Coding Challenge – 5

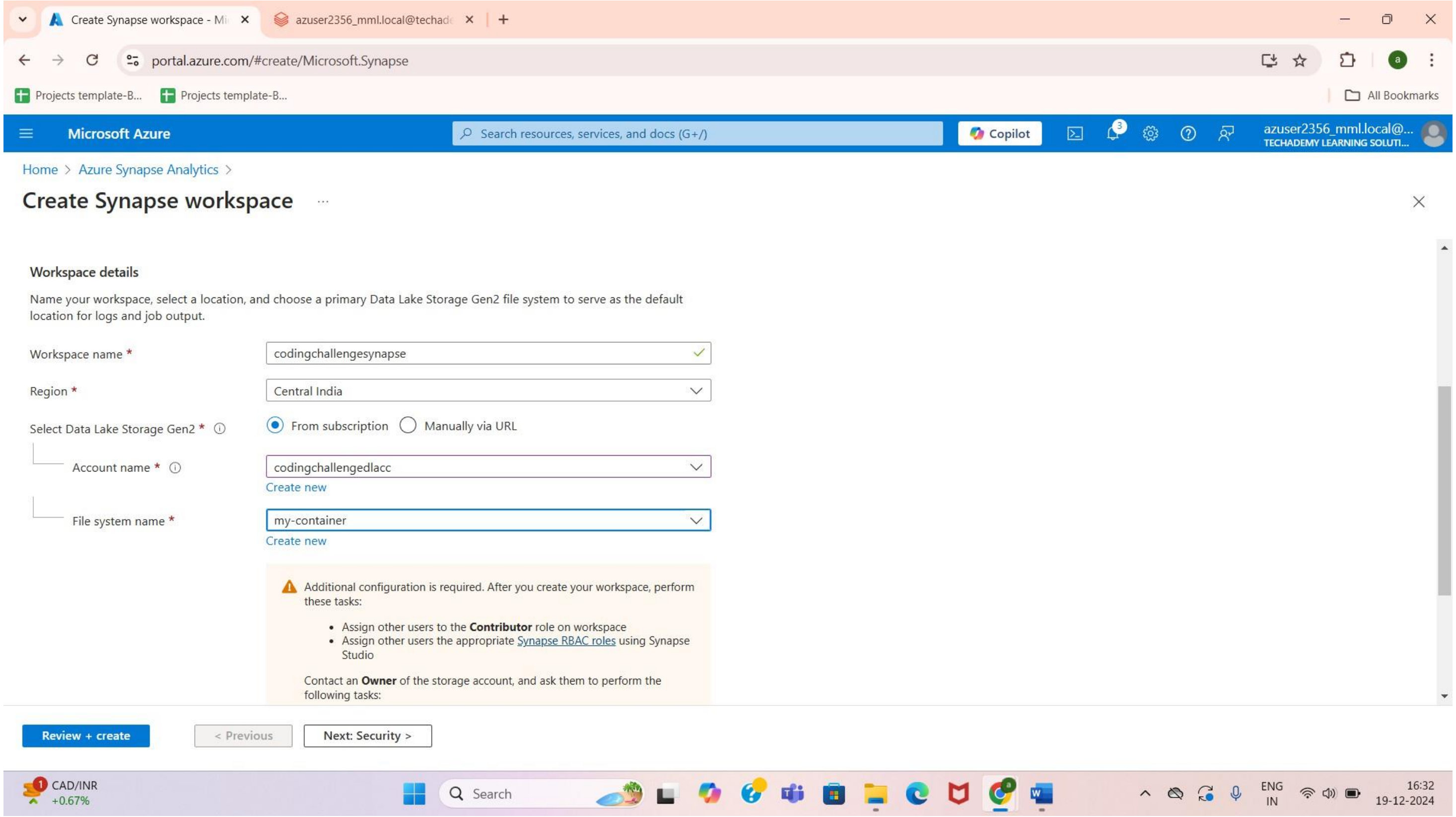
Azure Synapse ETL Pipeline

Submitted By-
Subrat Shukla, DE-1

1) Build an ETL pipline with azure synapse with dataflow running on it.

Steps:

Create an Azure Synapse Workspace:


Create Synapse workspace - Mi
azuser2356_mml.local@techad
portal.azure.com/#create/Microsoft.Synapse
Projects template-B...
Projects template-B...
All Bookmarks
Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
azuser2356_mml.local@...
TECHADEMY LEARNING SOLUTI...
Home > Azure Synapse Analytics >

Create Synapse workspace

Workspace details

Name your workspace, select a location, and choose a primary Data Lake Storage Gen2 file system to serve as the default location for logs and job output.

Workspace name * codingchallengesynapse

Region * Central India

Select Data Lake Storage Gen2 * ● From subscription ○ Manually via URL

Account name * codingchallengedlacc

Create new

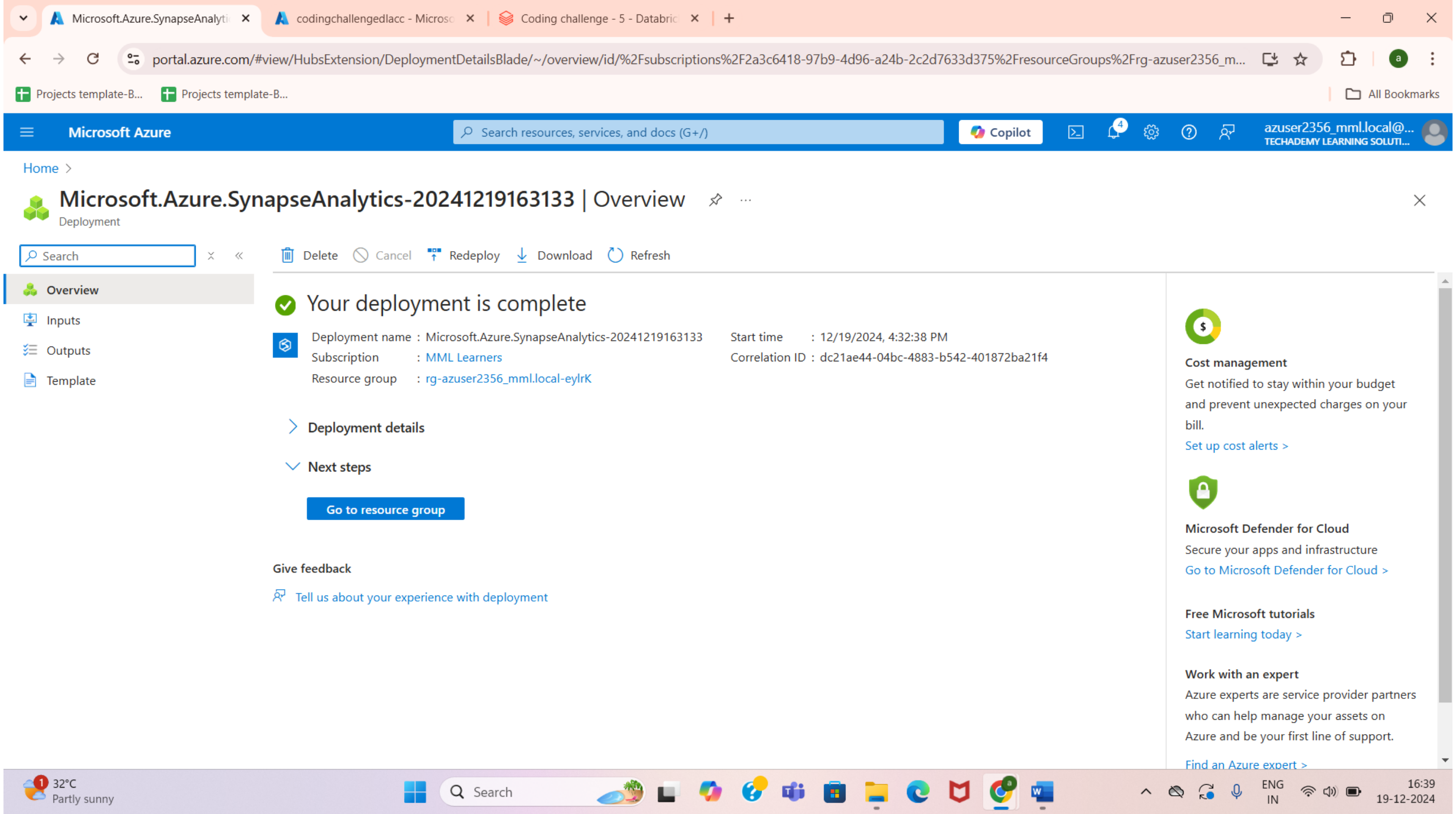
File system name * my-container

Create new

Additional configuration is required. After you create your workspace, perform these tasks:

- Assign other users to the **Contributor** role on workspace
- Assign other users the appropriate Synapse RBAC roles using Synapse Studio

Contact an **Owner** of the storage account, and ask them to perform the following tasks:



Microsoft.Azure.SynapseAnalyti
codingchallengedlacc - Microsc
Coding challenge - 5 - Databric
portal.azure.com/#view/HubsExtension/DeploymentDetailsBlade/~/overview/id/%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser2356_m...
Projects template-B...
Projects template-B...
All Bookmarks
Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
azuser2356_mml.local@...
TECHADEMY LEARNING SOLUTI...
Home

Microsoft.Azure.SynapseAnalytics-20241219163133 | Overview

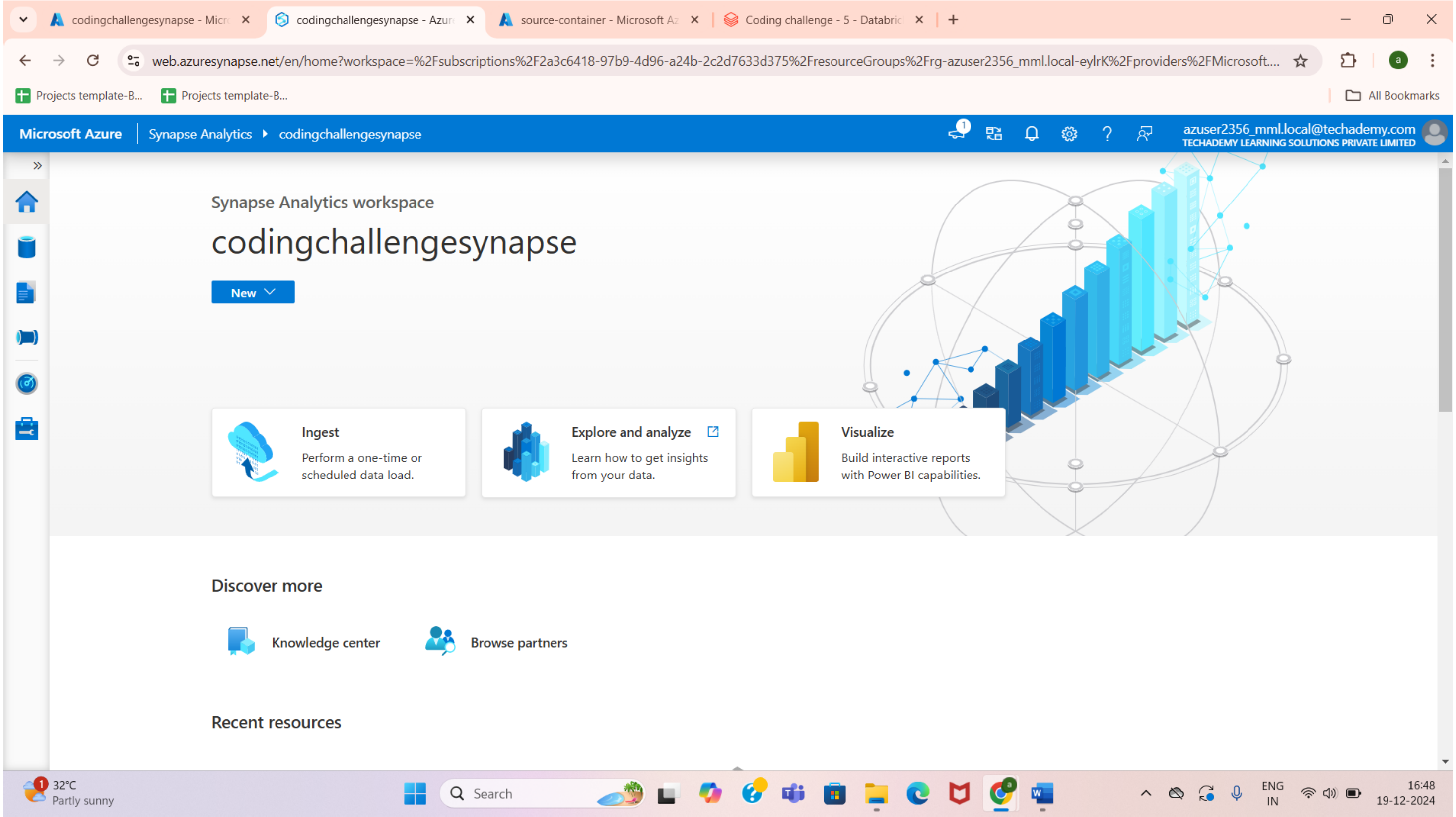
Deployment

Search
Overview
Inputs
Outputs
Template
Delete
Cancel
Redeploy
Download
Refresh

Your deployment is complete

Deployment name : Microsoft.Azure.SynapseAnalytics-20241219163133
Subscription : MML Learners
Resource group : rg-azuser2356_mml.local-eylrK
Start time : 12/19/2024, 4:32:38 PM
Correlation ID : dc21ae44-04bc-4883-b542-401872ba21f4

Deployment details
Next steps
Go to resource group
Give feedback
Tell us about your experience with deployment
Cost management
Get notified to stay within your budget and prevent unexpected charges on your bill.
Set up cost alerts >
Microsoft Defender for Cloud
Secure your apps and infrastructure
Go to Microsoft Defender for Cloud >
Free Microsoft tutorials
Start learning today >
Work with an expert
Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.
Find an Azure expert >
32°C
Partly sunny
Search
ENG
IN
16:39
19-12-2024



