VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Big Data Analytics (23CS6PEBDA)

Submitted by

Madhushree S Shetty (1BM22CS141)

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
Feb-2025 to July-2025

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 (22CS6PEBDA**)" carried out by **Madhushree S Shetty (1BM22CS141),** 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 2024. The Lab report has been approved as it satisfies the academic requirements in respect of a **Big Data Analytics-(23CS6PCBDA**) work prescribed for the said degree.

Leelavathi B
Assistant Professor
Department of CSE
BMSCE, Bengaluru

Dr. Kavitha Sooda
Professor and Head
Department of CSE
BMSCE, Bengaluru

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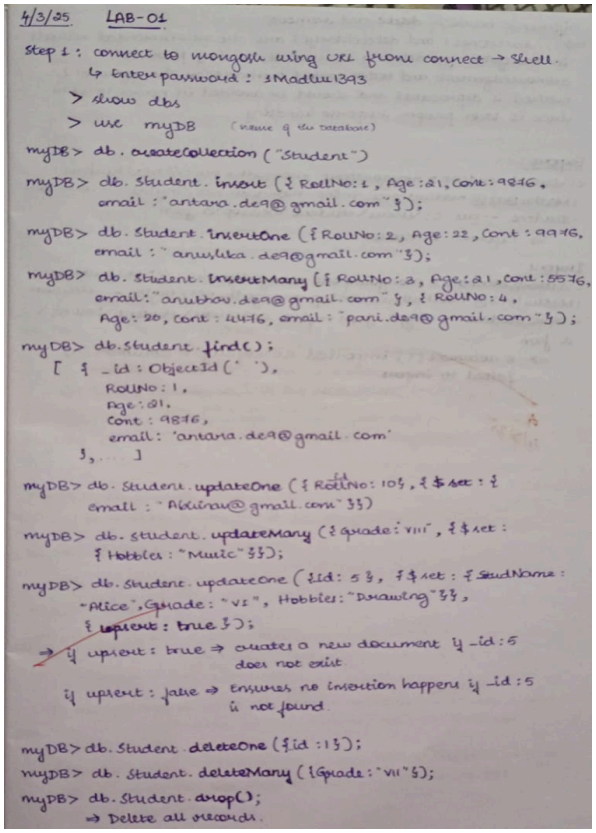
GitHub link: https://github.com/Madhushree-S-Shetty-3/BDA_Lab_6C.git

LAB 1 - MongoDB- CRUD Operations Demonstration (Practice and Self Study)

OBSERVATION:



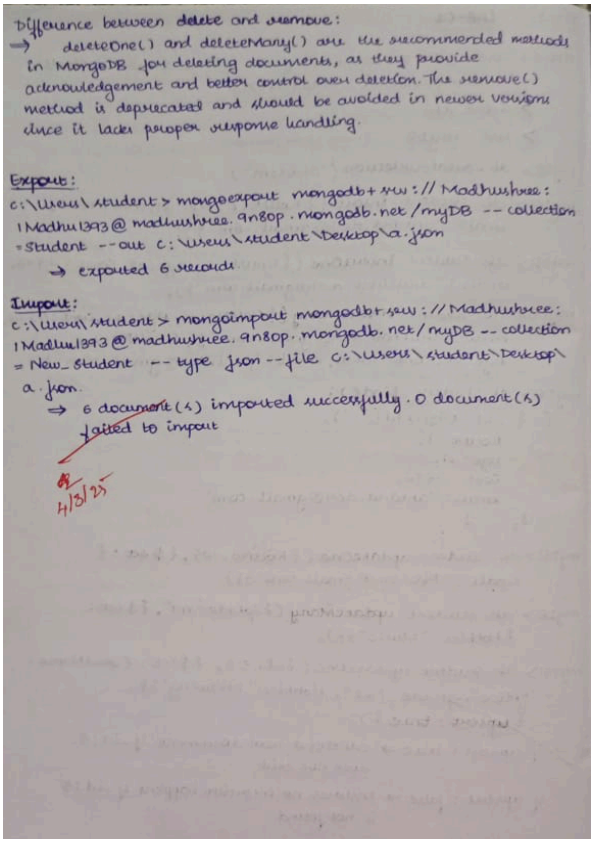
4/3/25 LAB-01

Step 1: connect to mongosh using URI from connect → Shell.
↳ Enter password : 1Madhu1393
> show dbs
> use myDB (name of the database)

```
myDB> db.createCollection("Student")
myDB> db.Student.insert({RollNo:1, Age:21, Cont:9876,
      email:"antara.de9@gmail.com"});
myDB> db.Student.insertOne({RollNo:2, Age:22, Cont:9976,
      email:"anuska.de9@gmail.com"});
myDB> db.Student.insertMany([{RollNo:3, Age:21, Cont:5576,
      email:"anubhav.dea@gmail.com"},{RollNo:4,
      Age:20, Cont:4476, email:"pani.de9@gmail.com"}]);
myDB> db.Student.find();
  [ { _id:ObjectId(' '),
      RollNo:1,
      Age:21,
      Cont:9876,
      email:'antara.de9@gmail.com'
    },
    ...
  ]
myDB> db.Student.updateOne({RollNo:10},{$set:{
      email:"Abhinav@gmail.com"}})
myDB> db.Student.updateMany({Grade:'VIII'},{$set:
      {Hobbies:"Music"}});
myDB> db.Student.updateOne({id:5},{$set:{StudName:
      "Alice",Grade:"VI", Hobbies:"Drawing"}},
      {upsert:true});
```

→ if upsert: true ⇒ creates a new document if _id:5 does not exist
if upsert: false ⇒ ensures no insertion happens if _id:5 is not found.

```
myDB> db.Student.deleteOne({id:13});
myDB> db.Student.deleteMany({Grade:"VII"});
myDB> db.Student.drop();
```
→ Delete all records.



Difference between delete and remove:
→ deleteOne() and deleteMany() are the recommended methods in MongoDB for deleting documents, as they provide acknowledgement and better control over deletion. The remove() method is deprecated and should be avoided in newer versions since it lacks proper response handling.

Export:

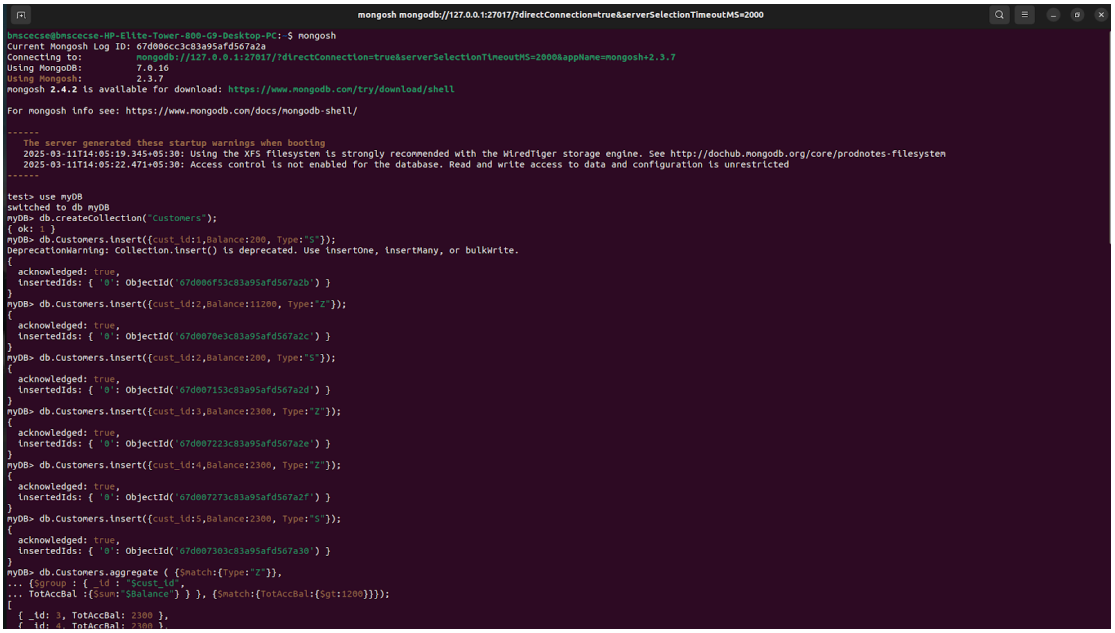
```
c:\Users\student> mongoexport mongodb+srv://Madhushree:
1Madhu1393@madhushree.9n8op.mongodb.net/myDB --collection
=Student --out C:\Users\student\Desktop\a.json
```
→ exported 6 records

Import:

```
c:\Users\student> mongoimport mongodb+srv://Madhushree:
1Madhu1393@madhushree.9n8op.mongodb.net/myDB --collection
= New_Student --type json --file C:\Users\student\Desktop\
a.json
```
→ 6 document(s) imported successfully. 0 document(s) failed to import

