VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.

LAB REPORT
on

BIG DATA ANALYTICS
(20CS6PEBDA)

Submitted by
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(1BM19CS148)

in partial fulfillment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "**BIG DATA ANALYTICS**" carried out by **SHASHWAT KHANNA (1BM18CS148),** who is bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a**Course Title - (Course code)**work prescribed for the said degree.

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Index Sheet

Course Outcome

CO1	Apply the concept of NoSQL, Hadoop or Spark for a given task
CO2	Analyze the Big Data and obtain insight using data analytics mechanisms.
CO3	Design and implement Big data applications by applying NoSQL, Hadoop or Spark

LAB 1:

CREATE DATABASE IN MONGODB.

```
> use newdb
switched to db newdb db;
newdb
show dbs; admin                0.000GB config 0.000GB local         0.000GB
```

To create a collection by the name “Student”. Let us take a look at the collection list prior to the creation of the new collection “Student”.
db.createCollection(“Student”);   =>   *sql equivalent*
CREATE TABLE STUDENT(…);
{ "ok" : 1 }
To drop a collection by the name “Student”.
db.Student.drop(); 3.Create a collection by the name “Students” and store the following data in
it. db.Student.insert({_id:1,StudName:"MichelleJacintha",Gra
de:"VII",Hobbies:"InternetSurfing"}); WriteResult({ "nInserted" : 1 })

Insert the document for “AryanDavid” in to the Students collection only if it does not already exist in the collection. However, if it is already present in the collection, then update the document with new values. (Update his Hobbies from “Skating” to “Chess”.) Use “Update else insert” (if there is an existing document, it will attempt to update it, if there is no existing document then it will insert it).

```
db.Student.update({_id:3,StudName:"AryanDavid",Grade:" VII"},{$set:{Hobbies:"Skating"}},{upsert:true});

WriteResult({ "nMatched" : 0, "nUpserted" : 1, "nModified"
: 0, "_id" : 3 })
```

FIND METHOD
To search for documents from the “Students” collection based on certain search criteria.
db.Student.find({StudName:"AryanDavid"}); ({cond..},{columns.. column:1, columnname:0}) {
"_id" : 3, "Grade" : "VII", "StudName" : "AryanDavid", "Hobbies" : "Skating" }
To display only the StudName and Grade from all the documents of the Students collection. The identifier_id should be suppressed and NOT displayed. db.Student.find({},{StudName:1,Grade:1,_id:0});

```
{ "StudName" : "MichelleJacintha", "Grade" : "VII" }
{ "Grade" : "VII", "StudName" : "AryanDavid" }
```

To find those documents where the Grade is set to
‘VII’ db.Student.find({Grade:{$eq:'VII'}}).pretty(); {

```
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
{
"_id" : 3, "Grade" : "VII",
"StudName" : "AryanDavid", "Hobbies" : "Skating"
}
```

To find those documents from the Students collection where the Hobbies is set to either ‘Chess’ or is set to ‘Skating’.

```
db.Student.find({Hobbies :{ $in: ['Chess','Skating']}}).pretty ();
{
"_id" : 3, "Grade" : "VII",
"StudName" : "AryanDavid", "Hobbies" : "Skating" }
```

To find documents from the Students collection where the StudName begins with “M”.

```
db.Student.find({StudName:/^M/}).pretty();
{
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
```

To find documents from the Students collection where the StudNamehas an “e” in any position.

```
db.Student.find({StudName:/e/}).pretty();
{
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
```

To find the number of documents in the Students collection.

```
db.Student.count(); 2
```

To sort the documents from the Students collection in the descending order of
StudName. db.Student.find().sort({StudName:-1}).pretty(); {

```
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
{
"_id" : 3, "Grade" : "VII",
"StudName" : "AryanDavid", "Hobbies" : "Skating"
}
```

Import data from a CSV file
Given a CSV file “sample.txt” in the D:drive, import the file into the MongoDB collection, “SampleJSON”.
The collection is in
the database “test”.

```
mongoimport --db Student --collection airlines --type csv – headerline --file /home/hduser/Desktop/airline.csv
```

Export data to a CSV file
This command used at the command prompt exports MongoDB JSON documents from
“Customers” collection in the “test” database into a CSV file “Output.txt” in the D:drive.

```
mongoexport --host localhost --db Student --collection airlines --csv --out /home/hduser/Desktop/output.txt –
fields “Year”,”Quarter”
```

Save Method :
Save() method will insert a new document, if the document with the _id does not exist. If it exists it
will replace the exisiting document.

```
db.Student.save({StudName:”Vamsi”, Grade:”VI”})

WriteResult({ "nInserted" : 1 })
```

Add a new field to existing Document:

```
db.Student.update({_id:ObjectId("625695cc7d129fb98b44c8a1")}
```

{$set:{Location:"Network"}})

WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })

Remove the field in an existing Document db.Student.update({_id:ObjectId("625695cc7d129fb98b44c8a1
")}, {$unset:{Location:”Network”}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })

Finding Document based on search criteria suppressing few fields
db.Student.find({_id:1},{StudName:1,Grade:1,_id:0}); { "StudName" :
"MichelleJacintha", "Grade" : "VII" }
To find those documents where the Grade is not set to
‘VII’ db.Student.find({Grade:{$ne:'VII'}}).pretty();

```
{
"_id" : ObjectId("625695cc7d129fb98b44c8a1"), "StudName" : "Vamsi",

"Grade" : "VI"
}
```

To find documents from the Students collection where the
StudName ends with s.
db.Student.find({StudName:/s$/}).pretty();

```
{
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
```

to set a particular field value to NULL
db.Student.update({_id:3},{$set:{Location:null}})

WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1
}) Count the number of documents in Student Collections
db.Student.count() 3
Count the number of documents in Student Collections with grade :VII
db.Student.count({Grade:”VII”})

2 retrieve first 3 documents

db.Student.find({Grade:”VII”}).limit(1).pretty();

```
{
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
```

Sort the document in Ascending order
db.Student.find().sort({StudName:1}).pretty();

```
{
"_id" : 3, "Grade" : "VII",
"StudName" : "AryanDavid", "Hobbies" : "Skating", "Location" : null
}
```

```
{
"_id" : 1,
"StudName" : "MichelleJacintha", "Grade" : "VII",
"Hobbies" : "InternetSurfing"
}
{
"_id" : ObjectId("625695cc7d129fb98b44c8a1"), "StudName" : "Vamsi",
"Grade" : "VI"
}
```

Note: for desending order : db.Students.find().sort({StudName:- 1}).pretty();

to Skip the 1st two documents from the Students
Collections db.Student.find().skip(2).pretty() {

```
"_id" : ObjectId("625695cc7d129fb98b44c8a1"), "StudName" : "Vamsi",
"Grade" : "VI"
}
```

Create a collection by name “food” and add to each document add a “fruits”
array db.food.insert({ _id:1, fruits:['grapes','mango','apple'] }) db.food.insert({
_id:2, fruits:['grapes','mango','cherry'] })

```
db.food.insert( { _id:3, fruits:['banana','mango'] } )
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
{ "_id" : 2, "fruits" : [ "grapes", "mango", "cherry" ] }
{ "_id" : 3, "fruits" : [ "banana", "mango" ] }
```

To find those documents from the “food” collection which has the “fruits array” constitute of “grapes”, “mango” and “apple”.

```
db.food.find ( {fruits: ['grapes','mango','apple'] } ). pretty();
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
```

To find in “fruits” array having “mango” in the first index position.

```
db.food.find ( {“fruits.1":grapes'} )
```

To find those documents from the “food” collection where the size of the array is two.

```
db.food.find ( {“fruits”: {$size:2}} )

{ "_id" : 3, "fruits" : [ "banana", "mango" ] }
```

To find the document with a particular id and display the first two elements from the array “fruits”

```
db.food.find({_id:1},{“fruits”:{$slice:2}})
{ "_id" : 1, "fruits" : [ "grapes", "mango" ] }
```

To find all the documets from the food collection which have elements mango and grapes in the array “fruits”

```
db.food.find({fruits:{$all:[“mango”,”grapes”]}})
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
{ "_id" : 2, "fruits" : [ "grapes", "mango", "cherry" ] }
```

update on Array: using particular id replace the element present in the 1st index position of the fruits array with apple

```
db.food.update({_id:3},{$set:{'fruits.1':'apple'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
```

insert new key value pairs in the fruits array

```
db.food.update({_id:2},{$push:{price:{grapes:80,mango:200,cherr y:100}}})
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
{ "_id" : 2, "fruits" : [ "grapes", "mango", "cherry" ], "price" : [ { "grapes" : 80, "mango" : 200, "cherry" : 100 } ] }
{ "_id" : 3, "fruits" : [ "banana", "apple" ] }
```

Note: perform query operations using - pop, addToSet, pullAll and pull

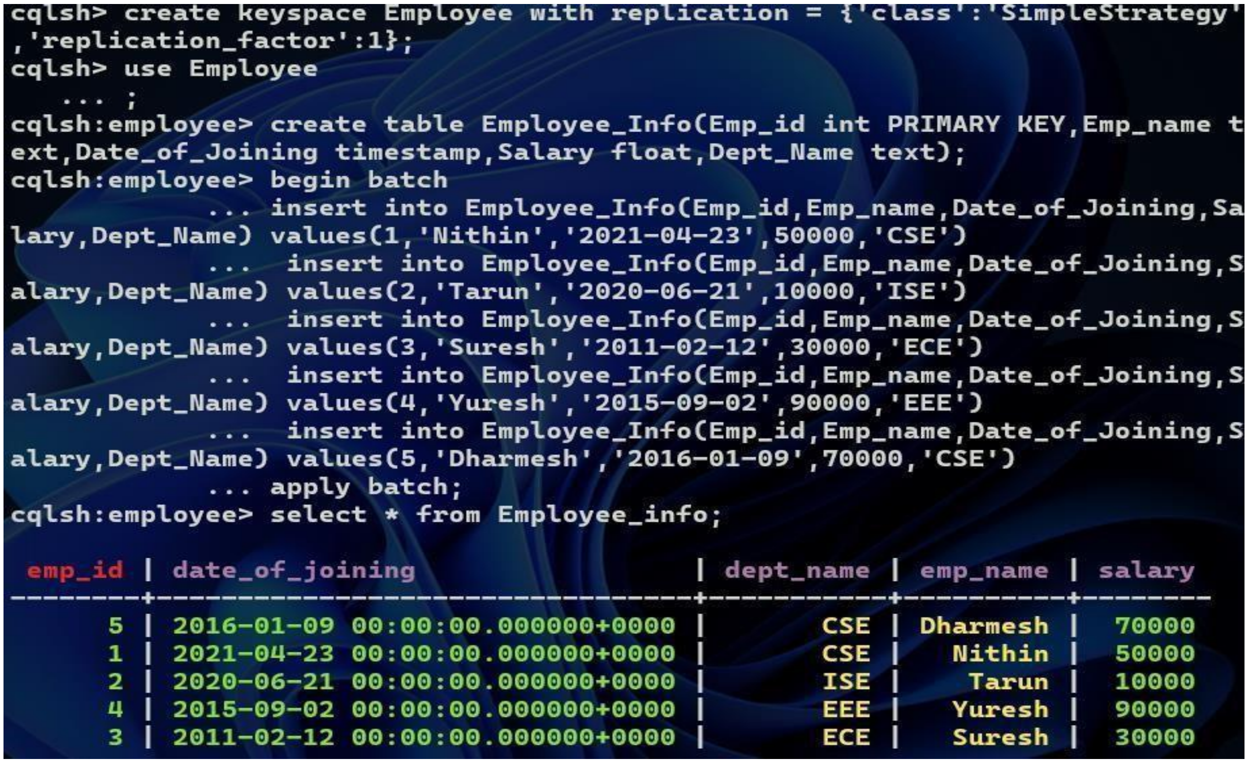
LAB 2:

Perform the following DB operations using Cassandra.
Create a key space by name Employee

create keyspace "Employee" with replication =
{'class':'SimpleStrategy','replication_factor':1}; cqlsh> use Employee;

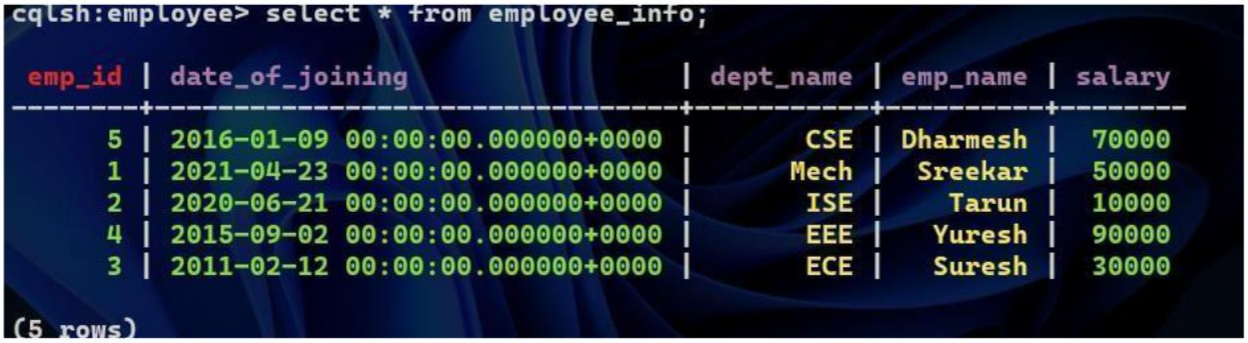
Create a column family by name Employee-Info with attributes Emp_Id Primary Key, Emp_Name, Designation, Date_of_Joining,
Salary, Dept_Name

create table Employee_Info(Emp_id int PRIMARY KEY,Emp_name text,Date_of_Joining timestamp,Salary float,Dept_Name text) ;
Insert the values into the table in batch cqlsh:employee> begin batch
... insert into
Employee_Info(Emp_id,Emp_name,Date_of_Joining,Salary,Dept_N ame) values(1,'Jack','2021-04-23',50000,'CSE') ... insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,Salary,Dept_N ame) values(2,'Tarun','2020-06-21',10000,'ISE')
... insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,Salary,Dept_N ame) values(3,'Suresh','2011-02-12',30000,'ECE')
... insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,Salary,Dept_N ame) values(4,'Yuresh','2015-09-02',90000,'EEE')... insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,Salary,Dept_N ame) values(5,'Dharmesh','2016-01-09',70000,'CSE')
... apply batch;



