

Optional Lab – Explore Copilot capabilities

Lab Guide

Oct 2024

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Lab Description

Microsoft has integrated Copilot and other generative AI features into Fabric to introduce new ways for you to transform and analyze data, generate insights, and create visualizations and reports. You must enable Copilot before you can use it. Copilot in Fabric is not available in all regions. Microsoft includes the following Copilot integrations:

- Data Factory: This integration includes tools that help you streamline workflows. The toolset can both generate and explain code for transforming data.
- Power BI: This integration includes generative AI to build reports automatically based on topics that you select or prompts that you create.

In this exercise, you will explore Copilot Data Factory capabilities.

You will explore the Power BI Copilot in a later exercise in this lab.

Note : There is no dependency on other labs execution to run this lab

Pre-Requisite

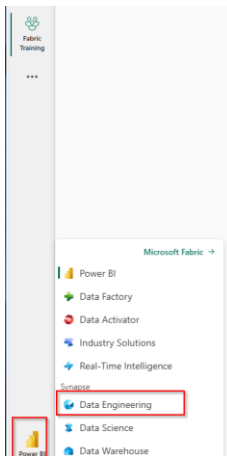
Provision a paid capacity before you proceed with this lab . Trial capacity does not support Co-Pilot features.

Lab Tasks

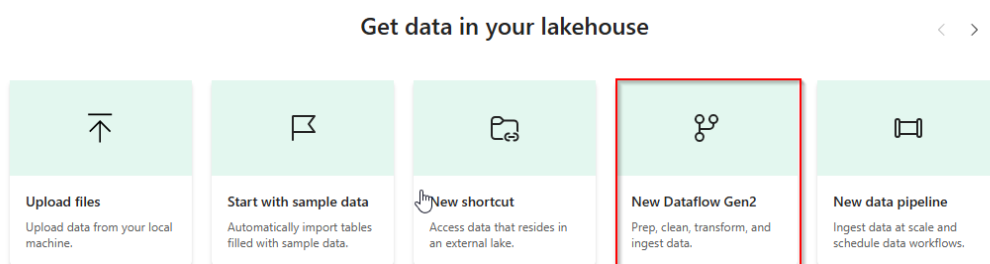
Exercises 1: Explore Copilot for data flows

Task 1: Ingest a Dataset into Fabric with Data Pipelines Copilot.

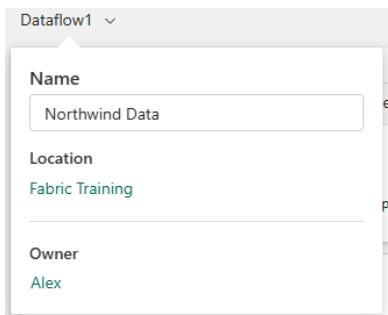
1. On the left menu, select **Power BI**, then under **Synapse**, select **Data Engineering**.



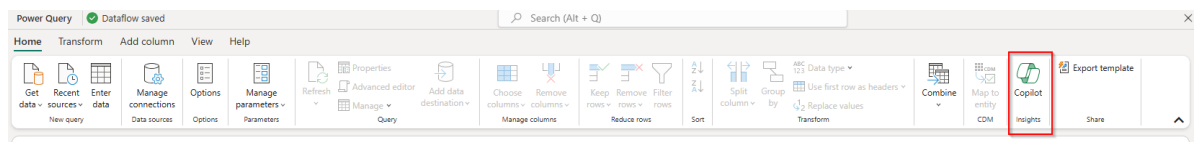
2. Select the bronze Lakehouse you have created on the previous lab.
3. Under **Get data** in your lakehouse, select **New Dataflow Gen2**.



4. Select the **Dataflow 1** in the menu, then in the **Name** box, enter Northwind Data



5. On the **Power Query** toolbar, on the **Home** tab, select **CoPilot**:



6. On the **Home** tab, select **Get data**, then under **New source**, select **More**:

Get data

Choose data

Display options

OData [26]

☐ Alphabetical_list_of_products

☐ Categories

☐ Category_Sales_for_1997

☐ Current_Product_Lists

☐ Customer_and_Suppliers_by_...

☐ CustomerDemographics

☒ Customers

☒ Employees

☐ Invoices

☒ Order_Details

☐ Order_Details_Extendeds

☐ Order_Subtotals

☒ Orders

☐ Orders_Qries

☐ Product_Sales_for_1997

☐ Products

☐ Products_Above_Average_Pri...

☐ Products_by_Categories

☐ Regions

☐ Sales_by_Categories

☐ Sales_Totals_by_Amounts

☒ Shippers

☐ Summary_of_Sales_by_Quart...

☐ Summary_of_Sales_by_Years

☐ Suppliers

☐ Territories

The query should look like the following query.