4/3/25

OUTPUT:



```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongosh
Current Mongosh Log ID: 67d006cc3c83a95afd567a2a
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.3.7
Using MongoDB:          7.0.16
Using Mongosh:          2.3.7
mongosh 2.4.2 is available for download: https://www.mongodb.com/try/download/shell

For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

------
   The server generated these startup warnings when booting
   2025-03-11T14:05:19.345+05:30: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
   2025-03-11T14:05:22.471+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
------

test> use myDB
switched to db myDB
myDB> db.createCollection("Customers");
{ ok: 1 }
myDB> db.Customers.insert({cust_id:1,Balance:200, Type:"S"});
DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('67d006f53c83a95afd567a2b') }
}
myDB> db.Customers.insert({cust_id:2,Balance:11200, Type:"Z"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('67d0070e3c83a95afd567a2c') }
}
myDB> db.Customers.insert({cust_id:2,Balance:200, Type:"S"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('67d007153c83a95afd567a2d') }
}
myDB> db.Customers.insert({cust_id:3,Balance:2300, Type:"Z"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('67d007223c83a95afd567a2e') }
}
myDB> db.Customers.insert({cust_id:4,Balance:2300, Type:"Z"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('67d007273c83a95afd567a2f') }
}
myDB> db.Customers.insert({cust_id:5,Balance:2300, Type:"S"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('67d007303c83a95afd567a30') }
}
myDB> db.Customers.aggregate ( {$match:{Type:"Z"}},
... {$group : { _id : "$cust_id",
... TotAccBal :{$sum:"$Balance"} } }, {$match:{TotAccBal:{$gt:1200}}});
[
  { _id: 3, TotAccBal: 2300 },
  { _id: 4, TotAccBal: 2300 },
```

```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
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myDB> db.Customers.aggregate ( {$match:{Type:"Z"}},
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[
  { _id: 3, TotAccBal: 2300 },
  { _id: 4, TotAccBal: 2300 },
  { _id: 2, TotAccBal: 11200 }
]
myDB> db.Customers.aggregate (
... {$group : { _id : "$cust_id",
... minAccBal :{$min:"$Balance"}, maxAccBal :{$max:"$Balance"} }});
[
  { _id: 3, minAccBal: 2300, maxAccBal: 2300 },
  { _id: 1, minAccBal: 200, maxAccBal: 200 },
  { _id: 4, minAccBal: 2300, maxAccBal: 2300 },
  { _id: 5, minAccBal: 2300, maxAccBal: 2300 },
  { _id: 2, minAccBal: 200, maxAccBal: 11200 }
]
myDB> exit
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoexport --host localhost --db myDB --collection CUstomers --type=csv --out /home/bmscecse/o.txt --fields "Balance","Type"
2025-03-11T15:21:30.413+0530    connected to: mongodb://localhost/
2025-03-11T15:21:30.413+0530    exported 0 records
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoexport --host localhost --db myDB --collection Customers --type=csv --out /home/bmscecse/o.txt --fields "Balance","Type"
2025-03-11T15:21:47.812+0530    connected to: mongodb://localhost/
2025-03-11T15:21:47.814+0530    exported 6 records
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongosh
Current Mongosh Log ID: 67d007c157780097375 67a2a
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.3.7
Using MongoDB:          7.0.16
Using Mongosh:          2.3.7
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   2025-03-11T14:05:22.471+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
------

test> use myDB
switched to db myDB
myDB> db.Customers.drop()
true
myDB> exit
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoimport --db myDB --collection newCust --type=csv --headerline --file /home/bmscecse/o/txt
2025-03-11T15:24:08.278+0530    Failed: open /home/bmscecse/o/txt: no such file or directory
2025-03-11T15:24:08.278+0530    0 document(s) imported successfully. 0 document(s) failed to import.
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoimport --db myDB --collection Customers --type=csv --headerline --file /home/bmscecse/o.txt
2025-03-11T15:24:56.973+0530    connected to: mongodb://localhost/
2025-03-11T15:24:57.328+0530    6 document(s) imported successfully. 0 document(s) failed to import.
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongosh
Current Mongosh Log ID: 67d00878022dc653c5567a2a
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.3.7
Using MongoDB:          7.0.16
```

```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
2025-03-11T15:24:08.278+0530    0 document(s) imported successfully. 0 document(s) failed to import.
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoimport --db myDB --collection Customers --type=csv --headerline --file /home/bmscecse/o.txt
2025-03-11T15:24:56.973+0530    connected to: mongodb://localhost/
2025-03-11T15:24:57.328+0530    6 document(s) imported successfully. 0 document(s) failed to import.
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongosh
Current Mongosh Log ID: 67d00878022dc653c5567a2a
Connecting to:          mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.3.7
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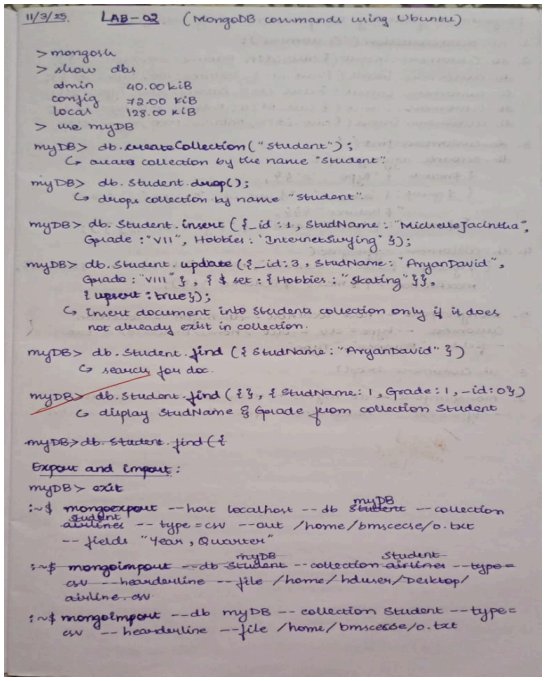
   2025-03-11T14:05:22.471+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
------

test> use myDB
switched to db myDB
myDB> db.Customers.find()
[
  {
    _id: ObjectId('67d008706d2ac454920b0abf'),
    Balance: 11200,
    Type: 'Z'
  },
  {
    _id: ObjectId('67d008706d2ac454920b0ac0'),
    Balance: 200,
    Type: 'S'
  },
  {
    _id: ObjectId('67d008706d2ac454920b0ac1'),
    Balance: 2300,
    Type: 'Z'
  },
  {
    _id: ObjectId('67d008706d2ac454920b0ac2'),
    Balance: 2300,
    Type: 'Z'
  },
  {
    _id: ObjectId('67d008706d2ac454920b0ac3'),
    Balance: 200,
    Type: 'S'
  },
  {
    _id: ObjectId('67d008706d2ac454920b0ac4'),
    Balance: 2300,
    Type: 'S'
  }
]
myDB>
```

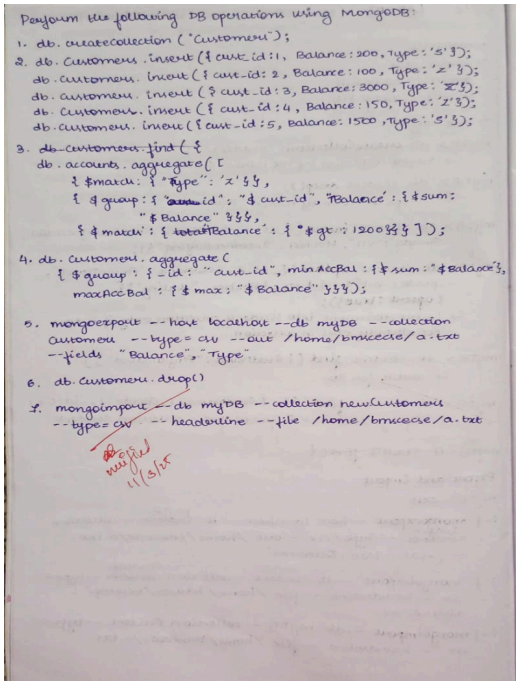
LAB 2:MongoDB

OBSERVATION:



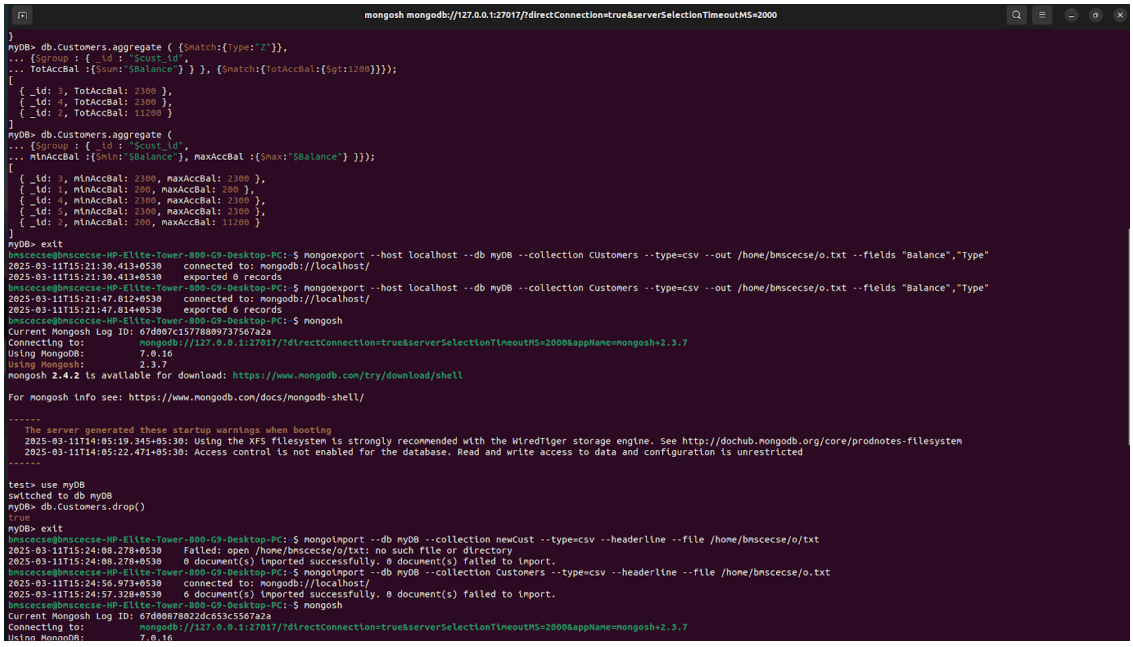
11/3/25. LAB-02 (MongoDB commands using Ubuntu)

> mongosh
> show dbs
admin 40.00 KiB
config 72.00 KiB
local 128.00 KiB
> use myDB
myDB> db.createCollection("student");
↳ create collection by the name "student"
myDB> db.student.drop();
↳ drops collection by name "student"
myDB> db.Student.insert({_id:1, StudName: "MichelleJacintha", Grade:"VII", Hobbies: 'InternetSurfing'});
myDB> db.Student.update({_id:3, StudName: "AryanDavid", Grade:"VIII"}, {$set:{Hobbies:"Skating"}}, {upsert:true});
↳ Insert document into Students collection only if it does not already exist in collection.
myDB> db.Student.find({StudName:"AryanDavid"})
↳ search for doc
myDB> db.Student.find({},{StudName:1, Grade:1, _id:0})
↳ display StudName & Grade from collection Student
myDB>db.Students.find({
Export and Import:
myDB> exit
:~$ mongoexport --host localhost --db myDB --collection Student --type=csv --out /home/bmscecse/o.txt --fields "Year, Quarter"
:~$ mongoimport --db myDB --collection Student --type=csv --headerline --file /home/bmscecse/o.txt



