
    2. Calculated tables
    3. Measures
- DAX = Data Analysis Expressions (DAX), consisting of:
    - Excel functions (~80 functions)
    - Table functions
    - Aggregate functions
    - Relationship navigation functions
    - Context modification functions
    - Time Intelligence functions

Differences between a calculated column and a measure

The fundamental difference between a calculated column and a measure is that a calculated column creates a value for each row in a table. For example, if the table has 1,000 rows, it will have

1,000 values in the calculated column. Calculated column values are stored in the Power BI .pbix file. Each calculated column will increase the space that is used in that file and potentially increase the refresh time.

Measures are calculated on demand. Power BI calculates the correct value when the user requests it. When you previously dragged the Total Sales measure onto the report, Power BI calculated the correct total and displayed the visual. Measures do not add to the overall disk space of the Power BI .pbix file.

Measures are calculated based on the filters that are used by the report user. These filters combine to create the filter context.

Calculated Tables

- Calculated Tables add new tables to the model, based on existing data from other tables.
  - Calculated tables are generally best for intermediate calculations of data stored in the model, rather than calculated on the fly.
  - Calculated tables appear in Relationship View, and relationships can be defined with other tables.
  - If possible, to reduce the model size, avoid creating them.
  - Calculated tables are recalculated in the same circumstances as calculated columns.

Create a calculated table

You create calculated tables by using the **New table** feature in Report View, Data View, or Model View of Power BI Desktop.

For example, imagine you're a personnel manager who has a table of **Northwest Employees** and another table of **Southwest Employees**. You want to combine the two tables into a single table called **Western Region Employees**.

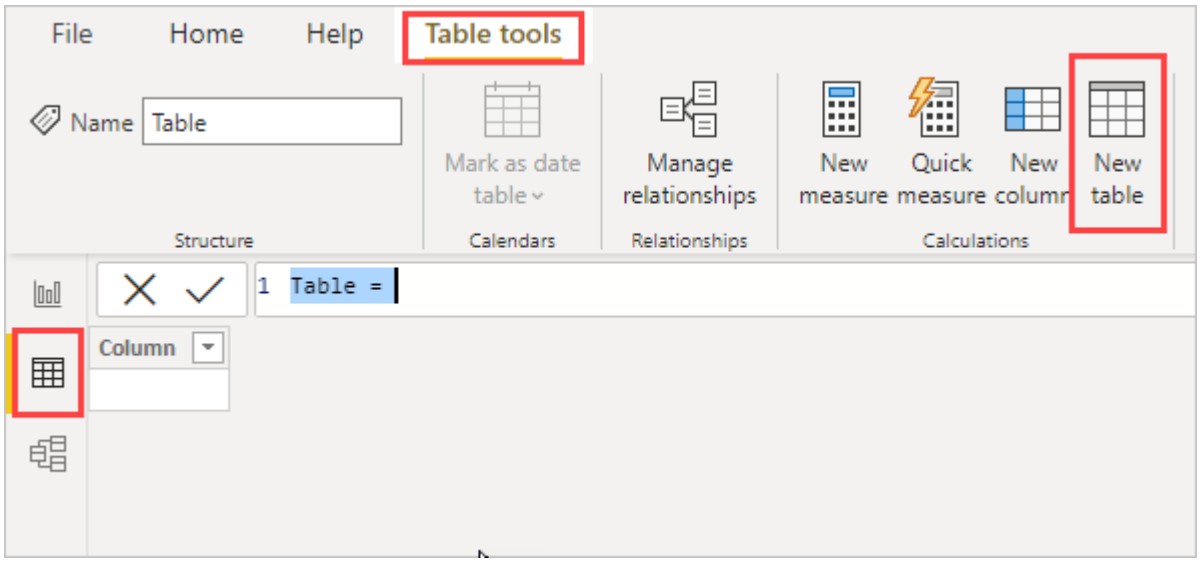
Northwest Employees

Employee	City	State	Tenure
Allen, Kerry	Eugene	OR	1
Baker, Cameron	Portland	OR	15
Morin, Max	Redmond	WA	10
Ramirez, Riley	Portland	OR	3
Rocha, Kim	Redmond	WA	15
Smith, Avery	Redmond	WA	15

Southwest Employees

Employee	City	State	Tenure
Connors, Morgan	San Diego	CA	10
Irwin, Jesse	Phoenix	AZ	3
Nguyen, Rory	Los Angeles	CA	3
Torres, Devon	Los Angeles	CA	2