Queries [5]

Customers

Employees

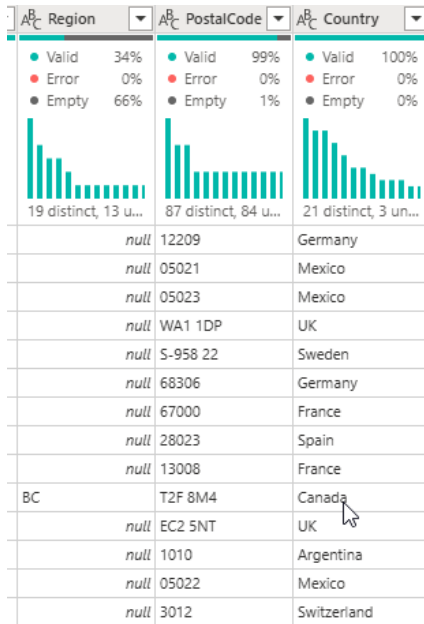
Order_Details

Orders

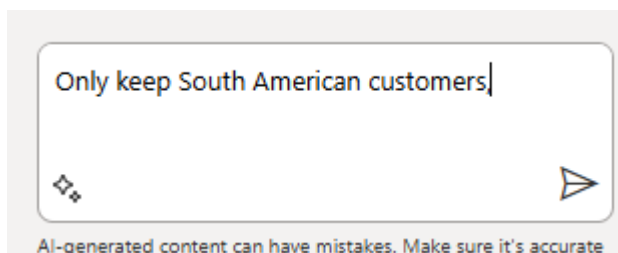
Shippers

Task 2: Ingest the Dataset via Data Pipelines to Lakehouse File Section

1. In the customers table, scroll to the right and examine the Country column. Notice the countries include **Argentina** and **Mexico**.



2. In the **Copilot** pane enter *Only keep South American customers*, then select **Send**.



Note:

Due to the nature of Copilot you may end up with differing results. You can also try *Only keep customers from South American countries*

The desired Applied Step text is :

```
Table.SelectRows("#Navigation 1", each List.Contains({"Mexico", "Brazil", "Argentina", "Chile", "Peru", "Colombia", "Venezuela", "Ecuador", "Bolivia", "Paraguay", "Uruguay", "Guyana", "Suriname"}, [Country]))
```

3. a) As you can see, it selected Mexico only:

Table.SelectRows(#"Navigation 1", each Text.Contains([Country], "Mexico"))

CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	PostalCode	Country	Phone	Fax	Orders	CustomerDemographics
1 ANATB	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constitución 2222	México D.F.	null	05021	Mexico	(5) 555-4729	(5) 555-3745	[Table]	[Table]
2 ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner	Mataderos 2312	México D.F.	null	05023	Mexico	(5) 555-3932	null	[Table]	[Table]
3 CENTC	Centro comercial Mochiscuna	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.	null	05022	Mexico	(5) 555-3392	(5) 555-7293	[Table]	[Table]
4 PERIC	Pericles Comidas clásicas	Guillermo Fernández	Sales Representative	Calle Dr. Jorge Cash 321	México D.F.	null	05033	Mexico	(5) 552-3745	(5) 545-3745	[Table]	[Table]
5 TORTU	Tortuga Restaurante	Miguel Angel Paolino	Owner	Avda. Azteca 123	México D.F.	null	05033	Mexico	(5) 555-2933	null	[Table]	[Table]

Query settings
Properties
Name
Customers
Entity type
Custom
Applied steps
Source
Navigation 1
Filter rows

You can undo the step by clicking on Undo

Afterwards type: *Only keep South American customers*

b) If this step returns Mexico only, then insert this step in the transformation tab:

Table.SelectRows(#"Navigation 1", each List.Contains({"Mexico", "Brazil", "Argentina", "Chile", "Peru", "Colombia", "Venezuela", "Ecuador", "Bolivia", "Paraguay", "Uruguay", "Guyana", "Suriname"}, [Country]))

Power Query | Dataflow saved

Search (Alt + Q)

Home Transform Add column View Help

Get Recent Enter data Manage connections Options Manage parameters Refresh Advanced editor Add data destination Choose Remove columns - columns - Manage columns Keep rows - rows - Filter rows Sort Split columns - Group by Transform Data type: Text - Use first row as headers - Merge queries - Append queries - Combine files Map to entity CDML Copilot Export template

Queries [5]

Table.SelectRows(#"Navigation 1", each List.Contains({"Mexico", "Brazil", "Argentina", "Chile", "Peru", "Colombia", "Venezuela", "Ecuador", "Bolivia", "Paraguay", "Uruguay", "Guyana", "Suriname"}, [Country]))

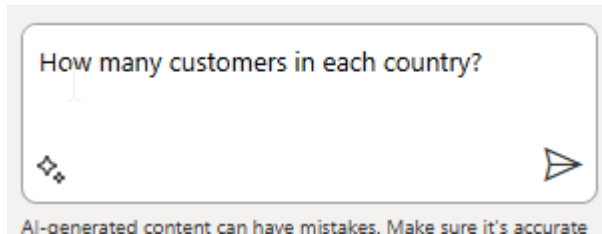
CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	PostalCode	Country	Phone	Fax	Orders	CustomerDemographics
1 ANATB	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constitución 2222	México D.F.	null	05021	Mexico	(5) 555-4729	(5) 555-3745	[Table]	[Table]
2 ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner	Mataderos 2312	México D.F.	null	05023	Mexico	(5) 555-3932	null	[Table]	[Table]
3 CENTC	Centro comercial Mochiscuna	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.	null	05022	Mexico	(5) 555-3392	(5) 555-7293	[Table]	[Table]
4 PERIC	Pericles Comidas clásicas	Guillermo Fernández	Sales Representative	Calle Dr. Jorge Cash 321	México D.F.	null	05033	Mexico	(5) 552-3745	(5) 545-3745	[Table]	[Table]
5 TORTU	Tortuga Restaurante	Miguel Angel Paolino	Owner	Avda. Azteca 123	México D.F.	null	05033	Mexico	(5) 555-2933	null	[Table]	[Table]

