



Introduction to Power BI

Phichayasini K.

pichak@sut.ac.th



Power BI

Go from **data** to **insights** in minutes

Go to >> <https://www.microsoft.com/en-us/download/details.aspx?id=58494>

The screenshot shows the Microsoft Download Center page for Power BI Desktop. At the top, there's a navigation bar with the Microsoft logo, 'Download Center', and links for Windows, Office, Web browsers, Developer tools, Xbox, and Windows Phone. To the right are links for 'All Microsoft', a search bar, a cart icon, and a user profile for 'Phichayasini'. A large banner image features a woman working at a desk with a computer displaying Power BI dashboards. Below the banner, the heading 'Power BI' is displayed, followed by the subtext 'Transform data into actionable insights with dashboards and reports' and a 'LEARN MORE >' button.

Microsoft Power BI Desktop

Important! Selecting a language below will dynamically change the complete page content to that language.

Select Language:

English ▾

Download

Microsoft Power BI Desktop is built for the analyst. It combines state-of-the-art

Related Files



<https://qrgo.page.link/wkFJu>

Version เก่า

Untitled - Power BI Desktop

File Home View Modeling Help

Cut Copy Format Painter Paste Get Recent Data Data Sources Refresh New Page New Visual Ask A Question Buttons Text box Image Shapes From Marketplace From File Switch Theme Manage Relationships New Measure New Column New Quick Measure Publish Share

Clipboard External data Insert Custom visuals Themes Relationships Calculations Share

Filters

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Fields

Search

Values

Add data fields here

Drillthrough

Cross-report

Off

Keep all filters

On

Add drillthrough fields here

Page 1 +

PAGE 1 OF 1

Version ใหม่

Untitled - Power BI Desktop

Sign in

File Home Insert Modeling View Help

Paste Cut
Copy Format painter
Clipboard

Get data v Excel Power BI datasets SQL Enter data Recent sources v

Transform Refresh data v New visual Text box More visuals v

New measure measure Publish Share

Filters

Search

Filters on this page ...
Add data fields here

Filters on all pages ...
Add data fields here

Values

Add data fields here

Drill through

Cross-report
Off

Keep all filters
On

Add drill-through fields here

Visualizations

Fields

Search

Page 1 +

PAGE 1 OF 1

Untitled - Power BI Desktop

File Home View Modeling Help

Cut Copy Format Painter Paste Get Recent Enter Data Refresh Data Sources Enter Data Edit Queries New Page New Visual Ask A Question Buttons Text box From Marketplace From File Switch Theme Manage Relationships New Measure New Column New Quick Measure Publish Share

Clipboard Insert Custom visuals Themes Relationships Calculations Share

Data Transformation

Filters

Filters on this page

Add data fields here

Filters on all pages

Add data fields here

Visualizations

Values

Add data fields here

Drillthrough

Cross-report

Off

Keep all filters

On

Add drillthrough fields here

Fields

Search

Data Visualization

Page 1 +

PAGE 1 OF 1

The screenshot shows the Power BI Desktop interface. The ribbon at the top has tabs for File, Home, View, Modeling, and Help. The Home tab is selected. In the Home tab ribbon, there is a 'Data' group with icons for Paste, Cut, Copy, Format Painter, Get Data, Recent Sources, Enter Data, and Edit Queries. The 'Edit Queries' icon is highlighted with an orange box. To the right of the ribbon, there is a 'Filters' pane and a 'Visualizations' pane. The 'Visualizations' pane is also highlighted with an orange box. The main workspace is titled 'Data Transformation'. At the bottom, there is a navigation bar with 'Page 1' and a plus sign, and a status bar at the bottom left indicating 'PAGE 1 OF 1'.

Data Transformation

Data Transformation

- Structured Data
- Import Data
- Transformation Tools

Structured Data



Report Format

Date	Product 1	Product 2	Product 3	Product 4
1/1/2019	300	200	400	200
2/1/2019	350	200	350	200

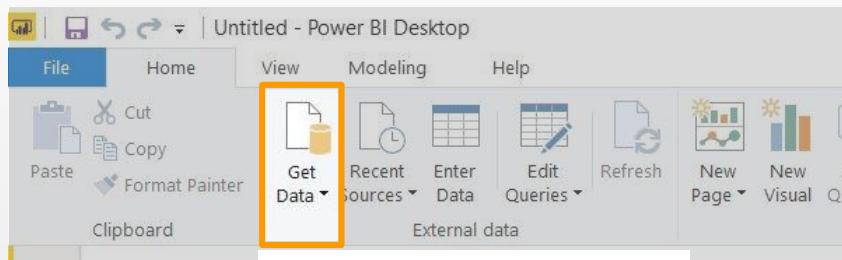


Machine Readable Format

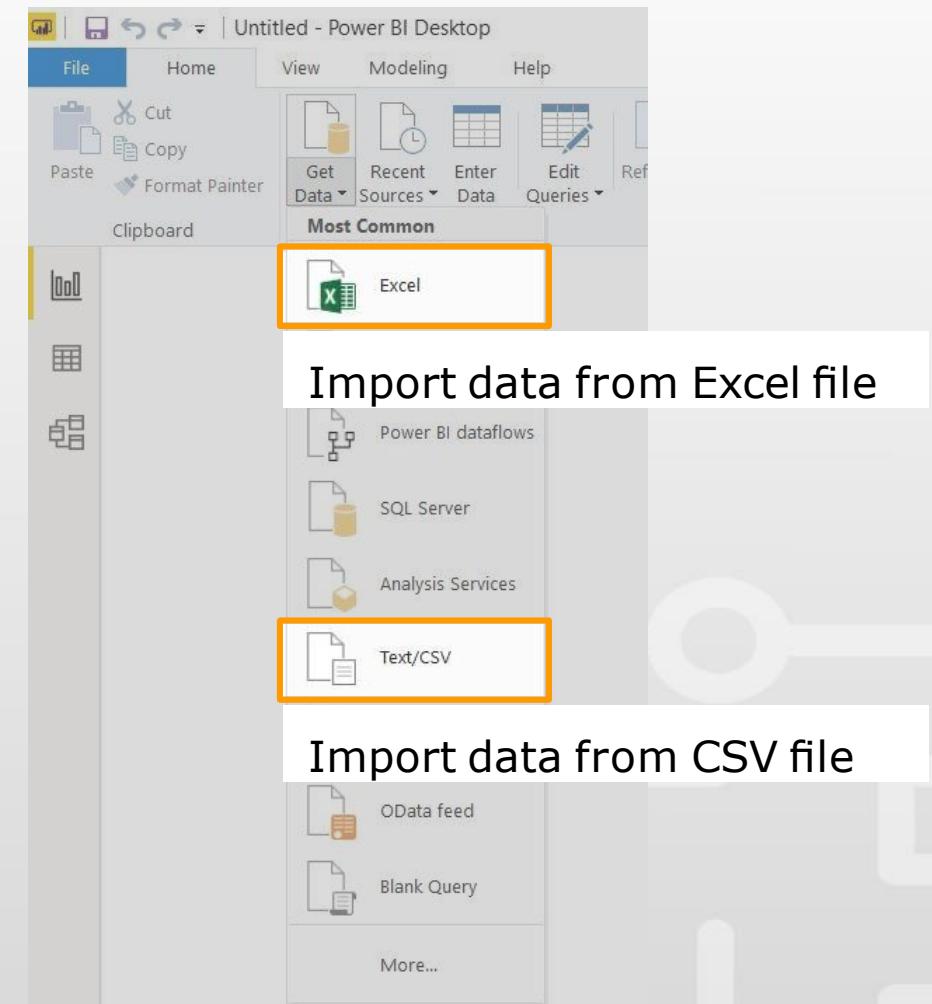
Date	Product	Sales
1/1/2019	Product 1	300
1/1/2019	Product 2	200
1/1/2019	Product 3	400
1/1/2019	Product 4	200
2/1/2019	Product 1	350
2/1/2019	Product 2	200
2/1/2019	Product 3	350
2/1/2019	Product 4	200

Import Data (From Excel/CSV)

1



2



Import Data (From Excel/CSV)

The screenshot shows the Microsoft Power BI desktop application. On the left, the 'Navigator' pane is open, displaying a list of files under 'Example data.xlsx [3]'. The 'Personal data' sheet is selected. A callout bubble labeled '3' points to the file list, with the text 'Select Sheet you want' overlaid. In the center, a table titled 'Personal data' shows five rows of sample data. On the right, the 'Visualizations' pane is visible. A callout bubble labeled '4' points to the 'Load' button at the bottom of the ribbon, with the text 'Click \'Load\'' overlaid.

3

Select Sheet you want

4

Click 'Load'

Full Name	Last Name	ID	Age
Ronnie	Anderson	1401	32
John	Brown	1402	35
Ann	Brook	1403	28
Lena	Smith	1404	33
Jone	Smith	1405	27

Transformation Tools

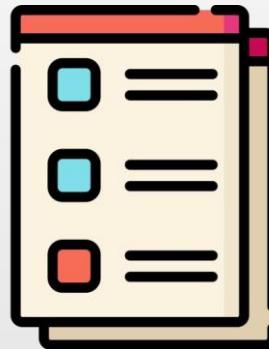
1. Data types
2. Applied Steps
3. Columns & Rows managing
4. Format Tools
5. Group by
6. Merge & Append Queries

Transformation Tools - Data types



Numerical Data

Represent **measurement** such as a person's height, weight, IQ, or blood pressure



Categorical Data

Represent **characteristics** such as a person's gender, marital status



Date - Time

Represent **date and time**

Transformation Tools - Data types

Untitled - Power Query Editor

File Home Transform Add Column View Help

Close & Apply New Source Recent Sources Enter Data Data source settings Manage Parameters Refresh Preview Advanced Editor Manage

Close New Query Data Sources Parameters Query

Queries [3]

Personal data (selected)

Hire date

Department data

Full Name

Last Name

1.2 Decimal Number

\$ Fixed decimal number

123 Whole Number

% Percentage

Date/Time

Date

Time

Date/Time/Timezone

Duration

Text

True/False

Binary

Using Locale...

or

Data Type: Any

Decimal Number

Fixed decimal number

Whole Number

Percentage

Date/Time

Date

Time

Date/Time/Timezone

Duration

Text

True/False

Binary

Transformation Tools - Applied Steps

The screenshot shows the Power BI Data Editor interface. On the left is a table with columns: Full Name, Last Name, ID, and Age. The table has 5 rows of data. The 'Age' column is highlighted with a yellow header. On the right is the 'Query Settings' pane, which includes sections for 'PROPERTIES' (Name: Personal data) and 'APPLIED STEPS'. The 'APPLIED STEPS' section is highlighted with a red border and lists: Source, Navigation, Promoted Headers, and Changed Type. A callout box points to the 'Changed Type' step.

	Full Name	Last Name	ID	Age
1	Ronnie	Anderson	1401	32
2	John	Brown	1402	35
3	Ann	Brook	1403	28
4	Lena	Smith	1404	33
5	Jone	Smith	1405	27

Query Settings

PROPERTIES

Name
Personal data

All Properties

APPLIED STEPS

Source

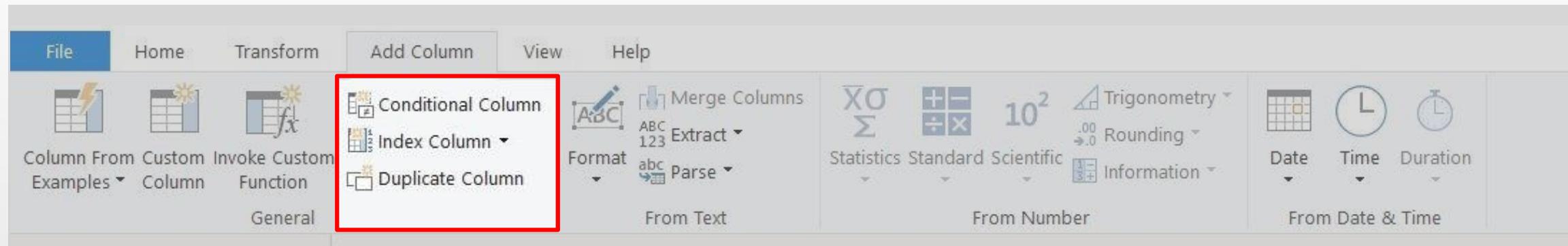
Navigation

Promoted Headers

Changed Type

Steps that have taken to transform data

Transformation Tools - Columns & Rows managing

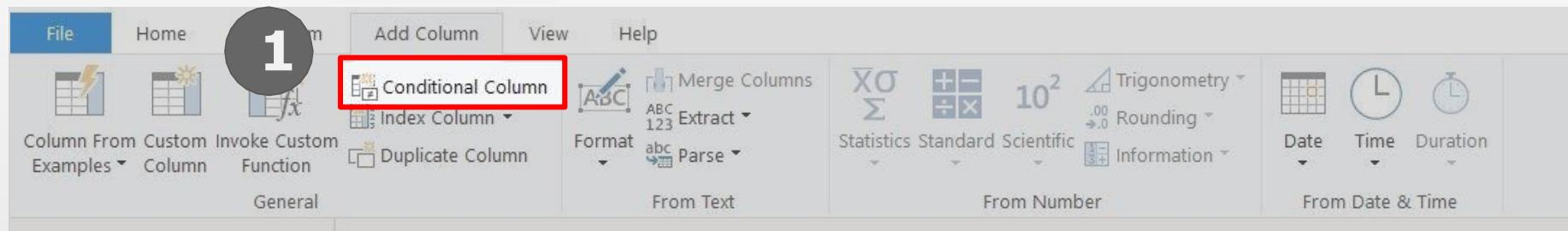


Add Column

1. Conditional Column
2. Index Column
3. Duplicate Column
4. Column from Examples
5. Unpivot Column
6. Split Column

Transformation Tools - Columns & Rows managing

Conditional Column



2 Add Conditional Column

Add a conditional column that is computed from the other columns or values.

New column name: Age Range

Column Name Operator Value Output

If Age is greater than or... ABC 123 Then ABC 123 over than 30

Else If Age is less than ABC 123 Then ABC 123 less than 30

Add rule

Else ABC 123 null

OK Cancel

A large red box highlights the 'If' and 'Else If' conditions in the 'Add Conditional Column' dialog.

