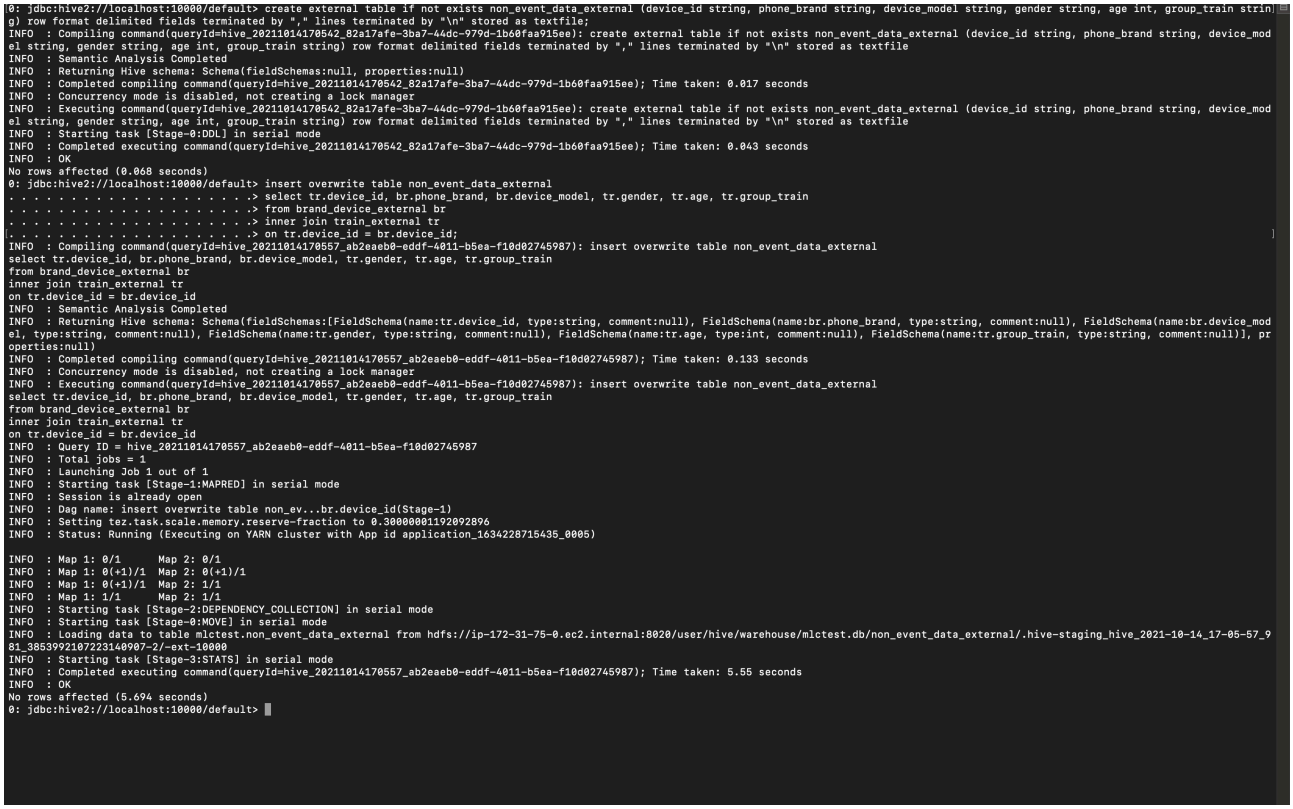
Data Preparation for Modelling

1. Non-event Dataset : Train and brand devices

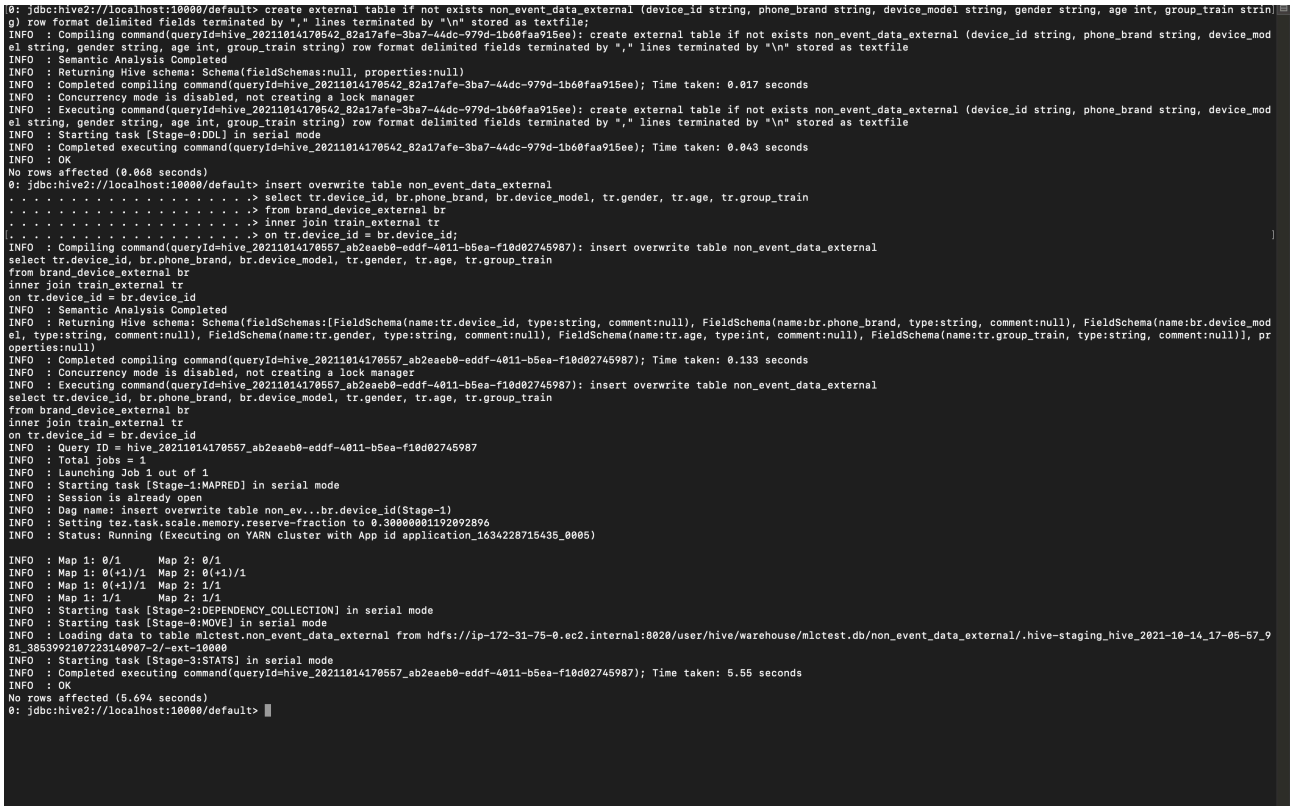
1.1 non_event_data_external table creation

create external table if not exists non_event_data_external (device_id string, phone_brand string, device_model string, gender string, age int, group_train string) row format delimited fields terminated by "," lines terminated by "\n" stored as textfile;