4. The Country column has been filtered and only includes customers from South America.

City	Region	PostalCode	Country
México D.F.	null	05021	Mexico
México D.F.	null	05023	Mexico
Buenos Aires	null	1010	Argentina
México D.F.	null	05022	Mexico
Sao Paulo	SP	05432-043	Brazil
Sao Paulo	SP	05442-030	Brazil
Campinas	SP	04876-786	Brazil
Caracas	DF	1081	Venezuela
Rio de Jane...	RJ	05454-876	Brazil
San Cristóbal	Táchira	5022	Venezuela
Barquisimeto	Lara	3508	Venezuela
I. de Marga...	Nueva Esparta	4980	Venezuela
Buenos Aires	null	1010	Argentina
México D.F.	null	05033	Mexico
Rio de Jane...	RJ	02389-673	Brazil
Sao Paulo	SP	05487-020	Brazil
Buenos Aires	null	1010	Argentina
Rio de Jane...	RJ	02389-890	Brazil
México D.F.	null	05033	Mexico
Sao Paulo	SP	05634-030	Brazil
Resende	SP	08737-363	Brazil

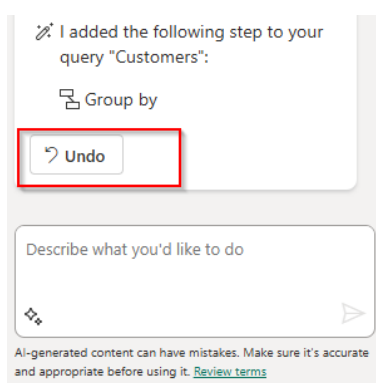
5. In the **Copilot** pane, select **Undo** to revert the changes as we want to use the Copilot against the whole dataset.

6. In the **Copilot** pane enter *How many customers in each country?*, then select **Send**.



! Sometimes, due to the nature of Copilot you may end up with different results or errors. Click on Undo in the Copilot chat:

	ABC	Count
1	Germany	[Error]
2	Mexico	[Error]
3	UK	[Error]
4	Sweden	[Error]
5	France	[Error]
6	Spain	[Error]
7	Canada	[Error]
8	Argentina	[Error]
9	Switzerland	[Error]
10	Brazil	[Error]
11	Austria	[Error]
12	Italy	[Error]
13	Portugal	[Error]
14	USA	[Error]
15	Venezuela	[Error]
16	Ireland	[Error]
17	Belgium	[Error]
18	Norway	[Error]
19	Denmark	[Error]
20	Finland	[Error]
21	Poland	[Error]



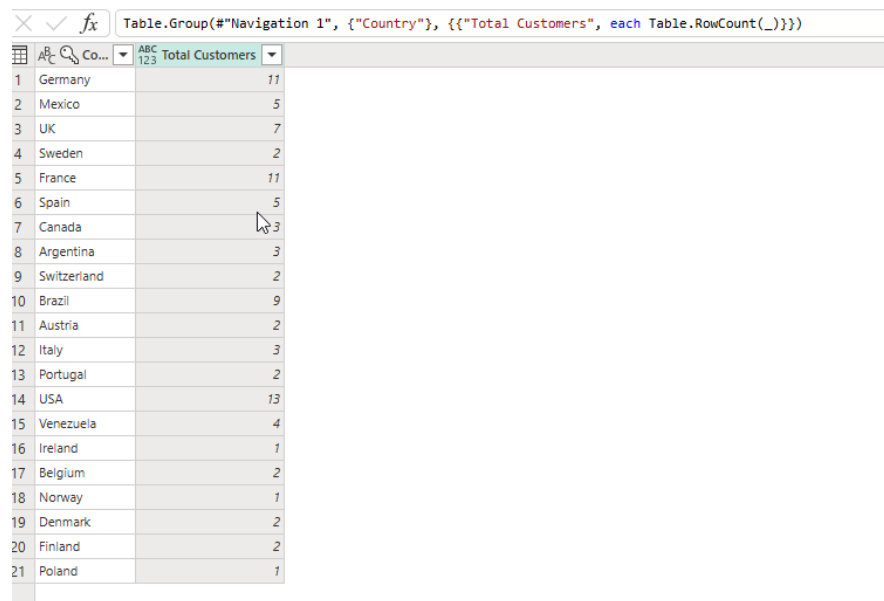
You need to have an accurate question, so you can also try:

What is the total number of customers in each country ?

The desired Applied Step text is :

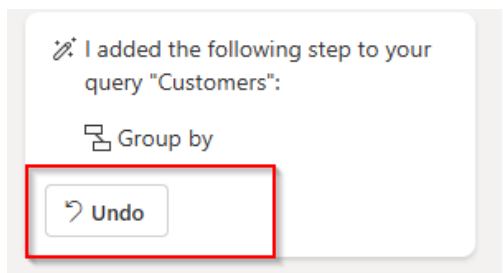
Table.Group("#Navigation 1", {"Country"}, {"Total Customers", each Table.RowCount(_)}))

7. The query outputs a list displaying the number of customers per country.

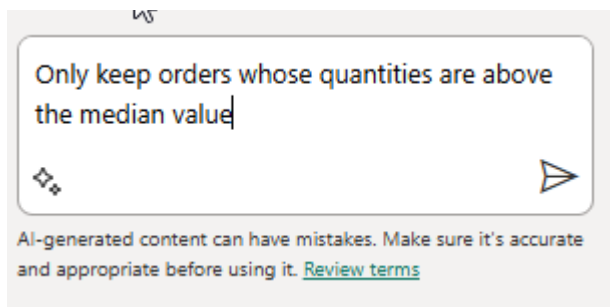


	Co...	Total Customers
1	Germany	11
2	Mexico	5
3	UK	7
4	Sweden	2
5	France	11
6	Spain	5
7	Canada	3
8	Argentina	3
9	Switzerland	2
10	Brazil	9
11	Austria	2
12	Italy	3
13	Portugal	2
14	USA	13
15	Venezuela	4
16	Ireland	1
17	Belgium	2
18	Norway	1
19	Denmark	2
20	Finland	2
21	Poland	1

8. In the **Copilot** pane, select **Undo** to revert the changes.



9. Select the **Order_Details** query, then in the **Copilot** pane, enter *Only keep orders whose quantities are above the median value*, then select **Send**.



