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EXP 6: IMPORT JSON

Aim: To create json file and to do manipulations like counting, skipping, filtering, aggregation using python3

Procedure:

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}
]
```

2) Check json is readable or any error by giving

sudo apt-get install jq

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
  }
]
```

bash: put the emp.json local directory to *home/*hadoop directory

The original employees relation has the following data:

name	**age**	**department**	**salary**
John Doe	30	HR	50000
Jane Smith	25	IT	60000
Alice Johnson	35	Finance	70000
Bob Brown	28	Marketing	55000

Charlie Black	45	IT	80000

After executing:

Load the json file by giving following command

```
grunt>-- Load the data employees = LOAD '/home/hadoop/emp.json' USING
JsonLoader('name:chararray,age:int,department:chararray,salary:float');
grunt>projected = FOREACH employees GENERATE name, salary;
DUMP projected;
```

The projected relation output:

```
 name           salary
John Doe         50000
Jane Smith      60000
Alice Johnson  70000
Bob Brown      55000
Charlie Black  80000
```

1. Aggregation:

Aggregate the total salary:

pig

```
-- Load the data  employees = LOAD
'/home/hadoop/employees.json' USING
JsonLoader('name:chararray,age:int,department:chararray,salary:float');


-- Aggregate: Calculate the total salary
total_salary = FOREACH (GROUP employees ALL) GENERATE SUM(employees.salary) AS
total_salary;


DUMP total_salary;
(315000.0)
```

2. Skip

pig

```
-- Load the data
employees = LOAD '/home/hadoop/employees.json'
USING
JsonLoader('name:chararray,age:int,department:chararray,salary:float');

-- Skip the first 2 records
skipped_employees = LIMIT employees 1000000;
DUMP skipped_employees;
```

```
Output:  name age  department  salary
          Alice Johnson 35  Finance  70000
          Bob Brown     28  Marketing  55000
          Charlie Black  45  IT  80000
```

3. Limit

pig

```
-- Load the data
employees = LOAD '/home/hadoop/employees.json' USING
JsonLoader('name:chararray,age:int,department:chararray,salary:float');
-- Limit: Get the top 3 highest earners
top_3_employees = LIMIT employees 3;
DUMP top_3_employees;
```

4. Count

Count the number of employees:

pig

```
-- Load the data
employees = LOAD '/home/hadoop/employees.json'
USING
JsonLoader('name:chararray,age:int,department:chararray,salary:float');
-- Count the number of employees
employee_count = FOREACH (GROUP employees ALL) GENERATE COUNT(employees) AS total_count;
DUMP employee_count;
```

Output:

```
5
```

5. Remove

Remove employees from a specific department, e.g., "IT":

pig

```
-- Load the data
employees = LOAD '/home/hadoop/employees.json'
USING
JsonLoader('name:chararray,age:int,department:chararray,salary:float');
-- Remove employees from the 'IT' department
filtered_employees = FILTER employees BY department != 'IT';
DUMP filtered_employees;
```

Output:

name	age	department	salary
John Doe	30	HR	50000
Alice Johnson	35	Finance	70000
Bob Brown	28	Marketing	55000

3) **Install** pandas and hdfs using pip.

- **Optionally** install pyarrow or hdfs3 if needed based on your specific requirements.
- **Verify** the installation to ensure everything is set up correctly.

PANDAS:

```
pip install pandas
```

HDFS:

```
pip install hdfs

pip install pyarrow

pip install hdfs3
```

4) Verifying Package Installation

- Create a python file with random name
- Type the following content inside that file

```
import pandas as pd from hdfs

import InsecureClient


# Check pandas version  print("Pandas

version:", pd.__version__) # Test HDFS

client connection client =

InsecureClient('http://localhost:9870', user='hadoop') print("HDFS

status:", client.status('/'))
```

The above program should run without any error. If it does then all packages are correctly downloaded.

5) Create another python file

```
process_data.py
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}")
```

