CAR SALES DATA ANALYSIS PROJECT

Using Azure Data Factory and Databricks

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OBJECTIVE

- The primary objective of this project is to demonstrate the application of various Azure data engineering services to manage, process and analyze car sales data

- The goal is to showcase the efficient handling of large datasets, perform complex transformations and derive meaningful business insights

year	make	model	trim	body	transmissi	vin	state	condition	odometer	color	interior	seller	mmr	sellingpric	saledate
2015	Kia	Sorento	LX	SUV	automatic	5xyktca69	ca	5	16639	white	black	kia motors	20500	21500	Tue Dec 16 2014 12:30:00 GMT-0800 (PST)
2015	Kia	Sorento	LX	SUV	automatic	5xyktca69	ca	5	9393	white	beige	kia motors	20800	21500	Tue Dec 16 2014 12:30:00 GMT-0800 (PST)
2014	BMW	3 Series	328i SULE	Sedan	automatic	wba3c1c5	ca	45	1331	gray	black	financial s	31900	30000	Thu Jan 15 2015 04:30:00 GMT-0800 (PST)
2015	Volvo	S60	T5	Sedan	automatic	yv1612tb4	ca	41	14282	white	black	volvo na r	27500	27750	Thu Jan 29 2015 04:30:00 GMT-0800 (PST)
2014	BMW	6 Series Gi	650i	Sedan	automatic	wba6b2c5	ca	43	2641	gray	black	financial s	66000	67000	Thu Dec 18 2014 12:30:00 GMT-0800 (PST)
2015	Nissan	Altima	2.5 S	Sedan	automatic	1n4al3ap1	ca	1	5554	gray	black	enterprise	15350	10900	Tue Dec 30 2014 12:00:00 GMT-0800 (PST)
2014	BMW	M5	Base	Sedan	automatic	wbsfv9c51	ca	34	14943	black	black	the hertz c	69000	65000	Wed Dec 17 2014 12:30:00 GMT-0800 (PST)
2014	Chevrolet	Cruze	1LT	Sedan	automatic	1g1pc5sb2	ca	2	28617	black	black	enterprise	11900	9800	Tue Dec 16 2014 13:00:00 GMT-0800 (PST)
2014	Audi	A4	2.0T Prem	Sedan	automatic	wauffafl3	ca	42	9557	white	black	audi missi	32100	32250	Thu Dec 18 2014 12:00:00 GMT-0800 (PST)
2014	Chevrolet	Camaro	LT	Convertibl	automatic	2g1fb3d37	ca	3	4809	red	black	d/m auto	26300	17500	Tue Jan 20 2015 04:00:00 GMT-0800 (PST)
2014	Audi	A6	3.0T Prest	Sedan	automatic	wauhgafc	ca	48	14414	black	black	desert aut	47300	49750	Tue Dec 16 2014 12:30:00 GMT-0800 (PST)
2015	Kia	Optima	LX	Sedan	automatic	5xxgm4a7	ca	48	2034	red	tan	kia motors	15150	17700	Tue Dec 16 2014 12:00:00 GMT-0800 (PST)

PRIMARY DATASET

About the Dataset

- The dataset comprises of 3,00,000+ rows and 16 columns
- Columns include-

1. year
2. make
3. model
4. trim
5. body
6. transmission
7. vin
8. state
9. condition
10. odometer
11. color
12. interior
13. seller
14. mmr
15. selling price
16. saledate

Key Points to be noted

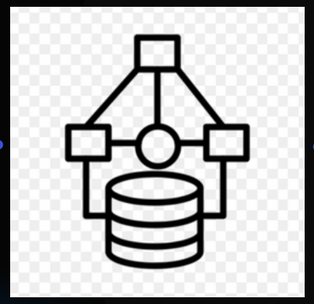
- This dataset is not clean so data cleaning has to be done
- The saledate column is not in the ideal format so it has to be transformed to a certain format for further data analysis

OVERVIEW

01

Data Cleaning and Transformation:

Extract, transform, and load (ETL) car sales data into a structured format using Databricks and Azure Data Factory.



02

Data Modelling

Create a robust data model by designing and implementing fact and dimension tables to facilitate efficient data querying and reporting

03

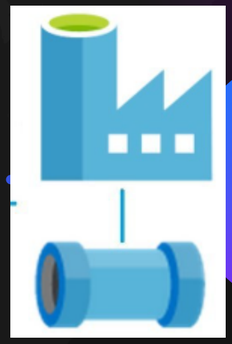
Data Storage and Accesibility

Convert and store the processed data in Delta tables and Parquet files for optimized storage and accessibility.

04

Data Loading

Load the processed data into an Azure SQL Database to enable advanced data analysis and integration with other business intelligence tools.



05

Data Handling

Implement dynamic data paths and pipeline variables in Azure Data Factory to handle data flexibly and efficiently.

06

Data Insights

Generate actionable insights from the transformed data to support business decisions and strategy formulation.

Data Modelling

SALES FACT TABLE

PK:fact_sales_id

FK:car_id

- vin
- yearMonth VARCHAR(6)
- total_sellingprice DECIMAL(18, 2)
- mmr DECIMAL(18, 2)

CAR DIMENSION TABLE

PK:car_id

- vin
- make VARCHAR(50)
- model VARCHAR(50)
- color VARCHAR(50)
- body VARCHAR(50)

Azure Resources Used

Resources

Recent **Favorite**

Name	Type
AdiDataBricksWS	Azure Databricks Service
SQLDatabase (adiserver1234/SQLDatabase)	SQL database
storagessample	Storage account
adiserver1234	SQL server
Demo1.1	Resource group
AdiDF2	Data factory (V2)

Linked Services Used

Linked services

Linked service defines the connection information to a data store or compute. Learn more

+ New

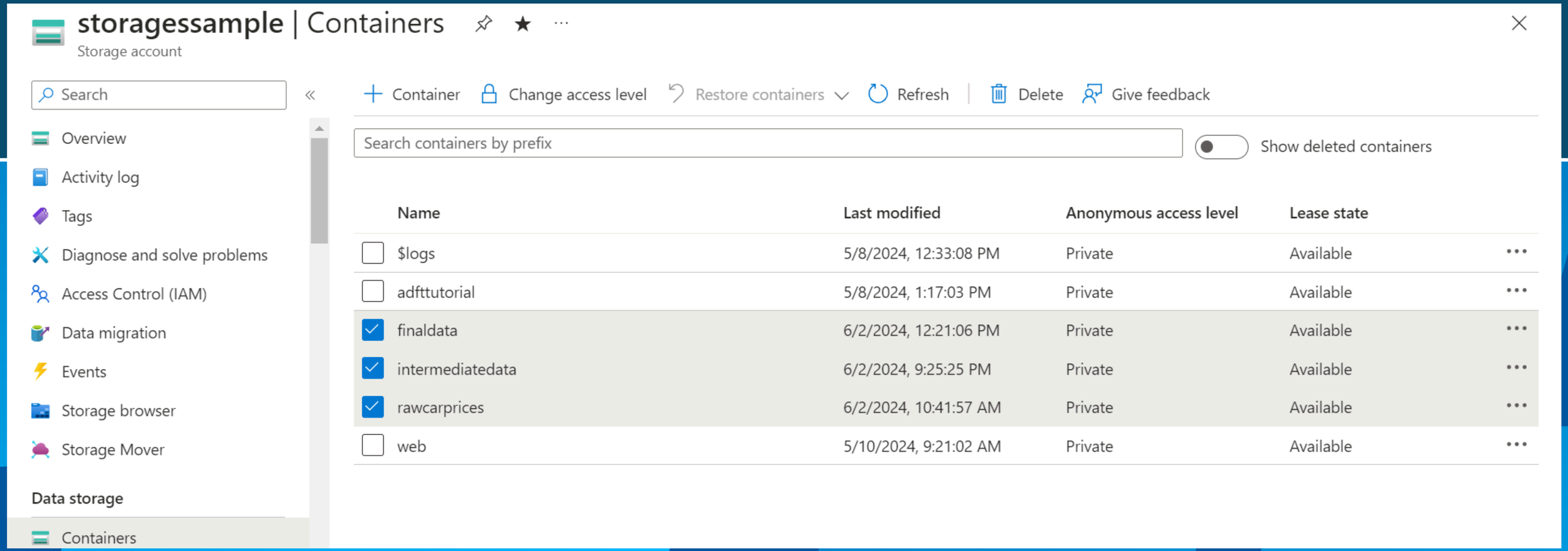
Filter by name

Annotations : **Any**

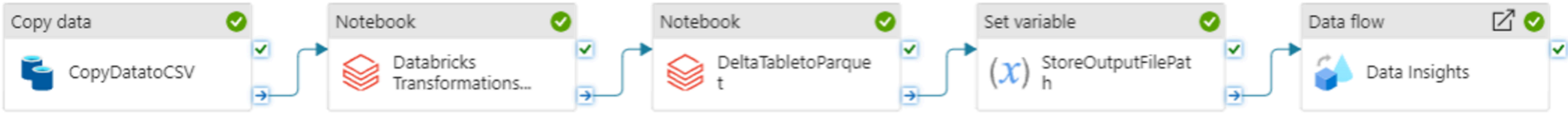
Showing 1 - 3 of 3 items

Name	Type	Related	Annotations
AzureBlobStorageLS	Azure Blob Storage	1	
AzureDatabricks1	Azure Databricks	2	
AzureDataLakeStorage1	Azure Data Lake Storage Gen2	3	

