SQL KONFERENZ 2025



Understanding DAX It's All About the Context

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Who Are You

Developer

DBA

Analyst

Report Writer

Awesome Human





Selfie time!

Understanding DAX

It’s all about the Context











DAX Intro

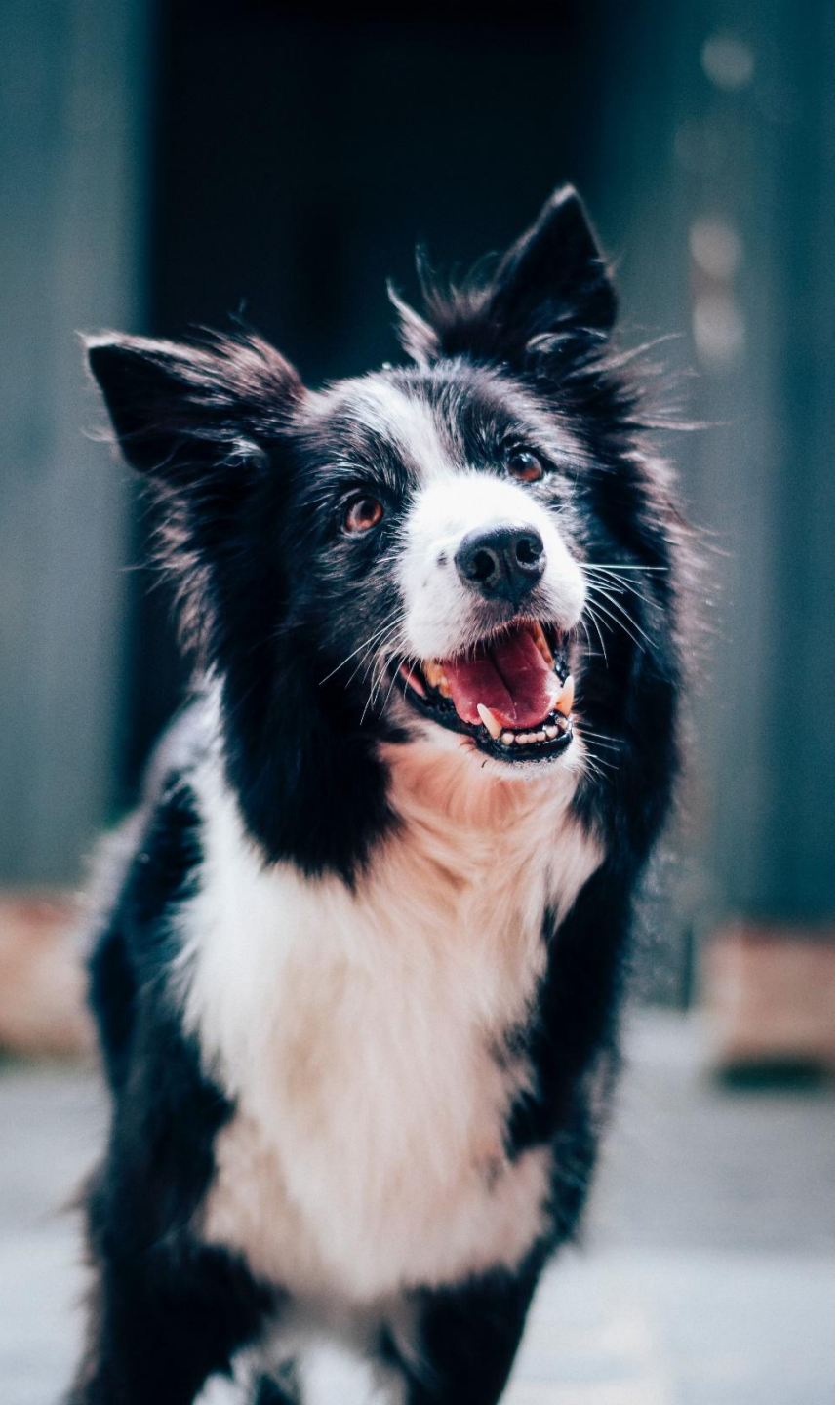
No, not that Dax…











What is DAX?

DAX is a **functional** language

This means **trees of expressions** are used to return a value, as opposed to a procedural language, where you have a sequence of statements.

Procedural vs Functional

Procedural (SQL)

```
SET NOCOUNT ON;
DECLARE @ErrorLogID int;
SET @ErrorLogID = 0;

IF ERROR_NUMBER() IS NULL
    RETURN;

INSERT [dbo].[Family Members]
   (
   .
   .
   )
VALUES
   (
    .
    .
   );
```

Functional (DAX)

```
COUNTROWS(
   CALCULATETABLE(
   'Family Members’
   , 'Family Members'[Hair Color] = "Blonde"
   )
)
```

What Can We Do With DAX?





