VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

BIG DATA ANALYTICS
(20CS6PEBDA)

Submitted by

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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
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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 **KRISHNA MOHAN DULLOLLI (1BM19CS075),** 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 year2022. The Lab report has been approved as it satisfies the academic requirements in respect of a**Course Title - (20CS6PEBDA)** 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

1 MongoDB CRUD Operations

I. CREATE DATABASE IN MONGODB

>use KrishnaDB

switched to db KrishnaDB

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

>db.createCollection("Student");

{ "ok" : 1 }

>db.Student.insert({_id:1,name:"Krishna",grade:9});

WriteResult({ "nInserted" : 1 })

>db.Student.update({_id:6,name:"qwert"},{$set:{grade:4}},{upsert:true});

WriteResult({ "nMatched" : 0, "nUpserted" : 1, "nModified" : 0, "_id" : 6 })

>db.Student.find();

{ "_id" : 1, "name" : "Krishna", "grade" : 9 }

{ "_id" : 2, "name" : "Abc", "grade" : 10 }

{ "_id" : 3, "name" : "Mno", "grade" : 5 }

{ "_id" : 4, "name" : "Pqr", "grade" : 8 }

> show collections;

Student

III. Save Method

> db.Student.save({name:"zzz",_id:10,grade:8});

WriteResult({ "nMatched" : 0, "nUpserted" : 1, "nModified" : 0, "_id" : 10 })

IV. COUNT

> db.Student.count();

6

> db.Student.count({grade:9});

1

V FIND

> db.Student.find({grade:{$lt:5}},{name:1,grade:1,_id:0});

{ "grade" : 2, "name" : "qwert" }

> db.Student.find({name:{$in:["Krishna","Abc","Mno"]}},{name:1,grade:1,_id:0});

{ "name" : "Krishna", "grade" : 9 }

{ "name" : "Abc", "grade" : 10 }

{ "name" : "Mno", "grade" : 5 }

> db.Student.find({name:/^S/},{name:1,grade:1,_id:0});

{ "name" : "Krishna", "grade" : 9 }

> db.Student.find({name:/.b/},{name:1,grade:1,_id:0});

{ "name" : "Abc", "grade" : 10 }

> db.Student.find().sort({name:1});

{ "_id" : 2, "name" : "Abc", "grade" : 10 }

{ "_id" : 3, "name" : "Mno", "grade" : 5 }

{ "_id" : 4, "name" : "Pqr", "grade" : 8 }

{ "_id" : 1, "name" : "Krishna", "grade" : 9 }

{ "_id" : 7, "name" : "kkk", "grade" : 6 }

{ "_id" : 6, "grade" : 2, "name" : "qwert" }

> db.Student.find().sort({name:1,grade:-1});

{ "_id" : 2, "name" : "Abc", "grade" : 10 }

{ "_id" : 3, "name" : "Mno", "grade" : 5 }

{ "_id" : 4, "name" : "Pqr", "grade" : 8 }

{ "_id" : 1, "name" : "Krishna", "grade" : 9 }

{ "_id" : 7, "name" : "kkk", "grade" : 6 }

{ "_id" : 6, "grade" : 2, "name" : "qwert" }

> db.Student.find({grade:8}).limit(3);

{ "_id" : 4, "name" : "Pqr", "grade" : 8 }

{ "_id" : 10, "name" : "zzz", "grade" : 8 }

> db.Student.find().skip(2);

{ "_id" : 3, "name" : "Mno", "grade" : 5 }

{ "_id" : 4, "name" : "Pqr", "grade" : 8 }

{ "_id" : 6, "grade" : 2, "name" : "qwert" }

{ "_id" : 7, "name" : "kkk", "grade" : 6 }

{ "_id" : 10, "name" : "zzz", "grade" : 8 }

VI. AGGREGATE FUNCTIONS

> db.faculty.aggregate ({$match:{department:"mech"}}, {$group : {_id : "$designation", AverageSal :{$avg:"$salary"} } }, {$match:{AverageSal:{$gt:50000}}});

{ "_id" : " associate prof", "AverageSal" : 85000 }

{ "_id" : "assistant prof", "AverageSal" : 70000 }

VII. ARRAYS

> db.food.insert({_id:1,fruits:['apple','mango']});

WriteResult({ "nInserted" : 1 })

> db.food.find({fruits:['pineapple','mango','orange']});

{ "_id" : 3, "fruits" : ["pineapple", "mango", "orange"] }

> db.food.find({fruits:{$all:['pineapple']}});

