VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT

on

BIG DATA ANALYTICS

(20CS6PEBDA)

Submitted by

SRISHTI DOREPALLY (1BM19CS160)

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)

BENGALURU-560019

May-2022 to July-2022

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 **SRISHTI DOREPALLY (1BM19CS160),** who is a 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 Big Data Analytics **- (20CS6PEBDA)** work prescribed for the said degree.

Antara Roy Choudhury
Assistant Professor
Department of CSE
BMSCE, Bengaluru

Dr. Jyothi S Nayak
Professor and Head
Department of CSE
BMSCE, Bengaluru

`

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

1. **MongoDB:**

I. CREATE DATABASE IN MONGODB.

use myDB;

Confirm the existence of your database

db;

To list all databases

show dbs;

II. CRUD (CREATE, READ, UPDATE, DELETE) OPERATIONS

1. To create a collection by the name "Student".

db.createCollection("Student");

2. 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",Grade:"VII",Hobbies:"InternetS

urfing"});

4. 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:"Skatin

g"}},{upsert:true});

5. FIND METHOD

A. To search for documents from the "Students" collection based on certain search

criteria.

db.Student.find({StudName:"Aryan David"});

B. 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});

C. To find those documents where the Grade is set to 'VII'

db.Student.find({Grade:{$eq:'VII'}}).pretty();

D. 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 ();

E. To find documents from the Students collection where the StudName begins with "M".

db.Student.find({StudName:/^M/}).pretty();

F. To find documents from the Students collection where the StudNamehas an "e" in any position.

db.Student.find({StudName:/e/}).pretty();

G. To find the number of documents in the Students collection.

db.Student.count();

H. To sort the documents from the Students collection in the descending order of StudName.

db.Student.find().sort({StudName:-1}).pretty();

III. 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

IV. 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"

V. 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.Students.save({StudName:"Vamsi", Grade:"VI"})

VI. Add a new field to existing Document:

db.Students.update({_id:4},{$set:{Location:"Network"}})

VII. Remove the field in an existing Document

db.Students.update({_id:4},{$unset:{Location:”Network”}})

VIII. Finding Document based on search criteria suppressing few fields

db.Student.find({_id:1},{StudName:1,Grade:1,_id:0});

To find those documents where the Grade is not set to ‘VII’

db.Student.find({Grade:{$ne:’VII’}}).pretty();

To find documents from the Students collection where the StudName ends with s.

db.Student.find({StudName:/s$/}).pretty();

IX. to set a particular field value to NULL

db.Students.update({_id:3},{$set:{Location:null}})

X. Count the number of documents in Student Collections

db.Students.count()

XI. Count the number of documents in Student Collections with grade :VII

db.Students.count({Grade:”VII”})

Retrieve first 3 documents

db.Students.find({Grade:”VII”}).limit(3).pretty();

Sort the document in Ascending order

db.Students.find().sort({StudName:1}).pretty();

for descending order:

db.Students.find().sort({StudName:-1}).pretty();

to Skip the 1st two documents from the Students Collections

db.Students.find().skip(2).pretty()

XII. 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’] })

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().

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}})

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}})

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”]}})

Update on Array:

Using particular id replace the element present in the 1 st index position of the fruits array with apple

db.food.update({_id:3},{$set:{‘fruits.1’:’apple’}})

Insert new key value pairs in the fruits array

db.food.update({_id:2},{$push:{price:{grapes:80,mango:200,cherry:100}}})

XII. Aggregate Function :

Create a collection Customers with fields custID, AcctBal, AcctType.

Now group on “custID” and compute the sum of “AccBal”.

db.Customers.aggregate ({$group : { _id : “$custID”,TotAccBal : {$sum:”$AccBal”} } });

Match on AcctType:”S” then group on “CustID” and compute the sum of “AccBal”.

db.Customers.aggregate ({$match:{AcctType:”S”}},{$group : { _id : “$custID”,TotAccBal : {$sum:”$AccBal”} } });

Match on AcctType:”S” then group on “CustID” and compute the sum of “AccBal” and total balance greater than 1200.

db.Customers.aggregate ({$match:{AcctType:”S”}},{$group : { _id : “$custID”,TotAccBal : {$sum:”$AccBal”} } }, {$match:{TotAccBal:{$gt:1200}}});

2. Perform the following DB operations using Cassandra.

1.Create a keyspace by name Employee

```
CREATE KEYSPACE employee123 WITH REPLICATION = {'class':'SimpleStrategy','replication_factor':1};
```

2. 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 EMPLOYEEINFO( EMPID INT PRIMARY KEY, EMPNAME TEXT, DESIGNATION TEXT, DATEOFJOINING
TIMESTAMP, SALARY DOUBLE, DEPTNAME TEXT);
```

3. Insert the values into the table in batch

Begin Batch

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME) VALUES(1,'ABHISHEK','ASSISTANT MANAGER', '2010-04-26', 75000, 'MARKETING')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME) VALUES(2,'BHASKAR','ASSISTANT MANAGER', '2010-04-26', 75000, 'MARKETING')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME) VALUES(3,'CHIRAG','ASSISTANT MANAGER', '2010-04-26', 75000, 'MARKETING')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)VALUES(4,'DHANUSH','ASSISTANT MANAGER', '2010-04-26', 75000, 'MARKETING')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME) VALUES(5,'ESHAAN','ASSISTANT MANAGER', '2010-04-26', 85000, 'TECHNICAL')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME) VALUES(6,'FARAH','MANAGER', '2010-04-26', 95000, 'TECHNICAL')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME) VALUES(7,'GEMMA','MANAGER', '2010-04-26', 95000, 'PR')

INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)VALUES(121,'HARRY','REGIONAL MANAGER', '2010-04-26', 99000, 'MANAGEMENT')

APPLY BATCH;

SELECT * FROM EMPLOYEEINFO;

```
empid | dateofjoining                | deptname  | designation       | empname  | salary

-------+---------------------------------+-----------+-------------------+----------+--------
```

```
  5 | 2010-04-25 18:30:00.000000+0000 | TECHNICAL | ASSISTANT MANAGER |   ESHAAN |  85000

  1 | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER | ABHISHEK |  75000

  2 | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER |  BHASKAR |  75000

  4 | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER |  DHANUSH |  75000

121 | 2010-04-25 18:30:00.000000+0000 | MANAGEMENT |  REGIONAL MANAGER |    HARRY |  99000

  7 | 2010-04-25 18:30:00.000000+0000 |        PR |          MANAGER |    GEMMA |  95000

  6 | 2010-04-25 18:30:00.000000+0000 | TECHNICAL |          MANAGER |    FARAH |  95000

  3 | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER |   CHIRAG |  75000
```

4. Update Employee name and Department of Emp-Id 121

UPDATE EMPLOYEEINFO SET EMPNAME='HARISH', DEPTNAME='PR' WHERE EMPID=121;

5. Sort the details of Employee records based on salary

SELECT * FROM EMPLOYEE_IN WHERE EMP_ID IN(1,2,3,4) ORDER BY SALARY DESC ALLOW FILTERING;

6. Alter the schema of the table Employee_Info to add a column Projects which

stores a set of Projects done by the corresponding Employee.

ALTER TABLE EMPLOYEEINFO ADD PROJECTS LIST<TEXT>;

7. Update the altered table to add project names.

UPDATE EMPLOYEEINFO SET PROJECTS=['FACEBOOK','SNAPCHAT'] WHERE EMPID=1;

UPDATE EMPLOYEEINFO SET PROJECTS=['FACEBOOK','SNAPCHAT'] WHERE EMPID=7;

UPDATE EMPLOYEEINFO SET PROJECTS=['PINTEREST','INSTAGRAM'] WHERE EMPID=121;

UPDATE EMPLOYEEINFO SET PROJECTS=['PINTEREST','INSTAGRAM'] WHERE EMPID=4;

UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=2;

UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=3;

UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=6;

UPDATE EMPLOYEEINFO SET PROJECTS=['TWITTER','REDDIT'] WHERE EMPID=5;

SELECT * FROM EMPLOYEEINFO;

