

Design and implement medicinal plant application (SITONA) on android platform

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Abstract.

The aim of this research is to design and build an android-based medicinal plant application or SITONA. SITONA consists of a directory of medicinal plants in Indonesia. SITONA has several features that function to empower health and strengthen the economy through an in-app marketplace. The steps in the study were literature study, requirement analysis, design flowchart, design interface, and implement application. First step was literature study, a step to collect information about medicinal plants in Indonesia. Requirement analysis consist of software requirement analysis and hardware requirement analysis. Design flowchart step has aim to design process flow in application. Design interface step has output such as interface in every feature in application. Implement application was a step to implement design flowchart and design interface into android application. Implement application using android studio. The last step is testing application using black box testing. Result of testing application show that application is running well and application ready in use.

1. Introduction

Indonesia is a developing country that is rich in biodiversity [1] with area of Indonesian tropical forests that covers about 143 million hectares and is home to about 80% of the world's medicinal plants [2]. Medicinal plants in Indonesia reached 2500 – 7500 species [1]. Medicinal plants are useful and valuable. These plants might be used as food [3], drugs [4] and cosmetic [5]. Several of medicinal plants have been used to treat viral infections in the past such as herpes simplex virus type 2 (HSV-2), HIV, hepatitis B virus (HBV) and emerging viral infections associated with poxvirus and severe acute respiratory syndroms (SARS) virus. Most of studies have utilized either water soluble or alcoholic extracts of medicinal plants. According to the study, limited efforts are needed to identify active natural ingredients that exhibit antiviral effects [6].

Medicinal plants have been used throughout the world, however, their wide usage had been limited to China, India, Japan, Pakistan, Sri Lanka, Thailand and a number of African countries. Developed countries include Indonesia are also turning to encourage the usage of plant-based natural medicinal product in their healthcare systems [6]. Various types of medicinal plants have been produced as raw materials of both modern and traditional medicine (herb) [7]. Traditional Indonesian herbal medicine has been practiced for centuries in Indonesian society for maintaining health and treating diseases. This traditional medicine is called jamu [8]. Jamu is a word in Javanese tribal language meaning the traditional medicine from plants [2]. Jamu consists of ingredients of medicinal plants with each medicinal plants have their benefits. Directory of medicinal plants in Indonesia is collected for education purpose. With implementation of technology, directory of medicinal is built in a mobile application.

Technology consist of hardware and software. It is show that the development of hardware and software will go side by side [9], and the most popular operating system is android OS [10]. Android OS grows fast because its open platform and the availability of attractive developer's tools like eclipse and android studio [10]. The android version is updated regularly. Updating of android OS indicates the dynamic and progressive environment. This happens because the developers' enthusiasm in generating billion either paid apps or free apps. It is indicated that android apps were easy to learn and build for developers of mobile apps [11].

According to the current situation of high demand for mobile applications and success of android based mobile device, android mobile application of medicinal plants is built [12]. Android is an open source project for smartphones and tablet computers. Android is provided by Google. Android OS is linux based mobile devices platform. Linux kernel is included into android software stack. Android OS have market of android application which is called Google Play. Google Play provide market of mobile application's developers. Developers can release all version app such as early version app until alpha-testing or beta-testing. After those testing stages, developers can improve their App quality by the collecting feedback and issues [13]. The android mobile application is built using Android Studio. Android Studio is a tools to develop android mobile apps, which is provided by Google as a full-fledged development environment for Android development, debugging, testing, and packaging [14].

The application in this study categorized as health application. Health application is result of collaboration of health and technology. One of health application is smart health. Smart health is a approach to health monitoring process using advanced technology consist of smart devices to overcome health problems [15]. The 3AHCare node is a health monitoring device with embedding Bluetooth module in it and capable of measuring a subject's ECG, blood pressure, blood oxygenation, respiration, temperature and motion based on the smartphone with the Android operating system. The system had good performance of the monitoring system in capturing, recording, transmitting and displaying ambulatory data and found the system easy to use and with high precision [16]. Android Application for Type 2 Diabetes Mellitus is done studied but still in a research and development (R&D) design. The results of the validation from the Android application experts, which focused on display quality, technical concerns, audio, and video quality, were found at 93.75% (very acceptable) [17].

Mobile health service system based on android platform with implementation of a wireless communication system for family mobile medical treatment. These application mainly record the daily health conditions of the family members which can effectively manage various chronic diseases and the prevention of disease. Not only that, it can be useful for some of the family members who have been suffering from chronic diseases, to help patients manage their daily diet and treatment [18]. The other android application for health was emergency helpline services application for a quick access to the phone numbers of the emergency helpline services of the respective emergencies. The system works by creating a digital template of the user which can be sent to their trusted contacts in case of an emergency. This helps the responding team to better equip for the necessary circumstances. Such a system will also allow notification to be sent that alerts your family and friends (trusted contacts) under such unfortunate circumstances [19].

Apps about medicinal plants also already launched by other researchers. Herbopolis – A Mobile serious game is built to educate players on herbal medicines. A mobile game on herbal medicines can potentially enhance players' herb-related knowledge. The results show that players are motivated to learn about herb-related information through playing "Herbopolis" and this app support its use for improving knowledge on herbal medicines [20]. In Indonesia, there is not application contain about medicinal plants. Because of that, the study design and implement SITONA (information system of medicinal plants).

2. Methodology

Methodology in this study consist of some steps such as study literature of medicinal plants, requirement analysis, design flowchart, design interface and implement application. Methodology is shown in Figure 1. In the first step of methodology, data about medicinal plants is collected and is learned. The next step is requirement analysis. Requirement analysis consist of two step like software requirement analysis and hardware requirement analysis. The aim of this step is prepare requirement not only software but also hardware to design and build an android-based medicinal plant application or SITONA. The next step is design flowchart provide step by step process in design application. Flowchart is a graphic diagram representation of a programming logic. A flowchart is used by programmers to design and develop an algorithm of a program. A flowchart is a very important tool in the planning phase in a program development cycle [21]. The fourth step is design interface is called Graphical User Interface (GUI) as display of application. Design interface was step to make design of Graphical User Interface. Graphical User Interface (GUI) was a form that consist of visual and text. User can be interaction with the application through GUI. Design GUI can be done by software is called evolus pencil [22].

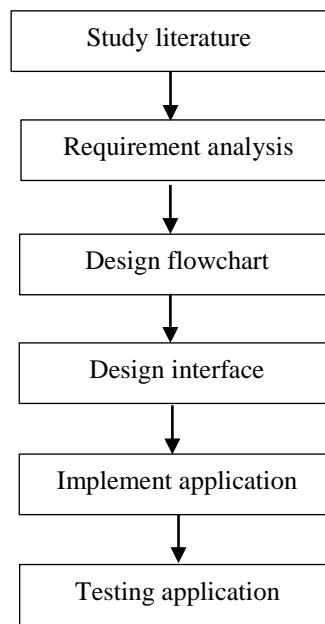


Figure 1. Methodology of research

Software evolus pencil is common open source application used to design an user interface that available for all platforms. This software has six benefits. The first benefit is easy GUI prototyping that provides various built-in shapes collection for drawing different types of user interface ranging from desktop to mobile platforms. The next benefit is built-in shape collections included by default, its collections includes general-purpose shapes, flowchart elements, desktop or web UI shapes, Android and iOS GUI shapes. The third benefit is diagram drawing support, connectors which can be used to wire shapes together in a diagram. Flowchart shapes available for drawing diagrams. The fourth benefit is file can be exported into some types of formats like PNG files, as a web page, open office text documents and adobe pdf. The fifth benefit is easy to find cliparts from internet by a simple drag and drop operation. Benefit of this software also inter-page linking that elements in drawing can be linked to specific page in the same document [23].

The next step is implement application, a conversion design flowchart and interface into application. This step is built using Android studio. After application is built, application is tested using black box testing. The black-box technique is common method in testing application [24]. Approach of black-box technique is the functionality of a device under the test (DUT) with no knowledge of the device's internal structure like hardware, software and their relations [25]. The black-box technique focuses on the functional specification of a software system and the coverage of the specified external behaviour of the software system [26].

3. Result and Discussion

This part of research explains about result and discussion of study. Result provide explanation based on methodology. The first step is study literature about medicinal plants. Literature is taken from any reference such as journal, article and news. References provide basic information about medicinal plants. The second step is requirement analysis in software and hardware. Software is used in this study is PHP, Android studio, Java, CodeIgniter, PostgreSQL. The first software is used in this study is PHP or the PHP Hypertext Preprocessor is a programming language that allows web developers to create dynamic content that interacts with databases. PHP is the widely-used, free and efficient for developing web-based software applications. PHP have five characteristics make PHP's practical nature possible are simplicity, efficiency, security, flexibility and familiarity [27]. The second is Android studio. Android Studio also is provided by Google. Android studio has image to be software be equipped by to build android apps [28].

The other software in this study is java. Java is an object-oriented programming language developed by Sun Microsystems, a company best known for its high-end Unix workstations. The java language was designed to be small, simple and portable across platforms and operating systems. The advantage of using java language are java is platform independence that a program's capability of moving easily from one computer system to another system, java is easier to write, easier to compile, easier to debug, and easy to learn

[29][30]. Codelgniter is a powerful PHP framework with a very small footprint, built for developers who need a simple and elegant toolkit to create full-featured web applications. Eventhough small footprint, codelgniter provides some characteristics such as exceptional performance, simple solutions over complexity, strong security, clear documentation and nearly zero configuration [31]. Software is used as database is PostgreSQL, a powerful, open source object-relational database system, strong reliability, feature robustness and performance. PostgreSQL has the PostgreSQL community that provides many helpful places to become familiar with the technology and discover how it works [32].

The third step is design flowchart. Design flowchart was a step to make algorithm of application [22]. Flowchart of this study is shown in Figure 2. Application consist of some feature such as medicinal plants, potion, market and login. Feature medicinal plants provide information detail about medicinal plants. Feature potion give information about medicinal plants, potion, other ingredients in potion and how to making potion based on complaint that entered by user. The other feature in application is market. Feature market provide product that sell in application. Ingredient of product is medicinal plants and has savour for health. The last feature in application is login for seller and customer of market feature. Login using email as username.

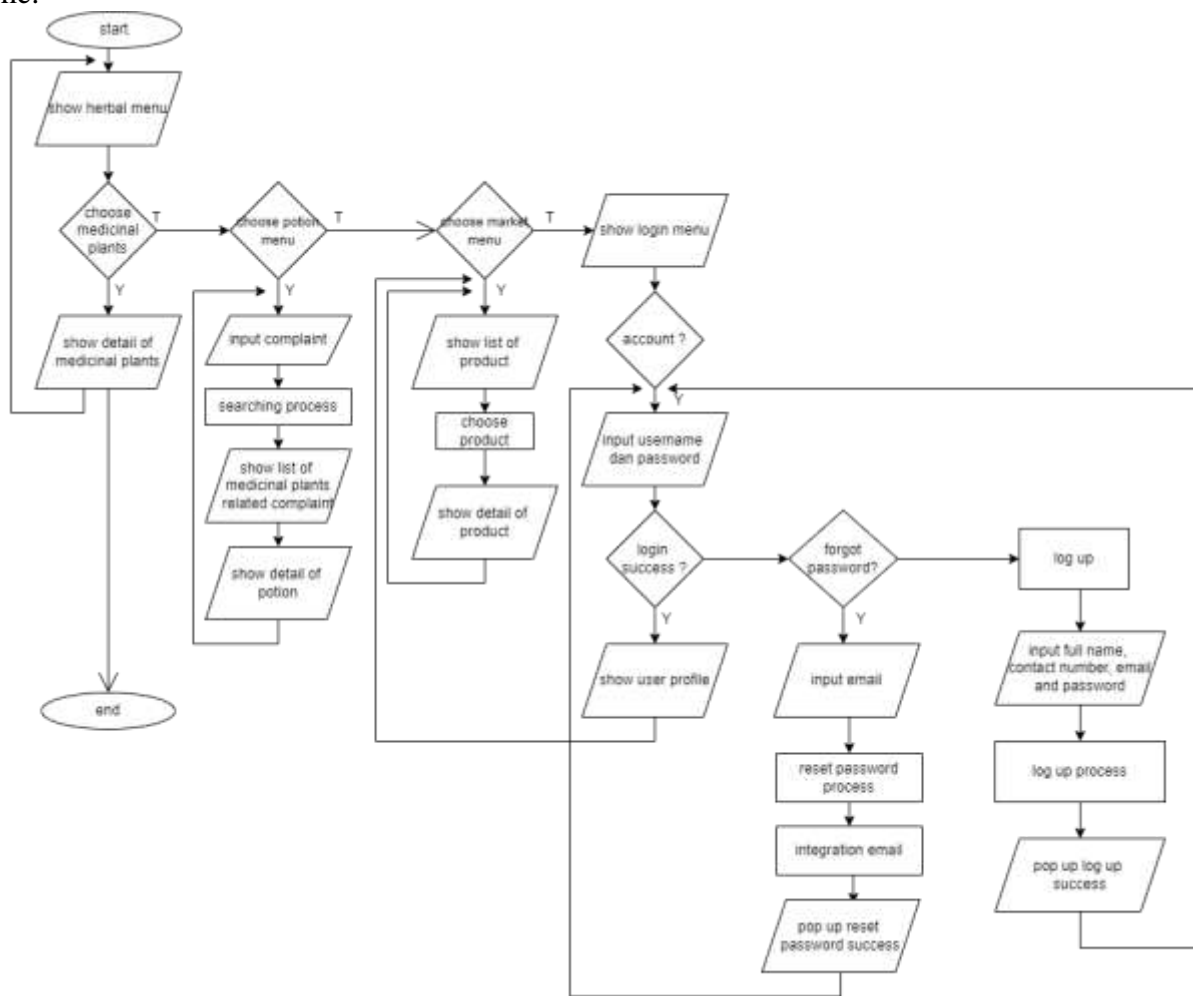


Figure 2. Flowchart of application

The fourth step is design interface. Output of this step is Graphical User Interface (GUI). GUI is built in simple way and user-friendly. GUI of application is shown in Figure 3. GUI have six display such as GUI dashboard, display of features, display of medicinal plants feature, display of potion feature, display of market feature and display of login feature. GUI dashboard displays the application logo shown in Figure 3a. Display of features provide four menu options in the SITONA application (medicinal plants, potions, markets, and login) as shown in Figure 3b. The third feature give information about medicinal plants menu which contains the names of medicinal plants. In the initial development stage, the SITONA application is filled with 20 of the most popular herbal plants in Indonesian society. These display is shown by Figure 3c. Potion feature displays the potion menu which contains a choice of pain complaints commonly experienced by the community, including: toothache, canker sores, and urinary stones. Display 4 is shown in Figure 3d. Market feature contains a list of products traded by sellers and buyers in the SITONA application.

Furthermore, each product in the Market menu is given information on the product name and price. Market feature is shown by Figure 3e. The last feature displays login menu containing the SITONA application logo, username, password, and login for buyer and seller users in the SITONA application. These feature be seen in Figure 3f.

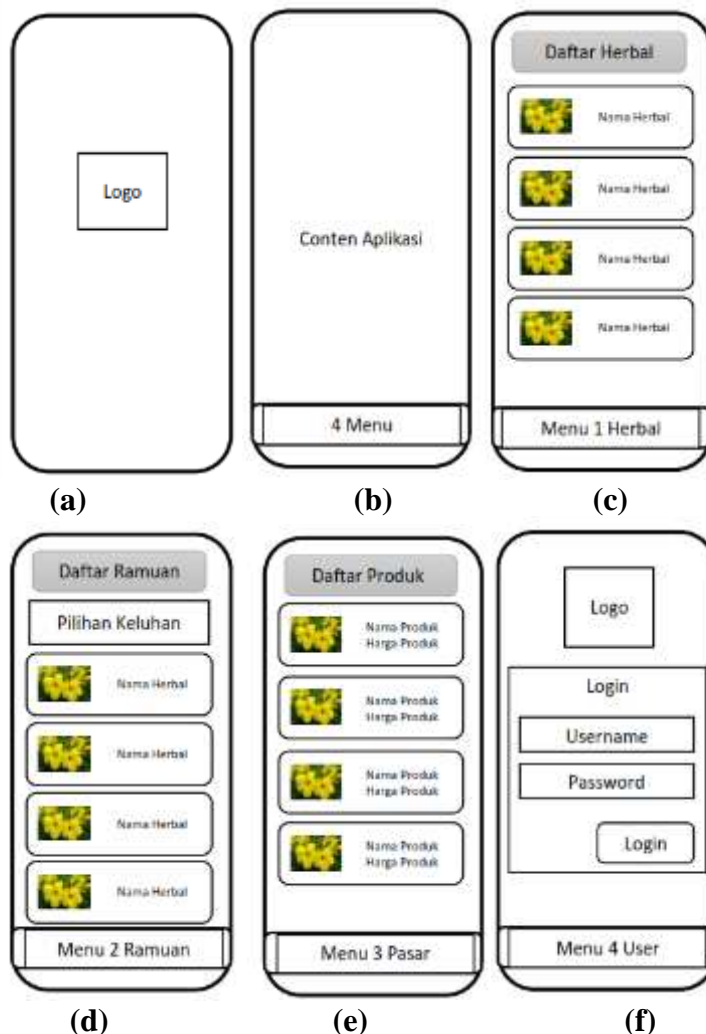


Figure 3. Design interface of application

The last step is implement application. Output of design flowchart and design interface is converted into mobile application using Android studio. According to design flowchart and design interface, application contains four features such as medicinal plants feature, potion feature, market feature and login feature. Beside features, dashboard of application also provided in application. Android mobile application SITONA is shown in Figure 4. Application is running well in android OS mobile phone. But application also tested using black box technique. Focus of this method is the functions of application. Function flow show the suitability of business processes desired by the user. Black-box testing is not related with the source code of the program. Table 1 shows the process of black-box testing of the application. In Table 1, there were conclusion column to compare expected result and test result. All test scenario show that all is match and normal. Because of that, the application works fine.

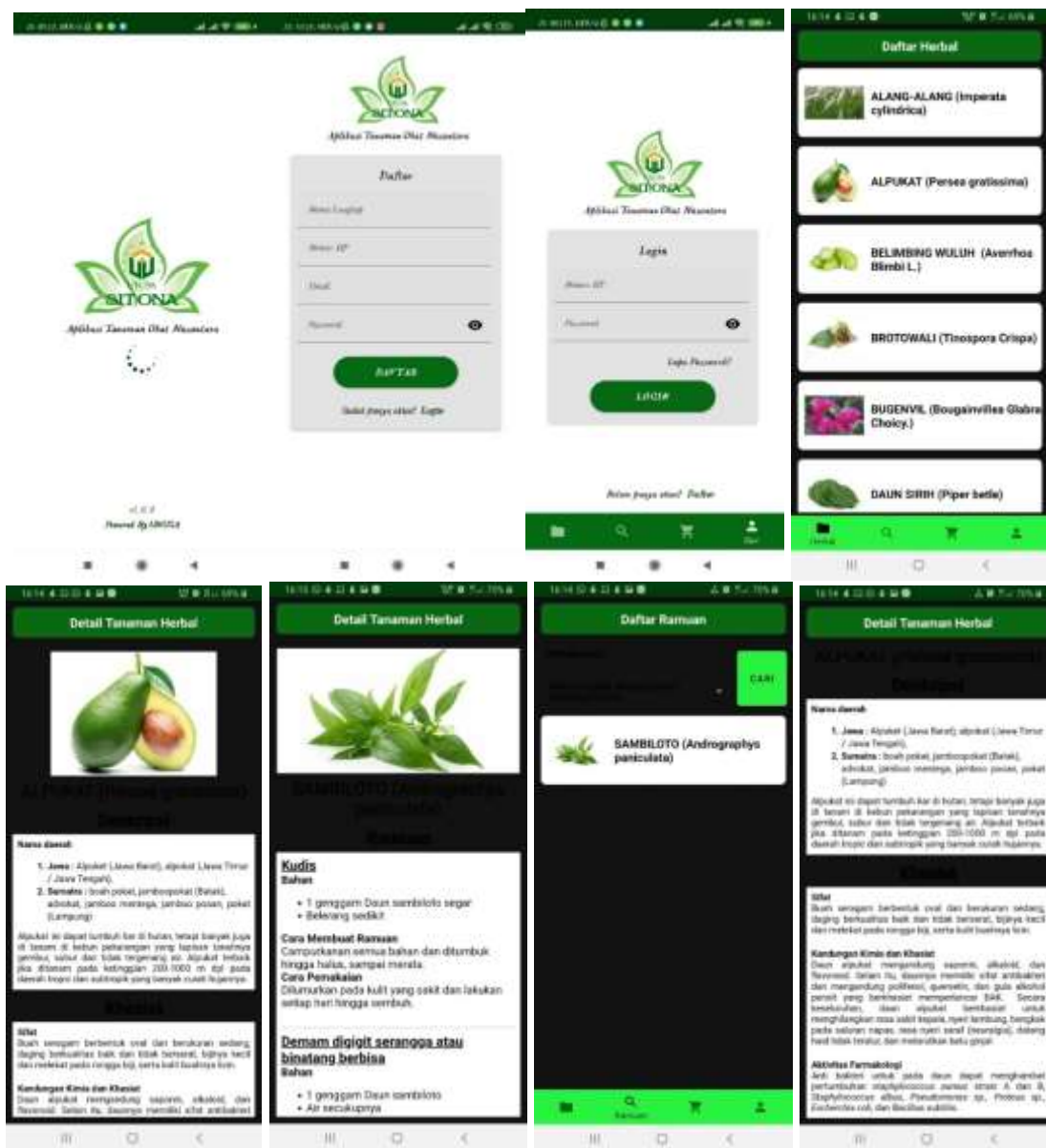


Figure 4. SITONA Application

Table 1. Process of black-box testing

Test scenario	Test case	Expected result	Test result	Conclusion
Sign up	Click sign up in login feature	Success in sign up in application	Match	normal
Login	Click login in login feature	Success login in application	Match	Normal
Search one of medicinal plants in application	Click medicinal plants feature, search and find medicinal plants is wanted	Medicinal plants is looking for is shown in application	Match	Normal
Search potion with input complaint	Click potion feature and input complaint	Potion is related with complaint is entered in application	Match	normal
Exit application	Click back arrow twice	App is closed	Match	normal

4. Conclusion

The aim of this research is to design and build an android-based medicinal plant application or SITONA. SITONA consists of a directory of medicinal plants in Indonesia. SITONA has several features that function to empower health and strengthen the economy through an in-app marketplace. The steps in the study are literature study, requirement analysis, design flowchart, design interface, and implement application. First step is literature study, a step to collect information about medicinal plants in Indonesia. Requirement analysis consist of software requirement analysis and hardware requirement analysis. Design flowchart step has aim to design process flow in application. Design interface step has output such as interface in every feature in application. Implement application is a step to implement design flowchart and design interface into android application. Implement application using android studio. The last step is testing application using black box testing. Result show that application is success in design and implement into android mobile application. Output of testing application also give good result. For conclusion, application is running well and application ready in use.

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