Data Engineering Project -1

ETL Pipeline for Global Superstore Dataset

Team:

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Date: 16-12-2024

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1. Project Overview:

The **Global Superstore Dataset** project leverages **Azure Data Engineering tools** to build a robust data pipeline for ingesting, transforming, and analyzing sales, profit, and operational data of a global retail store. This end-to-end solution demonstrates how to process large-scale retail data for actionable business insights by utilizing **Azure Data Factory (ADF)**, **Azure Databricks**, and **Delta Lake.**

2. Project Statement:

The objective of this project is to construct a three-tier data pipeline (**Bronze, Silver, and Gold zones**) that extracts data from Azure Blob Storage to Azure Delta Lake Storage, transforms it using **Azure Databricks**, and stores the results in a **Azure Databricks Delta Lake**. The project focuses on enabling seamless data processing, advanced analytics, and visualization to uncover trends in sales, profit margins, and regional performance.

Key deliverables include:

- Building scalable data pipelines for data ingestion, transformation, and loading (ETL).
- Cleaning and standardizing raw data to create a trusted dataset.
- Performing analytical transformations and aggregations to support data-driven decision-making.
- Visualizing key metrics such as top-performing regions, high-profit categories, and trends over time.

This project showcases the practical application of modern cloud data platforms to address challenges in retail data management and analytics, enabling business leaders to make informed decisions.

3. Data Overview:

The **Global Superstore Dataset** provides a comprehensive view of a global retail operation, covering various aspects of sales, profits, shipping, and customer segmentation. The dataset contains transactional data across multiple dimensions, offering rich insights into the performance of the business. Below are the key components of the dataset:

Data Source

The dataset originates from **Azure Blob Storage**, where the raw data is stored as a CSV file named Global_Superstore2.csv. This data is ingested and processed through the Azure data engineering pipeline.

Schema Details:

The dataset schema includes the following key attributes:

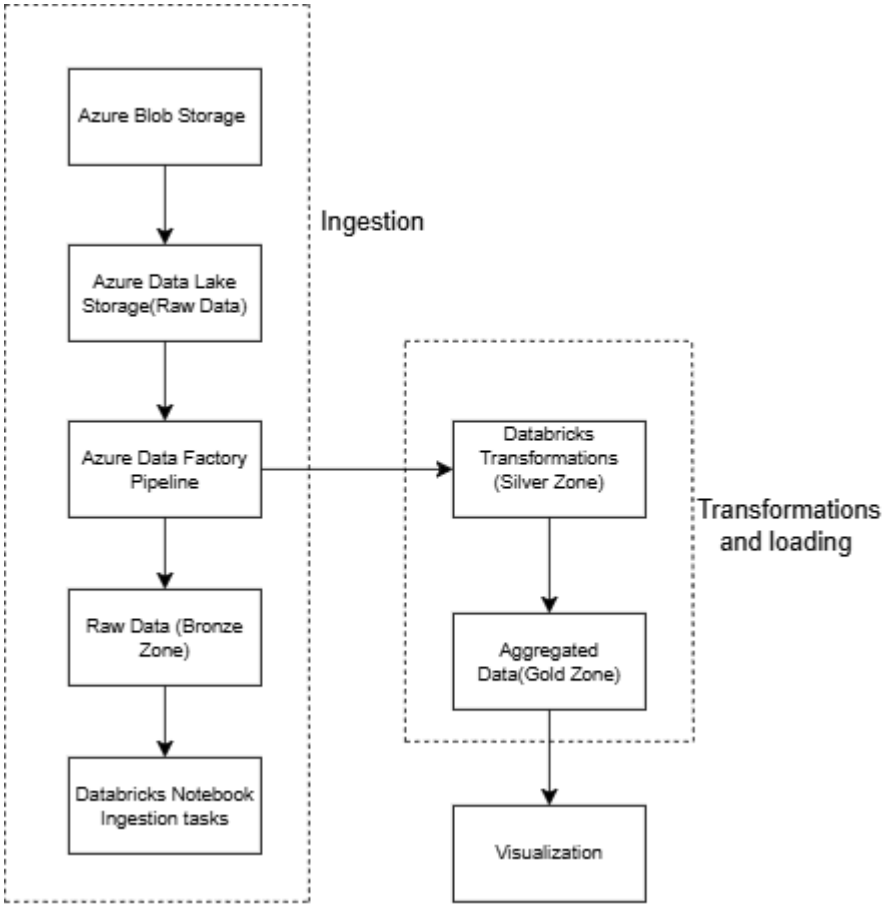
Column Name	Description
Row ID	Unique identifier for each record.
Order ID	Unique ID for each order placed.
Order Date	The date when the order was placed.
Ship Date	The date when the order was shipped.
Ship Mode	Shipping method chosen for the order (e.g., Standard Class, First Class).
Customer ID	Unique identifier for each customer.
Customer Name	Name of the customer placing the order.
Segment	Market segment (e.g., Consumer, Corporate, Home Office).
City	City of the customer.
State	State of the customer.
Country	Country of the customer.
Postal Code	Postal code of the customer.
Region	Region of the customer (e.g., East, West).
Product ID	Unique identifier for each product.
Category	Product category (e.g., Office Supplies, Furniture).
Sub-Category	Sub-category of the product (e.g., Binders, Chairs).
Product Name	Name of the product.
Sales	Sales amount for the product.
Quantity	Quantity of the product ordered.
Discount	Discount applied to the order.
Profit	Profit generated from the sale.
Shipping Cost	Cost of shipping the order.
Order Priority	Priority level of the order (e.g., High, Medium).

Data Zones

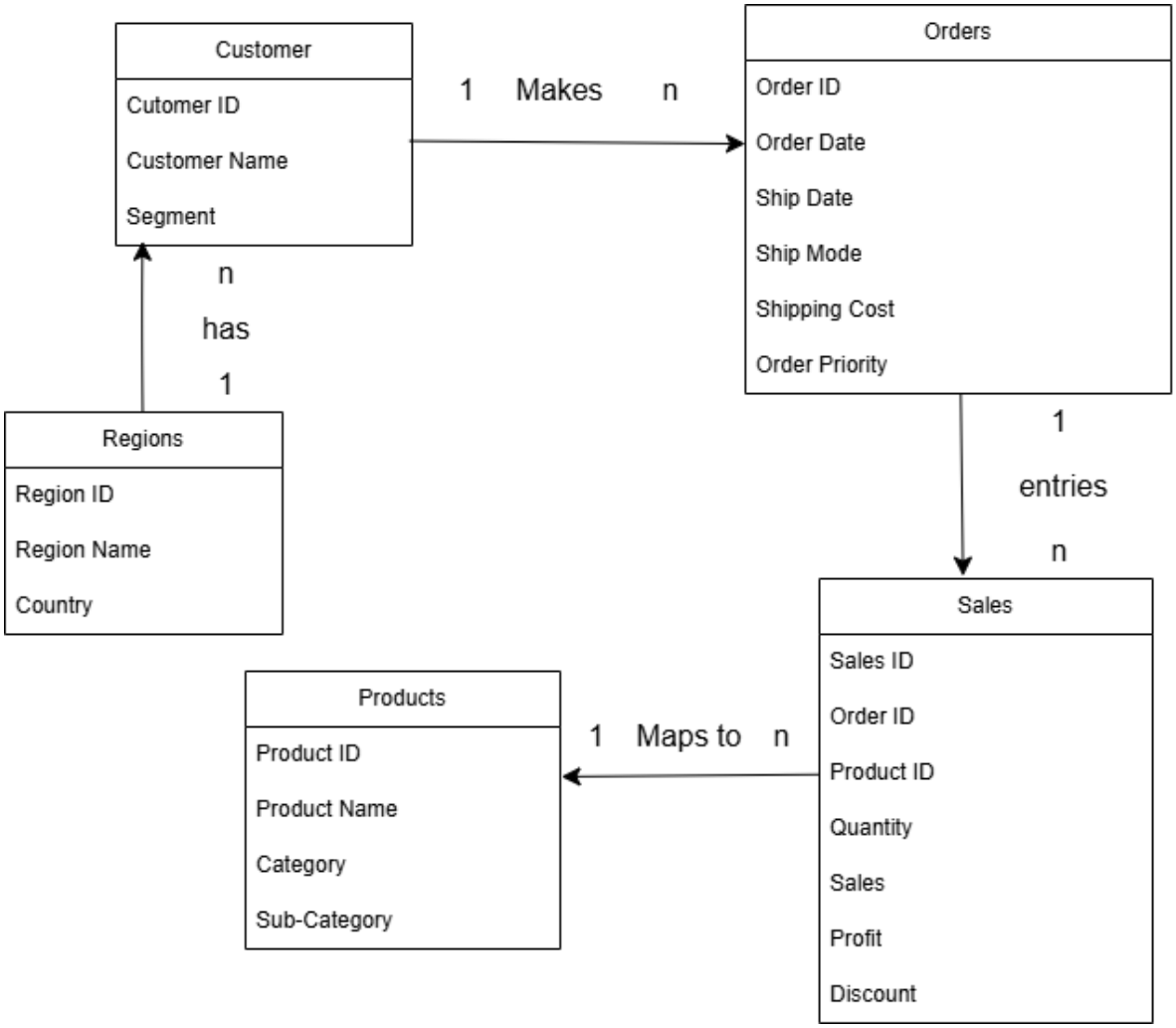
The dataset undergoes the following transformations through the pipeline:

1. **Bronze Zone:** Stores the raw data ingested from Azure Blob Storage.
2. **Silver Zone:** Contains cleaned and standardized data after transformations (e.g., type casting, null handling).
3. **Gold Zone:** Contains aggregated data optimized for analytics and visualization.

4. Architectural Diagram:



5. ER Diagram:



6.How it Works:

Source Data Files

We are using the **Global Superstore Dataset**, a publicly available dataset containing sales, orders, and customer data across regions. This data is ideal for ETL and analytics use cases.

File Details

File Name	File Type	Description
Global_Superstore2.csv	CSV	Contains data on orders, customers, products, and regions, including details like sales, profit, and discounts.

7. Execution Overview:

Step 1: Ingestion (Bronze Zone)

- The raw data file (Global_Superstore.csv) is uploaded to **Azure Blob Storage**.
- Azure Data Factory (ADF) pipelines copy the file into **Azure Data Lake Storage Gen2 (ADLS)**.
- The ingestion tasks involve mounting the data in **Databricks** for further processing.

Step 2: Transformation (Silver Zone)

- Using Databricks Notebooks, the raw data is cleaned and transformed into structured data:
  - Data types are cast appropriately (e.g., sales as float, quantity as int).
  - Columns like Profit Margin and High Discount are calculated.
  - Null values and invalid rows are removed.

Step 3: Analytical Zone (Gold Zone)

- The cleaned and aggregated data in the Silver Zone is used to:
  - Compute sales and profit by region, category, and year.
  - Identify high-profit orders and discount trends.
- The processed data is used in Delta format for visualizations and insights.

Pipeline Overview:

1. Copy Data Activity (Blob Storage to Data Lake)

- **Purpose**: The first step of the pipeline is to copy raw data (in CSV/JSON format) from Azure Blob Storage to Azure Data Lake Storage Gen2 (ADLS).
- **Source**: Azure Blob Storage (raw Global Superstore dataset).
- **Destination**: Azure Data Lake Storage Gen2 (Bronze Zone).

2. Ingestion Activity (Raw Data to Delta Format)

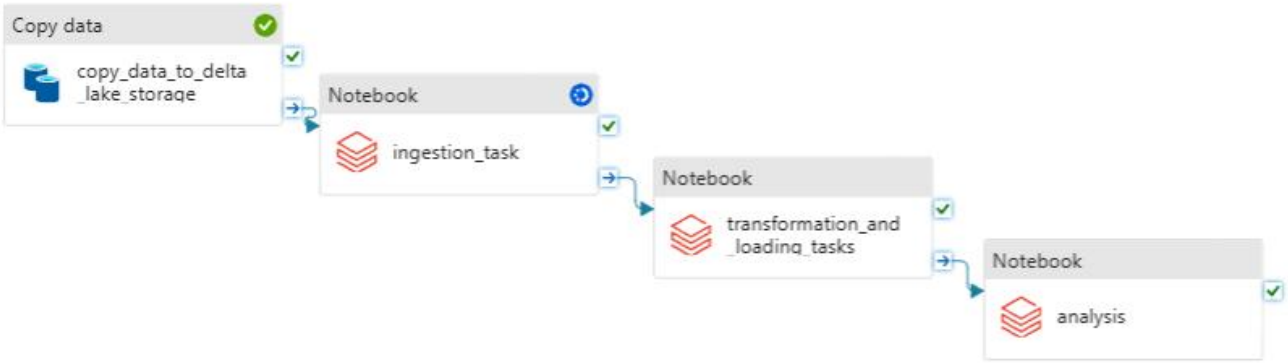
- **Purpose**: The second activity reads the raw data stored in the Bronze Zone and performs minimal transformations using a **Databricks Notebook**. These transformations include:
  - **Schema Application**: Ensures that the data has a consistent schema.
  - **Renaming Columns**: Columns are renamed to remove special characters.
  - **Dropping Unnecessary Columns**: Redundant or unnecessary data columns are removed.
- **Output**: Data is stored as Delta tables in the **Silver Zone** (standardized zone).

3. ***Transformation Activity (Silver to Gold Zone)***

- **Purpose**: In this activity, a Databricks SQL notebook is executed to transform the preprocessed data into the final structured form. Key transformations include:
  - **Deduplication**: Remove duplicate rows.
  - **Aggregations**: Grouping data by category, region, and other key attributes, and applying aggregations like SUM, COUNT, etc.
  - **Computed Columns**: Additional columns (e.g., profit margin) are created.
- **Output**: The transformed data is saved in the **Gold Zone** (analytical zone) as Delta tables, making it ready for analysis and visualization.

*4. **Analysis Activity (Data Queries and Visualization)***

- **Purpose**: The final activity executes SQL queries to analyze the transformed data stored in the Gold Zone. Examples of analysis could be:
    - **Top Regions by Total Sales**: Identify which regions contribute the most to the total sales.
    - **Profit Margin Analysis**: Calculate and analyze profit margins across different categories.
    - **Sales Trends**: Track sales over time, by category or region.
- **Output**: The results of the SQL queries are displayed in notebooks and can be visualized using Databricks' built-in visualization tools (e.g., bar charts, pie charts).



8. Resources Used for the project:

- Azure Data Lake Storage
- Azure Blob Storage
- Azure Data Factory
- Azure Databricks
- Azure Databricks Delta Lake

9. Project Requirements:

1. Ingestion Tasks Requirements:

- Mount Azure Blob Storage
- Verify the mount
- Load Data from Blob Storage
- Inspect and Verify Schema
- Persist Raw Data (Bronze Zone)
- Perform Data Validation Checks
- Deduplicate Raw Data
- Save Cleaned Raw Data in Bronze Zone

2. Transformation Tasks & Load Requirements:

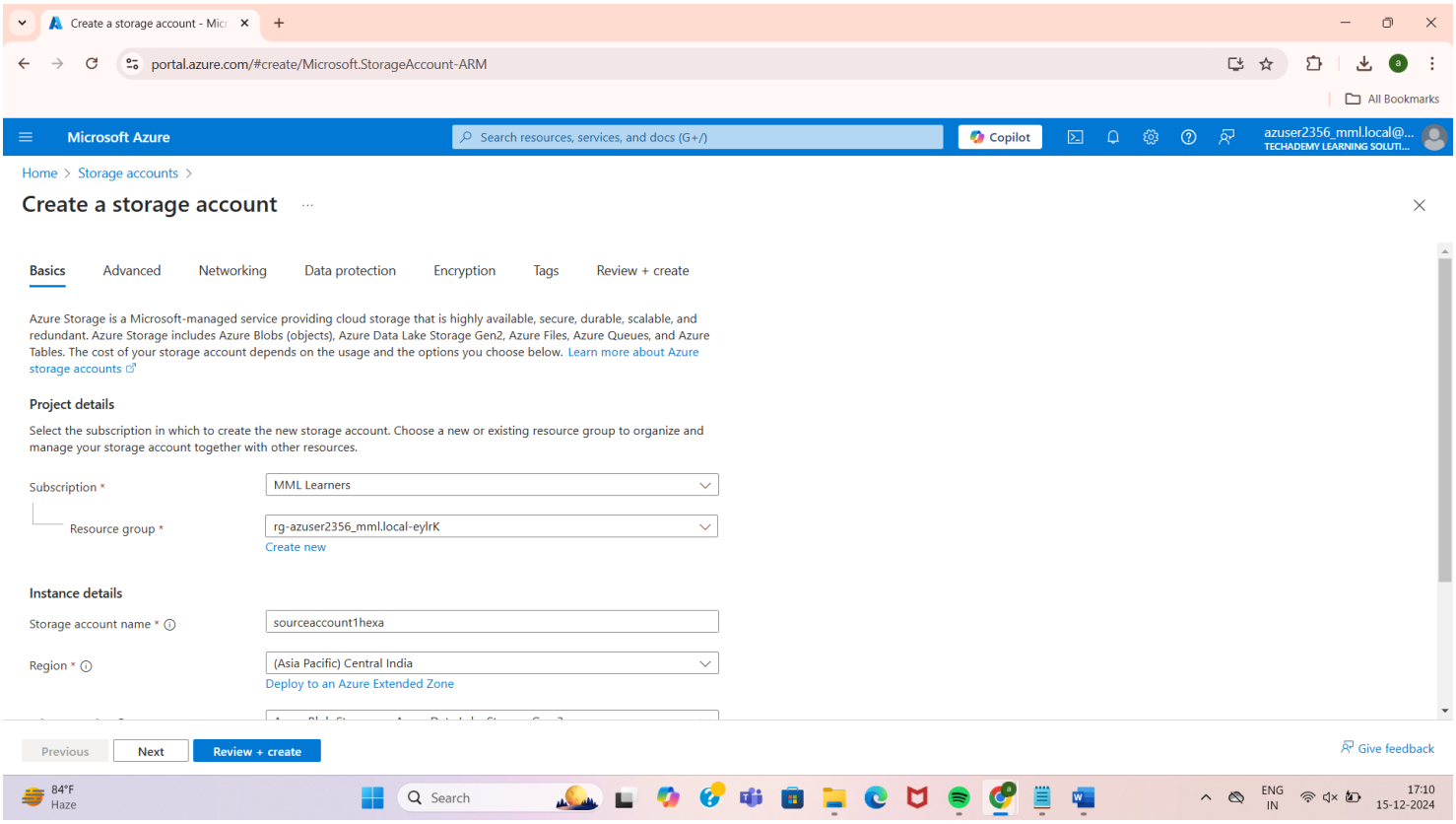
- Add a Column
- Convert Sales and Profit to Float
- Filter Rows with Zero or Negative Profit
- Group by Category and Region and perform aggregation
- Add a Profit Margin Column
- Remove Duplicate Rows based on 'Category' and 'Region'
- Rename Columns for Clarity
- Add a Year Column
- Filter the Data for a Specific Year
- Sort Data by Total Sales
- Save Transformed Data in Silver Zone

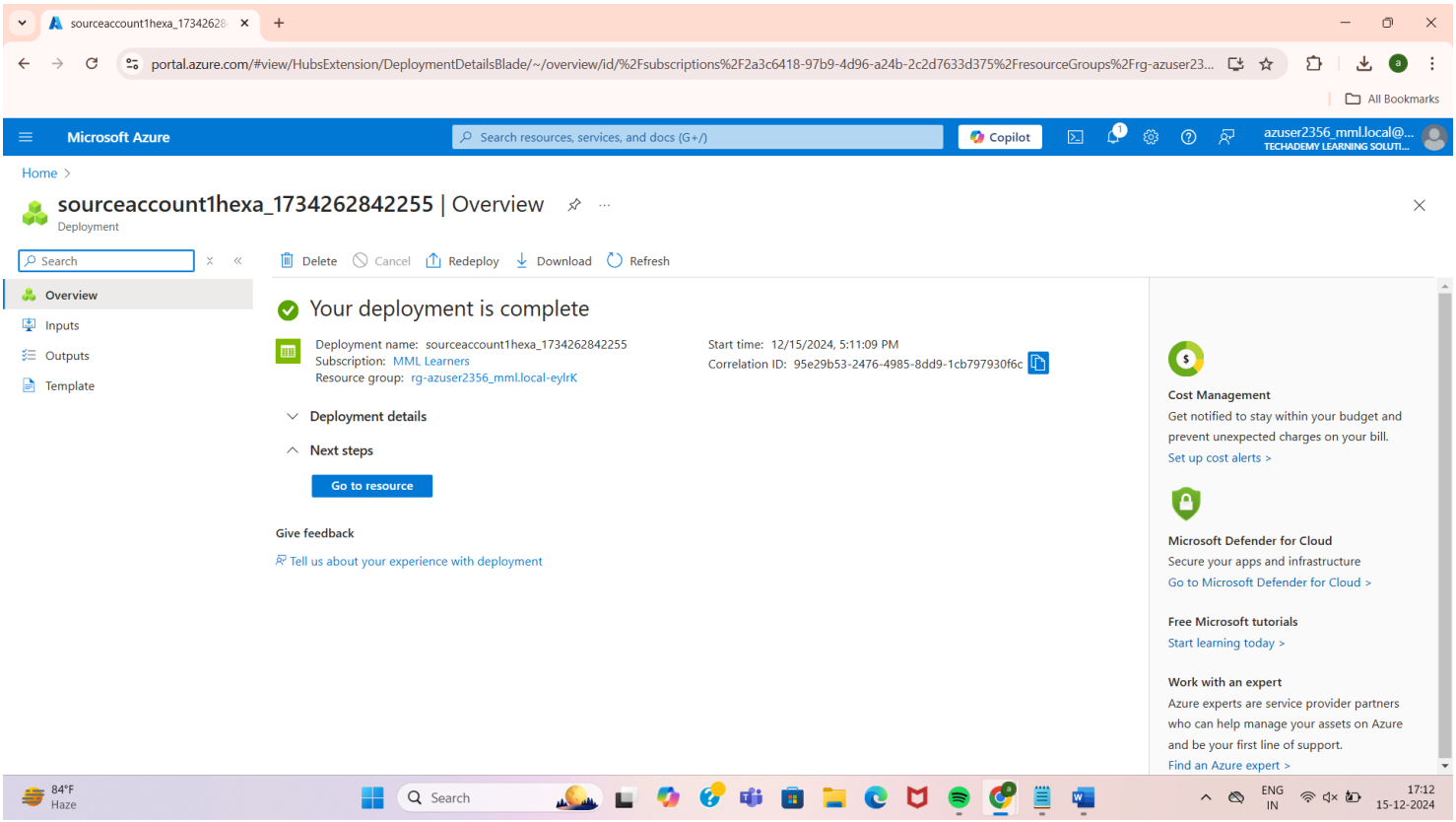
3. Analysis Requirements:

- Top 5 Regions by Total Sales
- Top Categories by Profit Margin
- Year-over-Year Sales Growth
- Regions with Highest Discounts
- Most Profitable Category-Region Pair

