



Lisbon School  
of Economics  
& Management  
Universidade de Lisboa

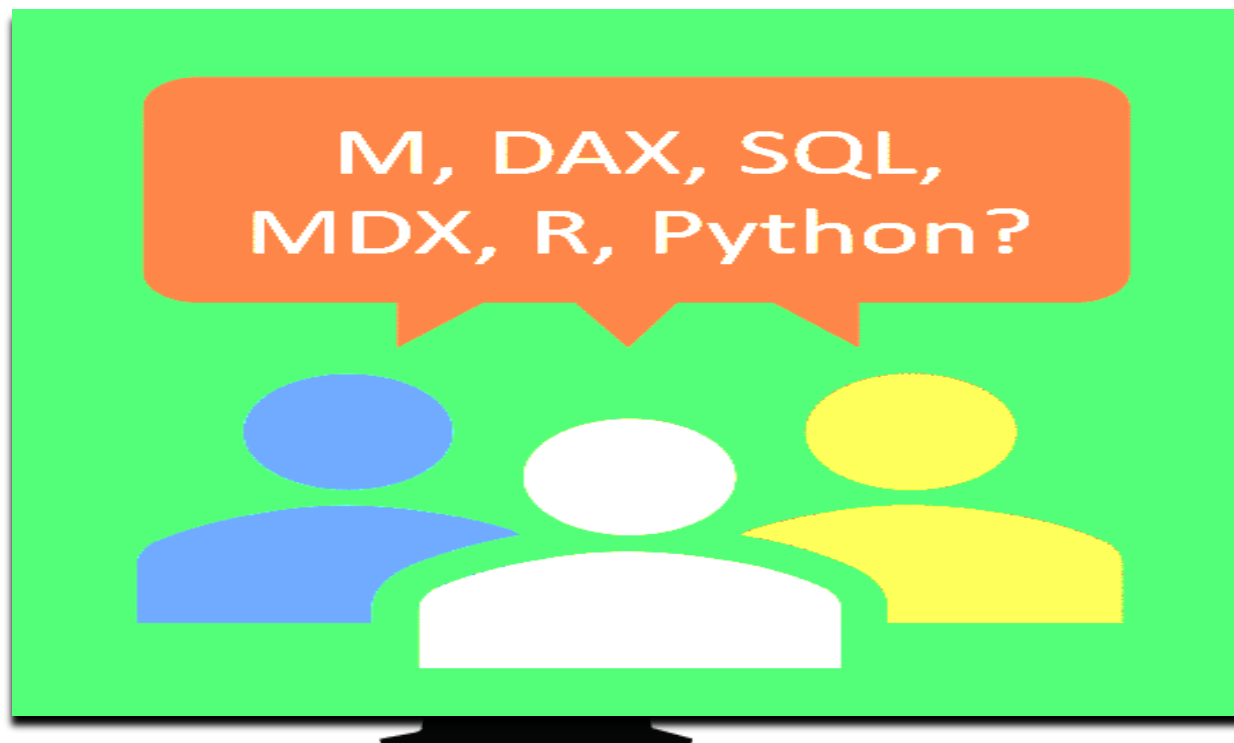


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M



Power Query M Formula Language.



Language used in the context of PowerQuery



It's a functional, case sensitive language like F#.



## DAX



### Data Analysis Expressions



DAX is primarily a formula or a query language.