Result

Age	Age Range
32	over than 30
35	over than 30
28	less than 30
33	over than 30
27	less than 30

Transformation Tools - Columns & Rows managing

Add Index Column

The screenshot shows a data processing interface with a toolbar at the top and a table below. The toolbar includes various transformation tools like Conditional Column, Merge Columns, Extract, Format, Parse, Statistics, Standard, Scientific, Trigonometry, Rounding, Date, Time, Duration, and Information. A red box highlights the 'Index Column' dropdown menu, which has three options: 'From 0', 'From 1', and 'Custom...'. A large number '1' is circled above this dropdown. To the right, a 'Result' button is shown, and a red box highlights the new 'Index' column in the table, which contains values 1 through 5 corresponding to the rows.

	Full Name	Last Name	ID	Age	Age Range	Index
1	Ronnie	Anderson	1401	32	over than 30	1
2	John	Brown	1402	35	over than 30	2
3	Ann	Brook	1403	28	less than 30	3
4	Lena	Smith	1404	33	over than 30	4
5	Jone	Smith	1405	27	less than 30	5

Transformation Tools - Columns & Rows managing

Add Duplicate Column

The screenshot shows a data transformation interface with a toolbar at the top and a data grid below. The toolbar includes various tools like Conditional Column, Merge Columns, Statistics, Standard, Scientific, Date, Time, Duration, and Information. A red box highlights the 'Duplicate Column' button in the 'Format' section of the toolbar. A large orange arrow points from the first column of the data grid to the new column 'Full Name - Copy' in the result grid. The data grid contains five rows of data with columns: Full Name, Name, ID, Age, Age Range, and Index. The result grid shows the same data with an additional column 'Full Name - Copy'.

	Full Name	Name	ID	Age	Age Range	Index	Full Name - Copy
1	Ronnie	Anderson	1401	32	over than 30	1.2	Ronnie
2	John	Brown	1402	35	over than 30		John
3	Ann	Brook	1403	28	less than 30		Ann
4	Lena	Smith	1404	33	over than 30		Lena
5	Jone	Smith	1405	27	less than 30		Jone

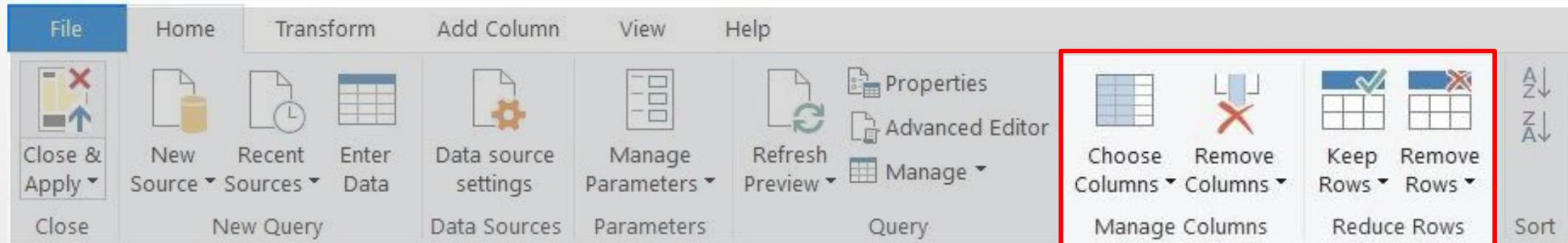
Transformation Tools - Columns & Rows managing

Column from Examples

The screenshot illustrates the process of generating a new column based on existing examples. A large orange arrow points from step 1 to step 3.

- 1**: A screenshot of a data grid showing a table with columns "Name" and "Hire Date". The "Hire Date" column is selected and highlighted with an orange border. The "Hire Date" header cell contains the value "8/20/2016".
- 2**: A screenshot of the "Transformation Tools" ribbon. The "Column From Examples" icon is highlighted with a red box. A dropdown menu is open, showing "From All Columns" and "From Selection". The "From Selection" option is also highlighted with a red box.
- 3**: A screenshot of the "Applied Steps" pane for the selected column. The pane lists numerous generated steps, all enclosed in an orange border. Some examples of the listed steps include:
 - 8/20/2016 (Hire Date)
 - 1109.00:00:00 (Age from Hire Date)
 - 20 (Day from Hire Date)
 - 6 (Day of Week from Hire Date)
 - Saturday (Day of Week Name from Hire Date)
 - 233 (Day of Year from Hire Date)
 - 31 (Days in Month from Hire Date)
 - 2016-08-20T23:59:59.9999999 (End of Day from Hire Date)
 - 8/31/2016 (End of Month from Hire Date)
 - 9/30/2016 (End of Quarter from Hire Date)
 - 12/31/2016 (End of Year from Hire Date)
 - 8 (Month from Hire Date)
 - August (Month Name from Hire Date)
 - 3 (Quarter of Year from Hire Date)
 - 8/1/2016 (Start of Month from Hire Date)
 - 7/1/2016 (Start of Quarter from Hire Date)
 - 8/14/2016 (Start of Week from Hire Date)
 - 1/1/2016 (Start of Year from Hire Date)
 - 3 (Week of Month from Hire Date)
 - 34 (Week of Year from Hire Date)

Transformation Tools - Columns & Rows managing



Manage Column

1. Choose Columns
2. Remove Columns
3. Remove Rows

Transformation Tools - Columns & Rows managing

Choose Columns

1

2

The screenshot shows the Power BI desktop interface. In the top ribbon, under the 'Query' tab, there is a 'Choose Columns' button highlighted with a red box. A callout bubble labeled '1' points to this button. To the right, a modal window titled 'Choose Columns' is open, labeled '2'. It contains a search bar and a list of columns with checkboxes. The 'Last Name' column has a checked checkbox. Other columns listed are 'Full Name', 'ID', 'Age', 'Age Range', and 'Index'. The 'OK' button at the bottom left of the modal is highlighted.

Choose Columns

Choose the columns to keep

Search Columns

(Select All Columns)

Full Name

Last Name

ID

Age

Age Range

Index

OK Cancel

	Full Name	Last Name	Age
1	Ronnie	Anderson	1401
2	John	Brown	1402
3	Ann	Brook	1403
4	Lena	Smith	1404
5	Jone	Smith	1405

Transformation Tools - Columns & Rows managing

Remove Columns

The screenshot shows the Power BI Data Editor interface. A red box highlights the 'Remove Columns' button in the 'Transform' ribbon, which is circled with a grey number '2'. To the right, another red box highlights a column labeled 'Full Name - Copy' in the data grid, which is circled with a grey number '1'.

	ABC Full Name	ABC Last Name	ABC	ABC 123 Age Range	1.2 Index
1	Ronnie	Anderson	1401	32 over than 30	1
2	John	Brown	1402	35 over than 30	2
3	Ann	Brook	1403	28 less than 30	3
4	Lena	Smith	1404	33 over than 30	4
5	Jone	Smith	1405	27 less than 30	5

Transformation Tools - Columns & Rows managing

Remove Duplicate Rows

The screenshot shows the Microsoft SQL Server Integration Services (SSIS) Data Flow Task ribbon. The 'Query' tab is selected. On the far right of the ribbon, there is a 'Rows' group containing several icons for managing rows. A context menu is open over the 'Remove Rows' icon, which is highlighted with a red box and a large number '2'. The menu items are:

- Remove Top Rows
- Remove Bottom Rows
- Remove Alternate Rows
- Remove Duplicates** (highlighted with a red box and a large number '2')
- Remove Blank Rows
- Remove Errors

On the left side of the ribbon, under the 'Data Sources' section, there is a table preview showing five rows of data. The first four rows are standard, but the fifth row, which contains the value 'Smith' in the 'Last Name' column, is highlighted with a red box and a large number '1'. The table has columns labeled 'Last Name' and 'First Name'.

	Last Name	First Name
1	Anderson	John
2	Brown	Mary
3	Brook	David
4	Smith	James
5	Smith	James

Transformation Tools - Columns & Rows managing

Remove Blank Rows

The screenshot shows the Microsoft SQL Server Integration Services (SSIS) Data Flow Task ribbon. The 'Transform' tab is selected. In the 'Manage Columns' section, the 'Remove Rows' button is highlighted. A dropdown menu is open, listing several options: 'Remove Top Rows', 'Remove Bottom Rows', 'Remove Alternate Rows', 'Remove Duplicates', 'Remove Blank Rows' (which is highlighted with a red box), and 'Remove Errors'.

Row ID	Dept.	Description	Date
1	Service	Administrative Manager	1/26/2017
2	Sales	Sales Assistant	2/23/2017
3	Accounting	Accounting Support	8/3/2017
4	null	null	null
5	null	null	null

Transformation Tools - Columns & Rows managing

Unpivot Columns

The screenshot shows the Power BI Data Editor interface. A red box highlights the "Unpivot Only Selected Columns" option in the ribbon under the "Transform" tab. A large number "1" is placed over the "Leave 2017" column header in the table below. A large number "2" is placed over the "Unpivot Only Selected Columns" button in the ribbon. The table contains five rows of employee data with columns for Name, Hire Date, and Leave 2017.

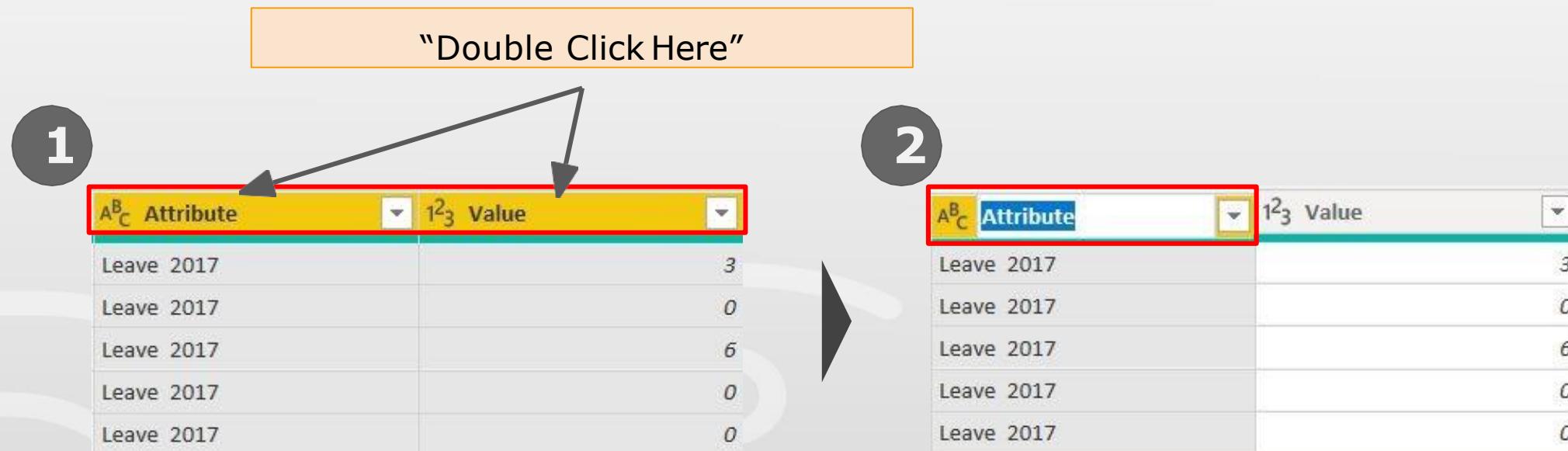
	Name	Hire Date	Leave 2017
1	Ronnie Anderson	8/20/2016	3
2	John Brown	9/13/2016	0
3	Ann Brook	11/22/2016	6
4	Lena Smith	3/2/2017	0
5	Jone Smith	6/12/2017	0

Result

Attribute	Value
Leave 2017	3
Leave 2017	0
Leave 2017	6
Leave 2017	0
Leave 2017	0

Transformation Tools - Columns & Rows managing

Rename Columns



Transformation Tools - Columns & Rows managing

Replace Values

The screenshot shows the Power Query Editor interface with the 'Transform' tab selected. A red box highlights the 'Replace Values' button in the ribbon under the 'Text Column' section. A callout bubble labeled '1' points to this button. A red box also highlights the 'Replace Values' button in a dropdown menu, with a callout bubble labeled '2'. A third red box highlights the 'Value To Find' input field in the 'Replace Values' dialog box, which contains the value 'Leave'. A callout bubble labeled '3' points to this field. A note below the dialog says 'Replace value to find with empty' with an arrow pointing to the 'Replace With' field, which is currently empty. The main table view shows a column named 'Year' with several rows containing the value 'Leave'.

Replace one value with another in the selected columns.

Value To Find: Leave

Replace With:

Advanced options

OK Cancel

Year
/20/2016
Leave 2017
/13/2016
Leave 2017
/22/2016
Leave 2017
3/2/2017
Leave 2017
/12/2017
Leave 2017

Transformation Tools - Columns & Rows managing

Split Column

The screenshot shows the Power Query Editor interface with the following details:

- File**, **Home**, **Transform**, **Add Column**, **View**, **Help** tabs are visible.
- Data Type**: Text
- Replace Values**, **Unpivot Columns**, **Transpose**, **Reverse Rows**, **Detect Data Type**, **Fill**, **Move**, **Group By**, **Use First Row as Headers**, **Count Rows** buttons.
- Rename**, **Pivot Column**, **Convert to List** buttons.
- Table** and **Any Column** dropdowns.
- Queries [3]**: Department data, Hire date (selected), Personal data.
- Name** column (highlighted with a red box) contains the following data:

	Name	Hire Date
1	Ronnie Anderson	8/20/2016
2	John Brown	9/13/2016
3	Ann Brook	11/22/2016
4	Lena Smith	3/2/2017
5	Jone Smith	6/12/2017

- Transform ribbon**:
 - Split Column** (highlighted with a red box and circled 1)
 - Merge Columns**
 - Format**
 - ABC Extract**
 - abc Parse**
- Split Column dropdown menu** (circled 2):
 - By Delimiter**
 - By Number of Characters**
 - By Positions**
 - By Lowercase to Uppercase**
 - By Uppercase to Lowercase**
 - By Digit to Non-Digit**
 - By Non-Digit to Digit**

Transformation Tools - Format Tools

The screenshot shows the Power Query Editor interface with the 'Transform' tab selected. A context menu is open over a column named 'Age Range'. The menu is divided into three sections: 'Format' (highlighted with a red box and circled with number 2), 'lowercase', and 'UPPERCASE'. The 'Format' section contains the following options: Capitalize Each Word (highlighted with a red box and circled with number 3), Trim, Clean, Add Prefix, and Add Suffix. To the right of the menu, a preview pane displays the original data and the results of applying the 'Capitalize Each Word' transformation.

