VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

BIG DATA ANALYTICS
(20CS6PEBDA)

Submitted by

PRIYANSHU GUPTA (1BM19CS124)

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 **PRIYANSHU GUPTA (1BM19CS124),** 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 **BIG DATA ANALYTICS - (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

Lab 1

Program 1. Perform the following DB operations using Cassandra.

1. Create a key space by name 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

3. Insert the values into the table in batch

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

5. Sort the details of Employee records based on 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.

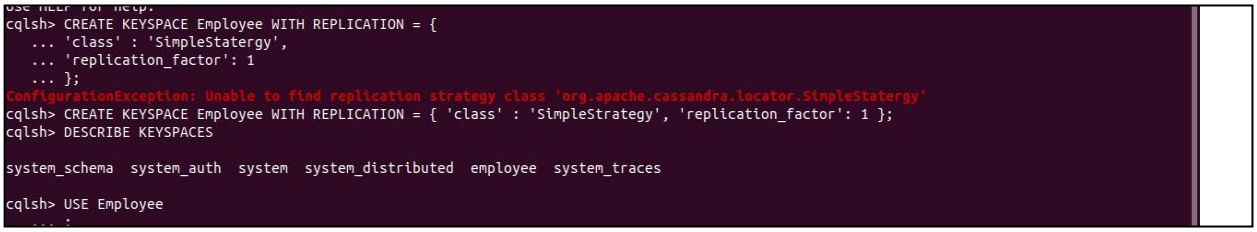
7. Update the altered table to add project names.

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

1.

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

cqlsh> DESCRIBE KEYSPACES



system_schema system_auth system system_distributed employee system_traces

2. CREATE TABLE Employee_info(

... emp_id int PRIMARY KEY,

... emp_name text,

... designation text,

... date_of_joining timestamp,

... salary double,

... dept_name text

...);

```
bmsce@bmsce-Precision-T1700: ~/cassandra/apache-cassandra-3.11.0/bin

CREATE TABLE employee.employee_info (
    emp_id int PRIMARY KEY,
    date_of_joining timestamp,
    dept_name text,
    designation text,
    emp_name text,
    salary double
) WITH bloom_filter_fp_chance = 0.01
    AND caching = {'keys': 'ALL', 'rows_per_partition': 'NONE'}
    AND comment = ''
    AND compaction = {'class': 'org.apache.cassandra.db.compaction.SizeTieredCompactionStrategy', 'max_threshold': '32', 'min_threshold': '4'}
    AND compression = {'chunk_length_in_kb': '64', 'class': 'org.apache.cassandra.io.compress.LZ4Compressor'}
    AND crc_check_chance = 1.0
    AND dclocal_read_repair_chance = 0.1
    AND default_time_to_live = 0
    AND gc_grace_seconds = 864000
    AND max_index_interval = 2048
    AND memtable_flush_period_in_ms = 0
    AND min_index_interval = 128
    AND read_repair_chance = 0.0
    AND speculative_retry = '99PERCENTILE';
```

3) BEGIN BATCH

... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)

... VALUES (1,'Pooja','Manager','2023-09-12',60000,'Technical')

... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)

... VALUES (2,'Prema','Supervisor','2023-10-12',55000,'Technical')

... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)

... VALUES (3,'Vijay','Employee','2023-10-30',45000,'HR')

... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)

... VALUES (4,'Prajwal','General manager','2023-12-30',55000,'Research')

... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)

... VALUES (5,'Varun','Manager','2023-12-30',55000,'Research')

... APPLY BATCH;

```
bmsce@bmsce-Precision-T1700: ~/cassandra/apache-cassandra-3.11.0/bin

cqlsh:employee> BEGIN BATCH
           ... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)
           ... VALUES (1,'Pooja','Manager','2023-09-12',60000,'Technical')
           ... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)
           ... VALUES (2,'Prema','Supervisor','2023-10-12',55000,'Technical')
           ... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)
           ... VALUES (3,'Vijay','Employee','2023-10-30',45000,'HR')
           ... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)
           ... VALUES (4,'Prajwal','General manager','2023-12-30',55000,'Research')
           ... INSERT INTO Employee_info(emp_id,emp_name,designation,date_of_joining,salary,dept_name)
           ... VALUES (5,'Varun','Manager','2023-12-30',55000,'Research')
           ... APPLY BATCH;
cqlsh:employee> SELECT * FROM eMPLOYEE_INFO
           ... ;

 emp_id | date_of_joining                 | dept_name | designation     | emp_name | salary
--------+---------------------------------+-----------+-----------------+----------+--------
      5 | 2023-12-29 18:30:00.000000+0000 |  Research |         Manager |    Varun |  55000
      1 | 2023-09-11 18:30:00.000000+0000 | Technical |         Manager |    Pooja |  60000
      2 | 2023-10-11 18:30:00.000000+0000 | Technical |      Supervisor |    Prema |  55000
      4 | 2023-12-29 18:30:00.000000+0000 |  Research | General manager |  Prajwal |  55000
      3 | 2023-10-29 18:30:00.000000+0000 |        HR |        Employee |    Vijay |  45000
```

4). SELECT * FROM eMPLOYEE_INFO

... ;

emp_id | date_of_joining | dept_name | designation | emp_name | salary

+ + + + + +

5 | 2023-12-29 18:30:00.000000+0000 | Research | Manager | Varun | 55000

1 | 2023-09-11 18:30:00.000000+0000 | Technical | Manager | Pooja | 60000

2 | 2023-10-11 18:30:00.000000+0000 | Technical | Supervisor | Prema | 55000

4 | 2023-12-29 18:30:00.000000+0000 | Research | General manager | Prajwal | 55000

3 | 2023-10-29 18:30:00.000000+0000 | HR | Employee | Vijay | 45000

5.)

UPDATE Employee_info SET emp_name = 'Tarun',dept_name='Sales' WHERE emp_id=5;

cqlsh:employee> SELECT * FROM eMPLOYEE_INFO ;

emp_id | date_of_joining | dept_name | designation | emp_name | salary

5 | 2023-12-29 18:30:00.000000+0000 | Sales | Manager | Tarun | 55000

1 | 2023-09-11 18:30:00.000000+0000 | Technical | Manager | Pooja | 60000

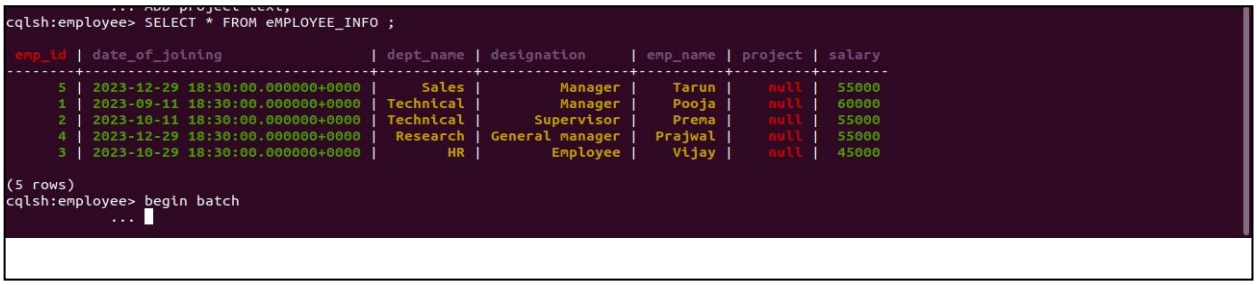
2 | 2023-10-11 18:30:00.000000+0000 | Technical | Supervisor | Prema | 55000

