Boundary Value Analysis Techniques for Testing Geographic Information System Applications for Public Facilities

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ABSTRACT

The Geographic Information System for Public Facilities is a system that makes it easier for the public to search and find locations. The more people use this system, the more problems will arise. Because people still use the manual method, namely by asking the location of public facilities to the surrounding community. This is very ineffective and accurate. Therefore, a public facility information system was built using CI 3, Java, and PHP in the form of android. The method used in this development system is the waterfall method. With this GIS, the public can search for the location of public facilities, find public facilities, and provide a route to the location using the Tracking process to find out where the current position is.

1.   Introduction

The city of Padang Panjang is currently driving the smart city program where all community activities will be transferred to technology, both administrative and office. To advance various economic and administrative sectors in the city of Padang Panjang, an application is needed that helps visitors who have an interest in the city of Padang Panjang. Thus, the occurrence of time efficiency if there is an application that helps.

So far, to get information about the location of public facilities, visitors do not have official directions which confuses visitors to go where they want to go, so visitors have to ask the surrounding community. However, the instructions given by the local community may not be understood by visitors so visitors do not understand the direction of the destination that is told the local community. So it is necessary to design an application to make it easier for visitors to get to their destination.

Seeing the development of mobile and internet technology, almost some people take advantage of this technology, and the ability of a smartphone to access internet services, thus enabling data and information to be accessed quickly and anytime. The search for a place of course requires a location or a position. At this time the most widely known geographic information is Google Maps. Almost all existing operating system platforms can use this map engine. The information system will be combined with geographic data that has the location or position information.

One type of information system that has developed rapidly at this time, especially in mapping surveys is the Geographic Information System (GIS)[1]. GIS is created by using information derived from processing the amount of data, namely geographic data or data relating to the position of objects on

the earth's surface. GIS is a handy tool for researchers, managers, and decision-makers to help solve problems[2], GIS can be presented in the form of desktop applications and mobile-based applications. GIS can also provide an explanation of an event, make forecasts of events, and other strategic plans, and can help analyze general problems such as problems in the socio-cultural[3]–[6], economic[7]–[9], political[10], [11], engineering[12]–[14], and planning fields[15], [16]. GIS is also used for facility management[6], [17], [18]. For facility management, this has been widely used.

2.   Material and Method

Google Map API is a service provided by Google to users to use Google Maps in developing applications. The Google Maps API provides features for manipulating maps and adding content through various types of services, as well as allowing users to build enterprise applications on their websites [19].

Google Map API is an interface application that can be accessed via Java Script so that Google maps can be displayed on the web page that we are building. Google Maps is a free service provided by Google and is very popular. Google Maps is a world map that we can use to see an area. In other words, Google Maps is a map that can be viewed using a browser. We can add Google Maps features on the web that we have created or on our blogs that are paid or free even with the Google Maps API. Google Maps API is a library in the form of Java Script [20].

According to Tarigan (2005) in Muzayanah's research "Location is space. Location is a science that investigates the geographical allocation of potential sources, as well as their relationship or influence on the existence of various kinds of businesses or activities such as economic, social, and others. Illuminated or not shining. One factor that determines whether a location is interesting to visit or not is the level of accessibility. The level of accessibility is the ease of reaching a location in terms of other locations in the vicinity.

Location is the location or place where the copy and paste of geographical phenomena occurs. The concept of location is divided into two, namely:

a. Absolute Location

Absolute location is the location or place as seen from the latitude and longitude (astronomical line).

b. Relative Location

Relative location is the location or place seen from other areas around it. The relative location can be changed according to the objects around it.

3.   Result and discussion

After implementing the public facility application website, the website will then be tested on the website. Testing can be seen in Table 1.

Table 1. Testing System (Website)

No.	Testing Section	Test Scenarios	Expected Results	Test Results
1.	Account Login	The user entered the username and password incorrectly or has not been registered.	The user fails to log in to the system dashboard or must first register.	Success

2.	Account login	The customer or admin inputs the email and password that has been registered.	The user will be redirected to the dashboard page.	Success
3.	Category list page on super admins, admins and members.	Members see category menu.	The page will only display a list of categories that have been saved, with no action to take.	Success
4.	Category list page on super admins, admins and members.	Super admins and admins see a menu of categories.	Super admins and admins can add categories and edit existing categories.	Success
5.	Location list page on the community application.	The community chooses the location of the icon on the map.	There will be a display of the location of the public watershed and the current location.	Success

The test was carried out on the login form using the black box test method, Boundary Value Analysis. Each field contained in the form can be seen through the table below.

Table 2. System Testing (Form Password)

Field	Elemen
Username	Text Box
Password	Text Box

The following is the appearance of the Registration form on the Public Facility Application.

Figure 1. Login Page

To test the form above, several test scenarios have been prepared, the results will be displayed in several tables below.

1. Field Testing Username
   In the input scenario for testing the username field, when the user enters the form, the username field section should not be emptied, because the username is one of the important fields for login information.

Table 3. Username Field Validation Test Results

Test Case	Expected Result	Result	Conclusion
(Blank username textbox)	F	T	Success
(Input the correct username) Member	T	T	Success
(Incorrect or unregistered input) Mmbr	F	T	Success

2. Field Testing Password
   In the input scenario for testing the password field, when the user enters the form, the password field section should not be emptied, because the password is one of the important fields for login information.

Table 4. Password Field Validation Test Results

Test Case	Expected Result	Result	Conclusion
(Blank password textbox)	F	T	Success
(input the correct password) Dpassword2	T	T	Success
(input password incorrect or unregistered) dpssword1	F	T	Success

6)   Conclusion

The Boundary Value Analysis testing technique is one of the effective test methods in finding errors in the functionality of the system. The input scenario used can be determined by looking at the format of the input data. Functionality testing performed through multiple tested input scenarios results in valid data for storage to the database.

Based on the tests carried out, it can be concluded that the test using the Boundary Value Analysis technique only focuses on input and flexibility that informs the suitability of the developed application to the established specifications. The test results show that the success rate of the application runs 100%. The system is able to validate the username and password that the user enters first.

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