

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“JnanaSangama”, Belgaum -590014, Karnataka.



LAB REPORT on

BIG DATA ANALYTICS (20CS6PEBDA)

Submitted by

DIVYANSHU (1BM19CS052)

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



B.M.S. COLLEGE OF ENGINEERING

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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 **DIVYANSHU (1BM19CS052)**, 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.

PALLAVI GB
Assistant Professor
Department of CSE
BMSCE, Bengaluru

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

Index Sheet

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

Course Outcome

CO1	Apply the concept of NoSQL, Hadoop or Spark for a given task
CO2	Analyze the Big Data and obtain insight using data analytics mechanisms.
CO3	Design and implement Big data applications by applying NoSQL, Hadoop or Spark

Cassandra Lab Program 1: -

Perform the following DB operations using Cassandra.

1. Create a key space by name Employee

```
Command Prompt - cqlsh
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>cd c:\apache-cassandra-3.11.13\bin
c:\apache-cassandra-3.11.13\bin>cqlsh

WARNING: console codepage must be set to cp65001 to support utf-8 encoding on Windows platforms.
If you experience encoding problems, change your console codepage with 'chcp 65001' before starting cqlsh.

Connected to Test Cluster at 127.0.0.1:9042.
[cqlsh 5.0.1 | Cassandra 3.11.13 | CQL spec 3.4.4 | Native protocol v4]
Use HELP for help.
cqlsh> CREATE KEYSPACE employee WITH REPLICATION = {'class':'SimpleStrategy','replication_factor':1};
cqlsh> DESCRIBE KEYSPACES;

system_schema  system      system_distributed  system_traces
system_auth    samples     employee
cqlsh>
```

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

Designation, Date_of_Joining, Salary, Dept_Name

```
Command Prompt - cqlsh
cqlsh:employee> CREATE TABLE EMPLOYEEINFO( EMPID INT, EMPNAME TEXT, DESIGNATION TEXT, DATEOFJOINING TIMESTAMP, SAL
ARY DOUBLE, DEPTNAME TEXT, PRIMARY KEY(EMPID,SALARY));
cqlsh:employee>
```

```
cqlsh:employee> SELECT * FROM EMPLOYEEINFO;

empid | salary | dateofjoining | deptname | designation | empname
-----+-----+-----+-----+-----+-----
(0 rows)
cqlsh:employee>
```

3. Insert the values into the table in batch

```
Command Prompt - cqlsh
cqlsh:employee> BEGIN BATCH
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(1,'LOKESH','ASSISTANT MANAGER', '2005-04-6', 50000, 'MARKETING')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(2,'DHEERAJ','ASSISTANT MANAGER', '2013-11-10', 30000, 'LOGISTICS')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(3,'CHIRAG','ASSISTANT MANAGER', '2011-07-1', 115000, 'SALES')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(4,'DHANUSH','ASSISTANT MANAGER', '2010-04-26', 75000, 'MARKETING')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(5,'ESHA','ASSISTANT MANAGER', '2010-04-26', 85000, 'TECHNICAL')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(6,'FARHAN','MANAGER', '2010-04-26', 95000, 'TECHNICAL')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(7,'JIMMY','MANAGER', '2010-04-26', 95000, 'PR')
... INSERT INTO EMPLOYEEINFO (EMPID, EMPNAME, DESIGNATION, DATEOFJOINING, SALARY, DEPTNAME)
... VALUES(121,'HARRY','REGIONAL MANAGER', '2010-04-26', 99000, 'MANAGEMENT')
... APPLY BATCH;
```

```
cqlsh:employee> SELECT * FROM EMPLOYEEINFO;
```

empid	salary	dateofjoining	deptname	designation	empname
5	85000	2010-04-25 18:30:00.000000+0000	TECHNICAL	ASSISTANT MANAGER	ESHA
1	50000	2005-04-05 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	LOKESH
2	30000	2013-11-09 18:30:00.000000+0000	LOGISTICS	ASSISTANT MANAGER	DHEERAJ
4	75000	2010-04-25 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	DHANUSH
121	99000	2010-04-25 18:30:00.000000+0000	MANAGEMENT	REGIONAL MANAGER	HARRY
7	95000	2010-04-25 18:30:00.000000+0000	PR	MANAGER	JIMMY
6	95000	2010-04-25 18:30:00.000000+0000	TECHNICAL	MANAGER	FARHAN
3	1.15e+05	2011-06-30 18:30:00.000000+0000	SALES	ASSISTANT MANAGER	CHIRAG

(8 rows)
cqlsh:employee>

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

```
cqlsh:employee> UPDATE EMPLOYEEINFO SET EMPNAME='HARRY', DEPTNAME='MANAGEMENT' WHERE EMPID=121 AND SALARY=99000;
cqlsh:employee> SELECT * FROM EMPLOYEEINFO;
```

empid	salary	dateofjoining	deptname	designation	empname
5	85000	2010-04-25 18:30:00.000000+0000	TECHNICAL	ASSISTANT MANAGER	ESHA
1	50000	2005-04-05 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	LOKESH
2	30000	2013-11-09 18:30:00.000000+0000	LOGISTICS	ASSISTANT MANAGER	DHEERAJ
4	75000	2010-04-25 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	DHANUSH
121	99000	2010-04-25 18:30:00.000000+0000	MANAGEMENT	REGIONAL MANAGER	HARRY
7	95000	2010-04-25 18:30:00.000000+0000	PR	MANAGER	JIMMY
6	95000	2010-04-25 18:30:00.000000+0000	TECHNICAL	MANAGER	FARHAN
3	1.15e+05	2011-06-30 18:30:00.000000+0000	SALES	ASSISTANT MANAGER	CHIRAG

(8 rows)
cqlsh:employee>

5. Sort the details of Employee records based on salary (Note:- cql>PAGING OFF)

```
cqlsh:employee> select * from EMPLOYEEINFO where empid IN(1,2,3,4,5,6,7) ORDER BY salary DESC allow filtering;
```

empid	salary	dateofjoining	deptname	designation	empname
3	1.15e+05	2011-06-30 18:30:00.000000+0000	SALES	ASSISTANT MANAGER	CHIRAG
6	95000	2010-04-25 18:30:00.000000+0000	TECHNICAL	MANAGER	FARHAN
7	95000	2010-04-25 18:30:00.000000+0000	PR	MANAGER	JIMMY
5	85000	2010-04-25 18:30:00.000000+0000	TECHNICAL	ASSISTANT MANAGER	ESHA
4	75000	2010-04-25 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	DHANUSH
1	50000	2005-04-05 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	LOKESH
2	30000	2013-11-09 18:30:00.000000+0000	LOGISTICS	ASSISTANT MANAGER	DHEERAJ

(7 rows)
cqlsh:employee>

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 rows)
cqlsh:employee> ALTER TABLE EMPLOYEEINFO ADD PROJECTS LIST<TEXT>;
cqlsh:employee> SELECT * FROM EMPLOYEEINFO;
```

empid	salary	dateofjoining	deptname	designation	empname	projects
5	85000	2010-04-25 18:30:00.000000+0000	TECHNICAL	ASSISTANT MANAGER	ESHA	null
1	50000	2005-04-05 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	LOKESH	null
2	30000	2013-11-09 18:30:00.000000+0000	LOGISTICS	ASSISTANT MANAGER	DHEERAJ	null
4	75000	2010-04-25 18:30:00.000000+0000	MARKETING	ASSISTANT MANAGER	DHANUSH	null
121	99000	2010-04-25 18:30:00.000000+0000	MANAGEMENT	REGIONAL MANAGER	HARRY	null
7	95000	2010-04-25 18:30:00.000000+0000	PR	MANAGER	JIMMY	null
6	95000	2010-04-25 18:30:00.000000+0000	TECHNICAL	MANAGER	FARHAN	null
3	1.15e+05	2011-06-30 18:30:00.000000+0000	SALES	ASSISTANT MANAGER	CHIRAG	null

(8 rows)
cqlsh:employee> _

7. Update the altered table to add project names.

