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:

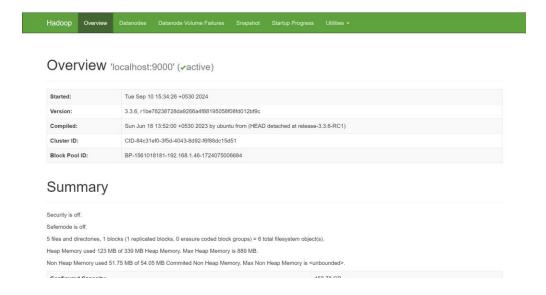
Open command prompt and run as administrator

Start Hadoop services by typing in the following commands:

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

```
C:\Windows\System32>jps
14212 Jps
C:\Windows\System32>start-dfs.cmd
C:\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
::\Windows\System32>
```

Open the browser and go to the URL localhost:9870

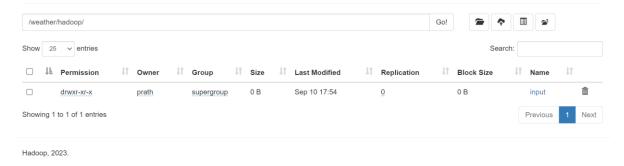


Create a directory in HDFS using the command:

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

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 24 943.9 24 15.0
               22.0 28.9 0.00I 999.9 000000
590190 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
 90190 13910 20060201_2 50.59 33.0 24 1006.3 24
                                                             943.9 24
                                                                         15.0
               22.0 28.9 0.00I 999.9 000000
24 10.7 24
690190 13910 20060201_3 51.67 33.0 24 1006.3 24 943.9 24 24 10.7 24 22.0 28.9 0.00I 999.9 000000
                                                                         15.0
                                      33.0 24 1006.3 24 943.9 24
 590190 13910 20060201_4 65.67
                                                                         15.0
               22.0 28.9 0.00I 999.9 000000
 590190 13910 20060201_5 55.37
                                       33.0 24 1006.3 24
                                                             943.9 24
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
                                                                         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
```

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:</pre>
            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}")
           == " 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
           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}")
           _ == "
                "__main__<mark>":</mark>
if __name__
    reduce1()
```

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

 $\label{libhadoop-streaming-stream} hadoop \ jar \ \% HADOOP_HOME\% \ hadoop \ lib \ hadoop-streaming-stream-$

- -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\sbin\hadoop jar W40000P_MOMEX/share/hadoop/tools/lib/hadoop-stramming+*,jar^-=mapper "python C:/Semester//DataAnalytics/Lab/Es3/mapper.py" ^ -reducer "pyt on C:/Semester/DataAnalytics/Lab/Es3/mapper.py" ^ -reducer "pyt on C:/Semester/DataAnalytics/Lab/Es3/mapper.pyt ^ -reducer "pyt on C:/Semester/Data
```

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

Map-Reduce Framework

Map input records=96

Map output records=96

Map output pytes=3872

Map output materialized bytes=3876

Input split bytes=226

Combine input records=9

Combine input records=9

Reduce input groups=4

Reduce input groups=4

Reduce input groups=4

Reduce input records=96

Reduce input records=4

Spilled Records=192

GC time elapsed (ms)=182

CPU time spent (ms)=451

Physical memory (bytes) snapshot=940191744

Virtual memory (bytes) snapshot=940191744

Virtual memory (bytes) snapshot=15798802624

Total committed heap usage (bytes)=877658112

Peak Map Physical memory (bytes)=559587328

Peak Reduce Physical memory (bytes)=559587328

Peak Reduce Virtual memory (bytes)=559587328

Peak Reduce Virtual memory (bytes)=274481152

Peak Reduce Virtual memory (bytes)=599587328

Peak Reduce Virtual memory (bytes)=692412928

Shuffle Errors

BAD JD=0

CONNCTION=0

IO_ERROR=0

MRONG_ENGTH=0

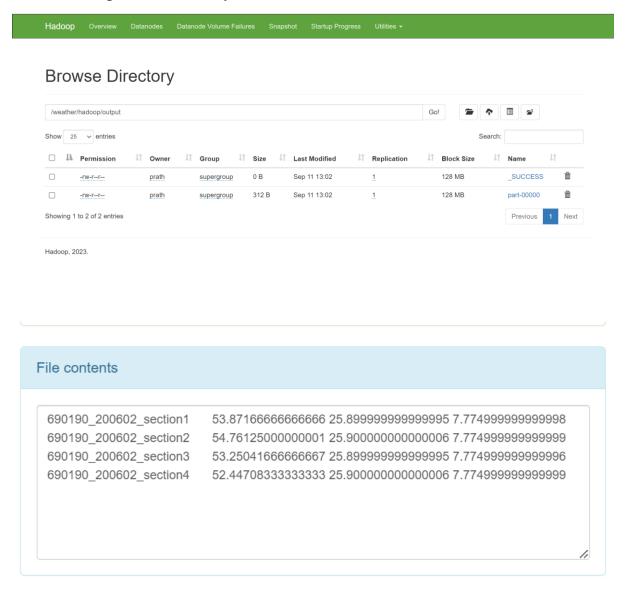
MRONG_ENGTH=0
```

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 25.89999999999999 7.77499999999998
690190_200602_section2 54.76125000000001 25.9000000000000 7.77499999999999
690190_200602_section3 53.25041666666667 25.8999999999999 7.77499999999999
690190_200602_section4 52.44708333333333 25.90000000000000 7.774999999999999
```

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.