Perform the following DB operations using MongoDB:
1. db.createCollection("Customers");
2. db.Customers.insert({cust_id:1, Balance:200, Type:'S'});
db.Customers.insert({cust_id:2, Balance:100, Type:'Z'});
db.Customers.insert({cust_id:3, Balance:3000, Type:'Z'});
db.Customers.insert({cust_id:4, Balance:150, Type:'Z'});
db.Customers.insert({cust_id:5, Balance:1500, Type:'S'});
3. db.Customers.find({
db.accounts.aggregate([
{$match:{"Type":'x'}},
{$group:{"_id":"$cust_id", "Balance":{$sum:"$Balance"}}},
{$match:{totalBalance:{$gt:1200}}}]);
4. db.Customers.aggregate(
{$group:{_id:"cust_id", minAccBal:{$sum:"$Balance"}, maxAccBal:{$max:"$Balance"}}});
5. mongoexport --host localhost --db myDB --collection Customers --type=csv --out /home/bmscecse/a.txt --fields "Balance","Type"
6. db.Customers.drop()
7. mongoimport --db myDB --collection newCustomers --type=csv --headerline --file /home/bmscecse/a.txt
Verified 11/3/25

OUTPUT:



```
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
}
myDB> db.Customers.aggregate ( {$match:{Type:"Z"}},
... {$group : { _id : "$cust_id",
... TotAccBal :{$sum:"$Balance"} } }, {$match:{TotAccBal:{$gt:1200}}});
[
  { _id: 3, TotAccBal: 2300 },
  { _id: 4, TotAccBal: 2300 },
  { _id: 2, TotAccBal: 11200 }
]
myDB> db.Customers.aggregate (
... {$group : { _id : "$cust_id",
... minAccBal :{$min:"$Balance"}, maxAccBal :{$max:"$Balance"} }});
[
  { _id: 3, minAccBal: 2300, maxAccBal: 2300 },
  { _id: 1, minAccBal: 200, maxAccBal: 200 },
  { _id: 4, minAccBal: 2300, maxAccBal: 2300 },
  { _id: 5, minAccBal: 2300, maxAccBal: 2300 },
  { _id: 2, minAccBal: 200, maxAccBal: 11200 }
]
myDB> exit
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoexport --host localhost --db myDB --collection CUstomers --type=csv --out /home/bmscecse/o.txt --fields "Balance","Type"
2025-03-11T15:21:30.413+0530    connected to: mongodb://localhost/
2025-03-11T15:21:30.413+0530    exported 0 records
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test> use myDB
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myDB> db.Customers.drop()
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myDB> exit
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ mongoimport --db myDB --collection newCust --type=csv --headerline --file /home/bmscecse/o/txt
2025-03-11T15:24:08.278+0530    Failed: open /home/bmscecse/o/txt: no such file or directory
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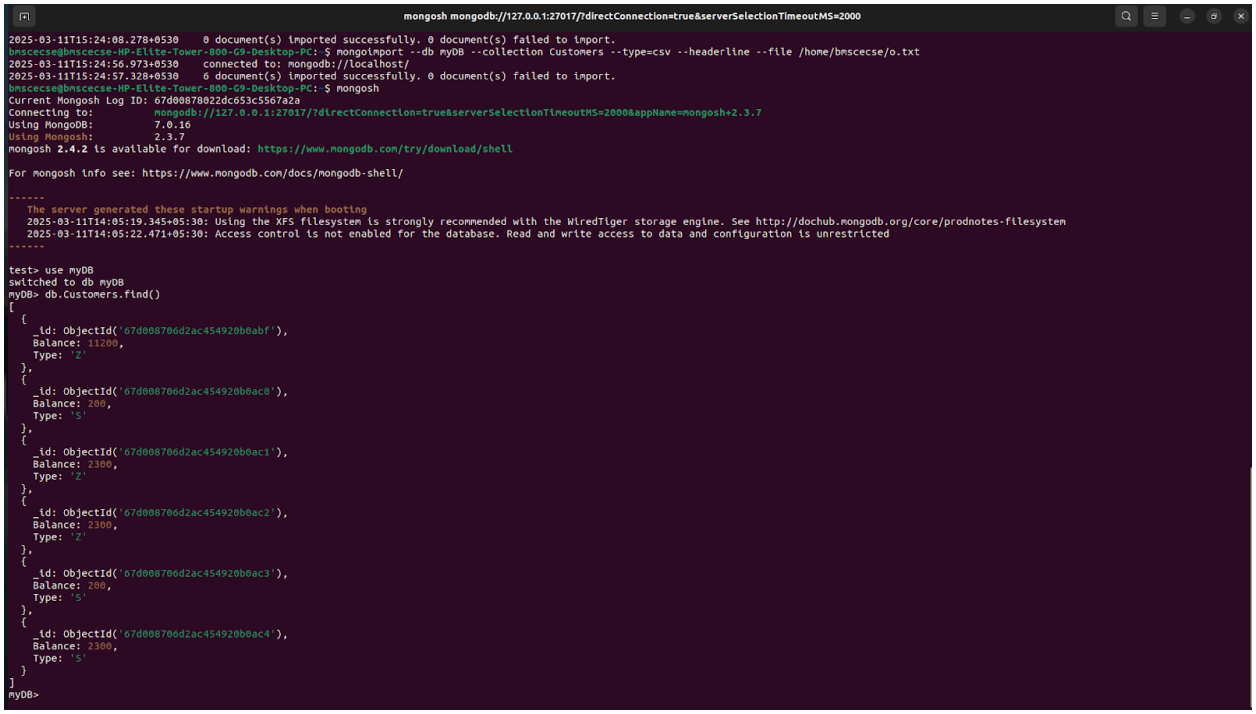
mongosh mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000
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test> use myDB
switched to db myDB
myDB> db.Customers.find()
[
{
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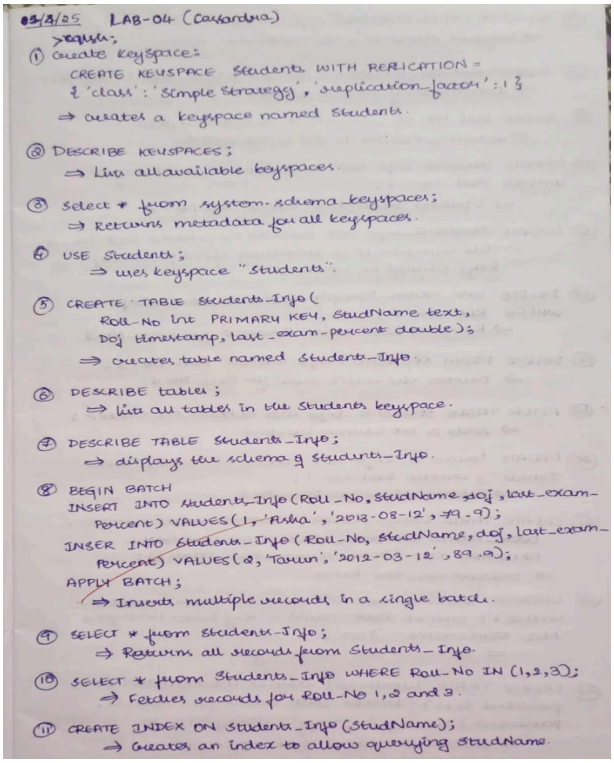
Balance: 11200,
Type: 'Z'
},
{
_id: ObjectId('67d008706d2ac454920b0ac0'),
Balance: 200,
Type: 'S'
},
{
_id: ObjectId('67d008706d2ac454920b0ac1'),
Balance: 2300,
Type: 'Z'
},
{
_id: ObjectId('67d008706d2ac454920b0ac2'),
Balance: 2300,
Type: 'Z'
},
{
_id: ObjectId('67d008706d2ac454920b0ac3'),
Balance: 200,
Type: 'S'
},
{
_id: ObjectId('67d008706d2ac454920b0ac4'),
Balance: 2300,
Type: 'S'
}
]
myDB>

LAB 3:CASSANDRA

OBSERVATION:



03/9/25 LAB-04 (Cassandra)

> cqlsh;

(1) Create keyspace:
CREATE KEYSPACE Students WITH REPLICATION =
{'class': 'SimpleStrategy', 'replication_factor': 1};
⇒ creates a keyspace named Students.

(2) DESCRIBE KEYSPACES;
⇒ Lists all available keyspaces.

(3) Select * from system.schema_keyspaces;
⇒ Returns metadata for all keyspaces.

(4) USE Students;
⇒ uses keyspace "Students".

(5) CREATE TABLE Students_Info(
Roll_No int PRIMARY KEY, StudName text,
DoJ timestamp, last_exam_percent double);
⇒ creates table named Students_Info.

(6) DESCRIBE tables;
⇒ Lists all tables in the Students keyspace.

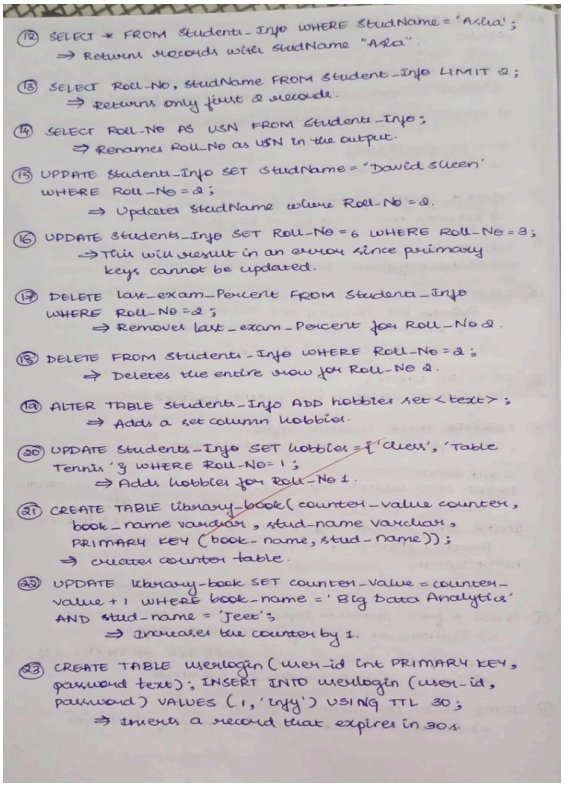
(7) DESCRIBE TABLE Students_Info;
⇒ displays the schema of Students_Info.

(8) BEGIN BATCH
INSERT INTO Students_Info(Roll_No, StudName, DoJ, last_exam_Percent) VALUES(1,'Asha','2013-08-12',79.9);
INSER INTO Students_Info(Roll_No, StudName, DoJ, last_exam_Percent) VALUES(2,'Tarun','2012-03-12',89.9);
APPLY BATCH;
⇒ Inserts multiple records in a single batch.

(9) SELECT * from Students_Info;
⇒ Returns all records from Students_Info.

(10) SELECT * from Students_Info WHERE Roll_No IN (1,2,3);
⇒ Fetches records for ROLL_No 1,2 and 3.

(11) CREATE INDEX ON Students_Info(StudName);
⇒ Creates an index to allow querying StudName.



(12) SELECT * FROM Students_Info WHERE StudName = 'Asha';
⇒ Returns records with StudName "Asha"

(13) SELECT Roll_No, StudName FROM Student_Info LIMIT 2;
⇒ Returns only first 2 records.

(14) SELECT Roll_No AS USN FROM Students_Info;
⇒ Renames Roll_No as USN in the output.

(15) UPDATE Students_Info SET StudName = 'David Green'
WHERE Roll_No = 2;
⇒ Updates StudName where Roll_No = 2.

(16) UPDATE Students_Info SET Roll_No = 6 WHERE Roll_No = 3;
⇒ This will result in an error since primary key cannot be updated.

(17) DELETE last_exam_Percent FROM Students_Info
WHERE Roll_No = 2;
⇒ Removes last_exam_Percent for Roll_No 2.

(18) DELETE FROM Students_Info WHERE Roll_No = 2;
⇒ Deletes the entire row for Roll_No 2.

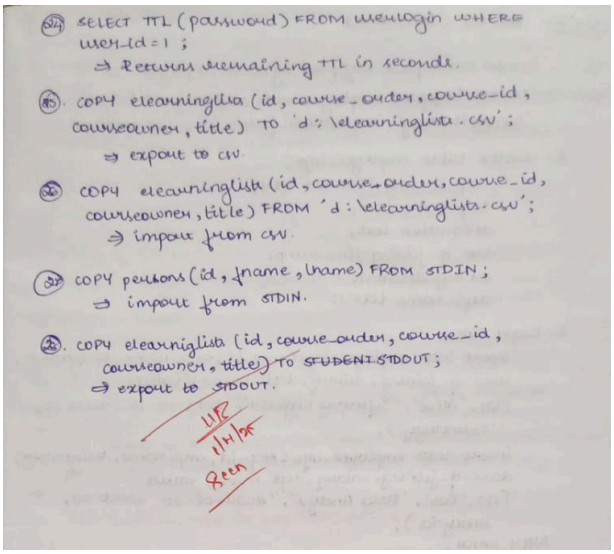
(19) ALTER TABLE Students_Info ADD hobbies set<text>;
⇒ Adds a set column hobbies.

(20) UPDATE Students_Info SET hobbies = {'Chess', 'Table Tennis'} WHERE Roll_No = 1;
⇒ Adds hobbies for Roll_No 1.

(21) CREATE TABLE library_book(counter_value counter,
book_name varchar, stud_name varchar,
PRIMARY KEY (book_name, stud_name));
⇒ creates counter table.

(22) UPDATE library_book SET counter_value = counter_value + 1 WHERE book_name = 'Big Data Analytics'
AND stud_name = 'Jeet';
⇒ Increases the counter by 1.

(23) CREATE TABLE mentlogin(user_id int PRIMARY KEY, password text); INSERT INTO mentlogin(user_id, password) VALUES (1,'iyfy') USING TTL 30;
⇒ Inserts a record that expires in 30s.



(24) SELECT TTL(password) FROM mentlogin WHERE user_id = 1;
⇒ Returns remaining TTL in seconds.

(25) COPY elearninglist (id, course_order, course_id, courseowner, title) TO 'd:\elearninglist.csv';
⇒ export to csv

(26) COPY elearninglist (id, course_order, course_id, courseowner, title) FROM 'd:\elearninglist.csv';
⇒ import from csv.

(27) COPY persons (id, fname, lname) FROM STDIN;
⇒ import from STDIN.

(28) COPY elearninglist (id, course_order, course_id, courseowner, title) TO STUDENT STDOUT;
⇒ export to STDOUT.

11/9/25
Recd

OUTPUT:

```
cqlsh> CREATE KEYSPACE Employee WITH replication = {'class':'SimpleStrategy', 'replication_factor':1};
cqlsh> USE Employee;
cqlsh:employee> CREATE TABLE Employee_Info (
           ...     Emp_Id int PRIMARY KEY,
           ...     Emp_Name text,
           ...     Designation text,
           ...     Date_of_Joining date,
           ...     Salary decimal,
           ...     Dept_Name text
           ... );
cqlsh:employee> BEGIN BATCH
           ... INSERT INTO Employee_Info (Emp_Id, Emp_Name, Designation, Date_of_Joining, Salary, Dept_Name)
           ... VALUES (121, 'John Doe', 'Manager', '2015-06-20', 75000, 'HR');
           ... INSERT INTO Employee_Info (Emp_Id, Emp_Name, Designation, Date_of_Joining, Salary, Dept_Name)
           ... VALUES (122, 'Jane Smith', 'Engineer', '2017-08-15', 60000, 'IT');
           ... APPLY BATCH;
cqlsh:employee> SELECT * FROM Employee_Info;

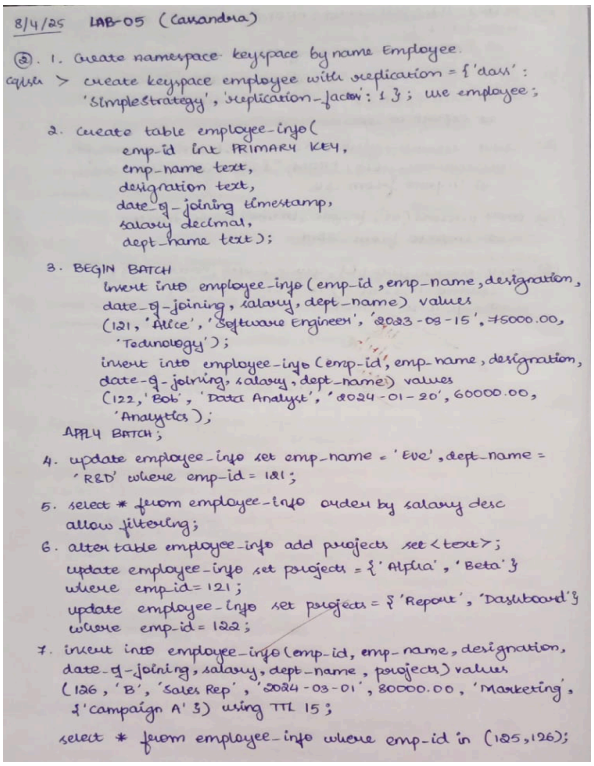
 emp_id | date_of_joining | dept_name | designation | emp_name   | salary
--------+-----------------+-----------+-------------+------------+--------
    122 |      2017-08-15 |        IT |    Engineer | Jane Smith |  60000
    121 |      2015-06-20 |        HR |     Manager |   John Doe |  75000

(2 rows)
cqlsh:employee> UPDATE Employee_Info SET Emp_Name = 'John Wick', Dept_Name = 'Security' WHERE Emp_Id = 121;
cqlsh:employee> SELECT * FROM Employee_Info;

 emp_id | date_of_joining | dept_name | designation | emp_name   | salary
--------+-----------------+-----------+-------------+------------+--------
    122 |      2017-08-15 |        IT |    Engineer | Jane Smith |  60000
    121 |      2015-06-20 |  Security |     Manager |  John Wick |  75000
```

LAB 04:CASSANDRA

OBSERVATION:



8/4/25 LAB-05 (Cassandra)

(a). 1. Create namespace keyspace by name Employee

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

2. Create table employee-info(
emp-id int PRIMARY KEY,
emp_name text,
designation text,
date_of_joining timestamp,
salary decimal,
dept_name text);

3. BEGIN BATCH
insert into employee-info(emp-id, emp_name, designation,
date_of_joining, salary, dept_name) values
(121, 'Alice', 'Software Engineer', '2023-05-15', 75000.00,
'Technology');
insert into employee-info(emp-id, emp_name, designation,
date_of_joining, salary, dept_name) values
(122, 'Bob', 'Data Analyst', '2024-01-20', 60000.00,
'Analytics');
APPLY BATCH;

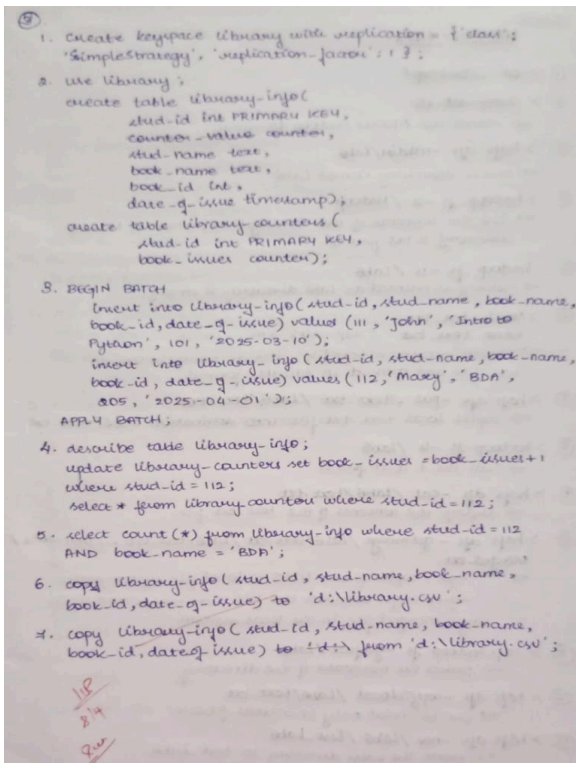
4. update employee_info set emp_name = 'Eve', dept_name =
'RED' where emp-id = 181;

5. select * from employee-info order by salary desc
allow filtering;

6. alter table employee-info add projects set<text>;
update employee-info set projects = {'Alpha', 'Beta'}
where emp-id = 121;
update employee-info set projects = {'Report', 'Dashboard'}
where emp-id = 122;

7. insert into employee-info(emp-id, emp_name, designation,
date_of_joining, salary, dept_name, projects) values
(126, 'B', 'Sales Rep', '2024-03-01', 80000.00, 'Marketing',
{'Campaign A'}) using TTL 15;

select * from employee-info where emp-id in (125,126);



(b)

1. Create keyspace library with replication = {'class':
'SimpleStrategy', 'replication_factor': 1};
2. use library;
create table library-info(
stud-id int PRIMARY KEY,
counter_value counter,
stud_name text,
book_name text,
book_id int,
date_of_issue timestamp);
create table library-counters(
stud-id int PRIMARY KEY,
book_issues counter);
3. BEGIN BATCH
insert into library-info(stud-id, stud_name, book_name,
book_id, date_of_issue) values (111, 'John', 'Intro to
Python', 101, '2025-03-10');
insert into library-info(stud-id, stud-name, book-name,
book-id, date_of_issue) values (112, 'Mary', 'BDA',
205, '2025-04-01');
APPLY BATCH;
4. describe table library-info;
update library-counters set book_issues = book_issues + 1
where stud-id = 112;
select * from library-counters where stud-id = 112;
5. select count(*) from library-info where stud-id = 112
AND book_name = 'BDA';
6. copy library-info(stud-id, stud-name, book_name,
book-id, date_of_issue) to 'd:\library.csv';
7. copy library-info(stud-id, stud_name, book_name,
book-id, date_of_issue) to 'd:\' from 'd:\library.csv';

OUTPUT:

```
cqlsh:employee> CREATE TABLE Employee_By_Dept (
           ...     Dept_Name text,
           ...     Salary decimal,
           ...     Emp_Id int,
           ...     Emp_Name text,
           ...     Designation text,
           ...     Date_of_Joining date,
           ...     PRIMARY KEY (Dept_Name, Salary)
           ... ) WITH CLUSTERING ORDER BY (Salary DESC);
cqlsh:employee>
cqlsh:employee>
cqlsh:employee>
cqlsh:employee> INSERT INTO Employee_By_Dept (Dept_Name, Salary, Emp_Id, Emp_Name, Designation, Date_of_Joining)
           ... VALUES ('IT', 60000, 122, 'Jane Smith', 'Engineer', '2017-08-15');
cqlsh:employee> INSERT INTO Employee_By_Dept (Dept_Name, Salary, Emp_Id, Emp_Name, Designation, Date_of_Joining)
           ... VALUES ('Security', 75000, 122, 'John Wick', 'Manager', '2015-06-20');
cqlsh:employee>
cqlsh:employee> INSERT INTO Employee_By_Dept (Dept_Name, Salary, Emp_Id, Emp_Name, Designation, Date_of_Joining)
           ... VALUES ('IT', 80000, 123, 'Alice', 'Senior Engineer', '2015-04-10');
cqlsh:employee> SELECT * FROM Employee_By_Dept WHERE Dept_Name = 'IT';

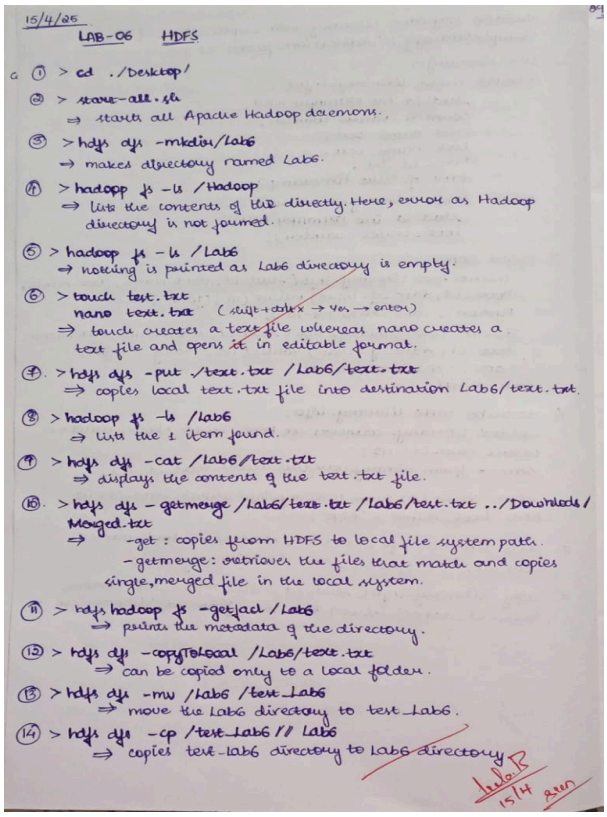
 dept_name | salary | date_of_joining | designation     | emp_id | emp_name
-----------+--------+-----------------+-----------------+--------+------------
        IT |  80000 |      2015-04-10 | Senior Engineer |    123 |      Alice
        IT |  60000 |      2017-08-15 |        Engineer |    122 | Jane Smith

(2 rows)
cqlsh:employee> ALTER TABLE Employee_Info ADD Projects list<text>;
cqlsh:employee> UPDATE Employee_Info SET Projects = ['Website Revamp', 'Cloud Migration'] WHERE Emp_Id = 121;
cqlsh:employee> INSERT INTO Employee_Info (Emp_Id, Emp_Name, Designation, Date_of_Joining, Salary, Dept_Name)
           ... VALUES (123, 'Temp User', 'Intern', '2024-01-01', 30000, 'Temp') USING TTL 15;
cqlsh:employee> SELECT * FROM Employee_Info;

 emp_id | date_of_joining | dept_name | designation | emp_name   | projects                                | salary
--------+-----------------+-----------+-------------+------------+-----------------------------------------+--------
    123 |      2024-01-01 |      Temp |      Intern |  Temp User |                                    null |  30000
    122 |      2017-08-15 |        IT |    Engineer | Jane Smith |                                    null |  60000
    121 |      2015-06-20 |  Security |     Manager |  John Wick | ['Website Revamp', 'Cloud Migration'] |  75000
```

LAB 05: HDFS

OBSERVATION:



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LAB-06 HDFS

① > cd ./Desktop/

② > start-all.sh
⇒ starts all Apache Hadoop daemons.

③ > hdfs dfs -mkdir /Lab6
⇒ makes directory named Lab6.

④ > hadoop fs -ls /Hadoop
⇒ lists the contents of the directly. Here, error as Hadoop directory is not found.

⑤ > hadoop fs -ls /Lab6
⇒ nothing is printed as Lab6 directory is empty.

⑥ > touch text.txt
nano text.txt (ctrl+shift+x → Yes → enter)
⇒ touch creates a text file whereas nano creates a text file and opens it in editable format.

⑦ > hdfs dfs -put ./text.txt /Lab6/text.txt
⇒ copies local text.txt file into destination Lab6/text.txt

⑧ > hadoop fs -ls /Lab6
⇒ lists the 1 item found.

⑨ > hdfs dfs -cat /Lab6/text.txt
⇒ displays the contents of the text.txt file.

⑩ > hdfs dfs -getmerge /Lab6/text.txt /Lab6/text.txt ../Downloads/Merged.txt
⇒ -get : copies from HDFS to local file system path.
-getmerge : retrieves the files that match and copies single, merged file in the local system.

⑪ > hdfs hadoop fs -getfacl /Lab6
⇒ prints the metadata of the directory.

⑫ > hdfs dfs -copyToLocal /Lab6/text.txt
⇒ can be copied only to a local folder.

⑬ > hdfs dfs -mv /Lab6 /test_Lab6
⇒ move the Lab6 directory to test_Lab6.

⑭ > hdfs dfs -cp /test_Lab6 /Lab6
⇒ copies test_lab6 directory to Lab6 directory

Lab 6 B 15/4 Seen

OUTPUT:

```
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ cd ./Desktop/
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ start-all.sh
WARNING: Attempting to start all Apache Hadoop daemons as hadoop in 10 seconds.
WARNING: This is not a recommended production deployment configuration.
WARNING: Use CTRL-C to abort.
Starting namenodes on [localhost]
Starting datanodes
Starting secondary namenodes [bmscecse-HP-Elite-Tower-800-G9-Desktop-PC]
Starting resourcemanager
Starting nodemanagers
```

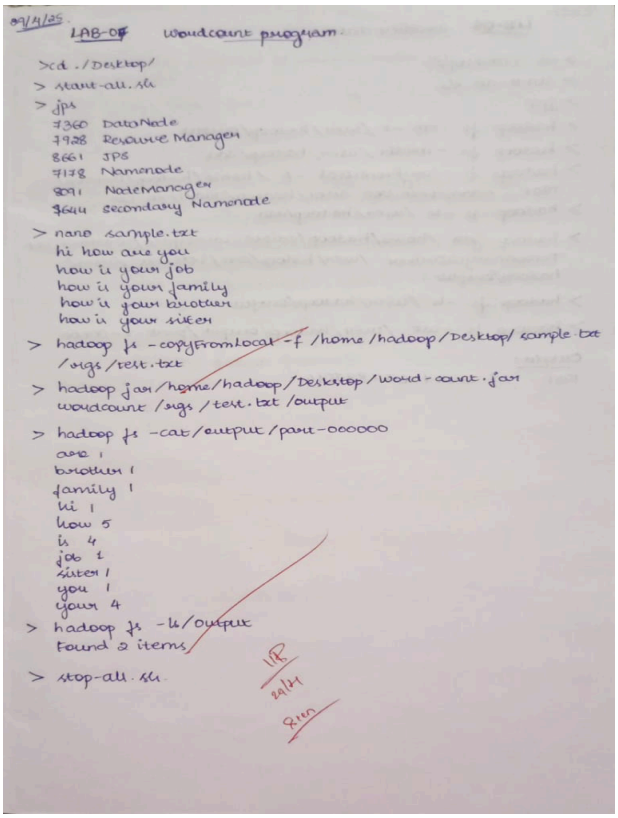
```
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -copyToLocal /Lab6/text.text ../Documents
copyToLocal: `/Lab6/text.text': No such file or directory
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -copyToLocal /Lab6/text.txt ../Documents
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -copyToLocal /Lab6/test.txt ../Documents
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -cat /Lab6/text.txt
hi how are you
how is your job
how is your family
how is your brother
how is your sister
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -mv /Lab6 /test_Lab6
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -ls /test_Lab6
Found 2 items
-rw-r--r--   1 hadoop supergroup         34 2025-04-15 14:26 /test_Lab6/test.txt
-rw-r--r--   1 hadoop supergroup         89 2025-04-15 14:23 /test_Lab6/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -cp /test_Lab6/ /Lab6
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -ls /Lab6
Found 2 items
-rw-r--r--   1 hadoop supergroup         34 2025-04-15 14:31 /Lab6/test.txt
-rw-r--r--   1 hadoop supergroup         89 2025-04-15 14:31 /Lab6/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -ls /test_Lab6
Found 2 items
-rw-r--r--   1 hadoop supergroup         34 2025-04-15 14:26 /test_Lab6/test.txt
-rw-r--r--   1 hadoop supergroup         89 2025-04-15 14:23 /test_Lab6/text.txt
```