Define Objects

Column

Hierarchy Levels

Measures

Query for Values



Phases of Analytical Query



Filter – targets the data of relevance



Group – dicing, divides results into groups

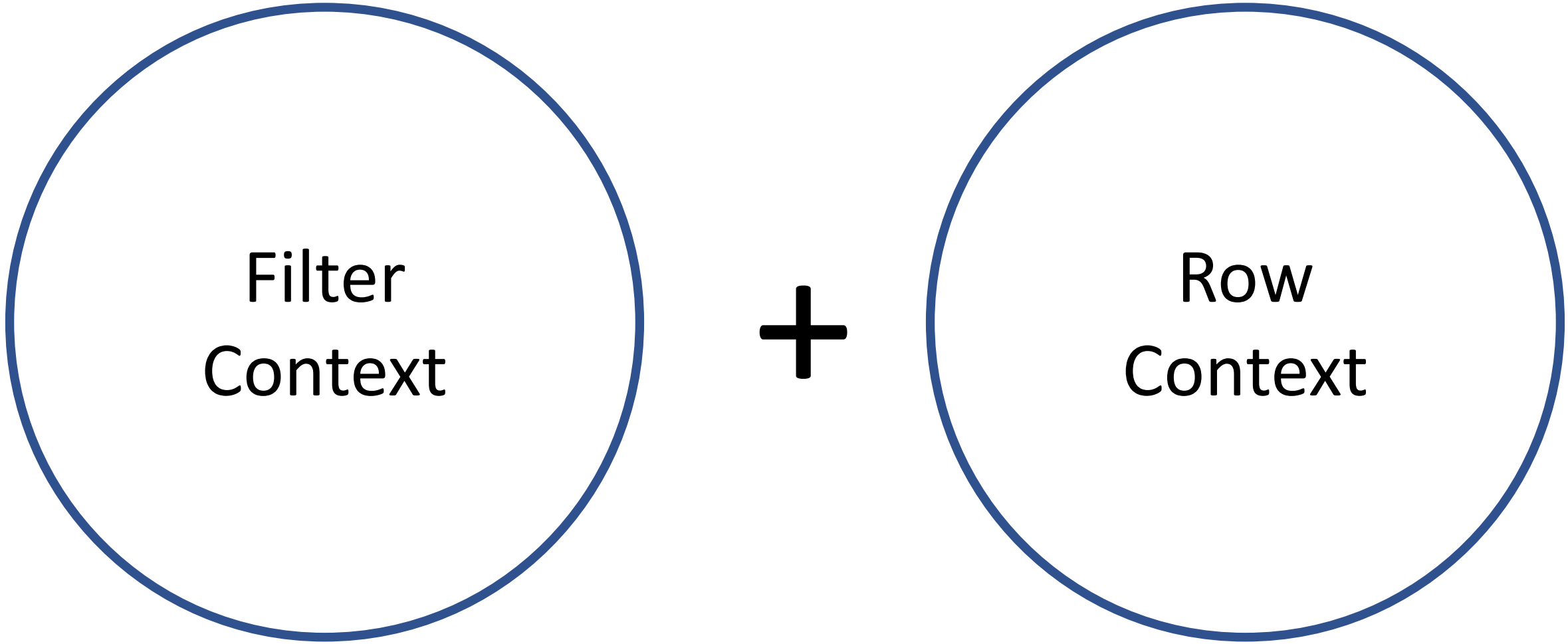


Summarize – Produces a single value result

Objects and Phases

	Filter	Group	Summarize
Columns	✓	✓	✓
Hierarchy Level	✓	✓	☒
Measures	✓	☒	✓

Evaluation Context



Intro Summary

DAX is a functional language

DAX can be used for defining or querying

DAX can create three types of Objects

Values are determined by Evaluation Context




Filter Context



Star Schemas

Kimball Method Vocabulary

Dimensions

Facts

Star Schema

Surrogate keys

Granularity

Sentinel values

Dimensions

The things that describe our business processes, how we typically want to “slice” our data.





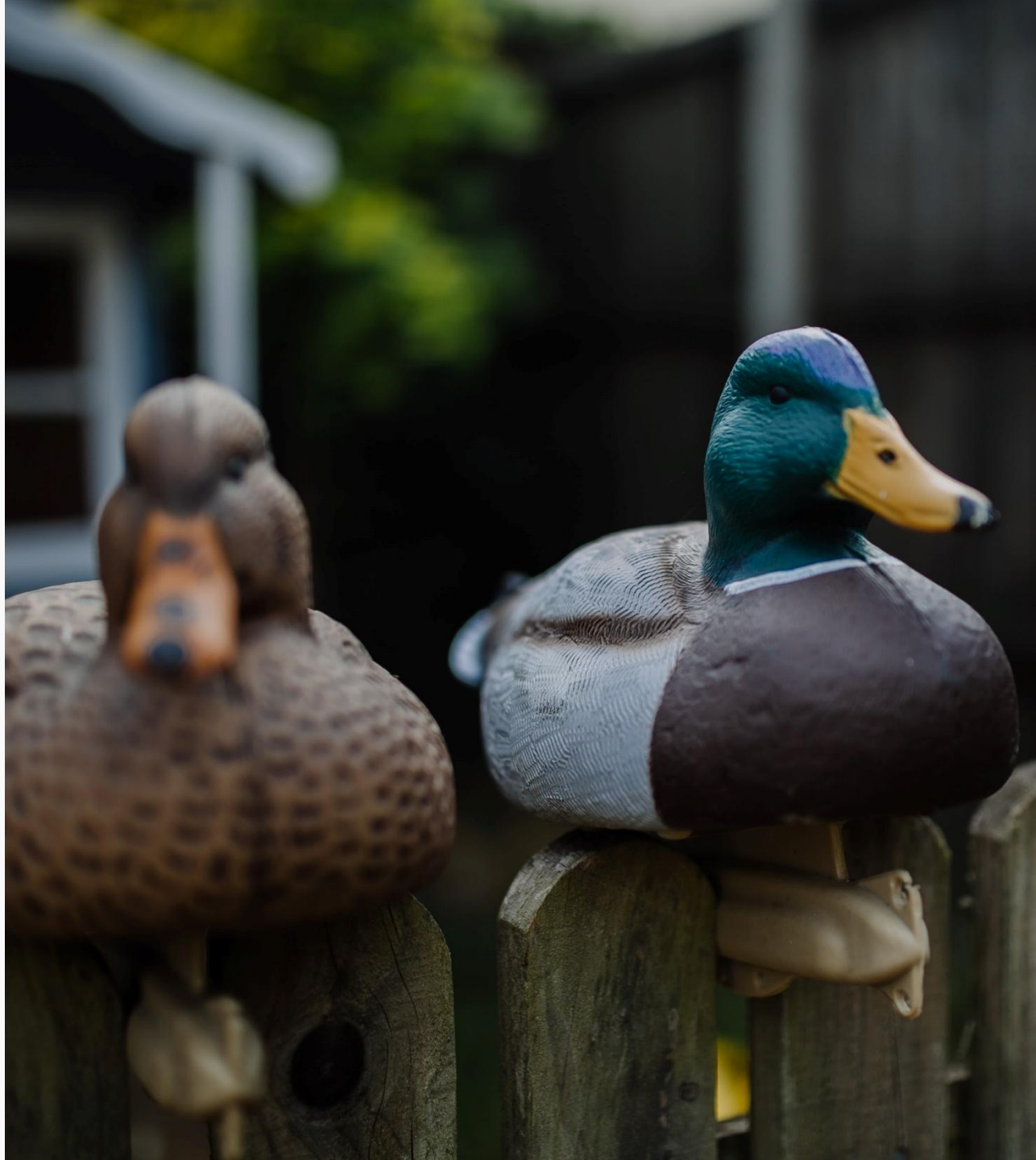
Facts

The business processes that we want to measure.

Relationships

Relationships are where the magic happens. They allow the filtering, slicing, and dicing to happen.

They have directionality associated with them.

