ELINVO (Electronics, Informatics, and Vocational Education), November 2023; vol 8(2): 275-289
ISSN 2580-6424 (printed), ISSN 2477-2399 (online) DOI: https://doi.org/10.21831/elinvo.v8i2.66420

Development of a Web-Based Information System for Student Leave Permission at Dar Al-Raudhah Islamic Boarding School: ISO Quality Standards Analysis

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ABSTRACT

Dar Al-Raudhah Entrepreneur, Islamic Boarding School, has adopted digital technology by upgrading hardware and software also investing in reliable internet infrastructure. However, this school still faces issues with students' leave permission process due to reliance on manual bookkeeping and Excel, which leads to potential errors. Based on those problems, this research aims to create a web-based student leave permission system called SIPERSAN. The SIPERSAN system was developed with a Waterfall development model, which includes requirements analysis, design, implementation, testing, and deployment. The database is managed with MySQL, and the system is developed using PHP with the Laravel framework. Based on testing results, SIPERSAN has met the ISO 25010 standard for the four aspects: functionality, performance efficiency, reliability, and usability. Regarding functionality, this system has a score of 0.964, indicating it is very eligible. It rates 90% on GTMetrix (Grade B) for performance efficiency with an average loaded time of 2.06 seconds, making it eligible. Regarding reliability, the system is rated as very eligible for success based on evaluations performed with WAPT software. Usability is rated at 75.33%, which is considered eligible. SIPERSAN also received a positive response from users, who felt impacts such as facilitating the processing of student permits, increasing efficiency in managing student permit data, minimizing data errors, and assisting in recording student permits that are organized and systematic.
Keywords*:* information system; functionality; performance efficiency; reliability; usability

INTRODUCTION

Islamic boarding schools, a longstanding educational tradition in Indonesia, are distinguished by their unique blend of religious and academic learning, providing a holistic education to their students [1]. Research indicates that many Islamic boarding schools do not have sufficient systems to manage various administrative needs [2], and several of them still use manual systems with records on sheets of paper. Several studies highlight the challenges and inefficiencies associated with these manual systems, such as the difficulty in data retrieval and the risk of data loss due to physical damage to paper records [3]–[5].

Adopting digital systems in Islamic boarding schools can be challenging due to several factors. Regarding infrastructure and connectivity, Islamic boarding schools, especially in rural or remote areas, often face challenges with unreliable internet access. This lack of reliable internet makes it difficult to implement digital solutions effectively [6]. The availability of staff members to handle the transition to digital systems also can be a significant challenge. Most of the staff members in Islamic boarding schools may lack the technical skills to operate and maintain digital systems [5]. Providing adequate training programs is essential but can be time-consuming and costly. Due to their limited budgets, Islamic boarding schools find it challenging to allocate the necessary funds for such comprehensive training [6], [7].

Even though adopting digital technology presents several challenges, Dar Al-Raudhah Entrepreneur as Islamic Boarding School has the ability to address these issues. Dar Al-Raudhah Entrepreneur Islamic Boarding School, located in Pangkalanbun, Central Kalimantan, is an educational institution that has adopted digital technology to enhance its operations and educational offerings. Here are some key aspects of the school's digital transformation: (1) The

school has invested in reliable internet infrastructure to ensure that all students and staff have access to the internet, facilitating online learning and digital communication; (2) The school has upgraded its hardware and software to support digital systems, including laptops, tablets, and educational software; (3) Regular workshops and seminars are conducted to keep teachers updated with the latest educational technologies and methodologies.

However, according to the research team's direct observations, Dar Al-Raudhah Entrepreneur Islamic Boarding School still has issues, particularly in the students' leave permission process. The school still utilizes a straightforward administrative system that relies on various ledgers and applications like Microsoft Excel. The process involves several bookkeeping stages, followed by data recapitalization on a computer. Records in schools that are maintained manually are vulnerable to numerous mistakes, which can substantially affect the accuracy and reliability of the information. Manual entry of data can lead to inconsistencies and errors [8], [9]. These errors can make it challenging to retrieve accurate information quickly, which is essential for administrative tasks like reporting, budgeting, and compliance [10], [11]. Identifying and correcting manual errors can also be time-consuming and delay administrative processes [12], [13].

Managing students' leave permissions in Islamic boarding school educational institutions is crucial for various reasons. The student's leave permission helps ensure that every student who leaves the school has obtained a valid permit. This minimizes the possibility of accidents or unwanted incidents and maintains order in the management of students [14]. The student's leave permission can also teach students religious values and good morals. By asking for permission, students learn to appreciate a more formal and ongoing process and understand the importance of getting permission before doing something [15], [16].

Student leave permission at Islamic boarding schools can vary depending on each institution's policies. These policies are often outlined in the school's handbook or student code of conduct [17]. Islamic boarding schools typically handle student leave permissions through a structured process that involves several steps and considerations. While specific procedures may vary from school to school, here are some general practices [18]: (1) Students must submit a formal application for leave, including providing reasons for the leave, expected duration, and necessary documentation; (2) The school administration reviews the application, considering factors such as academic performance, the timing of the leave, and whether the leave is for a valid reason; (3) Once the leave is approved, the student is usually required to provide documentation or updates on their status during the leave period. These steps help Islamic boarding schools maintain a balance between accommodating students' needs and ensuring they meet their academic and personal responsibilities.

There are two categories of student leave permissions at the Dar Al-Raudhah Entrepreneur Islamic Boarding School: temporary permit (*izin turun*) and home-return permit (*izin pulang*). The temporary permit allows students to leave the boarding school for one day, requiring that they return to the school by the end of the day after completing their activities outside [14]. The home-return permit is given to students to return home from boarding school, usually for a specific period. This permit allows students to leave the dormitory and return home, often for vacations, family events, or personal needs. After the specified period, students are expected to return to the dormitory according to a predetermined schedule [19].

Furthermore, the problem at the Dar Al-Raudhah Entrepreneur Islamic Boarding School, especially in the students' leave permission process, is that the large number of students and managed transactions are not comparable to the system used. Sometimes, it causes a buildup of records that can cause administration errors.