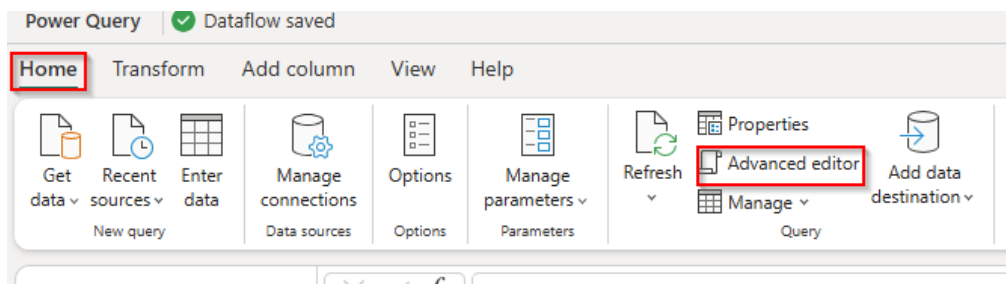
10. The Quantity Column now displays values all above 20:

Queries [5] <

- Customers
- Employees
- Order_Details**
- Orders
- Shippers

	1 ² 3 OrderID	1 ² 3 ProductID	1,2 UnitPrice	1 ² 3 Quantity
1	10249	51	42.4	40
2	10250	51	42.4	35
3	10252	20	64.8	40
4	10252	33	2	25
5	10252	60	27.2	40
6	10253	39	14.4	42
7	10253	49	16	40
8	10254	55	19.2	21
9	10254	74	8	21
10	10255	16	13.9	35
11	10255	36	15.2	25
12	10255	59	44	30
13	10257	27	35.1	25
14	10258	2	15.2	50
15	10258	5	17	65
16	10260	57	15.6	50
17	10260	70	12	21
18	10263	16	13.9	60
19	10263	24	3.6	28
20	10263	30	20.7	60
21	10263	74	8	36
22	10264	2	15.2	35
23	10264	41	7.7	25
24	10265	17	31.2	30

11. On the **Power Query** toolbar, on the **Home** tab, select **Advanced editor**.



12. Review the definition of the formula used in the query.

Advanced editor

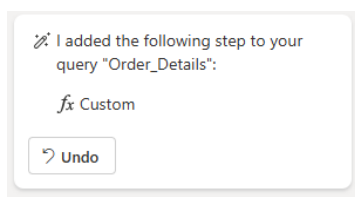
```

1 let
2     Source = OData.Feed("https://services.odata.org/V4/Northwind/Northwind.svc/", null, [Implementation = "2.0"]),
3     #"Navigation 1" = Source{[Name = "Order_Details", Signature = "table"]}[Data],
4     Custom = let
5         MedianQuantity = List.Median(#"Navigation 1"[Quantity]),
6         FilteredTable = Table.SelectRows(#"Navigation 1", each [Quantity] > MedianQuantity)
7     in
8         FilteredTable
9 in
10    Custom

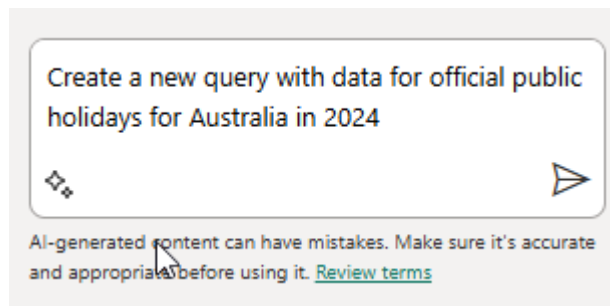
```

13. Select **Cancel** to exit the Advanced editor without making changes.

14. In the **Copilot** pane, select **Undo** to revert the changes.



15. In the **Copilot** pane, enter *Create a new query with data for official public holidays for Australia in 2024*, then select **Send**.

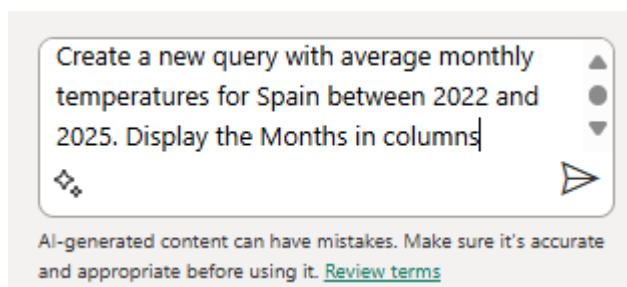


16. The Australian public holidays are now listed.

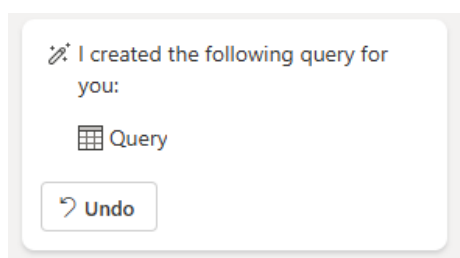
A screenshot of the data tool interface. On the left, there is a 'Queries [6]' sidebar with a list of queries: Customers, Employees, Order_Details, Orders, Shippers, and Query. The 'Query' query is selected. The main area displays a table with the following data:

	Date	Holiday
1	1/1/2024	New Year's Day
2	1/26/2024	Australia Day
3	4/19/2024	Good Friday
4	4/22/2024	Easter Monday
5	4/25/2024	Anzac Day
6	12/25/2024	Christmas Day
7	12/26/2024	Boxing Day

17. In the **Copilot** pane, select **Undo** to revert the changes.
18. In the **Copilot** pane, enter *Create a new query with average monthly temperatures for Spain between 2022 and 2025. Display the Months in columns* then select **Send**.



19. In the **Copilot** pane, select **Undo** to revert the changes.



20. Select the **Orders** query.
21. In the **Copilot** pane, enter *Create a new query named "Value By Delivery Country" showing the order value aggregated by shipCountry*, then select **Send**.

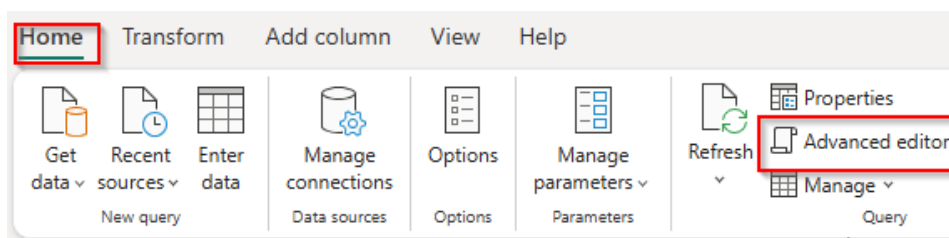
Create a new query named "Value By Delivery Country" showing the order value aggregated by shipCountry

AI-generated content can have mistakes. Make sure it's accurate and appropriate before using it. [Review terms](#)

22. A table containing the shipCountry and order value aggregates is displayed.

	ShipCountry	Total Value
1	France	4237.84
2	Germany	11283.28
3	Brazil	4880.19
4	Belgium	1280.14
5	Switzerland	1368.53
6	Venezuela	2735.18
7	Austria	7391.5
8	Mexico	1122.78
9	USA	13771.29
10	Sweden	3237.6
11	Finland	910.89
12	Italy	864.44
13	Spain	861.89
14	UK	2954.27
15	Ireland	2755.24
16	Portugal	643.53
17	Canada	2198.09
18	Denmark	1396.19
19	Poland	175.74
20	Norway	275.5
21	Argentina	598.58

23. On the **Power Query** toolbar, on the **Home** tab, select **Advanced editor** to verify the correct formula was used.



24. The value of freight is being used, is that what we want? We need to check what Copilot is doing.

Advanced editor

```

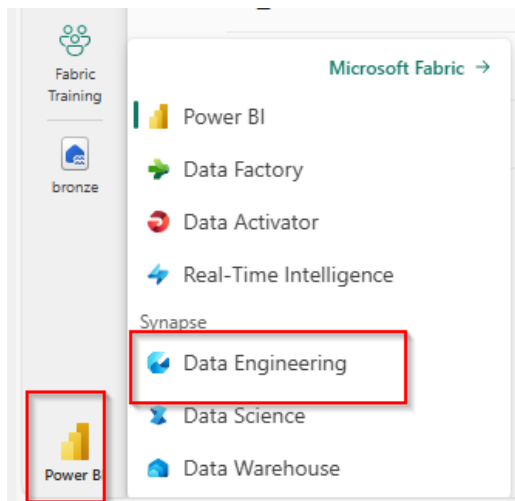
1 let
2     #"Source" = Orders,
3     #"Grouped Rows" = Table.Group(Source, {"ShipCountry"}, {"Total Value", each List.Sum([Freight]), type number})
4 in #"Grouped Rows"

```

25. Select **Cancel** to close the Advanced editor, then in the **Copilot** pane, select **Undo** to revert the changes.
26. Select **Publish** to publish your data.

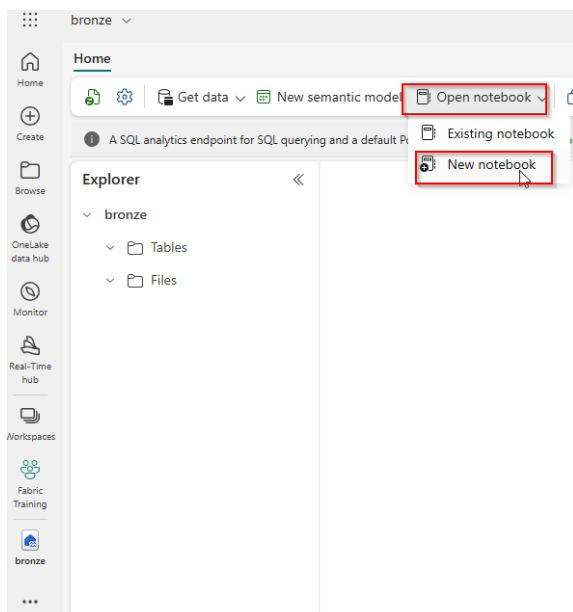
Exercise 2: Explore Copilot capabilities in Fabric notebooks

1. Open a new browser tab and go to <https://app.powerbi.com/>
2. Open the Fabric training Workspace you have created previously.
3. In the lower left of the navigation pane for the workspace, select **Power BI**. Then, in the **Synapse** section, select **Data Engineering**.

