Data Ingestion Tasks:

Task 1. Create an RDS instance in your AWS account and upload the data to the RDS instance (Note: Instructions on how to work with RDS can be found

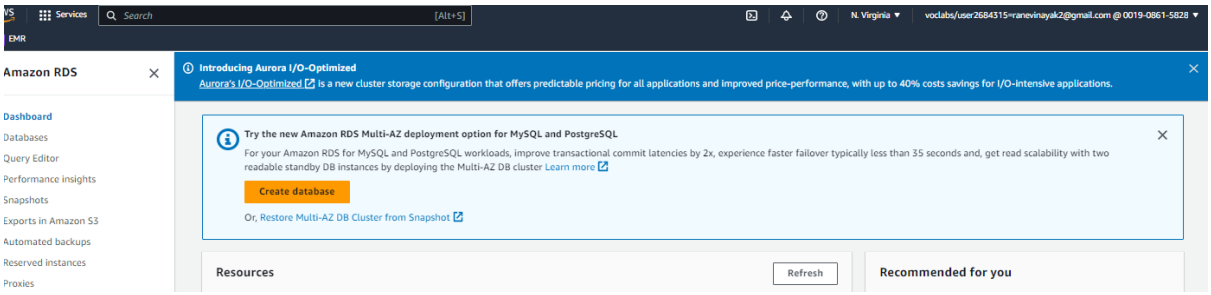
Since the dataset is huge, you need to upload the data from only two files (*i.e.* `yellow_tripdata_2017-01.csv & yellow_tripdata_2017-02.csv`) from the dataset.

Solution

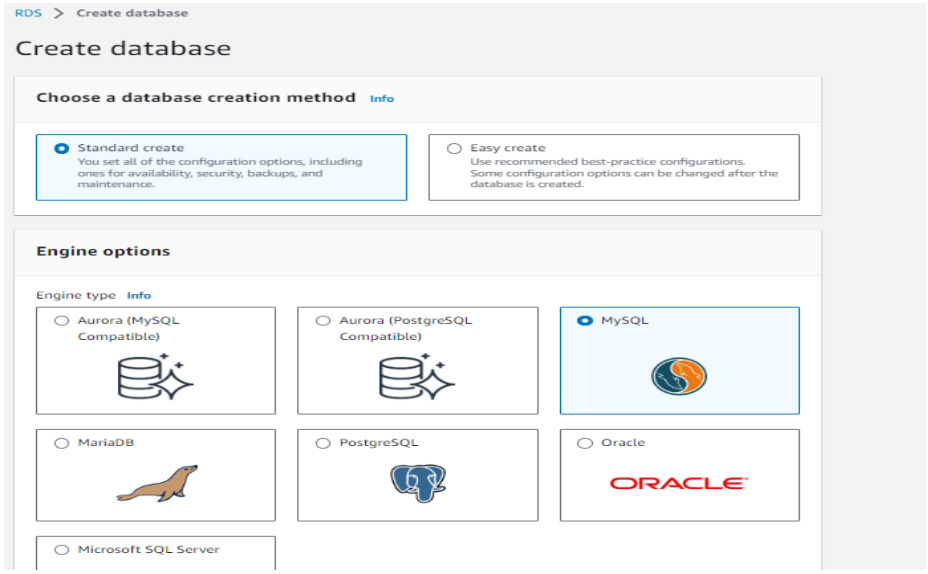
Followed below steps to create RDS instance and to upload data to it.

Steps:

