



Power BI Data Analyst

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1



Get started with Microsoft data analytics

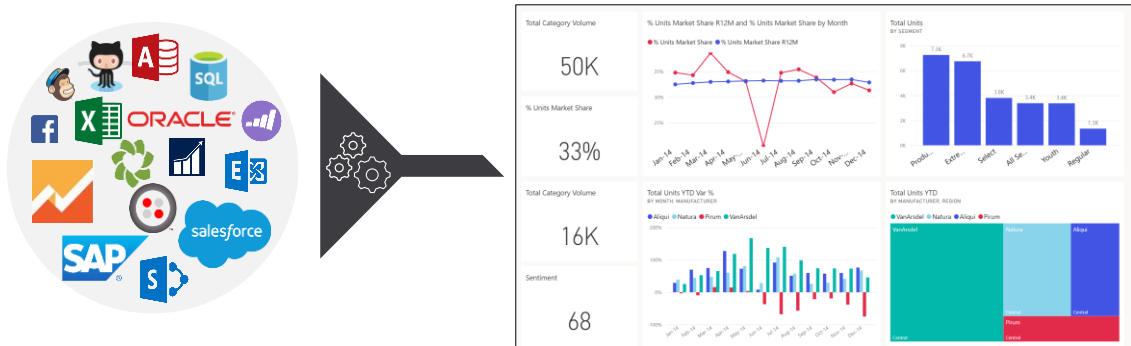


2

Discover data analysis

3

From data to business insights with Power BI



4

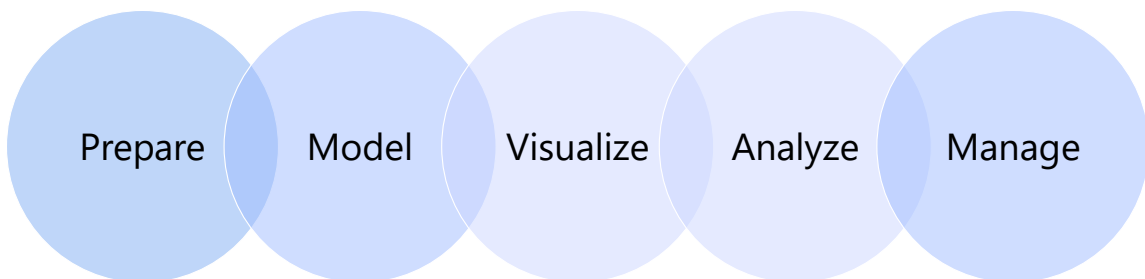
Different types of analysis

Data analysis is another form of storytelling with five categories:

- **Descriptive:** Summarize past data
- **Diagnostic:** Explain past data
- **Predictive:** Forecast future data
- **Prescriptive:** Optimize future data
- **Cognitive:** Learn from data

5

Tasks of a Data Analyst



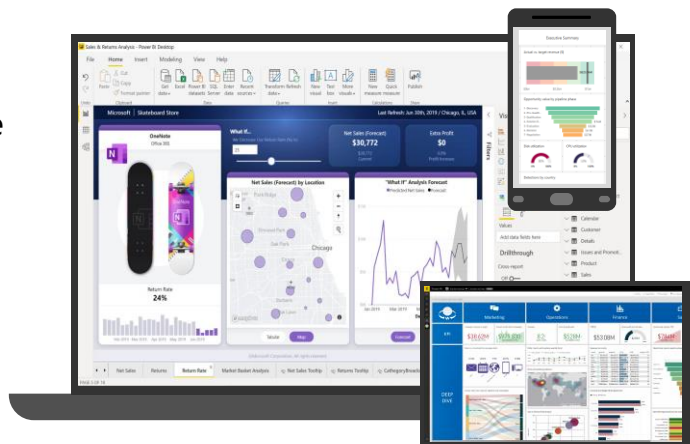
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Get started building with Power BI

7

Introduction to Power BI environment

- Create with Power BI Desktop
- Distribute with Power BI service
- Access with Power BI Mobile



8

The flow of Power BI

Data sources

Power BI Desktop

Power BI service & Mobile



9



Prepare data in Power BI Desktop

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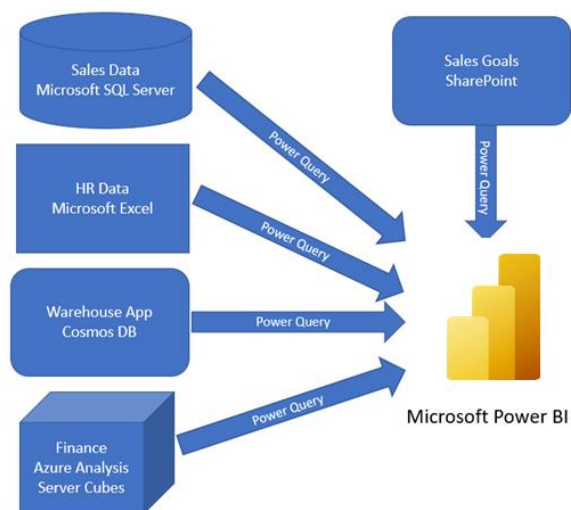
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Get data in Power BI

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11

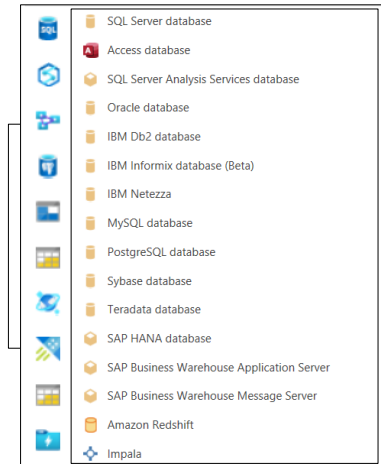
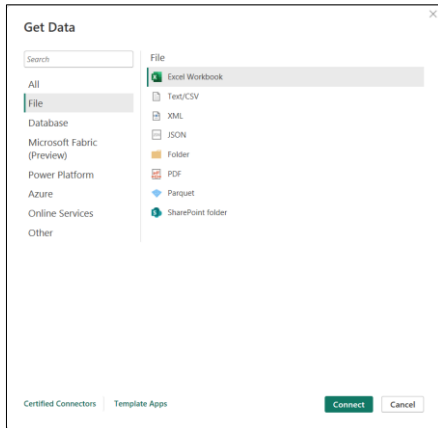
Combine all data into a single semantic model



