Ex.No.9

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

AIM:

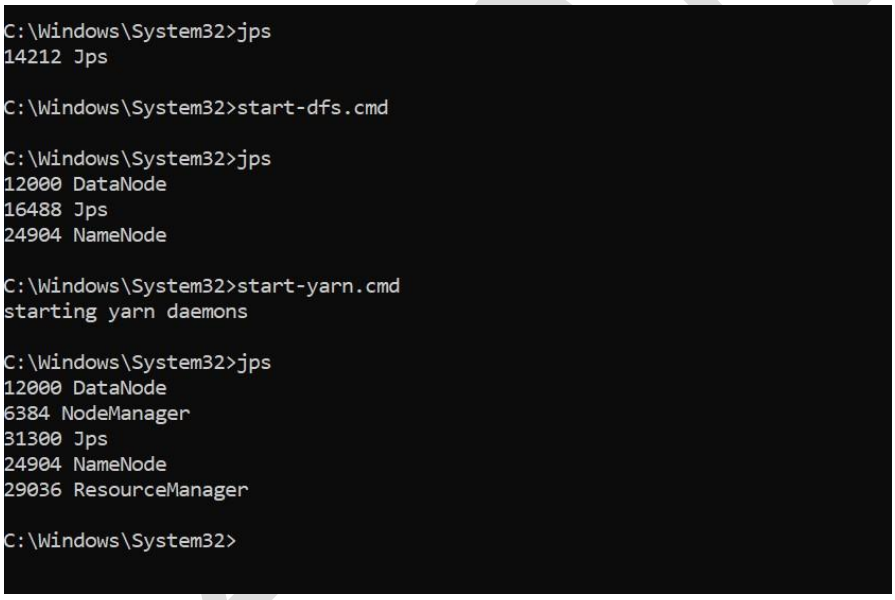
To demonstrate the MAP REDUCE programming model for counting the number of words in a file.

PROCEDURE:

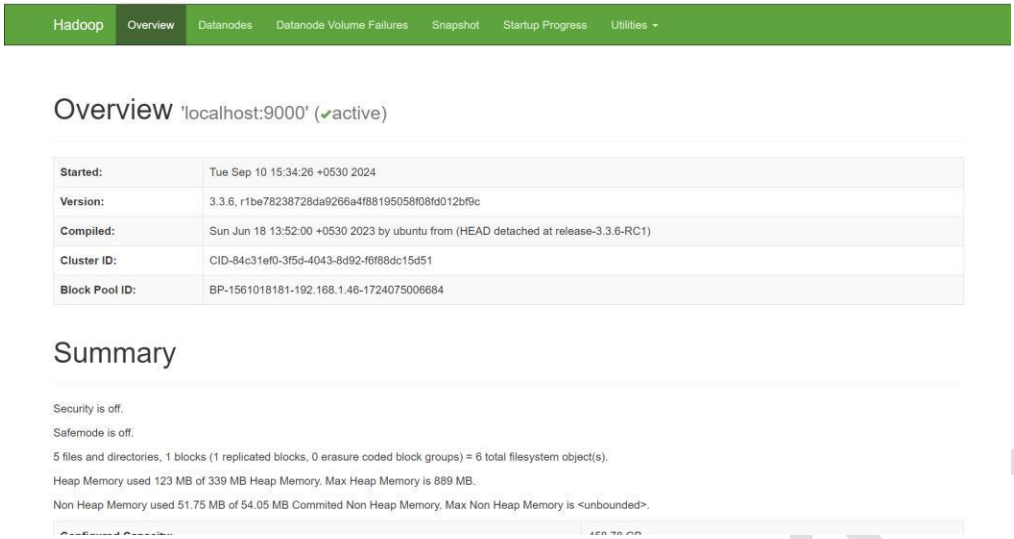
Open command prompt and run as administrator

Start Hadoop services by typing in the following commands:

- start-dfs.cmd
- start-yarn.cmd

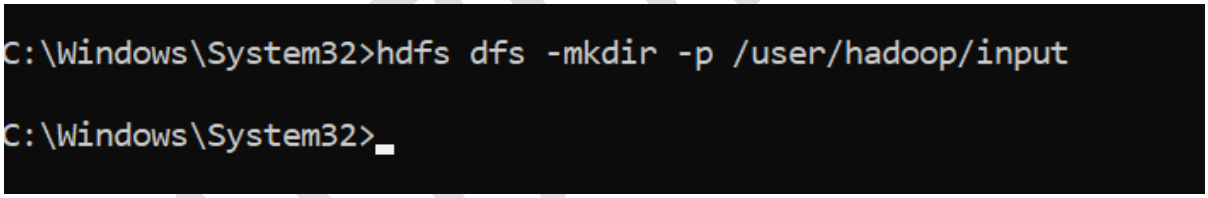


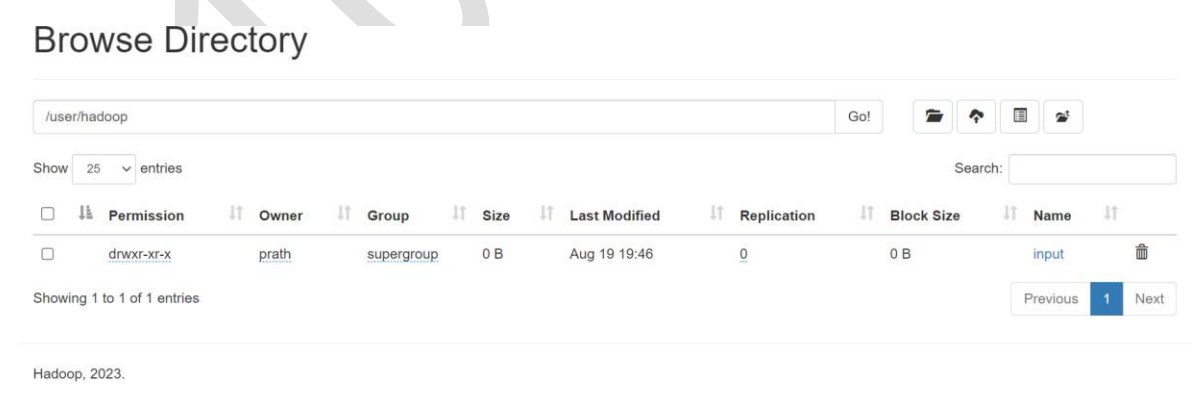
Open the browser and go to the URL localhost:9870



Create a directory in HDFS using the command:

hdfs dfs -mkdir -p /user/hadoop/input





Copy the input file to HDFS using the command:

hdfs dfs -put C:/Semester7/DataAnalytics/Lab/input.txt /user/hadoop/input

```
C:\Windows\System32>hdfs dfs -put C:/Semester7/DataAnalytics/Lab/input.txt /user/hadoop/input
```

Display the contents of the file using this command:

hdfs dfs -cat /user/hadoop/input/input.txt

```
C:\Windows\System32>hdfs dfs -cat /user/hadoop/input/input.txt
Hello world
Welcome to the world of programming
Have fun
Bye
```

Create mapper.py and reducer.py files

mapper.py

```
import sys
for line in sys.stdin:
    line=line.strip()
    words=line.split()
    for word in words:
        print("%s\t%s" %(word,1))
```

reducer.py

```
import sys
previous_word=None
previous_count=0

for line in sys.stdin:
    line=line.strip()
    word,count=line.split("\t")
    count=int(count)
    if previous_word==word:
        previous_count+=count
    else:
        if prev_word:
            print("%s\t%s" %(previous_word,previous_count))
        previous_word=word
        previous_count=count
if previous_word==word:
    print("%s\t%s" %(previous_word,previous_count))
```

Run the Hadoop Streaming Job and give the file paths to the input, mapper and reducer using the following command:

hadoop jar %HADOOP_HOME%\share\hadoop\tools\lib\hadoop-streaming-*.jar^

-mapper "python C:\Semester7\DataAnalytics\Lab\Ex.2\mapper.py" -reducer "python C:\Semester7\DataAnalytics\Lab\Ex.2\reducer.py"^