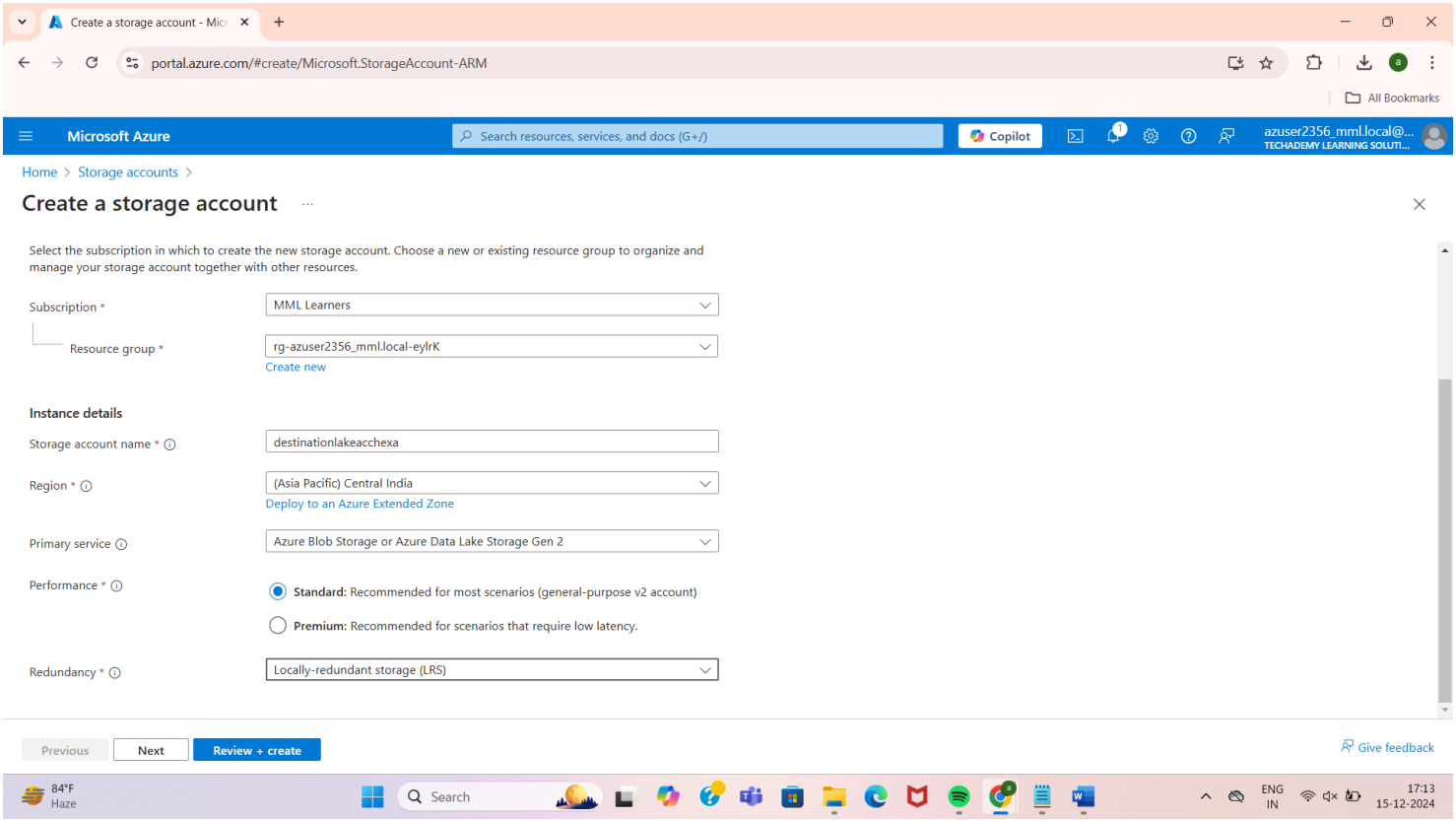
10. Tasks Performed:

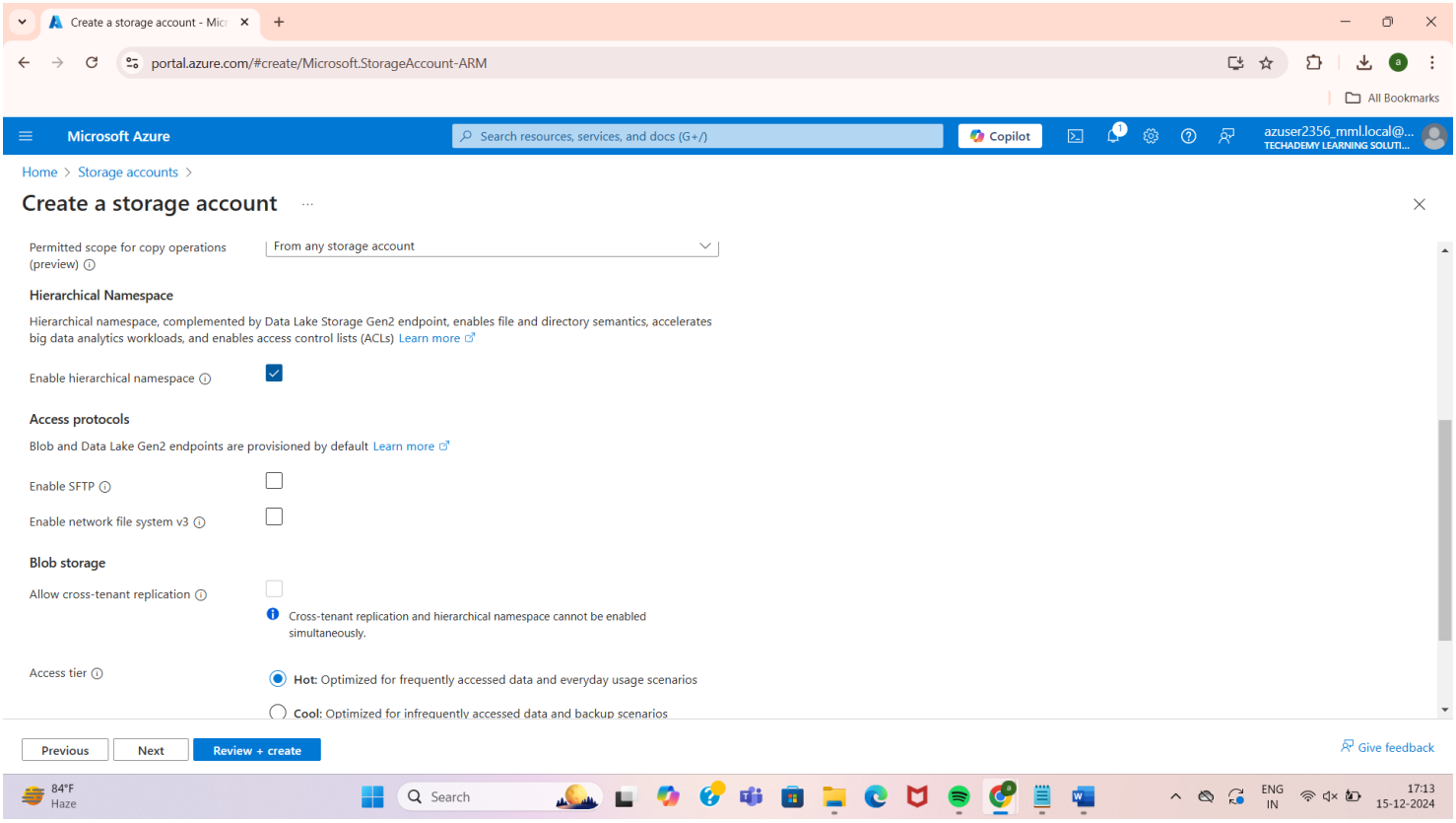
Creating an Azure Blob storage:





Creating a delta lake storage account:

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Permitted scope for copy operations (preview)
From any storage account
Hierarchical Namespace
Hierarchical namespace, complemented by Data Lake Storage Gen2 endpoint, enables file and directory semantics, accelerates big data analytics workloads, and enables access control lists (ACLs) Learn more
Enable hierarchical namespace
Access protocols
Blob and Data Lake Gen2 endpoints are provisioned by default Learn more
Enable SFTP
Enable network file system v3
Blob storage
Allow cross-tenant replication
Cross-tenant replication and hierarchical namespace cannot be enabled simultaneously.
Access tier
Hot: Optimized for frequently accessed data and everyday usage scenarios
Cool: Optimized for infrequently accessed data and backup scenarios
Previous
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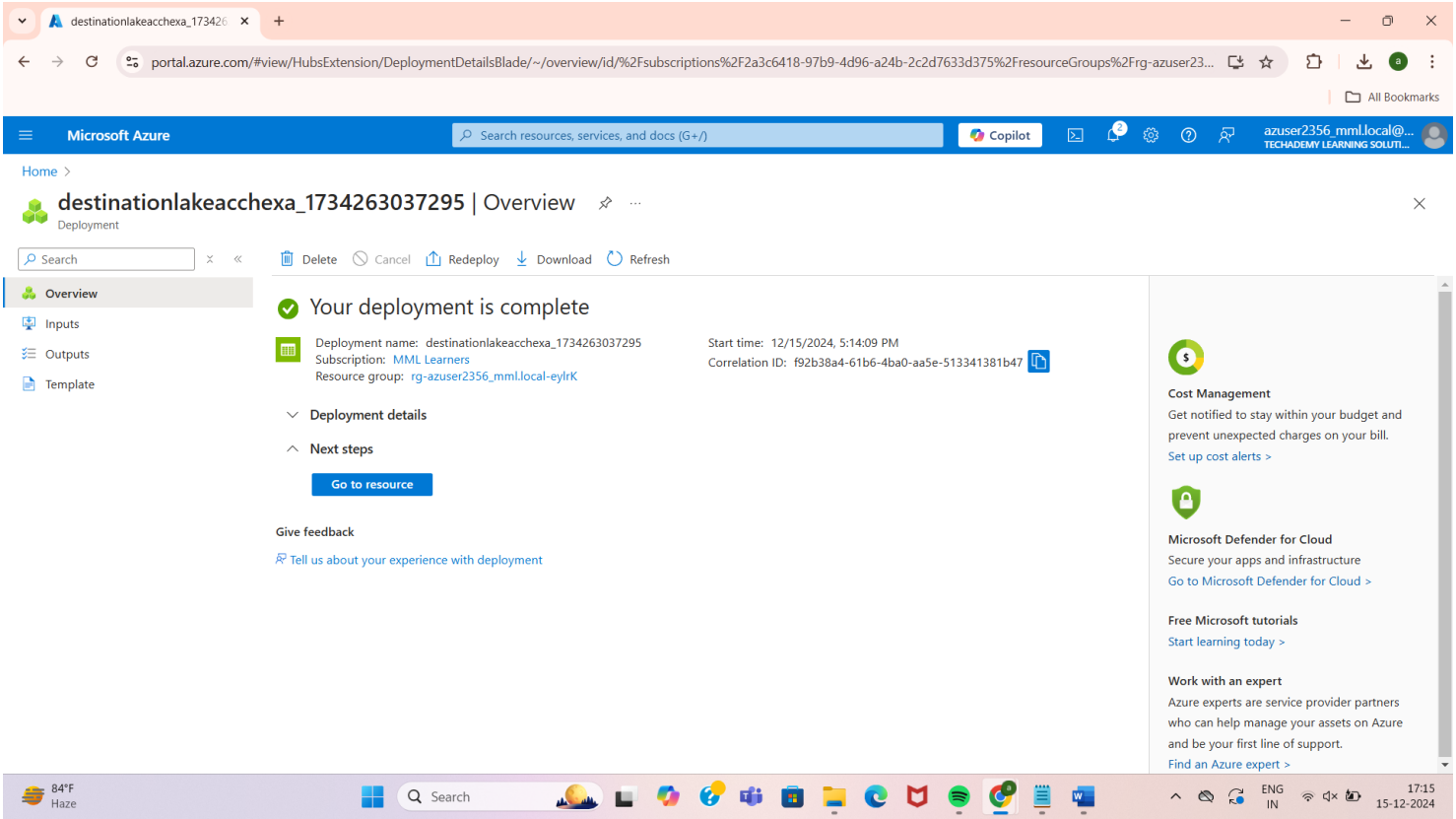
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Subscription: MML Learners
Resource group: rg-azuser2356_mml.local-eylrK
Start time: 12/15/2024, 5:14:09 PM
Correlation ID: f92b38a4-61b6-4ba0-aa5e-513341381b47
Deployment details
Next steps
Go to resource
Give feedback
Tell us about your experience with deployment
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Get notified to stay within your budget and prevent unexpected charges on your bill.
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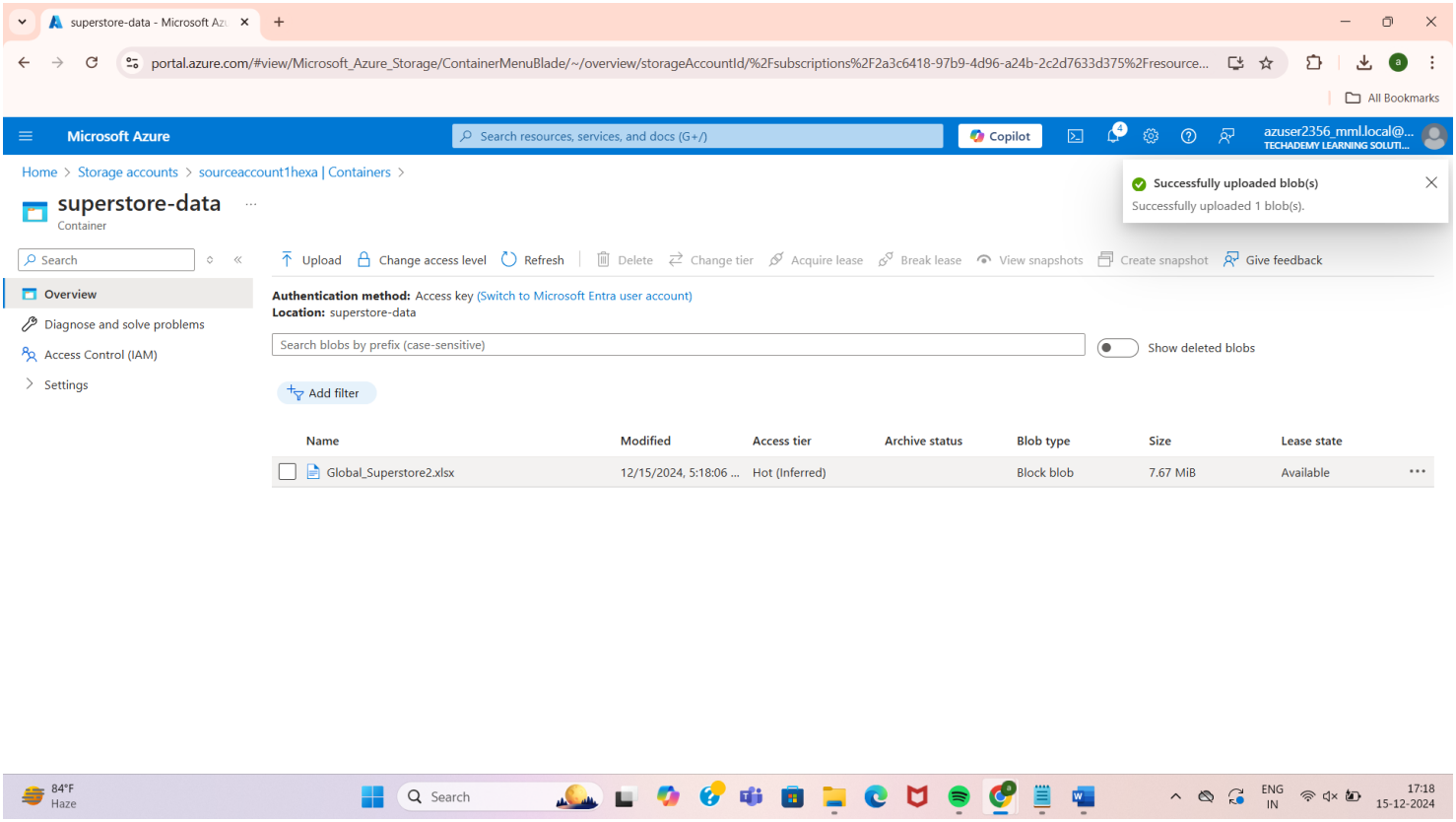
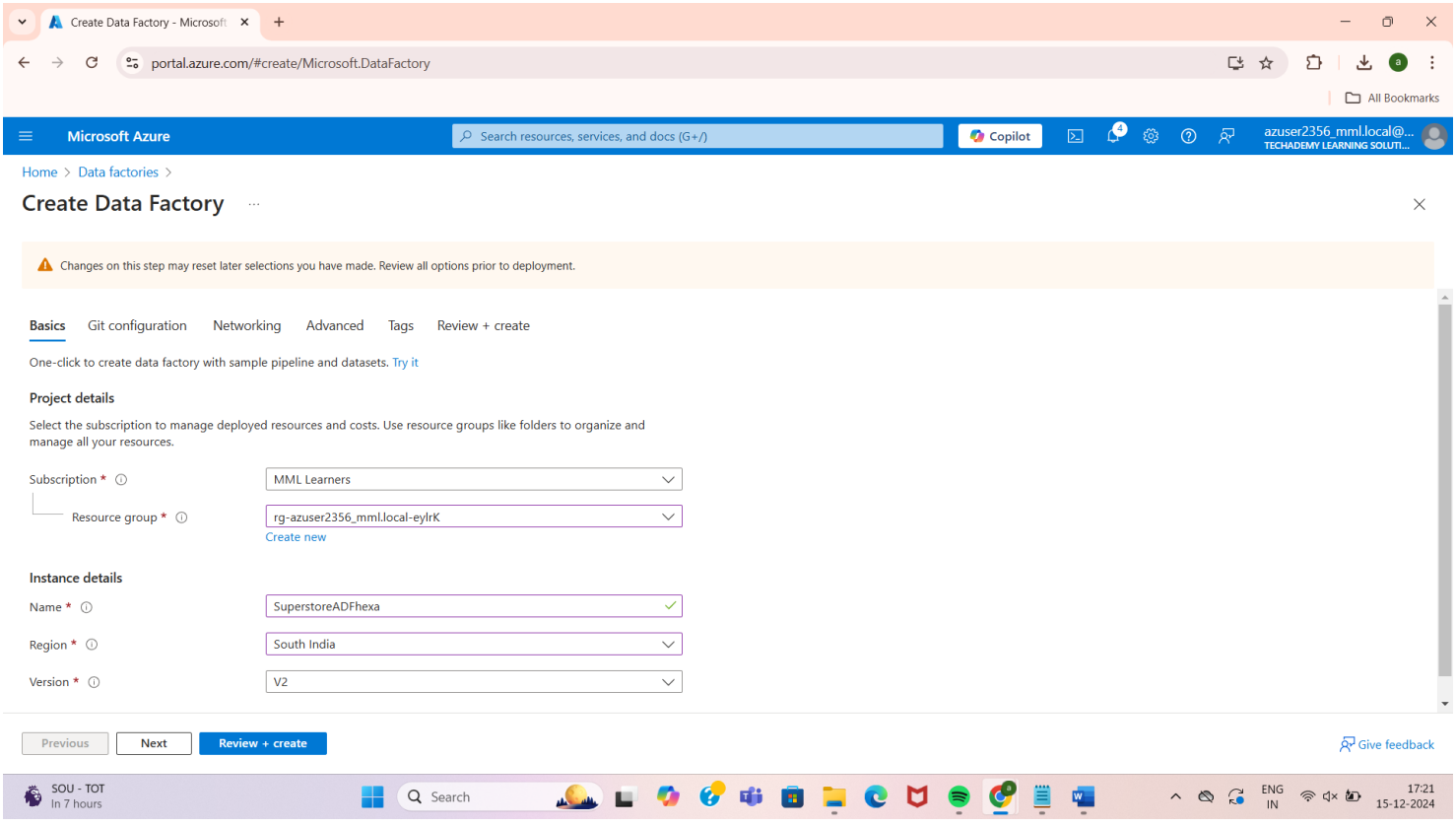
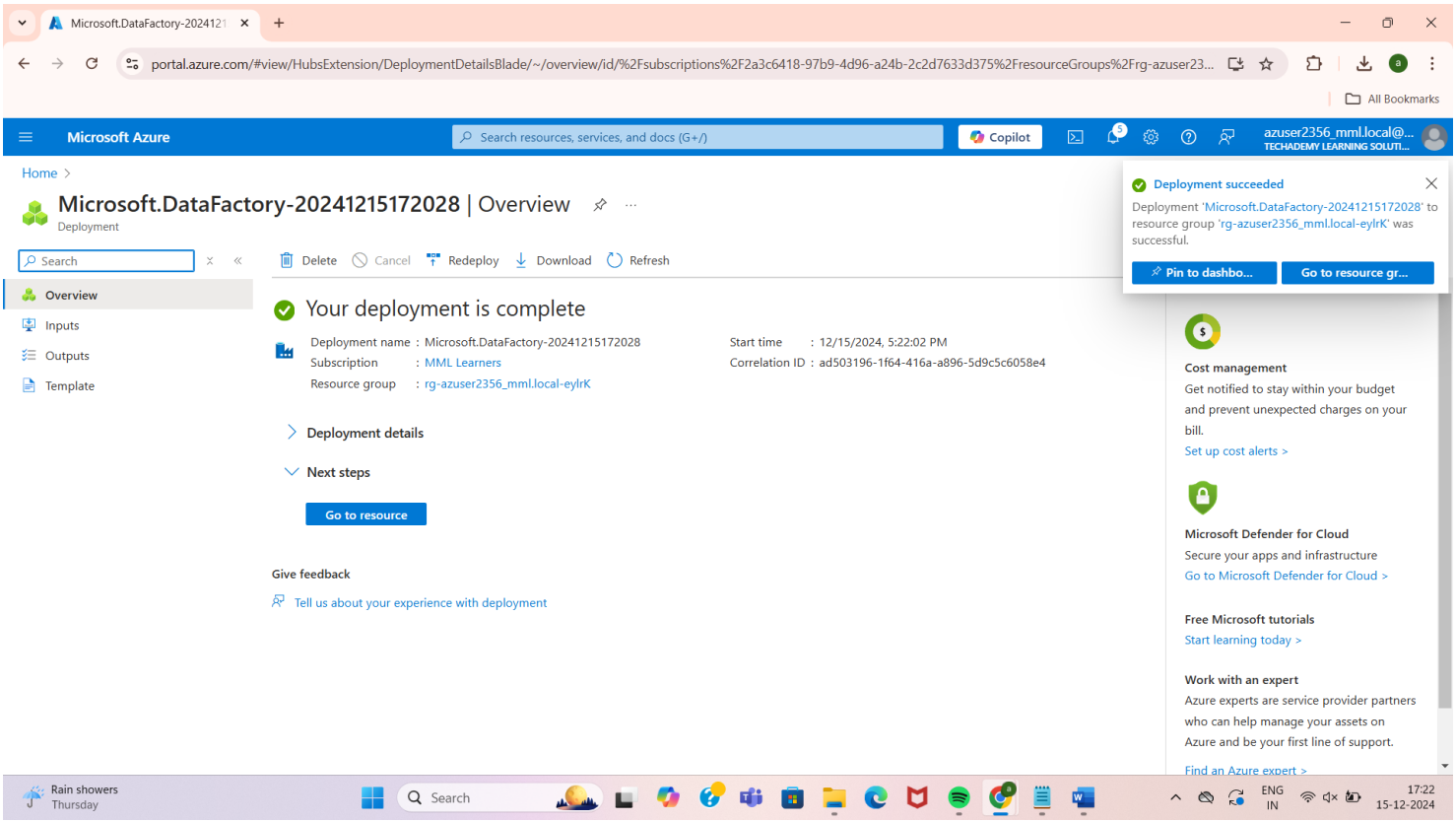
Upload the data into a container of the source account:



Create an Azure Data Factory:




