Library Database Management System

Group #10

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**Introduction**

We are a public library with multiple locations in Long Island, New York serving the community in our area. Our library uses a manual log to track books at every location. Maintaining our stock is time consuming as we have been steadily increasing our inventory yearly.

A library database would help us keep track of overdue loans and lost items efficiently. We would like to change our manual method to a database.

Our library holds a large membership base in which each member can reserve and borrow books. We would need a system to track each member’s activity to ensure items are returned on time. The database would help us send timely notifications to our members of the books they have checked out, any loans overdue, and reservation status updates.

We would like to schedule notifications for our members to prevent overdue book loans. Book reservations would become easier for our librarians as the database would track information more efficiently and allow all our branches to better communicate with each other.

**Entity Relationship Diagram**

Diagram, schematic

Description automatically generated

**Normalization Process**

**Member - Book Loan (Many to Many)**

Member (Member\_ID, First\_Name, Last\_Name,Phone\_Number, Email\_ID, Member\_Status)

FD 1: Member\_ID --> First\_Name, Last\_Name,Phone\_Number, Email\_ID, Member\_Status

FD 2: Email\_ID ---> First\_Name, Last\_Name,Phone\_Number, Member\_Status, Member\_ID

Member (Member\_ID, Email\_ID (FK)) BCNF

Member\_Info (Email\_ID ,First\_Name, Last\_Name,Phone\_Number, Member\_Status) BCNF

Member\_Book\_Loan (Member\_ID (FK), Loan\_ID (FK)) BCNF

**Book\_Loan - Copy (Many to Many)**

Book\_Loan(Loan\_ID, Date\_Loan\_Start, Date\_Loan\_Due, Employee\_ID (FK))

Copy (Copy\_ID, Book\_location, Loan\_ID (FK), ISBN (FK))

Book\_Copy (Loan\_ID (FK), Copy\_ID (FK))

FD1: Loan\_ID --> Date\_Loan\_Start, Date\_Loan\_Due, Employee\_ID (FK) BCNF

**Book - Author (Many to Many)**

Author (Author\_ID, First\_Name, Last\_Name, Country)

FD1: Author\_ID --> First\_Name, Last\_Name, Country BCNF

Book\_Author (ISBN (FK), Author\_ID (FK))

FD1: ISBN --> Author\_ID

**Final Normalized Relations**

1. Librarian (Employee\_ID, First\_Name, Last\_Name, Job\_Title)

2. Book\_Loan (Loan\_ID, Date\_Loan\_Start, Date\_Loan\_Due, Employee\_ID (FK))

3. Member (Member\_ID, Email\_ID (FK))

4. Member\_Info (Email\_ID ,First\_Name, Last\_Name, Phone\_Number, Member\_Status)

5. Member\_Book\_Loan (Member\_ID (FK), Loan\_ID (FK), )

6. Book\_Overdue (Overdue\_ID, Return\_Date, Fine\_Per\_Day, Loan\_ID( FK))

7. Book\_Return (Return\_ID, Date\_Loan\_Due, Loan\_ID (FK))

8. Book\_Copy (Loan\_ID (FK), Copy\_ID (FK))

9. Copy (Copy\_ID, Book\_location, Loan\_ID (FK), ISBN (FK))

10. Genre\_Type (Genre\_ID, Genre, Sub\_Genre, Language)

11. Publisher (Publisher\_ID, Publishing\_House, Country)

12. Book (ISBN, Price, Format, Publication\_Date, Title, Genre\_ID (FK), Publisher\_ID (FK))

13. Author (Author\_ID, First\_Name, Last\_Name, Country)

14. Book\_Author (ISBN (FK), Author\_ID (FK))

**SQL queries used create the tables**

1. **Librarian (Employee\_ID, First\_Name, Last\_Name, Job\_Title)**

**SQL Query:**

**Creating Table:**

CREATE TABLE Librarian (

    Employee\_ID NUMBER NOT NULL,

   First\_Name VARCHAR(30),

   Last\_Name VARCHAR(30),

   Job\_Title VARCHAR(30),

CONSTRAINT pk\_Librarian PRIMARY KEY (Employee\_ID)

)

**Insert Statement:**

**Row-1:**

INSERT INTO Librarian

VALUES (116789, ‘Jasmine’, ‘Xu', ‘Librarian’)

**Row-2:**

INSERT INTO Librarian

VALUES (116790, ‘Akhila’, ‘Pamukuntla', ‘IT Help Desk’)

1. **Book\_Loan (Loan\_ID, Date\_Loan\_Start, Date\_Loan\_Due, Employee\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Book\_Loan  (

    Loan\_ID   NUMBER NOT NULL,

    Date\_Loan\_Start   DATE,

    Date\_Loan\_Due   DATE,

    Employee\_ID NUMBER NOT NULL,

CONSTRAINT pk\_Book\_Loan  PRIMARY KEY (Loan\_ID)

)

**Adding Foreign Key:**

ALTER TABLE Book\_Loan

ADD CONSTRAINT fk1\_Book\_Loan FOREIGN KEY (Employee\_ID) REFERENCES Librarian ( Employee\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Book\_Loan

VALUES (1112, #6/8/2020#, #6/20/2020#, 136792)

**Row-2:**

INSERT INTO Book\_Loan

VALUES (2039, #7/14/2020#, #7/28/2020#, 186797)

1. **Member (Member\_ID, Email\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Member  (

    Member\_ID NUMBER NOT NULL,

    Email\_ID   VARCHAR(40) NOT NULL,

  CONSTRAINT pk\_Member\_ID  PRIMARY KEY (Member\_ID)

    )

**Adding Foreign Key:**

ALTER TABLE Member

ADD CONSTRAINT fk1\_Member FOREIGN KEY (Email\_ID) REFERENCES Member\_Info ( Email\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Member

VALUES (967594,  [‘stendulkar@gmail.com’](mailto:%E2%80%98stendulkar@gmail.com%E2%80%99))

**Row-2:**

INSERT INTO Member

VALUES (967595,  [‘virat\_kohli@hotmail.com](mailto:%E2%80%98virat_kohli@hotmail.com)’)

1. **Member\_Info (Email\_ID ,First\_Name, Last\_Name, Phone\_Number, Member\_Status)**

**SQL Query:**

**Creating Table:**

CREATE TABLE Member\_Info (

Email\_ID   VARCHAR(40) NOT NULL,

   First\_Name   VARCHAR(30) ,

   Last\_Name   VARCHAR(30),

    Phone\_Number   NUMBER ,

   Member\_Status   VARCHAR(10),

CONSTRAINT pk\_Member\_Info PRIMARY KEY (Email\_ID)

)

**Insert Statement:**

**Row-1:**

INSERT INTO  Member\_Info

VALUES ([‘andy\_bernard@cornell.edu’](mailto:%E2%80%98andy_bernard@cornell.edu%E2%80%99), ‘Andy’, ‘Bernard’, 5168399595, ‘Active’)

**Row-2:**

INSERT INTO  Member\_Info

VALUES ([‘angela.sprinkles@gmail.com](mailto:%E2%80%98angela.sprinkles@gmail.com)’, ‘Angela’, ‘Martin’, 5168575744, ‘Active’)

1. **Member\_Book\_Loan (Member\_ID (FK), Loan\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Member\_Book\_Loan  (

Loan\_ID   NUMBER NOT NULL,

Member\_ID NUMBER NOT NULL,

CONSTRAINT pk\_Member\_Book\_Loan PRIMARY KEY (Loan\_ID, Member\_ID)

)

**Adding Foreign Key-1:**

ALTER TABLE Member\_Book\_Loan

ADD CONSTRAINT fk1\_Member\_Book\_Loan FOREIGN KEY (Loan\_ID) REFERENCES Book\_Loan (Loan\_ID)

**Adding Foreign Key-2:**

ALTER TABLE Member\_Book\_Loan

ADD CONSTRAINT fk2\_Member\_Book\_Loan FOREIGN KEY (Member\_ID) REFERENCES  Member (Member\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Member\_Book\_Loan

VALUES (1112, 967594)

**Row-2:**

INSERT INTO Member\_Book\_Loan

VALUES (8989, 967594)

1. **Book\_Overdue (Overdue\_ID, Return\_Date, Fine\_Per\_Day, Loan\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Book\_Overdue  (

Overdue\_ID   VARCHAR(10) NOT NULL,

Return\_Date  DATE ,

Fine\_Per\_Day   NUMBER ,

Loan\_ID NUMBER NOT NULL,

CONSTRAINT pk\_Book\_Overdue PRIMARY KEY (Overdue\_ID)

)

**Adding Foreign Key:**

ALTER TABLE Book\_Overdue

ADD CONSTRAINT fk1\_Book\_Overdue FOREIGN KEY (Loan\_ID) REFERENCES Book\_Loan (Loan\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Book\_Overdue

VALUES (‘OD-001’, #5/27/2020#, 0.5, 9454)

**Row-2:**

INSERT INTO Book\_Overdue

VALUES (‘OD-002’, #1/3/2021#, 0.5, 9454)

1. **Book\_Return (Return\_ID, Date\_Loan\_Due, Loan\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Book\_Return  (

    Return\_ID   NUMBER NOT NULL,

    Date\_Loan\_Due DATE ,

    Loan\_ID NUMBER NOT NULL,

CONSTRAINT pk\_Book\_Return PRIMARY KEY (Return\_ID)

)

**Adding Foreign Key:**

ALTER TABLE Book\_Return

ADD CONSTRAINT fk1\_Book\_Return FOREIGN KEY (Loan\_ID) REFERENCES Book\_Loan (Loan\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Book\_Return

VALUES (10000, #9/30/2020#, 5753)

**Row-2:**

INSERT INTO Book\_Return

VALUES (10001, #2/10/2021#, 3948)

1. **Book\_Copy (Loan\_ID (FK), Copy\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Book\_Copy  (

Loan\_ID   NUMBER NOT NULL,

Copy\_ID NUMBER NOT NULL,

CONSTRAINT pk\_Book\_Copy PRIMARY KEY (Loan\_ID, Copy\_ID)

)

**Adding Foreign Key-1:**

ALTER TABLE Book\_Copy

ADD CONSTRAINT fk1\_Book\_Copy FOREIGN KEY (Loan\_ID) REFERENCES Book\_Loan (Loan\_ID)

**Adding Foreign Key-2:**

ALTER TABLE Book\_Copy

ADD CONSTRAINT fk2\_Book\_Copy FOREIGN KEY (Copy\_ID) REFERENCES Copy (Copy\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Book\_Copy

VALUES (1112, 1233)

**Row-2:**

INSERT INTO Book\_Copy

VALUES (2039, 1237)

1. **Copy (Copy\_ID, Book\_location, Loan\_ID (FK), ISBN (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE Copy (

   Copy\_ID NUMBER  NOT NULL,

   Book\_Location VARCHAR(10),

   Loan\_ID NUMBER NOT NULL,

   ISBN NUMBER NOT NULL,

CONSTRAINT pk\_Copy PRIMARY KEY (Copy\_ID)

)

**Adding Foreign Key-1:**

ALTER TABLE Copy

ADD CONSTRAINT fk1\_Copy FOREIGN KEY (Loan\_ID) REFERENCES Book\_Loan (Loan\_ID)

**Adding Foreign Key-2:**

ALTER TABLE Copy

ADD CONSTRAINT fk2\_Copy FOREIGN KEY (ISBN) REFERENCES Book (ISBN)

**Insert Statement:**

**Row-1:**

INSERT INTO Copy

VALUES (1232, ‘A0’, 3879, 9780553296983)

**Row-2:**

INSERT INTO Copy

VALUES (1233, ‘A1’, 1112, 9780553052435)

1. **Genre\_Type (Genre\_ID, Genre, Sub\_Genre, Language)**

**SQL Query:**

**Creating Table:**

CREATE TABLE Genre\_Type (

   Genre\_ID NUMBER(10) NOT NULL,

   Sub\_Genre VARCHAR(20),

    Genre VARCHAR(20),

   Language VARCHAR (20),

  CONSTRAINT pk\_Genre\_Type PRIMARY KEY (Genre\_ID)