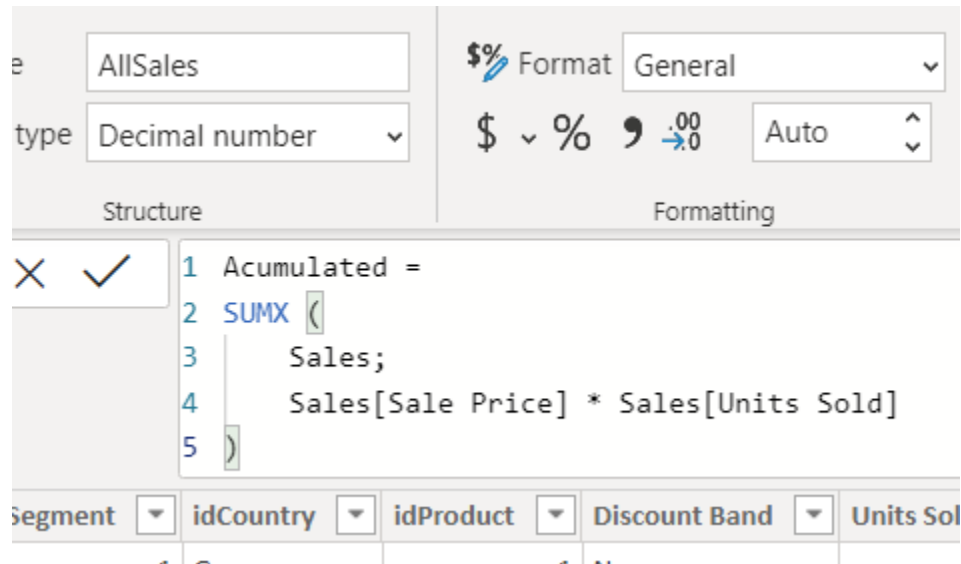
DAX was developed in 2009 by Microsoft

# Power BI



## DAX

- Creating Columns



The screenshot displays the DAX editor interface. The 'Name' field is set to 'AllSales' and the 'Data type' is 'Decimal number'. The 'Format' is set to 'General'. The 'Structure' pane shows the DAX formula for the 'Acumulated' column:

```
1 Acumulated =  
2 SUMX (  
3     Sales;  
4     Sales[Sales Price] * Sales[Units Sold]  
5 )
```

The 'Formatting' pane shows the currency symbol as '\$', the percentage symbol as '%', the thousands separator as ',', and the decimal separator as '.', with the 'Auto' option selected. The table below the formula shows columns for 'Segment', 'idCountry', 'idProduct', 'Discount Band', and 'Units Sol'.

# Power BI



## DAX

- Creating Table

The screenshot displays the Power BI DAX editor interface. The 'Table tools' ribbon is active, showing options like 'Mark as date table', 'Manage relationships', and 'New measure'. The DAX formula bar contains the following code:

```
1 ProductSales = SUMMARIZE (  
2     Sales;  
3     'Product'[Product];  
4     "SumOfSales"; SUM (Sales[Units Sold])  
5 )
```

Below the formula, a preview table is shown with the following data:

Product	SumOfSales
Carretera	146846
Montana	154198
Paseo	338239.5
Velo	162424.5
VTT	168783
Amarilla	155315

# Power BI



## DAX

- Arithmetic Operations and Conditions:

```
Sales[SalesAmount] = Sales[ProductPrice] *  
Sales[ProductQuantity]
```

```
comment = if(Sales[Profit]>0;"Profit";"Loss")
```

```
Margin = if(ISERROR(Sales[profit]/Sales[value]));  
          BLANK();  
          Sales[profit]/Sales[value]  
        )
```

```
country= SWITCH ( Sales[idCountry],  
                  "Fr", "France",  
                  "Ca", "Canada",  
                  "Me", "Mexico",  
                  "Un", "USA",  
                  "Other"  
                )
```

# Power BI



## DAX

- LOOKUPVALUE

```
DiscountValue =  
LOOKUPVALUE (Discount [Discount];  
              Discount [Discount Band];  
              Sales [Discount Band])
```

```
TotalCosts = LOOKUPVALUE (  
              'Product' [Manufacturing cost];  
              'Product' [idProduct];  
              Sales [idProduct]  
              ) * Sales [Units Sold]
```



# Power BI



## DAX

- Summarizing

```
AllSales = sum(Sales[TotalSales_no_Discount])
```

- SUMX allows to iterate line by line

```
AllSales =  
SUMX (  
    Sales;  
    Sales[Sales Price] * Sales[Units Sold]  
)
```

# Power BI



## DAX

- iterate sales but with conditions

```
AllSales =  
SUMX (  
    FILTER (  
        Sales;  
        Sales[idCountry]="fr"  
    );  
    Sales[Sales Price] * Sales[Units  
Sold]  
)
```

# Power BI



## DAX

- SQL:

```
Select Product.Product, Sum([Units Sold])  
From Sales, Product  
Where Product.idProduct=Sales.idProduct  
Group by Product.Product
```

