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## Design and Creation of Book Inventory Management System in School Library

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### **Abstract**

*The implementation of a digital book inventory system in school libraries plays a critical role in enhancing the efficiency, accuracy, and reliability of collection management. Traditional manual systems often result in challenges such as data redundancy, misplaced records, delayed reporting, and a higher risk of human error, all of which can disrupt library operations and hinder effective information access. In response to these challenges, this study was conducted to design and develop a web-based book inventory management system tailored specifically for school library needs. The system aims to automate core processes including book cataloging, borrowing and returning transactions, and inventory reporting. The development methodology adopted is the Waterfall model, a structured approach that includes sequential stages: requirement analysis, system design, implementation, testing, deployment, and maintenance. To support detailed system modeling, Unified Modeling Language (UML) tools were utilized, ensuring a comprehensive blueprint of system functionalities and data flow. The findings of the study indicate that the implementation of the system significantly reduces administrative workload, improves the accuracy of inventory records, and provides real-time data access to library administrators. Moreover, the system enhances the overall user experience by offering a more organized, accessible, and transparent library service. This innovation serves as a foundation for future enhancements such as mobile access or integration with online academic platforms.*

*Keywords: Book Inventory, School Library, Information System, Collection Management, UML*

### **1. Introduction**

The library is one of the vital elements in the world of education, functioning as a center of information and learning resources that support the learning activities of students and teachers. In school libraries, books are the main assets that need to be managed properly so that they can be utilized optimally. However, in practice, book inventory management in many school libraries is still done manually, such as through recording in a ledger or using a simple and non-integrated spreadsheet application. This method of working is very susceptible to recording errors, data loss, delays in reporting, and complicates the process of searching and tracking book status [1].

In addition, the manual system also causes low efficiency of library staff in recording incoming and outgoing books, recording book loans and returns, and in producing inventory reports. As the number of collections and transactions increases, the challenge of maintaining data accuracy and orderliness increases. This inefficiency ultimately impacts the quality of service to library users, especially students and teachers who need fast and accurate access to information.

In today's digital era, information technology has become an important tool to improve the efficiency and effectiveness of information services, including in the library sector. One relevant solution is the implementation of a web-based book inventory management system. Web-based systems have the advantages of high accessibility, multi-user support, and ease of integration with other devices and systems. This system allows users such as librarians, teachers, and students to access book collection information in real-time through any device connected to the network [2].

The web-based management system also supports the automation of important processes such as recording new books, searching collections, borrowing and returning processes, tracking book status, and compiling inventory reports quickly and accurately. With the implementation of the right system, library management can be more efficient, transparent, and organized, thus providing direct benefits in improving library services in the school environment [3].

Several previous studies have shown the success of implementing web-based information systems in improving library operational efficiency. Research by Rahadian et al. found that digital library information systems

can accelerate the collection data management process by up to 40% compared to manual methods, as well as increase user satisfaction [4]. This shows that the adoption of information technology is not only a trend, but also an urgent need for modern and adaptive library management to the times.

Based on these conditions, this study aims to design and build a web-based book inventory management system in school libraries. This system is designed to overcome the limitations of manual systems and provide efficient, accurate, and easily accessible digital solutions. With this system, it is expected that the management of book collections in school libraries can be carried out better, support the improvement of the quality of information services, and ultimately strengthen the function of the library as a learning center.

## **2. Research Methods**

### **2.1 Types of Research**

This research is an applied software engineering research, aimed at producing a web-based information system that can improve the efficiency of book inventory management in school libraries. This research adopts a system design and development approach, which focuses on the process of designing, implementing, and testing software.

### **2.2 System Development Methods**

The methodology used in system development is the Waterfall model, which consists of several structured stages as follows:

#### **a. Needs Analysis**

At this stage, identification of the functional and non-functional needs of the system is carried out through observation and interviews with library staff.

#### **b. System Design (System Design)**

This stage includes designing the system process flow, database design (Entity Relationship Diagram/ERD), and user interface (User Interface Design)

#### **c. System Implementation (Coding)**

The system is implemented using PHP programming language and MySQL database. Laravel framework is used to speed up the development process and ensure an organized code structure.

#### **d. System Testing**

Testing is carried out using the Black Box Testing method to check the suitability of system functions, and User Acceptance Testing (UAT) to assess user satisfaction.

#### **e. Maintenance**

After the system is tested, improvements are made based on user feedback, as well as additional features are developed if necessary.

### **2.3 Data Collection Techniques**

Techniques used in the data collection process include:

- a. Observation: Directly observing the library work process in recording books and manual lending.
- b. Interview: Conducted with librarians and users (teachers/students) to find out the system needs and problems faced.
- c. Documentation Study: Reviewing documents such as inventory lists, loan reports, and return archives to design the data structure.

### **2.4 System Testing Techniques**

**System testing is carried out in two stages:**

#### **a. Black Box Testing**

Used to test whether the system functions run as expected without considering the internal structure of the code. This test includes book data input features, book searches, borrowing, returning, and reporting.

#### **b. User Acceptance Testing (UAT)**

Conducted by librarians and teachers as system users to ensure that the system is easy to use, meets needs, and supports daily work efficiency in the library.

### 3. Results and Discussions

#### 3.1. Results Of System Analysis And Design

##### 3.1.1. Use Case Diagram

Use Case Diagram describes the interaction between actors (system users) with the functionality (use cases) of the system being developed. This diagram aims to visualize the relationship between users and the system in the context of functional needs that must be met. By using this approach, developers can understand the limitations of the system, the role of each user, and what features can be accessed by each actor in a more structured and systematic way. Use Case Diagram is also the basis for the system design process because it represents the interaction scenarios that will occur when the system is run by the end user [5].

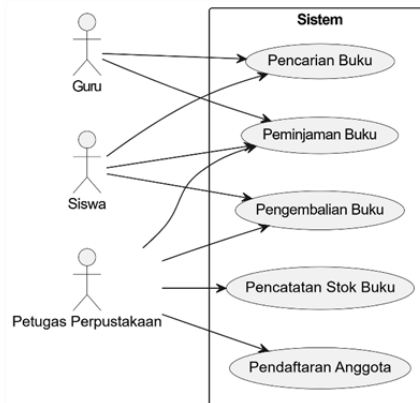


Figure 1. Use Case Diagram

##### 3.1.1. Class Diagram

Class Diagram is one type of diagram in UML (Unified Modeling Language) which is used to model the static structure of an object-based software system. This diagram contains a representation of the main classes, attributes, operations (methods), and relationships between classes in the system. The use of Class Diagram is very important in the design stage because it provides a comprehensive picture of the system architecture and facilitates understanding between development teams regarding the logical elements of the system to be built [5].

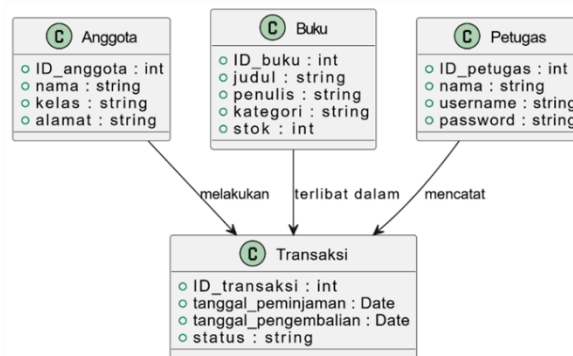


Figure 2. Class Diagram

##### 3.1.3 Activity Diagram

Activity Diagram is a type of UML diagram used to model the flow of activities or business processes in a system. This diagram describes the sequence of activities, decisions, branching conditions, and parallelism in the system, so it is very effective for explaining process logic dynamically. In the context of a school library book inventory management system, Activity Diagram represents the workflow of various activities such as user login, book data recording, borrowing process, returns, to printing reports [5].

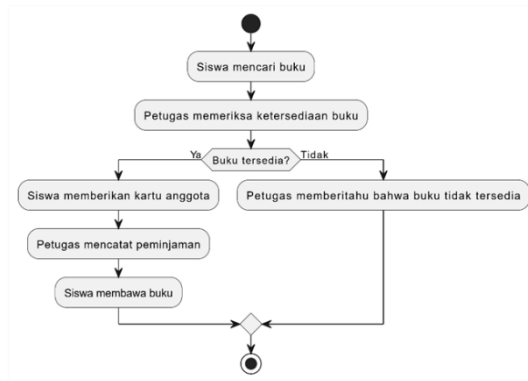


Figure 3. Activity Diagram

### 3.2. Screen display

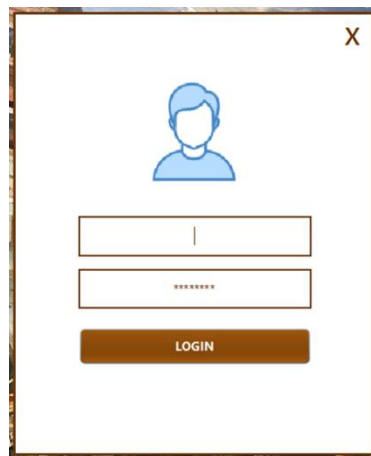


Figure 4. Login Screen Display

The login menu features an attractive, user-friendly interface to facilitate system access. Users enter their ID in the username field for admin validation and input a password for authentication. Once both fields are completed correctly, clicking the LOGIN button directs them to the system's main menu.

