VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Big Data Analytics

Submitted by

R Kumar Raghav (1BM21CS150)

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

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
Feb-2024 to July-2024

B. M. S. College of Engineering,

Bull Temple Road, Bangalore 560019
(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

<u>CERTIFICATE</u>

This is to certify that the Lab work entitled "**BIG DATA ANALYTICS LAB**" carried out by R **Kumar Raghav (1BM21C150),** who is a bonafide student of **B. M. S. College of Engineering.** It is in partial fulfillment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum during the year 2024. The Lab report has been approved as it satisfies the academic requirements in respect of a **Big Data Analytics -(22CS6PEBDA)** work prescribed for the said degree.

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Index Sheet

Course Outcome

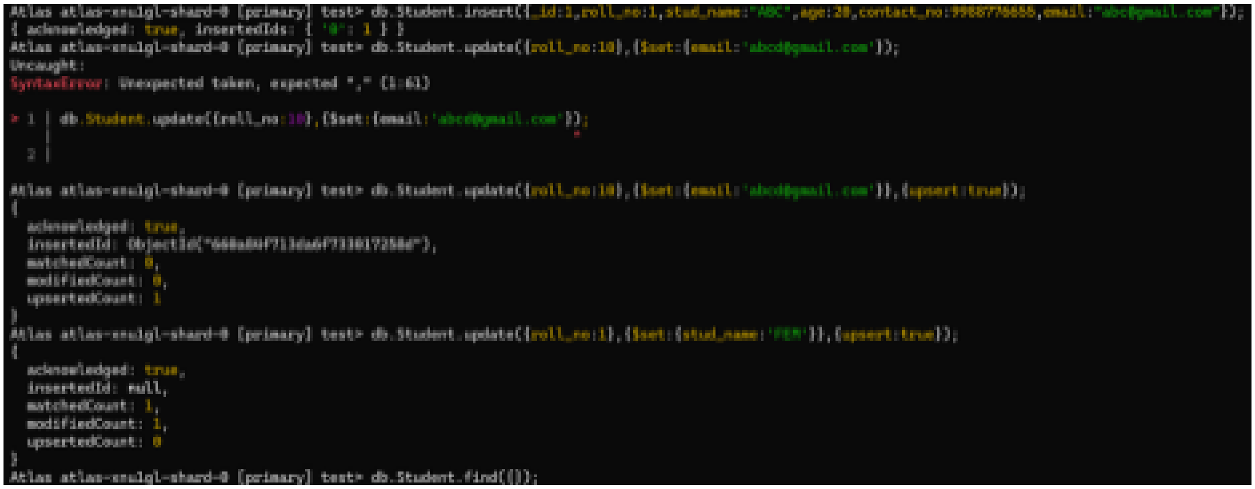
<u>BDA LAB-2</u> 01-04-2024 I Perform the following DB operations using MongoDB.

1. Create a database “Student” with the following attributes Rollno, Age, ContactNo, Email Id.

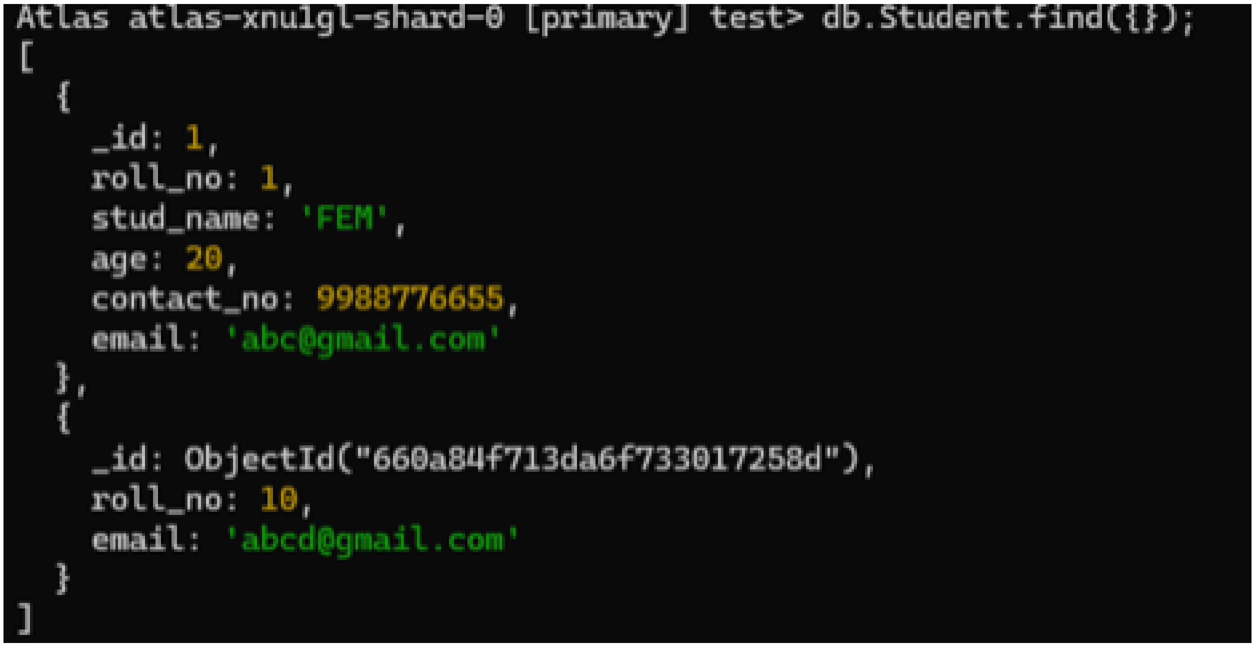
2. Insert appropriate values

3. Write a query to update the Email-Id of a student with roll no 10.

4. . Replace the student name from “ABC” to “FEM” of roll no 11



```
Atlas atlas-xnulgl-shard-0 [primary] test> db.Student.insert({_id:1,roll_no:1,stud_name:"ABC",age:20,contact_no:9988776655,email:"abc@gmail.com"});
{ acknowledged: true, insertedIds: { '0': 1 } }
Atlas atlas-xnulgl-shard-0 [primary] test> db.Student.update({roll_no:10},{$set:{email:'abcd@gmail.com'});
Uncaught:
SyntaxError: Unexpected token, expected "," (1:61)

> 1 | db.Student.update({roll_no:10},{$set:{email:'abcd@gmail.com'});
    |                                                              ^
  2 |

Atlas atlas-xnulgl-shard-0 [primary] test> db.Student.update({roll_no:10},{$set:{email:'abcd@gmail.com'}},{upsert:true});
{
  acknowledged: true,
  insertedId: ObjectId("660a84f713da6f733017258d"),
  matchedCount: 0,
  modifiedCount: 0,
  upsertedCount: 1
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.Student.update({roll_no:1},{$set:{stud_name:'FEM'}},{upsert:true});
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.Student.find({});
```



```
Atlas atlas-xnulgl-shard-0 [primary] test> db.Student.find({});
[
  {
    _id: 1,
    roll_no: 1,
    stud_name: 'FEM',
    age: 20,
    contact_no: 9988776655,
    email: 'abc@gmail.com'
  },
  {
    _id: ObjectId("660a84f713da6f733017258d"),
    roll_no: 10,
    email: 'abcd@gmail.com'
  }
]
```

II. Perform the following DB operations using MongoDB.
 1. Create a collection by name Customers with the following attributes.

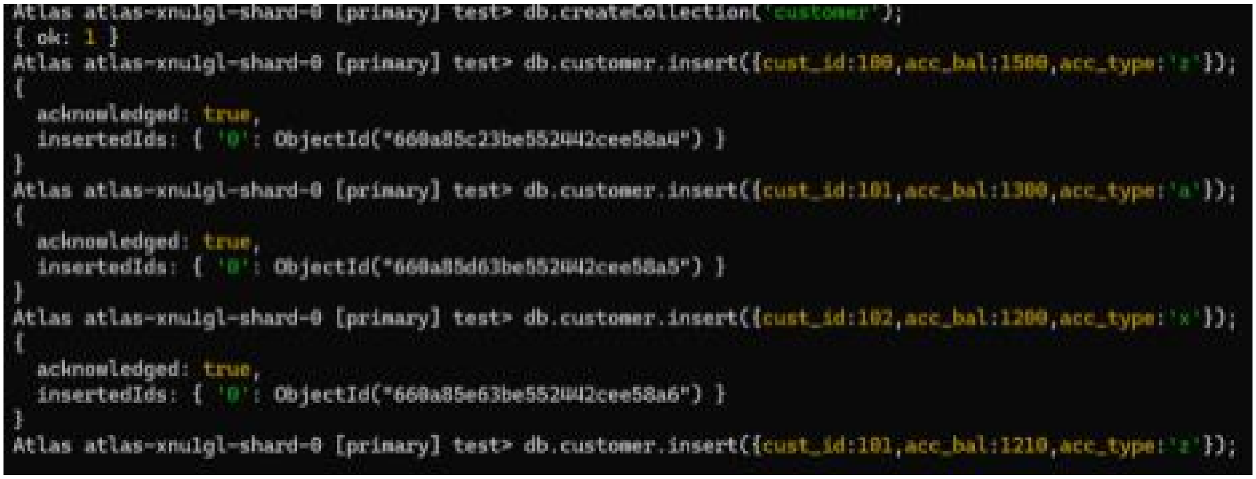
Cust_id, Acc_Bal, Acc_Type

2. Insert at least 5 values into the table

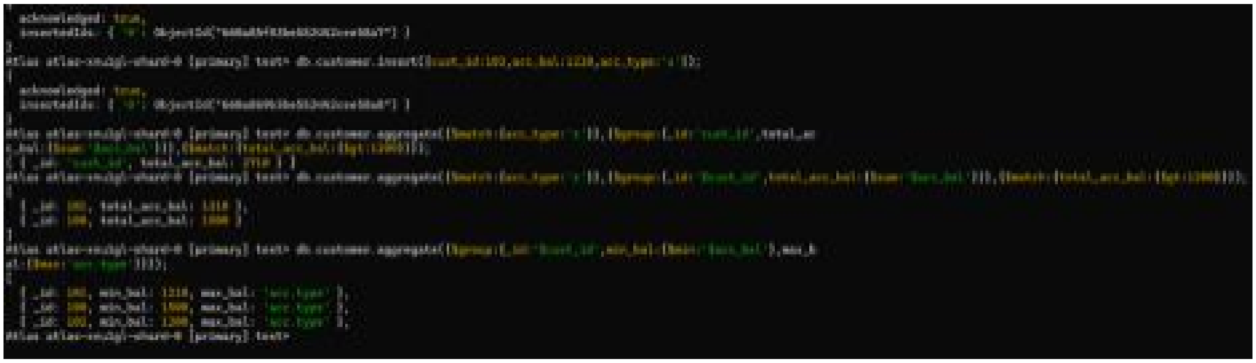
3. Write a query to display those records whose total account balance is greater than

1200 of account type 'Z' for each customer_id.