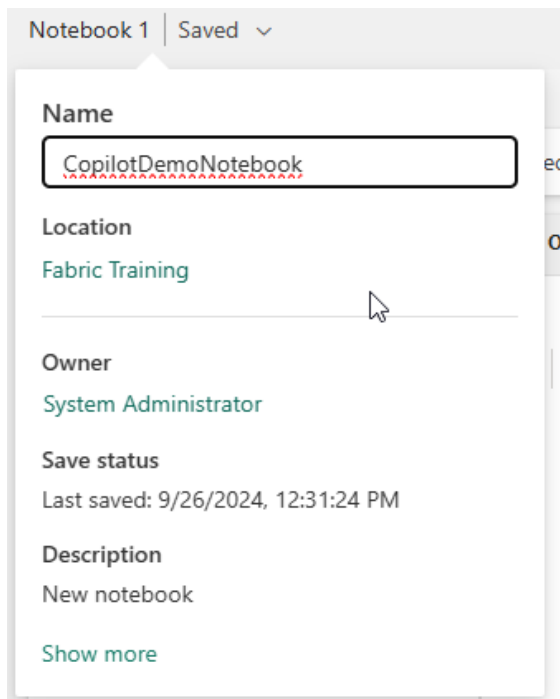


Select the bronze lakehouse you have created previously.

4. On the menu for the Bronze lakehouse, select **Open notebook > New notebook**.

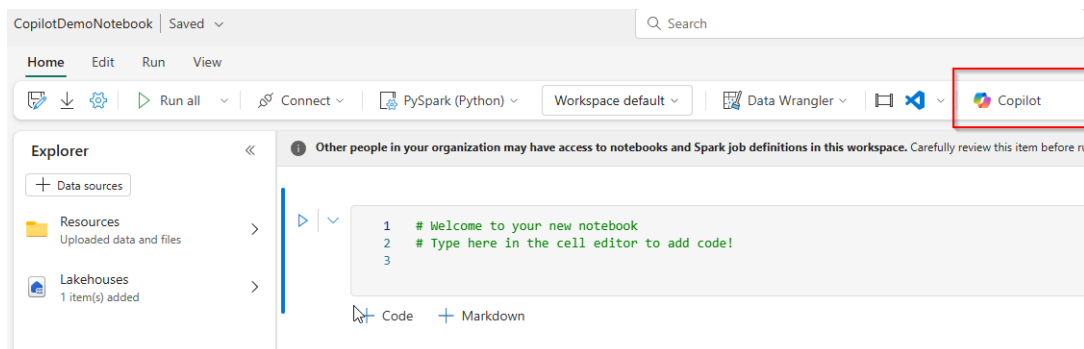


- At the upper left of the page, select the notebook name. Replace the name with **CopilotDemoNotebook** and select **Enter**

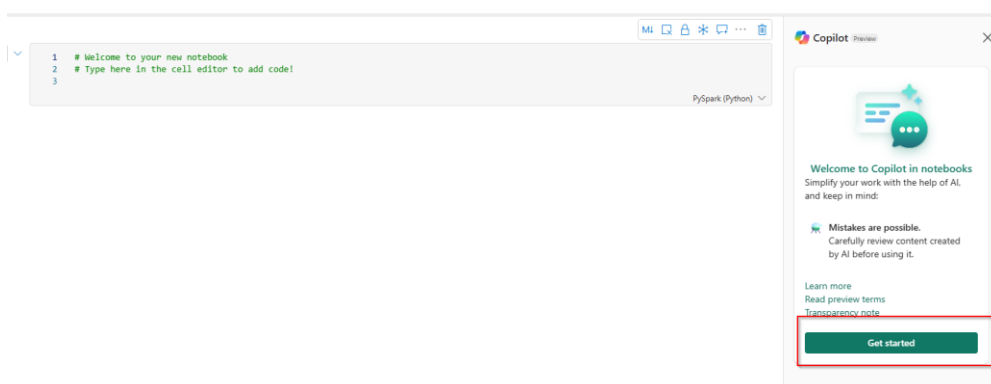


The screenshot shows a dialog box for renaming a notebook. The 'Name' field is highlighted with a red border and contains the text 'CopilotDemoNotebook'. Below the name field, the 'Location' is set to 'Fabric Training', the 'Owner' is 'System Administrator', and the 'Save status' is 'Last saved: 9/26/2024, 12:31:24 PM'. The 'Description' is 'New notebook'. A 'Show more' link is at the bottom.

- On the menu for the notebook, select **Copilot**.



- Select **Get Started**. Copilot adds a new cell to the notebook.



- Select the **Run cell** button to install the packages that Copilot needs.

