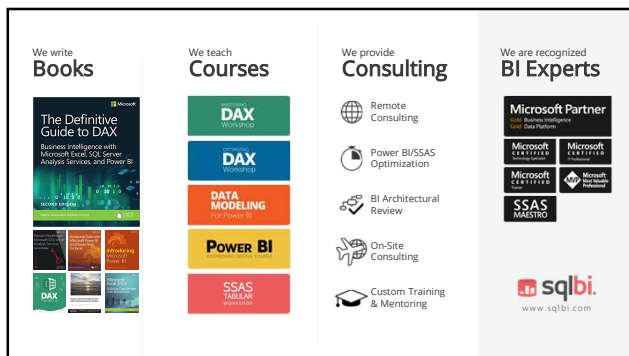




1



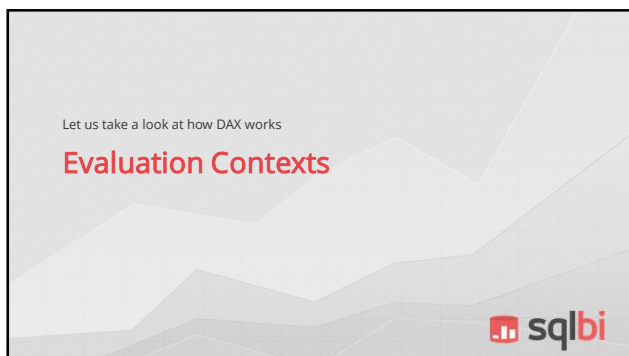
2



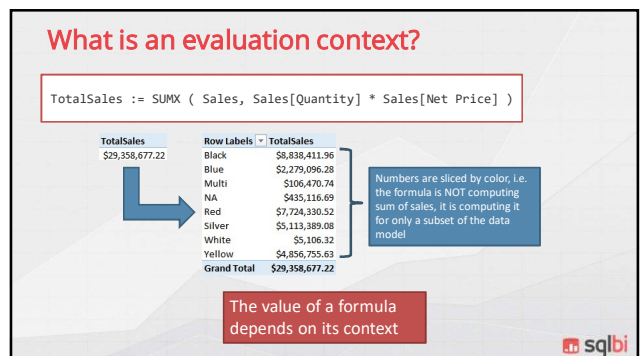
3



4

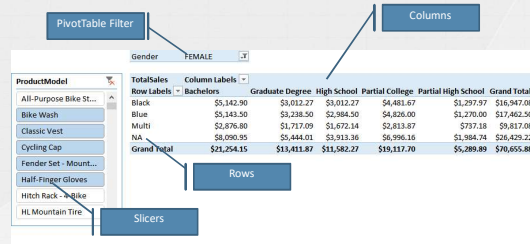


5



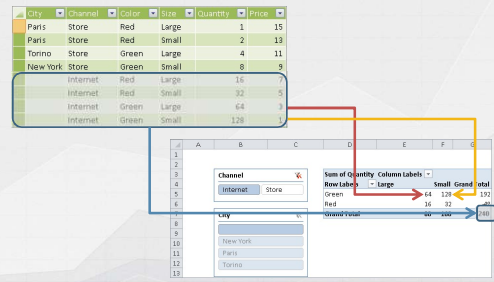
6

Filter context in a pivot table



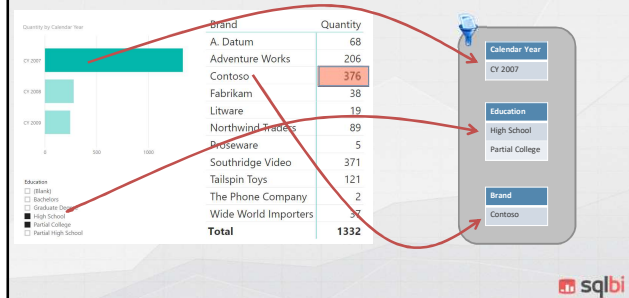
7

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

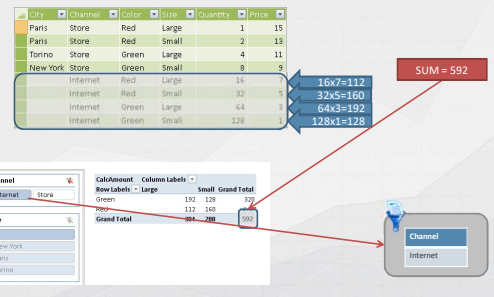
10

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

- Orders[Quantity] * Orders[Price]
- In a calculated column it works fine
- 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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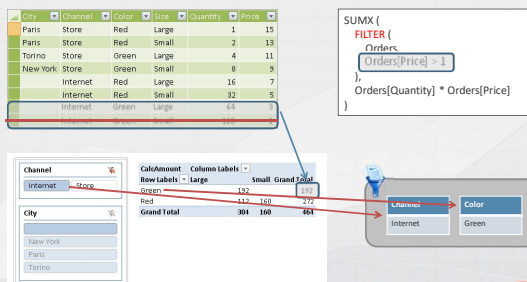
There are always two contexts

