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

AIM:

To implement MapReduce program to process a weather dataset.

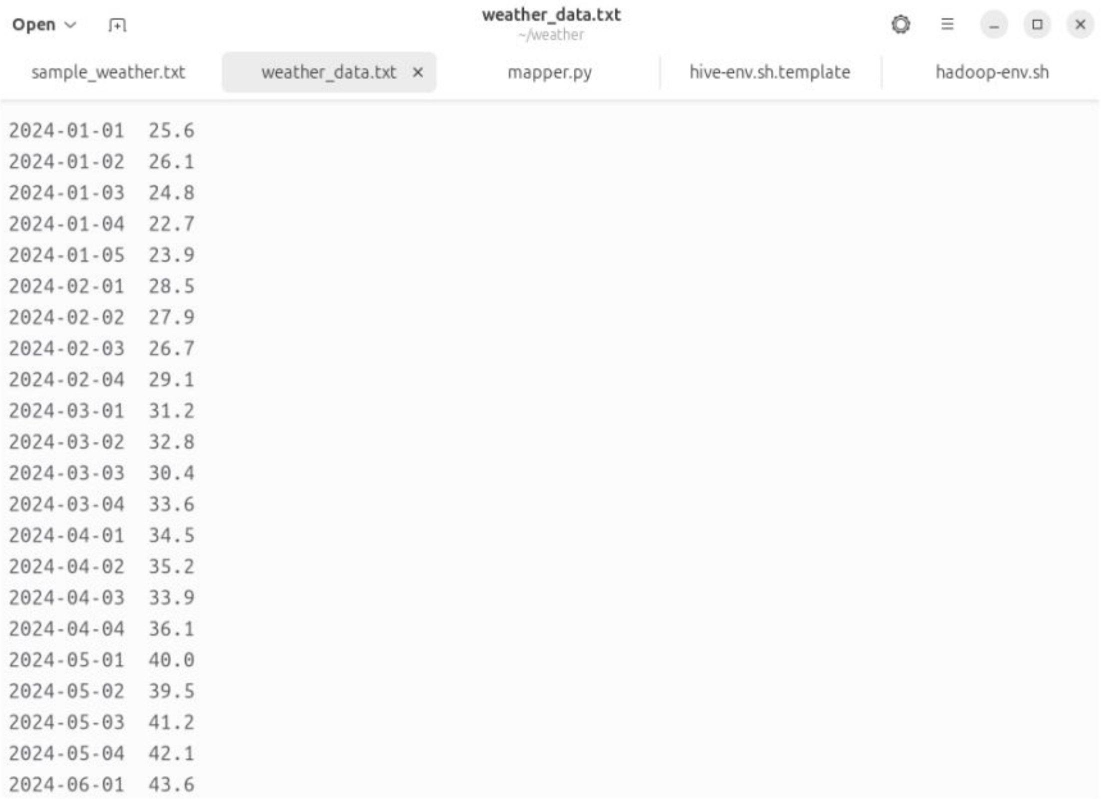
Procedure:

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:



```
2024-01-01  25.6
2024-01-02  26.1
2024-01-03  24.8
2024-01-04  22.7
2024-01-05  23.9
2024-02-01  28.5
2024-02-02  27.9
2024-02-03  26.7
2024-02-04  29.1
2024-03-01  31.2
2024-03-02  32.8
2024-03-03  30.4
2024-03-04  33.6
2024-04-01  34.5
2024-04-02  35.2
2024-04-03  33.9
2024-04-04  36.1
2024-05-01  40.0
2024-05-02  39.5
2024-05-03  41.2
2024-05-04  42.1
2024-06-01  43.6
```

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)
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:

