

Nama : Nanda Amelia

Nim : 191402015

Matkul : Data Warehouse & Business Intelligence

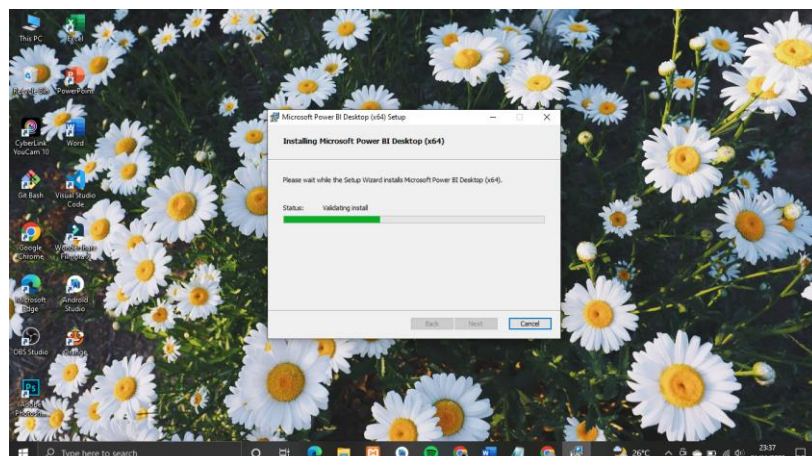
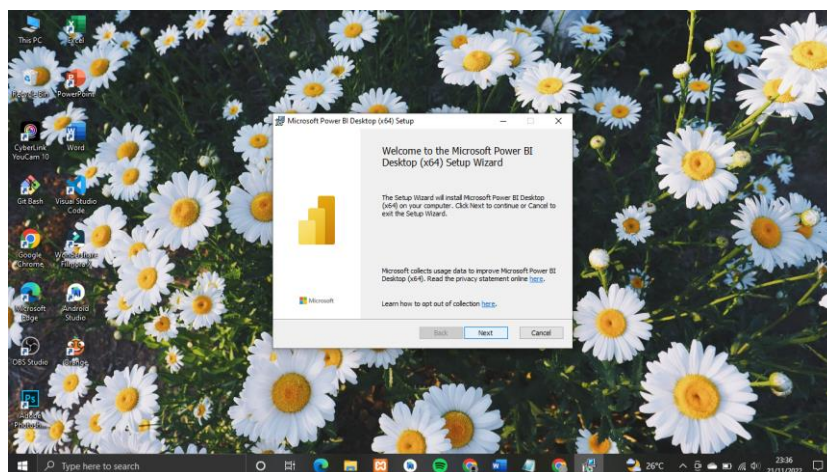
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## Power BI

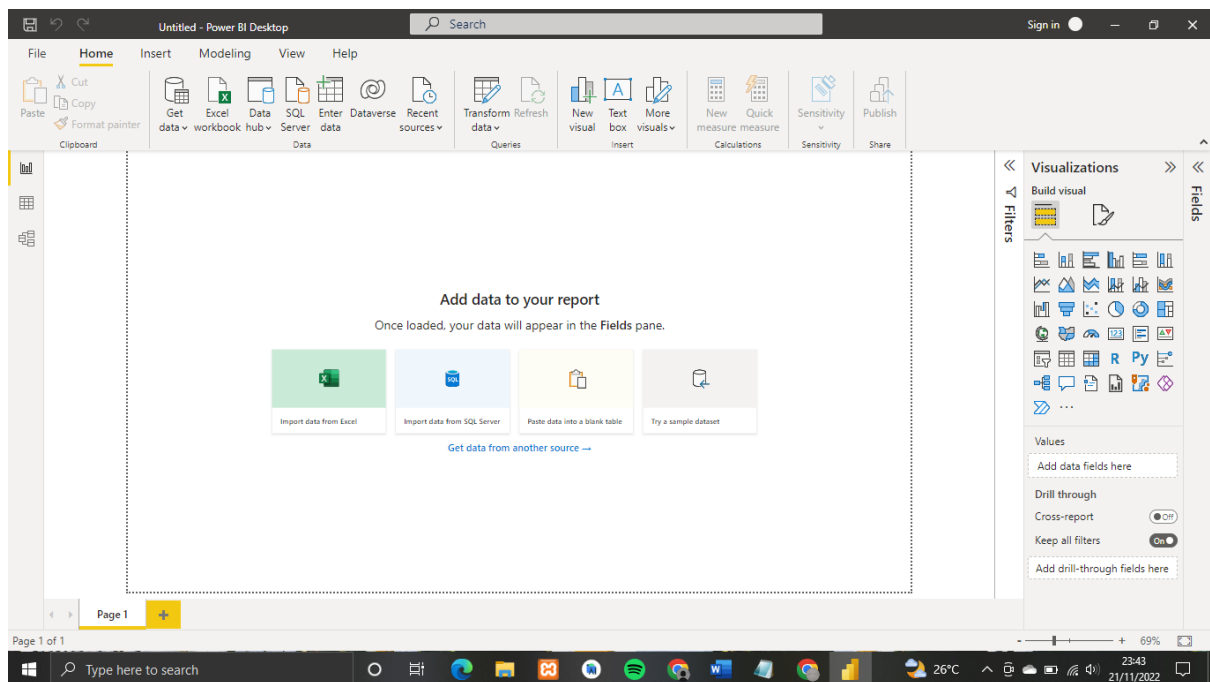
Microsoft Power BI adalah kumpulan layanan perangkat lunak, aplikasi, dan konektor yang mengubah sumber data yang tidak terkait menjadi wawasan yang koheren dan interaktif. Power BI memungkinkan analis data terhubung ke sumber data, memvisualisasikan (atau menemukan) apa yang penting, dan membagikan temuan. Power BI terdiri dari aplikasi desktop Microsoft Windows yang disebut SaaS.

untuk menggunakan aplikasi Power BI ini kita dapat menginstall terlebih dahulu aplikasinya <https://go.microsoft.com/fwlink/?LinkID=521662> dengan link berikut.

Setelah selesai didownload selanjutnya kita run aplikasinya



## Halaman awal aplikasi Power BI desktop



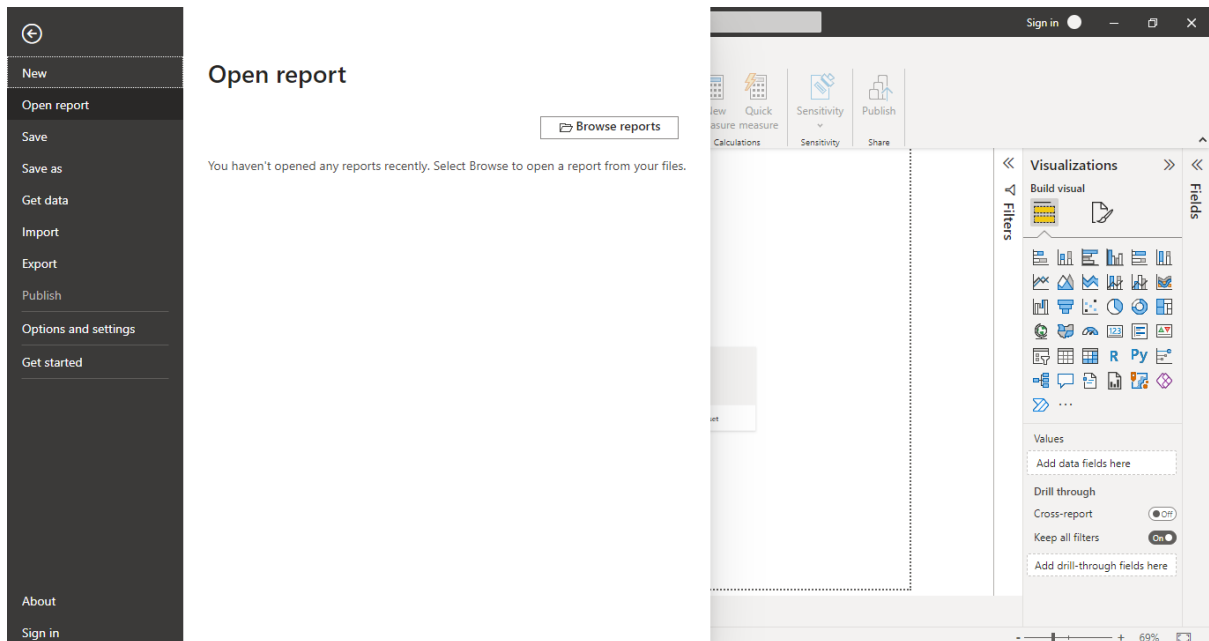
## Get Started Building with Power BI

Aktivitas dan analisis Power BI yang akan dilakukan

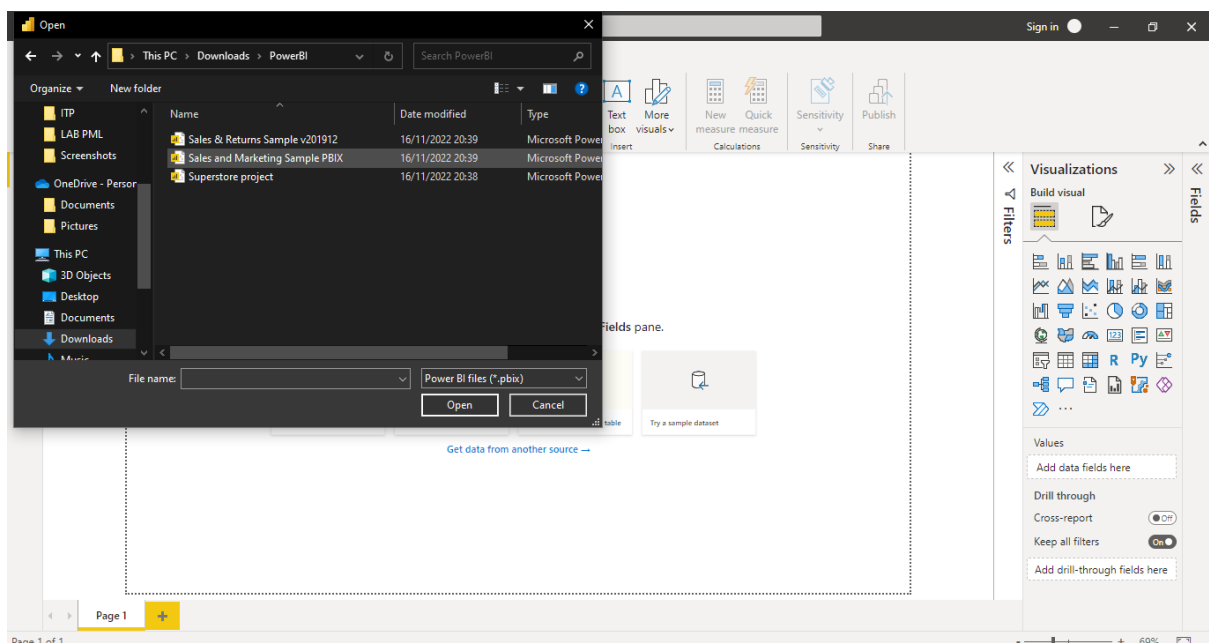
1. Bawa data ke Power BI Desktop, dan buat laporan.
2. Publikasikan ke layanan Power BI, tempat Anda dapat membuat visualisasi baru atau membuat dasbor.
3. Bagikan dasbor dengan orang lain, terutama orang yang sedang dalam perjalanan.
4. Lihat dan berinteraksi dengan dasbor dan laporan bersama di aplikasi Power BI Mobile.