4. Determine Minimum and Maximum account balance for each customer_id



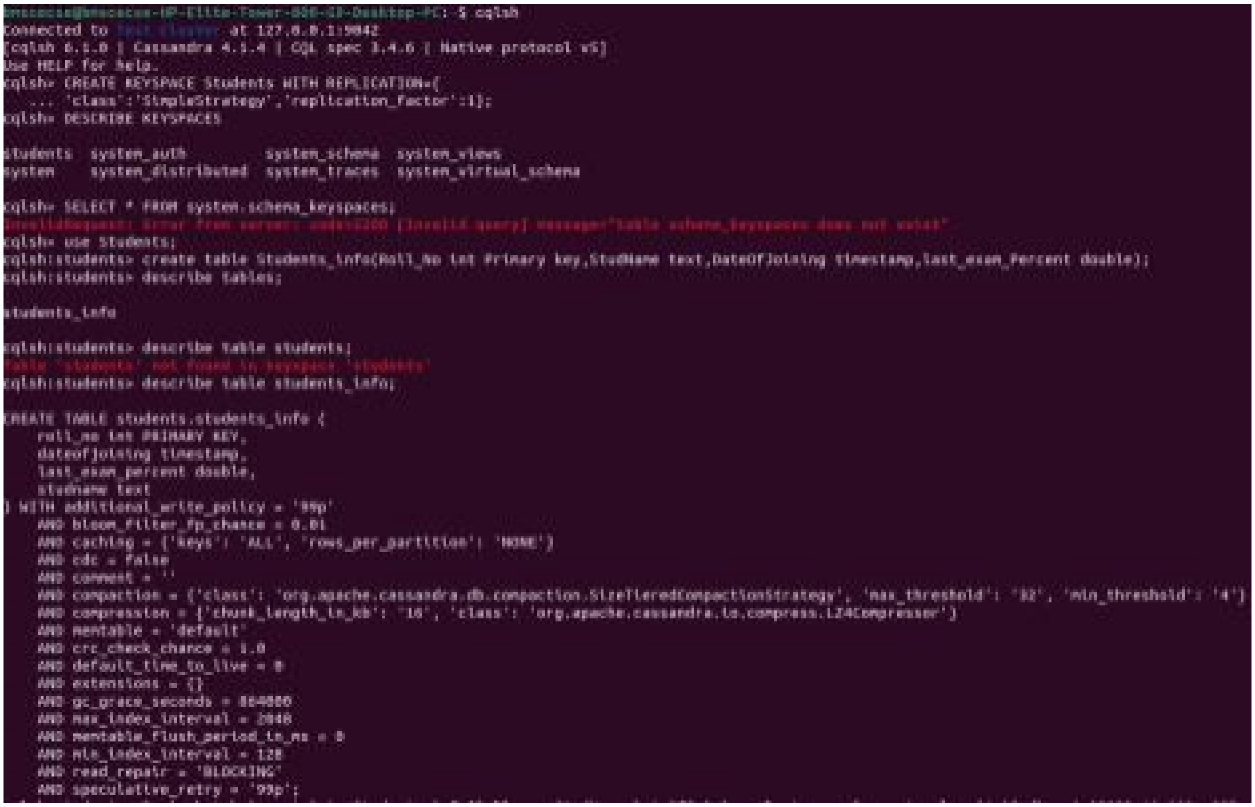
```
Atlas atlas-xnulgl-shard-0 [primary] test> db.createCollection('customer');
{ ok: 1 }
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.insert({cust_id:100,acc_bal:1500,acc_type:'z'});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId("660a85c23be552442cee58a4") }
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.insert({cust_id:101,acc_bal:1300,acc_type:'a'});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId("660a85d63be552442cee58a5") }
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.insert({cust_id:102,acc_bal:1200,acc_type:'x'});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId("660a85e63be552442cee58a6") }
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.insert({cust_id:101,acc_bal:1210,acc_type:'z'});
```



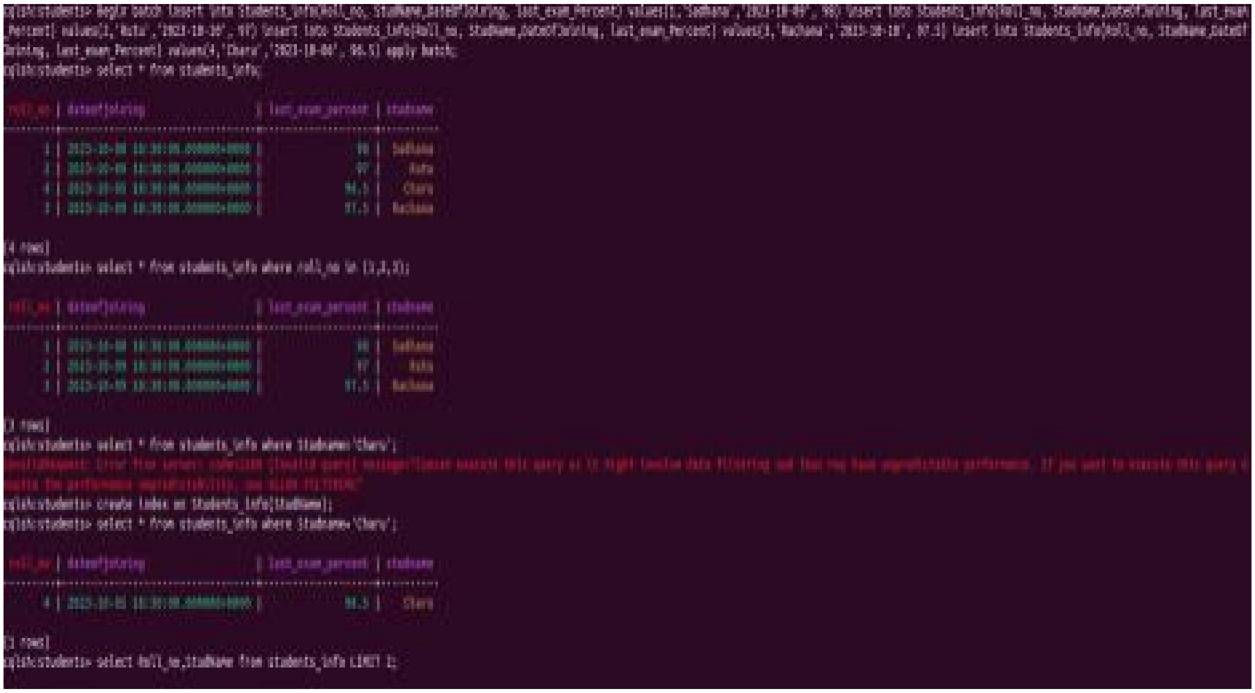
```
{
  acknowledged: true,
  insertedIds: { '0': ObjectId("[illegible]") }
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.insert({cust_id:102,acc_bal:1220,acc_type:'x'});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId("[illegible]") }
}
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.aggregate([{$match:{acc_type:'z'}},{$group:{_id:'cust_id',total_ac
c_bal:{$sum:'$acc_bal'}}},{$match:{total_acc_bal:{$gt:1200}}}]);
[ { _id: 'cust_id', total_acc_bal: 2710 } ]
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.aggregate([{$match:{acc_type:'z'}},{$group:{_id:'$cust_id',total_acc_bal:{$sum:'$acc_bal'}}},{$match:{total_acc_bal:{$gt:1200}}}]);
[
  { _id: 101, total_acc_bal: 1210 },
  { _id: 100, total_acc_bal: 1500 }
]
Atlas atlas-xnulgl-shard-0 [primary] test> db.customer.aggregate([{$group:{_id:'$cust_id',min_bal:{$min:'$acc_bal'},max_b
al:{$max:'acc_type'}}}]);
[
  { _id: 101, min_bal: 1210, max_bal: 'acc_type' },
  { _id: 100, min_bal: 1500, max_bal: 'acc_type' },
  { _id: 102, min_bal: 1200, max_bal: 'acc_type' },
Atlas atlas-xnulgl-shard-0 [primary] test>
```

