Big Data Exam

```
Hive Session ID = 7fb68362-0d7f-4aa0-9239-867219f0884d
Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execution engine (i.e. spark, te
z) or using Hive 1.X releases.
hive> use cdac_vijay;
OK
Time taken: 0.338 seconds
hive> desc airport_data;
OK
airport_id              int
name                    string
city                    string
country                 string
iata                    string
icao                    string
latitude                double
longitude               double
altitude                int
timezone                double
dst                     string
tz                      string
Time taken: 0.13 seconds, Fetched: 12 row(s)
hive> desc airlines_data;
OK
airline_id              int
name                    string
alias                   string
iata                    string
icao                    string
callsign                string
country                 string
active                  string
Time taken: 0.035 seconds, Fetched: 8 row(s)
hive> desc routes_data;
OK
airline_iata            string
airline_id              int
src_airport_iata        string
src_airport_id          int
dest_airport_iata       string
dest_airport_id         int
codeshare               string
stops                   int
equipment               string
Time taken: 0.036 seconds, Fetched: 9 row(s)
hive>
```


```
airport_id              int
name                    string
city                    string
country                 string
iata                    string
icao                    string
latitude                double
longitude               double
altitude                int
timezone                double
dst                     string
tz                      string
Time taken: 0.13 seconds, Fetched: 12 row(s)
hive> desc airlines_data;
OK
airline_id              int
name                    string
alias                   string
iata                    string
icao                    string
callsign                string
country                 string
active                  string
```

Big Data Exam

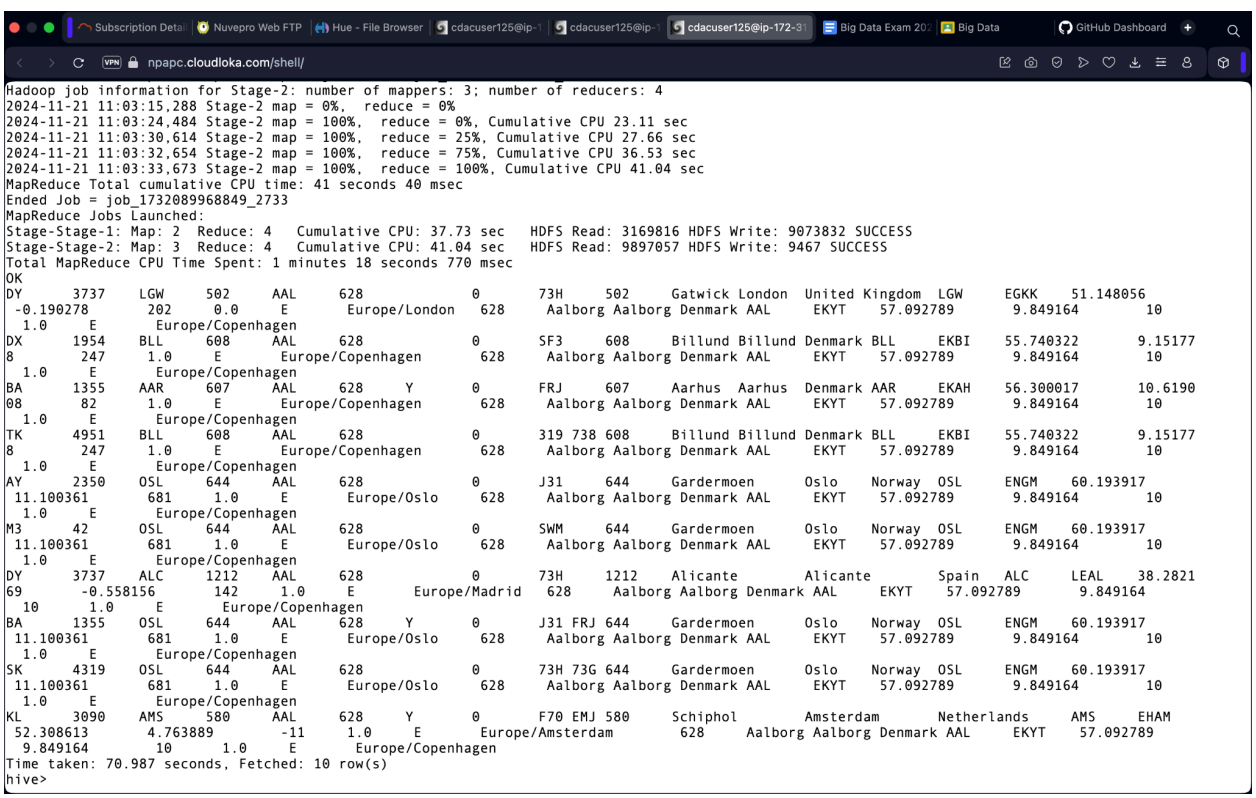
```
Time taken: 0.035 seconds, Fetched: 8 row(s)
hive> desc routes_data;
OK
airline_iata            string
airline_id              int
src_airport_iata        string
src_airport_id          int
dest_airport_iata       string
dest_airport_id         int
codeshare               string
stops                   int
equipment               string
Time taken: 0.036 seconds, Fetched: 9 row(s)
```

Hive:

Q 1:

