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Self-Medication Application (Swamedikasi) Based on Mobile

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ABSTRACT

The existence of the internet which is a means of providing actual information makes users obtain information through their mobile devices with mobile-based applications, including health information which is important for human life. Self-medication (Swamedication) can provide quick information about minor illnesses that can be handled independently without having to call a medical expert, patients can also take the initial steps to treat the symptoms of the disease that arise to prevent a more severe condition due to a disease that is slow to treat. Mobile devices for self-medication applications built with the Java J2ME programming language were chosen because mobile devices support Java applications. In this application, users can access information about the details of diseases classified as self-medication, including treatment, causes, and descriptions of each disease. Another feature of this application is that users can perform a search and then be connected to the web to search and display search results according to disease keywords.

1. Introduction

Symptoms of minor illnesses that are often ignored without the public knowing can cause serious illnesses that can threaten health. The existence of information from health experts in taking the first step in handling the symptoms of the disease experienced can provide the right solution. Information regarding early treatment measures that can be given for common disease symptoms, it is hoped that experts in the health sector will be able to provide health education, especially in tackling common diseases often suffered by most people. The use of technology to process information in the field of medical science, which is useful in providing clinical services (diagnoses), makes it easier for people to understand various types of drugs [1]. The problem is that the number of health workers and practitioners cannot be sufficient to be distributed throughout the archipelago, and also the available health services provide separate information such as using the website of the health office as a medium of socialization [2]. The limitations of health workers in providing this information can be overcome by providing an understanding of self-medication, namely actions taken to overcome health problems by using medicines that can be consumed without the supervision of a doctor. Drugs used for self-medication or self-medication are commonly referred to as non-prescription drugs or over-the-counter drugs or OTC (over-the-counter) drugs [3]. Drugs used in self-medication are non-prescription drugs (OTR). In Indonesia, OTR includes Obligatory Pharmacy Drugs (OWA) or hard drugs that can be delivered by pharmacists to patients at pharmacies without a doctor's prescription, limited over-the-counter drugs (drugs that will be safe and effective if used according to the instructions for use and warnings contained on the label), and over-the-counter drugs (drugs that are relatively safe to use without supervision).

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The use of OTR for self-medication is usually in conditions and cases of a) Minor symptomatic treatment, such as feeling unwell and minor injuries; b) Diseases that can heal on their own with increasing body resistance, such as flu; c) Prophylaxis or prevention and cure of minor illnesses, such as motion sickness and water fleas; d) Chronic diseases that have previously been diagnosed by doctors or other medical professionals, such as asthma and arthritis (rheumatism); e) A life-threatening condition that requires immediate treatment.

With the development of artificial intelligence, currently, most people prefer mobile devices that have many features and support various applications, especially applications equipped with artificial intelligence because the information provided can act as an alternative from experts in consulting about diseases [4]. An application that can replace health experts in providing precise information [5],[6] to the public regarding self-medication activities, it is hoped that the risks caused by the symptoms experienced by a person can be known quickly so that people are expected to be able to independently recognize the symptoms of the disease they are experiencing, and can cope and decide for themselves the right treatment to cure the sufferer [7] which can also save time and money because the information is already available through the application installed on the mobile device.

In self-medication, one of the factors that influence the success and safety of the treatment carried out is the provision of sufficient information about drugs that must be used in certain conditions, as well as how to use them properly and correctly. This is because self-medication can also be at risk if the community does not recognize serious disease disorders and because of inappropriate drug selection [8]. For this reason, pharmacists can assist in self-medication activities in providing rational OTR.

The main objective of this research is to design and build a mobile-based application for self-medication activities for minor ailments. This research provides benefits, including a) Continuous risk can be reduced due to rapid disease management by understanding the symptoms of the disease felt so that it is not wrong to take treatment steps; b) Can reduce panic caused by sudden illness due to the availability of information in fast mobile applications to overcome self-medication treatment.

2. Methods

The design of J2ME-based self-medication applications is carried out using object-oriented methods as a tool using UML (Unified Modeling Language) modeling [9],[10] to provide an overview of the components and flow of the system running on the application. The results of a software engineering process will be in the form of models, descriptions, and software [11]. To create a model, UML has diagrams [12] such as a) Use case diagram which is the interaction between actors (users) and the system; b) Activity diagram is a special state diagram that describes the activity processes of the system; c) Sequence diagrams describe a series of steps that are carried out in response to events that produce output.

J2ME is a development environment designed to put Java software on electronic goods with small memory capacity and supporting devices [13]. CDC is a specification of the J2ME configuration, CDC consists of a virtual machine and a collection of basic libraries for use in industrial profiles. CDC's implementation of J2ME is source code that provides connections with various platforms and the Java programming language can support the development of applications based on other programming languages [14]. In J2ME there are two profiles, namely MIDP (Mobile Information Device Profile) and Foundation Profile. The most popular profile used is MIDP (Mobile Information Device Profile). While the Foundation Profile is the profile used for CDC configuration. This profile adds several classes from J2SE to the CDC configuration and serves as the foundation for building other new profiles. The main feature of MIDP is RMS (Record Management System), an API that gives MIDP applications the ability to store data on mobile devices.

NetBeans is an Integrated Development Environment (IDE) based on Java from Sun Microsystems. The NetBeans product itself has 2 types, namely the NetBeans IDE and the NetBeans Platform. NetBeans is an open-source development software, which means it is under joint development and free of charge. Sun Java Wireless Toolkits (formerly known as Java 2 Platform, Micro Edition (J2ME) Wireless Toolkit) is a toolkit that provides an emulator environment for developing wireless applications [15] based on J2ME Connected Limited Device Configuration (CLDC) and Mobile Information Device Profile (MIDP) and is designed to run on cell phones, PDAs and other mobile devices. Devices designed to require the web to display more detailed information when needed. A web created with PHP is a collection of dynamic web pages, meaning

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that the page to be displayed is created when the page is requested by the client so that the information received is always up to date (latest). Applications built by PHP will generally provide results in a web browser, but the whole process is run on the server [16].

3. Results and Analysis

3.1. UML (Unified Modeling Language) Modeling

The general flow of the Swamedication application is as follows: a) The program starts by displaying a splash screen while waiting for the incoming application to load, the main menu appears containing several sub-menus that can be selected by the user; b) To find out information about diseases that can be classified as self-medication, the user can view it by selecting the sub-menu of the list of diseases. Accessing this information is free, there is no internet charge because the database is accessed internally which is stored via RMS; c) To search for the data that they want to know, the user can select the search submenu, where later there will be three types of search categories that can be adjusted to the words the user chooses to search. Accessing this information is subject to a GPRS fee according to its use because the search database will be loaded on the web, thus requiring an internet connection fee; d) About and help sub-menu is a sub-menu that contains information related to the use of this application and can be accessed for free without using a connection. Based on the application flow, the actors who play the most role in this system are the users or owners of mobile devices as shown in Figure 1.

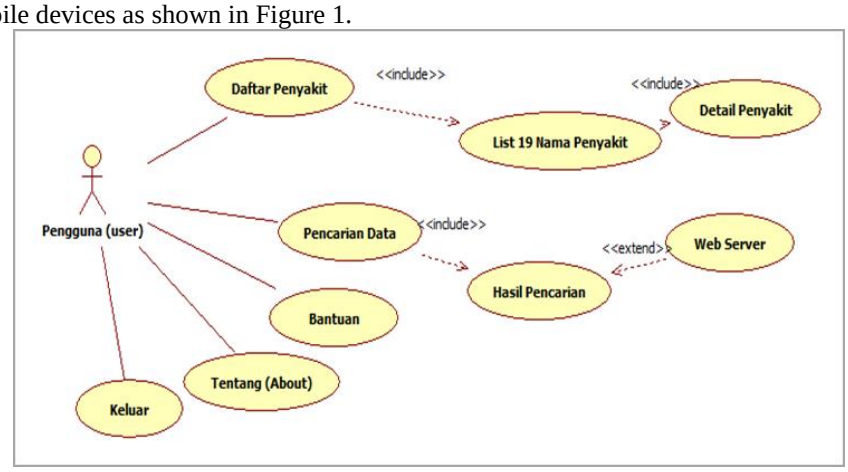

Fig 1. Self-medication application use case diagram

Users who have selected the disease list sub-menu on the main menu will be faced with a disease list screen containing about 19 types of diseases that can be self-medicated. Activity Diagram Figure 2 shows the interaction of the user who chooses one disease name, then the system will read it and then display the details of the disease including symptoms, causes of disease, and treatment.

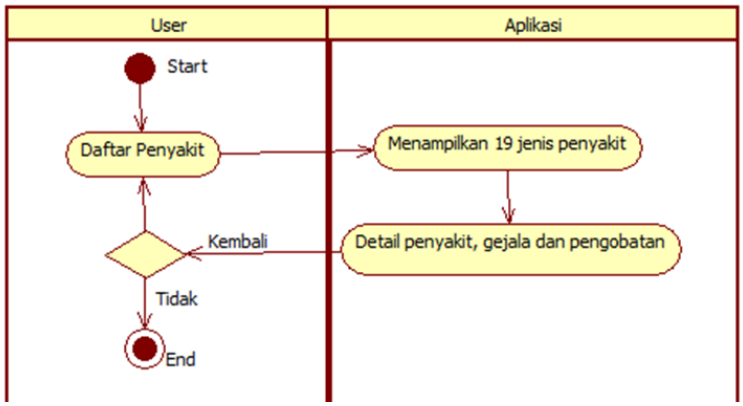

Fig 2. Activity diagram list of diseases

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According to the use case diagram in Figure 1, the data search sequence diagram explains that the user can search for information based on the three available categories by entering a related keyword. The system will search and match with databases available on the web if the data is found it will display the intended information, if not found a warning will appear and the user can return to the previous menu. The flow of this sub-menu is as shown in Figure 3.

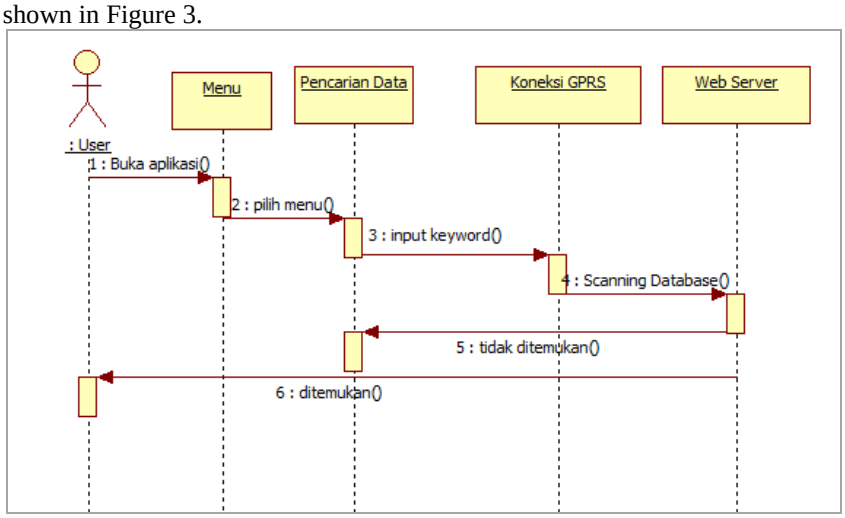

Fig 3. Data search sequence diagram

3.2. MIDlet Visualization

After the design flow is in the form of UML diagrams, then it is processed and visualized using the visual MIDlet facility contained in Netbeans 7.0.1 in Figure 4. Then, the J2ME source code is made by the design of the Swamedication application.

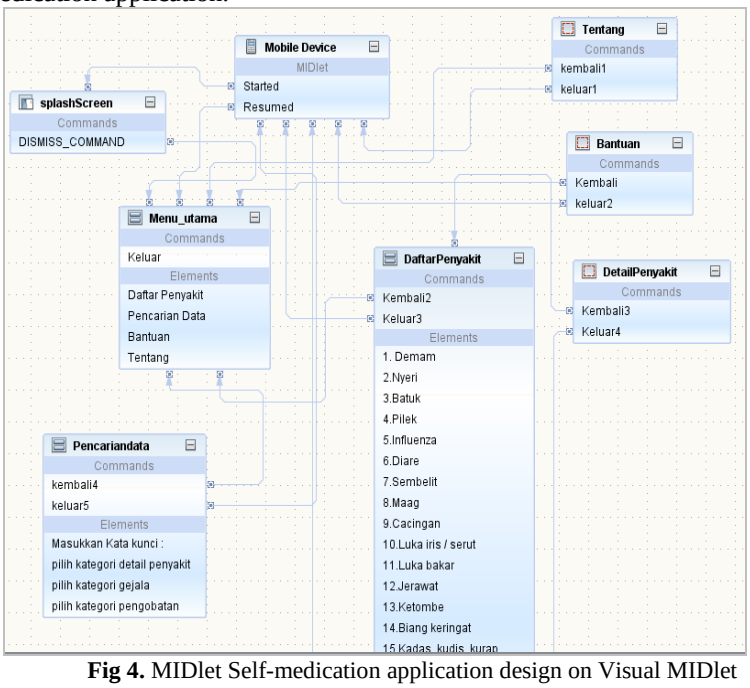

Fig 4. MIDlet Self-medication application design on Visual MIDlet

The coding process is the creation of the source code of the application. In making this self-medication application, it consists of 1 MIDlet class. The class for creating the Swamedikasi application is the mobile_swamedika.java application class. Created with Netbeans 7.01 editor can also be created with Notepad++ before the file is compiled by Sun J2ME Wireless Toolkit.

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3.3. Self-Medication Application User Interface

User interface Self-medication in the following images is performed on a device emulator available in Sun J2ME Wireless Toolkit 2.5.2 with the Sun Java SDK Standard Edition Version 1.6.0_21 compiler.

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TABLE 1
SWAMEDICATION APPLICATION INTERFACE

Menu	Function	User Interface
Main Menu Form	On the main menu form, there are several lists of options from the Swamedication application as well as an exit command to stop the application.	
Disease List Form	This form is the display when the sub-menu of the disease list on the main menu is selected by the user. In this form, 19 types of diseases are classified as self-medication.	

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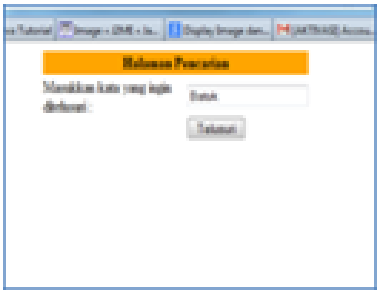
Menu	Function	User Interface
Disease Detail Form	This form is displayed the disease details selected by the user in the disease list sub-menu. This form contains disease details that are accessed through a database stored in a .txt file including the causes of the disease, its symptoms to actions, and drugs that can be given as first aid.	
Disease Data Search Form	This form will appear when the user selects data search on the main menu list at the beginning. The user will be redirected to a web page. After the search data is found, the results of the disease and also the treatment is self-administered.	 

3.4. J2ME Emulator Testing

The method used for testing is the black box, the test is carried out by paying attention to the final input and output of the use case that is run. The input given is then processed and will produce output that determines the suitability of the program with the design specifications and functional requirements desired by the user. If the given input produces output by the design specifications, then the application program is correct and does not need to be repaired. The following Table 2 is the test results, the comparison data of the test design using the emulator with the results of testing applications on mobile devices.

TABLE 2.
SWAMEDICATION TESTING APPLICATIONS

No.	Tested Module	Design Specification	Test Result	Number of Tests
1.	Splash Screen	Serves as a page buffer waiting for the system to access the application.	Functions are by design specifications. Based on the test results, there is	5 times

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No.	Tested Module	Design Specification	Test Result	Number of Tests
			one device that cannot display.	
2.	Disease List	Serves to display a list of 19 groups of diseases that are classified as self-medication.	Functions are by design specifications.	5 times
3.	Disease Details	The function displays data from a list of selected diseases.	Functions are by design specifications.	5 times
4.	Search Page	Serves to connect to a web to find and display health information.	Functions are by design specifications.	5 times
5.	Help	Serves to guide in running the application.	Functions are by design specifications.	3 times
6.	About	Serves to provide information about making applications including author data and year of manufacture.	Functions are by design specifications.	3 times

The test results in table 2 show that all the features of the tested application are by the design specifications and can function properly during implementation.

4. Conclusion

Based on the results of the design and implementation of Java Mobile-Based Self-Medication (Swamedication) applications, it can be concluded: a) J2ME programming language can be used in making expert system applications that are useful such as experts in solving problems based on the input of disease problems classified as self-medication; b) Mobile-based applications can provide knowledge about self-medication (Swamedication) which makes it easier for users to find information on the treatment of minor ailments including self-medication; c) Applications can be run on mobile devices that practically provide information quickly that can reduce ongoing risks and reduce panic in dealing with sudden health problems by providing solutions for minor ailments such as solutions provided by medical experts; d) If further symptoms are found, the user is advised to seek treatment at the nearest health facility and consult a doctor as a disease expert.

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