VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

BIG DATA ANALYTICS
(20CS6PEBDA)

Submitted by

HARSHA V N (1BM20CS406)

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)
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B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled "**BIG DATA ANALYTICS**" was carried out by **HARSHA V N (1BM20CS406),** who is bona fide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2022. The Lab report has been approved as it satisfies the academic requirements in respect of the course **BIG DATA ANALYTICS (20CS6PEBDA)** work prescribed for the said degree.

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Index Sheet

Course Outcome

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

Cassandra Lab Program 4: -

1. Create a key space by name Employee

```
cqlsh> CREATE KEYSPACE ronaldo WITH replication = {'class':'SimpleStrategy','replication_factor':1};
cqlsh> describe ronaldo;

CREATE KEYSPACE ronaldo WITH replication = {'class': 'SimpleStrategy', 'replication_factor': '1'}  AND durable_writes = true;

cqlsh>
```

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

```
cqlsh> create table ronaldo.ronaldo_emp (emp_id int primary key,emp_name text,designation text ,date_of_joining timestamp,salary double ,dept_name text);
cqlsh>
```

```
cqlsh> select * from ronaldo.ronaldo_emp;

 emp_id | date_of_joining | dept_name | designation | emp_name | salary
--------+-----------------+-----------+-------------+----------+--------

(0 rows)
cqlsh>
```

3. Insert the values into the table in batch

```
cqlsh> begin batch insert into ronaldo.ronaldo_emp(emp_id,date_of_joining,dept_name,designation,emp_name,salary)values(2,'2020-09-03','development','web developer','harsha',170000.50);apply batch;
cqlsh> select * from ronaldo.ronaldo_emp;

 emp_id | date_of_joining                 | dept_name   | designation   | emp_name | salary
--------+---------------------------------+-------------+---------------+----------+--------
      2 | 2020-09-02 18:30:00.000000+0000 | development | web developer |   harsha | 1.7e+05

(1 rows)
cqlsh>
```

```
cqlsh> begin batch
   ...  insert into ronaldo.ronaldo_emp(emp_id,date_of_joining,dept_name,designation,emp_name,salary)values(3,'2021-03-25','tester','analyst','parashiva',800000.50);
   ...  insert into ronaldo.ronaldo_emp(emp_id,date_of_joining,dept_name,designation,emp_name,salary)values(4,'2021-03-06','developer','game developer','krishna',90000.50);
   ... apply batch;
cqlsh> select * from ronaldo.ronaldo_emp;

 emp_id | date_of_joining                 | dept_name   | designation    | emp_name  | salary
--------+---------------------------------+-------------+----------------+-----------+---------
      2 | 2020-09-02 18:30:00.000000+0000 | development |  web developer |    harsha | 1.7e+05
      4 | 2021-03-05 18:30:00.000000+0000 |   developer | game developer |   krishna | 90000.5
      3 | 2021-03-24 18:30:00.000000+0000 |      tester |        analyst | parashiva |   8e+05

(3 rows)
cqlsh>
```

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

```
cqlsh> update ronaldo.ronaldo_emp SET emp_name='krishnathanki ',dept_name='developer' where emp_id=4;
cqlsh> select * from ronaldo.ronaldo_emp;

 emp_id | date_of_joining                 | dept_name   | designation    | emp_name       | salary
--------+---------------------------------+-------------+----------------+----------------+---------
      2 | 2020-09-02 18:30:00.000000+0000 | development |  web developer |         harsha | 1.7e+05
      4 | 2021-03-05 18:30:00.000000+0000 |   developer | game developer | krishnathanki  | 90000.5
      3 | 2021-03-24 18:30:00.000000+0000 |      tester |        analyst |      parashiva |   8e+05

(3 rows)
cqlsh>
```