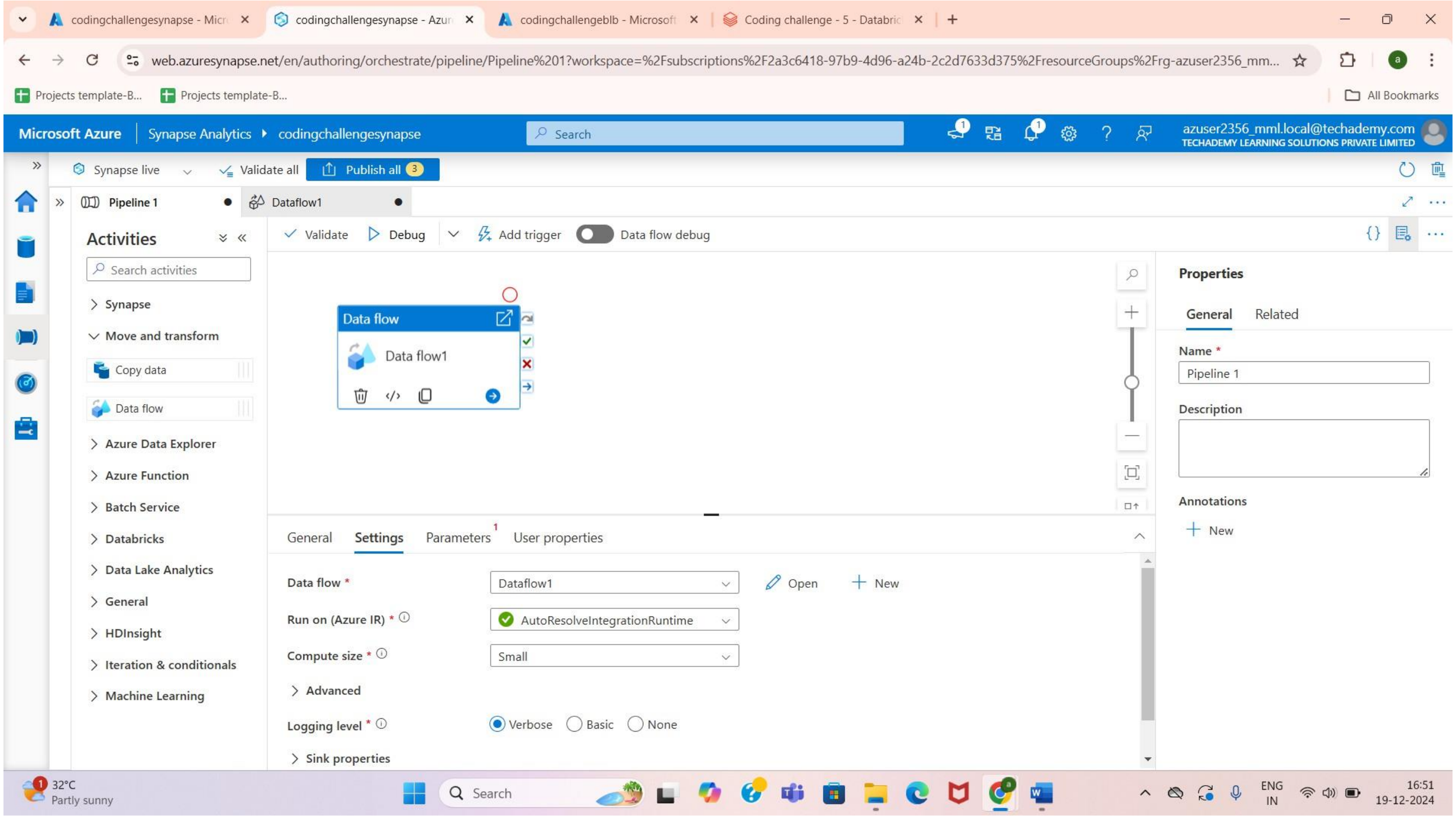
codingchallengesynapse - Micr
codingchallengesynapse - Azur
source-container - Microsoft Az
Coding challenge - 5 - Databric
web.azuresynapse.net/en/home?workspace=%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser2356_mml.local-eylrK%2Fproviders%2FMicrosoft....
Projects template-B...
Projects template-B...
All Bookmarks
Microsoft Azure
Synapse Analytics
codingchallengesynapse
azuser2356_mml.local@techademy.com
TECHADEMY LEARNING SOLUTIONS PRIVATE LIMITED

Synapse Analytics workspace

codingchallengesynapse

New
Ingest
Perform a one-time or scheduled data load.
Explore and analyze
Learn how to get insights from your data.
Visualize
Build interactive reports with Power BI capabilities.
Discover more
Knowledge center
Browse partners
Recent resources
32°C
Partly sunny
Search
ENG
IN
16:48
19-12-2024

Create data flow activity:



web.azuresynapse.net/en/authoring/orchestrate/pipeline/Pipeline%201?workspace=%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser2356_mm...

Name * Pipeline 1

Description

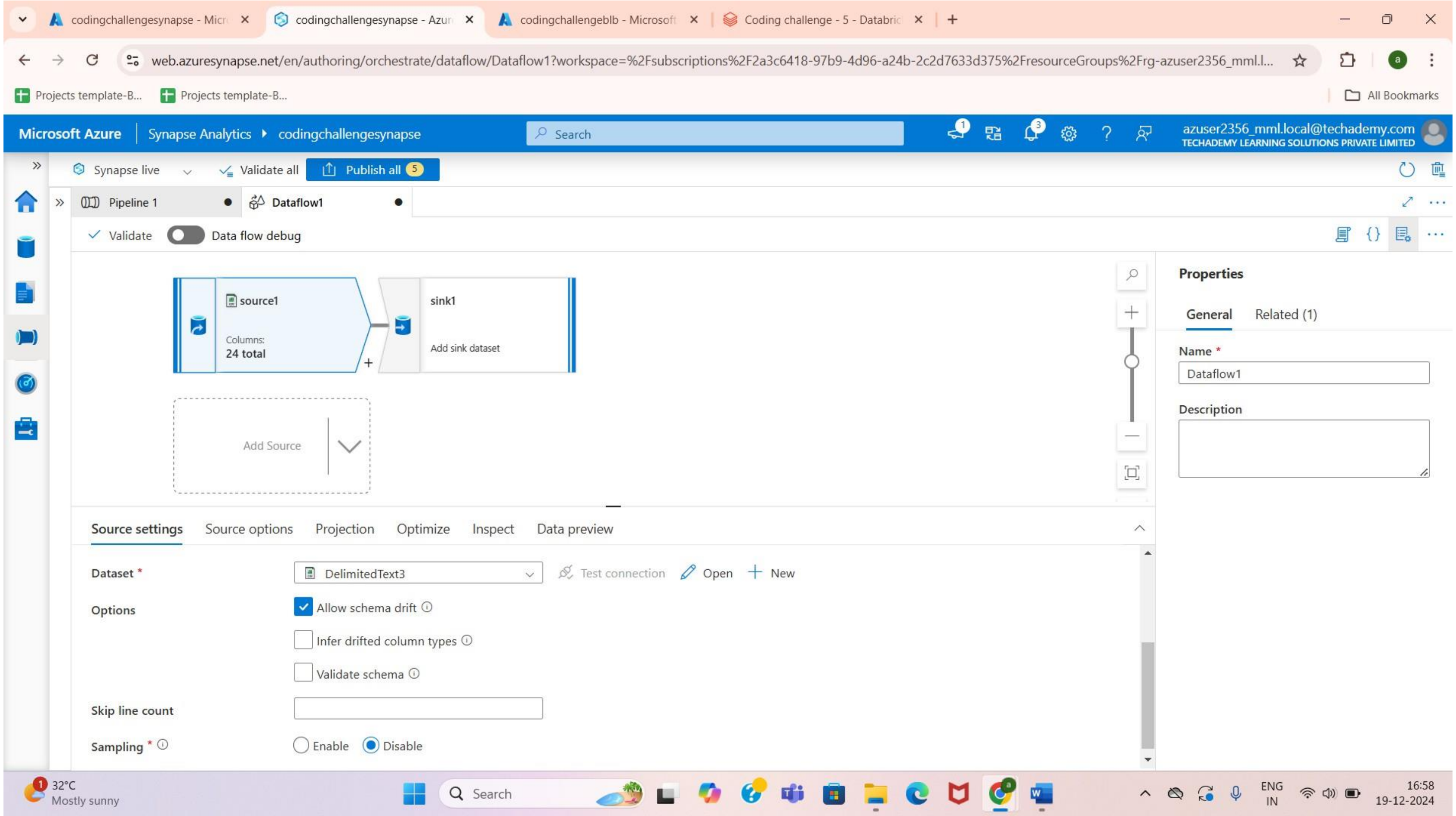
Data flow * Dataflow1

Run on (Azure IR) * AutoResolveIntegrationRuntime

Compute size * Small

Logging level * ● Verbose ○ Basic ○ None

Create a source and sink and Configure the source:



web.azuresynapse.net/en/authoring/orchestrate/dataflow/Dataflow1?workspace=%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser2356_mml.l...

Name * Dataflow1

Description

Dataset * DelimitedText3

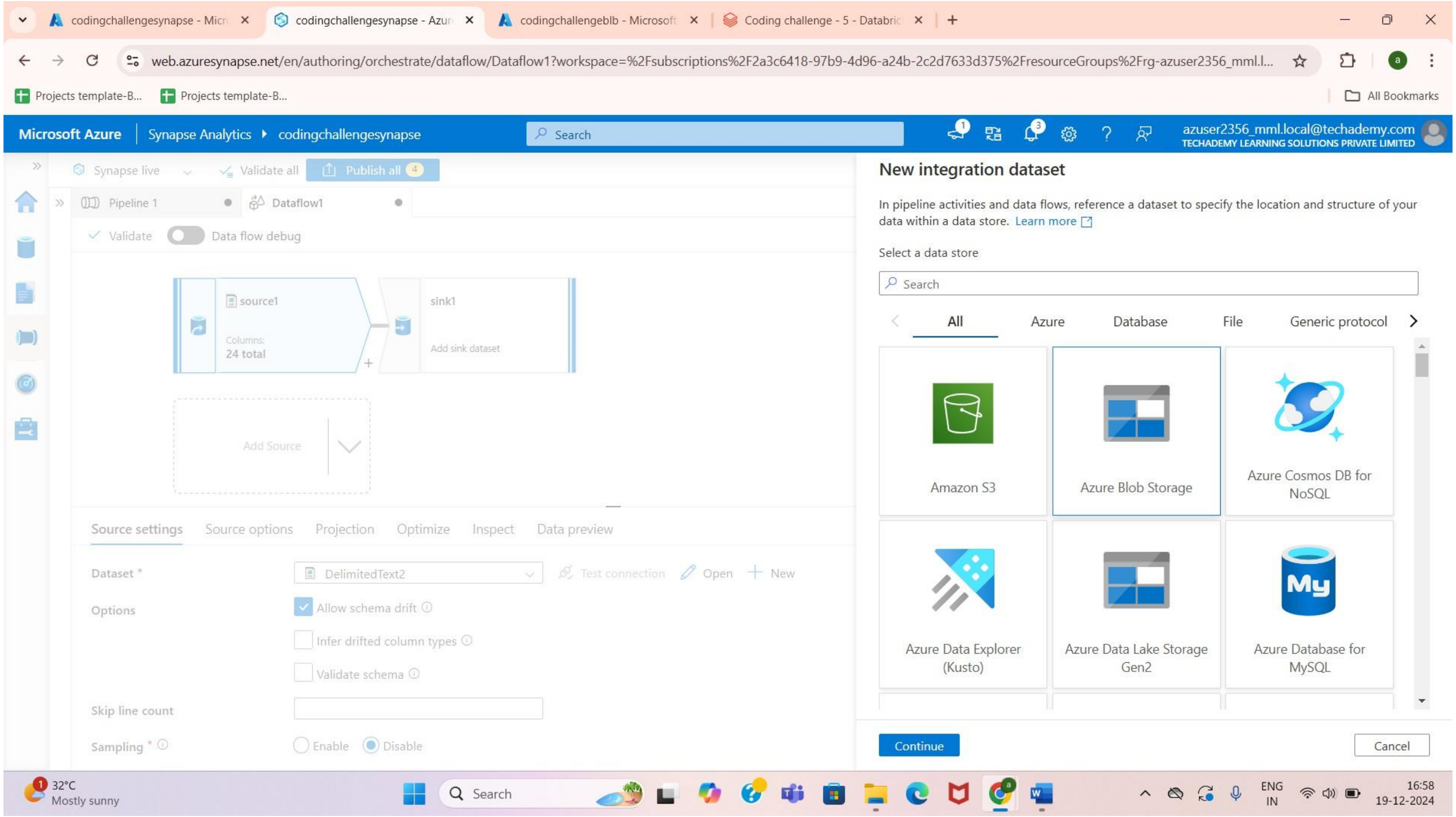
Options ☑ Allow schema drift

□ Infer drifted column types

□ Validate schema

Skip line count

Sampling * ○ Enable ● Disable



New integration dataset

In pipeline activities and data flows, reference a dataset to specify the location and structure of your data within a data store. Learn more