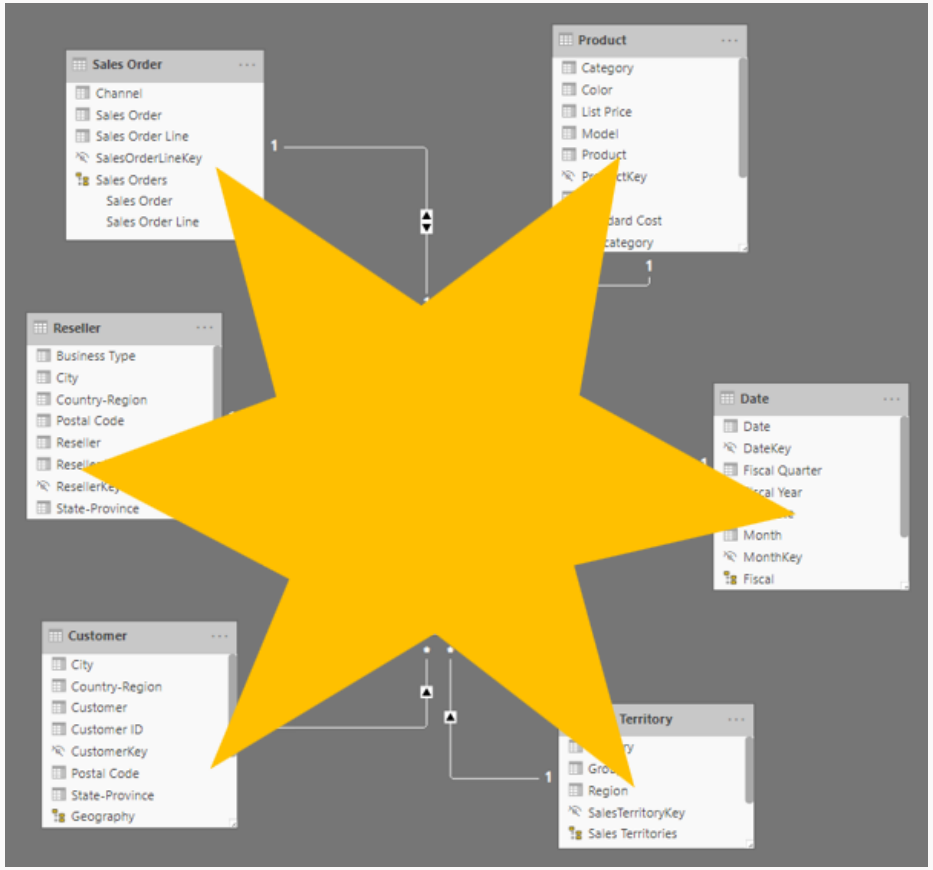


Kimball Methodology is best for Microsoft Analytical tools





Star Schema All The Things!!

