

Mobile and Web Application for an Online Computer Store and Computer Technical Services

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ABSTRACT

Cahaya Komputer is one of many companies engaged in the computer store as well as a computer service center business. Cahaya Komputer currently does not apply a computerized system in its computer store and service. The problem in this study is currently, Cahaya Komputer has not implemented a computerized system in its computer sales and service. This results in the inefficiency of the purchasing or service ordering process. This paper aims to present a process of developing an application to provide a solution to this study. The applications built in this paper are an Android application and a web application. The result of this paper is that the built Android application and web application can help the process of buying and selling computer devices and accessories. These applications also aim to record orders and computer services.

General Terms

Mobile Application, Web Service, Web Application.

Keywords

Application, Mobile, Android, Commerce, Computer service, Computer.

1. INTRODUCTION

Cahaya Komputer is one of many companies engaged in the computer store as well as a computer service center business. This company offers buying and selling computers and computer accessories or spare parts. In addition, Cahaya Komputer provides various types of computer services such as computer specification upgrades, repairs, and computer condition checks.

Currently, Cahaya Komputer has not implemented a computerized system in its computer sales and service. This results in the inefficiency of the purchasing or service ordering process. Consequently, customers often face difficulties in tracking the progress of their computer repairs or knowing what items are available for sale, leading them to constantly inquire with the owner of Cahaya Komputer for such information, which is highly inefficient [1], [2]. Therefore, the authors have decided to develop an e-commerce and service application to address the needs, load nature, and service quality requirements while reducing downtime and energy consumption [3].

The applications developed in this research are an Android device application and a web application. Android is an open-source Linux-based operating system that runs on mobile devices such as smartphones and tablets [4]. The web application utilizes technologies such as REST-API developed using Laravel with the PHP programming language and the MySQL database management system (DBMS). Web applications are software accessed using a web browser

through a network like the Internet or intranet, providing a safe process for users to do useful activities [5].

With the development of these applications, the authors hope to be able to facilitate both the owner and customers in conducting transactions such as services and the buying and selling processes of computer devices and accessories. These applications are expected to assist the owner in recording orders and service progress for customers so that all recorded information can be generated into reports and made available for viewing by the respective customers, thus facilitating the ordering process and payment by customers.

2. METHODOLOGY

This research was conducted through various ordered stages. The first stage of this research is site survey, in which the researcher will visit several locations to conduct surveys to determine the research location. Following this is data collection, with data gathered using literature review, interviews, and observations.

2.1 Observation.

Observation is a data collection method used in qualitative approaches, including traditional and institutional ethnographies, to explore how people's activities are coordinated or ruled by different institutions [6]. In this research, the researcher conducted one observation session. The researcher engaged in purchasing and installing computer spare parts during the observation process.

2.2 Interview.

A session of questions and answers conducted by an individual with one or more respondents to achieve specific goals [7]. In this research, one interview was conducted with the business owner to obtain the necessary data for the development of a web and mobile-based computer service and store management application.

2.3 Literature review.

A literature review article provides a comprehensive overview of literature related to a theme, theory, or method and synthesizes prior studies to strengthen the foundation of knowledge [8]. In this research, the researcher studied and analyzed previous studies relevant to the current research.

The third stage involves analyzing the existing system and the new system to be developed. The final stage encompasses application development, which entails developing the applications to be utilized in this research. These stages can be illustrated by the figure below.

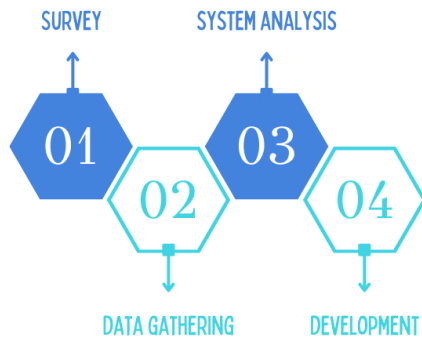


Fig 1: Research stages

3. RESULTS AND DISCUSSION

3.1 System Analysis

3.1.1 Current System Analysis

In the current system, customers manually inquire about the progress of their device repairs. This system has weaknesses whereby if there are too many customers inquiring about repair progress, service providers sometimes cannot respond promptly. Customers also must come in person just to browse the items for sale or if they want to submit items they want to sell. This is also a drawback as it can complicate the process of buying and selling goods for customers. For further clarification, refer to Figure 2.

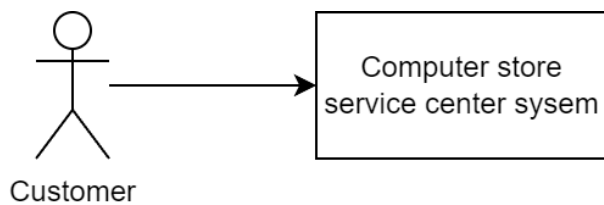


Fig 2: Current System

3.1.2 Proposed System Analysis

Based on the shortcomings of the old system, this study proposes a new system by designing an Android-based application that displays data for placing orders, with the necessary data stored in a database. For further details, refer to Figure 3.

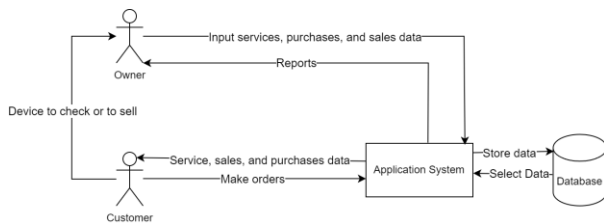


Fig 3: Proposed System

3.2 Functional Analysis

3.2.1 Input Requirements

- a) The system should be able to input services data.

- b) The system should be able to input order data.
- c) The system should be able to input items catalogue data.

3.2.2 Process Requirements

- a) The system should be able to display necessary data both within the application and in reports.
- b) The system should be able to store, update, and delete data into the database.

3.2.3 Output Requirements

- a) The system should function effectively according to its objectives.
- b) The application interface should have a clear design with good user experience.

3.3 Non-Functional Analysis

In designing this application, several software requirements are necessary. These include Windows 10/11 operating system, Visual Studio Code, MySQL, React Native, NPM, PHP, Laravel, and Windows Power Shell. Additionally, specific hardware requirements are essential for the application design, such as a computer with a minimum specification of 8 gigabytes of RAM, 2.4 GHz CPU, 4 Gigabytes of available storage and an Android phone with a minimum specification of Android version 6, 3 gigabytes of RAM, and 100 megabytes of available storage.

3.4 System Logic Analysis

3.4.1 Data Flow Diagram (DFD).

A data flow diagram is a visual representation of the flow of information in a business process [9]. In DFD level 1, depicted in Figure 4, there are 2 external entities: Customer and Admin. For the Customer, there are several data flows including member account data, purchase data, and services data. For the Admin, there are several data flows such as sales data and services data.

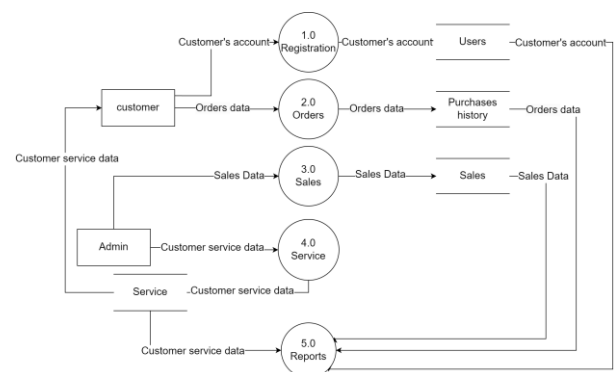


Fig 4: Data Flow Diagram Level 1

3.4.2 Entity Relationship Diagram

Entity Relationship Diagrams are used to identify all elements of a future system and their relationships and dependencies during the design stage of information systems [10]. In the Entity Relationship Diagram (ERD) depicted in Figure 5, there are 8 entities: member, orders, purchase detail, services, services detail, customer, catalogue, and admin.

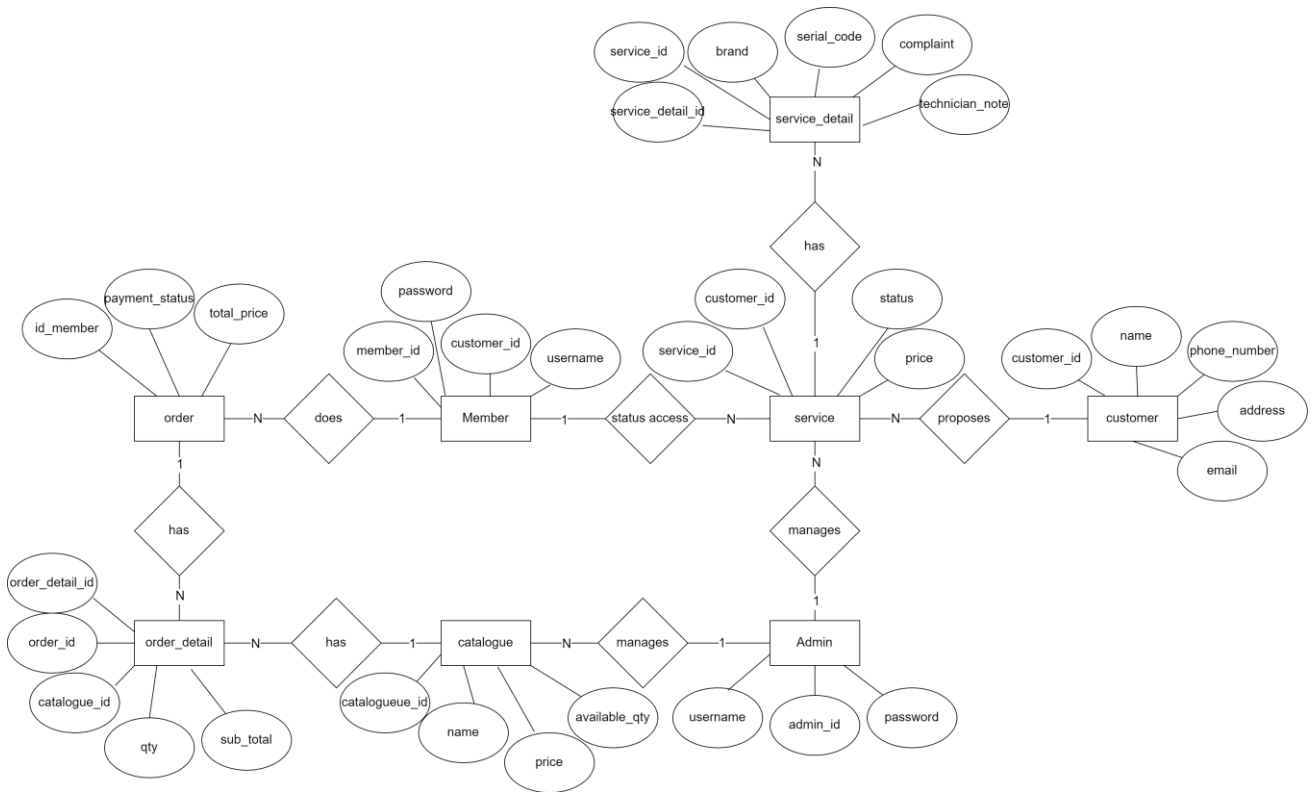


Fig 5: Entity Relationship Diagram

4. IMPLEMENTATION

Below are the implementations of the system into the Android application and the web application.

4.1 Android Application

4.1.1 Login Screen

The login screen functions to display a login form, which will then be filled out by the user to undergo the user authentication process. The login screen can be viewed in Figure 6 below.

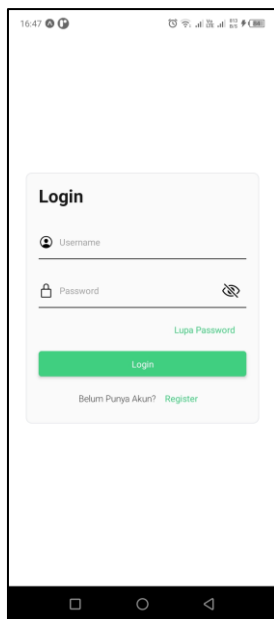


Fig 6: Login Screen

4.1.2 Register Screen

The Register Screen is for registering new user accounts. Here, there are two options: the first one is for registering accounts for existing customers, and the second one is for registering accounts for new customers. Figure 7 below shows the display of the register screen.

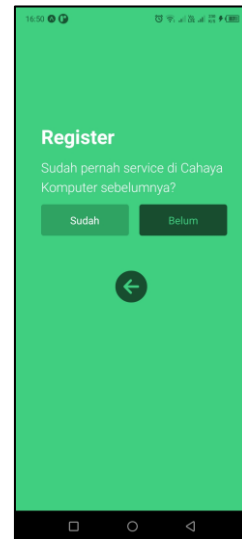


Fig 7: Register Screen

4.1.3 Register Existing Customer Screen

When the user selects "existing," they will be directed to the register screen for existing customers. Here, existing customers can search for their relevant customer data to create their account by searching for customer data based on the customer's phone number that has previously made transactions or used the service. They will then fill in their username and password

for creating their account. Figure 6 below shows the register user interface for existing customers.

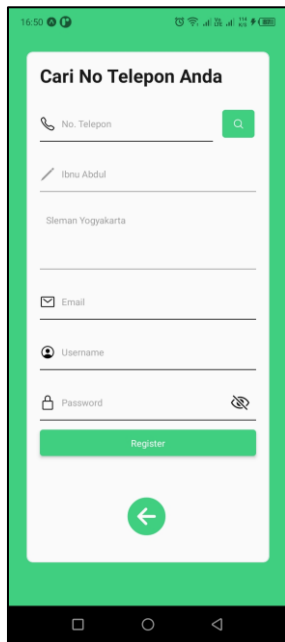


Fig 8: Register Existing Customer Screen

4.1.4 New Customer Register Screen

When the user selects "not yet" they will be directed to the register screen for new customers. Here, customers who have not previously made any transactions or used the service can fill out the registration form to create an account as a new customer. Figure 9 below shows the register user interface for new customers.

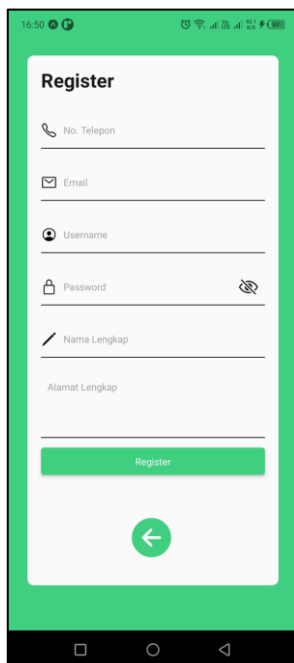


Fig 9: New Customer Register Screen

4.1.5 Home Screen

After successfully logging in, the user will be directed to the home screen, which displays the list of ongoing services (if any) and the list of items for sale. Figure 10 below shows the home screen interface.

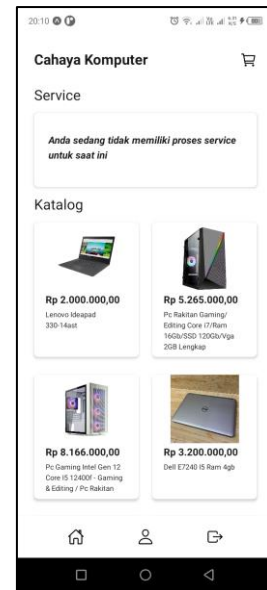


Fig 10: Home Screen

4.1.6 Product Detail Screen

When the user taps on a product on the home screen, they will be redirected to the detail screen of that product where they can view the product description and purchase it. Figure 11 below shows the interface of the product detail screen.



Fig 11: Product Detail Screen

4.1.7 Cart Screen

When the user touches the "cart" button on the home screen, they will be redirected to the cart screen where they can view the contents of their shopping cart. Figure 12 below shows the interface of the cart screen.

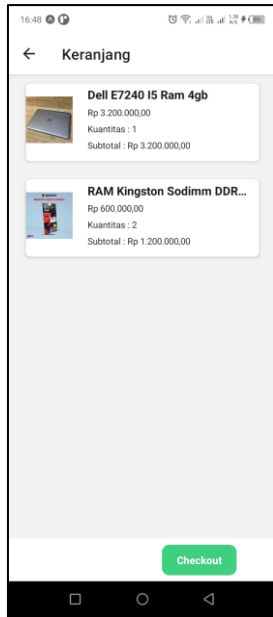


Fig 12: Cart Screen

4.1.8 Checkout Screen

When the user places an order for items in their cart, they are redirected to the checkout screen. Here, the items to be purchased, their prices, subtotals, and grand totals are displayed. Currently, the payment method still uses bank transfer, where the user will later be contacted by an administrator to send proof of payment, after which the administrator will update the payment status of the user's order. The checkout screen is displayed in Figure 13 below.

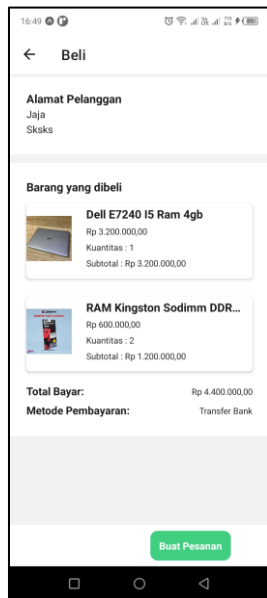


Fig 13: Checkout Screen

4.1.9 Profile Screen

On the home screen, when the user taps the "User" icon, they will be redirected to the profile screen containing navigation buttons to access the service status and the user's transaction history. The user profile screen is displayed in Figure 14 below.

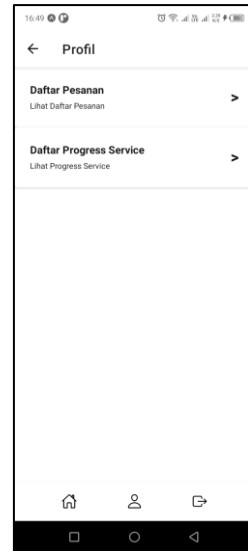


Fig 14: Profile Screen

4.1.10 Transactions List Screen

When the user taps on the "transaction list" icon on the home screen, they will be redirected to the transaction list screen where they can view all transactions performed by the user. Figure 15 below shows the interface of the transaction list screen.

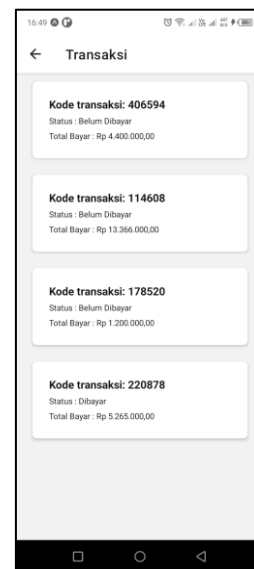


Fig 15: Transactions List Screen

4.1.11 Transaction Details Screen

When the user touches one of the cards on the transaction list screen, they will be redirected to the transaction detail screen where they can view the details of the user's transaction. Figure 16 below shows the interface of the transaction detail screen.

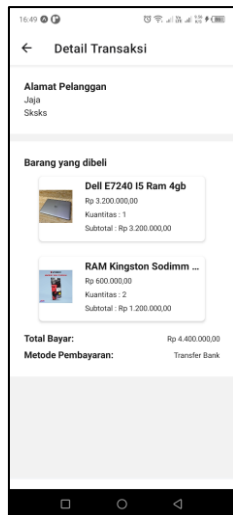


Fig 16: Transaction Detail Screen

4.1.12 Service Detail Screen

When the user taps on a service card, they will be directed to the service detail screen where they can view the detailed progress of the ongoing service. Figure 17 below shows the interface of the service detail screen.



Fig 17: Service Detail Screen

4.2 Web Application

4.2.1 Admin Login Page

This page is the first page seen by the administrator when accessing the admin web application. The admin login page can be seen in Figure 18 below.

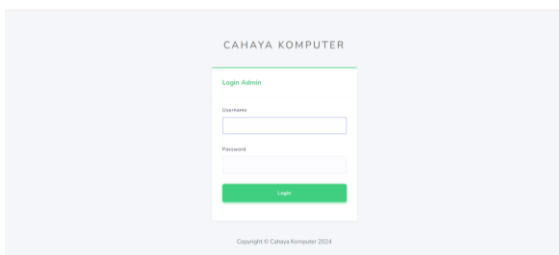


Fig 18: Admin Login Page

4.2.2 Catalogue Item Management Page

This is the catalogue item management page. Here, the admin can view, add, update, and delete catalogue item data. Figure 19 below shows the interface of the catalogue item management page.

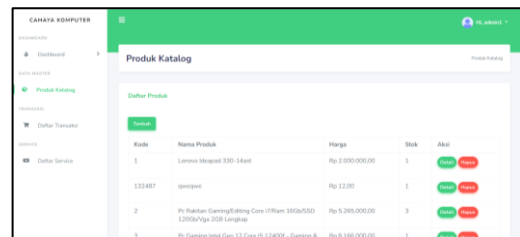


Fig 19: Catalogue Item Management Page

4.2.3 Transactions Management Page

This page represents the transaction management interface. Herein, the administrator possesses the capability to observe and modify transaction statuses, as well as review data details. Figure 20 below illustrates the transaction management interface.

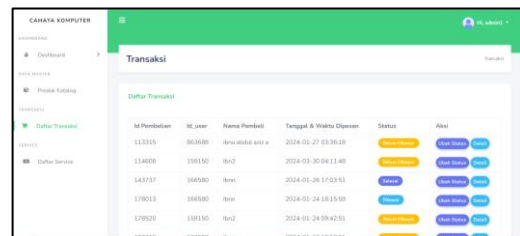


Fig 20: Transactions Management Page

4.2.4 Services Management Page

This constitutes the service management interface. In this domain, the administrator holds the capacity to view, add, update, and delete service data. Figure 21 below exemplifies the interface of the service management page.

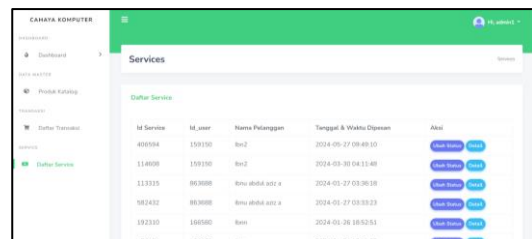


Fig 21: Services Management Page

5. TESTING

In this phase, the researcher performs application testing to ascertain whether the functionalities and features align with the researcher's expectations or otherwise. The Black-Box Testing method is employed in this study to evaluate the application. Black-box testing aims to check whether a program runs properly without knowing the program code [11]. Black-box testing, using methodologies such as Equivalence Partitions, is geared towards uncovering errors in functions, interfaces, data structures, database access, performance, initialization, and final destinations within applications. [12]. The result of both Android application and web application Black-Box Testing will be provided in Table 1 and Table 2 below.

Table 1: Android Application Black-Box Testing

No	Scenario	Testing	Result
1	Application Installation	Executing the installation process, typically initiated by tapping on the APK file or accessing it through a file manager application	Successful
2	Starting Screen	Displaying the home screen and redirecting the user to the login screen facilitate user access to the application's functionalities and features.	Successful
3	Login Screen	Displaying the login screen, executing authentication procedures, and subsequently guiding the user to both the register and home screen	Successful
4	Tapping the Register button	Displaying the registration page and facilitating redirection to both the registration screen for new customers and the registration screen for existing customers enables efficient user onboarding and account management within the application.	Successful
5	Tapping the “Existing” button	Displaying the registration screen for existing customers, allowing them to sign up, and then redirecting them to the login screen.	Successful
6	Tapping the “Not Yet” button	Showing the registration screen for new customers, completing the registration process, enabling redirection back to the registration screen, and redirecting the user to the login screen.	Successful
7	Tapping one of the product cards	Displaying the product detail screen and providing the option to redirect the user back to the home screen and adding items to the shopping cart.	Successful
8	Tapping the cart icon	Displaying the contents of the cart and being able to proceed with the checkout.	Successful
9	Tapping the “Make Order” button	Make an order and adding the order data to the database.	Successful
10	Tapping the Profile Icon	Displaying the profile screen and providing the option to redirect to the transaction list and service list screens.	Successful
11	Tapping the transaction list button	Displaying the transaction list page and providing the option to select one of the transactions to see the details	Successful
12	Tapping one of the transaction cards	Displaying the details of one transaction.	Successful
13	Tapping the Services button	Displaying the service detail screen and providing the option to redirect the user back to the home screen.	Successful

Table 2: Admin Web Application Black-Box Testing

No	Scenario	Testing	Result
1	Accessing the web	Displaying the login screen	Successful
2	Logging in as an Admin	Authenticating the admin credentials. after successfully completing the authentication process, the admin is redirected to the admin dashboard page, where a navigation bar allows access to various sections including the catalogue item management page, transactions management page, and services management page.	Successful

3	Accessing the catalogue item management page	The admin can view, add, update, and delete catalogue item data	Successful
4	Accessing the transactions management page	The admin can view, update transaction status, and view the details of the data	Successful
5	Accessing the services management page	The admin can view, add, update, and delete services data	Successful

6. CONCLUSION

Based on the findings of the research, the researcher concludes that, at present, only the user application has been developed. The user application is fully operational, encompassing functionalities such as registering new customer accounts, logging in, conducting the purchasing process, and monitoring service statuses. Additionally, an admin web page has also been developed.

This research has yielded a computer sales and service application intended for the management of sales and service operations related to computers. Initially, sales and service management processes were conducted manually, lacking digitization. However, with the introduction of this application, both customers and business owners can seamlessly conduct transactions and utilize services.

The utilization of web and mobile technologies for digitization purposes offers remarkable flexibility, enabling customers and business owners to access and manage the application conveniently, irrespective of time and location. Ideas for future research development include adding a feature to select a location using Google Maps for address determination, integrating additional payment gateway methods, implementing a customer service chat feature, and introducing a feature for users to submit items for sale.

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