1)

```
select * from routes_data r join airport_data src on
src.iata=r.src_airport_iata join airport_data dest on dest.iata
=r.dest_airport_iata
where src.iata=r.src_airport_iata and src.iata !=r.dest_airport_iata
limit 10;
```



```
Hadoop job information for Stage-2: number of mappers: 3; number of reducers: 4
2024-11-21 11:03:15,288 Stage-2 map = 0%,  reduce = 0%
2024-11-21 11:03:24,484 Stage-2 map = 100%,  reduce = 0%, Cumulative CPU 23.11 sec
2024-11-21 11:03:30,614 Stage-2 map = 100%,  reduce = 25%, Cumulative CPU 27.66 sec
2024-11-21 11:03:32,654 Stage-2 map = 100%,  reduce = 75%, Cumulative CPU 36.53 sec
2024-11-21 11:03:33,673 Stage-2 map = 100%,  reduce = 100%, Cumulative CPU 41.04 sec
MapReduce Total cumulative CPU time: 41 seconds 40 msec
Ended Job = job_1732089968849_2733
MapReduce Jobs Launched:
Stage-Stage-1: Map: 2  Reduce: 4   Cumulative CPU: 37.73 sec   HDFS Read: 3169816 HDFS Write: 9073832 SUCCESS
Stage-Stage-2: Map: 3  Reduce: 4   Cumulative CPU: 41.04 sec   HDFS Read: 9897057 HDFS Write: 9467 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 18 seconds 770 msec
OK
DY      3737    LGW     502     AAL     628             0       73H     502     Gatwick London  United Kingdom  LGW     EGKK    51.148056
 -0.190278       202     0.0     E       Europe/London   628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
DX      1954    BLL     608     AAL     628             0       SF3     608     Billund Billund Denmark BLL     EKBI    55.740322       9.15177
8        247     1.0     E       Europe/Copenhagen       628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
BA      1355    AAR     607     AAL     628     Y       0       FRJ     607     Aarhus  Aarhus  Denmark AAR     EKAH    56.300017       10.6190
08       82      1.0     E       Europe/Copenhagen       628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
TK      4951    BLL     608     AAL     628             0       319 738 608     Billund Billund Denmark BLL     EKBI    55.740322       9.15177
8        247     1.0     E       Europe/Copenhagen       628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
AY      2350    OSL     644     AAL     628             0       J31     644     Gardermoen      Oslo    Norway  OSL     ENGM    60.193917
 11.100361       681     1.0     E       Europe/Oslo     628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
M3      42      OSL     644     AAL     628             0       SWM     644     Gardermoen      Oslo    Norway  OSL     ENGM    60.193917
 11.100361       681     1.0     E       Europe/Oslo     628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
DY      3737    ALC     1212    AAL     628             0       73H     1212    Alicante        Alicante        Spain   ALC     LEAL    38.2821
69       -0.558156       142     1.0     E       Europe/Madrid   628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164
  10      1.0     E       Europe/Copenhagen
BA      1355    OSL     644     AAL     628     Y       0       J31 FRJ 644     Gardermoen      Oslo    Norway  OSL     ENGM    60.193917
 11.100361       681     1.0     E       Europe/Oslo     628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
SK      4319    OSL     644     AAL     628             0       73H 73G 644     Gardermoen      Oslo    Norway  OSL     ENGM    60.193917
 11.100361       681     1.0     E       Europe/Oslo     628     Aalborg Aalborg Denmark AAL     EKYT    57.092789       9.849164        10
  1.0     E       Europe/Copenhagen
KL      3090    AMS     580     AAL     628     Y       0       F70 EMJ 580     Schiphol        Amsterdam       Netherlands     AMS     EHAM
 52.308613       4.763889        -11     1.0     E       Europe/Amsterdam        628     Aalborg Aalborg Denmark AAL     EKYT    57.092789
  9.849164        10      1.0     E       Europe/Copenhagen
Time taken: 70.987 seconds, Fetched: 10 row(s)
hive>
```

Big Data Exam

2)