Select a data store

Dataset * DelimitedText2

Options

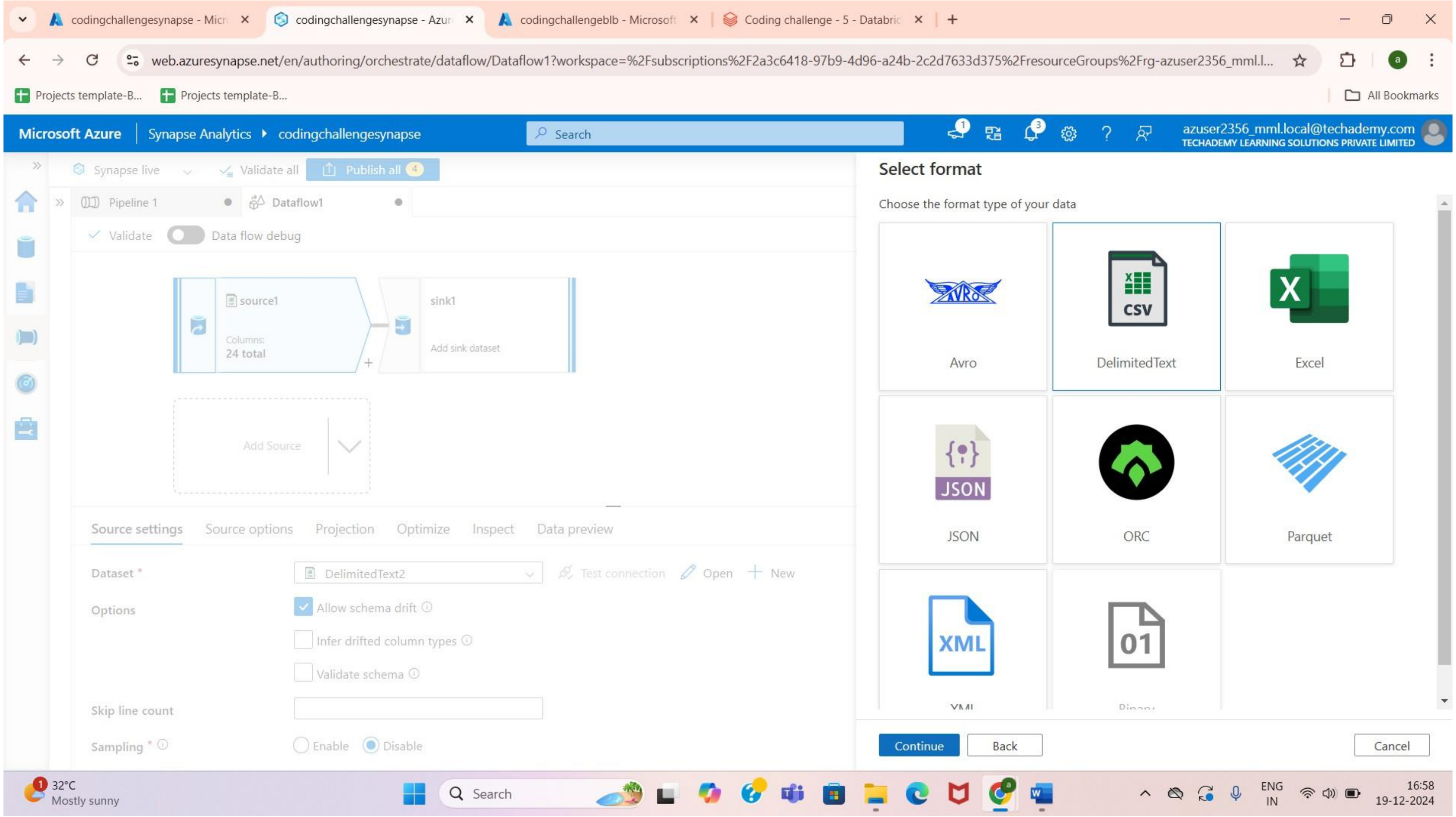
☑ Allow schema drift

□ Infer drifted column types

□ Validate schema

Skip line count

Sampling * ○ Enable ● Disable



Select format

Choose the format type of your data

Dataset * DelimitedText2

Options

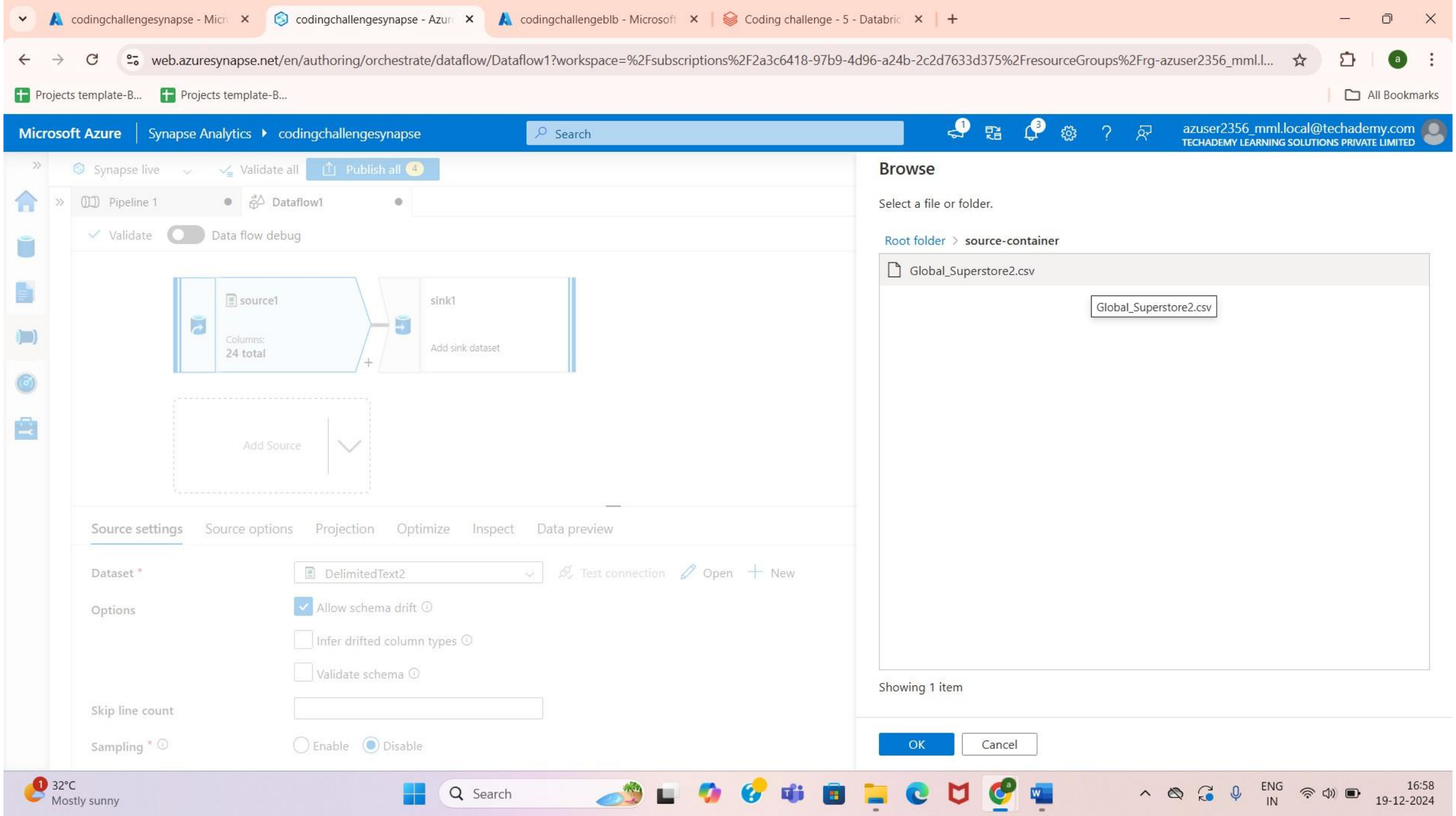
☑ Allow schema drift

□ Infer drifted column types

□ Validate schema

Skip line count

Sampling * ○ Enable ● Disable



Dataset * DelimitedText2

Options ☑ Allow schema drift
☐ Infer drifted column types
☐ Validate schema

Skip line count

Sampling * ○ Enable ● Disable

Browse

Select a file or folder.

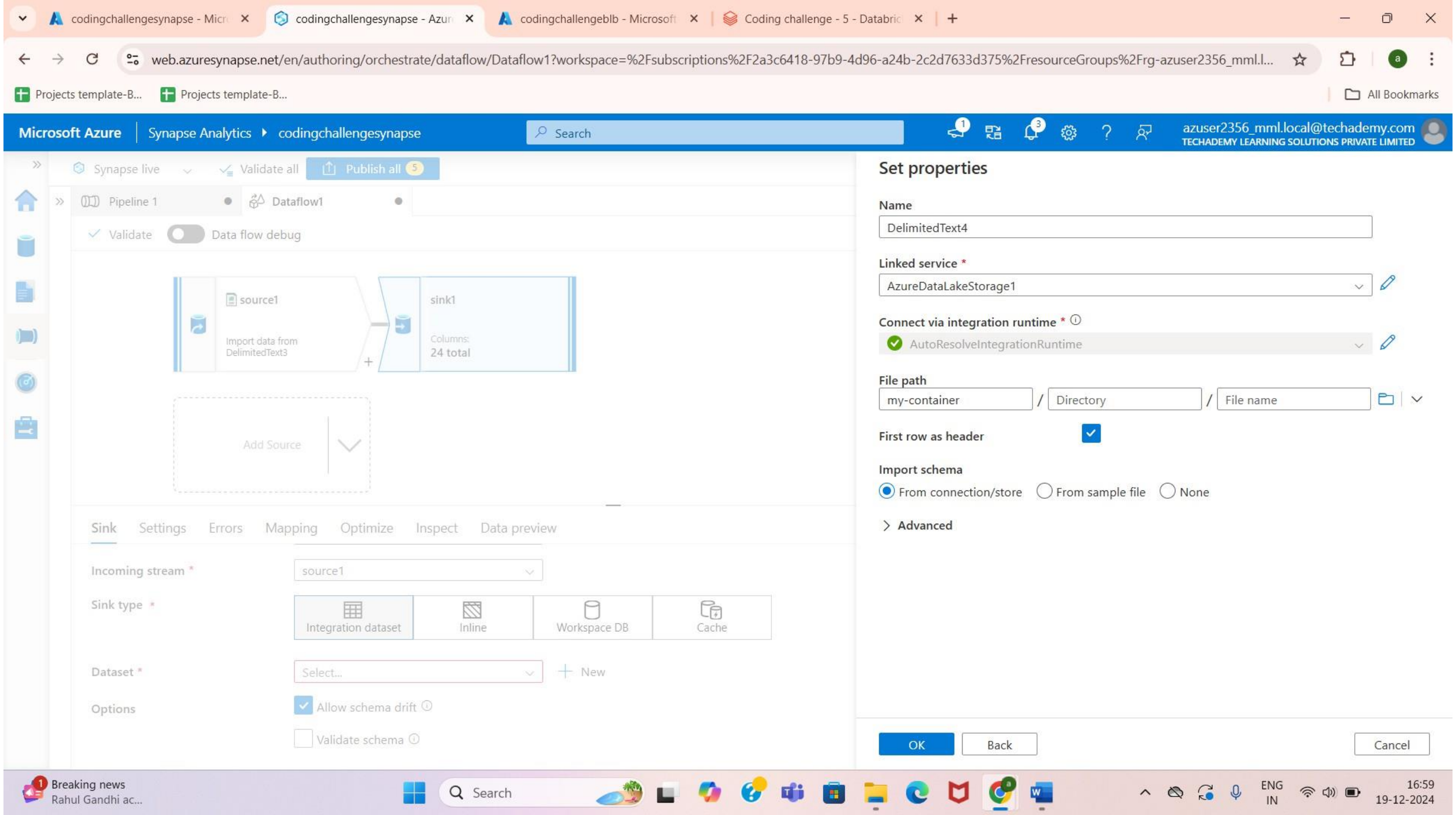
Root folder > source-container

Global_Superstore2.csv

Showing 1 item

OK Cancel

Configure the sink:



Incoming stream * source1

Sink type *

Dataset * Select...

Options ☑ Allow schema drift
☐ Validate schema

Set properties

Name
DelimitedText4

Linked service *
AzureDataLakeStorage1

Connect via integration runtime *
AutoResolveIntegrationRuntime

File path
my-container / Directory / File name

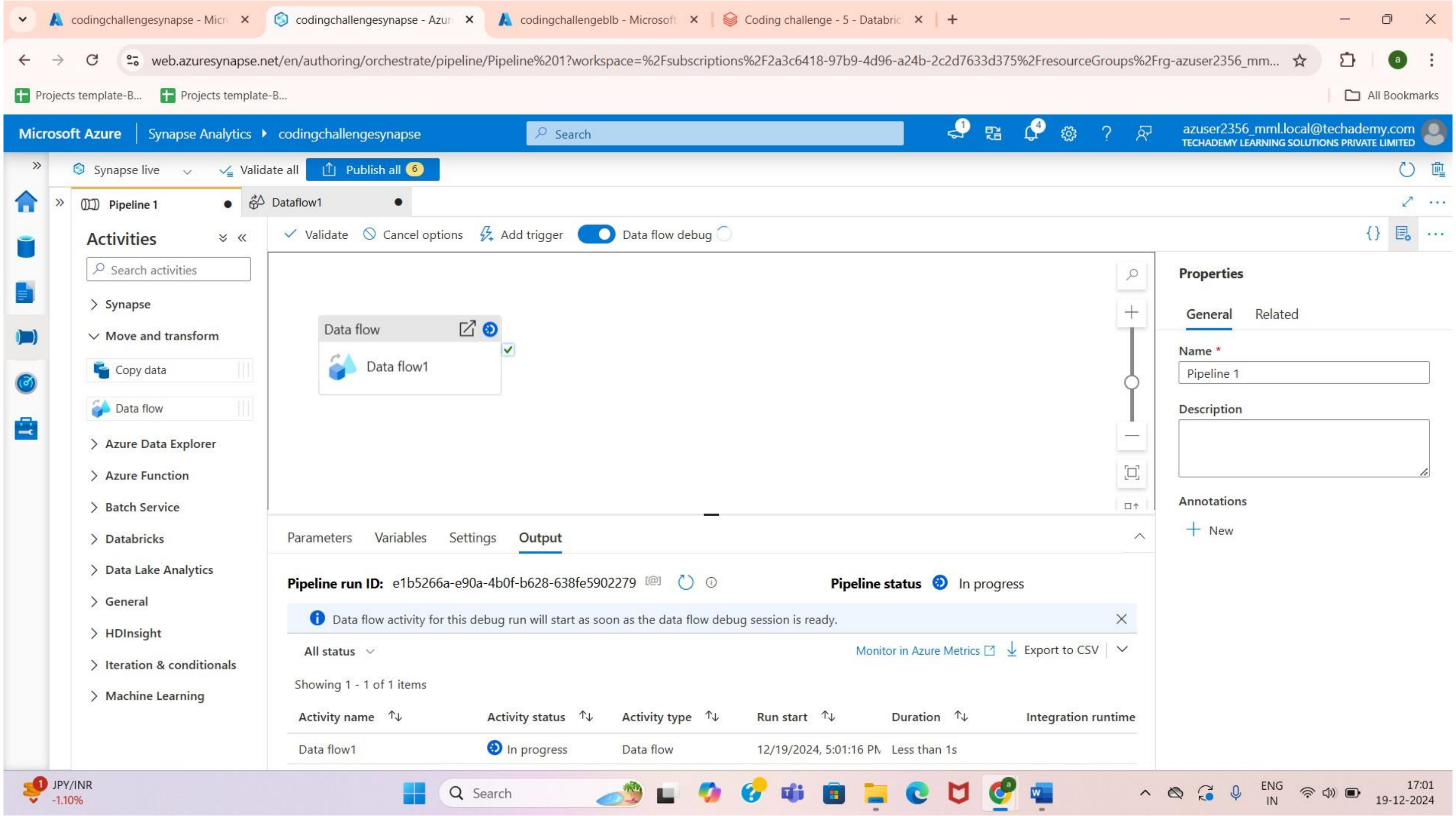
First row as header ☑

Import schema
● From connection/store ○ From sample file ○ None

> Advanced

OK Back Cancel

Validate and Debug the pipeline:



web.azuresynapse.net/en/authoring/orchestrate/pipeline/Pipeline%201?workspace=%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser2356_mm...

