Exp No 3

Map Reduce program to process a weather dataset Aim:

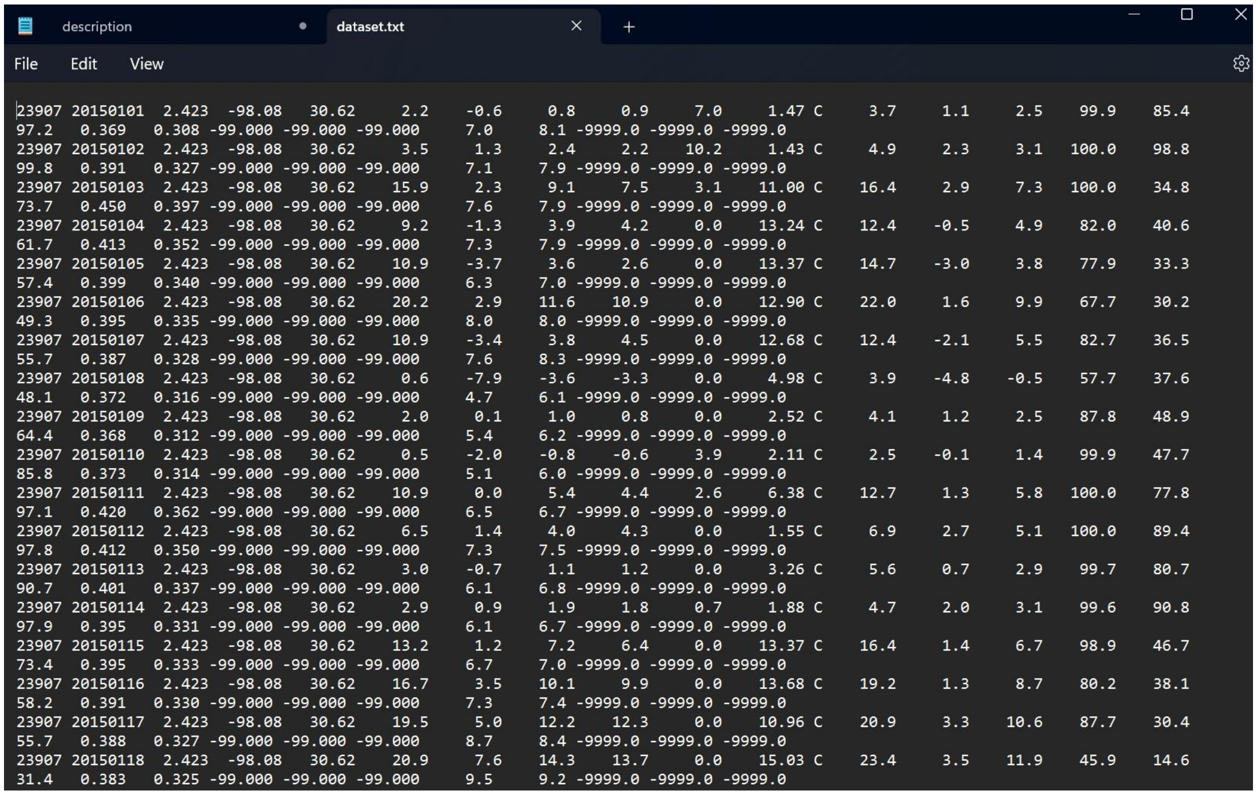
To implement MapReduce program to process a weather dataset.