## Building Blocks of Power BI: Visualization

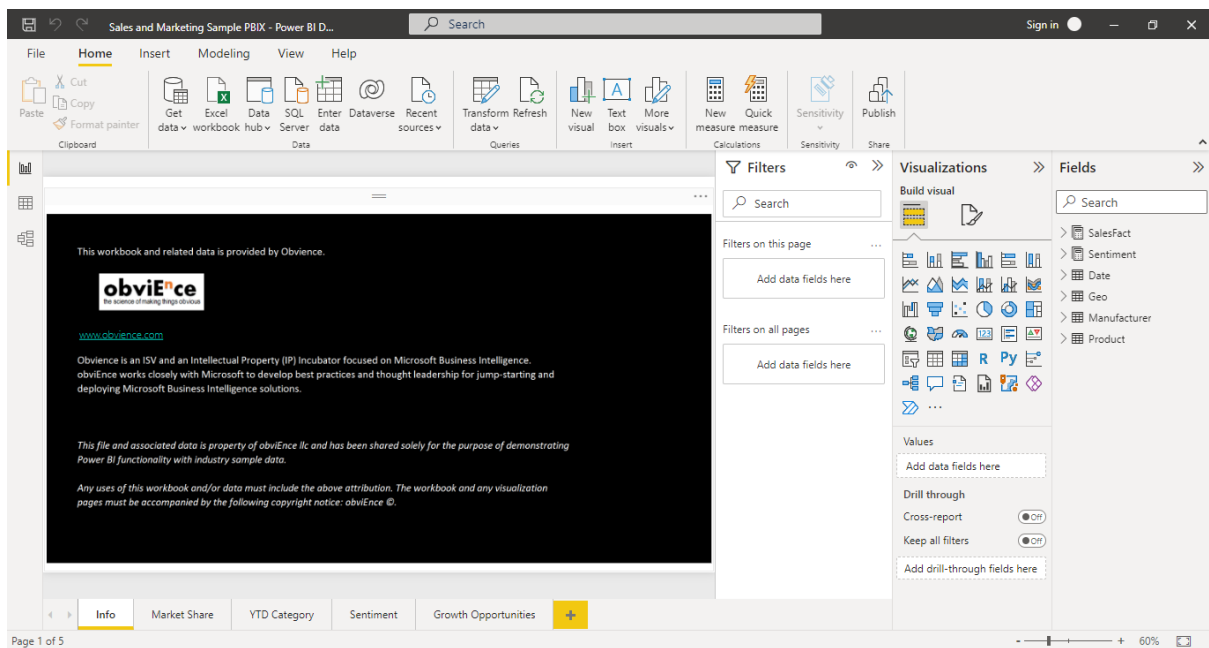
Pada Aplikasi Power BI klik file dan klik open report



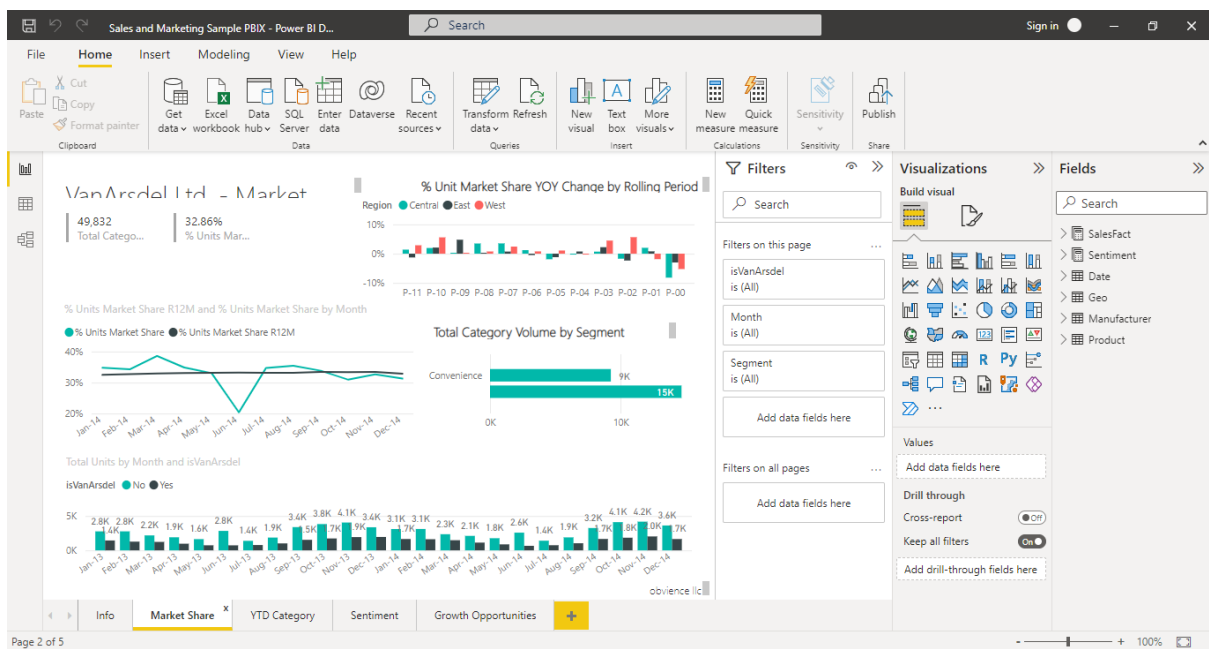
Kemudian pilih file sales and matketing sample PBIX



Halaman awal saat file telah dibuka



Untuk menampilkan visualisasi dari data klik Market Share di kiri bawah



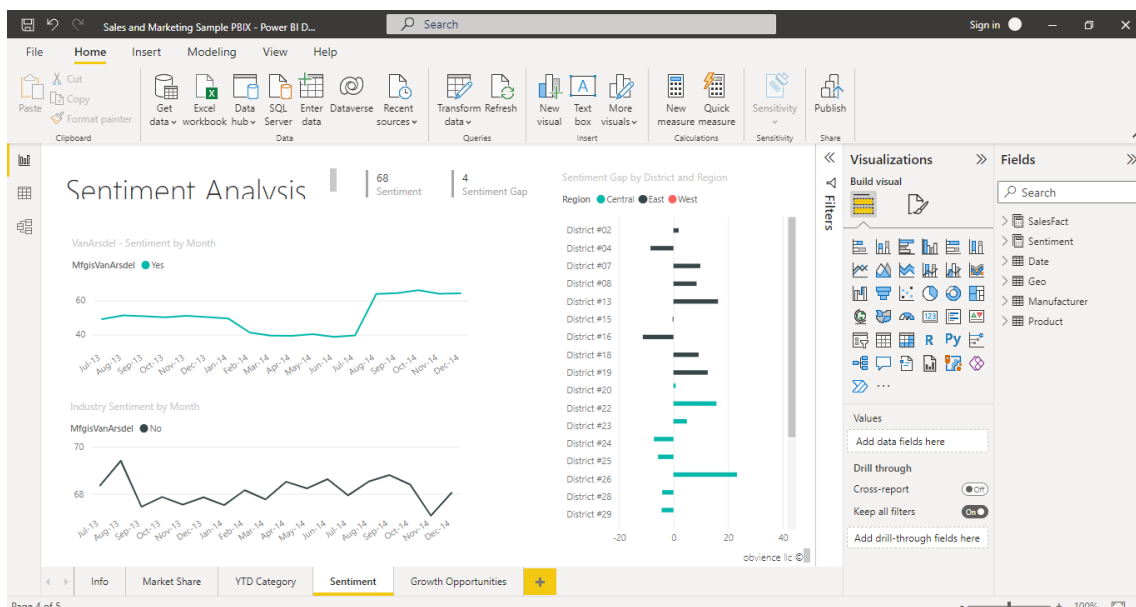
## Building Blocks of Power BI: Datasets

Dataset adalah kumpulan data yang digunakan PowerBI untuk membuat visualisasinya, pada bagian kiri klik ikon yang terlihat seperti data

Date	MonthNo	MonthName	MonthID	Month	Quarter	Year	RunningMonths	Running Year	Running Months	Rolling Period	Rolling Period Sort	MonthIndex
01/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
02/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
03/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
04/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
05/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
06/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
07/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
08/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
09/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
10/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
11/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
12/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
13/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
14/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
15/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
16/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
17/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
18/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
19/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
20/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
21/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				
22/07/1999 00:00:00	7	Jul	199907	Jul-99	Q3	1999	186	16				

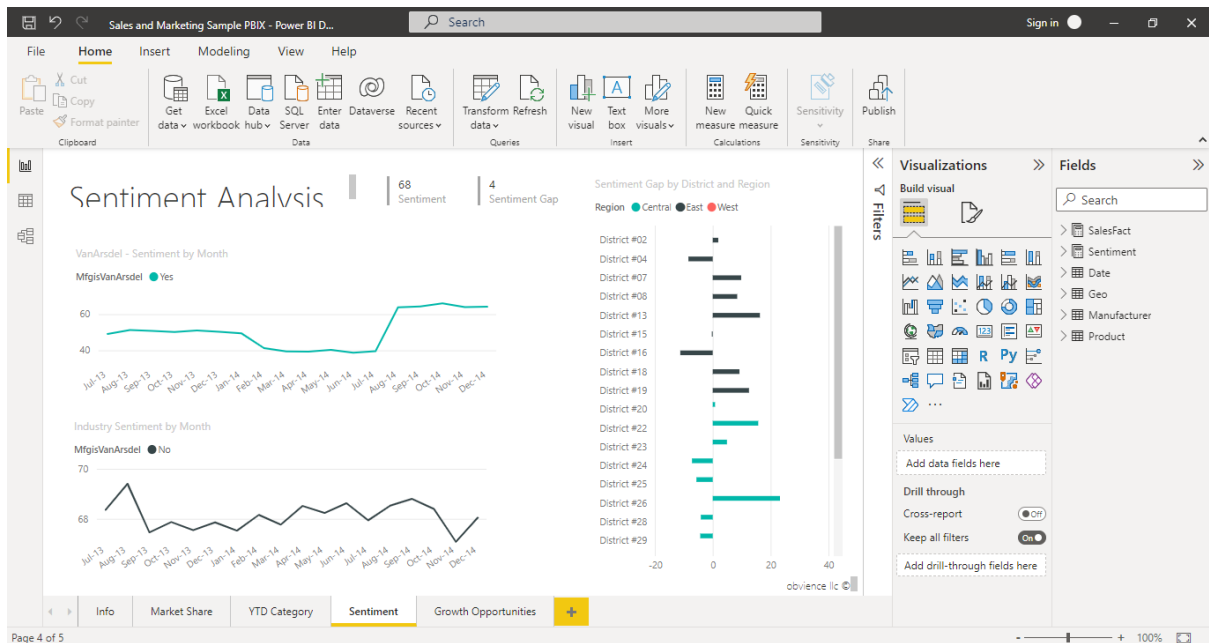
## Building Blocks of Power BI: Reports

Pada power Bi laporan adalah kumpulan visualisasi yang muncul bersamaan di satu atau beberapa halaman, sama dengan laporan lainnya yang memungkinkan kita untuk membuat presentasi jualan atau tugas lainnya, laporan di Power BI ini adalah kumpulan item yang saling terkait. Pada halaman ini Kembali ke halaman report dan klik Sentiment pada kiri bawah



## Building Blocks of Power BI: Dashboard and Tiles

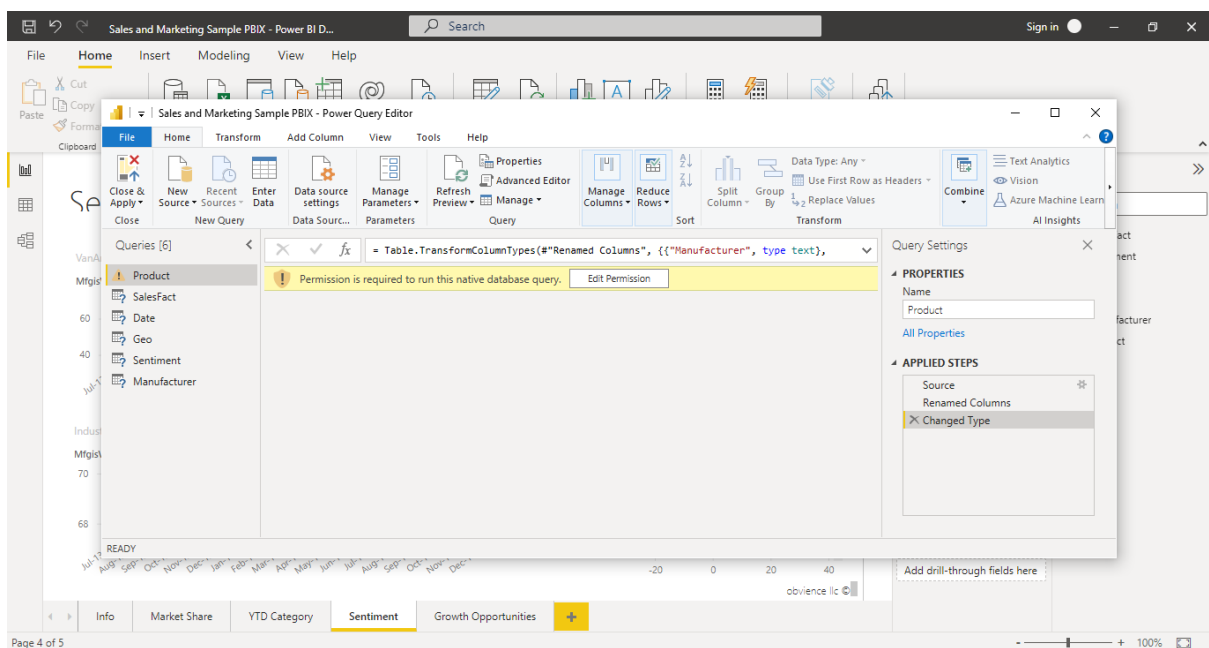
halaman utama dan utilities pada Power BI



