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LAB REPORT
on
Big Data Analytics (23CS6PCBDA)

Submitted by:

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



B.M.S. COLLEGE OF ENGINEERING
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**B. M. S. College of Engineering,
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Department of Computer Science and Engineering



CERTIFICATE

This is to certify that the Lab work entitled "**Big Data Analytics**" carried out by **Preeti T korishettar(1BM22CS208)**, who is bonafide student of **B. M. S. College of Engineering**. It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2024. The Lab report has been approved as it satisfies the academic requirements in respect of **Big Data Analytics –(23CS6PCBDA)** work prescribed for the said degree.

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Github Link: [Preeti-T-Korishettar](#)

Course Outcomes

CO1: Apply the concepts of NoSQL, Hadoop, Spark for a given task

CO2: Analyse data analytic techniques for a given problem.

CO3: Conduct experiments using data analytics mechanisms for a given problem.

Program 1

MongoDB- CRUD Operations Demonstration (Practice and Self Study)

- Created a database named **myDB** and verified its existence.
- Created and dropped collections like **Student** and **Students**.
- Inserted student data into collections.
- Performed **upsert** to insert or update a student record.
- Used to find queries with various filters: by name, grade, hobbies, regex, etc.
- Retrieved specific fields while suppressing **_id**.
- Counted total documents and documents with specific criteria.
- Sorted records in ascending and descending order.
- Imported data from a CSV file and exported data to a CSV file.
- Used **save()** to insert or replace documents.
- Added, removed, and set fields to **null** in documents.
- Retrieved limited records and skipped initial entries.
- Created a **food** collection with arrays and queried arrays by value, index, size, etc.
- Updated specific elements in an array.
- Practiced query optimizations using **\$in**, **\$all**, **\$ne**, **\$regex**, **\$slice**, and more.

Observation:

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```
create Database
use myDB;
db; // to list all databases
show dbs;
CRUD
db.createCollection ("Student");
db.Student.drop();
db.Student.insert ({_id: 1, StudName: "Michelle Tawintha", Grade: "VII", Hobbies: "Dance"});
db.Student.update({_id: 3, StudName: "Aryan", grade: "VII"}, {$set: {Hobbies: "SK"}}, {upsert:true});
db.Student.find({StudName: "Aryan"});
db.Student.find({StudName: 1, Grade: 1, _id: 0});
db.Student.find({$grade: {$eq: 'VII'}}).pretty();
db.Student.find({$StudName: /"N/1/}).pretty();
db.Student.find({$StudName: /e/1/}).pretty();
db.Student.count();
```

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```
db.Student.find().sort({_StudName: 1}).pretty()
import data from a CSV file.
mongoimport --db mydb --collection Student
--type csv --headerline --file "C:/Admin/downloads/democsv";
import data to a CSV file
mongoreport --host localhost --db mydb
--collection Student --csv --out 'C:/Admin/documents/Year', "Quarter"
```

1. use yourDatabaseName;

// create and insert records.

```
db.customers.insertMany([  
    { cust_id: 1, Acc_Bal: 1500, Acc_Type: 'Z' },  
    { cust_id: 2, Acc_Bal: 500, Acc_Type: 'X' },  
    { cust_id: 3, Acc_Bal: 2000, Acc_Type: 'Z' },  
    { cust_id: 4, Acc_Bal: 3000, Acc_Type: 'Y' },  
    { cust_id: 5, Acc_Bal: 1200, Acc_Type: 'Z' }  
]);
```

// Query to display records where acc_bal is greater than 1500 & acc_type is 'Z'

```
db.customers.find({ Acc_Bal: { $gt: 1500 },  
                    Acc_Type: 'Z' })
```

// query to determine the min & max acc_bal for cust_id

```
db.customers.aggregate([  
    {  
        $group: {  
            _id: "$cust_id",  
            min_balance: { $min: "$Acc_Bal" },  
            max_balance: { $max: "$Acc_Bal" }  
        }  
    }  
]);
```

2 db.createCollection('Products');

```
db.Products.insertMany ([  
  { p-id: "123", name: "Sphona", category: "Ele",  
    price: 299.9, quantity: 50 },  
  { p-id: "67890", name: "Laptop", category:  
    "Ele", price: 899.9, quantity: 30 },  
  ...  
]);
```

db.createCollection('Users');

```
db.Users.insertMany ([  
  { user-id: "789ghi",  
    name: "John",  
    email: "abc@email.com",  
    cart: [  
      { p-id: "12345", quantity: 2 },  
      { p-id: "23456", quantity: 1 }  
    ],  
    orders: [  
      {  
        order-id: "order123",  
        o-date: ISODate("2023-03-01T00:00:00"),  
        products: [  
          { p-id: "12345", quantity: 1,  
            price: 299.99 },  
          { p-id: "23456", quantity: 2,  
            price: 49.9 }  
        ],  
        total-price: 399.9  
      }  
    ]  
  }  
]);
```

Mongodb Queries

db.Products.find({}); // Retrieve

db.Products.find({category: "Ele"});
// Retrieve from "Ele"

db.Products.find({quantity: {\$gt: 0}});
// Retrieve products quantity > 0.

db.Products.find({}).sort({price: 1});
// Retrieve in ascending order

db.Products.find({price: {\$lt: 100}});
// products with price < 100.

Aggregation Queries:

db.Users.aggregate([
 { \$match: {user_id: "789ghi"}},
 { \$unwind: "\$cart"},
 { \$lookup: {
 from: "Products",
 localField: "cart.p_id",
 foreignField: "p_id",
 as: "cart_items"}},
 {
 \$project: {
 "cart_items.name": 1,
 "cart_items.price": 1,
 "cart.quantity": 1}}])

```
db.Users.find({user_id : "123abc"}, {orders:1})  
// retrieve orders placed by user with  
id 123abc
```

```
db.Users.aggregate([  
{$match : {user_id : "123abc"}},  
{$unwind : "$orders"},  
{$group : {_id : "$user_id",  
total_spent : {$sum : "$order.total  
price"}}});
```

// Additional aggregation queries
// calculate the total price.

```
db.Products.aggregate([  
{$group : {_id : "$category", total_price  
: {$sum : 1}}});
```

```
db.Products.aggregate([  
{$group : {_id : null, average_price :  
{$avg : "$price"}}}]); // calculate average price.
```

```
db.Products.find({$quantity : {$lt : 10}});  
// to find products with quantity < 10
```

```
db.Products.find({}).sort({price : -1});  
// Sort products in descending order.
```

```
db.Orders.aggregate([  
{$group : {_id : "$user_id", total_spent  
: {$sum : "$total_price"}}}]);
```

6 // To find users with highest total price

```
db.orders.aggregate([
  { $group: { _id: "$user_id", total_spent:
    { $sum: "$total_price" } },
  { $sort: { total_spent: -1 } },
  { $limit: 1 }
]);
```

7 // To find the average total price of order

```
db.orders.aggregate([
  { $group: { _id: null, average_order_price:
    { $avg: "$total_price" } }
]);
```

8 // calculate Total No. of Products in each category

```
db.products.aggregate([
  { $group: { _id: "$category", total_prod:
    { $sum: 1 } }
});
```