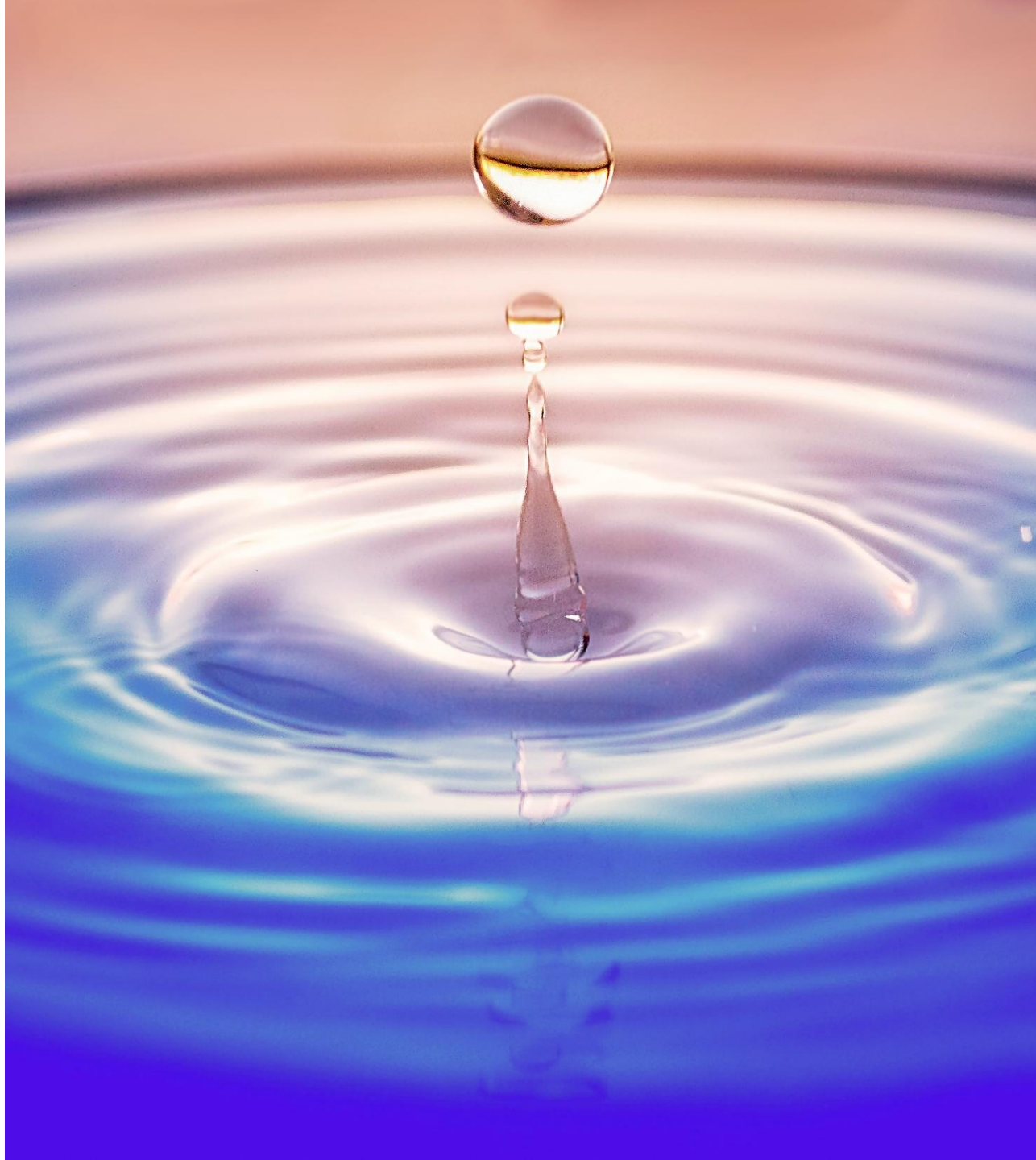


Filter Context

Filter context reduces the number of rows

Filter context is affected by

- Slicers, filters, visuals, interactions



Filter Functions

ALL

ALLCROSSFILTERED

ALLEXCEPT

ALLNOBLANKROW

ALLSELECTED

CALCULATE

CALCULATETABLE

EARLIER

EARLIEST

FILTER

KEEPFILTERS

LOOKUPVALUE

REMOVEFILTERS

SELECTEDVALUE

My Dataset

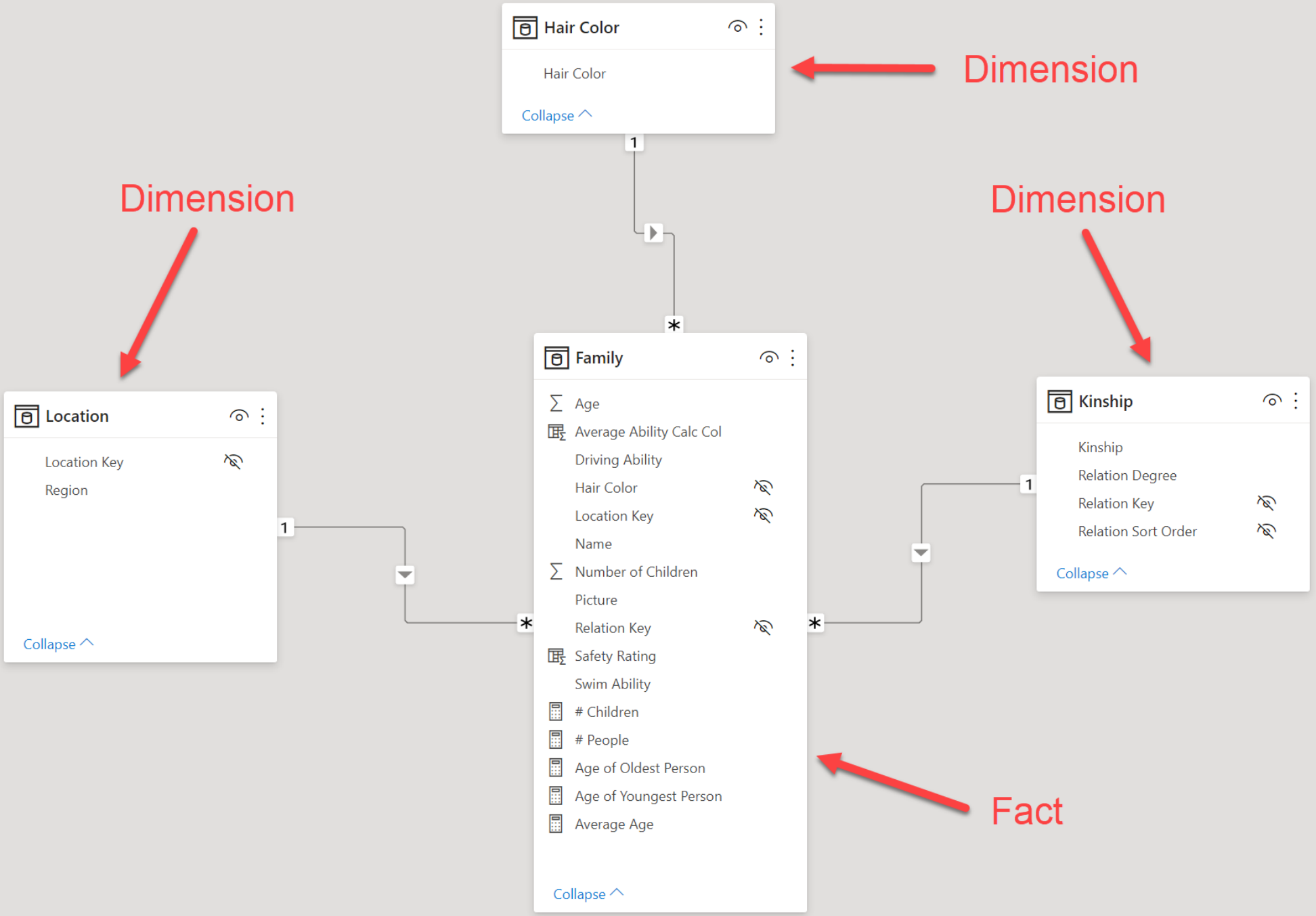


Attributes

- Hair Color
- Age
- Driving Ability
- Swim Ability

- Kinship
- Location
- Number of Children

My Semantic Model



Basic Questions To Answer

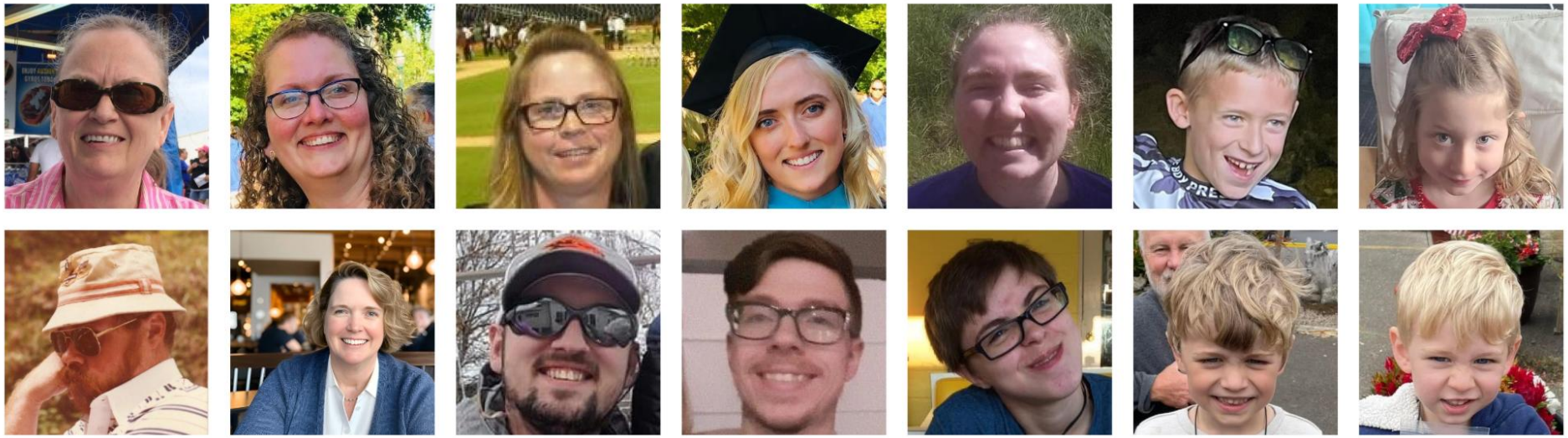
How many people in my family?

Age of the youngest?

What is the average age?

How many children?

