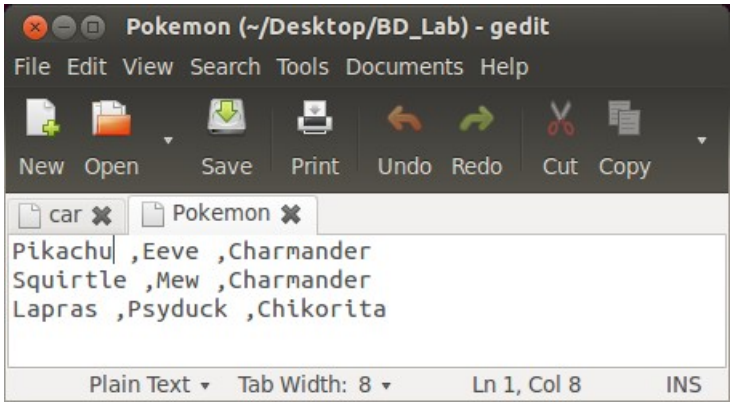
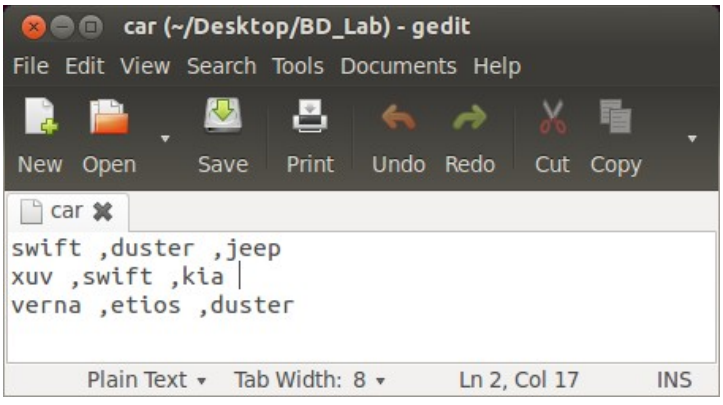
LAB CODES

WORDCOUNT

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class wordcount {
  public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>
 {

 IntWritable one = new IntWritable(1);

public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException {
        String[] line = value.toString().split(",");
        for(String lines:line) {
            context.write(new Text(lines),one);
        }     }
    }


  public static class Reduce extends Reducer<Text, IntWritable, Text, IntWritable> {
         public void reduce(Text key, Iterable<IntWritable> values, Context context)
         throws IOException, InterruptedException {          int sum = 0;
             for (IntWritable val : values) {
                 sum += val.get();
             }
        context.write(key, new IntWritable(sum));
         }  }


  public static void main(String[] args) throws Exception {
    Configuration conf = new Configuration();
      Job job = new Job(conf, "wordcount");
      job.setJarByClass(wordcount.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
      job.setMapperClass(Map.class);
    job.setReducerClass(Reduce.class);
    job.setInputFormatClass(TextInputFormat.class);
      job.setOutputFormatClass(TextOutputFormat.class);
      FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
      job.waitForCompletion(true);
      }
      }
```

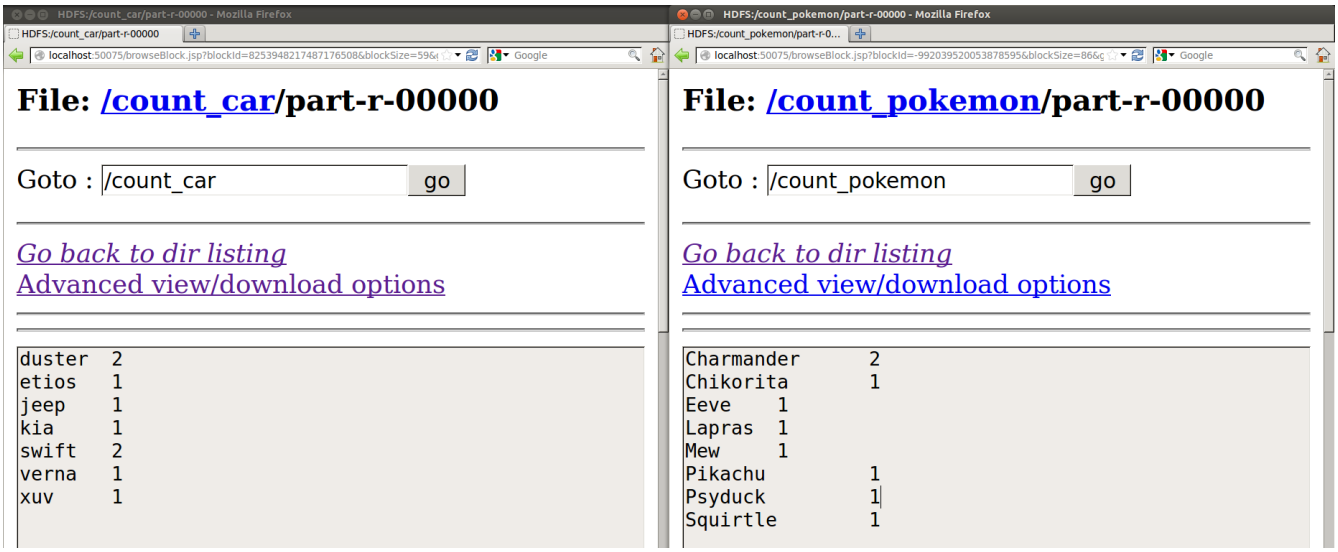
INPUT





OUTPUT

hadoop jar /home/ponny/Desktop/BD_Lab/wc.jar wordcount /Pokemon /count_pokemon



Identify the word that occurs maximum number of times from a file from HDFS

Wait until the reduce function gets complete to print the final result
setup task, cleanup task => runs for every map-reduce task internally
setup task => tasks to be performed before map
cleanup task =>

- tasks to be performed after map-reduce
- aggregate the final result

MAX_WORDCOUNT

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class max_wordcount {
  public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>
 {

 IntWritable one = new IntWritable(1);

public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException {
        String[] line = value.toString().split(",");
        for(String lines:line) {
            context.write(new Text(lines),one);
        }
      }
    }


  public static class Reduce extends Reducer<Text, IntWritable, Text, IntWritable> {
        public  IntWritable res1 = new IntWritable();
```

```
        public Text wrd1  = new Text();
    int max=0;


    public void reduce(Text key, Iterable<IntWritable> values, Context context)
      throws IOException, InterruptedException {
        int sum =0;

          for (IntWritable val : values) {

              sum += val.get();

              if(sum>max)
              {
                    max = sum;
                    wrd1.set(key);
                    res1.set(max);
              }
          }
    }


    public void cleanup(Context context) throws IOException, InterruptedException {
          context.write(wrd1,res1);
    }
  }

public static void main(String[] args) throws Exception {
       Configuration conf = new Configuration();
        Job job = new Job(conf, "max_wordcount");
          job.setJarByClass(max_wordcount.class);
        job.setOutputKeyClass(Text.class);
        job.setOutputValueClass(IntWritable.class);
          job.setMapperClass(Map.class);
        job.setReducerClass(Reduce.class);
        job.setInputFormatClass(TextInputFormat.class);
          job.setOutputFormatClass(TextOutputFormat.class);
          FileInputFormat.addInputPath(job, new Path(args[0]));
          FileOutputFormat.setOutputPath(job, new Path(args[1]));
          job.waitForCompletion(true);
          }
    }
```

hadoop jar /home/ponny/Desktop/BD_Lab/max_wc.jar max_wordcount /car /max_car

hadoop jar /home/ponny/Desktop/BD_Lab/max_wc.jar max_wordcount /Pokemon /max_pokemon

File: /max_car/part-r-00000

Goto : /max_car go

Go back to dir listing
Advanced view/download options

```
duster  2
```

File: /max_pokemon/part-r-00000

Goto : /max_pokemon go

Go back to dir listing
Advanced view/download options

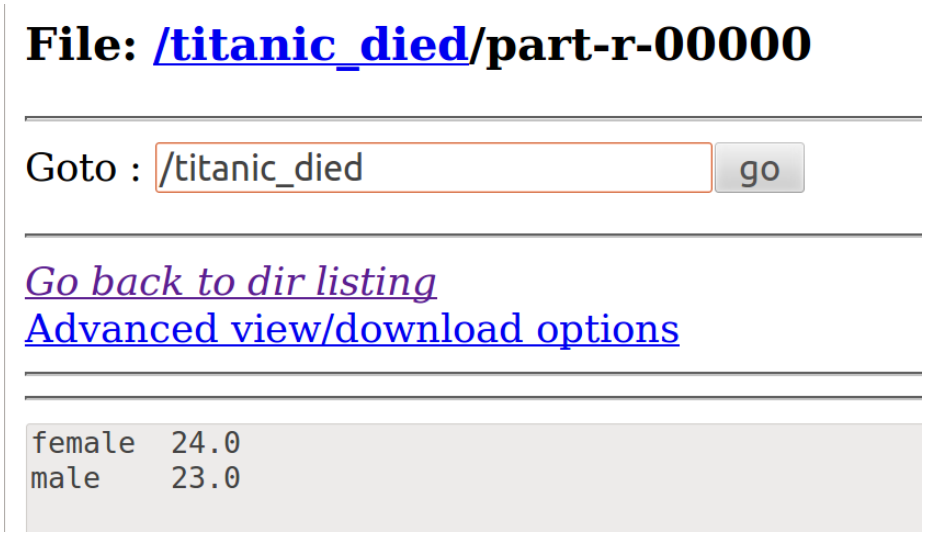
```
Charmander      2
```

TITANIC_DIED

Find the average age of males and females who died in the Titanic tragedy from the given input file. Also find the **maximum average age of female and male**.

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class titanic_died {
  public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>
 {

public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException {
        String[] line = value.toString().split(",");
        int a= Integer.parseInt(line[1]);

        if(a==1){ //If Died
            try
            {
            context.write(new Text(line[4]),new IntWritable(Integer.parseInt(line[5])));
            }

            catch(Exception  e)
            {
                  context.write(new Text(line[4]),new IntWritable(Integer.parseInt("0")));
            }

          }

        }
   }

  public static class Reduce extends Reducer<Text, IntWritable, Text, FloatWritable> {

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

            int sum =0 , n=0;;
            float avg;

              for (IntWritable val : values)
              {
                  n+=1;
                  sum += val.get();
              }
                        avg= sum/n;
                        context.write(key , new FloatWritable(avg));

              }
    }


  public static void main(String[] args) throws Exception {
         Configuration conf = new Configuration();
      Job job = new Job(conf, "titanic_died");
      job.setJarByClass(titanic_died.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
      job.setMapperClass(Map.class);
    job.setReducerClass(Reduce.class);
    job.setInputFormatClass(TextInputFormat.class);
      job.setOutputFormatClass(TextOutputFormat.class);
      FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
      job.waitForCompletion(true);
      }
```

```
}
```



SALARY1

Write a map reduce programming to find the details of the persons with the salary > 60,000 euros and years of experience >15. Also display the **total number of records (hint: Use Cleanup)** satisfying this condition. The output of the HDFS is:
country name, years of experience, salary

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;

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

public class salary1 {

public static class Map extends Mapper<LongWritable, Text, Text, Text>

{

IntWritable one = new IntWritable(1);

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

String[] line = value.toString().split(",");

if (Float.parseFloat(line[1])>60000 && Float.parseFloat(line[0])>15){

      //Key: country, Value: Salary , Years of experience
      context.write(new Text(line[3]),new Text(" , "+line[1]+" , "+line[0]));
}
}
}

public static class Reduce extends Reducer<Text, Text, Text, Text> {
int sum = 0;
public void reduce(Text key, Iterable<Text> values, Context context) throws IOException,
InterruptedException {
for (Text val : values) {
```

```
        context.write(key,val);
        sum++;
}

}
public void cleanup(Context context) throws IOException, InterruptedException
{
 context.write(new Text("Total Records: "),new Text(Integer.toString(sum)));
}
}

public static void main(String[] args) throws Exception {
Configuration conf = new Configuration();
Job job = new Job(conf, "salary1");
job.setJarByClass(salary1.class);
job.setOutputKeyClass(Text.class);
job.setOutputValueClass(Text.class);
job.setMapperClass(Map.class);
job.setReducerClass(Reduce.class);
job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);
FileInputFormat.addInputPath(job, new Path(args[0]));
FileOutputFormat.setOutputPath(job, new Path(args[1]));
job.waitForCompletion(true);
}
}
```

Goto : /tot_sal go

Go back to dir listing
Advanced view/download options

```
Germany   , 70000 , 18
Ireland   , 100000 , 20
Ireland   , 90000 , 18
Ireland   , 103000 , 16
Ireland   , 80000 , 20
Ireland   , 80000 , 20
Netherlands       , 82000 , 20
Netherlands       , 90000 , 17
Norway    , 820000 , 22
Norway    , 110000 , 25
Norway    , 81000 , 18
Norway    , 75653 , 20
Sweden    , 120000 , 20
Sweden    , 76600 , 19
Sweden    , 63000 , 20
Switzerland       , 113996 , 20
United Kingdom    , 65000 , 29
United Kingdom    , 210000 , 16
United Kingdom    , 185000 , 18
United Kingdom    , 181339 , 27
United Kingdom    , 150000 , 20
United Kingdom    , 100000 , 20
United Kingdom    , 70915 , 18
United Kingdom    , 130000 , 25
Total Records:  39
```

Input/Output Formats

KeyValueTextInputFormat

Use the car details file(occurrences of the car, i.e, car name and its count) that you have created in the hdfs..

In HDFS by default the tab is the separator. Search a particular car and display its count.

