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SUBJECT:

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4/March/2025

Lab - 1

Working with MongoDB.

1) Creating DATABASE In MONGODB

```
Use myDB;
db;
show dbs;
```

II) CRUD (CREATE, READ, UPDATE, DELETE) Operations

```
→ db.createCollection("student");
→ db.Student.drop()
→ db.Student.insert({_id:1, StudName:"Michellejoint ha",
    Grade:"VII", Hobbies:"internetSurfing"});
→ db.Student.update({_id:3, StudName:"Aryan",
    Grade:"VIII"}, {$set:{Hobbies:"Skating"}},
    {Upset:true});
```

FIND METHOD

```
→ db.Student.find({StudName:"Aryan"});
→ db.Student.find({}, {StudName:1, Grade:1, _id:0});
→ db.Student.find({Grade:{$eq:'VII'}}).
    Pretty();
→ db.Student.find({Hobbies:{$in:['Chess',
    'Skating']}}).Pretty();
→ db.Student.find({StudName:/^M/}).
    Pretty();
```

db. Student. find ({StudNames/e/}).Pretty();

db. Student. ~~Sh~~ count();

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

III import data from a csv file.

csv file "Sample.txt"

- Import file into the MongoDB collection, "SampleJson"

The collection is in the dataset "test".

mongoimport --db Student --collection airlines --type csv --h
/home/hduser/Desktop/airline.csv

IV Export data to a csv file

The
mongoexport --host localhost --db Student --collection airline
--csv --out /home/hduser/Desktop/output.txt --fields
"year", "Quarter"

V Save method.

. db. Student. Save ({StudName: "Vamsi", Grade: "

. add a new field

db. Students. Update ({_id:4}, {$set: {location: "Network

remove a field

db. Students. Update ({_id:4}, {$unset: {location:
"Network"}})

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

db. Student . find ({ Grade: { $ne: 'VII' } }) . Pretty()

find doc Student name ends with s

db. Student . find ({ Stud name : /s$/ }). Pretty();

db. Students . update ({ Stud name : /s$/ }). Pretty();

→ Set a Particular field value to NULL

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

→ Count the number of doc

db. students . count ({ Grade: "VII" })

retrieve first 3 documents

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

Lab-2

MongoDB Lab Exercises

1) Exercise : Collection Database

① db.createCollection("customers")

Output: { ok : 1 }

② db.customers.insertMany([{ cust-id: 1, Acc-Bal:1500, Acc-Type: "z" },
{cust-id:2, Acc-Bal: 900, Acc-Type: "A" },
{cust-id:3, Acc-Bal:1300, Acc-Type "z" },
{ cust-id:4, Acc-Bal: 700, Acc-Type: "B" },
{ Cust-id :5, ACC-Bal:1800, Acc-Type: "z" }])

Output

Acknowledged : true,
InsertIds : [
"0" : ObjectId("6...."),
"1" : ...
"2" : ...
"3" : ...
"4" :
"5" :
]

③ db.customers.find({ Acc-Bal: { $gt:1200 },
Acc-Type : "z" })

[
{
_id : ObjectId("6...."),
Cust-id:1,
Acc-Bal: 1500,
Acc-Type : "z"
}

① db.Customers.aggregate([
{
$group: {
_id : "$Cust_id",
Min_Acc_Bal : { $min: "$Acc_Bal" },
Max_Acc_Bd : { $max: "$Acc_Bal" }
}}
])

Output: [
{ _id : 5, Min_Acc_Bal : 1600, Max_Acc_Bal : 1600 },
{ _id : 4, Min_Acc_Bal : 700, Max_Acc_Bal : 700 }]

② Exercise
Product database
db.createCollection("Products")

db.Products.insertMany([
{ _id: ObjectId("507f11"), name: "Laptop",
Category: "Electronics", Price: 800, Quantity: 10 },
{ _id: ObjectID("507f12"), name: "Smartphone",
Category: "Electronics", Price: 500, Quantity: 5 },
{ _id: ObjectId("507f13"), name: "Shoes",
category: "Fashion", Price: 50, quantity: 20 },
{ _id: objectId("507f14"), name: "Tablet",
Category: "Electronics", Price: 300, Quantity: 8 },
{ _id: objectId("507f15"), name: "T-shirt",
Category: "Fashion", Price: 20, Quantity: 15 }
])

