

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
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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled “**BIG DATA ANALYTICS**” carried out by **HARISH SINGH MEHRA(1BM19CS222)**, 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

Sl. No.	Experiment Title	Page No.
1	Employee Database	5
2	Library	7
3	Mongo (CRUD)	8
4	Hadoop installation	11
5	HDFS Commands	12
6	Create a Map Reduce program to a) find average temperature for each year from NCDC data set. b) find the mean max temperature for every month	15
7	For a given Text file, Create a Map Reduce program to sort the content in an alphabetic order listing only top 10 maximum occurrences of words.	20
8	Create a Map Reduce program to demonstrating join operation	23
9	Program to print word count on scala shell and print "Hello world" on scala IDE	28
10	Using RDD and FlatMap 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	29

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

Employee Database

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
```

```
Use HELP for help.
cqlsh> CREATE KEYSPACE Employee WITH REPLICATION = {
... 'class' : 'SimpleStrategy',
... 'replication_factor': 1
... };
ConfigurationException: Unable to find replication strategy class 'org.apache.cassandra.locator.SimpleStategy'
cqlsh> CREATE KEYSPACE Employee WITH REPLICATION = { 'class' : 'SimpleStrategy', 'replication_factor': 1 };
cqlsh> DESCRIBE KEYSPACES

system_schema  system_auth  system  system_distributed  employee  system_traces

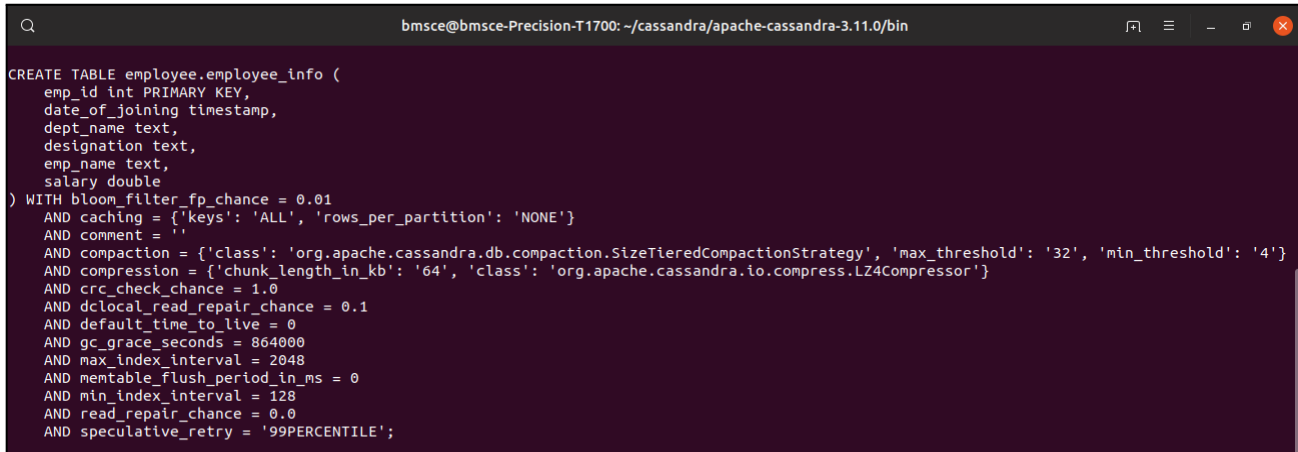
cqlsh> USE Employee
... ?
```

```
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

...);



```
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,'Prena','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 | Prena | 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 | Prena | 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

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

HARISH SINGH MEHRA

1BM19CS222

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

```
(5 rows)
cqlsh:employee> 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

```
(5 rows)
cqlsh:employee> SELECT * FROM eMPLOYEE_INFO d[];
```

6)ALTER TABLE Employee_info

... ADD project text;

```
cqlsh:employee> ... ADD project text;
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	null	55000
1	2023-09-11 18:30:00.000000+0000	Technical	Manager	Pooja	null	60000
2	2023-10-11 18:30:00.000000+0000	Technical	Supervisor	Prema	null	55000
4	2023-12-29 18:30:00.000000+0000	Research	General manager	Prajwal	null	55000
3	2023-10-29 18:30:00.000000+0000	HR	Employee	Vijay	null	45000