BDA LAB-03-06-05-2024

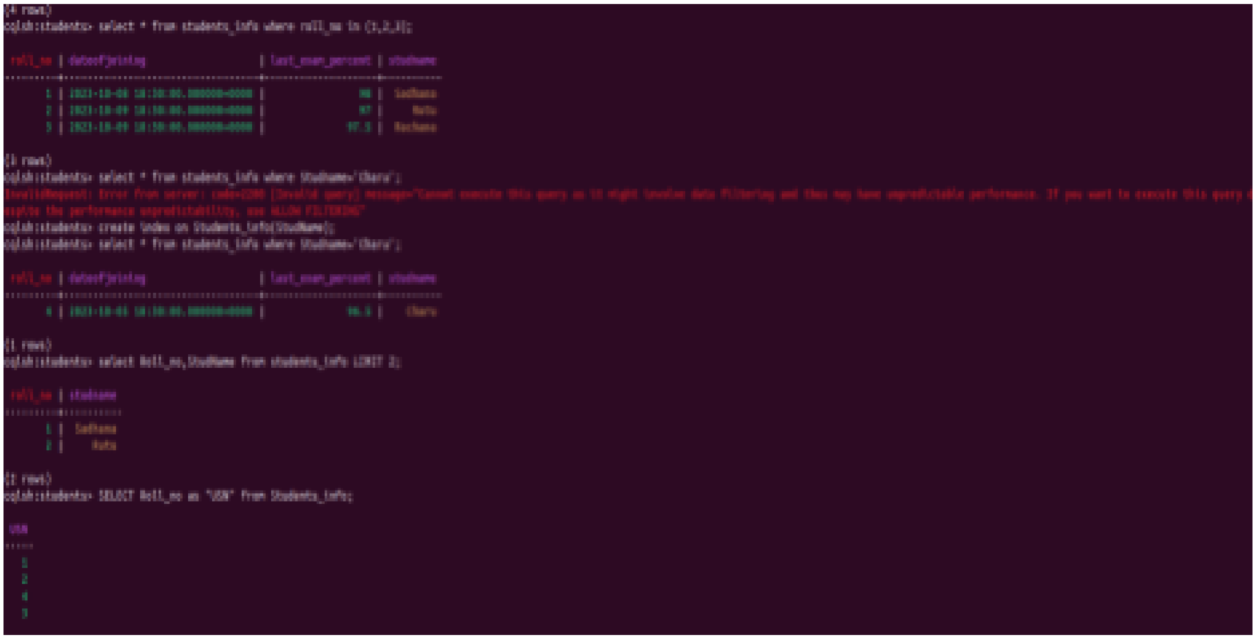
Cassandra



```
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.4 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> CREATE KEYSPACE Students WITH REPLICATION={
   ... 'class':'SimpleStrategy','replication_factor':1};
cqlsh> DESCRIBE KEYSPACES

students  system_auth         system_schema  system_views
system    system_distributed  system_traces  system_virtual_schema

cqlsh> SELECT * FROM system.schema_keyspaces;
InvalidRequest: Error from server: code=2200 [Invalid query] message="table schema_keyspaces does not exist"
cqlsh> use Students;
cqlsh:students> create table Students_info(Roll_No int Primary key,StudName text,DateOfJoining timestamp,last_exam_Percent double);
cqlsh:students> describe tables;

students_info

cqlsh:students> describe table students;
Table 'students' not found in keyspace 'students'
cqlsh:students> describe table students_info;

CREATE TABLE students.students_info (
    roll_no int PRIMARY KEY,
    dateofjoining timestamp,
    last_exam_percent double,
    studname text
) 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 Students_info(Roll_no, StudName,DateOfJoining, last_exam_Percent) values(1,'Sadhana','2023-10-09', 99) insert into Students_info(Roll_no, StudName,DateOfJoining, last_exam
_Percent) values(2,'Rutu','2023-10-10', 97) insert into Students_info(Roll_no, StudName,DateOfJoining, last_exam_Percent) values(3,'Rachana','2023-10-10', 97.5) insert into Students_info(Roll_no, StudName,DateOf
Joining, last_exam_Percent) values(4,'Charu','2023-10-06', 96.5) apply batch;
cqlsh:students> select * from students_info;

 roll_no | dateofjoining                   | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
       1 | 2023-10-08 18:30:00.000000+0000 |                99 |  Sadhana
       2 | 2023-10-09 18:30:00.000000+0000 |                97 |     Rutu
       4 | 2023-10-05 18:30:00.000000+0000 |              96.5 |    Charu
       3 | 2023-10-09 18:30:00.000000+0000 |              97.5 |  Rachana

(4 rows)
cqlsh:students> select * from students_info where roll_no in (1,2,3);

 roll_no | dateofjoining                   | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
       1 | 2023-10-08 18:30:00.000000+0000 |                99 |  Sadhana
       2 | 2023-10-09 18:30:00.000000+0000 |                97 |     Rutu
       3 | 2023-10-09 18:30:00.000000+0000 |              97.5 |  Rachana

(3 rows)
cqlsh:students> select * from students_info where Studname='Charu';
InvalidRequest: Error from server: code=2200 [Invalid query] message="Cannot execute this query as it might involve data filtering and thus may have unpredictable performance. If you want to execute this query d
espite the performance unpredictability, use ALLOW FILTERING"
cqlsh:students> create index on Students_info(StudName);
cqlsh:students> select * from students_info where Studname='Charu';

 roll_no | dateofjoining                   | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
       4 | 2023-10-05 18:30:00.000000+0000 |              96.5 |    Charu

(1 rows)
cqlsh:students> select Roll_no,StudName from students_info LIMIT 2;
```



```
(4 rows)
cqlsh:students> select * from students_info where roll_no in (1,2,3);

 roll_no | dateofjoining                   | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
       1 | 2023-10-08 18:30:00.000000+0000 |                98 |  Sadhana
       2 | 2023-10-09 18:30:00.000000+0000 |                97 |     Rutu
       3 | 2023-10-09 18:30:00.000000+0000 |              97.5 |  Rachana

(3 rows)
cqlsh:students> select * from students_info where StudName='Charu';
InvalidRequest: Error from server: code=2200 [Invalid query] message="Cannot execute this query as it might involve data filtering and thus may have unpredictable performance. If you want to execute this query d
espite the performance unpredictability, use ALLOW FILTERING"
cqlsh:students> create index on Students_info(StudName);
cqlsh:students> select * from students_info where StudName='Charu';

 roll_no | dateofjoining                   | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
       4 | 2023-10-03 18:30:00.000000+0000 |              96.5 |    Charu

(1 rows)
cqlsh:students> select Roll_no,StudName from students_info LIMIT 2;

 roll_no | studname
---------+----------
       1 |  Sadhana
       2 |     Rutu

(2 rows)
cqlsh:students> SELECT Roll_no as "USN" from Students_info;

 USN
-----
   1
   2
   4
   3
```

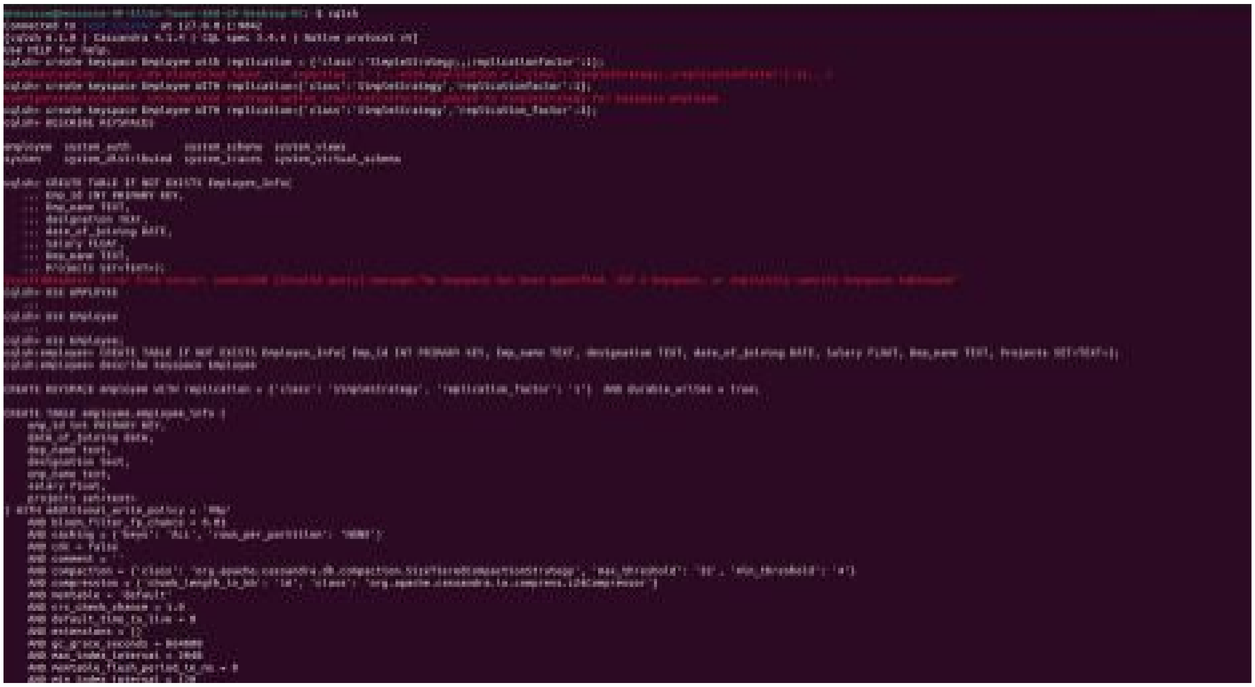
```
bmscecse@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.4 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> CREATE KEYSPACE Students WITH REPLICATION={
   ... 'class':'SimpleStrategy','replication_factor':1};
cqlsh> DESCRIBE KEYSPACES

students system_auth system_schema system_views
systemsystem_distributed system_traces system_virtual_schema



cqlsh> SELECT * FROM system.schema_keyspaces;
 InvalidRequest: Error from server: code=2200 [Invalid query] message="table
schema_keyspaces does not exist"
cqlsh> use Students;
cqlsh:students> create table Students_info(Roll_No int Primary key,StudName
text,DateOfJoining timestamp,last_exam_Percent double);
cqlsh:students> describe tables;

students_info

cqlsh:students> describe table students;
Table 'students' not found in keyspace 'students'
cqlsh:students> describe table students_info;

CREATE TABLE students.students_info (
          roll_no int PRIMARY KEY,
          dateofjoining timestamp,
          last_exam_percent double,
          studname text
) 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 Students_info(Roll_no, StudName,DateOfJoining,
last_exam_Percent) values(1,'Sachin','2023-10-09', 98)
insert into Students_info(Roll_no, StudName,DateOfJoining, last_exam_Percent)
values(2,'Ravi','2023-10-10', 97)
insert into Students_info(Roll_no, StudName,DateOfJoining, last_exam_Percent)
values(3,'Rakshit','2023-10-10', 97.5)
insert into Students_info(Roll_no, StudName,DateOfJoining, last_exam_Percent)
values(4,'Charan','2023-10-06', 96.5) apply batch;
cqlsh:students> select * from students_info;

 roll_no | dateofjoining | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
                1 | 2023-10-08 18:30:00.000000+0000 | 98 | Sachin
          2 | 2023-10-09 18:30:00.000000+0000 | 97 | Ravi
          4 | 2023-10-05 18:30:00.000000+0000 | 96.5 | Charan
                        3 | 2023-10-09 18:30:00.000000+0000 | 97.5 | Rakshit

(4 rows)
cqlsh:students> select * from students_info where roll_no in (1,2,3);
 roll_no | dateofjoining | last_exam_percent | studname
---------+---------------------------------+-------------------+----------
                1 | 2023-10-08 18:30:00.000000+0000 | 98 | Sachin
          2 | 2023-10-09 18:30:00.000000+0000 | 97 | Ravi
                        3 | 2023-10-09 18:30:00.000000+0000 | 97.5 | Rakshit
cqlsh:students> select * from students_info where Studname='Charan';
 InvalidRequest: Error from server: code=2200 [Invalid query] message="Cannot execute this
query as it might involve data filtering and thus may have unpredictable performance. If you
```

```
want to execute this query despite the performance unpredictability, use ALLOW
FILTERING" cqlsh:students> create index on Students_info(StudName);  cqlsh:students>
select * from students_info where Studname='Charan';

 roll_no | dateofjoining | last_exam_percent | studname
---------+--------------------------------+-------------------+----------
         4 | 2023-10-05 18:30:00.000000+0000 | 96.5 | Charan

(1 rows)
cqlsh:students> select Roll_no,StudName from students_info LIMIT 2;

 roll_no | studname
---------+----------
          1 Sachin
         2 | Ravi

(2 rows)
cqlsh:students> SELECT Roll_no as "USN" from Students_info;

 USN
-----
   1
  2
  4
  3

(4 rows)
cqlsh:students> update students_info set StudName='Shreyas' where
Roll_no=3; cqlsh:students> select * from students_info;




 roll_no | dateofjoining | last_exam_percent | studname



---------+--------------------------------+-------------------+----------
                   1 | 2023-10-08 18:30:00.000000+0000 | 98 | Sachin
         2 | 2023-10-09 18:30:00.000000+0000 | 97 | Ravi
         4 | 2023-10-05 18:30:00.000000+0000 | 96.5 | Charan
                3 | 2023-10-09 18:30:00.000000+0000 | 97.5 | Shreyas
(4 rows)
cqlsh:students> update students_info set roll_no=8 where Roll_no=3; InvalidRequest: Error
from server: code=2200 [Invalid query] message="PRIMARY KEY part roll_no found in SET
part"
cqlsh:students> delete last_exam_percent from students_info where roll_no=2;
cqlsh:students> select * from students_info;

 roll_no | dateofjoining | last_exam_percent | studname
```

