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The Development of Berbakti: Elder Caring Mobile Application in Indonesia

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ABSTRACT

Children must care their parent as their devotion to their parent. In Indonesia, that kind condition is a common situation. But, to handling this situation in this global era is more difficult because many children choose going to another city or another region to do some activity like taking a job or going to college. It gives an impact to their parent especially when their parent is too old and needs to be cared. This motivation in this paper is based on this kind problem. The development of application uses Waterfall. The system must meet the requirement so not just technichal development is performed, social study must be conducted in the process. We use several testings such blackbox testing, server testing, and usefulness identity. Commonly, we got unsatisfied result based on testing, so some repairement must be conducted.

I. INTRODUCTION

Human aging is a definite cycle. Its process can be identified by certain condition like decreasing in stamina, produc-tivity, and physical body changing like wrinkels. Based on that condition, the older a human is, it needs more atten-tion and caring by their relatives, physically or psychlogically. Rachel [2] explains that one of caring elder principle is support from their home. It means that elder needs more attention from the closest relatives of family as stated in [2]. The elder or in this situation is a parent needs to be cared by their son or daughter or another relative that can be called caregiver.

Ironically, the hope of elder about cared by their son or daughter does not usually comes true (we called it "orang tua terlantar" case). Certain condition can be a barrier to their relationship with their son or daughter like distance. In Indonesia, this distance means that elder and their caregiver is separated in long distance physically, that situation makes them cannot met regularly because many son or daughter go to another region of country to take a job or go to college, it is supported by archipelago that forms Indonesia. Another factor is a crowded activity by caregiver, it can decrease the intensity of giving a care for parent from caregiver as stated in [4]. In Dutch, there is a special institution to care parents as stated in [1], it is similar in Indone-sia, although in Indonesia, it is few parents use this facility.

In latest year, there are many ways to keep monitoring elder although the caregiver is far away through communica-tion device. Using phone is still an efficient way until now, but many modern humans feel it is too conventional to use. In contrary, many elders cannot use the latest technology device because the functionality of features in the latest mobile technology is not easy to use [5]. That contradiction makes communication intensity between elder and caregiv-er is not fluent and continous.

To avoid "orang tua terlantar" case, we propose an application to strengthen relationship between parent and their children. This application is a mobile application, it consists of two application: children apps and parent apps. Children apps is an app which is used by children to giv a care to their parent, and parent apps is for monitoring parent

condition. Parent apps send parent condition data through cloud and then children apps receive those data. Some features are available such: panic button, health record, 3rd party health care, etc.

This paper describes our activity in Aplikasi Berbakti Development. This application is to strengthen relationship between elder and their children. Section I is about problem description, the methodology is described in section II, discussion about system is described in section III, and conclusion comes in section IV.

II. METHODOLOGY

The development method that is used in this activity is Waterfall as shown in Table 1. The application that is dveloped named Berbakti, an application to strengthen children-parent relationship who separated in different area. In this application, children would be given role as caregiver and parent is an elder. The development of cycle and its testing takes One year between 2015 to 2016 in Universitas Dian Nuswantoro Semarang and Pekalongan City, Central Java, Indonesia as role model for this project.

