1. Deployment of downloading, ETL and Integraiton process

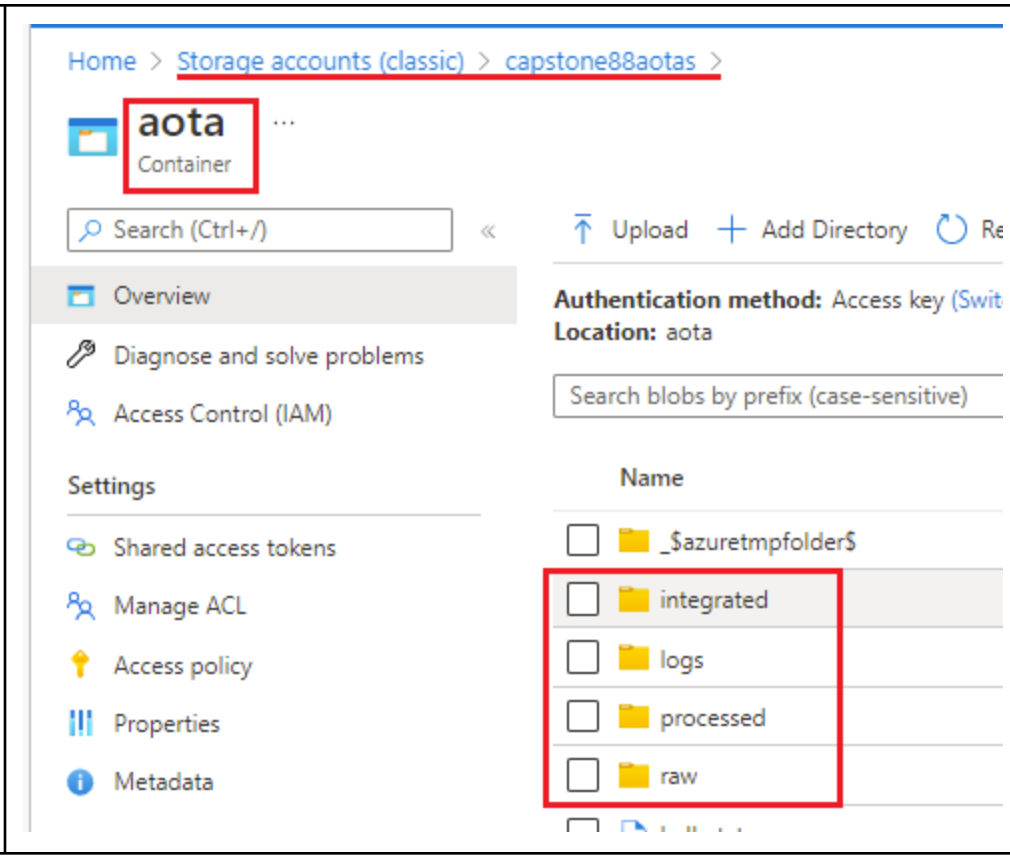
System information

Spark Cluster	HDInsight
Cluster OS	Ubuntu
Cloud Storage	Azure blob

1. Create Azure blob and container

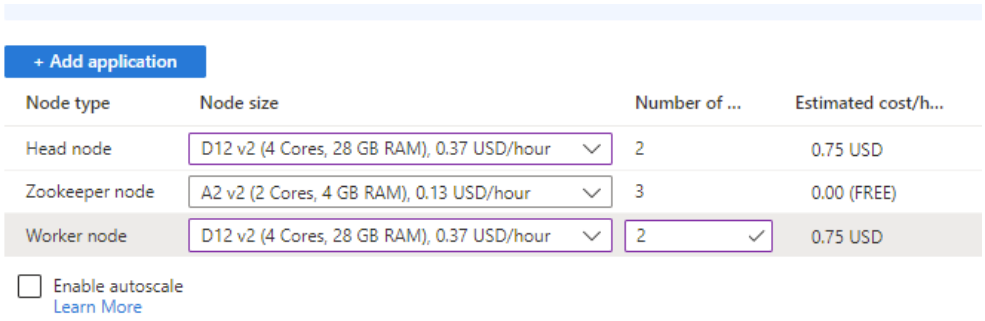
Azure Blob

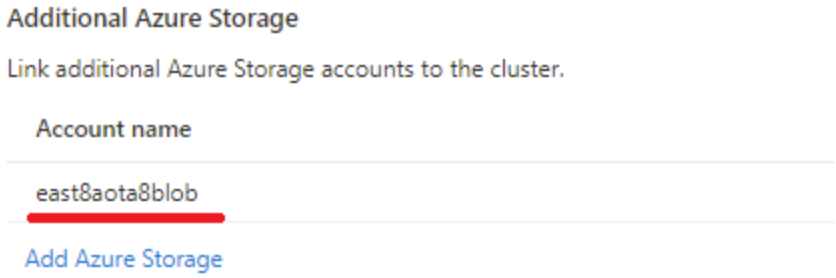
	Storage account: capstone88aotas Container: aota



2. Create HDinsight cluster

Here are some details about setting up the HDinsight cluster

Cluster Configuration	
Add additional storage	When creating the cluster, we add an Azure storage account, 'east8aota8blob', to be the additional storage. In this way, our Spark program can freely access it through some settings.

	
blobfuse	On Cluster, we installed blobfuse (on linux) which allows to mount Blob storage ('east8aota8blob'), as a local file system. In such a way, our python script can download the source data and directly save to it.

3. Deploy code HDinsight
    1) SSH to HDinsight Cluster
    2) Commands

```
---------- ssh----------

ssh sshuser@cluster-0531-ssh.azurehdinsight.net

---------- install moudle -==========

sudo pip3 install pyspark


---------- set up folder for aota
--------------------------------------------------------------------------
sudo mkdir /app
sudo chown sshuser /app
mkdir /app/aota


sudo mkdir /data
sudo chown sshuser /data


#create folder:
sudo mkdir /data/aota
sudo mkdir /data/aota/raw
sudo mkdir /data/aota/logs
```

```