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Get data from a wide variety of sources



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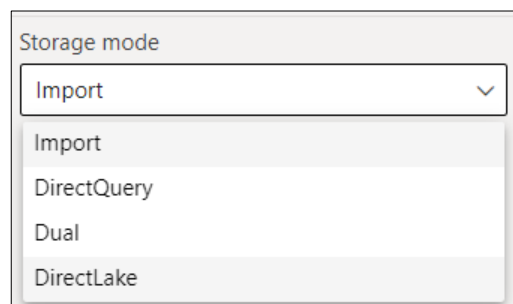
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Select a storage mode

Storage mode affects

- Available transformations
- Report performance

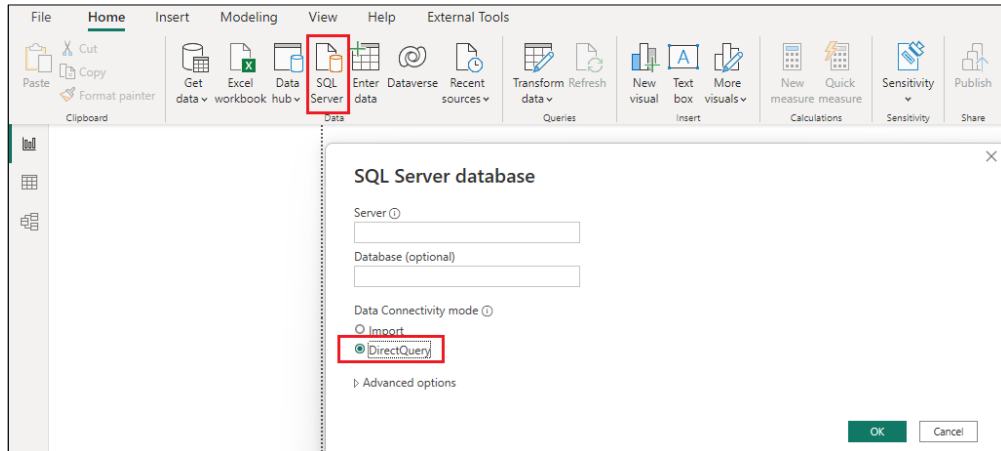
**Not all sources support all modes*



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Introduction to DirectQuery



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Implications of using DirectQuery

Benefits

- Frequently changing data
- Need near real-time
- Large data volumes
- Multi-dimensional data

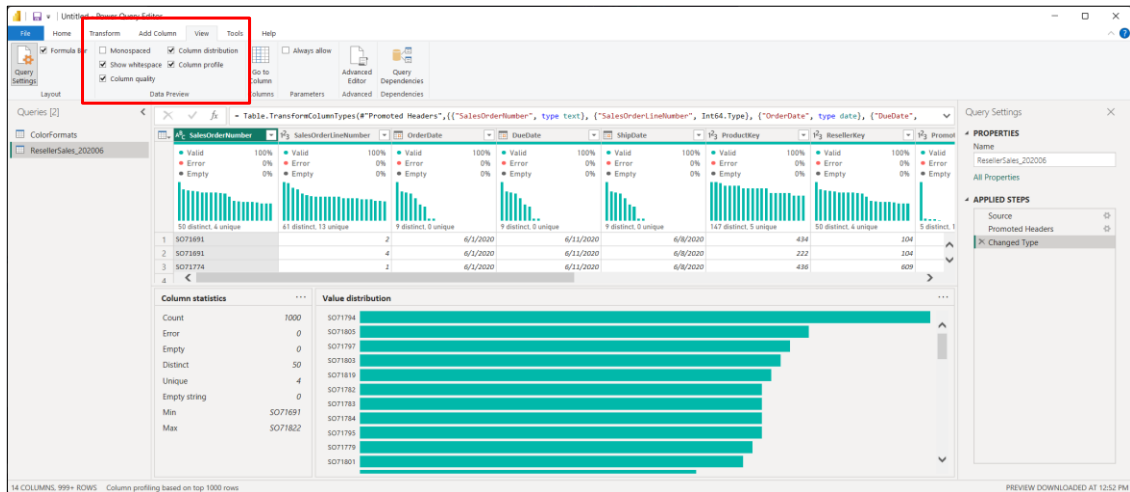
Limitations

- Dependent on data source performance
- Security between source and destination
- Limited modeling capabilities
- Limited transformation features

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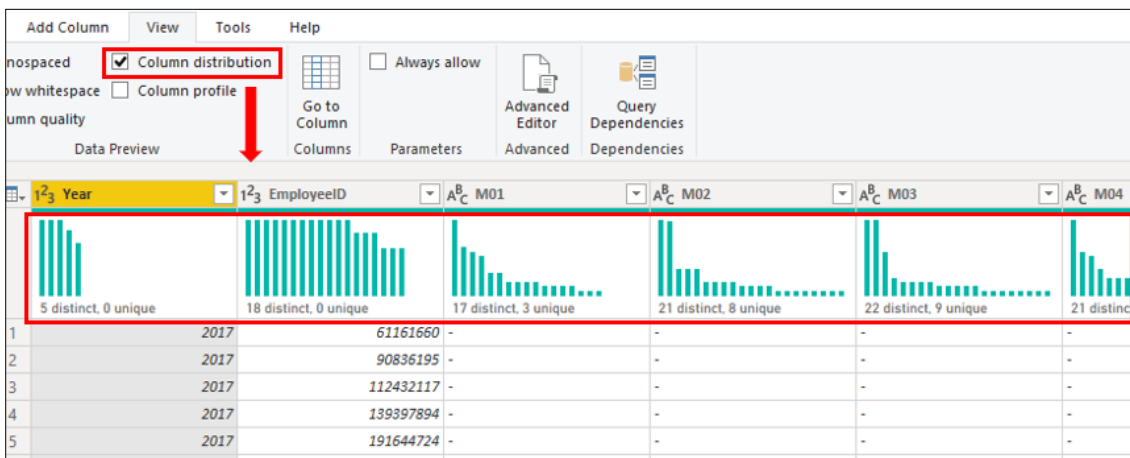
Data profiling options in Power Query Editor



