06c_customer_churn_airflow_execution.md

Customer Churn using Serverless Spark through Airflow.

Goal - Data Preparation and Model Training for Detecting Customer Churn Dataset.

Following are the lob modules:

1. Understanding Data

The dataset used for this project are customer churn data and customer test data.
The dataset contains the following features:

- Churn - Binary field which represents customers who left/were retained within the last month
- Services that each customer has signed up for – phone, multiple lines, internet, online security, online backup, device protection, tech support, and streaming TV and movies
- Customer account information – how long they've been a customer, contract, payment method, paperless billing, monthly charges, and total charges
- Demographic info about customers – gender, age range, and if they have partners and dependents

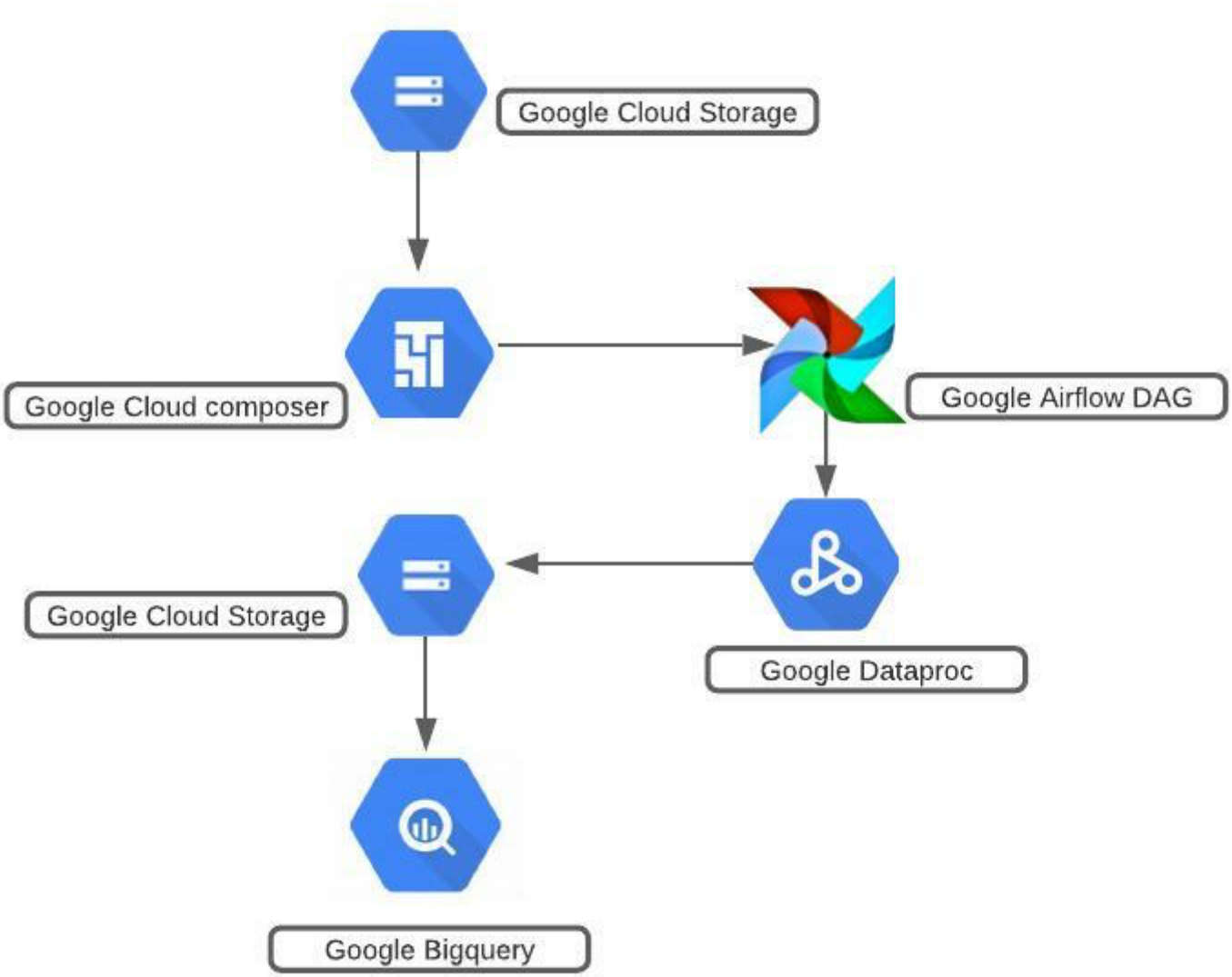
Note: The following features refer to these same-host connections.

