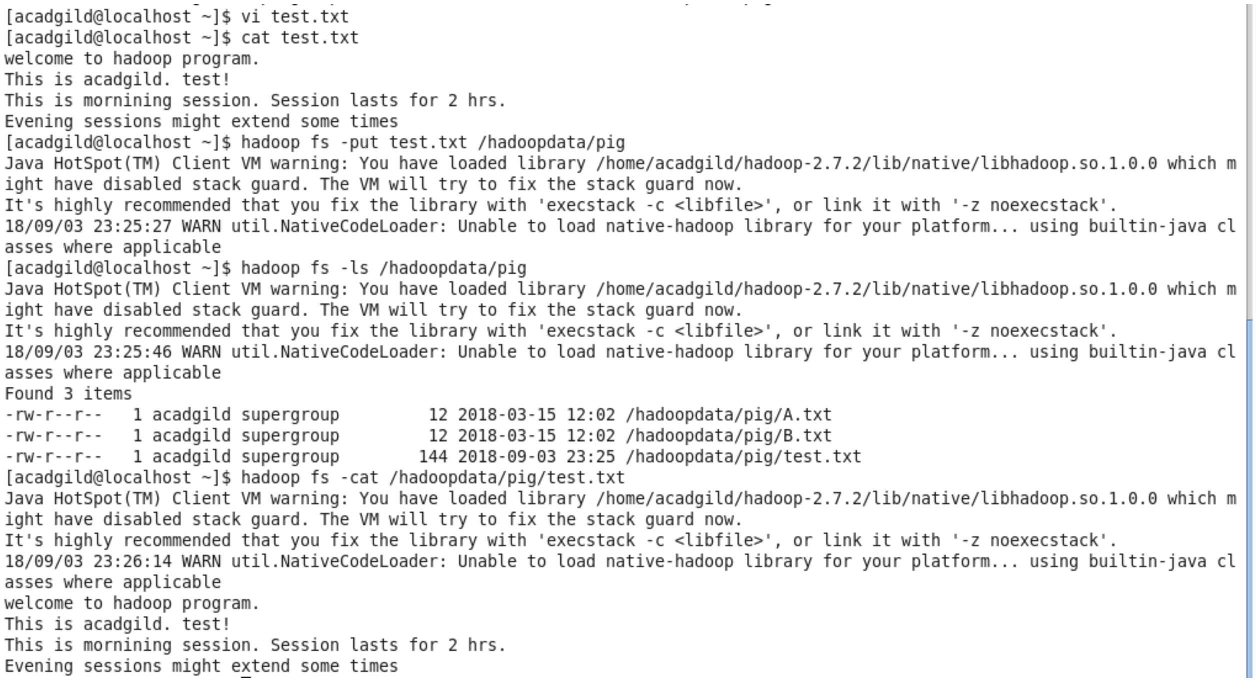
Task 1.1:

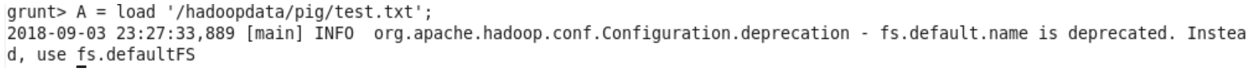
Word-Count in Pig:

I have put my file in /hadoopdata/pig/ directory

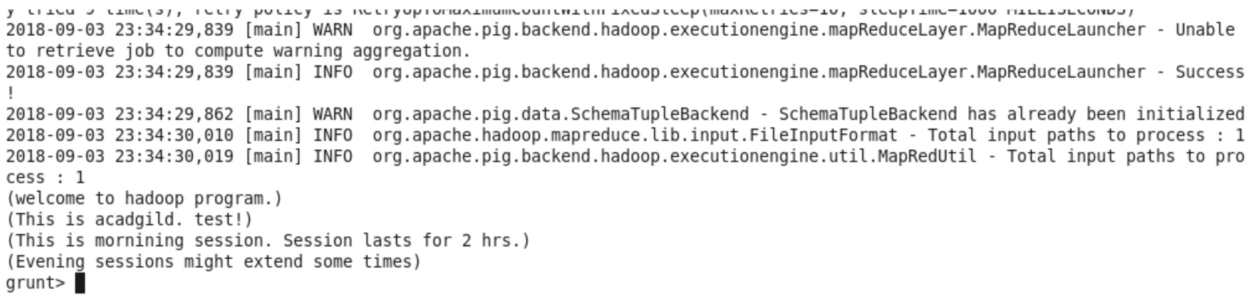


```
[acadgild@localhost ~]$ vi test.txt
[acadgild@localhost ~]$ cat test.txt
welcome to hadoop program.
This is acadgild. test!
This is mornining session. Session lasts for 2 hrs.
Evening sessions might extend some times
[acadgild@localhost ~]$ hadoop fs -put test.txt /hadoopdata/pig
Java HotSpot(TM) Client VM warning: You have loaded library /home/acadgild/hadoop-2.7.2/lib/native/libhadoop.so.1.0.0 which m
ight have disabled stack guard. The VM will try to fix the stack guard now.
It's highly recommended that you fix the library with 'execstack -c <libfile>', or link it with '-z noexecstack'.
18/09/03 23:25:27 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java cl
asses where applicable
[acadgild@localhost ~]$ hadoop fs -ls /hadoopdata/pig
Java HotSpot(TM) Client VM warning: You have loaded library /home/acadgild/hadoop-2.7.2/lib/native/libhadoop.so.1.0.0 which m
ight have disabled stack guard. The VM will try to fix the stack guard now.
It's highly recommended that you fix the library with 'execstack -c <libfile>', or link it with '-z noexecstack'.
18/09/03 23:25:46 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java cl
asses where applicable
Found 3 items
-rw-r--r--   1 acadgild supergroup         12 2018-03-15 12:02 /hadoopdata/pig/A.txt
-rw-r--r--   1 acadgild supergroup         12 2018-03-15 12:02 /hadoopdata/pig/B.txt
-rw-r--r--   1 acadgild supergroup        144 2018-09-03 23:25 /hadoopdata/pig/test.txt
[acadgild@localhost ~]$ hadoop fs -cat /hadoopdata/pig/test.txt
Java HotSpot(TM) Client VM warning: You have loaded library /home/acadgild/hadoop-2.7.2/lib/native/libhadoop.so.1.0.0 which m
ight have disabled stack guard. The VM will try to fix the stack guard now.
It's highly recommended that you fix the library with 'execstack -c <libfile>', or link it with '-z noexecstack'.
18/09/03 23:26:14 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java cl
asses where applicable
welcome to hadoop program.
This is acadgild. test!
This is mornining session. Session lasts for 2 hrs.
Evening sessions might extend some times
```

Loaded the data into A

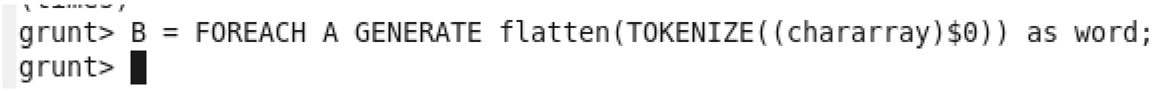


```
grunt> A = load '/hadoopdata/pig/test.txt';
2018-09-03 23:27:33,889 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
```

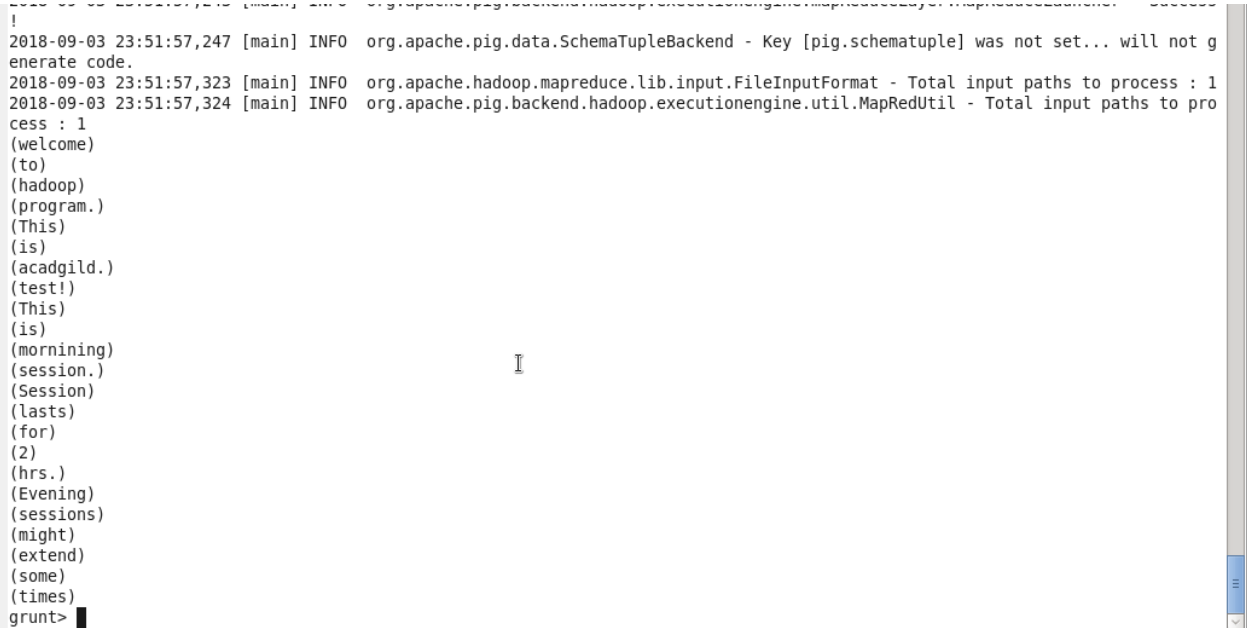


```
y tried 5 time(s), retry policy is RetryUpToMaximumCountWithFixedSleep(maxRetries=10, sleepTime=1000 MILLISECONDS)
2018-09-03 23:34:29,839 [main] WARN  org.apache.pig.backend.hadoop.executionengine.mapReduceLayer.MapReduceLauncher - Unable
to retrieve job to compute warning aggregation.
2018-09-03 23:34:29,839 [main] INFO  org.apache.pig.backend.hadoop.executionengine.mapReduceLayer.MapReduceLauncher - Success
!
2018-09-03 23:34:29,862 [main] WARN  org.apache.pig.data.SchemaTupleBackend - SchemaTupleBackend has already been initialized
2018-09-03 23:34:30,010 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-03 23:34:30,019 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(welcome to hadoop program.)
(This is acadgild. test!)
(This is mornining session. Session lasts for 2 hrs.)
(Evening sessions might extend some times)
grunt>
```

Tokenize function splits a string in a single tuple and returns a bag with a tuple for each chararray that results from the split.Flatten un-nests tuples as well as bags.

