DAX for creating tables and columns

DAX IN POWER BI

Carl Rosseel
Curriculum Manager at DataCamp

DAX stands for data analysis expressions

- DAX is a formula expression language used in multiple Microsoft analytics tools

PowerPivot

Microsoft SQL Server Analysis Services

Azure Analysis Services

- DAX formulas include functions, operators and values to perform advanced calculations
- DAX formulas are used in:
  - **Measures**
  - **Calculated columns**
  - **Calculated tables**
  - Row-level security

The power of DAX

- It opens up new capabilities:
  - Joins, filters, measures and calculated fields become part of your toolbox
- DAX + Power Query = a powerful data analysis tool:
  - Dive deeper into the data and extract key insights
  - Use DAX for rapid prototyping

Measures vs calculated columns

Calculated Columns:

- Calculated on data import
- Visible in data & report Pane

```
COST = Orders[Sales] - Orders[Profit]
```

Order_ID	Sales	Pofit	Cost
3151	$77.88	$3.89	$73.99
3152	$6.63	$1.79	$4.84
3153	$22.72	$10.22	$12.50
3154	45.36	$21.77	$23.59

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Measures:

- Calculated at query run-time
- Visible only in report pane

```
Total Sales = SUM(Orders[Sales])
```

Region	Total Sales
Central	$501,239.89
East	$678,781.24
West	$391,721.91
South	$725.457.82
Total	**$2,297,200.86**

Context allows you to perform dynamic analysis

There are three types of context: row, query and filter context

- Row context: (1)
    - "The current row"
    - DAX calculated columns

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Context allows you to perform dynamic analysis

There are three types of context: row, query and filter context

- Query context: (2)
  - Refers to the subset of data that is implicitly retrieved for a formula
  - Controlled by slicers, page filters, table columns and row headers
  - Controlled by chart/visual filters
  - Applies after row context

Context allows you to perform dynamic analysis

- Query context: (2)
    - *Example:* Filter data by Region.

Region	Total Sales
Central	$501,239
East	$678,781
West	$391,721
South	$725.457

- Query context: (2)
    - *Example:* Filter data by State.

State	Total Sales
Alabama	$13,724
Arizona	$38,710
Arkansas	$7,669
California	$381,306

Context allows you to perform dynamic analysis

There are three types of context: row, query and filter context

- Filter Context: (3)
  - The set of values allowed in each column, or in the values retrieved from a related table
  - By using arguments to a formula or by using report filters on row and column headings
  - Applies after query context

Context allows you to perform dynamic analysis

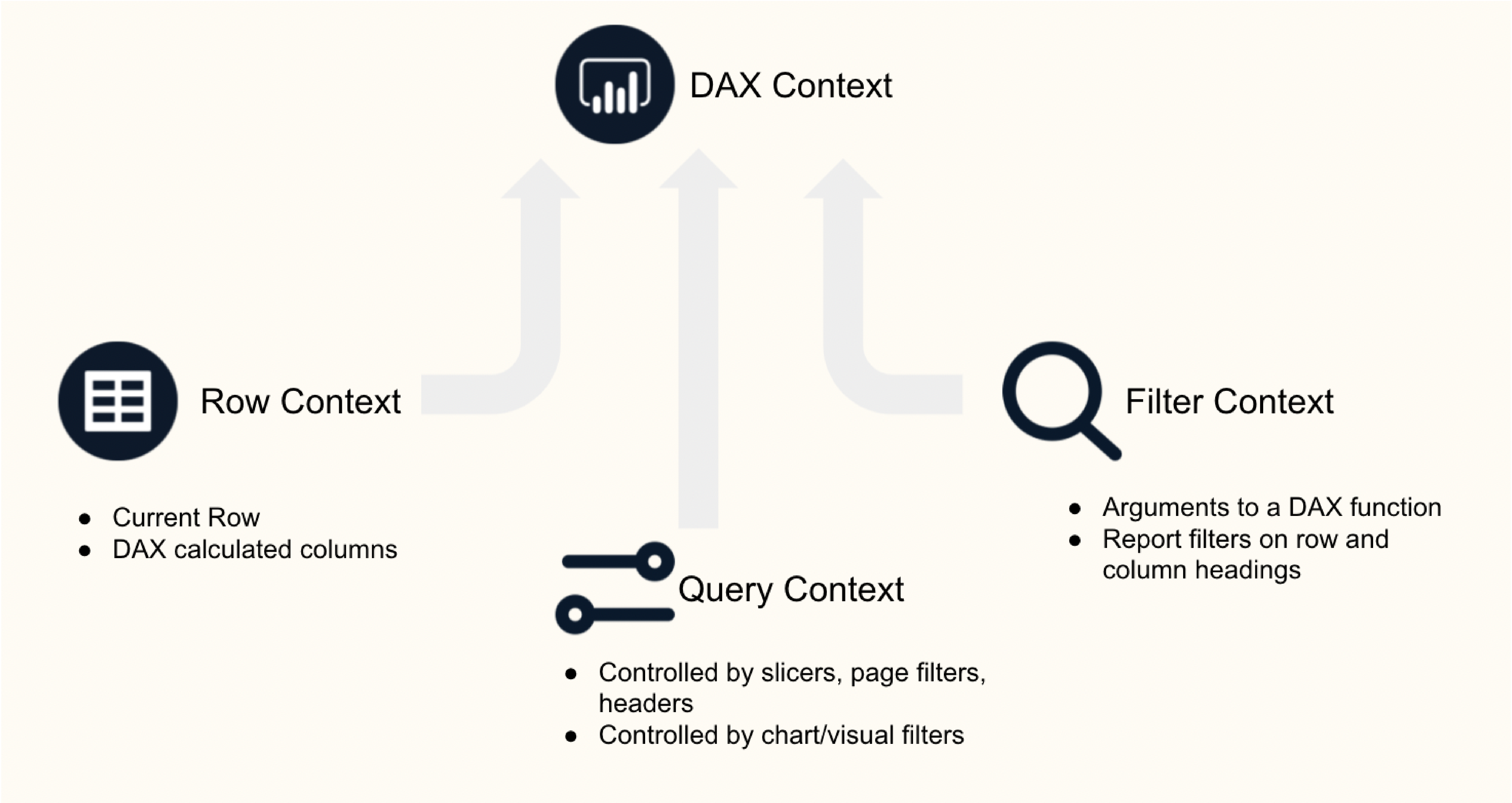
There are three types of context: row, query and filter context.

