

1. Relational Database Management System (RDBMS):

A Relational Database Management System (RDBMS) is a type of database management system that organizes data into structured tables. Tables can be linked—or related—based on data common to each. This capability enables the relational database to efficiently store large amounts of data, and effectively retrieve selected data.

Advantages of DBMS over File System:

1. **Data Integrity:** DBMS enforces data integrity constraints, such as unique, primary key, and foreign key.
2. **Data Redundancy:** Reduces data redundancy by storing a piece of data only once.
3. **Data Security:** Better data management with user access controls.
4. **Concurrency:** Multiple users can access the database concurrently without data inconsistencies.
5. **Backup and Recovery:** Provides backup and recovery subsystems.
6. **Complex Queries:** Ability to handle complex queries and large amounts of data.
7. **Centralized Management:** Centralized system makes maintenance easier.

2. ACID Properties:

- **Atomicity:** Ensures that all operations within a transaction are completed successfully; if not, the transaction is aborted at the failure point, and previous operations are rolled back to their former state.
- **Consistency:** Guarantees that the database will move from one consistent state to another, maintaining database rules and integrity constraints.
- **Isolation:** Ensures that concurrent execution of transactions leaves the database in the same state that would have been obtained if the transactions were executed sequentially.
- **Durability:** Once a transaction has been committed, it remains so, even in the face of crashes or system errors.

3. Concept of Normalization:

Normalization is the process of efficiently organizing data in a database. It involves dividing a database into two or more tables and defining relationships between the tables to eliminate redundancies and dependencies. This process aims to reduce data duplication and improve data integrity.

4. Query Languages in Relational Databases:

- **DQL (Data Query Language):** Used for querying data from the database. Example: `SELECT`.
- **DML (Data Manipulation Language):** Used for inserting, updating, and deleting data. Examples: `INSERT`, `UPDATE`, `DELETE`.
- **DCL (Data Control Language):** Used for controlling access to data. Examples: `GRANT`, `REVOKE`.
- **DDL (Data Definition Language):** Used for defining and managing database structures. Examples: `CREATE`, `ALTER`, `DROP`.

5. Difference between Primary Key and Composite Key:

- **Key:** A column or set of columns that uniquely identifies a row in a table. Each table can have only one primary key. *Example:* In a Students table, `StudentID` could be a primary key.
- **Composite Key:** When more than one column is used to specify the primary key of a table, it's called a composite key. *Example:* In a CourseEnrollment table, both `StudentID` and `CourseID` together could form a composite key, indicating a unique enrollment of a student in a course.