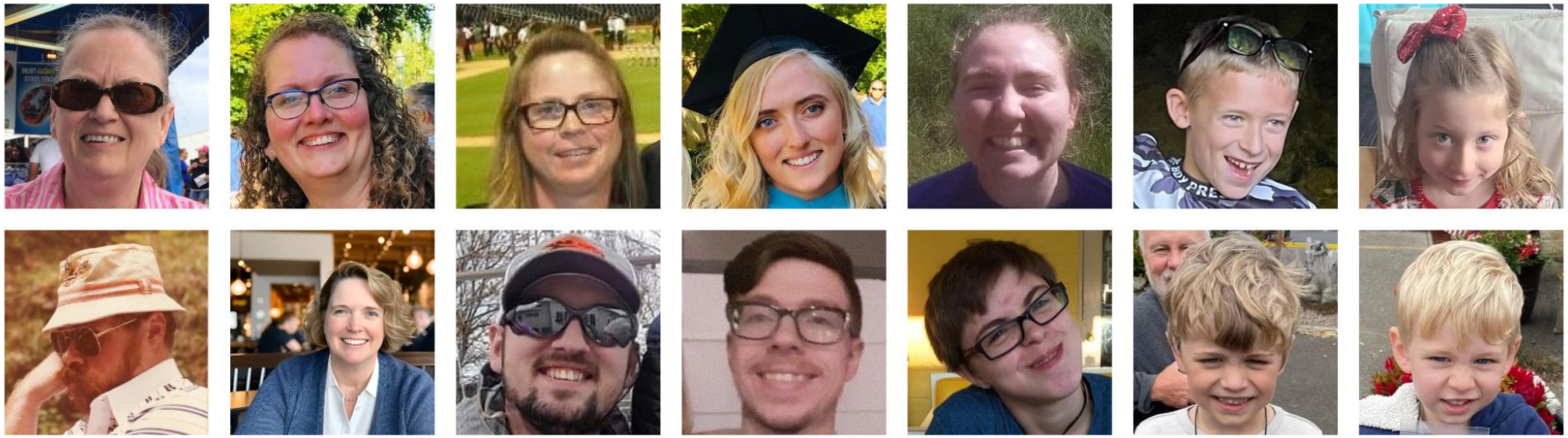
How Many People



```
# People
  = COUNTROWS('Family')
```

14

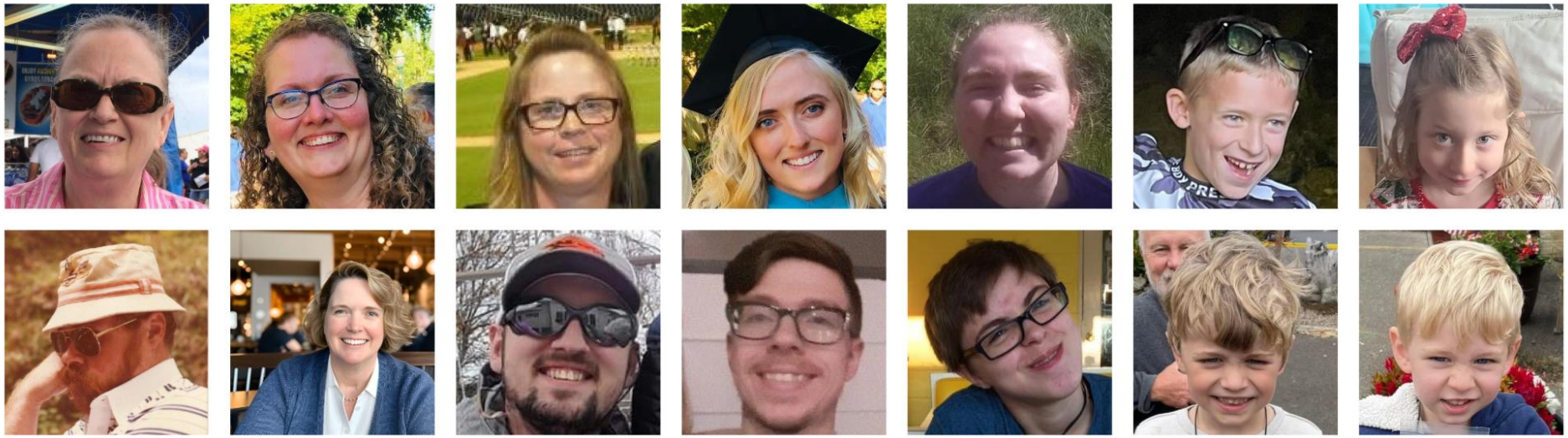
Age of Youngest Person



```
Age of Youngest Person
= MIN('Family'[Age])
```

3

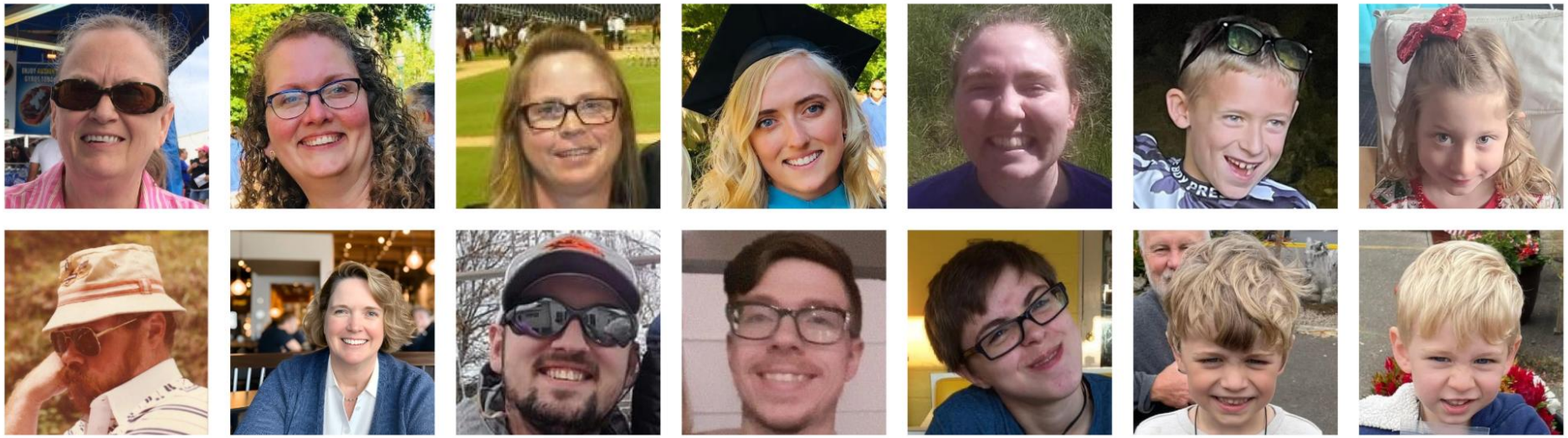
Average Age



```
Average Age
= AVERAGE('Family'[Age])
```

33

How Many Children



```
Number of Children
= SUM('Family'[Number of Children])
```