## Load, Clean, and Transform Data in Power BI - I

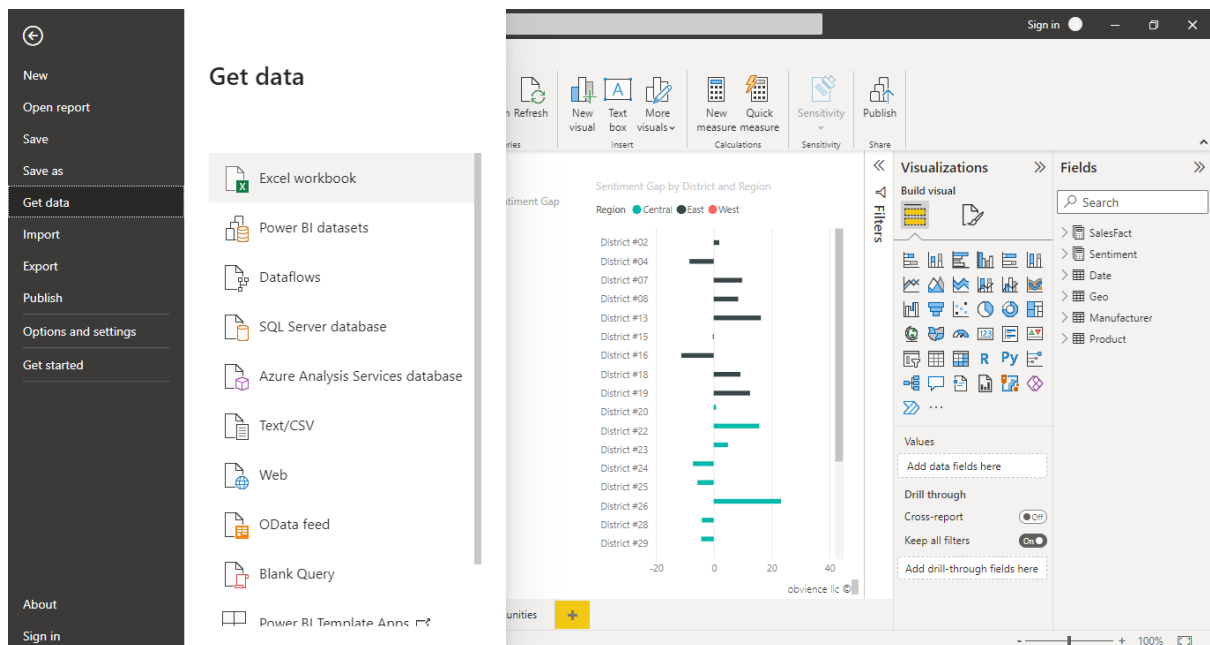
### Introduction

Pada halaman home, klik transform data untuk inisiasi data.

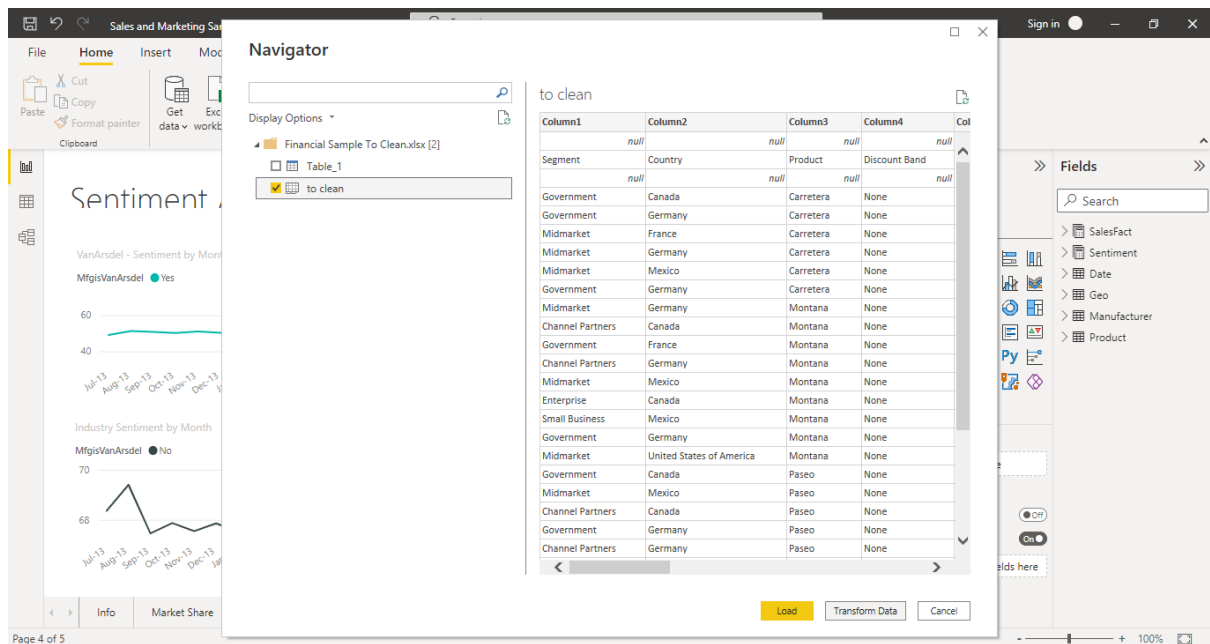


## Identify Column Headers and Names

Di halaman file klik Get Data dan pilih opsi excel workbook.



Pilih file yang ingin digunakan, disini saya menggunakan file Financial Sample To Clean , select table and klik transform data





## Tampilan table to clean

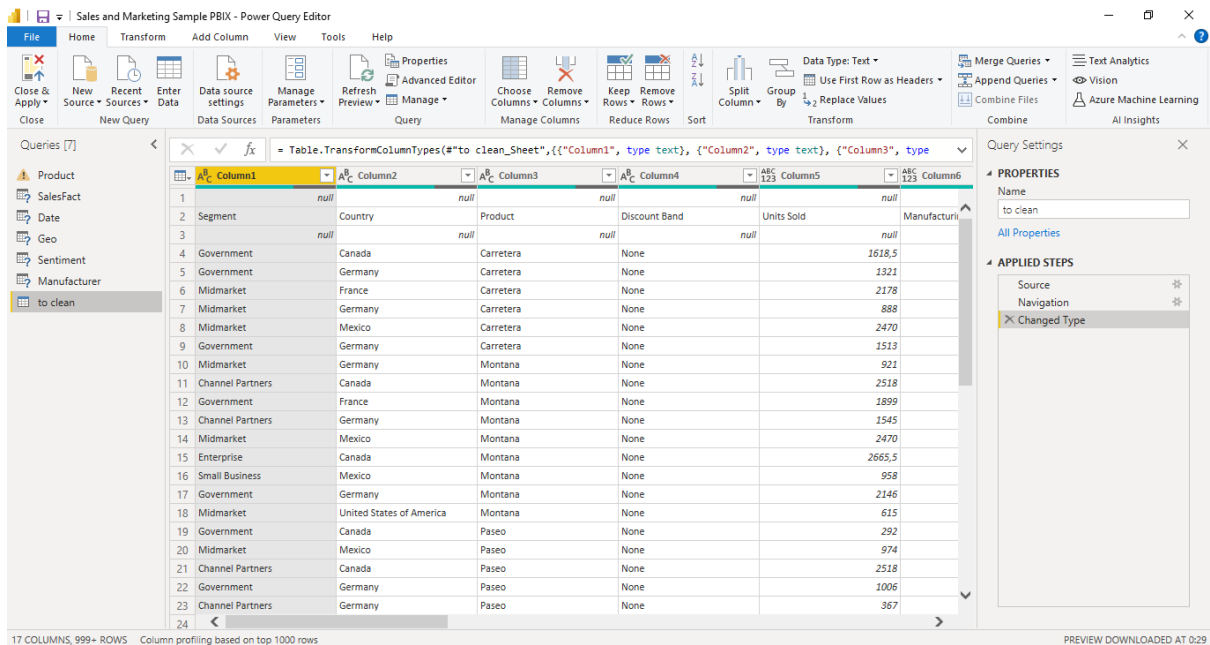


Table: TransformColumnTypes(\*to clean\_Sheet\*,{{"Column1", type text}, {"Column2", type text}, {"Column3", type text}, {"Column4", type text}, {"Column5", type text}, {"Column6", type text}}

Column1	Column2	Column3	Column4	Column5	Column6
1	Segment	Country	Product	Discount Band	Units Sold
2	Government	Canada	Carretera	None	1618,5
3	Government	Germany	Carretera	None	1321
4	Midmarket	France	Carretera	None	2178
5	Midmarket	Germany	Carretera	None	888
6	Midmarket	Mexico	Carretera	None	2470
7	Government	Germany	Carretera	None	1513
8	Midmarket	Germany	Montana	None	921
9	Channel Partners	Canada	Montana	None	2518
10	Government	France	Montana	None	1899
11	Channel Partners	Germany	Montana	None	1545
12	Midmarket	Mexico	Montana	None	2470
13	Enterprise	Canada	Montana	None	2665,5
14	Small Business	Mexico	Montana	None	958
15	Government	Germany	Montana	None	2146
16	Midmarket	United States of America	Montana	None	615
17	Government	Canada	Paseo	None	292
18	Midmarket	Mexico	Paseo	None	974
19	Channel Partners	Canada	Paseo	None	2518
20	Government	Germany	Paseo	None	1006
21	Channel Partners	Germany	Paseo	None	367

## Promote Headers

Pada table to clean ini, select use first row as header untuk membuat baris pertama sebagai headernya

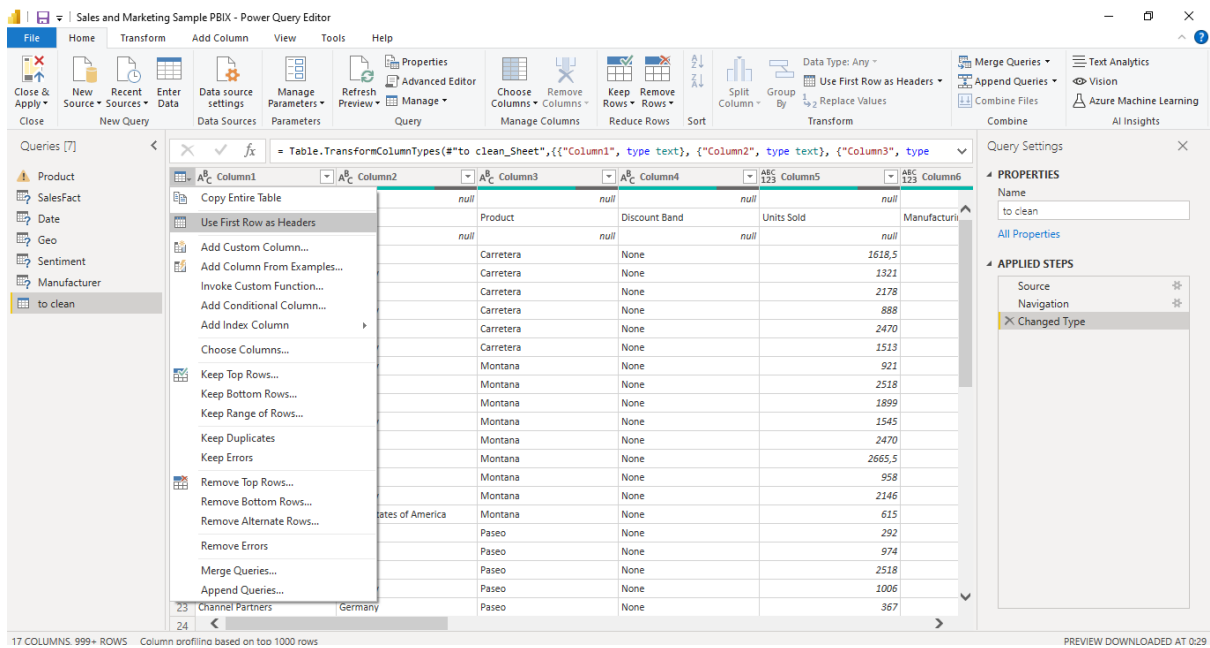


Table: TransformColumnTypes(\*to clean\_Sheet\*,{{"Column1", type text}, {"Column2", type text}, {"Column3", type text}, {"Column4", type text}, {"Column5", type text}, {"Column6", type text}}