- serror_rate
- rerror_rate
- same_srv_rate
- diff_srv_rate
- srv_count

Note: The following features refer to these same-service connections.

- srv_serror_rate
- srv_rerror_rate
- srv_diff_host_rate

2. Solution Diagram

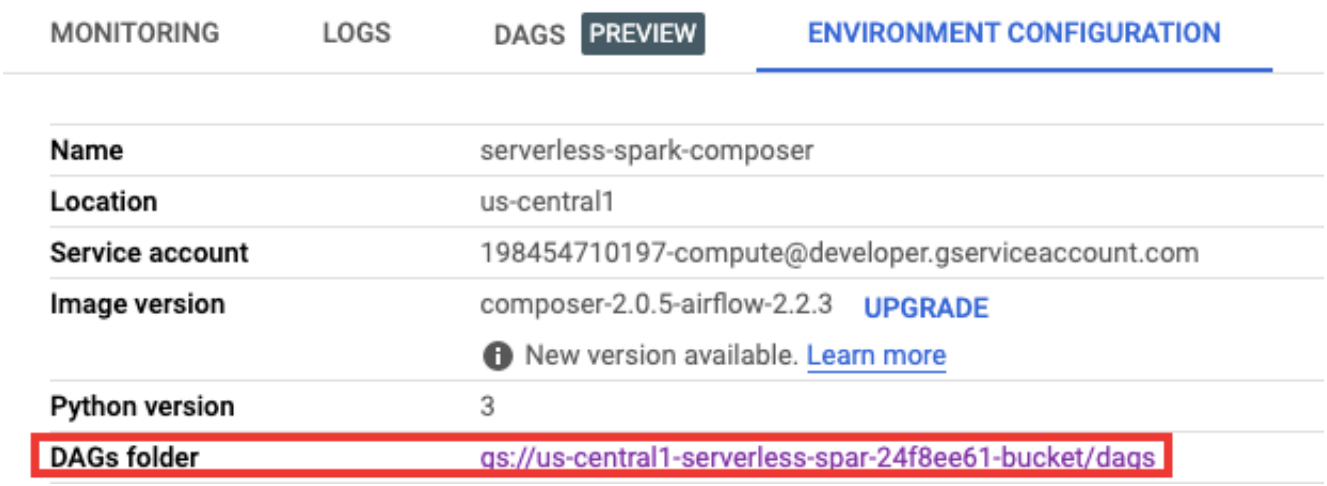


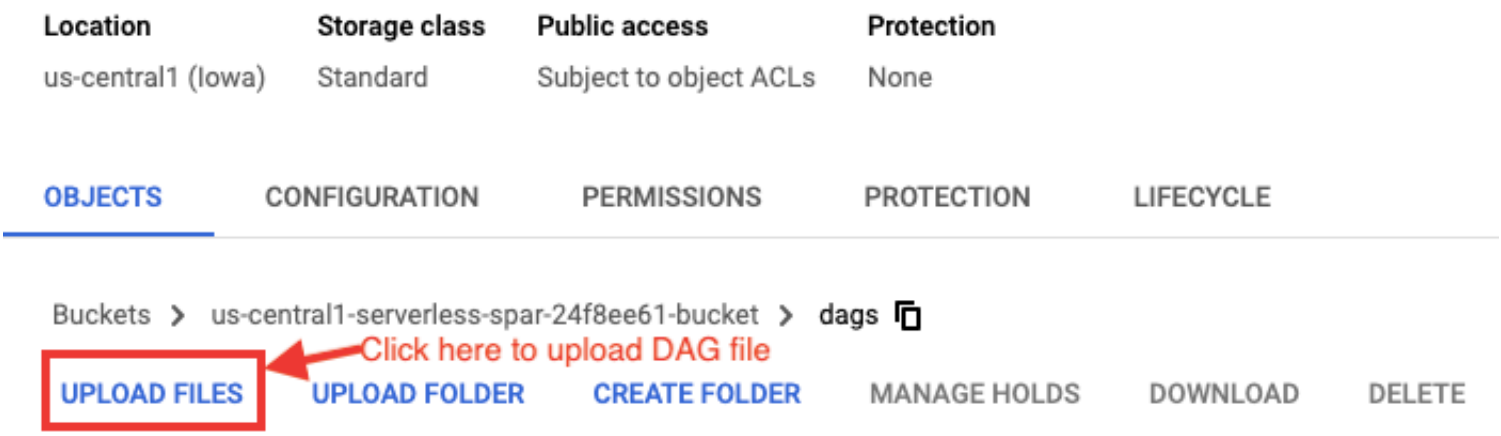
Model Pipeline

The model pipeline involves the following steps:
- Create buckets in GCS
- Create Dataproc and Persistent History Server Cluster
- Copy the raw data files, PySpark and notebook files into GCS
- Create a Cloud Composer environment and Airflow jobs to run the serverless spark job
- Creating Google BigQuery tables with summary of anomalous cell towers

3. Uploading DAG files to DAGs folder

- From the code repository, download the file located at: **customer_churn>00-scripts>customer_churn_airflow.py**
- Rename file to <your_name_here>-customer_churn_airflow.py
- Open the file and replace your name on row 21
- Navigate to **Composer><composer_environment>**
- Next, navigate to **Environment Configuration>DAGs folder URI**
- Next, upload the DAG file to the GCS bucket corresponding to the **DAGs folder URI**



