VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

BIG DATA ANALYTICS
(20CS6PEBDA)

Submitted by

Aruna Ravi K R (1BM19CS225)

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 **Aruna Ravi K R(1BM19CS225),** who is a bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of a **BIG DATA ANALYTICS - (20CS6PEBDA)** work prescribed for the said degree.

Antara Roy Choudhury
Assistant Professor
Department of CSE
BMSCE, Bengaluru

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

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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

BDA LAB 1

Program 1. Perform the following DB operations using Cassandra.

1. Create a key space by name Employee

```
cqlsh:employee2> create keyspace employee4 with replication={'class':'SimpleStrategy','replication_factor':'1'};
cqlsh:employee2>
```

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

Emp_Id Primary Key, Emp_Name, Designation, Date_of_Joining,

Salary, Dept_Name

```
cqlsh:employee2> create employee_info (id int Primary Key,name text,designation text,doj timestamp,salary double,department t
ext);
```

3. Insert the values into the table in batch

```
cqlsh:employee2> begin batch
             ... insert into employee_info(id,name,designation,doj,salary,department) values (1,'aruna','manager','2019-05-04
',125000,'management')
             ... insert into employee_info(id,name,designation,doj,salary,department) values (2,'manju','developer','2020-05-
04',105000,'dev')
             ... insert into employee_info(id,name,designation,doj,salary,department) values (3,'raj','developer','2021-05-04
',100000,'dev')
             ... apply batch;
```

4. Update Employee name and Department of Emp-Id 2

```
cqlsh:employee2> update employee_info set name='ram',department='management' where id=2;
```

5. Sort the details of Employee records based on salary

```
cqlsh:employee2> select * from employee_info where id in(1,2,3) orderby salary;
```

```
 id | department | designation | doj                             | name  | salary
----+------------+-------------+---------------------------------+-------+----------
  1 | management |     manager | 2019-05-03 18:30:00.000000+0000 | aruna | 1.25e+05
  2 | management |   developer | 2020-05-03 18:30:00.000000+0000 |   ram | 1.05e+05
  3 |        dev |   developer | 2021-05-03 18:30:00.000000+0000 |   raj |    1e+05
```

6. Alter the schema of the table Employee_Info to add a column Projects which stores a set of Projects done by the corresponding Employee.

```
cqlsh:employee2> alter table employee_info add projects set <text>;
cqlsh:employee2> select * from employee_info;

 id | department | designation | doj                             | name  | projects | salary
----+------------+-------------+---------------------------------+-------+----------+----------
  1 | management |     manager | 2019-05-03 18:30:00.000000+0000 | aruna |     null | 1.25e+05
  2 | management |   developer | 2020-05-03 18:30:00.000000+0000 |   ram |     null | 1.05e+05
  3 |        dev |   developer | 2021-05-03 18:30:00.000000+0000 |   raj |     null |    1e+05
```

7. Update the altered table to add project names.

```
cqlsh:employee2> update employee_info set projects=projects+{'p1','p2','p3'} where id=1;
cqlsh:employee2> select * from employee_info;

 id | department | designation | doj                             | name  | projects           | salary
----+------------+-------------+---------------------------------+-------+--------------------+----------
  1 | management |     manager | 2019-05-03 18:30:00.000000+0000 | aruna | {'p1', 'p2', 'p3'} | 1.25e+05
  2 | management |   developer | 2020-05-03 18:30:00.000000+0000 |   ram |               null | 1.05e+05
  3 |        dev |   developer | 2021-05-03 18:30:00.000000+0000 |   raj |               null |    1e+05
```

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

```
cqlsh:employee2> insert into employee_info(id,name,designation,doj,salary,department) values (4,'namatha','marketing man
,'2019-04-03',123000,'marketing') using ttl 45;
cqlsh:employee2> select * from employee_info;

 id | department | designation       | doj                             | name    | projects           | salary
----+------------+-------------------+---------------------------------+---------+--------------------+----------
  1 | management |           manager | 2019-05-03 18:30:00.000000+0000 |   aruna | ['p1', 'p2', 'p3'] | 1.25e+05
  2 | management |         developer | 2020-05-03 18:30:00.000000+0000 |     ram |               null | 1.05e+05
  4 |  marketing | marketing manager | 2019-04-02 18:30:00.000000+0000 | namatha |               null | 1.23e+05
  3 |        dev |         developer | 2021-05-03 18:30:00.000000+0000 |     raj |               null |    1e+05

(4 rows)
cqlsh:employee2> select ttl(department) from employee_info;

 ttl(department)
-----------------
            null
            null
               2
            null

(4 rows)
```

```
(4 rows)
cqlsh:employee2> select * from employee_info;

 id | department | designation | doj                             | name  | projects           | salary
----+------------+-------------+---------------------------------+-------+--------------------+----------
  1 | management |     manager | 2019-05-03 18:30:00.000000+0000 | aruna | ['p1', 'p2', 'p3'] | 1.25e+05
  2 | management |   developer | 2020-05-03 18:30:00.000000+0000 |   ram |               null | 1.05e+05
  3 |        dev |   developer | 2021-05-03 18:30:00.000000+0000 |   raj |               null |    1e+05
```

BDA LAB 2

Perform the following DB operations using Cassandra:

1 Create a key space by name Library

```
cqlsh> create keyspace Library1 WITH REPLICATION={'class':'SimpleStrategy','replication_factor':'2'};
cqlsh> use Library1;
```

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

```
cqlsh:library1> create table Library_info(id int,c_val counter,s_name text,b_name text,b_id int,doi ti
mestamp,primary key(id,s_name,b_name,b_id,doi));
```

3. Insert the values into the table in batch

```
cqlsh:library1> update Library_info set c_val=c_val+1 where id=1 and s_name='aruna' and b_name='maths'
 and b_id=1 and doi='2020-02-23';
cqlsh:library1> update Library_info set c_val=c_val+1 where id=1 and s_name='ram' and b_name='ccp' and
 b_id=2 and doi='2020-03-14';
cqlsh:library1> update Library_info set c_val=c_val+1 where id=3 and s_name='raja' and b_name='BDA' an
d b_id=3 and doi='2020-03-04';
cqlsh:library1> select * from Library_info ;
```

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

```
cqlsh:library1> update Library_info set c_val=c_val+2 where id=4 and s_name='manny' and b_name='CNS' a
nd b_id=4 and doi='2020-05-23';
cqlsh:library1> select * from Library_info ;

 id | s_name | b_name | b_id | doi                             | c_val
----+--------+--------+------+---------------------------------+-------
  1 |  aruna |  maths |    1 | 2020-02-22 18:30:00.000000+0000 |     1
  1 |    ram |    ccp |    2 | 2020-03-13 18:30:00.000000+0000 |     1
  4 |  manny |    CNS |    4 | 2020-05-22 18:30:00.000000+0000 |     5
  3 |   raja |    BDA |    3 | 2020-03-03 18:30:00.000000+0000 |     1
```

5.

Write a query to show that a student with id 1.

6.

```
cqlsh:library1> select * from Library_info where id=1 and s_name='aruna' and b_name='maths' and b_id=1
;

 id | s_name | b_name | b_id | doi                             | c_val
----+--------+--------+------+---------------------------------+-------
  1 |  aruna |  maths |    1 | 2020-02-21 18:30:00.000000+0000 |     2
  1 |  aruna |  maths |    1 | 2020-02-22 18:30:00.000000+0000 |     1
```

Export the created column to a csv file

7.

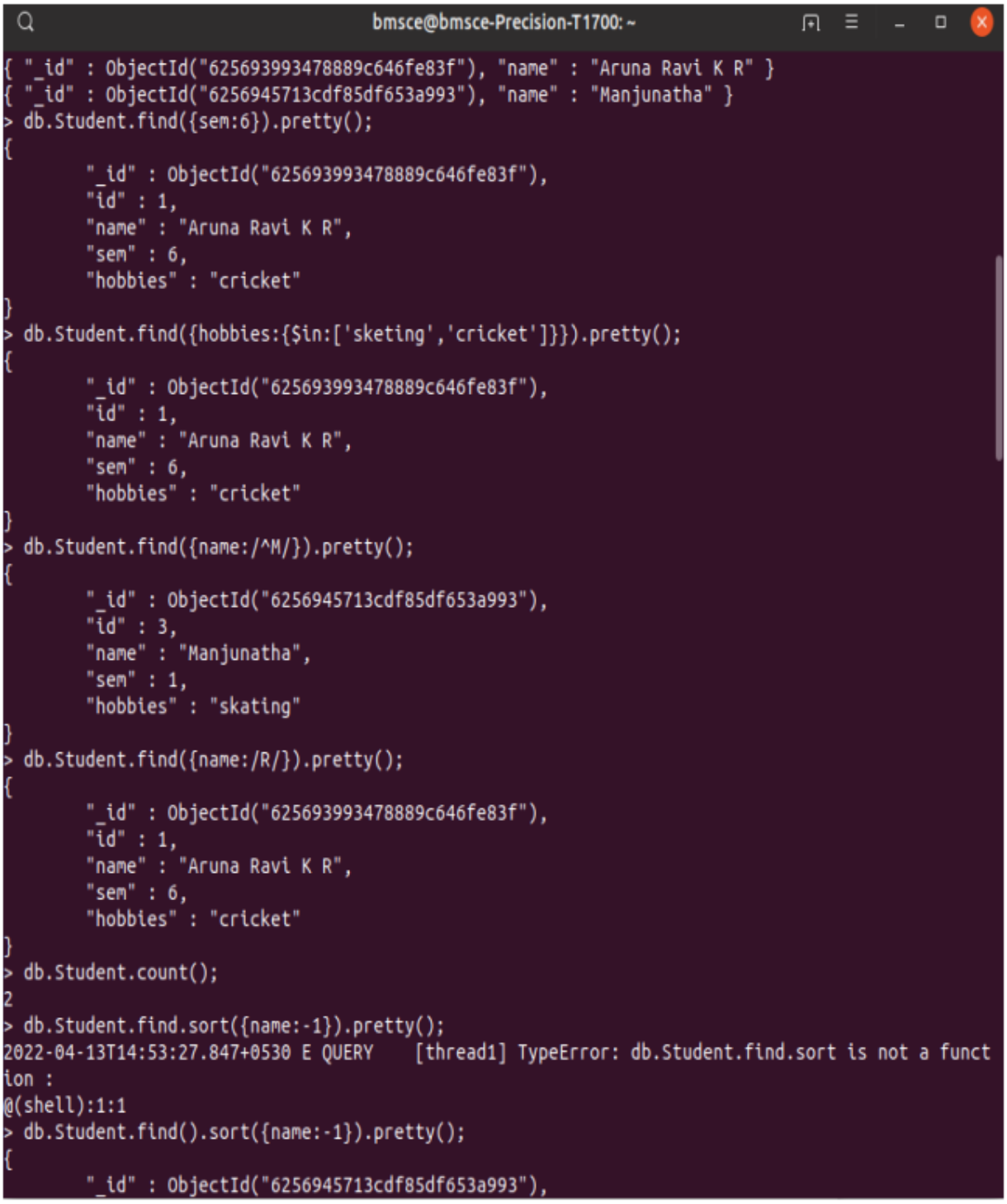
```
cqlsh:library1> copy Library_info(id,s_name,b_name,b_id,doi,c_val) to '/home/bmsce/aruna.csv';
Using 11 child processes
```