```

Command Prompt - cqlsh
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['FACEBOOK','SNAPCHAT'] WHERE EMPID=1 AND SALARY=50000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['FACEBOOK','SNAPCHAT'] WHERE EMPID=7 AND SALARY=95000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['PINTEREST','INSTAGRAM'] WHERE EMPID=121 AND SALARY=99000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['PINTEREST','INSTAGRAM'] WHERE EMPID=4 AND SALARY=75000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=2 AND SALARY=30000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=3 AND SALARY=115000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=6 AND SALARY=95000;
cqlsh:employee> UPDATE EMPLOYEEINFO SET PROJECTS=['YOUTUBE','SPOTIFY'] WHERE EMPID=5 AND SALARY=85000;
cqlsh:employee> SELECT * FROM EMPLOYEEINFO;

empid | salary | dateofjoining | deptname | designation | empname | projects
-----+-----+-----+-----+-----+-----+-----
5 | 85000 | 2010-04-25 18:30:00.000000+0000 | TECHNICAL | ASSISTANT MANAGER | ESHA | ['YOUTUBE', 'SPOTIFY']
1 | 50000 | 2005-04-05 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER | LOKESH | ['FACEBOOK', 'SNAPCHAT']
2 | 30000 | 2013-11-09 18:30:00.000000+0000 | LOGISTICS | ASSISTANT MANAGER | DHEERAJ | ['YOUTUBE', 'SPOTIFY']
4 | 75000 | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER | DHANUSH | ['PINTEREST', 'INSTAGRAM']
121 | 99000 | 2010-04-25 18:30:00.000000+0000 | MANAGEMENT | REGIONAL MANAGER | HARRY | ['PINTEREST', 'INSTAGRAM']
7 | 95000 | 2010-04-25 18:30:00.000000+0000 | PR | MANAGER | JIMMY | ['FACEBOOK', 'SNAPCHAT']
6 | 95000 | 2010-04-25 18:30:00.000000+0000 | TECHNICAL | MANAGER | FARHAN | ['YOUTUBE', 'SPOTIFY']
3 | 1.15e+05 | 2011-06-30 18:30:00.000000+0000 | SALES | ASSISTANT MANAGER | CHIRAG | ['YOUTUBE', 'SPOTIFY']

(8 rows)
cqlsh:employee>

```

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

//BEFORE 15 seconds

```

Command Prompt - cqlsh
cqlsh:employee> update EMPLOYEEINFO USING TTL 15 SET EMPNAME='LOKESH' where empid=1 AND salary=50000;
cqlsh:employee> SELECT * FROM EMPLOYEEINFO;

empid | salary | dateofjoining | deptname | designation | empname | projects
-----+-----+-----+-----+-----+-----+-----
5 | 85000 | 2010-04-25 18:30:00.000000+0000 | TECHNICAL | ASSISTANT MANAGER | ESHA | ['YOUTUBE', 'SPOTIFY']
1 | 50000 | 2005-04-05 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER | LOKESH | ['FACEBOOK', 'SNAPCHAT']
2 | 30000 | 2013-11-09 18:30:00.000000+0000 | LOGISTICS | ASSISTANT MANAGER | DHEERAJ | ['YOUTUBE', 'SPOTIFY']
4 | 75000 | 2010-04-25 18:30:00.000000+0000 | MARKETING | ASSISTANT MANAGER | DHANUSH | ['PINTEREST', 'INSTAGRAM']
121 | 99000 | 2010-04-25 18:30:00.000000+0000 | MANAGEMENT | REGIONAL MANAGER | HARRY | ['PINTEREST', 'INSTAGRAM']
7 | 95000 | 2010-04-25 18:30:00.000000+0000 | PR | MANAGER | JIMMY | ['FACEBOOK', 'SNAPCHAT']
6 | 95000 | 2010-04-25 18:30:00.000000+0000 | TECHNICAL | MANAGER | FARHAN | ['YOUTUBE', 'SPOTIFY']
3 | 1.15e+05 | 2011-06-30 18:30:00.000000+0000 | SALES | ASSISTANT MANAGER | CHIRAG | ['YOUTUBE', 'SPOTIFY']

(8 rows)
cqlsh:employee>

```


Cassandra Lab Program 2: -

Perform the following DB operations using Cassandra.

1. Create a key space by name Library

```
Command Prompt - CQLSH
cqlsh> create keyspace library with replication = {
... 'class':'SimpleStrategy', 'replication_factor':1
... };
cqlsh> describe keyspaces

system_schema  system  samples  employee
system_auth    library system_distributed system_traces

cqlsh> USE library;
cqlsh: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

```
cqlsh> USE library;
cqlsh:library> CREATE TABLE LIBRARY_INFO( STUDID INT PRIMARY KEY, STUDNAME TEXT, BOOKNAME TEXT, DATEOFISSUE TIMESTAMP,
COUNTER_VALUE COUNTER);
InvalidRequest: Error from server: code=2200 [Invalid query] message="Cannot mix counter and non counter columns in the same table"
cqlsh:library> CREATE TABLE LIBRARY_INFO( STUDID INT, STUDNAME TEXT, BOOKNAME TEXT, BOOKID INT, DATEOFISSUE TIMESTAMP,
COUNTER_VALUE COUNTER, PRIMARY KEY(STUDID, STUDNAME, BOOKNAME, BOOKID, DATEOFISSUE));
cqlsh:library> SELECT * FROM LIBRARYINFO;
InvalidRequest: Error from server: code=2200 [Invalid query] message="unconfigured table libraryinfo"
cqlsh:library> SELECT * FROM LIBRARY_INFO;

studid | studname | bookname | bookid | dateofissue | counter_value
-----+-----+-----+-----+-----+-----
(0 rows)
cqlsh:library>
```

3. Insert the values into the table in batch

```
Command Prompt - CQLSH
cqlsh:library> update library_info set counter_value = counter_value + 1 where studid = 1 and studname = 'MAHESH' and
bookname = 'Harry Potter' and bookid = 1 and dateofissue = '2022-01-02';
cqlsh:library> SELECT * FROM LIBRARY_INFO;

studid | studname | bookname | bookid | dateofissue | counter_value
-----+-----+-----+-----+-----+-----
1 | MAHESH | Harry Potter | 1 | 2022-01-01 18:30:00.000000+0000 | 1

(1 rows)
cqlsh:library>
```

```
cqlsh:library> update library_info set counter_value = counter_value + 1 where studid = 2 and studname = 'Ramesh' and
bookname = 'Wings of Fire' and bookid = 2 and dateofissue = '2022-01-02';
cqlsh:library> SELECT * FROM LIBRARY_INFO;

studid | studname | bookname | bookid | dateofissue | counter_value
-----+-----+-----+-----+-----+-----
1 | MAHESH | Harry Potter | 1 | 2022-01-01 18:30:00.000000+0000 | 1
2 | Ramesh | Wings of Fire | 2 | 2022-01-01 18:30:00.000000+0000 | 1

(2 rows)
cqlsh:library>
```

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

```
cqlsh:library> update library_info set counter_value = counter_value + 1 where studid = 112 and studname = 'Rajesh' a
nd bookname = 'BDA' and bookid = 3 and dateofissue = '2022-01-02';
cqlsh:library> SELECT * FROM LIBRARY_INFO;

studid | studname | bookname | bookid | dateofissue | counter_value
-----+-----+-----+-----+-----+-----
1 | MAHESH | Harry Potter | 1 | 2022-01-01 18:30:00.000000+0000 | 1
2 | Ramesh | Wings of Fire | 2 | 2022-01-01 18:30:00.000000+0000 | 1
112 | Rajesh | BDA | 3 | 2022-01-01 18:30:00.000000+0000 | 1

(3 rows)
cqlsh:library>
```

```
(3 rows)
cqlsh:library> update library_info set counter_value = counter_value + 1 where studid = 112 and studname = 'Rajesh' and bookname = 'BDA' and bookid = 3 and dateofissue = '2022-01-02';
cqlsh:library> SELECT * FROM LIBRARY_INFO;
```

studid	studname	bookname	bookid	dateofissue	counter_value
1	MAHESH	Harry Potter	1	2022-01-01 18:30:00.000000+0000	1
2	Ramesh	Wings of Fire	2	2022-01-01 18:30:00.000000+0000	1
112	Rajesh	BDA	3	2022-01-01 18:30:00.000000+0000	2

```
(3 rows)
cqlsh:library> _
```

studid	studname	bookname	bookid	dateofissue	counter_value
113	Ranjith	rpa	4	2022-01-01 18:30:00.000000+0000	1
1	MAHESH	Harry Potter	1	2022-01-01 18:30:00.000000+0000	1
2	Ramesh	Wings of Fire	2	2022-01-01 18:30:00.000000+0000	1
112	Rajesh	BDA	3	2022-01-01 18:30:00.000000+0000	3

```
(4 rows)
```

5. Write a query to show that a student with id 112 has taken a book “BDA” 3 times.

```
Command Prompt - CQLSH
cqlsh:library> select * from library_info where studid = 112;
```

studid	studname	bookname	bookid	dateofissue	counter_value
112	Rajesh	BDA	3	2022-01-01 18:30:00.000000+0000	3

```
(1 rows)
cqlsh:library>
```

6. Export the created column to a csv file


```
cqlsh:library> copy library_info (studid, studname, bookname, bookid, dateofissue, counter_value) to 'C:\Users\Admin\OneDrive\Desktop\BDA Lab\data.csv';
Using 7 child processes

Starting copy of library.library_info with columns [studid, studname, bookname, bookid, dateofissue, counter_value].
Processed: 4 rows; Rate: 2 rows/s; Avg. rate: 1 rows/s
4 rows exported to 1 files in 3.004 seconds.
cqlsh:library> _
```




