

# Disaster Information on Mobile Applications in Indonesia Using Sequential Search Algorithms Based On Android

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**Abstract**— Indonesia has 28 regions in the Republic of Indonesia Archipelago which are declared as areas prone to tectonic earthquakes, volcanoes and tsunamis. Among these are NAD, North Sumatra, West Sumatra, Bengkulu, Lampung, Banten, Central Java, and DIY in the south, East Java in the south, Bali, NTB, and NTT. Based on these facts, it can give an idea that the South East Java Province in particular has a high level of vulnerability when compared to other islands, when viewed from the total population density. Disasters can occur anytime and anywhere so people need to increase awareness, awareness, and preparedness, which is most at risk during the emergency response phase, where in that phase the situation is very conducive and the increasing hoaxes about data and information on disasters that spread in the community, along with the development of technological advancements, we need a mobile application that can provide the latest data and information routinely in the community. Referring to the design of mobile application designs that have been designed, in this study using the sequential algorithm method. With the sequential algorithm in this design, users can easily use this Android-based disaster information application, just by entering the keywords in the year of the disaster event, the location will be searched. The purpose of making this mobile application is to be able to provide data and information about disasters in Indonesia to all elements of society effectively and efficiently.

**Keywords**— disasters information; mobile application; the sequential algorithm method

## I. INTRODUCTION

A disaster is a natural event that cannot be predicted when it occurs. Likewise, earthquake disaster cannot be avoided, but its impact can be reduced through disaster mitigation efforts. Residential areas that are close to the source of the earthquake is a very vulnerable area, therefore it is necessary to take strategic steps to reduce or minimize the impact of loss or damage that can be caused by disasters. There are 28 regions in the Republic of Indonesia Archipelago which are declared as areas prone to tectonic earthquakes, volcanoes and tsunamis. Among these are NAD,

North Sumatra, West Sumatra, Bengkulu, Lampung, Banten, Central Java, and DIY in the south, East Java in the south, Bali, NTB, and NTT. Based on these facts, it can give an idea that the South East Java Province in particular has a high level of vulnerability when compared to other islands, when viewed from the total population density. Malang Regency is one of the districts included in the "High" hazard classification level against tectonic earthquake disasters, and ranks 60th in the national level (Irjaya & Pamungkas, 2014). In this regard, coupled with environmental damage and the uncontrolled use of natural resources, Indonesia has a high potential for

disaster threat (Khoiron, Rokhmah, & Widagdo, 2015). The high incidence of disasters in Indonesia is evidenced by data in 2018 of 2,572 disasters, 4,814 people dead and missing, 21,171 people injured, 10,417,179 people affected and displaced, 150,513 houses were severely damaged, 39,815 houses were moderately damaged, 129,837 houses were slightly damaged, 313,653 flooded houses, as well as damage to public facilities including 287 health facilities, 1,503 worship facilities and 2,984 educational facilities (BNPB, 2014).

Disaster management in Indonesia has been regulated in Law Number 24 of 2007, which aims to ensure the implementation of disaster management in a planned, integrated, coordinated and comprehensive manner. The Law has been included in Chapter V concerning Community Rights and Obligations Article 26 Point C, that the community has the right to obtain written and / or verbal information about disaster management policies.

It should be noted that in the disaster management cycle there are four phases that are carried out on an ongoing basis, including the phases of mitigation (prevention), preparedness, emergency response, and recovery and rebuilding (Harliani, 2014). Communication in a disaster is not only needed in a state of disaster emergency, but also important during and pre-disaster. Preparing people in disaster-prone areas must always be done. In addition to adequate information about potential disasters in an area, training and internalization of habits in dealing with disaster situations must also be carried out continuously. But it must be remembered, abundant information alone is not enough to make citizens aware of the dangers of a threatening disaster (Rudianto, 2015). With all information technology these problems can be overcome well, i.e. by connecting all related elements such as the government, the community, and donors volunteer so they can work together as a single unit. Research results from several sources that the government must indeed be utilizing technological developments and information (Yuwono, Winarno, & Harsono, 2015).

This research is similar to the previous research, namely The Socialization For Disaster Risk Reduction By Android Based Applications In Badan Penanggulangan Bencana Daerah Kabupaten Purworejo (Santoso, Sutiyatno, & Iskandar, 2014). This research explains about use of information technology and need. Information Technology with the media, especially Android-based smartphones are now widely used. Android-based smartphones are widely used today by all people in society. The purpose of the research is to create Android applications that will be disseminated in BPBD

Purworejo for disaster risk reduction. Android is a visualization process to facilitate the understanding of the disaster in the disaster protection in order to create a society that is aware of the disaster. Descriptive research methods and waterfall process model are used in this study. Descriptive method to obtain supporting data while the waterfall process model used to develop the application. From the results of this study is that the Android applications is made to enhance the participants' understanding of socialization in order to increase public awareness of disasters to reduce disaster risk.