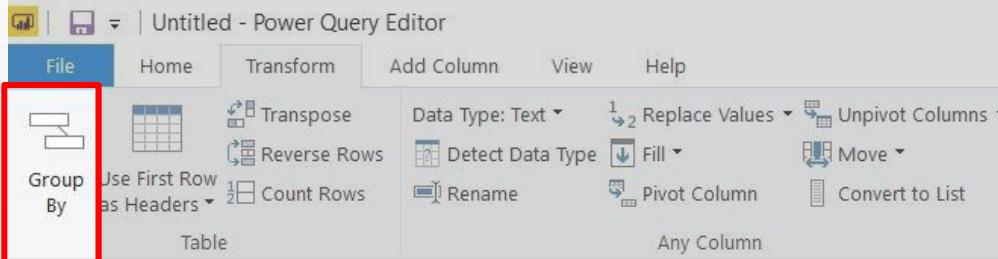
Original Data	Transformed Data
ABC 123 Age Range	ABC 123 Age Range
over than 30	Over than 30
over than 30	Over than 30
less than 30	Less Than 30
over than 30	Over than 30
less than 30	Less Than 30

Result

Age Range
Over Than 30
Over Than 30
Less Than 30
Over Than 30
Less Than 30

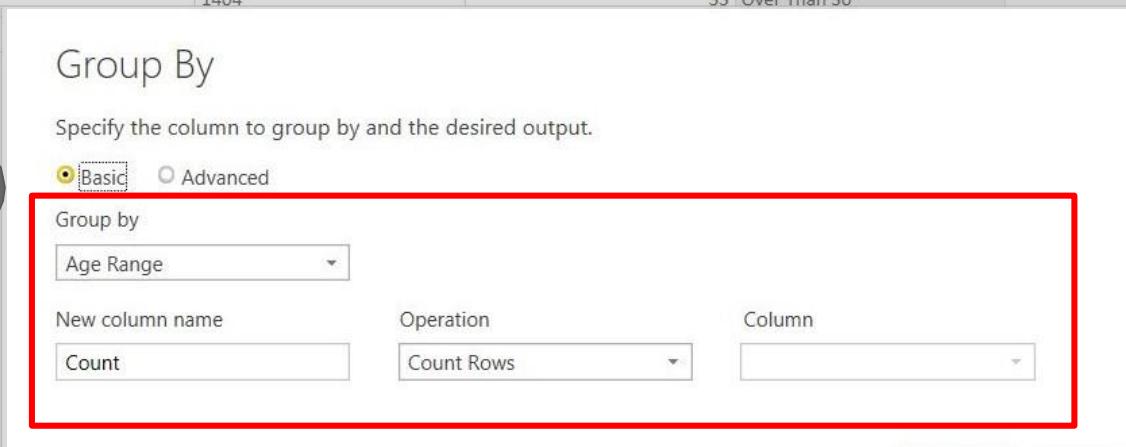
Transformation Tools - Group By

1



Group By

2



Group By

Specify the column to group by and the desired output.

Basic Advanced

Group by

Age Range

New column name

Count

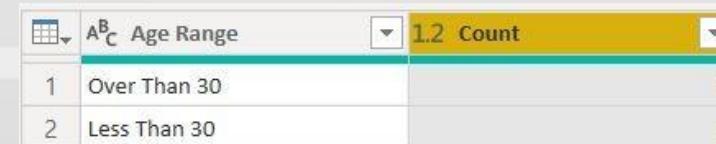
Operation

Column

Count Rows

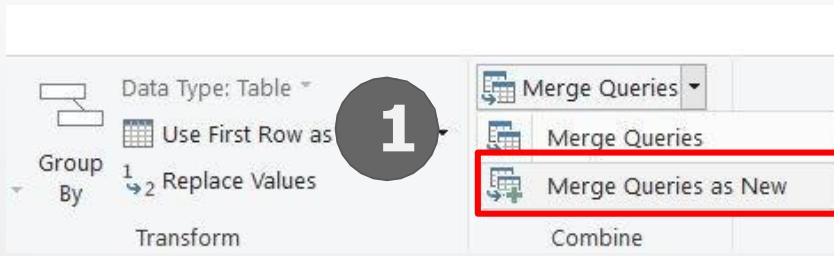
OK Cancel

Result



Age Range	Count
Over Than 30	3
Less Than 30	2

Transformation Tools - Merge Queries



2 Select pair column

The 'Merge' dialog box is open, showing two tables: 'Personal data' and 'Department data'. The 'ID' column in the 'Personal data' table is selected and highlighted with a red box. An orange arrow points from this red box to the 'ID' column in the 'Department data' table, which is also highlighted with a red box. A red box surrounds the 'Join Kind' dropdown menu at the bottom, which contains the following options:

- Left Outer (all from first, matching from second)
- Left Outer (all from first, matching from second) (selected)
- Right Outer (all from second, matching from first)
- Full Outer (all rows from both)
- Inner (only matching rows)
- Left Anti (rows only in first)
- Right Anti (rows only in second)

3 Choose join type

Transformation Tools - Merge Queries

Join kind

Join Kind

Left Outer (all from first, matching from second)

Left Outer (all from first, matching from second)

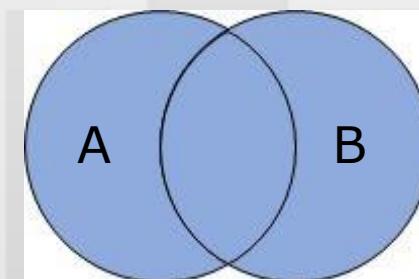
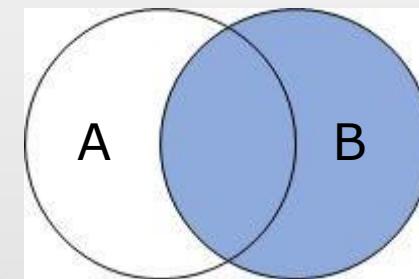
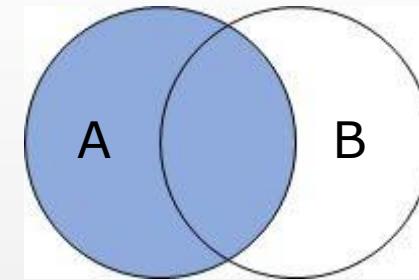
Right Outer (all from second, matching from first)

Full Outer (all rows from both)

Inner (only matching rows)

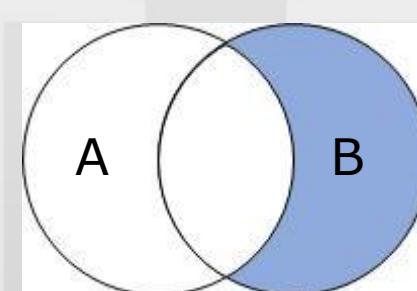
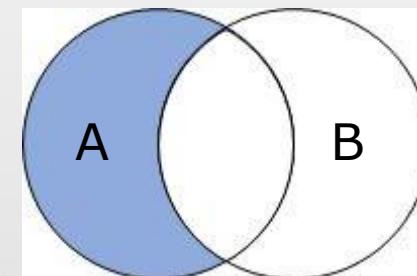
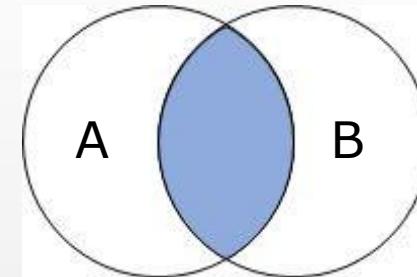
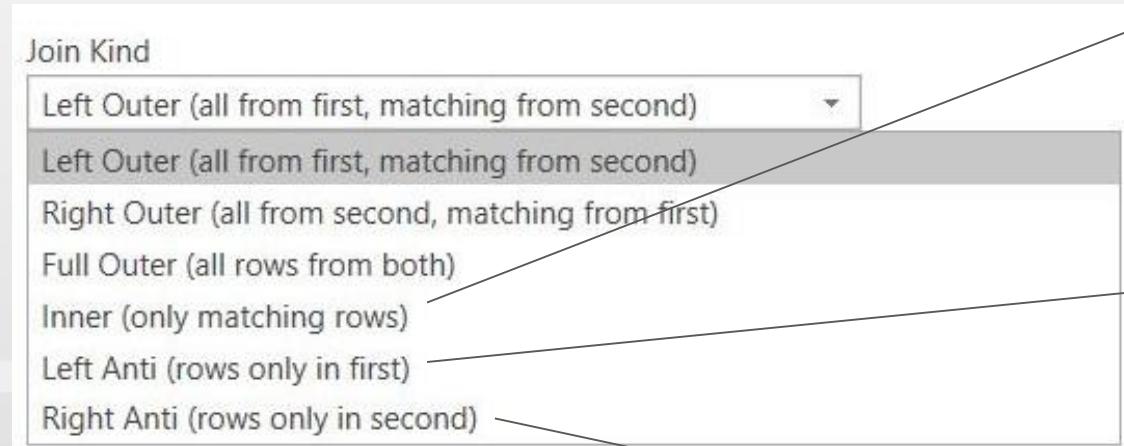
Left Anti (rows only in first)

Right Anti (rows only in second)



Transformation Tools - Merge Queries

Join kind



Transformation Tools - Merge Queries

Table after join

4

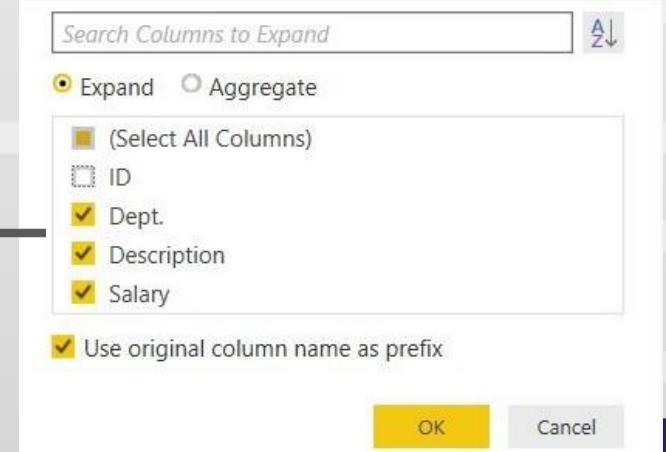
	Full Name	Last Name	ID	Age	Age Range	Department data
1	Ronnie	Anderson	1401	32	Over Than 30	Table
2	John	Brown	1402	35	Over Than 30	Table
3	Ann	Brook	1403	28	Less Than 30	Table
4	Lena	Smith	1404	33	Over Than 30	Table
5	Jone	Smith	1405	27	Less Than 30	Table

Result

Expanded table

Age Range	Department data.Dept.	Department data.Description	Department data.Salary
Over Than 30	Service	Administrative Manager	99095
Over Than 30	Sales	Sales Assistant	108912
Less Than 30	Accounting	Accounting Manager	104437
Over Than 30	Accounting	Accounting Support	85784
Less Than 30	IT	IT Executive	82705

5



Transformation Tools - Merge Queries

Merge with two or more column

Select pair columns

Merge

Select tables and matching columns to create a merged table.

Merge1

Full Name	1	Last Name	2	ID	Age	Age Range	Dept.	Description	Salary
Ronnie		Anderson		1401	32	Over Than 30	Service	Administrative Manager	99095
John		Brown		1402	35	Over Than 30	Sales	Sales Assistant	108912
Ann		Brook		1403	28	Less Than 30	Accounting	Accounting Manager	104437
Lena		Smith		1404	33	Over Than 30	Accounting	Accounting Support	85784
Jone		Smith		1405	27	Less Than 30	IT	IT Executive	82705

Hire date

Full Name	1	Last Name	2	Hire Date	Year	Leave
Ronnie		Anderson		8/20/2016	2017	3
John		Brown		9/13/2016	2017	0
Ann		Brook		11/22/2016	2017	6
Lena		Smith		3/2/2017	2017	0
Jone		Smith		6/12/2017	2017	0

Join Kind

Left Outer (all from first, matching from second)

Use fuzzy matching to perform the merge

> Fuzzy merge options

✓ The selection matches 5 of 5 rows from the first table.

