Ecommerce-Brazil Project

Overview and basic configurations

Step 1: Choose a suitable cloud provider and set up a Spark shell environment

Step 2: Configure the necessary dependencies

Step 3: Execute basic Spark commands to make sure Spark is ready

Ecommerce Insights

Setting Up Environment

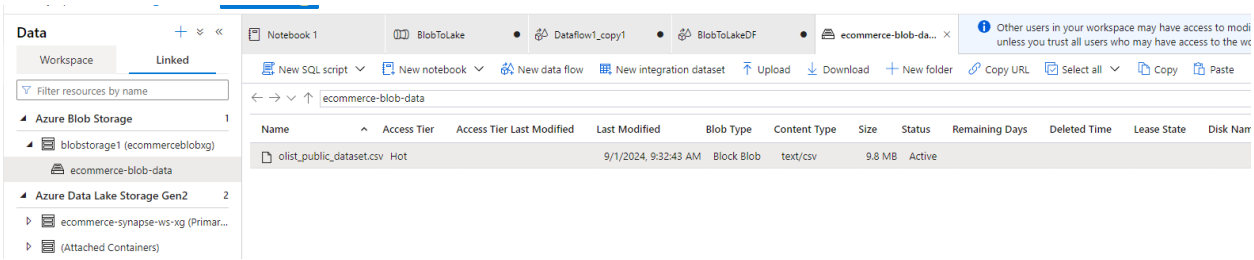
```
1  from pyspark.sql import SparkSession
2  from pyspark.sql.functions import *
3  from pyspark.sql.types import *
4
5  import datetime as dt
```

✓ - Command executed in 149 ms on 8:33:02 AM, 9/05/24

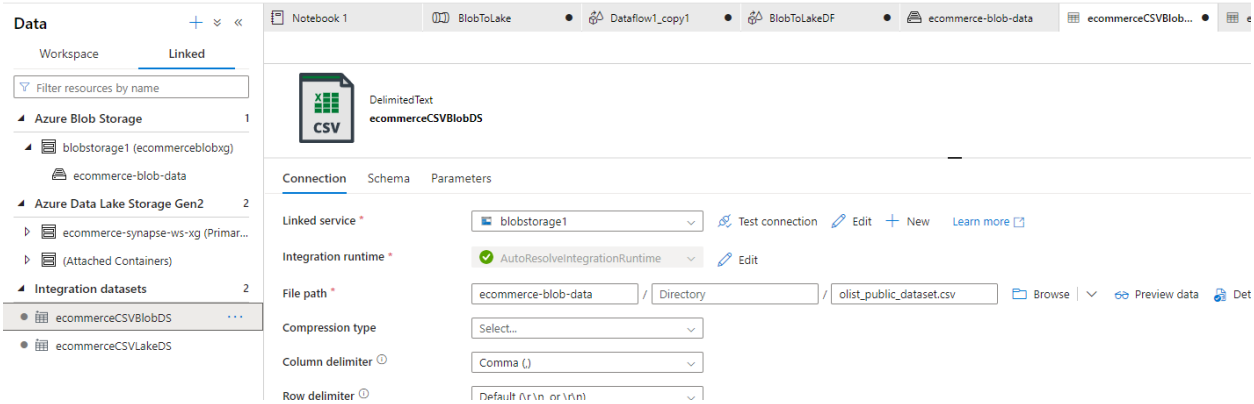
```
1  ecommerce_session = SparkSession.builder.appName("Ecommerce").getOrCreate()
```

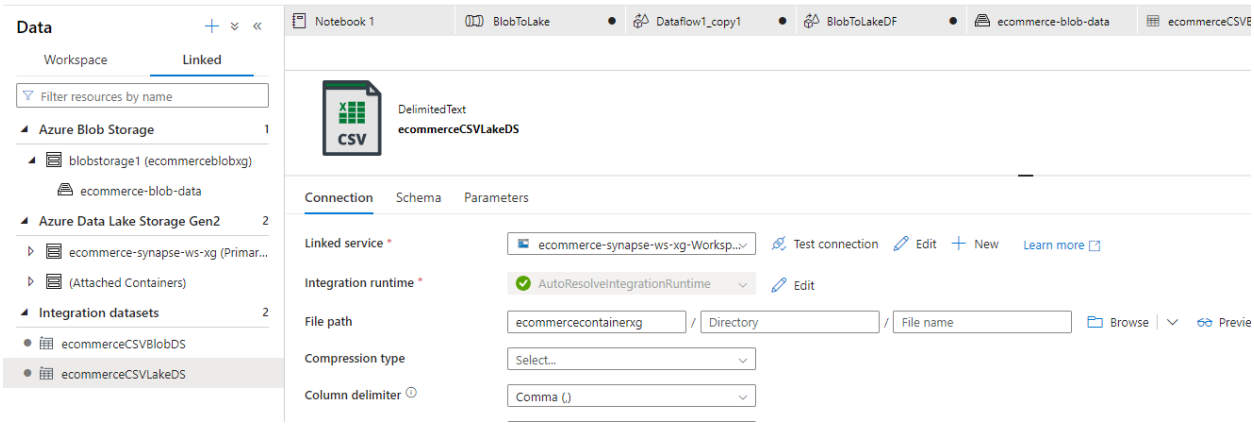
Data ingestion

Step 1: Create a bucket (Azure Blob) and upload the csv file



Step 2: Create a new directory in HDFS(Data Lake) and copy the data from Hive into HDFS


Data
Workspace
Linked
Filter resources by name
Azure Blob Storage 1
blobstorage1 (ecommerceblobxg)
ecommerce-blob-data
Azure Data Lake Storage Gen2 2
ecommerce-synapse-ws-xg (Primar...
(Attached Containers)
Integration datasets 2
ecommerceCSVBlobDS
ecommerceCSVLakeDS
Notebook 1
BlobToLake
Dataflow1_copy1
BlobToLakeDF
ecommerce-blob-data
ecommerceCSVBlob...
DelimitedText
ecommerceCSVBlobDS
Connection
Schema
Parameters
Linked service *
blobstorage1
Test connection
Edit
New
Learn more
Integration runtime *
AutoResolveIntegrationRuntime
Edit
File path *
ecommerce-blob-data
Directory
olist_public_dataset.csv
Browse
Preview data
Compression type
Select...
Column delimiter
Comma (,)
Row delimiter


