



## Development of Facility Rental, Product Shipment Tracking, and Payment in the UnilaHub Application

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#### Abstract

UnilaHub, a mobile e-commerce application developed by the University of Lampung, facilitates transactions for products derived from university research. This study aims to enhance UnilaHub by introducing new features like facility rental, product shipment tracking, and integrated payment systems. The research consisted of three main phases: problem identification, application development (prototyping method), and system testing. Utilizing the prototyping method, the researchers iteratively developed these features, incorporating user feedback to ensure functionality and usability. System testing, encompassing User Acceptance Testing (UAT) and Black Box Testing, validated the effectiveness of these enhancements. High user satisfaction indices were recorded: 84.19% for the Web Administrator, 84.66% for the Public Apps, and 82.62% for the Research Apps. The results indicate that the new features significantly meet user needs and improve the overall user experience. The research is expected to improve the efficiency and satisfaction of UnilaHub users through the development of facility rental, product delivery tracking, and in-app payments. Integrating payment gateway and delivery tracking through third-party services has improved transaction efficiencies and user satisfaction, contributing to the digitization and centralization of administrative processes in UnilaHub.

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### INTRODUCTION

UnilaHub, a mobile e-commerce application created by the University of Lampung in 2022, facilitates transactions for products derived from university research. The application categorizes users as buyers, including the general public and industries,

and sellers, consisting of university lecturers and researchers. UnilaHub operates on two platforms: UnilaHub (Public Apps) and UnilaHub (Research Apps). The Public Apps platform helps publish and market research products [1], while the Research Apps

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platform allows researchers to commercialize their products to the public and industry [2].

The University of Lampung offers various facilities for public rental, but the process remains manual, involving time-consuming administrative steps. Although efforts to digitize this service have been made, they are not yet fully operational and lack centralization. Renters must visit the Business Management Agency (BPU) in person and manually check facility availability with BPU staff. Despite having a website for facility rentals, critical features like availability checks and automatic payment verification are missing [3]. Renters must manually pay and verify payments through the website, requiring BPU staff verification, which is time-consuming and prone to errors [4].

Integrating these services into a single application [5], such as UnilaHub, can significantly enhance user experience by creating a seamless and efficient rental process. Research supports that mobile applications providing a unified platform streamline user interactions, making the app more intuitive and user-friendly [6], thereby improving overall user satisfaction and engagement [7]. This integration reduces the cognitive load on users and leads to higher adoption rates and user retention [8].

Currently, payments for products or services on the "UnilaHub (Public Apps)" platform are done outside the app, via ATM or mobile banking. Buyers then upload proof of payment into the app for admin confirmation, reducing transaction efficiency. Shipment tracking features are also needed on both "UnilaHub (Public Apps)" and "UnilaHub (Research Apps)" to help users monitor product status and location.

An important fact about mobile payments is that users have reached the majority group in over 40 countries [9]. Mobile payments support the growth of online markets and industries by accelerating payment flows and providing necessary security infrastructure, fostering innovation to address challenges and harness future development potential [10]. Therefore, a feature for making direct payments within the UnilaHub application is necessary.

A Payment Gateway is an e-commerce service provider that offers tools to facilitate payment processing between customers,

merchants, and banks over the World Wide Web (WWW) [11].

One of the most crucial aspects of e-commerce is the delivery sector, as most online retailers depend entirely on courier services to deliver products to their customers, also known as e-shoppers [12]. Research has shown that 38% of e-commerce were dissatisfied with certain aspects of the delivery process for their most recent online purchase [13]. The uncertainty of delivery time compared to the promised time and the lack of information about the current location of shipped products reduce user satisfaction in e-commerce applications [14]. This indicates the need for a shipment tracking feature in the UnilaHub application. Ship tracking through third-party services would enhance user satisfaction by providing accurate delivery information [15], [16].

Based on the issues previously described, this research aims to develop additional features for the UnilaHub application, including facility rentals, product shipment tracking, and payment features. These additional features are implemented to facilitate users renting facilities, making payments, and tracking product shipments through the UnilaHub application.

## METHOD

This research was conducted from January 2024 to June 2024 at the University of Lampung. The aim of this study is to develop facility rental, product shipment tracking, and payment features on the UnilaHub application. These features will be tested on three categories of audiences: the University of Lampung's Business Management Agency (BPU), the lecturers, and the general public.

The research stages carried out in this study can be seen in Figure 1.



**Figure 1.** Research Stages

As shown in Figure 1, the research stages consist of three main phases: Problem Identification, Application Development

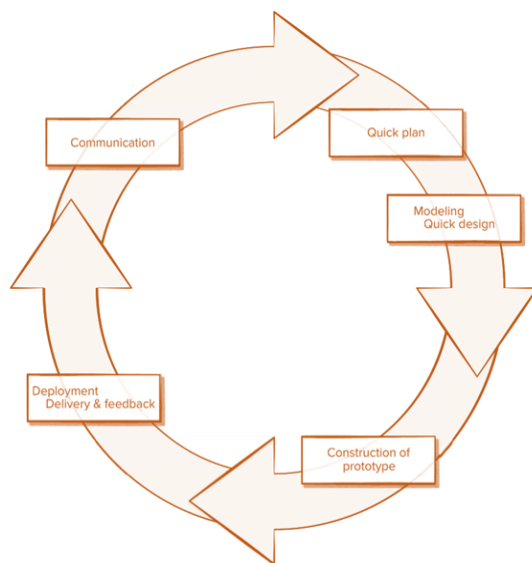
(Prototyping Method) [17], and System Testing. The following are explanations for each research stage that will be conducted.

### Problem Identification

Problem identification is conducted to understand the general issues and gather relevant information. The problem identification phase classifies the issues to be discussed. It is conducted based on the results of interviews with lecturers and observations made at the Business Management Agency (BPU) of the University of Lampung. This phase aims to gather detailed information about user needs, operational challenges, and areas for improvement within the current system.