Clipboard

Font

Alignment

 POSSIBLE DATA LOSS Some features might be lost if you save this workbook in the comma-delimited

A1

113

	A	B	C	D	E	F	G	H	I
1	113	Ranjith	rpa		4	2022-01-0	1		
2	2	Ramesh	Wings of F		2	2022-01-0	1		
3	112	Rajesh	BDA		3	2022-01-0	3		
4	1	MAHESH	Harry Pott		1	2022-01-0	1		
5									
6									
7									

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

```

cqlsh:library> copy library_info (studid, studname, bookname, bookid, dateofissue, counter_value) from 'C:\Users\Admin\OneDrive\Desktop\BDA Lab\data.csv';
Using 7 child processes

Starting copy of library_info with columns [studid, studname, bookname, bookid, dateofissue, counter_value].
Process ImportProcess-10: 2 rows/s; Avg. rate: 2 rows/s
[Traceback (most recent call last):
Process ImportProcess-8:
[Traceback (most recent call last):
Process ImportProcess-11:
[Traceback (most recent call last):
Process ImportProcess-9:
P File "C:\Python27\lib\multiprocessing\process.py", line 267, in _bootstrap
File "C:\Python27\lib\multiprocessing\process.py", line 267, in _bootstrap
[Traceback (most recent call last):
[Traceback (most recent call last):
P File "C:\Python27\lib\multiprocessing\process.py", line 267, in _bootstrap
self.run()
Process ImportProcess-12:
Process ImportProcess-14:
Process ImportProcess-13:
P File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
self.run()
[Traceback (most recent call last):
File "C:\Python27\lib\multiprocessing\process.py", line 267, in _bootstrap
[Traceback (most recent call last):
self.run()
[Traceback (most recent call last):
self.run()
File "C:\Python27\lib\multiprocessing\process.py", line 267, in _bootstrap
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
self.close()
self.close()
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
self.run()
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2343, in close
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
self.close()
File "C:\Python27\lib\multiprocessing\process.py", line 267, in _bootstrap
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
self._session.cluster.shutdown()
self.run()
self.close()
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver\internal-only\3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\cluster.py", line 1259, in shutdown
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2343, in close
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2339, in run
self.close()
self.close()
self.close()
File "c:\apache-cassandra-3.11.13\bin\..\pylib\cqlshlib\copyutil.py", line 2343, in close

```

```

File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 373, in close
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 335, in create_timer
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 373, in close
self._connection.close()
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 335, in create_timer
self._connection.close()
AsyncoreConnection.create_timer(0, partial(asyncore.dispatcher.close, self))
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 373, in close
cls._loop.add_timer(timer)
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 373, in close
cls._loop.add_timer(timer)
AsyncoreConnection.create_timer(0, partial(asyncore.dispatcher.close, self))
AA AsyncoreConnection.create_timer(0, partial(asyncore.dispatcher.close, self))
AttributeError: 'NoneType' object has no attribute 'add_timer'
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 335, in create_timer
File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 335, in create_timer
AsyncoreConnection.create_timer(0, partial(asyncore.dispatcher.close, self))
cls._loop.add_timer(timer)
cls._loop.add_timer(timer)
A File "c:\apache-cassandra-3.11.13\bin\..\lib\cassandra-driver-internal-only-3.11.0-bb96859b.zip\cassandra-driver-3.11.0-bb96859b\cassandra\io\asyncoreactor.py", line 335, in create_timer
AttributeError: 'NoneType' object has no attribute 'add_timer'
A cls._loop.add_timer(timer)
cls._loop.add_timer(timer)
AttributeError: 'NoneType' object has no attribute 'add_timer'
AttributeError: 'NoneType' object has no attribute 'add_timer'
AttributeError: 'NoneType' object has no attribute 'add_timer'
Processed: 4 rows; Rate: 1 rows/s; Avg. rate: 2 rows/s
4 rows imported from 1 files in 2.356 seconds (0 skipped).
cqlsh:library>

```

MongoDB Lab Program 1 (CRUD Demonstration): -

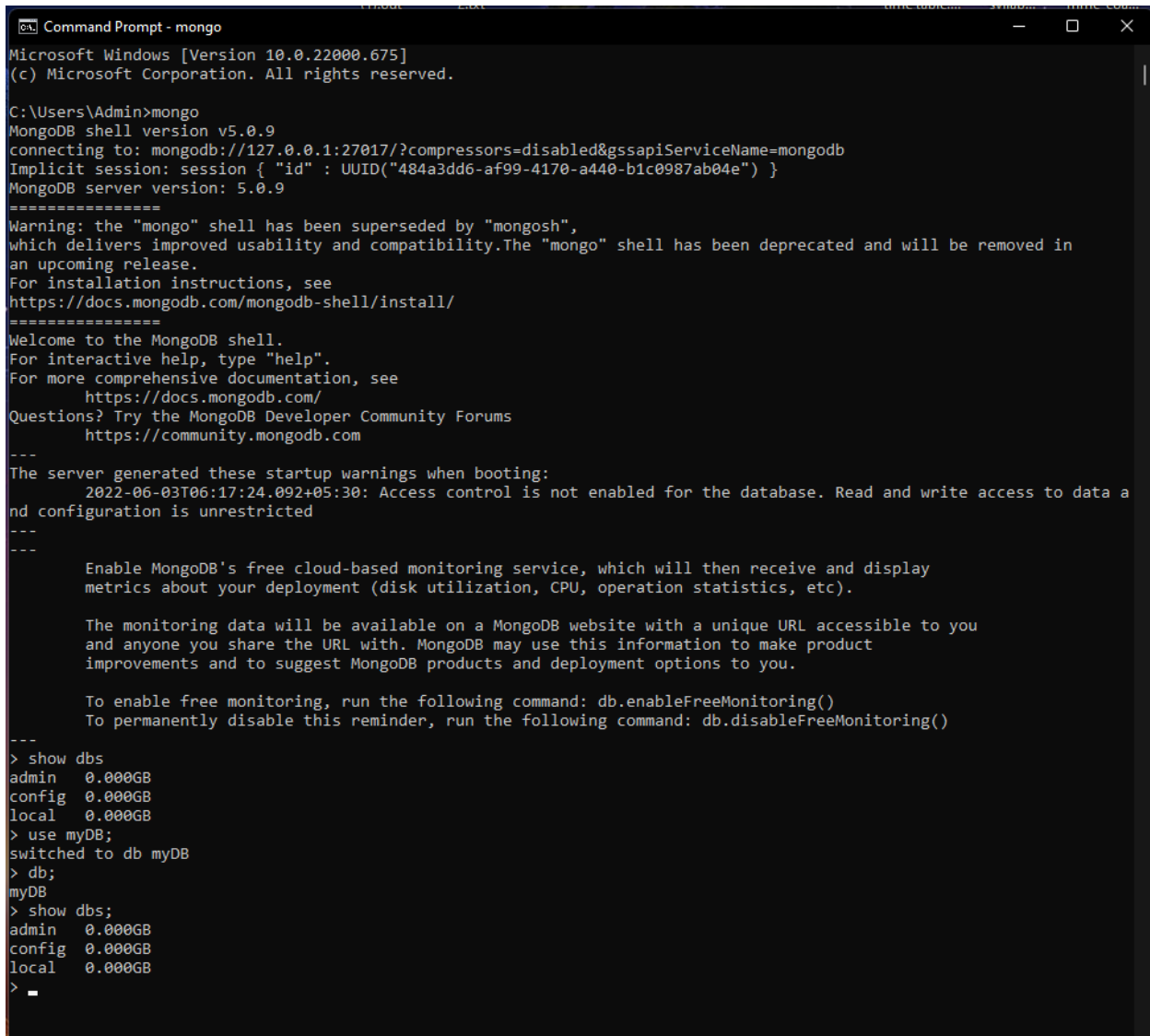
Execute the queries and upload a document with output.

