VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

COURSE TITLE

Submitted by

S Swaroop Bharadwaj

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

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "**BIG DATA ANALYTICS**" carried out by **S Swaroop Bharadwaj (1BM20CS136),** who is bonafide student of **B. M. S. College of Engineering.** Itis 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**

1 Perform the following DB operations using Cassandra.

1. Create a keyspace 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.

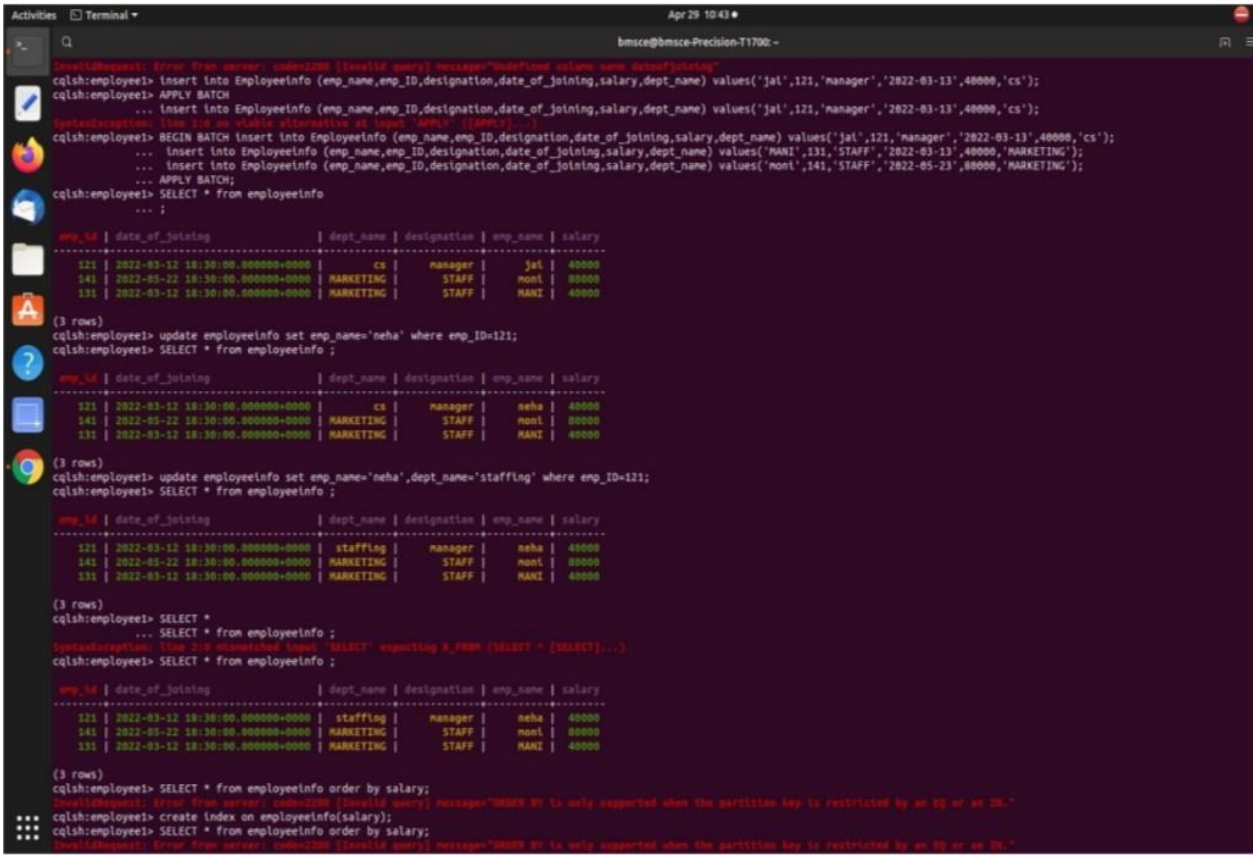
```
cqlsh:employee> CREATE KEYSPACE employee WITH REPLICATION={ 'class'
: 'SimpleStrategy', 'replication_factor' : 1};

cqlsh:employee> USE employee;

cqlsh:employee> create table employee_info(emp_id int PRIMARY KEY, emp_name
        text, ... designation text, date_of_joining timestamp, salary double PRIMARY
        KEY, dept_name text);

cqlsh:employee> CREATE TABLE employee_info(emp_id int, emp_name text, designation
text, date_of_joining timestamp, salary double, dept_name text, PRIMARY KEY(emp_id,
salary));

cqlsh:employee> BEGIN BATCH INSERT INTO
        ...
```