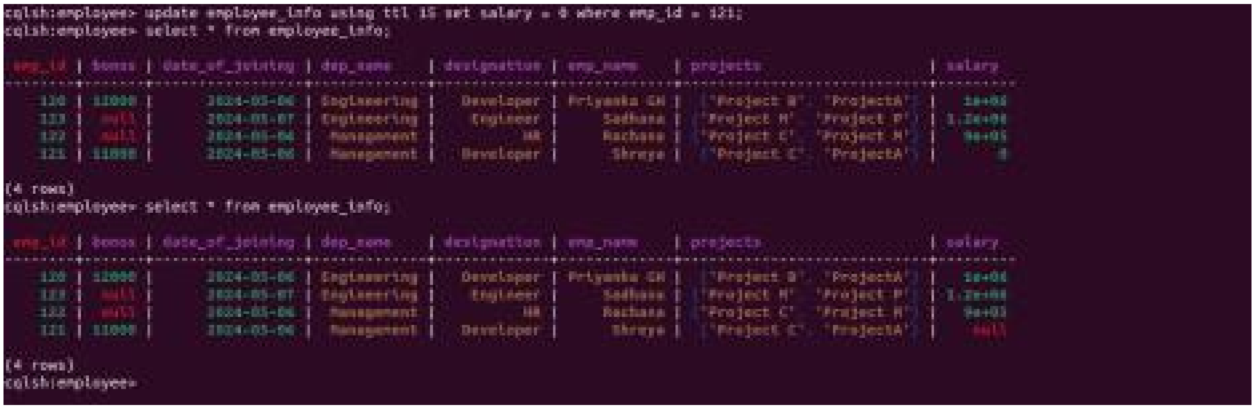
```
         ---------+--------------------------------+-------------------+----------
1 | 2023-10-08 18:30:00.000000+0000 | 98 | Sachin 2 | 2023-10-09 18:30:00.000000+0000 | null |
                         Ravi 4 | 2023-10-05 18:30:00.000000+0000 | 96.5 | Charan
                           3 | 2023-10-09 18:30:00.000000+0000 | 97.5 | Shreyas

         (4 rows)
         cqlsh:students> delete from students_info where roll_no=2;
         cqlsh:students> select * from students_info;

          roll_no | dateofjoining | last_exam_percent | studname
         ---------+--------------------------------+-------------------+----------
                             1 | 2023-10-08 18:30:00.000000+0000 | 98 | Sachin
                4 | 2023-10-05 18:30:00.000000+0000 | 96.5 | Charan
                      3 | 2023-10-09 18:30:00.000000+0000 | 97.5 | Shreyas

         (3 rows)
```

Cassandra : Employee

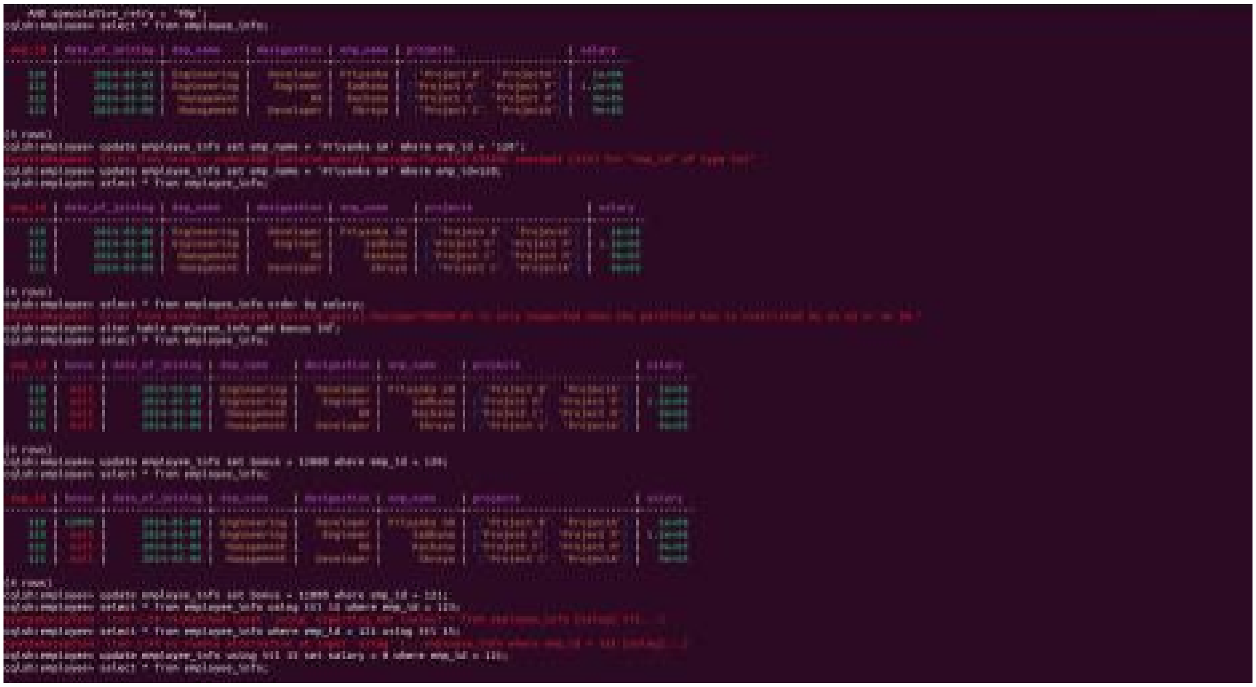
1. Create a keyspace by name Employee
2. Create a column family by name
Employee-Info with attributes
Emp_Id Primary Key, Emp_Name,
Designation, Date_of_Joining, Salary, Dept_Name
3. Insert the values into the table in batch
4. Update Employee name and Department of Emp-Id 121
5. Sort the details of Employee records based on salary
6. Alter the schema of the table Employee_Info to add a column Projects which stores a set of Projects done by the corresponding Employee.
7. Update the altered table to add project names.
8.Create a TTL of 15 seconds to display the values of Employees.



```
[illegible]:~$ cqlsh
Connected to Test Cluster at 127.0.0.1:9042
[cqlsh 6.1.0 | Cassandra 4.1.4 | CQL spec 3.4.6 | Native protocol v5]
Use HELP for help.
cqlsh> create keyspace Employee with replication = {'class':'SimpleStrategy';;replicationFactor':1};
[illegible]
cqlsh> create keyspace Employee WITH replication={'class':'SimpleStrategy','replicationFactor':1};
[illegible]
cqlsh> create keyspace Employee WITH replication={'class':'SimpleStrategy','replication_factor':1};
cqlsh> DESCRIBE KEYSPACES

employee  system_auth         system_schema  system_views
system    system_distributed  system_traces  system_virtual_schema

cqlsh> CREATE TABLE IF NOT EXISTS Employee_Info(
   ... Emp_id INT PRIMARY KEY,
   ... Emp_name TEXT,
   ... designation TEXT,
   ... date_of_joining DATE,
   ... Salary FLOAT,
   ... Dep_name TEXT,
   ... Projects SET<TEXT>);
[illegible]
cqlsh> USE EMPLOYEE
   ...
cqlsh> USE Employee
   ...
cqlsh> USE Employee;
cqlsh:employee> CREATE TABLE IF NOT EXISTS Employee_Info( Emp_id INT PRIMARY KEY, Emp_name TEXT, designation TEXT, date_of_joining DATE, Salary FLOAT, Dep_name TEXT, Projects SET<TEXT>);
cqlsh:employee> describe keyspace Employee

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

CREATE TABLE employee.employee_info (
    emp_id int PRIMARY KEY,
    date_of_joining date,
    dep_name text,
    designation text,
    emp_name text,
    salary float,
    projects set<text>
) 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
```



```
cqlsh:employee> update employee_info using ttl 15 set salary = 0 where emp_id = 121;
cqlsh:employee> select * from employee_info;

 emp_id | bonus | date_of_joining | dep_name    | designation | emp_name    | projects                     | salary
--------+-------+-----------------+-------------+-------------+-------------+------------------------------+---------
    120 | 12000 |      2024-05-06 | Engineering |   Developer | Priyanka GH |   {'Project B', 'ProjectA'}  |   1e+06
    123 |  null |      2024-05-07 | Engineering |    Engineer |     Sadhana | {'Project M', 'Project P'}   | 1.2e+06
    122 |  null |      2024-05-06 |  Management |          HR |     Rachana | {'Project C', 'Project M'}   |   9e+05
    121 | 11000 |      2024-05-06 |  Management |   Developer |      Shreya |  {'Project C', 'ProjectA'}   |       0

(4 rows)
cqlsh:employee> select * from employee_info;

 emp_id | bonus | date_of_joining | dep_name    | designation | emp_name    | projects                     | salary
--------+-------+-----------------+-------------+-------------+-------------+------------------------------+---------
    120 | 12000 |      2024-05-06 | Engineering |   Developer | Priyanka GH |   {'Project B', 'ProjectA'}  |   1e+06
    123 |  null |      2024-05-07 | Engineering |    Engineer |     Sadhana | {'Project M', 'Project P'}   | 1.2e+06
    122 |  null |      2024-05-06 |  Management |          HR |     Rachana | {'Project C', 'Project M'}   |   9e+05
    121 | 11000 |      2024-05-06 |  Management |   Developer |      Shreya |  {'Project C', 'ProjectA'}   |    null

(4 rows)
cqlsh:employee>
```



```
    AND speculative_retry = '99p';
cqlsh:employee> select * from employee_info;

 emp_id | date_of_joining | dep_name    | designation | emp_name | projects                   | salary
--------+-----------------+-------------+-------------+----------+----------------------------+---------
    120 |      2024-05-06 | Engineering |   Developer | Priyanka |  {'Project B', 'ProjectA'} |   1e+06
    123 |      2024-05-07 | Engineering |    Engineer |  Sadhana | {'Project M', 'Project P'} | 1.2e+06
    122 |      2024-05-06 |  Management |          HR |  Rachana | {'Project C', 'Project M'} |   9e+05
    121 |      2024-05-06 |  Management |   Developer |   Shreya |  {'Project C', 'ProjectA'} |   9e+05

(4 rows)
cqlsh:employee> update employee_info set emp_name = 'Priyanka GH' where emp_id = '120';
[illegible]
cqlsh:employee> update employee_info set emp_name = 'Priyanka GH' where emp_id=120;
cqlsh:employee> select * from employee_info;

 emp_id | date_of_joining | dep_name    | designation | emp_name    | projects                   | salary
--------+-----------------+-------------+-------------+-------------+----------------------------+---------
    120 |      2024-05-06 | Engineering |   Developer | Priyanka GH |  {'Project B', 'ProjectA'} |   1e+06
    123 |      2024-05-07 | Engineering |    Engineer |     Sadhana | {'Project M', 'Project P'} | 1.2e+06
    122 |      2024-05-06 |  Management |          HR |     Rachana | {'Project C', 'Project M'} |   9e+05
    121 |      2024-05-06 |  Management |   Developer |      Shreya |  {'Project C', 'ProjectA'} |   9e+05

(4 rows)
cqlsh:employee> select * from employee_info order by salary;
[illegible]
cqlsh:employee> alter table employee_info add bonus int;
cqlsh:employee> select * from employee_info;

 emp_id | bonus | date_of_joining | dep_name    | designation | emp_name    | projects                   | salary
--------+-------+-----------------+-------------+-------------+-------------+----------------------------+---------
    120 |  null |      2024-05-06 | Engineering |   Developer | Priyanka GH |  {'Project B', 'ProjectA'} |   1e+06
    123 |  null |      2024-05-07 | Engineering |    Engineer |     Sadhana | {'Project M', 'Project P'} | 1.2e+06
    122 |  null |      2024-05-06 |  Management |          HR |     Rachana | {'Project C', 'Project M'} |   9e+05
    121 |  null |      2024-05-06 |  Management |   Developer |      Shreya |  {'Project C', 'ProjectA'} |   9e+05

(4 rows)
cqlsh:employee> update employee_info set bonus = 12000 where emp_id = 120;
cqlsh:employee> select * from employee_info;

 emp_id | bonus | date_of_joining | dep_name    | designation | emp_name    | projects                   | salary
--------+-------+-----------------+-------------+-------------+-------------+----------------------------+---------
    120 | 12000 |      2024-05-06 | Engineering |   Developer | Priyanka GH |  {'Project B', 'ProjectA'} |   1e+06
    123 |  null |      2024-05-07 | Engineering |    Engineer |     Sadhana | {'Project M', 'Project P'} | 1.2e+06
    122 |  null |      2024-05-06 |  Management |          HR |     Rachana | {'Project C', 'Project M'} |   9e+05
    121 |  null |      2024-05-06 |  Management |   Developer |      Shreya |  {'Project C', 'ProjectA'} |   9e+05

(4 rows)
cqlsh:employee> update employee_info set bonus = 11000 where emp_id = 121;
cqlsh:employee> select * from employee_info using ttl 15 where emp_id = 121;
[illegible]
cqlsh:employee> select * from employee_info where emp_id = 121 using ttl 15;
[illegible]
cqlsh:employee> update employee_info using ttl 15 set salary = 0 where emp_id = 121;
cqlsh:employee> select * from employee_info;
```