{ "_id" : 2, "fruits" : ["pineapple", "mango", "grapes"] }

{ "_id" : 3, "fruits" : ["pineapple", "mango", "orange"] }

> db.food.update({_id:2},{$set:{'fruits.1':'apple'}});

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

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

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

2. MongoDB Operations

1) Faculty DB

i) Create a database for Faculty and Create a Faculty Collection(Faculty_id, Name, Designation ,Department, Age, Salary, Specialization(Set)).

```
>use Faculty
```

```
> db.createCollection("faculty")
```

ii) Insert required documents to the collection.

```
> db.faculty.insert({_id:1,name:"abc",designation:"assistant prof",department:"mech",age:31,salary:90000,specialization:['python','mysql','autocad']});
```

iii) First Filter on "Dept_Name:MECH" and then group it on "Designation" and compute the Average Salary for that Designation and filter those documents where the "Avg_Sal" is greater than 650000.

```
> db.faculty.aggregate ( {$match:{department:"mech"}}, {$group : {_id : "$designation", AverageSal :{$avg:"$salary"} } }, {$match:{AverageSal:{$gt:50000}}});
```

```
{ "_id" : " associate prof", "AverageSal" : 85000 }
{ "_id" : "assistant prof", "AverageSal" : 70000 }
```

2) Consider a table "Product" with the following columns:
Product _id
ProductName
ManufacturingDate
Price
Quantity
Write MongoDB queries for the following:

```
> use Products switched to db Products
```

```
> db.createCollection("product");
```

```
{ "ok" : 1 }
```

>
db.product.insert({pid:1,pname:"keyboard",mdate:2001,price:1800,quantity:2})
;

WriteResult({ "nInserted" : 1 })

i)To display only the product name from all the documents of the product collection.

> db.product.find({},{pname:1,_id:0});

{ "pname" : "keyboard" }

{ "pname" : "mouse" }

{ "pname" : "motherboard" }

ii)To display only the Product ID, ExpiryDate as well as the quantity from the document of the product collection where the _id column is 1.

> db.product.find({pid:1},

{pid:1,_id:0,mdate:1,quantity:1});

{ "pid" : 1, "mdate" : 2001, "quantity" : 2 }

iii)To find those documents where the price is not set to 45000.

> db.product.find({price:{$ne:45000}},{pname:1,_id:0});

{ "pname" : "keyboard" }

{ "pname" : "mouse" }

{ "pname" : "motherboard" }

iv)To find those documents from the Product collection where the quantity is set to 30 and the product name is set to 'LEDTV'.

> db.product.find({$and:[{quantity:{$eq:30}},{pname:{$eq:"LED TV"}}]},{pname:1,_id:0})8

{ "pname" : "LED TV" }

v)To find documents from the Product collection where the Product name ends in 'r'.

> db.product.find({pname:/d$/},{pname:1,quantity:1,_id:0})

{ "pname" : "keyboard", "quantity" : 2 }

{ "pname" : "motherboard", "quantity" : 150 }

3) Create a mongodb collection Hospital. Demonstrate the following by choosing fields of your choice.

> use Hospital switched to db Hospital

> db.createCollection("hospital");

{ "ok" : 1 }

> db.hospital.insert({_id:1,name:"xyz",diseases:["diabetes","high bp","fever"]});

WriteResult({ "nInserted" : 1 })

1. Insert three documents

> db.hospital.updateMany({},{$pull:{diseases:"fever"}});

{ "acknowledged" : true, "matchedCount" : 3, "modifiedCount" : 2 }

2. Use Arrays(Use Pull and Pop operation)

> db.hospital.updateOne({_id:1},{$pop:{diseases:-1}});

{ "acknowledged" : true, "matchedCount" : 1, "modifiedCount" : 1 }

3. Use Index

> db.hospital.find({"diseases.2":"nausea"});

{ "_id" : 3, "name" : "mno", "diseases" : ["covid", "sarscov", "nausea"] }

4. Use Cursors

> db.hospital.find({}).count();

3

> db.hospital.find({}).limit(2);

{ "_id" : 1, "name" : "xyz", "diseases" : ["high bp"] } { "_id" : 2, "name" : "abc", "diseases" : ["typhoid", "cholera"] }

> db.hospital.find({}).size();

3

5. Updation

> db.hospital.update({_id:3},{$set:{'diseases.1':'sarscov'}});