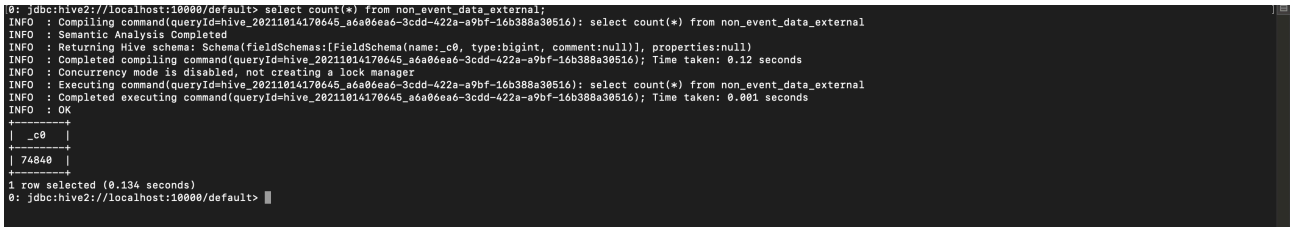


1.2 non_event_data_external table data load

insert overwrite table non_event_data_external
select tr.device_id, br.phone_brand, br.device_model, tr.gender, tr.age, tr.group_train
from brand_device_external br
inner join train_external tr
on tr.device_id = br.device_id;



1.3 non_event_data_external table data count - 74840



2.Event Dataset : Train and event

2.1 event_train_external table creation

create external table if not exists events_train_external (device_id string, event_id int, event_time timestamp, latitude float, longitude float, gender string, age int, group_train string) row format delimited fields terminated by "," lines terminated by "\n" stored as textfile;

2.2 event_train_external table data load

```
0: jdbc:hive2://localhost:10000/default> create external table if not exists events_train_external (device_id string, event_id int, event_time timestamp, latitude float, longitude float, gender string,
age int, group_train string) row format delimited fields terminated by "," lines terminated by "\n" stored as textfile;
INFO  : Compiling command(queryId=hive_20211014170715_70dcc77b-1d14-4170-a10a-b2db0640a85d): create external table if not exists events_train_external (device_id string, event_id int, event_time timesta
mp, latitude float, longitude float, gender string, age int, group_train string) row format delimited fields terminated by "," lines terminated by "\n" stored as textfile
INFO  : Semantic Analysis Completed
INFO  : Returning Hive schema: Schema(fieldSchemas:null, properties:null)
INFO  : Completed compiling command(queryId=hive_20211014170715_70dcc77b-1d14-4170-a10a-b2db0640a85d); Time taken: 0.017 seconds
INFO  : Concurrency mode is disabled, not creating a lock manager
INFO  : Executing command(queryId=hive_20211014170715_70dcc77b-1d14-4170-a10a-b2db0640a85d): create external table if not exists events_train_external (device_id string, event_id int, event_time timesta
mp, latitude float, longitude float, gender string, age int, group_train string) row format delimited fields terminated by "," lines terminated by "\n" stored as textfile
INFO  : Starting task [Stage-0:DDL] in serial mode
INFO  : Completed executing command(queryId=hive_20211014170715_70dcc77b-1d14-4170-a10a-b2db0640a85d); Time taken: 0.033 seconds
INFO  : OK
No rows affected (0.055 seconds)
0: jdbc:hive2://localhost:10000/default> insert overwrite table events_train_external
. . . . . .> select ev.device_id, ev.event_id, ev.event_time, ev.latitude, ev.longitude,
. . . . . .> tr.gender,tr.age, tr.group_train
. . . . . .> from events_external ev
. . . . . .> inner join train_external tr
. . . . . .> on ev.device_id = tr.device_id;
INFO  : Compiling command(queryId=hive_20211014170725_f333b9f4-6b99-4829-8f3d-d324ac03a26e): insert overwrite table events_train_external
select ev.device_id, ev.event_id, ev.event_time, ev.latitude, ev.longitude,
tr.gender,tr.age, tr.group_train
from events_external ev
inner join train_external tr
on ev.device_id = tr.device_id
INFO  : Semantic Analysis Completed
INFO  : Returning Hive schema: Schema(fieldSchemas:[FieldSchema(name:ev.device_id, type:string, comment:null), FieldSchema(name:ev.event_id, type:int, comment:null), FieldSchema(name:ev.event_time, type
:timestamp, comment:null), FieldSchema(name:ev.latitude, type:float, comment:null), FieldSchema(name:ev.longitude, type:float, comment:null), FieldSchema(name:tr.gender, type:string, comment:null), Fiel
dSchema(name:tr.age, type:int, comment:null), FieldSchema(name:tr.group_train, type:string, comment:null)], properties:null)
INFO  : Completed compiling command(queryId=hive_20211014170725_f333b9f4-6b99-4829-8f3d-d324ac03a26e); Time taken: 0.134 seconds
INFO  : Concurrency mode is disabled, not creating a lock manager
INFO  : Executing command(queryId=hive_20211014170725_f333b9f4-6b99-4829-8f3d-d324ac03a26e): insert overwrite table events_train_external
select ev.device_id, ev.event_id, ev.event_time, ev.latitude, ev.longitude,
tr.gender,tr.age, tr.group_train
from events_external ev
inner join train_external tr
on ev.device_id = tr.device_id
INFO  : Query ID = hive_20211014170725_f333b9f4-6b99-4829-8f3d-d324ac03a26e
INFO  : Total jobs = 1
INFO  : Launching Job 1 out of 1
INFO  : Starting task [Stage-1:MAPRED] in serial mode
INFO  : Session is already open
INFO  : Dag name: insert overwrite table events...tr.device_id(Stage-1)
INFO  : Setting tez.task.scale.memory.reserve-fraction to 0.3000000119209296
INFO  : Status: Running (Executing on YARN cluster with App id application_1634228715435_0005)

INFO  : Map 1: 0/11     Map 2: 0/1
INFO  : Map 1: 0(+1)/11 Map 2: 0/1
INFO  : Map 1: 0(+2)/11 Map 2: 0(+1)/1
INFO  : Map 1: 0(+3)/11 Map 2: 0(+1)/1
INFO  : Map 1: 0(+5)/11 Map 2: 0(+1)/1
INFO  : Map 1: 0(+6)/11 Map 2: 0(+1)/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1
INFO  : Map 1: 2(+7)/11 Map 2: 1/1
INFO  : Map 1: 3(+7)/11 Map 2: 1/1
INFO  : Map 1: 4(+6)/11 Map 2: 1/1
INFO  : Map 1: 6(+4)/11 Map 2: 1/1
INFO  : Map 1: 8(+3)/11 Map 2: 1/1
INFO  : Map 1: 9(+2)/11 Map 2: 1/1
INFO  : Map 1: 10(+1)/11        Map 2: 1/1
INFO  : Map 1: 11/11    Map 2: 1/1
```