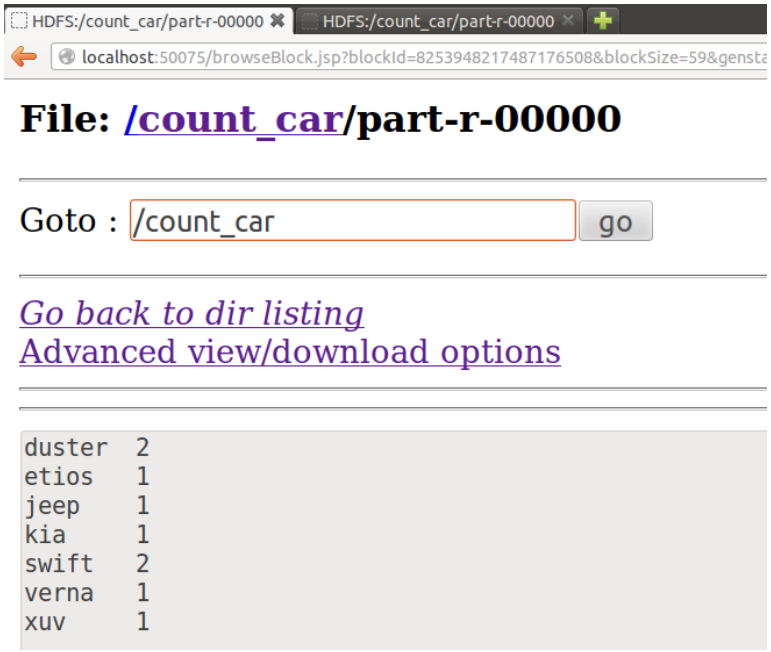
Given

- **[car_count] wordcount output as input**
- Separator ⇒ Tab
- Display the key along with its value
- Car names ⇒ Key (Text DataType)

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.Mapper.Context;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

public class keyval {

       public static class Map extends Mapper<Text, Text, Text, Text>
       {
             String s ="duster "; // fetch only the duster count
      public void map(Text key, Text value, Context context) throws IOException,
InterruptedException {
      String line=key.toString();
      if(s.equalsIgnoreCase(line))
                  context.write(key, value);
      }
       }

public static void main(String[] args) throws Exception {
      Configuration conf = new Configuration();

conf.set("mapreduce.input.keyvaluelinerecordreader.key.value.separator", "\t");

      Job job = new Job(conf, "keyval");

      job.setJarByClass(keyval.class);

      job.setOutputKeyClass(Text.class);
      job.setOutputValueClass(Text.class);

      job.setMapperClass(Map.class);

      job.setInputFormatClass(KeyValueTextInputFormat.class);

      job.setOutputFormatClass(TextOutputFormat.class);
      FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
      job.waitForCompletion(true);
            }
}
```

hadoop jar /home/ponny/Desktop/BD_Lab/key_val.jar keyval /count_car/part-r-00000 /car_keyvalue

Input



Output

NLineInputFormat

N ⇒ No. of Records
I/P file ⇒ 6 Records
Map Task ⇒ Has to Read only 3 Records from I/P File
Thus we need **2** Map Tasks

To see the Mapper O/P , **Set ⇒ Reducer(0)**

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class nline {
  public static class Map extends Mapper<LongWritable, Text, Text, Text>
 {
```

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

            String[] line = value.toString().split(",");

            context.write(new Text(line[0]),new Text(" , "+line[1]+" , "+line[2]+" ,
"+line[3]+" , "+line[4]));
                }
                        }


  public static void main(String[] args) throws Exception {
         Configuration conf = new Configuration();

         conf.setInt(NLineInputFormat.LINES_PER_MAP,3);

       Job job = new Job(conf, "nline");
       job.setJarByClass(nline.class);
       job.setOutputKeyClass(Text.class);
       job.setMapperClass(Map.class);

     job.setInputFormatClass(NLineInputFormat.class);

     job.setNumReduceTasks(0);

    job.setOutputFormatClass(TextOutputFormat.class);
    FileInputFormat.addInputPath(job, new Path(args[0]));
    FileOutputFormat.setOutputPath(job, new Path(args[1]));
       job.waitForCompletion(true);
       }
       }
```

Input

CustomerID	Genre	Age	Annual_Income_(k$)	Spending_Score
1	Male	19	15	39
2	Male	21	15	81
3	Female	20	16	6
4	Female	23	16	77
5	Female	31	17	40
6	Female	22	17	76
7	Female	35	18	6
8	Female	23	18	94
9	Male	64	19	3
10	Female	30	19	72
11	Male	67	19	14
12	Female	35	19	99

hadoop jar /home/ponny/Desktop/BD_Lab/nline.jar nline /cust.csv /nline_cust

Output

Contents of directory /nline_cust

Goto : /nline_cust go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
_SUCCESS	file	0 KB	1	64 MB	2021-03-19 13:10	rw-r--r--	ponny	supergroup
_logs	dir				2021-03-19 13:09	rwxr-xr-x	ponny	supergroup
part-m-00000	file	0.08 KB	1	64 MB	2021-03-19 13:09	rw-r--r--	ponny	supergroup
part-m-00001	file	0.08 KB	1	64 MB	2021-03-19 13:09	rw-r--r--	ponny	supergroup
part-m-00002	file	0.08 KB	1	64 MB	2021-03-19 13:09	rw-r--r--	ponny	supergroup
part-m-00003	file	0.07 KB	1	64 MB	2021-03-19 13:09	rw-r--r--	ponny	supergroup

File: /nline_cust/part-m-00003

Goto : /nline_cust go

Go back to dir listing
Advanced view/download options

```
1        , Male , 19 , 15 , 39
2        , Male , 21 , 15 , 81
3        , Female , 20 , 16 , 6
```

File: /nline_cust/part-m-00002

Goto : /nline_cust go

Go back to dir listing
Advanced view/download options

```
7        , Female , 35 , 18 , 6
8        , Female , 23 , 18 , 94
9        , Male , 64 , 19 , 3
```

File: /nline_cust/part-m-00000

Goto : /nline_cust go

Go back to dir listing
Advanced view/download options

```
10       , Female , 30 , 19 , 72
11       , Male , 67 , 19 , 14
12       , Female , 35 , 19 , 99
```

File: /nline_cust/part-m-00001

Goto : /nline_cust go

Go back to dir listing
Advanced view/download options

```
4        , Female , 23 , 16 , 77
5        , Female , 31 , 17 , 40
6        , Female , 22 , 17 , 76
```

NLine Tool Runner

During Runtime we pass the number of mapper inputs

NLine Input format code

nltool.java

use run

from main ⇒ call run using ToolRunner

While running

```
mahi@mahi-ThinkPad-E470:~$ hadoop jar /home/mahi/mpr/nltool.jar mpr.nltool
-D mapreduce.input.lineinputformat.linespermap=3 /sort /nlt
```

SequenceFileInputFormat

- Text / anything to Sequence File
- The sequence file format can be used to store an image in the binary format.
- They store key-value pairs in a Binary container format and are more efficient (Compressed) than a text file.
- Sequence files are not human-readable.

By Default Input and Output is set as Text

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class seq_in {
        public static class FormatConverterMapper extends Mapper<LongWritable, Text,
LongWritable, Text> {
              public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException
              {

                    context.write(key, value);
              }
          }

                public static void main(String[] args) throws Exception {
                     Configuration conf = new Configuration();

                  Job job = new Job(conf);

                  job.setJarByClass(seq_in.class);

                  job.setMapperClass(FormatConverterMapper.class);

                  job.setInputFormatClass(SequenceFileInputFormat.class);

                    FileInputFormat.setInputPaths(job, new Path(args[0]));
                    FileOutputFormat.setOutputPath(job, new Path(args[1]));
                  job.waitForCompletion(true);
                     }
                }
```

hadoop jar /home/ponny/Desktop/BD_Lab/seq_out.jar seq_out /cust.csv /seqout_cust

Output

File: /seqout_cust/part-r-00000

Goto : /seqout_cust go

Go back to dir listing
Advanced view/download options

SEQ!org.apache.hadoop.io.LongWritableorg.apache.hadoop.io.Text[illegible]t[illegible]^[illegible]tf[illegible]i 8[illegible]1,Male,19,15,39[illegible]2,Male,21,15,81[illegible]"3,Female,20,16,6[illegible]44,Female,23,16,77[illegible]G5,Female,31,17,40[illegible]Z6,Female,22,17,76[illegible]m7,Female,35,18,6[illegible]8,Female,23,18,94[illegible]9,Male,64,19,3[illegible]10,Female,30,19,72[illegible]11,Male,67,19,14[illegible]12,Female,35,19,99

SequenceFileOutputFormat

key ⇒ Count of characters in the whole record including " , "

Sequence File to Text / anything

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class seq_out {
        public static class FormatConverterMapper extends Mapper<LongWritable, Text,
LongWritable, Text> {
              public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException
              {

                    context.write(key, value);
              }
         }
               public static void main(String[] args) throws Exception {

                  Configuration conf = new Configuration();

                  Job job = new Job(conf);
                  job.setJarByClass(seq_out.class);
                  job.setMapperClass(FormatConverterMapper.class);

                  job.setOutputFormatClass(SequenceFileOutputFormat.class);

                   FileInputFormat.addInputPath(job, new Path(args[0]));
                   FileOutputFormat.setOutputPath(job, new Path(args[1]));
                  job.waitForCompletion(true);
                     }
                }
```

hadoop jar /home/ponny/Desktop/BD_Lab/seq_in.jar seq_in /seqout_cust/part-r-00000 /seqin_cust

Output

File: /seqin_cust/part-r-00000

Goto : /seqin_cust go

Go back to dir listing
Advanced view/download options

```
0       1,Male,19,15,39
17      2,Male,21,15,81
34      3,Female,20,16,6
52      4,Female,23,16,77
71      5,Female,31,17,40
90      6,Female,22,17,76
109     7,Female,35,18,6
127     8,Female,23,18,94
146     9,Male,64,19,3
162     10,Female,30,19,72
182     11,Male,67,19,14
200     12,Female,35,19,99
```

NAME AS PARTITION NAME / Multiple Output Format

It allows writing data to files whose names are derived from the output keys and values, or in fact from an arbitrary string.

Setup Task ⇒ Used to initialize the MultipleOutputs

Cleanup Task ⇒ Used to close the MultipleOutputs

o/p file is under the name of key

multipleOutputs.write(key, new IntWritable(sum), key.toString( ));

Give a name in double quotes instead of key.toString( ) , so the entire o/p will be stored in a particular file

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
     public class mulout {
  public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>
 {

 IntWritable one = new IntWritable(1);


public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException {
        String[] line = value.toString().toUpperCase().split(",");
        for(String lines:line) {
            context.write(new Text(lines),one);
        }
        }
      }

  public static class Reduce extends Reducer<Text, IntWritable, Text, IntWritable> {

       public MultipleOutputs  multipleOutputs;

           public void setup(Context context) throws IOException, InterruptedException
                 {

               multipleOutputs = new MultipleOutputs(context);
                 }

          public void reduce(Text key, Iterable<IntWritable> values, Context context)
          throws IOException, InterruptedException {
            int sum = 0;
              for (IntWritable val : values) {
                  sum += val.get();
              }
              multipleOutputs.write(key, new IntWritable(sum),key.toString());
         }

          public void cleanup(Context context) throws IOException, InterruptedException
            {
                  multipleOutputs.close();
```

```
            }

  }

  public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();
      Job job = new Job(conf, "mulout");
      job.setJarByClass(mulout.class);
      job.setOutputKeyClass(Text.class);
job.setOutputValueClass(IntWritable.class);

      job.setMapperClass(Map.class);
      job.setReducerClass(Reduce.class);

job.setInputFormatClass(TextInputFormat.class);

LazyOutputFormat.setOutputFormatClass(job, TextOutputFormat.class);

FileInputFormat.addInputPath(job, new Path(args[0]));
FileOutputFormat.setOutputPath(job, new Path(args[1]));
      job.waitForCompletion(true);

      }
      }
```

File: /Pokemon

Contents of directory /mulout_Pokemon

Goto : /mulout_Pokemon go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
CHARMANDER-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
CHIKORITA-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
EEVE-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
LAPRAS-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
MEW-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
PIKACHU-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
PSYDUCK-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
SQUIRTLE-r-00000	file	0.01 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
_SUCCESS	file	0 KB	1	64 MB	2021-03-22 16:26	rw-r--r--	ponny	supergroup
_logs	dir				2021-03-22 16:25	rwxr-xr-x	ponny	supergroup

Each “Key” from the Reducer is partioned separately

Lazy o/p can be used to avoid empty o/p being generated in part-r-00000

LazyOutputFormat

Sometimes FileOutputFormat will create output files, even if they are empty.
LazyOutputFormat is a wrapper OutputFormat which ensures that the output file will be created only when the record is emitted for a given partition.

Hash Partitioning / Custom Partitioning

Mapper (out) ⇒ partitioner ⇒ Reducer
gerPartition(key , value , "No of reducers: int nr ")

An organization maintains the salary details that contains years of experience,salary, gender and country name. Partition the file based on the salary. Create 3 partitions with salary <30000, salary<50000 and salary details other than the above two conditions. Write the country name and the salary details in the files. Also display the count of the records satisfying the above conditions.

Partition based on salary

sal<30k

sal<50k

sal⇒others

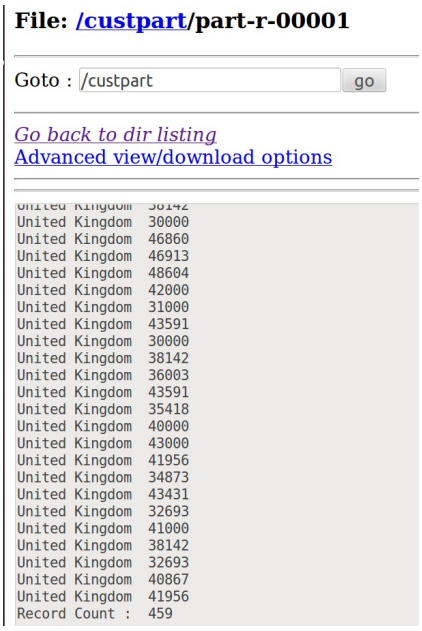
count the records in every partitioner

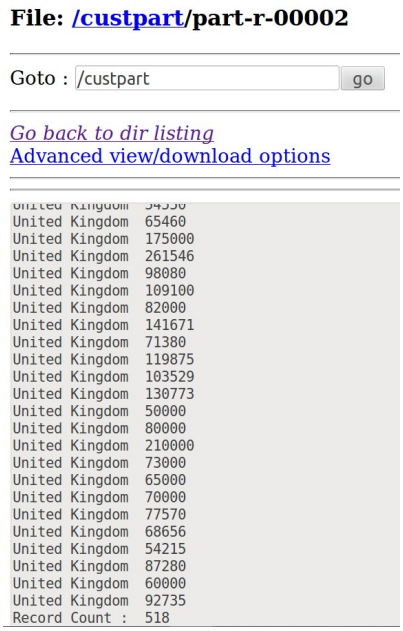
CODE

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.Reducer.Context;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

public class custpart {

public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>

{

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

String[] line = value.toString().split(",");


      //Key: country, Value: Salary
      context.write(new Text(line[3]),new IntWritable(Integer.parseInt(line[1])));

}

public static class dpart extends Partitioner<Text,IntWritable>
{
      //"nr" receives the value from setNumReduceTasks( _ )

        public int getPartition(Text key,IntWritable value,int nr)
        {
             if(value.get()<30000)
                   return 0;

             if(value.get() < 50000)
                   return 1;

              else
                   return 2;
        }
}
```

```
public static class Reduce extends Reducer<Text, IntWritable, Text, IntWritable> {
int count=0;
public void reduce(Text key, Iterable<IntWritable> values, Context context) throws
IOException, InterruptedException {
for (IntWritable val : values) {
      context.write(key,val);
      count++;
}
}

public void cleanup(Context context) throws IOException, InterruptedException
{
 context.write(new Text("Record Count : "),new IntWritable(count));
}
}

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

Configuration conf = new Configuration();

Job job = new Job(conf, "custpart");

job.setJarByClass(custpart.class);

job.setOutputKeyClass(Text.class);

job.setOutputValueClass(IntWritable.class);

job.setMapperClass(Map.class);
job.setReducerClass(Reduce.class);

// give the no. of reducer
job.setPartitionerClass(dpart.class);
job.setNumReduceTasks(3);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

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

FileOutputFormat.setOutputPath(job, new Path(args[1]));

job.waitForCompletion(true);

}
}
```

hadoop jar /home/ponny/Desktop/BD_Lab/cust_part.jar custpart /salary1.csv /custpart





Custom Counters

Salary details are maintained in the text file. Create the user defined counters. Count the number of persons having 10 years of experience and write the details of country name and the salary with 10 years of experience in HDFS. Also count the number of persons earning the salary greater than 50,000.

