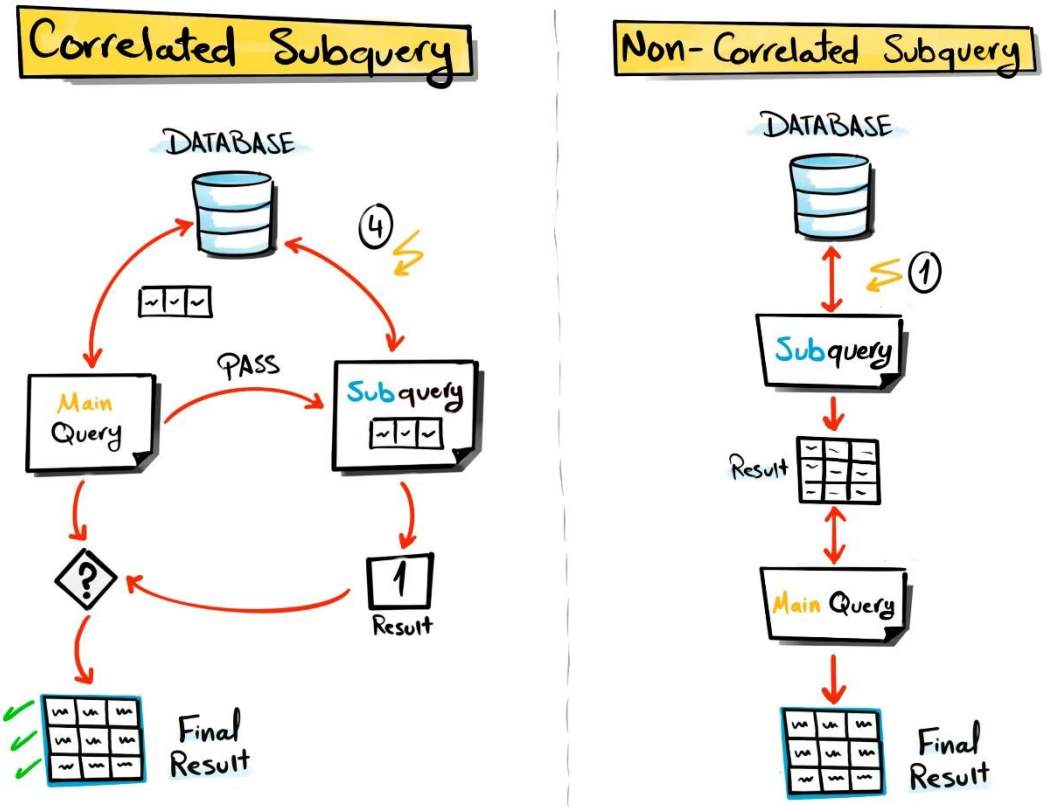
Nitya CloudTech Pvt Ltd.

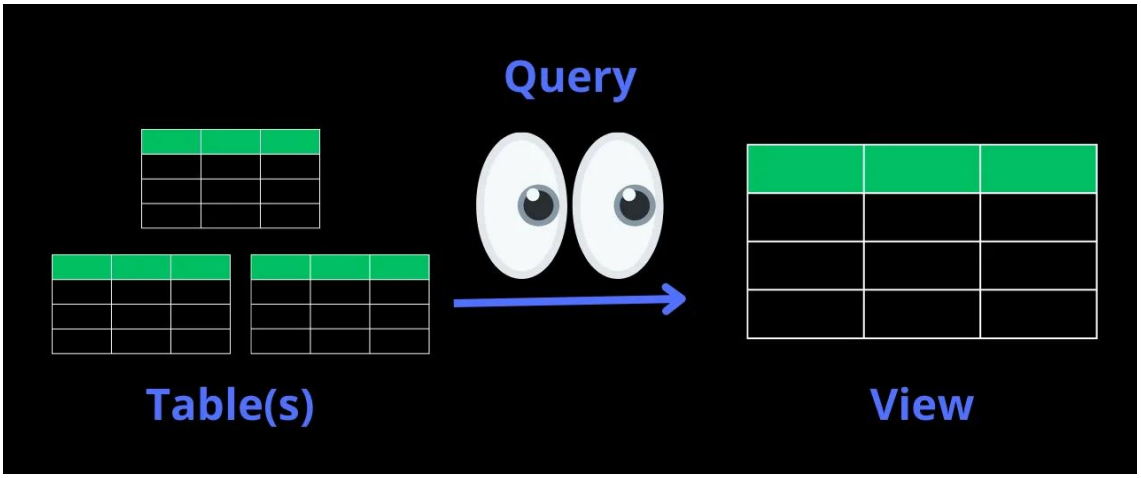
SQL Scenario-Based Interview Questions & Answers

