**Day 9 Assignment 1**

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**Problem**: Design a database schema for a library system, including tables, fields, and constraints like NOT NULL, UNIQUE, and CHECK. Include primary and foreign keys to establish relationships between tables.

**Solution**:

Tables:

1. Users

2. Books

3. Authors

4. BookAuthors

5. Borrowings

* Schema:

1. **Users**

CREATE TABLE Users (

UserID INT PRIMARY KEY AUTO\_INCREMENT,

UserName VARCHAR(100) NOT NULL,

Email VARCHAR(100) NOT NULL UNIQUE,

PhoneNumber VARCHAR(15) CHECK (PhoneNumber REGEXP '^[0-9]+$'),

MembershipStart DATE NOT NULL,

MembershipEnd DATE,

CHECK (MembershipEnd IS NULL OR MembershipEnd > MembershipStart)

);

1. **Books**

CREATE TABLE Books (

BookID INT PRIMARY KEY AUTO\_INCREMENT,

Title VARCHAR(200) NOT NULL,

ISBN VARCHAR(13) NOT NULL UNIQUE,

PublishedYear INT CHECK (PublishedYear >= 1000 AND PublishedYear <= YEAR(CURDATE())),

Genre VARCHAR(50)

);

1. **Authors**

CREATE TABLE Authors (

AuthorID INT PRIMARY KEY AUTO\_INCREMENT,

FirstName VARCHAR(100) NOT NULL,

LastName VARCHAR(100) NOT NULL

);

1. **BookAuthors**

This table establishes a many-to-many relationship between Books and Authors.

CREATE TABLE BookAuthors (

BookID INT,

AuthorID INT,

PRIMARY KEY (BookID, AuthorID),

FOREIGN KEY (BookID) REFERENCES Books(BookID) ON DELETE CASCADE,

FOREIGN KEY (AuthorID) REFERENCES Authors(AuthorID) ON DELETE CASCADE

);

1. **Borrowings**

CREATE TABLE Borrowings (

BorrowingID INT PRIMARY KEY AUTO\_INCREMENT,

UserID INT,

BookID INT,

BorrowedDate DATE NOT NULL,

DueDate DATE NOT NULL,

ReturnedDate DATE,

FOREIGN KEY (UserID) REFERENCES Users(UserID) ON DELETE CASCADE,

FOREIGN KEY (BookID) REFERENCES Books(BookID) ON DELETE CASCADE,

CHECK (ReturnedDate IS NULL OR ReturnedDate >= BorrowedDate),

CHECK (DueDate >= BorrowedDate)

);

**Explanation**:

* + Users: table stores user information with constraints to ensure data integrity.
  + Books :table contains book information, with constraints on ISBN uniqueness and valid publication years.
  + Authors: table holds author details.
  + BookAuthors : table manages the many-to-many relationship between books and authors.
  + Borrowings: table tracks the borrowing activity, including constraints to ensure valid dates for borrowing and returning books.