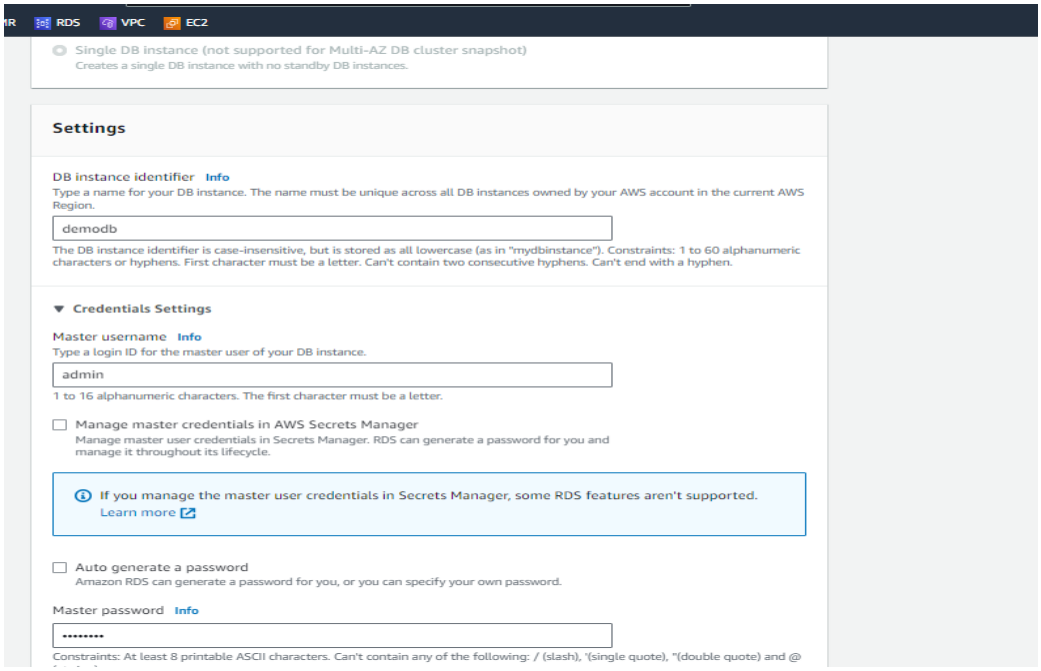
1. Create RDS instance on AWS portal



2. Create MYSQL database with free tier.



3. Crate Credential with db. name, user name and password.



4. Create EC2 instance and connect it with RDS instance.
   VPC: vpc-02c6bc8cf08bb3771
   EC2 = ec2-3-220-231-186.compute-1.amazonaws.com

EC2 > Instances > Launch an instance

Launch an instance Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags Info

Name

casestudyec2

Add additional tags

Application and OS Images (Amazon Machine Image) Info

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

Recents | Quick Start

Amazon Linux | macOS | Ubuntu | Windows | Red Hat | SUSE L

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Summary

Number of instances Info

1

Software Image (AMI)

Amazon Linux 2023 AMI 2023.1.2...read more

ami-051f7e7f6c2f40dc1

Virtual server type (instance type)

t2.micro

Firewall (security group)

New security group

Storage (volumes)

1 volume(s) - 8 GiB

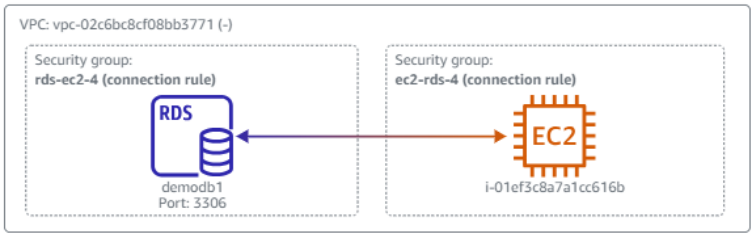
Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel | Launch instance

Review commands

You are setting up a connection between RDS database demodb1 and EC2 instance i-01ef3c8a7a1cc616b.

To set up a connection between the database and the EC2 instance, VPC security group *rds-ec2-4* is added to the database, and VPC security group *ec2-rds-4* is added to the EC2 instance.



Bold indicates an addition being made to set up a connection.