4 | 2023-12-29 18:30:00.000000+0000 | Research | General manager | Prajwal | 55000

3 | 2023-10-29 18:30:00.000000+0000 | HR | Employee | Vijay | 45000

6)ALTER TABLE Employee_info

... ADD project text;



7)

begin batch

... update employee_info set project = 'abc' where emp_id=1

```
        ... update employee_info set project = 'dfc' where emp_id=2
        ... update employee_info set project = 'dfc' where emp_id=3
        ... update employee_info set project = 'xyz' where emp_id=4
        ... update employee_info set project = 'rqz' where emp_id=5
        ... ;
        ... apply batch;
cqlsh:employee> SELECT * FROM eMPLOYEE_INFO ;

 emp_id | date_of_joining                 | dept_name | designation     | emp_name | project | salary
--------+---------------------------------+-----------+-----------------+----------+---------+--------
      5 | 2023-12-29 18:30:00.000000+0000 |     Sales |         Manager |    Tarun |     rqz | 55000
      1 | 2023-09-11 18:30:00.000000+0000 | Technical |         Manager |    Pooja |     abc | 60000
      2 | 2023-10-11 18:30:00.000000+0000 | Technical |      Supervisor |    Prema |     dfc |  55000
      4 | 2023-12-29 18:30:00.000000+0000 |  Research | General manager |  Prajwal |     xyz | 55000
      3 | 2023-10-29 18:30:00.000000+0000 |        HR |        Employee |    Vijay |     dfc | 45000
```

LAB 2

1 Create a key space by name Library

```
create keyspace library with replication={
  ... 'class':'SimpleStrategy','replication_factor':1
  ... };
```

```
cqlsh> describe keyspace library;

CREATE KEYSPACE library WITH replication = {'class': 'SimpleStrategy', 'replication_factor': '1'}  AND durable_writes = true;
```

```
use library;
```

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(
        ... 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));
```

```
cqlsh:library> describe table library_info;

CREATE TABLE library.library_info (
    stud_id int,
    stud_name text,
    book_name text,
    book_id int,
    date_of_issue timestamp,
    counter_value counter,
    PRIMARY KEY (stud_id, stud_name, book_name, book_id, date_of_issue)
) WITH CLUSTERING ORDER BY (stud_name ASC, book_name ASC, book_id ASC, date_of_issue ASC)
    AND additional_write_policy = '99p'
    AND bloom_filter_fp_chance = 0.01
    AND caching = {'keys': 'ALL', 'rows_per_partition': 'NONE'}
    AND cdc = false
    AND comment = ''
    AND compaction = {'class': 'org.apache.cassandra.db.compaction.SizeTieredCompactionStrategy', 'max_threshold': '32', 'min_threshold': '4'}
    AND compression = {'chunk_length_in_kb': '16', 'class': 'org.apache.cassandra.io.compress.LZ4Compressor'}
    AND crc_check_chance = 1.0
    AND default_time_to_live = 0
    AND extensions = {}
    AND gc_grace_seconds = 864000
    AND max_index_interval = 2048
    AND memtable_flush_period_in_ms = 0
    AND min_index_interval = 128
    AND read_repair = 'BLOCKING'
    AND speculative_retry = '99p';
```

3. Insert the values into the table in batch

```
cqlsh:library> update library_info set counter_value=counter_value+1 where stud_id=1 and stud_name = 'Raj' and book_name='BDA' and book_id=200 and date_of_issue='2022-04-30';
cqlsh:library> update library_info set counter_value=counter_value+1 where stud_id=2 and stud_name = 'Ravi' and book_name='ADA' and book_id=100 and date_of_issue='2022-04-30';
```

```
cqlsh:library> update library_info set counter_value=counter_value+1 where stud_id=1 and stud_name = 'Raj' and book_name='BDA' and book_id=200 and date_of_issue='2022-05-30';
```

cqlsh:library> select * from library_info;

```
cqlsh:library> select * from library_info;

 stud_id | stud_name | book_name | book_id | date_of_issue                     | counter_value
---------+-----------+-----------+---------+-----------------------------------+---------------
       1 |       Raj |       BDA |     200 | 2022-04-29 18:30:00.000000+0000 |             1
       1 |       Raj |       BDA |     200 | 2022-05-29 18:30:00.000000+0000 |             1
       2 |      Ravi |       ADA |     100 | 2022-04-29 18:30:00.000000+0000 |             1

(3 rows)
```

4. 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_name = 'Raj' and book_name='BDA' and book_id=200 and date_of_issue='2022-04-30';
cqlsh:library> select * from library_info;

```
 stud_id | stud_name | book_name | book_id | date_of_issue                     | counter_value
---------+-----------+-----------+---------+-----------------------------------+---------------
       1 |       Raj |       BDA |     200 | 2022-04-29 18:30:00.000000+0000 |             2
       1 |       Raj |       BDA |     200 | 2022-05-29 18:30:00.000000+0000 |             1
       2 |      Ravi |       ADA |     100 | 2022-04-29 18:30:00.000000+0000 |             1
```

```
cqlsh:library> select * from library_info;

 stud_id | stud_name | book_name | book_id | date_of_issue                     | counter_value
---------+-----------+-----------+---------+-----------------------------------+---------------
       1 |       Raj |       BDA |     200 | 2022-04-29 18:30:00.000000+0000 |             2
       1 |       Raj |       BDA |     200 | 2022-05-29 18:30:00.000000+0000 |             1
       2 |      Ravi |       ADA |     100 | 2022-04-29 18:30:00.000000+0000 |             1

(3 rows)
```

5. Write a query to show that a student with id 1 has taken a book “BDA” 2 times.cqlsh:library> select counter_value from library_info where stud_id = 1;

```
 counter_value
---------------
             2
             1
```

```
cqlsh:library> select counter_value from library_info where stud_id = 1;

 counter_value
---------------
             2
             1

(2 rows)
```

6. Export the created column to a csv file

```
cqlsh:lab2_library> copy library_info(stud_id,stud_name,book_id,date_of_issue,counter_value)to 'lib.csv';
Using 7 child processes

Starting copy of lab2_library.library_info with columns [stud_id, stud_name, book_id, date_of_issue, counter_v
alue].
Processed: 2 rows; Rate:       9 rows/s; Avg. rate:       9 rows/s
2 rows exported to 1 files in 0.250 seconds.
```

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

Cassandra column familycqlsh:library>truncate library_info;

cqlsh:library>copy library_info(stud_id,stud_name,book_id,date_of_issue,counter_value) from 'lib.csv';

Lab3

use studentdb switched

to db studentdb