Column1	Column2	Column3	Column4	Column5	Column6
1	Segment	Country	Product	Discount Band	Units Sold
2	Government	Canada	Carretera	None	1618,5
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4	Midmarket	France	Carretera	None	2178
5	Midmarket	Germany	Carretera	None	888
6	Midmarket	Mexico	Carretera	None	2470
7	Government	Germany	Carretera	None	1513
8	Midmarket	Germany	Montana	None	921
9	Channel Partners	Canada	Montana	None	2518
10	Government	France	Montana	None	1899
11	Channel Partners	Germany	Montana	None	1545
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13	Enterprise	Canada	Montana	None	2665,5
14	Small Business	Mexico	Montana	None	958
15	Government	Germany	Montana	None	2146
16	Midmarket	United States of America	Montana	None	615
17	Government	Canada	Paseo	None	292
18	Midmarket	Mexico	Paseo	None	974
19	Channel Partners	Canada	Paseo	None	2518
20	Government	Germany	Paseo	None	1006
21	Channel Partners	Germany	Paseo	None	367



Kemudian klik save dan apply

The screenshot shows the Microsoft Power BI Desktop interface. The main window displays a data table with the following columns: Segment, Country, Product, Discount Band, Units Sold, and Manufacturer. The data is organized into rows, with some cells containing null values. A dialog box is open in the center of the screen, titled "Microsoft Power BI Desktop", with the message "There are pending changes in your queries that haven't been applied. Do you want to apply them?". The dialog box has three buttons: "Apply", "Apply later", and "Cancel". The background interface shows the "Query Settings" pane on the right, which includes "PROPERTIES" and "APPLIED STEPS" sections. The "APPLIED STEPS" section shows a list of steps, including "Source", "Navigation", "Changed Type", "Promoted Headers", and "Changed Type1". The status bar at the bottom indicates "17 COLUMNS, 999+ ROWS" and "Column profiling based on top 1000 rows".

## Rename Columns

Untuk dapat mengubah nama kolom, klik kanan pada kolom dan select rename

The screenshot shows the Microsoft Power BI Desktop interface. The main window displays a data table with the following columns: Month Info, Month Number, and Month Name. The data is organized into rows, with some cells containing null values. A right-click context menu is open over the "Month Name" column, showing various options: Copy, Remove, Remove Other Columns, Duplicate Column, Add Column From Examples..., Remove Duplicates, Remove Errors, Change Type, Transform, Replace Values..., Replace Errors..., Split Column, Group By..., Fill, Unpivot Columns, Unpivot Other Columns, Unpivot Only Selected Columns, Rename..., Move, Drill Down, and Add as New Query. The background interface shows the "Query Settings" pane on the right, which includes "PROPERTIES" and "APPLIED STEPS" sections. The "APPLIED STEPS" section shows a list of steps, including "Source", "Navigation", "Changed Type", "Promoted Headers", and "Changed Type1". The status bar at the bottom indicates "17 COLUMNS, 999+ ROWS" and "Column profiling based on top 1000 rows".

## Remove Rows or Columns

Pada bagian ini kita akan menghapus Top Rows atau baris pertama

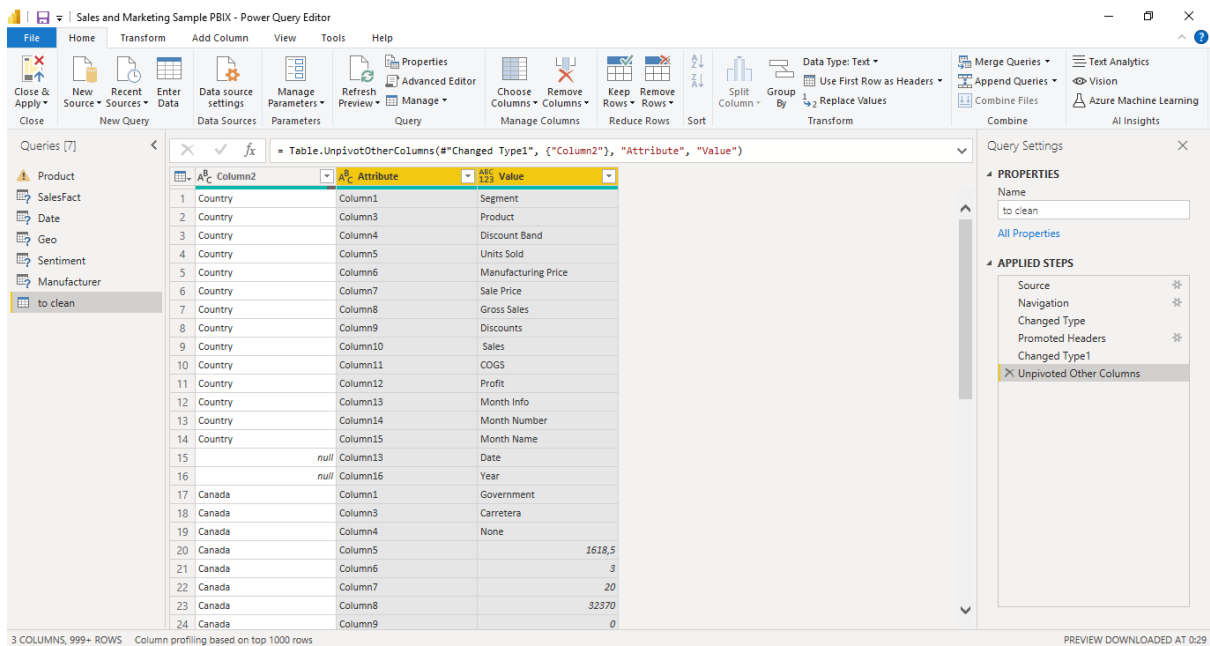
Untuk menghapus kolom klik kanan pada kolom yang akan dihapus dan klik remove kolom.

The screenshot shows the Power Query Editor interface. The main area displays a table with columns: Profit, Month Info, Month Number, Month Name, and Year. The formula bar shows the step: `Table.RemoveColumns(#"Changed Type1",{"Column17"})`. The right-hand pane shows the 'APPLIED STEPS' list, which includes 'Removed Columns' as the most recent step. The 'PROPERTIES' pane on the right shows the 'Name' property set to 'to clean (2)'.

## Pivot Columns

Pada column 2 bagian transform , select pivot column

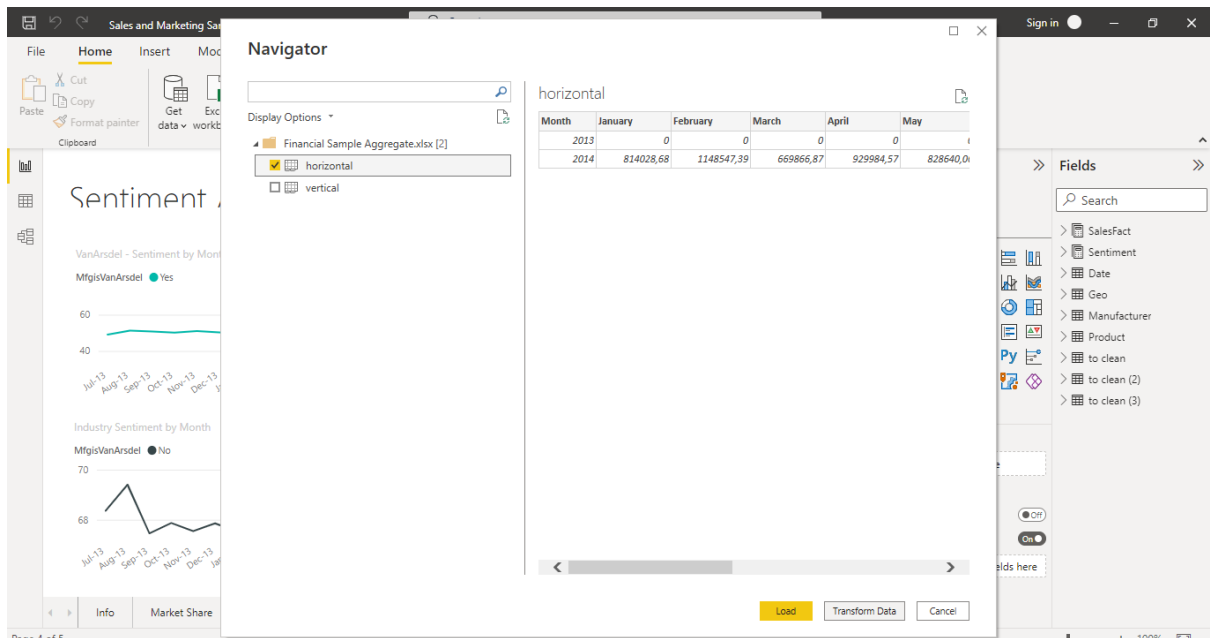
The screenshot shows the Power Query Editor interface. The main area displays a table with columns: Segment, Country, Product, Discount Band, Units Sold, and Manufacturi. The formula bar shows the step: `Table.TransformColumnTypes(#"Promoted Headers",{{"Column1", type text}, {"Column2", type text}, {"Column3", type text}}`. The right-hand pane shows the 'APPLIED STEPS' list, which includes 'Changed Type1' as the most recent step. The 'PROPERTIES' pane on the right shows the 'Name' property set to 'to clean'.