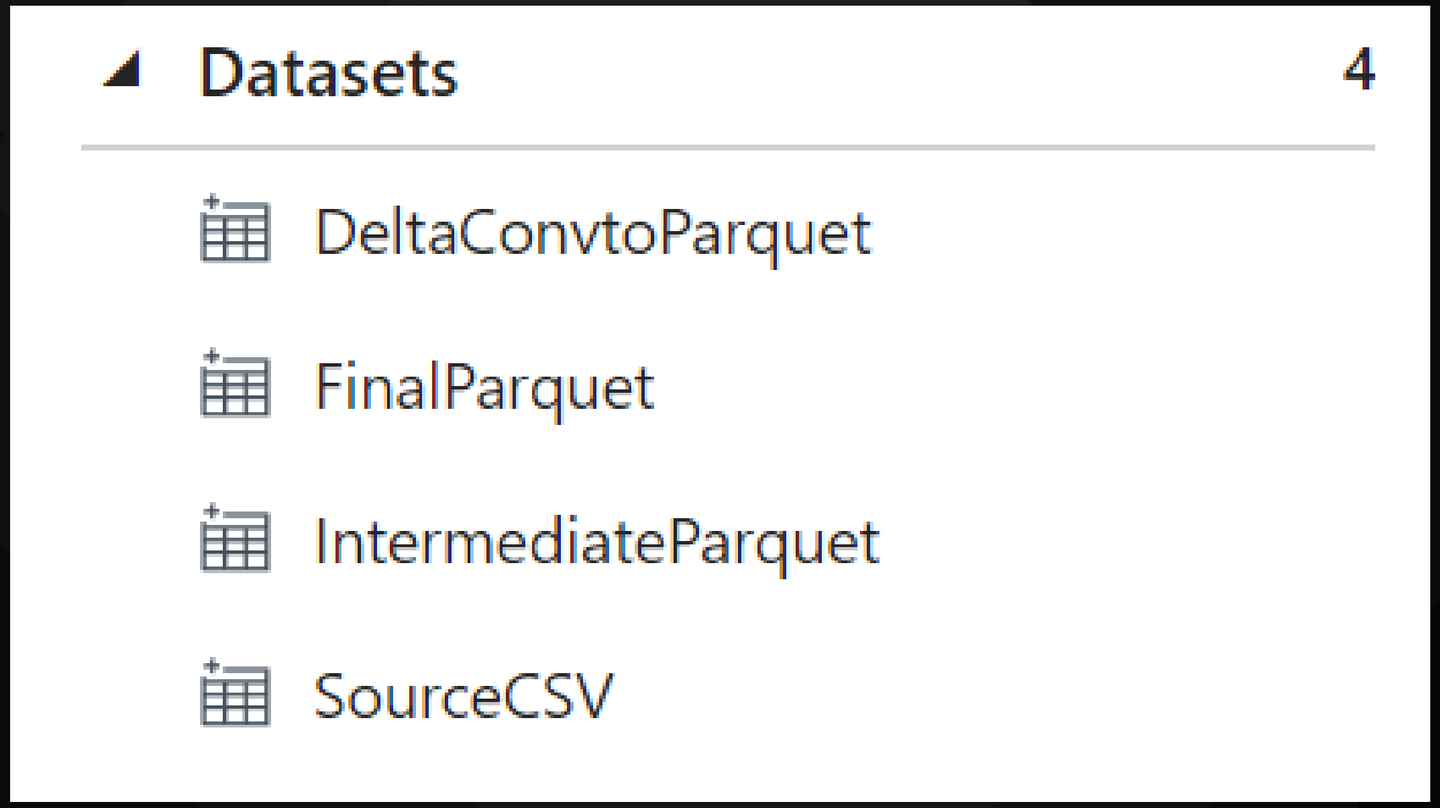
Containers Used



ENTIRE PIPELINE



Datasets Used



SourceCSV Dataset

DelimitedText

SourceCSV

Connection | Schema | Parameters

Linked service * AzureBlobStorageLS | Test connection | Edit | New | Learn more

File path * rawcarprices / Directory / car_prices.csv | Browse | Preview

Compression type Select...

Column delimiter Comma (,)

SourceCSV Dataset

Connection | Schema | Parameters

Import schema | Clear

Column name	Type
year	String
make	String
model	String
trim	String
body	String
transmission	String