Data
Workspace
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Filter resources by name
Azure Blob Storage 1
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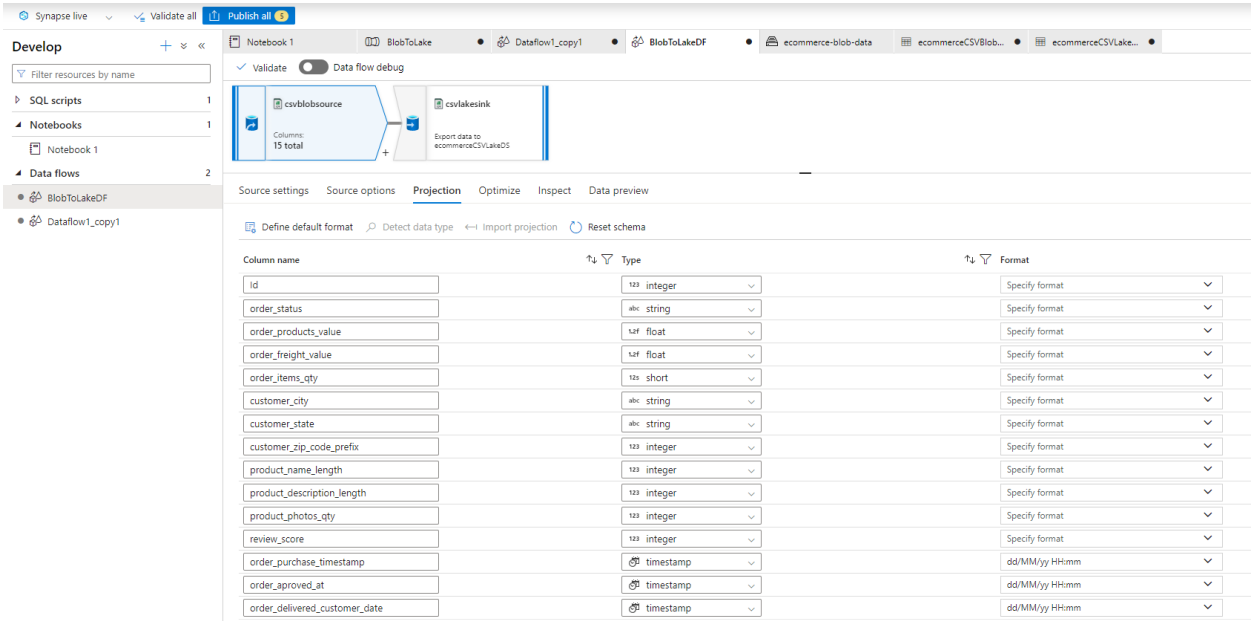
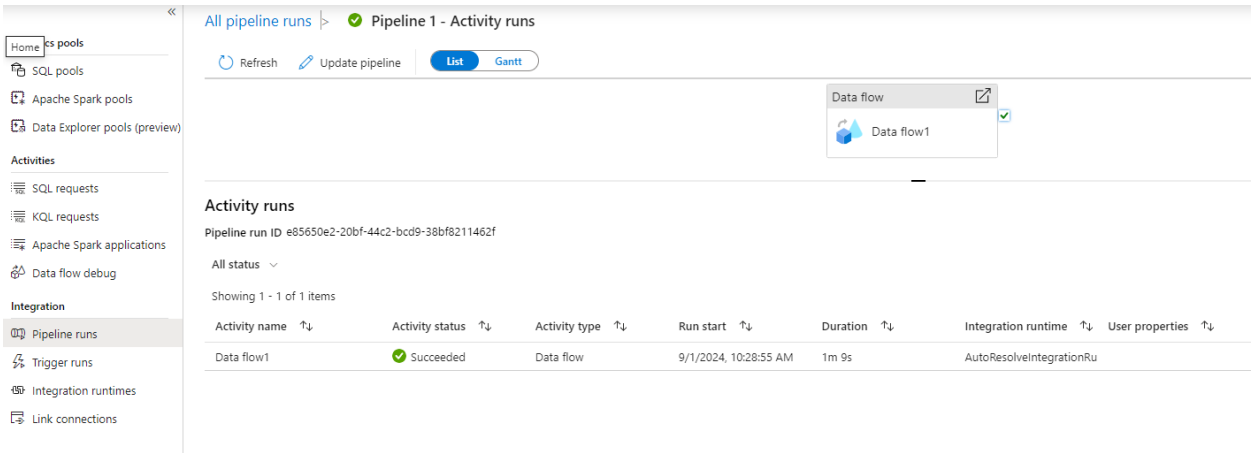
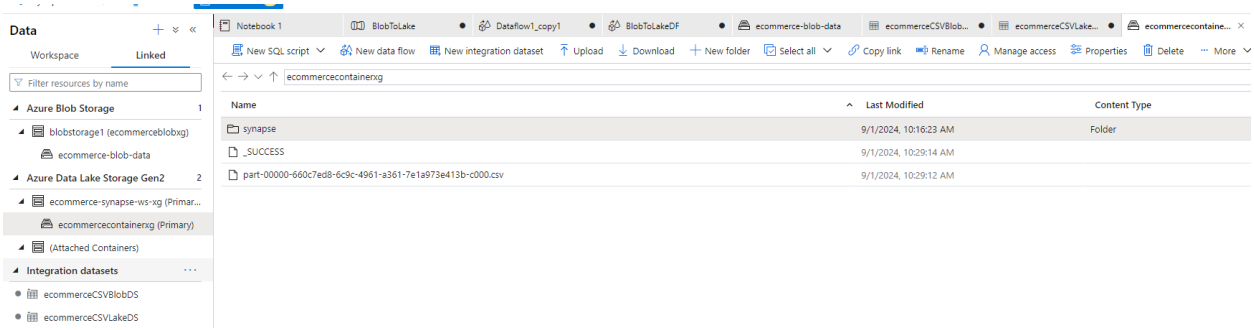
Linked service *
ecommerce-synapse-ws-xg-Worksp...
Test connection
Edit
New
Learn more
Integration runtime *
AutoResolveIntegrationRuntime
Edit
File path
ecommercecontainerxg
Directory
File name
Browse
Compression type
Select...
Column delimiter
Comma (,)

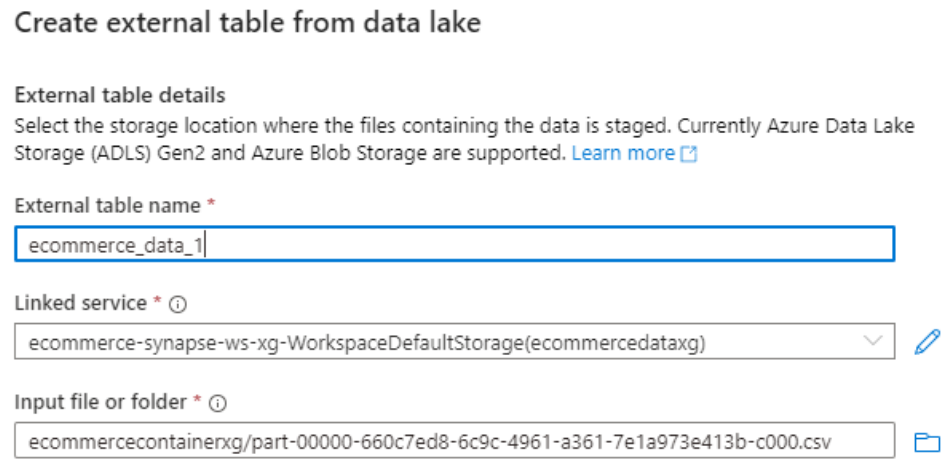

Synapse live
Validate all
Publish all
Develop
Filter resources by name
SQL scripts 1
Notebooks 1
Notebook 1
Data flows 2
BlobToLakeDF
Dataflow1_copy1
Notebook 1
BlobToLake
Dataflow1_copy1
BlobToLakeDF
ecommerce-blob-data
Validate
Data flow debug
csvblobsource
Columns:
15 total
csvlakesink
Export data to ecommerceCSVLakeDS
Source settings
Source options
Projection
Optimize
Inspect
Data preview
Define default format
Detect data type
Import projection
Reset schema
Column name
Type
Format
Id
integer
order_status
string
order_products_value
float
order_freight_value
float
order_items_qty
short
customer_city
string
customer_state
string
customer_zip_code_prefix
integer
product_name_length
integer
product_description_length
integer
product_photos_qty
integer
review_score
integer
order_purchase_timestamp
timestamp
order_aproved_at
timestamp
order_delivered_customer_date
timestamp
Specify format
dd/MM/yy HH:mm

