Assignment 9

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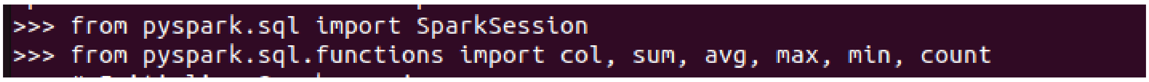
PS: Group and perform aggregate functions on columns in a Spark Data Frame

CODE & OUTPUT:

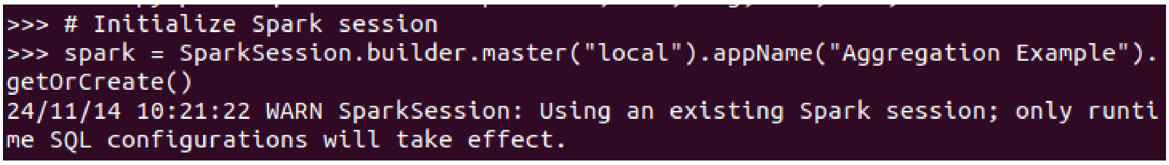
1) Step 1: Import Required Libraries



```
>>> from pyspark.sql import SparkSession
>>> from pyspark.sql.functions import col, sum, avg, max, min, count
```

- SparkSession: The entry point to Spark functionality. We use it to create a DataFrame and interact with the Spark cluster.
- pyspark.sql.functions: This module contains various built-in functions like sum(), avg(), max(), etc., which are used for performing operations on columns in a DataFrame.

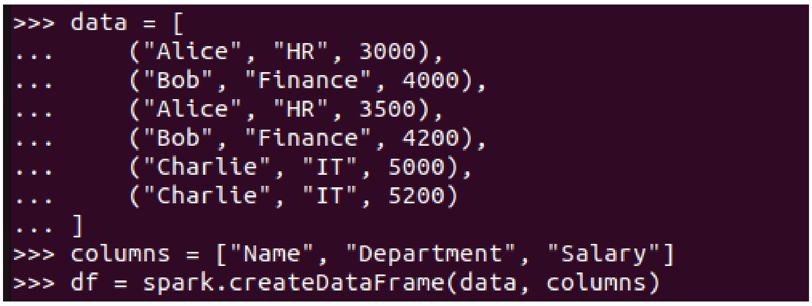
2) Step 2: Create a SparkSession



```
>>> # Initialize Spark session
>>> spark = SparkSession.builder.master("local").appName("Aggregation Example").
getOrCreate()
24/11/14 10:21:22 WARN SparkSession: Using an existing Spark session; only runti
me SQL configurations will take effect.
```

- SparkSession.builder: Starts the process of building a SparkSession. We specify the master node as "local" (meaning it runs on a local machine) and give the session an app name ("Aggregation Example").
- getOrCreate(): Creates the SparkSession if it doesn't exist, or retrieves the existing one if it does.

3) **Step 3: Create a Sample DataFrame**

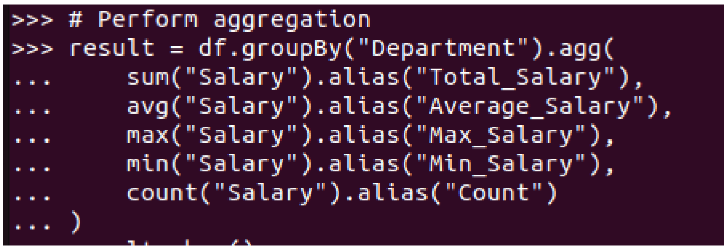


```
>>> data = [
...     ("Alice", "HR", 3000),
...     ("Bob", "Finance", 4000),
...     ("Alice", "HR", 3500),
...     ("Bob", "Finance", 4200),
...     ("Charlie", "IT", 5000),
...     ("Charlie", "IT", 5200)
... ]
>>> columns = ["Name", "Department", "Salary"]
>>> df = spark.createDataFrame(data, columns)
```

- **data**: A list of tuples, where each tuple contains data for a row. Each row has three values: Name, Department, and Salary.
- **columns**: A list of column names, which correspond to the data in the rows.

- **spark.createDataFrame(data, columns)**: This method converts the list of tuples data into a DataFrame with the specified column names.

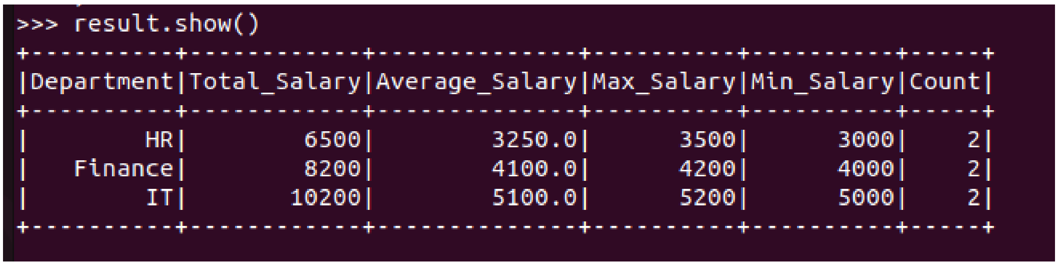
4) **Step 4: Perform GroupBy and Aggregate Operations**



```
>>> # Perform aggregation
>>> result = df.groupBy("Department").agg(
...     sum("Salary").alias("Total_Salary"),
...     avg("Salary").alias("Average_Salary"),
...     max("Salary").alias("Max_Salary"),
...     min("Salary").alias("Min_Salary"),
...     count("Salary").alias("Count")
... )
```

- **groupBy("Department")**: This groups the DataFrame by the "Department" column. It will create separate groups for each unique department value (HR, Finance, IT).
- **agg()**: The aggregation function. Inside it, we define what kind of aggregation we want for each column:
    - **sum("Salary")**: Adds up the salary values for each group (department).
    - **avg("Salary")**: Calculates the average salary for each department.
    - **max("Salary")**: Finds the highest salary in each department.
    - **min("Salary")**: Finds the lowest salary in each department.
    - **count("Salary")**: Counts the number of rows (salaries) in each department.
- **alias()**: Renames the results of the aggregation for better readability. For example, sum("Salary") is renamed to Total_Salary, avg("Salary") is renamed to Average_Salary, and so on.

5) **Step 5: Show the Results**



```
>>> result.show()
+----------+------------+--------------+----------+----------+-----+
|Department|Total_Salary|Average_Salary|Max_Salary|Min_Salary|Count|
+----------+------------+--------------+----------+----------+-----+
|        HR|        6500|        3250.0|      3500|      3000|    2|
|   Finance|        8200|        4100.0|      4200|      4000|    2|
|        IT|       10200|        5100.0|      5200|      5000|    2|
+----------+------------+--------------+----------+----------+-----+
```

- **show()**: This command displays the resulting DataFrame, which contains the aggregated values grouped by the "Department".