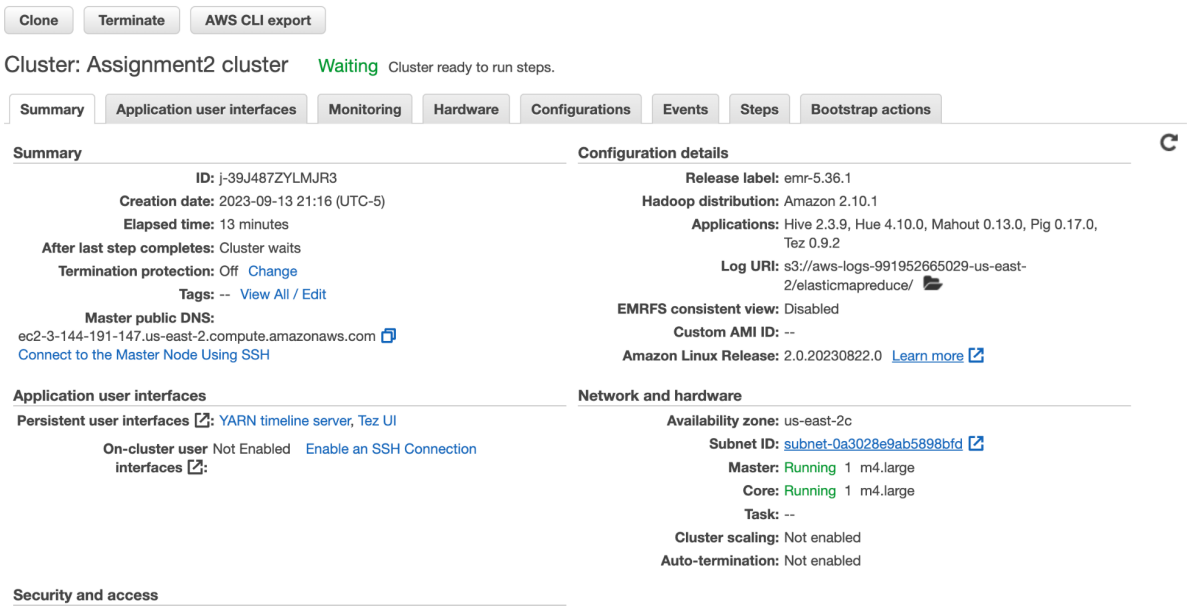
Big Data Technologies [CSP 554 - 01]

Assignment-3 [15 points]

Anusha Sonte Parameshwar [A20518694]

Step 1: Creating the Hadoop cluster:



Step 2: Installing mrjob library on EMR primary node:

Command used: sudo /usr/bin/pip3 install mrjob[aws]

```
[hadoop@ip-172-31-46-234 ~]$ sudo /usr/bin/pip3 install mrjob[aws]
WARNING: Running pip install with root privileges is generally not a good idea. Try `pip3 install --user` instead.
Collecting mrjob[aws]
  Downloading mrjob-0.7.4-py2.py3-none-any.whl (439 kB)
     |████████████████████████████████| 439 kB 17.0 MB/s
Requirement already satisfied: PyYAML>=3.10 in /usr/local/lib64/python3.7/site-packages (from mrjob[aws]) (5.4.1)
Collecting boto3>=1.10.0; extra == "aws"
  Downloading boto3-1.28.47-py3-none-any.whl (135 kB)
     |████████████████████████████████| 135 kB 27.4 MB/s
Collecting botocore>=1.13.26; extra == "aws"
  Downloading botocore-1.31.47-py3-none-any.whl (11.2 MB)
     |████████████████████████████████| 11.2 MB 44.9 MB/s
Requirement already satisfied: jmespath<2.0.0,>=0.7.1 in /usr/local/lib/python3.7/site-packages (from boto3>=1.10.0; extra == "aws"->mrjob[aws]) (1.0.0)
Collecting s3transfer<0.7.0,>=0.6.0
  Downloading s3transfer-0.6.2-py3-none-any.whl (79 kB)
     |████████████████████████████████| 79 kB 14.0 MB/s
Collecting python-dateutil<3.0.0,>=2.1
  Downloading python_dateutil-2.8.2-py2.py3-none-any.whl (247 kB)
     |████████████████████████████████| 247 kB 26.6 MB/s
Collecting urllib3<1.27,>=1.25.4
  Downloading urllib3-1.26.16-py2.py3-none-any.whl (143 kB)
     |████████████████████████████████| 143 kB 28.6 MB/s
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.7/site-packages (from python-dateutil<3.0.0,>=2.1->botocore>=1.13.26; extra == "aws"->mrjob[aws]) (1.13.0)
Installing collected packages: python-dateutil, urllib3, botocore, s3transfer, boto3, mrjob
  WARNING: The scripts mrjob, mrjob-3 and mrjob-3.7 are installed in '/usr/local/bin' which is not on PATH.
  Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
Successfully installed boto3-1.28.47 botocore-1.31.47 mrjob-0.7.4 python-dateutil-2.8.2 s3transfer-0.6.2 urllib3-1.26.16
[hadoop@ip-172-31-46-234 ~]$
```