OK Cancel

Transformation Tools - Append Queries



"Columns must be the same name"



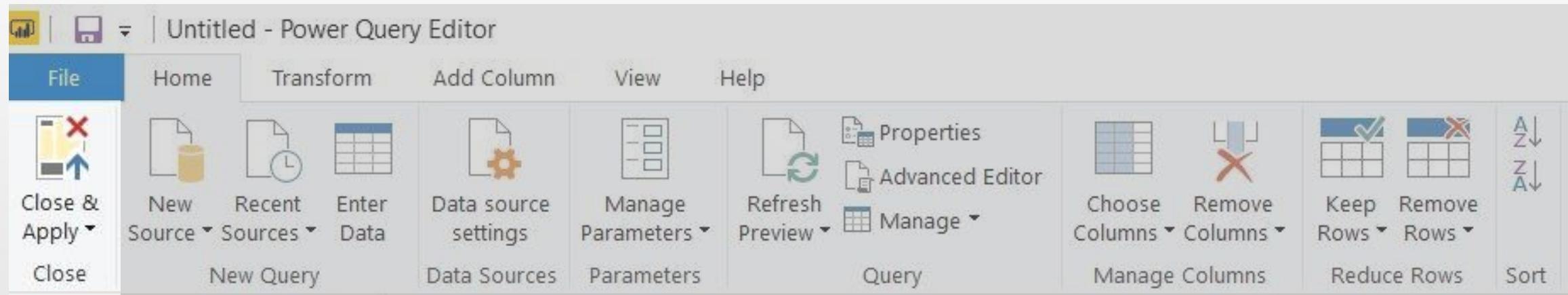
Result

	Full Name	Last Name	ID	Age	Age Range	Dept.	Description	S
1	Ronnie	Anderson	1401		32 Over Than 30	Service	Administrative Manager	
2	John	Brown	1402			Sales	Sales Assistant	
3	Ann	Brook	1403			Accounting	Accounting Manager	
4	Lena	Smith	1404		33 Over Than 30	Accounting	Accounting Support	
5	Jone	Smith	1405		27 Less Than 30	IT	IT Executive	
6	Andrew	Miller	1406			Service	Administrative Manager	
7	David	King	1407			Sales	Sales Assistant	
8	Lucy	White	1408		33 Over Than 30	Accounting	Accounting Support	

Primary Table

Table to Append

Close & Apply



After edit query is done click 'Close & Apply' for saving

Data Transformation Example Use Case

Name	Leave 2017	Leave 2018	Medical Expenses	Medical Expenses	Traveling Expenses	Traveling Expenses
			2017	2018	2017	2018
Andrew Miller	0	1	1500	3500	26000	31000
David King	2	3	5000	3000	35000	15000
Lucy White	1	1	0	2700	19000	13000

Data Transformation Example Use Case

Transform report format to machine readable format

Step 1

- Choose Columns
- Unpivot Columns
- Change Type

Step 2

- Split Column
- Rename Columns
- Replace Value
- Change Type
- Append Queries

Step 3

- Merge Queries

Data Transformation Example Use Case

“Create a duplicate imported table before doing every next step”

The screenshot shows the Microsoft Power Query Editor interface. On the left, a sidebar lists six queries: Sheet1, Leave, Med Expenses, Trav Expenses, Append1, and Merge1. The 'Merge1' query is currently selected and highlighted with a yellow background. In the main workspace, a table is displayed with columns labeled 'Name', 'Leave 2017', 'Leave 2018', 'Medical Expenses 2017', 'Medical Expenses 2018', and 'Traveling Expenses 2017'. The data for the 'Miller' row is as follows:

Name	Leave 2017	Leave 2018	Medical Expenses 2017	Medical Expenses 2018	Traveling Expenses 2017
Miller	0	1	1500	3500	
g	2	3	5000	3000	
te	1	1	0	2700	

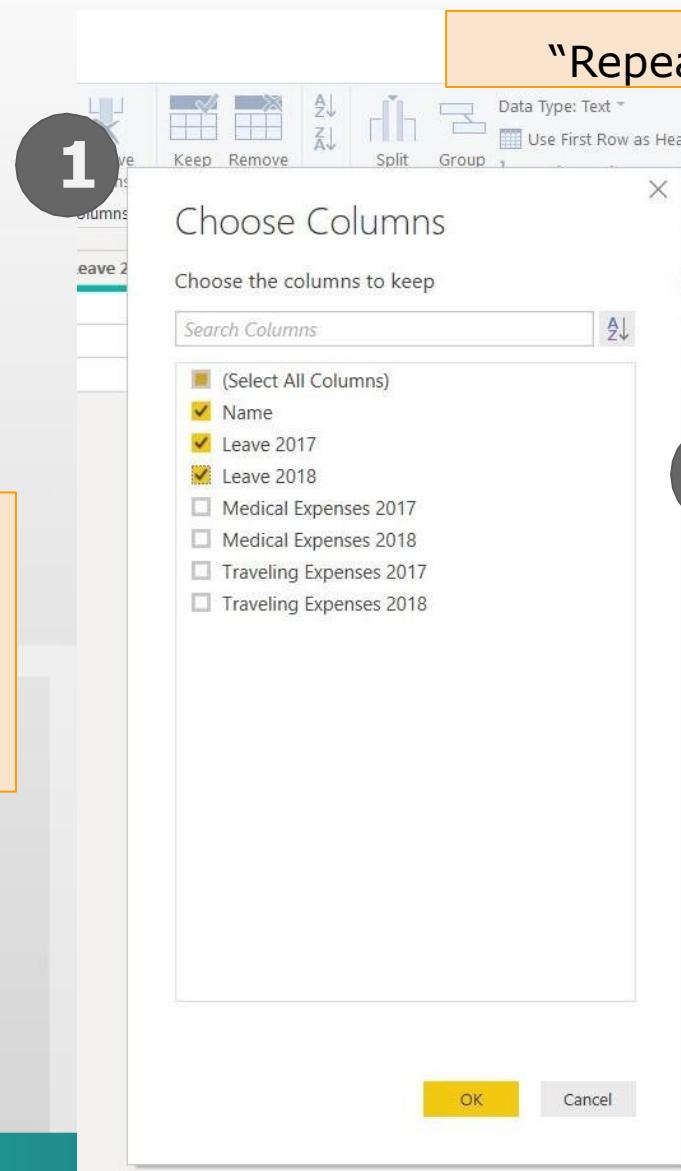
A context menu is open over the 'Miller' row, specifically over the 'Leave 2017' cell. The menu items are:

- Copy
- Paste
- Delete
- Rename
- Enable load
- Include in report refresh
- Duplicate** (This item is highlighted with a red box)
- Reference
- Move To Group
- Move Up
- Move Down
- Create Function...
- Convert To Parameter
- Advanced Editor
- Properties...

Data Transformation Example Use Case

Step 1

- Choose Columns
- Unpivot Columns
- Change Type



2

Name	Year	Leave
Andrew Miller	2017	0
Andrew Miller	2018	1
David King	2017	2
David King	2018	3
Lucy White	2017	1
Lucy White	2018	1

Data Transformation Example Use Case

Step 2

- Split Column
- Rename Columns
- Replace Value
- Change Type
- Append Queries

1

A ^B _C Name	A ^B _C Attribute	1 ² ₃ Value
Andrew Miller	Medical Expenses 2017	1500
Andrew Miller	Medical Expenses 2018	3500
David King	Medical Expenses 2017	5000
David King	Medical Expenses 2018	3000
Lucy White	Medical Expenses 2017	0
Lucy White	Medical Expenses 2018	2700

Split Column by Delimiter

Specify the delimiter used to split the text column.

Select or enter delimiter

Space

Split at

- Left-most delimiter
 Right-most delimiter
 Each occurrence of the delimiter

2

	A ^B _C Name	A ^B _C Expense Type	A ^B _C Year	1 ² ₃ Expense
1	Andrew Miller	Medical	2017	1500
2	Andrew Miller	Medical	2018	3500
3	David King	Medical	2017	5000
4	David King	Medical	2018	3000
5	Lucy White	Medical	2017	0
6	Lucy White	Medical	2018	2700

Data Transformation Example Use Case

Step 2

- Split Column
- Rename Columns
- Replace Value
- Change Type
- Append Queries

The screenshot shows the Microsoft Power Query Editor interface. The main area displays a table with four columns: Name, Expense Type, Year, and Expense. The data includes entries for Andrew Miller, David King, and Lucy White across two years. A context menu is open over the 'Med Expenses' query, with the 'Append' option selected, indicated by a large number '3'. An 'Append' dialog box is overlaid on the editor, showing settings for concatenating rows from two tables into a single table. The 'Primary table' is set to 'Med Expenses' and the 'Table to append to the primary table' is set to 'Trav Expenses'. The dialog also contains radio buttons for 'Two tables' (selected) and 'Three or more tables'.

	Name	Expense Type	Year	Expense
1	Andrew Miller	Medical	2017	1500
2	Andrew Miller	Medical	2018	3500
3	David King	Medical	2017	5000
4	David King	Medical	2018	3000
5	Lucy White	Medical	2017	0

Append

Concatenate rows from two tables into a single table.

Two tables Three or more tables

Primary table
Med Expenses

Table to append to the primary table
Trav Expenses

OK Cancel

Data Transformation Example Use Case

Step 3

- Merge Queries

The screenshot shows the Microsoft Power Query Editor interface. The title bar reads "Untitled - Power Query Editor". The ribbon has tabs for File, Home, Transform, Add Column, View, and Help. The "File" tab is selected. The "Home" tab has options for Close & Apply, New Source, Recent Sources, Enter Data, Close, and New Query. The "Transform" tab is also visible.

The main area is titled "Merge" with the sub-instruction "Select tables and matching columns to create a merged table." Below this, there are two tables:

- Append1**:

Name	Expense Type	Year	Expense
Andrew Miller	Medical	2017	1500
Andrew Miller	Medical	2018	3500
David King	Medical	2017	5000
David King	Medical	2018	3000
Lucy White	Medical	2017	0
- Leave**:

Name	Year	Leave
Andrew Miller	2017	0
Andrew Miller	2018	1
David King	2017	2
David King	2018	3
Lucy White	2017	1

Below the tables, the "Join Kind" dropdown is set to "Left Outer (all from first, matching from second)". There is a checkbox for "Use fuzzy matching to perform the merge" which is unchecked. A note says "Fuzzy merge options" with a right-pointing arrow. At the bottom, a green checkmark indicates "The selection matches 12 of 12 rows from the first table." The "OK" button is highlighted in yellow, while the "Cancel" button is grey.

On the right side of the editor, there is a ribbon-like panel with buttons for "Merge Queries", "Append Queries", "Combine Files", and "Combine".

Data Transformation Example Use Case

“Final Table”

The screenshot shows the Microsoft Power Query Editor interface. The ribbon at the top has tabs for File, Home, Transform, Add Column, View, and Help. The Home tab is selected. Below the ribbon are various icons for file operations like Close & Apply, New Source, Refresh Preview, and Data Type settings. The main area displays a table titled "Final Table" with the following schema:

	A ^B C Name	A ^B C Expense Type	A ^B C Year	1 ² 3 Expense	1 ² 3 Leave
1	Andrew Miller	Medical	2017	1500	0
2	Andrew Miller	Medical	2018	3500	1
3	David King	Medical	2017	5000	2
4	David King	Medical	2018	3000	3
5	Lucy White	Medical	2017	0	1
6	Lucy White	Medical	2018	2700	1
7	Andrew Miller	Traveling	2017	26000	0
8	Andrew Miller	Traveling	2018	31000	1
9	David King	Traveling	2017	35000	2
10	David King	Traveling	2018	15000	3
11	Lucy White	Traveling	2017	19000	1
12	Lucy White	Traveling	2018	13000	1

The left sidebar lists the queries used in the transformation: Sheet1, Leave, Med Expenses, Trav Expenses, Append1, and Merge1. The "Merge1" query is currently selected.

Copy Table to Excel

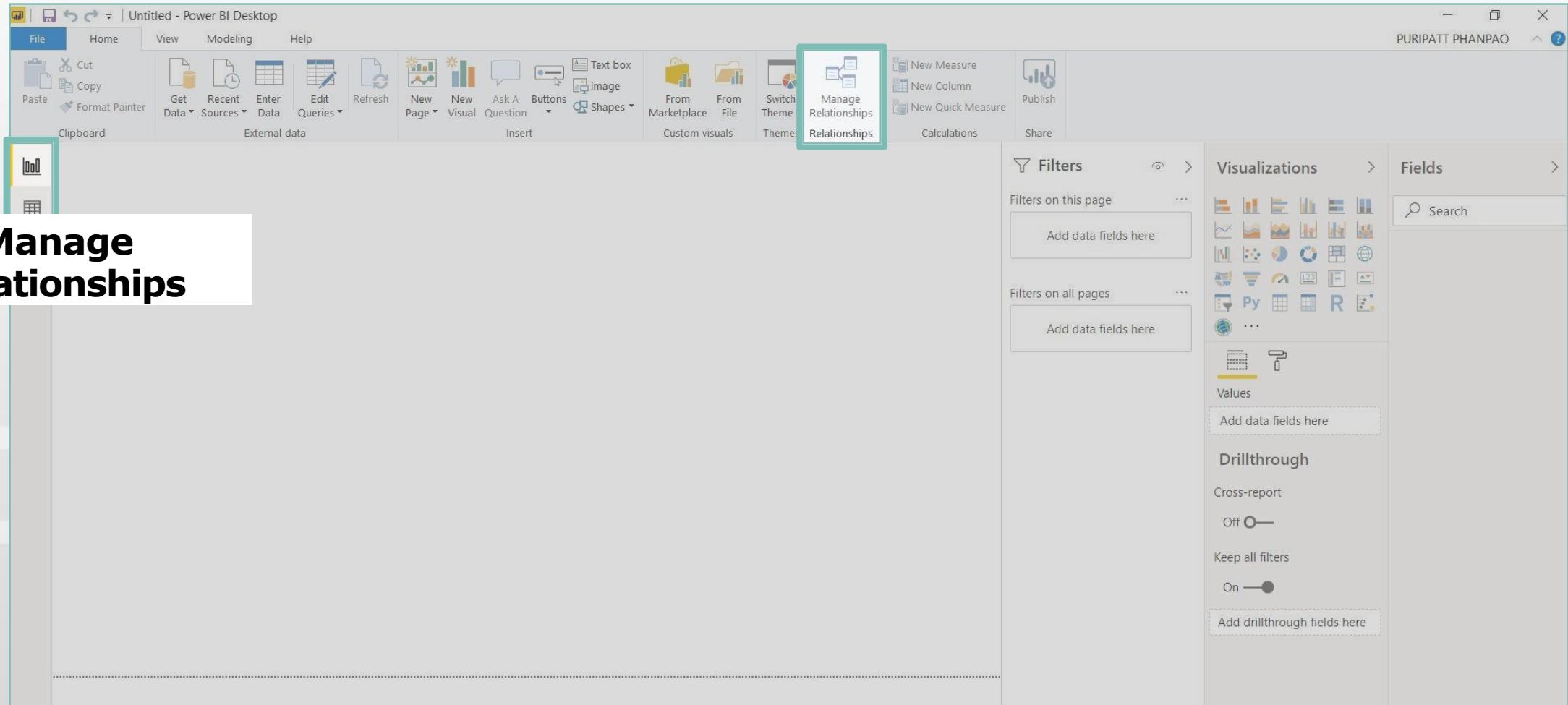
The screenshot shows the Power BI desktop interface with the following steps:

- Step 1:** The "Edit Queries" button in the ribbon's "External Data" tab is highlighted with a red box and a circled number 1.
- Step 2:** In the "Queries [3]" pane, the "Personal data" query is selected and highlighted with a red box, with a circled number 2 indicating it is the target for copying.
- Step 3:** A context menu is open over the "Personal data" table, with the "Copy Entire Table" option highlighted with a red box and a circled number 3.