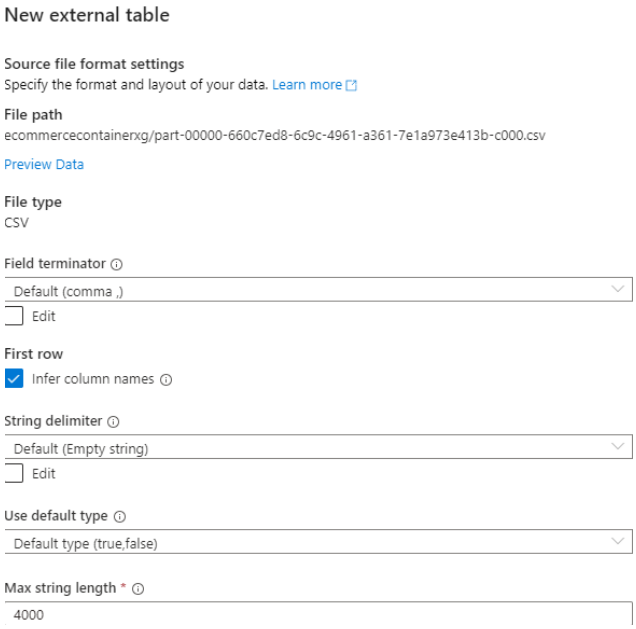


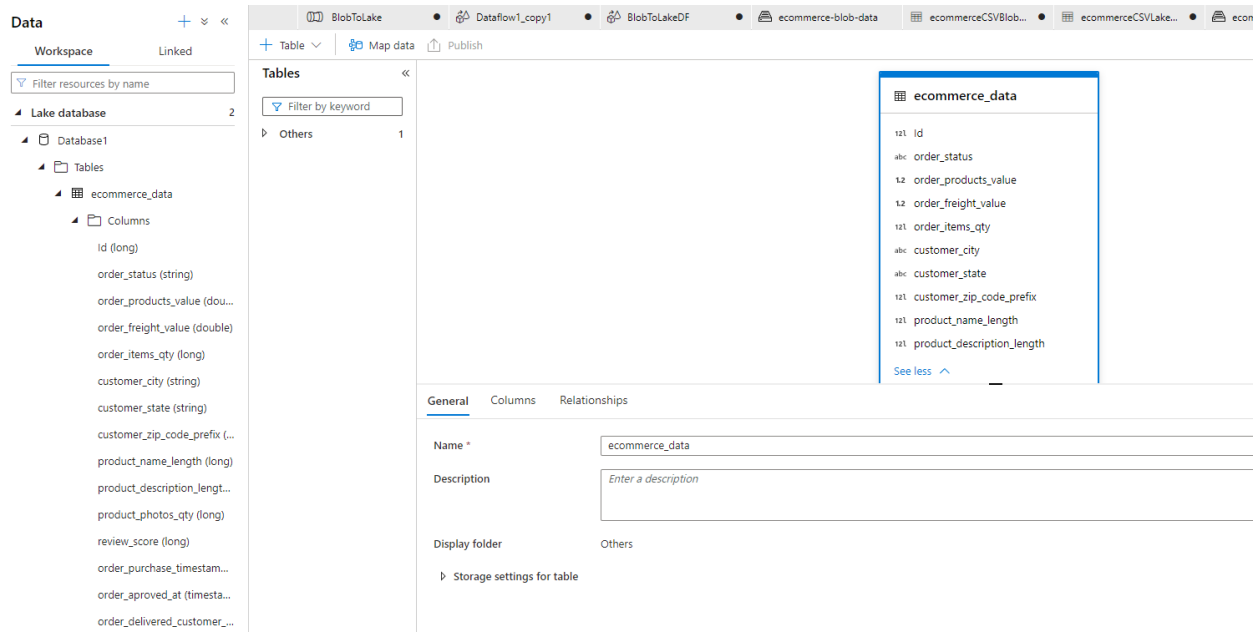
Step 3: Check if the data has been successfully loaded in the HDFS path



Step 4: Load the data from the bucket into the Hive table(Lake Database)







Data streaming

Step 1: Create Schema of the CSV files

Creating Schema

```
ecommerce_schema = StructType([
      StructField("id", IntegerType(), False),
      StructField("order_status", StringType(), True),
      StructField("order_products_value", FloatType(), True),
      StructField("order_freight_value", FloatType(), True),
      StructField("order_items_qty", IntegerType(), True),
      StructField("customer_city", StringType(), True),
      StructField("customer_state", StringType(), True),
      StructField("customer_zip_code_prefix", IntegerType(), True),
      StructField("product_name_lenght", IntegerType(), True),
      StructField("product_description_lenght", IntegerType(), True),
      StructField("product_photos_qty", IntegerType(), True),
      StructField("review_score", IntegerType(), True),
      StructField("order_purchase_timestamp", TimestampType(), True),
      StructField("order_aproved_at", TimestampType(), True),
      StructField("order_delivered_customer_date", TimestampType(), True)
  ])
```

[7] ✓ - Command executed in 152 ms on 8:33:41 AM, 9/05/24

Step 2: Create a Spark session (spark session is already up but this is what it would look like)

```
ecommerce_session = SparkSession.builder.appName("Ecommerce").getOrCreate()
```

Step 3: Read the CSV file and convert the file to a data frame

Creating Dataframe

```
ecommerce_df = spark.read.format("csv").option("header", "True").schema(ecommerce_schema).load("abfss://eco
print((ecommerce_df.count(), len(ecommerce_df.columns)))
ecommerce_df.printSchema()
```

[8] ✓ - Command executed in 14 sec 648 ms on 8:33:58 AM, 9/05/24

```
(100000, 15)
root
 |-- id: integer (nullable = true)
 |-- order_status: string (nullable = true)
 |-- order_products_value: float (nullable = true)
 |-- order_freight_value: float (nullable = true)
 |-- order_items_qty: integer (nullable = true)
 |-- customer_city: string (nullable = true)
 |-- customer_state: string (nullable = true)
 |-- customer_zip_code_prefix: integer (nullable = true)
 |-- product_name_lenght: integer (nullable = true)
 |-- product_description_lenght: integer (nullable = true)
 |-- product_photos_qty: integer (nullable = true)
 |-- review_score: integer (nullable = true)
 |-- order_purchase_timestamp: timestamp (nullable = true)
 |-- order_aproved_at: timestamp (nullable = true)
 |-- order_delivered_customer_date: timestamp (nullable = true)
```

Step 4: Convert “order_purchase_timestamp” to week and day using UDF

Setting up Dataframe

Creating Date Columns

```
ecommerce_df = ecommerce_df.withColumn("order_purchase_as_date",to_date(col("order_purchase_timestamp"),'dd/MM/yy'))
ecommerce_df = ecommerce_df.withColumn("order_approved_at_as_date",to_date(col("order_aproved_at"),'dd/MM/yy'))
ecommerce_df = ecommerce_df.withColumn("order_delivery_customer_date_as_date",to_date(col("order_delivered_customer_date"),'dd/MM/yy'))
```

✓ - Command executed in 146 ms on 8:34:00 AM, 9/05/24

```
ecommerce_df.printSchema()
display(ecommerce_df)
```

[10] ✓ - Command executed in 3 sec 990 ms on 8:34:05 AM, 9/05/24

```
root
 |-- id: integer (nullable = true)
 |-- order_status: string (nullable = true)
 |-- order_products_value: float (nullable = true)
 |-- order_freight_value: float (nullable = true)
 |-- order_items_qty: integer (nullable = true)
 |-- customer_city: string (nullable = true)
 |-- customer_state: string (nullable = true)
 |-- customer_zip_code_prefix: integer (nullable = true)
 |-- product_name_lenght: integer (nullable = true)
 |-- product_description_lenght: integer (nullable = true)
 |-- product_photos_qty: integer (nullable = true)
 |-- review_score: integer (nullable = true)
 |-- order_purchase_timestamp: timestamp (nullable = true)
 |-- order_aproved_at: timestamp (nullable = true)
 |-- order_delivered_customer_date: timestamp (nullable = true)
 |-- order_purchase_as_date: date (nullable = true)
 |-- order_approved_at_as_date: date (nullable = true)
 |-- order_delivery_customer_date_as_date: date (nullable = true)
```

Creating a Day of Week Column

```
def dayAsString(day_int):
  day_of_week_string = {
    1: "Monday",
    2: "Tuesday",
    3: "Wednesday",
    4: "Thursday",
    5: "Friday",
    6: "Saturday",
    7: "Sunday"
  }
  return day_of_week_string[day_int]
```

[11] ✓ - Command executed in 157 ms on 8:34:05 AM, 9/05/24

```
day_as_string_udf = udf(lambda x: dayAsString(x), StringType())
```

[12] ✓ - Command executed in 198 ms on 8:34:05 AM, 9/05/24

```
ecommerce_df = ecommerce_df.withColumn("day_of_week",day_as_string_udf(dayofweek(col("order_purchase_as_date"))))
display(ecommerce_df)
```

[13] ✓ - Command executed in 10 sec 676 ms on 8:34:16 AM, 9/05/24

```
1  ecommerce_df.select("day_of_week").distinct().show()
```

[14] ✓ - Command executed in 1 sec 832 ms on 8:34:18 AM, 9/05/24

```
+-----------+
|day_of_week|
+-----------+
|  Wednesday|
|    Tuesday|
|     Friday|
|   Thursday|
|   Saturday|
|     Monday|
|     Sunday|
+-----------+
```

Creating a Week of Month Column

```
1  def weekOfMonth(date1):
2    month = date1.month
3    year = date1.year
4    month_start = dt.date(year, month, 1)
5    if (dt.date(year, 1, 1) == month_start):
6      week_of_year_month_start = 1
7    else:
8      week_of_year_month_start = month_start.isocalendar()[1]
9    week_of_year_date1 = date1.isocalendar()[1]
10   return week_of_year_date1 - week_of_year_month_start + 1
```

[15] ✓ - Command executed in 152 ms on 8:34:18 AM, 9/05/24

```
1  weekOfMonth_udf = udf(lambda x: weekOfMonth(x), IntegerType())
```

[16] ✓ - Command executed in 155 ms on 8:34:19 AM, 9/05/24

```
1  ecommerce_df = ecommerce_df.withColumn("week_of_month",weekOfMonth_udf(col("order_purchase_as_date")))
2  display(ecommerce_df)
```

[17] ✓ - Command executed in 1 sec 925 ms on 8:34:21 AM, 9/05/24

```
1  ecommerce_df.select("week_of_month").distinct().show()
```

✓ - Command executed in 1 sec 812 ms on 8:34:23 AM, 9/05/24

```
+-------------+
|week_of_month|
+-------------+
|            1|
|            6|
|            3|
|            5|
|            4|
|            2|
+-------------+
```

```
1  ecommerce_df.printSchema()
```