sudo mkdir /data/aota/processed
sudo mkdir /data/aota/raw

sudo mkdir /data/aota/integrated

#change owner
sudo chown sshuser /data/aota/logs --recursive

sudo chown sshuser /data  --recursive

sudo chown sshuser /app  --recursive

------------------- how to upload code----------------------------------------------------

upload to hdfs:/tmp of primary storage

------------------  download code ----------
hdfs dfs -ls /
hdfs dfs -get  /tmp  /app/aota


------------ after   copy logs  to hdfs --------------------
 hdfs dfs -put   /data/aota/logs  /tmp/logs

-----------------------------------------------
---------   export --------------
export SPARK_HOME=/usr/lib/spark
export  sshuser_HOME=/usr/lib/sshuser

#sudo nano  $SPARK_HOME/conf/spark-defaults.conf

--- add  user to root  group ??? -----------------

sudo  usermod -G root  sshuser
```

4. Running

Process	Timing
Download	Start: 2022-05-29_17:43:29 End: 2022-05-29_17:43:59 Duration: 30 seconds

ETL (cleanse/TRansform)	Start: 2022-05-29_17:44:40 End: 2022-05-29_18:14:42 Duration: 30 minutes
Integration process	Start: 2022-05-31_19:44:00 End: 2022-05-31_19:55:46 Duration: 12 minutes

2. Deployment of DW-ETL

1. Run a python script which convert parquet files of 'integration layer' to CSV files (See 'convert_factflight_parquet_to_csv.py')

2. Upload CSV files to a S3 bucket using AWS cli command.

```
aws s3 sync    C:\demo\capstone\dwsource\fact_flight\  s3://capstone-aota/dwsource/fact_flight
```

