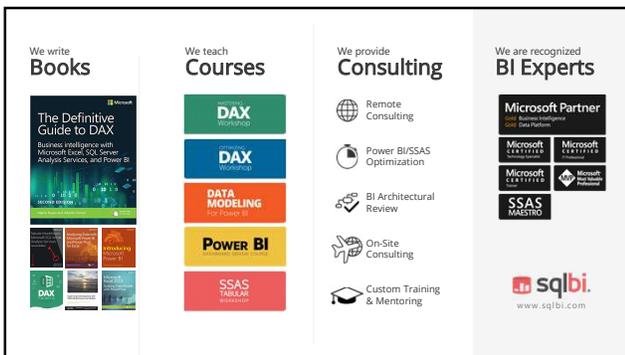




1



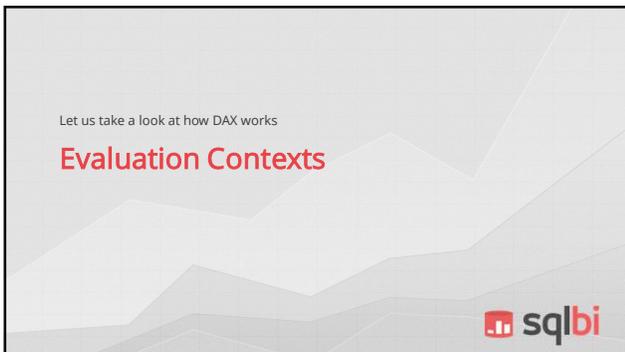
2



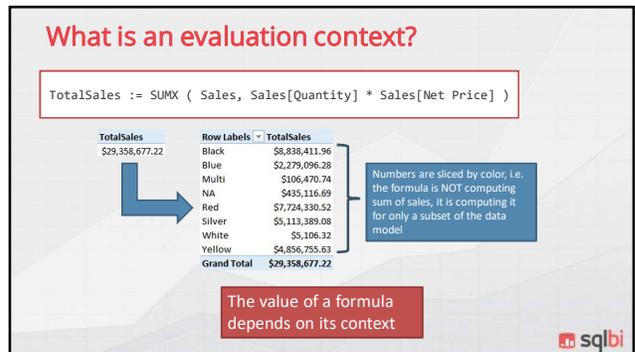
3



4



5



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### Filter context in a pivot table

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### Example of a filter context

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### Filter context in Power BI

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### Filter context

- Defined by
  - Row Selection
  - Column Selection
  - Report Filters
  - Slicers Selection
- Rows outside of the filter context
  - Are not considered for the computation
- Defined automatically by the client, tool
- Can also be created with specific functions

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### Row context

- Defined by
  - Calculated column definition
  - Defined automatically for each row
- Row Iteration functions
  - SUMX, AVERAGEX ...
  - All «X» functions and iterators
  - Defined by the user formulas
- Needed to evaluate column values, it is the concept of "current row"

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### SUMX ( Orders, Orders[Quantity]\*Orders[Price] )

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### Context errors

- o Orders[Quantity] \* Orders[Price]
- o In a calculated column it works fine
- o In a measure it does not work
  - A single value for column 'Quantity' in table 'Sales' cannot be determined...
  - A better error message would be: "you need a row context"



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### There are always two contexts

- o Filter context
  - Filters tables
  - Might be empty
  - All the tables are visible
  - But this never happens in the real world
- o Row context
  - Iterates rows
  - For the rows active in the filter context
  - Might be empty
  - There is no iteration running
- o Both are «evaluation contexts»



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### Filtering a table



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### Ignoring filters



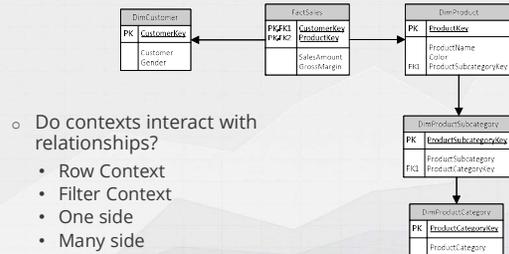
16

### Evaluation contexts and relationships



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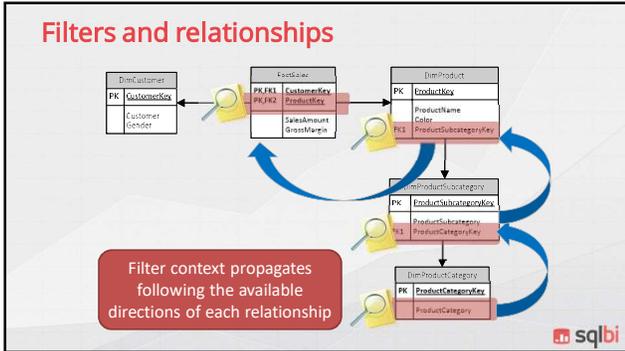
### Filters and relationships



- o Do contexts interact with relationships?
  - Row Context
  - Filter Context
  - One side
  - Many side



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- ### Bidirectional cross-filter
- Choose the propagation of the filter context
    - Single: one to many propagation
    - Both: filter context propagates both ways
  - Beware of several details
    - Performance degradation
    - Filtering is active when the "many" side is cross-filtered, numbers might be hard to read for certain measures
    - Ambiguity might appear in the model

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You can manipulate the filter context in DAX

## CALCULATE

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### CALCULATE syntax

Filters are evaluated in the outer filter context, then combined together in AND, and finally used to build a new filter context into which DAX evaluates the expression.

```
CALCULATE (
  Expression,
  Filter1,
  ...,
  FilterN
)
```

