

Testing the Academic Information System Application of SDN 192 Salobongko with the Boundary Value Analysis Technique

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Abstract

Each software is developed with a series of structured stages based on user needs. These stages are formed from a framework that forms the basis of well-planned and controlled software development. Software testing is a stage that ensures that software development that has been developed is free from errors or errors before being distributed to users. This study aims to find errors in input by using black box testing with boundary value analysis techniques in SDN 192 Salobongko academic information system applications. From the results of the test cases performed, it shows that the test was successfully carried out. The findings in this study are that the testing of the academic information system application at SDN 192 Salobongko has shown successful test results based on the test case scenarios that have been designed.

Keywords: *Application Testing, Black Box Testing, Boundary Value Analysis*

Introduction

The development of computer systems is accompanied by supporting applications that mark the role of technology as a basic need for every user of the system in every activity (Yulianti et al, 2022). Software has the responsibility to control, manage, and integrate the hardware components of a computer system with the aim of completing certain tasks and orders (Bansal, 2014; Dhaifullah, et al: 2022). Each software developed with a series of structured stages is also based on user needs (Nurelasari, 2020; Putri et al, 2017; Hakim et al, 2022). These stages are formed from a framework that forms the basis of well-planned and controlled software development (Petter et al, 2008; Bhenke et al, 2020).

The testing phase is a stage carried out to ensure that the system being developed is working properly, by conducting a series of tests on software behavior (Jauhari, et al 2019; Ozcan et al, 2023; Kweon et al 2017). These series of activities were carried out by internal teams related to building software quality, and external parties to test software quality (Malinda et al, 2020; Nurelasari, 2020, Aprilisa et al, 2021). In general, testing is divided into 3 testing techniques, namely white box testing, black box testing, and gray box testing (Pintelas et al, 2020; Ricco et al, 2020)

Black box testing (black box testing) is known as functional testing or input driven testing by finding errors when inputting data and applications displaying these errors (Nurudin et al, 2019; .Debiyanti et al 2020). Black box testing has no effect on the logical structure of the system internally (Arifandi, et al: 2022). Black box testing consists of several techniques

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including Boundary Value Analysis, Equivalence Partitioning, Decision Table Testing, Comparison Testing, Sample Testing, Robustness Testing, Behavior Testing, Performance Testing, Requirement Testing, Endurance Testing, and Cause-Effect Relationship Testing (Jaya, 2018 ; Vikasari, 2018; Ikhlaashi et al, 2019; Santiari et al, 2020). Each of these testing techniques has differences and similarities.

The use of computer systems in various fields, including in the education sector, underlies the development of software to support activities in schools (Setiawan et al, 2023; Rizaldi, 2023). In the field of education, computerized systems are needed both in the learning process and in processing school academic data (Pratama et al, 2023). The Academic Information System application for SDN 192 Salobongko that has been developed has gone through the development stage which is then followed by the testing phase. The novelty of this research is that it makes it easier for schools to manage school academic activities by managing data on students, teachers, teaching and learning activities, and student evaluation results.

Method

In the software testing cycle, it is carried out in a systematic and planned manner in order to improve the quality of the software by taking into account the testing objectives, which include:

1. Testing is the process of executing a program that has been made in the implementation stage to find errors in the program
2. Determine test case scenarios that are structured with a high probability of finding errors that have not been found before.
3. Testing is said to be successful if it finds all errors that have never been revealed before.

Black box testing focuses on quality risk, requirements and high-level designs (Black: 2016). Boundary Value Analysis testing techniques are black box testing techniques by determining upper and lower limits after grouping them into valid and invalid groups. This technique helps in reducing the number of test cases. This technique basically works on dividing the input domains of the program based on the input values into equivalence classes. Test cases are generated from equality classes that come from the input domain (Jan, et al: 2016). Test cases are designed based on this testing technique which is expected to get data sets as test results.

The academic information system application for SDN 192 Salobongko consists of several forms being tested, namely the student data form and the grades form. In the student data form, there are several fields tested, namely the Student ID field and the year field. While in the value form, the field being tested is the value field. The following is the design of the input form test case in the SDN 192 Salobongko information system application:

Table1. Test Case Design

ID	Test Description	Expected results
F1-001	Enters letter characters	Data successfully saved
F1-002	Enters a numeric character	Data successfully saved
F1-003	Enter symbols	The data was not saved successfully
F1-004	Enter more than 20 characters	There is a warning sound
F2-001	Enter a numeric character with a maximum of 3 digits	Data successfully saved
F2-002	Enters letter characters	The data was not saved successfully
F2-003	Enter the character "." or ","	The data was not saved successfully
F2-004	Enter a space	The data was not saved successfully
F3-001	Enter the date in day/month/year format	Data successfully saved
F3-002	Enter the date in month/day/year format	The data was not saved successfully

Results and Discussion

Testing the information system application at SDN 192 Salobongko using the Boundary Value Analysis technique by testing the student data form and value data based on the test case table, the test results are shown in Table 2 below.

Table 2. Test Results

ID	Test Description	Expected results	Test result
F1-001	Enters letter characters	Data saved successfully (TRUE)	The data has been successfully saved and there is a pop up message "Data saved successfully" (TRUE)
F1-002	Enters a numeric character	Data saved successfully (TRUE)	The data has been successfully saved and there is a pop up message "Data saved successfully" (TRUE)
F1-003	Enter symbols	Data failed to save (FALSE)	The data was not saved successfully and there is a pop up message "The data you entered is not correct" (FALSE)
F1-004	Enter more than 20 characters	There is a warning sound (FALSE)	A warning sound (FALSE) is heard
F2-001	Enter a numeric character with a maximum of 3 digits	Data saved successfully (TRUE)	The data has been successfully saved and there is a pop up message "Data saved successfully" (TRUE)
F2-002	Enters letter characters	Data failed to save (FALSE)	The data was not saved successfully and there is a pop up message "The data you entered is not correct" (FALSE)
F2-003	Enter the character "." or ","	Data failed to save (FALSE)	The data was not saved successfully and there is a pop up message "The data you entered is not correct" (FALSE)
F2-004	Enter a space	Data failed to save (FALSE)	The data was not saved successfully and there is a pop up message "The data you entered is not correct" (FALSE)
F3-001	Enter the date in day/month/year format. For example: 25/12/2000	Data saved successfully (TRUE)	The data has been successfully saved and there is a pop up message "Data saved successfully" (TRUE)
F3-002	Enter the date in month/day/year format For example: 12/25/2000	Data failed to save (FALSE)	The data was not saved successfully and there is a pop up message "The data you entered is not correct" (FALSE)

From table 2 above which shows the test results based on the test cases that have been prepared previously, the conclusions can be seen in Table 3 below.

Table 2. Conclusion of Test Results

No	ID	Conclusion
1	F1-001	Success
2	F1-002	Success
3	F1-003	Success
4	F1-004	Success
5	F2-001	Success
6	F2-002	Success
7	F2-003	Success
8	F2-004	Success
9	F3-001	Success
10	F3-002	Success
11	F1-001	Success
12	F1-002	Success

Black box testing with the Boundary Value Analysis technique applied at the testing stage of the academic information system application at SDN 192 Salobongko begins by identifying problems by designing test case scenarios that include several functions that represent other similar functions, namely the student id field, year, and student grades in the form of student data and value data then conduct experiments to enter data in the fields contained in the student data form and value data, then evaluate the output which shows the results are in accordance with the test case scenario. The findings in this study are that the testing of the academic information system application at SDN 192 Salobongko has shown successful test results based on the test case scenarios that have been designed.

Conclusion

Black box testing with the Boundary Value Analysis technique applied at the testing stage of the academic information system application at SDN 192 Salobongko has shown successful test results based on the test case scenarios that have been designed, which then documentation of the test results can be more easily observed for application repair/revision. The findings in this study are that the testing of the academic information system application at SDN 192 Salobongko has shown successful test results based on the test case scenarios that have been designed.

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