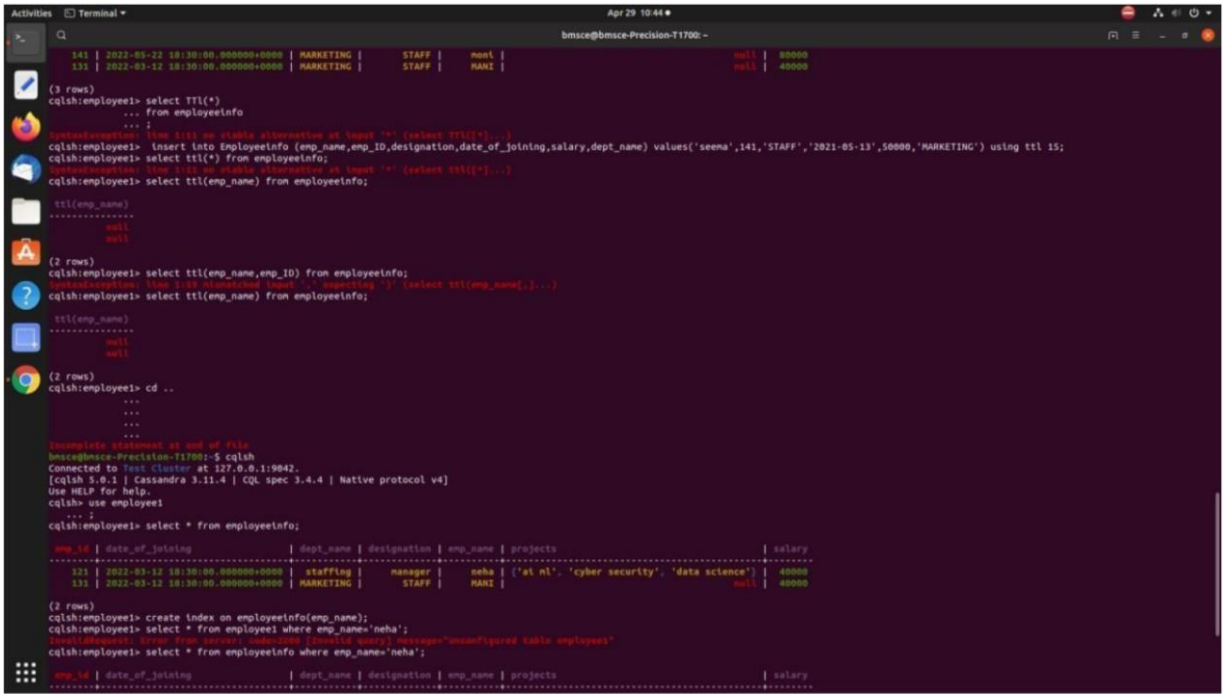
```
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        VALUES(100,'John','MANAGER','2021-09-11',30000,'TESTING');
        ... INSERT INTO
        ...
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        VALUES(111,'Tom','ASSOCIATE','2021-06-22',25000,'DEVELOPING');
        ... INSERT INTO
        ...
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        VALUES(121,'Elsa','MANAGER','2021-03-30',35000,'HR');
        ... INSERT INTO
        ...
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        VALUES(115,'Chris','ASSISTANT','2021-12-30',20000,'DEVELOPING');
        ... INSERT INTO
        ...
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        VALUES(105,'Sarah','ASSOCIATE','2021-06-25',25000,'TESTING');
        ... APPLY BATCH;
cqlsh:employee> SELECT * FROM employee_info
        ... ;
```

```
cqlsh:employee> UPDATE employee_info SET emp_name = 'Jessica', dept_name =
'DEVELOPING' WHERE emp_id = 121;

cqlsh:employee> UPDATE employee_info SET emp_name = 'Jessica', dept_name =
'DEVELOPING' WHERE emp_id = 121 AND salary = 35000;
cqlsh:employee> SELECT * FROM employee_info ;
   MANAGER | John



cqlsh:employee> SELECT * FROM employee_info WHERE emp_id in (105, 111, 121, 115,

100) order by salary; cqlsh:employee> paging off

Disabled Query paging.

cqlsh:employee> SELECT * FROM employee_info WHERE emp_id in (105, 111, 121, 115, 100)
order by salary;

cqlsh:employee> ALTER TABLE employee_info ADD projects text;

cqlsh:employee> UPDATE employee_info SET projects = 'Chat App' WHERE emp_id = 111;

cqlsh:employee> UPDATE employee_info SET projects = 'Chat App' WHERE emp_id = 111

and salary = 25000;

cqlsh:employee> UPDATE employee_info SET projects = 'Discord Bot' WHERE emp_id
= 115 and salary = 20000;

cqlsh:employee> UPDATE employee_info SET projects = 'Campus Portal' WHERE emp_id
= 105 and salary = 25000;

cqlsh:employee> UPDATE employee_info SET projects = 'YouTube Downloader' WHERE
emp_id = 100 and salary = 30000;

cqlsh:employee> UPDATE employee_info SET projects = 'Library Management System '
WHERE emp_id = 121 and salary = 35000;

cqlsh:employee> SELECT * FROM employee_infor

        ... ;

cqlsh:employee> SELECT * FROM employee_info ;

cqlsh:employee> INSERT INTO
```

```
        ...
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        ... ;
cqlsh:employee> INSERT INTO
        ...
        employee_info(emp_id,emp_name,designation,date_of_joining,sal
        ary,dept_name) ...
        VALUES(110,'SAM','ASSOCIATE','2021-01-11',28000,'TESTING')
        USING TTL 15;
cqlsh:employee> SELECT TTL(emp_name) from employee_info

 WHERE emp_id = 110; ttl(emp_name)


          3
cqlsh:employee> SELECT * FROM employee_info;
```

Output:


