Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Meeting Room Booking System with WhatsApp Notification Feature Using Extreme Programming Methods in RS Muhammadiyah Lamongan

Arizona Firdonsyah[1,*], Nafisyah Alyana Putri[2]
[1,2] Program Studi Teknologi Informasi, Universitas 'Aisyiyah Yogyakarta, DIY
[1] arizona@unisayogya.ac.id, [2] nafisyahalyana42@email.com

Submitted :Jun 20, 2025 | **Accepted** : Jul 5, 2025 | **Published** : Jul 12, 2025

Abstract: Meeting room management in hospitals plays an important role in supporting operational efficiency and coordination between departments. At RS Muhammadiyah Lamongan, common issues such as overlapping schedules, delays in booking information, and lack of transparency in the scheduling process are still frequently encountered. This study aims to develop a web-based meeting room booking system using the Extreme Programming (XP) method, integrated with a WhatsApp notification feature. The system is designed to improve transparency, minimize scheduling conflicts, and enhance communication between administrators and users. Requirements gathering was conducted through interviews with the hospital's secretariat, and the system was developed using the Laravel Framework and WhatsApp API. The system testing was carried out using Blackbox Testing and User Acceptance Testing (UAT) with a Likert scale. The test results showed that the system achieved a perfect score of 100 out of 100 points, indicating that all core features functioned as expected without significant technical issues. This system is expected to serve as an effective solution to support a more efficient, real-time, and structured meeting room scheduling process at RS Muhammadiyah Lamongan.

Keyword: Meeting Room Booking; WhatsApp Notification; Extreme Programming; Laravel Framework; RS Muhammadiyah Lamongan

INTRODUCTION

Hospitals as one of health institutions have a great responsibility to maintain the efficiency operation of their operations, both in terms of medical services and internal management. One of the important internal activities is the meeting between sections. In order to support the efficiency of the meeting, meeting room management must run well so that there are no overlapping schedules or room unavailability when needed.

Information system is a collection of people working with the provisions of the systematic and organized rules to form a unit which performs a task to achieve a goal (Abdulghani et al., 2021). The role of the system is very important for an organization. A good system can make work easier and more efficient (Sari & Wijayanto, 2023).

The room booking information system is a system that functions to reserve or booking a room through a web-based application. The room booking application is designed to support user activities in making room booking and provide information related to the room schedule. This application allows online room booking and can display room schedule information (Al dkk., 2020). Meetings are essential activities within an organization, serving as a means to share information and knowledge, engage in discussions, and make important strategic decisions (Zafarkhan Mulla et al., 2021).

The process of booking meeting rooms at RS Muhammadiyah Lamongan often faces obstacles, such as overlapping schedules, delays in notification of booking status that disrupt user planning, and minimal transparency in the scheduling process. This condition not only hinders work effectiveness but also increases the potential for misunderstandings between departments that need the room.

Agile originates from the Agile Manifesto (Ahmad & Wasim, 2023) and is a system development method that enables high flexibility in responding to changing requirements throughout the development process, allowing the system to adapt effectively to these changes (Johari et al., 2024). The Agile methodology aims to support organizations in responding to changes quickly and adaptively. This approach is characterized by continuous

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

development processes, active user involvement through regular consultations, and incremental product releases on a small scale (Shrivastava et al., 2021). In the agile method, there are 8 agile sub-methods, namely Scrum, Extreme Programming, Kanban, Lean, Feature-Driven Development, Crystal, Adaptive System Development (ASD), Dynamic Systems Development Method (DSDM) (Trivedi, 2021). This study uses one of the Agile sub-methods, namely Extreme Programming, which is a software development technique that aims to improve software quality to meet partner needs (Hidayatullah et al., 2024).

This study differs from previous research, particularly in the integration of WhatsApp notifications implemented in the hospital meeting room booking system. This feature has not been widely adopted in similar studies, especially in the context of meeting room booking in healthcare institutions.

This study aims to create a Meeting Room Booking System using the Extreme Programming Method, which is equipped with the WhatsApp Notification feature. This system is expected to overcome overlapping schedules and transparency in the room booking process at the RS Muhammadiyah Lamongan, as well as provide a better user experience through notifications for schedule confirmation.

LITERATURE REVIEW

The Research of C. A. Maulana dkk., 2023 which aims to develop a web-based application for room management, attendance, and meeting minutes is designed to replace the manual system that previously relied on paper recording in booking meeting rooms and recording attendance. This application utilizes the Laravel framework on the backend and Next.js for the frontend, and was tested using the black-box testing method. The test results show that this application has succeeded in increasing the efficiency of meeting and attendance management in related agencies. Based on these findings, further research that develops a web-based meeting room booking application aims to replace the manual system with a PHP and MySQL-based application, which is expected to overcome the problem of overlapping room booking.

The development of this web-based meeting room booking application was carried out using PHP and MySQL and utilizing the Unified Modeling Language (UML) design method. The implemented system successfully resolved the problem of overlapping room booking and increased service efficiency. Testing using the blackbox method showed that all functions ran well. This application has proven effective in reducing errors due to human error and simplifying the administrative process of booking space (Supriyadi, 2022). With a similar approach, the development of a web-based lending system for lending operational vehicles also focuses on ease of access and management efficiency, which prioritizes reducing manual processes in daily operations

The web-based e-booking system developed for operational vehicle lending at PT Indonesia Comnets Plus uses the XP method to increase software development productivity. This system aims to simplify the vehicle lending process which was previously done manually, by allowing lend to be made digitally. This application makes it easy for employees to lend vehicles anytime and anywhere, while admins can manage lending more efficiently (Darmawan Pratama & Noviana, 2023). In line with the development of a digital-based borrow system, research related to library information systems using the XP method also aims to replace the manual system in managing book borrow and returns, as well as increase operational efficiency.

This research on library information system in SMK Muhammadiyah 1 Malang implements XP method to replace manual system in the process of borrowing and returning books. The test results show that this system can improve time efficiency and accuracy of library operations. System testing through various methods, such as White-box, Black-box, and User Acceptance Testing (UAT), proves that this system is well received by users (Putra et al., 2019). Continuing this concept, a web-based library information system with WhatsApp notification features also aims to improve library data management, while reducing the risk of late book returns.

This web-based library information system with WhatsApp notification feature is designed to remind students about book return deadlines. The development of this system uses the Agile method which provides flexibility in development and increases the efficiency of library data management. This notification feature functions to reduce delays in book returns and makes it easier for officers to contact students automatically. Evaluation of the system shows that library services are more efficient and responsive to user needs (Johari et al., 2024). Following this development, similar research in the health sector shows that implementing a reminder system with WhatsApp notifications can improve employee compliance with administrative regulations, such as reminders for extending the Registration Certificate (STR).