```
empid | dateofjoining                | deptname  | designation       | empname  | projects                   | salary

-------+-------------------------------+-----------+-------------------+----------+----------------------------+--------

5     | 2010-04-25 18:30:00.000000+0000 | TECHNICAL | ASSISTANT MANAGER |   ESHAAN |      ['TWITTER', 'REDDIT'] |  85000
```

```
1    | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER | ABHISHEK |   ['FACEBOOK', 'SNAPCHAT'] |  75000

2    | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER |  BHASKAR |     ['YOUTUBE', 'SPOTIFY'] |  75000

4    | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER |  DHANUSH | ['PINTEREST', 'INSTAGRAM'] |  75000

121   | 2010-04-25 18:30:00.000000+0000 |       PR |  REGIONAL MANAGER |   HARISH | ['PINTEREST', 'INSTAGRAM'] |  99000

7    | 2010-04-25 18:30:00.000000+0000 |       PR |          MANAGER |    GEMMA |   ['FACEBOOK', 'SNAPCHAT'] |  95000

6    | 2010-04-25 18:30:00.000000+0000 | TECHNICAL |          MANAGER |    FARAH |     ['YOUTUBE', 'SPOTIFY'] |  95000

3    | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER |   CHIRAG |     ['YOUTUBE', 'SPOTIFY'] |  75000
```

3. Perform the following DB operations using Cassandra.

1.Create a keyspace by name Library

```
CREATE KEYSPACE Library WITH REPLICATION = {'class':'SimpleStrategy','replication_factor':1};
```

2. Create a column family by name Library-Info with attributes

Stud_Id Primary Key,

Counter_value of type Counter,

Stud_Name, Book-Name, Book-Id,

Date_of_issue

CREATE TABLE LIBRARY_INFO_4 (STUD_ID INT, COUNTER_VALUE COUNTER, STUD_NAME TEXT, BOOK_NAME TEXT, BOOK_ID INT, DATE_OF_ISSUE TIMESTAMP, PRIMARY KEY(STUD_ID, STUD_NAME, BOOK_NAME, BOOK_ID, DATE_OF_ISSUE));

3. Insert the values into the table in batch

UPDATE LIBRARY_INFO_4 SET COUNTER_VALUE+1 WHERE STUD_ID=121 AND STUD_NAME=’SNEHA’ AND BOOK_NAME=’BDA’ AND BOOK_ID=110 AND DATE_OF_ISSUE=’2022-04-01’;

UPDATE LIBRARY_INFO_4 SET COUNTER_VALUE+1 WHERE STUD_ID=122 AND STUD_NAME=’RAHUL’ AND BOOK_NAME=’OOMD’ AND BOOK_ID=111 AND DATE_OF_ISSUE=’2022-07-03’;

UPDATE LIBRARY_INFO_4 SET COUNTER_VALUE+1 WHERE STUD_ID=123 AND STUD_NAME=’RITIKA’ AND BOOK_NAME=’ML’ AND BOOK_ID=112 AND DATE_OF_ISSUE=’2022-02-21’;

UPDATE LIBRARY_INFO_4 SET COUNTER_VALUE+1 WHERE STUD_ID=124 AND STUD_NAME=’ISHA’ AND BOOK_NAME=’AI’ AND BOOK_ID=113 AND DATE_OF_ISSUE=’2022-09-02’;

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

SELECT * FROM LIBRARY_INFO_4;

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

SELECT * FROM LIBRARY_INFO_4 WHERE STUD_ID=112;

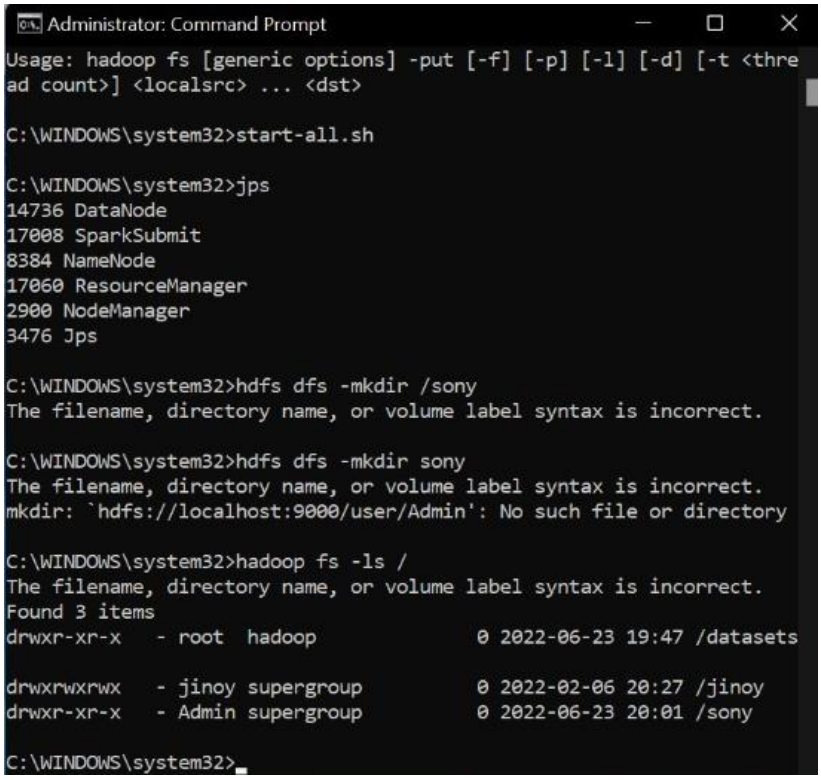
6. Export the created column to a csv file.

COPY LIBRARY_INFO_4 (STUD_ID, STUD_NAME, BOOK_NAME, BOOK_ID, DATE_OF_ISSUE, COUNTER_VALUE) TO 'C:\Users\Admin\OneDrive\Desktop\BDA Lab\data.csv';

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

COPY LIBRARY_INFO_4 (STUD_ID, STUD_NAME, BOOK_NAME, BOOK_ID, DATE_OF_ISSUE, COUNTER_VALUE) FROM 'C:\Users\Admin\OneDrive\Desktop\BDA Lab\data.csv';

Lab Program 4:Hadoop Installation



```
Administrator: Command Prompt
Usage: hadoop fs [generic options] -put [-f] [-p] [-l] [-d] [-t <thre
ad count>] <localsrc> ... <dst>

C:\WINDOWS\system32>start-all.sh

C:\WINDOWS\system32>jps
14736 DataNode
17008 SparkSubmit
8384 NameNode
17060 ResourceManager
2900 NodeManager
3476 Jps

C:\WINDOWS\system32>hdfs dfs -mkdir /sony
The filename, directory name, or volume label syntax is incorrect.

