Reg.No.: 210701263

Exp. No.: 3 **Map Reduce program to process a weather dataset**

AIM:

To implement MapReduce program to process a weather dataset.

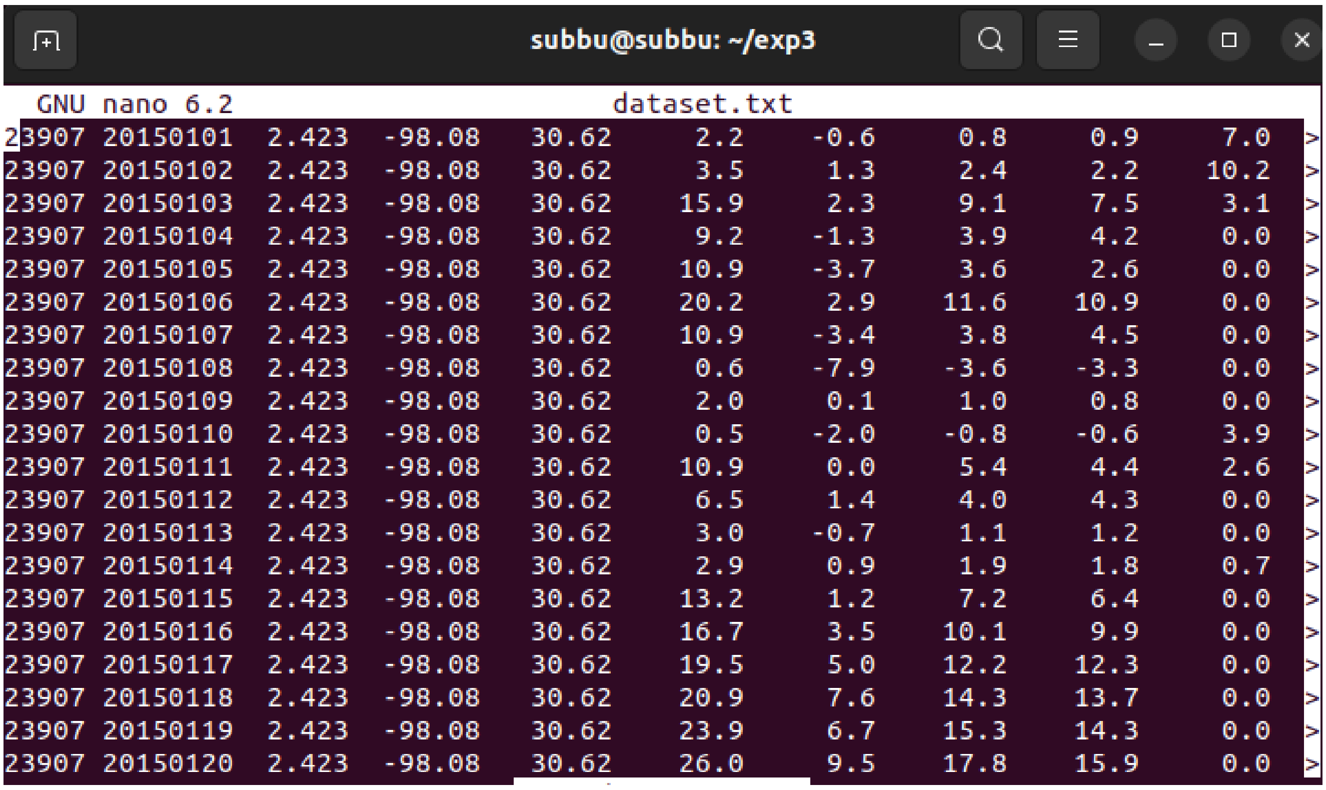
Procedure:

Step 1: Create Data File:

Create a file named "word_count_data.txt" and populate it with text data that you wish to analyse. Login with your hadoop user.

Download the dataset (weather data)