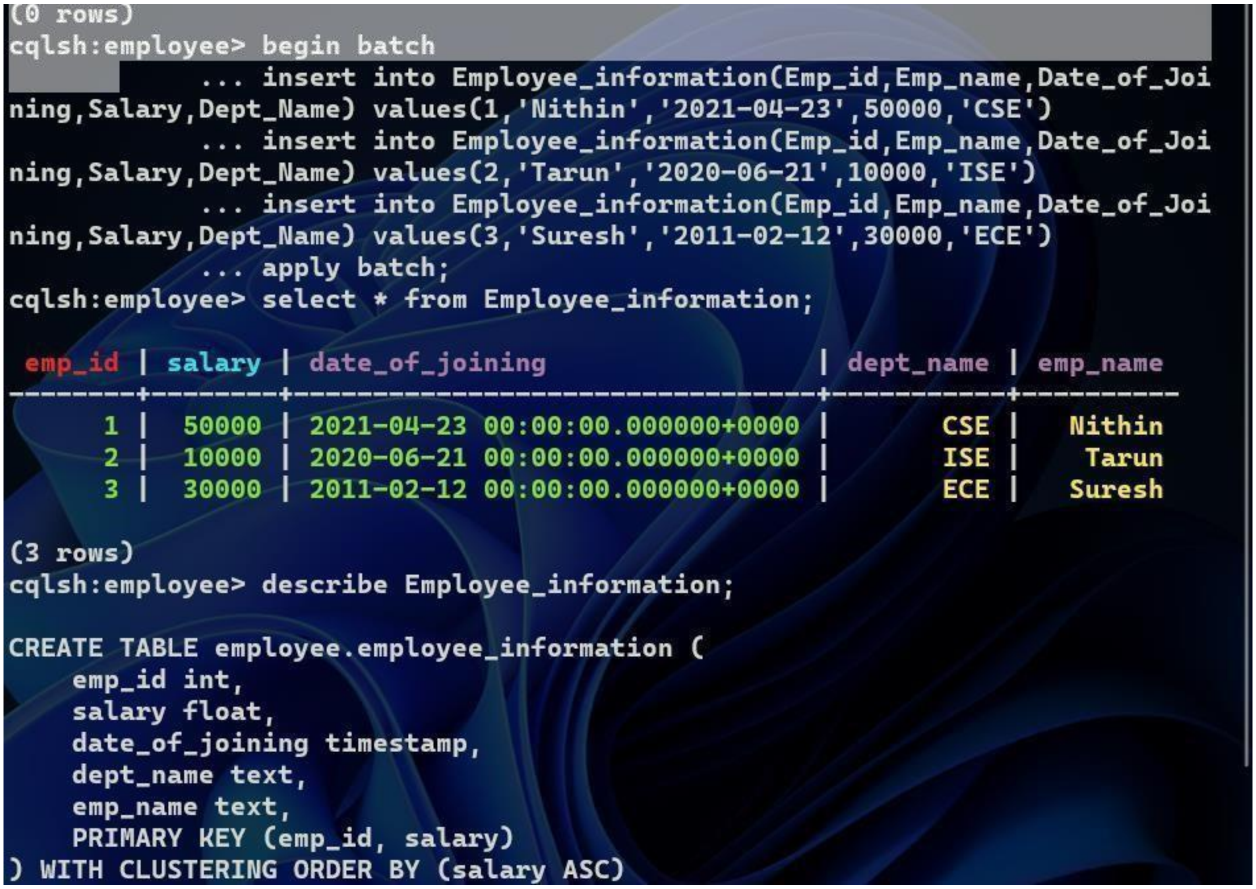
```
cqlsh> create keyspace Employee with replication = {'class':'SimpleStrategy'
,'replication_factor':1};
cqlsh> use Employee
   ... ;
cqlsh:employee> create table Employee_Info(Emp_id int PRIMARY KEY,Emp_name t
ext,Date_of_Joining timestamp,Salary float,Dept_Name text);
cqlsh:employee> begin batch
            ... insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,Sa
lary,Dept_Name) values(1,'Nithin','2021-04-23',50000,'CSE')
            ...  insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,S
alary,Dept_Name) values(2,'Tarun','2020-06-21',10000,'ISE')
            ...  insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,S
alary,Dept_Name) values(3,'Suresh','2011-02-12',30000,'ECE')
            ...  insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,S
alary,Dept_Name) values(4,'Yuresh','2015-09-02',90000,'EEE')
            ...  insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,S
alary,Dept_Name) values(5,'Dharmesh','2016-01-09',70000,'CSE')
            ... apply batch;
cqlsh:employee> select * from Employee_info;

 emp_id | date_of_joining                 | dept_name | emp_name | salary
--------+---------------------------------+-----------+----------+--------
      5 | 2016-01-09 00:00:00.000000+0000 |       CSE | Dharmesh |  70000
      1 | 2021-04-23 00:00:00.000000+0000 |       CSE |   Nithin |  50000
      2 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun |  10000
      4 | 2015-09-02 00:00:00.000000+0000 |       EEE |   Yuresh |  90000
      3 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh |  30000
```

Update Employee name and Department of Emp-Id 1 update employee_info set
Dept_Name='Mech',emp_name='Sreekar' where emp_id=1; cqlsh:employee>
select * from employee_info;



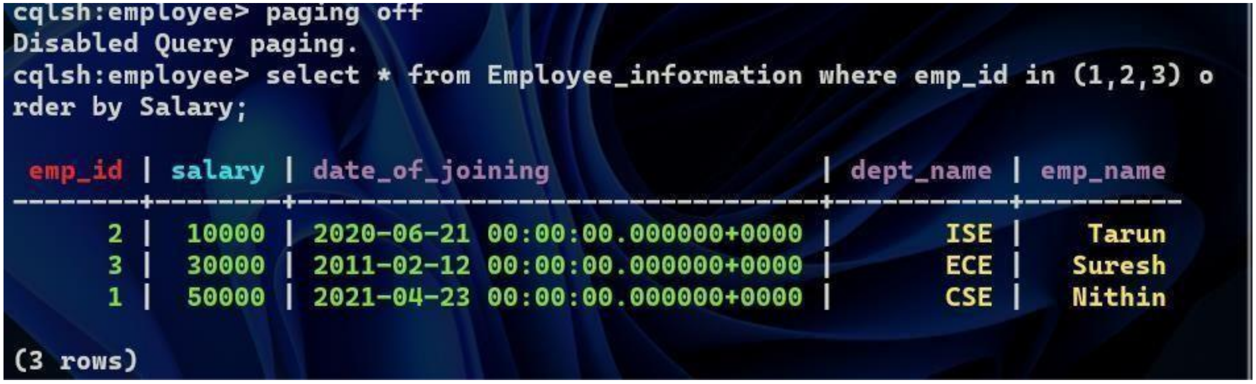
```
cqlsh:employee> select * from employee_info;

 emp_id | date_of_joining                 | dept_name | emp_name | salary
--------+---------------------------------+-----------+----------+--------
      5 | 2016-01-09 00:00:00.000000+0000 |       CSE | Dharmesh |  70000
      1 | 2021-04-23 00:00:00.000000+0000 |      Mech |  Sreekar |  50000
      2 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun |  10000
      4 | 2015-09-02 00:00:00.000000+0000 |       EEE |   Yuresh |  90000
      3 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh |  30000

(5 rows)
```

Sort the details of Employee records based on salary



```
(0 rows)
cqlsh:employee> begin batch
            ... insert into Employee_information(Emp_id,Emp_name,Date_of_Joi
ning,Salary,Dept_Name) values(1,'Nithin','2021-04-23',50000,'CSE')
            ... insert into Employee_information(Emp_id,Emp_name,Date_of_Joi
ning,Salary,Dept_Name) values(2,'Tarun','2020-06-21',10000,'ISE')
            ... insert into Employee_information(Emp_id,Emp_name,Date_of_Joi
ning,Salary,Dept_Name) values(3,'Suresh','2011-02-12',30000,'ECE')
            ... apply batch;
cqlsh:employee> select * from Employee_information;

 emp_id | salary | date_of_joining                 | dept_name | emp_name
--------+--------+---------------------------------+-----------+----------
      1 |  50000 | 2021-04-23 00:00:00.000000+0000 |       CSE |   Nithin
      2 |  10000 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun
      3 |  30000 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh

(3 rows)
cqlsh:employee> describe Employee_information;

CREATE TABLE employee.employee_information (
    emp_id int,
    salary float,
    date_of_joining timestamp,
    dept_name text,
    emp_name text,
    PRIMARY KEY (emp_id, salary)
) WITH CLUSTERING ORDER BY (salary ASC)
```

cqlsh:employee> select * from Employee_information where emp_id in (1,2,3) order by Salary;

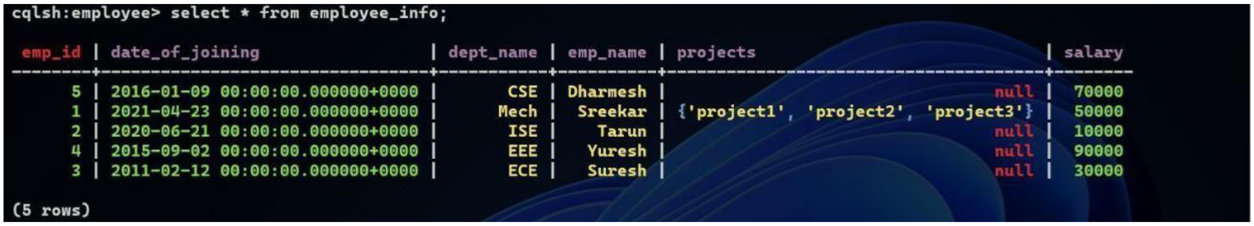


```
cqlsh:employee> paging off
Disabled Query paging.
cqlsh:employee> select * from Employee_information where emp_id in (1,2,3) o
rder by Salary;

 emp_id | salary | date_of_joining                 | dept_name | emp_name
--------+--------+---------------------------------+-----------+----------
      2 |  10000 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun
      3 |  30000 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh
      1 |  50000 | 2021-04-23 00:00:00.000000+0000 |       CSE |   Nithin

(3 rows)
```

Alter the schema of the table Employee_Info to add a column Projects which stores a set of Projects done by the corresponding Employee.

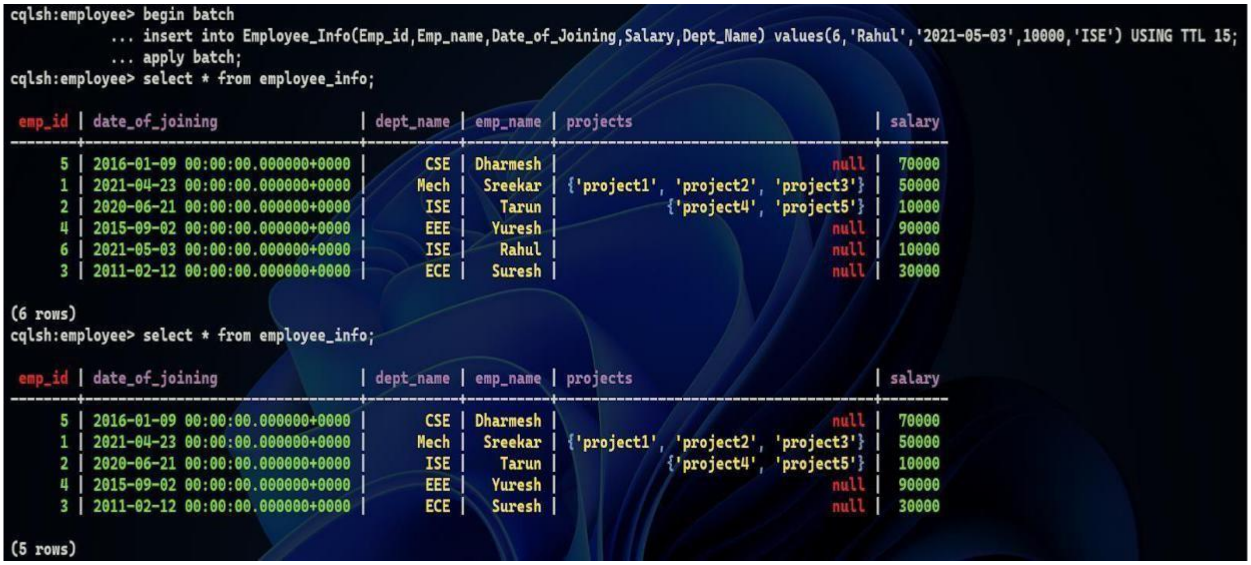
cqlsh:employee> alter table employee_info add projects set<text>;

Update the altered table to add project names. cqlsh:employee> update employee_info set projects=projects+{'project1','project2','project3'} where emp_id=1;



```
cqlsh:employee> select * from employee_info;

 emp_id | date_of_joining                 | dept_name | emp_name | projects                              | salary
--------+---------------------------------+-----------+----------+---------------------------------------+--------
      5 | 2016-01-09 00:00:00.000000+0000 |       CSE | Dharmesh |                                  null |  70000
      1 | 2021-04-23 00:00:00.000000+0000 |      Mech |  Sreekar | {'project1', 'project2', 'project3'} |  50000
      2 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun |                                  null |  10000
      4 | 2015-09-02 00:00:00.000000+0000 |       EEE |   Yuresh |                                  null |  90000
      3 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh |                                  null |  30000

(5 rows)
```

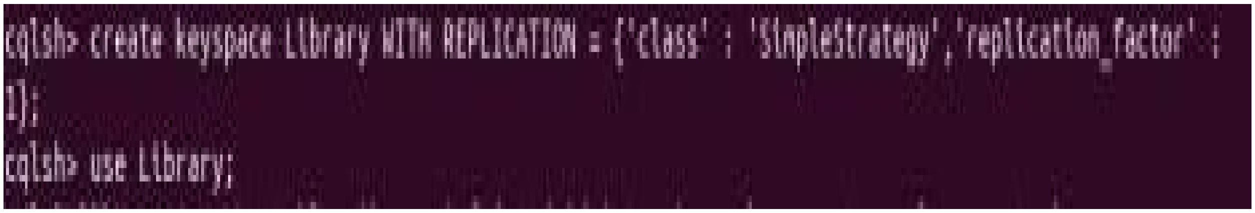
8 Create a TTL of 15 seconds to display the values of Employees.



```
cqlsh:employee> begin batch
            ... insert into Employee_Info(Emp_id,Emp_name,Date_of_Joining,Salary,Dept_Name) values(6,'Rahul','2021-05-03',10000,'ISE') USING TTL 15;
            ... apply batch;
cqlsh:employee> select * from employee_info;

 emp_id | date_of_joining                 | dept_name | emp_name | projects                              | salary
--------+---------------------------------+-----------+----------+---------------------------------------+--------
      5 | 2016-01-09 00:00:00.000000+0000 |       CSE | Dharmesh |                                  null |  70000
      1 | 2021-04-23 00:00:00.000000+0000 |      Mech |  Sreekar | {'project1', 'project2', 'project3'} |  50000
      2 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun |             {'project4', 'project5'} |  10000
      4 | 2015-09-02 00:00:00.000000+0000 |       EEE |   Yuresh |                                  null |  90000
      6 | 2021-05-03 00:00:00.000000+0000 |       ISE |    Rahul |                                  null |  10000
      3 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh |                                  null |  30000

(6 rows)
cqlsh:employee> select * from employee_info;

 emp_id | date_of_joining                 | dept_name | emp_name | projects                              | salary
--------+---------------------------------+-----------+----------+---------------------------------------+--------
      5 | 2016-01-09 00:00:00.000000+0000 |       CSE | Dharmesh |                                  null |  70000
      1 | 2021-04-23 00:00:00.000000+0000 |      Mech |  Sreekar | {'project1', 'project2', 'project3'} |  50000
      2 | 2020-06-21 00:00:00.000000+0000 |       ISE |    Tarun |             {'project4', 'project5'} |  10000
      4 | 2015-09-02 00:00:00.000000+0000 |       EEE |   Yuresh |                                  null |  90000
      3 | 2011-02-12 00:00:00.000000+0000 |       ECE |   Suresh |                                  null |  30000

(5 rows)
```

