- **What is normalization?**

Normalization is a systematic process used in relational database design to minimize redundancy and ensure data integrity. This is achieved by organizing data into multiple related tables and defining relationships between them, thereby reducing data anomalies and ensuring logical data dependencies. The main objectives of normalization are to:

1. Eliminate redundant data.
2. Ensure data dependencies are logical and efficient.

Normalization involves applying a series of rules called normal forms (NFs), each with specific requirements aimed at achieving these goals.

- **When is a table in 1NF?**

A table is in the First Normal Form (1NF) if it meets the following criteria:

1. All columns contain only atomic (indivisible) values; that is, each column contains a single value, not a set or list of values.
2. Each column contains only one type of data.
3. Each column has a unique name.
4. The order in which data is stored does not matter.

- **When is a table in 2NF?**

A table is in the Second Normal Form (2NF) if:

1. It is in 1NF.
2. All non-key attributes are fully functionally dependent on the entire primary key. This means that there are no partial dependencies of any column on the primary key (i.e., no attribute depends on just a part of a composite primary key).

- **When is a table in 3NF?**

A table is in the Third Normal Form (3NF) if:

1. It is in 2NF.
2. All the attributes are functionally dependent only on the primary key and not on any other non-key attribute. This means there are no transitive dependencies, where one non-key attribute depends on another non-key attribute.

- **What is a foreign key?**

A foreign key is a column or a set of columns in a relational database table that provides a link between data in two tables. Specifically:

1. A foreign key in one table refers to the primary key in another table.
2. The foreign key establishes a relationship between the two tables, ensuring referential integrity.
3. It ensures that the value in the foreign key column must match an existing value in the referenced primary key column or be null (if allowed).

Foreign keys are essential for maintaining consistency and integrity across related tables by ensuring that the links between them remain valid.