TASK 8: Normalizing databases using functional dependencies upto BCNF

(Tool: GU/ Table Normalization Tool, ALM:Jigsaw) CO3, K3

Upon relational tables created in task-2, perform normalization up to BCNF based on given Dependencies as following for the assumed relations specified below.

Employee Database:

1. Identify employee attributes: Employee_ID, Name, Department, Job_Title, Manager_ID, Hire_Date, Salary.

2. Define relational schema: Employee (Employee_ID, Name, Department, Job_Title, Manager_ID, Hire_Date, Salary).

3. Determine functional dependencies (FDs) between attributes:

- Employee_ID -> Name, Department, Job_Title, Manager_ID, Hire_Date, Salary

- Department -> Manager_ID

- Manager_ID -> Name

Step 2: Convert to 1NF

1. Eliminate repeating groups or arrays (none in this example).

2. Create separate tables for each repeating group (none in this example).

Step 3: Convert to 2NF

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

2. Move non-key attributes to separate tables if they depend on only part of the primary key.

- Create Department table: Department (Department_ID, Manager_ID, Name).

- Create Employee table: Employee (Employee_ID, Name, Department_ID, Job_Title, Hire_Date, Salary).

Step 4: Convert to 3NF

1. Ensure there are no transitive dependencies.

2. Move non-key attributes to separate tables if they depend on another non-key attribute.

- Create Manager table: Manager (Manager_ID, Name).

- Update Department table: Department (Department_ID, Manager_ID).

Step 5: Convert to BCNF

1. Ensure every determinant is a candidate key.

2. Check for overlapping candidate keys.

3. Decompose relations to eliminate redundancy.

- No further decomposition needed.

Using Griffith Tool

1. Input relational 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 transformations using the "Normalize" tool.

6. Verify BCNF compliance using the "BCNF Check" tool.

Normalized Schema

1. Employee (Employee_ID, Name, Department_ID, Job_Title, Hire_Date, Salary).
2. Department (Department_ID, Manager_ID).
3. Manager (Manager_ID, Name).