Intermediate to Advanced SQL Questions

1. **What is the difference between correlated and non-correlated subqueries?**
   - **Answer**:
     - **Non-correlated subquery**: A subquery that can be run independently and returns a result which is used by the outer query.
     - **Correlated subquery**: A subquery that refers to columns in the outer query, requiring it to be executed for each row processed by the outer query.



2. **What is a view, and why would you use it?**
   - **Answer**: A view is a virtual table created by a `SELECT` query. It allows for simplified, reusable queries, data security (by restricting access to specific columns), and abstraction over complex joins or aggregations.



3. **How can you find duplicate records in a table?**

➢ **Answer**:

```
SELECT column_name, COUNT(*)
FROM table_name
GROUP BY column_name
HAVING COUNT(*) > 1;
```

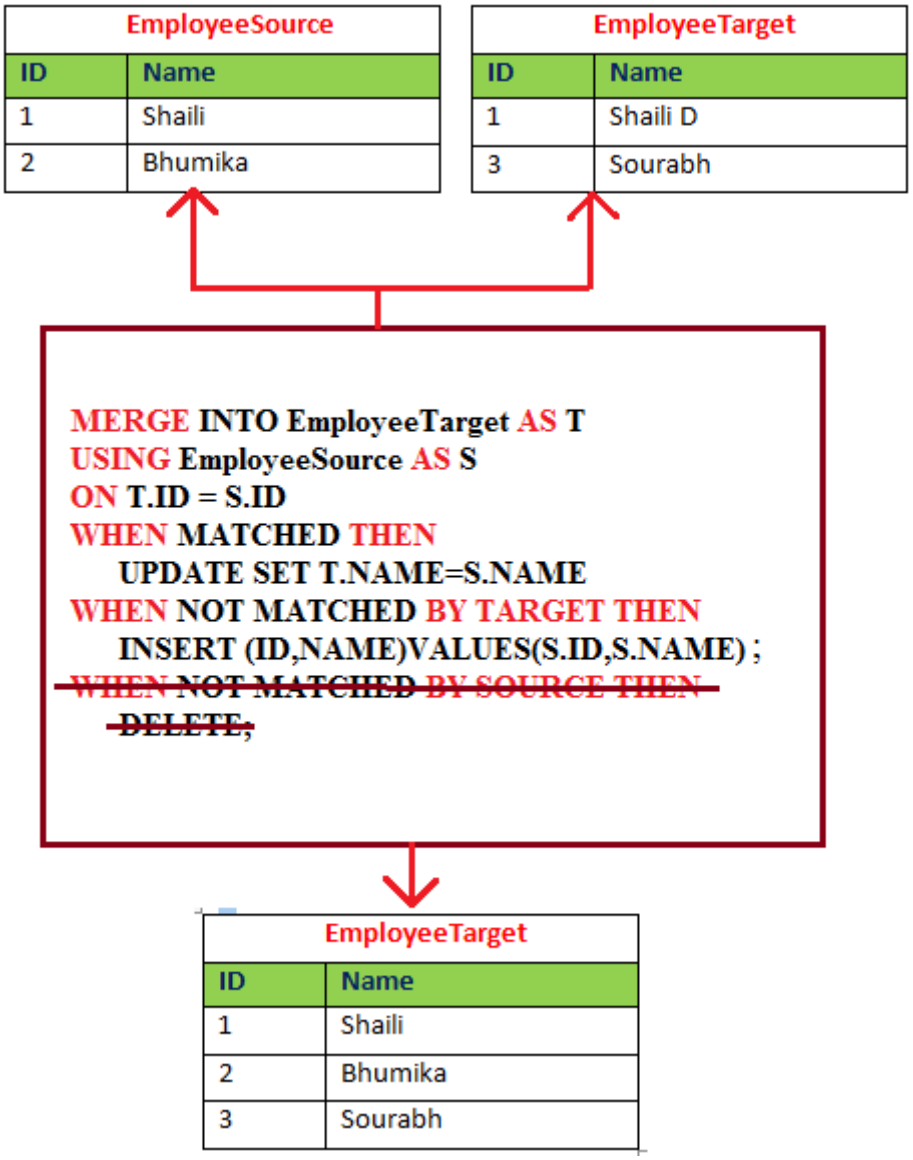
This query groups by the specified column and shows values that appear more than once.

