Capgemini Data Engineer Interview Guide – Experienced 3+

Round 1: Technical Round

1. **Introduction and Technology Overview**
   - Tell me about yourself and your professional background.
   - List all the technologies you have worked on in your project (e.g., Spark, Hadoop, Hive, Databricks).

2. **Spark Architecture**

   Explain the architecture of Spark, including its components such as driver, executor, and cluster manager.

3. **Cluster Configuration**

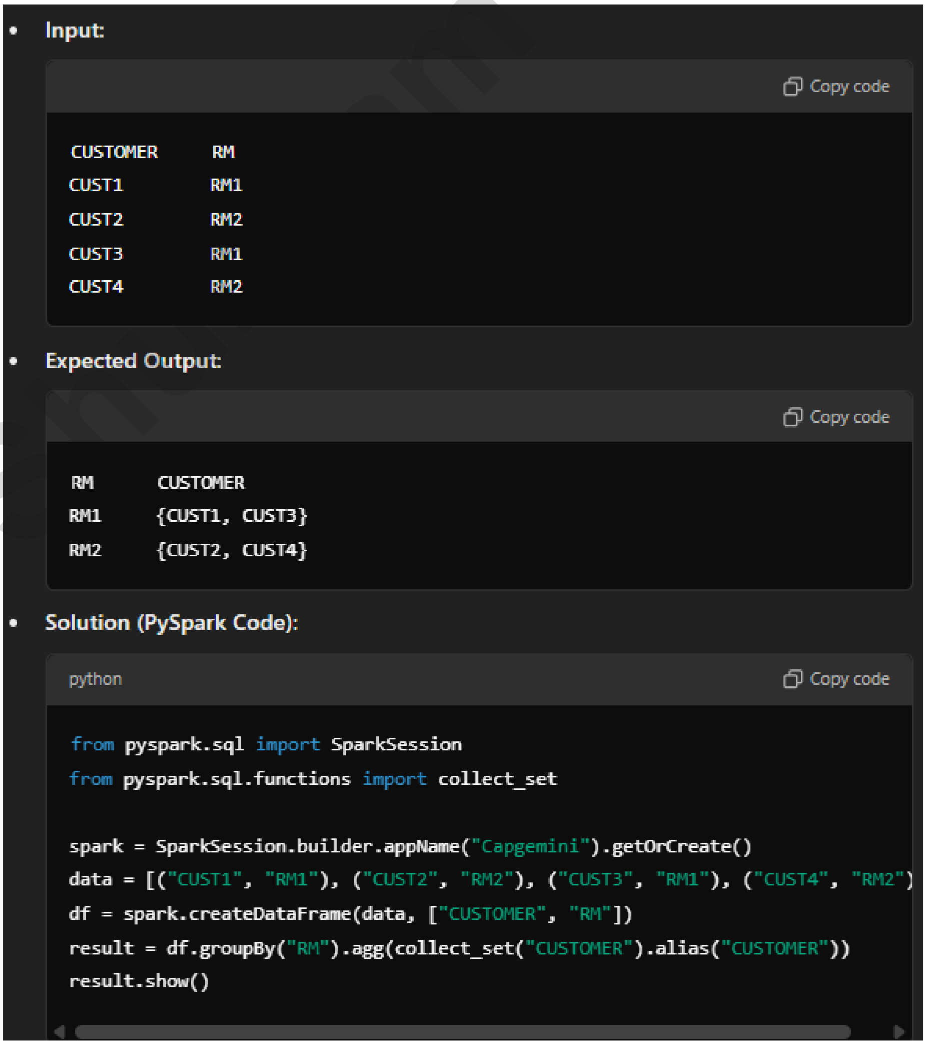
   Describe the cluster configuration used in your project, including memory allocation, number of nodes, and executor/driver settings.

4. **Spark Version**

   Which Spark version are you using in your project, and why did you choose it?

5. **PySpark Transformation**

   Solve the following dataset transformation:



- **Input:**

```
CUSTOMER      RM
CUST1         RM1
CUST2         RM2
CUST3         RM1
CUST4         RM2
```

- **Expected Output:**

```
RM     CUSTOMER
RM1    {CUST1, CUST3}
RM2    {CUST2, CUST4}
```

- **Solution (PySpark Code):**

```python
from pyspark.sql import SparkSession
from pyspark.sql.functions import collect_set

spark = SparkSession.builder.appName("Capgemini").getOrCreate()
data = [("CUST1", "RM1"), ("CUST2", "RM2"), ("CUST3", "RM1"), ("CUST4", "RM2")
df = spark.createDataFrame(data, ["CUSTOMER", "RM"])
result = df.groupBy("RM").agg(collect_set("CUSTOMER").alias("CUSTOMER"))
result.show()
```

