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# EXP 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 "sample_weather.txt" and populate it with text data that you wish to analyse.

**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.

**mapper1.py**

```
#!/usr/bin/python3
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.

**reducer1.py**

```
#!/usr/bin/python3
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.

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```
Administrator: Command Prompt

 Directory of D:\madhumitha\DA\weather

09/17/2024  05:19 PM    <DIR>          .
09/17/2024  05:19 PM    <DIR>          ..
09/17/2024  05:19 PM            12,053 input1.txt
09/17/2024  05:19 PM               934 mapper1.py
09/17/2024  05:19 PM             1,012 reducer1.py
               3 File(s)         13,999 bytes
               2 Dir(s)  335,340,986,368 bytes free

D:\madhumitha\DA\weather>hdfs dfs -put input1.txt /madhu

D:\madhumitha\DA\weather>hdfs dfs -put mapper1.py /madhu

D:\madhumitha\DA\weather>hdfs dfs -chmod 777 /madhu/mapper1.py

D:\madhumitha\DA\weather>hdfs dfs -put reducer1.py /madhu

D:\madhumitha\DA\weather>hdfs dfs -chmod 777 /madhu/reducer1.py
```

D:\madhumitha\DA\weather>hadoop jar D:/hadoop-3.3.6/share/hadoop/tools/lib/hadoop-streaming-3.3.6.jar -files "hdfs:///madhu/mapper1.py,hdfs:///madhu/reducer1.py" -input /madhu/input1.txt -output /madhu/output4 -mapper "python mapper1.py" -reducer "python reducer1.py"

**OUTPUT:**

```
Administrator: Command Prompt
D:\madhumitha\DA\weather>hdfs dfs -chmod 777 /madhu/reducer1.py