Step 3: Copying Wordcount.py and w.data from local machine to hadoop primary node:

Commands used:

[on local terminal]: scp -i emr-key-pair.pem Wordcount.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on local terminal]: scp -i emr-key-pair.pem w.data hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on main terminal]: hadoop fs -put ~/Wordcount.py /user/hadoop
[on main terminal]: hadoop fs -put ~/w.data /user/hadoop

```
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Wordcount.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.c
om:/home/hadoop
Wordcount.py                                  100%  402    21.2KB/s   00:00
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem w.data hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/ho
me/hadoop
w.data                                        100%  528    31.2KB/s   00:00
```

Step 4: Executing Python program for WordCount:

Command used: python WordCount.py -r hadoop hdfs:///user/hadoop/w.data

```
job output is in hdfs:///user/hadoop/tmp/mrjob/Wordcount.hadoop.20230914.024824.447071/output
Streaming final output from hdfs:///user/hadoop/tmp/mrjob/Wordcount.hadoop.20230914.024824.447071/output...
"a"     3
"all"   1
"an"    1
"and"   1
"are"   1
"as"    4
"available"     1
"be"    3
"by"    1
"cluster"       2
"combine"       1
"contained"     1
"defined"       1
"dependencies"  1
"do"    1
"either"        1
"executed"      1
"explains"      1
"file"  2
"first" 1
"following"     1
"for"   1
"hadoop"        1
"how"   2
"in"    1
"individual"    1
"is"    2
"job"   4
"machine"       1
"map"   1
"more"  2
"mrjob" 1
"must"  1
"nodes" 1
"of"    1
"on"    4
```

[5 points]
Step 5: Modified Python Program: Wordcount2.py

Commands used:
[on local terminal]: scp -i emr-key-pair.pem Wordcount2.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on main terminal]: hadoop fs -put ~/Wordcount2.py /user/hadoop

```
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem WordCount2.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.
com:/home/hadoop
WordCount2.py                                                                 100%  531    30.9KB/s   00:00
```

Wordcount2.py:

Git link:
https://github.com/anushasonte/BigData/blob/main/Assignment3/WordCount2.py

WordCount2.py 1 ●

Users > anushasp > Downloads > BigData > WordCount2.py > ...

```python
from mrjob.job import MRJob
import re

WORD_RE = re.compile(r"[\w']+")

class MRWordCount(MRJob):

    def mapper(self, _, line):
        for word in WORD_RE.findall(line):
            if word.lower()[0] >= 'a' and word.lower()[0] <= 'n':
                yield "a_to_n", 1
            else:
                yield "other", 1

    def combiner(self, category, counts):
        yield category, sum(counts)

    def reducer(self, category, counts):
        yield category, sum(counts)

if __name__ == '__main__':
    MRWordCount.run()

