Task 1.2 Databricks YouFlix DB Silver

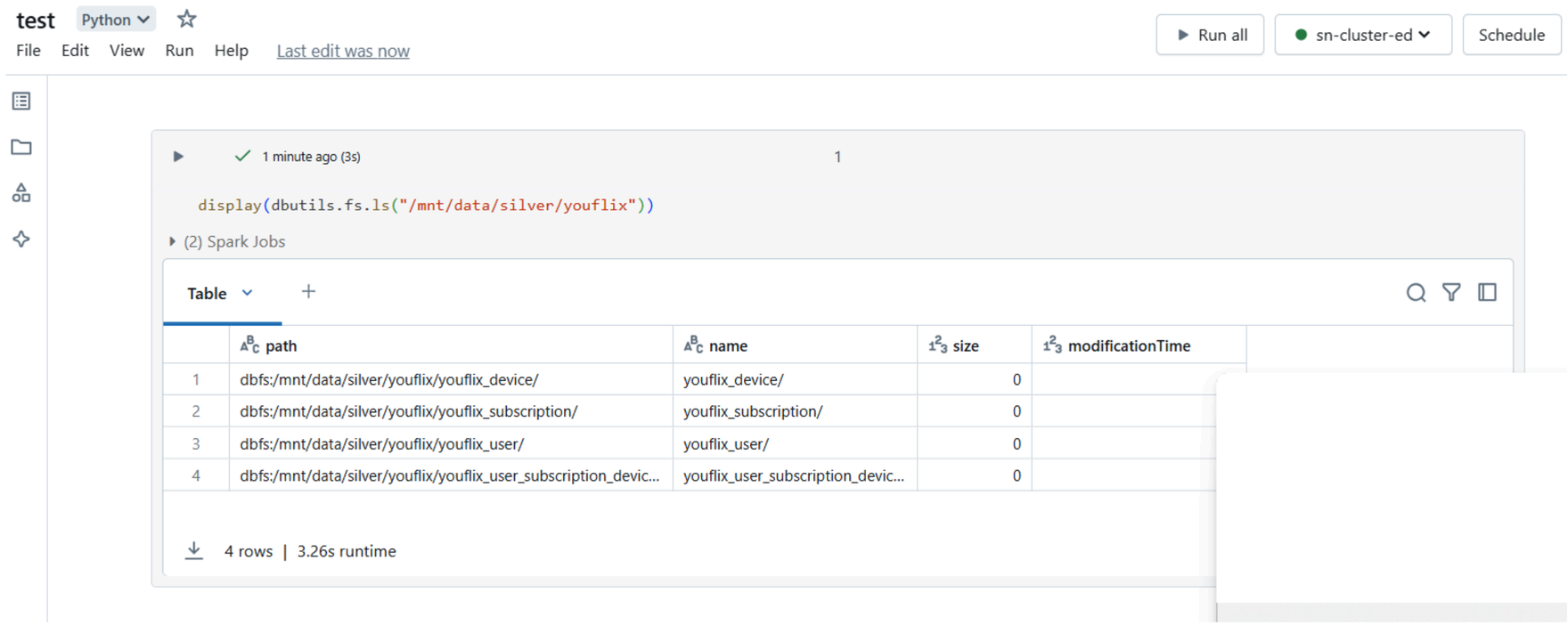
Run Scenario:

1. Before starting the run scenario, clear `bronze/youflix` and `silver/youflix` directories.
2. Delete and re-create YouFlixDB database from scratch using `DeploymentScript.sql` script. It is necessary to get rid of the results of your previous execution and testing activities.
3. Drop `YouFlix` database from your Databricks workspace.
4. Go to data lake `stdimentoringdatalakexx` and proceed to Storage browser, then click on Tables and edit each of entity by setting watermark value to `2000-01-01T00:00:00.00Z`.
5. Run pipeline from task 1.1.