```
(5 rows)
cqlsh:employee> begin batch
... █
```

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

Library

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,

HARISH SINGH MEHRA

1BM19CS222

... 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 family cqlsh:library>truncate library_info;

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

Lab3

Mongo (CRUD)

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("60a88f8ffecf7c8abe76777"), "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("60a88f8ffecf7c8abe76777"), "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("60a88f8ffecf7c8abe76777"), "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("60a88f8ffecf7c8abe76777"), "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("60a88f8ffecf7c8abe76777"), "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("60a88f8ffecf7c8abe76777"), "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("60a88f8ffecf7c8abe76777"), "name" : "pqr", "rollno" : 3, "age" : 21, "contactno" : 9999911111, "email" : "update@lab.com" }
```

```
> db.student_details.find({})
{ "_id" : ObjectId("60a88f8ffecf7c8abe76777"), "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

Hadoop installation

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
rumenrtrace     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

HDFS Commands

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 hdsuser@bmsce-Precision-T1700:~  
# owner: hdsuser  
# group: supergroup  
user::rwx  
group::r-x  
other::r-x  
  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar.txt /home/hdsuser/Desktop  
copyToLocal: '/Karthik/kar.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/karfile.txt /home/hdsuser/Desktop  
copyToLocal: '/Karthik/karfile.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar2.txt /home/hdsuser/Desktop  
copyToLocal: '/Karthik/kar2.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -getfacl /Kardir/  
# file: /Kardir  
# owner: hdsuser  
# group: supergroup  
user::rwx  
group::r-x  
other::r-x  
  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Kardir/kar.txt /home/hdsuser/Desktop  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -cat /Kardir/kar.txt  
Hello this is a sample Welcome Text File..  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -mv /Kardir /FFF  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -ls /FFF  
Found 2 items  
drwxr-xr-x - hdsuser supergroup 0 2022-06-06 14:49 /FFF/Kardir  
-rw-r--r-- 1 hdsuser supergroup 31 2022-05-31 09:59 /FFF/sample2  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -cp /Kardir/ /LLL  
cp: '/Kardir/': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -cp /CSE/ /LLL  
cp: '/CSE/': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -cp /FFF/ /LLL  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -ls /LLL  
Found 2 items  
drwxr-xr-x - hdsuser supergroup 0 2022-06-06 15:09 /LLL/Kardir  
-rw-r--r-- 1 hdsuser supergroup 31 2022-06-06 15:09 /LLL/sample2  
hdsuser@bmsce-Precision-T1700:~$
```

```
Activities Terminal Jun 6 15:05 hdsuser@bmsce-Precision-T1700:~  
command 'fs' from deb openafs-client (1.8.4-pre1-1ubuntu2.4)  
Try: sudo apt install <deb name>  
  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -getmerge /Kardir/kar.txt /Kardir/kar2.txt /home/hdsuser/Desktop/Merge.txt  
getmerge: '/Kardir/kar2.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -getmerge /Kardir/kar.txt /Kardir/kar.txt /home/hdsuser/Desktop/Merge.txt  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -getfacl /Karthik/  
# file: /Karthik  
# owner: hdsuser  
# group: supergroup  
user::rwx  
group::r-x  
other::r-x  
  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar.txt /home/hdsuser/Desktop  
copyToLocal: '/Karthik/kar.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/karfile.txt /home/hdsuser/Desktop  
copyToLocal: '/Karthik/karfile.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Karthik/kar2.txt /home/hdsuser/Desktop  
copyToLocal: '/Karthik/kar2.txt': No such file or directory  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -getfacl /Kardir/  
# file: /Kardir  
# owner: hdsuser  
# group: supergroup  
user::rwx  
group::r-x  
other::r-x  
  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -copyToLocal /Kardir/kar.txt /home/hdsuser/Desktop  
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -cat /Kardir/kar.txt  
Hello this is a sample Welcome Text File..  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -mv /Kardir /FFF  
hdsuser@bmsce-Precision-T1700:~$ hadoop fs -ls /FFF  
Found 2 items  
drwxr-xr-x - hdsuser supergroup 0 2022-06-06 14:49 /FFF/Kardir  
-rw-r--r-- 1 hdsuser supergroup 31 2022-05-31 09:59 /FFF/sample2  
hdsuser@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  