Consequently, preparing final reports for the head of the Islamic boarding school becomes time-consuming. Considering these conditions, it can be concluded that the current student leave permission system is not ineffective. This is due to the lack of a computerized system in place. Based on those problems, this research aims to create a website-based student leave permission system for Dar Al-Raudhah Entrepreneur Islamic Boarding School. This system aims to address the current problems and assist officers in their duties. The system is anticipated to enhance time management efficiency and improve the quality of information provided to both the head of the boarding school and the student's parents.

The rationale behind selecting a website-based information system for developing the student leave permission system is its benefits [20]. Implementing website-based systems can reduce the need for manual records and minimise the risk of errors [21]. A website-based information system in schools can offer several benefits [22], including: (1) Users can access the system from anywhere with an internet connection, making it convenient for students, teachers, and parents; (2) A website provides a centralized platform for communication, allowing teachers to share information and parents to stay informed about their child's activity; and (3) A website can provide transparent information about school enhancing accountability and trust among stakeholders.

Website-based information systems can also significantly enhance cost efficiency [23]–[25]. Transitioning from paper-based documentation to digital records enables schools to substantially cut costs associated with printing, copying, and storing physical documents. Digital storage is easier to maintain than physical storage, reducing the need for space, utilities, and staff to handle physical documents [26]. Furthermore, digital records offer quick access to information, which decreases the time spent searching for documents and can lower personnel costs [27].

METHODS

The research focuses on developing a software system, specifically the web-based information system for student leave permission (SIPERSAN). The Waterfall development model, a structured approach to software development, is used as a reference. This model, a specific type of Software Development Life Cycle (SDLC), mandates the completion of each phase before progressing to the next, thereby ensuring a well-defined structure and comprehensive documentation throughout the development process [28]. The Waterfall model's stages (Figure 1) generally include (1) requirements analysis, (2) system and software design, (3) implementation, (4) testing, (5) deployment, and (6) maintenance. Each stage must be completed before proceeding to the next stage. Adopting the waterfall model in the software development process can significantly enhance focus and reduce time consumption [29].

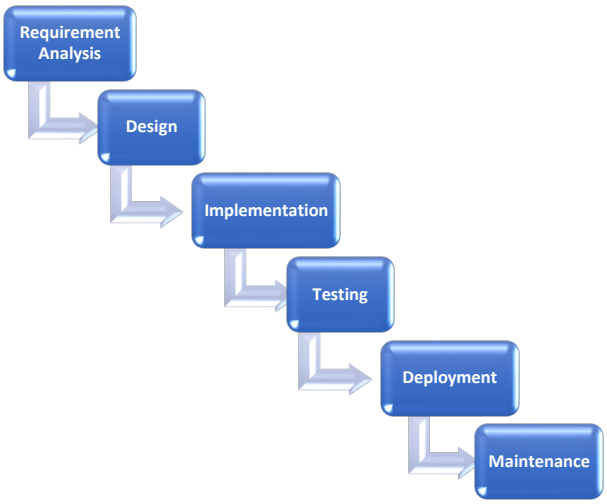


Figure 1. The Stages of the Waterfall Model

Activities carried out at each stage in Figure 1 include: (1) Analysis: identifying software needs, collecting user information through interviews and observations, and simplifying this data into comprehensive documentation on user specifications; (2) Design: creating use case diagrams and

databases, compiling specifications from previous analyses, and developing the software's architecture, design, and technical details; (3) Implementation: creating code and implementing features based on the design, followed by unit testing to ensure compliance with specifications; (4) Testing: integration testing to ensure they function together, and conducting system testing to verify that the entire system meets all required features and functions; (5) Deployment: fixing issues from testing, installing the system for users, and providing user training and support; (6) Maintenance: performing maintenance to update and expand the software.

The SIPERSAN system was developed in six months until the deployment stage, while the maintenance stage was continued next year per the cooperation implementation document. In addition to discussing system development to the deployment stage, this article will also discuss software product quality testing. Further testing of the quality of the information system is carried out based on the ISO 25010 standard, which includes functionality, performance efficiency, reliability, and usability.

System quality testing on the functionality aspect is carried out using a checklist given to experts to test how far the functions in the system can be implemented and run as expected. System quality testing on the performance efficiency is carried out by testing the system page load time. This test is carried out to ensure that the system performs efficiently when loading and handling user requests. The test results must meet the ISO 25010 standard regarding performance efficiency, which requires a load time that is in accordance with user needs.

System quality testing on reliability is carried out using WAPT (Web Application Performance Tool) software. WAPT is a load-testing tool used to measure the performance and reliability of web applications. This tool allows users to simulate high workloads and measure the performance of web applications under heavy load conditions. By using WAPT, testing can be carried out to evaluate the system's reliability in handling heavy workloads and ensure that the system can operate stably and efficiently. System quality testing on the usability aspect is carried out on prospective users using a questionnaire based on the System Usability Scale (SUS) Questionnaire. This questionnaire consists of 10 items. This questionnaire can measure the system's usability from the user's perspective.

RESULT AND DISCUSSION

A. Requirements Analysis

The initial process in developing the SIPERSAN system is requirement analysis. System development requirements are identified at this stage based on the problems encountered at the Dar Al-Raudhah Entrepreneur Islamic Boarding School. Based on the requirements analysis, the minimum functions that the system must own are obtained, including the following features: (1) dormitory data management, (2) room data management, (3) user data management, (4) student data management, (5) management of temporary permit and home-return permit, and (6) management of permit extensions. Furthermore, for system design and development needs, the identification results obtained include a laptop or computer with the following minimum specifications that can be seen in Table 1.