id	first_name	last_name	email
1	Carine	Schmitt	carine.schmitt@verizon.net
4	Janine	Labrune	janine.labrune@aol.com
6	Janine	Labrune	janine.labrune@aol.com
2	Jean	King	jean.king@me.com
12	Jean	King	jean.king@me.com
5	Jonas	Bergulfsen	jonas.bergulfsen@mac.com
10	Julie	Murphy	julie.murphy@yahoo.com
11	Kwai	Lee	kwai.lee@google.com
3	Peter	Ferguson	peter.ferguson@google.com
9	Roland	Keitel	roland.keitel@yahoo.com
14	Roland	Keitel	roland.keitel@yahoo.com
7	Susan	Nelson	susan.nelson@comcast.net
13	Susan	Nelson	susan.nelson@comcast.net
8	Zbyszek	Piestrzeniewicz	zbyszek.piestrzeniewicz@att.net

4. **What is the purpose of the `MERGE` statement?**

➢ **Answer**: `MERGE` allows you to perform `INSERT`, `UPDATE`, or `DELETE` operations in a single statement based on conditions.

It’s commonly used for handling data changes in data warehousing.

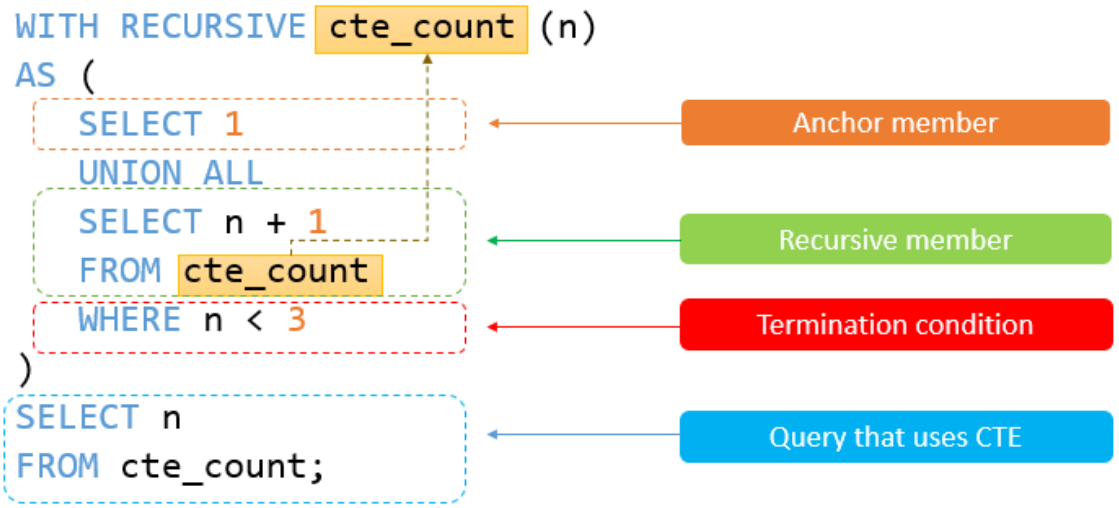


5. What is a recursive CTE?

- **Answer**: A recursive CTE is a CTE that references itself. It's useful for hierarchical data, such as organizational structures or folder directories.

