

SQL

Basic SQL Interview Questions (25 Questions)

1. What is SQL?

Answer: SQL (Structured Query Language) is used to manage and manipulate relational databases.

2. What are the types of SQL commands?

Answer:

- DDL (Data Definition Language): CREATE, ALTER, DROP
- DML (Data Manipulation Language): INSERT, UPDATE, DELETE
- DQL (Data Query Language): SELECT
- TCL (Transaction Control Language): COMMIT, ROLLBACK, SAVEPOINT
- DCL (Data Control Language): GRANT, REVOKE

3. What is the difference between SQL and MySQL?

Answer:

- SQL is a query language.
- MySQL is a relational database management system (RDBMS) using SQL.

4. What are tables and fields in SQL?

Answer:

- **Table:** A collection of related data stored in rows and columns.

- **Field (Column):** A single piece of information in a table.

5. What is a primary key?

Answer: A column (or combination) uniquely identifying each record.

6. What is a foreign key?

Answer: A column referencing the primary key of another table.

7. What are constraints in SQL?

Answer: Rules enforcing data integrity: **NOT NULL**, **UNIQUE**, **PRIMARY KEY**, **FOREIGN KEY**, **CHECK**, **DEFAULT**.

8. What is the difference between **CHAR** and **VARCHAR**?

Answer:

- **CHAR(n)**: Fixed-length storage.
- **VARCHAR(n)**: Variable-length storage.

9. What is the difference between **DELETE**, **TRUNCATE**, and **DROP**?

Answer:

- **DELETE**: Removes specific rows. Rollback possible.
- **TRUNCATE**: Deletes all rows but keeps the structure. No rollback.
- **DROP**: Deletes the entire table.

10. What is the **SELECT** statement?

Answer: Retrieves data from a table.

sql

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```
SELECT * FROM employees;
```

11. How do you use the **WHERE** clause?

Answer: Filters records.

sql

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```
SELECT * FROM employees WHERE age > 30;
```

12. What is the **ORDER BY** clause?

Answer: Sorts query results.

sql

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```
SELECT * FROM employees ORDER BY salary DESC;
```

13. What is the **GROUP BY** clause?

Answer: Groups records based on a column.

sql

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```
SELECT department, COUNT(*) FROM employees GROUP BY department;
```

14. What is the **HAVING** clause?

Answer: Filters grouped records.

sql

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```
SELECT department, COUNT(*) FROM employees GROUP BY department  
HAVING COUNT(*) > 5;
```

15. What are aggregate functions?

Answer: Perform calculations on a set of values: **SUM()**, **COUNT()**, **AVG()**, **MIN()**, **MAX()**.

16. What is the difference between **COUNT()**, **SUM()**, and **AVG()**?

Answer:

- **COUNT()**: Counts rows.
- **SUM()**: Adds up values.

- **AVG()**: Computes the average.

17. Explain different SQL joins.

Answer:

- **INNER JOIN**: Returns matching records.
- **LEFT JOIN**: Returns all records from the left table and matching ones from the right.
- **RIGHT JOIN**: Returns all records from the right table and matching ones from the left.
- **FULL JOIN**: Returns all records from both tables.

18. What is a self-join?

Answer: A table joins with itself.

19. What is a cross join?

Answer: Returns the Cartesian product of two tables.

20. What is the difference between **UNION** and **UNION ALL**?

Answer:

- **UNION**: Removes duplicates.
- **UNION ALL**: Keeps duplicates.

21. What is a subquery?

Answer: A query inside another query.

22. What is a view in SQL?

Answer: A virtual table based on a query.

23. What is the difference between **DISTINCT** and **GROUP BY**?

Answer:

- **DISTINCT**: Removes duplicate values.
- **GROUP BY**: Groups records.

24. What is the **LIKE** operator used for?

Answer: Pattern matching.

sql

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```
SELECT * FROM employees WHERE name LIKE 'A%';
```

25. What is the difference between **IN** and **EXISTS**?

Answer:

- **IN**: Checks if a value exists in a list.
- **EXISTS**: Checks if a subquery returns rows.