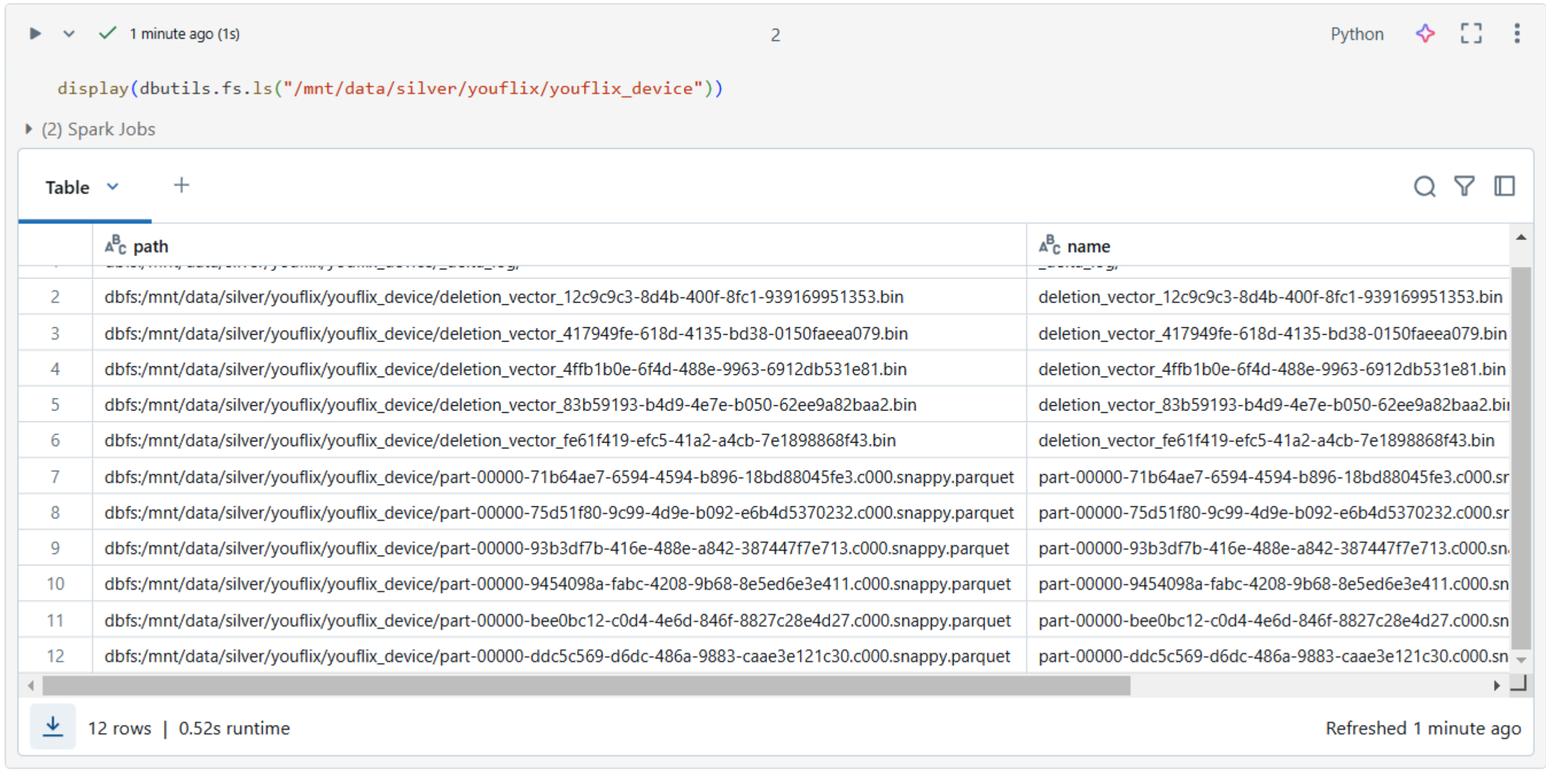
6. Run the notebook `uc1_load_bronze_to_silver.ipynb`.