Activities
Terminal
Apr 29 10:43
bmsce@bmsce-Precision-T1700: ~
cqlsh:employee1> insert into Employeeinfo (emp_name,emp_ID,designation,date_of_joining,salary,dept_name) values('jal',121,'manager','2022-03-13',40000,'cs');
cqlsh:employee1> APPLY BATCH
... insert into Employeeinfo (emp_name,emp_ID,designation,date_of_joining,salary,dept_name) values('jal',121,'manager','2022-03-13',40000,'cs');
cqlsh:employee1> BEGIN BATCH insert into Employeeinfo (emp_name,emp_ID,designation,date_of_joining,salary,dept_name) values('jal',121,'manager','2022-03-13',40000,'cs');
... insert into Employeeinfo (emp_name,emp_ID,designation,date_of_joining,salary,dept_name) values('MANI',131,'STAFF','2022-03-13',40000,'MARKETING');
... insert into Employeeinfo (emp_name,emp_ID,designation,date_of_joining,salary,dept_name) values('moni',141,'STAFF','2022-05-23',80000,'MARKETING');
... APPLY BATCH;
cqlsh:employee1> SELECT * from employeeinfo
... ;
emp_id | date_of_joining | dept_name | designation | emp_name | salary
121 | 2022-03-12 18:30:00.000000+0000 | cs | manager | jal | 40000
141 | 2022-05-22 18:30:00.000000+0000 | MARKETING | STAFF | moni | 80000
131 | 2022-03-12 18:30:00.000000+0000 | MARKETING | STAFF | MANI | 40000
(3 rows)
cqlsh:employee1> update employeeinfo set emp_name='neha' where emp_ID=121;
cqlsh:employee1> SELECT * from employeeinfo ;
emp_id | date_of_joining | dept_name | designation | emp_name | salary
121 | 2022-03-12 18:30:00.000000+0000 | cs | manager | neha | 40000
141 | 2022-05-22 18:30:00.000000+0000 | MARKETING | STAFF | moni | 80000
131 | 2022-03-12 18:30:00.000000+0000 | MARKETING | STAFF | MANI | 40000
(3 rows)
cqlsh:employee1> update employeeinfo set emp_name='neha',dept_name='staffing' where emp_ID=121;
cqlsh:employee1> SELECT * from employeeinfo ;
emp_id | date_of_joining | dept_name | designation | emp_name | salary
121 | 2022-03-12 18:30:00.000000+0000 | staffing | manager | neha | 40000
141 | 2022-05-22 18:30:00.000000+0000 | MARKETING | STAFF | moni | 80000
131 | 2022-03-12 18:30:00.000000+0000 | MARKETING | STAFF | MANI | 40000
(3 rows)
cqlsh:employee1> SELECT *
... SELECT * from employeeinfo ;
cqlsh:employee1> SELECT * from employeeinfo ;
emp_id | date_of_joining | dept_name | designation | emp_name | salary
121 | 2022-03-12 18:30:00.000000+0000 | staffing | manager | neha | 40000
141 | 2022-05-22 18:30:00.000000+0000 | MARKETING | STAFF | moni | 80000
131 | 2022-03-12 18:30:00.000000+0000 | MARKETING | STAFF | MANI | 40000
(3 rows)
cqlsh:employee1> SELECT * from employeeinfo order by salary;
cqlsh:employee1> create index on employeeinfo(salary);
cqlsh:employee1> SELECT * from employeeinfo order by salary;


Activities
Terminal
Apr 29 10:44
bmsce@bmsce-Precision-T1700: ~
141 | 2022-05-22 18:30:00.000000+0000 | MARKETING | STAFF | moni | null | 80000
131 | 2022-03-12 18:30:00.000000+0000 | MARKETING | STAFF | MANI | null | 40000
(3 rows)
cqlsh:employee1> select TTl(*)
... from employeeinfo
... ;
cqlsh:employee1> insert into Employeeinfo (emp_name,emp_ID,designation,date_of_joining,salary,dept_name) values('seena',141,'STAFF','2021-05-13',50000,'MARKETING') using ttl 15;
cqlsh:employee1> select ttl(*) from employeeinfo;
cqlsh:employee1> select ttl(enp_name) fron employeeinfo;
ttl(enp_name)
null
null
(2 rows)
cqlsh:employee1> select ttl(enp_name,enp_ID) from employeeinfo;
cqlsh:employee1> select ttl(enp_name) fron employeeinfo;
ttl(enp_name)
null
null
(2 rows)
cqlsh:employee1> cd ..
Incomplete statement at end of file
bmsce@bmsce-Precision-T1700:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042.
[cqlsh 5.0.1 | Cassandra 3.11.4 | CQL spec 3.4.4 | Native protocol v4]
Use HELP for help.
cqlsh> use employee1
... ;
cqlsh:employee1> select * fron enployeeinfo;
emp_id | date_of_joining | dept_name | designation | emp_name | projects | salary
121 | 2022-03-12 18:30:00.000000+0000 | staffing | manager | neha | {'at nl', 'cyber security', 'data science'} | 40000
131 | 2022-03-12 18:30:00.000000+0000 | MARKETING | STAFF | MANI | null | 40000
(2 rows)
cqlsh:employee1> create index on employeeinfo(enp_name);
cqlsh:employee1> select * from employee1 where enp_name='neha';
cqlsh:employee1> select * from employeeinfo where enp_name='neha';
emp_id | date_of_joining | dept_name | designation | emp_name | projects | salary

2.Perform the following DB operations using Cassandra.

1. Create a keyspace by name 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

3. Insert the values into the table in batch

4. Display the details of the table created and increase the value of the counter 5. Write a query to show that a student with id 112 has taken a book "BDA" 2 times. 6. Export the created column to a csv file

7. Import a given csv dataset from local file system into Cassandra column family cqlsh:library> CREATE KEYSPACE library WITH replication = {'class':

'SimpleStrategy','replication_factor':1}; cqlsh:library> USE library ;

cqlsh:library> CREATE TABLE Library_info(stud_id int, stud_name text, book_name text, book_id text, date_of_issue timestamp, counter_value counter, PRIMARY KEY(stud_id,stud_name, book_name, book_id, date_of_issue));

cqlsh:library> BEGIN COUNTER BATCH

... UPDATE library_info set counter_value +=1 where stud_id = 111 and stud_name = 'Manoj' and book_name = 'Operations Research' and book_id = '56TXT' and date_of_issue = '2021-09-12';

... UPDATE library_info set counter_value +=1 where stud_id = 112 and stud_name = 'Kamal' and book_name = 'Engineering Mathematics-3' and book_id = '5ERW4' and date_of_issue = '2021-04-10';

... UPDATE library_info set counter_value +=1 where stud_id = 113 and stud_name = 'Mahesh' and book_name = 'Robinson Crusoe' and book_id = '34EDC' and date_of_issue = '2021-02-01';

... UPDATE library_info set counter_value +=1 where stud_id = 114 and stud_name = 'Raj' and book_name = 'Engineering Drawing' and book_id = '123ER' and date_of_issue = '2021-04-03';