Next is a study entitled Design Of Disaster Victim Data Management Information System Android Mobile Based (Bahagia, Satria, & Ahmadian, 2017). In that study the following research results disaster data management information system at the Disaster Management Agency Aceh area based mobile application Android that can process disaster data especially in the Aceh district environment large by entering the form that has been built namely sub-district, village data forms. Type, disaster, user, victim, damage, sector and help. Report generated is a disaster report, register damage and help list. System Disaster data management information on Regional Disaster Management Agency Aceh was developed using Java programming through devices Android Studio for client applications while the server side is built using PHP programming and MySQL DBMS.

The design of the algorithm used in this study is similar to the research conducted by (Rizal & Latifah, 2017) with the research title Designing Tourism Location Applications in Jakarta Using Android-Based Sequential Search Algorithm. In this study discusses the application that provides information services on tourist attractions in Jakarta, where this application uses Google Maps and uses a sequential search algorithm to display tourist locations to be searched, user locations and tourist attractions to be selected by the user.

After reviewing the research, the researcher created an disaster information on mobile applications in Indonesia based on android using sequential search algorithms and using the prototype model. This application contains about the latest data and information on disasters, disaster events, documentation, by coverage of all regions in Indonesia.

## II. LITERATURE REVIEW

### A. Information

According to (Sutanta, 2003) in (Aswati & Kartika, 2014) defines that information is the result of data processing so that it becomes an important

form for the recipient and has a usefulness as a basis for making decisions that can be felt directly or indirectly in the future.

#### B. Disaster

According to (Law No. 24 of 2007 concerning Disaster Management) in (Wardyaningrum, 2014) a disaster is an event or series of events that threaten and disrupting people's lives and livelihoods caused, both by natural factors and or non-natural factors as well as human factors that result human casualties, environmental damage, property losses, and psychological impact.

#### C. Software Development Kit (SDK)

According to (Safaat, 2014) "SDK is a tool and API that is used to start developing applications on the Android platform using the Java programming language." Android is part of software for mobile phones or smartphones that includes operating systems, middleware and key application released by Google, currently available android SDK (Software Development Kit) android using java programming language.

#### D. iReport

According to (Riestiana & Sukadi, 2014) iReport is assistive software for visual report design which can later be compiled with using jasper Report so becomes a \* jasper or \* jrxml file.

#### E. Sequential Search Algorithm Method

According to (Aziz & Harafani, 2016) in the sequential search algorithm, word search is done by searching words one by one, then matched with the search terms. If the word is searched with the matched word, then the search is stopped, vice versa if the word searched is not the same as matched words then search continued until the search words found.

### III. PROPOSED METHOD

#### G. Object Research

Conduct observations at the National Disaster Management Agency related to the collection of data and information on disasters in Indonesia and observations in the community about the needs of data and information on disasters in Indonesia, as well as making existing applications as reviews and examples by researchers.

#### H. System Development Methods

A prototype is an early version of the system software used for demonstrating concepts, experiments design, and find more problems and possible solutions (Sommerville, 2011). The following is below the Prototype Model image :

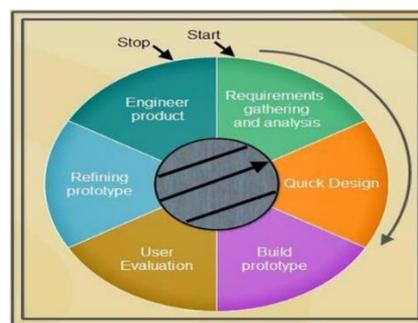


Figure 1. Prototype Model

The following are the stages of the prototype model, which researchers use in research:

#### a. Requirements gathering and analysis

In developing this application it starts with an analysis of system requirements and requirements. Interviews with users are needed to determine user needs and define in detail the system requirements in the mobile application to be implemented.

#### b. Quick design

If the analysis of the needs and requirements of the mobile application system is known by the user, the next step is to make the initial design or rapid design, in this case the design is only temporary and not detailed, only covers important aspects of the mobile application to be implemented.

#### c. Build prototype

Information collected from the initial design or rapid design is modified and implemented into a software program, including the coding phase until it becomes a mobile application or also known as the first prototype.

#### d. User evaluation

Next, the first mobile application or prototype is presented to the user for a thorough evaluation to recognize the strengths and weaknesses of the mobile application or prototype, and comments and suggestions are collected from users and given to developers.

#### e. Refining prototype

After the user evaluates the mobile application or prototype, and if the user is not appropriate or dissatisfied, the mobile application or prototype must be immediately refined and developed according to the comments and suggestions from the user. After being perfected and developed the new mobile application or prototype is presented and evaluated again by the user, this process continues until it meets the requirements by the user.

#### f. Engineer product

The final stage is a thorough evaluation followed by routine maintenance.

#### IV. RESULT AND DISCUSSION

The design of the algorithm used in this study is a sequential search algorithm, where this method is carried out in the following way

1.  $i \leftarrow 0$
2.  $found \leftarrow false$ .
3. as long as (not found) and ( $i < N$ ) work on line 4,
4. if (Data [ $i$ ] = key) then  
 $found \leftarrow true$ ,  
 if not,  
 $i \leftarrow i + 1$  {increase index value}.
5. if (found) then  
 $i$  is the index of the data sought, if not, data not found.

The design of the sequential algorithm used in this study : the search words are based on the index that has been determined by the user.

Input: x: Keywords

Output: Shown data

Process :

```

i ← 0
found ← false
for (int i = 0; i < data [years]; i ++)
if (x == data [years])
found ← true
if (found ← true)
Data found.
if (i ← 0)
Data not found.
    
```

This study uses cyclomatic white box testing.

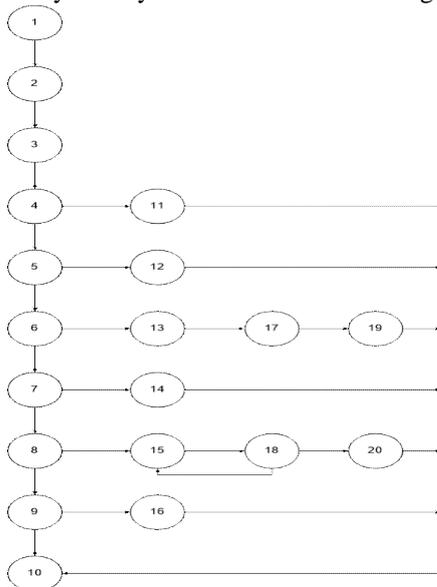


Figure 2. Cyclomatic white box testing

In this test, the authors calculate the cyclomatic complexity of the white box flow chart, which can be obtained as follows:

$$V(G) = E - N + 2$$

Where :

E = Number of Edge specified arrow

N = Number of flow graph vertices determined by drawing a circle

$$V(G) = 25 - 20 + 2 = 7$$

$V(G) < 10$  means fulfilling the cyclomatic complexity requirements. The set rows generated by the independent path are as follows:

- 1) 1-2-3-4-11-10
- 2) 1-2-3-4-5-12-10
- 3) 1-2-3-4-5-6-13-17-19-10
- 4) 1-2-3-4-5-6-7-14-10
- 5) 1-2-3-4-5-6-7-8-15-18-20-10
- 6) 1-2-3-4-5-6-7-8-9-16-10
- 7) 1-2-3-4-5-6-7-8-9-10

In this application there are a number of samples tested, namely the white box testing of the disaster information mobile application. The algorithm is: Select the year of disaster events menu on the main menu, then the user will go to the disaster events menu page and display the latest information on the impact of the disaster.

#### V. CONCLUSION AND SUGGESTION

After going through the stages of design, implementation and application testing, it can be concluded that:

1. With this disaster information mobile application in Indonesia, users can obtain data and information on disasters throughout Indonesia in an update and routine manner.
2. With the research on the disaster information mobile application, the public will become more attentive, aware and alert of disasters that occur at any time, because almost all regions in Indonesia are disaster-prone areas ranging from floods, landslides, earthquakes, tsunamis, tornadoes and other natural phenomena.
3. This study uses a sequential search algorithm to facilitate the search for information on disaster events.

In making research on this android-based disaster information mobile application, researchers realized that there were still shortages to adjust the needs in the community, especially in terms of disaster. Therefore it needs to be developed and further refined. The suggestions for this application are more

optimal and more interesting are as follows:

1. Application content can be developed related to disaster management contingency plans in each region, so that the community can access directly, related to information and what to do when a disaster occurs, such as: evacuation routes, shelter locations, safety procedures, information on disaster-prone areas, equipment readiness and logistics, and the strength of disaster management personnel consisting of government, local government and the community.
2. Information menu needs to be added from the community, so that this application does not only rely on the relevant apparatus to obtain disaster data and information, but also coordinates and cooperates with the community.

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