Ans

Code with Output:

```
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ mongosh
Current Mongosh Log ID: 6833f9c9126af1945c47586f
Connecting to:      mongodb://127.0.0.1:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.0.1
Using MongoDB:     7.0.2
Using Mongosh:    2.0.1
mongosh 2.5.1 is available for download: https://www.mongodb.com/try/download/shell

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

-----
The server generated these startup warnings when booting
2025-05-26T10:46:48.806+05:30: Using the XFS filesystem is strongly recommended with the WiredTiger storage engine. See http://dochub.mongodb.org/core/prodnotes-filesystem
2025-05-26T10:46:50.937+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
MyDB
MyDB> show dbs
admin          40.00 KiB
config         72.00 KiB
local          80.00 KiB
myNewDatabase  72.00 KiB
MyDB> db.createCollection("Student");
{
  "ok": 1
}
MyDB> db.Student.insert({_id:1,Name:"Preeti",Grade:"V",Hobbies:"Dancing"},{_id:2,Name:"Prajwal",Grade:"V",Hobbies:"Drawing"});
DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.
{
  "acknowledged": true,
  "insertedIds": [
    "0"
  ]
}
MyDB> db.find();
{
  "_id": 1,
  "Name": "Preeti",
  "Grade": "V",
  "Hobbies": "Dancing"
}
MyDB> db.Student.insertMany({_id:2,Name:"Rachana",Grade:"V",Hobbies:"Painting"},{_id:3,Name:"Prajwal",Grade:"V",Hobbies:"Drawing"});
MongoInvalidArgumentError: Argument "docs" must be an array of documents
MyDB> db.Student.insertMany([
  {
    "_id": 2,
    "Name": "Rachana",
    "Grade": "V",
    "Hobbies": "Painting"
  },
  {
    "_id": 3,
    "Name": "Prajwal",
    "Grade": "V",
    "Hobbies": "Drawing"
  }
]);
{
  "acknowledged": true,
  "insertedIds": [
    "0",
    "1"
  ]
}
MyDB> db.Student.update({_id:2,Name:"Rachana",Grade:"V"},{$set:{Hobbies:"Singing"}},{upsert:true});
DeprecationWarning: Collection.update() is deprecated. Use updateOne, updateMany, or bulkWrite.
{
  "acknowledged": true,
  "insertedId": null,
  "matchedCount": 1,
  "modifiedCount": 1,
  "upsertedCount": 0
}
MyDB> db.Student.find();
[
  {
    "_id": 1,
    "Name": "Preeti",
    "Grade": "V",
    "Hobbies": "Dancing"
  },
  {
    "_id": 2,
    "Name": "Rachana",
    "Grade": "V",
    "Hobbies": "Singing"
  },
  {
    "_id": 3,
    "Name": "Prajwal",
    "Grade": "V",
    "Hobbies": "Drawing"
  }
]
```

```
{
  "_id": 1,
  "fruits": [
    "grapes",
    "banana",
    "apple"
  ],
  "_id": 2,
  "fruits": [
    "grapes",
    "mango",
    "cherry"
  ],
  "price": [
    {
      "grapes": 80,
      "mango": 100,
      "cherry": 200
    }
  ],
  "_id": 3,
  "fruits": [
    "banana",
    "mango"
  ]
}
MyDB> db.food.find().pretty();
[
  {
    "_id": 1,
    "fruits": [
      "grapes",
      "banana",
      "apple"
    ]
  },
  {
    "_id": 2,
    "fruits": [
      "grapes",
      "mango",
      "cherry"
    ],
    "price": [
      {
        "grapes": 80,
        "mango": 100,
        "cherry": 200
      }
    ]
  },
  {
    "_id": 3,
    "fruits": [
      "banana",
      "mango"
    ]
  }
]
MyDB> db.createCollection("customer");
{
  "ok": 1
}
MyDB> var val=[{custid:1,accbal:100,acctype:"A"},{custid:1,accbal:100,acctype:"B"},{custid:2,accbal:200,acctype:"B"}];
Uncaught:
SyntaxError: Unexpected token, expected "," (1:144)
> 1 | var val=[{custid:1,accbal:100,acctype:"A"},{custid:1,accbal:100,acctype:"B"},{custid:2,accbal:200,acctype:"B"}];
|   ^
2 |
MyDB> var val=[{custid:1,accbal:100,acctype:"A"},{custid:1,accbal:100,acctype:"B"},{custid:2,accbal:200,acctype:"B"}];
MyDB> db.customer.insert(val);
{
  "acknowledged": true,
  "insertedIds": [
    "0": ObjectId("683405cb126af1945c47587e"),
    "1": ObjectId("683405cb126af1945c47587f"),
    "2": ObjectId("683405cb126af1945c475872"),
    "3": ObjectId("683405cb126af1945c475873")
  ]
}
MyDB> db.customer.aggregate([{$group:{_id:'$custid',totalbal:{$sum:'$accbal'}}}]);
[ {_id: 1, totalbal: 200}, { _id: 2, totalbal: 400 } ]
MyDB> db.customers.aggregate( {$match:{AcctType:"S"}},{$group : { _id : "$custID",TotAccBal :
Uncaught:
SyntaxError: Unexpected character "'". (1:43)
> 1 | db.customers.aggregate( {$match:{AcctType:"S"}},{$group : { _id : "$custID",TotAccBal :
```

```

[ { _id: 1, fruits: [ 'grapes', 'banana', 'apple' ] },
  {
    _id: 2,
    fruits: [ 'grapes', 'mango', 'cherry' ],
    price: [ { grapes: 80, mango: 100, cherry: 200 } ]
  },
  { _id: 3, fruits: [ 'banana', 'mango' ] }
]
MyDB> db.food.find().pretty();
[
  { _id: 1, fruits: [ 'grapes', 'banana', 'apple' ] },
  {
    _id: 2,
    fruits: [ 'grapes', 'mango', 'cherry' ],
    price: [ { grapes: 80, mango: 100, cherry: 200 } ]
  },
  { _id: 3, fruits: [ 'banana', 'mango' ] }
]
MyDB> db.createCollection("customer");
{ ok: 1 }
MyDB> var val=[{custid:1,accbal:100,acctype:"A"},{custid:1,accbal:100,acctype:"B"},{custid:2,accbal:200,acctype:"B"}];
Uncaught:
SyntaxError: Unexpected token, expected "," (1:144)

> 1 | var val=[{custid:1,accbal:100,acctype:"A"},{custid:1,accbal:100,acctype:"B"},{custid:2,accbal:200,acctype:"B"}];
|   ^
2 |

MyDB> var val=[{custid:1,accbal:100,acctype:"A"},{custid:1,accbal:100,acctype:"B"},{custid:2,accbal:200,acctype:"B"}];

MyDB> db.customer.insert(val);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId("683405cb126af1945c475870"),
    '1': ObjectId("683405cb126af1945c475871"),
    '2': ObjectId("683405cb126af1945c475872"),
    '3': ObjectId("683405cb126af1945c475873")
  }
}
MyDB> db.customer.aggregate({$group:{_id:'$custid',totalbal:{$sum:'$accbal'}}});
[ { _id: 1, totalbal: 200 }, { _id: 2, totalbal: 400 } ]
MyDB> db.Customers.aggregate ( {$match:{AcctType:"S"}},{$group : { _id : "$custID",TotAccBal :
Uncaught:
SyntaxError: Unexpected character '''. (1:43)

> 1 | db.Customers.aggregate ( {$match:{AcctType:"S"}},{$group : { _id : "$custID",TotAccBal :

```

```

MyDB> db.customer.aggregate({$match:{acctype:"A"}},{$group:{_id:"$custid",totalbal:{$sum:'$accbal'}}});
[ { _id: 1, totalbal: 100 }, { _id: 2, totalbal: 200 } ]
MyDB> db.customer.aggregate({$match:{acctype:"A"}},{$group:{_id:"$custid",totalbal:{$sum:'$accbal'}}},{$mat$}

MyDB> db.customer.aggregate({$match:{acctype:"A"}},{$group:{_id:"$custid",totalbal:{$sum:'$accbal'}}},{$match$}

MyDB> db.customer.aggregate({$match:{acctype:"A"}},{$group:{_id:"$custid",totalbal:{$sum:'$accbal'}}},{$match$}
[ { _id: 2, totalbal: 200 } ]
MyDB> S

```

Program 2

Perform the following DB operations using Cassandra.

a) Create a keyspace by name Employee

b) Create a column family by name

Employee-Info with attributes Emp_Id Primary Key, Emp_Name, Designation, Date_of_Joining, Salary, Dept_Name

c) Insert the values into the table in batch

d) Update Employee name and Department of Emp-Id 121

e) Sort the details of Employee records based on salary

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

g) Update the altered table to add project names.

