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Building Android-Based Gose Applications Using React Native Framework and Firebase Realtime Database

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ARTICLE INFO	ABSTRACT
	Many entrepreneurs provide electronic services, especially cellphones and PCs, but their marketing is very limited due to the non-strategic location of the shops and banners making it difficult to know where the service is located, on the other hand it is also difficult for customers to know the estimated cost of repairing electronic devices and often potential customers are disappointed when they arrive at the location but the service is closed. With these problems, the authors built an Android-based Go Service Electronic application by utilizing React Native Framework technology to build Android-based applications and using the Firebase Realtime Database as data storage. The advantage of this React Native Framework is that it is able to build an application on mobile phones that use the Android operating system and on the IOS operating system. Meanwhile, the advantage of using the Firebase database is that it can retrieve and send data in real time. With the Go Service Elektronik application, it will be easier for the public to find out where the service provider is located, know the estimated cost of repairs, and can consult directly through the application, and can increase business opportunities for electronic service providers.

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1. INTRODUCTION

Over time, the flow of technology and information is growing rapidly. This phenomenon of information technology must be carefully scrutinized, especially to make it easier for people to do everything, especially ordering online services that are easy and fast[1]. In today's digital era, mobile phones have become sophisticated technology that can connect to the internet. With the help of the internet, many companies are using it as an online business[2]. The use of the Internet in business has evolved from an electronic communication tool to a tool for strategic business applications, such as marketing, sales, and customer service[3].

Over time, this electronic device will be damaged due to excessive use or use that is not in accordance with the manufacturer's instructions, so the public must repair the electronic device so that it can be used again. Electronic equipment repair supports the emergence of electronic equipment service business[4]. Entrepreneurs in the service sector, especially in the field of cell phone and PC electronic services at several service shops in Medan City, many people provide service services, but their marketing is very limited, because the location is less strategic because the position of the store and banners are less visible so that potential customers find it difficult to find out where the service is located and it is difficult to know the estimated cost of repairing damage to electronic devices. Then prospective customers have to come to the location only to discuss problems repairing electronic equipment, and often prospective customers feel disappointed when they arrive at the location but the service is currently closed or has accumulated a lot of electronic equipment that they want to service so they cannot receive service for a while . Another problem experienced by prospective customers is the lack of information about service providers, especially in the city of Medan, there are still many local residents who do not know where service providers are close to local residents.

In building this application later the author will use the React Native Framework and use Firebase as a database that will be used to build an Android-based GoSE (Go Service Electronic) application. React Native is a JavaScript framework for writing native mobile apps that render natively for iOS and Android[5] whereas Firebase provides real-time database and backend services

as a service as well as apps that allow developers to build APIs that are syncable between clients and stored in Firebase's cloud[6]. This system will also make it easier for the public to find out the location of electronic services without having to manually search for information on electronic service locations or service sites. The application is also equipped with consulting features about electronic devices, a booking system so that service providers can directly check electronic equipment while calculating the estimated cost of device repair services, as well as providing information on the best service services through an assessment system that has been provided by customers who have booked service services before.

From this problem the authors conduct research to create innovations to build applications that can help to facilitate any electronic problems to consultants who are appropriate in their fields. With this system, the public no longer needs to bother making repairs to electronic devices, knowing the price range for electronic device services and easily finding any location for electronic equipment service providers.

2. RESEARCH METHOD

The research method used by the author in this study, the R&D method is a research method used to make certain products and test the effectiveness of these products[7]. The steps of the R&D research method are first; Research and Information Gathering, second; planning, third; system development, fourth; Initial Trial, fifth; Revise the trial results, sixth; due diligence, seventh; Final product revision, and finally Implementation. For the system development method used by the author in this study, the RAD method is an incremental software model process that emphasizes a short development cycle[8]. The following is an explanation of the process or stages of the RAD method.
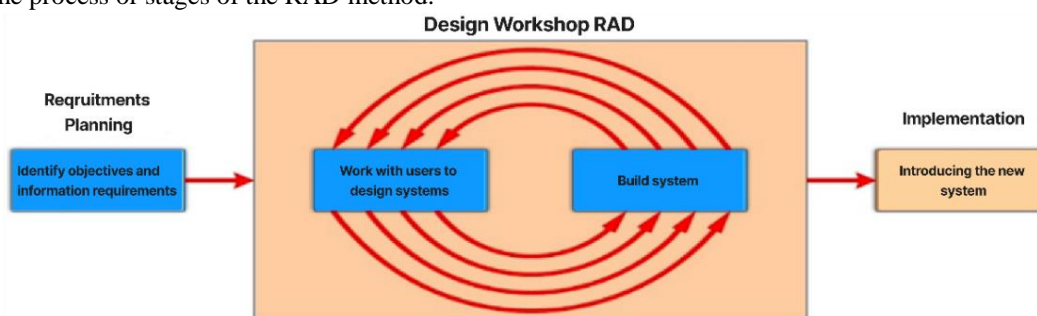