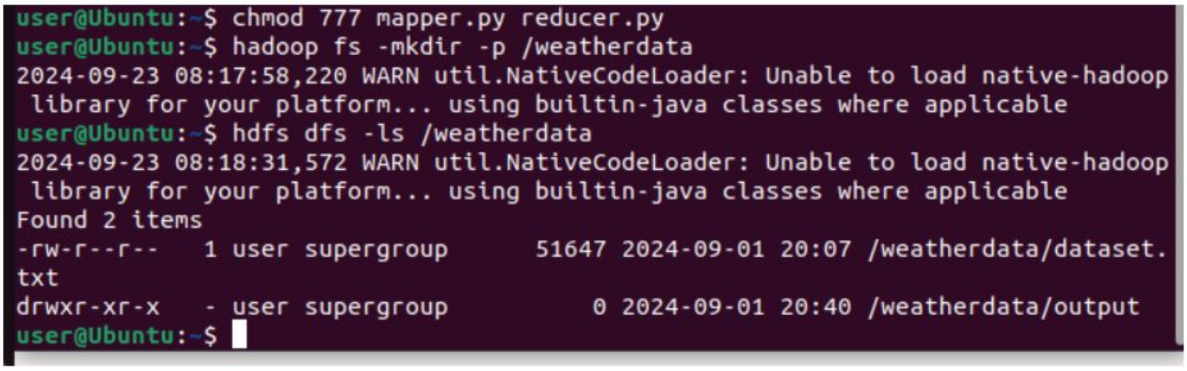
Start the Hadoop daemons and create a directory in HDFS to store your data.

```
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
```



```
user@Ubuntu:~$ chmod 777 mapper.py reducer.py
user@Ubuntu:~$ hadoop fs -mkdir -p /weatherdata
2024-09-23 08:17:58,220 WARN util.NativeCodeLoader: Unable to load native-hadoop
 library for your platform... using builtin-java classes where applicable
user@Ubuntu:~$ hdfs dfs -ls /weatherdata
2024-09-23 08:18:31,572 WARN util.NativeCodeLoader: Unable to load native-hadoop
 library for your platform... using builtin-java classes where applicable
Found 2 items
-rw-r--r--   1 user supergroup      51647 2024-09-01 20:07 /weatherdata/dataset.
txt
drwxr-xr-x   - user supergroup          0 2024-09-01 20:40 /weatherdata/output
user@Ubuntu:~$ 
```

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.

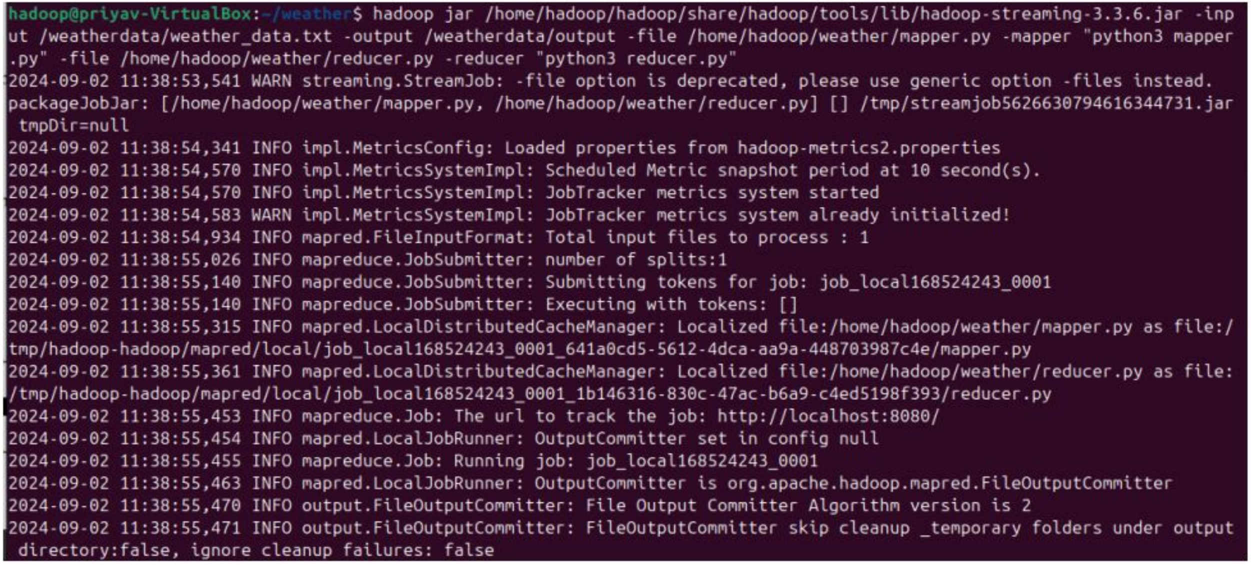
Then run the program using Hadoop Streaming.

```
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
```