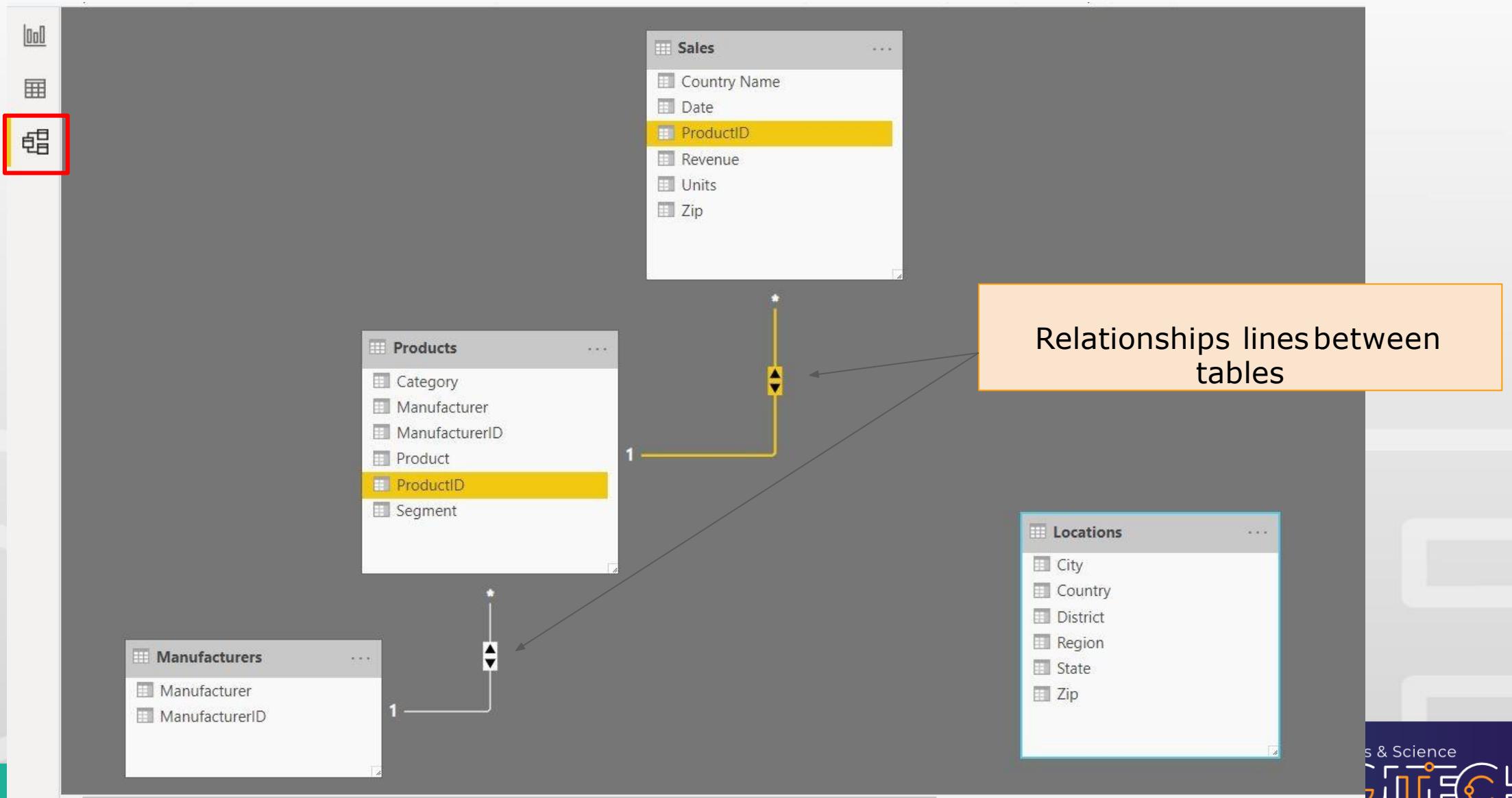
To the right of the Power BI window, there is an orange callout box with the text "Paste in Excel".

Data Visualization

Manage Relationships



Manage Relationships



Manage Relationships

The screenshot shows the Power BI Data Model view. On the left, there are two tables: 'Products' and 'Manufacturers'. The 'Products' table has columns: ProductID, Revenue, Units, Zip, Category, Manufacturer, ManufacturerID, Product, ProductID, Segment. The 'Manufacturers' table has columns: Manufacturer, ManufacturerID. A relationship line connects the 'ProductID' column in the 'Products' table to the 'ManufacturerID' column in the 'Manufacturers' table. This relationship is highlighted with a yellow box containing the text: "Double-click on relationship line for opening Edit relationship window".

Edit relationship

Select tables and columns that are related.

Sales

ProductID	Date	Zip	Units	Revenue	Country Name
786	Wednesday, April 30, 2003	01106	1	57.6975	USA
786	Wednesday, April 30, 2003	01540	1	57.6975	USA
786	Wednesday, April 30, 2003	02886	1	57.6975	USA

Products

ProductID	Product	Category	Segment	ManufacturerID	Manufacturer
536	Maximus UC-01	Urban	Convenience	7	VanArdsdel
537	Maximus UC-02	Urban	Convenience	7	VanArdsdel
538	Maximus UC-03	Urban	Convenience	7	VanArdsdel

Cardinality

Many to one (*:1)

Cross filter direction

Both

Make this relationship active

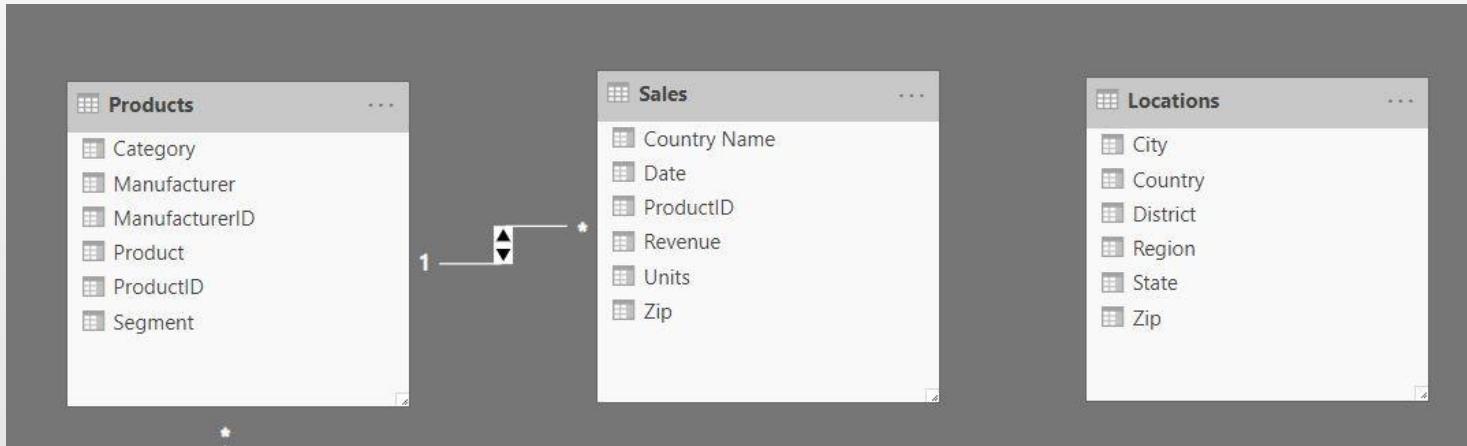
Assume referential integrity

Apply security filter in both directions

OK Cancel

Manage Relationships

What happened when between tables have no relationships ?



Can filter other
tables

All value is the
same

The image displays three separate tables, each showing the same data, illustrating that filtering one table affects all others due to the lack of relationships:

Category	Revenue
Mix	607,048.10
Rural	4,246,880.98
Urban	27,380,291.87
Youth	499,175.04
Total	32,733,395.99

Country Name	Revenue
Canada	32,733,395.99
France	140,830,543.41
Germany	125,956,055.50
Mexico	100,199,201.25
USA	4,720,036,250.50
Total	5,127,755,449.65

Country	Revenue
Canada	32,733,395.99
France	32,733,395.99
Germany	32,733,395.99
Mexico	32,733,395.99
USA	32,733,395.99
Total	32,733,395.99

Manage Relationships

Create a Unique key column for making a relationship

The screenshot shows the Power BI Desktop interface with the 'Model' tab selected. A red box highlights the 'New Column' button in the ribbon, which is circled with a number '1'. The formula bar at the top contains the DAX code: '1 CountryZip = Sales[Country Name] & "," & Sales[Zip]'. A red box highlights this formula bar, and a red box also highlights the 'Country Zip' column in the data grid, which is circled with a number '2'. The data grid displays several rows of sales data, and the 'Country Zip' column shows the concatenated values 'USA,01001' for most rows, except for one row where it shows 'USA,05341'.

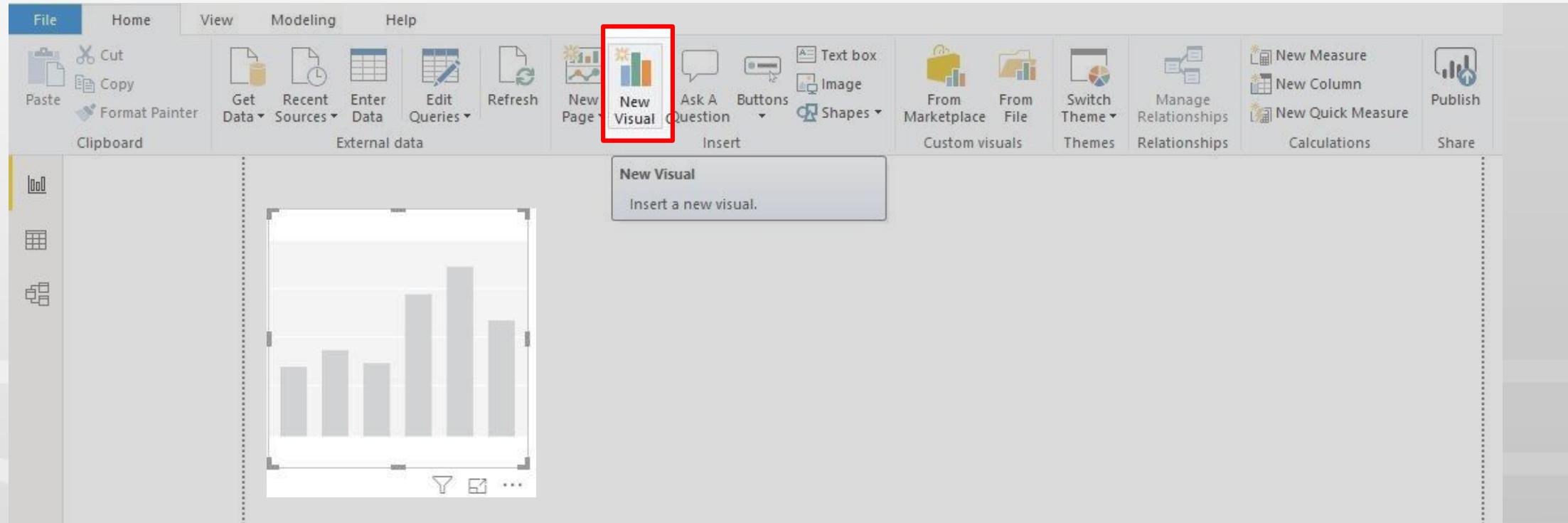
ProductID	Date	Zip	Units	Revenue	Country Name	CountryZip
506	Tuesday, April 8, 2014	01001	1	1359.6975	USA	USA,01001
1182	Tuesday, June 9, 2015	01001	1	225.6975	USA	USA,01001
1182	Tuesday, March 3, 2015	01001	1	215.1975	USA	USA,01001
2368	Monday, June 8, 2015	01001	1	734.475	USA	USA,01001
2368	Tuesday, May 12, 2015	01001	1	760.725	USA	USA,01001
118	Friday, April 25, 2014	05341	1	1572.375	USA	USA,05341
466	Wednesday, May 14, 2014	01001	1	973.1925	USA	USA,01001
567	Thursday, May 15, 2014	01001	1	853.0725	USA	USA,01001
1028	Thursday, May 15, 2014	01001	1	1123.4475	USA	USA,01001

Data Visualization

1. How to create visualization
2. How to select visualization
 - Stacked Chart
 - Clustered Chart
 - 100% Stacked Chart
 - Line Chart
 - Bar Chart with line
 - Scatter Chart
 - Map
3. Additional Function
 - Gauge
 - Card
 - KPI
 - Slicer
 - Table & Matrix
 - Custom Visual

How to Create Visualization

Click New Visual



Graph template will append

How to Create Visualization: Choose Visualization



How to Create Visualization: Choose Data

The screenshot shows the Microsoft Power BI desktop application interface. The top navigation bar includes File, Home, View, Modeling, Help, Format, and Data / Drill. The 'Format' tab is selected. On the left, there's a 'Interactions' pane with icons for Edit interactions and Bring forward/backward/Align/Distribute. The main area displays a bar chart with four bars. To the right is the 'Visualizations' pane, which is currently active. A tooltip box with a black border contains the text "Click on this to choose column" and "Drag into chart field Ex. Axis, Legend, Value". Below the 'Visualizations' pane is the 'Fields' pane, which lists fields from the 'SuperStore' dataset. Fields include Customer Name (highlighted with an orange border), Customer Segment, Discount, Order Date, Order ID, Order Priority, Order Quantity, Product Base Margin, Product Category, Product Container, Product Name, Product Sub-Category, Profit, and Profit average per Product Cat... A black curved arrow points from the 'Customer Name' field in the 'Fields' pane towards the 'Add data fields here' section in the tooltip.

