



Web-Based Goods Inventory Information System Using the Rapid Application Development Method (Case Study: SMK Fatahillah Cileungsi Bogor)

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Abstract

Inventory management at SMK Fatahillah Cileungsi Bogor is not yet supported by an integrated information system, so the process of recording incoming and outgoing goods has not been running optimally. This condition causes difficulties in data management, increases the risk of inventory information discrepancies, and limitations in monitoring real-time availability of goods. This study aims to design and implement a web-based inventory information system that is able to automate and centralize school asset management. The system development method used is Rapid Application Development (RAD), which includes the stages of requirements planning, system design, prototype construction, testing, and implementation. The developed system provides features for managing master data on goods, user management, recording incoming and outgoing goods transactions, borrowing and returning goods, and automatic generation of inventory reports. Test results show that the system can function well according to user needs. The implementation of this web-based information system has been proven to be able to improve data accuracy, accelerate the information search process, and optimize the effectiveness of asset management at SMK Fatahillah Cileungsi Bogor.

Keywords : *information system, inventory, web-based, Rapid Application Development, school asset management*

1. Introduction

The development of website-based information technology has brought significant changes in various fields, including the education sector. The implementation of web-based information systems enables more effective and efficient data management processes because the system can be accessed in real time and integrated into a single platform [1]. In the context of inventory management, the use of a website-based system can simplify the process of recording, searching, and preparing structured inventory reports, thereby minimizing recording errors that often occur in manual systems [2]. SMK Fatahillah Cileungsi Bogor is a vocational high school located on Jl. Raya Narogong KM. 16, Cileungsi, Bogor Regency, West Java, and was founded in 2006. This school has utilized information technology to support school administration activities. However, although the school has an administrative support system, the inventory system has not been running optimally. Based on observations, inventory management at the school still faces several problems. Inventory recording is not well integrated, the flow of incoming and outgoing goods is not always recorded consistently, and the process of borrowing and returning goods has not been well documented. These conditions cause discrepancies in inventory data and have the potential to cause loss of goods.

In this study, the system development was carried out using the Rapid Application Development (RAD) method because this method emphasizes the speed of development through an iterative approach and gradual prototyping. RAD allows users to be actively involved from the early stages of development, so that system requirements can be understood and validated directly, which ultimately reduces the risk of inconsistency between the system being built and user needs [3]. In addition, the RAD method is considered more flexible in adapting to changing needs during the development process compared to conventional development methods, making it suitable for application to inventory systems with a limited scope and relatively clear needs [4]. The selection of RAD is also based on the characteristics of the school environment as the object of research which has a relatively small organizational scale, a limited number of users, and a non-complex inventory management flow, so that the communication process and system evaluation can be carried out intensively and efficiently. Under these conditions, RAD is able to accelerate the project completion time without neglecting the quality of the system, because each development iteration is always accompanied by continuous user evaluation and feedback [5].

2. Research methods

The research method used in this study is descriptive with an information systems development approach. This method aims to systematically describe the current inventory management conditions at SMK Fatahillah Cileungsi Bogor, identify existing problems, and design a solution in the form of a web-based inventory system. To obtain accurate and relevant data, this study uses several data collection techniques and applies the Rapid Application Development (RAD) software development method in the system design and implementation process.

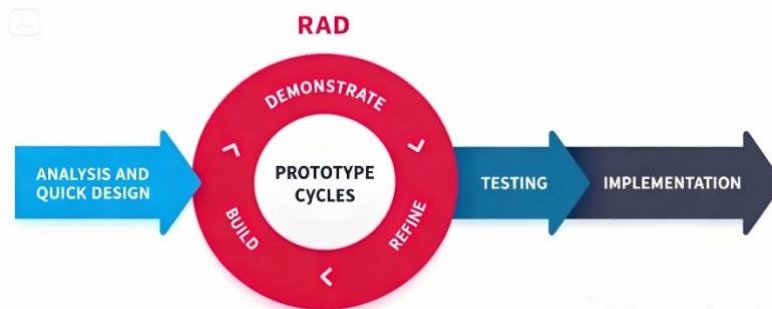
2.1. Data collection technique

The data collection techniques used in this study aim to obtain accurate data regarding the inventory system at SMK Fatahillah Cileungsi Bogor through the following methods:

1. Observations were carried out by directly observing the inventory management process in the school environment, especially in recording incoming and outgoing goods, recording the condition of goods, and compiling inventory reports.
2. Interviews were conducted directly with the Vice Principal for Facilities and Infrastructure, inventory officers, and teachers and students at SMK Fatahillah Cileungsi. The interviews aimed to obtain information regarding current inventory management procedures, system requirements, and challenges faced in manually recording inventory.
3. Literature study was conducted by reviewing books, scientific journals and relevant previous research.