### Application Development (Prototyping Method)

The prototyping method was used to develop the facility rental feature, product delivery tracking, and payment on the Unilahub application. The development stages in the prototyping method include communication, modeling and quick design, construction of the prototype, and deployment or delivery and feedback. The development cycle using the prototyping method can be seen in Figure 2[18].



**Figure 2.** SDLC Prototyping Method

The prototyping method becomes an effective solution in application development situations where the application requirements are unclear, or development goals are not well-defined [18]. The basic concept is that rather

than finalizing the requirements before proceeding with design or coding, a throwaway prototype is constructed to explore and refine the requirements. This prototype is iteratively developed based on the currently available information about the requirements [19], [20]. Unclear software requirements often occur because customers only provide a general outline or objectives for the software but do not identify detailed requirements for each function and feature. The philosophy behind the prototyping method approach is to create a prototype as quickly as possible and then get user feedback so the developer can immediately improve and refine the prototype.

The repetitive cycle or iteration within the prototyping model or method is a form of software refinement based on user feedback. Iteration will only stop when the users have approved the prototype. The stages of each iterative cycle of the prototyping method are as follows.

#### a) Communication

The first stage in the prototyping method is communication with the customer. Developers meet with relevant stakeholders to establish the general or overall objectives of the software to be developed, identify any known requirements, and highlight areas that require further definition.

#### b) Modeling and Quick Design

Modeling and Quick Design is the planning and system design stage. This stage can include creating use case diagrams, logical data models, and wireframes.

#### c) Construction of Prototype

Construction of the prototype is the stage where developers begin creating a prototype based on the previous design. The developed prototype can be either a simple visual model of the software or a coded system that includes some of the required system functions.

#### d) Deployment or Delivery and Feedback

This stage involves delivering the developed prototype to the users. Users will test the prototype and provide feedback to the developers. If users feel that improvements are

necessary, developers will refine the prototype based on the feedback. If the feedback indicates user satisfaction with the prototype, it is ready to be finalized and implemented (deployment). Testing at this stage can utilize the User Acceptance Testing (UAT) model to determine whether the prototype is acceptable to users.

### System Testing

User Acceptance Testing (UAT) and Black Box Testing are the system testing methods used in this development.

#### a) User Acceptance Test (UAT)

User Acceptance Tests (UAT) aim to validate that the developed software works according to the users' understanding, needs, and satisfaction [21]. Typically, this testing is conducted by providing a questionnaire to users, utilizing the Likert scale for measurement. The Likert scale is a type of measurement tool utilized for gathering qualitative data [22].

This study's calculation scale used in the User Acceptance Test (UAT) employs the Likert scale. Each question offers five answer choices: strongly agree, agree, neutral, disagree, and strongly disagree. The Likert scale weights for each answer can be seen in Table 1 [23].

**Table 1.** Likert Scale

Response	Scale
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

After obtaining the total score or weight from the given questionnaires, the next step is calculating the user satisfaction index using Equation 1 [24].

$$\text{Indeks (\%)} = \frac{\text{Total Score}}{\text{Maximum Score}} \times 100\%$$

The calculated user [25] satisfaction index will be compared with the satisfaction index range listed in Table 2.

**Table 2.** User Satisfaction Index Range

Response	Scale
0% – 19,99%	Very Unsatisfactory
20% – 39,99%	Unsatisfactory
40% – 59,99%	Somewhat Satisfactory
60% – 79,99%	Satisfactory
80% – 100%	Very Satisfactory

#### b) Black Box Testing

Black Box Testing, a type of User Acceptance Testing, focuses on assessing the software's functionality without delving into its internal design and code [26], [27]. This method ensures the application's inputs and outputs meet expected requirements and align with specified functionality [28]. It is straightforward as it only requires the expected data boundaries and emphasizes input rules and boundary cases.

## RESULTS AND DISCUSSION

A mobile e-commerce application named UnilaHub was developed to facilitate transactions for university research products. The main purpose is to group users into buyers, which includes the general public and industry, and sellers, which consist of lecturers and researchers. This study hypothesizes that developing additional features, such as direct payments in applications and delivery tracking, will improve transaction efficiency and user satisfaction.

The "UnilaHub (Public Application)" platform aims to help publish and market research products, while the "UnilaHub" platform allows researchers to commercialize their products to the public and industry. Currently, payment for products or services on the "UnilaHub (Public Application)" platform is done outside the application via ATM or mobile banking, which requires the buyer to upload proof of payment into the application for admin confirmation, reducing the efficiency of the transaction.

Previous research, as carried out by A. Al Alawi (2022), focused on developing the "Public Application" feature to help publish and market research products [29]. Other research by F. M. Permana (2022) focuses on the development of the "Research Apps" feature that allows researchers to commercialize their products to the public and industry [30]. The research focuses on

improving features in the UnilaHub application by developing additional features such as facility rental, product delivery tracking, and payment features. These additional features are implemented to make it easier for users to rent facilities, make payments, and track product delivery through the UnillaHub application.

The feature development cycle in the UnilaHub application using the prototyping method only occurred in one iteration. This is because the prototype developed in the first iteration met user needs, as tested using User Acceptance Testing (UAT).

Based on the development stages in the prototyping method that have been carried out, the following are the detailed results of each development stage.

### User Requirements

Here are the user requirements obtained through the communication stage that are shown in Table 3.

