6/10/25

TASK: 8 Normalizing database using functional dependencies upto BCNF

Aim:

To Normalize database using functional dependencies upto BCNF

Hospital Database:

1. Identify hospital attributes:

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 dependencies (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. Create seperate tables for each repeating group

Step 3: Convert to 2NF:

1. Ensure each non-key attribute depends on the entire primary key.
2. Move non-key attributes to seperate tables if they 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 dependencies.
2. move non-key attributes to seperate tables 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 determinant is a Cardidate key.
2. check for overlapping Candidate key.
3. Decompose relations to eliminate reduduancy.
   - No further decomposition needed

Using Griffith tool:

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

Griffith tool steps:

1. Create a new project in Griffith
2. Define the relational schema and FDs
3. Run the "Dependency Graph" tool.
4. Analyze the graph for normalization issues
5. Apply transformation using the "Normalize" 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).

VELTECH	
EX No.	8
PERFORMANCE (5)	5
RESULT AND ANALYSIS (5)	5
VIVA VOCE (5)	-
RECORD (5)	5
TOTAL (20)	20
SIGN WITH DATE	6/10/25

Result :

Thus the Normalization database using functional dependencies upto BCNF executed successfully.