-input /user/hadoop/input/input.txt -output /user/hadoop/output

```
C:\Windows\System32>hadoop jar %HADOOP_HOME%\share\hadoop\tools\lib\hadoop-streaming-*.jar^
More?  -mapper "python C:\Semester7\DataAnalytics\Lab\Ex.2\mapper.py" -reducer "python C:\Semester7\DataAnalytics\Lab\Ex.2\reducer.py" ^
More?  -input /user/hadoop/input/input.txt -output /user/hadoop/output
packageJobJar: [/C:/Users/prath/AppData/Local/Temp/hadoop-unjar7189392901373763060/] [] C:\Users\prath\AppData\Local\Temp\streamjob8037495271429660861.jar tmpDir=null
2024-09-10 16:32:00,707 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-09-10 16:32:00,855 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-09-10 16:32:01,325 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/prath/.staging/job_1725962680547_0004
2024-09-10 16:32:01,570 INFO mapred.FileInputFormat: Total input files to process : 1
2024-09-10 16:32:01,651 INFO mapreduce.JobSubmitter: number of splits:2
2024-09-10 16:32:01,794 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1725962680547_0004
2024-09-10 16:32:01,794 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-09-10 16:32:01,934 INFO conf.Configuration: resource-types.xml not found
2024-09-10 16:32:01,934 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-09-10 16:32:01,996 INFO impl.YarnClientImpl: Submitted application application_1725962680547_0004
2024-09-10 16:32:02,032 INFO mapreduce.Job: The url to track the job: http://ANURAJ:8088/proxy/application_1725962680547_0004/
2024-09-10 16:32:02,034 INFO mapreduce.Job: Running job: job_1725962680547_0004
2024-09-10 16:32:09,189 INFO mapreduce.Job: Job job_1725962680547_0004 running in uber mode : false
2024-09-10 16:32:09,191 INFO mapreduce.Job:  map 0% reduce 0%
2024-09-10 16:32:15,324 INFO mapreduce.Job:  map 100% reduce 0%
2024-09-10 16:32:20,394 INFO mapreduce.Job:  map 100% reduce 100%
2024-09-10 16:32:21,417 INFO mapreduce.Job: Job job_1725962680547_0004 completed successfully
2024-09-10 16:32:21,532 INFO mapreduce.Job: Counters: 54
       File System Counters
              FILE: Number of bytes read=111
              FILE: Number of bytes written=839411
              FILE: Number of read operations=0
              FILE: Number of large read operations=0
              FILE: Number of write operations=0
              HDFS: Number of bytes read=297
              HDFS: Number of bytes written=75
              HDFS: Number of read operations=11
              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=2
              Launched reduce tasks=1
              Data-local map tasks=2
              Total time spent by all maps in occupied slots (ms)=6817
              Total time spent by all reduces in occupied slots (ms)=3259
              Total time spent by all map tasks (ms)=6817
              Total time spent by all reduce tasks (ms)=3259
              Total vcore-milliseconds taken by all map tasks=6817
              Total vcore-milliseconds taken by all reduce tasks=3259
              Total megabyte-milliseconds taken by all map tasks=6980608
```