IntermediateParquet Dataset

Parquet

IntermediateParquet

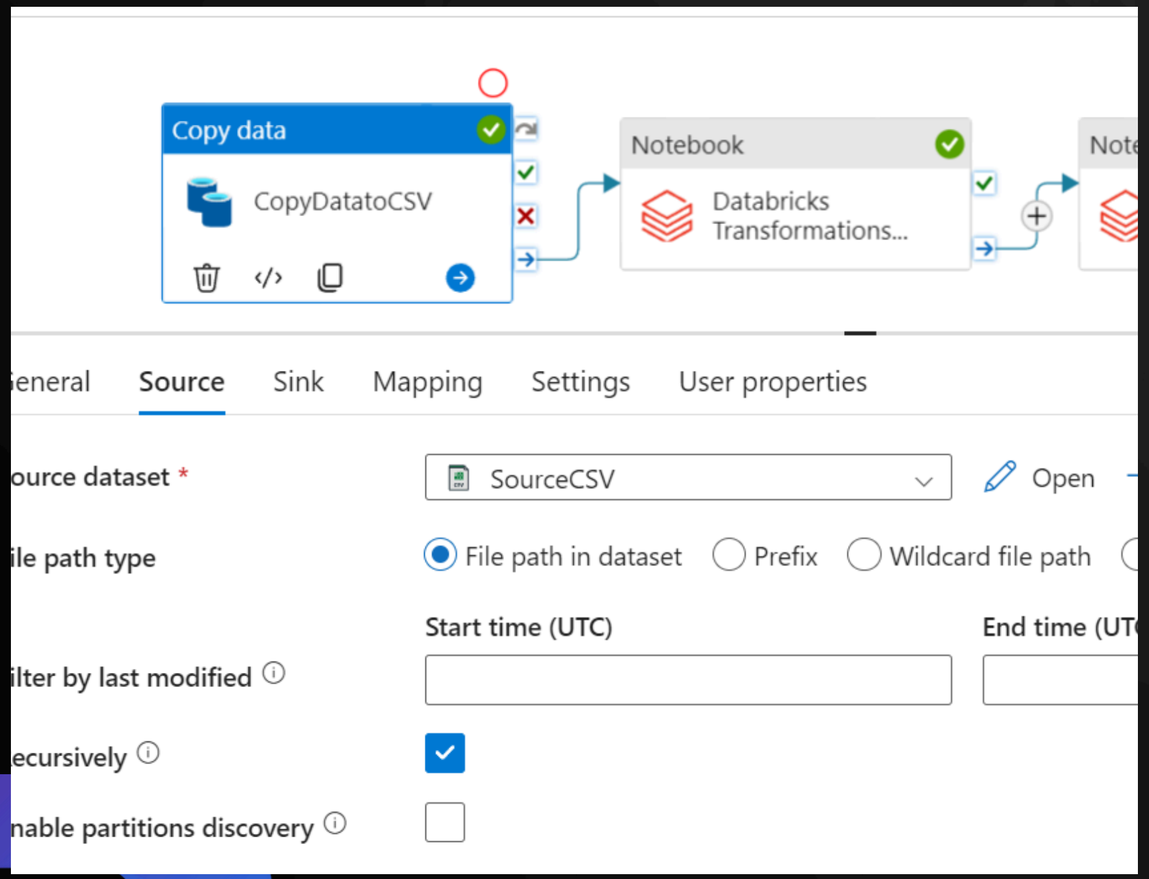
Connection | Schema | Parameters

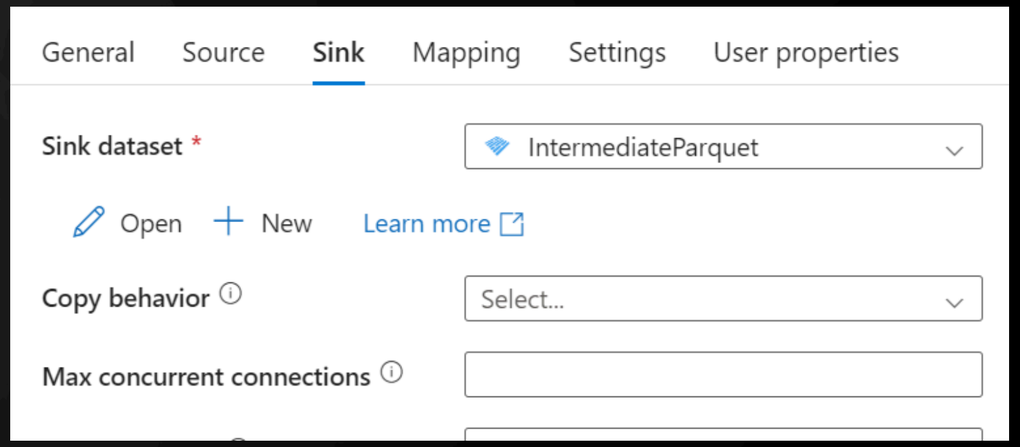
Linked service * AzureDataLakeStorage1 | Test connection | Edit | New | Learn more

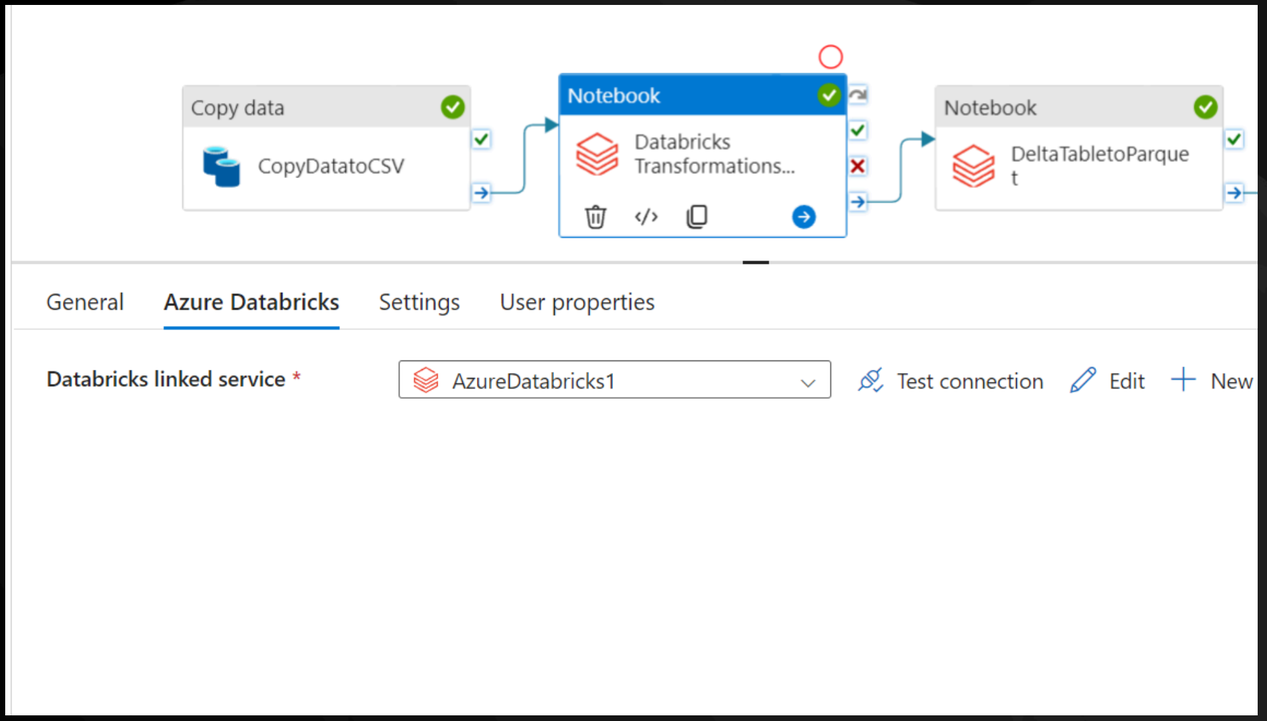
File path intermediatedata / Directory / File name | Browse | Preview

Compression type snappy

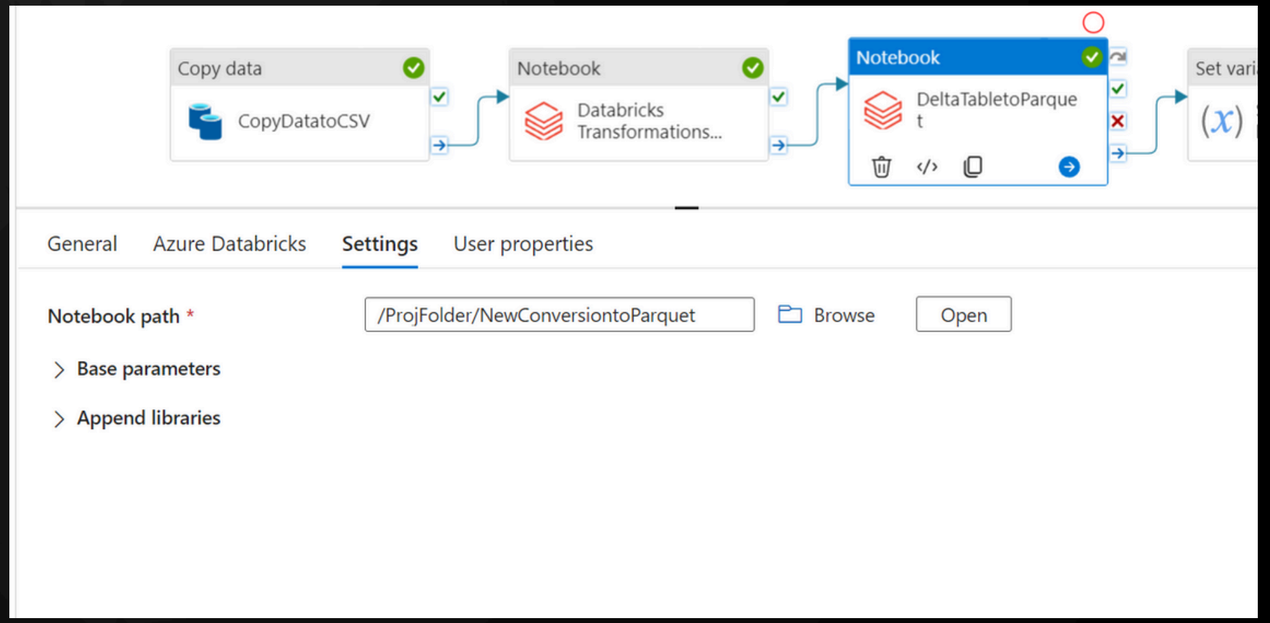
Copy Activity







Databricks Notebook Activities



Getting Primary and Foreign Keys

SQLDatabase (MyBoiAdi

Showing limited object explorer here. For full capability please click here to open Azure Data Studio.

- Tables
  - dbo.DimCar
  - dbo.FactSales
- Views
- Stored Procedures

Query 1 | Query 2 | Query 5 | Query 6 | Query 7

Run | Cancel query | Save query | Export data as | Show only Editor

```
1
2   SELECT CONSTRAINT_NAME
3   FROM INFORMATION_SCHEMA.TABLE_CONSTRAINTS
4   WHERE TABLE_NAME = 'DimCar'
```

Results | Messages

Search to filter items...

