Problem Statement:

Explain File Formats in Hive in Brief with an example.

File Format

A file format is a way in which information is stored or encoded in a computer file. In Hive it refers to how records are stored inside the file. As we are dealing with structured data, each record has to be its own structure. How records are encoded in a file defines a file format.

These file formats mainly vary between data encoding, compression rate, usage of space and disk I/O.

Hive does not verify whether the data that you are loading matches the schema for the table or not. However, it verifies if the file format matches the table definition or not.

TEXTFILE

TEXTFILE format is a famous input/output format used in Hadoop. In Hive if we define a table as TEXTFILE it can load data of from CSV (Comma Separated Values), delimited by Tabs, Spaces, and JSON data. This means fields in each record should be separated by comma or space or tab or it may be JSON(JavaScript Object Notation) data.

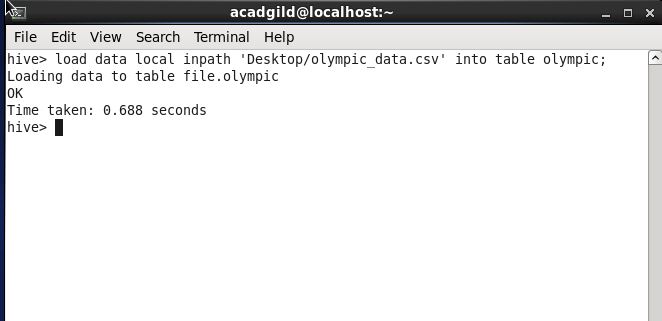
By default, if we use TEXTFILE format then each line is considered as a record.

We can create a TEXTFILE format in Hive as follows:

create table table\_name (schema of the table) row format delimited fields terminated by ',' | stored as TEXTFILE.

At the end, we need to specify the type of file format. If we do not specify anything it will consider the file format as TEXTFILE format.





SEQUENCEFILE

We know that Hadoop’s performance is drawn out when we work with a small number of files with big size rather than a large number of files with small size. If the size of a file is smaller than the typical block size in Hadoop, we consider it as a small file. Due to this, a number of metadata increases which will become an overhead to the NameNode. To solve this problem sequence files are introduced in Hadoop. Sequence files act as a container to store the small files.

Sequence files are flat files consisting of binary key-value pairs. When Hive converts queries to MapReduce jobs, it decides on the appropriate key-value pairs to be used for a given record. Sequence files are in the binary format which are able to split and the main use of these files is to club two or more smaller files and make them as a one sequence file.

In Hive we can create a sequence file by specifying STORED AS SEQUENCEFILE in the end of a CREATE TABLE statement.

There are three types of sequence files:

• Uncompressed key/value records.

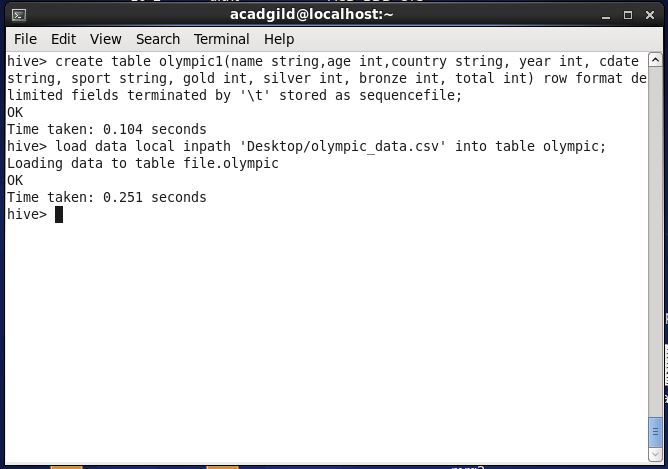
• Record compressed key/value records – only ‘values’ are compressed here