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Determine cardinality of a column

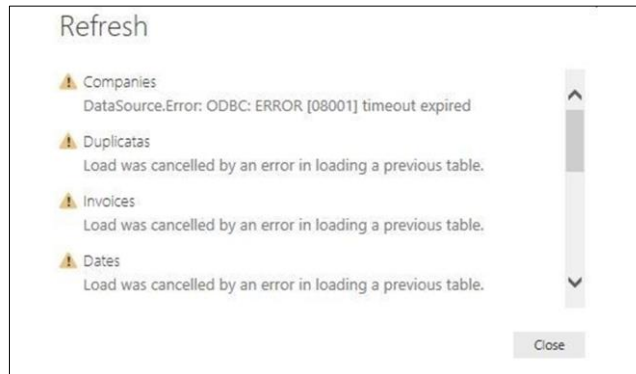


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Data import errors

- Possible data load errors:
 - Query Timeout
 - Couldn't find data formatted as a table
 - Could not find file
 - Data type errors



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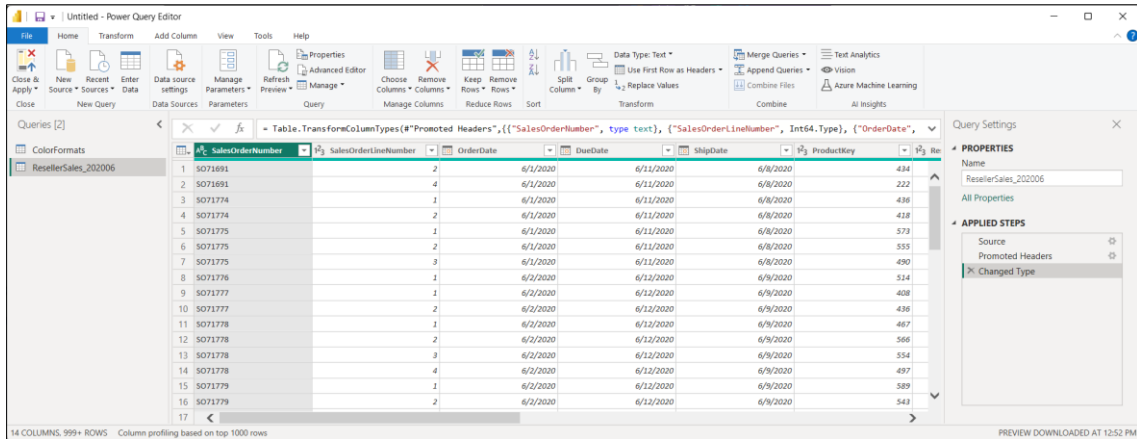
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Clean, transform, and load data

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Transform data with Power Query Editor

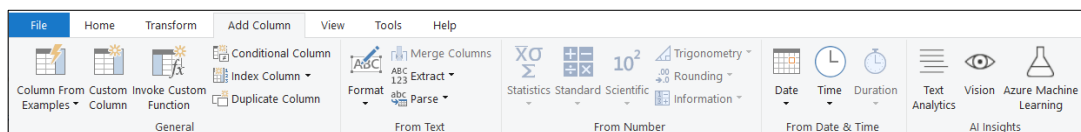
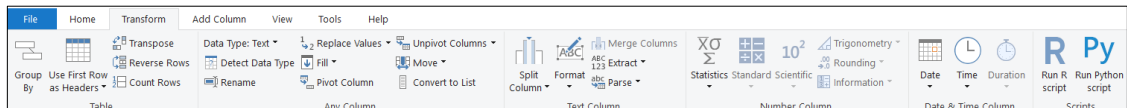


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Common transformations

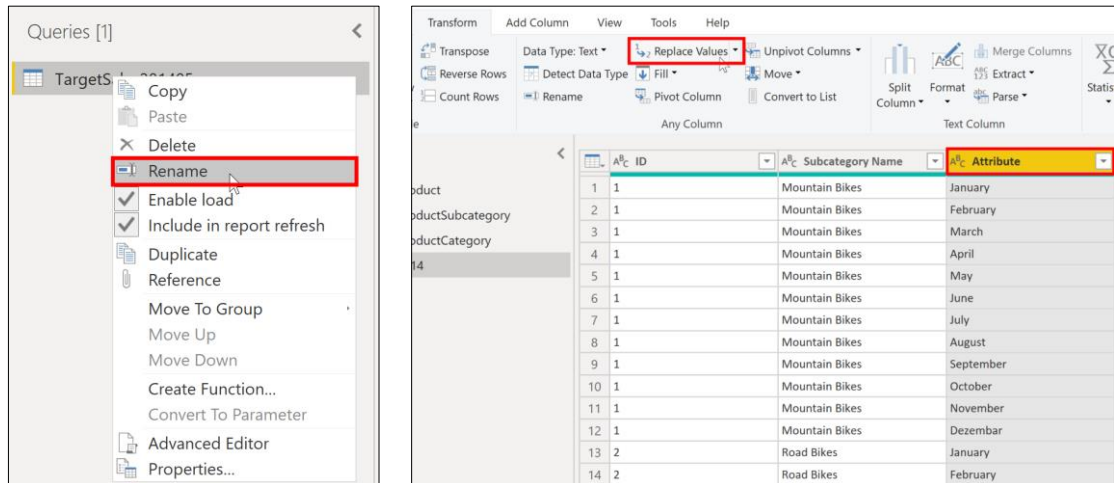
Transform columns, add new, split, extract, and more