The web-based STR reminder information system developed at RSUD Tidar Magelang uses the Rapid Application Development (RAD) method. This system is designed to provide automatic reminders via the WhatsApp notification feature to employees regarding STR extension. Evaluation of the system showed a high level of user satisfaction, with an evaluation result of 86%. This indicates that this system has succeeded in increasing employee compliance with applicable regulations and administrative efficiency (Muzaki et al., 2023). In line with the development of the administrative reminder system, the implementation of WhatsApp API in the clinic's online registration system also provides significant benefits in improving communication between the clinic and patients.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

The implementation of WhatsApp API in the clinic online registration system in the research conducted by Febriyanto et al., 2023 aims to provide real-time notifications to patients after registration is verified. This improves service efficiency by ensuring patients receive relevant information directly. Testing of the system showed high effectiveness, with a Likert score of 88.42%, which shows that the system is very good. This innovation has succeeded in reducing patient waiting times and improving communication between clinics and patients. The application of similar technology is also used in various other sectors, including public service management and health administration, which prioritize efficiency in information management (Febriyanto et al., 2023).

Most previous studies have shown that the implementation of digital systems significantly improves operational efficiency, particularly in areas such as meeting room management, vehicle lending, and library systems. These systems are generally developed using Agile methods such as XP or RAD, and evaluated through Blackbox and UAT testing. Several studies have begun to integrate notification features, particularly WhatsApp API, to support real-time information delivery. However, to date, no research has specifically combined the Extreme Programming (XP) development method with notification integration in the context of a hospital meeting room booking system.

METHOD

The system development method that will be used by researchers is the Extreme Programming method. This approach was chosen because the website development process does not require a long time, but is in accordance with the goals to be achieved. Website development also does not require a large team (A. E. Maulana, 2022). The stages in the Extreme Programming method are shown in Figure 1.

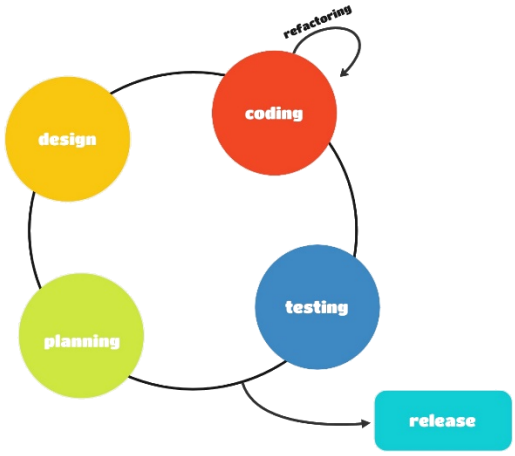


Fig 1. *Extreme Programming* Method

The following is an explanation of the phases in the XP method:

Planning

In planning the meeting room booking system at RS Muhammadiyah Lamongan, there are several data collection methods used, including:

Interview

Interview is a conversation conducted to obtain information with a specific purpose (Maryani & Firdonsyah, 2021). By conducting an interview, direct interaction can be carried out with the secretariat of the RS Muhammadiyah Lamongan to find out the problems that have been felt so far as the party that regulates the scheduling and to find out the needs and expectations desired by the secretariat of the RS Muhammadiyah Lamongan.

Based on the results of interviews with the secretariat of the RS Muhammadiyah Lamongan, the obstacles experienced were the difficulty of the secretariat in managing the booking rooms, and there was often overlapping booking due to the large number of meetings held and the lack of transparency regarding the booking schedule.

Literature Review

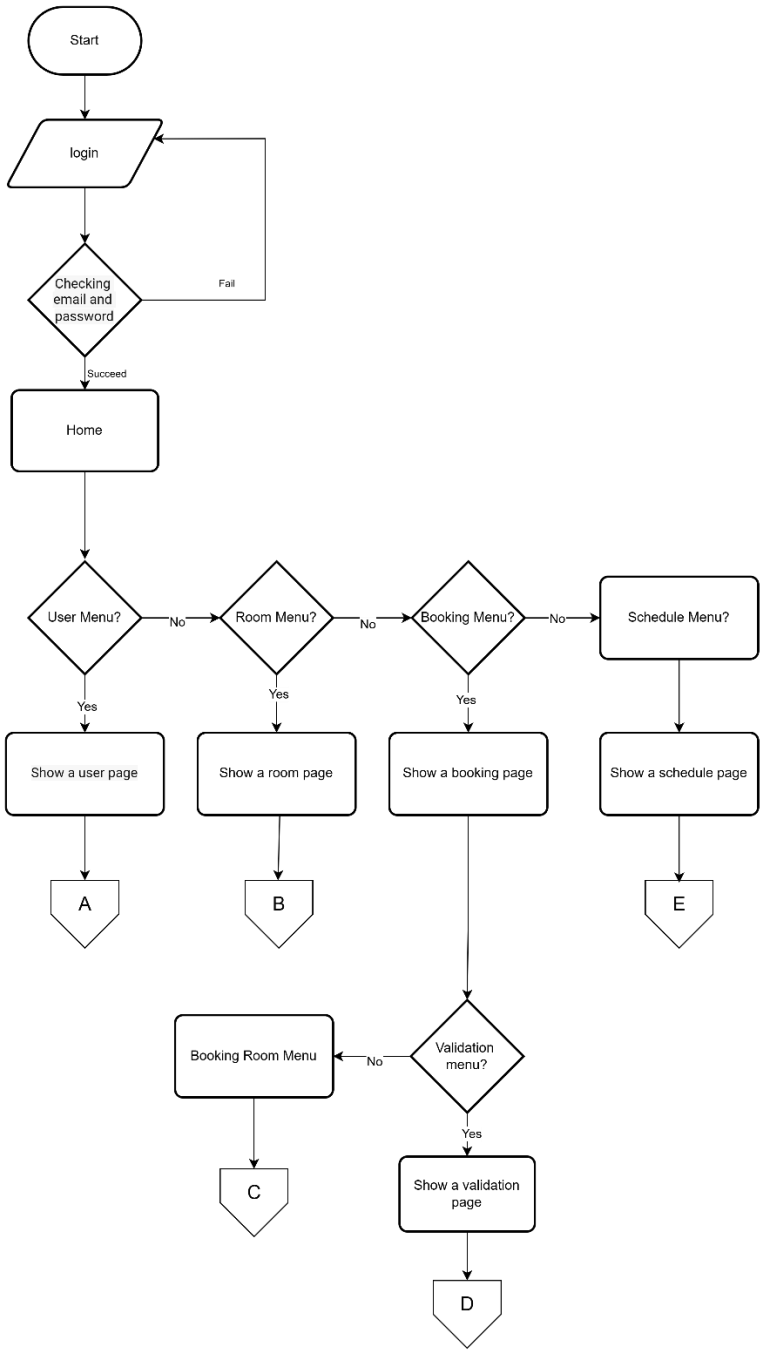
Literature study is conducted as a reference source and analyzing research related to the research to be conducted. Literature study facilitates research from previous research.

In the planning stage , there are user stories created based on the results of the user needs analysis. This process explains the system's business processes and provides the expected output from the system to be built (Rahmawati et al., 2022). System planning is a process of determining specifications and designs as proposals for problems

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

that have been identified. This process includes creating a flowchart. The flowchart shows the sequence of steps and activities in a system (Fajri & Hardiani, 2023). The application to be designed is a web based application that functions as a room booking, displays room schedule information and uses WhatsApp notifications as confirmation of meeting room booking. Notifications are sent using the WhatsApp API which is a WhatsApp service run by the system to send and receive messages from user to user with a special program (Febriyanto et al., 2023). This application can be accessed by admins and employees using email and password. This system is created using the Laravel Framework as a web framework that provides a web application development structure (Wijayanto, 2022), PHP Programming Language, and MySQL as a database. The following is a flowchart of the proposed meeting room booking system design:



*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

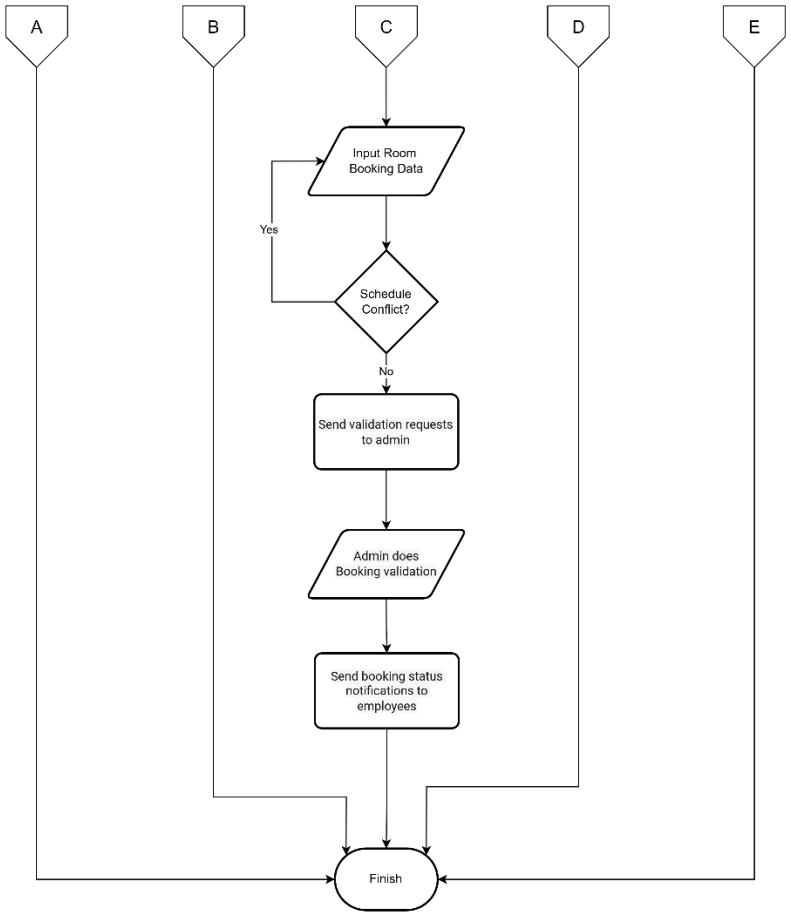


Fig 2. System Flowchart

Figure 2 explains the flow of the meeting room booking system which begins with the process of log in into the system before the booking is made. Users will enter their email and password to log in to the system, and the system will check the data entered. If the log in process is successful, the system will display the Home page. However, if the log in fails, the system will return to the Login page. On the Home page, there are four main menus that users can choose from. If the user selects the Users menu, the system displays the user page. Conversely, if the user selects the Rooms menu, the system displays the room page. If the Room menu is not selected, then the user can select the Booking menu, which will display the booking page.

On the booking page, there are two submenus that users can choose from. If the user selects the Validation menu, the system displays the validation page. Otherwise, the user will select the Room Book menu, which will open the Enter Room Order data page. The system will then check if there are overlapping schedules. If there is an overlapping schedule, the system will return to the Enter Room Booking Data page. Conversely, if there are no overlapping schedules, the system will send a validation request to the admin. If the user does not select the Booking menu, then the user can select the Schedule menu, which will display the schedule page.

Design

Based on the results of the needs analysis obtained at the Planning stage, various main features that must be provided in the system to be developed are determined. This stage plays an important role in ensuring that the system is able to meet user needs and objectives. Therefore, a system modeling process is carried out using UML. This modeling aims to provide a visual depiction of the interactions between users, systems, and the processes involved. The modeling used is the Use case Diagram and Activity Diagram. The use case diagram visualizes the interactions between actors and the system (Gunawan et al., 2023), while the activity diagram is a picture of the workflow or activity of a system or business process or software menu (Rachmaniah et al., 2020).

Coding

This stage will be carried out the implementation process in the form of a website from the modeling results that have been designed at the Design stage using the Laravel Framework. This implementation process includes the creation of the main features that have been identified. This stage is expected to produce a meeting room

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

booking system that is made according to user needs, and has complete features. This system is also expected to have a user-friendly interface and support the admin's booking validation process. Thus, the system can provide an optimal user experience while increasing efficiency in meeting room management.

Testing

The coding stage is complete, the next step will be testing to ensure that the meeting room booking system that has been created runs according to needs. This testing is carried out before the system is fully implemented in the operational environment. At this stage, the black-box testing method is used, where the focus of testing is on system functions without checking the source code. This testing will be carried out by the RS Muhammadiyah Lamongan as a direct user of the system. The goal is to ensure that every feature that has been created. In addition, this testing also aims to identify and record errors (bugs) or inconsistencies in the system. The results of this black-box testing will be used as evaluation material to fix system deficiencies before being officially implemented. Thus, the system is expected to run stably, meet user needs, and support more efficient meeting room management at the RS Muhammadiyah Lamongan.

Release

This stage is carried out after thorough testing, the meeting room booking system is declared ready to be implemented and used by partners, namely RS Muhammadiyah Lamongan. At this stage, the system will begin to be implemented in a real operational environment, so that it can support the activities of booking and managing meeting rooms effectively. This stage is also an important moment to get direct feedback from users who interact with the system. The feedback includes an assessment of system performance, ease of use, feature functions, and identification of potential improvements or further development. Input from users will be a very valuable reference in refining the system, both for future updates and for the development of additional features that are relevant to operational needs. With the implementation of this system, it is hoped that the meeting room management process at RS Muhammadiyah Lamongan can run more organized, efficient, and transparent. In addition, the implementation of this system also opens up opportunities for technological improvements in the partner environment.

RESULT

Planning Result

The results of the planning stage that have been carried out based on the results of interviews with partners, namely the system has 2 Actors as explained in Table 2 which have 11 functional requirements that have been approved by the partners in Table 1.

Table 1. System Requirements

No	Analysis
1.	The system must be able to save room data
2.	Admin can access all features on the website
3.	Users can book a room by entering the required data such as date, start time, end time, and purpose of booking
4.	If the room has already been booked at the same time, the system should provide a warning and prevent overlapping bookings
5.	Admin must be able to view all room booking requests for validation
6.	Admin can approve or reject the booking request. If approved, the booking will be recorded on the schedule, and the user will receive an approval notification
7.	The system must display the room booking schedule, so that users and the secretariat can see which rooms are currently in use
8.	Schedule information should be accessible to users to increase transparency and avoid booking conflicts
9.	The system must provide notification to the admin if there is a new booking request that needs to be validated
10.	After validation, the system should send a notification to the user to inform whether the booking is approved or rejected
11.	Users can select private mode on the booking form, so that confidential meeting requirements will not appear on the public schedule, but can still be accessed by the admin.

Table 2. User Analysis

User	Task
Admin	People who have the right to set roles on the website, perform validation, access the user menu, perform crud on the room menu and schedule menu.
Employee	People who can only access the user menu, booking menu and schedule menu.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Based on the results of the needs analysis that has been carried out, Use Case Diagram modeling was carried out which can be seen in Figure 3.

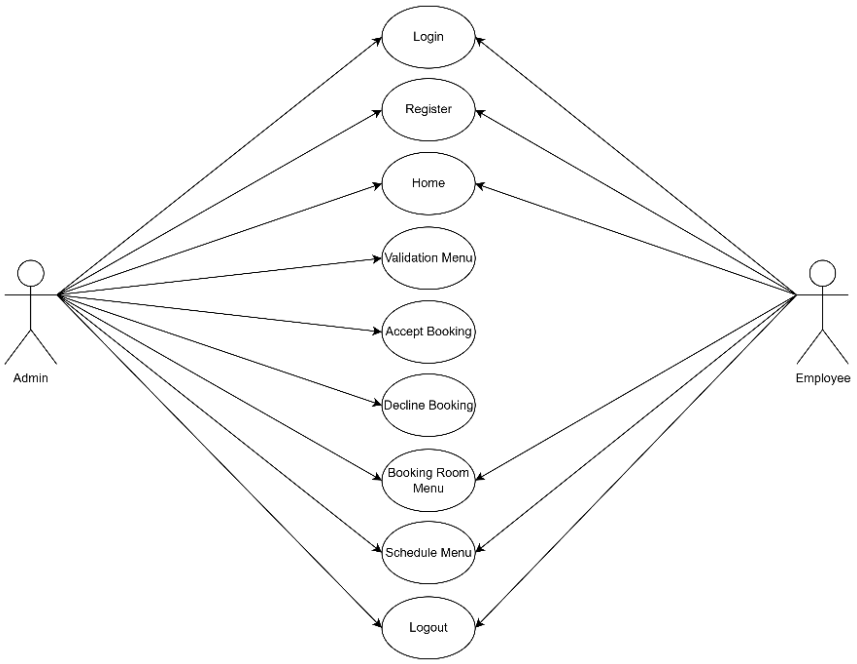


Fig 3. Use Case Diagram

Design Result

The result of the design stage that has been done then the Activity Diagram modeling is made. The system created has 6 Activity Diagrams including Activity Diagram Register, Log in, Log out, Schedule, Booking Validation, and Room Booking.

Activity Diagram in Figure 4. Explains the User Flow to start the account registration process by opening the room booking system application. The system then displays the login page, where the user can select the Register button to continue the registration process. After selecting the button, the system will direct the user to the registration form page. On this page, the User is asked to fill in the required data, such as name, email, password, and password confirmation. Furthermore, the system will validate the inputted data. If the data entered is invalid, such as an email that is not in the correct format or a mismatch between the password and password confirmation, the system will give a warning to the User to correct the incorrect data. If the data is valid, the system will automatically direct the user to the application homepage as a sign that the registration process has been successful.

Figure 5 Describes the Flow for Admin or User to start the login process to the system by opening the room booking application. The system displays the Login page where the Admin or Employee is asked to enter an email and password. After the data is entered, the system performs validation to check the email and password match the data in the database. If the data entered is invalid, such as an incorrect email or password, the system will provide a warning and direct the Admin or Employee to repeat the Login process by entering the correct data. Conversely, if the data is valid, the system will allow access and display the application home page as a sign that the Login process to the system was successful.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

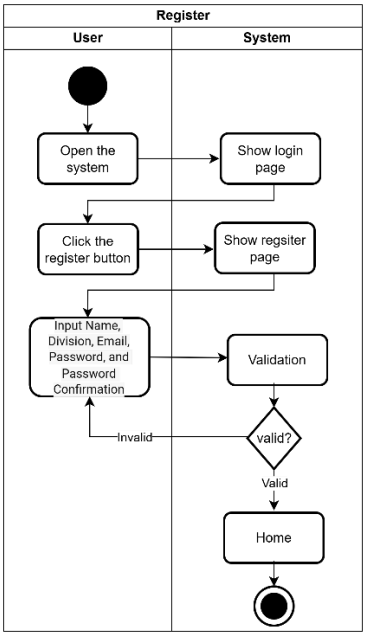


Fig 4. Register Activity Diagram

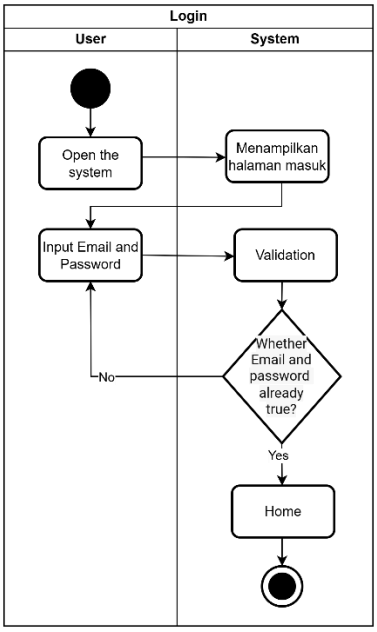


Fig 5. Login Activity Diagram

The process of exiting the system is described in Figure 6, starting with the Admin or Employee selecting the Home menu, which directs the system to display the Home page. The Admin or Employee selects the Exit menu, so that the system displays the Login page as an indicator that the exit process has been successful. Figure 7 explains the process flow for viewing the schedule, starting with the Admin or Employee selecting the Home page and the system will display the home page. The Admin or Employee selects the schedule menu, and the system will display the schedule page containing the available schedule information.