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

Observation:

1/04/25
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Create keyspace:

> Create Keyspace students with replication = { 'class': 'SimpleStrategy', 'replication_factor': 3};

Describe Keyspaces:

Select * from system_schema.keyspaces;

Use students;

Create table students_info (Roll-No int primary key, studname text, dob timestamp, last_exam_prc double);

Describe tables;

Describe tables > student_info;

> CRUD

Begin batch

Insert into students_info (Roll-no, studname, dob, last_exam_prc) values (1, 'Arha', '2022-03-12', 79.9)

Insert into students_info (Roll-no, studname, dob, last_exam_prc) values (2, 'Karan', '2022-03-12', 89.9)

Insert into students_info (Roll-no, studname, dob, last_exam_prc) values (3, 'Tarun', '2022-03-12', 78.9)

Apply Batch;

Select * From students_info;

roll_no	dob	last_exam_perc	studname
1	2012-03-12	79.7	asha
2	2012-03-12	89.7	Kiran
3	2012-03-12	78.9	Tarun

Select * from students_info where roll_no in(1,2);

Select * from students_info where studname='asha';

Create index on students_info (studname);

Select roll_no , studname from students_info limit 2;

Select roll_no as "USN" from students_info;

USN

1

2

3

~~update students_info set studname = 'David'~~
~~where Roll_no = 2;~~

Delete last_exam_perc from students_info
where Roll_no = 2;

Alter table students_info add hobby set <feats>

update students_info
set hobby = hobby + { 'chess', 'tennis' }
where Roll_no = 1;

create table library (counter_value =
counter_value + 1 where book_name = 'BDA'
and studname = 'jact');

create table user_login (id int primary key,
pass text);

Insert into userlogin (id , pass) values
(1 , 'infy') using FILE 30 ;

Select TTL (pass) from userlogin where
user id = 1 ;

Output :-

TTL (pass)

28

Roll-no	dob	hobby	language	last_exam_per
1	2012-03-11	{ 'chess'	null	99.9
		77' }		

studname
arha

AR
11ATIS

Code with Output:

```
...  
cqlsh> CREATE KEYSPACE Student WITH REPLICATION= {'class':'SimpleStrategy','replication_factor':1};  
cqlsh> describe keyspaces;  
'keyspaces' not found in keyspaces  
cqlsh> describe keyspaces;  
  
student      system      system_distributed  system_traces  system_virtual_schema  
students     system_auth   system_schema       system_views  
  
cqlsh> use students;  
cqlsh:students> create table st_info(rollno int primary key,name text,doj timestamp,percent double);  
cqlsh:students> describe tables;  
  
library_book  st_info  students_info  userlogin  
  
cqlsh:students> describe table<st_info>;  
Improper describe command.  
cqlsh:students> describe table st_info;  
  
CREATE TABLE students.st_info (  
    rollno int PRIMARY KEY,  
    DOJ timestamp,  
    name text,  
    percent double  
) WITH additional_write_policy = '99p'  
    AND bloom_filter_fp_chance = 0.01  
    AND caching = {'keys': 'ALL', 'rows_per_partition': 'NONE'}  
    AND cdc = false  
    AND comment = ''  
    AND compaction = {'class': 'org.apache.cassandra.db.compaction.SizeTieredCompactionStrategy', 'max_threshold': '32', 'min_threshold': '4'}  
    AND compression = {'chunk_length_in_kb': '16', 'class': 'org.apache.cassandra.io.compress.LZ4Compressor'}  
    AND memtable = 'default'  
    AND crc_check_chance = 1.0  
    AND default_time_to_live = 0  
    AND extensions = {}  
    AND gc_grace_seconds = 864000  
    AND max_index_interval = 2048  
    AND memtable_flush_period_in_ms = 0  
    AND min_index_interval = 128  
    AND read_repair = 'BLOCKING'  
    AND speculative_retry = '99p';  
cqlsh:students> begin batch  
    ... insert into st_info(rollno,name,doj,percent)
```

```

cqlsh:students> select * from st_info;
rollno | doj | name | percent
-----+-----+-----+
 1 | 2010-02-28 18:30:00.000000+0000 | preeti | 90
 2 | 2010-03-19 18:30:00.000000+0000 | prajwal | 89
 4 | 2010-04-22 18:30:00.000000+0000 | rachana | 90

(3 rows)
cqlsh:students> select * from st_info where rollno in(1,2);
rollno | doj | name | percent
-----+-----+-----+
 1 | 2010-02-28 18:30:00.000000+0000 | preeti | 90
 2 | 2010-03-19 18:30:00.000000+0000 | prajwal | 89

(2 rows)
cqlsh:students> select * from st_info where name="preeti";
SyntaxException: line 1:42 no viable alternative at input ';' (*.* from st_info where name=["preet]i")
cqlsh:students> create index on st_info(name);
cqlsh:students> select * from st_info where name="preeti";
SyntaxException: line 1:42 no viable alternative at input ';' (*.* from st_info where name=["preet]i")
cqlsh:students> select * from st_info where name='preeti';

rollno | doj | name | percent
-----+-----+-----+
 1 | 2010-02-28 18:30:00.000000+0000 | preeti | 90

(1 rows)
cqlsh:students> select rollno,name,percent from st_info limit 2;

rollno | name | percent
-----+-----+-----+
 1 | preeti | 90
 2 | prajwal | 89

(2 rows)
cqlsh:students> slect rollno as usn from st_info;
SyntaxException: line 1:0 no viable alternative at input 'slect' ([slect]...)
cqlsh:students> select rollno as usn from st_info;

usn
-----
 1
 2
 4

(3 rows)
cqlsh:students> create table library(c_val counter,book_name varchar,stud_name varchar,primary key(book_name,stud_name));
cqlsh:students> update library set c_val=c_val+1 where book_name='BDA' and stud_name='preeti';
cqlsh:students> create table userlogin(id int primary key,pass text);
AlreadyExists: Table 'students.userlogin' already exists
cqlsh:students> create table login(id int primary key,pass text);
cqlsh:students> insert into login(id,pass) values(1,'infy')using ttl 30;
cqlsh:students> select ttl(pass) from login where id=1;

ttl(pass)
-----
 3

```

Program 3

Perform the following DB operations using Cassandra.