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

3. Cassandra Lab 1

1. Create a key space by name Employee

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

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

cqlsh:employee> create table empInfo(emp_id int PRIMARY KEY, emp_name text,desig text,dpj timestamp,salary int,dept_name text);

3. Insert the values into the table in batch

cqlsh:employee> insert into empInfo(emp_id,emp_name,desig,dpj,salary,dept_name) values(1, 'Krishna','sde', '2022-05-05', 200000, 'cse');

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

cqlsh:employee> update empInfo set emp_name='zzz',dept_name='ie'where emp_id=2;

5. Sort the details of Employee records based on salary

.cqlsh:employee> select * from emp_Info where emp_id in (1,2,3) order by salary;

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.

cqlsh:employee> alter table empInfo add project set

7. Update the altered table to add project names.

cqlsh:employee> update empInfo set project={'reactJs','Ml'} where emp_id=1;

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

cqlsh:employee> insert into empInfo(emp_id,emp_name,desig,dpj,salary,dept_name) values(5, 'wxy', 'sde', '2022-02-05', 250000, 'cse') using ttl 30; cqlsh:employee> select ttl(emp_name) from empInfo;

4. Cassandra Lab 2

1 Create a key space by name Library

CREATE keyspace library1 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 lib.libinfo1 (s_id int, sname text, book text, bid int, doi timestamp, counter_val counter, PRIMARY KEY (s_id, sname, book, bid, doi));

3. Insert the values into the table in batch

update libinfo set counter_val=counter_val+1 where s_id=1 and sname='saf' and book='harry potter1' and bid=1 and doi='2022-05-05';

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

cqlsh:lib> update libinfo set counter_val=counter_val+1 where s_id=1 and sname='saf' and book='harry potter1'; cqlsh:lib> select * from libinfo;

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

cqlsh:lib> select counter_val from libinfo where s_id=1 and sname='saf' and book='harry potter1';

counter_val

2

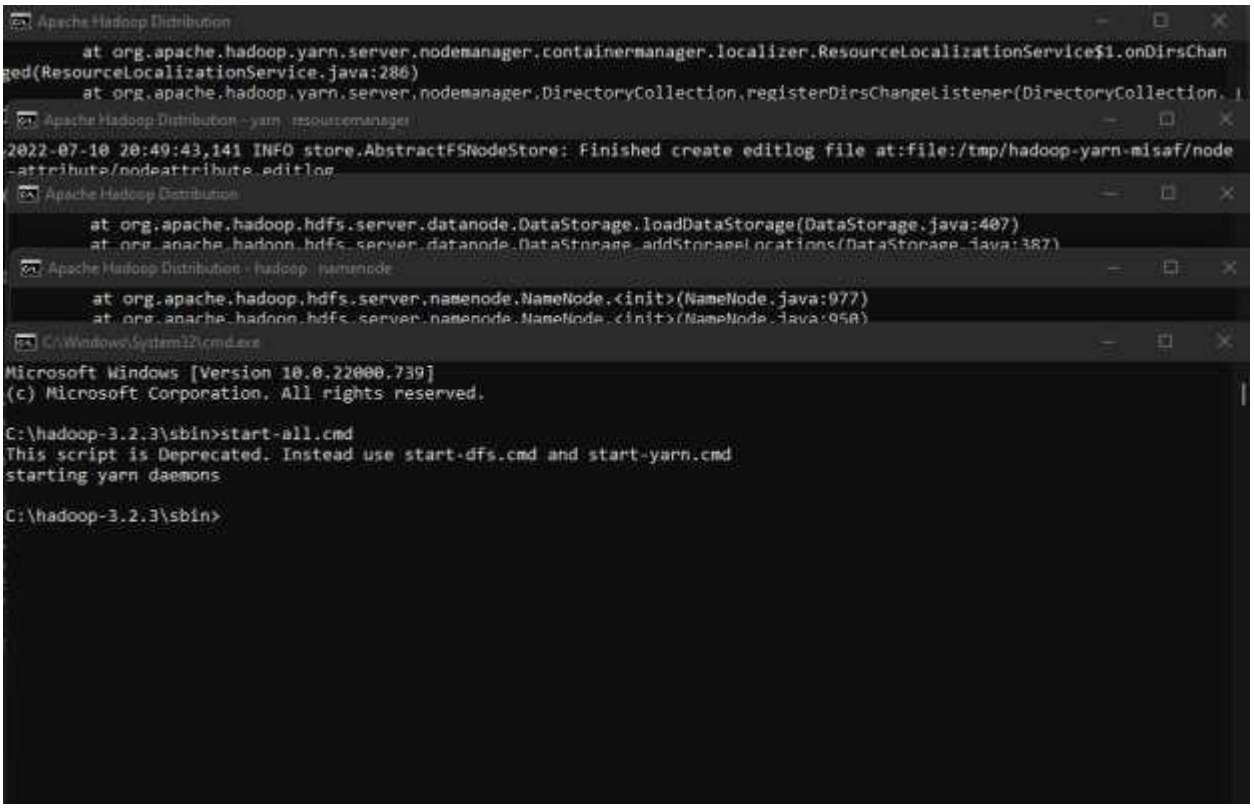
6. Export the created column to a csv file

