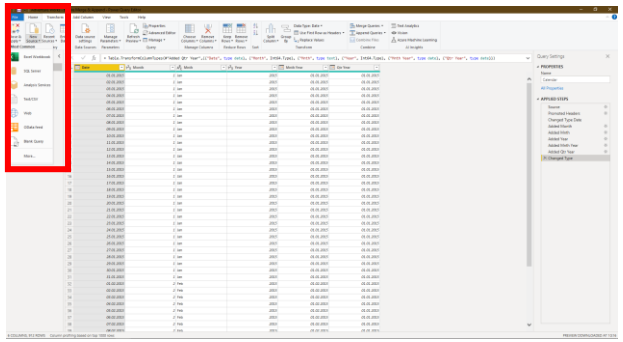
# Beginner Guide to Power BI

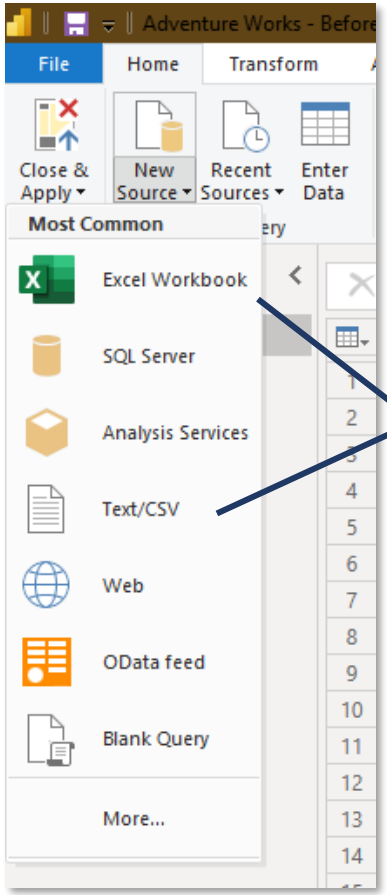
Ahmad Hatahet, Dec 11th, 2022

# Import and Transform Data:

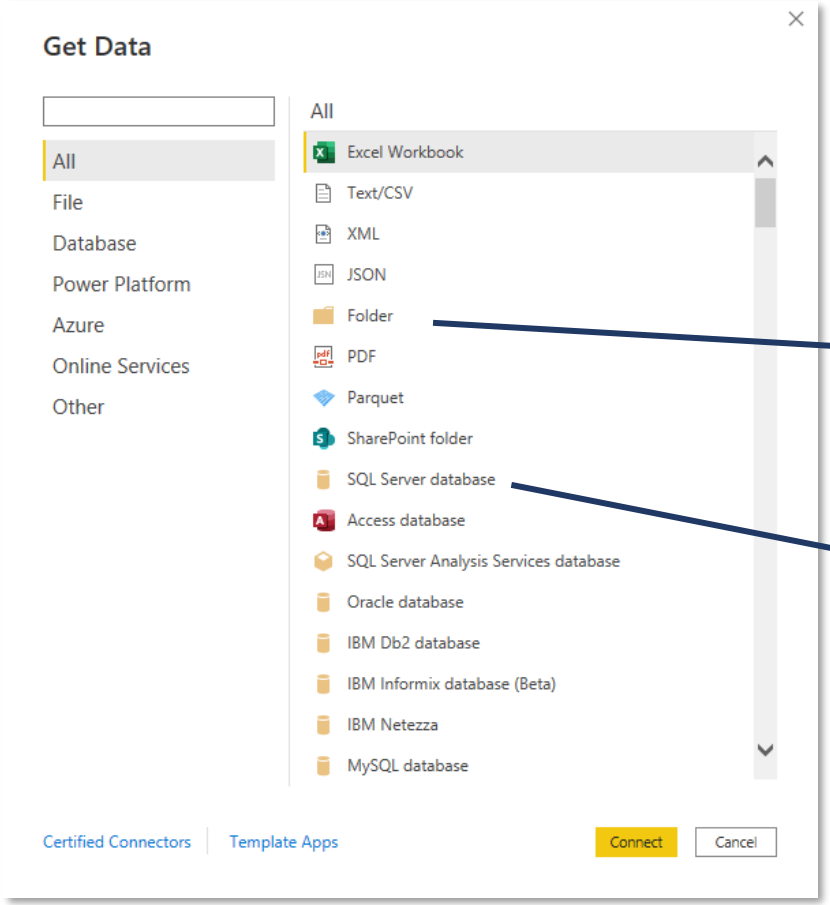
- Import CSV
- Simple Date transformation
- Region/Localization
- Replace Values
- How steps are listed and could be renamed
- Add Custom Column
- Merge Queries
- Append Queries
- Pivot/Unpivot Columns

# Import CSV





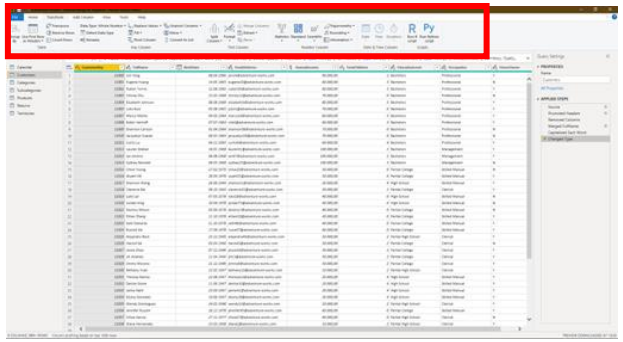

Excel and simple text files




All files in a folder

Connect to SSMS

# Simple Date transformation



## Text to Date

| Date | Date |
|---|---|
| 1/1/2015 | 01.01.2015 |
| 1/2/2015 | 02.01.2015 |
| 1/3/2015 | 03.01.2015 |
| 1/4/2015 | 04.01.2015 |
| 1/5/2015 | 05.01.2015 |
| 1/6/2015 | 06.01.2015 |
| 1/7/2015 | 07.01.2015 |
| 1/8/2015 | 08.01.2015 |