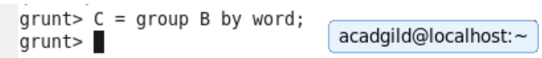


```
(times)
grunt> B = FOREACH A GENERATE flatten(TOKENIZE((chararray)$0)) as word;
grunt>
```



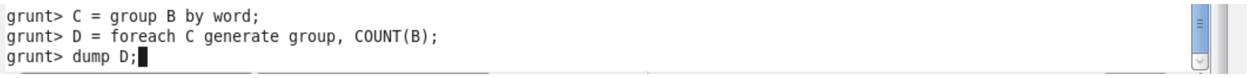
```
2018-09-03 23:51:57,245 [main] INFO  org.apache.pig.backend.hadoop.executionengine.mapReduceLayer.MapReduceLauncher - Success
!
2018-09-03 23:51:57,247 [main] INFO  org.apache.pig.data.SchemaTupleBackend - Key [pig.schematuple] was not set... will not g
enerate code.
2018-09-03 23:51:57,323 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-03 23:51:57,324 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(welcome)
(to)
(hadoop)
(program.)
(This)
(is)
(acadgild.)
(test!)
(This)
(is)
(mornining)
(session.)
(Session)
(lasts)
(for)
(2)
(hrs.)
(Evening)
(sessions)
(might)
(extend)
(some)
(times)
grunt>
```

Grouping by similar words

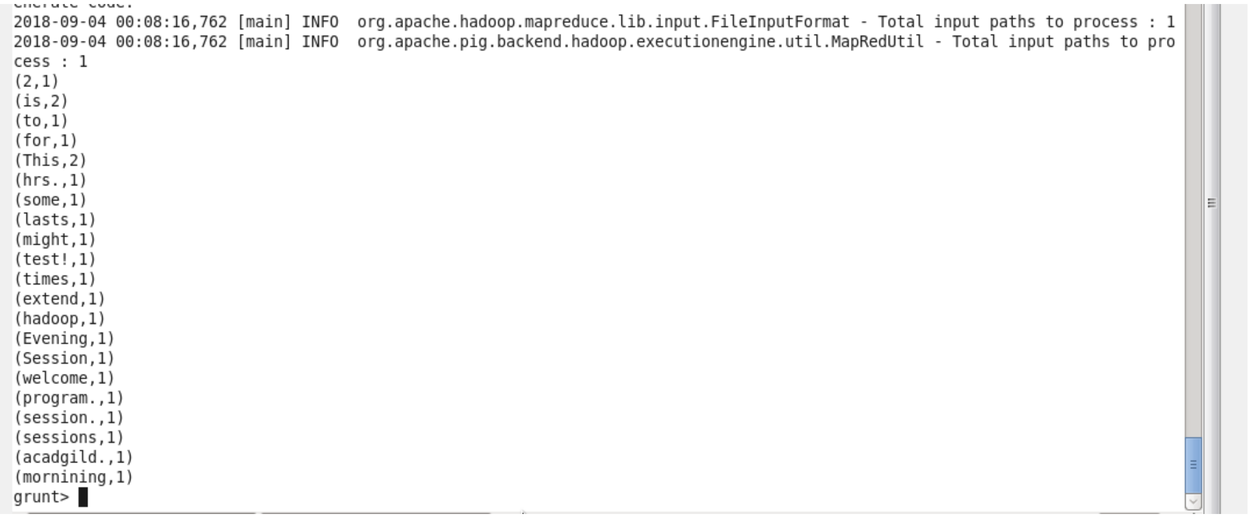


```
grunt> C = group B by word;
grunt>
```

Generating count of each word



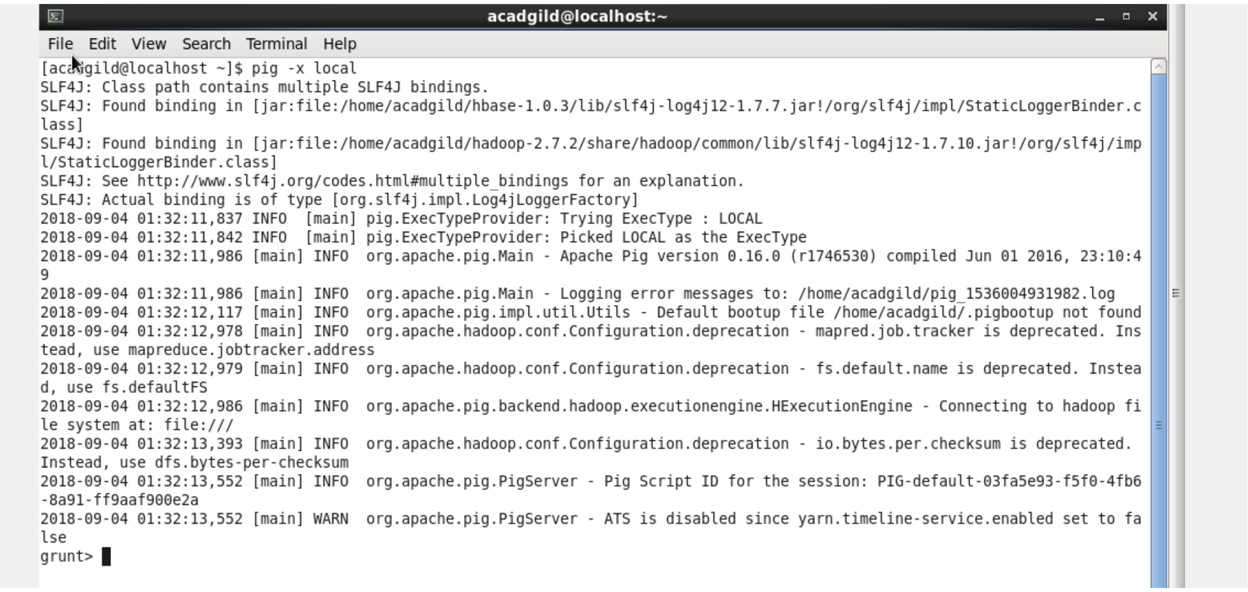
```
grunt> C = group B by word;
grunt> D = foreach C generate group, COUNT(B);
grunt> dump D;
```



```
2018-09-04 00:08:16,762 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-04 00:08:16,762 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(2,1)
(is,2)
(to,1)
(for,1)
(This,2)
(hrs.,1)
(some,1)
(lasts,1)
(might,1)
(test!,1)
(times,1)
(extend,1)
(hadoop,1)
(Evening,1)
(Session,1)
(welcome,1)
(program.,1)
(session.,1)
(sessions,1)
(acadgild.,1)
(mornining,1)
grunt>
```

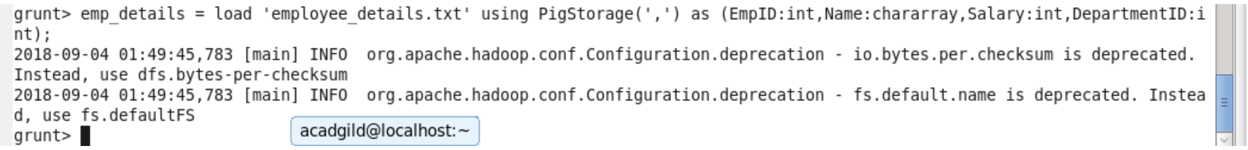
Task1.2:

To start pig in local mode use command pig –x local



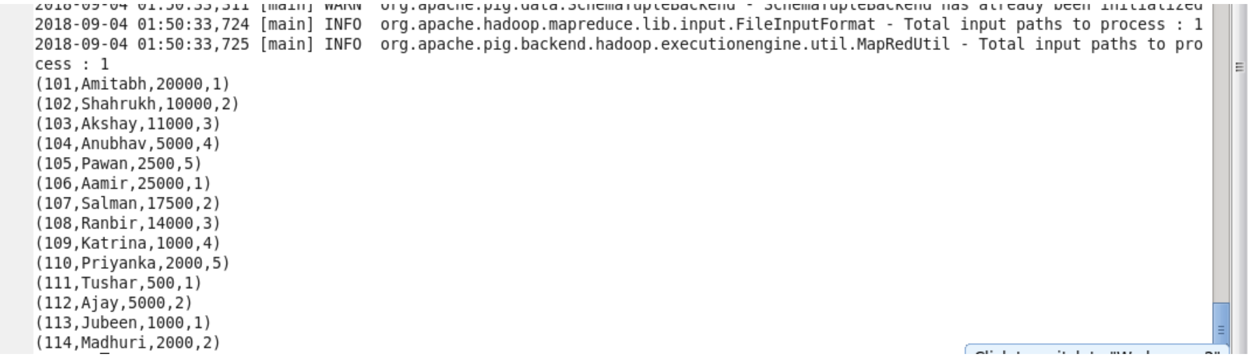
```
[acadgild@localhost ~]$ pig -x local
SLF4J: Class path contains multiple SLF4J bindings.
SLF4J: Found binding in [jar:file:/home/acadgild/hbase-1.0.3/lib/slf4j-log4j12-1.7.7.jar!/org/slf4j/impl/StaticLoggerBinder.c
lass]
SLF4J: Found binding in [jar:file:/home/acadgild/hadoop-2.7.2/share/hadoop/common/lib/slf4j-log4j12-1.7.10.jar!/org/slf4j/imp
l/StaticLoggerBinder.class]
SLF4J: See http://www.slf4j.org/codes.html#multiple_bindings for an explanation.
SLF4J: Actual binding is of type [org.slf4j.impl.Log4jLoggerFactory]
2018-09-04 01:32:11,837 INFO  [main] pig.ExecTypeProvider: Trying ExecType : LOCAL
2018-09-04 01:32:11,842 INFO  [main] pig.ExecTypeProvider: Picked LOCAL as the ExecType
2018-09-04 01:32:11,986 [main] INFO  org.apache.pig.Main - Apache Pig version 0.16.0 (r1746530) compiled Jun 01 2016, 23:10:4
9
2018-09-04 01:32:11,986 [main] INFO  org.apache.pig.Main - Logging error messages to: /home/acadgild/pig_1536004931982.log
2018-09-04 01:32:12,117 [main] INFO  org.apache.pig.impl.util.Utils - Default bootup file /home/acadgild/.pigbootup not found
2018-09-04 01:32:12,978 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - mapred.job.tracker is deprecated. Ins
tead, use mapreduce.jobtracker.address
2018-09-04 01:32:12,979 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
2018-09-04 01:32:12,986 [main] INFO  org.apache.pig.backend.hadoop.executionengine.HExecutionEngine - Connecting to hadoop fi
le system at: file:///
2018-09-04 01:32:13,393 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - io.bytes.per.checksum is deprecated.
Instead, use dfs.bytes-per-checksum
2018-09-04 01:32:13,552 [main] INFO  org.apache.pig.PigServer - Pig Script ID for the session: PIG-default-03fa5e93-f5f0-4fb6
-8a91-ff9aaf900e2a
2018-09-04 01:32:13,552 [main] WARN  org.apache.pig.PigServer - ATS is disabled since yarn.timeline-service.enabled set to fa
lse
grunt>
```

Loading data into emp_details



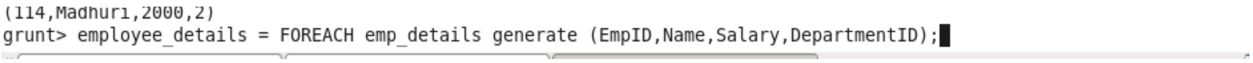
```
grunt> emp_details = load 'employee_details.txt' using PigStorage(',') as (EmpID:int,Name:chararray,Salary:int,DepartmentID:i
nt);
2018-09-04 01:49:45,783 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - io.bytes.per.checksum is deprecated.
Instead, use dfs.bytes-per-checksum
2018-09-04 01:49:45,783 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
grunt>
```