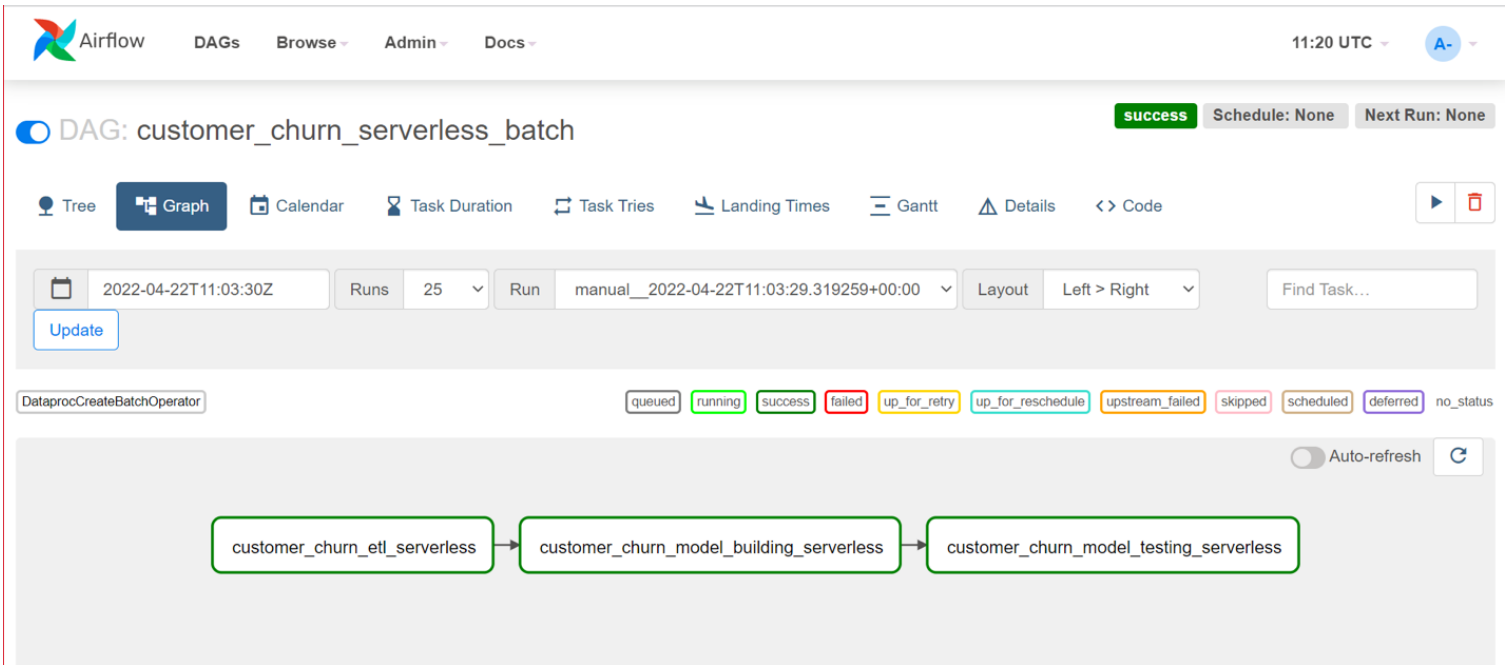


4. Execution of Airflow DAG

- Navigate to **Composer><your_environment>>Open Airflow UI**

- Once the Airflow UI opens, navigate to **DAGs** and open your respective DAG
- Next, trigger your DAG by clicking on the **Trigger DAG** button

- Once the DAG is triggered, the DAG can be monitored directly through the Airflow UI as well as the Dataproc>Serverless>Batches window

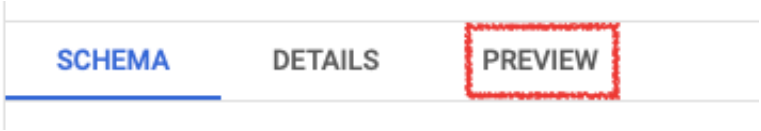


5. BQ output tables

Navigate to BigQuery Console, and check the **customer-churn** dataset.
Once the Airflow DAG execution is completed, four new tables '<your_name_here>_training_data', '<your_name_here>_test_data', '<your_name_here>_predictions_data' and '<your_name_here>_test_output' are created.

