Library System: Development with Integrated Social Media Networking

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# Declaration

I hereby certify that this report constitutes my own work, and that where the language of others is used, quotation marks so indicate. Appropriate credit is given for any language, ideas, or writings used. I declare that this report describes the original work that has not been previously presented for the award of any other degree at any other institution.

Signed: Nathaniel C Ani

# Acknowledgements

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# Abstract

This report details the development of a Library System designed to manage book borrowing and user information, with a focus on scalability, security, and user engagement. The system uses PostgreSQL as the database and NextAuth for secure user authentication. A unified sign-up and sign-in form simplifies user access. The system integrates features for managing user profiles, books, and borrow statuses. Future improvements include adding social media networking features such as book sharing, reviews, recommendations, and a private diary for each user. These social media components aim to enhance the traditional library system, encouraging collaboration, knowledge sharing, and book discovery.

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# 1. Introduction

## 1.1 Problem Statement

Traditional library systems often focus solely on managing books and borrowing activities, with limited opportunities for social interaction or collaboration among users. The lack of interactive features reduces user engagement and the discovery of new books. This project aims to address this limitation by integrating social media networking features into the library system, allowing users to share books, post reviews, recommend books to friends, and collaborate on writing projects.

## 1.2 Aims and Objectives

Aims:  
- To develop a library system with basic book management and enhanced user engagement through social media-like features.  
- To ensure the system is secure, scalable, and user-friendly.

Objectives:  
- Implement a PostgreSQL database for managing books and user data.  
- Integrate NextAuth for secure user authentication, supporting a unified sign-up and sign-in process.  
- Design and implement features for book borrowing, user management, and role-based access control.  
- Prepare for future implementation of social media features such as book sharing, reviews, recommendations, and a private diary for each user.

## 1.3 Legal, Social, Ethical, and Professional Considerations

Legal: Compliance with GDPR to ensure user data privacy.  
Social: The system encourages inclusivity by allowing users to share books and engage with the community through posts and recommendations.  
Ethical: Ethical handling of user data, including secure password storage and transparency regarding data usage.  
Professional: Following software development best practices, including using a secure authentication system and implementing role-based access control.

# 2. Literature Review and Technology Review

## 2.1 Literature Review

Library systems have traditionally focused on book management and borrowing, but there is growing interest in integrating social features to enhance user engagement. Adding social media-like features—such as user-generated content, book recommendations, and collaboration—has been shown to increase engagement, improve book discovery, and foster a sense of community. This report builds on these ideas to propose a hybrid model that incorporates social media networking features into the library system.

## 2.2 Technology Review

Backend: PostgreSQL was selected as the relational database management system due to its scalability, reliability, and robust features. The database is structured to handle user data, book metadata, borrowing statuses, and future social media features.  
Authentication: NextAuth provides a simple yet secure solution for user authentication, using JWT-based sessions to manage login and session states.  
Frontend: The system is built with Next.js, ensuring a responsive and dynamic user interface for managing books and user profiles.  
ORM: Drizzle ORM is used for managing database interactions, including migrations, CRUD operations, and schema definitions.  
Password Security: bcrypt is used to securely hash user passwords, ensuring sensitive data is never stored in plaintext.

# 3. Methodology

## 3.1 System Architecture

The system is designed with a modular architecture that separates concerns for managing users, books, and social media features. This approach facilitates maintenance and scalability as additional features are added.

## 3.2 Database Design

The database is built using PostgreSQL and managed through Drizzle ORM. Key components of the database schema include:  
- User Management: The registration table stores user details such as email, password (hashed with bcrypt), role, and approval status.  
- Books: The books table stores metadata about each book, including title, author, publisher, year, and ISBN.  
- Role-Based Access Control: Users are assigned roles (e.g., ADMIN, USER, SUPERADMIN) to control access to different parts of the system.  
- Future Tables: The system is designed to support additional tables for book reviews, user posts, followers, and a diary for each user.

## 3.3 Authentication and User Management

NextAuth is used to handle user authentication, providing a unified sign-up and sign-in form. Users can create an account by entering their email, password, and university ID, or log in using their credentials. JWT is used to manage sessions securely.

## 3.4 User Interface

The frontend is built with Next.js and features:  
- Book Management: Users can browse, search, and borrow books.  
- Profile Management: Each user has a personal profile that includes their borrowed books and review history.  
- Social Media Features (Future Work): The UI is designed to support future social media features like book sharing, reviews, recommendations, and a private diary.

# 4. Implementation

## 4.1 Database Integration

PostgreSQL is used to store and manage all data. Drizzle ORM handles the database migrations and schema management. The registration table tracks user information, and the books table stores metadata for each book. Migration scripts are used to create and alter tables, ensuring the database schema evolves as the system expands.

## 4.2 Unified Authentication Form

A single form handles both sign-up and sign-in functionality. The form checks if the user exists in the database and either logs them in or registers them as a new user.

## 4.3 Security

Passwords are hashed using bcrypt before being stored in the database. NextAuth manages user sessions using JWT, ensuring secure login and data handling.

# 5. Results and Evaluation

## 5.1 Results

The library system successfully handles user registration, authentication, book borrowing, and basic profile management. The unified sign-up and sign-in form works seamlessly, and the database schema is designed to accommodate future social media features.

## 5.2 Evaluation

Strengths: The system is user-friendly, scalable, and secure. The database schema is designed for easy extension as new features are added.  
Weaknesses: Social media features are still in development. These will need to be integrated in future phases of the project.

# 6. Conclusion

## 6.1 Summary

This project has developed a library system with a strong focus on user management, book borrowing, and security. Future work will focus on integrating social media features such as book sharing, reviews, recommendations, and a private diary to enhance the system’s functionality and user engagement.

## 6.2 Future Work

Future improvements will focus on:  
- Adding social media features like book sharing, user posts, and a recommendation engine.  
- Implementing a private diary for each user, protected by access control.  
- Expanding the system to support real-time interactions and notifications.

## 6.3 Reflection

This project has laid a strong foundation for integrating social networking features into library systems. As the system continues to evolve, it has the potential to significantly enhance how users interact with books and each other.

# 7. References

- Dataset: Kaggle. (2025). Books Dataset. Retrieved from <https://www.kaggle.com/datasets/saurabhbagchi/books-dataset>  
- NextAuth Documentation: https://next-auth.js.org/  
- Drizzle ORM: https://github.com/drizzle-team/drizzle-orm

# 8. Appendices

- GitHub Repository: [GitHub link]  
- Schema Files: [Include links to any relevant code or schema files]  
- Migration Files: [Include details of database migrations]  
- UI Screenshots:   
 - Sign-Up Page: [Screenshot 1]  
 - Sign-In Page: [Screenshot 2]  
 - Book Details Page: [Screenshot 3]