To see the content of emp_details use command dump emp_details

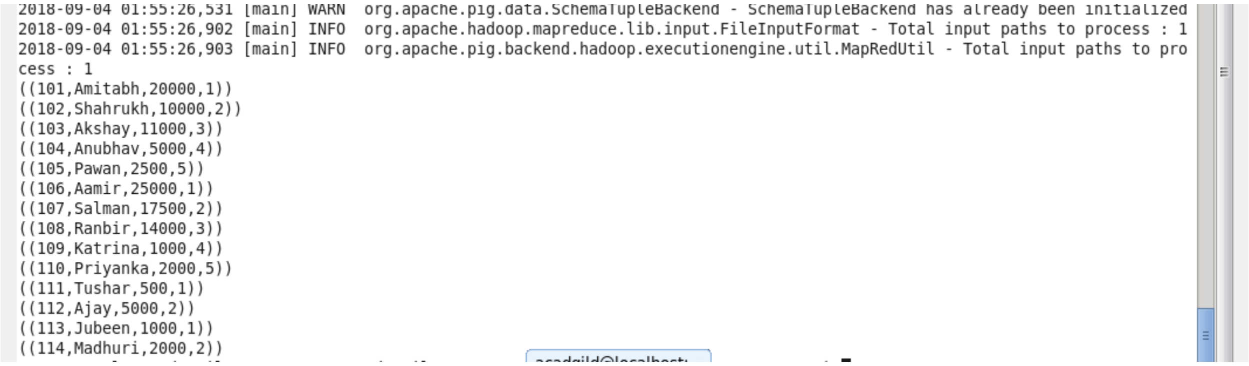


```
2018-09-04 01:50:33,311 [main] WARN  org.apache.pig.data.SchemaTupleBackend - SchemaTupleBackend has already been initialized
2018-09-04 01:50:33,724 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-04 01:50:33,725 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(101,Amitabh,20000,1)
(102,Shahrukh,10000,2)
(103,Akshay,11000,3)
(104,Anubhav,5000,4)
(105,Pawan,2500,5)
(106,Aamir,25000,1)
(107,Salman,17500,2)
(108,Ranbir,14000,3)
(109,Katrina,1000,4)
(110,Priyanka,2000,5)
(111,Tushar,500,1)
(112,Ajay,5000,2)
(113,Jubeen,1000,1)
(114,Madhuri,2000,2)
```

Use command FOREACH emp_details GENERATE (EmpID,Name,Salary,DepartmentID)

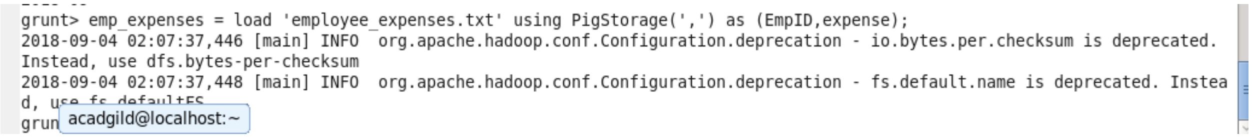


```
(114,Madhuri,2000,2)
grunt> employee_details = FOREACH emp_details generate (EmpID,Name,Salary,DepartmentID);
```



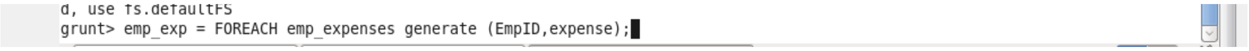
```
2018-09-04 01:55:26,531 [main] WARN  org.apache.pig.data.SchemaTupleBackend - SchemaTupleBackend has already been initialized
2018-09-04 01:55:26,902 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-04 01:55:26,903 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
((101,Amitabh,20000,1))
((102,Shahrukh,10000,2))
((103,Akshay,11000,3))
((104,Anubhav,5000,4))
((105,Pawan,2500,5))
((106,Aamir,25000,1))
((107,Salman,17500,2))
((108,Ranbir,14000,3))
((109,Katrina,1000,4))
((110,Priyanka,2000,5))
((111,Tushar,500,1))
((112,Ajay,5000,2))
((113,Jubeen,1000,1))
((114,Madhuri,2000,2))
```

Loading employee_expenses



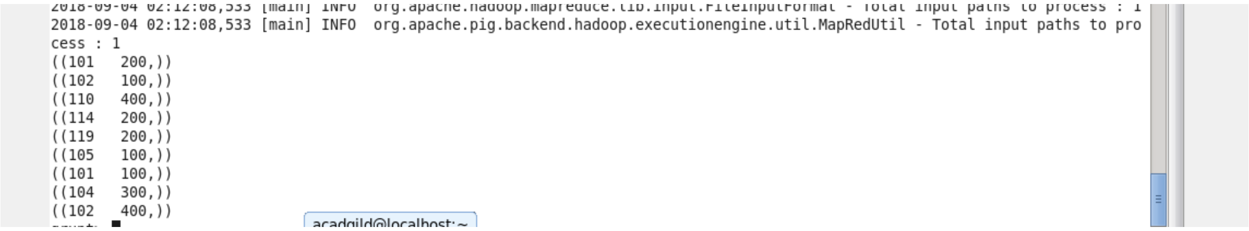
```
grunt> emp_expenses = load 'employee_expenses.txt' using PigStorage(',') as (EmpID,expense);
2018-09-04 02:07:37,446 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - io.bytes.per.checksum is deprecated.
Instead, use dfs.bytes-per-checksum
2018-09-04 02:07:37,448 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
grun
```

Use command FOREACH emp_expenses GENERATE (EmpID,expense)



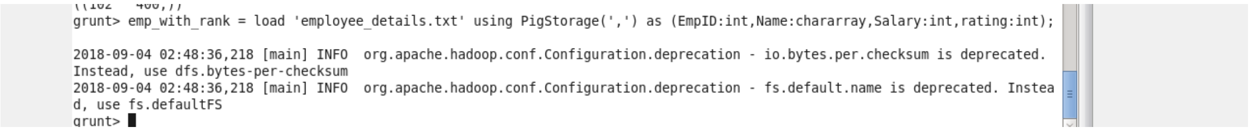
```
d, use fs.defaultFS
grunt> emp_exp = FOREACH emp_expenses generate (EmpID,expense);
```

Dump emp_exp to see the content



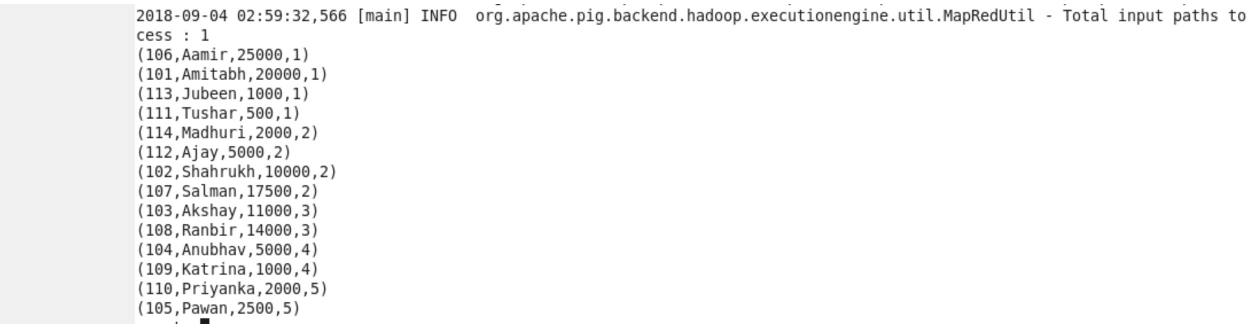
```
2018-09-04 02:12:08,533 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-04 02:12:08,533 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
((101   200,))
((102   100,))
((110   400,))
((114   200,))
((119   200,))
((105   100,))
((101   100,))
((104   300,))
((102   400,))
```

a)renamed departmentid to rating



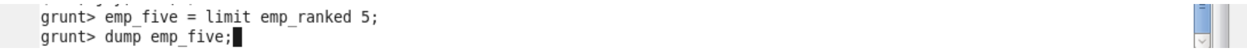
```
((102   400,))
grunt> emp_with_rank = load 'employee_details.txt' using PigStorage(',') as (EmpID:int,Name:chararray,Salary:int,rating:int);

2018-09-04 02:48:36,218 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - io.bytes.per.checksum is deprecated.
Instead, use dfs.bytes-per-checksum
2018-09-04 02:48:36,218 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
grunt>
```

Use command order emp_ranked = emp_with_rank by rating, Name.dump emp_ranked

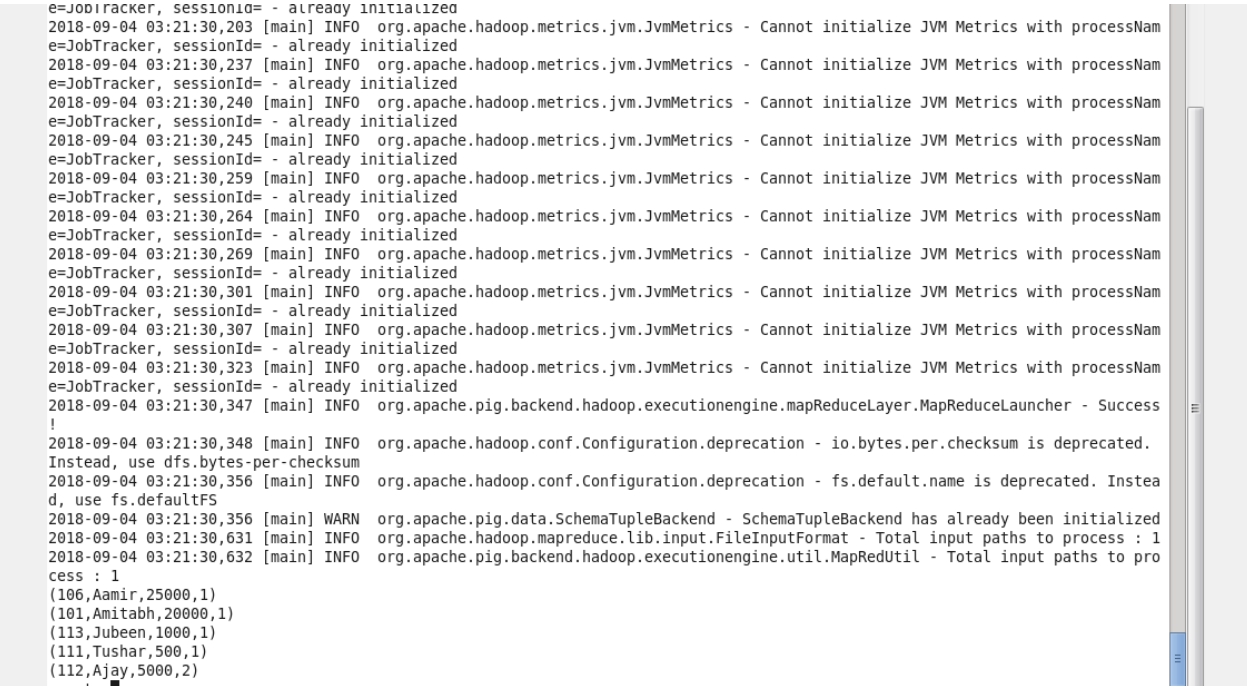


```
2018-09-04 02:59:32,566 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to
cess : 1
(106,Aamir,25000,1)
(101,Amitabh,20000,1)
(113,Jubeen,1000,1)
(111,Tushar,500,1)
(114,Madhuri,2000,2)
(112,Ajay,5000,2)
(102,Shahrukh,10000,2)
(107,Salman,17500,2)
(103,Akshay,11000,3)
(108,Ranbir,14000,3)
(104,Anubhav,5000,4)
(109,Katrina,1000,4)
(110,Priyanka,2000,5)
(105,Pawan,2500,5)
```

