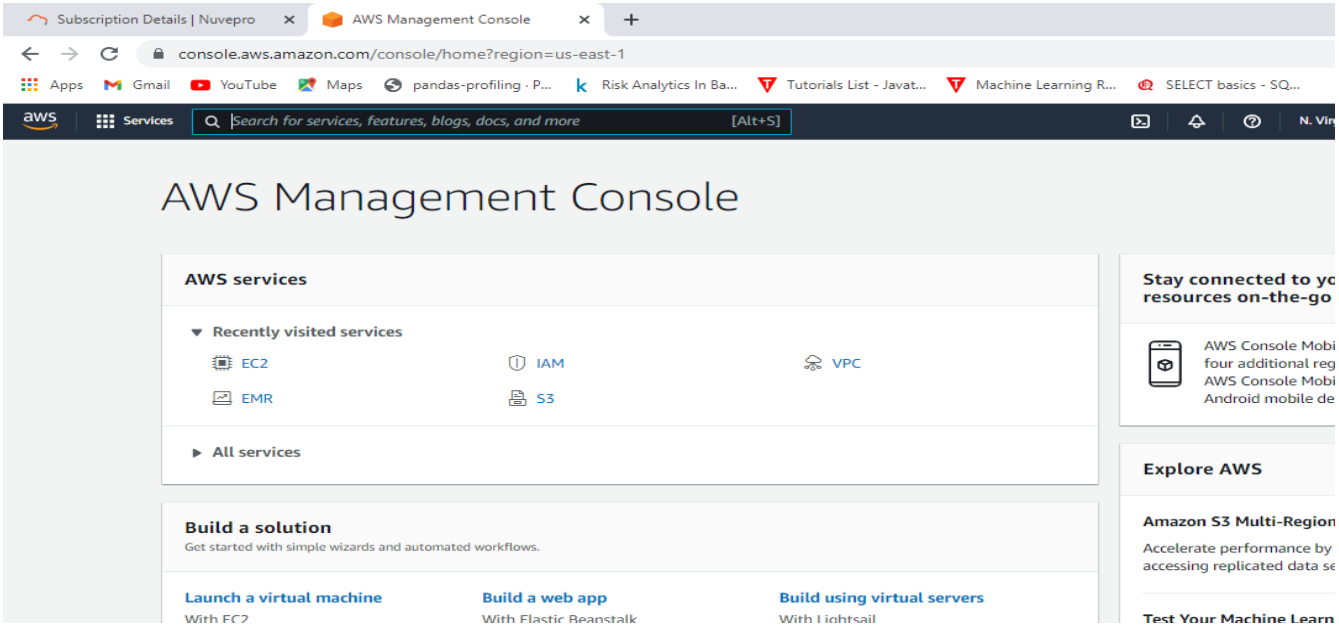
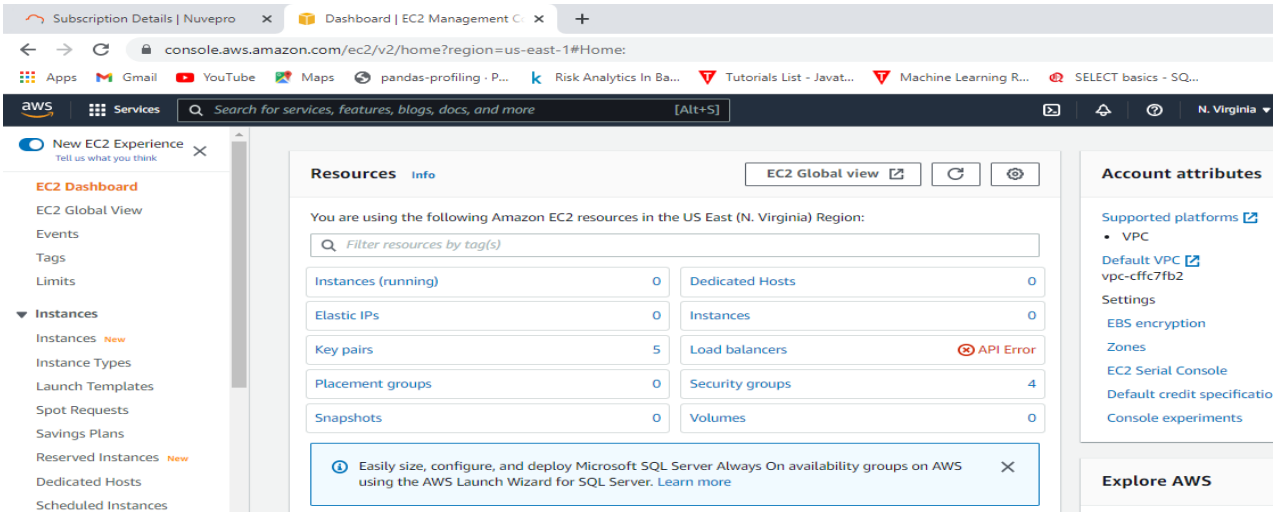
HIVE CASE STUDY

STEP 1: CREATING KEY PAIR

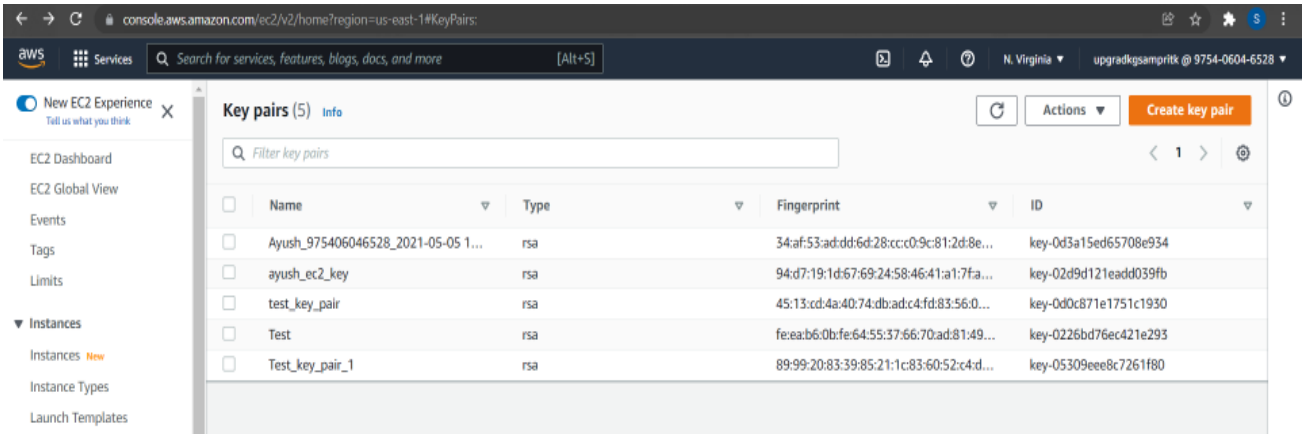


-After opening the AWS console click on "**EC2**".

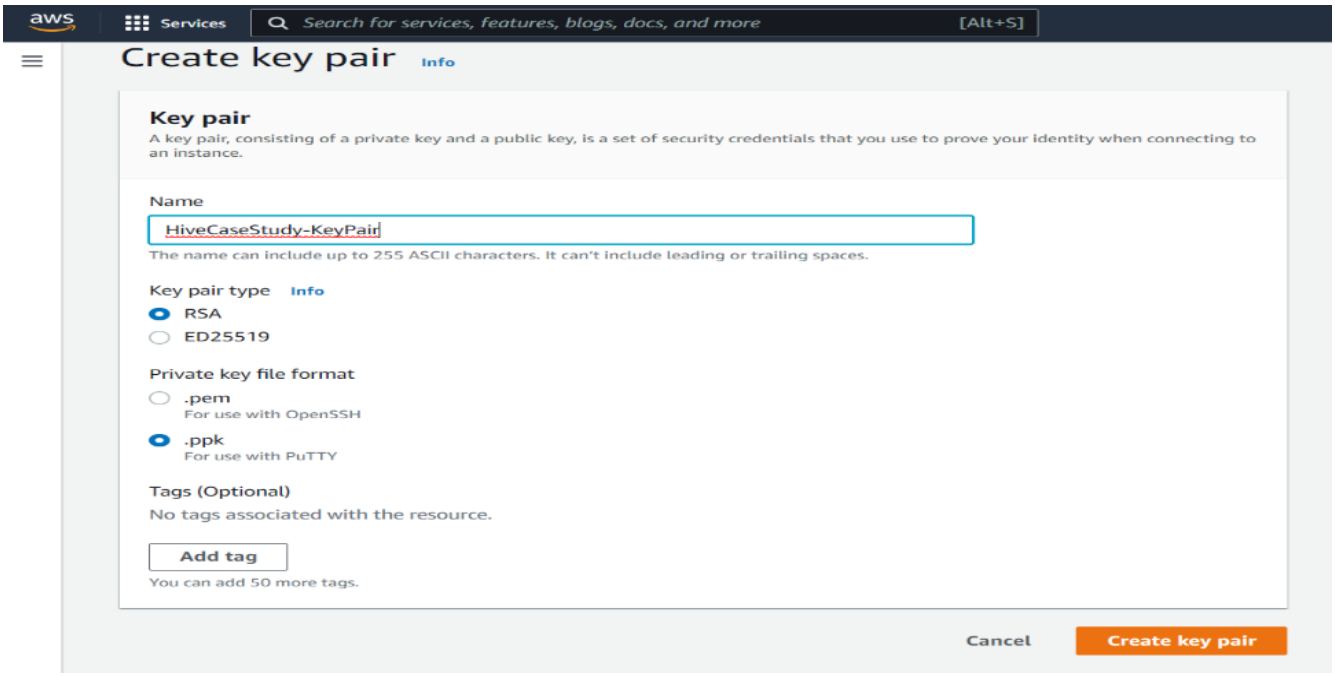


-

On EC2 dashboard click on "**Key Pairs**".

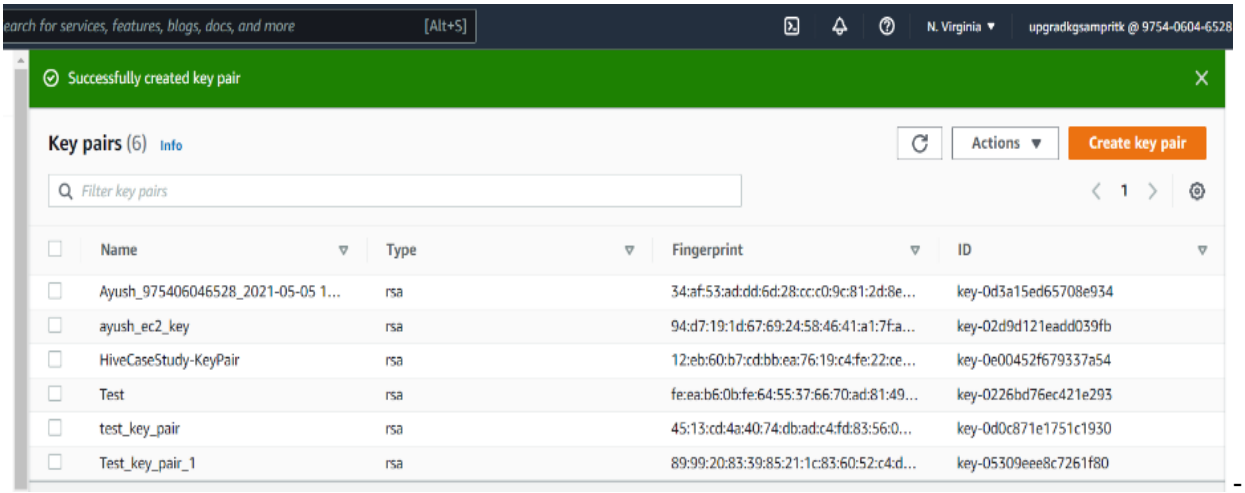


-Click on ”**Create key Pair**”.



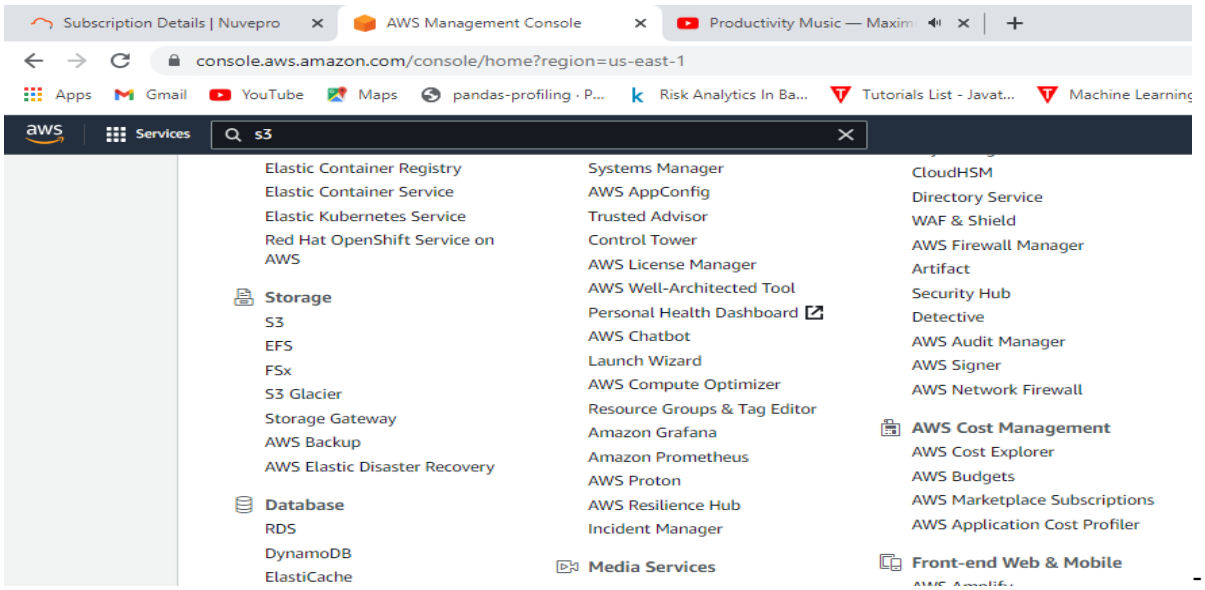
-

Fill the name section as shown in the snapshot ”**HiveCaseStudy- KeyPair**” and click on ”**Create Key pair**”.

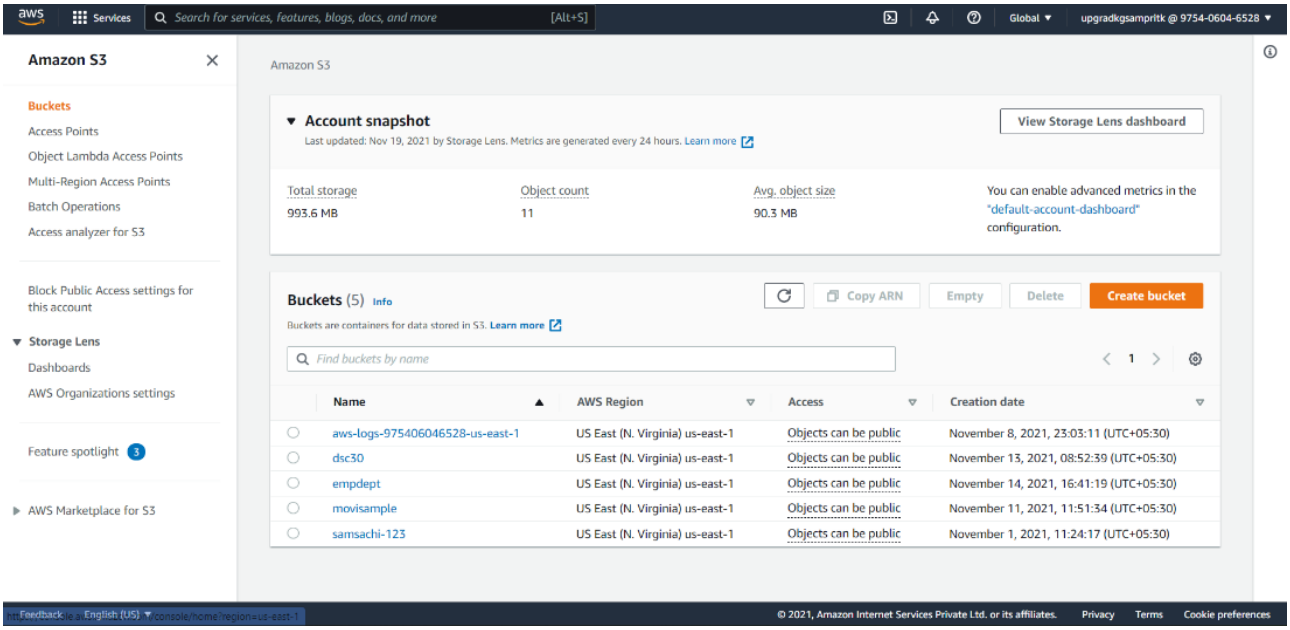


The key-pair is successfully created and **.ppk** file is downloaded.

