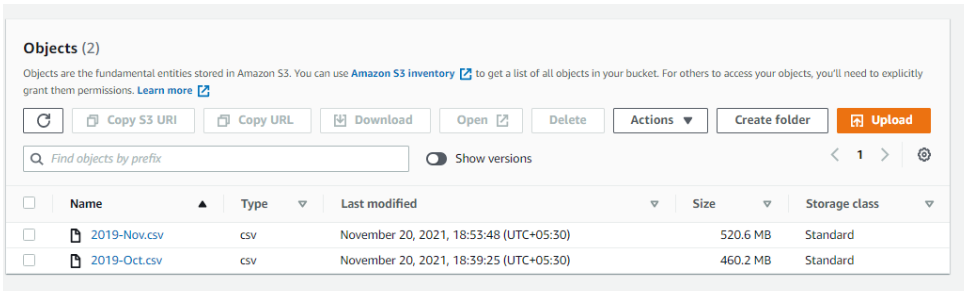
HIVE CASE STUDY

Loading the input data files into S3 bucket

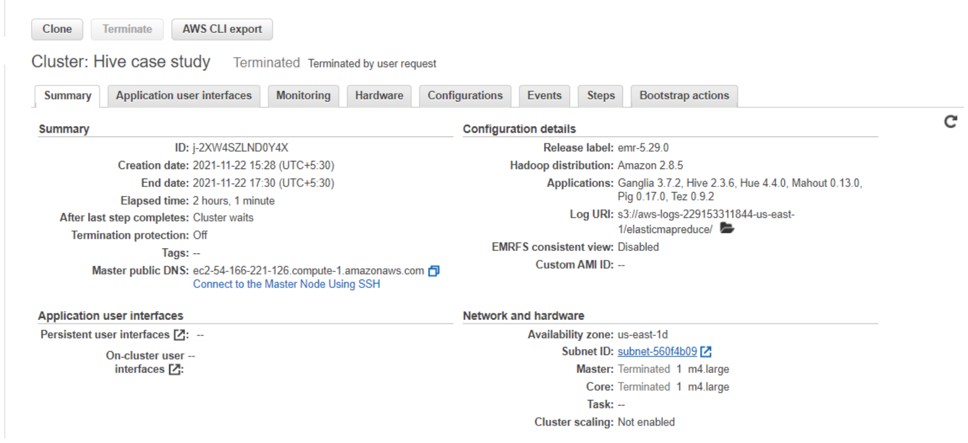


Objects (2)

Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

Name	Type	Last modified	Size	Storage class
2019-Nov.csv	csv	November 20, 2021, 18:53:48 (UTC+05:30)	520.6 MB	Standard
2019-Oct.csv	csv	November 20, 2021, 18:39:25 (UTC+05:30)	460.2 MB	Standard

Creating EMR cluster



Cluster: Hive case study Terminated Terminated by user request

Summary

ID:	j-2XW4SZLND0Y4X
Creation date:	2021-11-22 15:28 (UTC+5:30)
End date:	2021-11-22 17:30 (UTC+5:30)
Elapsed time:	2 hours, 1 minute
After last step completes:	Cluster waits
Termination protection:	Off
Tags:	--
Master public DNS:	ec2-54-166-221-126.compute-1.amazonaws.com Connect to the Master Node Using SSH

Configuration details

Release label:	emr-5.29.0
Hadoop distribution:	Amazon 2.8.5
Applications:	Ganglia 3.7.2, Hive 2.3.6, Hue 4.4.0, Mahout 0.13.0, Pig 0.17.0, Tez 0.9.2
Log URI:	s3://aws-logs-229153311844-us-east-1/elasticmapreduce/
EMRFS consistent view:	Disabled
Custom AMI ID:	--

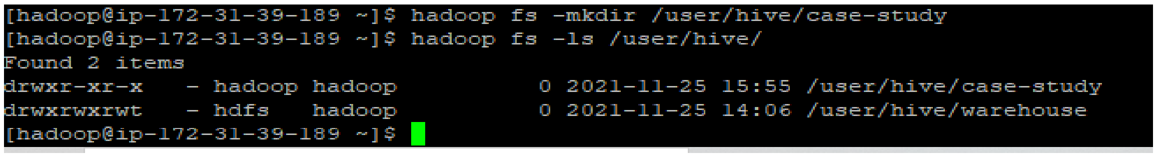
Application user interfaces

Persistent user interfaces:	--
On-cluster user interfaces:	--

Network and hardware

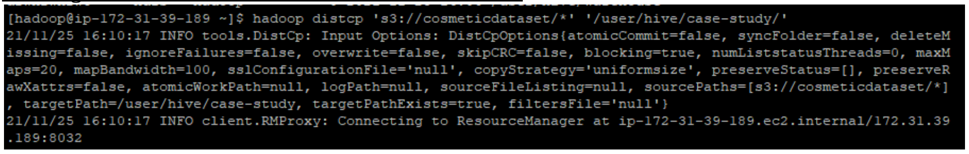
Availability zone:	us-east-1d
Subnet ID:	subnet-560f4b09
Master:	Terminated 1 m4.large
Core:	Terminated 1 m4.large
Task:	--
Cluster scaling:	Not enabled

Creating a folder in HDFS to load data

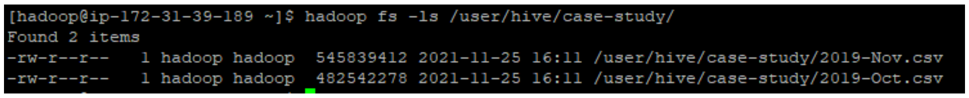


```
[hadoop@ip-172-31-39-189 ~]$ hadoop fs -mkdir /user/hive/case-study
[hadoop@ip-172-31-39-189 ~]$ hadoop fs -ls /user/hive/
Found 2 items
drwxr-xr-x   - hadoop hadoop          0 2021-11-25 15:55 /user/hive/case-study
drwxrwxrwt   - hdfs   hadoop          0 2021-11-25 14:06 /user/hive/warehouse
[hadoop@ip-172-31-39-189 ~]$
```

Moving the data from the S3 bucket into the HDFS

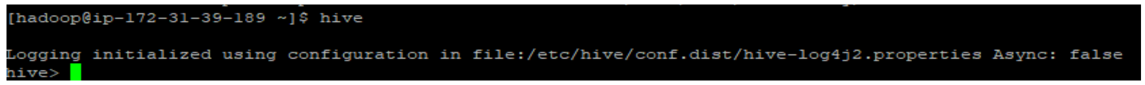


```
[hadoop@ip-172-31-39-189 ~]$ hadoop distcp 's3://cosmeticdataset/*' '/user/hive/case-study/'
21/11/25 16:10:17 INFO tools.DistCp: Input Options: DistCpOptions{atomicCommit=false, syncFolder=false, deleteM
issing=false, ignoreFailures=false, overwrite=false, skipCRC=false, blocking=true, numListstatusThreads=0, maxM
aps=20, mapBandwidth=100, sslConfigurationFile='null', copyStrategy='uniformsize', preserveStatus=[], preserveR
awXattrs=false, atomicWorkPath=null, logPath=null, sourceFileListing=null, sourcePaths=[s3://cosmeticdataset/*]
, targetPath=/user/hive/case-study, targetPathExists=true, filtersFile='null'}
21/11/25 16:10:17 INFO client.RMProxy: Connecting to ResourceManager at ip-172-31-39-189.ec2.internal/172.31.39
.189:8032
```



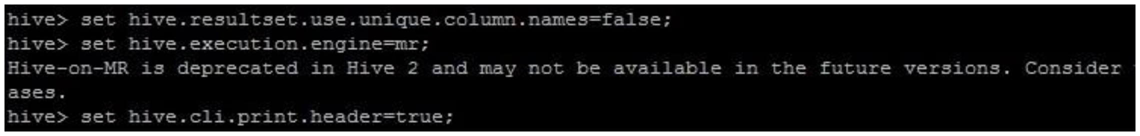
```
[hadoop@ip-172-31-39-189 ~]$ hadoop fs -ls /user/hive/case-study/
Found 2 items
-rw-r--r--   1 hadoop hadoop  545839412 2021-11-25 16:11 /user/hive/case-study/2019-Nov.csv
-rw-r--r--   1 hadoop hadoop  482542278 2021-11-25 16:11 /user/hive/case-study/2019-Oct.csv
```