... APPLY BATCH;

cqlsh:library> SELECT * FROM library_info ;

cqlsh:library> UPDATE library_info set counter_value += 1 where stud_id = 112 and stud_name = 'Kamal' and book_name = 'Engineering Mathematics-3' and book_id = '5ERW4' and date_of_issue = '2021-04-09';

cqlsh:library> SELECT * FROM library_info ;

```
cqlsh> use library;
cqlsh:library> create table library_info (
          ... ... stud_id int,
          ... ... stud_name text,
          ... ... book_id int,
          ... ... book_name text,
          ... ... date_of_issue timestamp,
```

```
cqlsh:library> update library_info set counter_value = counter_value+1 where stud_id = 112 and stud_name = 'Ram' and book_id = 200 and book_name = 'DSA' and date_of_issue = '2022-04-06';
cqlsh:library> update library_info set counter_value = counter_value+1 where stud_id = 113 and stud_name = 'sohan' and book_id = 300 and book_name = 'JAVA' and date_of_issue = '2022-04-07';
cqlsh:library> update library_info set counter_value = counter_value+1  where stud_id = 111 and stud_name = 'Raj' and book_id = 100 and book_name = 'ADA' and date_of_issue = '2022-04-05';
cqlsh:library> update library_info set counter_value = counter_value+1 where stud_id = 114 and stud_name = 'rohan' and book_id = 400 and book_name = 'UNIX' and date_of_issue = '2022-04-07';
cqlsh:library> select * from library_info ;

 stud_id | book_id | stud_name | book_name | date_of_issue                   | counter_value
---------+---------+-----------+-----------+---------------------------------+---------------
     114 |     400 |     rohan |      UNIX | 2022-04-06 18:30:00.000000+0000 |             1
     111 |     100 |       Raj |       ADA | 2022-04-04 18:30:00.000000+0000 |             1
     112 |     200 |       Ram |       DSA | 2022-04-05 18:30:00.000000+0000 |             1
     113 |     300 |     sohan |      JAVA | 2022-04-06 18:30:00.000000+0000 |             1

(4 rows)
```

```
 113 |     300 |     sohan |      JAVA | 2022-04-06 18:30:00.000000+0000 |             1

(4 rows)
cqlsh:library>  copy library_info(stud_id,stud_name,book_id,book_name,date_of_issue,counter_value ) to '/home/bmscecse/Documents/library/lib.csv' with header=true;
Using 16 child processes

Starting copy of library.library_info with columns [stud_id, stud_name, book_id, book_name, date_of_issue, counter_value].
Processed: 4 rows; Rate:      122 rows/s; Avg. rate:      122 rows/s
4 rows exported to 1 files in 0.069 seconds.
cqlsh:library>  copy library_info(stud_id,book_id,stud_name,book_name,date_of_issue,counter_value ) to '/home/bmscecse/Documents/library/lib.csv' with header=true;
Using 16 child processes

Starting copy of library.library_info with columns [stud_id, book_id, stud_name, book_name, date_of_issue, counter_value].
Processed: 4 rows; Rate:      129 rows/s; Avg. rate:      129 rows/s
4 rows exported to 1 files in 0.066 seconds.
cqlsh:library> copy library_info(stud_id,book_id,stud_name,book_name,date_of_issue,counter_value ) from '/home/bmscecse/Documents/library/lib.csv' with header = true;
Using 16 child processes

Starting copy of library.library_info with columns [stud_id, book_id, stud_name, book_name, date_of_issue, counter_value].
Processed: 4 rows; Rate:       7 rows/s; Avg. rate:       11 rows/s
4 rows imported from 1 files in 0.375 seconds (0 skipped).
cqlsh:library> select * from library_info ;

 stud_id | book_id | stud_name | book_name | date_of_issue                    | counter_value
---------+---------+-----------+-----------+----------------------------------+---------------
     114 |     400 |     rohan |      UNIX | 2022-04-06 18:30:00.000000+0000 |             2
     111 |     100 |       Raj |       ADA | 2022-04-04 18:30:00.000000+0000 |             2
     112 |     200 |       Ram |       DSA | 2022-04-05 18:30:00.000000+0000 |             2
     113 |     300 |     sohan |      JAVA | 2022-04-06 18:30:00.000000+0000 |             2

(4 rows)
cqlsh:library>  truncate library_info;
cqlsh:library> select * from library_info ;

 stud_id | book_id | stud_name | book_name | date_of_issue | counter_value
---------+---------+-----------+-----------+---------------+---------------

(0 rows)
cqlsh:library> copy library_info(stud_id,book_id,stud_name,book_name,date_of_issue,counter_value ) from '/home/bmscecse/Documents/library/lib.csv' with header = true;
Using 16 child processes

Starting copy of library.library_info with columns [stud_id, book_id, stud_name, book_name, date_of_issue, counter_value].
Processed: 4 rows; Rate:       8 rows/s; Avg. rate:       11 rows/s
4 rows imported from 1 files in 0.370 seconds (0 skipped).
cqlsh:library> select * from library_info ;

 stud_id | book_id | stud_name | book_name | date_of_issue                    | counter_value
---------+---------+-----------+-----------+----------------------------------+---------------
     114 |     400 |     rohan |      UNIX | 2022-04-06 18:30:00.000000+0000 |             1
     111 |     100 |       Raj |       ADA | 2022-04-04 18:30:00.000000+0000 |             1
     112 |     200 |       Ram |       DSA | 2022-04-05 18:30:00.000000+0000 |             1
     113 |     300 |     sohan |      JAVA | 2022-04-06 18:30:00.000000+0000 |             1

(4 rows)
cqlsh:library>
```