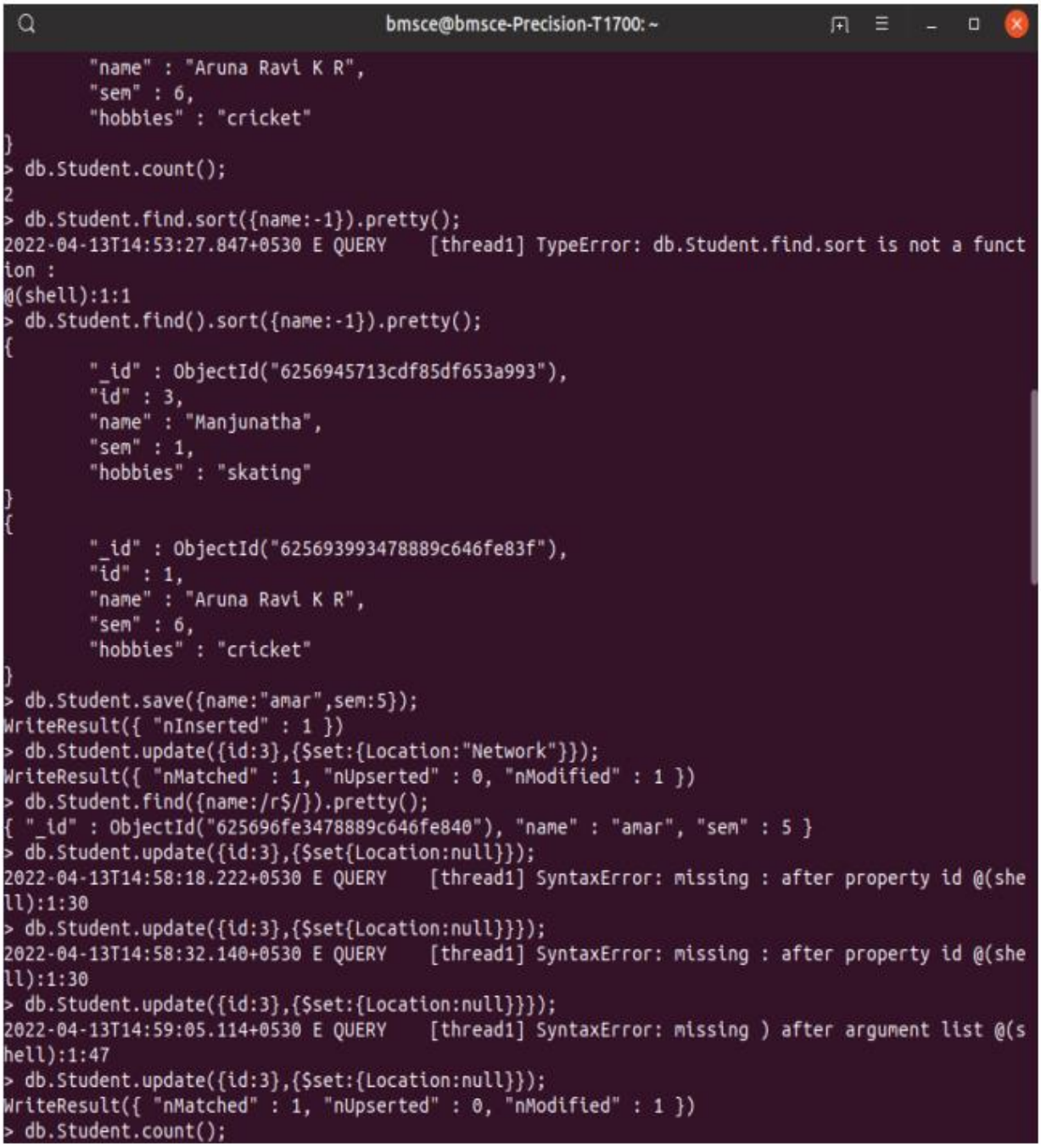
Import a given csv dataset from local file system into Cassandra column family

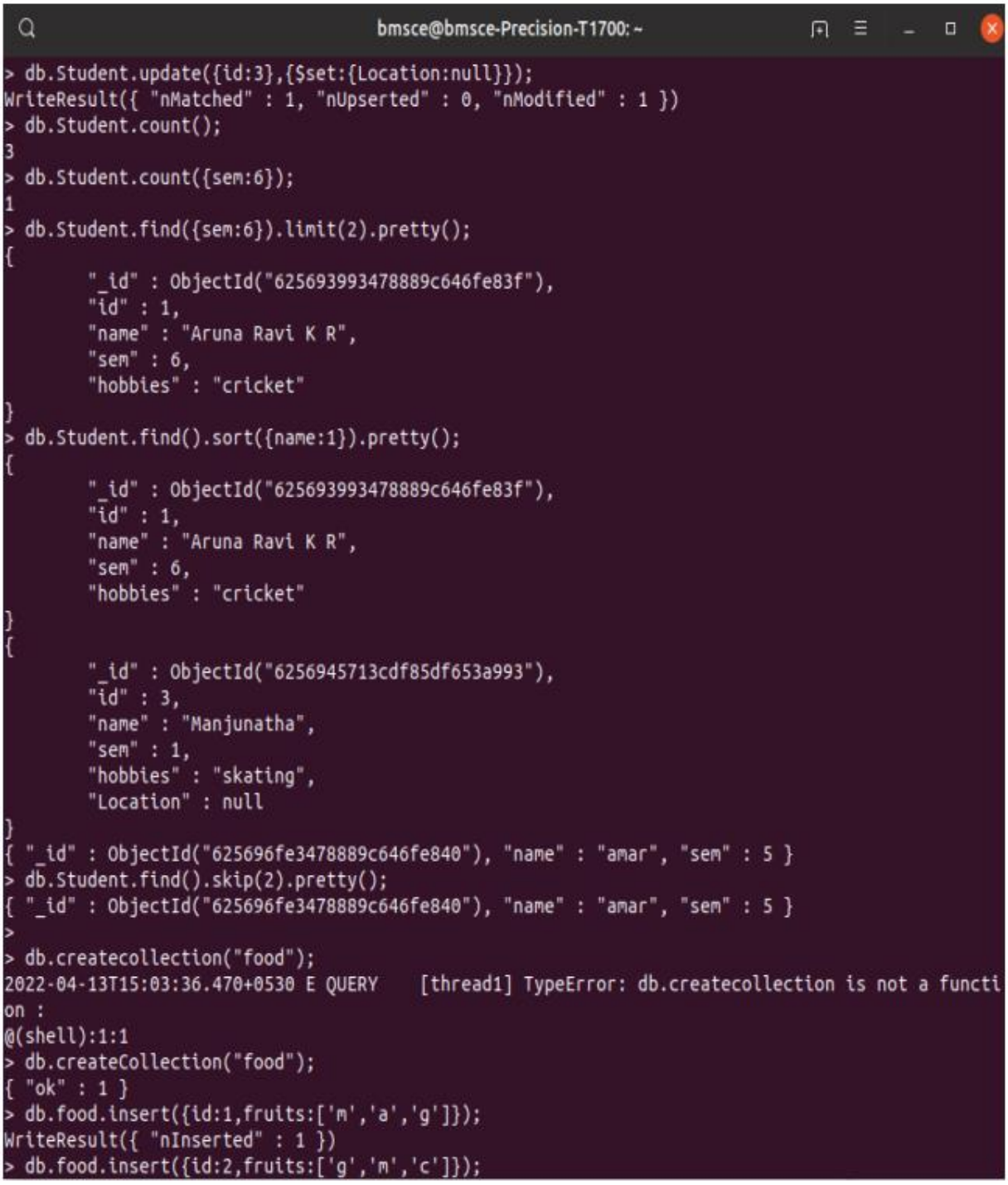
```
cqlsh:library1> copy Library_info2(id,s_name,b_name,b_id,doi,c_val) from '/home/bmsce/aruna.csv';
Using 11 child processes

Starting copy of library1.library_info2 with columns [id, s_name, b_name, b_id, doi, c_val].
Processed: 5 rows; Rate:       8 rows/s; Avg. rate:      12 rows/s
5 rows imported from 1 files in 0.429 seconds (0 skipped).
cqlsh:library1> select * from Library_info2
           ... ;

 id | s_name | b_name | b_id | doi                             | c_val
----+--------+--------+------+---------------------------------+-------
  1 |  aruna |  maths |    1 | 2020-02-21 18:30:00.000000+0000 |     2
  1 |  aruna |  maths |    1 | 2020-02-22 18:30:00.000000+0000 |     1
  1 |    ram |    ccp |    2 | 2020-03-13 18:30:00.000000+0000 |     1
  4 | manny |    CNS |    4 | 2020-05-22 18:30:00.000000+0000 |     5
  3 |  raja |    BDA |    3 | 2020-03-03 18:30:00.000000+0000 |     4

(5 rows)
```