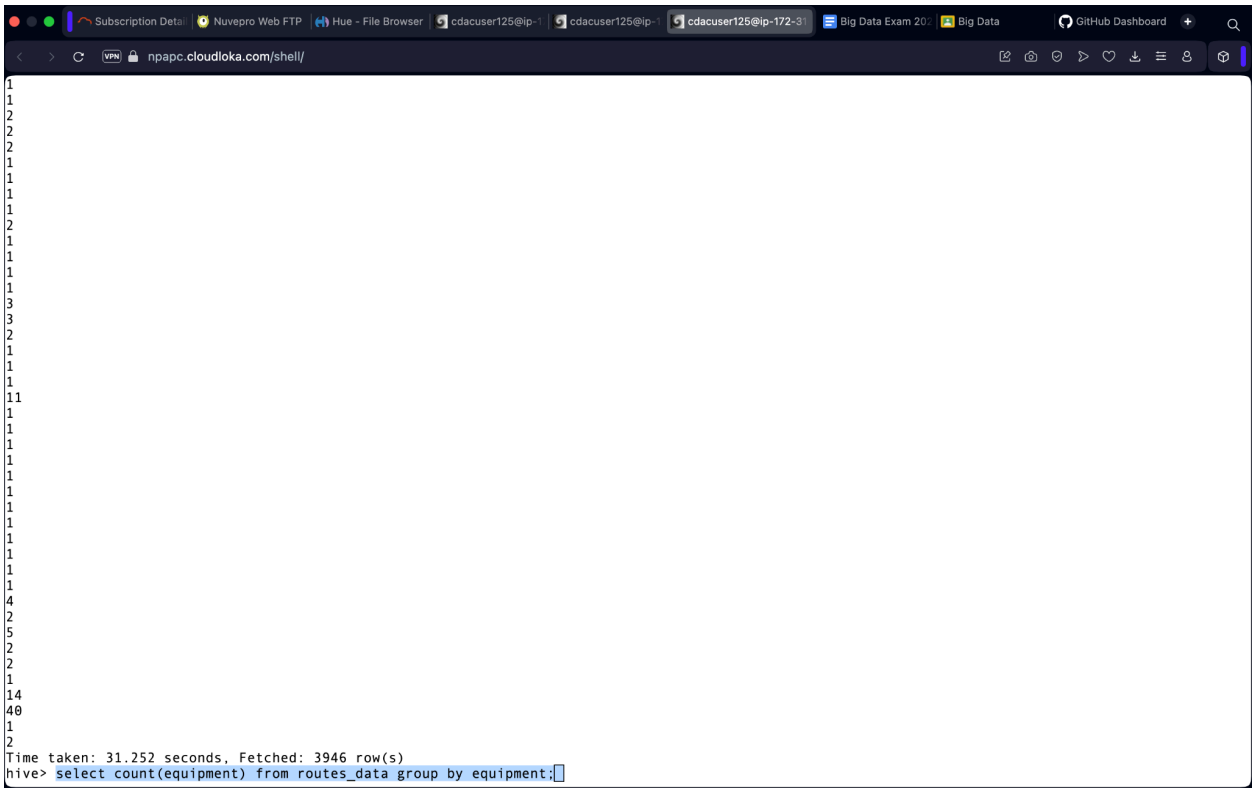
```
select r.src_airport_iata , b.name from routes_data r join
airlines_data b on r.src_airport_iata = b.iata  order by
r.src_airport_iata desc limit 3;
```

```
sc limit 3;
Query ID = cdacuser125_20241121111449_5b6c90d4-857b-4d95-a027-0c0d4d86eefd
Total jobs = 2
Launching Job 1 out of 2
Number of reduce tasks not specified. Defaulting to jobconf value of: 4
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapreduce.job.reduces=<number>
Starting Job = job_1732089968849_2809, Tracking URL = http://master:6318/proxy/application_1732089968849_2809/
Kill Command = /opt/hadoop/bin/mapred job  -kill job_1732089968849_2809
Hadoop job information for Stage-1: number of mappers: 2; number of reducers: 4
2024-11-21 11:15:00,199 Stage-1 map = 0%,  reduce = 0%
2024-11-21 11:15:07,340 Stage-1 map = 50%,  reduce = 0%, Cumulative CPU 6.57 sec
2024-11-21 11:15:09,378 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 12.51 sec
2024-11-21 11:15:13,450 Stage-1 map = 100%,  reduce = 75%, Cumulative CPU 22.41 sec
2024-11-21 11:15:14,469 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 25.98 sec
MapReduce Total cumulative CPU time: 25 seconds 980 msec
Ended Job = job_1732089968849_2809
Launching Job 2 out of 2
Number of reduce tasks determined at compile time: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapreduce.job.reduces=<number>
Starting Job = job_1732089968849_2814, Tracking URL = http://master:6318/proxy/application_1732089968849_2814/
Kill Command = /opt/hadoop/bin/mapred job  -kill job_1732089968849_2814
Hadoop job information for Stage-2: number of mappers: 1; number of reducers: 1
2024-11-21 11:15:28,598 Stage-2 map = 0%,  reduce = 0%
2024-11-21 11:15:35,753 Stage-2 map = 100%,  reduce = 0%, Cumulative CPU 2.81 sec
2024-11-21 11:15:43,898 Stage-2 map = 100%,  reduce = 100%, Cumulative CPU 6.05 sec
MapReduce Total cumulative CPU time: 6 seconds 50 msec
Ended Job = job_1732089968849_2814
MapReduce Jobs Launched:
Stage-Stage-1: Map: 2  Reduce: 4   Cumulative CPU: 25.98 sec   HDFS Read: 2725137 HDFS Write: 384 SUCCESS
Stage-Stage-2: Map: 1  Reduce: 1   Cumulative CPU: 6.05 sec   HDFS Read: 8535 HDFS Write: 87 SUCCESS
Total MapReduce CPU Time Spent: 32 seconds 30 msec
OK
Time taken: 57.452 seconds
hive>
```

3)

```
select count(equipment) from routes_data group by equipment;
                        OR
select distinct(equipment) from routes_data ;
```

Big Data Exam



Q2)

1)

Here we are performing static partition on dest_airport_iata column where the iata= KZN