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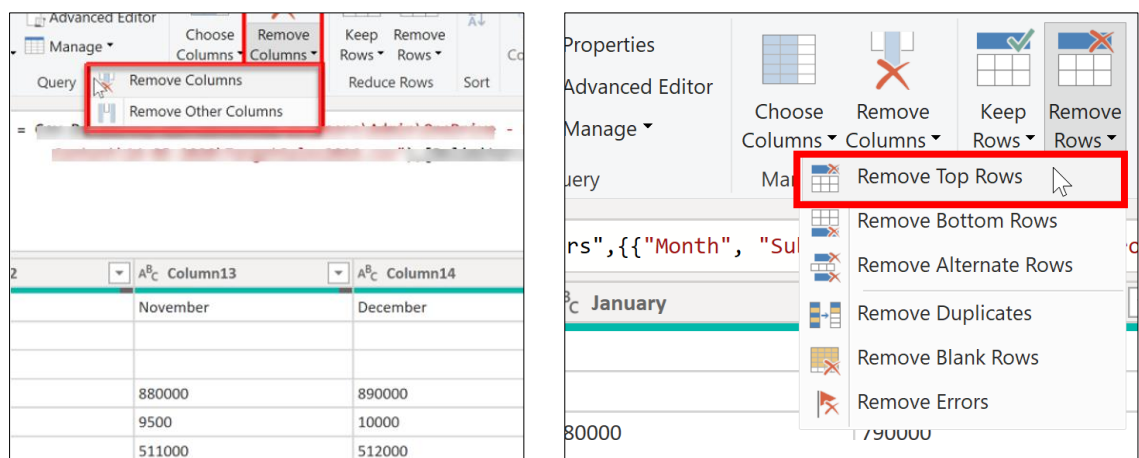
Choose user-friendly values



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Shaping table structure



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Evaluate and change column data types

ABC SalesOrderNumber	ABC OrderDate	ABC TotalCost
SO43659	7/1/2017	2024.99
SO43659	7/1/2017	6074.97
SO43659	7/1/2017	2024.99
SO43659	7/1/2017	2039.99
SO43659	7/1/2017	2039.99
SO43659	7/1/2017	4079.98
SO43659	7/1/2017	2039.99
SO43659	7/1/2017	86.52
SO43659	7/1/2017	28.84
SO43659	7/1/2017	34.2

Couldn't load the data for this visual

MdxScript(Model) (19, 40) Calculation error in measure 'Sales'[Quantity of Orders YTD]: A column specified in the call to function 'TOTALYTD' is not of type DATE. This is not supported.

[Copy details](#)

Send a Frown

Close

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Combine multiple queries into one

Append

Append

Concatenate rows from three or more tables into a single table.

☐ Two tables ☒ Three or more tables

Available tables

- Production Suppliers
- Sales Customers
- HR Employees

Tables to append

- Production Suppliers
- Sales Customers
- HR Employees

Add >>

OK

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Merge

Merge

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

Sales Orders

orderid	custid	empid	orderdate	requireddate	shipdate	shipperid	freight	shipname
10248	85	5	7/4/2014	8/1/2014	7/16/2014	3	32.38	Ship to 85-B
10249	79	6	7/5/2014	8/16/2014	7/10/2014	1	11.61	Ship to 79-C
10250	34	4	7/8/2014	8/5/2014	7/12/2014	2	65.83	Destination SCC
10251	84	3	7/8/2014	8/5/2014	7/15/2014	1	41.34	Ship to 84-A

Sales OrderDetails

orderid	productid	unitprice	qty	discount
10248	11	14.00	12	0
10248	42	9.80	10	0
10248	72	34.80	5	0
10249	14	18.60	9	0
10249	51	42.40	40	0

Join Kind

Left Outer (all from first, matching from second)

☐ Use fuzzy matching to perform the merge

Fuzzy matching options

✓ The selection matches 830 of 830 rows from the first table.

OK Cancel

26

Unpivot or pivot columns

Add or remove table structure to meet your aggregation needs.

	Category Name	Subcategory Name
1	Bikes	Mountain Bikes
2	Bikes	Road Bikes
3	Bikes	Touring Bikes
4	Clothing	Bib-Shorts
5	Clothing	Caps
6	Clothing	Gloves
7	Clothing	Jerseys
8	Clothing	Shorts
9	Clothing	Socks
10	Clothing	Tights
11	Clothing	Vests
12	Accessories	Bike Racks
13	Accessories	Bike Stands
14	Accessories	Bottles and Cages

	1.2 Bikes	1.2 Components	1.2 Clothing	1.2 Accessories
1	3	14	8	12

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27



Model data with Power BI Desktop

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Introduction to data modeling

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Data table types

Fact tables are activities or events.

FactResellerSales
DueDate
EmployeeKey
OrderDate
OrderQuantity
ProductKey
PromotionKey
ResellerKey
SalesAmount
SalesOrderLineNumber
Collapse ^

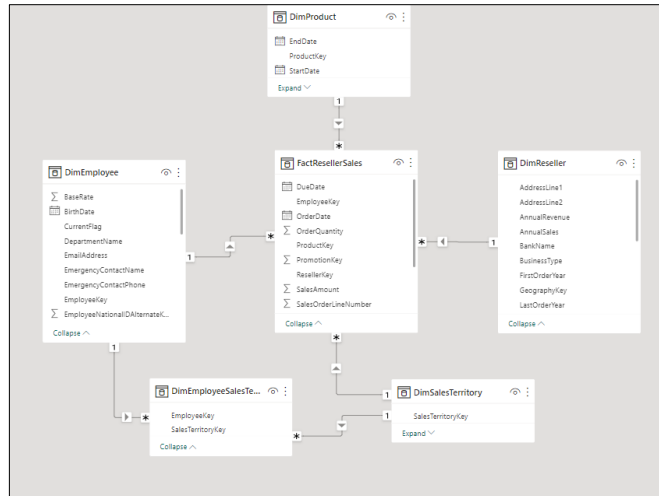
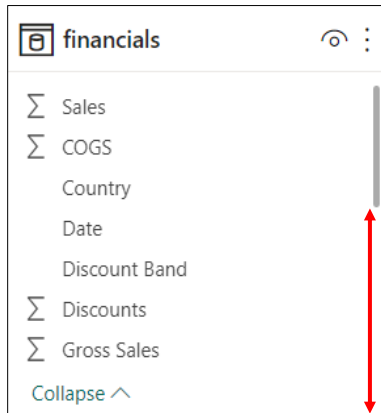
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Dimension tables provide the details.