COPY libinfo(s_id,sname,book,bid,doi,counter_val) TO 'data1.csv' WITH HEADER = TRUE;

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

COPY libinfo(s_id,sname,book,bid,doi) FROM 'libdata.csv' WITH HEADER = TRUE;

5. Screenshot of Hadoop Installation



6. HDFS Commands

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /
21/04/19 23:41:08 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 3 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:19 /mydir
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:21 /mydr
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:39 /newdir
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -mv /mydr /newdir
21/04/19 23:41:38 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /
21/04/19 23:41:44 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:19 /mydir
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:41 /newdir
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /newdir
21/04/19 23:42:05 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 1 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:21 /newdir/mydr
hduser@lab-VirtualBox:/usr/local/sbin$
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /
21/04/19 23:52:26 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:45 /mydir
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:48 /newdir
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -rm -R /mydir
21/04/19 23:52:56 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
21/04/19 23:52:57 INFO fs.TrashPolicyDefault: Namenode trash configuration: Del
etion interval = 0 minutes, Emptier interval = 0 minutes.
Deleted /mydir
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /
21/04/19 23:53:02 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 1 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:48 /newdir
hduser@lab-VirtualBox:/usr/local/sbin$
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -mkdir /mydir
21/04/19 22:58:30 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /
21/04/19 22:58:36 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 22:58 /mydir
drwxr-xr-x   - hduser supergroup          0 2021-04-18 19:27 /mydr
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -get /mydr ~/copyfromhadoop
21/04/19 23:25:49 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /
21/04/19 23:48:41 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:45 /mydir
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:41 /newdir
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -cp /mydir/sample.txt /newdir
21/04/19 23:48:56 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /newdir
21/04/19 23:49:22 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2021-04-19 23:21 /newdir/mydr
-rw-r--r--   1 hduser supergroup         13 2021-04-19 23:48 /newdir/sample.txt
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -copyToLocal /mydir ~/hadoopco
py
21/04/19 23:29:39 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
hduser@lab-VirtualBox:/usr/local/sbin$
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -copyFromLocal ~/file1.txt /my
dir
21/04/19 23:19:36 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /mydir
21/04/19 23:20:13 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 1 items
-rw-r--r--   1 hduser supergroup         30 2021-04-19 23:19 /mydir/file1.txt
```

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -cat /mydir/file1.txt
21/04/19 23:38:07 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
I am using Hadoop
line1
line2
```