- a) Create a keyspace by name Library
- b) 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
- c) Insert the values into the table in batch
- d) Display the details of the table created and increase the value of the counter
- e) Write a query to show that a student with id 112 has taken a book "BDA" 2 times.
- f) Export the created column to a csv file
- g) Import a given csv dataset from local file system into Cassandra column family

Observation:

LAB-03 | Cassandra Merge | PAGE NO :
DATE : 21/04/25

cqlsh

cqlsh > use Library;

cqlsh : library > create table library_info
(Stud_Id int , Stud_Name text ,
Book_name text , Date_of_Issue
date , Primary key (Stud_Id , Book_Id));

cqlsh : library > create table Book_Counter
(Stud_Id int , Book_Name text ,
Counter_value counter , primary
key (Stud_Id , Book_name));

cqlsh : library > begin batch
... insert into library_info (Stud_Id ,
stud_Name , Book_name , Book_Id , D-0-7)
values (112 , 'alice' , 'bda' , 'b101' , '08-09-
2025);
... apply batch;

cqlsh : library > select * from library_info;

cqlsh : library > ~~as~~

stud_Id	book_id	book_name	D-0-7	stud
113	b102	ads	2025-04-29	b103
112	b101	bda	2025-04-01	alice

cqlsh : library > update Book_Counter set
Counter_value = Counter_value + 1 where
Stud_Id = 112 and Book_name = 'bda';

stud_id	book_id	book_name	date_of_issue	stud_name
113	b102	ads	2023-04-07	bob
112	b101	ada	2023-04-07	alice

cqlsh : library > select * from Book_Counter;

stud_id	book_name	counter_value
113	ads	1
112	ada	3

cqlsh : library > cqlsh -c "Copy library.Library_Info To 'library_info.csv' with header = TRUE;"

cqlsh : library > select * from Library_info;

stud_id	book_id	book_name	date_of_issue	st_name
114	B103	ML	2024-04-03	John
117	B106	A I	2024-04-04	Maria
120	B104	Cloud	2024-04-06	Ajith
123	B105	Bigdata	2024-04-07	Vikram
118	B103	ML	2024-04-05	Amit.

SP-20
SP-20

Code with Output:

```
hadoop@bmseccse-HP-Elite-Tower-600-G9-Desktop-PC:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.8 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> create keyspace library with replication={'class':'SimpleStrategy','replication_factor':1};
ConfigurationException: Unable to find replication strategy class 'org.apache.cassandra.locator.SimpleStrategy'
cqlsh> create keyspace library with replication={'class':'SimpleStrategy','replication_factor':1};exit
ConfigurationException: Unable to find replication strategy class 'org.apache.cassandra.locator.SimpleStrategy'
hadoop@bmseccse-HP-Elite-Tower-600-G9-Desktop-PC:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.8 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> create keyspace library with replication={'class':'SimpleStrategy','replication_factor':1};exit
hadoop@bmseccse-HP-Elite-Tower-600-G9-Desktop-PC:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.8 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> create keyspace library with replication={'class':'SimpleStrategy','replication_factor':1};
AlreadyExists: Keyspace 'library' already exists
cqlsh> exit
hadoop@bmseccse-HP-Elite-Tower-600-G9-Desktop-PC:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.8 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> create keyspace libraries with replication={'class':'SimpleStrategy','replication_factor':1};
cqlsh> keyspaces
...
cqlsh> describe keyspaces;

libraries  students      system_distributed  system_views
library    system       system_schema        system_virtual_schema
student   system_auth  system_traces

cqlsh> use libraries;
cqlsh:libraries> create table l_info(sid int primary key, sname varchar,bname varchar,bid int,doi timestamp);
InvalidRequest: Error from server: code=2200 [Invalid query] message="Cannot mix counter and non counter columns in the same table"
cqlsh:libraries> create table l_info(sid int primary key, sname varchar,bname varchar,bid int,doi timestamp);
cqlsh:libraries> create table count(sid int primary key,c_val counter);
cqlsh:libraries> begin batch
... insert into l_info(sid,sname,bname,bid,doi)
... values(112,'alice','bda',1,'2020-03-03')
... insert into l_info(sid,sname,bname,bid,doi)
... values(113,'preeti','cn',2,'2020-03-04')
... apply batch;
cqlsh:libraries> update l_info
```

```
```
cqlsh:libraries> select * from l_info;

 sid | bid | bname | doi | sname
-----+-----+-----+-----+-----+
 113 | 2 | cn | 2020-03-03 18:30:00.000000+0000 | preeti
 112 | 1 | bda | 2020-03-02 18:30:00.000000+0000 | alice

(2 rows)
cqlsh:libraries> select * from count;

 sid | c_val
-----+-----
 112 | 1

(1 rows)
cqlsh:libraries>
```

## Program 4

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

Observation:

| LAB-06       |                                                                                                      | PAGE NO :<br>DATE : 15 / 04 / 23 |
|--------------|------------------------------------------------------------------------------------------------------|----------------------------------|
| Hadoop Usage |                                                                                                      |                                  |
| #            | \$ start-all.sh                                                                                      |                                  |
| root>        | \$ hdfs dfs -mkdir /demo208                                                                          |                                  |
| ls >         | \$ hadoop fs -ls /<br>Found 1 items<br>drwxr-xr-x - hadoop supergroup 0 2023-04-15<br>15:00 /demo208 |                                  |
| root>        | \$ hdfs dfs -cat -put /home/hadoop/Documents/<br>/demo.txt /demo208/file.txt                         |                                  |
| #            | \$ hdfs dfs -cat /demo208/file.txt<br>This is the demo for the usage of put<br>method in hadoop      |                                  |
| pyform       | real                                                                                                 |                                  |
| root>        | \$ hdfs dfs -copyFromLocal /home/hadoop/<br>Documents/demo.txt /demo208/file-cp.txt                  |                                  |
| #            | \$ hdfs dfs -cat /demo208/file-cp.txt<br>This is the demo for the usage of get<br>method in hadoop   |                                  |
| #            | \$ hdfs dfs -get /demo208/file.txt<br>/home/hadoop/Documents/demo.txt                                |                                  |
|              | ⇒ File exists.                                                                                       |                                  |

gfmERGE> \$ hdfs dfs -getmerge /demo208/file.txt  
/demo208/file-cp.txt /home/hadoop/  
Documents/demo.txt

gfmFACT> \$ hadoop fs -getfacl /demo208/  
# file : /demo208  
# owner : hadoop  
# group : supergroup  
user :: nnnn  
group :: n -x  
other :: n -x

copyToLocal> \$ hdfs dfs dfs -copyToLocal /demo208/file.txt  
/home/hadoop/Documents

move> \$ hadoop fs -mr /demo208/labc

ls> \$ hadoop fs -ls /labs

Found 2 items

-rw-r--r-- 1 hadoop supergroup 55 /lab/file1  
-rw-r--r-- 1 hadoop supergroup 55 /lab/file2

Study  
notes

## Code with Output:

```
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ 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-600-G9-Desktop-PC]
Starting resourcemanager
Starting nodemanagers
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -mkdir /bda_hadoop
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -ls /
Found 4 items
drwxr-xr-x - hadoop supergroup 0 2025-04-15 15:07 /abc
drwxr-xr-x - hadoop supergroup 0 2025-05-26 14:13 /bda_hadoop
drwxr-xr-x - hadoop supergroup 0 2025-05-22 16:32 /pqr
drwxr-xr-x - hadoop supergroup 0 2025-05-20 16:36 /rgs
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -put /home/hadoop/sample.txt /bda_hadoop/file.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyFromLocal /home/hadoop/sample.txt /bda_hadoop/local.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -cat /bda_hadoop/file.txt
hi how are you
how is your job
how is your family
how is your brother
how is your sister
eof
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -get /bda_hadoop/file.txt /home/hadoop/sample.txt
get: `/home/hadoop/sample.txt': File exists
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -get /bda_hadoop/file.txt /home/hadoop/get.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop fs -getfacl /bda_hadoop/
file: /bda_hadoop
owner: hadoop
group: supergroup
user::rwx
group::r-x
other::r-x

hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyToLocal /bda_hadoop/file.txt /home/hadoop/tolocal.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop fs -cp /bda_hadoop /abc
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop fs -ls /abc
Found 3 items
drwxr-xr-x - hadoop supergroup 0 2025-05-26 14:28 /abc/bda_hadoop
-rw-r--r-- 1 hadoop supergroup 55 2025-04-15 15:05 /abc/file.txt
-rw-r--r-- 1 hadoop supergroup 55 2025-04-15 15:07 /abc/file_cp_.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$
```

## Program 5

### Implement Wordcount program on Hadoop framework

#### Observation:

LAB - 05      wordCount Hadoop

WCDriver

```
package wordcount;
import java.io.IOException;
public class WCDriver extends Configured
 implements Tool {
 public int run(String args[]) throws
 IOException {
 if (args.length < 2)
 System.out.println("give inputs");
 return 1;
 }
 JobConf conf = new JobConf(WCDriver.class);
 FileInputFormat.setInputPaths
 (conf, new Path
 (args[1]));
 conf.setMapperClass(WCMapper.class);
 conf.setReducerClass(WCReducer.class);
 conf.setOutputKeyClass(Text.class);
 conf.setOutputValueClass(IntWritable.class);
 JobClient.runJob(conf);
 return 0;
}
```

## WCMapper.java

```
import java.io.IOException;
```

```
public class WCMapper extends MapReduceBase
implements Mapper<LongWritable, Text, IntWritable,
OutputCollector, Reporter> throws IOException
```

```
{ String line = value.toString();
```

```
for (String word : line.split(" ")){
```

```
if (word.length() > 0)
```

```
output.collect(new Text(word));
```

## WCReducer.java

```
package wordcount;
```

```
import java.io.IOException;
```

```
public class WCReducer extends MapReduceBase
implements Reducer<Text, IntWritable,>
```

```
public void reduce(Text key, Iterator<IntWritable> values,
OutputCollector<Text, IntWritable> output){
```

```
int count = 0;
```

```
while (value.hasNext())
{
 IntWritable i = value.next();
 count += i.get();
}
output.collect(key, new IntWritable(count));
}
```

output: word count  
  
are 1  
brother 1  
cog 1  
family 1  
hit -1  
how 1  
is 4  
job 1  
sister 1  
you 1  
you 4

## Code with Output:

```
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ 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]
localhost: namenode is running as process 12082. Stop it first and ensure /tmp/hadoop-hadoop-namenode.pid file is empty before retry.
Starting datanodes
localhost: datanode is running as process 12255. Stop it first and ensure /tmp/hadoop-hadoop-datanode.pid file is empty before retry.
Starting secondary namenodes [bmscse-HP-Elite-Tower-600-G9-Desktop-PC]
bmscse-HP-Elite-Tower-600-G9-Desktop-PC: secondarynamenode is running as process 12557. Stop it first and ensure /tmp/hadoop-hadoop-secondarnamenode.pid file is empty before retry.
Starting resourcemanager
resourcemanager is running as process 12845. Stop it first and ensure /tmp/hadoop-hadoop-resourcemanager.pid file is empty before retry.
Starting nodemanagers
localhost: nodemanager is running as process 13014. Stop it first and ensure /tmp/hadoop-hadoop-nodemanager.pid file is empty before retry.
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ jps
12082 NameNode
13014 NodeManager
15100 org.eclipse.equinox.launcher_1.6.1000.v20250227-1734.jar
17036 Jps
12845 ResourceManager
12557 SecondaryNameNode
12255 DataNode
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyFromLocal /home/hadoop/sample.txt /bda_hadoop/input.txt
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop jar /home/hadoop/Desktop/hdpwordcount.jar WCDriver /bda_hadoop/input.txt /bda_hadoop/output
Exception in thread "main" java.lang.ClassNotFoundException: WCDriver
 at java.base/java.net.URLClassLoader.findClass(URLClassLoader.java:476)
 at java.base/java.lang.ClassLoader.loadClass(ClassLoader.java:594)
 at java.base/java.lang.Class.forName(ClassLoader.java:527)
 at java.base/java.lang.Class.forName0(Native Method)
 at java.base/java.lang.Class.forName(Class.java:398)
 at org.apache.hadoop.util.RunJar.run(RunJar.java:321)
 at org.apache.hadoop.util.RunJar.main(RunJar.java:241)
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop jar /home/hadoop/Desktop/hdpwordcount.jar hdpwordcount.WCDriver /bda_hadoop/input.txt /bda_hadoop/output
2025-05-26 14:40:01,404 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-26 14:40:01,440 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-26 14:40:01,440 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-26 14:40:01,446 WARN impl.MetricsSystemImpl: JobTracker metrics system already initialized!
2025-05-26 14:40:01,501 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2025-05-26 14:40:01,545 INFO mapred.FileInputFormat: Total input files to process : 1
2025-05-26 14:40:01,567 INFO mapreduce.JobSubmitter: number of splits:1
2025-05-26 14:40:01,624 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local276129153_0001
2025-05-26 14:40:01,624 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-26 14:40:01,677 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-26 14:40:01,679 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-26 14:40:01,679 INFO mapreduce.Job: Running job: job_local276129153_0001
2025-05-26 14:40:01,680 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapred.FileOutputCommitter
2025-05-26 14:40:01,682 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:40:01,682 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore
```

```
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -ls /bda_hadoop/output
Found 2 items
-rw-r--r-- 1 hadoop supergroup 0 2025-05-26 14:40 /bda_hadoop/output/_SUCCESS
-rw-r--r-- 1 hadoop supergroup 75 2025-05-26 14:40 /bda_hadoop/output/part-00000
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -cat /bda_hadoop/output/part-00000
are 1
brother 1
eof 1
family 1
hi 1
how 5
is 4
job 1
sister 1
you 1
your 4
hadoop@bmscse-HP-Elite-Tower-600-G9-Desktop-PC:~$
```

## Program 6

From the following link extract the weather data

<https://github.com/tomwhite/hadoop-book/tree/master/input/ncdc/all>

- Create a MapReduce program to find average temperature for each year from the NCDC data set.
- find the mean max temperature for every month

Observation:

LAB 06 Find Average Temperature

```
AVDriver.java
package WAverag;
import org.apache.hadoop.fs.Path;
public class AVDriver
{
 public static void main (String[] args)
 {
 if (args.length != 2)
 System.out.println ("Enter");
 System.exit (-1);
 job.setJarByClass (AVDriver.class);
 job.setJobName ('Max temperature');
 FileInputFormat.addInputPath (
 job, new Path (args[0]));
 FileOutputFormat.setOutputPath (
 job, new Path (args[1]));
 job.setOutputKeyClass (Text.class);
 job.setOutputValueClass (IntWritable.class);
 }
}
```

## AVMapper.java

