**NORMALIZATION OF DATABASE**

* Definition : Normalization in databases is a systematic process of organizing data to minimize redundancy and dependency by dividing tables into smaller, related tables and defining relationships between them.
* It ensures data consistency, improves database performance, and simplifies maintenance.

Key Objectives of Normalization:

* Eliminate data redundancy: Avoid storing the same data in multiple places.
* Ensure data integrity: Maintain consistency and accuracy.
* Optimize queries: Reduce the chances of anomalies (insertion, deletion, and update anomalies).

Anomalies Addresse:

* Insertion Anomaly: Issues when adding new data.
* Update Anomaly: Data inconsistency during updates.
* Deletion Anomaly: Loss of valuable data when deleting unwanted data.

NORMAL FORMS:

* Normalization is divided into stages called normal forms (NF), each building on the previous one to improve the database structure. Here are the few normal forms.

1NF (First Normal Form):

* Eliminate repeating groups.
* Ensure each column contains atomic values.
* Each record must have a unique identifier (primary key).

2NF (Second Normal Form):

* Must be in 1NF.
* Eliminate partial dependency (non-key attributes should depend on the entire primary key).

3NF (Third Normal Form):

* Must be in 2NF.
* Eliminate transitive dependency (non-key attributes must depend only on the primary key).

BCNF (Boyce-Codd Normal Form):

* Stricter than 3NF, ensuring no overlapping candidate keys.

Higher Normal Forms:

* 4NF: Removes multi-valued dependencies.
* 5NF: Decomposes tables further to eliminate join dependencies.
* 6NF: Rarely used; focuses on reducing redundancy in temporal databases.