SQL Interview Questions & Answers

1. What is SQL?

- SQL stands for Structured Query Language. It is used to communicate with and manipulate databases.

2. What is a database?

- A database is a collection of organized data that can be easily accessed, managed, and updated.

3. What is a table in SQL?

- A table is a structure in a database that stores data in rows and columns.

4. What is a primary key?

- A primary key is a unique identifier for a record in a table. It must contain unique values and cannot be null.

5. What is a foreign key?

- A foreign key is a column or a set of columns in one table that uniquely identifies a row in another table, creating a link between the two tables.

6. What does the SELECT statement do?

- The SELECT statement retrieves data from a database.

7. How do you select all columns from a table?

- SELECT * FROM table_name;

8. How do you filter records in SQL?

- You use the WHERE clause to filter records.
- **Example:** SELECT * FROM table_name WHERE condition;

9. How do you sort records in SQL?

- Use the ORDER BY clause to sort records.
- **Example:** SELECT * FROM table_name ORDER BY column_name;

10. What is the purpose of the DISTINCT keyword?

- DISTINCT removes duplicate records from the result set.
- **Example:** SELECT DISTINCT column_name FROM table_name;

11. How do you find the number of rows in a table?

- Use the COUNT function
- SELECT COUNT(*) FROM table_name;

12. What is the difference between the WHERE and HAVING clauses?

- WHERE filters records before grouping, while HAVING filters groups after grouping.

13. What is a JOIN in SQL?

- JOIN combines rows from two or more tables based on a related column.

14. What is an INNER JOIN?

- INNER JOIN returns rows with matching values in both tables.

15. How do you perform a LEFT JOIN?

- SELECT columns FROM table1 LEFT JOIN table2 ON table1.column = table2.column;

16. What is a UNION in SQL?

- UNION combines the results of two or more SELECT queries and removes duplicates.

17. What is the difference between UNION and UNION ALL?

- UNION removes duplicates, while UNION ALL includes all duplicates.

18. What is a subquery?

- A subquery is a query nested inside another query.

19. How do you update existing records in a table?

- Use the UPDATE statement
- UPDATE table_name SET column_name = value WHERE condition;

20. How do you delete records from a table?

- Use the DELETE statement
- DELETE FROM table_name WHERE condition;

21. How do you insert new records into a table?

- Use the INSERT INTO statement
- INSERT INTO table_name (column1, column2) VALUES (value1, value2);

22. What is a NULL value in SQL?

- NULL represents missing or unknown data in a table.

23. What is normalization?

- Normalization organizes data to reduce redundancy and improve data integrity.

24. What are the common SQL data types?

- Common data types include INTEGER, VARCHAR, DATE, and FLOAT.

25. What is the purpose of the GROUP BY clause?

- GROUP BY is used to group rows that have the same values in specified columns into summary rows.

26. What is a window function in SQL?

- A window function performs calculations across a set of table rows that are related to the current row, without collapsing the result set. Examples include ROW_NUMBER(), RANK(), and SUM().

27. How does the PARTITION BY clause work with window functions?

- PARTITION BY divides the result set into partitions to which the window function is applied. Each partition is processed separately.

28. What is the ROW_NUMBER() function used for?

- ROW_NUMBER() assigns a unique sequential integer to rows within a partition of a result set. Example: ROW_NUMBER() OVER (PARTITION BY column_name ORDER BY column_name)

29. How does the RANK() function differ from DENSE_RANK()?

- RANK() assigns ranks with gaps in case of ties, whereas DENSE_RANK() assigns consecutive ranks without gaps for ties.

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

- A CTE is a temporary result set defined within the execution scope of a single SQL statement. It simplifies complex queries and improves readability.

31. How do you write a recursive CTE?

- WITH RECURSIVE cte_name AS (SELECT_statement UNION ALL SELECT_statement FROM cte_name) SELECT * FROM cte_name;

32. What is a cursor and when would you use it?

- A cursor is a database object that allows row-by-row processing of the result set. It's useful when operations need to be performed on each row individually.

33. How do you handle transactions in SQL?

- Transactions are handled with BEGIN TRANSACTION, COMMIT to save changes, and ROLLBACK to undo changes if there's an error.

34. What is a materialized view?

- A materialized view is a precomputed table that stores the results of a query, which can improve performance for complex queries by avoiding repetitive calculations.

35. How does a clustered index differ from a non-clustered index?

- A clustered index determines the physical order of data in a table, whereas a non-clustered index is a separate structure that points to the data's physical location.

36. What is the purpose of the EXCEPT clause?

- EXCEPT returns distinct rows from the first SELECT statement that are not present in the second SELECT statement.

37. What is the difference between UNION and UNION ALL?

- UNION removes duplicate rows from the result set, while UNION ALL includes all duplicates.

38. What are ACID properties in SQL?

- ACID stands for Atomicity, Consistency, Isolation, and Durability, ensuring reliable transactions in the database.

39. What is a self-join?

- A self-join is a join where a table is joined with itself to compare rows within the same table.

40. How does a non-clustered index improve query performance?

- A non-clustered index creates a separate structure from the table data that speeds up retrieval by using a pointer to the actual data rows.

41. What is data denormalization and why is it used?

- Denormalization involves combining tables to improve query performance and simplify complex queries, often at the cost of data redundancy.

42. What is a stored procedure and when should it be used?

- A stored procedure is a precompiled collection of SQL statements that can be executed as a unit. It's used to encapsulate repetitive tasks and improve performance and security.

43. What is a trigger in SQL?

- A trigger is a set of actions that automatically execute in response to certain events on a table or view, such as INSERT, UPDATE, or DELETE.

44. How do you handle complex joins in SQL?

- Complex joins involve combining multiple tables using different join types (INNER, LEFT, RIGHT, FULL) to fetch and analyze data from multiple sources.

45. What is an index seek and index scan?

- Index seek is a query operation that uses an index to find the exact rows, while index scan reads the entire index to retrieve the data, which is less efficient.

46. What are the advantages and disadvantages of indexing?

- Indexing speeds up query performance but can slow down data modification operations (INSERT, UPDATE, DELETE) due to the need to update the index.

47. How does SQL Server handle locking and concurrency?

- SQL Server uses various isolation levels and locking mechanisms to manage concurrent access to data and prevent conflicts.

48. What is a full-text search and how does it work?

- Full-text search allows for sophisticated search capabilities within text columns by using special indexes to improve performance and relevance.

49. What is the purpose of the WITH (NOLOCK) hint?

- The WITH (NOLOCK) hint allows reading data without acquiring a lock, potentially improving performance but risking reading uncommitted or inconsistent data.

50. How do you optimize SQL queries for performance?

- Query optimization involves analyzing execution plans, creating appropriate indexes, avoiding unnecessary calculations, and reducing the complexity of joins and subqueries.