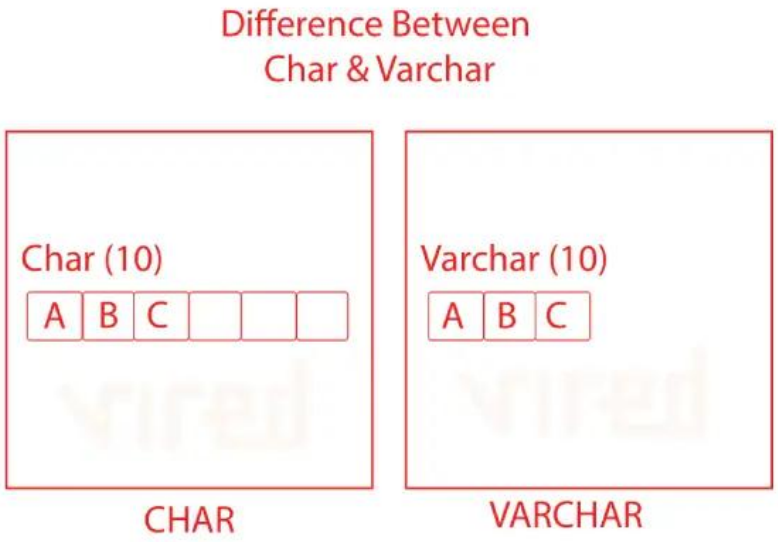
```
WITH RECURSIVE hierarchy AS (
    SELECT employee_id, manager_id
    FROM employees
    WHERE manager_id IS NULL
    UNION ALL
    SELECT e.employee_id, e.manager_id
    FROM employees e
```

```
    INNER JOIN hierarchy h ON e.manager_id
= h.employee_id
)
SELECT * FROM hierarchy;
```



6. What is the difference between CHAR and VARCHAR?

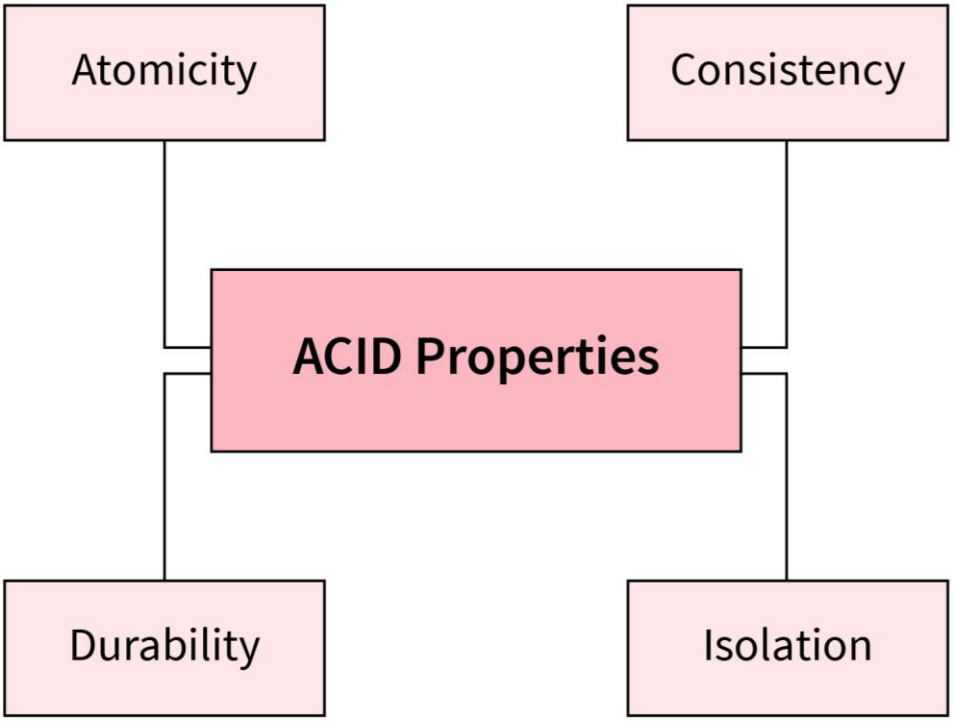
- **Answer**: CHAR is a fixed-length string, padding with spaces if necessary, whereas VARCHAR is a variable-length string, storing only the actual characters. VARCHAR is more space-efficient for variable-length data.