```
db.createCollection("student_details")
{ "ok" : 1 }

db.student_details.insert({'name':'abc','rollno':1,'age':19,'contactno':9090909090,'email':'abc@lab.
com'})
WriteResult({ "nInserted" : 1 })

db.student_details.insert({'name':'mno','rollno':2,'age':20,'contactno':9999900000,'email':'mno@lab.com'})
WriteResult({ "nInserted" : 1 })

db.student_details.insert({'name':'xyz','rollno':3,'age':21,'contactno':9999911111,'email':'xyz@lab .com'})
WriteResult({ "nInserted" : 1 })

db.student_details.find({})
{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19,
"contactno" : 9090909090, "email" : "abc@lab.com" }
{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20,
"contactno" : 9999900000, "email" : "mno@lab.com" }
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "xyz", "rollno" : 3, "age" : 21,
"contactno" : 9999911111, "email" : "xyz@lab.com" }

db.student_details.update({'rollno':3},{$set:{'email':'update@lab.com'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
```

```
db.student_details.find({'rollno':3})
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "xyz", "rollno" : 3, "age" : 21,
"contactno" : 9999911111, "email" : "update@lab.com" }

db.student_details.update({'name':'xyz'},{$set:{'name':'pqr'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
db.student_details.find({'name':'pqr'})
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "pqr", "rollno" : 3, "age" : 21,
"contactno" : 9999911111, "email" : "update@lab.com" }

mongoexport --db studentdb --collection student_details --out E:\Desktop\sample.json
2021-05-22T10:43:30.687+0530    connected to: mongodb://localhost/
2021-05-22T10:43:31.026+0530    exported 3 records

db.getCollection('student_details').drop()
true

mongoimport --db studentdb --collection student_details --type=json --file=
E:\Desktop\sample.json
2021-05-22T10:46:49.898+0530    connected to: mongodb://localhost/ 2021-05-
22T10:46:50.044+0530    3 document(s) imported successfully. 0 document(s) failed to import.

db.student_details.find({})
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "pqr", "rollno" : 3, "age" : 21,
"contactno" : 9999911111, "email" : "update@lab.com" }
{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19,
"contactno" : 9090909090, "email" : "abc@lab.com" }
{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20,
"contactno" : 9999900000, "email" : "mno@lab.com" }

db.student_details.remove({age:{$gt:20}})
```

WriteResult({ "nRemoved" : 1 })

db.student_details.find({})

{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19, "contactno" : 9090909090, "email" : "abc@lab.com" }

{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20, "contactno" : 9999900000, "email" : "mno@lab.com" }

db.student_details.find({})

{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19, "contactno" : 9090909090, "email" : "abc@lab.com" }

{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20, "contactno" : 9999900000, "email" : "mno@lab.com" }

```
> use studentdb
switched to db studentdb
> db.createCollection("student_details")
{ "ok" : 1 }
> db.student_details.insert({'name':'abc','rollno':1,'age':19,'contactno':9090909090,'email':'abc@lab.com'})
WriteResult({ "nInserted" : 1 })
> db.student_details.insert({'name':'mno','rollno':2,'age':20,'contactno':9999900000,'email':'mno@lab.com'})
WriteResult({ "nInserted" : 1 })
> db.student_details.insert({'name':'xyz','rollno':3,'age':21,'contactno':9999911111,'email':'xyz@lab.com'})
WriteResult({ "nInserted" : 1 })
> db.student_details.find({})
{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19, "contactno" : 9090909090, "email" : "abc@lab.com" }
{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20, "contactno" : 9999900000, "email" : "mno@lab.com" }
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "xyz", "rollno" : 3, "age" : 21, "contactno" : 9999911111, "email" : "xyz@lab.com" }
> db.student_details.update({'rollno':3},{$set:{'email':'update@lab.com'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.student_details.find({'rollno':3})
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "xyz", "rollno" : 3, "age" : 21, "contactno" : 9999911111, "email" : "update@lab.com" }
> db.student_details.update({'name':'xyz'},{$set:{'name':'pqr'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.student_details.find({'name':'pqr'})
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "pqr", "rollno" : 3, "age" : 21, "contactno" : 9999911111, "email" : "update@lab.com" }
```

```
> db.student_details.find({})
{ "_id" : ObjectId("60a88f8fffecf7c8abe76777"), "name" : "pqr", "rollno" : 3, "age" : 21, "contactno" : 9999911111, "email" : "update@lab.com" }
{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19, "contactno" : 9090909090, "email" : "abc@lab.com" }
{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20, "contactno" : 9999900000, "email" : "mno@lab.com" }
> db.student_details.remove({age:{$gt:20}})
WriteResult({ "nRemoved" : 1 })
> db.student_details.find({})
{ "_id" : ObjectId("60a88f32ffecf7c8abe76775"), "name" : "abc", "rollno" : 1, "age" : 19, "contactno" : 9090909090, "email" : "abc@lab.com" }
{ "_id" : ObjectId("60a88f7effecf7c8abe76776"), "name" : "mno", "rollno" : 2, "age" : 20, "contactno" : 9999900000, "email" : "mno@lab.com" }
```

LAB4

SCREENSHOT OF HADOOP INSTALLATION

```
shashi@Shashis-MacBook-Air-2 ~ % hadoop -version
ERROR: -version is not COMMAND nor fully qualified CLASSNAME.
Usage: hadoop [OPTIONS] SUBCOMMAND [SUBCOMMAND OPTIONS]
 or    hadoop [OPTIONS] CLASSNAME [CLASSNAME OPTIONS]
  where CLASSNAME is a user-provided Java class

  OPTIONS is none or any of:

--config dir                     Hadoop config directory
--debug                          turn on shell script debug mode
--help                           usage information
buildpaths                       attempt to add class files from build tree
hostnames list[,of,host,names]   hosts to use in slave mode
hosts filename                   list of hosts to use in slave mode
loglevel level                   set the log4j level for this command
workers                          turn on worker mode

  SUBCOMMAND is one of:


    Admin Commands:

daemonlog     get/set the log level for each daemon

    Client Commands:

archive       create a Hadoop archive
checknative   check native Hadoop and compression libraries availability
classpath     prints the class path needed to get the Hadoop jar and the
              required libraries
conftest      validate configuration XML files
credential    interact with credential providers
distch        distributed metadata changer
distcp        copy file or directories recursively
dtutil        operations related to delegation tokens
envvars       display computed Hadoop environment variables
fs            run a generic filesystem user client
gridmix       submit a mix of synthetic job, modeling a profiled from
              production load
jar <jar>     run a jar file. NOTE: please use "yarn jar" to launch YARN
              applications, not this command.
jnipath       prints the java.library.path
kdiag         Diagnose Kerberos Problems
kerbname      show auth_to_local principal conversion
key           manage keys via the KeyProvider
rumenfolder   scale a rumen input trace
rumentrace    convert logs into a rumen trace
s3guard       manage metadata on S3
trace         view and modify Hadoop tracing settings
version       print the version

