

30/11/25

Task 8

Normalizing database using Functional dependencies upto BCNF

(Tools (Giu / Table, Normalization tool, AML: Jigen)

Aim:

To perform normalization upto BCNF based on given dependencies.

E-Commerce Database:

1. Identify E-Commerce attributes: Users, Products, categories, orders, order Details, payments, Reviews

2. Relational Schema: Ecommerce (users, products, Categories, order, order Details, payments, Reviews).

3. Functional Dependencies (FD's between attributes:

User-ID \rightarrow Name, Email, Address, phone

product ID \rightarrow Product Name, Category ID, price, Description

Category ID \rightarrow Category Name

Order ID \rightarrow User-ID, order Date, status.

order Details ID \rightarrow Order ID, product ID, Quantity, price At Purchase

payment ID \rightarrow order ID, payment Date, payment Method

product-ID \rightarrow Category ID

Order ID \rightarrow payment ID

Step 2: - Convert to 1NF:

* No repeating groups or arrays

* All attributes are atomic

The schema is in 1NF

Step 3: convert to 2NF:

* All primary keys are single-column keys, So no partial dependency exist

* However, We over foreign key attributes are managed correctly

Output: The schema is already in 2NF

Step: 4 - Convert to 3NF.

Eliminate Transitive Dependencies

* $\text{product ID} \rightarrow \text{Category ID} \rightarrow \text{Category Name}$

→ Move category Name to a separate categories table

* $\text{User ID} \rightarrow \text{Name, Email, Address, phone}$

→ Already in separate users table

* $\text{Order ID} \rightarrow \text{User ID} \rightarrow \text{user details}$

→ No redundancy, as only user ID is stored in Orders

All transitive dependencies removed.

Step 5: Convert to BCNF

Check if every determinant is condition key:

* $\text{User ID, product ID, Order ID, payment ID}$ are all unique.

keys for their respective tables.

* foreign keys like Category ID, User ID etc. do not violate

BCNF rules.

All FD's empty with BCNF - no further decomposition needed

Using Griffith Tool:

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

Griffith Tool Steps:

1. Create a new project in Griffith.
2. Define the relational schema and FD's
3. Run the "Dependency Graph" tool.

4. Analyse the graph for normalization issues.

5. Apply transformations using the "Normalizer" tool

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

Normalized Schema:

User (User-ID, Name, Email, Address)



Categories (Category ID, Name of the category)

product (product ID, Name, Category-ID, price)

Orders (order ID, User-ID, order Date, Payment-Method)

Orders Details (order ID, product-ID, Quantity, price At time)

payments (payment ID, order ID, Payment Date, Total Amount)



VEL TECH	
PERFORMANCE (5)	8
RESULT AND ANALYSIS (5)	5
VA VOCE (5)	5
RECORD (5)	5
AL (20)	20
WITH DATE	20

Result:

thus the implementation of normalizing the database upto BCNF based on givens dependencies was executed Successfully.