```
package HAvorage;
```

```
import java.io.IOException;
```

```
public class AVMapper extends Mapper<
 LongWritable, Text, IntWritable>
```

```
{
 public static final int MAPPING = 9999;
```

```
 public void map(LongWritable key,
 Text value)
```

```
 {
 int temp;
```

```
 String line = value.toString();
```

```
 String year = line.substring(15, 19);
```

```
 if (line.charAt(82) == '+')
```

```
 temp = Integer.parseInt(line.substring
(88, 92));
```

```
 String quality = line.substring(92, 93);
```

```
 if (temp >= 9999 && quality.matches
 ("014592"))
```

```
 context.write(new Text(year), new
 IntWritable(temp));
```

```
}
```

## AVReducer.java

```
package WAverage;
```

```
import java.io.IOException;
```

```
public class AVReducer extends Reducer<Text, IntWritable, Text> {
```

```
{
```

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

```
 Text, IntWritable> content) throws IOException {
```

```
 int sum = 0;
```

```
 int count = 0;
```

```
 for (IntWritable value : values)
```

```
 sum += value.get();
```

```
 }
 count++;
```

```
 content.write(key, new IntWritable
```

```
 (sum / count));
```

```
endput:
```

```
19.01 146
```

MNMapper.java

package mean;

import java.io.IOException;

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

{  
    public static final int miss = 9999;

    public void map(LongWritable key,  
        Text value, Mapper<LongWritable,  
        Text, Text> >

        int temp;

        String line = value.toString();

        String month = line.substring(19, 21);

        if (line.charAt(27) == '1')

            temp = Integer.parseInt(line.substring(88, 92));

        String q = line.substring(92, 93);

        if (temp != miss)

            write(new Text(month));

}

}

MNReducer.java

package main;

import java.io.IOException;

public class MNReducer extends Reducer

public void reduce(Text key, Iterable<IntWritable>

int max = Int. min.

int totalTemp = 0;

int count = 0;

int days = 0;

for (IntW val : vals)

if t = val.get();

if (t > max)

max = temp;

c++

if (c == 3)

st. = max;

mem = Int. min

c = 0

d++;

}

## Code with Output:

### a) Average temperature

```
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ jps
12082 NameNode
17908 Jps
13014 NodeManager
15100 org.eclipse.equinox.launcher_1.6.1000.v20250227-1734.jar
12845 ResourceManager
12557 SecondaryNameNode
12255 DataNode
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyFromLocal /home/hadoop/Downloads/1901 /bda_hadoop/avinput.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop jar /home/hadoop/Desktop/WeatherAverage.jar WeatherAverage.AVDriver /bda_h
adoop/avinput.txt /bda_hadoop/avoutput
2025-05-26 14:49:09,290 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-26 14:49:09,327 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-26 14:49:09,327 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-26 14:49:09,380 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2025-05-26 14:49:09,427 INFO input.FileInputFormat: Total input files to process : 1
2025-05-26 14:49:09,452 INFO mapreduce.JobSubmitter: number of splits:1
2025-05-26 14:49:09,510 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local1313646497_0001
2025-05-26 14:49:09,510 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-26 14:49:09,566 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-26 14:49:09,566 INFO mapreduce.Job: Running job: job_local1313646497_0001
2025-05-26 14:49:09,567 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-26 14:49:09,570 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitte
rFactory
2025-05-26 14:49:09,571 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:49:09,571 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:f
alse, ignore cleanup failures: false
2025-05-26 14:49:09,571 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
2025-05-26 14:49:09,620 INFO mapred.LocalJobRunner: Waiting for map tasks
2025-05-26 14:49:09,620 INFO mapred.LocalJobRunner: Starting task: attempt_local1313646497_0001_m_000000_0
2025-05-26 14:49:09,629 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitte
rFactory
2025-05-26 14:49:09,629 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:49:09,629 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:f
alse, ignore cleanup failures: false
2025-05-26 14:49:09,635 INFO mapred.Task: Using ResourceCalculatorProcessTree : []
2025-05-26 14:49:09,637 INFO mapred.MapTask: Processing split: hdfs://localhost:9000/bda_hadoop/avinput.txt:0+888190
2025-05-26 14:49:09,666 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
2025-05-26 14:49:09,666 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
2025-05-26 14:49:09,666 INFO mapred.MapTask: soft limit at 83886080
2025-05-26 14:49:09,666 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
2025-05-26 14:49:09,666 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
2025-05-26 14:49:09,668 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer
2025-05-26 14:49:09,730 INFO mapred.LocalJobRunner:
2025-05-26 14:49:09,731 INFO mapred.MapTask: Starting flush of map output
2025-05-26 14:49:09,731 INFO mapred.MapTask: Spilling map output
2025-05-26 14:49:09,731 INFO mapred.MapTask: bufstart = 0; bufend = 59076; bufvoid = 104857600
2025-05-26 14:49:09,731 INFO mapred.MapTask: kvstart = 26214396(104857584); kvend = 26188144(104752576); length = 26253/6553600
2025-05-26 14:49:09,739 INFO mapred.MapTask: Finished spill 0
2025-05-26 14:49:09,743 INFO mapred.Task: Task:attempt_local1313646497_0001_m_000000_0 is done. And is in the process of committing
2025-05-26 14:49:09,745 INFO mapred.LocalJobRunner: map
```

```
Merged map outputs=1
GC time elapsed (ms)=0
Total committed heap usage (bytes)=1052770304
Shuffle Errors
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
File Input Format Counters
 Bytes Read=888190
File Output Format Counters
 Bytes Written=8
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -ls /bda_hadoop/avoutput
Found 2 items
-rw-r--r-- 1 hadoop supergroup 0 2025-05-26 14:49 /bda_hadoop/avoutput/_SUCCESS
-rw-r--r-- 1 hadoop supergroup 8 2025-05-26 14:49 /bda_hadoop/avoutput/part-r-00000
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -cat /bda_hadoop/avoutput/part-r-00000
1901 46
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$
```

## b) Maximum temperature

```
hadoop@bmscsecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ jps
18721 Jps
12082 NameNode
13014 NodeManager
15100 org.eclipse.equinox.launcher_1.6.1000.v20250227-1734.jar
12845 ResourceManager
12557 SecondaryNameNode
12255 DataNode
hadoop@bmscsecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyFromLocal /home/hadoop/Downloads/1901 /bda_hadoop/minput.txt
hadoop@bmscsecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop jar /home/hadoop/Desktop/meanTemp.jar Mean.MNDRiver /bda_hadoop/minput.txt /bda_hadoop/moutput
2025-05-26 14:54:41,993 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-26 14:54:42,029 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-26 14:54:42,029 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-26 14:54:42,083 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. I implement the Tool interface and execute your application with ToolRunner to remedy this.
2025-05-26 14:54:42,131 INFO input.FileInputFormat: Total input files to process : 1
2025-05-26 14:54:42,158 INFO mapreduce.JobSubmitter: number of splits:1
2025-05-26 14:54:42,216 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local862196817_0001
2025-05-26 14:54:42,216 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-26 14:54:42,272 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-26 14:54:42,273 INFO mapreduce.Job: Running job: job_local862196817_0001
2025-05-26 14:54:42,273 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-26 14:54:42,276 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-26 14:54:42,277 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:54:42,277 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-26 14:54:42,277 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.FileOutputCommitter
2025-05-26 14:54:42,319 INFO mapred.LocalJobRunner: Waiting for map tasks
2025-05-26 14:54:42,319 INFO mapred.LocalJobRunner: Starting task: attempt_local862196817_0001_m_000000_0
2025-05-26 14:54:42,328 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting to FileOutputCommitterFactory
2025-05-26 14:54:42,329 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:54:42,329 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output directory:false, ignore cleanup failures: false
2025-05-26 14:54:42,335 INFO mapred.Task: Using ResourceCalculatorProcessTree : []
2025-05-26 14:54:42,336 INFO mapred.MapTask: Processing split: hdfs://localhost:9000/bda_hadoop/minput.txt:0+888190
2025-05-26 14:54:42,366 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
2025-05-26 14:54:42,366 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
2025-05-26 14:54:42,366 INFO mapred.MapTask: soft limit at 83886080
2025-05-26 14:54:42,366 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
2025-05-26 14:54:42,366 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
2025-05-26 14:54:42,368 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapOutputBuffer
2025-05-26 14:54:42,428 INFO mapred.LocalJobRunner:
2025-05-26 14:54:42,428 INFO mapred.MapTask: Starting flush of map output
2025-05-26 14:54:42,429 INFO mapred.MapTask: Spilling map output
2025-05-26 14:54:42,429 INFO mapred.MapTask: bufstart = 0; bufend = 45948; bufvoid = 104857600
```