C:\WINDOWS\system32>hdfs dfs -mkdir sony
The filename, directory name, or volume label syntax is incorrect.
mkdir: `hdfs://localhost:9000/user/Admin': No such file or directory

C:\WINDOWS\system32>hadoop fs -ls /
The filename, directory name, or volume label syntax is incorrect.
Found 3 items
drwxr-xr-x   - root  hadoop              0 2022-06-23 19:47 /datasets

drwxrwxrwx   - jinoy supergroup          0 2022-02-06 20:27 /jinoy
drwxr-xr-x   - Admin supergroup          0 2022-06-23 20:01 /sony

C:\WINDOWS\system32>_
```

Lab Program 5: Execution of HDFS Commands for interaction with HadoopEnvironment. (Minimum 10 commands to be executed)

c:\hadoop_new\sbin>hdfs dfs -mkdir /temp

c:\hadoop_new\sbin>hdfs dfs -copyFromLocal E:\Desktop\sample.txt \temp

c:\hadoop_new\sbin>hdfs dfs -ls \temp

Found 1 items

-rw-r--r-- 1 Admin supergroup 11 2021-06-11 21:12 /temp/sample.txtc:\hadoop_new\sbin>hdfs

dfs -cat \temp\sample.txt hello

world

c:\hadoop_new\sbin>hdfs dfs -get \temp\sample.txt E:\Desktop\tempc:\hadoop_new\sbin>hdfs

dfs -put E:\Desktop\temp \temp c:\hadoop_new\sbin>hdfs dfs -ls \temp

Found 2 items

-rw-r--r-- 1 Admin supergroup 11 2021-06-11 21:12 /temp/sample.txt drwxr-xr-x -

Admin supergroup 0 2021-06-11 21:15 /temp/temp c:\hadoop_new\sbin>hdfs dfs -

mv \lab1 \temp c:\hadoop_new\sbin>hdfs dfs -ls \temp Found 3 items drwxr-xr-x -

Adminsupergroup 0 2021-04-19 15:07 /temp/lab1 -rw-r--r-- 1 Admin 7 supergroup 11

2021-06-11 21:12 /temp/sample.txt drwxr-xr-x -

Admin supergroup 0 2021-06-11 21:15 /temp/temp

c:\hadoop_new\sbin>hdfs dfs -rm /temp/sample.txt Deleted

/temp/sample.txt

c:\hadoop_new\sbin>hdfs dfs -ls \temp Found 2 items drwxr-xr-x – Admin supergroup 0 2021-04-19 15:07 /temp/lab1 drwxr-xr-x – Admin supergroup 0 2021-06-11 21:15 /temp/temp

c:\hadoop_new\sbin>hdfs dfs -copyFromLocal E:\Desktop\sample.txt \temp

c:\hadoop_new\sbin>hdfs dfs -ls \temp Found 3 items drwxr-xr-x - Admin supergroup 0 2021-04-

19 15:07 /temp/lab1 -rw-r--r-- 1 Admin supergroup

11 2021-06-11 21:17 /temp/sample.txt drwxr-xr-x - Admin supergroup 0

2021-06-11 21:15 /temp/temp

c:\hadoop_new\sbin>hdfs dfs -copyToLocal \temp\sample.txt E:\Desktop\sample.txt

```
# owner: hduser
# group: supergroup
user::rwx
group::r-x
other::r-x

hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar.txt /home/hduser/Desktop
copyToLocal: `/Karthik/kar.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/karfile.txt /home/hduser/Desktop
copyToLocal: `/Karthik/karfile.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar2.txt /home/hduser/Desktop
copyToLocal: `/Karthik/kar2.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hadoop fs -getfacl /Kardir/
# file: /Kardir
# owner: hduser
# group: supergroup
user::rwx
group::r-x
other::r-x

hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Kardir/kar.txt /home/hduser/Desktop
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /Kardir/kar.txt
Hello this is a sample Welcome Text File..
hduser@bmsce-Precision-T1700:~$ hadoop fs -mv /Kardir /FFF
hduser@bmsce-Precision-T1700:~$ hadoop fs -ls /FFF
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2022-06-06 14:49 /FFF/Kardir
-rw-r--r--   1 hduser supergroup         31 2022-05-31 09:59 /FFF/sample2
hduser@bmsce-Precision-T1700:~$ hadoop fs -cp /Kardir/  /LLL
cp: `/Kardir/': No such file or directory
hduser@bmsce-Precision-T1700:~$ hadoop fs -cp /CSE/  /LLL
cp: `/CSE/': No such file or directory
hduser@bmsce-Precision-T1700:~$ hadoop fs -cp /FFF/ /LLL
hduser@bmsce-Precision-T1700:~$ hadoop fs -ls /LLL
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2022-06-06 15:09 /LLL/Kardir
-rw-r--r--   1 hduser supergroup         31 2022-06-06 15:09 /LLL/sample2
hduser@bmsce-Precision-T1700:~$
```

```
command 'fs' from deb openafs-client (1.8.4-pre1-1ubuntu2.4)

Try: sudo apt install <deb name>

hduser@bmsce-Precision-T1700:~$ hdfs dfs -getmerge /Kardir/kar.txt /Kardir/kar2.txt /home/hduser/Desktop/Merge.txt
getmerge: `/Kardir/kar2.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -getmerge /Kardir/kar.txt /Kardir/kar.txt /home/hduser/Desktop/Merge.txt
hduser@bmsce-Precision-T1700:~$ hadoop fs -getfacl /Karthik/
# file: /Karthik
# owner: hduser
# group: supergroup
user::rwx
group::r-x
other::r-x

hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar.txt /home/hduser/Desktop
copyToLocal: `/Karthik/kar.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/karfile.txt /home/hduser/Desktop
copyToLocal: `/Karthik/karfile.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar2.txt /home/hduser/Desktop
copyToLocal: `/Karthik/kar2.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hadoop fs -getfacl /Kardir/
# file: /Kardir
# owner: hduser
# group: supergroup
user::rwx
group::r-x
other::r-x

hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Kardir/kar.txt /home/hduser/Desktop
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /Kardir/kar.txt
Hello this is a sample Welcome Text File..
hduser@bmsce-Precision-T1700:~$ hadoop fs -mv /Kardir /FFF
hduser@bmsce-Precision-T1700:~$ hadoop fs -ls /FFF
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2022-06-06 14:49 /FFF/Kardir
-rw-r--r--   1 hduser supergroup         31 2022-05-31 09:59 /FFF/sample2
hduser@bmsce-Precision-T1700:~$ hadoop fs -cp /Kardir/  /LLL
cp: `/Kardir/': No such file or directory
```

LAB 6 : For the given file, Create a Map Reduce program to

a) **Find the average temperature for each year from the NCDC data set.**

- **Program**

AverageDriver

```
package temp;

import org.apache.hadoop.fs.Path; import

org.apache.hadoop.io.IntWritable;import

org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Job;

import org.apache.hadoop.mapreduce.lib.input.FileInputFormat; import

org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;public class

AverageDriver {

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

(args.length != 2) {

System.err.println(&quot;Please Enter the input and outputparameters&quot;);

System.exit(-1);
}
Job job = new Job(); job.setJarByClass(AverageDriver.class);

job.setJobName("Max temperature");

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

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

job.setMapperClass(AverageMapper.class);

job.setReducerClass(AverageReducer.class);

job.setOutputKeyClass(Text.class);

job.setOutputValueClass(IntWritable.class); System.exit(job.waitForCompletion(true) ? 0 : 1);

}
}
```

AverageMapper

```
package temp;
```

```
import java.io.IOException;

import org.apache.hadoop.io.IntWritable; import

org.apache.hadoop.io.LongWritable;import

org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Mapper;

public class AverageMapper extends Mapper&lt;LongWritable, Text,Text,

IntWritable&gt; {

public static final int MISSING = 9999;

public void map(LongWritable key, Text value,
Mapper&lt;LongWritable, Text, Text, IntWritable&gt;.Context context)throws

IOException, InterruptedException {

int temperature;

String line = value.toString();

String year = line.substring(15, 19); if

(line.charAt(87) == &#39;+&#39;) {

temperature = Integer.parseInt(line.substring(88, 92));

} else {

temperature = Integer.parseInt(line.substring(87, 92));

