ACADGILD FINAL PROJECT

MyTunes Music Analysis

A leading music-catering company is planning to analyse large amount of data received from varieties of sources, namely mobile app and website to track the behaviour of users, classify users, calculate royalties associated with the song and make appropriate business strategies. The file server receives data files periodically after every 3 hours.

Fields present in the data files

Data files contain below fields.

Column Name/Field Name	Column Description/Field Description
User_id	Unique identifier of every user
Song_id	Unique identifier of every song
Artist_id	Unique identifier of the lead artist of the song
Timestamp	Timestamp when the record was generated
Start_ts	Start timestamp when the song started to play
End_ts	End timestamp when the song was stopped
Geo_cd	Can be 'A' for USA region, 'AP' for asia pacific region,'J' for Japan region, 'E' for europe and 'AU' for australia region
Station_id	Unique identifier of the station from where the song was played
Song_end_type	How the song was terminated. 0 means completed successfully 1 means song was skipped 2 means song was paused 3 means other type of failure like device issue, network error etc.
Like	0 means song was not liked 1 means song was liked
Dislike	0 means song was not disliked 1 means song was disliked

LookUp Tables

There are some existing look up tables present in NoSQL databases. They play an important role in data enrichment and analysis.

Table Name	Description
Station_Geo_Map	Contains mapping of a geo_cd with station_id
Subscribed_Users	Contains user_id, subscription_start_date and subscription_end_date. Contains details only for subscribed users
Song_Artist_Map	Contains mapping of song_id with artist_id alongwith royalty associated with each play of the song
User_Artist_Map	Contains an array of artist_id(s) followed by a user_id

- **Formatting by python script :-**

```
[acadgild@localhost scripts]$ vi generate_web_data.py
You have new mail in /var/spool/mail/acadgild
[acadgild@localhost scripts]$ python generate_web_data.py
[acadgild@localhost scripts]$ ls -ltr
total 64
```

```
<records>
<record>
<user_id>U106</user_id>
<song_id>S205</song_id>
<artist_id>A300</artist_id>
<timestamp>2016-05-10 12:24:22</timestamp>
<start_ts>2016-05-10 12:24:22</start_ts>
<end_ts>2017-05-09 08:09:22</end_ts>
<geo_cd>AP</geo_cd>
<station_id>ST407</station_id>
<song_end_type>2</song_end_type>
<like>1</like>
<dislike>1</dislike>
</record>
<record>
<user_id>U114</user_id>
<song_id>S209</song_id>
<artist_id>A303</artist_id>
<timestamp>2016-06-09 22:12:36</timestamp>
<start_ts>2016-05-10 12:24:22</start_ts>
<end_ts>2017-05-09 08:09:22</end_ts>
<geo_cd>U</geo_cd>
<station_id>ST411</station_id>
<song_end_type>2</song_end_type>
<like>1</like>
<dislike>0</dislike>
```

- **Started all Daemon service I:e hive and hbase services**

```
acadgild@localhost:~/project/scripts
File  Edit  View  Search  Terminal  Help
[acadgild@localhost scripts]$ python generate_mob_data.py
[acadgild@localhost scripts]$ chmod 755 start-daemons.sh
You have new mail in /var/spool/mail/acadgild
[acadgild@localhost scripts]$ ls -ltr
total 64
-rw-rw-r--. 1 acadgild acadgild  592 Sep  8 22:09 create_schema.sql
-rw-rw-r--. 1 acadgild acadgild  961 Sep  8 22:09 data_analysis.sh
-rw-rw-r--. 1 acadgild acadgild  873 Sep  8 22:09 create_hive_hbase_lookup.hql
-rw-rw-r--. 1 acadgild acadgild 1499 Sep  8 22:09 data_enrichment.sh
-rw-rw-r--. 1 acadgild acadgild  299 Sep  8 22:09 data_enrichment_filtering_schema.sh
-rw-rw-r--. 1 acadgild acadgild 1731 Sep  8 22:09 data_export.sh
-rw-rw-r--. 1 acadgild acadgild  402 Sep  8 22:09 dataformatting.sh
-rw-rw-r--. 1 acadgild acadgild  120 Sep  8 22:09 file_generation_in_python.txt
-rw-rw-r--. 1 acadgild acadgild  604 Sep  8 22:09 formatted_hive_load.hql
-rw-rw-r--. 1 acadgild acadgild  853 Sep  8 22:09 generate_mob_data.txt
-rw-rw-r--. 1 acadgild acadgild 1333 Sep  8 22:09 populate-lookup.sh
-rw-rw-r--. 1 acadgild acadgild  337 Sep  8 22:09 user-artist.hql
-rwxr-xr-x. 1 acadgild acadgild  412 Sep  8 22:09 start-daemons.sh
-rw-rw-r--. 1 acadgild acadgild  485 Sep  8 22:09 wrapper.sh
-rwxrwxrwx. 1 acadgild acadgild 1803 Sep  8 23:01 generate_web_data.py
-rwxrwxrwx. 1 acadgild acadgild 1165 Sep  8 23:12 generate_mob_data.py
[acadgild@localhost scripts]$ ./start-daemons.sh
./start-daemons.sh: line 7: /home/acadgild/project/logs/current-batch.txt: No such file or directory
chmod: cannot access `/home/acadgild/project/logs/current-batch.txt': No such file or directory
./start-daemons.sh: line 11: /home/acadgild/project/logs/current-batch.txt: No such file or directory
./start-daemons.sh: line 14: /home/acadgild/project/logs/log_batch_cat: No such file or directory
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
18/09/08 23:13:43 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using b
Starting namenodes on [localhost]
localhost: namenode running as process 4606. Stop it first.
localhost: datanode running as process 4699. Stop it first.
Starting secondary namenodes [0.0.0.0]
0.0.0.0: secondarynamenode running as process 4884. Stop it first.
18/09/08 23:13:54 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using b
```