Output

```
acknowledged : true,
insertedIds : [
'0' : ObjectId ("507f111"),
'1' : ObjectId ("507f112"),
'2' : ObjectId ("507f113")
```

ii) db.createCollection("Orders")

{ ok : 1 }

db.Orders.insertMany([

```
{
_id : ObjectId ("607f121"),
user_id : "123abc",
items : [{ Product-id : ObjectId ("507f112"),
Quantity : 1, Price : 500 }],
total_Price : 500
},
{
_id : ObjectId ("607f1022"),
user_id : "123abc",
items : [{Product-id : ObjectId ("5071f13"),
Quantity : 3, Price : 450 }],
total_Price : 150
},
{
_id : ObjectId ("607f123"),
user_id : "456def",
items : [{ Product-id : ObjectId ("507f111"),
Quantity : 2, Price : 1600 }],
total_Price : 1600
}
])
```

or: acknowledged: true,
insertedIds: {
'0': ObjectId("607021")
'1': objectId("607f12")
'2': ObjectId("607f13")
}
}

db.createCollection("carts")

{ok: 1}

db.carts.insertOne({
user_id: "789ghi",
items: [
{product_id: ObjectId("507f11"), quantity: 1},
{Produ_id: objectId("507f12"), quantity: 2}]})

or acknowledge: true,
inserted Id: ObjectId("6rdoobf")

db.Products.find()
[
{_id: ObjectId("507f1"),
name: 'laptop',
Category: 'Electronics',
Price: 800,
Quantity: 10},

{_id: ObjectId("50f15"),
name: 'T-shirt',
Category: 'Fashion',
Price: 20,
Quantity: 45}

output: Objectid(

db.Products.find({Category: "Electronics"})

[

{_id: ObjectId("507f1"),
name: 'Laptop',
Category: 'Electronics',
Price: 800,
Quantity: 10},

db.Products.find({Quantity: {$gt: 0}})

[

{

_id: ObjectId("507f1"),
name: 'Laptop',
Category: 'Electronics',
Price: 800,
Quantity: 10,

},

db.Products.find().sort({Price: 1})

{

_id: ObjectId("507f1"),
name: 'Fashion',
Price: 20
Quantity: 15},

db.Products.find({Price: {$lte: 100}})

[{

_id: ObjId("507f1")
name: 'Shoes',
Category: 'Fashion',
Price: 20,
Quantity: 15

db.carts.aggregate([

{$match:{user_id:"789hi"}},

{$unwind:"$items"},

{$lookup:{

from:"products",

as:"Productdetails"

}},

])

or:

{

_id:ObjId("6071

user_id:"123abc",

items:[

{Prod_id:ObjId("5071")

price:500

},

db.orders.aggregate([

{$match:{user_id:"123abc"}},

{$group:{_id:$user_id", total-count:

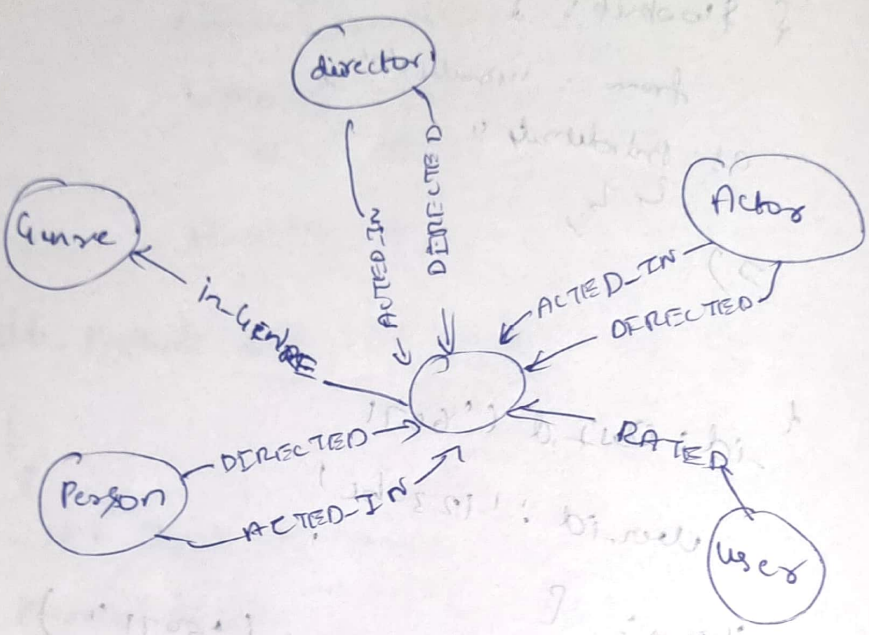
{$sum:$total_price}}])