CONSTRAINT_NAME
PK__DimCar__4C9A0DB3813BDEBE

Getting Primary and Foreign Keys

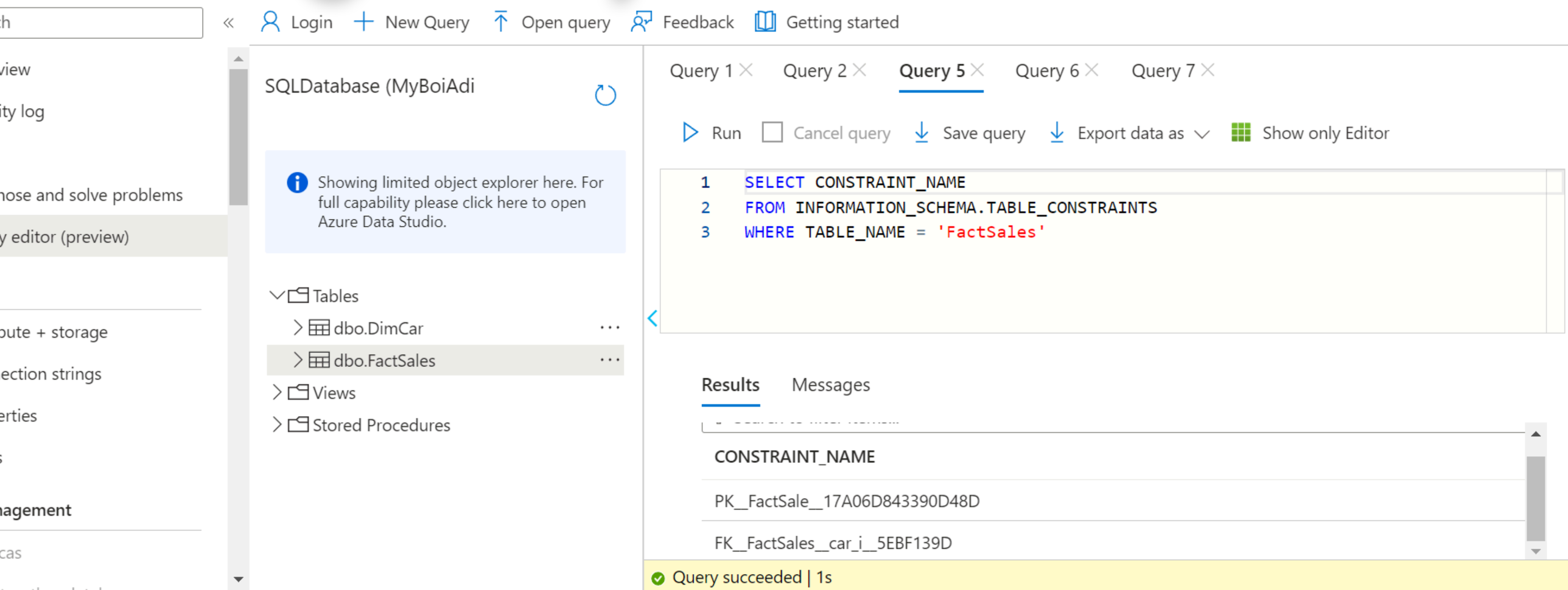


Table Successfully Loaded into SQL Database

Run | Cancel query | Save query | Export data as | Show only Editor

```
1   SELECT TOP (1000) * FROM [dbo].[DimCar]
```

Results | Messages

Search to filter items...

vin	make	model	color	body
1ftkr4ee4bpa55734	Ford	Ranger	black	SuperCab

Table Successfully Loaded into SQL Database

Run | Cancel query | Save query | Export data as | Show only Editor

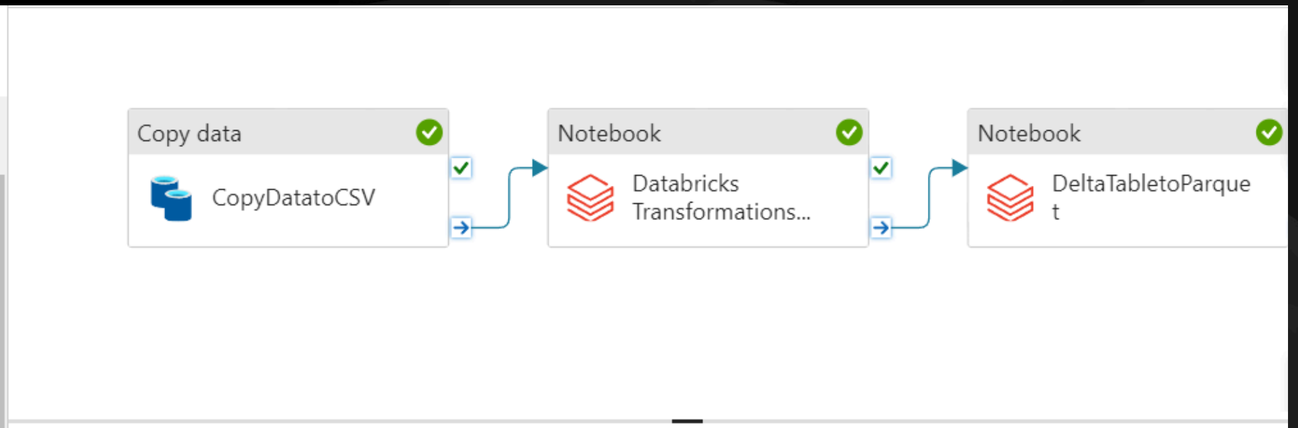
```
1   SELECT TOP (1000) * FROM [dbo].[FactSales]
```

Results | Messages

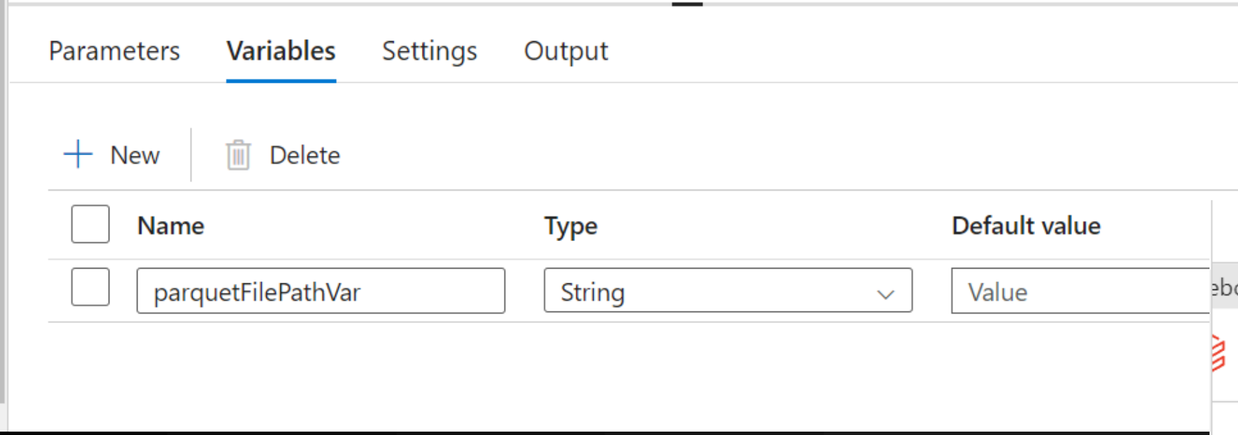
Search to filter items...