2.2. Rapid Application Development (RAD) Method

In developing this web-based inventory system, the researchers applied the Rapid Application Development (RAD) model. This method was chosen because the system's limited scale allowed for clearly defined functional requirements and completion in a relatively short time. The research stages were structured as follows:



Source :[6]

Fig 1: Rapid Application Development

1. Analysis and Quick Design

At this stage, an analysis was conducted of the manual inventory management system at SMK Fatahillah Cileungsi. The analysis focused on identifying system requirements, including recording incoming and outgoing goods, borrowing and returning goods, stock management, and inventory reporting. Furthermore, this stage also involved designing the initial system process flow using activity diagrams to provide a preliminary overview of the system to be developed.

2. Prototype Cycle (Build, Demonstrate, Refine)

This stage is the iterative development process for a web-based inventory system prototype. In the build stage, the system is designed using Unified Modeling Language (UML), including use case diagrams, sequence diagrams, and database design using Entity Relationship Diagrams (ERD). Next, in the demonstrate stage, the system prototype is shown to the school for feedback. The refinement stage involves refining the system based on user input to meet the school's operational needs. The implementation phase involves converting the design into program code. Researchers used the PHP programming language with a MySQL database to build a system that can be accessed in real time.

3. Testing (System Performance Testing)

After the system is developed, a testing phase is conducted using system performance testing methods. This testing aims to evaluate the application's performance in terms of response speed, system stability, and the system's ability to optimally perform stock management and inventory reporting functions. Test results are used to ensure the system meets user needs.

4. Implementation (System Implementation)

The implementation phase is the implementation of the inventory information system at SMK Fatahillah Cileungsi Bogor. At this stage, the system begins to be used operationally by administrators, inventory officers, as well as teachers and students in managing inventory. Implementation is carried out to ensure the system runs smoothly and effectively supports the school's inventory administration activities.

3. Results and Discussion

The result of this research is the development of a web-based inventory information system implemented at SMK Fatahillah Cileungsi Bogor as a solution to the problem of inventory recording which was previously done manually. The designed system provides user authentication facilities, inventory master data management, and recording of incoming and outgoing goods transactions. In addition, the system supports the process of borrowing and returning goods by teachers and students, real-time monitoring of stock availability, and

automatic preparation of inventory reports that can be accessed and printed by authorities. The implementation of this system is expected to improve data accuracy, accelerate administrative processes, and support the effectiveness of school asset management.

3.1. System Processes and Components

The inventory information system consists of three types of actors, namely:

1. Admins can log in and log out, manage user data, master item data (categories, brands, and items), manage incoming and outgoing item transactions, monitor borrowing history, and access and print all inventory reports.
2. Inventory/Administration Officers can log in and log out, record incoming goods transactions, borrow and return goods, check stock of goods, and produce inventory reports to be submitted to the school.
3. Teachers/Students can log in, apply to borrow items, view borrowing history, and process the return of items through the system.

3.2. Use case diagram modeling

The following shows a use case diagram modeling of the system being designed. This Use Case Diagram illustrates the interaction between users and the inventory information system, which involves Admin, Officer, and Teacher/Student actors. This diagram shows the main functions of the system, such as managing item data, recording transactions, borrowing and returning items, and creating inventory reports according to the access rights of each user.