Use command emp_five=limit emp_ranked 5; dump emp_five;

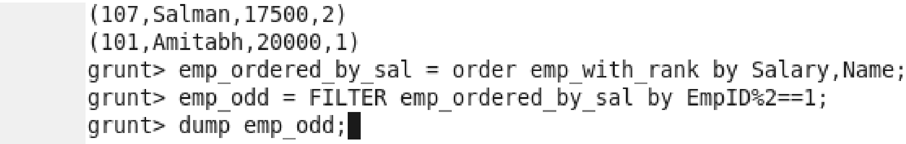


```
grunt> emp_five = limit emp_ranked 5;
grunt> dump emp_five;
```

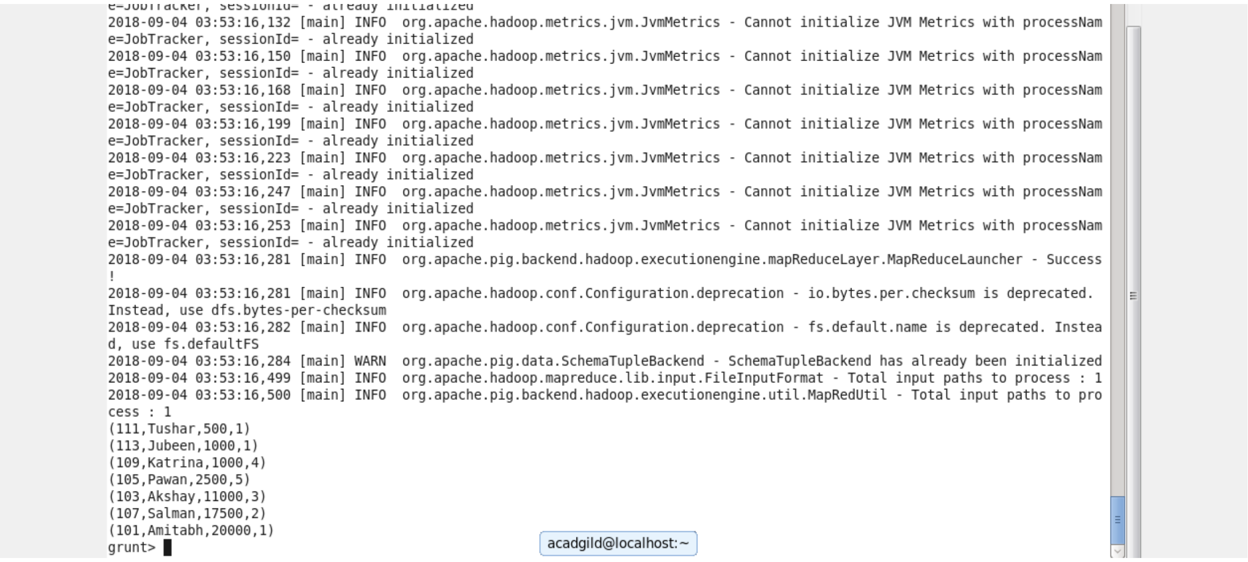


```
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,203 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,237 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,240 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,245 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,259 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,264 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,269 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,301 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,307 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,323 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:21:30,347 [main] INFO  org.apache.pig.backend.hadoop.executionengine.mapReduceLayer.MapReduceLauncher - Success
!
2018-09-04 03:21:30,348 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - io.bytes.per.checksum is deprecated.
Instead, use dfs.bytes-per-checksum
2018-09-04 03:21:30,356 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
2018-09-04 03:21:30,356 [main] WARN  org.apache.pig.data.SchemaTupleBackend - SchemaTupleBackend has already been initialized
2018-09-04 03:21:30,631 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-04 03:21:30,632 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(106,Aamir,25000,1)
(101,Amitabh,20000,1)
(113,Jubeen,1000,1)
(111,Tushar,500,1)
(112,Ajay,5000,2)
```

b)



```
(107,Salman,17500,2)
(101,Amitabh,20000,1)
grunt> emp_ordered_by_sal = order emp_with_rank by Salary,Name;
grunt> emp_odd = FILTER emp_ordered_by_sal by EmpID%2==1;
grunt> dump emp_odd;
```



```
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,132 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,150 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,168 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,199 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,223 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,247 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,253 [main] INFO  org.apache.hadoop.metrics.jvm.JvmMetrics - Cannot initialize JVM Metrics with processNam
e=JobTracker, sessionId= - already initialized
2018-09-04 03:53:16,281 [main] INFO  org.apache.pig.backend.hadoop.executionengine.mapReduceLayer.MapReduceLauncher - Success
!
2018-09-04 03:53:16,281 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - io.bytes.per.checksum is deprecated.
Instead, use dfs.bytes-per-checksum
2018-09-04 03:53:16,282 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
2018-09-04 03:53:16,284 [main] WARN  org.apache.pig.data.SchemaTupleBackend - SchemaTupleBackend has already been initialized
2018-09-04 03:53:16,499 [main] INFO  org.apache.hadoop.mapreduce.lib.input.FileInputFormat - Total input paths to process : 1
2018-09-04 03:53:16,500 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(111,Tushar,500,1)
(113,Jubeen,1000,1)
(109,Katrina,1000,4)
(105,Pawan,2500,5)
(103,Akshay,11000,3)
(107,Salman,17500,2)
(101,Amitabh,20000,1)
grunt> 
```

(c) Employee (employee id and employee name) with maximum expense (In case two employees have same expense, employee with name coming first in dictionary should get preference)

Ans) grunt>employee_expenses = LOAD 'hadoop/emlpoyee_expenses.txt' USING PigStorage('\t') AS (EmpID:int,Expense:int);

```
(101,200)
(102,100)
(110,400)
(114,200)
(119,200)
(105,100)
(101,100)
(104,300)
(102,400)
```

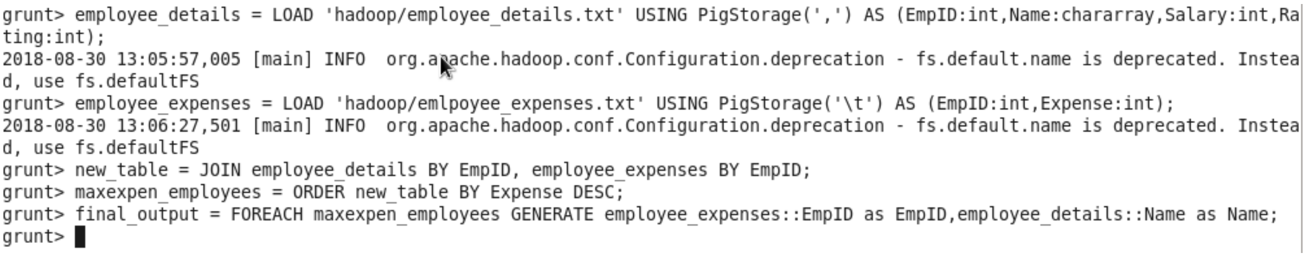
```
grunt> new_table = JOIN employee_details BY EmpID, employee_expenses BY EmpID;
(101,Amitabh,20000,1,101,100)
(101,Amitabh,20000,1,101,200)
(102,Shahrukh,10000,2,102,400)
(102,Shahrukh,10000,2,102,100)
(104,Anubhav,5000,4,104,300)
(105,Pawan,2500,5,105,100)
(110,Priyanka,2000,5,110,400)
(114,Madhuri,2000,2,114,200)
```

```
grunt>maxexpen_employees = ORDER new_table BY Expense DESC;

(110,Priyanka,2000,5,110,400)
(102,Shahrukh,10000,2,102,400)
(104,Anubhav,5000,4,104,300)
```

```
(114,Madhuri,2000,2,114,200)
(101,Amitabh,20000,1,101,200)
(105,Pawan,2500,5,105,100)
(102,Shahrukh,10000,2,102,100)
(101,Amitabh,20000,1,101,100)
```

```
grunt> final_output = FOREACH maxexpen_employees GENERATE employee_expenses::EmpID as
EmpID,employee_details::Name as Name;
```

```
(110,Priyanka)
(102,Shahrukh)
(104,Anubhav)
(114,Madhuri)
(101,Amitabh)
(105,Pawan)
(102,Shahrukh)
(101,Amitabh)
```



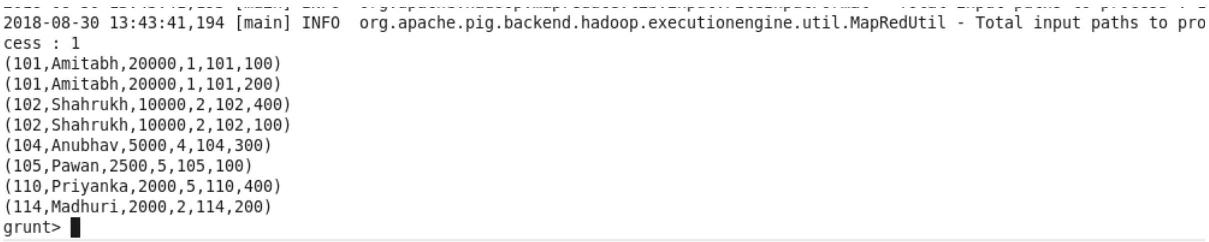
```
grunt> employee_details = LOAD 'hadoop/employee_details.txt' USING PigStorage(',') AS (EmpID:int,Name:chararray,Salary:int,Ra
ting:int);
2018-08-30 13:05:57,005 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
grunt> employee_expenses = LOAD 'hadoop/emlpoyee_expenses.txt' USING PigStorage('\t') AS (EmpID:int,Expense:int);
2018-08-30 13:06:27,501 [main] INFO  org.apache.hadoop.conf.Configuration.deprecation - fs.default.name is deprecated. Instea
d, use fs.defaultFS
grunt> new_table = JOIN employee_details BY EmpID, employee_expenses BY EmpID;
grunt> maxexpen_employees = ORDER new_table BY Expense DESC;
grunt> final_output = FOREACH maxexpen_employees GENERATE employee_expenses::EmpID as EmpID,employee_details::Name as Name;
grunt> █
```

(d) List of employees (employee id and employee name) having entries in employee_expenses file.

```
Ans) grunt>new_relation = JOIN employee_details BY EmpID LEFT OUTER, employee_expenses BY
EmpID;
(101,Amitabh,20000,1,101,100)
(101,Amitabh,20000,1,101,200)
(102,Shahrukh,10000,2,102,400)
(102,Shahrukh,10000,2,102,100)
(103,Akshay,11000,3,,)
(104,Anubhav,5000,4,104,300)
(105,Pawan,2500,5,105,100)
(106,Aamir,25000,1,,)
(107,Salman,17500,2,,)
(108,Ranbir,14000,3,,)
(109,Katrina,1000,4,,)
(110,Priyanka,2000,5,110,400)
(111,Tushar,500,1,,)
(112,Ajay,5000,2,,)
(113,Jubeen,1000,1,,)
(114,Madhuri,2000,2,114,200)
```

```
grunt> final_result = FILTER new_relation BY employee_expenses::Expense is not null;
```

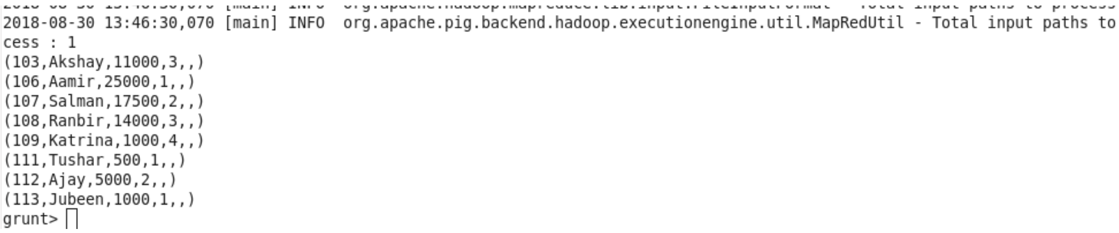
(101,Amitabh,20000,1,101,100)
(101,Amitabh,20000,1,101,200)
(102,Shahrukh,10000,2,102,400)
(102,Shahrukh,10000,2,102,100)
(104,Anubhav,5000,4,104,300)
(105,Pawan,2500,5,105,100)
(110,Priyanka,2000,5,110,400)
(114,Madhuri,2000,2,114,200)



```
2018-08-30 13:43:41,194 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(101,Amitabh,20000,1,101,100)
(101,Amitabh,20000,1,101,200)
(102,Shahrukh,10000,2,102,400)
(102,Shahrukh,10000,2,102,100)
(104,Anubhav,5000,4,104,300)
(105,Pawan,2500,5,105,100)
(110,Priyanka,2000,5,110,400)
(114,Madhuri,2000,2,114,200)
grunt> 
```

(e) List of employees (employee id and employee name) having no entry in employee_expenses file.