- Filter Context (3)

```
Total Costs East = CALCULATE([Total Costs], Orders[Region] = 'East')
```

Region	Total costs	Total costs East
Central	$617,039	
East	$587,258	$587,258
West	$461,534	
South	$344,972	
Total	**$2,010,804**	**$587,258**

Context in a nutshell



DAX Context

Row Context

- Current Row
- DAX calculated columns

Query Context

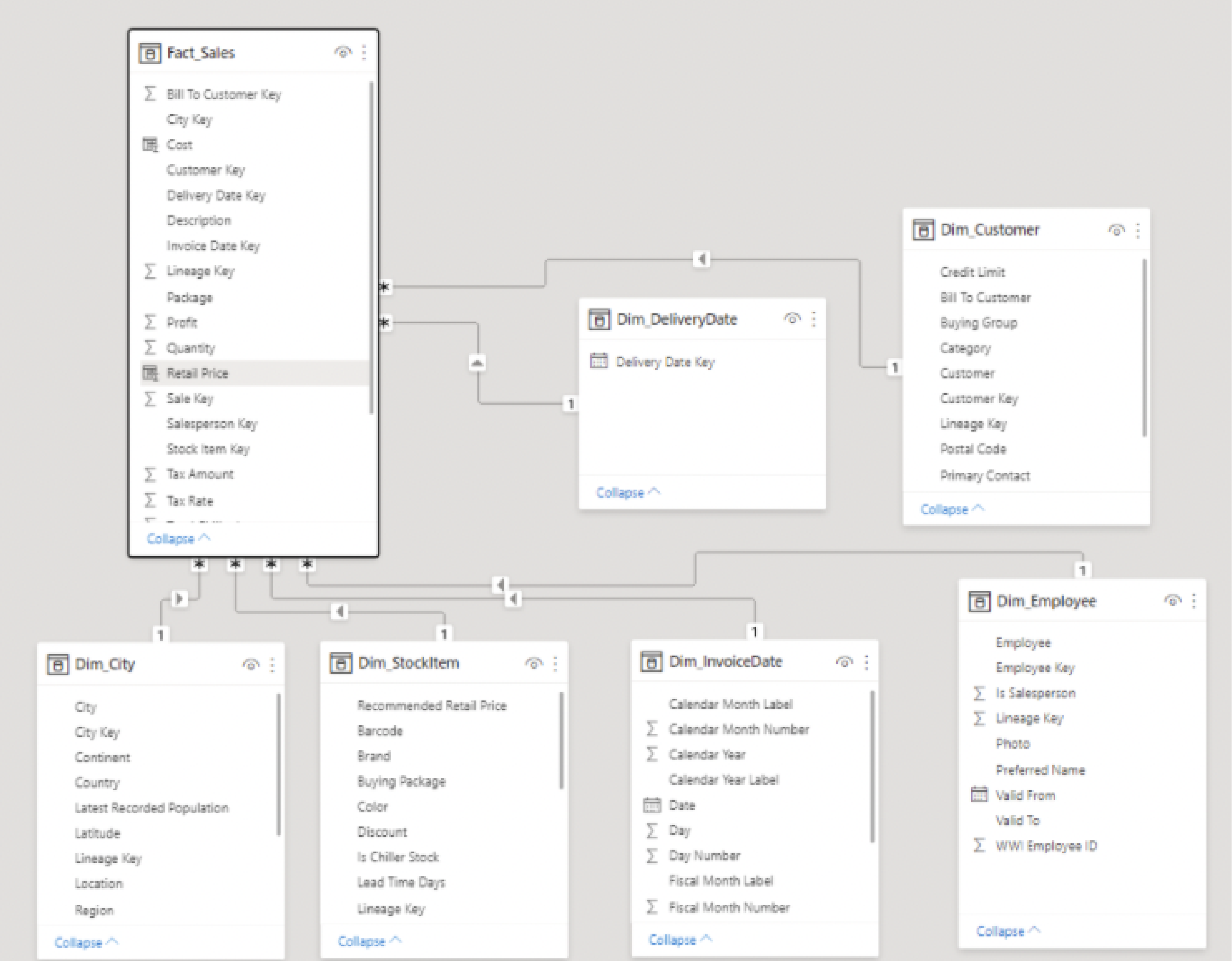
- Controlled by slicers, page filters, headers
- Controlled by chart/visual filters