```

Output:

python WordCount2.py -r hadoop hdfs:///user/hadoop/w.data

```
[hadoop@ip-172-31-46-234 ~]$ python WordCount2.py -r hadoop hdfs:///user/hadoop/w.data
No configs found; falling back on auto-configuration
No configs specified for hadoop runner
Looking for hadoop binary in $PATH...
Found hadoop binary: /usr/bin/hadoop
Using Hadoop version 2.10.1
Looking for Hadoop streaming jar in /home/hadoop/contrib...
Looking for Hadoop streaming jar in /usr/lib/hadoop-mapreduce...
Found Hadoop streaming jar: /usr/lib/hadoop-mapreduce/hadoop-streaming.jar
Creating temp directory /tmp/WordCount2.hadoop.20230914.025114.965568
uploading working dir files to hdfs:///user/hadoop/tmp/mrjob/WordCount2.hadoop.20230914.025114.965568/files/wd...
Copying other local files to hdfs:///user/hadoop/tmp/mrjob/WordCount2.hadoop.20230914.025114.965568/files/
Running step 1 of 1...
  packageJobJar: [] [/usr/lib/hadoop/hadoop-streaming-2.10.1-amzn-4.jar] /tmp/streamjob7058962125034010225.jar tmpDir=null
  Connecting to ResourceManager at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:8032
  Connecting to Application History server at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:10200
  Connecting to ResourceManager at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:8032
  Connecting to Application History server at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:10200
  Loaded native gpl library
  Successfully loaded & initialized native-lzo library [hadoop-lzo rev 049362b7cf53ff5f739d6b1532457f2c6cd495e8]
  Total input files to process : 1
  number of splits:4
  Submitting tokens for job: job_1694658178709_0002
  resource-types.xml not found
  Unable to find 'resource-types.xml'.
  Adding resource type - name = memory-mb, units = Mi, type = COUNTABLE
  Adding resource type - name = vcores, units = , type = COUNTABLE
  Submitted application application_1694658178709_0002
  The url to track the job: http://ip-172-31-46-234.us-east-2.compute.internal:20888/proxy/application_1694658178709_0002/
  Running job: job_1694658178709_0002
  Job job_1694658178709_0002 running in uber mode : false
   map 0% reduce 0%
   map 25% reduce 0%
   map 50% reduce 0%
   map 100% reduce 0%
   map 100% reduce 100%
  Job job_1694658178709_0002 completed successfully
  Output directory: hdfs:///user/hadoop/tmp/mrjob/WordCount2.hadoop.20230914.025114.965568/output
Counters: 50
        File Input Format Counters
                Bytes Read=1320
        File Output Format Counters
                Bytes Written=23
        File System Counters
```

```
                Launched reduce tasks=1
                Total megabyte-milliseconds taken by all map tasks=63438336
                Total megabyte-milliseconds taken by all reduce tasks=12564480
                Total time spent by all map tasks (ms)=41301
                Total time spent by all maps in occupied slots (ms)=1982448
                Total time spent by all reduce tasks (ms)=4090
                Total time spent by all reduces in occupied slots (ms)=392640
                Total vcore-milliseconds taken by all map tasks=41301
                Total vcore-milliseconds taken by all reduce tasks=4090
        Map-Reduce Framework
                CPU time spent (ms)=5700
                Combine input records=95
                Combine output records=6
                Failed Shuffles=0
                GC time elapsed (ms)=1039
                Input split bytes=504
                Map input records=6
                Map output bytes=999
                Map output materialized bytes=144
                Map output records=95
                Merged Map outputs=4
                Physical memory (bytes) snapshot=2044612608
                Reduce input groups=2
                Reduce input records=6
                Reduce output records=2
                Reduce shuffle bytes=144
                Shuffled Maps =4
                Spilled Records=12
                Total committed heap usage (bytes)=1668808704
                Virtual memory (bytes) snapshot=17848913920
        Shuffle Errors
                BAD_ID=0
                CONNECTION=0
                IO_ERROR=0
                WRONG_LENGTH=0
                WRONG_MAP=0
                WRONG_REDUCE=0
job output is in hdfs:///user/hadoop/tmp/mrjob/WordCount2.hadoop.20230914.025114.965568/output
Streaming final output from hdfs:///user/hadoop/tmp/mrjob/WordCount2.hadoop.20230914.025114.965568/output...
"a_to_n"        49
"other" 46
Removing HDFS temp directory hdfs:///user/hadoop/tmp/mrjob/WordCount2.hadoop.20230914.025114.965568...
Removing temp directory /tmp/WordCount2.hadoop.20230914.025114.965568...
[hadoop@ip-172-31-46-234 ~]$
```