    Daemon Commands:

kms           run KMS, the Key Management Server
registrydns   run the registry DNS server

SUBCOMMAND may print help when invoked w/o parameters or with -h.
```

LAB 5

Execution of HDFS Commands for interaction with Hadoop Environment. (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.txt

c:\hadoop_new\sbin>hdfs dfs -cat \temp\sample.txt hello

world

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

c:\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 - Admin

supergroup 0 2021-04-19 15:07 /temp/lab1 -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 -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

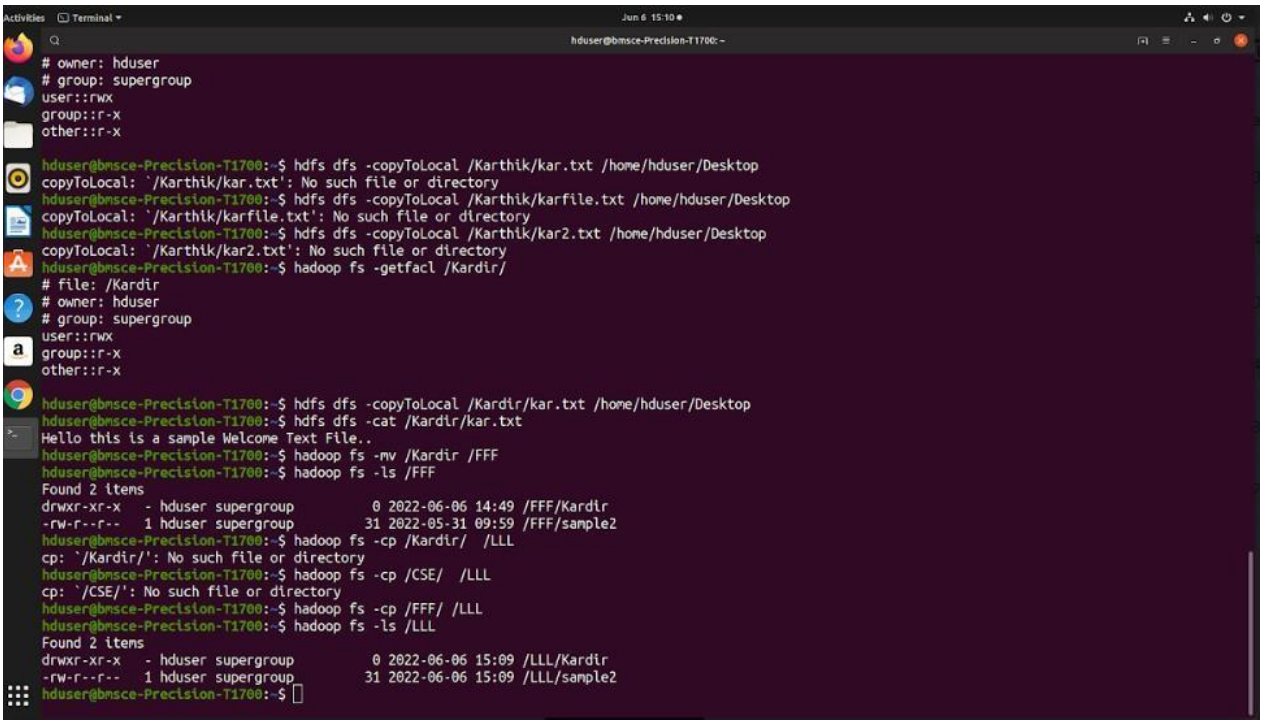
c:\hadoop_new\sbin>hdfs dfs -ls \temp Found 3 items drwxr-xr-x - Admin

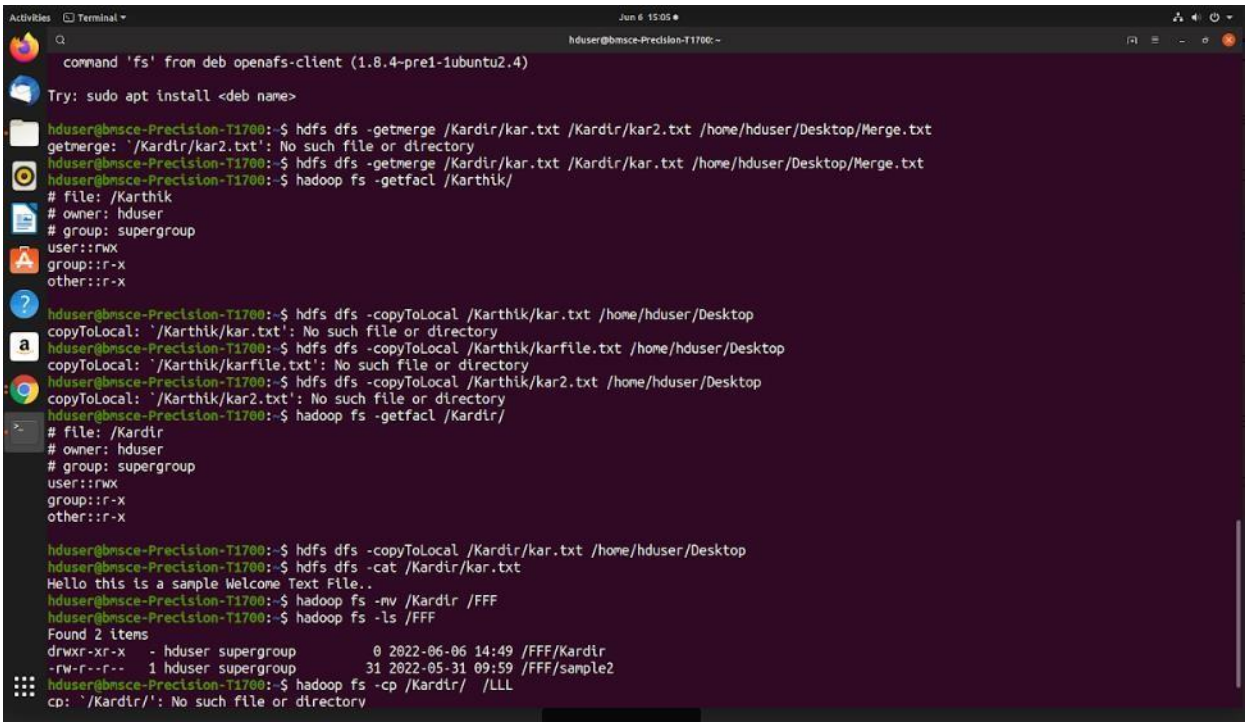
supergroup 0 2021-04-19 15:07 /temp/lab1 -rw-r--r-- 1 Admin supergroup

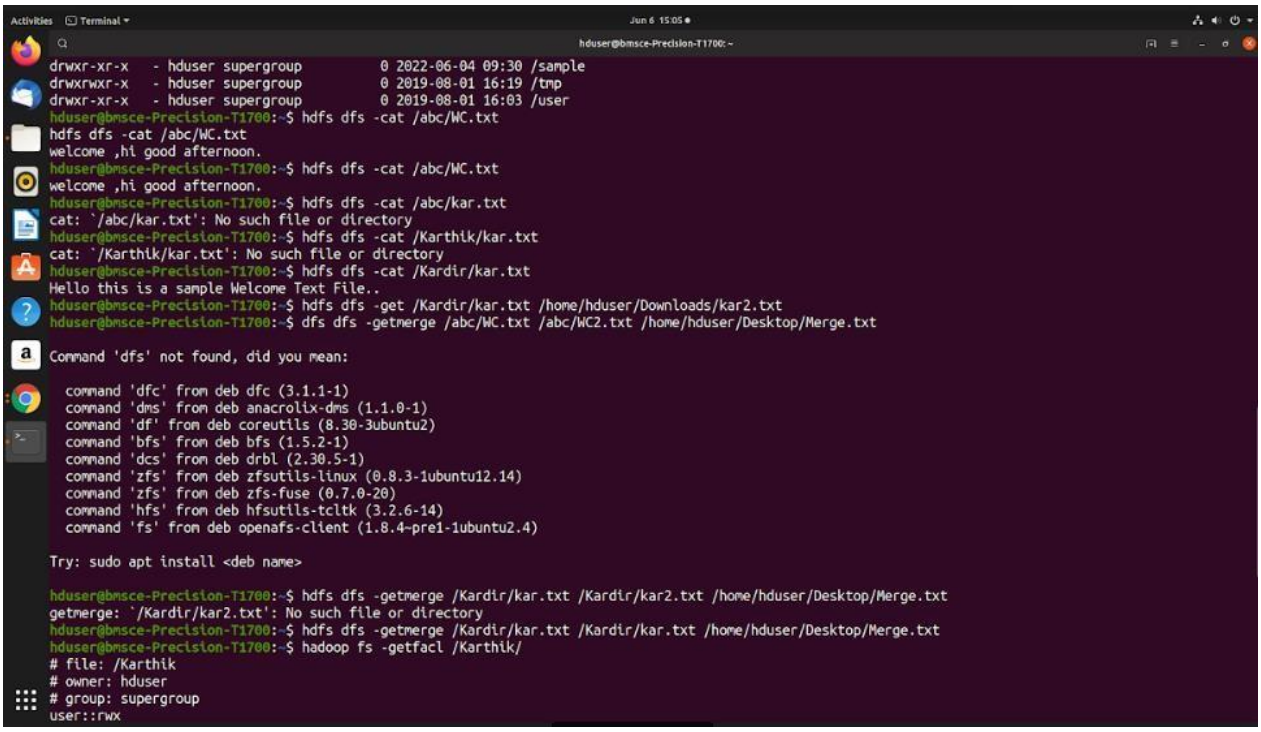
11 2021-06-11 21:17 /temp/sample.txt drwxr-xr-x - Admin supergroup 0

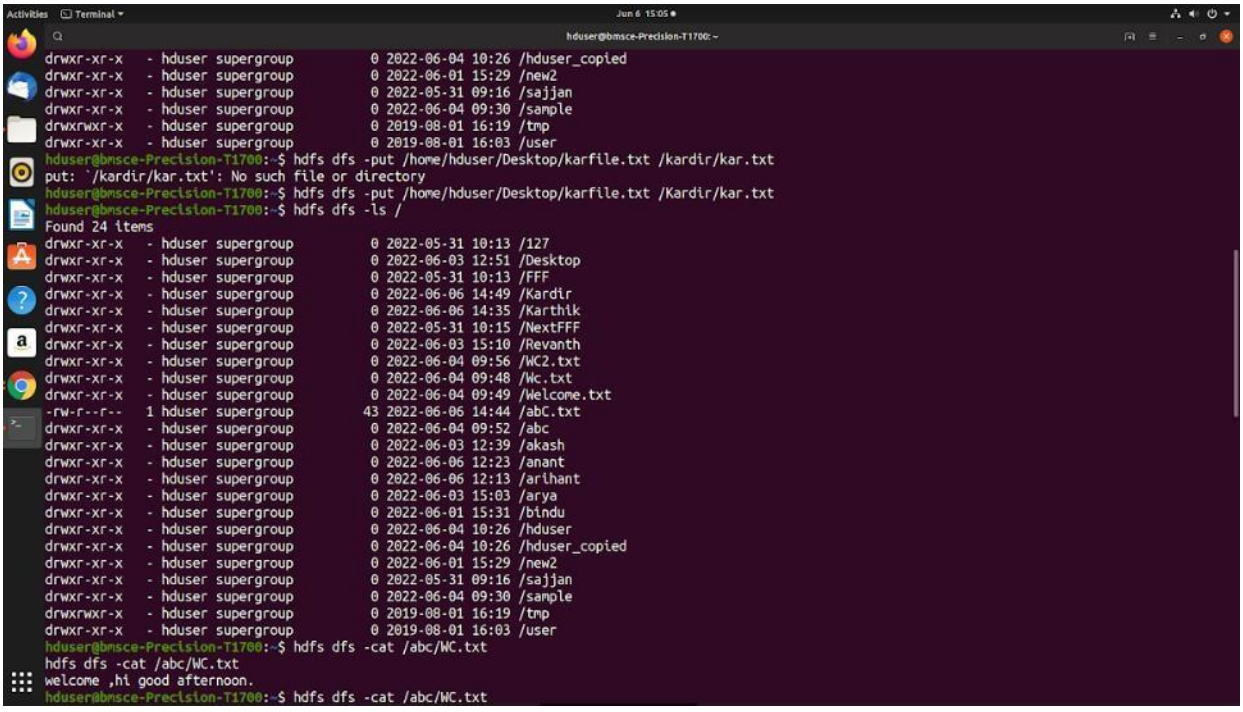
2021-06-11 21:15 /temp/temp

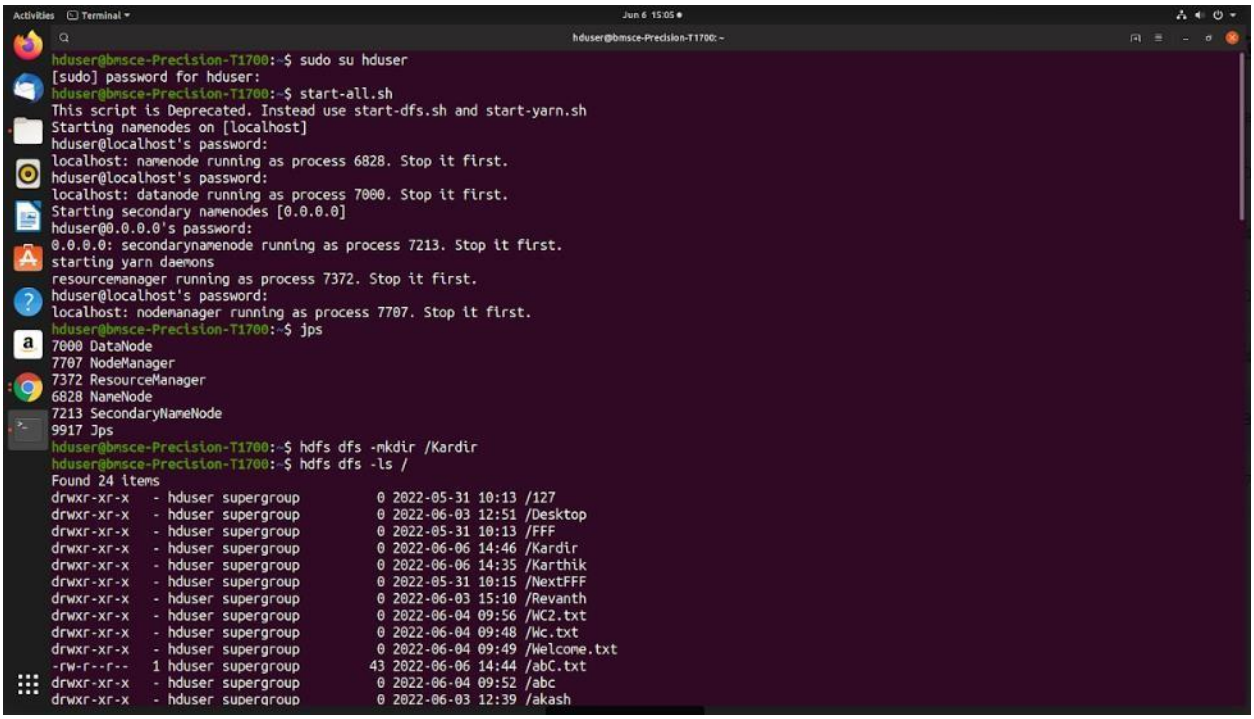
c:\hadoop_new\sbin>hdfs dfs -copyToLocal \temp\sample.txt E:\Desktop\sample.txt

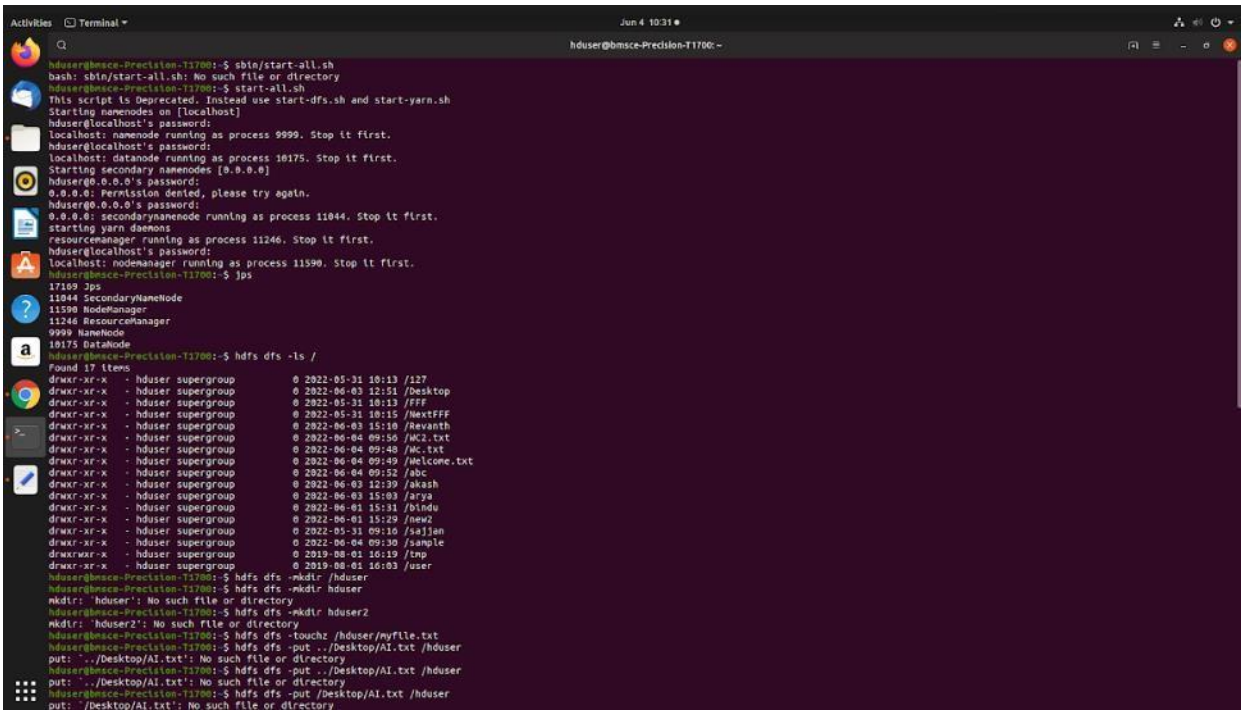

Activities
Terminal
Jun 6 15:10
hduser@bmsce-Precision-T1700: ~
owner: hduser
group: supergroup
user::rwx
group::r-x
other::r-x
hduser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar.txt /home/hduser/Desktop
copyToLocal: `/Karthik/kar.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ 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:~$


Activities
Terminal
Jun 6 15:05
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


Activities
Terminal
Jun 6 15:05
hduser@bmsce-Precision-T1700: ~
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:30 /sample
drwxrwxr-x - hduser supergroup 0 2019-08-01 16:19 /tmp
drwxr-xr-x - hduser supergroup 0 2019-08-01 16:03 /user
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /abc/WC.txt
hdfs dfs -cat /abc/WC.txt
welcome ,hi good afternoon.
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /abc/WC.txt
welcome ,hi good afternoon.
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /abc/kar.txt
cat: `/abc/kar.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /Karthik/kar.txt
cat: `/Karthik/kar.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /Kardir/kar.txt
Hello this is a sample Welcome Text File..