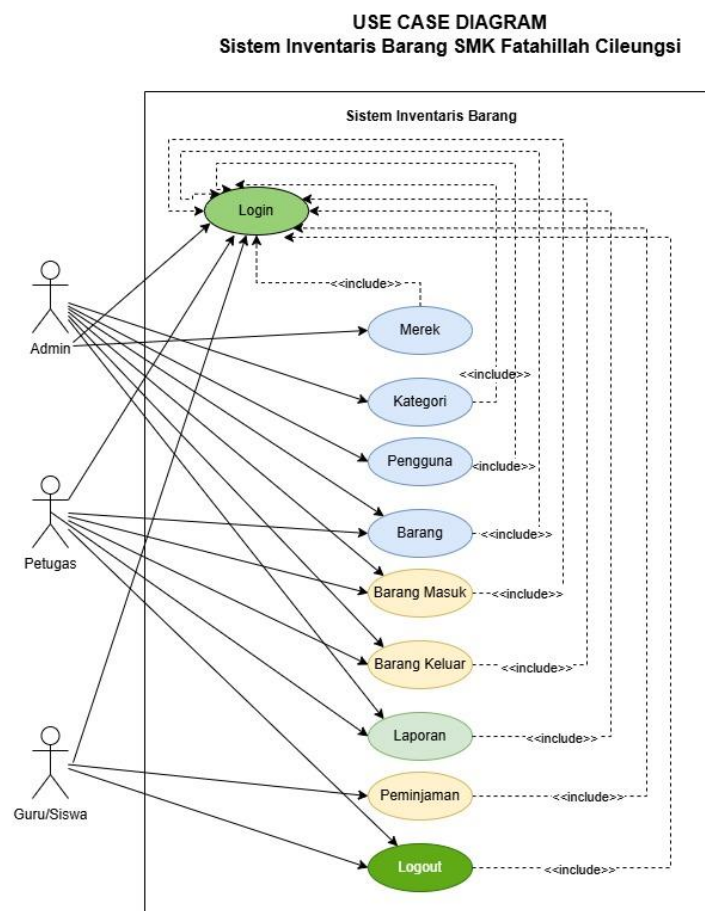


Fig. 2: Use case diagram of goods inventory information system

3.3. Activity Diagram Modeling

Activity diagram illustrates the process flow for an outgoing goods transaction carried out by the admin. The process begins with accessing the transaction page, selecting the outgoing goods menu, entering the goods data, and then saving the transaction. The system validates the data, and if valid, displays the outgoing goods status as a sign that the transaction has been successfully completed.

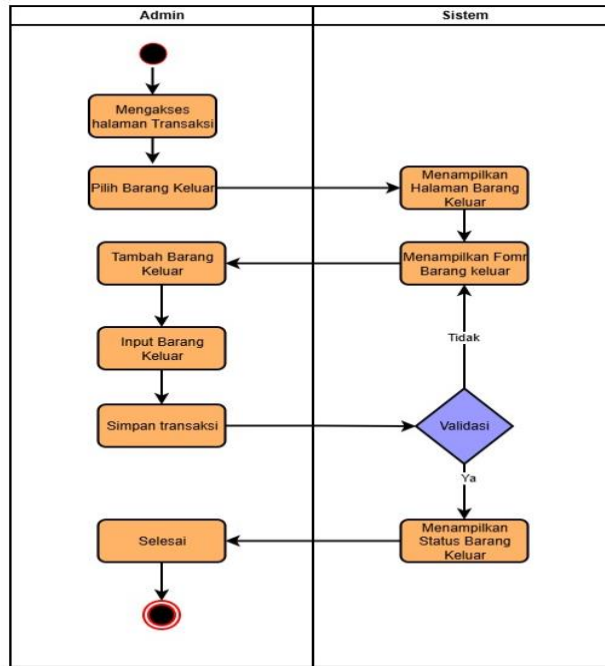


Fig. 3: Activity diagram Admin manages exit item

3.4. Entity Diagram Relationship

Entity Relationship Diagram (ERD) illustrates the database structure of the SMK Fatahillah Cileungsi Goods Inventory Information System. The system consists of several main entities: Users, Goods, Incoming Goods, Outgoing Goods, Categories, and Brands. User entity plays a role in the input process for incoming and outgoing goods. The Goods entity stores primary inventory data linked to the Category and Brand entities for item grouping. The relationship between Incoming and Outgoing Goods and Goods is used to record inventory transactions, allowing for structured and accurate inventory management.

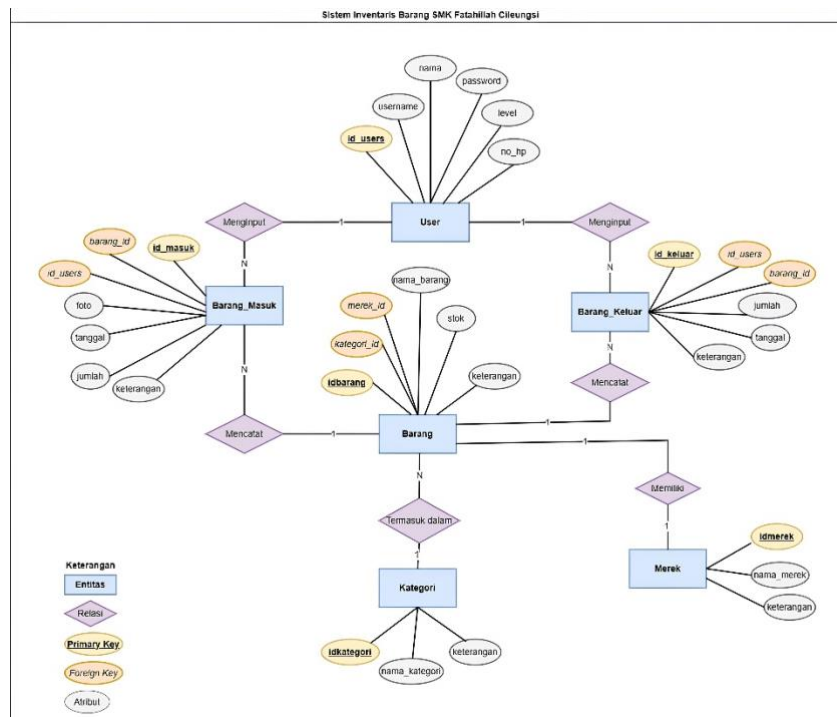


Fig. 4: Entity Diagram Relationship of Goods Inventory Information System

3.5. Sequence Diagram

sequence diagram illustrates the process flow for creating an inventory report by a clerk. The process begins with accessing the report page, selecting a date range, and then requesting report data from the system. The system then retrieves transaction data from the database and displays the report, which can then be printed or saved in PDF format.

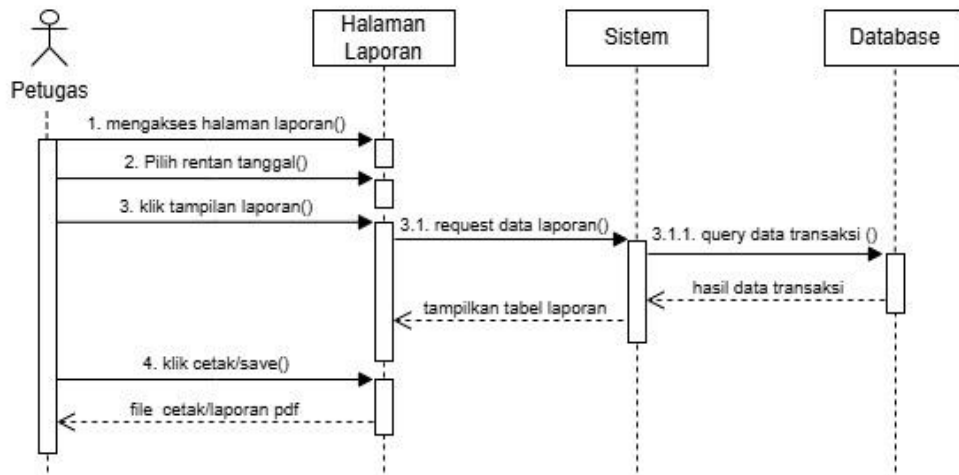


Fig. 5: Sequence diagram Report

3.6. System Implementation Results

1. Login Page View

The login page functions as a means of user authentication to obtain access rights to the system by entering the registered username and password.

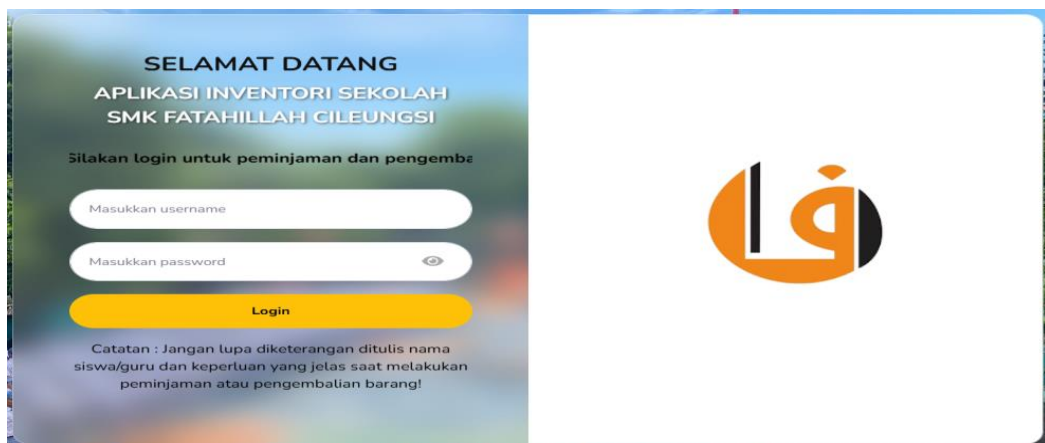


Fig. 6: Login Page View

2. Admin Home Page View

The Admin Homepage is the main post-login interface, providing menu navigation and a summary of inventory data. This page serves as a control center for administrators to quickly and efficiently monitor incoming and outgoing goods activity, as well as stock status.