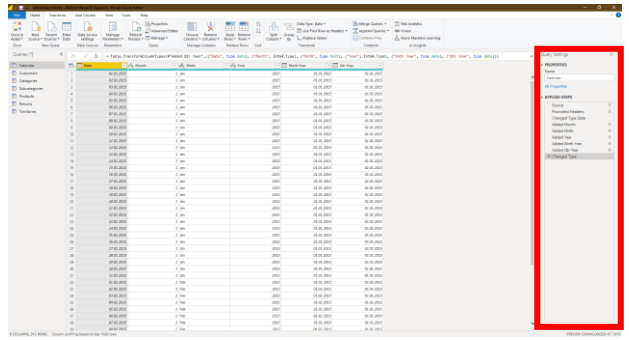
## Text to Currency

| AnnualIncome | AnnualIncome |
|---|---|
| $90,000 | 90.000,00 |
| $60,000 | 60.000,00 |
| $60,000 | 60.000,00 |
| $70,000 | 70.000,00 |
| $80,000 | 80.000,00 |
| $70,000 | 70.000,00 |
| $60,000 | 60.000,00 |
| $60,000 | 60.000,00 |

## Merge Columns

| FirstName | LastName | FullName |
|---|---|---|
| JON | YANG | Jon Yang |
| EUGENE | HUANG | Eugene Huang |
| RUBEN | TORRES | Ruben Torres |
| CHRISTY | ZHU | Christy Zhu |
| ELIZABETH | JOHNSON | Elizabeth Johnson |
| JULIO | RUIZ | Julio Ruiz |
| MARCO | MEHTA | Marco Mehta |
| ROBIN | VERHOFF | Robin Verhoff |

# Query Steps



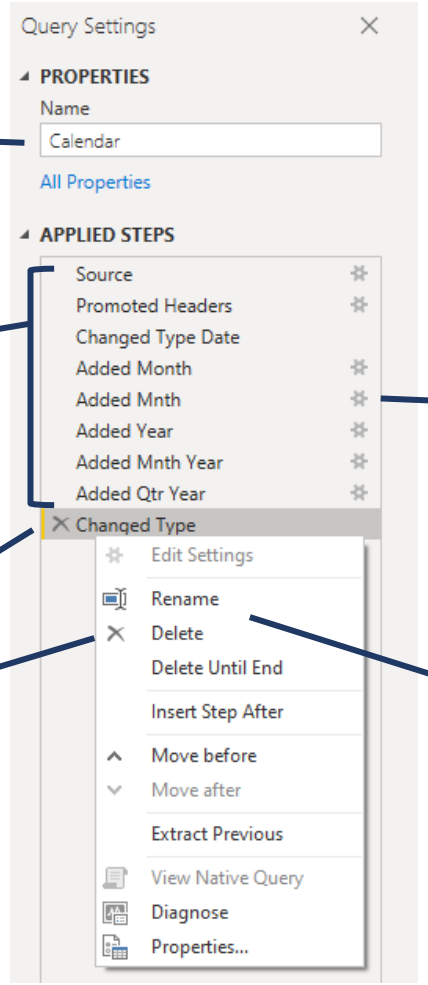
Query Name

Query Steps Executed in sequential order

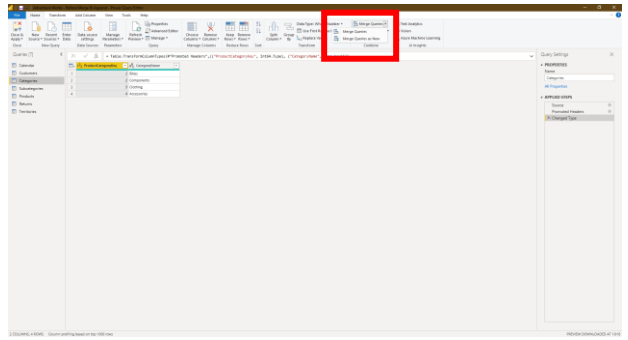
Delete a step

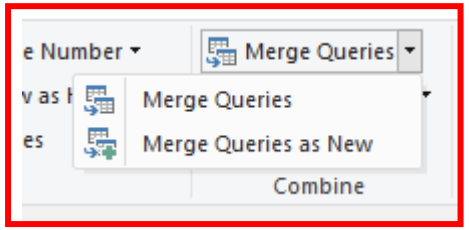
Edit custom column function

Rename a step



# Merge Queries






Merge

Select a table and matching columns to create a merged table.