Entering into Hive environment



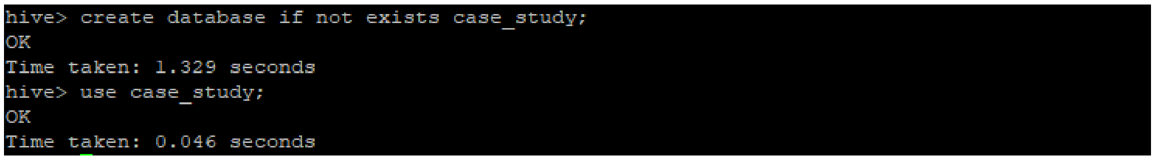
```
[hadoop@ip-172-31-39-189 ~]$ hive

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

Setting the environment in Hive



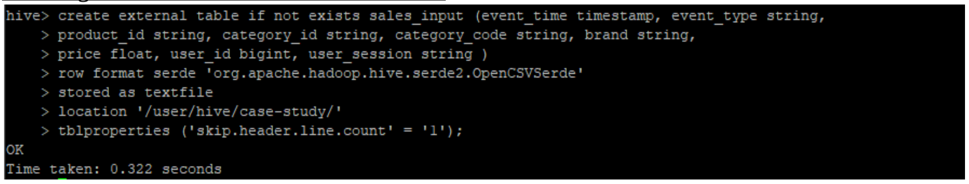
```
hive> set hive.resultset.use.unique.column.names=false;
hive> set hive.execution.engine=mr;
Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider
ases.
hive> set hive.cli.print.header=true;
```

Creating the database and using it

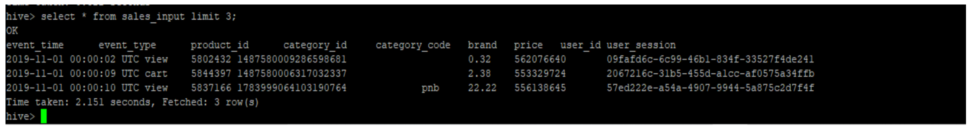


```
hive> create database if not exists case_study;
OK
Time taken: 1.329 seconds
hive> use case_study;
OK
Time taken: 0.046 seconds
```

Creating the table to load both the data files

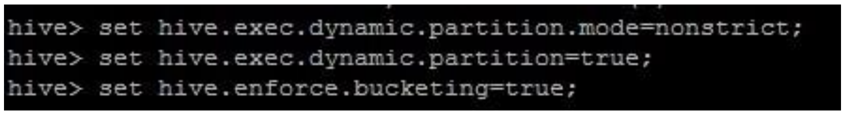


```
hive> create external table if not exists sales_input (event_time timestamp, event_type string,
    > product_id string, category_id string, category_code string, brand string,
    > price float, user_id bigint, user_session string )
    > row format serde 'org.apache.hadoop.hive.serde2.OpenCSVSerde'
    > stored as textfile
    > location '/user/hive/case-study/'
    > tblproperties ('skip.header.line.count' = '1');
OK
Time taken: 0.322 seconds
```



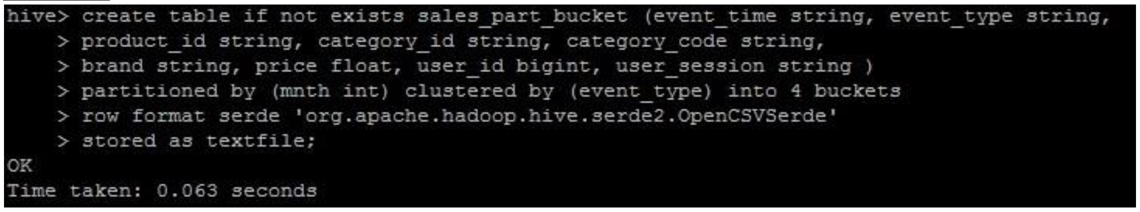
```
hive> select * from sales_input limit 3;
OK
event_time      event_type      product_id      category_id     category_code   brand   price   user_id user_session
2019-11-01 00:00:02 UTC view    5802432 1487580009286598681                     0.32    562076640       09fafd6c-6c99-46b1-834f-33527f4de241
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
Time taken: 2.151 seconds, Fetched: 3 row(s)
hive>
```

Setting the environment for the dynamic partitioning

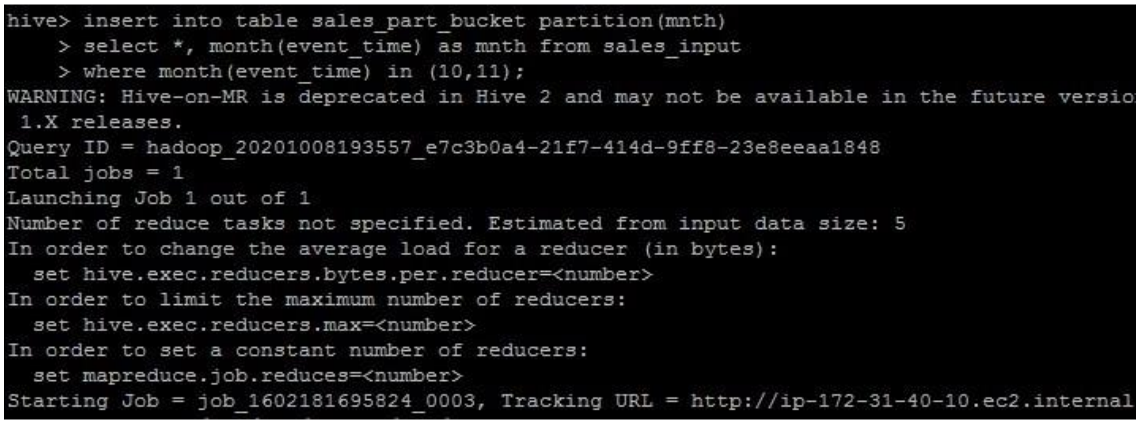


```
hive> set hive.exec.dynamic.partition.mode=nonstrict;
hive> set hive.exec.dynamic.partition=true;
hive> set hive.enforce.bucketing=true;
```

Creating table with the month ‘October’ and ‘November’ as partitions and bucketing on ‘event_type’ from the main table

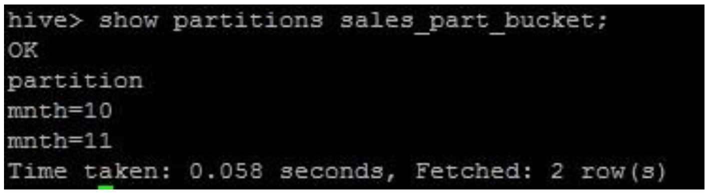


```
hive> create table if not exists sales_part_bucket (event_time string, event_type string,
    > product_id string, category_id string, category_code string,
    > brand string, price float, user_id bigint, user_session string )
    > partitioned by (mnth int) clustered by (event_type) into 4 buckets
    > row format serde 'org.apache.hadoop.hive.serde2.OpenCSVSerde'
    > stored as textfile;
OK
Time taken: 0.063 seconds
```



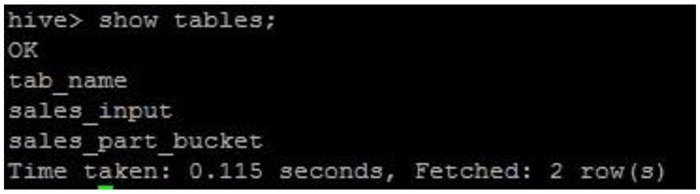
```
hive> insert into table sales_part_bucket partition(mnth)
    > select *, month(event_time) as mnth from sales_input
    > where month(event_time) in (10,11);
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versio
 1.X releases.
Query ID = hadoop_20201008193557_e7c3b0a4-21f7-414d-9ff8-23e8eeaa1848
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks not specified. Estimated from input data size: 5
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_1602181695824_0003, Tracking URL = http://ip-172-31-40-10.ec2.internal
```

Checking the partitions created for the “sales_part_bucket” table



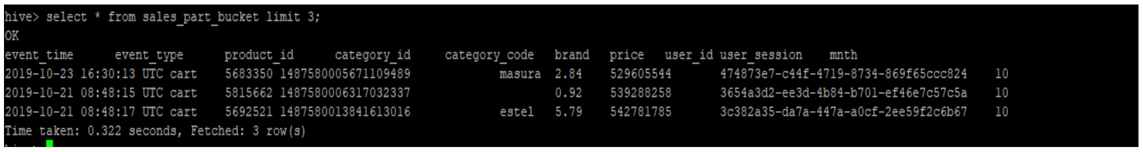
```
hive> show partitions sales_part_bucket;
OK
partition
mnth=10
mnth=11
Time taken: 0.058 seconds, Fetched: 2 row(s)
```

Checking for the tables created till now