7. Mean/Max temperature of weather data

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

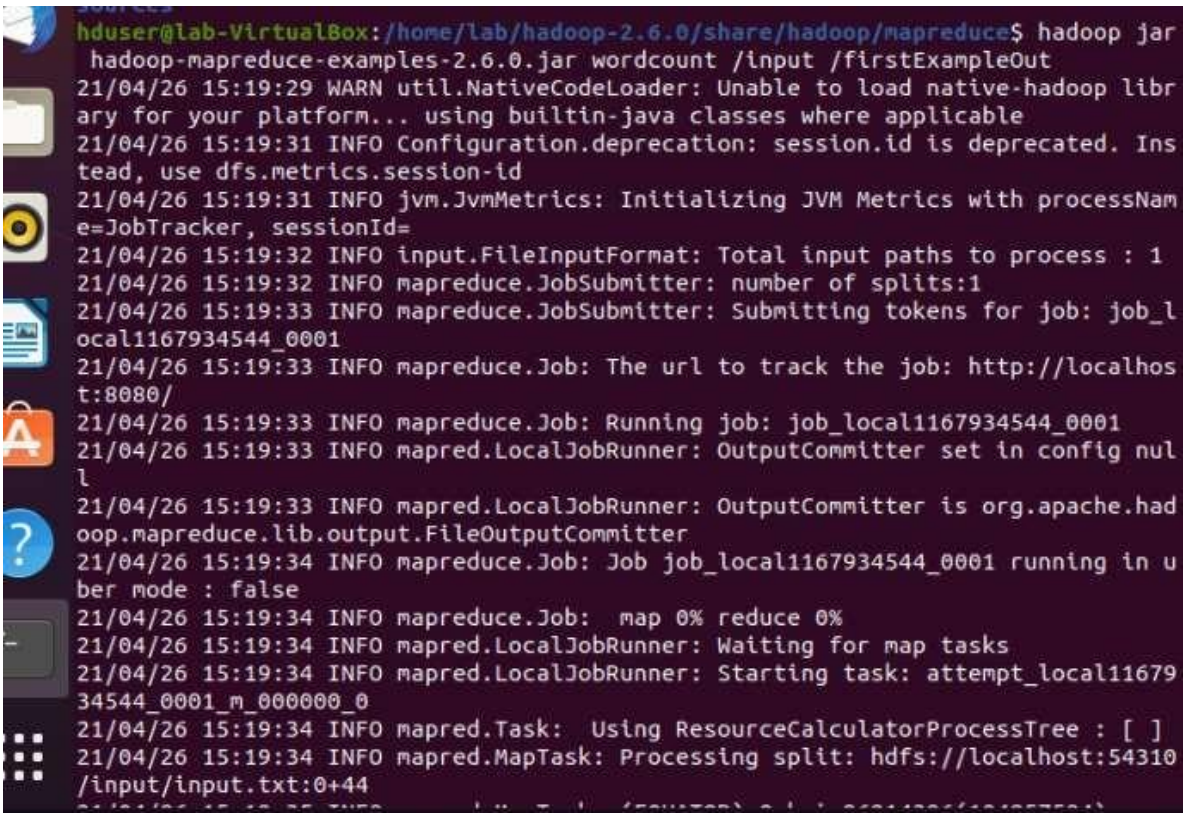
```
package temperatureMax;


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));

        }

}
```

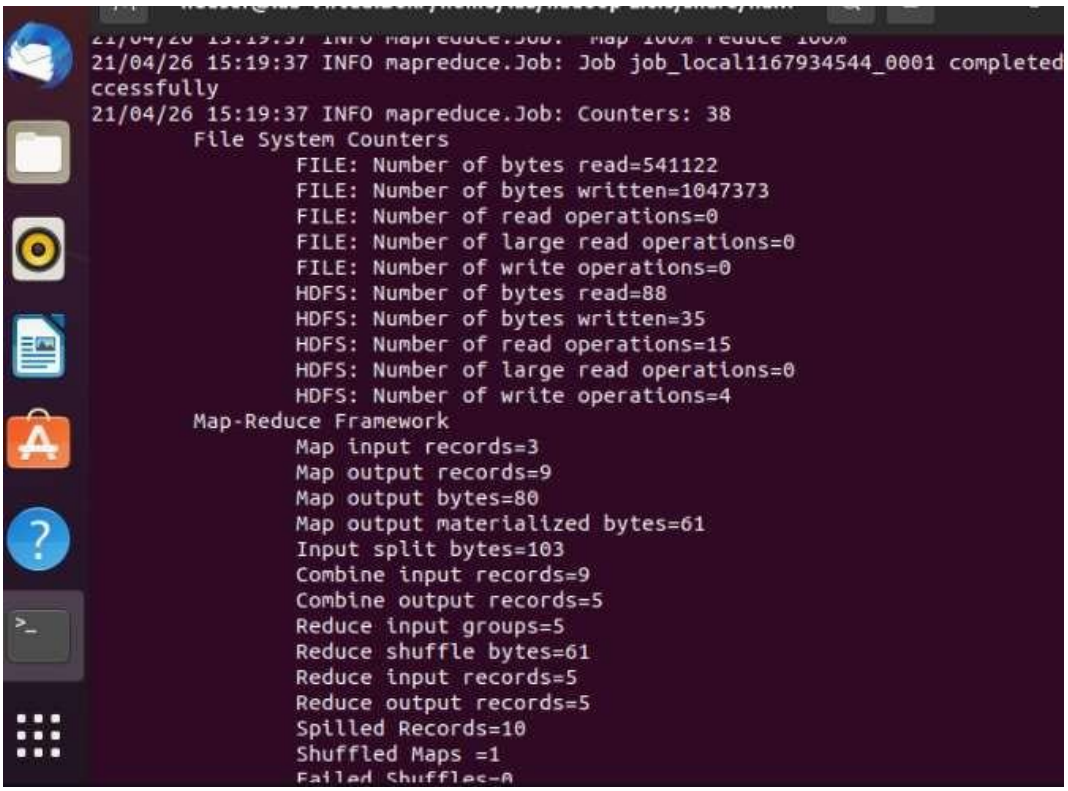
Output:

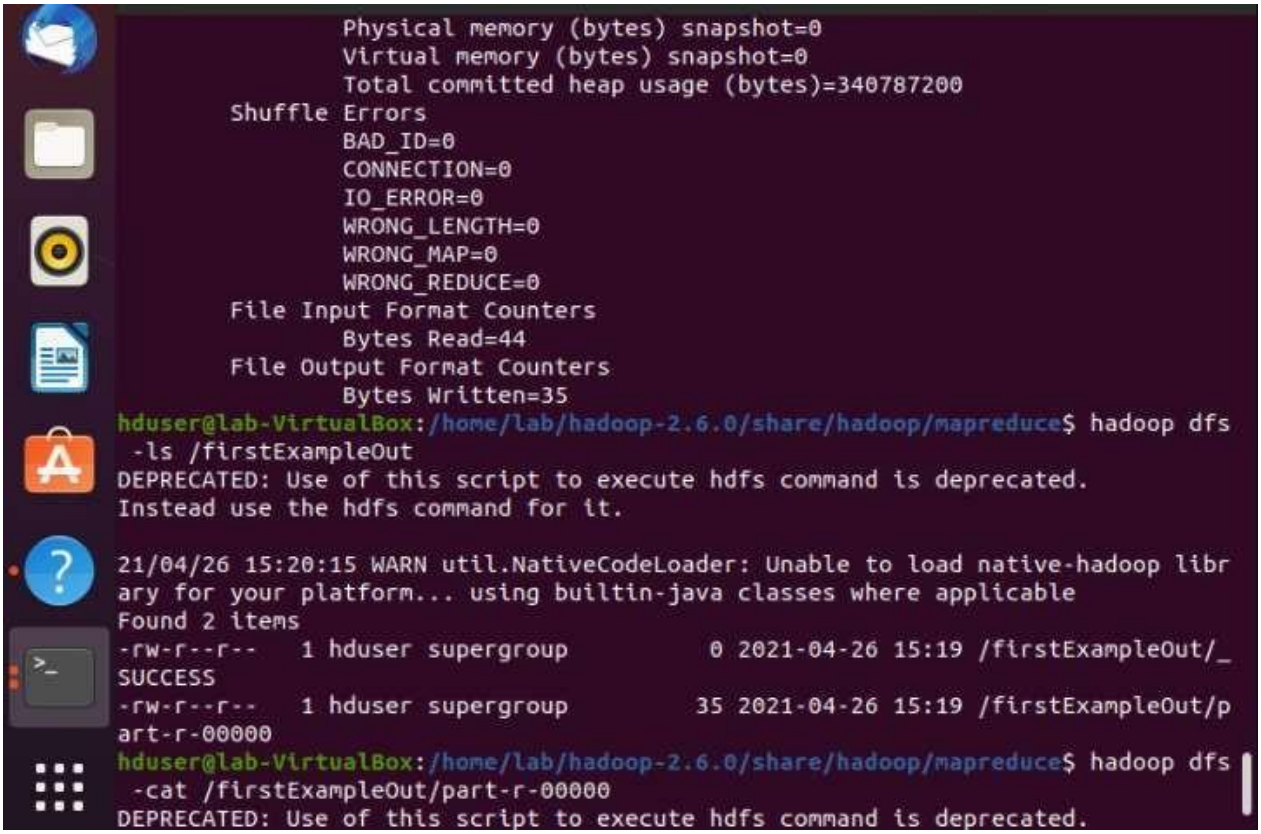
```
hduser@lab-VirtualBox:/home/lab$ hadoop dfs -cat /tempmax/part-r-00000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication
.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-
2.6.0.jar) to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop
.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflec
tive access operations
WARNING: All illegal access operations will be denied in a future release
21/05/10 16:08:48 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
03      111
05      22
```