```
command [genericOptions] [commandOptions]

hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -mkdir /Lab6
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /Hadoop
ls: `/Hadoop': No such file or directory
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /Lab6
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ touch test.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ nano text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -put ./text.txt /Lab6/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /Lab6
Found 1 items
-rw-r--r--   1 hadoop supergroup         89 2025-04-15 14:23 /Lab6/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -cat /Lab6/text.txt
hi how are you
how is your job
how is your family
how is your brother
how is your sister
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /Lab6
Found 1 items
-rw-r--r--   1 hadoop supergroup         89 2025-04-15 14:23 /Lab6/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ nano test.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -put ./test.txt /Lab6/test.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /Lab6
Found 2 items
-rw-r--r--   1 hadoop supergroup         34 2025-04-15 14:26 /Lab6/test.txt
-rw-r--r--   1 hadoop supergroup         89 2025-04-15 14:23 /Lab6/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -getmerge /Lab6 /text.txt /Lab6 /test.txt ../Downloads/Merged.txt
getmerge: `/text.txt': No such file or directory
getmerge: `/test.txt': No such file or directory
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hdfs dfs -getmerge /Lab6/text.txt /Lab6/test.txt ../Downloads/Merged.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -getfacl /Lab6
# file: /Lab6
# owner: hadoop
# group: supergroup
user::rwx
group::r-x
other::r-x
```

LAB 06:WORDCOUNT PROBLEM(HADOOP)

OBSERVATION:



CODE:

#driver.java

```
import java.io.IOException;

import org.apache.hadoop.conf.Configured;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapred.FileInputFormat;

import org.apache.hadoop.mapred.FileOutputFormat;
```

```
import org.apache.hadoop.mapred.JobClient;
import org.apache.hadoop.mapred.JobConf;
import org.apache.hadoop.util.Tool;
import org.apache.hadoop.util.ToolRunner;
public class WCDriver extends Configured implements Tool {
public int run(String args[]) throws IOException
{
if (args.length < 2)
{
System.out.println("Please give valid inputs");
return -1;
}
JobConf conf = new JobConf(WCDriver.class);
FileInputFormat.setInputPaths(conf, new Path(args[0]));
FileOutputFormat.setOutputPath(conf, new Path(args[1]));
conf.setMapperClass(WCMapper.class);
conf.setReducerClass(WCReducer.class);
conf.setMapOutputKeyClass(Text.class);
conf.setMapOutputValueClass(IntWritable.class);
conf.setOutputKeyClass(Text.class);
conf.setOutputValueClass(IntWritable.class);
JobClient.runJob(conf);
return 0;
}
public static void main(String args[]) throws Exception
{
int exitCode = ToolRunner.run(new WCDriver(), args);
```

```
System.out.println(exitCode);
}
}
```

#mapper.java

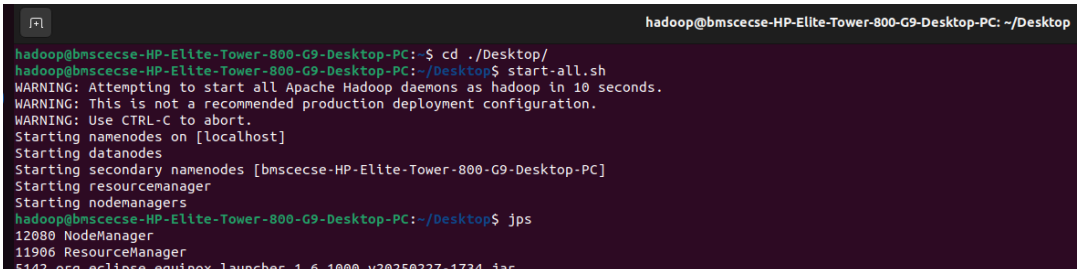
```
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.MapReduceBase;
import org.apache.hadoop.mapred.Mapper;
import org.apache.hadoop.mapred.OutputCollector;
import org.apache.hadoop.mapred.Reporter;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

#reducer.java

```
// Importing libraries
```

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

OUTPUT:

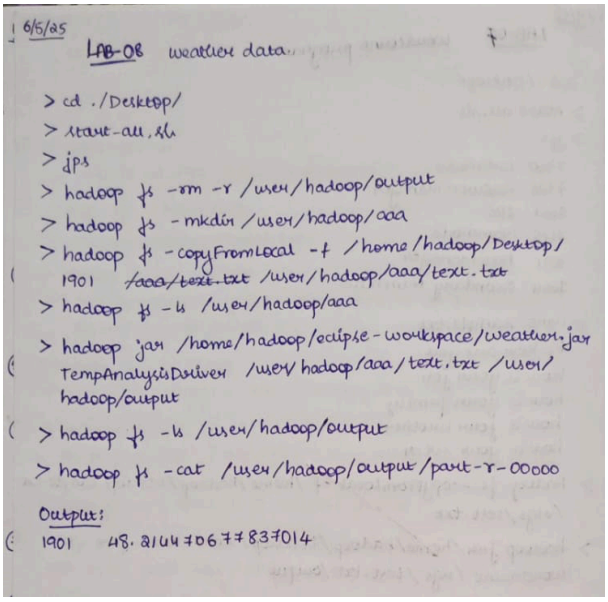


```
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop jar /home/hadoop/eclipse-workspace/WordCount.jar WCDriver input output
2025-05-06 14:45:31,601 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-06 14:45:31,636 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-06 14:45:31,636 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-06 14:45:31,695 WARN mapreduce.JobResourceUploader: No job jar file set.  User classes may not be found. See Job or Job#setJar(String).
2025-05-06 14:45:31,738 INFO input.FileInputFormat: Total input files to process : 1
2025-05-06 14:45:31,765 INFO mapreduce.JobSubmitter: number of splits:1
2025-05-06 14:45:31,825 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local1385456850_0001
2025-05-06 14:45:31,825 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-06 14:45:31,887 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-06 14:45:31,887 INFO mapreduce.Job: Running job: job_local1385456850_0001
2025-05-06 14:45:31,888 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-06 14:45:31,892 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-06 14:45:31,893 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-06 14:45:31,893 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-06 14:45:31,893 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
2025-05-06 14:45:31,925 INFO mapred.LocalJobRunner: Waiting for map tasks
2025-05-06 14:45:31,925 INFO mapred.LocalJobRunner: Starting task: attempt_local1385456850_0001_m_000000_0
2025-05-06 14:45:31,935 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-06 14:45:31,935 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-06 14:45:31,935 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-06 14:45:31,943 INFO mapred.Task:  Using ResourceCalculatorProcessTree : [ ]
2025-05-06 14:45:31,945 INFO mapred.MapTask: Processing split: hdfs://localhost:9000/user/hadoop/input/sample.txt:0+90
2025-05-06 14:45:31,978 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
2025-05-06 14:45:31,978 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
2025-05-06 14:45:31,978 INFO mapred.MapTask: soft limit at 83886080
2025-05-06 14:45:31,979 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
2025-05-06 14:45:31,979 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
2025-05-06 14:45:31,980 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer
2025-05-06 14:45:32,049 INFO mapred.LocalJobRunner:
2025-05-06 14:45:32,050 INFO mapred.MapTask: Starting flush of map output
2025-05-06 14:45:32,050 INFO mapred.MapTask: Spilling map output
2025-05-06 14:45:32,050 INFO mapred.MapTask: bufstart = 0; bufend = 174; bufvoid = 104857600
2025-05-06 14:45:32,050 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend = 26214316(104857264); length = 81/6553600
2025-05-06 14:45:32,052 INFO mapred.MapTask: Finished spill 0
2025-05-06 14:45:32,057 INFO mapred.Task: Task:attempt_local1385456850_0001_m_000000_0 is done. And is in the process of committing
2025-05-06 14:45:32,059 INFO mapred.LocalJobRunner: map
2025-05-06 14:45:32,059 INFO mapred.Task: Task 'attempt_local1385456850_0001_m_000000_0' done.
2025-05-06 14:45:32,061 INFO mapred.Task: Final Counters for attempt_local1385456850_0001_m_000000_0: Counters: 23
        File System Counters
                FILE: Number of bytes read=201
                FILE: Number of bytes written=641533
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=90
                HDFS: Number of bytes written=0
                HDFS: Number of read operations=5
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=1
                HDFS: Number of bytes read erasure-coded=0
        Map-Reduce Framework
                Map input records=6
```

```
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /output/
Found 2 items
-rw-r--r--   1 hadoop supergroup          0 2024-05-21 15:30 /output/_SUCCESS
-rw-r--r--   1 hadoop supergroup         69 2024-05-21 15:30 /output/part-00000
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -cat /output/part-00000
are     1
brother 1
family  1
hi      1
how     5
is      4
job     1
sister  1
you     1
your    4
```

LAB 07:WEATHER DATA(HADOOP)

OBSERVATION:



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LAB-08 weather data..

```
> cd ./Desktop/
> start-all.sh
> jps
> hadoop fs -rm -r /user/hadoop/output
> hadoop fs -mkdir /user/hadoop/aaa
> hadoop fs -copyFromLocal -f /home/hadoop/Desktop/
1901 aaa/text.txt /user/hadoop/aaa/text.txt
> hadoop fs -ls /user/hadoop/aaa
> hadoop jar /home/hadoop/eclipse-workspace/weather.jar
TempAnalysisDriver /user/hadoop/aaa/text.txt /user/
hadoop/output
> hadoop fs -ls /user/hadoop/output
> hadoop fs -cat /user/hadoop/output/part-r-00000
```

Output:

1901 48.21447067783701 4

CODE:

#AvgDriver.java

```
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);
}
}
```

#AvgMapper.java

```
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));
}
}
```

#AvgReducer.java

```
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));
```