[19] ✓ - Command executed in 143 ms on 8:34:23 AM, 9/05/24

```
root
 |-- id: integer (nullable = true)
 |-- order_status: string (nullable = true)
 |-- order_products_value: float (nullable = true)
 |-- order_freight_value: float (nullable = true)
 |-- order_items_qty: integer (nullable = true)
 |-- customer_city: string (nullable = true)
 |-- customer_state: string (nullable = true)
 |-- customer_zip_code_prefix: integer (nullable = true)
 |-- product_name_lenght: integer (nullable = true)
 |-- product_description_lenght: integer (nullable = true)
 |-- product_photos_qty: integer (nullable = true)
 |-- review_score: integer (nullable = true)
 |-- order_purchase_timestamp: timestamp (nullable = true)
 |-- order_aproved_at: timestamp (nullable = true)
 |-- order_delivered_customer_date: timestamp (nullable = true)
 |-- order_purchase_as_date: date (nullable = true)
 |-- order_approved_at_as_date: date (nullable = true)
 |-- order_delivery_customer_date_as_date: date (nullable = true)
 |-- day_of_week: string (nullable = true)
 |-- week_of_month: integer (nullable = true)
```

Step 5: Calculate the following data:

1. Total sales and order distribution per day and week for each city
2. Total sales and order distribution per day and week for each state
3. Average review score, average freight value, average order approval, and delivery time
4. The freight charges per city and total freight charges

Getting Ecommerce Results

Making Dictionary to Store Results

```
ecommerce_datasets = {}
```

✓ - Command executed in 176 ms on 8:34:23 AM, 9/05/24

Insight on Sales

```
total_sales_df = ecommerce_df.agg(round(sum("order_products_value"),2).alias("total_sales"))
total_sales_df.show()

ecommerce_datasets["total_sales"] = total_sales_df
```

✓ - Command executed in 1 sec 58 ms on 8:34:24 AM, 9/05/24

```
+-------------+
|  total_sales|
+-------------+
|1.284147698E7|
+-------------+
```

Sales by Day

```
total_sales_by_day_df = ecommerce_df.groupBy("day_of_week").agg(round(sum("order_products_value"),2).alias("total_sales")).orderBy("total_sales")
total_sales_by_day_df.show()

ecommerce_datasets["total_sales_by_day"] = total_sales_by_day_df
```

[51] ✓ - Command executed in 1 sec 890 ms on 8:50:44 AM, 9/05/24

```
+-----------+-----------+
|day_of_week|total_sales|
+-----------+-----------+
|     Sunday| 1406302.11|
|     Monday| 1530648.75|
|   Saturday| 1811400.14|
|     Friday| 1922774.44|
|   Thursday| 1989730.72|
|  Wednesday| 2077208.79|
|    Tuesday| 2103412.03|
+-----------+-----------+
```

```
total_sales_by_day_and_city_df = ecommerce_df.groupBy("day_of_week","customer_city").agg(round(sum("order_products_value"),2)\
.alias("total_sales")).orderBy("customer_city")
total_sales_by_day_and_city_df.show()

ecommerce_datasets["total_sales_by_day_and_city"] = total_sales_by_day_and_city_df
```

[52] ✓ - Command executed in 1 sec 845 ms on 8:50:46 AM, 9/05/24

```
+-----------+--------------------+-----------+
|day_of_week|       customer_city|total_sales|
+-----------+--------------------+-----------+
|     Friday|ALMIRANTE TAMANDA...|       49.9|
|    Tuesday|ALMIRANTE TAMANDA...|      99.99|
|     Sunday|ALTA FLORESTA D'O...|     708.99|
|    Tuesday|ALTO ALEGRE DOS P...|      299.0|
|     Sunday|ALTO ALEGRE DOS P...|      299.0|
|     Monday|ALTO ALEGRE DOS P...|     314.99|
|     Friday|    ALVORADA D'OESTE|      328.0|
|    Tuesday|    ALVORADA D'OESTE|     359.98|
|   Saturday| Abadia dos Dourados|       39.9|
|    Tuesday| Abadia dos Dourados|      319.0|
|    Tuesday|           Abadiania|       68.9|
|     Friday|           Abadiania|     949.99|
|   Thursday|              Abaete|     398.79|
|    Tuesday|              Abaete|      449.0|
|  Wednesday|              Abaete|      321.6|
|     Friday|              Abaete|      56.99|
|  Wednesday|          Abaetetuba|     435.41|
|     Monday|          Abaetetuba|     115.99|
|   Saturday|          Abaetetuba|     1574.8|
|     Friday|          Abaetetuba|     164.89|
+-----------+--------------------+-----------+
only showing top 20 rows
```

```
1  total_sales_by_day_and_state_df = ecommerce_df.groupBy("day_of_week","customer_state").agg(round(sum("order_products_value"),2)\
2  .alias("total_sales")).orderBy("customer_state")
3  total_sales_by_day_and_state_df.show()
4
5  ecommerce_datasets["total_sales_by_day_and_state"] = total_sales_by_day_and_state_df
```

```
+-----------+--------------+-----------+
|day_of_week|customer_state|total_sales|
+-----------+--------------+-----------+
|   Thursday|            AC|    2862.77|
|     Monday|            AC|     627.57|
|     Sunday|            AC|     853.49|
|     Friday|            AC|    2542.04|
|   Saturday|            AC|    3987.15|
|  Wednesday|            AC|    3478.97|
|    Tuesday|            AC|    2548.83|
|   Saturday|            AL|    7661.65|
|     Sunday|            AL|    8837.77|
|     Monday|            AL|   13089.56|
|    Tuesday|            AL|   14769.35|
|  Wednesday|            AL|   10002.48|
|     Friday|            AL|   11160.45|
|   Thursday|            AL|   12779.28|
|     Sunday|            AM|    2519.56|
|     Friday|            AM|    2063.87|
|  Wednesday|            AM|    2145.55|
|   Saturday|            AM|    3192.41|
|     Monday|            AM|     3949.5|
|   Thursday|            AM|    2505.38|
+-----------+--------------+-----------+
only showing top 20 rows
```

Sales by Week

```
total_sales_by_week_df = ecommerce_df.groupBy("week_of_month").agg(round(sum("order_products_value"),2).alias("total_sales")).orderBy("week_of_month")
total_sales_by_week_df.show()

ecommerce_datasets["total_sales_by_week"] = total_sales_by_week_df
```

✓ - Command executed in 1 sec 77 ms on 8:50:49 AM, 9/05/24

```
+-------------+-----------+
|week_of_month|total_sales|
+-------------+-----------+
|            1| 1542155.29|
|            2| 3089498.12|
|            3|  2957336.5|
|            4| 3027674.28|
|            5| 2058842.95|
|            6|  165969.84|
+-------------+-----------+
```

```
total_sales_by_week_and_city_df = ecommerce_df.groupBy("week_of_month","customer_city").agg(round(sum("order_products_value"),2)\
.alias("total_sales")).orderBy("customer_city")
total_sales_by_week_and_city_df.show()

ecommerce_datasets["total_sales_by_week_and_city"] = total_sales_by_week_and_city_df
```

✓ - Command executed in 1 sec 782 ms on 8:50:51 AM, 9/05/24

```
week_of_month|       customer_city|total_sales|
-------------+--------------------+-----------+
            2|ALMIRANTE TAMANDA...|      99.99|
            5|ALMIRANTE TAMANDA...|       49.9|
            4|ALTA FLORESTA D'O...|     349.99|
            1|ALTA FLORESTA D'O...|      359.0|
            3|ALTO ALEGRE DOS P...|      299.0|
            4|ALTO ALEGRE DOS P...|     613.99|
            1|    ALVORADA D'OESTE|      328.0|
            5|    ALVORADA D'OESTE|     359.98|
            3| Abadia dos Dourados|      358.9|
            5|           Abadiania|       68.9|
            1|           Abadiania|     949.99|
            5|              Abaete|      515.7|
            4|              Abaete|     176.89|
            2|              Abaete|      254.9|
            1|              Abaete|      69.99|
            3|              Abaete|      208.9|
            3|          Abaetetuba|    2410.96|
            1|          Abaetetuba|     134.99|
            2|          Abaetetuba|     305.51|
            4|          Abaetetuba|       63.8|
-------------+--------------------+-----------+
nly showing top 20 rows
```

```
total_sales_by_week_and_state_df = ecommerce_df.groupBy("week_of_month","customer_state").agg(round(sum("order_products_value"),2)\
.alias("total_sales")).orderBy("customer_state")
total_sales_by_week_and_state_df.show()

ecommerce_datasets["total_sales_by_week_and_state"] = total_sales_by_week_and_state_df
```

```
+-------------+--------------+-----------+
|week_of_month|customer_state|total_sales|
+-------------+--------------+-----------+
|            1|            AC|     3787.2|
|            4|            AC|    2092.61|
|            5|            AC|    4023.55|
|            3|            AC|    4034.82|
|            6|            AC|      699.0|
|            2|            AC|    2263.64|
|            6|            AL|    1057.29|
|            4|            AL|   18700.29|
|            1|            AL|    7343.29|
|            3|            AL|   17451.02|
|            2|            AL|   19961.02|
|            5|            AL|   13787.63|
|            4|            AM|    5775.42|
|            3|            AM|    5308.23|
|            5|            AM|     1554.8|
|            2|            AM|    6492.69|
|            6|            AM|      255.4|
|            1|            AM|    2789.03|
|            2|            AP|    5580.18|
|            5|            AP|    2929.67|
+-------------+--------------+-----------+
only showing top 20 rows
```