BDA LAB 3

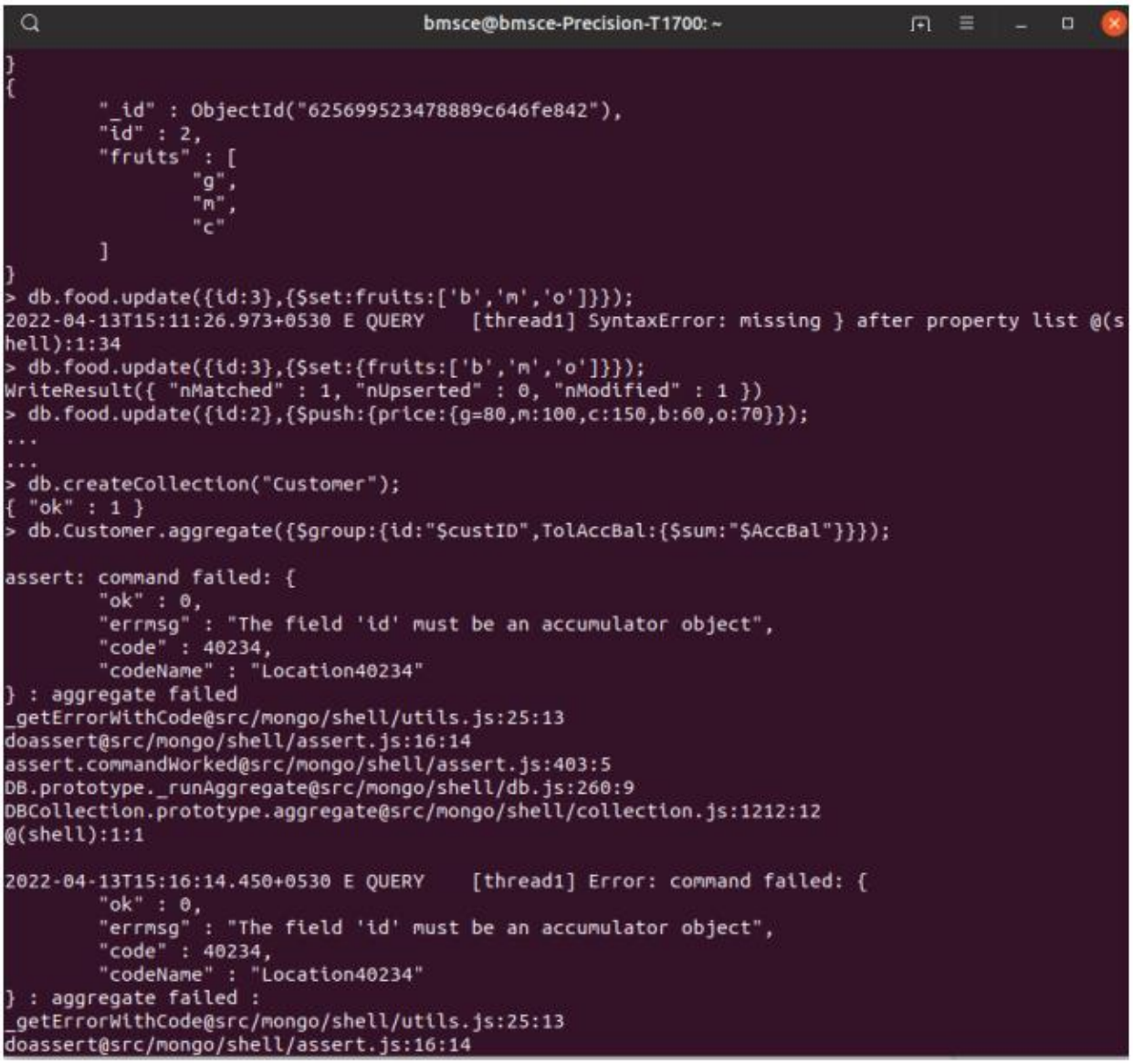
Mongo (CRUD)


bmsce@bmsce-Precision-T1700: ~
{ "_id" : ObjectId("625693993478889c646fe83f"), "name" : "Aruna Ravi K R" }
{ "_id" : ObjectId("6256945713cdf85df653a993"), "name" : "Manjunatha" }
> db.Student.find({sem:6}).pretty();
{
"_id" : ObjectId("625693993478889c646fe83f"),
"id" : 1,
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
> db.Student.find({hobbies:{$in:['sketing','cricket']}}).pretty();
{
"_id" : ObjectId("625693993478889c646fe83f"),
"id" : 1,
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
> db.Student.find({name:/^M/}).pretty();
{
"_id" : ObjectId("6256945713cdf85df653a993"),
"id" : 3,
"name" : "Manjunatha",
"sem" : 1,
"hobbies" : "skating"
}
> db.Student.find({name:/R/}).pretty();
{
"_id" : ObjectId("625693993478889c646fe83f"),
"id" : 1,
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
> db.Student.count();
2
> db.Student.find.sort({name:-1}).pretty();
2022-04-13T14:53:27.847+0530 E QUERY [thread1] TypeError: db.Student.find.sort is not a funct
ion :
@(shell):1:1
> db.Student.find().sort({name:-1}).pretty();
{
"_id" : ObjectId("6256945713cdf85df653a993"),


bmsce@bmsce-Precision-T1700: ~
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
> db.Student.count();
2
> db.Student.find.sort({name:-1}).pretty();
2022-04-13T14:53:27.847+0530 E QUERY [thread1] TypeError: db.Student.find.sort is not a funct
ion :
@(shell):1:1
> db.Student.find().sort({name:-1}).pretty();
{
"_id" : ObjectId("6256945713cdf85df653a993"),
"id" : 3,
"name" : "Manjunatha",
"sem" : 1,
"hobbies" : "skating"
}
{
"_id" : ObjectId("625693993478889c646fe83f"),
"id" : 1,
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
> db.Student.save({name:"amar",sem:5});
WriteResult({ "nInserted" : 1 })
> db.Student.update({id:3},{$set:{Location:"Network"}});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.find({name:/r$/}).pretty();
{ "_id" : ObjectId("625696fe3478889c646fe840"), "name" : "amar", "sem" : 5 }
> db.Student.update({id:3},{$set{Location:null}});
2022-04-13T14:58:18.222+0530 E QUERY [thread1] SyntaxError: missing : after property id @(she
ll):1:30
> db.Student.update({id:3},{$set{Location:null}}});
2022-04-13T14:58:32.140+0530 E QUERY [thread1] SyntaxError: missing : after property id @(she
ll):1:30
> db.Student.update({id:3},{$set:{Location:null}}});
2022-04-13T14:59:05.114+0530 E QUERY [thread1] SyntaxError: missing) after argument list @(s
hell):1:47
> db.Student.update({id:3},{$set:{Location:null}});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.count();


bmsce@bmsce-Precision-T1700: ~
> db.Student.update({id:3},{$set:{Location:null}});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.count();
3
> db.Student.count({sem:6});
1
> db.Student.find({sem:6}).limit(2).pretty();
{
"_id" : ObjectId("625693993478889c646fe83f"),
"id" : 1,
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
> db.Student.find().sort({name:1}).pretty();
{
"_id" : ObjectId("625693993478889c646fe83f"),
"id" : 1,
"name" : "Aruna Ravi K R",
"sem" : 6,
"hobbies" : "cricket"
}
{
"_id" : ObjectId("6256945713cdf85df653a993"),
"id" : 3,
"name" : "Manjunatha",
"sem" : 1,
"hobbies" : "skating",
"Location" : null
}
{ "_id" : ObjectId("625696fe3478889c646fe840"), "name" : "amar", "sem" : 5 }
> db.Student.find().skip(2).pretty();
{ "_id" : ObjectId("625696fe3478889c646fe840"), "name" : "amar", "sem" : 5 }
>
> db.createcollection("food");
2022-04-13T15:03:36.470+0530 E QUERY [thread1] TypeError: db.createcollection is not a functi
on :
@(shell):1:1
> db.createCollection("food");
{ "ok" : 1 }
> db.food.insert({id:1,fruits:['m','a','g']});
WriteResult({ "nInserted" : 1 })
> db.food.insert({id:2,fruits:['g','m','c']});


bmsce@bmsce-Precision-T1700: ~
> db.food.insert({id:1,fruits:['m','a','g']});
WriteResult({ "nInserted" : 1 })
> db.food.insert({id:2,fruits:['g','m','c']});
WriteResult({ "nInserted" : 1 })
> db.food.insert({id:3,fruits:['b','m']});
WriteResult({ "nInserted" : 1 })
> db.food.find({fruits:['g','m','c']});
{ "_id" : ObjectId("625699523478889c646fe842"), "id" : 2, "fruits" : ["g", "m", "c"] }
> db.food.find({fruits:{$size:2}}).pretty();
{
"_id" : ObjectId("625699603478889c646fe843"),
"id" : 3,
"fruits" : [
"b",
"m"
]
}
> db.food.find({id:1,{{fruits:{$slice:2}}).pretty();
...
...
>
>
> db.food.find({fruits:{$all:['m','g']}}).pretty();
{
"_id" : ObjectId("6256993d3478889c646fe841"),
"id" : 1,
"fruits" : [
"m",
"a",
"g"
]
}
{
"_id" : ObjectId("625699523478889c646fe842"),
"id" : 2,
"fruits" : [
"g",
"m",
"c"
]
}
> db.food.update({id:3},{$set:fruits:['b','m','o']}});
2022-04-13T15:11:26.973+0530 E QUERY [thread1] SyntaxError: missing } after property list @(s


bmsce@bmsce-Precision-T1700: ~
}
{
"_id" : ObjectId("625699523478889c646fe842"),
"id" : 2,
"fruits" : [
"g",
"m",
"c"
]
}
> db.food.update({id:3},{$set:fruits:['b','m','o']}});
2022-04-13T15:11:26.973+0530 E QUERY [thread1] SyntaxError: missing } after property list @(s
hell):1:34
> db.food.update({id:3},{$set:{fruits:['b','m','o']}});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.food.update({id:2},{$push:{price:{g=80,m:100,c:150,b:60,o:70}}});
...
...
> db.createCollection("Customer");
{ "ok" : 1 }
> db.Customer.aggregate({$group:{id:"$custID",TolAccBal:{$sum:"$AccBal"}}});
assert: command failed: {
"ok" : 0,
"errmsg" : "The field 'id' must be an accumulator object",
"code" : 40234,
"codeName" : "Location40234"
} : aggregate failed
_getErrorWithCode@src/mongo/shell/utils.js:25:13
doassert@src/mongo/shell/assert.js:16:14
assert.commandWorked@src/mongo/shell/assert.js:403:5
DB.prototype._runAggregate@src/mongo/shell/db.js:260:9
DBCollection.prototype.aggregate@src/mongo/shell/collection.js:1212:12
@(shell):1:1
2022-04-13T15:16:14.450+0530 E QUERY [thread1] Error: command failed: {
"ok" : 0,
"errmsg" : "The field 'id' must be an accumulator object",
"code" : 40234,
"codeName" : "Location40234"
} : aggregate failed :
_getErrorWithCode@src/mongo/shell/utils.js:25:13
doassert@src/mongo/shell/assert.js:16:14

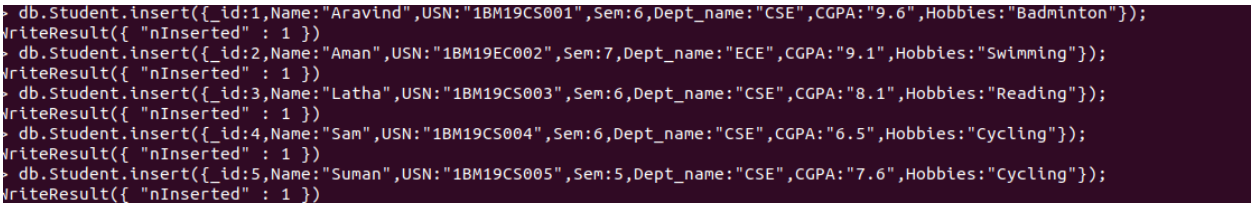
1) Using MongoDB

i) Create a database for Students and Create a Student Collection (_id,Name, USN, Semester, Dept_Name, CGPA, Hobbies(Set)).

ii) Insert required documents to the collection.