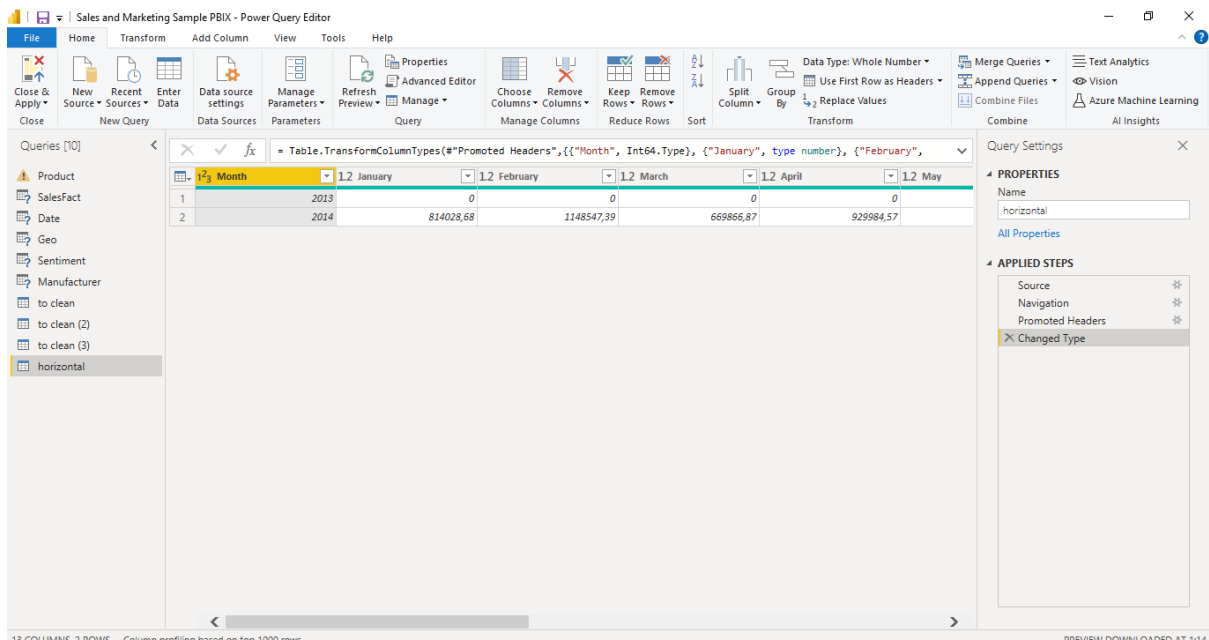


## Unpivot Columns

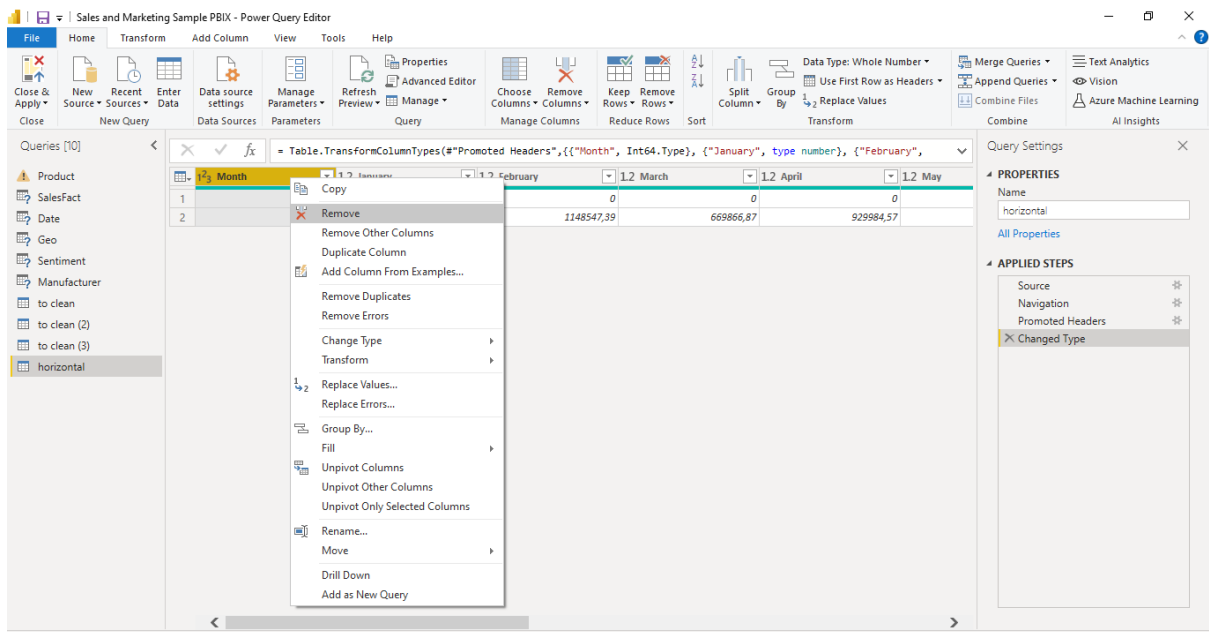
Sama dengan Langkah sebelumnya , klik get data kemudian buka file Finansial Sample Aggregate

Klik table Horizontal, dan klik transform data





Hapus Kolom Month, klik kanan pada month dan hapusn



## Select All Column dan unpivot column

The screenshot shows the Power Query Editor interface. The 'Queries' list on the left includes 'horizontal'. The main data view shows a table with columns for months (January, April, May, June) and sales values. A right-click context menu is open over the 'horizontal' query, with 'Unpivot Columns' selected. The 'Query Settings' pane on the right shows the 'APPLIED STEPS' list, which includes 'Removed Columns'.

12 COLUMNS, 2 ROWS - Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 1:14

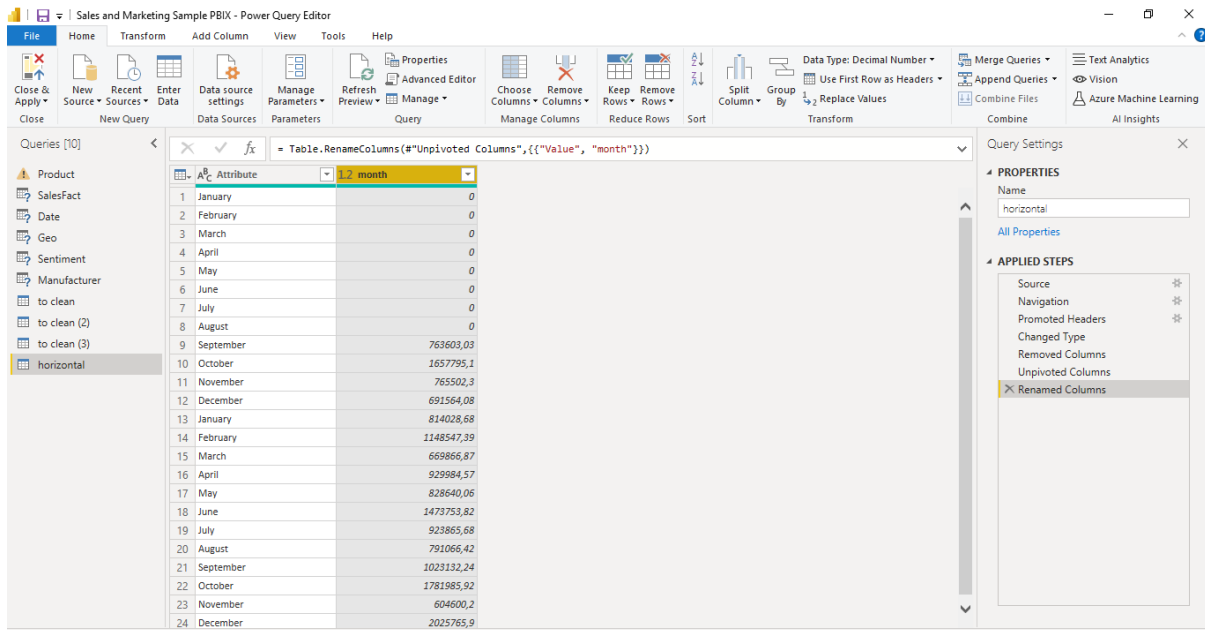
## Hasilnya menjadi seperti ini

The screenshot shows the result of unpivoting the columns. The table now has two columns: 'Attribute' (representing the months) and 'Value' (representing the sales values). The 'APPLIED STEPS' list in the 'Query Settings' pane now includes 'Unpivoted Columns'.

2 COLUMNS, 24 ROWS - Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 1:14

Setelah itu pivot column profit berdasarkan bulan

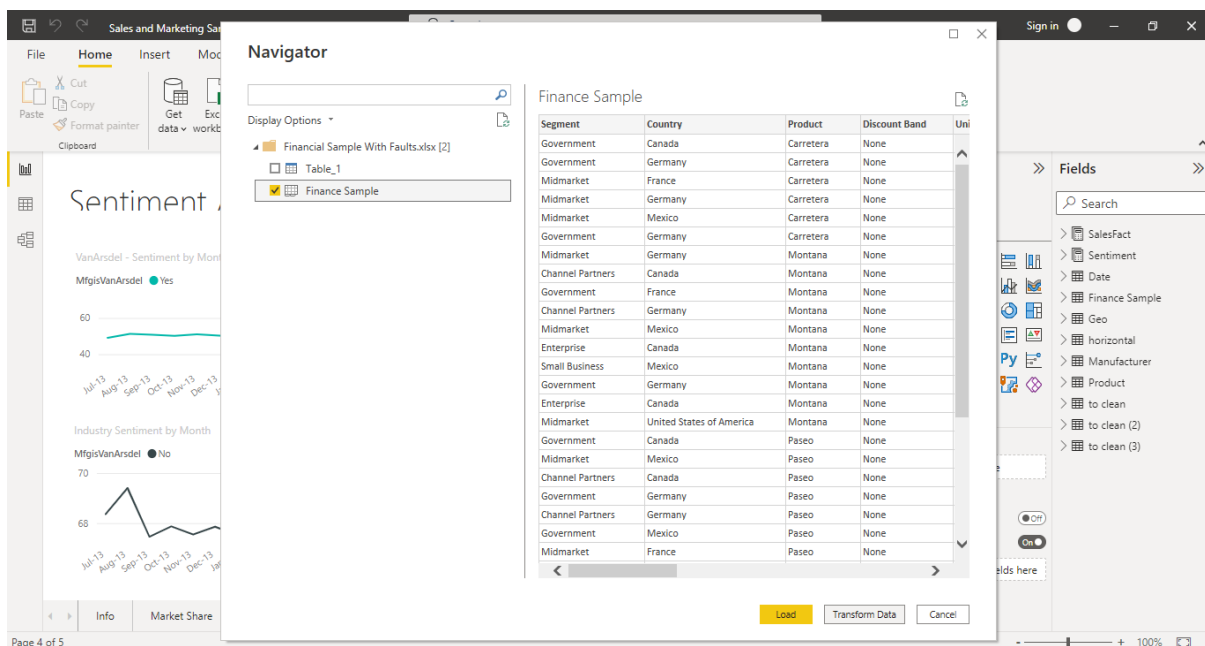


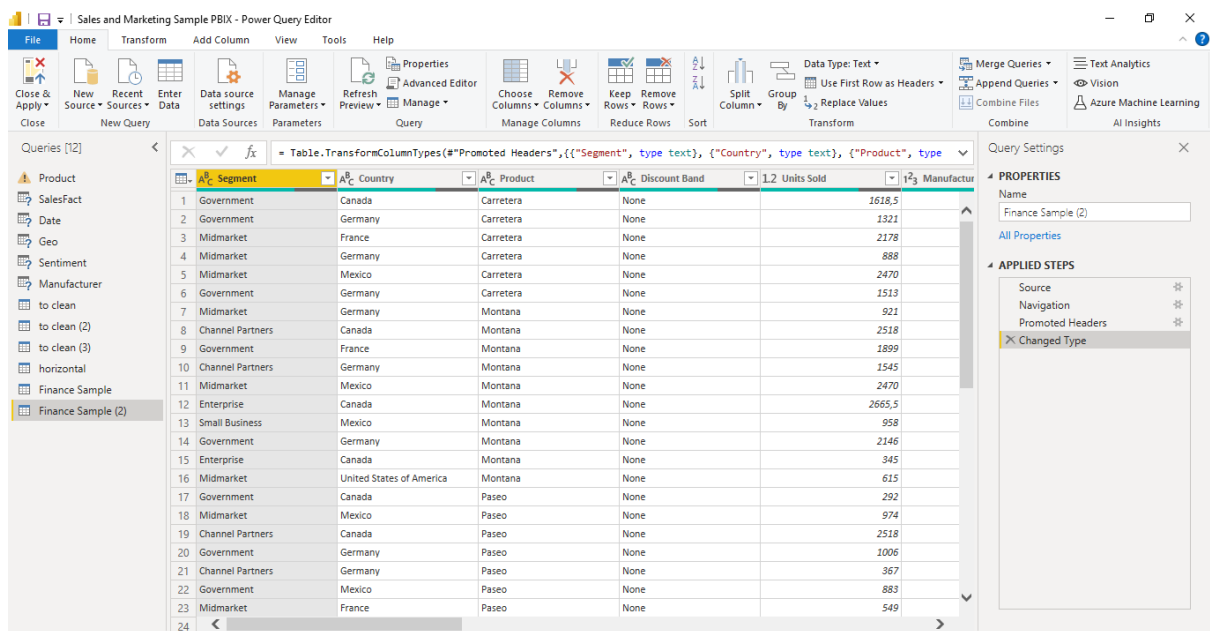
## Load, Clean, and Transform Data in Power BI – II