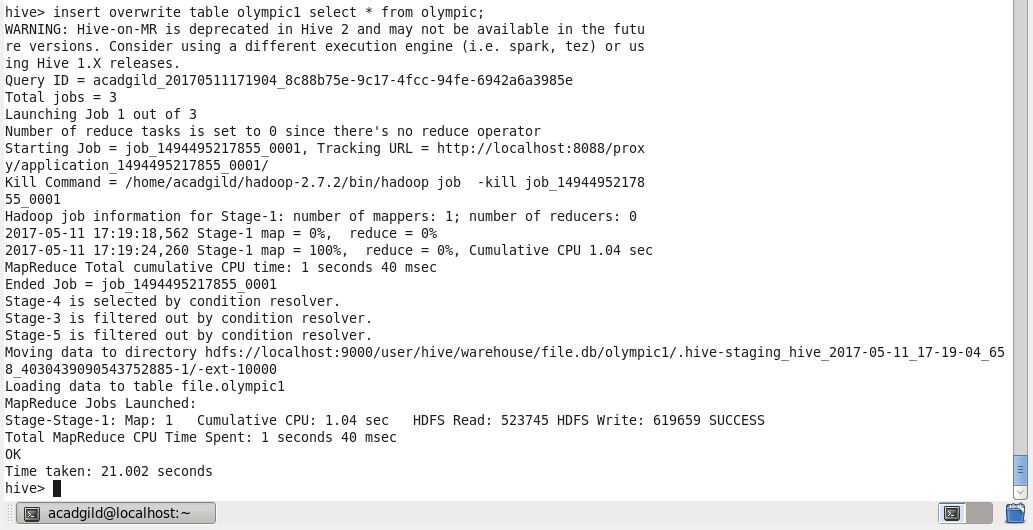
• Block compressed key/value records – both keys and values are collected in ‘blocks’ separately and compressed. The size of the ‘block’ is configurable.

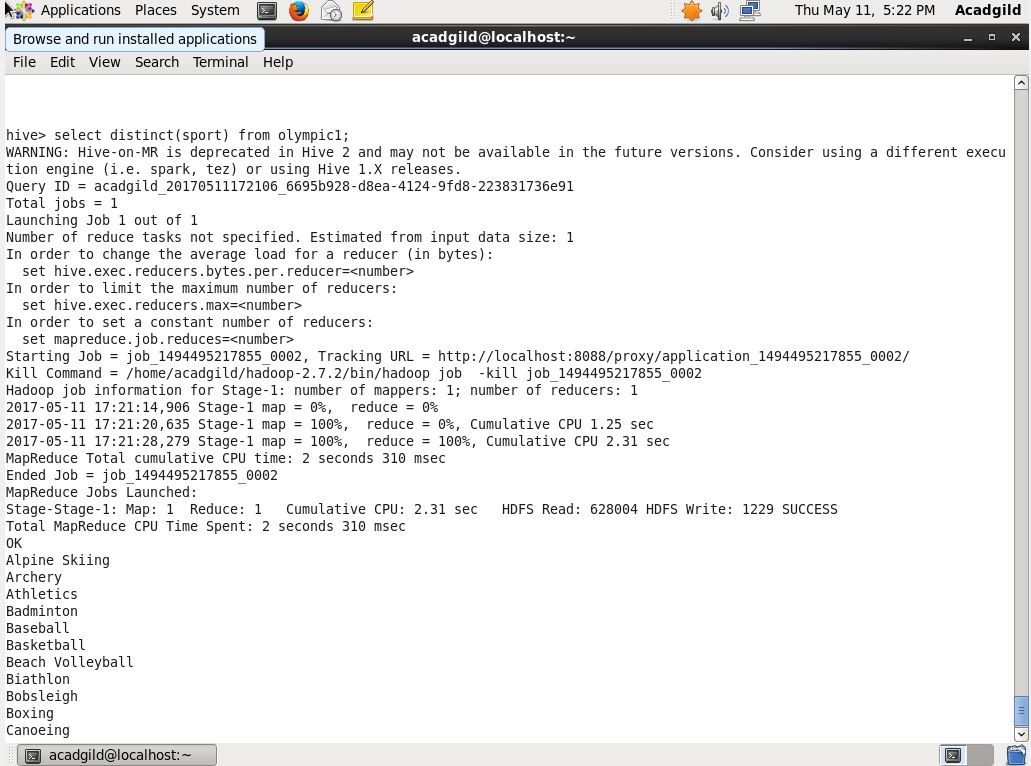
Hive has its own SEQUENCEFILE reader and SEQUENCEFILE writer for reading and writing through sequence files.

In Hive we can create a sequence file format as follows:

create table table\_name (schema of the table) row format delimited fileds terminated by ',' | stored as SEQUENCEFILE







RCFILE

RCFILE stands of Record Columnar File which is another type of binary file format which offers high compression rate on the top of the rows.

RCFILE is used when we want to perform operations on multiple rows at a time.