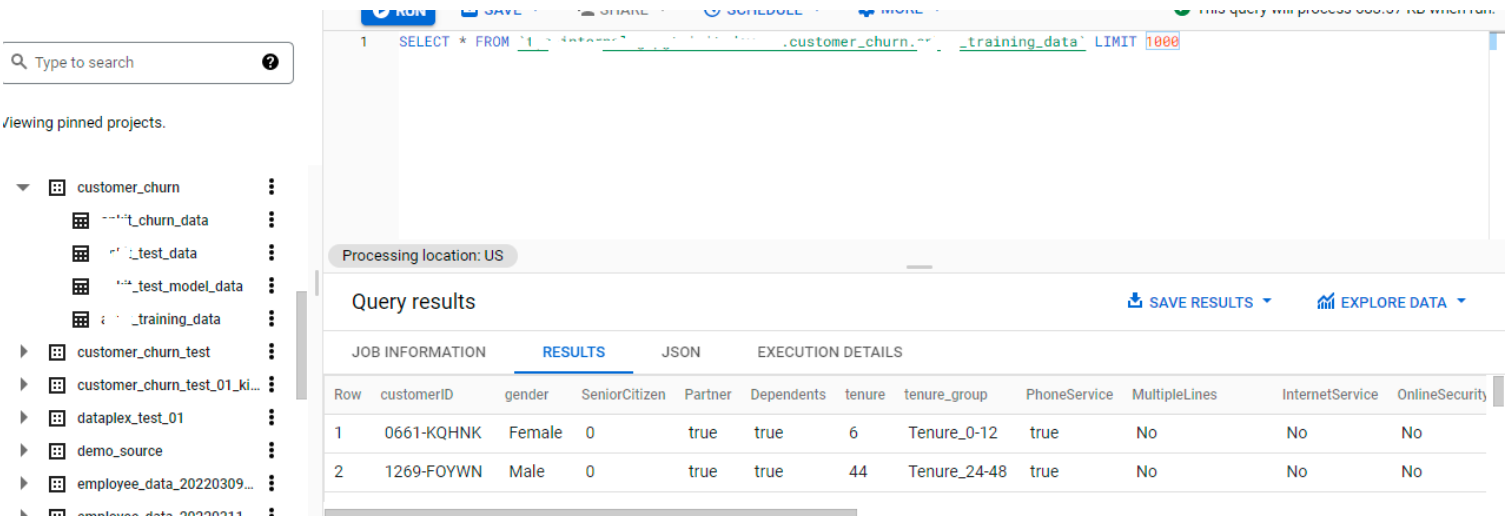
To view the data in these tables -

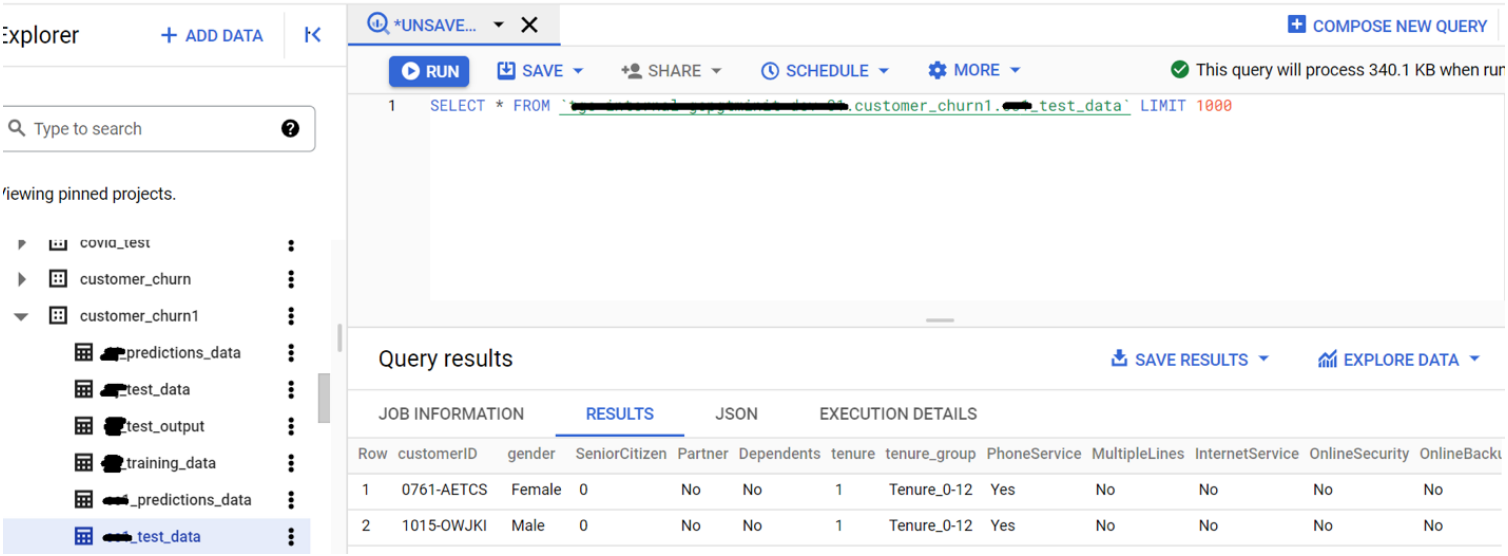
- Select the table from BigQuery Explorer by navigating 'project_id' **>** 'dataset' **>** 'table_name'
- Click on the **Preview** button to see the data in the table