db.o

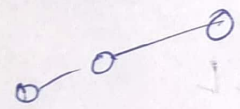
1/1/3/25

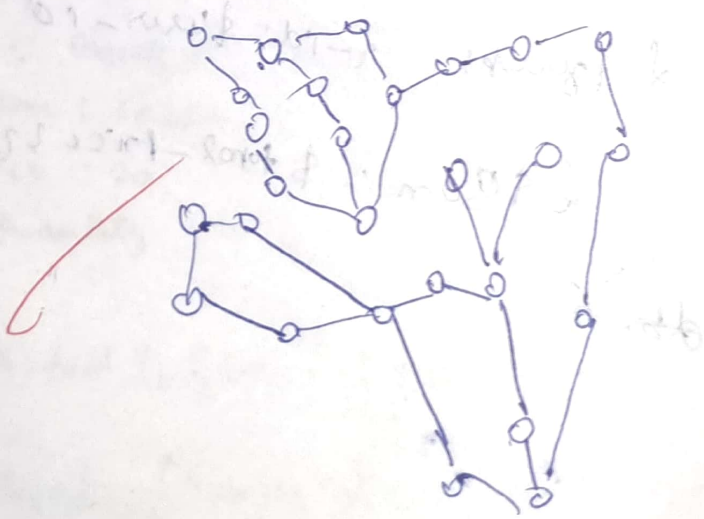
Lab 3 (Neo 4J)

1) call . db . schema . visualization



2) MATCH (n) return n limit 100





1/4/2025

Lab 4

Exploring operations on NOSQL - Cassandra.

Create keyspace:

→ CREATE KEYSPACE Students WITH REPLICATION =
{'class': SimpleStrategy', 'replication_factor': 1};

keyspace Created Successfully

→ DESCRIBE KEYSPACES;

Students System_auth System_schema System_views
System System_distributed System_traces System_virtual_schema

→ SELECT * FROM System_schema.keyspaces;

keyspace_name	durable_writes	replication
System_auth	True	{'class': 'org.apache.Cassandra.locator.S
imple strategy', 'replication_factor': '1'}		

(6 rows)

→ USE Students;

CREATE TABLE Student_Info (RollNo int PRIMARY KEY, StudName text, DateOfJoining timestamp, last_exam_Percent double);

→ DESCRIBE TABLES;

Library_book Student_Info user_login

→ DESCRIBE TABLE Student_Info;

/* Description of Table */

```
BEGIN BATCH
INSERT INTO Students_Info (Roll_NO, Stud Name,
    Date of Joining, last_exam_Percent
Values (1, 'Asha', 2012-03-12', 79.9)
;
```

```
INSERT INTO Students_info (Roll_NO; Stud Name,
    Date of Joining, last_exam_Percent)
VALUES (1, 'Rohan', '2012-03-12', 56.9)
```

→ SELECT * FROM Students_Info;

→ SELECT * FROM Students_Info WHERE Roll_NO IN (1, 2, 3);

→ SELECT * FROM Students_Info WHERE STUD Name = 'Asha';

→ CREATE INDEX ON STUDENTS_Info (Stud Name

→ Select * from Students_Info where Stu name = 'Asha';

→ Select Roll_NO As "USN" from Students_Info;

→ Update Students_Info Set Stud name = 'David Stein' where roll NO = 2;

→ DELETE FROM Student_info WHERE Roll_no = 2;

ALTER TABLE Student_info ADD hobbies set<text>;

UPDATE Student_info
SET hobbies = hobbies + {'chess', 'Table Tennis'}
WHERE Roll_no = 1;

List collection:

ALTER TABLE STUDENTS_Info: Add long list<text>;

Update Stud_info
Set long = [Hindi, English]
where roll no = 1;

Counter Table

create table Library_book (
book_name varchar,
Stud_name varchar
);

Time to Live

create Table Users (
user_id
Password text
);

14/25

Lab - 5

Cassandra Exercise.