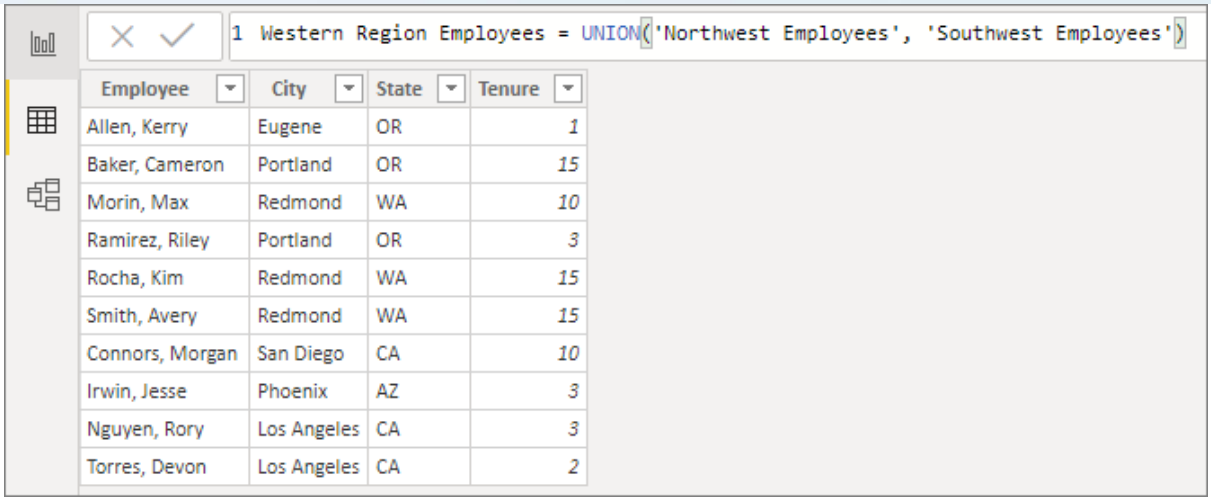
In Report View, Data View, or Model View of Power BI Desktop, in the **Calculations** group select **New table**. It's a bit easier to do in **Table tools** in the Data View, because then you can immediately see your new calculated table.



Enter the following formula in the formula bar:

Western Region Employees = UNION('Northwest Employees', 'Southwest Employees')

A new table named **Western Region Employees** is created, and appears just like any other table in the **Fields** pane. You can create relationships to other tables, add measures and calculated columns, and add the fields to reports just like with any other table.



```
1 Western Region Employees = UNION('Northwest Employees', 'Southwest Employees')
```

Employee	City	State	Tenure
Allen, Kerry	Eugene	OR	1
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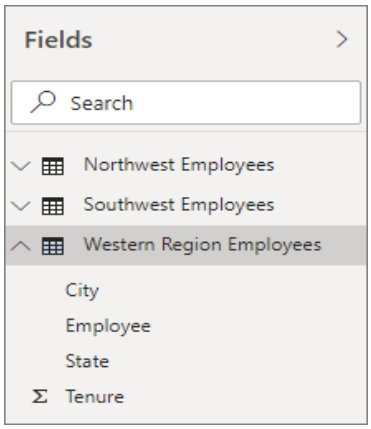

Functions for calculated tables

You can define a calculated table by any DAX expression that returns a table, including a simple reference to another table. For example:

New Western Region Employees = 'Western Region Employees'

CALENDAR FUNCTION

- It's used to set a date range. It returns a table containing a continuous collection of dates with a single column named "Date". The dates in the range are from the start date to the finish date, inclusive of those two dates.

Syntax: CALENDAR(<start_date>, <end_date>)

Parameters:

- start_date: Specify the start date.
- end_date: Specify the end date.

Example:

The following DAX formula returns a table with dates between March 1st, 2021, and August 31st, 2021.

```
CALENDAR (DATE (2021, 3, 1), DATE (2021, 8, 31))
```

CALENDARAUTO FUNCTION

- It is used to automatically include all dates in the model. You don't have to worry about extending the table. When a data refresh is completed, the table is recalculated.

Syntax: `CALENDARAUTO([fiscal_year_end_month])`

- Parameters:
  - fiscal_year_end_month: Any DAX expression that returns a number between 1 and 12 as an integer. If not given, defaults to the value set in the current user's calendar table template, if one exists; otherwise, it defaults to 12.

Example:

The DAX expression below generates a basic calculated date table.

```
ADDCOLUMNS (
  CALENDARAUTO (),
  "Year", YEAR ( [Date] ),
  "Quarter", "Q" & QUARTER ( [Date] ),
  "Month", FORMAT ( [Date], "mmmm" ),
  "Month Number", MONTH ( [Date] )
  )
  ORDER BY [Date] ASC
```