I. CREATE DATABASE IN MONGODB.

use myDB;

db; (Confirm the existence of your database)

show dbs; (To list all databases)



```
Microsoft Windows [Version 10.0.22000.675]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>mongo
MongoDB shell version v5.0.9
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("484a3dd6-af99-4170-a440-b1c0987ab04e") }
MongoDB server version: 5.0.9
=====
Warning: the "mongo" shell has been superseded by "mongosh",
which delivers improved usability and compatibility. The "mongo" shell has been deprecated and will be removed in
an upcoming release.
For installation instructions, see
https://docs.mongodb.com/mongodb-shell/install/
=====
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
https://docs.mongodb.com/
Questions? Try the MongoDB Developer Community Forums
https://community.mongodb.com
---
The server generated these startup warnings when booting:
  2022-06-03T06:17:24.092+05:30: Access control is not enabled for the database. Read and write access to data and
configuration is unrestricted
---
---
  Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).

  The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

  To enable free monitoring, run the following command: db.enableFreeMonitoring()
  To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
---
> show dbs
admin    0.000GB
config  0.000GB
local    0.000GB
> use myDB;
switched to db myDB
> db;
myDB
> show dbs;
admin    0.000GB
config  0.000GB
local    0.000GB
> -
```

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

1. To create a collection by the name “Student”. Let us take a look at the collection list

prior to the creation of the new collection “Student”.

```
db.createCollection("Student");
```

2. To drop a collection by the name “Student”.

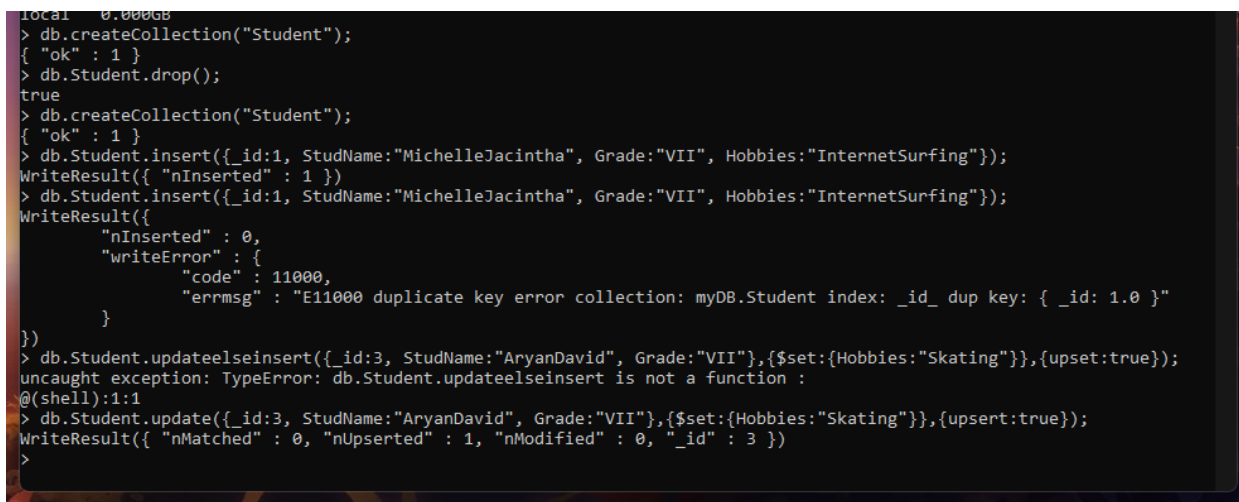
```
db.Student.drop();
```

3. Create a collection by the name “Students” and store the following data in it.

```
db.Student.insert({_id:1,StudName:"MichelleJacintha",Grade:"VII",Hobbies:"InternetSurfing"});
```

4. Insert the document for “AryanDavid” in to the Students collection only if it does not already exist in the collection. However, if it is already present in the collection, then update the document with new values. (Update his Hobbies from “Skating” to “Chess”.) Use “Update else insert” (if there is an existing document, it will attempt to update it, if there is no existing document then it will insert it).

```
db.Student.update({_id:3,StudName:"AryanDavid",Grade:"VII"},{$set:{Hobbies:"Skating"}},{upsert:true});
```



```
local 0.000GB
> db.createCollection("Student");
{ "ok" : 1 }
> db.Student.drop();
true
> db.createCollection("Student");
{ "ok" : 1 }
> db.Student.insert({_id:1, StudName:"MichelleJacintha", Grade:"VII", Hobbies:"InternetSurfing"});
WriteResult({ "nInserted" : 1 })
> db.Student.insert({_id:1, StudName:"MichelleJacintha", Grade:"VII", Hobbies:"InternetSurfing"});
WriteResult({
  "nInserted" : 0,
  "writeError" : {
    "code" : 11000,
    "errmsg" : "E11000 duplicate key error collection: myDB.Student index: _id_ dup key: { _id: 1.0 }"
  }
})
> db.Student.updateelseinsert({_id:3, StudName:"AryanDavid", Grade:"VII"},{$set:{Hobbies:"Skating"}},{upsert:true});
uncaught exception: TypeError: db.Student.updateelseinsert is not a function :
@ (shell):1:1
> db.Student.update({_id:3, StudName:"AryanDavid", Grade:"VII"},{$set:{Hobbies:"Skating"}},{upsert:true});
WriteResult({ "nMatched" : 0, "nUpserted" : 1, "nModified" : 0, "_id" : 3 })
>
```

```
Command Prompt - mongo
> show collections
Student
> db.Student.find();
{ "_id" : 1, "StudName" : "MichelleJacintha", "Grade" : "VII", "Hobbies" : "InternetSurfing" }
{ "_id" : 3, "Grade" : "VII", "StudName" : "AryanDavid", "Hobbies" : "Skating" }
>
```

5. FIND METHOD

A. To search for documents from the “Students” collection based on certain search criteria.

```
db.Student.find({StudName:"Aryan David"});
({cond..},{columns.. column:1, columnname:0} )
```

```
> db.Student.find({StudName:"AryanDavid"});
{ "_id" : 3, "Grade" : "VII", "StudName" : "AryanDavid", "Hobbies" : "Skating" }
>
```

B. To display only the StudName and Grade from all the documents of the Students collection. The identifier _id should be suppressed and NOT displayed.

```
db.Student.find({}, {StudName:1, Grade:1, _id:0});
```

```
Command Prompt - mongo
> db.Student.find({}, {StudName:1, Grade:1, _id:0});
{ "StudName" : "MichelleJacintha", "Grade" : "VII" }
{ "Grade" : "VII", "StudName" : "AryanDavid" }
>
```

C. To find those documents where the Grade is set to ‘VII’

```
db.Student.find({ Grade:{$eq:"VII"}}).pretty();
```



```
Command Prompt - mongo
> db.Student.find({Grade:{$eq:'VII'}}).pretty();
{
  "_id" : 1,
  "StudName" : "MichelleJacintha",
  "Grade" : "VII",
  "Hobbies" : "InternetSurfing"
}
{
  "_id" : 3,
  "Grade" : "VII",
  "StudName" : "AryanDavid",
  "Hobbies" : "Skating"
}
>
```

D. To find those documents from the Students collection where the Hobbies is set to either 'Chess' or is set to 'Skating'.

```
db.Student.find({Hobbies:{$in: ['Chess','Skating']}}).pretty();
```

```
Command Prompt - mongo
> db.Student.find({Hobbies:{$in: ['Chess','Skating']}}).pretty();
{
  "_id" : 3,
  "Grade" : "VII",
  "StudName" : "AryanDavid",
  "Hobbies" : "Skating"
}
>
```

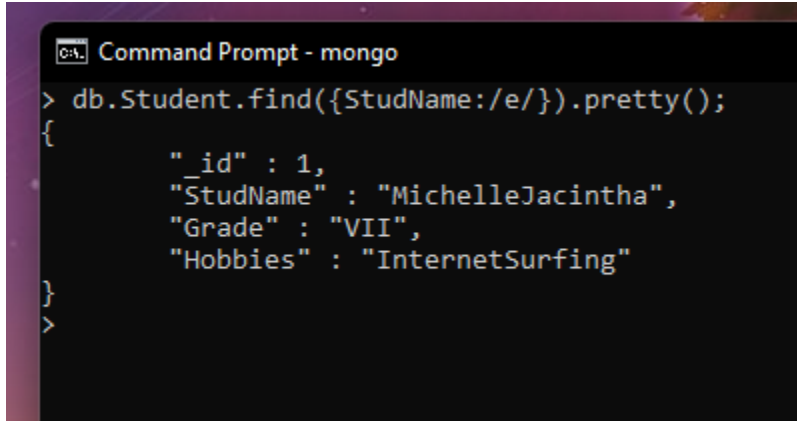
E. To find documents from the Students collection where the StudName begins with "M".

```
db.Student.find({StudName:/^M/}).pretty();
```

```
Command Prompt - mongo
> db.Student.find({StudName:/^M/}).pretty();
{
  "_id" : 1,
  "StudName" : "MichelleJacintha",
  "Grade" : "VII",
  "Hobbies" : "InternetSurfing"
}
>
```

F. To find documents from the Students collection where the StudName has an “e” in any position.

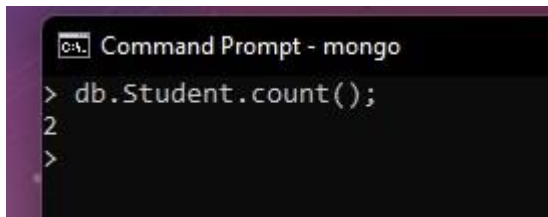
```
db.Student.find({StudName:/e/}).pretty();
```

A screenshot of a Windows Command Prompt window titled "Command Prompt - mongo". The prompt shows the command `> db.Student.find({StudName:/e/}).pretty();` being executed. The output is a JSON document:

```
{
  "_id" : 1,
  "StudName" : "MichelleJacintha",
  "Grade" : "VII",
  "Hobbies" : "InternetSurfing"
}
```

G. To find the number of documents in the Students collection.

```
db.Student.count();
```

A screenshot of a Windows Command Prompt window titled "Command Prompt - mongo". The prompt shows the command `> db.Student.count();` being executed. The output is the number `2`.