1) Create a keyspace by name Library

```
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 );
```

3) BEGIN BATCH

```
INSERT INTO Library_Info (Stud_Id, Counter_value,
Stud_Name, Book_Name, Book_Id, Date_of_issue)
VALUES (111, 1, 'Alice', 'Introduction to Cassandra',
101, '2025-04-10 10:00:00+0000');

INSERT INTO Library_Info (Stud_Id, Counter_value,
Stud_Name, Book_Name, Book_Id, Date_of_issue)
VALUES (112, 1, 'Bob', 'BDA', 205, '2025-04-11
14:30:00+0000');

INSERT INTO Library_Info (Stud_Id, Counter_value,
Stud_Name, Book_Name, Book_Id, Date_of_issue)
VALUES (113, 4, 'David', 'NOSQL', 206,
'2025-06-11', 14:30+007 0000');
```

4) DESCRIBE TABLE Library_Info

output:

```
CREATE TABLE Library_Info (
    Stud_Info int PRIMARY KEY,
    Book_Id int,
    Book_Name text,
    Counter_value Counter,
    Date_of_issue timestamp,
    Stud_Name text );
```

5) Increase counter val for student with stud_id = 112;

```
UPDATE Library_Info SET Counter_value = Counter_value + 1
WHERE Stud_Id = 112;
```

```
SELECT Stud_Id, Counter_value, Stud_Name,
Book_Name, Book_Name FROM Library_Info
WHERE Stud_Id = 112;
```

Output:

Stud_id	Counter_value	book_name	Stud_name
112	2	BDA	Bob

6) CREATE TABLE Library_Book_Tracking (

```
    Stud_Id int,
    Book_name text,
    Issue_Number int,
    Date_of_issue timestamp,
    PRIMARY KEY ((Stud_Id, Book_Name),
    Issue_Number) );
```

SELECT * FROM Library_info WHERE Stud_Id =
112 AND Book_Name = 'BDA' ;

Stud_id	book_id	book_Name	Counter_value	date_of_issue
112	205	BDA	2	2025-04-13
112	205	BAA	2	2025-04-13

(2 rows)

6) Export

COPY Library.Library_Info TO '/Path/to/your/output.csv'
With Header = TRUE ;

"SELECT Stud_Id, Counter_value, Stud_Name,
Book_Name, Book_Id FROM Library.Library_Info

7) Stud_Id, Counter_value, Stud_Name, Book_Name,
Book_Id, Date_of_issue

201, 1, "Eve", "DS", 305, "2025-04-15"
202, 2, "Frank", "Algorithms", 308, "2025-03,43

COPY Library.Library_Info (Stud_Id, Counter_val,
Stud_Name, Book_Name, Book_Id,
From '/Path/to/your/import_data.csv',
With Header = TRUE;

output Processed 2 rows in 0.xxx seconds

lab-6

#hadoop

→ $ start-all.sh

→ $ hdfs dfs -mkdir /bda_hadoop

→ hdfs dfs -ls /

Found 1 items

drwxr-xr-x - hduser supergroup

→ hdfs dfs -ls /bda_hadoop/.

Found 1 items

-rw-r--r-- 1 hduser supergroup

→ hdfs dfs -cat /bda_hadoop/file.txt.

→ hdfs -get /abc/WC.txt /home/hduser

/Downloads/annual income.csv.

ls /home/hduser/Downloads/

6) → hdfs dfs -copyToLocal /abc/annual.csv /home/hduser/Desktop/

ls /home/hduser/Desktop/

hdfs dfs -cat /abc/annual.csv /

→ OP: drwxr-xr-x - hduser supergroup

→ hadoop fs -cp / cpe / lll.

hadoop fs -ls / LLL

Op. found 1 items

drwxr-xr-x -hduser supergroup

0 YYYY-MM-DD HH:MM /LLL

15/4/25

6/may/25

Scala

Scala

```
Scala> 8 * 5 + 2
res0: Int = 42

Scala> 0.5 * res0
res1: Double = 21.0

Scala> "Hello," + res0
res2: String = Hello, 42

Scala> val answer = 8 * 5 + 2
answer : Int = 42

Scala> ~~val answer~~ 0.5 * answer
res3 : Double = 21.0

Scala> var Counter = 0
Counter : Int = 0

Scala> counter = 1
Counter : Int = 1

Scala> val greeting : String = null
greeting : String = null

Scala> val greeting : Any = "Hello"
greeting : Any = Hello

Scala> val xmax, ymax = 100
xmax : Int = 100
ymax : Int = 100

Scala> var greeting, message : String = null
greeting : String = null
message : String = null
```

```
Scala > toString()
res9 : String = @29c24ce

Scala > toString(10)

Scala > "Hello" .intersect ("world")
res7 : String = lo

Scala > 1 to 10
res8 : Scala.collection.immutable.Range.
       Inclusive = Range (1, 2, 3, 4, 5, 6, 7, 8, 9, 10)

Scala > Scala.math.sqrt(2)
res10 : Double = 1.4142 1

Scala > import Scala.math
import Scala.math.
```