7. Explain `ACID` properties in SQL.

➢ **Answer**:

- **Atomicity**: Ensures that all operations within a transaction are completed; if one fails, the transaction is aborted.
- **Consistency**: Guarantees data integrity by ensuring the database remains valid after a transaction.
- **Isolation**: Ensures transactions are executed independently.
- **Durability**: Ensures completed transactions are saved even if the system crashes.



8. What is a materialized view, and how does it differ from a regular view?

➢ **Answer**: A materialized view stores the query results physically on disk, making data retrieval faster. Unlike regular views, it doesn't require re-running the query each time.

eventname	total_sales
Dolly Parton	10.00
Gotterburg	48.00

events

eventid	catid	eventname
1	8	Gotterburg
18	8	Gotterburg
5311	9	Dolly Parton

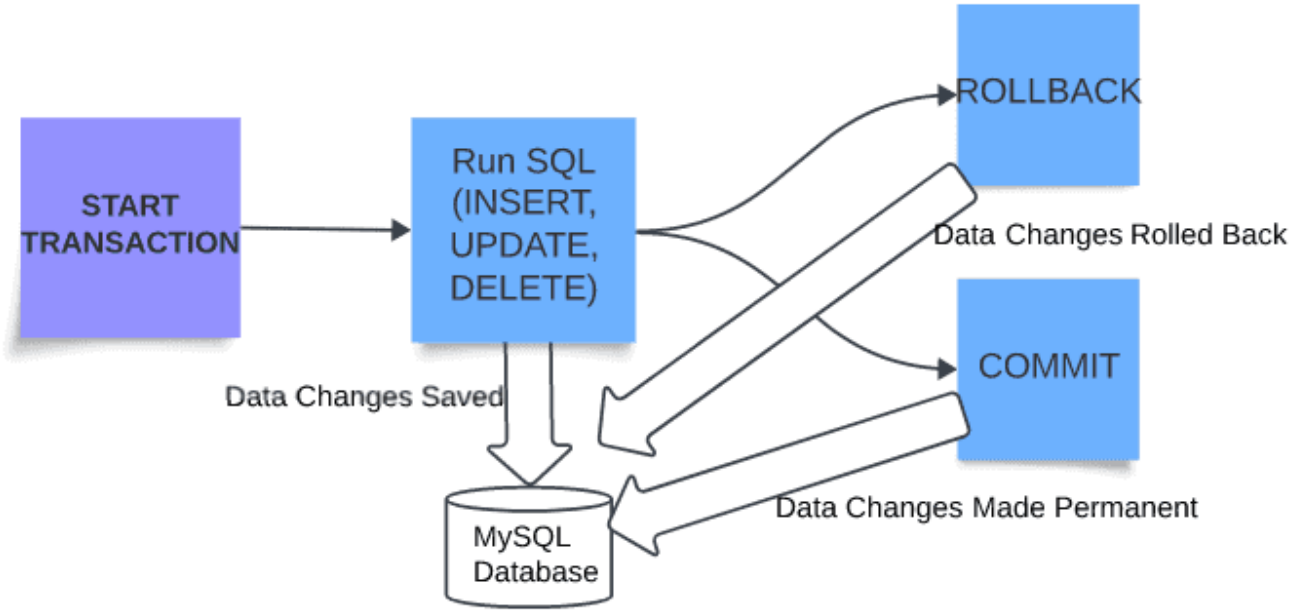
sales

salesid	eventid	cust	price
1	1	c1	12.00
2	18	c1	36.00
3	5311	c2	10.00

9. What are `ROLLBACK`, `COMMIT`, and `SAVEPOINT`?

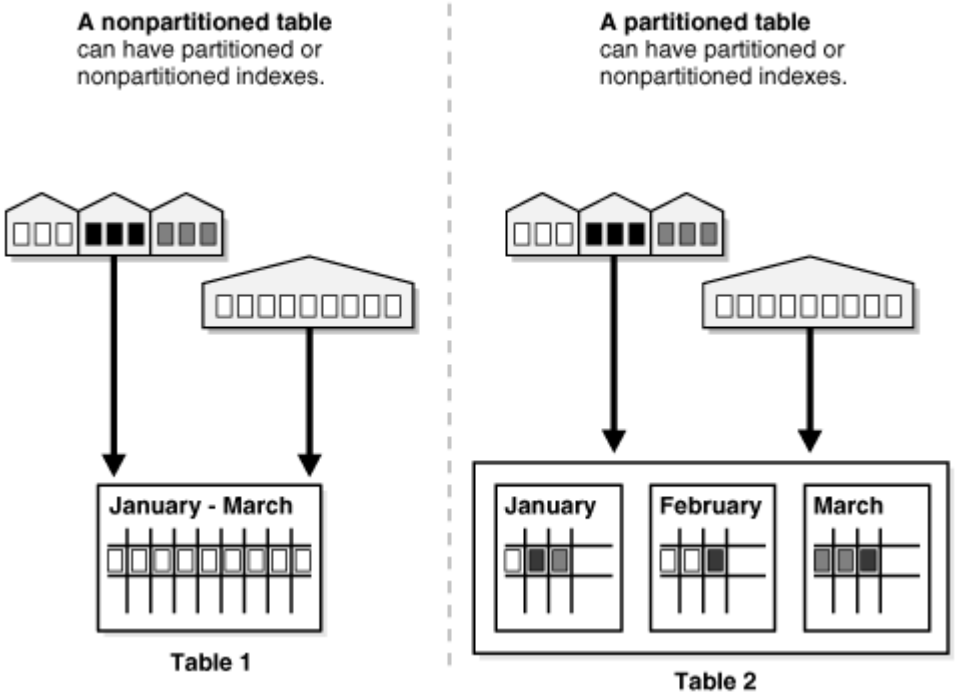
➢ **Answer**:

- **COMMIT**: Saves changes made by the transaction.
- **ROLLBACK**: Reverts changes made by the transaction.