)

**Insert Statement:**

**Row-1:**

INSERT INTO Genre\_Type

VALUES (3847, ‘Non-Fiction', ‘Science’, ‘English’)

**Row-2:**

INSERT INTO Genre\_Type

VALUES (6711, ‘Fiction', ‘History’, ‘English’)

1. **Publisher (Publisher\_ID, Publishing\_House, Country)**

**SQL Query:**

**Creating Table:**

CREATE TABLE Publisher (

   Publisher\_ID NUMBER NOT NULL,

    Publishing\_House VARCHAR(30),

   Country VARCHAR(10),

CONSTRAINT pk\_Publisher PRIMARY KEY (Publisher\_ID)

)

**Insert Statement:**

**Row-1:**

INSERT INTO Publisher

VALUES (1013, ‘Simon & Schuster’, ‘USA’)

**Row-2:**

INSERT INTO Publisher

VALUES (1026, ‘Modern Library’, ‘USA’)

1. **Book (ISBN, Price, Format, Publication\_Date, Title, Genre\_ID (FK), Publisher\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE Book (

   ISBN NUMBER NOT NULL,

  Price NUMBER,

   Format VARCHAR(10),

   Publication\_Date DATE,

   Title VARCHAR(40),

Genre\_ID NUMBER NOT NULL,

Publisher\_ID NUMBER NOT NULL,

CONSTRAINT pk\_Book PRIMARY KEY (ISBN)

)

**Adding Foreign Key-1:**

ALTER TABLE Book

ADD CONSTRAINT fk1\_Book FOREIGN KEY (Genre\_ID) REFERENCES Genre\_Type (Genre\_ID)

**Adding Foreign Key-2:**

ALTER TABLE Book

ADD CONSTRAINT fk2\_Book FOREIGN KEY (Publisher\_ID) REFERENCES Publisher (Publisher\_ID)

**Insert Statement:**

**Row-1:**

INSERT INTO Book

VALUES (9780060188702, 9.99, ‘Softcover', #5/23/2004#, ‘Don Quixote’, 7854, 3746)

**Row-2:**

INSERT INTO Book

VALUES (9780060850524, 11.54, ‘Hardcover', #4/15/2005#, ‘Brave New World’, 7001,  4536)

1. **Author (Author\_ID, First\_Name, Last\_Name, Country)**

**SQL Query:**

**Creating Table:**

CREATE TABLE Author (

   Author\_ID VARCHAR(10) NOT NULL,

   First\_Name VARCHAR(30),

   Last\_Name VARCHAR(30),

   Country VARCHAR(30),

CONSTRAINT pk\_Author PRIMARY KEY (Author\_ID)

)

**Insert Statement:**

**Row-1:**

INSERT INTO Author

VALUES (‘A1072’, ‘Fyodor’, ‘Dostoevsky’, ‘Russia’)

**Row-2:**

INSERT INTO Author

VALUES ('A1162', ‘Charles’, ‘Dickens’, ‘UK’)

1. **Book\_Author (ISBN (FK), Author\_ID (FK))**

**SQL Query:**

**Creating Table:**

CREATE TABLE  Book\_Author (

Author\_ID VARCHAR(10)  NOT NULL,

ISBN NUMBER NOT NULL,

CONSTRAINT pk\_Book\_Author PRIMARY KEY (Author\_ID, ISBN)

)

**Adding Foreign Key-1:**

ALTER TABLE Book\_Author

ADD CONSTRAINT fk1\_Book\_Author FOREIGN KEY (Author\_ID) REFERENCES Author (Author\_ID)

**Adding Foreign Key-2:**

ALTER TABLE Book\_Author

ADD CONSTRAINT fk2\_Book\_Author FOREIGN KEY (ISBN) REFERENCES Book (ISBN)

**Insert Statement:**

**Row-1:**

INSERT INTO Book\_Author

VALUES (‘A1072’, 9781593080815)

**Row-2:**

INSERT INTO Book\_Author

VALUES ('A1162', 9780141439600)

**Forms**

**Navigation Form**

**Conclusion**