Note: If the **Preview** button is not visible, run the below queries to view the data. However, these queries will be charged for the full table scan.

```
SELECT * FROM `<project_name>.<dataset_name>.<your_name_here>_training_data` LIMIT 1000;
SELECT * FROM `<project_name>.<dataset_name>.<your_name_here>_test_data` LIMIT 1000;
SELECT * FROM `<project_name>.<dataset_name>.<your_name_here>_predictions_data` LIMIT 1000;
SELECT * FROM `<project_name>.<dataset_name>.<your_name_here>_test_output` LIMIT 1000;
```



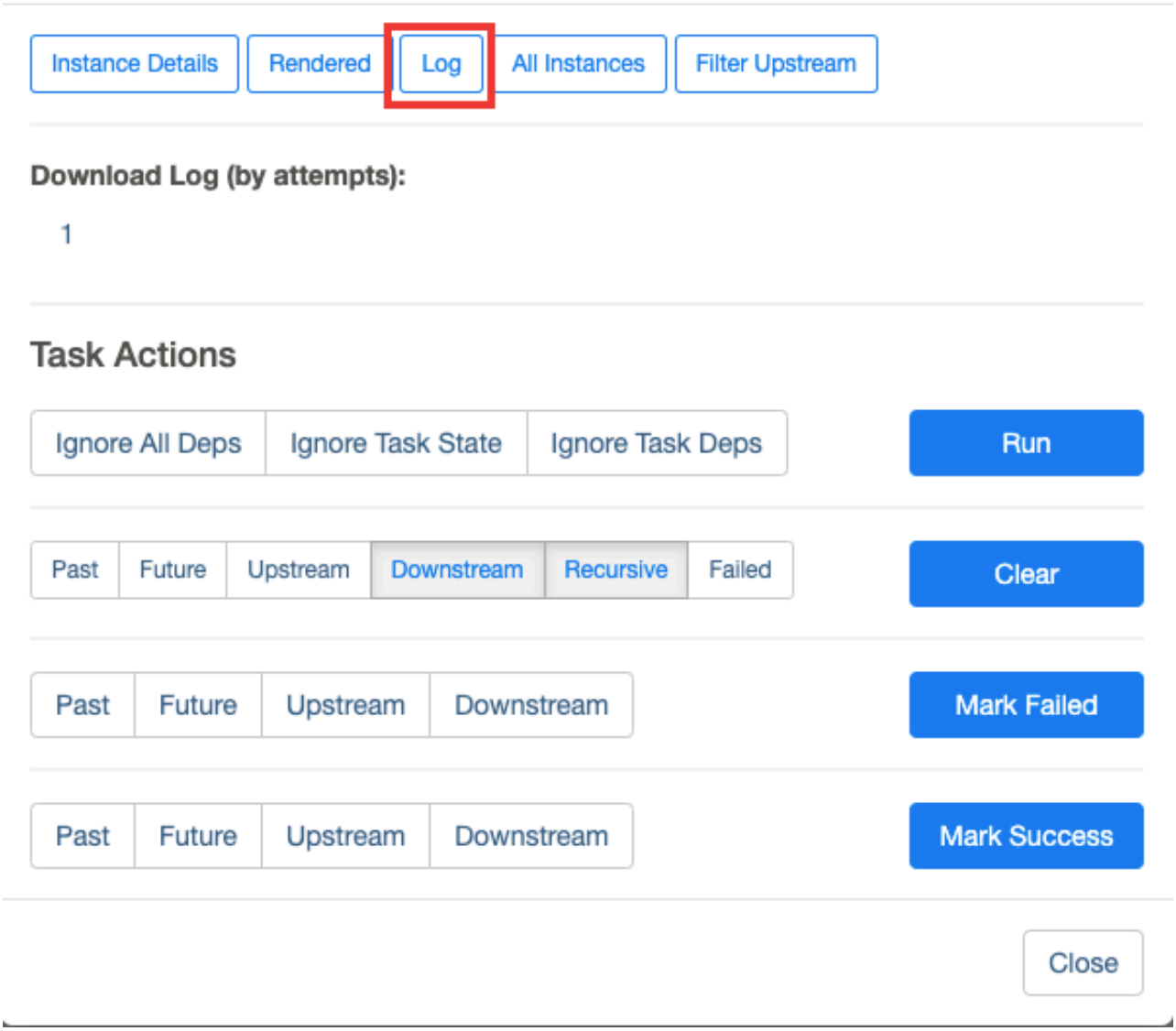


Note: Edit all occurrences of <project_name> and <dataset_name> to match the values of the variables PROJECT_ID, and BQ_DATASET_NAME respectively