3. MongoDB- CRUD Demonstration

```
bmsce@bmsce-Precision-T1700:~$ mongo
MongoDB shell version v3.6.8
connecting to: mongodb://127.0.0.1:27017
Implicit session: session { "id" :
UUID("d66acdb3-8482-417d-8b75-d65dae4b53ee") } MongoDB
server version: 3.6.8
> use  Student
switched to db Student
> db.createCollection("student");
{ "ok" : 1 }
>
db.Student.insert({_id:1,StudName:"Megha",Grade:"vii",Hobbies:"Int
ernetSurfi ng"}); WriteResult({ "nInserted" : 1 })
>
db.Student.update({_id:3,StudName:"Ayan",Grade:"vii"},{$set:{Hobbies:"skating"}
},{upsert:t rue}); WriteResult({ "nMatched" : 0, "nUpserted" : 1, "nModified" : 0,
"_id" : 3 })
> db.Student.find({StudName:"Ayan"}
{ "_id" : 3, "Grade" : "vii", "StudName" : "Ayan", "Hobbies" : "skating" }
> db.Student.find({},{StudName:1,Grade:1,_id:0});
{ "StudName" : "Megha", "Grade" : "vii" }
{ "Grade" : "vii", "StudName" : "Ayan" }
> db.Student.find({Grade:{$eq:'vii'}}).pretty();
{
        "_id" : 1,
        "StudName" : "Megha",
```

```
        "Grade" : "vii",
        "Hobbies" : "InternetSurfing"
}
{ "_id" : 3, "Grade" : "vii", "StudName" : "Ayan",
"Hobbies" : "skating" } >
db.Student.find({Grade:{$eq:'vii'}});
{ "_id" : 1, "StudName" : "Megha", "Grade" : "vii", "Hobbies" :
"InternetSurfing" } { "_id" : 3, "Grade" : "vii", "StudName" :
"Ayan", "Hobbies" : "skating" } >
db.Student.find({Grade:{$eq:'vii'}}).pretty();
{
        "_id" : 1,
        "StudName" : "Megha",
        "Grade" : "vii",
        "Hobbies" : "InternetSurfing"
}
{ "_id" : 3, "Grade" : "vii", "StudName" : "Ayan",
"Hobbies" : "skating" } >
db.Student.find({Hobbies:{$in:['Chess','Skating']}}).pr
etty(); >
db.Student.find({Hobbies:{$in:['Skating']}}).pretty();
> db.Student.find({Hobbies:{$in:['skating']}}).pretty();
{ "_id" : 3, "Grade" : "vii", "StudName" : "Ayan", "Hobbies" : "skating" }
> db.Student.find({StudName:/^M/}).pretty();
{
        "_id" : 1,
        "StudName" : "Megha",
```

```
        "Grade" : "vii",
        "Hobbies" : "InternetSurfing"
}
> db.Student.find({StudName:/e/}).pretty();
{
        "_id" : 1,
        "StudName" : "Megha",
        "Grade" : "vii",
        "Hobbies" : "InternetSurfing"
}
> db.Student.c
ount(); 2
> db.Student.find().sort({StudName:-1}).pretty();
{
        "_id" : 1,
        "StudName" : "Megha",
        "Grade" : "vii",
        "Hobbies" : "InternetSurfing"
}
{ "_id" : 3, "Grade" : "vii", "StudName" : "Ayan",
"Hobbies" : "skating" } >
db.Student.save({StudName:"Vamsi",Greade
:"vi"}) WriteResult({ "nInserted" : 1 })
>
db.Students.update({_id:4},{$set:{Location:"N
etwork"}}) WriteResult({ "nMatched" : 0,
```

"nUpserted" : 0, "nModified" : 0 })

>

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

"Network" }}) WriteResult({ "nMatched" : 0,

"nUpserted" : 0, "nModified" : 0 })

>

db.Student.find({_id:1},{StudName:1,

Grade:1,_id:0}); { "StudName" :

"Megha", "Grade" : "vii" }

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

{

"_id" : 1,

"StudName" : "Megha",

"Grade" : "vii",

"Hobbies" : "InternetSurfing"

}

{ "_id" : 3, "Grade" : "vii", "StudName" : "Ayan",

"Hobbies" : "skating" } {

"_id" : ObjectId("6253f413e88b8c9e787b194e"),

"StudName" : "Vamsi",

"Grade" : "vi"

