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202318056
Big Data Assignment-3

Mapper.py

```
#!/usr/bin/python3 -O

import sys

# Loop through each line in the input
for line in sys.stdin:
    # Remove leading and trailing whitespace
    line = line.strip()
    # Split the line into words
    words = line.split()
    # Emit key-value pairs of word and count of 1
    for word in words:
        print(word,"\t",1)
~
~
"mapper.py" 33L, 342B
```

Shebang Line:
- Specifies Python 3 interpreter.

Importing sys Module:
- sys module for system-specific functions.
- Provides access to system parameters.

Loop through Input Lines:
- Iterates over each line of input.
- Reads from standard input.

Stripping Whitespace:
- Removes leading and trailing whitespace.
- Ensures clean input.

Splitting Lines into Words:
- Splits lines into words.
- Based on whitespace.

Emitting Key-Value Pairs:
- Prints word and 1.
- Separated by a tab.

Reducer.py

```
#!/usr/bin/python3 -O

import sys

# Initialize variables to keep track of current word and its count
current_word = None
current_count = 0

# Loop through each line in the input
for line in sys.stdin:
    # Split the line into word and count, separated by tab
    word, count = line.strip().split('\t', 1)

    # Convert count to integer
    count = int(count)

    # If the word is the same as the current word, increment its count
    if word == current_word:
        current_count += count
    else:
        # If the word is different, print the current word and its count
        if current_word:
            print(current_word,"\t",current_count)
        # Update current word and its count
        current_word = word
        current_count = count

# Print the last word and its count
if current_word:
    print(current_word,"\t",current_count)
~
~
"reducer.py" 33L, 863B
```

Shebang Line:

- Specifies Python 3 interpreter.

Importing sys Module:

- sys module for system-specific functions.
- Provides access to system parameters.

Initialization:

- Initialize variables for word and count.
- current_word and current_count.

Loop through Input Lines:

- Iterates over each line of input.
- Reads from standard input.

Splitting Lines into Word and Count:

- Splits each line into word and count.
- Separated by tab, limiting to one split.

Converting Count to Integer:

- Converts count from string to integer.
- Ensures numerical operations.

Incrementing Word Count:

- Increments count if word is the same.
- Accumulates count for the same word.

Printing Word Count:

- Prints current word and count.
- Separated by tab.

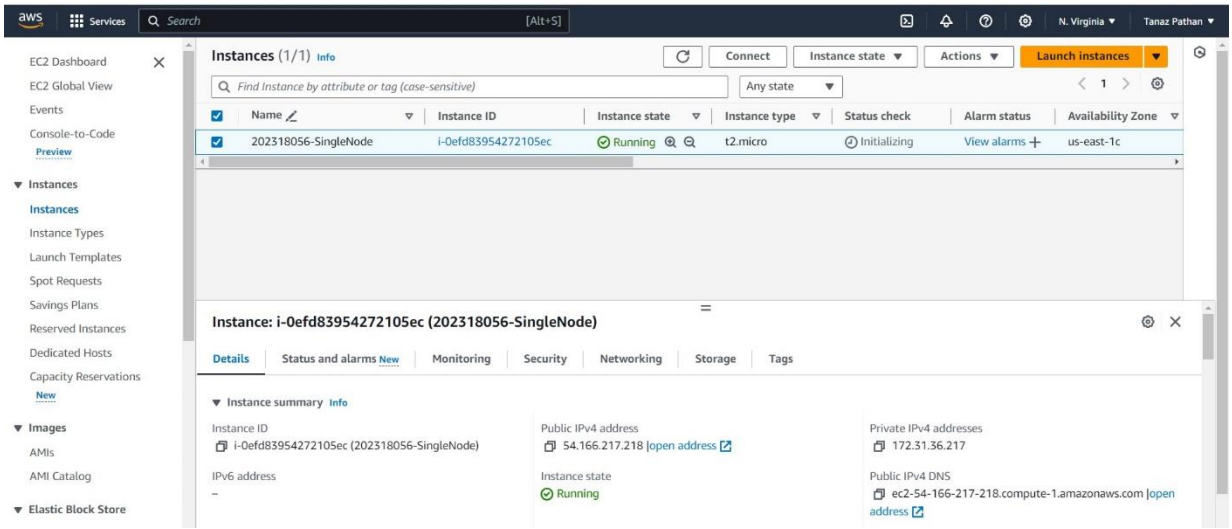
Updating Current Word and Count:

- Updates current word and its count.
- Prepares for the next word.

Printing Last Word and Count:

- Prints the last word and its count.
- Ensures all counts are accounted for.

SingleNode , used txt file corpus.txt ~ 90 mb




```
ubuntu@ip-172-31-41-195:~$ time cat corpus.txt | python3 mapper.py | sort | python3 reducer.py
!       26
!!!!!!!!        1
!)      1
"       482
"",     14
"","pc"         7
"","pcs"        7
""Do    1
""The   1
""There's       1
```

Without Hadoop

```
real    1m6.636s
user    0m5.413s
sys     0m0.466s
ubuntu@ip-172-31-41-195:~$
```

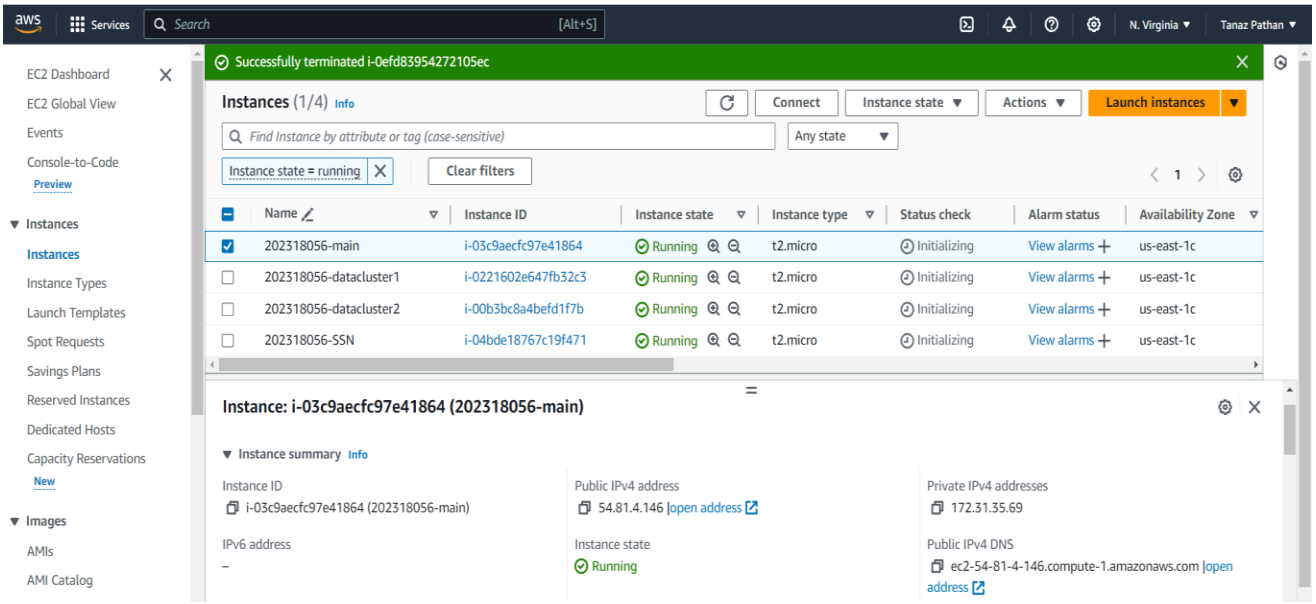
With Hadoop

```
ubuntu@ip-172-31-41-195:~$ time hadoop jar /home/ubuntu/hadoop/share/hadoop/tools/lib/hadoop-streaming-2.9.1.jar -mapper /home/ubuntu/mapper.py -reducer /home/ubuntu/reducer.py -input /input/corpus.txt -output /output/wordscounts
packageJobJar: [/tmp/hadoop-unjar5082568089063517402/] [] /tmp/streamjob8271078526609092725.jar tmpDir=null
24/02/24 05:08:12 INFO client.RMProxy: Connecting to ResourceManager at localhost/127.0.0.1:8032
24/02/24 05:08:12 INFO client.RMProxy: Connecting to ResourceManager at localhost/127.0.0.1:8032
24/02/24 05:08:12 INFO mapred.FileInputFormat: Total input files to process : 1
24/02/24 05:08:13 INFO mapreduce.JobSubmitter: number of splits:2
24/02/24 05:08:13 INFO Configuration.deprecation: yarn.resourcemanager.system-metrics-publisher.enabled is deprecated. Instead, use yarn.system-metrics-publisher.enabled
24/02/24 05:08:13 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1708748829675_0005
24/02/24 05:08:14 INFO impl.YarnClientImpl: Submitted application application_1708748829675_0005
