Ex.No.9

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

AIM:

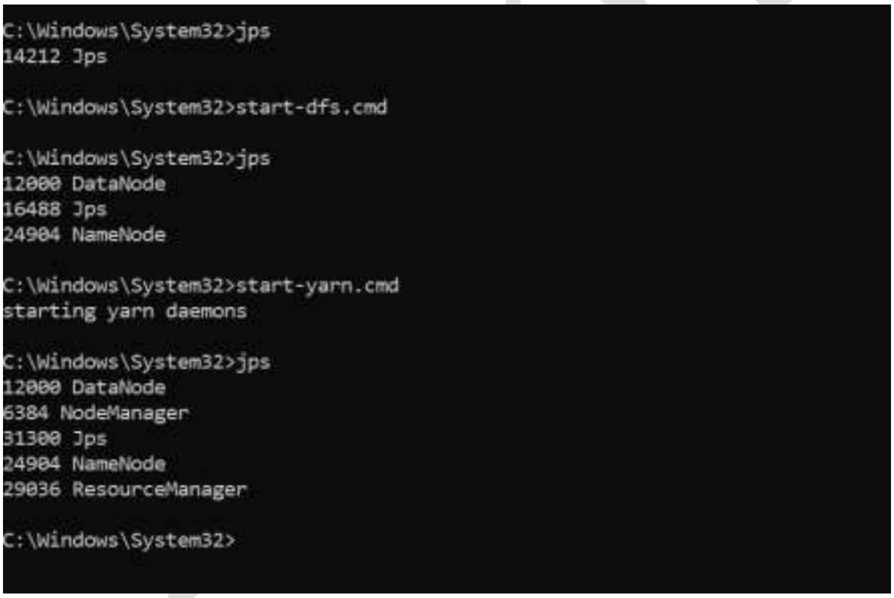
To demonstrate the MAP REDUCE programming model for counting the number of words in a file.

PROCEDURE:

Open command prompt and run as administrator

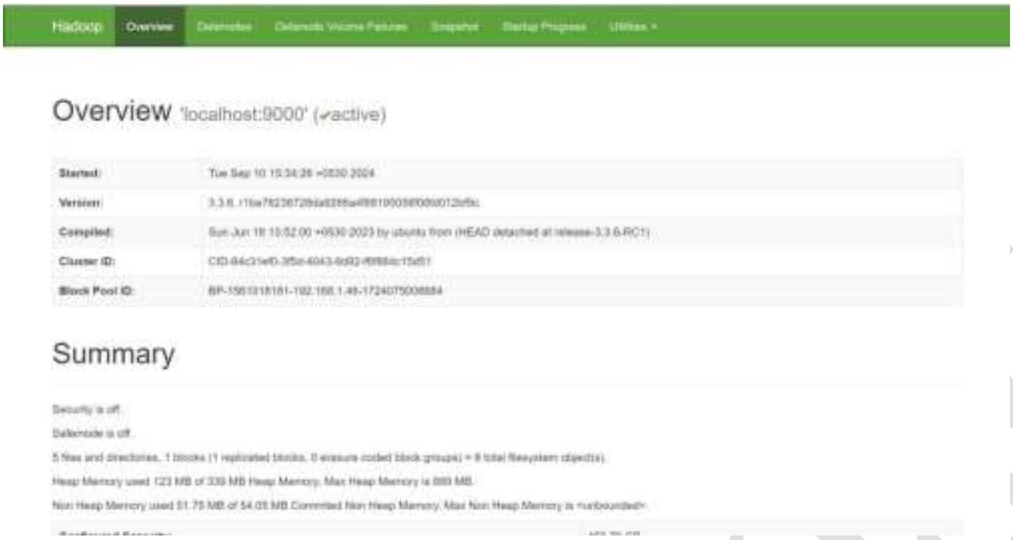
Start Hadoop services by typing in the following commands:

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



```
C:\Windows\System32>jps
14212 Jps

C:\Windows\System32>start-dfs.cmd

C:\Windows\System32>jps
12000 DataNode
16488 Jps
24904 NameNode

C:\Windows\System32>start-yarn.cmd
starting yarn daemons

C:\Windows\System32>jps
12000 DataNode
6384 NodeManager
31300 Jps
24904 NameNode
29036 ResourceManager

C:\Windows\System32>
```

Open the browser and go to the URL localhost:9870



Overview 'localhost:9000' (✓active)

Started:	Tue Sep 10 15:34:26 +0530 2024
Version:	3.3.6, r1be78238728da9266a4f88195058f08fd012bf9c
Compiled:	Sun Jun 18 13:52:00 +0530 2023 by ubuntu from (HEAD detached at release-3.3.6-RC1)
Cluster ID:	CID-84c31ef0-3f5e-4043-8d92-f0f88dc15d51
Block Pool ID:	BP-1561318181-192.168.1.48-1724075008884

Summary

Security is off.

Safemode is off.

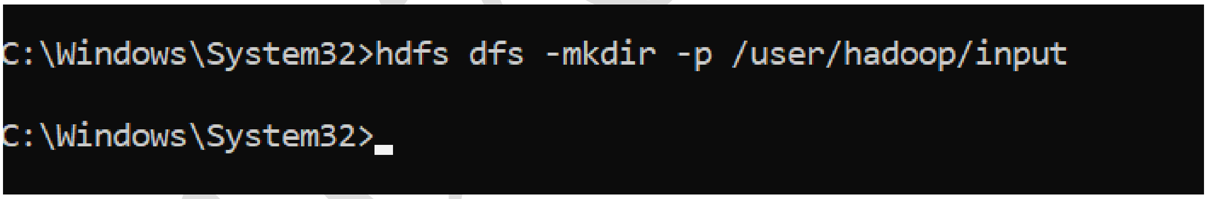
5 files and directories, 1 blocks (1 replicated blocks, 0 erasure coded block groups) = 6 total filesystem object(s).

Heap Memory used 123 MB of 330 MB Heap Memory. Max Heap Memory is 889 MB.

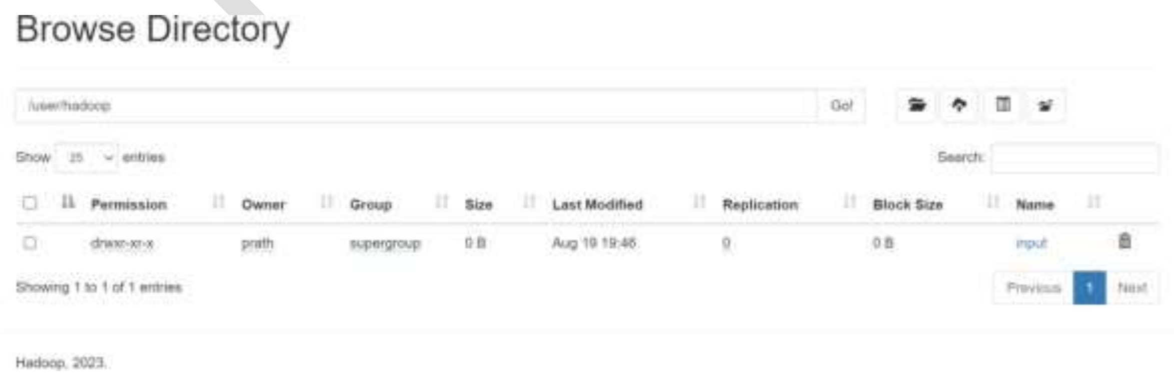
Non Heap Memory used 51.75 MB of 54.05 MB Commited Non Heap Memory. Max Non Heap Memory is <unbounded>.