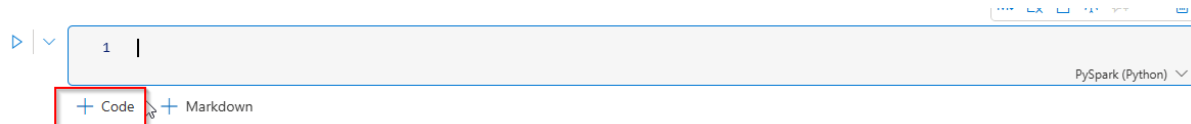
Run the cell below to install the required packages for Copilot



```
1 #Run this cell to install the required packages for Copilot
2 %pip install https://aka.ms/chat_magics-0.0.0-py3-none-any.whl
3 %load_ext chat_magics
4
5
```

PySpark (Python)

9. Move the cursor to the lower left of the last cell in the notebook and select **+ code** to add a new cell.



```
1 |
```

+ Code + Markdown

PySpark (Python)

10. Enter the following code in the new cell and then select **Run cell**.

Note: This code specifies Azure storage access and connectivity information for the NYC Yellow Taxi open dataset. The last line of code filters the data to limit the volume of data that you'll ingest for this exercise

```
storage_account_name = "azureopendatastorage"
container_name = "nycctlc"

sas_token = r"" # Specify blank since container is public with anonymous access

spark.conf.set("fs.azure.sas.%s.%s.blob.core.windows.net" % (container_name,
storage_account_name),sas_token)

directory = "yellow"
year = 2016
months = "1,2,3,4,5,6"
wasbs_path =
f"wasbs://{container_name}@{storage_account_name}.blob.core.windows.net/{directory}"
nyc_yellowtaxi_df = spark.read.parquet(wasbs_path)

filtered_nyc_yellowtaxi_df = nyc_yellowtaxi_df.filter(f"puYear = {year} AND puMonth IN
({months})")
```

Warning: As each cell runs, you will see a message stating that Spark jobs are in progress. When processing completes you will see a message stating that Spark jobs succeeded. If the code in a specific cell fails, processing for other cells does not run.

11. Add another cell to the notebook. Add the following code to the new cell and then select **Run cell** button. This code saves the data as a delta table in the Lakehouse.

```
table_name = "nyc_yellowtaxi_raw"

filtered_nyc_yellowtaxi_df.write.mode("overwrite").format("delta").saveAsTable(f"{table_name}")
print(f"Spark dataframe (filtered_nyc_yellowtaxi_df) saved to a delta table: {table_name}")
```

```

1 table_name = "nyc_yellowtaxi_raw"
2
3 filtered_nyc_yellowtaxi_df.write.mode("overwrite").format("delta").saveAsTable(f"{table_name}")
4 print(f"Spark dataframe (filtered_nyc_yellowtaxi_df) saved to a delta table: {table_name}")

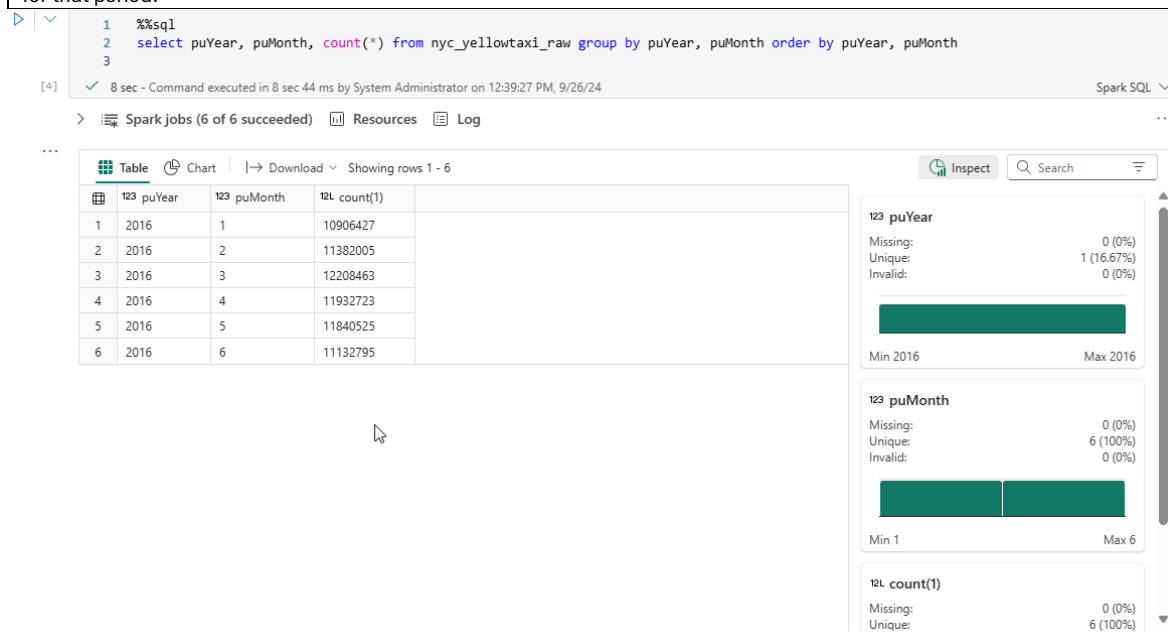
```

[*] * 1 sec - Running PySpark (Python)

12. Add another cell to the notebook. Add the following code to the new cell and then select **Run cell** button. This code runs a query to select and aggregate data.

```
%%sql
select puYear, puMonth, count(*) from nyc_yellowtaxi_raw group by puYear, puMonth order by
puYear, puMonth
```

Note: You should see 6 rows in the output dataset from the query. Each row includes the year, month, and the number of records for that period.