Lab-7

TOPN

Create a Mapreduce Program to find average temp for each year from NCDC data set Package Sample code:

```
import java.io.IOException;
import java.util.StringTokenizer;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable
import org.apache.io.Text;
import org.apache.mapreduce.Mapper,
import org.apache.mapreduce.lib.input.FileInput
import org.apache.mapreduce.lib.output.fileformat
                                        Output,
import mapreduce
import org.apache.util.GenericOptionsParser;
Public class TopN {
  Public static void main (String[] args) throws
  Exception {
    Configuration conf = new Configuration();
    String [] otherArgs = (new GenericOptionsParser
      (conf,args)).getRemainingArgs();
    if (otherArgs.length != 2) {
      System.err.println("Usage: TopN <in>
      <out>");
      System.Exit(2);
    }
    Job job = Job.getInstance(conf);
    job.setJobName("TopN");
```

```
job.setJarByClass(TopN.class);
job.setMapperClass(TopNMapper.class);
job.setReducerClass(TopNReducer.class);
job.setOutputKeyClass(Text.class);
job.setOutputValueClass(IntWritable.class);
FileInputFormat.addInputPath(job,
new Path(otherArgs[1]));
System.exit(job.waitForCompletion(true)?0:1);
}

Public Static class TopNMapper extends Mapper
<Object, Text, Text, IntWritable> {
Private static final IntWritable one = new IntWritable(1);
Private Text word = new Text();
Private String token = "[ |$#<>\^=\[\]*.,;:?!~(){}]*";

Public void map(Object key, Text value, Mapper
<Object, Text, Text, IntWritable> context)
throws IOException, InterruptedException {
String cleanline = value.toString().toLowerCase().replaceAll(this.token, " ");
}
}
}
```

Top N Reduce: Using.

```
Package Sambler TopNR;
import java.io.IOException;
import java.util.HashMap;
import java.util.Map;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.Reducer;
import Util.MiscUtils;
Public class TopNReducer extends Reducer
<Text, IntWritable, Text, IntWritable>
Private Map<Text, int writable> CountMap=
    new HashMap<>();
Public void reduce (Text key, Iterable
<IntWritable> values, Reducer<Text, int writable,
Text, IntWritable> context Context) throws
IOException,
    int sum=0;
for (IntWritable val; values)
sum+= val.get();
this.
countMap.put(new Text(key), new IntWritable(sum));
}
```

b) Mean max temperature for every month

```
Package  manmax;
Public class MeanMaxDriver {
  Public static void main (String [] args) throws
  Exception {
      if (args.length != 2) {
          System.exit(-1);
      }

      Job job = new Job();
      Job.setJarByClass (MeanMaxDriver.class);
  file input format.addInputPath (job, new Path (args[0]);
      System.exit (job.waitForCompletion (true) ? 0:1);
  }
}
```

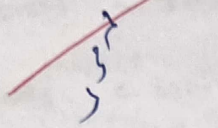
Mean Max Mapper.class.

```
Package meanmax;

Public class MeanmaxMapper extends
Mapper <LongWritable, Text, Text, IntWritable> {
  Private Map <Text, IntWritable> CountMap = new
      HashMap <>();
Public void reduce (Text key, Iterable <IntWritable>
  values, Reducer (Text, IntWritable, Text,
  IntWritable) Context Context)
  Throws IOException, InterruptedException {
      int Sum = 0;
  for (IntWritable Val : values)
      Sum + = val.get();
  this.CountMap.Put (new Text (key));
  new IntWritable (Sum));
  }
```

```
Protected void cleanup (Reducer.Context context)
Text, IntWritable > context Context)
Exception {
    map < Text, IntWritable > Sorted Map =
    Map Util . Sort By Values (this.countmap);

    int Counter = 0;
    for (Text key: Sorted map . key set()){
    if : (Counter++ == 20)
      break;;
    Context . write (key, Sorted Map . get(key))
```



Lab-6

① Write a Scala Program to Print numbers from 1 to 100 using for loop

> Sudo apt install scala

> nano PrintNumbers.scala

```
object PrintNumbers {
  def main(args: Array[String]): Unit = {
    for (i <- 1 to 100) {
      Println(i)
    }
  }
}
```

> Scala PrintNumbers.Scala

> Scala PrintNumbers

Output:

```
1
:
100
```

(Numbers Printed from 1 to 100)

e) Using RDD and Flatmap Count how many times each word appears in a file & write out a list of words whose count is strictly greater than 4 using spark.