Click on this to choose column

Drag into chart field
Ex. Axis, Legend, Value

Customer Name

Customer Segment

Discount

Order Date

Order ID

Order Priority

Order Quantity

Product Base Margin

Product Category

Product Container

Product Name

Product Sub-Category

Profit

Profit average per Product Cat...

Example: Create Visual

1. Click New Visual
2. Select Stacked Bar Chart
3. Drag Product Category in to Axis
4. Drag Customer Segment into Legend
5. Drag Count of Order ID into Value

The screenshot shows the Power BI desktop interface for creating a new visual. On the left, the 'Visualizations' pane displays various chart types. In the center, the 'Fields' pane lists fields from the 'SuperStore' dataset. Arrows point from the steps in the list to the corresponding actions in the interface:

- Step 1: Click New Visual → Click 'New Visual' button in the Visualizations pane.
- Step 2: Select Stacked Bar Chart → Select 'Stacked Bar' chart type in the Visualizations pane.
- Step 3: Drag Product Category in to Axis → Drag 'Product Category' field into the 'Axis' dropdown in the Fields pane.
- Step 4: Drag Customer Segment into Legend → Drag 'Customer Segment' field into the 'Legend' dropdown in the Fields pane.
- Step 5: Drag Count of Order ID into Value → Drag 'Count of Order ID' field into the 'Value' dropdown in the Fields pane.

Visualizations

Fields

Search

SuperStore

- Customer Name
- Customer Segment
- Σ Discount
- Order Date
- Σ Order ID
- Order Priority
- Σ Order Quantity
- Σ Product Base Margin
- Product Category
- Product Container
- Product Name
- Product Sub-Category
- Σ Profit
- Region
- Σ Row ID

Stacked Chart



When to use

- To illustrate part-to-whole relationships.

Remark

- Use contrasting colors for greater clarity.
- Make chart scale large enough to view group sizes in relation to one another.

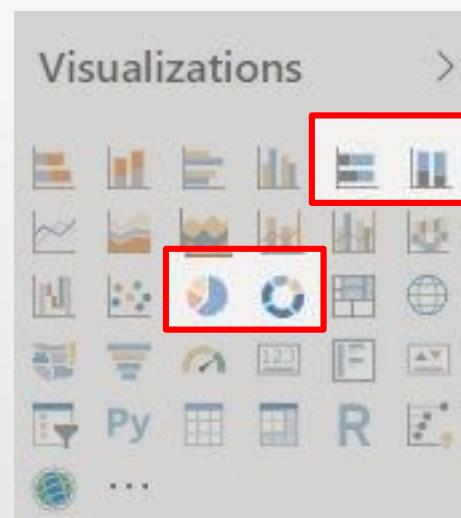
Clustered Chart



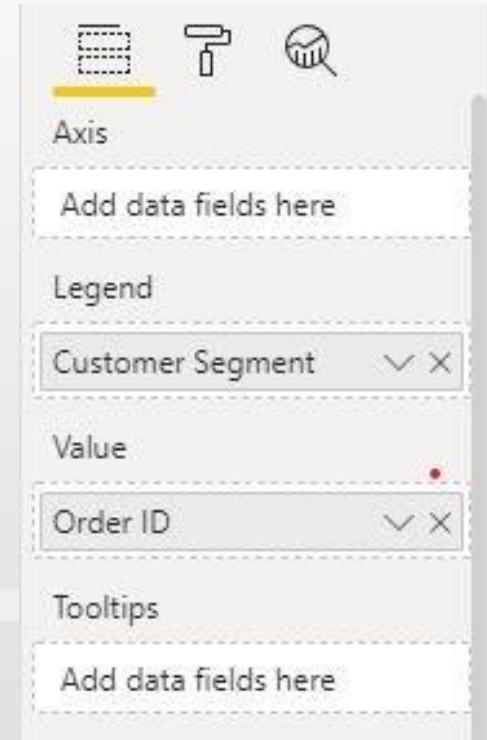
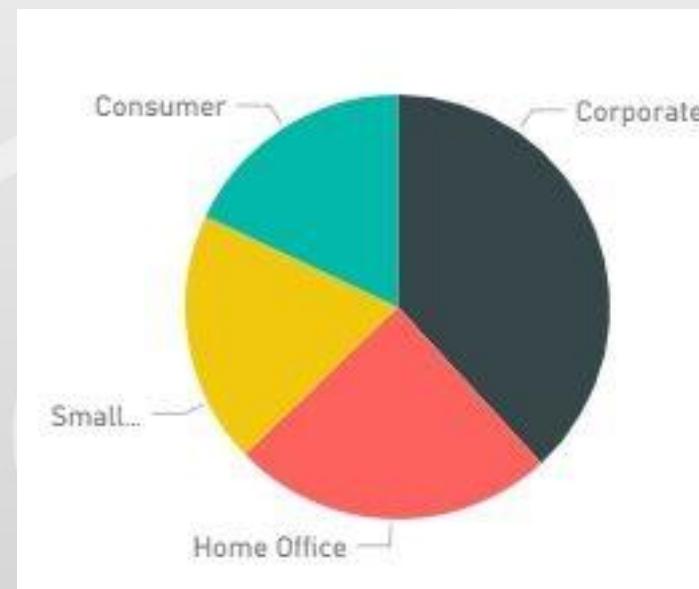
When to use

- When you have a line chart and a column chart with the same X axis.
- To compare multiple measures with different value ranges.
- To illustrate the correlation between two measures in one visualization.
- To check whether one measure meets the target defined by another measure.
- To conserve canvas space.

100% Stacked and Pie chart



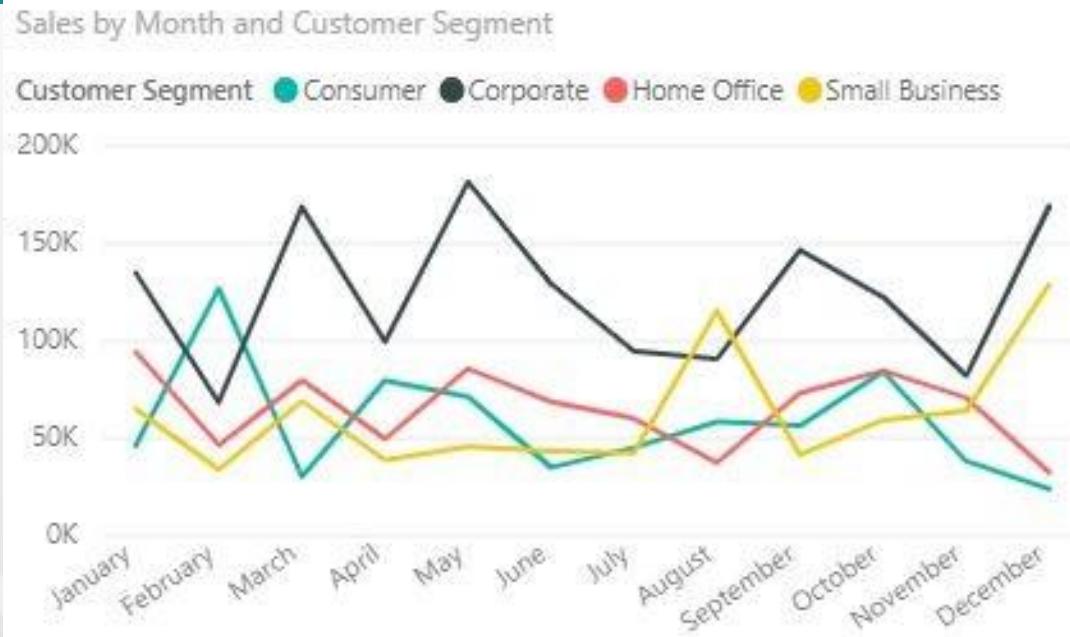
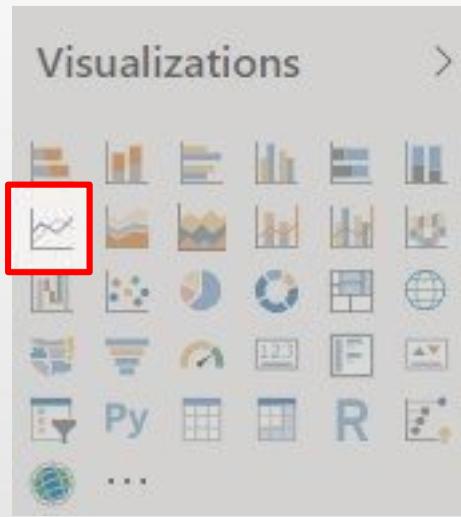
VS



When to use

- To show part-to-whole changes over time
- To use instead of pie chart

Line Chart



Filters

Filters on this visual ...

Customer Segment
is (All)

Order Date - Day
is (All)

Order Date - Month
is (All)

Order Date - Year
is 2012

Filter type ⓘ

Select all

2009

2010

2011

2012

Require single selection

Axis

Order Date

Month

Day

Legend

Customer Segment

Values

Sales

Tooltips

Add data fields here

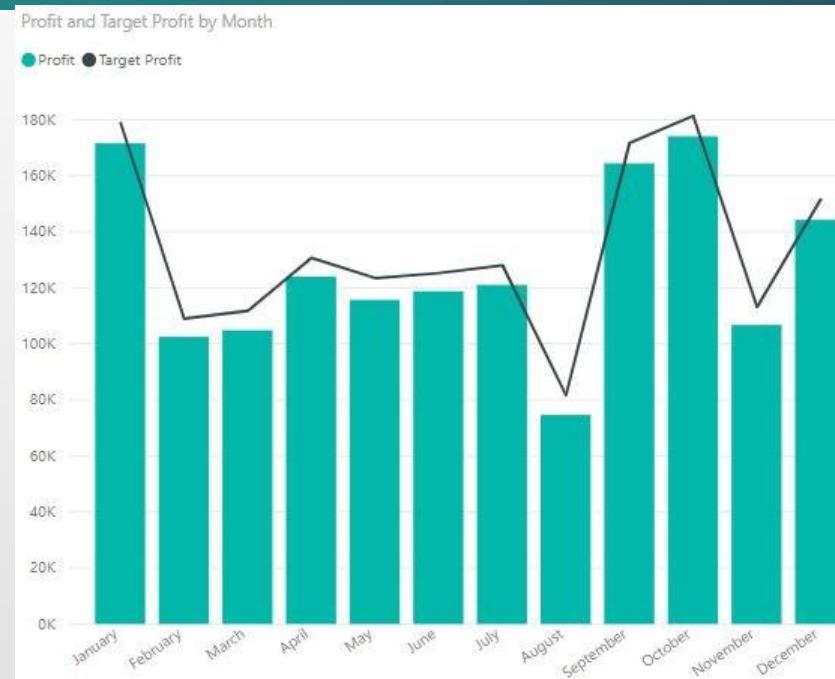
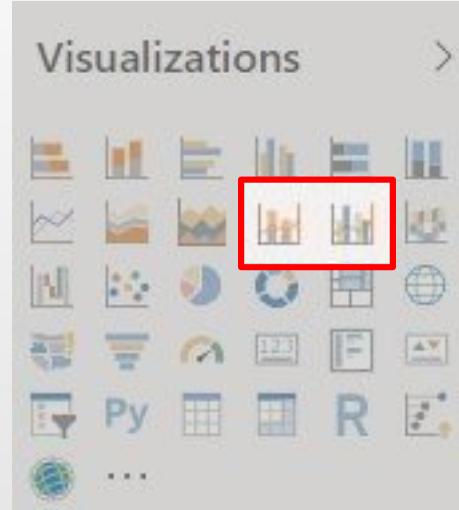
When to use

- To illustrate a series of data points such as time series data

Remark

- Use solid lines only.
- Don't plot more than four lines to avoid visual distractions.
- Use the right height so the lines take up roughly 2/3 of the y-axis' height.

Bar Chart with line



Shared axis

Order Date
Month

Column series

Add data fields here

Column values

Profit

Line values

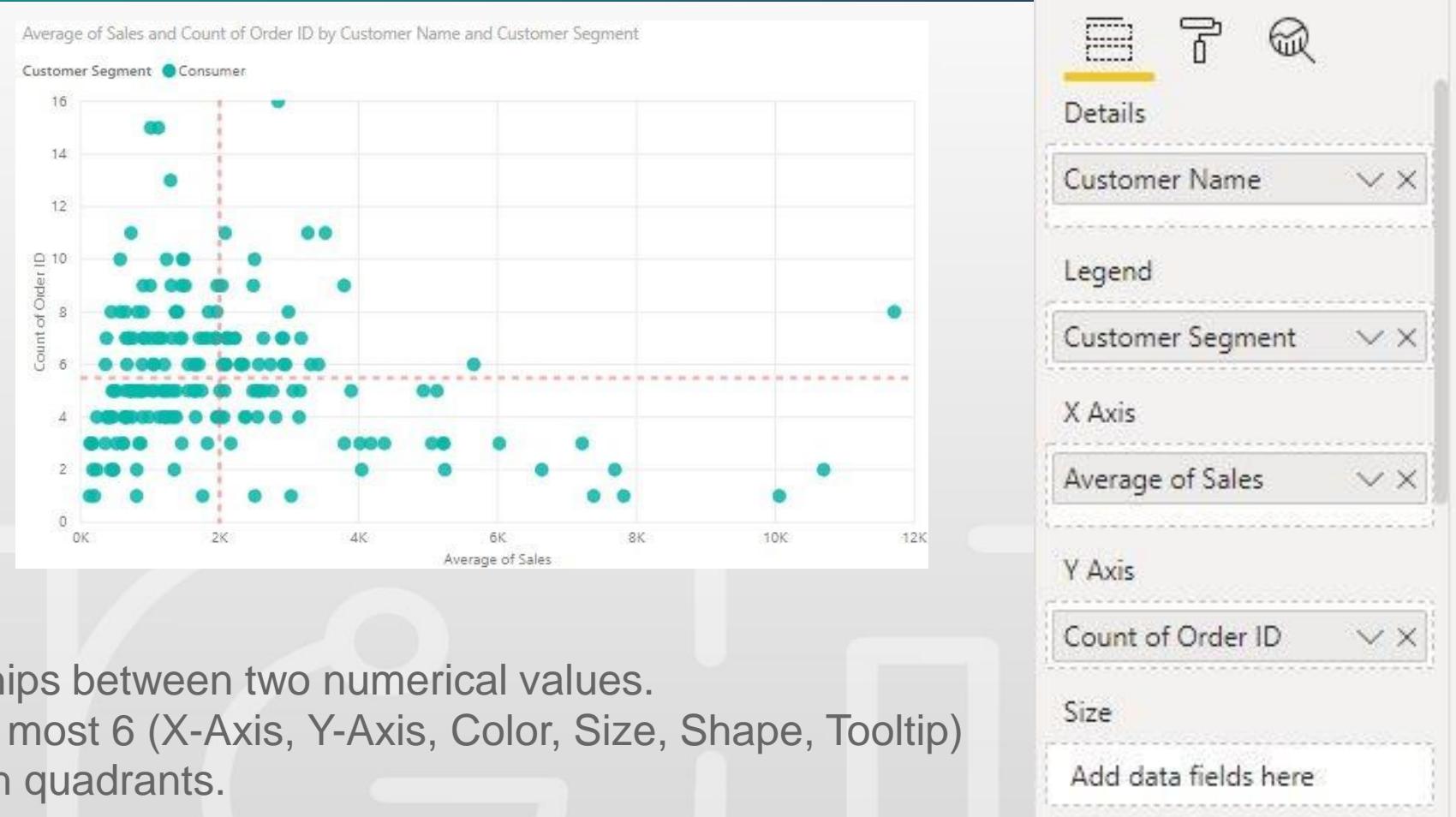
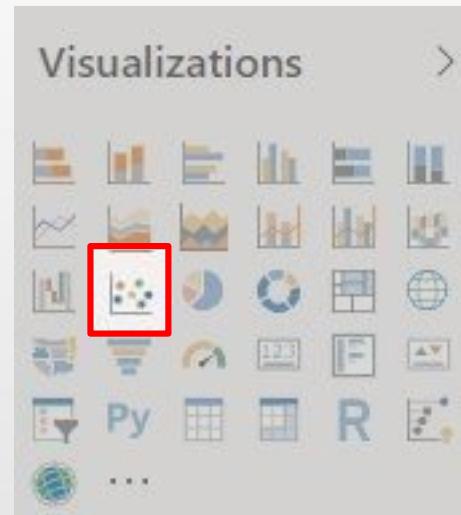
Target Profit