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:~$ hdfs 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 anacroltx-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 /arhant  
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 hdsuser@bmsce-Precision-T1700:~$ sudo su hdsuser
[sudo] password for hdsuser:
hdsuser@bmsce-Precision-T1700:~$ start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
Starting namenodes on [localhost]
hdsuser@localhost's password:
localhost: namenode running as process 6828. Stop it first.
hdsuser@localhost's password:
localhost: datanode running as process 7000. Stop it first.
Starting secondary namenodes [0.0.0.0]
hdsuser@0.0.0.0's password:
0.0.0.0: secondarynamenode running as process 7213. Stop it first.
starting yarn daemons
resourceananager running as process 7372. Stop it first.
hdsuser@localhost's password:
localhost: nodemananager running as process 7707. Stop it first.
hdsuser@bmsce-Precision-T1700:~$ jps
7000 DataNode
7707 NodeManager
7372 ResourceManager
6828 NameNode
7213 SecondaryNameNode
9917 Jps
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -mkdir /Kardir
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -ls /
Found 24 items
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 10:13 /127
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 12:51 /Desktop
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 10:13 /FFF
drwxr-xr-x - hdsuser supergroup 0 2022-06-06 14:46 /Kardir
drwxr-xr-x - hdsuser supergroup 0 2022-06-06 14:35 /Karthik
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 10:15 /NextFFF
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 15:10 /Revanth
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:56 /WC2.txt
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:48 /Wc.txt
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:49 /Welcome.txt
-rw-r--r-- 1 hdsuser supergroup 43 2022-06-06 14:44 /abC.txt
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:52 /abc
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 12:39 /akash
```

```
Activities Terminal Jun 4 10:31 hdsuser@bmsce-Precision-T1700:~$
hdsuser@bmsce-Precision-T1700:~$ sbie/start-all.sh
bash: sbie/start-all.sh: No such file or directory
hdsuser@bmsce-Precision-T1700:~$ start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
Starting namenodes on [localhost]
hdsuser@localhost's password:
localhost: namenode running as process 9999. Stop it first.
hdsuser@localhost's password:
localhost: datanode running as process 10175. Stop it first.
Starting secondary namenodes [0.0.0.0]
hdsuser@0.0.0.0's password:
0.0.0.0: Permission denied, please try again.
hdsuser@0.0.0.0's password:
0.0.0.0: secondarynamenode running as process 11844. Stop it first.
starting yarn daemons
resourceananager running as process 11246. Stop it first.
hdsuser@localhost's password:
localhost: nodemananager running as process 11590. Stop it first.
hdsuser@bmsce-Precision-T1700:~$ jps
17169 Jps
11044 SecondaryNameNode
11590 NodeManager
11246 ResourceManager
9999 NameNode
10175 DataNode
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -ls /
Found 17 items
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 10:13 /127
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 12:51 /Desktop
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 10:13 /FFF
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 10:15 /NextFFF
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 15:10 /Revanth
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:56 /WC2.txt
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:48 /Wc.txt
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:49 /Welcome.txt
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:52 /abc
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 12:39 /akash
drwxr-xr-x - hdsuser supergroup 0 2022-06-03 15:03 /arya
drwxr-xr-x - hdsuser supergroup 0 2022-06-01 15:31 /bindu
drwxr-xr-x - hdsuser supergroup 0 2022-06-01 15:29 /new2
drwxr-xr-x - hdsuser supergroup 0 2022-05-31 09:10 /sajjan
drwxr-xr-x - hdsuser supergroup 0 2022-06-04 09:30 /sample
drwxr-xr-x - hdsuser supergroup 0 2019-08-01 16:10 /tmp
drwxr-xr-x - hdsuser supergroup 0 2019-08-01 16:02 /user
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -mkdir /hdsuser
mkdir: 'hdsuser': No such file or directory
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -touchz /hdsuser/myfile.txt
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -put ../Desktop/Al.txt /hdsuser
put: ../Desktop/Al.txt: No such file or directory
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -put ../Desktop/Al.txt /hdsuser
put: ../Desktop/Al.txt: No such file or directory
hdsuser@bmsce-Precision-T1700:~$ hdfs dfs -put /Desktop/Al.txt /hdsuser
put: /Desktop/Al.txt: No such file or directory
```