Table 1. Device's Minimum Specification

No.	Minimum Specification
1.	Processor: AMD Ryzen 5 5500U with Radeon Graphics
2.	System type: 64-bit operating system, x64-based processor
3.	RAM: 8GB
4.	Operating System: Windows 11 Home
5.	Merk: MSI Modern 14 B5M

In addition, the laptop or computer device with the specifications in Table 1, the team also uses several software that can help develop the student licensing information system, as follows: (1) Visual Studio Code as a text editor, (2) MySQL as a database management system, (3) Web Browser is used to search for references,

test websites, and run the created web, (4) Server Hosting and Domain as a place to store websites and databases and to run web services so that the website can be accessed online via the website address, (5) Git (Github) as a control system for program code management and collaboration in information system development projects, (6) Stisla Template is used to create the appearance of the information system, (7) PHP with the Laravel framework as a programming language used to create the information system.

B. System and Software Design

After the requirements analysis stage, the next step is to design a system, including system and database design. A use case diagram made for the design of the SIPERSAN system. Figure 2 shows a use case diagram of the SIPERSAN system that consists of several user levels, including: (1) Use case diagram for the admin level illustrates that the Admin can manage dormitory data, manage room data, manage user data, manage student data, manage permit data, login to the system, and respond to permit extension requests; (2) Use case diagram for the operator level illustrates that the Operator can login to the system, manage permit data, and respond to permit extension requests; (3) Use case diagram for the guest level illustrates that Guest level users can view permit history, view extension status, and apply for permit extensions.