}

String quality = line.substring(92, 93);

if (temperature != 9999 &amp;&amp; quality.matches(&quot;[01459]&quot;))context.write(new

Text(year), new

IntWritable(temperature));

}

}
```

AverageReducer

```
package temp;

import java.io.IOException;

import org.apache.hadoop.io.IntWritable;import

org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Reducer;

public class AverageReducer extends Reducer&lt;Text, IntWritable,Text,

IntWritable&gt; {

public void reduce(Text key, Iterable&lt;IntWritable&gt; values,

Reducer&lt;Text, IntWritable, Text, IntWritable&gt;.Context context)throws

IOException, InterruptedException {

int max_temp = 0;int

count = 0;

for (IntWritable value : values) {

max_temp += value.get(); count++;

}

context.write(key, new IntWritable(max_temp / count));

}

}
```

·**Output**

hduser@bmsce-Precision-T1700:~$ sudo su hduser[sudo]

password for hduser:

hduser@bmsce-Precision-T1700:~$ start-all.sh

This script is Deprecated. Instead use start-dfs.sh and start-yarn.shStarting

namenodes on [localhost]

hduser@localhost's password:

localhost: starting namenode, logging to
/usr/local/hadoop/logs/hadoop-hduser-namenode-bmsce-Precision-T1700.out

hduser@localhost's password:

localhost: starting datanode, logging to
/usr/local/hadoop/logs/hadoop-hduser-datanode-bmsce-Precision-T1700.outStarting 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-hduser-secondarynamenode-bmsce-Precision-T1700.out

starting yarn daemons

starting resourcemanager, logging to
/usr/local/hadoop/logs/yarn-hduser-resourcemanager-bmsce-Precision-T1700.out

hduser@localhost's password:

localhost: starting nodemanager, logging to
/usr/local/hadoop/logs/yarn-hduser-nodemanager-bmsce-Precision-T1700.out

hduser@bmsce-Precision-T1700:~$ jps

7376 DataNode

8212 Jps

8090 NodeManager

3725 org.eclipse.equinox.launcher_1.5.600.v20191014-2022.jar

7758 ResourceManager

7199 NameNode

7599 SecondaryNameNode

hduser@bmsce-Precision-T1700:~$ hadoop fs -mkdir /input_kundana

hduser@bmsce-Precision-T1700:~$ hadoop fs -put Downloads/1901 /input_kundana/1901.txt

hduser@bmsce-Precision-T1700:~$ hadoop jar Desktop/temp.jar Temperature.AverageDriver /input_kundana/1901.txt /output_1901

Exception in thread "main" java.lang.ClassNotFoundException: Temperature.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:~$ hadoop jar Desktop/temp.jar AverageDriver /input_kundana/1901.txt /output_1901

22/06/21 10:26:05 INFO Configuration.deprecation: session.id is deprecated.Instead, use dfs.metrics.session-id

22/06/21 10:26:05 INFO jvm.JvmMetrics: Initializing JVM Metrics withprocessName=JobTracker, sessionId=

22/06/21 10:26:05 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute yourapplication with ToolRunner to remedy this.

22/06/21 10:26:05 INFO input.FileInputFormat: Total input paths to process : 122/06/21 10:26:05

INFO mapreduce.JobSubmitter: number of splits:1

22/06/21 10:26:05 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local1195965365_0001

22/06/21 10:26:05 INFO mapreduce.Job: The url to track the job:http://localhost:8080/

22/06/21 10:26:05 INFO mapreduce.Job: Running job: job_local1195965365_0001

22/06/21 10:26:05 INFO mapred.LocalJobRunner: OutputCommitter set in confignull

22/06/21 10:26:05 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter

22/06/21 10:26:05 INFO mapred.LocalJobRunner: Waiting for map tasks

22/06/21 10:26:05 INFO mapred.LocalJobRunner: Starting task: attempt_local1195965365_0001_m_000000_0

22/06/21 10:26:05 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]

22/06/21 10:26:05 INFO mapred.MapTask: Processing split: hdfs://localhost:54310/input_kundana/1901.txt:0+888190

22/06/21 10:26:06 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)

22/06/21 10:26:06 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 10022/06/21 10:26:06

INFO mapred.MapTask: soft limit at 83886080

22/06/21 10:26:06 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600 22/06/21 10:26:06

INFO mapred.MapTask: kvstart = 26214396; length = 6553600

22/06/21 10:26:06 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer

22/06/21 10:26:06 INFO mapred.LocalJobRunner:

22/06/21 10:26:06 INFO mapred.MapTask: Starting flush of map output22/06/21

10:26:06 INFO mapred.MapTask: Spilling map output

22/06/21 10:26:06 INFO mapred.MapTask: bufstart = 0; bufend = 59076; bufvoid =104857600

22/06/21 10:26:06 INFO mapred.MapTask: kvstart = 26214396(104857584);kvend = 26188144(104752576); length = 26253/6553600

22/06/21 10:26:06 INFO mapred.MapTask: Finished spill 022/06/21

10:26:06 INFO mapred.Task:

Task:attempt_local1195965365_0001_m_000000_0 is done. And is in the process
of committing

22/06/21 10:26:06 INFO mapred.LocalJobRunner: map

22/06/21 10:26:06 INFO mapred.Task: Task 'attempt_local1195965365_0001_m_000000_0'
done.
22/06/21 10:26:06 INFO mapred.LocalJobRunner: Finishing task:
attempt_local1195965365_0001_m_000000_0

22/06/21 10:26:06 INFO mapred.LocalJobRunner: map task executor complete.22/06/21

10:26:06 INFO mapred.LocalJobRunner: Waiting for reduce tasks

22/06/21 10:26:06 INFO mapred.LocalJobRunner: Starting task:
attempt_local1195965365_0001_r_000000_0

22/06/21 10:26:06 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]

22/06/21 10:26:06 INFO mapred.ReduceTask: Using ShuffleConsumerPlugin:
org.apache.hadoop.mapreduce.task.reduce.Shuffle@65367f35

22/06/21 10:26:06 INFO reduce.MergeManagerImpl: MergerManager:memoryLimit=349752512,
maxSingleShuffleLimit=87438128, mergeThreshold=230836672, ioSortFactor=10,
memToMemMergeOutputsThreshold=10

22/06/21 10:26:06 INFO reduce.EventFetcher: attempt_local1195965365_0001_r_000000_0
Thread started: EventFetcher forfetching Map Completion Events

22/06/21 10:26:06 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of map
attempt_local1195965365_0001_m_000000_0 decomp: 72206len: 72210 to MEMORY

22/06/21 10:26:06 INFO reduce.InMemoryMapOutput: Read 72206 bytes frommap-output
for attempt_local1195965365_0001_m_000000_0

22/06/21 10:26:06 INFO reduce.MergeManagerImpl: closeInMemoryFile ->
map-output of size: 72206, inMemoryMapOutputs.size() -> 1, commitMemory ->0,
usedMemory ->72206

22/06/21 10:26:06 INFO reduce.EventFetcher: EventFetcher is interrupted..Returning

22/06/21 10:26:06 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/21 10:26:06 INFO reduce.MergeManagerImpl: finalMerge called with 1in-memory
map-outputs and 0 on-disk map-outputs

22/06/21 10:26:06 INFO mapred.Merger: Merging 1 sorted segments

22/06/21 10:26:06 INFO mapred.Merger: Down to the last merge-pass, with 1segments left of

total size: 72199 bytes

22/06/21 10:26:06 INFO reduce.MergeManagerImpl: Merged 1 segments, 72206bytes to disk to satisfy reduce memory limit

22/06/21 10:26:06 INFO reduce.MergeManagerImpl: Merging 1 files, 72210 bytesfrom disk

22/06/21 10:26:06 INFO reduce.MergeManagerImpl: Merging 0 segments, 0 bytesfrom memory into reduce

22/06/21 10:26:06 INFO mapred.Merger: Merging 1 sorted segments

22/06/21 10:26:06 INFO mapred.Merger: Down to the last merge-pass, with 1segments left of total size: 72199 bytes

22/06/21 10:26:06 INFO mapred.LocalJobRunner: 1 / 1 copied.

22/06/21 10:26:06 INFO Configuration.deprecation: mapred.skip.on isdeprecated.
Instead, use mapreduce.job.skiprecords

22/06/21 10:26:06 INFO mapred.Task: Task:attempt_local1195965365_0001_r_000000_0 is done. And is in the processof committing

22/06/21 10:26:06 INFO mapred.LocalJobRunner: 1 / 1 copied.

22/06/21 10:26:06 INFO mapred.Task: Task attempt_local1195965365_0001_r_000000_0 is allowed to commit now

22/06/21 10:26:06 INFO output.FileOutputCommitter: Saved output of task 'attempt_local1195965365_0001_r_000000_0' to hdfs://localhost:54310/output_1901/_temporary/0/task_local1195965365_0001 _r_000000
22/06/21 10:26:06 INFO mapred.LocalJobRunner: reduce > reduce

22/06/21 10:26:06 INFO mapred.Task: Task 'attempt_local1195965365_0001_r_000000_0' done.

22/06/21 10:26:06 INFO mapred.LocalJobRunner: Finishing task: attempt_local1195965365_0001_r_000000_0

22/06/21 10:26:06 INFO mapred.LocalJobRunner: reduce task executor complete.

22/06/21 10:26:06 INFO mapreduce.Job: Job job_local1195965365_0001 runningin uber mode : false

22/06/21 10:26:06 INFO mapreduce.Job: map 100% reduce 100%

22/06/21 10:26:06 INFO mapreduce.Job: Job job_local1195965365_0001completed successfully

22/06/21 10:26:06 INFO mapreduce.Job: Counters: 38File

System Counters

FILE: Number of bytes read=152940 FILE:

Number of bytes written=725372FILE: Number

of read operations=0

FILE: Number of large read operations=0FILE:

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=0HDFS: Number

of write operations=4

Map-Reduce Framework

Map input records=6565 Map

output records=6564Map

output bytes=59076

Map output materialized bytes=72210Input split

bytes=110

Combine input records=0

Combine output records=0

Reduce input groups=1 Reduce

shuffle bytes=72210Reduce

input records=6564 Reduce

output records=1 Spilled

Records=13128 Shuffled Maps

=1

Failed Shuffles=0 Merged

Map outputs=1 GC time

elapsed (ms)=63CPU time

spent (ms)=0

Physical memory (bytes) snapshot=0Virtual

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=888190File

Output Format Counters

Bytes Written=8

hduser@bmsce-Precision-T1700:~$ hadoop fs -cat /output_1901/part-r-000001901 46

hduser@bmsce-Precision-T1700:~$

b) <u>find the mean max temperature for every month</u>

· **MeanMaxDriver.class**