### Simplify the Data Structure

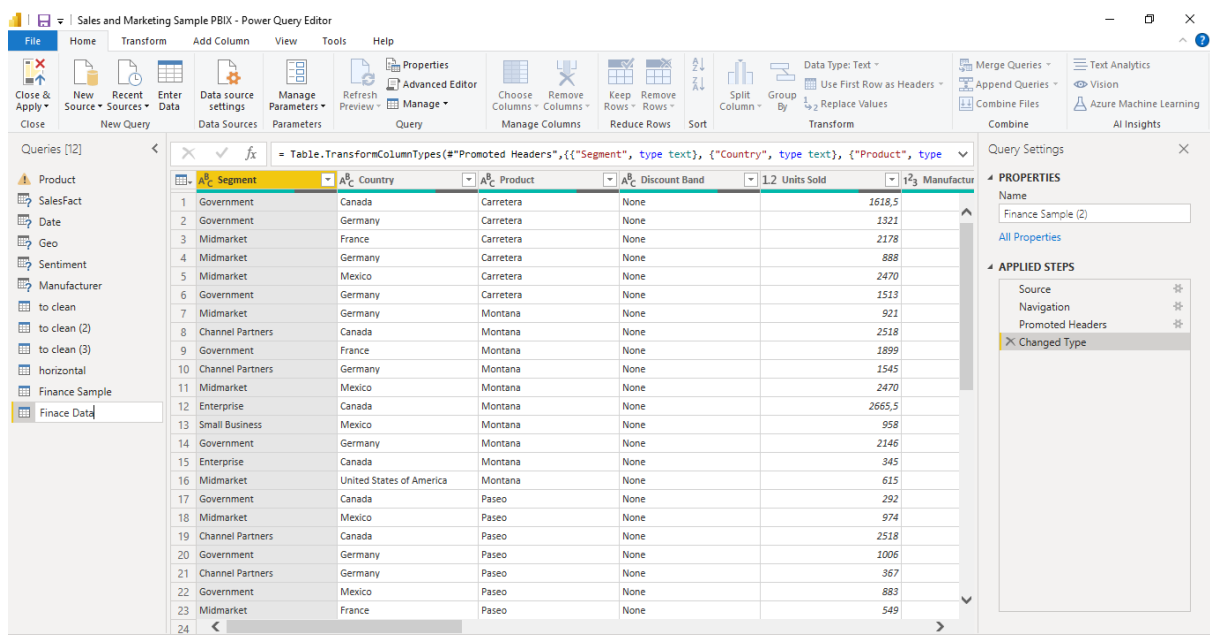
Pada bagian file klik get data kemudian buka file financial sampel with faults

Pilih Finance Sample, kemudian Transform Data





Pada bagian Queries, rename Finance Sample menjadi Finace Data.





## Simplify the Data Structure: Remove Duplicates

Pada kolom Month Name, klik kanan pada kolom dan pilih Remove Duplicates

The screenshot shows the Power Query Editor interface. The main data table has columns: 1.2 Profit, Date, Month Number, and Month Name. The 'Month Name' column is selected, and a right-click context menu is open, showing the 'Remove Duplicates' option. The 'Query Settings' pane on the right shows the 'APPLIED STEPS' list with 'Changed Type' selected.

1.2 Profit	Date	Month Number	Month Name
24700	12350	01/06/2014	6 June
393380	136170	01/12/2014	12 December
9210	4605	01/03/2014	3 March
7554	22662	01/06/2014	6 June
18990	18990	01/06/2014	6 June
4635	13905	01/06/2014	6 June
24700	12350	01/06/2014	6 June
319860	13327,5	01/07/2014	7 July
239500	47900	01/08/2014	8 August
10730	4292	01/09/2014	9 September
41400	1725	01/10/2013	10 October
6150	3075	01/12/2014	12 December
2920	2920	01/02/2014	2 February
9740	4870	01/02/2014	2 February
7554	22662	01/06/2014	6 June
261560	90540	01/06/2014	6 June
1101	3303	01/07/2014	7 July
4415	1766	01/08/2014	8 August
5490	2745	01/09/2013	9 September
197000	39400	01/09/2013	9 September
24720	12360	01/09/2014	9 September
5715	2286	01/10/2014	10 October
448500	155250	01/11/2013	11 November

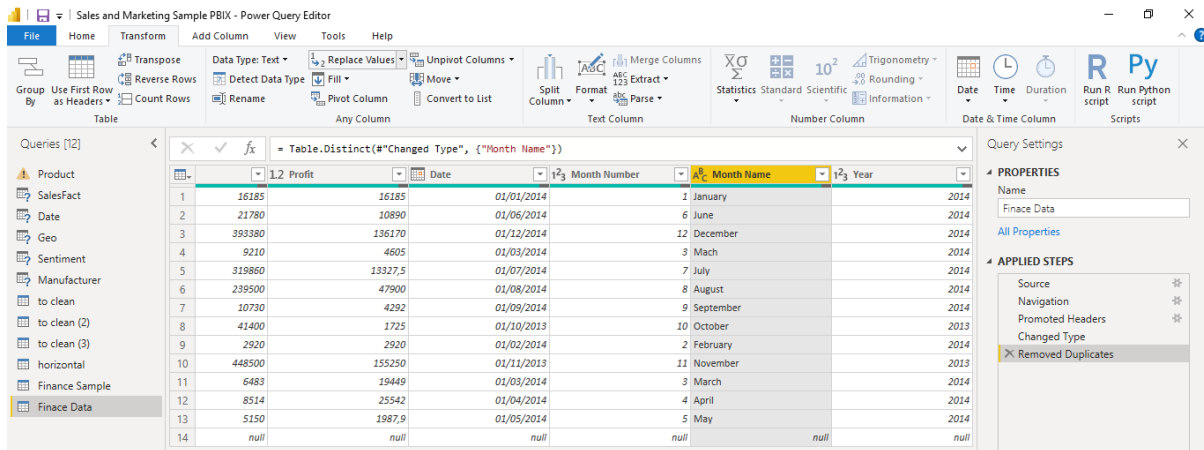
Hasilnya :

The screenshot shows the Power Query Editor interface after removing duplicates. The main data table now has columns: 1.2 Profit, Date, Month Number, Month Name, and Year. The 'Month Name' column is highlighted in yellow. The 'Query Settings' pane on the right shows the 'APPLIED STEPS' list with 'Removed Duplicates' selected.

1.2 Profit	Date	Month Number	Month Name	Year
16185	16185	01/01/2014	1 January	2014
21780	10890	01/06/2014	6 June	2014
393380	136170	01/12/2014	12 December	2014
9210	4605	01/03/2014	3 March	2014
319860	13327,5	01/07/2014	7 July	2014
239500	47900	01/08/2014	8 August	2014
10730	4292	01/09/2014	9 September	2014
41400	1725	01/10/2013	10 October	2013
2920	2920	01/02/2014	2 February	2014
448500	155250	01/11/2013	11 November	2013
6483	19449	01/03/2014	3 March	2014
8514	25542	01/04/2014	4 April	2014
5150	1987,9	01/05/2014	5 May	2014
null	null	null	null	null

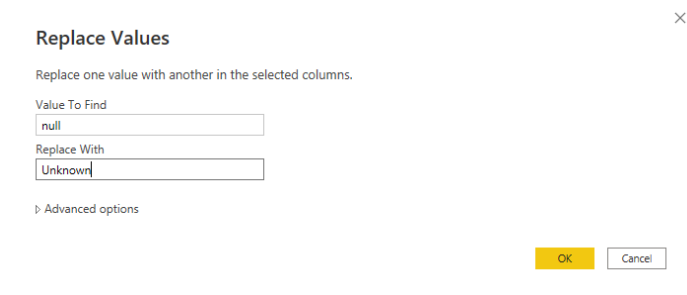
## Simplify the Data Structure: Replace Values

Pada bagian transform, select Replace Values.



	1.2 Profit	Date	1.3 Month Number	1.4 Month Name	1.5 Year
1	16185	01/01/2014	1	January	2014
2	21780	01/06/2014	6	June	2014
3	393380	01/12/2014	12	December	2014
4	9210	01/03/2014	3	March	2014
5	319860	01/07/2014	7	July	2014
6	239500	01/08/2014	8	August	2014
7	10730	01/09/2014	9	September	2014
8	41400	01/10/2013	10	October	2013
9	2920	01/02/2014	2	February	2014
10	448500	01/11/2013	11	November	2013
11	6483	01/03/2014	3	March	2014
12	8514	01/04/2014	4	April	2014
13	5150	01/05/2014	5	May	2014
14	null	null	null	null	null

Replace null menjadi Unknown. Klik Ok. Maka data yang bernilai null akan diubah menjadi Unknown



**Replace Values**

Replace one value with another in the selected columns.

Value To Find  
null

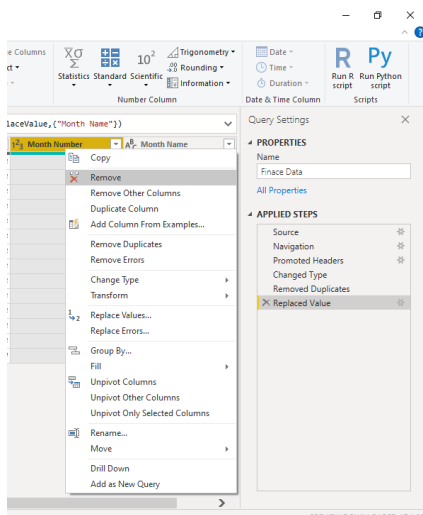
Replace With  
Unknown

☒ Advanced options

OK Cancel

## Best Practices for Naming Tables, Columns, and Values

Remove Kolom Month Number.



## Selanjutnya rename Month Name menjadi Month

The screenshot shows the Power Query Editor interface. The main area displays a table with columns: 1.2 COGS, 1.2 Profit, Date, Month Number, and Month. The 'Month' column contains month names like January, June, December, etc. The formula bar at the top shows the transformation: `= Table.ReplaceValue(#"Removed Duplicates",null,"Unknown",Replacer.ReplaceValue,{"Month Name"})`. The right sidebar shows the 'APPLIED STEPS' list, which includes 'Replaced Value'.

	1.2 COGS	1.2 Profit	Date	Month Number	Month
1	32370	16185	16185	01/01/2014	1 January
2	32670	21780	10890	01/06/2014	6 June
3	529550	393380	136170	01/12/2014	12 December
4	13815	9210	4805	01/03/2014	3 March
5	333187,5	319860	13327,5	01/07/2014	7 July
6	287400	239500	47900	01/08/2014	8 August
7	15022	10730	4292	01/09/2014	9 September
8	43125	41400	1725	01/10/2013	10 October
9	5840	2920	2920	01/02/2014	2 February
10	608750	448500	155250	01/11/2013	11 November
11	25932	6483	19449	01/03/2014	3 March
12	34056	8514	25542	01/04/2014	4 April
13	7137,9	5150	1987,9	01/05/2014	5 May
14	null	null	null	null	Unknown

## Evaluate and Change Column Data Types

Select kolom Manufacturing Price and the Sale Price, setelah itu klik kanan pada kolom. Select Change Type dan ubah tipe dari whole number ke decimal number

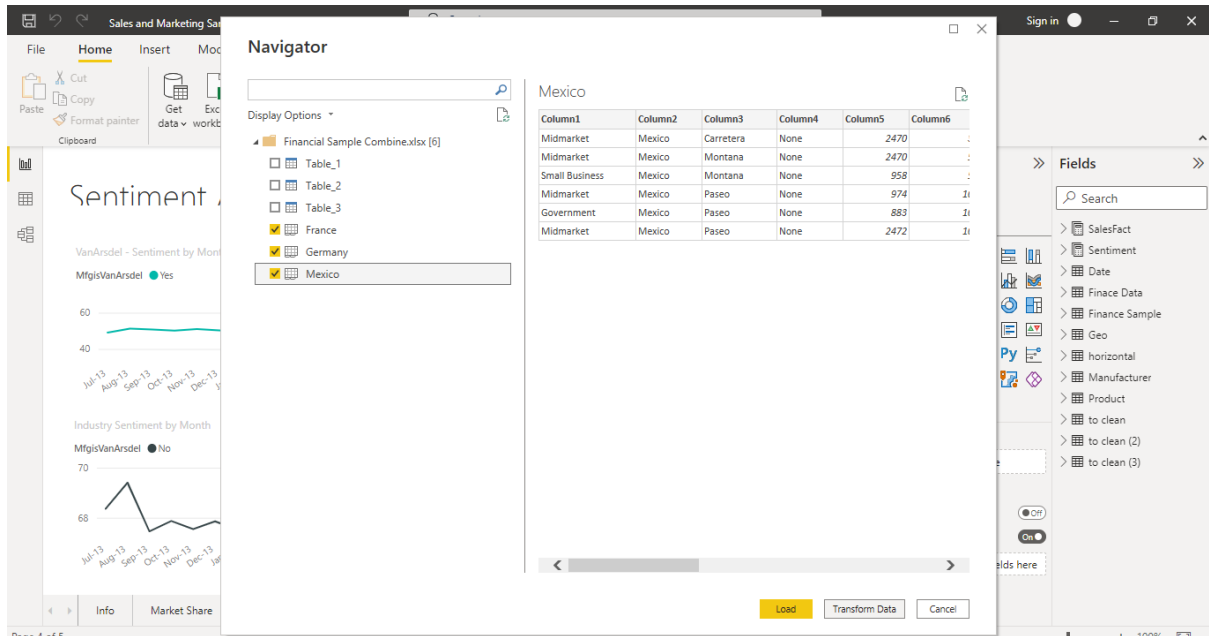
The screenshot shows the Power Query Editor interface. The main area displays a table with columns: Discount Band, 1.2 Units Sold, Manufacturing Price, Sale Price, 1.2 Gross Sales, and 1.2 Disc. The 'Manufacturing Price' column is selected, and a right-click context menu is open. The 'Change Type' option is highlighted, and a submenu is shown with 'Whole Number' selected. The right sidebar shows the 'APPLIED STEPS' list, which includes 'Renamed Columns'.

