Implement a MapReduce program to process a weather dataset

Steps:

1. Open command prompt and run as administrator

Go to hadoop sbin directory

```
C:\Windows\system32>cd C:\Hadoop\sbin
C:\Hadoop\sbin>_
```

Note:

- 1. Check hadoop/data/datanode and hadoop/data/namenode and if both folders are empty, type "hdfs namenode -format".
- 2. Check python version with "python --version".
- 3. Check "C:\Python39\" is added in Environment variables > System variables > Path, if not add your python path.
- 4. Check Environment variables > System variables > HADOOP_HOME is set as "C:\Hadoop".

```
C:\Hadoop\sbin>echo %HADOOP_HOME%
C:\Hadoop
C:\Hadoop\sbin>python --version
Python 3.11.4
```

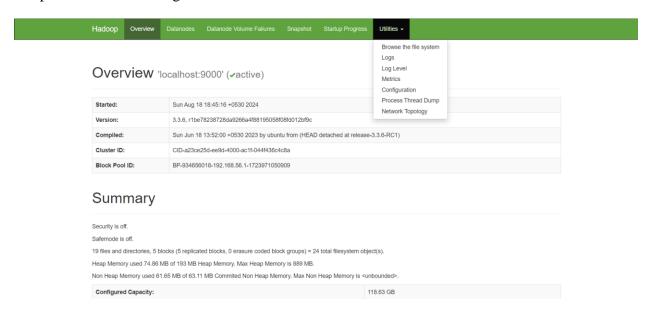
2. Start Hadoop Services

start-dfs.cmd

start-yarn.cmd

```
C:\Hadoop\sbin>start-dfs.cmd
C:\Hadoop\sbin>start-yarn.cmd
starting yarn daemons
C:\Hadoop\sbin>jps
13120 NameNode
2384 NodeManager
4100 DataNode
7956 ResourceManager
9124 Jps
```

3. Open the browser and go to the URL "localhost:9870"



4. Create a Directory in HDFS

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

```
C:\Hadoop\sbin>hdfs dfs -mkdir -p /weather/hadoop/input
C:\Hadoop\sbin>
```

5. Copy the Input File to HDFS

hdfs dfs -put C:/Users/Admin/mapreduce_weather/sample_weather.txt /weather/hadoop/input

```
:\Hadoop\sbin>hdfs dfs -put C:/Users/Admin/mapreduce_weather/sample_weather.txt /weather/hadoop/input
::\Hadoop\sbin>hdfs dfs -ls /weather/hadoop/input
ound 1 items
                                    12053 2024-08-18 18:52 /weather/hadoop/input/sample_weather.txt
            1 Admin supergroup
rw-r--r--
:\Hadoop\sbin>hdfs dfs -cat /weather/hadoop/input/sample weather.txt
                                   33.0 24 1006.3 24
                                                                                               28.9
                                                                                        22.0
                                                                                                       0.00I 999.9
590190 13910 20060201_0 51.75
                                                        943.9 24
                                                                   15.0 24
                                                                              10.7 24
                                                                                                                    000000
90190 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
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90190 13910
             20060201_2
                         50.59
                                   33.0 24
                                            1006.3 24
                                                        943.9 24
                                                                              10.7 24
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                         51.67
                                                        943.9 24
590190 13910
             20060201_3
                                   33.0 24
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                                                                                        22.0
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                                                                                                                    000000
                                                         943.9 24
90190 13910
             20060201_4
                         65.67
                                    33.0 24
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             20060201 5
                                                         943.9 24
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590190 13910
                         55.37
                                    33.0 24
                                            1006.3 24
                                                                    15.0 24
                                                                                        22.0
                                                                                                                    000000
                                                                                               28.9
90190 13910
             20060201_6 49.26
                                    33.0 24
                                            1006.3 24
                                                        943.9 24
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                                                                              10.7 24
                                                                                        22.0
                                                                                               28.9
                                                                                                       0.00I 999.9
                                                                                                                    000000
90190 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
                                                         943.9 24
                                                                              10.7 24
                                                                    15.0 24
                                                                                        22.0
690190 13910
             20060201 8 64.05
                                    33.0 24
                                            1006.3 24
                                                                                               28.9
                                                                                                       0.00T 999.9
                                                                                                                    999999
90190 13910
             20060201 9 68.77
                                    33.0 24
                                            1006.3 24
                                                        943.9 24
                                                                    15.0 24
                                                                              10.7 24
                                                                                                       0.00I 999.9
```