insert overwrite table events_train_external
select ev.device_id, ev.event_id, ev.event_time, ev.latitude, ev.longitude,
tr.gender,tr.age, tr.group_train
from events_external ev
inner join train_external tr
on ev.device_id = tr.device_id;

2.3 event_train_external table data count - 1215598

```
0: jdbc:hive2://localhost:10000/default> select count(*) from events_train_external;
INFO  : Compiling command(queryId=hive_20211014170818_55b1454c-0d1f-4291-b5ec-b2d28a35e893): select count(*) from events_train_external
INFO  : Semantic Analysis Completed
INFO  : Returning Hive schema: Schema(fieldSchemas:[FieldSchema(name:_c0, type:bigint, comment:null)], properties:null)
INFO  : Completed compiling command(queryId=hive_20211014170818_55b1454c-0d1f-4291-b5ec-b2d28a35e893); Time taken: 0.112 seconds
INFO  : Concurrency mode is disabled, not creating a lock manager
INFO  : Executing command(queryId=hive_20211014170818_55b1454c-0d1f-4291-b5ec-b2d28a35e893): select count(*) from events_train_external
INFO  : Completed executing command(queryId=hive_20211014170818_55b1454c-0d1f-4291-b5ec-b2d28a35e893); Time taken: 0.002 seconds
INFO  : OK
+----------+
|   _c0    |
+----------+
| 1215598  |
+----------+
1 row selected (0.12 seconds)
0: jdbc:hive2://localhost:10000/default>
```