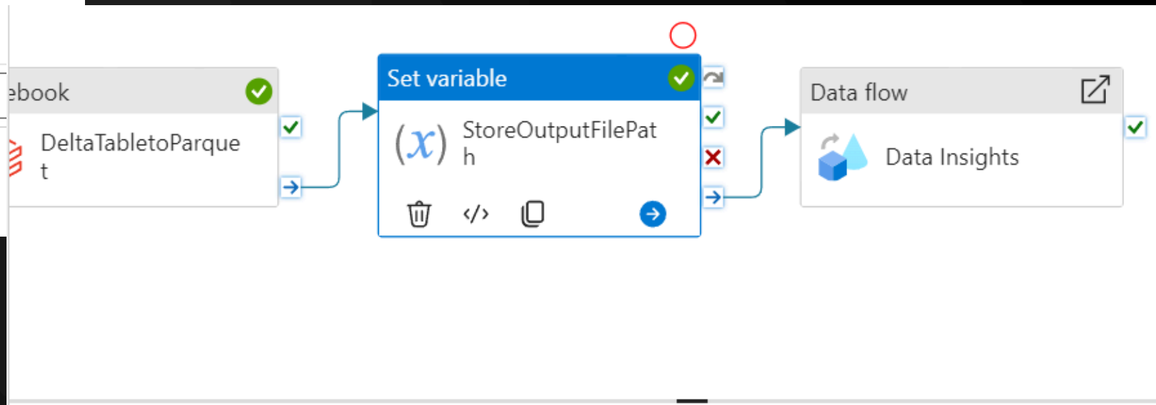
vin	YearMonth	total_selling_price	mmr
5npdh4ae7dh327127	2014-12	8700	11900