DimEmployee
BaseRate
BirthDate
CurrentFlag
DepartmentName
EmailAddress
EmergencyContactName
EmergencyContactPhone
EmployeeKey
EmployeeNationalIDAlternateK...
Collapse ^

30

Understand star schemas



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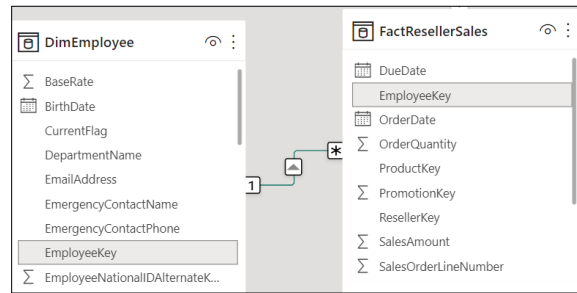
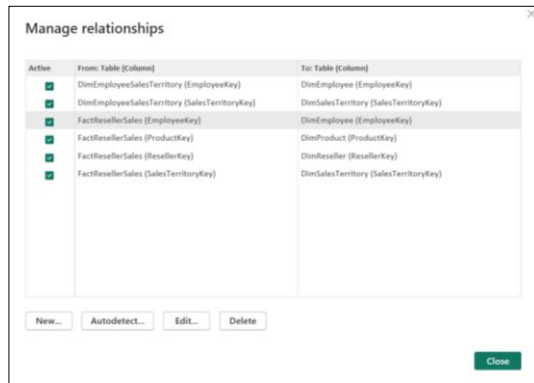
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Manage relationships

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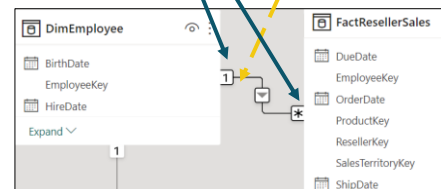
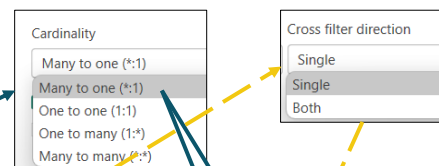
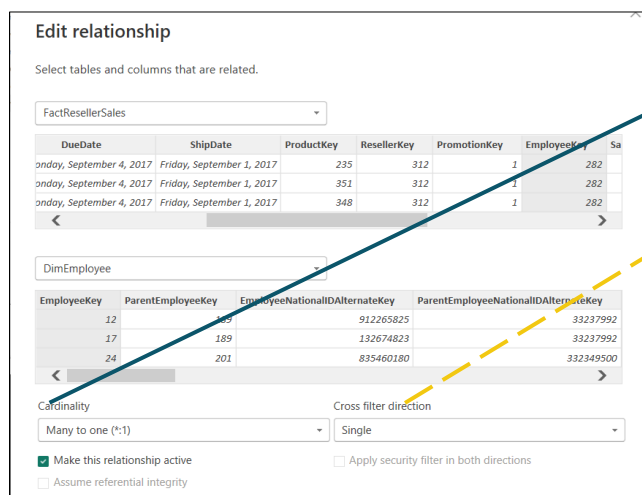
Create relationships



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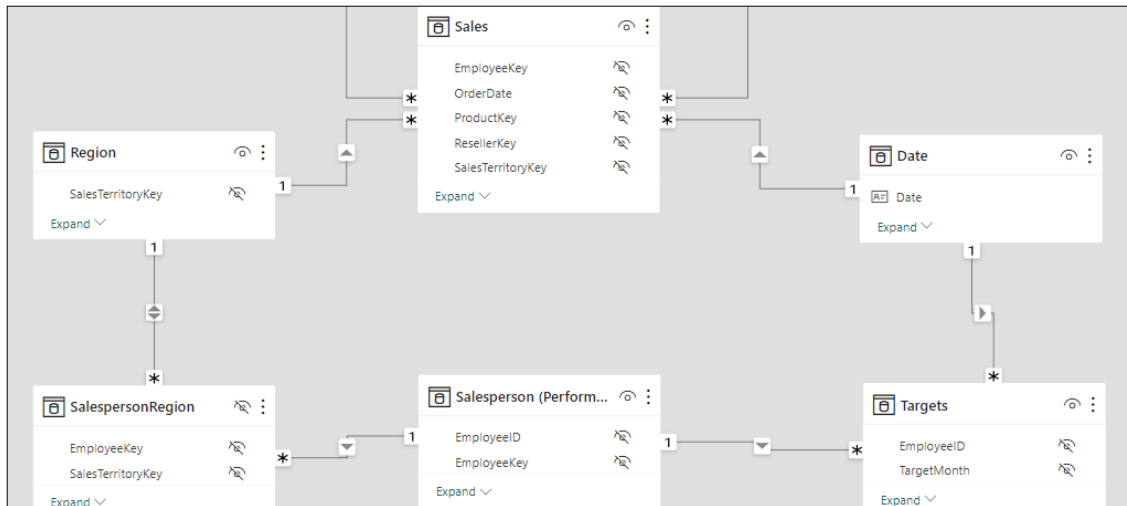
Edit relationships



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Implications of circular relationships



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Create calculations with DAX in Power BI

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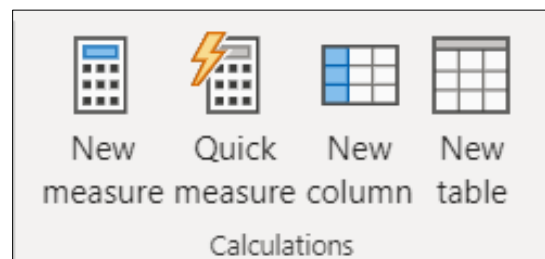
Introduction to DAX

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What is DAX?