}

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

>

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

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

```
0, "nModified" : 0 }) > db.Students.c

ount() 0

> db.Students.count({Grade:

"VII"}) 0

> db.Student.find({Grade:"VII"}).limit(3).pretty();

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

WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.count({Grade:"VII"})
0

> db.Students.count({Grade:

"vii"}) 0

> db.Student.c

ount() 3

> db.Student.count({Grade:

"vii"}) 2

>

db.Student.find({Grade:"vii"}).

limit(3).pretty(); {

        "_id" : 1,

        "StudName" : "Megha",

        "Grade" : "vii",

        "Hobbies" : "InternetSurfing"

}

{

        "_id" : 3,

        "Grade" : "vii",

        "StudName" : "Ayan",
```

```
        "Hobbies" : "skating",
        "Location" : null
}
>
db.Student.find().sort({StudN
ame:1}).pretty(); {
        "_id" : 3,
        "Grade" :
        "vii",
        "StudName" : "Ayan",
        "Hobbies" : "skating",
        "Location" : null
}
{
        "_id" : 1,
        "StudName" : "Megha",
        "Grade" : "vii",
        "Hobbies" : "InternetSurfing"
}
{
        "_id" : ObjectId("6253f413e88b8c9e787b194e"),
        "StudName" : "Vamsi",
        "Grade" : "vi"
}
> db.Student.find().skip(2).pretty()
{
        "_id" : ObjectId("6253f413e88b8c9e787b194e"),
```

```
        "StudName" : "Vamsi",
        "Grade" : "vi"
}
> db.food.insert( { _id:1, fruits:['grapes','mango','apple';] } )
2022-04-11T15:05:51.894+0530 E QUERY [thread1] SyntaxError: missing ] after element
list @(shell):1:57 > db.food.insert({_id:1,fruits:['grapes','mango','ap
ple']}) WriteResult({ "nInserted" : 1 })
> db.food.insert({_id:2,fruits:['grapes','mango','che
rry']}) WriteResult({ "nInserted" : 1 })
> db.food.insert({_id:3,fruits:['banana','ma
ngo']}) WriteResult({ "nInserted" : 1 })
> db.food.find({fruits:['grapes','mango','apple']}).pretty();
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
> db.food.find({'fruits.1':'grapes'})
> db.food.find({"fruits":{$size:2}})
{ "_id" : 3, "fruits" : [ "banana", "mango" ] }
> db.food.find({_id:1},{"fruits":{$slice:2}})
{ "_id" : 1, "fruits" : [ "grapes", "mango" ] }
> db.food.find({fruits:{$all:["mango","grapes"]}})
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
{ "_id" : 2, "fruits" : [ "grapes", "mango", "cherry" ] }
> db.food.update({_id:3},{$set:{"fruits.1":"apple"}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.food.update({_id:2},{$push:{price:{grapes:80,mango:200,cherry:1
00}}}) WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })

>db.Customers.insert({_custID:1,AcctBal:'100000',AcctType:"saving"});
```

WriteResult({ "nInserted" : 1 })

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

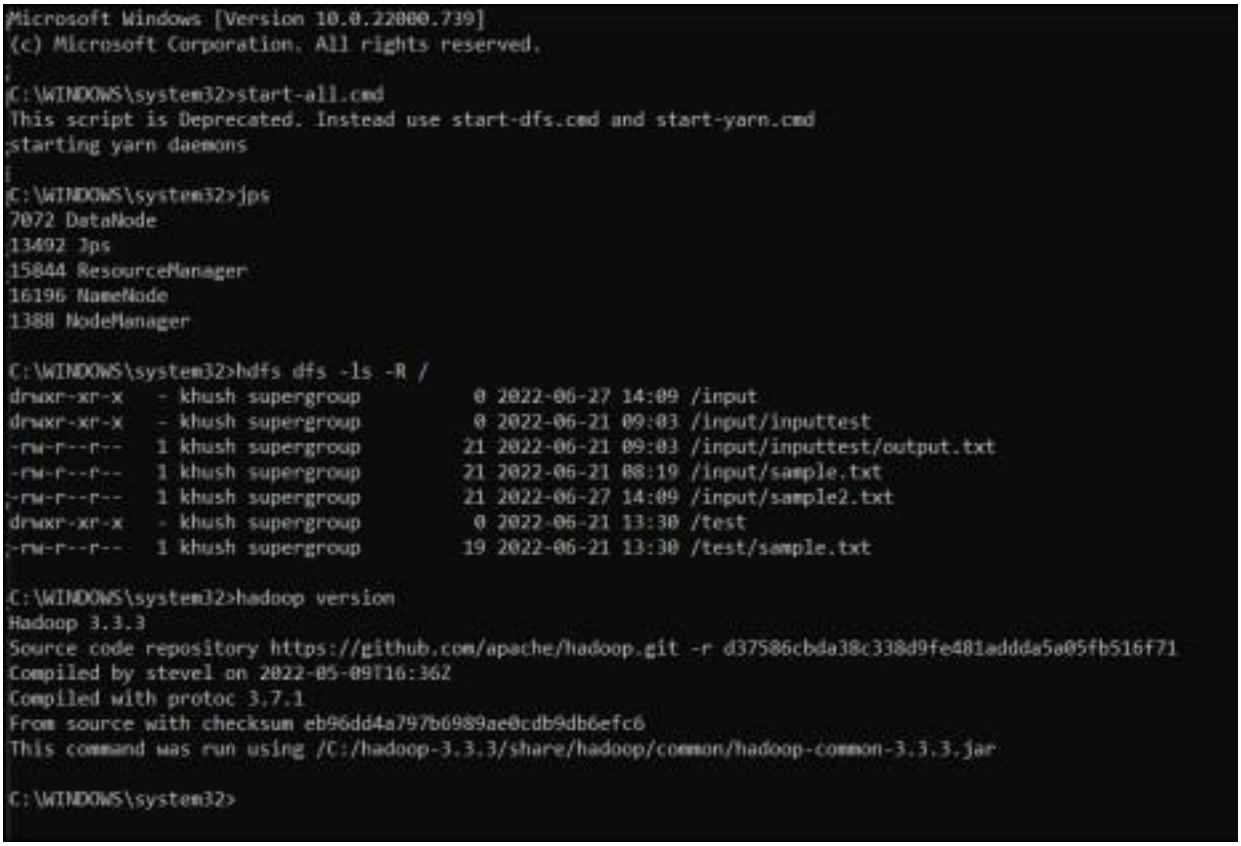
{ "_id" : null, "TotAccBal" : 0 }

db.Customers.aggregate({$match:{AcctType:"saving"}},{$group:{_id:"$custID",TotAccBal:{$s

um:"$AccBal"}}}); { "_id" : null, "TotAccBal" : 0 }

db.Customers.aggregate({$match:{AcctType:"saving"}},{$group:{_id:"$custID",TotAccBal:{$su
m:"$AccBal"}}},{$ match:{TotAccBal:{$gt:1200}}

