MediaStream Analytics Project

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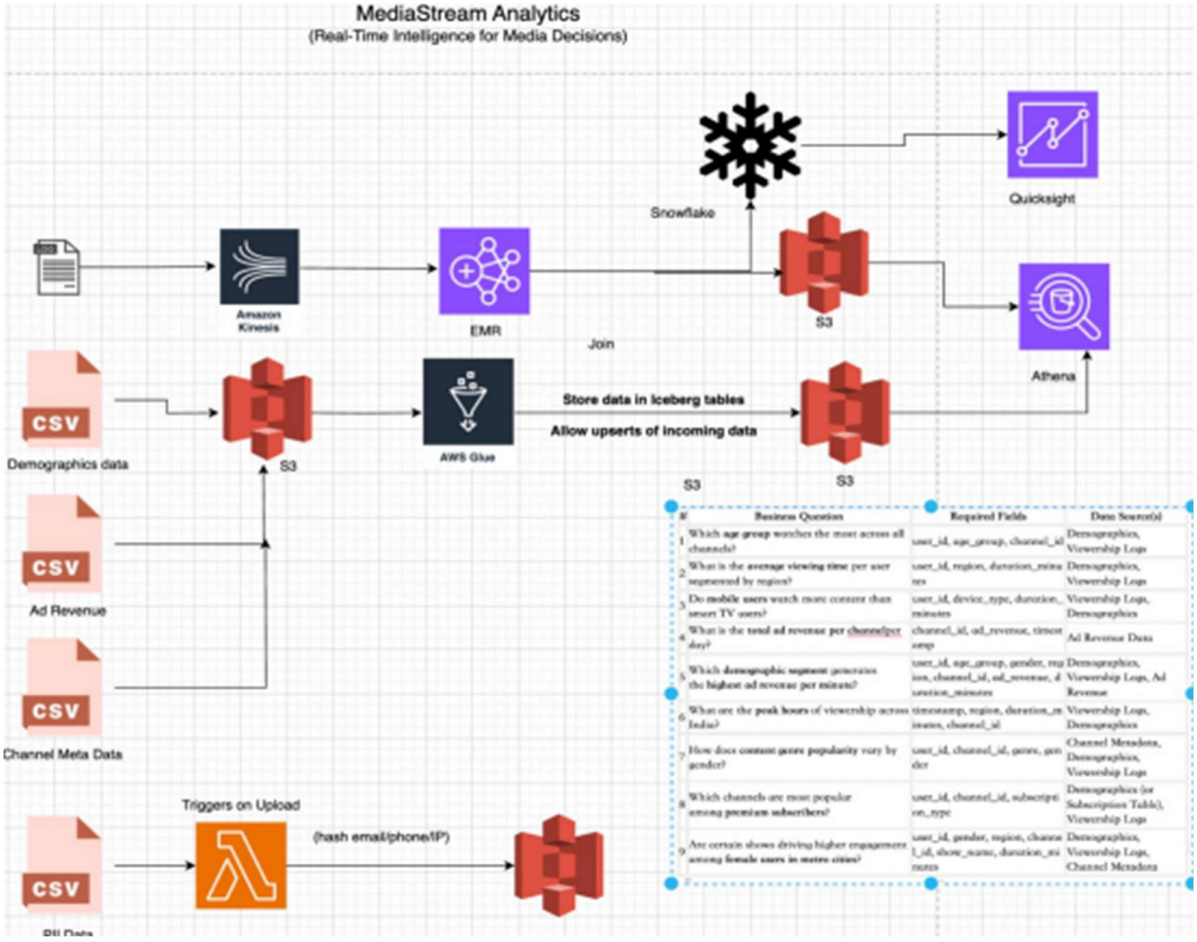
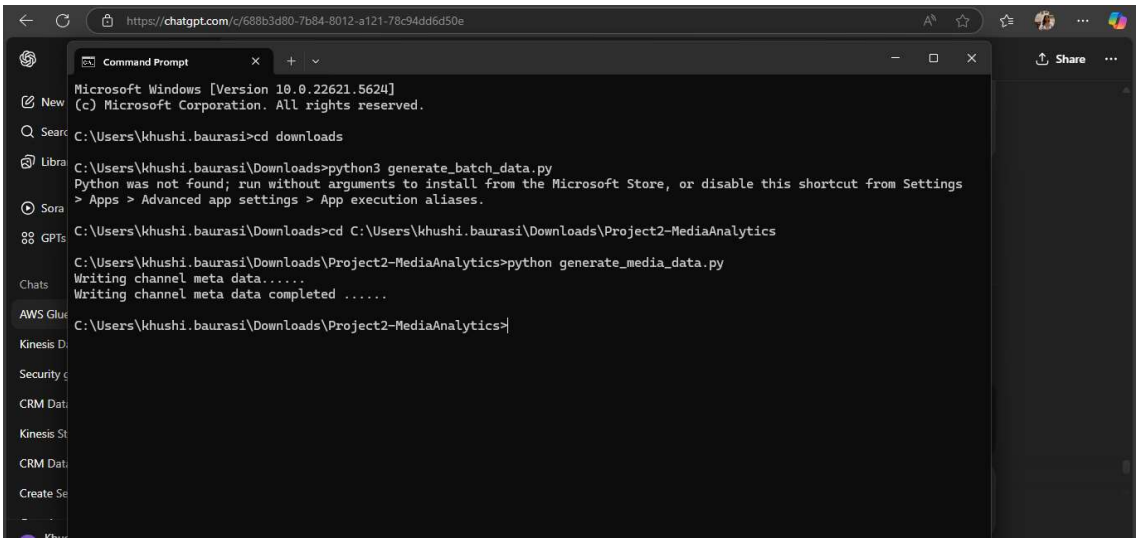
Data Engineering Bootcamp 2025