```
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
File Input Format Counters
 Bytes Read=888190
File Output Format Counters
 Bytes Written=81
hadoop@bmscsecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -ls /bda_hadoop/moutput
Found 2 items
-rw-r--r-- 1 hadoop supergroup 0 2025-05-26 14:54 /bda_hadoop/moutput/_SUCCESS
-rw-r--r-- 1 hadoop supergroup 81 2025-05-26 14:54 /bda_hadoop/moutput/part-r-00000
hadoop@bmscsecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -cat /bda_hadoop/moutput/part-r-00000
01 -13
02 -66
03 -15
04 43
05 100
06 168
07 219
08 198
09 141
10 100
11 1
12 -61
hadoop@bmscsecse-HP-Elite-Tower-600-G9-Desktop-PC:~$
```

## Program 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.

Observation:

LAB - 07      Find list of TopN  
PAGE NO:  
DATE: TopN

TNMapper.java

Package TopN;

```
import java.io.IOException;
public class TNMapper extends Mapper<Text, Text> {
 private final static IntWritable one = new IntWritable(1);
 private Text word = new Text();
 public void map(Text key, Text value, Context context) throws IOException, InterruptedException {
 String clean = val.toString();
 StringTokenizer tokens = new StringTokenizer(clean);
 while (tokens.hasMoreTokens()) {
 String token = tokens.nextToken();
 if (!token.isEmpty())
 word.set(token);
 context.write(word, one);
 }
 }
}
```

```

TN Reducer.java
package javatopN;
import java.io.IOException;
public class TNReducer extends Reducer<Text, IntWritable, Text, IntWritable> {
 public void reduce(Text key, Iterable<IntWritable> values, Context context) throws IOException, InterruptedException {
 int sum = 0;
 for (IntWritable v : values) {
 sum += v.get();
 }
 context.write(key, new IntWritable(sum));
 }
 protected void cleanup(Context context) {
 int freq = 20;
 int c = 0;
 for (Entry<String, Integer> entry : freqMap.entrySet()) {
 if (c == freq)
 break;
 context.write(entry.getKey(), entry.getValue());
 c++;
 }
 }
}

```

output:

|        |   |
|--------|---|
| banana | 5 |
| apple  | 4 |
| durian | 3 |
| mango  | 2 |
| kiwi   | 1 |

## Code with Output:

```
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ jps
12082 NameNode
19238 Jps
13014 NodeManager
15100 org.eclipse.equinox.launcher_1.6.1000.v20250227-1734.jar
12845 ResourceManager
12557 SecondaryNameNode
12255 DataNode
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyFromLocal /home/hadoop/Desktop/TopN.txt /bda_
hadoop/tinput.txt
copyFromLocal: '/bda_hadoop/tinput.txt': No such file or directory: `hdfs://localhost:9000/bda_hadoop/tinput.txt'
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -copyFromLocal /home/hadoop/Desktop/TopN.txt /bda_
hadoop/tinput.txt
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hadoop jar /home/hadoop/Desktop/TopN.jar TopN.TNDriver /bda_
hadoop/tinput.txt /bda_hadoop/toutput
2025-05-26 14:59:03,334 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2025-05-26 14:59:03,372 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2025-05-26 14:59:03,372 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2025-05-26 14:59:03,426 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. I
mplement the Tool interface and execute your application with ToolRunner to remedy this.
2025-05-26 14:59:03,472 INFO input.FileInputFormat: Total input files to process : 1
2025-05-26 14:59:03,497 INFO mapreduce.JobSubmitter: number of splits:1
2025-05-26 14:59:03,554 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local1824101299_0001
2025-05-26 14:59:03,554 INFO mapreduce.JobSubmitter: Executing with tokens: []
2025-05-26 14:59:03,609 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2025-05-26 14:59:03,610 INFO mapreduce.Job: Running job: job_local1824101299_0001
2025-05-26 14:59:03,610 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2025-05-26 14:59:03,614 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting
to FileOutputCommitterFactory
2025-05-26 14:59:03,614 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:59:03,614 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders un
der output directory:false, ignore cleanup failures: false
2025-05-26 14:59:03,614 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapreduce.lib.output.F
ileOutputCommitter
2025-05-26 14:59:03,654 INFO mapred.LocalJobRunner: Waiting for map tasks
2025-05-26 14:59:03,655 INFO mapred.LocalJobRunner: Starting task: attempt_local1824101299_0001_m_000000_0
2025-05-26 14:59:03,664 INFO output.PathOutputCommitterFactory: No output committer factory defined, defaulting
to FileOutputCommitterFactory
2025-05-26 14:59:03,664 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2025-05-26 14:59:03,664 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders un
der output directory:false, ignore cleanup failures: false
2025-05-26 14:59:03,670 INFO mapred.Task: Using ResourceCalculatorProcessTree : []
2025-05-26 14:59:03,672 INFO mapred.MapTask: Processing split: hdfs://localhost:9000/bda_hadoop/tinput.txt:0+95
2025-05-26 14:59:03,701 INFO mapred.MapTask: (EQUATOR) 0 kvi 26214396(104857584)
2025-05-26 14:59:03,701 INFO mapred.MapTask: mapreduce.task.io.sort.mb: 100
2025-05-26 14:59:03,701 INFO mapred.MapTask: soft limit at 83886080
2025-05-26 14:59:03,701 INFO mapred.MapTask: bufstart = 0; bufvoid = 104857600
2025-05-26 14:59:03,701 INFO mapred.MapTask: kvstart = 26214396; length = 6553600
2025-05-26 14:59:03,702 INFO mapred.MapTask: Map output collector class = org.apache.hadoop.mapred.MapTask$MapO
utputBuffer
2025-05-26 14:59:03,738 INFO mapred.LocalJobRunner:
2025-05-26 14:59:03,739 INFO mapred.MapTask: Starting flush of map output
```