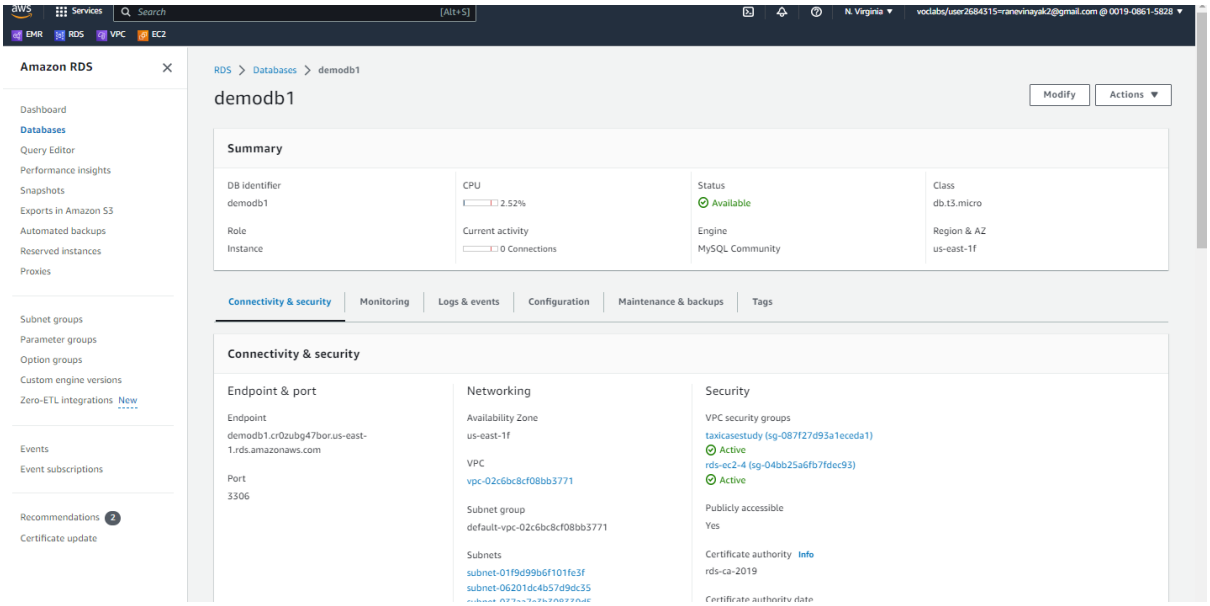
Changes to RDS database: demodb1

Attribute	Current value	New value
Security group	taxicasestudy	taxicasestudy, **rds-ec2-4**

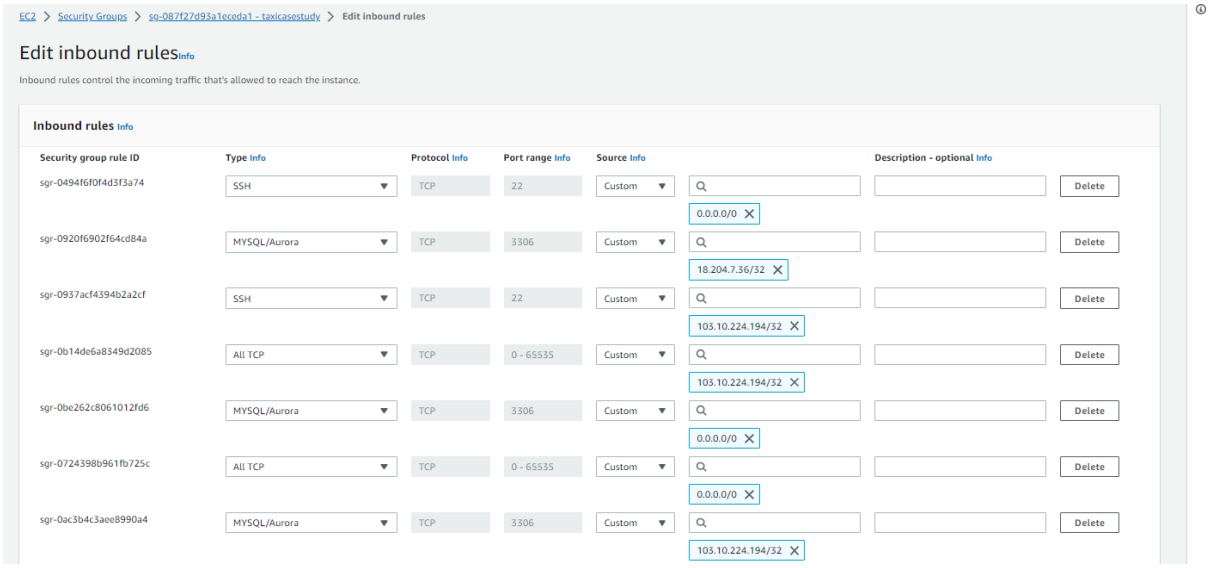
Changes to EC2 instance: i-01ef3c8a7a1cc616b