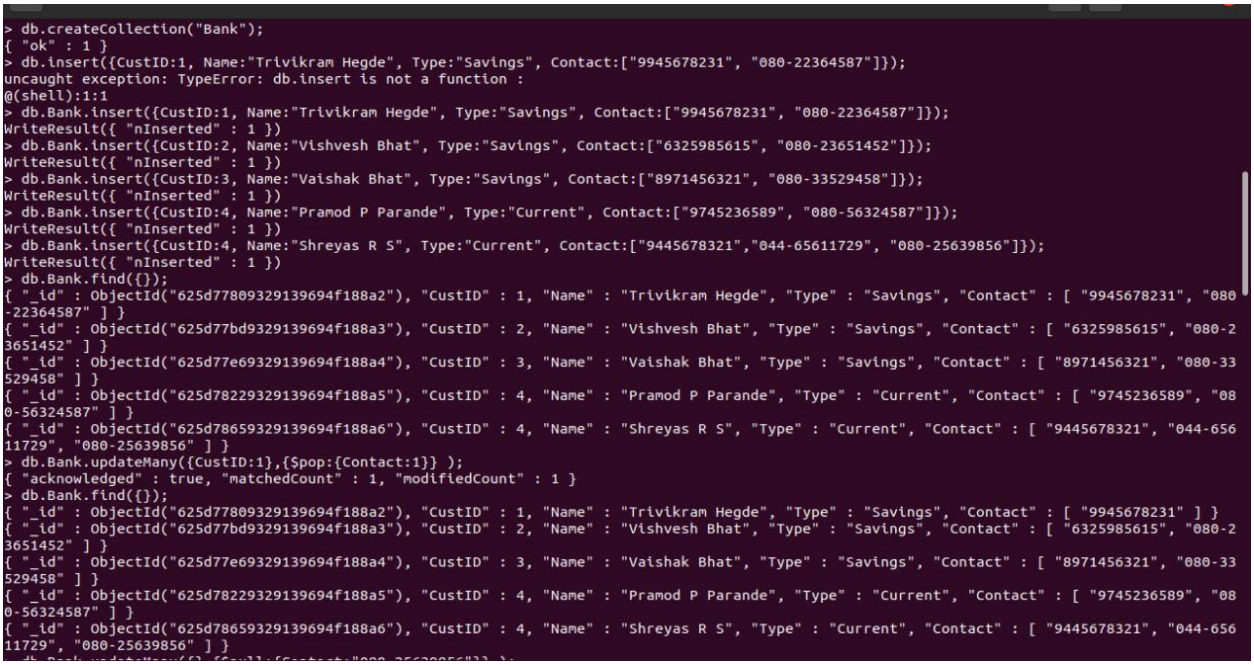
iii) First Filter on “Dept_Name:CSE” and then group it on “Semester” and compute the Average CPGA for that semester and filter those documents where the “Avg_CPGA” is greater than 7.5.

iv) Command used to export MongoDB JSON documents from “Student” Collection into the “Students” database into a CSV file “Output.txt”.



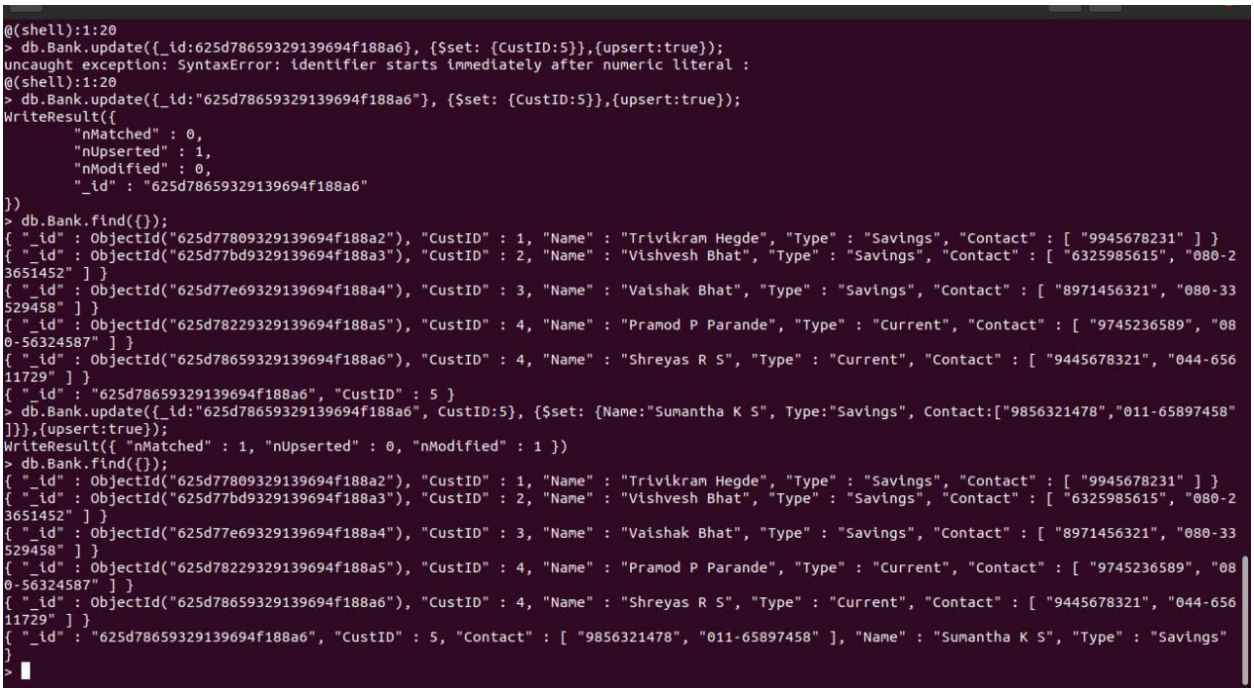
2)Create a mongodb collection Bank. Demonstrate the following by choosing fields of your choice.

1. Insert three documents
2. Use Arrays(Use Pull and Pop operation)
3. Use Index
4. Use Cursors
5. Updation



```
> db.createCollection("Bank");
{ "ok" : 1 }
> db.insert({CustID:1, Name:"Trivikram Hegde", Type:"Savings", Contact:["9945678231", "080-22364587"]});
uncaught exception: TypeError: db.insert is not a function :
@(shell):1:1
> db.Bank.insert({CustID:1, Name:"Trivikram Hegde", Type:"Savings", Contact:["9945678231", "080-22364587"]});
WriteResult({ "nInserted" : 1 })
> db.Bank.insert({CustID:2, Name:"Vishvesh Bhat", Type:"Savings", Contact:["6325985615", "080-23651452"]});
WriteResult({ "nInserted" : 1 })
> db.Bank.insert({CustID:3, Name:"Vaishak Bhat", Type:"Savings", Contact:["8971456321", "080-33529458"]});
WriteResult({ "nInserted" : 1 })
> db.Bank.insert({CustID:4, Name:"Pramod P Parande", Type:"Current", Contact:["9745236589", "080-56324587"]});
WriteResult({ "nInserted" : 1 })
> db.Bank.insert({CustID:4, Name:"Shreyas R S", Type:"Current", Contact:["9445678321","044-65611729", "080-25639856"]});
WriteResult({ "nInserted" : 1 })
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231", "080
-22364587" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729", "080-25639856" ] }
> db.Bank.updateMany({CustID:1},{$pop:{Contact:1}} );
{ "acknowledged" : true, "matchedCount" : 1, "modifiedCount" : 1 }
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729", "080-25639856" ] }
```

```
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729", "080-25639856" ] }
> db.Bank.updateMany({},{$pull:{Contact:"080-25639856"}} );
{ "acknowledged" : true, "matchedCount" : 5, "modifiedCount" : 1 }
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
> db.Bank.createIndex({Name:1, Type:1},{name:});
uncaught exception: SyntaxError: expected expression, got '}' :
@(shell):1:43
> db.Bank.createIndex({Name:1, Type:1},{name:"Find current account holders"});
{
        "createdCollectionAutomatically" : false,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
> db.Bank.getIndexes()
[
        {
                "v" : 2,
```



```
@(shell):1:20
> db.Bank.update({_id:625d78659329139694f188a6}, {$set: {CustID:5}},{upsert:true});
uncaught exception: SyntaxError: identifier starts immediately after numeric literal :
@(shell):1:20
> db.Bank.update({_id:"625d78659329139694f188a6"}, {$set: {CustID:5}},{upsert:true});
WriteResult({
        "nMatched" : 0,
        "nUpserted" : 1,
        "nModified" : 0,
        "_id" : "625d78659329139694f188a6"
})
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
{ "_id" : "625d78659329139694f188a6", "CustID" : 5 }
> db.Bank.update({_id:"625d78659329139694f188a6", CustID:5}, {$set: {Name:"Sumantha K S", Type:"Savings", Contact:["9856321478","011-65897458"
]}},{upsert:true});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d78659329139694f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
{ "_id" : "625d78659329139694f188a6", "CustID" : 5, "Contact" : [ "9856321478", "011-65897458" ], "Name" : "Sumantha K S", "Type" : "Savings"
}
>
```

1) Using MongoDB,
i) Create a database for Faculty and Create a Faculty Collection(Faculty_id, Name, Designation ,Department, Age, Salary, Specialization(Set)).
ii) Insert required documents to the collection.
iii) First Filter on “Dept_Name:MECH” and then group it on “Designation” and compute the Average Salary for that Designation and filter those documents where the “Avg_Sal” is greater than 650000.
iv) Demonstrate usage of import and export commands

Write MongoDB queries for the following:
1)To display only the product name from all the documents of the product collection.
2)To display only the Product ID, ExpiryDate as well as the quantity from the document of the product collection where the _id column is 1.
3)To find those documents where the price is not set to 15000.
4)To find those documents from the Product collection where the quantity is set to 9 and the product name is set to ‘monitor’.
5)To find documents from the Product collection where the Product name ends in ‘d’.

