Development of Rental Application using Prototyping Method

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	In the modern era of technology, it is crucial to have access to the most up-to-date technical advancements. However, not everyone has the means to regularly upgrade their gadgets to keep pace with these improvements. This phenomenon can be attributed to the exorbitant expenses and transitory demand for technology, particularly in emerging nations like Indonesia, where the rental sector remains inadequately developed. This research proposes the construction of a mobile phone and camera rental application named Quick-Rent. The application is created using the Prototyping method, which is a system development approach. The prototyping method was selected due to its ability to enable developers to evaluate and enhance features depending on user feedback right from the outset of the design process. This application is specifically intended to enhance the efficiency of the leasing process by adapting system features based on user needs analysis. The findings indicated that certain system features were modified based on the user needs analysis. The system implementation process and the 7 scenario of blackbox testing confirmed the validity and usability of these features.

1. Introduction

In the modern digital era, the existence of cellphones as a means of communication and access to information has become crucial in everyday life. As well as other items such as cameras which have become consumer goods that everyone must have. However, not all individuals have the ability to acquire or update their devices according to the latest technological developments(De Mooij, 2019). This is exacerbated by the ever-increasing prices of the latest devices as well as the need to own devices on a temporary basis(Candrasari, 2022; Wong et al., 2019), such as by tourists or professionals who need the device during certain activities. Although rental solutions can be a promising alternative, many obstacles remain, including process efficiency, transaction security, and user trust in the quality of the rental device. Especially in Indonesia, the mobile phone and camera rental market is still in its infancy, and requires innovation and approaches tailored to user needs(Harianto et al., 2022).

Mobile phone and camera rentals provide potential solutions to a variety of social and economic challenges, including reducing e-waste and expanding access to the latest technology. However, there are still gaps in the literature and practice regarding the development of rental applications that integrate specific user needs and local market conditions. The urgency of this research is also driven

by the acceleration of digital transformation which requires innovative solutions to ensure that more individuals can access the latest technology without huge costs (Fauzi et al., 2023; Wijaya et al., 2022).

With the rise and trend of mobile phone rentals, especially various brands, it is now showing that there is public interest in owning an item, but constraints on costs and budget have caused them to turn to renting the item (Setrojoyo et al., 2023; Van Noort & Van Reijmersdal, 2019), looking at this phenomenon, there is an opportunity to implement a system for the digital rental process of goods to make it easier for renters and rental providers to carry out transactional processes by utilizing information systems using system development methods, namely prototyping models (Aristamy et al., 2021; Loh & Hamid, 2021).

Existing studies have identified the prototyping method as one of the most effective approaches in technology product development (Aulia & Candra, 2023; Kleinsmann & Ten Bhömer, 2020; Oktaviana et al., 2022; Riyanti et al., 2023), allowing developers to implement user feedback-driven design early in the development cycle. Prototyping helps in validating the function and usability of the product before launch. Other research by (Ahyati et al., 2024; Monteverde et al., 2023; Rohman & Subarkah, 2024)shows that prototyping can speed up the process of product innovation and adaptation. However, there is a lack of literature regarding the application of this method to rental business models, especially in the Indonesian market, where social and economic dynamics play a role in technology adoption (Janureksa et al., 2022; Mon et al., 2020).

This research will develop and analyze the Quick-Rent application, with a focus on cellphone and camera rental. This application is designed to overcome the problems identified in the traditional rental process through features that ensure transaction security, ensure product quality, and facilitate user access. The main objective is to assess the effectiveness of prototyping methods in producing rental solutions that are not only responsive to user needs (Aditama et al., 2022; Apriyansyah et al., 2024; Wiratama et al., 2022), but also strengthens the customer base through user trust and satisfaction. It is hoped that the results of this research can provide valuable insight for the development of broader rental applications, as well as advance understanding of the implementation of prototyping in the rental business context.