Categories

| ProductCategoryKey | CategoryName |
|---|---|
| 1 | Bikes |
| 2 | Components |
| 3 | Clothing |
| 4 | Accessories |

Subcategories

| ProductSubcategoryKey | SubcategoryName | ProductCategoryKey |
|---|---|---|
| 1 | Mountain Bikes | 1 |
| 2 | Road Bikes | 1 |
| 3 | Touring Bikes | 1 |
| 4 | Handlebars | 2 |
| 5 | Bottom Brackets | 2 |

Join Kind

Right Outer (all from second, matching from first)

Use fuzzy matching to perform the merge

Fuzzy matching options

The selection matches 37 of 37 rows from the second table.

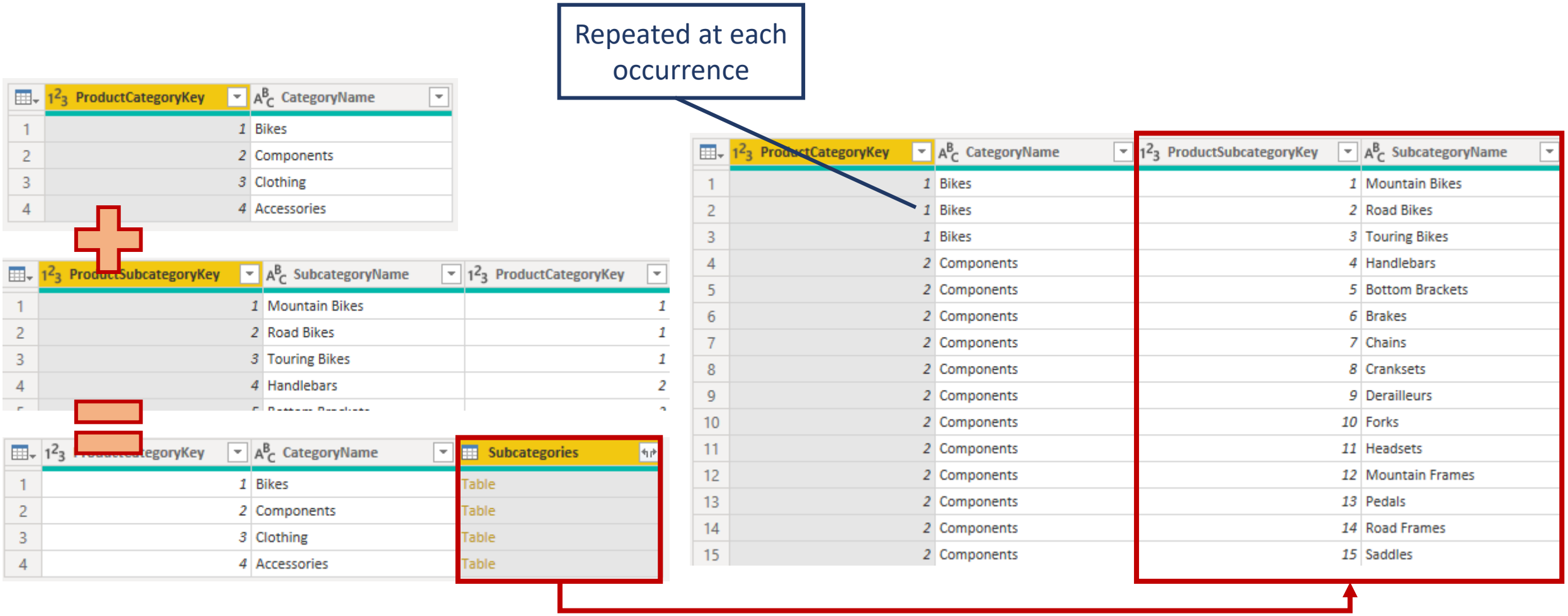
OK Cancel

Left Table

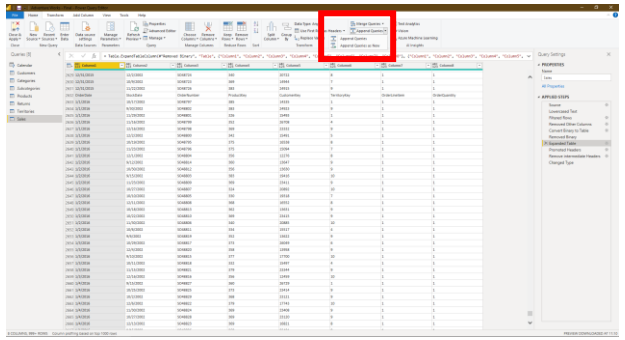
Right Table

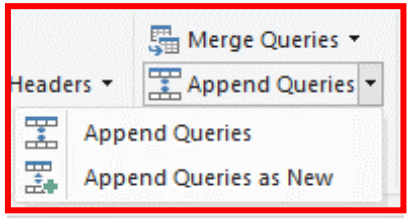
Join Type

# Merge Queries



# Append Queries





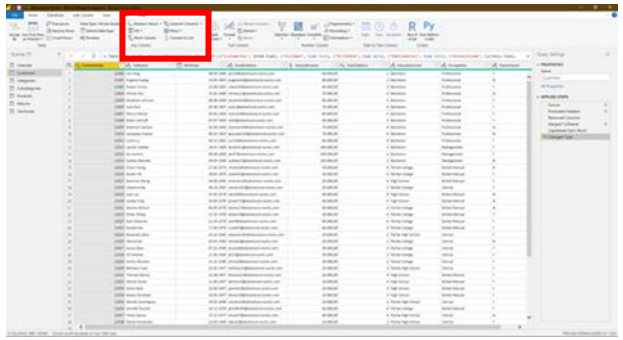

| OrderDate | StockDate | OrderNumber | ProductKey | CustomerKey | TerritoryKey | OrderLineItem | OrderQuantity |
|---|---|---|---|---|---|---|---|
| 1/1/2015 | 9/21/2001 | SO45080 | 332 | 14657 | 1 | 1 | 1 |
| 1/1/2015 | 12/5/2001 | SO45079 | 312 | 29255 | 4 | 1 | 1 |
| 1/1/2015 | 10/29/2001 | SO45082 | 350 | 11455 | 9 | 1 | 1 |
| 1/1/2015 | 11/16/2001 | SO45081 | 338 | 26782 | 6 | 1 | 1 |
| 1/2/2015 | 12/15/2001 | SO45083 | 312 | 14947 | 10 | 1 | 1 |
| 1/2/2015 | 10/12/2001 | SO45084 | 310 | 29143 | 4 | 1 | 1 |

| OrderDate | StockDate | OrderNumber | ProductKey | CustomerKey | TerritoryKey | OrderLineItem | OrderQuantity |
|---|---|---|---|---|---|---|---|
| 1/1/2016 | 10/17/2002 | SO48797 | 385 | 14335 | 1 | 1 | 1 |
| 1/1/2016 | 9/30/2002 | SO48802 | 383 | 24923 | 9 | 1 | 1 |
| 1/1/2016 | 11/29/2002 | SO48801 | 326 | 15493 | 1 | 1 | 1 |
| 1/1/2016 | 11/16/2002 | SO48799 | 352 | 26708 | 4 | 1 | 1 |
| 1/1/2016 | 12/16/2002 | SO48798 | 369 | 23332 | 9 | 1 | 1 |
| 1/1/2016 | 12/2/2002 | SO48800 | 342 | 15491 | 5 | 1 | 1 |

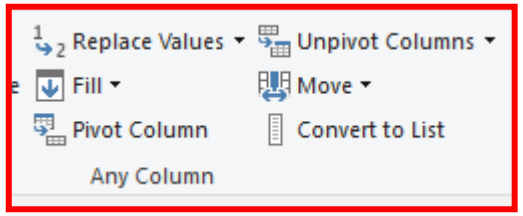
Import from folder, automatically append all imported files

| | Column1 | Column2 | Column3 | Column4 | Column5 | Column6 | Column7 | Column8 |