12



Demo - Filter Context

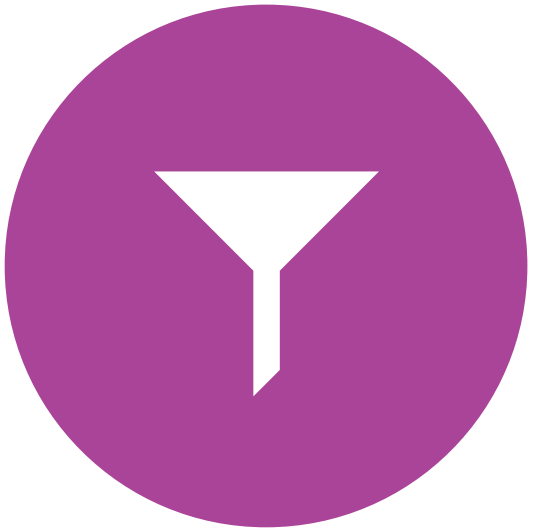
Filter context reduces the number of rows



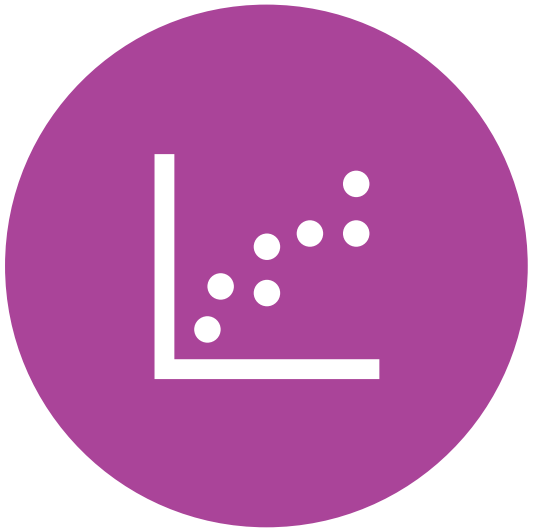
Filter Context is Affected by



Slicers



Filters



Visuals



Interactions




Row Context

Row Context

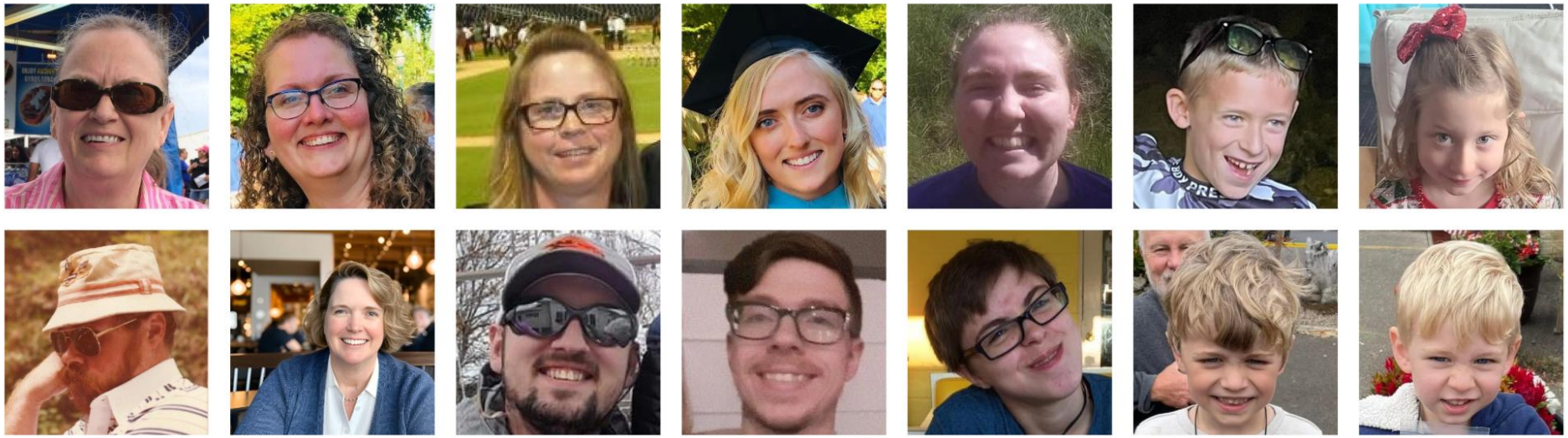
Row Context iterates over the rows to calculate the values we want

Row Context is created when we

- Use calculated columns
- Use iterator functions



Calculated Column

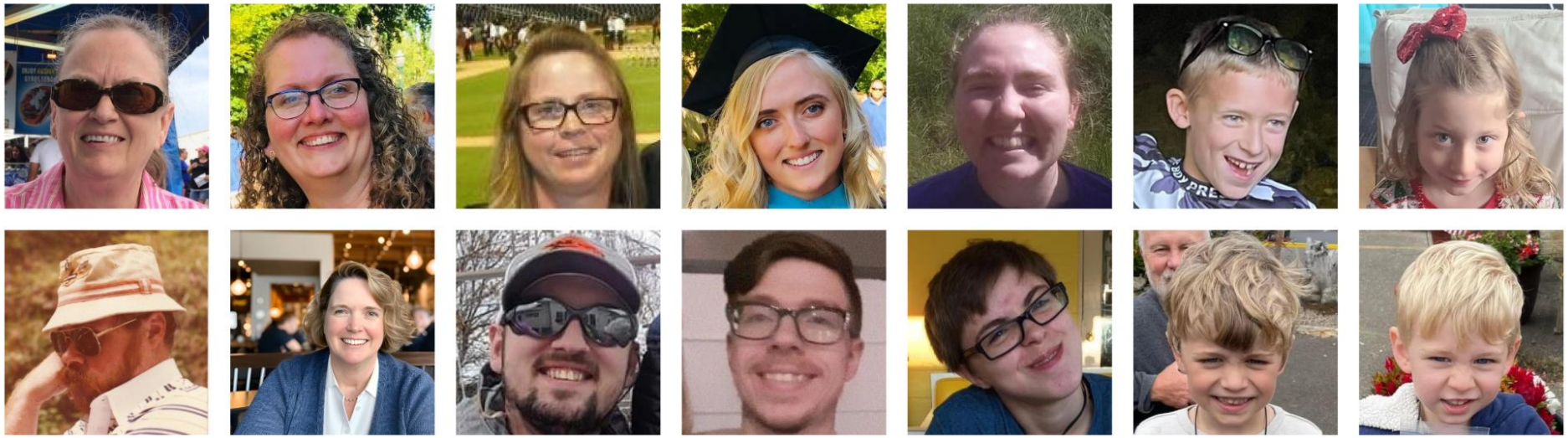


```
Average Ability Calc Col
= ('Family'[Swim Ability] +
   'Family'[Driving Ability]) /2
```

Iterator Functions

AVERAGEX
CONCATENATEX
COUNTAX
COUNTX
GEOMEANX
MAXX
MEDIANX
MINX
PERCENTILEX.EXC
PERCENTILEX.INC
PRODUCTX
RANKX
STDEVX.P
STDEVX.S
SUMX
VARX.P
VARX.S