Figure 1 RAD Stages Process

The following is an explanation of the image above which is the process and stages of the RAD method.
1. Requirements Planning; In this stage, users and analytics meet to identify the purpose of the application or system, and this stage is more focused on solving business problems. In this phase, the authors carry out the following needs plan:
   a. Data collection and information requirements that will be used for the next stage, the data is in the form of electronic service shop locations in sub-districts in the city of Medan. This data collection was carried out by spot observation and interviews.
   b. System identification is carried out in this stage to develop an existing system. Identification of the system in this study is the identification of the current/old system and the identification of the proposed system.
2. Design Workshop; This phase is the design and refinement phase, which uses system decision support groups to help users agree on the system they are building. Users typically see a visual representation of the system's design and operation. In this study, the authors divide the design stage into several sections as follows:
   a. Process Design; In this process design phase, the authors identify the actors involved in the electronic service system from which the data from the previous phase is taken. Here's how to use the integrated model language in the model diagrams used: Create Use Cases, Create Class Diagrams, Create Activity Diagrams, Create Sequence Diagrams.
   b. Database Design; Determine the potential of the object and make a database design.
   c. Interface Design; Perform Menu Structure Design and Interface Design.
3. Implementation; A newly built system, a new or partial system is tested by introducing it to the user, in this case using the blackbox method as the system testing stage, and the old system does not need to be run simultaneously. And at this stage also do system coding based on the stages in the Requirements Planning and Design Workshop as well as the implementation of React Native and Firebase.

3. RESULTS AND DISCUSSION
3.1. Requirements Planning
1) Analysis of the Running System Flowmap
This sub-chapter explains how the flow or flow of the system runs towards the service business that is carried out conventionally. The flowmap below starts from a customer who comes to an electronic service shop to repair the electronic device, then the customer will provide information on damage to the electronic device to the service shop and the service shop will absorb this information and then process it to check the physical condition and damage goods to be serviced, then the service shop determines the cost of servicing the electronic device to the customer, if the specified fee is not sufficient for the customer's funds, then the service is not carried out, if the service fee is promised by the customer, the service provider provides an invoice

consisting of identity of electronic goods and service fees to customers, after the electronic goods have been repaired, the service party confirms the customer to take the goods and make payments for the service. The flow is explained in the following diagram:
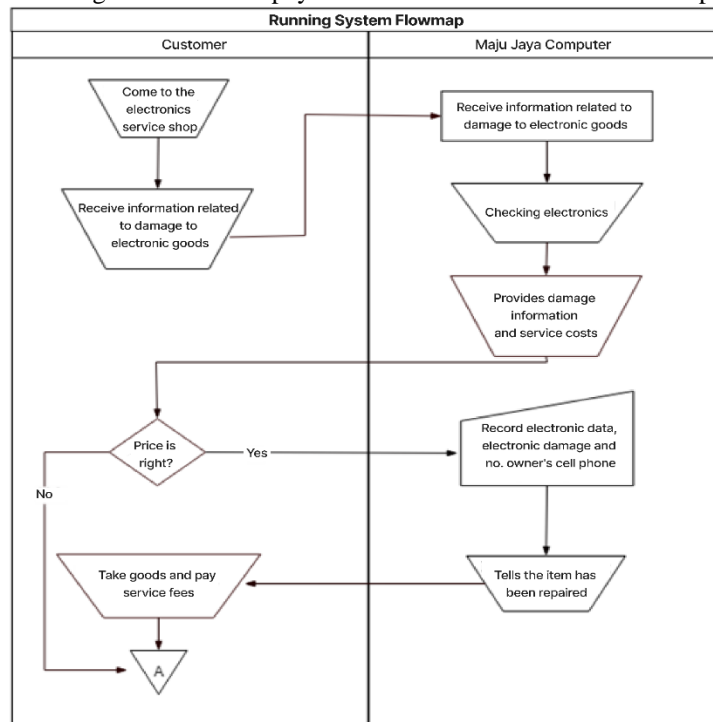