```
package meanmax;

import org.apache.hadoop.fs.Path; import

org.apache.hadoop.io.IntWritable;import

org.apache.hadoop.io.Text;
```

```
import org.apache.hadoop.mapreduce.Job;

import org.apache.hadoop.mapreduce.lib.input.FileInputFormat; import

org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;public class

MeanMaxDriver {

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

(args.length != 2) {

System.err.println(&quot;Please Enter the input and outputparameters&quot;);

System.exit(-1);

}

Job job = new Job(); job.setJarByClass(MeanMaxDriver.class);

job.setJobName(&quot;Max temperature&quot;);

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

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

job.setMapperClass(MeanMaxMapper.class);

job.setReducerClass(MeanMaxReducer.class);

job.setOutputKeyClass(Text.class);

job.setOutputValueClass(IntWritable.class);

System.exit(job.waitForCompletion(true) ? 0 : 1);

}}
```

MeanMaxMapper.class

```
package meanmax;


import java.io.IOException;

import org.apache.hadoop.io.IntWritable; import

org.apache.hadoop.io.LongWritable;import

org.apache.hadoop.io.Text;
```

```
import org.apache.hadoop.mapreduce.Mapper;

public class MeanMaxMapper extends Mapper&lt;LongWritable, Text,Text,

IntWritable&gt; {

public static final int MISSING = 9999;

public void map(LongWritable key, Text value, Mapper&lt;LongWritable, Text,

Text, IntWritable&gt;.Context context)throws IOException, InterruptedException

{

int temperature;

String line = value.toString();

String month = line.substring(19, 21);if

(line.charAt(87) == &#39;+&#39;) {

temperature = Integer.parseInt(line.substring(88, 92));

} else {
temperature = Integer.parseInt(line.substring(87, 92));
}
String quality = line.substring(92, 93);

if (temperature != 9999 &amp;&amp; quality.matches(&quot;[01459]&quot;))context.write(new

Text(month), new

IntWritable(temperature));

}

}
```

MeanMaxReducer.class

```
package meanmax;

import java.io.IOException;

import org.apache.hadoop.io.IntWritable;import

org.apache.hadoop.io.Text;
```

```
import org.apache.hadoop.mapreduce.Reducer;

public class MeanMaxReducer extends Reducer&lt;Text, IntWritable,Text,

IntWritable&gt; {

public void reduce(Text key, Iterable&lt;IntWritable&gt; values,

Reducer&lt;Text, IntWritable, Text, IntWritable&gt;.Context context)throws

IOException, InterruptedException {

int max_temp = 0;int

total_temp = 0;

int count = 0;

int days = 0;

for (IntWritable value : values) {int

temp = value.get();

if (temp &gt; max_temp)

max_temp = temp; count++;

if (count == 3) { total_temp +=

max_temp;max_temp = 0;

count = 0;

days++;

}

}

context.write(key, new IntWritable(total_temp / days));