Create a directory in HDFS using the command:

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



```
C:\Windows\System32>hdfs dfs -mkdir -p /user/hadoop/input

C:\Windows\System32>_
```



Browse Directory

Show 25 entries

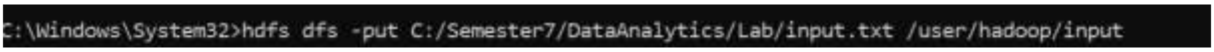
☐	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
☐	drwxr-xr-x	prath	supergroup	0 B	Aug 19 19:46	0	0 B	input

Showing 1 to 1 of 1 entries

Hadoop, 2023.

Copy the input file to HDFS using the command:

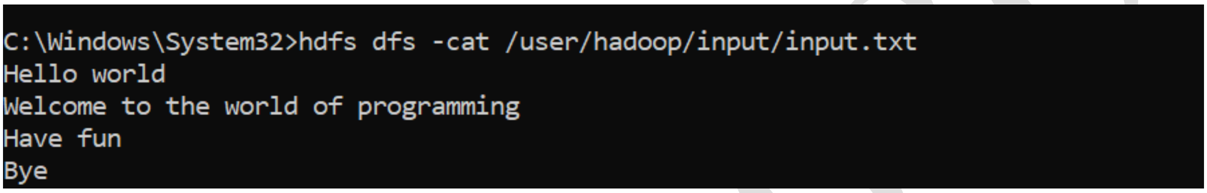
hdfs dfs -put C:/Semester7/DataAnalytics/Lab/input.txt /user/hadoop/input



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

Display the contents of the file using this command:

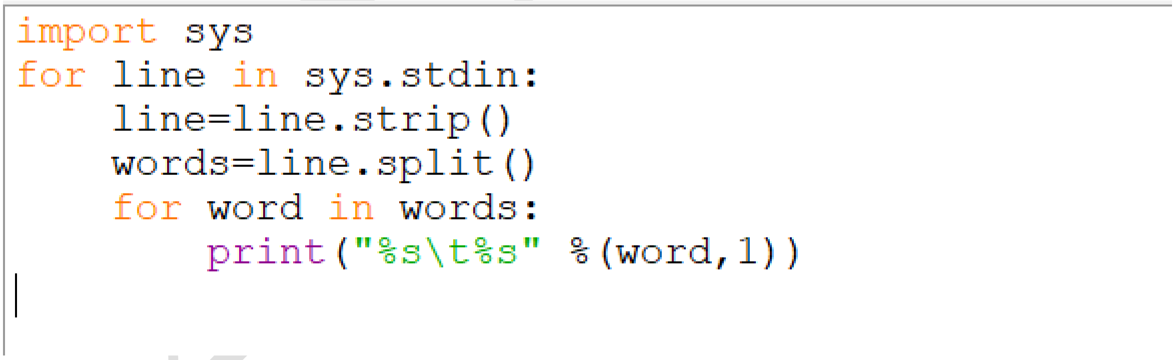
hdfs dfs -cat /user/hadoop/input/input.txt