A detailed view of the Power BI visualization settings. It shows how the chart uses a 'Shared axis' for 'Order Date' and 'Month'. The 'Column series' is set to 'Add data fields here', and the 'Column values' are currently set to 'Profit'. The 'Line values' are set to 'Target Profit'. There are also icons for a table, a brush, and a magnifying glass at the top.

When to use

- Compare value with its target when barchart higher than line, it means achieve target.
- Let bar show main value and let line shows its benchmark.

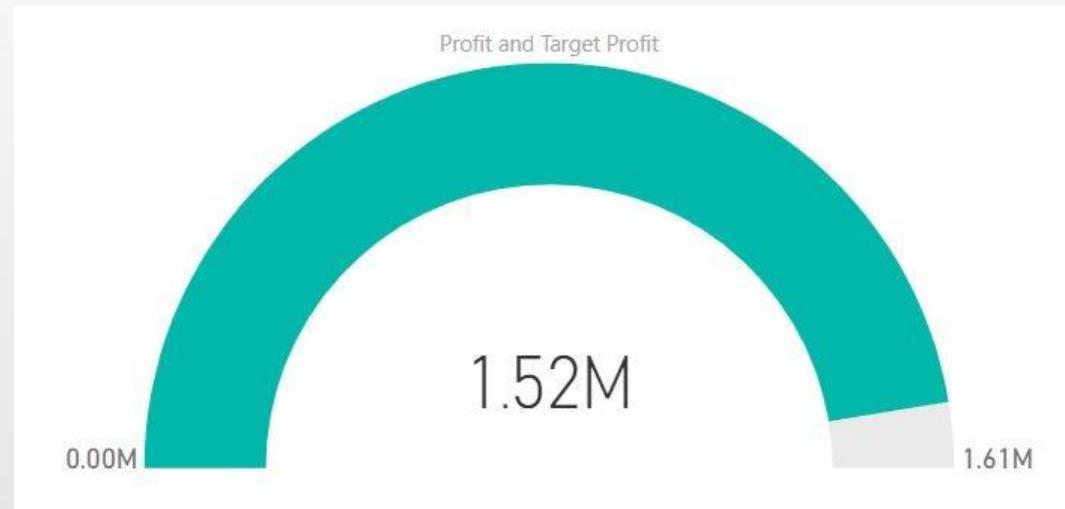
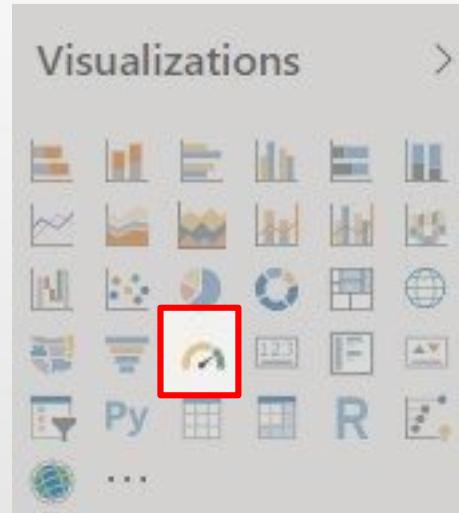
Scatter Chart



When to use

- To show relationships between two numerical values.
- Multi dimension at most 6 (X-Axis, Y-Axis, Color, Size, Shape, Tooltip)
- Be able to use with quadrants.

Gauge

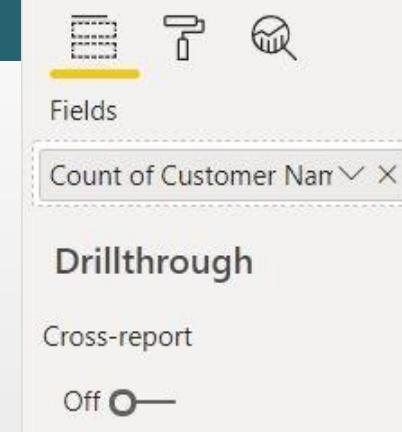
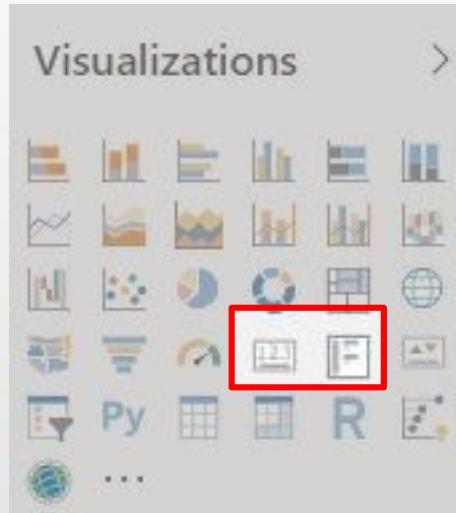


A screenshot of the Tableau configuration pane for the 'Value' field of the gauge. It shows the current value set to 'Profit'. Below that, there are sections for 'Minimum value' (with a placeholder 'Add data fields here'), 'Maximum value' (set to 'Target Profit'), and 'Target value' (with a placeholder 'Add data fields here'). There are also sections for 'Tooltips' and 'Add data fields here'.

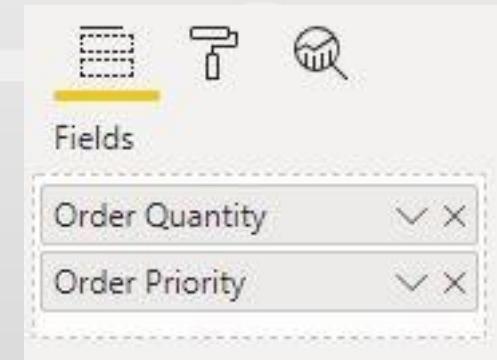
When to use

- Show progress toward a goal.
- Represent a percentile measure, like a KPI.
- Show the health of a single measure.
- Display information you can quickly scan and understand.

Card & Multi Card



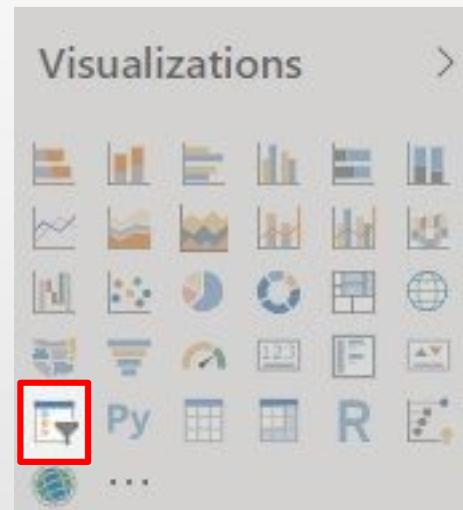
High	45675	Order Quantity
Low	44371	Order Quantity
Not Specified	42627	Order Quantity
Medium	41364	Order Quantity
Critical	40740	Order Quantity



When to use

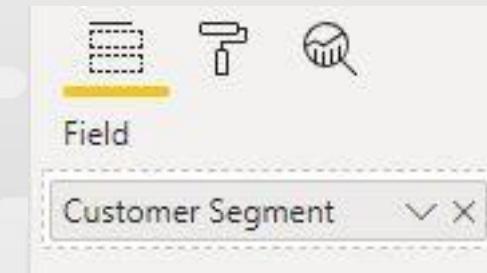
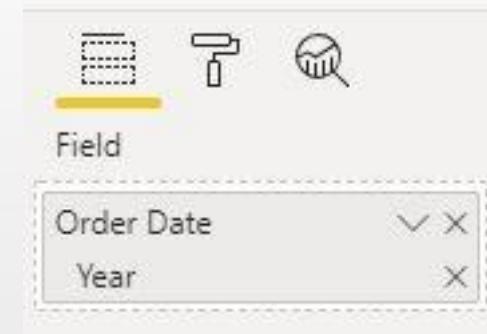
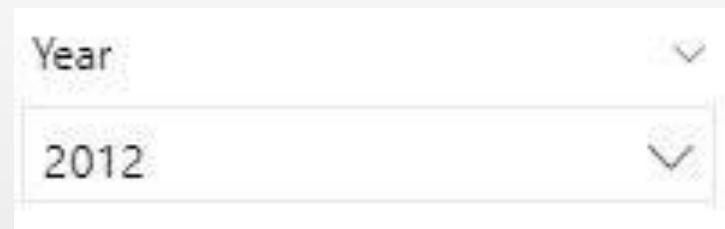
- To illustrate descriptive statistics such as sum , mean, median, variance and standard deviation

Slicer

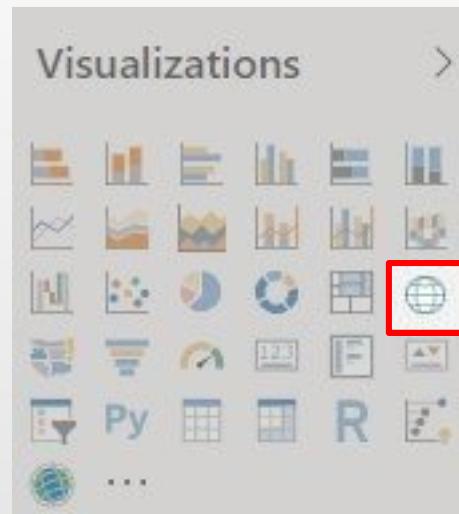


When to use

- Display commonly-used or important filters on the report canvas for easier access.



Map



Location
State

Legend
Add data fields here

Latitude
Add data fields here

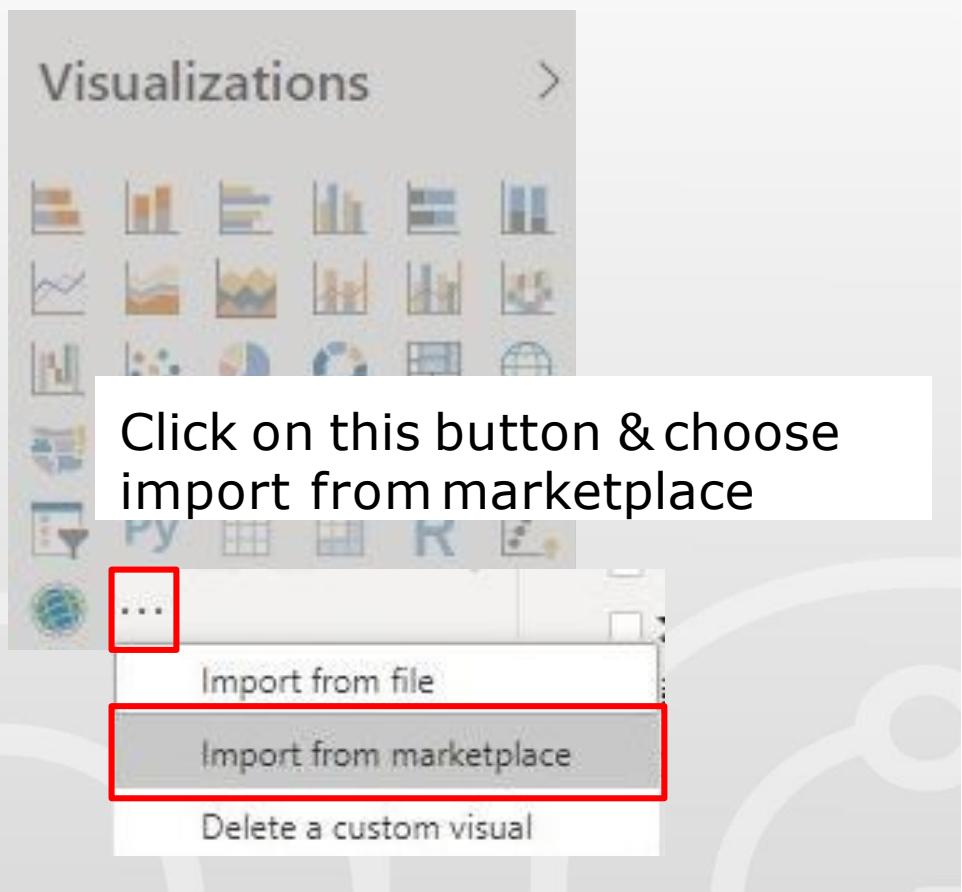
Longitude
Add data fields here

Size
Sales

When to use

- To display quantitative information on a map.
- To show spatial patterns and relationships.
- To get an overview of the distribution across the geographic locations.