Microsoft.DataFactory-20241215172028 | Overview
Deployment
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Deployment name : Microsoft.DataFactory-20241215172028
Subscription : MML Learners
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Start time : 12/15/2024, 5:22:02 PM
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Deployment details
Next steps
Go to resource
Give feedback
Tell us about your experience with deployment
Deployment succeeded
Deployment 'Microsoft.DataFactory-20241215172028' to resource group 'rg-azuser2356_mml.local-eylrK' was successful.
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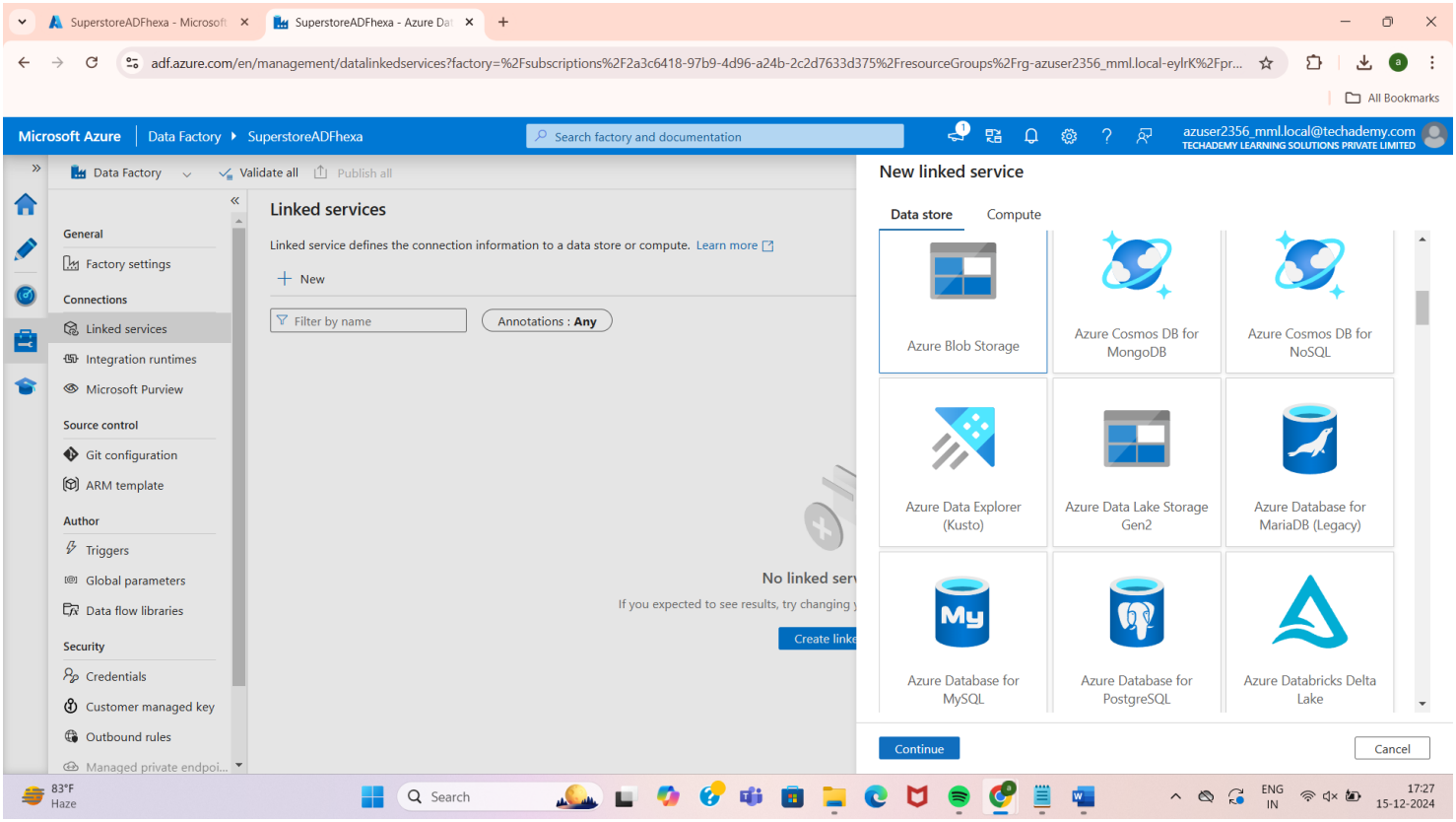
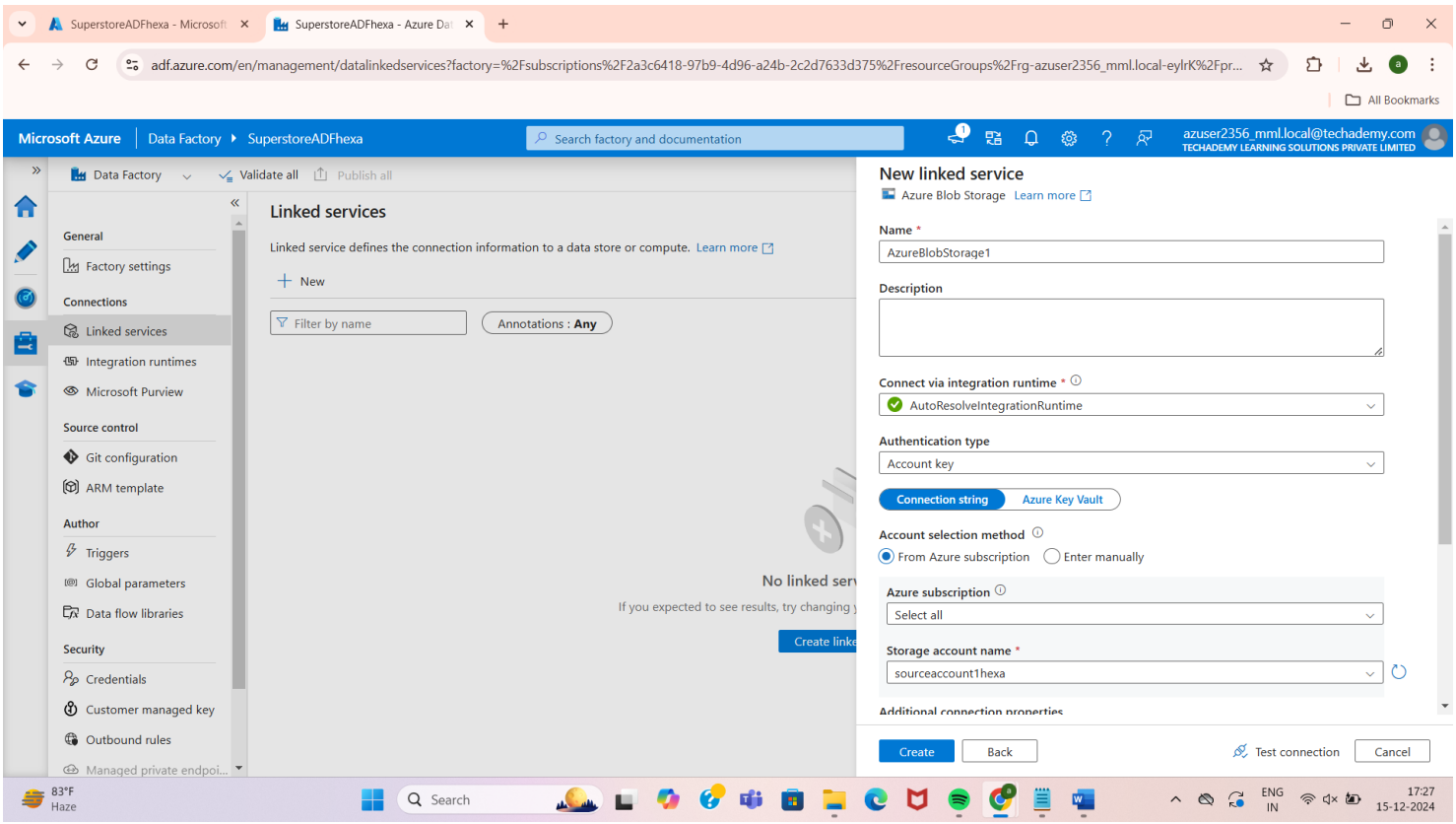
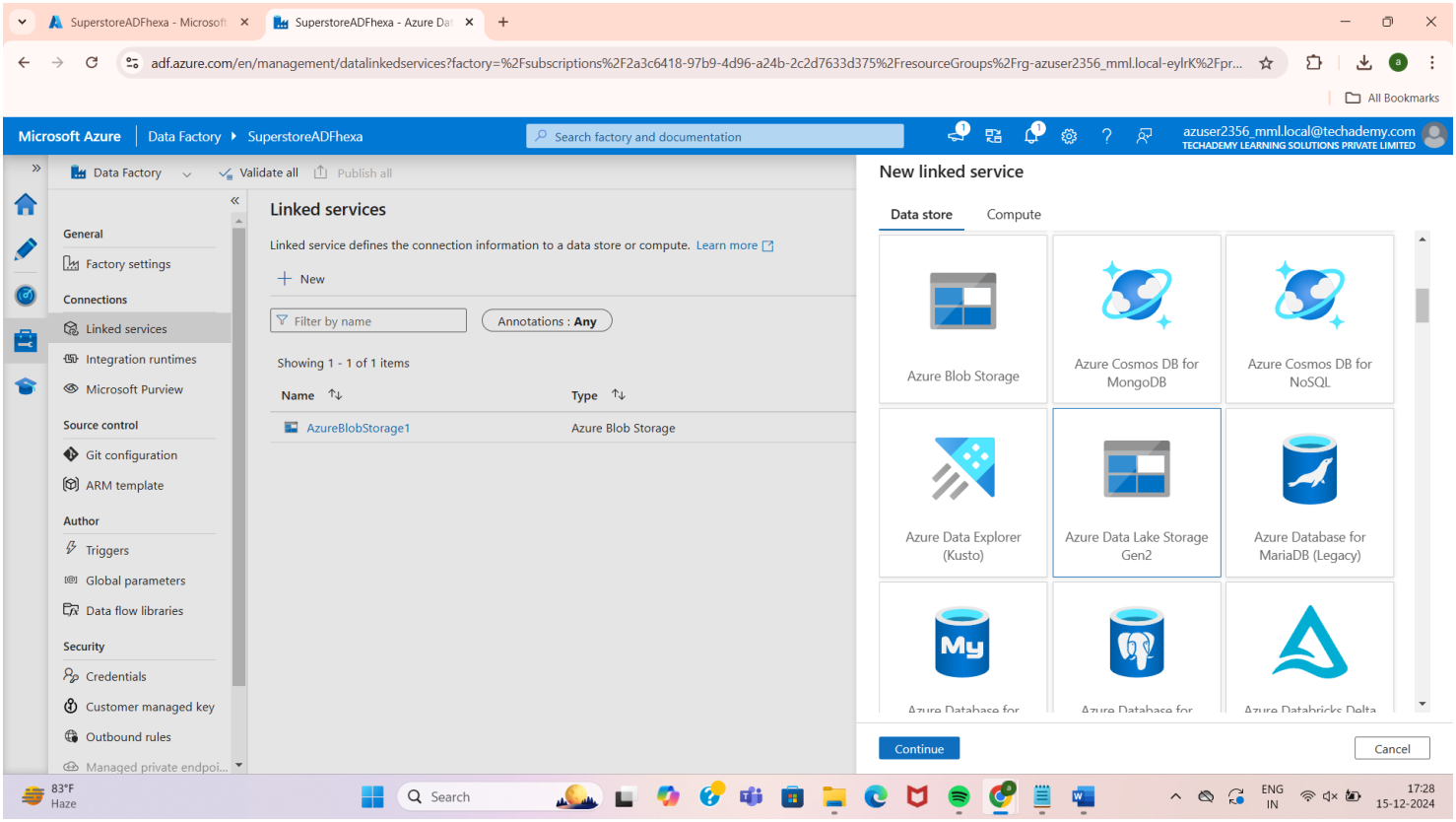
In linked services add the source and destination services (Azure Blob Storage, Azure Delta Lake Storage):



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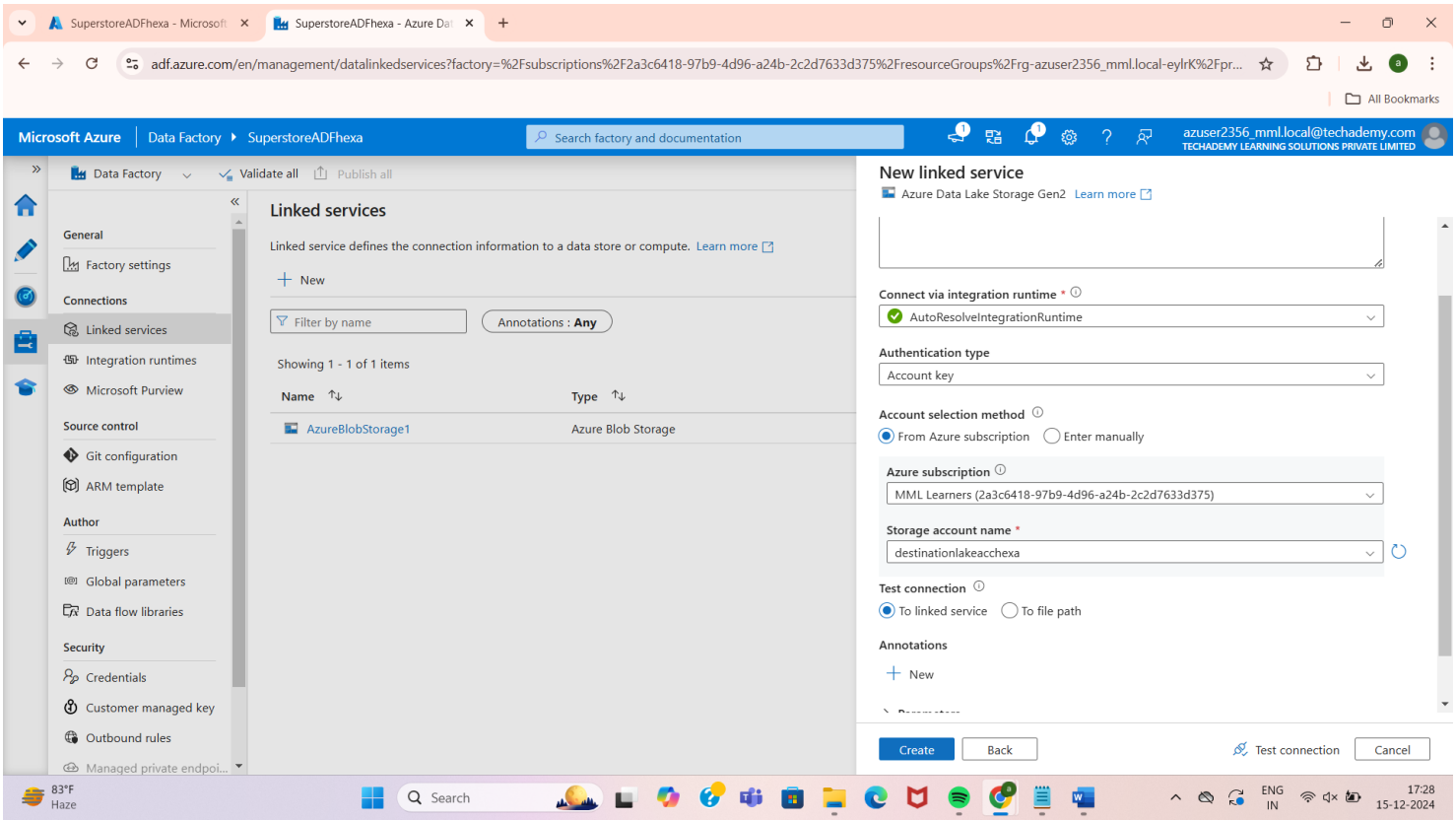
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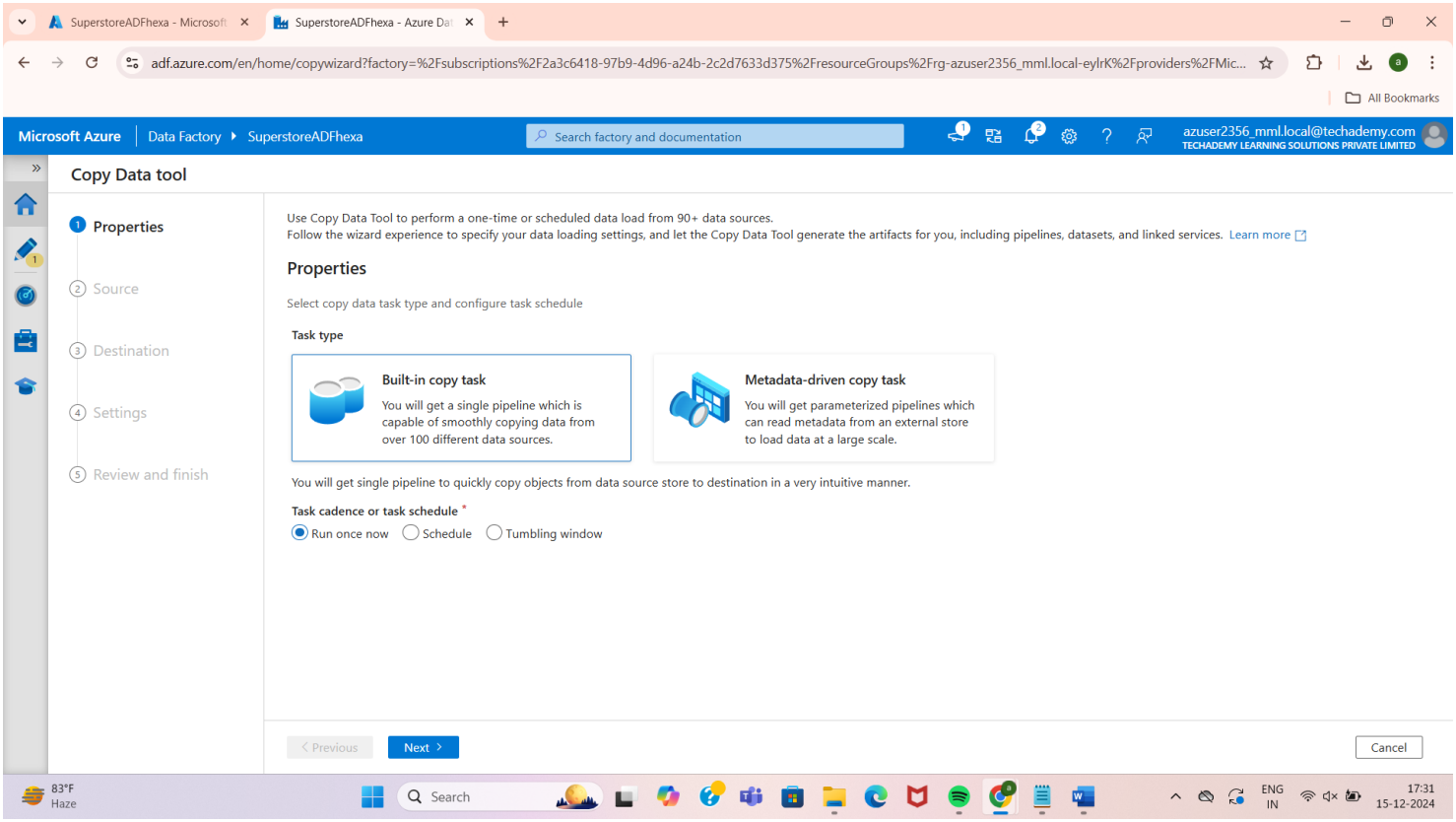
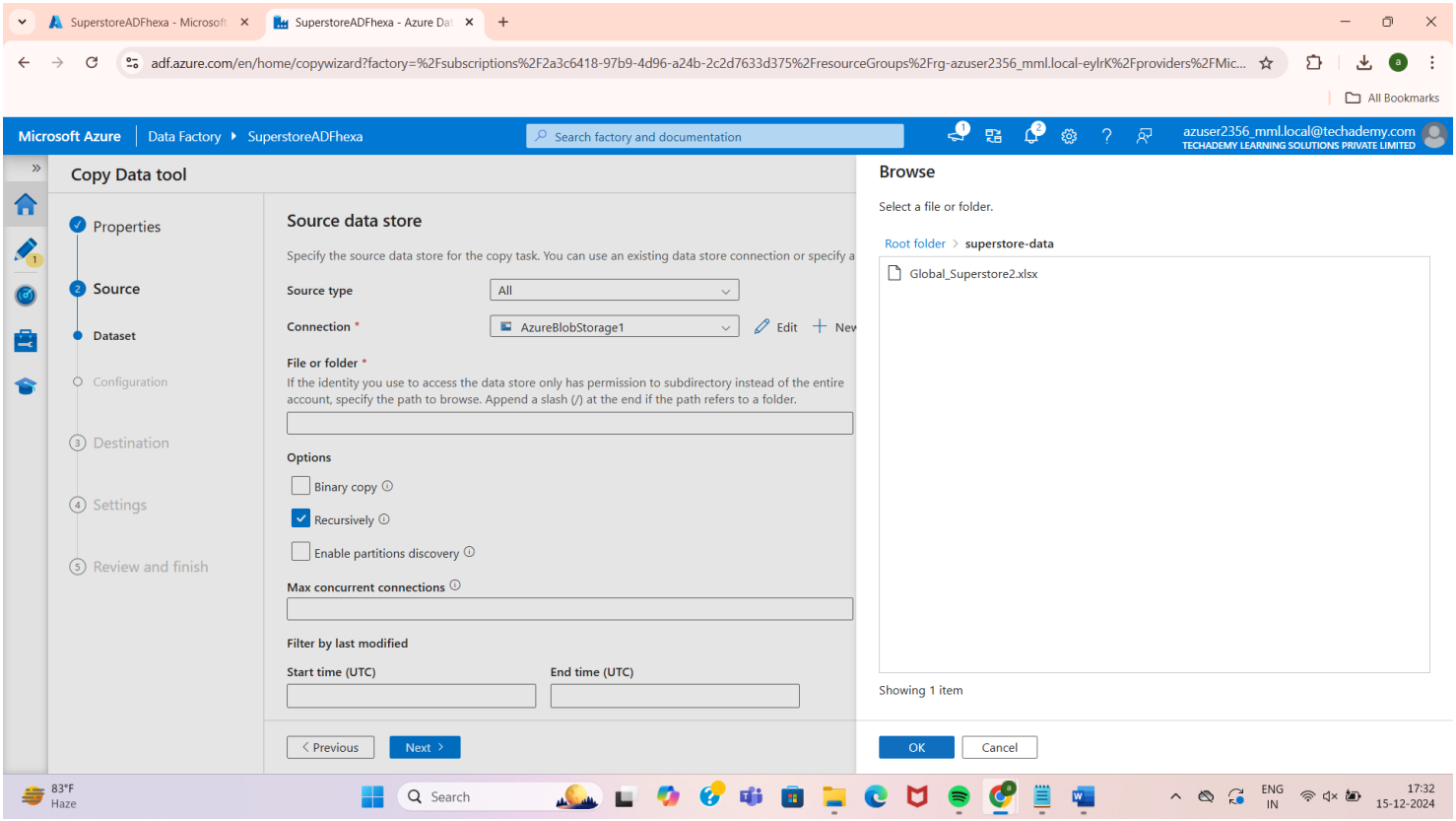
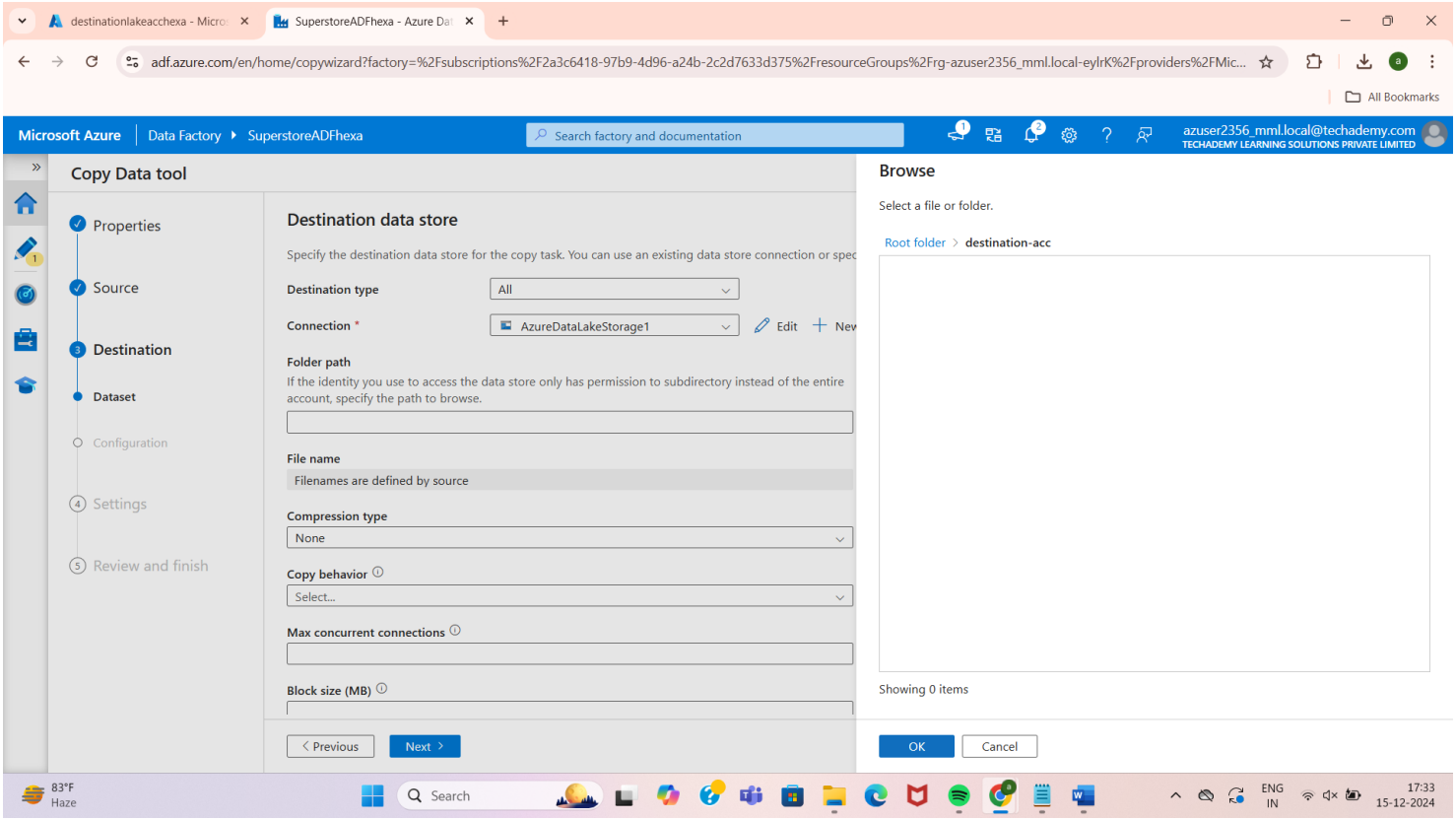
Create a new pipeline and perform a Copy data tool to move data to Delta Lake Account:

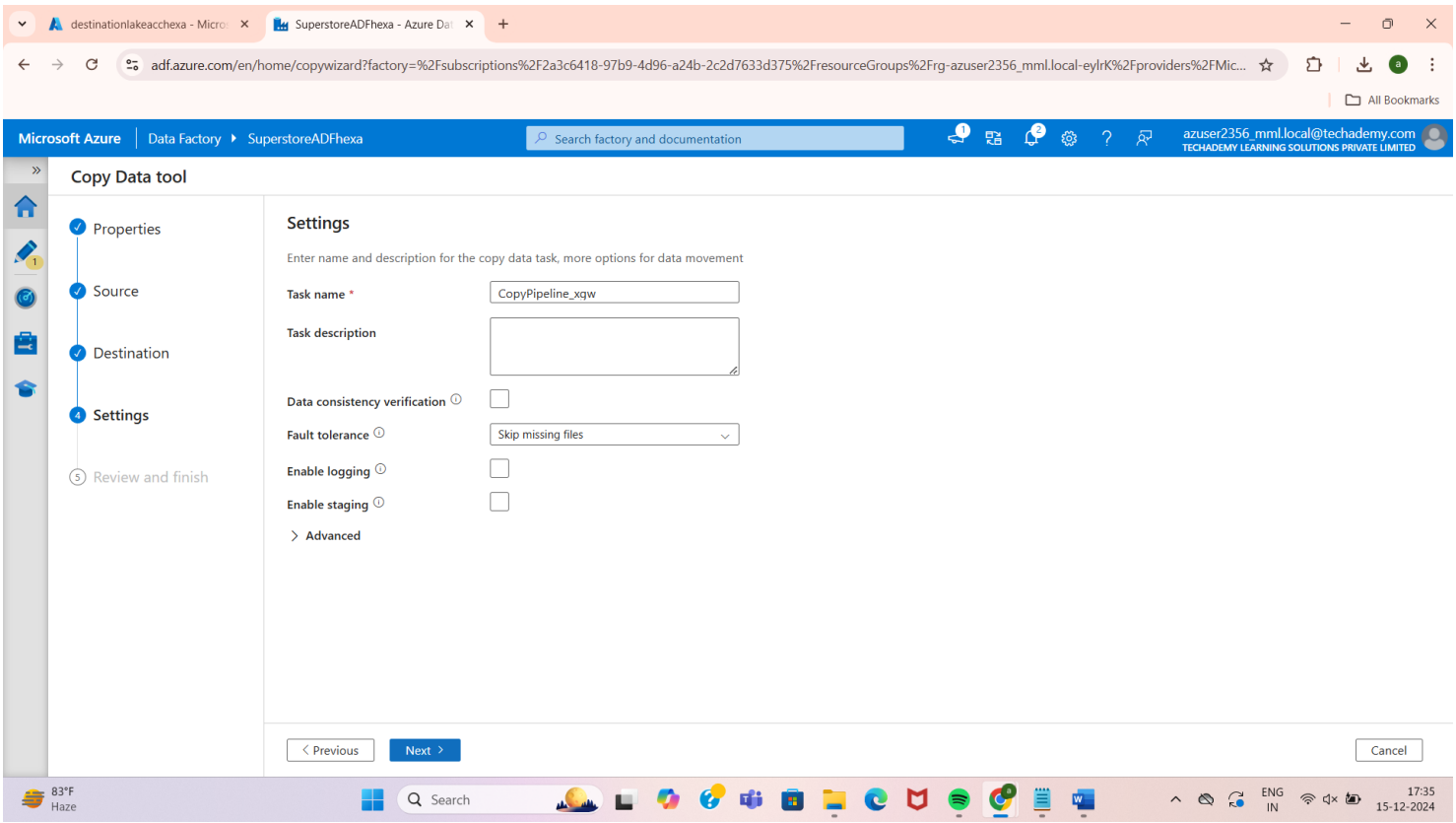


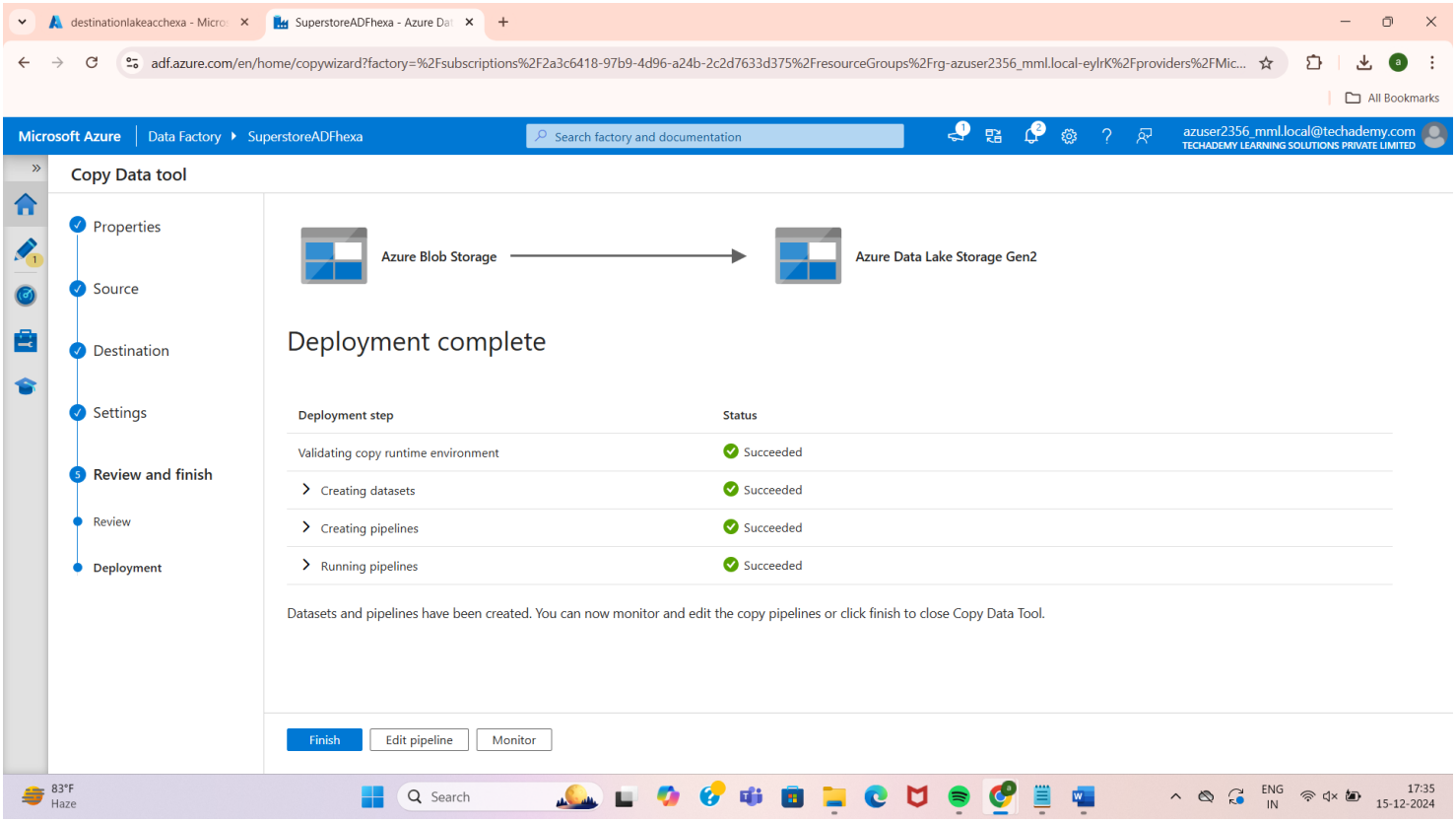
Select source data:



Select destination container:



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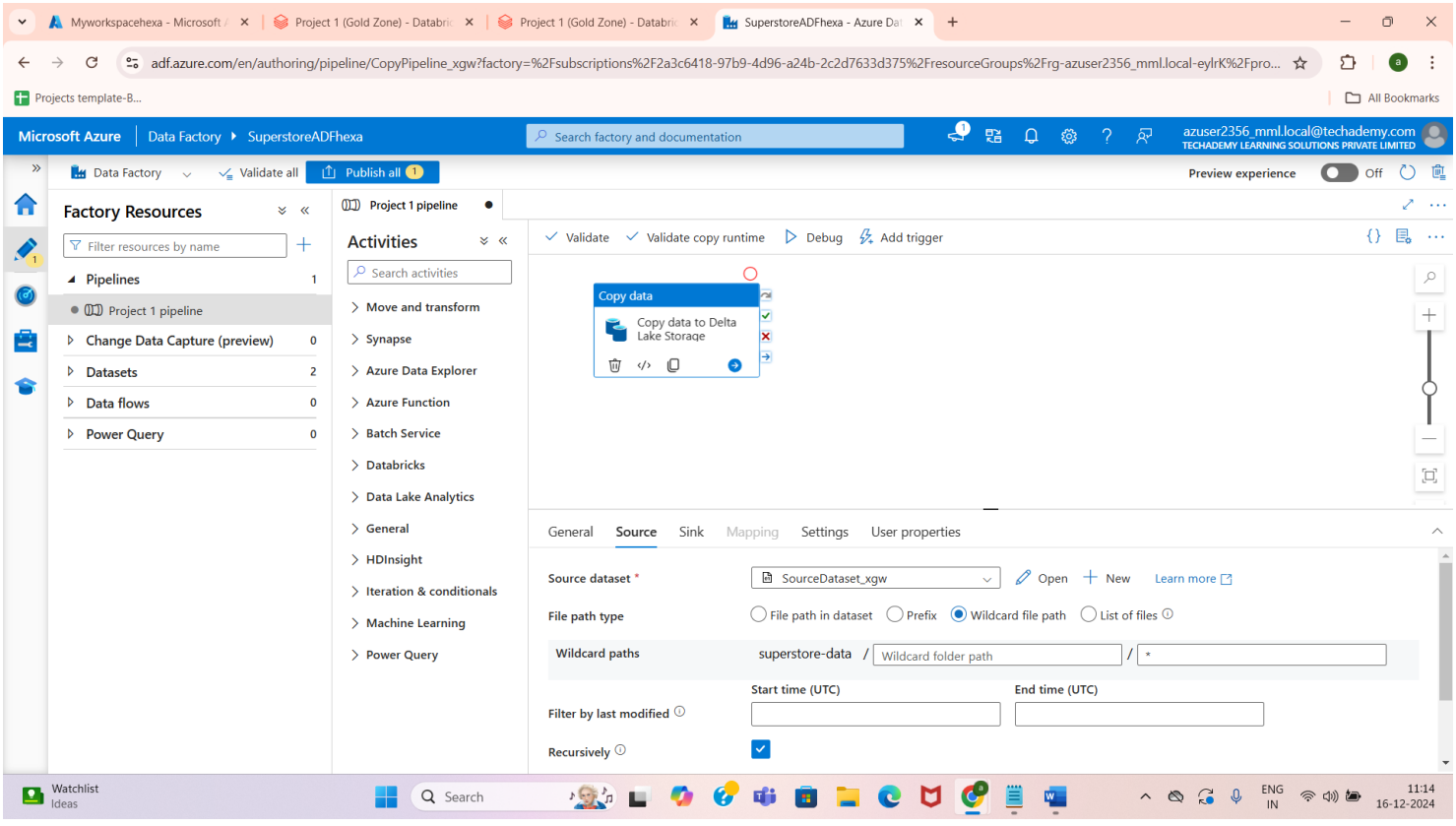
Azure Data Lake Storage Gen2
Deployment complete
Deployment step
Status
Validating copy runtime environment
Succeeded
Creating datasets
Succeeded
Creating pipelines
Succeeded
Running pipelines
Succeeded
Datasets and pipelines have been created. You can now monitor and edit the copy pipelines or click finish to close Copy Data Tool.
Finish
Edit pipeline
Monitor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Factory Resources
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Pipelines
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Change Data Capture (preview)
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Search activities
Move and transform
Synapse
Azure Data Explorer
Azure Function
Batch Service
Databricks
Data Lake Analytics
General
HDInsight
Iteration & conditionals
Machine Learning
Power Query
Validate
Validate copy runtime
Debug
Add trigger
Copy data
Copy data to Delta Lake Storage
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Sink
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Settings
User properties
Source dataset *
SourceDataset_xgw
Open
New
Learn more
File path type
File path in dataset
Prefix
Wildcard file path
List of files
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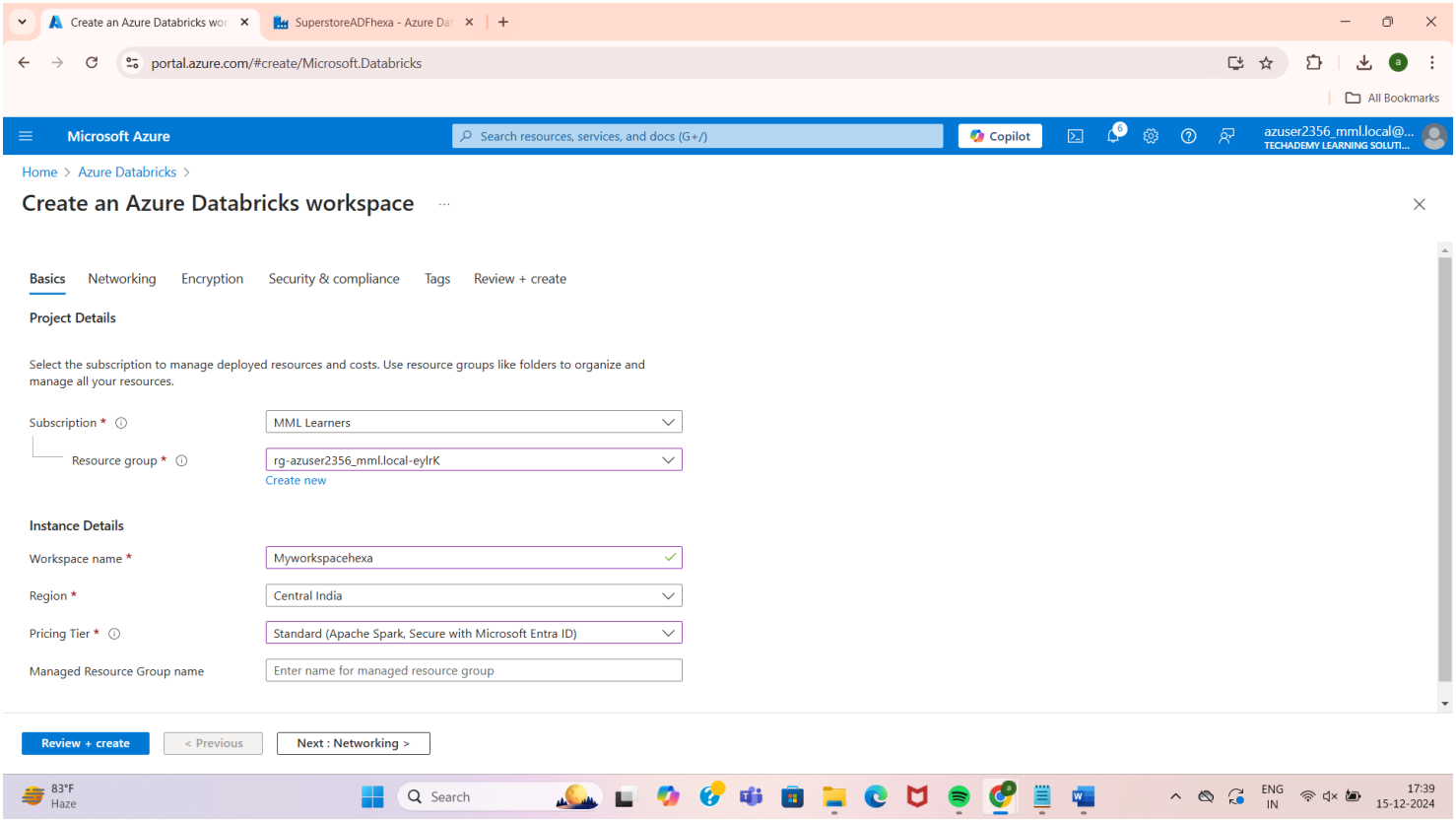
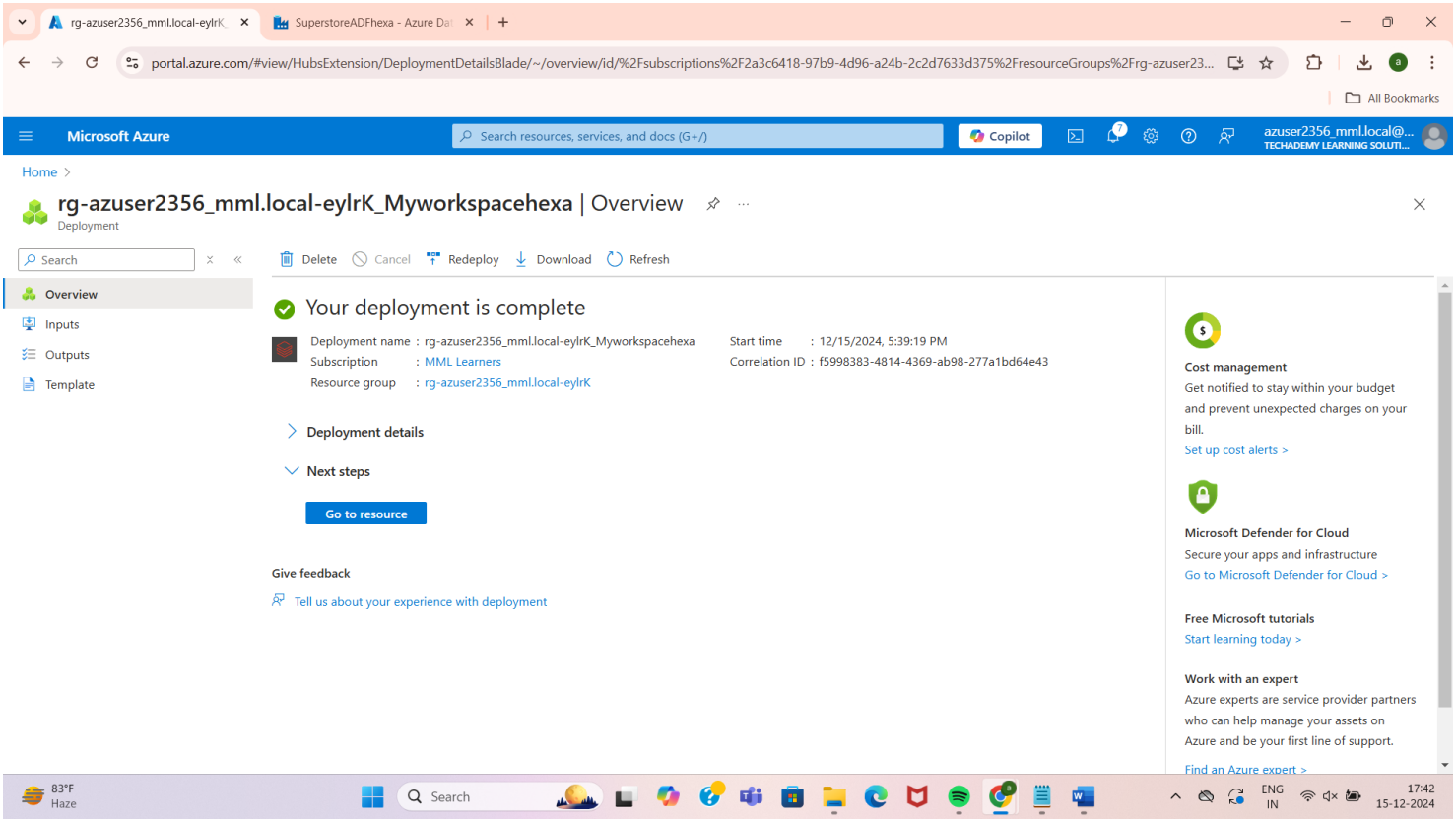
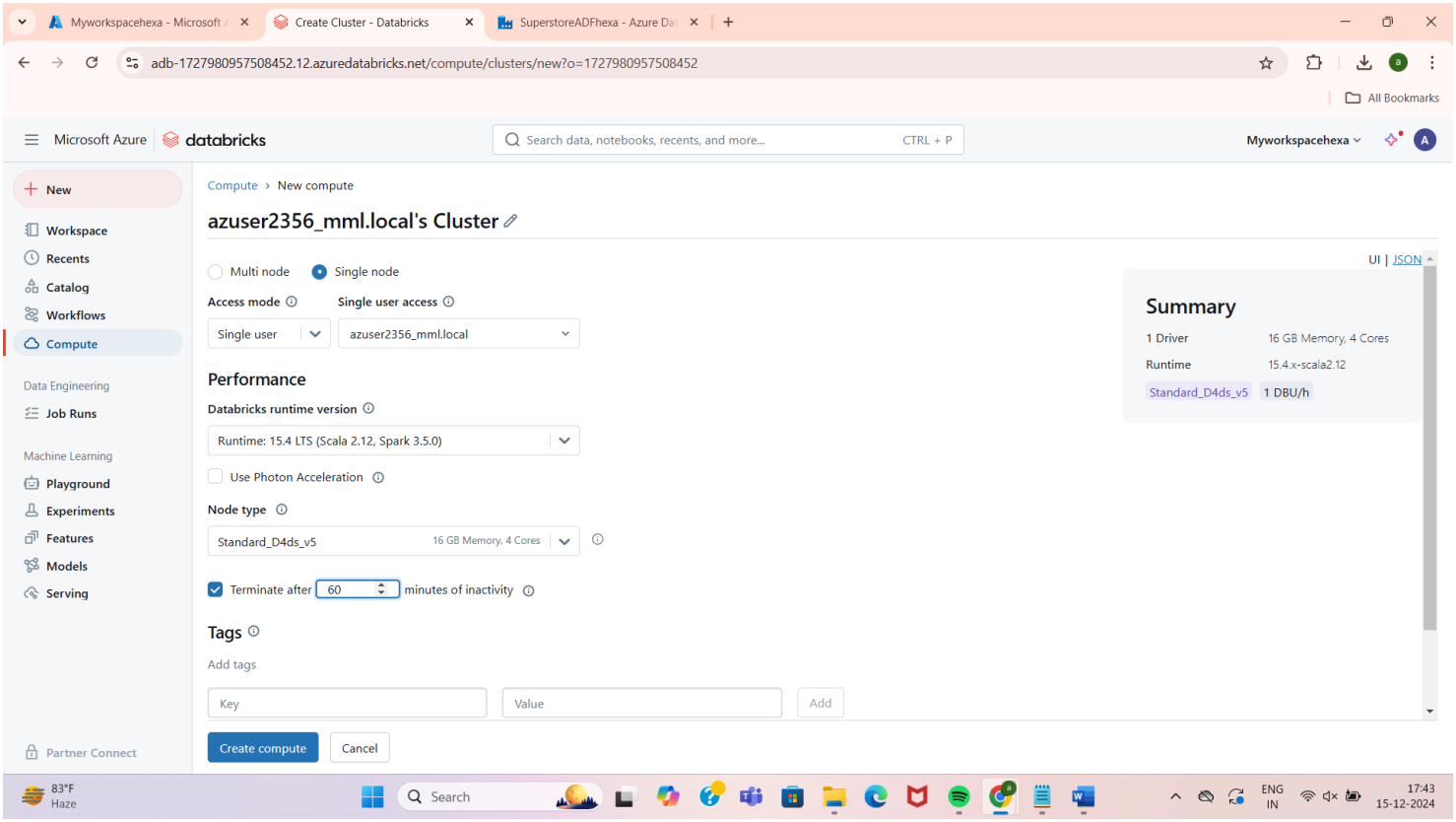
Start time (UTC)
End time (UTC)
Filter by last modified
Recursively

Create Azure Databricks Workspace:

