

**A  
PROJECT REPORT ON**

# **Library Management System**

**SUBMITTED IN FULFILLMENT OF  
DIPLOMA IN ADVANCED COMPUTING (PG-DAC)**



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**CERTIFICATE**

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**UNDER THE GUIDENCE OF**

**Mrs. Lalita Shinde**

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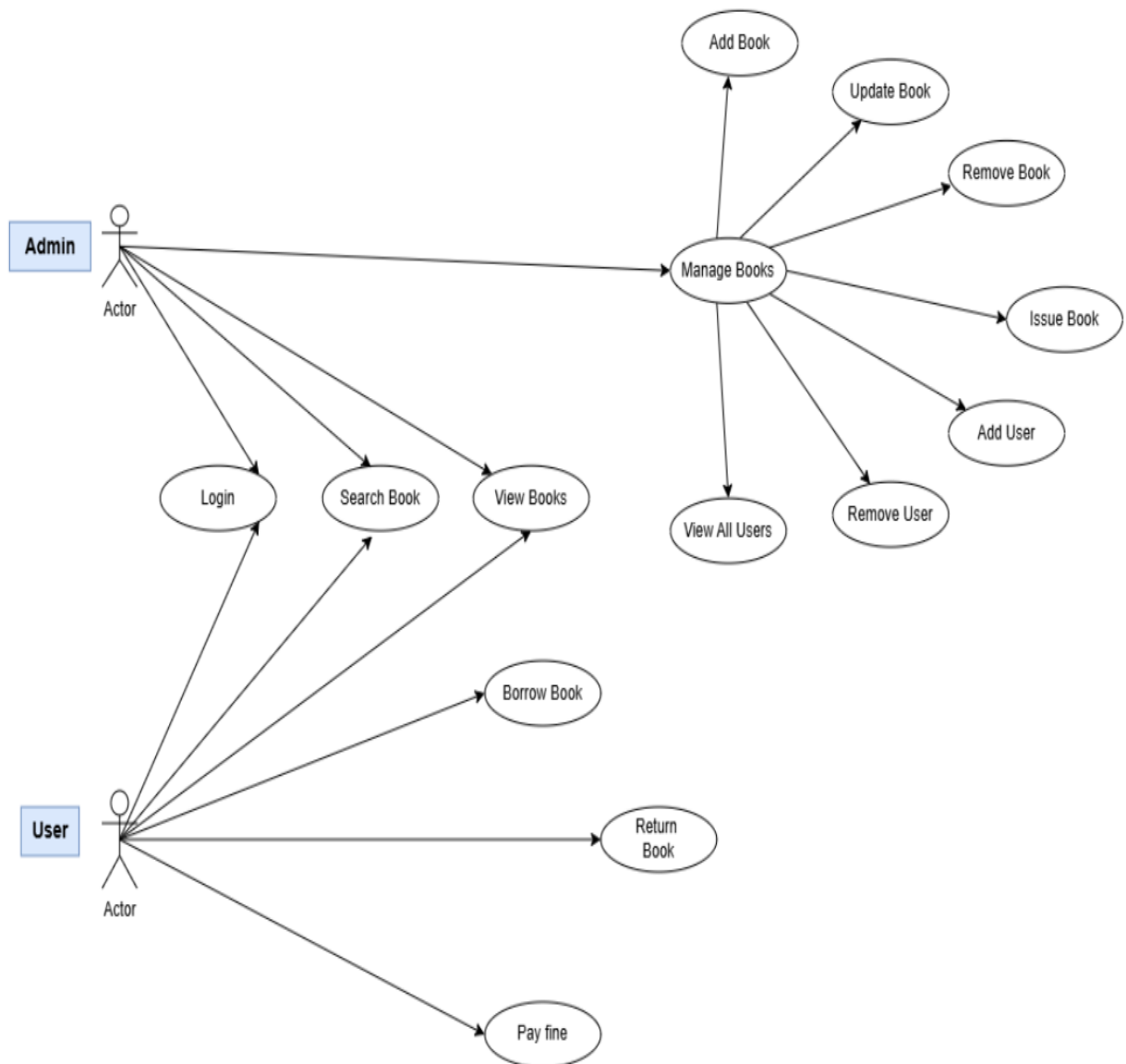
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## **1.INTRODUCTION TO PROJECT-**

The Library Management System is a comprehensive web application designed to efficiently manage and organize library resources. This system provides a user-friendly interface for librarians, students, and administrators to facilitate book cataloging, borrowing, returning, and tracking library assets. It streamlines operations by automating key tasks such as inventory management, member registration, and overdue book tracking. The system ensures seamless communication between users and administrators while enhancing the overall efficiency of library management.