Ans) grunt> final_result1 = FILTER new_relation BY employee_expenses::Expense is null;
(103,Akshay,11000,3,,)
(106,Aamir,25000,1,,)
(107,Salman,17500,2,,)
(108,Ranbir,14000,3,,)
(109,Katrina,1000,4,,)
(111,Tushar,500,1,,)
(112,Ajay,5000,2,,)
(113,Jubeen,1000,1,,)



```
2018-08-30 13:46:30,070 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to
cess : 1
(103,Akshay,11000,3,,)
(106,Aamir,25000,1,,)
(107,Salman,17500,2,,)
(108,Ranbir,14000,3,,)
(109,Katrina,1000,4,,)
(111,Tushar,500,1,,)
(112,Ajay,5000,2,,)
(113,Jubeen,1000,1,,)
grunt> 
```

Task 1.3) Implement the use case present in below blog link and share the complete steps along with

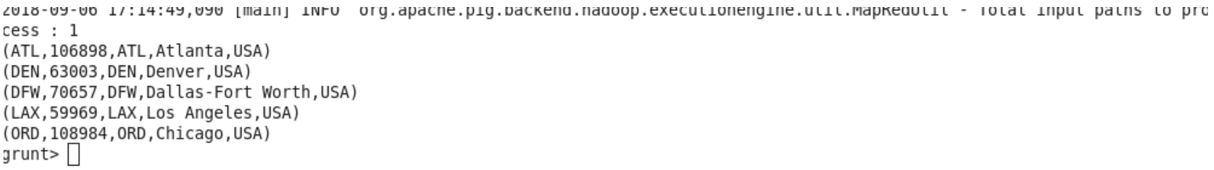
screenshot(s) from your end.

https://acadgild.com/blog/aviation-data-analysis-using-apache-pig/

Problem1) Find out the top 5 most visited destinations.

Ans) REGISTER '/home/acadgild/airline_usecase/piggybank.jar';

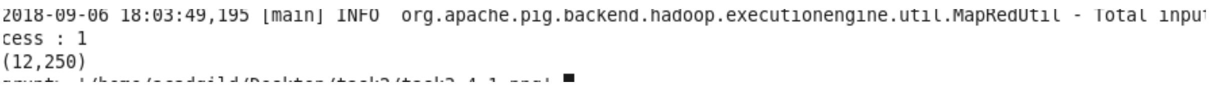
```
 A = load '/home/acadgild/airline_usecase/DelayedFlights.csv' USING
org.apache.pig.piggybank.storage.CSVExcelStorage(',','NO_MULTILINE','UNIX','SKIP_INPUT_HEADER');

 B = foreach A generate (int)$1 as year, (int)$10 as flight_num, (chararray)$17 as origin,(chararray)  $18
as dest;
C = filter B by dest is not null;
D = group C by dest;
E = foreach D generate group, COUNT(C.dest);
F = order E by $1 DESC;
Result = LIMIT F 5;
A1 = load '/home/acadgild/airline_usecase/airports.csv' USING
org.apache.pig.piggybank.storage.CSVExcelStorage(',','NO_MULTILINE','UNIX','SKIP_INPUT_HEADER')

A2 = foreach A1 generate (chararray)$0 as dest, (chararray)$2 as city, (chararray)$4 as country;
joined_table = join Result by $0, A2 by dest;
dump joined_table;
```



```
2018-09-06 17:14:49,090 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input paths to pro
cess : 1
(ATL,106898,ATL,Atlanta,USA)
(DEN,63003,DEN,Denver,USA)
(DFW,70657,DFW,Dallas-Fort Worth,USA)
(LAX,59969,LAX,Los Angeles,USA)
(ORD,108984,ORD,Chicago,USA)
grunt> □
```

problem2) Which month has seen the most number of cancellations due to bad weather?

```
Ans)REGISTER '/home/acadgild/airline_usecase/piggybank.jar';
A = load '/home/acadgild/airline_usecase/DelayedFlights.csv' USING
org.apache.pig.piggybank.storage.CSVExcelStorage(',','NO_MULTILINE','UNIX','SKIP_INPUT_HEADER');

B = foreach A generate (int)$2 as month,(int)$10 as flight_num,(int)$22 as cancelled,(chararray)$23 as
cancel_code;
C = filter B by cancelled == 1 AND cancel_code =='B';
D = group C by month;
E = foreach D generate group, COUNT(C.cancelled);
F= order E by $1 DESC;
Result = limit F 1;  dump Result;
```

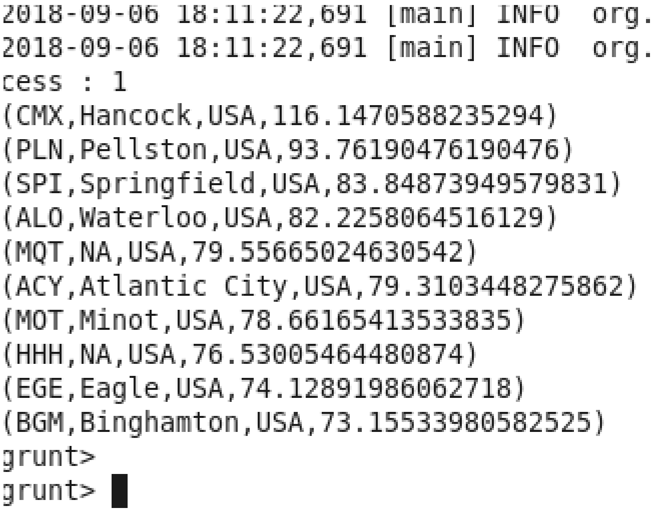


```
2018-09-06 18:03:49,195 [main] INFO  org.apache.pig.backend.hadoop.executionengine.util.MapRedUtil - Total input
cess : 1
(12,250)
```

Problem 3) Top ten origins with the highest AVG departure delay.

```
Ans) REGISTER '/home/acadgild/airline_usecase/piggybank.jar';
```

```
A = load '/home/acadgild/airline_usecase/DelayedFlights.csv' USING
org.apache.pig.piggybank.storage.CSVExcelStorage(',','NO_MULTILINE','UNIX','SKIP_INPUT_HEADER');

B1 = foreach A generate (int)$16 as dep_delay, (chararray)$17 as origin;
C1 = filter B1 by (dep_delay is not null) AND (origin is not null);
D1 = group C1 by origin;
E1 = foreach D1 generate group, AVG(C1.dep_delay);
Result = order E1 by $1 DESC;
Top_ten = limit Result 10;

Lookup = load '/home/acadgild/airline_usecase/airports.csv' USING
org.apache.pig.piggybank.storage.CSVExcelStorage(',','NO_MULTILINE','UNIX','SKIP_INPUT_HEADER');

Lookup1 = foreach Lookup generate (chararray)$0 as origin, (chararray)$2 as city, (chararray)$4 as
country;
Joined = join Lookup1 by origin, Top_ten by $0;
Final = foreach Joined generate $0,$1,$2,$4;
Final_Result = ORDER Final by $3 DESC;
dump Final_Result;
```



```
2018-09-06 18:11:22,691 [main] INFO  org.
2018-09-06 18:11:22,691 [main] INFO  org.
cess : 1
(CMX,Hancock,USA,116.1470588235294)
(PLN,Pellston,USA,93.76190476190476)
(SPI,Springfield,USA,83.84873949579831)
(ALO,Waterloo,USA,82.2258064516129)
(MQT,NA,USA,79.55665024630542)
(ACY,Atlantic City,USA,79.3103448275862)
(MOT,Minot,USA,78.66165413533835)
(HHH,NA,USA,76.53005464480874)
(EGE,Eagle,USA,74.12891986062718)
(BGM,Binghamton,USA,73.15533980582525)
grunt>
grunt> █
```

Problem4) Which route (origin & destination) has seen the maximum diversion?

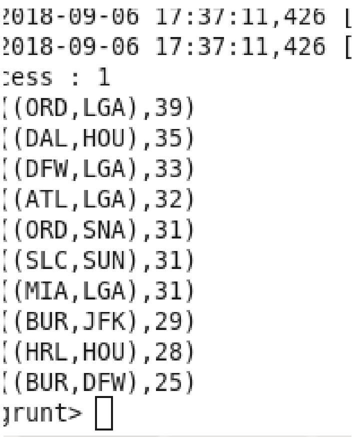
Ans)REGISTER '/home/acadgild/airline_usecase/piggybank.jar';

```
A = load '/home/acadgild/airline_usecase/DelayedFlights.csv' USING
org.apache.pig.piggybank.storage.CSVExcelStorage(',','NO_MULTILINE','UNIX','SKIP_INPUT_HEADER');

B = FOREACH A GENERATE (chararray)$17 as origin, (chararray)$18 as dest, (int)$24 as diversion;
C = FILTER B BY (origin is not null) AND (dest is not null) AND (diversion == 1);
D = GROUP C by (origin,dest);
E = FOREACH D generate group, COUNT(C.diversion);
```

F = ORDER E BY $1 DESC;

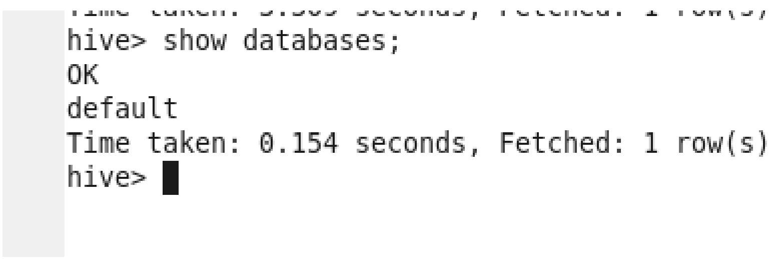
Result = limit F 10;

dump Result;