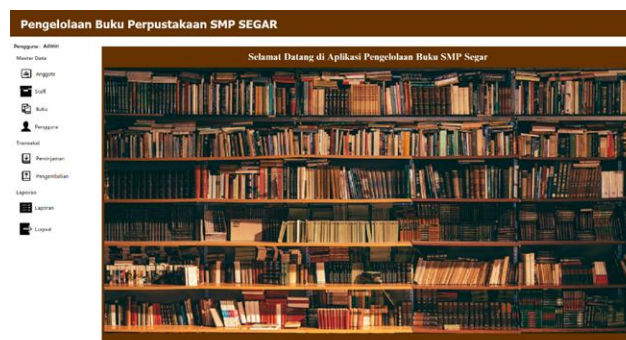


Figure 5. Main Menu Display

The main menu displays 6 master data for recording desk duty: Members, Staff, Books, and Users. There are also features for borrowing, returning, reporting, and a logout button. Each master data is equipped with a special icon that represents its appearance

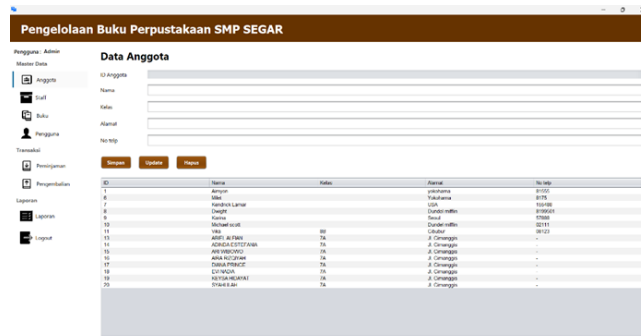


Figure 6. Form View

The image shows the "Member Data" interface of the "SMP Segar" library management app. It allows librarians to add, edit, and view member details such as name, class, address, and phone number. The app also manages book data, loan transactions, and generates reports.

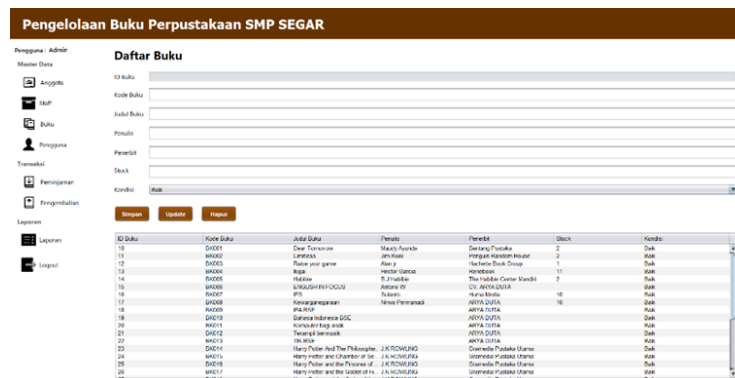


Figure 7. Book Form View

This form features a simple and intuitive design, making it easy for users to add, edit, or delete book data. It includes fields for book code (unique ID), title, author, publisher, stock, and book condition. Buttons for Save, Update, and Delete allow managing the book records. Below the form, a table displays the complete list of books in the system with detailed information. Overall, this book form is essential for the SMP Segar library app, enabling staff to efficiently manage book records for easy tracking and reporting.



Figure 8. User Form View

This form allows the admin to add, edit, or delete user accounts. Managed data includes name, username, password, and access rights. In short, it serves as the control center to manage who can access the library system and their permissions.



Figure 9. User Form View

The book loan form in the SMP Segar library app features input fields for loan ID, date, borrower's name, and book title. It includes Save, Update, and Delete buttons for managing records. A loan data table displays a complete list of transactions with ID, date, borrower, and book title.



Figure 11. Return Form View

The book return form in the SMP Segar library app streamlines return management with input fields for return ID, borrower's name, return date, and book title. It includes Save, Update, and Delete buttons, plus a data table showing all return transactions. An additional "Print Report" button allows generating return reports for administrative and analytical purposes.

#### 4. Conclusion

The Library Management System developed for SMP "SEGAR" Cimanggis is designed to improve the efficiency and accuracy of managing library resources by transitioning from a manual to a computerized system. The report outlines several key components: background, objectives, needs analysis, system design, implementation, and testing. The background highlights the need for a solution that can streamline library operations, minimize human error, and provide better service to students and staff. The objective is to create a user-friendly system that can manage book inventories, track borrowing and returns, and generate comprehensive reports. The needs analysis identifies critical functionalities such as data input for books and members, search features, and transaction logging. The design phase incorporates a relational database and intuitive user interfaces to support seamless interaction. Upon implementation, the system underwent thorough functional testing, with results showing that core features such as user login, book management, and transaction reports operated successfully according to user requirements. Despite the system's success, the report recommends continuous development to maintain relevance and adapt to future demands. One suggested improvement is transitioning to an online-based platform, which would enable broader access, faster information retrieval, and remote management capabilities. This evolution would support the library's role as an accessible and efficient knowledge hub within the school community.

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