6. Logging

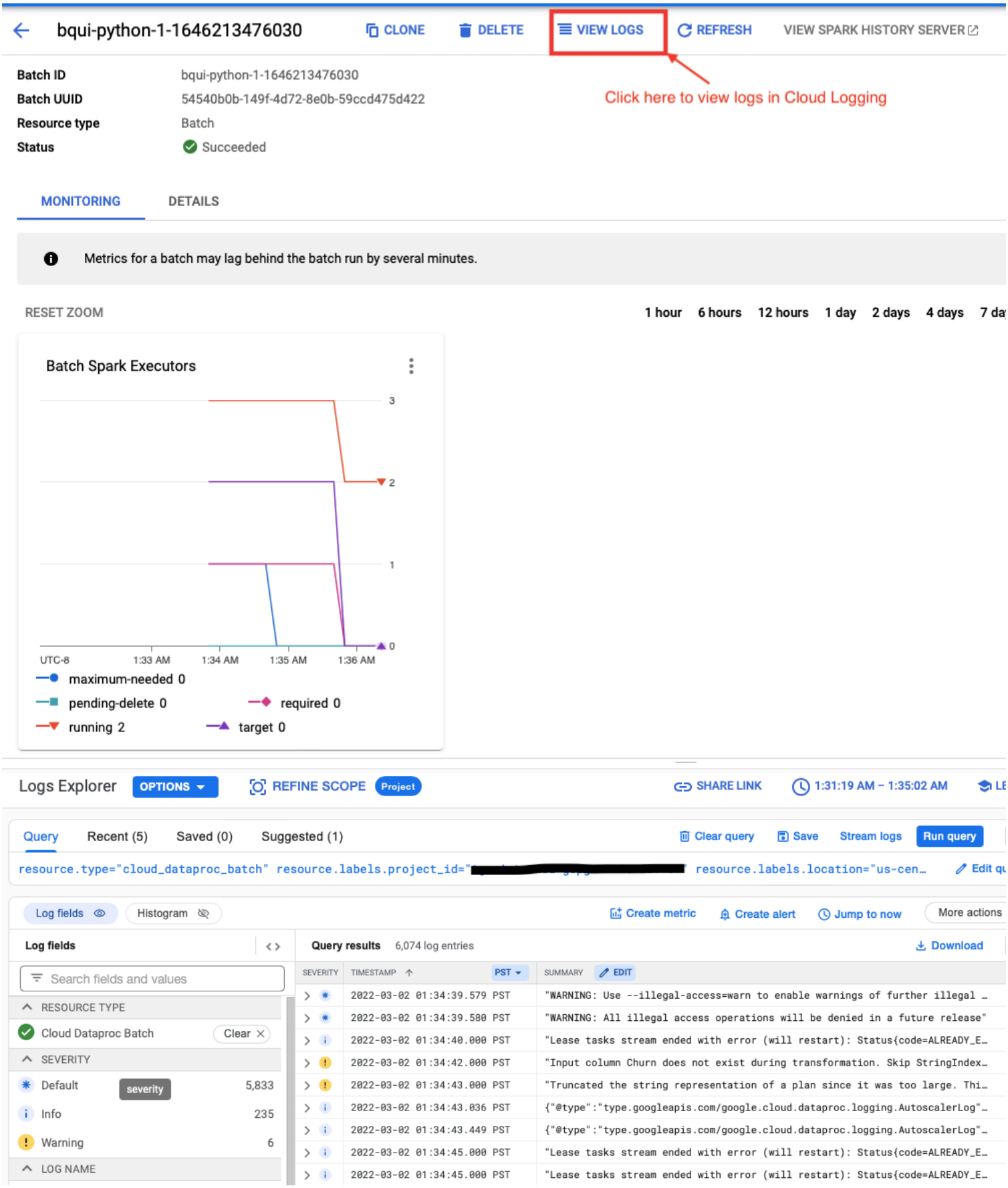
6.1 Airflow logging

- To view the logs of any step of the DAG execution, click on the >**Log** button



6.2 Serverless Batch logs

Logs associated with the application can be found in the logging console under **Dataproc > Serverless > Batches > <batch_name>**.
You can also click on “View Logs” button on the Dataproc batches monitoring page to get to the logging page for the specific Spark job.


bqui-python-1-1646213476030
CLONE
DELETE
VIEW LOGS
REFRESH
VIEW SPARK HISTORY SERVER
Click here to view logs in Cloud Logging
Batch ID bqui-python-1-1646213476030
Batch UUID 54540b0b-149f-4d72-8e0b-59ccd475d422
Resource type Batch
Status Succeeded
MONITORING
DETAILS
Metrics for a batch may lag behind the batch run by several minutes.
RESET ZOOM
1 hour 6 hours 12 hours 1 day 2 days 4 days
Batch Spark Executors
UTC-8 1:33 AM 1:34 AM 1:35 AM 1:36 AM
maximum-needed 0
pending-delete 0
required 0
running 2
target 0
Logs Explorer
OPTIONS
REFINE SCOPE
Project
SHARE LINK
1:31:19 AM – 1:35:02 AM
Query
Recent (5)
Saved (0)
Suggested (1)
Clear query
Save
Stream logs
Run query
resource.type="cloud_dataproc_batch" resource.labels.project_id="[redacted] resource.labels.location="us-cen…
Log fields
Histogram
Create metric
Create alert
Jump to now
More actions
Log fields