4. Screenshot of Hadoop installed



5. Execution of HDFS Commands for interaction with Hadoop Environment.

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

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

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

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

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

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

```
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -put ~/file1.txt /mydr
21/04/19 23:21:41 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
hduser@lab-VirtualBox:/usr/local/sbin$ hadooop fs -ls /mydr
hadooop: command not found
hduser@lab-VirtualBox:/usr/local/sbin$ hadoop fs -ls /mydr
21/04/19 23:22:20 WARN util.NativeCodeLoader: Unable to load native-hadoop libr
ary for your platform... using builtin-java classes where applicable
Found 1 items
-rw-r--r--   1 hduser supergroup         30 2021-04-19 23:21 /mydr/file1.txt
```

6. Create a Map Reduce program to

a) find average temperature for each year from the NCDC data set. b) find the mean max temperature for every month

AverageDriver

```
package temp;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import
org.apache.hadoop.mapreduce.lib.output.FileOutp
utFormat; 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

```
package temp;
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Mapper;
public class AverageMapper extends Mapper<LongWritable, Text,
Text, IntWritable> { public static final int MISSING = 9999;

public void map(LongWritable key, Text value,
Mapper<LongWritable, Text, Text, IntWritable>.Context
context) throws IOException, InterruptedException { int
temperature;
String line = value.toString();
String year = line.substring(15, 19);
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 != 9999 && quality.matches("[01459]"))
context.write(new Text(year), new IntWritable(temperature));
}
}
```

AverageReducer

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

}

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

b)MeanMaxDriver.class

```
package meanmax;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import
org.apache.hadoop.mapreduce.lib.input.FileInputF
ormat; import
org.apache.hadoop.mapreduce.lib.output.FileOutp
utFormat; public class MeanMaxDriver {
 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(MeanMaxDriver.class);
job.setJobName("Max temperature");
FileInputFormat.addInputPath(job, new
```

```
Path(args[0]));
FileOutputFormat.setOutputPath(job,
new Path(args[1]));
job.setMapperClass(MeanMaxMapper.c
lass);
job.setReducerClass(MeanMaxReducer.class);
job.setOutputKeyClass(Text.class);
job.setOutputValueClass(IntWritable.class);
System.exit(job.waitForCompletion(true) ? 0 : 1);
}
}
```

MeanMaxMapper.class

```
package meanmax;
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Mapper;
public class MeanMaxMapper extends Mapper<LongWritable, Text,
Text, IntWritable> { public static final int MISSING = 9999;

public void map(LongWritable key, Text value,
Mapper<LongWritable, Text, Text, IntWritable>.Context
context) throws IOException, InterruptedException { int
temperature;
String line = value.toString();
```

```
String month = line.substring(19, 21);
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 != 9999 && quality.matches("[01459]"))
context.write(new Text(month), new IntWritable(temperature));
}
}
```

MeanMaxReducer.class

```
package meanmax;
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Reducer;
public class MeanMaxReducer extends Reducer<Text, IntWritable, Text, IntWritable> {
public void reduce(Text key, Iterable<IntWritable> values, Reducer<Text,
IntWritable, Text, IntWritable>.Context context) throws IOException,
InterruptedException {
int max_temp = 0;
int total_temp = 0;
int count = 0;
int days = 0;
for (IntWritable value : values) {
int temp = value.get();
```

```
if (temp > max_temp)
 max_temp = temp;
 count++;
 if (count == 3) {
total_temp += max_temp;
 max_temp = 0;
 count = 0;
 days++;
 }
 }
 context.write(key, new IntWritable(total_temp / days));
 }
}
```

```
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
```

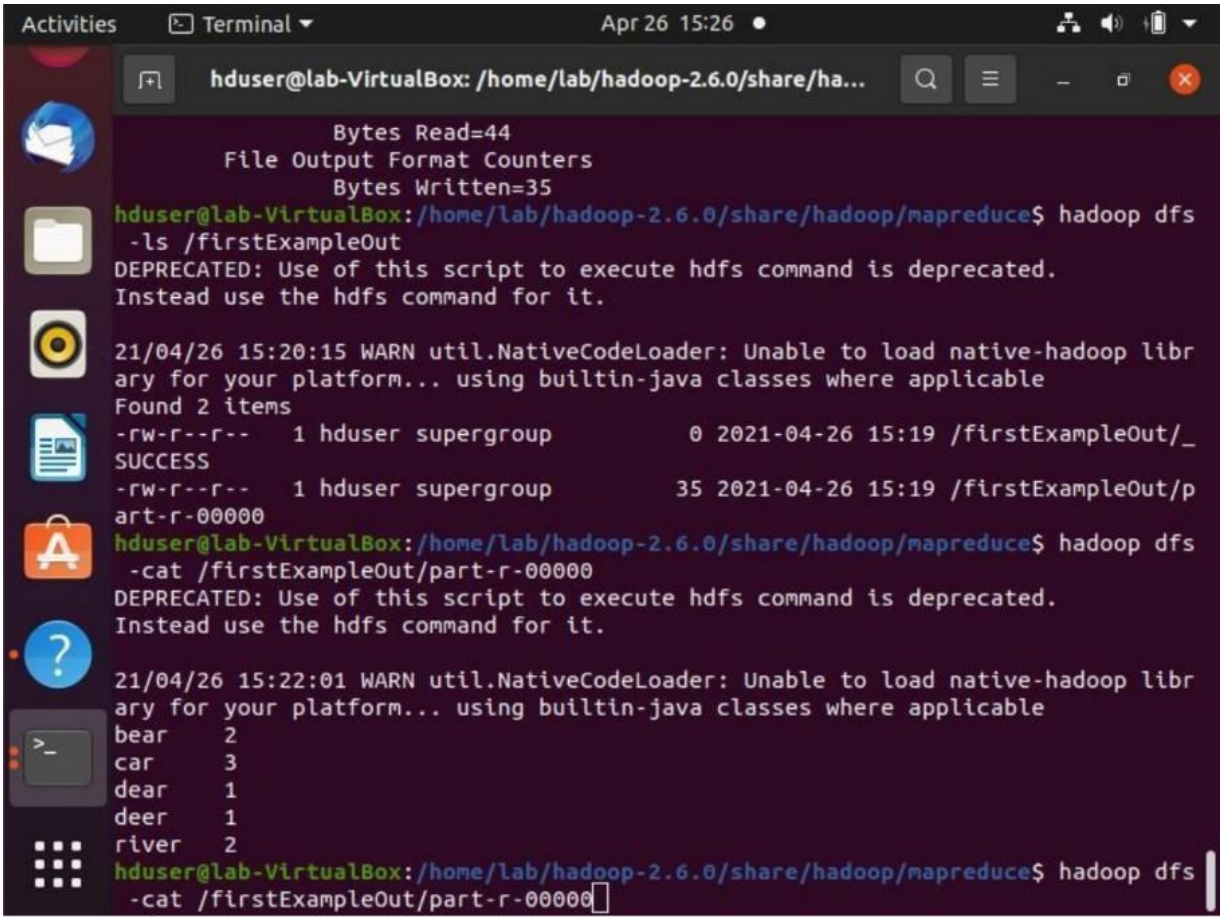
7. For a given Text file, Create a Map Reduce program to sort the content in an alphabetic order listing only top 10 maximum occurrences of words.