|---|---|---|---|---|---|---|---|---|
| 2629 | 12/31/2015 | 12/2/2002 | SO48724 | 340 | 20722 | 8 | 1 | 1 |
| 2630 | 12/31/2015 | 10/9/2002 | SO48723 | 369 | 14944 | 7 | 1 | 1 |
| 2631 | 12/31/2015 | 11/22/2002 | SO48726 | 383 | 24915 | 9 | 1 | 1 |
| 2632 | OrderDate | StockDate | OrderNumber | ProductKey | CustomerKey | TerritoryKey | OrderLineItem | OrderQuantity |
| 2633 | 1/1/2016 | 10/17/2002 | SO48797 | 385 | 14335 | 1 | 1 | 1 |
| 2634 | 1/1/2016 | 9/30/2002 | SO48802 | 383 | 24923 | 9 | 1 | 1 |
| 2635 | 1/1/2016 | 11/29/2002 | SO48801 | 326 | 15493 | 1 | 1 | 1 |
| 2636 | 1/1/2016 | 11/16/2002 | SO48799 | 352 | 26708 | 4 | 1 | 1 |
| 2637 | 1/1/2016 | 12/16/2002 | SO48798 | 369 | 23332 | 9 | 1 | 1 |

# Pivot/Unpivot Columns

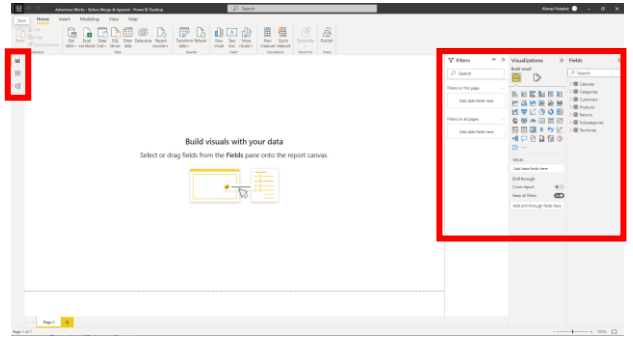


| | | 2016 | | | | 2017 | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 | Qtr 1 | Qtr 2 | Qtr 3 | Qtr 4 |
| Germany | Berlin | 38.834 | 67.699 | 33.491 | 72.129 | 78.767 | 52.877 | 61.949 | 35.949 |
| | Munich | 75.257 | 81.115 | 10.534 | 13.543 | 45.736 | 42.001 | 97.121 | 7.161 |
| | Frankfurt | 74.542 | 27.854 | 59.517 | 14.658 | 16.146 | 6.721 | 22.947 | 52.071 |
| Total | | 188.633 | 176.668 | 103.542 | 100.330 | 140.649 | 101.599 | 182.017 | 95.181 |
| USA | New York | 60.507 | 20.643 | 63.837 | 48.155 | 75.146 | 93.114 | 96.170 | 67.254 |
| | Boston | 81.929 | 67.257 | 43.765 | 91.705 | 79.900 | 97.227 | 32.580 | 80.321 |
| | California | 17.746 | 74.581 | 59.157 | 52.914 | 23.812 | 64.993 | 27.208 | 21.624 |
| Total | | 160.182 | 162.481 | 166.759 | 192.774 | 178.858 | 255.334 | 155.958 | 169.199 |
| ME | UAE | 58.109 | 92.166 | 60.578 | 89.321 | 31.152 | 60.291 | 75.889 | 8.528 |
| | Jordan | 5.930 | 27.403 | 88.201 | 41.956 | 95.842 | 32.625 | 48.737 | 46.767 |
| | Egypt | 43.632 | 88.897 | 61.235 | 66.927 | 70.983 | 99.722 | 19.291 | 54.107 |
| Total | | 107.671 | 208.466 | 210.014 | 198.204 | 197.977 | 192.638 | 143.917 | 109.402 |