7. Create new notebook `test` in Azure Databricks.

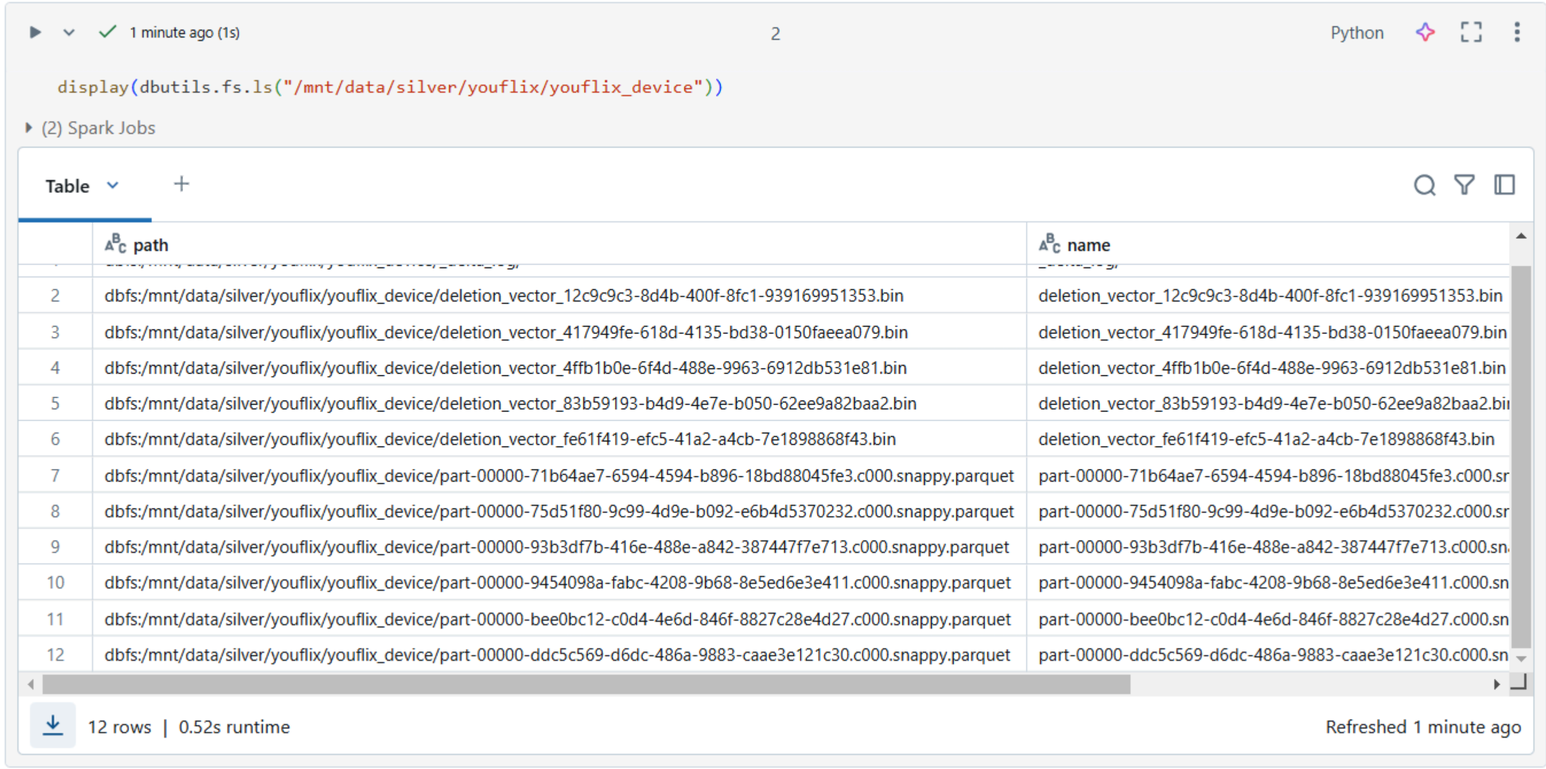
8. Run `display(dbutils.fs.ls("/mnt/data/silver/youflix"))` in â€œtestâ€ notebook and take screenshot(s) of the results.



9. Run `display(dbutils.fs.ls("/mnt/data/silver/youflix/youflix_device"))` in â€œtestâ€ notebook and take screenshot(s) of the results.

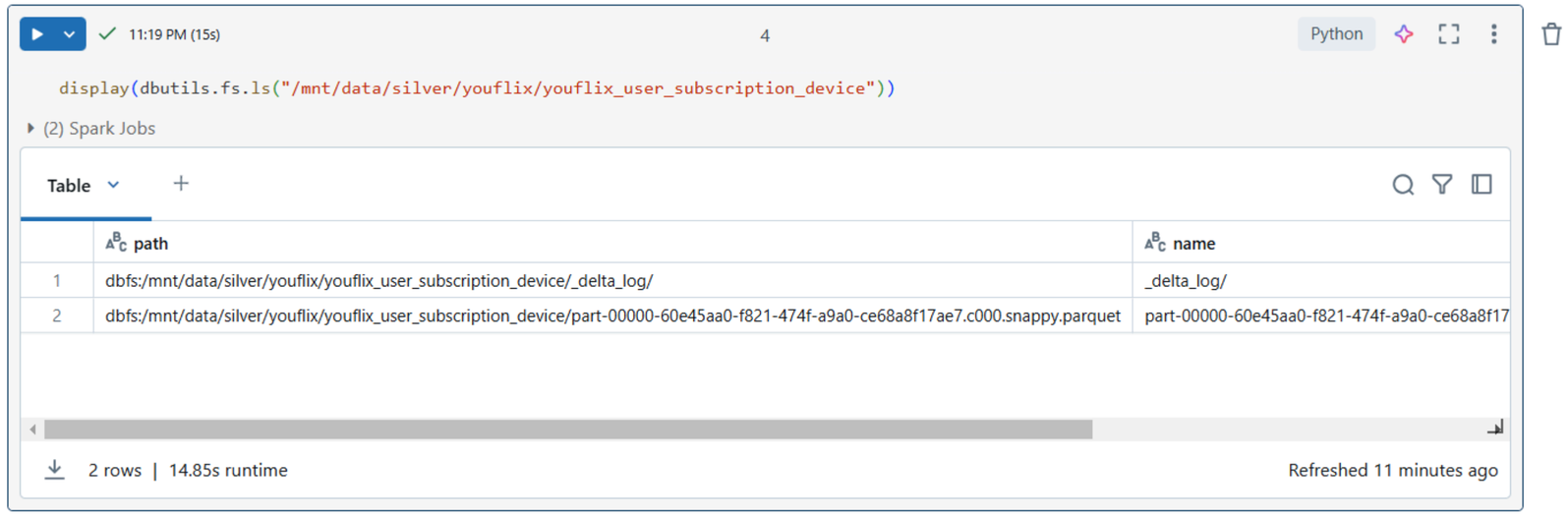


10. Run `display(dbutils.fs.ls("/mnt/data/silver/youflix/youflix_subscription"))` in â€œtestâ€ notebook and take screenshot(s) of the results.