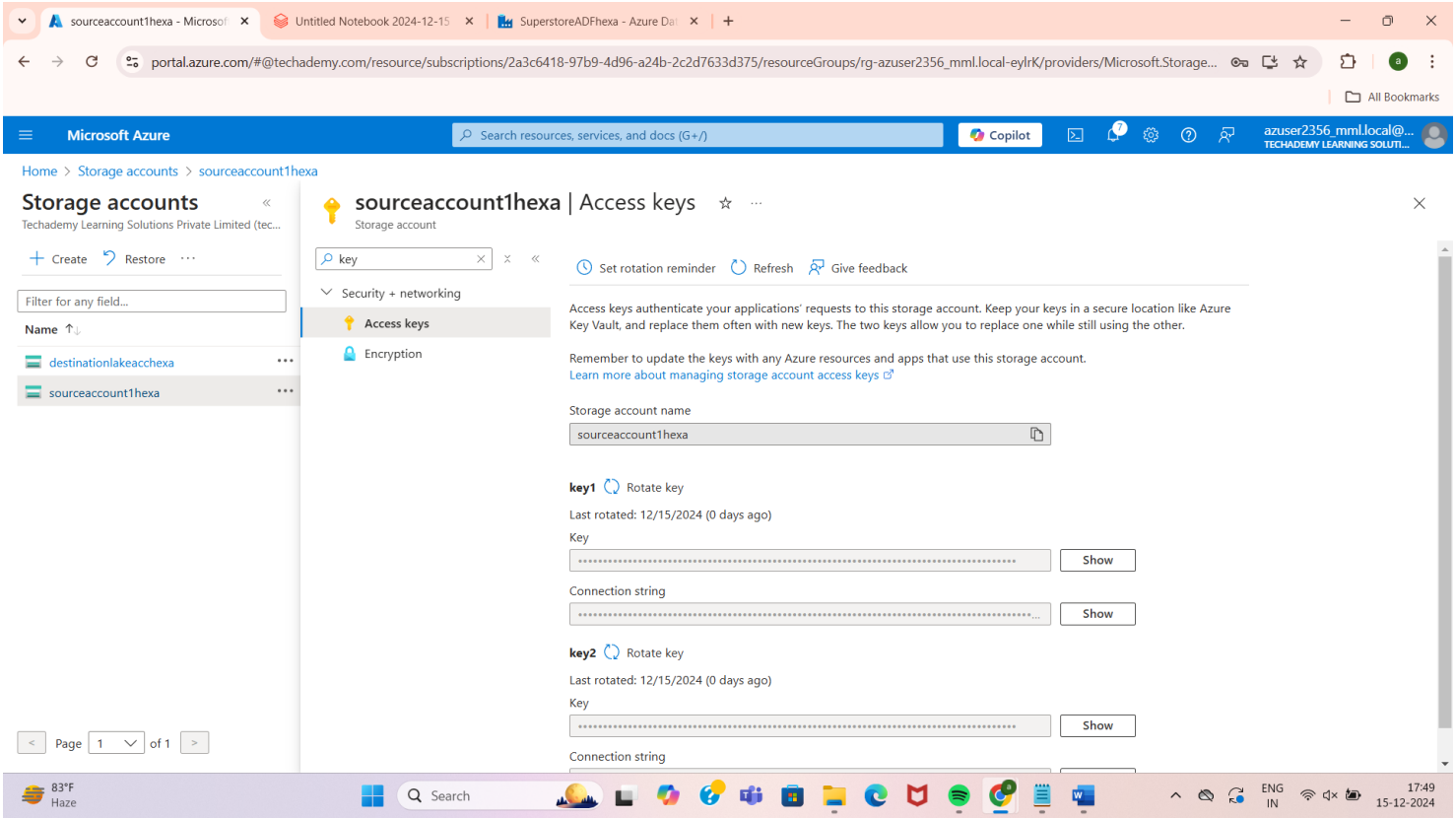




Create a cluster:



Create a notebook and copy the key of the storage account:



Perform the ingestion tasks in the notebook:

1. Mount Azure Blob Storage

Just now (21s) 1 Python

```
%python
# Fetching the csv file from the blob storage
storage_account_name = "sourceaccount1hexa"
container_name = "superstore-data"
storage_account_key = "ooZRQBCJR9AwKPvv5YvKprjv3UlGndcovcyJcjT4dVN8DbxojxsSgLojGldlb4O0ZMJd1AqFqrY2+AStj31gDQ=="

# Unmount the directory if it is already mounted
if any(mount.mountPoint == "/mnt/superstore" for mount in dbutils.fs.mounts()):
    dbutils.fs.unmount("/mnt/superstore")

# Mount Blob Storage
dbutils.fs.mount(
    source=f"wasbs://{container_name}@{storage_account_name}.blob.core.windows.net",
    mount_point="/mnt/superstore",
    extra_configs={
        f"fs.azure.account.key.{storage_account_name}.blob.core.windows.net": storage_account_key
    }
)
```

```
/mnt/superstore has been unmounted.
True
```

2.Verify the mount:

Just now (1s) 2 Python

```
#verifying the mount
display(dbutils.fs.ls("/mnt/superstore"))
```

(2) Spark Jobs

Table

	path	name	size	modificationTime
1	dbfs:/mnt/superstore/Global_Superstore2.c...	Global_Superstore2.c...	12089916	1734265964000

1 row | 0.52 seconds runtime Refreshed now

3. Load Data from Blob Storage

06:04 PM (4s) 3 Python

```
from pyspark.sql import SparkSession
spark = SparkSession.builder.appName("SuperstoreETL").getOrCreate()

# Load the dataset
file_path = "/mnt/superstore/Global_Superstore2.csv"
df = spark.read.csv(file_path, header=True, inferSchema=True)
df.show(5)
```

(3) Spark Jobs

df: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 22 more fields]

```
+------+---------------+----------+----------+------------+-----------+----------------+-----------+------------+---------------+-------------+
-----------+------+-------+----------------+----------+------------+--------------------+--------+--------+--------+--------+-------------+-----
---------+
|Row ID|       Order ID|Order Date| Ship Date|   Ship Mode|Customer ID|   Customer Name|    Segment|        City|          State|      Country|
Postal Code|Market| Region|      Product ID|  Category|Sub-Category|        Product Name|   Sales|Quantity|Discount|  Profit|Shipping Cost|Order
Priority|
+------+---------------+----------+----------+------------+-----------+----------------+-----------+------------+---------------+-------------+
-----------+------+-------+----------------+----------+------------+--------------------+--------+--------+--------+--------+-------------+-----
---------+
| 32298| CA-2012-124891|2012-07-31|2012-07-31|    Same Day|   RH-19495|     Rick Hansen|   Consumer|New York City|       New York|United States|
10024|    US|   East| TEC-AC-10003033|Technology| Accessories|Plantronics CS510...| 2309.65|       7|       0|762.1845|       933.57|      Criti
cal|
| 26341|  IN-2013-77878|2013-02-05|2013-02-07|Second Class|   JR-16210|   Justin Ritter|  Corporate|   Wollongong|New South Wales|    Australia|
NULL|  APAC|Oceania| FUR-CH-10003950| Furniture|      Chairs|Novimex Executive...|3709.395|       9|     0.1|-288.765|       923.63|      Critic
al|
| 25330|  IN-2013-71249|2013-10-17|2013-10-18| First Class|   CR-12730|    Craig Reiter|   Consumer|     Brisbane|     Queensland|    Australia|
```

4. Inspect and Verify Schema

12:17 PM (<1s) 4

```
# Inspect and Verify Schema
df.printSchema()
```

```
|-- Ship Mode: string (nullable = true)
|-- Customer ID: string (nullable = true)
|-- Customer Name: string (nullable = true)
|-- Segment: string (nullable = true)
|-- City: string (nullable = true)
|-- State: string (nullable = true)
|-- Country: string (nullable = true)
|-- Postal Code: integer (nullable = true)
|-- Market: string (nullable = true)
|-- Region: string (nullable = true)
|-- Product ID: string (nullable = true)
|-- Category: string (nullable = true)
|-- Sub-Category: string (nullable = true)
|-- Product Name: string (nullable = true)
|-- Sales: string (nullable = true)
|-- Quantity: string (nullable = true)
|-- Discount: string (nullable = true)
|-- Profit: double (nullable = true)
|-- Shipping Cost: double (nullable = true)
|-- Order Priority: string (nullable = true)
```

5. Persist Raw Data (Bronze Zone)

12:17 PM (23s) 5

```
#Persist Raw Data (Bronze Zone)
bronze_zone_path = "/mnt/bronze/superstore"
df.write.format("delta").option("mergeSchema", "true").option("delta.columnMapping.mode", "name").mode("overwrite").save(bronze_zone_path)
```

(6) Spark Jobs

6. Perform Data Validation Checks

12:17 PM (10s) 6

```
#Perform Data Validation Checks
# Check for null values in critical columns

from pyspark.sql.functions import col
df.filter(col("Order ID").isNull() | col("Customer ID").isNull()).show()
```

(2) Spark Jobs

```
+------+--------+----------+---------+---------+-----------+-------------+-------+----+-----+-------+-----------+------+------+----------+--------+
------------+------------+-----+--------+--------+------+-------------+--------------+
|Row ID|Order ID|Order Date|Ship Date|Ship Mode|Customer ID|Customer Name|Segment|City|State|Country|Postal Code|Market|Region|Product ID|Category|
Sub-Category|Product Name|Sales|Quantity|Discount|Profit|Shipping Cost|Order Priority|
+------+--------+----------+---------+---------+-----------+-------------+-------+----+-----+-------+-----------+------+------+----------+--------+
------------+------------+-----+--------+--------+------+-------------+--------------+
+------+--------+----------+---------+---------+-----------+-------------+-------+----+-----+-------+-----------+------+------+----------+--------+
------------+------------+-----+--------+--------+------+-------------+--------------+
```

7. Deduplicate Raw Data

12:17 PM (<1s) 7

```
#Deduplicate Raw Data
df = df.dropDuplicates(["Order ID", "Row ID"])
```

df: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 22 more fields]

8. Save Cleaned Raw Data in Bronze Zone

12:17 PM (11s) 8

```
#Save Cleaned Raw Data in Bronze Zone
df.write.format("delta").mode("overwrite").save(bronze_zone_path)
```

(8) Spark Jobs

12:17 PM (1s) 9

```
dbutils.notebook.exit(bronze_zone_path)
```

```
Notebook exited: /mnt/bronze/superstore
```

Perform Transformation & Load tasks in the Notebook:

1. Add a Column

06:08 PM (1s) 4

```
#Add Total Cost Column
from pyspark.sql.functions import col

df_transformed = df.withColumn("TotalCost", col("Sales") - col("Profit"))
df.show(5)
```

(1) Spark Jobs

df_transformed: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

```
---------+
| 32298| CA-2012-124891|2012-07-31|2012-07-31|    Same Day|   RH-19495|     Rick Hansen|   Consumer|New York City|       New York|United States|
10024|    US|   East| TEC-AC-10003033|Technology| Accessories|Plantronics CS510...| 2309.65|       7|       0|762.1845|       933.57|      Criti
cal|
| 26341|  IN-2013-77878|2013-02-05|2013-02-07|Second Class|   JR-16210|   Justin Ritter|  Corporate|   Wollongong|New South Wales|    Australia|
NULL|  APAC|Oceania| FUR-CH-10003950| Furniture|      Chairs|Novimex Executive...|3709.395|       9|     0.1|-288.765|       923.63|      Critic
al|
| 25330|  IN-2013-71249|2013-10-17|2013-10-18| First Class|   CR-12730|    Craig Reiter|   Consumer|     Brisbane|     Queensland|    Australia|
NULL|  APAC|Oceania| TEC-PH-10004664|Technology|      Phones|Nokia Smart Phone...|5175.171|       9|     0.1| 919.971|       915.49|        Medi
um|
| 13524|ES-2013-1579342|2013-01-28|2013-01-30| First Class|   KM-16375|Katherine Murray|Home Office|       Berlin|         Berlin|      Germany|
NULL|    EU|Central| TEC-PH-10004583|Technology|      Phones|Motorola Smart Ph...| 2892.51|       5|     0.1|  -96.54|       910.16|        Medi
um|
| 47221|   SG-2013-4320|2013-11-05|2013-11-06|    Same Day|    RH-9495|     Rick Hansen|   Consumer|        Dakar|          Dakar|      Senegal|
NULL|Africa| Africa|TEC-SHA-10000501|Technology|     Copiers|Sharp Wireless Fa...| 2832.96|       8|       0|  311.52|       903.04|      Critic
al|
+------+---------------+----------+----------+------------+-----------+----------------+-----------+-------------+---------------+-------------+
-----------+------+-------+----------------+----------+------------+--------------------+--------+--------+--------+--------+-------------+-----
---------+
only showing top 5 rows
```

2. Convert Sales and Profit to Float

06:09 PM (1s) 5 Python

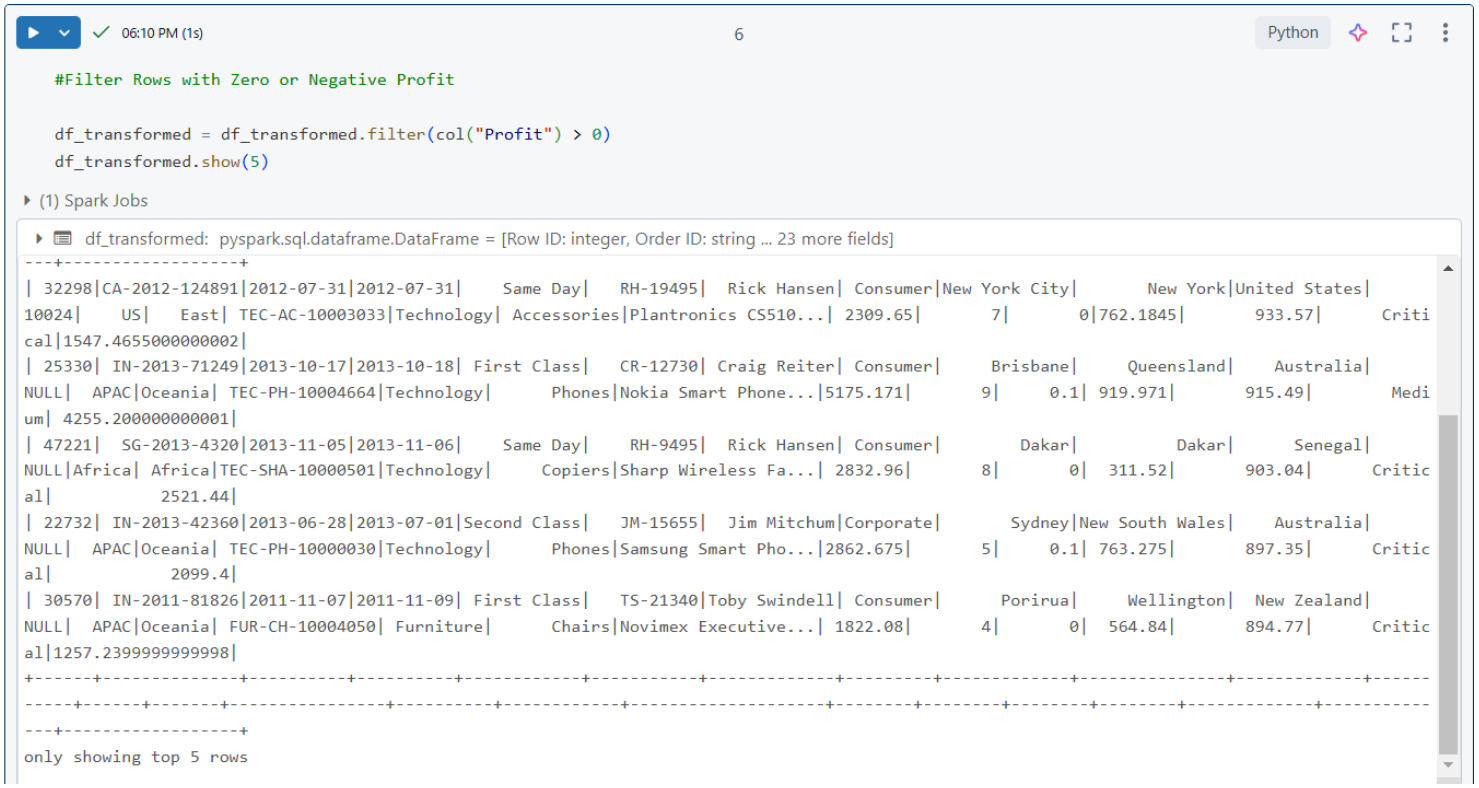
```
#Convert Sales and Profit to Float

df_transformed = df_transformed.withColumn("Sales", col("Sales").cast("float"))
df_transformed = df_transformed.withColumn("Profit", col("Profit").cast("float"))

df_transformed.show(5)
```

(1) Spark Jobs

df_transformed: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

```
+------+---------------+----------+----------+------------+-----------+----------------+-----------+-------------+---------------+-------------+
-----------+------+-------+----------------+----------+------------+--------------------+--------+--------+--------+--------+-------------+-----
---------+------------------+
|Row ID|       Order ID|Order Date| Ship Date|   Ship Mode|Customer ID|   Customer Name|    Segment|         City|          State|      Country|
Postal Code|Market| Region|      Product ID|  Category|Sub-Category|        Product Name|   Sales|Quantity|Discount|  Profit|Shipping Cost|Order
Priority|         TotalCost|
+------+---------------+----------+----------+------------+-----------+----------------+-----------+-------------+---------------+-------------+
-----------+------+-------+----------------+----------+------------+--------------------+--------+--------+--------+--------+-------------+-----
---------+------------------+
| 32298| CA-2012-124891|2012-07-31|2012-07-31|    Same Day|   RH-19495|     Rick Hansen|   Consumer|New York City|       New York|United States|
10024|    US|   East| TEC-AC-10003033|Technology| Accessories|Plantronics CS510...| 2309.65|       7|       0|762.1845|       933.57|      Criti
cal|1547.4655000000002|
| 26341|  IN-2013-77878|2013-02-05|2013-02-07|Second Class|   JR-16210|   Justin Ritter|  Corporate|   Wollongong|New South Wales|    Australia|
NULL|  APAC|Oceania| FUR-CH-10003950| Furniture|      Chairs|Novimex Executive...|3709.395|       9|     0.1|-288.765|       923.63|      Critic
al|           3998.16|
| 25330|  IN-2013-71249|2013-10-17|2013-10-18| First Class|   CR-12730|    Craig Reiter|   Consumer|     Brisbane|     Queensland|    Australia|
NULL|  APAC|Oceania| TEC-PH-10004664|Technology|      Phones|Nokia Smart Phone...|5175.171|       9|     0.1| 919.971|       915.49|        Medi
um| 4255.200000000001|
```

3. Filter Rows with Zero or Negative Profit



```
06:10 PM (1s)                                                    6                                                    Python

#Filter Rows with Zero or Negative Profit

df_transformed = df_transformed.filter(col("Profit") > 0)
df_transformed.show(5)

(1) Spark Jobs

df_transformed:  pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

---+------------------+
| 32298|CA-2012-124891|2012-07-31|2012-07-31|    Same Day|   RH-19495|  Rick Hansen| Consumer|New York City|       New York|United States|
10024|    US|   East| TEC-AC-10003033|Technology| Accessories|Plantronics CS510...| 2309.65|       7|       0|762.1845|       933.57|      Criti
cal|1547.4655000000002|
| 25330| IN-2013-71249|2013-10-17|2013-10-18| First Class|   CR-12730| Craig Reiter| Consumer|     Brisbane|     Queensland|    Australia|
NULL|  APAC|Oceania| TEC-PH-10004664|Technology|      Phones|Nokia Smart Phone...|5175.171|       9|     0.1| 919.971|       915.49|        Medi
um| 4255.200000000001|
| 47221|  SG-2013-4320|2013-11-05|2013-11-06|    Same Day|    RH-9495|  Rick Hansen| Consumer|        Dakar|          Dakar|      Senegal|
NULL|Africa| Africa|TEC-SHA-10000501|Technology|     Copiers|Sharp Wireless Fa...| 2832.96|       8|       0|  311.52|       903.04|      Critic
al|           2521.44|
| 22732| IN-2013-42360|2013-06-28|2013-07-01|Second Class|   JM-15655|  Jim Mitchum|Corporate|       Sydney|New South Wales|    Australia|
NULL|  APAC|Oceania| TEC-PH-10000030|Technology|      Phones|Samsung Smart Pho...|2862.675|       5|     0.1| 763.275|       897.35|      Critic
al|            2099.4|
| 30570| IN-2011-81826|2011-11-07|2011-11-09| First Class|   TS-21340|Toby Swindell| Consumer|      Porirua|     Wellington|  New Zealand|
NULL|  APAC|Oceania| FUR-CH-10004050| Furniture|      Chairs|Novimex Executive...| 1822.08|       4|       0|  564.84|       894.77|      Critic
al|1257.2399999999998|
+------+--------------+----------+----------+------------+-----------+-------------+---------+-------------+---------------+-------------+------
------+------+--------+---------------+----------+------------+--------------------+--------+--------+--------+--------+-------------+----------
---+------------------+
only showing top 5 rows
```

4. Group by Category and Region and perform aggregation

```
12:25 PM (1s)                                                    5

from pyspark.sql.functions import col, sum
#Group by Category and Region and perform aggregation

# Step 1: Clean the data by filtering out rows with non-numeric values in Sales, Quantity, or Discount
df_clean = df_bronze.filter(
    (col("Sales").rlike("^[0-9]*\.?[0-9]+$")) &  # Allow decimal numbers in Sales
    (col("Quantity").rlike("^[0-9]+$")) &  # Allow only integers in Quantity
    (col("Discount").rlike("^[0-9]*\.?[0-9]+$"))  # Allow decimal numbers in Discount
)

# Step 2: Cast the cleaned columns to appropriate numeric types
df_clean = df_clean.withColumn("Sales", col("Sales").cast("float")) \
                   .withColumn("Quantity", col("Quantity").cast("int")) \
                   .withColumn("Discount", col("Discount").cast("float"))

# Step 3: Drop rows with any null values in the numeric columns (after casting)
df_clean = df_clean.dropna(subset=["Sales", "Quantity", "Discount", "Profit"])

# Step 4: Group by Category and Region and perform aggregation
df_grouped = df_clean.groupBy("Category", "Region") \
    .agg(
        sum("Sales").alias("TotalSales"),
        sum("Profit").alias("TotalProfit"),
        sum("Quantity").alias("TotalQuantity"),
        sum("Discount").alias("TotalDiscount")
    )
```

```
# Step 5: Show the transformed data
df_grouped.show(5)
```

(2) Spark Jobs

df_clean: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 22 more fields]

df_grouped: pyspark.sql.dataframe.DataFrame = [Category: string, Region: string ... 4 more fields]

```
+----------+------+------------------+------------------+-------------+-----------------+
|  Category|Region|        TotalSales|       TotalProfit|TotalQuantity|    TotalDiscount|
+----------+------+------------------+------------------+-------------+-----------------+
| Furniture|Canada|10595.279964447021|2613.2400000000002|           78|              0.0|
|Technology|  EMEA|  300854.583026886|         17494.443|         2259|189.1000056862831|
| Furniture|  East| 205540.3473367691| 2501.816200000002|         2151| 90.6000018119812|
|Technology|Africa| 322367.0430994034|44129.492999999995|         2031|143.1999975964427|
|Technology|  East| 264872.0816922188|        47439.5576|         1927|76.30000080168247|
+----------+------+------------------+------------------+-------------+-----------------+
only showing top 5 rows
```

5. Add a Profit Margin Column

12:25 PM (<1s) 6

```
from pyspark.sql.functions import col

# Add a Profit Margin Column
df_grouped = df_transformed.withColumn("ProfitMargin", (col("Profit") / col("Sales")) * 100)

# Show the result
df_grouped.show(5)
```

(1) Spark Jobs

df_grouped: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 24 more fields]

```
-----------------+------------------+
| 42655|AG-2011-1390|2011-08-16|2011-08-21|Standard Class|    DH-3675|     Duane Huffman|Home Office|     Bejaia|     Bejaia|Algeria|       NULL
|Africa|Africa|OFF-SAN-10001237|Office Supplies|       Paper|SanDisk Cards & E...|581.04|      12|       0|220.68|        35.32|        Medium|3
60.35999999999996| 37.98017365775751|
| 48096|AG-2011-1440|2011-12-15|2011-12-20|Standard Class|    DB-3210|       Dean Braden|   Consumer|Constantine|Constantine|Algeria|       NULL
|Africa|Africa|OFF-AVE-10004909|Office Supplies|     Binders|Avery 3-Hole Punc...| 58.74|       2|       0| 20.52|         3.04|        Medium|
38.22|34.933605501216725|
| 44980| AG-2011-380|2011-03-03|2011-03-09|Standard Class|    CC-2370|Christopher Conant|   Consumer|    Algiers|      Alger|Algeria|       NULL
|Africa|Africa|FUR-ELD-10003131|      Furniture| Furnishings|Eldon Frame, Durable|113.28|       1|       0| 29.43|         9.51|        Medium|
83.85| 25.97987343071408|
| 47723|AG-2011-4410|2011-11-02|2011-11-04|   First Class|    JH-5985|       Joseph Holt|   Consumer|     Bejaia|     Bejaia|Algeria|       NULL
|Africa|Africa|OFF-EAT-10003338|Office Supplies|       Paper|Eaton Message Boo...| 24.72|       1|       0| 10.86|         4.29|          High|
13.86| 43.93203866640217|
| 43718| AG-2011-450|2011-11-07|2011-11-11|Standard Class|    BC-1125|     Becky Castell|Home Office|    Algiers|      Alger|Algeria|       NULL
|Africa|Africa|OFF-STO-10003604|Office Supplies|   Fasteners|Stockwell Staples...| 10.92|       1|       0|  4.14|         1.05|        Medium|
6.78|   37.912086424551|
```