*<- inner join*

- Corresponding in DAX:

```
Table = SUMMARIZE (  
    Sales;  
    'Product' [Product];  
    "SumOfSales"; SUM (Sales[Units Sold])  
)
```



## SQL

SQL Server database ×

Server

Database (optional)

Data Connectivity mode  Import  
 DirectQuery

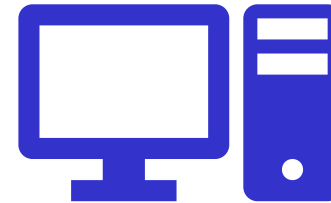
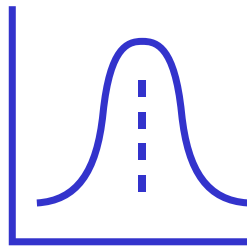
Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

Include relationship columns  
 Navigate using full hierarchy  
 Enable SQL Server Failover support

# Power BI

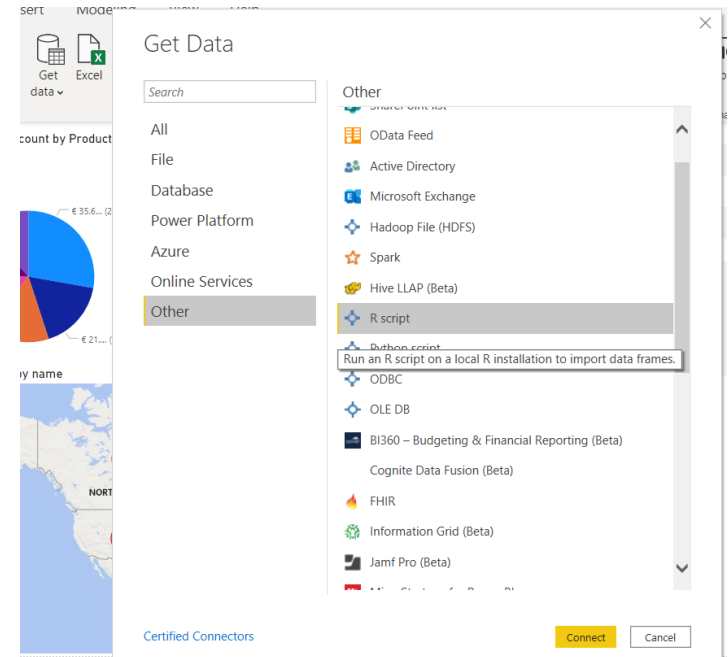
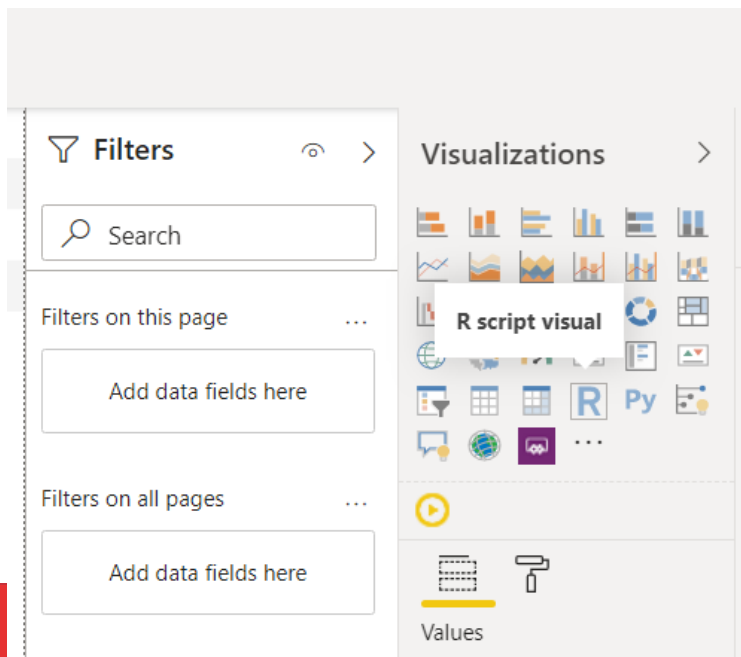


R is a free software environment for statistical computing and graphics.