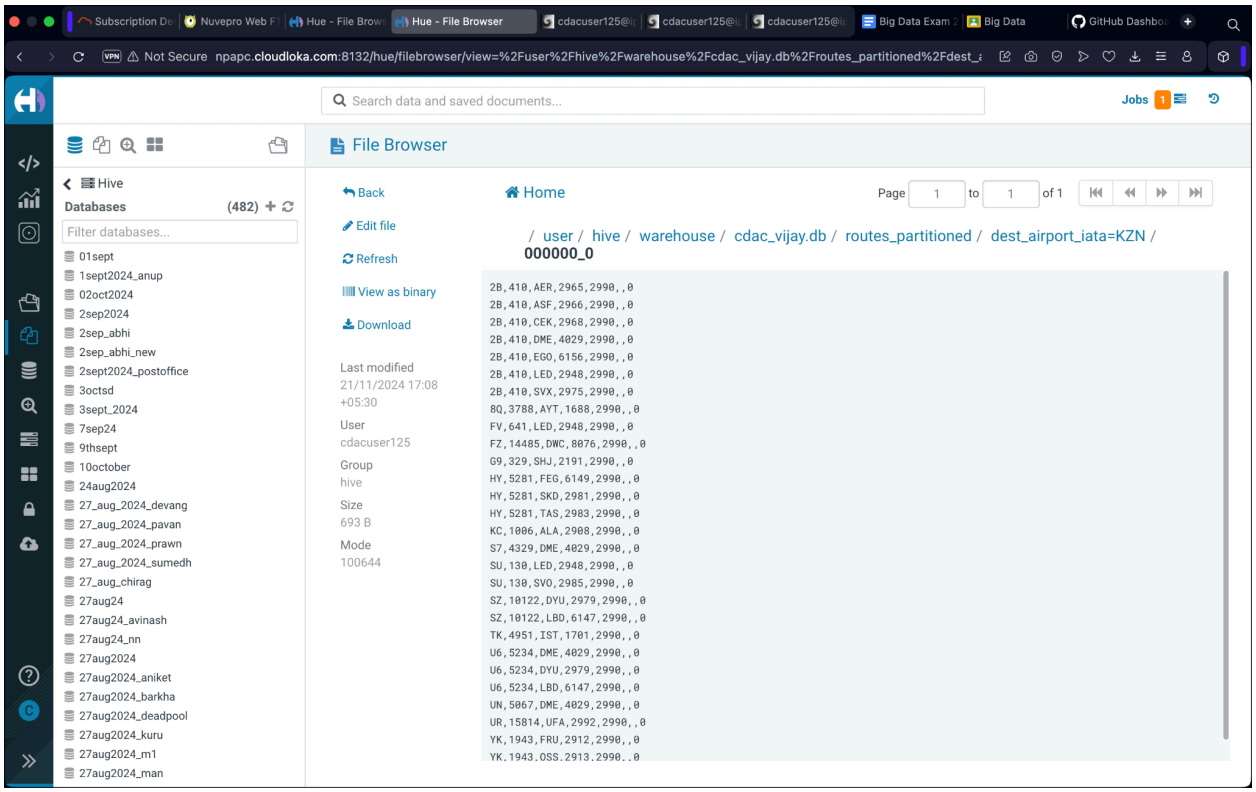
Table Schema:

```
create table routes_partitioned (airline_iata string, airline_id int,
src_airport_iata string , src_airport_id int, dest_airport_id int,
codeshare string, stops int) partitioned by (dest_airport_iata
string) row format delimited fields terminated by ',' stored as
textfile;
```

Overwriting the table

```
insert overwrite table routes_partitioned
partition(dest_airport_iata) select airline_iata , airline_id ,
src_airport_iata  , src_airport
_id , dest_airport_id, codeshare , stops , dest_airport_iata from
routes_data where dest_airport_iata = 'KZN';
```