6. Remove Duplicate Rows based on 'Category' and 'Region'

12:25 PM (1s) 7

```
# Remove Duplicate Rows based on 'Category' and 'Region'
df_grouped = df_transformed.dropDuplicates(["Category", "Region"])

df_grouped.show(5)
```

(2) Spark Jobs

df_grouped: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

```
--------------+------------------+
| 44980|   AG-2011-380|2011-03-03|2011-03-09|Standard Class|    CC-2370|Christopher Conant|Consumer|           Algiers|       Alger|      Alge
ria|       NULL|Africa|      Africa|FUR-ELD-10003131|Furniture| Furnishings|Eldon Frame, Durable|113.28|       1|       0|  29.43|         9.51|
Medium|             83.85|
| 46421|  CA-2011-4370|2011-09-23|2011-09-30|Standard Class|    DW-3540|         Don Weiss|Consumer|           Toronto|      Ontario|       Can
ada|       NULL|Canada|      Canada|FUR-DEF-10000622|Furniture| Furnishings|Deflect-O Light B...| 18.99|       1|       0|   6.81|         1.41|
Medium|             12.18|
|  1351|MX-2011-104752|2011-03-11|2011-03-16|Standard Class|   MM-18055|    Michelle Moray|Consumer|Consolaci□n del Sur|Pinar del R□o|
Cuba|       NULL| LATAM|   Caribbean| FUR-FU-10000885|Furniture| Furnishings|Eldon Light Bulb,...| 44.46|       3|       0|    8.4|         3.41
|        Medium|             36.06|
| 33942|CA-2011-131002|2011-09-07|2011-09-12|  Second Class|   TB-21400|  Tom Boeckenhauer|Consumer|             Tulsa|     Oklahoma|United Sta
tes|      74133|    US|     Central| FUR-FU-10004270|Furniture| Furnishings|"Executive Impres...| 57.69|       3|       0|23.6529|         4.22|
High|34.037099999999995|
| 22308| ID-2014-20205|2014-10-22|2014-10-27|Standard Class|   JC-15340|   Jasper Cacioppo|Consumer|            Lahore|       Punjab|     Pakis
tan|       NULL|  APAC|Central Asia| FUR-FU-10000394|Furniture| Furnishings|Rubbermaid Photo ...|78.048|       2|     0.2| 26.328|         5.82|
Medium|             51.72|
+------+--------------+----------+----------+--------------+-----------+------------------+--------+------------------+-------------+----------
---+-----------+------+------------+----------------+---------+------------+--------------------+------+--------+--------+-------+-------------+
--------------+------------------+
only showing top 5 rows
```

7. Rename Columns for Clarity

12:25 PM (<1s) 8

```
#Rename Columns for Clarity
df_grouped = df_transformed.withColumnRenamed("Sales", "TotalSales") \
                           .withColumnRenamed("Profit", "TotalProfit")

df_grouped.show(5)
```

(1) Spark Jobs

df_grouped: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

```
-------+------------------+
| 42655|AG-2011-1390|2011-08-16|2011-08-21|Standard Class|    DH-3675|     Duane Huffman|Home Office|     Bejaia|     Bejaia|Algeria|       NULL
|Africa|Africa|OFF-SAN-10001237|Office Supplies|       Paper|SanDisk Cards & E...|    581.04|      12|       0|    220.68|        35.32|
Medium|360.35999999999996|
| 48096|AG-2011-1440|2011-12-15|2011-12-20|Standard Class|    DB-3210|       Dean Braden|   Consumer|Constantine|Constantine|Algeria|       NULL
|Africa|Africa|OFF-AVE-10004909|Office Supplies|     Binders|Avery 3-Hole Punc...|     58.74|       2|       0|     20.52|         3.04|
Medium|             38.22|
| 44980| AG-2011-380|2011-03-03|2011-03-09|Standard Class|    CC-2370|Christopher Conant|   Consumer|    Algiers|      Alger|Algeria|       NULL
|Africa|Africa|FUR-ELD-10003131|      Furniture| Furnishings|Eldon Frame, Durable|    113.28|       1|       0|     29.43|         9.51|
Medium|             83.85|
| 47723|AG-2011-4410|2011-11-02|2011-11-04|   First Class|    JH-5985|       Joseph Holt|   Consumer|     Bejaia|     Bejaia|Algeria|       NULL
|Africa|Africa|OFF-EAT-10003338|Office Supplies|       Paper|Eaton Message Boo...|     24.72|       1|       0|     10.86|         4.29|
High|             13.86|
| 43718| AG-2011-450|2011-11-07|2011-11-11|Standard Class|    BC-1125|     Becky Castell|Home Office|    Algiers|      Alger|Algeria|       NULL
|Africa|Africa|OFF-STO-10003604|Office Supplies|   Fasteners|Stockwell Staples...|     10.92|       1|       0|      4.14|         1.05|
Medium|              6.78|
+------+------------+----------+----------+--------------+-----------+------------------+-----------+-----------+-----------+-------+-----------
+------+------+---------------+----------+-----------+--------------------+----------+--------+--------+-----------+-------------+-------
-------+------------------+
```

8. Add a Year Column

12:25 PM (<1s) 9

```
from pyspark.sql.functions import col, year, to_date

# Add a Year Column
df_grouped = df_bronze.withColumn("Year", year(to_date(col("Order Date"), "MM/dd/yyyy")))

# Show the result
df_grouped.show(5)
```

(1) Spark Jobs

df_grouped: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

```
----+--------------+----+
| 48312|AE-2011-9160|2011-10-03|2011-10-07|Standard Class|    PO-8865|Patrick O'Donnell|   Consumer|         Ajman|         'Ajman|United Arab E
mirates|       NULL|  EMEA|  EMEA|TEC-EPS-10004171|     Technology|    Machines|Epson Calculator,...|78.408|       6|     0.7| -88.992|
3.87|        Medium|2011|
| 47297|AE-2013-1130|2013-10-14|2013-10-14|      Same Day|    EB-4110|   Eugene Barchas|   Consumer|Ras al Khaymah|Ra's Al Khaymah|United Arab E
mirates|       NULL|  EMEA|  EMEA|OFF-ACC-10004278|Office Supplies|   Fasteners|Accos Paper Clips...| 4.248|       1|     0.7|  -4.692|
0.1|          High|2013|
| 43923|AE-2014-3830|2014-12-13|2014-12-19|Standard Class|    GH-4665|      Greg Hansen|   Consumer|Ras al Khaymah|Ra's Al Khaymah|United Arab E
mirates|       NULL|  EMEA|  EMEA|OFF-AVE-10000357|Office Supplies|     Binders|Avery Binder Cove...| 3.159|       1|     0.7|  -4.971|
0.25|        Medium|2014|
| 43926|AE-2014-3830|2014-12-13|2014-12-19|Standard Class|    GH-4665|      Greg Hansen|   Consumer|Ras al Khaymah|Ra's Al Khaymah|United Arab E
mirates|       NULL|  EMEA|  EMEA|TEC-MOT-10001535|     Technology|      Phones|Motorola Headset,...|95.796|       4|     0.7|-156.564|
6.73|        Medium|2014|
| 42656|AG-2011-1390|2011-08-16|2011-08-21|Standard Class|    DH-3675|    Duane Huffman|Home Office|        Bejaia|         Bejaia|
Algeria|       NULL|Africa|Africa|OFF-IBI-10000440|Office Supplies|     Binders|Ibico Binder Cove...| 26.22|       2|       0|     1.8|
2.41|        Medium|2011|
```

9. Filter the Data for a Specific Year:

12:25 PM (1s) 10

```
from pyspark.sql.functions import col, year, to_date, sum
#Filter the Data for a Specific Year

# Step 1: Add the Year Column to the Original DataFrame
df = df_bronze.withColumn("Year", year(to_date(col("Order Date"), "MM/dd/yyyy")))

# Step 2: Perform the aggregation including 'Year'
df_transformed = df.groupBy("Category", "Region", "Year") \
    .agg(
        sum("Sales").alias("TotalSales"),
        sum("Profit").alias("TotalProfit"),
        sum("Quantity").alias("TotalQuantity"),
        sum("Discount").alias("TotalDiscount")
    )

# Step 3: Filter the Data for a Specific Year
df_grouped = df_transformed.filter(col("Year") == 2012)

# Show the result
df_grouped.show(5)
```

(2) Spark Jobs

(2) Spark Jobs

df: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]

df_grouped: pyspark.sql.dataframe.DataFrame = [Category: string, Region: string ... 5 more fields]

df_transformed: pyspark.sql.dataframe.DataFrame = [Category: string, Region: string ... 5 more fields]

```
+----------+-------+----+----------+------------------+-------------+------------------+
|  Category| Region|Year|TotalSales|       TotalProfit|TotalQuantity|     TotalDiscount|
+----------+-------+----+----------+------------------+-------------+------------------+
| Furniture|Oceania|2012|100519.008| 8623.818000000001|        607.0|26.199999999999978|
|Technology| Africa|2012| 64734.582| 6320.741999999999|        404.0|36.699999999999996|
|Technology|  North|2012|126353.563|25098.863000000005|        809.0| 7.377999999999993|
| Furniture| Canada|2012|   1600.68|            290.19|         16.0|               0.0|
|Technology|Oceania|2012| 89761.767|         14203.827|        688.0|23.499999999999986|
+----------+-------+----+----------+------------------+-------------+------------------+
only showing top 5 rows
```

10. Sort Data by Total Sales:

12:25 PM (1s) 11 Python

```
#Sort Data by Total Sales
df_grouped = df_transformed.orderBy(col("TotalSales").desc())
df_grouped.show()
```

(2) Spark Jobs

df_grouped: pyspark.sql.dataframe.DataFrame = [Category: string, Region: string ... 5 more fields]

```
+---------------+-------+----+------------------+------------------+------------------+------------------+
|       Category| Region|Year|        TotalSales|       TotalProfit|     TotalQuantity|     TotalDiscount|
+---------------+-------+----+------------------+------------------+------------------+------------------+
|     Technology|Central|2014|343261.71891999996| 46266.45321999999|            2600.0| 93.55999999999997|
|Office Supplies|Central|2014| 313521.1169999999|36457.128400000016|          9564.338| 406.1000000000015|
|     Technology|Central|2013|      281501.66124| 39571.08374000002|2230.7799999999997| 76.50000000000003|
|      Furniture|Central|2014|281108.88969999994|15576.571300000007|          2778.252|129.51999999999995|
|Office Supplies|Central|2013|249453.54200000004|36849.007399999995|          7735.108|285.80000000000035|
|     Technology|Central|2012|237291.81162000002|       31373.85432|            1791.0| 61.14200000000001|
|      Furniture|Central|2013|        232113.698|         20804.504|          2187.344|103.06999999999987|
|     Technology|  South|2014|      208820.03832|16919.977120000003|            1617.0| 61.73200000000001|
|      Furniture|Central|2012|183778.99949999998| 5231.084800000003|           1876.94|  85.1399999999999|
|Office Supplies|Central|2012|        180068.292|26988.422599999998| 6003.083999999999|198.40000000000006|
|Office Supplies|Central|2011|177982.10699999996|         21178.898|            5032.1|215.58800000000008|
|     Technology|Central|2011|176379.68885999997|       18323.03876|            1370.0|47.118000000000016|
|      Furniture|  South|2014|       168929.8605| 8636.212800000001|2001.1680000000001| 78.69999999999996|
|Office Supplies|  South|2014|166334.93200000003|        25971.4154|          5738.816|235.09399999999994|
|     Technology|  North|2014|      164019.24052|       31386.99052|            1225.0|17.203999999999986|
|      Furniture|Central|2011|162401.97609999997|13228.075600000002|          1773.484|             77.86|
|     Technology|  South|2013|      154303.72908| 17870.09517999999|           1288.56|            54.104|
```

11. Save Transformed Data in Silver Zone:

12:25 PM (1s) 12 Python

```
#Add a business logic
df_final = df_grouped.withColumn("HighDiscount", col("TotalDiscount") > 50)
df_final.show(5)
```

(2) Spark Jobs

df_final: pyspark.sql.dataframe.DataFrame = [Category: string, Region: string ... 6 more fields]

```
+---------------+-------+----+------------------+------------------+------------------+------------------+------------+
|       Category| Region|Year|        TotalSales|       TotalProfit|     TotalQuantity|     TotalDiscount|HighDiscount|
+---------------+-------+----+------------------+------------------+------------------+------------------+------------+
|     Technology|Central|2014|343261.71891999996| 46266.45321999999|            2600.0| 93.55999999999997|        true|
|Office Supplies|Central|2014| 313521.1169999999|36457.128400000016|          9564.338| 406.1000000000015|        true|
|     Technology|Central|2013|      281501.66124| 39571.08374000002|2230.7799999999997| 76.50000000000003|        true|
|      Furniture|Central|2014|281108.88969999994|15576.571300000007|          2778.252|129.51999999999995|        true|
|Office Supplies|Central|2013|249453.54200000004|36849.007399999995|          7735.108|285.80000000000035|        true|
+---------------+-------+----+------------------+------------------+------------------+------------------+------------+
only showing top 5 rows
```

12:25 PM (6s) 13

```
#Save Transformed Data in Silver Zone
silver_zone_path = "/mnt/silver/superstore"
df_final.write.format("delta").mode("overwrite").save(silver_zone_path)

# Save transformed data as a table in the catalog (Silver Zone)
df_final.write.format("delta").mode("overwrite").saveAsTable("transformed_data")
```

(20) Spark Jobs

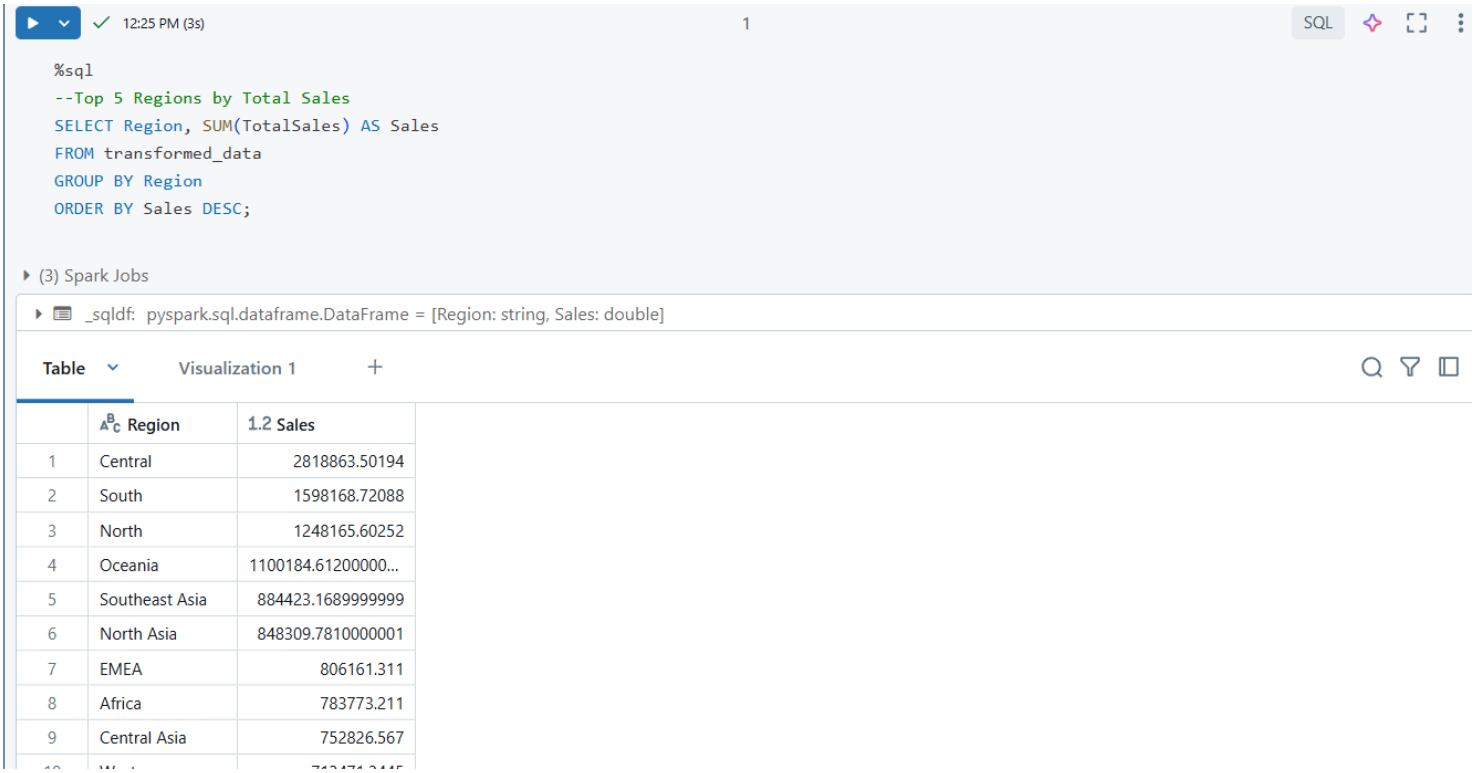
12:25 PM (<1s) 14

```
dbutils.notebook.exit(silver_zone_path)
```

```
Notebook exited: /mnt/silver/superstore
```

Perform Analysis:

1. Top 5 Regions by Total Sales:



```
%sql
--Top 5 Regions by Total Sales
SELECT Region, SUM(TotalSales) AS Sales
FROM transformed_data
GROUP BY Region
ORDER BY Sales DESC;
```

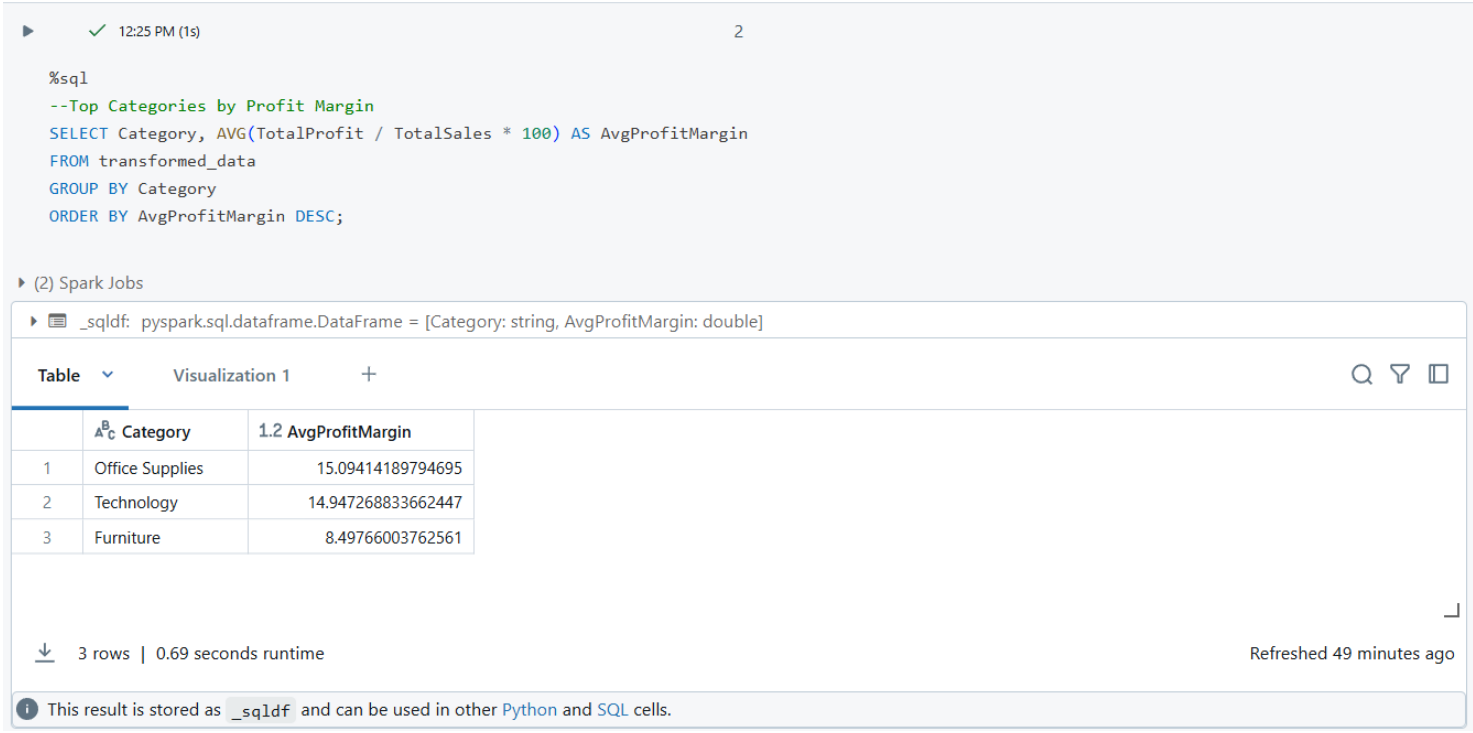
(3) Spark Jobs

_sqldf: pyspark.sql.dataframe.DataFrame = [Region: string, Sales: double]

Table | Visualization 1

	Region	Sales
1	Central	2818863.50194
2	South	1598168.72088
3	North	1248165.60252
4	Oceania	1100184.61200000...
5	Southeast Asia	884423.1689999999
6	North Asia	848309.7810000001
7	EMEA	806161.311
8	Africa	783773.211
9	Central Asia	752826.567

2. Top Categories by Profit Margin:



```
%sql
--Top Categories by Profit Margin
SELECT Category, AVG(TotalProfit / TotalSales * 100) AS AvgProfitMargin
FROM transformed_data
GROUP BY Category
ORDER BY AvgProfitMargin DESC;
```

(2) Spark Jobs

_sqldf: pyspark.sql.dataframe.DataFrame = [Category: string, AvgProfitMargin: double]

Table | Visualization 1

	Category	AvgProfitMargin
1	Office Supplies	15.09414189794695
2	Technology	14.947268833662447
3	Furniture	8.49766003762561

3 rows | 0.69 seconds runtime

Refreshed 49 minutes ago

This result is stored as `_sqldf` and can be used in other Python and SQL cells.

3. Year-over-Year Sales Growth:

12:25 PM (1s) 3

```
%sql
--Year-over-Year Sales Growth
SELECT Region, Year, SUM(TotalSales) AS Sales
FROM transformed_data
GROUP BY Region, Year
ORDER BY Region, Year;
```

(2) Spark Jobs

_sqldf: pyspark.sql.dataframe.DataFrame = [Region: string, Year: integer ... 1 more field]

Table | Visualization 1 +

	Region	Year	Sales
1	Africa	2011	127187.273999999...
2	Africa	2012	144480.705
3	Africa	2013	229068.792000000...
4	Africa	2014	283036.440000000...
5	Canada	2011	8509.11
6	Canada	2012	16096.8000000000...
7	Canada	2013	19161.1499999999...
8	Canada	2014	23161.11
9	Caribbean	2011	57043.4289600000...