hduser@bmsce-Precision-T1700:~$ hdfs dfs -get /Kardir/kar.txt /home/hduser/Downloads/kar2.txt
hduser@bmsce-Precision-T1700:~$ dfs dfs -getmerge /abc/WC.txt /abc/WC2.txt /home/hduser/Desktop/Merge.txt
Command 'dfs' not found, did you mean:
command 'dfc' from deb dfc (3.1.1-1)
command 'dms' from deb anacrolix-dms (1.1.0-1)
command 'df' from deb coreutils (8.30-3ubuntu2)
command 'bfs' from deb bfs (1.5.2-1)
command 'dcs' from deb drbl (2.30.5-1)
command 'zfs' from deb zfsutils-linux (0.8.3-1ubuntu12.14)
command 'zfs' from deb zfs-fuse (0.7.0-20)
command 'hfs' from deb hfsutils-tcltk (3.2.6-14)
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


Activities
Terminal
Jun 6 15:05
hduser@bmsce-Precision-T1700: ~
drwxr-xr-x - hduser supergroup 0 2022-06-04 10:26 /hduser_copied
drwxr-xr-x - hduser supergroup 0 2022-06-01 15:29 /new2
drwxr-xr-x - hduser supergroup 0 2022-05-31 09:16 /sajjan
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:30 /sample
drwxrwxr-x - hduser supergroup 0 2019-08-01 16:19 /tmp
drwxr-xr-x - hduser supergroup 0 2019-08-01 16:03 /user
hduser@bmsce-Precision-T1700:~$ hdfs dfs -put /home/hduser/Desktop/karfile.txt /kardir/kar.txt
put: `/kardir/kar.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -put /home/hduser/Desktop/karfile.txt /Kardir/kar.txt
hduser@bmsce-Precision-T1700:~$ hdfs dfs -ls /
Found 24 items
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:13 /127
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:51 /Desktop
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:13 /FFF
drwxr-xr-x - hduser supergroup 0 2022-06-06 14:49 /Kardir
drwxr-xr-x - hduser supergroup 0 2022-06-06 14:35 /Karthik
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:15 /NextFFF
drwxr-xr-x - hduser supergroup 0 2022-06-03 15:10 /Revanth
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:56 /WC2.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:48 /Wc.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:49 /Welcome.txt
-rw-r--r-- 1 hduser supergroup 43 2022-06-06 14:44 /abC.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:52 /abc
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:39 /akash
drwxr-xr-x - hduser supergroup 0 2022-06-06 12:23 /anant
drwxr-xr-x - hduser supergroup 0 2022-06-06 12:13 /arihant
drwxr-xr-x - hduser supergroup 0 2022-06-03 15:03 /arya
drwxr-xr-x - hduser supergroup 0 2022-06-01 15:31 /bindu
drwxr-xr-x - hduser supergroup 0 2022-06-04 10:26 /hduser