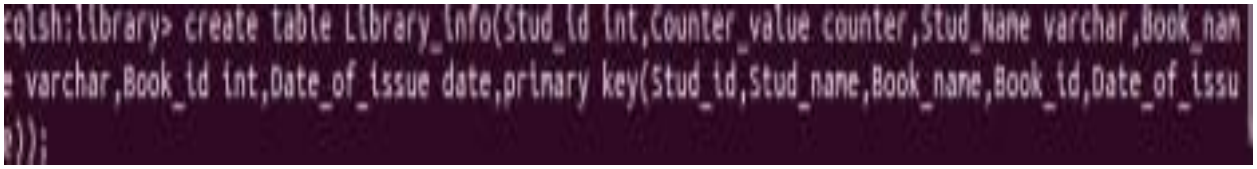
LAB 3:

Create a key space by name Library



```
cqlsh> create keyspace Library WITH REPLICATION = {'class' : 'SimpleStrategy','replication_factor' :
1};
cqlsh> use Library;
```

Create a column family by name Library-Info with attributes Stud_Id Primary Key, Counter_value of type Counter,

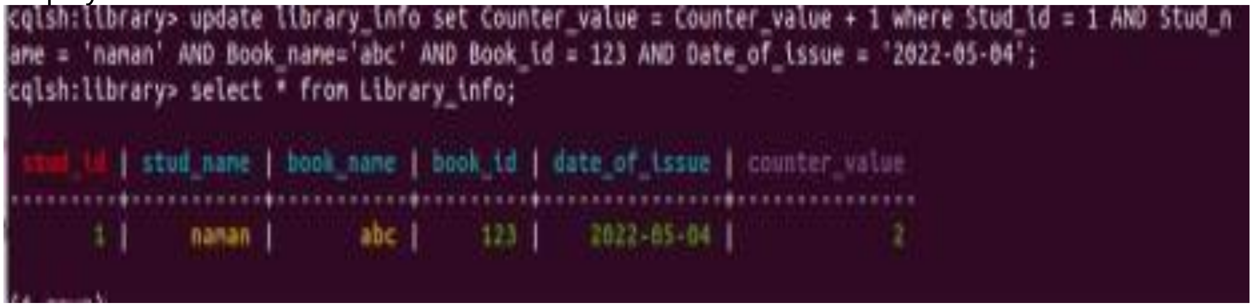


```
cqlsh:library> create table Library_info(Stud_id int,Counter_value counter,Stud_Name varchar,Book_nam
e varchar,Book_id int,Date_of_issue date,primary key(Stud_id,Stud_name,Book_name,Book_id,Date_of_issu
e));
```

Insert the values into the table in batch

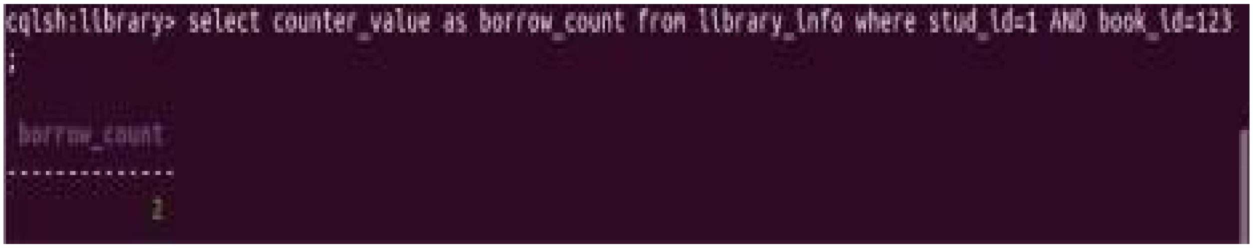
```
[illegible]
```

Display the details of the table created and increase the value of the counter



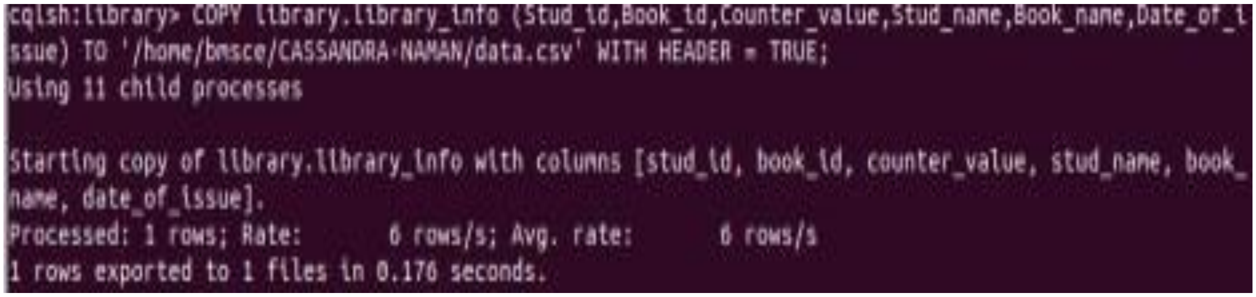
```
cqlsh:library> update library_info set Counter_value = Counter_value + 1 where Stud_id = 1 AND Stud_n
ame = 'naman' AND Book_name='abc' AND Book_id = 123 AND Date_of_issue = '2022-05-04';
cqlsh:library> select * from Library_info;

 stud_id | stud_name | book_name | book_id | date_of_issue | counter_value
---------+-----------+-----------+---------+---------------+---------------
       1 |     naman |       abc |     123 |    2022-05-04 |             2
```

Write a query to show that a student with id 112 has taken a book “BDA” 2 times.



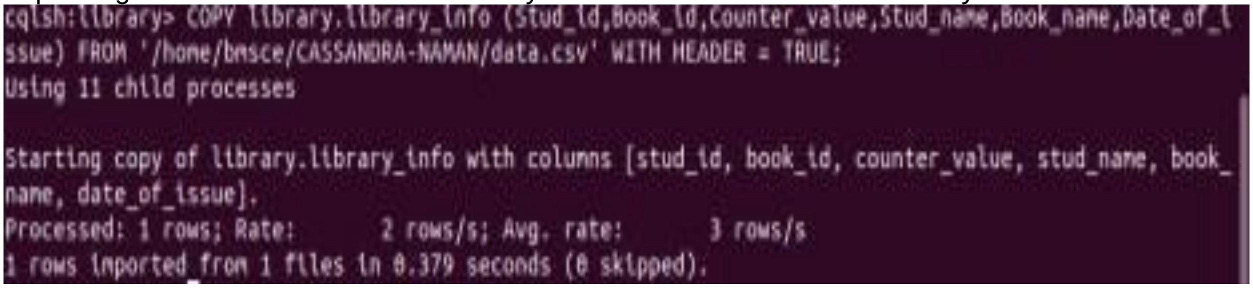
```
cqlsh:library> select counter_value as borrow_count from library_info where stud_id=1 AND book_id=123
;

 borrow_count
--------------
            2
```

Export the created column to a csv file



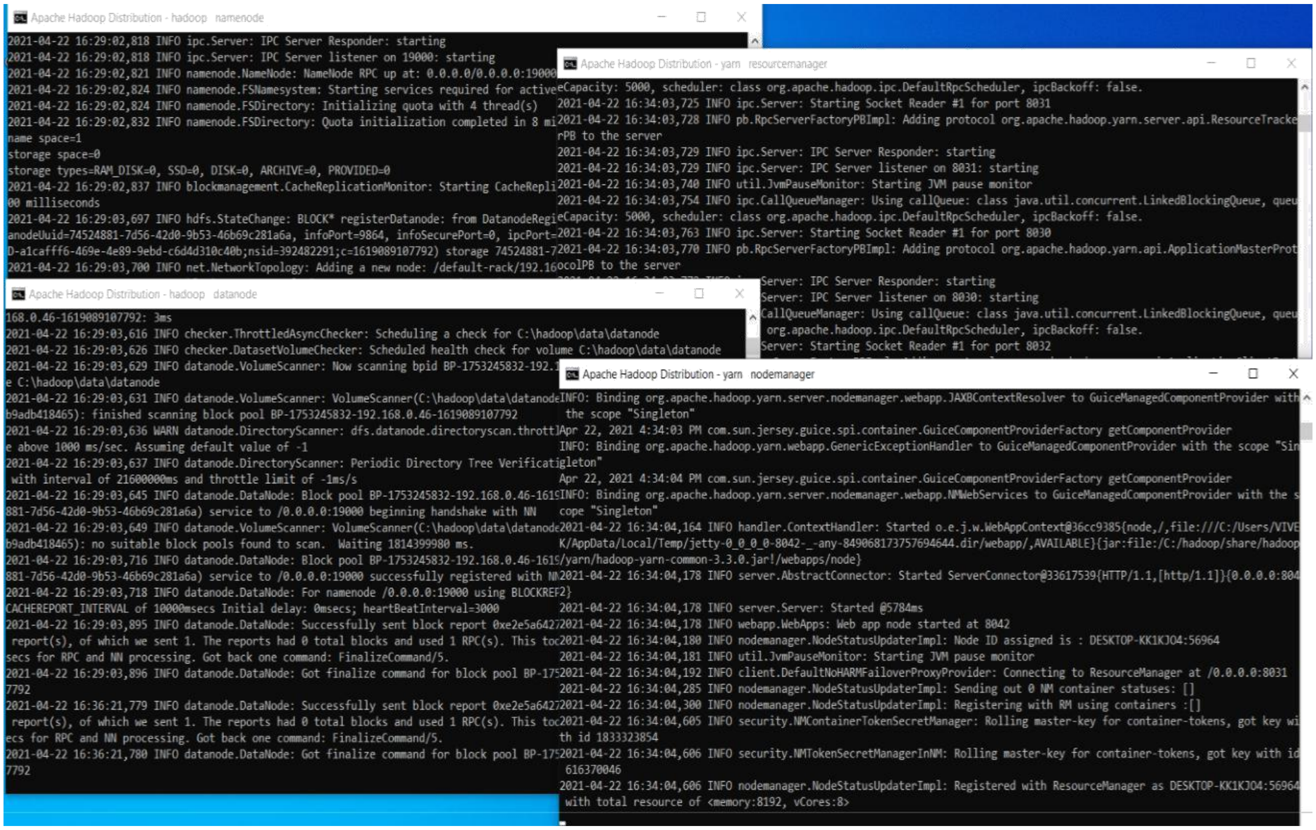
```
cqlsh:library> COPY library.library_info (Stud_id,Book_id,Counter_value,Stud_name,Book_name,Date_of_i
ssue) TO '/home/bmsce/CASSANDRA-NAMAN/data.csv' WITH HEADER = TRUE;
Using 11 child processes

Starting copy of library.library_info with columns [stud_id, book_id, counter_value, stud_name, book_
name, date_of_issue].
Processed: 1 rows; Rate:       6 rows/s; Avg. rate:       6 rows/s
1 rows exported to 1 files in 0.176 seconds.
```

Import a given csv dataset from local file system into Cassandra column family



```
cqlsh:library> COPY library.library_info (Stud_id,Book_id,Counter_value,Stud_name,Book_name,Date_of_i
ssue) FROM '/home/bmsce/CASSANDRA-NAMAN/data.csv' WITH HEADER = TRUE;
Using 11 child processes

Starting copy of library.library_info with columns [stud_id, book_id, counter_value, stud_name, book_
name, date_of_issue].
Processed: 1 rows; Rate:       2 rows/s; Avg. rate:       3 rows/s
1 rows imported from 1 files in 0.379 seconds (0 skipped).
```

LAB 4:



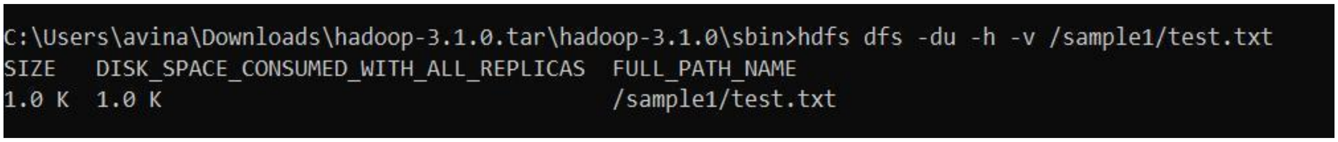
```
2021-04-22 16:29:02,818 INFO ipc.Server: IPC Server Responder: starting
2021-04-22 16:29:02,818 INFO ipc.Server: IPC Server listener on 19000: starting
2021-04-22 16:29:02,821 INFO namenode.NameNode: NameNode RPC up at: 0.0.0.0/0.0.0.0:19000
2021-04-22 16:29:02,824 INFO namenode.FSNamesystem: Starting services required for active
2021-04-22 16:29:02,824 INFO namenode.FSDirectory: Initializing quota with 4 thread(s)
2021-04-22 16:29:02,832 INFO namenode.FSDirectory: Quota initialization completed in 8 mi
name space=1
storage space=0
storage types=RAM_DISK=0, SSD=0, DISK=0, ARCHIVE=0, PROVIDED=0
2021-04-22 16:29:02,837 INFO blockmanagement.CacheReplicationMonitor: Starting CacheRepli
00 milliseconds
2021-04-22 16:29:03,697 INFO hdfs.StateChange: BLOCK* registerDatanode: from DatanodeRegi
anodeUuid=74524881-7d56-42d0-9b53-46b69c281a6a, infoPort=9864, infoSecurePort=0, ipcPort=
D-a1cafff6-469e-4e89-9ebd-c6d4d310c40b;nsid=392482291;c=1619089107792) storage 74524881-7
2021-04-22 16:29:03,700 INFO net.NetworkTopology: Adding a new node: /default-rack/192.16
```

```
eCapacity: 5000, scheduler: class org.apache.hadoop.ipc.DefaultRpcScheduler, ipcBackoff: false.
2021-04-22 16:34:03,725 INFO ipc.Server: Starting Socket Reader #1 for port 8031
2021-04-22 16:34:03,728 INFO pb.RpcServerFactoryPBImpl: Adding protocol org.apache.hadoop.yarn.server.api.ResourceTracke
rPB to the server
2021-04-22 16:34:03,729 INFO ipc.Server: IPC Server Responder: starting
2021-04-22 16:34:03,729 INFO ipc.Server: IPC Server listener on 8031: starting
2021-04-22 16:34:03,740 INFO util.JvmPauseMonitor: Starting JVM pause monitor
2021-04-22 16:34:03,754 INFO ipc.CallQueueManager: Using callQueue: class java.util.concurrent.LinkedBlockingQueue, queu
eCapacity: 5000, scheduler: class org.apache.hadoop.ipc.DefaultRpcScheduler, ipcBackoff: false.
2021-04-22 16:34:03,763 INFO ipc.Server: Starting Socket Reader #1 for port 8030
2021-04-22 16:34:03,770 INFO pb.RpcServerFactoryPBImpl: Adding protocol org.apache.hadoop.yarn.api.ApplicationMasterProt
ocolPB to the server
Server: IPC Server Responder: starting
Server: IPC Server listener on 8030: starting
CallQueueManager: Using callQueue: class java.util.concurrent.LinkedBlockingQueue, queu
 org.apache.hadoop.ipc.DefaultRpcScheduler, ipcBackoff: false.
Server: Starting Socket Reader #1 for port 8032
```