Filter Context

- Arguments to a DAX function
- Report filters on row and column headings

World wide importers dataset

- A fictitious wholesaler who imports and distributes novelty goods
- The dataset consists of:
  - A fact table that detailing sales transactions
  - Multiple other dimension tables:
    - Dates
    - Customers
    - Cities
    - Employees
    - Stock Items



Let's practice!

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Methods to create DAX measures

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Implicit vs explicit measures

Implicit

- Automatically created by Power BI
- Comes directly from the Database
- E.g.: If we drag `Sales` to values of a table, Power BI will automatically sum it
- Using a dropdown menu we can define the aggregation: sum, average, count, ...

Explicit

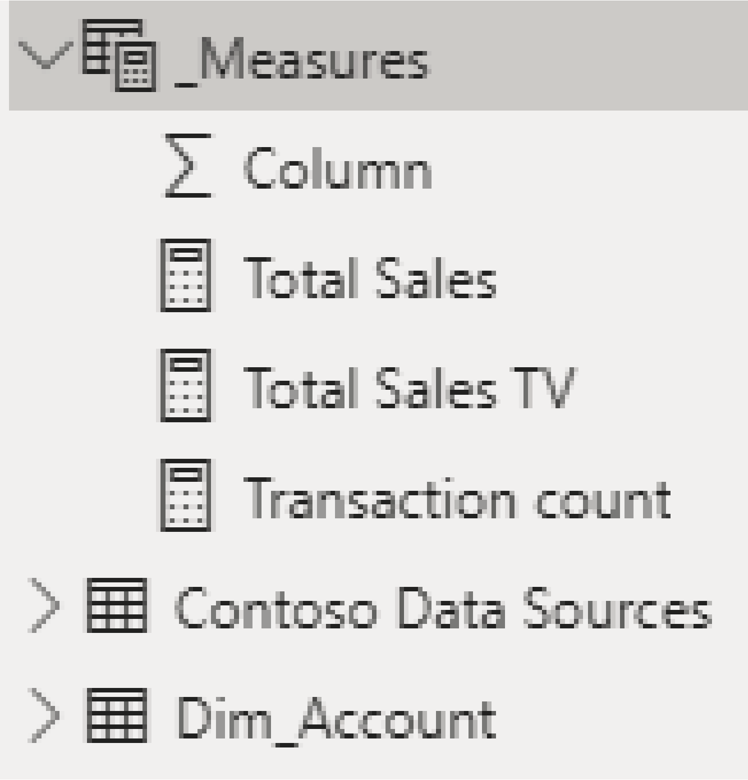
- Writing measures in an explicit way
- E.g.: `Total Sales = SUM(Orders[Sales])`
- Offer flexibility

Why explicit measures are preferred

- Reduces confusion of what a measure is or does
  - `Total Sales = SUM(Orders[Sales])`
  - `Total Sales` is more clear than `Sales` (SUM, AVG, MIN, ... ?)
- Reusable within other measures
  - `Total Sales East = CALCULATE([Total Sales],Orders[Region] = 'East')`
- Can be given a custom name to explain its functionality
- Makes maintenance of complex models more sustainable

Best practices

- **Keep DAX measures grouped together:**
  - Measures are free to move to any table
  - This is in contrast with calculated columns, which belong to a specific table



_Measures

∑ Column

Total Sales

Total Sales TV

Transaction count

Contoso Data Sources

Dim_Account

- **Format and comment with DAX:**
  - Use indentations to increase understanding
    - Shift Enter to start a new line
    - Tab to indent
  - Add comments after a //

Use variables to improve your formulas

- Stores the result of an expression as a named variable
- Can be used as an argument to other measure expressions
- Four main advantages:
  - Improve performance
  - Improve readability
  - Simplify debugging
  - Reduce complexity

Syntax:

- `VAR <name> = <expression>`
  - Name = The name of the variable
  - A DAX expression which returns a scalar or table value
  - Followed by a `RETURN` statement

Use variables to improve your formulas - example

- Calculate the sales from last year and store it as a variable

```
VAR
SALESPRIORYEAR = CALCULATE([SALES],SAMEPERIODLASTYEAR('DATE'))
RETURN
```

- Use the variable in a formula

```
Sales growth = [Sales] - SALESPRIORYEAR
```

Use variables to improve your formulas - example

- All together it would look like this:

```
Sales growth =


VAR
SALESPRIORYEAR = CALCULATE([SALES],SAMEPERIODLASTYEAR('DATE'))
RETURN


Sales growth = [Sales] - SALESPRIORYEAR
```

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DAX and measures

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