```
import java.io.IOException;

import java.util.*;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.conf.*;

import org.apache.hadoop.io.*;

import org.apache.hadoop.mapreduce.*;

import org.apache.hadoop.mapreduce.Reducer.Context;
import org.apache.hadoop.mapreduce.lib.input.*;

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

public class custcount {
      public enum ct
        {
              cnt,nt //cnt => Condition 1 ; nt => Condition 2
        };

public static class Map extends Mapper<LongWritable, Text, Text, FloatWritable>

{


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

String[] line = value.toString().split(",");

if(Float.parseFloat(line[0])==10.0)
```

```
            {
        context.getCounter(ct.cnt).increment(1);

        // country name , salary
         context.write(new Text(line[3]),new FloatWritable(Float.parseFloat(line[1])));
            }

if(Float.parseFloat(line[1])>50000)
{
        context.getCounter(ct.nt).increment(1);
}
}
}

public static class Reduce extends Reducer<Text, FloatWritable, Text, FloatWritable>
{
public void reduce(Text key, Iterable<FloatWritable> values, Context context) throws
IOException, InterruptedException
{
for (FloatWritable val : values)
{
      context.write(key,val);
}
}
}


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

Configuration conf = new Configuration();

Job job = new Job(conf, "custcount");

job.setJarByClass(custcount.class);

job.setOutputKeyClass(Text.class);
job.setOutputValueClass(FloatWritable.class);

job.setMapperClass(Map.class);
job.setReducerClass(Reduce.class);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

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

FileOutputFormat.setOutputPath(job, new Path(args[1]));
job.waitForCompletion(true);

Counters cn = job.getCounters();
cn.findCounter(ct.cnt).getValue();
cn.findCounter(ct.nt).getValue();

}
}
```

hadoop jar /home/ponny/Desktop/BD_Lab/custcount.jar custcount /salary1.csv /custcount

File: /custcount/part-r-00000

Goto : /custcount go

Go back to dir listing
Advanced view/download options

```
Austria 49000.0
Austria 69000.0
Belgium 52000.0
Belgium 49400.0
Bulgaria        42000.0
Bulgaria        42000.0
Bulgaria        43700.0
Croatia 36000.0
Croatia 32400.0
Czech Republic  102000.0
Czech Republic  24745.0
Czech Republic  50000.0
Denmark 92000.0
Finland 57000.0
Finland 46000.0
France  50000.0
France  32000.0
France  50000.0
```

21/03/31 12:37:08 INFO mapred.JobClient: **nt=476**

21/03/31 12:37:08 INFO mapred.JobClient: **cnt=131**

Side Data

Create a text file for students details(student id,student name, marks-5 courses) in HDFS. Get a particular student details using side data configuration. Display the student details in hdfs. Also display the total and average of the student's marks in hdfs.

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class sidedata {
  public static class Map extends Mapper<LongWritable, Text, Text, Text>
 {


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

        String[] line = value.toString().split(",");
        String name1;
        name1 = context.getConfiguration().get("name");
```

```
        String studname = line[1];

        if(studname.equals(name1)){
            {
                    String[] marks= {line[4],line[5],line[6],line[7],line[8]};
                    float n=marks.length;
                    float sum =0;
                    float avg=0;
                    for(int i=0; i< marks.length; i++)
                    {
                          sum = sum + Float.parseFloat(marks[i]);
                          avg= sum/n;
                    }
context.write(new Text(line[0]+" , "+line[1]+" , "+line[2]+" , "+line[3]+" , "+line[4]+" ,
"+line[5]+" , "+line[6]+" , "+line[7]+" , "+line[8]),new Text("\nSum : "+sum+"\nAvg :
"+avg));
            }
      }  }   }

  public static void main(String[] args) throws Exception {
   Configuration conf = new Configuration();

         conf.set("name",args[2]);

      Job job = new Job(conf, "sidedata");
      job.setJarByClass(sidedata.class);
      job.setOutputKeyClass(Text.class);
      job.setOutputValueClass(Text.class);
      job.setMapperClass(Map.class);
      job.setInputFormatClass(TextInputFormat.class);
      job.setOutputFormatClass(TextOutputFormat.class);
      FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
      job.waitForCompletion(true);
      }
      }
```

hadoop jar /home/ponny/Desktop/BD_Lab/sidedata.jar sidedata /student_marks.csv /Naren_mark Naren

INPUT

File: /student_marks.csv

Goto : / go

Go back to dir listing
Advanced view/download options

```
1001,Naren,M,05/04/1988,55,45,56,87,21
1002,Kavya,F,4/5/1987,75,55,89,64,90
1003,Yugi,M,25/5/1989,25,54,89,76,95
1004,Pappu,F,12/8/1990,78,55,86,63,54
1005,Jahnu,F,2/9/1989,58,96,78,46,96
```

OUTPUT

File: /Naren_mark/part-r-00000

Goto : /Naren_mark go

Go back to dir listing
Advanced view/download options

```
1001 , Naren , M , 05/04/1988 , 55 , 45 , 56 , 87 , 21
Sum : 264.0
Avg : 52.8
```

Mapside Join

Distributed Cache

Create the student details(student id,student name,CGPA) file and the department details(student id,department) file in HDFS. Let the department details can be stored using distributed cache. Write the student id, name,department and CGPA in the HDFS. Use map side join.

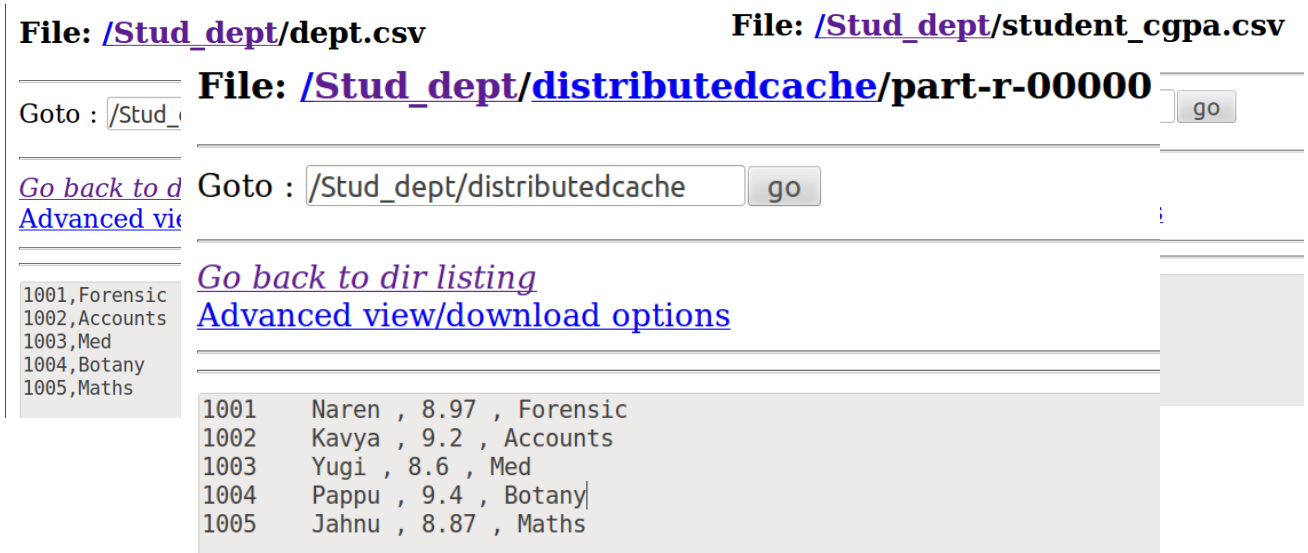
DISTRIBUTED CACHE ⇒ DEPARTMENT

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

import org.apache.hadoop.filecache.DistributedCache;
import org.apache.hadoop.fs.Path;
import java.io.BufferedReader;
import java.io.FileReader;

import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
     public class distributedcache {
  public static class Map extends Mapper<LongWritable, Text, Text, Text>
 {

      Path[ ] cfile=new Path[0];  //cfile ⇒ path variable//cfile ⇒ path variable
      ArrayList<Text> dep=new ArrayList<Text>(); //ArrayList class ⇒ Expandable : no size
restriction

      public void setup(Context context)

      {
            Configuration conf=context.getConfiguration();
         try
         {
                  cfile = DistributedCache.getLocalCacheFiles(conf);

            @SuppressWarnings("resource")
 //BufferedReader class is used to read the text from a character-based input stream
            BufferedReader reader=new BufferedReader(new FileReader(cfile[0].toString()));
            String line;
            while ((line=reader.readLine())!=null)
            {
                  Text tt=new Text(line);
            dep.add(tt);
            }
```

```
        }
            catch(IOException e)
            {
                  e.printStackTrace();
                        }
      }

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

        String line2 = value.toString(); //stud_cgpa
        String[ ] elements=line2.split(",");

        for(Text e:dep)
        {
            String[ ] line1 = e.toString().split(","); //dept

            if(elements[0].equals(line1[0]))
            {

context.write(new Text(elements[0]),new Text(elements[1]+" , "+elements[2]+" ,
"+line1[1]));

            }
      }  }  }

  public static void main(String[] args) throws Exception {
         Configuration conf = new Configuration();

      Job job = new Job(conf, "distributedcache");
      job.setJarByClass(distributedcache.class);

   DistributedCache.addCacheFile(new Path(args[0]).toUri(),job.getConfiguration());

    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(Text.class);

      job.setMapperClass(Map.class);
      job.setInputFormatClass(TextInputFormat.class);
      job.setOutputFormatClass(TextOutputFormat.class);

      FileInputFormat.addInputPath(job, new Path(args[1])); //DIST_CACHE : DEPT
      FileOutputFormat.setOutputPath(job, new Path(args[2]));

      job.waitForCompletion(true);
      }
      }
```

hadoop jar jarfile classname distributedcache_path Input_path Output_path

hadoop jar /home/ponny/Desktop/BD_Lab/distributedcache.jar distributedcache /Stud_dept/dept.csv /Stud_dept/student_cgpa.csv /Stud_dept/distributedcache



Reduce Side Join

Create the customer details(cid,name) and the transaction details(cid, transaction amount) file in hdfs. Write the cname, number of transactions and transaction amount in hdfs. Use reduce side join.

NOTE:

I/P Records
Cust ⇒ Cust id , name
trans ⇒ Cust id , Transaction amnt

O/P : cname , no of trans , trans amnt

2 Mappers needed,
1. Customer Mapper
2. Transaction mapper

To Differentiate add a word " cust," before cust name & " trans," before transaction amount

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
     public class redsidejoin {
      public static class custmapper extends Mapper<LongWritable, Text,
Text, Text>
 {
 IntWritable one = new IntWritable(1);


public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException {
        String[] line = value.toString().split(",");
          context.write(new Text(line[0]), new Text("cust"+","+line[1]));
       }
        }


     public static class transmapper extends
Mapper<LongWritable,Text,Text,Text>
      {
       public void map(LongWritable key, Text value, Context context)
throws IOException, InterruptedException {
        String[] line = value.toString().split(",");
        context.write(new Text(line[0]), new Text("trans"+","+line[1]));
       }
      }
```

```
  public static class Reduce extends Reducer<Text,Text,Text,Text> {
        String st1;

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

        int sum = 0;
        int c=0,amt=0;

        for(Text val:values)
         {

             String[]  line = val.toString().split(",");

              if (line[0].equals("trans"))
              {
                 amt += Integer.parseInt(line[1]);
                 c++;
              }
              else if (line[0].equals("cust"))
              {
                   st1=line[1].toString();
              }
         }
                         context.write(new Text(st1), new Text(c+" , "+amt));
     }
    }

  public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();
         Job job = new Job(conf, "redsidejoin");
          job.setJarByClass(redsidejoin.class);
         job.setOutputKeyClass(Text.class);

         MultipleInputs.addInputPath(job,new Path(args[0]),
TextInputFormat.class,  custmapper.class);

         MultipleInputs.addInputPath(job,new Path(args[1]),
TextInputFormat.class, transmapper.class);
         job.setReducerClass(Reduce.class);

         job.setOutputFormatClass(TextOutputFormat.class);
         FileOutputFormat.setOutputPath(job, new Path(args[2]));
      job.waitForCompletion(true);
      }
}
```

File: /RedSideJoin/custname.csv

Goto : /RedSideJoin go

Go back to dir listing
Advanced view/download options

```
1001,Jahnu
1002,Naren
1003,Rakshu
1004,Vaishu
1005,Pappu
1006,Yugi
1007,Balaji
```

File: /RedSideJoin/transamnt.csv

Goto : /RedSideJoin go

Go back to dir listing
Advanced view/download options

```
1001,50000
1001,80000
1003,20000
1002,100000
1004,70000
1005,80000
1004,40500
1006,30000
1006,40000
1007,28000
1007,65000
1002,200000
```

OUTPUT

File: /RedSideJoin/Output/part-r-00000

Goto : /RedSideJoin/Output go

Go back to dir listing
Advanced view/download options

```
Jahnu   2 , 130000
Naren   2 , 300000
Rakshu  1 , 20000
Vaishu  2 , 110500
Pappu   1 , 80000
Yugi    2 , 70000
Balaji  2 , 93000
```

TreeMAP

- **Red-Black** Tree format / not Hash function
- Won't accept Key as NULL unlike HashMap
- Always considers unique values
- **Result is sorted** based on the KEY

Salary ⇒ Key , Entire Record ⇒ Values

Allows to use multiple methods like ,

- put( ) ⇒ Add values
- remove( ) ⇒ Remove values
- size( ) ⇒ no of records in Tree Map

Display highest 10 salary records,

- To display that we reduce our records to 10 by removing the least salary records that is in the beginning
- Common **Key** as **NullWritable** ⇒ Easy to Retrieve and group (Reducer)
- Declare TreeMap again in Reducer ⇒ To sort all the records got from various Mappers

Create a text file with employee name, department, designation, salary. Identify the top 10 salary details from the file. Write the details in HDFS. Create 20 records.