Name * Pipeline 1

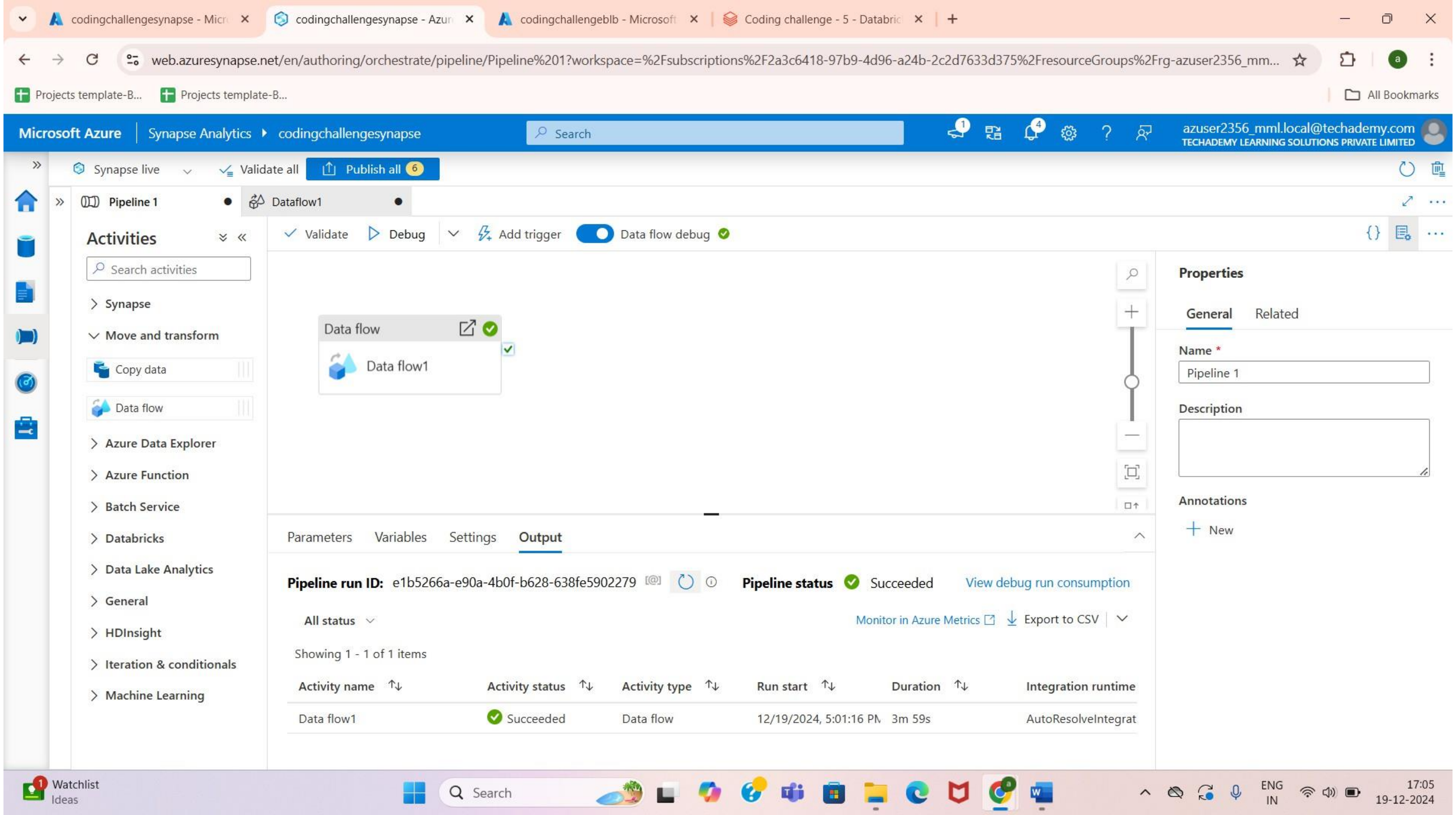
Pipeline run ID: e1b5266a-e90a-4b0f-b628-638fe5902279

Pipeline status In progress

Data flow activity for this debug run will start as soon as the data flow debug session is ready.

Showing 1 - 1 of 1 items

Activity name	Activity status	Activity type	Run start	Duration	Integration runtime
Data flow1	In progress	Data flow	12/19/2024, 5:01:16 PM	Less than 1s	



Name * Pipeline 1

Pipeline run ID: e1b5266a-e90a-4b0f-b628-638fe5902279

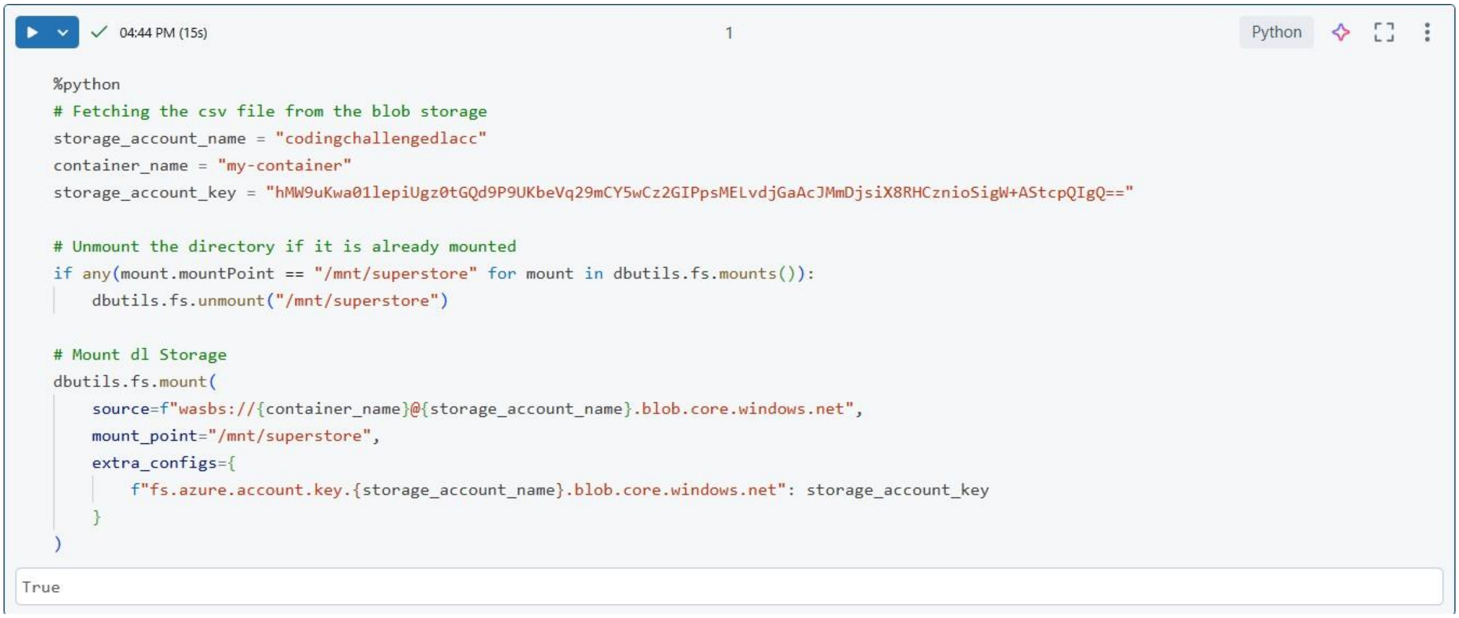
Pipeline status Succeeded

View debug run consumption

Showing 1 - 1 of 1 items

Activity name	Activity status	Activity type	Run start	Duration	Integration runtime
Data flow1	Succeeded	Data flow	12/19/2024, 5:01:16 PM	3m 59s	AutoResolveIntegrat

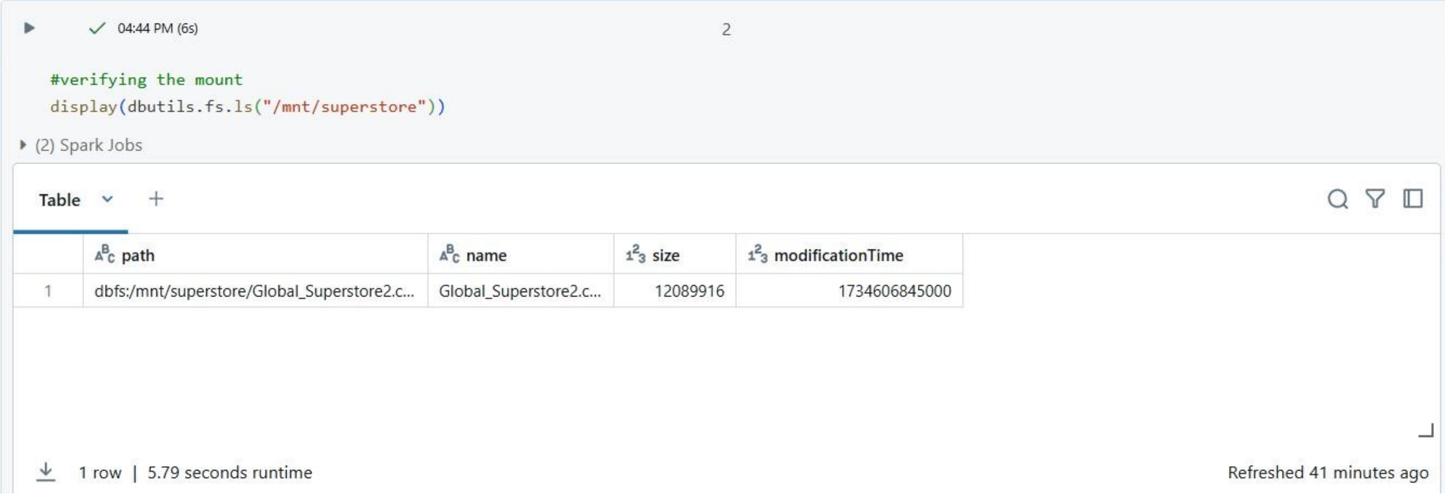
Extract the data from the delta lake storage and do the transformations and loading:



```
%python
# Fetching the csv file from the blob storage
storage_account_name = "codingchallengedlacc"
container_name = "my-container"
storage_account_key = "hMW9uKwa01lepiUgz0tGQd9P9UKbeVq29mCY5wCz2GIPpsMELvdjGaAcJMmDjsiX8RHCznioSigW+AStcpQIgQ=="

# 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 dl 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
    }
)
```

```
True
```

Verifying the mount:



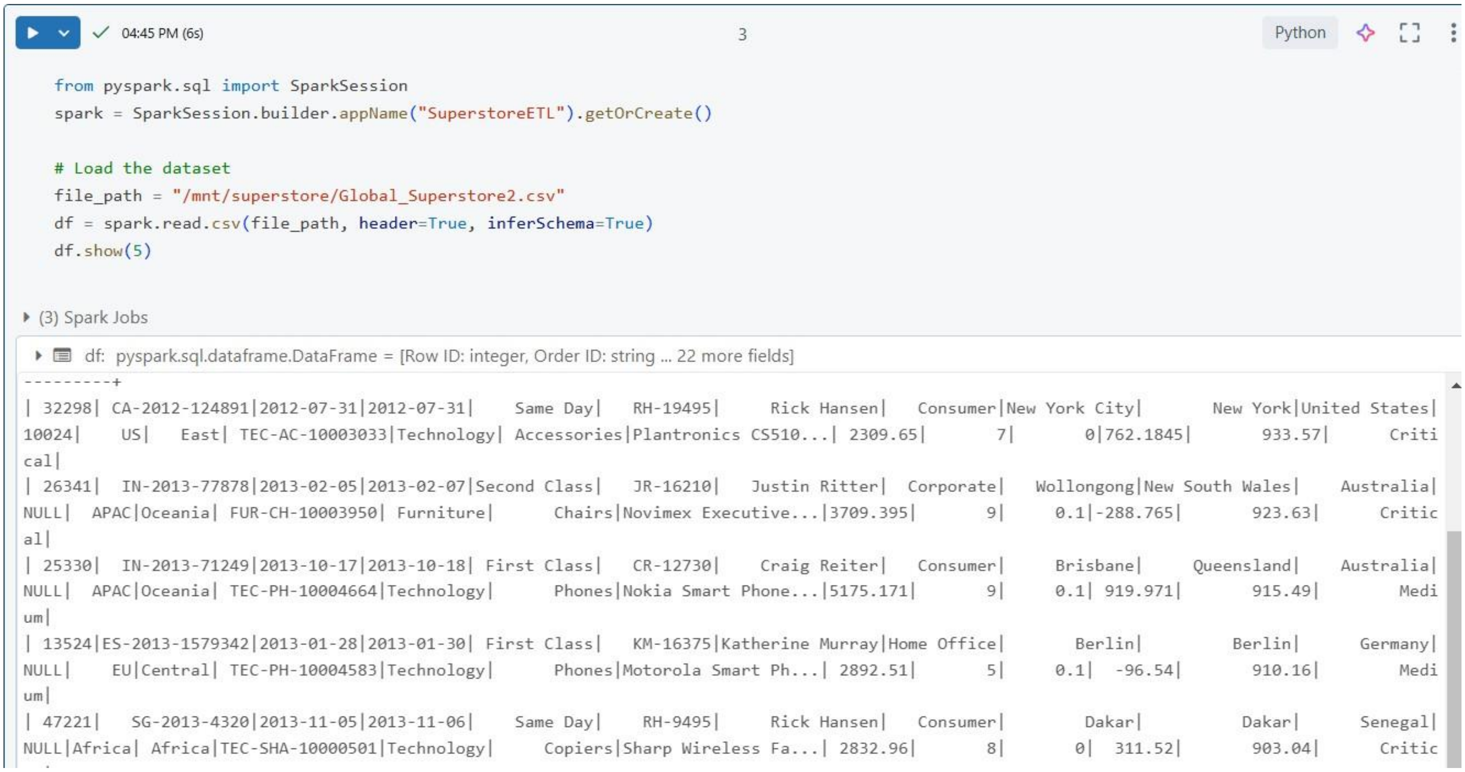
```
#verifying the mount
display(dbutils.fs.ls("/mnt/superstore"))
```

	path	name	size	modificationTime
1	dbfs:/mnt/superstore/Global_Superstore2.c...	Global_Superstore2.c...	12089916	1734606845000

1 row | 5.79 seconds runtime

Refreshed 41 minutes ago

Load the dataset:

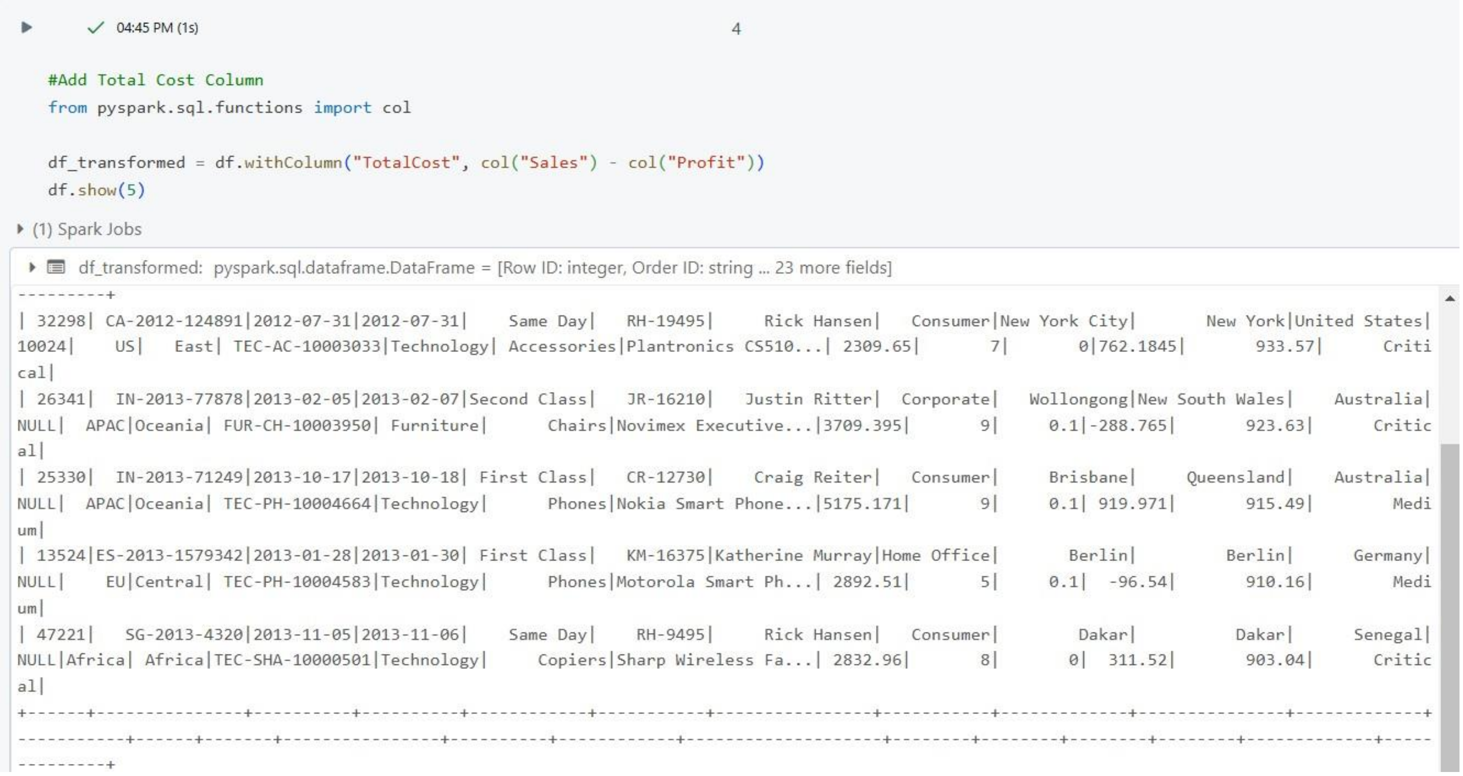


```python
from pyspark.sql import SparkSession
spark = SparkSession.builder.appName("SuperstoreETL").getOrCreate()

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

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

Add Total Cost Column:

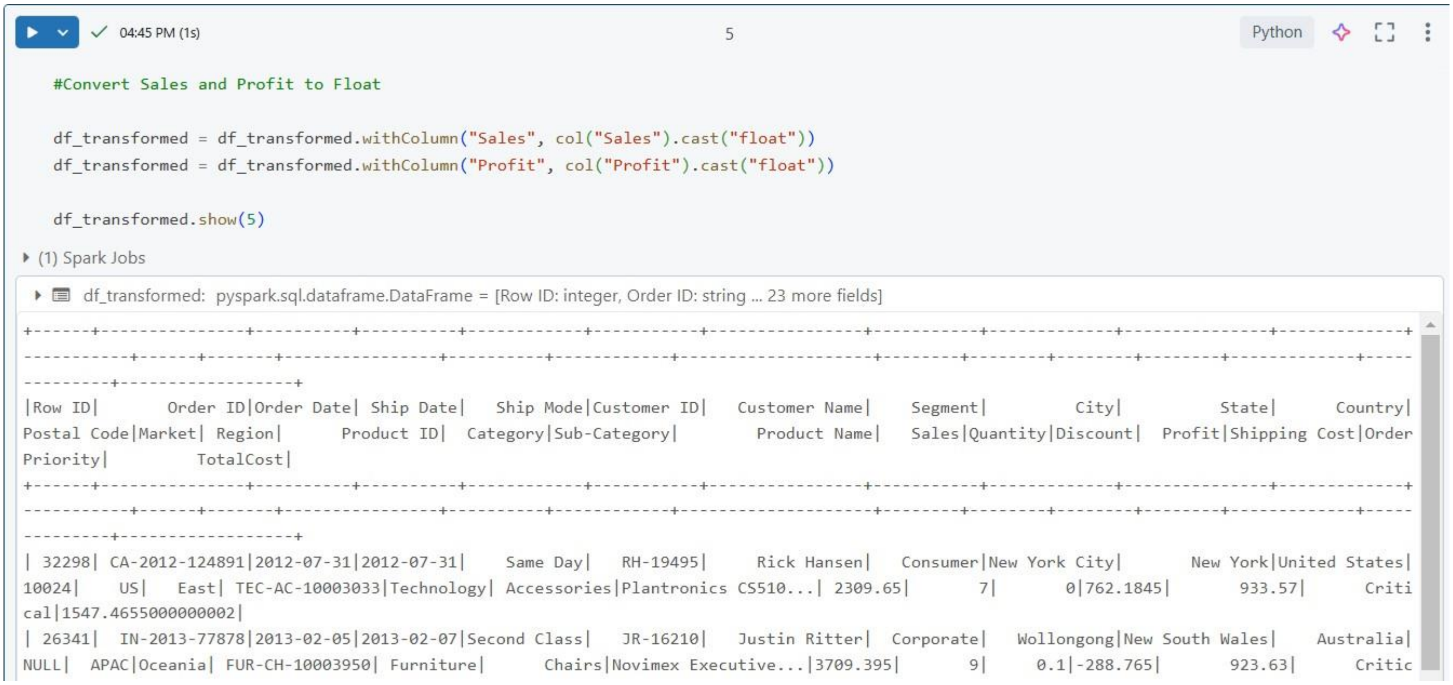


```python
#Add Total Cost Column
from pyspark.sql.functions import col

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

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|
+------+---------------+----------+----------+------------+-----------+----------------+-----------+-------------+---------------+-------------+
----------+------+-------+----------------+----------+------------+--------------------+--------+--------+--------+--------+--------------+----
---------+
```

Convert Sales and Profit to Float:



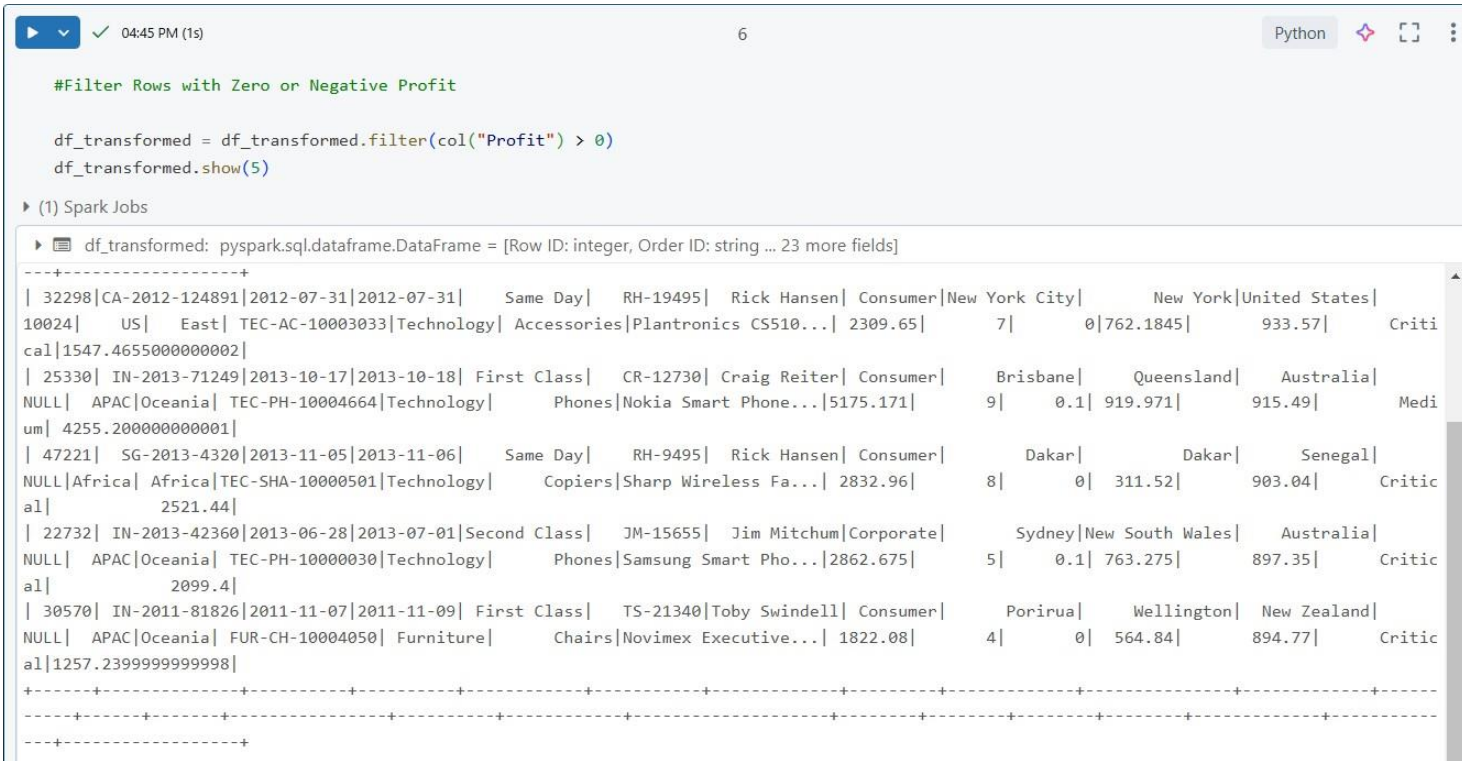
```
#Convert Sales and Profit to Float

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
```

Filter Rows with Zero or Negative Profit:

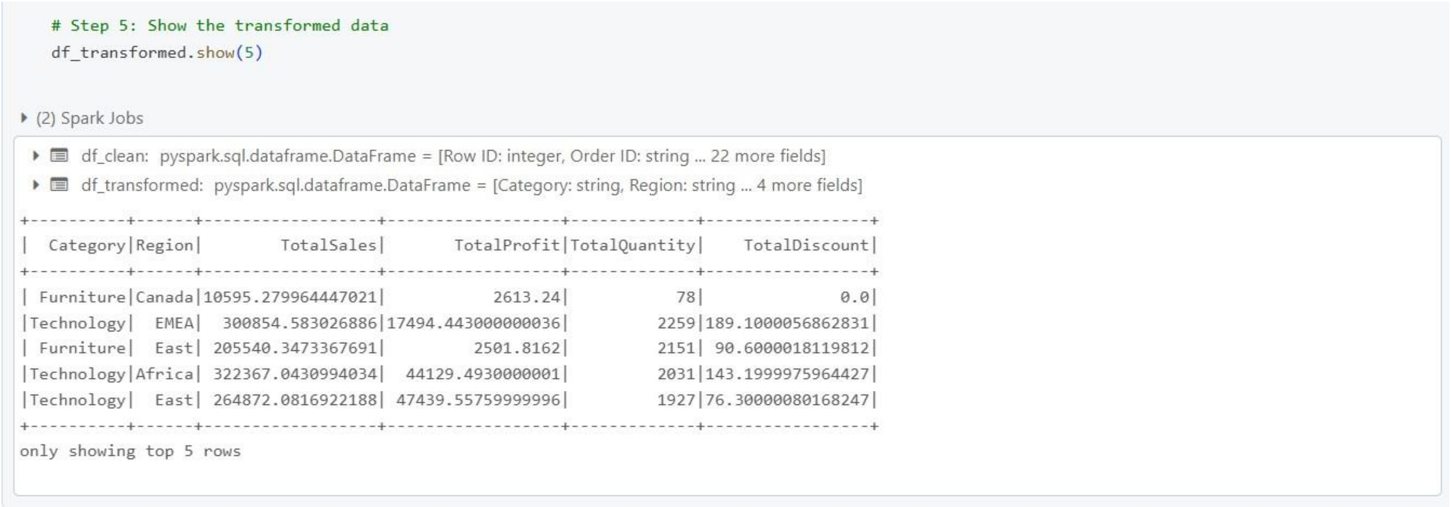


```
#Filter Rows with Zero or Negative Profit

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|
+------+--------------+----------+----------+------------+-----------+-------------+---------+--------------+----------------+--------------+------
-----+------+-------+----------------+----------+------------+--------------------+--------+---------+----------+--------+---------------+----------
---+------------------+
```



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

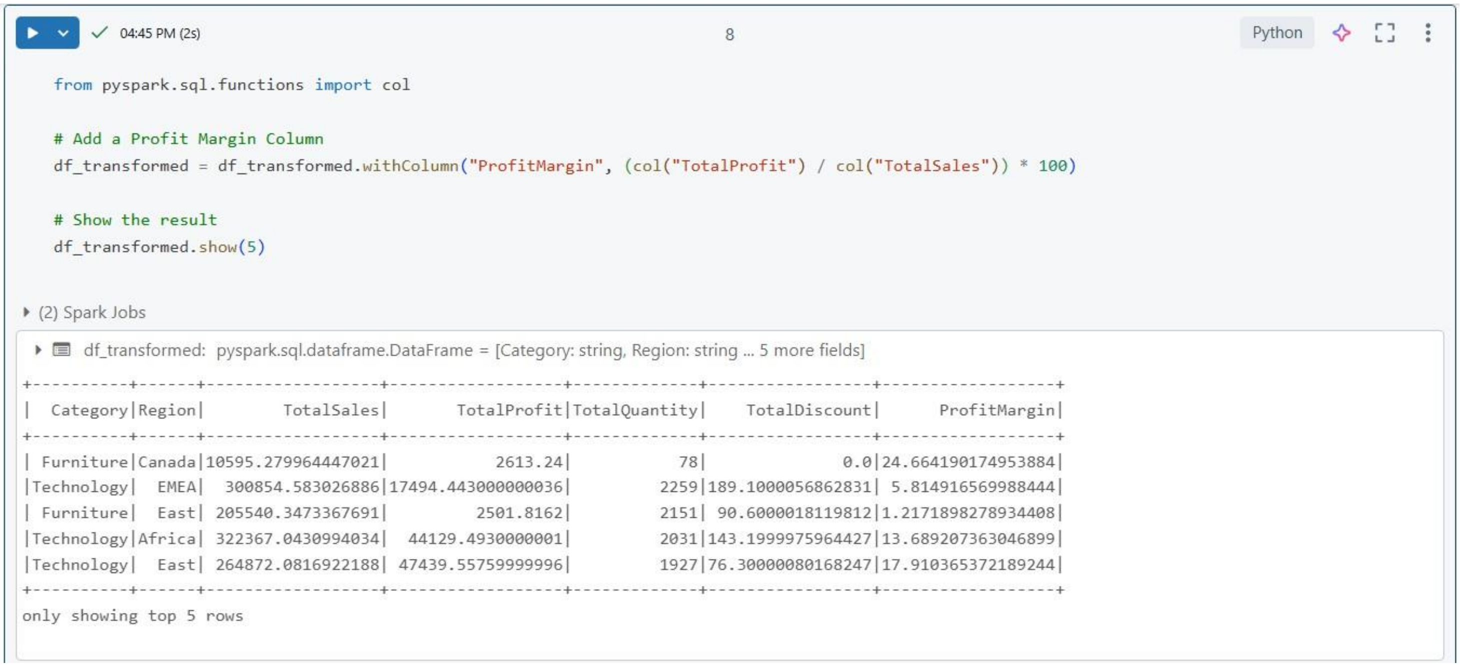
▸ (2) Spark Jobs

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

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

