SQL Interview Questions & Answers - 2025 Edition

Q: What are the different types of SQL commands (DDL, DML, DCL, TCL)?

A: DDL (Data Definition Language) defines schema structures like CREATE, ALTER, DROP. DML (Data Manipulation Language) handles data operations such as INSERT, UPDATE, DELETE. DCL (Data Control Language) manages access rights using GRANT and REVOKE. TCL (Transaction Control Language) manages transactions with COMMIT, ROLLBACK, and SAVEPOINT.

Q: Explain JOINs (INNER, LEFT, RIGHT, FULL) with examples.

A: INNER JOIN returns only matching rows from both tables. LEFT JOIN returns all rows from the left table and matching rows from the right. RIGHT JOIN does the opposite. FULL JOIN returns all rows, with NULLs for unmatched records.

Q: What is a subquery? What is a correlated subquery?

A: A subquery is a query nested inside another. A correlated subquery depends on the outer query for its values and executes once per row of the outer query.

Q: What is a CTE (Common Table Expression)? When and why use it?

A: A CTE is a temporary named result set defined with a WITH clause. It improves query readability and supports recursion for hierarchical data.

Q: Explain window functions — e.g. ROW_NUMBER(), RANK(), LAG().

A: Window functions compute values across sets of rows related to the current row. ROW_NUMBER() gives a sequence, RANK() provides ranking with gaps, and LAG() retrieves a previous row value.

Q: What is the difference between GROUP BY and window functions?

A: GROUP BY aggregates and collapses rows into groups. Window functions perform calculations across rows while preserving individual rows.

Q: How do you optimize a slow SQL query?

A: Use indexes efficiently, avoid SELECT *, limit subqueries, analyze execution plans, filter early using WHERE, and update database statistics.

Q: What are indexes? What pros and cons?

A: Indexes improve search speed using data structures like B-trees. Pros: faster lookups. Cons: slower inserts/updates, additional storage space.

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

A: UNION removes duplicates, while UNION ALL includes all records. UNION is slower due to sorting for distinct results.

Q: What is a view? What are its advantages and limitations?

A: A view is a virtual table based on a query. Advantages: simplifies complex queries, adds security, and improves abstraction. Limitations: slower than base tables, dependent on underlying schema.

Q: Explain MERGE / upsert logic.

A: MERGE combines INSERT, UPDATE, and DELETE in one operation. It's commonly used for incremental updates, matching source and target data.

Q: What is normalization and denormalization?

A: Normalization reduces redundancy and improves integrity by splitting tables. Denormalization merges tables to optimize read performance in analytical workloads.

Q: What is a transaction? Explain COMMIT, ROLLBACK, SAVEPOINT.

A: A transaction is a logical unit of work. COMMIT saves changes, ROLLBACK undoes them, and SAVEPOINT allows partial rollbacks.

Q: What is the difference between DELETE and TRUNCATE?

A: DELETE removes specific rows and logs each deletion, allowing rollback. TRUNCATE deletes all rows faster but cannot be rolled back in some databases.

Q: What are SQL constraints (PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK)?

A: PRIMARY KEY uniquely identifies a row. FOREIGN KEY enforces referential integrity. UNIQUE ensures distinct values, NOT NULL disallows nulls, and CHECK validates conditions on data.