Exp No: 10 **Date:**

HADOOP

DEMONSTRATE THE MAP REDUCE PROGRAMMING MODEL BY COUNTING THE NUMBER OF WORDS IN A FILE

AIM:

To demonstrate the MAP REDUCE programming model for counting the number of words in a file.

PROCEDURE

Step 1 - Open Terminal

$ su hduser

Password:

Step 2 - Start dfs and mapreduce services

$ cd /usr/local/hadoop/hadoop-2.7.2/sbin

$ start-dfs.sh

$ start-yarn.sh

$ jps

Step 3 - Check Hadoop through web UI

// Go to browser type http://localhost:8088 – All Applications Hadoop Cluster

// Go to browser type http://localhost:50070 – Hadoop Namenode

Step 4 – Open New Terminal

$ cd Desktop/

$ mkdir inputdata

$ cd inputdata/

$ echo “Hai, Hello, How are you? How is your health?” >> hello.txt

$ cat>> hello.txt

Step 5 – Go back to old Terminal

$ hadoop fs –copyFromLocal /home/hduser/Desktop/inputdata/hello.txt /folder/hduser // Check in hello.txt in Namenode using Web UI

Step 6 – Download and open eclipse by creating workspace

Create a new java project.

Step 7 – Add jar to the project

You need to remove dependencies by adding jar files in the hadoop source folder. Now Click on Project tab and go to Properties.Under Libraries tab, click Add External JARs and select all the jars in the folder (click on 1st jar, and Press Shift and Click on last jat to select all jars in between and click ok)

/usr/local/hadoop/hadoop-2.7.2/share/hadoop/commonand

/usr/local/hadoop/hadoop-2.7.2/share/hadoop/mapreduce folders.

Step -8 – WordCount Program

Create 3 java files named

- WordCount.java
- WordCountMapper.java
- WordCountReducer.java

WordCount.java

```
import org.apache.hadoop.conf.Configured;

import org.apache.hadoop.fs.Path;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.mapred.FileInputFormat;
```

```
import org.apache.hadoop.mapred.FileOutputFormat;
import org.apache.hadoop.mapred.JobClient; import
org.apache.hadoop.mapred.JobConf;

import org.apache.hadoop.util.Tool;
import org.apache.hadoop.util.ToolRunner;
import org.apache.hadoop.io.Text;

public class WordCount extends Configured implements Tool {

        @Override
        public int run(String[] arg0) throws Exception {
                // TODO Auto-generated method
                stub if(arg0.length<2)
                {
System.out.println("check the command line arguments");
                }
                JobConf conf=new JobConf(WordCount.class);
                FileInputFormat.setInputPaths(conf, new Path(arg0[0]));
                        FileOutputFormat.setOutputPath(conf, new
Path(arg0[1])); conf.setMapperClass(WordMapper.class);
conf.setReducerClass(WordReducer.class);

                        conf.setOutputKeyClass(Text.class);
                        conf.setOutputValueClass(IntWritable.class);
                        conf.setOutputKeyClass(Text.class);
```

```
                    conf.setOutputValueClass(IntWritable.class);
                    JobClient.runJob(conf);



            return 0;
        }
        public static void main(String args[]) throws Exception
        {
            int exitcode=ToolRunner.run(new WordCount(),
            args); System.exit(exitcode);

        }
}
```

WordCountMapper.java

```
import java.io.IOException;
import     org.apache.hadoop.io.IntWritable;
import org.apache.hadoop.io.LongWritable;
import org.apache.hadoop.mapred.MapReduceBase;
import  org.apache.hadoop.mapred.OutputCollector;
import org.apache.hadoop.mapred.Reporter;
import          org.apache.hadoop.io.Text;
import org.apache.hadoop.mapred.Mapper;
public class WordCountMapper extends MapReduceBase implements
```

```
Mapper<LongWritable,Text,Text,IntWritable>

{

        @Override

        public void map(LongWritable arg0, Text arg1, OutputCollector<Text,
IntWritable> arg2, Reporter arg3)

                        throws IOException {

                // TODO Auto-generated method stub


                String s=arg1.toString();

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

                {

arg2.collect(new Text(word),new IntWritable(1));

                }

        }

}
```

WordCountReducer.java

```
import java.io.IOException;

import java.util.Iterator;

import org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.mapred.JobConf;

import org.apache.hadoop.mapred.OutputCollector;

import org.apache.hadoop.mapred.Reducer;

import org.apache.hadoop.mapred.Reporter;

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

```
public class WordCountReducer implements
        Reducer<Text,IntWritable,Text,IntWritable> {  @Override

public void configure(JobConf arg0) {

        // TODO Auto-generated method stub

}

@Override

public void close() throws IOException {

        // TODO Auto-generated method stub

}

@Override
public void reduce(Text arg0, Iterator<IntWritable> arg1,
OutputCollector<Text, IntWritable> arg2, Reporter arg3)

                throws IOException {

        // TODO Auto-generated method

        stub int count=0;

        while(arg1.hasNext())

        {

                IntWritable i=arg1.next();

                count+=i.get();

