Top SQL Interview Q and A

# Basics & Concepts

**Q: What is SQL?**

A: Structured Query Language used to interact with relational databases.

**Q: What is a primary key?**

A: A column that uniquely identifies each row in a table.

**Q: What is a foreign key?**

A: A column that creates a link between two tables.

**Q: What is a database?**

A: An organized collection of structured data.

**Q: What is a table?**

A: A collection of rows and columns to store data in a database.

**Q: What are joins?**

A: Combine rows from two or more tables based on related columns.

**Q: Explain INNER JOIN vs LEFT JOIN vs RIGHT JOIN vs FULL OUTER JOIN.**

A: INNER JOIN: Matches only common records; LEFT JOIN: All from left + matched from right; RIGHT JOIN: All from right + matched from left; FULL OUTER JOIN: All records from both tables.

**Q: What is normalization and why is it important?**

A: Organizing data to reduce redundancy and improve integrity.

**Q: What is denormalization and when is it useful?**

A: Combining tables to improve performance at the cost of redundancy.

**Q: What are indexes and how do they affect performance?**

A: Indexes speed up data retrieval but can slow down inserts/updates.

# Practical Queries & Operations

**Q: Write a SQL query to find duplicate records in a table.**

A: SELECT column, COUNT(\*) FROM table GROUP BY column HAVING COUNT(\*) > 1;

**Q: Write a SQL query to find the second highest salary in an Employee table.**

A: SELECT MAX(salary) FROM Employee WHERE salary < (SELECT MAX(salary) FROM Employee);

**Q: What is the difference between WHERE and HAVING?**

A: WHERE filters rows before aggregation; HAVING filters after aggregation.

**Q: How to perform a case-insensitive search in SQL?**

A: Use UPPER() or LOWER() functions or ILIKE (in PostgreSQL).

**Q: What is a subquery and give an example?**

A: SELECT name FROM Employee WHERE salary > (SELECT AVG(salary) FROM Employee);

**Q: What is the difference between UNION and UNION ALL?**

A: UNION removes duplicates; UNION ALL keeps all rows.

**Q: Explain the difference between CHAR and VARCHAR.**

A: CHAR is fixed-length; VARCHAR is variable-length.

**Q: What is a view? Why use it?**

A: Virtual table based on a query. Simplifies complex queries and provides abstraction.

**Q: What is a stored procedure and when would you use it?**

A: Predefined SQL code for repeated use and encapsulation of logic.

**Q: What is a trigger and an example use-case?**

A: SQL code that runs automatically on INSERT/UPDATE/DELETE. Example: Auto-update audit columns.

# Advanced Concepts & Best Practices

**Q: What is a transaction and why is it important?**

A: A sequence of SQL operations executed as a single unit, ensuring consistency.

**Q: Explain ACID properties.**

A: Atomicity, Consistency, Isolation, Durability.

**Q: What is the difference between DELETE and TRUNCATE?**

A: DELETE removes rows one by one (can be rolled back); TRUNCATE removes all rows (cannot be rolled back).

**Q: What is a composite key?**

A: Primary key consisting of multiple columns.

**Q: How would you optimize a slow query?**

A: Add indexes, avoid SELECT \*, limit subqueries, use joins effectively.

**Q: What is a scalar function vs aggregate function?**

A: Scalar returns single value per row (e.g., UPPER()); aggregate returns summary (e.g., SUM()).

**Q: How do you handle NULL values in SQL?**

A: Use IS NULL, IS NOT NULL, COALESCE(), or IFNULL().

**Q: What is the difference between EXISTS and IN?**

A: EXISTS returns true if subquery returns rows; IN compares a list of values.

**Q: What is a data type mismatch error and how to fix it?**

A: Occurs when comparing incompatible types. Use CAST or CONVERT.

**Q: Explain indexing strategies and their trade-offs.**

A: Clustered index organizes data; non-clustered stores pointers. Improves read speed but can slow writes.