Insights on Orders

```
1  total_order_df = ecommerce_df.agg(count("id").alias("total_orders"))
2  total_order_df.show()
3
4  ecommerce_datasets["total_orders"] = total_order_df
```

✓ - Command executed in 512 ms on 8:50:52 AM, 9/05/24

```
+------------+
|total_orders|
+------------+
|      100000|
+------------+
```

Orders by Day

```
1  total_order_by_day_df = ecommerce_df.groupBy("day_of_week").agg(count("id").alias("total_orders")).orderBy("total_orders")
2  total_order_by_day_df.show()
3
4  ecommerce_datasets["total orders by day"] = total order by day df
```

```
+-----------+------------+
|day_of_week|total_orders|
+-----------+------------+
|     Sunday|       10944|
|     Monday|       12034|
|   Saturday|       14199|
|     Friday|       14857|
|   Thursday|       15634|
|  Wednesday|       16045|
|    Tuesday|       16287|
+-----------+------------+
```

```
1  total_order_by_day_and_city_df = ecommerce_df.groupBy("day_of_week","customer_city").agg(count("id").alias("total_orders")).orderBy("customer_city")
2  total_order_by_day_and_city_df.show()
3
4  ecommerce_datasets["total_orders_by_day_and_city"] = total_order_by_day_and_city_df
```

59] ✓ - Command executed in 1 sec 163 ms on 8:50:55 AM, 9/05/24

```
+-----------+--------------------+------------+
|day_of_week|       customer_city|total_orders|
+-----------+--------------------+------------+
|     Friday|ALMIRANTE TAMANDA...|           1|
|    Tuesday|ALMIRANTE TAMANDA...|           1|
|     Sunday|ALTA FLORESTA D'O...|           2|
|    Tuesday|ALTO ALEGRE DOS P...|           1|
|     Sunday|ALTO ALEGRE DOS P...|           1|
|     Monday|ALTO ALEGRE DOS P...|           1|
|     Friday|    ALVORADA D'OESTE|           1|
|    Tuesday|    ALVORADA D'OESTE|           1|
|   Saturday| Abadia dos Dourados|           1|
|    Tuesday| Abadia dos Dourados|           2|
|    Tuesday|           Abadiania|           1|
|     Friday|           Abadiania|           1|
|   Thursday|              Abaete|           3|
|    Tuesday|              Abaete|           1|
|  Wednesday|              Abaete|           3|
|     Friday|              Abaete|           1|
|  Wednesday|          Abaetetuba|           3|
|     Monday|          Abaetetuba|           2|
|   Saturday|          Abaetetuba|           3|
|     Friday|          Abaetetuba|           2|
+-----------+--------------------+------------+
only showing top 20 rows
```

```
1  total_order_by_day_and_state_df = ecommerce_df.groupBy("day_of_week","customer_state").agg(count("id").alias("total_orders")).orderBy("customer_state")
2  total_order_by_day_and_state_df.show()
3
4  ecommerce_datasets["total_orders_by_day_and_state"] = total_order_by_day_and_state_df
```

```
+-----------+--------------+------------+
|day_of_week|customer_state|total_orders|
+-----------+--------------+------------+
|   Thursday|            AC|          10|
|     Monday|            AC|           7|
|     Sunday|            AC|          11|
|     Friday|            AC|          15|
|   Saturday|            AC|          16|
|  Wednesday|            AC|          13|
|    Tuesday|            AC|          12|
|   Saturday|            AL|          53|
|     Sunday|            AL|          54|
|     Monday|            AL|          59|
|    Tuesday|            AL|          80|
|  Wednesday|            AL|          52|
|     Friday|            AL|          71|
|   Thursday|            AL|          65|
|     Sunday|            AM|          21|
|     Friday|            AM|          12|
|  Wednesday|            AM|          22|
|   Saturday|            AM|          21|
|     Monday|            AM|          20|
|   Thursday|            AM|          28|
+-----------+--------------+------------+
only showing top 20 rows
```

Orders by Week

```
total_order_by_week_df = ecommerce_df.groupBy("week_of_month").agg(count("id").alias("total_orders")).orderBy("week_of_month")
total_order_by_week_df.show()

ecommerce_datasets["total_orders_by_week"] = total_order_by_week_df
```

✓ - Command executed in 1 sec 104 ms on 8:50:57 AM, 9/05/24

```
+-------------+------------+
|week_of_month|total_orders|
+-------------+------------+
|            1|       12202|
|            2|       23676|
|            3|       23255|
|            4|       23392|
|            5|       16160|
|            6|        1315|
+-------------+------------+
```

```
total_order_by_week_and_city_df = ecommerce_df.groupBy("week_of_month","customer_city").agg(count("id").alias("total_orders")).orderBy("customer_city")
total_order_by_week_and_city_df.show()

ecommerce_datasets["total_orders_by_week_and_city"] = total_order_by_week_and_city_df
```

✓ - Command executed in 1 sec 85 ms on 8:50:59 AM, 9/05/24

```
+-------------+--------------------+------------+
|week_of_month|       customer_city|total_orders|
+-------------+--------------------+------------+
|            2|ALMIRANTE TAMANDA...|           1|
|            5|ALMIRANTE TAMANDA...|           1|
|            4|ALTA FLORESTA D'O...|           1|
|            1|ALTA FLORESTA D'O...|           1|
|            3|ALTO ALEGRE DOS P...|           1|
|            4|ALTO ALEGRE DOS P...|           2|
|            1|    ALVORADA D'OESTE|           1|
|            5|    ALVORADA D'OESTE|           1|
|            3| Abadia dos Dourados|           3|
|            5|           Abadiania|           1|
|            1|           Abadiania|           1|
|            5|              Abaete|           3|
|            4|              Abaete|           2|
|            2|              Abaete|           1|
|            1|              Abaete|           1|
|            3|              Abaete|           1|
|            3|          Abaetetuba|           7|
|            1|          Abaetetuba|           1|
|            2|          Abaetetuba|           2|
|            4|          Abaetetuba|           2|
+-------------+--------------------+------------+
only showing top 20 rows
```

```
total_order_by_week_and_state_df = ecommerce_df.groupBy("week_of_month","customer_state").agg(count("id").alias("total_orders")).orderBy("customer_state")
total_order_by_week_and_state_df.show()

ecommerce_datasets["total_orders_by_week_and_state"] = total_order_by_week_and_state_df
```

```
+-------------+--------------+------------+
|week_of_month|customer_state|total_orders|
+-------------+--------------+------------+
|            1|            AC|          15|
|            4|            AC|          20|
|            5|            AC|          15|
|            3|            AC|          20|
|            6|            AC|           1|
|            2|            AC|          13|
|            6|            AL|           4|
|            4|            AL|         104|
|            1|            AL|          52|
|            3|            AL|         113|
|            2|            AL|          89|
|            5|            AL|          72|
|            4|            AM|          41|
|            3|            AM|          30|
|            5|            AM|          18|
|            2|            AM|          41|
|            6|            AM|           2|
|            1|            AM|          22|
|            2|            AP|          25|
|            5|            AP|          14|
+-------------+--------------+------------+
only showing top 20 rows
```

Average of Misc. Columns

By Day

```
1  average_review_score_by_day_df = ecommerce_df.groupBy("day_of_week").agg(round(avg("review_score"),2).alias("average_review_score")).orderBy("average_review_score")
2  average_review_score_by_day_df.show()
3
4  ecommerce_datasets["average_review_score_by_day"] = average_review_score_by_day_df
```

