

## **Lab 3 Submission - Team 2 (Z43)**

Team members:

- Joel Tan (U2122877C)
- Tar Sreeja (U2123104B)
- Liu Liwen (N2202357F)
- Agarwal Lakshya (U2123904L)
- Luo Minjuan (N2202356J)
- Shourya Kuchhal (U2123334A)

**PUBLICATION (PubID, Publisher, Year)**

Keys: PubID

Primary Key: PubID

FDs: PubID → PubID, Publisher, Year

This relation is in 3NF and BCNF.

**BOOKS (PubID, Title)**

(ER Approach)

Keys: PubID

Primary Key: PubID

FDs: PubID → PubID, Title

This relation is in 3NF and BCNF.

**MAGAZINES (PubID, Title, Issue)**

(ER Approach)

Keys: PubID

Primary Key: PubID

FDs: PubID → PubID, Title, Issue

This relation is in 3NF and BCNF.

**BOOKSTORE (Bookstore-ID)**

Keys: Bookstore-ID

Primary Key: Bookstore-ID

FDs: Bookstore-ID → Bookstore-ID

This relation is in 3NF and BCNF.

**STOCKS-IN-BOOKSTORE (Bookstore-ID, PubID, Stock-ID, Stock-Price, Stock-Qty)**

Keys: {Bookstore-ID, PubID, Stock-ID}

Primary Key: {Bookstore-ID, PubID, Stock-ID}

FDs: {Bookstore-ID, PubID, Stock-ID} → Bookstore-ID, PubID, Stock-ID, Stock-Price, Stock-Qty

This relation is in 3NF and BCNF.

**PRICE-HISTORY (PubID, Bookstore-ID, Stock-ID, Price, Start-date, End-date)**

Keys: {PubID, Bookstore-ID, Stock-ID, Price, Start-date, End-date}

Primary key: {PubID, Bookstore-ID, Stock-ID, Price, Start-date, End-date}

FDs: {PubID, Bookstore-ID, Stock-ID, Price, Start-date, End-date} → PubID, Bookstore-ID, Stock-ID, Price, Start-date, End-date

This relation is in 3NF and BCNF.

### **CUSTOMERS (CID, Name)**

Keys: CID

Primary Key: CID

FDs: CID  $\rightarrow$  CID, Name

This relation is in 3NF and BCNF.

### **ORDERS (OrderID, Order-Date-Time, Shipping-address, CID)**

Keys: OrderID

Primary Key: OrderID

FDs: OrderID  $\rightarrow$  OrderID, Order-Date-Time, Shipping-address, CID

This relation is in 3NF and BCNF.

### **ITEMS-IN-ORDERS (PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Item-Price, Item-Qty, Delivery-Date, CID, Comment, Rating, Feedback-Date-Time)**

Keys: {PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID}

Primary Key: {PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID}

FDs:

- {PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID}  $\rightarrow$  PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Item-Price, Item-Qty, Delivery-Date, Comment, Rating, Feedback-Date-Time, CID
- OrderID  $\rightarrow$  CID

This relation is **NOT in 3NF and BCNF** because LHS does not contain a key (OrderID is part of a key) and RHS is not contained in a key.

### **BCNF Decomposition:**

Step 1: OrderID  $\rightarrow$  CID is a violation.

Step 2: {OrderID}<sup>+</sup> = {OrderID, CID}

Step 3: We decompose ITEMS-IN-ORDERS into two relations, R1 and R2 where:

- R1 (**OrderID**, CID)
- R2 (PubID, Bookstore-ID, Stock-ID, **OrderID**, Item-ID, Item-Price, Item-Qty, Delivery-Date, Comment, Rating, Feedback-Date-Time)

Step 4:

- As R1 contains only two attributes, it is in BCNF.
- FDs in R2: {PubID, Bookstore-ID, Stock-ID, **OrderID**, Item-ID}  $\rightarrow$  PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Item-Price, Item-Qty, Delivery-Date, Comment, Rating, Feedback-Date-Time  
R2 is in BCNF.

Therefore, ITEMS-IN-ORDERS is finally decomposed into two relations:

**R1 (OrderID, CID)**

**R2 (PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Item-Price, Item-Qty, Delivery-Date, Comment, Rating, Feedback-Date-Time)**

Since R1 and R2 are in BCNF, they are also in 3NF.

**ORDER-STATUS (PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Date, State)**

Keys: {PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Date}

Primary key: {PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Date}

FDs: {PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Date} → PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Date, State

This relation is in 3NF and BCNF.

**EMPLOYEES (EID, Name, Salary)**

Keys: EID

Primary key: EID

FDs: EID → EID, Name, Salary

This relation is in 3NF and BCNF.

**COMPLAINTS (Complaint-ID, Text, Filed-date-time, EID, Handled-date-time, CID)**

Keys: Complaint-ID

Primary key: Complaint-ID

FDs: Complaint-ID → Complaint-ID, Text, Filed-date-time, EID, Handled-date-time, CID

This relation is in 3NF and BCNF.

**COMPLAINT-STATUS (Complaint-ID, Date, State)**

Keys: {Complaint-ID, Date}

Primary key: {Complaint-ID, Date}

FDs: {Complaint-ID, Date} → Complaint-ID, Date, State

This relation is in 3NF and BCNF.

**COMPLAINTS-ON-BOOKSTORE (Complaint-ID, Bookstore-ID)**

(ER Approach)

Keys: Complaint-ID

Primary Key: Complaint-ID

FDs: Complaint-ID → Complaint-ID, Bookstore-ID

This relation is in 3NF and BCNF.

**COMPLAINTS-ON-ORDER (Complaint-ID, OrderID)**

(ER Approach)

Keys: Complaint-ID

Primary Key: Complaint-ID

FDs: Complaint-ID → Complaint-ID, OrderID

This relation is in 3NF and BCNF.

## **Lab 5 Submission - Team 2 (Z43)**

```
CREATE TABLE STOCKS_IN_BOOKSTORE(  
    Bookstore_ID varchar(255) NOT NULL,  
    PubID varchar(255) NOT NULL,  
    Stock_ID varchar(255) NOT NULL,  
    Stock-Price varchar(255),  
    Stock-Qty varchar(255),  
    CONSTRAINT Stock_in_bookstore_PK PRIMARY KEY(Bookstore_ID, PubID,  
    Stock_ID),  
    FOREIGN KEY (Bookstore_ID) REFERENCES BOOKSTORE(Bookstore_ID),  
    FOREIGN KEY (PubID) REFERENCES PUBLICATION(PubID)  
);
```

```
CREATE TABLE PUBLICATION(  
    PubID int NOT NULL PRIMARY KEY,  
    Publisher varchar(255),  
    Year year  
);
```

```
CREATE TABLE BOOKSTORE(  
    Bookstore_ID int NOT NULL PRIMARY KEY  
);
```

```
CREATE TABLE CUSTOMERS(  
    CID int NOT NULL PRIMARY KEY,  
    Name varchar(255)  
);
```


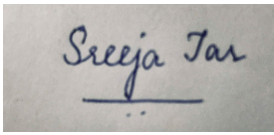
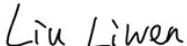


```
CREATE TABLE COMPLAINTS_ON_BOOKSTORE (  
    Complaint-ID int NOT NULL PRIMARY KEY  
    Bookstore-ID int  
);
```

```
CREATE TABLE COMPLAINTS-ON-ORDER (  
    Complaint-ID int NOT NULL PRIMARY KEY  
    Order-ID int  
);
```

```
CREATE TABLE ORDERS (  
    OrderID int NOT NULL,PRIMARY KEY  
    `Order-Date-Time` datetime  
    `Shipping-address` varchar(255)  
    CID int
```

);

### APPENDIX C: INDIVIDUAL CONTRIBUTION FORM

Full Name	Individual Contribution to Lab 3 Submission	Percentage of Contribution	Signature
Joel Tan	<ul style="list-style-type: none"><li>- Dealt with relations COMPLAINTS-ON-BOOKSTORE and BOOKSTORE</li><li>- Performed final checks</li></ul>	16.67%	
Tar Sreeja	<ul style="list-style-type: none"><li>- Dealt with relations CUSTOMERS and ITEMS-IN-ORDERS</li><li>- Performed final checks</li></ul>	16.67%	
Liu Liwen	<ul style="list-style-type: none"><li>- Dealt with relations PRICE-HISTORY and ORDER-STATUS</li><li>- Performed final checks</li></ul>	16.67%	
Agarwal Lakshya	<ul style="list-style-type: none"><li>- Dealt with relations EMPLOYEES, COMPLAINTS and COMPLAINT-STATUS</li><li>- Performed final checks</li></ul>	16.67%	
Luo Minjuan	<ul style="list-style-type: none"><li>- Dealt with relations PUBLICATION and STOCKS-IN-BOOKSTORES</li><li>- Performed final checks</li></ul>	16.67%	
Shourya Kuchhal	<ul style="list-style-type: none"><li>- Dealt with Customers</li></ul>	16.67%	Shourya Kuchhal

	and items in order - Performed final checks		
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