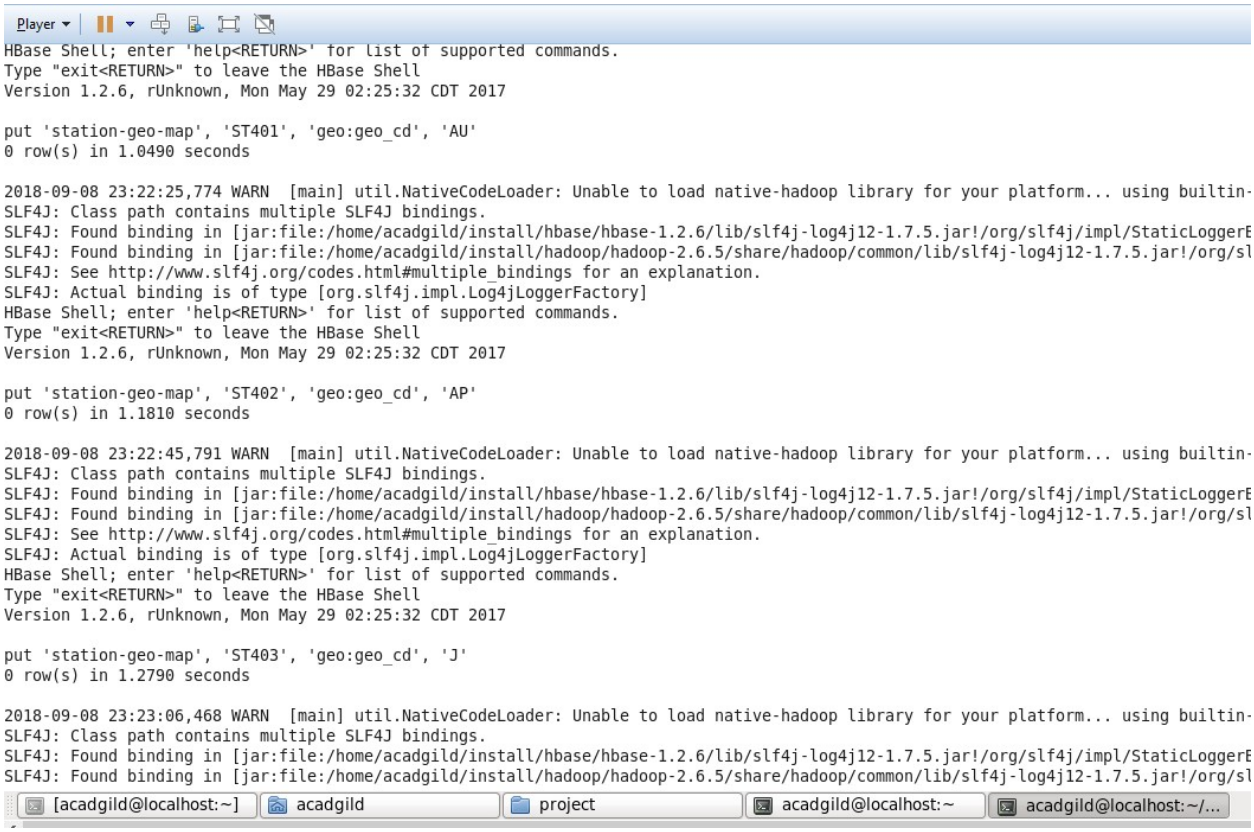
- **All services up and running**

```
0.0.0.0: secondarynamenode running as process 4884. Stop it first.
18/09/08 23:13:54 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using bu
starting yarn daemons
resourcemanager running as process 5199. Stop it first.
localhost: nodemanager running as process 5299. Stop it first.
localhost: starting zookeeper, logging to /home/acadgild/install/hbase/hbase-1.2.6/logs/hbase-acadgild-zookeeper
starting master, logging to /home/acadgild/install/hbase/hbase-1.2.6/logs/hbase-acadgild-master-localhost.locald
starting regionserver, logging to /home/acadgild/install/hbase/hbase-1.2.6/logs/hbase-acadgild-1-regionserver-lo
[acadgild@localhost scripts]$ jps
8720 HRegionServer
5299 NodeManager
4884 SecondaryNameNode
8519 HQuorumPeer
4699 DataNode
8813 Jps
4606 NameNode
5199 ResourceManager
8607 HMaster
[acadgild@localhost scripts]$
```

➢ Loading all lookup tables in Hbase

```
[acadgild@localhost scripts]$ chmod 755 populate-lookup.sh
[acadgild@localhost scripts]$ dos2unix populate-lookup.sh
dos2unix: converting file populate-lookup.sh to UNIX format ...
[acadgild@localhost scripts]$ ./populate-lookup.sh
cat: /home/acadgild/project/logs/current-batch.txt: No such file or directory
./populate-lookup.sh: line 7: /home/acadgild/project/logs/log_batch_: No such file or directory
2018-09-08 23:20:41,804 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Sta
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

create 'station-geo-map', 'geo'
0 row(s) in 3.4410 seconds

Hbase::Table - station-geo-map
2018-09-08 23:21:03,591 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Sta
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017
```


```
Hbase::Table - subscribed-users
2018-09-08 23:21:24,483 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using b
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Static
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

create 'song-artist-map', 'artist'
0 row(s) in 3.2210 seconds

Hbase::Table - song-artist-map
./populate-lookup.sh: line 14: /home/acadgild/project/logs/log_batch_: No such file or directory
2018-09-08 23:21:46,622 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using b
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Static
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'station-geo-map', 'ST400', 'geo:geo_cd', 'A'
0 row(s) in 1.2880 seconds

2018-09-08 23:22:07,506 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using b
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Static
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
```


Player
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017
put 'station-geo-map', 'ST401', 'geo:geo_cd', 'AU'
0 row(s) in 1.0490 seconds
2018-09-08 23:22:25,774 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerB
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/sl
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017
put 'station-geo-map', 'ST402', 'geo:geo_cd', 'AP'
0 row(s) in 1.1810 seconds
2018-09-08 23:22:45,791 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerB
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/sl
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017
put 'station-geo-map', 'ST403', 'geo:geo_cd', 'J'
0 row(s) in 1.2790 seconds
2018-09-08 23:23:06,468 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerB
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/sl
[acadgild@localhost:~]
acadgild
project
acadgild@localhost:~
acadgild@localhost:~/...


put 'station-geo-map', 'ST404', 'geo:geo_cd', 'E'
0 row(s) in 1.2420 seconds
2018-09-08 23:23:27,040 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Stat
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017
put 'station-geo-map', 'ST405', 'geo:geo_cd', 'A'
0 row(s) in 1.3840 seconds
2018-09-08 23:23:47,224 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Stat
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017
put 'station-geo-map', 'ST406', 'geo:geo_cd', 'AU'
0 row(s) in 1.3970 seconds
2018-09-08 23:24:06,899 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLoggerBinder.class]
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/Stat
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]

```
2018-09-08 23:24:06,899 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platfor
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j1
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'station-geo-map', 'ST407', 'geo:geo_cd', 'AP'
0 row(s) in 1.1920 seconds

2018-09-08 23:24:26,968 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platfor
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j1
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'station-geo-map', 'ST408', 'geo:geo_cd', 'E'
0 row(s) in 1.1120 seconds

2018-09-08 23:24:47,236 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platfor
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j1
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
```

acadgild@loca

[acadgild@localhost:~] | acadgild | project | acadgild@localhost:~ | acadg

Acadgild_64bit_2.6 - VMware Workstation 12 Player (Non-commercial use only)

Player

```
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'station-geo-map', 'ST408', 'geo:geo_cd', 'E'
0 row(s) in 1.1120 seconds

2018-09-08 23:24:47,236 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLogg
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'station-geo-map', 'ST409', 'geo:geo_cd', 'E'
0 row(s) in 1.0140 seconds

2018-09-08 23:25:07,019 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using built
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/slf4j/impl/StaticLogg
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'station-geo-map', 'ST410', 'geo:geo_cd', 'A'
0 row(s) in 1.0580 seconds
```

acadgild@localhost:~/project/scr

[acadgild@localhost:~] | acadgild | project | acadgild@localhost:~ | acadgild@localhost:~/...

```
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'subscribed-users', 'U114', 'subscn:startdt', '1465230523'
0 row(s) in 1.0170 seconds

2018-09-08 23:38:35,103 WARN  [main] util.NativeCodeLoader: Unable to load native-hadoop library for your pl
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hbase/hbase-1.2.6/lib/slf4j-log4j12-1.7.5.jar!/org/
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-l
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
HBase Shell; enter 'help<RETURN>' for list of supported commands.
Type "exit<RETURN>" to leave the HBase Shell
Version 1.2.6, rUnknown, Mon May 29 02:25:32 CDT 2017

put 'subscribed-users', 'U114', 'subscn:enddt', '1468130523'
0 row(s) in 1.0870 seconds

SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hive/apache-hive-2.3.2-bin/lib/log4j-slf4j-impl-2.6
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-l
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.apache.logging.slf4j.Log4jLoggerFactory]

Logging initialized using configuration in jar:file:/home/acadgild/install/hive/apache-hive-2.3.2-bin/lib/hi
OK
Time taken: 17.03 seconds
OK
Time taken: 0.075 seconds
OK
Time taken: 2.555 seconds
Loading data to table project.users_artists
OK
Time taken: 3.812 seconds
You have new mail in /var/spool/mail/acadgild
[acadgild@localhost scripts]$
```

