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Implementation of Mobile-Based E-Kost System to Optimize Online Search, Booking, and Payment

Baroto Samadyo[1], Arif Pramudwiatmoko[2]
[1,2]Teknik Informatika, Universitas Teknologi Yogyakarta, Indonesia

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ABSTRACT

Rapid technological developments have changed the process of searching for boarding houses, which has been done manually through brochures, pamphlets, or banners. These conventional methods are considered inefficient because of their limited reach and the time required, especially for prospective tenants from outside the area. This study designs and develops a mobile-based e-boarding house application with features such as searching, booking, and digital payments, using the Rapid Application Development (RAD) methodology. This application makes it easier for users to find boarding houses that suit their wishes while making it easier for boarding house owners to manage room availability, tenant data, and payment history in a structured manner. The test results show that the e-boarding house application runs optimally without technical constraints and is effective in meeting user needs. By providing digital solutions, this application can increase the efficiency of searching and managing boarding houses, so that the process becomes faster, more practical, and more modern. Implementing this system provides significant benefits for prospective tenants and boarding house owners, namely increasing accessibility and management in the boarding house industry.

Corresponding Author:

Baroto Samadyo
Department of Computer Science and Engineering
Universitas Teknologi Yogyakarta
Yogyakarta, Indonesia
Email: brotosamadyo75@gmail.com

1. Introduction

Having a place to live is one of the three primary needs of every individual. In addition to functioning as a place to live, a house can also be a business opportunity, such as a boarding house business [1][2]. A boarding house is a room or residence rental service with a specific fee that can be paid monthly or annually [3][4]. A boarding house is a basic need for workers and students who are living away from home or do not have a permanent place to live [5]. The boarding house business has great potential, especially in big cities, especially around office and campus areas, because boarding houses are a primary need [6][7]. Boarding houses come with various facilities that are adjusted to a certain price range so that they can meet the needs of students and workers [8]. However, in finding a suitable boarding house, students and employees often face challenges [9]. One of the main difficulties is the lack of information about available

boarding houses that can be used as a reference in finding a place to live [10]. On the other hand, boarding house owners also have difficulty marketing their boarding houses. Lack of attention to promotion means that boarding house seekers must visit the boarding house location directly to assess the condition of the desired residence, which of course will take time and money [11][12]. This method is considered inefficient because even though they have tried, boarding house seekers often get accommodation that does not match their budget or desires [13]. This challenge is generally faced by students and employees from outside the area who are looking for boarding houses near their campus or workplace [14]. Several factors influence a person's decision to choose a boarding house [15][16]. Some of these factors include proximity to the campus or office, the facilities provided, an affordable payment system, and security, especially in terms of having a large and safe parking area. With so many aspects to consider, boarding house seekers may experience difficulties if they do not have clear and complete information [17][18].

Several previous studies have discussed the development of a boarding house information system to overcome existing problems. However, existing research generally has limitations in the development model used, the completeness of the features, and the user interface (UI) design applied. The use of the Rapid Application Development (RAD) method has not been widely applied in the development of mobile-based boarding house information systems, even though RAD has the advantage of being able to produce a quality system in a shorter time and at a lower cost [19]. In addition, the application of UI/UX design that focuses on user comfort and experience is still limited to previous studies [20][21]. Optimizing interface design is very important to make it easier for users to access applications, especially in the context of mobile devices [22][23][24]. In addition, previous studies have generally not integrated digital payment features, especially e-wallets, which are increasingly needed to support practical and safe transactions [25]. Therefore, there is still a research gap in developing a mobile-based boarding house information system using the RAD method, optimizing UI/UX design, and integrating digital payment features to improve user experience.

Based on these problems, this study aims to develop a mobile-based boarding house information system using the Rapid Application Development (RAD) method. This system is designed to facilitate boarding house seekers in finding information and making transactions easily, while helping boarding house owners promote their properties effectively. The contribution of this research is the development of a boarding house information system with optimal UI/UX design and integrated e-wallet payments to provide convenience, efficiency, and user satisfaction in the boarding house search and reservation process.