5. Sort the details of Employee records based on salary

```
cqlsh> create table ronaldo.rona_emp (emp_id int,emp_name text,designation text ,date_of_joining timestamp,salary double ,dept_name text,primary key(emp_id,salary));
cqlsh>
```

```
cqlsh> begin batch  insert into ronaldo.rona_emp (emp_id,emp_name ,designation ,date_of_joining ,salary  ,dept_name )values(1,'parashiva','developer','2021-03-06',800000.50,'web developer'); insert into ronaldo.
rona_emp (emp_id,emp_name ,designation ,date_of_joining ,salary  ,dept_name )values(2,'anju','tester','2021-03-25',25000.50,'analyst'); insert into ronaldo.rona_emp (emp_id ,emp_name ,designation  ,date_of_joini
ng ,salary ,dept_name )values(3,'harsha','developer','2021-03-15',25800.50,'Full stack developer'); apply batch;
cqlsh> select * from ronaldo.rona_emp;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name
--------+---------+---------------------------------+----------------------+-------------+-----------
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha

(3 rows)
cqlsh>
```

```
(3 rows)
cqlsh> paging off;
Disabled Query paging.
cqlsh> select * from ronaldo.rona_emp where emp_id in(1,2,3) order by salary;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name
--------+---------+---------------------------------+----------------------+-------------+-----------
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva

(3 rows)
cqlsh>
```

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

```
cqlsh> alter table  ronaldo.rona_emp add projects set<text>;
cqlsh> select * from ronaldo.rona_emp ;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name  | projects
--------+---------+---------------------------------+----------------------+-------------+-----------+----------
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva |     null
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju |     null
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha |     null

(3 rows)
cqlsh>
```

7. Update the altered table to add project names.

```
cqlsh> update ronaldo.rona_emp set projects=projects+{'abc','xyz'} where emp_id=1 and salary=800000.50;
cqlsh> select * from ronaldo.rona_emp;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name  | projects
--------+---------+---------------------------------+----------------------+-------------+-----------+----------------
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva | {'abc', 'xyz'}
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju |           null
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha |           null

(3 rows)
cqlsh>
```

```
cqlsh> update ronaldo.rona_emp set projects=projects+{'def','lmn','pqrs','tuv'} where emp_id=2 and salary=25000.50;
cqlsh> update ronaldo.rona_emp set projects=projects+{'xyz'} where emp_id=3 and salary=25800.50;
cqlsh> select * from ronaldo.rona_emp;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name  | projects
--------+---------+---------------------------------+----------------------+-------------+-----------+-------------------------------------
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva |                   {'abc', 'xyz'}
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju | {'def', 'lmn', 'pqrs', 'tuv'}
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha |                          {'xyz'}

(3 rows)
cqlsh>
```

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

```
cqlsh>  insert into ronaldo.rona_emp (emp_id ,emp_name,designation ,date_of_joining ,salary ,dept_name )values(5,'nikhil','tester','2022-03-06',78000.50,'game developer') using TTL 15;
cqlsh> select * from ronaldo.rona_emp;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name  | projects
--------+---------+---------------------------------+----------------------+-------------+-----------+-------------------------------------
      5 | 78000.5 | 2022-03-05 18:30:00.000000+0000 |       game developer |      tester |    nikhil |                             null
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva |                   {'abc', 'xyz'}
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju | {'def', 'lmn', 'pqrs', 'tuv'}
      4 |  7000.5 | 2022-03-05 18:30:00.000000+0000 |       game developer |      tester |    ananth |                             null
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha |                          {'xyz'}

(5 rows)
cqlsh>
```

```
(5 rows)
cqlsh> select * from ronaldo.rona_emp;

 emp_id | salary  | date_of_joining                 | dept_name            | designation | emp_name  | projects
--------+---------+---------------------------------+----------------------+-------------+-----------+-------------------------------------
      1 |   8e+05 | 2021-03-05 18:30:00.000000+0000 |        web developer |   developer | parashiva |                   {'abc', 'xyz'}
      2 | 25000.5 | 2021-03-24 18:30:00.000000+0000 |              analyst |      tester |      anju | {'def', 'lmn', 'pqrs', 'tuv'}
      4 |  7000.5 | 2022-03-05 18:30:00.000000+0000 |       game developer |      tester |    ananth |                             null
      3 | 25800.5 | 2021-03-14 18:30:00.000000+0000 | Full stack developer |   developer |    harsha |                          {'xyz'}

(4 rows)
cqlsh>
```