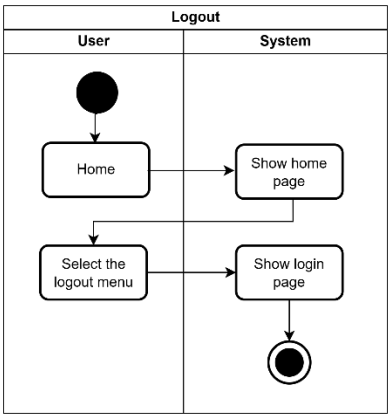


Fig 6. Logout Activity Diagram

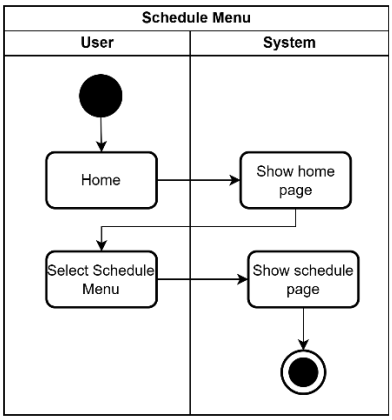


Fig 7. Schedule Activity Diagram

Figure 8 explains the booking validation process flow carried out by the Admin. This process begins with the Admin accessing the booking menu, the system will display the booking page. The Admin selects the validation and the system displays a list of booking data. The page contains an option to select the accept or reject button. If the Admin selects the accept button, the system will send a notification message that the booking has been accepted via WhatsApp. Conversely, if the Admin selects the reject button, the system will send a notification message that the booking has been rejected via WhatsApp.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

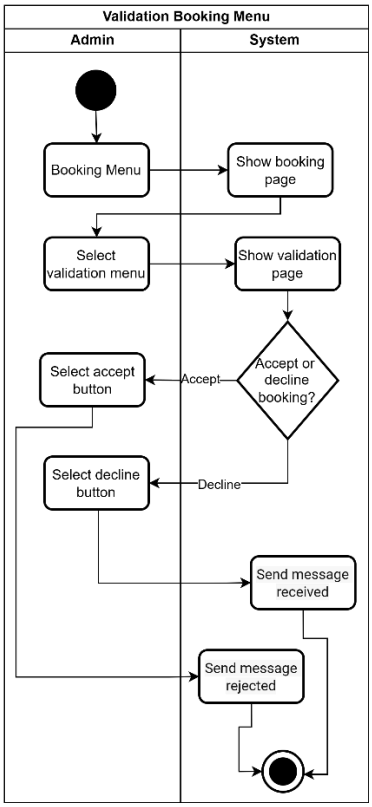


Fig 8. Validation Activity Diagram

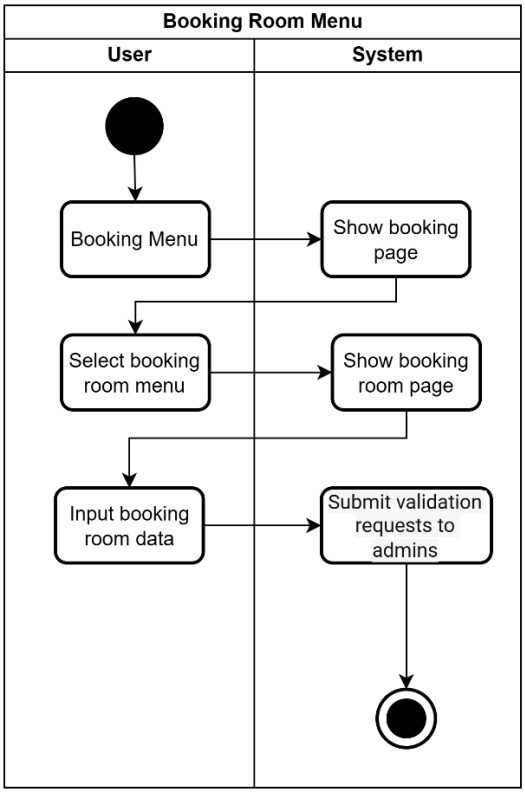


Fig 9. Booking Room Activity Diagram

Figure 9 explains the process of Booking a room carried out by the Admin or Employee through the Booking menu and the system will display the booking page. The Admin or Employee selects the Booking Room menu which will display the Booking Room page by the system. At this stage, the Admin or Employee Enter the Room Message data, and the system automatically sends a validation request to the Admin.

Implementation Results (Coding)

The results of the implementation stage which is a continuation of the design process produce a functional system flow that has been modeled using Activity Diagram. This implementation includes the system interface, one of which is the page for the login process into the system as an Admin or Employee, as shown in Figure 10. The page also provides a user registration feature, as seen in Figure 11.

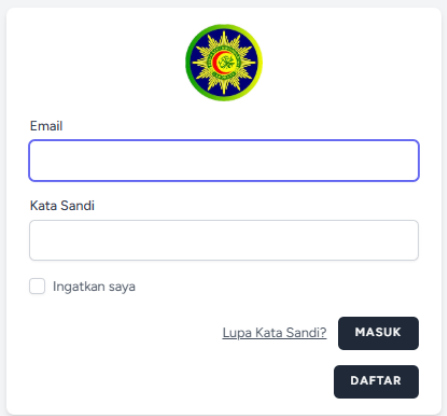


Fig 10. Login View

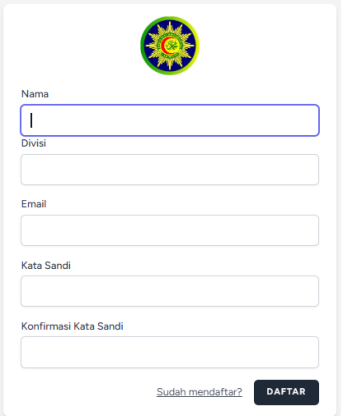


Fig 11. Register View

Figure 12 shows the Admin home page after successfully logging in using email and password. This page includes four main menus, namely the User Menu, Room Menu, Booking Menu, and Schedule Menu.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

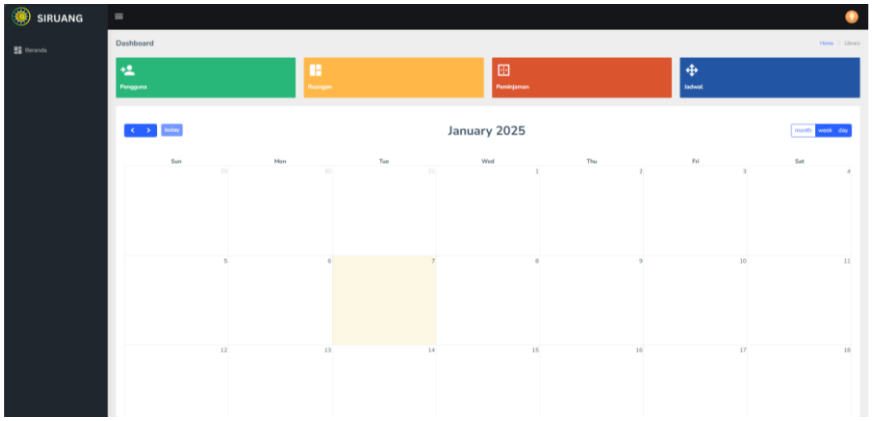


Fig 12. Admin Home View

Figure 13 shows the home page for employees that displays three main menus, namely the Room Menu, the Booking Menu, and the Schedule Menu.

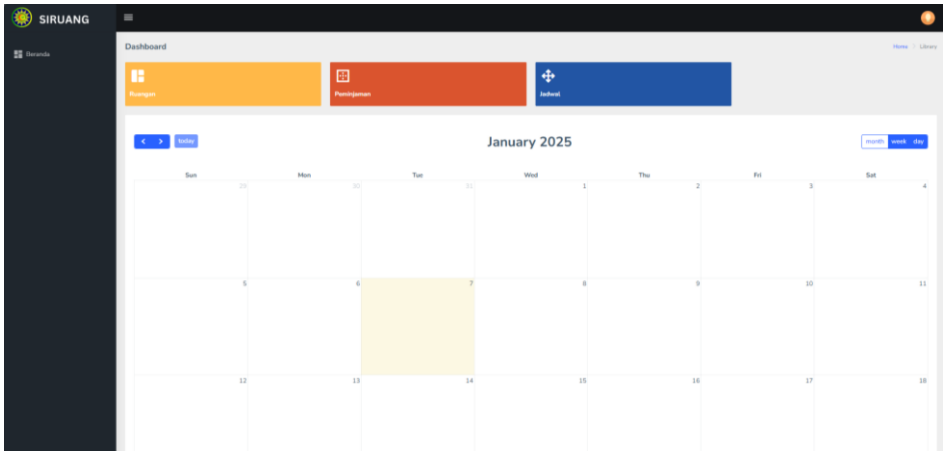


Fig 13. Employee Home View

In addition to the main menu, this page is also equipped with an exit button located at the top right of the home page as shown in Figure 14.

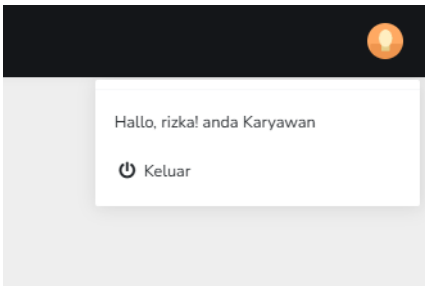


Fig 14. Profile View

Figure 15 shows the room usage schedule page interface. Users can access this page by clicking the Schedule Menu located on the Home page, so that the system will display complete room usage schedule information.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

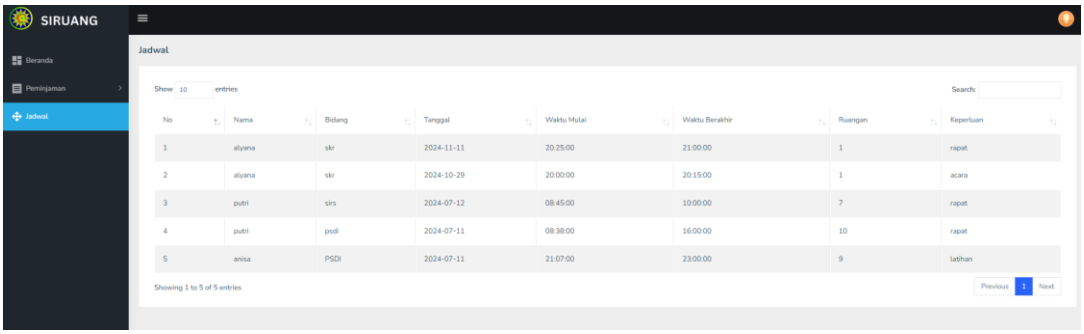


Fig 15. Schedule Page View

Figure 16 shows the validation page containing a list of room bookings waiting approval from the Admin, with the option to accept or reject the booking. This page can be accessed through the Booking Menu by selecting the Validation submenu.

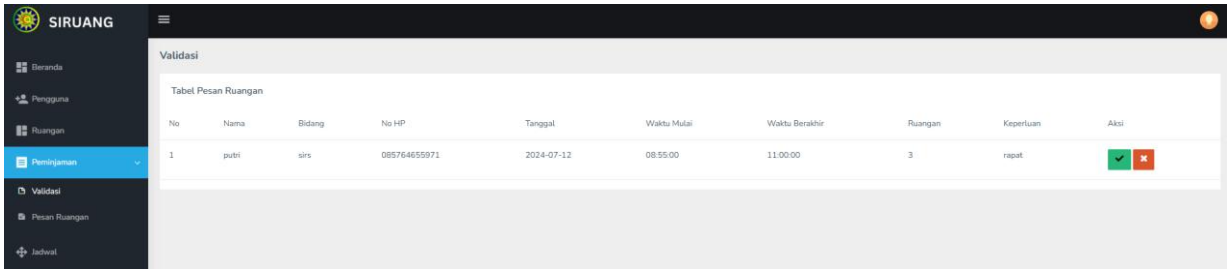


Fig 16. Validation Page View

Figure 17 shows the room booking form used to apply for a room booking. Users can access this form through the Booking menu by selecting the Book a Room submenu.

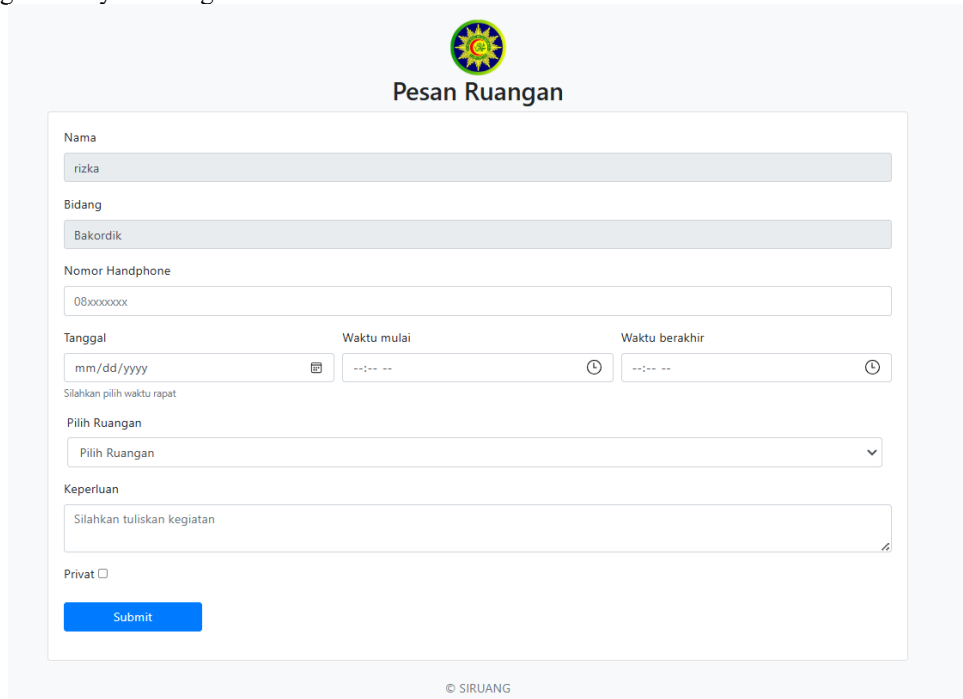


Fig 17. Room Booking Page View

Testing Results

The system deployment process was carried out first to ensure that the system could be tested optimally in accordance with the specifications. Although direct testing by the partner could not be conducted due to technical issues during deployment, an internal evaluation of the system was conducted by the development team. This system testing utilized black box testing, as outlined in Table 3.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 9, Number 3, July 2025
DOI : https://doi.org/10.33395/sinkron.v9i3.14927
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Table 4. System Testing Table

No	Testing Components	Testing Scenarios	Typo of testing
1	Landing Page	Displays the login page to access the website	Black Box
2	Dashboard Page	Successfully logs in or registers to the website and gains access to the dashboard	Black Box
3	User Management Feature (Admin)	Displays the list of registered users, accessible only by the admin	Black Box
4	Room Management Feature	Displays the list of available rooms	Black Box
5	Add Room Feature (Admin)	Shows the form to add a new room and saves the room data	Black Box
6	Edit Room Feature (Admin)	Shows the form to edit an existing room and saves the updated data	Black Box
7	Delete Room Feature	Displays a confirmation pop-up to approve or cancel the deletion of a room	Black Box
8	Booking Feature	Shows the validation feature for admin, room booking feature for users, and the list of bookings pending approval	Black Box
9	Validation Feature (Admin)	Displays the list of room booking requests requiring admin validation. Includes two actions: approve or reject, and sends a WhatsApp notification to the user based on the action taken	Black Box
10	Room Reservation Feature	Displays the room booking form. After submission, the system sends a room booking notification to the admin	Black Box
11	Schedule Display Feature	Shows the schedule of approved meeting room bookings	Black Box
12	Logout Feature	Displays the initial landing page of the website.	Black Box

The User Acceptance Testing (UAT) method is an evaluation technique conducted by users to produce documentation that serves as proof that the developed system has received user approval. The UAT process for this system was carried out using a Likert scale by distributing questionnaires or posing several questions. In this UAT testing, there are 5 categories: Strongly Agree, Agree, Somewhat Agree, Disagree, and Strongly Disagree (Azzahra & Ramadhani, 2020). The User Acceptance Test (UAT) was conducted internally by a single developer who also acted as the system evaluator. A total of 20 statement items were used to evaluate the core functionalities of the system using a Likert scale of 1–5. Although this test did not directly involve end users, the results still provide an initial overview of the system's functional readiness from a user's perspective. Further evaluation involving external users is planned for the next development phase to obtain more representative feedback.
The calculation of the total respondent answers is as follows:

a. Strongly Agree = 5 × 20 = 100
b. Agree = 4 × 0 = 0
c. Somewhat Agree = 3 × 0 = 0
d. Disagree = 2 × 0 = 0
e. Strongly Disagree = 1 × 0 = 0
Total Score **= 100**

Then, the calculation of the values X (highest score) and Y (lowest score) is carried out as follows:
X = Highest score × (number of statements × number of respondents)
= 5 × 20 = 100
Y = Lowest score × (number of statements × number of respondents)
= 1 × 20 = 20
The result of the X calculation is then used to determine the UAT percentage using the following formula :

$$Persamaan\ UAT = \frac{\text{Total Skor}}{\text{X}}\ x\ 100\% \qquad (1)$$

$$= \frac{100}{100}\ x\ 100\%$$

*name of corresponding author

e-ISSN : 2541-2019
p-ISSN : 2541-044X

= 100%

Based on the results of simulations and trials conducted using the Black Box Testing approach with a Likert scale rating of 1–5, the system achieved an evaluation score of 100 out of a possible 100 points, indicating that the system's readiness in terms of core functionality falls into the "very good" category. Each core function was tested by evaluators through 20 statements that reflect the overall performance of the system, covering features such as login, user management, room management, booking processes, and notifications.

The highest score weight was obtained from the “Strongly Agree” category, which holds a value of 5. In this test, the majority of respondents gave a score of 5 (Strongly Agree) for all test items, resulting in a perfect total score of 100 points. This indicates that the system has successfully performed all functions as expected by users, without any technical issues or functionality disruptions affecting workflow.

This achievement serves as a strong indicator that the system is ready for broader implementation and demonstrates that the development process has aligned with user needs and the initial system design. Nonetheless, evaluation efforts will continue to ensure the system remains relevant and responsive to emerging needs in the future.

However, despite these promising results, there are several limitations that should be noted in this study. One of the main limitations is the system's reliance on a third-party service, namely the WhatsApp API, which may be subject to policy changes, connectivity issues, or service restrictions. This dependency could affect the reliability of the system in delivering notifications. The system also has not implemented any fallback mechanism or alternative notification methods (such as email or SMS), so if network or API disruptions occur, the information will not be delivered. This becomes an important consideration for future development to ensure the system remains reliable under various operational conditions.

DISCUSSION

The testing using the Blackbox Testing method could not be conducted due to deployment issues. To address this, the development team identified the cause of the errors, corrected the program code, performed internal retesting, and redeployed the system. After the improvements, the system functioned as expected, with all core features operating properly. Internal testing results confirmed that the system met functional requirements, and this was further supported by high user satisfaction in the User Acceptance Test (UAT). These results indicate that the system is ready for broader implementation.

The testing results showed that all system features, including real-time notifications, worked properly without technical issues. The ability to deliver timely notifications is essential, as it prevents delays in information, minimizes scheduling conflicts, and reduces the risk of user oversight during the room booking process.

Notification accuracy and speed directly improve operational efficiency in hospital workflows, particularly in inter-departmental coordination. Moreover, this system reduces dependence on manual processes that are prone to errors and miscommunication. By implementing this digital approach, the booking process becomes more structured, transparent, and easier to monitor in real time.

From a hospital management perspective, the system offers practical benefits in terms of validation, tracking, and reporting room usage. It also supports the hospital’s digital transformation efforts by facilitating the adoption of information technology in administrative and operational activities. Thus, this system not only resolves technical challenges in meeting room booking, but also offers strategic value by improving efficiency, reducing administrative workload, and strengthening the governance of internal services.

CONCLUSION

This study successfully developed a Meeting Room Booking System using the Extreme Programming (XP) methodology, integrated with WhatsApp notification features, to address scheduling conflicts and enhance transparency at RS Muhammadiyah Lamongan. The system enables users to efficiently book meeting rooms, prevents overlapping reservations, and provides real-time notifications for approval or rejection.

Although initial testing was delayed due to deployment issues, the development team conducted internal testing after identifying and resolving the problems. This testing focused on ensuring that all core features functioned properly as designed. Once fully ready, the system is expected to help improve work efficiency, reduce scheduling conflicts, and simplify meeting room management at RS Muhammadiyah Lamongan.

REFERENCES

Abdulghani, T., Jaelani, L., & Sidik, J. (2021). Android Based Information System of Indekos Booking and Rentation Locations in Cianjur District. *Journal of Physics: Conference Series*, *1764*(1). https://doi.org/10.1088/1742-6596/1764/1/012157

*name of corresponding author

Ahmad, S., & Wasim, S. (2023). AGILE Methodology in Healthcare and Medical Practices: A Narrative Review. *Scholars International Journal of Chemistry and Material Sciences*, *6*(08), 129–133. https://doi.org/10.36348/sijtcm.2023.v06i08.002

Al, N., Dhanardana, D., & Rahayu, T. (2020). Aplikasi Peminjaman Ruangan berbasis Web pada Direktorat Jenderal Hak Asasi Manusia. *Seminar Nasional Mahasiswa Ilmu Komputer dan Aplikasinya* (SENAMIKA).

Azzahra, D., & Ramadhani, S. (2020). Pengembangan aplikasi online public access catalog (OPAC) perpustakaan berbasis web pada STAI Auliaurrasyiddin Tembilahan. *Jurnal Teknologi Dan Sistem Informasi Bisnis*, *2*(2), 152–160. https://doi.org/10.47233/jteksis.v2i2.127

Darmawan Pratama, A., & Noviana, W. (2023). Perancangan Sistem Informasi Aplikasi E-booking Berbasis Website Menggunakan Metode Extreme Programming Pada PT Indonesia Comnets Plus. *Jurnal Ilmu Komputer Dan Pendidikan*, *1*(6). https://journal.mediapublikasi.id/index.php/logic

Fajri, W., & Hardiani, T. (2023). Sistem Informasi Rekam Medis Asesmen Kebidanan Berbasis Web Menggunakan Metode Rapid Aplication Development (RAD). *Pseudocode*, *10*(2), 90–96. https://doi.org/10.33369/pseudocode.10.2.90-96

Febriyanto, F., Sari, R. P., & Rasimin, E. (2023). Penerapan Whatsapp Notification pada Sistem Pendaftaran Online Klinik PKU Muhammadiyah Kitamura Pontianak. *Sebatik*, *27*(1), 279–286. https://doi.org/10.46984/sebatik.v27i1.1999

Gunawan, A., Gunadi, I. G. A., & Dewi, L. J. E. (2023). Development of a Web-Based Dashboard System for Monitoring Study Programme Accreditation Instruments. *SinkrOn*, *8*(3), 1917–1931. https://doi.org/10.33395/sinkron.v8i3.12799

Hidayatullah, A., Yusuf, D., & Ratri, I. N. (2024). Penerapan Metode Extreme Programming Sistem Kearsipan Dokumen Berbasis Web. *KLIK: Kajian Ilmiah Informatika Dan Komputer*, *4*(6), 2721–2732. https://doi.org/10.30865/klik.v4i6.1847

Johari, R., Rasywir, E., & Rofi, I. (2024). Perancangan Sistem Informasi Perpustakaan Berbasis Web Pada SMK-PP Negeri Jambi. *Jurnal Manajemen Teknologi Dan Sistem Informasi (JMS)*. https://doi.org/10.33998/jms.v4i2

Maryani, S., & Firdonsyah, A. (2021). Implementation of a Web-based Zakat Impact Assessment System (Case Study: Berau District National Amil Zakat Agency). *Procedia of Engineering and Life Science*, *1*.

Maulana, A. E. (2022). Implementasi Extreme Programming pada Website Sekolah Tinggi Ilmu Tarbiyah (STIT) Daarul Fatah Tangerang. *Journal of Computer Science and Information Technology E-ISSN*, *2*, 61.

Maulana, C. A., Sholva Riza, Y., & Asrin, F. (2023). Aplikasi Berbasis Web untuk Manajemen Ruangan, Presensi, dan Notulensi Rapat Pada Bappeda Kota Pontianak. *Jurnal Ilmu Komputer Dan Informatika*, 2621–4962.

Muzaki, H. N., Arri Widyanto, R., & Arumi, E. R. (2023). Implementasi Sistem Informasi Push Notification pada RSUD Tidar Magelang Berbasis Website. *Jurnal FASILKOM*.

Putra, R. E., Wicaksono, S. A., & Arwani, I. (2019). Pengembangan Sistem Informasi Perpustakaan menggunakan Metode Extreme Programming (Studi pada: SMK 1 Muhammadiyah Malang). *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, *3*(7), 2548–2964. http://j-ptiik.ub.ac.id

Rachmaniah, M., Krismanti, M. M., & Darissalam, M. I. (2020). Tokocabai marketplace application based on web using extreme programming method. *2020 International Conference on Computer Science and Its Application in Agriculture, ICOSICA 2020*. https://doi.org/10.1109/ICOSICA49951.2020.9243214

Rahmawati, A., Yulianti, I., & Nurajizah, S. (2022). Penerapan API WhatsApp pada Sistem Pengolahan Data Tabungan Sekolah Menggunakan Model Extreme Programming. *Jurnal Sistem Informasi Akuntansi*. https://ejaournal.bsi.ac.id/ejurnal/index.php/justika

Sari, D. A., & Wijayanto, D. (2023). Rancang Bangun Sistem Pemesanan Ruang Meeting Berbasis Web (Studi Kasus: PT Media Sarana Data). *Jurnal Sains Komputer Dan Teknologi Informasi E-Issn*, *5*(2), 2023.

Shrivastava, A., Jaggi, I., Katoch, N., Gupta, D., & Gupta, S. (2021). A Systematic Review on Extreme Programming. *Journal of Physics: Conference Series*, *1969*(1). https://doi.org/10.1088/1742-6596/1969/1/012046

Supriyadi, A. (2022). Implementasi Aplikasi Peminjaman Ruang Rapat Berbasis Web Di Sekolah Vokasi Universitas Sebelas Maret. *Jurnal Ilmiah Sistem Informasi Dan Ilmu Komputer*. http://journal.sinov.id/index.php/juisik/index

Trivedi, D. (2021). Agile Methodologies. *International Journal of Computer Science and Communication*.

Wijayanto, D. (2022). Laravel Blade Templating Engine Implementation (Case Study: Muhammadiyah Lamongan Hospital Job Management System). *Prosiding Seminar Nasional Teknologi Informasi Dan Kedirgantaraan*. https://doi.org/10.28989/senatik.v7i1.447

Zafarkhan Mulla, S., Sayabsing Thakur, P., Tambe, T. Z., Vijayjaveri, V., & Wankhede, N. R. (2021). Smart Meeting Room Booking System. *International Journal of Scientific Research in Engineering and Management (IJSREM)*, 5. www.ijsrem.com

*name of corresponding author