```
hive> show tables;
OK
tab_name
sales_input
sales_part_bucket
Time taken: 0.115 seconds, Fetched: 2 row(s)
```

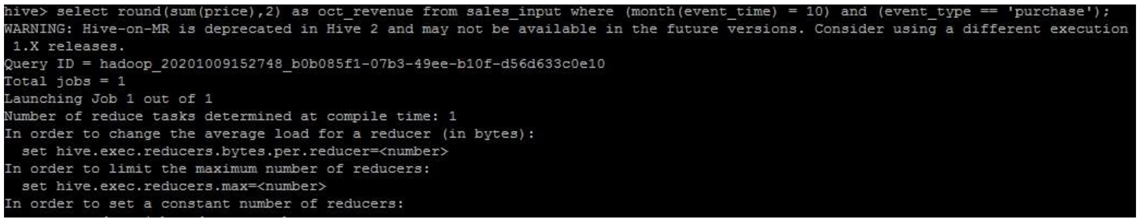
Checking the data inserted in ‘sales_part_bucket’ table

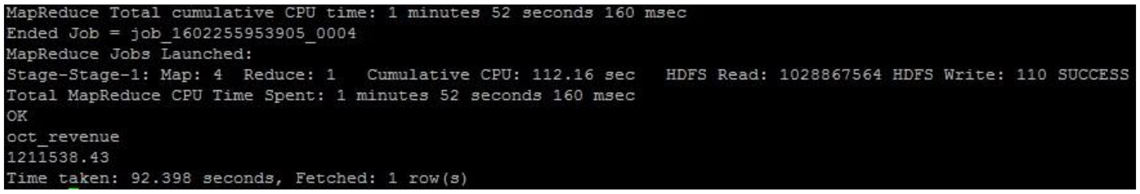


```
hive> select * from sales_part_bucket limit 3;
OK
event_time      event_type      product_id      category_id     category_code   brand   price   user_id user_session    mnth
2019-10-23 16:30:13 UTC cart    5683350 1487580005671109489             masura  2.84    529605544       474873e7-c44f-4719-8734-869f65ccc824    10
2019-10-21 08:48:15 UTC cart    5815662 1487580006317032337                     0.92    539288258       3654a3d2-ee3d-4b84-b701-ef46e7c57c5a    10
2019-10-21 08:48:17 UTC cart    5692521 1487580013841613016             estel   5.79    542781785       3c382a35-da7a-447a-a0cf-2ee59f2c6b67    10
Time taken: 0.322 seconds, Fetched: 3 row(s)
```

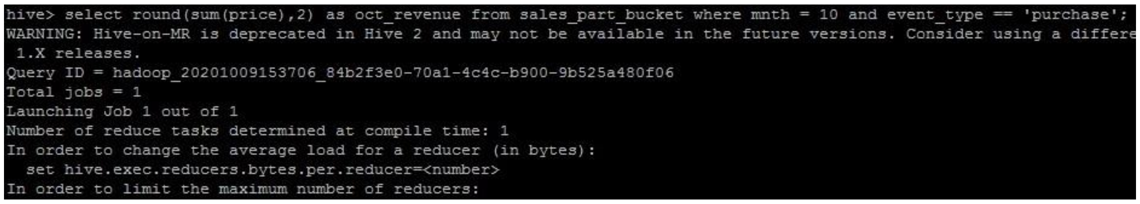
1.Find the total revenue generated due to purchases made in October

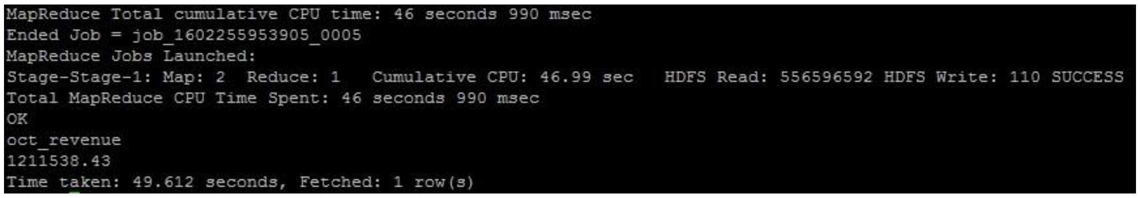
Using sales_input table


```
hive> select round(sum(price),2) as oct_revenue from sales_input where (month(event_time) = 10) and (event_type == 'purchase');
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execution
 1.X releases.
Query ID = hadoop_20201009152748_b0b085f1-07b3-49ee-b10f-d56d633c0e10
Total jobs = 1
Launching Job 1 out of 1
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:
```


```
MapReduce Total cumulative CPU time: 1 minutes 52 seconds 160 msec
Ended Job = job_1602255953905_0004
MapReduce Jobs Launched:
Stage-Stage-1: Map: 4  Reduce: 1   Cumulative CPU: 112.16 sec   HDFS Read: 1028867564 HDFS Write: 110 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 52 seconds 160 msec
OK
oct_revenue
1211538.43
Time taken: 92.398 seconds, Fetched: 1 row(s)
```

Using sales_part_bucket for optimisation for optimisation


```
hive> select round(sum(price),2) as oct_revenue from sales_part_bucket where mnth = 10 and event_type == 'purchase';
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a differe
 1.X releases.
Query ID = hadoop_20201009153706_84b2f3e0-70a1-4c4c-b900-9b525a480f06
Total jobs = 1
Launching Job 1 out of 1
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:
```

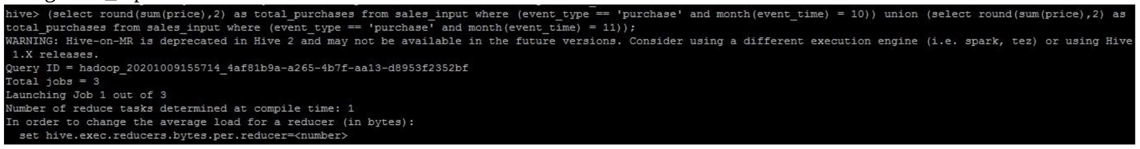

```
MapReduce Total cumulative CPU time: 46 seconds 990 msec
Ended Job = job_1602255953905_0005
MapReduce Jobs Launched:
Stage-Stage-1: Map: 2  Reduce: 1   Cumulative CPU: 46.99 sec   HDFS Read: 556596592 HDFS Write: 110 SUCCESS
Total MapReduce CPU Time Spent: 46 seconds 990 msec
OK
oct_revenue
1211538.43
Time taken: 49.612 seconds, Fetched: 1 row(s)
```

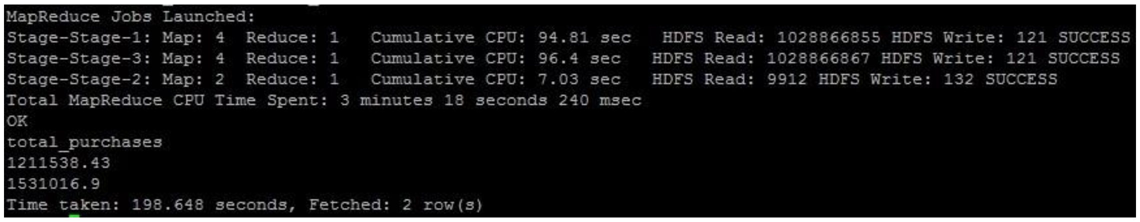
From the above, we can see that the query using the main table takes 92.398 seconds, where as when the same query is made using the partitioned table with buckets we get the output in only 49.612 seconds.

Output: So the revenue generated due to purchases in October is Rs. 1211538.43.

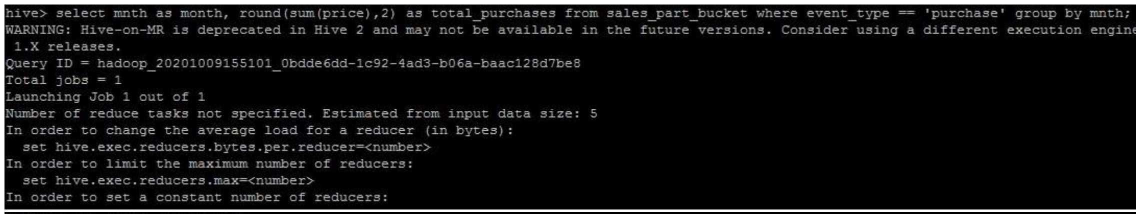
2. Write a query to yield the total sum of purchases per month in a single output.

Using sales_input table

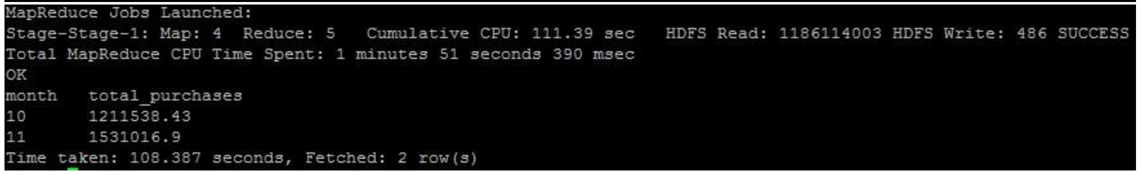