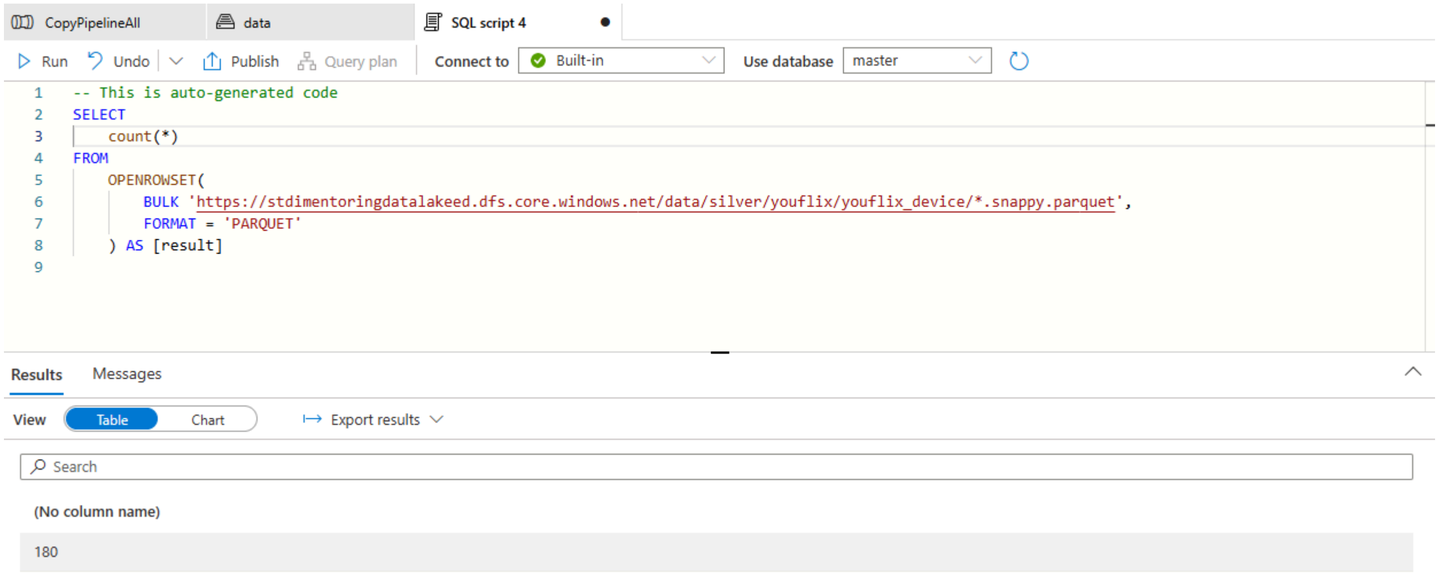


11. Run `display(dbutils.fs.ls("/mnt/data/silver/youflix/youflix_user"))` in â€œtestâ€ notebook and take screenshot(s) of the results.

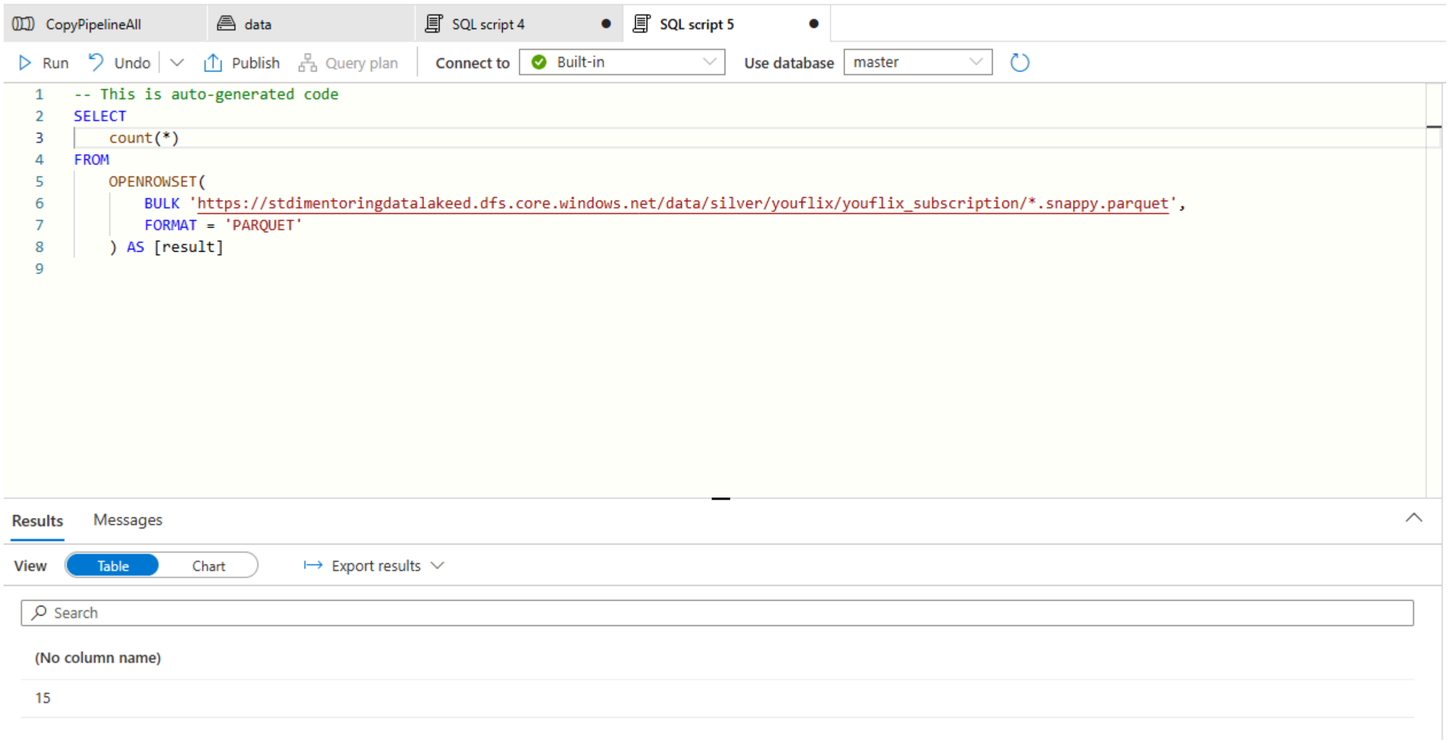
12. Run `display(dbutils.fs.ls("/mnt/data/silver/youflix/youflix_user_subscription_device"))` in â€œtestâ€ notebook and take screenshot(s) of the results.