Retrieve Top 10 Records

CODE

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
     public class Treemapp {

 public static class Map extends Mapper<LongWritable,
Text,NullWritable,Text>
 {
 private TreeMap<Integer, Text> salary = new TreeMap<Integer, Text>();

 public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException
 {
      String[] line = value.toString().split(",");

         salary.put(Integer.parseInt(line[3]),new Text(value));

          if (salary.size() > 10) {
          salary.remove(salary.firstKey());
         }
 }
 protected void cleanup(Context context) throws IOException,
InterruptedException
 {                for ( Text name : salary.values() ) {
                    context.write(NullWritable.get(), name);
                 }
             }
 }

  public static class Reduce extends Reducer<NullWritable, Text,
NullWritable, Text>
  {
  public void reduce(NullWritable key, Iterable<Text> values, Context
context) throws IOException, InterruptedException {
```

```
  TreeMap<Integer, Text> salary = new TreeMap< Integer, Text>();

          for (Text value : values) {
                  String line = value.toString();
                    String[] elements=line.split(",");

                   int  i= Integer.parseInt(elements[3]);
                  salary.put(i, new Text(value));

                      if (salary.size() > 10) {
                    salary.remove(salary.firstKey());
                              }
                    }
                     for (Text t : salary.values()) {
                 context.write(NullWritable.get(), t);
                     }
                 }
                  }


  public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();
     Job job = new Job(conf, "Treemapp");
     job.setJarByClass(Treemapp.class);

     job.setOutputKeyClass(NullWritable.class);
     job.setOutputValueClass(Text.class);

     job.setNumReduceTasks(1);

     job.setMapperClass(Map.class);
     job.setReducerClass(Reduce.class);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

FileInputFormat.addInputPath(job, new Path(args[0]));
FileOutputFormat.setOutputPath(job, new Path(args[1]));
job.waitForCompletion(true);
      }
      }
```

hadoop jar /home/ponny/Desktop/BD_Lab/Treemapp.jar Treemapp /TreeMap_emp.csv /TreeMapp_out

Input file

File: /TreeMap_emp.csv

Goto : / go

Go back to dir listing
Advanced view/download options

```
Naren,Forensic,Team Lead,100000
Kavya,Accounts,Snr,75000
Yugi,Med,Dr,150000
Pappu,Botany,Scientist,85000
Jahnu,Maths,Technician,88000
Vaishu,Design,Design Head,97000
Naveen,Accounts,Snr accountant,67000
Aravind,Maths,ML Engineer,89000
Ram,Mech,Eng,90000
Kushi,Med,Bds,78000
Babu,CS,Ethical hacker,175000
Kannan,Banking,Officer,105000
```

OUTPUT

File: /TreeMapp_out/part-r-00000

Goto : /TreeMapp_out go

Go back to dir listing
Advanced view/download options

```
Kushi,Med,Bds,78000
Pappu,Botany,Scientist,85000
Jahnu,Maths,Technician,88000
Aravind,Maths,ML Engineer,89000
Ram,Mech,Eng,90000
Vaishu,Design,Design Head,97000
Naren,Forensic,Team Lead,100000
Kannan,Banking,Officer,105000
Yugi,Med,Dr,150000
Babu,CS,Ethical hacker,175000
```

Secondary Sort - Composite Key

Unlike Key sort , we can Sort using 1/ more keys

Composite Key ⇒ Combine 2Keys

implements Writable,WritableComparable<CompositeKeyWritable>

Dept AO , Emp DO

Override everywhere with the COMPOSITE key

-state ⇒ sort in D.O

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

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

import org.apache.hadoop.mapreduce.*;

import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;


public class secsort {

	public static class CompositeKeyWritable implements Writable,
			WritableComparable<CompositeKeyWritable> {

	private String deptNo;
	private String emp;

	public CompositeKeyWritable() {
	}

	public CompositeKeyWritable(String deptNo, String emp) {
		this.deptNo = deptNo;
		this.emp = emp;
	}

	@Override
	public String toString() {
		return (new StringBuilder().append(deptNo).append("\t")
				.append(emp)).toString();
	}

	public void readFields(DataInput dataInput) throws IOException {
		deptNo = WritableUtils.readString(dataInput);
		emp = WritableUtils.readString(dataInput);
	}

	public void write(DataOutput dataOutput) throws IOException {
		WritableUtils.writeString(dataOutput, deptNo);
		WritableUtils.writeString(dataOutput, emp);
	}

	public int compareTo(CompositeKeyWritable objKeyPair) {

		int result = deptNo.compareTo(objKeyPair.deptNo);
		if (0 == result) {
			result = emp.compareTo(objKeyPair.emp);
		}
		return result;
	}

}
	public  static class mapper1 extends
	Mapper<LongWritable, Text, CompositeKeyWritable, NullWritable> {

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

		if (value.toString().length() > 0) {
			String arrEmpAttributes[] = value.toString().split(",");

			context.write(
					new CompositeKeyWritable(
							arrEmpAttributes[1].toString(),
							(arrEmpAttributes[0].toString())),
NullWritable.get());
		}
```

```
	}
}

	public static class SecondarySortBasicPartitioner extends
	Partitioner<CompositeKeyWritable, NullWritable> {

	@Override
	public int getPartition(CompositeKeyWritable key, NullWritable value,
			int numReduceTasks) {

		return (key.deptNo.hashCode() % numReduceTasks);
	}
}

	public static class SecondarySortBasicCompKeySortComparator extends
WritableComparator {

		protected SecondarySortBasicCompKeySortComparator() {
			super(CompositeKeyWritable.class, true);
		}

		@Override
public int compare(WritableComparable w1, WritableComparable w2) {
CompositeKeyWritable key1 = (CompositeKeyWritable) w1;
CompositeKeyWritable key2 = (CompositeKeyWritable) w2;

			int cmpResult = key1.deptNo.compareTo(key2.deptNo);
			if (cmpResult == 0)
			{
			return -key1.emp.compareTo(key2.emp);

			}
			return cmpResult;
		}
	}


	public static class SecondarySortBasicGroupingComparator extends WritableComparator {
		protected SecondarySortBasicGroupingComparator() {
			super(CompositeKeyWritable.class, true);
		}

		@Override
		public int compare(WritableComparable w1, WritableComparable w2) {
			CompositeKeyWritable key1 = (CompositeKeyWritable) w1;
			CompositeKeyWritable key2 = (CompositeKeyWritable) w2;
			return key1.deptNo.compareTo(key2.deptNo);
		}
	}

	public static class SecondarySortBasicReducer extends
	Reducer<CompositeKeyWritable, NullWritable, CompositeKeyWritable, NullWritable> {

	@Override
	public void reduce(CompositeKeyWritable key, Iterable<NullWritable> values,
			Context context) throws IOException, InterruptedException {

		for (NullWritable value : values) {

			context.write(key, NullWritable.get());
		}

	}
}
	public static void main(String[] args) throws Exception{
		Configuration conf = new Configuration();
```

```
        Job job = new Job(conf, "secsort");

        job.setJarByClass(secsort.class);


        job.setMapperClass(mapper1.class);
        job.setPartitionerClass(SecondarySortBasicPartitioner.class);
        job.setSortComparatorClass(SecondarySortBasicCompKeySortComparator.class);
        job.setGroupingComparatorClass(SecondarySortBasicGroupingComparator.class);
        job.setReducerClass(SecondarySortBasicReducer.class);
        job.setMapOutputKeyClass(CompositeKeyWritable.class);
        job.setMapOutputValueClass(NullWritable.class);
        job.setOutputKeyClass(CompositeKeyWritable.class);
        job.setOutputValueClass(NullWritable.class);

        job.setNumReduceTasks(1);
        FileInputFormat.setInputPaths(job, new Path(args[0]));
        FileOutputFormat.setOutputPath(job, new Path(args[1]));



         job.waitForCompletion(true);
}
}
```

FOR UNDERSTANDING ONLY

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

import org.apache.hadoop.mapreduce.*;

import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;


public class secsort {
//Build-in compare( ) => sorts the key of the Reducer
//override that compare( )

     public static class CompositeKeyWritable implements Writable,
                 WritableComparable<CompositeKeyWritable> {

     private String deptNo;
     private String emp;

     //Empty constructor
     public CompositeKeyWritable() {
     }
     //Constructor with 2 String Args
     //this => Accesses Current classes variables
     public CompositeKeyWritable(String deptNo, String emp) {
          this.deptNo = deptNo;
          this.emp = emp;
     }
```

```
//Merge 2 fields => Using StringBuilder => append(key1 \t key2)
     @Override
     public String toString() {
     //append( ) ⇒ Helps to combine the 2 fields
          return (new StringBuilder().append(deptNo).append("\t")
                    .append(emp)).toString();
     }
     //Read and Write the data
     //Reads the content from the i/p file in deserialized form
     public void readFields(DataInput dataInput) throws IOException {
          deptNo = WritableUtils.readString(dataInput);
          emp = WritableUtils.readString(dataInput);
     }
     //Writes in Serialized form
     public void write(DataOutput dataOutput) throws IOException {
          WritableUtils.writeString(dataOutput, deptNo);
          WritableUtils.writeString(dataOutput, emp);
     }
     //Inbuilt func()in MapReduce
     public int compareTo(CompositeKeyWritable objKeyPair) {
          //if the department record is available sort it , internally it
sorts the employee details
          int result = deptNo.compareTo(objKeyPair.deptNo);
          if (0 == result) {
               result = emp.compareTo(objKeyPair.emp);
          }
          return result;
     }

}
//O/P Key => CompositeKey
     public  static class mapper1 extends
     Mapper<LongWritable, Text, CompositeKeyWritable, NullWritable> {

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

          if (value.toString().length() > 0) {
               String arrEmpAttributes[] = value.toString().split(",");

// Creating object for CompositeKeyWritable Class
 //arr{1] Dept
//arr[0] Emp
     context.write(
     new CompositeKeyWritable(    arrEmpAttributes[1].toString(),
                                  arrEmpAttributes[0].toString())),
NullWritable.get());
          }

     }
}

     public static class SecondarySortBasicPartitioner extends
     Partitioner<CompositeKeyWritable, NullWritable> {
//Return the no.of partitions
```

```
     @Override
     public int getPartition(CompositeKeyWritable key, NullWritable value,
               int numReduceTasks) {
//hashkey is created based on hash function on the key-value , based on it
partitioners will be created

          return (key.deptNo.hashCode() % numReduceTasks);
     }
}

     public static class SecondarySortBasicCompKeySortComparator extends
WritableComparator {

            protected SecondarySortBasicCompKeySortComparator() {
//super - access the parent class - compositekeywritable
                  super(CompositeKeyWritable.class, true);
               }

               @Override
public int compare(WritableComparable w1, WritableComparable w2) {
CompositeKeyWritable key1 = (CompositeKeyWritable) w1;
CompositeKeyWritable key2 = (CompositeKeyWritable) w2;

                  int cmpResult = key1.deptNo.compareTo(key2.deptNo);
                  if (cmpResult == 0)
                  {
                  // - => Desc order , remove(-) => Acs Order
                  return -key1.emp.compareTo(key2.emp);

                  }
                  return cmpResult;
               }
          }

     //Group the Dept records together => Shuffling
     public static class SecondarySortBasicGroupingComparator extends
WritableComparator {
            protected SecondarySortBasicGroupingComparator() {
                  super(CompositeKeyWritable.class, true);
               }

     @Override
     public int compare(WritableComparable w1, WritableComparable w2) {
                  CompositeKeyWritable key1 = (CompositeKeyWritable) w1;
                  CompositeKeyWritable key2 = (CompositeKeyWritable) w2;
                  return key1.deptNo.compareTo(key2.deptNo);
               }
          }

     public static class SecondarySortBasicReducer extends
     Reducer<CompositeKeyWritable, NullWritable, CompositeKeyWritable,
NullWritable> {

//Write in the reducer
     @Override
```

```
     public void reduce(CompositeKeyWritable key, Iterable<NullWritable>
values, Context context) throws IOException, InterruptedException {

          for (NullWritable value : values) {

               context.write(key, NullWritable.get());
          }

     }
}
     public static void main(String[] args) throws Exception{
           Configuration conf = new Configuration();


     Job job = new Job(conf, "secsort");

     job.setJarByClass(secsort.class);


     job.setMapperClass(mapper1.class);
     job.setPartitionerClass(SecondarySortBasicPartitioner.class);

job.setSortComparatorClass(SecondarySortBasicCompKeySortComparator.class);

job.setGroupingComparatorClass(SecondarySortBasicGroupingComparator.class);

     job.setReducerClass(SecondarySortBasicReducer.class);

// If Map and Reduce DataTypes are different use below
     job.setMapOutputKeyClass(CompositeKeyWritable.class);
     job.setMapOutputValueClass(NullWritable.class);

// Same Map and Reduce DataType
job.setOutputKeyClass(CompositeKeyWritable.class);
job.setOutputValueClass(NullWritable.class);

     job.setNumReduceTasks(1);
     FileInputFormat.setInputPaths(job, new Path(args[0]));
     FileOutputFormat.setOutputPath(job, new Path(args[1]));


      job.waitForCompletion(true);
}
}
```

DICTIONARY PROGRAM - REVERSE, UPPERCASE

ONLY REVERSE

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

```
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
public class revv {
        public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>
        {

        IntWritable one = new IntWritable(1);


       public void map(LongWritable key, Text value, Context context) throws IOException,
InterruptedException {
               String[] line = value.toString().split(",");
               int n=line.length;

               for(String i:line)
               {
               StringBuffer sb = new StringBuffer();
               sb.append(i);
               i = sb.reverse().toString();
               context.write(new Text(i),one);

               }

                  }
           }

        public static class Reduce extends Reducer<Text, IntWritable, Text, IntWritable> {
                public void reduce(Text key, Iterable<IntWritable> values, Context context)
                throws IOException, InterruptedException {          int sum = 0;
                    for (IntWritable val : values) {
                        sum += val.get();
                    }
              context.write(key, new IntWritable(sum));
               }  }



        public static void main(String[] args) throws Exception {
          Configuration conf = new Configuration();
            Job job = new Job(conf, "wordcount");
            job.setJarByClass(revv.class);
          job.setOutputKeyClass(Text.class);
          job.setOutputValueClass(IntWritable.class);
            job.setMapperClass(Map.class);
          job.setReducerClass(Reduce.class);
          job.setInputFormatClass(TextInputFormat.class);
            job.setOutputFormatClass(TextOutputFormat.class);
            FileInputFormat.addInputPath(job, new Path(args[0]));
            FileOutputFormat.setOutputPath(job, new Path(args[1]));
            job.waitForCompletion(true);
            }
            }
```

REVERSE & UPPERCASE

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
```

```
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
public class dictrev {
   public static class Map extends Mapper<Text, Text, Text, Text>
  {
 String s ="Create" ;
 String[] lines;
public void map(Text key, Text value, Context context) throws IOException,
InterruptedException
{
      if(s.equalsIgnoreCase(key.toString()))
     {
      int n;
      String[] line = value.toString().split(",");
      int len;
      n=line.length;

for(String i:line)
{
            StringBuffer s=new StringBuffer();
            s.append(i);
            s.reverse();
            len=s.length();
            context.write(new Text(s.toString()), new Text(Integer.toString(len)));

      }
      context.write(key,value);
      context.write(new Text("uppercase word:"), new Text(key.toString().toUpperCase()));

         //context.write(new Text("Count"), new Text(Integer.toString(n)));

        }

 }
 }

  public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();

        conf.set("mapreduce.input.keyvaluelinerecordreader.key.value.separator", "-");

      Job job = new Job(conf, "dictionary");
      job.setJarByClass(dictrev.class);
      job.setOutputValueClass(Text.class);
      job.setOutputKeyClass(Text.class);
      job.setMapperClass(Map.class);
job.setInputFormatClass(KeyValueTextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);
FileInputFormat.addInputPath(job, new Path(args[0]));
FileOutputFormat.setOutputPath(job, new Path(args[1]));
      job.waitForCompletion(true);
      }
      }
```

SET MAXIMUM SPLIT – MAXSPLIT / MINSPLIT

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
public class maxsplit {
```

```
  public static class Map extends Mapper<LongWritable, Text, LongWritable, Text> {

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

}

  }


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

       Configuration conf = new Configuration();

       // Following Statement sets the min split size...
       conf.set("mapred.min.split.size","10000");

    Job job = new Job(conf, "inputsplit");

    job.setJarByClass(maxsplit.class);
        job.setOutputKeyClass(LongWritable.class);
    job.setOutputValueClass(Text.class);

    job.setMapperClass(Map.class);

            job.setInputFormatClass(TextInputFormat.class);

        job.setOutputFormatClass(TextOutputFormat.class);
        FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
    job.waitForCompletion(true);
       }
  }
```

PREVENTING SPLITS

Some applications don't want files to be split, so that a single mapper can process each input file in its entirety.

Entire I/P file goes to a single mapper

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
public class splitf {

public static class Map extends Mapper<LongWritable, Text, LongWritable, Text> {

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

} }

public class splitfalse extends TextInputFormat {

    protected boolean isSplitable(JobContext context, Path file) {
    return false;
    }
```

```
    }

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

        Configuration conf = new Configuration();

    Job job = new Job(conf, "splitfalse");

    job.setJarByClass(splitf.class);

    job.setOutputKeyClass(LongWritable.class);
    job.setOutputValueClass(Text.class);
    job.setMapperClass(Map.class);

    job.setInputFormatClass(splitfalse.class);

    job.setInputFormatClass(TextInputFormat.class);

        job.setOutputFormatClass(TextOutputFormat.class);
        FileInputFormat.addInputPath(job, new Path(args[0]));
      FileOutputFormat.setOutputPath(job, new Path(args[1]));
    job.waitForCompletion(true);
  }
}
```

PRACTICE PROBLEM LAB

The File "customer" has the customer id , Account type (savings/current) and customer name are attributes. The File "amount" has the customer id, balance amount are attributes.

a). If the type of account is savings , then add Rs. 10000 in the balance. Write the customer id ,name, balance in HDFS.

b) If the type of account is current , then add Rs. 20000 in the balance. Write the customer id ,name, balance in HDFS.