✓ - Command executed in 1 sec 69 ms on 8:51:01 AM, 9/05/24

```
+-----------+--------------------+
|day_of_week|average_review_score|
+-----------+--------------------+
|    Tuesday|                4.04|
|     Friday|                4.04|
|  Wednesday|                4.05|
|   Saturday|                4.05|
|     Sunday|                4.05|
|   Thursday|                4.06|
|     Monday|                4.06|
+-----------+--------------------+
```

```
1  average_freight_value_by_day_df = ecommerce_df.groupBy("day_of_week").agg(round(avg("order_freight_value"),2).alias("average_freight_value"))\
2  .orderBy("average_freight_value")
3  average_freight_value_by_day_df.show()
4
5  ecommerce_datasets["average_freight_value_by_day"] = average_freight_value_by_day_df
```

```
+-----------+--------------------+
|day_of_week|average_freight_value|
+-----------+--------------------+
|     Monday|               21.49|
|    Tuesday|                21.5|
|  Wednesday|                21.7|
|   Saturday|               21.79|
|   Thursday|               21.85|
|     Friday|               21.92|
|     Sunday|               21.98|
+-----------+--------------------+
```

```
1  ecommerce_df = ecommerce_df.withColumn("time_to_approve_order",col("order_aproved_at").cast("long") - col('order_purchase_timestamp').cast("long"))
2  ecommerce_df = ecommerce_df.withColumn("time_to_deliver_order",col("order_delivered_customer_date").cast("long") - col('order_purchase_timestamp').cast("long"))
3  display(ecommerce_df)
```

	time_to_approve_order	time_to_deliver_order
	660	728940
	110580	1190760
	1020	811680
	1020	1141200
	3720	248340
	780	1429200
	176580	176580
	720	863100
	116460	848340
	600	1574340
	540	1093020
	720	497160
	148020	1043940

```
average_time_to_approve_order_by_day_df = ecommerce_df.groupBy("day_of_week").agg(round(avg("time_to_approve_order"),2)\
.alias("average_time_to_approve_order")).orderBy("average_time_to_approve_order")
average_time_to_approve_order_by_day_df.show()

ecommerce_datasets["average_time_to_approve_order_by_day"] = average_time_to_approve_order_by_day_df
```

[67] ✓ - Command executed in 1 sec 183 ms on 8:51:05 AM, 9/05/24

```
+-----------+----------------------------+
|day_of_week|average_time_to_approve_order|
+-----------+----------------------------+
|   Thursday|                    31410.68|
|     Friday|                    31577.61|
|  Wednesday|                    32383.93|
|    Tuesday|                    33473.55|
|     Monday|                    38871.57|
|   Saturday|                    48351.09|
|     Sunday|                    52226.07|
+-----------+----------------------------+
```

```
average_time_to_deliver_order_by_day_df = ecommerce_df.groupBy("day_of_week").agg(round(avg("time_to_deliver_order"),2)\
.alias("average_time_to_approve_order")).orderBy("average_time_to_approve_order")
average_time_to_deliver_order_by_day_df.show()

ecommerce_datasets["average_time_to_deliver_order_by_day"] = average_time_to_deliver_order_by_day_df
```

```
+-----------+----------------------------+
|day_of_week|average_time_to_approve_order|
+-----------+----------------------------+
|     Monday|                  1033518.33|
|    Tuesday|                  1036488.73|
|  Wednesday|                  1043121.45|
|   Thursday|                  1075211.61|
|     Friday|                  1101193.49|
|     Sunday|                  1154172.92|
|   Saturday|                  1172419.75|
+-----------+----------------------------+
```

By Week

```
average_review_score_by_week_df = ecommerce_df.groupBy("week_of_month").agg(round(avg("review_score"),2).alias("average_review_score")).orderBy("average_review_score")
average_review_score_by_week_df.show()

ecommerce_datasets["average_review_score_by_week"] = average_review_score_by_week_df
```

```
+-------------+--------------------+
|week_of_month|average_review_score|
+-------------+--------------------+
|            3|                4.04|
|            5|                4.04|
|            4|                4.05|
|            2|                4.06|
|            1|                4.07|
|            6|                4.07|
+-------------+--------------------+
```

```
average_freight_value_by_week_df = ecommerce_df.groupBy("week_of_month").agg(round(avg("order_freight_value"),2)\
.alias("average_freight_value")).orderBy("average_freight_value")
average_freight_value_by_week_df.show()

ecommerce_datasets["average_freight_value_by_week"] = average_freight_value_by_week_df
```

[70] ✓ - Command executed in 1 sec 59 ms on 8:51:09 AM, 9/05/24

```
+-------------+--------------------+
|week_of_month|average_freight_value|
+-------------+--------------------+
|            6|               21.43|
|            3|               21.62|
|            5|               21.71|
|            2|               21.78|
|            1|               21.82|
|            4|               21.82|
+-------------+--------------------+
```

```
average_time_to_approve_order_by_week_df = ecommerce_df.groupBy("week_of_month").agg(round(avg("time_to_approve_order"),2)\
.alias("average_time_to_approve_order")).orderBy("average_time_to_approve_order")
average_time_to_approve_order_by_week_df.show()

ecommerce_datasets["average_time_to_approve_order_by_week"] = average_time_to_approve_order_by_week_df
```

[71] ✓ - Command executed in 1 sec 34 ms on 8:51:10 AM, 9/05/24

```
+-------------+---------------------------+
|week_of_month|average_time_to_approve_order|
+-------------+---------------------------+
|            3|                   34514.17|
|            2|                   37290.22|
|            5|                   37842.18|
|            6|                   37842.89|
|            4|                   39152.78|
|            1|                    40009.4|
+-------------+---------------------------+
```

```
average_time_to_deliver_order_by_week_df = ecommerce_df.groupBy("week_of_month").agg(round(avg("time_to_deliver_order"),2)\
.alias("average_time_to_deliver_order")).orderBy("average_time_to_deliver_order")
average_time_to_deliver_order_by_week_df.show()

ecommerce_datasets["average_time_to_deliver_order_by_week"] = average_time_to_deliver_order_by_week_df
```

```
+-------------+---------------------------+
|week_of_month|average_time_to_deliver_order|
+-------------+---------------------------+
|            6|                  812527.32|
|            5|                 1073336.96|
|            3|                 1082696.05|
|            2|                 1089760.94|
|            4|                 1095327.44|
|            1|                 1105146.08|
+-------------+---------------------------+
```

Extra Look at Freight Costs

```
1  total_freight_charges_df = ecommerce_df.agg(round(sum("order_freight_value"),2).alias("total_freight_charges"))
2  total_freight_charges_df.show()
3
4  ecommerce_datasets["total_freight_charges"] = total_freight_charges_df
```

[73] ✓ - Command executed in 507 ms on 8:51:12 AM, 9/05/24

```
+---------------------+
|total_freight_charges|
+---------------------+
|           2174127.92|
+---------------------+
```

```
1  average_freight_charges_by_city_df = ecommerce_df.groupBy("customer_city").agg(round(avg("order_freight_value"),2).alias("average_freight_charges"))
2  average_freight_charges_by_city_df.show()
3
4  ecommerce_datasets["average_freight_charges_by_city"] = average_freight_charges_by_city_df
```

[74] ✓ - Command executed in 524 ms on 8:51:12 AM, 9/05/24

```
+---------------+----------------------+
|   customer_city|average_freight_charges|
+---------------+----------------------+
|       Araruama|                  24.3|
|       Guidoval|                 17.61|
|    Piranguinho|                 16.18|
|    Tres Pontas|                 22.49|
|Senador Guiomard|                 68.55|
|       Rio Novo|                 15.56|
|      Carrancas|                 16.09|
|      Fronteira|                 20.64|
|         Utinga|                 26.07|
|   Assis Brasil|                 24.84|
|         Pianco|                 65.21|
|       Macaubas|                 45.09|
|     Livramento|                 25.47|
|   Cristalandia|                 48.81|
|       Machados|                 42.51|
|   Rio do Campo|                 25.14|
|     Purilandia|                 27.49|
|       Alambari|                 18.78|
|  Guajará-Mirim|                 38.67|
|          Tapes|                 21.69|
+---------------+----------------------+
```

```
1  average_freight_charges_by_state_df = ecommerce_df.groupBy("customer_state").agg(round(avg("order_freight_value"),2).alias("average_freight_charges"))
2  average_freight_charges_by_state_df.show()
3
4  ecommerce_datasets["average_freight_charges_by_state"] = average_freight_charges_by_state_df
```

[75] ✓ - Command executed in 509 ms on 8:51:13 AM, 9/05/24

```
+--------------+-----------------------+
|customer_state|average_freight_charges|
+--------------+-----------------------+
|            SC|                  23.25|
|            RO|                  51.16|
|            PI|                  41.18|
|            AM|                  36.32|
|            RR|                  46.53|
|            GO|                  24.44|
|            TO|                  38.92|
|            MT|                   29.8|
|            SP|                  16.63|
|            ES|                  23.97|
|            PB|                  41.15|
|            RS|                  23.64|
|            MS|                  24.97|
|            AL|                  37.71|
|            MG|                  22.02|
|            PA|                  37.95|
|            BA|                  29.07|
|            SE|                  39.24|
|            PE|                  34.65|
|            CE|                  35.23|
+--------------+-----------------------+
only showing top 20 rows
```