Note: mapper.py: #! /usr/bin/env python 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()
reducer.py:
#! /usr/bin/env python
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()
```

6. Run the Hadoop Streaming Job

hadoop jar %HADOOP_HOME%\share\hadoop\tools\lib\hadoop-streaming-*.jar ^

-mapper "python C:\\Users\\Admin\\mapreduce_weather\\mapper.py" -reducer "python C:\\Users\\Admin\\mapreduce_weather\\reducer.py" ^

-input /weather/hadoop/input/sample_weather.txt -output /weather/hadoop/output

```
C:\Hadoop\sbin>hadoop jar %HADOOP_HOME%\share\hadoop\tools\lib\hadoop-streaming-*.jar ^
More? -mapper "python C:\\Users\\Admin\\mapreduce_weather\\mapper.py" -reducer "python C:\\Users\\Admin\\mapreduce_weather\\reducer.py" ^
More? -input /weather/hadoop/input/sample_weather.txt -output /weather/hadoop/output
package]obJar: [/C:\Users\Admin\AppData\Local\Temp\hadoop-unjar754311025374819372/] [] C:\Users\Admin\AppData\Local\Temp\streamjob18574619942
2024-08-18 19:02:14,970 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-08-18 19:02:14,970 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-08-18 19:02:17,513 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/Admin/.staging/job_17
2024-08-18 19:02:17,513 INFO mapreduce.JobSubmitter: Total input files to process: 1
2024-08-18 19:02:17,703 INFO mapreduce.JobSubmitter: submitting tokens for job: job_1723986937631_0001
2024-08-18 19:02:18,141 INFO mapreduce.JobSubmitter: Executing with Koens: []
2024-08-18 19:02:18,525 INFO conf.Configuration: resource-types.xml not found
2024-08-18 19:02:18,525 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-08-18 19:02:19,981 INFO mapreduce.Job: The url to track the job: http://DESKTOP-TF65P79:8088/proxy/application_1723986937631_0001/
2024-08-18 19:02:19,991 INFO mapreduce.Job: The url to track the job: http://DESKTOP-TF65P79:8088/proxy/application_1723986937631_0001/
2024-08-18 19:02:19,991 INFO mapreduce.Job: map 0% reduce 0%
2024-08-18 19:03:13,149 INFO mapreduce.Job: map 100% reduce 0%
2024-08-18 19:03:13,149 INFO mapreduce.Job: map 100% reduce 0%
2024-08-18 19:03:13,149 INFO mapreduce.Job: Dob job_1723986937631_0001 completed successfully
2024-08-18 19:03:13,149 INFO mapreduce.Job: Dob job_1723986937631_0001 completed successfully
```

```
File Input Format Counters

Bytes Read=16149

File Output Format Counters

Bytes Written=312

2024-08-18 19:03:13,482 INFO streaming.StreamJob: Output directory: /weather/hadoop/output

C:\Hadoop\sbin>
```

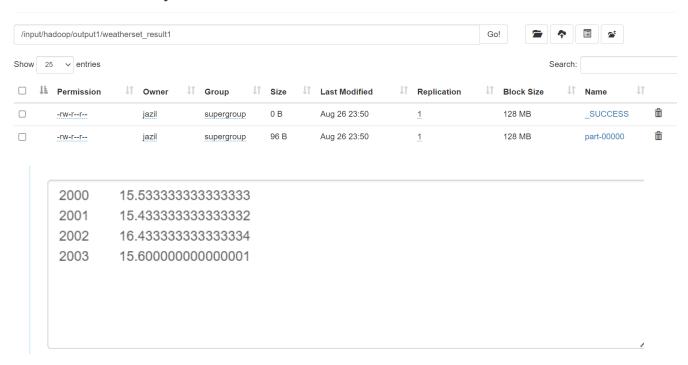
7. View the Output

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

```
C:\Windows\System32>hdfs dfs -cat /input/hadoop/output1/weatherset_result1/part-00000
2000 15.5333333333333
2001 15.4333333333332
2002 16.4333333333334
2003 15.60000000000001
```

8. Once the map reduce operations are performed successfully, the output will be present in the specified directory.

Browse Directory



9. Stop Hadoop Services

stop-dfs.cmd

stop-yarn.cmd

```
C:\Hadoop\sbin>stop-dfs.cmd
SUCCESS: Sent termination signal to the process with PID 7964.
SUCCESS: Sent termination signal to the process with PID 13580.
C:\Hadoop\sbin>stop-yarn.cmd
stopping yarn daemons
SUCCESS: Sent termination signal to the process with PID 14412.
SUCCESS: Sent termination signal to the process with PID 7092.
INFO: No tasks running with the specified criteria.
C:\Hadoop\sbin>
```

[&]quot;/weather/hadoop/output/part-00000"