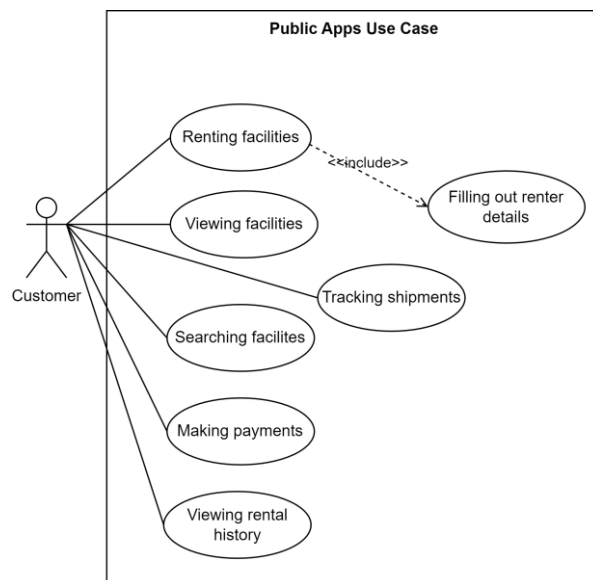
**Table 3.** User Requirements (Based on Communication Stage)

No	Name	Description
1	Development of Facility Rental Feature	Users on the Public Apps platform can search for facilities, make reservations, and view booking history, while administrators manage facilities and bookings on the website platform.
2	Development of Product Shipment Tracking Feature	Both buyers and sellers can view shipment tracking information for products sent by the seller. This feature has been added to both UnilaHub platforms: Research Apps and Public Apps.
3	Development of Payment Feature (Payment Gateway)	Users can place orders and make payments directly within the application. This feature is implemented on the UnilaHub Public Apps platform.

### Modeling and Quick Design

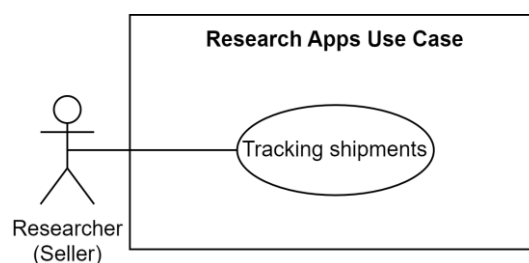
Based on previous user needs analysis, additional use cases are required to enhance existing features for facility rental, product shipment tracking, and payments.

Customers can rent facilities, view detailed information about available facilities, and search for specific facilities based on criteria. They can also make payments for rentals or purchases, view their rental history, and track the status of shipments for products they have purchased. Each of these use cases supports the overall functionality and usability of the UnilaHub system, catering to different types of users with specific needs. The public Apps use case is shown in Figure 3.



**Figure 3.** Public Apps Use Case

The new primary functionality for researchers is tracking shipments, which allows them to monitor the status and location of their product shipments to ensure timely delivery. The Research App use case is shown in Figure 4.



**Figure 4.** Research Apps Use Case

The administrator is responsible for managing facilities and handling facility rental bookings. Managing facilities involves adding, updating, and deleting facility information. In managing facility rental bookings, the administrator oversees bookings, confirms reservations, and handles cancellations. Web Administrator use case is shown in Figure 5.

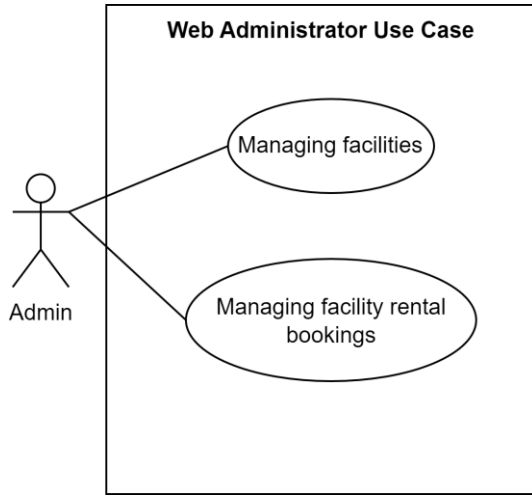


Figure 5. Web Administrator Use Case

In this study, the table structure design has been modified and expanded to develop the features for facility rental, product shipment tracking, and payments.

The diagram that is shown in Figure 6 illustrates the table structure for enhancing

UnilaHub with facility rental, shipment tracking, and payment features.

The `invoices` table references `orders`, `researchers`, and `shipping` through foreign keys. The `orders` table links to `users` and stores order details. The `shipping` table connects to `addresses` and contains tracking and courier information.

The `users` table stores user details, while `users\_dosen` refers to faculty members. The `bookings` table manages facility rentals and references `facilities`, `users`, and `payments`, including reservation details. The `booking\_payments` table links to `users` and `facilities`, tracking payment details.

These interconnected tables ensure a comprehensive structure, linking orders, shipments, and rentals to users and payment details, thus enhancing UnilaHub's functionality.

Here is the proposed update to the table structure, detailed in Figure 6.