24/02/24 05:08:14 INFO mapreduce.Job: The url to track the job: http://ip-172-31-41-195.ap-south-1.compute.internal:8088/proxy/application_1708748829675_0005/
24/02/24 05:08:14 INFO mapreduce.Job: Running job: job_1708748829675_0005
24/02/24 05:08:20 INFO mapreduce.Job: Job job_1708748829675_0005 running in uber mode : false
24/02/24 05:08:20 INFO mapreduce.Job:  map 0% reduce 0%
24/02/24 05:08:38 INFO mapreduce.Job:  map 37% reduce 0%
24/02/24 05:08:44 INFO mapreduce.Job:  map 56% reduce 0%
24/02/24 05:08:50 INFO mapreduce.Job:  map 67% reduce 0%
24/02/24 05:08:55 INFO mapreduce.Job:  map 83% reduce 0%
24/02/24 05:08:56 INFO mapreduce.Job:  map 100% reduce 0%
24/02/24 05:09:12 INFO mapreduce.Job:  map 100% reduce 94%
24/02/24 05:09:15 INFO mapreduce.Job:  map 100% reduce 100%
24/02/24 05:09:16 INFO mapreduce.Job: Job job_1708748829675_0005 completed successfully
24/02/24 05:09:16 INFO mapreduce.Job: Counters: 49
        File System Counters
                FILE: Number of bytes read=341906164
                FILE: Number of bytes written=513458624
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=87466386
                HDFS: Number of bytes written=7297521
                HDFS: Number of read operations=9
                HDFS: Number of large read operations=0
                HDFS: Number of write operations=2
```

```
real    2m17.928s
user    2m13.154s
sys     0m3.162s
ubuntu@ip-172-31-41-195:~$
```

```
ubuntu@ip-172-31-41-195:~$ hdfs dfs -cat /output/wordscounts/part-00000
!       26
!!!!!!!!        1
!)      1
"       482
"",     14
"","pc"         7
"","pcs"        7
""Do    1
""The   1
""There's       1
""We    2
""},    7
"#[FROM         1
```