Step 6: Executing Python program for Salaries:

Commands used:

[on local terminal]: scp -i emr-key-pair.pem Salaries.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on local terminal]: scp -i emr-key-pair.pem Salaries.tsv hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on main terminal]: hadoop fs -put ~/Salaries.py /user/hadoop
[on main terminal]: hadoop fs -put ~/Salaries.tsv /user/hadoop

```
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Salaries.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.co
m:/home/hadoop
Salaries.py                                                                   100%  411    26.2KB/s   00:00
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Salaries2.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.c
om:/home/hadoop
Salaries2.py                                                                  100%  752    45.6KB/s   00:00
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Salaries.tsv hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.c
om:/home/hadoop
Salaries.tsv                                                                  100% 1502KB   1.1MB/s   00:01
anushasp@Anushas-MacBook-Air BigData %
```

python Salaries.py -r hadoop hdfs:///user/hadoop/Salaries.tsv

```
"WASTE WATER PLANT COORDINATOR" 2
"WASTE WATER PLANT MANAGER"     2
"WASTE WATER PLANT OPNS SUPV"   2
"WATER PUMPING ASST MANAGER"    2
"WATER SERVICE INSPECTOR"       4
"WATER SERVICE REPRESENTATIVE"  12
"WATER TREATMENT ASST MANAGER"  2
"WATER TREATMENT TECHNICIAN II" 17
"WATER TREATMENT TECHNICIAN III"        8
"WATER TREATMENT TECHNICIAN SUP"        6
"WATERSHED MAINT SUPV"  3
"WATERSHED MANAGER"     1
"WATERSHED RANGER II"   5
"WATERSHED RANGER III"  3
"WATERSHED RANGER SUPERVISOR"   1
"WEB DEVELOPER" 1
"WELDER"        8
"WHITEPRINT MACHINE OPR"        1
"WORK STUDY STUDENT"    18
"WORKER'S COMPENSATION CONTRACT"        1
"WWW Chief of Engineering"      1
"WWW Division  Manager I"       1
"WWW Division Manager II"       5
"Waste Water Maint Mgr Instrum" 1
"Waste Water Maintenance Mgr Me"        1
"Waste Water Opns Tech II Pump" 10
"Waste Water Opns Tech II Sanit"        81
"Waste Water Tech Supv I Pump"  6
"Waste Water Tech Supv II Pump" 1
"Waste Water Tech Supv II Sanit"        10
"Waste Water Techn Supv I Sanit"        19
"Water Systems Pumping Supv"    1
"Water Systems Treatment Manage"        1
"Water Systems Treatment Supv"  2
"YOUTH DEVELOPMENT TECH"        3
"ZONING ADMINISTRATOR"  1
"ZONING APPEALS ADVISOR BMZA"   1
"ZONING APPEALS OFFICER"        1
"ZONING ENFORCEMENT OFFICER"    1
"ZONING EXAMINER I"     2
"ZONING EXAMINER II"    1
Removing HDFS temp directory hdfs:///user/hadoop/tmp/mrjob/Salaries.hadoop.20230914.025500.423427...
Removing temp directory /tmp/Salaries.hadoop.20230914.025500.423427...
[hadoop@ip-172-31-46-234 ~]$
```