```
//Driver Code
package wordCount;
import java.io.IOException;
import org.apache.hadoop.conf.Configured;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.FileInputFormat;
import org.apache.hadoop.mapred.FileOutputFormat;

import org.apache.hadoop.mapred.JobClient;
import org.apache.hadoop.mapred.JobConf;
import org.apache.hadoop.util.Tool;
import org.apache.hadoop.util.ToolRunner;

public class WCDriver extends Configured implements Tool {
        public int run(String args[]) throws IOException
        {
                if (args.length < 2)
                {
                        System.out.println("Please give valid inputs");
                        return -1;
                }
```

```
                JobConf conf = new JobConf(WCDriver.class);
                FileInputFormat.setInputPaths(conf, new
                Path(args[0]));
                FileOutputFormat.setOutputPath(conf,
                new Path(args[1]));
                conf.setMapperClass(WCMapper.class);
                conf.setReducerClass(WCReducer.class);
                conf.setMapOutputKeyClass(Text.class);
                conf.setMapOutputValueClass(IntWritable.class);
                conf.setOutputKeyClass(Text.class);
                conf.setOutputValueClass(IntWritable.class);
                JobClient.runJob(conf);
                return 0;
        }
        // Main Method
        public static void main(String args[]) throws Exception
        {
                int exitCode = ToolRunner.run(new WCDriver(), args);
                System.out.println(exitCode);
        }
}

//Mapper Code
package wordCount;
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
```

```
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.MapReduceBase;
import org.apache.hadoop.mapred.Mapper;
import org.apache.hadoop.mapred.OutputCollector;

import org.apache.hadoop.mapred.Reporter;
public class WCMapper extends MapReduceBase implements Mapper<LongWritable,Text,
        Text, IntWritable> { // Map function
        public void map(LongWritable key, Text value, OutputCollector<Text, IntWritable>
output, Reporter rep) throws IOException
        {
                String line = value.toString();
                // Splitting the line on spaces
                for (String word : line.split(" "))
                {
                        if (word.length() > 0)
                        {
                output.collect(new Text(word), new IntWritable(1));
                        }
                }
        }
}

//Reducer Code
package wordCount;

import java.io.IOException;
```

```
import java.util.Iterator;
import  org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import  org.apache.hadoop.mapred.MapReduceBase;
import  org.apache.hadoop.mapred.OutputCollector;
import org.apache.hadoop.mapred.Reducer;
import org.apache.hadoop.mapred.Reporter;


public class WCReducer extends MapReduceBase implements Reducer<Text,IntWritable,
        Text, IntWritable> { // Reduce function
        public void reduce(Text key, Iterator<IntWritable> value,
OutputCollector<Text, IntWritable> output,Reporter rep) throws IOException
        {
                int count = 0;
                // Counting the frequency of each words
                while (value.hasNext())
                {
                        IntWritable i = value.next();
                        count += i.get();
                }
                output.collect(key, new IntWritable(count));
        }
}
```


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

8. Create a Map Reduce program to demonstrating join operation

```
// 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 Nameinput'");
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);
}
} }
```

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

```
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;
```

10. Using RDD and FlaMap 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

```
val textFile = sc.textFile("/home/bhoom/Desktop/wc.txt")

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

import scala.collection.immutable.ListMap

val sorted=ListMap(counts.collect.sortWith(_._2 > _._2):_*)// sort in descending order based

on values

println(sorted)

for((k,v)<-sorted)

{

if(v>4)

{

print(k+",")

print(v)
println()

}

}
```

```
scala> val textFile = sc.textFile("sample.txt")
textFile: org.apache.spark.rdd.RDD[String] = sample.txt MapPartitionsRDD[1] at textFile at <console>: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 <console>:25

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

scala> val sorted=ListMap(counts.collect.sortWith(_._2 > _._2):_*)// sort in descending order based
sorted: scala.collection.immutable.ListMap[String,Int] = Map(how -> 5, is -> 4, your -> 4, are -> 1, brother -> 1, sister -> 1, family -> 1, job -> 1, you -> 1, hi
-> 1)

scala> println(sorted)
Map(how -> 5, is -> 4, your -> 4, are -> 1, brother -> 1, sister -> 1, family -> 1, job -> 1, you -> 1, hi -> 1)

scala> for((k,v)<-sorted)
     | {
     |
Display all 689 possibilities? (y or n)
     |
     | if(v>4)
     | {
     | print(k+",")
     | print(v)
     | println()
     | }
     | }
how,5
```