	Discount Band	1.2 Units Sold	Manufacturing Price	Sale Price	1.2 Gross Sales	1.2 Disc
1	None	1618,5			32370	
2	None	2178			32670	
3	None	1519			529550	
4	None	921			13815	
5	None	2665,5			333187,5	
6	None	958			287400	
7	None	2146			15022	
8	None	345			43125	
9	None	292				
10	None	1725				
11	None	2161				
12	None	2838				
13	Low	1030				
14	null	null	null			

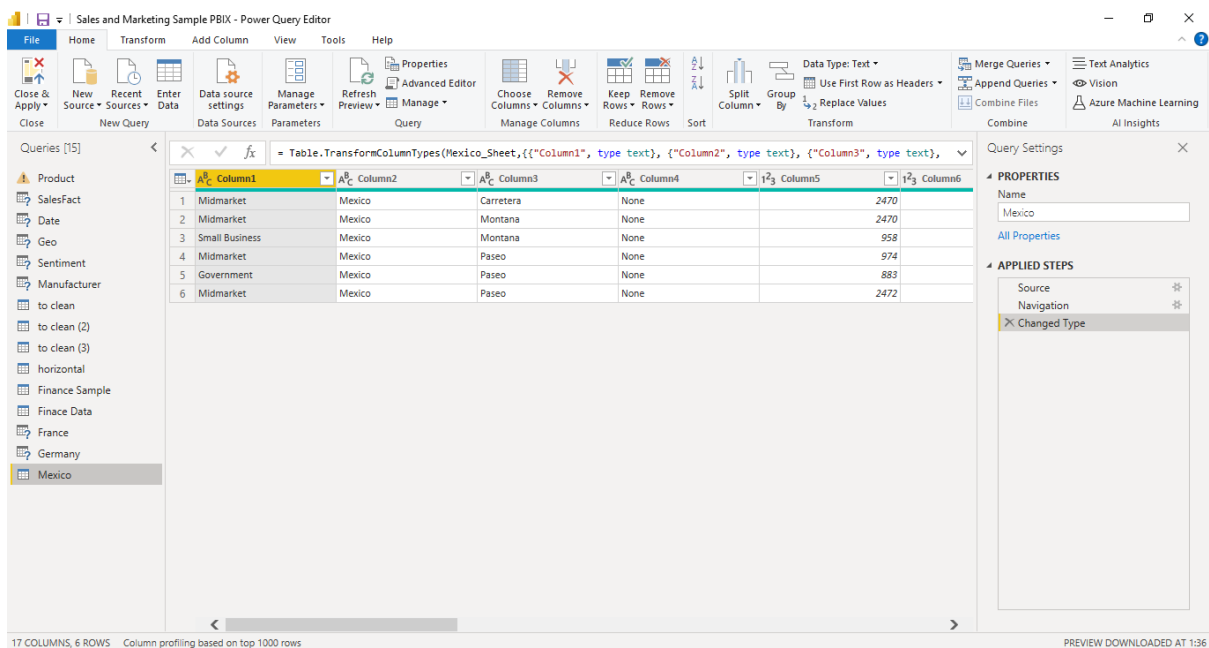
## Load, Clean, and Transform Data in Power BI – III

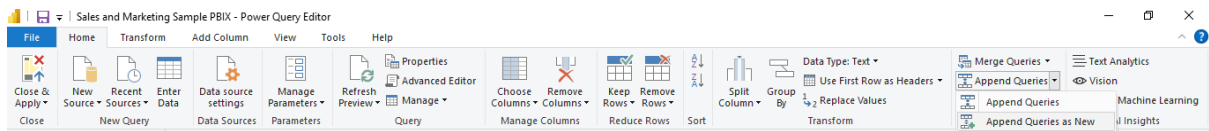
### Combine Tables by Appending Queries

Pada file, klik get data. Setelah itu buka file Finansial Sampe Combine. Pilih France, Germany dan Mexico kemudian Transfrom dataq