2. Literature Review

To develop a rental application using the prototyping method, it is essential to consider various aspects highlighted in the literature. Prototyping in software development involves translating ideas into software for simulation and utilization in the product development process (Buede & Miller, 2024; Kossiakoff et al., 2020; Wariunsora et al., 2024). This approach facilitates communication between users and designers during the design process, enhancing user involvement and feedback (Lauff et al., 2020; Mohapatra & Rath, 2020). The use of rapid prototyping techniques can aid in the efficient development of the application, ensuring that user needs are met effectively (Burggräf et al., 2020; Kent et al., 2021). In the context of rental applications, previous studies have explored different methodologies for developing rental systems. For instance, a study focused on a car rental system developed an application using prototyping method (Siwa et al., 2020) This demonstrates the importance of incorporating decision-making tools in rental applications to enhance user experience. Furthermore, the use of advanced technologies such as Prototyping model has been suggested to improve apartment rental advertisements, especially in response to challenges like those posed by the COVID-19 pandemic (Yu & Fan, 2023). Additionally, the development of a Web-Based Rental House Smart Finder using Rapid Application Development has been proposed to simplify the process of searching for rental properties and enhance communication between landlords and clients (Dirgantoro et al., 2021; Monteverde et al., 2023). This emphasizes the significance of user-friendly interfaces and efficient search functionalities in rental applications. The development of a rental application using the prototyping method should focus on user engagement, decision support system integration. By incorporating these elements, the rental application can be designed to meet user needs effectively and provide a seamless rental experience.

3. Research Methods

The prototyping method is a development technique that focuses on creating an initial version of a product with the aim of testing a concept or process and making improvements before developing the final product (Ibrahim et al., 2023; Kunicina et al., 2020). This is a user-oriented approach, which

relies heavily on feedback from end users to shape product development (Rony et al., 2023; Sumesta & Satyawan, 2024). This method helps in minimizing the risks and costs associated with launching a product that may not meet user needs.In the context of building a web-based rental system, prototyping focuses on creating an initial model of the system that will be used to demonstrate, test, and refine the required functions before the complete system is built (Rachmad et al., 2023; Sudipa et al., 2023). This allows development teams and users to visually observe and interact with the system, identifying design issues, functionality deficiencies, and opportunities for improvement before investing significant time and resources in development
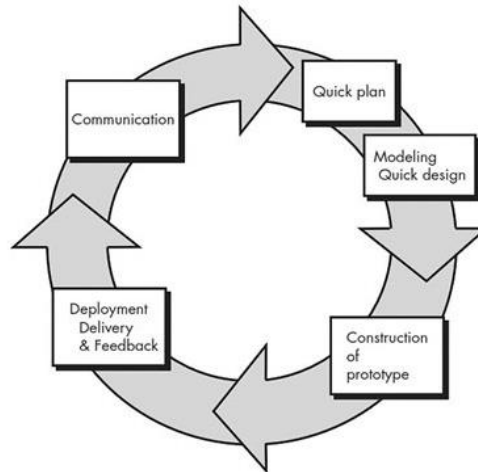

Figure 1. Prototyping Method

The utilisation of the prototype method is highly strategic and efficient while creating an e-rent system to facilitate transactions. The process commences with the initial stage of user requirements identification, wherein comprehensive data is gathered regarding the precise feature requisites of the mobile phone and camera rental system. This encompassed the requested functionalities, necessary security measures, the sequence of transactions, and the preferred user interface. Upon identifying the needs, the development team created an initial design of the programme, encompassing the interface and user experience (Oktaviana et al., 2022; Putri et al., 2024; Wahanani & Swari, 2023). This preliminary design offered a general understanding of the fundamental concept and functioning of the app, while it has not been fully completed or confirmed. Based on the information collected during the requirements collecting stage, the development team creates an early wireframe or mockup of the web-based system. Typically, these prototypes prioritise navigation and interface design, along with fundamental user behaviours like creating an account, searching for products, and processing orders. Prototypes undergo real-world usage scenario testing conducted by user groups that represent the intended market. The objective is to collect comments regarding the lucidity, user-friendliness, and efficacy of the rental process flow. Usability and functionality testing sessions can be conducted online to perform this testing. All feedback acquired during testing is incorporated into the design. The prototype has been redesigned and enhanced to specifically address noted issues, optimise navigation, and improve system functionality. This procedure is iterated multiple times, with each iteration yielding an enhanced version that approaches the ultimate product. Once the prototype has achieved a satisfactory level of quality and all functional requirements have been confirmed, the full development phase of the web-based system commences. This include the development of the backend code, integration of the database, implementation of security measures, and the final customisation of the user interface. Implementing the prototyping approach during the creation of a web-based iPhone item rental system not only minimises the chances of system malfunction but also enhances user contentment by guaranteeing that the established system fulfils or surpasses their expectations right from the initial launch. It also enables

quick adjustment to evolving market demands or emerging technologies of the transactional processes necessary to streamline the business process of renting products.