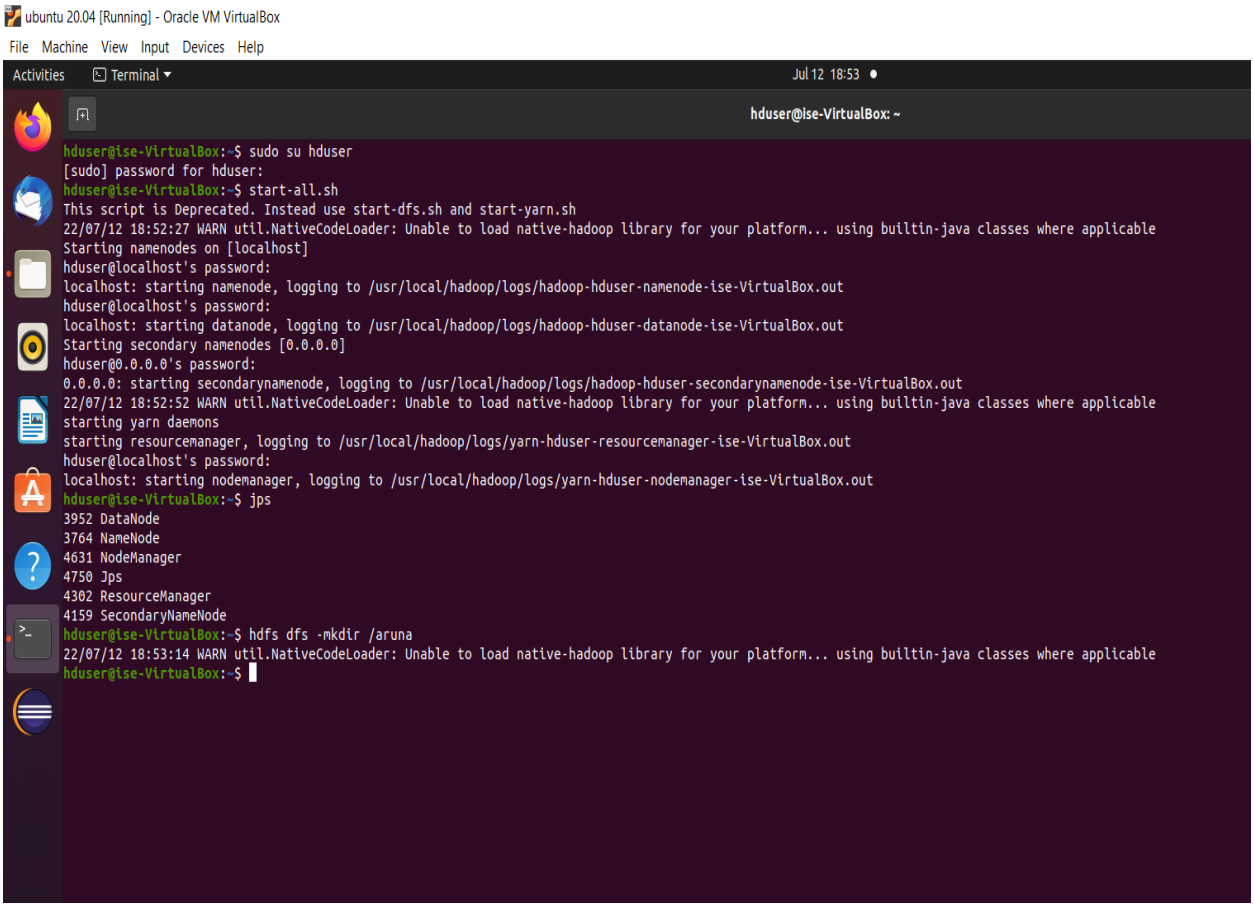
```
}
> db.createCollection("faculty");
{ "ok" : 1 }
> db.faculty.insert({_id:1,name:"Dr. Balaraman Ravindran",designation:"Professor",department:"CSE",age:45,salary:100000,specialization:['pytho
n','mysql','sklearn', 'tensorflow']});
WriteResult({ "nInserted" : 1 })
> db.faculty.insert({_id:2,name:"Dr. Mahadev Ghorkl",designation:"Assistant Professor",department:"CSE",age:35,salary:80000,specialization:['p
ython','numpy','sklearn', 'tensorflow', 'java']});
WriteResult({ "nInserted" : 1 })
> db.faculty.insert({_id:3,name:"Dr. Praveen Borade",designation:"Associate Professor",department:"ME",age:40,salary:75000,specialization:['au
tocad', 'aerodynamics', 'thermal physics']});
WriteResult({ "nInserted" : 1 })
> db.faculty.insert({_id:4,name:"Dr. Madhav Nayak",designation:"Assistant Professor",department:"ME",age:37,salary:95000,specialization:['auto
cad', 'flight-dynamics', 'Finite Element Analysis']});
WriteResult({ "nInserted" : 1 })
> db.faculty.aggregate ( {$match:{department:"ME"}}, {$group : {_id : "$designation", AverageSal :{$avg:"$salary"} } },  {$match:{AverageSal:{
$gt:50000}}});
{ "_id" : "Associate Professor", "AverageSal" : 75000 }
{ "_id" : "Assistant Professor", "AverageSal" : 95000 }
> db.createCollection("product");
{ "ok" : 1 }
> db.product.insert({pid:1,pname:"keyboard",mdate:2001,price:1800,quantity:2});
WriteResult({ "nInserted" : 1 })
> db.product.insert({pid:2,pname:"mouse",mdate:2005,price:1500,quantity:5});
WriteResult({ "nInserted" : 1 })
> db.product.insert({pid:3,pname:"monitor",mdate:2015,price:10000,quantity:9});
WriteResult({ "nInserted" : 1 })
> db.product.insert({pid:4,pname:"motherboard",mdate:2021,price:15000,quantity:4});
WriteResult({ "nInserted" : 1 })
> db.product.find({},{pname:1,_id:0})
{ "pname" : "keyboard" }
{ "pname" : "mouse" }
{ "pname" : "monitor" }
{ "pname" : "motherboard" }
> db.product.find({pid:1},{pid:1,_id:0,mdate:1,quantity:1});
{ "pid" : 1, "mdate" : 2001, "quantity" : 2 }
>  db.product.find({price:{$ne:15000}},{pname:1,_id:0});
{ "pname" : "keyboard" }
```

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

1. Insert three documents
2. Use Arrays(Use Pull and Pop operation)
3. Use Index
4. Use Cursors
5. Updation

BDA LAB 4

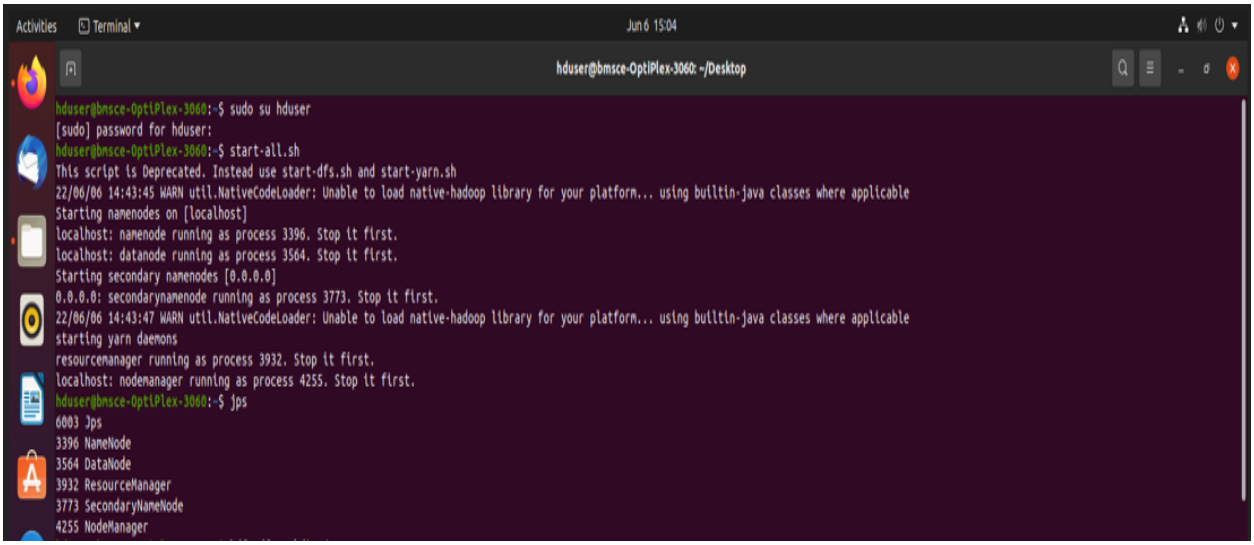
4. Hadoop Installation



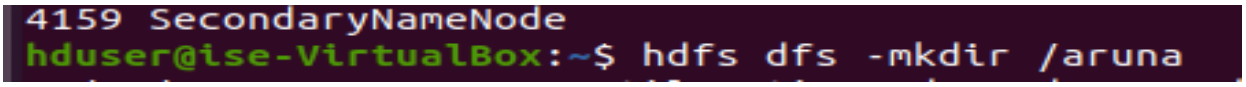
BDA LAB 5

5.Execution of HDFS Commands for interaction with Hadoop Environment. (Minimum 10 commands to be executed)

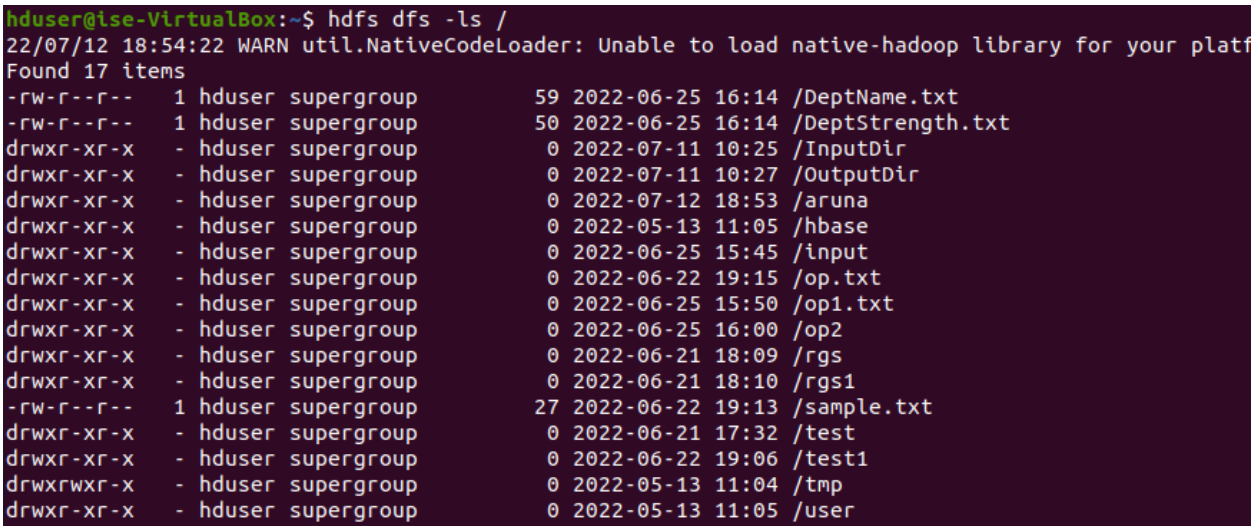
1. **jps**



2. mkdir



3. ls



4. put

```
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -put /home/hduser/Desktop/6b.txt  /Kusum/WC.txt
22/06/06 14:46:40 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -cat /Kusum/WC.txt
22/06/06 14:47:00 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hello fron 6B

D
B

B
```

5. copyFromLocal

```
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -put /home/hduser/Desktop/6b.txt  /Kusum/newWC.txt
22/06/06 14:50:45 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -cat /Kusum/newWC.txt
22/06/06 14:50:52 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hello fron 6B

D
B

B
```