D:\madhumitha\DA\weather>hadoop jar D:/hadoop-3.3.6/share/hadoop/tools/lib/hadoop-streaming-3.3.6.jar -files "hdfs:///madhu/mapper1.py,hdfs:///madhu/reducer1.py" -input /madhu/input1.txt -output /madhu/output4 -
mapper "python mapper1.py" -reducer "python reducer1.py"
packageJobJar: [/C:/Users/ADMIN/AppData/Local/Temp/hadoop-unjar1687931298959750318/] [] C:\Users\ADMIN\AppData\Local\Temp\streamjob2350782234208546254.jar tmpDir=null
2024-09-17 17:21:57,875 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-09-17 17:21:58,059 INFO client.DefaultNoHARMFailoverProxyProvider: Connecting to ResourceManager at /0.0.0.0:8032
2024-09-17 17:22:03,436 INFO mapreduce.JobResourceUploader: Disabling Erasure Coding for path: /tmp/hadoop-yarn/staging/ADMIN/.staging/job_1726572362226_0002
2024-09-17 17:22:03,676 INFO mapred.FileInputFormat: Total input files to process : 1
2024-09-17 17:22:03,723 INFO mapreduce.JobSubmitter: number of splits:2
2024-09-17 17:22:03,878 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1726572362226_0002
2024-09-17 17:22:03,878 INFO mapreduce.JobSubmitter: Executing with tokens: []
2024-09-17 17:22:04,021 INFO conf.Configuration: resource-types.xml not found
2024-09-17 17:22:04,021 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'.
2024-09-17 17:22:04,080 INFO impl.YarnClientImpl: Submitted application application_1726572362226_0002
2024-09-17 17:22:04,113 INFO mapreduce.Job: The url to track the job: http://DESKTOP-TAPFJT5:8088/proxy/application_1726572362226_0002/
2024-09-17 17:22:04,114 INFO mapreduce.Job: Running job: job_1726572362226_0002
2024-09-17 17:22:35,535 INFO mapreduce.Job: Job job_1726572362226_0002 running in uber mode : false
2024-09-17 17:22:35,537 INFO mapreduce.Job:  map 0% reduce 0%
2024-09-17 17:22:55,798 INFO mapreduce.Job:  map 50% reduce 0%
2024-09-17 17:23:00,844 INFO mapreduce.Job:  map 100% reduce 0%
2024-09-17 17:23:21,085 INFO mapreduce.Job:  map 100% reduce 100%
2024-09-17 17:23:26,150 INFO mapreduce.Job: Job job_1726572362226_0002 completed successfully
2024-09-17 17:23:26,231 INFO mapreduce.Job: Counters: 54
        File System Counters
                FILE: Number of bytes read=3870
                FILE: Number of bytes written=851819
                FILE: Number of read operations=0
                FILE: Number of large read operations=0
                FILE: Number of write operations=0
                HDFS: Number of bytes read=16329
                HDFS: Number of bytes written=312
                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
                Launched map tasks=2
                Launched reduce tasks=1
                Data-local map tasks=2
                Total time spent by all maps in occupied slots (ms)=35526
                Total time spent by all reduces in occupied slots (ms)=17581
                Total time spent by all map tasks (ms)=35526
                Total time spent by all reduce tasks (ms)=17581
                Total vcore-milliseconds taken by all map tasks=35526
                Total vcore-milliseconds taken by all reduce tasks=17581
                Total megabyte-milliseconds taken by all map tasks=36378624
                Total megabyte-milliseconds taken by all reduce tasks=18002944
        Map-Reduce Framework
```

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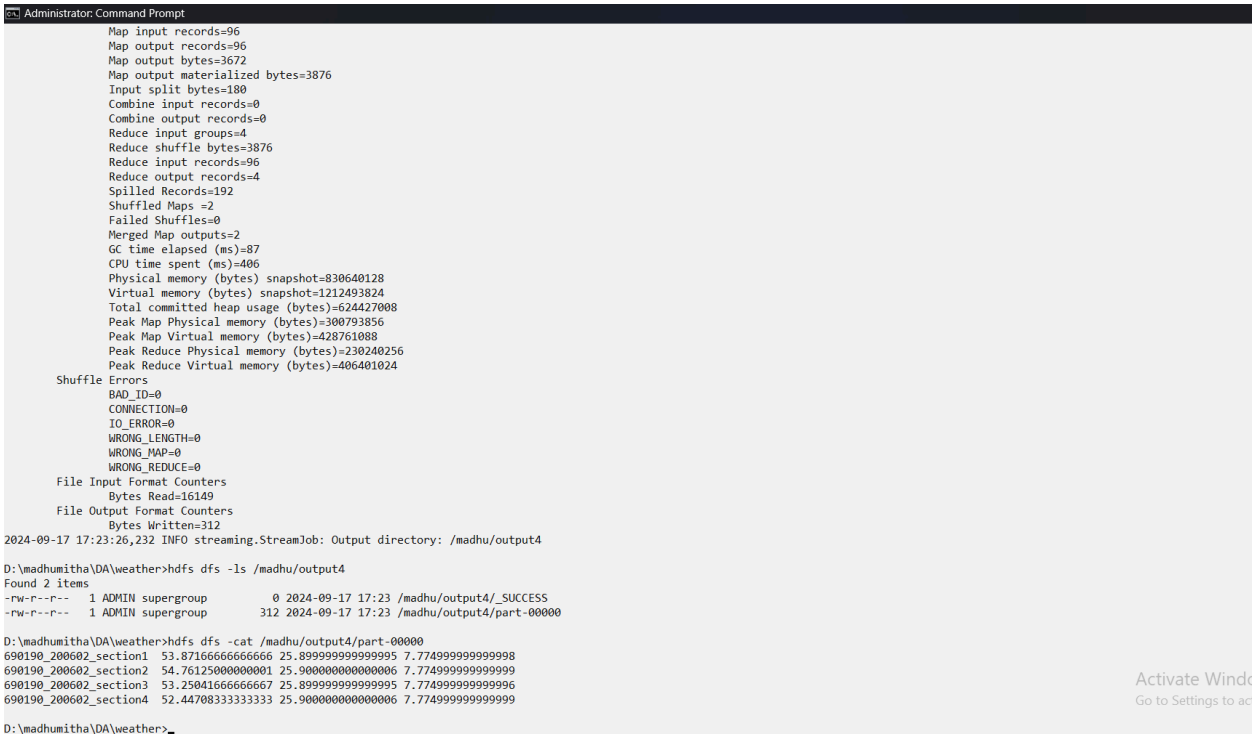


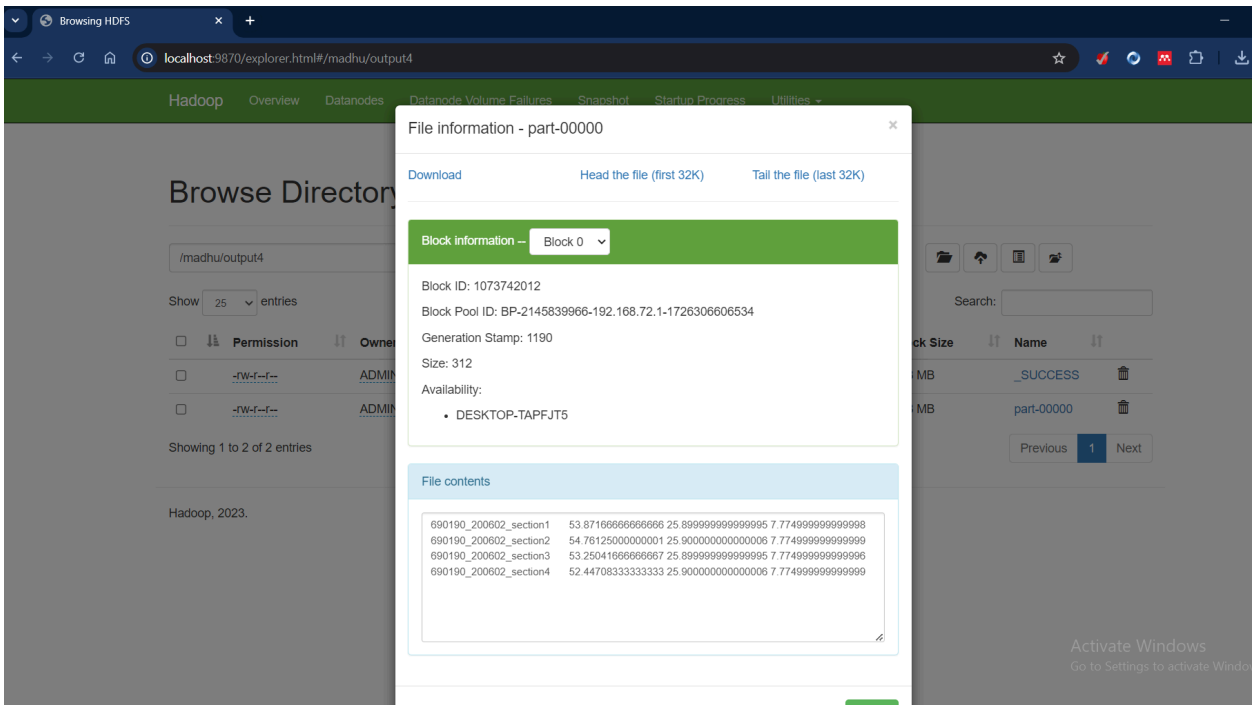


## RESULT:

Thus, the program for weather dataset using Map Reduce has been executed successfully.