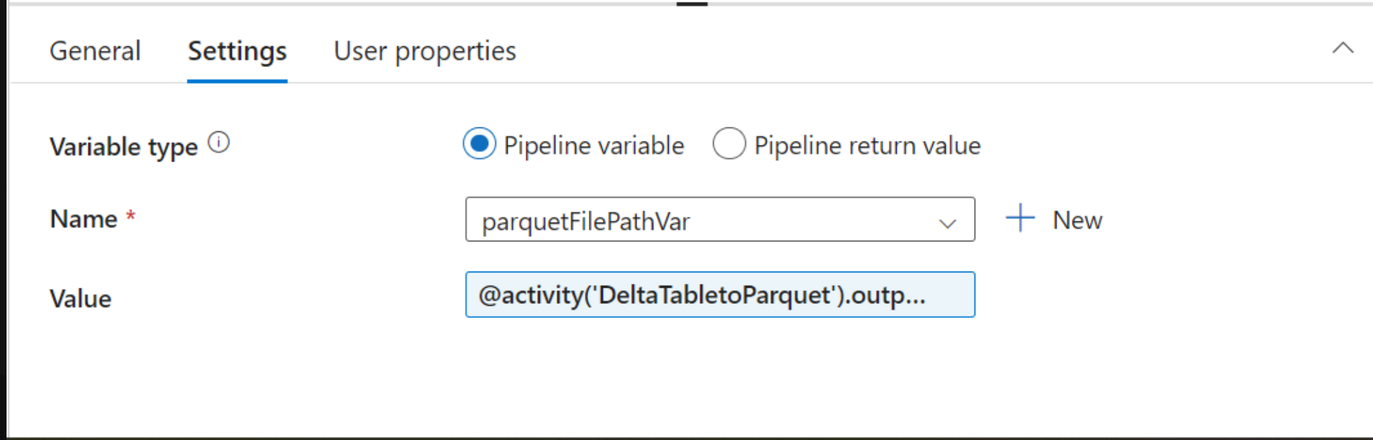
Query succeeded | 1s



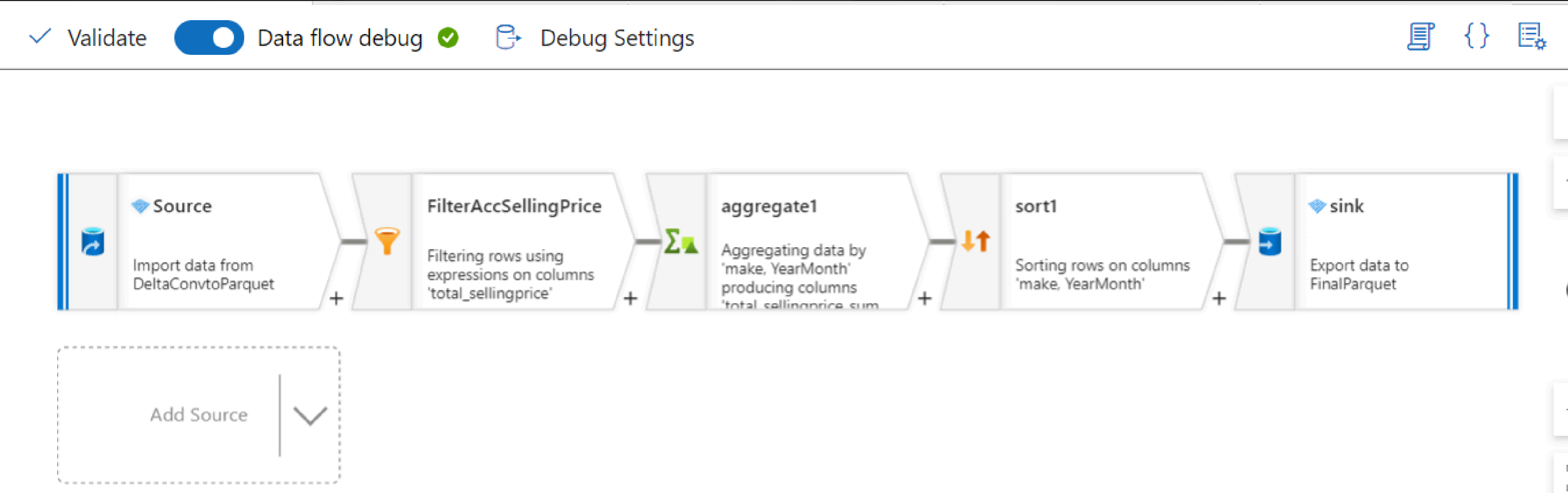
Set Variable Activity



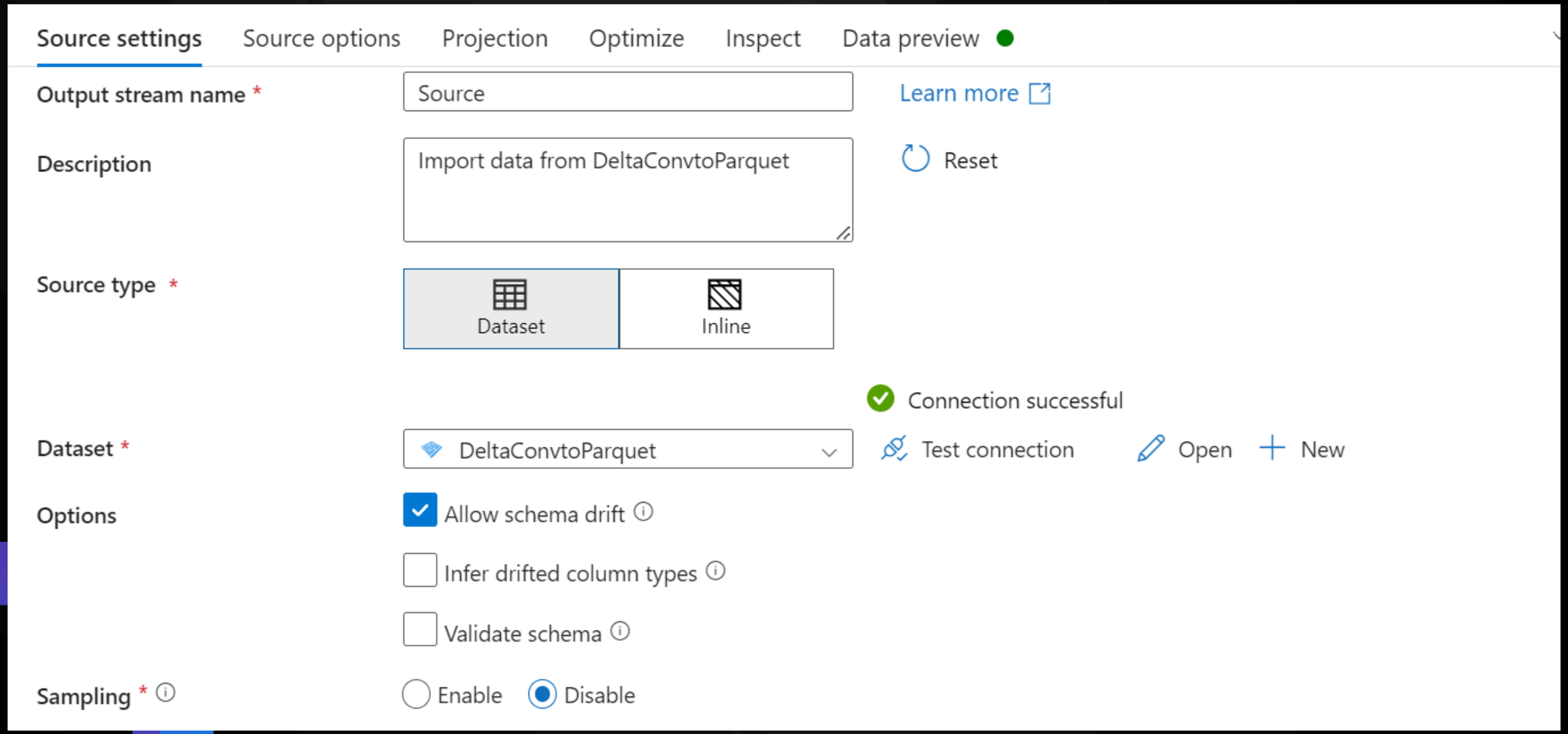




Data Flow Activity



Data Flow Source



Data Flow Source Preview

Validate | Data flow debug | Debug Settings

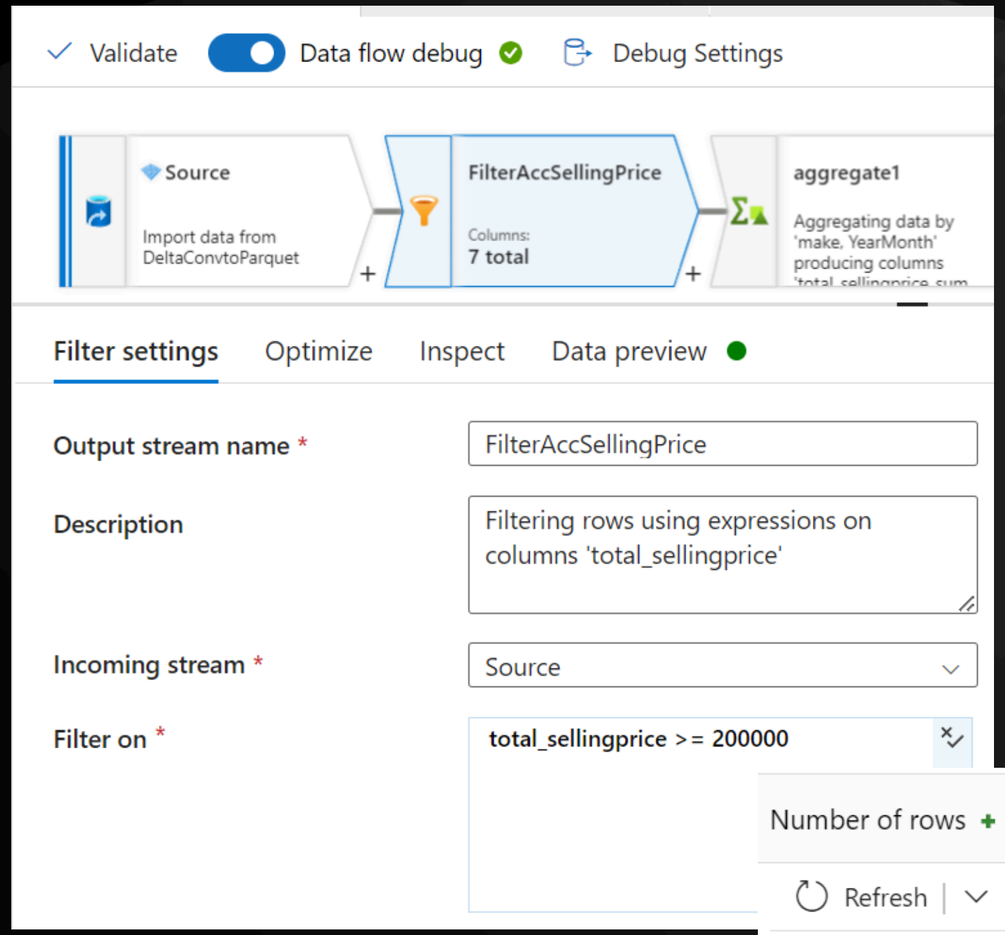
urce settings | Source options | Projection | Optimize | Inspect | Data preview

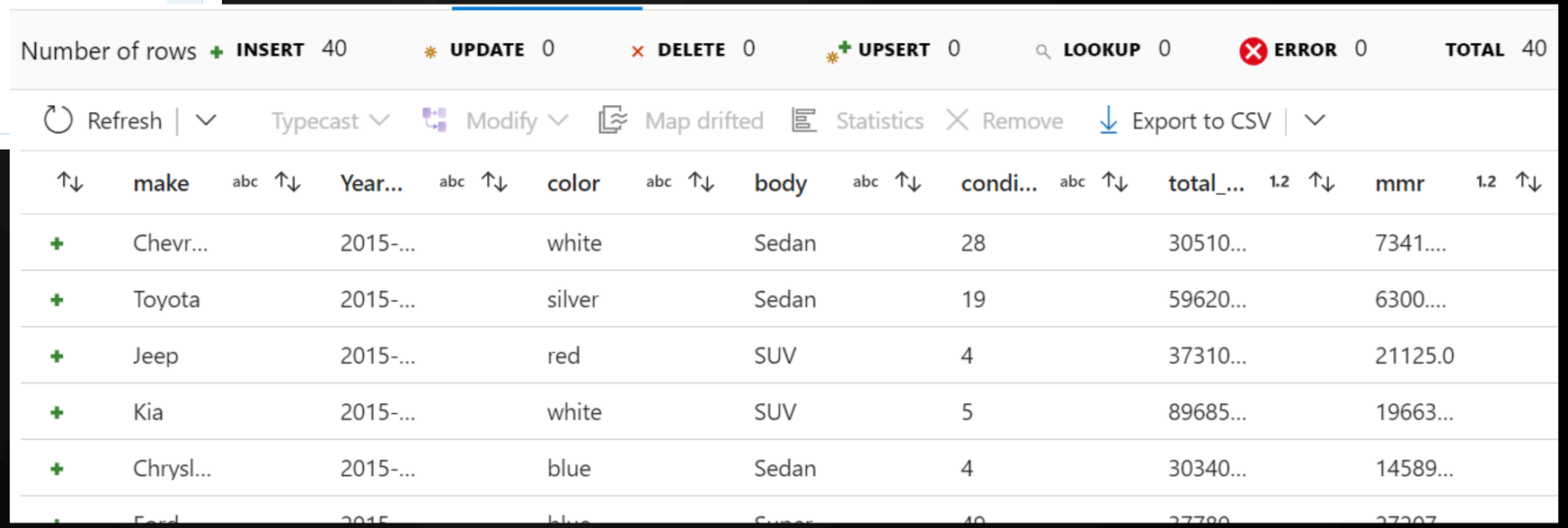
Number of rows | INSERT 100 | UPDATE 0 | DELETE 0 | UPSERT 0 | LOOKUP 0 | ERROR 0 | TOTAL

Refresh | Typecast | Modify | Map drifted | Statistics | Remove | Export to CSV

make	Year...	color	body	condi...	total_...	mmr
ford	2014-...	white	na	38	51250.0	11268...
Nissan	2014-...	gray	SUV	36	86850.0	14633...
Toyota	2014-...	blue	SUV	38	49800.0	17533...
Chevr...	2015-...	white	Sedan	28	30510...	7341....
Jaquar	2014-...	gray	Sedan	38	31500.0	30700.0
Mazda	2014-...	gray	Sedan	19	62851.0	6595....
Honda	2014-...	white	SUV	47	21000.0	17300.0
MINI	2014-...	gray	Hatch...	2	4600.0	5825.0

Data Insights- Filter





make	Year...	color	body	condi...	total_...	mmr
Chevr...	2015-...	white	Sedan	28	30510...	7341....
Toyota	2015-...	silver	Sedan	19	59620...	6300....
Jeep	2015-...	red	SUV	4	37310...	21125.0
Kia	2015-...	white	SUV	5	89685...	19663...
Chrysl...	2015-...	blue	Sedan	4	30340...	14589...