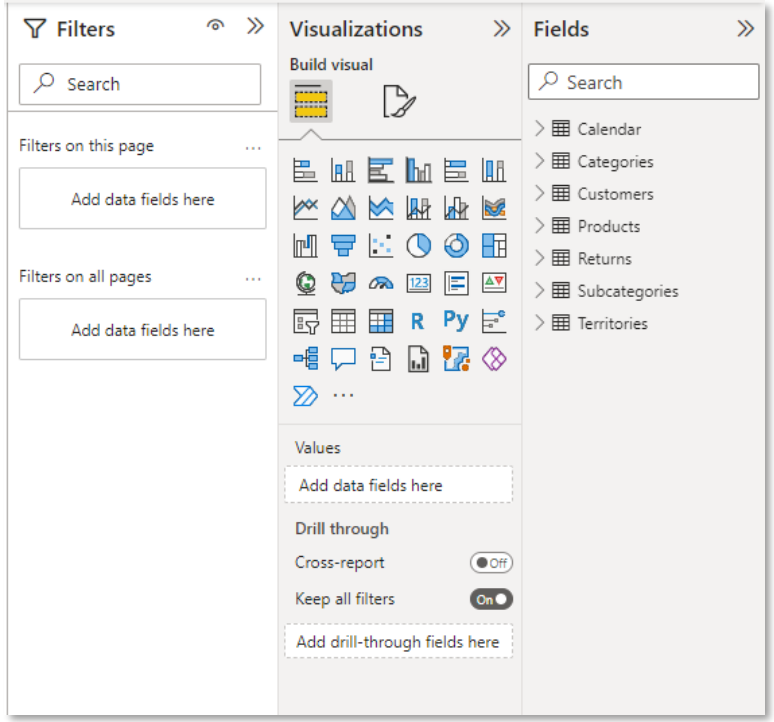



| Year | Qtr | Country | City | Revenue |
|---|---|---|---|---|
| 2016 | Qtr 1 | Germany | Berlin | 38.834 |
| 2016 | Qtr 1 | Germany | Munich | 75.257 |
| 2016 | Qtr 1 | Germany | Frankfurt | 74.542 |
| 2016 | Qtr 1 | USA | New York | 60.507 |
| 2016 | Qtr 1 | USA | Boston | 81.929 |
| 2016 | Qtr 1 | USA | California | 17.746 |
| 2016 | Qtr 1 | ME | UAE | 58.109 |
| 2016 | Qtr 1 | ME | Jordan | 5.930 |
| 2016 | Qtr 1 | ME | Egypt | 43.632 |
| 2016 | Qtr 2 | Germany | Berlin | 67.699 |
| 2016 | Qtr 2 | Germany | Munich | 81.115 |
| 2016 | Qtr 2 | Germany | Frankfurt | 27.854 |
| 2016 | Qtr 2 | USA | New York | 20.643 |