drwxr-xr-x - hduser supergroup 0 2022-06-04 10:26 /hduser_copied
drwxr-xr-x - hduser supergroup 0 2022-06-01 15:29 /new2
drwxr-xr-x - hduser supergroup 0 2022-05-31 09:16 /sajjan
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:30 /sample
drwxrwxr-x - hduser supergroup 0 2019-08-01 16:19 /tmp
drwxr-xr-x - hduser supergroup 0 2019-08-01 16:03 /user
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /abc/WC.txt
hdfs dfs -cat /abc/WC.txt
welcome ,hi good afternoon.
hduser@bmsce-Precision-T1700:~$ hdfs dfs -cat /abc/WC.txt


Activities
Terminal
Jun 6 15:05
hduser@bmsce-Precision-T1700: ~
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.sh
Starting namenodes on [localhost]
hduser@localhost's password:
localhost: namenode running as process 6828. Stop it first.
hduser@localhost's password:
localhost: datanode running as process 7000. Stop it first.
Starting secondary namenodes [0.0.0.0]
hduser@0.0.0.0's password:
0.0.0.0: secondarynamenode running as process 7213. Stop it first.
starting yarn daemons
resourcemanager running as process 7372. Stop it first.
hduser@localhost's password:
localhost: nodemanager running as process 7707. Stop it first.
hduser@bmsce-Precision-T1700:~$ jps
7000 DataNode
7707 NodeManager
7372 ResourceManager
6828 NameNode
7213 SecondaryNameNode
9917 Jps
hduser@bmsce-Precision-T1700:~$ hdfs dfs -mkdir /Kardir
hduser@bmsce-Precision-T1700:~$ hdfs dfs -ls /
Found 24 items
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:13 /127
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:51 /Desktop
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:13 /FFF
drwxr-xr-x - hduser supergroup 0 2022-06-06 14:46 /Kardir
drwxr-xr-x - hduser supergroup 0 2022-06-06 14:35 /Karthik
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:15 /NextFFF
drwxr-xr-x - hduser supergroup 0 2022-06-03 15:10 /Revanth
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:56 /WC2.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:48 /Wc.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:49 /Welcome.txt
-rw-r--r-- 1 hduser supergroup 43 2022-06-06 14:44 /abC.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:52 /abc
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:39 /akash


Activities
Terminal
Jun 4 10:31
hduser@bmsce-Precision-T1700: ~
hduser@bmsce-Precision-T1700:~$ sbin/start-all.sh
bash: sbin/start-all.sh: No such file or directory