H. To sort the documents from the Students collection in the descending order of StudName.

```
db.Student.find().sort({StudName:-1}).pretty();
```

```
Command Prompt - mongo
> db.Student.find().sort({StudNam:-1}).pretty();
{
  "_id" : 1,
  "StudName" : "MichelleJacintha",
  "Grade" : "VII",
  "Hobbies" : "InternetSurfing"
}
{
  "_id" : 3,
  "Grade" : "VII",
  "StudName" : "AryanDavid",
  "Hobbies" : "Skating"
}
>
```

III. Import data from a CSV file

Given a CSV file “sample.txt” in the D:drive, import the file into the MongoDB collection, “SampleJSON”. The collection is in the database “test”.

```
mongoimport --db Student --collection airlines --type csv --headerline --file
/home/hduser/Desktop/airline.csv
```

```
Command Prompt
C:\Program Files\MongoDB\Server\5.0\bin>mongoimport --db Student --collection airlines --type csv --file "C:\Program Files\MongoDB\airline.csv" --headerline
2022-06-03T08:24:18.366+0530 connected to: mongod://localhost/
2022-06-03T08:24:18.395+0530 6 document(s) imported successfully. 0 document(s) failed to import.
C:\Program Files\MongoDB\Server\5.0\bin>
```

IV. Export data to a CSV file

This command used at the command prompt exports MongoDB JSON documents from “Customers” collection in the “test” database into a CSV file “Output.txt” in the D:drive.

```
mongoexport --host localhost --db Student --collection airlines --csv --out
/home/hduser/Desktop/output.txt --fields "Year","Quarter"
```

```
C:\Program Files\MongoDB\Server\5.0\bin>mongoexport --host localhost --db Student --collection airlines
--csv --out "C:\home\hduser\Desktop\output.txt" --fields "Year","Quarter"
2022-06-03T08:28:58.325+0530 csv flag is deprecated; please use --type=csv instead
2022-06-03T08:28:58.946+0530 connected to: mongodb://localhost/
2022-06-03T08:28:58.972+0530 exported 6 records

C:\Program Files\MongoDB\Server\5.0\bin>
```

V. Save Method :

Save() method will insert a new document, if the document with the _id does not exist. If it exists it will replace the existing document.

```
db.Students.save({StudName:"Vamsi", Grade:"VI"})
```

```
switched to db Student
> db.Students.save({StudName:"Vamsi",Grade:"VII"})
WriteResult({ "nInserted" : 1 })
>
```

VI. Add a new field to existing Document:

```
db.Students.update({_id:4},{ $set: {Location:"Network"}})
```

```
> db.Students.update({_id:4},{ $set: {Location:"Network"}})
WriteResult({ "nMatched" : 0, "nUpserted" : 0, "nModified" : 0 })
>
```

VII. Remove the field in an existing Document

```
db.Students.update({_id:4},{ $unset: {Location:"Network"}})
```

```
Command Prompt - mongo
> db.Students.update({_id:4},{ $unset: {Location:"Network"}})
WriteResult({ "nMatched" : 0, "nUpserted" : 0, "nModified" : 0 })
>
```

VIII. Finding Document based on search criteria suppressing few fields

```
db.Student.find({_id:1},{StudName:1,Grade:1,_id:0});
```

To find those documents where the Grade is not set to 'VII'

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

To find documents from the Students collection where the StudName ends with s.

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

```
> db.Student.find({_id:1},{StudName:1,Grade:1,_id:0});  
>
```

```
Command Prompt - mongo  
> db.Student.find({Grade:{$ne:'VII'}}).pretty();  
> db.Student.find({StudName:/s$/}).pretty();  
>
```

IX. to set a particular field value to NULL

```
> db.Students.update({_id:3},{ $set:{Location:null}})  
WriteResult({ "nMatched" : 0, "nUpserted" : 0, "nModified" : 0 })  
>
```

X Count the number of documents in Student Collections

```
> db.Student.count()  
0  
>
```

XI. Count the number of documents in Student Collections with grade :VII

```
db.Students.count({Grade:"VII"})
```

retrieve first 3 documents

```
db.Students.find({Grade:"VII"}).limit(3).pretty();
```

Sort the document in Ascending order

```
db.Students.find().sort({StudName:1}).pretty();
```

Note:

for descending order : `db.Students.find().sort({StudName:-1}).pretty();`

to Skip the 1 st two documents from the Students Collections

`db.Students.find().skip(2).pretty()`

```
> db.Students.find().sort({StudName:1}).pretty();
{
  "_id" : ObjectId("629979944de3211e43081306"),
  "StudName" : "Vamsi",
  "Grade" : "VII"
}
>
```

XII. Create a collection by name “food” and add to each document add a “fruits” array

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

`db.food.insert({ _id:2, fruits:['grapes','mango','cherry'] })`

`db.food.insert({ _id:3, fruits:['banana','mango'] })`

```
Command Prompt - mongo
> db.food.insert({_id:1,fruits:['grapes','mango','apple']})
WriteResult({ "nInserted" : 1 })
> db.food.insert({_id:2,fruits:['grapes','mango','cherry']})
WriteResult({ "nInserted" : 1 })
> db.food.insert({_id:3,fruits:['banana','mango']})
WriteResult({ "nInserted" : 1 })
>
```

To find those documents from the “food” collection which has the “fruits array” constitute of “grapes”, “mango” and “apple”.

`db.food.find ({ fruits: ['grapes','mango','apple'] }). pretty().`

```
> db.food.find({fruits:['grapes','mango','apple']}).pretty()
{ "_id" : 1, "fruits" : [ "grapes", "mango", "apple" ] }
>
```

To find in “fruits” array having “mango” in the first index position.

`db.food.find ({ fruits.1:'mango' })`

```
> db.food.find({'fruits.1':'mango'})
>
```

To find those documents from the “food” collection where the size of the array is two.

```
db.food.find ( {“fruits”: {$size:2}} )
```

```
> db.food.find ( {“fruits”: {$size:2}} )
{ “_id” : 3, “fruits” : [ “banana”, “mango” ] }
> _
```

To find the document with a particular id and display the first two elements from the array “fruits”

```
db.food.find({_id:1},{“fruits”:$slice:2}})
```

```
> db.food.find({_id:1},{“fruits”:$slice:2}})
{ “_id” : 1, “fruits” : [ “grapes”, “mango” ] }
> _
```

To find all the documents from the food collection which have elements mango and grapes in the array “fruits”

```
db.food.find({fruits:{$all:[“mango”,“grapes”]}})
```

```
> db.food.find({fruits:{$all:[“mango”,“grapes”]}})
{ “_id” : 1, “fruits” : [ “grapes”, “mango”, “apple” ] }
{ “_id” : 2, “fruits” : [ “grapes”, “mango”, “cherry” ] }
>
```

update on Array:

using particular id replace the element present in the 1 st index position of the fruits array with apple

```
db.food.update({_id:3},{ $set: {“fruits.1”:“apple”}})
```

insert new key value pairs in the fruits array

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

```

> 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:100}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
>

```

Note: perform query operations using - pop, addToSet, pullAll and pull

XII. Aggregate Function :

Create a collection Customers with fields custID, AcctBal, AcctType.

Now group on “custID” and compute the sum of “AccBal”.