3. App Data : app_events, app_labels and label_categories

3.1 app_data_external table creation

create external table if not exists app_data_external (event_id int, app_id string, is_installed int, is_active int, label_id int, category string) row format delimited fields terminated by "," lines terminated by "\n" stored as textfile;

```
0: jdbc:hive2://localhost:10000/default> insert overwrite table app_data_external
. . . . . . . . . . . . . . . . . . . . .> select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
. . . . . . . . . . . . . . . . . . . . .> from app_events_external app_eve
. . . . . . . . . . . . . . . . . . . . .> join app_labels_external app_lbl
. . . . . . . . . . . . . . . . . . . . .> on app_eve.app_id = app_lbl.app_id
. . . . . . . . . . . . . . . . . . . . .> join label_categories_external lbl
. . . . . . . . . . . . . . . . . . . . .> on lbl.label_id = app_lbl.label_id;
INFO  : Compiling command(queryId=hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b): insert overwrite table app_data_external
select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
from app_events_external app_eve
join app_labels_external app_lbl
on app_eve.app_id = app_lbl.app_id
join label_categories_external lbl
on lbl.label_id = app_lbl.label_id
INFO  : Semantic Analysis Completed
INFO  : Returning Hive schema: Schema(fieldSchemas:[FieldSchema(name:app_eve.event_id, type:int, comment:null), FieldSchema(name:app_eve.app_id, type:string, comment:null), FieldSchema(name:app_eve.is_i
nstalled, type:int, comment:null), FieldSchema(name:app_eve.is_active, type:int, comment:null), FieldSchema(name:lbl.label_id, type:int, comment:null), FieldSchema(name:lbl.category, type:string, commen
t:null)], properties:null)
INFO  : Completed compiling command(queryId=hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b); Time taken: 0.22 seconds
INFO  : Concurrency mode is disabled, not creating a lock manager
INFO  : Executing command(queryId=hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b): insert overwrite table app_data_external
select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
from app_events_external app_eve
join app_labels_external app_lbl
on app_eve.app_id = app_lbl.app_id
join label_categories_external lbl
on lbl.label_id = app_lbl.label_id
INFO  : Query ID = hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b
INFO  : Total jobs = 1
INFO  : Launching Job 1 out of 1
INFO  : Starting task [Stage-1:MAPRED] in serial mode
INFO  : Session is already open
INFO  : Dag name: insert overwrite table ap...app_lbl.label_id(Stage-1)
INFO  : Setting tez.task.scale.memory.reserve-fraction to 0.30000001192092896
INFO  : Status: Running (Executing on YARN cluster with App id application_1634228715435_0005)

INFO  : Map 1: 0/11     Map 2: 0/1      Map 3: 0/1
INFO  : Map 1: 0/11     Map 2: 0/1      Map 3: 0(+1)/1
INFO  : Map 1: 0(+1)/11 Map 2: 0/1      Map 3: 0(+1)/1
INFO  : Map 1: 0(+3)/11 Map 2: 0(+1)/1  Map 3: 0(+1)/1
INFO  : Map 1: 0(+4)/11 Map 2: 0(+1)/1  Map 3: 0(+1)/1
INFO  : Map 1: 0(+5)/11 Map 2: 0(+1)/1  Map 3: 0(+1)/1
INFO  : Map 1: 0(+5)/11 Map 2: 0(+1)/1  Map 3: 1/1
INFO  : Map 1: 0(+6)/11 Map 2: 0(+1)/1  Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
```