6. Get

i)

```
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -get /Kusum/WC.txt /home/hduser/Downloads/newWC.txt
22/06/06 14:51:43 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~$ cd Downloads
hduser@bmsce-OptiPlex-3060:~/Downloads$ cat newWC.txt
hello fron 6B

D
B

B
```

ii)

```
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -ls /Kusum/
22/06/06 14:54:04 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         23 2022-06-06 14:46 /Kusum/WC.txt
-rw-r--r--   1 hduser supergroup         23 2022-06-06 14:50 /Kusum/newWC.txt
hduser@bmsce-OptiPlex-3060:~$ hdfs dfs -getmerge /Kusum/WC.txt /Kusum/newWC.txt /home/hduser/Desktop/newmerge.txt
22/06/06 14:55:18 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~$ cd Desktop
hduser@bmsce-OptiPlex-3060:~/Desktop$ cat newmerge.txt
hello fron 6B

D
B

B

hello fron 6B

D
B

B
```

iii)

```
hduser@bmsce-OptiPlex-3060:~/Desktop$ hadoop fs -getfacl /Kusum/
22/06/06 14:56:24 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
# file: /Kusum
# owner: hduser
# group: supergroup
user::rwx
group::r-x
other::r-x
```

7. copyToLocal

```
hduser@bmsce-OptiPlex-3060:~/Desktop$ hdfs dfs -copyToLocal /Kusum/WC.txt /home/hduser/Desktop
22/06/06 14:58:09 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~/Desktop$ cat WC.txt
hello fron 6B

D
B

B
```

8. cat

```
hduser@bmsce-OptiPlex-3060:~/Desktop$ hdfs dfs -cat /Kusum/WC.txt
22/06/06 14:58:59 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hello fron 6B

D
B

B
```

9. Mv

```
hduser@bmsce-OptiPlex-3060:~/Desktop$ hadoop fs -mv /Kusum /FFF
22/06/06 14:59:46 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~/Desktop$ hadoop fs -ls /FFF
22/06/06 15:00:00 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2022-06-06 14:58 /FFF/Kusum
-rw-r--r--   1 hduser supergroup         17 2022-06-04 10:06 /FFF/WC.txt
```

10. cp

```
hduser@bmsce-OptiPlex-3060:~/Desktop$ hadoop fs -cp /FFF/ /LLL
22/06/06 15:09:34 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@bmsce-OptiPlex-3060:~/Desktop$ hadoop fs -ls /LLL
22/06/06 15:10:07 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 2 items
drwxr-xr-x   - hduser supergroup          0 2022-06-06 15:09 /LLL/Kusum
-rw-r--r--   1 hduser supergroup         17 2022-06-06 15:09 /LLL/WC.txt
hduser@bmsce-OptiPlex-3060:~/Desktop$
```

BDA LAB 6

6. From the following link extract the weather data
https://github.com/tomwhite/hadoop-book/tree/master/input/ncdc/all
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.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

```
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));
  }
}
```

b) find the mean max temperature for every month

MeanMax
MeanMaxDriver.class

```
package meanmax;

import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class MeanMaxDriver {
  public static void main(String[] args) throws Exception {
    if (args.length != 2) {
      System.err.println("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.class);
    job.setReducerClass(MeanMaxReducer.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
    System.exit(job.waitForCompletion(true) ? 0 : 1);
  }
}
```

MeanMaxMapper.class

```
package meanmax;

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

public class MeanMaxMapper extends Mapper<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));
  }
}
```

```
hduser@ise-VirtualBox:~$ sudo su hduser
[sudo] password for hduser:
hduser@ise-VirtualBox:~$ start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
22/06/25 15:37:23 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Starting namenodes on [localhost]
hduser@localhost's password:
localhost: starting namenode, logging to /usr/local/hadoop/logs/hadoop-hduser-namenode-ise-VirtualBox.out
hduser@localhost's password:
localhost: starting datanode, logging to /usr/local/hadoop/logs/hadoop-hduser-datanode-ise-VirtualBox.out
Starting secondary namenodes [0.0.0.0]
hduser@0.0.0.0's password:
0.0.0.0: starting secondarynamenode, logging to /usr/local/hadoop/logs/hadoop-hduser-secondarynamenode-ise-VirtualBox.out
22/06/25 15:37:43 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
starting yarn daemons
starting resourcemanager, logging to /usr/local/hadoop/logs/yarn-hduser-resourcemanager-ise-VirtualBox.out
hduser@localhost's password:
localhost: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-hduser-nodemanager-ise-VirtualBox.out
hduser@ise-VirtualBox:~$ jps
3714 DataNode
2438 org.eclipse.equinox.launcher_1.5.600.v20191014-2022.jar
4392 NodeManager
3531 NameNode
3919 SecondaryNameNode
4511 Jps
4063 ResourceManager
hduser@ise-VirtualBox:~$ hadoop fs -ls /
22/06/25 15:44:22 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 9 items
drwxr-xr-x   - hduser supergroup          0 2022-05-13 11:05 /hbase
drwxr-xr-x   - hduser supergroup          0 2022-06-22 19:15 /op.txt
drwxr-xr-x   - hduser supergroup          0 2022-06-21 18:09 /rgs
drwxr-xr-x   - hduser supergroup          0 2022-06-21 18:10 /rgs1
-rw-r--r--   1 hduser supergroup         27 2022-06-22 19:13 /sample.txt
drwxr-xr-x   - hduser supergroup          0 2022-06-21 17:32 /test
drwxr-xr-x   - hduser supergroup          0 2022-06-22 19:06 /test1
drwxrwxr-x   - hduser supergroup          0 2022-05-13 11:04 /tmp
drwxr-xr-x   - hduser supergroup          0 2022-05-13 11:05 /user
hduser@ise-VirtualBox:~$ hadoop fs -mkdir /input
22/06/25 15:44:43 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@ise-VirtualBox:~$ hadoop fs -ls /
22/06/25 15:44:46 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 10 items
drwxr-xr-x   - hduser supergroup          0 2022-05-13 11:05 /hbase
drwxr-xr-x   - hduser supergroup          0 2022-06-25 15:44 /input
drwxr-xr-x   - hduser supergroup          0 2022-06-22 19:15 /op.txt
drwxr-xr-x   - hduser supergroup          0 2022-06-21 18:09 /rgs
```

```
drwxr-xr-x   - hduser supergroup          0 2022-06-22 19:06 /test1
drwxrwxr-x   - hduser supergroup          0 2022-05-13 11:04 /tmp
drwxr-xr-x   - hduser supergroup          0 2022-05-13 11:05 /user
hduser@ise-VirtualBox:~$ hadoop fs -copyFromLocal /home/hduser/Downloads/1901 /input
22/06/25 15:45:48 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@ise-VirtualBox:~$ hadoop fs -ls /input
22/06/25 15:45:57 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 1 items
-rw-r--r--   1 hduser supergroup     888190 2022-06-25 15:45 /input/1901
hduser@ise-VirtualBox:~$ hadoop jar /temp.jar temp.AverageDriver /input/1901 /output
Not a valid JAR: /temp.jar
hduser@ise-VirtualBox:~$ hadoop jar /home/hduser/Desktop/temp.jar temp.AverageDriver /input/1901 /op1.txt
Not a valid JAR: /home/hduser/Desktop/temp.jar
hduser@ise-VirtualBox:~$ hadoop jar /home/hduser/eclipse-workspace/temp.jar temp.AverageDriver /input/1901 /op1.txt
22/06/25 15:50:42 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
22/06/25 15:50:44 INFO Configuration.deprecation: session.id is deprecated. Instead, use dfs.metrics.session-id
22/06/25 15:50:44 INFO jvm.JvmMetrics: Initializing JVM Metrics with processName=JobTracker, sessionId=
22/06/25 15:50:44 WARN mapreduce.JobSubmitter: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
22/06/25 15:50:44 INFO input.FileInputFormat: Total input paths to process : 1
22/06/25 15:50:44 INFO mapreduce.JobSubmitter: number of splits:1
22/06/25 15:50:44 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local482228824_0001
22/06/25 15:50:44 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
22/06/25 15:50:44 INFO mapreduce.Job: Running job: job_local482228824_0001
22/06/25 15:50:44 INFO mapred.LocalJobRunner: OutputCommitter set in config null
22/06/25 15:50:44 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
22/06/25 15:50:44 INFO mapred.LocalJobRunner: Waiting for map tasks
22/06/25 15:50:44 INFO mapred.LocalJobRunner: Starting task: attempt_local482228824_0001_m_000000_0
22/06/25 15:50:44 INFO mapred.Task:  Using ResourceCalculatorProcessTree : [ ]
22/06/25 15:50:44 INFO mapred.MapTask: Processing split: hdfs://localhost:54310/input/1901:0+888190
22/06/25 15:50:45 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
22/06/25 15:50:45 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
22/06/25 15:50:45 INFO mapred.MapTask: soft limit at 83886080
22/06/25 15:50:45 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
22/06/25 15:50:45 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
22/06/25 15:50:45 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer
22/06/25 15:50:45 INFO mapred.LocalJobRunner:
22/06/25 15:50:45 INFO mapred.MapTask: Starting flush of map output
22/06/25 15:50:45 INFO mapred.MapTask: Spilling map output
22/06/25 15:50:45 INFO mapred.MapTask: bufstart = 0; bufend = 59076; bufvoid = 104857600
22/06/25 15:50:45 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend = 26188144(104752576); length = 26253/6553600
22/06/25 15:50:45 INFO mapred.MapTask: Finished spill 0
22/06/25 15:50:45 INFO mapred.Task: Task:attempt_local482228824_0001_m_000000_0 is done. And is in the process of committing
22/06/25 15:50:45 INFO mapred.LocalJobRunner: map
22/06/25 15:50:45 INFO mapred.Task: Task 'attempt_local482228824_0001_m_000000_0' done.
22/06/25 15:50:45 INFO mapred.LocalJobRunner: Finishing task: attempt_local482228824_0001_m_000000_0
22/06/25 15:50:45 INFO mapred.LocalJobRunner: map task executor complete.
hduser@ise-VirtualBox:~$ hadoop jar /home/hduser/Desktop/temp.jar temp.AverageDriver /input/1901 /op1.txt
Not a valid JAR: /home/hduser/Desktop/temp.jar
hduser@ise-VirtualBox:~$ hadoop jar /home/hduser/eclipse-workspace/temp.jar temp.AverageDriver /input/1901 /op1.txt
```

```
                WRONG_MAP=0
                WRONG_REDUCE=0
        File Input Format Counters
                Bytes Read=888190
        File Output Format Counters
                Bytes Written=8
hduser@ise-VirtualBox:~$ hadoop fs -ls /
22/06/25 15:51:03 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 11 items
drwxr-xr-x   - hduser supergroup          0 2022-05-13 11:05 /hbase
drwxr-xr-x   - hduser supergroup          0 2022-06-25 15:45 /input
drwxr-xr-x   - hduser supergroup          0 2022-06-22 19:15 /op.txt
drwxr-xr-x   - hduser supergroup          0 2022-06-25 15:50 /op1.txt
drwxr-xr-x   - hduser supergroup          0 2022-06-21 18:09 /rgs
drwxr-xr-x   - hduser supergroup          0 2022-06-21 18:10 /rgs1
-rw-r--r--   1 hduser supergroup         27 2022-06-22 19:13 /sample.txt
drwxr-xr-x   - hduser supergroup          0 2022-06-21 17:32 /test
drwxr-xr-x   - hduser supergroup          0 2022-06-22 19:06 /test1
drwxrwxr-x   - hduser supergroup          0 2022-05-13 11:04 /tmp
drwxr-xr-x   - hduser supergroup          0 2022-05-13 11:05 /user
hduser@ise-VirtualBox:~$ hadoop fs -ls /op1.txt
22/06/25 15:51:23 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 2022-06-25 15:50 /op1.txt/_SUCCESS
-rw-r--r--   1 hduser supergroup          8 2022-06-25 15:50 /op1.txt/part-r-00000
hduser@ise-VirtualBox:~$ hadoop fs -cat /op1.txt/part-r-00000
22/06/25 15:51:40 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
1901    46
```