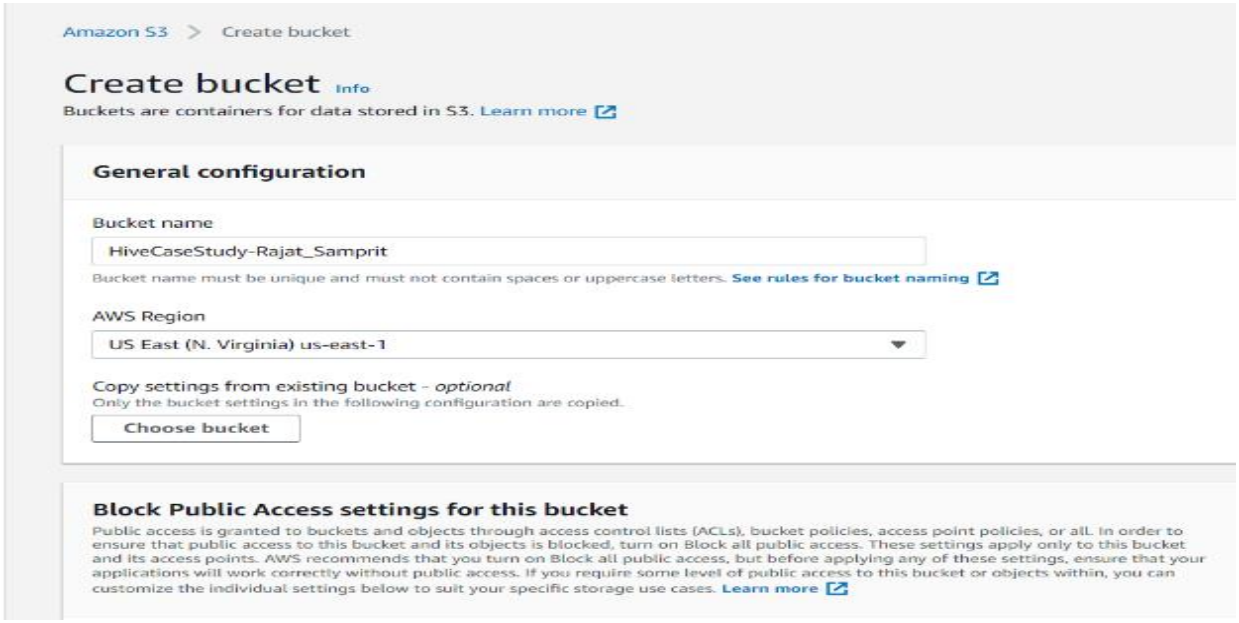
STEP 2- CREATING BUCKETS



- First, we will find the **S3** services in amazon services and click on it to open.



- We will then click on" Create **Bucket"**



-

- We will then put in the appropriate bucket name. Like here we have put it as "**HiveCaseStudy-Rajat_Samprit**". Bucket name should be **unique**.

Block Public Access settings for this bucket

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to this bucket and its objects is blocked, turn on Block all public access. These settings apply only to this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to this bucket or objects within, you can customize the individual settings below to suit your specific storage use cases. Learn more

- [ ] **Block *all* public access**

  Turning this setting on is the same as turning on all four settings below. Each of the following settings are independent of one another.

  - [ ] **Block public access to buckets and objects granted through *new* access control lists (ACLs)**

    S3 will block public access permissions applied to newly added buckets or objects, and prevent the creation of new public access ACLs for existing buckets and objects. This setting doesn't change any existing permissions that allow public access to S3 resources using ACLs.

  - [ ] **Block public access to buckets and objects granted through *any* access control lists (ACLs)**

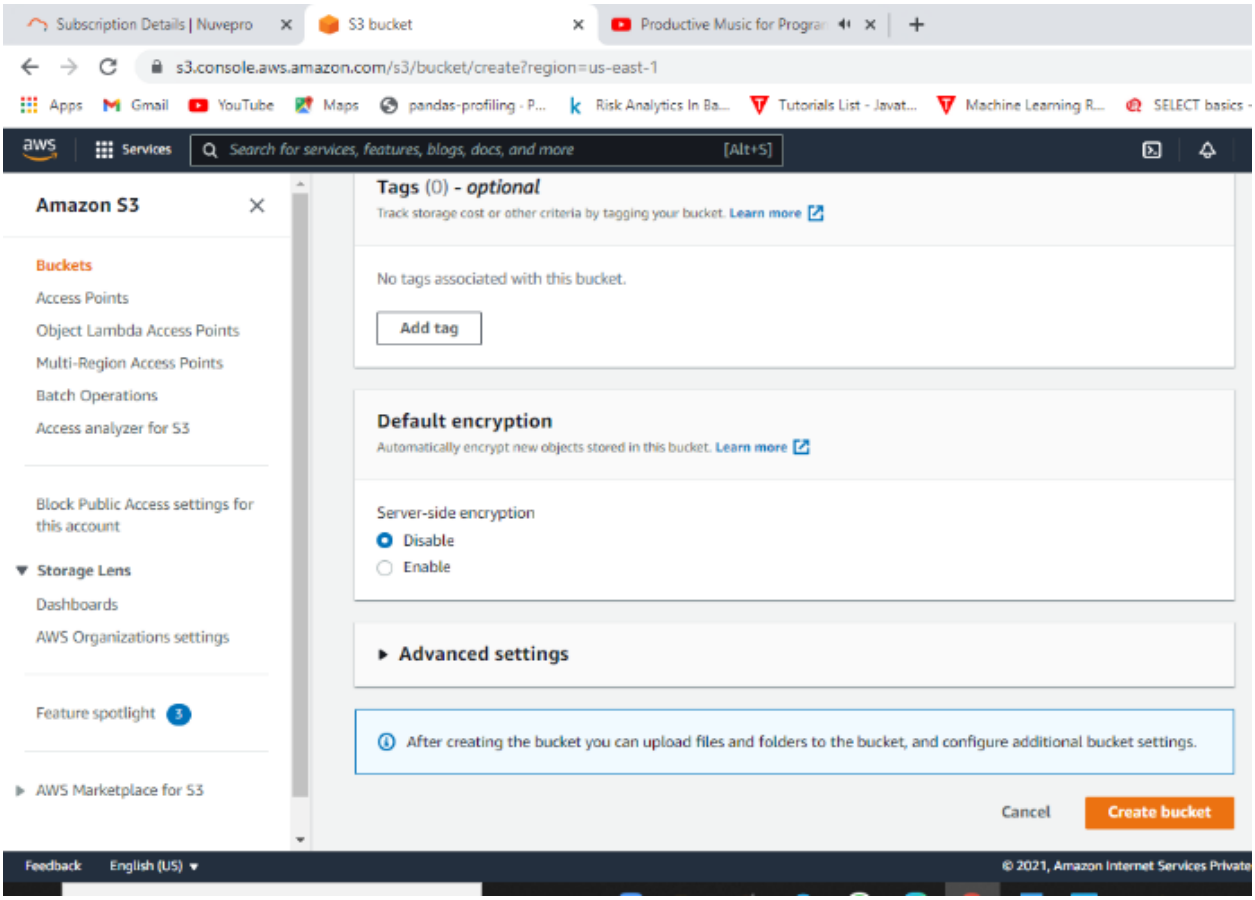
    S3 will ignore all ACLs that grant public access to buckets and objects.

  - [ ] **Block public access to buckets and objects granted through *new* public bucket or access point policies**

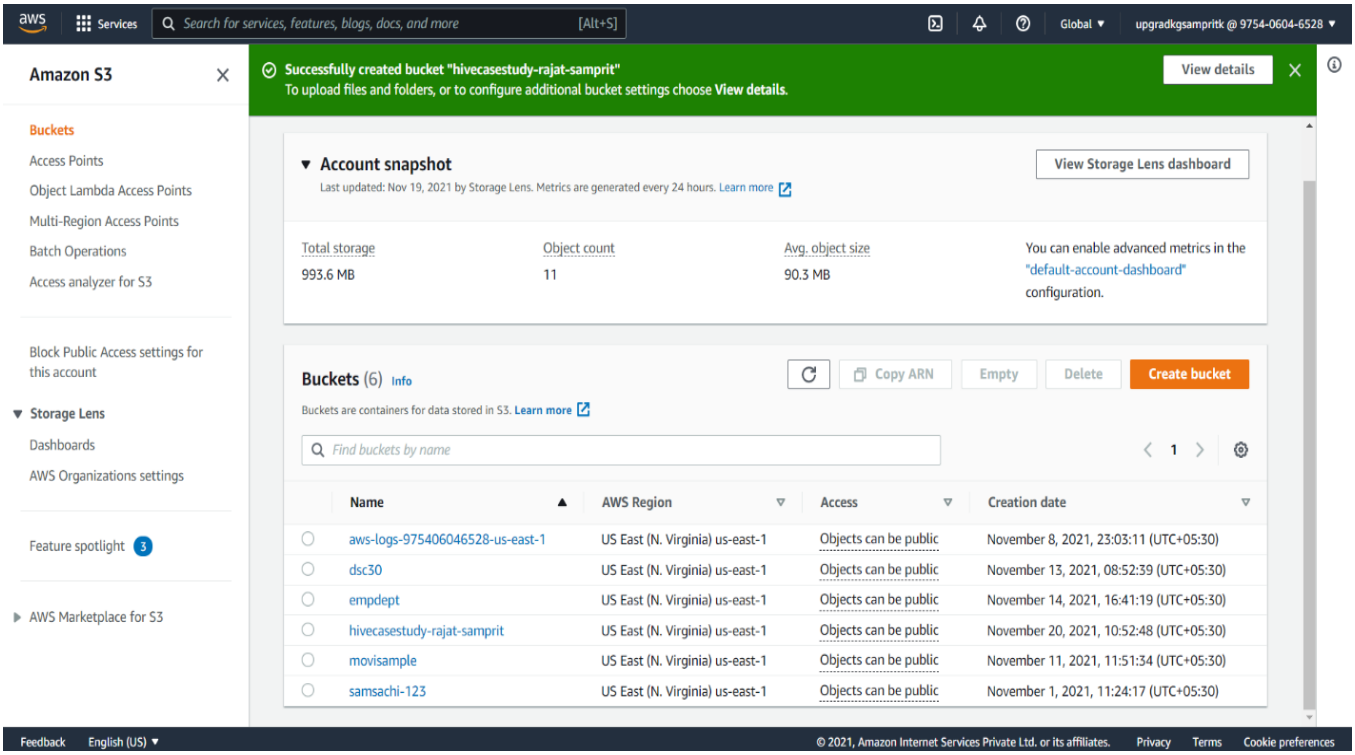
    S3 will block new bucket and access point policies that grant public access to buckets and objects. This setting doesn't change any existing policies that allow public access to S3 resources.

  - [ ] **Block public and cross-account access to buckets and objects through *any* public bucket or access point policies**

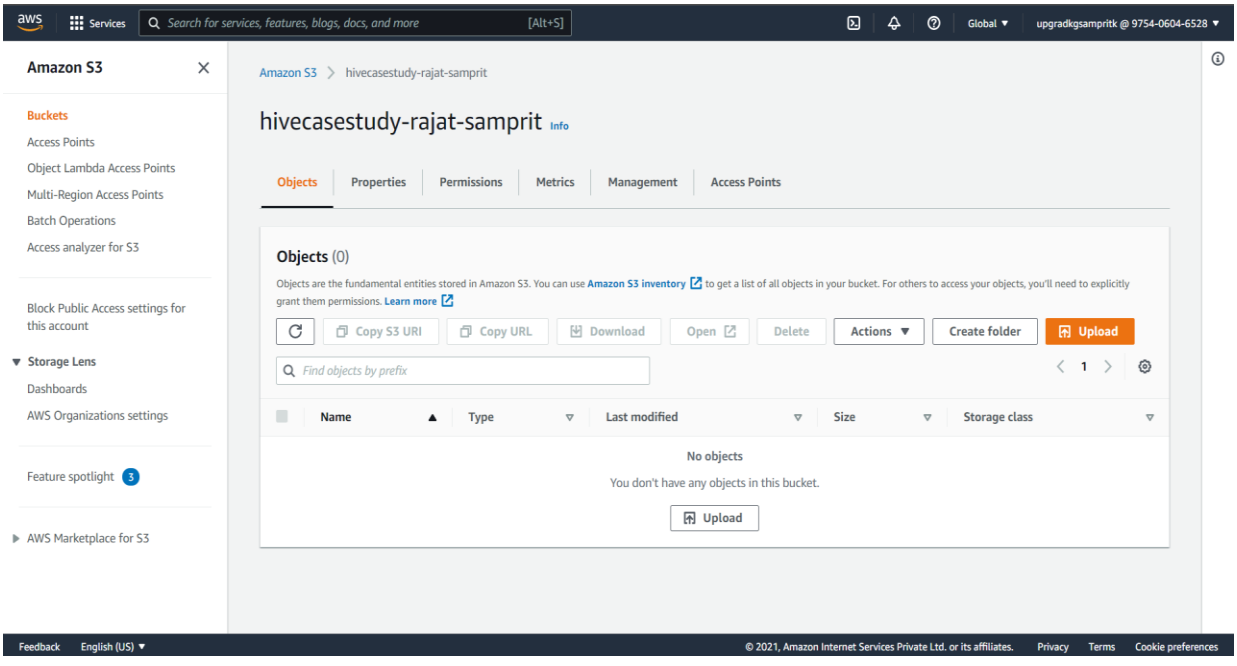
    S3 will ignore public and cross-account access for buckets or access points with policies that grant public access to buckets and objects.



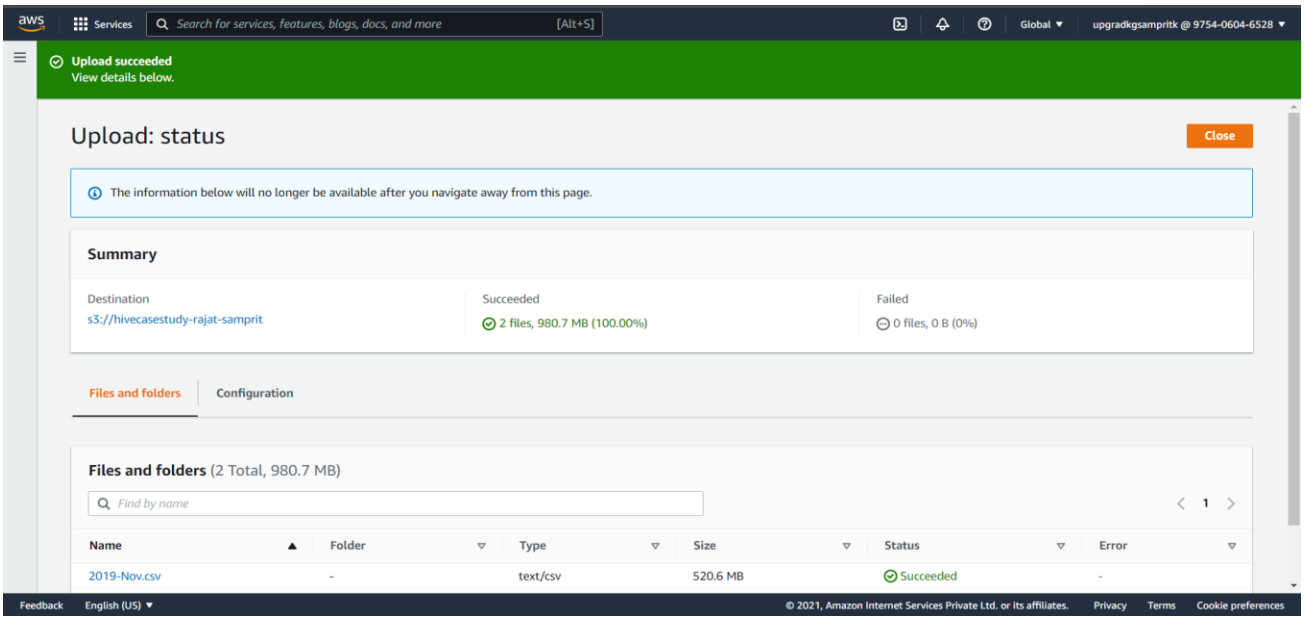
- We need to enable the public access of the bucket. Therefore, we untick the" Block **all public access**" button.