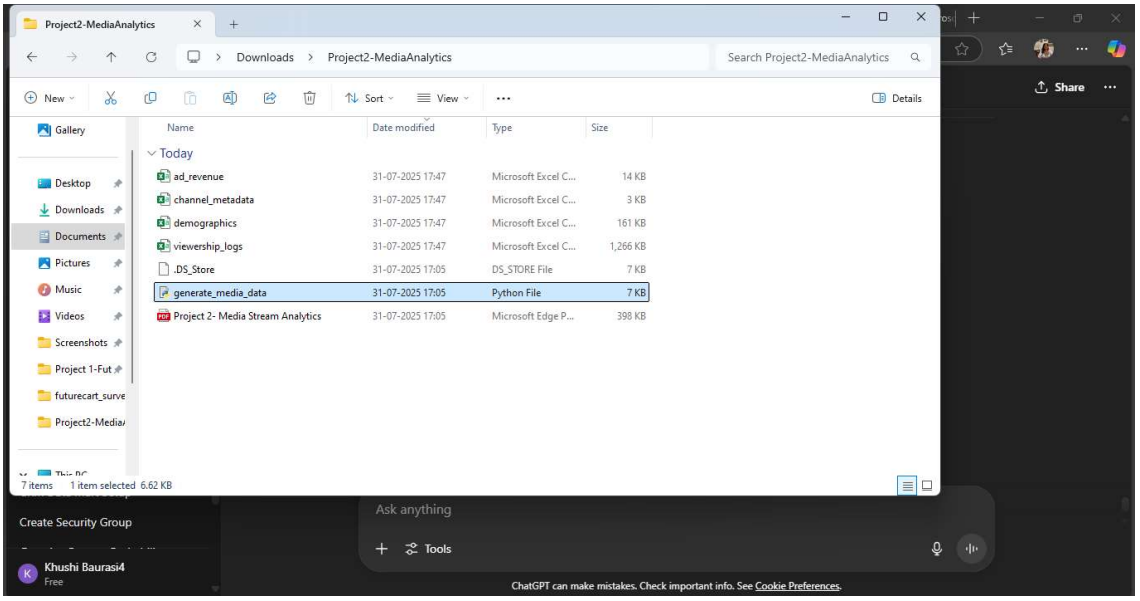
Submit Date-04/08/25

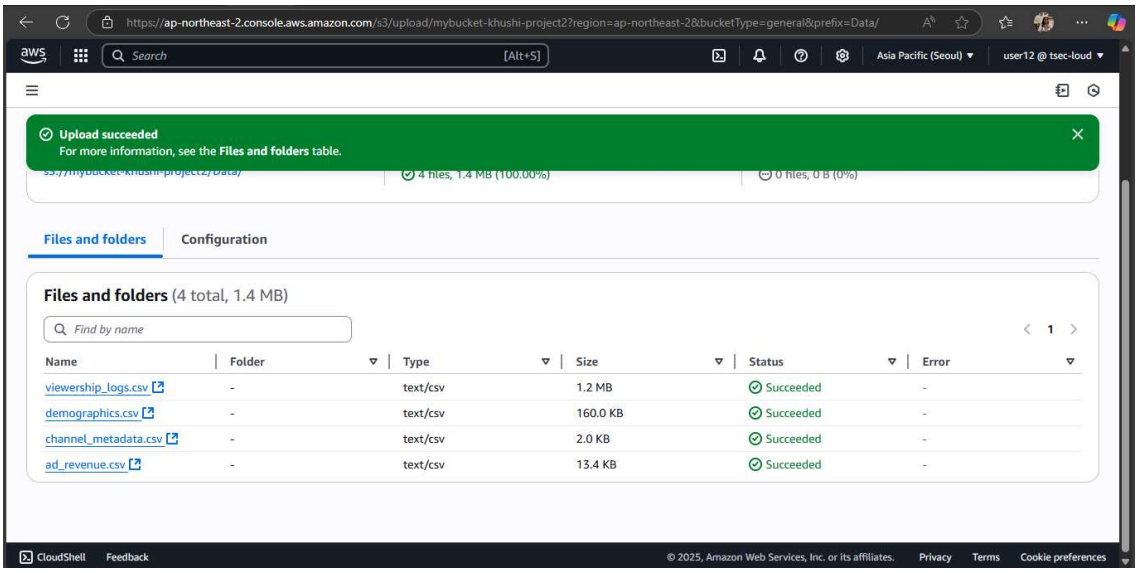


#	Business Question	Required Fields	Data Source(s)
1	Which **age group** watches the most across all channels?	user_id, age_group, channel_id	Demographics, Viewership Logs
2	What is the **average viewing time** per user segmented by region?	user_id, region, duration_minutes	Demographics, Viewership Logs
3	Do **mobile users** watch more content than smart TV users?	user_id, device_type, duration_minutes	Viewership Logs, Demographics
4	What is the **total ad revenue per channel**per day?	channel_id, ad_revenue, timestamp	Ad Revenue Data
5	Which **demographic segment** generates the highest ad revenue per minute?	user_id, age_group, gender, region, channel_id, ad_revenue, duration_minutes	Demographics, Viewership Logs, Ad Revenue
6	What are the **peak hours** of viewership across India?	timestamp, region, duration_minutes, channel_id	Viewership Logs, Demographics
7	How does **content genre popularity** vary by gender?	user_id, channel_id, genre, gender	Channel Metadata, Demographics, Viewership Logs
8	Which channels are most popular among **premium subscribers**?	user_id, channel_id, subscription_type	Demographics (or Subscription Table), Viewership Logs
9	Are certain shows driving higher engagement among **female users in metro cities**?	user_id, gender, region, channel_id, show_name, duration_minutes	Demographics, Viewership Logs, Channel Metadata

locally on my machine then uploaded it on my S3 bucket







NEXT STEP: Process the CSVs in Glue Job

1. **Create Tables** using a Glue job.

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

spark = SparkSession.builder \
  .appName("Write Iceberg Tables") \
  .config("spark.sql.catalog.glue_catalog", "org.apache.iceberg.spark.SparkCatalog") \
  .config("spark.sql.catalog.glue_catalog.catalog-impl", "org.apache.iceberg.aws.glue.GlueCatalog") \
  .config("spark.sql.catalog.glue_catalog.warehouse", "s3://mybucket-khushi-project2/Output/") \
  .config("spark.sql.catalog.glue_catalog.io-impl", "org.apache.iceberg.aws.s3.S3FileIO") \
  .getOrCreate()

# Drop and recreate to be sure
spark.sql("DROP TABLE IF EXISTS glue_catalog.mediadata_db.ad_revenue")
spark.sql("DROP TABLE IF EXISTS glue_catalog.mediadata_db.channel_metadata")
spark.sql("DROP TABLE IF EXISTS glue_catalog.mediadata_db.demographics")

spark.sql("CREATE DATABASE IF NOT EXISTS glue_catalog.mediadata_db")

spark.sql("""
  CREATE TABLE glue_catalog.mediadata_db.ad_revenue (
```

```
    channel_id STRING,
    channel_name STRING,
    date DATE,
    ad_revenue DOUBLE
  )
  USING ICEBERG
  PARTITIONED BY (date)
""")

spark.sql("""
  CREATE TABLE glue_catalog.mediadata_db.channel_metadata (
    channel_id STRING,
    channel_name STRING,
    genre STRING,
    language STRING,
    launch_year INT
  )
  USING ICEBERG
""")

spark.sql("""
  CREATE TABLE glue_catalog.mediadata_db.demographics (
    user_id STRING,
    gender STRING,
    age_group STRING,
    region STRING,
    subscription_type STRING
  )
  USING ICEBERG
""")

ad_revenue_df = spark.read.option("header", True).csv("s3://mybucket-khushi-project2/Data/ad_revenue.csv")
ad_revenue_df = ad_revenue_df \
  .withColumn("channel_id", col("channel_id").cast("string")) \
  .withColumn("channel_name", col("channel_name").cast("string")) \
  .withColumn("date", to_date("date", "yyyy-MM-dd")) \
```

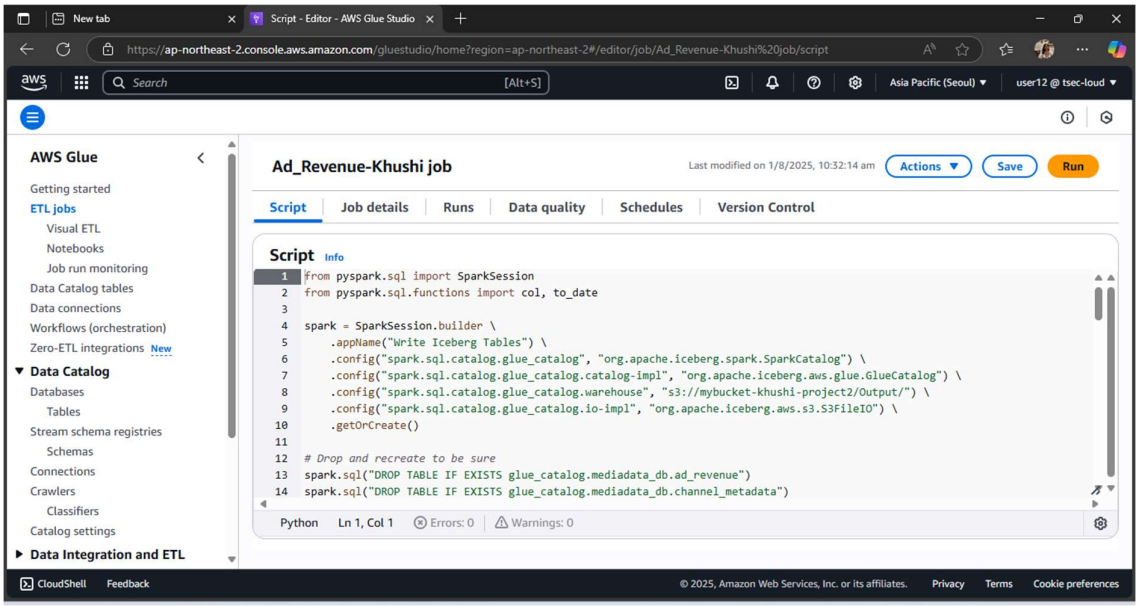
```
    .withColumn("ad_revenue", col("ad_revenue").cast("double"))


channel_metadata_df = spark.read.option("header", True).csv("s3://mybucket-khushi-
project2/Data/channel_metadata.csv")
channel_metadata_df = channel_metadata_df \
    .withColumn("channel_id", col("channel_id").cast("string")) \
    .withColumn("channel_name", col("channel_name").cast("string")) \
    .withColumn("genre", col("genre").cast("string")) \
    .withColumn("language", col("language").cast("string")) \
    .withColumn("launch_year", col("launch_year").cast("int"))


demographics_df = spark.read.option("header", True).csv("s3://mybucket-khushi-project2/Data/demographics.csv")
demographics_df = demographics_df \
    .withColumn("user_id", col("user_id").cast("string")) \
    .withColumn("gender", col("gender").cast("string")) \
    .withColumn("age_group", col("age_group").cast("string")) \
    .withColumn("region", col("region").cast("string")) \
    .withColumn("subscription_type", col("subscription_type").cast("string"))

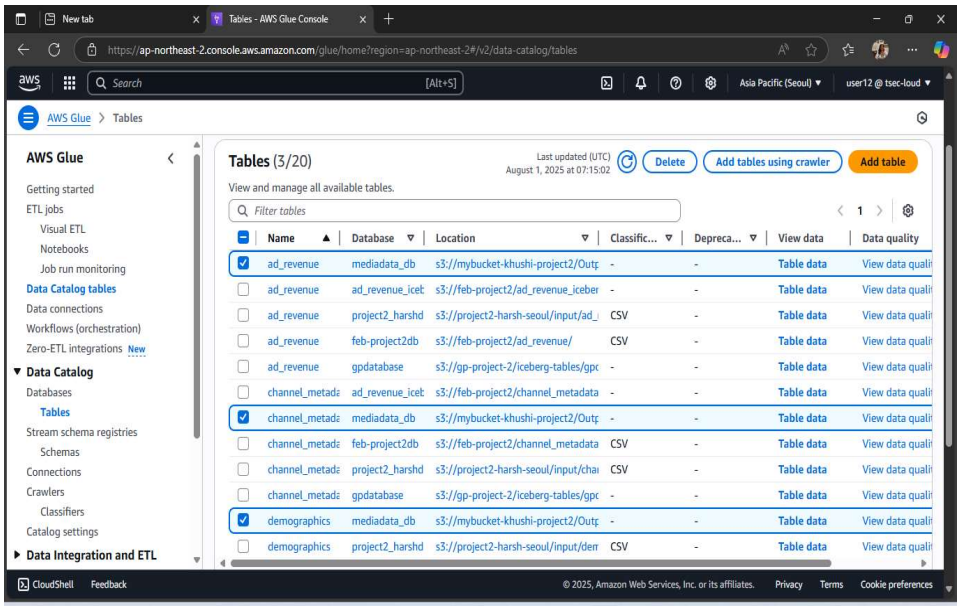

ad_revenue_df.writeTo("glue_catalog.mediadata_db.ad_revenue").append()
channel_metadata_df.writeTo("glue_catalog.mediadata_db.channel_metadata").append()
demographics_df.writeTo("glue_catalog.mediadata_db.demographics").append()