# Power BI GUI:

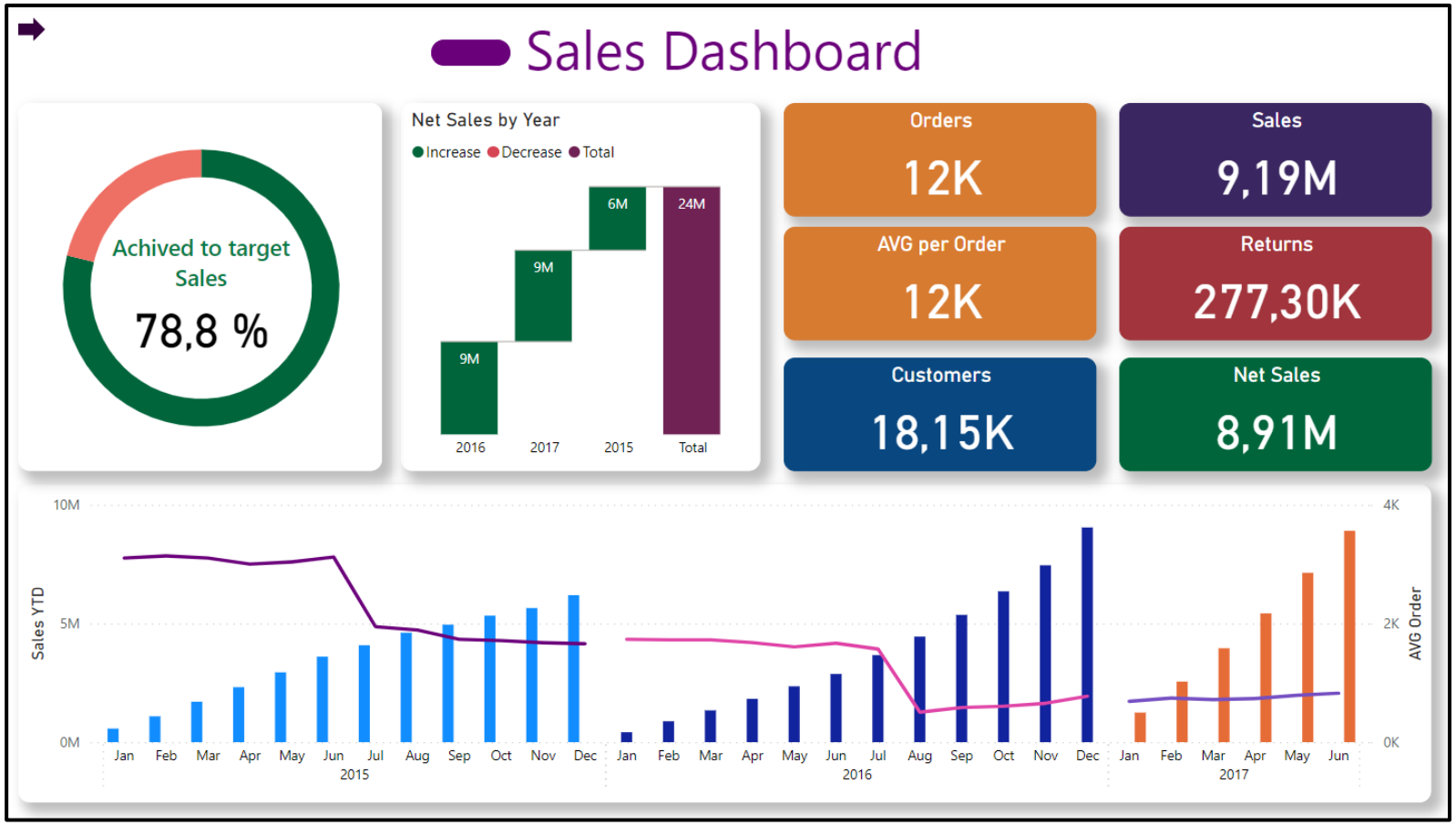



- Report View
  - Fields
  - Visualizations
  - Filters
- Table View
- Relationship
  - One to Many
  - Direction of the relation



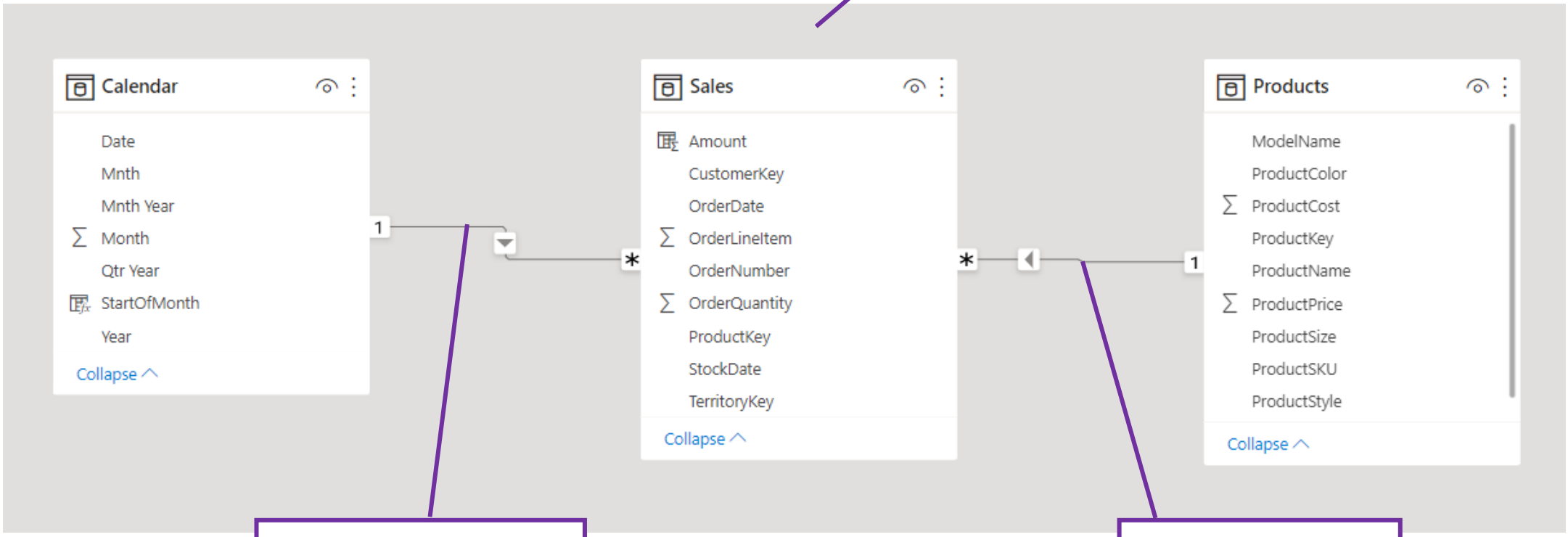
# Starter Dashboard:

- Sort Month Names based on numbers
- Add Slicer
- Add Line
  - Data Labels
  - Legends
- Add Matrix
  - Order of fields
- Add KPI