```
hive> (select round(sum(price),2) as total_purchases from sales_input where (event_type == 'purchase' and month(event_time) = 10)) union (select round(sum(price),2) as
total_purchases from sales_input where (event_type == 'purchase' and month(event_time) = 11));
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execution engine (i.e. spark, tez) or using Hive
 1.X releases.
Query ID = hadoop_20201009155714_4af81b9a-a265-4b7f-aa13-d8953f2352bf
Total jobs = 3
Launching Job 1 out of 3
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>
```


```
MapReduce Jobs Launched:
Stage-Stage-1: Map: 4  Reduce: 1   Cumulative CPU: 94.81 sec   HDFS Read: 1028866855 HDFS Write: 121 SUCCESS
Stage-Stage-3: Map: 4  Reduce: 1   Cumulative CPU: 96.4 sec   HDFS Read: 1028866867 HDFS Write: 121 SUCCESS
Stage-Stage-2: Map: 2  Reduce: 1   Cumulative CPU: 7.03 sec   HDFS Read: 9912 HDFS Write: 132 SUCCESS
Total MapReduce CPU Time Spent: 3 minutes 18 seconds 240 msec
OK
total_purchases
1211538.43
1531016.9
Time taken: 198.648 seconds, Fetched: 2 row(s)
```

Using sales_part_bucket table for optimisation



```
hive> select mnth as month, round(sum(price),2) as total_purchases from sales_part_bucket where event_type == 'purchase' group by mnth;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execution engine
 1.X releases.
Query ID = hadoop_20201009155101_0bdde6dd-1c92-4ad3-b06a-baac128d7be8
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks not specified. Estimated from input data size: 5
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:
```

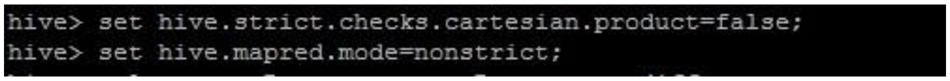


```
MapReduce Jobs Launched:
Stage-Stage-1: Map: 4  Reduce: 5   Cumulative CPU: 111.39 sec   HDFS Read: 1186114003 HDFS Write: 486 SUCCESS
Total MapReduce CPU Time Spent: 1 minutes 51 seconds 390 msec
OK
month   total_purchases
10      1211538.43
11      1531016.9
Time taken: 108.387 seconds, Fetched: 2 row(s)
```

From the above, we can see that the query using the main table takes 198.648 seconds, where as when the same query is made using the partitioned table with buckets we get the output in only 108.387 seconds.

Output: The total sum of the purchases per month is :- October: 1211538.43 and November: 1531016.90.

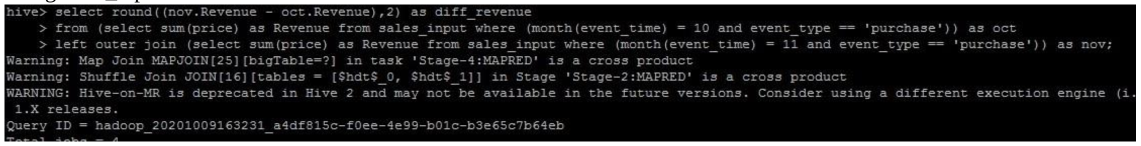
Setting the environment to do the cartesian join



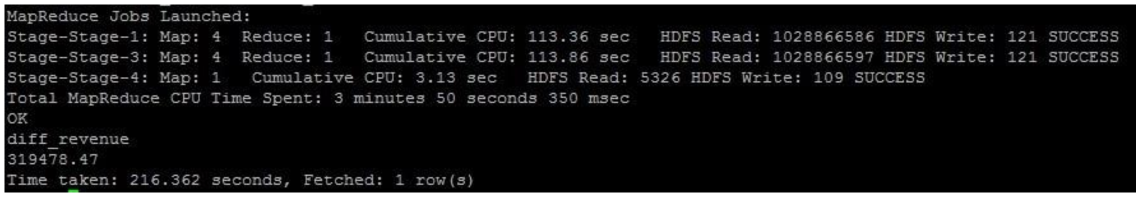
```
hive> set hive.strict.checks.cartesian.product=false;
hive> set hive.mapred.mode=nonstrict;
```

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

Using sales_input table

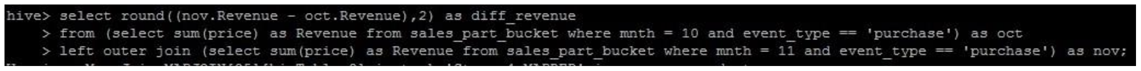


```
hive> select round((nov.Revenue - oct.Revenue),2) as diff_revenue
    > from (select sum(price) as Revenue from sales_input where (month(event_time) = 10 and event_type == 'purchase')) as oct
    > left outer join (select sum(price) as Revenue from sales_input where (month(event_time) = 11 and event_type == 'purchase')) as nov;
Warning: Map Join MAPJOIN[25][bigTable=?] in task 'Stage-4:MAPRED' is a cross product
Warning: Shuffle Join JOIN[16][tables = [$hdt$_0, $hdt$_1]] in Stage 'Stage-2:MAPRED' is a cross product
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execution engine (i.
 1.X releases.
Query ID = hadoop_20201009163231_a4df815c-f0ee-4e99-b01c-b3e65c7b64eb
```

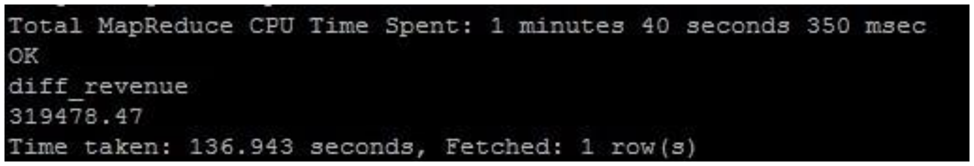


```
MapReduce Jobs Launched:
Stage-Stage-1: Map: 4  Reduce: 1   Cumulative CPU: 113.36 sec   HDFS Read: 1028866586 HDFS Write: 121 SUCCESS
Stage-Stage-3: Map: 4  Reduce: 1   Cumulative CPU: 113.86 sec   HDFS Read: 1028866597 HDFS Write: 121 SUCCESS
Stage-Stage-4: Map: 1   Cumulative CPU: 3.13 sec   HDFS Read: 5326 HDFS Write: 109 SUCCESS
Total MapReduce CPU Time Spent: 3 minutes 50 seconds 350 msec
OK
diff_revenue
319478.47
Time taken: 216.362 seconds, Fetched: 1 row(s)
```

Using sales_part_bucket table for optimisation



```
hive> select round((nov.Revenue - oct.Revenue),2) as diff_revenue
    > from (select sum(price) as Revenue from sales_part_bucket where mnth = 10 and event_type == 'purchase') as oct
    > left outer join (select sum(price) as Revenue from sales_part_bucket where mnth = 11 and event_type == 'purchase') as nov;
```

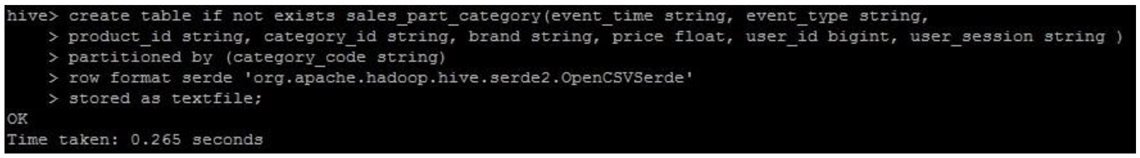