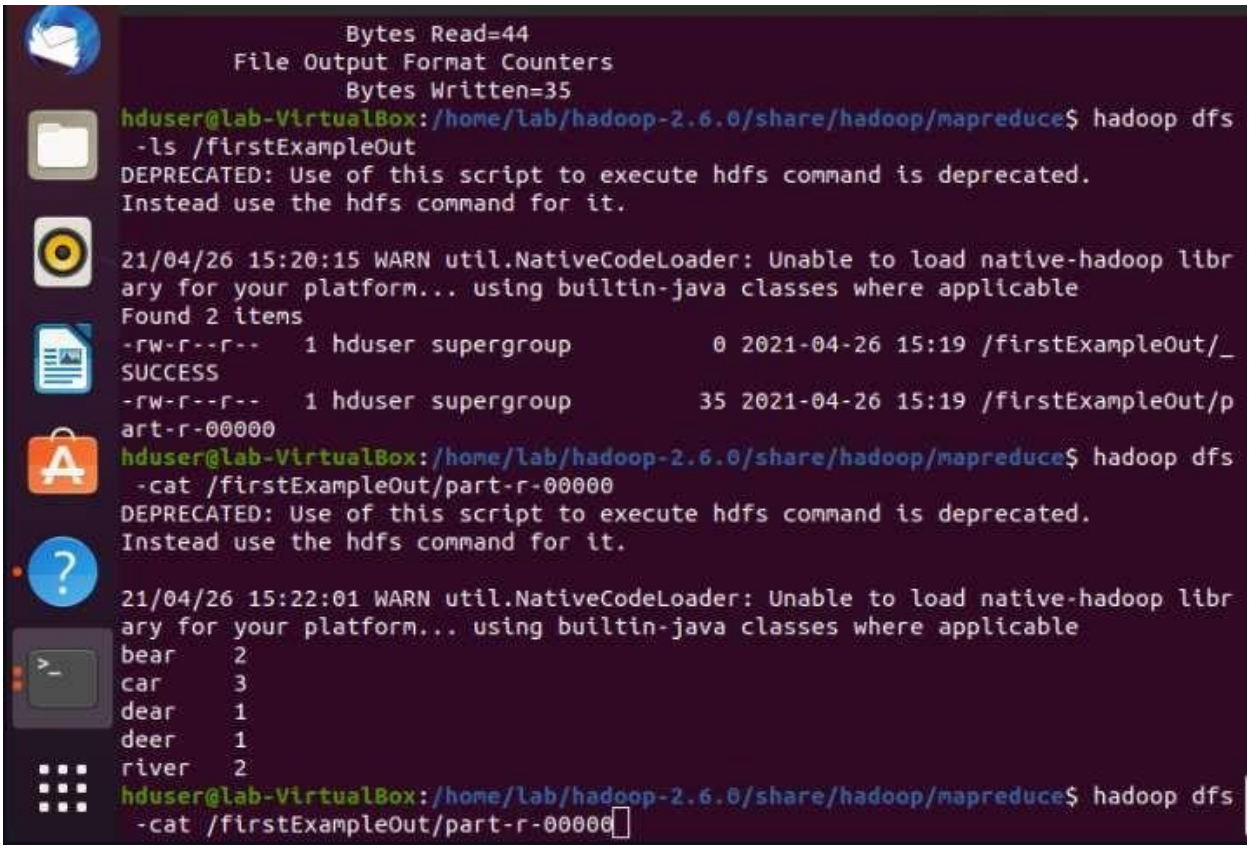
```
hduser@lab-VirtualBox:/home/lab$ hadoop dfs -ls  /tempmax
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication
.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-
2.6.0.jar) to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop
.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflec
tive access operations
WARNING: All illegal access operations will be denied in a future release
21/05/10 16:08:23 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 2 items
-rw-r--r--   1 hduser supergroup          0 2021-05-10 16:08 /tempmax/_SUCCESS
-rw-r--r--   1 hduser supergroup         13 2021-05-10 16:08 /tempmax/part-r-00
000
```

8. Word Occurences






Physical memory (bytes) snapshot=0
Virtual memory (bytes) snapshot=0
Total committed heap usage (bytes)=340787200
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=44
File Output Format Counters
Bytes Written=35
hduser@lab-VirtualBox:/home/lab/hadoop-2.6.0/share/hadoop/mapreduce$ hadoop dfs -ls /firstExampleOut
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
21/04/26 15:20:15 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 2 items
-rw-r--r-- 1 hduser supergroup 0 2021-04-26 15:19 /firstExampleOut/_SUCCESS
-rw-r--r-- 1 hduser supergroup 35 2021-04-26 15:19 /firstExampleOut/part-r-00000
hduser@lab-VirtualBox:/home/lab/hadoop-2.6.0/share/hadoop/mapreduce$ hadoop dfs -cat /firstExampleOut/part-r-00000
DEPRECATED: Use of this script to execute hdfs command is deprecated.