## 2. REQUIREMENTS :



### 1. Use Case Diagram

## **2.1 Customer Flow for Library Management System**

### **2.1.1 Home Page**

**Objective:** Display a list of available books and resources.

**Features:**

- View a list of books, e-books, and other resources.
- Search and filter books based on title, author, genre, or availability.

### **2.1.2 Book Selection**

**Objective:** Select a book to view its details.

**Features:**

- Click on a book to view details such as author, summary, availability, and reviews.
- Check if the book is available for borrowing or reservation.

### **2.1.3 Book Borrowing & Reservation**

**Objective:** Allow customers to borrow or reserve books.

**Features:**

- If the book is available:
  - Borrow the book (if eligible and logged in).
  - Choose a borrowing duration.
- If the book is not available:
  - Reserve the book for future borrowing.

### **2.1.4 Cart Interaction (For Multiple Borrowing Requests)**

**Objective:** Manage borrowing requests before finalizing.

**Features:**

- If Logged In:
  - Navigate to the borrowing cart to review selected books.



- If Not Logged In:
  - Display a login prompt.
  - If not registered, prompt registration before borrowing.

#### **2.1.5 Borrowing Confirmation Page**

**Objective:** Finalize the borrowing process.

**Features:**

- View selected books for borrowing.
- Choose a pickup location (if applicable).
- Confirm borrowing or reservation.
- Redirect to the home page after confirming the borrowing request.

#### **2.1.6 Profile Page**

**Objective:** Manage user profile, borrowed books, and history.

**Features:**

- If Not Logged In:
  - Display a sign-in prompt.
- If Logged In:
  - View and update profile details.
  - View borrowed books, due dates, and past borrowing history.
  - Renew books (if applicable).
  - Submit book reviews.
  - Logout.

## **2.2 Admin Flow for Library Management System**

### **2.2.1 Admin Dashboard**

**Objective:** Provide an overview of library operations.

**Features:**

- View total books, borrowed books, reservations, and registered users.
- Search and filter books, users, and borrowing records.
- View notifications for overdue books and pending reservations.

### **2.2.2 Book Management**

**Objective:** Manage the library's book collection.

**Features:**

- Add new books with details like title, author, genre, and availability.
- Edit or update book information.
- Remove books from the system.
- Manage book categories and genres.

### **2.2.3 User Management**

**Objective:** Manage library members.

**Features:**

- View a list of registered users.
- Search and filter users by name, email, or membership status.
- Edit user details (e.g., contact info, membership status).
- Activate or deactivate user accounts.

### **2.2.4 Borrowing & Reservation Management**

**Objective:** Oversee book borrowing and reservations.

**Features:**

- View and approve/reject book reservations.

- Track currently borrowed books and their due dates.
- Mark books as returned and update availability status.
- Send reminders for overdue books.

#### **2.2.5 Reports & Analytics**

**Objective:** Monitor library activity and generate reports.

**Features:**

- Generate reports on borrowed books, overdue books, and user activity.
- Track the most borrowed books and popular categories.
- Export reports in different formats (PDF, Excel).

#### **2.2.6 Admin Profile & Settings**

**Objective:** Manage admin account and system settings.

**Features:**

- Update admin profile details.
- Change password and security settings.
- Configure library settings (e.g., borrowing limits, late fees).
- Logout.

### 3. Non-Functional Requirements

#### 3.1 Interface

- User interfaces must be intuitive and user-friendly for both library users and administrators.
- Detailed UI designs are provided in Appendix B.

#### 3.2 Performance

- **Number of Concurrent Users:** The system should handle at least 1000 transactions/inquiries per second.
- **System Resilience:** The application should be resilient to temporary server failures and ensure data consistency.

#### 3.3 Constraints

- The system should maintain performance standards of handling 1000 transactions/inquiries per second.
- The database should be optimized for fast retrieval of books, users, and borrowing records.