```
+----------+------+------------------+------------------+-------------+-----------------+
|  Category|Region|        TotalSales|       TotalProfit|TotalQuantity|    TotalDiscount|
+----------+------+------------------+------------------+-------------+-----------------+
| Furniture|Canada|10595.279964447021|           2613.24|           78|              0.0|
|Technology|  EMEA|  300854.583026886|17494.443000000036|         2259|189.1000056862831|
| Furniture|  East| 205540.3473367691|         2501.8162|         2151| 90.6000018119812|
|Technology|Africa| 322367.0430994034|  44129.4930000001|         2031|143.1999975964427|
|Technology|  East| 264872.0816922188| 47439.55759999996|         1927|76.30000080168247|
+----------+------+------------------+------------------+-------------+-----------------+
only showing top 5 rows
```

Add a Profit Margin Column:



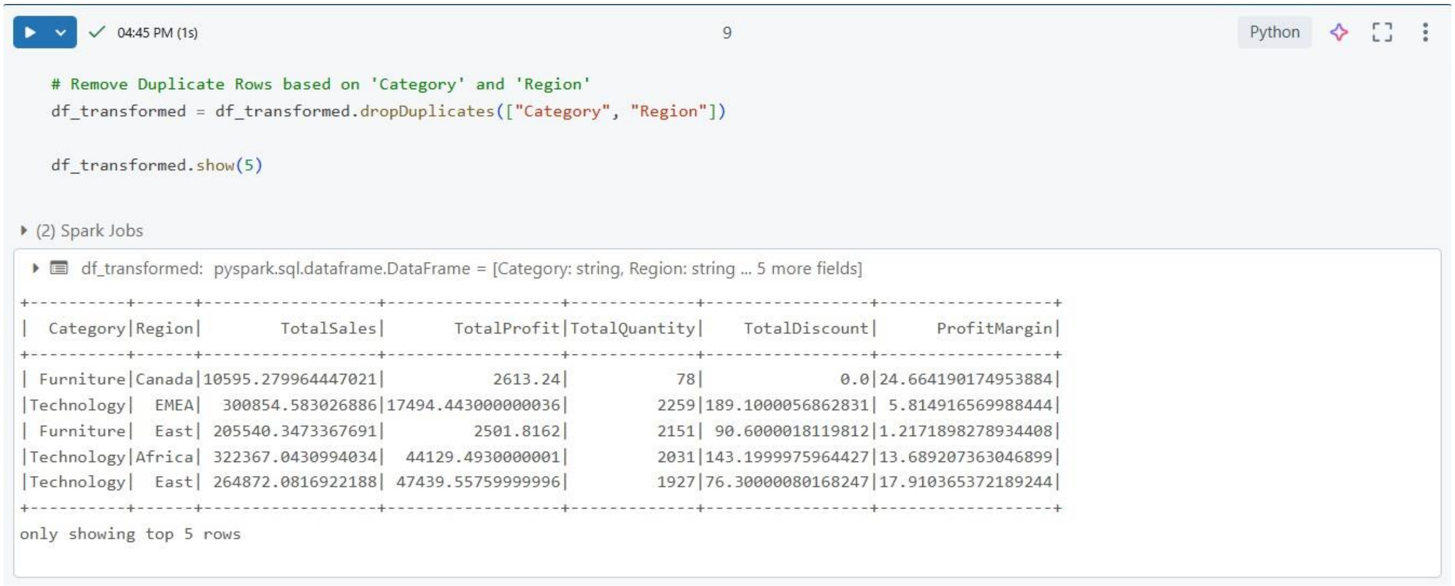
```python
from pyspark.sql.functions import col

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

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

(2) Spark Jobs

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

```
+----------+------+------------------+------------------+-------------+-----------------+------------------+
|  Category|Region|        TotalSales|       TotalProfit|TotalQuantity|    TotalDiscount|      ProfitMargin|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
| Furniture|Canada|10595.279964447021|           2613.24|           78|              0.0|24.664190174953884|
|Technology|  EMEA|  300854.583026886|17494.443000000036|         2259|189.1000056862831| 5.814916569988444|
| Furniture|  East| 205540.3473367691|         2501.8162|         2151| 90.6000018119812|1.2171898278934408|
|Technology|Africa| 322367.0430994034|  44129.4930000001|         2031|143.1999975964427|13.689207363046899|
|Technology|  East| 264872.0816922188| 47439.55759999996|         1927|76.30000080168247|17.910365372189244|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
only showing top 5 rows
```

Remove Duplicate Rows based on 'Category' and 'Region':



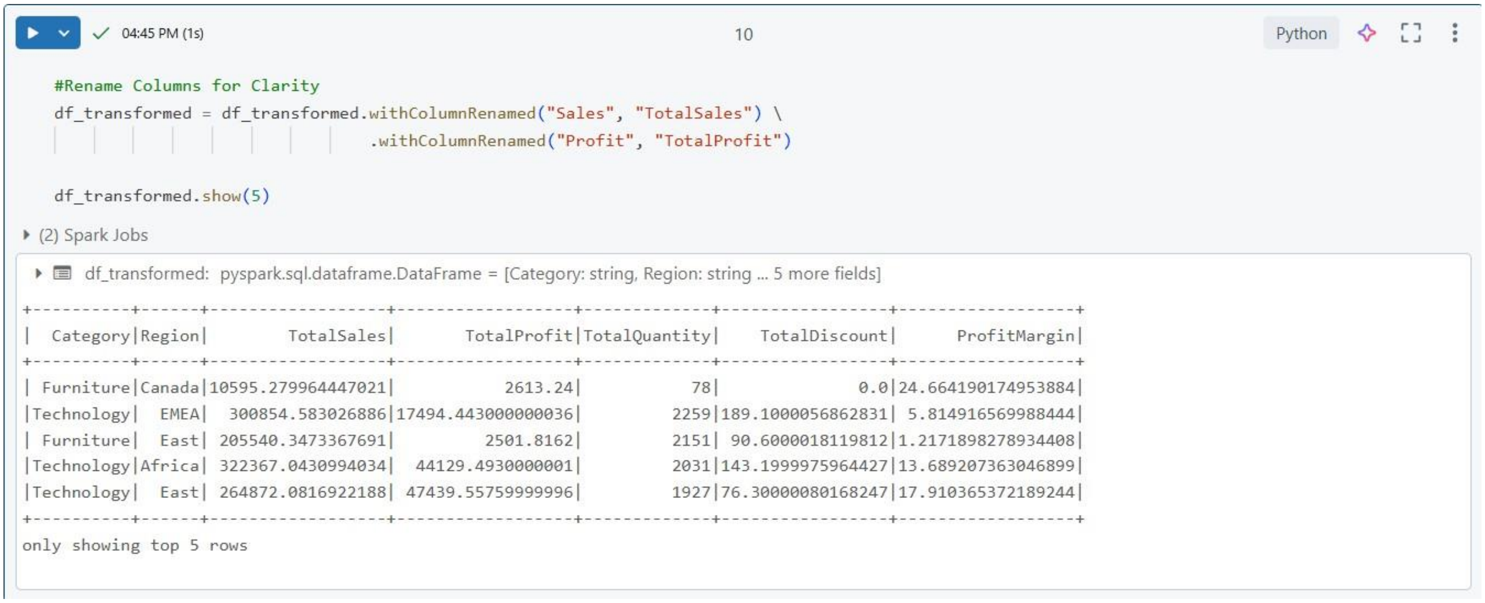
```python
# Remove Duplicate Rows based on 'Category' and 'Region'
df_transformed = df_transformed.dropDuplicates(["Category", "Region"])

df_transformed.show(5)
```

(2) Spark Jobs

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

```
+----------+------+------------------+------------------+-------------+-----------------+------------------+
|  Category|Region|        TotalSales|       TotalProfit|TotalQuantity|    TotalDiscount|      ProfitMargin|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
| Furniture|Canada|10595.279964447021|           2613.24|           78|              0.0|24.664190174953884|
|Technology|  EMEA|  300854.583026886|17494.443000000036|         2259|189.1000056862831| 5.814916569988444|
| Furniture|  East| 205540.3473367691|         2501.8162|         2151| 90.6000018119812|1.2171898278934408|
|Technology|Africa| 322367.0430994034|  44129.4930000001|         2031|143.1999975964427|13.689207363046899|
|Technology|  East| 264872.0816922188| 47439.55759999996|         1927|76.30000080168247|17.910365372189244|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
only showing top 5 rows
```

Rename Columns for Clarity:



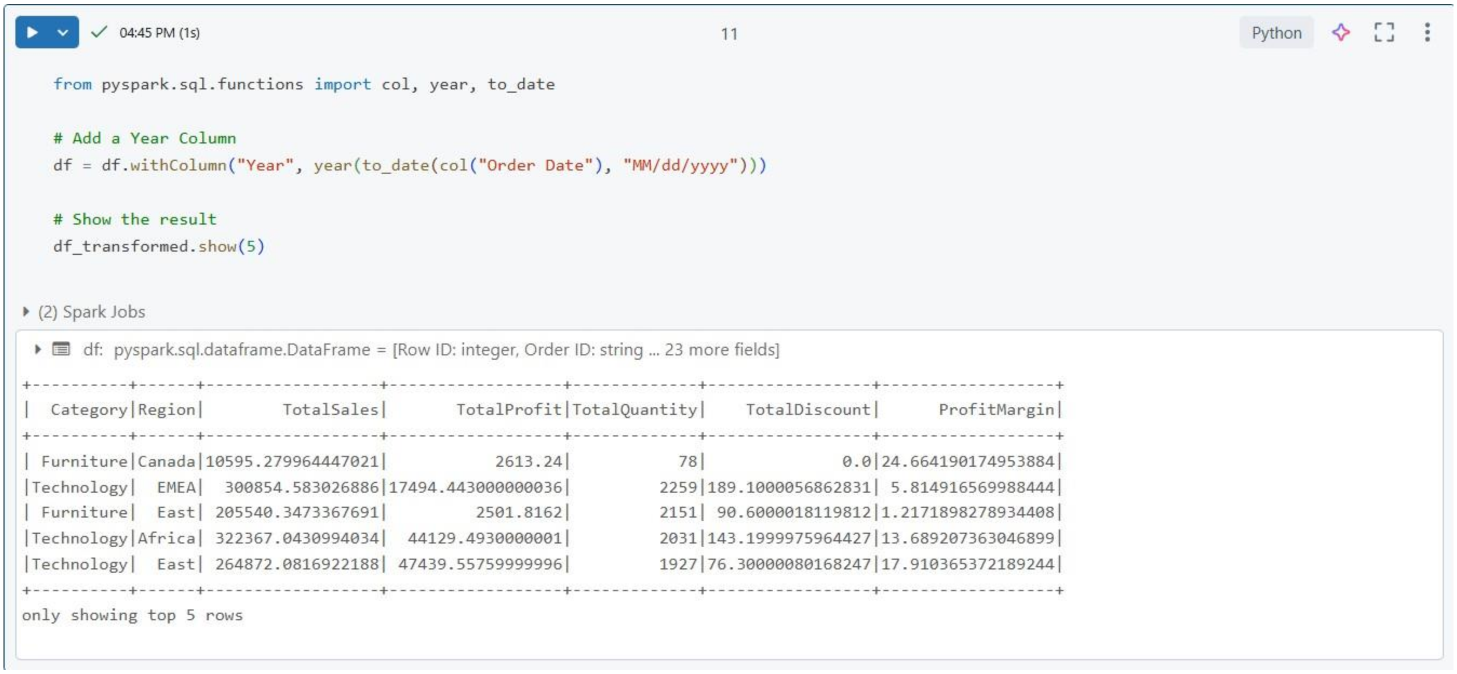
```python
#Rename Columns for Clarity
df_transformed = df_transformed.withColumnRenamed("Sales", "TotalSales") \
                                .withColumnRenamed("Profit", "TotalProfit")

df_transformed.show(5)
```

(2) Spark Jobs

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

```
+----------+------+------------------+------------------+-------------+-----------------+------------------+
|  Category|Region|        TotalSales|       TotalProfit|TotalQuantity|    TotalDiscount|      ProfitMargin|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
| Furniture|Canada|10595.279964447021|           2613.24|           78|              0.0|24.664190174953884|
|Technology|  EMEA|  300854.583026886|17494.443000000036|         2259|189.1000056862831| 5.814916569988444|
| Furniture|  East| 205540.3473367691|         2501.8162|         2151| 90.6000018119812|1.2171898278934408|
|Technology|Africa| 322367.0430994034|  44129.4930000001|         2031|143.1999975964427|13.689207363046899|
|Technology|  East| 264872.0816922188| 47439.55759999996|         1927|76.30000080168247|17.910365372189244|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
only showing top 5 rows
```

Add a Year Column:



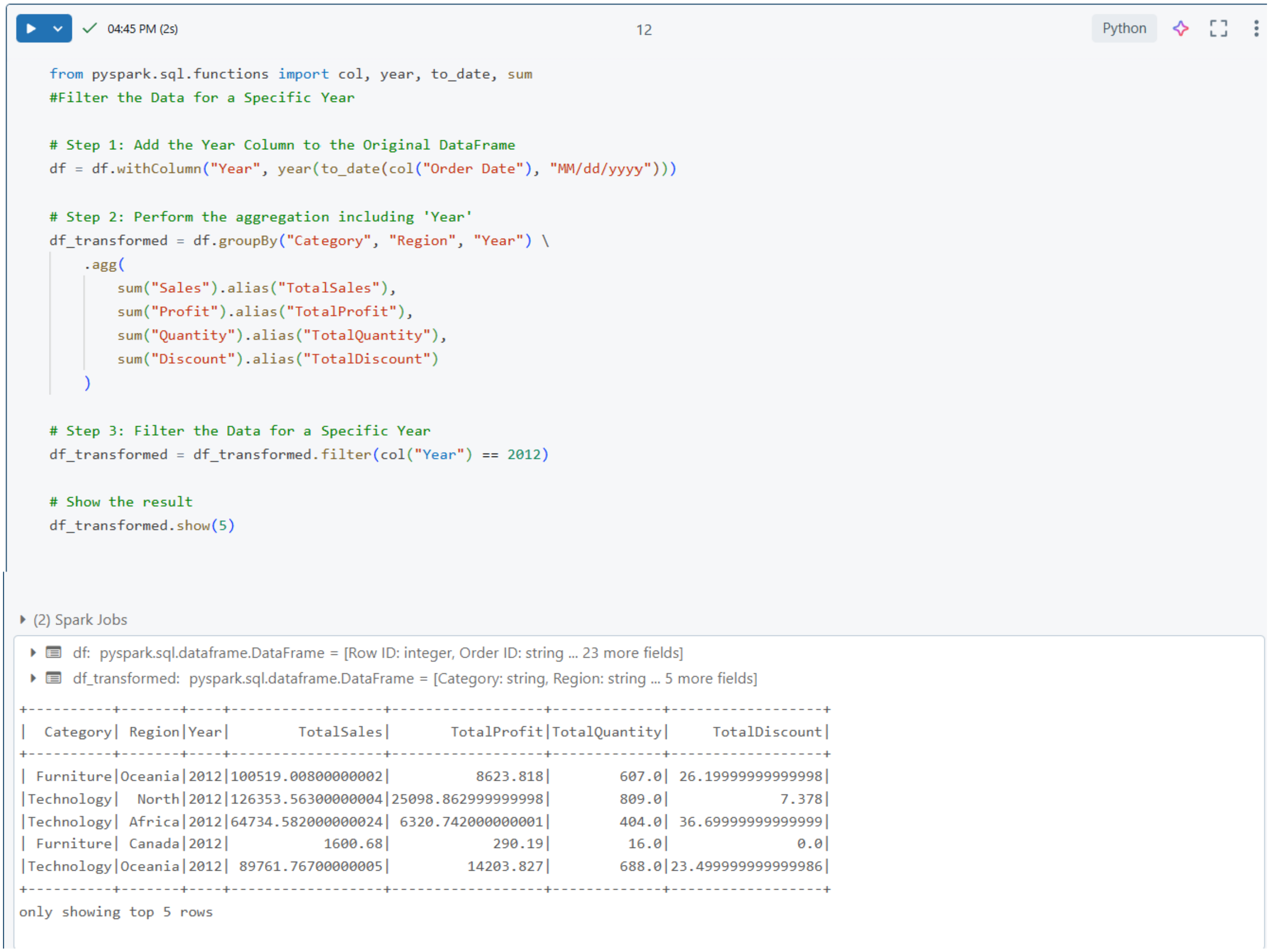
```python
from pyspark.sql.functions import col, year, to_date

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

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

(2) Spark Jobs

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

