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

Team members:

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* 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 → CID, Name

This relation is in 3NF and BCNF.

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

Keys: OrderID

Primary Key: OrderID

FDs: OrderID → 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} → PubID, Bookstore-ID, Stock-ID, OrderID, Item-ID, Item-Price, Item-Qty, Delivery-Date, Comment, Rating, Feedback-Date-Time, CID
* OrderID → 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 → CID is a violation.

Step 2: {OrderID}+ = {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} → 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 | * Dealt with relations COMPLAINTS-ON-BOOKSTORE and BOOKSTORE * Performed final checks | 16.67% |  |
| Tar Sreeja | * Dealt with relations CUSTOMERS and ITEMS-IN-ORDERS * Performed final checks | 16.67% |  |
| Liu Liwen | * Dealt with relations PRICE-HISTORY and ORDER-STATUS * Performed final checks | 16.67% |  |
| Agarwal Lakshya | * Dealt with relations EMPLOYEES, COMPLAINTS and COMPLAINT-STATUS * Performed final checks | 16.67% |  |
| Luo Minjuan | * Dealt with relations PUBLICATION and STOCKS-IN-BOOKSTORES * Performed final checks | 16.67% |  |
| Shourya Kuchhal | * Dealt with Customers and items in order * Performed final checks | 16.67% | Shourya Kuchhal |