


**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 = words[10]
    daily_max = words[38]
    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 = 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
```

```

swathi@swathi-VirtualBox:~/da2$ hadoop jar SHADOOP_STREAMING -input /weatherdata/weather_data.txt -output /user/swathi/outputte -map
per ~/da2/mapper.py -reducer ~/da2/reducer.py
packageJobJar: [/tmp/hadoop-unjar8997754304788571910/] [] /tmp/streamjob523954984575776188.jar tmpDir=null
2024-09-19 18:25:55,425 INFO client.DefaultNoHARMFalloverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-09-19 18:25:55,649 INFO client.DefaultNoHARMFalloverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-09-19 18:25:56,096 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/swathi/.stag
ing/job_1726748824473_0007
Rhythmbox 18:25:56,492 INFO mapred.FileInputFormat: Total input files to process : 1
2024-09-19 18:25:56,998 INFO mapreduce.JobSubmitter: number of splits:2
2024-09-19 18:25:57,191 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1726748824473_0007
2024-09-19 18:25:57,191 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-09-19 18:25:57,442 INFO conf.Configuration: resource-types.xml not found
2024-09-19 18:25:57,443 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-09-19 18:25:57,576 INFO impl.YarnClientImpl: Submitted application application_1726748824473_0007
2024-09-19 18:25:57,654 INFO mapreduce.Job: The url to track the job: http://swathi-VirtualBox:8088/proxy/application_1726748824473_
0007/
2024-09-19 18:25:57,663 INFO mapreduce.Job: Running job: job_1726748824473_0007
2024-09-19 18:26:05,883 INFO mapreduce.Job: Job job_1726748824473_0007 running in uber mode : false
2024-09-19 18:26:05,885 INFO mapreduce.Job: map 0% reduce 0%
2024-09-19 18:26:15,099 INFO mapreduce.Job: map 100% reduce 0%
2024-09-19 18:26:21,160 INFO mapreduce.Job: map 100% reduce 100%
2024-09-19 18:26:22,178 INFO mapreduce.Job: Job job_1726748824473_0007 completed successfully
2024-09-19 18:26:22,336 INFO mapreduce.Job: Counters: 54
File System Counters
  FILE: Number of bytes read=56
  FILE: Number of bytes written=934326
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=309
  HDFS: Number of bytes written=8
  HDFS: Number of read operations=11
  HDFS: Number of large read operations=0
  HDFS: Number of write operations=2
  HDFS: Number of bytes read erasure-coded=0

```

### 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
```

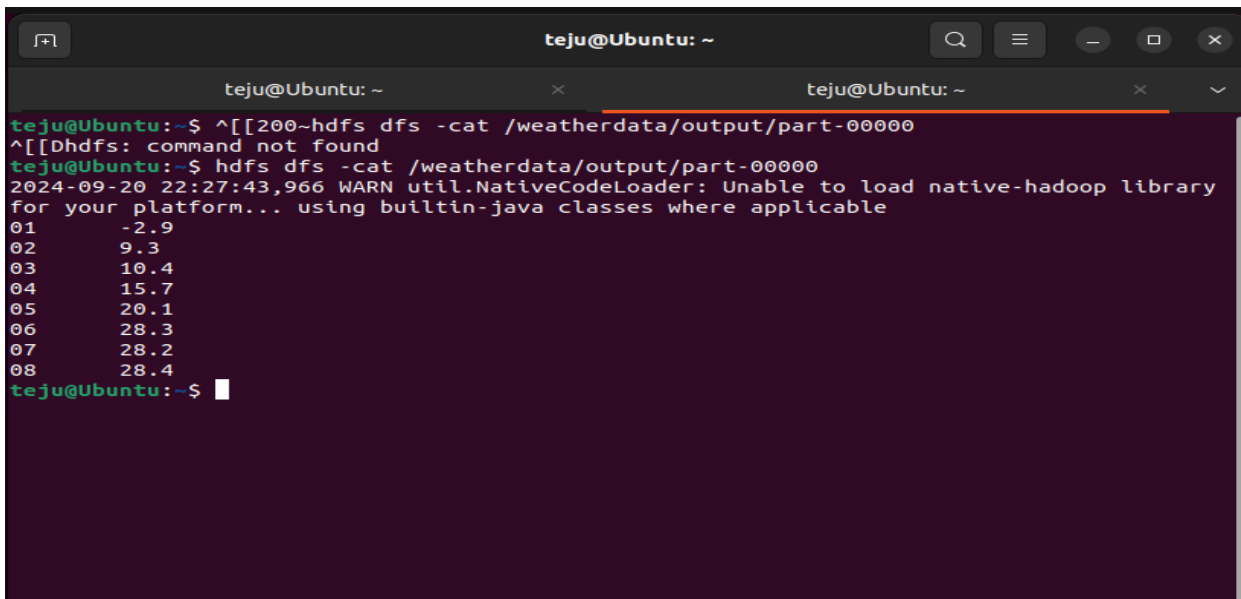
```
hdfs dfs -ls /weatherdata
```

```

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:**


```

teju@Ubuntu: ~
teju@Ubuntu: ~
teju@Ubuntu:~$ ^[[200~hdfs dfs -cat /weatherdata/output/part-00000
^[[Dhdfs: command not found
teju@Ubuntu:~$ hdfs dfs -cat /weatherdata/output/part-00000
2024-09-20 22:27:43,966 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
teju@Ubuntu:~$ █

```

Check the output of the program in the specified HDFS output directory. `hdfs dfs -text`

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

<input type="checkbox"/>	Permission	Owner	Group	Size	Last Modified	Replication	Block Size	Name	
<input type="checkbox"/>	-rw-r--r--	swathi	supergroup	0 B	Sep 19 18:26	1	128 MB	<a href="#">_SUCCESS</a>	
<input type="checkbox"/>	-rw-r--r--	swathi	supergroup	8 B	Sep 19 18:26	1	128 MB	<a href="#">part-00000</a>	

Showing 1 to 2 of 2 entries

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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.