Use map reduce programming.

REDUCE SIDE JOIN

```
import java.io.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

public class assessr{

     public static class custmapper extends
Mapper<LongWritable,Text,Text,Text>{
         public void map(LongWritable key, Text value, Context context)
throws IOException, InterruptedException{

           //key => cust_id
           String[] line = value.toString().split(",");
```

```
            context.write(new Text(line[0]), new
Text(line[2]+","+"account:"+","+line[1]));   //key:cust_id , val:name ,
account , current/saving
             }
            }

           public static class transmapper extends
Mapper<LongWritable,Text,Text,Text>
            {
             public void map(LongWritable key, Text value, Context
context)throws IOException, InterruptedException{

                  String[] line = value.toString().split(",");
          //key => cust_id
             context.write(new Text(line[0]), new
Text("amnt:"+","+line[1])); //key:cust_id val: amnt , bal
             }
            }

           public static class jreducer extends
Reducer<Text,Text,Text,Text>
            {
              String st1;
             public void reduce(Text key, Iterable<Text> values, Context
context )
             throws IOException, InterruptedException
             {
          int amt=0;
            for(Text val:values)
             {

                  String[] line = val.toString().split(",");

                  if (line[1].equals("account:")){

                       if (line[2].equals("current")){
                            amt+=20000;
                            st1=line[0].toString();
                       }

                       else if (line[2].equals("savings")){
                            amt+=10000;
                            st1=line[0].toString();
                       }

                  }

                  else if (line[0].equals("amnt:"))
                  {
                       amt+=Integer.parseInt(line[1]);

                  }
             }
                    context.write(new Text(key), new Text(st1+" , "+amt));
        }   }
```

```
        public static void main(String[] args) throws Exception {
             Configuration conf = new Configuration();
                Job job = new Job(conf, "redjoin");
                job.setJarByClass(assessr.class);
                job.setOutputKeyClass(Text.class);
                job.setOutputValueClass(Text.class);
                job.setReducerClass(jreducer.class);
                job.setInputFormatClass(TextInputFormat.class);
                job.setOutputFormatClass(TextOutputFormat.class);
                MultipleInputs.addInputPath(job,new
Path(args[0]),TextInputFormat.class,custmapper.class);
                MultipleInputs.addInputPath(job,new
Path(args[1]),TextInputFormat.class,transmapper.class);
                FileOutputFormat.setOutputPath(job, new Path(args[2]));
                job.waitForCompletion(true);
            }
            }
```

INPUT

File: /Assess/amount.csv

Goto : /Assess go

Go back to dir listing
Advanced view/download options

```
101,20000
102,30000
103,50000
104,70000
105,90000
106,20000
107,40000
108,50000
109,70000
110,80000
```

File: /Assess/customer.csv

Goto : /Assess go

Go back to dir listing
Advanced view/download options

```
101,savings,Naren
102,savings,Babu
103,savings,Jahnu
104,savings,Pappu
105,savings,Vaishu
106,savings,Yugi
107,current,Rakshu
108,current,Bala
109,current,Akshi
110,current,Arsha
```

OUTPUT

```
101   Naren , 30000
102   Babu , 40000
103   Jahnu , 60000
104   Pappu , 80000
105   Vaishu , 100000
106   Yugi , 30000
107   Rakshu , 60000
108   Bala , 70000
109   Akshi , 90000
110   Arsha , 100000
```

MAP SIDE JOIN – Distributed Cache

```
import java.io.IOException;

import java.util.*;
```

```
import org.apache.hadoop.filecache.DistributedCache;
import org.apache.hadoop.fs.Path;
import java.io.BufferedReader;
import java.io.FileReader;

import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
     public class cust {
  public static class Map extends Mapper<LongWritable, Text, Text, Text>
 {

      Path[ ] cfile=new Path[0];
      ArrayList<Text> cust_bal=new ArrayList<Text>();

      public void setup(Context context)

      {
          Configuration conf=context.getConfiguration();
          try
          {
               cfile = DistributedCache.getLocalCacheFiles(conf);

          @SuppressWarnings("resource")
          BufferedReader reader=new BufferedReader(new
FileReader(cfile[0].toString()));
          String line;
          while ((line=reader.readLine())!=null)
          {
               Text tt=new Text(line);
          cust_bal.add(tt);
          }

              }

          catch(IOException e)
          {
               e.printStackTrace();
                    }
      }


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

        String line2 = value.toString(); //cust
        String[ ] elements=line2.split(",");

        for(Text e:cust_bal)
        {
          String[ ] line1 = e.toString().split(","); //cust_bal

          if(elements[0].equals(line1[0])){
```

```
          if(elements[2].equals("savings"))
          {
               line1[1]= String.valueOf(Integer.parseInt(line1[1]) +10000);

          }

          if(elements[2].equals("current"))
          {
               line1[1]= String.valueOf(Integer.parseInt(line1[1]) +
20000);
          }

          context.write(new Text(elements[0]),new Text(elements[1]+" ,
"+elements[2]+" , "+line1[1]));

          }

     }  }  } //BufferedReader class is used to read the text from a
character-based input stream


  public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();

     Job job = new Job(conf, "cust");
     job.setJarByClass(cust.class);

     DistributedCache.addCacheFile(new
Path(args[0]).toUri(),job.getConfiguration());

    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(Text.class);

     job.setMapperClass(Map.class);
    job.setInputFormatClass(TextInputFormat.class);
    job.setOutputFormatClass(TextOutputFormat.class);

FileInputFormat.addInputPath(job, new Path(args[1]));
FileOutputFormat.setOutputPath(job, new Path(args[2]));

     job.waitForCompletion(true);
     }
     }
```

Contents of directory /customer

Goto : /customer go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
cust	file	0.15 KB	1	64 MB	2021-06-03 19:29	rw-r--r--	ponny	supergroup
cust_bal	file	0.06 KB	1	64 MB	2021-06-03 19:29	rw-r--r--	ponny	supergroup
cust_out	dir				2021-06-03 19:40	rwxr-xr-x	ponny	supergroup

File: /customer/cust

Goto : /customer go

Go back to dir listing
Advanced view/download options

```
c1,Jahnavi,current
c2,Naren,savings
c3,Vaishnavi,current
c4,Vishnupriya,current
c5,Jana,savings
c6,Prarthana,savings
c7,Deepika,current
c8,Yasaswi,current
```

File: /customer/cust_bal

Goto : /customer go

Go back to dir listing
Advanced view/download options

```
c1,1200
c2,25000
c3,900
c4,6000
c5,1000
c6,0
c7,10000
c8,200000
```

File: /customer/cust_out/part-r-00000

Goto : /customer/cust_out go

Go back to dir listing
Advanced view/download options

```
c1      Jahnavi , current , 21200
c2      Naren , savings , 35000
c3      Vaishnavi , current , 20900
c4      Vishnupriya , current , 26000
c5      Jana , savings , 11000
c6      Prarthana , savings , 10000
c7      Deepika , current , 30000
c8      Yasaswi , current , 220000
```

2.**Sports** details are maintained in a text file. It has person name, age, sport name, gender and

salary. Find the person receiving maximum salary in **each sports category** and write the person name, sport name and the salary in HDFS. The sports details file is in compressed format. Apply map reduce programming to perform the above job.

max(sal) each sports category => Name,sport,max(sal)

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;
public class sport_count {
      public static class FormatConverterMapper extends
Mapper<LongWritable, Text, Text, Text>
     {

          IntWritable one = new IntWritable(1);
          public void map(LongWritable key, Text value, Context context)
throws IOException, InterruptedException {

               String[] line = value.toString().split(",");

               context.write(new Text(line[2]), new
Text(line[0]+","+line[1]+","+line[3]+","+line[4]));
               //key : sport
               //value : name, age, gender, salary
          }
     }

     public static class Reduce extends Reducer<Text, Text, Text, Text> {

          public Text word = new Text();
          public IntWritable maxsum = new IntWritable();


          String name,age,gender;

          public void reduce(Text key, Iterable<Text> values, Context
context)throws IOException, InterruptedException {
               int max = 0;
               int sum = 0;
               for (Text val : values) {

                    String[] line = val.toString().split(",");
                    sum = Integer.parseInt(line[3]);
                    if (sum > max){
                    max = sum;
                    name=line[0];
                    age=line[1];
                    gender=line[2];
                    }
               }
          context.write(key, new Text(name+","+age+","+gender+","+max));
```

```
        }
    }


    public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();
        Job job = new Job(conf, "sport_count");
        job.setJarByClass(sport_count.class);
        job.setOutputKeyClass(Text.class);
        job.setOutputValueClass(Text.class);
        job.setMapperClass(FormatConverterMapper.class);
        job.setReducerClass(Reduce.class);
        job.setInputFormatClass(SequenceFileInputFormat.class);
        job.setOutputFormatClass(TextOutputFormat.class);
        FileInputFormat.addInputPath(job, new Path(args[0]));
        FileOutputFormat.setOutputPath(job, new Path(args[1]));
        job.waitForCompletion(true);
    }
}
```

Contents of di

Goto : /Sports

Go to parent direc

Name	Owner	Group
sports_salary	ponny	supergroup
sports_salary_se	ponny	supergroup
sports_salary_se	ponny	supergroup

```
balamurali,45,cricket,male,100000
dinesh,35,hockey,male,70000
divyapriya,35,basketball,female,100000
preetha,30,basketball,female,90000
jason,23,hockey,male,100000
arihant,21,cricket,male,120000
swetha,19,swimming,female,80000
```

```
SEQ!org.apache.hadoop.io.LongWritableorg.apache.hadoop.io.Text▯▯▯▯▯▯▯▯▯▯KL▯2ђB▯nf▯▯▯*▯▯▯▯▯▯▯▯▯▯!balamurali,45,cricket,male,100000▯▯▯$▯▯▯▯▯▯▯▯▯"
dinesh,35,hockey,male,70000▯▯▯/▯▯▯▯▯▯▯▯▯>&divyapriya,35,basketball,female,100000▯▯▯+▯▯▯▯▯▯▯▯▯e"preetha,30,basketball,female,90000▯▯▯$▯▯▯▯▯▯▯▯▯▯
jason,23,hockey,male,100000▯▯▯'▯▯▯▯▯▯▯▯▯▯arihant,21,cricket,male,120000▯▯▯(▯▯▯▯▯▯▯▯▯▯swetha,19,swimming,female,80000
```

```
basketball      divyapriya,35,female,100000
cricket arihant,21,male,120000
hockey  jason,23,male,100000
swimming        swetha,19,female,80000
```

CAT 2

Me: An organization maintains the salary details that have employee-id, employee-name, age, address, city and salary as attributes. Create 2 salary input files. Write the city name and average salary of each city in HDFS. Write a MapReduce program to produce the output files based on the name of city in a reducer.

Multiple I/P + Multiple O/P

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

  public class sal1 {
          public static class map1 extends
Mapper<LongWritable,Text,Text,IntWritable>{
              public void map(LongWritable key, Text value, Context
context) throws IOException, InterruptedException{

                String[] line = value.toString().split(",");
                context.write(new Text(line[4]),new
IntWritable(Integer.parseInt(line[5])));
                 }
                }

           public static class map2 extends
Mapper<LongWritable,Text,Text,IntWritable>
           {
            public void map(LongWritable key, Text value, Context
context)throws IOException, InterruptedException{

                 String[] line = value.toString().split(",");

                 context.write(new Text(line[4]),new
IntWritable(Integer.parseInt(line[5])));
            }
           }


  public static class Reduce extends Reducer<Text, IntWritable, Text,
FloatWritable> {
       public MultipleOutputs  multipleOutputs;
       public void setup(Context context) throws IOException,
InterruptedException
          {

        multipleOutputs = new MultipleOutputs(context);
          }


       public void reduce(Text key, Iterable<IntWritable> values, Context
context)
         throws IOException, InterruptedException {
          int sum=0, n=0;
          float avg;

             for (IntWritable val : values) {
               n+=1;
```

```
                sum += val.get();
            }
            avg = sum/n;

            multipleOutputs.write(key, new
FloatWritable(avg),key.toString());

            }


  public void cleanup(Context context) throws IOException,
InterruptedException
     {
           multipleOutputs.close();
     }
  }
  public static void main(String[] args) throws Exception {
        Configuration conf = new Configuration();
         Job job = new Job(conf, "sal1");
          job.setJarByClass(sal1.class);
         job.setOutputKeyClass(Text.class);
         job.setOutputValueClass(IntWritable.class);

         job.setReducerClass(Reduce.class);
         job.setInputFormatClass(TextInputFormat.class);
         job.setOutputFormatClass(TextOutputFormat.class);

         MultipleInputs.addInputPath(job,new
Path(args[0]),TextInputFormat.class,map1.class);
         MultipleInputs.addInputPath(job,new
Path(args[1]),TextInputFormat.class,map2.class);

         FileOutputFormat.setOutputPath(job, new Path(args[2]));

         job.waitForCompletion(true);
          }
     }
```

MULTIPLE - INPUT

File: /sal1_2/sal1

Goto : /sal1_2 go

Go back to dir listing
Advanced view/download options

```
100,A,XYZ,30,C1,10000
101,B,YZX,40,C2,20000
103,C,ZYX,50,C1,20000
105,D,AAA,60,C2,40000
```

File: /sal1_2/sal2

Goto : /sal1_2 go

Go back to dir listing
Advanced view/download options

```
200,E,BBB,60,C1,10000
201,F,CCC,30,C2,30000
202,G,DDD,40,C3,50000
```

MULTIPLE - OUTPUT

Contents of directory /sal_out

Goto : /sal_out go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
C1-r-00000	file	0.01 KB	1	64 MB	2021-06-03 16:51	rw-r--r--	ponny	supergroup
C2-r-00000	file	0.01 KB	1	64 MB	2021-06-03 16:51	rw-r--r--	ponny	supergroup
C3-r-00000	file	0.01 KB	1	64 MB	2021-06-03 16:51	rw-r--r--	ponny	supergroup
_SUCCESS	file	0 KB	1	64 MB	2021-06-03 16:52	rw-r--r--	ponny	supergroup
_logs	dir				2021-06-03 16:51	rwxr-xr-x	ponny	supergroup
part-r-00000	file	0 KB	1	64 MB	2021-06-03 16:51	rw-r--r--	ponny	supergroup

Me : The mega event coordinator has a text file that has Kids-id, Kids- name, event-name and marks as attributes. Here marks attribute is used to specify their score, out of 100 in the competition. The coordinator likes to store the kids-name, marks and event-name in alphabetical order based on kids-name. Also use appropriate concept to find out the number of kids who have scored greater than 90. Develop an appropriate MapReduce program for the same.

