

MySQL

1. **What is the purpose of the SQL SELECT statement, and how is it used to retrieve data from a database?**

The SQL SELECT statement is used to query the database and retrieve data from one or more tables. It can include various clauses such as WHERE, JOIN, and GROUP BY to filter and aggregate the data. Example: `SELECT column1, column2 FROM table_name WHERE condition;`

2. **Explain the difference between INNER JOIN and LEFT JOIN in SQL.**

INNER JOIN returns only the rows that have matching values in both tables. LEFT JOIN returns all rows from the left table and the matched rows from the right table; if there is no match, NULL values are returned for columns from the right table.

3. **What is a primary key in SQL, and why is it important?**

A primary key is a unique identifier for a record in a table. It ensures that each record can be uniquely identified and is used to maintain data integrity. It cannot contain NULL values.

4. **What is a foreign key in SQL?**

A foreign key is a field (or collection of fields) in one table that uniquely identifies a row in another table. It establishes a link between the two tables and enforces referential integrity.

5. **Explain the difference between WHERE and HAVING clauses.**

The WHERE clause is used to filter records before any groupings are made, whereas the HAVING clause is used to filter records after groupings are made by the GROUP BY clause.

6. **What is an aggregate function in SQL? Provide examples.**

Aggregate functions perform a calculation on a set of values and return a single value. Examples include `COUNT()`, `SUM()`, `AVG()`, `MIN()`, and `MAX()`.

7. **What is the purpose of the GROUP BY clause in SQL?**

The GROUP BY clause groups rows that have the same values into summary rows, like finding the total or average for each group. It is often used with aggregate functions.

8. **How do you create a new table in SQL?**

You create a new table using the CREATE TABLE statement. Example:

```
CREATE TABLE table_name (  
    column1 datatype constraint,  
    column2 datatype constraint,  
    ...
```

);

9. What is the purpose of the SQL INSERT statement?

The INSERT statement is used to add new rows of data to a table. Example: INSERT INTO table_name (column1, column2) VALUES (value1, value2);.

10. How do you update data in a SQL table?

You update data using the UPDATE statement. Example: UPDATE table_name SET column1 = value1 WHERE condition;.

11. What is the purpose of the SQL DELETE statement?

The DELETE statement is used to remove rows from a table based on a specified condition. Example: DELETE FROM table_name WHERE condition;.

12. What is a SQL view, and why would you use it?

A view is a virtual table that is based on the result of a SELECT query. It is used to simplify complex queries, enhance security by restricting access to certain data, and provide a consistent interface.

13. What is a stored procedure in SQL?

A stored procedure is a precompiled collection of SQL statements that can be executed as a single unit. It is used to encapsulate logic, improve performance, and reduce code duplication.

14. How do you create a stored procedure in SQL?

You create a stored procedure using the CREATE PROCEDURE statement. Example:

```
CREATE PROCEDURE procedure_name  
  
AS  
  
BEGIN  
  
    -- SQL statements  
  
END;
```

15. What is an index in SQL, and why is it used?

An index is a database object that improves the speed of data retrieval operations on a table. It is used to quickly locate and access data without having to search every row in the table.

16. What is the difference between a clustered and a non-clustered index?

A clustered index determines the physical order of data in a table, and there can be only one clustered index per table. A non-clustered index creates a logical order and a separate structure from the data.

17. What is a transaction in SQL, and what are its properties?

A transaction is a sequence of operations performed as a single logical unit of work. The properties of a transaction are known as ACID (Atomicity, Consistency, Isolation, Durability).

18. How do you begin and commit a transaction in SQL?

You begin a transaction using the BEGIN TRANSACTION statement and commit it using the COMMIT statement. Example:

```
sql
```

Copy code

```
BEGIN TRANSACTION;
```

```
-- SQL statements
```

```
COMMIT;
```

19. What is a subquery, and how is it different from a JOIN?

A subquery is a query nested inside another query. It is used to retrieve data that will be used by the outer query. A JOIN combines rows from two or more tables based on a related column.

20. How do you handle NULL values in SQL?

NULL values represent unknown or missing data. You handle NULL values using IS NULL or IS NOT NULL conditions. Example: SELECT * FROM table_name WHERE column IS NULL;.

21. What is normalization, and why is it important?

Normalization is the process of organizing data to reduce redundancy and improve data integrity. It involves dividing a database into two or more tables and defining relationships between them.

22. What is denormalization?

Denormalization is the process of combining normalized tables to improve query performance and reduce the complexity of data retrieval, often at the cost of data redundancy.

23. What is a trigger in SQL?

A trigger is a special kind of stored procedure that automatically executes in response to certain events on a table, such as INSERT, UPDATE, or DELETE operations.

24. How do you create a trigger in SQL?

You create a trigger using the CREATE TRIGGER statement. Example:

```
CREATE TRIGGER trigger_name
```

```
ON table_name
```

```
AFTER INSERT
```

```
AS
```

```
BEGIN
```

```
-- SQL statements
```

END;

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

UNION combines the results of two queries and removes duplicate rows, while UNION ALL combines the results and includes all duplicates.

26. How do you handle errors in SQL Server?

Errors in SQL Server can be handled using TRY...CATCH blocks. Example:

```
BEGIN TRY
```

```
-- SQL statements
```

```
END TRY
```

```
BEGIN CATCH
```

```
-- Error handling statements
```

```
END CATCH;
```

27. What is SQL Server Profiler, and how is it used?

SQL Server Profiler is a tool used to monitor and analyze SQL Server events and performance. It helps in debugging and tuning SQL queries by capturing and analyzing SQL Server activity.

28. What is the difference between CHAR and VARCHAR data types?

CHAR is a fixed-length data type, meaning it always uses the defined number of characters, while VARCHAR is a variable-length data type, using only the space needed for the actual content.

29. What is a common table expression (CTE), and how is it used?

A CTE is a temporary result set that can be referenced within a SELECT, INSERT, UPDATE, or DELETE statement. It is defined using the WITH keyword and is useful for simplifying complex queries. Example:

```
WITH CTE_name AS (
```

```
-- CTE query
```

```
)
```

```
SELECT * FROM CTE_name;
```

30. What are SQL Server data types, and why is it important to choose the right one?

SQL Server data types define the type of data that can be stored in a column, such as INT, VARCHAR, DATE, etc. Choosing the right data type is important for data integrity, storage efficiency, and performance.