Data Insights- Aggregate

Validate | Data flow debug | Debug Settings

Source → FilterAccSelling... → 4 Columns

Aggregate settings | Optimize | Inspect | Data preview

Output stream name * : aggregate1

Description : Aggregating data by 'make, YearMonth' producing columns 'total_sellingprice_sum, avg_sellingprice'

Incoming stream * : FilterAccSellingPrice

Group by | Aggregates

Columns	Name as
abc make	make
abc YearMonth	YearMonth

Aggregate settings | Optimize | Inspect | Data preview

Number of rows + INSERT 28 | * UPDATE 0 | × DELETE 0 | UPSERT 0 | LOOKUP 0 | ERROR 0

Refresh | Typecast | Modify | Map drifted | Statistics | Remove | Export to CSV

	make	YearMonth	total_sellingprice_s...	avg_sellingprice
+	Chevrolet	2015-01	1105701.0	552850.5
+	Toyota	2015-01	596200.0	596200.0
+	Jeep	2015-01	777500.0	388750.0
+	Kia	2015-02	1401300.0	467100.0
+	Chrysler	2015-01	303400.0	303400.0
+	Ford	2015-01	974300.0	324766.6666666667

Validate | Data flow debug | Debug Settings

Data Insights- Sort

Sort settings | Optimize | Inspect | Data preview

Previous | Next

Output stream name * sort1

Learn more

Description: Sorting rows on columns 'make, YearMonth'

Reset

Incoming stream * aggregate1

Options * Case insensitive

Sort only within partition

Sort conditions *

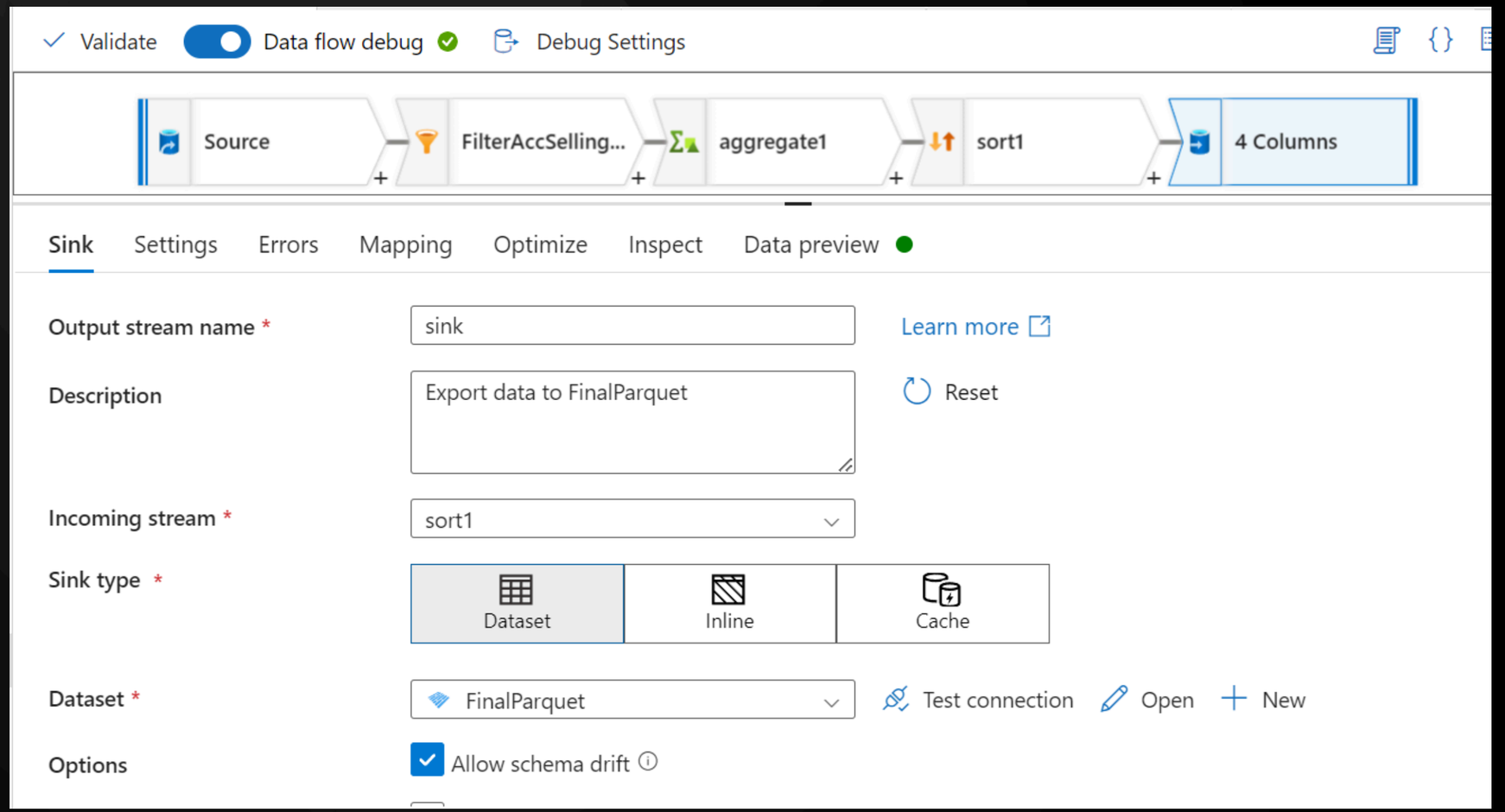
aggregate1's column	Order	Nulls first
abc make	Ascending	✓
abc YearMonth		

Number of rows | INSERT 28 | UPDATE 0 | DELETE 0 | UPSERT 0 | LOOKUP 0 | ERROR 0 | TOTAL 28

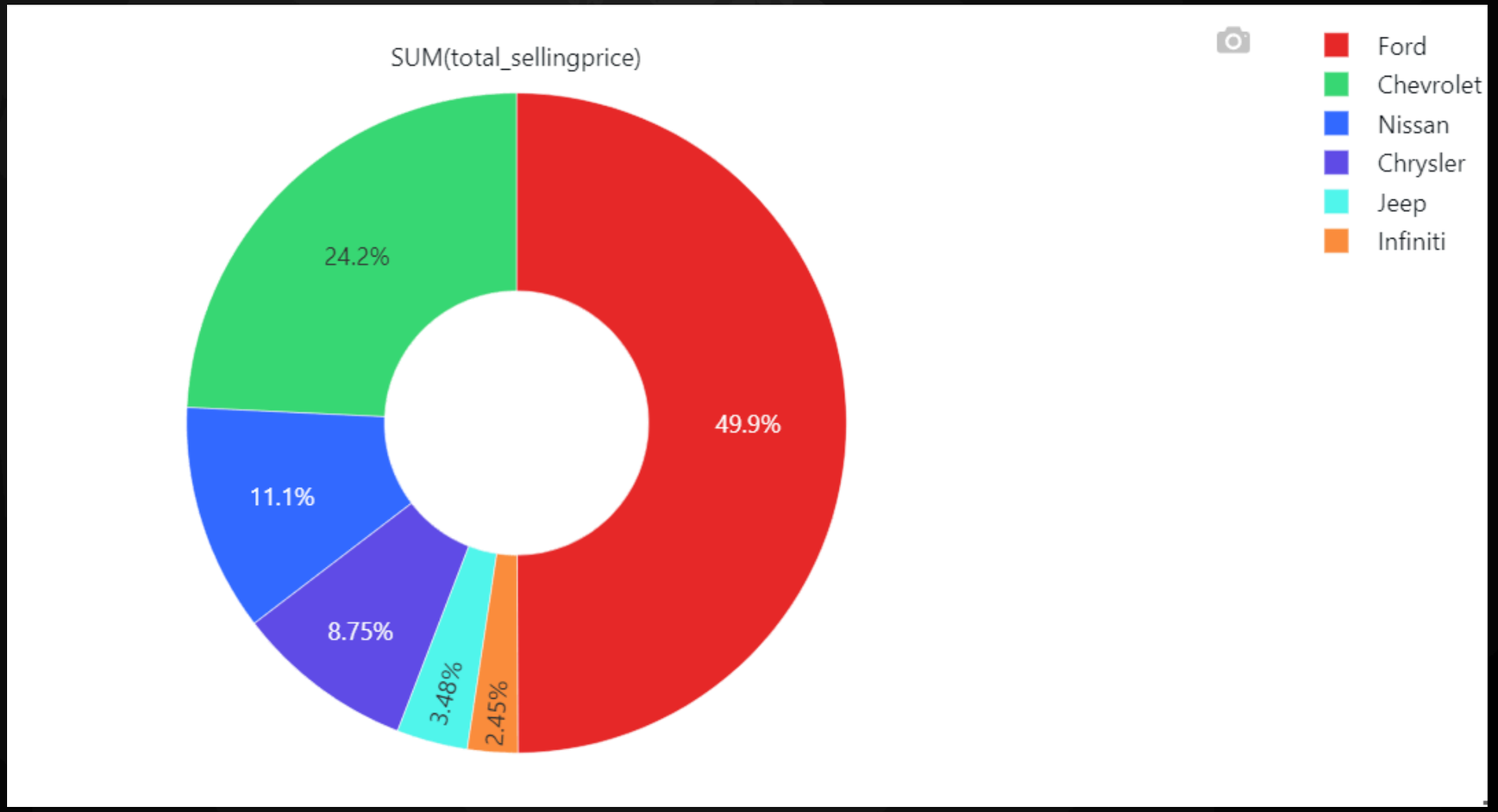
Refresh | Typecast | Modify | Map drifted | Statistics | Remove | Export to CSV

make	YearMonth	total_sellingprice_s...	avg_sellingprice
Audi	2015-01	409800.0	409800.0
Audi	2015-02	292500.0	292500.0
BMW	2015-01	221200.0	221200.0
BMW	2015-02	1232650.0	616325.0
BMW	2015-06	224800.0	224800.0
Chevrolet	2015-01	1105701.0	552850.5

