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6/0/25 **Task-8: Normalizing Database Using Functional Dependence Upto BCNF**

Aim:-

To normalize database using functional dependence upto BCNF.

Hosptial database:

1. Identify hospital attribute:

   Patient-ID, patient-Name, Doctor-ID, Doctor-Name, Department, Room-No, Treatment, Bill-Amount.

2. Define Relational schema:

   Hospital (Patient-ID, patient-Name, Doctor-ID, Doctor-name, Department, Room-No, Treatment, Bill-Amount).

3. Determine functional dependence (FDs) between attributes

   Patient_ID → Patient-Name, Doctor-ID, Room-No, Treatment, Bill-Amount

   Doctor-ID → Doctor-Name, Department

   Room-No → Department

Step-2: Convert to 1NF

1. Eliminate Repeating groups or array.
2. Greate seperate tables for each Repeating group.

Step-3: Convert to 2NF:

1. Ensure each non-key attribute depend on the entire primary key.

2. Move non-key attribute to seperate tables it key depend only part of the primary key.

   - Create Doctor table: Doctor (Doctor-ID), Doctor-Name, Department)

   - Create patient table: Patient (Patient-ID, patient-name, Doctor-ID, Room-No, Treatment, Bill-Amount).

Step-4: Convert to 3NF

1. Ensure there are no transitive dependence.

2. More non-key attribute to seperate table if they depend on another non-key attribute.

- Create Room table: Room (Room-No, Department).
- Update Doctor table: Doctor (Doctor- ID, Doctor-Name)

Step-5: Convert to BCNF

1. Ensure every department is a candidate key.
2. Check for overlapping candidate key.
3. Decompose relation to eliminate redudancy no further decomposition needed.

Using Criteria tool:

1. Input relation schema and functional dependencies.
2. Griffith tool generator as dependency graph.
3. Analyze the graph to identity normalization issues.
4. Apply normalization rule to transform the schema.
5. Verify the resulting schema a meets BCNF criteria.

Criffith tool steps:

1. Create a new project in Criffith.
2. Define the relational schema and fun.
3. Run the "dependency graph" tool.
4. Analyze the graph for normalization issues.
5. Apply transformation using the "Narmatrix" tool.
6. Verify BCNF Compliance using the "BCNF check" tool.

Normalized Schema:

1. Patient (Patient- ID, Patient-Name, Doctor- ID, Room-No, Treatment, Bill-Amount).
2. Doctor (Doctor- ID , Doctor- Name)
3. Room (Room-No, Department).

Result:- Thus the Normalized database using functional dependence upto BCNF executed successfully.