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

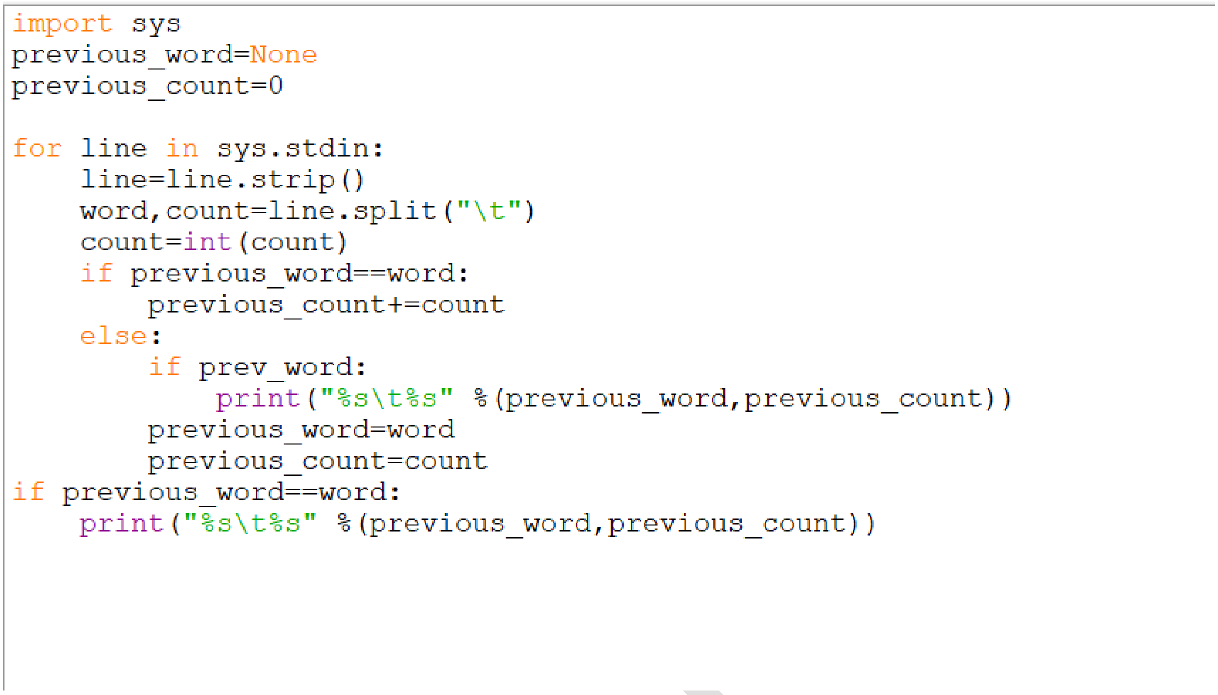
Create mapper.py and reducer.py files

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



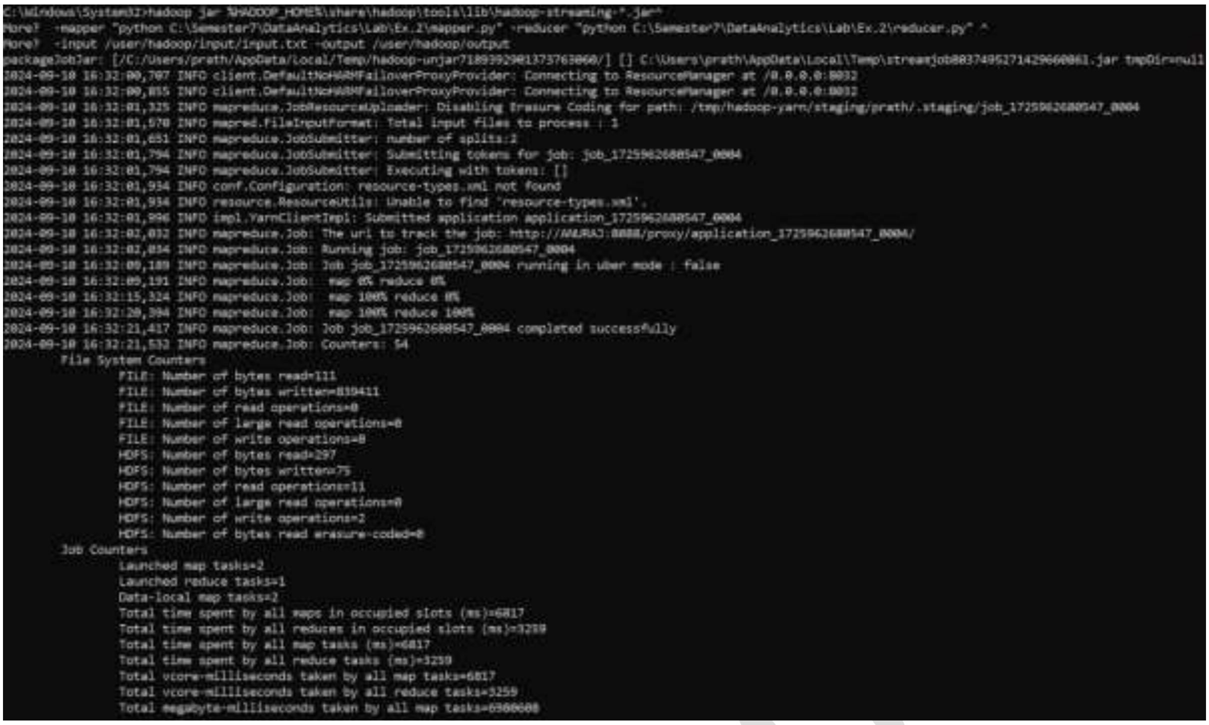
```
import sys
previous_word=None
previous_count=0

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:

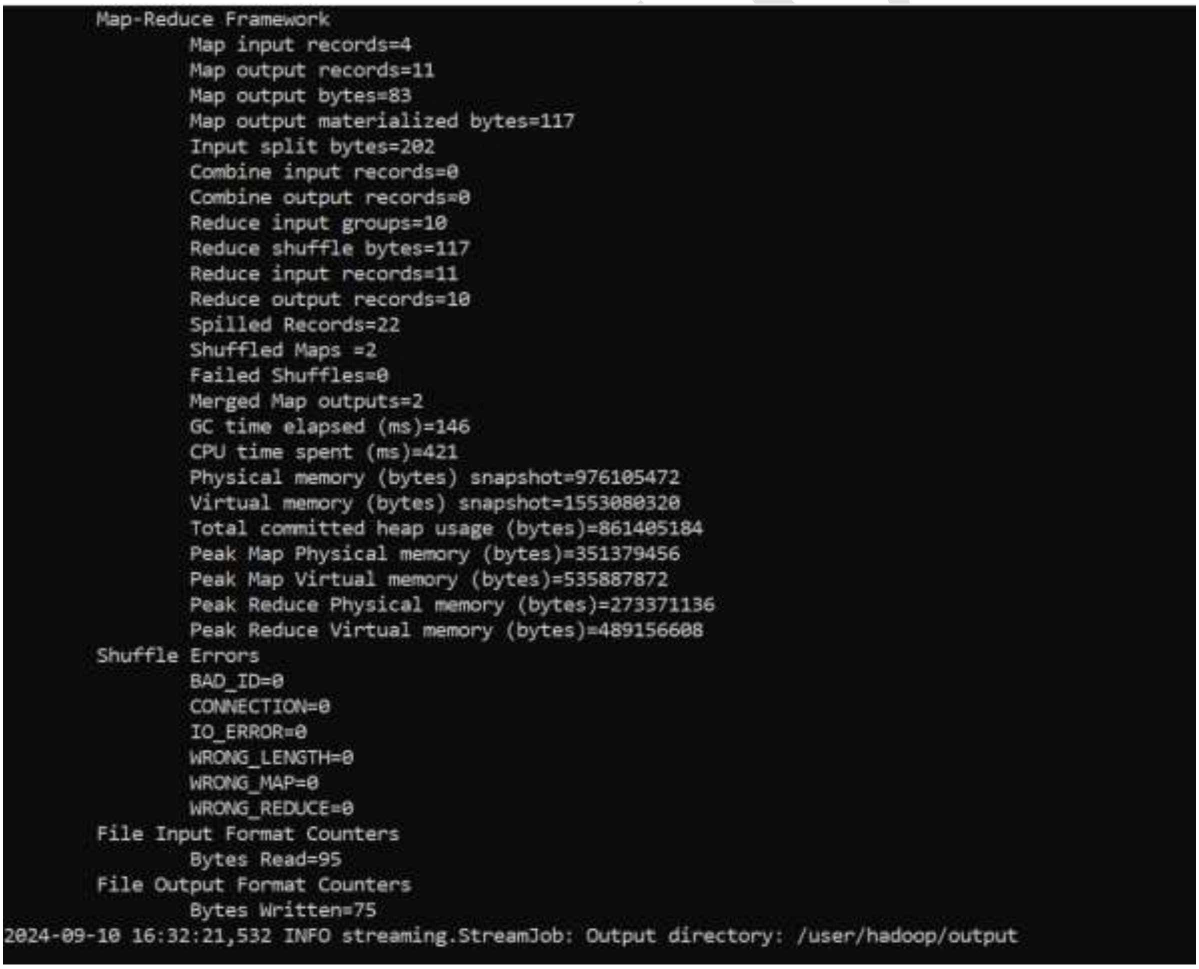
hadoop jar %HADOOP_HOME%\share\hadoop\tools\lib\hadoop-streaming-*.jar^