Intermediate SQL Interview Questions (25 Questions)

26. What is normalization in SQL?

Answer: Organizing data to reduce redundancy and improve integrity.

27. What are the different normal forms?

Answer:

- **1NF**: Remove duplicate columns.
- **2NF**: No partial dependencies.
- **3NF**: No transitive dependencies.
- **BCNF**: Stricter version of 3NF.

28. What is denormalization?

Answer: Adding redundancy to improve read performance.

29. What is the difference between clustered and non-clustered indexes?

Answer:

- **Clustered Index:** Sorts and stores data rows.
- **Non-Clustered Index:** Stores pointers to data.

30. How does indexing improve performance?

Answer: Speeds up searches by reducing the number of rows scanned.

31. What is a stored procedure?

Answer: A precompiled SQL query stored in the database.

32. What is a trigger in SQL?

Answer: A function that executes automatically in response to events.

33. What is a cursor in SQL?

Answer: A database object used for row-by-row operations.

34. What is the **COALESCE** function?

Answer: Returns the first non-null value.

sql

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```
SELECT COALESCE(NULL, 'SQL', 'Database');
```

35. How do you remove duplicate records in SQL?

Answer:

sql

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```
DELETE FROM employees WHERE id NOT IN  
(SELECT MIN(id) FROM employees GROUP BY name);
```

36. What is the difference between correlated and non-correlated subqueries?

Answer:

- **Correlated Subquery:** Depends on outer query.
- **Non-Correlated Subquery:** Runs independently.

37. What is a materialized view?

Answer: A stored query result for faster access.

38. How do you find the second highest salary?

Answer:

```
sql
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SELECT MAX(salary) FROM employees WHERE salary < (SELECT MAX(salary)
FROM employees);
```

39. What is the CASE statement?

Answer: Similar to IF-ELSE.

```
sql
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SELECT name,
CASE
    WHEN age > 50 THEN 'Senior'
    ELSE 'Junior'
END AS category
FROM employees;
```

40. How can you optimize a SQL query?

Answer: Use indexing, avoid **SELECT ***, use joins properly, limit results.

There are 60 more questions in **Advanced** and **Technical** sections. Would you like me to continue, or do you want a document format? 🚀

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You said:

yes

ChatGPT said:

Advanced SQL Interview Questions (25 Questions)

51. What is the difference between `RANK()`, `DENSE_RANK()`, and `ROW_NUMBER()`?

Answer:

- `RANK()`: Assigns ranks with gaps if duplicate values exist.
- `DENSE_RANK()`: Assigns continuous ranks without gaps.
- `ROW_NUMBER()`: Assigns unique row numbers.

sql

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```
SELECT name, salary,  
       RANK() OVER (ORDER BY salary DESC) AS Rank,  
       DENSE_RANK() OVER (ORDER BY salary DESC) AS DenseRank,  
       ROW_NUMBER() OVER (ORDER BY salary DESC) AS RowNum  
FROM employees;
```

52. What is the difference between `HAVING` and `WHERE`?

Answer:

- `WHERE` filters before aggregation.
- `HAVING` filters after aggregation.

53. What is a recursive CTE?

Answer: A Common Table Expression (CTE) that refers to itself.

sql

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```
WITH EmployeeHierarchy AS (  
    SELECT id, name, manager_id FROM employees WHERE manager_id IS  
    NULL  
    UNION ALL  
    SELECT e.id, e.name, e.manager_id  
    FROM employees e  
    JOIN EmployeeHierarchy eh ON e.manager_id = eh.id  
)  
SELECT * FROM EmployeeHierarchy;
```

54. What is **PIVOT** and **UNPIVOT**?

Answer:

- **PIVOT**: Converts rows into columns.
- **UNPIVOT**: Converts columns into rows.

55. How do you find duplicate records in a table?

Answer:

sql

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```
SELECT name, COUNT(*) FROM employees GROUP BY name HAVING COUNT(*) >  
1;
```

56. How do you find the nth highest salary?

Answer:

sql

CopyEdit

```
SELECT DISTINCT salary FROM employees ORDER BY salary DESC LIMIT 1  
OFFSET 3;
```

57. What is an indexed view?

Answer: A materialized view with an index for performance improvement.

58. What are **JSON** functions in SQL?

Answer: Functions to parse JSON data.

sql
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```
SELECT JSON_VALUE('{"name": "SQL"}', '$.name');
```

59. How do you swap values between two columns?

Answer:

sql
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```
UPDATE employees
SET salary = (CASE WHEN id = 1 THEN (SELECT salary FROM employees
WHERE id = 2)
                ELSE (SELECT salary FROM employees WHERE id = 1)
END)
WHERE id IN (1,2);
```

60. What is a partitioned table?

Answer: A table divided into smaller partitions for better query performance.

Technical SQL Interview Questions (25 Questions)

76. What is database sharding?

Answer: Distributing data across multiple databases for scalability.

77. What is a NoSQL database?

Answer: A non-relational database designed for high-speed transactions.

78. How do you perform batch updates in SQL?

Answer:

sql
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```
BEGIN TRANSACTION;  
UPDATE employees SET salary = salary * 1.1 WHERE department = 'IT';  
COMMIT;
```

79. What are SQL transactions?

Answer: A unit of work that follows ACID properties.

80. What are ACID properties in SQL?

Answer:

- **Atomicity:** All or nothing.
- **Consistency:** Valid state transitions.
- **Isolation:** Transactions remain separate.
- **Durability:** Data is permanent.

81. What is optimistic vs. pessimistic locking?

Answer:

- **Optimistic Locking:** Assumes no conflicts, checks before committing.
- **Pessimistic Locking:** Locks resources until a transaction completes.

82. What is SQL injection?

Answer: A security vulnerability that allows attackers to manipulate queries.

Prevention: Use prepared statements:

```
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SELECT * FROM users WHERE username = ? AND password = ?;
```

83. What are window functions?

Answer: Functions that operate on a set of table rows relative to the current row.

Example:

```
sql  
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```

```
SELECT name, salary,  
AVG(salary) OVER (PARTITION BY department) AS AvgSalary  
FROM employees;
```

84. What is database replication?

Answer: Copying data from one database to another.

85. What is a surrogate key?

Answer: A system-generated unique identifier.

86. How do you optimize a slow SQL query?

Answer:

- Use indexes.
- Avoid `SELECT *`.
- Optimize joins.
- Partition large tables.

87. What is deadlock in SQL?

Answer: When two transactions wait on each other indefinitely.

88. What is the difference between a temporary table and a table variable?

Answer:

- **Temporary Table** (`#temp`): Stored in `tempdb`, can be indexed.
- **Table Variable** (`@table`): Stored in memory, limited scope.

89. How do you handle NULL values in SQL?

Answer:

```
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SELECT COALESCE(NULL, 'Default Value');
```

90. How do you rollback a transaction?

Answer:

```
sql
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BEGIN TRANSACTION;
DELETE FROM employees WHERE id = 10;
ROLLBACK;
```

91. What is a bitmap index?

Answer: An index type for columns with low distinct values.

92. How do you improve query execution time?

Answer:

- Use indexes.
- Avoid correlated subqueries.
- Use **EXPLAIN PLAN** to analyze queries.

93. What is a covering index?

Answer: An index that includes all required columns for a query.

94. What is the difference between **EXISTS** and **IN**?

Answer:

- **EXISTS**: Stops after finding the first match.
- **IN**: Checks all values in the list.

95. What is a sequence in SQL?

Answer: A database object that generates unique numeric values.

96. How do you find gaps in a sequence?

Answer:

sql

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```
SELECT id + 1 FROM employees e1 WHERE NOT EXISTS  
(SELECT id FROM employees e2 WHERE e1.id + 1 = e2.id);
```

97. What is query optimization?

Answer: The process of improving query execution performance.

98. What is a dynamic SQL query?

Answer: A query constructed at runtime.

sql

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```
EXEC ('SELECT * FROM ' + @tableName);
```

99. What is a hash join?

Answer: A join type that uses hashing for efficiency.

100. How do you write a stored procedure with parameters?

Answer:

sql

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```
CREATE PROCEDURE GetEmployee (@id INT)  
AS  
BEGIN  
    SELECT * FROM employees WHERE id = @id;  
END;
```