Output:



```
subbu@subbu: ~/exp3
  GNU nano 6.2                                dataset.txt
23907 20150101  2.423  -98.08   30.62     2.2    -0.6     0.8     0.9     7.0  >
23907 20150102  2.423  -98.08   30.62     3.5     1.3     2.4     2.2    10.2  >
23907 20150103  2.423  -98.08   30.62    15.9     2.3     9.1     7.5     3.1  >
23907 20150104  2.423  -98.08   30.62     9.2    -1.3     3.9     4.2     0.0  >
23907 20150105  2.423  -98.08   30.62    10.9    -3.7     3.6     2.6     0.0  >
23907 20150106  2.423  -98.08   30.62    20.2     2.9    11.6    10.9     0.0  >
23907 20150107  2.423  -98.08   30.62    10.9    -3.4     3.8     4.5     0.0  >
23907 20150108  2.423  -98.08   30.62     0.6    -7.9    -3.6    -3.3     0.0  >
23907 20150109  2.423  -98.08   30.62     2.0     0.1     1.0     0.8     0.0  >
23907 20150110  2.423  -98.08   30.62     0.5    -2.0    -0.8    -0.6     3.9  >
23907 20150111  2.423  -98.08   30.62    10.9     0.0     5.4     4.4     2.6  >
23907 20150112  2.423  -98.08   30.62     6.5     1.4     4.0     4.3     0.0  >
23907 20150113  2.423  -98.08   30.62     3.0    -0.7     1.1     1.2     0.0  >
23907 20150114  2.423  -98.08   30.62     2.9     0.9     1.9     1.8     0.7  >
23907 20150115  2.423  -98.08   30.62    13.2     1.2     7.2     6.4     0.0  >
23907 20150116  2.423  -98.08   30.62    16.7     3.5    10.1     9.9     0.0  >
23907 20150117  2.423  -98.08   30.62    19.5     5.0    12.2    12.3     0.0  >
23907 20150118  2.423  -98.08   30.62    20.9     7.6    14.3    13.7     0.0  >
23907 20150119  2.423  -98.08   30.62    23.9     6.7    15.3    14.3     0.0  >
23907 20150120  2.423  -98.08   30.62    26.0     9.5    17.8    15.9     0.0  >
```

Step 2: Mapper Logic - mapper.py:

Create a file named "mapper.py" to implement the logic for the mapper. The mapper will read input data from STDIN, split lines into words, and output each word with its count.

```
nano mapper.py
# Copy and paste the mapper.py code
```

```
#!/usr/bin/env python

import sys

# input comes from STDIN (standard input)
# the mapper will get daily max temperature and group it by month. so output will be
(month,dailymax_temperature)
for line in sys.stdin:
    # remove leading and trailing whitespace
    line = line.strip()     # split
the line into words     words =
line.split()
    #See the README hosted on the weather website which help us understand how each
position represents a column     month = line[10:12]     daily_max = line[38:45]     daily_max
= daily_max.strip()
    # increase counters     for
word in words:
        # write the results to STDOUT (standard output);
        # what we output here will be go through the shuffle proess and then
        # be the input for the Reduce step, i.e. the input for reducer.py
        #
        # tab-delimited; month and daily max temperature as output
print ('%s\t%s' % (month ,daily_max))

          .
```

Step 3: Reducer Logic - reducer.py:

Create a file named "reducer.py" to implement the logic for the reducer. The reducer will aggregate the occurrences of each word and generate the final output.

```
nano reducer.py
# Copy and paste the reducer.py code
```

reducer.py

```
#!/usr/bin/env python

from operator import itemgetter import sys
#reducer will get the input from stdid which will be a collection of key, value(Key=month , value=
daily max temperature)
#reducer logic: will get all the daily max temperature for a month and find max temperature for the
month
#shuffle will ensure that key are sorted(month)
```

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```
current_month = None
current_max = 0 month =
None

# input comes from STDIN for
line in sys.stdin:
   # remove leading and trailing whitespace     line
= line.strip()
   # parse the input we got from mapper.py     month,
daily_max = line.split('\t', 1)

   # convert daily_max (currently a string) to float     try:
      daily_max = float(daily_max)     except
ValueError:
      # daily_max was not a number, so silently
      # ignore/discard this line
continue

   # this IF-switch only works because Hadoop shuffle process sorts map output
   # by key (here: month) before it is passed to the reducer
if current_month == month:         if daily_max > current_max:
current_max = daily_max     else:         if current_month:
         # write result to STDOUT
         print ('%s\t%s' % (current_month, current_max))
current_max = daily_max
      current_month = month

# output of the last month if current_month == month:
print ('%s\t%s' % (current_month, current_max))
```

Step 4: Prepare Hadoop Environment:

Start the Hadoop daemons and create a directory in HDFS to store your data.

```
start-all.sh
```

Step 6: Make Python Files Executable:

Give executable permissions to your mapper.py and reducer.py files.

```
chmod 777 mapper.py reducer.py
```

Step 7: Run the program using Hadoop Streaming:

Download the latest hadoop-streaming jar file and place it in a location you can easily access.

Then run the program using Hadoop Streaming.

```
hadoop fs -mkdir -p /weatherdata

hadoop fs -copyFromLocal /home/sx/Downloads/dataset.txt /weatherdata

hdfs dfs -ls /weatherdata

hadoop jar /home/sx/hadoop-3.2.3/share/hadoop/tools/lib/hadoop-streaming-3.2.3.jar \
  -input /weatherdata/dataset.txt \
  -output /weatherdata/output \
  -file "/home/sx/Downloads/mapper.py" \
  -mapper "python3 mapper.py" \
  -file "/home/sx/Downloads/reducer.py" \
  -reducer "python3 reducer.py"

hdfs dfs -text /weatherdata/output/* > /home/sx/Downloads/outputfile.txt
```

Step 8: Check Output:

Check the output of the program in the specified HDFS output directory.