[5 points]

Step 7: Modified Python Program: Salaries2.py

Commands used:

[on local terminal]: scp -i /emr-key-pair.pem /Salaries2.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on main terminal]: hadoop fs -put ~/Salaries2.py /user/hadoop

```
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Salaries.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.co
m:/home/hadoop
Salaries.py                                                                   100%  411    26.2KB/s   00:00
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Salaries2.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.c
om:/home/hadoop
Salaries2.py                                                                  100%  752    45.6KB/s   00:00
anushasp@Anushas-MacBook-Air BigData % scp -i emr-key-pair.pem Salaries.tsv hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.c
om:/home/hadoop
Salaries.tsv                                                                  100% 1502KB   1.1MB/s   00:01
anushasp@Anushas-MacBook-Air BigData %
```

Salaries2.py:

Git link: https://github.com/anushasonte/BigData/blob/main/Assignment3/Salaries2.py

Salaries2.py 1

Users > anushasp > Downloads > BigData > Salaries2.py > ...

```python
from mrjob.job import MRJob

class MRSalaries(MRJob):

    def categorize_salary(self, salary):
        salary = float(salary)
        if salary >= 100000.0:
            return "High"
        elif 50000.0 <= salary < 100000.0:
            return "Medium"
        else:
            return "Low"

    def mapper(self, _, line):
        (name, jobTitle, agencyID, agency, hireDate, annualSalary, grossPay) = line.split('\t')
        salary_category = self.categorize_salary(annualSalary)
        yield salary_category, 1

    def combiner(self, salary_category, counts):
        yield salary_category, sum(counts)

    def reducer(self, salary_category, counts):
        yield salary_category, sum(counts)

if __name__ == '__main__':
    MRSalaries.run()

```

Output:

python Salaries2.py -r hadoop hdfs:///user/hadoop/Salaries.tsv

```
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -put ~/Salaries2.py /user/hadoop
[hadoop@ip-172-31-46-234 ~]$ clear

[hadoop@ip-172-31-46-234 ~]$ hadoop fs -ls /user/hadoop
Found 7 items
-rw-r--r--   1 hadoop hdfsadmingroup        411 2023-09-14 02:54 /user/hadoop/Salaries.py
-rw-r--r--   1 hadoop hdfsadmingroup    1538148 2023-09-14 02:54 /user/hadoop/Salaries.tsv
-rw-r--r--   1 hadoop hdfsadmingroup        752 2023-09-14 03:00 /user/hadoop/Salaries2.py
-rw-r--r--   1 hadoop hdfsadmingroup        531 2023-09-14 02:50 /user/hadoop/WordCount2.py
-rw-r--r--   1 hadoop hdfsadmingroup        402 2023-09-14 02:46 /user/hadoop/Wordcount.py
drwxr-xr-x   - hadoop hdfsadmingroup          0 2023-09-14 02:48 /user/hadoop/tmp
-rw-r--r--   1 hadoop hdfsadmingroup        528 2023-09-14 02:45 /user/hadoop/w.data
[hadoop@ip-172-31-46-234 ~]$ python Salaries2.py -r hadoop hdfs:///user/hadoop/Salaries.tsv
No configs found; falling back on auto-configuration
No configs specified for hadoop runner
Looking for hadoop binary in $PATH...
Found hadoop binary: /usr/bin/hadoop
Using Hadoop version 2.10.1
Looking for Hadoop streaming jar in /home/hadoop/contrib...
Looking for Hadoop streaming jar in /usr/lib/hadoop-mapreduce...
Found Hadoop streaming jar: /usr/lib/hadoop-mapreduce/hadoop-streaming.jar
Creating temp directory /tmp/Salaries2.hadoop.20230914.030108.534007
uploading working dir files to hdfs:///user/hadoop/tmp/mrjob/Salaries2.hadoop.20230914.030108.534007/files/wd...
Copying other local files to hdfs:///user/hadoop/tmp/mrjob/Salaries2.hadoop.20230914.030108.534007/files/
Running step 1 of 1...
  packageJobJar: [] [/usr/lib/hadoop/hadoop-streaming-2.10.1-amzn-4.jar] /tmp/streamjob4670546331418000762.jar tmpDir=null
  Connecting to ResourceManager at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:8032
  Connecting to Application History server at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:10200
  Connecting to ResourceManager at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:8032
  Connecting to Application History server at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:10200
  Loaded native gpl library
  Successfully loaded & initialized native-lzo library [hadoop-lzo rev 049362b7cf53ff5f739d6b1532457f2c6cd495e8]
  Total input files to process : 1
  number of splits:4
  Submitting tokens for job: job_1694658178709_0004
  resource-types.xml not found
  Unable to find 'resource-types.xml'.
  Adding resource type - name = memory-mb, units = Mi, type = COUNTABLE
  Adding resource type - name = vcores, units = , type = COUNTABLE
  Submitted application application_1694658178709_0004
  The url to track the job: http://ip-172-31-46-234.us-east-2.compute.internal:20888/proxy/application_1694658178709_0004/
  Running job: job_1694658178709_0004
  Job job_1694658178709_0004 running in uber mode : false
   map 0% reduce 0%
```

```
                Total megabyte-milliseconds taken by all map tasks=67236864
                Total megabyte-milliseconds taken by all reduce tasks=13314048
                Total time spent by all map tasks (ms)=43774
                Total time spent by all maps in occupied slots (ms)=2101152
                Total time spent by all reduce tasks (ms)=4334
                Total time spent by all reduces in occupied slots (ms)=416064
                Total vcore-milliseconds taken by all map tasks=43774
                Total vcore-milliseconds taken by all reduce tasks=4334
        Map-Reduce Framework
                CPU time spent (ms)=6940
                Combine input records=13818
                Combine output records=12
                Failed Shuffles=0
                GC time elapsed (ms)=901
                Input split bytes=528
                Map input records=13818
                Map output bytes=129922
                Map output materialized bytes=231
                Map output records=13818
                Merged Map outputs=4
                Physical memory (bytes) snapshot=2031996928
                Reduce input groups=3
                Reduce input records=12
                Reduce output records=3
                Reduce shuffle bytes=231
                Shuffled Maps =4
                Spilled Records=24
                Total committed heap usage (bytes)=1632632832
                Virtual memory (bytes) snapshot=17853067264
        Shuffle Errors
                BAD_ID=0
                CONNECTION=0
                IO_ERROR=0
                WRONG_LENGTH=0
                WRONG_MAP=0
                WRONG_REDUCE=0
job output is in hdfs:///user/hadoop/tmp/mrjob/Salaries2.hadoop.20230914.030108.534007/output
Streaming final output from hdfs:///user/hadoop/tmp/mrjob/Salaries2.hadoop.20230914.030108.534007/output...
"High"  442
"Low"   7064
"Medium"        6312
Removing HDFS temp directory hdfs:///user/hadoop/tmp/mrjob/Salaries2.hadoop.20230914.030108.534007...
Removing temp directory /tmp/Salaries2.hadoop.20230914.030108.534007...
[hadoop@ip-172-31-46-234 ~]$ x
```

[5 points]

Step 8: Executing Python program for Moviecount:

Commands used:

[on local terminal]: scp -i emr-key-pair.pem u.data hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on local terminal]: scp -i emr-key-pair.pem MovieCount.py hadoop@ec2-3-144-191-147.us-east-2.compute.amazonaws.com:/home/hadoop

[on main terminal]: hadoop fs -put ~/MovieCount.py /user/hadoop
[on main terminal]: hadoop fs -put ~/u.data /user/hadoop

Moviecount.py:

Gitlink:https://github.com/anushasonte/BigData/blob/main/Assignment3/MovieCount.py