HADOOP 13-05-24

```
hadoop@bmscecse-HP-Elite-Tower-800-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-800-G9-Desktop
PC] Starting resourcemanager
Starting nodemanagers
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hadoop dfs -mkdir
/sachin WARNING: Use of this script to execute dfs is deprecated.
WARNING: Attempting to execute replacement "hdfs dfs" instead.

hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs -mkdir
/sachin mkdir: `/sachin': File exists
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hadoop fs -ls
/ Found 1 items
drwxr-xr-x - hadoop supergroup 0 2024-05-13 14:27 /sachin

hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hadoop fs -ls
/sachin hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs –
put /home/hadoop/Desktop/example/Welcome.txt /sachin/WC.txt

hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs -cat
/sachin/WC.txt hiiii
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs -get
/sachin/WC.txt /home/hadoop/Desktop/example/WWC.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs -get
/sachin/WC.txt /home/hadoop/Desktop/example/WWC2.txt

hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs
- put /home/hadoop/Desktop/example/Welcome.txt /sachin/WC2.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hdfs dfs -getmerge
/sachin/WC.txt /sachin/WC2.txt /home/hadoop/Desktop/example/Merge.txt
hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hadoop fs -getfacl
/sachin/ # file: /sachin
# owner: hadoop
# group: supergroup
user::rwx
group::r-x
other::r-x

hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hadoop fs -mv /sachin
```

```
/WC2.txt hadoop@bmscecse-HP-Elite-Tower-800-G9-Desktop-PC:~$ hadoop fs -ls
/sachin /WC2.txt ls: `/sachin': No such file or directory
Found 2 items
-rw-r--r-- 1 hadoop supergroup 6 2024-05-13 14:51 /WC2.txt/WC.txt -rw-r--r-- 1 hadoop
supergroup 6 2024-05-13 15:03 /WC2.txt/WC2.txt
hadoop@bmscecse-HP-Elite-Tower-800- G9-Desktop-PC:~$ hadoop fs -cp /WC2.txt/
/WC.txt
```

BDA LAB-5 DATE:-27-05-2024 Implement WordCount Program on Hadoop framework

Mapper Code:

```
import java.io.IOException;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.LongWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapred.MapReduceBase;

import org.apache.hadoop.mapred.Mapper;

import org.apache.hadoop.mapred.OutputCollector;

import org.apache.hadoop.mapred.Reporter;

public class WCMapper extends MapReduceBase implements

Mapper<LongWritable, Text, Text,

IntWritable> {

public void map(LongWritable key, Text value,

OutputCollector<Text, IntWritable> output, Reporter rep) throws

IOException

{

String line = value.toString();

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

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

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

IntWritable(1)); } } } }
```

Reducer Code:

```
// Importing libraries

import java.io.IOException;

import java.util.Iterator;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapred.MapReduceBase;

import org.apache.hadoop.mapred.OutputCollector;

import org.apache.hadoop.mapred.Reducer;

import org.apache.hadoop.mapred.Reporter;

public class WCReducer extends MapReduceBase implements

Reducer<Text, IntWritable, Text, IntWritable> {

// Reduce function

public void reduce(Text key, Iterator<IntWritable> value,

OutputCollector<Text, IntWritable> output,

Reporter rep) throws IOException

{

int count = 0;

// Counting the frequency of each words

while (value.hasNext())
{

IntWritable i = value.next();
count += i.get();

}
output.collect(key, new IntWritable(count));
} }
```

Driver Code: You have to copy paste this program into the WCDriver Java Class file. // Importing libraries

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

conf.setMapOutputKeyClass(Text.class);

conf.setMapOutputValueClass(IntWritable.class

) ; conf.setOutputKeyClass(Text.class);

conf.setOutputValueClass(IntWritable.class)

; JobClient.runJob(conf);

return 0;

}

// Main Method

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

{

int exitCode = ToolRunner.run(new WCDriver(),

args); System.out.println(exitCode);

}

}
```

From the following link extract the weather

data

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

Create a Map Reduce program to

a) find average temperature for each year from NCDC data set.

AverageDriver

```
package temp;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

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

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

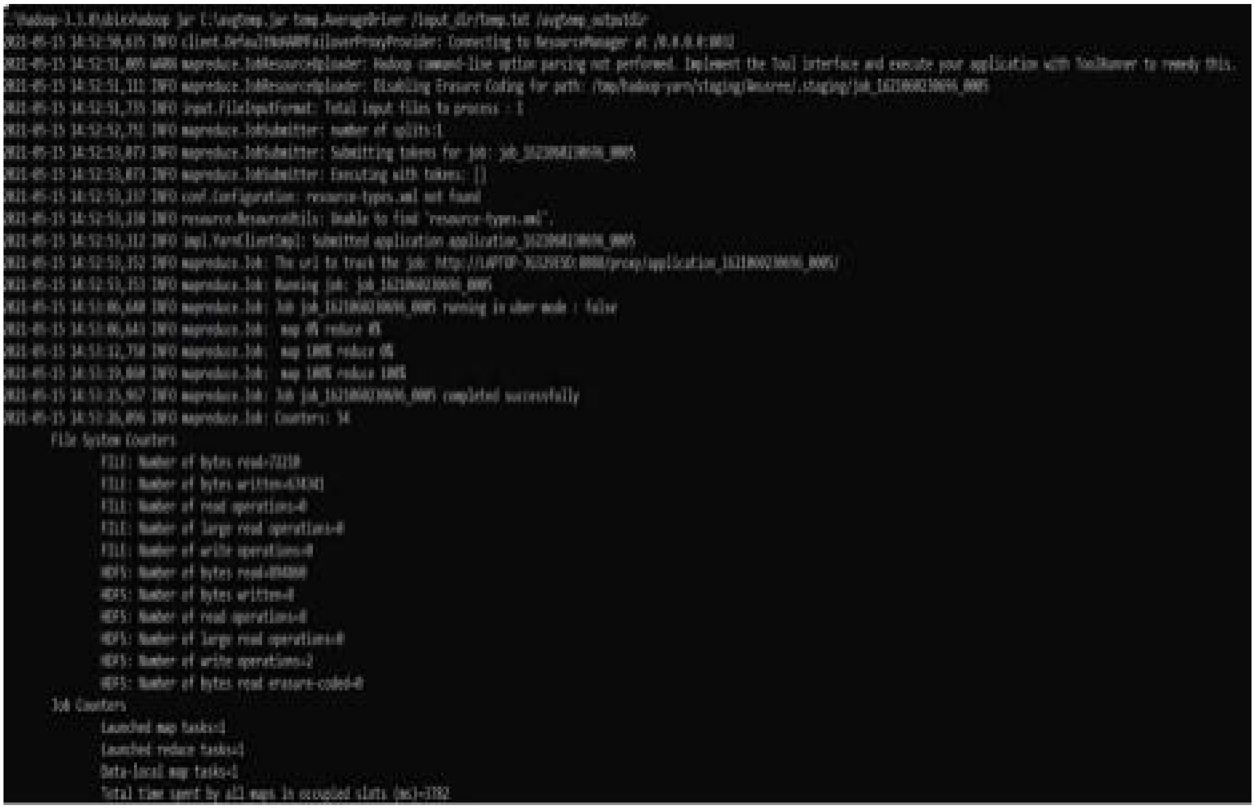
AverageMapper

```
package temp;
import java.io.IOException;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Mapper;

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

{ public static final int MISSING = 9999;

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

Text, IntWritable>.Context context) throws IOException, InterruptedException

{ int temperature;

String line = value.toString();

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

if (line.charAt(87) == '+') {

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

} else {
temperature = Integer.parseInt(line.substring(87, 92));

}

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

if (temperature != 9999 && quality.matches("[01459]"))

context.write(new Text(year), new IntWritable(temperature));

}
}
```