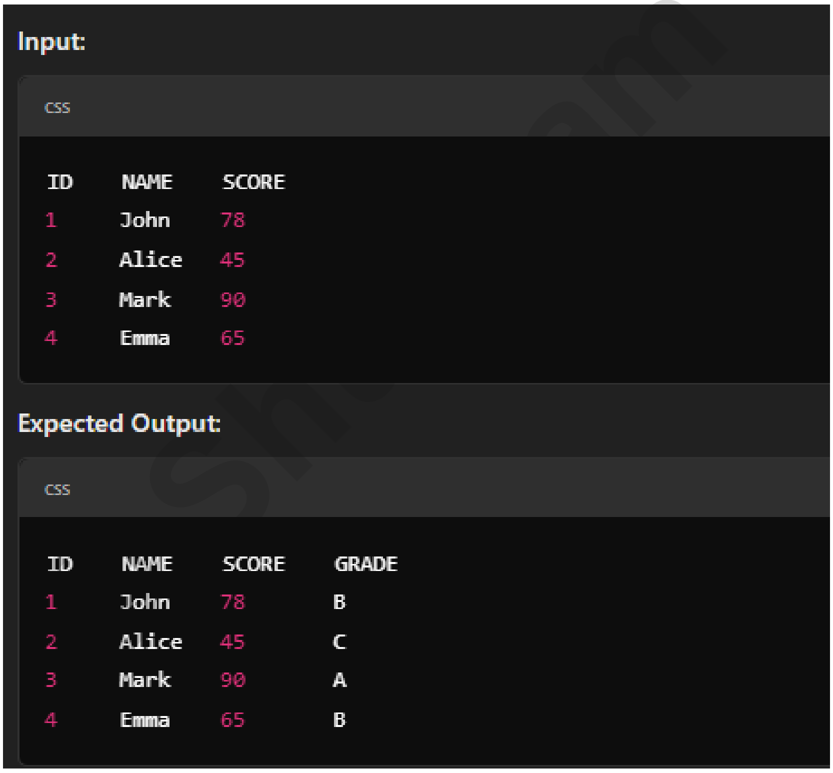
6. **Spark Optimization Techniques**

    - Cache() vs Persist(): Explain the difference and use cases for caching and persisting data in Spark with memory levels.
    - map() vs mapPartitions(): Highlight the difference between map (row-level transformation) and mapPartitions (partition-level transformation).
    - Adaptive Query Execution (AQE): Discuss how AQE optimizes query execution in Spark dynamically based on runtime stats.
    - repartition() vs coalesce(): Explain when to use repartition() (increases partitions) vs coalesce() (reduces partitions).

7. **SQL and Hive Questions**
    - Window Function: Solve a problem using a window function in Spark or SQL.
    - Indexing in SQL: How does indexing improve query performance?
    - Managed vs External Tables in Hive: Explain the difference and when to use each.

Round 2: Technical + Managerial Round

1. **UDF in PySpark**
    - Define what a **User-Defined Function (UDF)** is and how to register it in PySpark.
    - Solve the following problem using a UDF:



Input:

```css
ID     NAME    SCORE
1      John    78
2      Alice   45
3      Mark    90
4      Emma    65
```

Expected Output:

```css
ID     NAME    SCORE    GRADE
1      John    78       B
2      Alice   45       C
3      Mark    90       A
4      Emma    65       B
```

Solution (PySpark Code):

```
from pyspark.sql.functions import udf
from pyspark.sql.types import StringType

def grade(score):
   if score >= 80:
      return "A"
   elif 60 <= score < 80:
      return "B"
   else:
      return "C"

grade_udf = udf(grade, StringType())
df = spark.createDataFrame([(1, "John", 78), (2, "Alice", 45), (3, "Mark", 90), (4, "Emma",
65)], ["ID", "NAME", "SCORE"])
result = df.withColumn("GRADE", grade_udf(df["SCORE"]))
result.show()
```

2. **Experience-Based Questions**
    - Explain the projects you have worked on, focusing on challenges and solutions you implemented.
    - Discuss how you handled null values or unstructured data in your previous projects.
    - Talk about your approach to deploying pipelines from development to production.

3. **Delta Lake Concepts**
    - Explain Delta Lakehouse architecture and its advantages.
    - Discuss the Bronze, Silver, and Gold layers in the Delta Lake pipeline.

4. **Databricks Questions**
    - How do you create a job cluster in Databricks?
    - Explain the use of dbutils functions in Databricks.
    - Discuss the process of moving files in Databricks File System (DBFS).

5. **Scala Traits and Azure Integration**
    - Define traits in Scala and their applications in your project.
    - Discuss how you integrated Azure services into your Spark application.

6. **Performance Optimization**
    - What performance optimization techniques have you applied in Spark, Sqoop, or Databricks?
    - Explain lazy evaluation in Spark and how it impacts performance.

7. **Project Management**
    - How do you handle team coordination and deadlines in complex projects?
    - Provide an example of a critical decision you made in a project and its impact.

Summary

- **Round 1** focused on core technical skills, including Spark architecture, transformations, optimizations, SQL, and Hive.
- **Round 2** tested advanced PySpark concepts, real-world problem-solving with UDFs, Databricks, Delta Lake, and experience-based managerial scenarios.

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https://www.glassdoor.co.in/Reviews/Capgemini-Reviews-E3803.htm

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