- As our new bucket has been created, we are ready to upload files to this bucket. We will click on our newly created bucket.

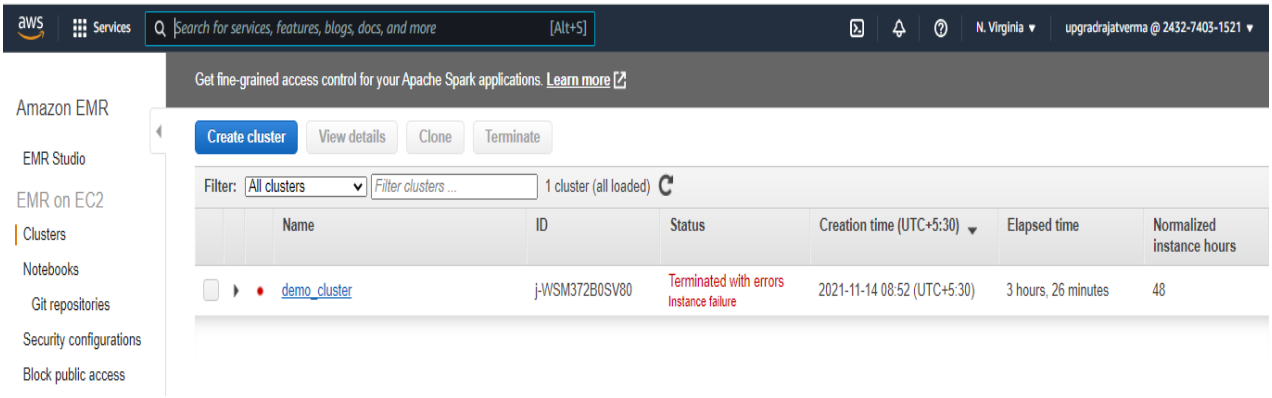


- We click on **upload** and select the files/dataset we want to upload by clicking on" Add **files".**

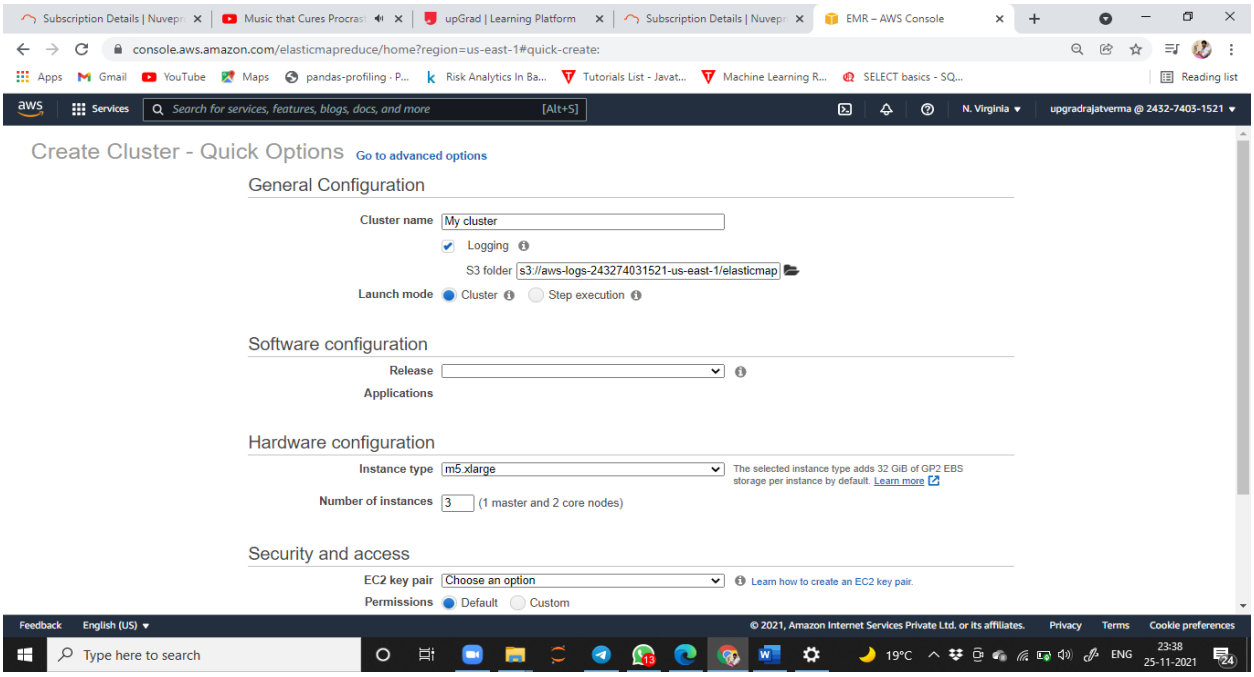


- We have successfully uploaded both our files **2019-Nov.csv** and **2019-Oct.csv** in S3 bucket.
- So, we can see 2 FILES 980.7MB files has been uploaded to S3.
- We can now start with the process of our cluster creation

STEP 3- EMR (ELASTIC MAP REDUCE)

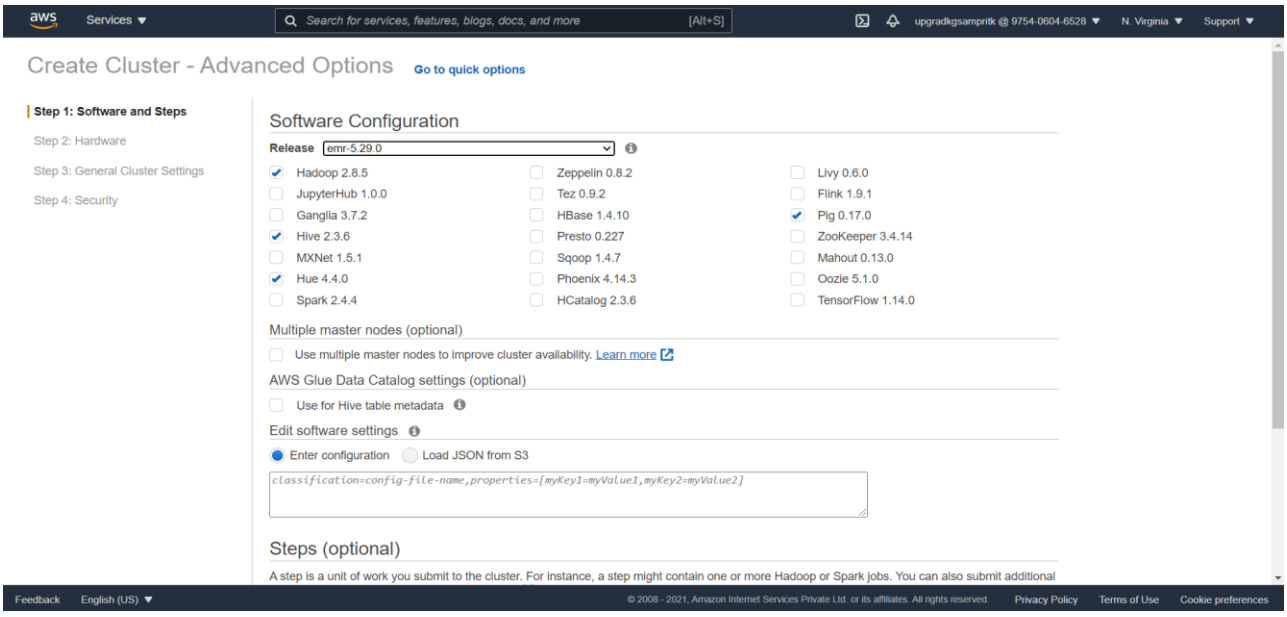


- Search for **EMR** on AWS management console and then click on" **CREATE CLUSTER".**



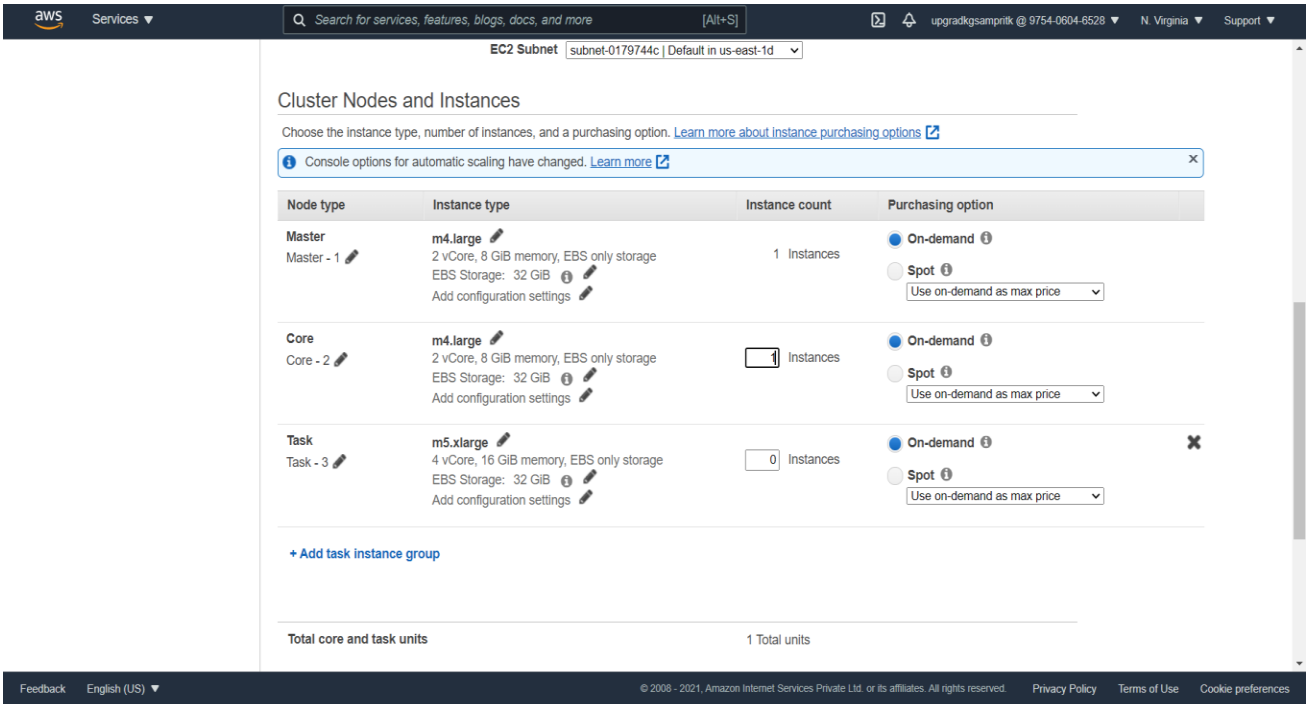
- Then we click on "**Go to advanced options**".

- CLUSTER CREATION: STEP 1- **SOFTWARE AND STEPS**.



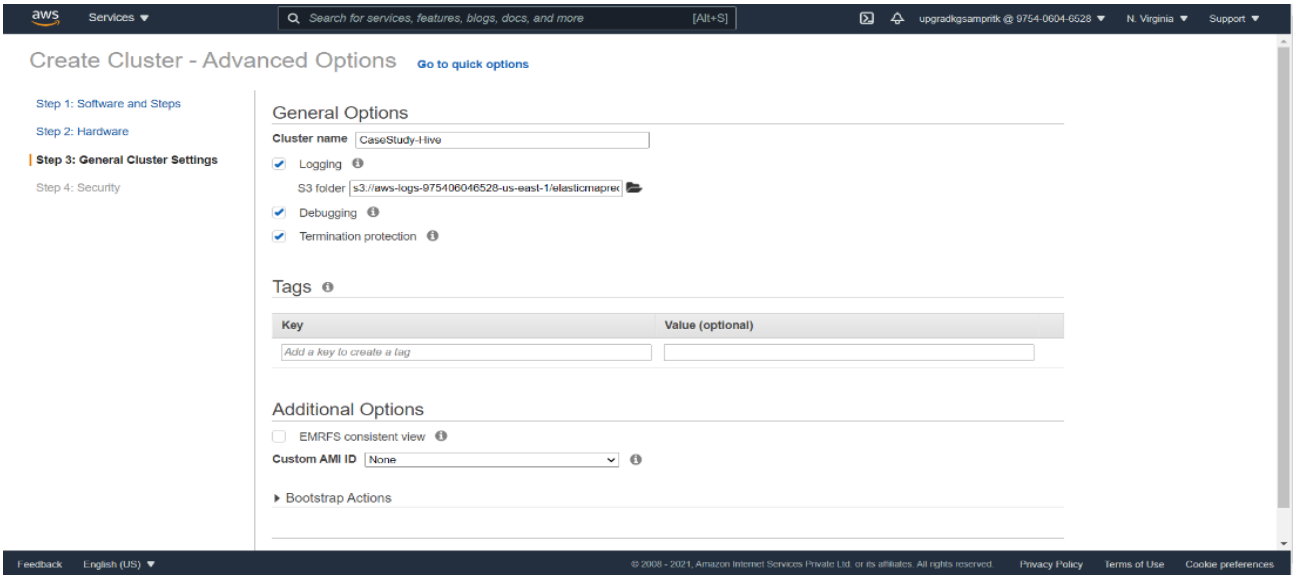
-In software configuration we choose the **EMR release 5.29.0** for this case study. After that we go on the bottom of this page and click on **Next.**

STEP 2- **HARDWARE.**



- In Cluster Nodes and Instances option we choose our **Master Node Instance type** as **m4.large** and **Core node** as **m4.large** and **instance count** as 1. After selecting appropriate nodes, we click on **Next.**

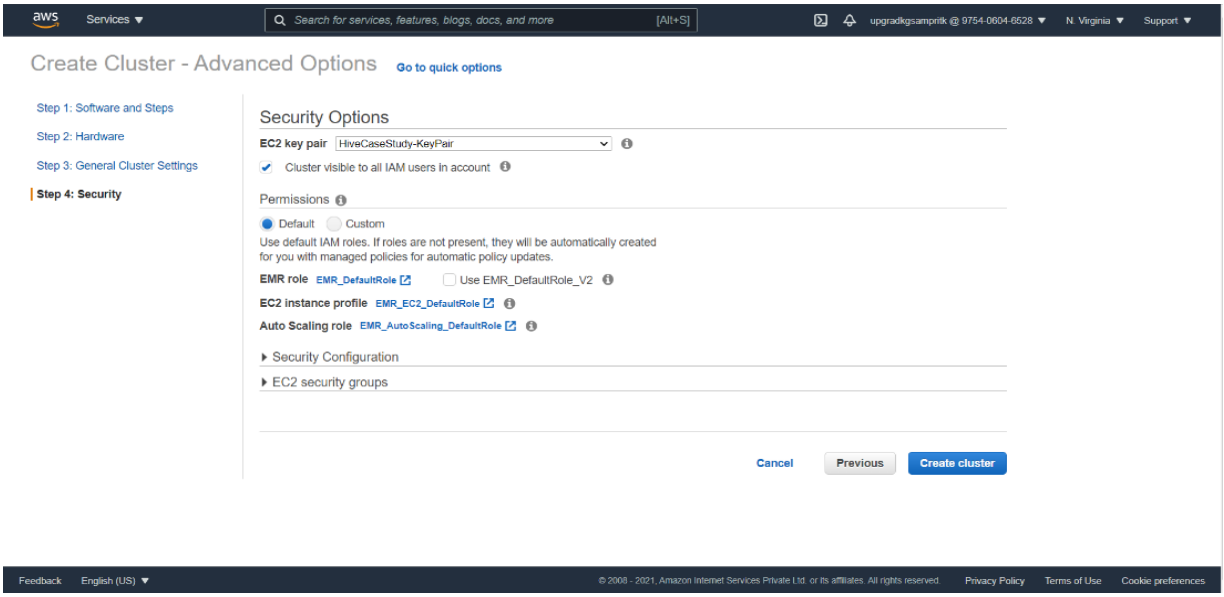
STEP 3- GENERAL CLUSTER SETTING.



