Developing a Mobile-based Reservation System: Rest API for Barbershop

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ABSTRACT
Nowadays, hair care is one of the appearance factors that are often considered by men. This is reinforced by the increasing barbershop business that has sprung up today. However, in the midst of the development of the barbershop business, not a few barbershops use WhatsApp as a medium for making reservations and choosing services provided by barbershops. Service through WhatsApp media cannot handle customer queues and has obstacles, namely it is difficult to determine which customer comes first because the barbershop must always see an empty schedule, it is not uncommon for the barbershop to forget and cause the customer's schedule to clash with other customers. To overcome these problems, an application was built that can process android-based customer queues as a solution for ordering queues to be more organized and effective. With the development of this application, it can make it easier for barbershops to handle queues and not have to worry about clashing schedules. Customers are also easy to make reservations online and can directly choose the facilities and services provided by the barbershop.

General Terms
REST API, Kotlin, Android Studio

Keywords
Application, Online Reservation, Barbershop, Technology

1. INTRODUCTION
Hair care and treatment has evolved significantly through the years as new formulations are continuously being explored in an attempt to meet the demand in cosmetic and medicinal fields [1]. Nowadays, hair care is one of the appearance factors that men often pay attention to. This is reinforced by the increase in barbershop businesses that have sprung up at this time. To support the sustainability of the system, a technology is needed. Technological developments affect human life. With the penetration of mobile phone users reaching 124% and the internet reaching 64%, it encourages various mobile applications [2]. So an application was built that can process android-based customer queues as a solution so that the order queue becomes more organized and effective. Digitalization of industrial production, also known as Industry 4.0, may have profound environmental impacts, raising both hopes and fears with regards to the environmental friendliness of manufacturing [3]. With the development of this application, it can make it easier for barbershops to handle queues and not have to worry about schedule clashes. Customers can also easily make reservations online and can directly choose the facilities and services provided by the barbershop. Barbershop is one type of business engaged in the world of services. Barbershops cater to men's grooming needs, and offer a variety of solutions for men to decide on trending hairstyles. Hairstyles reflect the self-image of individuals against the background of prevailing cultural and political views [4]. A system is needed so that customers can easily make reservations. the system is made into a mobile-based reservation application to optimize digitalization and technology utilization [5] in barbershop, Bedda Hair House.

Reservation or booking is not a new concept [6]. Bedda Hair House Barbershop has been established since 2020 which is located in Pandowo Harjo, Sleman District, Sleman Regency, Yogyakarta Special Region. Proven by the increasing number of barbershop businesses that have sprung up today, consumers can find barbershops easily, especially in the Sleman area. Finally, practical issues about the application of the road reservation system are discussed [7]. The current procedure at Bedda Hair House barbershop is to come directly to the barbershop or use WhatsApp or Telephone media to make reservations to the barbershop. This then causes inaccurate information, unrecorded customer order data and can cause clashes with other customers which can cause customers to be disappointed. Transaction data includes numeric values of the transactions and the date/time when the transactions are recorded, and textual data such as descriptions [8].

Much of the research in software engineering has focused on developing methods, techniques and tools, and much less research on exploring the foundations of software engineering, including identifying fundamental principles [9]. In this research, an application system will be built by utilizing Android-based Online Reservation so that it can help the Bedda Hair House barbershop in overcoming the problems of the queuing process and also services at the barbershop. Procedural model for project management can use a plan-based method that follows the classic waterfall process [10]. As for the software development, Kotlin language is used as well as the utilization of REST API. REpresentational State Transfer (REST) is the de facto standard to design, develop, and deploy mobile-based applications in cloud environments [11]

2. RESEARCH METHOD
The transition from approaches based on a directly code creation to model-driven software development proses the modeling as one of the first most important things in the all field of engineering [12]. The waterfall model is one of the SDLC models that is often used in the development of information systems or software. This transformation is a huge undertaking impacting all aspects of the software development life cycle (SDLC), including the quality management system [13].

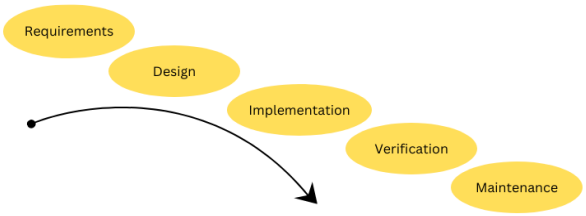

Fig. 1 Waterfall Method

This model uses a systematic and sequential approach. The stages in this model start from the planning stage to the maintenance stage and are carried out in stages.