Attribute	Current value	New value
Security group	default	default, **ec2-rds-4**

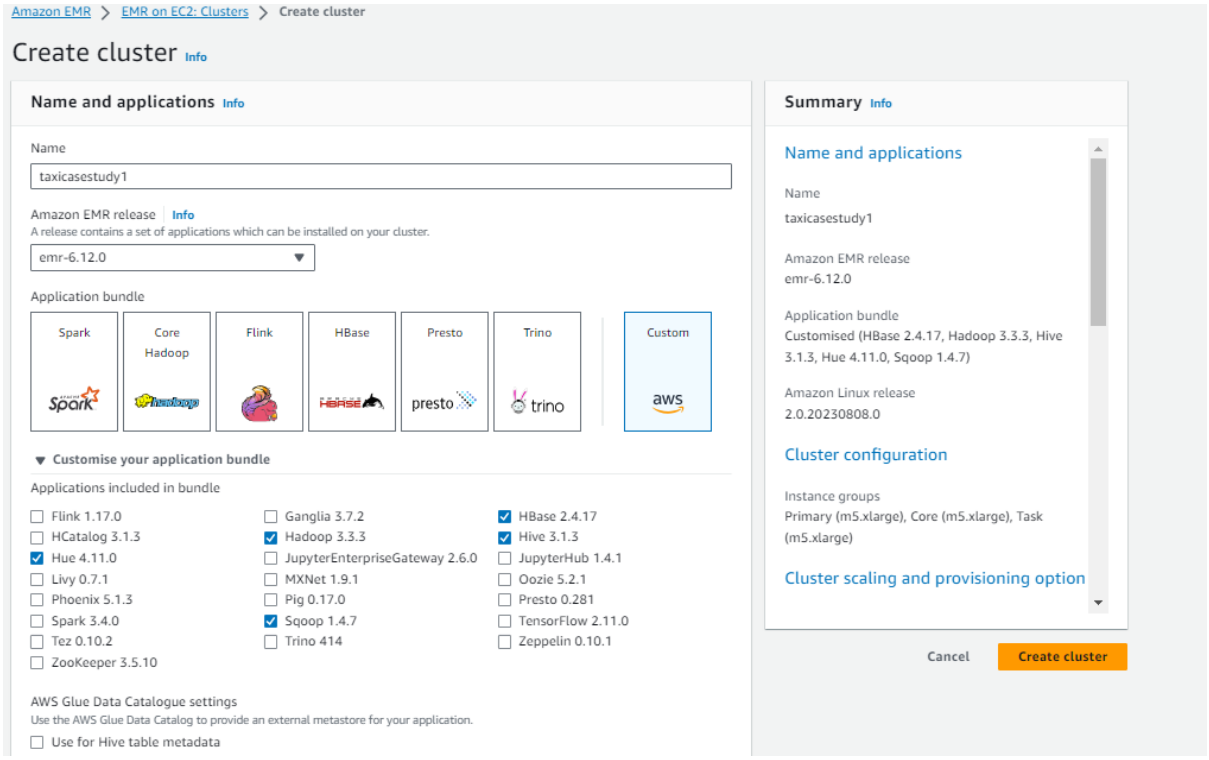
5. RDS database has been created which will be accessible through below URL
   Db url = demodb1.cr0zubg47bor.us-east-1.rds.amazonaws.com