Figure 2 Flowmap analysis of the running system

2) Analysis of the Proposed System Flowmap

The proposed system for the system carried out in this study is to develop applications that can run as clients on the Android operating system and use Google's Firebase services. The proposal for this system is to make two applications, namely for customers and owners of electronic service shops, the reason why you have to use two applications so that the application does not crash when requesting data between the service shop and the customer and avoids hacking of important data. The following is a flowmap and illustration of the proposed system architecture:
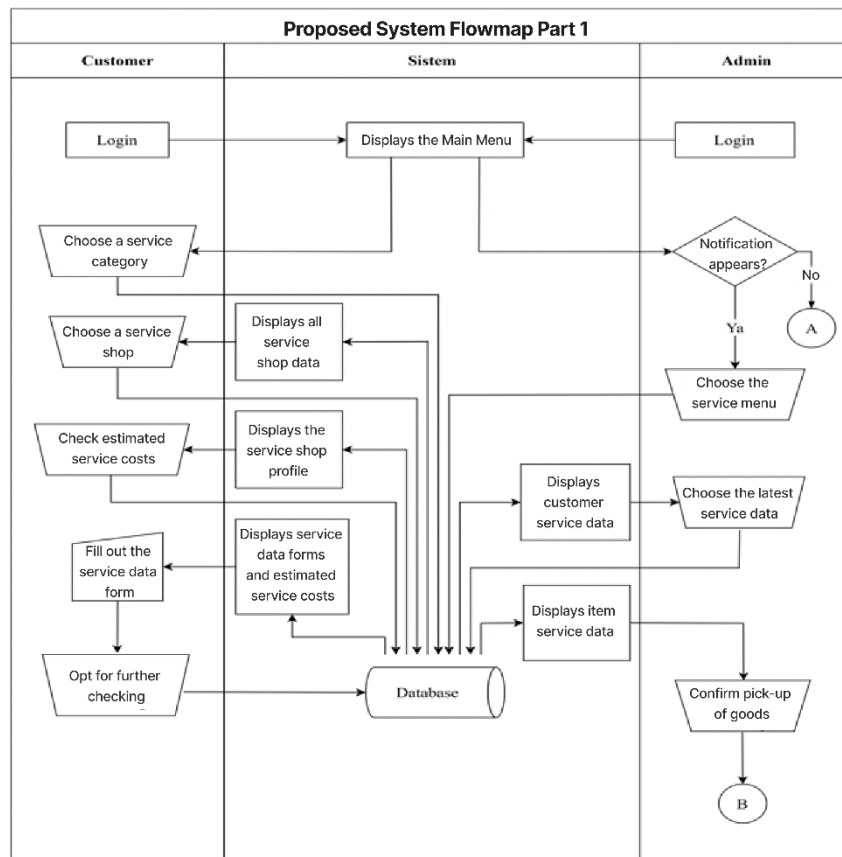
Figure 3 Flowmap of the Proposed System Part 1

