



## **DBMS PROJECT**

**Title:** Online Pharmeasy Application

**Content:**

- BCNF prove or disprove

**Group No:** 1

**Team\_ID:** G1-T3

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## Functional Dependencies (FDs), Minimal set & BCNF prove or disprove for each relation in database

### 1. Customers:

| Customers        |             |
|------------------|-------------|
| ♦ <u>cust_id</u> | int         |
| ♦ email          | text        |
| ♦ name           | text        |
| ♦ phone_no       | int         |
| ♦ password       | varchar(10) |

### Functional Dependencies (FDs):

cust\_id  $\rightarrow$  email  
cust\_id  $\rightarrow$  name  
cust\_id  $\rightarrow$  phone\_no  
cust\_id  $\rightarrow$  password  
phone\_no  $\rightarrow$  email  
phone\_no  $\rightarrow$  password  
phone\_no  $\rightarrow$  name

### Minimal FD Set:

cust\_id  $\rightarrow$  phone\_no  
phone\_no  $\rightarrow$  email, password, name

**KEY:** cust\_id

## BCNF Analysis:

The relation is not in BCNF, as cust\_id is a key, but there exists a non-trivial dependency in minimal set (phone\_no  $\rightarrow$  email, password, name) where phone\_no is not a key.

Decomposition is not feasible in this case without losing important functional dependencies.

## 2. Address:

| Address          |             |
|------------------|-------------|
| * <u>cust_id</u> | int         |
| *street/area     | text        |
| *city            | varchar(30) |
| * <u>pin</u>     | int         |
| *house           | text        |

## Functional Dependencies (FDs):

cust\_id, pin  $\rightarrow$  street

cust\_id, pin  $\rightarrow$  city

cust\_id, pin  $\rightarrow$  pin

cust\_id, pin  $\rightarrow$  house

## Minimal Set of FDs:

cust\_id, pin  $\rightarrow$  city, street, house

**KEY:** {cust\_id, pin}

## BCNF Analysis:

The relation Address is in BCNF.

### 3. Members:

| Members                |      |
|------------------------|------|
| * <u>cust_id</u>       | int  |
| *expiry_date           | date |
| *membership_type_id    | int  |
| * <u>purchase_date</u> | date |

#### Functional Dependencies (FDs):

$\text{cust\_id, purchase\_date} \rightarrow \text{type}$   
 $\text{cust\_id, purchase\_date} \rightarrow \text{expiry\_date}$   
 $\text{cust\_id, purchase\_date} \rightarrow \text{membership\_type\_id}$

#### Minimal FD Set:

$\{\text{cust\_id, purchase\_date}\} \rightarrow \text{type, expiry\_date, membership\_type\_id}$

#### Key:

$\{\text{cust\_id, purchase\_date}\}$

#### BCNF Analysis:

- The relation Members is in **BCNF**.

## 4. Order:

| Order                    |             |
|--------------------------|-------------|
| * <u>order_id</u>        | int         |
| *cust_id                 | int         |
| *order_date              | date        |
| *order_status            | varchar(10) |
| *delivery_fee            | numeric     |
| *estimated_delivery_date | date        |

### Functional Dependencies (FDs):

$\text{order\_id} \rightarrow \text{cust\_id}$

$\text{order\_id} \rightarrow \text{order\_date}$

$\text{order\_id} \rightarrow \text{order\_status}$

$\text{order\_id} \rightarrow \text{delivery\_fees}$

$\text{order\_id} \rightarrow \text{estimated\_delivery\_date}$

### Minimal FD Set:

$\text{order\_id} \rightarrow \{\text{cust\_id}, \text{order\_date}, \text{order\_status}, \text{delivery\_fees}, \text{estimated\_delivery\_date}\}$

**KEY:** order\_id

### BCNF Analysis:

The relation Order is in **BCNF**.

