GEOGRAPHIC INFORMATION SYSTEM OF DESTRUCTING EARTHQUAKE IN INDONESIA AT CENTRE OF VOLCANOLOGY AND GEOLOGICAL HAZARD MITIGATION WEB BASED

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ABSTRACT

Application that can show information about earthquake position and camp of disaster with visual that contain realtime data and history data is a web based technology. Centre of Volcanology and Geological Hazard Mitigation is a unit inside Volcanological Survey of Indonesia, which the job is for making policy, standardization, technical guidance and evaluation volcanology and geological hazard mitigation. There is any system that can manage earthquake data and disaster camp data at Centre of volcanology and geological hazard mitigation. This situation make the information cannot reach by the people.

The method to build the system that writer use is waterfall method. This method is activity sequence for build the system start from requirements definition, system and software design, implementation and unit testing, integration and system testing, operation and maintenance. To build this application is using PHP script, MySQL database and MapServer for the web server. This application produce information that can make benefit for the people.

From research that have a purpose to build this application, hopefully this application can make a benefit information for the people as soon as possible and accurate.

***Keyword**: System, waterfall, information*

1. INTRODUCTION

Center for Volcanology and Geological Hazard Mitigation is a unit within the Agency of Geology Department of Energy and Mineral Resources. In the international world, the agency is better known as the Volcanological Survey of Indonesia (VSI), where this unita lot of data handling geological disasters caused by natural factors, especiallyearthquakes that is currently often the case in indonesia. Data destructive earthquakes there since1629 until now. The more information incidence of destructive earthquakes in a region, it will be known earthquake characteristics of the area, as well as if more and more incidents recorded earthquake, the more easily study the seismic activity in a region. Earthquakes have a huge impact, for example, that occurred on 30 September 2009Mw 7.6 magnitude earthquake occurred at a depth of 80km and damaging the city of Padang and taken the lives of approximately 1100 inhabitants. In addition tocasualties, the quake destroyed most infrastructure in the city of Padang. In eachoccurrence of earthquakes is needed post-disaster aid post where their function toprovide information about the earthquake that occurred to the public. But the location of the post-post and the information contained in these posts as the number of casualtiesand damage to buildings is difficult to know with certainty the general public. Hence the need for information on the location of the post, information on casualties andinformation on post-earthquake building damage.

The data must be held that already have data for updating the information obtained is thelatest data. However this is very difficult, because there is not an update system that can assist in accelerating the update data. The absence of earthquake damage to the system catalog information that is included with the media visualization by usingGeographic Infor mation System (GIS). Because, with the help of visualization media in the form of maps will

be more interesting and easily understood by t he publiccompared to the exposure data presented in tabular format that just some people whounderstand while the information is intended for the general public.

Earthquake is a natural occurrence that can not be predicted by any person or evenscientists, so that when an earthquake happens a lot of people who are not ready todeal with the quake caused heavy casualties and infrastructure damage as well. Therefore we need information on how to minimize the impact of the earthquake disaster is very important to the community. Therefore see the various problems thatarise as described above, we need a geographical information system in which theearthquake these problems can be solved properly and efficiently as possible.

1.1 Problem Identification

From the introduction was found a few problems that were formulated in anidentification problem: how to build a prototype geographical information system of earthquake damage in Indonesia at the Center for Volcanology and Geological Hazard Mitigation web based.

1.2 Mean and Purpose

The purpose of this thesis is to build a Goegraphic information system of destructing earthquake in Indonesia at centre of volcanology and geological hazard mitigation web based.

The objectives of the construction of geographic information system of earthquake damage in Indonesia at the center of volcanology and geological disaster mitigation web based, among others:

1. Availability of information on the location of earthquakes and its data coordinate.
2. Availability of information on the location of camp disaster and its data coordinate.
3. Facilitate the process of updating the data and post earthquake disaster.
4. Map as visual media to assist in facilitating conveying information
5. Availability of information on how to minimize disaster.

1.2 Boundary

The scope of which will be discussed will be very broad, it is necessary to limit the problem as follows:

a. Earthquake data are processed, ie the location of the earthquake, the province, the epicenter coordinates, time of disasters, the depth of the earthquake, earthquake magnitude, MMI scale, the number of casualties, the number of injuries, number of buildings damaged
b. Data that is processed post disaster, post disaster that is the name, address post disaster, coordinate the post, no. telephone, post information
c. The process contained in this earthquake data processing, data processing disaster aid post, process information display that is poured into the map, in the form of data processing procedures add, delete and search data.
d. The information will be produced this software are:
    1. Data from earthquake damage in 1629 until now.
    2. Data post disaster.
    3. Information on how to minimize the impact of disasters.
e. The resulting output of this software contains information on destructive earthquakes from 1629 to the present by using the map and also exposure to earthquake data, information, post disaster.
f. Seismic data used in the large-scale earthquake data starting from V to the upper scale.
g. This system is based on the WEB. h. In this software there are two types of users, namely:
    1. Administrator:
       Administrators have the task which has the authority to manage the data in this software, such as input, edit, delete data and reports. For administrators recommended a minimum of D3. Can use the software or tools on the computer properly.
    2. Public User:
       Public users of the public. For public users are recommended at least secondary school education. Has experience in using computers.

Understanding and experience in using Internet browsers, including the functions therein.

2. MODEL, ANALYSIS, DESIGN AND IMPLEMENTATION

2.1 Model

a. Stage of data collection
   1. Library Studies
   2. Observation
   3. Interview

b. In building the software system used method of Waterfall (Image 1), which includes several processes including:

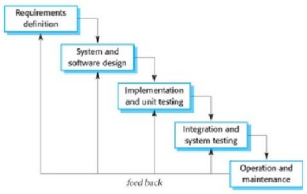


Image 1. *Waterfall*

a. Requirements definition
   Requirements definition is a stage where all the needs of the various elements were collected and analyzed which will be defined needs to be fulfilled by the system to be built.
b. System and software design
   System and software design is a stage which was built design for the system to be built.
c. Implementation and unit testing
   Implementation and unit testing is a stage where there is data translation stages or solving the problem of a matter that has been designed into the form of a computer programming language that has been determined.
d. Integration and system testing
   Integration and system testing is testing the system. Testing can be done two (2) ways: white box testing and black box.
e. Operation and maintenance
   Operation and maintenance is the final stage where it can be improved as well as changes in accordance with user requests or for further system development.
f. Feed back
   Feed back is the process of return or repeat the previous process.

2.2 Analysis

A. System Analysis

The analysis is the decomposition of a problem or an object which eventually resulted in a conclusion, it is meant to identify and evaluate the problems, opportunities, barriers that occur and needs, so it can be proposed improvement.

B. GIS Concept Analysis

The concept of Geographic Information Systems (GIS) that have not been applied on systems currently running in the Center of Volcanology and Geological Hazard Mitigation today, so that the information provided it difficult to be understood by the public. For that this concept be applied to the new system later. Where this concept will be applied in the main display menu for the user so that in addition there are public media also contained data visualization-related premises such visual media.

C. Functional Needs Analysis

In defining the functional requirements and modeling is needed in designing this software.

1. *Usecase Diagram*

The software created will handle the 8 (eight) main function, as shown in usecase (Image 2).

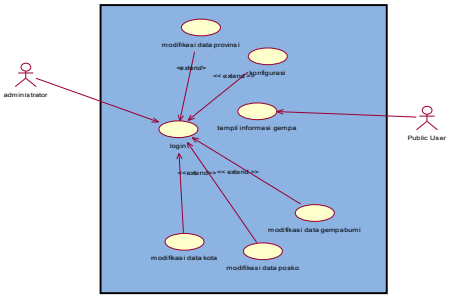


Image 2. *Usecase Diagram*

2. *Activity Diagram*

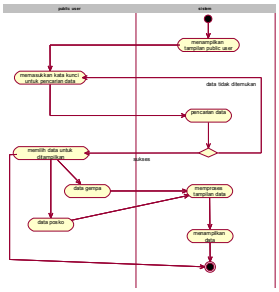


Image 3. *Activity Diagram*

3. *Class Diagram*

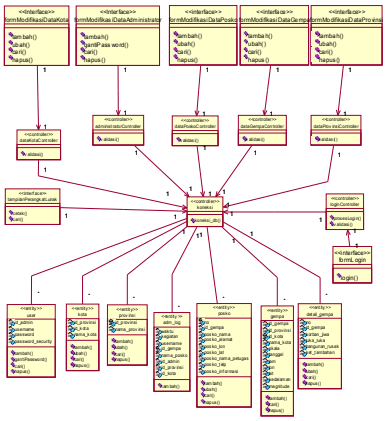


Image 4. *Class Diagram*

2.3 Design

A. Network Design Semantics

Semantic network describes the connectedness of the navigation menu from one form to another form. Connectedness of navigation on every menu of software damaging earthquakes are as follows:

1. Semantic network to an administrator (Image 5):

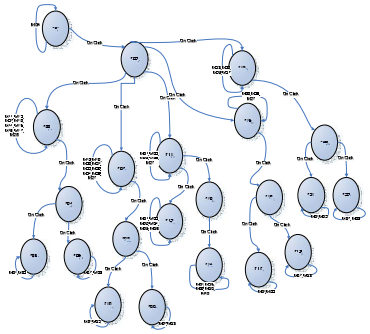
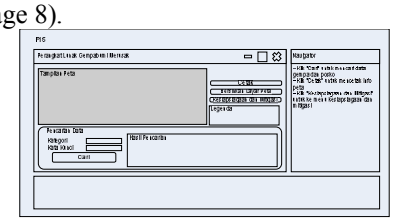


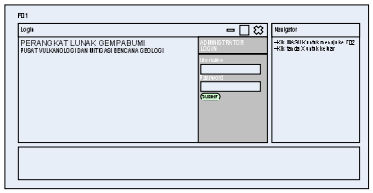
Image 5 Network Design Semantics administrator

B. Interface Design

Here is a picture design of the main page (image 7) and the administrator's main page (image 8).



Gambar 6 Interface main menu *Website*



Gambar 7 Interface main menu administrator

2.4 Implementation

Implementation of the system will change the shape of the analysis and design of a form of programming language. After implementation it will be tested against the new system and will see the shortcomings in the new software for further system development.

A. System Implementation

Implementation is a continuation of the activities of system design and can be viewed as an attempt to realize the designed system. The steps of the implementation process is the sequence of events beginning to the end of activities to do in realizing the designed system. The results of this implementation phase is a data processing system that already can run well.

B. Hardware Implementation

Hardware (Hardware) is a component or peraltan used to support the development of geographical information system has a set of earthquake damage to a computer with following specifications:

1. CPU *Processor* 2.8 Ghz
2. Hardisk *freespace* 512mb
3. RAM 1024 Mb
4. Monitor LCD 14”
5. Ethernet Card : LAN card 10/100Mbps
6. *Keyboard* dan *mouse*
7. Printer

C. Software Implementation

Needs of the software used to develop destructive earthquakes geographic information system is as follows:

1. Software server
   - Operating system Windows Server 2003
   - Database Mysql ver 5.1.36
   - Server MS4W Ver. 2.3.1
2. Software client
   - Operating system Windows XP, Vista dan 7

- Web Browser

D. Program Implementation Interface

To clarify the shape of the interface implementation, the following program displays that have been made:

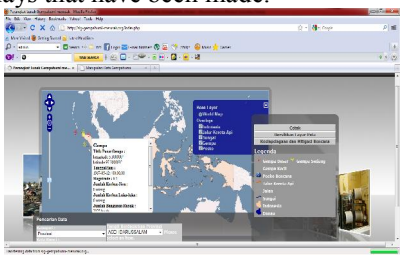


Image 8 Interface of Public User

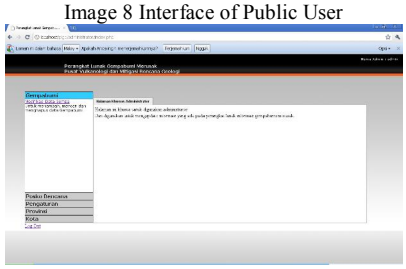


Image 9 Interface of Administrator Screen

3. RESULTS AND DISCUSSION

System testing is done after the implementation of a system that aims to determine the extent to which the system can meet the need for users to test the ability of the system also in data processing systems available. This test is directed at the relevance of each component in the system.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

After doing the analysis and system implementation and continuing with the testing system, the implementation and testing results can be drawn some conclusions as follows:

1. Geographic Information System Making Destructive Earthquake in Indonesia at the Center for Volcanology and Geological Hazard Mitigation Web-based has been realized.
2. With a Geographic Information System Destructive Earthquake in Indonesia at the Center for Volcanology and Geological Hazard Mitigation Web-based provision of information about earthquakes, post disaster and preparedness and mitigation information can be viewed online.
3. With a Geographic Information System Destructive Earthquake in Indonesia at the Center for Volcanology and Geological Hazard Mitigation available Web-based map as a visualization of the location of earthquakes and media disaster camp.
4. With a Geographic Information System Destructive Earthquake in Indonesia at the Center for Volcanology and Geological Hazard Mitigation Web-based community can find out information about the earthquake and its disaster aid post.

4.2 Recommendations

Recommendations that could be offered based on the above conclusions are as follows:

1. Need any more information that can support this software.
2. Implementation of the data needs to be more detail again.
3. In doing maintenance software is expected to be done regularly.
4. Compatibility visualization maps to be developed again so when run by other browsers do not have errors.
5. In this geographic information system development, developers are expected to improve the system of the deficiencies that exist in this system, so that later the software is able to answer the problem.

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