6. Update Inbound properties of RDS instance to connect EC2 and EMR with RDS



7. Launch EMR cluster



8. Login into EMR cluster with root privilege and run below command for RDS connection.

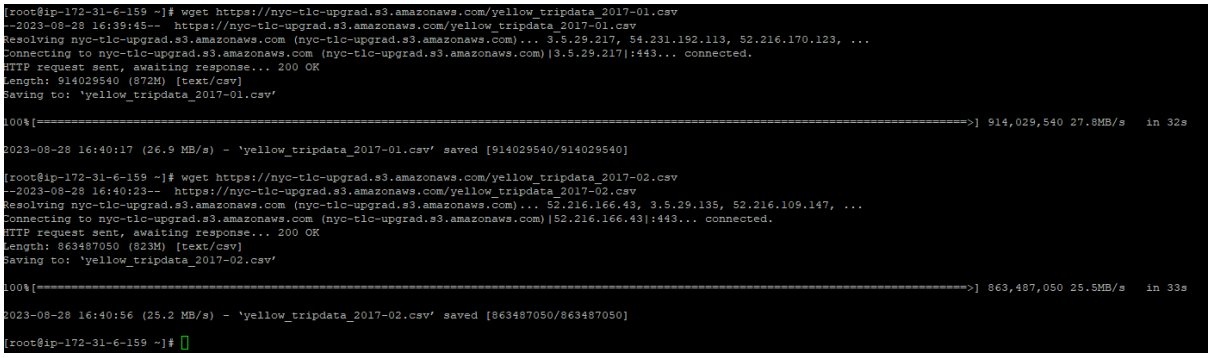
mysql -h demodb1.cr0zubg47bor.us-east-1.rds.amazonaws.com -P 3306 -u admin -p

```
[hadoop@ip-172-30-2-67 ~]$ sudo -i

EEEEEEEEEEEEEEEEEEE MMMMMMMM           MMMMMMMM RRRRRRRRRRRRRRR
E::::::::::::::::::E M:::::::M         M:::::::M R:::::::::::::::R
EE:::::EEEEEEEEE:::E M::::::::M       M::::::::M R:::::RRRRRR:::::R
  E::::E       EEEEE M:::::::::M     M:::::::::M RR::::R      R::::R
  E::::E             M::::::M:::M   M:::M:::::::M   R:::R      R::::R
  E:::::EEEEEEEEEE   M:::::M M:::M M:::M M:::::M   R:::RRRRRR:::::R
  E::::::::::::::E   M:::::M  M:::M:::M  M:::::M   R:::::::::::RR
  E:::::EEEEEEEEEE   M:::::M   M:::::M   M:::::M   R:::RRRRRR::::R
  E::::E             M:::::M    M:::M    M:::::M   R:::R      R::::R
  E::::E       EEEEE M:::::M     MMM     M:::::M   R:::R      R::::R
EE:::::EEEEEEEE::::E M:::::M             M:::::M   R:::R      R::::R
E::::::::::::::::::E M:::::M             M:::::M RR::::R      R::::R
EEEEEEEEEEEEEEEEEEE MMMMMMM             MMMMMMM RRRRRRR      RRRRRR

[root@ip-172-30-2-67 ~]# mysql -h demodb1.cr0zubg47bor.us-east-1.rds.amazonaws.c
om -P 3306 -u admin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 8.0.33 Source distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]>
```

9. Download yellow_tripdata csv into EMR cluster

wget https://nyc-tlc-upgrad.s3.amazonaws.com/yellow_tripdata_2017-01.csv

wget https://nyc-tlc-upgrad.s3.amazonaws.com/yellow_tripdata_2017-02.csv



10. Move the csv to local mapr_assignment dir

Command:

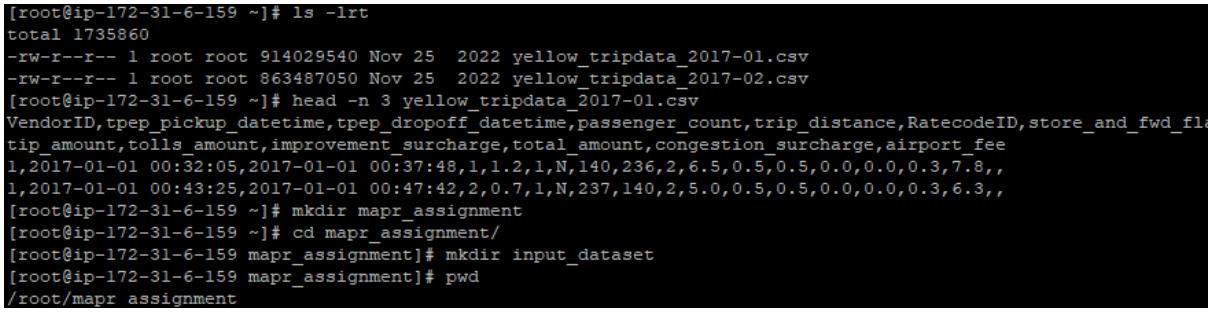
Move to local dir:

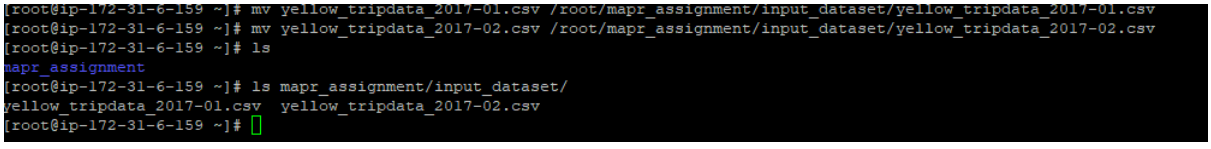
Mkdir mapr_assignment

Cd mapr_assignment

Mkdir input_dataset

cp /root/yellow_tripdata_* /root/mapr_assignment/input_dataset





11. Move file to hdfs location /user/hadoop/mapr_assignment/input

hadoop fs -mkdir -p /user/hadoop/mapr_assignment/input

hadoop fs -ls /user/hadoop/mapr_assignment/input

cd mapr_assignment/input_dataset/

hadoop fs -put yellow_tripdata_* /user/hadoop/mapr_assignment/input

```
[root@ip-172-31-6-159 ~]# ls mapr_assignment/input_dataset/
yellow_tripdata_2017-01.csv  yellow_tripdata_2017-02.csv
[root@ip-172-31-6-159 ~]# hadoop fs -mkdir -p /user/hadoop/mapr_assignment/input
[root@ip-172-31-6-159 ~]# hadoop fs -ls /user/hadoop/mapr_assignment/input
[root@ip-172-31-6-159 ~]# cd mapr_assignment/input_dataset/
[root@ip-172-31-6-159 input_dataset]# hadoop fs -put yellow_tripdata_* /user/hadoop/mapr_assignment/input
```

```
[root@ip-172-31-6-159 input_dataset]# hadoop fs -ls /user/hadoop/mapr_assignment/input/
Found 2 items
-rw-r--r--   1 root hdfsadmingroup  914029540 2023-08-28 16:53 /user/hadoop/mapr_assignment/input/yellow_tripdata_2017-01.csv
-rw-r--r--   1 root hdfsadmingroup  863487050 2023-08-28 16:53 /user/hadoop/mapr_assignment/input/yellow_tripdata_2017-02.csv
[root@ip-172-31-6-159 input_dataset]#
```

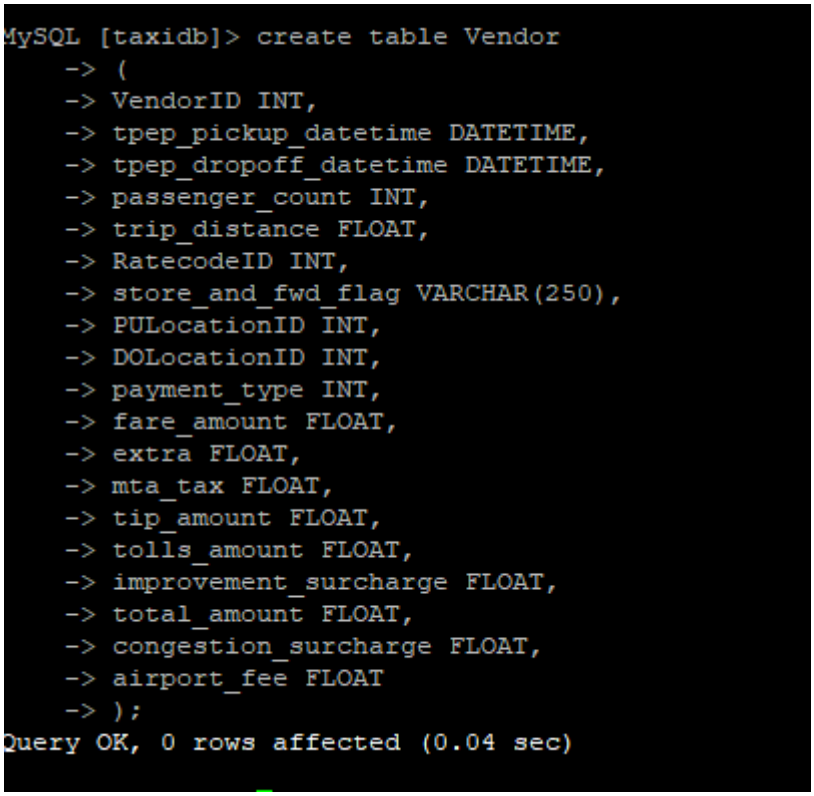
12. Connect to RDS database and display database and tables in it
    Command:
    Show databases;
13. Create database taxidb in rds instance and use taxidb for table creation.
    Command:
    create database taxidb;
    use taxidb;

```
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MySQL [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
4 rows in set (0.00 sec)

MySQL [(none)]> create database taxidb;
Query OK, 1 row affected (0.01 sec)

MySQL [(none)]> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| taxidb             |
+--------------------+
5 rows in set (0.01 sec)

MySQL [(none)]> use taxidb;
Database changed
MySQL [taxidb]>
```