# Relationship

One fact table and multiple dimension tables “Star Schema”




Left table “Calendar” can slice right table “Sales”

Each Product has multiple sales

# Writing DAX

- Measure
  - Filter Context
  - Collect all measures in one place
  - Iterate (SUMX, AVGX)
  - Calculate – Override filter context
- Calculated Column vs Measure

| CategoryName | Amount | % of Parent Category | % of All Category |
|---|---|---|---|
| **Accessories** | **885.417,02** | **100,0 %** | **3,7 %** |
| Bike Racks | 35.280,00 | 4,0 % | 0,1 % |
| Bike Stands | 35.934,00 | 4,1 % | 0,1 % |
| Bottles and Cages | 105.698,82 | 11,9 % | 0,4 % |
| Cleaners | 13.363,95 | 1,5 % | 0,1 % |
| Fenders | 85.853,88 | 9,7 % | 0,4 % |
| Helmets | 199.414,62 | 22,5 % | 0,8 % |
| Hydration Packs | 36.843,30 | 4,2 % | 0,2 % |
| Tires and Tubes | 373.028,45 | 42,1 % | 1,5 % |
| **Bikes** | **22.908.941,80** | **100,0 %** | **94,9 %** |
| Mountain Bikes | 8.332.251,86 | 36,4 % | 34,5 % |
| Road Bikes | 10.928.204,36 | 47,7 % | 45,3 % |
| Touring Bikes | 3.648.485,58 | 15,9 % | 15,1 % |
| **Clothing** | **354.950,16** | **100,0 %** | **1,5 %** |
| Caps | 35.484,44 | 10,0 % | 0,1 % |
| Gloves | 61.107,32 | 17,2 % | 0,3 % |
| Jerseys | 153.851,85 | 43,3 % | 0,6 % |
| Shorts | 63.270,96 | 17,8 % | 0,3 % |
| Socks | 9.358,59 | 2,6 % | 0,0 % |
| Vests | 31.877,00 | 9,0 % | 0,1 % |
| **Total** | **24.149.308,98** | **100,0 %** | **100,0 %** |

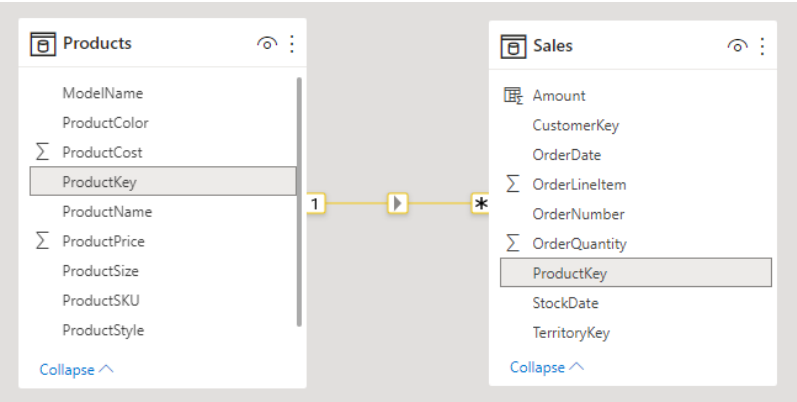
# Iterate (SUMX, AVGX)

1 How to get total sales? *SUM(Quantity * Price)*

| OrderDate | StockDate | OrderNumber | ProductKey | CustomerKey | TerritoryKey | OrderLineItem | OrderQuantity |
|---|---|---|---|---|---|---|---|
| Sonntag, 5. Juli 2015 | Montag, 3. Juni 2002 | SO46718 | 360 | 12570 | 9 | 1 | 1 |
| Dienstag, 7. Juli 2015 | Montag, 22. April 2002 | SO46736 | 360 | 12341 | 9 | 1 | 1 |
| Sonntag, 12. Juli 2015 | Sonntag, 5. Mai 2002 | SO46776 | 360 | 12356 | 9 | 1 | 1 |
| Donnerstag, 16. Juli 2015 | Samstag, 22. Juni 2002 | SO46808 | 360 | 12347 | 9 | 1 | 1 |

2 We have quantity, but not the price?

*Use "RELATED" to fetch the prices, by utilizing the relationship between "SALES" and "PRODUCT"*