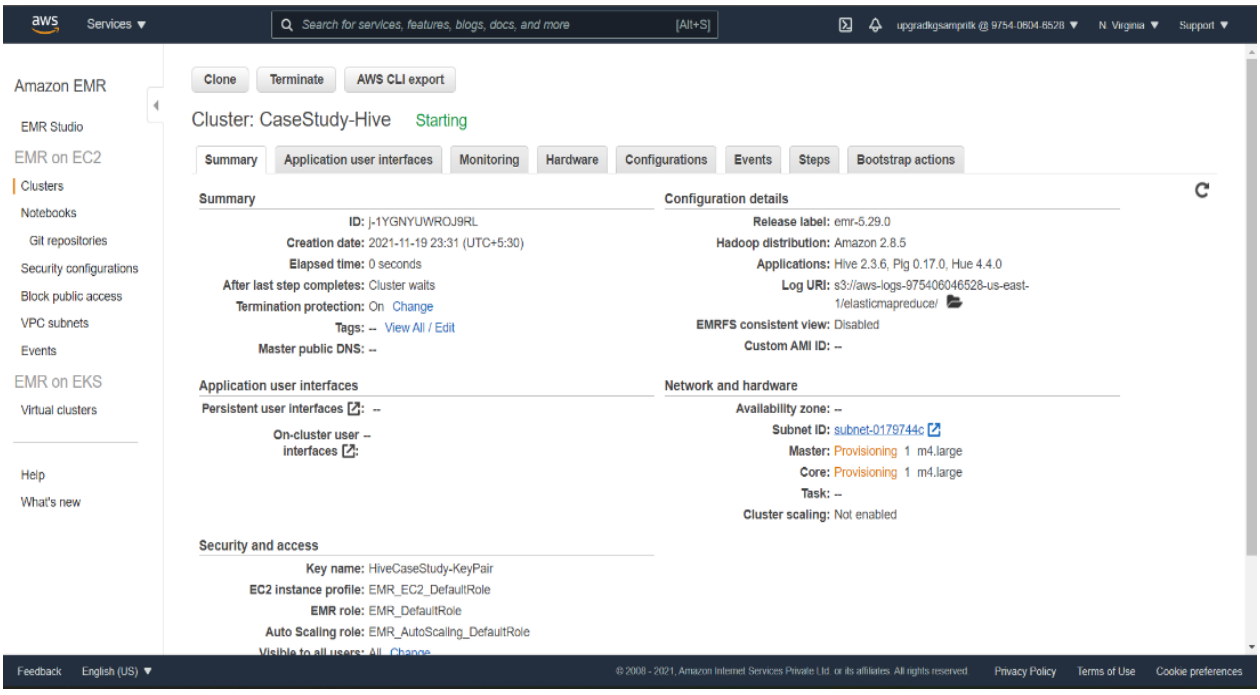
-

In" **GENERAL CLUSTER SETTING**" we fill our cluster name as "**CaseStudy-Hive**"--> We click on **Next.**

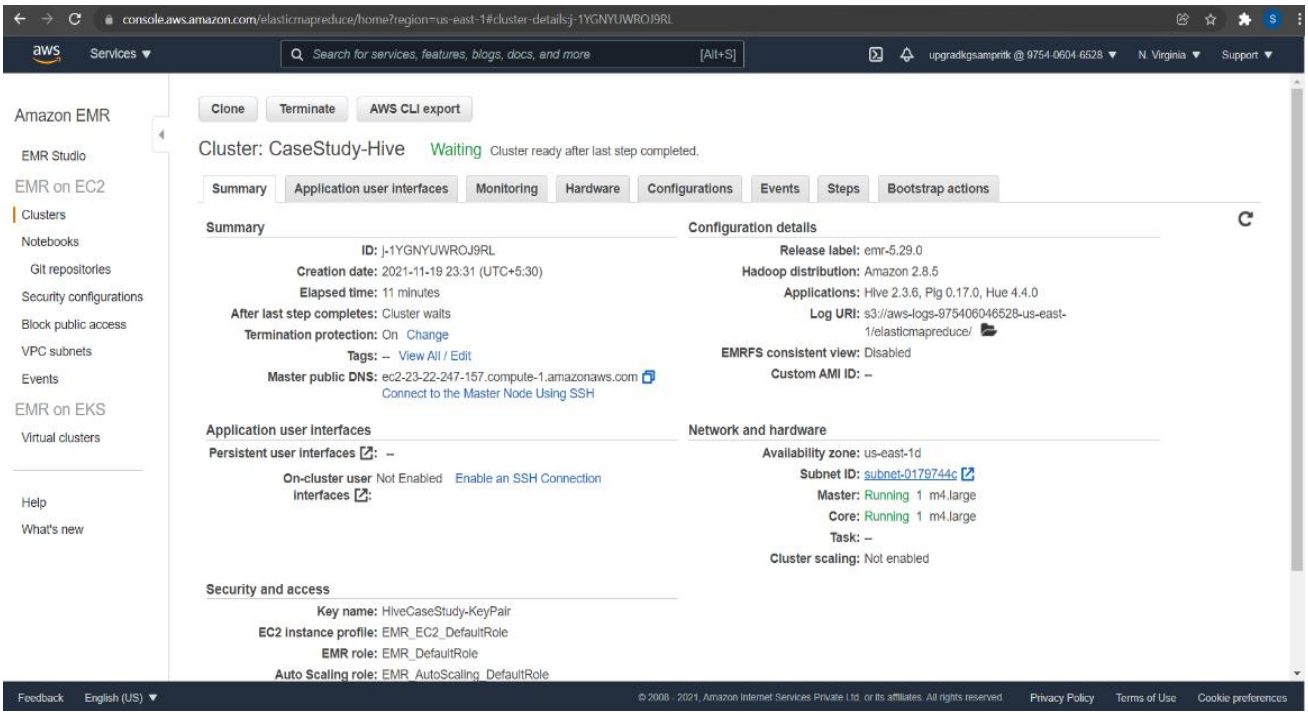
STEP 4- SECURITY.



- In **SECURITY** options we fill our **EC2 key pair** as "**HiveCaseStudy-KeyPair**" which we downloaded and then we click on **CREATE CLUSTER.**

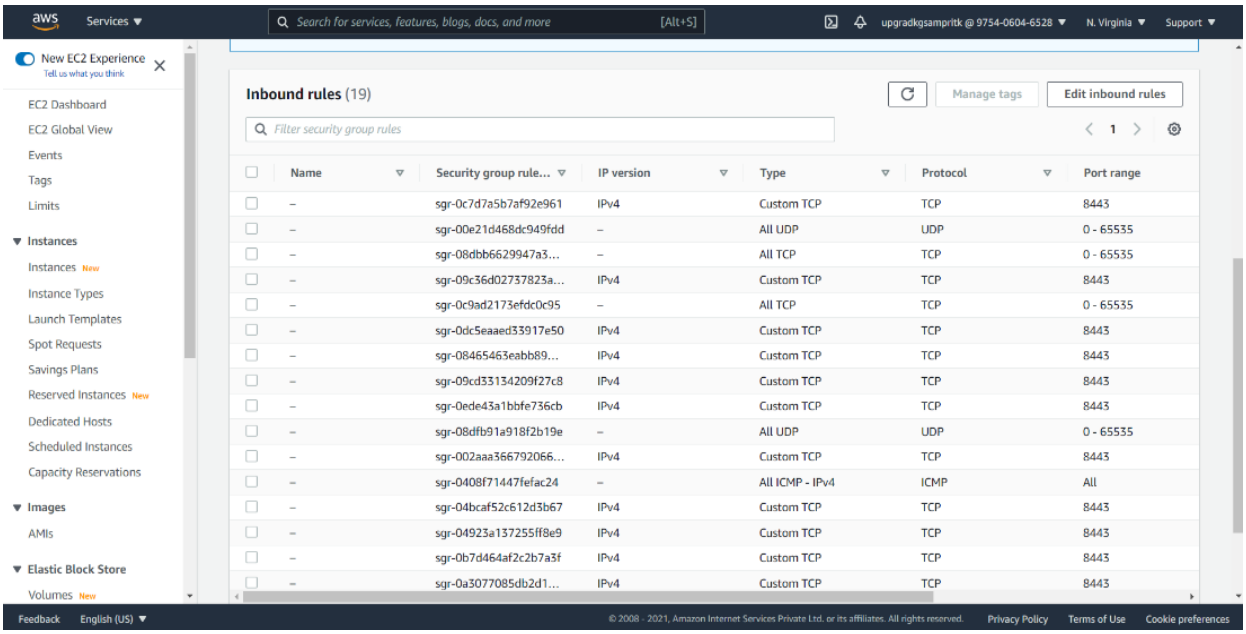


-As we can see here that our cluster is showing the status **STARTING** with 1 master and 1 core node.

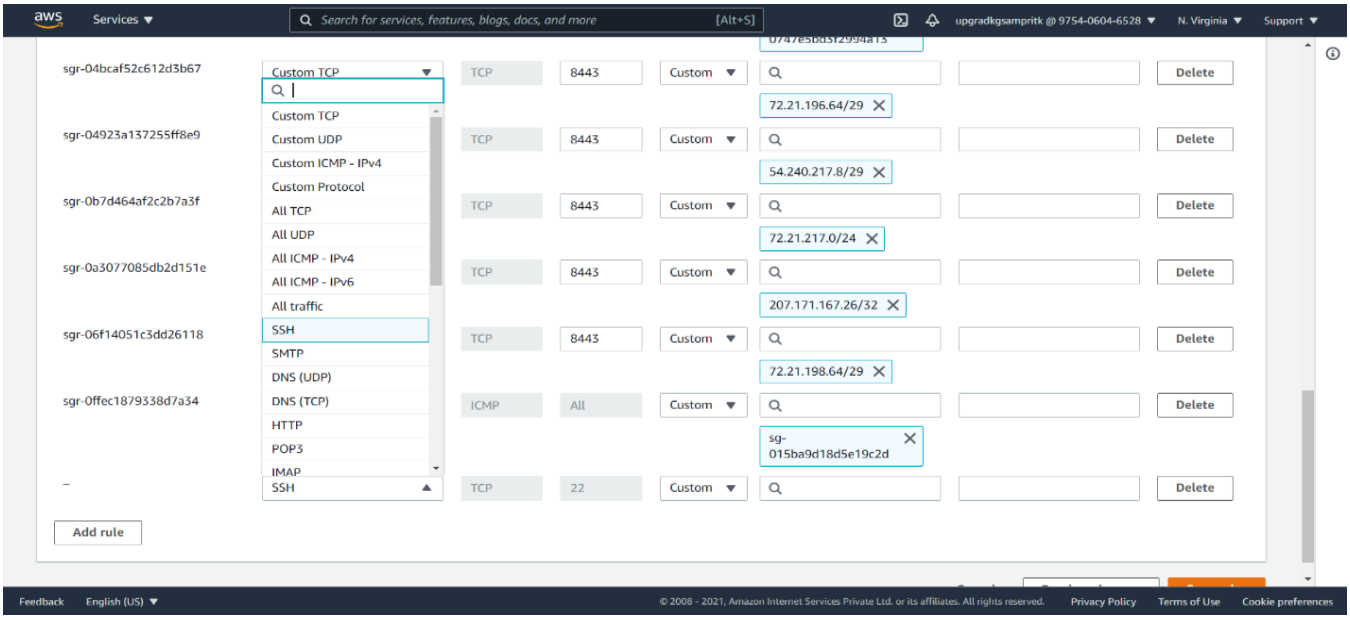


- Here the cluster shows the status **WAITING** which means the cluster is ready now and the **master** and **core node** is running.

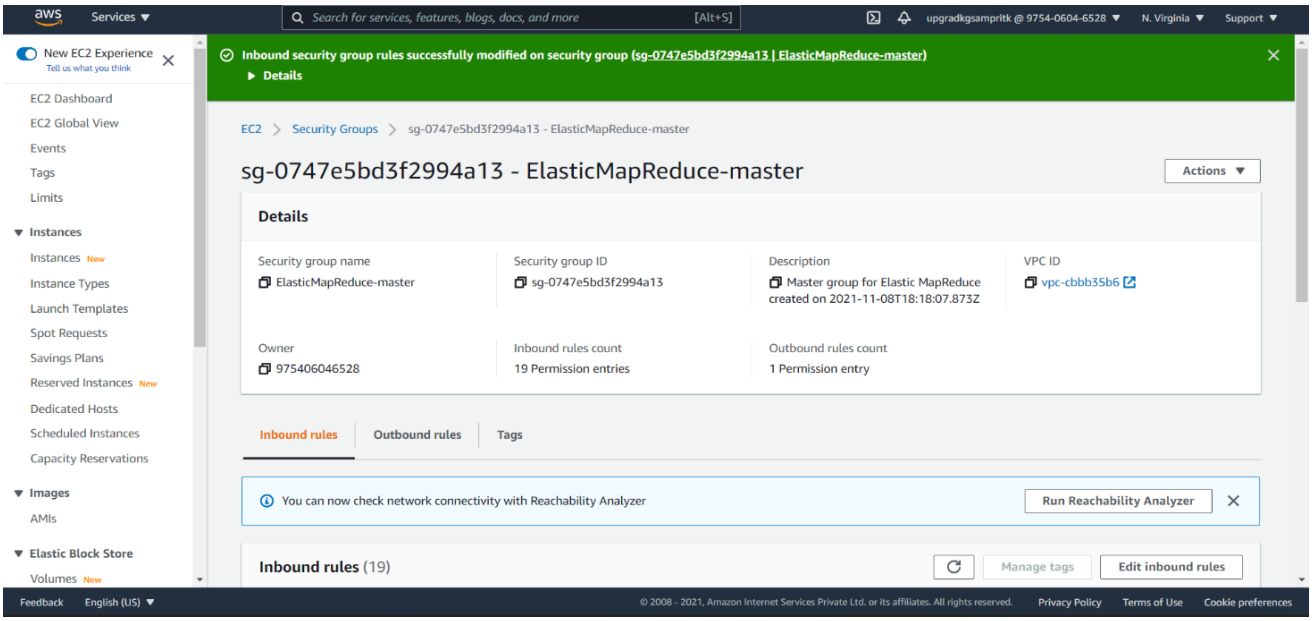
STEP 4- SECURITY GROUPS.