14. Run below command to create Vendor table schema in RDS taxidb.

Command:

```
create table Vendor
(
VendorID INT,
tpep_pickup_datetime DATETIME,
tpep_dropoff_datetime DATETIME,
passenger_count INT,
trip_distance FLOAT,
RatecodeID INT,
store_and_fwd_flag VARCHAR(250),
PULocationID INT,
DOLocationID INT,
payment_type INT,
fare_amount FLOAT,
extra FLOAT,
mta_tax FLOAT,
tip_amount FLOAT,
tolls_amount FLOAT,
improvement_surcharge FLOAT,
total_amount FLOAT,
congestion_surcharge FLOAT,
airport_fee FLOAT
);
```



15. Load the tripdata csv into RDS instance by using below command.

    LOAD DATA LOCAL INFILE ''/root/mapr_assignment/input_dataset/yellow_tripdata_2017-01.csv'
    INTO TABLE Vendor
    FIELDS TERMINATED BY ','
    LINES TERMINATED BY '\n'
    IGNORE 1 LINES;

```
MySQL [taxidb]> LOAD DATA LOCAL INFILE '/root/mapr_assignment/input_dataset/yellow_tripdata_2017-01.csv'
    -> INTO TABLE Vendor
    -> FIELDS TERMINATED BY ','
    -> LINES TERMINATED BY '\n'
    -> IGNORE 1 LINES;

Query OK, 9710820 rows affected, 65535 warnings (2 min 31.33 sec)
Records: 9710820  Deleted: 0  Skipped: 0  Warnings: 19421640

MySQL [taxidb]>
```

16. Verify the count from Vendor table
    Select count(*) from Vendor

```
MySQL [taxidb]>
MySQL [taxidb]> select count(*) from Vendor;
+----------+
| count(*) |
+----------+
|  9710820 |
+----------+
1 row in set (20.81 sec)

MySQL [taxidb]>
```

17. Verify count with CSV file
    wc -l yellow_tripdata_2017-01.csv
    9710821

    file contain column as well so data count = 9710821

```
[root@ip-172-31-6-159 input_dataset]# wc -l yellow_tripdata_2017-01.csv
9710821 yellow_tripdata_2017-01.csv
[root@ip-172-31-6-159 input_dataset]# wc -l yellow_tripdata_2017-02.csv
9169776 yellow_tripdata_2017-02.csv
[root@ip-172-31-6-159 input_dataset]#
```

18. Load the 2nd tripdata csv into RDS instance by using below command.

    LOAD DATA LOCAL INFILE '/root/mapr_assignment/input_dataset/yellow_tripdata_2017-02.csv'
    INTO TABLE Vendor
    FIELDS TERMINATED BY ','
    LINES TERMINATED BY '\n'
    IGNORE 1 LINES;

```
MySQL [taxidb]> LOAD DATA LOCAL INFILE '/root/mapr_assignment/input_dataset/yellow_tripdata_2017-02.csv' INTO TABLE Vendor FIELDS TERMINATED BY ',' LINES TERMINATED BY '\n' IGNO
RE 1 LINES;
```