## 5. Doctor:

| Doctor            |     |
|-------------------|-----|
| <u>emp_id</u>     | int |
| <u>license_id</u> | int |

### Functional Dependencies (FDs):

$\text{emp\_id} \rightarrow \text{license\_id}$   
 $\text{license\_id} \rightarrow \text{emp\_id}$

### Minimal FD Set:

$\text{emp\_id} \rightarrow \text{license\_id}$   
 $\text{license\_id} \rightarrow \text{emp\_id}$

### KEY:

$\text{emp\_id}$  or  $\text{license\_id}$

### BCNF Analysis:

The relation Doctor is in BCNF.

## 6. Purchased items:

| purchased_items |     |
|-----------------|-----|
| med_id          | int |
| quantity        | int |
| total_price     | int |
| net_price       | int |
| order_id        | int |

### Functional Dependencies (FDs):

$\text{order\_id, med\_id} \rightarrow \text{quantity}$   
 $\text{order\_id, med\_id} \rightarrow \text{total\_price}$   
 $\text{order\_id, med\_id} \rightarrow \text{net\_price}$

### Minimal FD Set:

$\text{order\_id, med\_id} \rightarrow \text{quantity, total\_price, net\_price}$

### KEY:

$\{\text{order\_id, med\_id}\}$

### BCNF Analysis:

The relation purchased\_items is in BCNF.

## 7. Staff:

| Staff         |     |
|---------------|-----|
| <u>emp_id</u> | int |
| working hours | int |

### Functional Dependencies (FDs):

$\text{emp\_id} \rightarrow \text{working\_hours}$

### Minimal FD Set:

$\text{emp\_id} \rightarrow \text{working\_hours}$

**KEY:**  $\text{emp\_id}$

### BCNF Analysis:

The relation Staff is in BCNF.



## 8. Membership\_Type:

| Membership_Type             |             |
|-----------------------------|-------------|
| • <u>membership_type_id</u> | int         |
| • validity                  | varchar(10) |
| • price                     | numeric     |

### Functional Dependencies (FDs):

$\text{membership\_type\_id} \rightarrow \text{validity}$

$\text{membership\_type\_id} \rightarrow \text{price}$

### Minimal FD Set:

$\text{membership\_type\_id} \rightarrow \text{validity, price}$

**KEY:** membership\_type\_id

### BCNF Status:

The relation membership\_type is in BCNF.

## 9. Query:

| Query             |             |
|-------------------|-------------|
| * <u>query_id</u> | int         |
| * status          | varchar(10) |
| * query_date      | date        |
| * cust_id         | int         |
| * emp_id          | int         |

### Functional Dependencies (FDs):

$\text{query\_id} \rightarrow \text{status}$   
 $\text{query\_id} \rightarrow \text{query\_date}$   
 $\text{query\_id} \rightarrow \text{cust\_id}$   
 $\text{query\_id} \rightarrow \text{emp\_id}$

### Minimal FD Set:

$\text{query\_id} \rightarrow \text{status, query\_date, cust\_id, emp\_id}$

**KEY:** query\_id

### BCNF Analysis:

The relation Query is in BCNF.

## 10. Delivery:

| Delivery           |             |
|--------------------|-------------|
| <u>emp_id</u>      | int         |
| vehicle_no         | varchar(15) |
| driving_license_no | varchar(20) |
| area_code          | int         |
| experience         | varchar(10) |

### Functional Dependencies (FDs):

$\text{emp\_id} \rightarrow \text{driving\_license\_no}$

$\text{emp\_id} \rightarrow \text{area\_code}$

$\text{emp\_id} \rightarrow \text{vehicle\_no}$

$\text{emp\_id} \rightarrow \text{experience}$

### Minimal FD Set:

$\text{emp\_id} \rightarrow \text{driving\_license\_no}, \text{area\_code}, \text{vehicle\_no}, \text{experience}$

**KEY:** emp\_id

### BCNF Analysis:

The relation Delivery is in BCNF.

## 11. Medicine:

| Medicine            |       |
|---------------------|-------|
| * <u>med_id</u>     | int   |
| *name               | text  |
| *company            | text  |
| *discount           | int   |
| *manufacturing_date | date  |
| *expiry_date        | date  |
| *price              | int   |
| *category_id        | int[] |

| Medicine_Id's   |             |
|-----------------|-------------|
| * <u>med_id</u> | int         |
| *name           | varchar(20) |
| *company        | varchar(20) |

| Medicine_Details    |             |
|---------------------|-------------|
| * <u>name</u>       | varchar(20) |
| * <u>company</u>    | varchar(20) |
| *discount           | int         |
| *manufacturing_date | date        |
| *expiry_date        | date        |
| *category_id        | int[]       |
| *price              | int         |

## Functional Dependencies (FDs):

$\text{med\_id} \rightarrow \text{name}$

$\text{med\_id} \rightarrow \text{company}$

$\text{med\_id} \rightarrow \text{discount}$

$\text{med\_id} \rightarrow \text{manufacturing\_date}$

$\text{med\_id} \rightarrow \text{expiry\_date}$

$\text{med\_id} \rightarrow \text{price}$

$\text{med\_id} \rightarrow \text{category\_id}$

$\text{name, company} \rightarrow \text{discount}$

$\text{name, company} \rightarrow \text{manufacturing\_date}$

$\text{name, company} \rightarrow \text{expiry\_date}$

$\text{name, company} \rightarrow \text{price}$

$\text{name, company} \rightarrow \text{category\_id}$

### Minimal FD Set:

$\text{med\_id} \rightarrow \text{name, company}$

$\text{name, company} \rightarrow \text{discount, manufacturing\_date, expiry\_date, price, category\_id}$

**KEY:**  $\text{med\_id}$

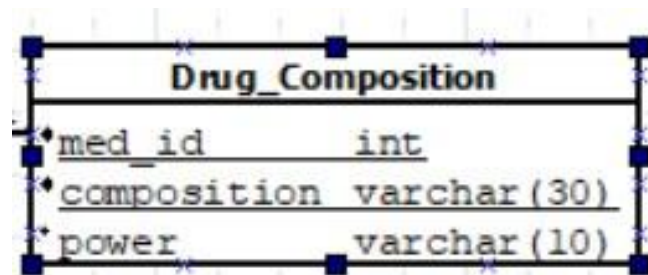
### BCNF Analysis:

The relation Medicine is not in BCNF, as  $\{\text{name, company}\}$  form a determinant that is not a key.

So, we need to decompose in order to make BCNF, the relation Medicine should be decomposed into two relations:

1.  $(\text{med\_id, name, company})$
2.  $(\text{name, company, discount, manufacturing\_date, expiry\_date, price, category\_id})$

## 12. Drug Composition:



### Functional Dependencies (FDs):

$\text{med\_id, composition} \rightarrow \text{power}$

### Minimal FD Set:

$\text{med\_id, composition} \rightarrow \text{power}$

**KEY:** {med\_id, composition}

### BCNF Analysis:

The relation Drug\_composition is in BCNF.

### 13. Category:

| Category             |             |
|----------------------|-------------|
| • <u>category_id</u> | int         |
| • category_name      | varchar(20) |
| • description        | text        |

#### Functional Dependencies (FDs):

$\text{category\_id} \rightarrow \text{category\_name}$

$\text{category\_id} \rightarrow \text{description}$

#### Minimal FD Set:

$\text{category\_id} \rightarrow \text{category\_name, description}$

**KEY:**  $\text{category\_id}$

#### BCNF Analysis:

The relation Category is in BCNF.

## 14. Add to Cart:

| Add_to_cart |            |     |
|-------------|------------|-----|
| 1           | * cust_id  | int |
| 1           | * quantity | int |
| 1           | * med_id   | int |

### Functional Dependencies (FDs):

$\text{cust\_id, med\_id} \rightarrow \text{quantity}$

### Minimal FD Set:

$\text{cust\_id, med\_id} \rightarrow \text{quantity}$

**KEY:** {cust\_id, med\_id}

### BCNF Analysis:

The relation Add\_to\_cart is in BCNF.



## 15. Delivered by:

| Delivered by      |             |
|-------------------|-------------|
| ♦ <u>emp_id</u>   | int         |
| ♦ <u>order_id</u> | int         |
| ♦ delivery_status | varchar(10) |

## Functional Dependencies (FDs):

$\text{emp\_id, order\_id} \rightarrow \text{delivery\_status}$

## Minimal FD Set:

$\text{emp\_id, order\_id} \rightarrow \text{delivery\_status}$

**KEY:** {emp\_id, order\_id}

## BCNF Analysis:

The relation Delivered\_By is in BCNF.

## 16. Employee:

| Employee        |      |
|-----------------|------|
| ♦ <u>emp_id</u> | int  |
| ◊ name          | text |
| ◊ salary        | int  |
| ◊ contact_no    | int  |

### Functional Dependencies (FDs):

$\text{emp\_id} \rightarrow \text{name}$

$\text{emp\_id} \rightarrow \text{salary}$

$\text{emp\_id} \rightarrow \text{contact\_no}$

$\text{contact\_no} \rightarrow \text{name}$

### Minimal FD Set:

$\text{emp\_id} \rightarrow \text{contact\_no, salary}$

$\text{contact\_no} \rightarrow \text{name}$

KEY: emp\_id

### BCNF Analysis:

The relation Employee is not in BCNF, as contact\_no is a determinant but not a key.

Decomposition is not feasible without losing essential dependencies, so the relation is in Second Normal Form (2NF).

## 17. Prescription Status:

| Prescription status |             |
|---------------------|-------------|
| * <u>order_id</u>   | int         |
| *status             | varchar(10) |
| *verified           | varchar(10) |
| *emp_id             | int         |

## Functional Dependencies (FDs):

$order\_id \rightarrow status$   
 $order\_id \rightarrow verified$   
 $order\_id \rightarrow emp\_id$

## Minimal FD Set:

$order\_id \rightarrow status, verified, emp\_id$

**KEY:** order\_id

## BCNF Analysis:

The relation Prescription\_Status is in BCNF.

## 18. Payment:

| Payment           |             |
|-------------------|-------------|
| * <u>trans_id</u> | varchar(20) |
| * <u>order_id</u> | int         |
| * payment_date    | date        |
| * amount          | numeric     |
| * status          | varchar(10) |
| * payment_type    | varchar(10) |

### Functional Dependencies (FDs):

$\text{trans\_id} \rightarrow \text{amount}$

$\text{trans\_id} \rightarrow \text{status}$

$\text{trans\_id} \rightarrow \text{payment\_type}$

$\text{trans\_id} \rightarrow \text{order\_id}$

$\text{trans\_id} \rightarrow \text{payment\_date}$

$\text{order\_id} \rightarrow \text{trans\_id}$

$\text{order\_id} \rightarrow \text{payment\_date}$

$\text{order\_id} \rightarrow \text{amount}$

$\text{order\_id} \rightarrow \text{status}$

$\text{order\_id} \rightarrow \text{payment\_type}$

### Minimal FD Set:

$\text{order\_id} \rightarrow \text{trans\_id}, \text{payment\_date}, \text{amount}, \text{status}, \text{payment\_type}$

$\text{trans\_id} \rightarrow \text{order\_id}$

**KEY:** trans\_id or order\_id can serve as keys under the given conditions

### **BCNF Analysis:**

The relation Payment is in BCNF.

### **Assumptions:**

There are no partial or multiple payments associated with a single order.

In case of a payment failure, the order is cancelled and a new order ID is generated for any subsequent payment attempt.