Iterator Functions



```
Average Ability Iterator
= AVERAGEX('Family',
'Family'[Driving Ability] +
'Family'[Swim Ability])
```

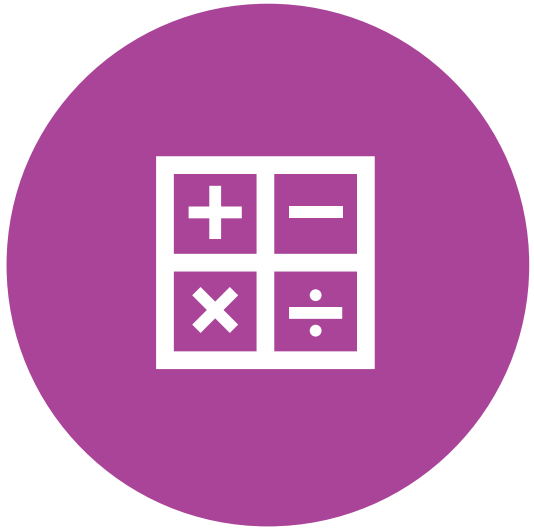


Demo – Row Context

Row Context iterates over each row to calculate the values



Row Context is Created When We Use



Calculated Columns



Iterator Functions




Exceptions

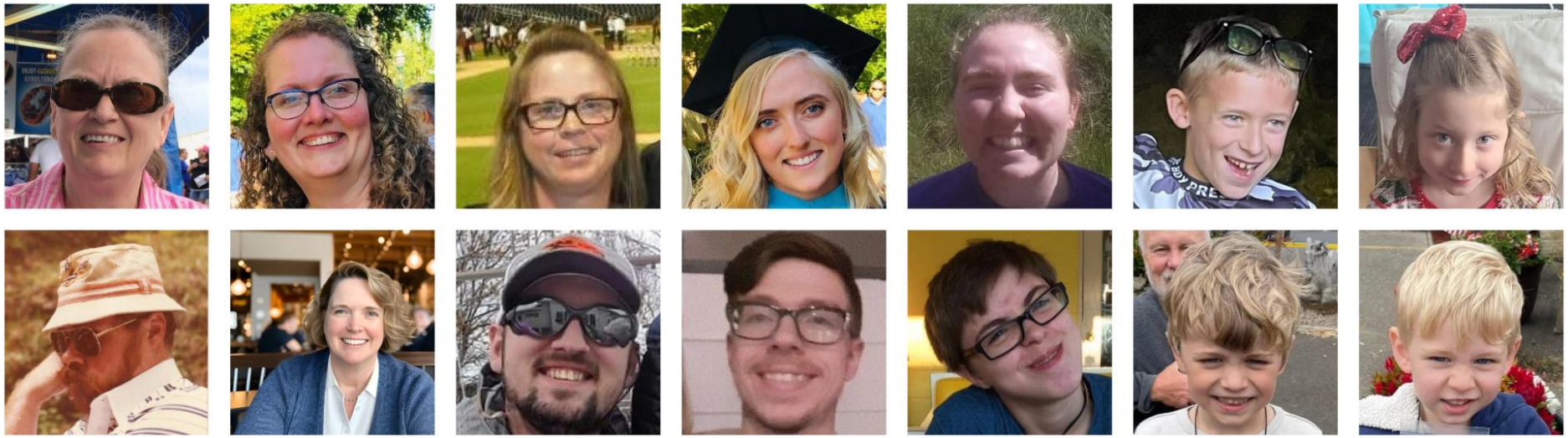


Calculate Function

Allows us to modify the filter context

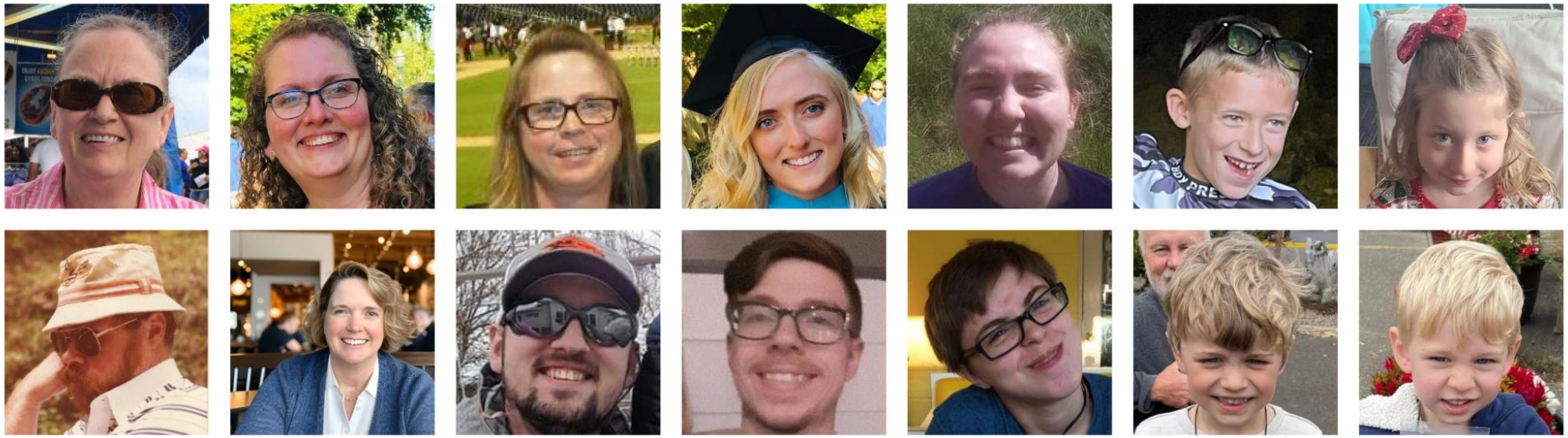
- Reducing rows w/ new filters
- Adding rows by removing filters
- Changing the rows by modifying filters