19. Display top 5 records from the table
    Select * from vendor limit 5;

```
MySQL [taxidb]> select * from Vendor limit 5;
+----------+----------------------+----------------------+-----------------+---------------+------------+--------------------+--------------+--------------+--------------+-----
-------+-------+---------+------------+-------------+---------------------+-------------+---------------------+-------------+
| VendorID | tpep_pickup_datetime | tpep_dropoff_datetime | passenger_count | trip_distance | RatecodeID | store_and_fwd_flag | PULocationID | DOLocationID | payment_type | fare
_amount | extra | mta_tax | tip_amount | tolls_amount | improvement_surcharge | total_amount | congestion_surcharge | airport_fee |
+----------+----------------------+----------------------+-----------------+---------------+------------+--------------------+--------------+--------------+--------------+-----
-------+-------+---------+------------+-------------+---------------------+-------------+---------------------+-------------+
|        1 | 2017-01-01 00:32:05  | 2017-01-01 00:37:48  |               1 |           1.2 |          1 | N                  |          140 |          236 |            2 |
   6.5 |   0.5 |     0.5 |          0 |           0 |                 0.3 |         7.8 |                   0 |           0 |
|        1 | 2017-01-01 00:43:25  | 2017-01-01 00:47:42  |               2 |           0.7 |          1 | N                  |          237 |          140 |            2 |
     5 |   0.5 |     0.5 |          0 |           0 |                 0.3 |         6.3 |                   0 |           0 |
|        1 | 2017-01-01 00:49:10  | 2017-01-01 00:53:53  |               2 |           0.8 |          1 | N                  |          140 |          237 |            2 |
   5.5 |   0.5 |     0.5 |          0 |           0 |                 0.3 |         6.8 |                   0 |           0 |
|        1 | 2017-01-01 00:36:42  | 2017-01-01 00:41:09  |               1 |           1.1 |          1 | N                  |           41 |           42 |            2 |
     6 |   0.5 |     0.5 |          0 |           0 |                 0.3 |         7.3 |                   0 |           0 |
|        1 | 2017-01-01 00:07:41  | 2017-01-01 00:18:16  |               1 |             3 |          1 | N                  |           48 |          263 |            2 |
    11 |   0.5 |     0.5 |          0 |           0 |                 0.3 |        12.3 |                   0 |           0 |
+----------+----------------------+----------------------+-----------------+---------------+------------+--------------------+--------------+--------------+--------------+-----
-------+-------+---------+------------+-------------+---------------------+-------------+---------------------+-------------+
5 rows in set (0.01 sec)
```

```
2023-08-29 18:50:32,127 INFO orm.CompilationManager: Writing jar file: /tmp/sqoop-root/compile/42771f3286140c5b0c9fe4f459428cf0/Vendor.jar
2023-08-29 18:50:32,146 WARN manager.MySQLManager: It looks like you are importing from mysql.
2023-08-29 18:50:32,146 WARN manager.MySQLManager: This transfer can be faster! Use the --direct
2023-08-29 18:50:32,146 WARN manager.MySQLManager: option to exercise a MySQL-specific fast path.
2023-08-29 18:50:32,147 INFO manager.MySQLManager: Setting zero DATETIME behavior to convertToNull (mysql)
2023-08-29 18:50:32,171 INFO mapreduce.ImportJobBase: Beginning import of Vendor
2023-08-29 18:50:32,308 INFO Configuration.deprecation: mapred.jar is deprecated. Instead, use mapreduce.job.jar
2023-08-29 18:50:32,327 INFO Configuration.deprecation: mapred.map.tasks is deprecated. Instead, use mapreduce.job.maps
2023-08-29 18:50:33,937 WARN mapreduce.TableMapReduceUtil: The addDependencyJars(Configuration, Class<?>...) method has been deprecated since it is easy to use incorrectly. M
 users should rely on addDependencyJars(Job) instead. See HBASE-8386 for more details.
2023-08-29 18:50:34,162 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at ip-172-30-2-198.ec2.internal/172.30.2.198:8032
2023-08-29 18:50:34,325 INFO client.AHSProxy: Connecting to Application History server at ip-172-30-2-198.ec2.internal/172.30.2.198:10200
2023-08-29 18:50:34,937 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/root/.staging/job_1693332422648_0003
2023-08-29 18:50:40,405 INFO db.DBInputFormat: Using read commited transaction isolation
2023-08-29 18:50:40,406 INFO db.DataDrivenDBInputFormat: BoundingValsQuery: SELECT MIN(`tpep_pickup_datetime`), MAX(`tpep_pickup_datetime`) FROM `Vendor`
2023-08-29 18:51:20,547 INFO db.IntegerSplitter: Split size: 1274399750; Num splits: 4 from: 1483228800000 to: 1488326399000
2023-08-29 18:51:20,634 INFO mapreduce.JobSubmitter: number of splits:4
2023-08-29 18:51:20,809 INFO Configuration.deprecation: yarn.resourcemanager.system-metrics-publisher.enabled is deprecated. Instead, use yarn.system-metrics-publisher.enable
2023-08-29 18:51:20,964 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1693332422648_0003
2023-08-29 18:51:20,965 INFO mapreduce.JobSubmitter: Executing with tokens: []
2023-08-29 18:51:21,168 INFO conf.Configuration: resource-types.xml not found
2023-08-29 18:51:21,169 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2023-08-29 18:51:21,708 INFO impl.YarnClientImpl: Submitted application application_1693332422648_0003
2023-08-29 18:51:21,740 INFO mapreduce.Job: The url to track the job: http://ip-172-30-2-198.ec2.internal:20888/proxy/application_1693332422648_0003/
2023-08-29 18:51:21,740 INFO mapreduce.Job: Running job: job_1693332422648_0003
```