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

match on AcctType:"S" then group on “CustID” and compute the sum of “AccBal”.

```
db.Customers.aggregate ( { $match:{AcctType:"S"} }, { $group : { _id : "$custID", TotAccBal : { $sum : "$AccBal" } } } );
```

match on AcctType:"S" then group on “CustID” and compute the sum of “AccBal” and total balance greater than 1200.

```
db.Customers.aggregate ( { $match:{AcctType:"S"} }, { $group : { _id : "$custID", TotAccBal : { $sum : "$AccBal" } } }, { $match:{TotAccBal:{ $gt:1200 } } } );
```

```

WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Customers.aggregate ( { $group : { _id : "$custID", TotAccBal : { $sum : "$AccBal" } } } );
> db.Customers.aggregate ( { $match:{AcctType:"S"} }, { $group : { _id : "$custID", TotAccBal : { $sum : "$AccBal" } } } );
uncaught exception: SyntaxError: illegal character :
@(shell):1:43
> db.Customers.aggregate ( { $match:{AcctType:"S"} }, { $group : { _id : "$custID", TotAccBal : { $sum : "$AccBal" } } } );
> db.Customers.aggregate ( { $match:{AcctType:"S"} }, { $group : { _id : "$custID", TotAccBal : { $sum : "$AccBal" } } }, { $match:{TotAccBal:{ $gt:1200 } } } );
>

```


LAB 5

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

```
c:\hadoop_new\sbin>hdfs dfs -mkdir /temp
```

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

```
c:\hadoop_new\sbin>hdfs dfs -ls \temp
```

Found 1 items

```
-rw-r--r--  1 Admin supergroup      11 2021-06-11 21:12 /temp/sample.txt
```

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

world

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

```
c:\hadoop_new\sbin>hdfs dfs -put E:\Desktop\temp \temp
```

```
c:\hadoop_new\sbin>hdfs dfs -ls \temp
```

Found 2 items

```
-rw-r--r--  1 Admin supergroup      11 2021-06-11 21:12 /temp/sample.txt drwxr-xr-x -  
Admin supergroup      0 2021-06-11 21:15 /temp/temp
```

```
c:\hadoop_new\sbin>hdfs dfs -mv \lab1 \temp
```

```
c:\hadoop_new\sbin>hdfs dfs -ls \temp Found 3 items drwxr-xr-x - Admin  
supergroup      0 2021-04-19 15:07 /temp/lab1 -rw-r--r--  1 Admin
```

```
supergroup      11 2021-06-11 21:12 /temp/sample.txt drwxr-xr-x -  
Admin supergroup    0 2021-06-11 21:15 /temp/temp
```

```
c:\hadoop_new\sbin>hdfs dfs -rm /temp/sample.txt  
Deleted /temp/sample.txt
```

```
c:\hadoop_new\sbin>hdfs dfs -ls /temp Found 2 items drwxr-xr-x - Admin  
supergroup      0 2021-04-19 15:07 /temp/lab1 drwxr-xr-x - Admin  
supergroup      0 2021-06-11 21:15 /temp/temp
```

```
c:\hadoop_new\sbin>hdfs dfs -copyFromLocal E:\Desktop\sample.txt /temp
```

```
c:\hadoop_new\sbin>hdfs dfs -ls /temp Found 3 items drwxr-xr-x - Admin  
supergroup      0 2021-04-19 15:07 /temp/lab1 -rw-r--r-- 1 Admin supergroup  
11 2021-06-11 21:17 /temp/sample.txt drwxr-xr-x - Admin supergroup      0  
2021-06-11 21:15 /temp/temp
```

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

```

c:\hadoop_new\sbin>hdfs dfs -mkdir /temp

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

c:\hadoop_new\sbin>hdfs dfs -ls \temp
Found 1 items
-rw-r--r--   1 Admin supergroup          11 2021-06-11 21:12 /temp/sample.txt

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

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

c:\hadoop_new\sbin>hdfs dfs -put E:\Desktop\temp \temp

c:\hadoop_new\sbin>hdfs dfs -ls \temp
Found 2 items
-rw-r--r--   1 Admin supergroup          11 2021-06-11 21:12 /temp/sample.txt
drwxr-xr-x   - Admin supergroup           0 2021-06-11 21:15 /temp/temp

c:\hadoop_new\sbin>hdfs dfs -mv \lab1 \temp

c:\hadoop_new\sbin>hdfs dfs -ls \temp
Found 3 items
drwxr-xr-x   - Admin supergroup           0 2021-04-19 15:07 /temp/lab1
-rw-r--r--   1 Admin supergroup          11 2021-06-11 21:12 /temp/sample.txt
drwxr-xr-x   - Admin supergroup           0 2021-06-11 21:15 /temp/temp

c:\hadoop_new\sbin>hdfs dfs -rm /temp/sample.txt
Deleted /temp/sample.txt

c:\hadoop_new\sbin>hdfs dfs -ls \temp
Found 2 items
drwxr-xr-x   - Admin supergroup           0 2021-04-19 15:07 /temp/lab1
drwxr-xr-x   - Admin supergroup           0 2021-06-11 21:15 /temp/temp

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

c:\hadoop_new\sbin>hdfs dfs -ls \temp
Found 3 items
drwxr-xr-x   - Admin supergroup           0 2021-04-19 15:07 /temp/lab1
-rw-r--r--   1 Admin supergroup          11 2021-06-11 21:17 /temp/sample.txt
drwxr-xr-x   - Admin supergroup           0 2021-06-11 21:15 /temp/temp

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

```

LAB 6

For the given file, Create a Map Reduce program to
a) Find the average temperature for each year from the NCDC data set.

```
// AverageDriver.java package temperature;
```

```
import org.apache.hadoop.io.*; import org.apache.hadoop.fs.*; import
org.apache.hadoop.mapreduce.*; import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class AverageDriver
{
    public static void main (String[] args) throws Exception
    {
        if (args.length != 2)
        {
            System.err.println("Please Enter the input and output parameters");
            System.exit(-1);
        }
        Job job = new Job();
        job.setJarByClass(AverageDriver.class);
        job.setJobName("Max temperature");
        FileInputFormat.addInputPath(job,new Path(args[0]));
        FileOutputFormat.setOutputPath(job,new Path (args[1]));

        job.setMapperClass(AverageMapper.class);
        job.setReducerClass(AverageReducer.class);
        job.setOutputKeyClass(Text.class);
        job.setOutputValueClass(IntWritable.class);
        System.exit(job.waitForCompletion(true)?0:1);
    }
}
```

```
//AverageMapper.java package temperature;
```

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

public class AverageMapper extends Mapper <LongWritable, Text, Text, IntWritable>
{ public static final int MISSING = 9999;

    public void map(LongWritable key, Text value, Context context) throws IOException,
    InterruptedException
    {
        String line = value.toString();
        if (line.charAt(87)=='+')
        {
            String year = line.substring(15,19);
            int temperature;
            temperature = Integer.parseInt(line.substring(88, 92));
        }
        else
        {
            temperature = Integer.parseInt(line.substring(87, 92));
            String quality =
            line.substring(92, 93);
            if(temperature != MISSING && quality.matches("[01459]"))
            context.write(new Text(year),new IntWritable(temperature));
        }
    }
}
```

```

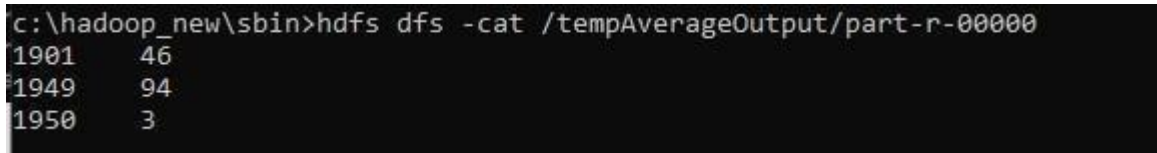
}

//AverageReducer.java package temperature;

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

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

```



```

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

```

```

//TempDriver.java package
temperatureMax;

import org.apache.hadoop.io.*; import org.apache.hadoop.fs.*; import
org.apache.hadoop.mapreduce.*; import
org.apache.hadoop.mapreduce.lib.input.FileInputFormat; import
org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

public class TempDriver
{
    public static void main (String[] args) throws Exception
    {
        if (args.length != 2)

```

```

        {
            System.err.println("Please Enter the input and output parameters");
            System.exit(-1);
        }

        Job job = new Job();
        job.setJarByClass(TempDriver.class);          job.setJobName("Max
        temperature");

        FileInputFormat.addInputPath(job,new Path(args[0]));

        FileOutputFormat.setOutputPath(job,new Path (args[1]));

        job.setMapperClass(TempMapper.class);
        job.setReducerClass(TempReducer.class);

        job.setOutputKeyClass(Text.class);
        job.setOutputValueClass(IntWritable.class);
        System.exit(job.waitForCompletion(true)?0:1);
    }
}

```

//TempMapper.java package

temperatureMax;

```

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

```

```

public class TempMapper extends Mapper <LongWritable, Text, Text, IntWritable>

```

```

{ public static final int MISSING = 9999;

```

```

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

```

```

{

```

```

        String line = value.toString();    String month = line.substring(19,21);
int temperature;        if (line.charAt(87)=='+')        temperature =
Integer.parseInt(line.substring(88, 92));

        else

                temperature = Integer.parseInt(line.substring(87, 92));    String
quality = line.substring(92, 93); if(temperature != MISSING &&
quality.matches("[01459]"))        context.write(new Text(month),new
IntWritable(temperature)); }

}

//TempReducer.java package
temperatureMax;

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

public class TempMapper extends Mapper <LongWritable, Text, Text, IntWritable>
{ public static final int MISSING = 9999;

public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException
{
        String line = value.toString();    String month = line.substring(19,21);
int temperature;        if (line.charAt(87)=='+')        temperature =
Integer.parseInt(line.substring(88, 92));

        else

                temperature = Integer.parseInt(line.substring(87, 92));    String
quality = line.substring(92, 93); if(temperature != MISSING &&
quality.matches("[01459]"))        context.write(new Text(month),new
IntWritable(temperature));

```