LAB PROGRAM 3

1.Create a key space by name Library

```
cqlsh> create keyspace Library with replication = {'class':'SimpleStrategy','replication_factor':2};
```

Create a column family by name Library-Info with attributes Stud_Id Primary Key,Counter_value of type Counter,

Stud_Name, Book-Name, Book-Id, Date_of_issue

```
cqlsh:library> create table Library_Info ( Stud_id int ,Counter_value counter, Stud_Name text , Book_
Name text,Book_Id int, Date_of_issue timestamp,primary key(Stud_id,Stud_Name,Book_Name,Book_Id,Date_o
f_issue));
```

Insert the values into the table in batch

```
cqlsh:library> update Library_Info set Counter_value = Counter_value+1 where Stud_id = 1 and Stud_Nam
e = 'Prem Sai' and Book_Name = 'Big Data Analysis' and Book_Id = 1000 and Date_of_issue='2022-04-29';
cqlsh:library> select * from Library_INfo;

 stud_id | stud_name | book_name          | book_id | date_of_issue                     | counter_value
---------+-----------+--------------------+---------+-----------------------------------+---------------
       1 |  Prem Sai | Big Data Analysis |    1000 | 2022-04-28 18:30:00.000000+0000 |             1

(1 rows)
cqlsh:library> update Library_Info set Counter_value = Counter_value+1 where Stud_id = 112 and Stud_N
ame = 'Tarun' and Book_Name = 'OOMD' and Book_Id = 1020 and Date_of_issue='2022-05-04';
cqlsh:library> update Library_Info set Counter_value = Counter_value+1 where Stud_id = 112 and Stud_N
ame = 'Tarun' and Book_Name = 'BDA' and Book_Id = 1100 and Date_of_issue='2022-03-06';
cqlsh:library> update Library_Info set Counter_value = Counter_value+1 where Stud_id = 112 and Stud_N
ame = 'Tarun' and Book_Name = 'BDA' and Book_Id = 1100 and Date_of_issue='2022-05-04';
cqlsh:library> select * from Library_INfo;

 stud_id | stud_name | book_name          | book_id | date_of_issue                     | counter_value
---------+-----------+--------------------+---------+-----------------------------------+---------------
       1 |  Prem Sai | Big Data Analysis |    1000 | 2022-04-28 18:30:00.000000+0000 |             1
     112 |     Tarun |                BDA |    1100 | 2022-03-05 18:30:00.000000+0000 |             1
     112 |     Tarun |                BDA |    1100 | 2022-05-03 18:30:00.000000+0000 |             1
     112 |     Tarun |               OOMD |    1020 | 2022-05-03 18:30:00.000000+0000 |             1
```

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

```
cqlsh:library> update Library_Info set Counter_value = Counter_value+1 where Stud_id = 112 and Stud_N
ame = 'Tarun' and Book_Name = 'BDA' and Book_Id = 1100 and Date_of_issue='2022-04-30';
cqlsh:library> select * from Library_INfo;

 stud_id | stud_name | book_name          | book_id | date_of_issue                     | counter_value
---------+-----------+--------------------+---------+-----------------------------------+---------------
       1 |  Prem Sai | Big Data Analysis |    1000 | 2022-04-19 18:30:00.000000+0000 |             1
     112 |     Tarun |                BDA |    1100 | 2022-04-29 18:30:00.000000+0000 |             2
```