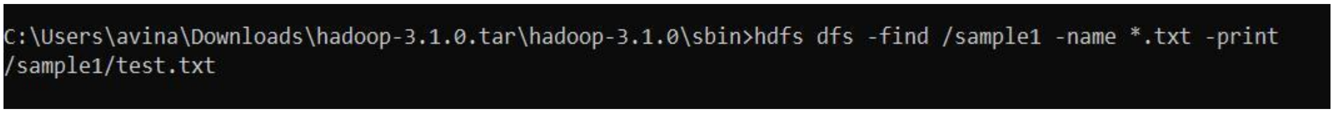
```
168.0.46-1619089107792: 3ms
2021-04-22 16:29:03,616 INFO checker.ThrottledAsyncChecker: Scheduling a check for C:\hadoop\data\datanode
2021-04-22 16:29:03,626 INFO checker.DatasetVolumeChecker: Scheduled health check for volume C:\hadoop\data\datanode
2021-04-22 16:29:03,629 INFO datanode.VolumeScanner: Now scanning bpid BP-1753245832-192.1
e C:\hadoop\data\datanode
2021-04-22 16:29:03,631 INFO datanode.VolumeScanner: VolumeScanner(C:\hadoop\data\datanode
b9adb418465): finished scanning block pool BP-1753245832-192.168.0.46-1619089107792
2021-04-22 16:29:03,636 WARN datanode.DirectoryScanner: dfs.datanode.directoryscan.thrott
e above 1000 ms/sec. Assuming default value of -1
2021-04-22 16:29:03,637 INFO datanode.DirectoryScanner: Periodic Directory Tree Verificat
 with interval of 21600000ms and throttle limit of -1ms/s
2021-04-22 16:29:03,645 INFO datanode.DataNode: Block pool BP-1753245832-192.168.0.46-1619
881-7d56-42d0-9b53-46b69c281a6a) service to /0.0.0.0:19000 beginning handshake with NN
2021-04-22 16:29:03,649 INFO datanode.VolumeScanner: VolumeScanner(C:\hadoop\data\datanode
b9adb418465): no suitable block pools found to scan.  Waiting 1814399980 ms.
2021-04-22 16:29:03,716 INFO datanode.DataNode: Block pool BP-1753245832-192.168.0.46-1619
881-7d56-42d0-9b53-46b69c281a6a) service to /0.0.0.0:19000 successfully registered with NN
2021-04-22 16:29:03,718 INFO datanode.DataNode: For namenode /0.0.0.0:19000 using BLOCKREP
CACHEREPORT_INTERVAL of 10000msecs Initial delay: 0msecs; heartBeatInterval=3000
2021-04-22 16:29:03,895 INFO datanode.DataNode: Successfully sent block report 0xe2e5a6427
 report(s), of which we sent 1. The reports had 0 total blocks and used 1 RPC(s). This toc
secs for RPC and NN processing. Got back one command: FinalizeCommand/5.
2021-04-22 16:29:03,896 INFO datanode.DataNode: Got finalize command for block pool BP-175
7792
2021-04-22 16:36:21,779 INFO datanode.DataNode: Successfully sent block report 0xe2e5a6427
 report(s), of which we sent 1. The reports had 0 total blocks and used 1 RPC(s). This toc
ecs for RPC and NN processing. Got back one command: FinalizeCommand/5.
2021-04-22 16:36:21,780 INFO datanode.DataNode: Got finalize command for block pool BP-175
7792
```

```
INFO: Binding org.apache.hadoop.yarn.server.nodemanager.webapp.JAXBContextResolver to GuiceManagedComponentProvider with
 the scope "Singleton"
Apr 22, 2021 4:34:03 PM com.sun.jersey.guice.spi.container.GuiceComponentProviderFactory getComponentProvider
INFO: Binding org.apache.hadoop.yarn.webapp.GenericExceptionHandler to GuiceManagedComponentProvider with the scope "Sin
gleton"
Apr 22, 2021 4:34:04 PM com.sun.jersey.guice.spi.container.GuiceComponentProviderFactory getComponentProvider
INFO: Binding org.apache.hadoop.yarn.server.nodemanager.webapp.NMWebServices to GuiceManagedComponentProvider with the s
cope "Singleton"
2021-04-22 16:34:04,164 INFO handler.ContextHandler: Started o.e.j.w.WebAppContext@36cc9385{node,/,file:///C:/Users/VIVE
K/AppData/Local/Temp/jetty-0_0_0_0-8042-_-any-849068173757694644.dir/webapp/,AVAILABLE}{jar:file:/C:/hadoop/share/hadoop
/yarn/hadoop-yarn-common-3.3.0.jar!/webapps/node}
2021-04-22 16:34:04,178 INFO server.AbstractConnector: Started ServerConnector@33617539{HTTP/1.1,[http/1.1]}{0.0.0.0:804
2}
2021-04-22 16:34:04,178 INFO server.Server: Started @5784ms
2021-04-22 16:34:04,178 INFO webapp.WebApps: Web app node started at 8042
2021-04-22 16:34:04,180 INFO nodemanager.NodeStatusUpdaterImpl: Node ID assigned is : DESKTOP-KK1KJO4:56964
2021-04-22 16:34:04,181 INFO util.JvmPauseMonitor: Starting JVM pause monitor
2021-04-22 16:34:04,192 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8031
2021-04-22 16:34:04,285 INFO nodemanager.NodeStatusUpdaterImpl: Sending out 0 NM container statuses: []
2021-04-22 16:34:04,300 INFO nodemanager.NodeStatusUpdaterImpl: Registering with RM using containers :[]
2021-04-22 16:34:04,605 INFO security.NMContainerTokenSecretManager: Rolling master-key for container-tokens, got key wi
th id 1833323854
2021-04-22 16:34:04,606 INFO security.NMTokenSecretManagerInNM: Rolling master-key for container-tokens, got key with id
 616370046
2021-04-22 16:34:04,606 INFO nodemanager.NodeStatusUpdaterImpl: Registered with ResourceManager as DESKTOP-KK1KJO4:56964
 with total resource of <memory:8192, vCores:8>
```

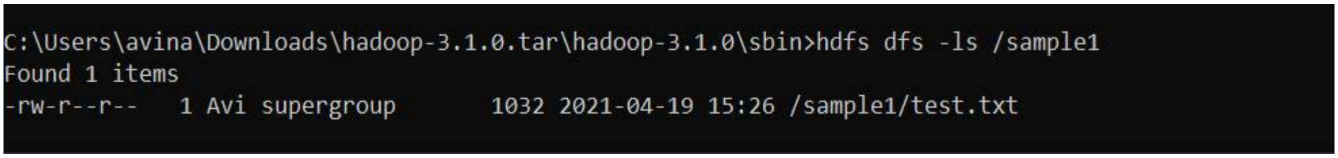
LAB 5:



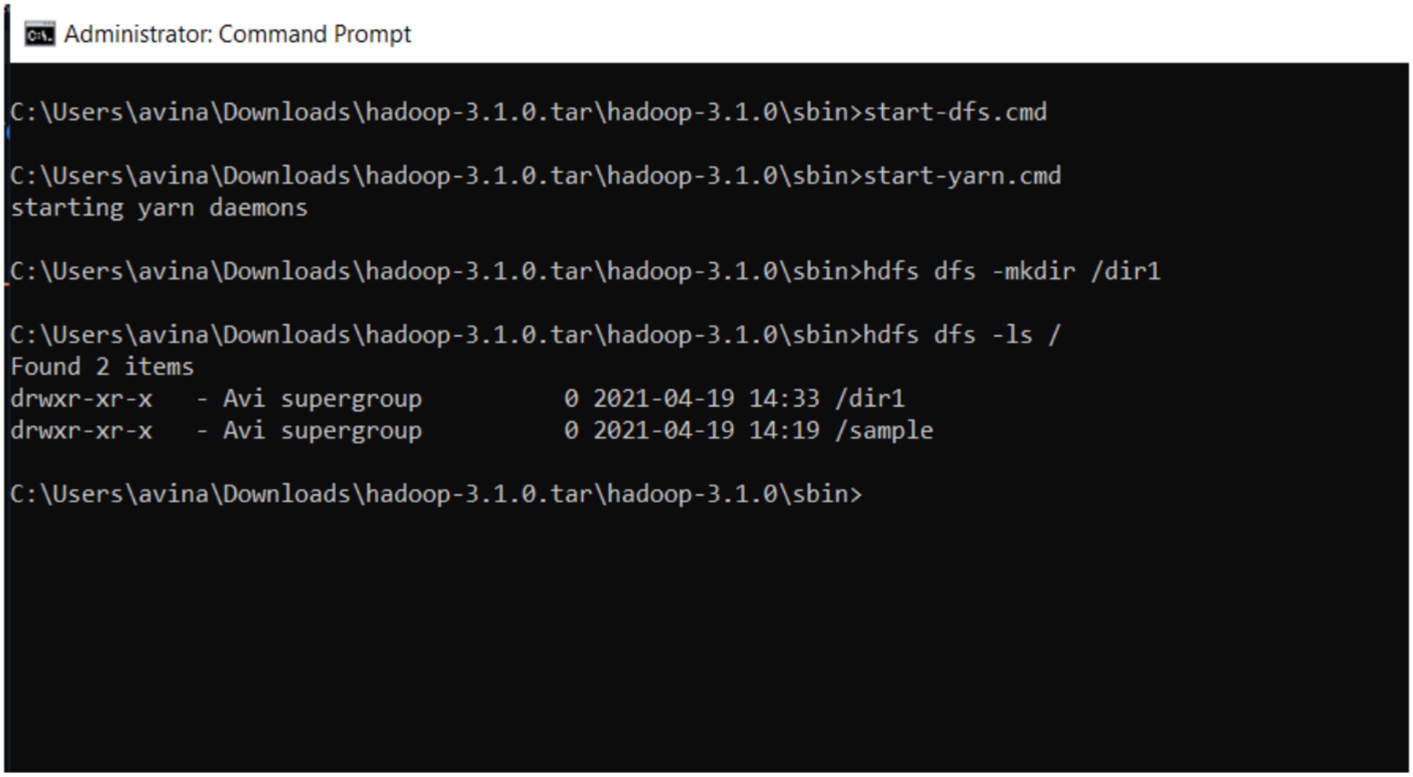
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -du -h -v /sample1/test.txt
SIZE   DISK_SPACE_CONSUMED_WITH_ALL_REPLICAS  FULL_PATH_NAME
1.0 K  1.0 K                                  /sample1/test.txt
```



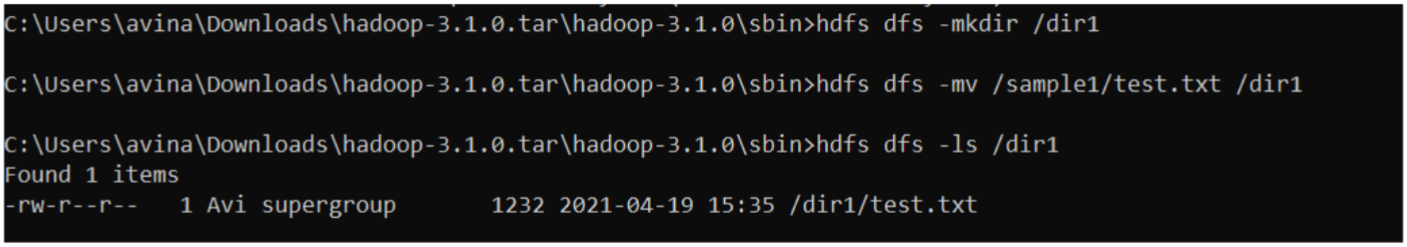
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -find /sample1 -name *.txt -print
/sample1/test.txt
```



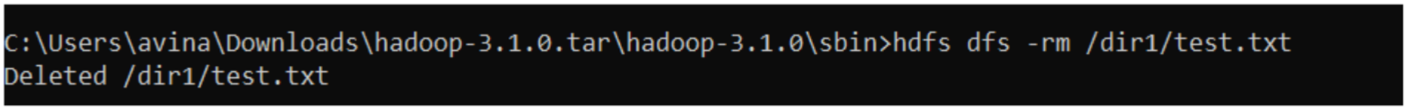
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -ls /sample1
Found 1 items
-rw-r--r--   1 Avi supergroup       1032 2021-04-19 15:26 /sample1/test.txt
```



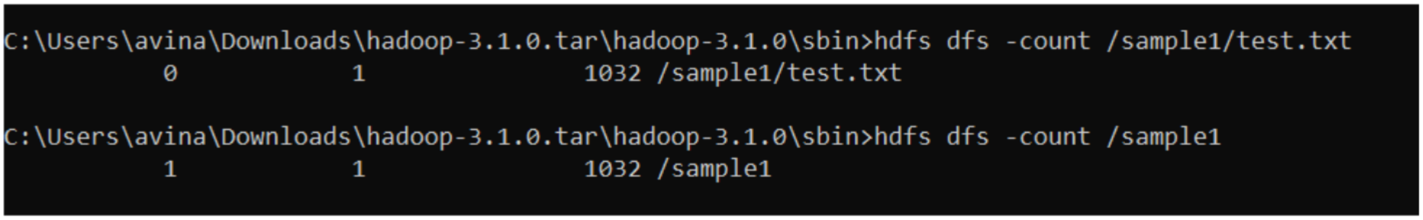
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>start-dfs.cmd

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>start-yarn.cmd
starting yarn daemons

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -mkdir /dir1

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -ls /
Found 2 items
drwxr-xr-x   - Avi supergroup          0 2021-04-19 14:33 /dir1
drwxr-xr-x   - Avi supergroup          0 2021-04-19 14:19 /sample

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>
```



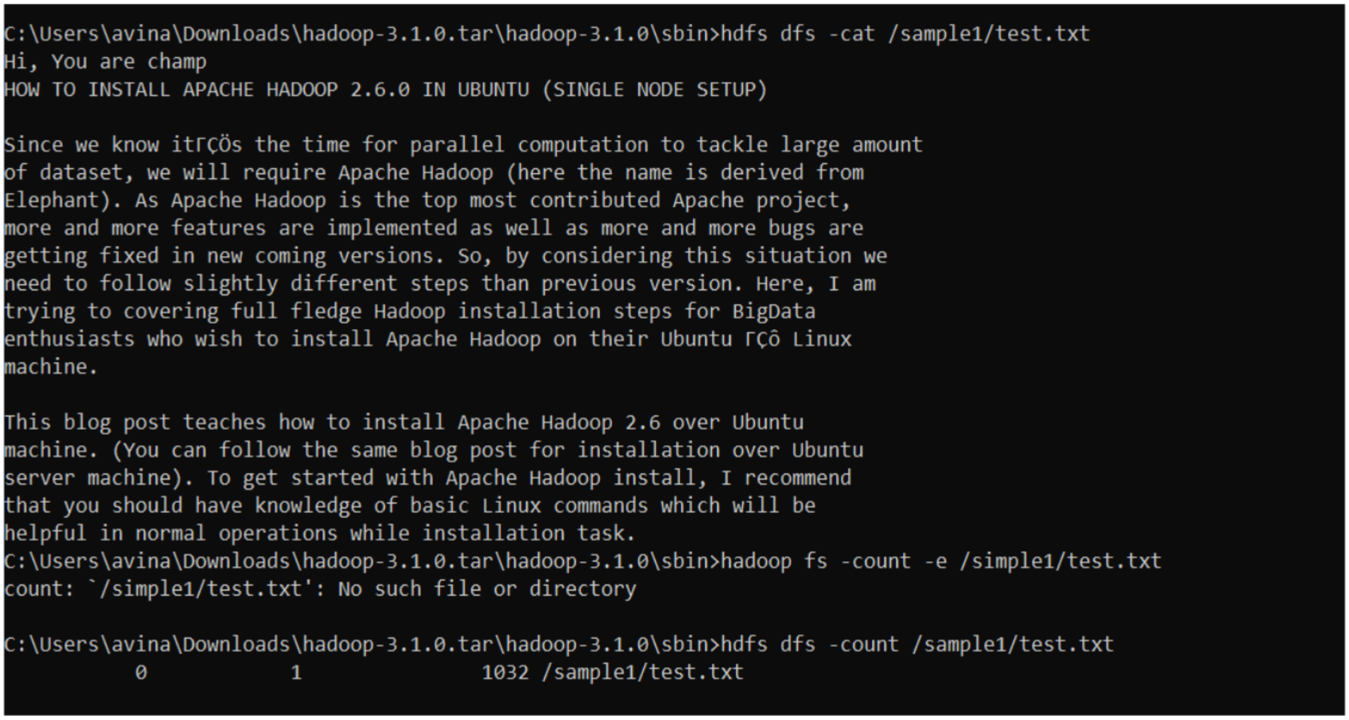
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -mkdir /dir1