CUSTOM COUNTER : No.of kids + Give kids_name to Reducer (A.O. sort)

```
import java.io.IOException;

import java.util.*;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.conf.*;

import org.apache.hadoop.io.*;

import org.apache.hadoop.mapreduce.*;

import org.apache.hadoop.mapreduce.Reducer.Context;
import org.apache.hadoop.mapreduce.lib.input.*;

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

public class kids {
     public enum ct
       {
            cnt //cnt => Condition 1
       };


public static class Map extends Mapper<LongWritable, Text, Text, Text>
```

```
{

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

String[] line = value.toString().split(",");

       context.write(new Text(line[1]), new Text(line[0]+" "+line[2]+"
"+line[3]));

if(Integer.parseInt(line[3])>90)
{
      context.getCounter(ct.cnt).increment(1);
}
}
}

public static class Reduce extends Reducer<Text, Text, Text, Text>
{
public void reduce(Text key,  Iterable<Text> values, Context context)
throws IOException, InterruptedException
{
     for (Text val : values)
     {
     context.write(key,val);
     }
}
}


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

Configuration conf = new Configuration();

Job job = new Job(conf, "kids");

job.setJarByClass(kids.class);

job.setOutputKeyClass(Text.class);
job.setOutputValueClass(Text.class);

job.setMapperClass(Map.class);
job.setReducerClass(Reduce.class);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

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

FileOutputFormat.setOutputPath(job, new Path(args[1]));
job.waitForCompletion(true);

Counters cn = job.getCounters();
cn.findCounter(ct.cnt).getValue();
}
}
```

File: /kids_out/part-r-00000

Goto : /kids_out go

Go back to dir listing
Advanced view/download options

```
A       100 XYZ 99
B       101 YZX 98
C       103 ZYX 80
D       105 AAA 78
E       200 BBB 94
F       201 CCC 79
G       202 DDD 88
```

```
21/06/03 18:36:09 INFO mapred.JobClient:     Bytes Read=98
21/06/03 18:36:09 INFO mapred.JobClient:   kids$ct
21/06/03 18:36:09 INFO mapred.JobClient:     cnt=3
21/06/03 18:36:09 INFO mapred.JobClient:   Map-Reduce Framework
```

Vaishu: The drawing event coordinator has a text file that has kids-id, kids-name, event-name, and marks as attributes. Here marks attribute is used to specify their score, out of 100 in the competition. The coordinator likes to list out the **5 kids who scored the highest**. Develop a MapReduce program to display the kid's details with their name, marks, and event name. Also, display the **second-highest scored kids** details with the name of the kids be displayed in **uppercase**.

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

public class Treemap_marks {
public static class Map extends Mapper<LongWritable,
Text,NullWritable,Text>
{
private TreeMap<Integer, Text> marks = new TreeMap<Integer, Text>();

public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException
{
          String[] line = value.toString().split(",");
```

```
        int i = Integer.parseInt(line[3]);
        marks.put(i,new Text(value));
        if (marks.size() > 5)
        {
         marks.remove(marks.firstKey());
        }
}

protected void cleanup(Context context) throws IOException,
InterruptedException
{            for ( Text name : marks.values() ) {
                context.write(NullWritable.get(), name);
             }
         }
}

public static class Reduce extends Reducer<NullWritable, Text,
NullWritable, Text>
{
     int k = 1;
public void reduce(NullWritable key, Iterable<Text> values, Context
context) throws IOException, InterruptedException {


TreeMap<Integer, Text> marks = new TreeMap< Integer, Text>();

        for (Text value : values)
        {
                String line = value.toString();
                String[] elements=line.split(",");

                int  i= Integer.parseInt(elements[3]);
                marks.put(i, new Text(value));

             if (marks.size() > 5)
             {
              marks.remove(marks.firstKey());
                   }
         }

         for (Text t : marks.values())
         {
          String[] line = t.toString().split(",");
          if(k==4)
          {
               line[1] = line[1].toUpperCase();
          }
          t = new Text(line[0]+','+line[1]+','+line[2]+','+line[3]);
             context.write(NullWritable.get(), t);
             k++;
           }
```

```
    }
}

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


        Configuration conf = new Configuration();
        Job job = new Job(conf, "kids");
        job.setJarByClass(Treemap_marks.class);
        job.setOutputKeyClass(NullWritable.class);
        job.setOutputValueClass(Text.class);
        job.setNumReduceTasks(1);
        job.setMapperClass(Map.class);
        job.setReducerClass(Reduce.class);
        job.setInputFormatClass(TextInputFormat.class);
        job.setOutputFormatClass(TextOutputFormat.class);
        FileInputFormat.addInputPath(job, new Path(args[0]));
        FileOutputFormat.setOutputPath(job, new Path(args[1]));
        job.waitForCompletion(true);
    }
}
```

File: /TreeMap_sec_high/tree

Goto : /TreeMap_sec_high go

Go back to dir listing
Advanced view/download options

```
101,maven,draw,75
102,maiq,paint,95
103,mercer,doodle,94
104,vex,draw,63
105,sapphire,paint,56
106,delvin,doodle,98
107,tonila,draw,85
108,lydia,paint,54
109,belethor,doodle,99
110,serana,draw,88
```

File: /TreeMap_sec_high/out/part-r-00000

Goto : /TreeMap_sec_high/out go

Go back to dir listing
Advanced view/download options

```
110,serana,draw,88
103,mercer,doodle,94
102,maiq,paint,95
106,DELVIN,doodle,98
109,belethor,doodle,99
```

UG PG / UGPG

Student details are maintained in the files “st” and “mark”. The File “st” has the student-id , student-type (UG/PG) and student-name are attributes. The File “mark” has the student-id, (marks of 4 subjects) M1, M2, M3 and M4 are attributes.

a). If the type of student belongs to ”UG” , then write the student-id, student-type, student-name and average marks of the corresponding student in HDFS.

b) If the student-type is “PG”, then write the student-id, student-type, student-name and total marks of the corresponding student in HDFS.

Use map reduce programming.

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

import org.apache.hadoop.filecache.DistributedCache;
import org.apache.hadoop.fs.Path;
import java.io.BufferedReader;
import java.io.FileReader;

import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
```

```
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

   public class ugpg {
 public static class Map extends Mapper<LongWritable, Text, Text, Text>
{

    Path[ ] cfile=new Path[0];
    ArrayList<Text> ugpg=new ArrayList<Text>();

    public void setup(Context context)

    {
        Configuration conf=context.getConfiguration();
        try
        {
                cfile = DistributedCache.getLocalCacheFiles(conf);

        @SuppressWarnings("resource")
                BufferedReader reader=new BufferedReader(new FileReader(cfile[0].toString()));
        String line;
        while ((line=reader.readLine())!=null)
        {
                Text tt=new Text(line);
        ugpg.add(tt);
        }

           }
        catch(IOException e)
        {
                e.printStackTrace();
                        }
```

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

    String line2 = value.toString(); //ugpg
    String[ ] elements=line2.split(",");

    float ans=0;
    for(Text e:ugpg)
    {
       String[ ] line = e.toString().split(","); //ugpg

       if(elements[0].equals(line[0])){

       if(elements[1].equals("pg"))
       {
              String [] marks = {line[1],line[2],line[3],line[4],line[5]};
              float n = marks.length;
              float sum=0;

              for(int i=0; i< marks.length; i++)
              {
                     sum = sum + Float.parseFloat(marks[i]);
                     ans = sum;
              }
       }

       if(elements[1].equals("ug"))
       {
              String [] marks = {line[1],line[2],line[3],line[4],line[5]};
              float n = marks.length;
              float sum=0;
              for(int i=0; i< marks.length; i++)
              {
```

```
                    sum = sum + Float.parseFloat(marks[i]);
                    ans= sum/n;
                }
        }

        context.write(new Text(elements[0]),new Text(elements[1]+" , "+elements[2]+" , "+String.valueOf(ans)));

        }

        } } } //BufferedReader class is used to read the text from a character-based input stream

  public static void main(String[] args) throws Exception {
            Configuration conf = new Configuration();

        Job job = new Job(conf, "ugpg");
        job.setJarByClass(ugpg.class);

        DistributedCache.addCacheFile(new Path(args[0]).toUri(),job.getConfiguration());

    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(Text.class);

        job.setMapperClass(Map.class);
    job.setInputFormatClass(TextInputFormat.class);
    job.setOutputFormatClass(TextOutputFormat.class);

FileInputFormat.addInputPath(job, new Path(args[1]));
FileOutputFormat.setOutputPath(job, new Path(args[2]));

        job.waitForCompletion(true);
        }
```

}

File: /UGPG/st.csv

Goto : /UGPG go

Go back to dir listing
Advanced view/download options

```
1001,ug,Naren
1002,pg,Babu
1003,ug,Yugi
1004,pg,Pappu
1005,ug,Jahnu
```

File: /UGPG/mark.csv

Goto : /UGPG go

Go back to dir listing
Advanced view/download options

```
1001,55,45,56,87,21
1002,75,55,89,64,90
1003,25,54,89,76,95
1004,78,55,86,63,54
1005,58,96,78,46,96
```

```
1001    ug , Naren , 264.0
1002    pg , Babu , 74.6
1003    ug , Yugi , 339.0
1004    pg , Pappu , 67.2
1005    ug , Jahnu , 374.0
```

Prar: An organization maintains the salary details that have employee-id, employee-name, age, city, country, and salary as attributes. Create 3 salary input files. **Partition** the files based on the **country**. Write the **country name and average salary** of each country in HDFS. Use map reduce programming.

```
import java.io.IOException;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.FloatWritable;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Partitioner;
import org.apache.hadoop.mapreduce.Reducer;
import org.apache.hadoop.mapreduce.Reducer.Context;
import org.apache.hadoop.mapreduce.lib.input.MultipleInputs;
import org.apache.hadoop.mapreduce.lib.input.TextInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;
import org.apache.hadoop.mapreduce.lib.output.MultipleOutputs;
import org.apache.hadoop.mapreduce.lib.output.TextOutputFormat;
public class prar_country{
public static class mapper1 extends
Mapper<LongWritable,Text,Text,IntWritable>{
```

```
    public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException{
     String[] line = value.toString().split(",");
        context.write(new Text(line[4]), new
IntWritable(Integer.parseInt(line[5])));
       }
      }

      public static class jreducer extends
Reducer<Text,IntWritable,Text,FloatWritable>
      {
            public  FloatWritable res1 = new FloatWritable();
           public Text wrd1  = new Text();
           public MultipleOutputs multipleOutputs;

            public void setup(Context context) throws IOException,
InterruptedException

            {

            multipleOutputs = new MultipleOutputs(context);

            }

          public void reduce(Text key, Iterable<IntWritable> values,
Context context) throws IOException, InterruptedException {
          int sum = 0;
          int count=0;
          float avg;
          for (IntWritable val : values) {
               multipleOutputs.write(key, new
IntWritable(val.get()),key.toString());
               count+=1;
               sum+=val.get();
          }
          avg=sum/count;
          multipleOutputs.write(new Text("Average salary of "+key+":"),new
FloatWritable(avg),key.toString());


                  }


          public void cleanup(Context context) throws IOException,
InterruptedException

            {

            multipleOutputs.close();

            }

           }

      public static void main(String[] args) throws Exception {
           Configuration conf = new Configuration();
```

```
                Job job = new Job(conf, "wordcount");

                job.setJarByClass(prar_country.class);
                job.setOutputKeyClass(Text.class);
                job.setOutputValueClass(IntWritable.class);
                job.setReducerClass(jreducer.class);
                job.setInputFormatClass(TextInputFormat.class);
                job.setOutputFormatClass(TextOutputFormat.class);
                MultipleInputs.addInputPath(job,new
Path(args[0]),TextInputFormat.class,mapper1.class);
                MultipleInputs.addInputPath(job,new
Path(args[1]),TextInputFormat.class,mapper1.class);
                MultipleInputs.addInputPath(job,new
Path(args[2]),TextInputFormat.class,mapper1.class);
                FileOutputFormat.setOutputPath(job, new Path(args[3]));
                job.waitForCompletion(true);
            }
            }
```

Prar: The Government agency is maintaining the citizen's details. The citizen's details (i.e name, DOB (date, month, year), location) are maintained in the text file. Use a suitable concept to identify the total number of citizens whose age is above 30. Write the **citizen name** and the **age** satisfying the above condition in HDFS. Develop a MapReduce program for the same. Use **year in DOB** attribute for age calculation.

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.Reducer.Context;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

public class prar_date {
public static class Map extends Mapper<LongWritable, Text, Text, Text>
{
IntWritable one = new IntWritable(1);
public void map(LongWritable key, Text value, Context context) throws
IOException, InterruptedException {
String[] line = value.toString().split(",");
     context.write(new Text(line[0]),new Text(line[1]+','+line[2]));
}
}
//input key is name,value is dob and location
public static class Reduce extends Reducer<Text, Text, Text, Text> {
public void reduce(Text key, Iterable<Text> values, Context context) throws
IOException, InterruptedException {
for (Text val : values) {
```

```
      String[] line = val.toString().split(","); //splitting the dob and
location
      String[] Date = line[0].split("/"); // splitting the date into dd mm
yy and storing them in an array date[]
      int day=(3-(Integer.parseInt(Date[0]))+30)%30; //calculating the diff
between the days
      int month=(6-(Integer.parseInt(Date[1]))+12)%12; //calculating the
diff between months
      int year=2021-(Integer.parseInt(Date[2])); //calculating the diff
between years
      double no_years= (day+(month*30)+(year*365.25))/365.25;

      if(no_years>30.0){
      context.write(key,val);
      }
}
}
}
public static void main(String[] args) throws Exception {

Configuration conf = new Configuration();

Job job = new Job(conf, "prar_date");

job.setJarByClass(prar_date.class);

job.setOutputKeyClass(Text.class);

job.setOutputValueClass(Text.class);

job.setMapperClass(Map.class);

job.setReducerClass(Reduce.class);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

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

FileOutputFormat.setOutputPath(job, new Path(args[1]));

job.waitForCompletion(true);

}

}
```

Contents of directory /prar_date

Goto : /prar_date go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
date	file	0.16 KB	1	64 MB	2021-06-04 10:40	rw-r--r--	ponny	supergroup
date_out	dir				2021-06-04 10:43	rwxr-xr-x	ponny	supergroup

```
Ashwineyy       07/05/1991,Coimbatore
Dulquer 28/07/1988,Trivandrum
```

```
Jahnavi,10/6/2001,ongole
Areyy,06/09/2000,vijayawada
Naren,30/10/2000,Chennai
Vaishu,23/01/1997,Royapuram
Ashwineyy,07/05/1991,Coimbatore
Dulquer,28/07/1988,Trivandrum
```

FAT LAB

I. The electricity department maintains the power consumption details of the customers. Customer name,city and the units consumed are maintained in the text file. The unit values are ranged from 500 to 20,000. Department wishes to store the customer details in 4 different files based on the units consumed as:

1. Customer details with the units <1000
2. Customer details with the units <3000
3. Customer details with the units >5000
4. Customer details with the units other than the above three conditions.