print(" ✅ All tables written to Iceberg successfully.")
```



```
```

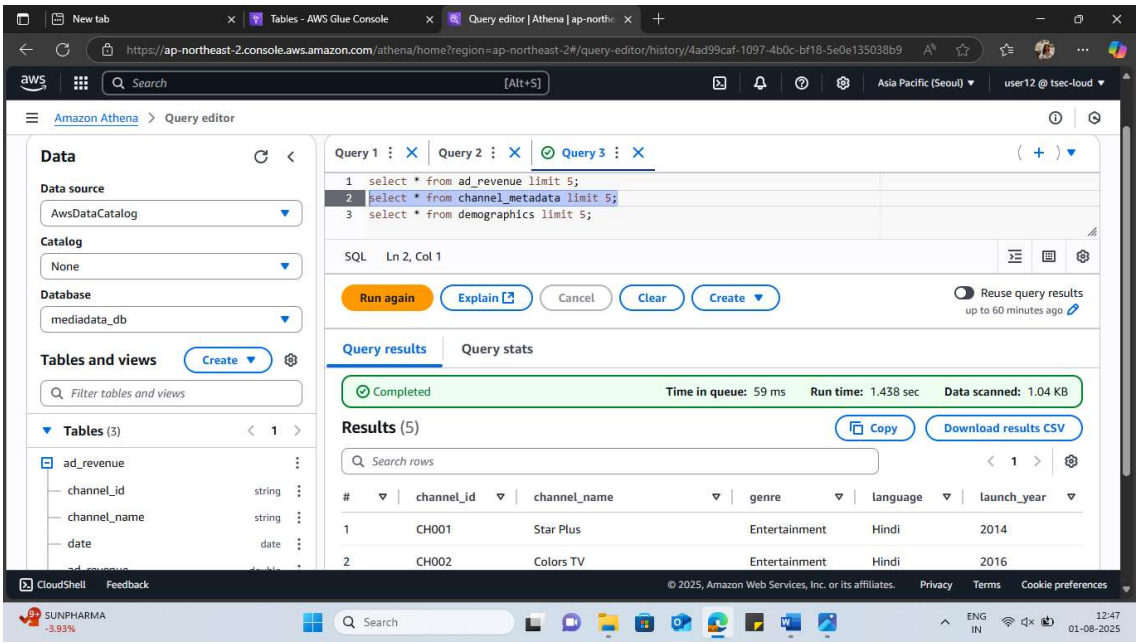
Now my tables are created:



Preview Data in Athena-

1. Go to **Athena Console**
2. Choose database: mediadata_db

Now I can see my data in Athena-



SELECT * FROM ad_revenue LIMIT 5;

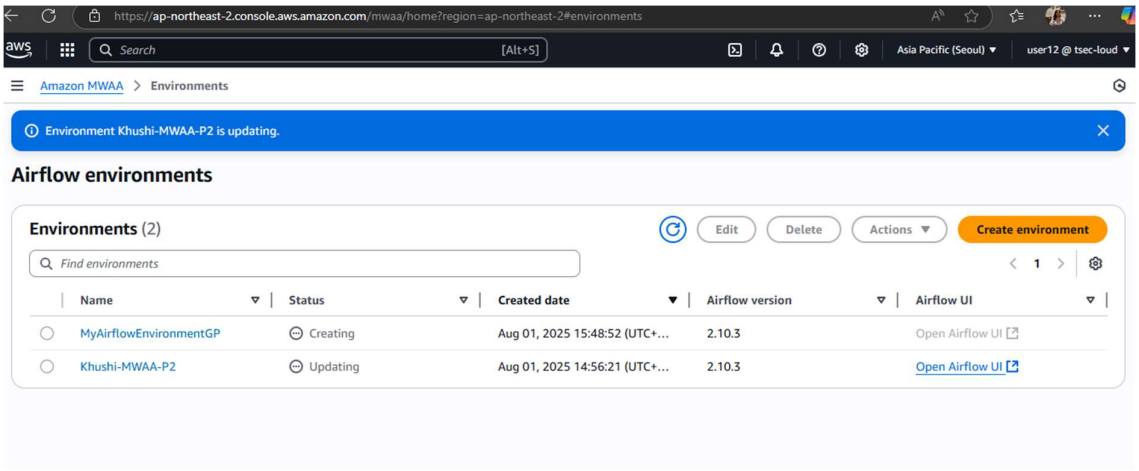
SELECT * FROM channel_metadata LIMIT 5;

SELECT * FROM demographics LIMIT 5;

Lambda → Triggers Airflow DAG → Airflow runs AWS Glue Job

1. Created MWAA (Amazon Managed Workflows for Apache Airflow) Environment

- Environment Name: Khushi-MWAA-P2
- Airflow version: (likely default, e.g. 2.9.0)
- Environment class: mw1.small
- Logging: CloudWatch task logs enabled
- Status: Now ACTIVE or STARTING



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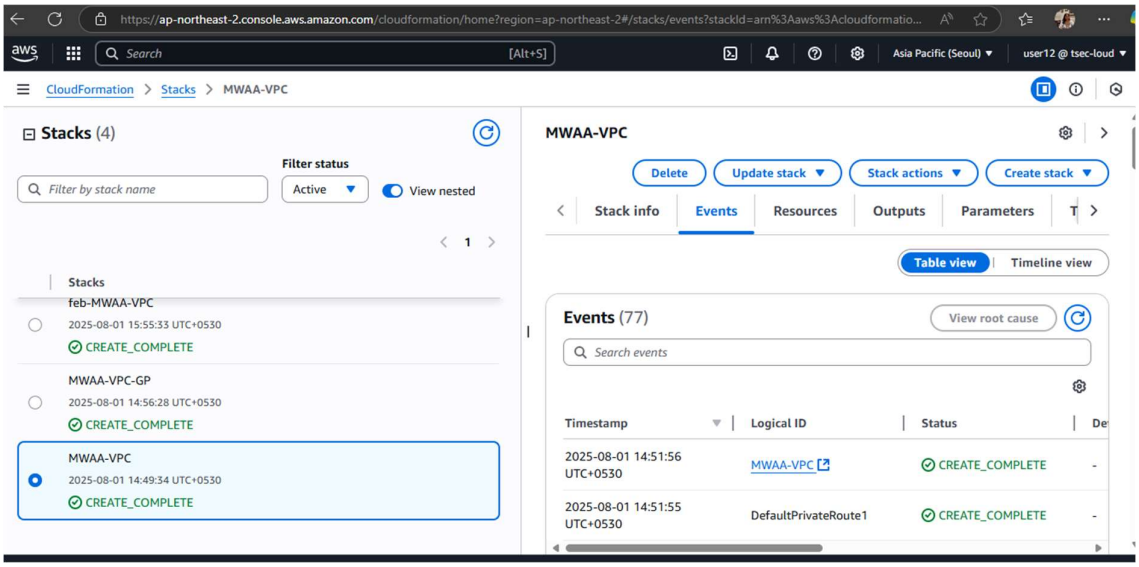
2. Networking: VPC Configuration

- VPC: vpc-02453d5b657dd8785
- Subnets:
  - subnet-01ed01e62ee252289
  - subnet-06a71efafc6461f3f
- Security Group: sg-0d03796aba8449471



- Access Type: Public (can open Airflow UI via browser)

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3. IAM Role (Execution Role for MWAA)

- Role Name: AWSGlueServiceRole-S3-Khushi
- Trust policy updated to allow MWAA to assume the role
  → ✅ Principal: "Service": "airflow-env.amazonaws.com"

---

4. S3 Bucket Setup for MWAA

- Bucket Name: mybucket-khushi-project2
- MWAA paths configured:
  - DAGs folder: Dags/
  - requirements.txt: in root of the bucket

---

5. DAG File Created

I created a DAG file named ad_revenue_glue_dag.py with content like:

```
from airflow import DAG
from airflow.providers.amazon.aws.operators.glue import GlueJobOperator
from datetime import datetime

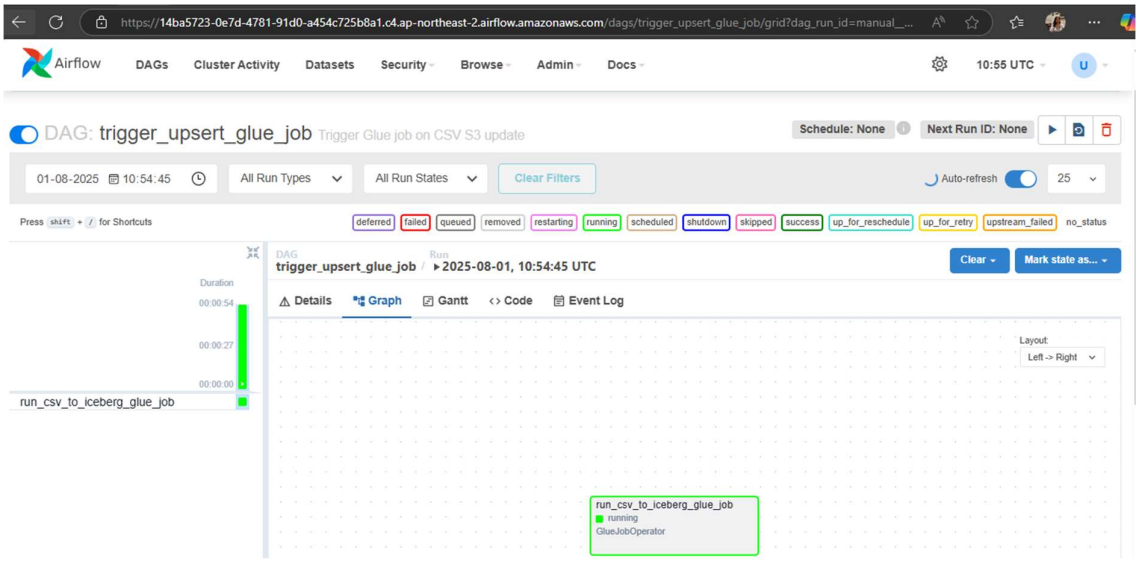

# Replace with your values
GLUE_JOB_NAME = "Khushi-P2-job"  # <- Your Glue job name
AWS_REGION = "ap-northeast-2"  # e.g., Mumbai
DAG_ID = "trigger_upsert_glue_job"