Custom visual



Power BI Visuals

MARKETPLACE | MY ORGANIZATION

Add-ins may access personal and document information. By using an add-in, you agree to its Permissions

Category

All

Advanced Analytics

Data Visualizations

Editor's Picks

Filters

Gauges

Infographics

KPIs

Maps

Power BI Certified

Time

Click to add

Suggested for you

Bullet Chart Add

A bar chart with extra visual elements to provide additional context. Useful for tracking goals
★★★★★

Histogram Chart Add

Visualises the distribution of data over a continuous interval or certain time period
★★★★★

Dual KPI Add

Efficiently visualizes two measures over time, showing their trend on a joint timeline
★★★★★

Infographic Designer Add

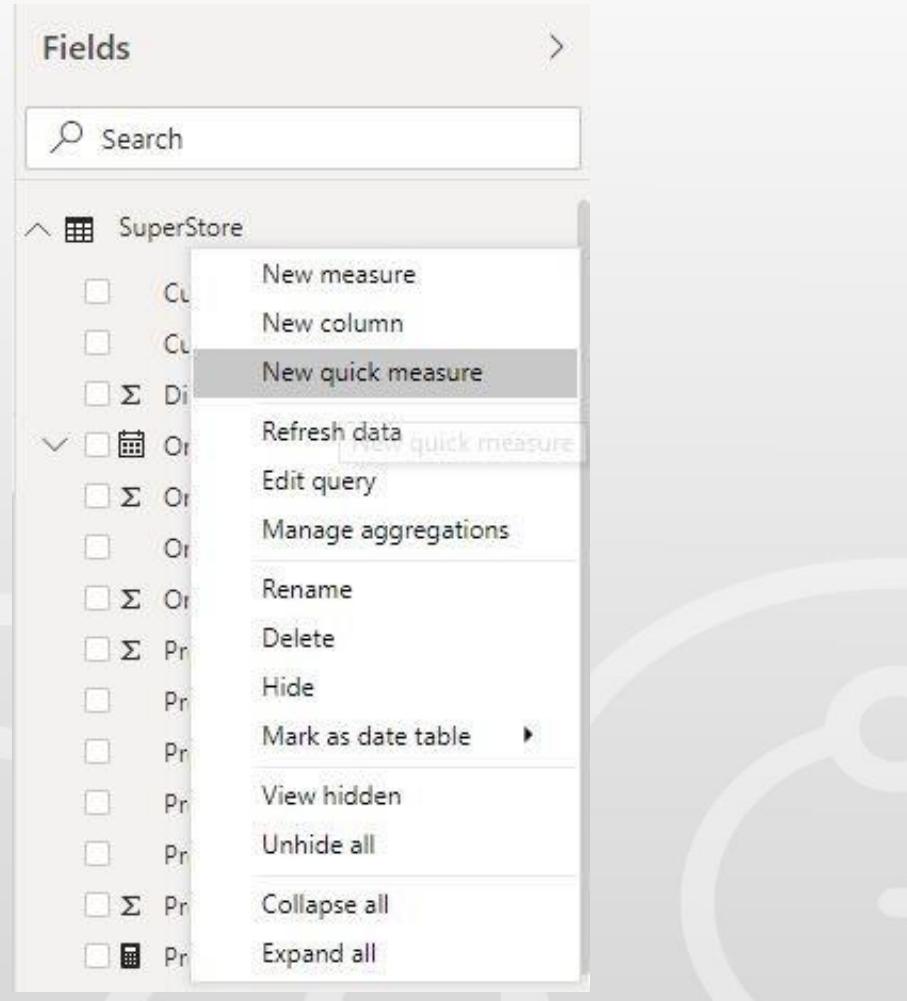
Beautify your reports with easy-to-create infographics
★★★★★

Additional Function

Quick Measure

- Aggregate per category
 - Average per category
 - Variance per category
 - Max per category
 - Min per category
 - Weighted average per category
- Filters
 - Filtered value
 - Difference from filtered value
 - Percentage difference from filtered value
 - Sales from new categories
- Time intelligence
 - **Year-to-date total**
 - Quarter-to-date total
 - Month-to-date total
 - **Year-over-year change**
 - Quarter-over-quarter change
 - Month-over-month change
 - Rolling average
- Totals
 - Running total
 - Total for category (filters applied)
 - Total for category (filters not applied)
- Mathematical operations
 - Addition
 - Subtraction
 - Multiplication
 - Division
 - Percentage difference
 - Correlation coefficient
- Text
 - Star rating
 - Concatenated list of values

Quick Measure



The screenshot shows the 'Fields' pane in Power BI. A context menu is open over a table named 'SuperStore'. The menu includes options like 'New measure', 'New column', and 'New quick measure'. The 'New quick measure' option is highlighted.

Quick measures

Calculation

Select a calculation

- Aggregate per category
- Average per category **(selected)**
- Variance per category
- Max per category
- Min per category
- Weighted average per category

Filters

- Filtered value
- Difference from filtered value
- Percentage difference from filtered value
- Sales from new customers

Time intelligence

- Year-to-date total
- Quarter-to-date total
- Month-to-date total
- Year-over-year change
- Quarter-over-quarter change
- Month-over-month change
- Rolling average

Fields

Search

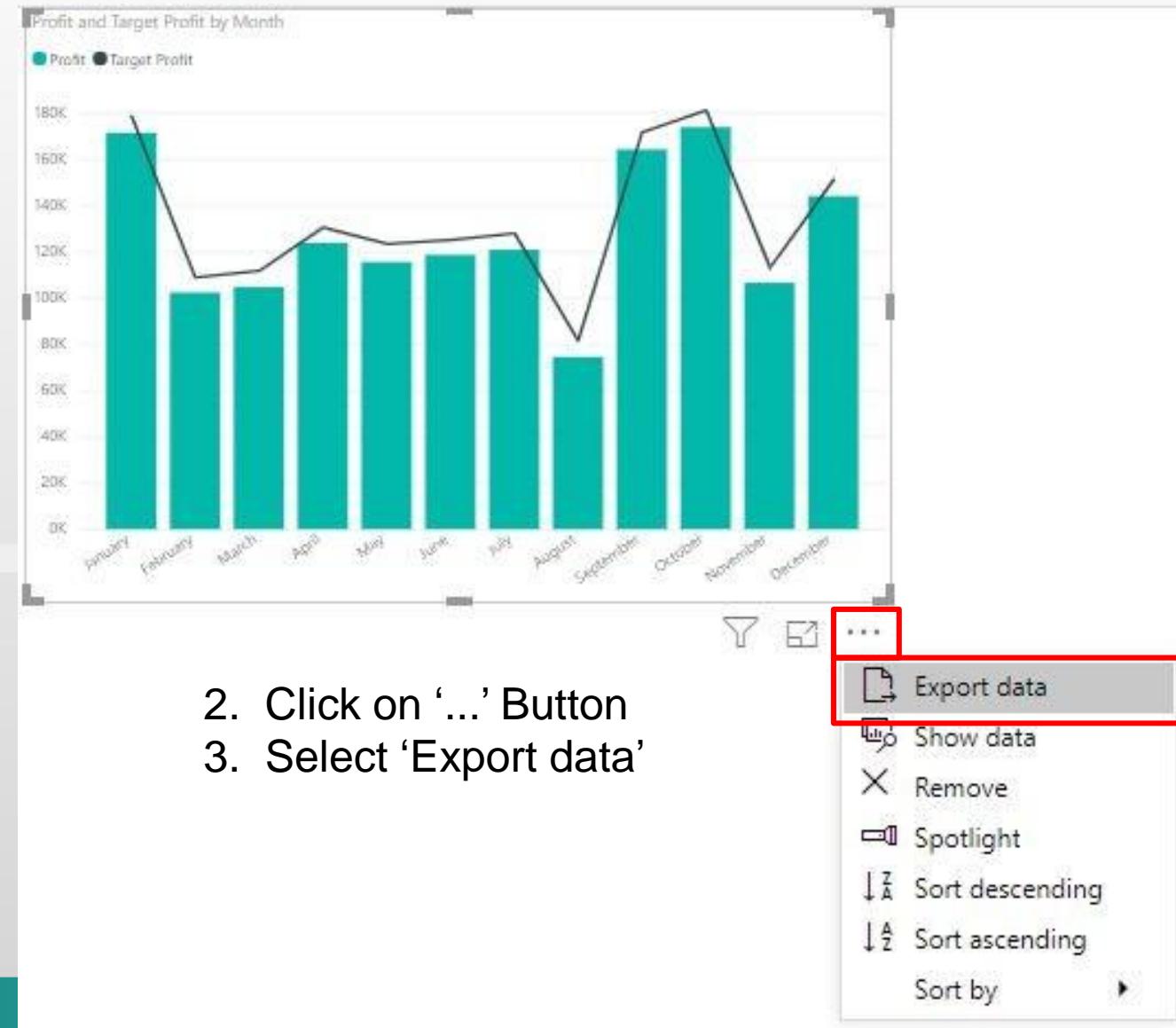
- SuperStore
 - Customer Name
 - Customer Segment
 - Σ Discount
 - Order Date
 - Order ID
 - Order Priority
 - Order Quantity
 - Product Base Margin
 - Product Category
 - Product Container
 - Product Name
 - Product Sub-Category
 - Profit
 - Profit average per Product Category
 - Profit MTD
 - Region
 - Row ID
 - Sales
 - Sales average per Product Category
 - Sales YTD

OK Cancel

Don't see the calculation you want? Post an idea

Export data from Visual

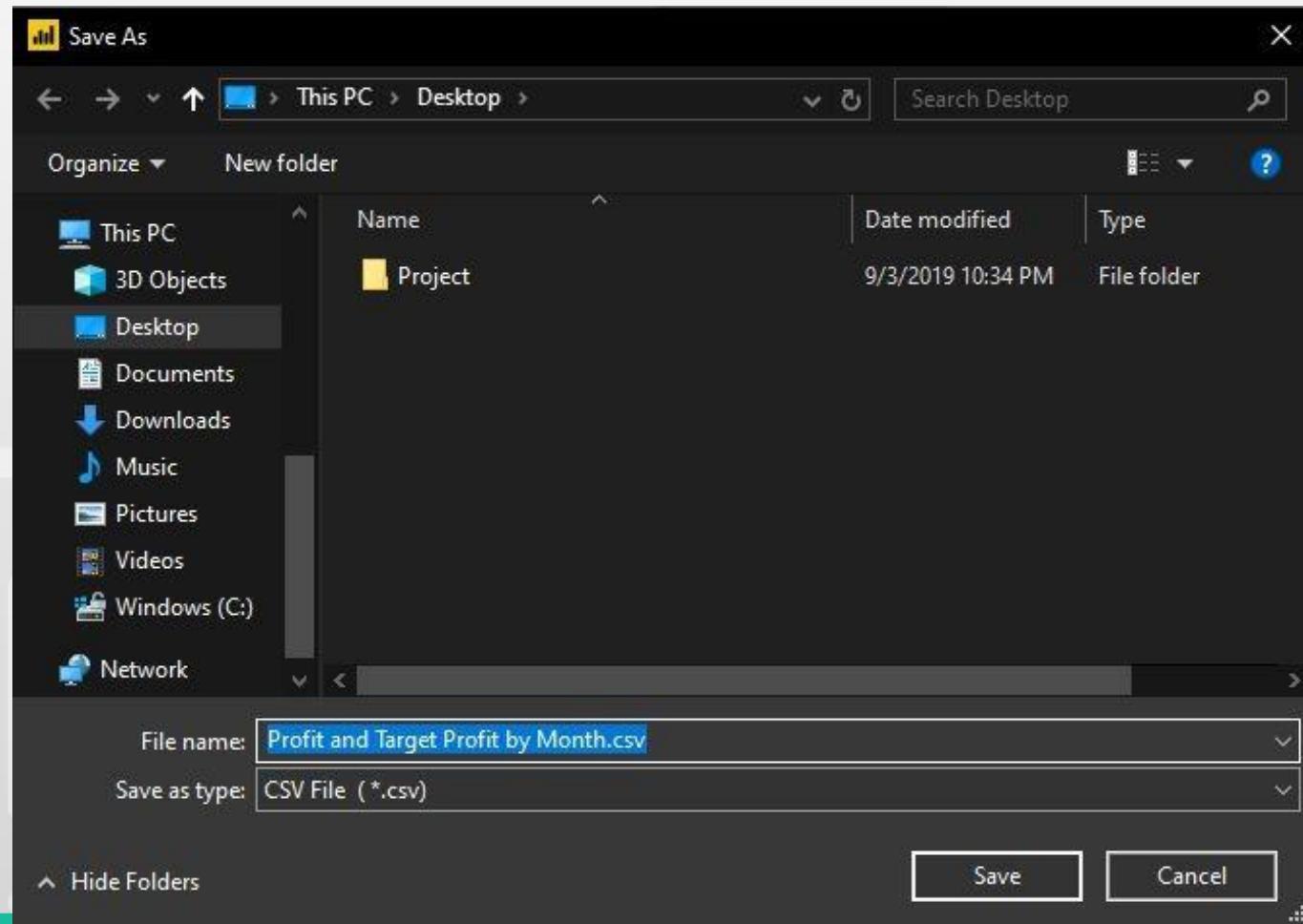
1. Click on visual graph



2. Click on '...' Button
3. Select 'Export data'

Export data from Visual

4. Select directory and Named file



A	B	C
Profit	Target Profit	Month
171520.75	178680.75	January
102429.12	108949.12	February
104799.33	111769.33	March
123906.52	130626.52	April
115628.69	123408.69	May
118703.56	125193.56	June
120965.31	127955.31	July
74585.5	81635.5	August
164352.69	171702.69	September
174016.39	181316.39	October
106670.36	113120.36	November
144189.76	151399.76	December

Workshop