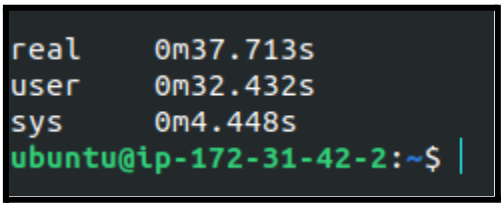
MultiNode , used txt file corpus.txt ~ 90 mb




```
ubuntu@ip-172-31-42-2:~/hadoop$ sbin/start-all.sh
This script is Deprecated. Instead use start-dfs.sh and start-yarn.sh
Starting namenodes on [ip-172-31-42-2.ap-south-1.compute.internal]
ip-172-31-42-2.ap-south-1.compute.internal: starting namenode, logging to /home/ubuntu/hadoop/logs/hadoop-ubuntu-namenod
172.31.42.2: starting datanode, logging to /home/ubuntu/hadoop/logs/hadoop-ubuntu-datanode-ip-172-31-42-2.out
172.31.44.214: starting datanode, logging to /home/ubuntu/hadoop/logs/hadoop-ubuntu-datanode-ip-172-31-44-214.out
172.31.32.110: starting datanode, logging to /home/ubuntu/hadoop/logs/hadoop-ubuntu-datanode-ip-172-31-32-110.out
```

```
ubuntu@ip-172-31-42-2:~$ hadoop jar /home/ubuntu/hadoop/share/hadoop/tools/lib/hadoop-streaming-2.9.1.jar -mapper /home/ubuntu/mapper.py -reducer /ho
me/ubuntu/reducer.py -input /input/corpus.txt -output /output/wordcounts
packageJobJar: [/tmp/hadoop-unjar1936485731669817299/] [] /tmp/streamjob7987625646435085579.jar tmpDir=null
24/02/24 10:53:14 INFO client.RMProxy: Connecting to ResourceManager at /172.31.42.2:8032
24/02/24 10:53:14 INFO client.RMProxy: Connecting to ResourceManager at /172.31.42.2:8032
24/02/24 10:53:15 INFO mapred.FileInputFormat: Total input files to process : 1
24/02/24 10:53:15 INFO mapreduce.JobSubmitter: number of splits:2
24/02/24 10:53:15 INFO Configuration.deprecation: yarn.resourcemanager.system-metrics-publisher.enabled is deprecated. Instead, use yarn.system-metri
cs-publisher.enabled
24/02/24 10:53:15 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1708769543844_0002
24/02/24 10:53:15 INFO impl.YarnClientImpl: Submitted application application_1708769543844_0002
24/02/24 10:53:15 INFO mapreduce.Job: The url to track the job: http://ip-172-31-42-2.ap-south-1.compute.internal:8088/proxy/application_170876954384
4_0002/
24/02/24 10:53:15 INFO mapreduce.Job: Running job: job_1708769543844_0002
24/02/24 10:53:22 INFO mapreduce.Job: Job job_1708769543844_0002 running in uber mode : false
24/02/24 10:53:22 INFO mapreduce.Job:  map 0% reduce 0%
24/02/24 10:53:40 INFO mapreduce.Job:  map 37% reduce 0%
24/02/24 10:53:46 INFO mapreduce.Job:  map 58% reduce 0%
24/02/24 10:53:52 INFO mapreduce.Job:  map 67% reduce 0%
24/02/24 10:53:57 INFO mapreduce.Job:  map 100% reduce 0%
24/02/24 10:54:14 INFO mapreduce.Job:  map 100% reduce 94%
24/02/24 10:54:16 INFO mapreduce.Job:  map 100% reduce 100%
24/02/24 10:54:18 INFO mapreduce.Job: Job job_1708769543844_0002 completed successfully
```

With Hadoop


real 0m37.713s
user 0m32.432s
sys 0m4.448s
ubuntu@ip-172-31-42-2:~$

```
ubuntu@ip-172-31-42-2:~$ hdfs dfs -ls /output/wordcounts
Found 2 items
-rw-r--r--   3 ubuntu supergroup          0 2024-02-24 10:54 /output/wordcounts/_SUCCESS
-rw-r--r--   3 ubuntu supergroup    7297521 2024-02-24 10:54 /output/wordcounts/part-00000
ubuntu@ip-172-31-42-2:~$ hdfs dfs -cat /output/wordcounts/part-00000
!       26
!!!!!!!!        1
!)      1
"       482
"",     14
"","pc"         7
"","pcs"        7
""Do    1
""The   1
""There's       1
```