BDA LAB 7

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

Driver-TopN.class

```
package samples.topn;

import java.io.IOException;
import java.util.StringTokenizer;
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.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;
import org.apache.hadoop.util.GenericOptionsParser;

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.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);
  }

  public static class TopNMapper extends Mapper<Object, Text, Text,
IntWritable> {
    private static final IntWritable one = new IntWritable(1);

    private Text word = new Text();

    private String tokens = "[_|$#<>\\^=\\[\\]\\*/\\\\,;,.\\-:()?!\"']";

    public void map(Object key, Text value, Mapper<Object, Text, Text,
IntWritable>.Context context) throws IOException, InterruptedException {
      String cleanLine =
value.toString().toLowerCase().replaceAll(this.tokens, " ");
      StringTokenizer itr = new StringTokenizer(cleanLine);
      while (itr.hasMoreTokens()) {
        this.word.set(itr.nextToken().trim());
        context.write(this.word, one);
      }
    }
  }
}
```

TopNCombiner.class

```
package samples.topn;

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

public class TopNCombiner 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 sum = 0;
```

```
    for (IntWritable val : values)
      sum += val.get();
    context.write(key, new IntWritable(sum));
  }
}
```

TopNMapper.class

```
package samples.topn;

import java.io.IOException;
import java.util.StringTokenizer;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Mapper;

public class TopNMapper extends Mapper<Object, Text, Text, IntWritable> {
  private static final IntWritable one = new IntWritable(1);

  private Text word = new Text();

  private String tokens = "[_|$#<>\\^=\\[\\]\\*/\\\\,;,.\\-:()?!\"']";

  public vo```\\id map(Object key, Text value, Mapper<Object, Text, Text,
IntWritable>.Context context) throws IOException, InterruptedException {
    String cleanLine = value.toString().toLowerCase().replaceAll(this.tokens,
" ");
    StringTokenizer itr = new StringTokenizer(cleanLine);
    while (itr.hasMoreTokens()) {
      this.word.set(itr.nextToken().trim());
      context.write(this.word, one);
    }
  }
}
```

TopNReducer.class

```
package samples.topn;

import java.io.IOException;
import java.util.HashMap;
import java.util.Map;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Reducer;
import utils.MiscUtils;

public class TopNReducer extends Reducer<Text, IntWritable, Text,
IntWritable> {
  private Map<Text, IntWritable> countMap = new HashMap<>();

  public void reduce(Text key, Iterable<IntWritable> values, Reducer<Text,
```

```
IntWritable, Text, IntWritable>.Context context) throws IOException,
InterruptedException {
    int sum = 0;
    for (IntWritable val : values)
      sum += val.get();
    this.countMap.put(new Text(key), new IntWritable(sum));
  }

  protected void cleanup(Reducer<Text, IntWritable, Text,
IntWritable>.Context context) throws IOException, InterruptedException {
    Map<Text, IntWritable> sortedMap = MiscUtils.sortByValues(this.countMap);
    int counter = 0;
    for (Text key : sortedMap.keySet()) {
      if (counter++ == 20)
        break;
      context.write(key, sortedMap.get(key));
    }
  }
}
```

```
hduser@ise-VirtualBox:~$ hadoop jar topn.jar topn.TopNDriver /aruna/input.txt /aruna/output
```

```
22/06/27 15:45:22 INFO Configuration.deprecation: session.id is deprecated.  Instead,
usedfs.metrics.session-id
22/06/27 15:45:22 INFO jvm.JvmMetrics: Initializing JVM Metrics with
processName=JobTracker,sessionId=
22/06/27 15:45:22 INFO input.FileInputFormat: Total input paths to process :
122/06/27 15:45:22 INFO mapreduce.JobSubmitter: number of splits:1
22/06/27 15:45:22 INFO mapreduce.JobSubmitter: Submitting tokens for job:
job_local691635730_000122/06/27 15:45:22 INFO mapreduce.Job: The url to track the job: http://
localhost:8080/
22/06/27 15:45:22 INFO mapreduce.Job: Running job: job_local691635730_0001
22/06/27 15:45:22 INFO mapred.LocalJobRunner: OutputCommitter set in config
null22/06/27 15:45:22 INFO mapred.LocalJobRunner: OutputCommitter is
org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Waiting for map tasks
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Starting task:
attempt_local691635730_0001_m_000000_022/06/27 15:45:22 INFO mapred.Task:  Using
ResourceCalculatorProcessTree : [ ]
22/06/27 15:45:22 INFO mapred.MapTask: Processing
split:hdfs://localhost:54310/kusum_topn/input.txt:0+103
22/06/27 15:45:22 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
22/06/27 15:45:22 INFO mapred.MapTask: mapreduce.task.io.sort.mb:
10022/06/27 15:45:22 INFO mapred.MapTask: soft limit at 83886080
22/06/27 15:45:22 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
22/06/27 15:45:22 INFO mapred.MapTask: kvstart = 26214396; length =
655360022/06/27 15:45:22 INFO mapred.MapTask: Map output collector class =
org.apache.hadoop.mapred.MapTask$MapOutputBuffer
22/06/27 15:45:22 INFO mapred.LocalJobRunner:
22/06/27 15:45:22 INFO mapred.MapTask: Starting flush of map
output22/06/27 15:45:22 INFO mapred.MapTask: Spilling map output
22/06/27 15:45:22 INFO mapred.MapTask: bufstart = 0; bufend = 187; bufvoid = 104857600
22/06/27 15:45:22 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend = 26214316(104857264);
length = 81/6553600
22/06/27 15:45:22 INFO mapred.MapTask: Finished spill 0
22/06/27 15:45:22 INFO mapred.Task: Task:attempt_local691635730_0001_m_000000_0 is done. And is
inthe process of committing
22/06/27 15:45:22 INFO mapred.LocalJobRunner: map
22/06/27 15:45:22 INFO mapred.Task: Task 'attempt_local691635730_0001_m_000000_0' done.
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Finishing task:
attempt_local691635730_0001_m_000000_022/06/27 15:45:22 INFO mapred.LocalJobRunner: map task
executor complete.
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Waiting for reduce tasks
22/06/27 15:45:22 INFO mapred.LocalJobRunner: Starting task:
attempt_local691635730_0001_r_000000_022/06/27 15:45:22 INFO mapred.Task:  Using
ResourceCalculatorProcessTree : [ ]
```

```
22/06/27 15:45:22 INFO mapred.ReduceTask: Using
ShuffleConsumerPlugin:
org.apache.hadoop.mapreduce.task.reduce.Shuffle@40a5e65a
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: MergerManager:
memoryLimit=334338464,maxSingleShuffleLimit=83584616, mergeThreshold=220663392,
ioSortFactor=10, memToMemMergeOutputsThreshold=10
22/06/27 15:45:22 INFO reduce.EventFetcher: attempt_local691635730_0001_r_000000_0 Thread
started:EventFetcher for fetching Map Completion Events
22/06/27 15:45:22 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of
mapattempt_local691635730_0001_m_000000_0 decomp: 231 len: 235 to MEMORY
22/06/27 15:45:22 INFO reduce.InMemoryMapOutput: Read 231 bytes from map-output
forattempt_local691635730_0001_m_000000_0
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: closeInMemoryFile -> map-output of size:
231,inMemoryMapOutputs.size() -> 1, commitMemory -> 0, usedMemory ->231
22/06/27 15:45:22 INFO reduce.EventFetcher: EventFetcher is interrupted..
Returning22/06/27 15:45:22 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: finalMerge called with 1 in-memory map-outputs and
0on-disk map-outputs
22/06/27 15:45:22 INFO mapred.Merger: Merging 1 sorted segments
22/06/27 15:45:22 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of
totalsize: 226 bytes
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: Merged 1 segments, 231 bytes to disk to
satisfyreduce memory limit
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: Merging 1 files, 235 bytes from disk
22/06/27 15:45:22 INFO reduce.MergeManagerImpl: Merging 0 segments, 0 bytes from memory into
reduce22/06/27 15:45:22 INFO mapred.Merger: Merging 1 sorted segments
22/06/27 15:45:22 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of
totalsize: 226 bytes
22/06/27 15:45:22 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 15:45:22 INFO Configuration.deprecation: mapred.skip.on is deprecated. Instead,
usemapreduce.job.skiprecords
22/06/27 15:45:23 INFO mapred.Task: Task:attempt_local691635730_0001_r_000000_0 is done. And is
inthe process of committing
22/06/27 15:45:23 INFO mapred.LocalJobRunner: 1 / 1 copied.
22/06/27 15:45:23 INFO mapred.Task: Task attempt_local691635730_0001_r_000000_0 is allowed to
commitnow
22/06/27 15:45:23 INFO output.FileOutputCommitter: Saved output of task
'attempt_local691635730_0001_r_000000_0' to hdfs://localhost:54310/kusum_topn/output/
_temporary/0/task_local691635730_0001_r_00000022/06/27 15:45:23 INFO mapred.LocalJobRunner:
reduce > reduce
22/06/27 15:45:23 INFO mapred.Task: Task 'attempt_local691635730_0001_r_000000_0' done.
22/06/27 15:45:23 INFO mapred.LocalJobRunner: Finishing task:
attempt_local691635730_0001_r_000000_022/06/27 15:45:23 INFO mapred.LocalJobRunner: reduce task
executor complete.
22/06/27 15:45:23 INFO mapreduce.Job: Job job_local691635730_0001 running in uber mode :
false22/06/27 15:45:23 INFO mapreduce.Job:  map 100% reduce 100%
22/06/27 15:45:23 INFO mapreduce.Job: Job job_local691635730_0001 completed
successfully22/06/27 15:45:23 INFO mapreduce.Job: Counters: 38
 File System Counters
 FILE: Number of bytes read=18078
 FILE: Number of bytes
 written=516697FILE: Number of read
 operations=0
 FILE: Number of large read
 operations=0FILE: Number of write
 operations=0 HDFS: Number of bytes
 read=206
 HDFS: Number of bytes written=105
 HDFS: Number of read operations=13
 HDFS: Number of large read
 operations=0HDFS: Number of write
 operations=4
 Map-Reduce Framework
```


hduser@bmsce-Precision-T1700: ~/Desktop/temperature$ hdfs dfs -cat /
hadoop 4
i 3
am 2
hi 1
im 1
is 1
there 1
bye 1
learing 1
awesome 1

BDA LAB 8

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 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);
}
}  }
```

```
hduser@ise-VirtualBox:~$ hadoop jar MapReduceJoin.jar  /aruna/DeptName.txt /aruna/DeptStrength.txt /aruna/output
```

```
22/06/27 15:12:24 INFO mapred.MapTask: soft limit at 83886080
22/06/27 15:12:24 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
22/06/27 15:12:24 INFO mapred.MapTask: kvstart = 26214396; length =
655360022/06/27 15:12:24 INFO mapred.MapTask: Map output collector class =
org.apache.hadoop.mapred.MapTask$MapOutputBuffer
22/06/27 15:12:24 INFO mapred.LocalJobRunner:
22/06/27 15:12:24 INFO mapred.MapTask: Starting flush of map
output22/06/27 15:12:24 INFO mapred.MapTask: Spilling map output
22/06/27 15:12:24 INFO mapred.MapTask: bufstart = 0; bufend = 54; bufvoid = 104857600
22/06/27 15:12:24 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend = 26214384(104857536);
length = 13/6553600
22/06/27 15:12:24 INFO mapred.MapTask: Finished spill 0
22/06/27 15:12:24 INFO mapred.Task: Task:attempt_local1238804660_0001_m_000001_0 is done. And is
inthe process of committing
22/06/27 15:12:24 INFO mapred.LocalJobRunner: hdfs://
localhost:54310/kusum_join/DeptStrength.txt:0+50
22/06/27 15:12:24 INFO mapred.Task: Task 'attempt_local1238804660_0001_m_000001_0'
done.22/06/27 15:12:24 INFO mapred.LocalJobRunner: Finishing task:
attempt_local1238804660_0001_m_000001_0
22/06/27 15:12:24 INFO mapred.LocalJobRunner: map task executor
complete.22/06/27 15:12:24 INFO mapred.LocalJobRunner: Waiting for reduce
tasks
22/06/27 15:12:24 INFO mapred.LocalJobRunner: Starting task:
attempt_local1238804660_0001_r_000000_022/06/27 15:12:24 INFO mapred.Task:  Using
ResourceCalculatorProcessTree : [ ]
22/06/27 15:12:24 INFO mapred.ReduceTask: Using
ShuffleConsumerPlugin:
org.apache.hadoop.mapreduce.task.reduce.Shuffle@45cb1c
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: MergerManager:
memoryLimit=334338464,maxSingleShuffleLimit=83584616, mergeThreshold=220663392,
ioSortFactor=10, memToMemMergeOutputsThreshold=10
22/06/27 15:12:24 INFO reduce.EventFetcher: attempt_local1238804660_0001_r_000000_0 Thread
started:EventFetcher for fetching Map Completion Events
22/06/27 15:12:24 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of
mapattempt_local1238804660_0001_m_000001_0 decomp: 64 len: 68 to MEMORY
22/06/27 15:12:24 INFO reduce.InMemoryMapOutput: Read 64 bytes from map-output
forattempt_local1238804660_0001_m_000001_0
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: closeInMemoryFile -> map-output of size:
64,inMemoryMapOutputs.size() -> 1, commitMemory -> 0, usedMemory ->64
22/06/27 15:12:24 INFO reduce.LocalFetcher: localfetcher#1 about to shuffle output of
mapattempt_local1238804660_0001_m_000000_0 decomp: 73 len: 77 to MEMORY
22/06/27 15:12:24 INFO reduce.InMemoryMapOutput: Read 73 bytes from map-output
forattempt_local1238804660_0001_m_000000_0
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: closeInMemoryFile -> map-output of size:
73,inMemoryMapOutputs.size() -> 2, commitMemory -> 64, usedMemory ->137
22/06/27 15:12:24 INFO reduce.EventFetcher: EventFetcher is interrupted..
Returning22/06/27 15:12:24 INFO mapred.LocalJobRunner: 2 / 2 copied.
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: finalMerge called with 2 in-memory map-outputs and
0on-disk map-outputs
22/06/27 15:12:24 INFO mapred.Merger: Merging 2 sorted segments
22/06/27 15:12:24 INFO mapred.Merger: Down to the last merge-pass, with 2 segments left of
totalsize: 121 bytes
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: Merged 2 segments, 137 bytes to disk to
satisfyreduce memory limit
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: Merging 1 files, 139 bytes from disk
22/06/27 15:12:24 INFO reduce.MergeManagerImpl: Merging 0 segments, 0 bytes from memory into
reduce22/06/27 15:12:24 INFO mapred.Merger: Merging 1 sorted segments
22/06/27 15:12:24 INFO mapred.Merger: Down to the last merge-pass, with 1 segments left of
totalsize: 127 bytes
22/06/27 15:12:24 INFO mapred.LocalJobRunner: 2 / 2 copied.
```

```
FILE: Number of bytes read=26370
FILE: Number of bytes
written=782871FILE: Number of read
operations=0
FILE: Number of large read
operations=0FILE: Number of write
operations=0 HDFS: Number of bytes
read=277
HDFS: Number of bytes written=85
HDFS: Number of read operations=28
HDFS: Number of large read
operations=0HDFS: Number of write
operations=5
Map-Reduce
FrameworkMap input
records=8 Map output
records=8Map output
bytes=117
Map output materialized
bytes=145Input split bytes=443
Combine input records=0
Combine output
records=0Reduce input
groups=4 Reduce shuffle
bytes=145Reduce input
records=8 Reduce output
records=4 Spilled
Records=16 Shuffled Maps
=2
Failed Shuffles=0
Merged Map outputs=2
GC time elapsed
(ms)=2CPU time spent
(ms)=0
Physical memory (bytes)
snapshot=0Virtual memory (bytes)
snapshot=0
Total committed heap usage
(bytes)=913833984Shuffle Errors
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=
0WRONG_MAP=0
WRONG_REDUCE=0
File Input Format
CountersBytes Read=0
File Output Format
CountersBytes Written=85
```

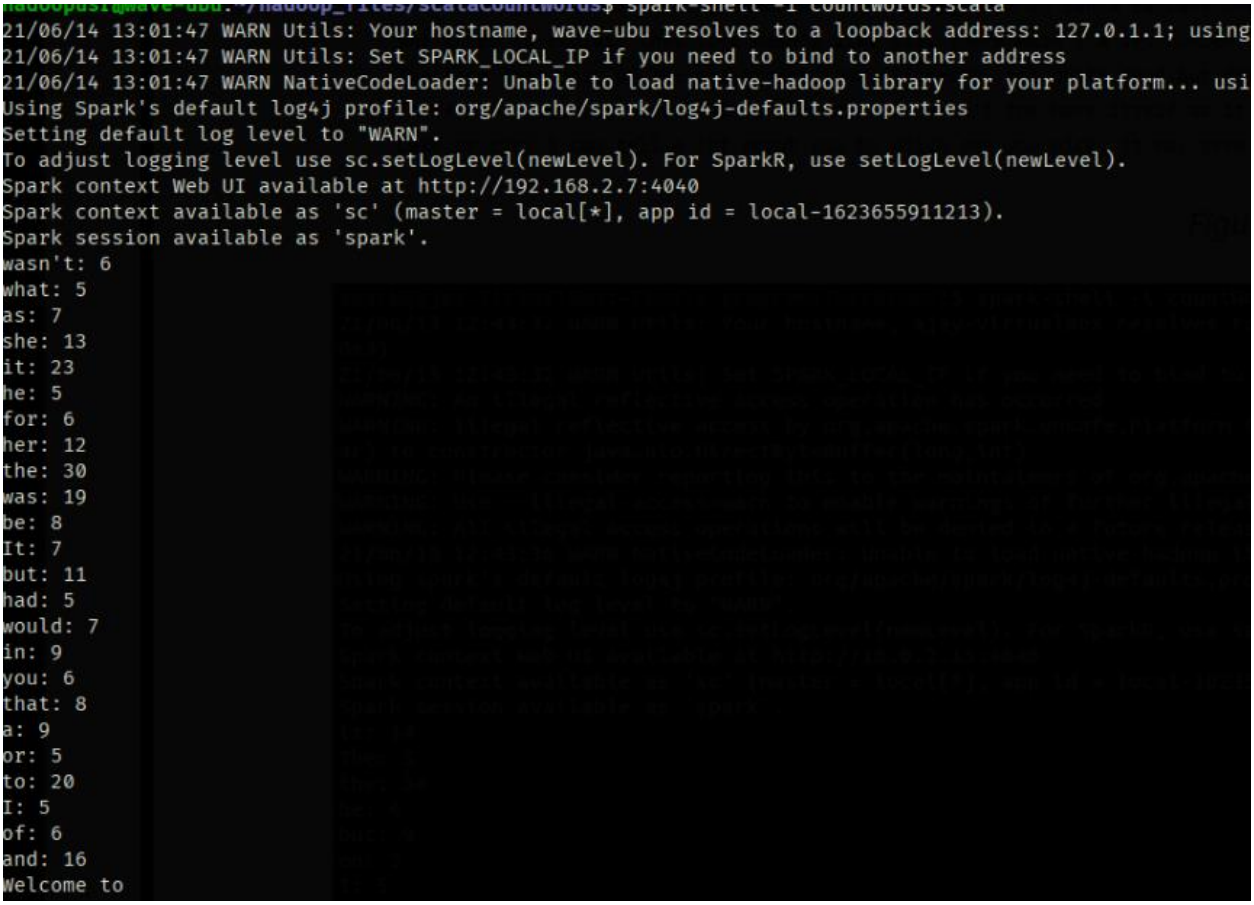
```
00000
A11     50          Finance
B12     100         HR
C13     250         Manufacturing
Dept_ID Total_Employee          Dept_Name
```

BDA 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;
```



BDA LAB 10

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

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

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

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

scala> val sorted = ListMap(counts.collect.sortWith(_._2>_._2):_*)
sorted: scala.collection.immutable.ListMap[String,Int] = ListMap(hello -> 3, apple -> 2, unicorn -> 1, world ->
1)

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