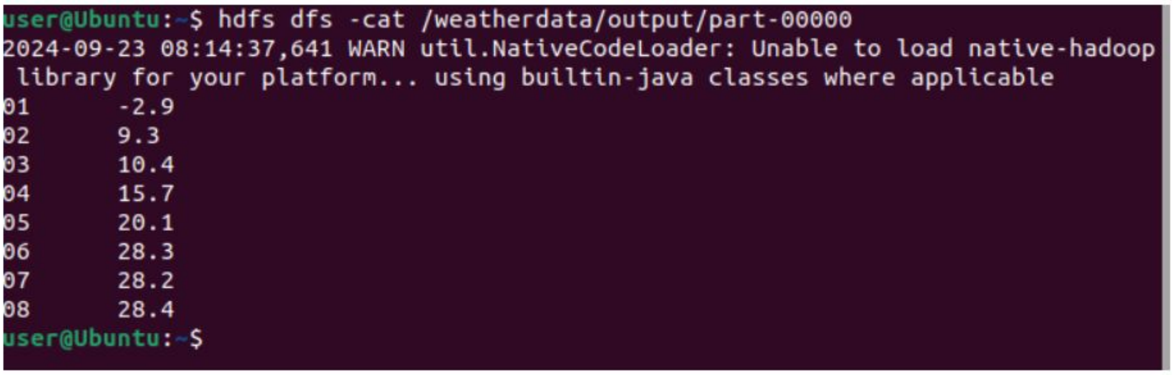


```
hadoop@priyav-VirtualBox:~/weather$ hadoop jar /home/hadoop/hadoop/share/hadoop/tools/lib/hadoop-streaming-3.3.6.jar -inp
ut /weatherdata/weather_data.txt -output /weatherdata/output -file /home/hadoop/weather/mapper.py -mapper "python3 mapper
.py" -file /home/hadoop/weather/reducer.py -reducer "python3 reducer.py"
2024-09-02 11:38:53,541 WARN streaming.StreamJob: -file option is deprecated, please use generic option -files instead.
packageJobJar: [/home/hadoop/weather/mapper.py, /home/hadoop/weather/reducer.py] [] /tmp/streamjob5626630794616344731.jar
 tmpDir=null
2024-09-02 11:38:54,341 INFO impl.MetricsConfig: Loaded properties from hadoop-metrics2.properties
2024-09-02 11:38:54,570 INFO impl.MetricsSystemImpl: Scheduled Metric snapshot period at 10 second(s).
2024-09-02 11:38:54,570 INFO impl.MetricsSystemImpl: JobTracker metrics system started
2024-09-02 11:38:54,583 WARN impl.MetricsSystemImpl: JobTracker metrics system already initialized!
2024-09-02 11:38:54,934 INFO mapred.FileInputFormat: Total input files to process : 1
2024-09-02 11:38:55,026 INFO mapreduce.JobSubmitter: number of splits:1
2024-09-02 11:38:55,140 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_local168524243_0001
2024-09-02 11:38:55,140 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-09-02 11:38:55,315 INFO mapred.LocalDistributedCacheManager: Localized file:/home/hadoop/weather/mapper.py as file:/
tmp/hadoop-hadoop/mapred/local/job_local168524243_0001_641a0cd5-5612-4dca-aa9a-448703987c4e/mapper.py
2024-09-02 11:38:55,361 INFO mapred.LocalDistributedCacheManager: Localized file:/home/hadoop/weather/reducer.py as file:
/tmp/hadoop-hadoop/mapred/local/job_local168524243_0001_1b146316-830c-47ac-b6a9-c4ed5198f393/reducer.py
2024-09-02 11:38:55,453 INFO mapreduce.Job: The url to track the job: http://localhost:8080/
2024-09-02 11:38:55,454 INFO mapred.LocalJobRunner: OutputCommitter set in config null
2024-09-02 11:38:55,455 INFO mapreduce.Job: Running job: job_local168524243_0001
2024-09-02 11:38:55,463 INFO mapred.LocalJobRunner: OutputCommitter is org.apache.hadoop.mapred.FileOutputCommitter
2024-09-02 11:38:55,470 INFO output.FileOutputCommitter: File Output Committer Algorithm version is 2
2024-09-02 11:38:55,471 INFO output.FileOutputCommitter: FileOutputCommitter skip cleanup _temporary folders under output
 directory:false, ignore cleanup failures: false
```

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
```



```
user@Ubuntu:~$ hdfs dfs -cat /weatherdata/output/part-00000
2024-09-23 08:14:37,641 WARN util.NativeCodeLoader: Unable to load native-hadoop
 library for your platform... using builtin-java classes where applicable
01      -2.9
02      9.3
03      10.4
04      15.7
05      20.1
06      28.3
07      28.2
08      28.4
user@Ubuntu:~$
```

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.