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -mv /sample1/test.txt /dir1

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -ls /dir1
Found 1 items
-rw-r--r--   1 Avi supergroup       1232 2021-04-19 15:35 /dir1/test.txt
```



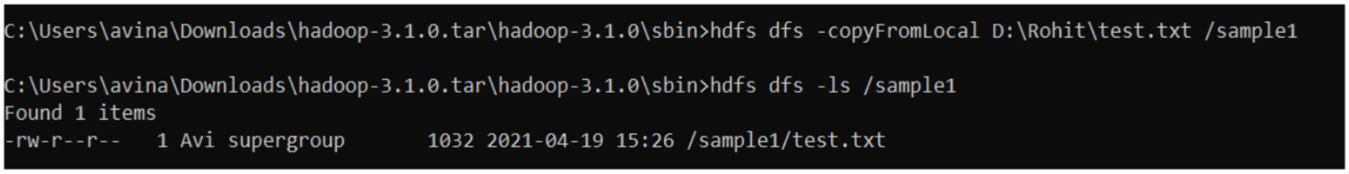
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -rm /dir1/test.txt
Deleted /dir1/test.txt
```



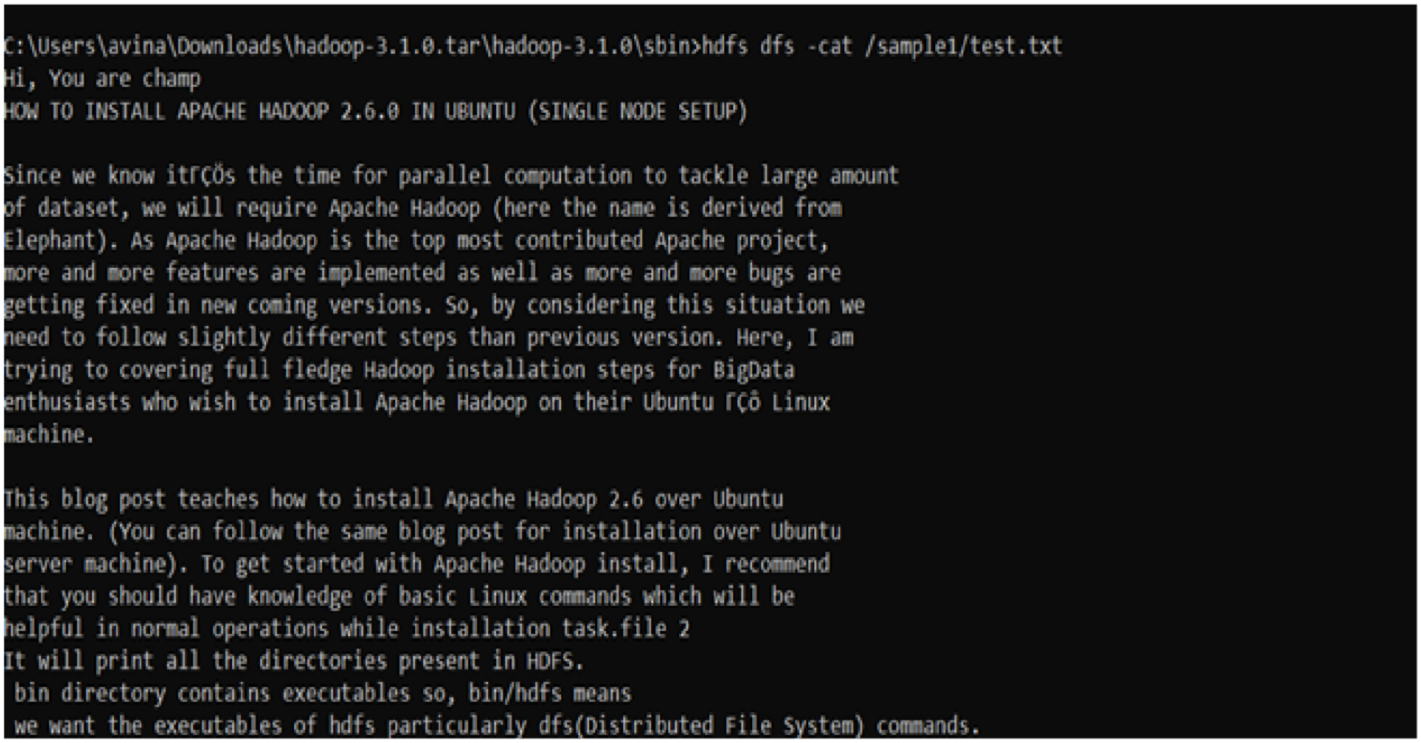
```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -count /sample1/test.txt
           0            1               1032 /sample1/test.txt

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -count /sample1
           1            1               1032 /sample1
```



```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -cat /sample1/test.txt
Hi, You are champ
HOW TO INSTALL APACHE HADOOP 2.6.0 IN UBUNTU (SINGLE NODE SETUP)

Since we know itΓÇÖs the time for parallel computation to tackle large amount
of dataset, we will require Apache Hadoop (here the name is derived from
Elephant). As Apache Hadoop is the top most contributed Apache project,
more and more features are implemented as well as more and more bugs are
getting fixed in new coming versions. So, by considering this situation we
need to follow slightly different steps than previous version. Here, I am
trying to covering full fledge Hadoop installation steps for BigData
enthusiasts who wish to install Apache Hadoop on their Ubuntu ΓÇô Linux
machine.

This blog post teaches how to install Apache Hadoop 2.6 over Ubuntu
machine. (You can follow the same blog post for installation over Ubuntu
server machine). To get started with Apache Hadoop install, I recommend
that you should have knowledge of basic Linux commands which will be
helpful in normal operations while installation task.
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hadoop fs -count -e /simple1/test.txt
count: `/simple1/test.txt': No such file or directory

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -count /sample1/test.txt
           0            1               1032 /sample1/test.txt
```



```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -copyFromLocal D:\Rohit\test.txt /sample1

C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -ls /sample1
Found 1 items
-rw-r--r--   1 Avi supergroup       1032 2021-04-19 15:26 /sample1/test.txt
```



```
C:\Users\avina\Downloads\hadoop-3.1.0.tar\hadoop-3.1.0\sbin>hdfs dfs -cat /sample1/test.txt
Hi, You are champ
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of dataset, we will require Apache Hadoop (here the name is derived from
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This blog post teaches how to install Apache Hadoop 2.6 over Ubuntu
machine. (You can follow the same blog post for installation over Ubuntu
server machine). To get started with Apache Hadoop install, I recommend
that you should have knowledge of basic Linux commands which will be
helpful in normal operations while installation task.file 2
It will print all the directories present in HDFS.
 bin directory contains executables so, bin/hdfs means
 we want the executables of hdfs particularly dfs(Distributed File System) commands.
```
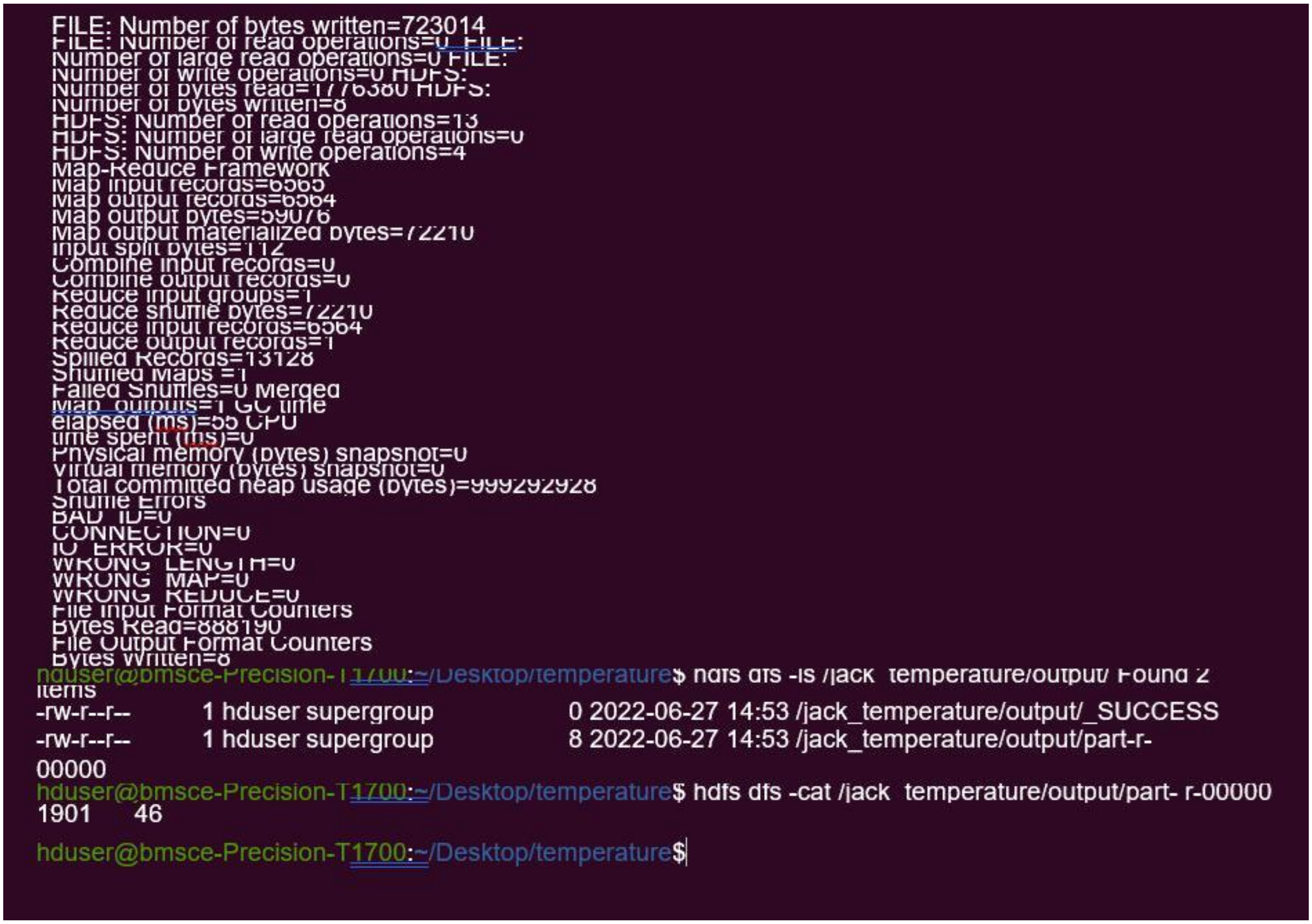