}}

#MeanMaxDriver.java

```
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.java

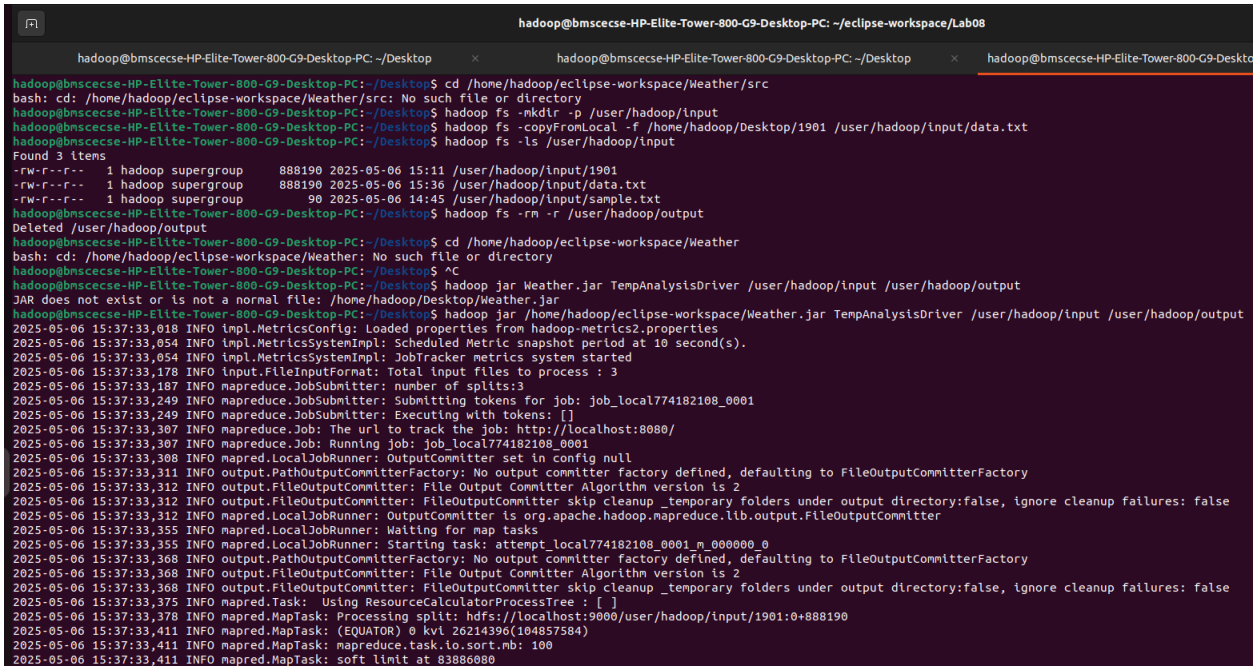
```
package meanmax;
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Mapper;
public class MeanMaxMapper extends Mapper<LongWritable, Text, Text, IntWritable> {
public static 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));
}
}
```

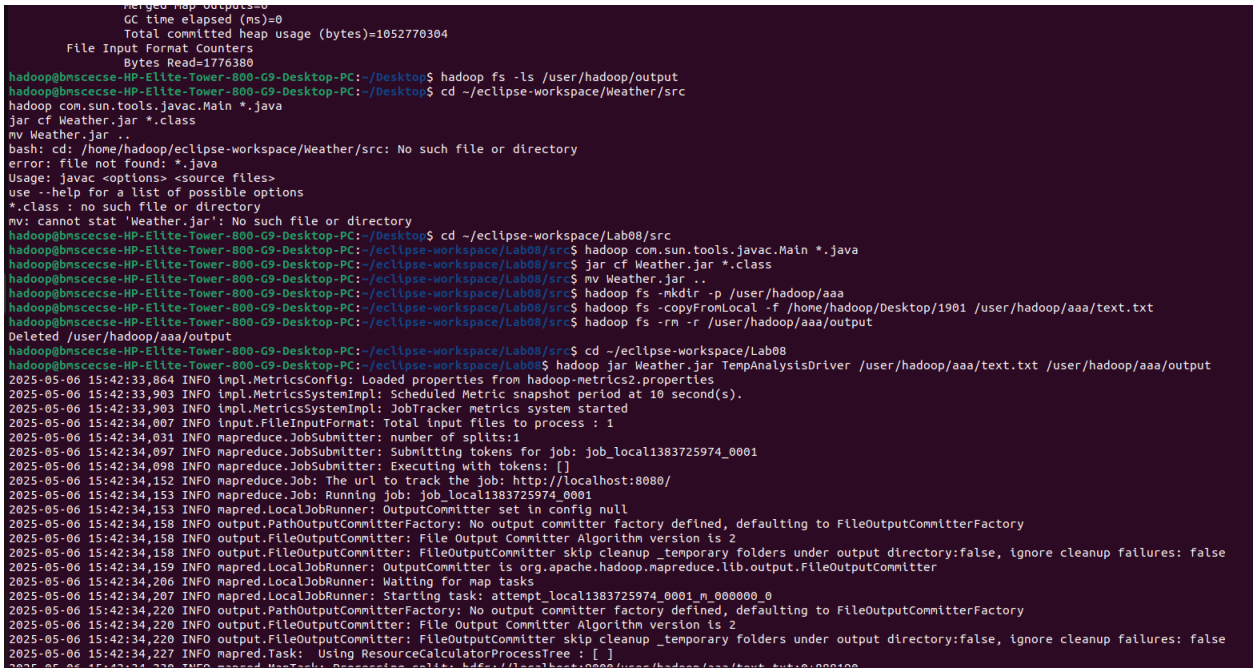
#MeanMaxReducer.java

```
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));
}
}
```

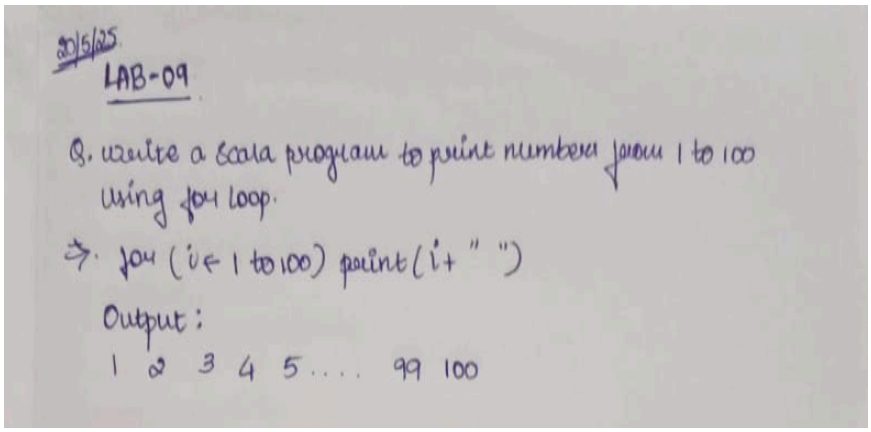
OUTPUT:


hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC: ~/eclipse-workspace/Lab08
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC: ~/Desktop
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC: ~/Desktop
hadoop@bmscecse-HP-Elite-Tower-800-G9-Deskto
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ cd /home/hadoop/eclipse-workspace/Weather/src
bash: cd: /home/hadoop/eclipse-workspace/Weather/src: No such file or directory
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -mkdir -p /user/hadoop/input
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -copyFromLocal -f /home/hadoop/Desktop/1901 /user/hadoop/input/data.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /user/hadoop/input
Found 3 items
-rw-r--r--   1 hadoop supergroup   888190 2025-05-06 15:11 /user/hadoop/input/1901
-rw-r--r--   1 hadoop supergroup   888190 2025-05-06 15:36 /user/hadoop/input/data.txt
-rw-r--r--   1 hadoop supergroup   90 2025-05-06 14:45 /user/hadoop/input/sample.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -rm -r /user/hadoop/output
Deleted /user/hadoop/output
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ cd /home/hadoop/eclipse-workspace/Weather
bash: cd: /home/hadoop/eclipse-workspace/Weather: No such file or directory
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ ^C
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop jar Weather.jar TempAnalysisDriver /user/hadoop/input /user/hadoop/output
JAR does not exist or is not a normal file: /home/hadoop/Desktop/Weather.jar
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop jar /home/hadoop/eclipse-workspace/Weather.jar TempAnalysisDriver /user/hadoop/input /user/hadoop/output
2025-05-06 15:37:33,018 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-06 15:37:33,054 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-06 15:37:33,054 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-06 15:37:33,178 INFO input.FileInputFormat: Total input files to process : 3
2025-05-06 15:37:33,187 INFO mapreduce.JobSubmitter: number of splits:3
2025-05-06 15:37:33,249 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local774182108_0001
2025-05-06 15:37:33,249 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-06 15:37:33,307 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-06 15:37:33,307 INFO mapreduce.Job: Running job: job_local774182108_0001
2025-05-06 15:37:33,308 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-06 15:37:33,311 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-06 15:37:33,312 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-06 15:37:33,312 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-06 15:37:33,312 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
2025-05-06 15:37:33,355 INFO mapred.LocalJobRunner: Waiting for map tasks
2025-05-06 15:37:33,355 INFO mapred.LocalJobRunner: Starting task: attempt_local774182108_0001_m_000000_0
2025-05-06 15:37:33,368 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-06 15:37:33,368 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-06 15:37:33,368 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-06 15:37:33,375 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]
2025-05-06 15:37:33,378 INFO mapred.MapTask: Processing split: hdfs://localhost:9000/user/hadoop/input/1901:0+888190
2025-05-06 15:37:33,411 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
2025-05-06 15:37:33,411 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
2025-05-06 15:37:33,411 INFO mapred.MapTask: soft limit at 83886080


GC time elapsed (ms)=0
Total committed heap usage (bytes)=1052770304
File Input Format Counters
Bytes Read=1776380
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ hadoop fs -ls /user/hadoop/output
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ cd ~/eclipse-workspace/Weather/src
hadoop com.sun.tools.javac.Main *.java
jar cf Weather.jar *.class
mv Weather.jar ..
bash: cd: /home/hadoop/eclipse-workspace/Weather/src: No such file or directory
error: file not found: *.java
Usage: javac <options> <source files>
use --help for a list of possible options
*.class : no such file or directory
mv: cannot stat 'Weather.jar': No such file or directory
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/Desktop$ cd ~/eclipse-workspace/Lab08/src
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ hadoop com.sun.tools.javac.Main *.java
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ jar cf Weather.jar *.class
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ mv Weather.jar ..
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ hadoop fs -mkdir -p /user/hadoop/aaa
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ hadoop fs -copyFromLocal -f /home/hadoop/Desktop/1901 /user/hadoop/aaa/text.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ hadoop fs -rm -r /user/hadoop/aaa/output
Deleted /user/hadoop/aaa/output
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08/src$ cd ~/eclipse-workspace/Lab08
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~/eclipse-workspace/Lab08$ hadoop jar Weather.jar TempAnalysisDriver /user/hadoop/aaa/text.txt /user/hadoop/aaa/output
2025-05-06 15:42:33,864 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-06 15:42:33,903 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-06 15:42:33,903 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-06 15:42:34,007 INFO input.FileInputFormat: Total input files to process : 1
2025-05-06 15:42:34,031 INFO mapreduce.JobSubmitter: number of splits:1
2025-05-06 15:42:34,097 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local1383725974_0001
2025-05-06 15:42:34,098 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-06 15:42:34,152 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-06 15:42:34,153 INFO mapreduce.Job: Running job: job_local1383725974_0001
2025-05-06 15:42:34,153 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-06 15:42:34,158 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-06 15:42:34,158 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-06 15:42:34,158 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-06 15:42:34,159 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
2025-05-06 15:42:34,206 INFO mapred.LocalJobRunner: Waiting for map tasks
2025-05-06 15:42:34,207 INFO mapred.LocalJobRunner: Starting task: attempt_local1383725974_0001_m_000000_0
2025-05-06 15:42:34,220 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-06 15:42:34,220 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-06 15:42:34,220 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-06 15:42:34,227 INFO mapred.Task: Using ResourceCalculatorProcessTree : [ ]

LAB 08:SCALA(PRINTING THE NUMBER)

OBSERVATION:



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LAB-09

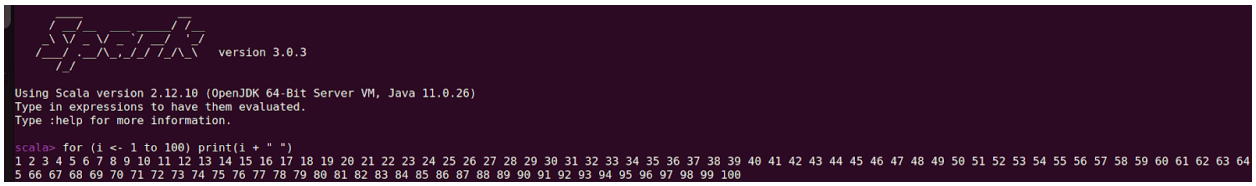
Q. write a Scala program to print numbers from 1 to 100 using for loop.

⇒. for (i ← 1 to 100) print(i+" ")

Output:

1 2 3 4 5 .... 99 100

OUTPUT:

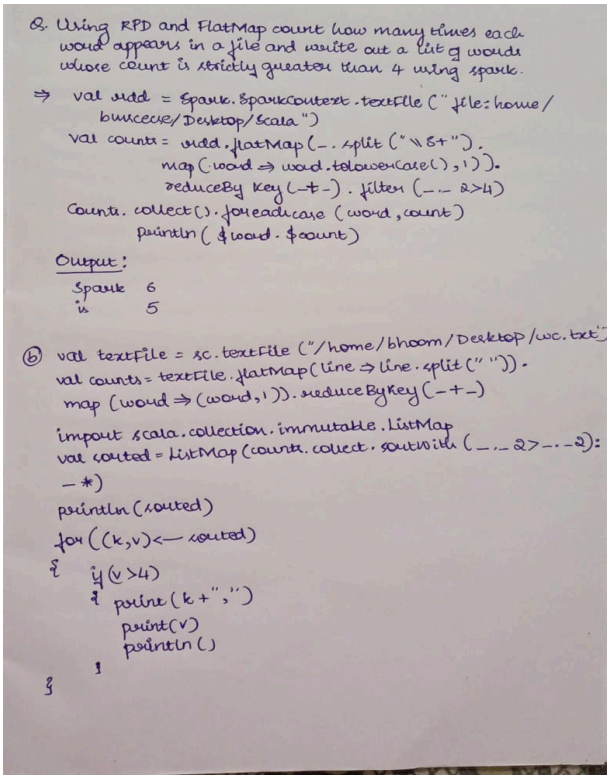