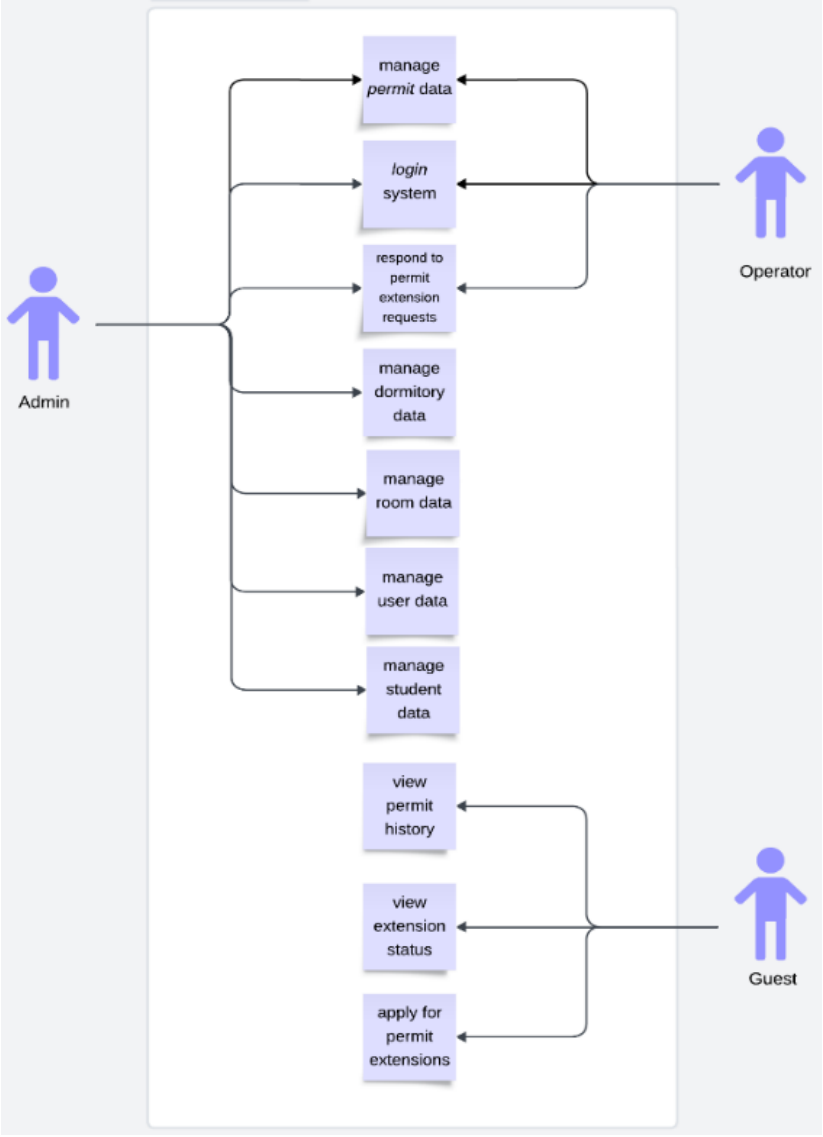


Figure 2. Use Case Diagram of SIPERSAN System

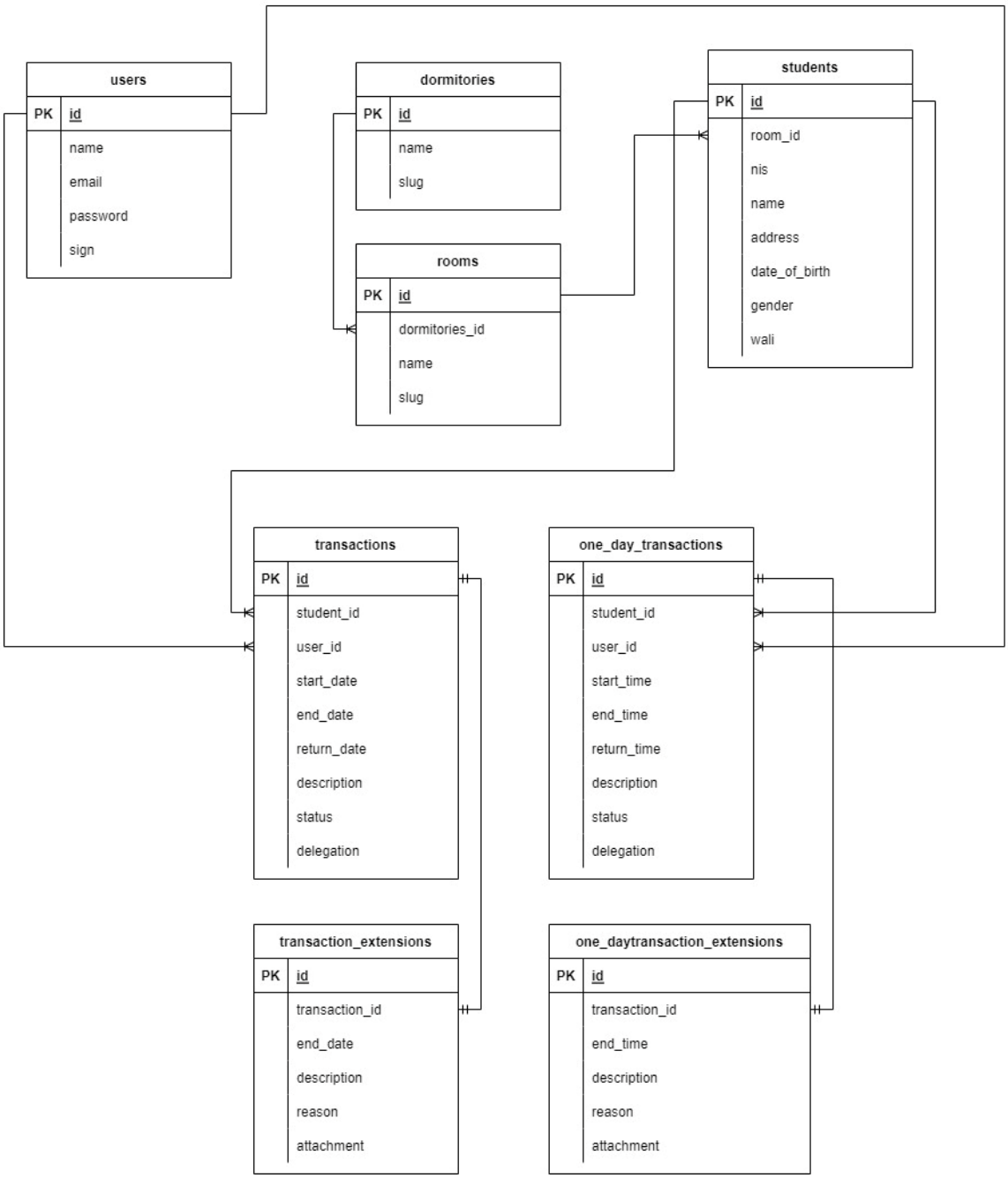


Figure 3. Entity-Relationship (E-R) Data of SIPERSAN System

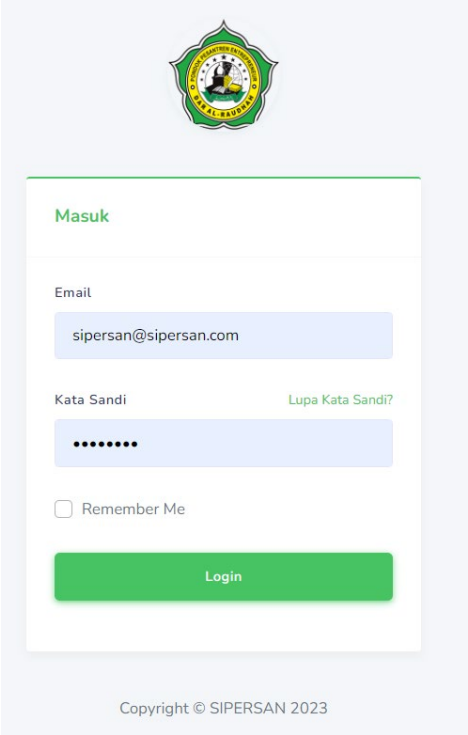
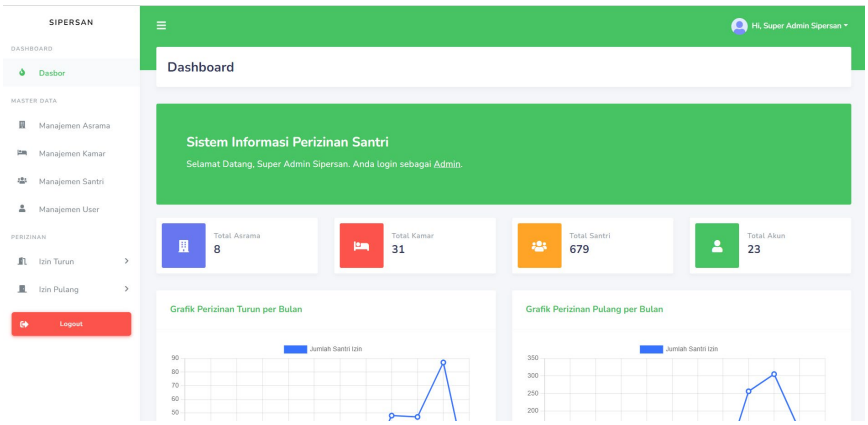
In addition to using case diagrams, the team also conducted interviews and documentation observations at the previous stage to identify the information as data that would be processed in the information system. The data includes dormitory, room, user, and student data. Based on the data, it was then developed according to the Entity-Relationship (E-R) data model so that the form of the data processing implementation diagram in the SIPERSAN system's database is as shown in Figure 3.