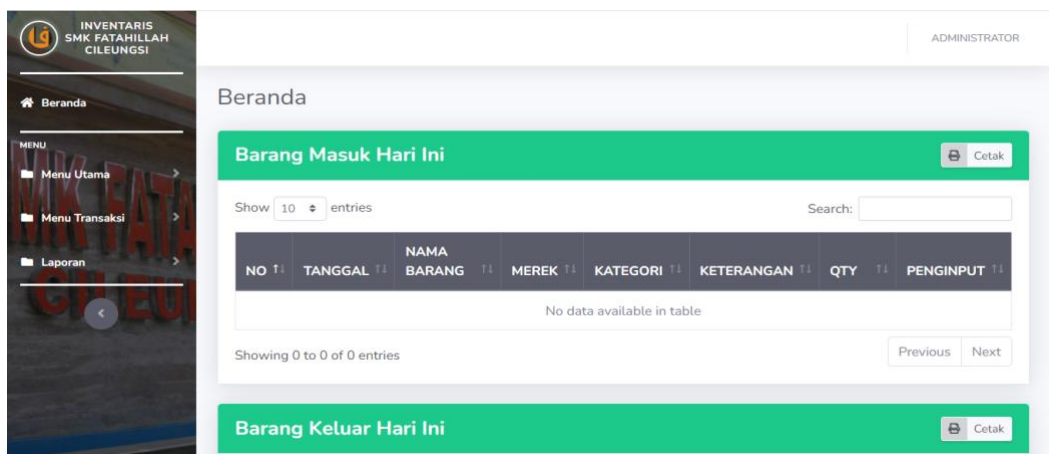


Fig. 7: Admin Home Page View

3. Officer Home Page

The homepage for officers or operational staff contains a navigation menu for managing daily transactions. This page provides a summary of inventory data and shortcuts to expedite the process of recording borrowing and returning school assets.

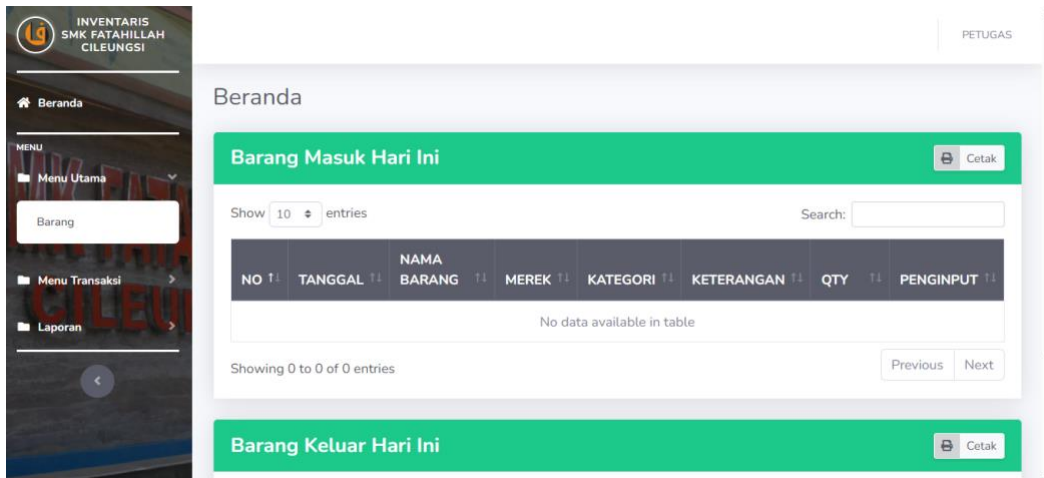


Fig. 8: Officer Home Page View

4. Teacher/Student Home View

The user homepage displays personalized information about item availability and loan status. This page is designed to make it easier for teachers and students to borrow and return assets.

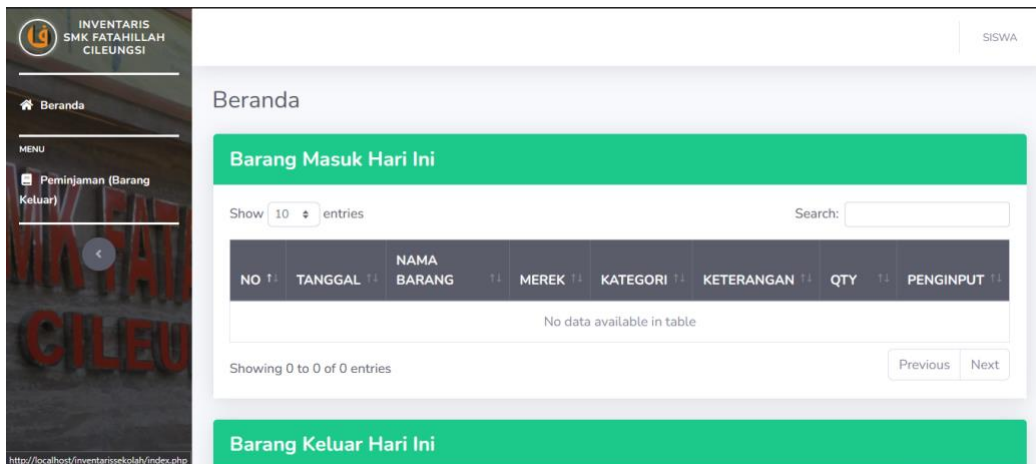


Fig. 9: Teacher/Student Home Page View

5. Goods Data Management View

This page is used by the admin to add, edit, and delete item data. Each item has a category, brand, item name, description, and stock.

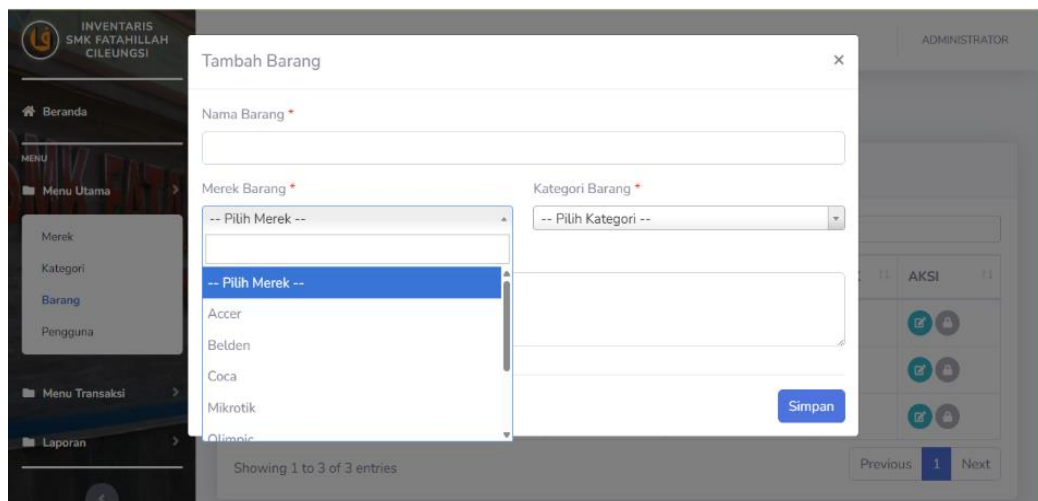


Fig. 10: Display of goods data management

6. Incoming goods transaction page

This feature is used by staff to record items received by the school. Each entry automatically adds to the inventory.