```
Total MapReduce CPU Time Spent: 1 minutes 40 seconds 350 msec
OK
diff_revenue
319478.47
Time taken: 136.943 seconds, Fetched: 1 row(s)
```

From the above, we can see that the query using the main table takes 216.362 seconds, where as when the same query is made using the partitioned table with buckets we get the output in only 136.943 seconds.

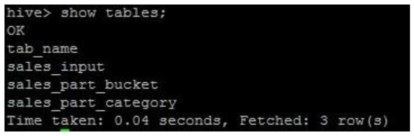
Output: The change in the revenue generated due to purchases from October to November is 319478.47

Creating table with ‘category_code’ as partitions from the main table



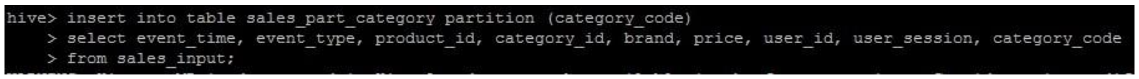
```
hive> create table if not exists sales_part_category(event_time string, event_type string,
    > product_id string, category_id string, brand string, price float, user_id bigint, user_session string )
    > partitioned by (category_code string)
    > row format serde 'org.apache.hadoop.hive.serde2.OpenCSVSerde'
    > stored as textfile;
OK
Time taken: 0.265 seconds
```

Checking if the table is created properly



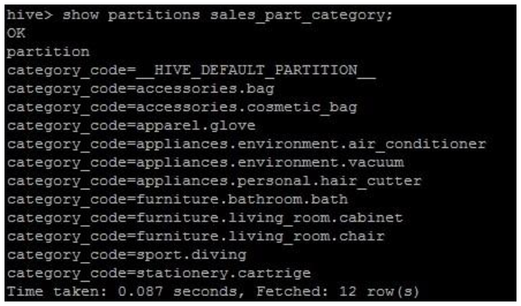
```
hive> show tables;
OK
tab_name
sales_input
sales_part_bucket
sales_part_category
Time taken: 0.04 seconds, Fetched: 3 row(s)
```

Inserting the data from main table into ‘sales_part_category’ table



```
hive> insert into table sales_part_category partition (category_code)
    > select event_time, event_type, product_id, category_id, brand, price, user_id, user_session, category_code
    > from sales_input;
```

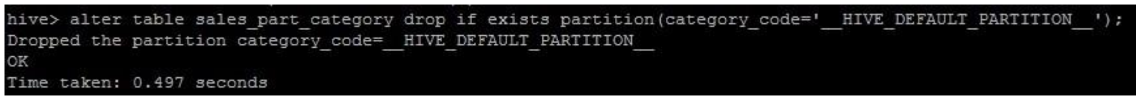
Checking for the partitions created in the category_code table



```
hive> show partitions sales_part_category;
OK
partition
category_code=__HIVE_DEFAULT_PARTITION__
category_code=accessories.bag
category_code=accessories.cosmetic_bag
category_code=apparel.glove
category_code=appliances.environment.air_conditioner
category_code=appliances.environment.vacuum
category_code=appliances.personal.hair_cutter
category_code=furniture.bathroom.bath
category_code=furniture.living_room.cabinet
category_code=furniture.living_room.chair
category_code=sport.diving
category_code=stationery.cartrige
Time taken: 0.087 seconds, Fetched: 12 row(s)
```

From the above we can see that an unnecessary partition ‘__HIVE_DEFAULT_PARTITION__’ has been created where the category_code is null

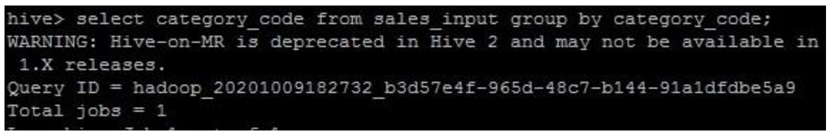
Deleting the ‘__HIVE_DEFAULT_PARTITION__’ partition from the table



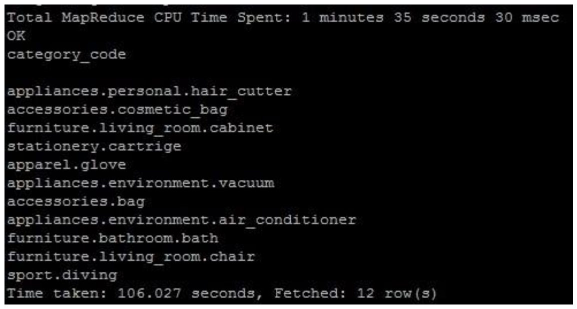
```
hive> alter table sales_part_category drop if exists partition(category_code='__HIVE_DEFAULT_PARTITION__');
Dropped the partition category_code=__HIVE_DEFAULT_PARTITION__
OK
Time taken: 0.497 seconds
```

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

Using sales_input table

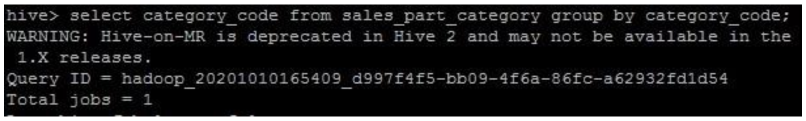


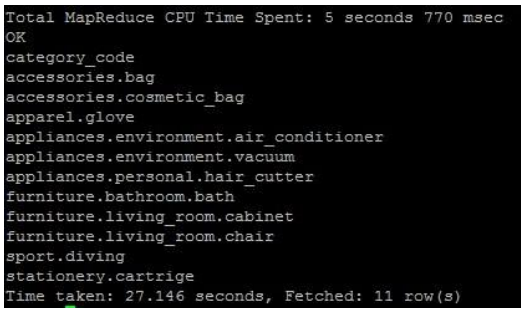
```
hive> select category_code from sales_input group by category_code;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in
 1.X releases.
Query ID = hadoop_20201009182732_b3d57e4f-965d-48c7-b144-91a1dfdbe5a9
Total jobs = 1
```



```
Total MapReduce CPU Time Spent: 1 minutes 35 seconds 30 msec
OK
category_code

appliances.personal.hair_cutter
accessories.cosmetic_bag
furniture.living_room.cabinet
stationery.cartrige
apparel.glove
appliances.environment.vacuum
accessories.bag
appliances.environment.air_conditioner
furniture.bathroom.bath
furniture.living_room.chair
sport.diving
Time taken: 106.027 seconds, Fetched: 12 row(s)
```

Using sales_part_category table for optimisation


```
hive> select category_code from sales_part_category group by category_code;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the
 1.X releases.
Query ID = hadoop_20201010165409_d997f4f5-bb09-4f6a-86fc-a62932fd1d54
Total jobs = 1
```

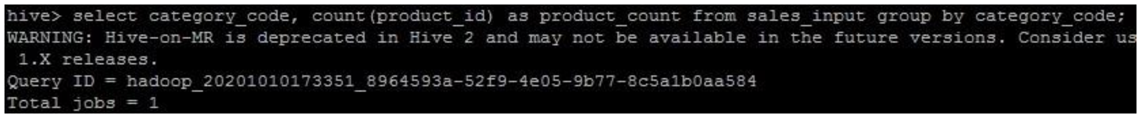

```
Total MapReduce CPU Time Spent: 5 seconds 770 msec
OK
category_code
accessories.bag
accessories.cosmetic_bag
apparel.glove
appliances.environment.air_conditioner
appliances.environment.vacuum
appliances.personal.hair_cutter
furniture.bathroom.bath
furniture.living_room.cabinet
furniture.living_room.chair
sport.diving
stationery.cartrige
Time taken: 27.146 seconds, Fetched: 11 row(s)
```

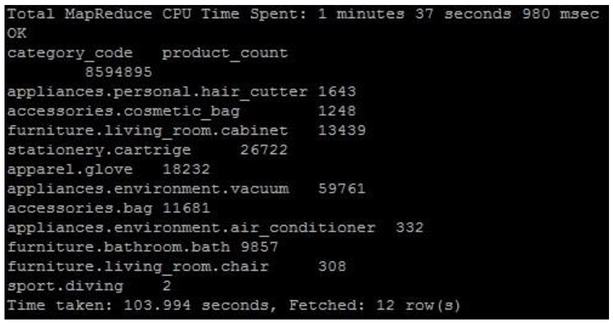
From the above, we can see that the query using the main table takes 106.027 seconds, where as when the same query is made using the partitioned table we get the output in only 27.146 seconds.

Output: The distinct categories of products are: accessories.bag, accessories.cosmetic_bag, apparel.glove, appliances.environment.air_conditioner, appliances.environment.vacuum, appliances.personal.hair_cutter, furniture.bathroom.bath, furniture.living_room.cabinet, furniture.living_room.chair, sport.diving and stationery.cartrige

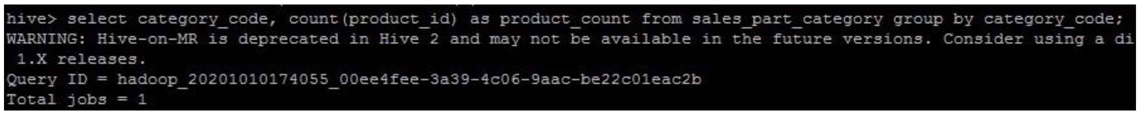
5. Find the total number of products available under each category.

Using sales_input table

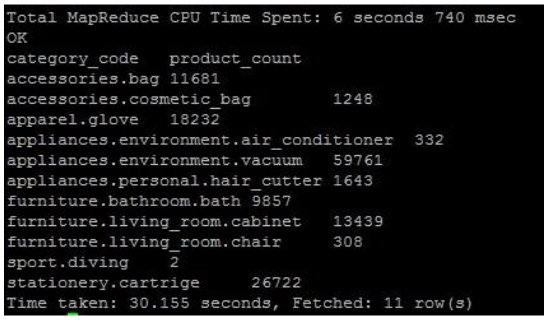