```
+----------+------+------------------+------------------+-------------+-----------------+------------------+
|  Category|Region|        TotalSales|       TotalProfit|TotalQuantity|    TotalDiscount|      ProfitMargin|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
| Furniture|Canada|10595.279964447021|           2613.24|           78|              0.0|24.664190174953884|
|Technology|  EMEA|  300854.583026886|17494.443000000036|         2259|189.1000056862831| 5.814916569988444|
| Furniture|  East| 205540.3473367691|         2501.8162|         2151| 90.6000018119812|1.2171898278934408|
|Technology|Africa| 322367.0430994034|  44129.4930000001|         2031|143.1999975964427|13.689207363046899|
|Technology|  East| 264872.0816922188| 47439.55759999996|         1927|76.30000080168247|17.910365372189244|
+----------+------+------------------+------------------+-------------+-----------------+------------------+
only showing top 5 rows
```

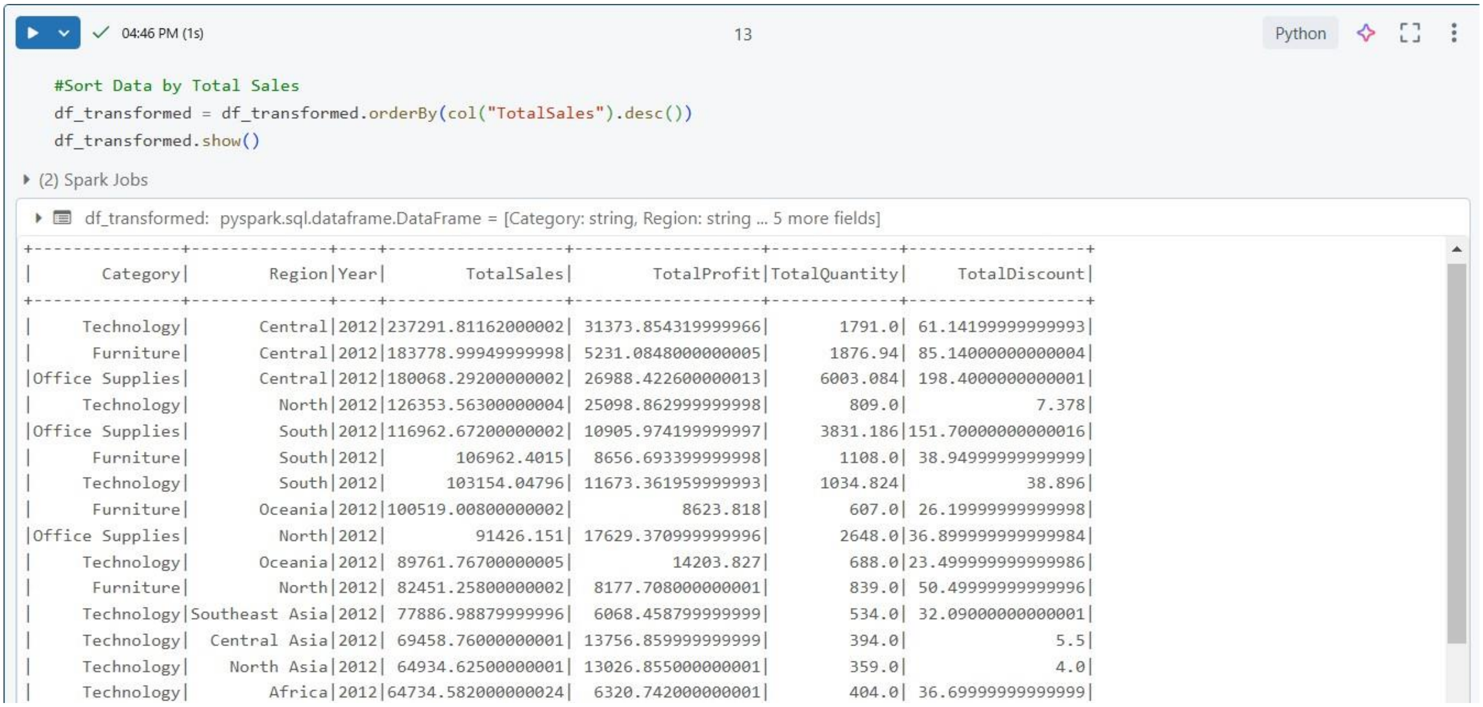
Filter the Data for a Specific Year:



```python
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.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_transformed = df_transformed.filter(col("Year") == 2012)

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

```
df:  pyspark.sql.dataframe.DataFrame = [Row ID: integer, Order ID: string ... 23 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|100519.00800000002|          8623.818|        607.0| 26.19999999999998|
|Technology|  North|2012|126353.56300000004|25098.862999999998|        809.0|             7.378|
|Technology| Africa|2012|64734.582000000024| 6320.742000000001|        404.0| 36.69999999999999|
| Furniture| Canada|2012|           1600.68|            290.19|         16.0|               0.0|
|Technology|Oceania|2012| 89761.76700000005|         14203.827|        688.0|23.499999999999986|
+----------+-------+----+------------------+------------------+-------------+------------------+
only showing top 5 rows
```

Sort Data by Total Sales:



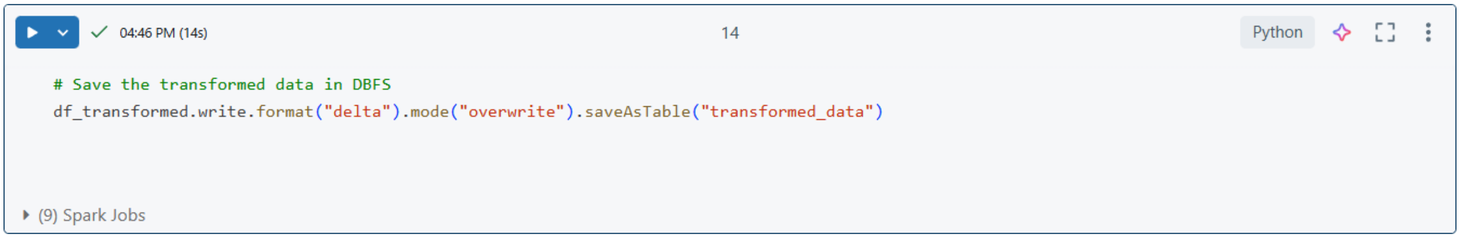
```
#Sort Data by Total Sales
df_transformed = df_transformed.orderBy(col("TotalSales").desc())
df_transformed.show()
```

(2) Spark Jobs

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

```
+---------------+--------------+----+------------------+------------------+-------------+------------------+
|       Category|        Region|Year|        TotalSales|       TotalProfit|TotalQuantity|     TotalDiscount|
+---------------+--------------+----+------------------+------------------+-------------+------------------+
|     Technology|       Central|2012|237291.81162000002|31373.854319999966|       1791.0| 61.14199999999993|
|      Furniture|       Central|2012|183778.99949999998|5231.0848000000005|      1876.94| 85.14000000000004|
|Office Supplies|       Central|2012|180068.29200000002|26988.422600000013|     6003.084| 198.4000000000001|
|     Technology|         North|2012|126353.56300000004|25098.862999999998|        809.0|             7.378|
|Office Supplies|         South|2012|116962.67200000002|10905.974199999997|     3831.186|151.70000000000016|
|      Furniture|         South|2012|       106962.4015| 8656.693399999998|       1108.0| 38.94999999999999|
|     Technology|         South|2012|      103154.04796|11673.361959999993|     1034.824|            38.896|
|      Furniture|       Oceania|2012|100519.00800000002|          8623.818|        607.0| 26.19999999999998|
|Office Supplies|         North|2012|         91426.151|17629.370999999996|       2648.0|36.899999999999984|
|     Technology|       Oceania|2012| 89761.76700000005|         14203.827|        688.0|23.499999999999986|
|      Furniture|         North|2012| 82451.25800000002| 8177.708000000001|        839.0| 50.49999999999996|
|     Technology|Southeast Asia|2012| 77886.98879999996| 6068.458799999999|        534.0| 32.09000000000001|
|     Technology|  Central Asia|2012| 69458.76000000001|13756.859999999999|        394.0|               5.5|
|     Technology|    North Asia|2012| 64934.62500000001|13026.855000000001|        359.0|               4.0|
|     Technology|        Africa|2012|64734.582000000024| 6320.742000000001|        404.0| 36.69999999999999|
```

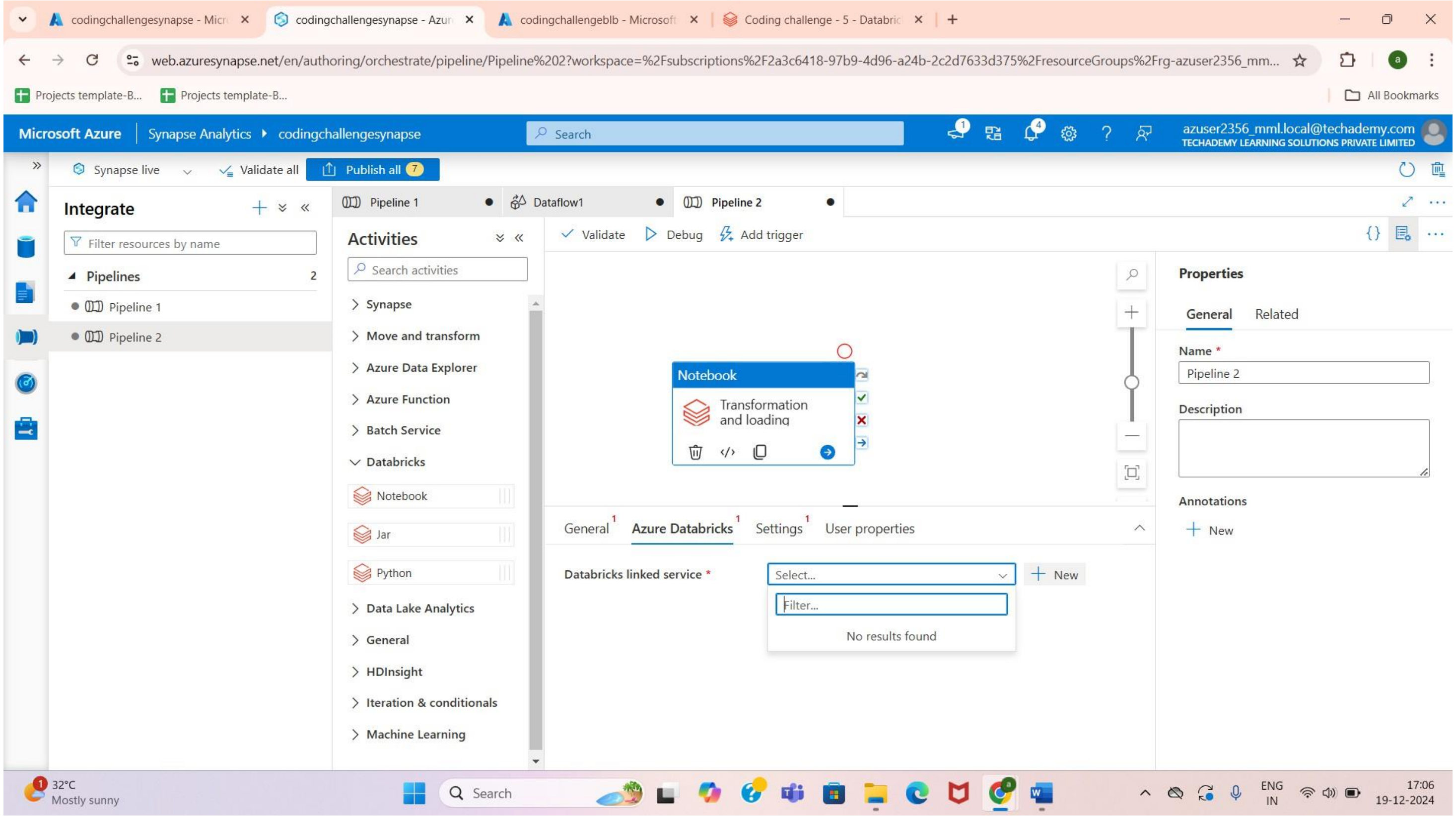
Save the transformed data in DBFS:



```
# Save the transformed data in DBFS
df_transformed.write.format("delta").mode("overwrite").saveAsTable("transformed_data")
```

(9) Spark Jobs

Configure Databricks and the Databricks notebook to Azure Synapse Pipeline:



web.azuresynapse.net/en/authoring/orchestrate/pipeline/Pipeline%202?workspace=%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser2356_mm...

Notebook: Transformation and loading

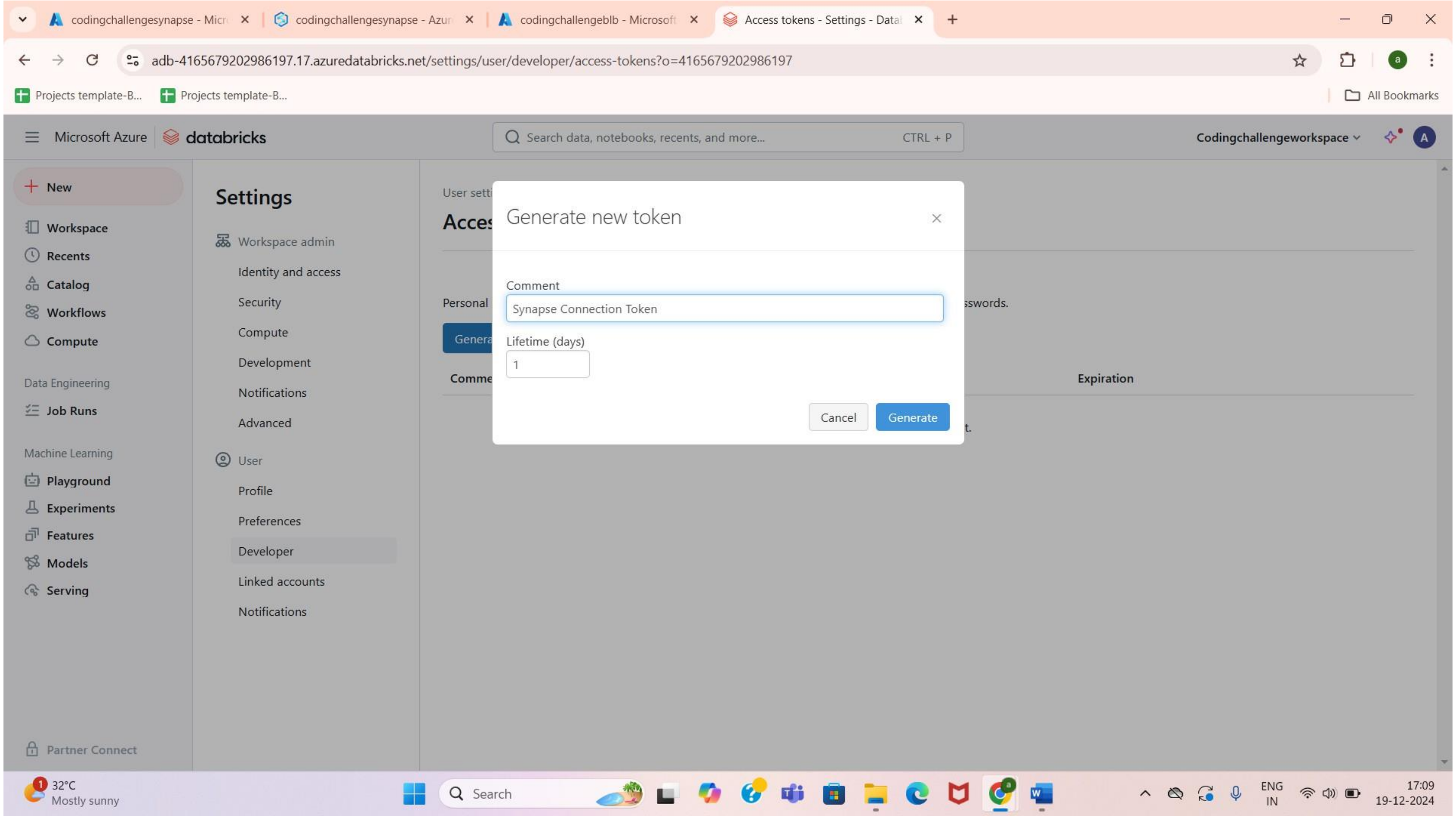
Databricks linked service *: Select...

