

Assignment 2: 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.

A proposed database schema for a library system:

Table: Books

Fields:

Book_ID (Primary Key, integer)

Title (varchar(255) NOT NULL)

Author (varchar(255) NOT NULL)

ISBN (varchar(13) UNIQUE NOT NULL)

Published_Year (integer CHECK Published_Year >= 0)

Constraints:

Book_ID: NOT NULL

Table: Students

Fields:

Student_ID (Primary Key, integer)

Name (varchar(100) NOT NULL)

Email (varchar(100) UNIQUE NOT NULL)

Phone (varchar(20) UNIQUE)

Constraints:

Student_ID: NOT NULL

Table: Book_Copies

Fields:

Copy_ID (Primary Key, integer)

Book_ID (Foreign Key references Books(Book_ID) ON DELETE CASCADE)

Available (boolean NOT NULL DEFAULT TRUE)

Constraints:

Copy_ID: NOT NULL

Table: Book_Loans

Fields:

Loan_ID (Primary Key, integer)

Student_ID (Foreign Key references Students(Student_ID) ON DELETE CASCADE)

Copy_ID (Foreign Key references Book_Copies(Copy_ID) ON DELETE CASCADE)

Date_Borrowed (date NOT NULL)

Due_Date (date NOT NULL)

Date_Returned (date)

Constraints:

Loan_ID: NOT NULL

Date_Borrowed: NOT NULL

Due_Date: NOT NULL

CHECK (Date_Borrowed <= Due_Date)

In this schema:

Each book is uniquely identified by Book_ID and has a title, author, ISBN, and published year.

Each student is uniquely identified by Student_ID and has a name, email, and phone number.

Book_Copies table maintains information about each copy of a book, including its availability status.

Book_Loans table tracks the borrowing of books by students, including the loan date, due date, and return date.

The foreign keys establish relationships between tables:

Book_Copies.Book_ID references Books.Book_ID

Book_Loans.Student_ID references Students.Student_ID

Book_Loans.Copy_ID references Book_Copies.Copy_ID

Constraints such as NOT NULL, UNIQUE, and CHECK ensure data integrity and validity within the library system. Additionally, ON DELETE CASCADE is used to ensure referential integrity; if a book or a student is deleted, all corresponding records in Book_Copies and Book_Loans are also deleted.