Repeated many times, as needed

The filter parameters are used to modify the existing filter context. They can add, remove or change existing filter

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### Filters are tables

Each filter is a table.  
Boolean expressions are nothing but shortcuts for table expressions.

```
CALCULATE (
  [Sales Amount],
  Sales[Net Price] > 100
)
```

Is equivalent to

```
CALCULATE (
  [Sales Amount],
  FILTER (
    ALL ( Sales[Net Price] ),
    Sales[Net Price] > 100
  )
)
```

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### CALCULATE examples

Compute the sales amount for all of the product colors, regardless of the user selection.

```
SalesAllColors :=
CALCULATE (
  [Sales Amount],
  ALL ( Product[Color] )
)
```

The condition is the list of acceptable values

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## CALCULATE examples

Compute the sales amount for red products, regardless of user selection for color. The filter context is applied on the entire model, products filter the Sales table, too.

```
SalesRedProducts :=
CALCULATE (
    [Sales Amount],
    Product[Color] = "Red"
)
```

Filter and SUM are on different tables. Filter happens because of filter context propagation

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## CALCULATE examples

Compute the sales amount for red and blue products, within the user selection for color.

```
SalesTrendyColors :=
CALCULATE (
    [Sales Amount],
    KEEPFILTERS ( Product[Color] IN { "Red", "Blue" } )
)
```

KEEPFILTERS keeps the previous filter, so that the new filter does not override the previous one

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## What is a filter context?

```
CALCULATE (
    Product[Color] IN { "Red", "Black" },
    FILTER (
        ALL ( Date[Year], Date[Month] ),
        OR (
            AND ( Date[Year] = 2006, Date[Month] = "December" ),
            AND ( Date[Year] = 2007, Date[Month] = "January" )
        )
    )
)
```

Year	Month	Color
2006	December	Red
2007	January	Black

Filters are tables. You can use any table function to create a filter in CALCULATE

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## Filter context definition

Year	Month	Color
2006	December	Red
2007	January	Black

Tuple: value for a set of columns  
Filter: table of tuples  
Filter context: set of filters

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## Multiple conditions in CALCULATE

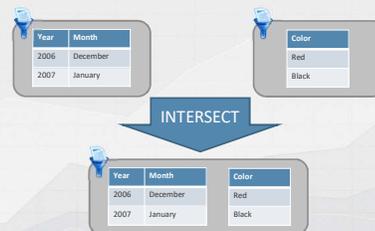
Multiple filter parameters in CALCULATE are intersected, generating a new filter context that uses both filters at the same time.

```
CALCULATE (
    Product[Color] IN { "Red", "Black" },
    FILTER (
        ALL ( Date[Year], Date[Month] ),
        OR (
            AND ( Date[Year] = 2006, Date[Month] = "December" ),
            AND ( Date[Year] = 2007, Date[Month] = "January" )
        )
    )
)
```

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## Intersection of filter context

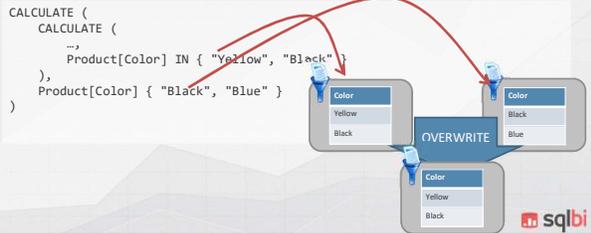
Used by CALCULATE to put filters in AND



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## Overwriting filter contexts

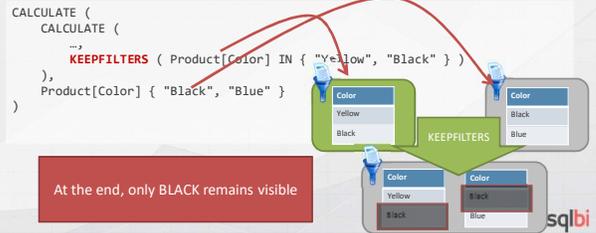
Nested CALCULATE do not intersect filters, they use another operator, called OVERWRITE. In fact, the Yellow/Black filter wins against the Black/Blue one, being the innermost. Yellow/Black overwrites Black/Blue.



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## KEEPFILTERS

KEEPFILTERS retains the previous filters, instead of replacing them.



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Transform a row context into a filter context

## Context transition



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## Context Transition

- o CALCULATE performs another task
- o If executed inside a row context
  - It takes the row context
  - Transforms it into an equivalent filter context
  - Applies it to the data model
  - Before computing its expression
- o Very important and useful feature
  - Better to learn it writing some code...



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## Some notes on context transition

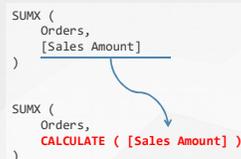
- o It is invoked by CALCULATE
- o It is expensive: don't use it iterating large tables
- o It does not filter one row, it filters all the identical rows
- o It creates a filter context out of a row context
- o It happens whenever there is a row context
- o It transforms all the row contexts, not only the last one
- o Row contexts are no longer available in CALCULATE



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## Automatic CALCULATE

Whenever a measure is invoked, an automatic CALCULATE is added around the measure. This is the reason why using [Measure] and Table[Column] as a standard is a best practice.



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### Conclusions

- A column reference requires a row context
- CALCULATE changes the filter context
- CALCULATE performs context transition
- Row context, filter context, context transition



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# Thank you!



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