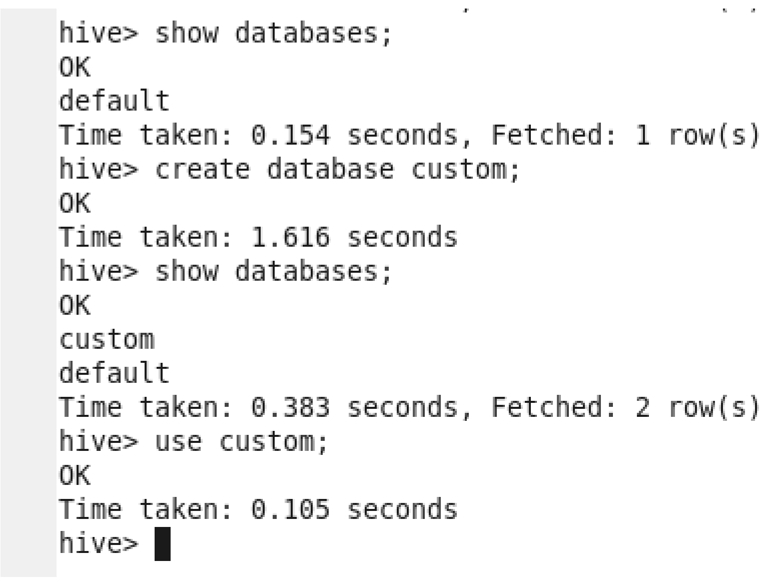
```
2018-09-06 17:37:11,426 [
2018-09-06 17:37:11,426 [
cess : 1
((ORD,LGA),39)
((DAL,HOU),35)
((DFW,LGA),33)
((ATL,LGA),32)
((ORD,SNA),31)
((SLC,SUN),31)
((MIA,LGA),31)
((BUR,JFK),29)
((HRL,HOU),28)
((BUR,DFW),25)
grunt>
```

Show databases; command displays all the databases available



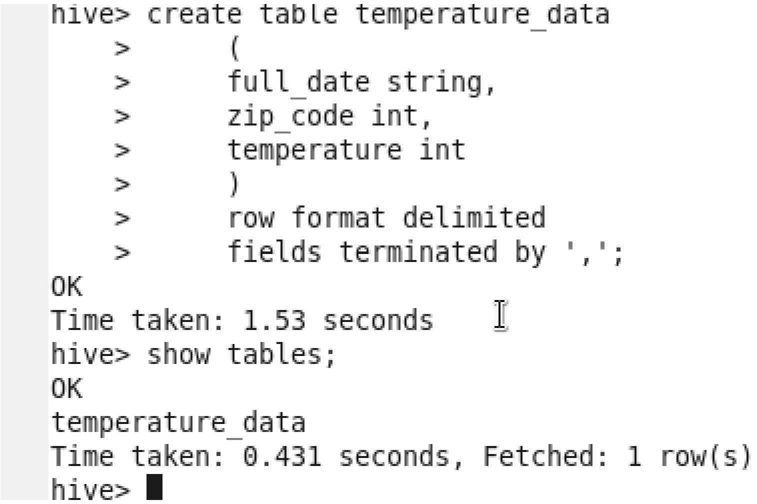
```
Time taken: [illegible] seconds, Fetched: 1 row(s)
hive> show databases;
OK
default
Time taken: 0.154 seconds, Fetched: 1 row(s)
hive>
```

Task2.1)Create database custom ;creates database with name custom.use custom; command uses custom database

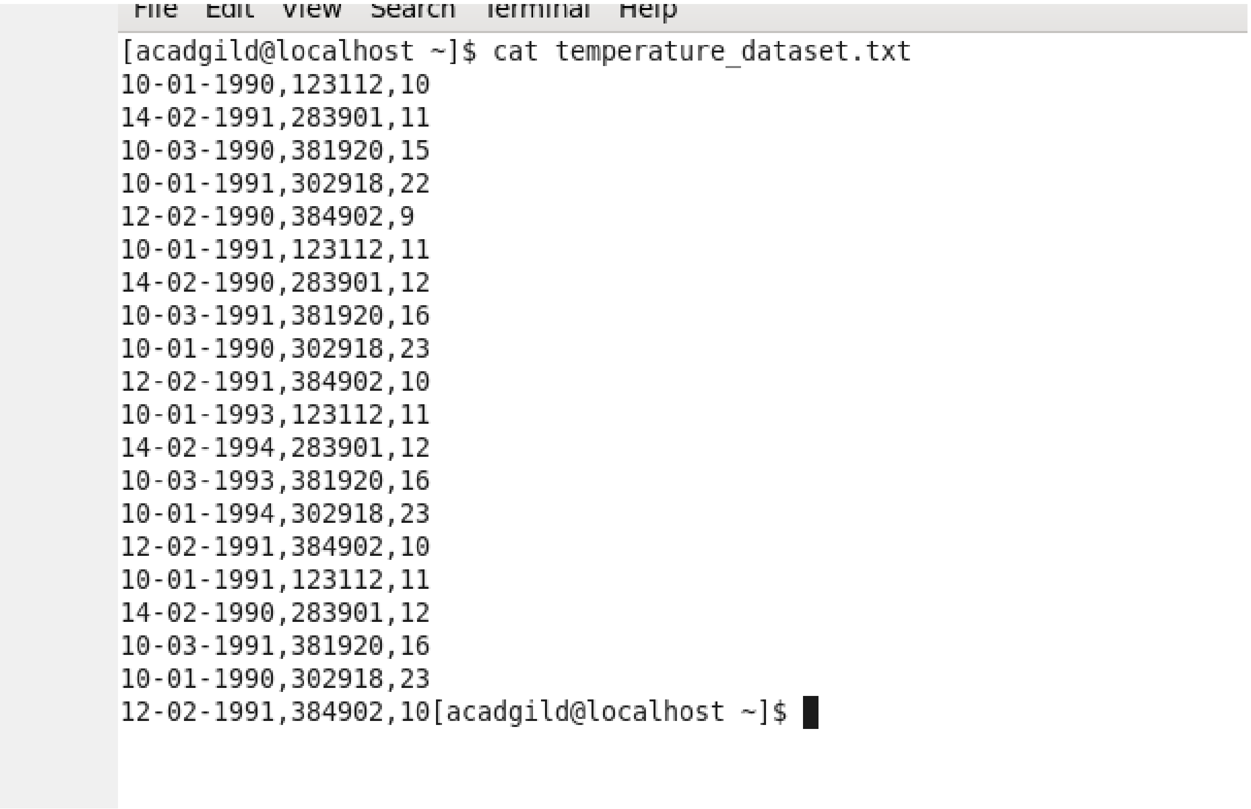


```
hive> show databases;
OK
default
Time taken: 0.154 seconds, Fetched: 1 row(s)
hive> create database custom;
OK
Time taken: 1.616 seconds
hive> show databases;
OK
custom
default
Time taken: 0.383 seconds, Fetched: 2 row(s)
hive> use custom;
OK
Time taken: 0.105 seconds
hive>
```

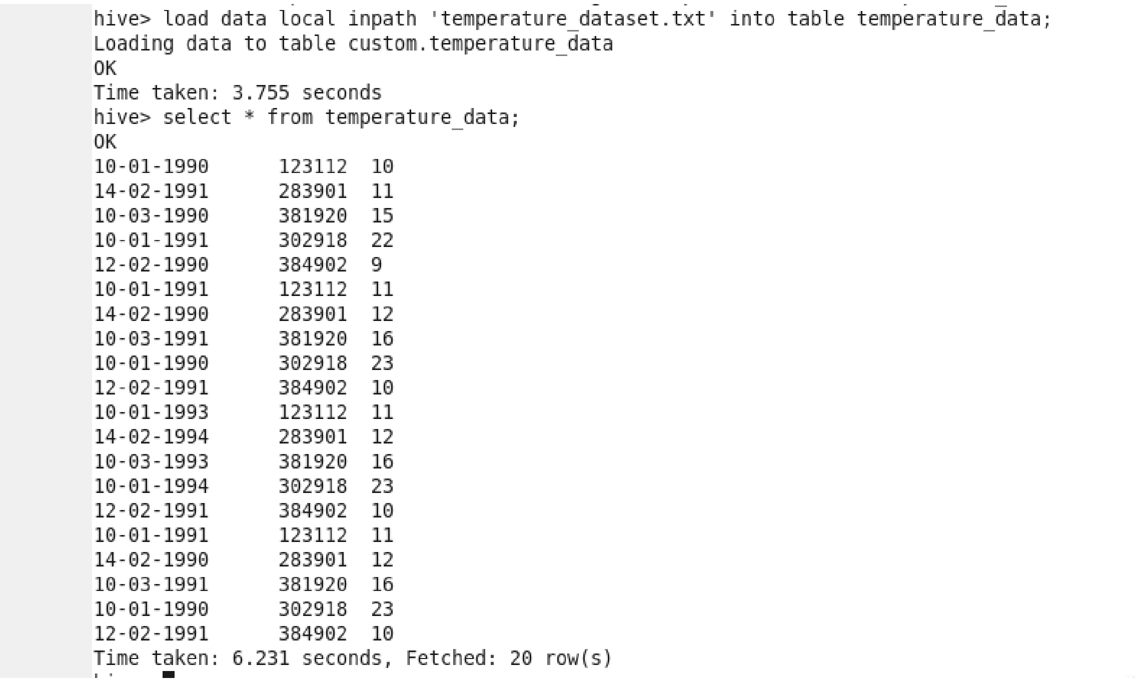
Create table command creates table with specified fields



```
hive> create table temperature_data
    >      (
    >      full_date string,
    >      zip_code int,
    >      temperature int
    >      )
    >      row format delimited
    >      fields terminated by ',';
OK
Time taken: 1.53 seconds
hive> show tables;
OK
temperature_data
Time taken: 0.431 seconds, Fetched: 1 row(s)
hive>
```

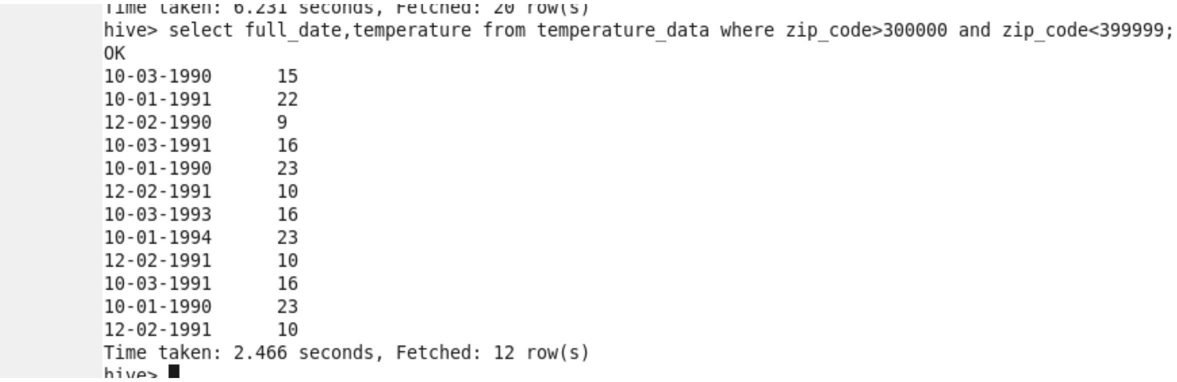


```
[acadgild@localhost ~]$ cat temperature_dataset.txt
10-01-1990,123112,10
14-02-1991,283901,11
10-03-1990,381920,15
10-01-1991,302918,22
12-02-1990,384902,9
10-01-1991,123112,11
14-02-1990,283901,12
10-03-1991,381920,16
10-01-1990,302918,23
12-02-1991,384902,10
10-01-1993,123112,11
14-02-1994,283901,12
10-03-1993,381920,16
10-01-1994,302918,23
12-02-1991,384902,10
10-01-1991,123112,11
14-02-1990,283901,12
10-03-1991,381920,16
10-01-1990,302918,23
12-02-1991,384902,10[acadgild@localhost ~]$
```