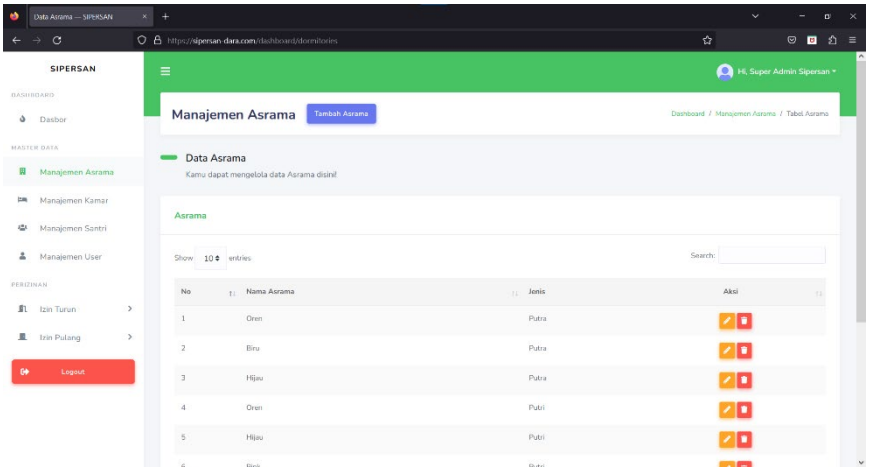
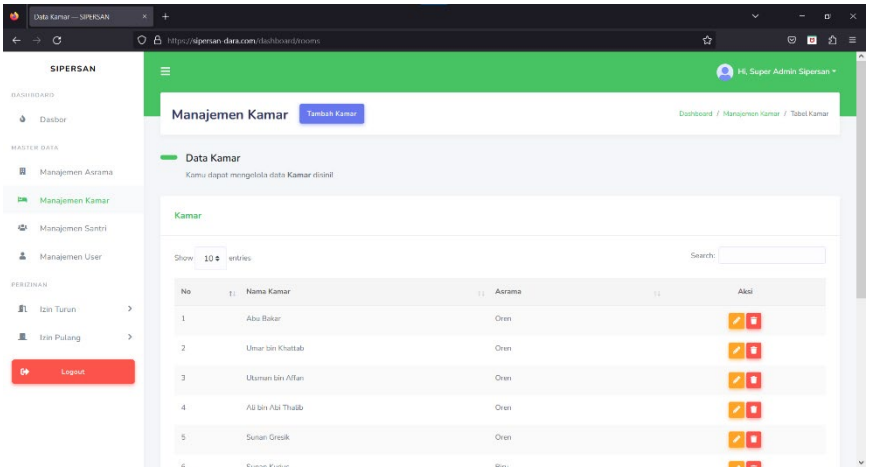
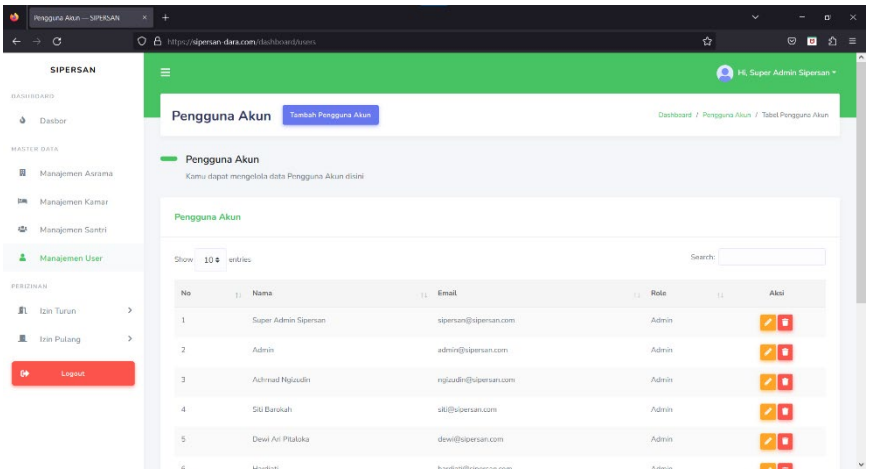
C. Implementation

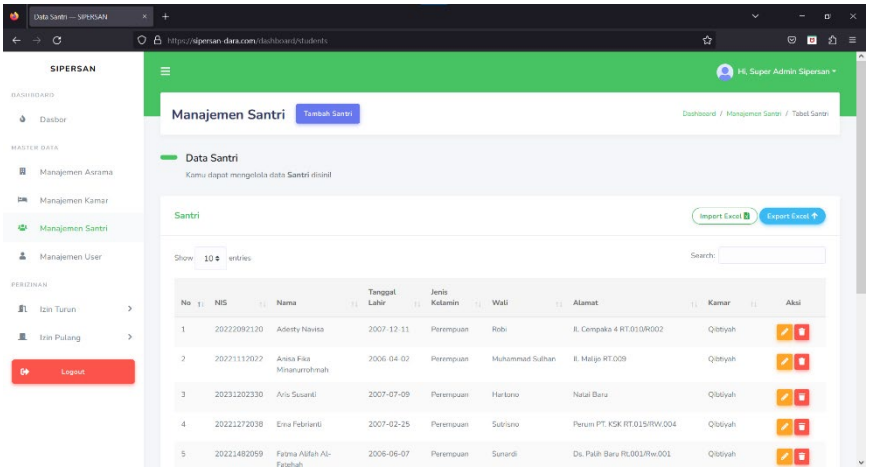
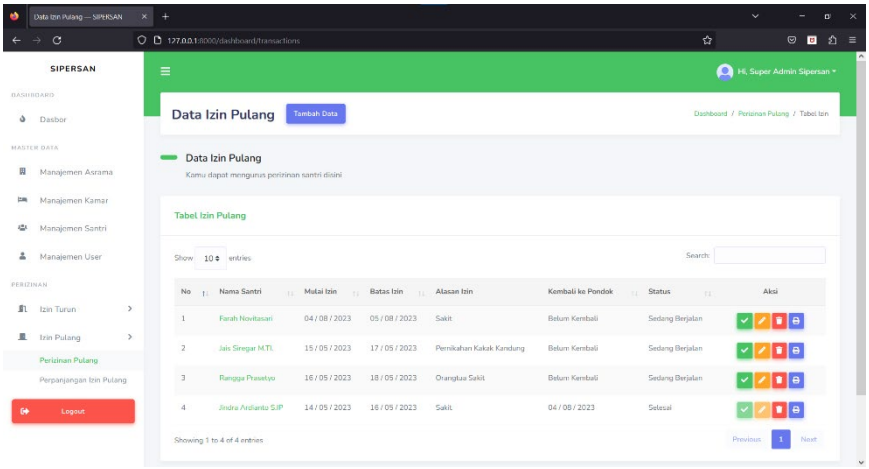
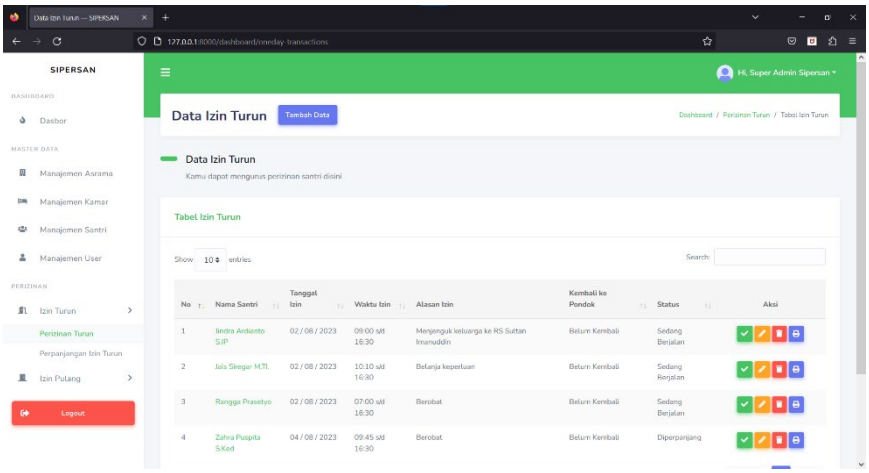
The system being developed is a web-based platform that will be hosted on a commercial domain (.com), reflecting the entrepreneurial characteristic of Islamic