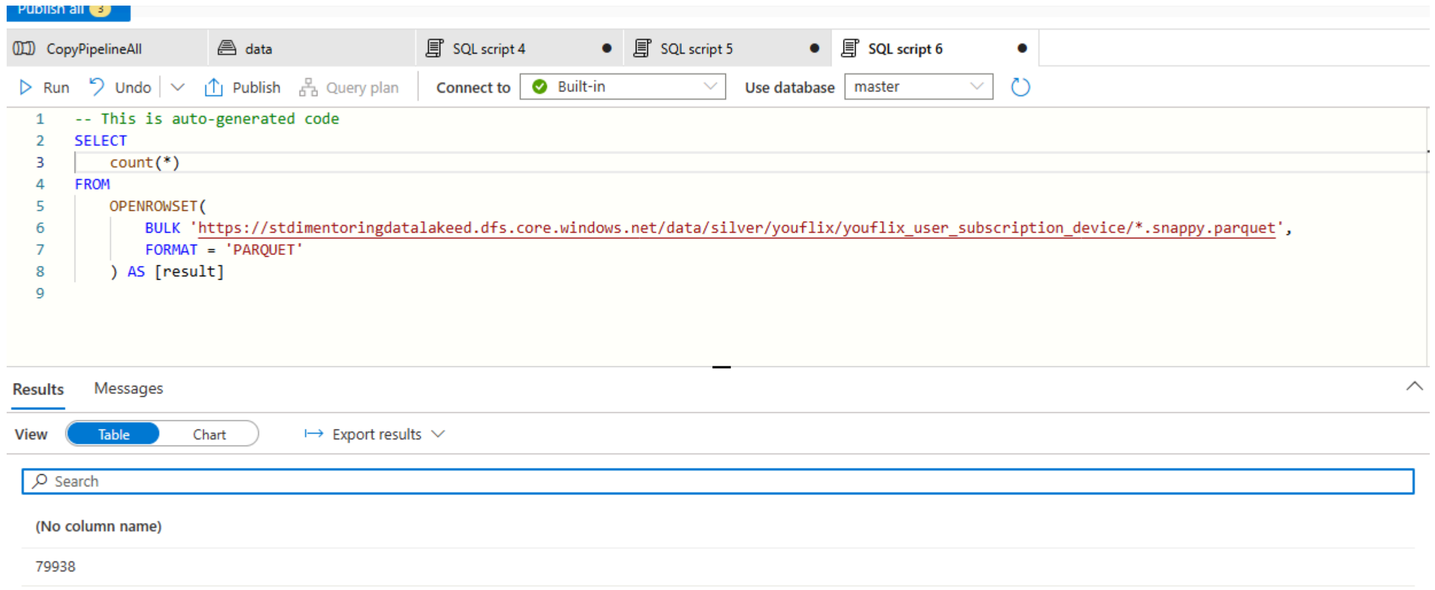


13. In Synapse Workspace, navigate to Data section, find in Linked tab your container, open `silver/youflix` and check number of rows for each delta table using SQL query.

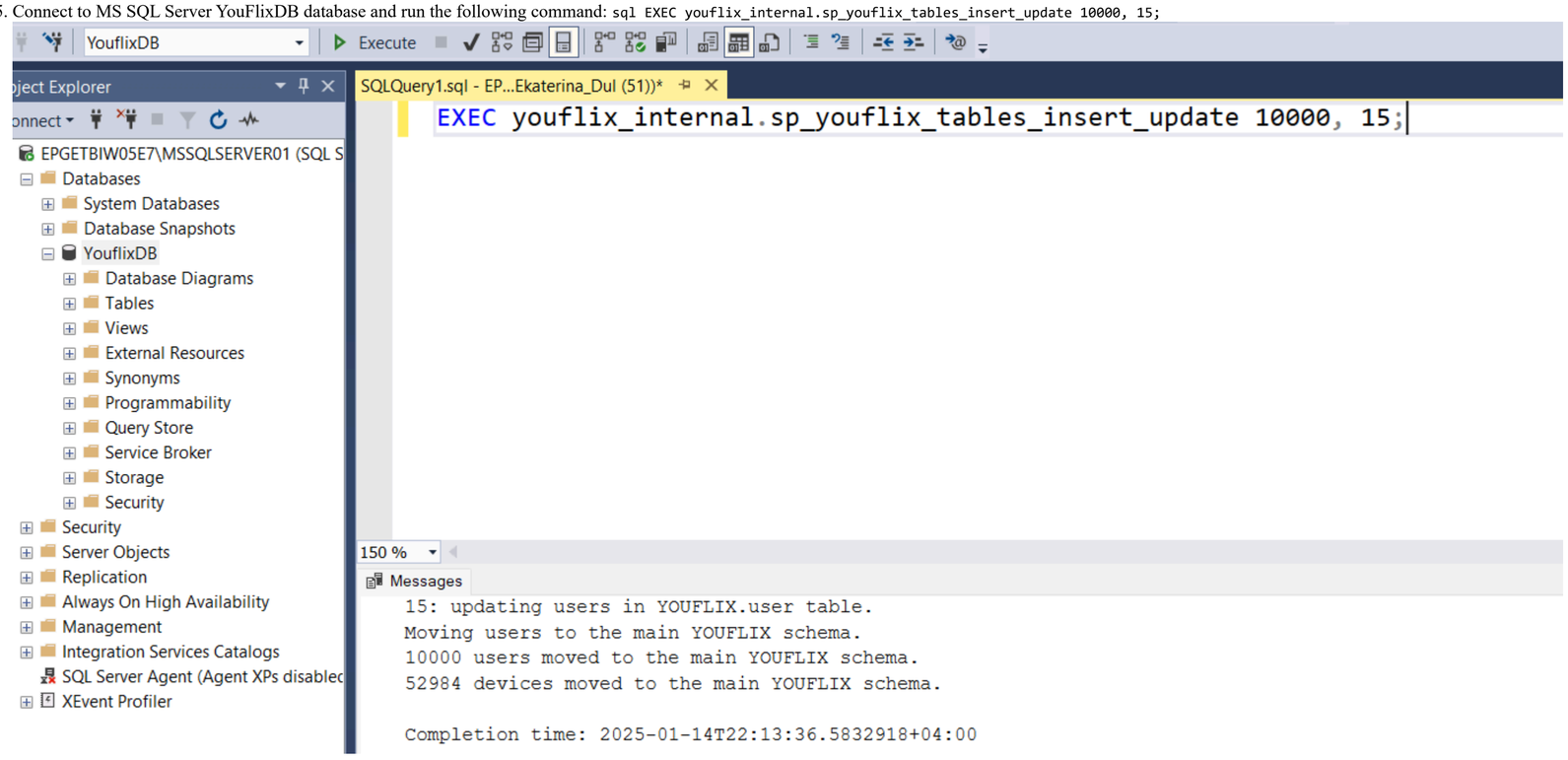


14. Take screenshot(s) of SQL queries in with count values.



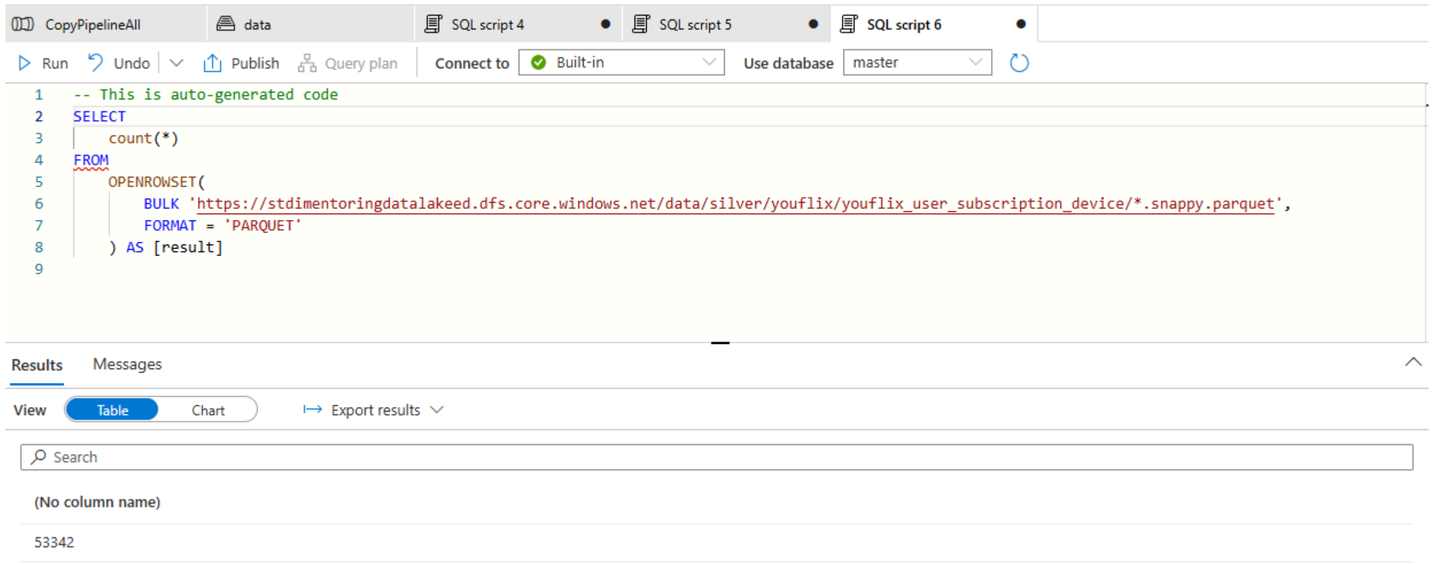


15. Connect to MS SQL Server YouFlixDB database and run the following command: `sql EXEC youflix_internal.sp_youflix_tables_insert_update 10000, 15;`



16. Run pipeline from task 1.1.

17. Run the notebook `uc1_load_bronze_to_silver.ipynb`.
18. In Synapse Workspace, navigate to Data section, find in Linked tab your container, open â€œbronze/youflixâ€□ and check number of rows for each newly loaded file using SQL query.



19. Take screenshot(s) of SQL queries with count values.

Full Notebook:

```python

# Authenticate Databricks to access Data Lake

# value must be updated with Azure Key Vault-backed secret scope name

# must be updated with Azure Key Vault value for application id

# must be updated with Azure Key Vault value for tenant id

# must be updated with Azure Key Vault value for client secret

AppID = dbutils.secrets.get(scope="secret-scope-ed", key="applicationID>") TenantID = dbutils.secrets.get(scope="secret-scope-ed", key="tenantID") ClientSecret = dbutils.secrets.get(scope="secret-scope-ed", key="clientSecret")

configs = {"fs.azure.account.auth.type": "OAuth", "fs.azure.account.oauth.provider.type": "org.apache.hadoop.fs.azurebfs.oauth2.ClientCredsTokenProvider", "fs.azure.account.oauth2.client.id": AppID, "fs.azure.account.oauth2.client.secret": ClientSecret, "fs.azure.account.oauth2.client.endpoint": "https://login.microsoftonline.com/{tenant}/oauth2/token".format( tenant=TenantID)}

# Mounting data in an Azure storage account using an Azure Active Directory (Azure AD) application service principal for authentication

# dbutils.fs.unmount("/mnt/data") #use to unmount data if needed

# must be replaced with your Azure Data Lake Storage Gen2 name

try: dbutils.fs.mount( source="abfss://data@stdimentoringdatalakeed.dfs.core.windows.net/", mount_point="/mnt/data", extra_configs=configs) except Exception as e: if "Directory already mounted" in str(e): pass # Ignore error if already mounted. else: raise e ```

```
python dbutils.fs.mounts()

[MountInfo(mountPoint='/databricks-datasets', source='databricks-datasets', encryptionType=''),
 MountInfo(mountPoint='/Volumes', source='UnityCatalogVolumes', encryptionType=''),
 MountInfo(mountPoint='/databricks/mlflow-tracking', source='databricks/mlflow-tracking', encryptionType=''),
 MountInfo(mountPoint='/databricks-results', source='databricks-results', encryptionType=''),
 MountInfo(mountPoint='/databricks/mlflow-registry', source='databricks/mlflow-registry', encryptionType=''),
 MountInfo(mountPoint='/Volume', source='DbfsReserved', encryptionType=''),
 MountInfo(mountPoint='/volumes', source='DbfsReserved', encryptionType=''),
 MountInfo(mountPoint='/mnt/data', source='wasbs://data@stdimentoringdatalakeed.blob.core.windows.net/', encryptionType=''),
 MountInfo(mountPoint='/', source='DatabricksRoot', encryptionType=''),
 MountInfo(mountPoint='/volume', source='DbfsReserved', encryptionType='')]
```