#### 3.4 Other Requirements

##### 3.4.1 Hardware Interfaces

###### Minimum Requirements:

- Processor: Intel Core i5 or higher (or AMD equivalent)
- RAM: 8 GB or more
- Storage: 512 GB SSD or larger

##### 3.4.2 Software Interfaces

- **Operating Systems:** Windows 11, Ubuntu 22.04
- **Database:** MySQL
- **Server:** Embedded Tomcat
- **Browsers:** Compatible with modern web browsers (Chrome, Firefox, Edge)

### 3.4.3 System Design

#### Architecture

- **Front-End:** Developed using React.js and Redux for state management.
- **Back-End:** Built with Spring Boot for server-side logic.
- **Database:** MySQL for storing user details, book inventory, and borrowing records.
- **Server:** Embedded Tomcat for hosting the application.

## **4. DESIGN**

4.1 Database Design The following table structures depict the database design.

### **1] Users Table**

<b>Key Type/Constraint</b>	<b>Column Name</b>	<b>Data Type</b>	<b>Length</b>	<b>Allow Null (1=Yes; 0=No)</b>
3	id	bigint	-	0
0	name	varchar	50	0
0	email	varchar	25	0
0	password	varchar	10	0
0	role	varchar	10	0

### **2] Books Table**

<b>Key Type/Constraint</b>	<b>Column Name</b>	<b>Data Type</b>	<b>Length</b>	<b>Allow Null (1=Yes; 0=No)</b>
3	id	bigint	-	0
0	title	varchar	30	0
0	author	varchar	30	1
0	publisher	varchar	30	1
0	isbn	varchar	10	0
0	genre	varchar	20	0
0	total_copies	int	-	0
0	available_copies	int	-	0

### **3] Reservations Table**

<b>Key Type/Constraint</b>	<b>Column Name</b>	<b>Data Type</b>	<b>Length</b>	<b>Allow Null (1=Yes; 0=No)</b>
3	id	bigint	-	0
0	user_id	bigint	-	0
0	book_id	bigint	-	0
0	reservation_date	date	-	0
0	expiration_date	date	-	0
0	status	varchar	10	0

#### 4] Fines Table

Key Type/Constraint	Column Name	Data Type	Length	Allow Null (1=Yes; 0=No)
3	id	bigint	-	0
0	user_id	bigint	-	0
0	record_id	bigint	-	0
0	amount	int	-	0
0	payment_status	varchar	10	1

#### 5] Borrowing\_records Table

Key Type/Constraint	Column Name	Data Type	Length	Allow Null (1=Yes; 0=No)
3	id	bigint	-	0
0	user_id	bigint	-	0
0	book_id	bigint	-	0
0	borrow_date	date	-	0
0	due_date	date	-	0
0	return_date	date	-	0
0	status	varchar	10	0

#### 6] Transactions Table

Key Type/Constraint	Column Name	Data Type	Length	Allow Null (1=Yes; 0=No)
3	id	bigint	-	0
0	user_id	bigint	-	0
0	book_id	bigint	-	0
0	transaction_amount	int	-	0
0	payment_method	varchar	10	0
0	transaction_type	varchar	10	0
0	status	varchar	10	0

### 7] Logs Table

Key Type/Constraint	Column Name	Data Type	Length	Allow Null (1=Yes; 0=No)
3	id	bigint	-	0
0	user_id	bigint	-	0
0	action	varchar	20	0
0	timestamp	date	-	0
0	details	varchar	50	0

### 8] Book\_Suggestions Table

Key Type/Constraint	Column Name	Data Type	Length	Allow Null (1=Yes; 0=No)
3	id	bigint	-	0
0	user_id	bigint	-	0
0	title	varchar	50	0
0	author	varchar	20	0
0	timestamp	varchar	10	0



## **5. CODING STANDARDS IMPLEMENTED :**

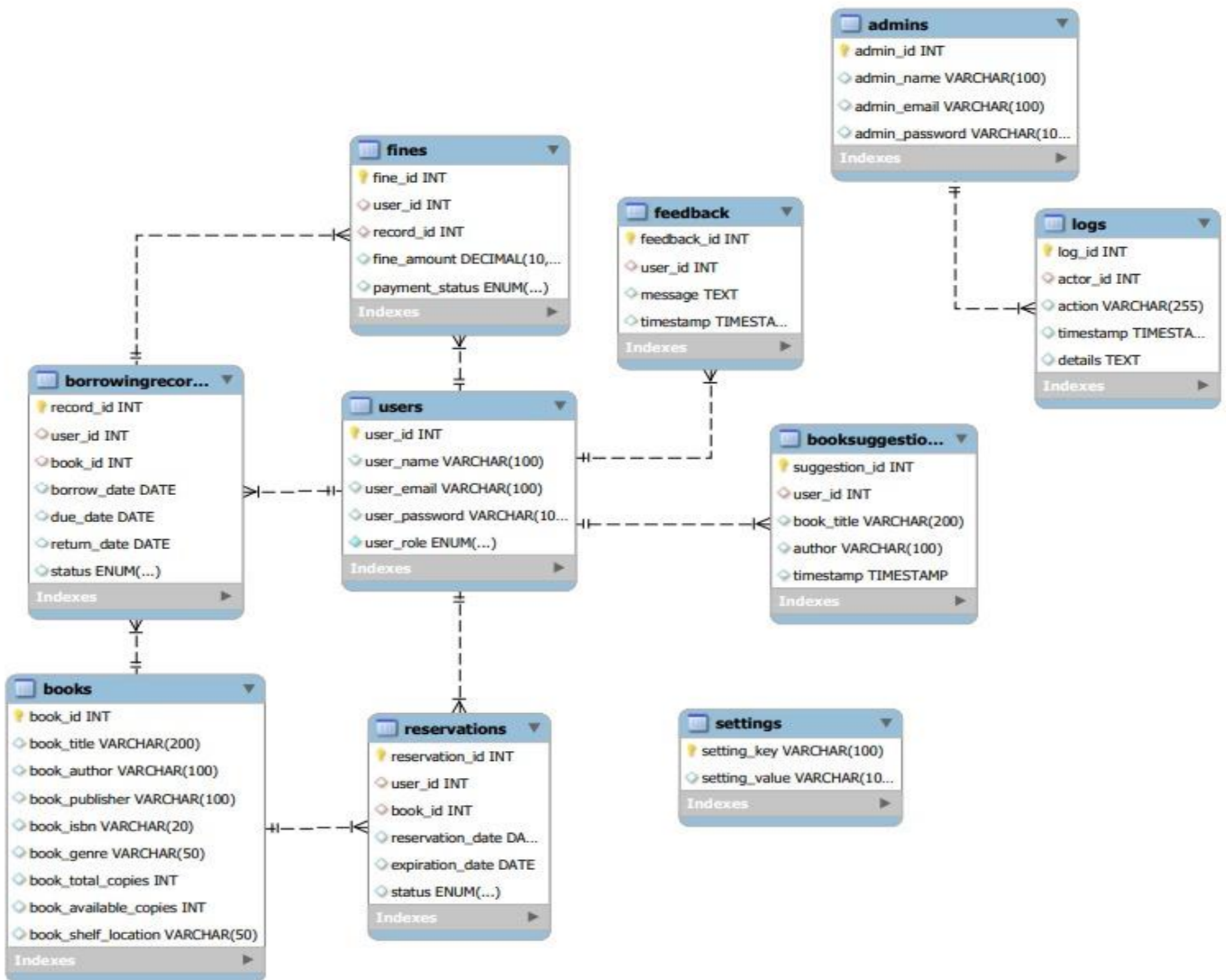
Naming and Capitalization Below summarizes the naming recommendations for identifiers in Pascal casing is used mainly (i.e. capitalize first letter of each word) with camel casing (capitalize each word except for the first one) being used in certain circumstances.

Identifier	Case	Examples	Additional Notes
Class	Pascal	User, Order, UserController	Class names should be based on "objects" or "real things" and should generally be nouns.  No ‘_’ signs allowed. Do not use type prefixes like ‘C’ for class.
Method	Camel	signUp , signIn, addReview	Methods should use verbs or verb phrases.
Parameter	Camel	firstName, lastName, email, password	Use descriptive parameter names. Parameter names should be descriptive enough that the name of the parameter and its type can be used to determine its meaning in most scenarios.
Interfaces	Pascal with I prefix	UserRepository, BookRepository	Do not use the “_” sign
Annotations	Pascal	@SpringBootApplication	Use @ at start of annotation
DTOs	Camel	ApiResponseDTO	Used to transfer data between the processes
Exception Class	Pascal with “Exception” suffix	ResourceNotFoundException	

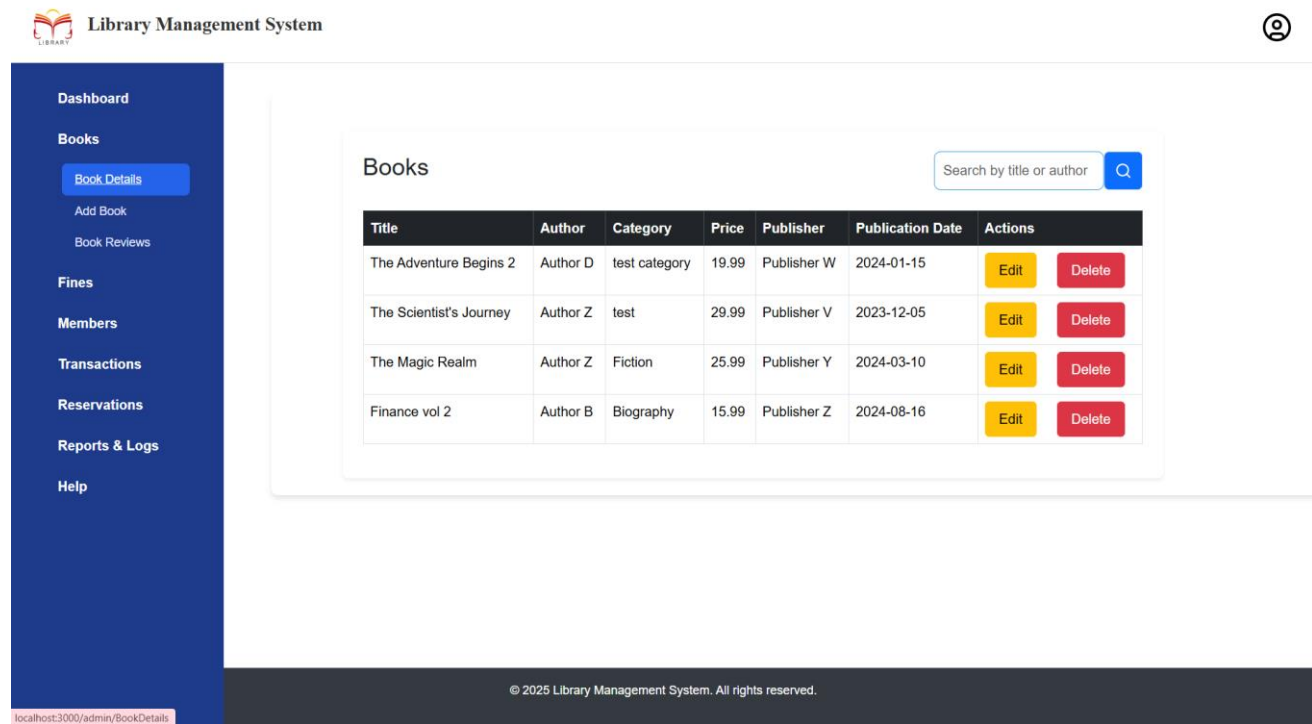
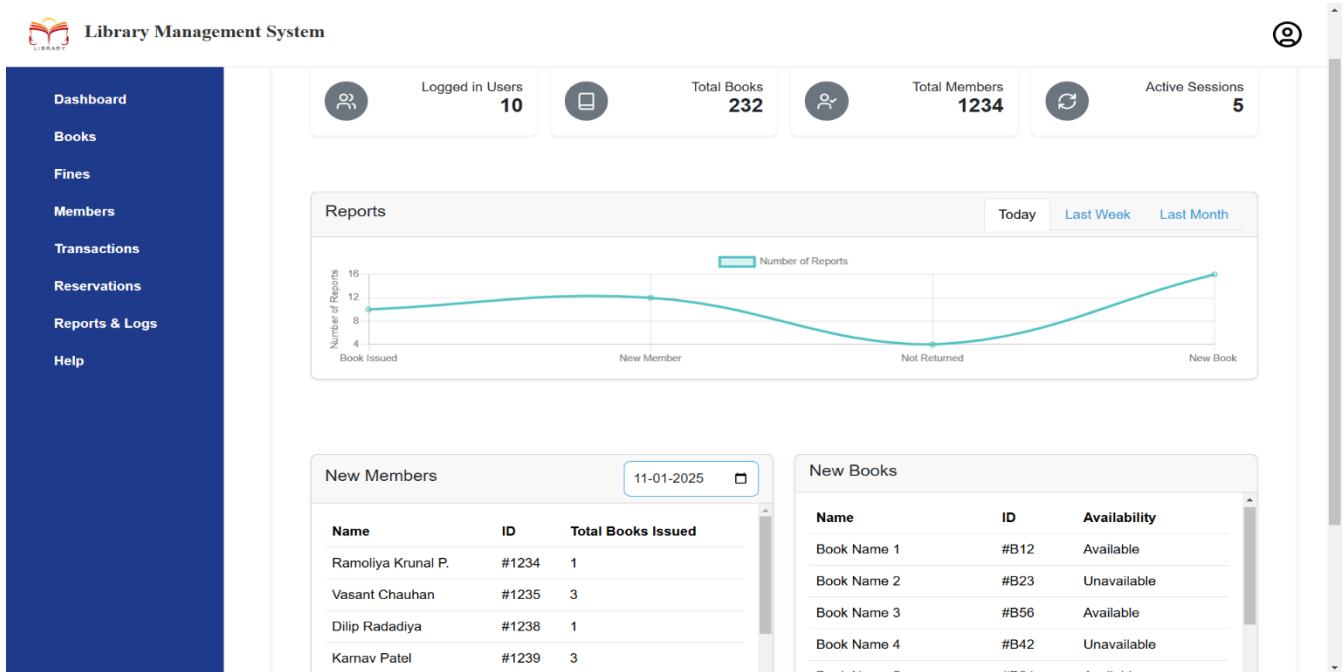
**Comments :**

- Comment each type, each non-public type member, and each region declaration.
- Use end-line comments only on variable declaration lines. End-line comments are comments that follow code on a single line.
- Separate comments from comment delimiters (apostrophe) or//with one space.
- Begin the comment text with an uppercase letter.
- End the comment with a period.
- Explain the code; do not repeat it.

## 6.E-R Diagram :



## 7. USER INTERFACE :





Dashboard

Books

Book Details

Add Book

Book Reviews

Fines

Members

Transactions

Reservations

Reports & Logs

Help

## Reviews

Search by member or book



Member	Book	Rating	Comment
Arya Stark	A Game of Thrones	★★★★★	Amazing book! A must-read.
Frodo Baggins	The Lord of the Rings	★★★★★	Great adventure, but a bit long.
Jon Snow	A Clash of Kings	★★★☆☆	Good, but not as engaging as the first book.
Gandalf the Grey	The Hobbit	★★★★★	Absolutely love this classic!
Tyrian Lannister	A Storm of Swords	★★★★★	One of the best books in the series.

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localhost:3000/admin/BookReviews



Dashboard

Books

Book Details

Add Book

Book Reviews

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Help

## Add New Book

Book Title

Description

Publish Date

Category

Author

Publisher

Image

 No file chosen 

Add Book

localhost:3000/admin/AddBook



Dashboard

Books

Fines

Members

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Manage  
Reservations

Reports & Logs

Help

## Reservations

Search by member or book



Member	Book	Reservation Date	Status	Actions
John Doe	The Great Gatsby	2025-02-05	APPROVED	
Jane Smith	1984	2025-02-08	CANCELED	
Emily Johnson	To Kill a Mockingbird	2025-02-10	PENDING	Approve Cancel
Michael Brown	The Catcher in the Rye	2025-02-12	PENDING	Approve Cancel
Sarah Davis	Pride and Prejudice	2025-02-15	PENDING	Approve Cancel
David Wilson	Moby Dick	2025-02-18	PENDING	Approve Cancel
Emma Martinez	War and Peace	2025-02-20	PENDING	Approve Cancel
James Anderson	The Hobbit	2025-02-22	PENDING	Approve Cancel

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localhost:3000/admin/ManageReservations



Dashboard

Books

Fines

Members

Members

Transactions

Reservations

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Help

## Edit User

First Name

Last Name

Email

Date of Birth

Gender

Phone Number

Update User

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localhost:3000/admin/UserDetails



Dashboard

Books

Fines

Members

Members

Transactions

Reservations

Reports & Logs

Help

Search members...



ID	Name	Card ID	Member Group	Email	Address	Department	Class	Actions	
1	AAA	2343243	Student	DFDSF@GASDVD	DDSDAS	WVSAD	2	Edit	Delete
2	HAMAAA	22222222222	Student	VSDV@SEFW	DVSVSF	DVSV	1	Edit	Delete
3	Alan Ahmad	alan	Student	123@asd	CS	CS	1	Edit	Delete
1	AAA	2343243	Student	DFDSF@GASDVD	DDSDAS	WVSAD	2	Edit	Delete
2	HAMAAA	22222222222	Student	VSDV@SEFW	DVSVSF	DVSV	1	Edit	Delete
3	Alan Ahmad	alan	Student	123@asd	CS	CS	1	Edit	Delete
1	AAA	2343243	Student	DFDSF@GASDVD	DDSDAS	WVSAD	2	Edit	Delete
2	HAMAAA	22222222222	Student	VSDV@SEFW	DVSVSF	DVSV	1	Edit	Delete
3	Alan Ahmad	alan	Student	123@asd	CS	CS	1	Edit	Delete

localhost:3000/admin/UserDetails



Dashboard

Books

Fines

Manage Fines

Members

Transactions

Reservations

Reports & Logs

Help

## Fines

Search by member or tra



Member	Transaction ID	Amount (\$)	Due Date	Return Date	Days Late	Status	Actions
John Doe	TXN123	15.00	2025-02-15	2025-02-10	5	UNPAID	Mark as Paid
Jane Smith	TXN124	25.00	2025-02-12	2025-02-05	7	PAID	

localhost:3000/admin/Fines



Dashboard

Books

Fines

Members

Transactions

Transaction Report

Reservations

Reports & Logs

Help

## Transactions

Search by member or book



Member	Book	Issue Date	Due Date	Return Date	Status
Arya Stark	A Game of Thrones	2025-02-01	2025-02-15	Not Returned	ISSUED
Frodo Baggins	The Lord of the Rings	2025-01-20	2025-02-05	2025-02-07	RETURNED
Jon Snow	A Clash of Kings	2025-01-10	2025-01-25	Not Returned	OVERDUE
Gandalf the Grey	The Hobbit	2025-02-02	2025-02-16	Not Returned	ISSUED
Tyrion Lannister	A Storm of Swords	2025-02-05	2025-02-20	Not Returned	ISSUED
Legolas Greenleaf	The Silmarillion	2025-01-28	2025-02-12	Not Returned	ISSUED
Samwell Tarly	A Feast for Crows	2025-02-03	2025-02-17	Not Returned	ISSUED

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localhost:3000/admin/Transaction

## Payment

Card Accepted:



Name On Card:

Enter Card Name

Credit Card Number:

1111-2222-3333-4444

Exp Month:

Choose Month

Exp Year:


Choose Year


CVV

123

Proceed To Checkout




Library Management System



Home

Browse Categories

Renew Book


Borrowed Books

Payment & Fines

Book Review

User Profile


Logout


Borrowed Books


No.	Book Title ↑	Author ↑	Due Date ↑	Status ↑
1	The Pragmatic Programmer	Andrew Hunt & David Thomas	2025-02-15	Overdue
2	Clean Code	Robert C. Martin	2025-02-10	Borrowed
3	Introduction to Algorithms	Cormen et al.	2025-02-20	Returned
4	Refactoring	Martin Fowler	2025-03-05	Borrowed
5	Design Patterns	Erich Gamma et al.	2025-03-10	Borrowed


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Library Management System




Library Management System



Home

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Science Fiction

Mystery

Fantasy

Non-Fiction

Biography


Science Fiction


3 titles

Dune

Neuromancer

The Left Hand of Darkness


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Sapiens

Educated

Atomic Habits


Library Management System



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Renew Book

Borrowed Books

Payment & Fines

Book Review

User Profile

Logout

Book Finder

Science Fiction

Mystery

Fantasy

Non-Fiction

Biography

Mystery

3 titles

Gone Girl

The Girl with the Dragon Tattoo

The Silent Patient

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## **8. REFERENCES :**

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7. MDN Web Docs URL: <https://developer.mozilla.org/>
8. React Redux Integration Guide URL: <https://react-redux.js.org/>