

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:**

```
weather_data.txt
~/weather

sample_weather.txt  weather_data.txt x  mapper.py  hive-env.sh.template  hadoop-env.sh

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,daily_max_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 process 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
```

```
nandha@ubuntu1 -VirtualBox:~/weather$ chmod 777 mapper.py reducer.py
nandha@ubuntu1 -VirtualBox:~/weather$ hadoop fs -mkdir -p /weatherdata
hadoop fs -copyFromLocal /home/hadoop/weather/weather_data.txt /weatherdata

nandha@ubuntu1 -VirtualBox:~/weather$ hdfs dfs -ls /weatherdata
Found 1 items
-rw-r--r-- 3 hadoop supergroup 425 2024-09-02 11:13 /weatherdata/weather_data.txt
```

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
```

```
nandha@ubuntu1-VirtualBox:~/weather$ hadoop jar /home/hadoop/hadoop/share/hadoop/tools/lib/hadoop-streaming-3.3.6.jar -input /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

```
nandha@ubuntu1-VirtualBox:~/weather$ hadoop fs -ls /weatherdata/output
Found 2 items
-rw-r--r-- 3 hadoop supergroup 0 2024-09-02 11:38 /weatherdata/output/_SUCCESS
-rw-r--r-- 3 hadoop supergroup 48 2024-09-02 11:38 /weatherdata/output/part-00000
nandha@ubuntu1-VirtualBox:~/weather$ hadoop fs -cat /weatherdata/output/part-00000
01      26.1
02      29.1
03      33.6
04      36.1
05      42.1
06      44.0
nandha@ubuntu1-VirtualBox:~/weather$
```

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.