- **SAVEPOINT**: Creates a checkpoint within a transaction to roll back to if needed without rolling back the entire transaction.



10. **What is a partitioned table, and why use it?**

- **Answer**: Partitioning divides a large table into smaller, manageable pieces, improving query performance by reducing the data scanned. Common partitioning strategies are range, list, and hash partitioning.



11. **Explain the `OVER` clause and give an example of its use.**

- **Answer**: The `OVER` clause defines a window for applying window functions. For example:

```
SELECT employee_id, salary,
       AVG(salary) OVER (PARTITION BY
department_id) AS avg_dept_salary
FROM employees;
```

This calculates the average salary for each department.

```
SELECT StudId, SubjectId, Marks,
ROW_NUMBER() OVER
(PARTITION BY StudId ORDER BY Marks DESC) AS [Rank_By_Marks]
FROM dbo.StudentScoreCard
```

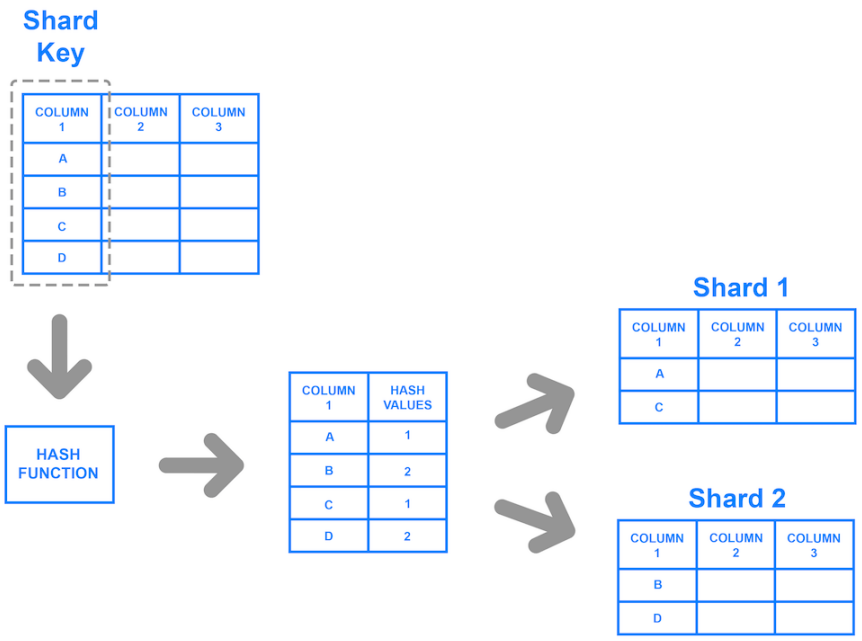
Results | Messages

StudId	SubjectId	Marks	Rank_By_Marks
1	101	85	1
1	102	81	2
1	103	75	3
1	104	70	4
2	101	78	1
2	102	70	2
2	103	65	3
2	104	55	4
3	104	83	1
3	103	70	2
3	101	70	3
3	102	69	4
4	103	90	1
4	104	85	2
4	102	80	3
4	101	77	4