Search fields and values
RESOURCE TYPE
Cloud Dataproc Batch
Clear
SEVERITY
Default
severity
5,833
Info
235
Warning
6
LOG NAME
Query results 6,074 log entries
Download
SEVERITY TIMESTAMP PST SUMMARY EDIT
2022-03-02 01:34:39.579 PST "WARNING: Use --illegal-access=warn to enable warnings of further illegal …
2022-03-02 01:34:39.580 PST "WARNING: All illegal access operations will be denied in a future release"
2022-03-02 01:34:40.000 PST "Lease tasks stream ended with error (will restart): Status{code=ALREADY_E…
2022-03-02 01:34:42.000 PST "Input column Churn does not exist during transformation. Skip StringIndex…
2022-03-02 01:34:43.000 PST "Truncated the string representation of a plan since it was too large. Thi…
2022-03-02 01:34:43.036 PST {"@type":"type.googleapis.com/google.cloud.dataproc.logging.AutoscalerLog"…
2022-03-02 01:34:43.449 PST {"@type":"type.googleapis.com/google.cloud.dataproc.logging.AutoscalerLog"…
2022-03-02 01:34:45.000 PST "Lease tasks stream ended with error (will restart): Status{code=ALREADY_E…
2022-03-02 01:34:45.000 PST "Lease tasks stream ended with error (will restart): Status{code=ALREADY_E…

6.3 Persistent History Server logs

To view the Persistent History server logs, click the 'View History Server' button on the Dataproc batches monitoring page and the logs will be shown as below: