Normalization

ENTITIES AND THEIR ATTRIBUTES

Entity	Attributes	Primary Key
Staff	Name Mail Staff_id Password Department_id (FK) D.O.B Phone_No Gender	Mail
Department	Department_id Dept_Name	Department_id
Student	Name Mail Roll_No Department_id (FK) Password D.O.B Phone_No Gender	Mail
Score	Serial_No Score Quiz_id (FK) Mail (FK) Total_Score Remark	Serial_No
Quizzes	Quiz_id Quiz_name Date_Created Mail (FK)	Quiz_id

Question	Question	
	Quiz_id (FK)	
	Option1	
	Option2	
	Option3	
	answer	

Normalization is the process of minimizing **redundancy** from a relation or set of relations. Redundancy in relation may cause insertion, deletion and updation anomalies. So, it helps to minimize the redundancy in relations. **Normal forms** are used to eliminate or reduce redundancy in database tables.

1.First Normal Form –If a relation contain composite or multi-valued attribute, it violates first normal form or a relation is in first normal form if it does not contain any composite or multi-valued attribute. A relation is in first normal form if every attribute in that relation is **singled valued attribute**.

→Here in our database,Phone number in STUDENT and STAFF table can take multiple values.

→ We can convert this table in 1NF by decomposing multi-valued(Phone number) rows in multiple rows.After that all relations is in 1NF as, no **attributes takes multiple values.**

2. **Second Normal Form –**To be in second normal form, a relation must be in first normal form and relation must not contain any partial dependency. A relation is in 2NF if it has **No Partial Dependency,** i.e.**,** no non-prime attribute (attributes which are not part of any candidate key) is dependent on any proper subset of any candidate key of the table.

→ In SCORE Table

(SERIAL_NO,SCORE)→ REMARK (Dependency)

Candidate key - {SERIAL_NO,SCORE} then if,we take non-prime attribute REMARK.

REMARK is dependent on {SCORE} Which is proper subset of candidate key -{SERIAL_NO,SCORE},

(SCORE → REMARK) (Partial Dependency is present)

Thus relation is not in 2NF.

Now for converting this relation in 2NF we can decompose SCORE table into two different tables SCORE and REMARK.

SCORE

Serial_No
Score
Quiz_id (FK)
Mail (FK)
Total_Score

REMARK

Score
Remark

3. Third Normal Form –A relation is in third normal form, if there is **no transitive dependency** for non-prime attributes as well as it is in second normal form.
A relation is in 3NF if **at least one of the following condition holds** in every non-trivial function dependency X → Y

1. X is a super key.
2. Y is a prime attribute (each element of Y is part of some candidate key).

➔In Relational Schemas, there are **no transitive dependencies** for non-prime attributes as well as it is in second normal form.

Thus Relational Schemas is in 3NF.

4.Boyce-Codd Normal Form (BCNF) –A relation R is in BCNF if R is in Third Normal Form and for every FD, LHS is super key. A relation is in BCNF if in every non-trivial functional dependency X → Y, X is a super key.

➔In Relational Schemas, for every non-trivial functional dependency

X → Y and X is a super key.

Thus Relational Schemas is in BCNF.