LAB 6

Create a Map Reduce program to

a) find average temperature for each year from NCDC data set.

b) find the mean max temperature for every month

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)); }
}

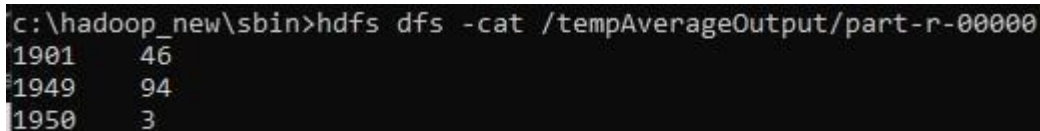
```

```
//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;

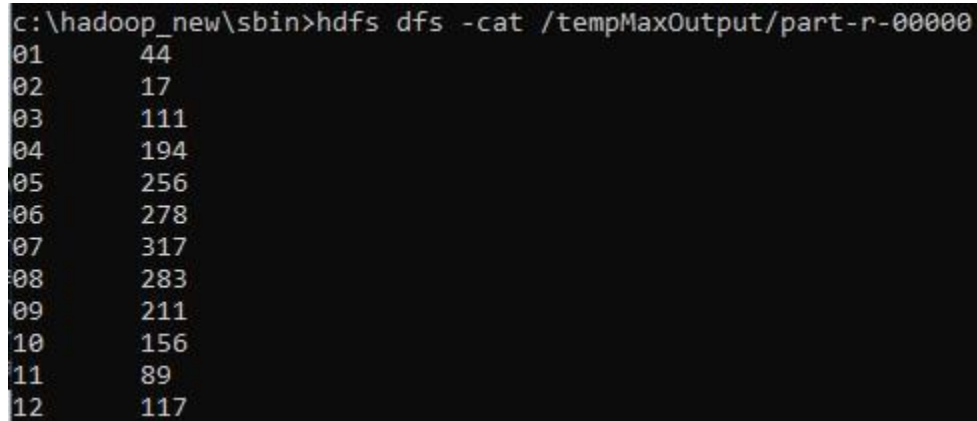
public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException
{

```