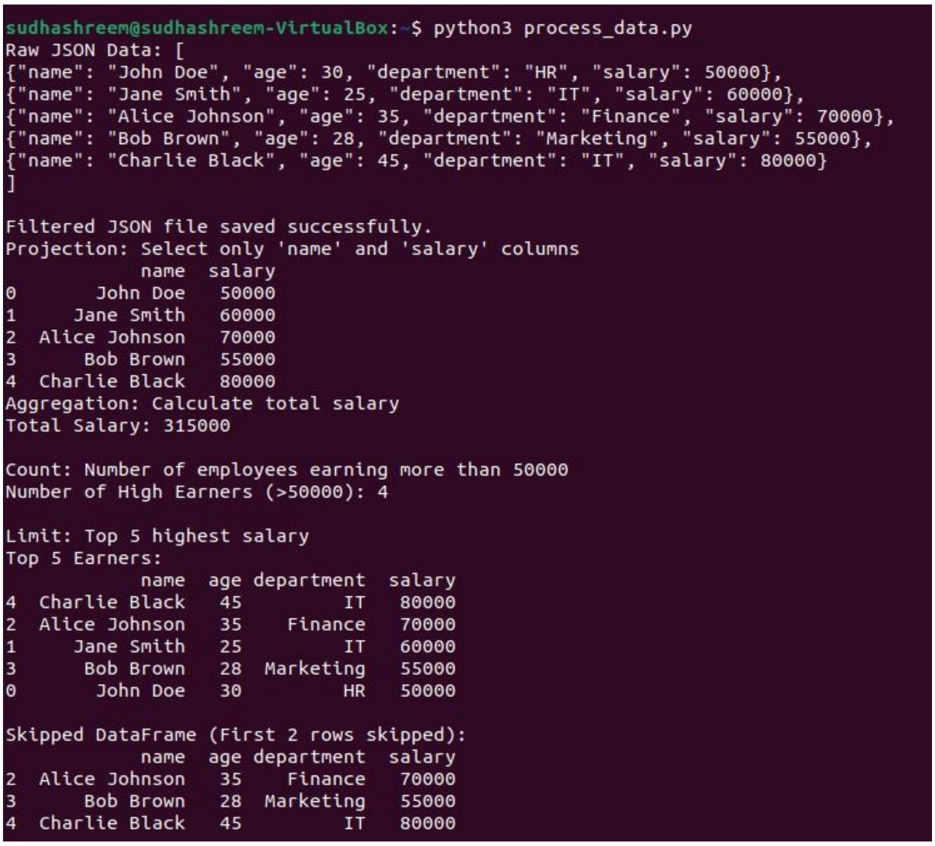
```
exit(1)

# 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}")
```

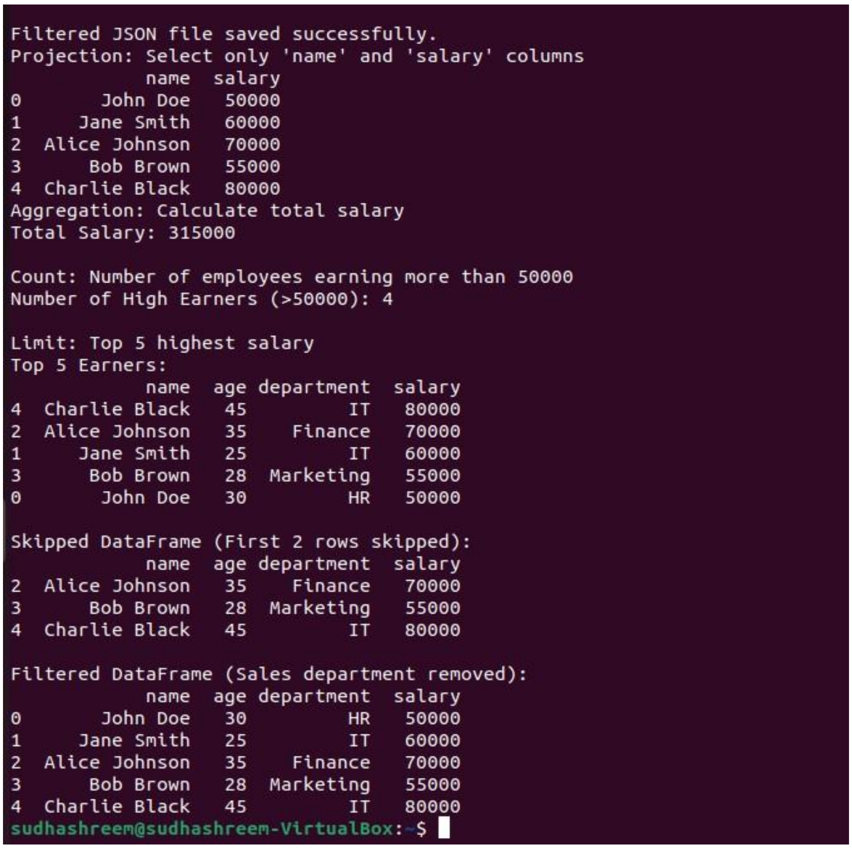
6) Run the file using command

```
python3 process_data.py
```

OUTPUT:



```
sudhashreem@sudhashreem-VirtualBox:~$ python3 process_data.py
Raw JSON Data: [
{"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}
]

Filtered JSON file saved successfully.
Projection: Select only 'name' and 'salary' columns
            name  salary
0       John Doe   50000
1     Jane Smith   60000
2  Alice Johnson   70000
3      Bob Brown   55000
4  Charlie Black   80000
Aggregation: Calculate total salary
Total Salary: 315000

Count: Number of employees earning more than 50000
Number of High Earners (>50000): 4

Limit: Top 5 highest salary
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 JSON file saved successfully.
Projection: Select only 'name' and 'salary' columns
            name  salary
0       John Doe   50000
1     Jane Smith   60000
2  Alice Johnson   70000
3      Bob Brown   55000
4  Charlie Black   80000
Aggregation: Calculate total salary
Total Salary: 315000

Count: Number of employees earning more than 50000
Number of High Earners (>50000): 4

Limit: Top 5 highest salary
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
1     Jane Smith   25         IT   60000
2  Alice Johnson   35    Finance   70000
3      Bob Brown   28  Marketing   55000
4  Charlie Black   45         IT   80000
sudhashreem@sudhashreem-VirtualBox:~$ 
```

Result: Thus json program is executed successfully.