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.



```
23907 20150101  2.423  -98.08   30.62     2.2    -0.6     0.8     0.9     7.0     1.47 C     3.7     1.1     2.5    99.9    85.4
97.2   0.369   0.308 -99.000 -99.000 -99.000     7.0     8.1 -9999.0 -9999.0 -9999.0
23907 20150102  2.423  -98.08   30.62     3.5     1.3     2.4     2.2    10.2     1.43 C     4.9     2.3     3.1   100.0    98.8
99.8   0.391   0.327 -99.000 -99.000 -99.000     7.1     7.9 -9999.0 -9999.0 -9999.0
23907 20150103  2.423  -98.08   30.62    15.9     2.3     9.1     7.5     3.1    11.00 C    16.4     2.9     7.3   100.0    34.8
73.7   0.450   0.397 -99.000 -99.000 -99.000     7.6     7.9 -9999.0 -9999.0 -9999.0
23907 20150104  2.423  -98.08   30.62     9.2    -1.3     3.9     4.2     0.0    13.24 C    12.4    -0.5     4.9    82.0    40.6
61.7   0.413   0.352 -99.000 -99.000 -99.000     7.3     7.9 -9999.0 -9999.0 -9999.0
23907 20150105  2.423  -98.08   30.62    10.9    -3.7     3.6     2.6     0.0    13.37 C    14.7    -3.0     3.8    77.9    33.3
57.4   0.399   0.340 -99.000 -99.000 -99.000     6.3     7.0 -9999.0 -9999.0 -9999.0
23907 20150106  2.423  -98.08   30.62    20.2     2.9    11.6    10.9     0.0    12.90 C    22.0     1.6     9.9    67.7    30.2
49.3   0.395   0.335 -99.000 -99.000 -99.000     8.0     8.0 -9999.0 -9999.0 -9999.0
23907 20150107  2.423  -98.08   30.62    10.9    -3.4     3.8     4.5     0.0    12.68 C    12.4    -2.1     5.5    82.7    36.5
55.7   0.387   0.328 -99.000 -99.000 -99.000     7.6     8.3 -9999.0 -9999.0 -9999.0
23907 20150108  2.423  -98.08   30.62     0.6    -7.9    -3.6    -3.3     0.0     4.98 C     3.9    -4.8    -0.5    57.7    37.6
48.1   0.372   0.316 -99.000 -99.000 -99.000     4.7     6.1 -9999.0 -9999.0 -9999.0
23907 20150109  2.423  -98.08   30.62     2.0     0.1     1.0     0.8     0.0     2.52 C     4.1     1.2     2.5    87.8    48.9
64.4   0.368   0.312 -99.000 -99.000 -99.000     5.4     6.2 -9999.0 -9999.0 -9999.0
23907 20150110  2.423  -98.08   30.62     0.5    -2.0    -0.8    -0.6     3.9     2.11 C     2.5    -0.1     1.4    99.9    47.7
85.8   0.373   0.314 -99.000 -99.000 -99.000     5.1     6.0 -9999.0 -9999.0 -9999.0
23907 20150111  2.423  -98.08   30.62    10.9     0.0     5.4     4.4     2.6     6.38 C    12.7     1.3     5.8   100.0    77.8
97.1   0.420   0.362 -99.000 -99.000 -99.000     6.5     6.7 -9999.0 -9999.0 -9999.0
23907 20150112  2.423  -98.08   30.62     6.5     1.4     4.0     4.3     0.0     1.55 C     6.9     2.7     5.1   100.0    89.4
97.8   0.412   0.350 -99.000 -99.000 -99.000     7.3     7.5 -9999.0 -9999.0 -9999.0
23907 20150113  2.423  -98.08   30.62     3.0    -0.7     1.1     1.2     0.0     3.26 C     5.6     0.7     2.9    99.7    80.7
90.7   0.401   0.337 -99.000 -99.000 -99.000     6.1     6.8 -9999.0 -9999.0 -9999.0
23907 20150114  2.423  -98.08   30.62     2.9     0.9     1.9     1.8     0.7     1.88 C     4.7     2.0     3.1    99.6    90.8
97.9   0.395   0.331 -99.000 -99.000 -99.000     6.1     6.7 -9999.0 -9999.0 -9999.0
23907 20150115  2.423  -98.08   30.62    13.2     1.2     7.2     6.4     0.0    13.37 C    16.4     1.4     6.7    98.9    46.7
73.4   0.395   0.333 -99.000 -99.000 -99.000     6.7     7.0 -9999.0 -9999.0 -9999.0
23907 20150116  2.423  -98.08   30.62    16.7     3.5    10.1     9.9     0.0    13.68 C    19.2     1.3     8.7    80.2    38.1
58.2   0.391   0.330 -99.000 -99.000 -99.000     7.3     7.4 -9999.0 -9999.0 -9999.0
23907 20150117  2.423  -98.08   30.62    19.5     5.0    12.2    12.3     0.0    10.96 C    20.9     3.3    10.6    87.7    30.4
55.7   0.388   0.327 -99.000 -99.000 -99.000     8.7     8.4 -9999.0 -9999.0 -9999.0
23907 20150118  2.423  -98.08   30.62    20.9     7.6    14.3    13.7     0.0    15.03 C    23.4     3.5    11.9    45.9    14.6
31.4   0.383   0.325 -99.000 -99.000 -99.000     9.5     9.2 -9999.0 -9999.0 -9999.0
```

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)

Download the dataset (weather data) 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)
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 5: Make Python Files Executable:

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

777 mapper.py reducer.py

Step 6: 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"

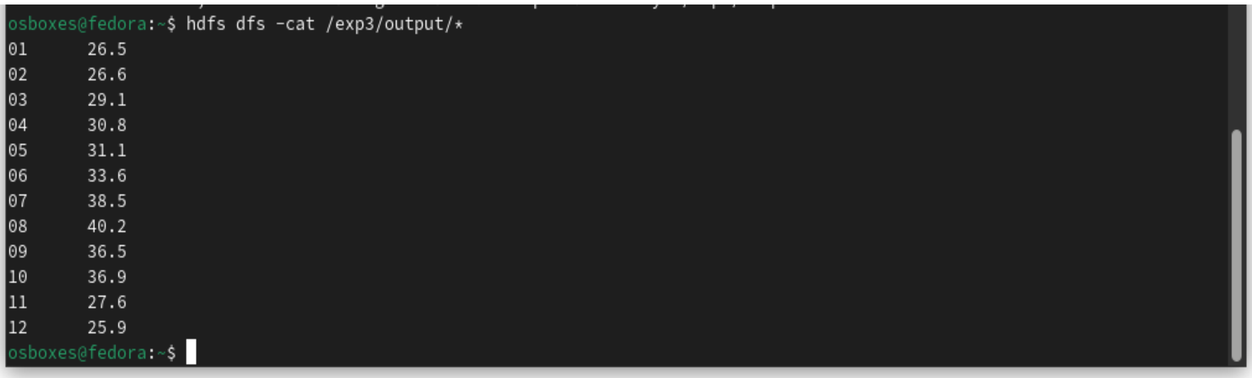
hdfs dfs -text /weatherdata/output/* > /home/sx/Downloads/outputfile.txt

Step 7: 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



```
osboxes@fedora:~$ hdfs dfs -cat /exp3/output/*
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
osboxes@fedora:~$
```

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.