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EXP 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:

Open *sample_weather.txt ~/Downloads Save

```
1 S690190 13910  20060201_0  51.75     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
2 690190 13910  20060201_1  54.74     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
3 690190 13910  20060201_2  50.59     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
4 690190 13910  20060201_3  51.67     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
5 690190 13910  20060201_4  65.67     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
6 690190 13910  20060201_5  55.37     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
7 690190 13910  20060201_6  49.26     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
8 690190 13910  20060201_7  55.44     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
9 690190 13910  20060201_8  64.05     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
10 690190 13910  20060201_9  68.77     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
11 690190 13910  20060201_10  48.93     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
12 690190 13910  20060201_11  65.37     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
13 690190 13910  20060201_12  69.45     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
14 690190 13910  20060201_13  52.91     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
15 690190 13910  20060201_14  53.69     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
16 690190 13910  20060201_15  53.30     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
17 690190 13910  20060201_16  66.17     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
18 690190 13910  20060201_17  53.83     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
19 690190 13910  20060201_18  50.54     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
20 690190 13910  20060201_19  50.27     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
21 690190 13910  20060201_20  59.08     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
22 690190 13910  20060201_21  53.05     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
23 690190 13910  20060201_22  57.97     33.0 24  1006.3 24   943.9 24   15.0 24   10.7 24   22.0
  28.9    0.00I 999.9  000000
```

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))
```

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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 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:

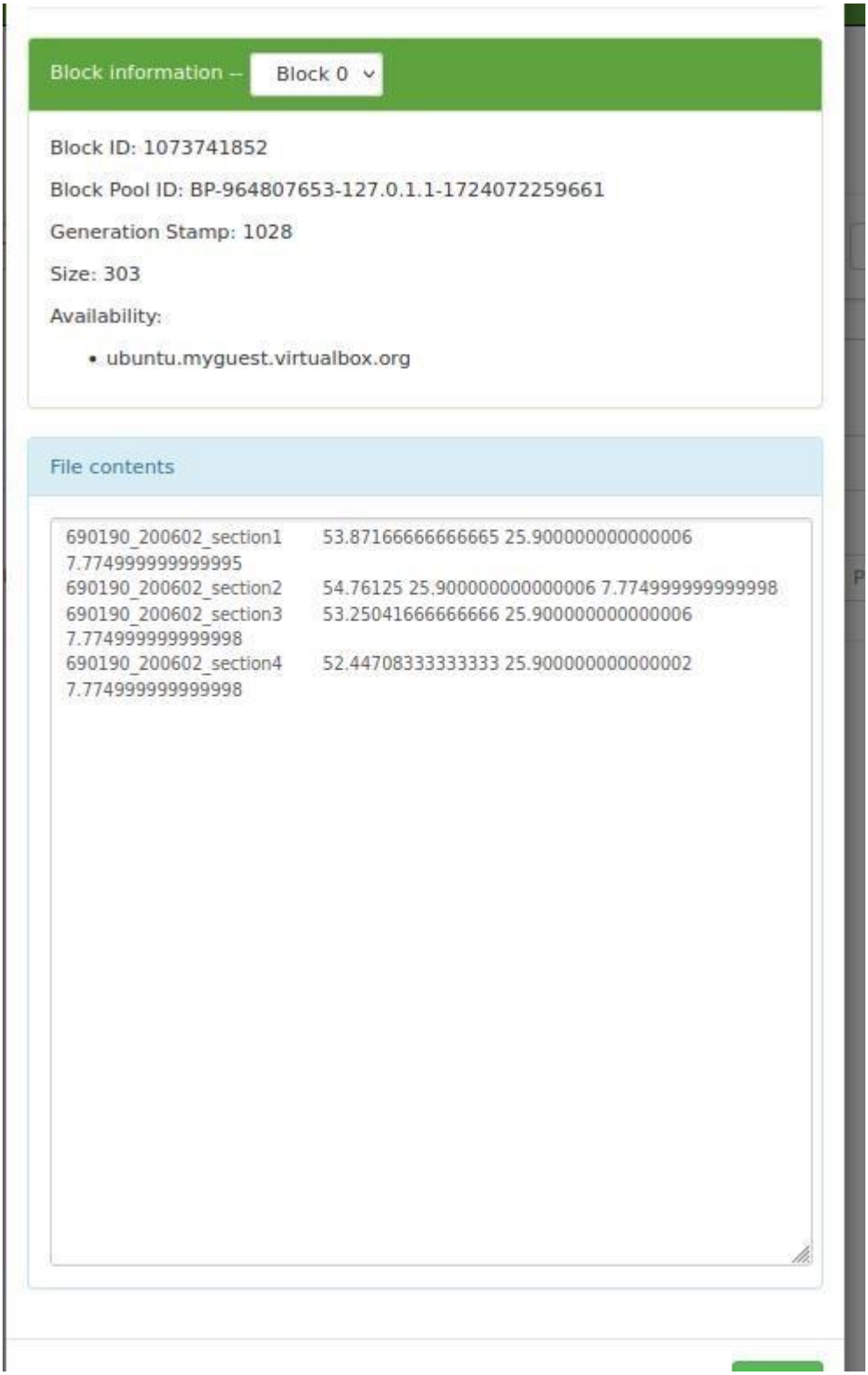
Download the latest hadoop-streaming jar file and place it in a location you can easily access.

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.



Result:

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