- Click on EC2 on AWS management console--> On EC2 dashboard select **SECURITY GROUPS** --> Select **ElasticMapReduce-master**--> Click on **edit inbound rules.**

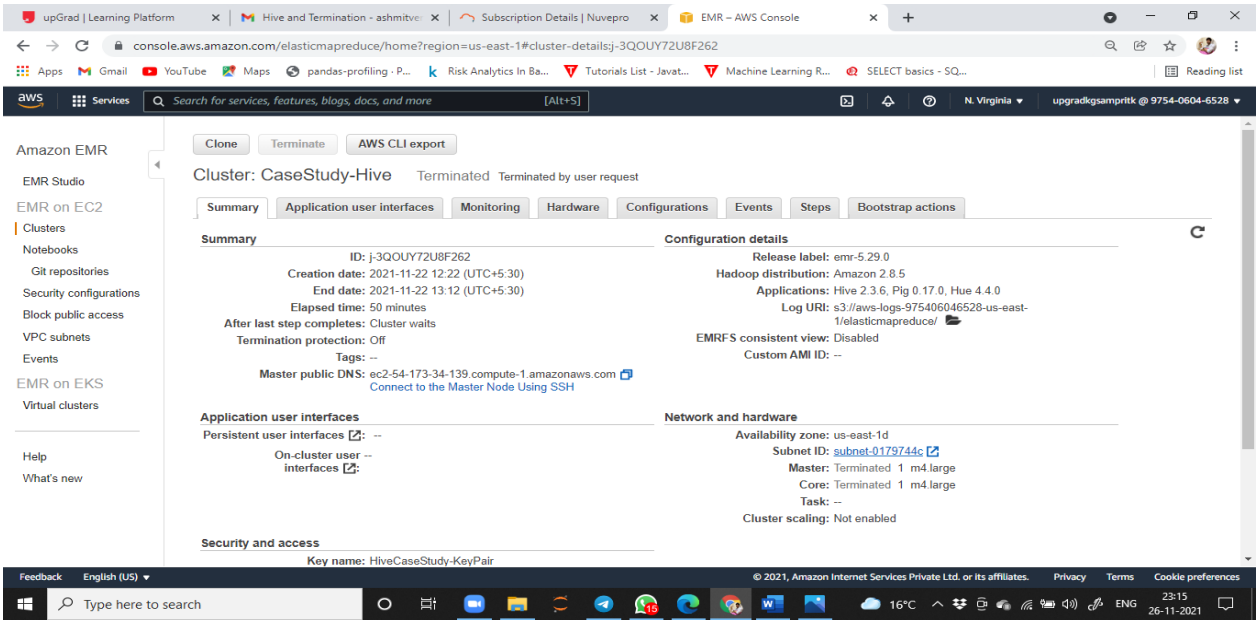


- Delete all by default SSH rules and click on **ADD RULES** that you see on the left side of the screen. Drop down **Custom TCP** and select **SSH.** Select the source as **Anywhere IPv4.** After that click on **Save Rules.**

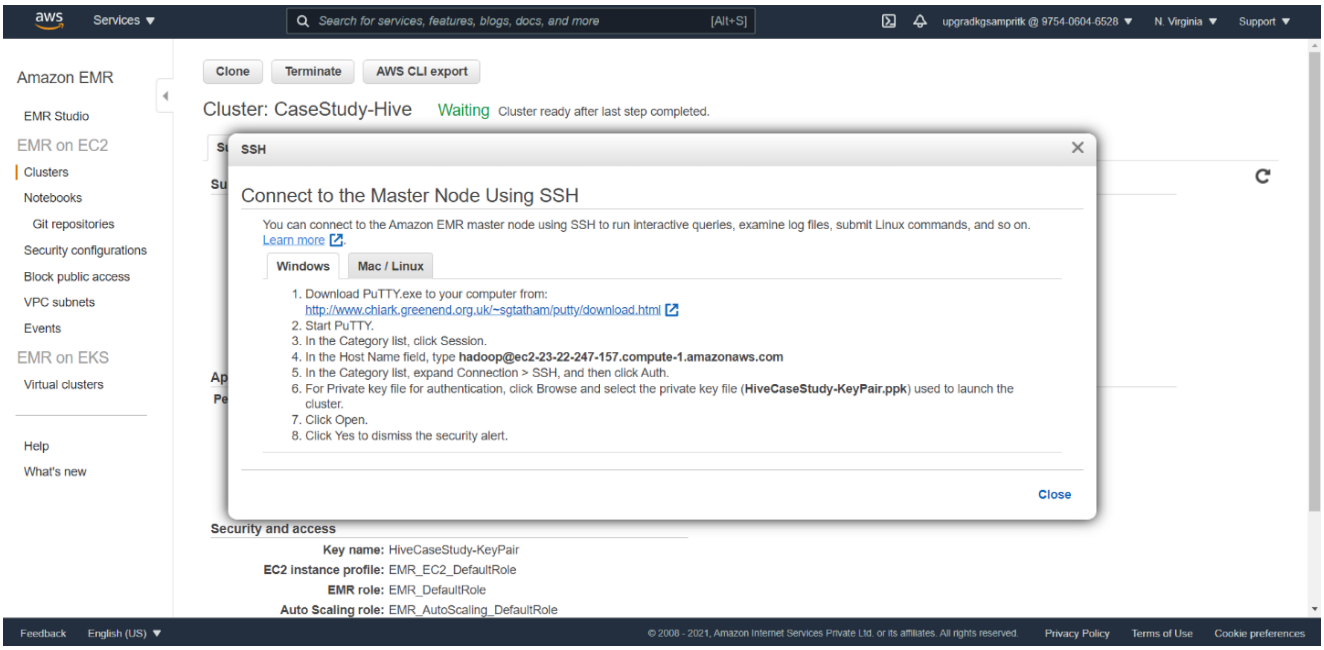


- After clicking on save rules you will get the above screen showing that **inbound security group rules successfully modified.**

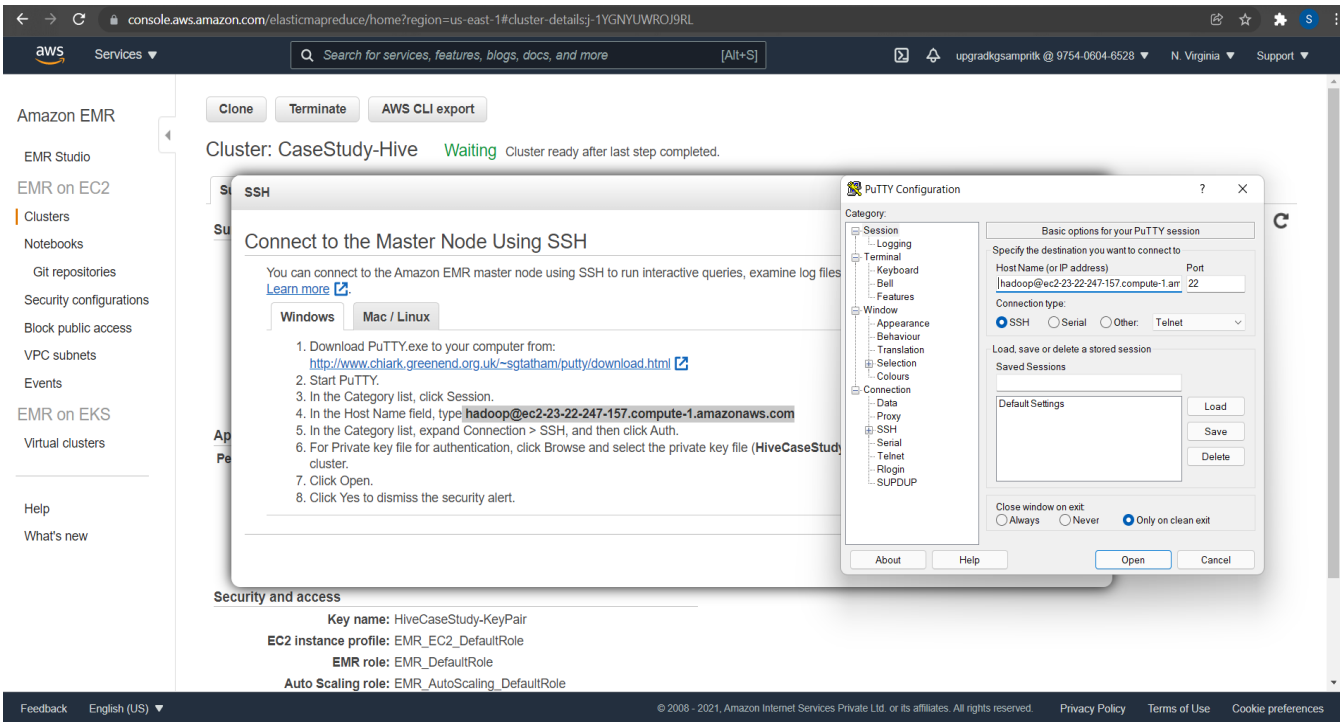
STEP 5- CONNECTING THE MASTER NODE WITH PUTTY



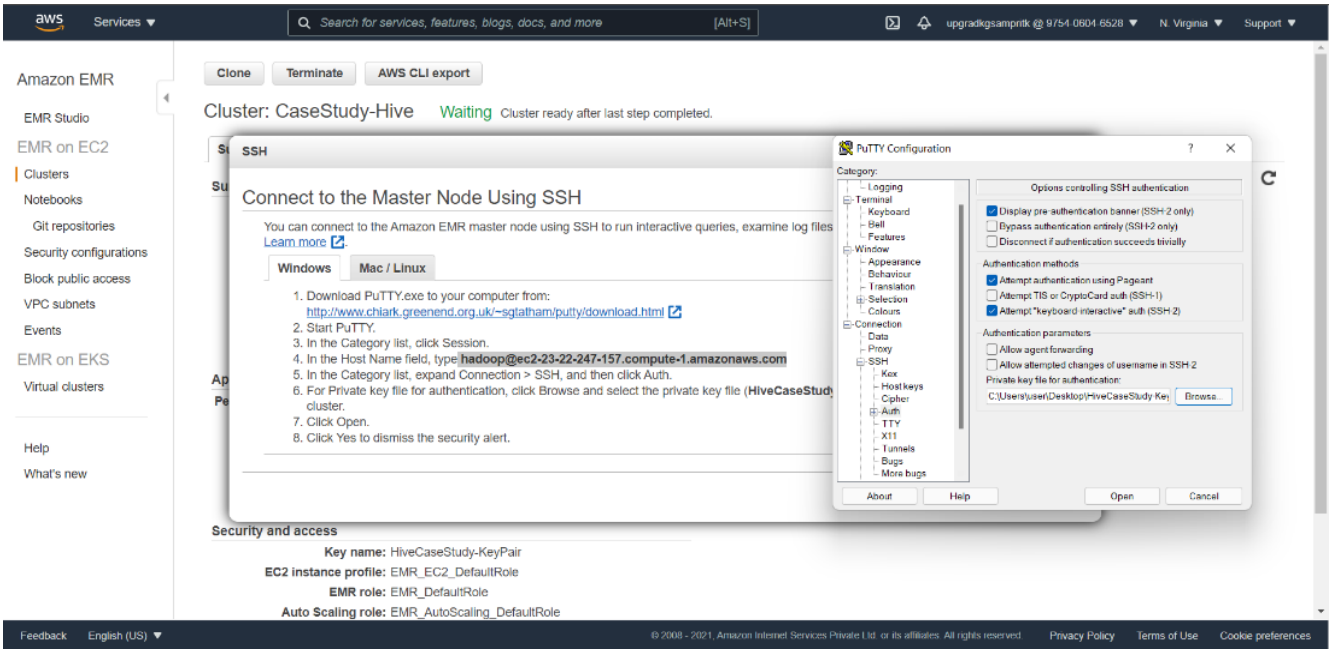
- Click on the latest cluster that we have created and after that click on the '**Connect to the master node using SSH**'



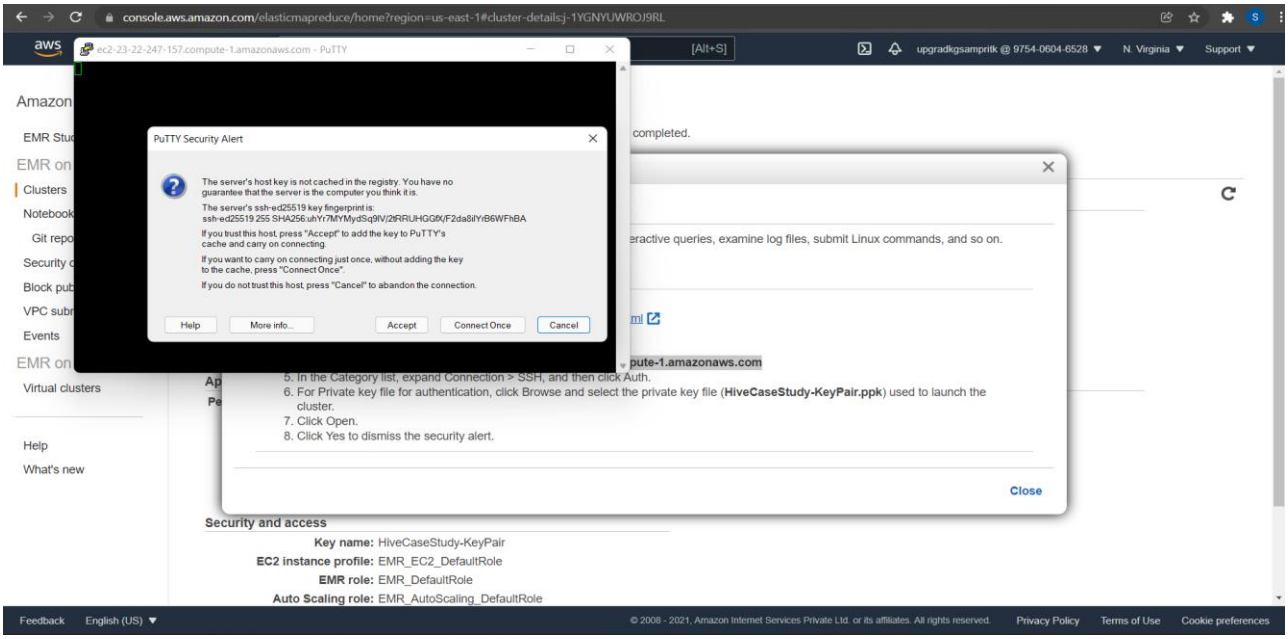
HOST- hadoop@ec2-54-173-34-139.compute-1.amazonaws.com



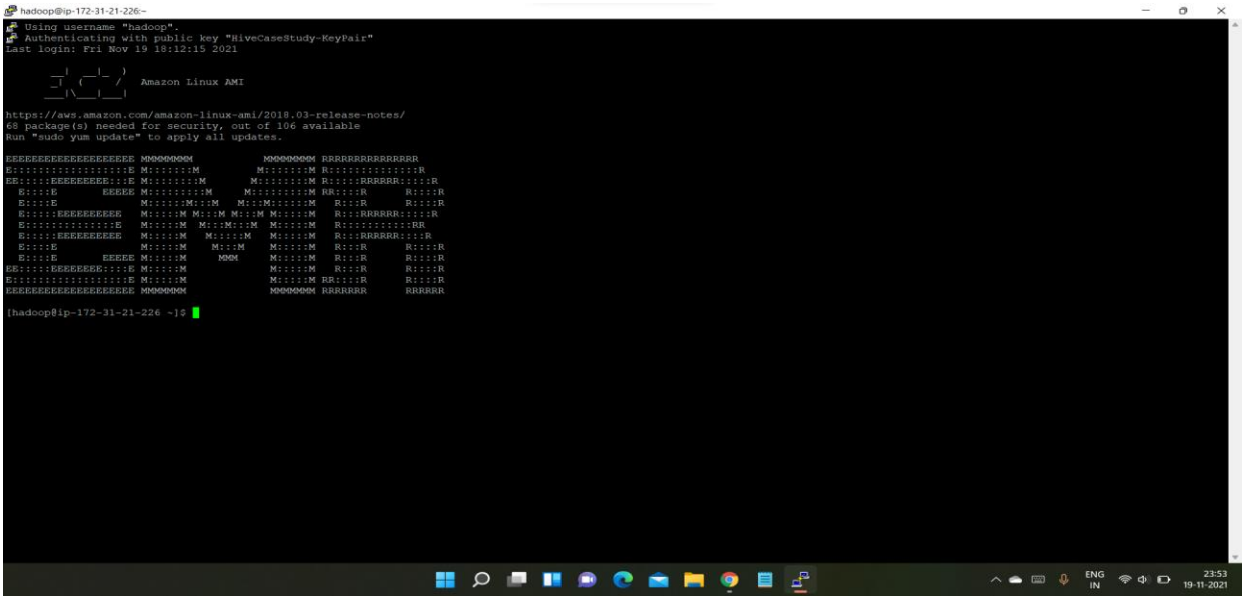
- Launch PUTTY on your system and enter the **'host name'**. On the Category side click on **'SSH'** --> **'Auth'.**