[acadgild@localhost:~] | acadgild | project | acadgild@localhost:~

- **Creating hive tables on top of hbase tables for data enrichment and filtering...**

```
-rw-rw-r--. 1 acadgild acadgild  299 Sep  8 23:41 data_enrichment_filtering_schema.sh
[acadgild@localhost scripts]$ chmod 755 data_enrichment_filtering_schema.sh
You have new mail in /var/spool/mail/acadgild
[acadgild@localhost scripts]$ ./data_enrichment_filtering_schema.sh
cat: /home/acadgild/project/logs/current-batch.txt: No such file or directory
./data_enrichment_filtering_schema.sh: line 6: /home/acadgild/project/logs/log_batch_: No such file or directory
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hive/apache-hive-2.3.2-bin/lib/log4j-slf4j-impl-2.6.2.jar!/org/slf4j/imp
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hadoop/common/lib/slf4j-log4j12-1.7.5.jar!/org
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.apache.logging.slf4j.Log4jLoggerFactory]

Logging initialized using configuration in jar:file:/home/acadgild/install/hive/apache-hive-2.3.2-bin/lib/hive-common-2.3.2.jar!/
OK
Time taken: 13.698 seconds
OK
Time taken: 6.777 seconds
OK
Time taken: 0.695 seconds
OK
Time taken: 0.631 seconds
[acadgild@localhost scripts]$
```

- **Details of DB and Tables under Hive and it's Data**

```
File  Edit  View  Search  Terminal  Help
[acadgild@localhost ~]$ hive
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hive/apache-hive-2.3.2-bin/lib
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/hado
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.apache.logging.slf4j.Log4jLoggerFactory]

Logging initialized using configuration in jar:file:/home/acadgild/install/hive/apache-
Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Con
eases.
hive> show databases;
OK
acadgilddb
default
project
Time taken: 25.186 seconds, Fetched: 3 row(s)
hive> use project;
OK
Time taken: 0.088 seconds
hive> show tables;
OK
song_artist_map
station_geo_map
subscribed_users
users_artists
Time taken: 0.125 seconds, Fetched: 4 row(s)
hive> select * from song_artist_map limit 5;
OK
S200    A300
S201    A301
S202    A302
S203    A303
S204    A304
Time taken: 8.964 seconds, Fetched: 5 row(s)
```

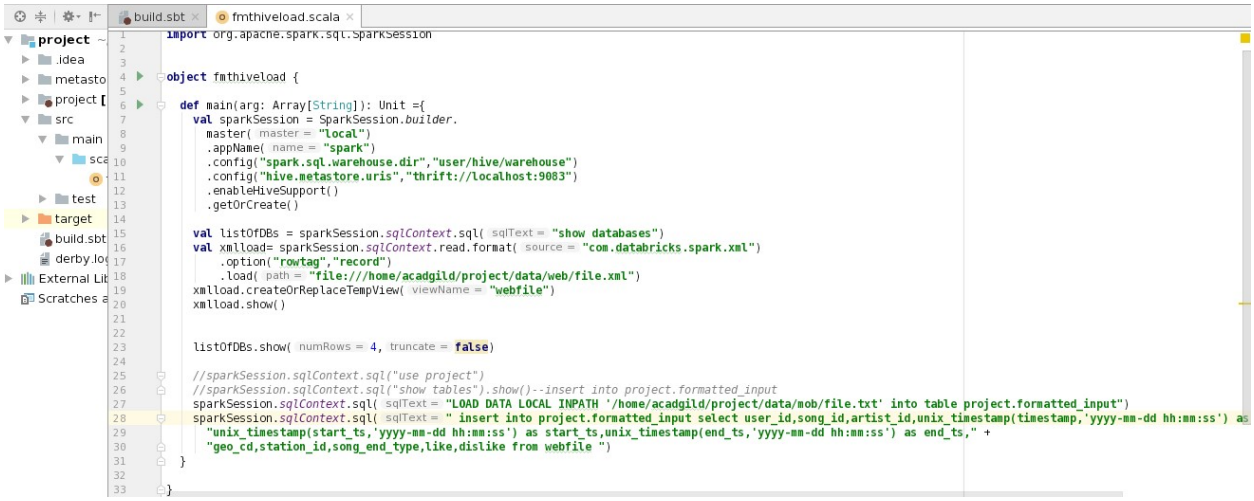
```
hive> select * from station_geo_map limit 5;
OK
ST400   A
ST401   AU
ST402   AP
ST403   J
ST404   E
Time taken: 1.083 seconds, Fetched: 5 row(s)
hive> select * from subscribed_users limit 5;
OK
U100    1465230523      1465130523
U101    1465230523      1475130523
U102    1465230523      1475130523
U103    1465230523      1475130523
U104    1465230523      1475130523
Time taken: 0.749 seconds, Fetched: 5 row(s)
hive> select * from users_artists limit 5;
OK
U100    ["A300","A301","A302"]
U101    ["A301","A302"]
U102    ["A302"]
U103    ["A303","A301","A302"]
U104    ["A304","A301"]
Time taken: 0.605 seconds, Fetched: 5 row(s)
hive>
```

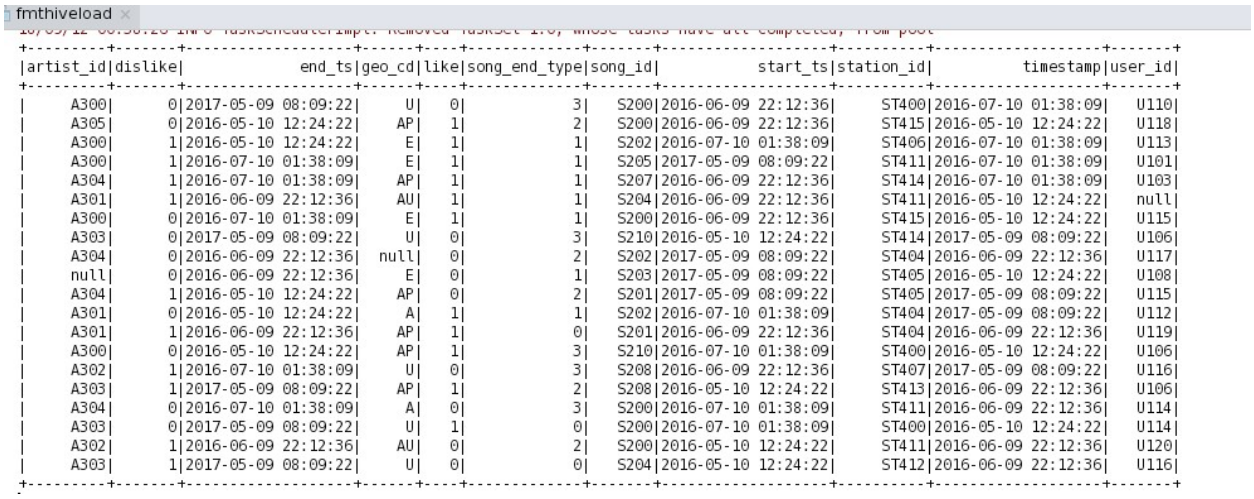
- **Loading csv and xml file to format table**