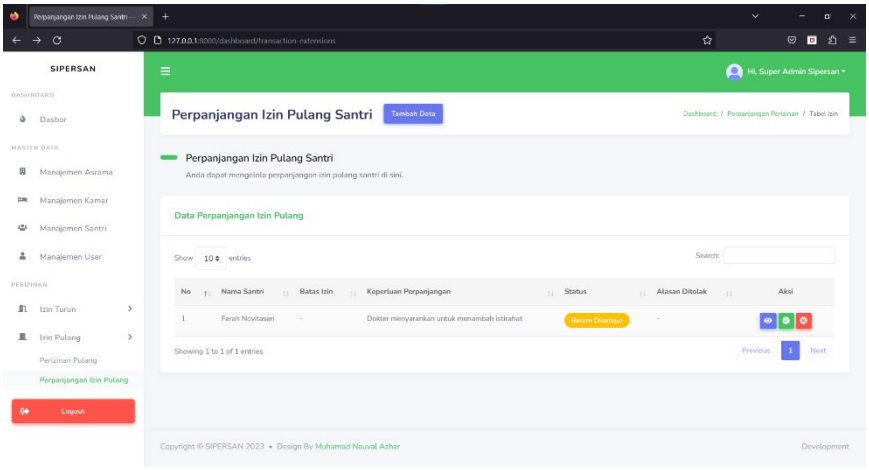
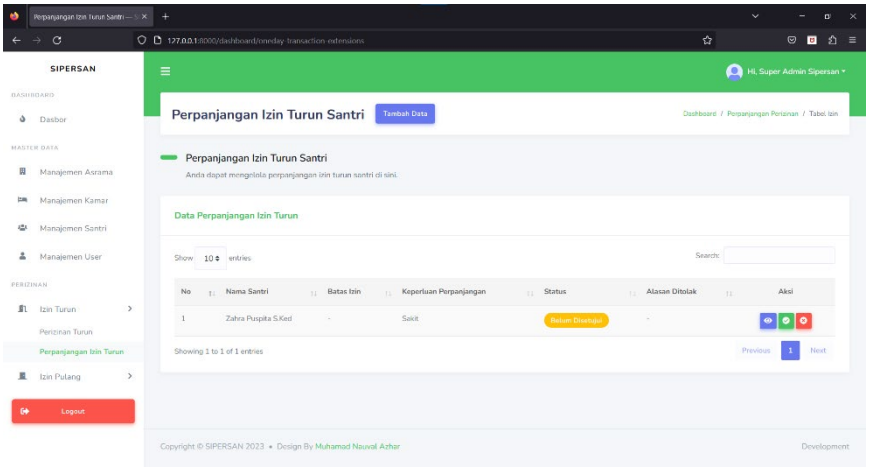
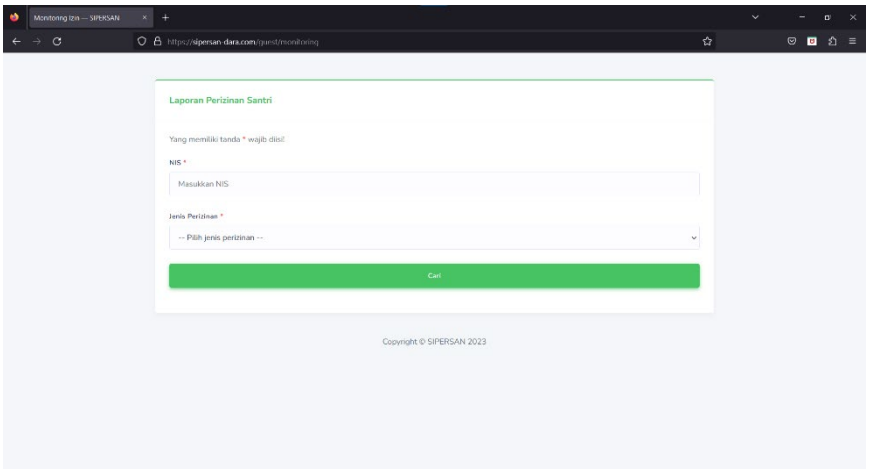
boarding schools as the research location. The database management for the system uses MySQL, and the development will be carried out using PHP with the Laravel framework. Based on the design of the use case diagram, it is continued by creating an interface for the project. The interface of the information system is created using the Stisla template. Furthermore, PHP with the Laravel framework as the programming language used to create the information system. The implementation of the information system appearance is shown in Table 2.