3.2 app_data_external table data load

insert overwrite table app_data_external
select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
from app_events_external app_eve
join app_lables_external app_lbl
on app_eve.app_id = app_lbl.app_id
join label_categories_external lbl
on lbl.label_id = app_lbl.label_id;

```
0: jdbc:hive2://localhost:10000/default> insert overwrite table app_data_external
. . . . . . . . . . . . . . . . . . . . .> select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
. . . . . . . . . . . . . . . . . . . . .> from app_events_external app_eve
. . . . . . . . . . . . . . . . . . . . .> join app_labels_external app_lbl
. . . . . . . . . . . . . . . . . . . . .> on app_eve.app_id = app_lbl.app_id
. . . . . . . . . . . . . . . . . . . . .> join label_categories_external lbl
. . . . . . . . . . . . . . . . . . . . .> on lbl.label_id = app_lbl.label_id;
INFO  : Compiling command(queryId=hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b): insert overwrite table app_data_external
select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
from app_events_external app_eve
join app_labels_external app_lbl
on app_eve.app_id = app_lbl.app_id
join label_categories_external lbl
on lbl.label_id = app_lbl.label_id
INFO  : Semantic Analysis Completed
INFO  : Returning Hive schema: Schema(fieldSchemas:[FieldSchema(name:app_eve.event_id, type:int, comment:null), FieldSchema(name:app_eve.app_id, type:string, comment:null), FieldSchema(name:app_eve.is_i
nstalled, type:int, comment:null), FieldSchema(name:app_eve.is_active, type:int, comment:null), FieldSchema(name:lbl.label_id, type:int, comment:null), FieldSchema(name:lbl.category, type:string, commen
t:null)], properties:null)
INFO  : Completed compiling command(queryId=hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b); Time taken: 0.22 seconds
INFO  : Concurrency mode is disabled, not creating a lock manager
INFO  : Executing command(queryId=hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b): insert overwrite table app_data_external
select app_eve.event_id, app_eve.app_id, app_eve.is_installed, app_eve.is_active, lbl.label_id, lbl.category
from app_events_external app_eve
join app_labels_external app_lbl
on app_eve.app_id = app_lbl.app_id
join label_categories_external lbl
on lbl.label_id = app_lbl.label_id
INFO  : Query ID = hive_20211014170945_af4d00fe-3f85-4ce4-895c-b3c797614b1b
INFO  : Total jobs = 1
INFO  : Launching Job 1 out of 1
INFO  : Starting task [Stage-1:MAPRED] in serial mode
INFO  : Session is already open
INFO  : Dag name: insert overwrite table ap...app_lbl.label_id(Stage-1)
INFO  : Setting tez.task.scale.memory.reserve-fraction to 0.30000001192092896
INFO  : Status: Running (Executing on YARN cluster with App id application_1634228715435_0005)

INFO  : Map 1: 0/11     Map 2: 0/1      Map 3: 0/1
INFO  : Map 1: 0/11     Map 2: 0/1      Map 3: 0(+1)/1
INFO  : Map 1: 0(+1)/11 Map 2: 0/1      Map 3: 0(+1)/1
INFO  : Map 1: 0(+3)/11 Map 2: 0(+1)/1  Map 3: 0(+1)/1
INFO  : Map 1: 0(+4)/11 Map 2: 0(+1)/1  Map 3: 0(+1)/1
INFO  : Map 1: 0(+5)/11 Map 2: 0(+1)/1  Map 3: 0(+1)/1
INFO  : Map 1: 0(+5)/11 Map 2: 0(+1)/1  Map 3: 1/1
INFO  : Map 1: 0(+6)/11 Map 2: 0(+1)/1  Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
INFO  : Map 1: 0(+7)/11 Map 2: 1/1      Map 3: 1/1
```

3.3 app_data_external table data count - 209355710

```
0: jdbc:hive2://localhost:10000/default> select count(*) from app_data_external;
INFO  : Compiling command(queryId=hive_20211014171221_e5e862dc-e7e0-4755-8f1a-f647b8de33bc): select count(*) from app_data_external
INFO  : Semantic Analysis Completed
INFO  : Returning Hive schema: Schema(fieldSchemas:[FieldSchema(name:_c0, type:bigint, comment:null)], properties:null)
INFO  : Completed compiling command(queryId=hive_20211014171221_e5e862dc-e7e0-4755-8f1a-f647b8de33bc); Time taken: 0.117 seconds
INFO  : Concurrency mode is disabled, not creating a lock manager
INFO  : Executing command(queryId=hive_20211014171221_e5e862dc-e7e0-4755-8f1a-f647b8de33bc): select count(*) from app_data_external
INFO  : Completed executing command(queryId=hive_20211014171221_e5e862dc-e7e0-4755-8f1a-f647b8de33bc); Time taken: 0.001 seconds
INFO  : OK
+------------+
|    _c0     |
+------------+
| 209355710  |
+------------+
1 row selected (0.13 seconds)
0: jdbc:hive2://localhost:10000/default>
```