```
}  
}
```

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


LAB 7

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

```
// TopN.java package sortWords;

import org.apache.hadoop.conf.Configuration; import org.apache.hadoop.fs.Path; import
org.apache.hadoop.io.IntWritable; import org.apache.hadoop.io.Text; import
org.apache.hadoop.mapreduce.Job; import org.apache.hadoop.mapreduce.Mapper; import
org.apache.hadoop.mapreduce.Reducer; import
org.apache.hadoop.mapreduce.lib.input.FileInputFormat; import
org.apache.hadoop.mapreduce.lib.output.FileOutputFormat; import
org.apache.hadoop.util.GenericOptionsParser; import utils.MiscUtils;

import java.io.IOException; import java.util.*;

public class TopN {

    public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();
        String[] otherArgs = new GenericOptionsParser(conf, args).getRemainingArgs();    if
(otherArgs.length != 2) {
            System.err.println("Usage: TopN <in> <out>");
            System.exit(2);
        }
        Job job = Job.getInstance(conf);    job.setJobName("Top N");    job.setJarByClass(TopN.class);
job.setMapperClass(TopNMapper.class);    //job.setCombinerClass(TopNReducer.class);
job.setReducerClass(TopNReducer.class);    job.setOutputKeyClass(Text.class);
job.setOutputValueClass(IntWritable.class);
        FileInputFormat.addInputPath(job, new Path(otherArgs[0]));
        FileOutputFormat.setOutputPath(job, new Path(otherArgs[1]));
        System.exit(job.waitForCompletion(true) ? 0 : 1);
    }

    /**
     * The mapper reads one line at the time, splits it into an array of single words and emits every
     * word to the reducers with the value of 1.
     */
    public static class TopNMapper extends Mapper<Object, Text, Text, IntWritable> {

        private final static IntWritable one = new IntWritable(1);    private Text word = new Text();
        private String tokens = "[_ | $#<>\\^=\\[\\]\\*\\/\\\\\\.;,\\.\\-:()?!\"']";

        @Override
        public void map(Object key, Text value, Context context) throws IOException,
```

```

InterruptedException {
    String cleanLine = value.toString().toLowerCase().replaceAll(tokens, " ");
    StringTokenizer itr = new StringTokenizer(cleanLine);
    while (itr.hasMoreTokens()) {
        word.set(itr.nextToken().trim());
        context.write(word, one);
    }
}

/**
 * The reducer retrieves every word and puts it into a Map: if the word already exists in the * map,
 * increments its value, otherwise sets it to 1.
 */
public static class TopNReducer extends Reducer<Text, IntWritable, Text, IntWritable> {

    private Map<Text, IntWritable> countMap = new HashMap<>();

    @Override
    public void reduce(Text key, Iterable<IntWritable> values, Context context) throws IOException,
    InterruptedException {

        // computes the number of occurrences of a single word
        int sum = 0;
        for (IntWritable
val : values) {
            sum += val.get();
        }
        // puts the number of occurrences of this word into the map.
        // We need to create another Text object because the Text instance
        // we receive is the same for all the words
        countMap.put(new Text(key), new
IntWritable(sum));
    }
    @Override
    protected void cleanup(Context context) throws IOException, InterruptedException {

        Map<Text, IntWritable> sortedMap = MiscUtils.sortByValues(countMap);

        int counter = 0;
        for (Text key : sortedMap.keySet()) {
            if (counter++ == 3) {
                break;
            }
            context.write(key, sortedMap.get(key));
        }
    }

    /**
     * The combiner retrieves every word and puts it into a Map: if the word already exists in the * map,
     * increments its value, otherwise sets it to 1.
     */
    public static class TopNCombiner extends Reducer<Text, IntWritable, Text, IntWritable> {

        @Override

```

```

    public void reduce(Text key, Iterable<IntWritable> values, Context context) throws IOException,
    InterruptedException {

        // computes the number of occurrences of a single word
        int sum = 0;
        for (IntWritable
val : values) {
            sum += val.get();
        }
        context.write(key, new IntWritable(sum));
    }
}
}

```

```
// MiscUtils.java package utils;
```

```
import java.util.*;
```

```
public class MiscUtils {
```

```

    /**
    sorts the map by values. Taken from:
    http://javarevisited.blogspot.it/2012/12/how-to-sort-hashmap-java-by-key-and-value.html
    */
    public static <K extends Comparable, V extends Comparable> Map<K, V> sortByValues(Map<K, V>
map) {
        List<Map.Entry<K, V>> entries = new LinkedList<Map.Entry<K, V>>(map.entrySet());

        Collections.sort(entries, new Comparator<Map.Entry<K, V>>() {

            @Override
            public int compare(Map.Entry<K, V> o1, Map.Entry<K, V> o2) {
                return
o2.getValue().compareTo(o1.getValue());
            }
        });

        //LinkedHashMap will keep the keys in the order they are inserted
        //which is currently sorted on natural ordering
        Map<K, V> sortedMap = new LinkedHashMap<K, V>();
        for (Map.Entry<K, V> entry : entries) {
            sortedMap.put(entry.getKey(), entry.getValue());
        }

        return sortedMap;
    }
}

```

```

C:\hadoop_new\share\hadoop\mapreduce>hdfs dfs -cat \sortwordsOutput\part-r-00000
car      7
deer     6
bear     3

```

LAB 8

Create a Hadoop Map Reduce program to combine information from the users file along with Information from the posts file by using the concept of join and display user_id, Reputation and Score.

```
// JoinDriver.java import org.apache.hadoop.conf.Configured; import org.apache.hadoop.fs.Path; import
org.apache.hadoop.io.Text; import org.apache.hadoop.mapred.*; import
org.apache.hadoop.mapred.lib.TextInputFormat; import org.apache.hadoop.util.*;
```

```
public class JoinDriver extends Configured implements Tool {

    public static class KeyPartitioner implements Partitioner<TextPair, Text> {
        @Override
        public void configure(JobConf job) {}

        @Override
        public int getPartition(TextPair key, Text value, int numPartitions) { return
(key.getFirst().hashCode() & Integer.MAX_VALUE) % numPartitions;
        }
    }

    @Override public int run(String[] args) throws Exception {
        if (args.length != 3) {
            System.out.println("Usage: <Department Emp Strength input>
<Department Name input> <output>");
            return -1;
        }

        JobConf conf = new JobConf(getConf(), getClass());
        conf.setJobName("Join
'Department Emp Strength input' with 'Department Name input'");

        Path AInputPath = new Path(args[0]);
        Path BInputPath = new Path(args[1]);
        Path outputPath = new Path(args[2]);

        MultipleInputs.addInputPath(conf, AInputPath, TextInputFormat.class,
Posts.class);
        MultipleInputs.addInputPath(conf, BInputPath, TextInputFormat.class,
User.class);

        FileOutputFormat.setOutputPath(conf, outputPath);

        conf.setPartitionerClass(KeyPartitioner.class);
        conf.setOutputValueGroupingComparator(TextPair.FirstComparator.class);

        conf.setMapOutputKeyClass(TextPair.class);
    }
}
```

```

        conf.setReducerClass(JoinReducer.class);

        conf.setOutputKeyClass(Text.class);

        JobClient.runJob(conf);

        return 0;
    }

    public static void main(String[] args) throws Exception {

        int exitCode = ToolRunner.run(new JoinDriver(), args);
        System.exit(exitCode);
    }
}

// JoinReducer.java import java.io.IOException; import java.util.Iterator;

import org.apache.hadoop.io.Text; import org.apache.hadoop.mapred.*;

public class JoinReducer extends MapReduceBase implements Reducer<TextPair, Text, Text, Text> {

    @Override
    public void reduce (TextPair key, Iterator<Text> values, OutputCollector<Text, Text> output,
Reporter reporter)
        throws IOException
    {

        Text nodeId = new Text(values.next()); while (values.hasNext()) {
            Text node = values.next();
            Text outValue = new Text(nodeId.toString() + "\t\t" + node.toString());
            output.collect(key.getFirst(), outValue);
        }
    }
}

// User.java import java.io.IOException; import java.util.Iterator; import
org.apache.hadoop.conf.Configuration; import org.apache.hadoop.fs.FSDataInputStream; import
org.apache.hadoop.fs.FSDataOutputStream; import org.apache.hadoop.fs.FileSystem; import
org.apache.hadoop.fs.Path; import org.apache.hadoop.io.LongWritable; import
org.apache.hadoop.io.Text; import org.apache.hadoop.mapred.*;

import org.apache.hadoop.io.IntWritable;

public class User extends MapReduceBase implements Mapper<LongWritable, Text, TextPair, Text> {

