

30/7/25

Task 8

Normalizing database using Functional dependencies upto BCNF

(Tools (Gu / Table, Normalization tool, AML: Jigan)

Aim:

To perform normalization upto BCNF based on given dependencies.

E-commerce Database:

1. Identify E-commerce attributes: User, Products, categories, orders, order Details, payments, reviews

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

3. functional Dependencies (FDs) 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 INF:

* No repeating groups or arrays

* All attributes are atomic

The schema is in INF

Step 3: convert to 2NF:

* All primary keys are single-column keys, some partial department 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

* product-ID \rightarrow Category-ID \rightarrow Category-Name

\rightarrow Move category-Name to a separate categories table

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

\rightarrow Already in separate users table

* Order-ID \rightarrow User-ID \rightarrow user-details

\rightarrow 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:

* 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 fb'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 scheme meets BCNF criteria

Griffith Tool Steps:

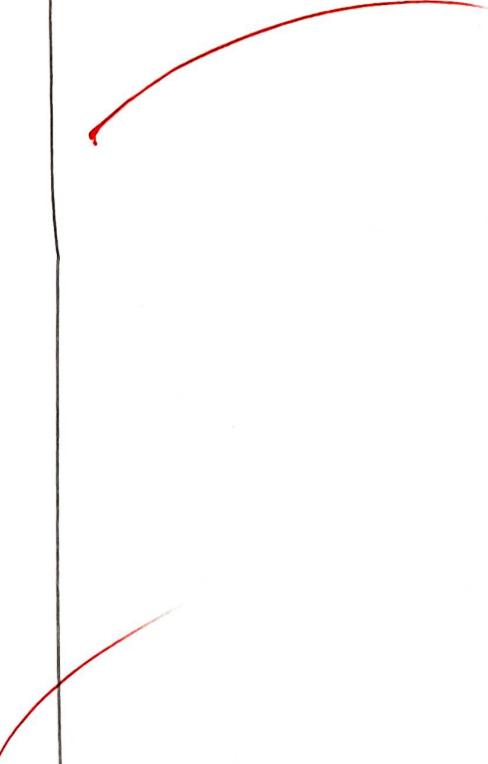
1. Create a new project in Griffith.

2. Define the relational schema and FD's

3. Run the "Dependency Graph" tool.

- A. Analyze the graph for normalization issue.
 - B. Apply transformations using the "Normalise" tool
 - C. Verify BCNF Compliance using the "BCNF check" tool
- Normalized Schema:

User (User-ID, Name, Email, Address)
 Categories (Category ID, Name of the category)
 product (productID, Name, Category-ID, price)
 Orders (orderID, Order-ID), orderDate, Payment-Method
 Orders Details (orderID, product-ID, Quantity, Price, Atkns)
 payments (paymentID, orderID, Payment Date, Total Amount)



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1. CO.	8
2. PERFORMANCE (5)	5
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4. A VOCE (5)	5
5. CORD (5)	6
6. TAL (20)	6
7. SIGN WITH DATE	7

Result:

thus the implementation of normalizing the database upto BCNF based on given dependencies was executed successfully.