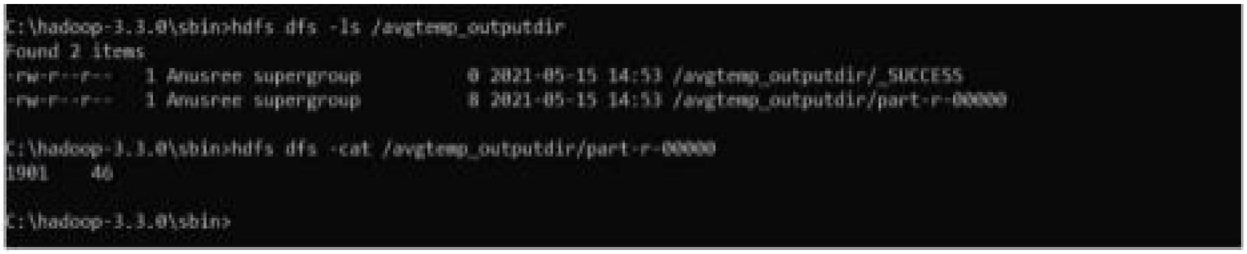
AverageReducer

```
package temp;

import java.io.IOException;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Reducer;

public class AverageReducer extends Reducer<Text, IntWritable, Text, IntWritable>
```

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

IntWritable, Text, IntWritable>.Context context) throws IOException,

InterruptedException { int max_temp = 0;

int count = 0;

for (IntWritable value : values) {

max_temp += value.get();

count++;

}

context.write(key, new IntWritable(max_temp / count));

}}
```



```
C:\hadoop-3.3.0\sbin>hadoop jar C:\avgtemp.jar temp.AverageDriver /input_dir/temp.txt /avgtemp_outputdir
2021-05-15 14:52:50,635 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2021-05-15 14:52:51,005 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2021-05-15 14:52:51,111 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/Anusree/.staging/job_1621060230696_0005
2021-05-15 14:52:51,735 INFO input.FileInputFormat: Total input files to process : 1
2021-05-15 14:52:52,751 INFO mapreduce.JobSubmitter: number of splits:1
2021-05-15 14:52:53,073 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1621060230696_0005
2021-05-15 14:52:53,073 INFO mapreduce.JobSubmitter: Executing with tokens: []
2021-05-15 14:52:53,237 INFO conf.Configuration: resource-types.xml not found
2021-05-15 14:52:53,238 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2021-05-15 14:52:53,312 INFO impl.YarnClientImpl: Submitted application application_1621060230696_0005
2021-05-15 14:52:53,352 INFO mapreduce.Job: The url to track the job: http://LAPTOP-JG329ESD:8088/proxy/application_1621060230696_0005/
2021-05-15 14:52:53,353 INFO mapreduce.Job: Running job: job_1621060230696_0005
2021-05-15 14:53:06,640 INFO mapreduce.Job: Job job_1621060230696_0005 running in uber mode : false
2021-05-15 14:53:06,643 INFO mapreduce.Job:  map 0% reduce 0%
2021-05-15 14:53:12,758 INFO mapreduce.Job:  map 100% reduce 0%
2021-05-15 14:53:19,860 INFO mapreduce.Job:  map 100% reduce 100%
2021-05-15 14:53:25,967 INFO mapreduce.Job: Job job_1621060230696_0005 completed successfully
2021-05-15 14:53:26,096 INFO mapreduce.Job: Counters: 54
        File System Counters
                FILE: Number of bytes read=72210
                FILE: Number of bytes written=674341
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=894860
                HDFS: Number of bytes written=8
                HDFS: Number of read operations=8
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
                HDFS: Number of bytes read erasure-coded=0
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=3782
```



```
C:\hadoop-3.3.0\sbin>hdfs dfs -ls /avgtemp_outputdir
Found 2 items
-rw-r--r--   1 Anusree supergroup          0 2021-05-15 14:53 /avgtemp_outputdir/_SUCCESS
-rw-r--r--   1 Anusree supergroup          8 2021-05-15 14:53 /avgtemp_outputdir/part-r-00000

C:\hadoop-3.3.0\sbin>hdfs dfs -cat /avgtemp_outputdir/part-r-00000
1901    46

C:\hadoop-3.3.0\sbin>
```

b) find the mean max temperature for every month MeanMaxDriver.class

```
package meanmax;
```

```
import org.apache.hadoop.fs.Path;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Job;

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

public class MeanMaxDriver {

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

{ if (args.length != 2) {

System.err.println("Please Enter the input and output

parameters"); System.exit(-1);

}

Job job = new Job();

job.setJarByClass(MeanMaxDriver.class);

job.setJobName("Max temperature");

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

FileOutputFormat.setOutputPath(job, new

Path(args[1]));

job.setMapperClass(MeanMaxMapper.class);

job.setReducerClass(MeanMaxReducer.class);

job.setOutputKeyClass(Text.class);

job.setOutputValueClass(IntWritable.class);

System.exit(job.waitForCompletion(true) ? 0 : 1);

