# IMPLEMENT THE MAPREDUCE PROGRAM TO PERFORM PROCESSING ON TEMPERATURE DATA COLLECTED FROM SENSORS

## AIM:

To implement a Map Reduce program to perform processing on the temperature data collected from sensors

## **PROCEDURE:**

Open command prompt and run as administrator

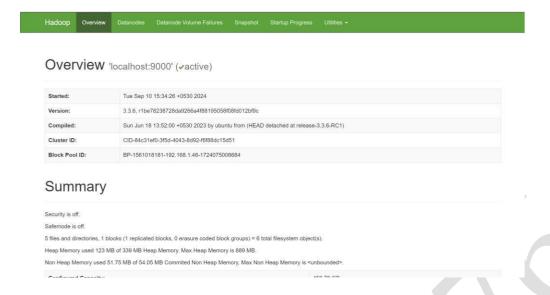
Start Hadoop services by typing in the following commands:

- start-dfs.cmd
- start-yarn.cmd

```
:\Windows\System32>jps
14212 Jps
:\Windows\System32>start-dfs.cmd
:\Windows\System32>jps
12000 DataNode
16488 Jps
24904 NameNode
C:\Windows\System32>start-yarn.cmd
starting yarn daemons
C:\Windows\System32>jps
12000 DataNode
6384 NodeManager
31300 Jps
24904 NameNode
29036 ResourceManager
C:\Windows\System32>
```

Open the browser and go to the URL localhost:9870

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Create a directory in HDFS using the command:

hdfs dfs -mkdir -p /weather/hadoop/input

C:\hadoop-3.3.6\sbin>hdfs dfs -mkdir -p /weather/hadoop/input
C:\hadoop-3.3.6\sbin>\_

## **Browse Directory**



Copy the input file to HDFS using the command:

 $hdfs \quad dfs \quad -put \quad C:/Semester 7/Data Analytics/Lab/Ex3/sample\_weather.txt/weather/hadoop/input$ 

C:\hadoop-3.3.6\sbin>hdfs dfs -put C:/Semester7/DataAnalytics/Lab/Ex3/sample\_weather.txt /weather/hadoop/input

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Display the contents of the file using this command:

hdfs dfs -cat /weather/hadoop/input/sample\_weather.txt

```
C:\hadoop-3.3.6\sbin>hdfs dfs -cat /weather/hadoop/input/sample_weather.txt
690190 13910 20060201_0 51.75 33.0 24 1006.3 24
24 10.7 24 22.0 28.9 0.00I 999.9 000000
                                                                          943.9 24 15.0
690190 13910 20060201_1 54.74 33.0 24 1006
24 10.7 24 22.0 28.9 0.00I 999.9 000000
                                              33.0 24 1006.3 24
                                                                          943.9 24
690190 13910 20060201_2 50.59 33.0 24 1006
24 10.7 24 22.0 28.9 0.00I 999.9 000000
690190 13910 20060201_3 51.67 33.0 24 1006
                                               33.0 24 1006.3 24
                                                                           943.9 24
                                               33.0 24 1006.3 24 943.9 24
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
                  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
590190 13910   20060201_6   49.26         33.0   24     1006.3   24
                                                                          943.9 24
                   22.0 28.9
                                      0.001 999.9 000000
590190 13910 20060201_7 55.44 33.0 24 1006
24 10.7 24 22.0 28.9 0.00I 999.9 000000
                                              33.0 24 1006.3 24 943.9 24
690190 13910 20060201_8 64.05
                                              33.0 24 1006.3 24 943.9 24 15.0
```

Create mapper.py and reducer.py files

### mapper.py

```
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:</pre>
            section = "section1"
        elif 10 < hour <= 16:
            section = "section2"
        elif 16 < hour <= 22:</pre>
            section = "section3"
        else:
            section = "section4"
        key_out = f"{station}_{date}_{section}"
        value_out = f"{temp} {dew} {wind}"
        print(f"{key out}\t{value out}")
          __ == "__main__":
if __name_
    map1()
```

## reducer.py

```
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}")
me__ == "__main__":
     name
    reduce1()
```

Run the Hadoop Streaming Job and give the file paths to the input, mapper and reducer using the following command:

 $hadoop \quad jar \quad \% HADOOP\_HOME\% \\ share \\ hadoop \\ tools \\ lib \\ hadoop - streaming \\ *.jar^{\land}$ 

