Exp No: 6

Handling JSON data using HDFS and Python

AIM:

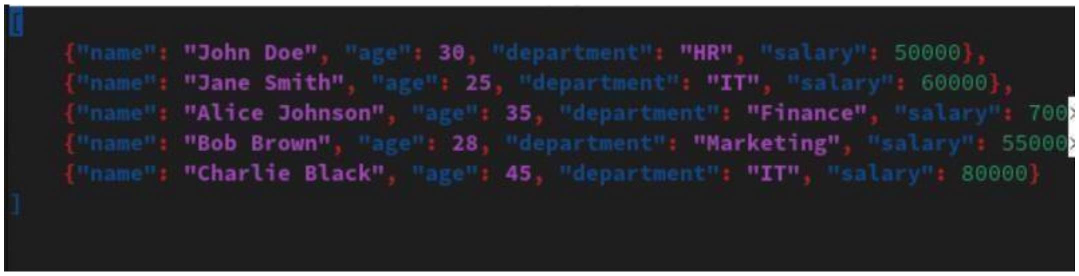
To handle JSON data using HDFS and python.

PROCEDURE:

Step 1: Create json file on bash & save as emp.json

nano emp.json ; Paste the below content on it

```
[
    {"name": "John Doe", "age": 30, "department": "HR", "salary": 50000},
    {"name": "Jane Smith", "age": 25, "department": "IT", "salary": 60000},
    {"name": "Alice Johnson", "age": 35, "department": "Finance", "salary": 70000},
    {"name": "Bob Brown", "age": 28, "department": "Marketing", "salary": 55000},
    {"name": "Charlie Black", "age": 45, "department": "IT", "salary": 80000}
]
```

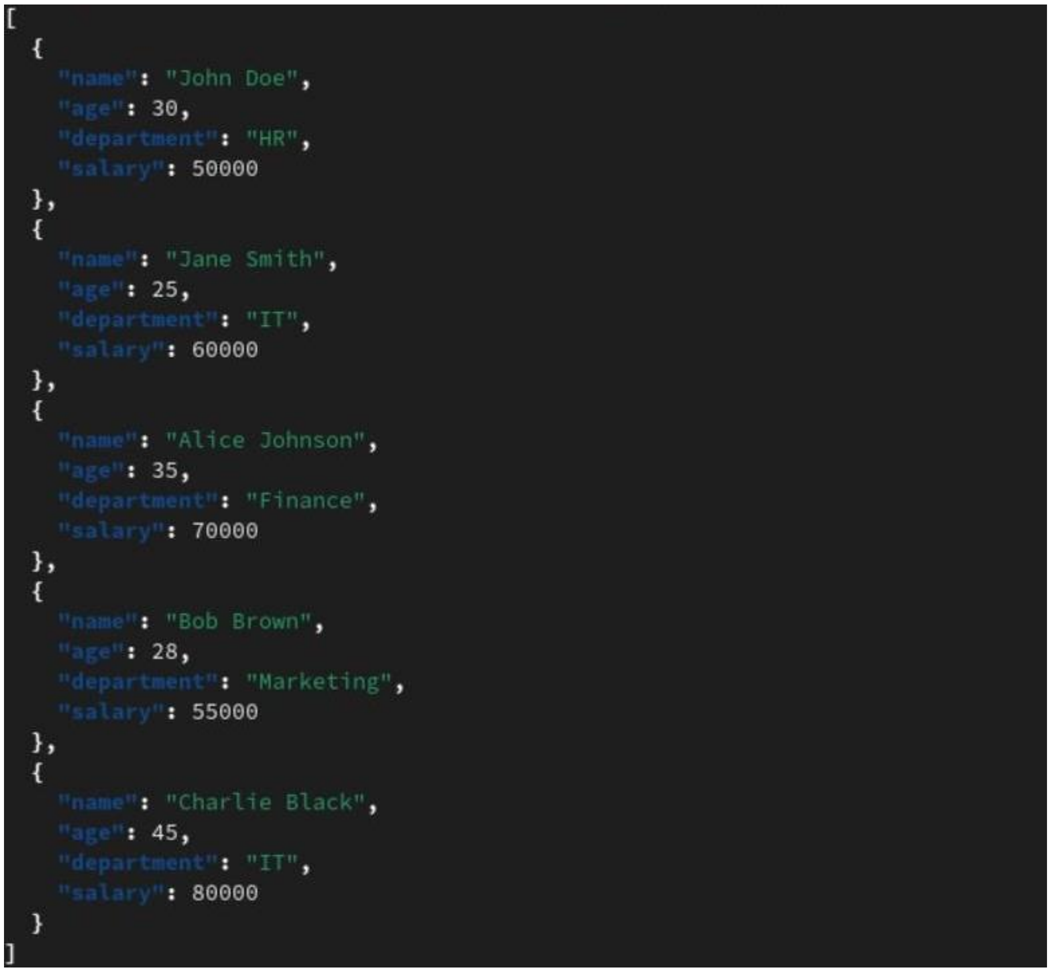


```
[
    {"name": "John Doe", "age": 30, "department": "HR", "salary": 50000},
    {"name": "Jane Smith", "age": 25, "department": "IT", "salary": 60000},
    {"name": "Alice Johnson", "age": 35, "department": "Finance", "salary": 700>
    {"name": "Bob Brown", "age": 28, "department": "Marketing", "salary": 55000>
    {"name": "Charlie Black", "age": 45, "department": "IT", "salary": 80000}
]
```

