LAB-10

AIM: To write a MapReduce code for matrix addition in eclipse environment.

PROCEDURE:

1) Install Hadoop and Eclipse IDE in virtual machine or Linux OS.
2) Start Hadoop daemons using start-all.sh.
3) Create new project and class for matrix addition using MapReduce.
4) The program requires JAR files to be configured with it so that it can interact with Hadoop environment.
5) Create an input file containing sentences or paragraph which will be fed to MapReduce program to count each word. Similarly, create an output path where the result will be stored.

PROGRAM:

```
import java.io.IOException;
import org.apache.hadoop.conf.Configuration;
import org.apache.hadoop.fs.Path;
import org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.Text;
import org.apache.hadoop.mapreduce.Job;
import org.apache.hadoop.mapreduce.Mapper;
import org.apache.hadoop.mapreduce.Reducer;
import org.apache.hadoop.mapreduce.lib.input.FileInputFormat;
import org.apache.hadoop.mapreduce.lib.output.FileOutputFormat;
public class matrix {
  public static class Map extends Mapper<Object, Text, Text, IntWritable> {
    public void map(Object key, Text value, Context context) throws IOException,
InterruptedException {
      String[] row = value.toString().split(",");
      String matrixName = row[0];
      int rowIndex = Integer.parseInt(row[1]);
      if (matrixName.equals("A")) {
        for (int i = 2; i < row.length; i++) {
          int columnIndex = i - 2;
          int element = Integer.parseInt(row[i]);
          context.write(new Text(rowIndex + "," + columnIndex), new IntWritable(element));
        }
      } else if (matrixName.equals("B")) {
        for (int i = 2; i < row.length; i++) {
          int columnIndex = i - 2;
          int element = Integer.parseInt(row[i]);
          context.write(new Text(rowIndex + "," + columnIndex), new IntWritable(element));
        }
      }
    }
  }
  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 value : values) {
            sum += value.get();
        }
        context.write(key, new IntWritable(sum));
    }
  }
  public static void main(String[] args) throws Exception {
    Configuration conf = new Configuration();
    Job job = Job.getInstance(conf, "Matrix Addition");
    job.setJarByClass(matrix.class);
    job.setMapperClass(Map.class);
    job.setReducerClass(Reduce.class);
    job.setOutputKeyClass(Text.class);
    job.setOutputValueClass(IntWritable.class);
    FileInputFormat.addInputPath(job, new Path(args[0]));
    FileOutputFormat.setOutputPath(job, new Path(args[1]));
    System.exit(job.waitForCompletion(true) ? 0 : 1);
  }
}
```

EXECUTION:

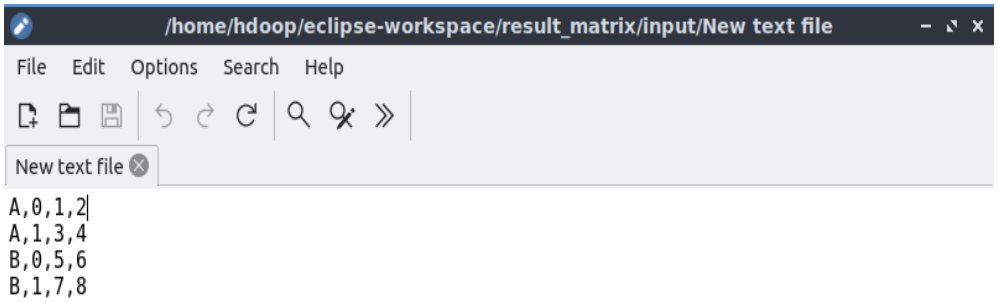
1) Starting Hadoop daemons: start-all.sh

```
67027 DataNode
14579 org.eclipse.equinox.launcher_1.6.400.v20210924-0641.jar
14581 org.eclipse.equinox.launcher_1.6.400.v20210924-0641.jar
67364 ResourceManager
14694 org.eclipse.equinox.launcher_1.6.400.v20210924-0641.jar
67577 Jps
66920 NameNode
67468 NodeManager
67167 SecondaryNameNode
14703 org.eclipse.equinox.launcher_1.6.400.v20210924-0641.jar
```

2) Executing java code consisting of Mapper, Reducer and Driver.

```
2023-06-10 10:38:57,937 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your p
latform... using builtin-java classes where applicable
2023-06-10 10:38:58,221 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManag
er at /0.0.0.0:8032
2023-06-10 10:38:58,603 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not
performed. Implement the Tool interface and execute your application with ToolRunner to remedy this
.
2023-06-10 10:38:58,642 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp
/hadoop-yarn/staging/hari/.staging/job_1686373051697_0001
2023-06-10 10:38:58,809 INFO input.FileInputFormat: Total input files to process : 1
2023-06-10 10:38:59,740 INFO mapreduce.JobSubmitter: number of splits:1
2023-06-10 10:39:00,279 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1686373051697_0
001
2023-06-10 10:39:00,280 INFO mapreduce.JobSubmitter: Executing with tokens: []
2023-06-10 10:39:00,385 INFO conf.Configuration: resource-types.xml not found
2023-06-10 10:39:00,385 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2023-06-10 10:39:00,683 INFO impl.YarnClientImpl: Submitted application application_1686373051697_0
001
2023-06-10 10:39:00,704 INFO mapreduce.Job: The url to track the job: http://localhost:8088/proxy/a
pplication_1686373051697_0001/
2023-06-10 10:39:00,704 INFO mapreduce.Job: Running job: job_1686373051697_0001
2023-06-10 10:39:05,830 INFO mapreduce.Job: Job job_1686373051697_0001 running in uber mode : false
2023-06-10 10:39:05,833 INFO mapreduce.Job:  map 0% reduce 0%
2023-06-10 10:39:08,920 INFO mapreduce.Job:  map 100% reduce 0%
2023-06-10 10:39:12,977 INFO mapreduce.Job:  map 100% reduce 100%
2023-06-10 10:39:15,019 INFO mapreduce.Job: Job job_1686373051697_0001 completed successfully
2023-06-10 10:39:15,117 INFO mapreduce.Job: Counters: 50
        File System Counters
```

3) Input



4) Output