Data analysis and visualization

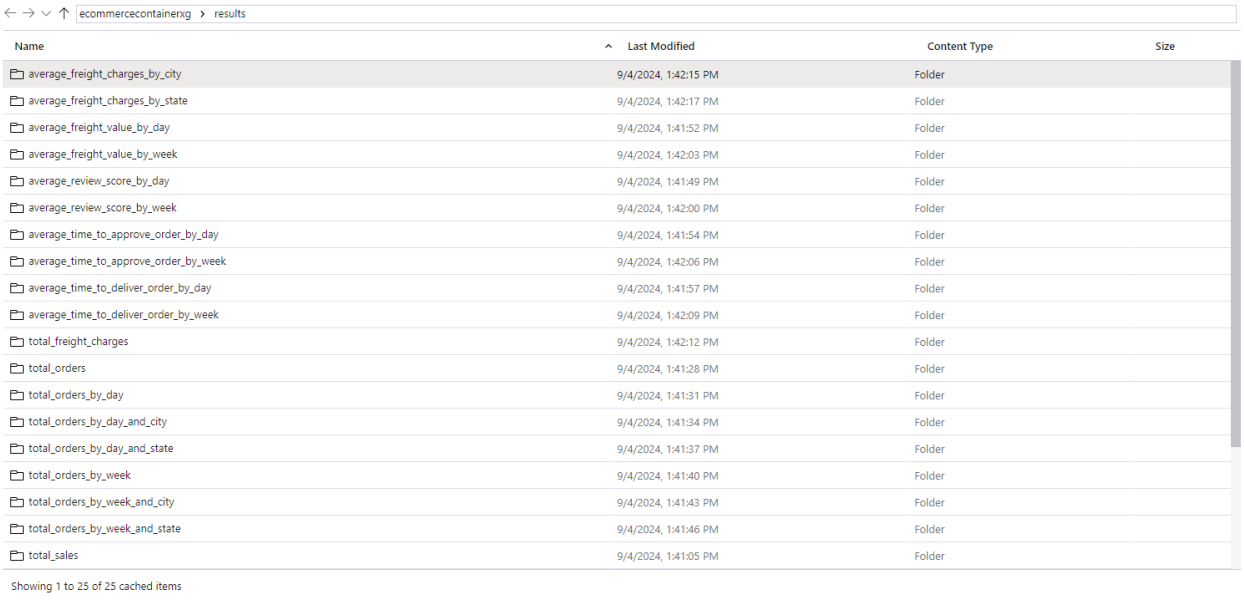
Step 1: Write the results into HDFS

Exporting Data

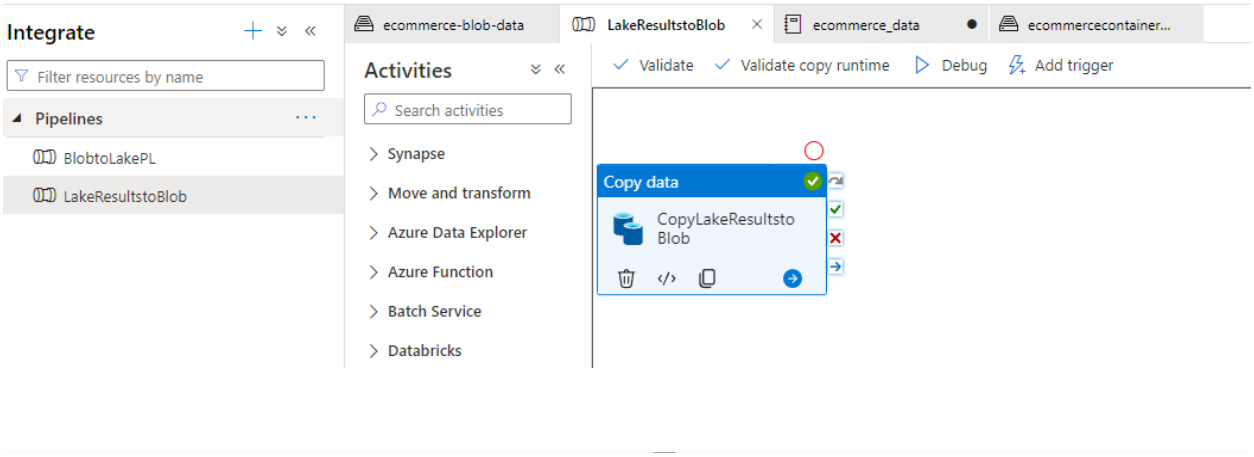
Exporting to Data Lake

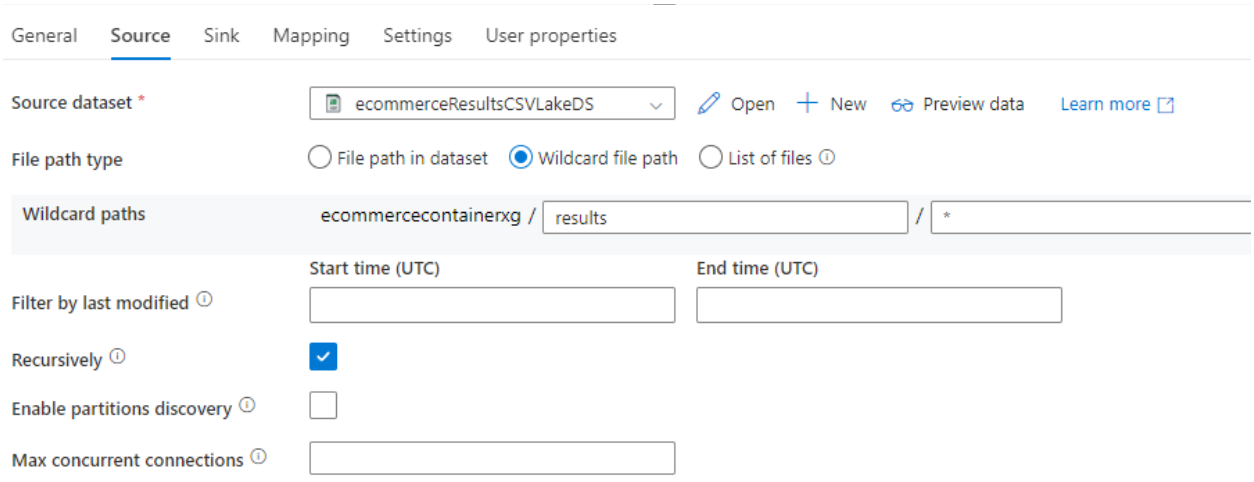
```
1  for i in ecommerce_datasets:
2    ecommerce_datasets[i].write.format("csv").option("header", "True").save('abfss://ecommercecontainerxg@ecommercedataxg.dfs.core.windows.net/results/{}'.format(i,'r'))
```

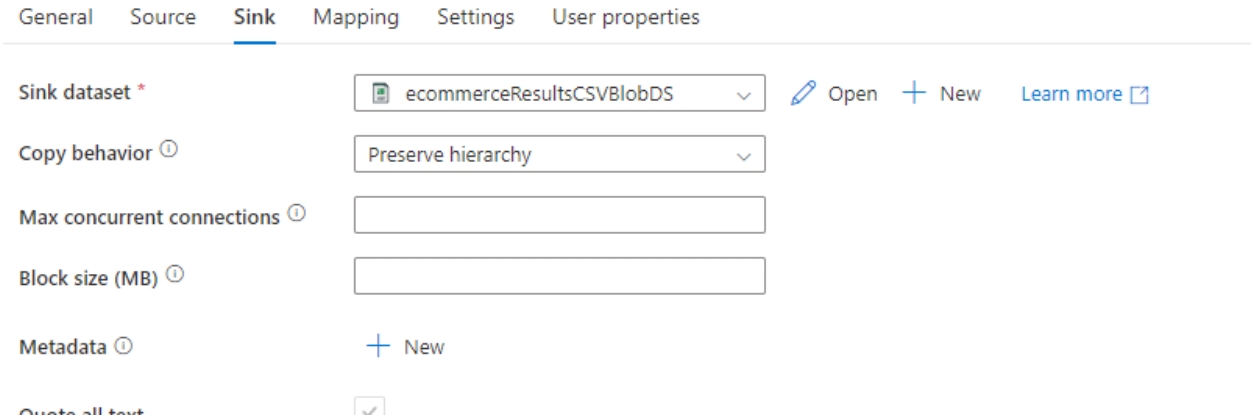
[57] ✓ - Command executed in 1 min 17 sec 562 ms on 1:42:22 PM, 9/04/24



Step 2: Save the final dataset into object storage service per the cloud platform