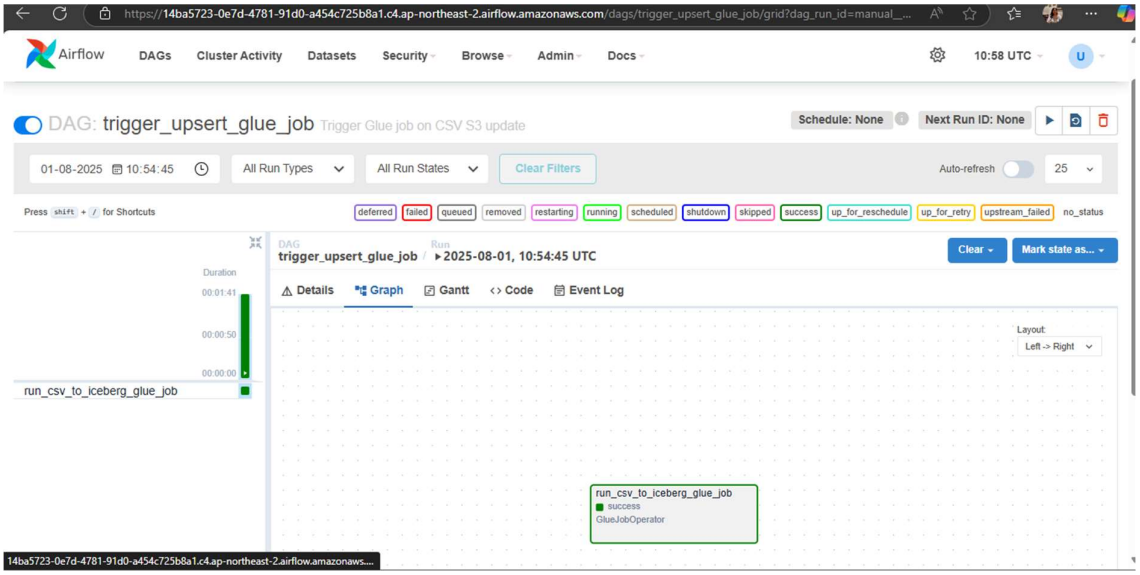
default_args = {
  'owner': 'airflow',
}

with DAG(
  dag_id=DAG_ID,
  default_args=default_args,
  description="Trigger Glue job on CSV S3 update",
  start_date=datetime(2025, 8, 1),
  schedule_interval=None,  # DAG is manually triggered
  catchup=False,
  tags=["glue", "csv", "iceberg"]
) as dag:

  run_glue = GlueJobOperator(
    task_id="run_csv_to_iceberg_glue_job",
    job_name=GLUE_JOB_NAME,
    region_name=AWS_REGION
  )

  run_glue
```





✅ GOAL: Lambda → Trigger Airflow DAG

✅ 3. Create Lambda Function (Python)

Go to Lambda > Create function → Author from scratch:

- Name: `'trigger_upsert_glue_job'`
- Runtime: Python 3.11
- Execution role: use the IAM role you just created

```
import boto3
import hashlib
import json
from datetime import datetime

s3 = boto3.client('s3')
airflow = boto3.client('mwaa')  # or use requests if using webserver endpoint

BUCKET = 'mybucket-khushi-project2'
KEY = 'Data/ad_revenue.csv'
ARCHIVE_KEY = 'archive/ad_revenue_previous.csv'
MWAA_ENV = 'Khushi-MWAA-P2'
DAG_NAME = 'trigger_upsert_glue_job'


def get_file_hash(bucket, key):
    try:
        obj = s3.get_object(Bucket=bucket, Key=key)
        return hashlib.md5(obj['Body'].read()).hexdigest()
    except s3.exceptions.NoSuchKey:
        # If archive file not found, return None or empty string
        return None


def lambda_handler(event, context):
    try:
        new_hash = get_file_hash(BUCKET, KEY)
        old_hash = get_file_hash(BUCKET, ARCHIVE_KEY)

        if new_hash != old_hash:
            print("Data has changed. Triggering Airflow DAG...")

            # Archive current as previous
            s3.copy_object(Bucket=BUCKET, CopySource=f"{BUCKET}/{KEY}", Key=ARCHIVE_KEY)

            response = airflow.create_cli_token(Name=MWAA_ENV)
            web_token = response['CliToken']
            web_server = response['WebServerHostname']

            # Airflow DAG Trigger
            import requests
            url = f"https://{web_server}/aws_mwaa/cli"
            trigger_cmd = f"dags trigger {DAG_NAME}"
            resp = requests.post(url, headers={"Authorization": f"Bearer {web_token}"}, data=trigger_cmd)

```

```
            return {
                'statusCode': 200,
                'body': f'DAG {DAG_NAME} triggered successfully.'
            }
        else:
            print("No change detected.")
            return {
                'statusCode': 200,
                'body': 'No update in ad_revenue.csv.'
            }

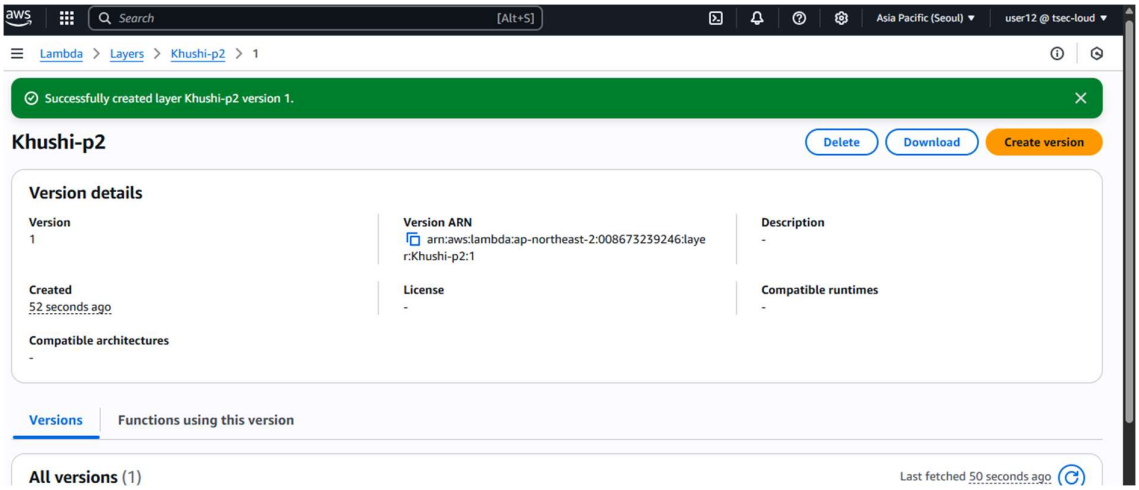
    except Exception as e:
        print(f"Error: {str(e)}")
        return {
            'statusCode': 500,
            'body': str(e)
        }