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



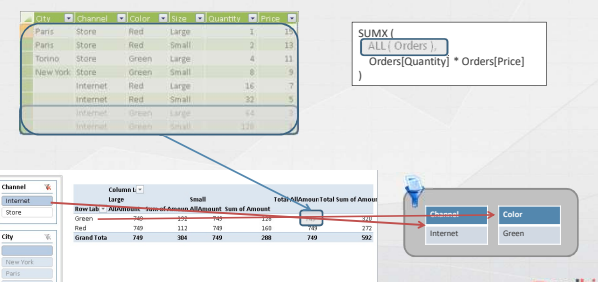
14

Filtering a table



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Ignoring filters



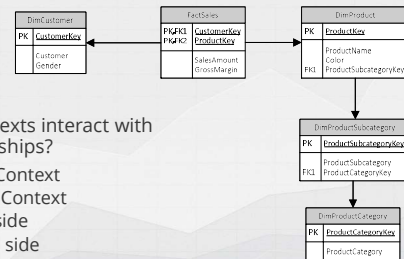
16

Evaluation contexts and relationships



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Filters and relationships

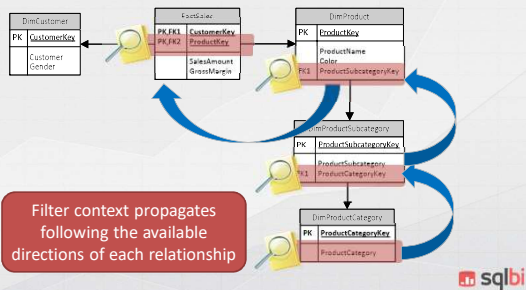


- Do contexts interact with relationships?
 - Row Context
 - Filter Context
 - One side
 - Many side



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Filters and relationships



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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" )
        )
    )
)
```



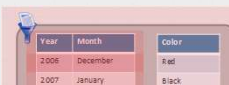
Year	Month	Color
2006	December	Red
2007	January	Black

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.

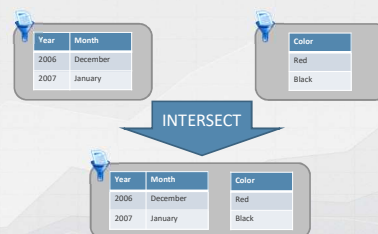
```
CALCULATE (
    ...,
    Product[Color] IN { "Red", "Black" },
    FILTER (
        ALL ( Date[Year], Date[Month] ),
        OR (
            AND ( Date[Year] = 2006, Date[Month] = "December" ),
            AND ( Date[Year] = 2007, Date[Month] = "January" )
        )
    )
)
```



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Intersection of filter context

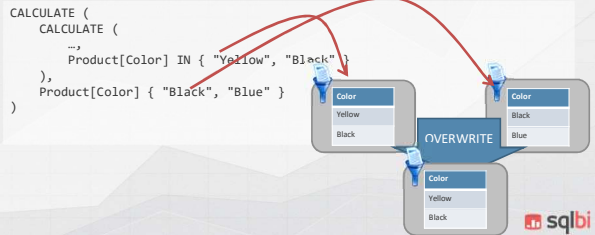
Used by CALCULATE to put filters in AND



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Overwriting filter contexts

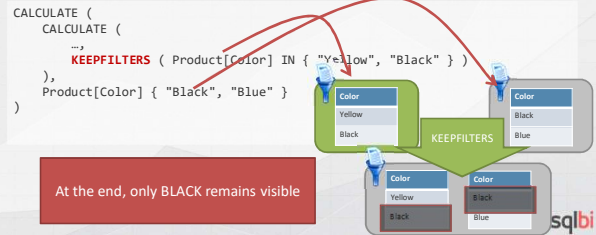
Nested CALCULATE do not intersect filters, they use another operator, called OVERWRITE. In fact, the Yellow/Black filter wins against the Black/Blue one, being the innermost. Yellow/Black overwrites Black/Blue.



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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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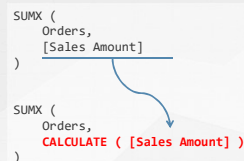
Automatic CALCULATE

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.

```

SUMX (
  Orders,
  [Sales Amount]
)

```



```

SUMX (
  Orders,
  CALCULATE ( [Sales Amount] )
)

```



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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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