}

}
```

- Output

hduser@bmsce-OptiPlex-3060:~$ hadoop jar /home/hduser/Desktop/mean_max_temp.jar meanmax.MeanMaxDriver /input_pranav/temp_1901.txt /avg_temp_output_meanmax_1901

22/06/21 10:17:01 INFO Configuration.deprecation: session.id is deprecated.Instead, use dfs.metrics.session-id

22/06/21 10:17:01 INFO jvm.JvmMetrics: Initializing JVM Metrics withprocessName=JobTracker, sessionId=

22/06/21 10:17:01 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute yourapplication with ToolRunner to remedy this.

22/06/21 10:17:01 INFO input.FileInputFormat: Total input paths to process : 122/06/21 10:17:01

INFO mapreduce.JobSubmitter: number of splits:1

22/06/21 10:17:01 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local232634845_0001

22/06/21 10:17:01 INFO mapreduce.Job: The url to track the job:http://localhost:8080/

22/06/21 10:17:01 INFO mapreduce.Job: Running job: job_local232634845_0001

22/06/21 10:17:01 INFO mapred.LocalJobRunner: OutputCommitter set in confignull

22/06/21 10:17:01 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter

22/06/21 10:17:01 INFO mapred.LocalJobRunner: Waiting for map tasks

22/06/21 10:17:01 INFO mapred.LocalJobRunner: Starting task: attempt_local232634845_0001_m_000000_0

22/06/21 10:17:01 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]
22/06/21 10:17:01 INFO mapred.MapTask: Processing split: hdfs://localhost:54310/input_pranav/temp_1901.txt:0+888190

22/06/21 10:17:01 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)

22/06/21 10:17:01 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 10022/06/21 10:17:01

INFO mapred.MapTask: soft limit at 83886080

22/06/21 10:17:01 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600

22/06/21 10:17:01 INFO mapred.MapTask: kvstart = 26214396; length = 6553600

22/06/21 10:17:01 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer

22/06/21 10:17:01 INFO mapred.LocalJobRunner:

22/06/21 10:17:01 INFO mapred.MapTask: Starting flush of map output22/06/21

10:17:01 INFO mapred.MapTask: Spilling map output

22/06/21 10:17:01 INFO mapred.MapTask: bufstart = 0; bufend = 45948; bufvoid =104857600

22/06/21 10:17:01 INFO mapred.MapTask: kvstart = 26214396(104857584);kvend = 26188144(104752576); length = 26253/6553600

22/06/21 10:17:01 INFO mapred.MapTask: Finished spill 022/06/21

10:17:01 INFO mapred.Task:
Task:attempt_local232634845_0001_m_000000_0 is done. And is in the process of committing

22/06/21 10:17:01 INFO mapred.LocalJobRunner: map

22/06/21 10:17:01 INFO mapred.Task: Task 'attempt_local232634845_0001_m_000000_0' done.
22/06/21 10:17:01 INFO mapred.LocalJobRunner: Finishing task: attempt_local232634845_0001_m_000000_0

22/06/21 10:17:01 INFO mapred.LocalJobRunner: map task executor complete.22/06/21

10:17:01 INFO mapred.LocalJobRunner: Waiting for reduce tasks

22/06/21 10:17:01 INFO mapred.LocalJobRunner: Starting task: attempt_local232634845_0001_r_000000_0

22/06/21 10:17:01 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]

22/06/21 10:17:01 INFO mapred.ReduceTask: Using ShuffleConsumerPlugin: org.apache.hadoop.mapreduce.task.reduce.Shuffle@1a055244

22/06/21 10:17:01 INFO reduce.MergeManagerImpl: MergerManager:memoryLimit=349752512, maxSingleShuffleLimit=87438128, mergeThreshold=230836672, ioSortFactor=10, memToMemMergeOutputsThreshold=10

22/06/21 10:17:01 INFO reduce.EventFetcher: attempt_local232634845_0001_r_000000_0 Thread started: EventFetcher forfetching Map Completion Events

22/06/21 10:17:01 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of map

attempt_local232634845_0001_m_000000_0 decomp: 59078 len:59082 to MEMORY

22/06/21 10:17:01 INFO reduce.InMemoryMapOutput: Read 59078 bytes frommap-output for attempt_local232634845_0001_m_000000_0

22/06/21 10:17:01 INFO reduce.MergeManagerImpl: closeInMemoryFile -> map-output of size: 59078, inMemoryMapOutputs.size() -> 1, commitMemory ->0, usedMemory ->59078

22/06/21 10:17:01 INFO reduce.EventFetcher: EventFetcher is interrupted..Returning

22/06/21 10:17:01 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/21 10:17:01 INFO reduce.MergeManagerImpl: finalMerge called with 1in-memory map-outputs and 0 on-disk map-outputs

22/06/21 10:17:01 INFO mapred.Merger: Merging 1 sorted segments

22/06/21 10:17:01 INFO mapred.Merger: Down to the last merge-pass, with 1segments left of total size: 59073 bytes

22/06/21 10:17:01 INFO reduce.MergeManagerImpl: Merged 1 segments, 59078bytes to disk to satisfy reduce memory limit

22/06/21 10:17:01 INFO reduce.MergeManagerImpl: Merging 1 files, 59082 bytesfrom disk

22/06/21 10:17:01 INFO reduce.MergeManagerImpl: Merging 0 segments, 0 bytesfrom memory into reduce

22/06/21 10:17:01 INFO mapred.Merger: Merging 1 sorted segments

22/06/21 10:17:01 INFO mapred.Merger: Down to the last merge-pass, with 1segments left of total size: 59073 bytes

22/06/21 10:17:01 INFO mapred.LocalJobRunner: 1 / 1 copied.

22/06/21 10:17:01 INFO Configuration.deprecation: mapred.skip.on isdeprecated. Instead, use mapreduce.job.skiprecords

22/06/21 10:17:01 INFO mapred.Task: Task:attempt_local232634845_0001_r_000000_0 is done. And is in the process ofcommitting

22/06/21 10:17:01 INFO mapred.LocalJobRunner: 1 / 1 copied.

22/06/21 10:17:01 INFO mapred.Task: Task attempt_local232634845_0001_r_000000_0 is allowed to commit now

22/06/21 10:17:01 INFO output.FileOutputCommitter: Saved output of task 'attempt_local232634845_0001_r_000000_0' to hdfs://localhost:54310/avg_temp_output_meanmax_1901/_temporary/0/task_lo

cal232634845_0001_r_000000
22/06/21 10:17:01 INFO mapred.LocalJobRunner: reduce > reduce

22/06/21 10:17:01 INFO mapred.Task: Task 'attempt_local232634845_0001_r_000000_0' done.

22/06/21 10:17:01 INFO mapred.LocalJobRunner: Finishing task:
attempt_local232634845_0001_r_000000_0

22/06/21 10:17:01 INFO mapred.LocalJobRunner: reduce task executor complete.

22/06/21 10:17:02 INFO mapreduce.Job: Job job_local232634845_0001 runningin uber mode
: false

22/06/21 10:17:02 INFO mapreduce.Job: map 100% reduce 100%

22/06/21 10:17:02 INFO mapreduce.Job: Job job_local232634845_0001completed
successfully

22/06/21 10:17:02 INFO mapreduce.Job: Counters: 38File

System Counters

FILE: Number of bytes read=125588 FILE:

Number of bytes written=682332FILE: Number

of read operations=0

FILE: Number of large read operations=0FILE:

Number of write operations=0 HDFS: Number

of bytes read=1776380 HDFS: Number of bytes

written=74 HDFS: Number of read

operations=13

HDFS: Number of large read operations=0HDFS:

Number of write operations=4

Map-Reduce Framework

Map input records=6565 Map

output records=6564Map

output bytes=45948

Map output materialized bytes=59082Input split

bytes=114

Combine input records=0

Combine output records=0

Reduce input groups=12 Reduce

shuffle bytes=59082Reduce

input records=6564 Reduce

output records=12 Spilled

Records=13128 Shuffled Maps

=1

Failed Shuffles=0 Merged

Map outputs=1 GC time

elapsed (ms)=54CPU time

spent (ms)=0

Physical memory (bytes) snapshot=0Virtual

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=888190File

Output Format Counters

Bytes Written=74

```
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -ls /avg_temp_meanmax_outputls:

`/avg_temp_meanmax_output': No such file or directory

hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -ls /avg_temp_output_meanmax_1901Found 2 items

-rw-r--r--   1 hduser supergroup          0 2022-06-21 10:17
/avg_temp_output_meanmax_1901/_SUCCESS

-rw-r--r--   1 hduser supergroup         74 2022-06-21 10:17
/avg_temp_output_meanmax_1901/part-r-00000

hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -cat
/avg_temp_output_meanmax/part-r-00000

cat: `/avg_temp_output_meanmax/part-r-00000': No such file or directory
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -cat
/avg_temp_output_meanmax_1901/part-r-00000

01	4

02	0

03	7

04	44

05	100

06	168

07	219

08	198

09	141

10	100

11	19

12	3
```

LAB 7

For a given Text file, create a Map Reduce program to sort the content in analphabetic order listing only top 'n' maximum occurrence of words.