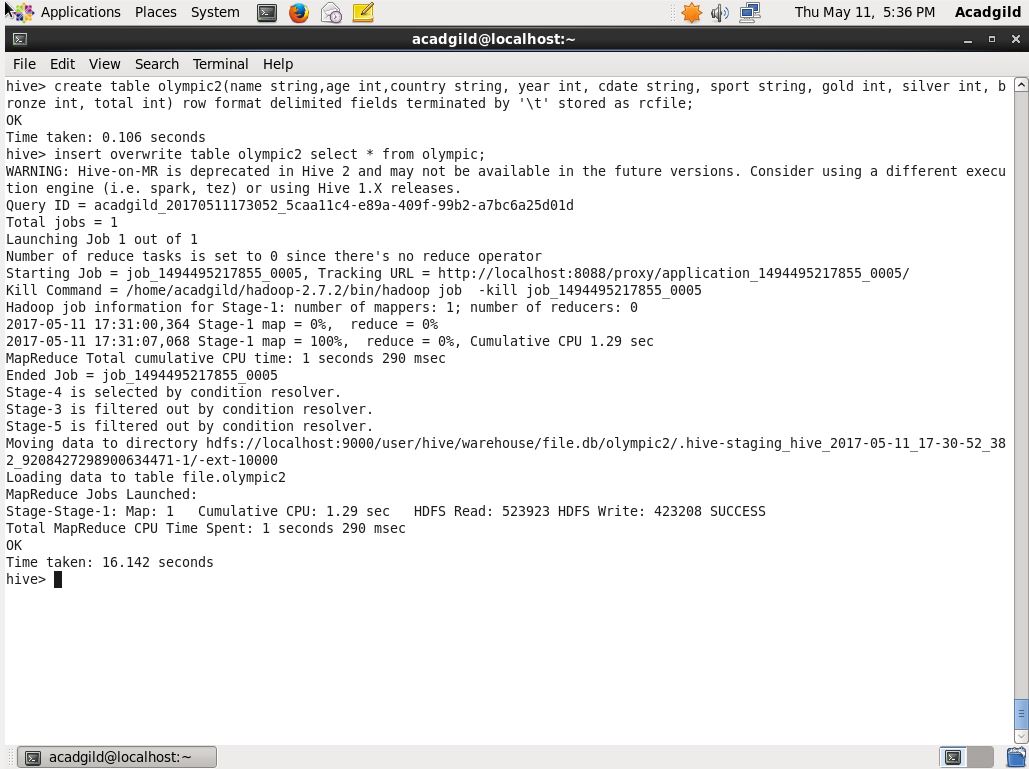
RCFILEs are flat files consisting of binary key/value pairs, which shares much similarity with SEQUENCEFILE. RCFILE stores columns of a table in form of record in a columnar manner. It first partitions rows horizontally into row splits and then it vertically partitions each row split in a columnar way. RCFILE first stores the metadata of a row split, as the key part of a record, and all the data of a row split as the value part. This means that RCFILE encourages column oriented storage rather than row oriented storage.

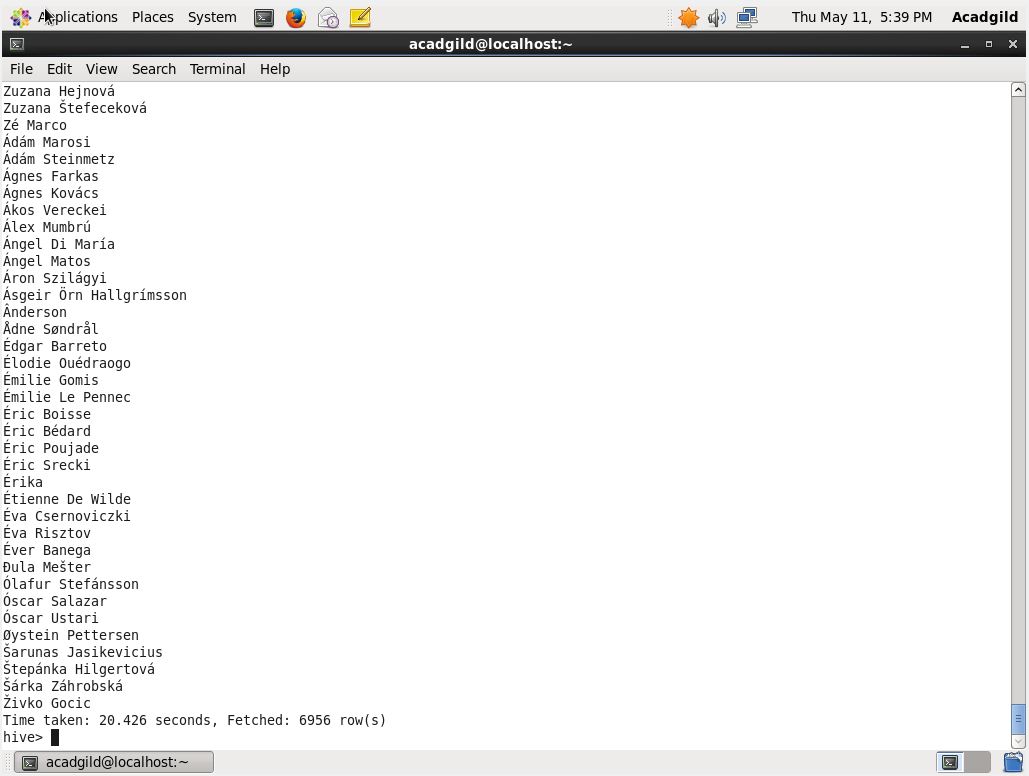
This column oriented storage is very useful while performing analytics. It is easy to perform analytics when we “hive’ a column oriented storage type.

