

Essential SQL Interview Questions & Answers

1. What is SQL?

Answer:

SQL (Structured Query Language) is a standard language for storing, manipulating, and retrieving data in relational databases.

2. Name the different types of SQL commands

Answer:

- **DDL** (Data Definition Language): CREATE, ALTER, DROP, TRUNCATE
 - **DML** (Data Manipulation Language): SELECT, INSERT, UPDATE, DELETE
 - **DCL** (Data Control Language): GRANT, REVOKE
 - **TCL** (Transaction Control Language): COMMIT, ROLLBACK, SAVEPOINT
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3. What is a primary key?

Answer:

A primary key uniquely identifies each record in a table. It must contain unique values and cannot contain NULLs.

4. What is a foreign key?

Answer:

A foreign key is a field (or collection of fields) in one table that refers to the primary key in another table, establishing a relationship between the two tables.

5. How do you select unique values from a column?

Answer:

```
SELECT DISTINCT column_name FROM table_name;
```

6. What is the difference between INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL JOIN?

Answer:

- **INNER JOIN:** Returns records with matching values in both tables.
 - **LEFT JOIN (LEFT OUTER JOIN):** Returns all records from the left table and matched records from the right table; NULL for no match.
 - **RIGHT JOIN (RIGHT OUTER JOIN):** Returns all records from the right table and matched records from the left table; NULL for no match.
 - **FULL JOIN (FULL OUTER JOIN):** Returns all records when there is a match in either left or right table; NULL where there is no match.
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7. How do you filter records in SQL?

Answer:

Use the `WHERE` clause:

```
SELECT * FROM table_name WHERE condition;
```

8. How do you sort results in SQL?

Answer:

Use the `ORDER BY` clause:

```
SELECT * FROM table_name ORDER BY column_name [ASC|DESC];
```

9. How do you group data in SQL?

Answer:

Use the `GROUP BY` clause:

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

10. What is the difference between WHERE and HAVING?

Answer:

- `WHERE` filters rows before grouping.

- HAVING filters groups after aggregation.

11. How do you update data in SQL?

Answer:

```
UPDATE table_name SET column1 = value1 WHERE condition;
```

12. How do you delete data in SQL?

Answer:

```
DELETE FROM table_name WHERE condition;
```

13. How do you insert data in SQL?

Answer:

```
INSERT INTO table_name (column1, column2) VALUES (value1, value2);
```

14. What is a subquery?

Answer:

A subquery is a query nested inside another query.

15. How do you find the second highest salary from an Employee table?

Answer:

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

16. What is normalization? Name its types.

Answer:

Normalization is the process of organizing data to reduce redundancy.

Types: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

17. What is denormalization?

Answer:

Denormalization is the process of combining tables to improve read performance, at the cost of redundancy.

18. What is an index? Why is it used?

Answer:

An index is a database object that improves the speed of data retrieval. It is created on columns used in search conditions.

19. How do you get the current date in SQL?

Answer:

- SQL Server: `SELECT GETDATE();`
 - MySQL: `SELECT NOW();`
 - Oracle: `SELECT SYSDATE FROM dual;`
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20. What is the difference between DELETE, TRUNCATE, and DROP?

Answer:

- **DELETE:** Removes rows based on condition, can be rolled back.
 - **TRUNCATE:** Removes all rows, cannot be rolled back (in most DBs), resets identity.
 - **DROP:** Deletes the entire table structure.
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21. How do you find duplicate records in a table?

Answer:

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

22. What is a view?

Answer:

A view is a virtual table based on the result of a SQL statement.

23. What is a stored procedure?

Answer:

A stored procedure is a set of SQL statements that can be executed as a program.

24. What is a trigger?

Answer:

A trigger is a set of SQL statements that automatically executes in response to certain events on a table or view.

25. How do you limit the number of rows returned?

Answer:

- SQL Server: `SELECT TOP 10 * FROM table_name;`
 - MySQL/SQLite/PostgreSQL: `SELECT * FROM table_name LIMIT 10;`
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26. How do you perform a case-insensitive search?

Answer:

```
SELECT * FROM table_name WHERE LOWER(column_name) = 'value';
```

27. How do you concatenate strings in SQL?

Answer:

- SQL Server: `SELECT column1 + column2 FROM table_name;`
- MySQL: `SELECT CONCAT(column1, column2) FROM table_name;`

28. How do you rename a column in the result set?

Answer:

```
SELECT column_name AS new_name FROM table_name;
```

29. How do you get the number of records in a table?

Answer:

```
SELECT COUNT(*) FROM table_name;
```

30. What is a self join?

Answer:

A self join is a regular join but the table is joined with itself.

31. How do you select all columns from two tables with the same column names?

Answer:

Use table aliases:

```
SELECT a.*, b.*  
FROM table1 a  
JOIN table2 b ON a.id = b.id;
```

32. How do you retrieve only the first N characters of a string?

Answer:

- SQL Server: `SELECT LEFT(column_name, N) FROM table_name;`
 - MySQL: `SELECT SUBSTRING(column_name, 1, N) FROM table_name;`
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33. How do you check for NULL values?

Answer:

```
SELECT * FROM table_name WHERE column_name IS NULL;
```

34. How do you replace NULL with a default value?

Answer:

- SQL Server: `SELECT ISNULL(column_name, 'default') FROM table_name;`
 - MySQL/Oracle: `SELECT IFNULL(column_name, 'default') FROM table_name;`
 - PostgreSQL: `SELECT COALESCE(column_name, 'default') FROM table_name;`
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35. What is a composite key?

Answer:

A composite key is a combination of two or more columns used to uniquely identify a row.

36. How do you perform a UNION of two queries?

Answer:

```
SELECT column1 FROM table1
UNION
SELECT column1 FROM table2;
```

Use `UNION ALL` to include duplicates.

37. What is a CTE (Common Table Expression)?

Answer:

A CTE is a temporary result set that can be referenced within a SELECT, INSERT, UPDATE, or DELETE statement.

```
WITH cte_name AS (
    SELECT column1 FROM table1
)
SELECT * FROM cte_name;
```

38. How do you get the nth highest value in a column?

Answer:

```
SELECT DISTINCT column_name  
FROM table_name  
ORDER BY column_name DESC  
LIMIT n-1,1; -- MySQL
```

For SQL Server, use `ROW_NUMBER()`.

39. What is the difference between UNION and JOIN?

Answer:

- UNION combines the result of two queries with the same number of columns.
- JOIN combines columns from two or more tables based on a related column.

40. How do you add a new column to an existing table?

Answer:

```
ALTER TABLE table_name ADD column_name datatype;
```

41. How do you change the data type of a column?

Answer:

```
ALTER TABLE table_name ALTER COLUMN column_name new_datatype; -- SQL Server  
ALTER TABLE table_name MODIFY column_name new_datatype; -- MySQL/Oracle
```

42. How do you remove a column from a table?

Answer:

```
ALTER TABLE table_name DROP COLUMN column_name;
```

43. How do you copy data from one table to another?

Answer:


```
INSERT INTO table2 (column1, column2)
SELECT column1, column2 FROM table1;
```

44. How do you find the maximum/minimum value in a column?

Answer:

```
SELECT MAX(column_name) FROM table_name;
SELECT MIN(column_name) FROM table_name;
```

45. How do you calculate the average of a column?

Answer:

```
SELECT AVG(column_name) FROM table_name;
```

46. How do you use the CASE statement in SQL?

Answer:

```
SELECT column_name,
CASE
    WHEN condition THEN 'Result1'
    ELSE 'Result2'
END AS new_column
FROM table_name;
```

47. What is a transaction in SQL?

Answer:

A transaction is a sequence of operations performed as a single logical unit of work. It is either fully completed or not executed at all.

48. How do you start and end a transaction?

Answer:

```
BEGIN TRANSACTION;  
-- SQL statements  
COMMIT; -- or ROLLBACK;
```

49. What is ACID property in databases?

Answer:

- **Atomicity:** All or nothing.
 - **Consistency:** Data must be valid.
 - **Isolation:** Transactions do not interfere.
 - **Durability:** Once committed, changes are permanent.
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50. How do you get the difference between two dates?

Answer:

- **SQL Server:** DATEDIFF(day, date1, date2)
 - **MySQL:** DATEDIFF(date2, date1)
 - **Oracle:** date2 - date1
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