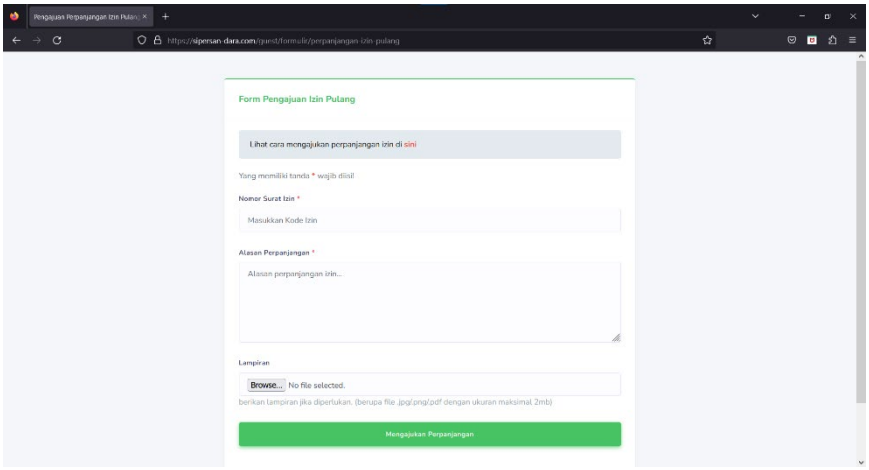
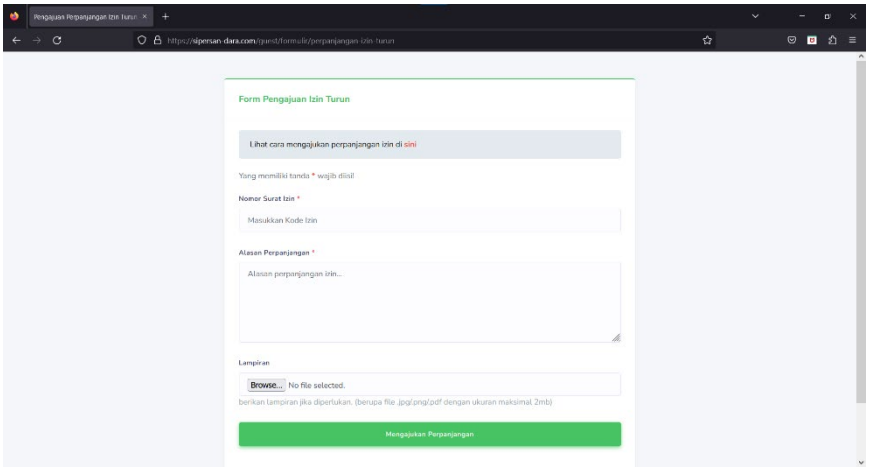
Table 2. Implementation of the SIPERSAN System's Interface

#	Page/Menu	User Interface
1	Landing Page and Dashboard	 

#	Page/Menu	User Interface
2	Dormitori Management Page	
3	Room Management Page	
4	User Management Page	

#	Page/Menu	User Interface
5	Student Management Page	
6	Home-Return Permit Management Page	
7	Temporary Permit Management Page	

#	Page/Menu	User Interface
8	Return Home Permit Extension Management Page	
9	Temporary Permit Extension Management Page	
10	Permit History Page	

#	Page/Menu	User Interface
11	Apply Permit Extension Page	
12	Permit Extention Status Page	

D. Testing

Before the deployment stage is carried out at the Entrepreneur Islamic Boarding School Dar Al-Raudhah, a testing stage is carried out first to evaluate whether the system is functioning as expected and to fix it if necessary. The following are the test results according to ISO 25010, covering four aspects: functionality, performance efficiency, reliability, and usability.

Functionality testing was conducted by two programming experts. The functionality test instrument was a test case consisting of 56 tasks. The test results by the two experts were then calculated using the following formula:

$$Functionality = 1 - \frac{Hasil\ Uji\ gagal}{Total\ Uji}$$

$$Functionality = 1 - \frac{4}{112}$$
$$Functionality = 1 - 0{,}036$$
$$Functionality = 0{,}964$$

Based on the functionality level score obtained, the software quality in terms of functionality can be said to be 'Good' according to the interpretation of ISO 25010; namely, a good value is a value that is close to 1. From these results, the Santri Licensing Information System is suitable because it passes the Functionality test.

The performance efficiency test results produced an average loaded time of 2.06 seconds. The system received a grade of B for the overall assessment with GTMetrix tools. The SIPERSAN system meets the category of

performance efficiency aspects, which are considered good if the time required to open a page is no more than 10 seconds. The following are the test results using GTMetrix, which are presented in Table 3.

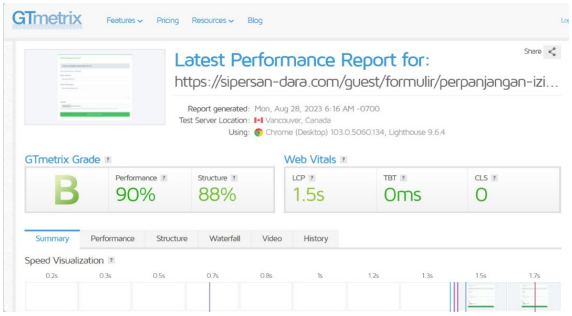


Figure 4. One of the Test Results Sample via GTMetrix

Table 3. Page Loading Results for Each Page

#	Page Name	Time (seconds)
1	Home Page (Login)	2.1
2	Dormitori Management Page	2.2
3	Room Management Page	2.6
4	Student Management Page	2
5	User Management Page	2.1
6	Home-Return Permit Management Page	2
7	Temporary Permit Management Page	2
8	Home-Return Permit Extension Management Page	2
9	Temporary Permit Extension Management Page	2.3
10	Home-Return Permit Extension Application Page	1.7
11	Temporary Permit Extension Application Page	1.7
	Average Loaded Time	**2.06**

Reliability testing was performed using WAPT software version 10.1. WAPT is effective for evaluating the reliability of web-based information systems because it provides in-depth load testing capabilities, comprehensive performance analysis, and realistic user scenario simulation. The tool supports test automation and visualization of results in clear graphs and reports and can simulate multiple users simultaneously. In addition, WAPT supports a wide range of protocols and technologies, making it an ideal tool for testing system stability and capacity. Testing the SIPERSAN system using WAPT obtained successful results, with details shown in Table 4.