> echo -e "hello world \n hello spark \n hello scala \n spark is fast \n hello spark spark spark" > input.txt

> spark - shell

> val rdd = sc.textFile ("input.txt")
val words = rdd.flatmap (line => line.split ("\W+"))
val Pairs = words.map (word => (word.to lowercase, 1))
val Counts = Pairs.reduceByKey (_+_)
val filtered = Counts.filter { case (word, count) => count > 4 }
filtered.collect().foreach { case (word, count) => println (s"$word: $count") }

output:
spark: 6

~~3) Write a Scala Streaming Program in~~

3) Map reduce Program to Sort the Content in a alphabetic order listing only top 10 max occurances of words (Hadoop Pg).

WordCount Mapper.java

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

Public class WordCount Mapper extends Mapper
<Long Writable, Text, Text, IntWritable> {
Private final Static IntWritable One = new IntWritable(
    Private Text word = new Text();
Public void = new Text();

Public void map (Long writable key, Text value
    Context, Context)
throws IOException, InterruptedException {
String line = value.toString().toLowerCase(),
replaceAll("[^a-z]", " ");
String[] words = line.split("\\s+");
for (String w: words) {
    if (!w.isEmpty()) {
        word.set(w);
        Context.write(word, One);
    }
}
}
```

WordCountReducer.java

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

Public class WordCountsReducer extends Reducer<Text,
IntWritable, Text, IntWritable> {

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

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

    int sum = 0;
    for (IntWritable val : values) {
        sum += val.get();
    }
    countMap.put(new Text(key), new IntWritable
        (sum));
}

Protected void cleanup(Context context) throws
    IOException, InterruptedException {
    countMap.entrySet().stream()
    .sorted((e1, e2) -> {
    int cmp = e2.getValue().compareTo(e1.getValue
        ());
    if (cmp == 0) return e1.getKey().toString().
    compareTo(e2.getKey().toString());
    return cmp;
    })
    .limit(10)
    .forEach(e -> {
```

```
Context.write(e.getKey(), e.getValue());
} catch (IOException | InterruptedException ex) {
    throw new RuntimeException(ex); }
});
```

WordCountDriver.java

```
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.*;

public class WordCountDriver {
public static void main(String[] args)
throws Exception {
    Configuration conf = new Configuration();
Job job = Job.getInstance(conf, "Job 10
    Word Count");

    job.setJarByClass(WordCountDriver.class);
    job.setMapperClass(WordCountMapper.class);
    job.setReduceClass(WordCountReducer.class);
    job.setOutputKeyClass(Text.class);

FileInputFormat.addInputPath(job, new Path
    (args[0]));
System.exit(job.waitForCompletion(true)
    ? 0 : 1);
}
}
```

OP: hadoop

And	1
an	1
are	1
big	1
data	2
framework	1
hadoop	3
is	1
large	1
amount	1

4) (Open Ended)

Write a Simple Streaming Prog in Spark to receive text data Streams on a particular Space removal. Stop words removal, lemmatization etc) and Print cleaned text on screen.

Terminal 1:

> Spark-shell

> import org.apache.spark.streaming._

import org.apache.spark.streaming.Context._

val ssc = new StreamingContext(sc, second(5))

val Stopwords = Set("a", "an", "the", "is", "are", "and", "or", "to", "in")

val lines = ssc.socketTextStream("localhost", 9999)

val cleaned = lines . flatmap ("localhost", 9999)

val cleaned = lines . flatmap (_.split ("\\W+"))

. map (_.toLowerCase . trim)

. filter (word => word. nonEmpty && !stopwords

contains (word))

cleaned . print ()

ssc. start ()

ssc . await Termination ()

Terminal B

$ nc -lk 9999

Terminal A : (run the Py Prg)

> spark submit word count. Py

Terminal B

The quick brown fox jumps over the lazy dog'

Terminal A :

"the

quick

brown

fox

jumps

over

the

lazy

dog