Step 2 : Check json is readable or any error by giving

install jq by sudo apt-get install jq

```
hadoop@Ubuntu:~$ jq . emp.json
```



```json
[
  {
    "name": "John Doe",
    "age": 30,
    "department": "HR",
    "salary": 50000
  },
  {
    "name": "Jane Smith",
    "age": 25,
    "department": "IT",
    "salary": 60000
  },
  {
    "name": "Alice Johnson",
    "age": 35,
    "department": "Finance",
    "salary": 70000
  },
  {
    "name": "Bob Brown",
    "age": 28,
    "department": "Marketing",
    "salary": 55000
  },
  {
    "name": "Charlie Black",
    "age": 45,
    "department": "IT",
    "salary": 80000
  }
]
```

Step 3: Install pandas and hdfs dependencies for python.

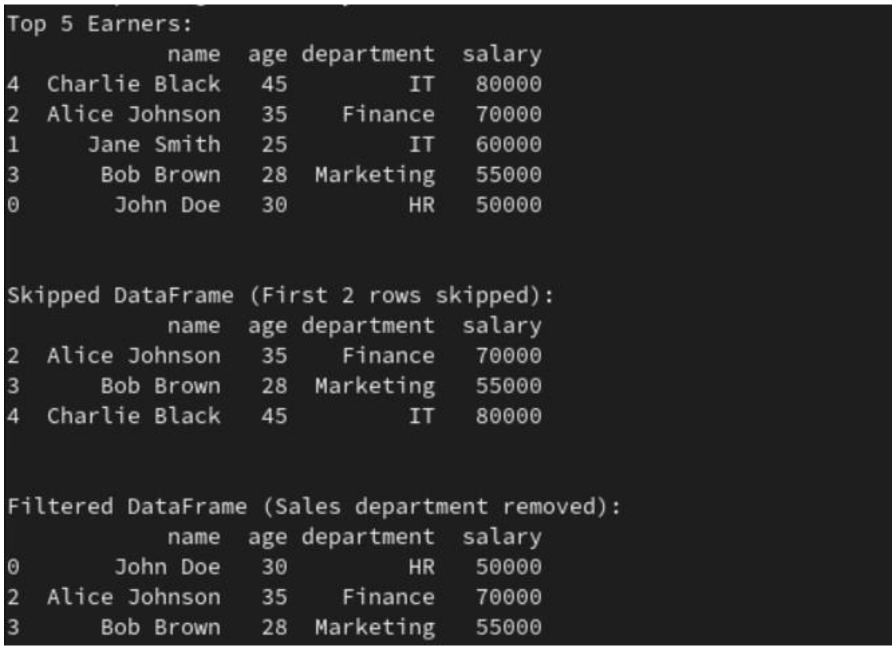
Step 4: Create process_data.py file

```python
from hdfs import InsecureClient

import pandas as pd

import json


# Connect to HDFS

hdfs_client = InsecureClient('http://localhost:9870', user='hdfs')


# Read JSON data from HDFS

try:

    with hdfs_client.read('/home/hadoop/emp.json', encoding='utf-8') as reader:
        json_data = reader.read()  # Read the raw data as a string
        if not json_data.strip():  # Check if data is empty
            raise ValueError("The JSON file is empty.")
        print(f"Raw JSON Data: {json_data[:1000]}")  # Print first 1000 characters for debugging
        data = json.loads(json_data) # Load the JSON data
except json.JSONDecodeError as e:
    print(f"JSON Decode Error: {e}")
    exit(1)
except Exception as e:
    print(f"Error reading or parsing JSON data: {e}")
    exit(1)

# Convert JSON data to DataFrame
try:
    df = pd.DataFrame(data)
except ValueError as e:
    print(f"Error converting JSON data to DataFrame: {e}")
    exit(1)

# Projection: Select only 'name' and 'salary' columns
projected_df = df[['name', 'salary']]

# Aggregation: Calculate total salary
total_salary = df['salary'].sum()

# Count: Number of employees earning more than 50000
high_earners_count = df[df['salary'] > 50000].shape[0]