Pipeline run ID: 96e159ed-2709-4174-b55f-9e3986c65cb9 **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	Duration	Integration runtime	Us
CopyLakeResultstoBlob	Succeeded	Copy data	9/5/2024, 12:40:20 PM	15s	AutoResolveIntegratior	

ecommerce-blob-data

Search by prefix (case-sensitive)

Name	Access Tier	Access Tier Last Modified	Last Modified	Blob Type	Content Type	Size	Status	Remaining Days	Deleted Time	Lease State	Disk Name	VM Name
average_freight_charges_by_city					Folder							
average_freight_charges_by_state					Folder							
average_freight_value_by_day					Folder							
average_freight_value_by_week					Folder							
average_review_score_by_day					Folder							
average_review_score_by_week					Folder							
average_time_to_approve_order_by_day					Folder							
average_time_to_approve_order_by_week					Folder							
average_time_to_deliver_order_by_day					Folder							
average_time_to_deliver_order_by_week					Folder							
total_freight_charges					Folder							
total_orders					Folder							
total_orders_by_day					Folder							
total_orders_by_day_and_city					Folder							
total_orders_by_day_and_state					Folder							
total_orders_by_week					Folder							
total_orders_by_week_and_city					Folder							
total_orders_by_week_and_state					Folder							
total_sales					Folder							

Showing 1 to 26 of 26 cached items

Step 3: Create a DB cluster that is also a NoSQL using the relevant service on the cloud platform

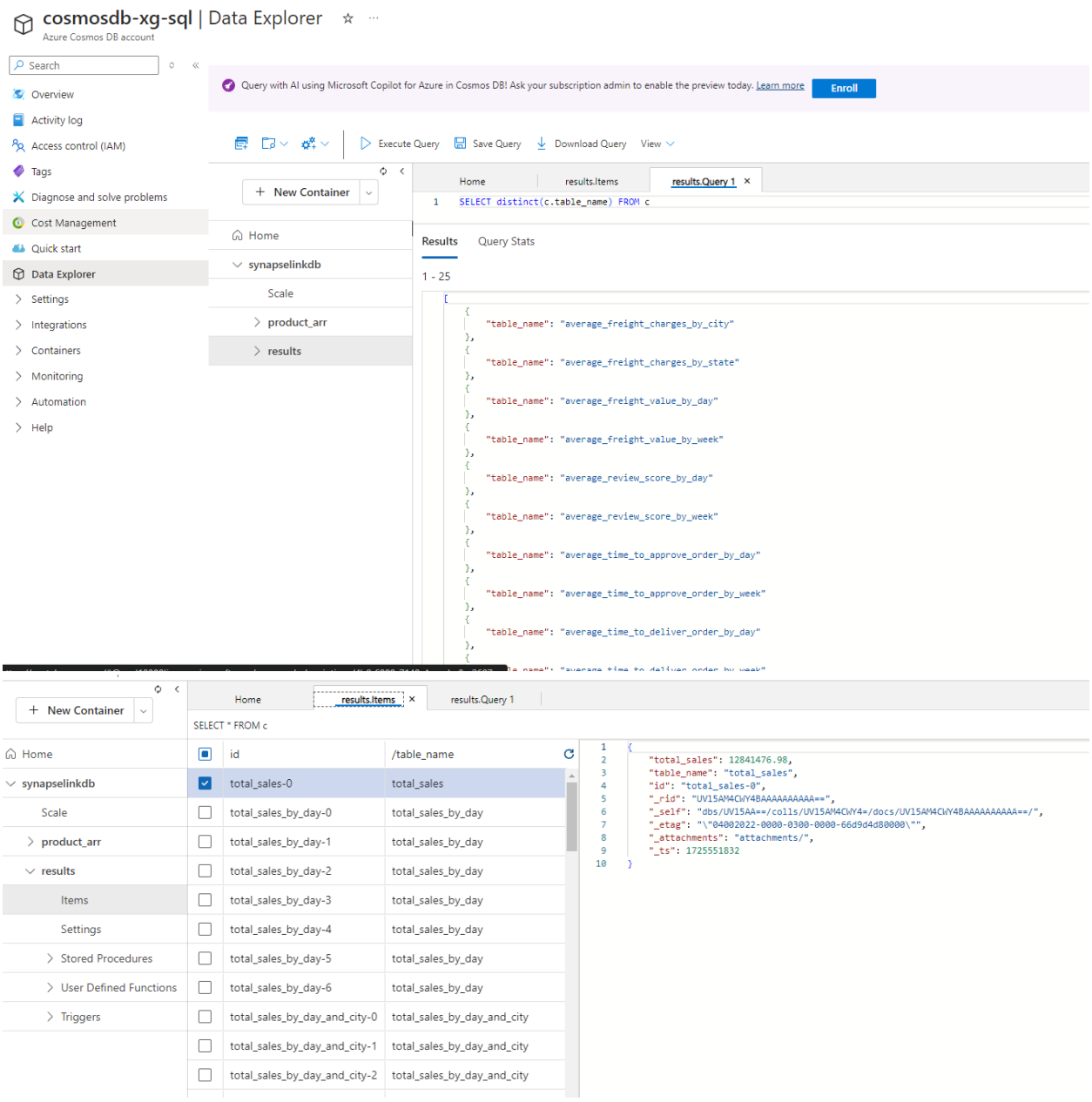
Step 4: Save insights in the NoSQL DB mentioned in the previous step

Exporting to CosmosDB

```
for i in ecommerce_datasets:
  #Making id column
  dataset_x = ecommerce_datasets[i]
  dataset_x = dataset_x.withColumn("index", monotonically_increasing_id())
  dataset_x = dataset_x.withColumn("table_name", lit(i))
  dataset_x = dataset_x.withColumn("id", concat(col("table_name"),lit("-"), col("index")))
  dataset_x = dataset_x.drop("index")
  #Exporting to CosmosDB
  config = {
  'spark.cosmos.accountEndpoint': 'https://cosmosdb-xg-sql.documents.azure.com:443/',
  'spark.cosmos.accountKey': 'WVkKMa27deTM6hH1emUN68KJMSeJmvi1ZJpYSOQxaSZ6qFNURAaNyvOjutbwYizQFfaSXKSWlVmIACDbcbmCdA==',
  'spark.cosmos.database': 'synapselinkdb',
  'spark.cosmos.container': 'results',
  }
  dataset_x.write.format("cosmos.oltp").options(**config).mode('append').save()
```

[81] ✓ - Command executed in 6 min 26 sec 826 ms on 9:03:33 AM, 9/05/24

...


cosmosdb-xg-sql | Data Explorer
Azure Cosmos DB account
Search
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Cost Management
Quick start
Data Explorer
Settings
Integrations
Containers
Monitoring
Automation
Help
Query with AI using Microsoft Copilot for Azure in Cosmos DB! Ask your subscription admin to enable the preview today. Learn more
Enroll
Execute Query
Save Query
Download Query
View
New Container
Home
synapselinkdb
Scale
product_arr
results
Home
results.Items
results.Query 1
SELECT distinct(c.table_name) FROM c
Results
Query Stats
1 - 25
[
{
"table_name": "average_freight_charges_by_city"
},
{
"table_name": "average_freight_charges_by_state"
},
{
"table_name": "average_freight_value_by_day"
},
{
"table_name": "average_freight_value_by_week"
},
{
"table_name": "average_review_score_by_day"
},
{
"table_name": "average_review_score_by_week"
},
{
"table_name": "average_time_to_approve_order_by_day"
},
{
"table_name": "average_time_to_approve_order_by_week"
},
{
"table_name": "average_time_to_deliver_order_by_day"
},
{
New Container
Home
results.Items
results.Query 1
SELECT * FROM c
Home
synapselinkdb
Scale
product_arr
results
Items
Settings
Stored Procedures
User Defined Functions
Triggers
id
/table_name
total_sales-0
total_sales
total_sales_by_day-0
total_sales_by_day
total_sales_by_day-1
total_sales_by_day
total_sales_by_day-2
total_sales_by_day
total_sales_by_day-3
total_sales_by_day
total_sales_by_day-4
total_sales_by_day
total_sales_by_day-5
total_sales_by_day
total_sales_by_day-6
total_sales_by_day
total_sales_by_day_and_city-0
total_sales_by_day_and_city
total_sales_by_day_and_city-1
total_sales_by_day_and_city
total_sales_by_day_and_city-2
total_sales_by_day_and_city
{
"total_sales": 12841476.98,
"table_name": "total_sales",
"id": "total_sales-0",
"_rid": "UV15AM4CWY4BAAAAAAAAAA==",
"_self": "dbs/UV15AA==/colls/UV15AM4CWY4=/docs/UV15AM4CWY4BAAAAAAAAAA==/",
"_etag": "\"04002022-0000-0300-0000-66d9d4d80000\"",
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