Data Ingestion and Initial Validation

Rules for data ingestion and data filtering

1. Data coming from web applications reside in /data/web and has xml format.
2. Data coming from mobile applications reside in /data/mob and has csv format.
3. Data files come every 3 hours.
4. All the timestamp fields in data coming from web application is of the format YYYY-MM-DD HH:MM:SS.
5. All the timestamp fields in data coming from mobile application is a long integer interpreted as UNIX timestamps.
6. Finally, all timestamps must have the format of a long integer to be interpreted as UNIX timestamps.





- **<u>After enrichment loading into Enrich_load_data table</u>**

7. If both *like* and *dislike* are 1, consider that record to be **invalid**.
8. If any of the fields from User_id, Song_id, Timestamp, Start_ts, End_ts, Geo_cd is **NULL** or *absent*, consider that record to be invalid.
9. If Song_end_type is **NULL** or *absent*, treat it to be 3.

Create a temporary identfier for all the data files received in the last 3 hours (may be an integer batch_id which is auto incremented or a string obtained after combining current date and current hour, to keep track of valid and invalid records per batch).

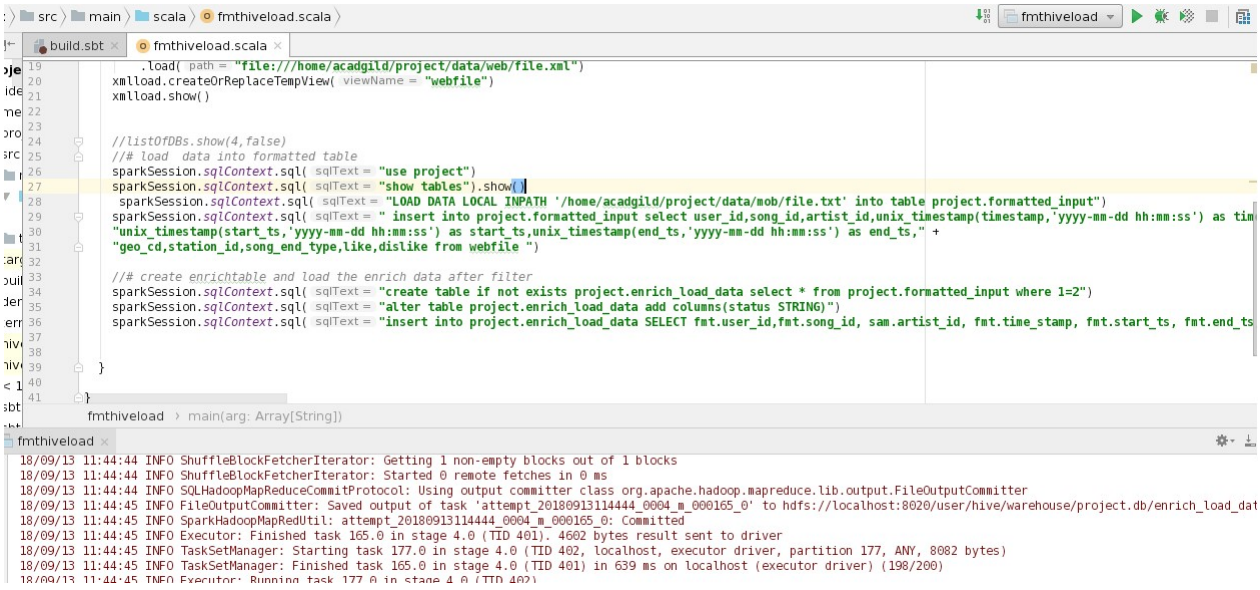
Data Enrichment

Rules for data enrichment

1. If any of *like*or*dislike* is **NULL** or *absent*, consider it as 0.
2. If fields like *Geo_cd* and *Artist_id* are **NULL** or *absent*, consult the lookup tables for fields *Station_id* and *Song_id* respectively to get the values of *Geo_cd* and *Artist_id*.
3. If corresponding lookup entry is not found, consider that record to be invalid.

NULL or absent field	Look up field	Look up table (Table from which record can be updated)
Geo_cd	Station_id	Station_Geo_Map
Artist_id	Song_id	Song_Artist_Map

- **Data loaded under formatted table**



Logs of above script

fmthiveload

```
18/09/13 11:44:44 INFO ShuffleBlockFetcherIterator: Getting 1 non-empty blocks out of 1 blocks
18/09/13 11:44:44 INFO ShuffleBlockFetcherIterator: Started 0 remote fetches in 0 ms
18/09/13 11:44:44 INFO SQLHadoopMapReduceCommitProtocol: Using output committer class org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
18/09/13 11:44:45 INFO FileOutputCommitter: Saved output of task 'attempt_20180913114444_0004_m_000165_0' to hdfs://localhost:8020/user/hive/warehous
18/09/13 11:44:45 INFO SparkHadoopMapRedUtil: attempt_20180913114444_0004_m_000165_0: Committed
18/09/13 11:44:45 INFO Executor: Finished task 165.0 in stage 4.0 (TID 401). 4602 bytes result sent to driver
18/09/13 11:44:45 INFO TaskSetManager: Starting task 177.0 in stage 4.0 (TID 402, localhost, executor driver, partition 177, ANY, 8082 bytes)
18/09/13 11:44:45 INFO TaskSetManager: Finished task 165.0 in stage 4.0 (TID 401) in 639 ms on localhost (executor driver) (198/200)
18/09/13 11:44:45 INFO Executor: Running task 177.0 in stage 4.0 (TID 402)
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Getting 3 non-empty blocks out of 200 blocks
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Started 0 remote fetches in 0 ms
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Getting 1 non-empty blocks out of 1 blocks
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Started 0 remote fetches in 0 ms
18/09/13 11:44:45 INFO SQLHadoopMapReduceCommitProtocol: Using output committer class org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
18/09/13 11:44:45 INFO FileOutputCommitter: Saved output of task 'attempt_20180913114445_0004_m_000177_0' to hdfs://localhost:8020/user/hive/warehous
18/09/13 11:44:45 INFO SparkHadoopMapRedUtil: attempt_20180913114445_0004_m_000177_0: Committed
18/09/13 11:44:45 INFO Executor: Finished task 177.0 in stage 4.0 (TID 402). 4602 bytes result sent to driver
18/09/13 11:44:45 INFO TaskSetManager: Starting task 199.0 in stage 4.0 (TID 403, localhost, executor driver, partition 199, ANY, 8082 bytes)
18/09/13 11:44:45 INFO TaskSetManager: Finished task 177.0 in stage 4.0 (TID 402) in 420 ms on localhost (executor driver) (199/200)
18/09/13 11:44:45 INFO Executor: Running task 199.0 in stage 4.0 (TID 403)
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Getting 6 non-empty blocks out of 200 blocks
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Started 0 remote fetches in 1 ms
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Getting 1 non-empty blocks out of 1 blocks
18/09/13 11:44:45 INFO ShuffleBlockFetcherIterator: Started 0 remote fetches in 0 ms
18/09/13 11:44:45 INFO SQLHadoopMapReduceCommitProtocol: Using output committer class org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
18/09/13 11:44:46 INFO FileOutputCommitter: Saved output of task 'attempt_20180913114445_0004_m_000199_0' to hdfs://localhost:8020/user/hive/warehous
18/09/13 11:44:46 INFO SparkHadoopMapRedUtil: attempt_20180913114445_0004_m_000199_0: Committed
18/09/13 11:44:46 INFO Executor: Finished task 199.0 in stage 4.0 (TID 403). 4602 bytes result sent to driver
18/09/13 11:44:46 INFO TaskSetManager: Finished task 199.0 in stage 4.0 (TID 403) in 712 ms on localhost (executor driver) (200/200)
18/09/13 11:44:46 INFO DAGScheduler: ResultStage 4 (sql at fmthiveload.scala:37) finished in 54.852 s
```