}

}
```

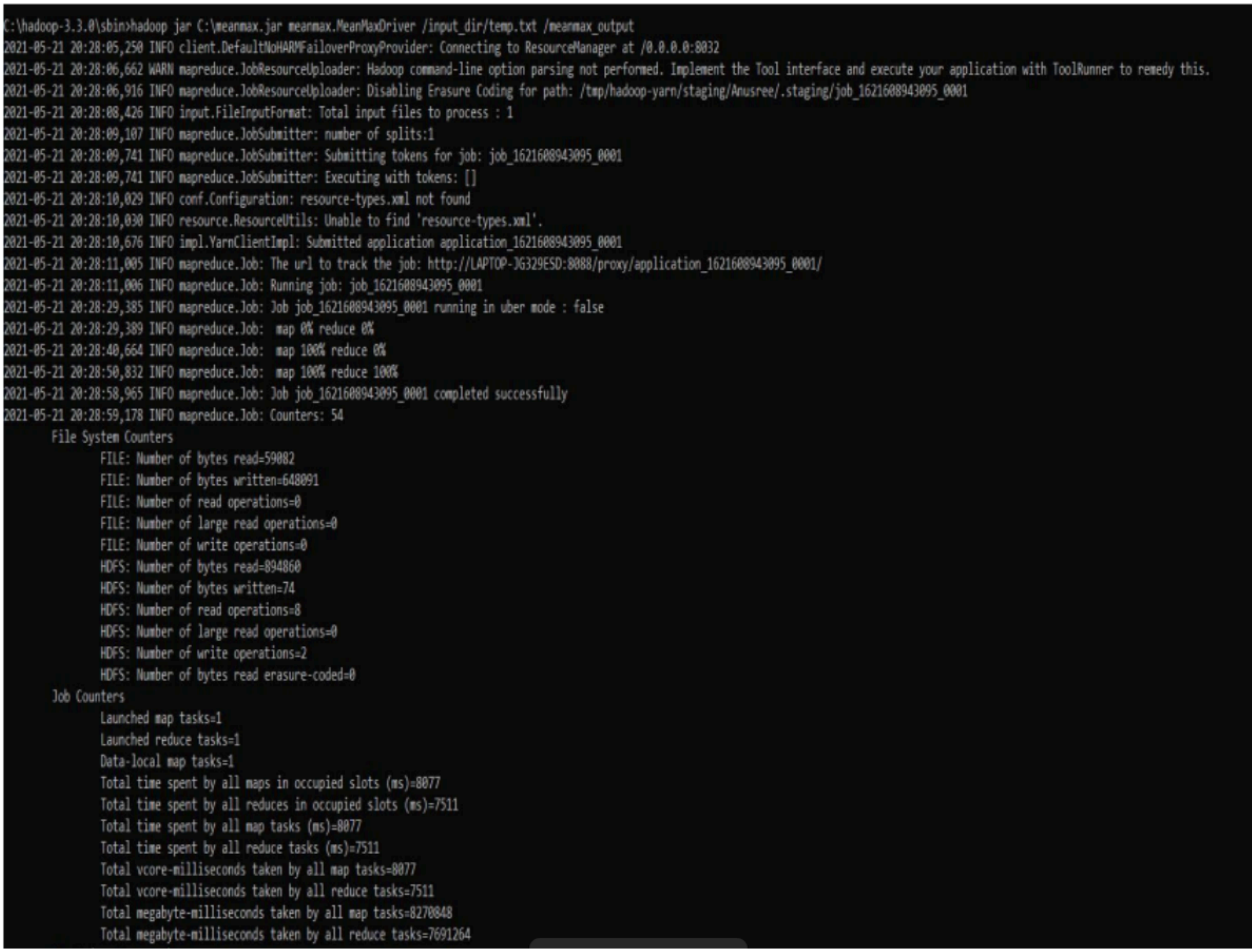
MeanMaxMapper.class

```
package meanmax;
```

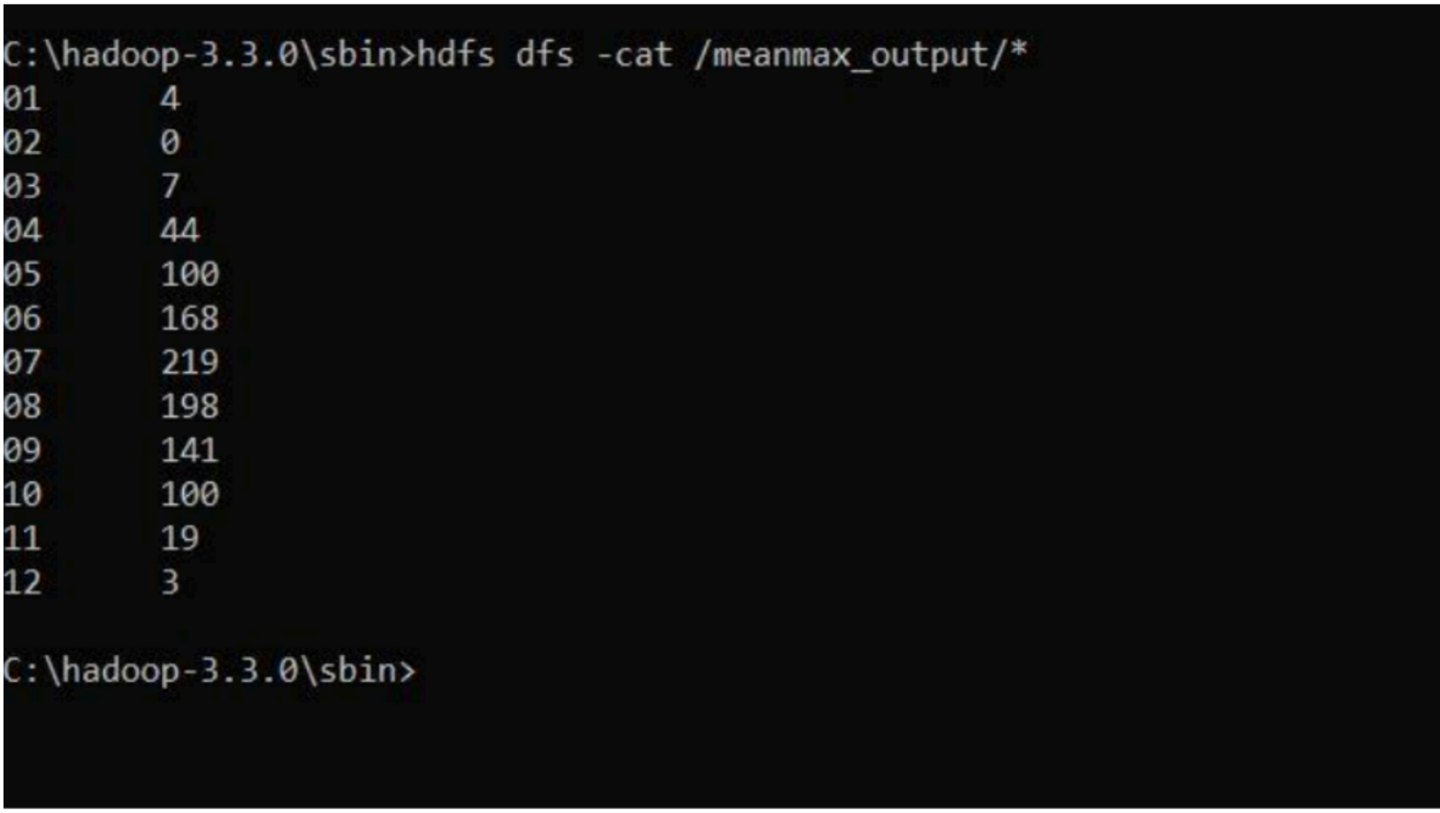
```
import java.io.IOException;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Mapper;

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

{ public static final int MISSING = 9999;

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

Text, IntWritable>.Context context) throws IOException, InterruptedException

{ int temperature;



String line = value.toString();

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

if (line.charAt(87) == '+') {

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

} else {

temperature = Integer.parseInt(line.substring(87, 92));

}

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

if (temperature != 9999 && quality.matches("[01459]"))

context.write(new Text(month), new IntWritable(temperature));

}

}
```

MeanMaxReducer.class

```
package meanmax;

import java.io.IOException;

import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Reducer;

public class MeanMaxReducer extends Reducer<Text, IntWritable, Text, IntWritable>

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

IntWritable, Text, IntWritable>.Context context) throws IOException,

InterruptedException { int max_temp = 0;

int total_temp = 0;

int count = 0;

int days = 0;


for (IntWritable value : values) {

int temp = value.get();

if (temp > max_temp)

max_temp = temp;

count++;

if (count == 3) {

total_temp += max_temp;

max_temp = 0;

count = 0;

days++;

}

}
context.write(key, new IntWritable(total_temp / days));

}

}
```



```
C:\hadoop-3.3.0\sbin>hadoop jar C:\meanmax.jar meanmax.MeanMaxDriver /input_dir/temp.txt /meanmax_output
2021-05-21 20:28:05,250 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2021-05-21 20:28:06,662 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2021-05-21 20:28:06,916 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/Anusree/.staging/job_1621608943095_0001
2021-05-21 20:28:08,426 INFO input.FileInputFormat: Total input files to process : 1
2021-05-21 20:28:09,107 INFO mapreduce.JobSubmitter: number of splits:1
2021-05-21 20:28:09,741 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1621608943095_0001
2021-05-21 20:28:09,741 INFO mapreduce.JobSubmitter: Executing with tokens: []
2021-05-21 20:28:10,029 INFO conf.Configuration: resource-types.xml not found
2021-05-21 20:28:10,030 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2021-05-21 20:28:10,676 INFO impl.YarnClientImpl: Submitted application application_1621608943095_0001
2021-05-21 20:28:11,005 INFO mapreduce.Job: The url to track the job: http://LAPTOP-JG329ESD:8088/proxy/application_1621608943095_0001/
2021-05-21 20:28:11,006 INFO mapreduce.Job: Running job: job_1621608943095_0001
2021-05-21 20:28:29,385 INFO mapreduce.Job: Job job_1621608943095_0001 running in uber mode : false
2021-05-21 20:28:29,389 INFO mapreduce.Job:  map 0% reduce 0%
2021-05-21 20:28:40,664 INFO mapreduce.Job:  map 100% reduce 0%
2021-05-21 20:28:50,832 INFO mapreduce.Job:  map 100% reduce 100%
2021-05-21 20:28:58,965 INFO mapreduce.Job: Job job_1621608943095_0001 completed successfully
2021-05-21 20:28:59,178 INFO mapreduce.Job: Counters: 54
        File System Counters
                FILE: Number of bytes read=59082
                FILE: Number of bytes written=648091
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=894860
                HDFS: Number of bytes written=74
                HDFS: Number of read operations=8
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
                HDFS: Number of bytes read erasure-coded=0
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=8077
                Total time spent by all reduces in occupied slots (ms)=7511
                Total time spent by all map tasks (ms)=8077
                Total time spent by all reduce tasks (ms)=7511
                Total vcore-milliseconds taken by all map tasks=8077
                Total vcore-milliseconds taken by all reduce tasks=7511
                Total megabyte-milliseconds taken by all map tasks=8270848
                Total megabyte-milliseconds taken by all reduce tasks=7691264
```



```
C:\hadoop-3.3.0\sbin>hdfs dfs -cat /meanmax_output/*
01      4
02      0
03      7
04      44
05      100
06      168
07      219
08      198
09      141
10      100
11      19
12      3

C:\hadoop-3.3.0\sbin>
```

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.

Driver-TopN.class

```
package samples.topn;

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.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Job;

import org.apache.hadoop.mapreduce.Mapper;

import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;

import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;

import org.apache.hadoop.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("Top N");
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[0]));

FileOutputFormat.setOutputPath(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 tokens = "[_|$#<>\\^=\\[\\]\\*/\\\\,;,.\\-:()?!\""]";

public void map(Object key, Text value, Mapper<Object, Text, Text,

IntWritable>.Context context) throws IOException, InterruptedException {

String cleanLine = value.toString().toLowerCase().replaceAll(this.tokens, "

"); StringTokenizer itr = new StringTokenizer(cleanLine);

while (itr.hasMoreTokens()) {

this.word.set(itr.nextToken().trim());

context.write(this.word, one);

}

}

}

}
```

TopNCombiner.class

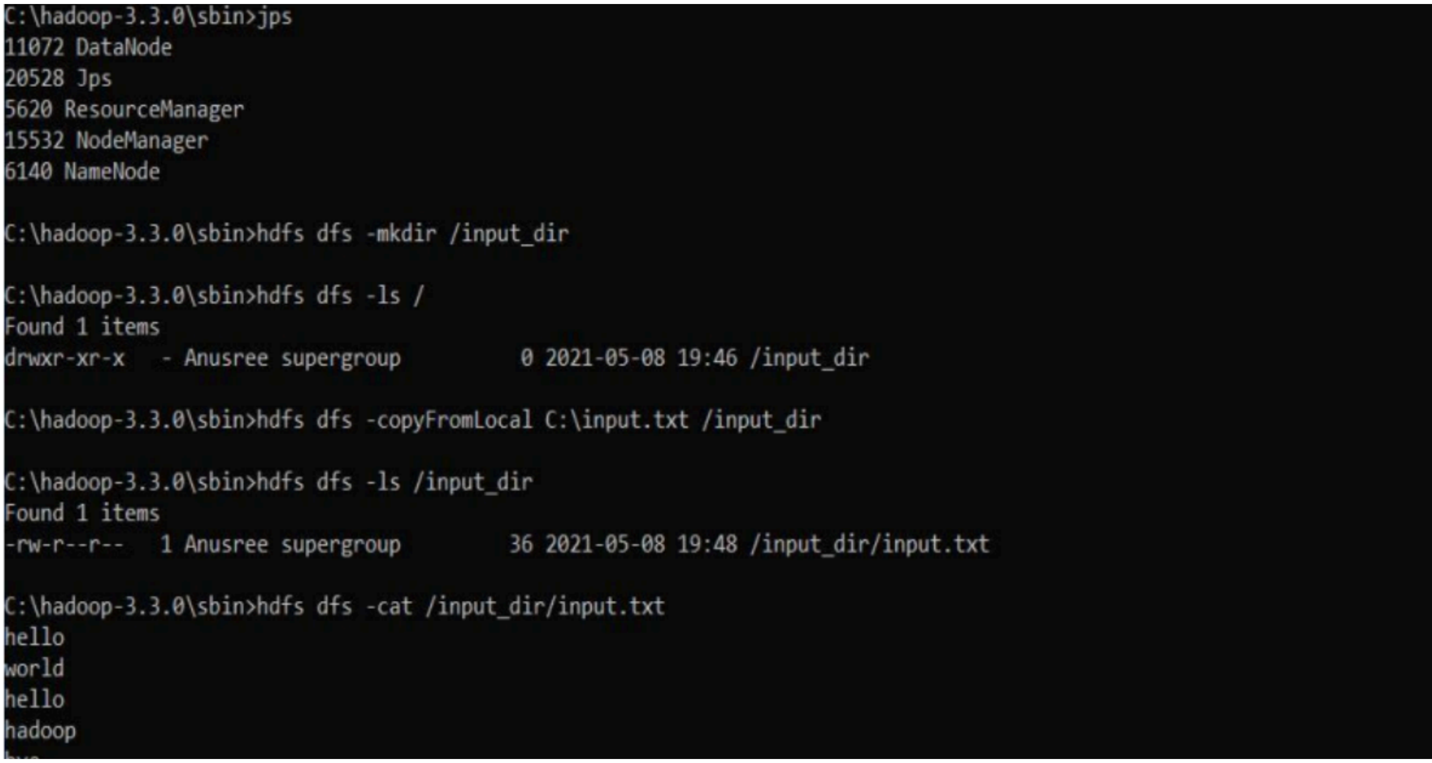
```
package samples.topn;

import java.io.IOException;
import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Reducer;


public class TopNCombiner extends Reducer<Text, IntWritable, Text, IntWritable> {