LAB 6:

```
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
Starting namenodes on [localhost]
hduser@localhost's password:
localhost: starting namenode, logging to /usr/local/hadoop/logs/hadoop-hduser-namenode-bmscePrecision-
T1700.out
hduser@localhost's password:
localhost: starting datanode, logging to /usr/local/hadoop/logs/hadoop-hduser-datanode-bmscePrecision-
T1700.out
Starting secondary namenodes [0.0.0.0]
hduser@0.0.0.0's password:
0.0.0.0: starting secondarynamenode, logging to /usr/local/hadoop/logs/hadoop-hdusersecondarynamenode-
bmsce-Precision-T1700.out
starting yarn daemons
starting resourcemanager, logging to /usr/local/hadoop/logs/yarn-hduser-resourcemanager-bmscePrecision-
T1700.out
hduser@localhost's password:
localhost: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-hduser-nodemanager-
bmscePrecision-T1700.out
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ jps
6832 NodeManager
6498 ResourceManager
6339 SecondaryNameNode
4887 org.eclipse.equinox.launcher_1.5.600.v20191014-2022.jar
6954 Jps
6123 DataNode
5951 NameNode
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -le /
-le: Unknown command
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -ls /
Found 31 items
drwxr-xr-x - hduser supergroup 0 2022-06-06 12:35 /CSE
drwxr-xr-x - hduser supergroup 0 2022-06-06 12:23 /FFF
drwxr-xr-x - hduser supergroup 0 2022-06-06 12:36 /LLL
drwxr-xr-x - hduser supergroup 0 2022-06-20 12:06 /amit_bda
drwxr-xr-x - hduser supergroup 0 2022-06-27 11:42 /amit_lab
drwxr-xr-x - hduser supergroup 0 2022-06-03 14:52 /bharath
drwxr-xr-x - hduser supergroup 0 2022-06-03 14:43 /bharath035
drwxr-xr-x - hduser supergroup 0 2022-06-24 14:54 /chi
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:21 /example
drwxr-xr-x - hduser supergroup 0 2022-06-01 15:13 /foldernew
drwxr-xr-x - hduser supergroup 0 2022-06-06 15:04 /hemang061
drwxr-xr-x - hduser supergroup 0 2022-06-20 15:16 /input_Jack
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:27 /irfan
drwxr-xr-x - hduser supergroup 0 2022-06-22 10:44 /lwde
drwxr-xr-x - hduser supergroup 0 2022-06-27 13:03 /mapreducejoin_amit
drwxr-xr-x - hduser supergroup 0 2022-06-22 15:32 /muskan drwxr-xr-x -
hduser supergroup 0 2022-06-22 15:06 /muskan_op drwxr-xr-x - hduser
supergroup 0 2022-06-22 15:35 /muskan_output

drwxr-xr-x - hduser supergroup 0 2022-06-06 15:04 /new_folder
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:26 /one drwxr-
xr-x - hduser supergroup 0 2022-06-24 15:30 /out55 drwxr-xr-x
- hduser supergroup 0 2022-06-20 12:17 /output
```

```
drwxr-xr-x - hduser supergroup 0 2022-06-27 13:04 /output_TOPn
drwxr-xr-x - hduser supergroup 0 2022-06-27 12:14 /output_Topn
drwxr-xr-x - hduser supergroup 0 2022-06-24 12:42 /r1
drwxr-xr-x - hduser supergroup 0 2022-06-24 12:24 /rgs
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:08 /saurab
drwxrwxr-x - hduser supergroup 0 2019-08-01 16:19 /tmp
drwxr-xr-x - hduser supergroup 0 2019-08-01 16:03 /user
drwxr-xr-x - hduser supergroup 0 2022-06-01 09:46 /user1
-rw-r--r-- 1 hduser supergroup 2436 2022-06-24 12:17 /wc.jar hduser@bmsce-Precision-
T1700:~/Desktop/temperature$ hdfs dfs -mkdir /Jack_temperature hduser@bmsce-Precision-
T1700:~/Desktop/temperature$ hdfs dfs -put ./1901 /Jack_temperature hduser@bmsce-
Precision-T1700:~/Desktop/temperature$ hdfs dfs -put ./1902 /Jack_temperature
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -ls /Jack_temperature Found
2 items
-rw-r--r-- 1 hduser supergroup 888190 2022-06-27 14:47 /Jack_temperature/1901 -rw-r--r-- 1
hduser supergroup 888978 2022-06-27 14:47 /Jack_temperature/1902 hduser@bmsce-Precision-
T1700:~/Desktop/temperature$ hadoop jar ./avgtemp.jar AverageDriver /Jack_temperature/1901
/Jack_temperature/output/
Exception in thread "main" java.lang.ClassNotFoundException: AverageDriver
at java.net.URLClassLoader.findClass(URLClassLoader.java:382) at
java.lang.ClassLoader.loadClass(ClassLoader.java:418)
at java.lang.ClassLoader.loadClass(ClassLoader.java:351)
at java.lang.Class.forName0(Native Method)
at java.lang.Class.forName(Class.java:348)
at org.apache.hadoop.util.RunJar.run(RunJar.java:214)
at org.apache.hadoop.util.RunJar.main(RunJar.java:136)
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hadoop jar ./avgtemp.jar
temperature.AverageDriver /Jack_temperature/1901 /Jack_temperature/output/
22/06/27 14:53:27 INFO Configuration.deprecation: session.id is deprecated. Instead, use
dfs.metrics.session-id
22/06/27 14:53:27 INFO jvm.JvmMetrics: Initializing JVM Metrics with processName=JobTracker,
sessionId=
22/06/27 14:53:27 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed.
Implement the Tool interface and execute your application with ToolRunner to remedy this.
22/06/27 14:53:27 INFO input.FileInputFormat: Total input paths to process : 1
22/06/27 14:53:27 INFO mapreduce.JobSubmitter: number of splits:1
22/06/27 14:53:28 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local254968295_0001
22/06/27 14:53:28 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
22/06/27 14:53:28 INFO mapreduce.Job: Running job: job_local254968295_0001
22/06/27 14:53:28 INFO mapred.LocalJobRunner: OutputCommitter set in config null
22/06/27 14:53:28 INFO mapred.LocalJobRunner: OutputCommitter is
org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
22/06/27 14:53:28 INFO mapred.LocalJobRunner: Waiting for map tasks
22/06/27 14:53:28 INFO mapred.LocalJobRunner: Starting task:
attempt_local254968295_0001_m_000000_0

22/06/27 14:53:28 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]
22/06/27 14:53:28 INFO mapred.MapTask: Processing split:
hdfs://localhost:54310/Jack_temperature/1901:0+888190
22/06/27 14:53:28 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
22/06/27 14:53:28 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
22/06/27 14:53:28 INFO mapred.MapTask: soft limit at 83886080
22/06/27 14:53:28 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
22/06/27 14:53:28 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
22/06/27 14:53:28 INFO mapred.MapTask: Map output collector class =
org.apache.hadoop.mapred.MapTask$MapOutputBuffer
22/06/27 14:53:28 INFO mapred.LocalJobRunner:
22/06/27 14:53:28 INFO mapred.MapTask: Starting flush of map output
22/06/27 14:53:28 INFO mapred.MapTask: Spilling map output
22/06/27 14:53:28 INFO mapred.MapTask: bufstart = 0; bufend = 59076; bufvoid = 104857600
22/06/27 14:53:28 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend =
26188144(104752576);
length = 26253/6553600
22/06/27 14:53:28 INFO mapred.MapTask: Finished spill 0
22/06/27 14:53:28 INFO mapred.Task: Task:attempt_local254968295_0001_m_000000_0 is done. And is in
the process of committing
22/06/27 14:53:28 INFO mapred.LocalJobRunner: map
22/06/27 14:53:28 INFO mapred.Task: Task 'attempt_local254968295_0001_m_000000_0' done.
22/06/27 14:53:28 INFO mapred.LocalJobRunner: Finishing task:
attempt_local254968295_0001_m_000000_0
22/06/27 14:53:28 INFO mapred.LocalJobRunner: map task executor complete.
22/06/27 14:53:28 INFO mapred.LocalJobRunner: Waiting for reduce tasks
22/06/27 14:53:28 INFO mapred.LocalJobRunner: Starting task: attempt_local254968295_0001_r_000000_0
22/06/27 14:53:28 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]
22/06/27 14:53:28 INFO mapred.ReduceTask: Using ShuffleConsumerPlugin:
org.apache.hadoop.mapreduce.task.reduce.Shuffle@262cb2a9
22/06/27 14:53:28 INFO reduce.MergeManagerImpl: MergerManager:
memoryLimit=349752512, maxSingleShuffleLimit=87438128, mergeThreshold=230836672,
ioSortFactor=10, memToMemMergeOutputsThreshold=10
22/06/27 14:53:28 INFO reduce.EventFetcher: attempt_local254968295_0001_r_000000_0 Thread started:
EventFetcher for fetching Map Completion Events
22/06/27 14:53:28 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of map
attempt_local254968295_0001_m_000000_0 decomp: 72206 len: 72210 to MEMORY
22/06/27 14:53:28 INFO reduce.InMemoryMapOutput: Read 72206 bytes from map-output
for attempt_local254968295_0001_m_000000_0
22/06/27 14:53:28 INFO reduce.MergeManagerImpl: closeInMemoryFile -> map-output of size:
72206, inMemoryMapOutputs.size() -> 1, commitMemory -> 0, usedMemory ->72206 22/06/27
14:53:28 INFO reduce.EventFetcher: EventFetcher is interrupted.. Returning
22/06/27 14:53:28 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 14:53:28 INFO reduce.MergeManagerImpl: finalMerge called with 1 in-memory map-outputs and 0
on-disk map-outputs
22/06/27 14:53:28 INFO mapred.Merger: Merging 1 sorted segments

22/06/27 14:53:28 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of total
size: 72199 bytes
22/06/27 14:53:28 INFO reduce.MergeManagerImpl: Merged 1 segments, 72206 bytes to disk to satisfy
reduce memory limit
22/06/27 14:53:28 INFO reduce.MergeManagerImpl: Merging 1 files, 72210 bytes from disk
22/06/27 14:53:28 INFO reduce.MergeManagerImpl: Merging 0 segments, 0 bytes from memory into reduce
22/06/27 14:53:28 INFO mapred.Merger: Merging 1 sorted segments
22/06/27 14:53:28 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of total
size: 72199 bytes
22/06/27 14:53:28 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 14:53:28 INFO Configuration.deprecation: mapred.skip.on is deprecated. Instead, use
mapreduce.job.skiprecords
22/06/27 14:53:28 INFO mapred.Task: Task:attempt_local254968295_0001_r_000000_0 is done. And is
in the process of committing
22/06/27 14:53:28 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 14:53:28 INFO mapred.Task: Task attempt_local254968295_0001_r_000000_0 is allowed to
commit
```

```
now
22/06/27 14:53:28 INFO output.FileOutputCommitter: Saved output of task
'attempt_local254968295_0001_r_000000_0' to
hdfs://localhost:54310/Jack_temperature/output/_temporary/0/task_local254968295_0001_r_000000
22/06/27 14:53:28 INFO mapred.LocalJobRunner: reduce > reduce
22/06/27 14:53:28 INFO mapred.Task: Task 'attempt_local254968295_0001_r_000000_0' done.
22/06/27 14:53:28 INFO mapred.LocalJobRunner: Finishing task:
attempt_local254968295_0001_r_000000_0
22/06/27 14:53:28 INFO mapred.LocalJobRunner: reduce task executor complete.
22/06/27 14:53:29 INFO mapreduce.Job: Job job_local254968295_0001 running in uber mode : false
22/06/27 14:53:29 INFO mapreduce.Job: map 100% reduce 100%
22/06/27 14:53:29 INFO mapreduce.Job: Job job_local254968295_0001 completed successfully
22/06/27 14:53:29 INFO mapreduce.Job: Counters: 38
File System Counters
FILE: Number of bytes read=153102
FILE: Number of bytes written=723014
FILE: Number of read operations=0
FILE: Number of large read operations=0
FILE: Number of write operations=0
HDFS: Number of bytes read=1776380
HDFS: Number of bytes written=8
HDFS: Number of read operations=13
HDFS: Number of large read operations=0
HDFS: Number of write operations=4
Map-Reduce Framework
Map input records=6565
Map output records=6564
Map output bytes=59076
Map output materialized bytes=72210

Input split bytes=112
Combine input records=0
Combine output records=0
Reduce input groups=1
Reduce shuffle bytes=72210
Reduce input records=6564
Reduce output records=1
Spilled Records=13128
Shuffled Maps =1
Failed Shuffles=0
Merged Map outputs=1
GC time elapsed (ms)=55
CPU time spent (ms)=0
Physical memory (bytes) snapshot=0
Virtual memory (bytes) snapshot=0
Total committed heap usage (bytes)=999292928
Shuffle Errors
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
File Input Format Counters
Bytes Read=888190
```

```
File Output Format Counters
Bytes Written=8
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -ls /Jack_temperature/output/
Found 2 items
-rw-r--r-- 1 hduser supergroup 0 2022-06-27 14:53 /Jack_temperature/output/_SUCCESS
-rw-r--r-- 1 hduser supergroup 8 2022-06-27 14:53 /Jack_temperature/output/part-r00000
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -cat /Jack_temperature/output/partr-
00000
1901 46
```



```
   FILE: Number of bytes written=723014
   FILE: Number of read operations=0 FILE:
   Number of large read operations=0 FILE:
   Number of write operations=0 HDFS:
   Number of bytes read=1776380 HDFS:
   Number of bytes written=8
   HDFS: Number of read operations=13
   HDFS: Number of large read operations=0
   HDFS: Number of write operations=4
   Map-Reduce Framework
   Map input records=6565
   Map output records=6564
   Map output bytes=59076
   Map output materialized bytes=72210
   Input split bytes=112
   Combine input records=0
   Combine output records=0
   Reduce input groups=1
   Reduce shuffle bytes=72210
   Reduce input records=6564
   Reduce output records=1
   Spilled Records=13128
   Shuffled Maps =1
   Failed Shuffles=0 Merged
   Map outputs=1 GC time
   elapsed (ms)=55 CPU
   time spent (ms)=0
   Physical memory (bytes) snapshot=0
   Virtual memory (bytes) snapshot=0
   Total committed heap usage (bytes)=999292928
   Shuffle Errors
   BAD_ID=0
   CONNECTION=0
   IO_ERROR=0
   WRONG_LENGTH=0
   WRONG_MAP=0
   WRONG_REDUCE=0
   File Input Format Counters
   Bytes Read=888190
   File Output Format Counters
   Bytes Written=8
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -ls /jack  temperature/output/ Found 2
items
-rw-r--r--        1 hduser supergroup                0 2022-06-27 14:53 /jack_temperature/output/_SUCCESS
-rw-r--r--        1 hduser supergroup                8 2022-06-27 14:53 /jack_temperature/output/part-r-
00000
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -cat /jack  temperature/output/part- r-00000
1901      46

hduser@bmsce-Precision-T1700:~/Desktop/temperature$
```

Max Temp:
Driver class:

```
package temperatureMax;

import org.apache.hadoop.io.*;
import org.apache.hadoop.fs.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class TempDriver
{
    public static void main (String[] args) throws
    Exception {
        if (args.length != 2)
        {
            System.err.println("Please Enter the input and output
            parameters"); System.exit(-1);
        }
        Job job = new Job();
        job.setJarByClass(TempDriver.class);
        job.setJobName("Max temperature");

        FileInputFormat.addInputPath(job,new Path(args[0]));
        FileOutputFormat.setOutputPath(job,new Path (args[1]));

        job.setMapperClass(TempMapper.class);
        job.setReducerClass(TempReducer.class);
        job.setOutputKeyClass(Text.class);
        job.setOutputValueClass(IntWritable.class);
        System.exit(job.waitForCompletion(true)?0:1);
    }
}
```

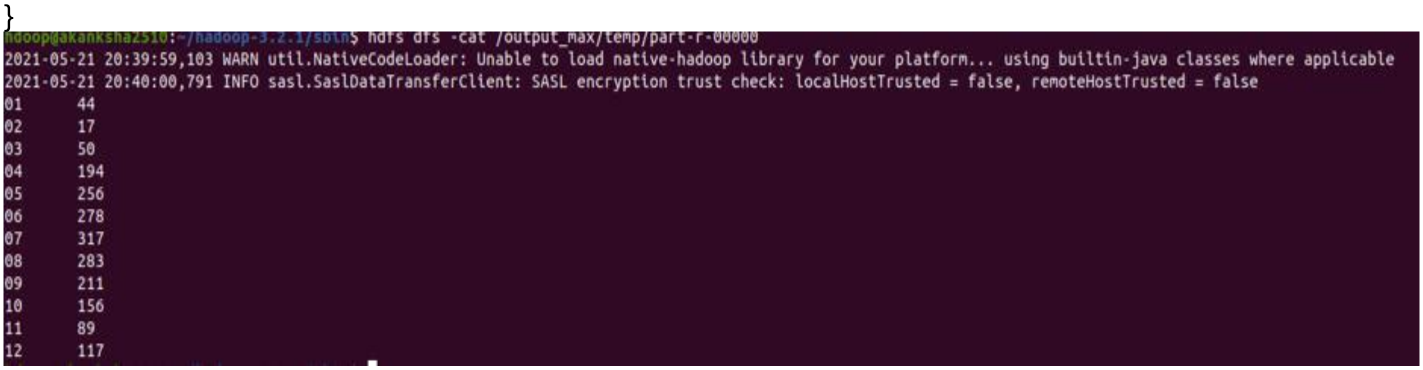
Mapper Class;

```
package temperatureMax;

import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import java.io.IOException;

public class TempMapper extends Mapper <LongWritable, Text, Text, IntWritable>
{
public static final int MISSING = 9999;

public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException {
    String line = value.toString();
    String month = line.substring(19,21);
    int temperature;
    if (line.charAt(87)=='+')
            temperature = Integer.parseInt(line.substring(88, 92));
    else
        temperature = Integer.parseInt(line.substring(87, 92));
    String quality = line.substring(92, 93);
    if(temperature != MISSING && quality.matches("[01459]"))
```

```
                    context.write(new Text(month),new IntWritable(temperature));
          }
}
```

Reducer Class:

```
package temperatureMax;

import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.*;
import java.io.IOException;

public class TempReducer extends Reducer <Text, IntWritable,Text, IntWritable>
{
          public void reduce(Text key, Iterable<IntWritable> values, Context context) throws
IOException,InterruptedException
          {
                    int max_temp = 0;

                    for (IntWritable value : values)
                    {
                              if(max_temp<value.get()) {
                                        max_temp = value.get();
                              }
                    }
                    context.write(key, new IntWritable(max_temp));
          }
}
```



```
hdoop@akanksha2510:~/hadoop-3.2.1/sbin$ hdfs dfs -cat /output_max/temp/part-r-00000
2021-05-21 20:39:59,103 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
2021-05-21 20:40:00,791 INFO sasl.SaslDataTransferClient: SASL encryption trust check: localHostTrusted = false, remoteHostTrusted = false
01      44
02      17
03      50
04      194
05      256
06      278
07      317
08      283
09      211
10      156
11      89
12      117
```