fmthiveload

```
18/09/13 11:44:51 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:51 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:51 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:51 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:51 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:51 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:51 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:52 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:52 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:52 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:52 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:52 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:52 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:52 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:52 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/13 11:44:52 INFO Hive: Renaming src: hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hive-staging_hive_2018-09-13_11-41-47_415_
18/09/13 11:44:55 INFO SparkContext: Invoking stop() from shutdown hook
18/09/13 11:44:55 INFO SparkUI: Stopped Spark web UI at http://192.168.64.129:4040
18/09/13 11:44:56 INFO MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint stopped!
18/09/13 11:44:56 INFO MemoryStore: MemoryStore cleared
18/09/13 11:44:56 INFO BlockManager: BlockManager stopped
18/09/13 11:44:56 INFO BlockManagerMaster: BlockManagerMaster stopped
18/09/13 11:44:57 INFO OutputCommitCoordinator$OutputCommitCoordinatorEndpoint: OutputCommitCoordinator stopped!
18/09/13 11:44:57 INFO SparkContext: Successfully stopped SparkContext
18/09/13 11:44:57 INFO ShutdownHookManager: Shutdown hook called
18/09/13 11:44:57 INFO ShutdownHookManager: Deleting directory /tmp/spark-40b200d9-78bb-4d9c-9972-6630c207440f

Process finished with exit code 0
```

- **Loaded data into formatted table in hive**

```
hive> select * from formatted_input;
OK
U103    S210    A305    1465230523      1485130523      1465230523      AU      ST402   3       1       1
U103    S210    A305    1465130523      1485130523      1465230523      E       ST414   0       0       1
U114    S202    A304    1495130523      1475130523      1465230523      A       ST406   2       0       1
U114    S203    A300    1495130523      1485130523      1465130523      U       ST411   1       0       1
U105    S201    A303    1465130523      1475130523      1465230523      AP      ST409   0       0       0
        S203    A301    1465230523      1485130523      1475130523      E       ST406   3       0       0
U108    S205    A304    1475130523      1465130523      1475130523      AP      ST412   1       0       1
U100    S210    A304    1465230523      1475130523      1465130523      A       ST401   1       0       1
U119    S209    A302    1495130523      1485130523      1465230523              ST404   3       0       0
U105    S208            1465130523      1465230523      1475130523      AU      ST407   2       1       0
U101    S210    A301    1495130523      1475130523      1465130523      U       ST409   3       1       1
U104    S208    A304    1495130523      1485130523      1465230523      A       ST401   1       1       1
U103    S206    A300    1465130523      1475130523      1465230523      A       ST405   0       0       0
U104    S203    A300    1475130523      1475130523      1465130523      AU      ST412   1       1       0
U117    S203    A305    1465230523      1465230523      1465130523      E       ST401   1       0       0
U111    S203    A302    1465130523      1465230523      1475130523      A       ST403   2       1       0
U113    S207    A300    1465130523      1485130523      1465230523      U       ST403   1       0       1
U115    S207    A305    1465130523      1465130523      1485130523      A       ST409   3       0       1
U101    S205    A302    1475130523      1475130523      1465230523      AP      ST400   1       0       0
U104    S200    A301    1465230523      1465230523      1465130523      E       ST400   2       1       1
U110    S200    A300    1468094889      1465490556      1494297562      U       ST400   3       0       0
U118    S200    A305    1462863262      1465490556      1462863262      AP      ST415   2       1       0
U113    S202    A300    1468094889      1468094889      1462863262      E       ST406   1       1       1
U101    S205    A300    1468094889      1494297562      1468094889      E       ST411   1       1       1
U103    S207    A304    1468094889      1465490556      1468094889      AP      ST414   1       1       1
NULL    S204    A301    1462863262      1465490556      1465490556      AU      ST411   1       1       1
U115    S200    A300    1462863262      1465490556      1468094889      E       ST415   1       1       0
U106    S210    A303    1494297562      1462863262      1494297562      U       ST414   3       0       0
U117    S202    A304    1465490556      1494297562      1465490556      NULL    ST404   2       0       0
U108    S203    NULL    1462863262      1494297562      1465490556      E       ST405   1       0       0
U115    S201    A304    1494297562      1494297562      1462863262      AP      ST405   2       0       1
U112    S202    A301    1494297562      1468094889      1462863262      A       ST404   1       1       0
U119    S201    A301    1465490556      1465490556      1465490556      AP      ST404   0       1       1
```