hduser@bmsce-Precision-T1700:~$ 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: namenode running as process 9999. Stop it first.
hduser@localhost's password:
localhost: datanode running as process 10175. Stop it first.
Starting secondary namenodes [0.0.0.0]
hduser@0.0.0.0's password:
0.0.0.0: Permission denied, please try again.
hduser@0.0.0.0's password:
0.0.0.0: secondarynamenode running as process 11044. Stop it first.
starting yarn daemons
resourcemanager running as process 11246. Stop it first.
hduser@localhost's password:
localhost: nodemanager running as process 11590. Stop it first.
hduser@bmsce-Precision-T1700:~$ jps
17169 Jps
11044 SecondaryNameNode
11590 NodeManager
11246 ResourceManager
9999 NameNode
10175 DataNode
hduser@bmsce-Precision-T1700:~$ hdfs dfs -ls /
Found 17 items
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:13 /127
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:51 /Desktop
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:13 /FFF
drwxr-xr-x - hduser supergroup 0 2022-05-31 10:15 /NextFFF
drwxr-xr-x - hduser supergroup 0 2022-06-03 15:10 /Revanth
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:56 /WC2.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:48 /Wc.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:49 /Welcome.txt
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:52 /abc
drwxr-xr-x - hduser supergroup 0 2022-06-03 12:39 /akash
drwxr-xr-x - hduser supergroup 0 2022-06-03 15:03 /arya
drwxr-xr-x - hduser supergroup 0 2022-06-01 15:31 /bindu
drwxr-xr-x - hduser supergroup 0 2022-06-01 15:29 /new2
drwxr-xr-x - hduser supergroup 0 2022-05-31 09:16 /sajjan
drwxr-xr-x - hduser supergroup 0 2022-06-04 09:30 /sample
drwxrwxr-x - hduser supergroup 0 2019-08-01 16:19 /tmp
drwxr-xr-x - hduser supergroup 0 2019-08-01 16:03 /user
hduser@bmsce-Precision-T1700:~$ hdfs dfs -mkdir /hduser
hduser@bmsce-Precision-T1700:~$ hdfs dfs -mkdir hduser
mkdir: `hduser': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -mkdir hduser2
mkdir: `hduser2': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -touchz /hduser/myfile.txt
hduser@bmsce-Precision-T1700:~$ hdfs dfs -put ../Desktop/AI.txt /hduser
put: `../Desktop/AI.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -put ../Desktop/AI.txt /hduser
put: `../Desktop/AI.txt': No such file or directory
hduser@bmsce-Precision-T1700:~$ hdfs dfs -put /Desktop/AI.txt /hduser
put: `/Desktop/AI.txt': 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.