Big Data Exam

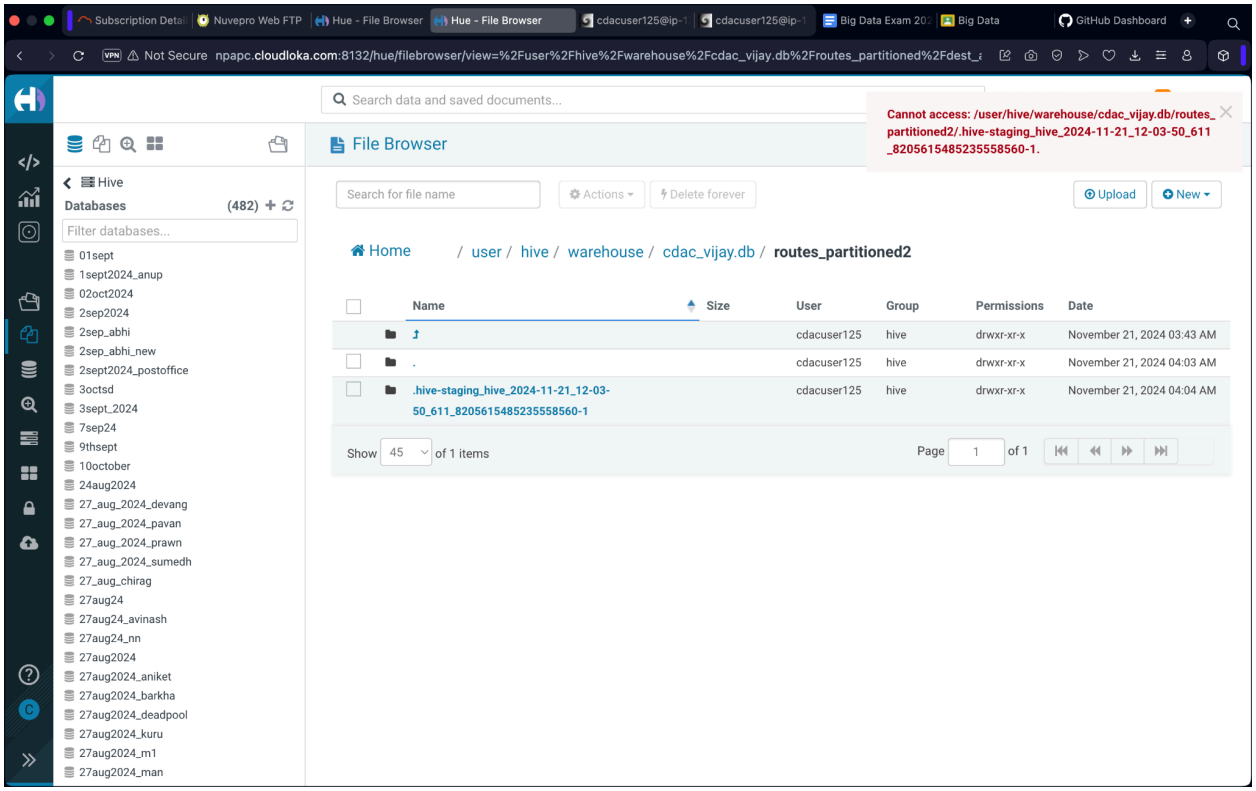


Dynamic partitioning

```
SET hive.exec.dynamic.partition=true;

SET hive.exec.dynamic.partition.mode=nonstrict;



create table routes_partitioned2 (airline_iata string, airline_id
int, src_airport_iata string , src_airport_id int, dest_airport_id
int,
codeshare string, stops int) partitioned by (dest_airport_iata
string) row format delimited fields terminated by ',' stored as orc;

insert overwrite table routes_partitioned2
partition(dest_airport_iata) select airline_iata , airline_id ,
src_airport_iata  , src_airport_id , dest_airport_id, codeshare ,
stops , dest_airport_iata from routes_data;
```

Big Data Exam

The shell is not handling the jobs properly partitions canot be added



2)

Orc format support ddl commands

```
insert into routes_partitioned2 values ("hji",789,"HJK",
786,"MGN",567,899,"HUJ",0) partition(dest_airport_iata='ORD');
```

3)

```
select * from routes_partitioned2 partition
(dest_airport_iata='ORD');
```

4)

In hive the num of distinct dest_airport_iata are the number of partitions

```
Select distinct(dest_airport_iata),count(*) from routes_partitioned2;
```

Sir teached us the way in spark sql In spark.sql

```
df = spark.sql("select * form routes_partitioned2")
df.show()
df.getNumPartitions()
```

Big Data Exam

Spark:

Q1)

1)

```
df.resisterTempTable("airline")
booked_seats = spark.sql("select count(*) from airline where
booked_seats between 20000 and 50000")
booked_seats.show()
+--------+
|count(1)|
+--------+
|      84|
+--------+
```

Big Data Exam

```
|1998|      4|          316.18|       35393|
|1999|      1|          331.74|       47453|
|1999|      2|          329.34|       38243|
|1999|      3|          317.22|       33048|
|1999|      4|          317.93|       31256|
+----+-------+----------------+------------+
only showing top 20 rows

>>> df.resisterTempTable("airline")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "/opt/spark-3.1.2/python/pyspark/sql/dataframe.py", line 1643, in __getattr__
    raise AttributeError(
AttributeError: 'DataFrame' object has no attribute 'resisterTempTable'
>>> df.registerTempTable("airline")
>>> booked_seats = spark.sql("select count(*) from airlines where booked_seats between 20000 and 50000")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "/opt/spark-3.1.2/python/pyspark/sql/session.py", line 723, in sql
    return DataFrame(self._jsparkSession.sql(sqlQuery), self._wrapped)
  File "/opt/spark-3.1.2/python/lib/py4j-0.10.9-src.zip/py4j/java_gateway.py", line 1304, in __call__
  File "/opt/spark-3.1.2/python/pyspark/sql/utils.py", line 117, in deco
    raise converted from None
pyspark.sql.utils.AnalysisException: cannot resolve '`booked_seats`' given input columns: [spark_catalog.default.airlines.active, spark_catalog
.default.airlines.airline_id, spark_catalog.default.airlines.alias, spark_catalog.default.airlines.callsign, spark_catalog.default.airlines.cou
ntry, spark_catalog.default.airlines.iata, spark_catalog.default.airlines.icao, spark_catalog.default.airlines.name]; line 1 pos 36;
'Aggregate [unresolvedalias(count(1), None)]
+- 'Filter (('booked_seats >= 20000) AND ('booked_seats <= 50000))
   +- SubqueryAlias spark_catalog.default.airlines
      +- HiveTableRelation [`default`.`airlines`, org.apache.hadoop.hive.serde2.lazy.LazySimpleSerDe, Data Cols: [airline_id#263, name#264, ali
as#265, iata#266, icao#267, callsign#268, country#269, active#270], Partition Cols: []]

>>> booked_seats = spark.sql("select count(*) from airline where booked_seats between 20000 and 50000")
>>> booed_seats.show()
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'booed_seats' is not defined
>>> booked_seats.show()
+--------+
|count(1)|
+--------+
|      84|
+--------+

>>>
```