2. Research Method

Rapid Application Development (RAD) is a software development model that is linear and sequential, with a focus on fast and short development cycles [26]. The RAD method was chosen in this study due to its proven ability to accelerate and enhance the efficiency of application development, especially in environments where requirements may evolve during the development process. RAD is particularly well-suited for projects that demand rapid delivery without compromising quality, as it emphasizes iterative development and active user involvement.

The development process using RAD consists of several clearly defined stages that support a user-centered approach. These stages typically include requirements planning, user design, construction, and cutover. During the user design phase, functional prototypes are created based on user input and immediately tested. Feedback obtained from users is then integrated into subsequent iterations of the prototype. This interactive process continues until the system meets user expectations and achieves functional completeness.

One of the primary strengths of RAD lies in its adaptability and responsiveness. By allowing ongoing revisions and refinements throughout the development lifecycle, RAD helps minimize the risk of user dissatisfaction and reduces the likelihood of extensive changes after deployment. The dynamic nature of RAD ensures that the final product is both practical and aligned with user needs. The overall RAD development workflow adopted in this project is visually represented in Figure 1, providing a clear overview of the stages and flow of activities involved in the process.

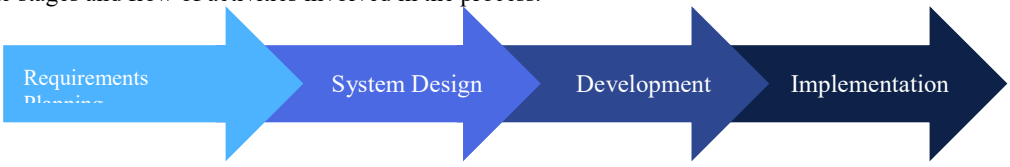

Figure 1. Rapid Application Development

The following is an explanation of each stage in the Rapid Application Development (RAD) method, which includes requirement planning, system design, development, and implementation:

1. Requirements Planning
   At this stage, the identification and analysis of user needs for the e-boarding system are carried out. This process is critical to ensure that the system is designed and developed in alignment with the expectations and requirements of its intended users. The first step involves identifying the system's primary users by determining all stakeholders involved in the boarding house ecosystem, including prospective tenants, boarding house owners, and system administrators.
   To gather a comprehensive understanding of user expectations, data collection is conducted using a combination of qualitative and quantitative methods. Interviews with users provide in-depth insights into their preferences, behaviors, and challenges in managing or searching for boarding accommodations. Surveys are distributed to a broader group of respondents to capture general trends, pain points, and common user demands regarding features such as search filters, booking flexibility, and secure payment processing.
   The findings from this phase are then synthesized to formulate both functional and non-functional requirements for the e-boarding system. Functional requirements focus on the system's core capabilities, such as user registration, property listing, real-time availability search, booking confirmation, and integrated digital payment. Non-functional requirements, on the other hand, emphasize aspects such as ease of access, system usability, interface responsiveness, performance, and data security.
   By conducting a thorough needs analysis, the development team can ensure that the resulting system is user-oriented, intuitive, and capable of addressing real-world problems experienced by both tenants and property owners. This user-centered approach lays the foundation for building a reliable and efficient e-boarding platform that enhances user satisfaction and operational effectiveness..
2. System Design
   After the needs planning is complete, the next stage is system design. In this stage, the developer creates a user interface (UI) prototype that displays the initial design of the application, including key elements such as the main page, boarding house search features, booking, and payment. System flow development is also carried out to determine the steps that users must follow in the search, booking, and payment process, including registration and login. To ensure alignment with user expectations, a trial session involving users is carried out to collect feedback on the prototype, which is then used for adjustments. The results of this phase are documented in the form of use case diagrams, sequence diagrams, class diagrams, and functional descriptions of each module.
3. Development
   The development stage involves transforming the approved design into a fully functional application. The application is developed in a modular manner, where each module, such as search management, booking, and payment, can be tested independently. System integration is also carried out to ensure that all modules can work optimally, for example, the booking system must interact with the database to update room availability in real time. During this stage, initial testing is carried out periodically to identify and fix bugs before the application is released to the public. In addition, code documentation is prepared to explain the structure and functionality of each module, which will be useful in future maintenance.
4. Implementation
   The final stage in the RAD method is implementation, where the tested application is implemented in a production environment. In this phase, the application is prepared for use by end users, and training is provided to users and boarding house managers on how to search, book, and manage payments digitally. After launch, application performance is monitored, and user feedback is collected to identify potential problems. Based on this feedback, continuous improvements are made, including adding new features if necessary, to keep the system relevant to user needs.

3. Result and Discussion

3.1. Use Case Diagram

The use case design includes two main actors, namely users and owners. users function to search, book, and pay for rooms, while owners are responsible for managing room data and monitoring rentals. Both must go through the registration process to create an account and then log in to access the system. After logging in, they are directed to the home page, which displays features according to their respective roles.

Through the Profile feature, Users and Owners can view and update their personal information. The use case diagram is illustrated in Figure 2.

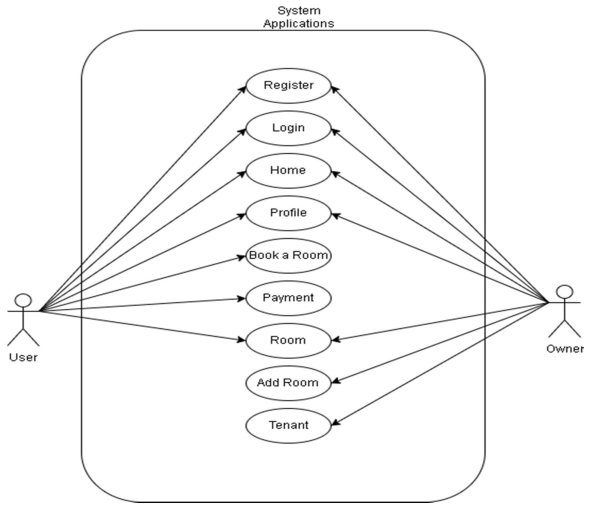

Figure 2. Use Case Diagram E-kost

For users, the system provides a Book a Room feature that enables them to conveniently search for and reserve available boarding rooms according to their preferences. This feature is integrated with filtering options such as price range, location, room size, and available facilities, which enhances the user experience by making the search process more efficient. Once a room is selected, users can proceed to the Payment feature to securely complete their transactions using various supported payment methods. This seamless integration ensures a smooth booking experience from start to finish. Additionally, users can access the Room feature to view a comprehensive list of all rooms available within the application, helping them make well-informed decisions based on updated availability and room details.

Meanwhile, for property owners, the system offers features tailored to managing room listings and tenant interactions. The Add Room feature allows owners to upload and register new rooms available for rent, complete with descriptions, photos, pricing, and availability schedules. This function is designed to be user-friendly, enabling quick and accurate data entry. Owners can also utilize the Tenant feature to monitor and manage a list of users who have booked or rented their rooms, including access to booking histories and tenant contact details. In addition, owners have access to the Room feature to efficiently oversee and update their room inventory, making it easier to manage current listings, edit room information, or remove inactive listings.

Through these integrated features, the system ensures that both users and owners benefit from a streamlined, interactive, and user-centric experience that supports the full lifecycle of boarding house rental transactions..

3.2. Sequence diagrams

Sequence diagrams are employed to illustrate the step-by-step interaction process between the user and the system, operating by the designed functionality of the system. Below are several sequence diagrams utilized in this research.

1. Registration Sequence Diagram

The registration sequence diagram is used to illustrate the registration process. The interaction begins when the user presses the "register" button on the login page. The system then makes a request to open the registration page and displays the registration form to the user. After the registration page appears, the user fills out the registration form with the required data. The registration data is sent to the application system, which then forwards it to the database for validation and storage. After the data is successfully validated and stored in the database, the system confirms that the account has been successfully created. finally, the system displays a success message to the user and directs them to the home page to continue using the application. Figure 3 shows the registration sequence diagram.

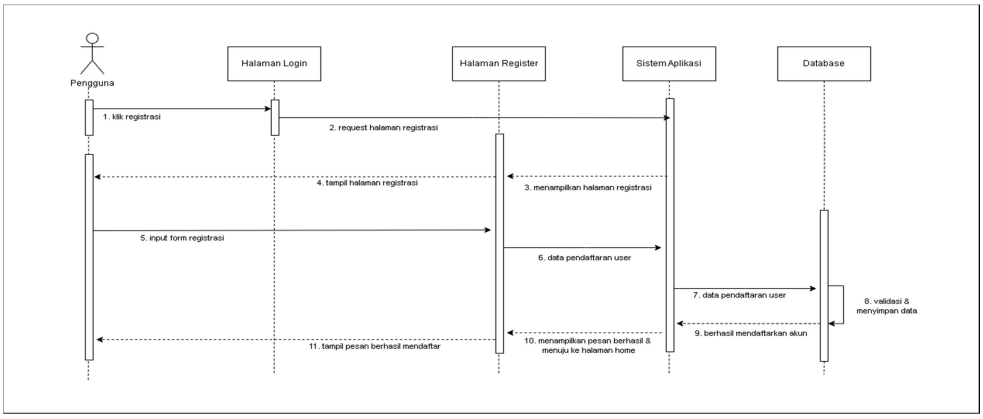

Figure 3. Registration Sequence Diagram E-kost

2. Login Sequence Diagram

The login sequence diagram is used to illustrate the process of a user logging in to access a system. The user begins by entering a username and password on the login page. The system then sends the input to the application server for processing, where the user data is sent to the database for validation. If validation finds that the username or password is incorrect, the system displays an error message to the user. However, if validation is successful, the system continues the process by displaying the homepage as an indication that the user has successfully logged in to the application. Figure 4 shows a login sequence diagram.

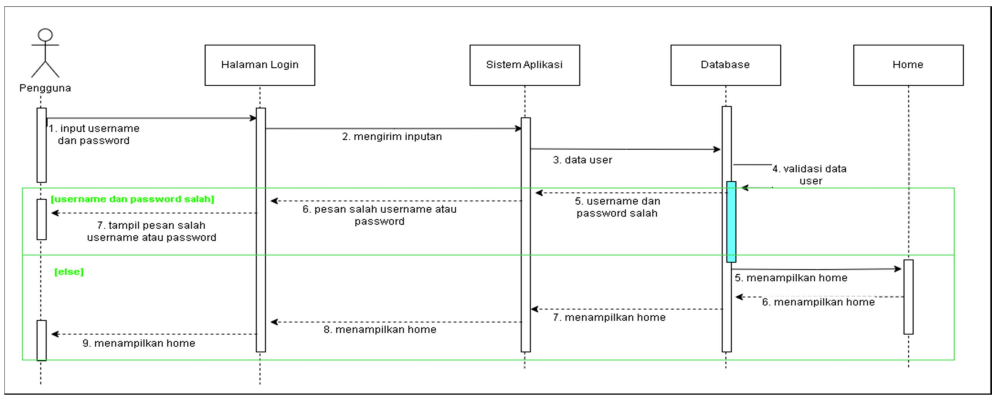

Figure 4. Login Sequence Diagram E-kost

3. Booking Sequence Diagram

The booking sequence diagram is used to illustrate the room booking process, the user starts the interaction from the Home Page by selecting the Select Room menu. The system then opens and displays the Select Room Page, then after the user selects a room, the system displays the room Information Page. Next, the user offers a rental by pressing the Submit Rental button, which triggers the system to open the Billing Page and display the billing details. After the user confirms the rental, the system requests the payment page for the payment process. At this stage, the user fills out a payment form that is validated by the system; if the data is incomplete, the system requests complete data, while if it is complete, the system saves the booking data into the Database and displays a notification that the payment was successful. This flow shows that each user interaction results in a request to the server, validation, and data storage, ensuring that the booking process runs sequentially and consistently. Figure 5 shows the booking sequence diagram.

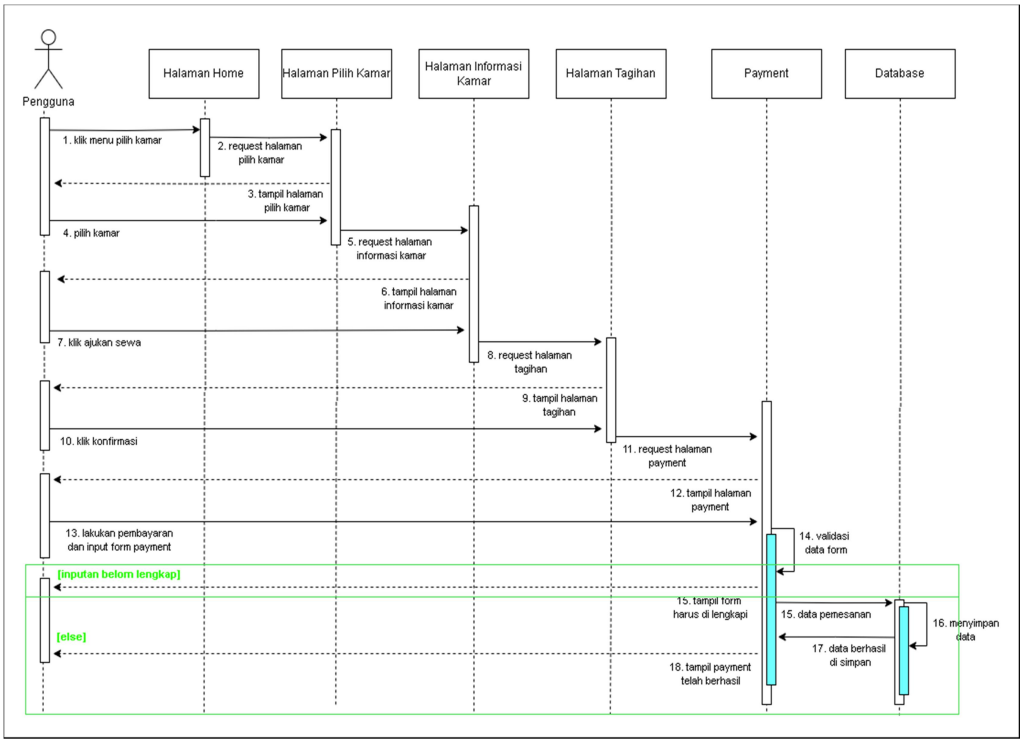

Figure 5. Booking Sequence Diagram E-kost

3.3. Class Diagram

This class diagram provides a detailed representation of the database architecture used within the Room Booking Application system. It visually outlines the structure and relationships between multiple core tables that are central to the system's functionality. The key data entities include tb_users, tb_kamar, tb_transaction, tb_payment, tb_review, tb_data_rekening, and tb_simpan_kamar. These primary tables are complemented by several reference tables such as tb_role, tb_bank, tb_provinces, tb_regencis, and tb_districts, which provide auxiliary information to support the main transactional processes.

The tb_users table serves as the central repository for user data, containing fields such as name, email, password, profile photo, WhatsApp number, and a foreign key (id_role) that links to user roles. The tb_kamar table holds detailed information about each rental room, including available facilities, pricing, location identifiers, availability status, and a reference to the user (id_user) managing the room listing.

The room booking process is managed through the tb_transaction table, which establishes the relationship between users and rooms while also capturing essential transaction data such as rental dates, duration, total cost, and current transaction status. Payment-related data is handled by the tb_payment table, which logs details about payment methods, uploaded proof of payment, payment amount, and its association with a specific transaction.

To support financial transactions, the tb_data_rekening table stores user bank account details, which are necessary for transferring funds. User feedback is managed through the tb_review table, where renters can submit ratings and reviews after the completion of a booking. Meanwhile, the tb_simpan_kamar table allows users to bookmark or save rooms for future consideration, enhancing the user experience by enabling a personalized favorites feature.

The reference tables, including tb_role, tb_bank, tb_provinces, tb_regencis, and tb_districts, enrich the system by offering structured data that supports drop-down selections, filtering, and geographical or institutional categorization. Foreign key constraints establish the logical relationships between these entities, ensuring data consistency and referential integrity across the entire application. These interconnections enhance the efficiency of data retrieval, support advanced queries, and facilitate robust system operations. The overall structure is presented in the class diagram shown in Figure 6.

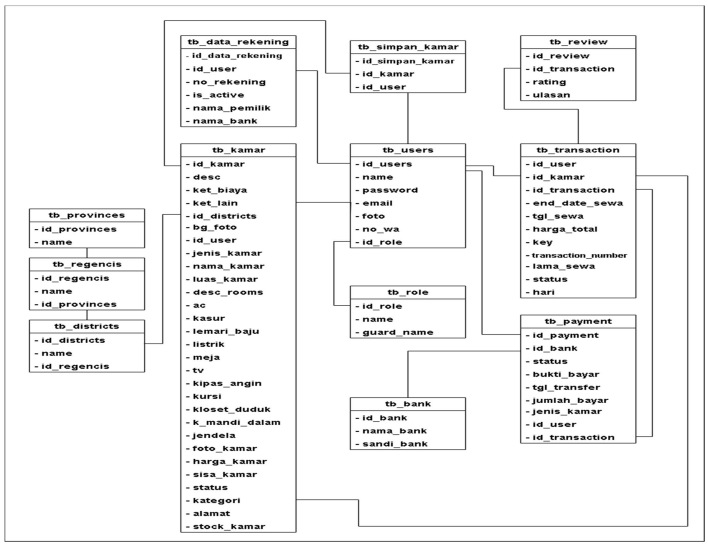

Figure 6. Class Diagram E-kost

3.4. Design Results

1. Register Page and Login Page

If users do not have an account yet, they can register first by clicking the registration button on the login page. The appearance of the registration page can be seen in Figure 7.

When users open the application, they will be directed to the login page. Users can fill out the form if they already have an account. The appearance of the login page can be seen in Figure 8.

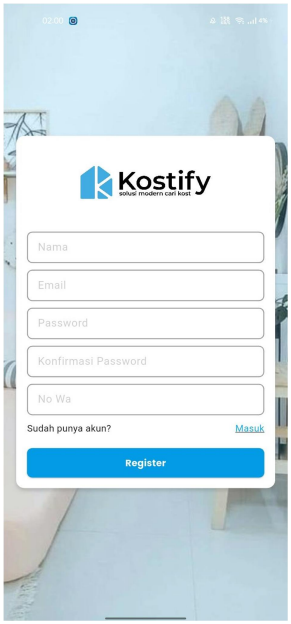

Figure 7. Register Page E-kost

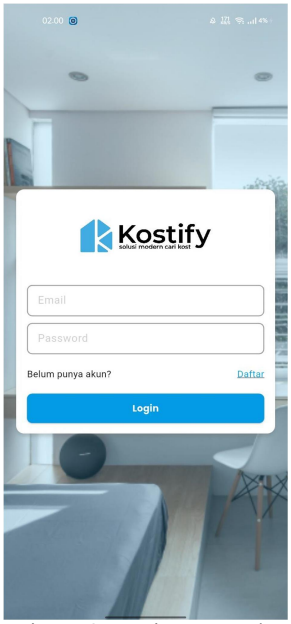

Figure 8. Login Page E-kost

2. Home Page

The Home page of this application serves as the main landing page where users can begin their search for boarding houses. At the top of the page, there is a search bar that allows users to search for kos based on the name or city. Just below the search bar, there is a Recommended Cities section displaying popular locations such as Jakarta and Bandung, helping users quickly select their preferred area.

Additionally, there is a Recommended Kost section showcasing a list of recommended boarding houses, complete with essential information such as the name of the kos (e.g., Perdana Putra, Dwi Lingga), monthly rental price (e.g., Rp 610,000 and Rp 750,000), location (e.g., Sleman Regency, South Jakarta City), the number of available rooms (displayed numerically and color coded red indicates no availability and green indicates rooms are still available), and the type of kos (e.g., male or female boarding houses). All of these elements are designed to make the boarding house search experience easier, faster, and more informative for users. The home page can be seen in Figure 9.

The edit profile page is used to change your profile data, such as name, password, mobile number, and profile photo. The edit profile page can be seen in Figure 10.

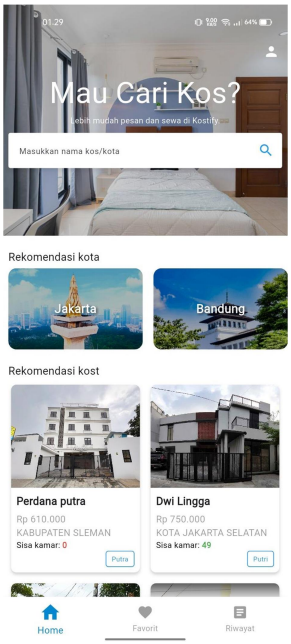

Figure 9. Home Page E-kost

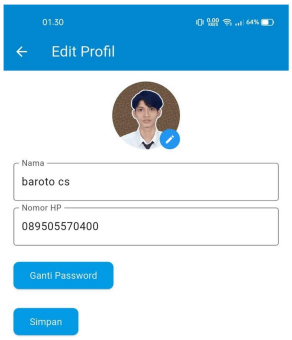

Figure 10. Edit Profile Page E-kost

3. Room Details Page

This page displays complete details about the boarding house room, such as facilities, price, location, and room description. On this page, there is also a request booking button for users who want to book the room. It can be seen in Figure 11.

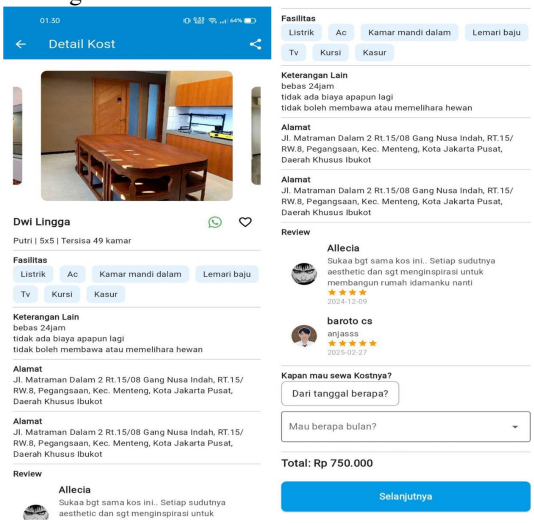

Figure 11. Room Details Page E-kost

4. Favorite Page and History Page

This favorite page contains several rooms that have been saved/favorited by the user so that the user does not need to search again from the beginning for the room they like. The favorite page display can be seen in Figure 12.

This history page displays rooms that have been booked by the user, and the user can proceed to payment, delete orders before being paid by the user, and add reviews for rooms that have been successfully booked. This page can be used to provide a history of room reservations. The history page display can be seen in Figure 13.

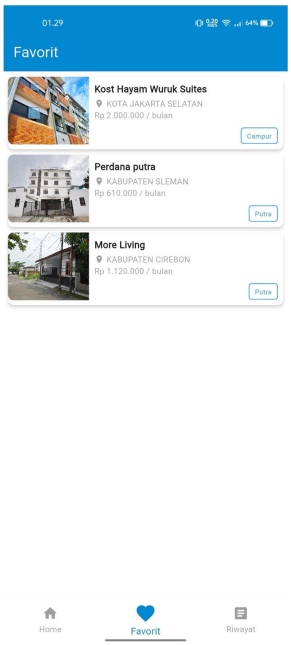

Figure 12. Favorite Page E-kost

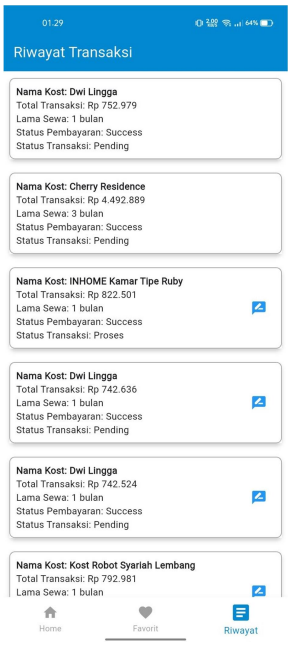

Figure 13. History page E-kost

4. Conclusion

After going through the design and development stages of the e-boarding system, which includes searching, booking, and paying online based on mobile, it can be concluded that this system can overcome the problems of boarding house seekers, which were previously still done manually and often caused ambiguity and indications of fraud. We developed an Android-based mobile application that allows real-time and more efficient boarding house bookings. Through the Rapid Application Development (RAD) method, we were able to develop the application quickly, involve users throughout the process, and reduce communication errors. This application not only provides online search, booking, and payment features but also adds integrity to the boarding houses offered to prospective tenants, making it easier for prospective tenants to find the boarding house they want without having to be afraid or doubtful about the boarding house.

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