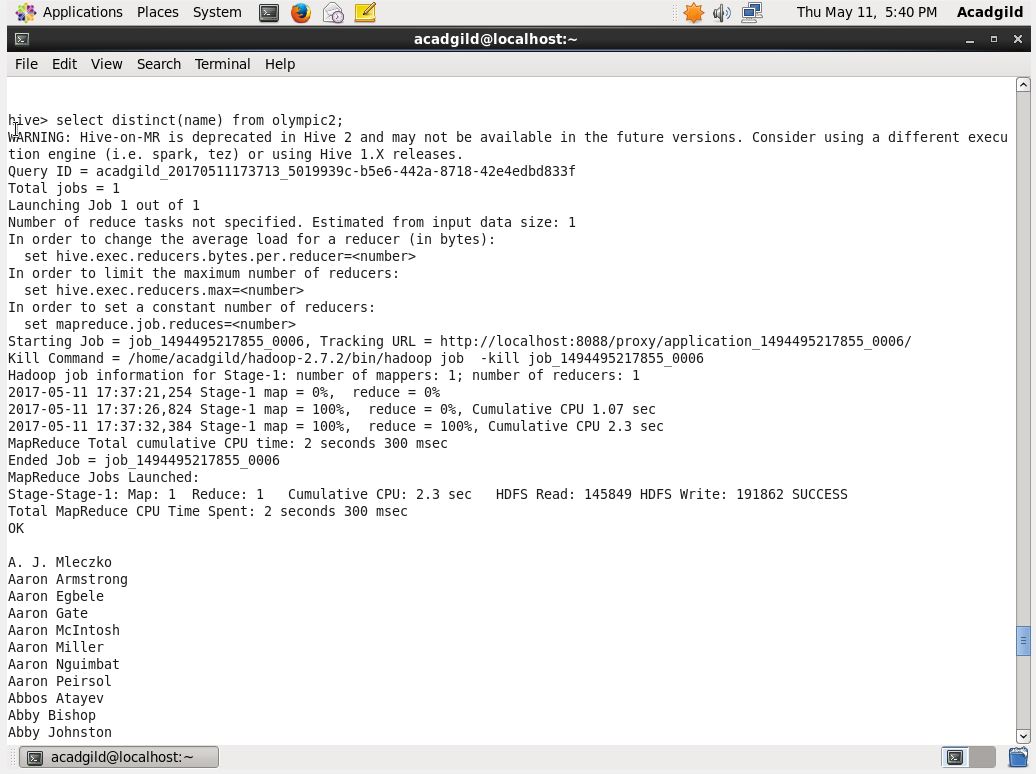
Facebook uses RCFILE as its default file format for storing of data in their data warehouse as they perform different types of analytics using Hive.

In Hive we can create a RCFILE format as follows:

create table table\_name (schema of the table) row format delimited fields terminated by ',' | stored as RCFILE







ORCFILE

ORC stands for Optimized Row Columnar which means it can store data in an optimized way than the other file formats. ORC reduces the size of the original data up to 75%. As a result the speed of data processing also increases. ORC shows better performance than Text, Sequence and RC file formats.

An ORC file contains rows data in groups called as Stripes along with a file footer. ORC format improves the performance when Hive is processing the data.

In Hive we can create a RCFILE format as follows:

create table table\_name (schema of the table) row format delimited fields terminated by ',' | stored as ORC