- Browse the .ppk file i.e **HiveCaseStudy- KeyPair** --> Click on **OPEN.**



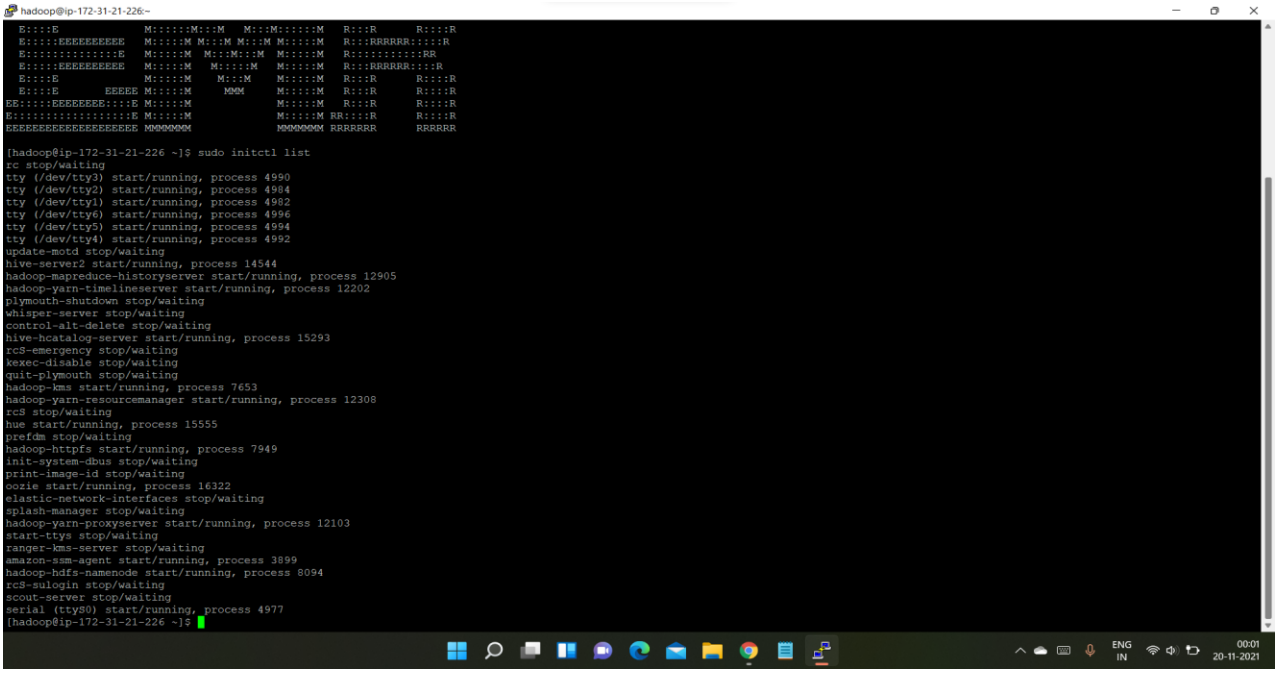
-Click on Open and Click on **ACCEPT.**



- EMR(ELASTIC MAP REDUCE) CLI is launched successfully.

STEP 6- QUERYING: Loading data in HDFS

-Checking for the services running in hadoop cluster using command “**sudo initctl list**”.



- Verifying the Hadoop file system using command “**hadoop fs -ls /**”.

- Creating a new for our case study using command ”**hadoop fs -mkdir /user/hive/hivecasestudy**”.

```
[hadoop@ip-172-31-17-238 ~]$ hadoop fs -ls /user/hive/
Found 2 items
drwxr-xr-x   - hadoop hadoop          0 2021-11-20 10:21 /user/hive/hivecasestudy
drwxrwxrwt   - hdfs   hadoop          0 2021-11-20 10:08 /user/hive/warehouse
```

- We verified the directory using the command "**hadoop fs -ls /user/hive/**".

```
[hadoop@ip-172-31-17-238 ~]$ hadoop distcp s3://hivecasestudy-rajat-samprit/2019-Oct.csv /user/hive/hivecasestudy/2019-Oct.csv
21/11/20 10:27:44 INFO tools.DistCp: Input Options: DistCpOptions{atomicCommit=false, syncFolder=false, deleteMissing=false, ignoreFailures=false, overwrite=false, skipCRC=false, blocking=t
rue, numListstatusThreads=0, maxMaps=20, mapBandwidth=100, sslConfigurationFile='null', copyStrategy='uniformsize', preserveStatus=[], preserveRawXattrs=false, atomicWorkPath=null, logPath=
null, sourceFileListing=null, sourcePaths=[s3://hivecasestudy-rajat-samprit/2019-Oct.csv], targetPath=/user/hive/hivecasestudy/2019-Oct.csv, targetPathExists=false, filtersFile='null'}
21/11/20 10:27:44 INFO client.RMProxy: Connecting to ResourceManager at ip-172-31-17-238.ec2.internal/172.31.17.238:8032
21/11/20 10:27:51 INFO tools.SimpleCopyListing: Paths (files+dirs) cnt = 1; dirCnt = 0
21/11/20 10:27:51 INFO tools.SimpleCopyListing: Build file listing completed.
21/11/20 10:27:51 INFO Configuration.deprecation: io.sort.mb is deprecated. Instead, use mapreduce.task.io.sort.mb
21/11/20 10:27:51 INFO Configuration.deprecation: io.sort.factor is deprecated. Instead, use mapreduce.task.io.sort.factor
21/11/20 10:27:51 INFO tools.DistCp: Number of paths in the copy list: 1
21/11/20 10:27:51 INFO tools.DistCp: Number of paths in the copy list: 1
21/11/20 10:27:51 INFO client.RMProxy: Connecting to ResourceManager at ip-172-31-17-238.ec2.internal/172.31.17.238:8032
21/11/20 10:27:52 INFO mapreduce.JobSubmitter: number of splits:1
21/11/20 10:27:52 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1637403004108_0001
21/11/20 10:27:53 INFO impl.YarnClientImpl: Submitted application application_1637403004108_0001
21/11/20 10:27:53 INFO mapreduce.Job: The url to track the job: http://ip-172-31-17-238.ec2.internal:20888/proxy/application_1637403004108_0001/
21/11/20 10:27:53 INFO tools.DistCp: DistCp job-id: job_1637403004108_0001
21/11/20 10:27:53 INFO mapreduce.Job: Running job: job_1637403004108_0001
21/11/20 10:28:02 INFO mapreduce.Job: Job job_1637403004108_0001 running in uber mode : false
21/11/20 10:28:02 INFO mapreduce.Job:  map 0% reduce 0%
21/11/20 10:28:21 INFO mapreduce.Job:  map 100% reduce 0%
21/11/20 10:28:23 INFO mapreduce.Job: Job job_1637403004108_0001 completed successfully
21/11/20 10:28:23 INFO mapreduce.Job: Counters: 38
        File System Counters
                FILE: Number of bytes read=0
                FILE: Number of bytes written=172507
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=366
                HDFS: Number of bytes written=482542278
                HDFS: Number of read operations=12
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=4
                S3: Number of bytes read=482542278
                S3: Number of bytes written=0
                S3: Number of read operations=0
                S3: Number of large read operations=0
                S3: Number of write operations=0
        Job Counters
                Launched map tasks=1
                Other local map tasks=1
                Total time spent by all maps in occupied slots (ms)=564416
                Total time spent by all reduces in occupied slots (ms)=0
                Total time spent by all map tasks (ms)=17638
                Total vcore-milliseconds taken by all map tasks=17638
                Total megabyte-milliseconds taken by all map tasks=18061312
        Map-Reduce Framework
                Map input records=1
```

- Copying the data from S3 to HDFS Using distributed copy command:

hadoop distcp s3://hivecasestudy-rajat-samprit/2019-Oct.csv /user/hive/hivecasestudy/2019-Oct.csv

hadoop distcp s3:// hivecasestudy-rajat-samprit /2019-Nov.csv /user/hive/hivecasestudy/2019- Nov.csv

```
[hadoop@ip-172-31-17-238 ~]$ hadoop fs -ls /user/hive/hivecasestudy
Found 2 items
-rw-r--r--   1 hadoop hadoop  545839412 2021-11-20 10:42 /user/hive/hivecasestudy/2019-Nov.csv
-rw-r--r--   1 hadoop hadoop  482542278 2021-11-20 10:28 /user/hive/hivecasestudy/2019-Oct.csv
```

- Verifying the loaded data in HDFS using command: ***hadoop fs -ls /user/hive/hivecasestudy***

It shows that 2 items are found which means both our files are loaded successfully.

- Checking the top rows for the month of October from our loaded file.

```
[hadoop@ip-172-31-17-238 ~]$ hadoop fs -cat /user/hive/hivecasestudy/2019-Oct.csv |head
event_time,event_type,product_id,category_id,category_code,brand,price,user_id,user_session
2019-10-01 00:00:00 UTC,cart,5773203,1487580005134238553,,runail,2.62,463240011,26dd6e6e-4dac-4778-8d2c-92e149dab885
2019-10-01 00:00:03 UTC,cart,5773353,1487580005134238553,,runail,2.62,463240011,26dd6e6e-4dac-4778-8d2c-92e149dab885
2019-10-01 00:00:07 UTC,cart,5881589,2151191071051219817,,lovely,13.48,429681830,49e8d843-adf3-428b-a2c3-fe8bc6a307c9
2019-10-01 00:00:07 UTC,cart,5723490,1487580005134238553,,runail,2.62,463240011,26dd6e6e-4dac-4778-8d2c-92e149dab885
2019-10-01 00:00:15 UTC,cart,5881449,1487580013522845895,,lovely,0.56,429681830,49e8d843-adf3-428b-a2c3-fe8bc6a307c9
2019-10-01 00:00:16 UTC,cart,5857269,1487580005134238553,,runail,2.62,430174032,73dea1e7-664e-43f4-8b30-d32b9d5af04f
2019-10-01 00:00:19 UTC,cart,5739055,1487580008246412266,,kapous,4.75,377667011,81326ac6-daa4-4f0a-b488-fd0956a78733
2019-10-01 00:00:24 UTC,cart,5825598,1487580009445982239,,,0.56,467916806,2f5b5546-b8cb-9ee7-7ecd-84276f8ef486
2019-10-01 00:00:25 UTC,cart,5698989,1487580006317032337,,,1.27,385985999,d30965e8-1101-44ab-b45d-cc1bb9fae694
```

- Checking the top rows for the month of October from our loaded file.
- Command "**hadoop fs -cat /user/hive/hivecasestudy/2019-Oct.csv |head**"

```
[hadoop@ip-172-31-17-238 ~]$ hadoop fs -cat /user/hive/hivecasestudy/2019-Nov.csv |head
event_time,event_type,product_id,category_id,category_code,brand,price,user_id,user_session
2019-11-01 00:00:02 UTC,view,5802432,1487580009286598681,,,0.32,562076640,09fafd6c-6c99-46b1-834f-33527f4de241
2019-11-01 00:00:09 UTC,cart,5844397,1487580006317032337,,,2.38,553329724,2067216c-31b5-455d-a1cc-af0575a34ffb
2019-11-01 00:00:10 UTC,view,5837166,1783999064103190764,,pnb,22.22,556138645,57ed222e-a54a-4907-9944-5a875c2d7f4f
2019-11-01 00:00:11 UTC,cart,5876812,1487580010100293687,,jessnail,3.16,564506666,186c1951-8052-4b37-adce-dd9644b1d5f7
2019-11-01 00:00:24 UTC,remove_from_cart,5826182,1487580007483048900,,,3.33,553329724,2067216c-31b5-455d-a1cc-af0575a34ffb
2019-11-01 00:00:24 UTC,remove_from_cart,5826182,1487580007483048900,,,3.33,553329724,2067216c-31b5-455d-a1cc-af0575a34ffb
2019-11-01 00:00:25 UTC,view,5856189,1487580009026551821,,runail,15.71,562076640,09fafd6c-6c99-46b1-834f-33527f4de241
2019-11-01 00:00:32 UTC,view,5837835,1933472286753424063,,,3.49,514649199,432a4e95-375c-4b40-bd36-0fc039e77580
2019-11-01 00:00:34 UTC,remove_from_cart,5870838,1487580007675986893,,milv,0.79,429913900,2f0bff3c-252f-4fe6-afcd-5d8a6a92839a
cat: Unable to write to output stream.
```

- Checking the top rows for the month of November from our loaded file.

- Command "**hadoop fs -cat /user/hive/hivecasestudy/2019-Nov.csv |head"**

Creating a database.

```
[hadoop@ip-172-31-17-238 ~]$ hive

Logging initialized using configuration in file:/etc/hive/conf.dist/hive-log4j2.properties Async: false
hive>
```

- First we will enter the **hive CLI**(command Line Interface).

```
hive> show databases ;
OK
default
Time taken: 0.639 seconds, Fetched: 1 row(s)
hive>
```

- After entering into hive we will Check databases

```
hive> create database if not exists retailstore ;
OK
Time taken: 0.503 seconds
```

- We will create database called '**retailstore'** in our databases.
- Command – "**create database if not exists retailstore**".

```
hive> show databases ;
OK
default
retailstore
Time taken: 0.018 seconds, Fetched: 2 row(s)
```

- Now we will Verify our newly created databases using show databases.
- Command- "**show databse**".

```
hive> describe database retailstore ;
OK
retailstore             hdfs://ip-172-31-17-238.ec2.internal:8020/user/hive/warehouse/retailstore.db    hadoop  USER
Time taken: 0.05 seconds, Fetched: 1 row(s)
```

- We will describe our databases.
- Command- "**describe databse retailstore**"

```
hive> use retailstore ;
OK
Time taken: 0.02 seconds
```

- We will use **retailstore** database for further query.
- Command- "**use retailstore**"

```
hive> CREATE EXTERNAL TABLE IF NOT EXISTS retailstore (event_time timestamp, event_type string, product_id string, category_id string, category_code string, brand string, price float,user_i
d bigint, user_session string) ROW FORMAT SERDE 'org.apache.hadoop.hive.serde2.OpenCSVSerde' STORED AS TEXTFILE LOCATION '/user/hive/hivecasestudy' tblproperties("skip.header.line.count"="1
");
OK
```

- Now we will create external new Base table
- Command- **CREATE EXTERNAL TABLE IF NOT EXISTS retailstore (event_time timestamp, event_type string, product_id string, category_id string, category_code string, brand string, price float,user_id bigint, user_session string) ROW FORMAT SERDE 'org.apache.hadoop.hive.serde2.OpenCSVSerde' STORED AS TEXTFILE LOCATION '/user/hive/hivecasestudy' tblproperties("skip.header.line .count"="1");**

```
hive> show tables ;
OK
retailstore
Time taken: 0.06 seconds, Fetched: 1 row(s)
```

- Show tables.

```
hive> set hive.cli.print.header = true ;
hive> select * from retailstore limit 5 ;
OK
retailstore.event_time  retailstore.event_type  retailstore.product_id  retailstore.category_id reta
ser_id  retailstore.user_session
2019-11-01 00:00:02 UTC view    5802432 1487580009286598681                     0.32    562076640
2019-11-01 00:00:09 UTC cart    5844397 1487580006317032337                     2.38    553329724
2019-11-01 00:00:10 UTC view    5837166 1783999064103190764             pnb     22.22   556138645
2019-11-01 00:00:11 UTC cart    5876812 1487580010100293687             jessnail        3.16    5645
2019-11-01 00:00:24 UTC remove_from_cart        5826182 1487580007483048900                     3.33
Time taken: 2.121 seconds, Fetched: 5 row(s)
```

- We will add **hive.cli.print.header** for putting headers.

```
hive>
    > CREATE TABLE IF NOT EXISTS dynpart_bucket_retailstore(event_time timestamp, product_id string,
r_session string) PARTITIONED BY (event_type string) CLUSTERED BY (price) INTO 10 BUCKETS ROW FORMA
ve/hivecasestudy' tblproperties('skip.header.line.count' = '1');
OK
Time taken: 0.095 seconds
```