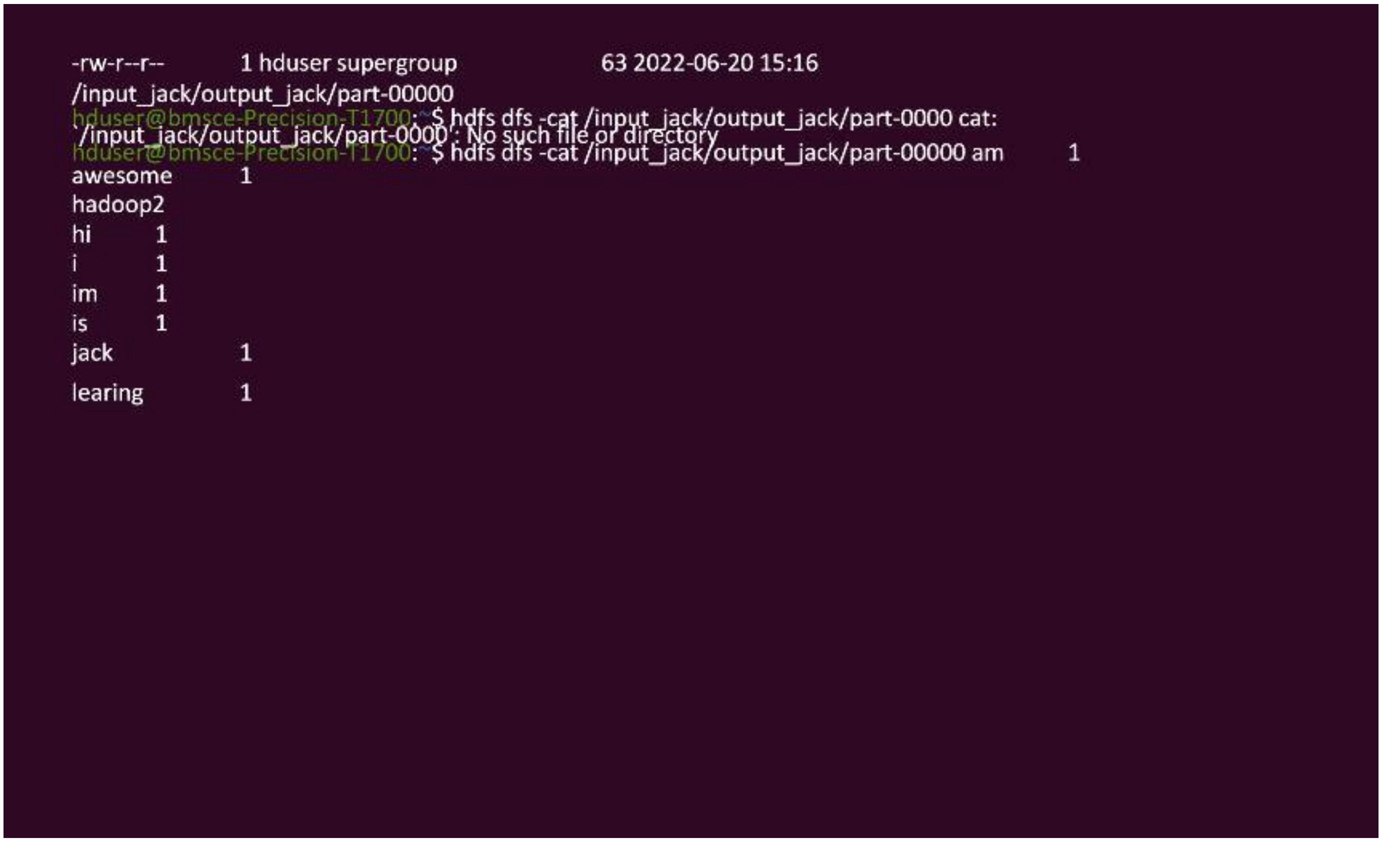
LAB 7:

```
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -mkdir /Jack_topn
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -put ./input.txt /Jack_topn/
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -ls /Jack_topn/
Found 1 items
-rw-r--r-- 1 hduser supergroup 103 2022-06-27 15:43 /Jack_topn/input.txt
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hadoop jar topn.jar
TopNDriver /Jack_topn/input.txt /Jack_topn/output
Exception in thread "main" java.lang.ClassNotFoundException: TopNDriver
at java.net.URLClassLoader.findClass(URLClassLoader.java:382) at
java.lang.ClassLoader.loadClass(ClassLoader.java:418)
at java.lang.ClassLoader.loadClass(ClassLoader.java:351)
at java.lang.Class.forName0(Native Method)
at java.lang.Class.forName(Class.java:348)
at org.apache.hadoop.util.RunJar.run(RunJar.java:214)
at org.apache.hadoop.util.RunJar.main(RunJar.java:136) hduser@bmsce-Precision-
T1700:~/Desktop/temperature$ hadoop jar topn.jar topn.TopNDriver /Jack_topn/input.txt
/Jack_topn/output
22/06/27 15:45:22 INFO Configuration.deprecation: session.id is deprecated. Instead,
use dfs.metrics.session-id
22/06/27 15:45:22 INFO jvm.JvmMetrics: Initializing JVM Metrics with processName=JobTracker,
sessionId=
22/06/27 15:45:22 INFO input.FileInputFormat: Total input paths to process : 1
22/06/27 15:45:22 INFO mapreduce.JobSubmitter: number of splits:1
22/06/27 15:45:22 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local691635730_0001
22/06/27 15:45:22 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
22/06/27 15:45:22 INFO mapreduce.Job: Running job: job_local691635730_0001
22/06/27 15:45:22 INFO mapred.LocalJobRunner: OutputCommitter set in config null
22/06/27 15:45:22 INFO mapred.LocalJobRunner: OutputCommitter is
org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Waiting for map tasks
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Starting task:
attempt_local691635730_0001_m_000000_0
22/06/27 15:45:22 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]
22/06/27 15:45:22 INFO mapred.MapTask: Processing split:
hdfs://localhost:54310/Jack_topn/input.txt:0+103
22/06/27 15:45:22 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
22/06/27 15:45:22 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
22/06/27 15:45:22 INFO mapred.MapTask: soft limit at 83886080
22/06/27 15:45:22 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
22/06/27 15:45:22 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
22/06/27 15:45:22 INFO mapred.MapTask: Map output collector class
= org.apache.hadoop.mapred.MapTask$MapOutputBuffer 22/06/27
15:45:22 INFO mapred.LocalJobRunner:
22/06/27 15:45:22 INFO mapred.MapTask: Starting flush of map output
22/06/27 15:45:22 INFO mapred.MapTask: Spilling map output
22/06/27 15:45:22 INFO mapred.MapTask: bufstart = 0; bufend = 187; bufvoid = 104857600
22/06/27 15:45:22 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend =
26214316(104857264);

length = 81/6553600
22/06/27 15:45:22 INFO mapred.MapTask: Finished spill 0
22/06/27 15:45:22 INFO mapred.Task: Task:attempt_local691635730_0001_m_000000_0 is done. And is in
the process of committing
22/06/27 15:45:22 INFO mapred.LocalJobRunner: map
```

```
22/06/27 15:45:22 INFO mapred.Task: Task 'attempt_local691635730_0001_m_000000_0' done.
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Finishing task:
attempt_local691635730_0001_m_000000_0
22/06/27 15:45:22 INFO mapred.LocalJobRunner: map task executor complete.
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Waiting for reduce tasks
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Starting task: attempt_local691635730_0001_r_000000_0
22/06/27 15:45:22 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]
22/06/27 15:45:22 INFO mapred.ReduceTask: Using ShuffleConsumerPlugin:
org.apache.hadoop.mapreduce.task.reduce.Shuffle@40a5e65a
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: MergerManager:
memoryLimit=334338464, maxSingleShuffleLimit=83584616, mergeThreshold=220663392,
ioSortFactor=10, memToMemMergeOutputsThreshold=10
22/06/27 15:45:22 INFO reduce.EventFetcher: attempt_local691635730_0001_r_000000_0 Thread started:
EventFetcher for fetching Map Completion Events
22/06/27 15:45:22 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of map
attempt_local691635730_0001_m_000000_0 decomp: 231 len: 235 to MEMORY
22/06/27 15:45:22 INFO reduce.InMemoryMapOutput: Read 231 bytes from map-output for
attempt_local691635730_0001_m_000000_0
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: closeInMemoryFile -> map-output of size: 231,
inMemoryMapOutputs.size() -> 1, commitMemory -> 0, usedMemory ->231
22/06/27 15:45:22 INFO reduce.EventFetcher: EventFetcher is interrupted.. Returning
22/06/27 15:45:22 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: finalMerge called with 1 in-memory map-outputs and 0
on-disk map-outputs
22/06/27 15:45:22 INFO mapred.Merger: Merging 1 sorted segments
22/06/27 15:45:22 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of total
size: 226 bytes
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: Merged 1 segments, 231 bytes to disk to satisfy
reduce memory limit
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: Merging 1 files, 235 bytes from disk
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: Merging 0 segments, 0 bytes from memory into reduce
22/06/27 15:45:22 INFO mapred.Merger: Merging 1 sorted segments
22/06/27 15:45:22 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of total
size: 226 bytes
22/06/27 15:45:22 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 15:45:22 INFO Configuration.deprecation: mapred.skip.on is deprecated. Instead, use
mapreduce.job.skiprecords
22/06/27 15:45:23 INFO mapred.Task: Task:attempt_local691635730_0001_r_000000_0 is done. And is
in the process of committing

22/06/27 15:45:23 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 15:45:23 INFO mapred.Task: Task attempt_local691635730_0001_r_000000_0 is allowed to
commit
now
22/06/27 15:45:23 INFO output.FileOutputCommitter: Saved output of task
'attempt_local691635730_0001_r_000000_0' to
hdfs://localhost:54310/Jack_topn/output/_temporary/0/task_local691635730_0001_r_000000
22/06/27 15:45:23 INFO mapred.LocalJobRunner: reduce > reduce
22/06/27 15:45:23 INFO mapred.Task: Task 'attempt_local691635730_0001_r_000000_0' done.
22/06/27 15:45:23 INFO mapred.LocalJobRunner: Finishing task:
attempt_local691635730_0001_r_000000_0
22/06/27 15:45:23 INFO mapred.LocalJobRunner: reduce task executor complete.
22/06/27 15:45:23 INFO mapreduce.Job: Job job_local691635730_0001 running in uber mode : false
22/06/27 15:45:23 INFO mapreduce.Job: map 100% reduce 100%
22/06/27 15:45:23 INFO mapreduce.Job: Job job_local691635730_0001 completed successfully
```

```
22/06/27 15:45:23 INFO mapreduce.Job: Counters: 38
File System Counters
FILE: Number of bytes read=18078
FILE: Number of bytes written=516697
FILE: Number of read operations=0
FILE: Number of large read operations=0
FILE: Number of write operations=0
HDFS: Number of bytes read=206
HDFS: Number of bytes written=105
HDFS: Number of read operations=13
HDFS: Number of large read operations=0
HDFS: Number of write operations=4
Map-Reduce Framework
Map input records=6
Map output records=21
Map output bytes=187
Map output materialized bytes=235
Input split bytes=110
Combine input records=0
Combine output records=0
Reduce input groups=15
Reduce shuffle bytes=235
Reduce input records=21
Reduce output records=15
Spilled Records=42
Shuffled Maps =1
Failed Shuffles=0
Merged Map outputs=1
GC time elapsed (ms)=42
CPU time spent (ms)=0
Physical memory (bytes) snapshot=0
Virtual memory (bytes) snapshot=0
Total committed heap usage (bytes)=578289664
Shuffle Errors

BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
File Input Format Counters
Bytes Read=103
File Output Format Counters
Bytes Written=105
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -ls /Jack_topn/output/
Found 2 items
-rw-r--r-- 1 hduser supergroup 0 2022-06-27 15:45 /Jack_topn/output/_SUCCESS
-rw-r--r-- 1 hduser supergroup 105 2022-06-27 15:45 /Jack_topn/output/part-r-00000
hduser@bmsce-Precision-T1700:~/Desktop/temperature$ hdfs dfs -cat /Jack_topn/output/part-r-00000
hadoop 4
i3
am 2
hi 1
```

```
im 1
is 1
there 1
bye 1
learing 1
awesome 1
love 1
Jack 1
cool 1
and 1
using 1
```



```
-rw-r--r--      1 hduser supergroup          63 2022-06-20 15:16
/input_jack/output_jack/part-00000
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /input_jack/output_jack/part-0000 cat:
`/input_jack/output_jack/part-0000': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /input_jack/output_jack/part-00000 am      1
awesome     1
hadoop2
hi      1
i       1
im      1
is      1
jack        1
learing     1
```

LAB8:

DeptEmpStrengthMapper

```
package MapReduceJoin;
import java.io.IOException;
import java.util.Iterator;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.FSDataInputStream;
import org.apache.hadoop.fs.FSDataOutputStream;
import org.apache.hadoop.fs.FileSystem;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.*;
import org.apache.hadoop.io.IntWritable;

public class DeptEmpStrengthMapper extends MapReduceBase implements Mapper<LongWritable,
Text, TextPair, Text> {

    @Override
    public void map(LongWritable key, Text value, OutputCollector<TextPair, Text> output, Reporter
reporter)
            throws IOException
    {

        String valueString = value.toString();
        String[] SingleNodeData = valueString.split("\t");
        output.collect(new TextPair(SingleNodeData[0], "1"), new Text(SingleNodeData[1]));
    }
}
```

DeptNameStrengthMapper:

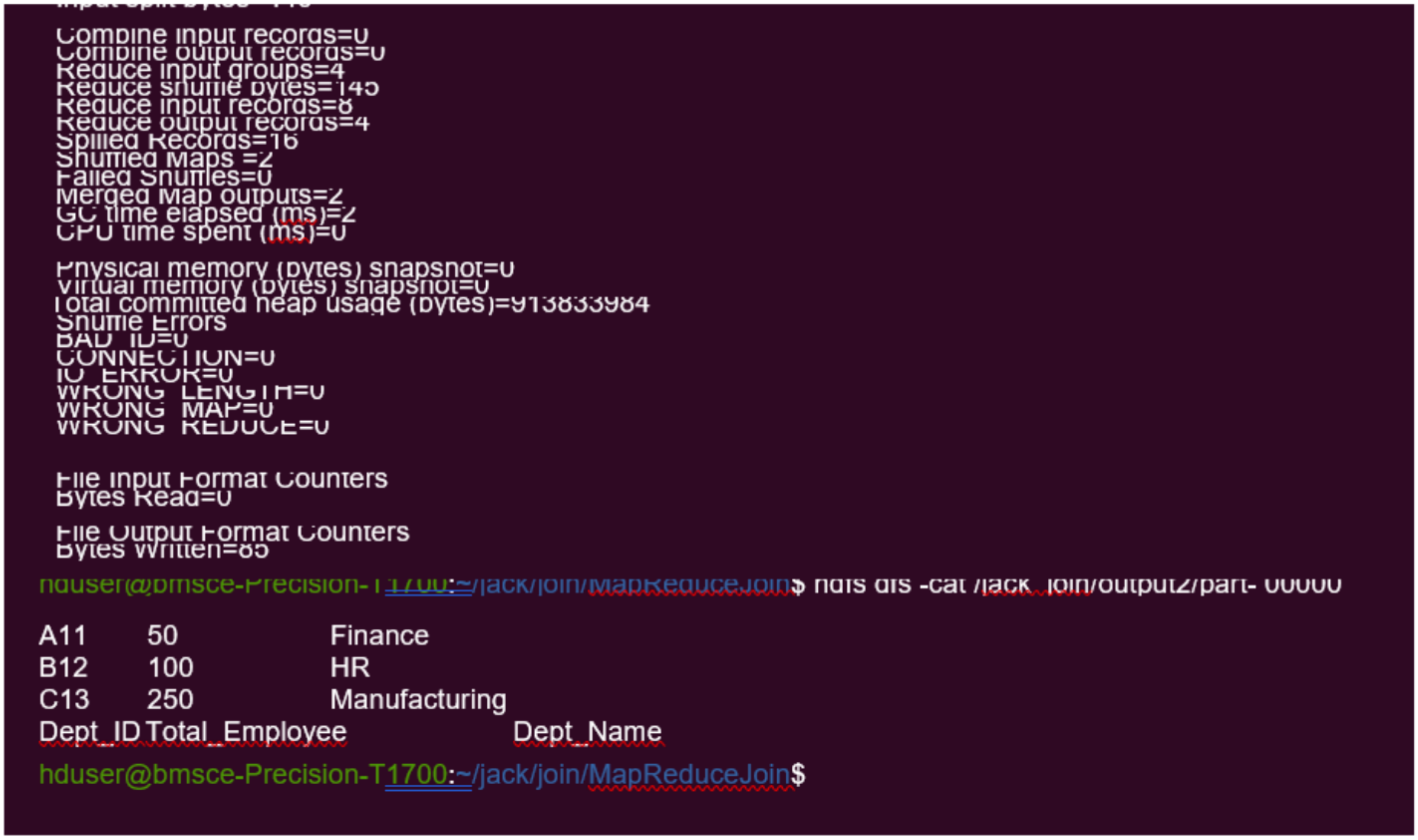
```
package MapReduceJoin;

import java.io.IOException;

import org.apache.hadoop.io.*;
import org.apache.hadoop.mapred.*;

public class DeptNameMapper extends MapReduceBase implements Mapper<LongWritable, Text,
TextPair, Text> {

    @Override
    public void map(LongWritable key, Text value, OutputCollector<TextPair, Text> output,
Reporter reporter)
            throws IOException

    {

        String valueString = value.toString();
        String[] SingleNodeData = valueString.split("\t");
        output.collect(new TextPair(SingleNodeData[0], "0"), new Text(SingleNodeData[1]));
    }
}
```

Join Driver

```
package MapReduceJoin;

import org.apache.hadoop.conf.Configured;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.*;
import org.apache.hadoop.mapred.lib.MultipleInputs;
import org.apache.hadoop.util.*;


public class JoinDriver extends Configured implements Tool {

    public static class KeyPartitioner implements Partitioner<TextPair, Text>
        { @Override
        public void configure(JobConf job) {}

        @Override
        public int getPartition(TextPair key, Text value, int numPartitions) {
            return (key.getFirst().hashCode() & Integer.MAX_VALUE) % numPartitions;
        }
    }

    @Override
    public int run(String[] args) throws Exception {

        if (args.length != 3) {
            System.out.println("Usage: <Department Emp Strength input> <Department Name
input> <output>");
            return -1;
        }

        JobConf conf = new JobConf(getConf(), getClass());
        conf.setJobName("Join 'Department Emp Strength input' with 'Department Name input'");

        Path AInputPath = new Path(args[0]);
        Path BInputPath = new Path(args[1]);
        Path outputPath = new Path(args[2]);

        MultipleInputs.addInputPath(conf, AInputPath, TextInputFormat.class,
DeptNameMapper.class);
        MultipleInputs.addInputPath(conf, BInputPath, TextInputFormat.class,
DeptEmpStrengthMapper.class);

        FileOutputFormat.setOutputPath(conf, outputPath);

        conf.setPartitionerClass(KeyPartitioner.class);
        conf.setOutputValueGroupingComparator(TextPair.FirstComparator.class);

        conf.setMapOutputKeyClass(TextPair.class);

        conf.setReducerClass(JoinReducer.class);
        conf.setOutputKeyClass(Text.class);

        JobClient.runJob(conf);

        return 0;
    }

    public static void main(String[] args) throws Exception {

        int exitCode = ToolRunner.run(new JoinDriver(),
        args); System.exit(exitCode);
    }
}
```

Join Reducer

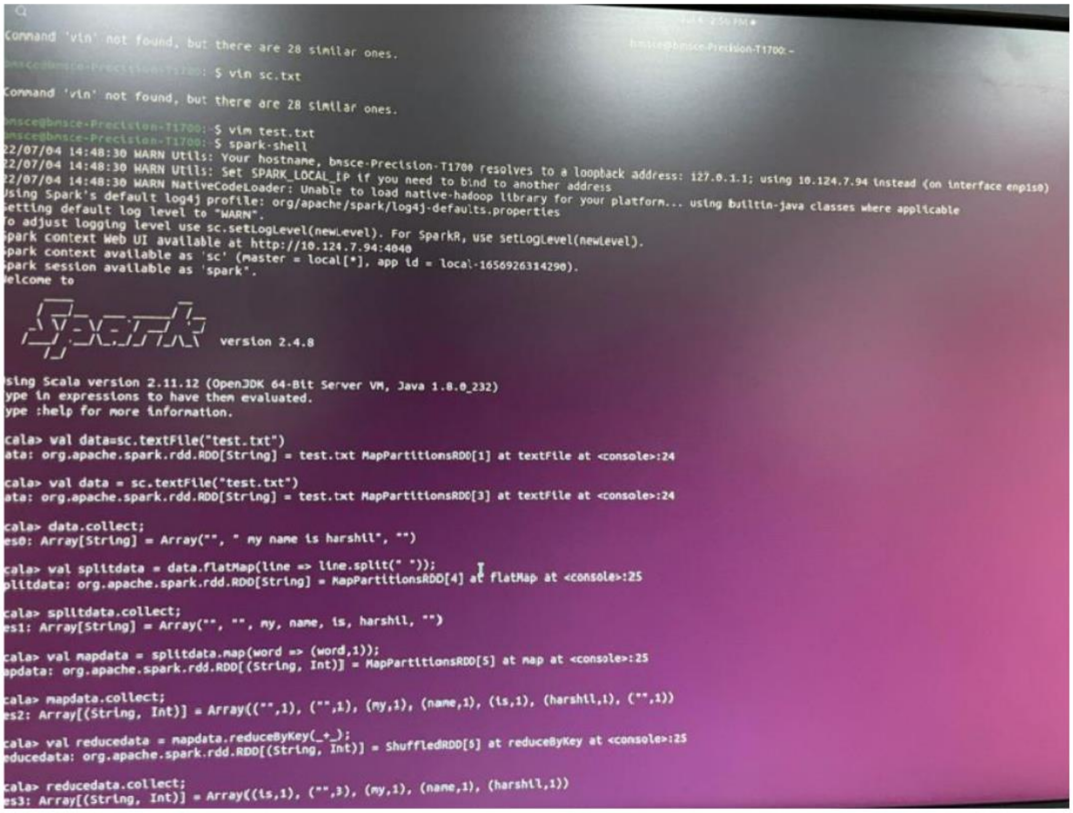
```
package MapReduceJoin;

import java.io.IOException;
import java.util.Iterator;

import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.*;

public class JoinReducer extends MapReduceBase implements Reducer<TextPair, Text, Text, Text> {

    @Override
    public void reduce (TextPair key, Iterator<Text> values, OutputCollector<Text, Text> output,
Reporter reporter)
          throws IOException
    {

        Text nodeId = new Text(values.next());
        while (values.hasNext()) {
            Text node = values.next();
            Text outValue = new Text(nodeId.toString() + "\t\t" +
            node.toString()); output.collect(key.getFirst(), outValue);
        }
    }
}
```



```
    Input split bytes=145
    Combine input records=0
    Combine output records=0
    Reduce input groups=4
    Reduce shuffle bytes=145
    Reduce input records=8
    Reduce output records=4
    Spilled Records=16
    Shuffled Maps =2
    Failed Shuffles=0
    Merged Map outputs=2
    GC time elapsed (ms)=2
    CPU time spent (ms)=0

    Physical memory (bytes) snapshot=0
    Virtual memory (bytes) snapshot=0
    Total committed heap usage (bytes)=913833984
    Shuffle Errors
    BAD_ID=0
    CONNECTION=0
    IO_ERROR=0
    WRONG_LENGTH=0
    WRONG_MAP=0
    WRONG_REDUCE=0

    File Input Format Counters
    Bytes Read=0

    File Output Format Counters
    Bytes Written=85
hduser@bmsce-Precision-T1700:~/jack/join/MapReduceJoin$ hdfs dfs -cat /jack_join/output2/part- 00000

A11      50          Finance
B12      100         HR
C13      250         Manufacturing
Dept_ID Total_Employee          Dept_Name
hduser@bmsce-Precision-T1700:~/jack/join/MapReduceJoin$
```

LAB9:

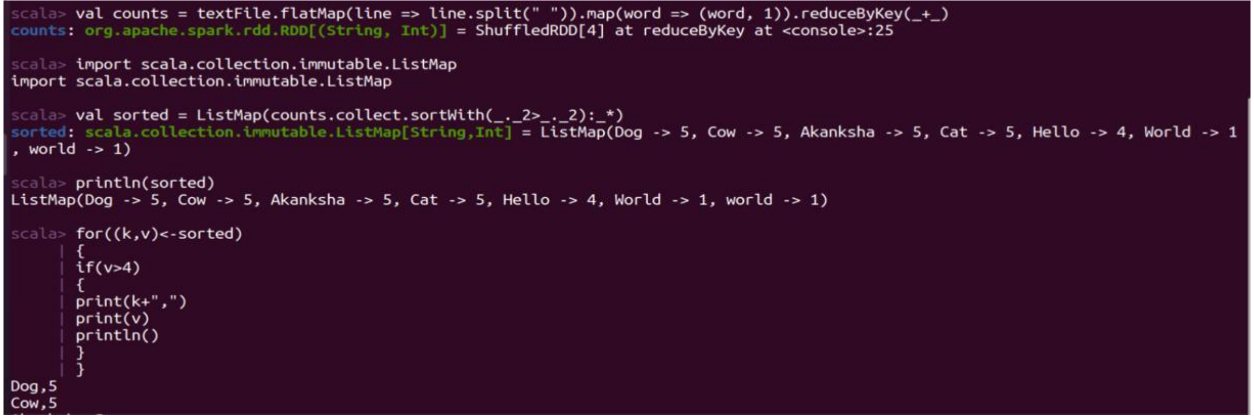
```
val data=sc.textFile("sparkdata.txt")
data.collect;
val splitdata = data.flatMap(line => line.split(" "));
splitdata.collect;
val mapdata = splitdata.map(word => (word,1));
mapdata.collect;
val reducedata = mapdata.reduceByKey(_+_);
reducedata.collect;
```



```
Command 'vin' not found, but there are 28 similar ones.
bmsce@bmsce-Precision-T1700:~$ vin sc.txt
Command 'vin' not found, but there are 28 similar ones.
bmsce@bmsce-Precision-T1700:~$ vim test.txt
bmsce@bmsce-Precision-T1700:~$ spark-shell
2/07/04 14:48:30 WARN Utils: Your hostname, bmsce-Precision-T1700 resolves to a loopback address: 127.0.1.1; using 10.124.7.94 instead (on interface enp1s0)
2/07/04 14:48:30 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
2/07/04 14:48:30 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
sing Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
etting default log level to "WARN".
o adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).
park context Web UI available at http://10.124.7.94:4040
park context available as 'sc' (master = local[*], app id = local-1656926314290).
park session available as 'spark'.
elcome to
      ____              __
     / __/__  ___ _____/ /__
    _\ \/ _ \/ _ `/ __/  '_/
   /___/ .__/\_,_/_/ /_/\_\   version 2.4.8
      /_/

sing Scala version 2.11.12 (OpenJDK 64-Bit Server VM, Java 1.8.0_232)
ype in expressions to have them evaluated.
ype :help for more information.

cala> val data=sc.textFile("test.txt")
ata: org.apache.spark.rdd.RDD[String] = test.txt MapPartitionsRDD[1] at textFile at <console>:24

cala> val data = sc.textFile("test.txt")
ata: org.apache.spark.rdd.RDD[String] = test.txt MapPartitionsRDD[3] at textFile at <console>:24

cala> data.collect;
es0: Array[String] = Array("", " my name is harshil", "")

cala> val splitdata = data.flatMap(line => line.split(" "));
plitdata: org.apache.spark.rdd.RDD[String] = MapPartitionsRDD[4] at flatMap at <console>:25

cala> splitdata.collect;
es1: Array[String] = Array("", "", my, name, is, harshil, "")

cala> val mapdata = splitdata.map(word => (word,1));
apdata: org.apache.spark.rdd.RDD[(String, Int)] = MapPartitionsRDD[5] at map at <console>:25

cala> mapdata.collect;
es2: Array[(String, Int)] = Array(("",1), ("",1), (my,1), (name,1), (is,1), (harshil,1), ("",1))

cala> val reducedata = mapdata.reduceByKey(_+_);
educedata: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[6] at reduceByKey at <console>:25

cala> reducedata.collect;
es3: Array[(String, Int)] = Array((is,1), ("",3), (my,1), (name,1), (harshil,1))
```

LAB10:

```
  val textFile = sc.textFile("/home/bhoom/Desktop/wc.txt")
val counts = textFile.flatMap(line => line.split(" ")).map(word => (word, 1)).reduceByKey(_ +
_) import scala.collection.immutable.ListMap
val sorted=ListMap(counts.collect.sortWith(_._2 > _._2):_*)// sort in descending order based on values
println(sorted)
for((k,v)<-sorted)
{
  if(v>4)
    {
     print(k+",")
       print(v)
       println()
     }
}
```



```
scala> val counts = textFile.flatMap(line => line.split(" ")).map(word => (word, 1)).reduceByKey(_+_)
counts: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[4] at reduceByKey at <console>:25

scala> import scala.collection.immutable.ListMap
import scala.collection.immutable.ListMap

scala> val sorted = ListMap(counts.collect.sortWith(_._2>_._2):_*)
sorted: scala.collection.immutable.ListMap[String,Int] = ListMap(Dog -> 5, Cow -> 5, Akanksha -> 5, Cat -> 5, Hello -> 4, World -> 1
, world -> 1)

scala> println(sorted)
ListMap(Dog -> 5, Cow -> 5, Akanksha -> 5, Cat -> 5, Hello -> 4, World -> 1, world -> 1)

scala> for((k,v)<-sorted)
     | {
     | if(v>4)
     | {
     | print(k+",")
     | print(v)
     | println()
     | }
     | }
Dog,5
Cow,5
```