Data loaded into enrich table

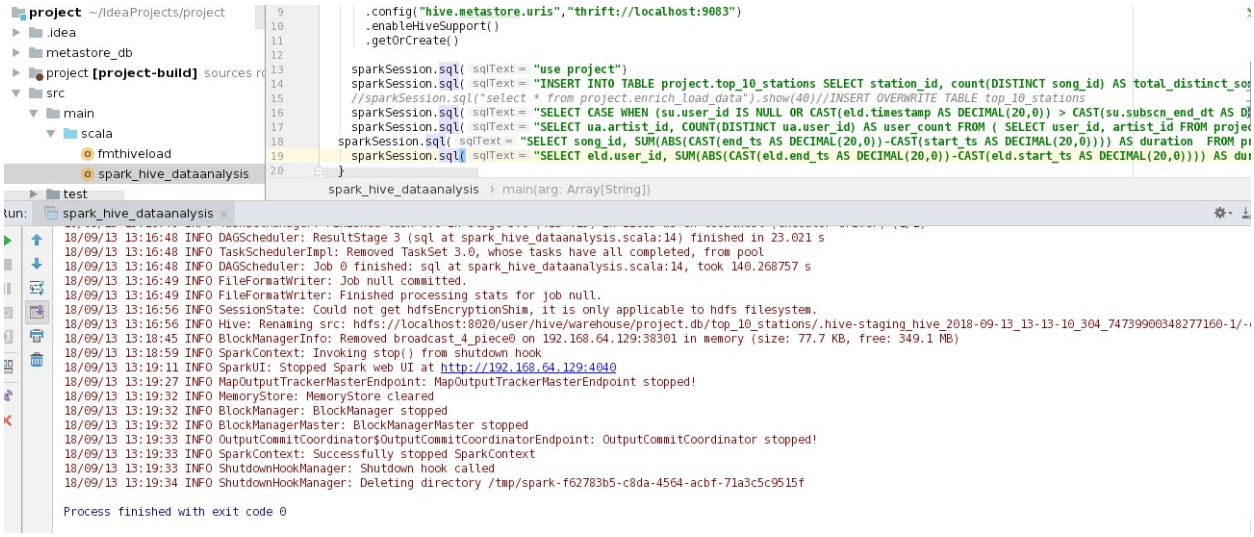
```
build.sbt | fmthiveload.scala | spark_hive_dataanalysis.scala

13          .enableHiveSupport()
14          .getOrCreate()
15
16        val listOfDBs = sparkSession.sqlContext.sql("show databases")
17        val xmlload= sparkSession.sqlContext.read.format("com.databricks.spark.xml")
18           .option("rowtag","record")
19            .load("file:///home/acadgild/project/data/web/file.xml")
20        xmlload.createOrReplaceTempView("webfile")
21        xmlload.show()
22
23
24        //listOfDBs.show(4,false)
25        //# load  data into formatted table
26        sparkSession.sqlContext.sql("use project")
27        sparkSession.sqlContext.sql("show tables").show()
28         sparkSession.sqlContext.sql("LOAD DATA LOCAL INPATH '/home/acadgild/project/data/mob/file.txt' into table project.formatted_input")
29        sparkSession.sqlContext.sql(" insert into project.formatted_input select user_id,song_id,artist_id,unix_timestamp(timestamp,'yyyy-mm-d
30        "unix_timestamp(start_ts,'yyyy-mm-dd hh:mm:ss') as start_ts,unix_timestamp(end_ts,'yyyy-mm-dd hh:mm:ss') as end_ts," +
31        "geo_cd,station_id,song_end_type,like,dislike from webfile ")
32
33        //# create enrichtable and load the enrich data after filter
34        sparkSession.sqlContext.sql("create table if not exists project.enrich_load_data select * from project.formatted_input where 1=2")
35        sparkSession.sqlContext.sql("alter table project.enrich_load_data add columns(status STRING)")
36        sparkSession.sqlContext.sql("insert into project.enrich_load_data SELECT fmt.user_id,fmt.song_id, sam.artist_id, fmt.time_stamp, fmt.s
37
38
39      }
40
```

Create table with only structure

```
18/09/12 02:11:00 INFO FileFormatWriter: Finished processing stats for job null.
18/09/12 02:11:03 INFO SessionState: Could not get hdfsEncryptionShim, it is only applicable to hdfs filesystem.
18/09/12 02:11:03 INFO Hive: Replacing src:hdfs://localhost:8020/user/hive/warehouse/project.db/enrich_load_data/.hi
18/09/12 02:11:15 INFO CodeGenerator: Code generated in 335.578202 ms
18/09/12 02:11:16 INFO CodeGenerator: Code generated in 329.105987 ms
+--------+---------------+-----------+
|database|      tableName|isTemporary|
+--------+---------------+-----------+
| project|enrich_load_data|      false|
| project| formatted_input|      false|
| project| song_artist_map|      false|
| project| station_geo_map|      false|
| project|subscribed_users|      false|
| project|   users_artists|      false|
+--------+---------------+-----------+

18/09/12 02:11:16 INFO SparkContext: Invoking stop() from shutdown hook
18/09/12 02:11:17 INFO SparkUI: Stopped Spark web UI at http://192.168.0.5:4040
18/09/12 02:11:17 INFO MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint stopped!
```

```
hive> select * from enrich_load_data;
OK
U119    S201    A301    1465490556      1465490556      1465490556      E       ST404   0       1       1       False
U115    S201    A301    1494297562      1494297562      1462863262      A       ST405   2       0       1       True
U105    S201    A301    1465130523      1475130523      1465230523      E       ST409   0       0       0       True
U103    S207    A303    1468094889      1465490556      1468094889      E       ST414   1       1       1       False
U113    S207    A303    1465130523      1485130523      1465230523      J       ST403   1       0       1       True
U115    S207    A303    1465130523      1465130523      1485130523      E       ST409   3       0       1       True
U117    S202    A302    1465490556      1494297562      1465490556      E       ST404   2       0       0       False
U112    S202    A302    1494297562      1468094889      1462863262      E       ST404   1       1       0       True
U114    S202    A302    1495130523      1475130523      1465230523      AU      ST406   2       0       1       True
U113    S202    A302    1468094889      1468094889      1462863262      AU      ST406   1       1       1       False
NULL    S204    A304    1462863262      1465490556      1465490556      A       ST411   1       1       1       False
U116    S204    A304    1465490556      1462863262      1494297562      AP      ST412   0       0       1       True
U119    S209    A305    1495130523      1485130523      1465230523      E       ST404   3       0       0       False
U103    S206    A302    1465130523      1475130523      1465230523      A       ST405   0       0       0       True
U104    S208    A304    1495130523      1485130523      1465230523      AU      ST401   1       1       1       False
U105    S208    A304    1465130523      1465230523      1475130523      AP      ST407   2       1       0       True
U116    S208    A304    1494297562      1465490556      1468094889      AP      ST407   3       0       1       True
U106    S208    A304    1465490556      1462863262      1494297562      J       ST413   2       1       1       False
U103    S210    NULL    1465230523      1485130523      1465230523      AP      ST402   3       1       1       False
U106    S210    NULL    1462863262      1468094889      1462863262      A       ST400   3       1       0       False
U103    S210    NULL    1465130523      1485130523      1465230523      E       ST414   0       0       1       False
U106    S210    NULL    1494297562      1462863262      1494297562      E       ST414   3       0       0       False
U101    S210    NULL    1495130523      1475130523      1465130523      E       ST409   3       1       1       False
U100    S210    NULL    1465230523      1475130523      1465130523      AU      ST401   1       0       1       False
U101    S205    A301    1475130523      1475130523      1465230523      A       ST400   1       0       0       True
U101    S205    A301    1468094889      1494297562      1468094889      A       ST411   1       1       1       False
U108    S205    A301    1475130523      1465130523      1475130523      AP      ST412   1       0       1       True
U104    S200    A300    1465230523      1465230523      1465130523      A       ST400   2       1       1       False
U110    S200    A300    1468094889      1465490556      1494297562      A       ST400   3       0       0       True
U114    S200    A300    1462863262      1468094889      1494297562      A       ST400   0       1       0       True
U114    S200    A300    1465490556      1468094889      1468094889      A       ST411   3       0       0       True
U120    S200    A300    1465490556      1462863262      1465490556      A       ST411   2       0       1       True
U118    S200    A300    1462863262      1465490556      1462863262      NULL    ST415   2       1       0       False
U115    S200    A300    1462863262      1465490556      1468094889      NULL    ST415   1       1       0       False
```


- **DataAnalysis Queries**



1. Determine top 10 station_id(s) where maximum number of songs were played, which were liked by unique users.

```
hive> select * from top_10_stations;
OK
ST400   1       1
ST404   1       1
ST403   1       1
ST407   1       1
ST412   1       1
Time taken: 21.057 seconds, Fetched: 5 row(s)
hive>
```

2 Determine total duration of songs played by each type of user, where type of user can be **'subscribed'** or **'unsubscribed'**. An unsubscribed user is the one whose record is either not present in **Subscribed_users** lookup table or has *subscription_end_date* earlier than the *timestamp* of the song played by him.

