

Task-8

Lab Task-8:- Normalizing Database using Functional Dependencies up to BCNF

Objective:

To normalize the database created in Task-1 using Functional Dependencies (FDs) and apply normalization techniques up to BCNF

1. Apply the Functional Dependency and Normalize to 1NF

Step-1:- Identify Functional Dependencies (FD's)

Consider the following relations and FDs
OrderTable (Order-ID, Cust-ID, Order-Date, Order-Total, Payment-Status)

Customer (Cust-ID, Cust-Name, Cust-Contact, Cust-Email, Cust-Address)

• FD₂: Cust-ID \rightarrow Cust-Name, Cust-Contact, Cust-Email, Cust-Address

Menu-Items (Item-ID, Item-Name, Price, Category, Rest-ID).

• FD₃: Item-ID \rightarrow Item-Name, Price, Category, Rest-ID

2. Normalize the Relations using FD's and 1NF

• Compute FD⁺ (closure of FD₃) using Armstrong's Axioms

closure for order Table:

- FD₁: {order-ID → cust-ID, order-Date, order-Total, payment-status}

closure for MenuItems

- FD₁: {Item-ID → Item-Name, price, category, Rest-ID}

3. FIND the minimal covers and canonical covers

- FD₁: order-ID → cust-ID, order-Date, order-Total, Payment-Status
- FD₂: cust-ID → cust-Name, cust-Contact, cust-Email, cust-Address.
- FD₃: Item-ID → Item-Name, price, category, Rest-ID

canonical covers:

- No redundancy detected

4. Normalize to 2NF

- A relation is in 2NF if it is in 1NF and has no partial dependencies
- Remove partial dependencies by creating separate relation

Normalization to 2NF

- order-Table (order-ID, order-Date, order-Total, ~~Rest-ID~~ payment-status);
- customer (cust-ID, cust-Name, cust-contact, cust-Email, cust-Address);

5. Normalize to 3NF

- Restaurant (Rest-ID, Rest-Name, Rest-Location, Rest-Contact)
- Menu-Item (Item-ID, Item-Name, Price, Category, Rest-ID)

Normalization to BCNF

- Order-Table (Order-ID, Cust-ID, Order-Date, Order-Total, Payment-Status)
- Customer (Cust-ID, Cust-Name, Cust-Contact, Cust-Email, Cust-Address)
- Menu-Item (Item-ID, Item-Name, Price, Category, Rest-ID)