**University Library Management System**

Group Project: 3-4 students.

Deadline: Sunday January 4th, 2025

Following the MVC architectural pattern, build a web application using Java Servlets, JSPs, and HTML (also you can use JavaScript and CSS for frontend) for the library management system. You need to use an RDBM (relational database management system) of your choice. *[Suggestion: Start by the object-oriented design of the problem (models) and apply design patterns when necessary. Then, write the servlet or servlets that will act as the controllers in your application. Finally, write the views as JSP files.]*

1. User Roles & Actors

* Administrator: Oversees the system, manages users (patrons, librarians), and handles book inventory and system configurations.
* Librarian: Manages day-to-day operations, such as handling book borrowing, returns, and managing fines.
* Patron: Can search for books, borrow available ones, view borrowing history, and check fine status.
* The patron can be either a university student or a university employee

1. Authentication & Authorization

* Administrator: Full access to manage books, users, and system settings.
* Librarian: Access to book management, patron borrowing records, and fine processing.
* Patron: Access to personal borrowing history, available books, and fine status.

1. Book Management (Admin and Librarian)

* Add, Edit, and Remove Books: Administrators and librarians can add new books, update details (e.g., title, author, genre, availability), or remove books from the system.
* View All Books: Provide a comprehensive list of all books in the library, including details like title, author, ISBN, genre, and availability.
* Book Availability Tracking: Track whether books are available for borrowing, currently borrowed, or reserved.

1. Patron Management (Admin and Librarian)

* Add, Edit, and Remove Patrons: Administrators and librarians can add new patrons, update their details (e.g., Patron Name, DOB, patron ID), or remove them from the system.
* View Patron Borrowing History: Librarians and administrators can access the borrowing history of individual patrons, including borrowed books, return status, and any pending fines.

1. Borrow and Return Books (Librarian and Patron)

* Borrow Books: Patrons can check out books if available, and the system will record the borrowing date and due date. The patron can borrow a maximum of three books at the same time.
* Return Books: Librarians log the return of books, and the system calculates any fines if the book is returned late. The return status and fine amounts are updated in the patron's borrowing history.
* Each book should have a separate borrow transaction. A transaction ID in the format of BT###### (ex. BT123456) will be assigned for each borrowing. (make sure that no two transactions receive Translate the same transaction ID – synchronization).

1. Fine Management (Admin and Librarian)

* Automatic Fine Calculation: The system should automatically calculate fines for overdue books based on pre-configured rates and display the fine to the patron (fine is 1JD per every extra day).
* Fine Payment Status: Librarians can update the system when a fine is paid, and patrons can view their outstanding fines in their account.
* Fine History: The system should track all fines paid and outstanding for each patron, with details available to both librarians and patrons.

1. Book Search & Filtering (Patron)

* In the main page, the patron will see all the books sorted by year of publication. However, they can search for books by title or author.
* Search Results: Display relevant book details (title, author, availability) and indicate whether the book is available or currently borrowed.

1. Borrowing and Fine Status Notifications

* System Messages: The system will display important messages to users regarding their borrowing status:
  + For patrons: Notifications for due dates and overdue books will be shown when they log in.
  + For librarians: Notifications about pending returns and fines will be visible when managing patron accounts.
* Visual Indicators: Use color-coded (red or green) indicators messages to alert patrons about overdue books or unpaid fines as they interact with their account.

1. Book Reviews and Ratings (Patron)

* Comment on Books: Patrons can leave comments or reviews for any book they have borrowed. These comments will be visible to other patrons browsing the book's details.
* Rate Books: Patrons can rate books on a scale of 1 to 5.

1. Sharing Books (Patron)

* Share Book Information: Patrons can share book details (e.g., title, author, description) with other patrons within the system.
* View Shared Books: Each patron will have a dedicated view or section where they can see books shared with them by other patrons. This view will include book details, and any comments shared alongside the book.

1. Reports & Statistics (Admin and Librarian)

* Fine Reports: View detailed reports on fines collected, outstanding fines, and overdue payments.
* Library Usage Statistics: Track overall library usage, including the number of active borrowers and current book reservations.

1. System Configuration (Admin): Use the deployment descriptor (web.xml) to configure the following values in the system:

* Fine and Borrowing Limits: Administrators can configure fine rates for overdue books and set borrowing limits (e.g., maximum number of books borrowed per patrons or borrowing period).
* Borrowing Period Management: Set default borrowing periods for books.