

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}  
]
```

A screenshot of a terminal window with a dark background. It displays the same JSON array as the previous block, with each line of the array highlighted in a different color: the first line is blue, the second is red, the third is green, the fourth is yellow, and the fifth is cyan. The closing bracket on the last line is also highlighted in cyan.

```
[  
  {"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 2 : Check json is readable or any error by giving

install jq by sudo apt-get install jq

hadoop@Ubuntu:~\$ jq . emp.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

```
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.