- **D**ata **A**nalysis **E**xpressions
- Library of functions and operators
- Build formulas and expressions
- Create calculated measures, columns, and tables

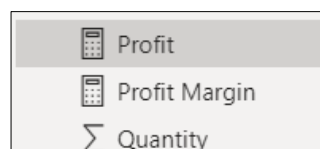
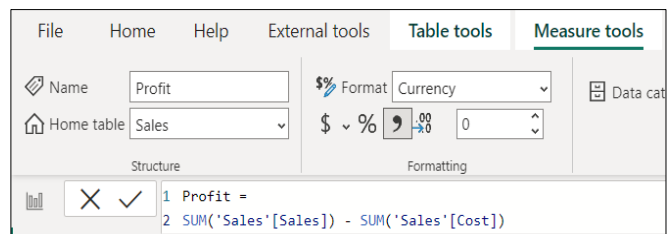


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Create calculated measures

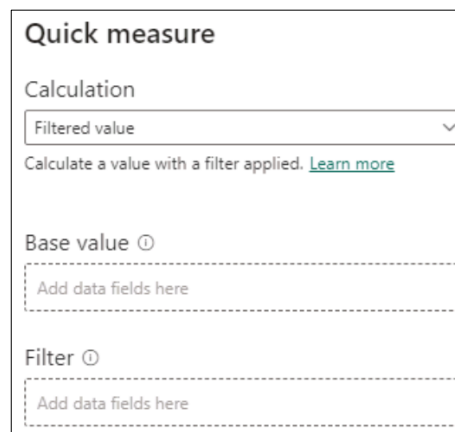
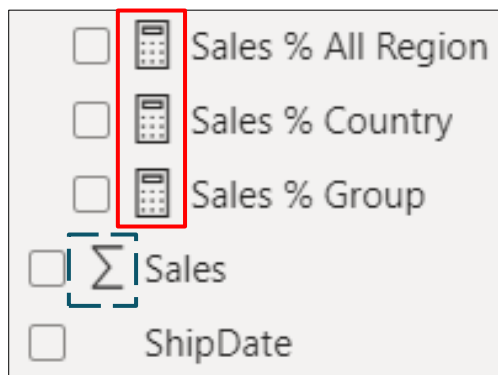
- Defined with DAX definitions
- Computed on the fly.
- Not stored in data model.
- Responsive to interactions.
- Indicated by calculator icon.



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Implicit vs. Explicit vs. Quick measures

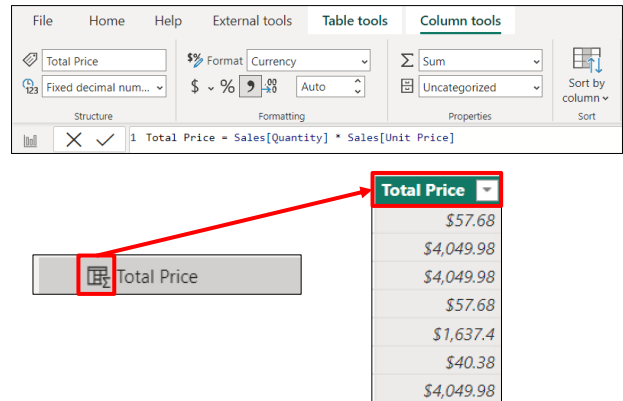


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Create calculated columns

- Defined using DAX expressions.
- Computed & stored in data model.
- Useful “helper/connector columns.”
- Recalculated during data refresh.
- Table and Sigma icon.

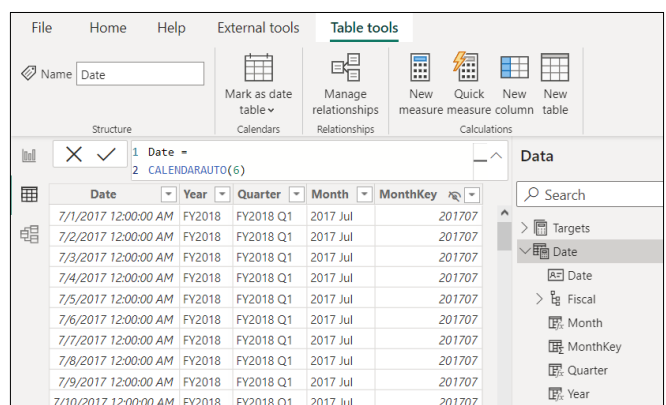


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Create calculated tables

- Defined using DAX expressions.
- Computed & stored in data model.
- Useful for aggregating data or creating custom tables.
- Table and calculator icon.



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Columns vs. measures

Calculated columns:

- Create values for each row in table.
- Store values in the .pbix file.
- Increases data model size.
- Row-by-row calculation can impact performance.
- Must be referenced with measures for reuse.

Measures:

- Calculate on demand.
- Calculated based on filters.
- Doesn't affect data model size.
- DAX expressions may still be suboptimal.
- Can reference other measures directly for reuse.

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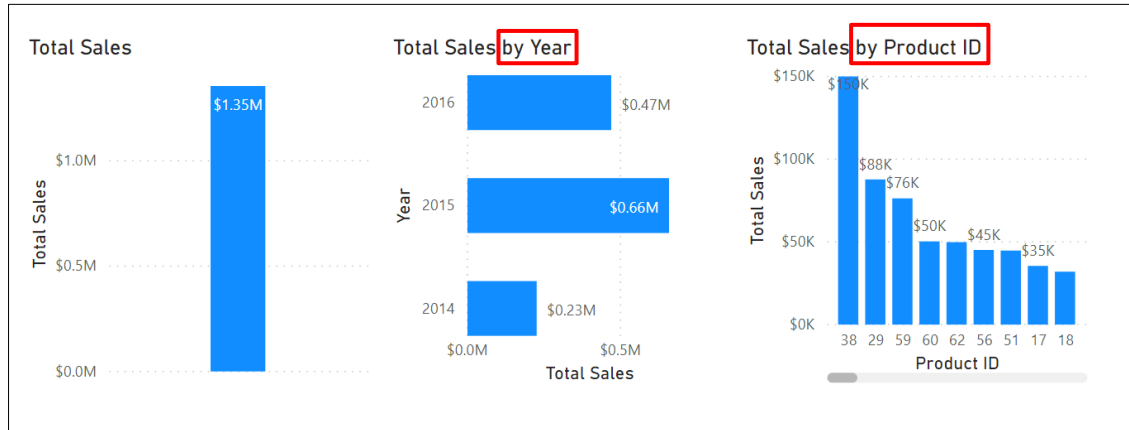
Advanced DAX concepts

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Understanding filter context

Measures are contextually different, or “dynamic,” depending on filters.

