

# The Library Management

## Project Overview

The Library Management System (LMS) is designed to efficiently manage the operations of a library. It includes two separate websites: one for clients (students) and one for administrators (admins). The system handles various functions such as managing books, book categories, clients, and borrowing transactions.

## Entities and Features

### Admin

Admins are responsible for managing all aspects of the library system. The key features and tasks include:

#### 1. Manage Books:

- **Add New Books:** Admins can add new books by entering details such as title, author, ISBN, category, and availability status.
- **Update Books:** Admins can update the information of existing books.
- **Delete Books:** Admins can remove books from the library system.
- **Display All Books:** Admins can view a comprehensive list of all books in the library.
- **Search Books:** Admins can search for books by title, author, or ISBN.

#### 2. Manage Students:

- **Add New Students:** Admins can add new student records including details such as name, student ID, contact information, and address.
- **Update Student Information:** Admins can update the details of existing students.
- **Delete Students:** Admins can remove student records from the system.
- **Display All Students:** Admins can view a comprehensive list of all students.
- **Search Students:** Admins can search for students by name or student ID.

### 3. Manage Book Categories:

- **Add New Categories:** Admins can add new categories for books.
- **Update Categories:** Admins can update the details of existing categories.
- **Delete Categories:** Admins can remove categories from the system.
- **Display All Categories:** Admins can view a comprehensive list of all book categories.
- **Search Categories:** Admins can search for categories by name.

### 4. Manage Borrowed Books:

- **Record Borrowed Books:** Admins can record when a book is borrowed by a student, including due dates.
- **Update Borrowed Book Records:** Admins can update the borrowing records.
- **Delete Borrowed Book Records:** Admins can remove borrowed book records once the book is returned.
- **Display All Borrowed Books:** Admins can view a list of all borrowed books along with their due dates.
- **Search Borrowed Books:** Admins can search for borrowed books by student name, book title, or due date.

### 5. Manage Other Admins:

- **Add New Admins:** Super admins can add new admin users.
- **Update Admin Information:** Super admins can update the details of existing admins.
- **Delete Admins:** Super admins can remove admin users from the system.
- **Display All Admins:** Super admins can view a comprehensive list of all admins.
- **Search Admins:** Super admins can search for admins by name or admin ID.

## Client (Student)

Clients (students) can perform a variety of actions related to their library usage. The key features and tasks include:

#### 1. Show Books:

- **View Available Books:** Students can view the list of books available in the library.

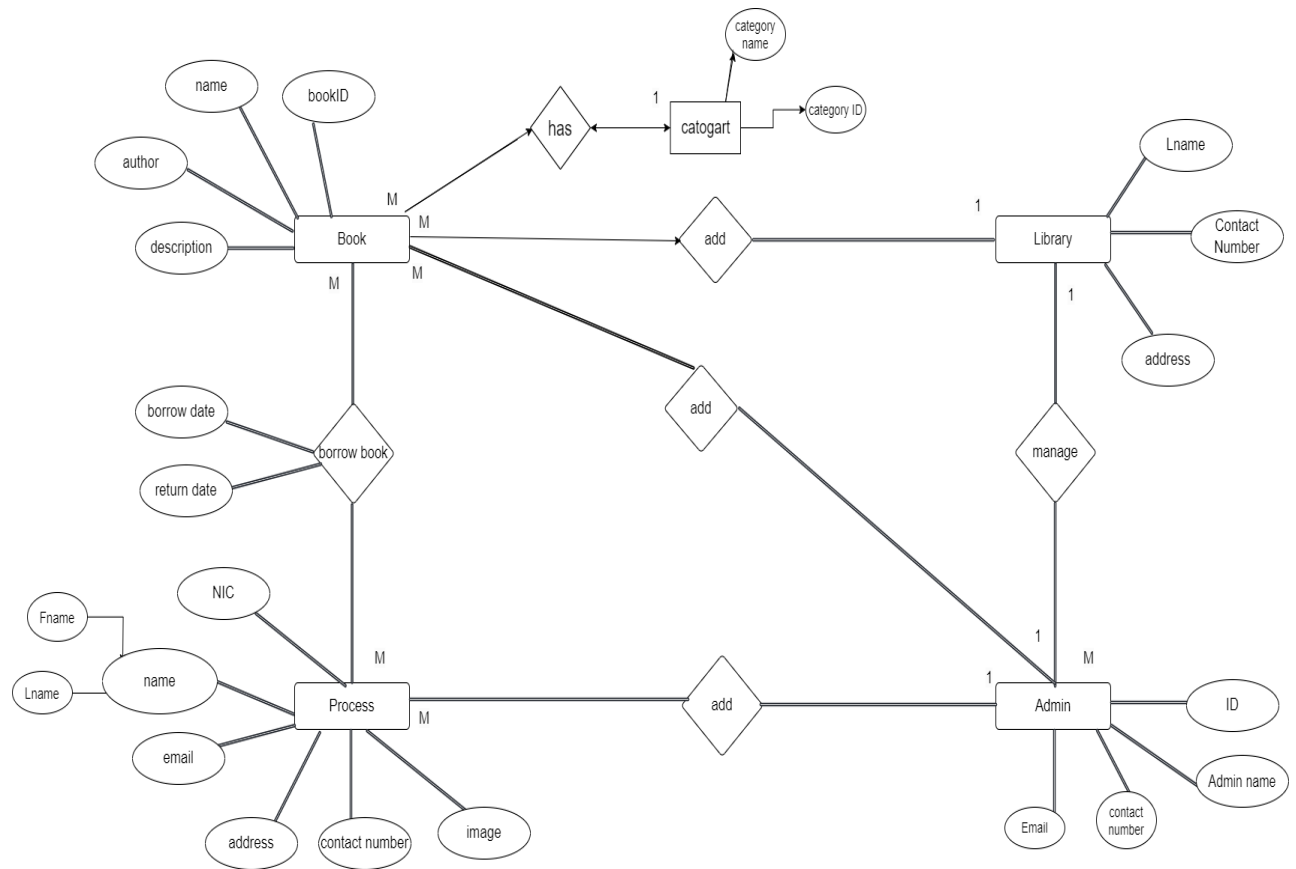
#### 2. Borrowing History:

- **View Borrowing History:** Students can view the list of books they have borrowed along with the due dates.

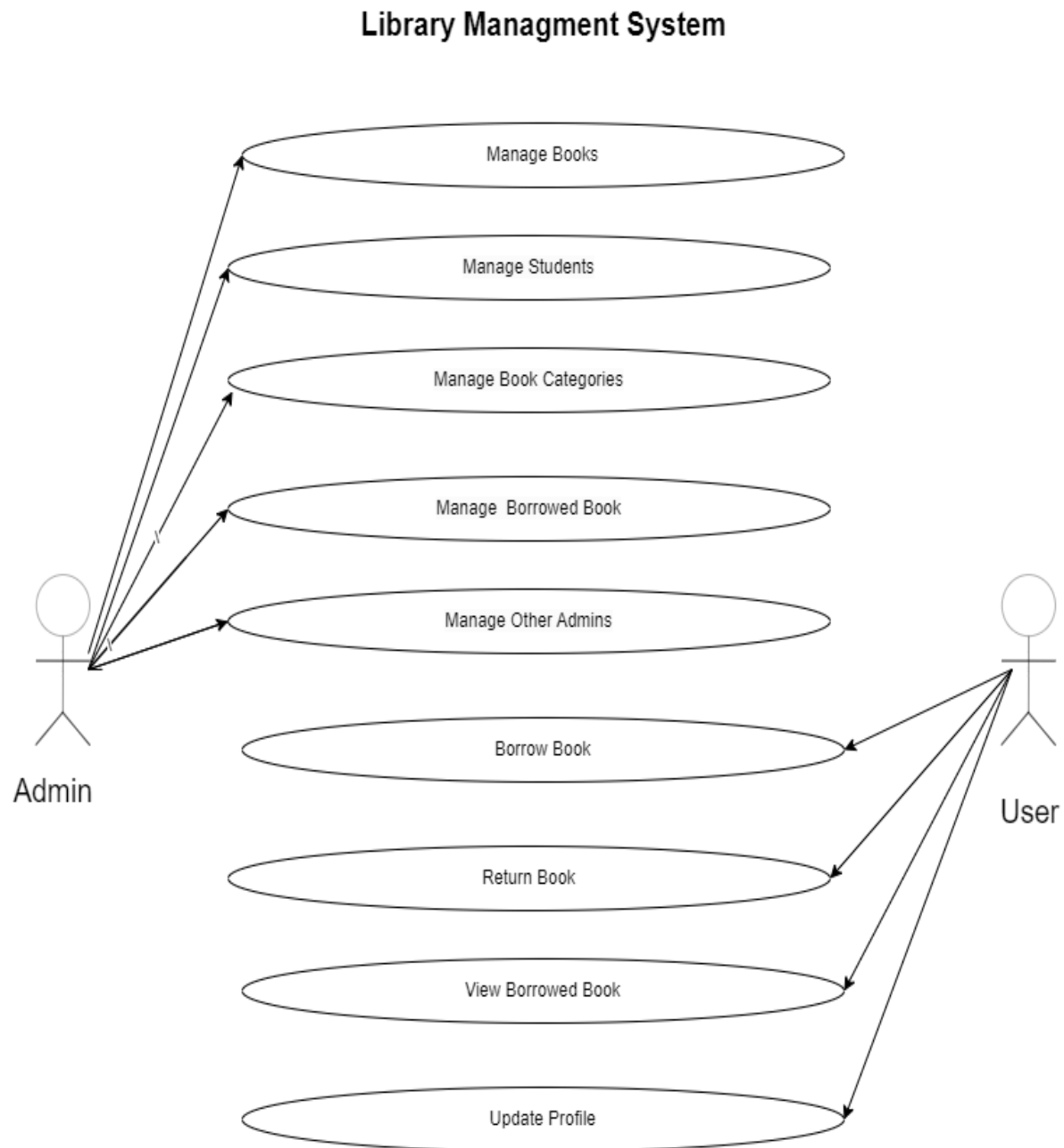
#### 3. Client's Profile:

- **Update Profile Image:** Students can update their profile image.
- **Update Profile Password:** Students can update their profile password.

## ER Diagram:



## User Diagram:



## **Requirements Analysis**

### **1.1 Functional Requirements**

- **Admin Functionalities:**
  1. Manage Books:
    - Add, update, delete, display, and search books.
  2. Manage Students:
    - Add, update, delete, display, and search student records.
  3. Manage Book Categories:
    - Add, update, delete, display, and search book categories.
  4. Manage Borrowed Books:
    - Record, update, delete, display, and search borrowed book records.
  5. Manage Admins:
    - Add, update, delete, display, and search admin users.
- **Student Functionalities:**
  1. Show Books:
    - View available books.
  2. Borrowing History:
    - View borrowing history and due dates.
  3. Client's Profile:
    - Update profile image and password.

### **1.2 Non-Functional Requirements**

- **Performance Requirements:**
  - The system should handle simultaneous requests from multiple users.
- **Security Requirements:**
  - User authentication for both admin and student portals.
  - Data encryption for sensitive information.
- **Usability Requirements:**
  - User-friendly interfaces for both portals.
- **Reliability Requirements:**
  - Regular data backups and recovery options.

## **Plan**

### **Testing Plan**

#### **1.1 Types of Testing**

- **Unit Testing:** Test individual components of the system.
- **Integration Testing:** Test the interaction between different components.
- **System Testing:** Test the complete system for defects.
- **Acceptance Testing:** Validate the system against user requirements.

#### **1.2 Test Cases**

- **Admin Portal:**
    - Add new book and verify its addition.
    - Update book details and verify updates.
    - Delete a book and verify deletion.
    - Search for a book and verify results.
    - Add, update, delete, and search students.
    - Add, update, delete, and search categories.
    - Record, update, delete, and search borrowed books.
    - Add, update, delete, and search admin users.
  - **Student Portal:**
    - View available books.
    - View borrowing history.
    - Update profile image and password.
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## Deployment Plan

### 2.1 Deployment Steps

- **Step 1:** Prepare the production environment.
- **Step 2:** Deploy the backend server.
- **Step 3:** Deploy the frontend applications.
- **Step 4:** Configure the database.
- **Step 5:** Perform system testing in the production environment.
- **Step 6:** Go live and monitor the system for any issues.

### 2.2 User Training and Support

- **User Manuals:** Provide detailed user manuals for both admins and students.
- **Training Sessions:** Conduct training sessions for admin users.
- **Support:** Offer ongoing support and maintenance for the system.

## **Implementation**

The Library Management System (LMS) is structured into several components including frontend views, backend controllers, utility classes, models, and services. This section provides an overview of the implementation details, ensuring maintainability and scalability.

### **1.1 Project Structure**

The project is divided into the following key directories and files:

- **Views:**
  - Contains JSP files for the frontend user interface.
  - Subdirectories for Admin and Client views.
- **Source Packages:**
  - Contains Java packages for controllers, utilities, models, and services.

### **1.2 Frontend Implementation**

The frontend is implemented using JSP (JavaServer Pages). Key directories include:

- **styles:**
  - admin.css: Stylesheet for admin pages.
  - client.css: Stylesheet for client pages.
  -
- **views:**
  - **Admin:**
    - Admin\_manage: Managing admins (admin\_form.jsp, show\_admins.jsp).
    - Books\_Categories: Managing book categories (show\_bookcategories.jsp).
    - borrowed\_books: Displaying borrowed books (display\_borrowed\_books.jsp).
    - books: Managing books (adminAddBook.jsp, adminBook.jsp, adminEditBook.jsp, adminSearchBook.jsp).
    - home: Admin home page.



- students: Managing students (show\_students.jsp, student\_form.jsp).
- admin\_page\_template.jsp: Admin page template.
- **auth:**
  - login\_form.jsp: Login form for authentication.
- **client:**
  - clientCommon: Common components like footer and header.
  - home: Client home page.
  - my\_books: Viewing borrowed books.
  - profile: Managing client profile.
- **common:**
  - common\_url.jsp: Common URLs for the application.
- index.jsp: Main entry point of the application.

### 1.3 Backend Implementation

The backend is implemented using Java. Key packages and classes include:

- **com.team2.controller.admin:**
  - Manages various admin functionalities (books, students, categories, borrowed books, admins).
- **com.team2.controller.auth:**
  - AuthController.java: Handles authentication processes.
- **com.team2.controller.client:**
  - Manages client functionalities (home, books, profile).
- **com.team2.controller.util:**
  - Utility classes for database connections, image paths, password generation, and asset URLs.
- **com.team2.models:**
  - Models for borrowed books, book categories, books, and users.
- **com.team2.service:**
  - Services for authentication, borrowed books, book categories, books, and users.
- **com.test:**
  - Test.java: Contains test cases for the application.

## 1.4 Implementation Details

- **Admin Portal Implementation:**
  - **Book Management:** Handled by AdminManageBooksController.java.
  - **Student Management:** Handled by AdminStudentController.java.
  - **Category Management:** Handled by AdminManageBooksCategoriesController.java.
  - **Borrowed Books Management:** Handled by AdminManageBorrowedBooksController.java.
  - **Admin User Management:** Handled by ManageAdminsController.java.
- **Client Portal Implementation:**
  - **Book Viewing:** Handled by HomeController.java.
  - **Borrowing History:** Handled by MyBooksController.java.
  - **Profile Management:** Handled by ProfileController.java.
- **Authentication Implementation:**
  - AuthController.java handles login and logout functionality.
- **Utility Classes:**
  - DBConnection.java manages database connections.
  - Utility functions provided by PasswordGenerator.java and RandomBookIdGenerator.java.
- **Models and Services:**
  - Models define data structure and relationships.
  - Services implement business logic and interact with the database through models.

## Design

### Login



A user login form titled "User Login" is displayed on a light blue background. The form has a blue header with the title. Below the header, there are two input fields: "Email:" and "Password:". Below the password field, there is a link "Forgot Password". At the bottom of the form, there is a green "Login" button.

# Student Management

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out





KAVINDU KAVEESHA

Student Details

Refresh

Add New Student

All Students(4)

ID	First Name	Last Name	Profile Image	NIC	Email	Phone Number	Address	Status	Actions
1	kavindu	kaveesha		200020702993	kavindu@gmail.c...	0771235703	No:103/19,Sonflo...	<div>Active</div>	<div>Edit</div> <div>Delete</div>
2	Dinesh	Hashan		2000020702994	dinesh@gmail.com	0771234556	Horana,Kathulath...	<div>Active</div>	<div>Edit</div> <div>Delete</div>
3	Nimeshi	Dilshara		200012045678	nimesh@gmail.co...	0773455464	Godagama,Homg...	<div>Active</div>	<div>Edit</div> <div>Delete</div>
4	Panchayu	Bhanu		20012044567	bhanu@gmail.com	0772344543	Anuradapura	<div>Active</div>	<div>Edit</div> <div>Delete</div>

N Library

Home

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Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Update Student Data

All Students

First Name:  
kavindu

Last Name:  
kaveesha

NIC:  
200020702993

Update Image  
Choose File No file chosen

Email:  
kavindu@gmail.com

Phone Number:  
0771235703

Address:  
No:103/19,Sonflowergarden,kathathuduwa

Update

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Student Registration

New Student

All Students

First Name:

Last Name:

NIC:

Add new Image  
Choose File No file chosen

Email:

Phone Number:

Address:

Add Student

# Book Categories

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Category Management

Refresh

Add New Category

Category Name:

Enter category name

Submit

All Students(6)

No	Category ID	Category Name	Actions
1	6	History	<div>Update</div> <div>EditDelete</div>
2	10	Java	<div>EditDelete</div>
3	7	Maths	<div>EditDelete</div>
4	9	Programing C	<div>EditDelete</div>
5	11	Python	<div>EditDelete</div>
6	8	Sinhala	<div>EditDelete</div>

N Library

Home

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Log Out

KAVINDU KAVEESHA

Category Management

Refresh

Add New Category

All Students(6)

No	Category ID	Category Name	Actions
1	6	History	<div>Update</div> <div>EditDelete</div>
2	10	Java	<div>EditDelete</div>
3	7	Maths	<div>EditDelete</div>
4	9	Programing C	<div>EditDelete</div>
5	11	Python	<div>EditDelete</div>
6	8	Sinhala	<div>EditDelete</div>

N Library

Home

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Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Category Management

Refresh

Add New Category

All Students(6)

No	Category ID	Category Name	Actions
1	6	History	<div>EditDelete</div>
2	10	Java	<div>EditDelete</div>
3	7	Maths	<div>EditDelete</div>
4	9	Programing C	<div>EditDelete</div>
5	11	Python	<div>EditDelete</div>
6	8	Sinhala	<div>EditDelete</div>

## admin management

N Library

Home

Borrow Books

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Books

Book Categories

Admins

Log Out



KAVINDU KAVEESHA

Admin Details

Refresh

Add New Admin

All Admins (2)

ID	First Name	Last Name	Profile Image	NIC	Email	Phone Number	Address	Status	Actions
1	Kavindu	Kaveesha		20002045633	admin@gmial.com	0771235704	No:103/19,Sonflo...	<div>Disable</div>	<div>Edit</div> <div>Delete</div>
2	Admin	Second		20001234325V	adminsecond@g...	0771233224	Colombo	<div>Active</div>	<div>Edit</div> <div>Delete</div>

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Admins

Log Out

KAVINDU KAVEESHA

Admin Registration

New Admin

All Admins

First Name:

Add new Image

Choose File

No file chosen

Email:

Last Name:

Phone Number:

NIC:

Address:

Add Admin

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Admin Registration

All Admins

First Name:

Add new Image

Choose File

No file chosen

Email:

Last Name:

Phone Number:

NIC:

Address:

Update Admin

Successfully update Admin.

# Manage Books

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Update Book Data

All Books

Book Title

The C Programming Language

Update Image

Choose File

No file chosen

Category

Programing C

Quantity

2

Description

A true classic when it comes to Programming. Dennis Ritchie originally designed and implemented the language! "The C Programming language" was instrumental in popularizing the C language and is still

Update Book

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

Add New Book

Refresh

All Books

Book Title

Enter book title

Add new Image

Choose File

No file chosen

Category

Select category

Author

Enter author

Quantity

Enter quantity

Description

Enter description

Add Book

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA



Book Details

Refresh

Add New Book

Search Book

All Books(2)

No	Image	Book ID	Title	Category	Quantity	Author	Available	Actions
1		TME0940789	The C Programming L...	9	2	Brian Kernighan & De...	Available	<div>Like</div> <div>Delete</div>
2		BNL1231320	Beginning Perl	12	3	Curtis Poe	Available	<div>Like</div> <div>Delete</div>

# Barrow Books

N Library

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Borrow Books

Students

Books

Book Categories

Admins

Log Out

book image

Book Name

Category

Author

Edition

Borrow Details

Book Id

TME0940789

User Id

200020702993

Borrow Date

06/25/2024

Return Date

07/03/2024

Borrow Book

Back

N Library

Home

Borrow Books

Students

Books

Book Categories

Admins

Log Out

KAVINDU KAVEESHA

New Book Borrowing

User Details

User Id

Find User

User Name

Contact Number

Address

Email

Book Details

Book Id

Find Book

Book Availability

true

Book Image

Book Name

Category

N Library

Home

Borrow Books

Return Books

Students

Books

Book Categories

Admins

Log Out

Kavindu Kaveesha

Add New Borrowed Book

Search Borrowed Book :

Search Borrowed Book

Id	User Id	Book Id	Borrowed date	Return Date	Actions
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