Data Insights- To Sink

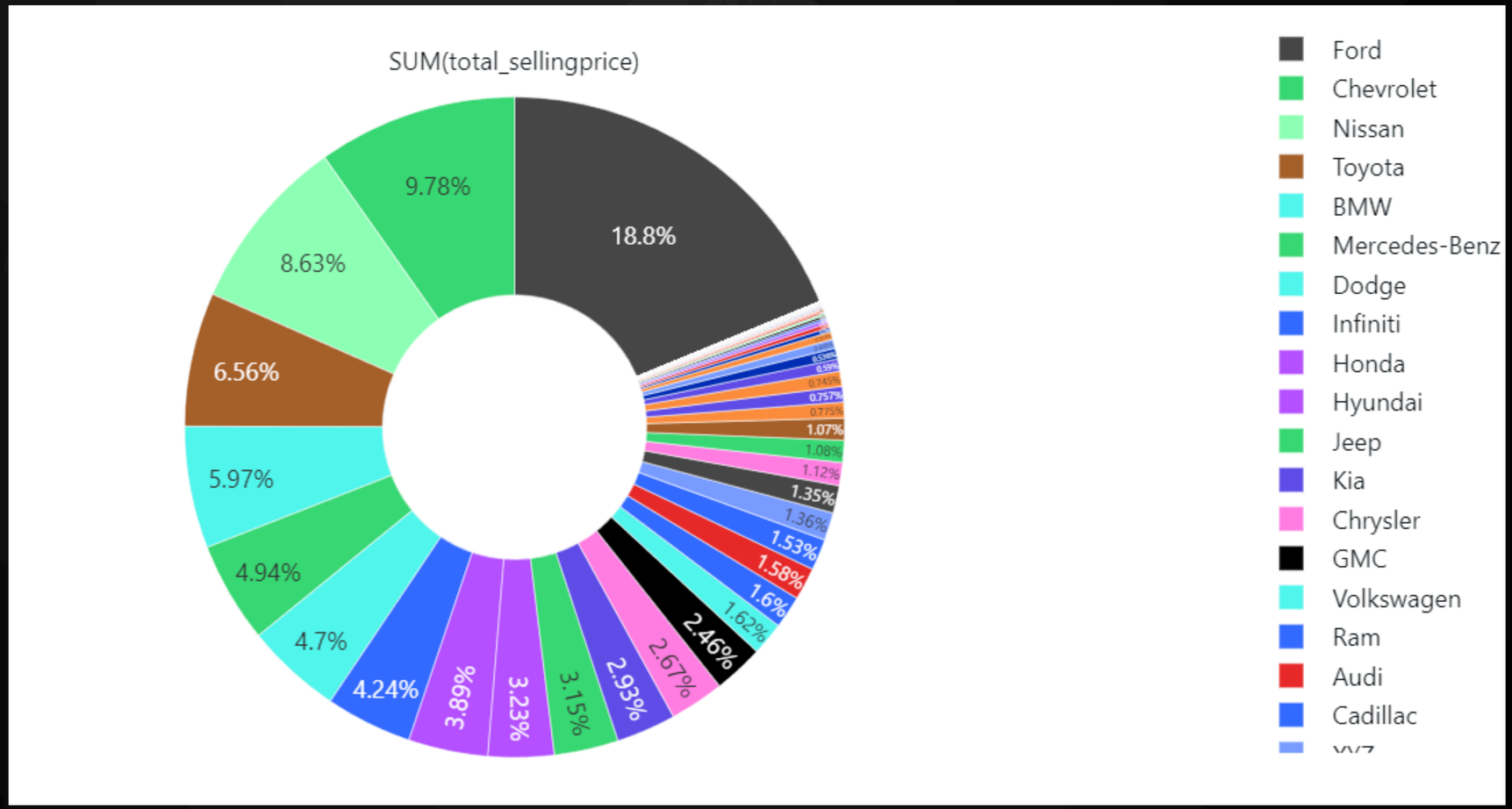


Data Visualisations



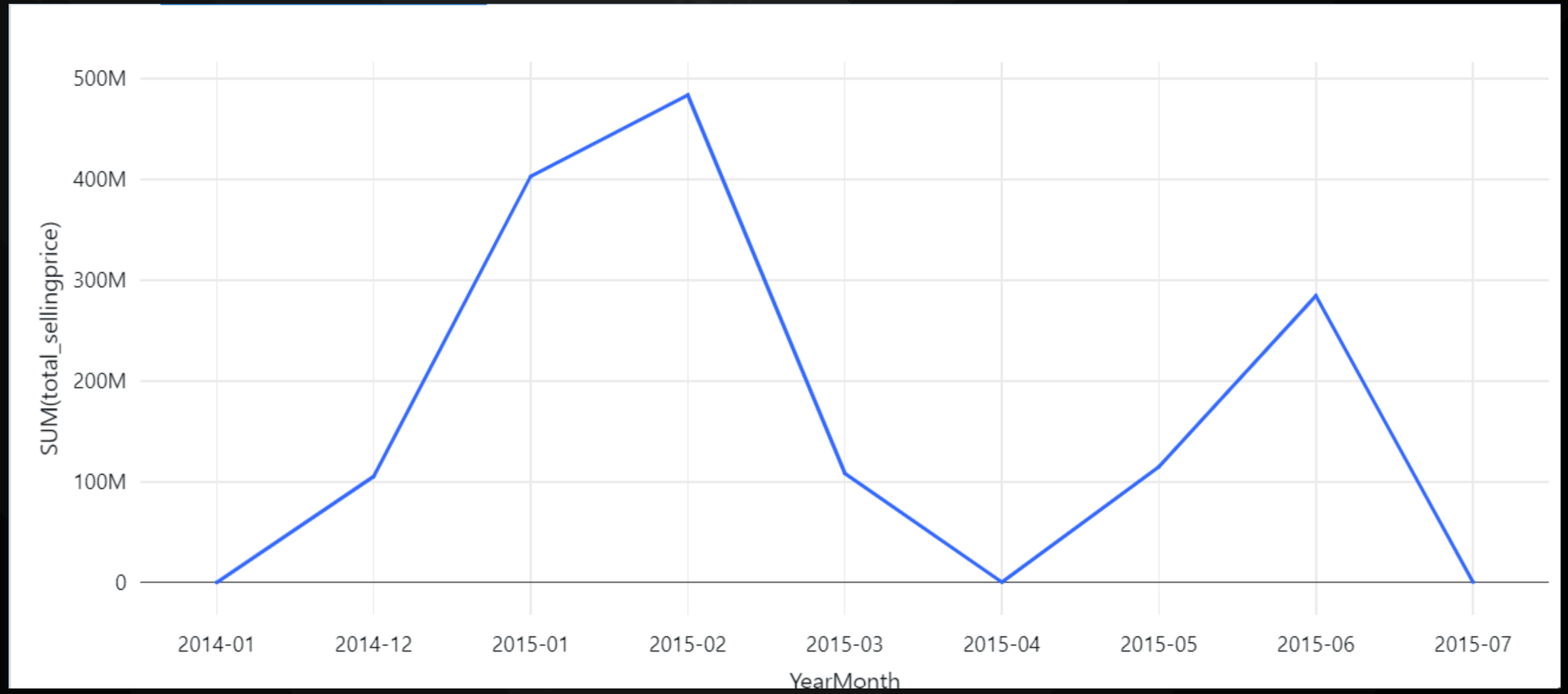
March 2015 Sales by Make

Data Visualisations



2015 Sales by Make

Data Visualisations



Sales by YearMonth

THANK YOU

For watching this presentation

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