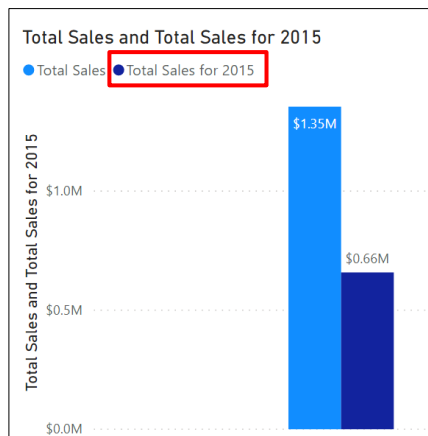


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CALCULATE() function

Adjusts how measures interpret data filters, enabling context control.



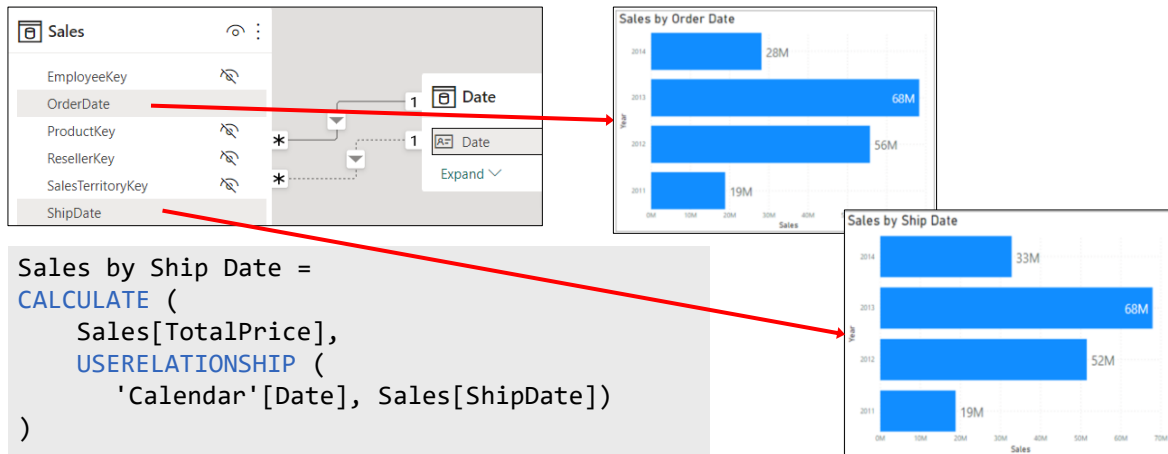
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```
Total Sales for 2015 =
CALCULATE (
    SUM ( 'Sales OrderDetails'[Total Price]
),
    YEAR ( 'Sales OrderDetails'[OrderDate] )
= 2015
)
```

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Use inactive relationships with DAX

Enable additional table filtering without impacting the active relationship.



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Create a common date table

Mark as date table

Select a column to be used for the date. The column must be of the data type 'date' and must contain only unique values. [Learn more](#)

Date column

✓ Validated successfully

When you mark this as a date table, the built-in date tables that were associated with this table are removed. Visuals or DAX expressions referring to them may break. [Learn how to fix visuals and DAX expressions](#)

OK Cancel

✓ Date

☐ Date

✓ ☐ Fiscal

☐ Year

☐ Quarter

☐ Month

☐ Month

☐ Quarter

☐ Year

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48

Time Intelligence functions

Month	2014	2015	2016
January		\$66,692.8	\$100,854.72
February		\$107,900	\$205,416.67
March		\$147,879.9	\$315,242.12
April		\$203,579.29	\$449,872.68
May		\$260,402.99	\$469,771.34
June		\$299,490.99	\$469,771.34
July	\$30,192.1	\$354,955.92	\$469,771.34
August	\$56,801.5	\$404,937.61	\$469,771.34
September	\$84,437.5	\$464,670.63	\$469,771.34
October	\$125,641.1	\$534,999.13	\$469,771.34
November	\$175,345.1	\$580,912.49	\$469,771.34
December	\$226,298.5	\$658,388.75	\$469,771.34
Total	\$226,298.5	\$658,388.75	\$469,771.34

Total Sales Previous Month =