Write the unique city names and the count of the cities in HDFS.
Use map reduce programming to perform the above job.
Note: Create a text file with minimum of 10 records.

```
import java.io.IOException;
import java.util.*;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.conf.*;
import org.apache.hadoop.io.*;
import org.apache.hadoop.mapreduce.*;
import org.apache.hadoop.mapreduce.Reducer.Context;
import org.apache.hadoop.mapreduce.lib.input.*;
import org.apache.hadoop.mapreduce.lib.output.*;

public class current {
```

```
public static class Map extends Mapper<LongWritable, Text, Text, IntWritable>

{

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

String[] line = value.toString().split(",");



        //Key: country, Value: Salary
        context.write(new Text(line[1]),new IntWritable(Integer.parseInt(line[2])));

}
}

public static class dpart extends Partitioner<Text,IntWritable>
{
        //"nr" receives the value from setNumReduceTasks( _ )

          public int getPartition(Text key,IntWritable value,int nr)
          {
                if(value.get()<1000)
                        return 0;

                if(value.get() < 3000)
                        return 1;

                 if(value.get() > 5000)
                        return 2;

                 else
                        return 3;
          }
```

```
}


public static class Reduce extends Reducer<Text, IntWritable, Text, Text> {
int count=0;
Text store;
public void reduce(Text key, Iterable<IntWritable> values, Context context) throws IOException,
InterruptedException {
for (IntWritable val : values) {
        context.write(key,new Text("- Units: " + val.toString()));
        store=key;
        count++;
}
context.write(key, new Text("- Count: " +count+"\n"));
}
}

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

Configuration conf = new Configuration();

Job job = new Job(conf, "current");

job.setJarByClass(current.class);

job.setOutputKeyClass(Text.class);

job.setOutputValueClass(IntWritable.class);

job.setMapperClass(Map.class);
job.setReducerClass(Reduce.class);

// give the no. of reducer
job.setPartitionerClass(dpart.class);
```

```
job.setNumReduceTasks(4);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

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

FileOutputFormat.setOutputPath(job, new Path(args[1]));

job.waitForCompletion(true);

}
}
```

Contents of directory /rev/current_out

Goto : /rev/current_out go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
_SUCCESS	file	0 KB	1	64 MB	2021-06-13 20:26	rw-r--r--	ponny	supergroup
_logs	dir				2021-06-13 20:25	rwxr-xr-x	ponny	supergroup
part-r-00000	file	0.12 KB	1	64 MB	2021-06-13 20:26	rw-r--r--	ponny	supergroup
part-r-00001	file	0.04 KB	1	64 MB	2021-06-13 20:26	rw-r--r--	ponny	supergroup
part-r-00002	file	0.13 KB	1	64 MB	2021-06-13 20:26	rw-r--r--	ponny	supergroup
part-r-00003	file	0.12 KB	1	64 MB	2021-06-13 20:26	rw-r--r--	ponny	supergroup

Missing Count / Missing column

Identify missing data , count

If a particular value is empty , count++

prod , country name

under country find the missing

```
import java.io.IOException;
import org.apache.hadoop.fs.Path;

import org.apache.hadoop.conf.*;

import org.apache.hadoop.io.*;

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

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

public class missingcount {
        public enum ct
          {
                  cnt //cnt => Condition 1
          };


public static class Map extends Mapper<LongWritable, Text, Text, Text>

{

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

String[] line = value.toString().split(",");

if(line[7].equals(""))
                  {
          context.getCounter(ct.cnt).increment(1);
          line[7]="Empty";
                  }

        context.write(new Text(line[1]),new Text(line[7]));
}
}

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

Configuration conf = new Configuration();

Job job = new Job(conf, "missingcount");

job.setJarByClass(missingcount.class);

job.setOutputKeyClass(Text.class);
```

```
job.setOutputValueClass(Text.class);

job.setMapperClass(Map.class);
//job.setReducerClass(Reduce.class);

job.setInputFormatClass(TextInputFormat.class);
job.setOutputFormatClass(TextOutputFormat.class);

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

FileOutputFormat.setOutputPath(job, new Path(args[1]));
job.waitForCompletion(true);

Counters cn = job.getCounters();
cn.findCounter(ct.cnt).getValue();

}
}
```

A social media maintains the Friendship Network in the text file. Text file maintains the network as person name and friend name. Identify the occurrences of the friends names using map reduce programming.

Note: Create a text file with minimum of 15 records.

Sample Text file

Ram,raj

Ram,tej

Tej,raj

Raj,kamal

Tej,ravi

Karthik,anand

Sample Output

Raj - 2

Tej-1

Kamal-1

Ravi-1

Anand-1

HIVE Query

cd hadoop/ cd hive-0.9.0-bin/

cd bin

./hive

Enter into hive:
cd /hadoop/hive-0.9.0-bin/bin$ ./hive

Display the Database:
show databases;

Display the Tables:

show tables;

Create a database:
create database db1;

To find the location of the DB:
describe database db1;

To use DB:
use db1;

Create table:
create table dt(a int,b string,c int,d int,e int) **row** format delimited fields terminated by ',' stored as **textfile**;
By default => Textfile Format

Load file content into the table:
load data inpath '/mar' into table dt;
load data inpath '/mar' overwrite into table dt;

Load file from local directory
load data local inpath '/home/ponny/file.txt into table dt;

Display the Table contents:
select * from dt;

Create a table like the old table:
create table dt1 **like** dt;

load data local inpath '/mar' into table dt1;

Create a table like the old table along with the contents:
create table dt2 as select*from dt1;

Drop table
drop table dt2;

Drop Databases along with Tables inside
drop database if exists dk **cascade**;

Add columns to existing table:
alter table dt add columns(Class_section STRING);

Rename columns:
alter table dt change column Class_section Class__section STRING;

Alter table and change position of column
alter table dt change column Class__section Class_section STRING after avg;

Replace Columns
alter table dt replace columns(a string,b int, c int);

External files:
create external table et(a int, b string) row format delimited fields terminated by ',' location '/user/ponny/newfile/';

Describe Extended table:
describe extended et;

DROP DATABASE IF EXISTS db_name CASCADE;

Add Columns to existing table

ALTER TABLE log_messages **ADD** COLUMNS (app_name STRING, session_id LONG);

Rename Table

ALTER TABLE before_tname RENAME TO after_tname;

Alter Column (Name / Datatype)

alter table t4 change column oldcolname newcolname datatype_newcol;

alter table d1 change column c y int ;

Rename and change the position of column after some col (k)

ALTER TABLE Tname change column oldcolname newcolname datatype_newcol after k;

alter table d1 change column c y int after x;

Replace columns

Remove the existing columns and replace the positions with only selected columns;

a , b , d => x , y , d

ALTER TABLE d1 REPLACE COLUMNS(x int, y string, d int) ;

describe d1;

OK

x int

y string

d int

Load File to Table

load data inpath '/hive/lab1' into table **t1**; // From HDFS
load data **local** inpath '/home/ponny/ " into table t1; // From OS

local ⇒ from OS

in hdfs ⇒ remove local

Import file from external directory not from HIVE warehouse

Hive won't take the ownership of this table

while dropping metadata will be deleted and not the contents

create **external table** et(a int, b string) row format delimited fields terminated by ','
location '/home/ponny/Desktop/Hive_tt/ext_table';

hive> describe et;

OK

a int

b string

check table path;

describe extended tname;

External table location is in some other location

location:hdfs://localhost:54310/home/ponny/Desktop/Hive_tt/ext_table

Internal table location is in Hive warehouse

location:hdfs://localhost:54310/user/hive/warehouse/c2.db/d1

Table Creation - stud table

cols : name , id , marks , grade ,address, contact_num

create table stud(name string, id int, marks int, grade string, address string, contact_num bigint) row format delimited fields terminated by ',' stored as textfile;

describe stud;

OK

name string

id int

marks int

grade string

address string

contact_num bigint

Write a query...

1. **Using concat() , join address and contact_num**

SELECT name, concat(column1,column2) AS x FROM table;

SELECT name , CONCAT(address,contact_num) AS concated FROM stud;

Naren Tambaram9840999509
Babu Chitlapakkam9988776655
Kavya Arthi Tower8877665544
Pappu Kunjappan7766554433
Jahnu Ongole6655443322
Vaishu Beach9977553311

add " - " inbetween

SELECT name , CONCAT(address,' - ', contact_num) AS concated FROM stud;

OK
Naren Tambaram - 9840999509
Babu Chitlapakkam - 9988776655
Kavya Arthi Tower - 8877665544
Pappu Kunjappan - 7766554433
Jahnu Ongole - 6655443322
Vaishu Beach – 9977553311

2. Max(Marks) , Min(Marks) , Avg(Marks) of the class from the Table

SELECT concat(' Max : ',max(marks), ' - Min : ',min(marks),' - Avg : ',avg(marks)) FROM stud;

Max : 100 - Min : 93 - Avg : 96.5

3.Stud_name to Uppercase

select id, ucase(name),contact_num from stud;

1001 NAREN 9840999509
1002 BABU 9988776655
1003 KAVYA 8877665544
1004 PAPPU 7766554433
1005 JAHNU 6655443322
1006 VAISHU 9977553311

LAB

1. Create a table with column names as

1.ID
2.NAME

3.DOB
4.GENDER

create table t1(id int,name string,dob string,gender string) row format delimited fields terminated by ',' stored as textfile;

describe t1;

Textfile ⇒ HDFS
hadoop fs -copyFromLocal /home/ponny/Desktop/Hive_tt/lab1 /hive/

Load File to Table

load data inpath '/hive/lab1' into table **t1**;

Q1.Write the query to display name in uppercase letters

select ucase(name) from t1;

```
hive> select ucase(name) from t1;
Total MapReduce jobs = 1
Launching Job 1 out of 1
Number of reduce tasks is set to 0 since there's no reduce operator
Starting Job = job_202105191151_0001, Tracking URL = http://localhost:50030/jobdetails.jsp?jobid=job_202105191151_0001
Kill Command = /home/ponny/hadoop/libexec/../bin/hadoop job  -Dmapred.job.tracker=localhost:54311 -kill job_202105191151_0001
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 0
2021-05-21 12:15:29,978 Stage-1 map = 0%,  reduce = 0%
2021-05-21 12:15:36,035 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.26 sec
2021-05-21 12:15:37,045 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.26 sec
2021-05-21 12:15:38,061 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.26 sec
2021-05-21 12:15:39,075 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.26 sec
2021-05-21 12:15:40,094 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.26 sec
2021-05-21 12:15:41,104 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.26 sec
2021-05-21 12:15:42,128 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.26 sec
MapReduce Total cumulative CPU time: 260 msec
Ended Job = job_202105191151_0001
MapReduce Jobs Launched:
Job 0: Map: 1   Cumulative CPU: 0.26 sec   HDFS Read: 309 HDFS Write: 25 SUCCESS
Total MapReduce CPU Time Spent: 260 msec
OK
JAHNU
NAREN
VAISHU
PAPPU
Time taken: 21.444 seconds
```

Q2.write the query to count number of male and female.

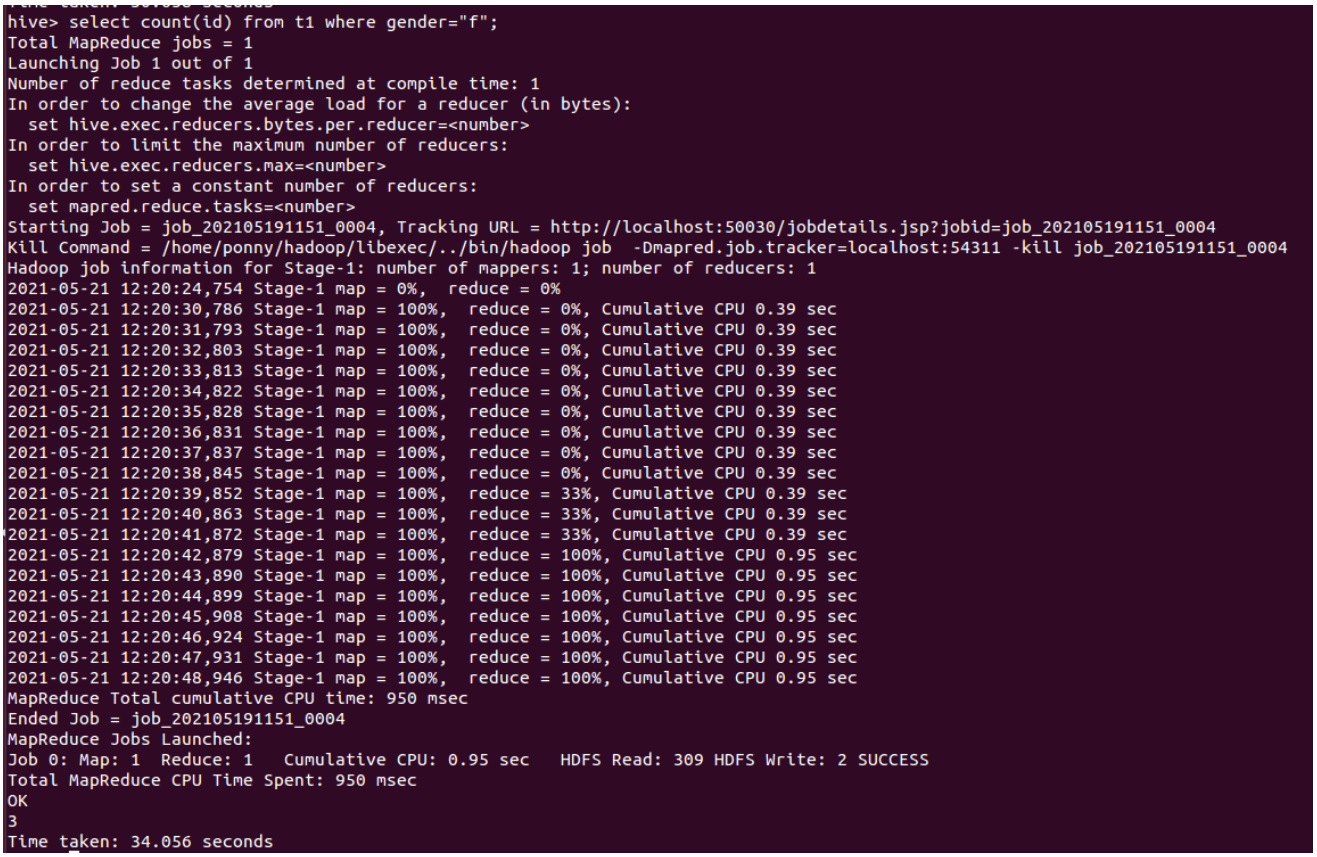
select count(id) from t1 where gender="m";