Write a query to show that a student with id 112 has taken a book “BDA” 2 times.

```
cqlsh:library> select * from Library_Info where Stud_Id =112;

 stud_id | stud_name | book_name | book_id | date_of_issue                     | counter_value
---------+-----------+-----------+---------+-----------------------------------+---------------
     112 |     Tarun |       BDA |    1100 | 2022-04-29 18:30:00.000000+0000 |             2
cqlsh:library> copy library_Info(Stud_Id,Stud_Name,Book_Name,Book_Id,date_of_issue,counter_value) to
'/home/bmsce/BDA/lib.csv';
Using 11 child processes

Starting copy of library.library_info with columns [stud_id, stud_name, book_name, book_id, date_of_i
ssue, counter_value].
Processed: 2 rows; Rate:       14 rows/s; Avg. rate:       14 rows/s
2 rows exported to 1 files in 0.153 seconds.
```

Export the created column to a csv file

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

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

```
cqlsh:library> copy library_Info2(Stud_Id,Stud_Name,Book_Name,Book_Id,date_of_issue,counter_value) fr
om  '/home/bmsce/BDA/lib.csv';
Using 11 child processes

Starting copy of library.library_info2 with columns [stud_id, stud_name, book_name, book_id, date_of_
issue, counter_value].
Processed: 2 rows; Rate:       3 rows/s; Avg. rate:       5 rows/s
2 rows imported from 1 files in 0.401 seconds (0 skipped).
cqlsh:library> select * from library_info2;

 stud_id | stud_name | book_name         | book_id | date_of_issue                     | counter_value
---------+-----------+-------------------+---------+-----------------------------------+---------------
       1 |  Prem Sai | Big Data Analysis |    1000 | 2022-04-19 18:30:00.000000+0000 |             1
     112 |     Tarun |               BDA |    1100 | 2022-04-29 18:30:00.000000+0000 |             2
```

Lab Program 2

1) Using MongoDB

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

ii) Insert required documents to the collection.

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

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

```
> db.createCollection("Student");
{ "ok" : 1 }
```

```
> db.Student.insert({_id:1,name:"ananya",USN:"1BM19CS095",Sem:6,Dept_Name:"CSE",CGPA:"8.1",Hobbies:"Badminton"});
WriteResult({ "nInserted" : 1 })
> db.Student.insert({_id:2,name:"bharath",USN:"1BM19CS002",Sem:6,Dept_Name:"CSE",CGPA:"8.3",Hobbies:"Swimming"});
WriteResult({ "nInserted" : 1 })
> db.Student.insert({_id:3,name:"chandana",USN:"1BM19CS006",Sem:6,Dept_Name:"CSE",CGPA:"7.1",Hobbies:"Cycling"});
WriteResult({ "nInserted" : 1 })
> db.Student.insert({_id:4,name:"hrithik",USN:"1BM19CS010",Sem:6,Dept_Name:"CSE",CGPA:"8.6",Hobbies:"Reading"});
WriteResult({ "nInserted" : 1 })
> db.Student.insert({_id:5,name:"kanika",USN:"1BM19CS090",Sem:6,Dept_Name:"CSE",CGPA:"9.2",Hobbies:"Cycling"});
WriteResult({ "nInserted" : 1 })
```

```
> db.Student.update({_id:1},{$set:{CGPA:9.0}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.update({_id:2},{$set:{CGPA:9.1}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.update({_id:3},{$set:{CGPA:8.1}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.update({_id:4},{$set:{CGPA:6.5}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Student.update({_id:5},{$set:{CGPA:8.6}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.students.aggregate({$match:{Dept_Name:"CSE"}},{$group:{_id:"$Sem",AvgCGPA:{$avg:"$CGPA"}}},{$match:{AvgCGPA:{$gt:7.5}}});
> db.Student.aggregate({$match:{Dept_Name:"CSE"}},{$group:{_id:"$Sem",AvgCGPA:{$avg:"$CGPA"}}},{$match:{AvgCGPA:{$gt:7.5}}});
{ "_id" : 6, "AvgCGPA" : 8.26 }
```

```
bmsce@bmsce-Precision-T1700:~$ mongoexport --host localhost --db nayana_db --collection Student --csv --out /home/bmsce/Desktop/output.txt
--fields "_id","Name","USN","Sem","Dept_Name","CGPA","Hobbies"
2022-04-20T15:13:53.933+0530    csv flag is deprecated; please use --type=csv instead
2022-04-20T15:13:53.935+0530    connected to: localhost
2022-04-20T15:13:53.935+0530    exported 5 records
```

```
_id,Name,USN,Sem,Dept_Name,CGPA,Hobbies
1,,1BM19CS095,6,CSE,9,Badminton
2,,1BM19CS002,6,CSE,9.1,Swimming
3,,1BM19CS006,6,CSE,8.1,Cycling
4,,1BM19CS010,6,CSE,6.5,Reading
5,,1BM19CS090,6,CSE,8.6,Cycling
```