```
CALCULATE ( SUM ( Sales[Total Price] ),
PREVIOUSMONTH ( 'Date'[Date] ) )
```

April	\$33,899.39	
May	\$56,823.7	
June	\$39,088	
July	\$55,464.93	
August	\$49,981.69	
September	\$59,733.02	
October	\$70,328.5	
November	\$45,913.36	
December	\$77,476.26	

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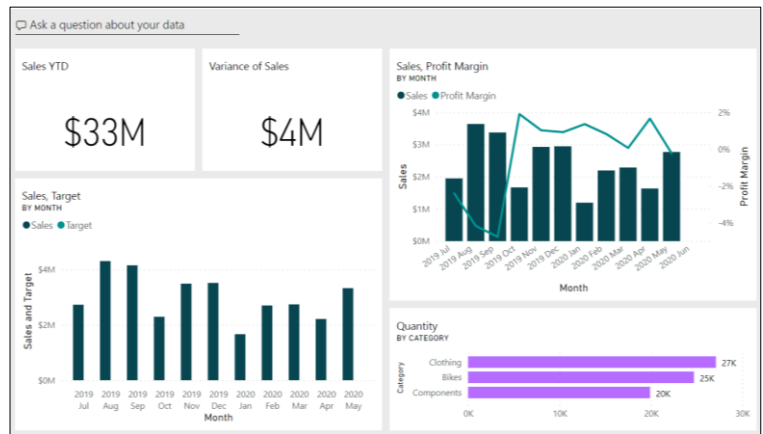
Create and use dashboards

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What is a Power BI dashboard?

- Single page
- Visuals pinned from reports
- Tiles are static
- Default Q&A feature
- Refreshes with semantic model
 - DirectQuery every 15 min

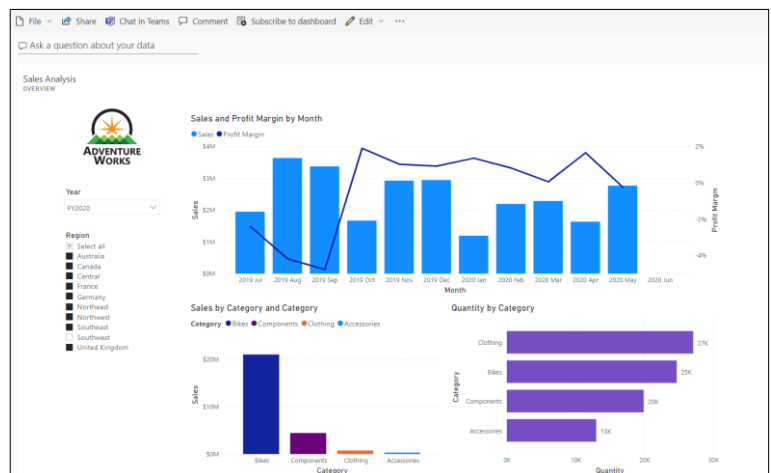
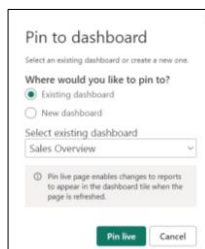


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Pin visuals to a dashboard

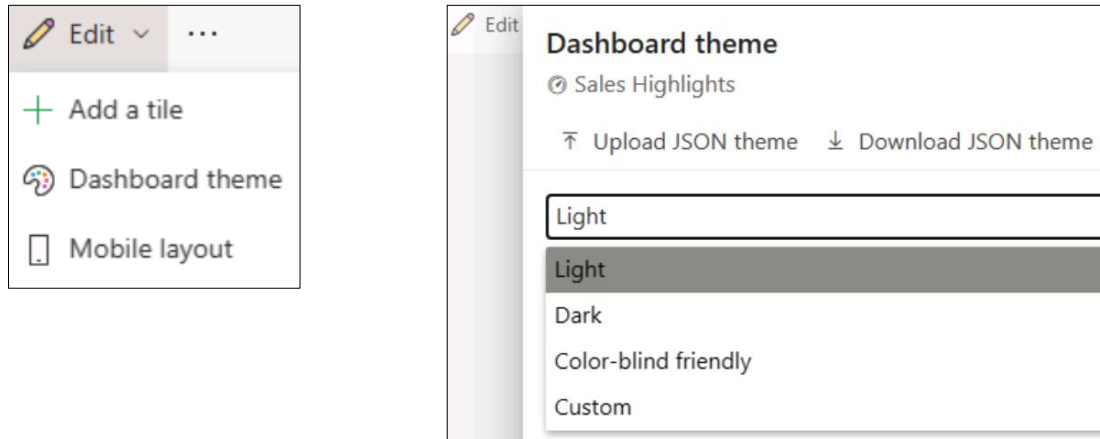
- Specific visuals
- Entire pages (pin live)



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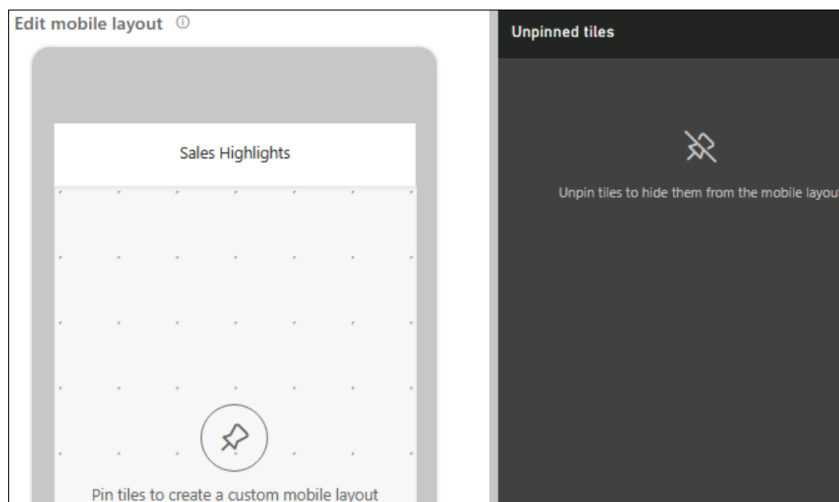
Enhance your dashboard with a theme



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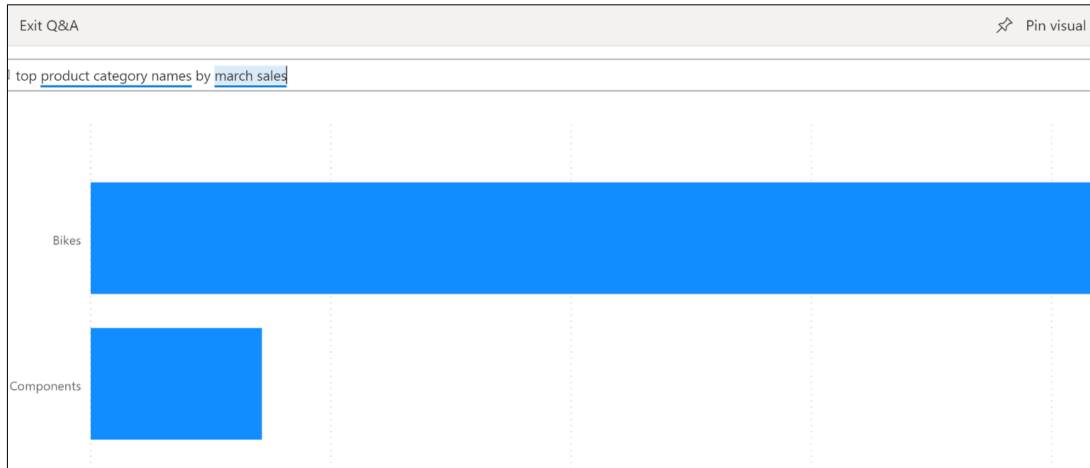
Design mobile layout for dashboards on the go



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Use natural language to explore with Q&A



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Thanks

56