```
hive> select category_code, count(product_id) as product_count from sales_input group by category_code;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider us
 1.X releases.
Query ID = hadoop_20201010173351_8964593a-52f9-4e05-9b77-8c5a1b0aa584
Total jobs = 1
```


```
Total MapReduce CPU Time Spent: 1 minutes 37 seconds 980 msec
OK
category_code   product_count
        8594895
appliances.personal.hair_cutter 1643
accessories.cosmetic_bag        1248
furniture.living_room.cabinet   13439
stationery.cartrige     26722
apparel.glove   18232
appliances.environment.vacuum   59761
accessories.bag 11681
appliances.environment.air_conditioner  332
furniture.bathroom.bath 9857
furniture.living_room.chair     308
sport.diving    2
Time taken: 103.994 seconds, Fetched: 12 row(s)
```

Using sales_part_category table for optimisation



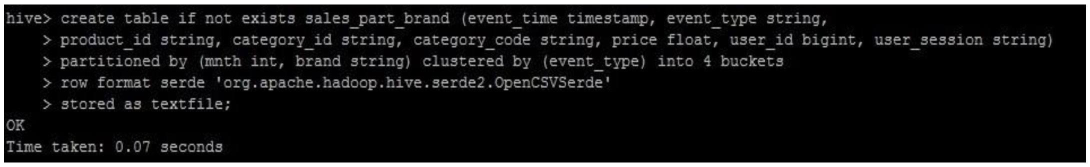
```
hive> select category_code, count(product_id) as product_count from sales_part_category group by category_code;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a di
 1.X releases.
Query ID = hadoop_20201010174055_00ee4fee-3a39-4c06-9aac-be22c01eac2b
Total jobs = 1
```



```
Total MapReduce CPU Time Spent: 6 seconds 740 msec
OK
category_code   product_count
accessories.bag 11681
accessories.cosmetic_bag        1248
apparel.glove   18232
appliances.environment.air_conditioner  332
appliances.environment.vacuum   59761
appliances.personal.hair_cutter 1643
furniture.bathroom.bath 9857
furniture.living_room.cabinet   13439
furniture.living_room.chair     308
sport.diving    2
stationery.cartrige     26722
Time taken: 30.155 seconds, Fetched: 11 row(s)
```

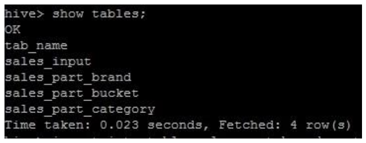
From the above, we can see that the query using the main table takes 103.994 seconds, whereas when the same query is made using the partitioned table we get the output in only 30.155 seconds.

Creating table with month and brand as partitions and bucketing using 'event_type' from the main table



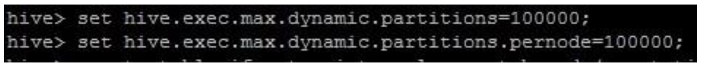
```
hive> create table if not exists sales_part_brand (event_time timestamp, event_type string,
    > product_id string, category_id string, category_code string, price float, user_id bigint, user_session string)
    > partitioned by (mnth int, brand string) clustered by (event_type) into 4 buckets
    > row format serde 'org.apache.hadoop.hive.serde2.OpenCSVSerde'
    > stored as textfile;
OK
Time taken: 0.07 seconds
```

Checking if the table is created properly



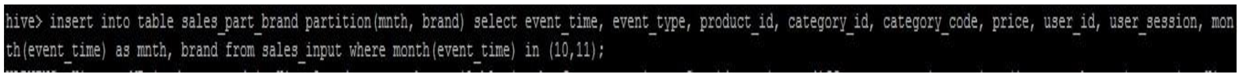
```
hive> show tables;
OK
tab_name
sales_input
sales_part_brand
sales_part_bucket
sales_part_category
Time taken: 0.023 seconds, Fetched: 4 row(s)
```

Setting the environment to increase the number of partitions



```
hive> set hive.exec.max.dynamic.partitions=100000;
hive> set hive.exec.max.dynamic.partitions.pernode=100000;
```

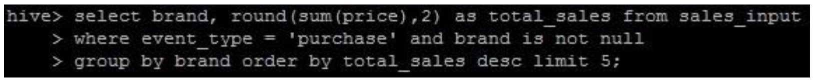
Inserting the data from main table into 'sales_part_brand' table



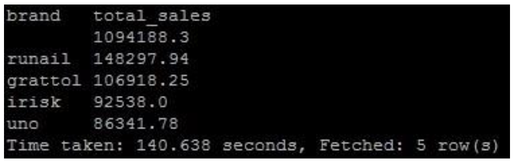
```
hive> insert into table sales_part_brand partition(mnth, brand) select event_time, event_type, product_id, category_id, category_code, price, user_id, user_session, mon
th(event_time) as mnth, brand from sales_input where month(event_time) in (10,11);
```

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

Using sales_input table

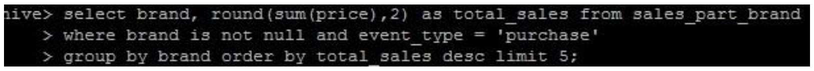


```
hive> select brand, round(sum(price),2) as total_sales from sales_input
    > where event_type = 'purchase' and brand is not null
    > group by brand order by total_sales desc limit 5;
```

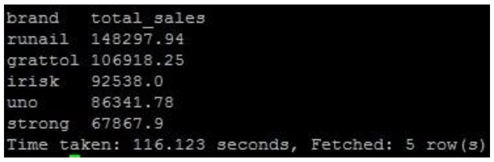


```
brand   total_sales
        1094188.3
runail  148297.94
grattol 106918.25
irisk   92538.0
uno     86341.78
Time taken: 140.638 seconds, Fetched: 5 row(s)
```

Using sales_part_brand table for optimisation



```
ive> select brand, round(sum(price),2) as total_sales from sales_part_brand
    > where brand is not null and event_type = 'purchase'
    > group by brand order by total_sales desc limit 5;
```



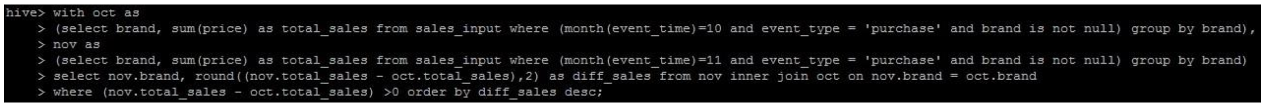
```
brand   total_sales
runail  148297.94
grattol 106918.25
irisk   92538.0
uno     86341.78
strong  67867.9
Time taken: 116.123 seconds, Fetched: 5 row(s)
```

From the above, we can see that the query using the main table takes 140.638 seconds, whereas when the same query is made using the partitioned table we get the output in only 116.123 seconds.

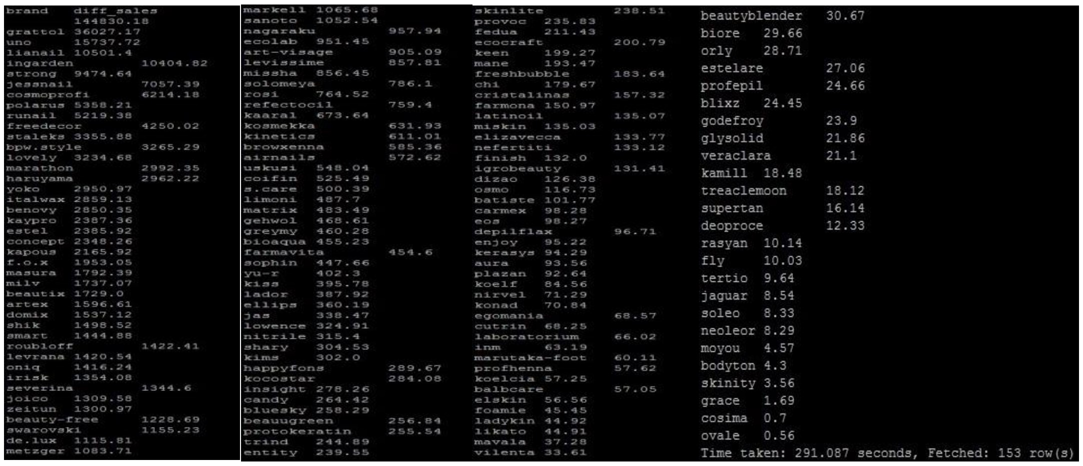
Output: The brand with the maximum sales in October and November combined is Runail.

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

Using sales_input table

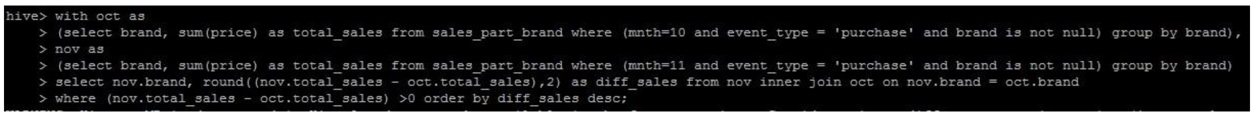


