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IMPLEMENT THE MAX TEMPERATURE MAPREDUCE PROGRAM TO
IDENTIFY THE YEAR WISE MAXIMUM TEMPERATURE FROM SENSOR

AIM:

To implement the max temperature Mapreduce program to identify the year wise maximum temperature from sensor.

PROCEDURE:

Step 1: Create Data File:

Create a file named "sample_weather.txt" and populate it with text data that you wish to analyse.

```
690190 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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
```

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.

mapper.py:

```
#!/usr/bin/python
3 import sys def
map1():
    for line in sys.stdin: tokens =
        line.strip().split()            if len(tokens)
        < 13: continue
        station = tokens[0] if
        "STN" in station:
        continue
        date_hour = tokens[2] temp = tokens[3] dew = tokens[4] wind =
        tokens[12] if temp == "9999.9" or dew == "9999.9" or wind ==
```

```
        "999.9":        continue              hour        =
        int(date_hour.split("_")[-1])        date        =
        date_hour[:date_hour.rfind("_")-2]  if  4  <
        hour <= 10: section = "section1"
        elif 10 < hour <= 16:
            section = "section2"
        elif 16 < hour <= 22:
            section = "section3"
        else:
            section = "section4"
        key_out = f"{station}_{date}_{section}"
        value_out  =  f"{temp}  {dew}  {wind}"
        print(f"{key_out}\t{value_out}")
if __name__ == "__main__":
    map1()
```

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.

reducer.py:

```
#!/usr/bin/python
3 import sys def reduce1():
    current_key = None  sum_temp, sum_dew,
    sum_wind = 0, 0, 0  count = 0 for line in
    sys.stdin: key, value = line.strip().split("\t")
          temp,   dew,     wind    = map(float,
    value.split()) if current_key is None:
    current_key = key   if key
        ==            current_key:
        sum_temp    +=    temp
        sum_dew     +=     dew
        sum_wind    +=    wind
        count += 1  else:
            avg_temp = sum_temp / count avg_dew = sum_dew / count
            avg_wind = sum_wind / count
            print(f"{current_key}\t{avg_temp} {avg_dew} {avg_wind}")

            current_key = key  sum_temp, sum_dew, sum_wind = temp,
            dew, wind count =
            1
    if current_key is not None: avg_temp
        = sum_temp / count avg_dew =
        sum_dew / count avg_wind =
        sum_wind / count
        print(f"{current_key}\t{avg_temp} {avg_dew} {avg_wind}")
if __name__ == "__main__":
    reduce1()
```

Step 4: Prepare Hadoop Environment:

Start the Hadoop daemons and create a directory in HDFS to store your data. Run the following commands to store the data in the WeatherData Directory.

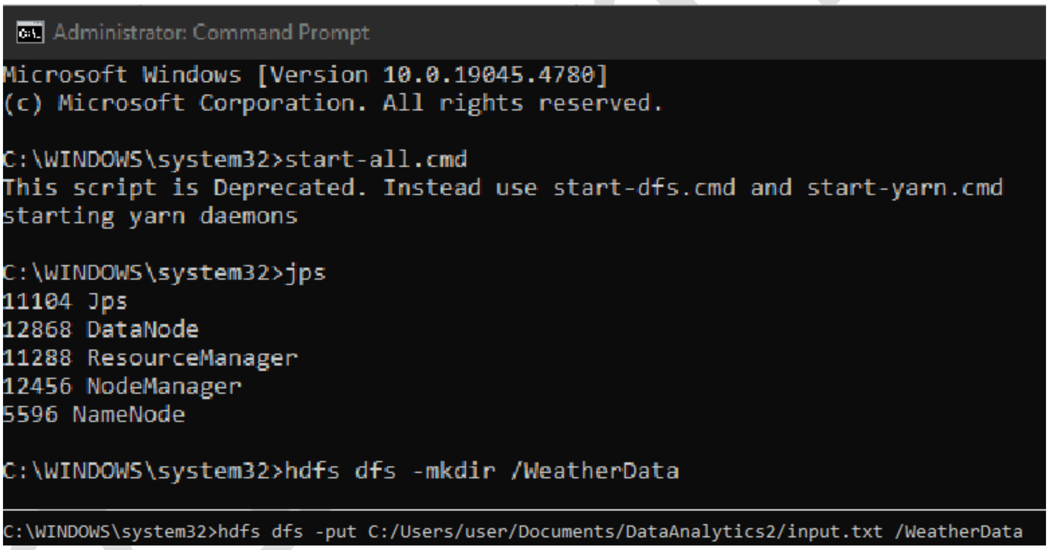
start-all.cmd cd C:/Hadoop/sbin hdfs dfs -mkdir /WeatherData hdfs dfs -put C:/Users/user/Documents/DataAnalytics2/input.txt /WeatherData hadoop jar C:\hadoop\share\hadoop\tools\lib\hadoop-streaming-3.3.6.jar ^
-input /user/input/sample_weather.txt ^
-output /user/output ^
-mapper "python C:/ Users/user/Documents/DataAnalytics2/mapper.py" ^ -reducer "python C:/ Users/user/Documents/DataAnalytics2/reducer.py"