```
// TopN.java package sortWords;

import org.apache.hadoop.conf.Configuration; import org.apache.hadoop.fs.Path;import

org.apache.hadoop.io.IntWritable; import org.apache.hadoop.io.Text; import

org.apache.hadoop.mapreduce.Job; import org.apache.hadoop.mapreduce.Mapper; import

org.apache.hadoop.mapreduce.Reducer; import

org.apache.hadoop.mapreduce.lib.input.FileInputFormat; import

org.apache.hadoop.mapreduce.lib.output.FileOutputFormat; import

org.apache.hadoop.util.GenericOptionsParser; import utils.MiscUtils;import

java.io.IOException; import java.util.*;

public class TopN {

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

 conf = new Configuration();

 String[] otherArgs = new GenericOptionsParser(conf, args).getRemainingArgs(); if

(otherArgs.length != 2) {

 System.err.println("Usage: TopN <in> <out>");

 System.exit(2);

 }

 Job job = Job.getInstance(conf); job.setJobName("Top N");job.setJarByClass(TopN.class);

job.setMapperClass(TopNMapper.class);
//job.setCombinerClass(TopNReducer.class);
job.setReducerClass(TopNReducer.class); job.setOutputKeyClass(Text.class);

job.setOutputValueClass(IntWritable.class); FileInputFormat.addInputPath(job, new

Path(otherArgs[0])); FileOutputFormat.setOutputPath(job, new Path(otherArgs[1]));

System.exit(job.waitForCompletion(true) ? 0 : 1);

 }

 /**

 * The mapper reads one line at the time, splits it into an array of single words andemits every *

word to the reducers with the value of 1.

 */
```

```
 public static class TopNMapper extends Mapper<Object, Text, Text, IntWritable> {
 private final static IntWritable one = new IntWritable(1); private Text word = newText();
 private String tokens = "[_|$#<>\\^=\\[\\]\\*/\\\\,;,.\\-:()?!\"']";@Override
17
 public void map(Object key, Text value, Context context) throws IOException,
InterruptedException {
 String cleanLine = value.toString().toLowerCase().replaceAll(tokens, " ");StringTokenizer itr
= new StringTokenizer(cleanLine); while (itr.hasMoreTokens()) {word.set(itr.nextToken().trim());
 context.write(word, one);
 }
 }
 }
 /**
 * The reducer retrieves every word and puts it into a Map: if the word alreadyexists in the *
map,
increments its value, otherwise sets it to 1.
 */
 public static class TopNReducer extends Reducer<Text, IntWritable, Text,IntWritable> {
 private Map<Text, IntWritable> countMap = new HashMap<>();@Override
 public void reduce(Text key, Iterable<IntWritable> values, Context context) throwsIOException,
InterruptedException {
 // computes the number of occurrences of a single word int sum = 0; for(IntWritable val : values)
{ sum += val.get();
 }
 // puts the number of occurrences of this word into the map.
 // We need to create another Text object because the Text instance
 // we receive is the same for all the words countMap.put(new Text(key), newIntWritable(sum));
 }
@Override
 protected void cleanup(Context context) throws IOException,InterruptedException {
 Map<Text, IntWritable> sortedMap = MiscUtils.sortByValues(countMap);int counter =
```

```
 0; for (Text key : sortedMap.keySet()) { if (counter++ == 3) {
break;
 }
 context.write(key, sortedMap.get(key));
 }
 }
 }
 /**
 * The combiner retrieves every word and puts it into a Map: if the word alreadyexists in the *
map, increments its value, otherwise sets it to 1.
 */
 public static class TopNCombiner extends Reducer<Text, IntWritable, Text,IntWritable> {
18
 @Override
 public void reduce(Text key, Iterable<IntWritable> values, Context context) throwsIOException,
InterruptedException {
 // computes the number of occurrences of a single word int sum = 0; for(IntWritable val : values)
{ sum += val.get();
 }
 context.write(key, new IntWritable(sum));
}
 }
}
// MiscUtils.java package utils;
import java.util.*;
public class MiscUtils {
 /**
sorts the map by values. Taken from:
http://javarevisited.blogspot.it/2012/12/how-to-sort-hashmap-java-by-key-and-va lue.html
 */
```

```
 public static <K extends Comparable, V extends Comparable> Map<K, V>sortByValues(Map<K, V>
map) {
 List<Map.Entry<K, V>> entries = new LinkedList<Map.Entry<K,V>>(map.entrySet());
 Collections.sort(entries, new Comparator<Map.Entry<K, V>>() {
 @Override public int compare(Map.Entry<K, V> o1, Map.Entry<K, V> o2) { return
o2.getValue().compareTo(o1.getValue());
 }
 });
 //LinkedHashMap will keep the keys in the order they are inserted
 //which is currently sorted on natural ordering Map<K, V>
sortedMap = new LinkedHashMap<K, V>();for (Map.Entry<K, V>
entry : entries) { sortedMap.put(entry.getKey(),
entry.getValue());
 }
 return sortedMap;
 }
}
```

```
C:\hadoop_new\share\hadoop\mapreduce>hdfs dfs -cat \sortwordsOutput\part-r-00000
car     7
deer    6
bear    3
```

LAB 8:-Create a Hadoop Map Reduce program to combine information from the users file along with Information from the posts file by using the concept of joinand display user_id, Reputation and Score.

```
// JoinDriver.java 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,Posts.class);

MultipleInputs.addInputPath(conf, BInputPath, TextInputFormat.class,User.class);

FileOutputFormat.setOutputPath(conf, outputPath);

conf.setPartitionerClass(KeyPartitioner.class);

conf.setOutputValueGroupingComparator(TextPair.FirstComparator.class);

 conf.setMapOutputKeyClass(TextPair.class);21
```

```
 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);
}
}
// JoinReducer.java 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);
}
}
}
// User.java 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 User extends MapReduceBase implements Mapper<LongWritable,Text, TextPair,
Text> {
22

@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"), newText(SingleNodeData[1]));

}

}

//Posts.java import java.io.IOException;

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

public class Posts 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[3], "0"), new

Text(SingleNodeData[9]));

}

}

// TextPair.java import java.io.*;
```

```
import org.apache.hadoop.io.*;
public class TextPair implements WritableComparable<TextPair> {private Text
 first; private Text second;

 public TextPair() { set(new Text(), new Text());
 }

 public TextPair(String first, String second) { set(new Text(first), new Text(second));
 }

 public TextPair(Text first, Text second) { set(first, second);
 }
```

23

```
 public void set(Text first, Text second) { this.first = first; this.second = second;
 }

 public Text getFirst() { return first;
 }
 public Text getSecond() { return second;
 }
 @Override
 public void write(DataOutput out) throws IOException { first.write(out);second.write(out);
 }
 @Override public void readFields(DataInput in) throws IOException {first.readFields(in);
second.readFields(in);
 }

 @Override public int hashCode() { return first.hashCode() * 163 +second.hashCode();
 }

