Normalization:

Normalization is a database design technique used to organize data in a structured way, reducing data redundancy and dependency issues. The primary goal of normalization is to eliminate data anomalies that can arise due to data duplication and ensure data integrity.

There are several normal forms in database normalization, with each normal form representing a specific level of data organization:

First Normal Form (1NF): Ensures that each column contains only atomic (indivisible) values, and there are no repeating groups.

Second Normal Form (2NF): Builds on 1NF and requires that the table has a primary key defined and that all non-key attributes depend on the entire primary key.

Third Normal Form (3NF): Builds on 2NF and ensures that there are no transitive dependencies, meaning non-key attributes should not depend on other non-key attributes.

Boyce-Codd Normal Form (BCNF): A stronger version of 3NF that deals with certain types of anomalies involving functional dependencies.

Fourth Normal Form (4NF): Ensures that there are no multi-valued dependencies between non-key attributes.

Fifth Normal Form (5NF): Also known as Project-Join Normal Form (PJNF), deals with certain types of join dependencies.

Normalization helps maintain data consistency, reduces data duplication, and facilitates more efficient querying of the database. However, higher normal forms can result in more complex query structures, so the level of normalization should be determined based on the specific requirements of the application and the trade-offs between data integrity and query performance.