-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



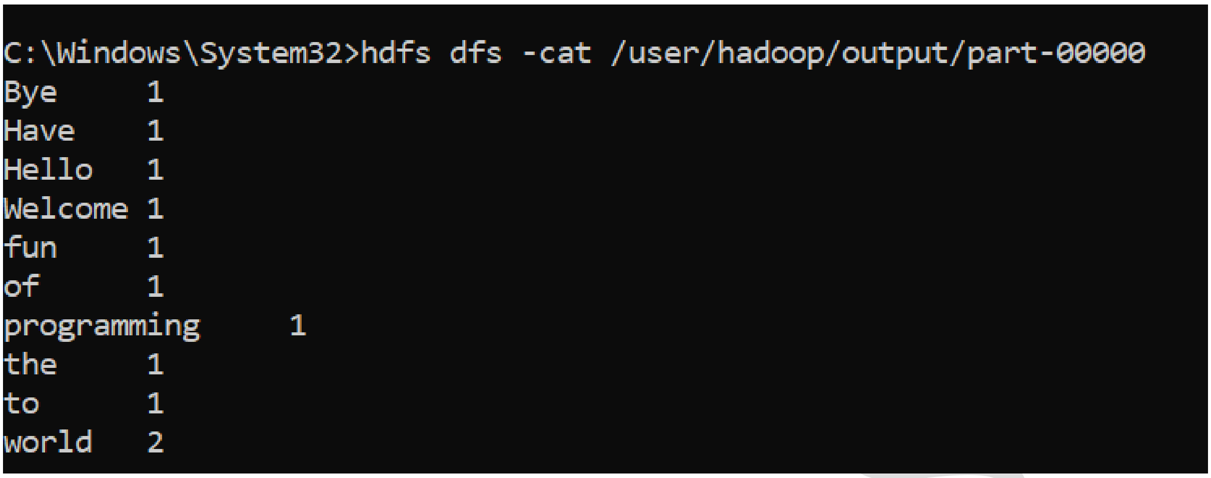
```
C:\Windows\System32>hadoop jar %HADOOP_HOME%\share\hadoop\tools\lib\hadoop-streaming-*.jar^
More?  -mapper "python C:\Semester7\DataAnalytics\Lab\Ex.2\mapper.py" -reducer "python C:\Semester7\DataAnalytics\Lab\Ex.2\reducer.py" ^
More?  -input /user/hadoop/input/input.txt -output /user/hadoop/output