```

        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));
    }
}

```



A terminal window showing a command to cat a file from HDFS. The command is: `c:\hadoop_new\sbin>hdfs dfs -cat /tempMaxOutput/part-r-00000`. The output is a list of 12 lines, each with a two-digit index followed by a temperature value.

Index	Temperature
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 10 maximum occurrences of words.

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 Map Reduce program to demonstrating join operation

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"

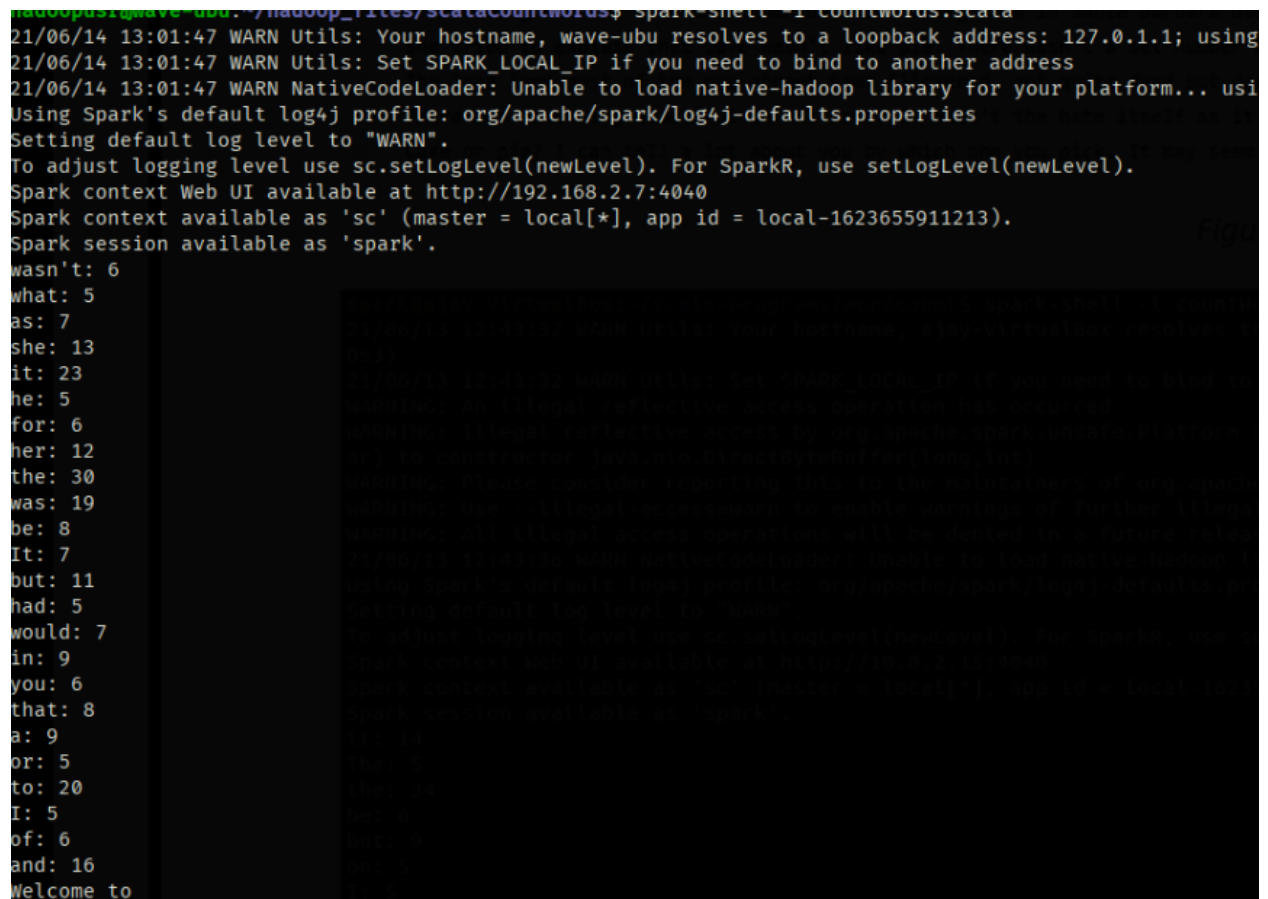
```

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;
```



The screenshot shows a terminal window with the following content:

```
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
```

Using RDD and FlatMap 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 shell
scala> val textfile = sc.textFile("/home/sam/Desktop/abc.txt")
textfile: org.apache.spark.rdd.RDD[String] = /home/sam/Desktop/abc.txt MapPartitionsRDD[1] at
textFile at :24
scala> val counts = textfile.flatMap(line => line.split(" ")).map(word => (word,1)).reduceByKey(+) counts:
org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[4] at reduceByKey at :25
scala> import scala.collection.immutable.ListMap import
scala.collection.immutable.ListMap
scala> val sorted = ListMap(counts.collect.sortWith(_. _2>._2):*)
scala> println(sorted)
ListMap(car -> 7, deer -> 5, bear -> 3, river -> 3, -> 1)
scala> for((k,v)<-sorted)
| { | if(v>4)
| {
| println(k+"-"+v)
| }
| }
car-7
deer-5
```

```
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 <console>: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)
```