```
Using Scala version 2.12.10 (OpenJDK 64-Bit Server VM, Java 11.0.26)
Type in expressions to have them evaluated.
Type :help for more information.

scala> for (i <- 1 to 100) print(i + " ")
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
5 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
```

LAB 09:SCALA SPARK(RDD AND FLATMAP)

OBSERVATION:



8. 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.

```
⇒ val rdd = spark.sparkContext.textFile("file:home/
    bmscecse/Desktop/scala")
  val counts = rdd.flatMap(_.split("\\s+")).
          map(word => word.toLowerCase(),1)).
          reduceByKey(_+_).filter(_._2>4)
  Counts.collect().foreach(case (word,count)
          println($word.$count)
```

Output:

```
spark   6
in      5
```

```
⑥ val textFile = sc.textFile("/home/bhoom/Desktop/wc.txt")
  val counts = textFile.flatMap(line => line.split(" ")).
   map(word => (word,1)).reduceByKey(_+_)

  import scala.collection.immutable.ListMap
  val sorted = ListMap(counts.collect.sortWith(_._2>_._2):
  _*)
  println(sorted)
  for((k,v)<- sorted)
  {   if(v>4)
      { print(k+",")
        print(v)
        println()
      }
  }
```

OUTPUT:

```
bmscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ spark-shell
25/05/20 11:28:13 WARN Utils: Your hostname, bmscecse-HP-Elite-Tower-600-G9-Desktop-PC resolves to a loopback address: 127.0.1.1; using 10.124.3.80 instead (on interface eno1)
25/05/20 11:28:13 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.spark.unsafe.Platform (file:/opt/spark/jars/spark-unsafe_2.12-3.0.3.jar) to constructor java.nio.DirectByteBuffer(long,int)
WARNING: Please consider reporting this to the maintainers of org.apache.spark.unsafe.Platform
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
25/05/20 11:28:13 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
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://10.124.3.80:4040
Spark context available as 'sc' (master = local[*], app id = local-1747720695950).
Spark session available as 'spark'.
Welcome to
      ____              __
     / __/__  ___ _____/ /__
    _\ \/ _ \/ _ `/ __/  '_/
   /___/ .__/\_,_/_/ /_/\_\   version 3.0.3
      /_/

Using Scala version 2.12.10 (OpenJDK 64-Bit Server VM, Java 11.0.26)
Type in expressions to have them evaluated.
Type :help for more information.

scala> for (i <- 1 to 100) print(i + " ")
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 6
5 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
scala> val rdd = spark.sparkContext.textFile("file:/home/bmscecse/Desktop/scala")
rdd: org.apache.spark.rdd.RDD[String] = file:/home/bmscecse/Desktop/scala MapPartitionsRDD[1] at textFile at <console>:23

scala> val counts = rdd.flatMap(_.split("\\s+")).map(word => (word.toLowerCase, 1)).reduceByKey(_ + _).filter(_._2 > 4)
counts: org.apache.spark.rdd.RDD[(String, Int)] = MapPartitionsRDD[5] at filter at <console>:25

scala> counts.collect().foreach{ case (word, count) => println(s"$word $count") }
spark 6
```

```
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spark 6

scala>
```

LAB 10:

Write a simple streaming program in Spark to receive text data streams on a particular port, perform basic text cleaning (like white space removal, stop words removal, lemmatization, etc.), and print the cleaned text on the screen. (Open Ended Question).

```
# Install NLTK and download required data (run once)
!pip install nltk

import nltk
nltk.download('punkt')
nltk.download('stopwords')
nltk.download('wordnet')

from pyspark.sql import SparkSession
from pyspark.sql.functions import col, lower, regexp_replace, split, explode, udf
from pyspark.sql.types import ArrayType, StringType
from pyspark.ml.feature import StopWordsRemover
from nltk.stem import WordNetLemmatizer

# Initialize SparkSession
spark = SparkSession.builder.appName("TextProcessing").getOrCreate()

# Define your input lines
```

```
lines = [
    "Hello, I hate you.",
    "I hate that I love you.",
    "Don't want to, but I can't put",
    "nobody else above you."
]

# Create DataFrame from lines
df = spark.createDataFrame(lines, "string").toDF("value")

# Step 1: Lowercase and remove punctuation
df_clean = df.select(regexp_replace(lower(col("value")), "[^a-zA-Z\\s]", "").alias("cleaned"))

# Step 2: Tokenize the cleaned text
df_tokens = df_clean.select(split(col("cleaned"), "\\s+").alias("tokens"))

# Step 3: Remove stop words
remover = StopWordsRemover(inputCol="tokens", outputCol="filtered")
df_filtered = remover.transform(df_tokens)

# Step 4: Lemmatization using NLTK WordNetLemmatizer with UDF
lemmatizer = WordNetLemmatizer()
```

```
def lemmatize_words(words):
    return [lemmatizer.lemmatize(word) for word in words]

lemmatize_udf = udf(lemmatize_words, ArrayType(StringType()))

df_lemmatized = df_filtered.withColumn("lemmatized", lemmatize_udf(col("filtered")))

# Step 5: Explode the lemmatized words and show results
df_lemmatized.select(explode(col("lemmatized")).alias("word")).show(truncate=False)
```

```
Requirement already satisfied: nltk in /usr/local/lib/python3.11/dist-packages (3.9.1)
Requirement already satisfied: click in /usr/local/lib/python3.11/dist-packages (from nltk) (8.2.0)
Requirement already satisfied: joblib in /usr/local/lib/python3.11/dist-packages (from nltk) (1.5.0)
Requirement already satisfied: regex>=2021.8.3 in /usr/local/lib/python3.11/dist-packages (from nltk) (2024.11.6)
Requirement already satisfied: tqdm in /usr/local/lib/python3.11/dist-packages (from nltk) (4.67.1)
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
[nltk_data] Downloading package wordnet to /root/nltk_data...
+------+
|word  |
+------+
|hello |
|hate  |
|hate  |
|love  |
|dont  |
|want  |
|cant  |
|put   |
|nobody|
|else  |
+------+
```