Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY

PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION

Map.java | MatrixMultiply.java | Reduce.java

```java
import org.apache.hadoop.conf.*;
    import org.apache.hadoop.io.LongWritable;
    import org.apache.hadoop.io.Text;
    import org.apache.hadoop.mapreduce.Mapper;

    import java.io.IOException;

    public class Map
      extends org.apache.hadoop.mapreduce.Mapper<LongWritable, Text, Text, Text> {
        @Override
        public void map(LongWritable key, Text value, Context context)
                throws IOException, InterruptedException {
            Configuration conf = context.getConfiguration();
            int m = Integer.parseInt(conf.get("m"));
            int p = Integer.parseInt(conf.get("p"));
            String line = value.toString();
            // (M, i, j, Mij);
            String[] indicesAndValue = line.split(",");
            Text outputKey = new Text();
            Text outputValue = new Text();
            if (indicesAndValue[0].equals("M")) {
                for (int k = 0; k < p; k++) {
                    outputKey.set(indicesAndValue[1] + "," + k);
                    // outputKey.set(i,k);
                    outputValue.set(indicesAndValue[0] + "," + indicesAndValue[2]
                            + "," + indicesAndValue[3]);
                    // outputValue.set(M,j,Mij);
                    context.write(outputKey, outputValue);
                }
            } else {
                // (N, j, k, Njk);
                for (int i = 0; i < m; i++) {
                    outputKey.set(i + "," + indicesAndValue[2]);
                    outputValue.set("N," + indicesAndValue[1] + ","
                            + indicesAndValue[3]);
                    context.write(outputKey, outputValue);
                }
            }
        }
    }
```

Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY
PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION

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

    import java.io.IOException;
    import java.util.HashMap;