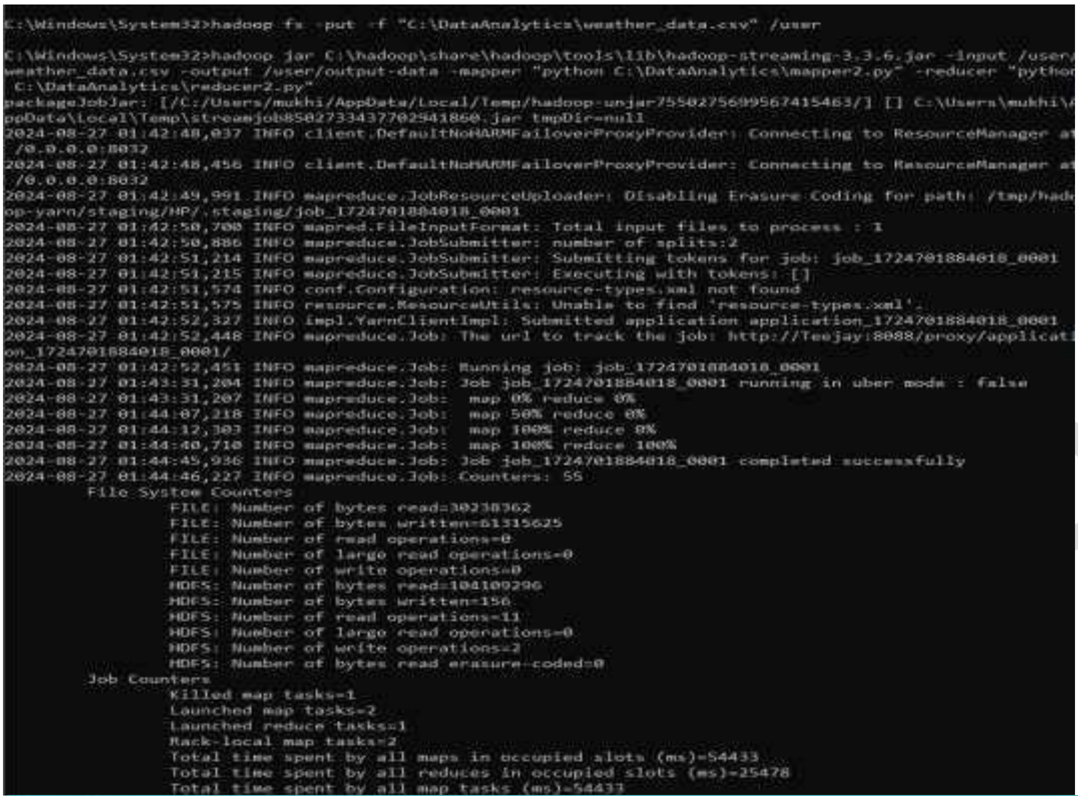
Step 5: Check Output:

Check the output of the Word Count program in the specified HDFS output directory.