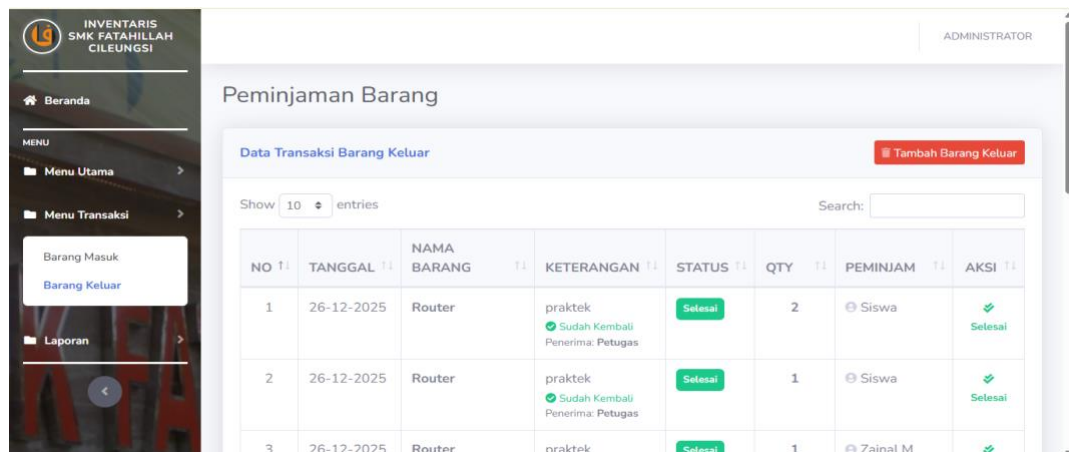


NO	TANGGAL	NAMA BARANG	MEREK	KATEGORI	KETERANGAN	JUMLAH	FOTO	PENI
1	23-12-2025	Router	TP Link	Alat Jaringan	baru	2		Admi
2	23-12-2025	Router	Mikrotik	Alat Jaringan	baru	2		odex
3	23-12-2025	Meja	Olimpic	Meubel	baru	20		odex
4	17-12-2025	Router	TP Link	Alat Jaringan	beli baru	5		Admi

Fig. 11: Incoming goods transaction page

7. Outgoing goods transaction page

The item loan page is used to display and manage inventory loan transaction data. Information displayed includes the transaction date, item name, description, loan status, quantity, and borrower details. Through this page, admins or staff can monitor loan status and complete the return process in a controlled manner.

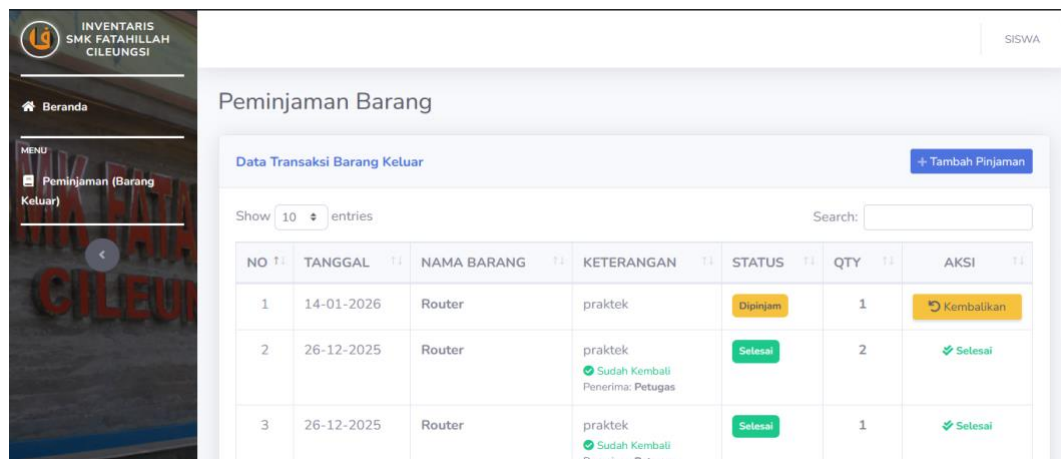


NO	TANGGAL	NAMA BARANG	KETERANGAN	STATUS	QTY	PEMINJAM	AKSI
1	26-12-2025	Router	praktek Sudah Kembali Penerima: Petugas	Selesai	2	Siswa	Selesai
2	26-12-2025	Router	praktek Sudah Kembali Penerima: Petugas	Selesai	1	Siswa	Selesai
3	26-12-2025	Router	praktek	Selesai	1	Zainal M	Selesai

Fig. 12: Outgoing goods transaction page

8. Display of the Borrowing and Returning Items Page

Teachers or students can borrow items and officers will verify the return process.



NO	TANGGAL	NAMA BARANG	KETERANGAN	STATUS	QTY	AKSI
1	14-01-2026	Router	praktek	Dipinjam	1	Kembalikan
2	26-12-2025	Router	praktek Sudah Kembali Penerima: Petugas	Selesai	2	Selesai
3	26-12-2025	Router	praktek Sudah Kembali Penerima: Petugas	Selesai	1	Selesai

Fig. 13: Item borrowing and return page

9. Report Page

This view presents an automatic report that can be printed in pdf format or printed directly.

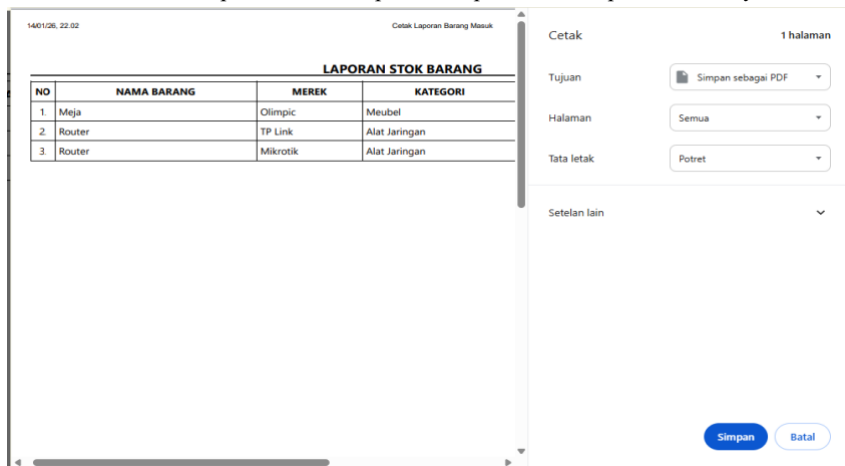


Fig. 14: Report Page

3.6. System Performance Testing

System performance testing aims to evaluate how quickly, efficiently, and stably an application meets user needs. In this study, performance testing was conducted using Google Lighthouse, a web-based tool capable of assessing technical aspects such as page load time, content rendering, script utilization, and interface responsiveness. Comprehensive performance evaluation is important because it impacts the user experience, especially for applications accessed directly through a browser.

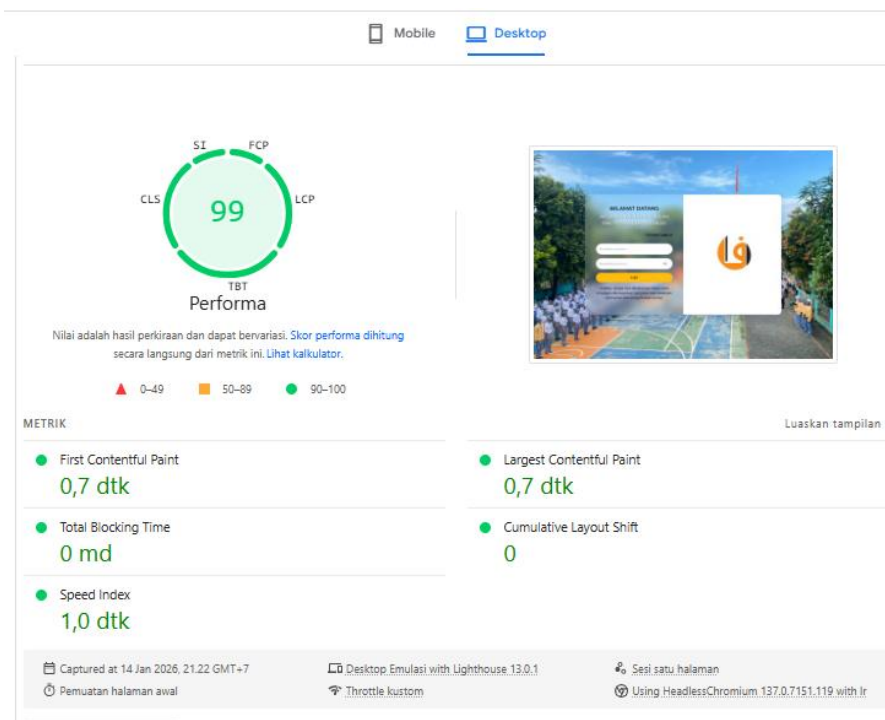


Fig. 15: System Performance Testing

4. Conclusion

This research successfully designed and implemented a web-based inventory information system at SMK Fatahillah Cileungsi Bogor using the Rapid Application Development (RAD) method. The developed system is able to integrate the entire inventory management process, starting from recording incoming and outgoing goods, borrowing and returning goods, user management, to automatically preparing inventory reports in one centralized platform. The results of implementation and testing indicate that the system can operate well according to user needs and provide improvements in data accuracy, speed of information access, and efficiency of inventory administration. In addition, this system allows real-time monitoring of inventory availability, thus assisting the school in making decisions regarding asset management. Thus, this web-based inventory information system is an effective solution to improve the quality of asset management in vocational high schools and can be used as a reference for the development of similar systems in other educational institutions with similar needs.

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