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Ex No 3

Map Reduce program to process a weather dataset.

AIM:

To implement MapReduce program to process a weather dataset.

PROCEDURE:

Step 1: Prepare the Weather Dataset
Ensure your weather dataset is in a text file (weather_dataset.txt). A simple format might be:
python
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2024-01-01,23,60
2024-01-02,25,65
...
Step 2: Create Input Directory in HDFS
Upload your dataset to HDFS:
bash
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hdfs dfs -mkdir -p /weather/input
hdfs dfs -put /path/to/your/weather_dataset.txt /weather/input
Step 3: Write the MapReduce Program in Python
We'll create two Python scripts: one for the mapper and one for the reducer.

1. **Mapper (mapper.py):**
    - Reads each line of the input file.
    - Extracts the year and temperature.
    - Outputs the year as the key and the temperature as the value.
2. **Reducer (reducer.py):**
    - Receives key-value pairs from the mapper.
    - Finds the maximum temperature for each year.

mapper.py:
python
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```
#!/usr/bin/env python3
import sys

for line in sys.stdin:
    line = line.strip()
```

```
    if not line:
        continue
    try:
        date, temperature, _ = line.split(',')
        year = date[:4]
        print(f"{year}\t{temperature}")
    except ValueError:
        continue  # skip lines with missing or invalid data
```

reducer.py:

python
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```
#!/usr/bin/env python3
import sys

current_year = None
max_temp = -float('inf')

for line in sys.stdin:
    line = line.strip()
    year, temperature = line.split('\t')
    temperature = int(temperature)

    if current_year == year:
        if temperature > max_temp:
            max_temp = temperature
    else:
        if current_year:
            print(f"{current_year}\t{max_temp}")
        current_year = year
        max_temp = temperature

if current_year:
    print(f"{current_year}\t{max_temp}")
```

Step 4: Make the Scripts Executable

Make sure the Python scripts are executable:

bash
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```
chmod +x mapper.py reducer.py
```

Step 5: Run the MapReduce Job Using Hadoop Streaming

Use Hadoop streaming to run the MapReduce job with Python scripts:

bash
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hadoop jar /usr/local/hadoop/share/hadoop/tools/lib/hadoop-streaming-*.jar \
-input /weather/input/weather_dataset.txt \
-output /weather/output \
-mapper /path/to/mapper.py \
-reducer /path/to/reducer.py
Replace /path/to/mapper.py and /path/to/reducer.py with the actual paths to your scripts.

Step 6: View the Results

Check the output directory for results:
bash
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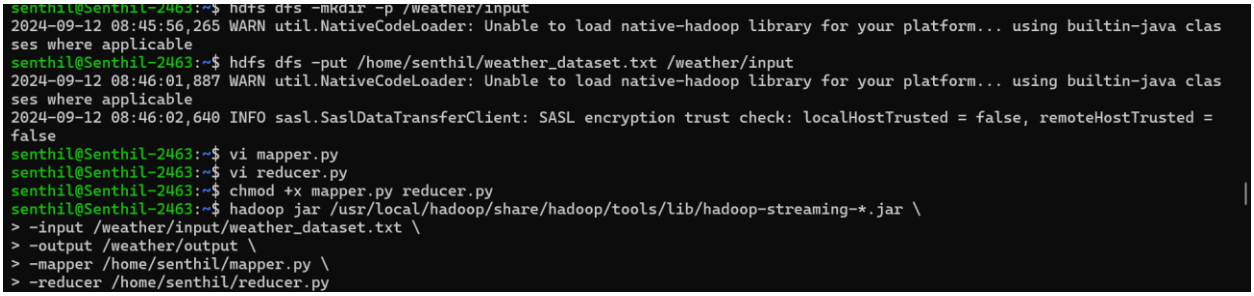
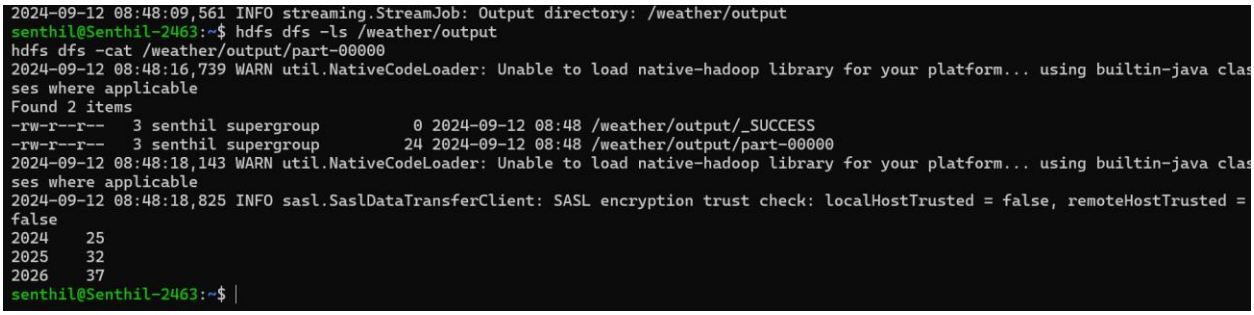
hdfs dfs -ls /weather/output
hdfs dfs -cat /weather/output/part-00000
This will display the maximum temperature for each year based on your dataset.

OUTPUT:





RESULT:

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