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A Test Analysis of Fingerprint SMS Gateway System using Black Box Testing Method

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ABSTRACT

Fingerprint and SMS Gateway system is one of the alternative technology solutions for Institution, university, school or corporation to state and measure their students and staff discipline. However, most of its technology have note tested yet. This research, will take the sample of one of fingerprint and SMS Gateway Software that previously implemented it at Junior High School 3 Katibung, Lampung. It claim that this application was not only able to provide the information about the student attendance reports through fingerprint but it was also able to provide information to the students' parents through the SMS Gateway. The aiming of this research is to have analysis testing to determine the validation of data that will inputted through the database with method of Boundary Value Analysis. The result of the analysis is, there are 10% data that failed, therefore there still needs improvements for the system.

Keywords: Black Box, Boundary Value Analysis, SMS Gateway, Fingerprint

1. INTRODUCTION

Black box testing is characterized as a testing method in which the Application Under Test (AUT) functionality is tested without looking at the inside code structure, the deployment and information inside the program. Black box testing is use when the software is ready to deploy. It could find the minor bug of the functionality of the system which might not realize when the software is under developed it. With this testing, we can give the suggestion and correction to the developer, which minor should be fix before it release to public.

This research is aim to implement the Black Box testing method to test the Finger Print system with SMS Gateway. Fingerprint Absence system is one of the alternative solutions of technology for Institution, university, school or corporation to state and measure their students and staff discipline. With this technology the supervisor is able to know the lack of the disciplines of their subordinate. The supervisor will know which member is cheating going out without permission or falsified their absence. However this fingerprint technology is expanded and combined with SMS Gateway Technology, where the absence notification not just recorded to the database, but also send the absence report to the supervisor, in hoping, the supervisor will direct knows how many subordinates are not coming or late.

In order to implement the testing, we are take the object at *Sekolah Menengah Pertama* (SMP) 3 Katibung, South Lampung, Lampung. SMP 3 Katibung is using the fingerprint

SMS Gateway technology to disciplines their teacher, staff, and students. The flow of system is, every time they take absence using finger, the absence will goes to the head master phone and to the student's parents. Therefore, they will know which students, teacher and staff who off without permission from school.

This system is a good example to test the functionality of the system, therefore, we will know the minor error which could be a problem to the system. This research will using one of the method of black box testing, it is Boundary Value Analysis. In this method, we will set the rule of the systems, if the output of the system is against the rules then the result is fail, but if the output is not against the rules we set, then it will be pass.

2. THEORY

Black box testing is additionally called as functional testing, a functional testing technique that to design a test cases based on the information from the specification. With black box testing, the software developer ought not to test the internal code of the system. Black box testing not concern what inside is in the box, we just focus on the output that come out from the system. The internal code is considered as "Big Black Box" that we are not allowed to see inside it.
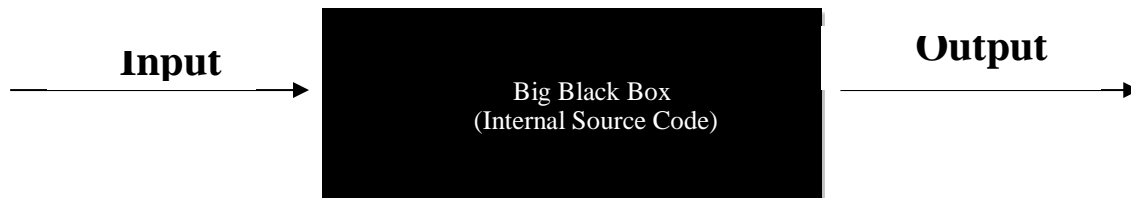

Figure 1. Black Box Illustration

There are sorts of Black

a. Functional testing - This black box testing type is to test the functional requirements of a software. It is tested by Software Tester to look the minor output that might come out from the software.
b. Non-functional testing - This type of black box testing which not to testing of functionality, but to testing non-functional requirements such as performance, scalability, usability.
c. Regression testing - Regression Testing is a testing after the programmer fix the code, updates, upgrades or any other maintenance to check the new code is not affected the existing code.

Black Box testing is also has its own technique to do a testing, which divided into these techniques below:

a. Equivalence Class Testing: It is a technique used to reduce the number of test cases available at the time of testing. The test cases designed for Equivalence class testing are based on evaluations of type / class equivalents for input conditions. Equivalent classes represent a set of valid and invalid states for input conditions.
b. Boundary Value Testing: Boundary Value Analysis (BVA) is one of the black box testing techniques that perform tests on the upper and lower limits of a value that is inputted into the system.
c. Decision table testing: is a part of black box testing in which there are elements in the form of:
   1. Conditions (inputs)
   2. Actions (outputs)
   3. Rules (rules) that are used to find and make decisions on a system

3.   RESEARCH METHODOLOGY

This research will using Boundary Value Testing (BVA) Technique. We using BVA because of this considerations:
   a. BVA focus on a value limit where possibility to find hidden defects
   b. BVA is selecting test cases which could be using to trains the boundaries values.
   c. BVA is a test design to complete equivalence class testing.
   d. Instead focusing on input, BVA focusing on on domain output.
   e. BVA is able to testing on upper and lower limit of valid value
   f.   BVA is able to testing minimal and maximal of the value
   g. BVA is able to testing limit of data structure, for instance is array.

BVA testing can be described with a function F, which function has two variables namely x1 and x2. When the function F it is implemented into a program, input variables x1 and x2 have some restrictions that might not be mentioned. the function can be defined as follows:

$$a \leq x1 \leq b$$
$$c \leq x2 \leq d$$

3.   RESULT

This research will take one of the behaviour of the system, it is the report of presence list of the students. We do BVA Test to test whether there is minor-error of the dates and hour of recorded presence list system. We set 5 rules to test the system and here is the result of our test.

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Figure 2. Core System

A. Testing A.1

In testing A.1 we set the rules that presence list should be inputted the today's date. It should could not be inputted with the past dates. To get the result, we do the manual input from admin area. Here is the result

Table 1. Testing A.1

Sample Data	Expected Result	Result	Conclusion	Remark
1-01-1987	F	T	Failed	Past Dates
1-01-2019	F	T	Failed	Past Dates
01-12-2019	T	T	Success	Today

B. Testing A.2

In testing A.2 we set the rules that presence list for the student's major database should be inputted correctly based on their major's name. It should could not be inputted with the wrong major's name. To get the result, we do the manual input from admin area. Here is the result

Table 2. Testing A.2

Sample Data	Expected Result	Result	Conclusion	Remark
IPAAA	F	T	Failed	Wrong Major
IPSAA	F	T	Failed	Wrong Major
3 IPA 1	T	T	Success	Correct Major
3 IPS 1	T	T	Success	Correct Major

C. Testing A.3

In testing A.3 we set the rules that school year for the presence list should be inputted the correct school year. It should could not be inputted with the wrong school year. To get the result, we do the manual input from admin area. Here is the result

Table 3. Testing A.3

Sample Data	Expected Result	Result	Conclusion	Remark
1987/1988	F	T	Failed	Wrong
2019/2019	F	T	Failed	Same Dates
2019 / 2020	T	T	Success	Current Dates
1987/1988	F	T	Failed	Wrong

D. Testing A.4

In testing A.4 we set the rules that presence list should not record the holiday dates, like Sunday, new year, Eid Fitri, Christmas, and so on. To get the result, we do the manual input from admin area. Here is the result.

Table 4. Testing A.4

Sample Data	Expected Result	Result	Conclusion	Remark
01/12/2019	F	T	Failed	Sunday
25/12/2019	F	T	Failed	Christmas
01/12/2019	T	T	Success	Monday

E. Testing A.5

In testing A.5 we set the rules that presence list should filter holiday absence to not to be reported on the system, like Sunday, new year, eid fitr, Christmas, and so on. To get the result, we do the manual input from admin area. Here is the result.

Table 4. Testing A.5

Sample Data	Expected Result	Result	Conclusion	Remark
01/12/2019	F	F	Failed	Sunday
25/12/2019	F	F	Failed	Christmas
01/12/2019	T	T	Success	Monday

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4. CONCLUSIONS

After series of testing with BVA we get the numerous result that there is minor output that can be exploited to faking the presence list. We have report this result to SMPN 3 Katibung, South Lampung to take any actions for this problem. We recommend to take white box testing to check the internal code, which causing the minor output of the system.

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