        }

        arg2.collect(arg0,new IntWritable(count));


}

}
```

Step 9 - Create JAR file

Now Click on the Run tab and click Run-Configurations. Click on New Configuration button on the left top side and Apply after filling the following properties.

Step 10 - Export JAR file

Now click on File tab and select Export. under Java, select Runnable Jar.

In Launch Config – select the config fie you created in Step 9 (WordCountConfig).

➢ Select an export destination (let's say desktop.)

➢ Under Library handling, select Extract Required Libraries into generated JAR and click Finish. ➢ Right-Click the jar file, go to Properties and under Permissions tab, Check Allow executing file

as a program. and give Read and Write access to all the users

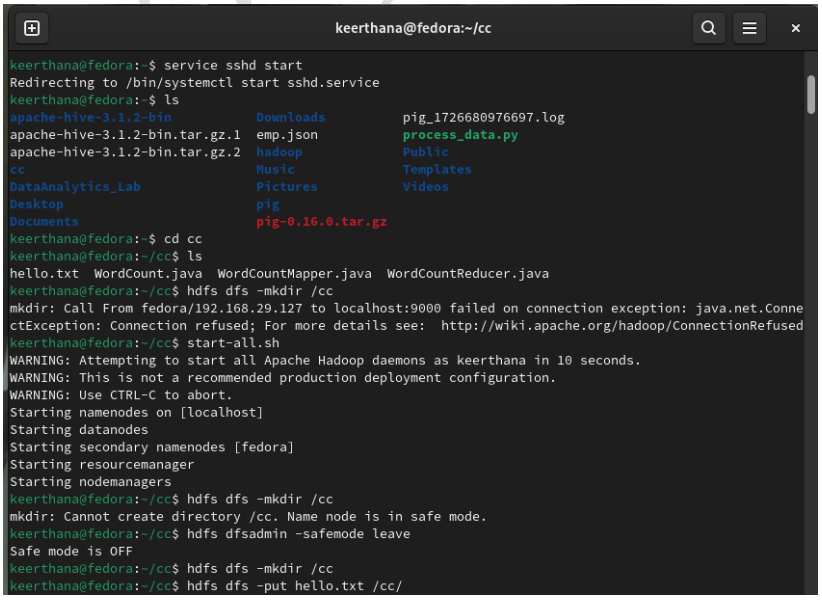
Step 11 – Go back to old Terminal for Execution of WordCount Program $hadoop jar wordcount.jar/usr/local/hadoop/input/usr/local/hadoop/output

Step 12 – To view results in old Terminal
$hdfs dfs -cat /usr/local/hadoop/output/part-r-00000

Step 13 - To Remove folders created using hdfs

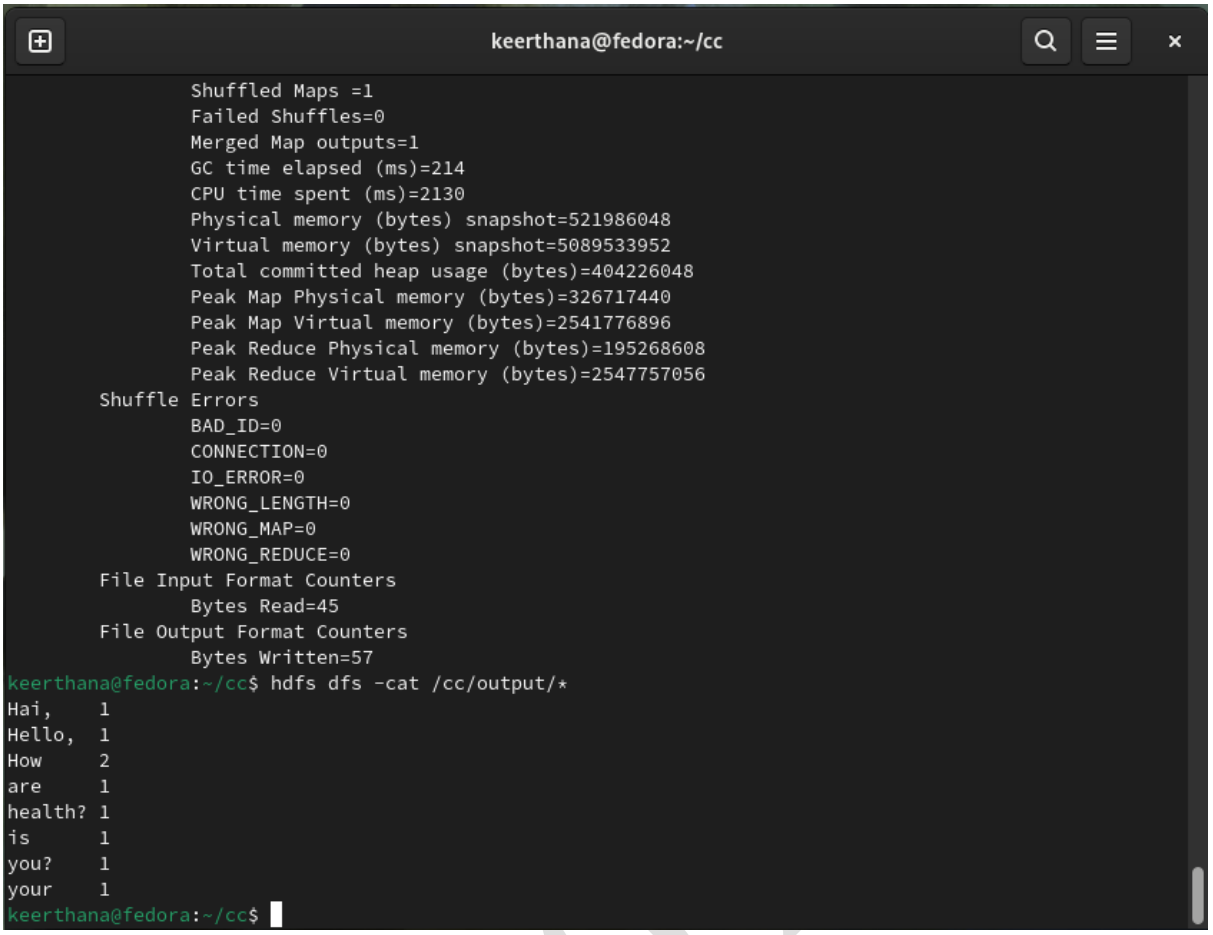
$ hdfs dfs -rm -R /usr/local/hadoop/output

OUTPUT:



```
keerthana@fedora:~/cc
keerthana@fedora:~/cc$ javac -classpath $HADOOP_HOME/share/hadoop/common/*:$HADOOP_HOME/share/hadoop/ma
preduce/*:. -d . WordCountMapper.java WordCountReducer.java WordCount.java
keerthana@fedora:~/cc$ jar cf wordcount.jar WordCount*.class
keerthana@fedora:~/cc$ hadoop jar wordcount.jar WordCount /cc/hello.txt /cc/output
2024-11-17 00:58:37,886 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager a
t /0.0.0.0:8032
2024-11-17 00:58:38,764 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not perf
ormed. Implement the Tool interface and execute your application with ToolRunner to remedy this.
2024-11-17 00:58:38,849 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/had
oop-yarn/staging/keerthana/.staging/job_1731784864991_0001
2024-11-17 00:58:39,355 INFO input.FileInputFormat: Total input files to process : 1
2024-11-17 00:58:40,023 INFO mapreduce.JobSubmitter: number of splits:1
2024-11-17 00:58:40,761 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1731784864991_0001
2024-11-17 00:58:40,761 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-11-17 00:58:41,227 INFO conf.Configuration: resource-types.xml not found
2024-11-17 00:58:41,227 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-11-17 00:58:42,390 INFO impl.YarnClientImpl: Submitted application application_1731784864991_0001
2024-11-17 00:58:42,508 INFO mapreduce.Job: The url to track the job: http://fedora:8088/proxy/applicat
ion_1731784864991_0001/
2024-11-17 00:58:42,511 INFO mapreduce.Job: Running job: job_1731784864991_0001
2024-11-17 00:58:57,248 INFO mapreduce.Job: Job job_1731784864991_0001 running in uber mode : false
2024-11-17 00:58:57,254 INFO mapreduce.Job:  map 0% reduce 0%
2024-11-17 00:59:04,485 INFO mapreduce.Job:  map 100% reduce 0%
2024-11-17 00:59:11,615 INFO mapreduce.Job:  map 100% reduce 100%
2024-11-17 00:59:12,663 INFO mapreduce.Job: Job job_1731784864991_0001 completed successfully
2024-11-17 00:59:12,807 INFO mapreduce.Job: Counters: 54
        File System Counters
                FILE: Number of bytes read=105
                FILE: Number of bytes written=553005
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
```

```
keerthana@fedora:~/cc
                HDFS: Number of bytes written=57
                HDFS: Number of read operations=8
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
                HDFS: Number of bytes read erasure-coded=0
        Job Counters
                Launched map tasks=1
                Launched reduce tasks=1
                Data-local map tasks=1
                Total time spent by all maps in occupied slots (ms)=4698
                Total time spent by all reduces in occupied slots (ms)=4966
                Total time spent by all map tasks (ms)=4698
                Total time spent by all reduce tasks (ms)=4966
                Total vcore-milliseconds taken by all map tasks=4698
                Total vcore-milliseconds taken by all reduce tasks=4966
                Total megabyte-milliseconds taken by all map tasks=4810752
                Total megabyte-milliseconds taken by all reduce tasks=5085184
        Map-Reduce Framework
                Map input records=1
                Map output records=9
                Map output bytes=81
                Map output materialized bytes=105
                Input split bytes=99
                Combine input records=0
                Combine output records=0
                Reduce input groups=8
                Reduce shuffle bytes=105
                Reduce input records=9
                Reduce output records=8
                Spilled Records=18
                Shuffled Maps =1
                Failed Shuffles=0
```



RESULT

Thus a word count program in java is implemented using Map Reduce.