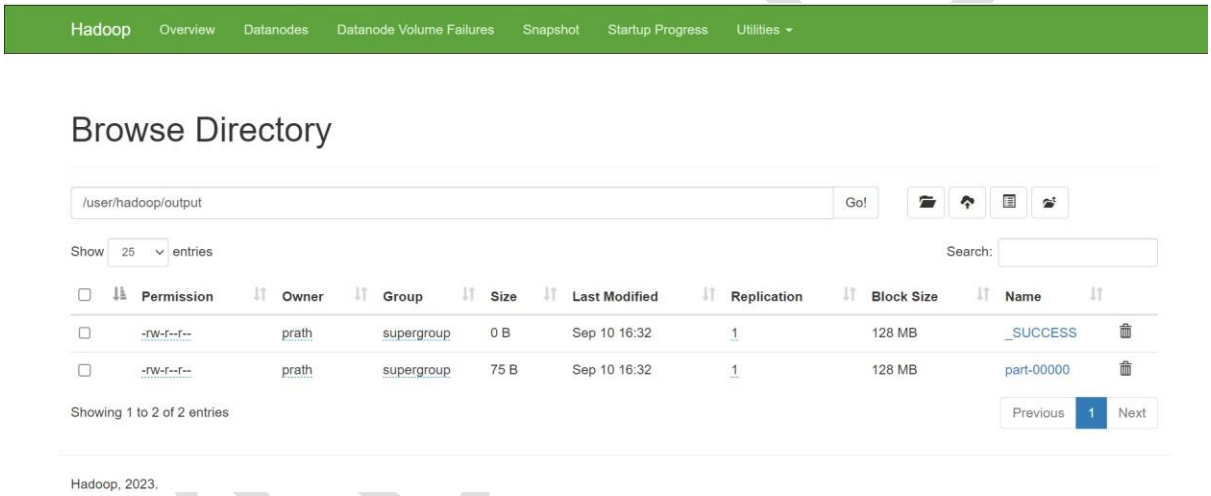
```
       Map-Reduce Framework
              Map input records=4
              Map output records=11
              Map output bytes=83
              Map output materialized bytes=117
              Input split bytes=202
              Combine input records=0
              Combine output records=0
              Reduce input groups=10
              Reduce shuffle bytes=117
              Reduce input records=11
              Reduce output records=10
              Spilled Records=22
              Shuffled Maps =2
              Failed Shuffles=0
              Merged Map outputs=2
              GC time elapsed (ms)=146
              CPU time spent (ms)=421
              Physical memory (bytes) snapshot=976105472
              Virtual memory (bytes) snapshot=1553080320
              Total committed heap usage (bytes)=861405184
              Peak Map Physical memory (bytes)=351379456
              Peak Map Virtual memory (bytes)=535887872
              Peak Reduce Physical memory (bytes)=273371136
              Peak Reduce Virtual memory (bytes)=489156608
       Shuffle Errors
              BAD_ID=0
              CONNECTION=0
              IO_ERROR=0
              WRONG_LENGTH=0
              WRONG_MAP=0
              WRONG_REDUCE=0
       File Input Format Counters
              Bytes Read=95
       File Output Format Counters
              Bytes Written=75
2024-09-10 16:32:21,532 INFO streaming.StreamJob: Output directory: /user/hadoop/output
```

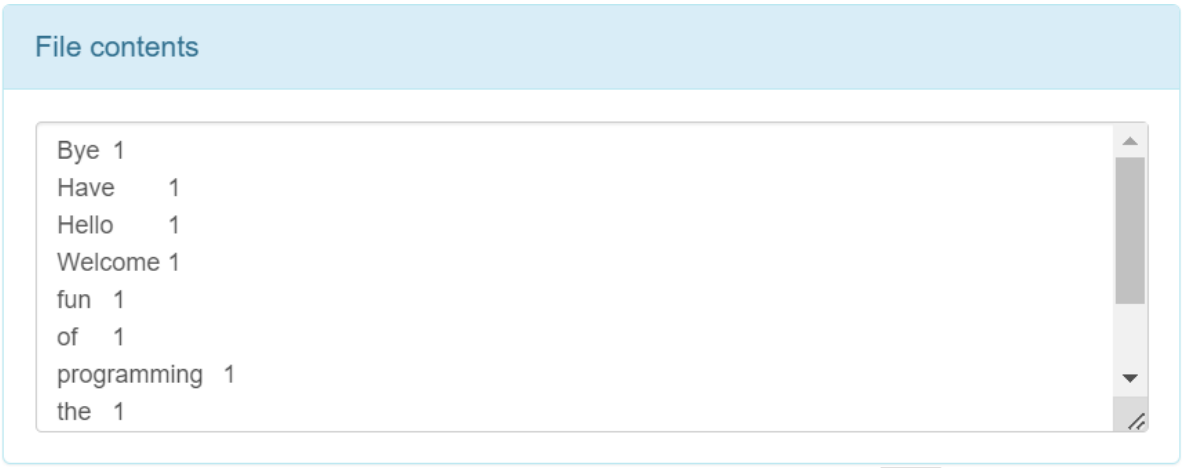
View the output using the command:

hdfs dfs -cat /user/hadoop/output/part-00000

```
C:\Windows\System32>hdfs dfs -cat /user/hadoop/output/part-00000
Bye     1
Have    1
Hello   1
Welcome 1
fun     1
of      1
programming     1
the     1
to      1
world   2
```

Check the output on the file system in the browser





RESULT:

Thus, to demonstrate the MAP REDUCE programming model for counting the number of words in a file was completed successfully.