4. Results and Discussions

Requirement Analysis

The system analysis stage will be carried out to collect the data needed for research based on the theory that has been studied previously. This stage also aims to obtain information regarding the expectations of users of the system to be developed. The analysis carried out in this research is based on observations or events during the equipment rental process to support an activity or events. Before building a mobile-based goods rental information system, researchers must first study the goods rental flow. Based on the needs analysis, there are several system features required, namely.

a) Registration is a feature for users who want to register with the system
b) User Login is a feature to enter the system.
c) Viewing and Searching for Items is a feature for users to search for and view information on items they want to rent.
d) Viewing Item Categories is a feature for users to view types of items or select items as desired.
e) Item Rental Order is a feature for users who will later order and rent the selected items.
f) Check Rental Orders is a feature for users to confirm items to be rented and confirm items have been returned.
g) Add Items is a feature for admins to add item data according to user requests which will later be rented to the system.
h) Edit Items is a feature for admins to change item data according to user requests in the system.
i) Viewing the Number of Users and Items is a feature for admins to view the number of users and items.
j) Delete Items is a feature for admins to delete item data in the system.

System Design

The system design uses unified modeling language (UML) modeling, using use case diagrams to make it easier to describe the processes that can be carried out by actors or system users. UML offers the benefit of generating diagrams that effectively elucidate the structure and behaviour of the system. This encompasses many elements such as classes, objects, packages, and components, along with their interactions. These visualisations are quite valuable for comprehending the entire system as well as specific intricacies.

Use Case Diagrams

Use case diagrams describe the relationships or interactions between actors and use cases that will be created in the system. The mobile-based goods rental information system has 2 actors, namely admin and user. The Use Case Diagram display can be seen in Figure 1. The use cases that will be created in this information system are:
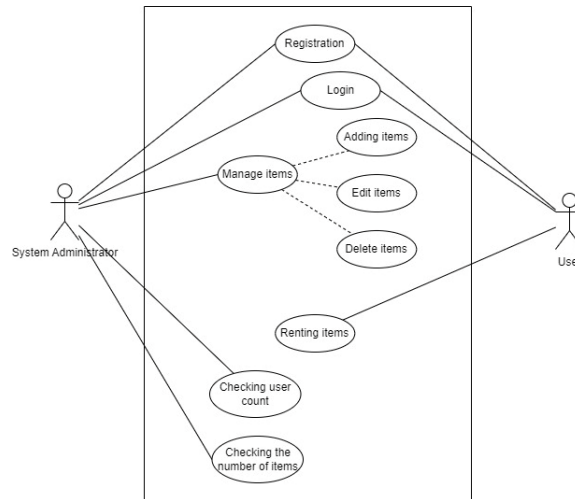
Fig.1. Usecase Diagrams

Based on Figure 1, several processes in the item rental system can be explained, namely the registration process, the login process, the process of viewing and searching for items to be rented, viewing the item categories or selecting items as desired, the process of ordering and renting the selected items, the process of confirming the items to be rented. and confirming that the goods have been returned, the process of adding item data according to user requests which will later be rented to the system, the process of changing item data according to user requests in the system, the process of viewing the number of users and items and deleting item data in the system.

Activity Diagram Order Goods Rental

The activity diagram explains the flow of activities starting from the user selecting the item to be rented, then the application will direct the detail page of the item to be rented, when renting the user can see the item information first before renting, then the user fills in or determines the rental date for the item being rented. will be rented, then the application will redirect to the basket page, but if the user wants to save the item without pressing the submit button then the user can select the item again, but the user continues to rent and the application will save the order before confirming.
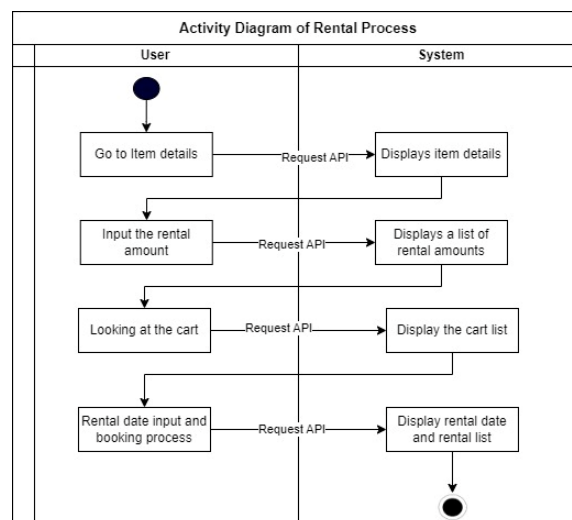

Fig.2. Activity Diagram Order Goods Rental

System Implementation
Display Interface PageRegistration Form

The Registration Form will appear when a prospective user wants to enter the system as a user. In the Registration Form, prospective users can complete the form provided, then press the Register and Success button, then prospective users will be directed to the Login Menu. The registration form display can be seen in Figure 3 below.

Fig.3. Registration Form Display

Logout Display Interface Page
    If the user wants to leave the system, they can look for the Logout action on the profile page, then the display will look like Figure 4 below.
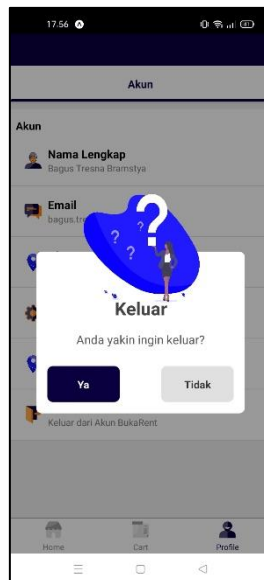

Fig. 4. Logout display

Main Page Display
    On the main page there are several menus, namely Home, Cart, Profile, Search, Check History and Notifications. On the Home menu there is information about all available items. In the Cart menu there is information about the items to be rented. In the Profile menu there is a user account page. The Search menu functions to search for items according to what is needed. In the Check History menu there is information about the items being rented by the user and there is a History which functions to display all of the user's loan history. In the Notification menu there is information about all activities carried out in the system. On the Rental Page in Item Details, if the user wants to carry out the process of renting items, the user must fill in the desired borrowing date then click the Rental

button and will be directed to the Cart Page. On the Cart Page there will be information about the items to be rented, the status of the goods and a Submit button. To continue the process of renting items the user selects which items will be rented by checking the items to be rented then clicking the Submit button, then the status of the rental items will be has been confirmed and information on items that have been rented will be entered on the History Check Page. The Rental Page View in Item Details can be seen in Figure 5.

Fig. 5. Rental Display in Item Details

Rental Success Display Interface Page

If the user has selected the item he wants to rent and clicks the Rent button, the item to be rented will be on the Cart Page. When the user clicks the Submit button on the Cart Page, a successful rental notification will appear. The Rental Success Page can be seen in Figure 6 below.
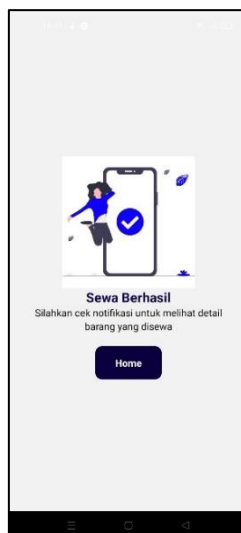

Fig. 6. Rental Success Display

Return Goods Display Interface Page

If the user wants to return the rental item by clicking the Return Item button, a notification will appear. The Return of Goods display can be seen in Figure 7 below.

Fig. 7. Return of Goods Display

Profile View Interface Page

On the Profile Page there is information about the user's personal data on the system. On the Profile Page there is a Settings button which functions to change the user's personal data, the About Us button contains information about the system used and the Exit button functions if the user has finished using the system and wants to exit the system. The profile page display can be seen in Figure 8 below.
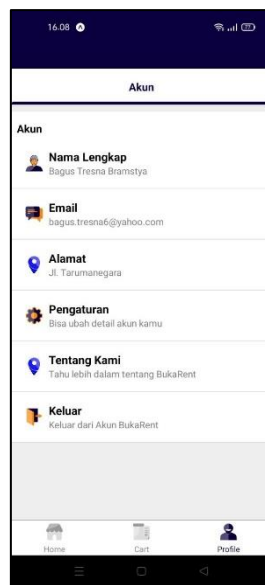
Fig. 8. Profile Page Views

Admin Main Page Display Interface

On the Main Admin Page there is a Dashboard which functions to display the Number of Users, Number of Items and Number of Items Rented. In the Items Menu there are submenus, namely All Items and Add Items, in the All Items submenu displays all items registered in the system, in Add Items the function is to add the types of items that will be entered into the system. The appearance of the Admin Main Page can be seen in Figure 9 below.

Fig. 9. Admin Main Page Display

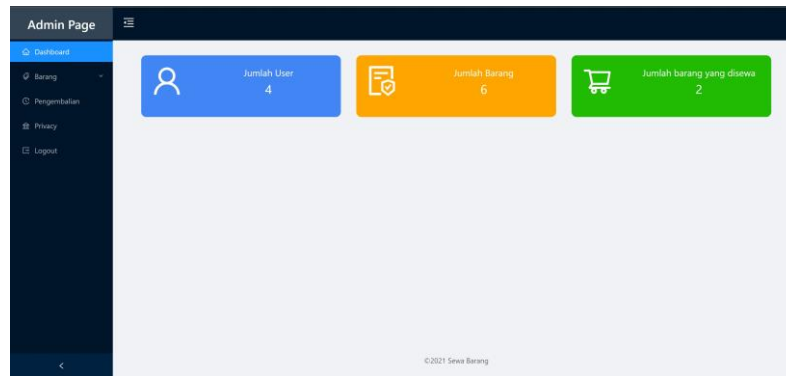The system implementation differs slightly from the author's system design. The previously specified system implementation features differ. From data entry to tables and previous system information. The Main Page, Item Detail Page, Profile Page, and Admin Page have separate user interfaces. Because of several obstacles in making the user interface on the Main Page, if the user interface is implemented the same as the previous design, the Main Page will be too full of information to display, while the Item Detail Page, Profile Page, and Admin Page adjust with the system's creation. The system is tested as designed.

Pengujian Blackbox Testing

Blackbox testing is used for system testing. This method tests application functionality without understanding its structure or code. In other words, black box testing checks application input and output without knowing its core operations. When there are differences between the application's intended and actual behaviour, such as malfunctions in the transaction process, UI issues, or noncompliance with functional requirements, these discrepancies can be easily identified with this method.

Table 1. Blackbox Testing

System Features	Test scenarios	Results
Registration and Login	Functionality works fine	valid
Goods Rental Process	Functionality works fine	valid
Goods Management Process	Functionality works fine	valid
Goods Category Management	Functionality works fine	valid
Goods Transaction Management	Functionality works fine	valid
Management of Goods transaction details	Functionality works fine	valid
Admin Main Page Process	Functionality works fine	valid

According to the blackbox testing table, it can be inferred that all the system features, including registration and login, item rental process, item management, item category management, item transaction management, item transaction detail management, and admin main page, function as intended. The test results are deemed valid.

5. Conclusion

The research concludes that the prototyping technique may be effectively applied in the creation of a mobile phone and camera rental application. This method is specifically developed to address challenges encountered in the traditional rental process, such as improving process efficiency and enhancing user trust. In the era of digitalization, the option of renting technology items is a viable solution for individuals who are unable to afford the latest gadgets or require them for a short period

of time. The Quick-Rent app aims to cater to users' individual requirements by guaranteeing transaction security and product excellence, while also enhancing accessibility to cutting-edge technology. During the app's development, the utilisation of the prototyping process enables developers to evaluate and improve features depending on user feedback at an early stage. This study outlines the sequential steps involved in creating a product, starting from identifying requirements, designing an early version, testing a prototype, and finally developing the whole system. It highlights the significance of user interaction in ensuring that the product is both responsive and gratifying. The blackbox testing method used for system testing demonstrates that all functionalities function as anticipated and are deemed valid. The system's functionality, including item administration, registration, and the rental process, operate smoothly, delivering a user-friendly and efficient experience for users. This demonstrates that the application is capable of fulfilling the functional requirements satisfactorily, hence validating the efficacy of the prototyping process in the creation of this application. The implementation of the system has revealed that prototyping enables iterative customisation and enhancement of features based on user feedback, resulting in heightened user happiness and trust in the system. The system features have been customised to analyse user requirements, and the process of system installation and testing has demonstrated the validity and usability of these features.

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