2)

Q2)

```
df = spark.read.csv('/user/cdacuser125/airlines1.csv' , header=True,
inferSchema=True)
>>> df.count()
84
>>> df.printSchema()
root
|-- Year: integer (nullable = true)
|-- Quarter: integer (nullable = true)
|-- Avg_rev_per_seat: double (nullable = true)
|-- booked_seats: integer (nullable = true)

>>> df.show()
+----+-------+----------------+------------+
```

Big Data Exam

```
|Year|Quarter|Avg_rev_per_seat|booked_seats|
+----+-------+----------------+------------+
|1995|      1|           296.9|       46561|
|1995|      2|           296.8|       37443|
|1995|      3|          287.51|       34128|
|1995|      4|          287.78|       30388|
|1996|      1|          283.97|       47808|
|1996|      2|          275.78|       43020|
|1996|      3|          269.49|       38952|
|1996|      4|          278.33|       37443|
|1997|      1|           283.4|       35067|
|1997|      2|          289.44|       46565|
|1997|      3|          282.27|       38886|
|1997|      4|          293.51|       37454|
|1998|      1|          304.74|       31315|
|1998|      2|          300.97|       30852|
|1998|      3|          315.25|       38118|
|1998|      4|          316.18|       35393|
|1999|      1|          331.74|       47453|
|1999|      2|          329.34|       38243|
|1999|      3|          317.22|       33048|
|1999|      4|          317.93|       31256|
+----+-------+----------------+------------+
only showing top 20 rows
```

1)

```
from pyspark.sql.functions import min,max,avg
avg_seats = df.agg(avg("booked_seats").alias("avg"))
>>> avg_seats.show()
+-----------------+
|              avg|
+-----------------+
|39640.70238095238|
+-----------------+

>>>
max_seats = df.agg(max("booked_seats").alias("max"))
>>> max_seats.show()
+-----+
|  max|
+-----+
|49678|
+-----+
```

Big Data Exam

```
>>>
min_seats = df.agg(min("booked_seats").alias("min"))

>>> min_seats.show()
+-----+
|  min|
+-----+
|30103|
+-----+
```

```
Subscription De | Nuvepro Web F | Hue - File Brow | Hue - File Brow | cdacuser125@ip | cdacuser125@ip | cdacuser125@ip-172-31 | Big Data Exam | Big Data | GitHub Dashbo
npapc.cloudloka.com/shell/
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "/opt/spark-3.1.2/python/pyspark/sql/dataframe.py", line 1643, in __getattr__
    raise AttributeError(
AttributeError: 'DataFrame' object has no attribute 'avg'
>>> avg_seats = df.avg("booked_seats")
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
  File "/opt/spark-3.1.2/python/pyspark/sql/dataframe.py", line 1643, in __getattr__
    raise AttributeError(
AttributeError: 'DataFrame' object has no attribute 'avg'
>>> avg_seats = df.agg(avg("booked_seats").alias("avg"))
>>> avg_seats.show()
+-----------------+
|              avg|
+-----------------+
|39640.70238095238|
+-----------------+

>>> max_seats = df.agg(max("booked_seats").alias("max"))
>>> max_seats.show()
+-----+
|  max|
+-----+
|49678|
+-----+

>>> min_seats = df.agg(min("booked_seats").alias("min"))
>>> min
min(       min_seats  minute(
>>> min_seats.show()
+-----+
|  min|
+-----+
|30103|
+-----+

>>> less_rev = df.filter("Avg_rev_per_seat"<290)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: '<' not supported between instances of 'str' and 'int'
>>> less_rev = df.filter("Avg_rev_per_seat<290")
>>> less_rev.co
less_rev.coalesce(  less_rev.colRegex(  less_rev.collect(   less_rev.columns    less_rev.corr(      less_rev.count(     less_rev.cov(
>>> less_rev.count()
```

```
2)
less_rev = df.filter("Avg_rev_per_seat<290")
>>> less_rev.count()
9
>>> less_rev.show()
+----+-------+----------------+------------+
|Year|Quarter|Avg_rev_per_seat|booked_seats|
+----+-------+----------------+------------+
|1995|      3|          287.51|       34128|
|1995|      4|          287.78|       30388|
|1996|      1|          283.97|       47808|
|1996|      2|          275.78|       43020|
|1996|      3|          269.49|       38952|
```