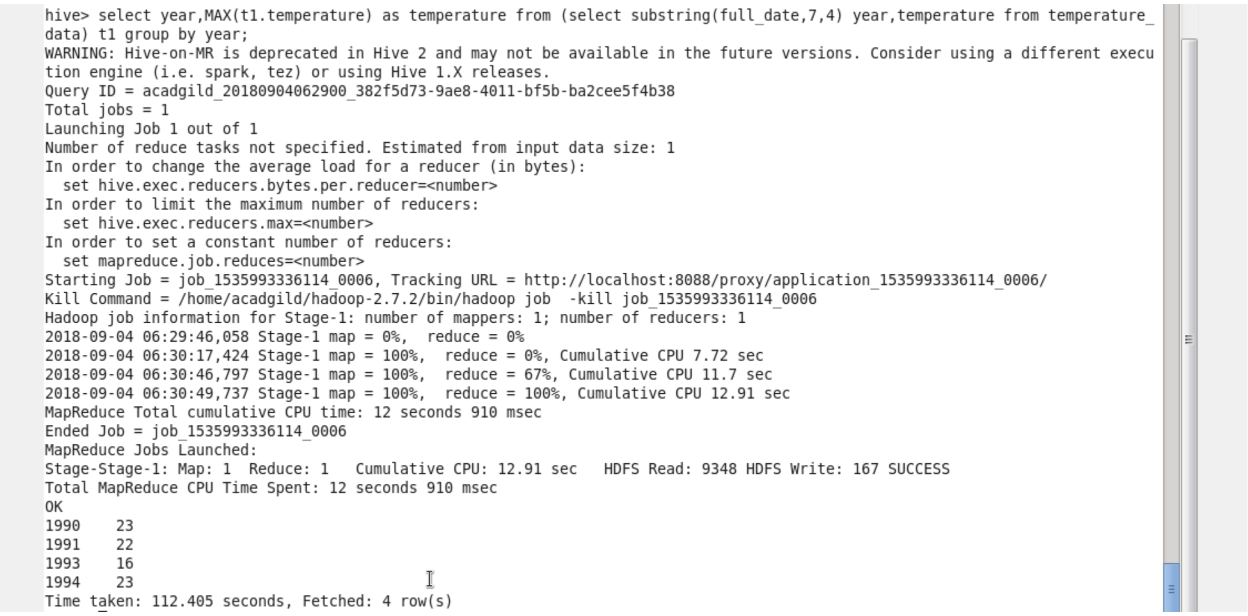
```
hive> load data local inpath 'temperature_dataset.txt' into table temperature_data;
Loading data to table custom.temperature_data
OK
Time taken: 3.755 seconds
hive> select * from temperature_data;
OK
10-01-1990      123112  10
14-02-1991      283901  11
10-03-1990      381920  15
10-01-1991      302918  22
12-02-1990      384902  9
10-01-1991      123112  11
14-02-1990      283901  12
10-03-1991      381920  16
10-01-1990      302918  23
12-02-1991      384902  10
10-01-1993      123112  11
14-02-1994      283901  12
10-03-1993      381920  16
10-01-1994      302918  23
12-02-1991      384902  10
10-01-1991      123112  11
14-02-1990      283901  12
10-03-1991      381920  16
10-01-1990      302918  23
12-02-1991      384902  10
Time taken: 6.231 seconds, Fetched: 20 row(s)
```

Data for zipcode greater than 300000 and zipcode less than 399999



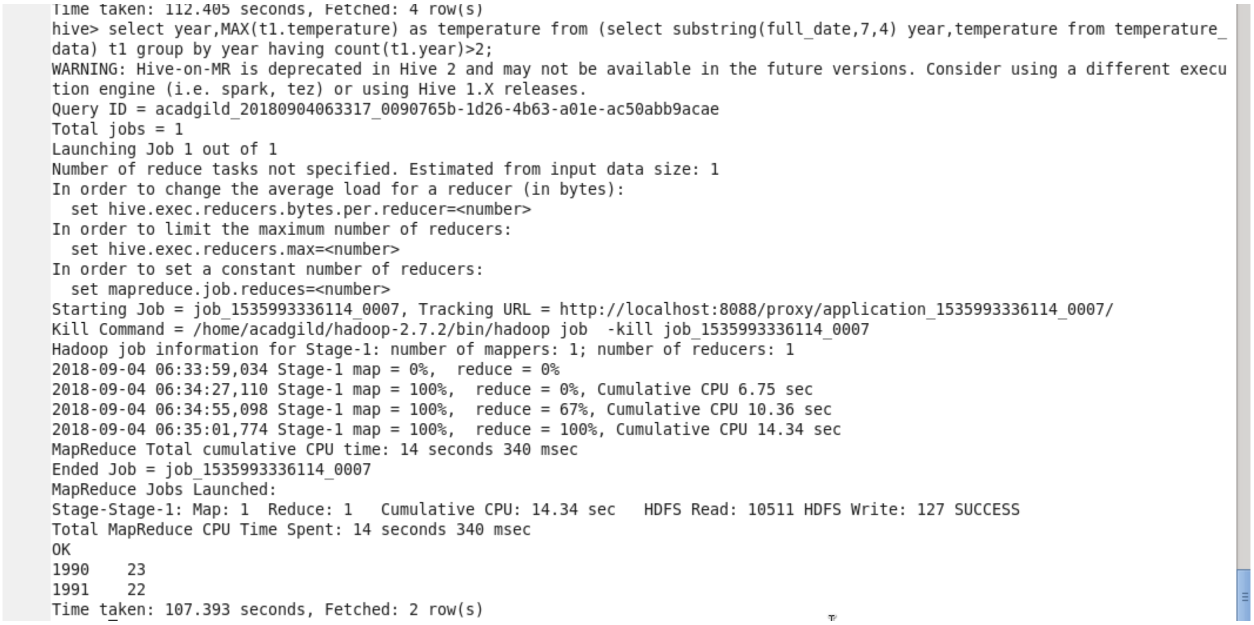
```
Time taken: 6.231 seconds, Fetched: 20 row(s)
hive> select full_date,temperature from temperature_data where zip_code>300000 and zip_code<399999;
OK
10-03-1990      15
10-01-1991      22
12-02-1990      9
10-03-1991      16
10-01-1990      23
12-02-1991      10
10-03-1993      16
10-01-1994      23
12-02-1991      10
10-03-1991      16
10-01-1990      23
12-02-1991      10
Time taken: 2.466 seconds, Fetched: 12 row(s)
hive> 
```

Maximum temperature corresponding to every year



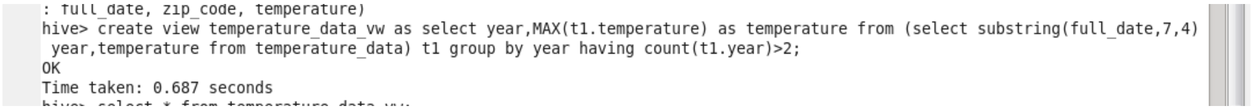
```
hive> select year,MAX(t1.temperature) as temperature from (select substring(full_date,7,4) year,temperature from temperature_
data) t1 group by year;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execu
tion engine (i.e. spark, tez) or using Hive 1.X releases.
Query ID = acadgild_20180904062900_382f5d73-9ae8-4011-bf5b-ba2cee5f4b38
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks not specified. Estimated from input data size: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapreduce.job.reduces=<number>
Starting Job = job_1535993336114_0006, Tracking URL = http://localhost:8088/proxy/application_1535993336114_0006/
Kill Command = /home/acadgild/hadoop-2.7.2/bin/hadoop job  -kill job_1535993336114_0006
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2018-09-04 06:29:46,058 Stage-1 map = 0%,  reduce = 0%
2018-09-04 06:30:17,424 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 7.72 sec
2018-09-04 06:30:46,797 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 11.7 sec
2018-09-04 06:30:49,737 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 12.91 sec
MapReduce Total cumulative CPU time: 12 seconds 910 msec
Ended Job = job_1535993336114_0006
MapReduce Jobs Launched:
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 12.91 sec   HDFS Read: 9348 HDFS Write: 167 SUCCESS
Total MapReduce CPU Time Spent: 12 seconds 910 msec
OK
1990    23
1991    22
1993    16
1994    23
Time taken: 112.405 seconds, Fetched: 4 row(s)
```

Maximum temperature those years who have more than 2 entries

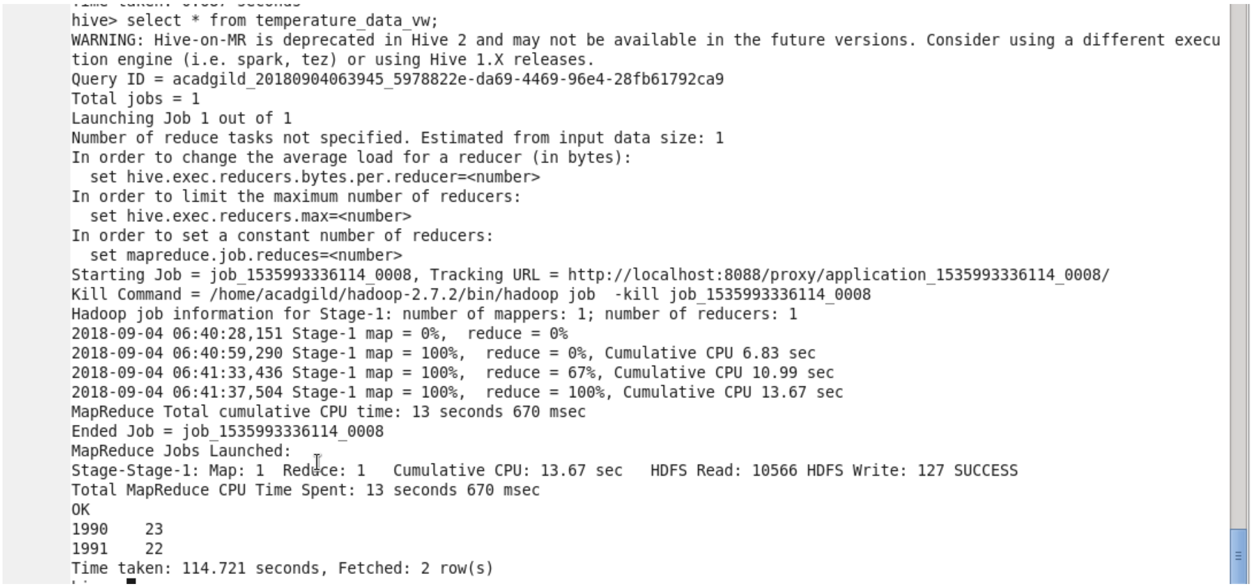


```
Time taken: 112.405 seconds, Fetched: 4 row(s)
hive> select year,MAX(t1.temperature) as temperature from (select substring(full_date,7,4) year,temperature from temperature_
data) t1 group by year having count(t1.year)>2;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execu
tion engine (i.e. spark, tez) or using Hive 1.X releases.
Query ID = acadgild_20180904063317_0090765b-1d26-4b63-a01e-ac50abb9acae
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks not specified. Estimated from input data size: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapreduce.job.reduces=<number>
Starting Job = job_1535993336114_0007, Tracking URL = http://localhost:8088/proxy/application_1535993336114_0007/
Kill Command = /home/acadgild/hadoop-2.7.2/bin/hadoop job  -kill job_1535993336114_0007
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2018-09-04 06:33:59,034 Stage-1 map = 0%,  reduce = 0%
2018-09-04 06:34:27,110 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 6.75 sec
2018-09-04 06:34:55,098 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 10.36 sec
2018-09-04 06:35:01,774 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 14.34 sec
MapReduce Total cumulative CPU time: 14 seconds 340 msec
Ended Job = job_1535993336114_0007
MapReduce Jobs Launched:
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 14.34 sec   HDFS Read: 10511 HDFS Write: 127 SUCCESS
Total MapReduce CPU Time Spent: 14 seconds 340 msec
OK
1990    23
1991    22
Time taken: 107.393 seconds, Fetched: 2 row(s)
```

