

Q What is Normalization and it's types.  
 It is a process of organizing data in a database reduce redundancy (duplicate data) (unnecessary data) and improve data integrity. It ensures that data is stored efficiently and avoid anomalies during insert, update or delete operations.

Imagine you are storing student records.  
 Normally you will store name, course, roll no, email and if student join multiple course name will be repeat but with the help of normalization it helps in split data into smaller related tables to avoid repetition.

Types:-

① 1NF (First Normal Form) → Remove duplicates and multivalued column.

101	Ram	Math
101	Ram	Science
102	Arund	English

- Each column should contain atomic (indivisible) values.
- No repeat group or multiple values in a single column.

② 2NF (Second Normal Form) → Remove Partial dependencies.

→ Must be 1NF

→ Composite primary key should not have a column dependent on only part of the key.

→ Move such columns to a separate table.

Ex → Student table, teacher table.

ID, Course, Teacher

↓  
 Teacher, Teacher Age



③ 3NF  $\rightarrow$  Remove Transitive dependencies.

$\rightarrow$  Must be 2NF

$\rightarrow$  No column should depend on non-key column.  
means column should only depend on primary key.

Student table  $\rightarrow$  ID, course, teacher

Teacher table  $\rightarrow$  teacher, teacher department.

④ BCNF (Boyce - Codd Normal Form)  $\rightarrow$  Stronger than 3NF

$\rightarrow$  Must be in 3NF

$\rightarrow$  Non-key column determines another key column, move it to a new table.

Student table  $\rightarrow$  ID Course

Teacher table  $\rightarrow$  Course Teacher

⑤ Higher Normal forms (Optional for interview)

4NF  $\rightarrow$  Handled multivalued dependencies.

5NF  $\rightarrow$  Eliminate Join dependencies.

6NF  $\rightarrow$  deals with temporary database.

Q What is ACID property and its uses.

$\rightarrow$  ACID stand for Atomicity, Consistency, Isolation, Durability. These ensure the database transaction are reliable and maintain data integrity.

$\rightarrow$  Atomicity  $\rightarrow$  Ensure that transaction is fully completed and if any part of transaction fails the entire transaction will be rolled back.

$\rightarrow$  Consistency  $\rightarrow$  Ensures that the database remains in a valid state before/after the transaction.



Subject .....

- Isolation - Ensures that multiple transaction happening at the same time and don't affect each other.
- Durability - Once transaction is committed, the changes saved even the system crashes.

Uses →

- Ensures data accuracy and integrity in banking, e-commerce etc.
- Prevent data corruption even the system fails.
- Allow multiple user to work together on database without interfering with each other.

8 Correlated subquery.

- Depends on the outer query for its values. It runs multiple times once for each row-process in outer query.

means Runs for every row in outer query using data from that row.  
Commonly used for where, having, select.