Table 4. Testing Results Using WAPT ver 10.1

Aspect	Success	Failed	Percentage
Session	774	0	100%
Page	779	0	100%
Hits	1553	0	100%

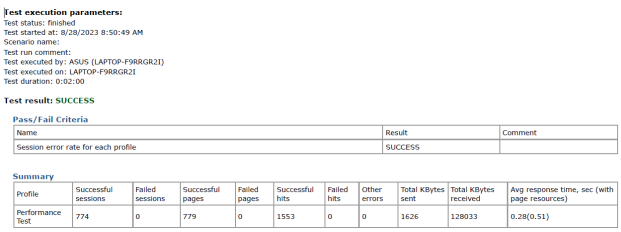


Figure 5. SIPERSAN Test Results Using WAPT Software

Usability aspect testing was tested using a questionnaire. The questionnaire was distributed to 21 respondents as prospective users consisting of Islamic Boarding School administrators who would serve as System Operators. The questionnaire was based on the System Usability Scale (SUS) Questionnaire. The usability assessment questionnaire was distributed online via Google Forms and can be accessed at https://siagen.uny.ac.id/link/evaluasiSIPERSAN. Based on user assessments, the assessment results in a percentage of 75.33% were obtained from the usability test. From this score, according to the interpretation of the 5 Likert scales, it can be said that this software is "Good".

E. Deployment

Developing the SIPERSAN System is a collaborative project with the Dar Al-Raudhah Entrepreneur Islamic Boarding School, which aims to provide an effective solution for managing student leave permits in the Islamic boarding school environment. This project was developed starting in early March 2023 and includes developing a website-based information system. SIPERSAN can be accessed by three levels of users, including: admin, operator, and guest. The admin can login to the system, manage dormitory data, room data, user data, student data, permit data, and respond to requests for permit extensions. Operators can login to the system,

manage licensing data, and respond to requests for license extensions. Meanwhile, Guests can view the licensing history, view the extension status, and apply for a license extension. The system that has been successfully developed can be accessed online on the page: https://sipersan-dara.com/. The SIPERSAN system was completed and deployed at the Dar Al-Raudhah Entrepreneur Islamic Boarding School on August 4-6, 2023. In addition to handing over the information system to the boarding school, the team also conducted outreach and training for system users who will later serve as system operators.

Figure 6. SIPERSAN Socialization and Training for Operator-Level Users

Based on the results of user responses and the Entrepreneur Islamic Boarding School Dar Al-Raudhah, it can be seen that the system developed has been in accordance with the requirement analysis as the specification plans at the beginning of system development. The training participants, who were system operators, also did not experience significant obstacles during the training process. Some impacts related to the success of the SIPERSAN system project: (1) Simplifying the student leave permit process: SIPERSAN system can simplify the permit process with computerized data management and real-time monitoring of permit status; (2) Increasing efficiency: SIPERSAN system allows centralized and efficient monitoring and management of students' permit data, making it easier for dormitory administrators to manage student permission; (3) Facilitating information access: Students' parents can easily monitor student permit schedules online without having to come to the Islamic boarding school; (4) Organized recording: SIPERSAN system can assist in recording student exit permits in an organized and systematic manner, thereby minimizing data errors; (5) Performance optimization: SIPERSAN system can help optimize the performance of administrators at Islamic boarding schools

Overall, the SIPERSAN system is an effective solution for managing student leave permits at the Dar Al-Raudhah Entrepreneur Islamic Boarding School by helping to improve efficiency, facilitate access to information, and ensure student leave control. Several further comments and inputs submitted by users were recorded in the feedback questionnaire, which can be seen in Figure 7.

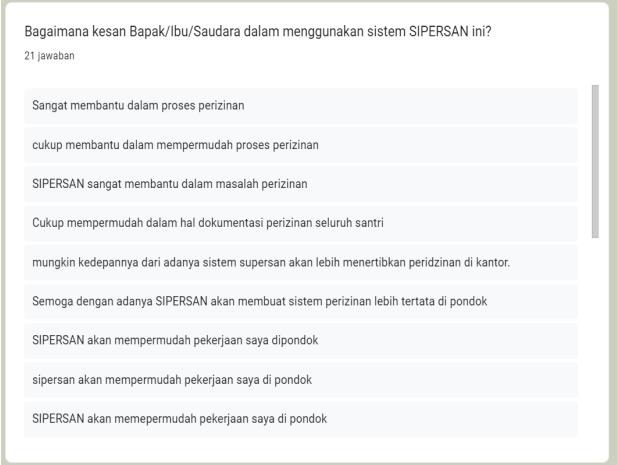


Figure 7. Some Impressions of Users

CONCLUSION

Developing the SIPERSAN system is a research with a team of lecturers and students from the Faculty of Engineering, Universitas Negeri Yogyakarta, in collaboration with the Dar Al-Raudhah Entrepreneur Islamic Boarding School. The system developed is website-based, hosted with a commercial domain (.com) which can be accessed on the page https://sipersan-dara.com/. The SIPERSAN system was developed with a Waterfall development model, which includes requirements analysis, design, implementation, testing, and deployment. The system database development management uses MySQL, and the programming language used to develop the system is PHP with the Laravel framework.

Based on the test results, SIPERSAN has met the ISO 25010 standard for the four aspects: functionality, performance efficiency, reliability, and usability. In terms of functionality, this system gets a score of 0.964 (Very Eligible). In terms of performance efficiency, this system gets a level of eligibility of 90% with GTMetrix (Grade B) and a waiting time of 2.06 seconds (Eligible). In terms of reliability, this system gets a success result (Very Eligible). In terms of usability, this system obtained a percentage of 75.33% (Eligible). Based on the results of the system deployment, SIPERSAN received a positive response from users, who felt impacts such as facilitating the processing of student permits, increasing efficiency in managing student permit data, minimizing data errors in permits, and assisting in recording student permits that are organized and systematic. This project also has the potential to be developed further because the Islamic boarding school is interested in continuing the maintenance stage in the form of cooperation in the following year.

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