```python %sql -- Creating database and delta tables if not exist

CREATE DATABASE IF NOT EXISTS YouFlix; CREATE TABLE IF NOT EXISTS YouFlix.youflix_user_delta( user_id BIGINT, user_name STRING, user_email STRING, first_name STRING, last_name STRING, user_date_of_birth DATE, user_address STRING, user_phone STRING, created_timestamp TIMESTAMP, expiration_timestamp TIMESTAMP, modified_timestamp TIMESTAMP ) USING DELTA LOCATION '/mnt/data/silver/youflix/youflix_user';

CREATE TABLE IF NOT EXISTS YouFlix.youflix_device_delta( device_id BIGINT, device_name STRING, device_type STRING, device_os STRING, created_timestamp TIMESTAMP ) USING DELTA LOCATION '/mnt/data/silver/youflix/youflix_device';
```
```

CREATE TABLE IF NOT EXISTS YouFlix.youflix_subscription_delta(subscription_id BIGINT, subscription_name STRING, subscription_type STRING, subscription_video_quality STRING, subscription_max_devices INT, created_timestamp TIMESTAMP, expiration_timestamp TIMESTAMP) USING DELTA LOCATION '/mnt/data/silver/youflix/youflix_subscription';

CREATE TABLE IF NOT EXISTS YouFlix.youflix_user_subscription_device_delta(user_subscription_device_id BIGINT, user_id BIGINT, device_id BIGINT, created_timestamp TIMESTAMP) USING DELTA LOCATION '/mnt/data/silver/youflix/youflix_user_subscription_device';

```

```python import re from delta.tables import * from pyspark.sql.functions import * from pyspark.sql import Window

# dictionary "entities" store the name of the entities and it's BK

entities = {"device": "device_id", "subscription": "subscription_id", "user": "user_id", "user_subscription_device": "user_subscription_device_id"}

try: # looping through every entity for entity in entities.items():

```
    bronzePath = "/mnt/data/bronze/youflix/youflix_{entity_name}".format(entity_name=entity[0])
    silverPath = "/mnt/data/silver/youflix/youflix_{entity_name}".format(entity_name=entity[0])
    processedPath = "/mnt/data/bronze/youflix/processed/youflix_{entity_name}".format(entity_name=entity[0])

    # files to load from bronze to silver
    filePaths = dbutils.fs.ls(bronzePath)

    if filePaths:

        # MERGE BRONZE TO SILVER

        # TODO
        # use pyspark spark.read.load method to create dataframe based on csv files in the bronzePath
        # do not forget that file has header

        bronzeDF = spark.read.option("header", "true").option("inferSchema", "true").csv(bronzePath)

        partition = Window.partitionBy(entity[1]).orderBy(col("filedate").desc())

        bronzeDF_cln = (bronzeDF.withColumn("filedate",
                                            to_timestamp(regexp_extract(input_file_name(), '([\d]{14})', 0),
                                                         'yyyyMMddhhmmss'))
                        .withColumn("rn", row_number().over(partition))
                        .filter("rn == 1")
)

        # get delta table at the silver path
        silver_table = DeltaTable.forPath(spark, silverPath)

        # TODO
        # add your code into brackets below
        # use pyspark merge method to merge bronzeDF_cln dataframe into silver_table by BK. BK for table can be accessible by entity[1]
        # refer to the https://learn.microsoft.com/en-us/azure/databricks/delta/merge to learn about upsert into a Delta Lake table using merge.
        # this article https://docs.delta.io/latest/delta-update.html#table-deletes-updates-and-merges&language-python will help to understand how to delete, update and merge Delta tables
        (
            silver_table.alias('silver')
            .merge(
                bronzeDF_cln.alias('updates'),
                f'silver.{entity[1]} = updates.{entity[1]}'
)
            .whenMatchedUpdate(
                set=
                {
                    col: f"updates.{col}" for col in bronzeDF.columns
                }
)
            .whenNotMatchedInsert(values=
            {
                col: f"updates.{col}" for col in bronzeDF.columns
            }
)
            .execute()
)

        # MOVE TO PROCESSED DIRECTORY

        # looping through every file in directory
        for file_info in filePaths:
            # creating tuple to store (year, month, day) of the file
            file_date = (re.split("_", file_info.name)[-1][0:4], re.split("_", file_info.name)[-1][4:6],
                         re.split("_", file_info.name)[-1][6:8])

            # TODO
            # complete mv command to move files from bronzePath to processedPath according to the structure in 1.2.7.
            # use file_date tuple to get year, month and day of the file, use file_info.name to get name of file
            dbutils.fs.mv(file_info.path, processedPath + "/" + file_date[0] + "/" + file_date[1] + "/" + file_date[
                2] + "/" + file_info.name)

        # REMOVE Success.csv

        # TODO
        dbutils.fs.rm(f"/mnt/data/bronze/youflix/Success_{entity[0]}.txt")

    else:
        print("Entity \"{entity}\" - No files for load".format(entity=entity[0]))
```

except Exception as e: print(e)

```
```