4. Regions with Highest Discounts:

12:25 PM (1s) 4

```
%sql
--Regions with Highest Discounts
SELECT Region, SUM(TotalDiscount) AS TotalDiscount
FROM transformed_data
GROUP BY Region
ORDER BY TotalDiscount DESC;
```

(2) Spark Jobs

_sqldf: pyspark.sql.dataframe.DataFrame = [Region: string, TotalDiscount: double]

Table | Visualization 1 +

	Region	TotalDiscount
1	Central	1779.7980000000018
2	West	1268.2180000000003
3	South	1115.8319999999997
4	EMEA	986.1000000000007
5	Southeast Asia	851.33
6	East	723.8940000000001
7	Africa	718.7999999999998
8	Oceania	534.1000000000003
9	North	459.6299999999998
10	Caribbean	229.42000000000002

5. Most Profitable Category-Region Pairs:

12:25 PM (1s) 5 SQL

```
%sql
--Most Profitable Category-Region Pair
SELECT Category, Region, SUM(TotalProfit) AS TotalProfit
FROM transformed_data
GROUP BY Category, Region
ORDER BY TotalProfit DESC;
```

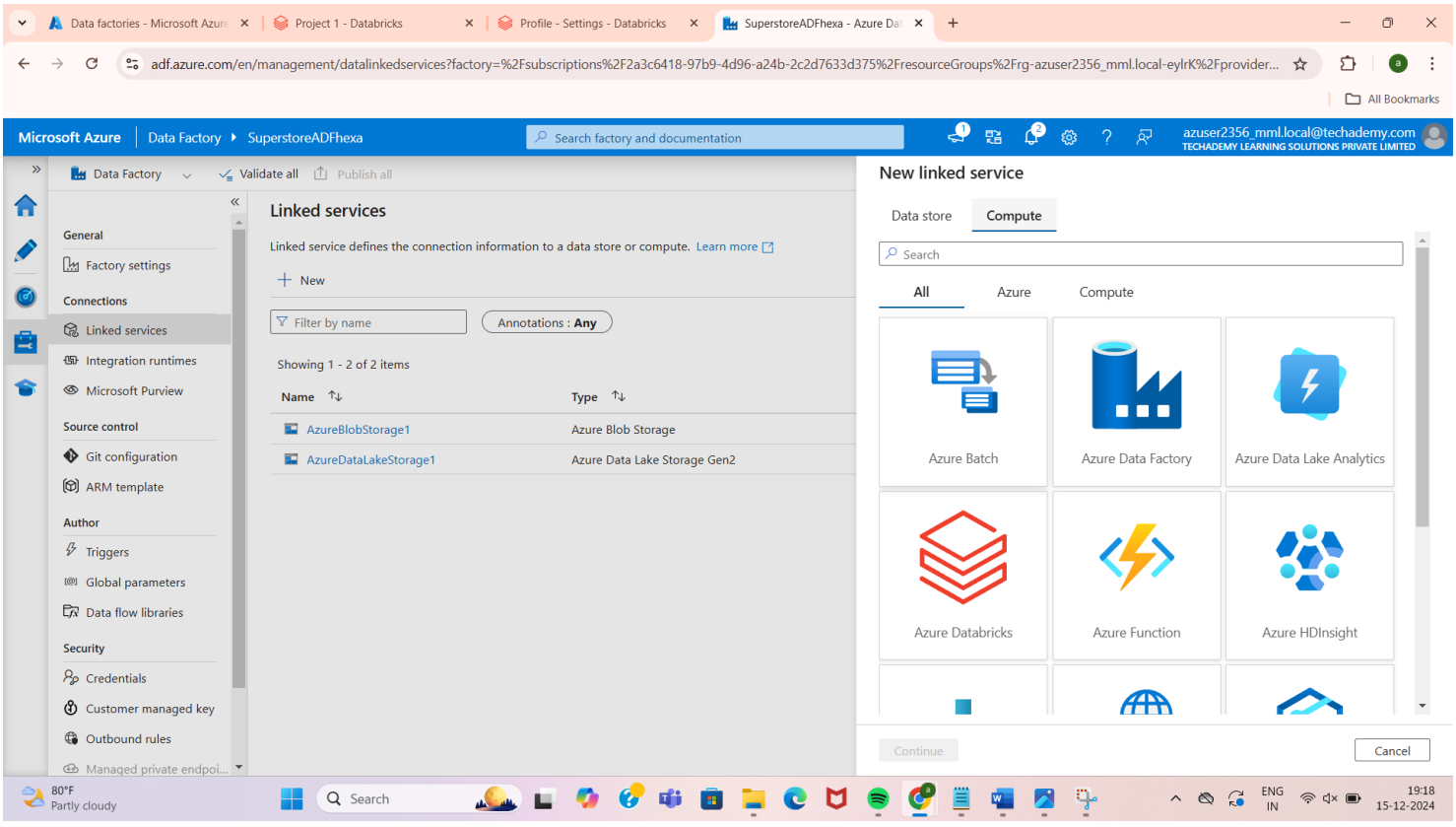
(2) Spark Jobs

_sqldf: pyspark.sql.dataframe.DataFrame = [Category: string, Region: string ... 1 more field]

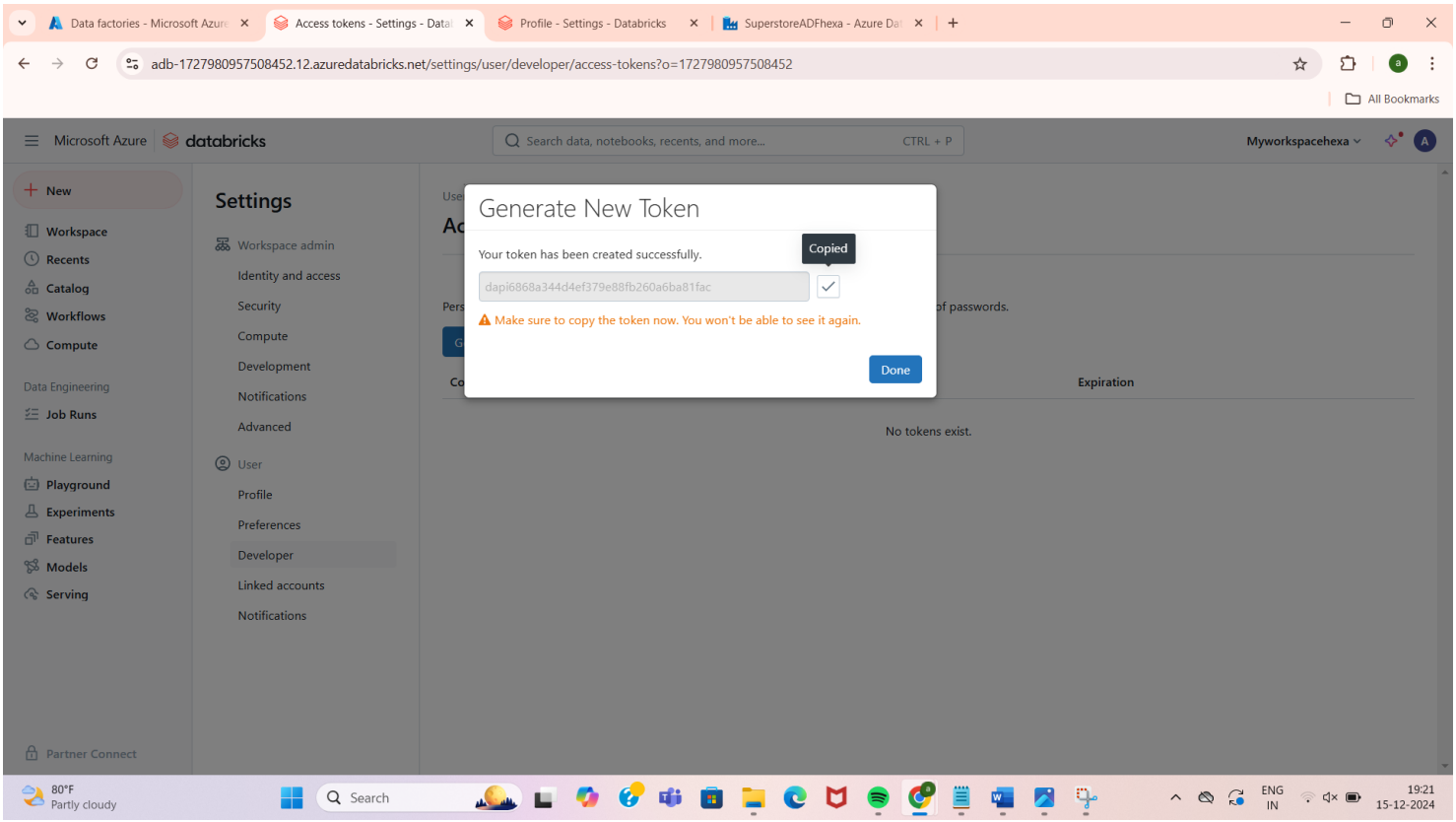
Table | Visualization 1

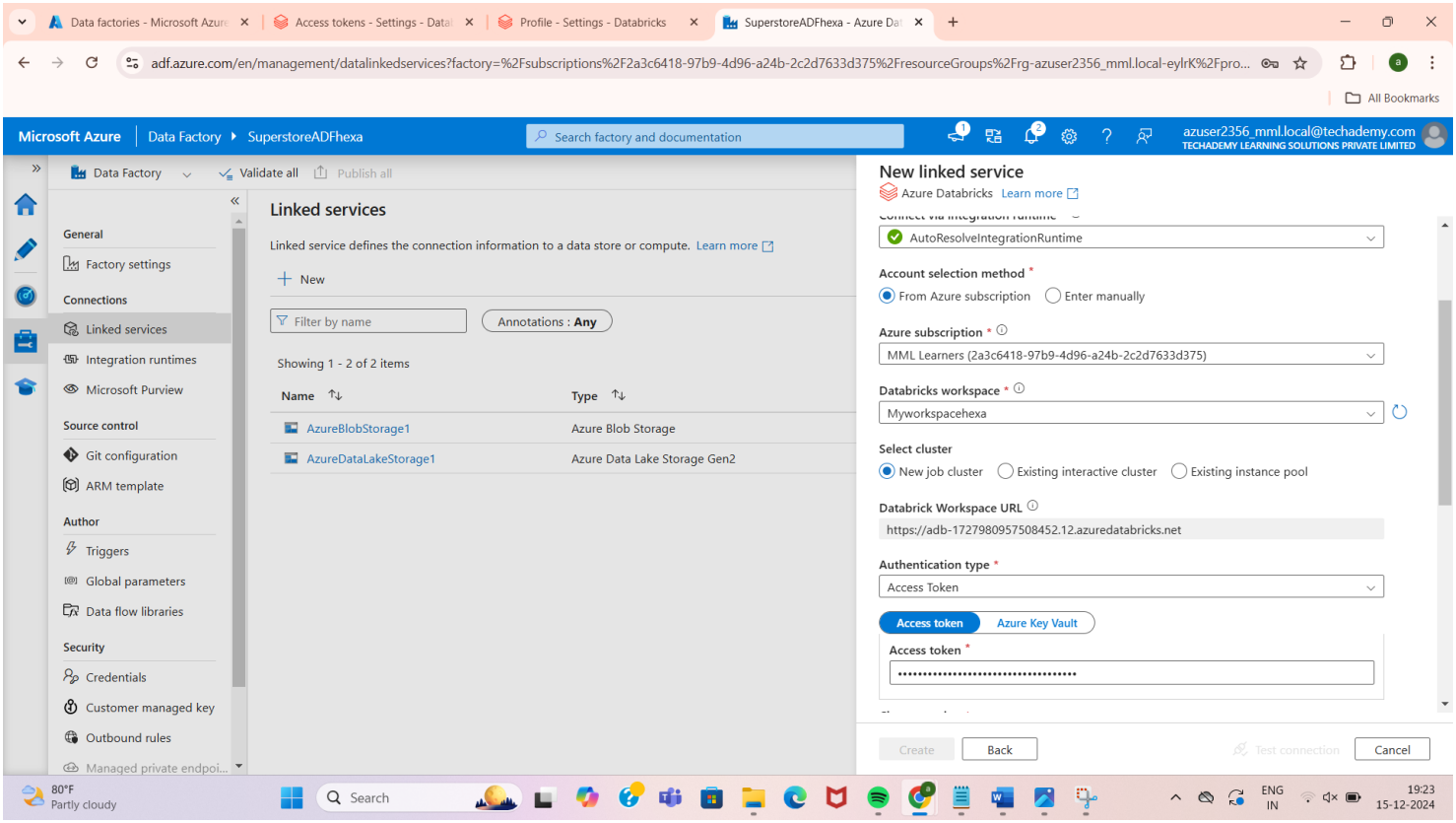
	Category	Region	TotalProfit
1	Technology	Central	135534.43004
2	Office Supplies	Central	121473.45640000001
3	Technology	North	99272.49152
4	Technology	North Asia	72471.015
5	Office Supplies	South	67105.35949999999
6	Office Supplies	North	64403.393000000004
7	Technology	Central Asia	56439.975
8	Furniture	Central	54840.23570000002
9	Technology	Oceania	54734.022000000004

Link Azure Databricks to Azure Data Factory:

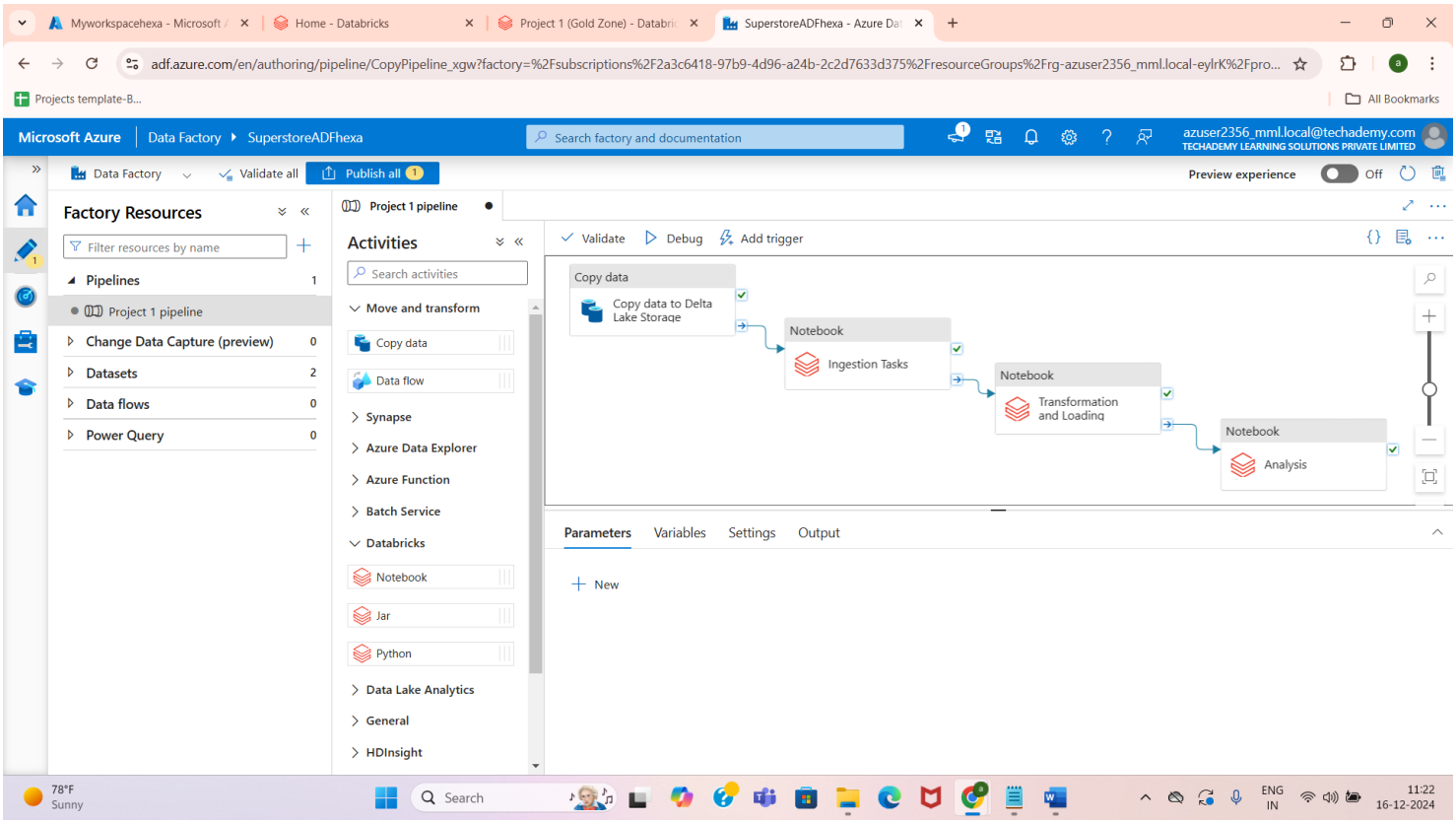


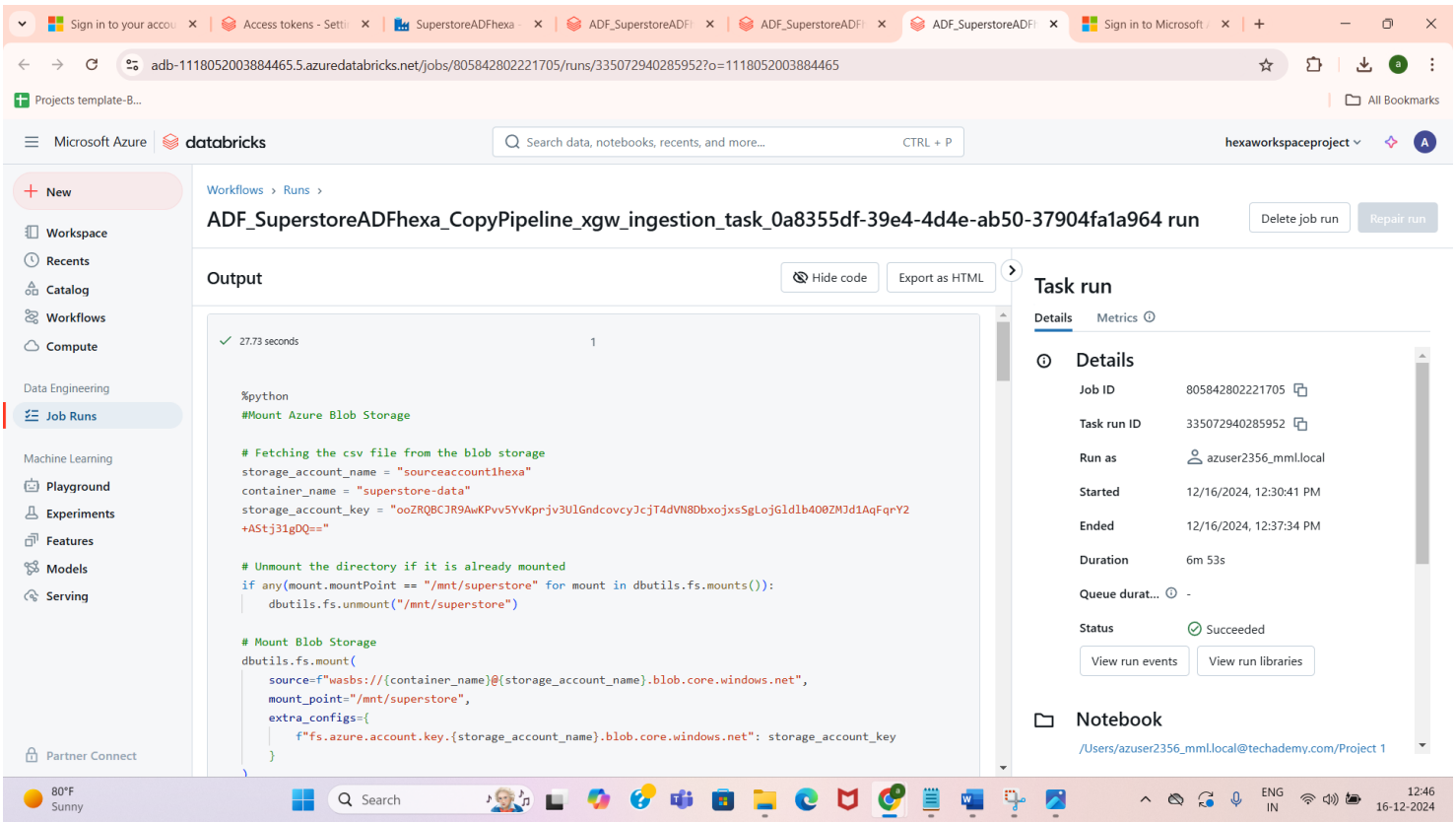
Generate New Databricks Token:

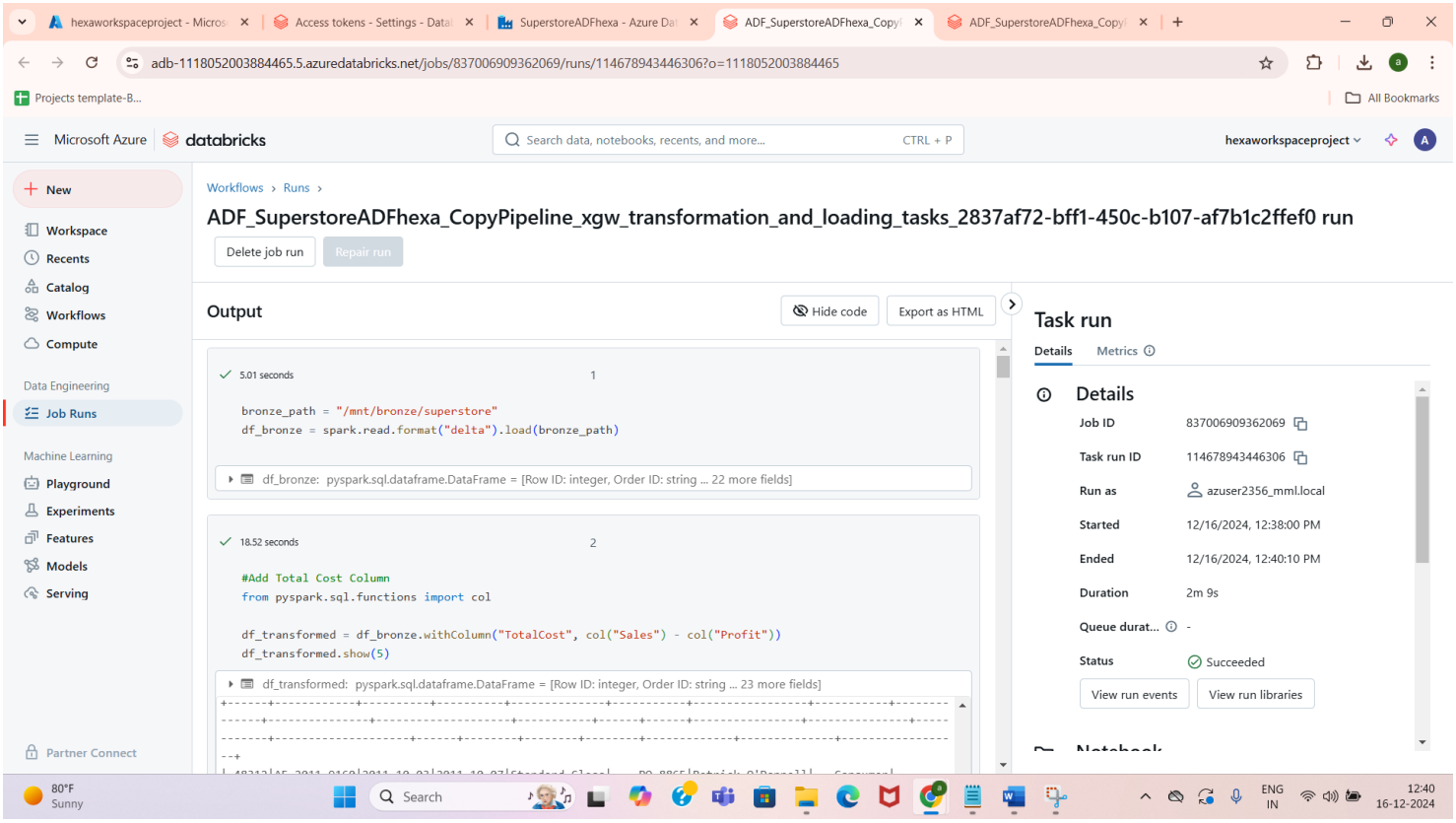


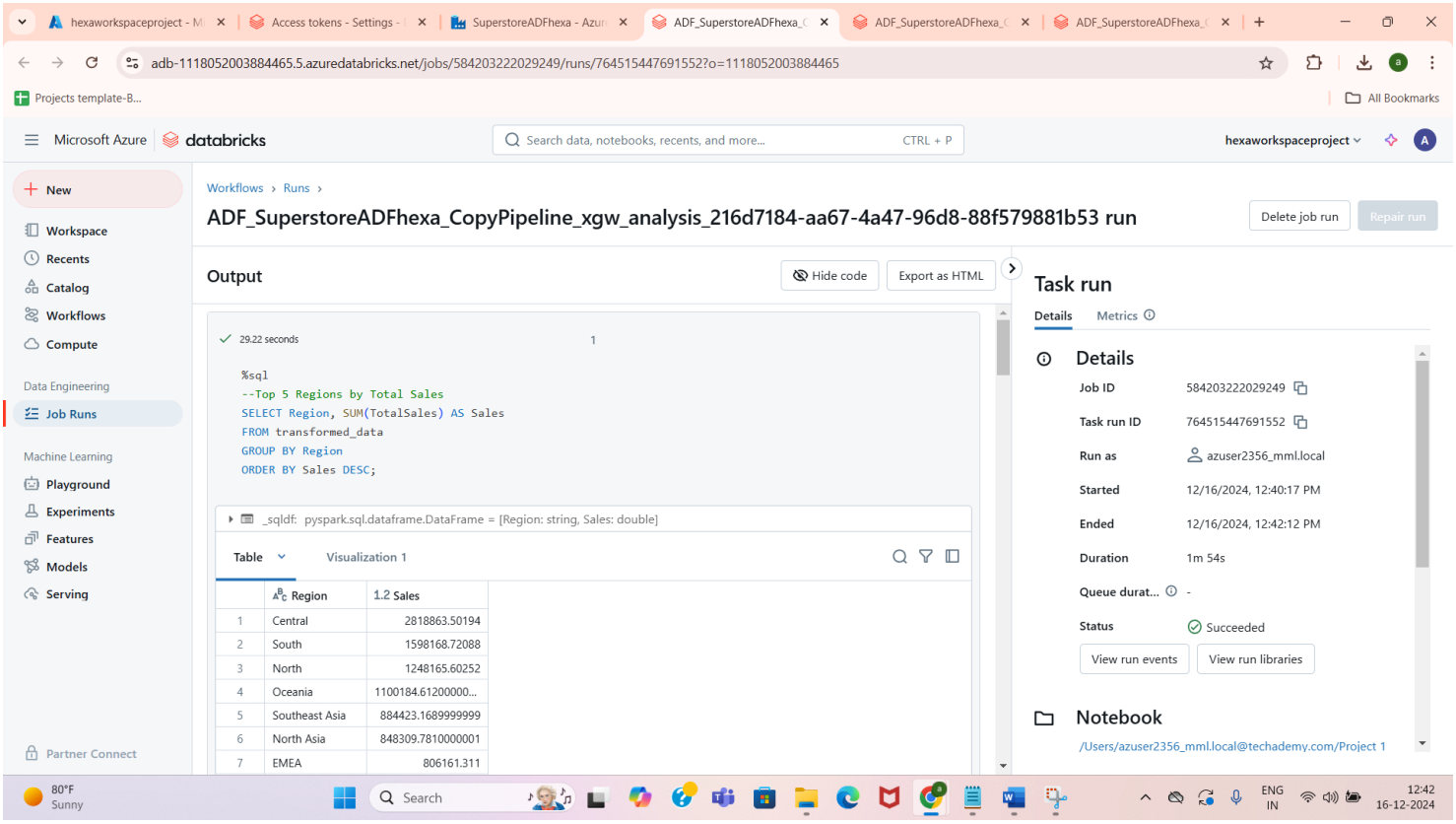


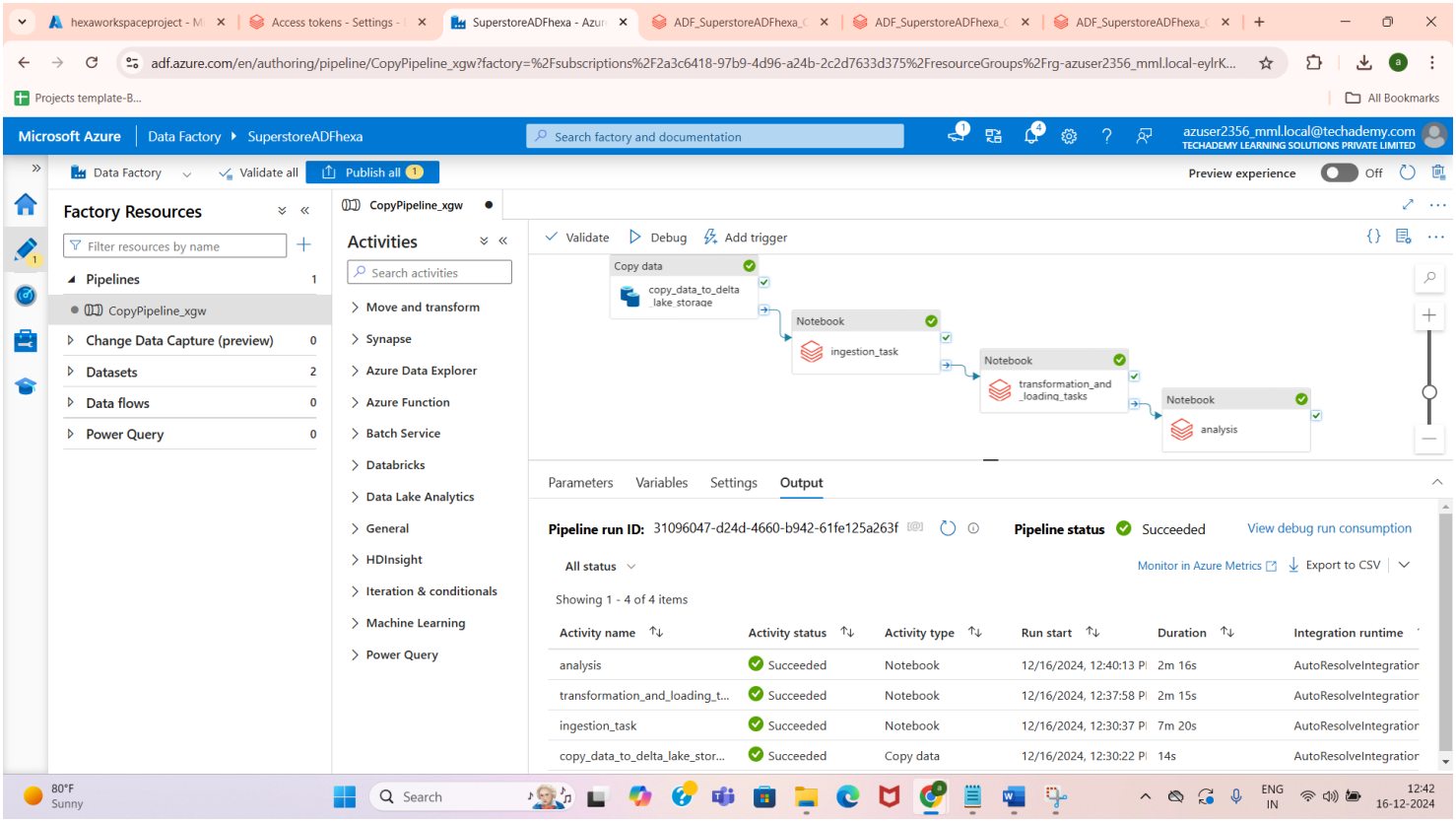
Add all the notebooks to the existing pipeline and run the pipeline:





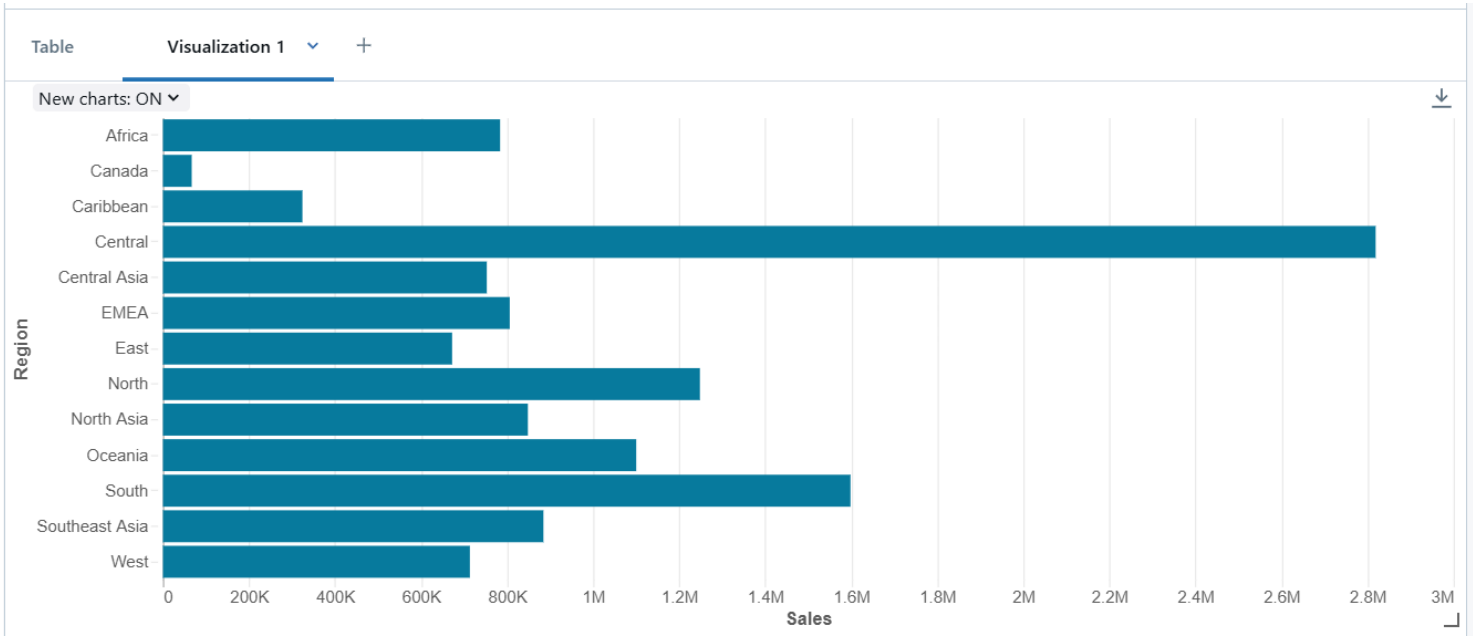

adb-1118052003884465.5.azuredatabricks.net/jobs/837006909362069/runs/1146789434463 06?o=1118052003884465
Microsoft Azure
databricks
Search data, notebooks, recents, and more... CTRL + P
hexaworkspaceproject
New
Workspace
Recents
Catalog
Workflows
Compute
Data Engineering
Job Runs
Machine Learning
Playground
Experiments
Features
Models
Serving
Partner Connect
Workflows › Runs ›
ADF_SuperstoreADFhexa_CopyPipeline_xgw_transformation_and_loading_tasks_2837af72-bff1-450c-b107-af7b1c2ffef0 run
Delete job run
Repair run
Output
Hide code
Export as HTML
5.01 seconds 1
bronze_path = "/mnt/bronze/superstore"
df_bronze = spark.read.format("delta").load(bronze_path)
df_bronze: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 22 more fields]
18.52 seconds 2
#Add Total Cost Column
from pyspark.sql.functions import col
df_transformed = df_bronze.withColumn("TotalCost", col("Sales") - col("Profit"))
df_transformed.show(5)
df_transformed: pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 more fields]
Task run
Details
Metrics
Details
Job ID 837006909362069
Task run ID 114678943446306
Run as azuser2356_mml.local
Started 12/16/2024, 12:38:00 PM
Ended 12/16/2024, 12:40:10 PM
Duration 2m 9s
Queue durat... -
Status Succeeded
View run events
View run libraries
80°F Sunny
Search
ENG IN
12:40 16-12-2024


adb-1118052003884465.5.azuredatabricks.net/jobs/584203222029249/runs/764515447691552?o=1118052003884465
Microsoft Azure
databricks
Search data, notebooks, recents, and more... CTRL + P
hexaworkspaceproject
New
Workspace
Recents
Catalog
Workflows
Compute
Data Engineering
Job Runs
Machine Learning
Playground
Experiments
Features
Models
Serving
Partner Connect
Workflows › Runs ›
ADF_SuperstoreADFhexa_CopyPipeline_xgw_analysis_216d7184-aa67-4a47-96d8-88f579881b53 run
Delete job run
Repair run
Output
Hide code
Export as HTML
29.22 seconds 1
%sql
--Top 5 Regions by Total Sales
SELECT Region, SUM(TotalSales) AS Sales
FROM transformed_data
GROUP BY Region
ORDER BY Sales DESC;
_sqldf: pyspark.sql.dataframe.DataFrame = [Region: string, Sales: double]
Table
Visualization 1
Region
Sales
1 Central 2818863.50194
2 South 1598168.72088
3 North 1248165.60252
4 Oceania 1100184.61200000...
5 Southeast Asia 884423.1689999999
6 North Asia 848309.7810000001
7 EMEA 806161.311
Task run
Details
Metrics
Details
Job ID 584203222029249
Task run ID 764515447691552
Run as azuser2356_mml.local
Started 12/16/2024, 12:40:17 PM
Ended 12/16/2024, 12:42:12 PM
Duration 1m 54s
Queue durat... -
Status Succeeded
View run events
View run libraries
Notebook
/Users/azuser2356_mml.local@techademy.com/Project 1
80°F Sunny
Search
ENG IN
12:42 16-12-2024

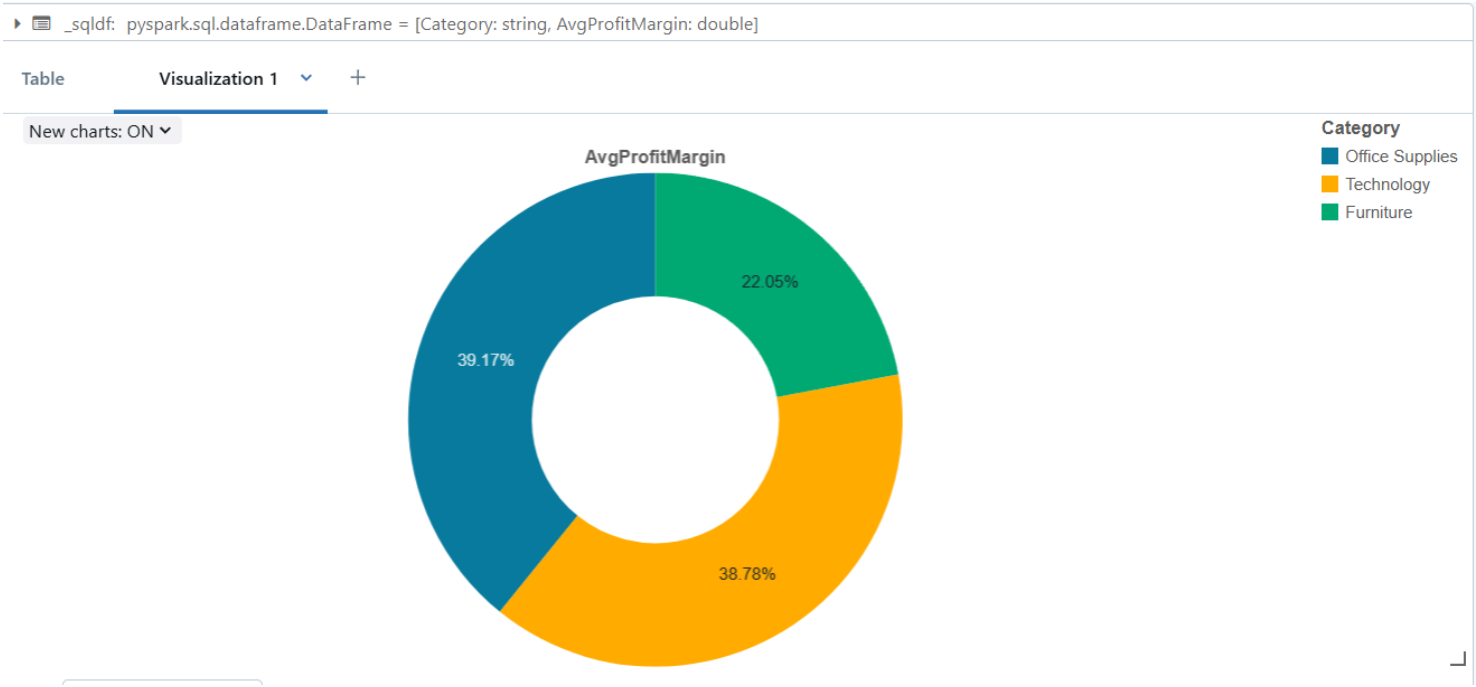


11. Analysis & (Visualization):

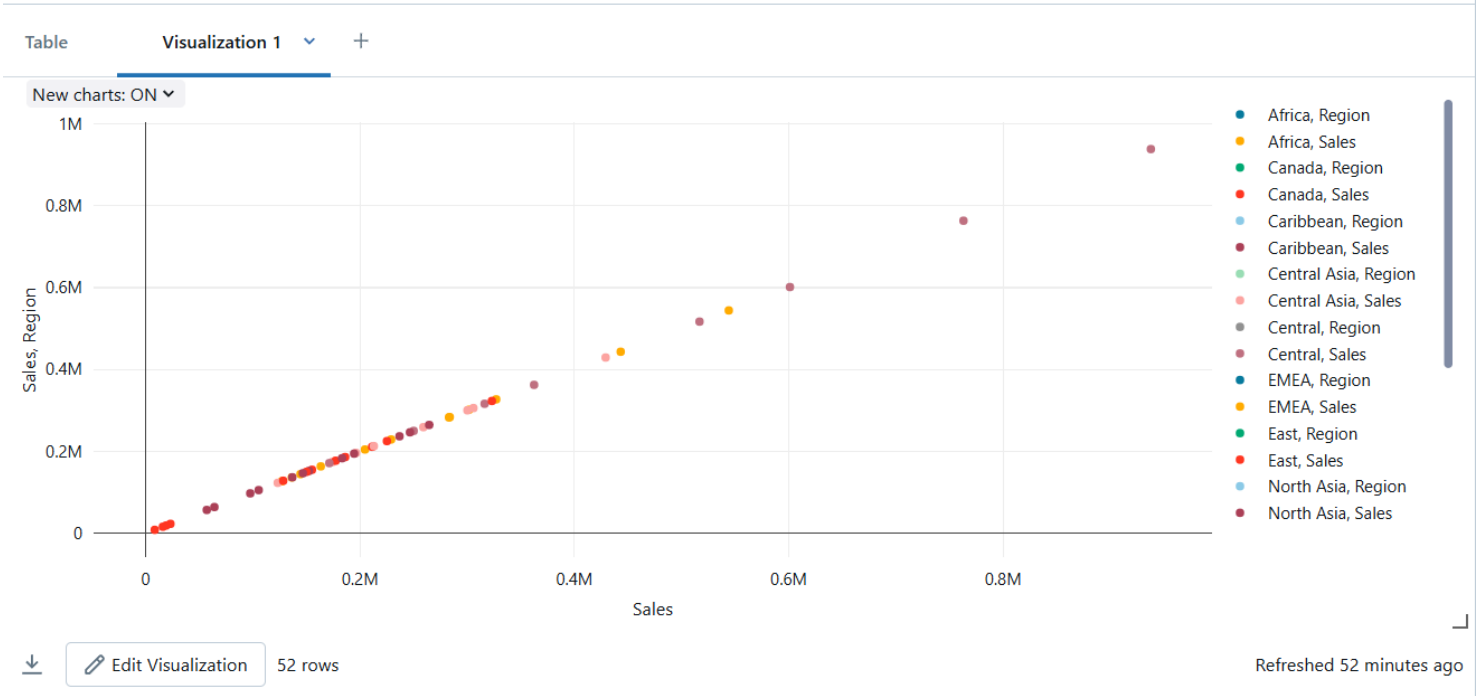
1. Sales vs Region:



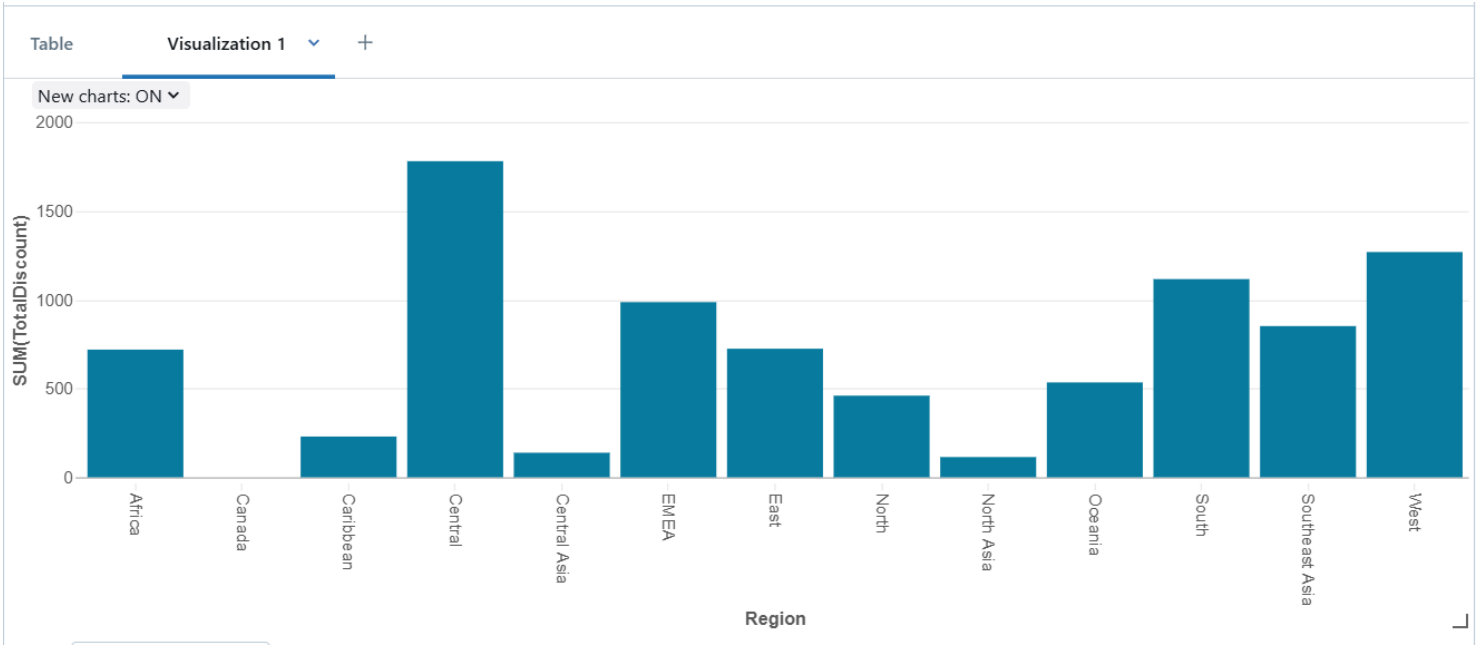
2. Average Profit margin:



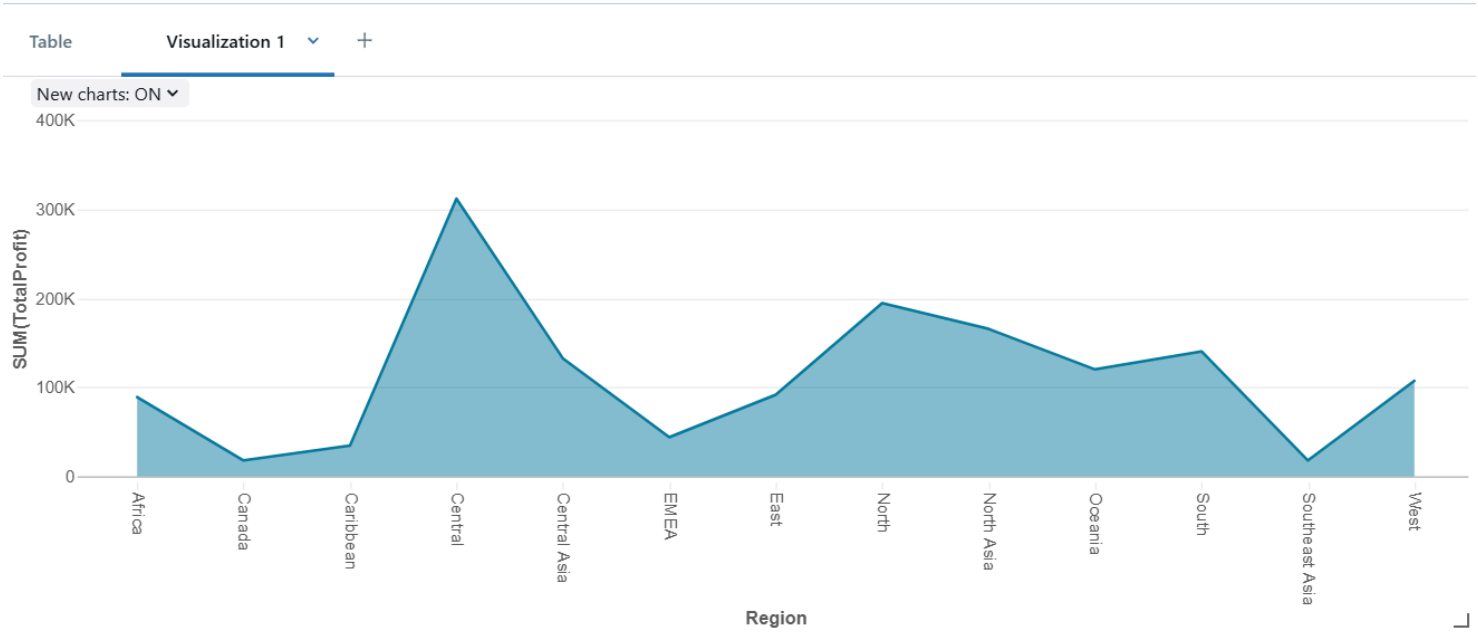
3. Sales vs Sales, region:



4. Region vs Sum(TotalDiscount):



5.Region vs SUM(TotalProfit):



Submitted by:
Eswara Venkata Sai Raja