Interview Questions About Relational Databases

What is a relational database?
A relational database is a type of database that stores and provides access to data points that are related to one another. It is structured into tables, which consist of rows and columns.

How does a relational database differ from a non-relational database?
Relational databases use structured query language (SQL) for defining and manipulating the data, which is strictly structured into tables. Non-relational databases, or NoSQL databases, have dynamic schemas for unstructured data and are more suitable for data that does not fit neatly into tables.

What are some common relational database management systems (RDBMS)?
Common RDBMS include MySQL, PostgreSQL, Oracle Database, SQL Server, and SQLite.

What is a primary key?
A primary key is a unique identifier for a record in a table. It ensures that each record can be uniquely identified and that no duplicate rows exist.

What is a foreign key?
A foreign key is a column (or columns) in a table that uniquely identifies a row of another table. It is used to establish and enforce a link between the data in two tables.

Explain the concept of normalization.
Normalization is the process of organizing data in a database to reduce redundancy and improve data integrity. It involves dividing large tables into smaller, more manageable pieces and defining relationships between them.

What is denormalization and when would you use it?
Denormalization is the process of increasing data redundancy in a database, typically to improve read performance. It is used when read speed is a higher priority

than data normalization principles, often in data warehousing and reporting scenarios.

Can you explain the ACID properties?
ACID stands for Atomicity, Consistency, Isolation, and Durability. These properties ensure that database transactions are processed reliably and guarantee the integrity of the database:

1. **Atomicity** ensures that all steps in a transaction are completed; if not, the transaction is aborted.
2. **Consistency** keeps the database in a consistent state by only allowing transactions that meet validation rules.
3. **Isolation** makes sure that concurrently executed transactions behave as if they are executed sequentially.
4. **Durability** ensures that once a transaction has been committed, it will remain so, even in the event of a system failure.

What are indexes and why are they important?
Indexes are special lookup tables that the database search engine can use to speed up data retrieval. They are important because they help optimize query performance on large datasets.

What is SQL?

Structured Query Language (SQL) is a domain-specific language used for managing and manipulating relational databases. It serves as a standard interface for interacting with databases and is employed for various tasks such as querying data, updating records, and managing database schemas. SQL is crucial for working with relational database management systems (RDBMS), which organize data into tables with rows and columns.

What is a query?
A query is a request for data or information from a database table or combination of tables. Queries can be used to select, insert, update, and delete data.

What is a join and name the different types of joins?

A join is an SQL operation that combines columns from one or more tables in a relational database via a common field. The different types of joins include:

- INNER JOIN
- LEFT JOIN
- RIGHT JOIN
- FULL JOIN
- CROSS JOIN
- SELF JOIN

What is a stored procedure?
A stored procedure is a collection of SQL statements that are stored in the database and executed as a single unit to perform a specific task.

What is a trigger?
A trigger is a special type of stored procedure that automatically runs when certain events occur in a database, such as insertions, updates, or deletions.

What is a view?
A view is a virtual table that consists of a stored query on the data. The view itself does not contain any data; it is merely a saved query that provides a particular way of looking at the data in the database.

What are transactions in the context of a database?
Transactions in a database are sequences of operations performed as a single logical unit of work. A transaction must be either fully completed or rolled back and leaves the database in a consistent state.

Explain the concept of data integrity.
Data integrity refers to the accuracy and consistency of data stored in a database. It ensures the quality and the reliability of data across its lifecycle.

What is the difference between a subquery and a join?
A subquery is a query nested inside another query, which can be used to perform operations that need a temporary dataset. A join, on the other hand, combines rows from two or more tables based on a related column.

How does a database handle concurrent access to the same data?

Databases handle concurrent access to the same data by using locking mechanisms and isolation levels to ensure that transactions are executed in a controlled manner, preventing conflicts.

What is a schema?
A schema is an organizational blueprint of how a database is constructed, comprising of the database's logical structures, including tables, views, stored procedures, and more.

What is database replication?
Database replication is the process of copying and maintaining database objects in multiple databases that makeup a distributed database system, which can improve data accessibility and increase redundancy for fault tolerance.