Library Management System

BY

Tanjila Hafsa Lata
ID: 221-15-4645

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

Supervised By

Narayan Ranjan Chakraborty
Associate Professor & Associate Head
Department of CSE
Daffodil International University

Co-Supervised By

Naznin Sultana
Associate Professor
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

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APPROVAL

This Project Library Management System, submitted by Tanjila Hafsa Lata to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 13-01-2025.

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Jagannath University

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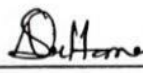
Supervised by:

Mr. Narayan Ranjan Chakraborty
Associate Professor and Associate Head
Department of CSE
Daffodil International University

Co-Supervised by:



Naznin Sultana
Associate Professor
Department of CSE
Daffodil International University

Submitted by:

Lata

Tanjila Hafsa Lata
ID: 221-15-4645
Department of CSE
Daffodil International University

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ABSTRACT

The Library Management System modernizes the automation of conventional library operations. This thesis focuses on the creation and development of a learning management system (LMS) platform that satisfies the needs of both administrators and users. The project's major objective is to provide a user-friendly, efficient, and scalable system for managing library resources, user accounts, and administrative functions. The system has two fundamental functionalities: Admin Panel and User Interface. The Admin Panel includes functionalities that enable librarians to efficiently oversee the library's operational operations. Essential features include the administration of categories, authors, and books, as well as the issue and monitoring of borrowed books. Functions such as monitoring and addressing book requests, managing a registry of enrolled students, and securely modifying passwords improve administrative efficacy. The dashboard offers a clear picture of all current library activities, facilitating prompt decision-making and oversight. Conversely, the User Interface aims to streamline the library experience for users. Safe registration and login of users is made easier by the system, which gives users access to features like panels that can be customized, profile management, and changing passwords. Users can look at a list of the books they have out right now and use an advanced search tool to find the ones they want. The goal of these features is to give students and library users a more uniform and interesting experience. The technical design of the system is looked at in this thesis, with a focus on how flexible and scalable it is to meet the changing needs of libraries. Modern computing techniques were used in the system design to make it reliable, safe, and easy to use. A thorough look at the rules of user interface design makes sure that the system is easy for everyone to understand and use. The study also stresses that the system can cut down on manual work, get rid of mistakes, and make general library management more efficient. In addition, it looks at how functions were put in place to deal with problems that traditional libraries often have, like managing resources, late returns, and communication gaps between users and managers. Finally, the Library Management System is a big improvement to how libraries work because it combines digital and human tasks. This thesis shows how the system worked well and lays the groundwork for future

improvements that will be made to keep up with changing user needs and technology trends.

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CHAPTER 1

Introduction

1.1 **Introduction**

Libraries have always been important to the sharing of knowledge and to the development of both academic and professional skills. But in today's technologically advanced, fast-paced world, running a library via manual techniques has grown more difficult. An innovative way to digitize and simplify library operations and increase their efficiency and accessibility is through the use of a Library Management System (LMS). This system solves the problems of time consumption, mistake control, and resource tracking by incorporating contemporary technology to enable smooth administration of books, admin and users. The creation of an all-inclusive LMS that is suited to administrator’s and user’s requirements is examined in this thesis.

1.2 **Motivation**

The main impetus for creating this system is the growing need for digitization and the streamlining of library functions. This project was initiated due to the identification of inefficiencies in conventional libraries, such as laborious recordkeeping, limited accessibility, and communication obstacles. The growing reliance on technology in educational institutions highlights the need of an efficient digital platform. The project's aim is to provide a solution that enhances administrative efficiency and elevates user experience via a modern, intuitive interface. This commitment is further reinforced by a desire to assist libraries in their digital transformation, assuring their continued relevance in the digital era.

1.3 **Expected Outcome**

If this project is carried out successfully, it is expected to provide significant results. Administrators will benefit from a more efficient and well-organized approach to library resource management as it will need less human effort. Because it will be simpler for them to interact with the library, an improved interface will encourage users to spend more time

with its materials. The solution is also expected to increase overall operating efficiency, enable future scalability, and protect data processing. Finally, this design envisions a library environment in which technology seamlessly blends with traditional library principles to provide a modern, efficient, and user-focused system.

CHAPTER 2
Background Study

2.1 Preliminaries

Library Management Systems (LMS) have seen substantial evolution, shifting from manual cataloging to sophisticated digital platforms. A Library Management System (LMS) provides an integrated framework for managing library materials, streamlining operations, and improving user interaction. Cataloging, distribution, acquisition, and user management exemplify fundamental abilities. The need for efficiency, accuracy, and accessibility in library services has propelled the use of LMS. Modern LMS platforms provide web-based interfaces, facilitating remote access to resources for users and enabling administrators to manage operations efficiently. The transition to digital libraries has provided additional functionality, such as electronic resource management and interaction with other digital platforms, therefore increasing the capabilities and depth of traditional library systems.

2.2 Related Work

A variety of studies has investigated the development and deployment of Learning Management Systems (LMS). A study article examines the conversion of conventional libraries into digital formats, highlighting the need of user-friendly solutions to improve accessibility and efficiency [1]. Another research investigates the obstacles and possibilities in digital library administration, emphasizing the role of librarians in adjusting to technological progress [2]. Furthermore, studies on web-based LMS design highlight the need of developing scalable and efficient systems to accommodate a variety of users [3]. These studies together enhance the comprehension of LMS development, implementation issues, and the essential importance of user-centric design in maintaining system efficiency.

2.3 Comparative Analysis

An analysis of several LMS systems demonstrates disparities in functionality, scalability, and usability. Open-source systems such as the Senayan Library Management System (SLIMS) provide economical solutions with customizable functionalities, making them appropriate for universities with constrained budgets [4]. Conversely, proprietary systems often provide extensive support and sophisticated features, but at an expensive rate. Another study examining the influence of library management software on service development reveals that the selection of LMS may substantially affect library operations, impacting elements such as user satisfaction and resource availability [5]. Therefore, picking a suitable LMS requires careful evaluation of institutional requirements, financial limitations, and the desired degree of customization.

2.4 Scope of the Problem

Despite the progress in Learning Management Systems, some obstacles remain. Challenges include data inaccuracy, integration difficulties with current systems, and the need for ongoing upgrades to incorporate new categories of digital resources are widespread [6]. The concurrent administration of physical and electronic collections presents a considerable challenge, demanding systems capable of effectively managing both mediums [7]. The Intricacy of user expectations, ranging from fundamental book searches to sophisticated research queries, complicates the requirements for the system. Addressing these difficulties requires continuous research and development to provide more resilient, adaptable, and user-centric LMS systems that can adjust to the changing nature of library services.

2.5 Challenges

Implementing a successful LMS entails several obstacles, such as assuring data security, safeguarding user privacy, and accomplishing system compatibility with different online platforms. A study illustrates the challenges of maintaining digital libraries, stressing the need for solutions that tackle problems like system scalability and user engagement [8].

Moreover, the fast advancement of technology necessitates ongoing system enhancements and employee training to ensure peak performance. The reluctance to adapt among library personnel and patrons familiar with conventional methods may impede the integration of new technology. Addressing these problems is crucial for the effective implementation and sustainability of LMS in contemporary libraries.

CHAPTER 3
REQUIREMENT SPECIFICATIONS

3.1 Software Development Life Cycle (SDLC)

The Library Management System (LMS) project employs the Waterfall Model of SDLC due to its sequential and structured approach. Each phase requirement analysis, system design, implementation, testing, deployment, and maintenance was completed thoroughly before moving to the next. This ensured clarity in requirements, systematic design, and rigorous testing for a robust final product.

3.2 Requirement Collection and Analysis

The requirements for the Library Management System (LMS) were gathered by analyzing the functional needs of academic institutions and their libraries. The process involved:

1. **Defining Core Functionalities**:
   Specific features were identified based on the key tasks of administrators and users, such as book classification, author management, book issuance, and user account administration.
2. **Identifying Pain Points in Existing Systems**:
   Existing manual and semi-automated systems were reviewed to identify inefficiencies such as stressful book tracking, lack of centralized management, and limited user access to book searches and profile updates.
3. **Technology Selection**:
   The decision to use Bootstrap for the front-end, PHP for server-side scripting, and MySQL for database administration was driven by scalability, ease of deployment, and meeting the requirements of academic infrastructure.

4. **Defining User Roles**:

    - **Admin Role**: Responsible for creating and maintaining categories, authors, books, and users, as well as publishing books.
    - **User Role**: Users may register, log in, request new book issues, see issued books, search for books, and change account information.

By concentrating on these standards, the system design is more closely aligned with the needs of library administrators and users.

Functional Requirements:

- Admin login and dashboard features.
- User registration, login, and profile management.
- Book categorization, addition, issuance, and management.
- Search functionality for users.

Non-functional Requirements:

- System scalability to support growing user bases.
- Secure authentication mechanisms.
- High system availability and fast response times.

3.3 Hardware Requirements

1. Server Requirements:

- Processor: Intel Core i5 or higher.
- RAM: 8 GB minimum.
- Storage: 500 GB SSD.

2. Client Requirements:

- Device: Desktop or laptop with an updated browser.
- Connectivity: Stable internet connection.

3.4 Technological Requirements

Frontend Part:

- Bootstrap framework.
- HTML, CSS, and PHP for UI and server-side scripting.

Backend Part:

- MySQL for database management.
- Development Tools:
- VS Code or Sublime Text for coding.
- XAMPP server for local development.

3.5 Basic Use-Case Diagram

The basic use-case diagram illustrates the interaction between the system and its users, highlighting primary functionalities like user registration, book management, and book search.

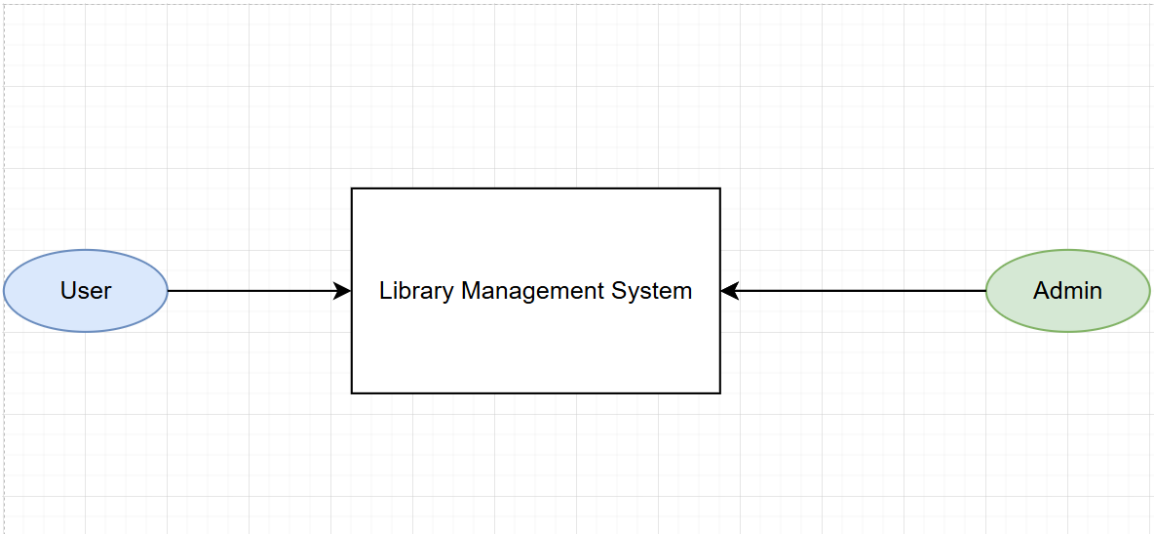


Figure 1: Basic Use Case Diagram

3.6 ER Diagram

The Entity-Relationship (ER) diagram outlines the relationships between entities such as Admin, Users, Books, Categories, and Issued Books.

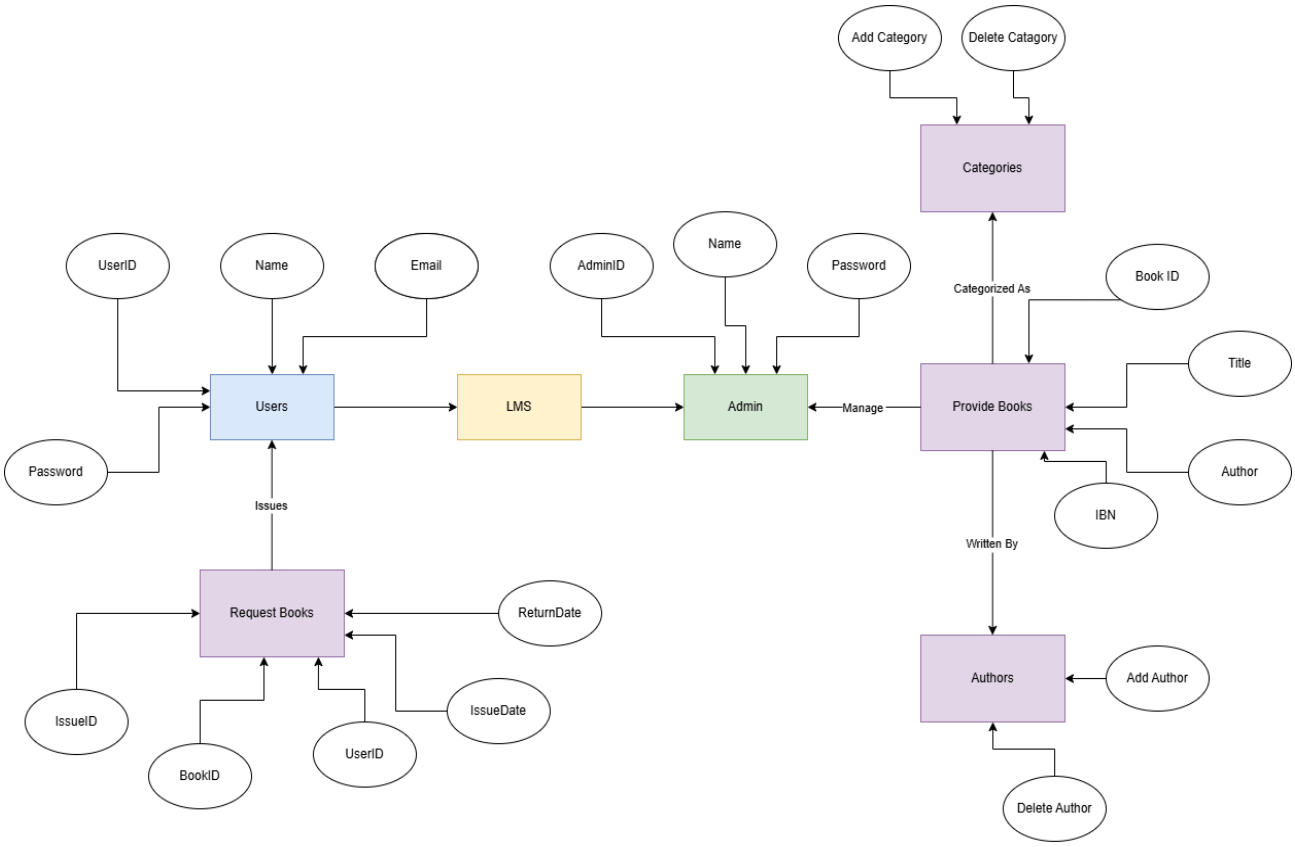


Figure 2: ER Diagram

3.7 ER Diagram Description

- Users: Stores information about registered users, including their login credentials.
- Books: Contains details about books, such as title, author, and category.
- Categories: Defines various genres or categories of books.
- Issued Books: Tracks the book lending process, including issue and return dates.

3.8 Logical Data Model

The logical data model represents the system's structure and relationships between entities, focusing on normalization and minimizing redundancy. The key tables include Users, Books, Categories, and Issued Books.

3.9 Design Requirement

- User Interface Design: Responsive design using Bootstrap framework, ensuring compatibility with various devices.
- Database Design: Relational database using MySQL, with optimized indexing for fast query execution.
- Security Design: Implementation of encrypted password storage and secure session handling.

CHAPTER 4

DESIGN SPECIFICATION

4.1 Front-end Design

The LMS front-end was developed using the Bootstrap framework to guarantee a responsive and user-friendly experience. The used technologies include of HTML for structural purposes, CSS for aesthetic design, and JavaScript for interactive functionality.

Key features of the front-end include:

1. Admin Dashboard: Displays a summary of critical information such as the number of books, categories, and registered users.
2. User-Friendly Forms: Forms for user signup, book management, and category addition have been optimized for simplicity.
3. Navigation: A consistent navigation bar ensures seamless access to features like dashboards, book search, and profile management.
4. Responsiveness: The interface adjusts dynamically to various screen sizes, enabling usability on desktops, tablets, and mobile devices.

4.2 Back-end Design

The back-end is developed using PHP to handle server-side scripting and MySQL for database management. This combination ensures efficient processing of requests and secure storage of data.

Key functionalities of the back-end include:

1. Database Operations: CRUD (Create, Read, Update, Delete) operations for categories, authors, books, users, and issued books.
2. Authentication and Authorization: Secure login mechanisms for admins and users, including password hashing.

3. Session Management: Tracks active sessions for users and administrators to ensure secure access.
4. Dynamic Content Rendering: The back-end dynamically generates pages like the book list, user dashboard, and issued books based on user roles.

4.3 Project Design

The LMS follows a modular design approach, making it scalable and maintainable. Each module corresponds to a specific functionality, either the function focused on admin or the user. Each detail shows as fig, from here.

Log in & register Module:

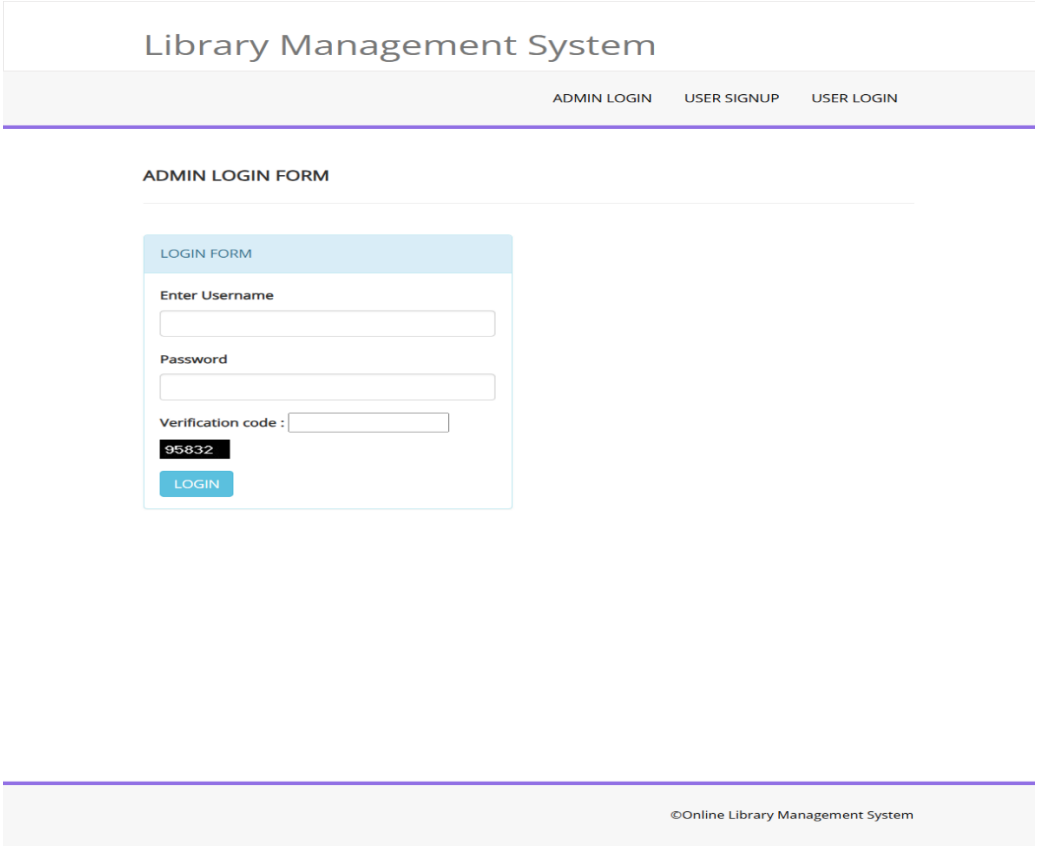


Figure 3 Admin Login Page

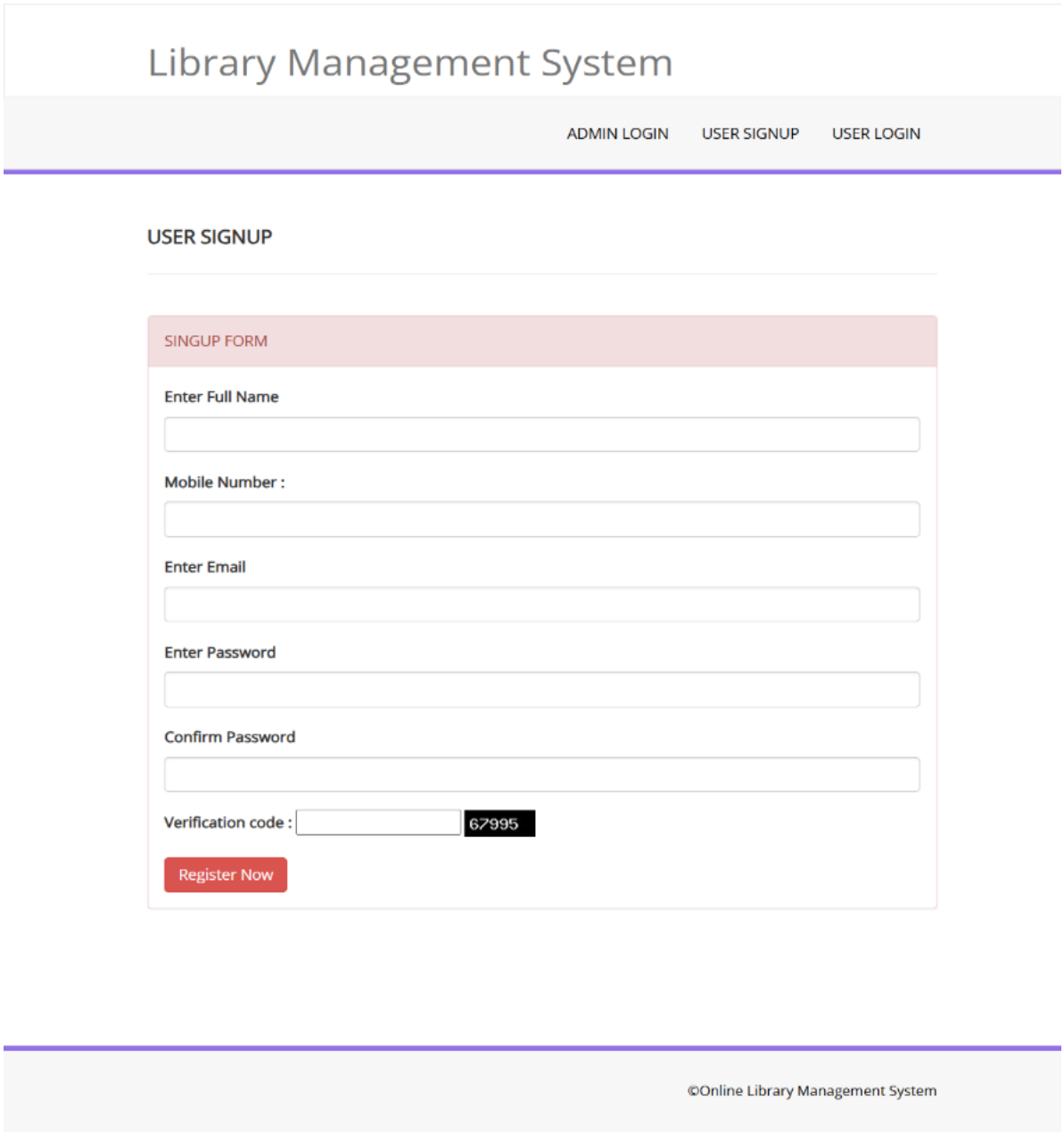


Figure 4 User Registration page

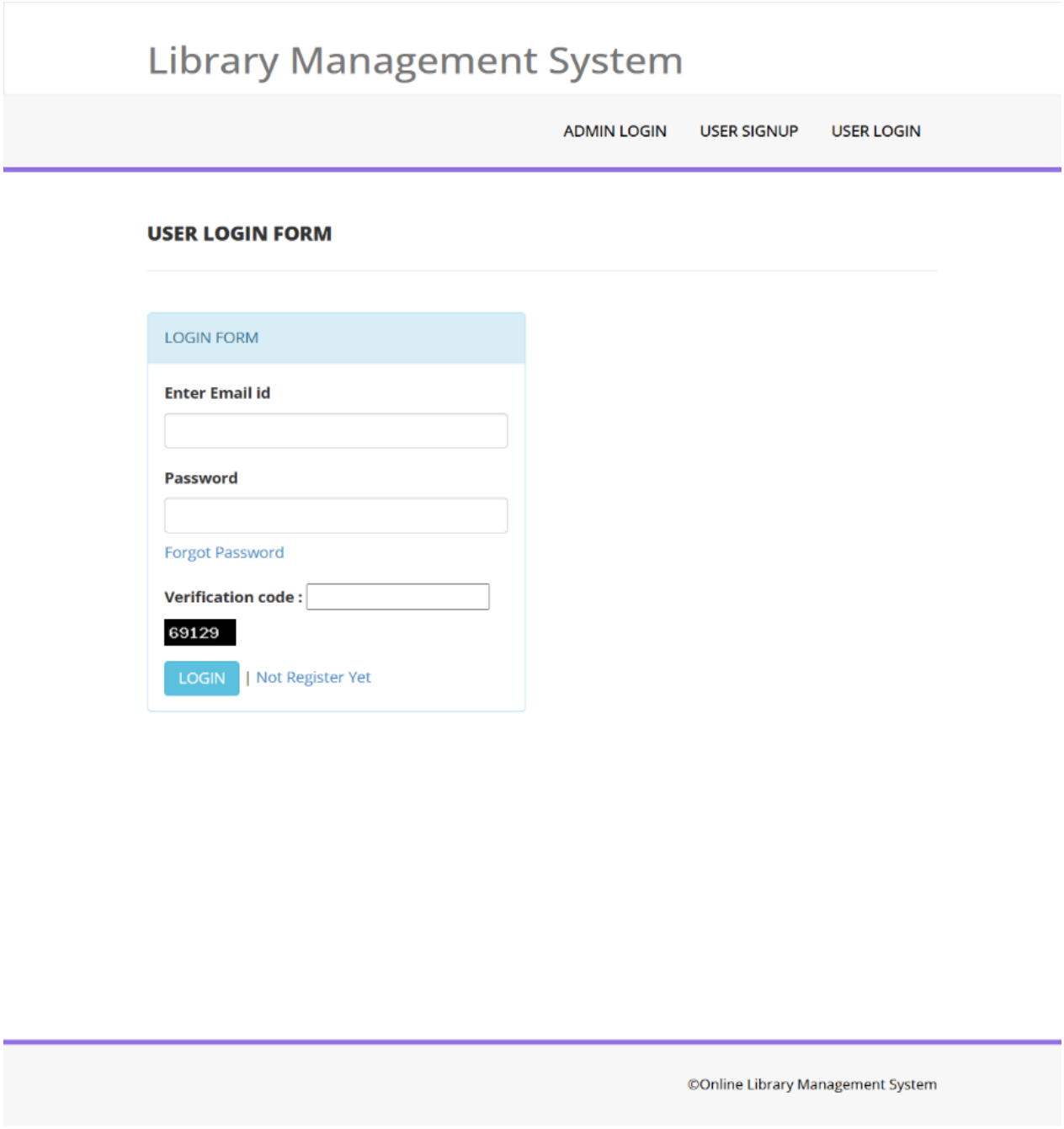


Figure 5 User Login Page

Admin Dashboard:

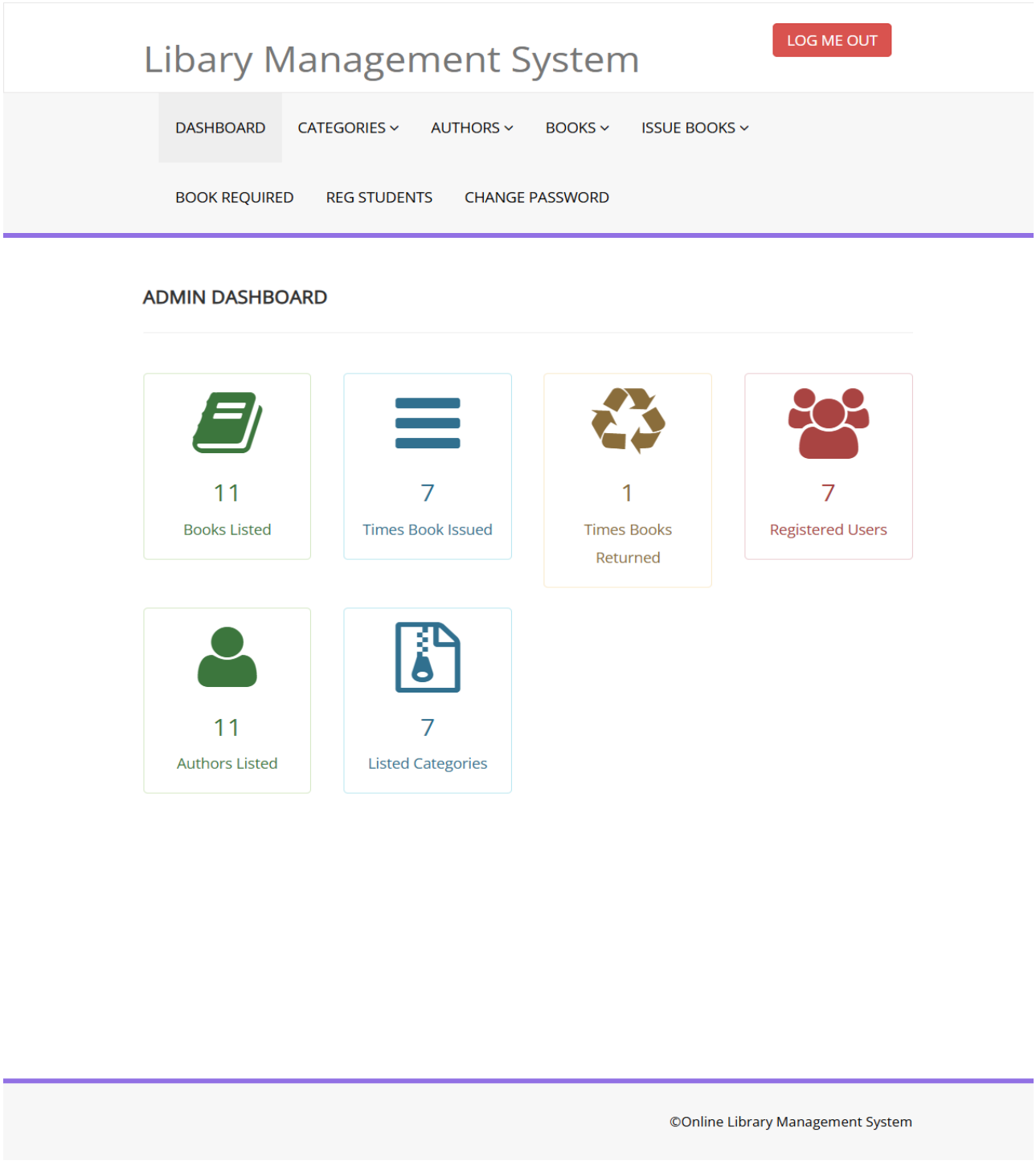


Figure 6 Admin Dashboard

Add & Manage Category:

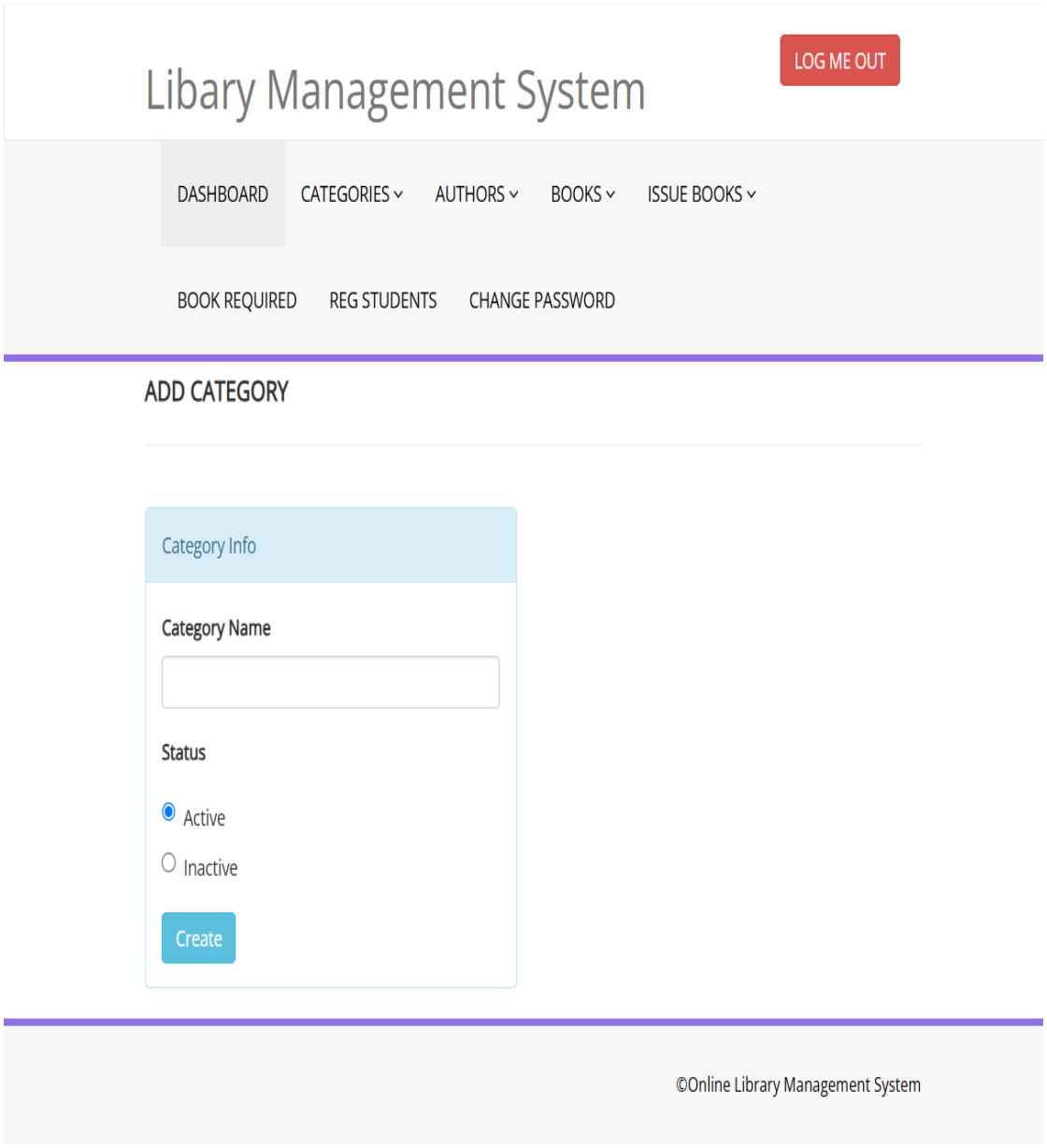


Figure 7: Add New Category

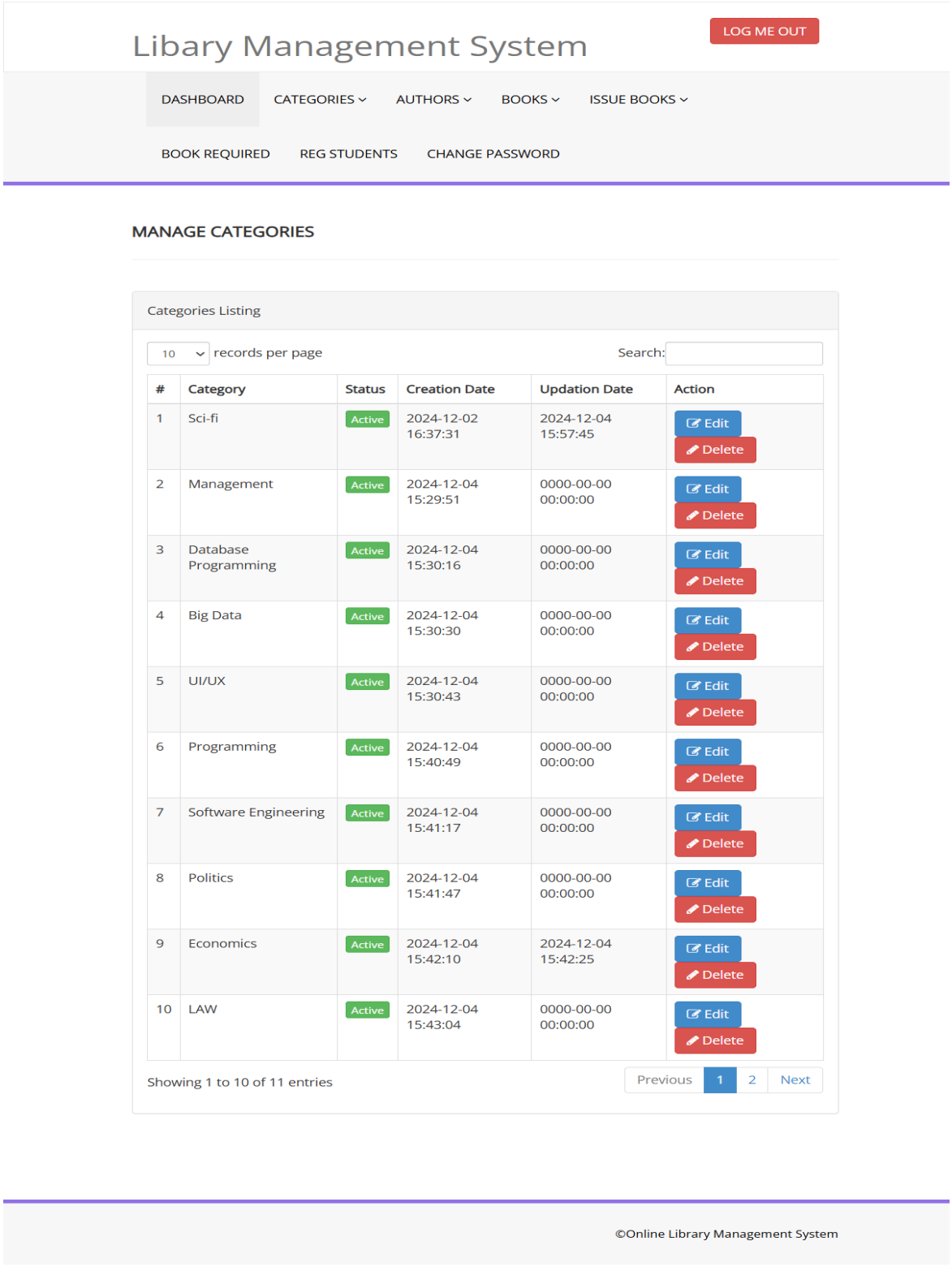


Figure 8: Manage Category

Add & Manage Author:

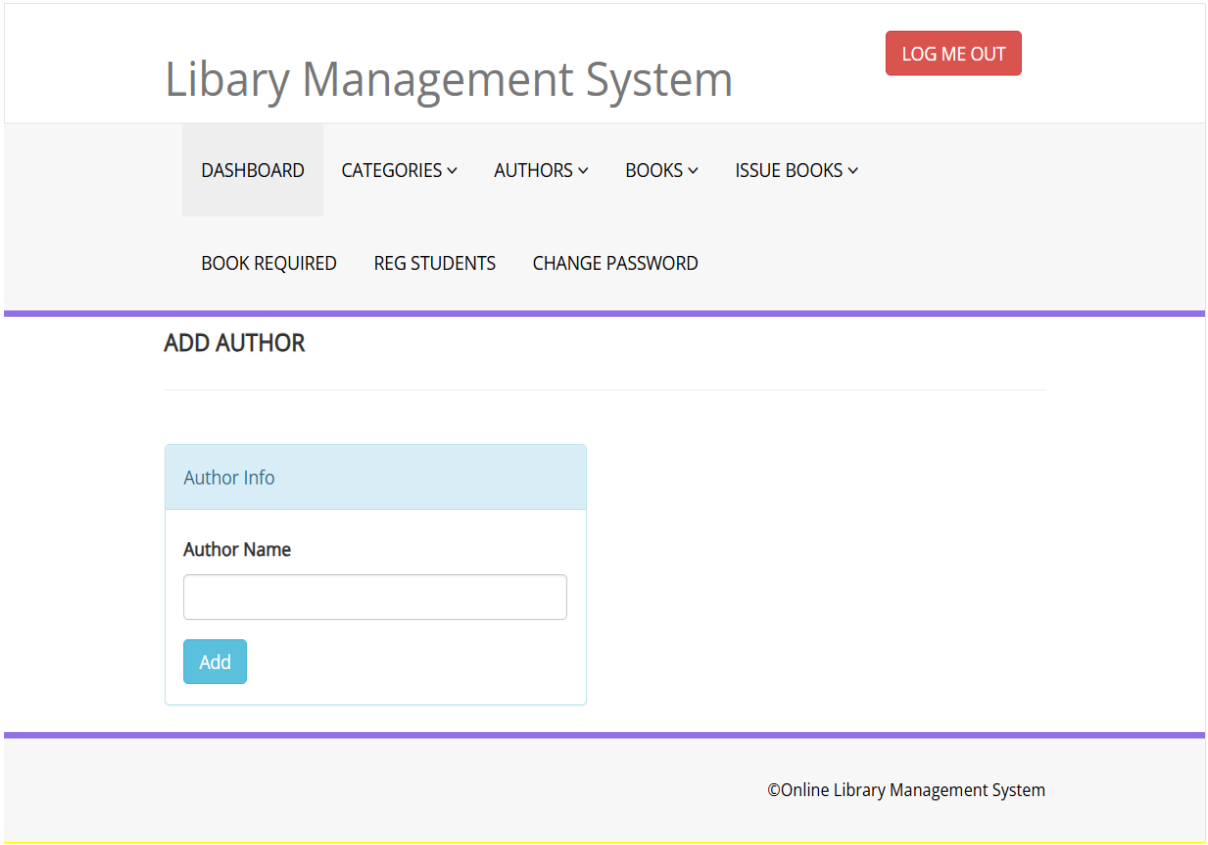


Figure 9: Add Author

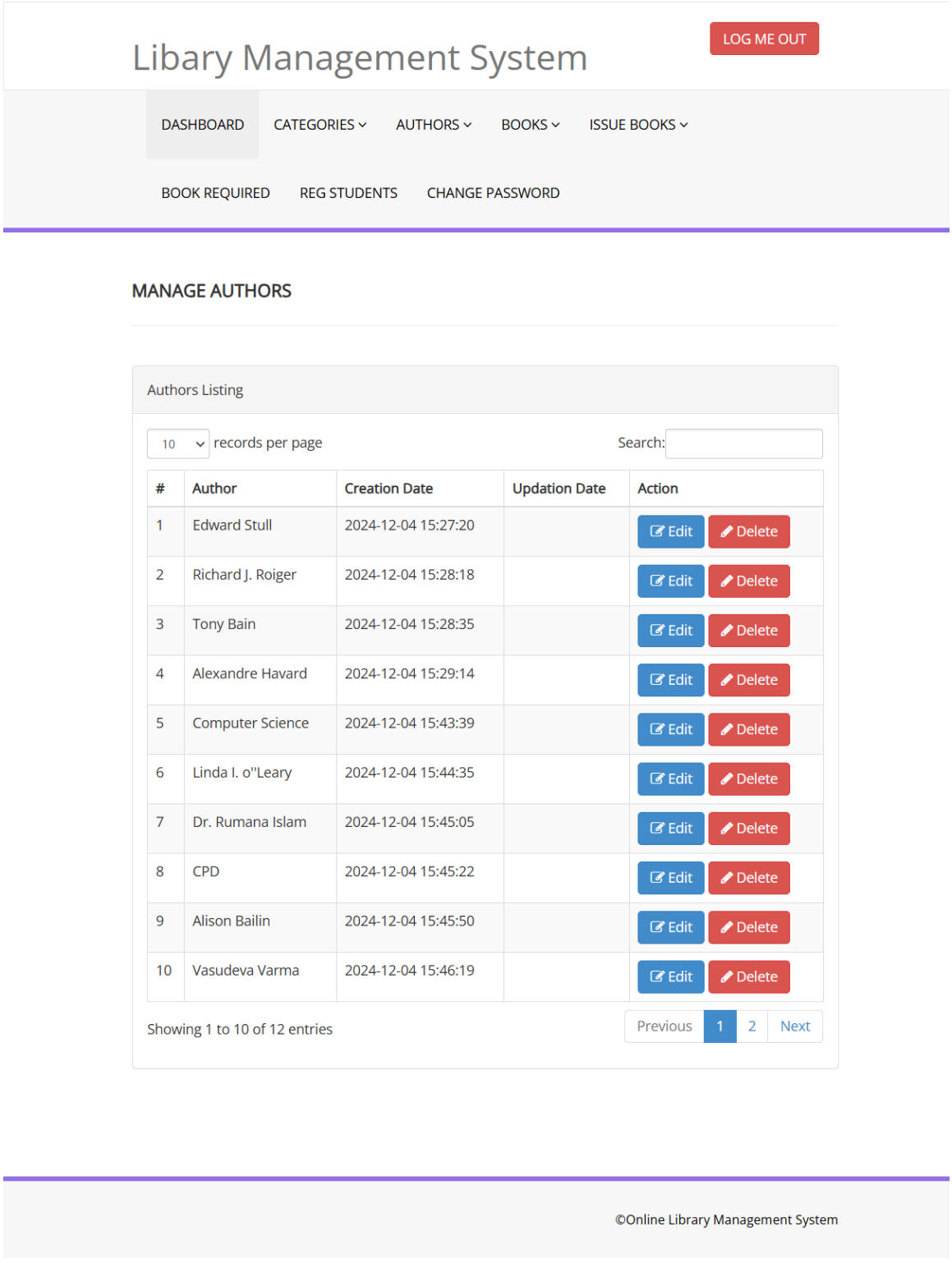


Figure 10: Manage Author

Add Books:

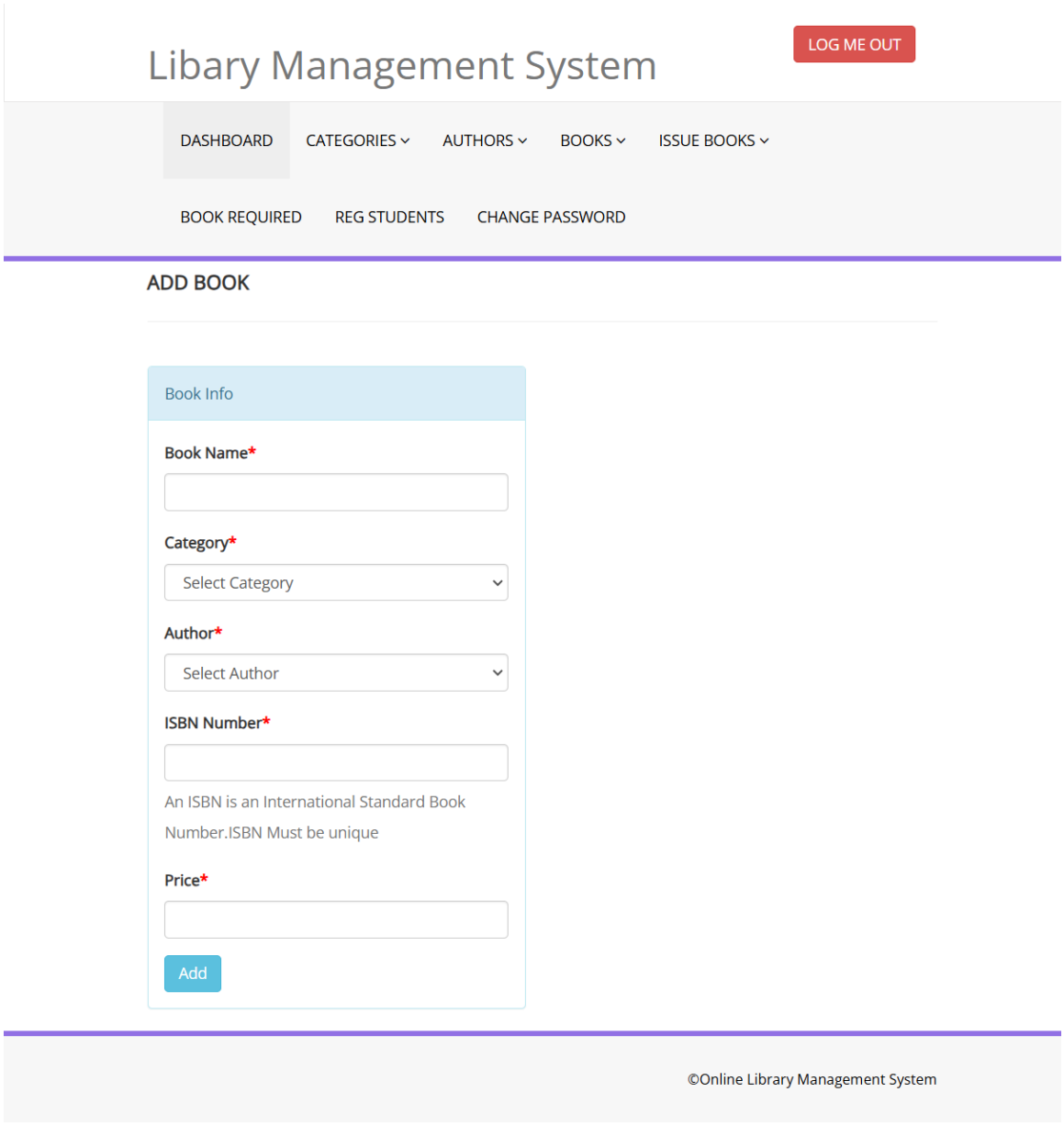


Figure 11: Add Books

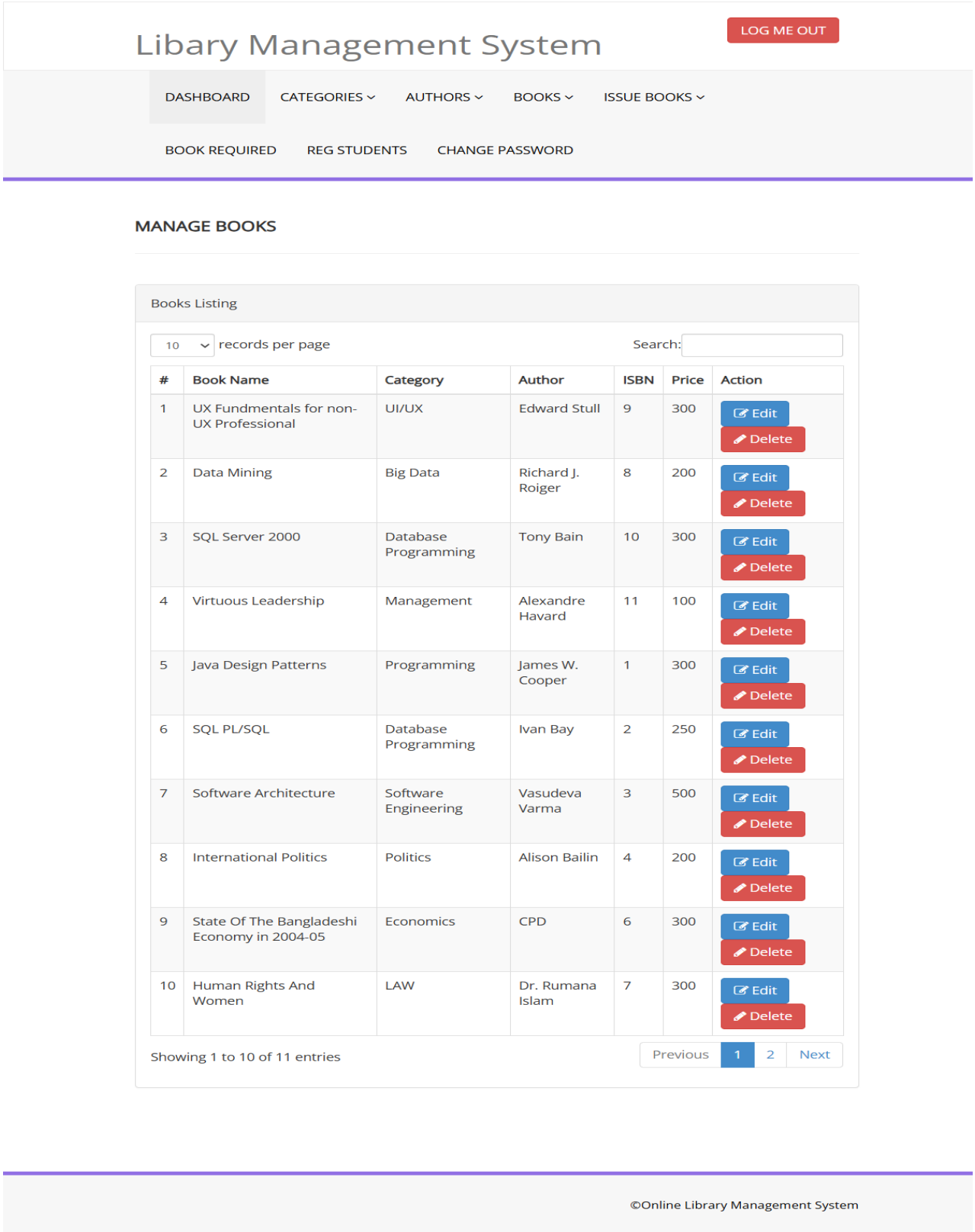


Figure 12: Manage Books

Issue new books:

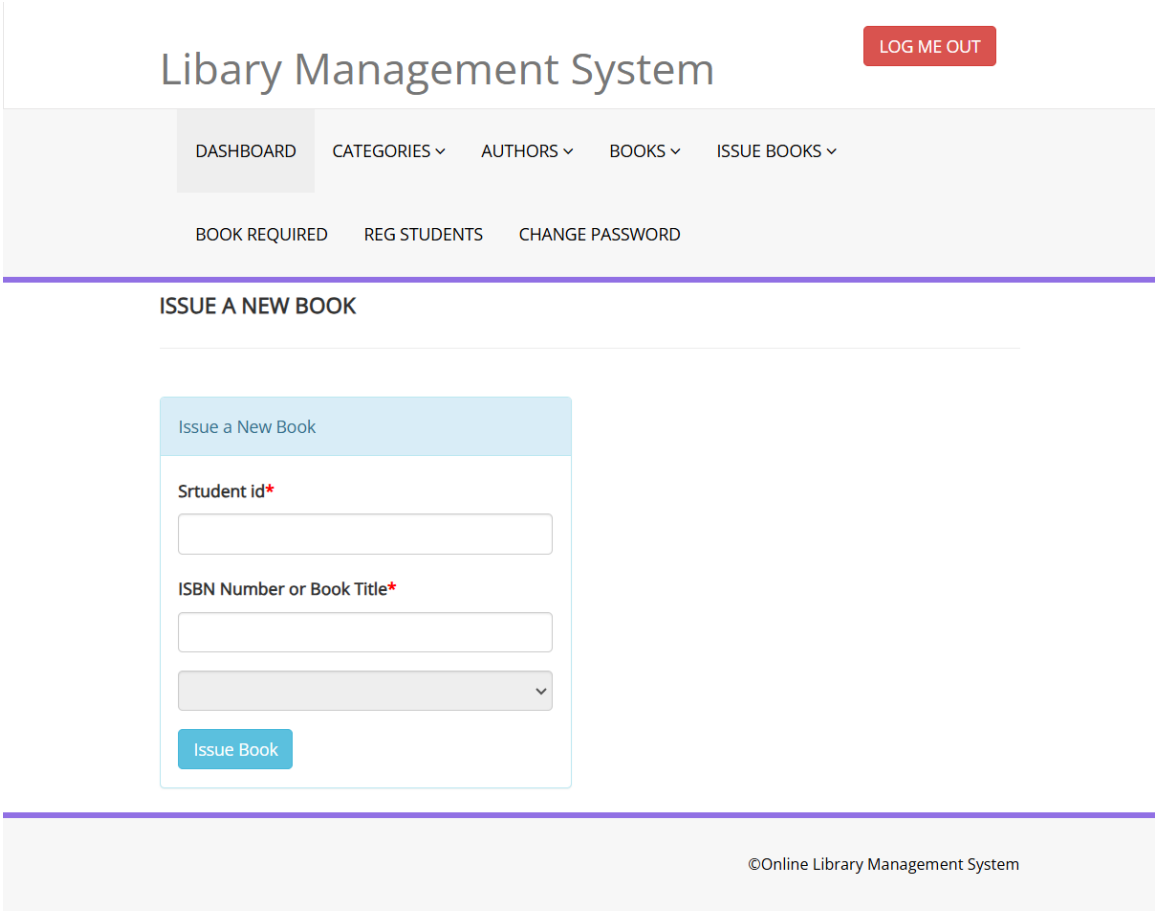


Figure 13: Issue new books

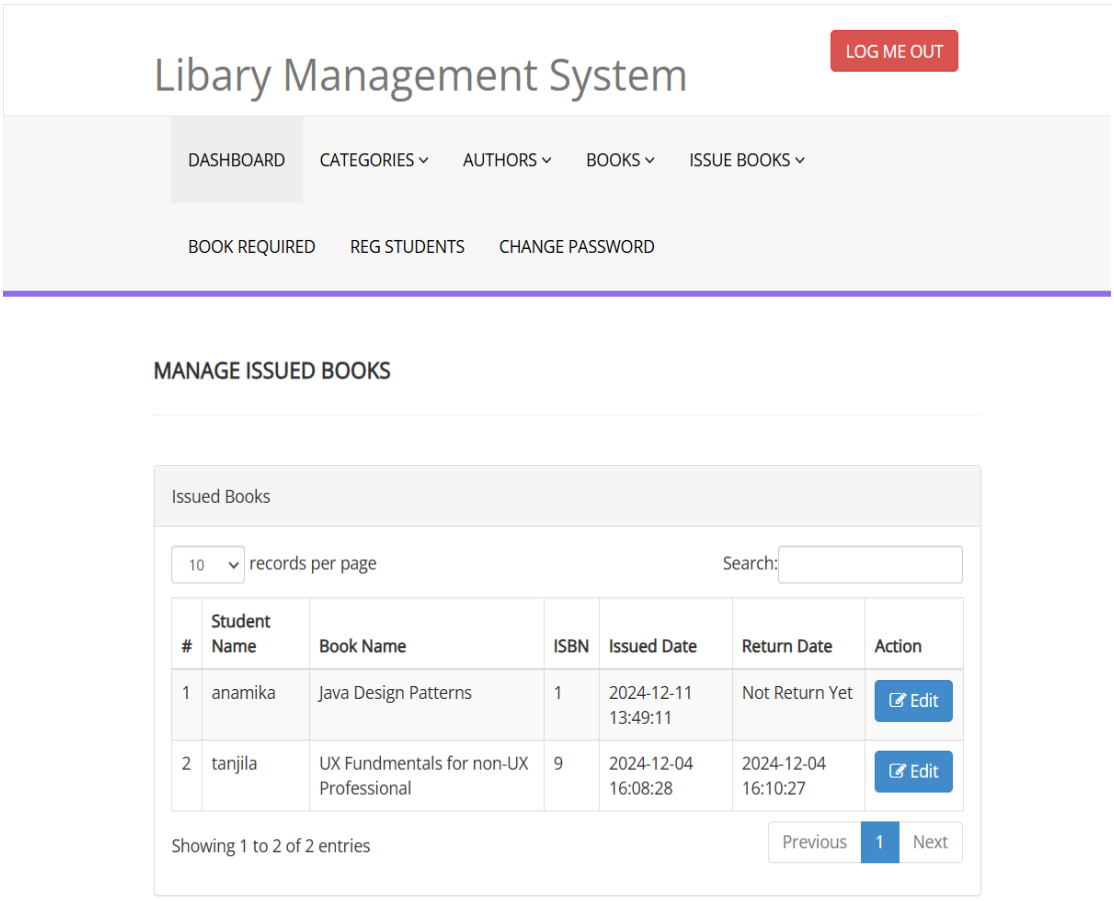


Figure 14: Manage Issued Books

Book Checkout Request:

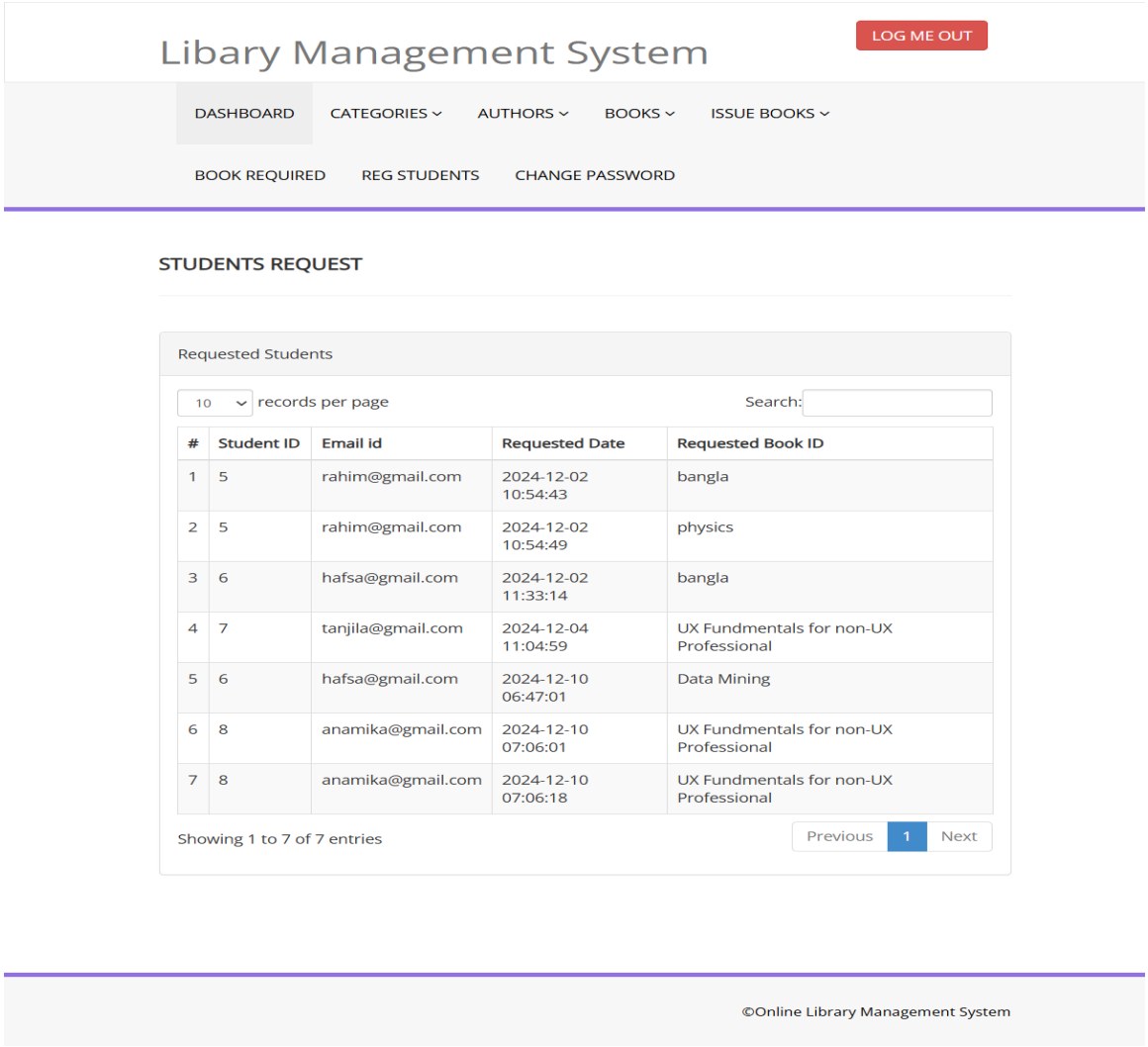


Figure 15: Book checkout request

Manage Registered Students:

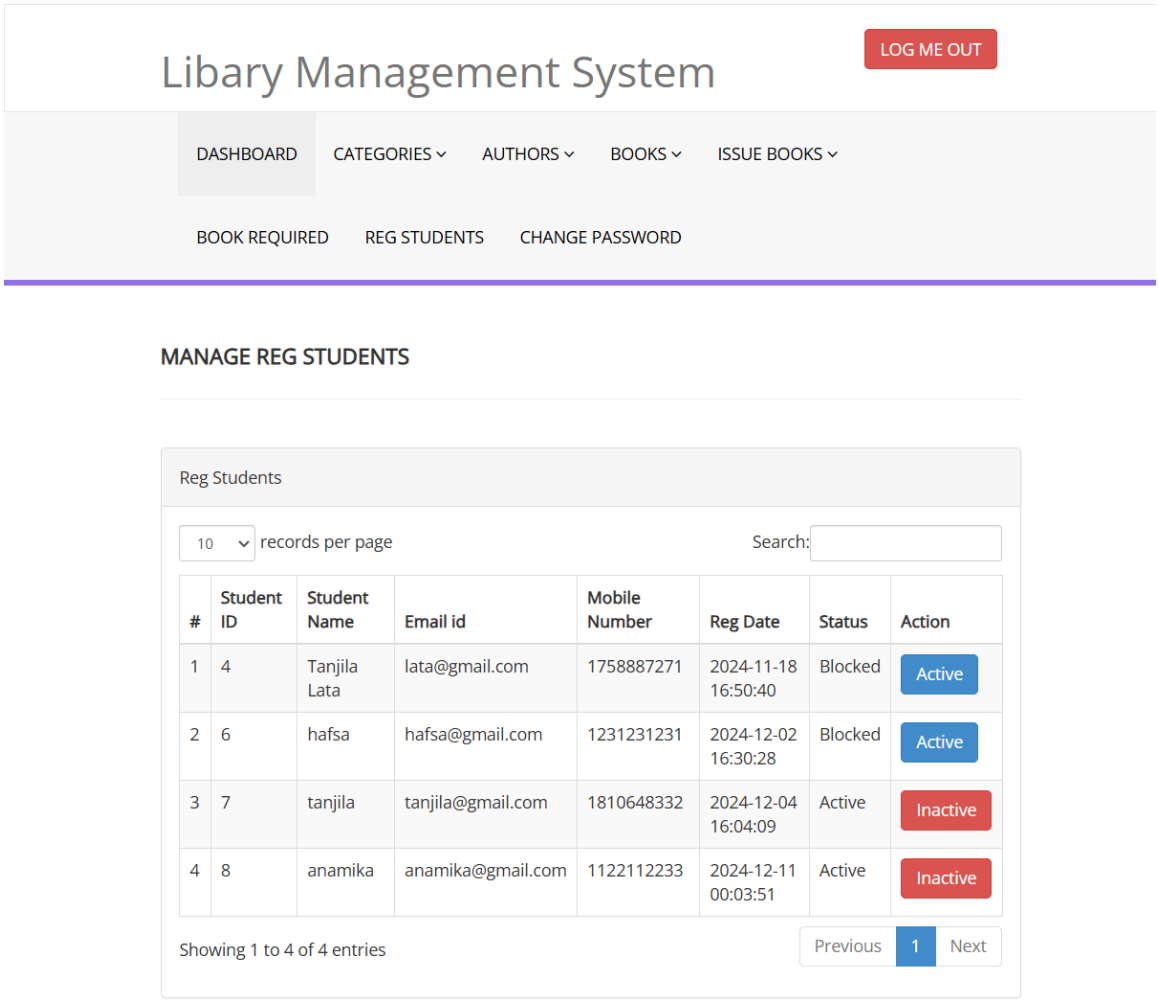


Figure 16: Admin Manage Registered Students

Admin Password Change:

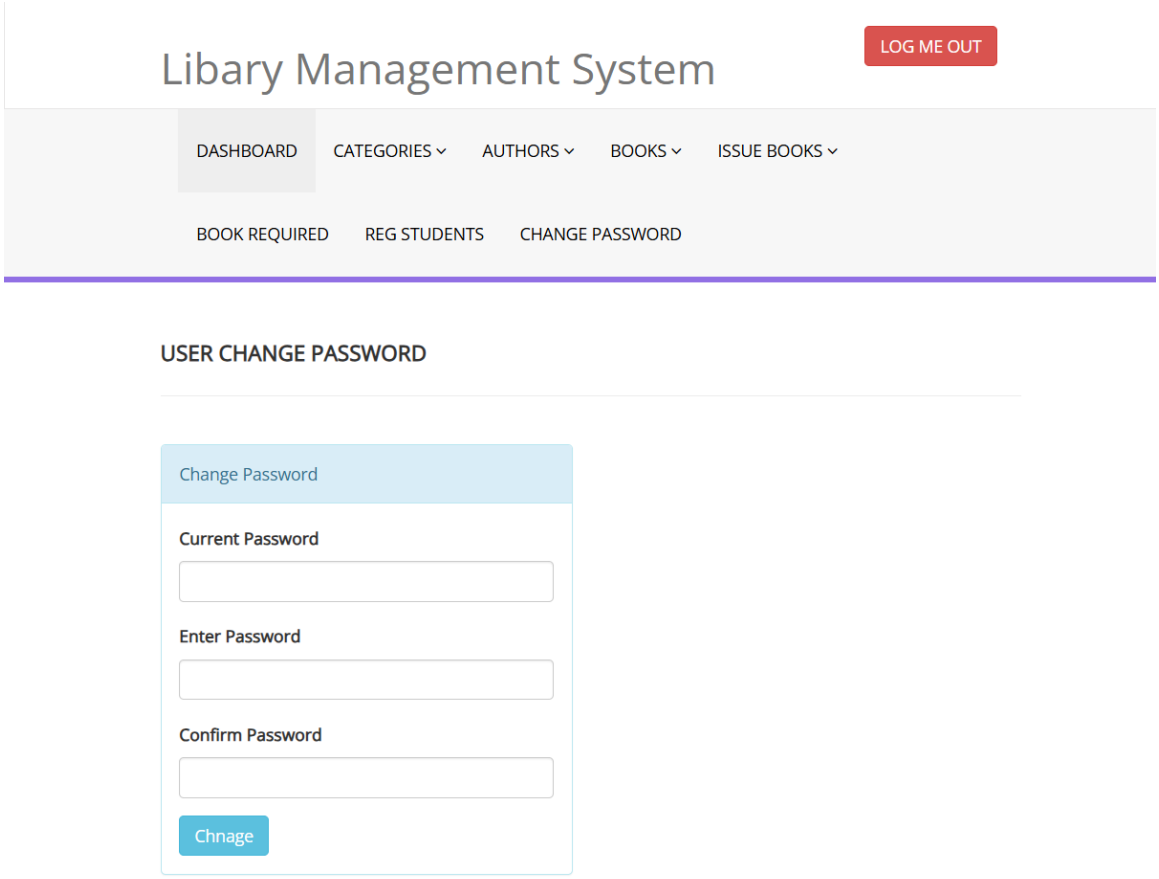


Figure 17: Admin Change Password

User Dashboard:

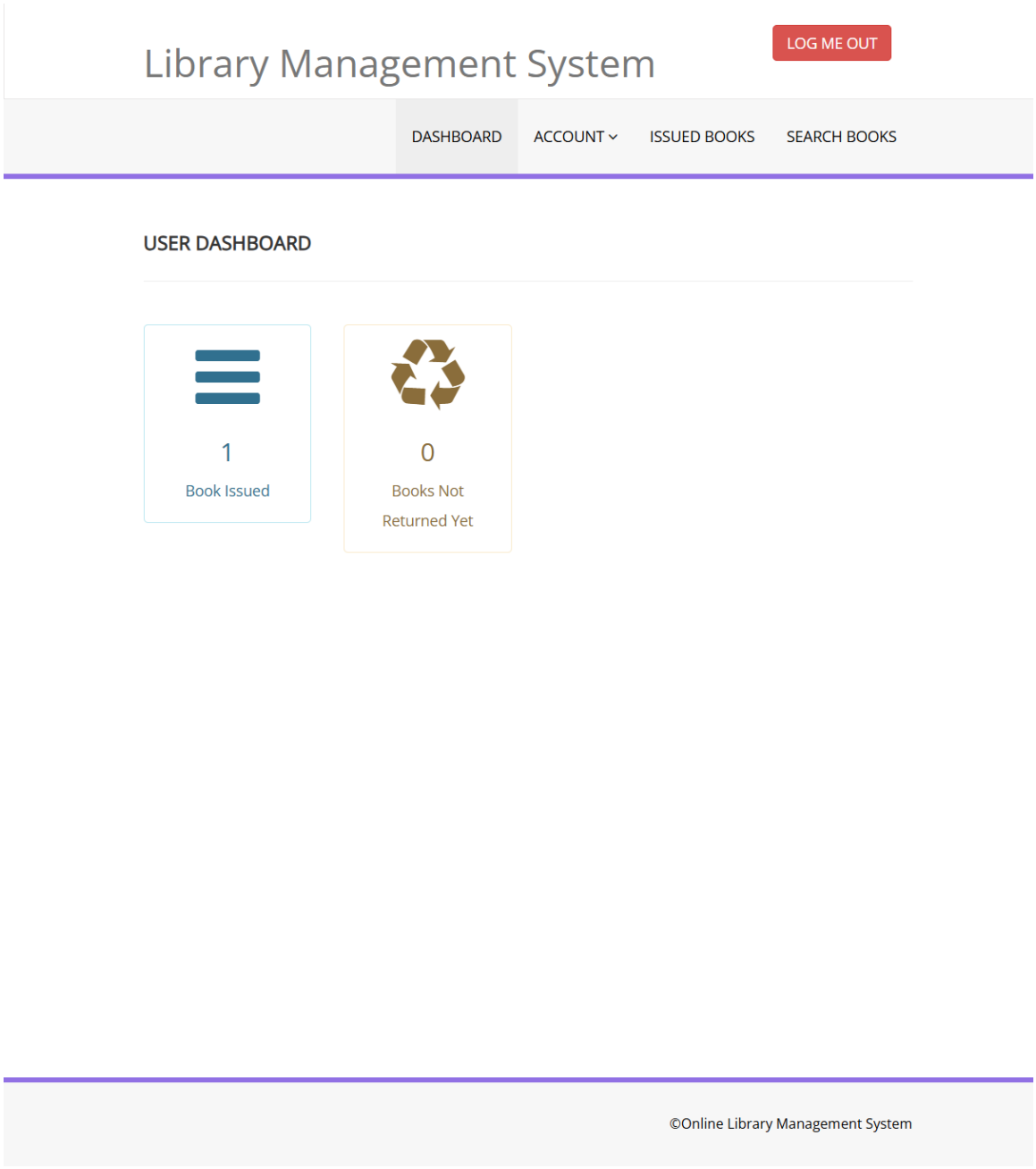


Figure 18: User Dashboard

User Profile:

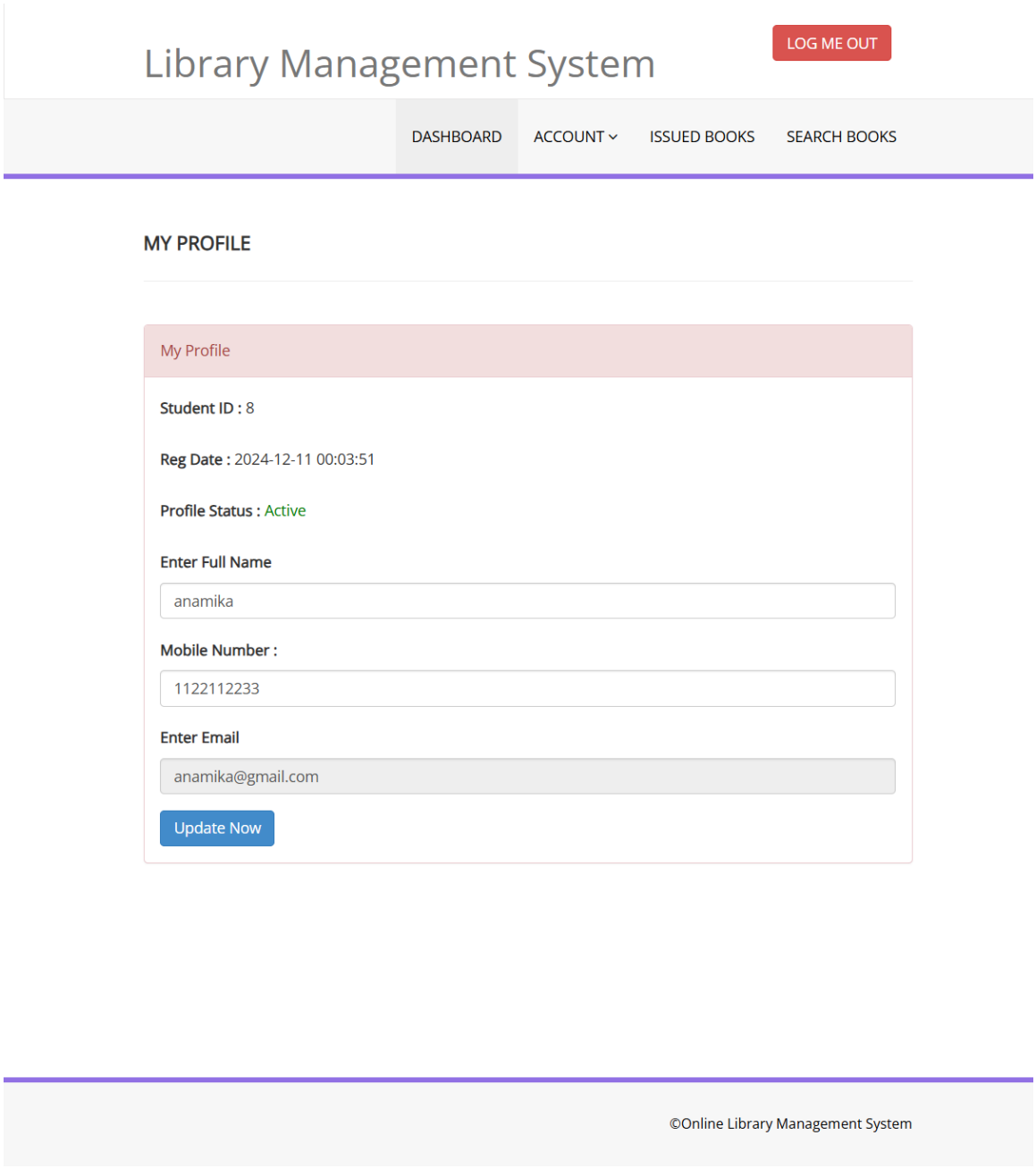


Figure 19: User Profile

User Change Password:

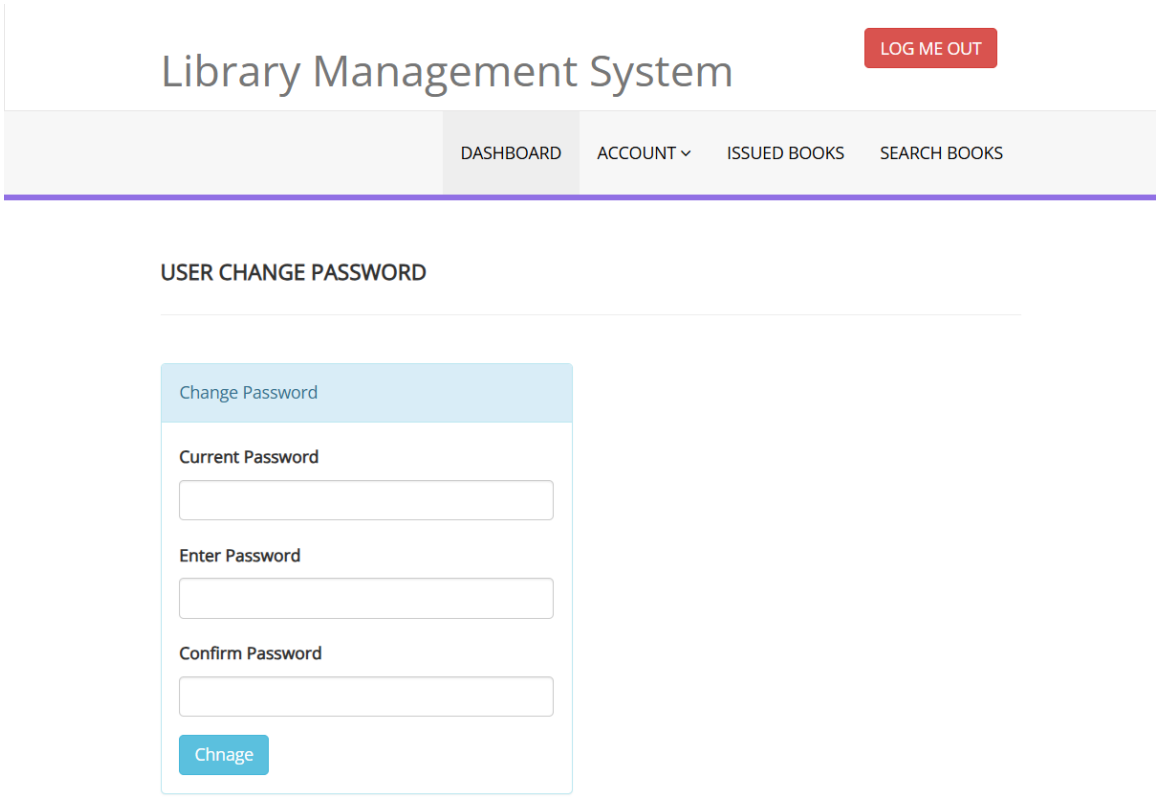


Figure 20: User Change Password

Issued Books[USER] :

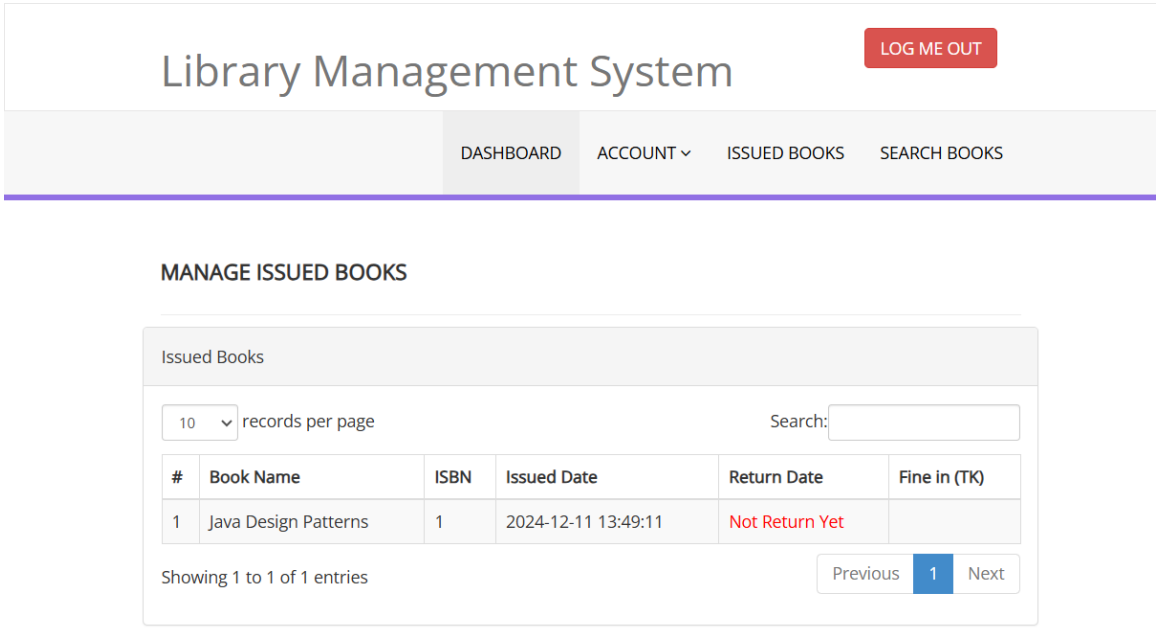


Figure 21: User Issued Books

New Book-Request:

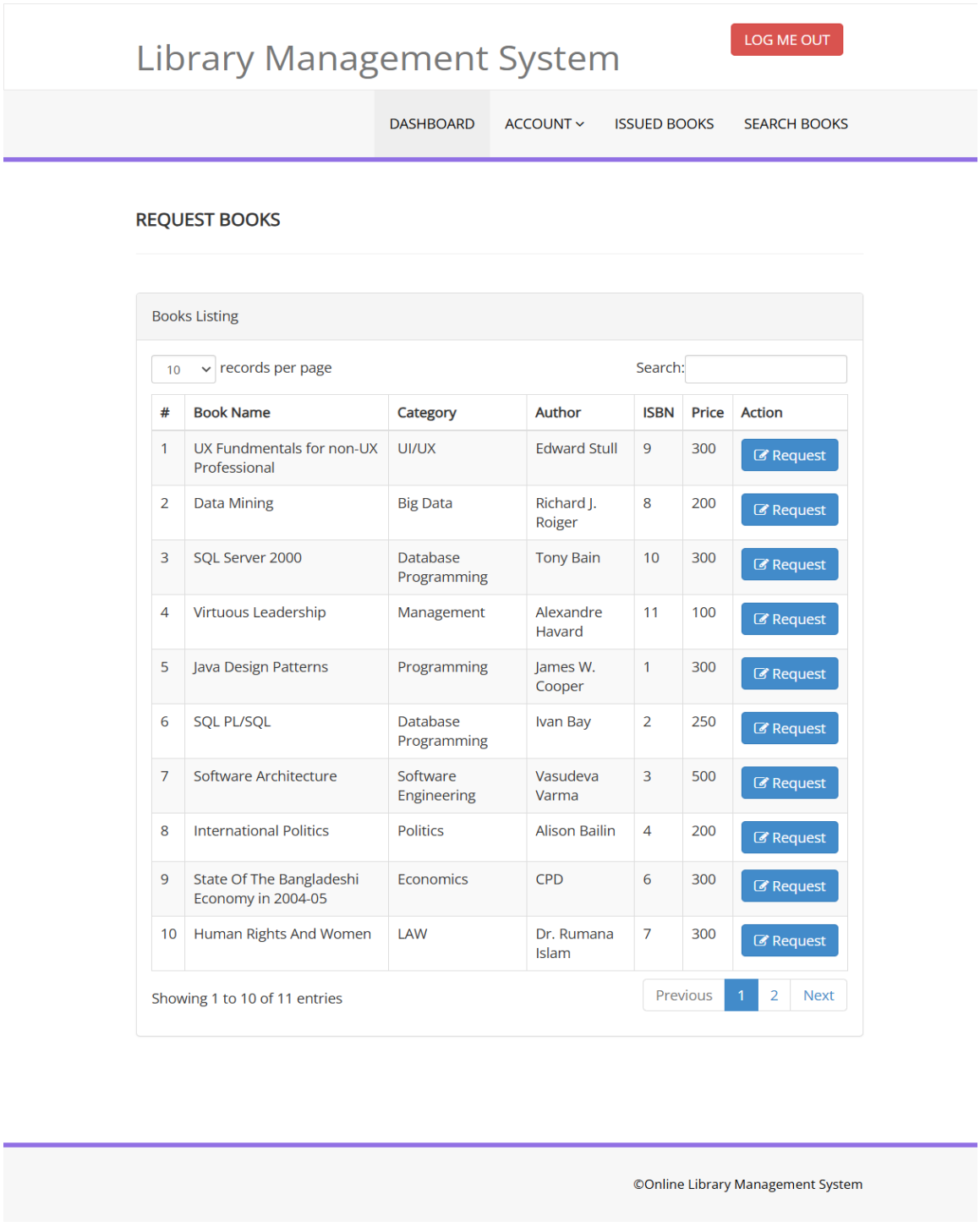


Figure 22: Request to checkout & search book [USER]

4.4 Project Page working procedure

The LMS consists of several pages, each designed with a specific purpose:

Admin Pages:

1. Admin Login Page: Allows administrators to log in securely.
2. Admin Dashboard: Displays key metrics and quick access to functionalities.
3. Manage Books: Includes pages for adding and deleting books.
4. Manage Categories: Enables adding and updating book categories.
5. Manage Authors: Provides an interface to add and manage authors.
6. Issue Books: A form-based page for issuing books to registered users.
7. View requested books: Admin can watch the checkout request.
8. Check-in: After a user returns book, admin can update the due status.
9. Change password: To change account password.

User Pages:

1. Signup/Login Page: Allows users to create accounts and log in.
2. Dashboard: Displays the user's issued books and account details.
3. Request book: User's can search and request books to procced checkout.
4. Issued books: Tabular view of the issued books that has been taken or taken before.
5. Profile Page: Enables users to view and update their personal details.

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1 Discussion and Conclusion

The Library Management System (LMS) created for this project meets the essential requirements of library managers and users. The system optimizes library operations and improves user experience by including capabilities such as book administration, category handling, user registration, and book issuing.

The LMS enhances productivity by automating repetitive operations, including book issuance, record maintenance, and user information management. It provides a responsive front-end with the Bootstrap framework and a strong back-end developed with PHP and MySQL. These technologies together provide a reliable and scalable solution. The LMS's modular architecture clarifies duties between users and administrators, facilitating usability and operational transparency. The incorporation of elements such as password protection, session management, and dynamic content production underscores the project's focus on security and usability. The system effectively achieves its stated goals, establishing a robust basis for further improvements.

5.2 Scope for Future Development

Since the LMS achieves its fundamental objectives, several potentials for future enhancement exist to broaden its capabilities and augment functionality. Such as,

Advanced Search Features:

Adding advanced search criteria, including publication year, availability status, and user ratings, may improve the user experience.

Notifications and Alerts:

Implementing email or SMS alerts for book return reminders, new arrivals, and overdue books may enhance user engagement.

Mobile Application:

Creating a mobile application version of the LMS will enable users to access library services remotely.

Integration with External Libraries:

The system may be developed to interface with other library systems for inter-library book exchange and cooperation.

Digital Content Management:

Incorporating a function for the management and access of digital resources, including e-books, journals, and research papers, will expand the library's services.

Analytics and Reports:

Incorporating data analytics can help administrators track library usage, identify popular books, and optimize inventory management.

AI-Powered Recommendations:

Incorporating AI algorithms for individualized book suggestions based on user history and interests might enhance user happiness.

Role-Based Access Control:

Implementing enhanced role-based access for certain library personnel, such as librarians or assistants, might enhance operational efficiency.

REFERENCES

[1] a P, Shanmugam & A, Ramalakshmi & Ganeshan, Sasthri & S, Baalachandran. (2020). Library Management System. Xi'an Jianzhu Keji Daxue Xuebao/Journal of Xi'an University of Architecture & Technology. 12. 743-753. 10.37896/JXAT12.11/29777.

[2] Kumbhar, S. S., & Harake, S. B. (2015). Digital Library Management: Challenges and Opportunities.

[3] Araya, T. W., & Mengsteab, A. (2020). Designing Web-based Library Management System. *International Journal of Engineering Research & Technology*, *9*(10), 2278-0181.

[4] Pamungkas, P. D. A. (2018). Library Information System Audit Senayan Library Management System (SLiMS) Using ISO 9126. *arXiv preprint arXiv:1808.07234*.

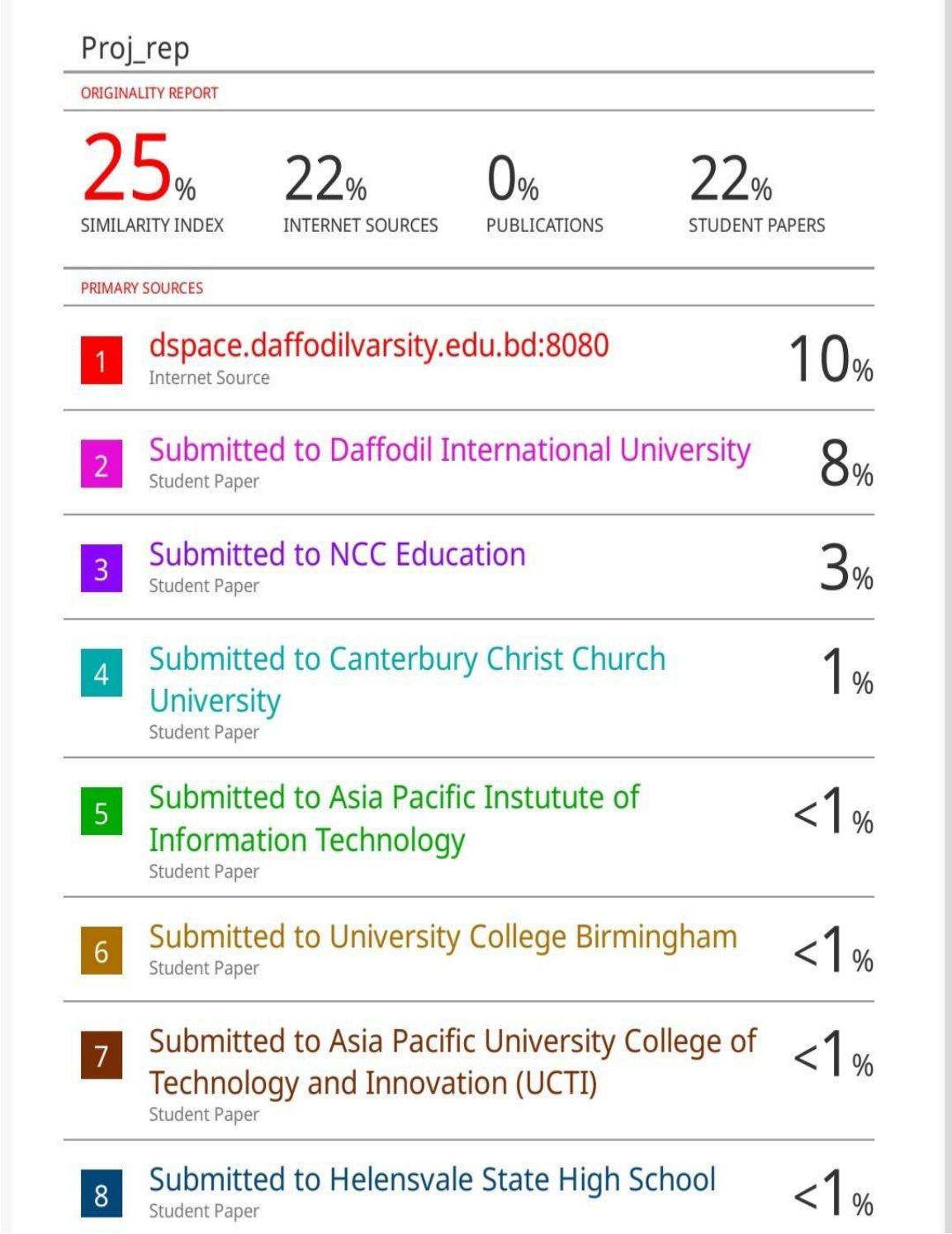
[5] Yaya, J. A. (2023). EFFECT OF LIBRARY MANAGEMENT SOFTWARE ON THE GROWTH AND DEVELOPMENT OF LIBRARY SERVICES. *Library Philosophy & Practice*.

[6] "The Challenges of Library Management," (n.d.). *Altium Resources*. Retrieved from https://resources.altium.com/p/the-challenges-of-library-management

[7] "Library Management System," (n.d.). *SkoolBeep*. Retrieved from https://www.skoolbeep.com/blog/library-management-system/

[8] Rahmani, M. (2022). Identifying and evaluating the challenges facing the management of digital libraries. *International Journal of Innovation Management and Organizational Behavior (IJIMOB)*, *2*(3), 1-11.

APPENDIX



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