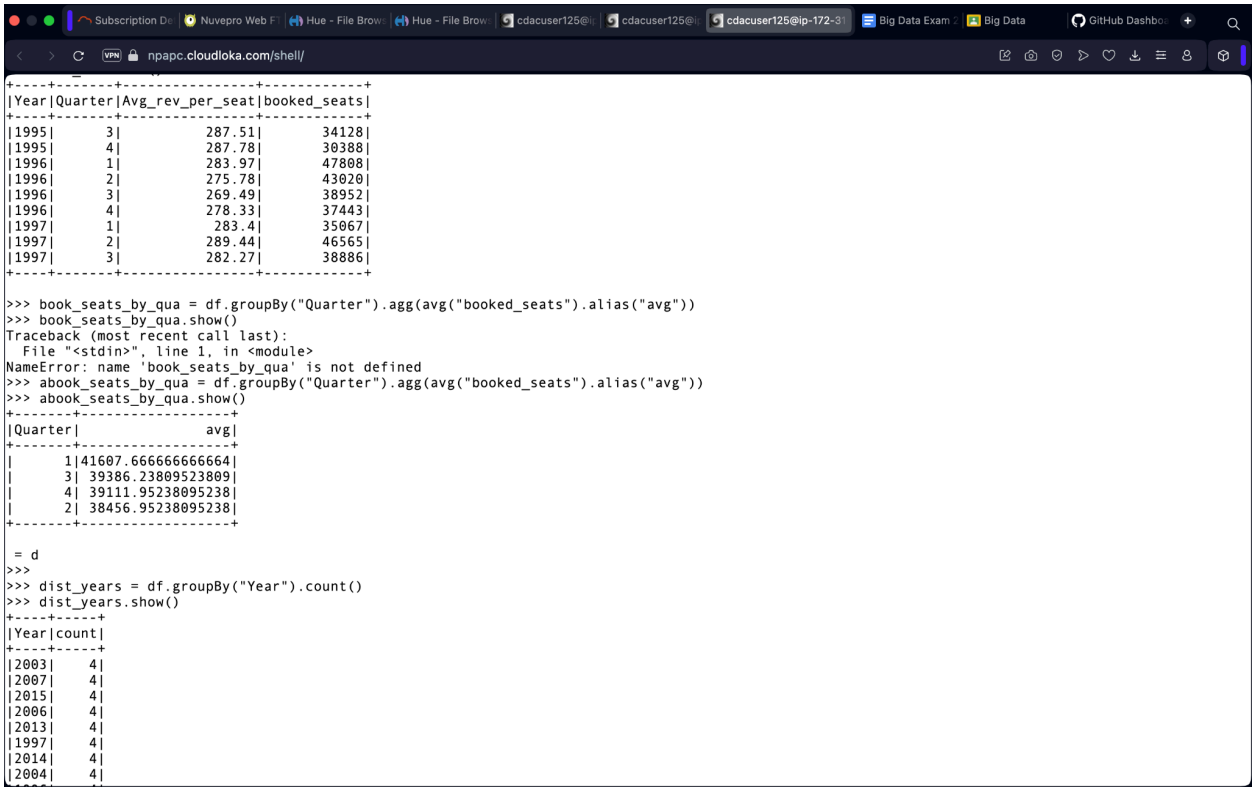
Big Data Exam

```
|1996|       4|           278.33|        37443|
|1997|       1|            283.4|        35067|
|1997|       2|           289.44|        46565|
|1997|       3|           282.27|        38886|
+----+-------+----------------+------------+
```

```
>>> max_seats.show()
+-----+
|  max|
+-----+
|49678|
+-----+

>>> min_seats = df.agg(min("booked_seats").alias("min"))
>>> min
min(       min_seats  minute(
>>> min_seats.show()
+-----+
|  min|
+-----+
|30103|
+-----+

>>> less_rev = df.filter("Avg_rev_per_seat"<290)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
TypeError: '<' not supported between instances of 'str' and 'int'
>>> less_rev = df.filter("Avg_rev_per_seat<290")
>>> less_rev.co
less_rev.coalesce(  less_rev.colRegex(  less_rev.collect(   less_rev.columns    less_rev.corr(      less_rev.count(     less_rev.cov(
>>> less_rev.count()
9
>>> less_rev.show()
+----+-------+----------------+------------+
|Year|Quarter|Avg_rev_per_seat|booked_seats|
+----+-------+----------------+------------+
|1995|      3|          287.51|       34128|
|1995|      4|          287.78|       30388|
|1996|      1|          283.97|       47808|
|1996|      2|          275.78|       43020|
|1996|      3|          269.49|       38952|
|1996|      4|          278.33|       37443|
|1997|      1|           283.4|       35067|
|1997|      2|          289.44|       46565|
|1997|      3|          282.27|       38886|
+----+-------+----------------+------------+

>>> book_seats_by_qua = df.groupBy("Quarter").agg(avg("booked_seats").alias("avg"))
>>> book_seats_by_qua.show()
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
```

```
>>>
3)
abook_seats_by_qua =
df.groupBy("Quarter").agg(avg("booked_seats").alias("avg"))
>>> abook_seats_by_qua.show()
+-------+------------------+
|Quarter|               avg|
+-------+------------------+
|      1|41607.666666666664|
|      3| 39386.23809523809|
|      4| 39111.95238095238|
|      2| 38456.95238095238|
+-------+------------------+
```