    public class Reduce
      extends org.apache.hadoop.mapreduce.Reducer<Text, Text, Text, Text> {
        @Override
        public void reduce(Text key, Iterable<Text> values, Context context)
                throws IOException, InterruptedException {
            String[] value;
            //key=(i,k),
            //Values = [(M/N,j,V/W),..]
            HashMap<Integer, Float> hashA = new HashMap<Integer, Float>();
            HashMap<Integer, Float> hashB = new HashMap<Integer, Float>();
            for (Text val : values) {
                value = val.toString().split(",");
                if (value[0].equals("M")) {
                    hashA.put(Integer.parseInt(value[1]), Float.parseFloat(value[2]));
                } else {
                    hashB.put(Integer.parseInt(value[1]), Float.parseFloat(value[2]));
                }
            }
            int n = Integer.parseInt(context.getConfiguration().get("n"));
            float result = 0.0f;
            float m_ij;
            float n_jk;
            for (int j = 0; j < n; j++) {
                m_ij = hashA.containsKey(j) ? hashA.get(j) : 0.0f;
                n_jk = hashB.containsKey(j) ? hashB.get(j) : 0.0f;
                result += m_ij * n_jk;
            }
            if (result != 0.0f) {
                context.write(null,
                        new Text(key.toString() + "," + Float.toString(result)));
            }
        }
    }
```

Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY

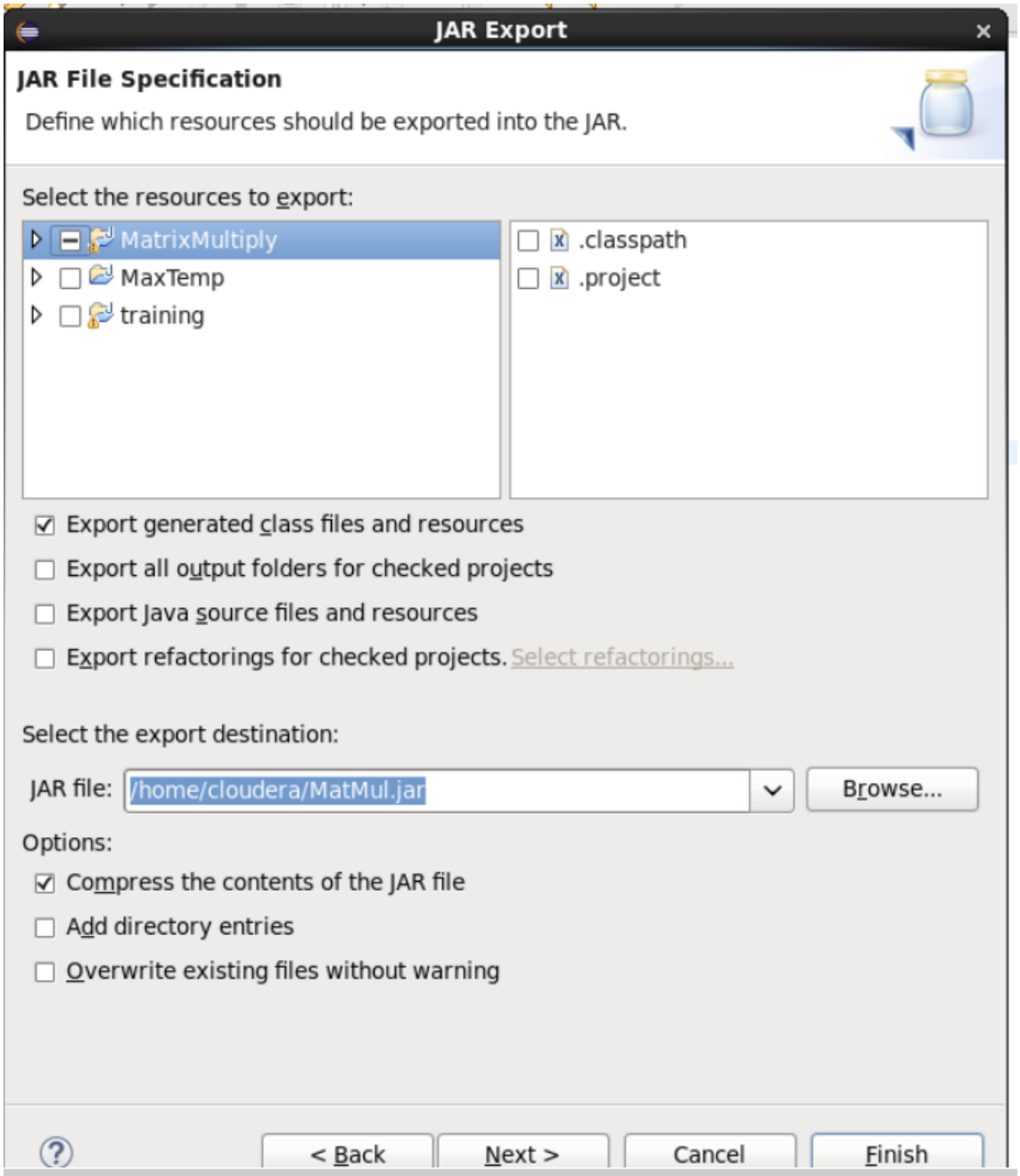
PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION

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

public class MatrixMultiply {

    public static void main(String[] args) throws Exception {
        if (args.length != 2) {
            System.err.println("Usage: MatrixMultiply <in_dir> <out_dir>");
            System.exit(2);
        }
        Configuration conf = new Configuration();
        // M is an m-by-n matrix; N is an n-by-p matrix.
        conf.set("m", "1000");
        conf.set("n", "100");
        conf.set("p", "1000");
        @SuppressWarnings("deprecation")
        Job job = new Job(conf, "MatrixMultiply");
        job.setJarByClass(MatrixMultiply.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);
    }
}
```

Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY

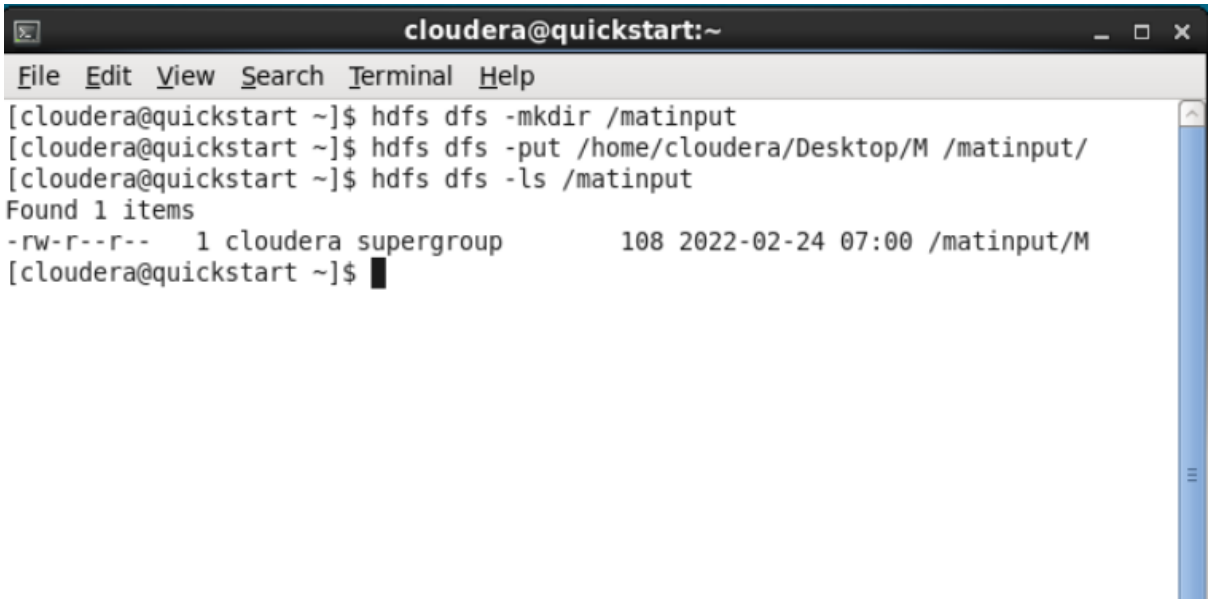
PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION

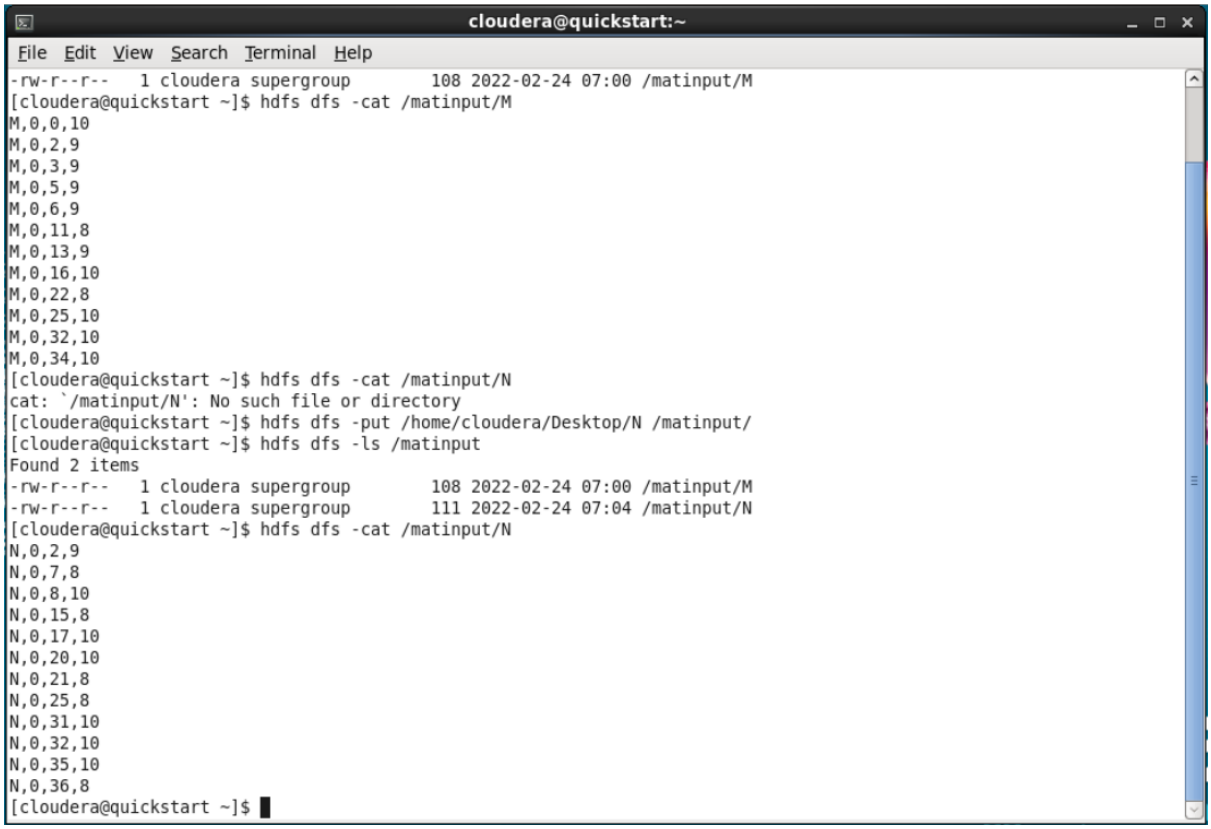


Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY

PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION

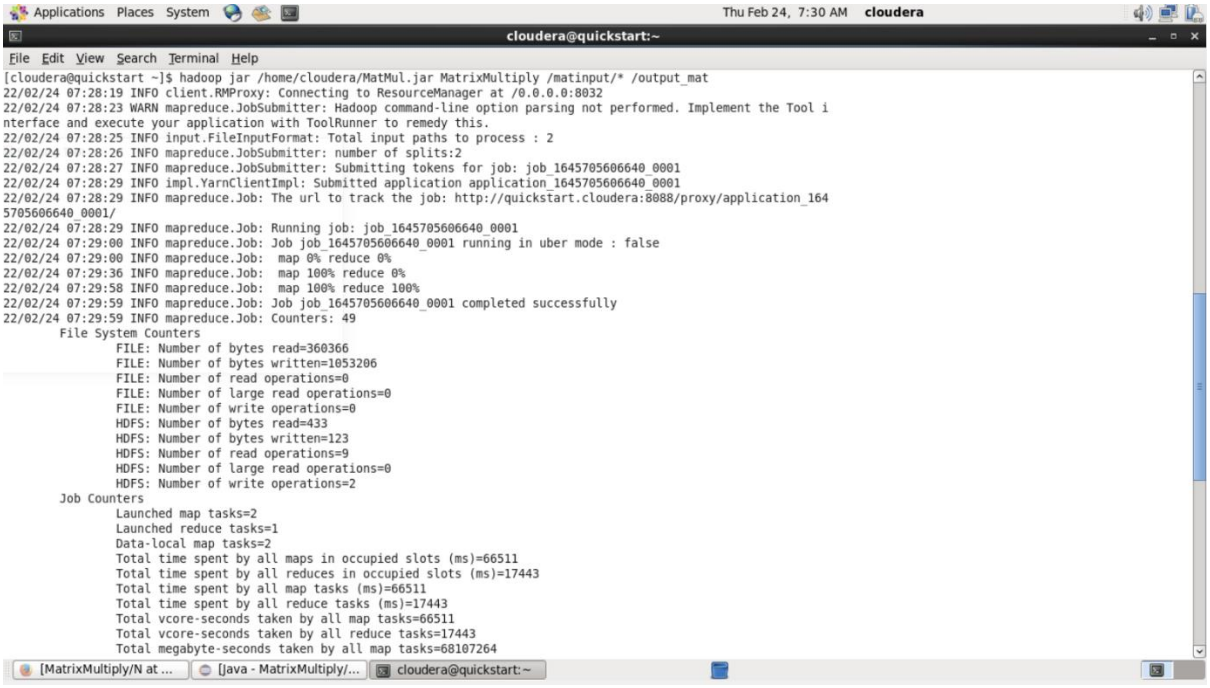


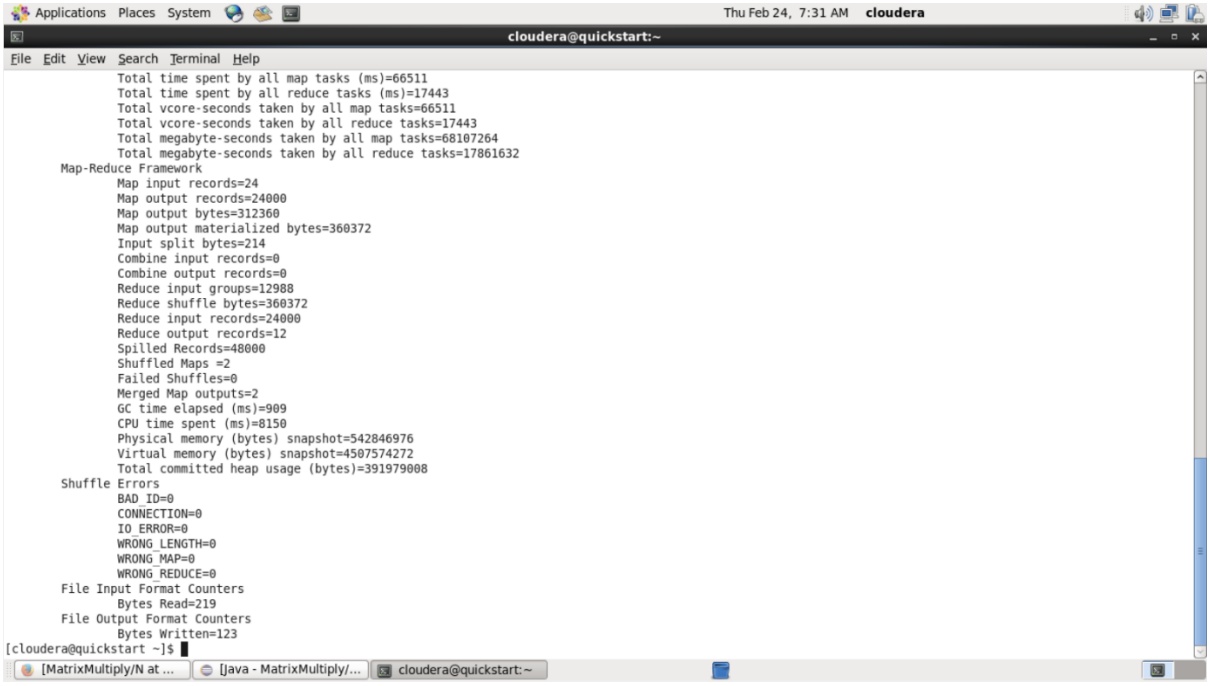


Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY

PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION





Name-Pooja Pathak
Roll no-14
MSC DSAI PART 1 SEM 2

SUBJECT-BIG DATA TECHNOLOGY

PRACTICAL 5- MAP REDUCE MATRIX MULTIPLICATION

```
[cloudera@quickstart ~]$ hdfs dfs -ls /output_mat
Found 2 items
-rw-r--r--   1 cloudera supergroup          0 2022-02-24 07:29 /output_mat/_SUCCESS
-rw-r--r--   1 cloudera supergroup        123 2022-02-24 07:29 /output_mat/part-r-00000
[cloudera@quickstart ~]$ hdfs dfs -cat /output_mat/part-r-00000
0,15,80.0
0,17,100.0
0,2,90.0
0,20,100.0
0,21,80.0
0,25,80.0
0,31,100.0
0,32,100.0
0,35,100.0
0,36,80.0
0,7,80.0
0,8,100.0
[cloudera@quickstart ~]$
```