Rank is assigned by partitioning student, rank order is sort based on marks. Highest marks will be on top rank

12. What is database sharding?

➢ **Answer**: Sharding is a database architecture pattern that partitions large datasets across multiple servers. It enhances performance and allows horizontal scaling.



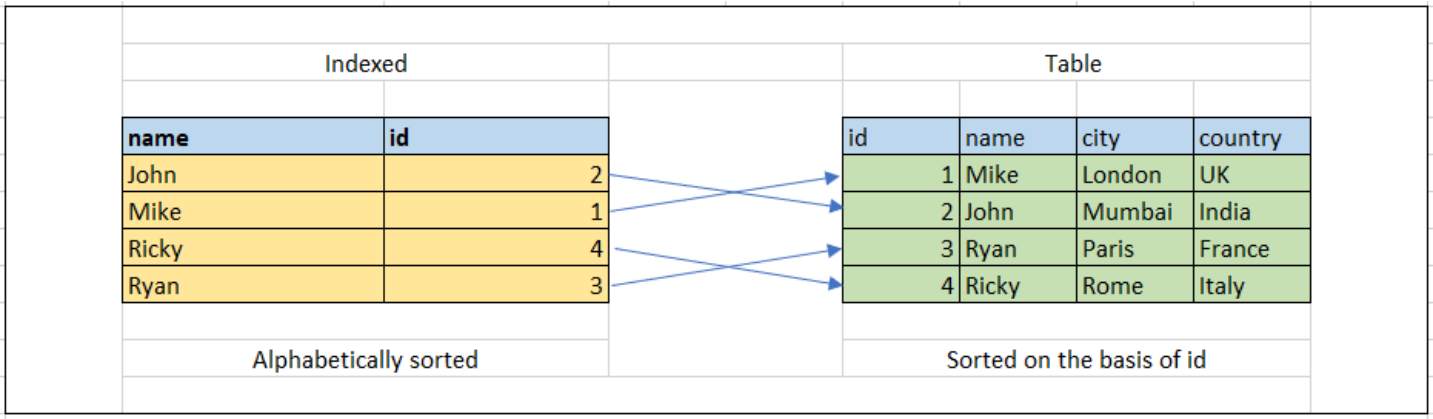
13. **How can you retrieve the current date and time in SQL?**
    - **Answer**: Use the `CURRENT_TIMESTAMP` function or its variations like `GETDATE()` (SQL Server) or `NOW()` (MySQL).

14. **How do you calculate the difference between two dates in SQL?**
    - **Answer**:

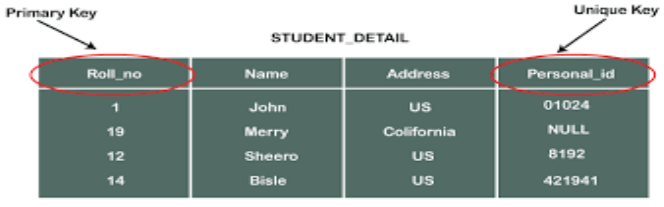
```
SELECT DATEDIFF(day, start_date, end_date)
AS date_difference;
```

The function and syntax vary across database systems (`DATEDIFF`, `TIMESTAMPDIFF`, etc.).