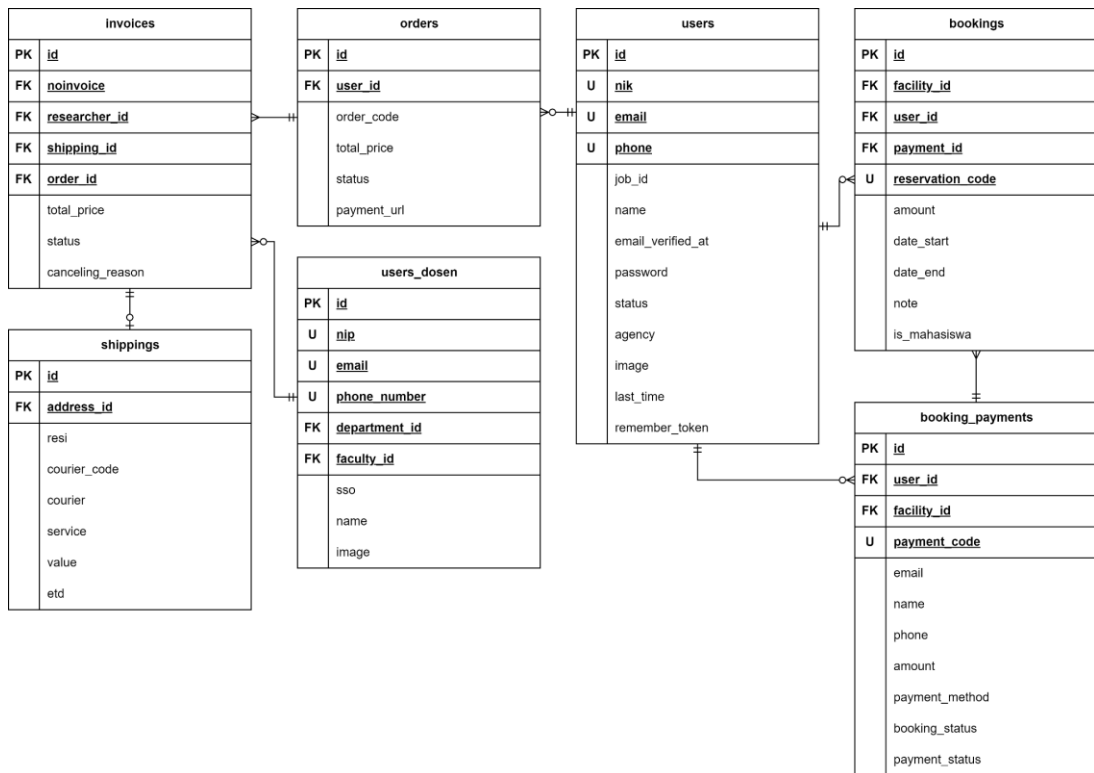


Figure 6. Database Structure Design

**Construction of Prototype**

The feature development is divided into three sections: Facility Rental Development, Product Shipment Tracking Feature Development, and Payment Feature Development.

a) Facility Rental Feature Development

In the implementation, facilities are selected and booked by users through a public application. Desired facilities and multiple booking slots can be chosen within a

single payment transaction. Payment information is recorded in the booking\_payments table, while individual booking slots are stored in the bookings table.

Database locks are implemented during query execution to prevent race conditions during the booking process. The administrator's website facilitates booking verification or cancellation. Both users and administrators can access booking history and tickets. The following figures illustrate essential views that streamline the system's user experience and administrative tasks.

Figure 7 displays facility home views and detail views. The left side lists facilities along with search and filter buttons, and the right side displays the details of a selected facility and a button for making a reservation.

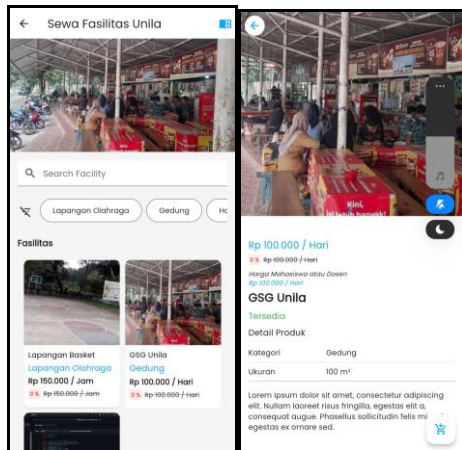


Figure 7. Facility Home and Detail Views of the UnilaHub Public Apps

Figure 8 shows that users can select their preferred dates and times for booking. An interactive calendar and time slots help users choose their booking schedule conveniently. Two types of facilities can be booked: per day and per hour.

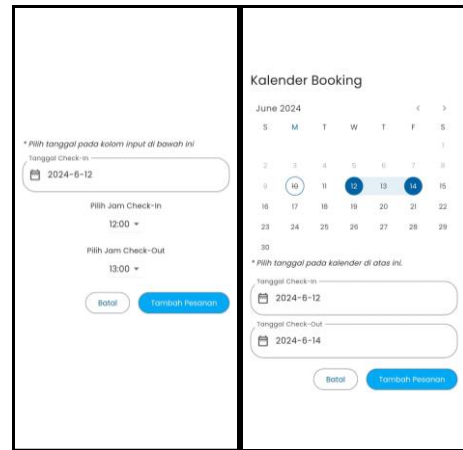


Figure 8. Date and Time Selection

Users can enter their details and have the option to add additional booking slots, as shown in Figure 9. Users can verify all information before confirming the booking.

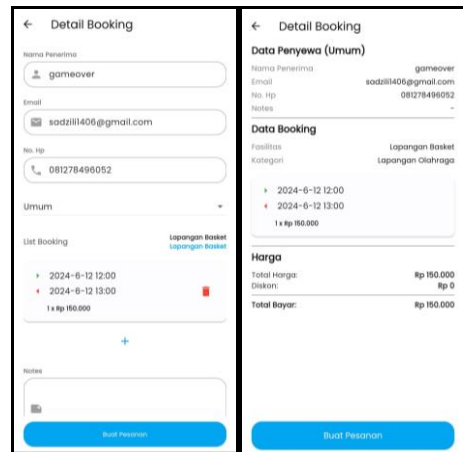


Figure 9. Booking Details Form and Confirmation of UnilaHub Public Apps

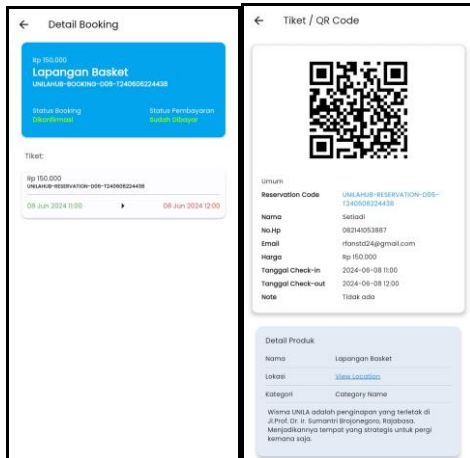
This page allows users to view their booking history, which overviews all past reservations. This allows users to keep track of their previous bookings. The view is shown in Figure 10.



**Figure 10.** Booking History of the UnilaHub Public Apps

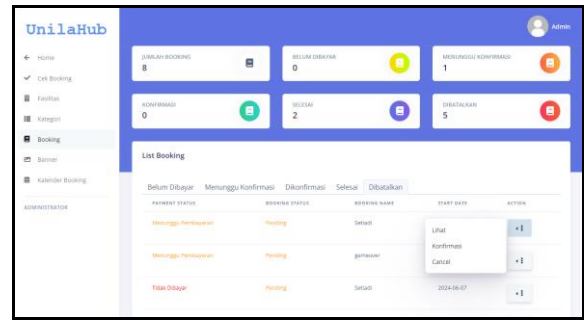
Figure 11 displays detailed booking history and tickets once payment has been completed. Users can access their tickets and detailed records of each booking.

By providing these detailed and user-friendly views, the system ensures a smooth and transparent booking process for both users and administrators.



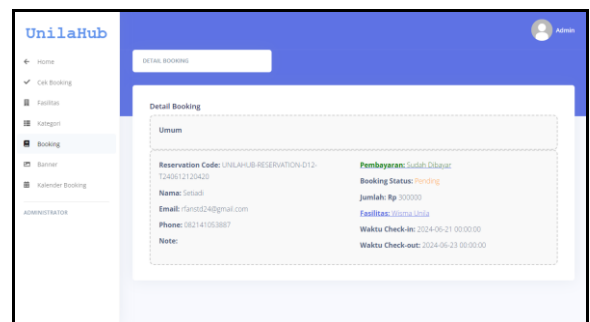
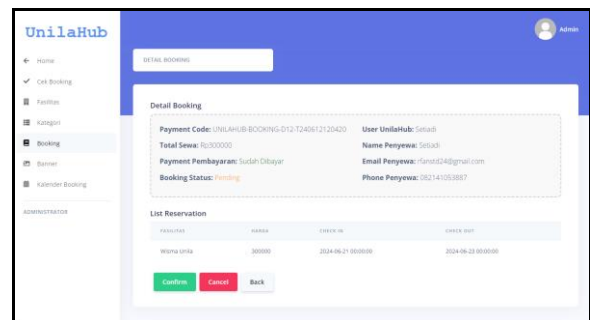
**Figure 11.** Booking Details and Tickets of the UnilaHub Public Apps

The administrator website has views like Figure 12 to manage bookings. It provides insights into booking volumes and statuses, helping administrators quickly assess the current state of operations. The tabular list supports tracking individual bookings, enabling management of customer payment processing.



**Figure 12.** Manage Bookings View

Administrators can dive deep into the specifics of an individual booking. It aggregates all relevant information in one place, streamlining decision-making processes such as booking confirmation or cancellation. Each booking also has corresponding booking tickets, shown in Figure 13.

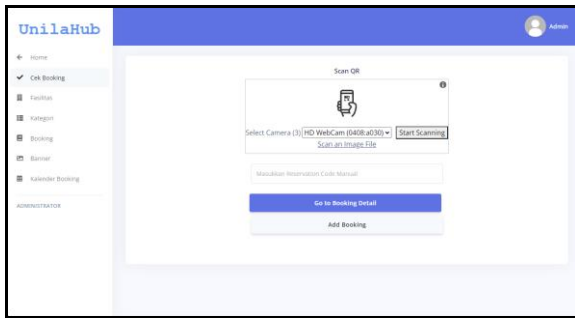


**Figure 13.** Bookings Details and Tickets View

Figure 13 shows administrators navigating to the ticket page by scanning a QR code or manually entering a booking code. This functionality ensures quick and accurate access to booking details, facilitating smooth operations.

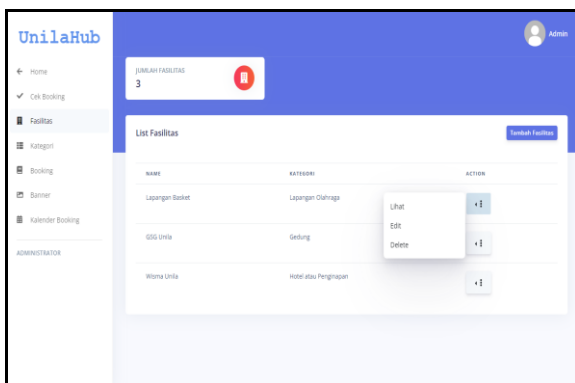
In addition, there is a button that allows administrators to manually enter bookings directly from the website. This feature is particularly useful for handling offline bookings. Figure 14 shows this feature.





**Figure 14.** Bookings Check and Manual Add View

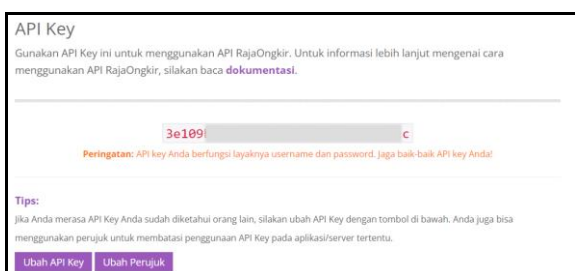
Figure 15 allows administrators to maintain an inventory of available facilities and perform essential maintenance tasks such as adding new facilities, modifying existing ones, and deleting facilities.



**Figure 15.** Manage Facilities View

### b) Product Shipment Tracking Feature Development

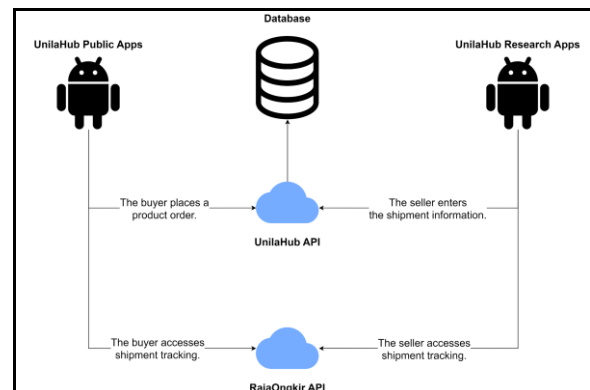
The shipment tracking feature is developed using a third-party service, RajaOngkir API, to obtain shipping costs and track shipped products. RajaOngkir provides an API Key that functions as an authorization key when requesting shipping cost data or shipment tracking data from various courier services. The API Key from RajaOngkir is obtained after purchasing a RajaOngkir account. The provided RajaOngkir API Key can be seen in Figure.



**Figure 16.** API Key RajaOngkir

The illustration of the shipment tracking feature in the UnilaHub application, both on the Research Apps and Public Apps platforms, can be seen in Figure 17. First, the buyer places an order or purchases a product on the UnilaHub Public Apps, where the purchase data is managed by the UnilaHub API and entered into the UnilaHub database. The related product purchase will appear on the seller's order page. The seller can ship the goods based on the selected courier service. After that, the seller must enter the tracking number information into the UnilaHub Research Apps, which will then be entered into the UnilaHub database. Once the shipment data is in the UnilaHub database, the seller and the buyer can track the shipment on the Order Detail page on each UnilaHub platform.

Figure 17 illustrates the shipment tracking flow developed in the UnilaHub application.



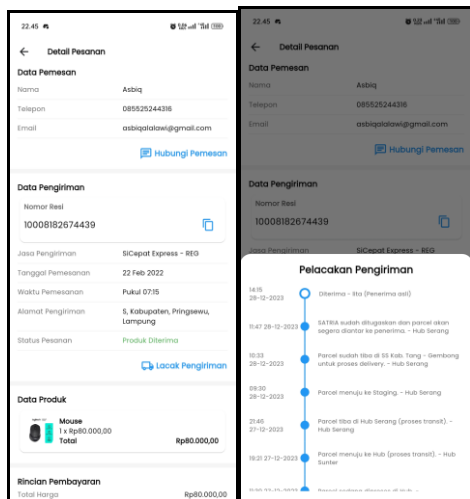
**Figure 17.** Shipment Tracking Flow

Accessing the shipment tracking status of products the seller sends involves sending the necessary data to the RajaOngkir API when the application requests shipment tracking data. The data sent to the RajaOngkir API includes the API Key, tracking number, and courier service code. After sending the required data, the RajaOngkir API will respond with the latest shipment information to the UnilaHub application.

To access the shipment tracking feature, users can visit the order detail screen with the status 'shipped' or 'received,' as shown in Figure 18. Once users open the order detail page, they can press the 'Lacak Pengiriman' button available.

The feature will only be available for physical product shipments as a handling measure for shipment tracking. Therefore, for digital products, the feature will not be available on the Order Detail page, and the 'Lacak Pengiriman' button will also not be available.

Figure 18 shows the result of developing the shipment tracking feature in the UnilaHub application for both the Public Apps and Research Apps platforms.



**Figure 18.** Shipment Tracking Display

### c) Payment Feature Development

The UnilaHub application's payment feature utilizes the payment gateway system from Midtrans, a leading financial technology company in Indonesia. Midtrans provides various integration options for payment system development, including a Built-In Interface (Snap), Native Mobile App SDK, Custom Interface (Core API), Payment Link, and CMS Payment Plugin [31].

In the development of UnilaHub, we chose to implement Snap as the payment gateway integration method. Snap allows the payment page to be displayed as a redirect URL or a pop-up within the application. We used the redirect URL method to display the Snap page within the UnilaHub application, implemented using the WebView library in the Flutter framework. This enables users to make payments directly through the app with a responsive interface that integrates seamlessly.

Figure 19 illustrates the payment process using Snap with the redirect URL method. Essentially, the redirect system provides the Midtrans URL after the application successfully sends transaction data to Midtrans. This URL is used in the UnilaHub application to display the Snap page as the payment interface for users.

The payment process begins when the user tries to access the payment page in the UnilaHub application [32]. The UnilaHub API sends transaction data to the Midtrans system. Midtrans [33] returns a URL to the UnilaHub API upon receiving valid transaction data. This URL is then forwarded to the UnilaHub application as a response. The application subsequently displays the payment page using this URL. After the user completes the payment, the application displays information indicating that the payment has been made. The payment process occurs asynchronously, where the Midtrans system waits for the payment to be completed and sends transaction status notifications to the UnilaHub API. An illustration of the payment process using Snap with the redirect URL method can be seen in Figure 19 [34].

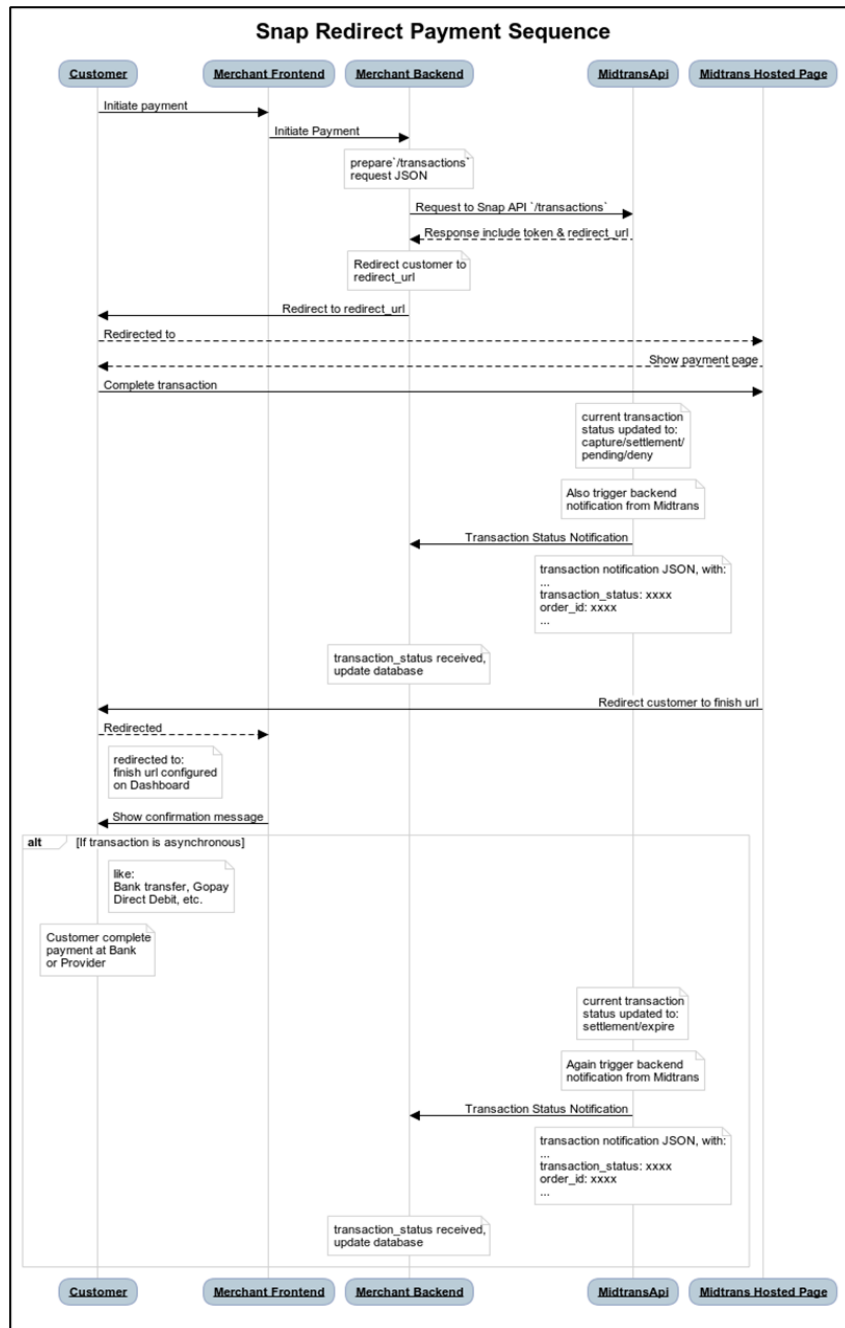


Figure 19. Snap Payment Process Flow Using Redirect URL

The development of the payment feature in the UnilaHub application integrated with the Midtrans payment gateway system begins with the account registration process. After successfully creating an account, developers can choose between the available Midtrans service modes: Production Mode and Sandbox Mode. During the development phase, the chosen mode is Sandbox Mode, Which allows developers to simulate payments without using real money.

Figure 20 displays the dashboard page in Sandbox Mode. This page contains simulated transaction information that does not

represent real data. In Sandbox Mode, developers can also make payments using the payment simulator provided by Midtrans.

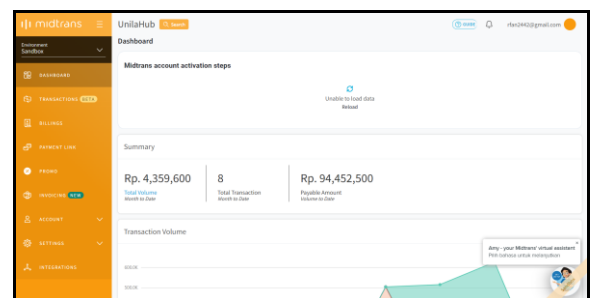


Figure 20. Dashboard Display in Sandbox Mode

Production mode and sandbox mode have different endpoints for receiving transaction data provided by the UnilaHub API. This differentiation is crucial so that the Midtrans system can return the correct redirect URL according to the user's mode, ensuring smooth payment processing. The endpoints provided by Midtrans for each mode are shown in Table 4.

**Table 4.** Midtrans API Endpoints

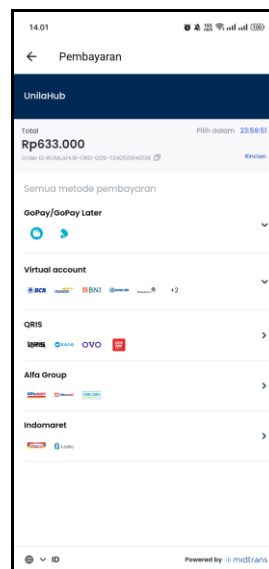
Mode	Description
Production	https://app.midtrans.com/snap/v1/transactions
Sandbox	https://app.sandbox.midtrans.com/snap/v1/transactions

To integrate the UnilaHub application's payment system with the Midtrans payment gateway, you need an API Key provided by Midtrans. This API Key is unique and confidential, so each account registered with Midtrans will have a different one. The API Keys provided by Midtrans include the Client Key and Server Key.

To request or fetch the redirect URL from the Midtrans system, you must send the necessary transaction data such as order\_id, total\_price, item\_details, and customer\_details. Upon successful submission of the transaction data, the Midtrans system will return a unique redirect URL for each transaction that enters the Midtrans system. The server will then return this redirect URL to the UnilaHub application to be displayed as a website page within the app.

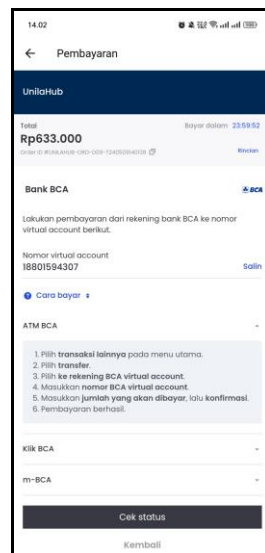
In addition to displaying the payment page using the redirect\_url obtained from the Midtrans service, setting up a Callback endpoint within the Midtrans system is essential. This Callback serves as the endpoint through which Midtrans sends payment notifications whenever a user completes a transaction. This integration enables the UnilaHub API to update existing order data within the UnilaHub application. Given that payments processed through the Midtrans payment gateway are asynchronous, the Callback plays a critical role in receiving timely payment notifications from Midtrans.

The developed payment feature produces three main pages during the payment process: the payment methods list, payment details, instructions, and the payment status page. The payment methods list shown in Figure 21 includes various payment options for users to pay for their orders or rentals. The developed payment methods list page, visible in Figure 21.



**Figure 21.** Payment Method List Page

After users select their preferred payment method, they will be directed to the payment details and instructions page, as displayed in Figure 22. On this page, users will receive guidance on how to proceed with the payment based on the chosen payment method.



**Figure 22.** Payment Details and Instructions Page

After users complete the payment following the instructions, they will be automatically redirected to the payment status page, as shown in Figure 23. This page will automatically close after 5 seconds, and users will then be directed to the order history page within the UnilaHub application.

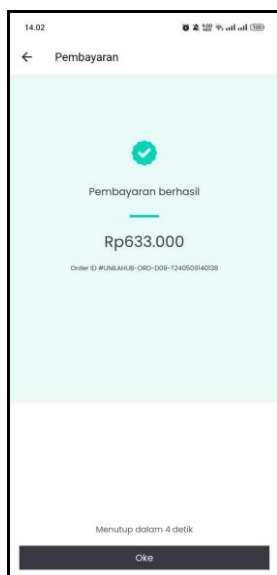


Figure 23. The Payment Transaction Status Page

**Deployment or Delivery and Feedback**

Before delivering the prototype, developers conducted Black Box Testing using the equivalence partitioning technique. The results indicate that the prototype functions correctly according to its intended functionalities.

The next step is to deliver the prototype to users to determine whether it meets their needs. This evaluation is conducted through a User Acceptance Test (UAT), which is performed on each platform separately.

For the Web Administrator, the UAT for feature additions was conducted with seven participants who are employees and managers of the University of Lampung's Business Management Agency (BPU). For the Public Apps, the UAT was conducted with 44 participants from the general public. For the Research Apps, the UAT was conducted with six participants who are faculty members at the University of Lampung.

The results of the User Acceptance Test (UAT) conducted over one week on each platform (WA: Web Administrator, PA: Public Apps, RA: Research Apps) are obtained from the questionnaires distributed to the audiences, displayed in Table 5.

Table 5. UAT Questionnaires Results

Response	Platform		
	WA	PA	RA
Respondents	7	44	6
Questions	15	27	14
Strongly Agree	36	540	29
Agree	56	445	37
Neutral	12	159	18
Disagree	1	28	0
Strongly Disagree	0	16	0

Based on the questionnaire results in Table 5, user satisfaction index calculations were conducted using Equation 1 to measure user satisfaction with the developed prototype. The results of the user satisfaction index are displayed in Table 6.

Table 6. User Satisfaction Index Range

Platform	Index (%)
Web Administrator	84,19%
Public Apps	84,66%
Researcher Apps	82,62%

The calculation results indicate that the index values from the Likert scale fall within the range of 80% to 100%. The user satisfaction index for the Web Administrator is 84.19%. The user satisfaction index for Public Apps is 84.66%. The user satisfaction index for Research Apps is 82.62%. Based on the user satisfaction index shown in Table 2, it can be concluded that respondents for each platform/application feel that the added features developed are "Very Satisfactory" and meet the established criteria.

The results of the User Acceptance Test (UAT) indicate that respondents find the developed prototype "Very Satisfactory." Therefore, the feature development cycle has been completed in one iteration.

The developed feature was highly efficient, with over 80% user satisfaction rate. This is comparable to the satisfaction rates reported for Booking.com and Airbnb. According to a study by Pires and Rafael, Airbnb has a high user satisfaction rate, reflecting the positive feedback seen on their platform. Specifically, Airbnb users appreciated the variety of available options and the ease of booking, which aligns with the positive feedback our platform has received. This comparison highlights the

good position of our service in the university facility rental market [35].

By integrating a payment gateway, users experience seamless transactions, while shipment tracking ensures transparency and reliability in logistical operations. These enhancements meet contemporary consumer expectations and contribute to advancing the field's knowledge on optimizing user satisfaction in e-commerce platforms.

The findings of this study have several implications for developing and optimizing multi-functional platforms. The high user satisfaction rates across different features suggest that our platform effectively meets user needs comparable to or exceeding established platforms in the market. Future research should focus on longitudinal studies to track user satisfaction and performance metrics over time. Additionally, more in-depth comparative studies with direct data from other platforms could provide further insights into the platform's strengths and areas for improvement.

### CONCLUSION

Based on the research and development of the UnilaHub application, it can be concluded that the features for facility rental, product shipment tracking, and payments have been successfully developed. Testing results from samples, including 7 participants who are employees and managers of the Unila Management Body (BPU), achieved a user satisfaction index of 84.19% for the Web Administrator. Additionally, 44 participants from the general public attained a user satisfaction index of 84.66% for Public Apps. In comparison, 6 participants who are faculty members at the University of Lampung obtained a user satisfaction index of 82.62% for Research Apps. These results indicate that users find the developed features highly satisfactory and aligned with the established criteria.

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