```
// AverageDriver.java package temperature;

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 AverageDriver
{       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(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.java package temperature;

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

public class AverageMapper 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 year = line.substring(15,19);         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(year),new IntWritable(temperature)); }
```

```
}

//AverageReducer.java package temperature;

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

public class AverageReducer extends Reducer <Text, IntWritable,Text, IntWritable>
{
        public void reduce(Text key, Iterable<IntWritable> values, Context context) throws
IOException,InterruptedException
        {
                int max_temp = 0;                int count = 0;
                for (IntWritable value : values)
                {
                        max_temp += value.get();
                        count+=1;
                }
                context.write(key, new IntWritable(max_temp/count));
        }
}
```

```
c:\hadoop_new\sbin>hdfs dfs -cat /tempAverageOutput/part-r-00000
1901    46
1949    94
1950    3
```

```
//TempDriver.java 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);
        }
}

//TempMapper.java 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)); }
}

//TempReducer.java 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));
        }
}
```

```
c:\hadoop_new\sbin>hdfs dfs -cat /tempMaxOutput/part-r-00000
01      44
02      17
03      111
04      194
05      256
06      278
07      317
08      283
09      211
10      156
11      89
12      117
```

LAB 7

For a given Text file, create a Map Reduce program to sort the content in an alphabetic 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 and emits 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 = new Text();
      private String tokens = "[_|$#<>\\^=\\[\\]\\*/\\\\,;,.\\-:()?!\"']";

      @Override
```

```
      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 already exists 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) throws IOException,
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), new
IntWritable(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 already exists in the      *
map, increments its value, otherwise sets it to 1.
    */
   public static class TopNCombiner extends Reducer<Text, IntWritable, Text, IntWritable> {
```

```
    @Override
    public void reduce(Text key, Iterable<IntWritable> values, Context context) throws IOException,
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-value.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 join and 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);
```

```
		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> {
```

```
	@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]));
	}
}

//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);
  }
```

```
 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 extends WritableComparator {

   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 {
```

```
      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) {          return cmp;
      }
      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);        return TEXT_COMPARATOR.compare(b1,
s1, firstL1, b2, s2, firstL2);
    } catch (IOException e) {        throw new IllegalArgumentException(e);
    }
  }

  @Override
  public int compare(WritableComparable a, WritableComparable b) {       if (a instanceof TextPair && b
instanceof TextPair) {        return ((TextPair) a).first.compareTo(((TextPair) b).first);
    }
    return super.compare(a, b);
  }
 }
}
```

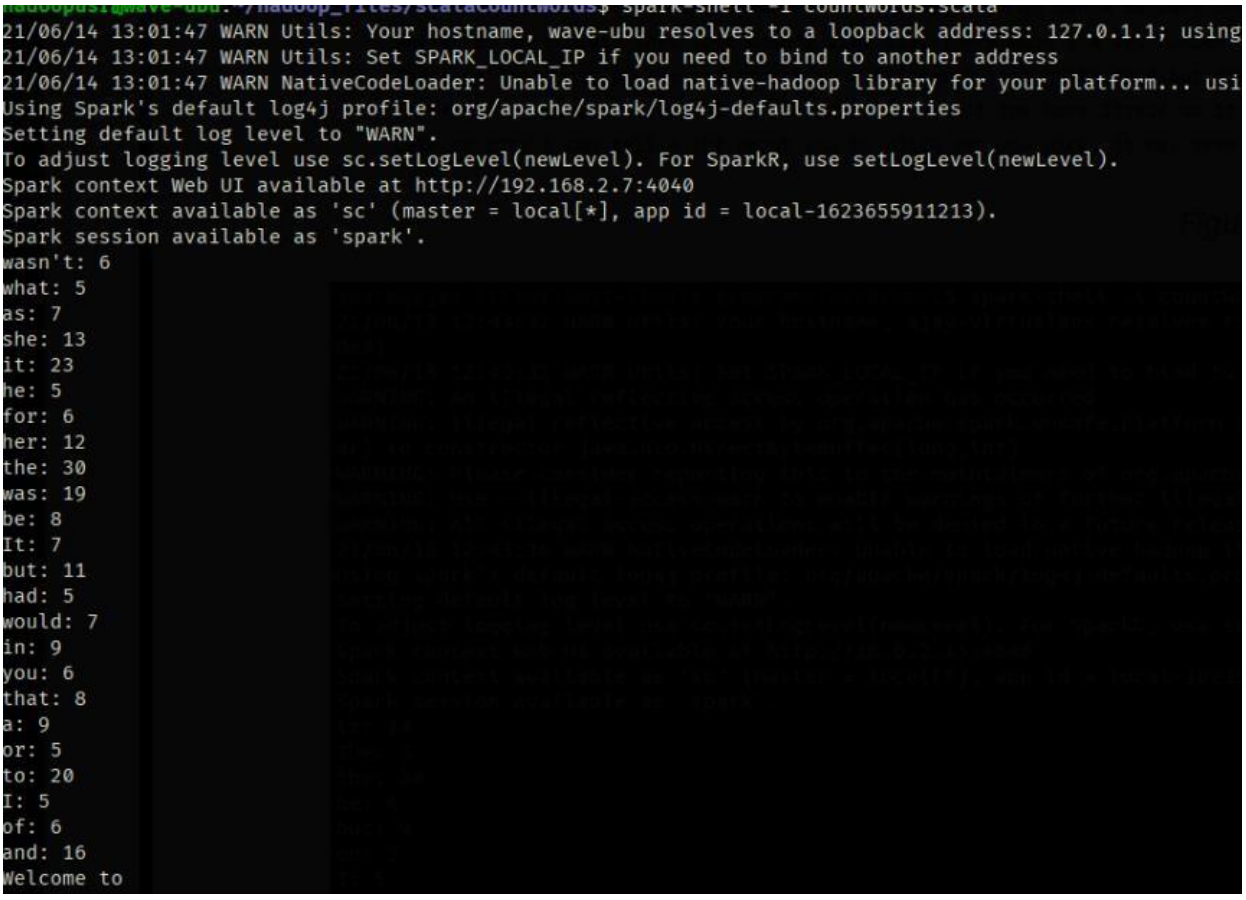
```
c:\hadoop_new\share\hadoop\mapreduce>hdfs dfs -cat \joinOutput\part-00000
"100005361"     "2"             "36134"
"100018705"     "2"             "76"
"100022094"     "0"             "6354"
```

LAB 9

Program to print word count on scala shell and print “Hello world” on scala 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;
```



LAB 10

Using RDD and Flat Map count how many times each word appears in a file and write out a list of
words whose count is strictly greater than 4 using Spark

```
scala> val textfile = sc.textFile("/home/sam/Desktop/abc.txt")
textfile: org.apache.spark.rdd.RDD[String] = /home/sam/Desktop/abc.txt MapPartitionsRDD[8] at textFile at <conso
le>:25

scala> val counts = textfile.flatMap(line => line.split(" ")).map(word => (word,1)).reduceByKey(_+_)
counts: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[11] at reduceByKey at <console>:26

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(hello -> 3, apple -> 2, unicorn -> 1, world ->
1)

scala> println(sorted)
ListMap(hello -> 3, apple -> 2, unicorn -> 1, world -> 1)
```