 @Override public boolean equals(Object o) { if (o instanceof TextPair) { TextPair tp
= (TextPair) o;
return first.equals(tp.first) && second.equals(tp.second);
 } return false;
 }
```

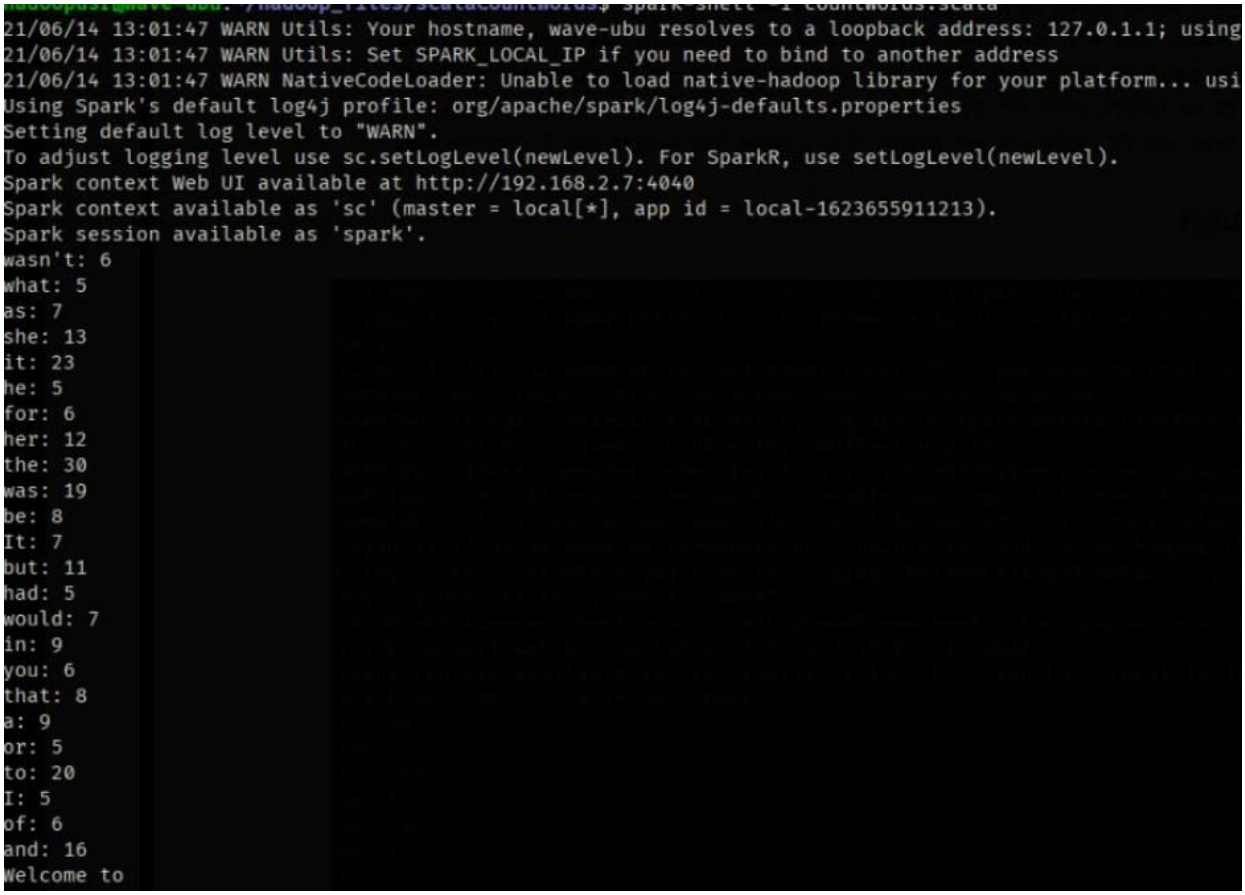
```
 @Override public String toString() { return first + "\t" + second;
 }

 @Override
 public int compareTo(TextPair tp) { int cmp = first.compareTo(tp.first); if (cmp != 0)
{ return
cmp;
 }
 return second.compareTo(tp.second);
 }
 // ^^ TextPair
 // vv TextPairComparator public static class Comparator extendsWritableComparator {
 private static final Text.Comparator TEXT_COMPARATOR = new Text.Comparator();
 public Comparator() { super(TextPair.class);
 }
 @Override public int compare(byte[] b1, int s1, int l1, byte[] b2, int s2, int l2) {try {
24
 int firstL1 = WritableUtils.decodeVIntSize(b1[s1]) + readVInt(b1, s1); int firstL2 =
WritableUtils.decodeVIntSize(b2[s2]) + readVInt(b2, s2); int cmp =
TEXT_COMPARATOR.compare(b1, s1, firstL1, b2, s2, firstL2); if (cmp != 0) { returncmp;
 }
 return TEXT_COMPARATOR.compare(b1, s1 + firstL1, l1 - firstL1,b2, s2 +
 firstL2, l2 - firstL2);
 } catch (IOException e) { throw new IllegalArgumentException(e);
 }
 }
 }
 static {
 WritableComparator.define(TextPair.class, new Comparator());
 }
```

```
public static class FirstComparator extends WritableComparator {

private static final Text.Comparator TEXT_COMPARATOR = new Text.Comparator();

public FirstComparator() { super(TextPair.class);

}

@Override public int compare(byte[] b1, int s1, int l1, byte[] b2, int s2, int l2) {try {

int firstL1 = WritableUtils.decodeVIntSize(b1[s1]) + readVInt(b1, s1); int firstL2 =

WritableUtils.decodeVIntSize(b2[s2]) + readVInt(b2, s2); returnTEXT_COMPARATOR.compare(b1,

s1, firstL1, b2, s2, firstL2);

} catch (IOException e) { throw new IllegalArgumentException(e);

}

}

@Override

public int compare(WritableComparable a, WritableComparable b) { if (ainstanceof TextPair &&
b

instanceof TextPair) { return ((TextPair) a).first.compareTo(((TextPair) b).first);

}
return super.compare(a, b);

}

}

}
```

```
c:\hadoop_new\share\hadoop\mapreduce>hdfs dfs -cat \joinOutput\part-00000
"100005361"     "2"             "36134"
"100018705"     "2"             "76"
"100022094"     "0"             "6354"
```

LAB 9 Program to print word count on scala shell and print “Hello world” onscala IDE

```
scala> println("Hello World!");

Hello World!

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
```



```
21/06/14 13:01:47 WARN Utils: Your hostname, wave-ubu resolves to a loopback address: 127.0.1.1; using
21/06/14 13:01:47 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
21/06/14 13:01:47 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... usi
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
Setting default log level to "WARN".
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).
Spark context Web UI available at http://192.168.2.7:4040
Spark context available as 'sc' (master = local[*], app id = local-1623655911213).
Spark session available as 'spark'.
wasn't: 6
what: 5
as: 7
she: 13
it: 23
he: 5
for: 6
her: 12
the: 30
was: 19
be: 8
It: 7
but: 11
had: 5
would: 7
in: 9
you: 6
that: 8
a: 9
or: 5
to: 20
I: 5
of: 6
and: 16
Welcome to
```

LAB-10 :-Using RDD and FlaMap count how many times each word appears in afile and write out a list of words whose count is strictly greater than 4 using Spark

- commands and output:

```
cala> val textFile=sc.textFile("/home/hduser/Desktop/sample.txt");

textFile: org.apache.spark.rdd.RDD[String] = /home/hduser/Desktop/sample.txt
MapPartitionsRDD[8] at textFile at <console>:24
scala> val counts=textFile.flatMap(line=>line.split("
")).map(word=>(word,1)).reduceByKey(_=_)

<console>:25: error: reassignment to val

      val counts=textFile.flatMap(line=>line.split("")).map(word=>(word,1)).reduceByKey(_=_)
scala> val counts=textFile.flatMap(line=>line.split("
")).map(word=>(word,1)).reduceByKey(_+_)

counts: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[11] at reduceByKeyat
<console>:25
scala> import scala.collection.immutable.ListMapimport

scala.collection.immutable.ListMap


scala> val sorted=ListMap(counts.collect.sortWith(_._2>_._2):_*)

sorted: scala.collection.immutable.ListMap[String,Int] = Map(is -> 4, how -> 4, your -> 4, are
-> 1, brother -> 1, sister -> 1, family -> 1, ypu -> 1, job -> 1, hi -> 1,
hw -> 1)
scala> println(sorted)

Map(is -> 4, how -> 4, your -> 4, are -> 1, brother -> 1, sister -> 1, family -> 1, ypu
-> 1, job -> 1, hi -> 1, hw -> 1)
scala> for((k,v)<-sorted)

     | {

     |  if(v>4)

     |  {

     |      print(k+",")

     |       print(v)

     |       println()

     |  }| }
```