Data populated snap in all hive table at the end of page

```
18/09/13 13:36:29 INFO TaskSetManager: Finished task 74.0 in stag
18/09/13 13:36:29 INFO TaskSchedulerImpl: Removed TaskSet 19.0, w
18/09/13 13:36:29 INFO DAGScheduler: ResultStage 19 (show at spar
18/09/13 13:36:29 INFO DAGScheduler: Job 4 finished: show at spar
+------------+---------+
|   user_type| duration|
+------------+---------+
|UNSUBSCRIBED|133331854|
|  SUBSCRIBED|163216685|
+------------+---------+

18/09/13 13:36:39 INFO CodeGenerator: Code generated in 172.28553
18/09/13 13:36:40 INFO CodeGenerator: Code generated in 193.59978
18/09/13 13:36:40 INFO CodeGenerator: Code generated in 163.11504
18/09/13 13:36:40 INFO CodeGenerator: Code generated in 314.50033
```

1. Determine top 10 connected artists. Connected artists are those whose songs are most listened by the unique users who follow them.

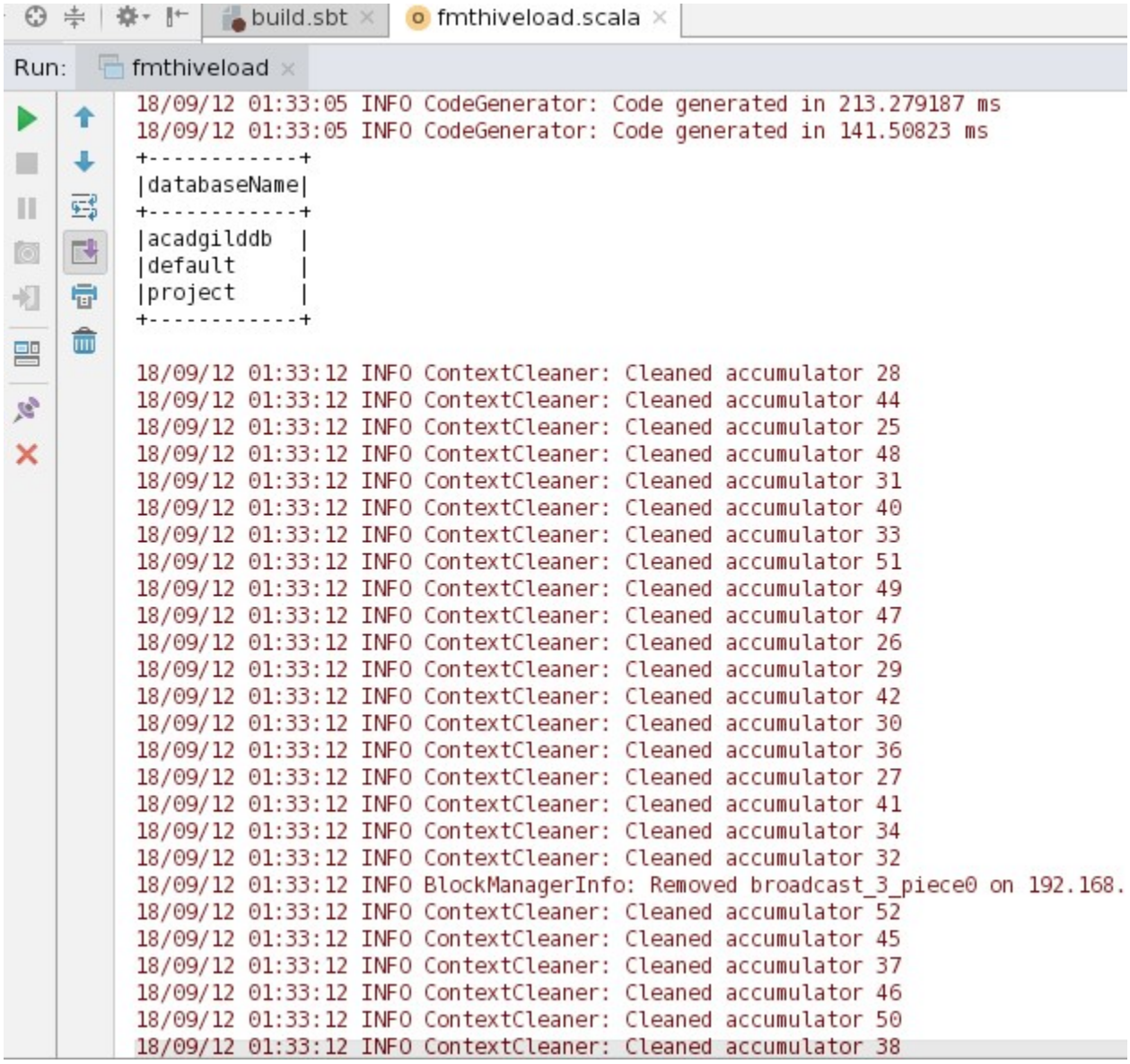
```
18/09/13 13:37:39 INFO DAGScheduler: ResultStage 24 (show at spark_hive_dataanalysis.scala:17) finish
18/09/13 13:37:39 INFO DAGScheduler: Job 6 finished: show at spark_hive_dataanalysis.scala:17, took 4
+---------+----------+
|artist_id|user_count|
+---------+----------+
|     A301|         2|
|     A302|         2|
|     A303|         2|
|     A300|         1|
+---------+----------+

18/09/13 13:37:42 INFO CodeGenerator: Code generated in 247.644891 ms
18/09/13 13:37:43 INFO CodeGenerator: Code generated in 338.758282 ms
18/09/13 13:37:43 INFO CodeGenerator: Code generated in 347.047082 ms
18/09/13 13:37:43 INFO HashAggregateExec: spark.sql.codegen.aggregate.map.twolevel.enabled is set to
```