1

```
hive> select count(id) from t1 where gender="m";
Total MapReduce jobs = 1
Launching Job 1 out of 1
Number of reduce tasks determined at compile time: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapred.reduce.tasks=<number>
Starting Job = job_202105191151_0003, Tracking URL = http://localhost:50030/jobdetails.jsp?jobid=job_202105191151_0003
Kill Command = /home/ponny/hadoop/libexec/../bin/hadoop job  -Dmapred.job.tracker=localhost:54311 -kill job_202105191151_0003
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2021-05-21 12:18:51,599 Stage-1 map = 0%,  reduce = 0%
2021-05-21 12:18:57,626 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:18:58,636 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:18:59,643 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:00,651 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:01,662 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:02,668 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:03,671 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:04,678 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:05,685 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.39 sec
2021-05-21 12:19:06,696 Stage-1 map = 100%,  reduce = 33%, Cumulative CPU 0.39 sec
2021-05-21 12:19:07,720 Stage-1 map = 100%,  reduce = 33%, Cumulative CPU 0.39 sec
2021-05-21 12:19:08,731 Stage-1 map = 100%,  reduce = 33%, Cumulative CPU 0.39 sec
2021-05-21 12:19:09,738 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.88 sec
2021-05-21 12:19:10,746 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.88 sec
2021-05-21 12:19:11,757 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.88 sec
2021-05-21 12:19:12,770 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.88 sec
2021-05-21 12:19:13,780 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.88 sec
2021-05-21 12:19:14,816 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.88 sec
MapReduce Total cumulative CPU time: 880 msec
Ended Job = job_202105191151_0003
MapReduce Jobs Launched:
Job 0: Map: 1  Reduce: 1   Cumulative CPU: 0.88 sec   HDFS Read: 309 HDFS Write: 2 SUCCESS
Total MapReduce CPU Time Spent: 880 msec
OK
1
Time taken: 30.658 seconds
```

Select count(id) from t1 where gender="f";

3



2. Create a table with column as

1.FID

2.FNAME

3.GENDER

4.DOB

5.QUALIFICATION

6.JOB

7.CONTACT NUMBER

8.ADDRESS

9.FRIENDS

10.VIDEOS SHARED

11.MSG(POSTED/SHARED)

create table t2(fid int,fname string,gender string,dob string,qual string, job string, cnum int, addr string, friends int, vids string, msg string) row format delimited fields terminated by ',' stored as textfile;

describe t2;

Textfile ⇒ HDFS
hadoop fs -copyFromLocal /home/ponny/Desktop/Hive_tt/lab1_vids /hive/

Load File to Table

load data inpath '**/hive/lab1_vids**' into table **t2**;

File: /user/hive/warehouse/lab1.db/t2/lab1_vids

Goto : /user/hive/warehouse/lab1.db/t2 go

Go back to dir listing
Advanced view/download options

```
1001,Jahnu,f,10/06/2001,mtech,IT,9876543210,ongole,12,comedy,shared
1003,Naren,m,30/10/2000,mtech,Security,1234567890,tambaram,5,lecture,shared
1029,Vaishu,f,23/01/1996,mtech,Desingner,2345678901,beach,15,lecture,shared
1085,Pappu,f,29/09/2000,mtech,ML,3456789012,tambaram,10,comedy,shared
1084,Jana,m,10/09/2000,mtech,ML,3356788012,guduvanchery,10,comedy,posted
```

Q1.Write the Query to get the count of lecture videos shared from the database

select count(fid) from t2 where vids="lecture" and msg="shared";

```
hive> select count(fid) from t2 where vids="lecture" and msg="shared";
Total MapReduce jobs = 1
Launching Job 1 out of 1
Number of reduce tasks determined at compile time: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapred.reduce.tasks=<number>
Starting Job = job_202105191151_0006, Tracking URL = http://localhost:50030/jobdetails.jsp?jobid=job_202105191151_0006
Kill Command = /home/ponny/hadoop/libexec/../bin/hadoop job  -Dmapred.job.tracker=localhost:54311 -kill job_202105191151_0006
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2021-05-21 12:42:41,700 Stage-1 map = 0%,  reduce = 0%
2021-05-21 12:42:47,742 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:48,748 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:49,756 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:50,763 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:51,769 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:52,777 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:53,786 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:54,796 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:55,804 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:56,811 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:57,819 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:58,827 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.47 sec
2021-05-21 12:42:59,831 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
2021-05-21 12:43:00,837 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
2021-05-21 12:43:01,844 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
2021-05-21 12:43:02,861 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
2021-05-21 12:43:03,868 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
2021-05-21 12:43:04,876 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
2021-05-21 12:43:05,885 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.0 sec
MapReduce Total cumulative CPU time: 1 seconds 0 msec
Ended Job = job_202105191151_0006
MapReduce Jobs Launched:
Job 0: Map: 1  Reduce: 1   Cumulative CPU: 1.0 sec   HDFS Read: 580 HDFS Write: 2 SUCCESS
Total MapReduce CPU Time Spent: 1 seconds 0 msec
OK
2
Time taken: 32.785 seconds
```

Q2.Write the Query to get th count of comedy videos shared from the database

select count(fid) from t2 where vids="comedy" and msg="shared";

```
hive> select count(fid) from t2 where vids="comedy" and msg="shared";
Total MapReduce jobs = 1
Launching Job 1 out of 1
Number of reduce tasks determined at compile time: 1
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapred.reduce.tasks=<number>
Starting Job = job_202105191151_0007, Tracking URL = http://localhost:50030/jobdetails.jsp?jobid=job_202105191151_0007
Kill Command = /home/ponny/hadoop/libexec/../bin/hadoop job  -Dmapred.job.tracker=localhost:54311 -kill job_202105191151_0007
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 1
2021-05-21 12:43:48,065 Stage-1 map = 0%,  reduce = 0%
2021-05-21 12:43:54,090 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:43:55,097 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:43:56,102 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:43:57,105 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:43:58,111 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:43:59,118 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:00,125 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:01,131 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:02,138 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:03,143 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:04,149 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:05,157 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.35 sec
2021-05-21 12:44:06,161 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
2021-05-21 12:44:07,167 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
2021-05-21 12:44:08,179 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
2021-05-21 12:44:09,186 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
2021-05-21 12:44:10,190 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
2021-05-21 12:44:11,197 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
2021-05-21 12:44:12,213 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 0.84 sec
MapReduce Total cumulative CPU time: 840 msec
Ended Job = job_202105191151_0007
MapReduce Jobs Launched:
Job 0: Map: 1  Reduce: 1   Cumulative CPU: 0.84 sec   HDFS Read: 580 HDFS Write: 2 SUCCESS
Total MapReduce CPU Time Spent: 840 msec
OK
2
Time taken: 31.566 seconds
```

Partitioning and Bucketing

- Helps to improve hive performance
- Splits (table) ⇒ creates subdirectories / sampling of the table
- Horizontally the load gets balanced

1. Dynamic Partition

non-strict⇒ dynamic

by default => strict

Partition based on a column

set hive.exec.dynamic.partition = true;

set hive.exec.dynamic.partition.mode = nonstrict;

create table t1part(id int,name string,dob string) partitioned by (gender string) row format delimited fields terminated by ',' stored as textfile;

insert ⇒ insert the table values from one table **(not partitioned)** to other **(newly created partitioned table)**

insert into table t1part partition(gender) select id ,name, dob, gender from t1;

NOTE : partitioned col is given at the end , bcde"q"

LOCATION : /user/hive/warehouse/lab1.db/t1part

Contents of directory /user/hive/warehouse/lab1.db/t1part

Goto : /user/hive/warehouse/lab1.db/t1 go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
gender=f	dir				2021-05-21 13:11	rwxr-xr-x	ponny	supergroup
gender=m	dir				2021-05-21 13:11	rwxr-xr-x	ponny	supergroup

2.Static Partition

strict ⇒ static

NOTE : c=90, only for that condition a partition will be created

set hive.exec.dynamic.partition.mode = strict;

create table stpq(a int,b string,d int,e int) partitioned by (c int) row format delimited fields terminated by ',' stored as textfile;

insert into table stpq partition(c = 90) select a,b,d,e from dtbl where c = 90;

Partition the table using the column "gender"

NOTE : Based on every value of the col "gender" a directory will be created

set hive.exec.dynamic.partition.mode = strict;

create table t1stpart(id int,name string,dob string) partitioned by (gender string) row format delimited fields terminated by ',' stored as textfile;

insert into table t1stpart partition(gender='f') select id ,name, dob from t1 where gender='f';

LOCATION : /user/hive/warehouse/lab1.db/t1stpart

Contents of directory /user/hive/warehouse/lab1.db/t1stpart

Goto : /user/hive/warehouse/lab1.db/t1 go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
gender=f	dir				2021-05-21 13:29	rwxr-xr-x	ponny	supergroup

NOTE : don’t mention part_col in "select"

else

FAILED: Error in semantic analysis: Line 1:18 Cannot insert into target table because column number/types are different "f": Table insclause-0 has 3 columns, but query has 4 columns.

Bucketing

Creates multiple sub-samples of original table

Partitions are created as direectories

Buckets will be created as files in a directory

We can specify the no. of buckets , thus we can restrict the no.of partitions.

set hive.enforce.bucketing = true;

create table bt(a int,b string, c int, d int, e int) clustered by (d) into 2 buckets row format delimited fields terminated by ',' stored as textfile;

Transfer column from the non_bucketing table to the newly created table

insert into table_name select a,b,c,d,e from dtbl;

Creating 2 Buckets on the column “gender”

set hive.enforce.bucketing = true;

create table bt_gender(id int,name string,dob string,gender string) clustered by (gender) into **2** buckets row format delimited fields terminated by ',' stored as textfile;

insert into table bt_gender select id,name,dob,gender from t1;

insert overwrite table bt_gender select id,name,dob,gender from t1;

LOCATION: /user/hive/warehouse/lab1.db/bt_gender

```
hive> insert into table bt_gender select id,name,dob,gender from t1;
Total MapReduce jobs = 1
Launching Job 1 out of 1
Number of reduce tasks determined at compile time: 2
In order to change the average load for a reducer (in bytes):
  set hive.exec.reducers.bytes.per.reducer=<number>
In order to limit the maximum number of reducers:
  set hive.exec.reducers.max=<number>
In order to set a constant number of reducers:
  set mapred.reduce.tasks=<number>
Starting Job = job_202105282228_0003, Tracking URL = http://localhost:50030/jobd
etails.jsp?jobid=job_202105282228_0003
Kill Command = /home/ponny/hadoop/libexec/../bin/hadoop job  -Dmapred.job.tracke
r=localhost:54311 -kill job_202105282228_0003
Hadoop job information for Stage-1: number of mappers: 1; number of reducers: 2
2021-05-28 23:14:20,219 Stage-1 map = 0%,  reduce = 0%
2021-05-28 23:14:26,286 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:27,301 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:28,315 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:29,324 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:30,333 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:31,356 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:32,369 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:33,379 Stage-1 map = 100%,  reduce = 0%, Cumulative CPU 0.78 sec
2021-05-28 23:14:34,396 Stage-1 map = 100%,  reduce = 17%, Cumulative CPU 0.78 sec
2021-05-28 23:14:35,401 Stage-1 map = 100%,  reduce = 17%, Cumulative CPU 0.78 sec
2021-05-28 23:14:36,416 Stage-1 map = 100%,  reduce = 17%, Cumulative CPU 0.78 sec
2021-05-28 23:14:37,426 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 1.31 sec
2021-05-28 23:14:38,430 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 1.31 sec
2021-05-28 23:14:39,433 Stage-1 map = 100%,  reduce = 67%, Cumulative CPU 1.31 sec
2021-05-28 23:14:40,442 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
2021-05-28 23:14:41,462 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
2021-05-28 23:14:42,477 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
2021-05-28 23:14:43,492 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
2021-05-28 23:14:44,510 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
2021-05-28 23:14:45,519 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
2021-05-28 23:14:46,526 Stage-1 map = 100%,  reduce = 100%, Cumulative CPU 1.79 sec
MapReduce Total cumulative CPU time: 1 seconds 790 msec
Ended Job = job_202105282228_0003
Loading data to table lab1.bt_gender
Table lab1.bt_gender stats: [num_partitions: 0, num_files: 2, num_rows: 0, total_size: 97, raw_data_size: 0]
4 Rows loaded to bt_gender
MapReduce Jobs Launched:
Job 0: Map: 1  Reduce: 2   Cumulative CPU: 1.79 sec   HDFS Read: 309 HDFS Write: 97 SUCCESS
Total MapReduce CPU Time Spent: 1 seconds 790 msec
OK
Time taken: 36.83 seconds
```

Contents of directory /user/hive/warehouse/lab1.db/bt_gender

Goto : /user/hive/warehouse/lab1.db/bt go

Go to parent directory

Name	Type	Size	Replication	Block Size	Modification Time	Permission	Owner	Group
000000_0	file	0.07 KB	1	64 MB	2021-05-28 23:14	rw-r--r--	ponny	supergroup
000001_0	file	0.02 KB	1	64 MB	2021-05-28 23:14	rw-r--r--	ponny	supergroup

File: /user/hive/warehouse/lab1.db/bt_gender/000000_0

Goto : /user/hive/warehouse/lab1.db/bt go

Go back to dir listing
Advanced view/download options

```
1001,Jahnu,10/06/2001,f
1029,Vaishu,23/01/1996,f
1085,Pappu,29/09/2000,f
```

File: /user/hive/warehouse/lab1.db/bt_gender/000001_0

Goto : /user/hive/warehouse/lab1.db/bt go

Go back to dir listing
Advanced view/download options

```
1003,Naren,30/10/2000,m
```

Group By Class

Table Name Stocks

Fields

Exchange String

Year String (repeat same year 5 times) Give 2 Years

Open Price FLoat

Close Price

hadoop fs -copyFromLocal ~/Desktop/stocks /hive/

create table stock(year string, exchange string, op float ,cp float) row format delimited fields terminated by ',' stored as textfile;

load data inpath '/hive/stocks' into table stock;

select * from stock;

OK

2000 MARUTI 164.9 164.3

2000 TITAN 146.0 155.7

2000 RELIANCE 237.5 251.7

2000 WIPRO 2724.0 2724.2

2000 BRITANNIA 705.0 756.9

2001 MARUTI 167.75 173.35

2001 TITAN 144.0 149.5

2001 RELIANCE 256.65 282.5

2001 WIPRO 2942.15 2990.1

2001 BRITANNIA 820.0 798.75

select year, count(*), avg(op) from stock group by year; // 5 exchanges ⇒ count = 5

OK

2000 5 795.4799987792969

2001 5 866.1099792480469

select exchange,year,avg(op) from stock group by exchange,year having avg(op)>800;

BRITANNIA 2001 820.0
WIPRO 2000 2724.0
WIPRO 2001 2942.14990234375