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

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

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

```
{ "_id" : ObjectId("625d7865932913969 4f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729", "080-25639856" ] }
> db.Bank.updateMany({},{$pull:{Contact:"080-25639856"}} );
{ "acknowledged" : true, "matchedCount" : 5, "modifiedCount" : 1 }
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d7865932913969 4f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
> db.Bank.createIndex({Name:1, Type:1},{name:});
uncaught exception: SyntaxError: expected expression, got '}' :
@(shell):1:43
> db.Bank.createIndex({Name:1, Type:1},{name:"Find current account holders"});
{
        "createdCollectionAutomatically" : false,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d7865932913969 4f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
> db.Bank.getIndexes()
[
        {
                "v" : 2,
```

```
@(shell):1:20
> db.Bank.update({_id:625d78659329139694f188a6}, {$set: {CustID:5}},{upsert:true});
uncaught exception: SyntaxError: identifier starts immediately after numeric literal :
@(shell):1:20
> db.Bank.update({_id:"625d78659329139694f188a6"}, {$set: {CustID:5}},{upsert:true});
WriteResult({
        "nMatched" : 0,
        "nUpserted" : 1,
        "nModified" : 0,
        "_id" : "625d78659329139694f188a6"
})
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d7865932913969 4f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
{ "_id" : "625d78659329139694f188a6", "CustID" : 5 }
> db.Bank.update({_id:"625d78659329139694f188a6", CustID:5}, {$set: {Name:"Sumantha K S", Type:"Savings", Contact:["9856321478","011-65897458"
]}},{upsert:true});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.Bank.find({});
{ "_id" : ObjectId("625d77809329139694f188a2"), "CustID" : 1, "Name" : "Trivikram Hegde", "Type" : "Savings", "Contact" : [ "9945678231" ] }
{ "_id" : ObjectId("625d77bd9329139694f188a3"), "CustID" : 2, "Name" : "Vishvesh Bhat", "Type" : "Savings", "Contact" : [ "6325985615", "080-2
3651452" ] }
{ "_id" : ObjectId("625d77e69329139694f188a4"), "CustID" : 3, "Name" : "Vaishak Bhat", "Type" : "Savings", "Contact" : [ "8971456321", "080-33
529458" ] }
{ "_id" : ObjectId("625d78229329139694f188a5"), "CustID" : 4, "Name" : "Pramod P Parande", "Type" : "Current", "Contact" : [ "9745236589", "08
0-56324587" ] }
{ "_id" : ObjectId("625d7865932913969 4f188a6"), "CustID" : 4, "Name" : "Shreyas R S", "Type" : "Current", "Contact" : [ "9445678321", "044-656
11729" ] }
{ "_id" : "625d78659329139694f188a6", "CustID" : 5, "Contact" : [ "9856321478", "011-65897458" ], "Name" : "Sumantha K S", "Type" : "Savings"
}
>
```

1) Using MongoDB,

i) Create a database for Faculty and Create a Faculty Collection(Faculty_id, Name, Designation ,Department, Age, Salary, Specialization(Set)).

ii) Insert required documents to the collection.

iii) First Filter on "Dept_Name:MECH" and then group it on "Designation" and

compute the Average Salary for that Designation and flter those documents where the "Avg_Sal" is greater than 650000. iv) Demonstrate usage of import and export commands

Write MongoDB queries for the following:

1)To display only the product name from all the documents of the product collection.