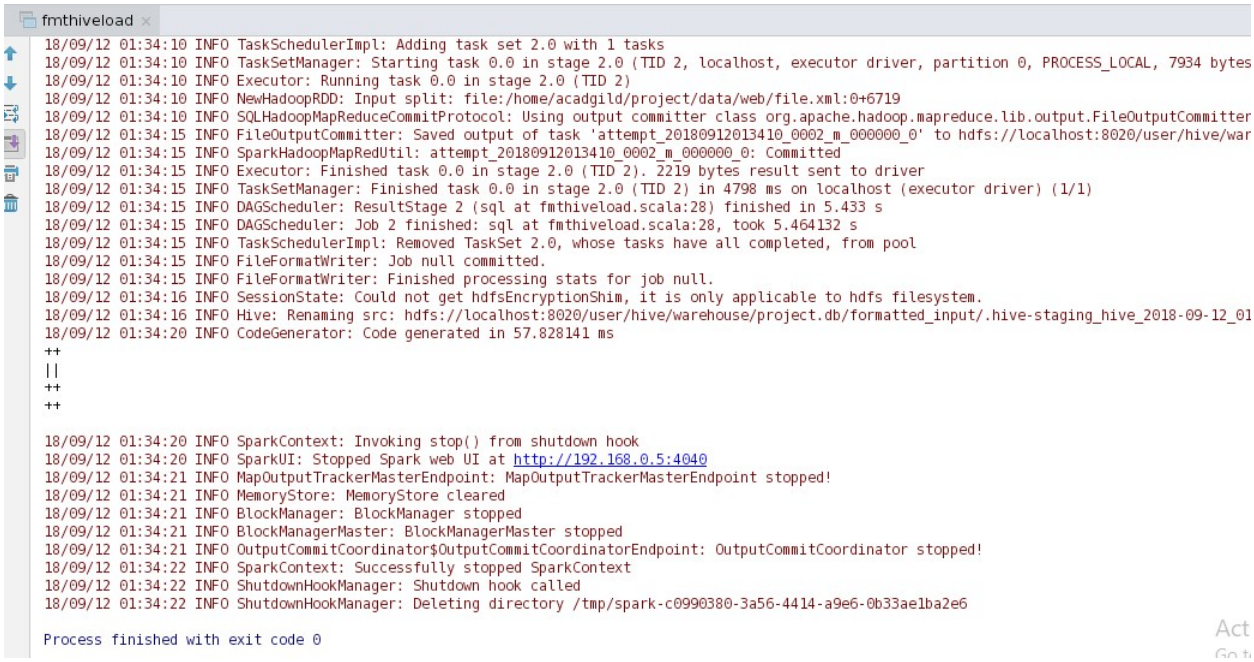
1. Determine top 10 songs who have generated the maximum revenue. Royalty applies to a song only if it was *liked* or was *completed successfully* or both.

```
18/09/13 13:38:10 INFO TaskSchedulerImpl: Removed TaskSet 27.0, whose
18/09/13 13:38:10 INFO DAGScheduler: ResultStage 27 (show at spark_hiv
18/09/13 13:38:10 INFO DAGScheduler: Job 7 finished: show at spark_hiv
+-------+--------+
|song_id|duration|
+-------+--------+
|   S204|31434300|
|   S200|26202673|
|   S203|19900000|
|   S201| 9900000|
|   S206| 9900000|
|   S208| 9900000|
|   S202| 5231627|
+-------+--------+

18/09/13 13:38:17 INFO CodeGenerator: Code generated in 126.485646 ms
18/09/13 13:38:17 INFO HashAggregateExec: spark.sql.codegen.aggregate.
18/09/13 13:38:17 INFO CodeGenerator: Code generated in 232.070772 ms
```

1. Determine top 10 unsubscribed users who listened to the songs for the longest duration.

```
18/09/13 13:38:56 INFO TaskSchedulerImpl: Removed TaskSet 31.0, whose tasks have all
18/09/13 13:38:56 INFO DAGScheduler: ResultStage 31 (show at spark_hive_dataanalysis.
18/09/13 13:38:56 INFO DAGScheduler: Job 8 finished: show at spark_hive_dataanalysis.
+-------+--------+
|user_id|duration|
+-------+--------+
|   U115|51434300|
|   U116|34038633|
|   U114|29900000|
|   U108|10000000|
|   U112| 5231627|
|   U120| 2627294|
|   U117|  100000|
+-------+--------+

18/09/13 13:38:58 INFO SparkContext: Invoking stop() from shutdown hook
18/09/13 13:38:59 INFO SparkUI: Stopped Spark web UI at http://192.168.64.129:4040
18/09/13 13:38:59 INFO MapOutputTrackerMasterEndpoint: MapOutputTrackerMasterEndpoint
18/09/13 13:39:00 INFO MemoryStore: MemoryStore cleared
```


build.sbt
fmthiveload.scala
Run:
fmthiveload
18/09/12 01:33:05 INFO CodeGenerator: Code generated in 213.279187 ms
18/09/12 01:33:05 INFO CodeGenerator: Code generated in 141.50823 ms
+------------+
|databaseName|
+------------+
|acadgilddb |
|default |
|project |
+------------+
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 28
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 44
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 25
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 48
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 31
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 40
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 33
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 51
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 49
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 47
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 26
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 29
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 42
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 30
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 36
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 27
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 41
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 34
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 32
18/09/12 01:33:12 INFO BlockManagerInfo: Removed broadcast_3_piece0 on 192.168.
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 52
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 45
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 37
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 46
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 50
18/09/12 01:33:12 INFO ContextCleaner: Cleaned accumulator 38



- **Data in all Hive table through above spark integration**

```
[acadgild@localhost mob]$ hive
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/install/hive/apache-hive-2.3.2-bin/l
SLF4J: Found binding in [jar:file:/home/acadgild/install/hadoop/hadoop-2.6.5/share/ha
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.apache.logging.slf4j.Log4jLoggerFactory]

Logging initialized using configuration in jar:file:/home/acadgild/install/hive/apach
Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. C
eases.
hive> show databases;
OK
acadgilddb
default
project
Time taken: 43.489 seconds, Fetched: 3 row(s)
hive> use project
    > ;
OK
Time taken: 0.187 seconds
hive> show tables;
OK
formatted_input
song_artist_map
station_geo_map
subscribed_users
users_artists
Time taken: 0.32 seconds, Fetched: 5 row(s)
```

```
File  Edit  View  Search  Terminal  Help
hive> show tables;
OK
connected_artists
enrich_load_data
formatted_input
song_artist_map
station_geo_map
subscribed_users
top_10_royalty_songs
top_10_stations
top_10_unsubscribed_users
users_artists
users_behaviour
Time taken: 2.139 seconds, Fetched: 11 row(s)
hive> select * from top_10_stations;
OK
ST400   1       1
ST404   1       1
ST403   1       1
ST407   1       1
ST412   1       1
Time taken: 2.541 seconds, Fetched: 5 row(s)
hive> select * from top_10_royalty_songs;
OK
S204    31434300
S200    26202673
S203    19900000
S201    9900000
S206    9900000
S208    9900000
S202    5231627
Time taken: 1.242 seconds, Fetched: 7 row(s)
```

```
hive> select * from top_10_unsubscribed_users;
OK
U115    51434300
U116    34038633
U114    29900000
U108    10000000
U112    5231627
U120    2627294
U117    100000
Time taken: 1.665 seconds, Fetched: 7 row(s)
hive> select * from connected_artists;
OK
A301    2
A302    2
A303    2
A300    1
Time taken: 2.236 seconds, Fetched: 4 row(s)
hive> select * from users_behaviour;
OK
UNSUBSCRIBED    133331854
SUBSCRIBED      163216685
Time taken: 2.458 seconds, Fetched: 2 row(s)
hive>
```