hdfs dfs -cat /WeatherData/output/part-00000

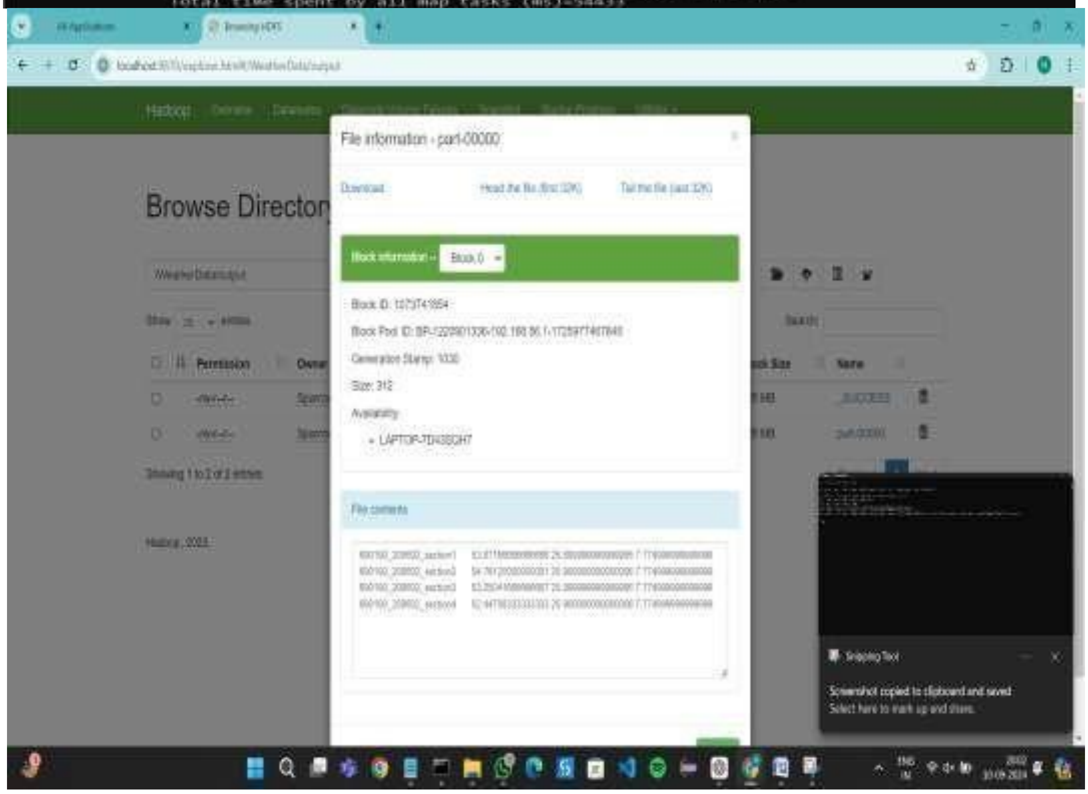
OUTPUT:





```
C:\Windows\System32>hadoop fs -put -f "C:\DataAnalytics\weather_data.csv" /user

C:\Windows\System32>hadoop jar C:\hadoop\share\hadoop\tools\lib\hadoop-streaming-3.3.6.jar -input /user/
weather_data.csv -output /user/output-data -mapper "python C:\DataAnalytics\mapper2.py" -reducer "python
 C:\DataAnalytics\reducer2.py"
packageJobJar: [/C:/Users/mukhi/AppData/Local/Temp/hadoop-unjar7550275699567415463/] [] C:\Users\mukhi\A
ppData\Local\Temp\streamjob8502733437702941860.jar tmpDir=null
2024-08-27 01:42:48,037 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at
 /0.0.0.0:8032
2024-08-27 01:42:48,456 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at
 /0.0.0.0:8032
2024-08-27 01:42:49,991 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hado
op-yarn/staging/HP/.staging/job_1724701884018_0001
2024-08-27 01:42:50,700 INFO mapred.FileInputFormat: Total input files to process : 1
2024-08-27 01:42:50,886 INFO mapreduce.JobSubmitter: number of splits:2
2024-08-27 01:42:51,214 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1724701884018_0001
2024-08-27 01:42:51,215 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-08-27 01:42:51,574 INFO conf.Configuration: resource-types.xml not found
2024-08-27 01:42:51,575 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-08-27 01:42:52,327 INFO impl.YarnClientImpl: Submitted application application_1724701884018_0001
2024-08-27 01:42:52,448 INFO mapreduce.Job: The url to track the job: http://Teejay:8088/proxy/applicati
on_1724701884018_0001/
2024-08-27 01:42:52,451 INFO mapreduce.Job: Running job: job_1724701884018_0001
2024-08-27 01:43:31,204 INFO mapreduce.Job: Job job_1724701884018_0001 running in uber mode : false
2024-08-27 01:43:31,207 INFO mapreduce.Job:  map 0% reduce 0%
2024-08-27 01:44:07,218 INFO mapreduce.Job:  map 50% reduce 0%
2024-08-27 01:44:12,303 INFO mapreduce.Job:  map 100% reduce 0%
2024-08-27 01:44:40,710 INFO mapreduce.Job:  map 100% reduce 100%
2024-08-27 01:44:45,936 INFO mapreduce.Job: Job job_1724701884018_0001 completed successfully
2024-08-27 01:44:46,227 INFO mapreduce.Job: Counters: 55
        File System Counters
                FILE: Number of bytes read=30238362
                FILE: Number of bytes written=61315625
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=104109296
                HDFS: Number of bytes written=156
                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
        Job Counters
                Killed map tasks=1
                Launched map tasks=2
                Launched reduce tasks=1
                Rack-local map tasks=2
                Total time spent by all maps in occupied slots (ms)=54433
                Total time spent by all reduces in occupied slots (ms)=25478
                Total time spent by all map tasks (ms)=54433
```



RESULT:

Thus, the Mapreduce program to identify the year wise maximum temperature from sensor has been executed successfully.