

Normalizing databases using functional dependencies upto BCNF

Date: 30-9-25 TASK 8:

Aim: To perform normalization upto
BCNF based on given dependencies

• Mobile Phone Database:

1. Identify mobile phone attributes :
phone-ID, mobile-name, mobile-price,
Date
2. Define relational schema : mobile phone
(phone-ID, mobile-name, mobile-date,
mobile-price)
3. Determine functional dependencies (FDS)
between attributes:
- mobile-name, phone-ID, mobile-price,
mobile-ID.

Step 2: Convert to 1NF

- * No repeating groups or arrays
- * All attributes are atomic

The schema in 1NF.

Step 3: Convert to 2NF

- * All primary keys are single-column keys, so no partial dependence exists.
 - * However, we ensure foreign-key attributes are managed correctly.
- Output: The schema is already in 2NF.

Step 4: Convert to 3NF

Estimate transitive dependencies

* Product-ID → Category-ID → Category-Name

→ Move Category-Name to a separate categories mobile table

* User-ID → Name, Email, Address, phone

→ Already implemented users table

* ID → User → User Details.

→ No need now as only User-ID is sorted in phones.

All transitive dependencies removed

STEPS: Convert to BCNF

= check if every determinant is a candidate key;

* user-ID, product-ID, payment-ID, mobile-number, user all unique.

keys for their respective tables.

* foreign keys like category-ID, user-ID ex. --- do not violate BCNF rules.

Using Billjith Tool:

1. INPUT ~~selection~~ schema and functional dependencies.

2. Billjith 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.

Graffith tool steps:

1. Create a new project in Graffith.
2. Define the relational schema and its dependencies.
3. Run the "Dependency Graph" tool.
4. Analyze the graph for normalization issues.
5. Apply transformations using the "Normalization" tool.
6. Verify BCNF compliance using the "BCNF Check" tool.

Normalized Schema:

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users (User-ID, Name, Email Address)

Categories (Category-ID, Name of the Category)

mobile (Phone-ID, Name, Category-ID, Price)

Mobile Details (Phone-ID, Quantity, Price of Payment-ID, Total Amount).

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PERFORMANCE (5)	5
RESULT AND ANALYSIS (5)	5
VIVA VOCE (5)	5
RECORD (5)	
TOTAL (20)	15
SIGN WITH DATE	30/9/12

~~Result: Thus the implementation of normalization database upto BCNF based on given dependencies - was done correctly~~