- -mapper "python C:\Semester7\DataAnalytics\Lab\Ex3\mapper.py" -reducer "python C:\Semester7\DataAnalytics\Lab\Ex3\reducer.py"^
- -input/weather/hadoop/input/sample\_weather.txt -output /weather/hadoop/output

```
C:\hadoop-3.3.6\abin\hadoop jar %MADOOP_MOMEM\share\hadoop\tools\lib\hadoop-streaming-*.jar ^ -mapper "python C:\Semester?/DataAnalytics\Lab\Ex\S\rab{\text{mapper.py}^ ^ -reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rab{\text{mapper.py}^ ^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rab{\text{mapper.py}^ ^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rab{\text{mapper.py}^ ^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rab{\text{mapper.python}^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rap{\text{mapper.python}^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rap{\text{mapper.python}^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rap{\text{mapper.python}^ - reducer "python C:\Semester?/DataAnalytics\Lab\Ex\S\rap{\text{mapper.python}^ - reducer "python C:\Semester?^ - reducer "python C:\Se
```

```
Total megabyte-milliseconds taken by all reduce tasks=3352576

Map-Reduce Framework
Map input records=96
Map output records=96
Map output bytes=3672
Map output materialized bytes=3876
Input split bytes=26
Combine input records=9
Combine input records=96
Reduce input groups=4
Reduce input groups=4
Reduce input records=96
Reduce input records=96
Reduce input records=96
Reduce input records=95
Reduce output records=95
Reduce input records=95
Reduce Virtual memory (bytes)=59587328
Reduce Virtual memory (bytes)=492412928
Shuffle Errors
Reduce Virtual memory (bytes)=492412928
Shuffle Errors
Reduce Virtual memory (bytes)=492412928
Reduce Virtual memory (bytes)=492412928
Reduce Virtual memory (bytes)=69587328
Reduce Virtual memory (bytes)=70587328
Reduce Virtual memory (bytes)=70587328
Reduce Virtual memory (bytes)=70587328
Reduce Virtual memory
```

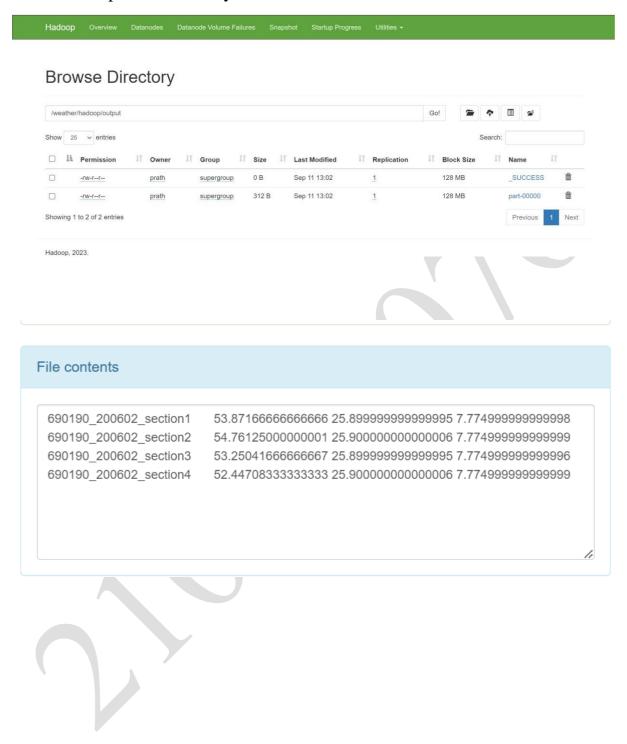
View the output using the command:

hdfs dfs -cat /weather/hadoop/output/part-00000

```
C:\hadoop-3.3.6\sbin>hdfs dfs -cat /weather/hadoop/output/part-00000
690190_200602_section1 53.87166666666666 25.89999999999995 7.77499999999998
690190_200602_section2 54.761250000000001 25.90000000000000 7.77499999999999
690190_200602_section3 53.25041666666667 25.8999999999999 7.77499999999999
690190_200602_section4 52.44708333333333 25.9000000000000000 7.77499999999999
```

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View the output on the file system in browser



### **RESULT:**

Thus, to implement the Map Reduce program to perform processing on the temperature data collected from sensors was completed successfully.