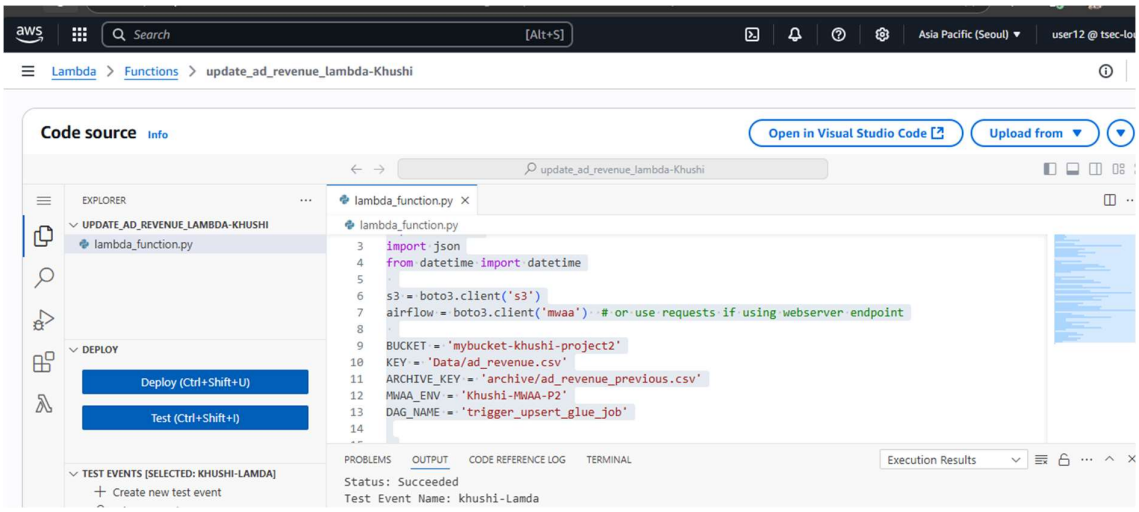
```

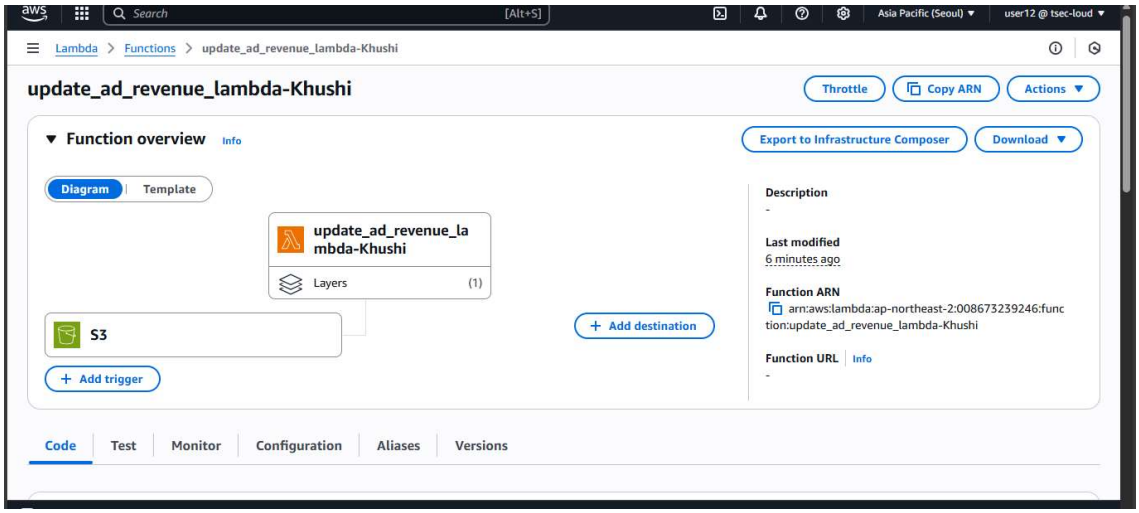
✅ 4. Deploy and Test Lambda

Use AWS Lambda Layer (Simplest Way)

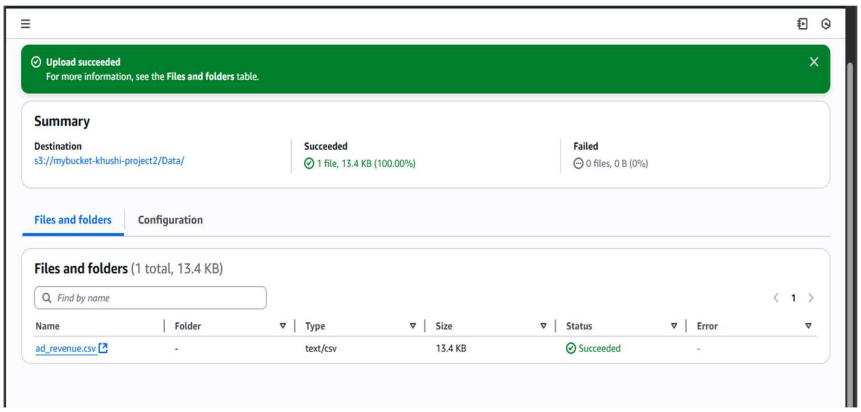
1. Go to the AWS Console → **Lambda Layers**
2. Click **"Create Layer"**
3. Set name: requests-layer
4. Upload a .zip file that contains the requests module



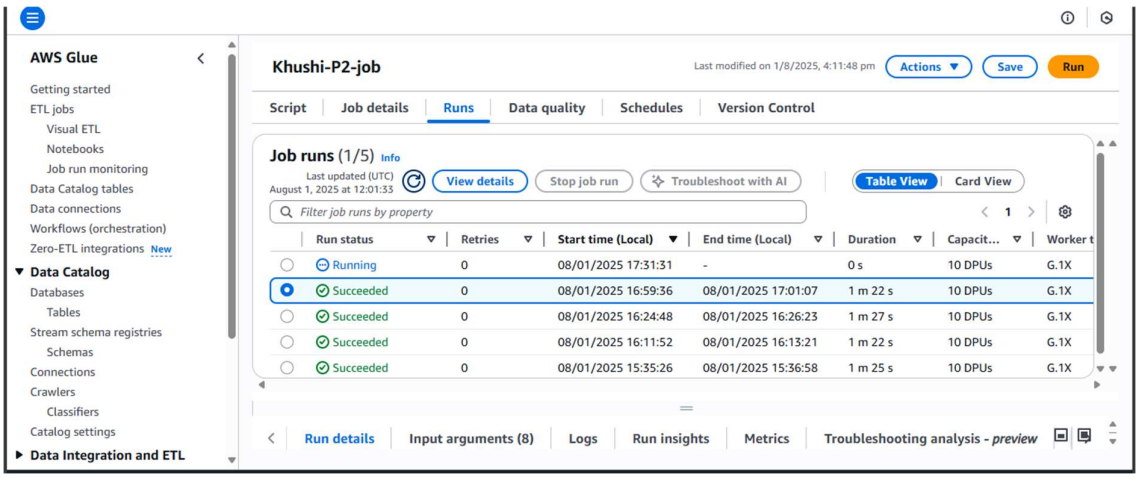




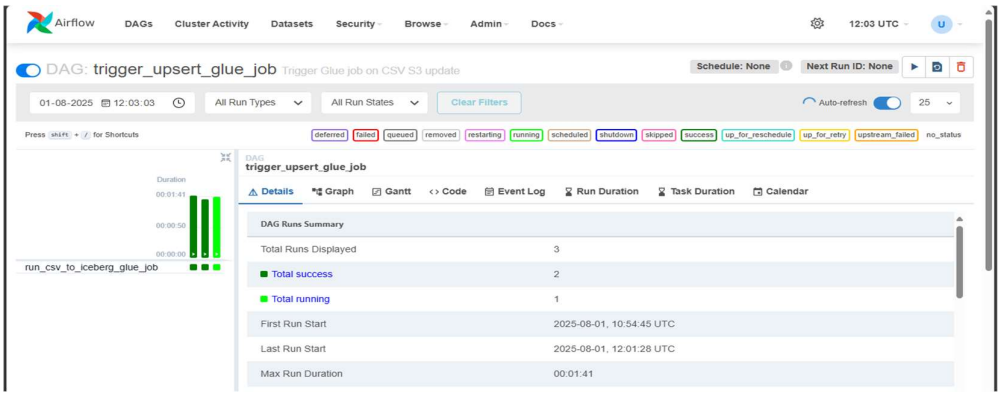
I change my CSV file to check if it is working or not-



As I uploaded –



My Airflow Running-



Real Time: AWS Console → Kinesis → Data Streams → EMR →(Snowflake & S3)

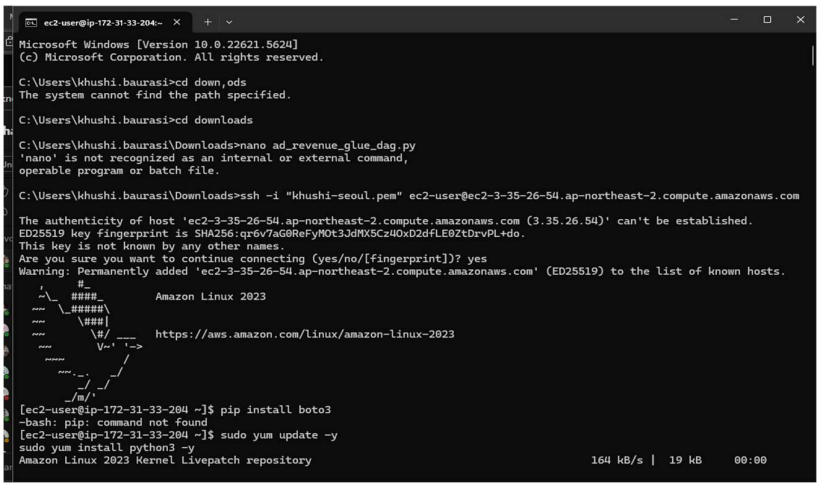
✅ **Kinesis Setup**

1. **Created Kinesis Data Stream:**
    - Stream name: ad-revenue-stream-Khushi-P2
    - Step 1: Go to AWS Console → Kinesis → Data Streams
    - Click Create Data Stream
    - Region: ap-northeast-2
2. **IAM Role for EC2:**
    - **Policies attached:**
        - AmazonKinesisFullAccess
        - AmazonS3FullAccess
        - CloudWatchLogsFullAccess

✅ **Step 5: EC2 Setup**

1. **Launched EC2 (Amazon Linux 2)**
2. **Security Group: Opened port 22 for SSH**
3. **Attached IAM Role (created in Step 4)**
4. **SSH into EC2:**

ssh -i "khushi-seoul.pem" ec2-user@ec2-43-203-139-103.ap-northeast-2.compute.amazonaws.com



5. **Install Dependencies:**

   sudo yum update -y

   sudo yum install python3 -y

   pip3 install boto3

✅ **Step 6: CSV → Kinesis**

1. **From EC2 to Kinesis Data Stream:**

   nano stream_to_kinesis.py

```
import boto3
import time


# Kinesis setup
stream_name = 'nano stream_to_kinesis.py '
region_name = 'ap-northeast-2'


kinesis = boto3.client('kinesis', region_name=region_name)
s3 = boto3.client('s3')


# S3 path info
bucket_name = 'mybucket-khushi-project2'
s3_key = 'Data/viewership_logs.csv'


# Download from S3
response = s3.get_object(Bucket=bucket_name, Key=s3_key)
lines = response['Body'].read().decode('utf-8').splitlines()


# Send each line to Kinesis
for line in lines:
  line = line.strip()
  if line:
    kinesis.put_record(
      StreamName=stream_name,
      Data=line,
      PartitionKey='partitionKey'
    )
    print(f"Sent: {line}")
    time.sleep(1)  # Simulate real-time stream
```