Reducing Rows



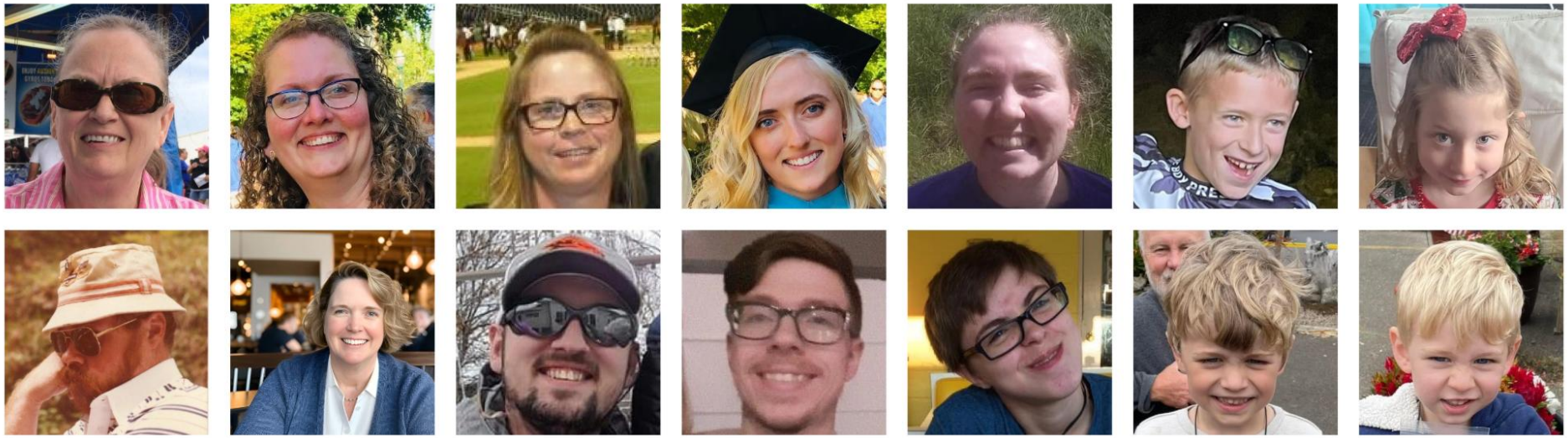
```
# People with Blonde Hair
= CALCULATE(
    COUNTROWS('Family')
    ,'Hair Color'[Hair Color] = "Blonde"
          )
```

Adding Rows



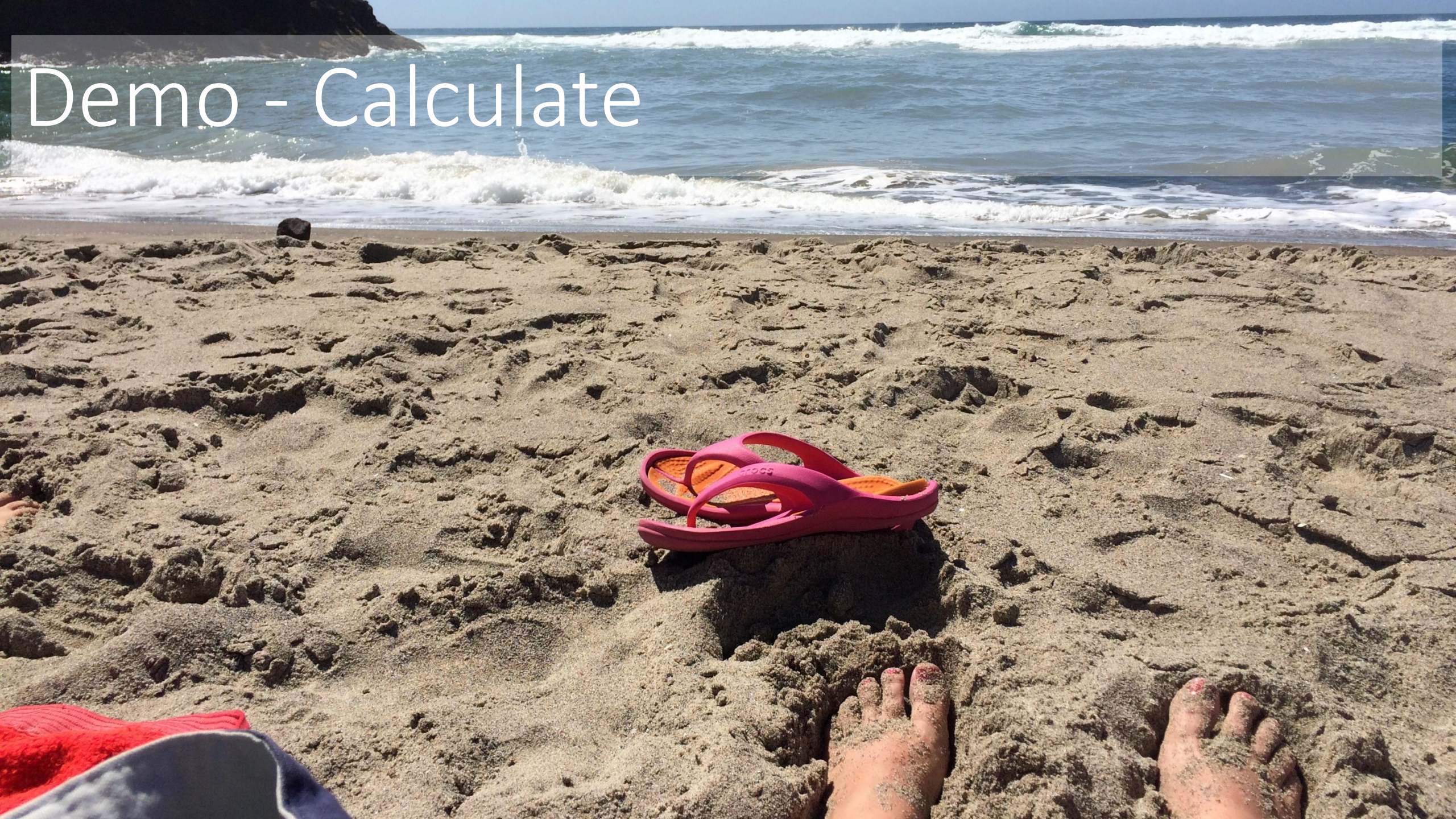
```
# People in my family
= CALCULATE(
            COUNTROWS('Family'),
            REMOVEFILTERS('Family')
    )
```

Changing Rows



```
# Blondes in My Family
= CALCULATE(
    COUNTROWS('Family')
    ,ALL('Family')
    ,'Hair Color'[Hair Color] = "Blonde"
          )
```

Demo - Calculate



Filter Context + Row Context = Evaluation Context





Context Transition

This when a measure or measure expression is evaluated within row context

Used a lot when you want to bucketize values or compute percent of total

Context Transition

```
Kid Bucket =
VAR NumKids = [# Children]
RETURN
      SWITCH(
        NumKids,
        2, "Not so many",
        3, "A few",
        4, “More than a few",
        5, “Buy a bigger car",
        6, “Buy another car",
        7, "Geez, what's in the water",
        8, “Buy a bigger house",
        9, “Invest in laundry detergent stock",
        10, “Buy a laundromat",
        11, “Buy another house",
        12, "Now I know how Mother Hubbard felt",
        BLANK()
    )
```




Thank You!

Contact Info & Feedback

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SQLSwimmer.com

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References

The Definitive Guide to DAX

MS Learn - Use DAX in Power BI Desktop

Star Schema in Power BI

MS DAX Reference

SQLBI.com

References

- Kimball Group

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