MovieCount.py 1

Users > anushasp > Downloads > BigData > MovieCount.py > ...

```python
from mrjob.job import MRJob

class MRMovieCount(MRJob):

    def mapper(self, _, line):
        (userID,movieID,rating,timestamp) = line.split(',')
        yield userID, 1

    def combiner(self, userID, counts):
        yield userID, sum(counts)

    def reducer(self, userID, counts):
        yield userID, sum(counts)


if __name__ == '__main__':
    MRMovieCount.run()

```

Output:

python Moviecount.py -r hadoop hdfs:///user/hadoop/u.data

```
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -put ~/MovieCount.py /user/hadoop
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -put ~/u.data /user/hadoop
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -ls /user/hadoop
Found 9 items
-rw-r--r--   1 hadoop hdfsadmingroup        372 2023-09-14 03:05 /user/hadoop/MovieCount.py
-rw-r--r--   1 hadoop hdfsadmingroup        411 2023-09-14 02:54 /user/hadoop/Salaries.py
-rw-r--r--   1 hadoop hdfsadmingroup    1538148 2023-09-14 02:54 /user/hadoop/Salaries.tsv
-rw-r--r--   1 hadoop hdfsadmingroup        752 2023-09-14 03:00 /user/hadoop/Salaries2.py
-rw-r--r--   1 hadoop hdfsadmingroup        531 2023-09-14 02:50 /user/hadoop/WordCount2.py
-rw-r--r--   1 hadoop hdfsadmingroup        402 2023-09-14 02:46 /user/hadoop/Wordcount.py
drwxr-xr-x   - hadoop hdfsadmingroup          0 2023-09-14 02:48 /user/hadoop/tmp
-rw-r--r--   1 hadoop hdfsadmingroup    2438233 2023-09-14 03:05 /user/hadoop/u.data
-rw-r--r--   1 hadoop hdfsadmingroup        528 2023-09-14 02:45 /user/hadoop/w.data
[hadoop@ip-172-31-46-234 ~]$ python MovieCount.py -r hadoop hdfs:///user/hadoop/u.data
No configs found; falling back on auto-configuration
No configs specified for hadoop runner
Looking for hadoop binary in $PATH...
Found hadoop binary: /usr/bin/hadoop
Using Hadoop version 2.10.1
Looking for Hadoop streaming jar in /home/hadoop/contrib...
Looking for Hadoop streaming jar in /usr/lib/hadoop-mapreduce...
Found Hadoop streaming jar: /usr/lib/hadoop-mapreduce/hadoop-streaming.jar
Creating temp directory /tmp/MovieCount.hadoop.20230914.030614.283848
uploading working dir files to hdfs:///user/hadoop/tmp/mrjob/MovieCount.hadoop.20230914.030614.283848/files/wd...
Copying other local files to hdfs:///user/hadoop/tmp/mrjob/MovieCount.hadoop.20230914.030614.283848/files/
Running step 1 of 1...
  packageJobJar: [] [/usr/lib/hadoop/hadoop-streaming-2.10.1-amzn-4.jar] /tmp/streamjob6842682106768538 53.jar tmpDir=null
  Connecting to ResourceManager at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:8032
  Connecting to Application History server at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:10200
  Connecting to ResourceManager at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:8032
  Connecting to Application History server at ip-172-31-46-234.us-east-2.compute.internal/172.31.46.234:10200
  Loaded native gpl library
  Successfully loaded & initialized native-lzo library [hadoop-lzo rev 049362b7cf53ff5f739d6b1532457f2c6cd495e8]
  Total input files to process : 1
  number of splits:4
  Submitting tokens for job: job_1694658178709_0005
  resource-types.xml not found
  Unable to find 'resource-types.xml'.
  Adding resource type - name = memory-mb, units = Mi, type = COUNTABLE
  Adding resource type - name = vcores, units = , type = COUNTABLE
  Submitted application application_1694658178709_0005
  The url to track the job: http://ip-172-31-46-234.us-east-2.compute.internal:20888/proxy/application_1694658178709_0005/
  Running job: job_1694658178709_0005
  Job job_1694658178709_0005 running in uber mode : false
```

```
Streaming final output from hdfs:///user/hadoop/tmp/mrjob/MovieCount.hadoop.20230914.030614.283848/output...
"1"     20
"10"    46
"100"   25
"101"   55
"102"   678
"103"   94
"104"   76
"105"   525
"106"   45
"107"   32
"108"   31
"109"   23
"11"    38
"110"   120
"111"   341
"112"   21
"113"   27
"114"   25
"115"   41
"116"   25
"117"   55
"118"   189
"119"   641
"12"    61
"120"   138
"121"   80
"122"   40
"123"   33
"124"   85
"125"   210
"126"   64
"127"   21
"128"   323
"129"   26
"13"    53
"130"   375
"131"   44
"132"   94
"133"   178
"134"   311
"135"   22
"136"   50
"137"   80
```

```
"667"   68
"668"   20
"669"   37
"67"    103
"670"   31
"671"   115
"68"    123
"69"    81
"7"     88
"70"    83
"71"    23
"72"    191
"73"    1610
"74"    49
"75"    145
"76"    20
"77"    315
"78"    263
"79"    55
"8"     116
"80"    37
"81"    160
"82"    39
"83"    161
"84"    116
"85"    107
"86"    190
"87"    31
"88"    255
"89"    66
"9"     45
"90"    50
"91"    150
"92"    123
"93"    159
"94"    196
"95"    299
"96"    76
"97"    128
"98"    71
"99"    188
Removing HDFS temp directory hdfs:///user/hadoop/tmp/mrjob/MovieCount.hadoop.20230914.030614.283848...
Removing temp directory /tmp/MovieCount.hadoop.20230914.030614.283848...
[hadoop@ip-172-31-46-234 ~]$
```