Bytes Read=44
File Output Format Counters
Bytes Written=35
hduser@lab-VirtualBox:/home/lab/hadoop-2.6.0/share/hadoop/mapreduce$ hadoop dfs -ls /firstExampleOut
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
21/04/26 15:20:15 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 2 items
-rw-r--r-- 1 hduser supergroup 0 2021-04-26 15:19 /firstExampleOut/_SUCCESS
-rw-r--r-- 1 hduser supergroup 35 2021-04-26 15:19 /firstExampleOut/part-r-00000
hduser@lab-VirtualBox:/home/lab/hadoop-2.6.0/share/hadoop/mapreduce$ hadoop dfs -cat /firstExampleOut/part-r-00000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
21/04/26 15:22:01 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
bear 2
car 3
dear 1
deer 1
river 2
hduser@lab-VirtualBox:/home/lab/hadoop-2.6.0/share/hadoop/mapreduce$ hadoop dfs -cat /firstExampleOut/part-r-00000

9. Use of Join

Driver Class

```
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);
	}
}
```

Mapper Class

```
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]));
	}
}
```

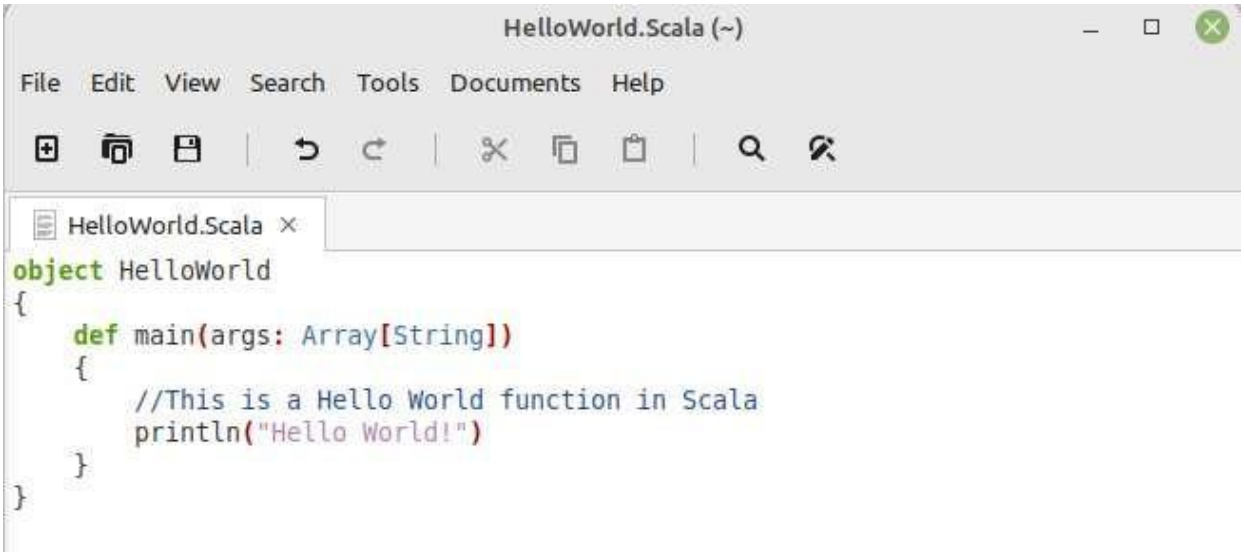
Reducer Class

```
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);
		}
	}
}
```

10. Program to print word count on scala shell and print “Hello world” on scala IDE

```
object HelloWorld {
   def main(args: Array[String]) {
      println("Hello world")
   }
}
```

```
Hello world
```



11. Using RDD and FlatMap

Code:

```
>val text = sc.textFile("abc.txt")

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

>val greaterThan4=counts.filter(x=>x._2>4);

>greaterThan4.collect().forEach(println)
```

Input file:

Hello Hello World Hello Hello Xyz Xyz Xyz Hello World Hello Xyz World World Xyz Hello World

Output:

Hello 7

World 5

Xyz 5