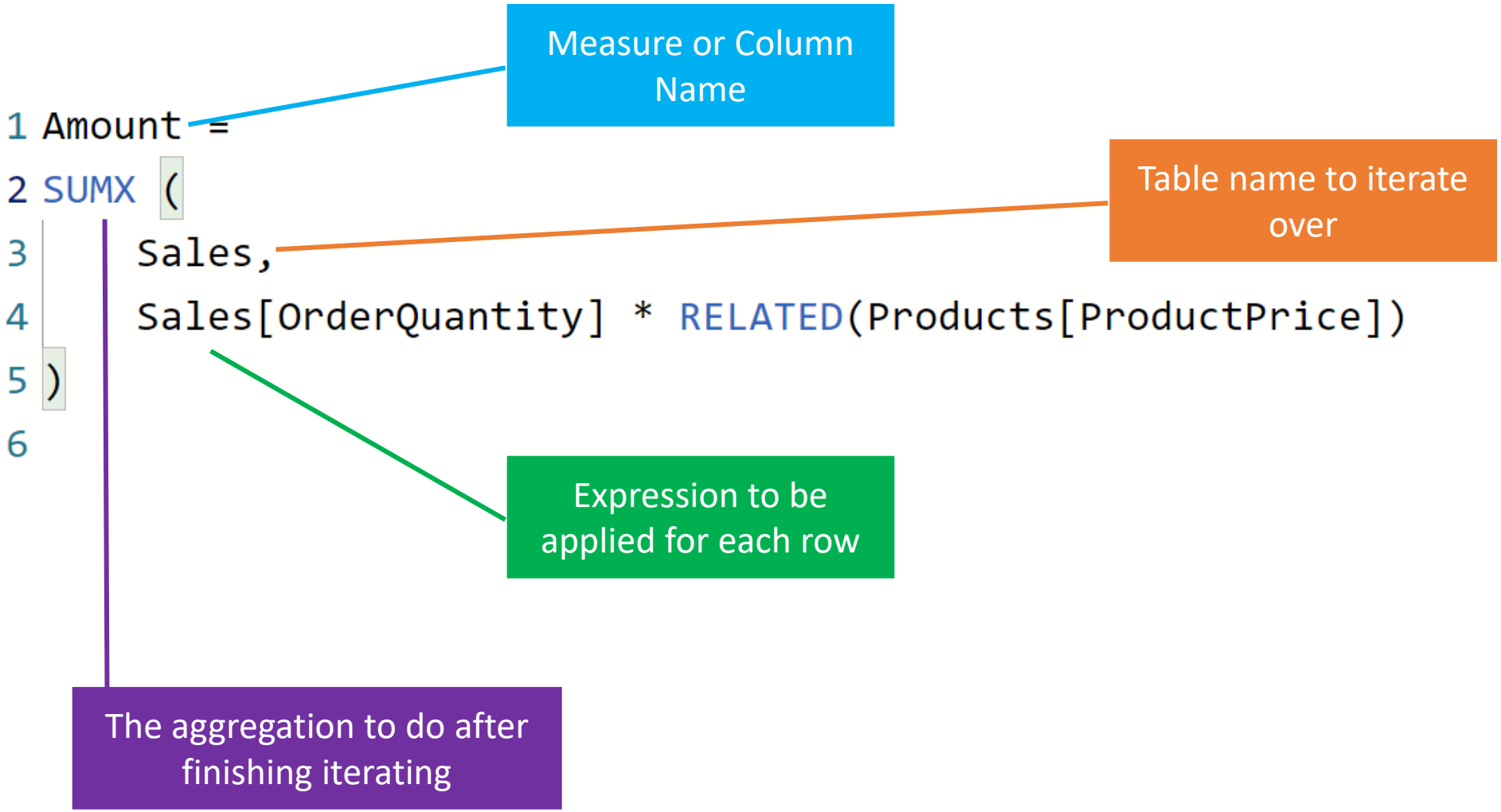



3 *Add a measure to get the price and multiply with the quantity for each row in "SALES"*

**Amount =**

```
SUMX (
    Sales,
    RELATED(Products[ProductPrice]) * Sales[OrderQuantity]
)
```

# Syntax - SUMX


1 Amount =
2 SUMX (
3 Sales,
4 Sales[OrderQuantity] * RELATED(Products[ProductPrice])
5 )
6
Measure or Column Name
Table name to iterate over
Expression to be applied for each row
The aggregation to do after finishing iterating

# Calculate – Override filter context

1 What is the Product importance within his category?

| CategoryName | Amount | Amount Parent Category | % of Parent Category |
|---|---|---|---|
| **Accessories** | **885.417,02** | **885.417,02** | **100,0 %** |
| Bike Racks | 35.280,00 | 885.417,02 | 4,0 % |
| Bike Stands | 35.934,00 | 885.417,02 | 4,1 % |
| Bottles and Cages | 105.698,82 | 885.417,02 | 11,9 % |
| Cleaners | 13.363,95 | 885.417,02 | 1,5 % |
| Fenders | 85.853,88 | 885.417,02 | 9,7 % |
| Helmets | 199.414,62 | 885.417,02 | 22,5 % |

2 Calculate the product sales

3 Total sales for each category

4 Divide the product sales by the

# Syntax - CALCULATE

**Calculate the product sales**

```
[Amount]
```

**Total sales for each category**

```
1 Amount Parent Category =
2 CALCULATE(
3     [Amount],
4     REMOVEFILTERS(Categories[SubcategoryName])
5 )
```

Translation: calculate the [Amount] but ignore all filters regarding “SubcategoryName”

Overwrite Filter

**Divide the product sales by the** ✔

```
1 % of Parent Category =
2 DIVIDE(
3     [Amount],
4     [Amount Parent Category]
5 )
```

# Calculated Column vs Measure

Calculated Column:

- Saved with the model
- Calculated at refresh time
- Row Context

Measure:

- Only definition is saved
- Calculated when it is used

## Map


More detailed comparison

# What is Next:

- Advanced DAX
  - Summarize, RANKX, SWITCH, Conditional Formatting
- Drill through
- Bookmarks
  - Navigation menu
- DAX Studio
  - Analyze generated DAX queries (Formula Engine vs Storage Engine)
- Tabular Editor
  - Calculation Groups

# Important References

SQLBI

Guy in a Cube

Goodly


How to Power BI

Curbal

Link to Dataset “Adventure Works” on Kaggle

# Thank you for your patience