```

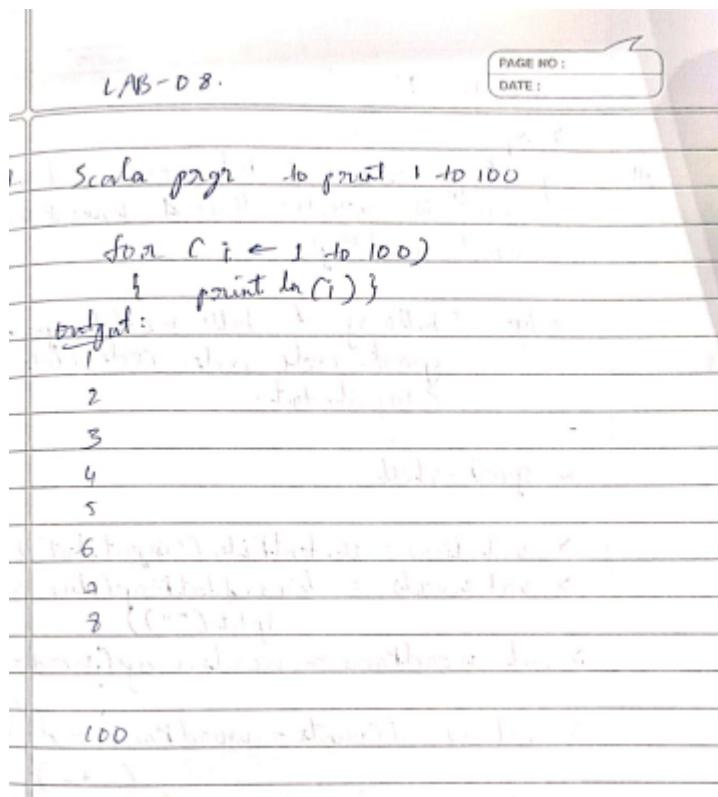
File System Counters
 FILE: Number of bytes read=10682
 FILE: Number of bytes written=1291808
 FILE: Number of read operations=0
 FILE: Number of large read operations=0
 FILE: Number of write operations=0
 HDFS: Number of bytes read=190
 HDFS: Number of bytes written=40
 HDFS: Number of read operations=15
 HDFS: Number of large read operations=0
 HDFS: Number of write operations=4
 HDFS: Number of bytes read erasure-coded=0
Map-Reduce Framework
 Map input records=3
 Map output records=15
 Map output bytes=154
 Map output materialized bytes=190
 Input split bytes=108
 Combine input records=0
 Combine output records=0
 Reduce input groups=5
 Reduce shuffle bytes=190
 Reduce input records=15
 Reduce output records=5
 Spilled Records=30
 Shuffled Maps =1
 Failed Shuffles=0
 Merged Map outputs=1
 GC time elapsed (ms)=0
 Total committed heap usage (bytes)=1052770304
Shuffle Errors
 BAD_ID=0
 CONNECTION=0
 IO_ERROR=0
 WRONG_LENGTH=0
 WRONG_MAP=0
 WRONG_REDUCE=0
File Input Format Counters
 Bytes Read=95
File Output Format Counters
 Bytes Written=40
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -ls /bda_hadoop/toutput
Found 2 items
-rw-r--r-- 1 hadoop supergroup 0 2025-05-26 14:59 /bda_hadoop/toutput/_SUCCESS
-rw-r--r-- 1 hadoop supergroup 40 2025-05-26 14:59 /bda_hadoop/toutput/part-r-00000
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ hdfs dfs -cat /bda_hadoop/toutput/part-r-00000
banana 5
apple 4
fruit 3
mango 2
kiwi 1
hadoop@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$

```

## Program 8

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

Observation:



Code with Output:

```
bmscse@bmscsece-HP-Elite-Tower-600-G9-Desktop-PC:~$ spark-shell
25/05/26 15:58:23 WARN Utils: Your hostname, bmscsece-HP-Elite-Tower-600-G9-Desktop-PC resolves to a loopback address: 127.0.1.1; using 10.124.5.27 instead (on interface eno1)
25/05/26 15:58:23 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
Setting default log level to "WARN".
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).
25/05/26 15:58:26 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Spark context Web UI available at http://10.124.5.27:4040
Spark context available as 'sc' (master = local[*], app id = local-1748255306894).
Spark session available as 'spark'.
Welcome to

 \ _/
) \))
 / \ / \
 / _ \ _ \
 / / \ \ \
 /_/_\ /_/_\ \
version 3.5.4

Using Scala version 2.12.18 (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){println(i)};
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
```

## Program 9

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

Observation:

LAB - 9

PAGE NO :  
DATE :

Q1 Spark program to list words whose count is greater than 4, using RDD and flatmap.

echo "hello spark hello world spark  
spark code code code code spark"  
-> input.txt

> spark-shell

> val lines = sc.textFile("input.txt")  
> val words = lines.flatMap(line => line.  
split(" "))  
> val wordPairs = words.map(word => (word,  
1))  
> val wordCounts = wordPairs.reduceByKey(  
(\_, +\_))  
> val frequentWords = wordCounts.filter(  
case (word, count) => count > 4)

> frequentWords.collect().foreach(println)

Output :

code 5  
spark 5

## Code with Output:

```
bmscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ echo "code code code code code spark spark spark spark spark hell
o hello hi hi joe ken">input.txt
bmscecse@bmscecse-HP-Elite-Tower-600-G9-Desktop-PC:~$ spark-shell
25/05/26 16:01:15 WARN Utils: Your hostname, bmscecse-HP-Elite-Tower-600-G9-Desktop-PC resolves to a loopback address:
127.0.1.1; using 10.124.5.27 instead (on interface eno1)
25/05/26 16:01:15 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another address
Setting default log level to "WARN".
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use setLogLevel(newLevel).
25/05/26 16:01:17 WARN NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java c
lasses where applicable
Spark context Web UI available at http://10.124.5.27:4040
Spark context available as 'sc' (master = local[*], app id = local-1748255477930).
Spark session available as 'spark'.
Welcome to

 / \ / \
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/ \ / \
/ \ / \
/ \ / \
/ \
version 3.5.4

Using Scala version 2.12.18 (OpenJDK 64-Bit Server VM, Java 11.0.26)
Type in expressions to have them evaluated.
Type :help for more information.

scala> val lines=sc.textFile("input.txt")
lines: org.apache.spark.rdd.RDD[String] = input.txt MapPartitionsRDD[1] at textFile at <console>:23

scala> val words=lines.flatMap(line => line.split(" "))
<console>:23: error: value flatMap is not a member of org.apache.spark.rdd.RDD[String]
 val words=lines.flatMap(line => line.split(" "))
 ^

scala> val words=lines.flatMap(line => line.split(" "))
words: org.apache.spark.rdd.RDD[String] = MapPartitionsRDD[2] at flatMap at <console>:23

scala> val wordParts = words.map(word => (word,1))
wordParts: org.apache.spark.rdd.RDD[(String, Int)] = MapPartitionsRDD[3] at map at <console>:23

scala> val wordcount = wordParts.reduceByKey(_+_)
wordcount: org.apache.spark.rdd.RDD[(String, Int)] = ShuffledRDD[4] at reduceByKey at <console>:23

scala> val freq = wordcount.filter {case (word,count) => count > 4}
freq: org.apache.spark.rdd.RDD[(String, Int)] = MapPartitionsRDD[5] at filter at <console>:23

scala> freq.collect().foreach(println)
(spark,5)
(code,5)

scala>
```

## Program 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).

**Observation:**

LAB - 10.

PAGE NO :  
DATE :

Write a simple streaming program in spark text data streams on a particular port perform basic text cleaning & print the cleaned text.

```
def commotize (word : string) : string = word.
(match () <
 case w if w.endsWith ("ing") =>
 w.substring (0, w.length - 2)
 case _ => word
>

val cleanText = def (line : string)
 => <
 line.toLowerCase
 .replaceAll ("[\\p{Punct}]", "")
 .split ("\\s+").
 .map (denominate)
 .mkString (" ")
>

val lines = spark.readStream.
val very = ("socket")
option ("host", "localhost")
.load()
val cleared = ("Value")
query.awaitTermination()
```

new terminal.

nc - lk a999

test = this is a good day.

output: Batch 1;

value: This is a good day

cleaned: good day.