4. CSV file creation from external tables

4.1 Commands

hive -e 'set hive.cli.print.header=true; select * from mlctest.non_event_data_external' | sed 's/[\t]/,/g' > /home/hadoop/non_events.csv;
hive -e 'set hive.cli.print.header=true; select * from mlctest.events_train_external' | sed 's/[\t]/,/g' > /home/hadoop/events.csv;
hive -e 'set hive.cli.print.header=true; select * from mlctest.app_data_external' | sed 's/[\t]/,/g' > /home/hadoop/appdata.csv;

```
[[hadoop@ip-172-31-75-0 ~]$ hive -e 'set hive.cli.print.header=true; select * from mlctest.non_event_data_external' | sed 's/[\t]/,/g' > /home/hadoop/non_events.csv;

Logging initialized using configuration in file:/etc/hive/conf.dist/hive-log4j2.properties Async: false
OK
Time taken: 2.471 seconds, Fetched: 74840 row(s)
[[hadoop@ip-172-31-75-0 ~]$ hive -e 'set hive.cli.print.header=true; select * from mlctest.events_train_external' | sed 's/[\t]/,/g' > /home/hadoop/events.csv;

Logging initialized using configuration in file:/etc/hive/conf.dist/hive-log4j2.properties Async: false
OK
Time taken: 2.245 seconds, Fetched: 1215598 row(s)
[[hadoop@ip-172-31-75-0 ~]$ hive -e 'set hive.cli.print.header=true; select * from mlctest.app_data_external' | sed 's/[\t]/,/g' > /home/hadoop/appdata.csv;

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

^[^Z
[3]+  Stopped                 hive -e 'set hive.cli.print.header=true; select * from mlctest.app_data_external' | sed 's/[\t]/,/g' > /home/hadoop/appdata.csv
[[hadoop@ip-172-31-75-0 ~]$ hive -e 'set hive.cli.print.header=true; select * from mlctest.app_data_external' | sed 's/[\t]/,/g' > /home/hadoop/appdata.csv;

Logging initialized using configuration in file:/etc/hive/conf.dist/hive-log4j2.properties Async: false
OK
sed: couldn't write 43 items to stdout: No space left on device
Time taken: 2.24 seconds, Fetched: 55616200 row(s)
[hadoop@ip-172-31-75-0 ~]$
```

5. Transfer CSV Data Files to S3 Bucket

5.1 Commands

aws s3 cp non_events.csv s3://capstone-sanjaykarthik/non_events.csv;
aws s3 cp events.csv s3://capstone-sanjaykarthik/events.csv;
aws s3 cp appdata.csv s3://capstone-sanjaykarthik/appdata.csv;

```
[[hadoop@ip-172-31-75-0 ~]$ aws s3 cp non_events.csv s3://capstone-sanjanameghna/non_events.csv;
upload: ./non_events.csv to s3://capstone-sanjanameghna/non_events.csv
[[hadoop@ip-172-31-75-0 ~]$ aws s3 cp events.csv s3://capstone-sanjanameghna/events.csv;
upload: ./events.csv to s3://capstone-sanjanameghna/events.csv
[[hadoop@ip-172-31-75-0 ~]$ aws s3 cp appdata.csv s3://capstone-sanjanameghna/appdata.csv;
upload: ./appdata.csv to s3://capstone-sanjanameghna/appdata.csv
[hadoop@ip-172-31-75-0 ~]$
```