- Creating an external table called **dynpart_bucket_retailstore**.
- Command- **CREATE EXTERNAL TABLE IF NOT EXISTS dynpart_bucket_retailstore (event_time timestamp, event_type string, product_id string, category_id string, category_code string, brand string, price float,user_id bigint, user_session string) ROW FORMAT SERDE 'org.apache.hadoop.hive.serde2.OpenCSVSerde' STORED AS TEXTFILE LOCATION '/user/hive/hivecasestudy' tblproperties("skip.header.line .count"="1");**

```
hive> INSERT INTO TABLE dynpart_bucket_retailstore PARTITION (event_type) SELECT event_time, product_id,category_id, category_code, brand, price,user_id, user_session, event_type FROM retai
lstore ;
Query ID = hadoop_20211121112501_552b8ada-239c-484f-a4e5-df6b38fa83c7
Total jobs = 1
Launching Job 1 out of 1
Tez session was closed. Reopening...
Session re-established.
Status: Running (Executing on YARN cluster with App id application_1637490126174_0004)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      2          2        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      5          5        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 02/02  [==========================>>] 100%  ELAPSED TIME: 174.68 s
--------------------------------------------------------------------------------
Loading data to table retailstore.dynpart_bucket_retailstore partition (event_type=null)

Loaded : 4/4 partitions.
         Time taken to load dynamic partitions: 0.955 seconds
         Time taken for adding to write entity : 0.004 seconds
OK
event_time      product_id      category_id     category_code   brand   price   user_id user_session    event_type
Time taken: 188.135 seconds
```

- Copying the dataset from retailstore table and inserting it into **dyn_part_bucket_retailstore.**
- Command- **INSERT INTO TABLE dynpart_bucket_retailstore PARTITION (event_type) SELECT event_time,product_id, category_id, category_code, brand , price, user_id, user_session, event_type FROM retail;**

```
hive> show tables ;
OK
tab_name
dynpart_bucket_retailstore
retailstore
Time taken: 0.033 seconds, Fetched: 2 row(s)
```

- Verifying the inserted table using show tables . We can see tables have been inserted.
- Command- **show table;**

```
[hadoop@ip-172-31-21-36 ~]$ hadoop fs -ls /user/hive/hivecasestudy
Found 6 items
-rw-r--r--   1 hadoop hadoop  545839412 2021-11-21 10:30 /user/hive/hivecasestudy/2019-Nov.csv
-rw-r--r--   1 hadoop hadoop  482542278 2021-11-21 10:29 /user/hive/hivecasestudy/2019-Oct.csv
drwxr-xr-x   - hadoop hadoop          0 2021-11-21 11:28 /user/hive/hivecasestudy/event_type=cart
drwxr-xr-x   - hadoop hadoop          0 2021-11-21 11:28 /user/hive/hivecasestudy/event_type=purchase
drwxr-xr-x   - hadoop hadoop          0 2021-11-21 11:28 /user/hive/hivecasestudy/event_type=remove_from_cart
drwxr-xr-x   - hadoop hadoop          0 2021-11-21 11:28 /user/hive/hivecasestudy/event_type=view
[hadoop@ip-172-31-21-36 ~]$ hadoop fs -ls /user/hive/hivecasestudy/event_type=cart
Found 10 items
-rwxr-xr-x   1 hadoop hadoop   27512579 2021-11-21 11:26 /user/hive/hivecasestudy/event_type=cart/000000_0
-rwxr-xr-x   1 hadoop hadoop   32190447 2021-11-21 11:26 /user/hive/hivecasestudy/event_type=cart/000001_0
-rwxr-xr-x   1 hadoop hadoop   33302805 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000002_0
-rwxr-xr-x   1 hadoop hadoop   32602023 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000003_0
-rwxr-xr-x   1 hadoop hadoop   34104132 2021-11-21 11:26 /user/hive/hivecasestudy/event_type=cart/000004_0
-rwxr-xr-x   1 hadoop hadoop   32538513 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000005_0
-rwxr-xr-x   1 hadoop hadoop   39257340 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000006_0
-rwxr-xr-x   1 hadoop hadoop   24825787 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000007_0
-rwxr-xr-x   1 hadoop hadoop   28504487 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000008_0
-rwxr-xr-x   1 hadoop hadoop   35410315 2021-11-21 11:27 /user/hive/hivecasestudy/event_type=cart/000009_0
```

- Verifying partitioned files and bucketed files.
- Command- **hadoop fs -ls /user/hive/hivecasestudy**

```
hive> use retailstore ;
OK
Time taken: 0.019 seconds
hive> select * from retailstore limit 5 ;
OK
2019-11-01 00:00:02 UTC view    5802432 1487580009286598681                  0.32    562076640       09fafd6c-6c99-
2019-11-01 00:00:09 UTC cart    5844397 1487580006317032337                  2.38    553329724       2067216c-31b5-
2019-11-01 00:00:10 UTC view    5837166 1783999064103190764           pnb    22.22   556138645       57ed222e-a54a-
2019-11-01 00:00:11 UTC cart    5876812 1487580010100293687           jessnail       3.16    564506666       186c19
2019-11-01 00:00:24 UTC remove_from_cart        5826182 1487580007483048900                  3.33    553329724
Time taken: 2.38 seconds, Fetched: 5 row(s)
hive> select * from dynpart_bucket_retailstore limit 5 ;
OK
2019-10-08 09:19:19 UTC 89350   1487580011652186237           runail  1.27    232701853       3f1469f5-d926-44ce-a9f
2019-10-10 05:29:47 UTC 5866208 1487580013841613016           concept 3.16    493381333       535bb6b7-08f4-4021-ac6
2019-10-08 12:25:50 UTC 5821183 1487580007717929935                   1.27    546703849       3daf4d64-5ffa-46cc-827
2019-10-10 08:19:06 UTC 5848901 1487580007675986893           bpw.style       1.27    439370683       9aeb4d9a-1bed-
2019-10-09 18:32:50 UTC 5869152 1487580005268456287           cosmoprofi      7.94    558533352       cfde0f74-8705-
Time taken: 0.225 seconds, Fetched: 5 row(s)
hive>
```

- After partitioned files we will use retailstore and check the first row for **retailstore** and **dynpart_bucket_retailstore.**

Command-

- Without optimization- **select * from retailstore limit 5;**
- With optimization- **select * from dynpart_bucket_retailstore limit 5;**

QUESTIONS....

1. Find the total revenue generated due to purchases made in October.

Base Table: **retailstore** table

SELECT SUM(price) AS tot_revenue_oct FROM retailstore WHERE MONTH(event_time) = '10' AND event_type = 'purchase';

OptimisedTable: **dynpart_bucket_retailstore** table

SELECT SUM(price) AS tot_revenue_oct FROM dynpart_bucket_retailstore WHERE MONTH(event_time) = '10' AND event_type = 'purchase';

```
hive> SELECT SUM(price) AS tot_revenue_oct FROM retailstore WHERE MONTH(event_time) = '10' AND event_type = 'purchase';
Query ID = hadoop_20211122053035_0fe72c98-e268-4c1f-8b40-51b1179e5103
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637556007874_0006)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      5          5        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 02/02  [==========================>>] 100%  ELAPSED TIME: 125.18 s
--------------------------------------------------------------------------------
OK
1211538.4299997438
Time taken: 126.027 seconds, Fetched: 1 row(s)
hive> SELECT SUM(price) AS tot_revenue_oct from dynpart_bucket_retailstore WHERE MONTH(event_time) = '10' AND event_type = 'purchase';
Query ID = hadoop_20211122053648_d507ee77-9ceb-4ce2-bffa-7222eb633603
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637556007874_0006)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      3          3        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 02/02  [==========================>>] 100%  ELAPSED TIME: 23.69 s
--------------------------------------------------------------------------------
OK
1211532.4500002791
Time taken: 24.715 seconds, Fetched: 1 row(s)
```

Output & Observation-

- Total revenue generated in the month of October is 1211538.43 +/- on purchase.
- Time taken to execute the query is 125.18 seconds when table is not optimized whereas time taken to execute is 23.69 when the table is optimized.
- The optimized table reduces the execution time to a significant level. Thus, we can say that performance of the optimized table is better.

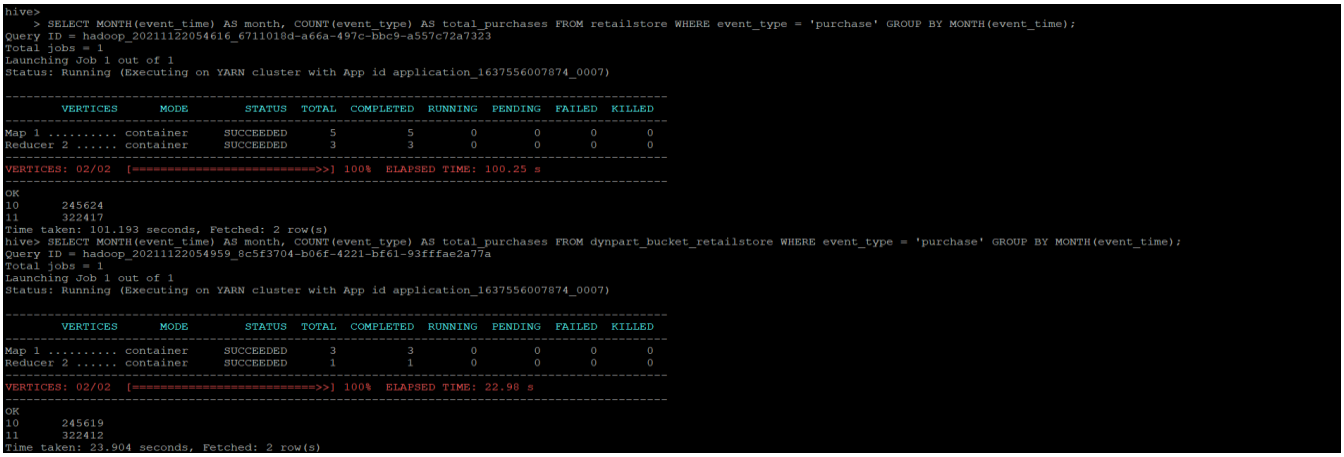
2. Write a query to yield the total sum of purchases per month in a single output.

Base Table : **retailstore** table

SELECT MONTH(event_time) AS month, COUNT(event_type) AS total_purchases FROM retailstore WHERE event_type = 'purchase' GROUP BY MONTH(event_time);

Optimisation Table **dynpart_bucket_retailstore** table

SELECT MONTH(event_time) AS month, COUNT(event_type) AS total_purchases FROM dynpart_bucket_retailstore WHERE event_type = 'purchase' GROUP BY MONTH(event_time);



Output & Observation-

- Total purchase for the month of October is 245624 and for November it is 322417. There is a significant increase in November purchase, around 30%.
- Execution time for un-optimized table is 100.25 seconds and 22.98 seconds for optimized table which is again a very significant difference. Thus, our optimized table again gives better performance in respect to time.

3. Write a query to find the change in revenue generated due to purchases from October to November.

Base Table **retailstore** table

SELECT (SUM(CASE WHEN MONTH(event_time)=11 THEN price ELSE 0 END) - SUM(CASE WHEN MONTH(event_time)=10 THEN PRICE ELSE 0 END)) AS change_rev FROM retailstore WHERE event_type = 'purchase' AND MONTH(event_time) in ('10','11');

Optimised Table: **dynpart_bucket_retailstore** table

SELECT (SUM(CASE WHEN MONTH(event_time)=11 THEN price ELSE 0 END) - SUM(CASE WHEN MONTH(event_time)=10 THEN PRICE ELSE 0 END)) AS change_rev FROM dynpart_bucket_retailstore WHERE event_type = 'purchase' AND MONTH(event_time) in ('10','11');

```
hive> SELECT (SUM(CASE WHEN MONTH(event_time)=11 THEN price ELSE 0 END) - SUM(CASE WHEN MONTH(event_time)=10 THE
se' AND MONTH(event_time) in ('10','11');
Query ID = hadoop_20211122071550_6eeee7dc-1483-4cd8-9b55-514f0eea3998
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      5          5        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 02/02  [==========================>>] 100%  ELAPSED TIME: 102.84 s
--------------------------------------------------------------------------------
OK
319478.4700003781
Time taken: 105.478 seconds, Fetched: 1 row(s)
hive> SELECT (SUM(CASE WHEN MONTH(event_time)=11 THEN price ELSE 0 END) - SUM(CASE WHEN MONTH(event_time)=10 THE
_type = 'purchase' AND MONTH(event_time) in ('10','11');
Query ID = hadoop_20211122071750_f2f8e609-4bd4-401c-b734-928d9ba76e5c
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      3          3        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 02/02  [==========================>>] 100%  ELAPSED TIME: 25.46 s
--------------------------------------------------------------------------------
OK
319437.7899997565
Time taken: 26.363 seconds, Fetched: 1 row(s)
```

Output & Observation-

- We can observe that the difference in revenue between October purchases and November Purchases is 319478.
- Execution time for un-optimized table is 102.84 seconds and 25.46 seconds for optimized table which is again a very significant difference. Thus, our optimized table again gives better performance in respect to time.

4. Find distinct categories of products. Categories with null category code can be ignored.

With Optimiszation(**dynpart_bucket_retailstore** table)-

SELECT DISTINCT SPLIT(category_code,'\\.')[0] AS Category FROM dynpart_bucket_retailstore WHERE category_code != '';

```
hive> SELECT DISTINCT SPLIT(category_code,'\\.')[0] AS Category FROM dynpart_bucket_retailstore WHERE cat
Query ID = hadoop_20211122072148_730c7c71-621b-4641-8a71-b6ecc8ea3255
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      6          6        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      5          5        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 02/02  [==========================>>] 100%  ELAPSED TIME: 68.46 s
--------------------------------------------------------------------------------
OK
furniture
appliances
accessories
apparel
sport
stationery
Time taken: 69.344 seconds, Fetched: 6 row(s)
```

Output & Observation-

- The distinct categories of the products are:
  - furniture
  - Appliances
  - Accessories
  - Apparel
  - Sport
  - Stationary
- The execution time here is 69.344 seconds.

5. Find the total number of products available under each category.

With Optimiszation(**dynpart_bucket_retailstore** table)-

SELECT SPLIT(category_code,'\\.')[0] AS Category, COUNT(product_id) AS number_of_products FROM dynpart_bucket_retailstore WHERE category_code != '' GROUP

BY SPLIT(category_code,'\\.')[0] ORDER BY number_of_products DESC;

```
hive> SELECT SPLIT(category_code,'\\.')[0] AS Category, COUNT(product_id) AS number_of_products FROM dynpart_bu
[0] ORDER BY number_of_products DESC;
Query ID = hadoop_20211122072441_7cb34ce2-579c-4117-8488-3a51e66aa367
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

----------------------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
----------------------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      6          6        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      5          5        0        0       0       0
Reducer 3 ...... container     SUCCEEDED      1          1        0        0       0       0
----------------------------------------------------------------------------------------------
VERTICES: 03/03  [==========================>>] 100%  ELAPSED TIME: 64.90 s
----------------------------------------------------------------------------------------------
OK
appliances      61736
stationery      26722
furniture       23604
apparel 18232
accessories     12928
sport   2
Time taken: 65.966 seconds, Fetched: 6 row(s)
```

Output & Observation-

No.	Category	Number of Products
1.	Appliances	61736
2.	Stationery	26722
3.	Furniture	23604
4.	Apparel	18232
5.	Accessories	12928
6.	Sports	2

- Appliances category have the most number of products followed by Stationary. Sports category has the least number of products.
- Execution time here is 65.966 seconds.