Filter...

No results found

Name *: Pipeline 2

Generate a new token in Databricks to connect to Azure Synapse:

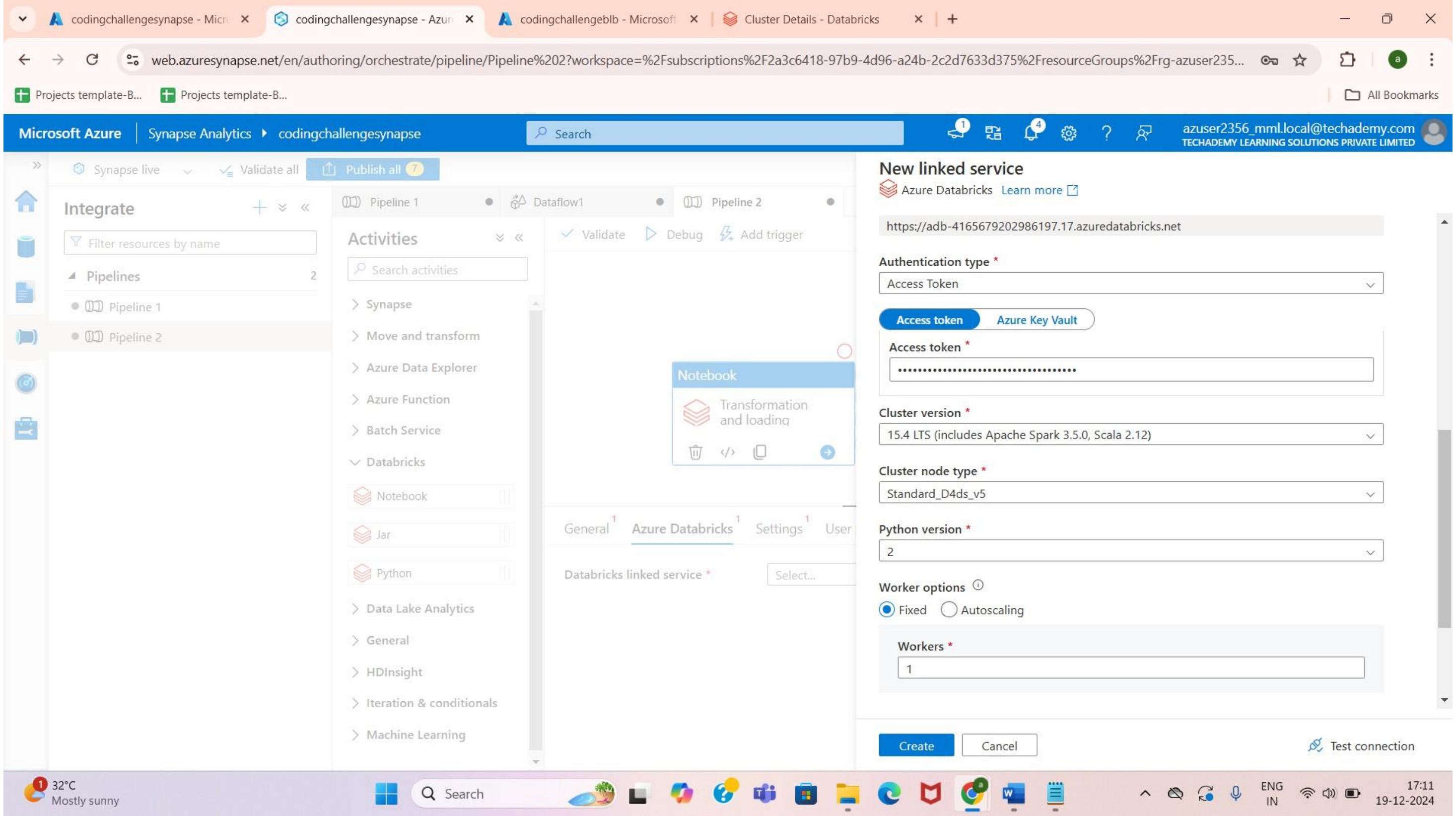


adb-4165679202986197.17.azuredatabricks.net/settings/user/developer/access-tokens?o=4165679202986197

Generate new token

Comment: Synapse Connection Token

Lifetime (days): 1



New linked service

Azure Databricks Learn more

https://adb-4165679202986197.17.azuredatabricks.net

Authentication type *: Access Token

Access token | Azure Key Vault

Access token *: ••••••••••••••••••••••••••••••••••••

Cluster version *: 15.4 LTS (includes Apache Spark 3.5.0, Scala 2.12)

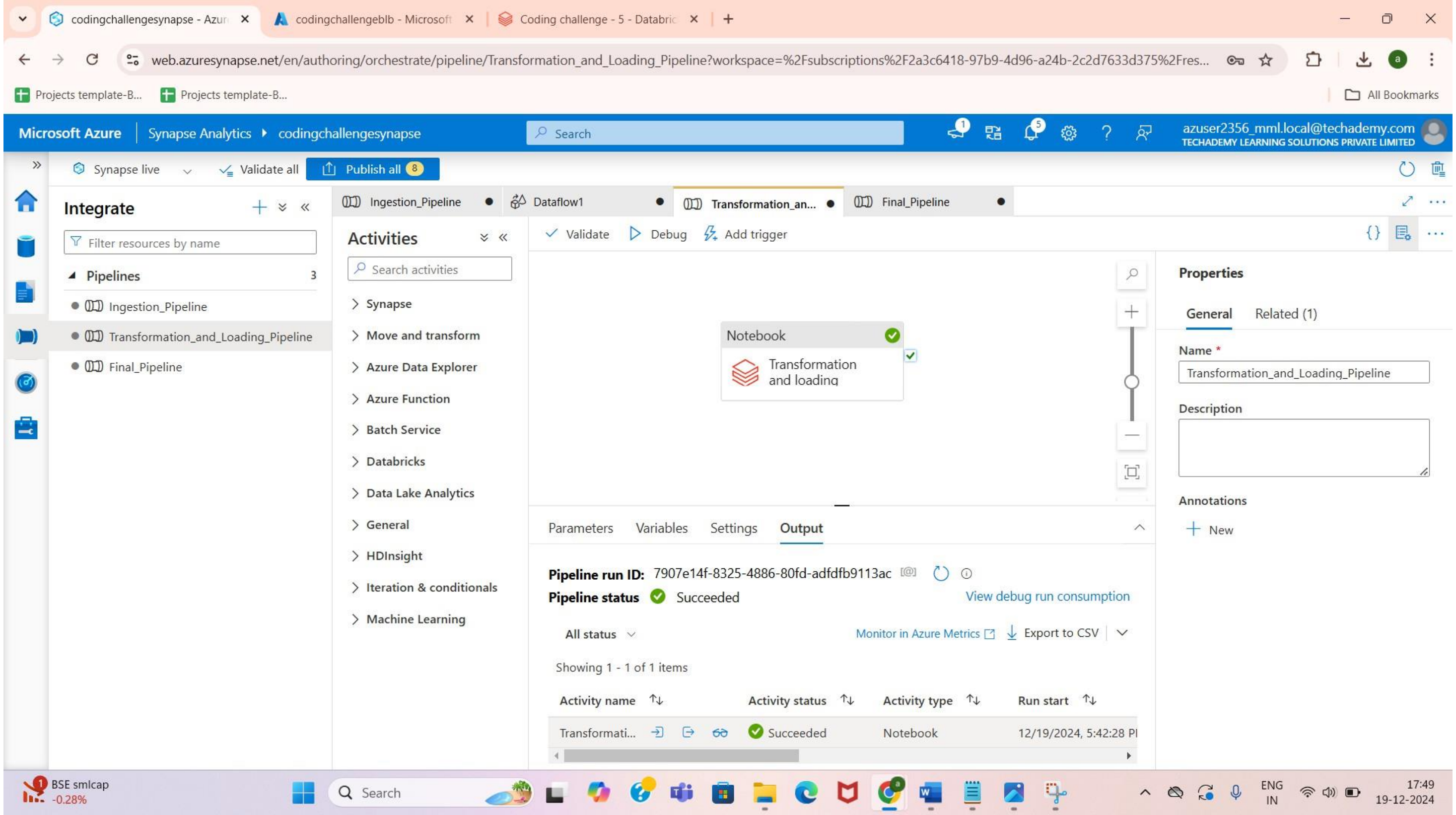
Cluster node type *: Standard_D4ds_v5

Python version *: 2

Worker options: ● Fixed ○ Autoscaling

Workers *: 1

Validate and Debug the pipeline:



Name *: Transformation_and_Loading_Pipeline

Description:

Pipeline run ID: 7907e14f-8325-4886-80fd-adfdfb9113ac

Pipeline status: Succeeded

View debug run consumption

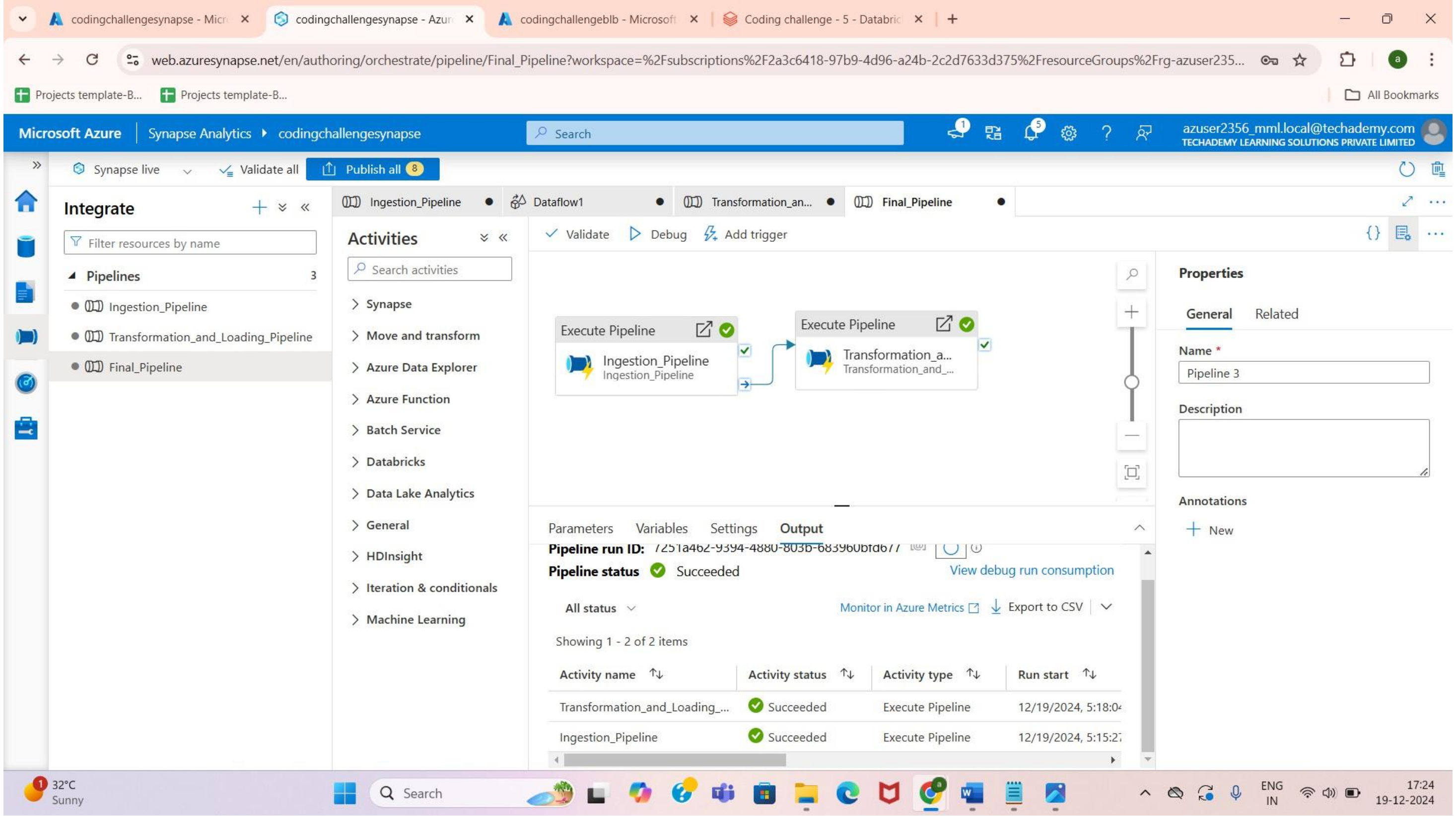
All status

Monitor in Azure Metrics | Export to CSV

Showing 1 - 1 of 1 items

Activity name	Activity status	Activity type	Run start
Transformati...	Succeeded	Notebook	12/19/2024, 5:42:28 PI

Create the final pipeline to connect the ingestion pipeline and Transformation pipeline and then Validate and Debug it:



web.azuresynapse.net/en/authoring/orchestrate/pipeline/Final_Pipeline?workspace=%2Fsubscriptions%2F2a3c6418-97b9-4d96-a24b-2c2d7633d375%2FresourceGroups%2Frg-azuser235...

Name * Pipeline 3

Description

Pipeline run ID: 7251a462-9394-4880-803b-683960bfd677

Pipeline status ✓ Succeeded

View debug run consumption

Showing 1 - 2 of 2 items

Activity name	Activity status	Activity type	Run start
Transformation_and_Loading_...	✓ Succeeded	Execute Pipeline	12/19/2024, 5:18:04
Ingestion_Pipeline	✓ Succeeded	Execute Pipeline	12/19/2024, 5:15:27

--Thank You!