Big Data Exam



```
+----+-------+----------------+------------+
|Year|Quarter|Avg_rev_per_seat|booked_seats|
+----+-------+----------------+------------+
|1995|      3|          287.51|       34128|
|1995|      4|          287.78|       30388|
|1996|      1|          283.97|       47808|
|1996|      2|          275.78|       43020|
|1996|      3|          269.49|       38952|
|1996|      4|          278.33|       37443|
|1997|      1|           283.4|       35067|
|1997|      2|          289.44|       46565|
|1997|      3|          282.27|       38886|
+----+-------+----------------+------------+

>>> book_seats_by_qua = df.groupBy("Quarter").agg(avg("booked_seats").alias("avg"))
>>> book_seats_by_qua.show()
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'book_seats_by_qua' is not defined
>>> abook_seats_by_qua = df.groupBy("Quarter").agg(avg("booked_seats").alias("avg"))
>>> abook_seats_by_qua.show()
+-------+------------------+
|Quarter|               avg|
+-------+------------------+
|      1|41607.666666666664|
|      3| 39386.23809523809|
|      4| 39111.95238095238|
|      2| 38456.95238095238|
+-------+------------------+

 = d
>>>
>>> dist_years = df.groupBy("Year").count()
>>> dist_years.show()
+----+-----+
|Year|count|
+----+-----+
|2003|    4|
|2007|    4|
|2015|    4|
|2006|    4|
|2013|    4|
|1997|    4|
|2014|    4|
|2004|    4|
```

```
4)
>>> dist_years = df.groupBy("Year").count()
>>> dist_years.show()
+----+-----+
|Year|count|
+----+-----+
|2003|    4|
|2007|    4|
|2015|    4|
|2006|    4|
|2013|    4|
|1997|    4|
|2014|    4|
|2004|    4|
|1996|    4|
|1998|    4|
|2012|    4|
|2009|    4|
|1995|    4|
|2001|    4|
|2005|    4|
|2000|    4|
```

Big Data Exam

```
|2010|     4|
|2011|     4|
|2008|     4|
|1999|     4|
+----+-----+
only showing top 20 rows

>>>
```

```
>>> book_seats_by_qua = df.groupBy("Quarter").agg(avg("booked_seats").alias("avg"))
>>> book_seats_by_qua.show()
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'book_seats_by_qua' is not defined
>>> abook_seats_by_qua = df.groupBy("Quarter").agg(avg("booked_seats").alias("avg"))
>>> abook_seats_by_qua.show()
+-------+------------------+
|Quarter|               avg|
+-------+------------------+
|      1|41607.666666666664|
|      3| 39386.23809523809|
|      4| 39111.95238095238|
|      2| 38456.95238095238|
+-------+------------------+

 = d
>>>
>>> dist_years = df.groupBy("Year").count()
>>> dist_years.show()
+----+-----+
|Year|count|
+----+-----+
|2003|    4|
|2007|    4|
|2015|    4|
|2006|    4|
|2013|    4|
|1997|    4|
|2014|    4|
|2004|    4|
|1996|    4|
|1998|    4|
|2012|    4|
|2009|    4|
|1995|    4|
|2001|    4|
|2005|    4|
|2000|    4|
|2010|    4|
|2011|    4|
|2008|    4|
|1999|    4|
+----+-----+
only showing top 20 rows
```

5)

```
>>> high_rev =
df.withColumn("total_revenue",col("Avg_rev_per_seat")*col("booked_sea
ts")).groupBy("Quarter").agg(max("total_revenue")).orderBy(
"Quarter")
>>> high_rev.show()
+-------+--------------------+
|Quarter|  max(total_revenue)|
+-------+--------------------+
|      1|1.8572613990000002E7|
|      2|        1.731616761E7|
|      3|         1.81778142E7|
|      4|        1.881940848E7|
+-------+--------------------+
```

Big Data Exam

>>>

```
|2015|    4|
|2006|    4|
|2013|    4|
|1997|    4|
|2014|    4|
|2004|    4|
|1996|    4|
|1998|    4|
|2012|    4|
|2009|    4|
|1995|    4|
|2001|    4|
|2005|    4|
|2000|    4|
|2010|    4|
|2011|    4|
|2008|    4|
|1999|    4|
+----+-----+
only showing top 20 rows

>>> high_rev = df.withColumn("total_revenue",col("Avg_rev_per_seat")*col("booked_seats")).groupBy("Quarter").agg(max("total_revenue"))
>>> high_rev.show()
+-------+--------------------+
|Quarter|  max(total_revenue)|
+-------+--------------------+
|      1|1.8572613990000002E7|
|      3|        1.81778142E7|
|      4|       1.881940848E7|
|      2|       1.731616761E7|
+-------+--------------------+

>>> high_rev = df.withColumn("total_revenue",col("Avg_rev_per_seat")*col("booked_seats")).groupBy("Quarter").agg(max("total_revenue")).orderBy(
"Quarter")
>>> high_rev.show()
+-------+--------------------+
|Quarter|  max(total_revenue)|
+-------+--------------------+
|      1|1.8572613990000002E7|
|      2|       1.731616761E7|
|      3|        1.81778142E7|
|      4|       1.881940848E7|
+-------+--------------------+

>>>
```