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

IntWritable, Text, IntWritable>.Context context) throws IOException,

InterruptedException { int sum = 0;

for (IntWritable val : values)

sum += val.get();

context.write(key, new IntWritable(sum));

}

}
```

TopNMapper.class

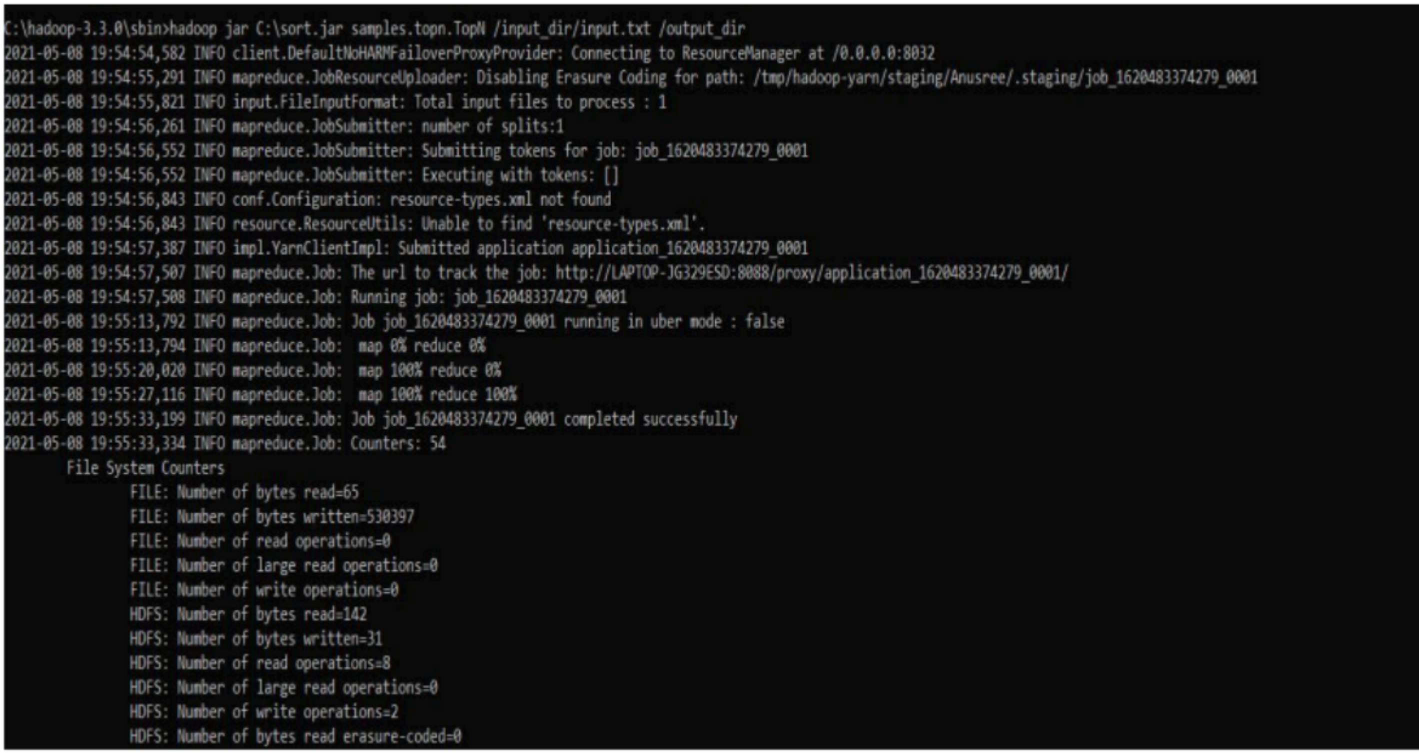
```
package samples.topn;

import java.io.IOException;

import java.util.StringTokenizer;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

import org.apache.hadoop.mapreduce.Mapper;

public class TopNMapper extends Mapper<Object, Text, Text, IntWritable>

{ private static final IntWritable one = new IntWritable(1);

private Text word = new Text();

private String tokens = "[_|$#<>\\^=\\[\\]\\*/\\\\,;,.\\-:()?!\""]";

public void map(Object key, Text value, Mapper<Object, Text, Text,
IntWritable>.Context context) throws IOException, InterruptedException {

String cleanLine = value.toString().toLowerCase().replaceAll(this.tokens, "

"); StringTokenizer itr = new StringTokenizer(cleanLine);




while (itr.hasMoreTokens()) {

this.word.set(itr.nextToken().trim());


context.write(this.word, one);

}

}

}
```

TopNReducer.class

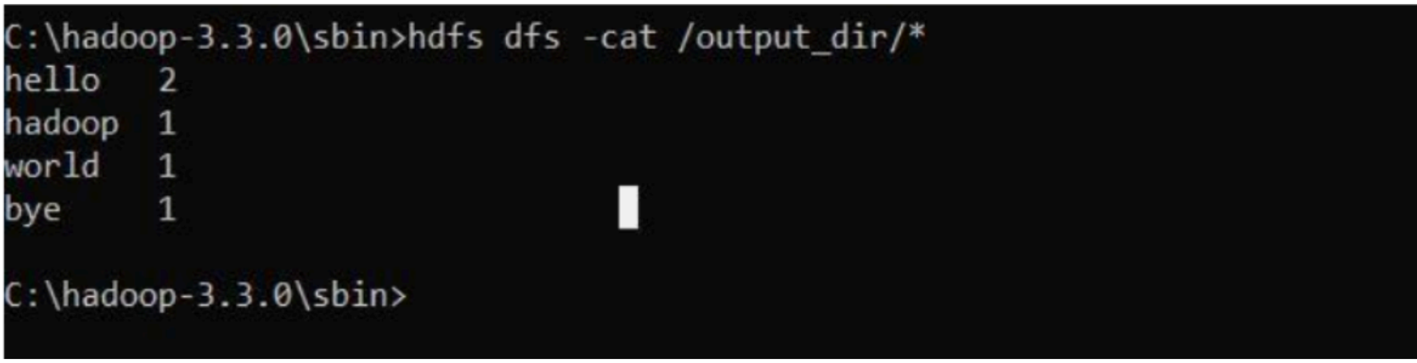
```
package samples.topn;

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.mapreduce.Reducer;

import utils.MiscUtils;
public class TopNReducer extends Reducer<Text, IntWritable, 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<Text, IntWritable, Text, IntWritable>.Context
context) throws IOException, InterruptedException {
Map<Text, IntWritable> sortedMap =
MiscUtils.sortByValues(this.countMap); int counter = 0;
for (Text key : sortedMap.keySet()) {
if (counter++ == 20)
break;
context.write(key, sortedMap.get(key));
}
}
}
```



```
C:\hadoop-3.3.0\sbin>jps
11072 DataNode
20528 Jps
5620 ResourceManager
15532 NodeManager
6140 NameNode

C:\hadoop-3.3.0\sbin>hdfs dfs -mkdir /input_dir

C:\hadoop-3.3.0\sbin>hdfs dfs -ls /
Found 1 items
drwxr-xr-x   - Anusree supergroup          0 2021-05-08 19:46 /input_dir

C:\hadoop-3.3.0\sbin>hdfs dfs -copyFromLocal C:\input.txt /input_dir

C:\hadoop-3.3.0\sbin>hdfs dfs -ls /input_dir
Found 1 items
-rw-r--r--   1 Anusree supergroup         36 2021-05-08 19:48 /input_dir/input.txt

C:\hadoop-3.3.0\sbin>hdfs dfs -cat /input_dir/input.txt
hello
world
hello
hadoop
```



```
C:\hadoop-3.3.0\sbin>hadoop jar C:\sort.jar samples.topn.TopN /input_dir/input.txt /output_dir
2021-05-08 19:54:54,582 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2021-05-08 19:54:55,291 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/Anusree/.staging/job_1620483374279_0001
2021-05-08 19:54:55,821 INFO input.FileInputFormat: Total input files to process : 1
2021-05-08 19:54:56,261 INFO mapreduce.JobSubmitter: number of splits:1
2021-05-08 19:54:56,552 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1620483374279_0001
2021-05-08 19:54:56,552 INFO mapreduce.JobSubmitter: Executing with tokens: []
2021-05-08 19:54:56,843 INFO conf.Configuration: resource-types.xml not found
2021-05-08 19:54:56,843 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2021-05-08 19:54:57,387 INFO impl.YarnClientImpl: Submitted application application_1620483374279_0001
2021-05-08 19:54:57,507 INFO mapreduce.Job: The url to track the job: http://LAPTOP-JG329ESD:8088/proxy/application_1620483374279_0001/
2021-05-08 19:54:57,508 INFO mapreduce.Job: Running job: job_1620483374279_0001
2021-05-08 19:55:13,792 INFO mapreduce.Job: Job job_1620483374279_0001 running in uber mode : false
2021-05-08 19:55:13,794 INFO mapreduce.Job:  map 0% reduce 0%
2021-05-08 19:55:20,020 INFO mapreduce.Job:  map 100% reduce 0%
2021-05-08 19:55:27,116 INFO mapreduce.Job:  map 100% reduce 100%
2021-05-08 19:55:33,199 INFO mapreduce.Job: Job job_1620483374279_0001 completed successfully
2021-05-08 19:55:33,334 INFO mapreduce.Job: Counters: 54
        File System Counters
                FILE: Number of bytes read=65
                FILE: Number of bytes written=530397
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=142
                HDFS: Number of bytes written=31
                HDFS: Number of read operations=8
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
                HDFS: Number of bytes read erasure-coded=0
```



```
C:\hadoop-3.3.0\sbin>hdfs dfs -cat /output_dir/*
hello   2
hadoop  1
world   1
bye     1

C:\hadoop-3.3.0\sbin>
```