# Limit: Get the top 5 highest earners
top_5_earners = df.nlargest(5, 'salary')
```

```
# Skip: Skip the first 2 employees
skipped_df = df.iloc[2:]

# Remove: Remove employees from a specific department
filtered_df = df[df['department'] != 'IT']

# Save the filtered result back to HDFS
filtered_json = filtered_df.to_json(orient='records')
try:
    with hdfs_client.write('/home/hadoop/filtered_employees.json', encoding='utf-8', overwrite=True) as writer:
        writer.write(filtered_json)
    print("Filtered JSON file saved successfully.")
except Exception as e:
    print(f"Error saving filtered JSON data: {e}")
    exit(1)

# Print results
print(f"Projection: Select only name and salary columns")
print(f"{projected_df}")

print(f"Aggregation: Calculate total salary")

print(f"Total Salary: {total_salary}")
print(f"\n")

print(f"# Count: Number of employees earning more than 50000")

print(f"Number of High Earners (>50000): {high_earners_count}")
print(f"\n")
print(f"limit Top 5 highest salary")


print(f"Top 5 Earners: \n{top_5_earners}")
print(f"\n")
print(f"Skipped DataFrame (First 2 rows skipped): \n{skipped_df}")
print(f"\n")
print(f"Filtered DataFrame (Sales department removed): \n{filtered_df}")
```

Step 5: run the file by

bash: python3 process_data.py



```
Top 5 Earners:
            name  age department  salary
4  Charlie Black   45         IT   80000
2  Alice Johnson   35    Finance   70000
1     Jane Smith   25         IT   60000
3      Bob Brown   28  Marketing   55000
0       John Doe   30         HR   50000


Skipped DataFrame (First 2 rows skipped):
            name  age department  salary
2  Alice Johnson   35    Finance   70000
3      Bob Brown   28  Marketing   55000
4  Charlie Black   45         IT   80000


Filtered DataFrame (Sales department removed):
            name  age department  salary
0       John Doe   30         HR   50000
2  Alice Johnson   35    Finance   70000
3      Bob Brown   28  Marketing   55000
```

RESULT:

Experiment has been successfully executed and output has been verified.