The following image below is a flowmap of the proposed system part 2.
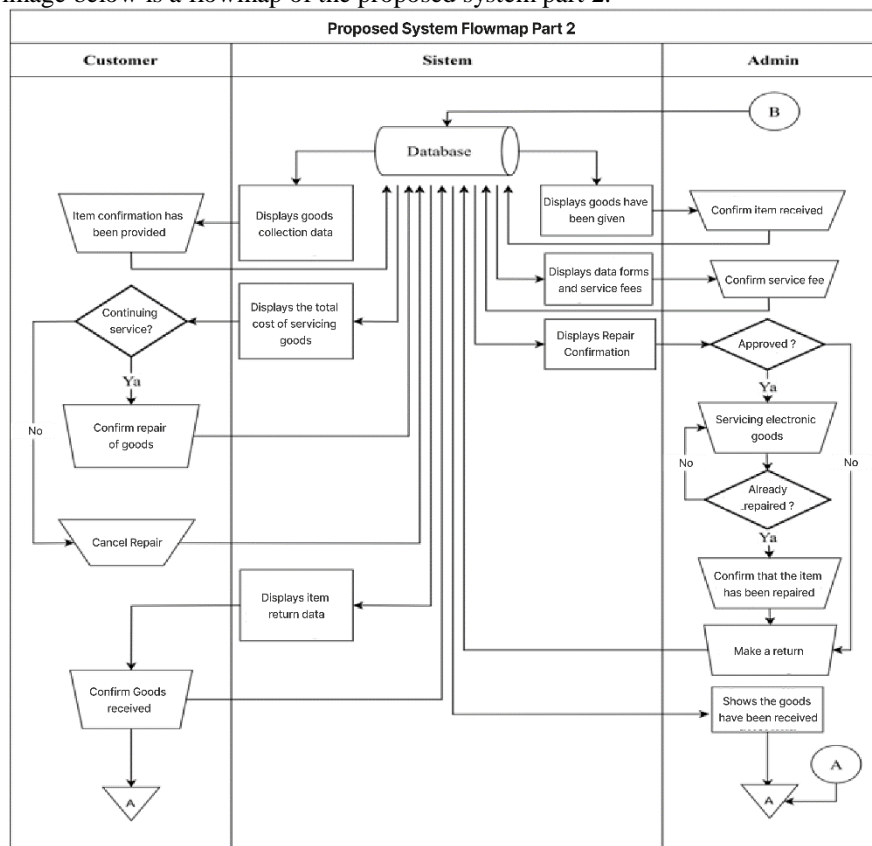
Figure 4 Flowmap of the Proposed System Part 2

3.2. Workshop Design

1) UML (Unified Modeling Language)

The Unified Modeling Language (UML) is a family of graphical notations supported by software systems, especially systems built using object-oriented programming (OOP) concepts, a single metamodel. Useful for exploring existing systems[9]. Unified Modeling Language (UML) is a graphical or image-based language for displaying, specifying, designing, and documenting software development systems based on object-oriented programming[10]. UML has two main types of diagrams, structural diagrams and operational diagrams, which serve as models for creating UML[11]. In UML design, the writer only made 4 diagrams, namely use case, class diagram, activity diagram, sequence diagram.

a. Use Case Diagram

Use case can be interpreted as a graph of interaction between several actors representing the system and actors[12].

b. Activity Diagram

Activity diagrams describe the jobs/tasks in a workflow[13].

c. Sequence Diagram

Sequence diagrams describe the behavior of objects in a use case by describing the lifetime of the object and the messages sent and received between objects[14].

d. Class Diagram

Class diagrams that describe the structure of the system, starting with the definition of the classes needed to form the system. The class diagram describes the types of objects in the system and the various inactive interactions that exist between them.[15]

3.3. Implementation

1) Implementation React Native

In this sub-chapter, we will discuss how to use the React Native framework in building Android applications. Following is the install process and how to use React Native:

a. Install Android Studio; Download and install Android Studio.

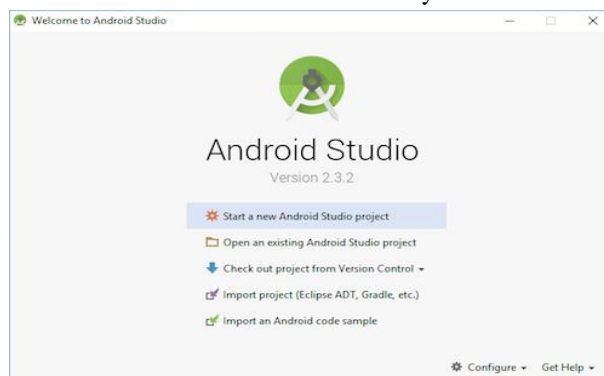b. Install Android SDK; Android Studio installs the latest Android SDK by default.

Figure 5 Android Studio view

c. Configuring the ANDROID_HOME Environment Variable; React Native requires several environment variables to be prepared to build applications with native code.
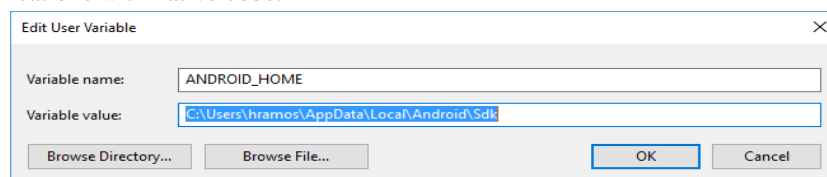

Figure 6 The Edit User Variable view

d. Add the Platform Tool to the Path

After all the installation processes have been carried out according to the previous instructions, then we can do the React Native application project. React Native has a built-in command line interface, which you can use to generate new projects. You can access it without installing anything globally using npx, which ships with Node.js. Let's create a new React Native project called GOSE with the "npx react-native init GOSE" command. After we create an Android-based GOSE application project, then we type the source code below to run our application "npx react-native run-android". If everything is set up correctly, you should see your new app running on your Android emulator in no time.

Figure 7 Display Home React Native

2) Imlementation Firebase

a. Firebase Auth

Firebase Authentication Service simplifies the sign-in process without having to think about complex system architectures. This is achieved by integrating native Android apps with Firebase's authentication service. Below is a full description of how the Firebase Authentication Service process is built. Registering a Google account with Firebase services. Once your account is registered, Firebase means granting access to developers who can build your app's project environment. In this case, your Firebase project is integrated into your Android application.
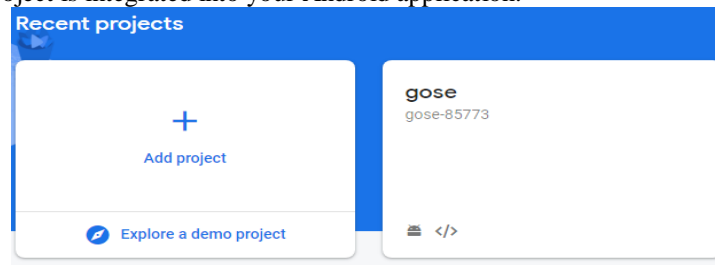
Figure 8 The Project Environment page from Firebase

Then you can click on the project that was created earlier and will display a menu like the following image:
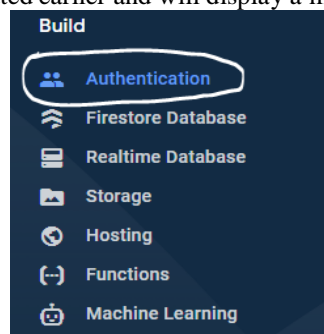
Figure 9 Menu of Firebase Service Projects

To activate the authentication service to be selected, in this study the authentication to be used is Email or Password.
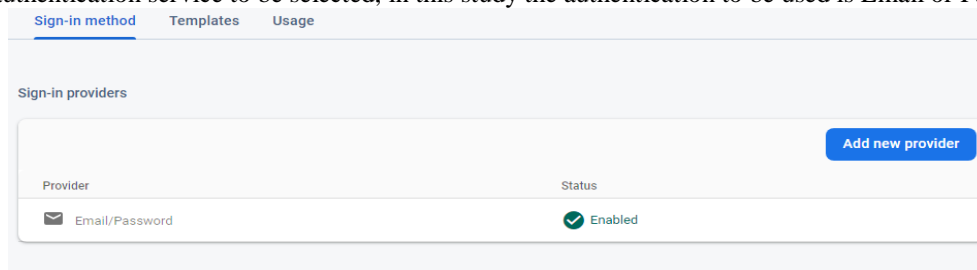
Figure 10 Firebase Authentication Provider Service

b. Firebase Realtime Database

The following describes how to implement a Firebase real-time database that helps you handle storing and operating data in database form. The first thing you need to do to implement this real-time database is to configure the rules in the real-time

database. The rule itself is a security rule when using a real-time database and is related to the access rights of all users who can read and write data. In our investigation, the rules used were to allow read, through login, and write access to Firebase's real-time database as shown below.
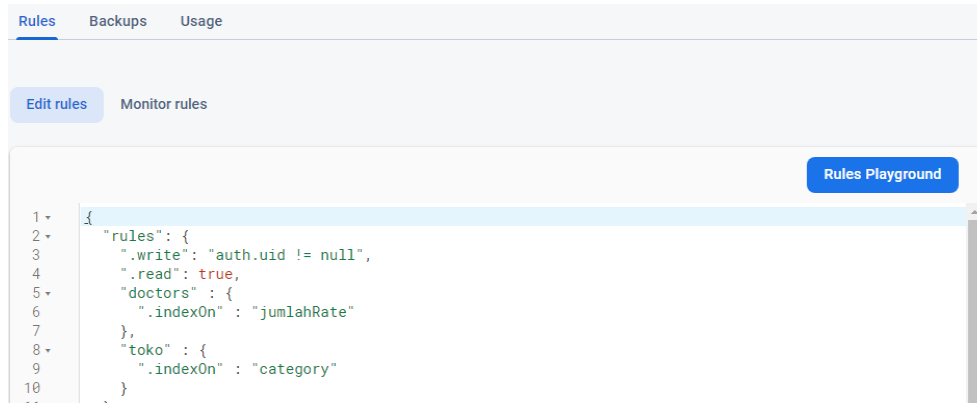

Figure 11 Realtime Database Rules

c. Firebase Cloud Messaging

In developing for the GOSE platform, you use Firebase Cloud Messaging to handle notifications in your management application, which trigger incoming transaction data. Therefore, when a customer performs a service or chat, the administrator is notified that there is a new message. To access Firebase Cloud Messaging, you need an API key so that your device or devices can communicate with the server. You can get the API key from the Firebase dashboard as shown below.
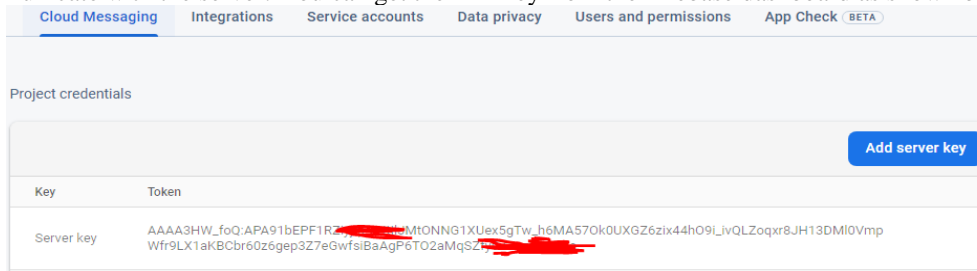
Figure 12 Server Lock On Cloud Messaging

3) System Implementation

  a. Implementation of the Customer Interface

In the image below is the home view of the go service electronic application on the customer's side.
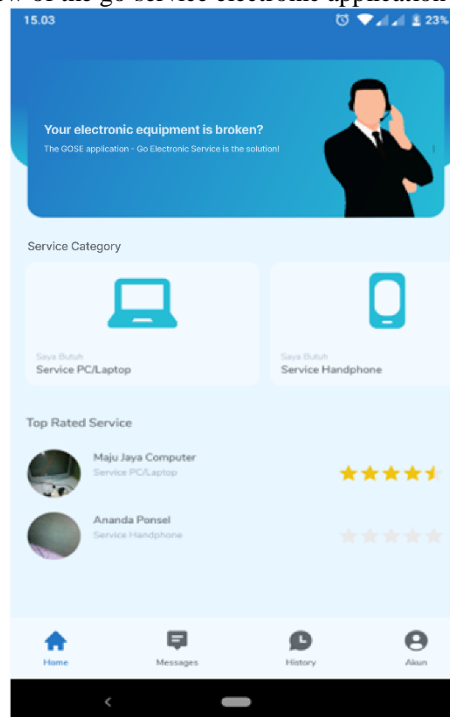
Figure 13 Home Display

In the image below is a display of service categories in the go service electronic application on the customer side.
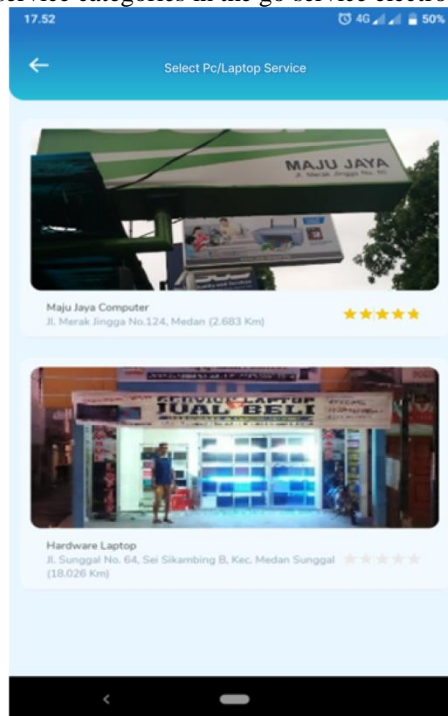

Figure 14 Display Select Service Shop

In the image below, the service shop profile displays on the go service electronic application on the customer's side.
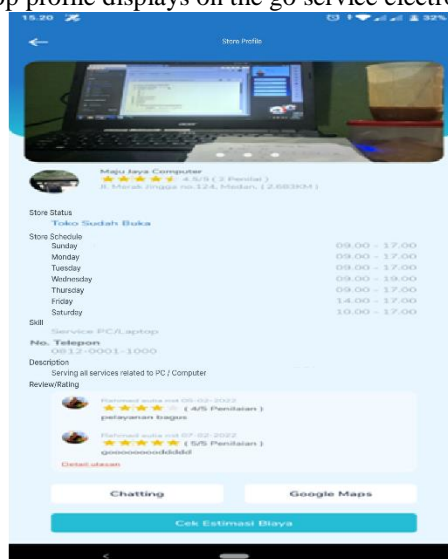

Figure 15 Service Shop Profile Display

The image below shows a check for estimated service costs for the go service electronic application on the customer's side.

Figure 16 Cost Estimation Check Display

The image below shows the service confirmation display for the go service electronic application on the customer's side.

Figure 17 Service Confirmation Display

In the image below, the repair display has been completed on the go service electronic application on the customer's side.
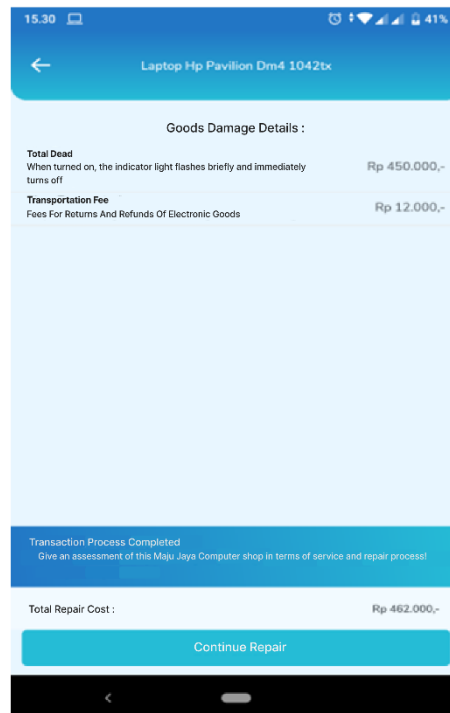
Figure 18 Display Repair Completed

b. Implementation of the Admin Interface

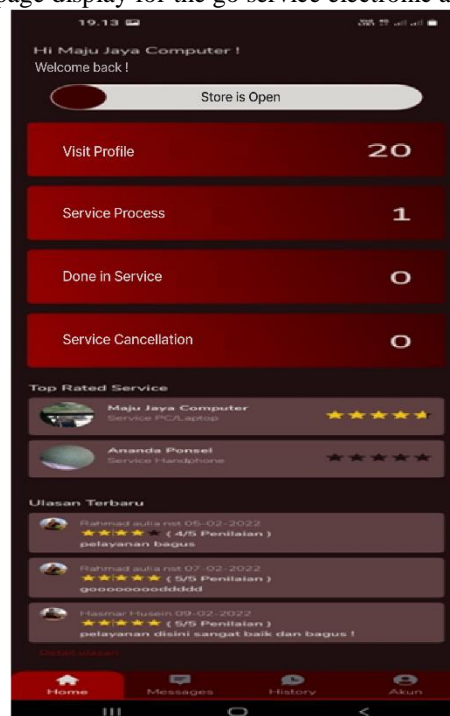The image below shows the main page display for the go service electronic application on the admin side.

Figure 19 Main Page Display

In the image below is a display of store data upload on the go service electronic application on the admin side.

Figure 20 Store Data Upload Display

In the image below is a display of estimated service service data on the go service electronic application on the admin side.

Figure 21 Display of Service Estimation Data

The image below is the confirmation display that the item has arrived on the gose application on the admin side.

Figure 22 Display Confirmation of Goods Has Arrived

In the image below is a display of confirmation of damage to goods in the go service electronic application on the admin side.
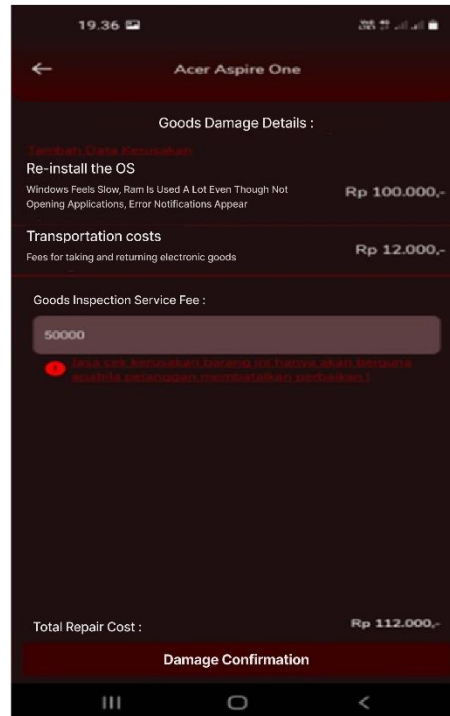
Figure 23 Item Damage Confirmation Display

In the image below, the confirmation display for the repair is complete in the go service electronic application on the admin side.
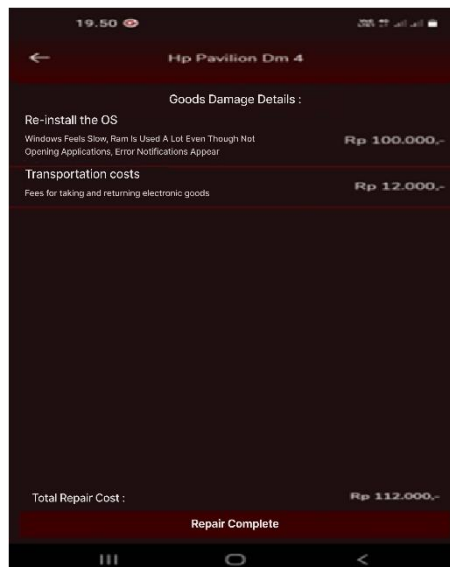
Figure 24 Repair Complete confirmation display

3.3.   System Testing

Test the system used by the author in testing this system with the black box testing method. Black-box testing aims to assess the suitability of an application with user needs, to find out whether the application functionality has been carried out according to its function[16]. The validators in this test were tested directly by Ahwat as the owner of the Maju Jaya Computer store and Arjoko Siahaan as the owner of the Laptop Hardware store in Medan, as well as being a test sample for other electronics service shops. The following are the results of the test.

Table 1. Testing On The Customer Side

No	Test Scenario	Validator 1	Validator 2	Success Rate
1	Home Display	✓	✓	99%

2	Display Select Service Shop	✓	✓	98%
3	Service Shop Profile Display	✓	✓	98%
4	Cost Estimation Check Display	✓	✓	98%
5	Service Confirmation Display	✓	✓	98%
6	Display Repair Completed	✓	✓	98%

Table 2. Testing On The Admin Side

No	Test Scenario	Validator 1	Validator 2	Success Rate
1	Main Page Display	✓	✓	99%
2	Store Data Upload Display	✓	✓	98%
3	Display Of Service Estimation Data	✓	✓	98%
4	Display Confirmation Of Goods Has Arrived	✓	✓	98%
5	Item Damage Confirmation Display	✓	✓	98%
6	Repair Complete Confirmation Display	✓	✓	98%

4. CONCLUSION

Based on the discussion in the previous chapters, the writer can draw conclusions, as follows; By using the React Native Framework and Firebase Realtime Database, it can be applied to the Go Service Electronic application to make it easier for customers and electronic service providers to find out the location of service services, estimate service costs, and perform electronic device servicing, and be able to expand marketing of service services. Then in this system two applications were made, namely for customers and admins, to avoid crashes due to data requests between admins and customers and to avoid important data breaches. So with this application, it can add to the knowledge of writers and readers in terms of building Android applications using the React Native framework and the Firebase database.

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