2.1 Data Collection Procedure

In this research, data collection procedures refer to the steps or methods used to collect information or data needed in a research or study. The purpose of data collection procedures is to obtain accurate, relevant, and reliable data to answer research questions or fulfill research objectives.

2.1.1 Interview

The interview method is data collection through a question and answer process with the barbershop owner directly or through social media. With this method, researchers will get direct information and also the data needed to be implemented into the system to be built.

2.1.2 Observation

The observation method is a data collection technique by direct observation on the spot. Researchers come to the place and see firsthand the reservation and transaction process.

2.1.3 Literature Study

This literature study method is carried out by looking for data sources from various books, journals or other media related to research to complement the data that has been obtained.

2.1.4 Primary and Secondary Data

In this study, data was obtained from the owner and customers of Bedda Hair House barbershop, they provided information directly related to the research topic.

2.1.5 Data Collection Location

The location chosen by the author in this research is at Bedda Hair House Barbershop which is located at Pandowo Harjo, Sleman District, Sleman Regency, Yogyakarta Special Region.

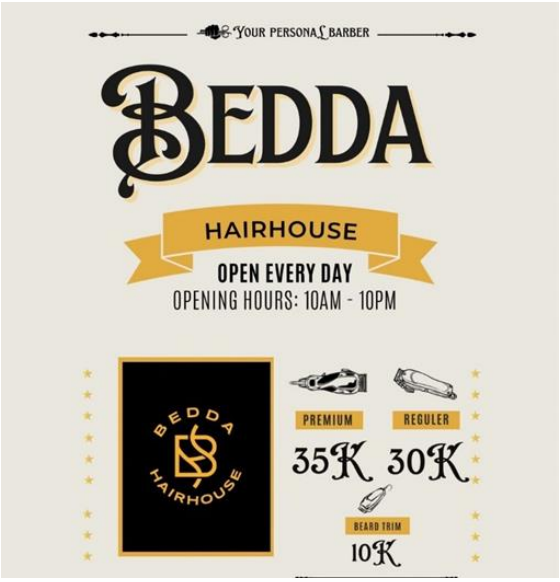

Fig. 2 Data Collection Location

2.2 System Design Logic

Logical design involves designing Data Flow Diagrams and Entity Relationship Diagrams. DFD has been constructed using [open-source software tools that provide users with different shapes and environments [14]. This is the step in system design that logically explains how the system will be designed considering the data required by the system.

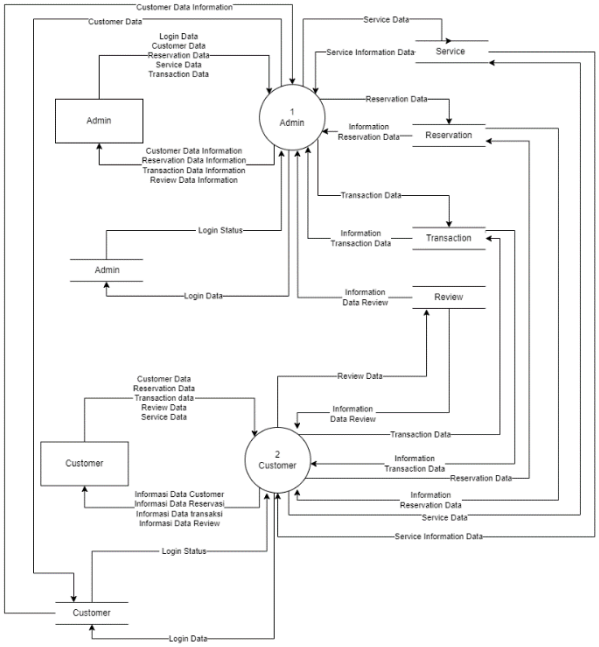

Fig. 3 Data Flow Diagram Level 1

The diagram explains that admins and customers can manage various information. data data can also be updated in real time, so that it can be accessed quickly and easily.

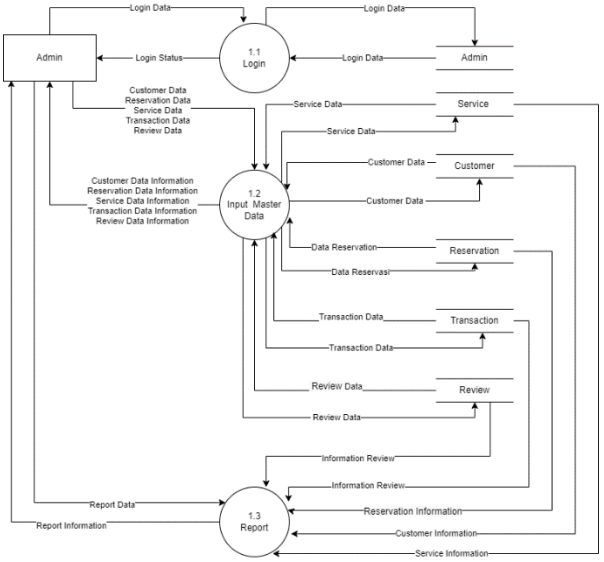

Fig. 4 Data Flow Diagram Level 2 Process 1

Admins can login to access data. Data inputted in the form of service data, customer data, reservation data, transaction data, and even reviews. The data information will be displayed in the form of reports

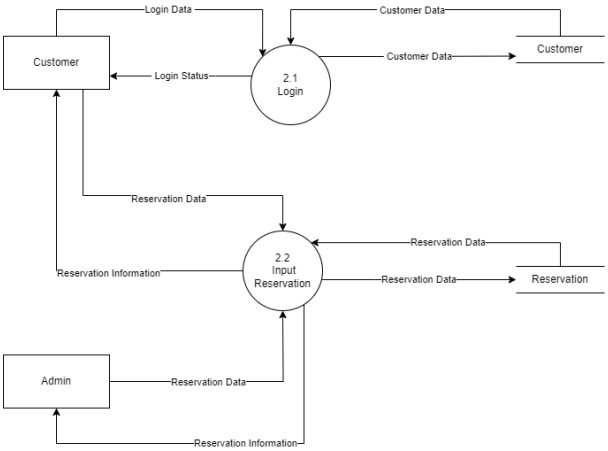

Fig. 5 Data Flow Diagram Level 2 Process 2

This diagram explains the reservation process. The reservation process must be done after logging in, then entering the reservation data data.

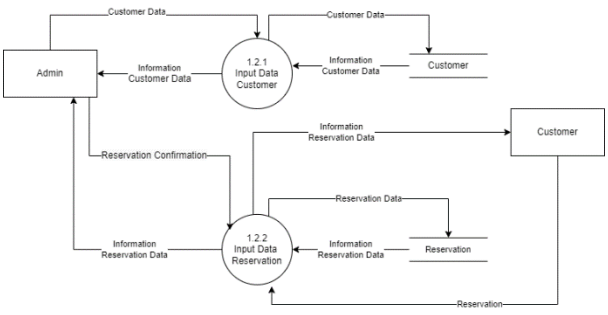

Fig. 6 Data Flow Diagram Level 3 Process 1

the data flow process for admin and customers requires the process of inputting customer data and reservation data. with this data, customers can obtain information.

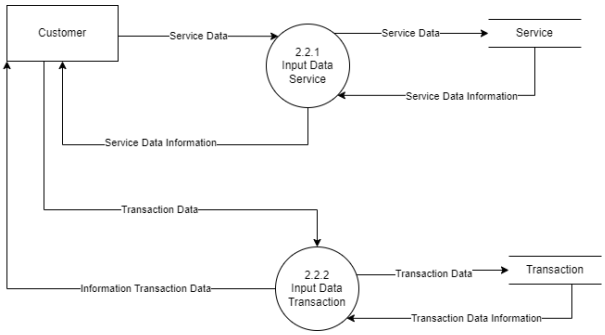

Fig. 7 Data Flow Diagram Level 3 Process 2

The DFD above illustrates the components of a system, the flow of data between them, the origin, destination, and storage of data. ERD is a database design that is interconnected between entities. While ERD is used to see relationships or relationships between entities and their attributes. Explanation of the relationship between the reservation flow process carried out by the customer and the reservation process that will be confirmed directly by the admin.

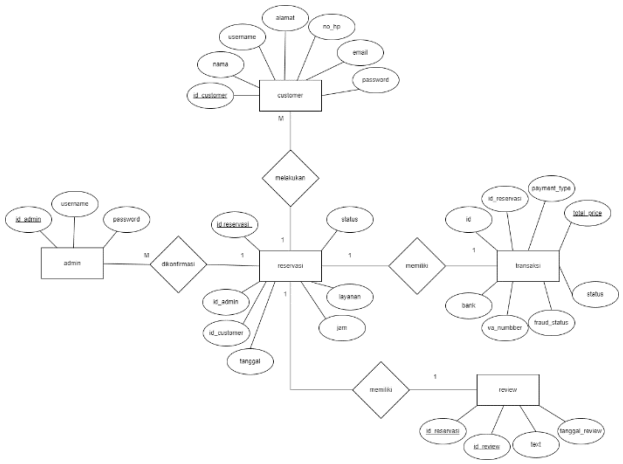

Fig. 8 Entity Relationship Diagram

2.3 Physical Design

Table relation is a relationship or relation between one table and another table in the database. This table relationship is used to combine data from one table with another by matching the primary key with the foreign key.

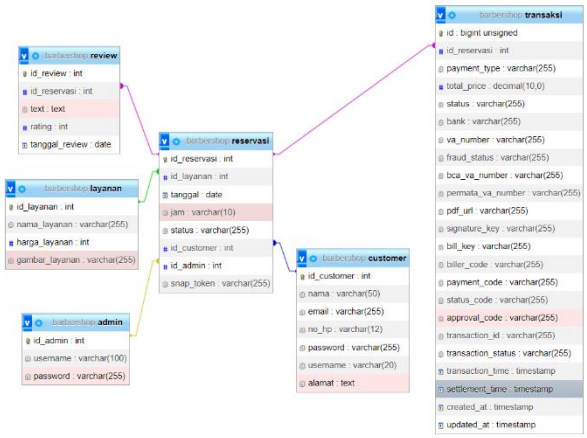

Fig. 9 Table Relations

3. RESULT AND DISCUSSION

3.1 Assumptions

The development of this reservation system is expected to improve the old system in the barbershop. With the new system, customers will find it easier to access information and make reservations for hair treatment.

3.2 Hyphotesis

This hypothesis is based on assumptions obtained and proven in the research stage. This research hypothesizes that "Reservation system with Rest API can make it easier for barbershop to support their performance and customers to make reservations easily and optimally".

3.3 Feature

Analysis of the new system in this barbershop reservation research includes evaluation and testing of the barbershop online reservation application developed to simplify the reservation process, scheduling and types of hair shaving services online. The system developed is a special android-based barbershop reservation application designed using the REST API. Through the android application, customers simply enter the application and login to be able to enter their account. On the initial display of the application, information on the available schedule and also the type of haircut model is shown. Furthermore, there is a reservation menu where customers can choose the schedule and type of service available at the barbershop. Customers can easily make reservations and are immediately directed to the history menu. In this history menu, customers will be shown reservation information that can be seen in status, if it has been accepted by the barbershop, it will be directed directly to the transaction.

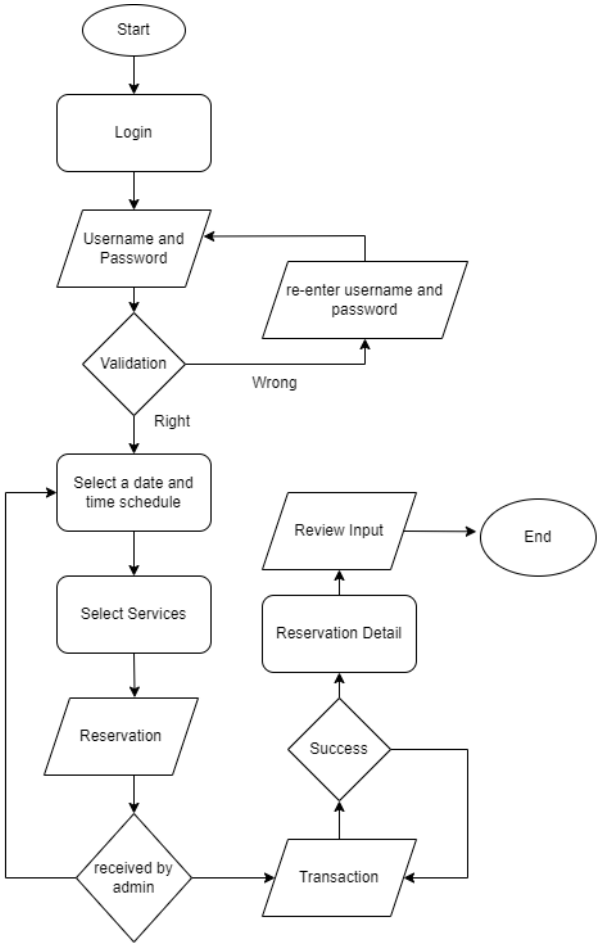

Fig. 10 Flowchart

3.4 Run an Experiment

Android is nowadays the most popular operating system in the world. Implementation is an application process based on the results of system analysis and design that has been done in the previous chapter. In the implementation sub chapter, the process of applying the Kotlin programming language using the Android Studio IDE software for Android application development will be explained. The latter are going through a transition in which the Android ecosystem is moving from the usage of Java as the official language for developing apps, to the adoption of Kotlin as the first choice supported by Google [15].

3.5 Implementations

Implementation aims to realize a system that can be used by users in this case the barbershop admin and customers. The results of the implementation stage are in the form of an android application system for customers and a website for admins that are integrated with each other through the RESTfull API.

3.5.1 Splash Screen & Onboarding Page

The splash page is the page that is first displayed when a customer logs into the app. The splash page displays the Bedda Hair House barbershop logo. The onboarding page is the page after the splash, this page is used to welcome customers and provide a little initial information about the application.

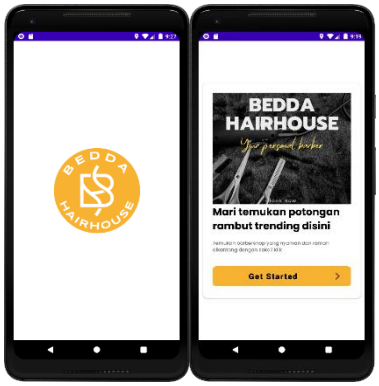

Fig. 11 Splash Screen & Onboarding Page

3.5.2 Login Page & Home Page

The login page is a page that is displayed to the customer if the customer has not entered the application. To be able to enter the application, customers must enter their personal data in the form of a username and password. The home page is the initial page in the application menu when the customer successfully authenticates at login. The home page displays barbershop information which includes opening hours, holiday schedule information and various haircut models.

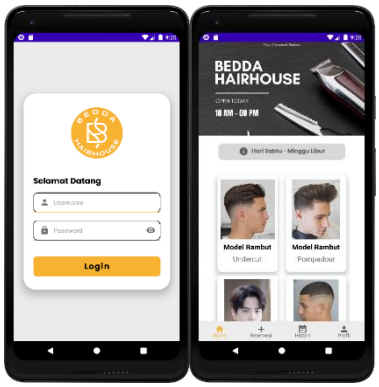

Fig. 12 Login Page & Home Page

3.5.3 Reservation Page & History Page

The reservation page is the page when customers want to book a haircut service schedule at the barbershop. The reservation page displays a selection of schedule hours, dates and types of services, customers can choose according to what they want. The history page is a page that displays details of reservations that are being booked and after being booked. This page provides reservation information and confirmation by the admin in the form of being processed, accepted and rejected. If you choose the wrong time or date, the customer can cancel the reservation by clicking the cancel button, then the order will automatically disappear. If it has been confirmed or accepted, the customer will be asked to make a transaction.

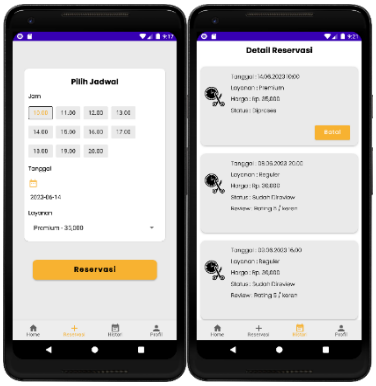

Fig. 13 Reservation Page & History Page

3.5.4 Confirmed Page & Payment Method

Display after confirmed or accepted by the barbershop admin and immediately wait for the payment process.

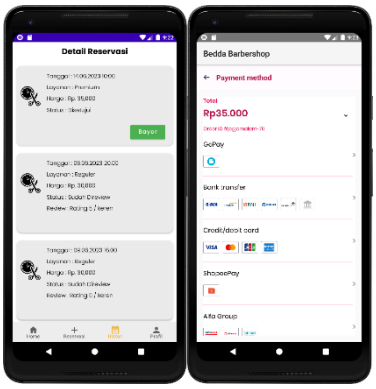

Fig. 14 Confirmed Page & Payment Method

3.5.5 Payment Success & Review

Display after making the payment process to the barbershop and waiting for review.

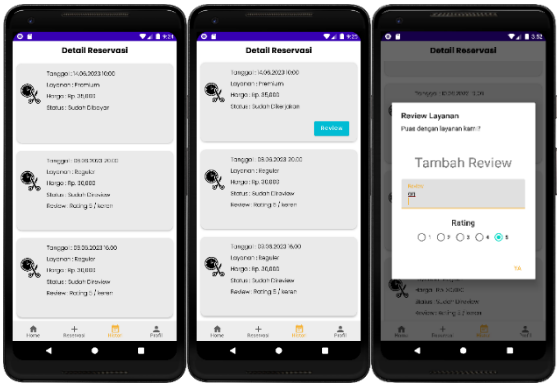

Fig. 15 Payment & Review

3.5.6 Profile Page & About

The profile page is a page that displays customer identity data. The data displayed are name, username, phone number, and email. In addition, on the profile page there are 2 buttons, namely the exit button to log out of the account and the about button. The about page is a page that introduces a little about the company or agency. The about page on the application has the address of the Bedda Hair House barbershop location.

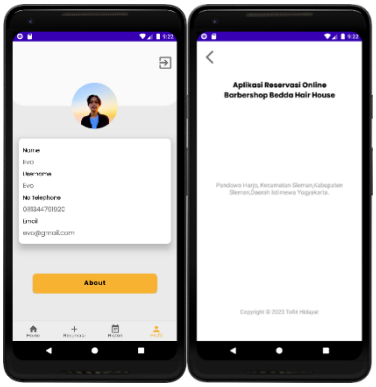

Fig. 16 Profile Page & About

3.6 Discussion of Result

The prototype that has been built will then undergo a testing phase to get the results of the system analysis that has been designed. Testing will be carried out using the whitebox method on several modules. White-box test generation is a technique used for automatically selecting test inputs using only the code under test [16]. Additionally a more powerful white–box testing method is developed, through which inherent limitations and not yet exhausted possibilities of white-box testing are made clear [17]. If the output does not meet the requirements, the code will be recompiled and checked again until it reaches the expected target. In this research, the author will test the application with parameters that cause the application to run normally and abnormally. The results of application testing are described in several sections which include the login module, and the reservation module.

3.6.1 Login Module

Customers must enter a username and password that matches the data in the database. This application will produce a short message output on Toast in the form of "Failed Login: Incorrect password!" or "Failed Login: Username not found!" if the authentication status is incorrect. Meanwhile, if the authentication status is correct, the application will move to the home display page.

Scenario Name : Customer Autentification

Table 1 Customer Autentification

Input Data	Testing Scenario	Expected Result	Result	Parameter
Username and Password	Enter the username and password according to the data in the database.	Valid, moved to the home view page	Correct	Normal
	username and password input does not match the data in the database	Invalid, and produces the Toast output "Failed Login: Incorrect Password!" or "Login Failed: Username not found!"	Correct	Abnormal

3.6.2 Reservation Module

Customers need to enter a reservation that includes the time, date and type of service that matches the data in the database. If the customer selects the date to be inputted, the customer will get the inputted date and move to the history display page. Conversely, if the customer does not input the date, it will automatically be input according to the current date and move to the history display page.

Scenario Name : Reservation Input

Table 2 Reservation Input

Input Data	Testing Scenario	Expected Result	Result	Parameter
Hours, Dates, and Services	Retrieve date data if the customer selects a date to enter.	Valid, get the desired date and move to the history display page	Correct	Normal
	Retrieve date data automatically if the customer does not select a date to enter.	Valid, get the auto date on the current date and move to the history view page	Correct	Abnormal

Software testing is beneficial for testers doing many testing processes according to the existing scenarios [18]. Based on the above tests, it can be concluded that the results of the test parameters are **Normal.**

4. CONCLUSION

The making of the Android-based Barbershop Online Reservation application at Bedda Hair House can only be used by customers who have become members or have subscribed directly registered by the admin, this application aims to help facilitate customers in making reservations online and get information in the Bedda Hair House barbershop, the reservation includes reservation time, reservation date and desired service and can do payment gateway.

With this application, the reservation process and getting information becomes more effective and efficient because it helps barbershop owners in managing customer data, recording customer reservation schedules and knowing how many customers make reservations in a day and makes it easier for customers who want to make reservations online without having to be afraid of not being recorded and clashing schedules.

The resulting application is expected to simplify system performance and reduce human error.

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