packageJobJar: [/C:/Users/prath/AppData/Local/Temp/hadoop-unjar7189392901373763060/] [] C:\Users\prath\AppData\Local\Temp\streamjob8037495271429660061.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
```

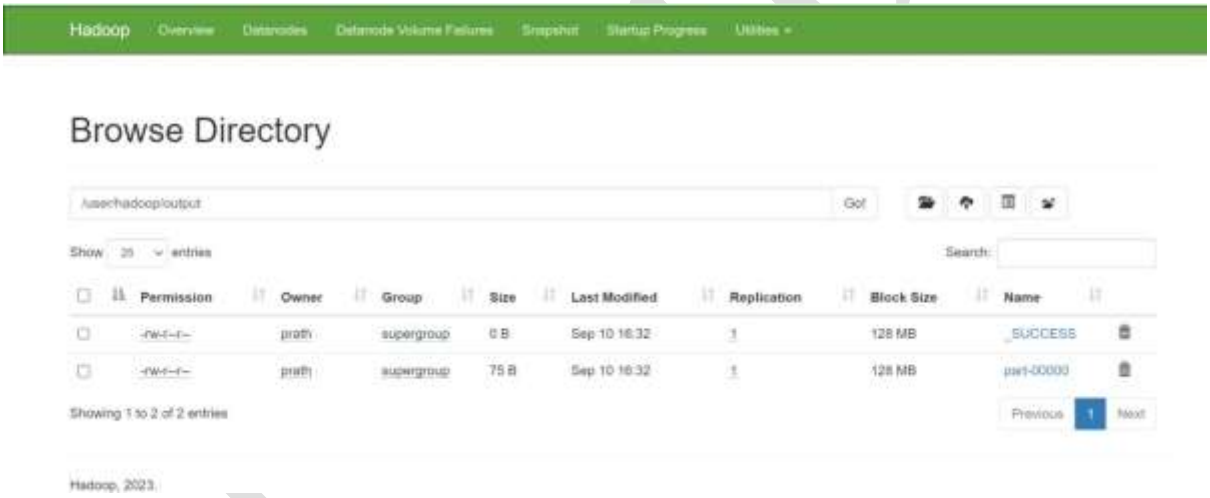
View the output using the command:

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



Browse Directory

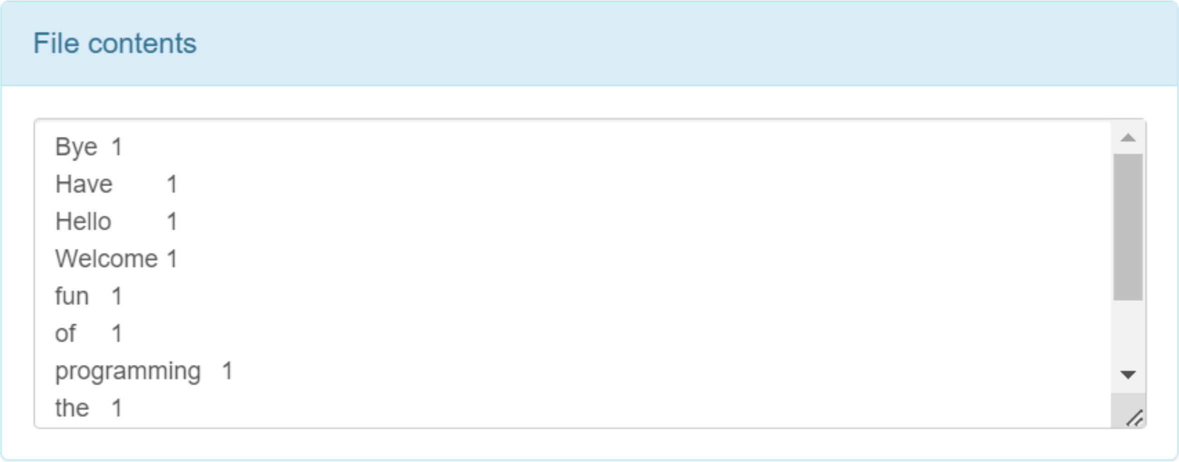
/user/hadoop/output Go!

Show 25 entries Search:

□	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name
□	-rw-r--r--	prath	supergroup	0 B	Sep 10 16:32	1	128 MB	_SUCCESS
□	-rw-r--r--	prathj	supergroup	75 B	Sep 10 16:32	1	128 MB	part-00000

Showing 1 to 2 of 2 entries

Hadoop, 2023.



```
Bye	1
Have	1
Hello	1
Welcome	1
fun	1
of	1
programming	1
the	1
```

RESULT:

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