    @Override

```

```

public void map(LongWritable key, Text value, OutputCollector<TextPair, Text> output, Reporter
reporter)
    throws IOException
{
    String valueString = value.toString();
    String[] SingleNodeData = valueString.split("\t");
    output.collect(new TextPair(SingleNodeData[0], "1"), new
Text(SingleNodeData[1]));
}
}

//Posts.java import java.io.IOException;

import org.apache.hadoop.io.*; import org.apache.hadoop.mapred.*;

public class Posts extends MapReduceBase implements Mapper<LongWritable, Text, TextPair, Text> {

    @Override
    public void map(LongWritable key, Text value, OutputCollector<TextPair, Text> output, Reporter
reporter)
        throws IOException
    {
        String valueString = value.toString();
        String[] SingleNodeData = valueString.split("\t");
        output.collect(new
TextPair(SingleNodeData[3], "0"), new
Text(SingleNodeData[9]));
    }
}

// TextPair.java import java.io.*;

import org.apache.hadoop.io.*;
public class TextPair implements WritableComparable<TextPair> {

    private Text first; private Text second;

    public TextPair() { set(new Text(), new Text());
    }

    public TextPair(String first, String second) { set(new Text(first), new Text(second));
    }

    public TextPair(Text first, Text second) { set(first, second);
    }

    public void set(Text first, Text second) { this.first = first; this.second = second;
    }
}

```

```

public Text getFirst() { return first;
}

public Text getSecond() { return second;
}

@Override
public void write(DataOutput out) throws IOException { first.write(out); second.write(out);
}

@Override public void readFields(DataInput in) throws IOException { first.readFields(in);
second.readFields(in);
}

@Override public int hashCode() { return first.hashCode() * 163 + second.hashCode();
}

@Override public boolean equals(Object o) { if (o instanceof TextPair) { TextPair tp = (TextPair) o;
return first.equals(tp.first) && second.equals(tp.second);
} return false;
}

@Override public String toString() { return first + "\t" + second;
}

@Override
public int compareTo(TextPair tp) { int cmp = first.compareTo(tp.first); if (cmp != 0) { return cmp;
}
return second.compareTo(tp.second);
}
// ^^ TextPair

// vv TextPairComparator public static class Comparator extends WritableComparator {

private static final Text.Comparator TEXT_COMPARATOR = new Text.Comparator();

public Comparator() { super(TextPair.class);
}

@Override public int compare(byte[] b1, int s1, int l1, byte[] b2, int s2, int l2) {
try {
int firstL1 = WritableUtils.decodeVIntSize(b1[s1]) + readVInt(b1, s1); int firstL2 =
WritableUtils.decodeVIntSize(b2[s2]) + readVInt(b2, s2); int cmp = TEXT_COMPARATOR.compare(b1,
s1, firstL1, b2, s2, firstL2); if (cmp != 0) { return cmp;
}
return TEXT_COMPARATOR.compare(b1, s1 + firstL1, l1 - firstL1,
b2, s2 + firstL2, l2 - firstL2);
}
}

```

```

    } catch (IOException e) {        throw new IllegalArgumentException(e);
    }
}

static {
    WritableComparator.define(TextPair.class, new Comparator());
}
public static class FirstComparator extends WritableComparator {

    private static final Text.Comparator TEXT_COMPARATOR = new Text.Comparator();

    public FirstComparator() {        super(TextPair.class);
    }

    @Override    public int compare(byte[] b1, int s1, int l1,                byte[] b2, int s2, int l2) {
        try {
            int firstL1 = WritableUtils.decodeVIntSize(b1[s1]) + readVInt(b1, s1);    int firstL2 =
WritableUtils.decodeVIntSize(b2[s2]) + readVInt(b2, s2);    return TEXT_COMPARATOR.compare(b1, s1,
firstL1, b2, s2, firstL2);
        } catch (IOException e) {        throw new IllegalArgumentException(e);
        }
    }

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

```

```

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

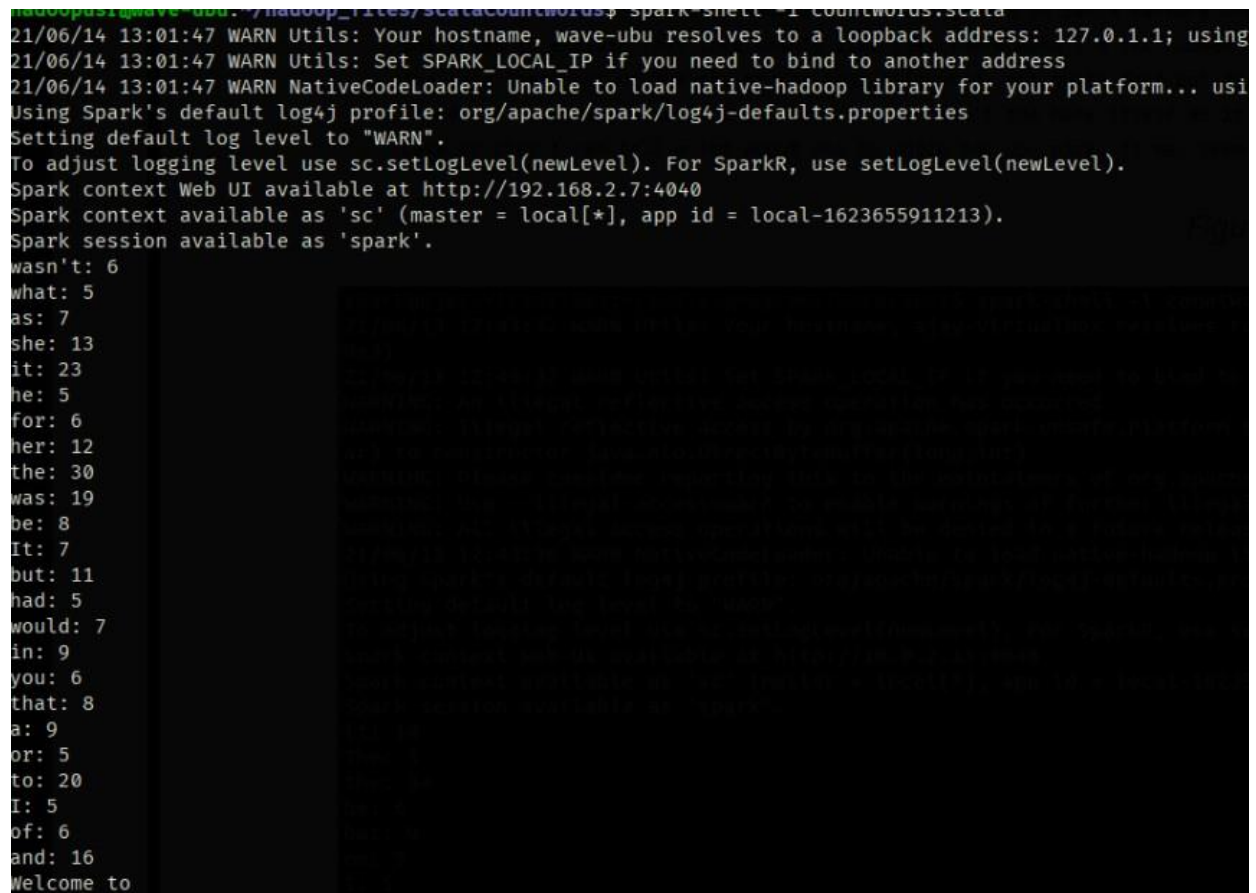
```


LAB 9

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

```
scala> println("Hello World!");  
Hello World!
```

```
val data=sc.textFile("sparkdata.txt") data.collect;  
val splitdata = data.flatMap(line => line.split(" "));  
splitdata.collect;  
val mapdata = splitdata.map(word => (word,1));mapdata.collect;  
val reducedata = mapdata.reduceByKey(_+_);reducedata.collect;
```



The screenshot shows a terminal window with the following content:

```
21/06/14 13:01:47 WARN Utils: Your hostname, wave-ubu. resolves to a loopback address: 127.0.1.1; using  
21/06/14 13:01:47 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address  
21/06/14 13:01:47 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... usi  
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties  
Setting default log level to "WARN".  
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).  
Spark context Web UI available at http://192.168.2.7:4040  
Spark context available as 'sc' (master = local[*], app id = local-1623655911213).  
Spark session available as 'spark'.  
wasn't: 6  
what: 5  
as: 7  
she: 13  
it: 23  
he: 5  
for: 6  
her: 12  
the: 30  
was: 19  
be: 8  
It: 7  
but: 11  
had: 5  
would: 7  
in: 9  
you: 6  
that: 8  
a: 9  
or: 5  
to: 20  
I: 5  
of: 6  
and: 16  
Welcome to
```

LAB 10

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

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

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

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

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

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