Creating view with previous command data

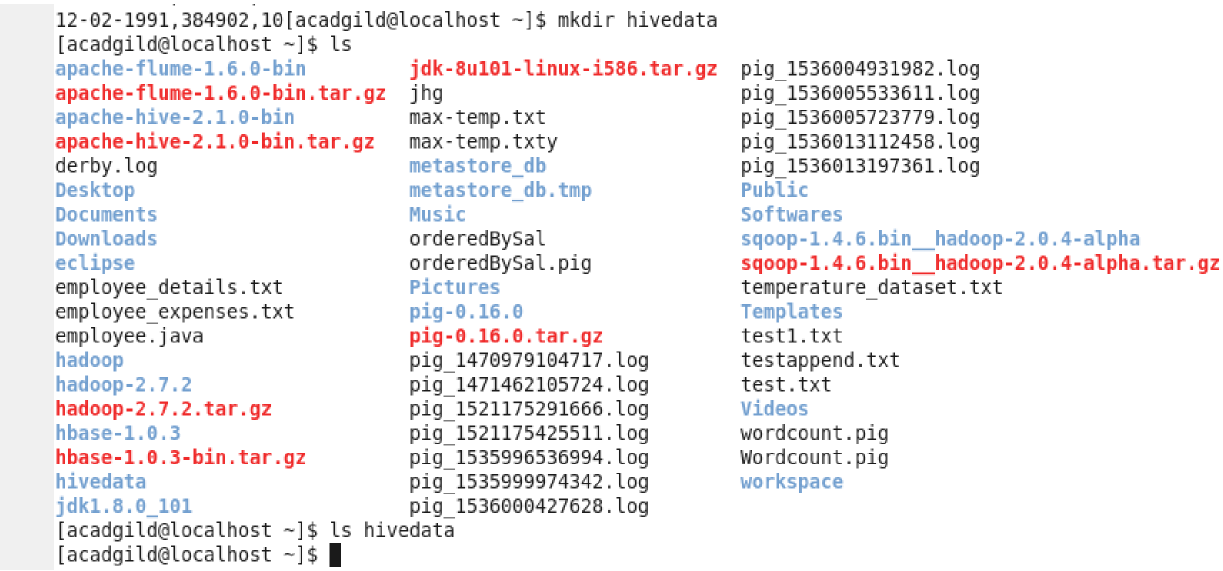


```
: full_date, zip_code, temperature)
hive> create view temperature_data_vw as select year,MAX(t1.temperature) as temperature from (select substring(full_date,7,4)
 year,temperature from temperature_data) t1 group by year having count(t1.year)>2;
OK
Time taken: 0.687 seconds
```

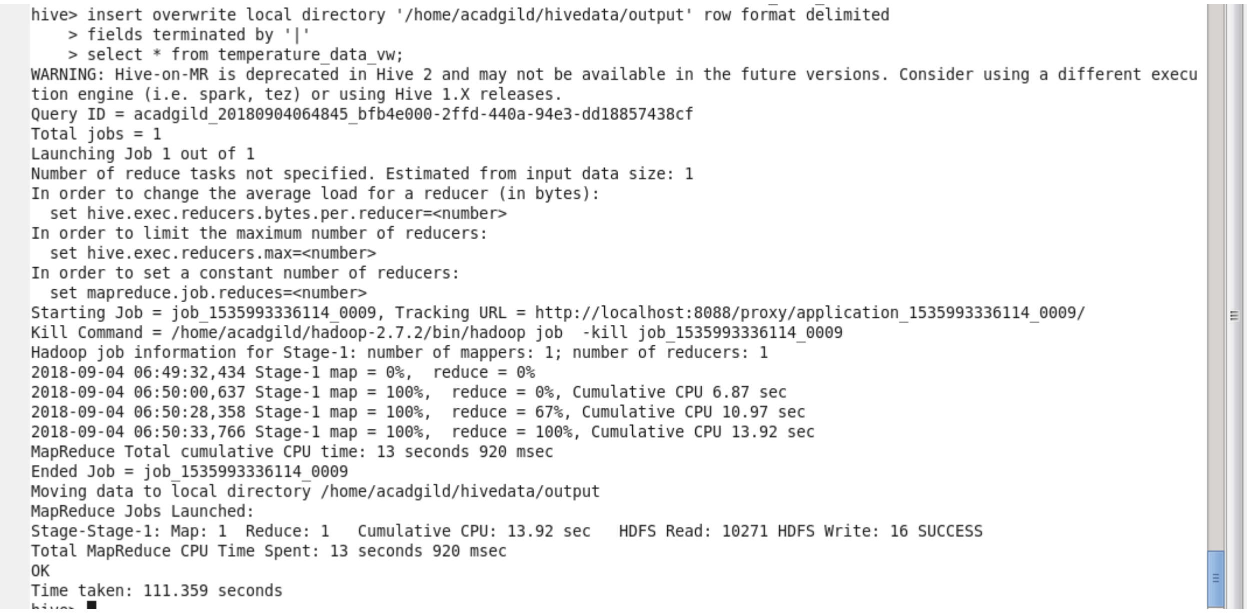


```
hive> select * from temperature_data_vw;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execu
tion engine (i.e. spark, tez) or using Hive 1.X releases.
Query ID = acadgild_20180904063945_5978822e-da69-4469-96e4-28fb61792ca9
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks not specified. Estimated from input data size: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapreduce.job.reduces=<number>
Starting Job = job_1535993336114_0008, Tracking URL = http://localhost:8088/proxy/application_1535993336114_0008/
Kill Command = /home/acadgild/hadoop-2.7.2/bin/hadoop job  -kill job_1535993336114_0008
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2018-09-04 06:40:28,151 Stage-1 map = 0%,  reduce = 0%
2018-09-04 06:40:59,290 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 6.83 sec
2018-09-04 06:41:33,436 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 10.99 sec
2018-09-04 06:41:37,504 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 13.67 sec
MapReduce Total cumulative CPU time: 13 seconds 670 msec
Ended Job = job_1535993336114_0008
MapReduce Jobs Launched:
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 13.67 sec   HDFS Read: 10566 HDFS Write: 127 SUCCESS
Total MapReduce CPU Time Spent: 13 seconds 670 msec
OK
1990    23
1991    22
Time taken: 114.721 seconds, Fetched: 2 row(s)
```

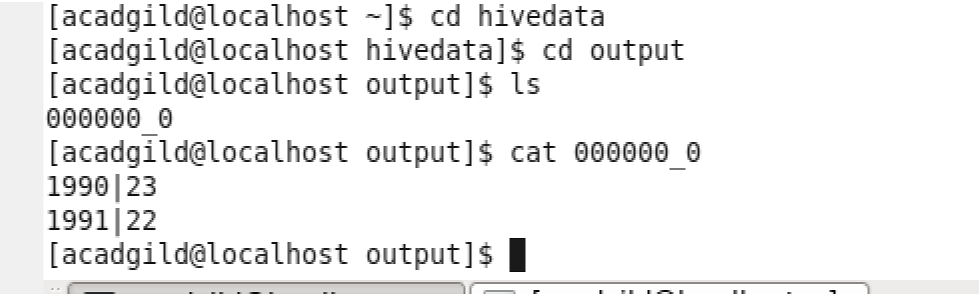
Exporting data from view to local file with | delimited



```
12-02-1991,384902,10[acadgild@localhost ~]$ mkdir hivedata
[acadgild@localhost ~]$ ls
apache-flume-1.6.0-bin         jdk-8u101-linux-i586.tar.gz  pig_1536004931982.log
apache-flume-1.6.0-bin.tar.gz  jhg                          pig_1536005533611.log
apache-hive-2.1.0-bin          max-temp.txt                 pig_1536005723779.log
apache-hive-2.1.0-bin.tar.gz   max-temp.txty                pig_1536013112458.log
derby.log                      metastore_db                 pig_1536013197361.log
Desktop                        metastore_db.tmp             Public
Documents                      Music                        Softwares
Downloads                      orderedBySal                 sqoop-1.4.6.bin__hadoop-2.0.4-alpha
eclipse                        orderedBySal.pig             sqoop-1.4.6.bin__hadoop-2.0.4-alpha.tar.gz
employee_details.txt           Pictures                     temperature_dataset.txt
employee_expenses.txt          pig-0.16.0                   Templates
employee.java                  pig-0.16.0.tar.gz            test1.txt
hadoop                         pig_1470979104717.log        testappend.txt
hadoop-2.7.2                   pig_1471462105724.log        test.txt
hadoop-2.7.2.tar.gz            pig_1521175291666.log        Videos
hbase-1.0.3                    pig_1521175425511.log        wordcount.pig
hbase-1.0.3-bin.tar.gz         pig_1535996536994.log        Wordcount.pig
hivedata                       pig_1535999974342.log        workspace
jdk1.8.0_101                   pig_1536000427628.log
[acadgild@localhost ~]$ ls hivedata
[acadgild@localhost ~]$ 
```



```
hive> insert overwrite local directory '/home/acadgild/hivedata/output' row format delimited
    > fields terminated by '|'
    > select * from temperature_data_vw;
WARNING: Hive-on-MR is deprecated in Hive 2 and may not be available in the future versions. Consider using a different execu
tion engine (i.e. spark, tez) or using Hive 1.X releases.
Query ID = acadgild_20180904064845_bfb4e000-2ffd-440a-94e3-dd18857438cf
Total jobs = 1
Launching Job 1 out of 1
Number of reduce tasks not specified. Estimated from input data size: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapreduce.job.reduces=<number>
Starting Job = job_1535993336114_0009, Tracking URL = http://localhost:8088/proxy/application_1535993336114_0009/
Kill Command = /home/acadgild/hadoop-2.7.2/bin/hadoop job  -kill job_1535993336114_0009
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2018-09-04 06:49:32,434 Stage-1 map = 0%,  reduce = 0%
2018-09-04 06:50:00,637 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 6.87 sec
2018-09-04 06:50:28,358 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 10.97 sec
2018-09-04 06:50:33,766 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 13.92 sec
MapReduce Total cumulative CPU time: 13 seconds 920 msec
Ended Job = job_1535993336114_0009
Moving data to local directory /home/acadgild/hivedata/output
MapReduce Jobs Launched:
Stage-Stage-1: Map: 1  Reduce: 1   Cumulative CPU: 13.92 sec   HDFS Read: 10271 HDFS Write: 16 SUCCESS
Total MapReduce CPU Time Spent: 13 seconds 920 msec
OK
Time taken: 111.359 seconds
hive> 
```



```
[acadgild@localhost ~]$ cd hivedata
[acadgild@localhost hivedata]$ cd output
[acadgild@localhost output]$ ls
000000_0
[acadgild@localhost output]$ cat 000000_0
1990|23
1991|22
[acadgild@localhost output]$ 
```