```
ec2-user@ip-172-31-33-204:~
    return self._emitter.emit(aliased_event_name, **kwargs)
  File "/home/ec2-user/.local/lib/python3.9/site-packages/botocore/hooks.py", line 256, in emit
    return self._emit(event_name, kwargs)
  File "/home/ec2-user/.local/lib/python3.9/site-packages/botocore/hooks.py", line 239, in _emit
    response = handler(**kwargs)
  File "/home/ec2-user/.local/lib/python3.9/site-packages/botocore/signers.py", line 108, in handler
    return self.sign(operation_name, request)
  File "/home/ec2-user/.local/lib/python3.9/site-packages/botocore/signers.py", line 200, in sign
    auth.add_auth(request)
  File "/home/ec2-user/.local/lib/python3.9/site-packages/botocore/crt/auth.py", line 56, in add_auth
    raise NoCredentialsError()
botocore.exceptions.NoCredentialsError: Unable to locate credentials
[ec2-user@ip-172-31-33-204 ~]$ nano stream_to_kinesis.py
[ec2-user@ip-172-31-33-204 ~]$ python3 stream_to_kinesis.py
Sent: session_id,user_id,channel_id,channel_name,show_name,genre,timestamp,duration_minutes,region,subscription_type,device,platform,is_live,ads_watched,ad_revenue,engagement_score,buffer_count,completion_percentage
Sent: SID652253,U56366,CH008,Zee Anmol,Show_48,Entertainment,2025-07-30 15:18:14,98,Central,Premium,Smart TV,Web,False,1,86.1,0.36,2,80.09
Sent: SID369996,U27555,CH005,Star Bharat,Show_111,Movies,2025-07-28 04:21:02,70,East,Basic,Mobile,Android,True,5,122.71,0.49,1,70.83
Sent: SID591350,U51120,CH032,Star Vijay,Show_77,Entertainment,2025-07-25 01:01:24,174,Pan-India,Basic,Smart TV,Roku,True,4,437.73,0.76,1,79.11
Sent: SID462921,U10309,CH003,Sony Entertainment Television,Show_155,Entertainment,2025-07-30 14:18:33,162,West,Basic,Smart TV,Roku,False,3,41.61,0.84,1,53.54
Sent: SID195719,U49174,CH047,DD Sahyadri,Show_90,News,2025-07-27 03:38:56,19,Pan-India,Free,Laptop,Roku,False,1,20.05,0.93,2,35.48
Sent: SID907005,U31682,CH035,KTV,Show_65,Movies,2025-07-26 20:24:32,134,Central,Premium,Mobile,FireTV,False,3,236.31,0.85,0,68.74
Sent: SID348132,U23434,CH005,Star Bharat,Show_125,Kids,2025-07-25 18:38:11,115,East,Free,Tablet,Android,True,2,99.9,0.21,0,70.67
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Sent: SID491012,U55582,CH049,News18 Kerala,Show_63,Movies,2025-07-30 15:29:26,174,Northeast,Basic,Tablet,Web,True,1,133.67,0.99,0,50.9
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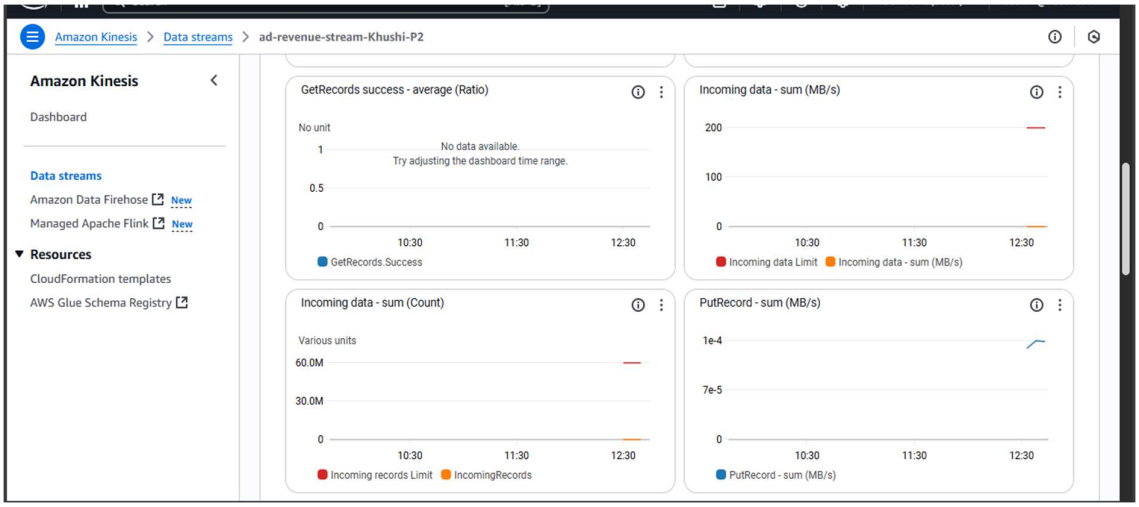


As you can see, I can see my data coming in my data stream

✅ Step 7: EMR Spark Streaming (Kinesis → S3 + Snowflake)

1. **EMR Cluster Launched (with Spark)**
2. **Uploaded PySpark job khushi.py:**
    - Reads from Kinesis stream viewership-stream
    - Writes to:
        - S3 for raw/processed logs
        - Snowflake for transformed data
3. **Required JARs:**
    - snowflake-jdbc-*.jar
    - spark-snowflake_2.12-*.jar
    - spark-sql-kinesis_2.12-1.2.0_spark-3.0.jar
4. **Run Spark Submit:**

```
nano Khushi.py

from pyspark.sql import SparkSession
from pyspark.sql.functions import col, expr, split
from pyspark.sql.types import *

# 1. Define the schema of the CSV-style records
schema = StructType([
  StructField("session_id", StringType()),
  StructField("user_id", StringType()),
  StructField("channel_id", StringType()),
  StructField("channel_name", StringType()),
  StructField("show_name", StringType()),
  StructField("genre", StringType()),
  StructField("timestamp", StringType()),
  StructField("duration_minutes", IntegerType()),
  StructField("region", StringType()),
  StructField("subscription_type", StringType()),
  StructField("device", StringType()),
  StructField("platform", StringType()),
  StructField("is_live", StringType()),
  StructField("ads_watched", IntegerType()),
  StructField("ad_revenue", FloatType()),
  StructField("engagement_score", FloatType()),
  StructField("buffer_count", IntegerType()),
  StructField("completion_percentage", FloatType())
])

# 2. Initialize Spark Session
print("🚀 Initializing Spark session...")
spark = SparkSession.builder \
```

```
    .appName("KinesisToS3AndSnowflake") \
    .getOrCreate()

print("✅ Spark session initialized.")

# 3. Read from Kinesis
print("🔄 Connecting to Kinesis...")
df_raw = spark.readStream \
    .format("kinesis") \
    .option("streamName", "ad-revenue-stream-Khushi-P2") \
    .option("endpointUrl", "https://kinesis.ap-northeast-2.amazonaws.com") \
    .option("region", "ap-northeast-2") \
    .option("startingPosition", "LATEST") \
    .load()
print("✅ Connected to Kinesis.")


# 4. Convert and split raw records
df_string = df_raw.withColumn("data_string", expr("CAST(data AS STRING)"))
df_split = df_string.withColumn("fields", split(col("data_string"), ","))

# 5. Assign to structured schema
df_parsed = df_split.select(
    col("fields").getItem(0).alias("session_id"),
    col("fields").getItem(1).alias("user_id"),
    col("fields").getItem(2).alias("channel_id"),
    col("fields").getItem(3).alias("channel_name"),
    col("fields").getItem(4).alias("show_name"),
    col("fields").getItem(5).alias("genre"),
    col("fields").getItem(6).alias("timestamp"),
    col("fields").getItem(7).cast("int").alias("duration_minutes"),
    col("fields").getItem(8).alias("region"),
    col("fields").getItem(9).alias("subscription_type"),
    col("fields").getItem(10).alias("device"),
    col("fields").getItem(11).alias("platform"),
    col("fields").getItem(12).alias("is_live"),
    col("fields").getItem(13).cast("int").alias("ads_watched"),
    col("fields").getItem(14).cast("float").alias("ad_revenue"),
    col("fields").getItem(15).cast("float").alias("engagement_score"),
    col("fields").getItem(16).cast("int").alias("buffer_count"),
    col("fields").getItem(17).cast("float").alias("completion_percentage")
)


# 6. Function to write batch to S3 and Snowflake
def write_batch(batch_df, epoch_id):
    print(f"🔁 Processing batch {epoch_id}...")
    record_count = batch_df.count()
    print(f"📦 Records in batch: {record_count}")
    if record_count == 0:
        print("⚠️ Empty batch. Skipping writes.")
        return
  try:
        # Snowflake options
        snowflake_options = {
            "sfURL": "snowflake-khushiinfocepts.snowflakecomputing.com",
            "sfUser": "khushiinfocepts",
            "sfPassword": "Khushi9407489099",
            "sfDatabase":"media_stream_db",
            "sfSchema": "media_data",
```

```
        "sfWarehouse": "media_warehouse",
        "sfRole":"ACCOUNTADMIN"
    }
    print("🌨️ Writing to Snowflake...")

    batch_df.write \

        .format("net.snowflake.spark.snowflake") \

        .options(**snowflake_options) \

        .option("dbtable", "channel_logs") \

        .mode("append") \

        .save()

    print("✅ Write to Snowflake succeeded.")

  except Exception as e:

    print("❌ Error writing to Snowflake:", e)

  try:

    print("📩 Writing to S3...")

    batch_df.write \

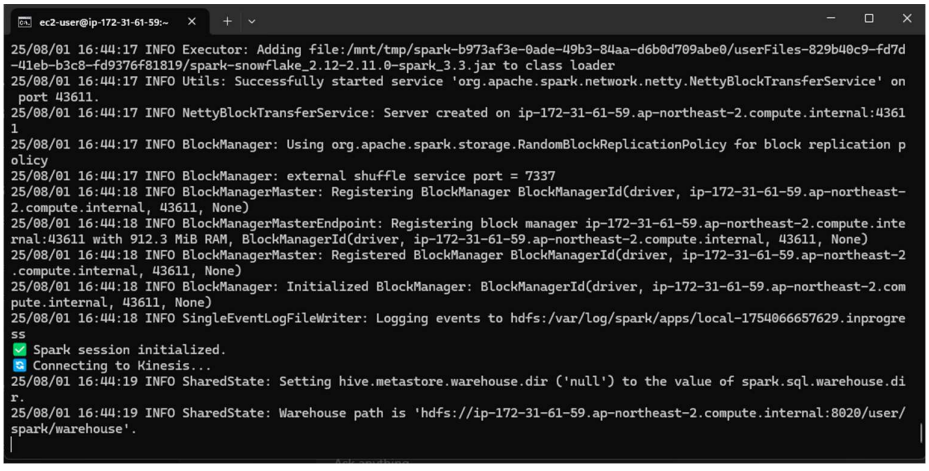
        .format("csv") \

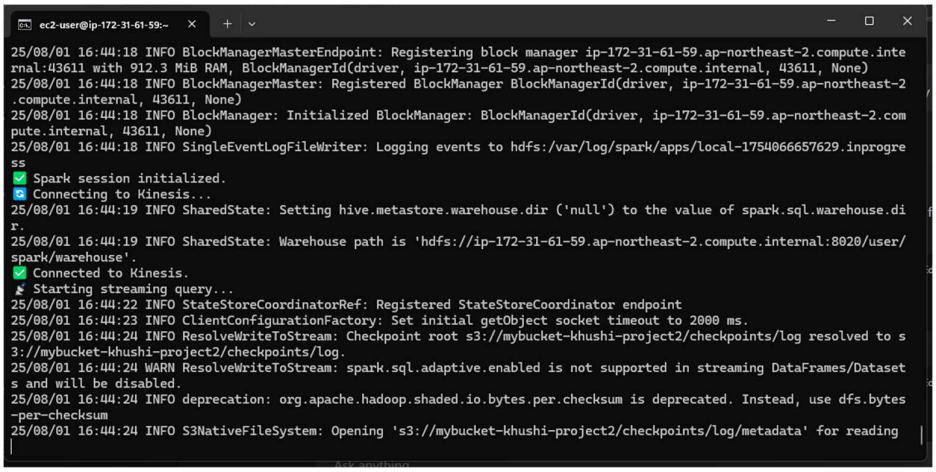
        .mode("append") \

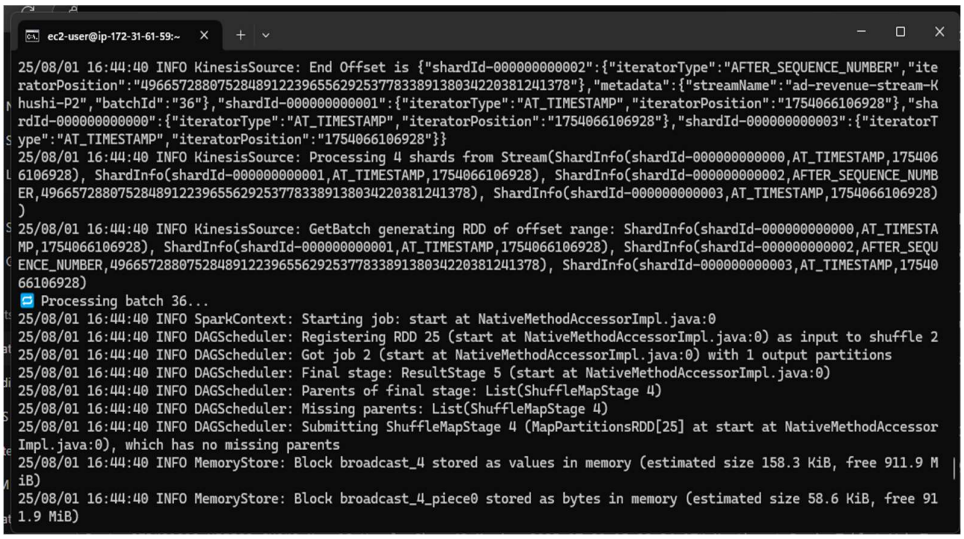
        .save("s3://mybucket-khushi-project2/checkpoints/log")

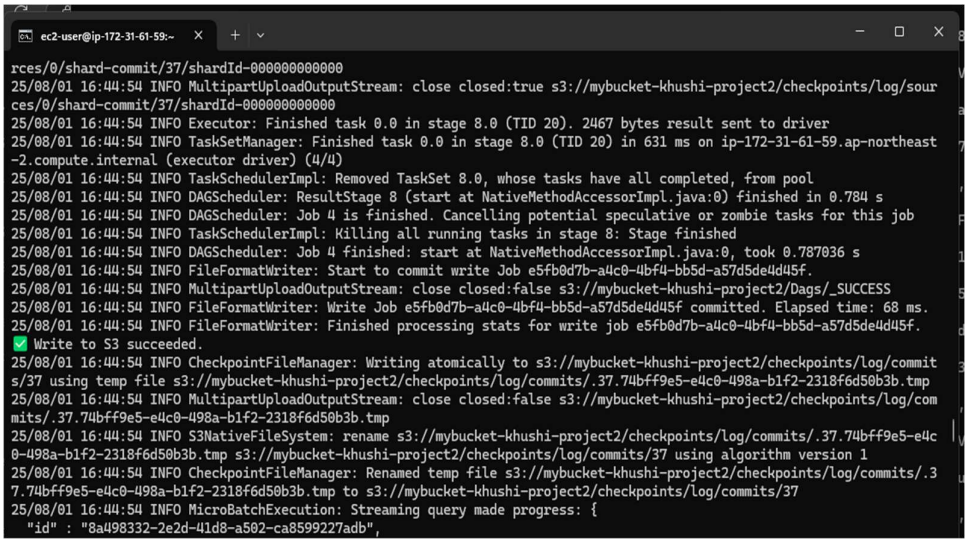
    print("✅ Write to S3 succeeded.")
```

spark-submit khushi.py



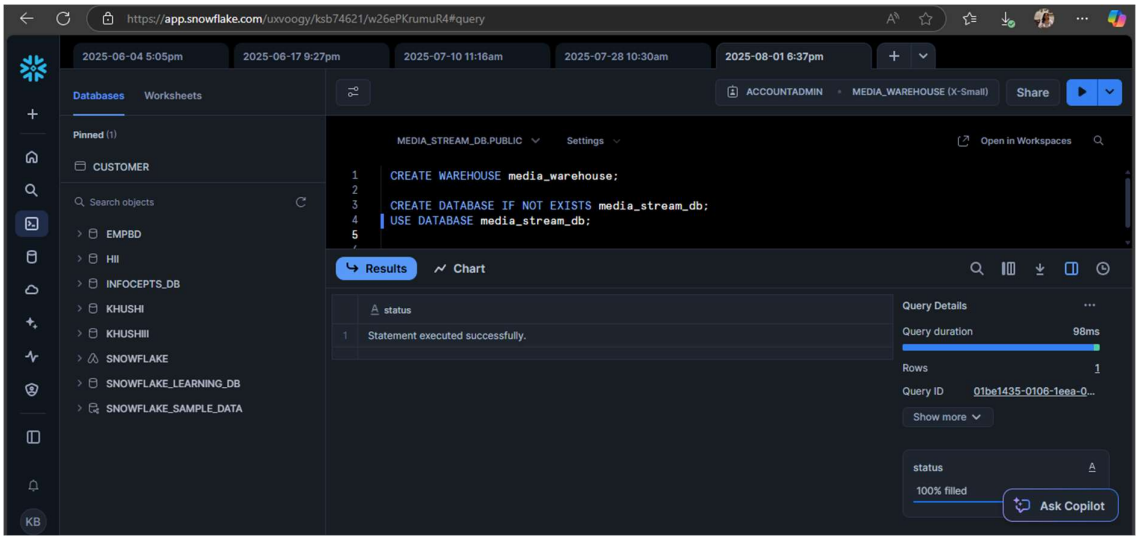

ec2-user@ip-172-31-61-59:~
25/08/01 16:44:18 INFO BlockManagerMasterEndpoint: Registering block manager ip-172-31-61-59.ap-northeast-2.compute.internal:43611 with 912.3 MiB RAM, BlockManagerId(driver, ip-172-31-61-59.ap-northeast-2.compute.internal, 43611, None)
25/08/01 16:44:18 INFO BlockManagerMaster: Registered BlockManager BlockManagerId(driver, ip-172-31-61-59.ap-northeast-2.compute.internal, 43611, None)
25/08/01 16:44:18 INFO BlockManager: Initialized BlockManager: BlockManagerId(driver, ip-172-31-61-59.ap-northeast-2.compute.internal, 43611, None)
25/08/01 16:44:18 INFO SingleEventLogFileWriter: Logging events to hdfs:/var/log/spark/apps/local-1754066657629.inprogress
Spark session initialized.
Connecting to Kinesis...
25/08/01 16:44:19 INFO SharedState: Setting hive.metastore.warehouse.dir ('null') to the value of spark.sql.warehouse.dir.
25/08/01 16:44:19 INFO SharedState: Warehouse path is 'hdfs://ip-172-31-61-59.ap-northeast-2.compute.internal:8020/user/spark/warehouse'.
Connected to Kinesis.
Starting streaming query...
25/08/01 16:44:22 INFO StateStoreCoordinatorRef: Registered StateStoreCoordinator endpoint
25/08/01 16:44:23 INFO ClientConfigurationFactory: Set initial getObject socket timeout to 2000 ms.
25/08/01 16:44:24 INFO ResolveWriteToStream: Checkpoint root s3://mybucket-khushi-project2/checkpoints/log resolved to s3://mybucket-khushi-project2/checkpoints/log.
25/08/01 16:44:24 WARN ResolveWriteToStream: spark.sql.adaptive.enabled is not supported in streaming DataFrames/Datasets and will be disabled.
25/08/01 16:44:24 INFO deprecation: org.apache.hadoop.shaded.io.bytes.per.checksum is deprecated. Instead, use dfs.bytes-per-checksum
25/08/01 16:44:24 INFO S3NativeFileSystem: Opening 's3://mybucket-khushi-project2/checkpoints/log/metadata' for reading

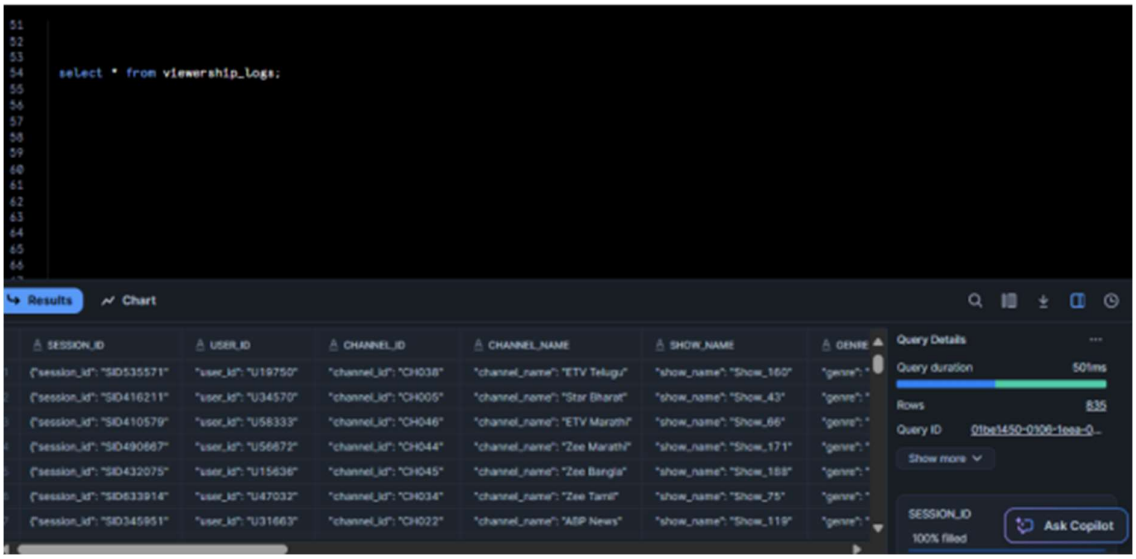

ec2-user@ip-172-31-61-59:~
25/08/01 16:44:40 INFO KinesisSource: End Offset is {"shardId-000000000002":{"iteratorType":"AFTER_SEQUENCE_NUMBER","iteratorPosition":"496657288075284891223965562925377833891380342203812413 78"},"metadata":{"streamName":"ad-revenue-stream-Khushi-P2","batchId":"36"},"shardId-000000000001":{"iteratorType":"AT_TIMESTAMP","iteratorPosition":"1754066106928"},"shardId-000000000000":{"iteratorType":"AT_TIMESTAMP","iteratorPosition":"1754066106928"},"shardId-000000000003":{"iteratorType":"AT_TIMESTAMP","iteratorPosition":"1754066106928"}}
25/08/01 16:44:40 INFO KinesisSource: Processing 4 shards from Stream(ShardInfo(shardId-000000000000,AT_TIMESTAMP,1754066106928), ShardInfo(shardId-000000000001,AT_TIMESTAMP,1754066106928), ShardInfo(shardId-000000000002,AFTER_SEQUENCE_NUMBER,496657288075284891223965562925377833891380342203812413 78), ShardInfo(shardId-000000000003,AT_TIMESTAMP,1754066106928))
25/08/01 16:44:40 INFO KinesisSource: GetBatch generating RDD of offset range: ShardInfo(shardId-000000000000,AT_TIMESTAMP,1754066106928), ShardInfo(shardId-000000000001,AT_TIMESTAMP,1754066106928), ShardInfo(shardId-000000000002,AFTER_SEQUENCE_NUMBER,496657288075284891223965562925377833891380342203812413 78), ShardInfo(shardId-000000000003,AT_TIMESTAMP,1754066106928)
Processing batch 36...
25/08/01 16:44:40 INFO SparkContext: Starting job: start at NativeMethodAccessorImpl.java:0
25/08/01 16:44:40 INFO DAGScheduler: Registering RDD 25 (start at NativeMethodAccessorImpl.java:0) as input to shuffle 2
25/08/01 16:44:40 INFO DAGScheduler: Got job 2 (start at NativeMethodAccessorImpl.java:0) with 1 output partitions
25/08/01 16:44:40 INFO DAGScheduler: Final stage: ResultStage 5 (start at NativeMethodAccessorImpl.java:0)
25/08/01 16:44:40 INFO DAGScheduler: Parents of final stage: List(ShuffleMapStage 4)
25/08/01 16:44:40 INFO DAGScheduler: Missing parents: List(ShuffleMapStage 4)
25/08/01 16:44:40 INFO DAGScheduler: Submitting ShuffleMapStage 4 (MapPartitionsRDD[25] at start at NativeMethodAccessorImpl.java:0), which has no missing parents
25/08/01 16:44:40 INFO MemoryStore: Block broadcast_4 stored as values in memory (estimated size 158.3 KiB, free 911.9 MiB)
25/08/01 16:44:40 INFO MemoryStore: Block broadcast_4_piece0 stored as bytes in memory (estimated size 58.6 KiB, free 911.9 MiB)


ec2-user@ip-172-31-61-59:~
rces/0/shard-commit/37/shardId-000000000000
25/08/01 16:44:54 INFO MultipartUploadOutputStream: close closed:true s3://mybucket-khushi-project2/checkpoints/log/sources/0/shard-commit/37/shardId-000000000000
25/08/01 16:44:54 INFO Executor: Finished task 0.0 in stage 8.0 (TID 20). 2467 bytes result sent to driver
25/08/01 16:44:54 INFO TaskSetManager: Finished task 0.0 in stage 8.0 (TID 20) in 631 ms on ip-172-31-61-59.ap-northeast-2.compute.internal (executor driver) (4/4)
25/08/01 16:44:54 INFO TaskSchedulerImpl: Removed TaskSet 8.0, whose tasks have all completed, from pool
25/08/01 16:44:54 INFO DAGScheduler: ResultStage 8 (start at NativeMethodAccessorImpl.java:0) finished in 0.784 s
25/08/01 16:44:54 INFO DAGScheduler: Job 4 is finished. Cancelling potential speculative or zombie tasks for this job
25/08/01 16:44:54 INFO TaskSchedulerImpl: Killing all running tasks in stage 8: Stage finished
25/08/01 16:44:54 INFO DAGScheduler: Job 4 finished: start at NativeMethodAccessorImpl.java:0, took 0.787036 s
25/08/01 16:44:54 INFO FileFormatWriter: Start to commit write Job e5fb0d7b-a4c0-4bf4-bb5d-a57d5de4d45f.
25/08/01 16:44:54 INFO MultipartUploadOutputStream: close closed:false s3://mybucket-khushi-project2/Dags/_SUCCESS
25/08/01 16:44:54 INFO FileFormatWriter: Write Job e5fb0d7b-a4c0-4bf4-bb5d-a57d5de4d45f committed. Elapsed time: 68 ms.
25/08/01 16:44:54 INFO FileFormatWriter: Finished processing stats for write job e5fb0d7b-a4c0-4bf4-bb5d-a57d5de4d45f.
Write to S3 succeeded.
25/08/01 16:44:54 INFO CheckpointFileManager: Writing atomically to s3://mybucket-khushi-project2/checkpoints/log/commits/37 using temp file s3://mybucket-khushi-project2/checkpoints/log/commits/.37.74bff9e5-e4c0-498a-b1f2-2318f6d50b3b.tmp
25/08/01 16:44:54 INFO MultipartUploadOutputStream: close closed:false s3://mybucket-khushi-project2/checkpoints/log/commits/.37.74bff9e5-e4c0-498a-b1f2-2318f6d50b3b.tmp
25/08/01 16:44:54 INFO S3NativeFileSystem: rename s3://mybucket-khushi-project2/checkpoints/log/commits/.37.74bff9e5-e4c0-498a-b1f2-2318f6d50b3b.tmp s3://mybucket-khushi-project2/checkpoints/log/commits/37 using algorithm version 1
25/08/01 16:44:54 INFO CheckpointFileManager: Renamed temp file s3://mybucket-khushi-project2/checkpoints/log/commits/.37.74bff9e5-e4c0-498a-b1f2-2318f6d50b3b.tmp to s3://mybucket-khushi-project2/checkpoints/log/commits/37
25/08/01 16:44:54 INFO MicroBatchExecution: Streaming query made progress: {
"id" : "8a498332-2e2d-41d8-a502-ca8599227adb",

✅ Step 8: Snowflake Setup

1. Used Snowflake Web UI: https://app.snowflake.com/uxvoogy/ksb74621/w26ePKrumuR4
2. Database: MEDIA_STREAM_DB
3. Schema: MEDIA_DATA
4. Table: viewership_logs





✅ Step 9: Issues Faced

- Snowflake JDBC write failed due to locked account – needs to be unlocked by admin.
- Missing JAR error for Kinesis connector.
- Permissions and path corrections done using chmod and checking /usr/lib/spark/jars.

Data Send Sucessfully on S3-