TABEL I
Development Cycle of Berbakti Application

Phase	Activities	Location	Deliverable
Analysis			
	1. Analysis of long distance problem between parent and its son/daughter in Indonesia 2. Literature study in Journal and Book 3. Data collection about long distance problem between parent and their son/daughter in Indonesia using online questionnaire. 4. Analysis on the flow procedure in the management system.	1. Universitas Dian Nuswantoro Semarang 2. Universitas Dian Nuswantoro Semarang 3. Region in Indonesia: Sumatera, Java, Madura, Bali, West Nusa Tenggara, East Nusa Tenggara. 4. Universitas Dian Nuswantoro Semarang	1. Main key of problem is about long ditance problem between parent and their son/daughter is identified. 2. The teories about problem to its relvenacy in research is identified. 3. Requirement analysis is retrieved reliably. 4. The entity os users and its characteristics was known.
Design			
	1. Design of system architechture 2. Design of interface system 3. Design of UML	1. Universitas Dian Nuswantoro Semarang 2. Universitas Dian Nuswantoro Semarang 3. Universitas Dian Nuswantoro Semarang	1. Mobile application which is separated into two kinds: caregiver app and elder app 2. Interface design for caregiver app and elder app.
Development			
	1. Database implementation 2. Interface system implementation 3. System implementation	1. Universitas Dian Nuswantoro Semarang 2. Universitas Dian Nuswantoro Semarang 3. Universitas Dian Nuswantoro Semarang	1. Database was implemneted 2. Interface system was implemented 3. System has been implemented in the server.
Testing			
	Unit testing Integration testing System testing User acceptance testing	1. Universitas Dian Nuswantoro Semarang 2. Universitas Dian Nuswantoro Semarang 3. Universitas Dian Nuswantoro Semarang 4. Stikes Muhammadiyah Pekajangan 2, Pekalongan City, Central Java, Indonesia	1. Each function has been verified. 2. Each function has been verified to the algorithm. 3. The system entity has been veirified with algorithm flow. 4. The system entity has been validated with the users needs.
Further testing			
	Field testing	Universitas Pekalongan, Pekalongan City, Central Java, Indonesia.	Percentege response from Pekalongan Citizen.
Maintenance Phase was not done in this activity			

The response of Pekalongan City citizens were descriptively analysed using questionnaire with Likert scale 4 (score 1 to 4). More detail can be seen in Table 2. This development can be succesfull if it could fullfill the criteria of the research: successfull in development Berbakti Application; response of Pekalongan citizen as sample that have to be in useful and very useful.

TABEL III
LIKERT SCALE FOR FIELD TESTING IN BERBAKTI APPLICATION

Values Range	Response Categories
$M_i + 1.5\ S_i \leq x$	Very useful
$M_i + 0.5\ S_i \leq x < M_i + 1.5S_i$	useful
$M_i - 0.5\ S_i \leq x < M_i + 1.5S_i$	Not Useful
$x < M_i - 1.5S_i$	Doubt

Mi = ½(highest score ideal + lowest score ideal)
Si = 1/6(highest score ideal - lowest score ideal)

III. DISCUSSION

This activity was conducted for one year, from October 2015 to Nopember 2016. The application is an Android mobile application which uses Java Android native programming. Because it exploits two side (caregiver and elder), so the development splits into two apllications: caregiver app and elder app. Caregiver app is apllication used by caregiver to monitor and give a care to their elder. Elder app is for elder which has function to report elder condition based on set-ting by caregiver.

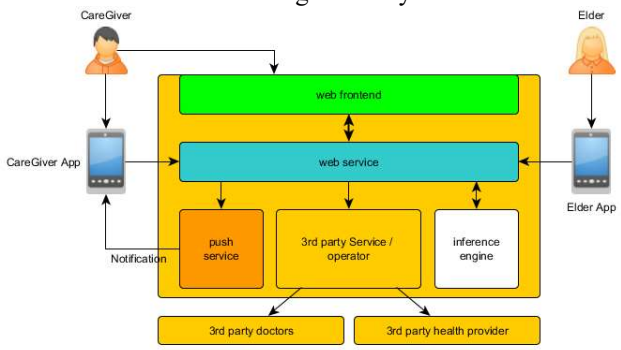
Notification in this application system takes the main role because action from caregiver and elder using this app is determined by notification. The developed feature consists of four parts: caregiver app feature, elder app feature, infer-ence system feature, and 3rd party service.

Caregiver app feature is developed to give perception about active communication activity from caregiver to elder. There are several features of caregiver app such are: 1) registration feature that is just to be performed by caregiver and include elder registration; 2) emergency response feature, it will be activated when an elder push a panic button; and 3) reminder to call elder, caregiver will be alarmed regularly based on time setting to call their elder.