2)To display only the Product ID, ExpiryDate as well as the quantity from the document of the product collection where the _id column is 1.

3)To fnd those documents where the price is not set to 15000.

4)To fnd those documents from the Product collection where the quantity is set to 9 and the product name is set to 'monitor'.

5)To fnd documents from the Product collection where the Product name ends in 'd'.

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

3)Create a mongodb collection Hospital. Demonstrate the following by choosing felds of

choice.

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

   Updation

5.

```
{ "pname" : "motherboard" }
> db.product.find({pid:1},{pid:1,_id:0,mdate:1,quantity:1});
{ "pid" : 1, "mdate" : 2001, "quantity" : 2 }
>  db.product.find({price:{$ne:15000}},{pname:1,_id:0});
{ "pname" : "keyboard" }
{ "pname" : "mouse" }
{ "pname" : "monitor" }
> db.product.find({$and:[{quantity:{$eq:9}},{pname:{$eq:"monitor"}}]},{pname:1,_id:0})
{ "pname" : "monitor" }
> db.product.find({pname:/d$/},{pname:1,quantity:1,_id:0})
{ "pname" : "keyboard", "quantity" : 2 }
{ "pname" : "motherboard", "quantity" : 4 }
> db.createCollection("hospital");
{ "ok" : 1 }
> db.hospital.insert({_id:1, Name: "Anshuman Agarwal", age:23, diseases:["fever", "diarrhoea", "wheezing", "gastritis"]});
WriteResult({ "nInserted" : 1 })
> db.hospital.insert({_id:2, Name: "Pinky Chaubey", age:35, diseases:["fever","nausea", "food infection", "indigestion", "kidney stones"]});
WriteResult({ "nInserted" : 1 })
> db.hospital.insert({_id:3, Name: "Amresh Chowpati", age:63, diseases:["hyperglycemia", "diabetes mellitus", "food poisoning", "cold"]});
WriteResult({ "nInserted" : 1 })
> db.hospital.updateMany({},{$pull:{diseases:"fever"}});
{ "acknowledged" : true, "matchedCount" : 3, "modifiedCount" : 2 }
> db.hospital.updateOne({_id:1},{$pop:{diseases:-1}});
{ "acknowledged" : true, "matchedCount" : 1, "modifiedCount" : 1 }
> db.hospital.find({"diseases.2":"nausea"});
> db.hospital.find({"diseases.1":"nausea"});
> d.hospital.find({});
uncaught exception: ReferenceError: d is not defined :
@(shell):1:1
> db.hospital.find({});
{ "_id" : 1, "Name" : "Anshuman Agarwal", "age" : 23, "diseases" : [ "wheezing", "gastritis" ] }
{ "_id" : 2, "Name" : "Pinky Chaubey", "age" : 35, "diseases" : [ "nausea", "food infection", "indigestion", "kidney stones" ] }
{ "_id" : 3, "Name" : "Amresh Chowpati", "age" : 63, "diseases" : [ "hyperglycemia", "diabetes mellitus", "food poisoning", "cold" ] }
> db.hospital.find({"diseases.0":"nausea"});
{ "_id" : 2, "Name" : "Pinky Chaubey", "age" : 35, "diseases" : [ "nausea", "food infection", "indigestion", "kidney stones" ] }
> db.hospital.update({_id:3},{$set:{'diseases.1':'sarscov'}});
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
>
```

LAB PROGRAM : 1

I. CREATE DATABASE IN MONGODB.

use myDB;

db

show dbs;

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

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

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

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

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

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

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

db.createCollection(“Student”); => sql equivalent CREATE TABLE STUDENT(...);

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

db.Student.drop();

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

db.Student.insert({_id:1,StudName:"MichelleJacintha",Grade:"VII",Hobbies:"InternetS

urfing"});

4. Insert the document for “AryanDavid” in to the Students collection only if it does not

already exist in the collection. However, if it is already present in the collection, then

update the document with new values. (Update his Hobbies from “Skating” to “Chess”.