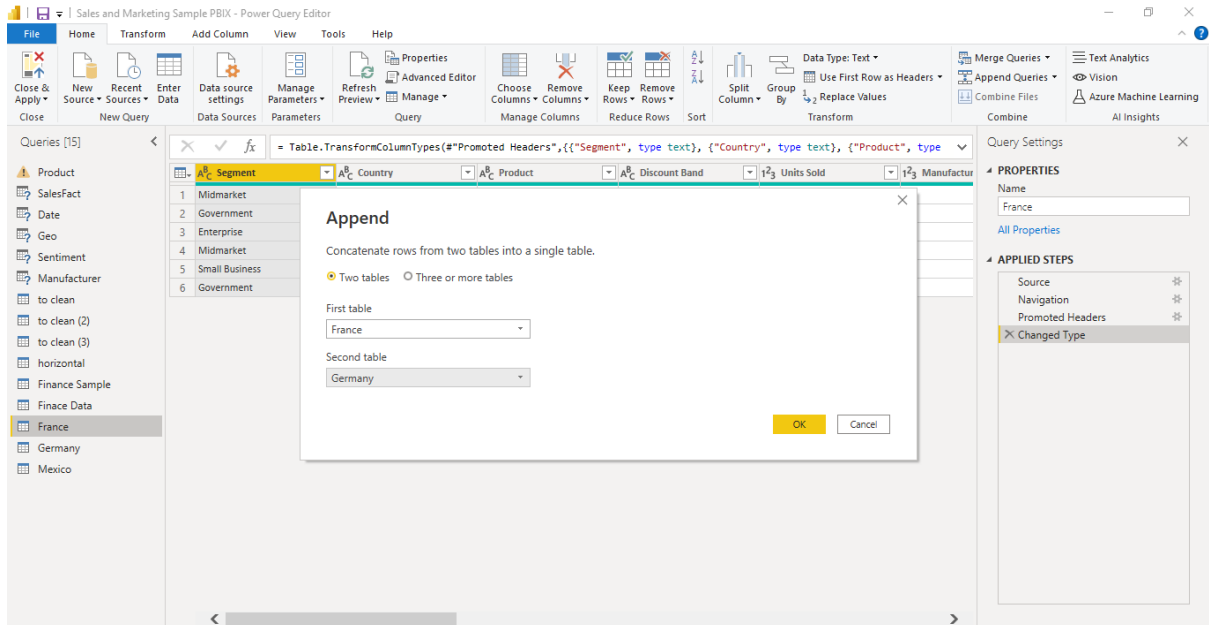


Pada halaman home, pilih Append Queries kemudian Append Queries as new

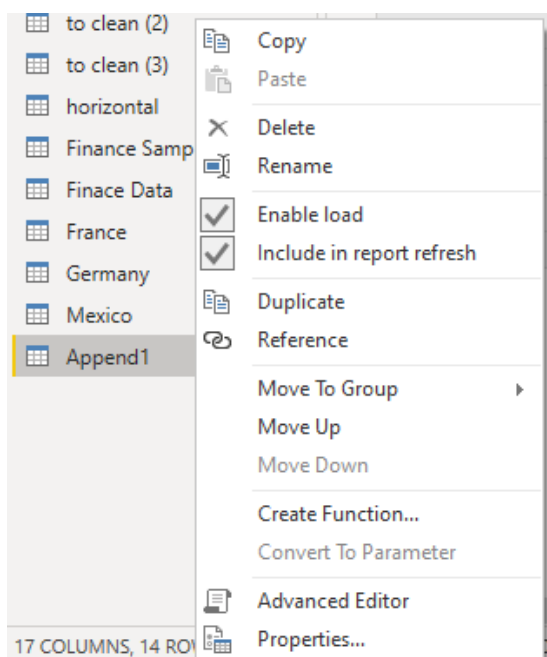


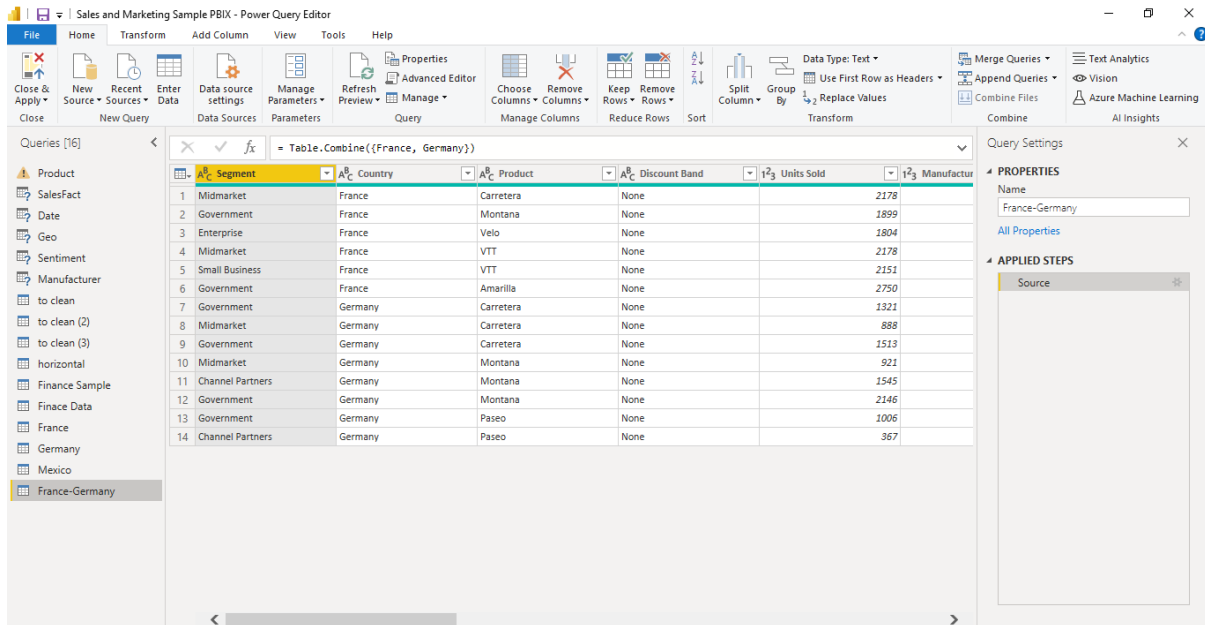


## Append table France and Germany



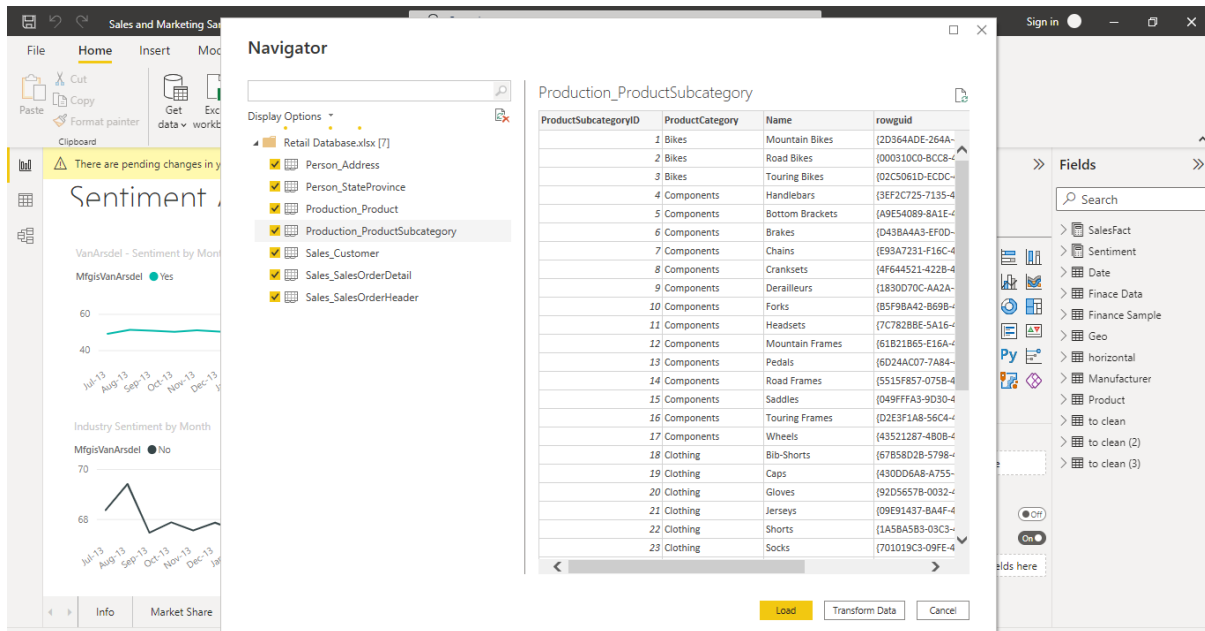
Kemudian akan muncul query baru , ubah Namanya menjadi France-Germany



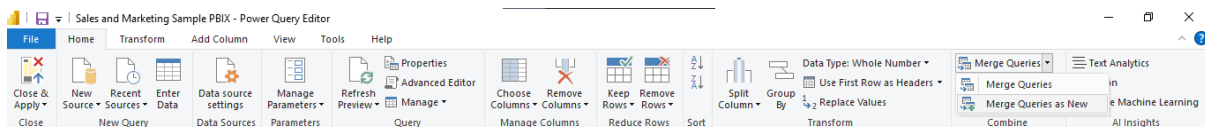


## Combine Tables by Merging Queries

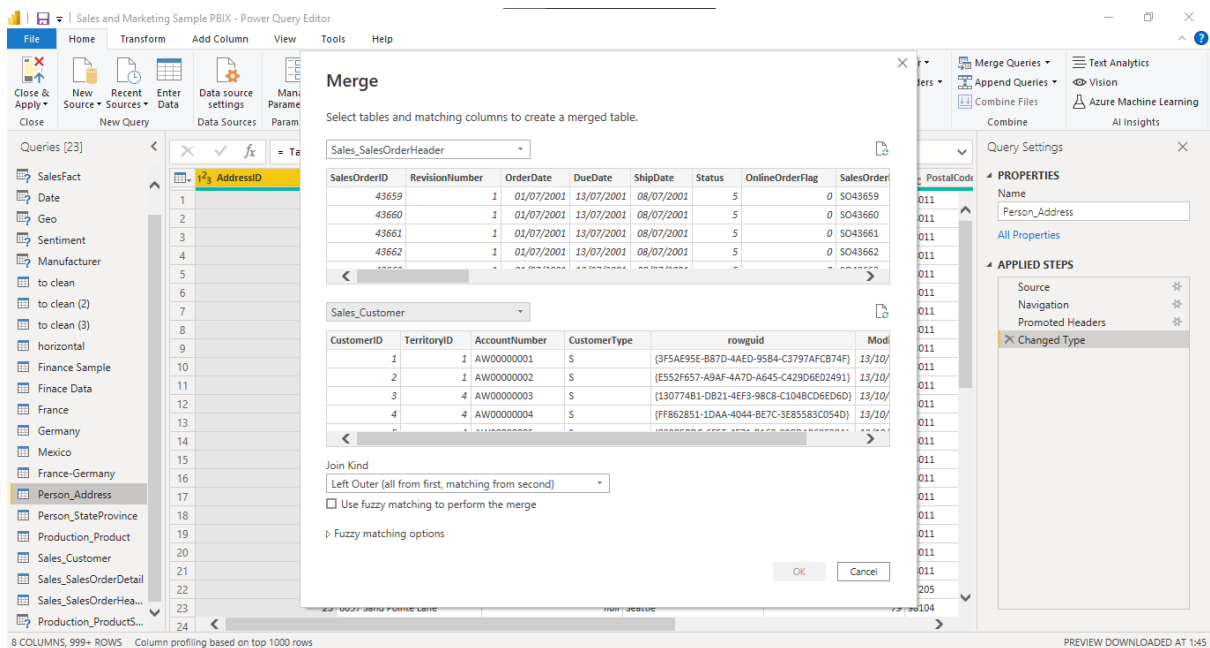
Klik halaman file kemudian get data dan buka file Retail Database, pilih semua table kemudian Transform data



Pada bagian transform, pilih merge queries dan pilih queries as new

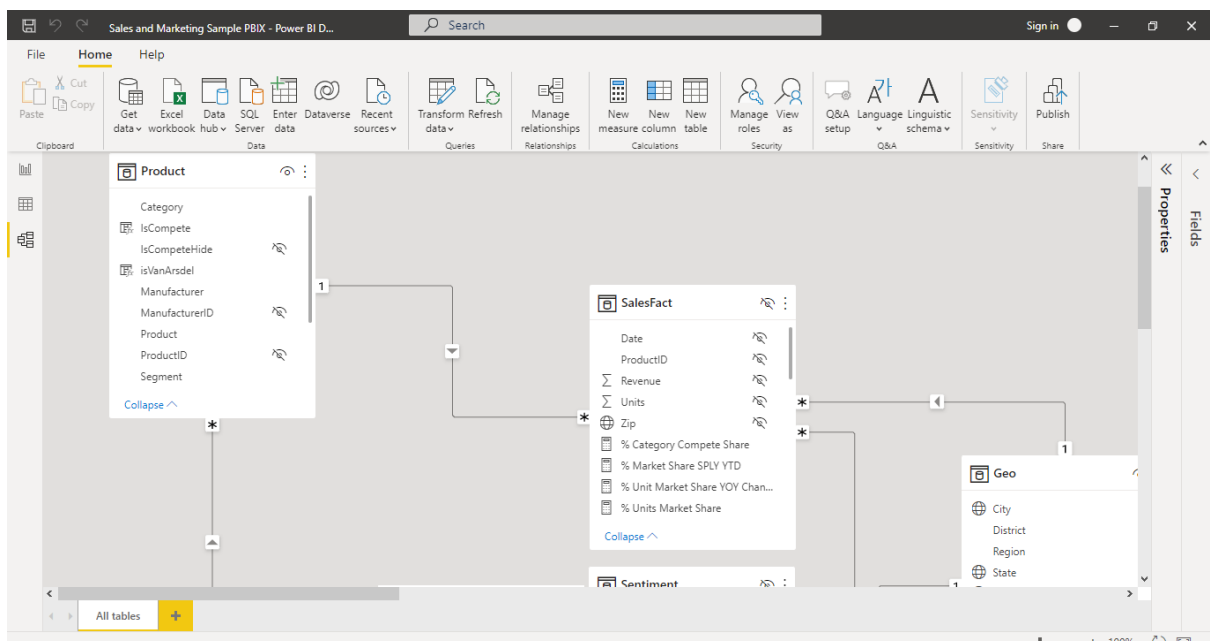


Inner Sales\_SalesOrderHeader dengan Sales\_Customer dengan menggunakan CustomerID sebagai penghubung antara kedua table.



## Profiling Data in Power BI: Examining Data Structures

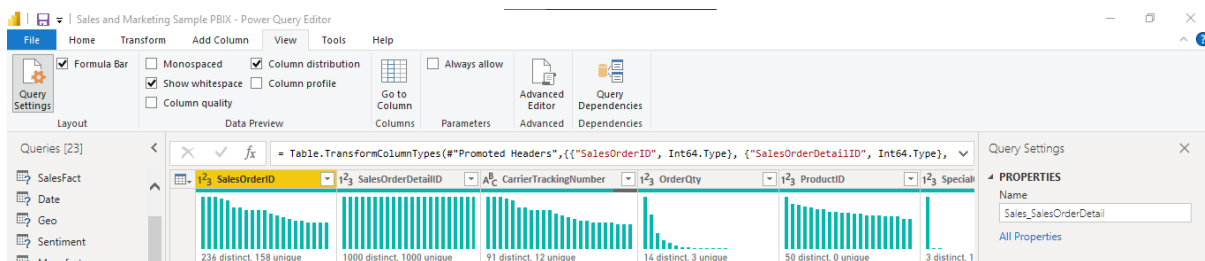
Untuk melihat struktur data yang telah dibuat, pada Power BI Desktop, pilih bagian Model di sebelah kiri atas , disini dapat melihat struktur data yang telah dibuat dalam queries.





## Profiling Data in Power BI: Finding Data Anomalies and Data Statistics

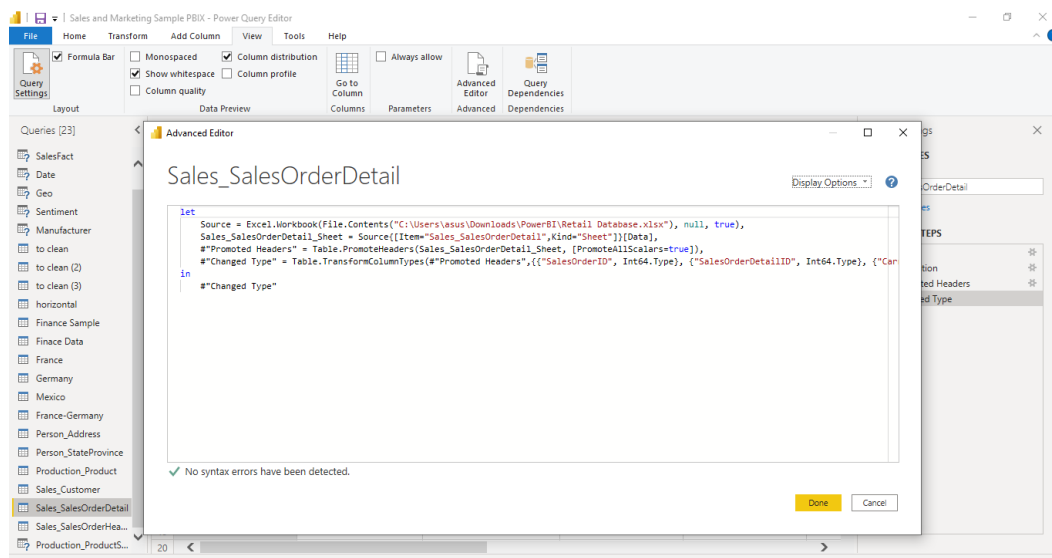
Pada view pilih column distribution , column ini menampilkan distribusi data dalam kolom dan jumlah nilai, kita dapat mengetahui detail jumlah data yang diperhitungkan, nilai yang berbeda yaitu semua nilai dalam kolom termasuk juga duplikat dan nilai nol,



## Using Advanced Editor to Modify M Code

Menggunakan Editor Tingkat Lanjut untuk Memodifikasi Kode M

Pada view, pilih advance editor



Setiap kali Anda membentuk data di Power Query, Anda membuat langkah dalam proses Power Query. Langkah - langkah tersebut dapat disusun ulang, dihapus, dan dimodifikasi jika memungkinkan. Setiap langkah pembersihan yang Anda buat kemungkinan dibuat dengan menggunakan antarmuka grafis, Setiap langkah Power Query secara kasar akan sejajar dengan satu atau dua baris menjadi ahli dalam kode M untuk dapat membacanya. Anda bahkan dapat bereksperimen dengan mengubahnya. Misalnya, jika Anda perlu mengubah nama database, Anda dapat melakukannya langsung di kode kemudian selesai