```
hive> with oct as
    > (select brand, sum(price) as total_sales from sales_input where (month(event_time)=10 and event_type = 'purchase' and brand is not null) group by brand),
    > nov as
    > (select brand, sum(price) as total_sales from sales_input where (month(event_time)=11 and event_type = 'purchase' and brand is not null) group by brand)
    > select nov.brand, round((nov.total_sales - oct.total_sales),2) as diff_sales from nov inner join oct on nov.brand = oct.brand
    > where (nov.total_sales - oct.total_sales) >0 order by diff_sales desc;
```

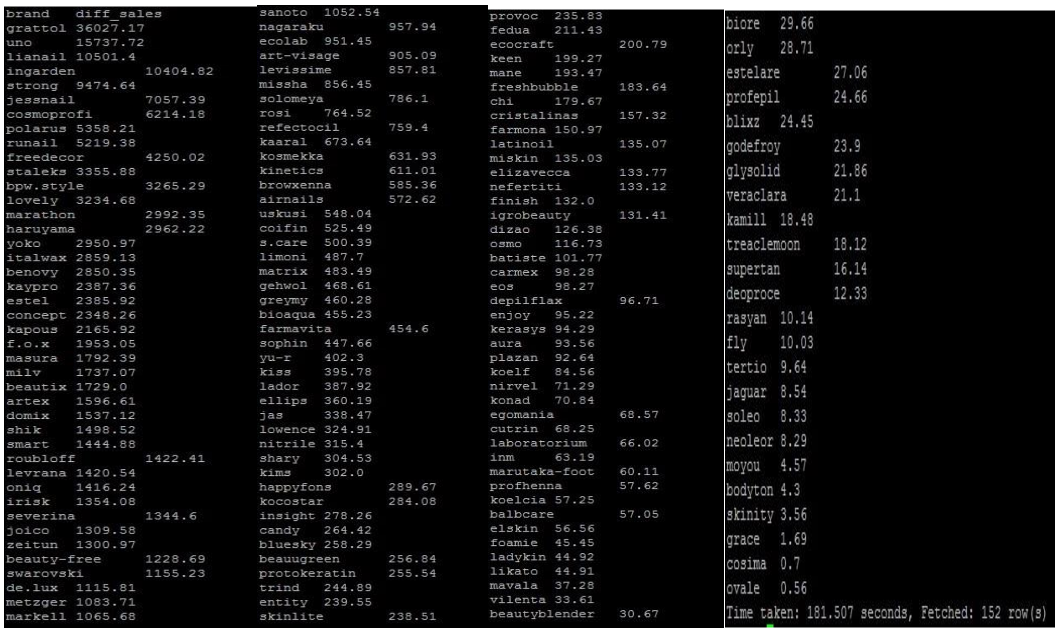


```
brand   diff_sales
        144830.18
grattol 36027.17
uno     15737.72
lianail 10501.4
ingarden        10404.82
strong  9474.64
jessnail        7057.39
cosmoprofi      6214.18
polarus 5358.21
runail  5219.38
freedecor       4250.02
staleks 3355.88
bpw.style       3265.29
lovely  3234.68
marathon        2992.35
haruyama        2962.22
yoko    2950.97
italwax 2859.13
benovy  2850.35
kaypro  2387.36
estel   2385.92
concept 2348.26
kapous  2165.92
f.o.x   1953.05
masura  1792.39
milv    1737.07
beautix 1729.0
artex   1596.61
domix   1537.12
shik    1498.52
smart   1444.88
roubloff        1422.41
levrana 1420.54
oniq    1416.24
irisk   1354.08
severina        1344.6
joico   1309.58
zeitun  1300.97
beauty-free     1228.69
swarovski       1155.23
de.lux  1115.81
metzger 1083.71
markell 1065.68
sanoto  1052.54
nagaraku        957.94
ecolab  951.45
art-visage      905.09
levissime       857.81
missha  856.45
solomeya        786.1
rosi    764.52
refectocil      759.4
kaaral  673.64
kosmekka        631.93
kinetics        611.01
browxenna       585.36
airnails        572.62
uskusi  548.04
coifin  525.49
s.care  500.39
limoni  487.7
matrix  483.49
gehwol  468.61
greymy  460.28
bioaqua 455.23
farmavita       454.6
sophin  447.66
yu-r    402.3
kiss    395.78
lador   387.92
ellips  360.19
jas     338.47
lowence 324.91
nitrile 315.4
shary   304.53
kims    302.0
happyfons       289.67
kocostar        284.08
insight 278.26
candy   264.42
bluesky 258.29
beauugreen      256.84
protokeratin    255.54
trind   244.89
entity  239.55
skinlite        238.51
provoc  235.83
fedua   211.43
ecocraft        200.79
keen    199.27
mane    193.47
freshbubble     183.64
chi     179.67
cristalinas     157.32
farmona 150.97
latinoil        135.07
miskin  135.03
elizavecca      133.77
nefertiti       133.12
finish  132.0
igrobeauty      131.41
dizao   126.38
osmo    116.73
batiste 101.77
carmex  98.28
eos     98.27
depilflax       96.71
enjoy   95.22
kerasys 94.29
aura    93.56
plazan  92.64
koelf   84.56
nirvel  71.29
konad   70.84
egomania        68.57
cutrin  68.25
laboratorium    66.02
inm     63.19
marutaka-foot   60.11
profhenna       57.62
koelcia 57.25
balbcare        57.05
elskin  56.56
foamie  45.45
ladykin 44.92
likato  44.91
mavala  37.28
vilenta 33.61
beautyblender   30.67
biore   29.66
orly    28.71
estelare        27.06
profepil        24.66
blixz   24.45
godefroy        23.9
glysolid        21.86
veraclara       21.1
kamill  18.48
treaclemoon     18.12
supertan        16.14
deoproce        12.33
rasyan  10.14
fly     10.03
tertio  9.64
jaguar  8.54
soleo   8.33
neoleor 8.29
moyou   4.57
bodyton 4.3
skinity 3.56
grace   1.69
cosima  0.7
ovale   0.56
Time taken: 291.087 seconds, Fetched: 153 row(s)
```

Using sales_part_brand table for optimisation



```
hive> with oct as
    > (select brand, sum(price) as total_sales from sales_part_brand where (mnth=10 and event_type = 'purchase' and brand is not null) group by brand),
    > nov as
    > (select brand, sum(price) as total_sales from sales_part_brand where (mnth=11 and event_type = 'purchase' and brand is not null) group by brand)
    > select nov.brand, round((nov.total_sales - oct.total_sales),2) as diff_sales from nov inner join oct on nov.brand = oct.brand
    > where (nov.total_sales - oct.total_sales) >0 order by diff_sales desc;
```