On contrary, elder app has features that makes elder less active than caregiver in using this mobile application. There are several features of elder app such are: 1) notification response from caregiver to give confirmation about elder condi-tion to caregiver; 2) checking condition, an elder will face an interface to tell about his/her condition by pressing a button menu; and 3) panic button, it is emergency button to help elder when they are in danger condition and can ac-cess the application.

There are two active entities in this scheme: elder and caregiver. Caregiver will act more because many things to must be performed by caregiver such registering caregiver and elder identity, setting alarm and action to activate care feature. The main feature is checking parent condition that a caregiver know their parent condition from which menu that the elder chooses.

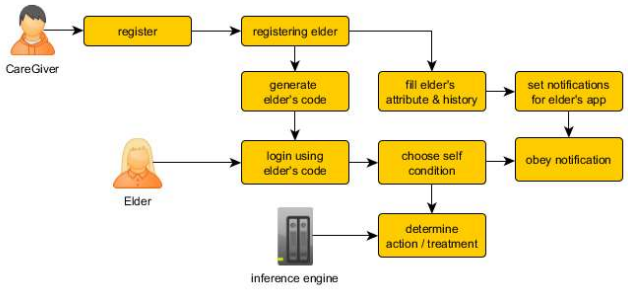
Based on caregiver app, web service receives a command as an input. Respond of web service is quite related with apps and inference engine. Inference engine gives a service as decision maker from elder app and caregiver app data which is collected in server that organized by web service.



Gambar 1. Scheme of caregiver-elder app sistem based mobile application

A. User Access

Notification that must be responded by elder is processed by inference engine to makin decision that can be an information for caregiver. For example, an elder responds a notification from a caregiver then inference engine will process this action to produce a reliable information for caregiver about elder condition.

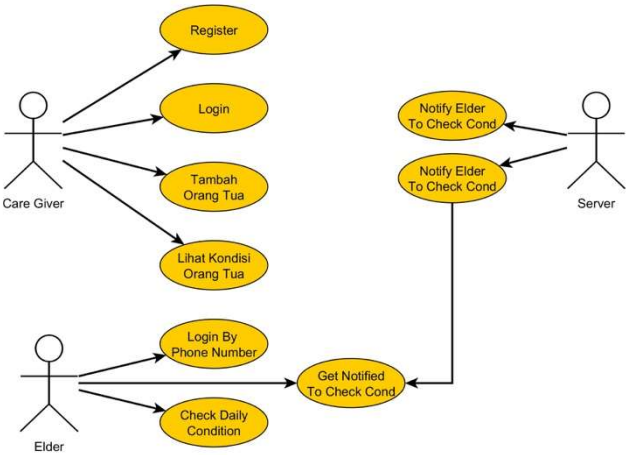


Gambar 2. System flow in mobile application

B. Server role for elder-caregiver app system

From system perspective, server or admin server also has important contribution between caregiver app and elder app. Each entity has certain activity that ust be performed as listed in system (Gambar 3). Between server and elder, server sends a reminder notification then elder must follow instruction that appears in notification, it is for elder condition check data and this data is send back to server. Caregiver can do a monitoring an elder condition based on database in server system.

Caregiver and server have same activity in registering and login. In addition, caregiver also add elder if a caregiver has to treat more than one elder. Caregiver is automatically added in elder app when a caregiver adds an elder.



Gambar 3. Use case of mobile apps at functional part

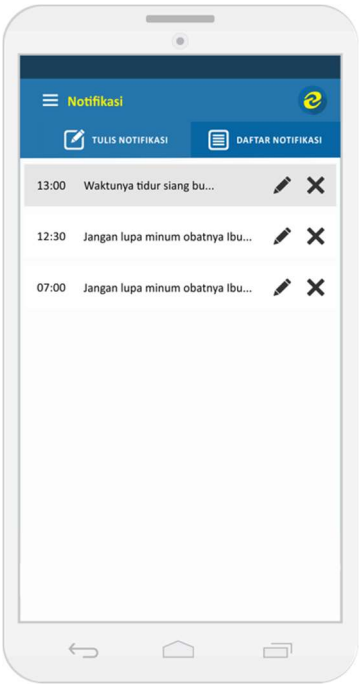
C. Testing

There are three testing phases that performed in this research:

a. Black Box Testing and White Box Testing conducted technical testing. Those kinds of testing were stated successful and compatible although there is some UI element is not suitable for elder.
b. Testing activity for first time was performed in 10th August 2016 by experts in mobile apps using forcing application server with 1.000.000,00 virtual users. The result of this testing is if many users use this application, the speed of ontent delivery process would be slow. To tackle this problem, new virtual server was established. The second testing was performed in 14th September 2016 and the result is the app is ready to launch.
c. The field test was conducted from 16th September – 10th October 2016 in Pekalongan City, Indonesia by some residents in that city with range of age between 16 – 60 years old which is separated into two group: elder group and caregiver group. That group is selected and must have parent-children relationship. This testing was measured by Likert Scale between 1-4. The highest ideal score and the lowest were found 75 and 10 respectively. The response from user states very useful (84.77%-206 respondents), and not useful (4.11%-10 respondents), another is doubtful. Because of this result, this apps development can be launched to citizen. Response that stated not useful is coming from condition of UI is still confusing for elder.

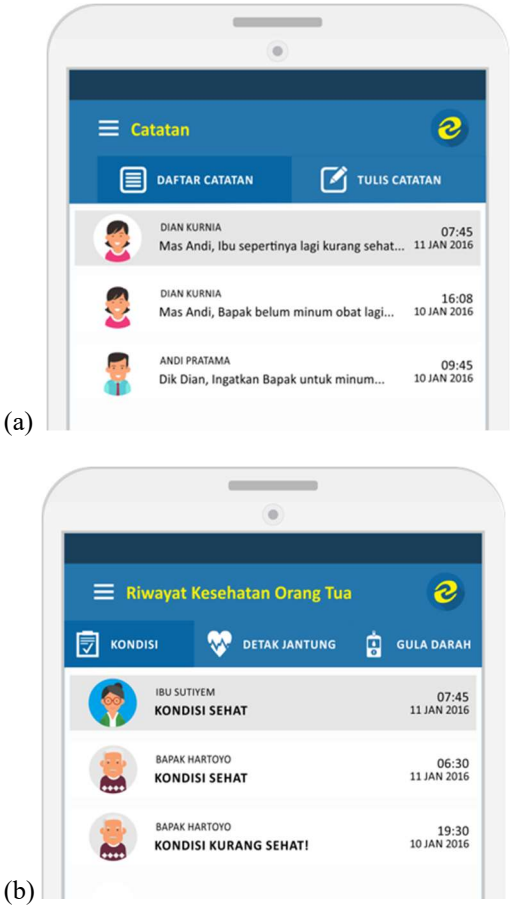
D. Appllication Features

Main feature in this application is sending reminder for parent. It is performed by children to remind their parent about some kind of activities that must be performed by tehir parent.



Gambar 4. Notification list that made by children to their parent

Not only that, if children are forget about to remind tehir parent, the apps will tell the children to contact their parent, beside the children can write this reminder by themself.



Gambar 5. (a) Reminder note menu that can generated automatically by system or write by the children and (b) Resume of parent condition

Based on that condition, some report about parent condition are established periodically.

E. Discussion

The development of this application uses Android programming using ionic framework and the database uses MySQL. Web service application uses PHP based on Laravel framework. Altough many revision and update must be performed in the next activity; this application can follow the requirement and quite solve the main problem of society.

IV. CONCLUSION

The application is quite enough to fullfill the solving of this problem. This statement based on reponses from most of respondent that this application is very useful. Some suggestions for this activity are development of this application must have more inetarctive UI and Reactive programming mst be implemented in this sytem to deliver the data better.

UCAPAN TERIMA KASIH

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