

CPSC 3660 SPRING 2021

Library Management Web Application

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October 1, 2021

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About the Project

For the course project, the group will be developing a web-based library management system that will be used by a librarian to help keep track of all books in the library as well as all book rentals. The project members are Don Castillo, Billy Hughson, and Brian Cruz.

Entities and Attributes

Given the limited time for the conceptualization and development of the project, the group has decided to make the application as simple as possible. The library management system will consist of the following data (entities and attributes) enough to simulate a real-world library management system.

BOOK

- Book ID
- Title
- Publication Year
- Name of the Author(s)
- Amount

Business rules and assumptions:

- The book id, title, and amount are required.
- Book id is added since there may be an instance where two or more books can have the same title.
- A book can have one or more authors.
- A book can have no author.

- The amount attribute is the number of copies of the book that is currently in the library and can be rented by the borrower. This is regardless of the book's format (e.g. paperback, hardcover).
- All books in the library are assumed to be printed and can be actually borrowed (digital copies will be excluded).
- All books are treated as stand alone. It means that a book, especially those belonging in a book series, will be treated as separate or unrelated to other books.

AUTHOR

- Author ID
- First Name
- Last Name

Business rules and assumptions:

- The author id, and last name are required.
- It is assumed that the authors of the books in the library have a unique combination of first and last names, although for simplicity, author id will be used as the primary key.

BORROWER

- Borrower ID
- First Name
- Last Name
- Email
- Phone Number
- Address
 - Street
 - City
 - Province
- Postal Code

Business rules and assumptions:

- The borrower id, last name, and email will be required.
- Although it is possible to create a composite key out of the borrower's attributes to ensure uniqueness, the group has decided to simplify everything and make the borrower id as the primary key.
- The borrower's first name is optional.
- Phone number is the most preferred number that the borrower uses.

RENTAL

- Rental ID
- Book ID
- Borrower ID
- Rental Date
- Due Date

Business rules and assumptions:

- All attributes in the rental entity are required.
- It is assumed that all records in the rental entity are ongoing rentals, meaning the books are still unreturned.
- A borrower can rent one or more books, but s/he cannot rent the same book at the same time.
- Rental date is the date the book was rented (the date of the transaction).
- Time is not important for rental and due date.
- Due date is a derived attribute (that will be stored in the database), calculated by rental date + 14 days.

Operations and Functions

Below are the operations that the application is expected to do along with how the librarian, the intended user, will accomplish each operation.

1. Create, Read, Update, and Delete a BORROWER record

- a. The librarian should be able to create a BORROWER record via form.
- b. The librarian should be able to read a BORROWER record on a single page, with an option to delete or update the record.
- c. To update, the librarian will be presented with a form where the editable fields will contain the current values of the attributes of the BORROWER record.
- d. To delete the BORROWER, the system will check first if he has no pending rentals (unreturned books). If so, his record will not be deleted. Otherwise, the deletion will proceed.

2. Create, Read, Update, and Delete an AUTHOR record

- a. The librarian should be able to create an AUTHOR record via form. The system assumes that each author's combination of first and last name is unique. If there is already an existing first and last name in the system, the system will notify that the author already exists, otherwise, creation will proceed.
- b. The librarian should be able to read an AUTHOR record on a single page, with an option to delete or update the record.
- c. To update, the librarian will be presented with a form where the editable fields will contain the current values of the attributes of the AUTHOR record. Update will proceed if the new first and last names entered do not already exist in the database (other than the record itself being updated).
- d. Deleting the author also removes the author from any BOOKs related to him.

3. Create, Read, Update, and Delete a BOOK record

- a. The librarian should be able to create a BOOK record via form.
When adding the BOOK's author, that author should already exist in the AUTHOR table, otherwise the librarian will have to create a new author and assign it to the BOOK.
- b. The librarian should be able to read a BOOK record on a single page, with an option to delete or update the record.
- c. To update, the librarian will be presented with a form where the editable fields will contain the current values of the attributes of the BOOK record.
- d. To delete a BOOK, the BOOK should not exist in any RENTAL records. It cannot be deleted until that book is returned.

4. Create, Read, Update, and Delete a RENTAL record

- a. If a BORROWER wants to rent a BOOK, each book he rents represents a record in RENTAL.
- b. The librarian should be able to create a RENTAL record via form.
Before creating the record, the system checks if the BOOK to be rented is in the library (if that book's amount is not 0). If available, proceed. Otherwise, notify the librarian that no copy is available. After that, the system will also check for the existence of the BORROWER. If everything is set, a RENTAL record is added. Also, the amount of the BOOK rented will decrease by 1. The due date of the RENTAL record is calculated 14 days after the rent date.
- c. To update, the system will change the amount attribute of the previously entered BOOK. The librarian should also be able to change the BOOK to a new one and assign a new BORROWER to it.
- d. Deleting a record means the BOOK is returned. The amount attribute of that BOOK will increase by 1.

5. List all records of BOOK, AUTHOR, BORROWER, RENTAL

Entity Relationship Diagram