```
brand   diff_sales
grattol 36027.17
uno     15737.72
lianail 10501.4
ingarden        10404.82
strong  9474.64
jessnail        7057.39
cosmoprofi      6214.18
polarus 5358.21
runail  5219.38
freedecor       4250.02
staleks 3355.88
bpw.style       3265.29
lovely  3234.68
marathon        2992.35
haruyama        2962.22
yoko    2950.97
italwax 2859.13
benovy  2850.35
kaypro  2387.36
estel   2385.92
concept 2348.26
kapous  2165.92
f.o.x   1953.05
masura  1792.39
milv    1737.07
beautix 1729.0
artex   1596.61
domix   1537.12
shik    1498.52
smart   1444.88
roubloff        1422.41
levrana 1420.54
oniq    1416.24
irisk   1354.08
severina        1344.6
joico   1309.58
zeitun  1300.97
beauty-free     1228.69
swarovski       1155.23
de.lux  1115.81
metzger 1083.71
markell 1065.68
```

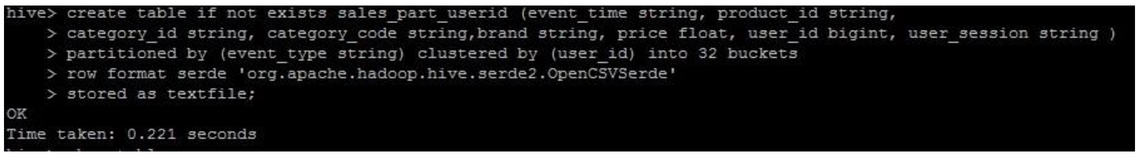
```
sanoto  1052.54
nagaraku        957.94
ecolab  951.45
art-visage      905.09
levissime       857.81
missha  856.45
solomeya        786.1
rosi    764.52
refectocil      759.4
kaaral  673.64
kosmekka        631.93
kinetics        611.01
browxenna       585.36
airnails        572.62
uskusi  548.04
coifin  525.49
s.care  500.39
limoni  487.7
matrix  483.49
gehwol  468.61
greymy  460.28
bioaqua 455.23
farmavita       454.6
sophin  447.66
yu-r    402.3
kiss    395.78
lador   387.92
ellips  360.19
jas     338.47
lowence 324.91
nitrile 315.4
shary   304.53
kims    302.0
happyfons       289.67
kocostar        284.08
insight 278.26
candy   264.42
bluesky 258.29
beauugreen      256.84
protokeratin    255.54
trind   244.89
entity  239.55
skinlite        238.51
```

```
provoc  235.83
fedua   211.43
ecocraft        200.79
keen    199.27
mane    193.47
freshbubble     183.64
chi     179.67
cristalinas     157.32
farmona 150.97
latinoil        135.07
miskin  135.03
elizavecca      133.77
nefertiti       133.12
finish  132.0
igrobeauty      131.41
dizao   126.38
osmo    116.73
batiste 101.77
carmex  98.28
eos     98.27
depilflax       96.71
enjoy   95.22
kerasys 94.29
aura    93.56
plazan  92.64
koelf   84.56
nirvel  71.29
konad   70.84
egomania        68.57
cutrin  68.25
laboratorium    66.02
inm     63.19
marutaka-foot   60.11
profhenna       57.62
koelcia 57.25
balbcare        57.05
elskin  56.56
foamie  45.45
ladykin 44.92
likato  44.91
mavala  37.28
vilenta 33.61
beautyblender   30.67
```

```
biore   29.66
orly    28.71
estelare        27.06
profepil        24.66
blixz   24.45
godefroy        23.9
glysolid        21.86
veraclara       21.1
kamill  18.48
treaclemoon     18.12
supertan        16.14
deoproce        12.33
rasyan  10.14
fly     10.03
tertio  9.64
jaguar  8.54
soleo   8.33
neoleor 8.29
moyou   4.57
bodyton 4.3
skinity 3.56
grace   1.69
cosima  0.7
ovale   0.56
Time taken: 181.507 seconds, Fetched: 152 row(s)
```

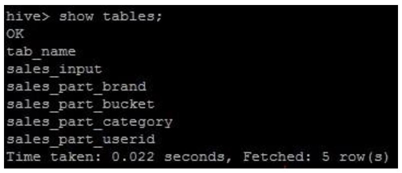
From the above, we can see that the query using the main table takes 291.087 seconds, whereas when the same query is made using the partitioned table we get the output in only 181.507 seconds.

<u>Creating table with ‘event_type’ as partitions and bucketing using ‘user_id’ from the main table</u>



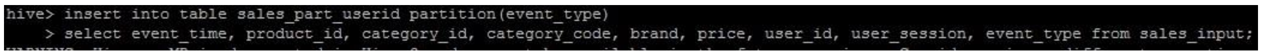
```
hive> create table if not exists sales_part_userid (event_time string, product_id string,
    > category_id string, category_code string,brand string, price float, user_id bigint, user_session string )
    > partitioned by (event_type string) clustered by (user_id) into 32 buckets
    > row format serde 'org.apache.hadoop.hive.serde2.OpenCSVSerde'
    > stored as textfile;
OK
Time taken: 0.221 seconds
```

Checking if the table is created properly



```
hive> show tables;
OK
tab_name
sales_input
sales_part_brand
sales_part_bucket
sales_part_category
sales_part_userid
Time taken: 0.022 seconds, Fetched: 5 row(s)
```

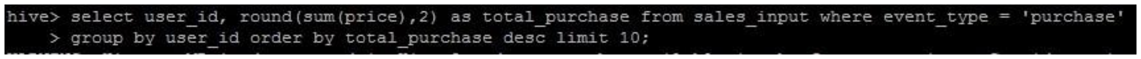
Inserting the data from main table into ‘sales_part_userid’ table



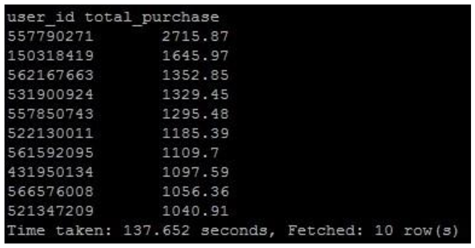
```
hive> insert into table sales_part_userid partition(event_type)
    > select event_time, product_id, category_id, category_code, brand, price, user_id, user_session, event_type from sales_input;
```

<u>8. Write a query to generate a list of top 10 users who spend the most.</u>

Using sales_input table

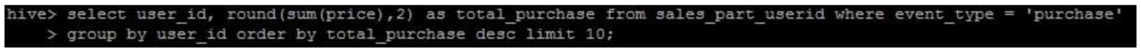


```
hive> select user_id, round(sum(price),2) as total_purchase from sales_input where event_type = 'purchase'
    > group by user_id order by total_purchase desc limit 10;
```

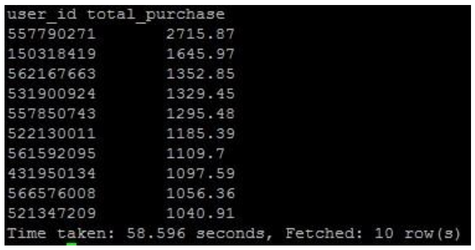


```
user_id total_purchase
557790271       2715.87
150318419       1645.97
562167663       1352.85
531900924       1329.45
557850743       1295.48
522130011       1185.39
561592095       1109.7
431950134       1097.59
566576008       1056.36
521347209       1040.91
Time taken: 137.652 seconds, Fetched: 10 row(s)
```

Using sales_part_userid table for optimisation



```
hive> select user_id, round(sum(price),2) as total_purchase from sales_part_userid where event_type = 'purchase'
    > group by user_id order by total_purchase desc limit 10;
```

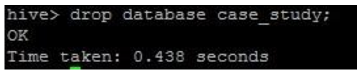


```
user_id total_purchase
557790271       2715.87
150318419       1645.97
562167663       1352.85
531900924       1329.45
557850743       1295.48
522130011       1185.39
561592095       1109.7
431950134       1097.59
566576008       1056.36
521347209       1040.91
Time taken: 58.596 seconds, Fetched: 10 row(s)
```

From the above, we can see that the query using the main table takes 137.652 seconds, whereas when the same query is made using the partitioned table we get the output in only 58.596 seconds.

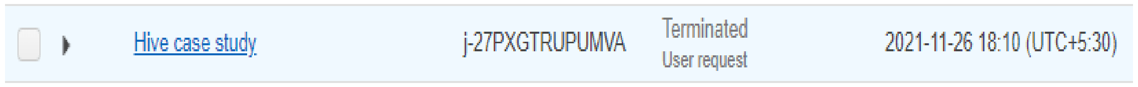
Output: The top 10 users with the most purchases has been queried in the output.

Dropping the database



```
hive> drop database case_study;
OK
Time taken: 0.438 seconds
```

Terminating the cluster



Hive case study   j-27PXGTRUPUMVA   Terminated
User request   2021-11-26 18:10 (UTC+5:30)