Timing	Start: 22:09:48.40 End: 21:39:21.61 Duration: 30 minutes

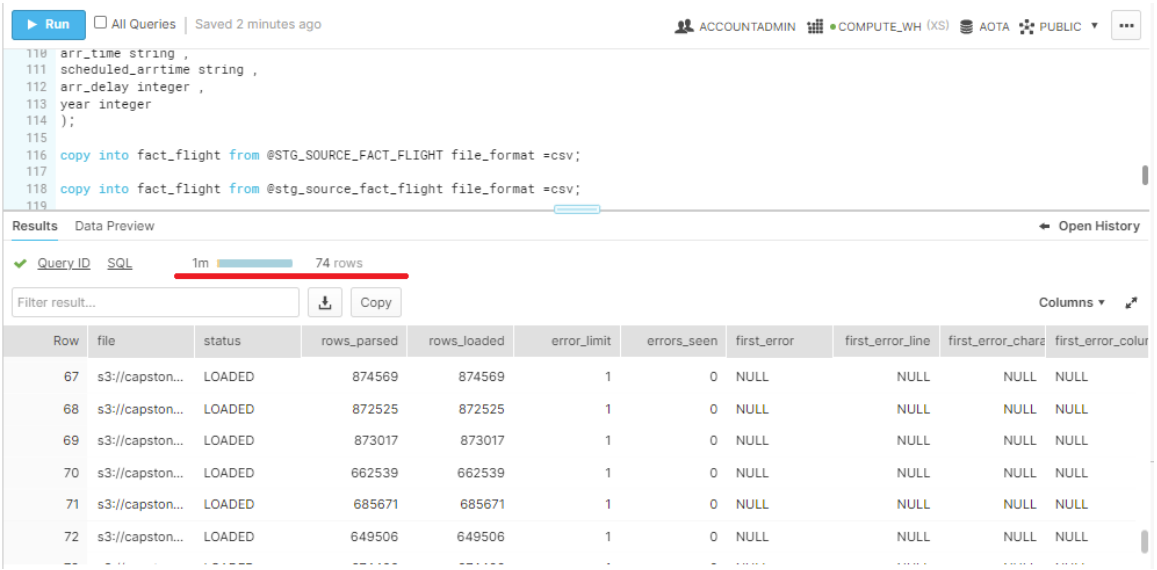
3. In Snowflake, run SQL statements to load from s3 (see file sql_snowslake_load_from_s3.txt)

   Main steps:
   1) Create database and tables

   2) Create stage

   3) Using 'copy' command to load data

Row count loaded	59 millions
Time	1 minute

Screen shot	

Run
All Queries
Saved 2 minutes ago
ACCOUNTADMIN
COMPUTE_WH (XS)
AOTA
PUBLIC
arr_time string ,
scheduled_arrtime string ,
arr_delay integer ,
year integer
);
copy into fact_flight from @STG_SOURCE_FACT_FLIGHT file_format =csv;
copy into fact_flight from @stg_source_fact_flight file_format =csv;
Results
Data Preview
Open History
Query ID
SQL
1m
74 rows
Filter result...
Copy
Columns
Row | file | status | rows_parsed | rows_loaded | error_limit | errors_seen | first_error | first_error_line | first_error_chara | first_error_colu
67 | s3://capston... | LOADED | 874569 | 874569 | 1 | 0 | NULL | NULL | NULL | NULL
68 | s3://capston... | LOADED | 872525 | 872525 | 1 | 0 | NULL | NULL | NULL | NULL
69 | s3://capston... | LOADED | 873017 | 873017 | 1 | 0 | NULL | NULL | NULL | NULL
70 | s3://capston... | LOADED | 662539 | 662539 | 1 | 0 | NULL | NULL | NULL | NULL
71 | s3://capston... | LOADED | 685671 | 685671 | 1 | 0 | NULL | NULL | NULL | NULL
72 | s3://capston... | LOADED | 649506 | 649506 | 1 | 0 | NULL | NULL | NULL | NULL