

Persistent Systems

Data Engineer Interview (Round 2)

Real Scenario-Based Questions

1 Question: PySpark Coding — Remove Duplicates While Keeping Latest Record

What they asked me

"You have customer records with multiple entries. Deduplicate and keep the latest by timestamp."

What I said

I used Window + row_number:

```
from pyspark.sql import Window
import pyspark.sql.functions as F

w = Window.partitionBy("customer_id").orderBy(F.desc("updated_at"))

df_final = df.withColumn("rn", F.row_number().over(w)) \
    .filter("rn = 1") \
    .drop("rn")
```

Tips

- Persistent expects Window functions, not groupBy + join (slow).
- Mention "Distributed + scalable solution".

2 Question: Implement SCD Type-2 in Delta Lake

What they asked me

"How will you implement SCD2 using Delta Lake?"

What I said

I explained MERGE logic:

```
MERGE INTO dim_customer t
USING updates s
ON t.customer_id = s.customer_id
WHEN MATCHED AND t.hash <> s.hash THEN
    UPDATE SET t.is_current = false, t.end_date = current_date()
WHEN NOT MATCHED THEN
    INSERT *
```

Tips

- Always mention hash comparison to detect changes.
 - Delta MERGE = expected answer.
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3 Question: PySpark Optimization Scenario

What they asked me

"Your join is extremely slow. What steps would you take to optimize it?"

What I said

I used 5 optimizations:

1. Broadcast small dimension table
2. df.join(F.broadcast(dim), "id")
3. Repartition by join key
4. Cache reused DataFrames
5. Avoid wide transformations early
6. Select only needed columns

Tips

- Start with broadcast join.
 - Persistent LOVES Spark optimization.
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4 Question: ADF Debug — Pipeline is failing randomly

What they asked me

"A pipeline runs sometimes but fails at other times. How will you debug?"



What I said

Step-by-step approach:

1. Check Activity logs → identify which activity fails
2. Verify Linked Service Authentication
3. Validate dataset schema drift
4. Check mapping data flow partitions
5. Check integration runtime capacity
6. Review source-side throttling (SQL / Salesforce API limits)

Tips

- Mention "Integration Runtime throttling" — common in Persistent projects.
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5 Question: SQL — Find Second Highest Salary

What they asked me

"Write SQL to fetch the 2nd highest salary without using MAX twice."

What I said

```
SELECT salary
FROM (
    SELECT salary,
           DENSE_RANK() OVER (ORDER BY salary DESC) AS rnk
      FROM employees
) t
 WHERE rnk = 2;
```

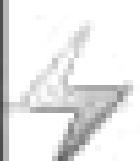
Tips

- Window functions preferred.
 - Avoid LIMIT 1 OFFSET 1 as main answer.
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6 Question: Data Partitioning Strategy

What they asked me

"How do you decide partitioning for a Delta table?"



What I said

I consider:

- High-cardinality (NOT preferred for partitions)
- Query patterns (date-based)
- File size expectations
- Avoid over-partitioning

Example:

Partition by `order_date` (year, month) but NOT by `customer_id`.

Tips

- Always warn about "too many partitions → small file problem".
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7 Question: Data Quality Framework in Databricks

What they asked me

"How do you apply DQ in your Silver zone?"

What I said

DQ Rules applied:

- Null checks
- Duplicate checks
- Pattern checks
- Range checks
- Reference integrity validation

Invalid rows stored in:

`/silver/errors/<table>/<date>/`

Tips

- Persistent LOVES error folder + replay answers.
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8 Question: ADF – How do you implement Incremental Copy?

What they asked me

"You need to move only changed records into ADLS. How do you design this in ADF?"

What I said

1. Maintain `last_watermark` in metadata table
2. Parameterize Copy Activity
3. Use dynamic query:
`SELECT * FROM table WHERE last_updated > @watermark`
4. Update watermark after success
5. Process in Databricks with MERGE

Tips

- Don't say "full load daily" — they reject immediately.
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9 Question: Handle Small File Problem in ADLS

What they asked me

"How do you solve the small file problem?"

What I said

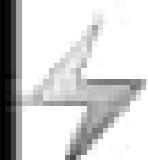
Solutions:

- `df.repartition(10)` or `.coalesce(10)`
- **Enable Auto Optimize + Auto Compaction**
- **Use Delta OPTIMIZE ZORDER**

```
OPTIMIZE silver.orders ZORDER BY (order_date)
```

Tips

- **ZORDER** is a Persistent favorite keyword.
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10 Question: Join Two Delta Tables Efficiently (PySpark)

What they asked me

"Your join on two Delta tables is slow. What will you check?"

What I said

1. Is one table small? → Broadcast
2. Is data skewed? → Repartition or salt
3. Are both tables partitioned properly?
4. Select only needed columns
5. Enable AQE (Adaptive Query Execution)

```
spark.conf.set("spark.sql.adaptive.enabled", True)
```

Tips

- Mention AQE → they love updated Spark knowledge.