It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS.



- Getting Data using script
- Customizing Visualizations





- Generic Language
- License: compatible with GNU-GPL
- Guido van Rossum
- <https://www.python.org/>





## Python script



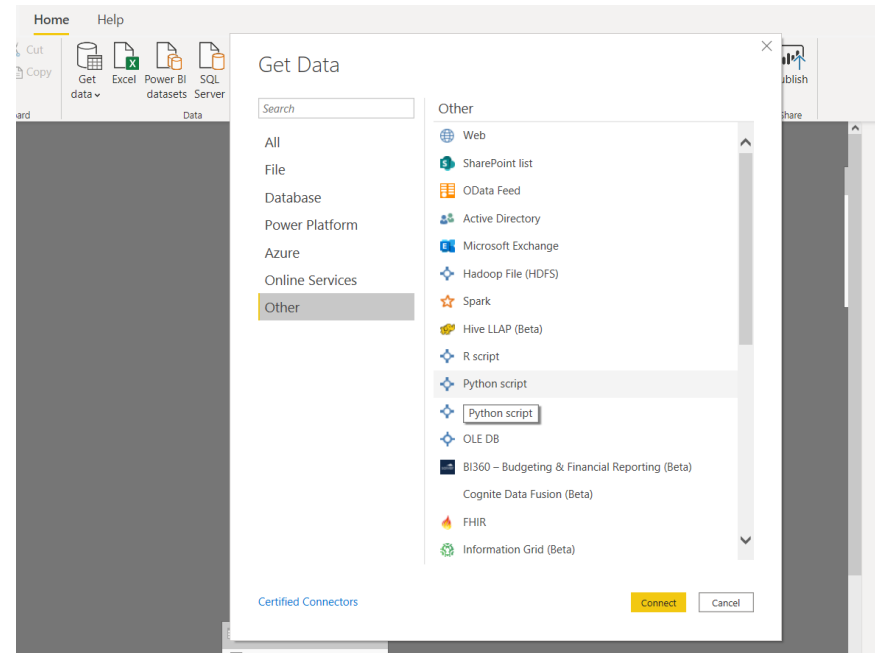
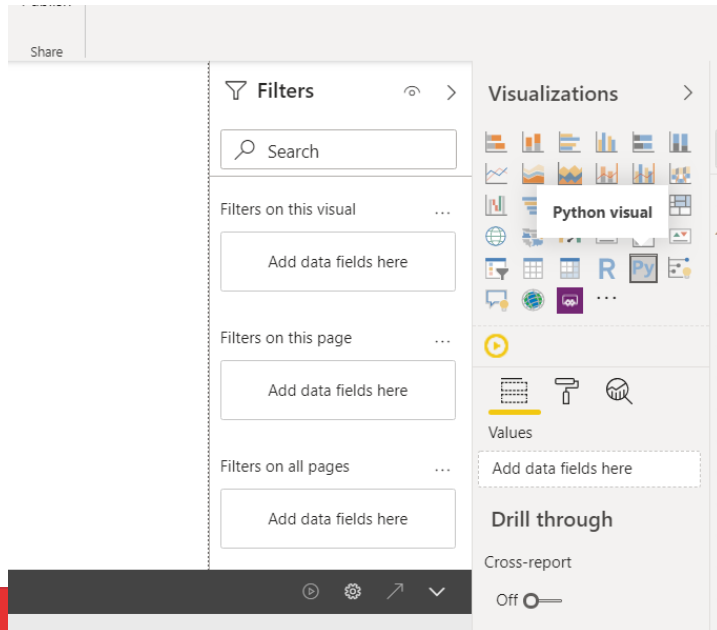
Script

```
import pandas as pd
data = [['Ana',20],['Margarida',20],['Silvia',19]]
df = pd.DataFrame(data,columns=['Name','Age'],dtype=float)
print (df)
```





- Getting Data using script
- Customizing Visualizations



# References

- <https://docs.microsoft.com/en-us/powerquery-m/>
- <https://docs.microsoft.com/en-us/dax/>
- <https://docs.microsoft.com/en-us/power-bi/desktop-python-scripts>
- <https://docs.microsoft.com/en-us/power-bi/desktop-r-visuals>