) Use “Update else insert” (if there is an existing document, it will attempt to update it,

if there is no existing document then it will insert it).

db.Student.update({_id:3,StudName:"AryanDavid",Grade:"VII"},{$set:{Hobbies:"Skatin

g"}},{upsert:true});

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

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

5. FIND METHOD

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

criteria.

db.Student.find({StudName:"Aryan David"});

({cond..},{columns.. column:1, columnname:0})

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

B. To display only the StudName and Grade from all the documents of the Students

collection. The identifier_id should be suppressed and NOT displayed.

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

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

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

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

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

D. To find those documents from the Students collection where the Hobbies is set to

either 'Chess' or is set to 'Skating'.

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

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

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

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

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

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

position.

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

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

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

db.Student.count();

```
Command Prompt - mongo
> db.Student.count();
2
>
```

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

StudName.

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

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

III. Import data from a CSV file

Given a CSV file "sample.txt" in the D:drive, import the file into the MongoDB

collection, "SampleJSON". The collection is in the database "test".

mongoimport --db Student --collection airlines --type csv –headerline --file

/home/hduser/Desktop/airline.csv

```
Command Prompt

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

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

IV. Export data to a CSV file

This command used at the command prompt exports MongoDB JSON documents from

“Customers” collection in the “test” database into a CSV file “Output.txt” in the D:drive.

mongoexport --host localhost --db Student --collection airlines --csv --out

/home/hduser/Desktop/output.txt –fields “Year”,”Quarter”

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

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

V. Save Method :

Save() method will insert a new document, if the document with the _id does not

exist. If it exists it will replace the exisiting document.

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

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

VI. Add a new field to existing Document:

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

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

VII. Remove the field in an existing Document

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

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

VIII. Finding Document based on search criteria suppressing few fields

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

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

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

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

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

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

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

IX. to set a particular field value to NULL

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

XCount the number of documents in Student Collections

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

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

db.Students.count({Grade:”VII”})

retrieve first 3 documents

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

Sort the document in Ascending order

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

Note:

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

to Skip the 1 st two documents from the Students Collections

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

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

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

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

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

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

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

To find those documents from the “food” collection which has the “fruits array”

constitute of “grapes”, “mango” and “apple”.

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

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

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

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

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

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

db.food.find ({“fruits”: {$size:2}})

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

To find the document with a particular id and display the first two elements from the

array “fruits”

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

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

To find all the documets from the food collection which have elements mango and

grapes in the array “fruits”

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

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

update on Array:

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

array with apple

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

insert new key value pairs in the fruits array

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

```
> db.food.update({_id:3},{$set:{'fruits.1':'apple'}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
> db.food.update({_id:2},{$push:{price:{grapes:80,mango:200,cherry:100}}})
WriteResult({ "nMatched" : 1, "nUpserted" : 0, "nModified" : 1 })
>
```

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

XII. Aggregate Function :

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

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

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

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

db.Customers.aggregate ({$match:{AcctType:”S”}},{$group : { _id : “$custID”,TotAccBal :

{$sum:”$AccBal”} } });

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

total balance greater than 1200.

db.Customers.aggregate ({$match:{AcctType:”S”}},{$group : { _id : “$custID”,TotAccBal :

{$sum:”$AccBal”} } }, {$match:{TotAccBal:{$gt:1200}}});

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

LAB 6

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