Step 9: Removing all the files from /user/hadoop

```
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -ls /user/hadoop
Found 9 items
-rw-r--r--   1 hadoop hdfsadmingroup        372 2023-09-14 03:05 /user/hadoop/MovieCount.py
-rw-r--r--   1 hadoop hdfsadmingroup        411 2023-09-14 02:54 /user/hadoop/Salaries.py
-rw-r--r--   1 hadoop hdfsadmingroup    1538148 2023-09-14 02:54 /user/hadoop/Salaries.tsv
-rw-r--r--   1 hadoop hdfsadmingroup        752 2023-09-14 03:00 /user/hadoop/Salaries2.py
-rw-r--r--   1 hadoop hdfsadmingroup        531 2023-09-14 02:50 /user/hadoop/WordCount2.py
-rw-r--r--   1 hadoop hdfsadmingroup        402 2023-09-14 02:46 /user/hadoop/Wordcount.py
drwxr-xr-x   - hadoop hdfsadmingroup          0 2023-09-14 02:48 /user/hadoop/tmp
-rw-r--r--   1 hadoop hdfsadmingroup    2438233 2023-09-14 03:05 /user/hadoop/u.data
-rw-r--r--   1 hadoop hdfsadmingroup        528 2023-09-14 02:45 /user/hadoop/w.data
[hadoop@ip-172-31-46-234 ~]$
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/MovieCount.py
Deleted /user/hadoop/MovieCount.py
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/Salaries.py
Deleted /user/hadoop/Salaries.py
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/Salaries2.py
Deleted /user/hadoop/Salaries2.py
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/Salaries.tsv
Deleted /user/hadoop/Salaries.tsv
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/u.data
Deleted /user/hadoop/u.data
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/w.data
Deleted /user/hadoop/w.data
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/Wordcount.py
Deleted /user/hadoop/Wordcount.py
[hadoop@ip-172-31-46-234 ~]$ hadoop fs -rm /user/hadoop/WordCount2.py
Deleted /user/hadoop/WordCount2.py
```

Step 10: Terminating the cluster: