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Farmers Helping Hand Application

Ramthanaraj Nagarajan[1], Mohd Amin Mohd Yunus[1*]

[1]Fakulti Sains Komputer dan Teknologi Maklumat,
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author Designation

Abstract: Farmers Helping Hand Application is an application which act as a educational platform for the farmer's for Radza and Son's farm. The purpose of developing this application is to solve the problem of Radza and Sons farm in training their farmers to produce quality fruits. This application will provide information to the farmer regarding correct way of planting specific fruits. To ensure farmers can follow the procedures, scheduling features included which help farmers follow the daily task assigned on planting fruits. Despite that to clarify farmer's doubts, forum features included to make sure they could interact with other users and clear their doubts. The developed application also included weather forecast features to provide clarity among the farmers on the weather daily which will help them to organize their plantations well. To secure the privacy of the users, login method of One Time Password (OTP) implemented. Waterfall model which consists of six phases is used to assist this project development. The development of this application will assist the owner and farmers to produce more quality fruits which could increase their sales consecutively.

Keywords: Crops Plantation Application, Waterfall, Farmers Helping Hand Application

1.   Introduction

The act of agriculture has acquired significance because of the increasing pace of metropolitan destitution and populace in creating districts [1]. Yet it is very rare to see farmers getting proper knowledge on crops plantations nowadays. Many challenges faced by the companies to train their farmer to produce quality crops. There will be no agriculture when the mankind does not exist [2]. Therefore, an educational application has been developed for Radza and Sons farm. Directly following the asset limitations for farm inputs faced by farmers in sustainable agriculture practices leads to low crop qualities [3].

The existing method used by the company to train their farmers may be very practical, but it has few limitations. For instance, the company are calling experts from outside to train their farmers every time when they get new workers. This cause the farmers not to have proper educations on plantations as they aren't expose to it well. Next, company having loss due to low crop yield which caused due to

farmers not well informed with unpredictable weather conditions. This resulted to the degradation of soil properties, contamination of groundwater and decline of food quality. Finally, lack of connectivity with the experienced agriculture community which cause farmers could not be able to recover the crops from insects' attacks and other diseases.

Hence, an educational based application called Farmers Helping Hand will be adopted into the farmers community at Radza and Sons farm which utilizes the old method used to train their farmers on growing quality crops. The goal in this project is to design, develop and test the functionality of Farmers Helping Hand application which will help the company farmers to grow quality crops. This application developed with features like, OTP login method, weather forecast, scheduling, crop plantation, and multilanguage feature to ease the farmers well.

This article is organized into six sections. The first segment explains the context of the project. The second section clarifies the analysis of literature. In the third part, the methodology is explained. The study and design of the system is illustrated in the fourth section. Section 5 explains system implementation and testing. In the last segment conclusion is explained.

2.   Related Work

The study in this project focuses on the research has been done regarding application about farmers educational application to ensure that the development of the project to ensure that the development of the project runs smoothly by reviewing the advantages and disadvantages of other applications. The advantage of the applications provides guidance to improve the quality of the application. Agricultural innovations are viewed as a significant course out of neediness in the vast majority of the nation's [4]. In addition, a literature survey gives knowledge about the various types of features that can be added in the proposed application. Furthermore, there is a way to obtain an idea to introduce new elements which makes Farmers Helping Hand application unique than existing application.

2.1   Study of existing Radza and Sons Enterprise farm system

Radza and Sons Enterprise have been running 12 acres of fruit farm. The company have been training their new farmers frequently by assigning experienced tutor to grow quality crops. This traditional method failed to provide persisting, longstanding farmers for the company and huge sum of money was wasted regularly for training purposes. Despite that, farmers need to work on rotation based in order to learn and manage all the plantation techniques at the farm. Other than that, farmers are facing difficulties recording the growth of fruits and maintaining the crops by regular fertilization and watering. This reduces the crops quality. Therefore, this current manual system needs enhancement to produce increased and efficient productivity of crops at Radza and Sons fruit farm.

2.2   Comparison with the Existing System

Usage of systems in agriculture ecosystem became reasons for crops productivity increments[5]. The results of a comparison of the three current applications to the proposed application shown in Table 1. The three existing applications are AgriApp, Mardi MyOnFarmFruits, and PlantApp. Generally, all the existing applications are educational based application. The six (6) modules defined are user log in, multilingual, weather prediction, scheduling, crop plantation, and forum.

Table 1: Comparison with the existing system

Modules	AgriApp	Mardi MyOnFarmFruits	PlantApp	Farmers Helping Hand Application
User Log In	Yes	Yes	Yes	Yes
Multilingual	Yes	Yes	Yes	Yes
Weather Prediction	Yes	Yes	Yes	Yes
Scheduling	Yes	Yes	Yes	Yes

Crop Plantation	Yes	No	Yes	Yes
Forum	Yes	Yes	Yes	Yes

3. Methodology

This segment discusses the waterfall model used to develop the proposed application. One main justification behind the usage of waterfall approach is simple inertia [6].

The waterfall model is chosen to the fact that this model suitable in development of proposed application to achieve the scope and objective according to the user's requirements. There are six (6) phases involved in this development using waterfall model such as requirement analysis, system design, implementation, testing, deployment, and maintenance. Table 2 explains the task and output developed for each phase in waterfall model.

Table 2: Software development tasks and outputs

Phases	Task	Output
Requirement Analysis	- Proposed the project - Determine the project schedule, activities, and output - Gather analyze and validate the information	- Project proposal - Develop Gantt Chart
System Design	- Get the design of application database and user interfaces. - Review proposed design to ensure final design meets client's specifications.	- Architectural workflow of the application - User interface of the application.
Implementation	- Implement the design into source code. - Detailed specifications turned into executable software.	Complete functionable application.
System Testing	- Application will be unit tested, integrated, and retested. - Errors and issues will be rectified.	Finalized and updated application.
Deployment	Application deployed to the client's environment.	Application released to market.
Maintenance	- Errors fixing based on the feedback from client. - Features adjustments based on requests	Updated version of the application.

4. Results and Discussion

In this section, analysis and design of Farmers Helping Hand application was discussed in detail. Analysis emphasizes an investigation of the problem and requirements meanwhile design emphasizes a conceptual design that fulfils the requirements. All the details about structured approach used such as Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD) will be included in appendix as Figure 5 and Figure 6.

4.1   System Architecture

System architecture describes a conventional portrayal of a framework that supports thinking about the designs and practices of a framework. Figure 1 explains the theoretical model that characterizes the construction, conduct and more perspective on framework.
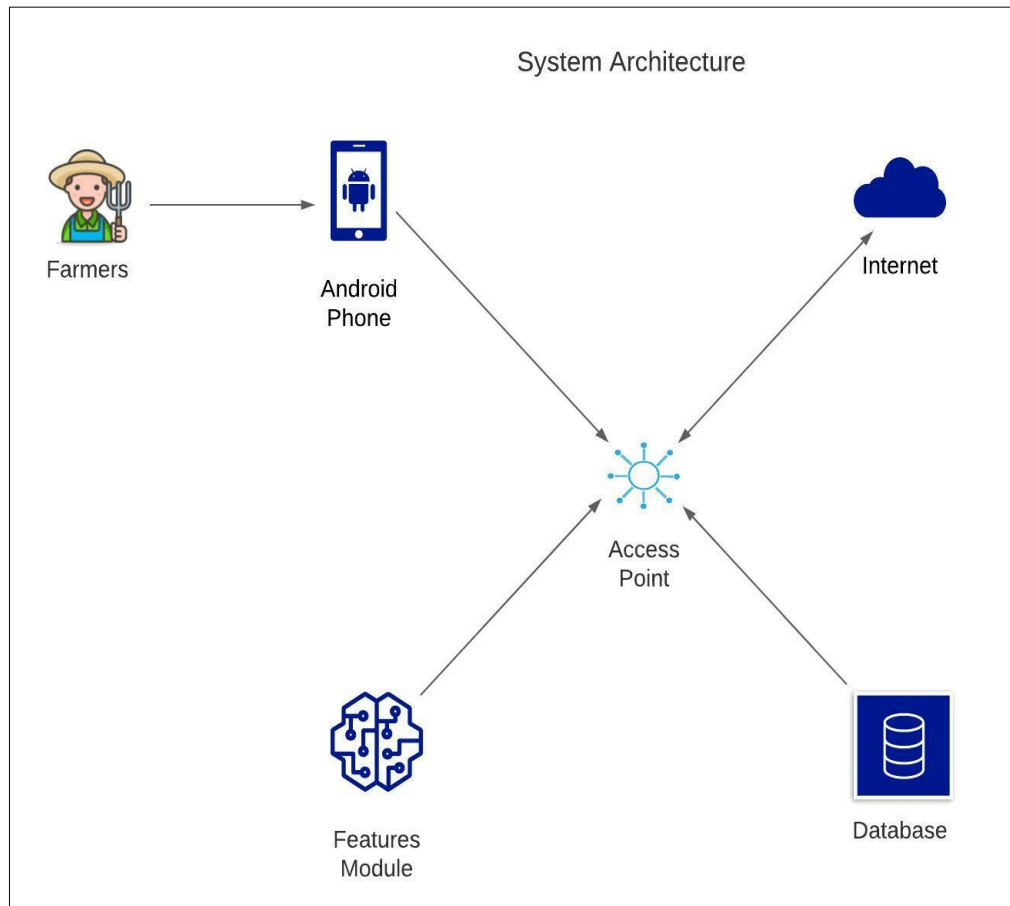

Figure 1: System architecture of the proposed application

4.2   System Flowchart

Flowchart of the proposed application is to develop better understanding on the development flow of the project. Figure 2 shows the flowchart of the proposed application. As seen in Figure 2, on the login screen, the application will start. Users need to login by providing their phone number and OTP code received. Once user gain access to the homepage, they will be able to access various features provided in the application such as Crops Plantation, Weather Forecast, Forum, Multilingual, and Scheduling. Finally, the account will be signed out if the user wishes to end the session.
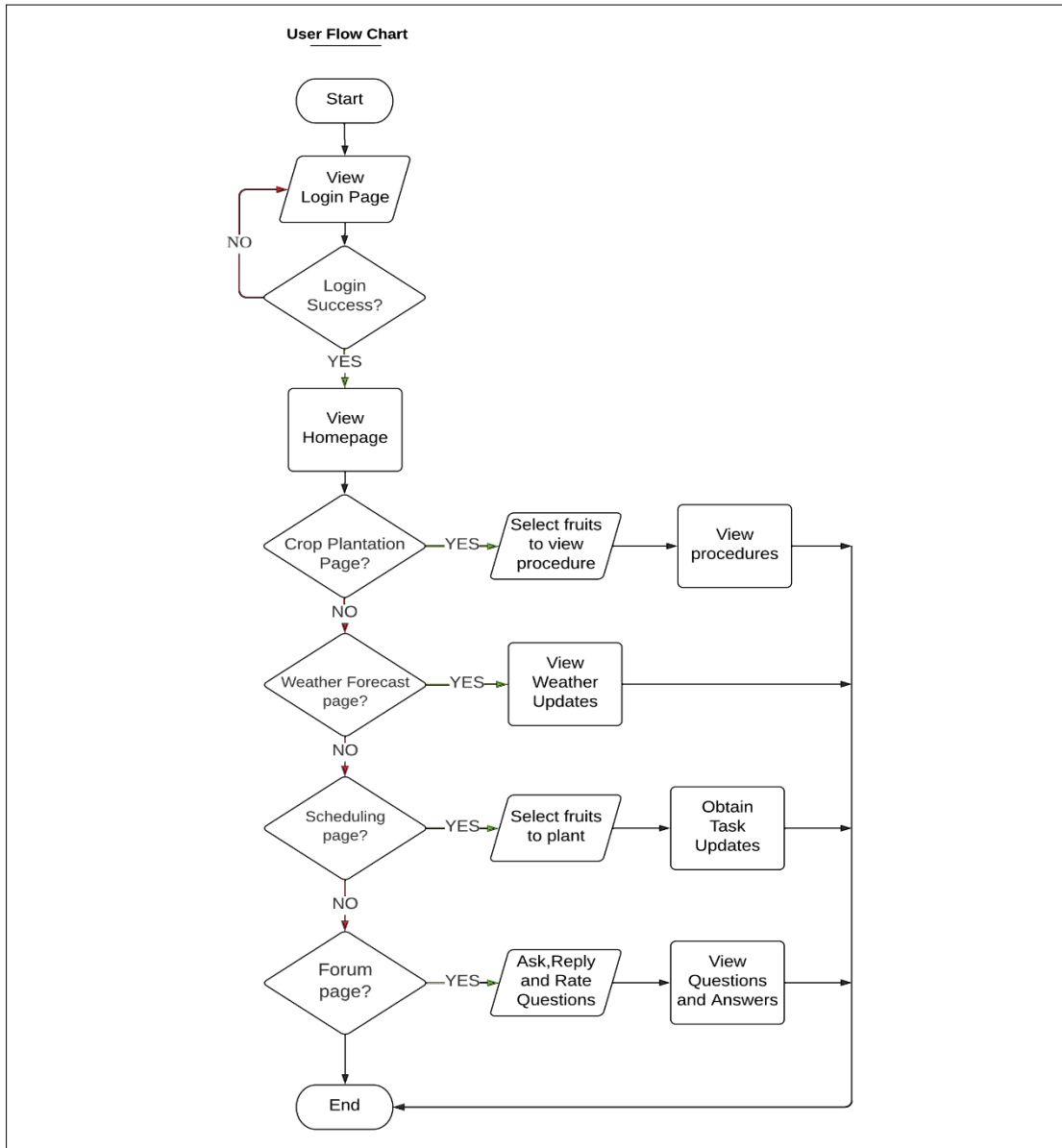
Figure 2: Flowchart of proposed application

4.3 User Interface

Figures 3 and 4 demonstrate the user interface for login page and homepage respectively. Flutter environment platform is used to create the user functional user interface which is also being connected to Firebase that act as backend for this project.
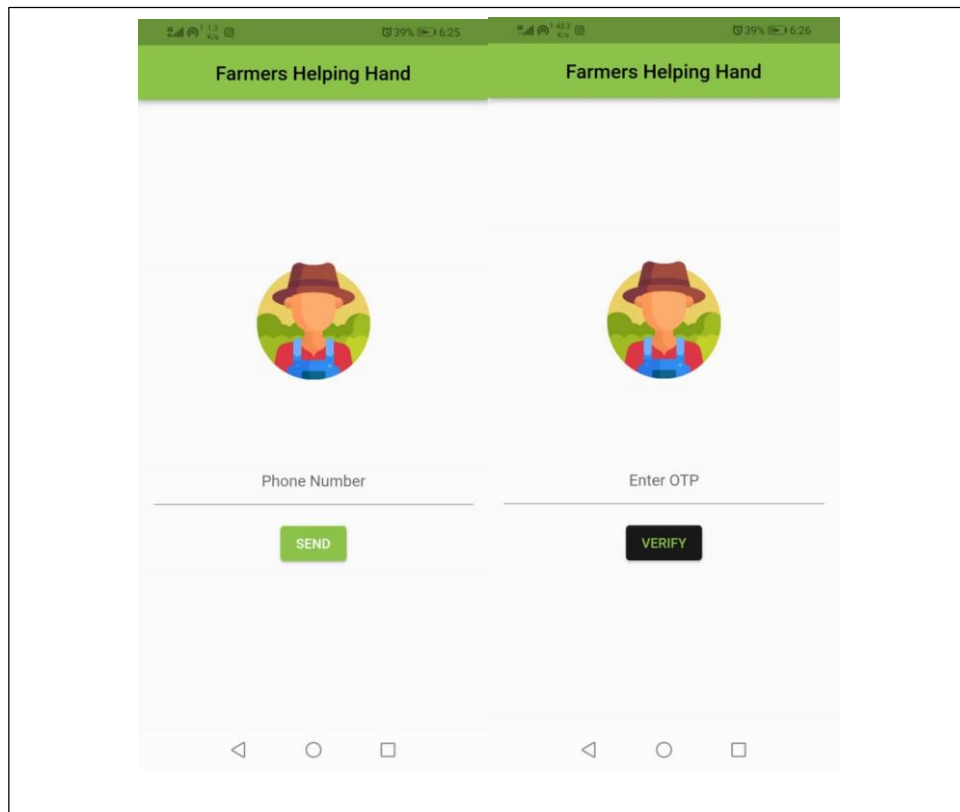
Figure 3: Login Interface of proposed application

Figure 4: Homepage Interface of the proposed application

5. Implementation and Testing

This section focuses on the description of the implementation of the developed application. In order to implement the interface and database design previously build, the software that needs to be installed to firebase console and Visual Studio Code. The main activity in this phase is programming. Writing code program is important because it is part of the activity that will realized and executing all the plans and designs. The objective of the implementation phase is to ensure that the system is developed in accordance with the project planning guidelines.

5.1 Database Connection

Firebase chosen for the authentication of the developed application. Firebase Authentication implemented for user's login into the application. Figure 7 shows the firebase database connection of the developed application in Visual Studio Code.

```
FirebaseAuth _auth = FirebaseAuth.instance;
String verificationId = "";

bool showLoading = false;

void signInWithPhoneAuthCredential(
    PhoneAuthCredential phoneAuthCredential) async {
  setState(() {
    showLoading = true;
  });

  try {
    final authCredential =
        await _auth.signInWithCredential(phoneAuthCredential);

    setState(() {
      showLoading = false;
    });

    if(authCredential.user != null){
      Navigator.push(context, MaterialPageRoute(builder: (context)=> MyBottomNavigationBar()));
    }
  } on FirebaseAuthException catch (e) {
    setState(() {
      showLoading = false;
    });

    ScaffoldMessenger.of(context)
        .showSnackBar(SnackBar(content: Text(e.message.toString())));
  }
}
```

Figure 7: Database Connection

5.2 Login Interface

This section will explain the login interface of the application system. Figure 8 (Appendix) shows the login module of the developed application. Users need to enter phone number and OTP to continue the login page. After the verification is successful, users will be redirected to the homepage of the application.
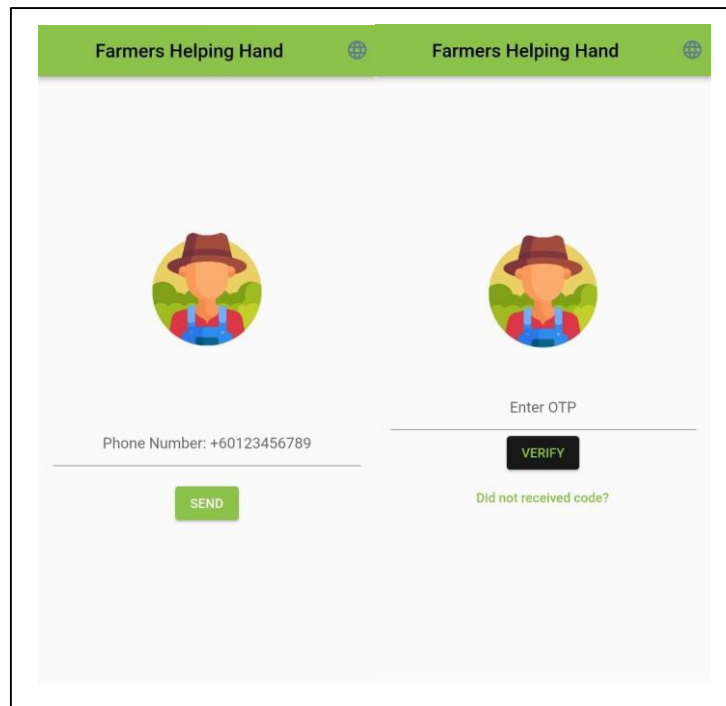
Figure 8: Login Interface

5.3 Crop Plantation Interface

This section will explain the crop plantation interface of the proposed application. Figure 9 (Appendix) shows the crop plantation module of the developed application. This page contains the crop plantation procedures for all the proposed five fruits by the farm owners. Users can view it and click to view in detail of the plantation procedures.
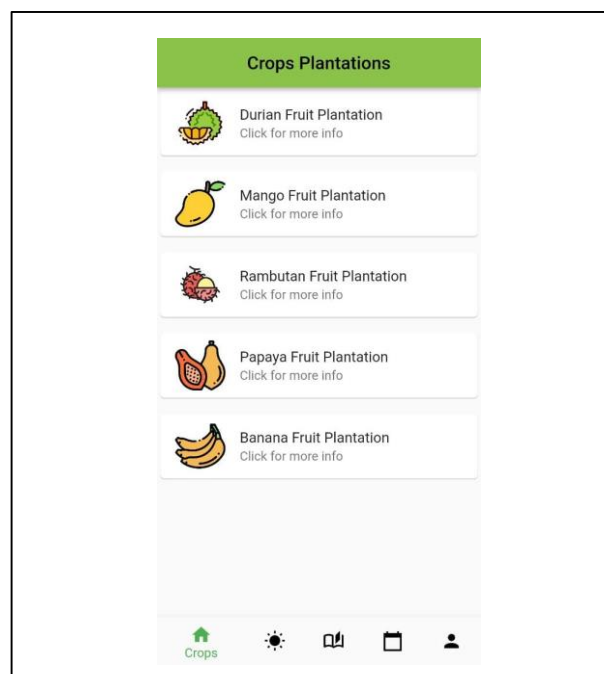

Figure 9: Crop Plantation Interface

5.4 Weather Forecast Interface

This section will explain the weather forecast interface of the developed application. Figure 10 (Appendix) shows the weather forecast module. This page contains details of location's weather. Users can view the weather details of the specific day.
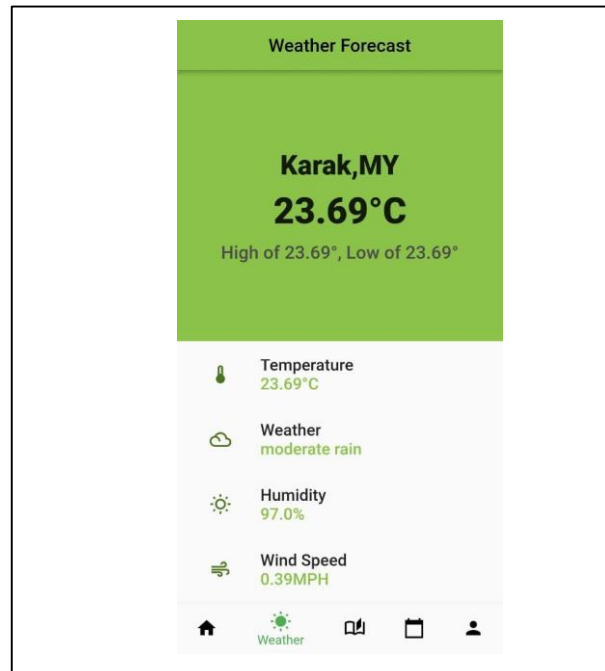
Figure 10: Weather Forecast Interface

5.5 Schedule Interface

This section will explain the schedule interface of the developed application. Figure 11 (Appendix) shows the schedule module. This page contains scheduling access for the users to get reminders about planting procedures and also watering procedures as per set in the application.
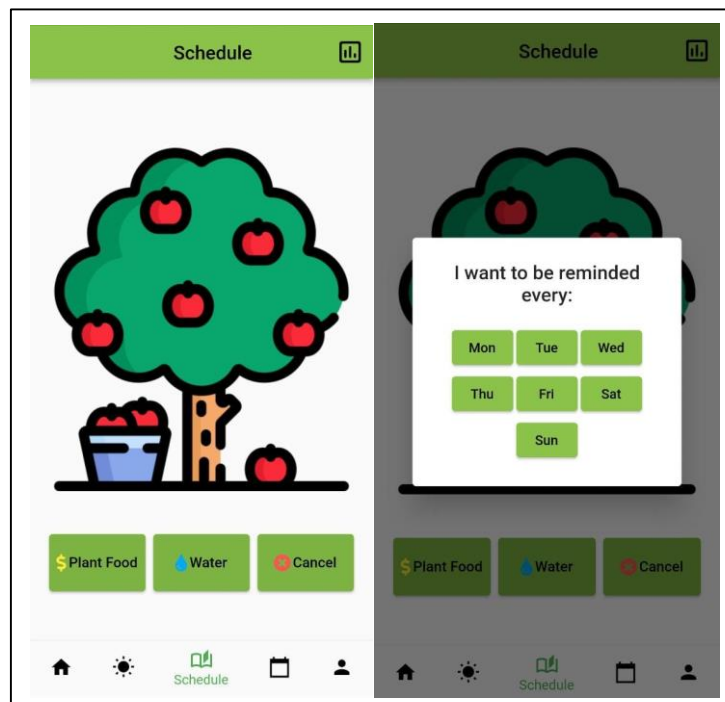
Figure 11: Schedule Interface

5.6   Forum Interface

This interface will explain the forum interface of the developed application. Figure 12 (Appendix) shows the forum module of the developed application. This page allows the users to chat among the users of the application to clarify their own doubts regarding the plantations. Users will also be provided date and time of the message sent to make sure it is easy to retrieve back again for future purposes.
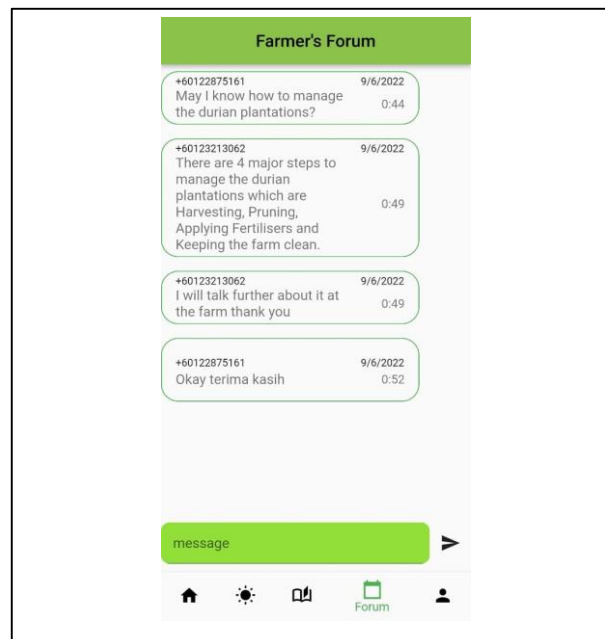

Figure 12: Forum Interface

5.7   Multilanguage Interface

This section will explain the multilanguage features of the developed application. Figure 13 (Appendix) shows the multilanguage features. Users can change their preferred languages for the application to ensure the users can utilize the application well.
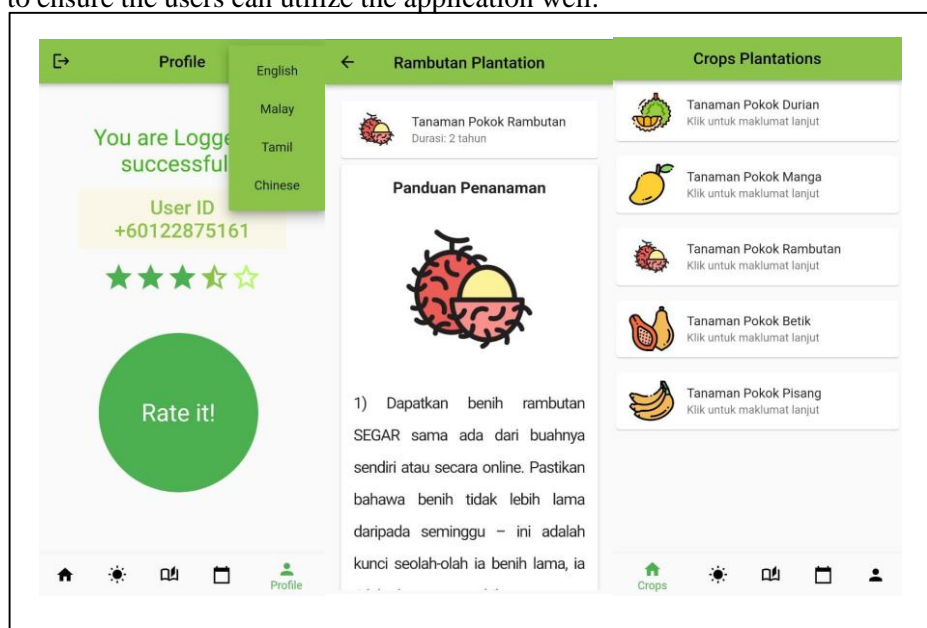

Figure 13: Multilanguage Interface

5.9 Testing

All six modules are tested, including the login module, crop plantation module, weather forecast module, scheduling module, forum module, and multilanguage module.

Table 1: System Functional Testing

Testing Modules	Testing	Expected Results	Actual Results
Login Module	• Input correct phone number and OTP • Input wrong phone number • Input wrong OTP	• Redirects to the homepage if user login details are valid. • Displays error message to reenter correct information. • Display error message to enter correct OTP.	• As expected for all the test plans
Crop Plantation	• Users can choose all the plantation procedures to view in detail. • Users can get back to the main page to view other plantation procedures.	• Display the correct information of clicked plantation procedures • User interface adapts to user's requirement and display as needed.	• Successfully displayed the data as expected results.
Weather Forecast	• User can view the current weather forecast of the farm location from anywhere online.	• The results displayed to users is correct as per in OpenWeather API	• Displayed results as expected
Scheduling	• User can set their own reminders for planting and watering plants. • User can also delete all the reminders in necessary.	• The notification will appear based on user's reminder setting • All the reminder notification will be deleted	• All the notification works as per expected.
Forum	• User can send message to other users • User can view all the old messages sent in the forum page	• All the message details displayed in the forum page correctly. • User can scroll the page to view all the messages.	• All the message data is displayed successfully as expected.
Multilanguage	• User can change app language easily based on their preferences	• The app language changes once user changes their language preferences	• Multilanguage features works as expected for the user's preferences

6   Conclusion

Farmers Helping Hand Application will be developed to help the users learn about correct plantation procedures. Overall, all the phases of the application development process have been carried out to meet the target of achieving satisfactory. This application plays a significant role in facilitating the farmers and provide benefits to farm in enhancing the fruit plants. The improvement can be done by optimizing performance and usability of the application.
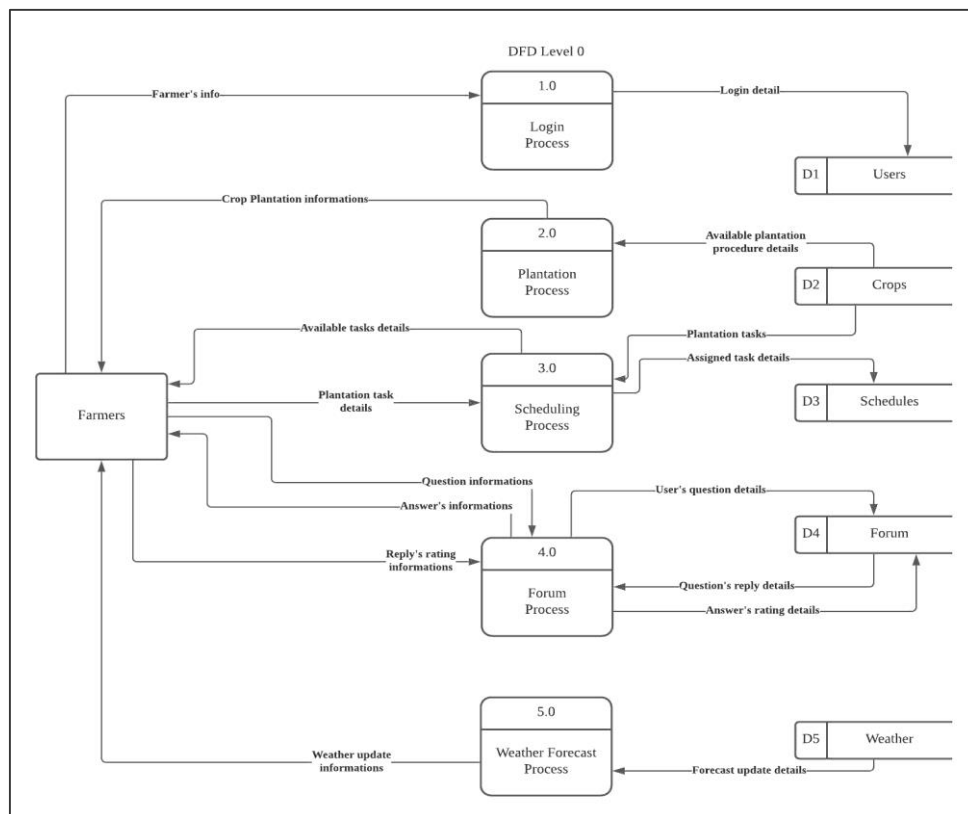
Acknowledgement

Appendix

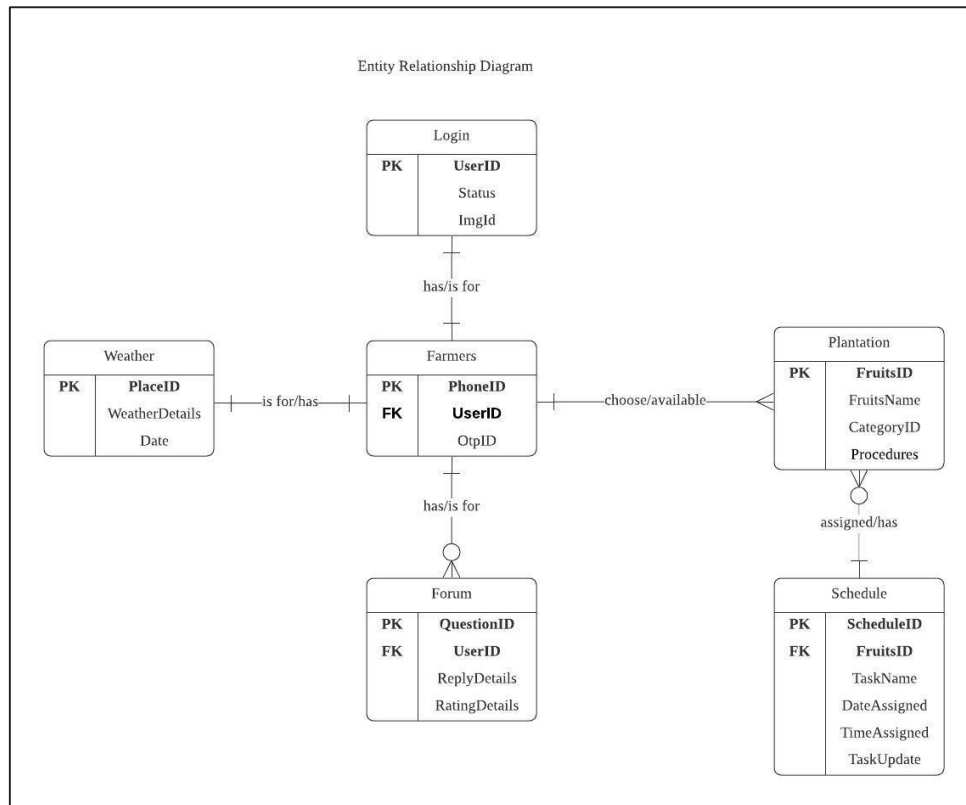**Figure 5 : Data Flow Diagram (DFD) of proposed application**

Figure 6: Entity Relationship Diagram (ERD) of proposed application

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