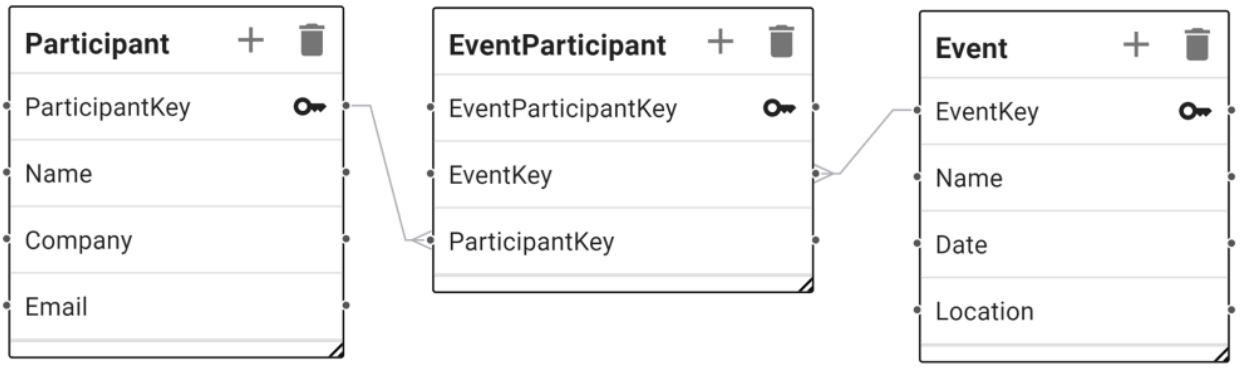
15. **What is the purpose of indexing in SQL, and when should you avoid it?**
    - **Answer**: Indexing speeds up data retrieval. Avoid over-indexing or indexing frequently updated columns, as it can slow down `INSERT`, `UPDATE`, and `DELETE` operations.



16. **Explain `UNIQUE` constraint vs. `PRIMARY KEY`.**
    - **Answer**: Both enforce uniqueness, but a table can have multiple `UNIQUE` constraints, while it can only have one `PRIMARY KEY`, which also disallows nulls.

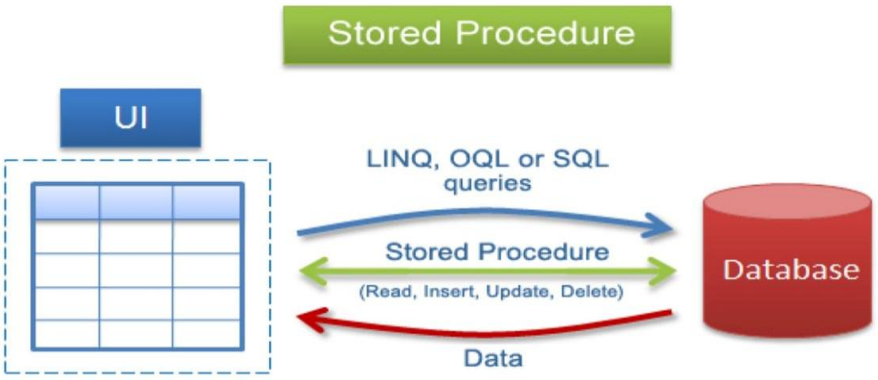


17. **How do you implement many-to-many relationships in SQL?**
    - **Answer**: Use a junction (or associative) table with foreign keys linking the two tables in a many-to-many relationship.



18. **What is the purpose of `COALESCE` and `NULLIF` functions?**
    - **Answer**:
      - **COALESCE**: Returns the first non-null value in a list of arguments.
      - **NULLIF**: Returns null if two expressions are equal; otherwise, it returns the first expression.

19. **How do you handle stored procedure error handling in SQL?**
    - **Answer**: Use `TRY...CATCH` blocks (in SQL Server) or `DECLARE EXIT HANDLER` (in MySQL) to catch and handle errors in stored procedures.



20. What is data denormalization, and when might it be used?

- **Answer**: Denormalization adds redundancy to speed up read operations by combining tables. It's useful in read-heavy applications, particularly in OLAP (Online Analytical Processing).

Student_ID	Name
1	Alex
2	Marie

Student_ID	Assignment_ID	Mark
1	1	20
1	2	35.50
2	1	45
2	2	45

⟹

Student_ID	Name	Total_Marks
1	Alex	55.5
2	Marie	90

These questions expand on essential SQL topics, including database design, data manipulation, indexing, transaction handling, and optimization. Knowing these concepts in depth will help you tackle a broad range of SQL interview questions confidently.

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