```
hdfs dfs -text /weatherdata/output/* > /home/sx/Downloads/output/ /part-00000
```

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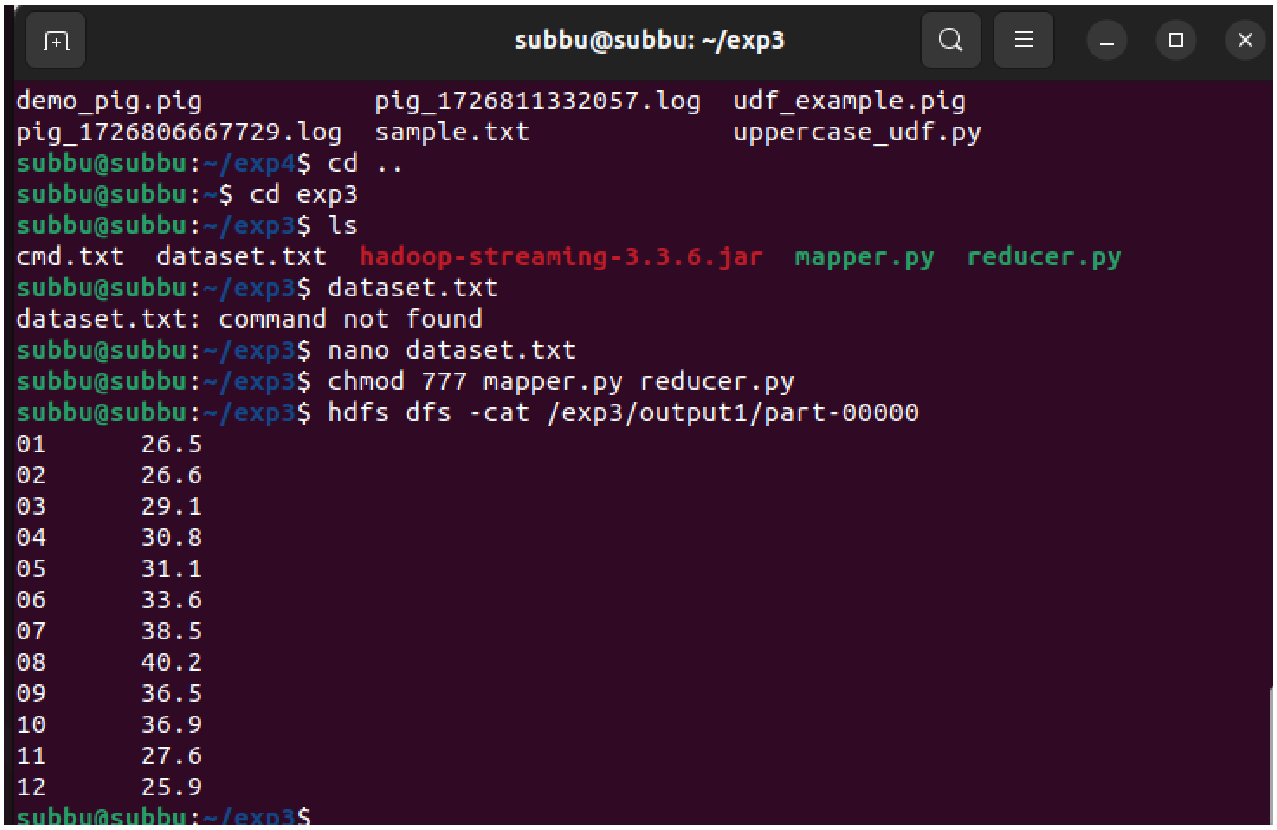

```
demo_pig.pig           pig_1726811332057.log  udf_example.pig
pig_1726806667729.log  sample.txt             uppercase_udf.py
subbu@subbu:~/exp4$ cd ..
subbu@subbu:~$ cd exp3
subbu@subbu:~/exp3$ ls
cmd.txt  dataset.txt  hadoop-streaming-3.3.6.jar  mapper.py  reducer.py
subbu@subbu:~/exp3$ dataset.txt
dataset.txt: command not found
subbu@subbu:~/exp3$ nano dataset.txt
subbu@subbu:~/exp3$ chmod 777 mapper.py reducer.py
subbu@subbu:~/exp3$ hdfs dfs -cat /exp3/output1/part-00000
01      26.5
02      26.6
03      29.1
04      30.8
05      31.1
06      33.6
07      38.5
08      40.2
09      36.5
10      36.9
11      27.6
12      25.9
subbu@subbu:~/exp3$
```

After copy and paste the above output in your local file give the below command to remove the directory from hdfs : hadoop fs -rm -r /weatherdata/output

Result:

Thus, the program for weather dataset using Map Reduce has been executed successfully.