```
// AverageDriver.java package temperature;

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

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

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

//AverageMapper.java package temperature;

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

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

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

//AverageReducer.java package temperature;

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

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

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

```
//TempDriver.java package temperatureMax;
```

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

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

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

//TempMapper.java package temperatureMax;

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

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

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

```
  String line = value.toString();        String month = line.substring(19,21);      int temperature;           if
  (line.charAt(87)=='+')                              temperature = Integer.parseInt(line.substring(88, 92));
  else
    temperature = Integer.parseInt(line.substring(87, 92));   String quality = line.substring(92, 93);
    if(temperature != MISSING && quality.matches("[01459]"))                    context.write(new
  Text(month),new IntWritable(temperature)); }

}


//TempReducer.java package temperatureMax;


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


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


public void map(LongWritable key, Text value, Context context) throws IOException, InterruptedException
{
  String line = value.toString();        String month = line.substring(19,21);      int temperature;           if
  (line.charAt(87)=='+')                              temperature = Integer.parseInt(line.substring(88, 92));
  else
    temperature = Integer.parseInt(line.substring(87, 92));   String quality = line.substring(92, 93);
    if(temperature != MISSING && quality.matches("[01459]"))                    context.write(new
  Text(month),new IntWritable(temperature));
  }
}
```

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

LAB 7

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

```
// TopN.java package sortWords;

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

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

public class TopN {

   public static void main(String[] args) throws Exception {
      Configuration conf = new Configuration();
      String[] otherArgs = new GenericOptionsParser(conf, args).getRemainingArgs();        if (other-
  Args.length != 2) {
         System.err.println("Usage: TopN <in> <out>");
         System.exit(2);
      }
```

```
    Job job = Job.getInstance(conf);        job.setJobName("Top N");        job.setJarByClass(TopN.class);
  job.setMapperClass(TopNMapper.class);        //job.setCombinerClass(TopNReducer.class);
  job.setReducerClass(TopNReducer.class);        job.setOutputKeyClass(Text.class);
  job.setOutputValueClass(IntWritable.class);
    FileInputFormat.addInputPath(job, new Path(otherArgs[0]));
    FileOutputFormat.setOutputPath(job, new Path(otherArgs[1]));
    System.exit(job.waitForCompletion(true) ? 0 : 1);
  }

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

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

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

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

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

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

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

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

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

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

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

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

// MiscUtils.java package utils;

import java.util.*;

public class MiscUtils {

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

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

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

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

```
    return sortedMap;
  }
}
```

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

LAB 8

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

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


public class JoinDriver extends Configured implements Tool {

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

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

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

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

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

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

    FileOutputFormat.setOutputPath(conf, outputPath);

    conf.setPartitionerClass(KeyPartitioner.class);
```

```
            conf.setOutputValueGroupingComparator(TextPair.FirstComparator.class);

            conf.setMapOutputKeyClass(TextPair.class);

            conf.setReducerClass(JoinReducer.class);

            conf.setOutputKeyClass(Text.class);

    JobClient.runJob(conf);

    return 0;
  }

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

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

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

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

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

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

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

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

import org.apache.hadoop.io.IntWritable;

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

  @Override
 public void map(LongWritable key, Text value, OutputCollector<TextPair, Text> output, Reporter re-
  porter)
```

```
                throws IOException
  {

    String valueString = value.toString();
    String[] SingleNodeData = valueString.split("\t");
  output.collect(new TextPair(SingleNodeData[0], "1"), new
Text(SingleNodeData[1]));
  }
}

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

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

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

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

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

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

  private Text first;   private Text second;

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

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

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

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

  public Text getFirst() {     return first;
  }

  public Text getSecond() {     return second;
  }
```

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

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

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

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

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

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

// vv TextPairComparator   public static class Comparator extends WritableComparator {

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

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

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

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

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

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

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

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

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

LAB 9

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

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

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

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

LAB 10

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

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

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

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

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

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