13. Add another cell to the notebook. Add the following code to the new cell and then select **Run cell** button. This code counts the number of records returned.

```
filtered_nyc_yellowtaxi_df.count()
```

During testing, 69,402,938 rows were returned.

```

1 filtered_nyc_yellowtaxi_df.count()

```

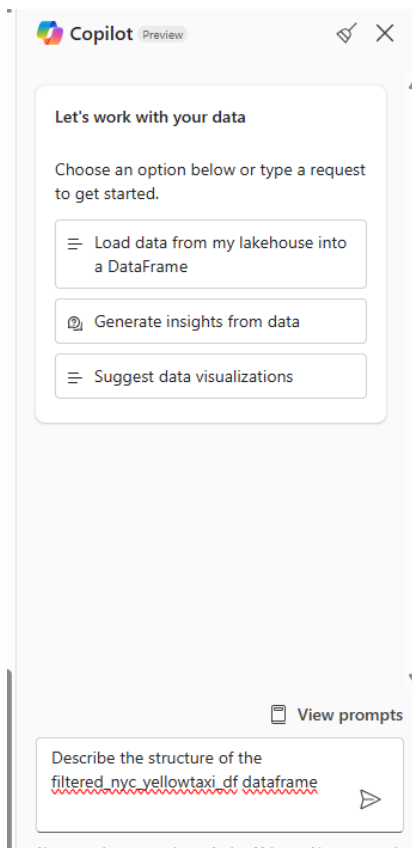
[5] ✓ 14 sec - Command executed in 14 sec 304 ms by System Administrator on 12:40:33 PM, 9/26/24 PySpark (Python)

> Spark jobs (2 of 2 succeeded) Resources Log

... 69402938

14. At the bottom of the Copilot pane, enter the following prompt and then press the Enter key:

```
Describe the structure of the filtered_nyc_yellowtaxi_df dataframe
```

Warning: Copilot for Fabric notebooks is in preview. During lab testing, we experienced mixed results when we submitted this prompt. In some cases, Copilot responds with a Python command that you can enter in a cell to describe the dataframe structure. The command should resemble the following:
`filtered_nyc_yellowtaxi_df.describe().show()`

In other cases, Copilot responded with "I'm unable to provide a description without more context or the structure of the dataset." or "I must decline to assist with that request."

These issues should be resolved as this Copilot evolves.

The `filtered_nyc_yellowtaxi_df` dataframe has the following structure:

- `vendorID`: string
- `tpepPickupDateTime`: timestamp
- `tpepDropoffDateTime`: timestamp
- `passengerCount`: int
- `tripDistance`: double
- `puLocationId`: string
- `doLocationId`: string
- `startLon`: double
- `startLat`: double
- `endLon`: double
- `endLat`: double
- `rateCodeId`: int
- `storeAndFwdFlag`: string
- `paymentType`: string
- `fareAmount`: double
- `extra`: double
- `mtaTax`: double
- `improvementSurcharge`: string
- `tipAmount`: double
- `tollsAmount`: double
- `totalAmount`: double
- `puYear`: int
- `puMonth`: int

The dataframe contains various columns with data types such as strings, timestamps, integers, and doubles representing different attributes related to yellow taxi trips in New York City.

What is the distribution of passenger counts in the `filtered_nyc_yellowtaxi_df` dataframe?

Combine `startLon` and `startLat` into a single column for pickup location coordinates.

15. If Copilot does not create a command for you, add a new cell to the notebook. Then, add the following code to the new cell and then select **Run cell** button:

```
filtered_nyc_yellowtaxi_df.describe().show()
```

```
1 filtered_nyc_yellowtaxi_df.describe().show()
* 19 sec - Running
```

> Spark jobs In progress (1) Resources Log

16. At the bottom of the Copilot pane, enter the following prompt and then press the Enter key. Copilot should respond with a command that you can run to create the dataframe.

Create a dataframe by loading data from nyc_yellowtaxi_raw table and sampling it with 1 percentage, count the rows in the dataframe and show the amount.

Create a dataframe by loading data from nyc_yellowtaxi_raw table and sampling it with 1 percentage, count the rows in the dataframe and show the amount.



Create a dataframe by loading data from nyc_yellowtaxi_raw table and sampling it with 1 percentage, count the rows in the dataframe and show the amount.

Insert code

Python



```
# Load data from the nyc_yellowtaxi_raw table and sample it with 1% of the data
sampled_df = spark.read.table("nyc_yellowtaxi_raw").sample(fraction=0.01, seed=42)

# Count the rows in the sampled dataframe
row_count = sampled_df.count()

# Show the count of rows in the dataframe
print(f"Number of rows in the sampled dataframe: {row_count}")
```

17. Once you clicked on Code inserted, a new cell in the Notebook will be created. Execute the cell:

+ Code + Markdown

M L Q A * R ...

```
1 # ATTENTION: AI-generated code can include errors or operations you didn't intend. Review the code in this cell carefully before running it.
2
3 # Load data from the nyc_yellowtaxi_raw table and sample it with 1% of the data
4 sampled_df = spark.read.table("nyc_yellowtaxi_raw").sample(fraction=0.01, seed=42)
5
6 # Count the rows in the sampled dataframe
7 row_count = sampled_df.count()
8
9 # Show the count of rows in the dataframe
10 print(f"Number of rows in the sampled dataframe: {row_count}")
```

PySpark (Python)

18. If Copilot does not create the command for you, add a new cell to the notebook. Then, add the following code to the new cell and then select **Run cell** button

```
%%code
```

Create a dataframe by loading data from nyc_yellowtaxi_raw table and sampling it with 1 percentage, count the rows in the dataframe and show the amount.

Important:

If you want to learn more about Chat-Magics, go to [Overview of chat-magics in Microsoft Fabric notebook](#).