6. Which brand had the maximum sales in October and November combined?

With Optimiszation(**dynpart_bucket_retailstore** table)-

WITH total_sales_summary AS(SELECT brand, round((SUM(CASE WHEN MONTH(event_time)=10 THEN price ELSE 0 END) + SUM(CASE WHEN MONTH(event_time)=11 THEN PRICE ELSE 0 END)),2) AS total_sales FROM dynpart_bucket_retailstore WHERE event_type = 'purchase' AND MONTH(event_time) in ('10','11') AND brand != '' GROUP BY brand)

SELECT brand, total_sales FROM total_sales_summary ORDER BY total_sales DESC LIMIT 1;

```
hive> WITH total_sales_summary AS(
    > SELECT brand, round((SUM(CASE WHEN MONTH(event_time)=10 THEN price ELSE 0 END) + SUM(CASE WHEN MO
lstore WHERE event_type = 'purchase' AND MONTH(event_time) in ('10','11') AND brand != '' GROUP BY bran
    > SELECT brand, total_sales FROM total_sales_summary ORDER BY total_sales DESC LIMIT 1;
Query ID = hadoop_20211122072729_edcaf121-6fa0-4785-80a4-3be1cb407f65
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

--------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
--------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      3          3        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
Reducer 3 ...... container     SUCCEEDED      1          1        0        0       0       0
--------------------------------------------------------------------------------
VERTICES: 03/03  [==========================>>] 100%  ELAPSED TIME: 25.94 s
--------------------------------------------------------------------------------
OK
runail  148292.46
Time taken: 26.614 seconds, Fetched: 1 row(s)
```

Output & Observation-

- It can be seen that **runail** has the highest number of sales for the month of October and November with total sales of 148292.
- Time taken to execute the query is 25.95 seconds.

7. Which brands increased their sales from October to November?

With Optimiszation(**dynpart_bucket_retailstore** table)-

WITH brand_sales_summary AS(

SELECT brand, round(SUM(CASE WHEN MONTH(event_time)=10 THEN price ELSE 0 END),2) AS Oct_sales,round(SUM(CASE WHEN MONTH(event_time)=11 THEN PRICE ELSE 0 END),2) AS Nov_sales FROM dynpart_bucket_retailstore WHERE event_type = 'purchase' AND MONTH(event_time) in ('10','11') AND brand != '' GROUP BY brand)

SELECT brand, Oct_sales, Nov_sales, round((Nov_sales-Oct_sales),2)AS Change_in_Sales FROM brand_sales_summary WHERE Nov_sales-Oct_sales > 0 ORDER BY Change_in_Sales DESC;

```
hive> WITH brand_sales_summary AS(
    > SELECT brand, round(SUM(CASE WHEN MONTH(event_time)=10 THEN price ELSE 0 END),2) AS Oct_sales,round(SUM
art_bucket_retailstore WHERE event_type = 'purchase' AND MONTH(event_time) in ('10','11') AND brand != '' GROU
    > SELECT brand, Oct_sales, Nov_sales, round((Nov_sales-Oct_sales),2)AS Change_in_Sales FROM brand_sales_su
Query ID = hadoop_20211122072925_b0c1c291-9c05-4ada-86ef-cb142a9b6e46
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

----------------------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
----------------------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      3          3        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
Reducer 3 ...... container     SUCCEEDED      1          1        0        0       0       0
----------------------------------------------------------------------------------------------
VERTICES: 03/03  [==========================>>] 100%  ELAPSED TIME: 25.58 s
----------------------------------------------------------------------------------------------
OK
grattol 35445.54        71472.71        36027.17
uno     35302.03        51039.75        15737.72
lianail 5892.84 16394.24        10501.4
ingarden        23161.39        33566.21        10404.82
strong  29196.63        38671.27        9474.64
jessnail        26287.84        33345.23        7057.39
cosmoprofi      8322.81 14536.99        6214.18
polarus 6013.72 11371.93        5358.21
runail  71537.77        76754.69        5216.92
freedecor       3421.78 7671.8  4250.02
staleks 8519.73 11875.61        3355.88
bpw.style       11572.15        14837.44        3265.29
lovely  8704.38 11939.06        3234.68
marathon        7280.75 10273.1 2992.35
haruyama        9390.69 12352.91        2962.22
yoko    8756.91 11707.88        2950.97
italwax 21940.24        24799.37        2859.13
benovy  409.62  3259.97 2850.35
kaypro  881.34  3268.7  2387.36
estel   21756.75        24142.67        2385.92
concept 11032.14        13380.4 2348.26
kapous  11927.16        14093.08        2165.92
f.o.x   6624.23 8577.28 1953.05
masura  31266.08        33058.47        1792.39
milv    3904.94 5642.01 1737.07
beautix 10493.95        12222.95        1729.0
artex   2730.64 4327.25 1596.61
domix   10472.05        12009.17        1537.12
shik    3341.2  4839.72 1498.52
```

```
nirvel  163.04  234.33  71.29
konad   739.83  810.67  70.84
egomania        77.47   146.04  68.57
cutrin  299.37  367.62  68.25
laboratorium    246.5   312.52  66.02
inm     288.02  351.21  63.19
dewal   0.0     61.29   61.29
marutaka-foot   49.22   109.33  60.11
kares   0.0     59.45   59.45
profhenna       679.23  736.85  57.62
koelcia 55.5    112.75  57.25
balbcare        155.33  212.38  57.05
elskin  251.09  307.65  56.56
foamie  35.04   80.49   45.45
ladykin 125.65  170.57  44.92
likato  296.06  340.97  44.91
mavala  409.04  446.32  37.28
vilenta 197.6   231.21  33.61
beautyblender   78.74   109.41  30.67
biore   60.65   90.31   29.66
orly    902.38  931.09  28.71
estelare        444.81  471.87  27.06
profepil        93.36   118.02  24.66
blixz   38.95   63.4    24.45
binacil 0.0     24.26   24.26
godefroy        401.22  425.12  23.9
glysolid        69.73   91.59   21.86
veraclara       50.11   71.21   21.1
juno    0.0     21.08   21.08
kamill  63.01   81.49   18.48
treaclemoon     163.37  181.49  18.12
supertan        50.37   66.51   16.14
barbie  0.0     12.39   12.39
deoproce        316.84  329.17  12.33
rasyan  18.8    28.94   10.14
fly     17.14   27.17   10.03
tertio  236.16  245.8   9.64
jaguar  1102.11 1110.65 8.54
soleo   204.2   212.53  8.33
neoleor 43.41   51.7    8.29
moyou   5.71    10.28   4.57
bodyton 1376.34 1380.64 4.3
skinity 8.88    12.44   3.56
helloganic      0.0     3.1     3.1
grace   100.92  102.61  1.69
cosima  20.23   20.93   0.7
ovale   2.54    3.1     0.56
Time taken: 26.222 seconds, Fetched: 160 row(s)
```

Output & Observation-

- ‘Grattol’ brand has the highest total increment from October to Novermber i.e., 36,027 which is around 20% . ‘Ovale’ seems to have the least increment of 0.56 from October to November.
- From the output we can see there are total of 160 brands that has increased their sales from October to November.
- Total time taken for execution is 26.222 seconds.

8. Your company wants to reward the top 10 users of its website with a Golden Customer plan. Write a query to generate a list of top 10 users who spend the most.

With Optimiszation(**dynpart_bucket_retailstore** table)-

SELECT user_id, round(SUM(price),2) AS total_spends FROM dynpart_bucket_estore WHERE event_type = 'purchase' GROUP BY user_id ORDER BY total_spends DESC LIMIT 10;

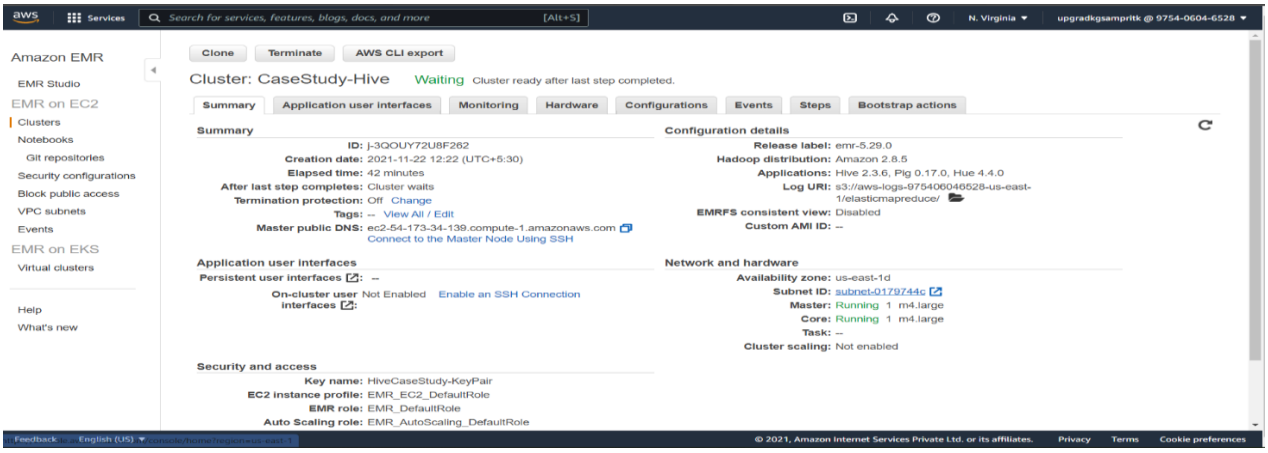
```
hive> SELECT user_id, round(SUM(price),2) AS total_spends FROM dynpart_bucket_retailstore WHERE event_type = 'purch
Query ID = hadoop_20211122073204_ef0542ef-e08e-496e-be87-613c7a96c3f8
Total jobs = 1
Launching Job 1 out of 1
Status: Running (Executing on YARN cluster with App id application_1637564392791_0004)

----------------------------------------------------------------------------------------------
        VERTICES      MODE        STATUS  TOTAL  COMPLETED  RUNNING  PENDING  FAILED  KILLED
----------------------------------------------------------------------------------------------
Map 1 .......... container     SUCCEEDED      3          3        0        0       0       0
Reducer 2 ...... container     SUCCEEDED      1          1        0        0       0       0
Reducer 3 ...... container     SUCCEEDED      1          1        0        0       0       0
----------------------------------------------------------------------------------------------
VERTICES: 03/03  [==========================>>] 100%  ELAPSED TIME: 25.64 s
----------------------------------------------------------------------------------------------
OK
557790271       2715.87
150318419       1645.97
562167663       1352.85
531900924       1329.45
557850743       1295.48
522130011       1185.39
561592095       1109.7
431950134       1097.59
566576008       1056.36
521347209       1040.91
Time taken: 26.311 seconds, Fetched: 10 row(s)
hive>
```

Output & Observation-

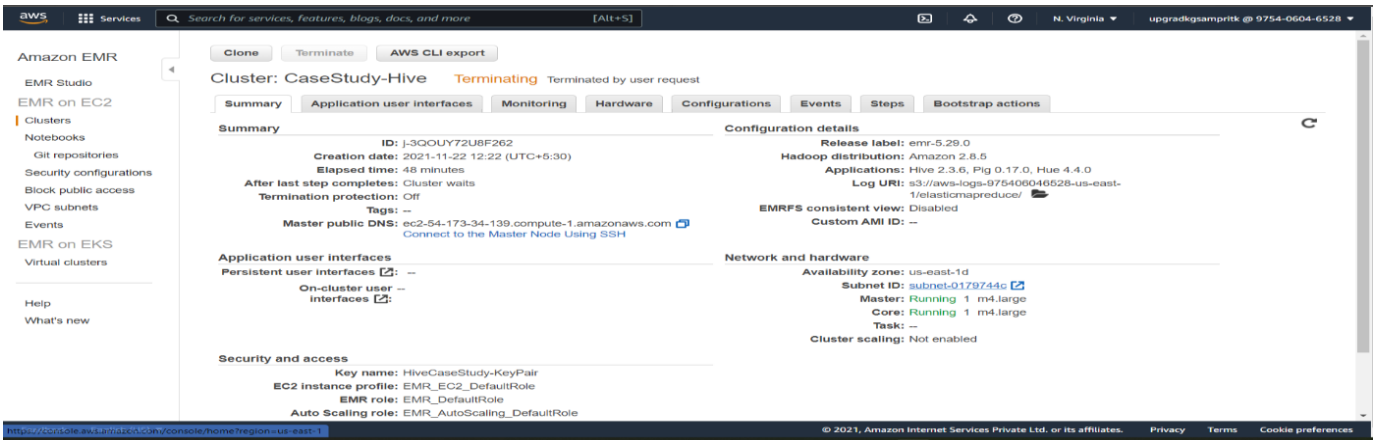
- Here is the list of top 10 users in the output who deserve Golden Customer Plan. They have spent in the range of 2716 and 1040.
- The execution time is 26.311 seconds.

Termination of EMR Cluster.

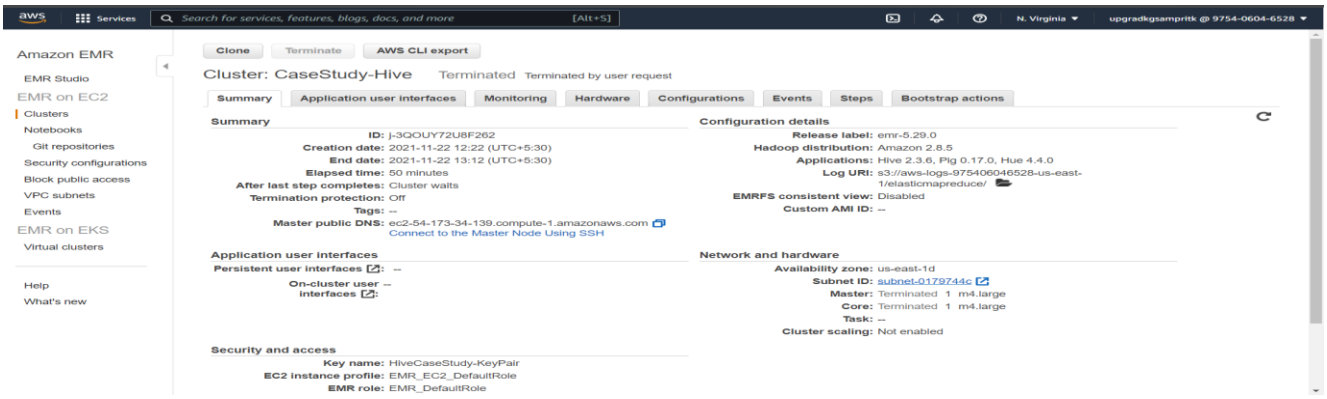
After completing the analysis it is important to terminate the cluster. If the cluster is left running aws billing will keep on increasing for the users account even when it is not being used. So here arfe the steps how one can terminate the cluster after finishing their work.....



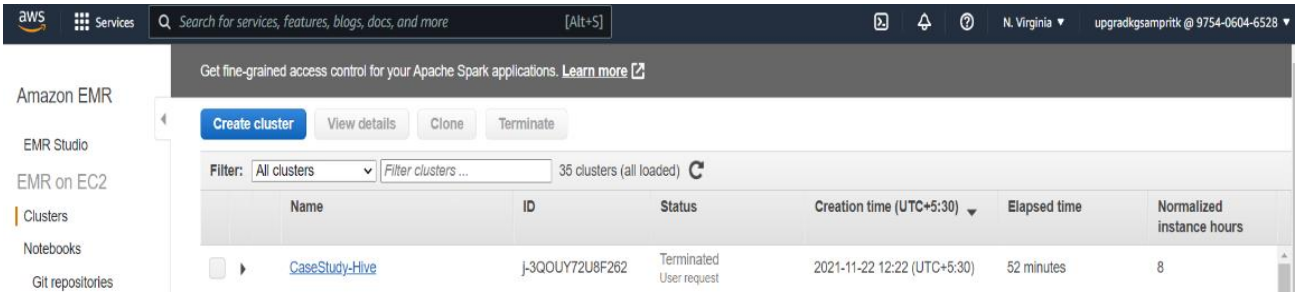
Search for EMR--> Click on the cluster that has to be terminated--> Click on terminate.



In the window above we can see that the “Termination” is in progress.



Termination is complete. Both our master and core node has been terminated.



The status here shows terminated.

With this we have completed analysis on our dataset successfully.

Thank You!