SOFTWARE TESTING USING BLACK BOX TESTING BOUNDARY VALUE ANALYSIS (CASE STUDY: E-COMMERCE ON BOOKSTORE WALI SONGO MEDAN)

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Abstract
Information technology is currently utilized in all aspects such as education, business, marketing (buying and selling) and also health. One of the activities of these aspects is data processing activities. following the development of information technology data processing activities are now using the application of information systems. Information systems can process data quickly and efficiently and produce accurate information from the data processed. at Wali Songo Bookstore in processing book data and book marketing using online marketing information system (e-commerce). to produce a good book marketing information system at Wali Songo Bookstore requires steps that must be implemented such as analysis, design, implementation and testing system. after the analysis phase, design and implementation done in this study the author focus discuss the last stage of system testing. system testing is done by using the Black Box Technique by way of Boundary Value Analysis (BVA) that is by determining the lower boundary value and upper limit of data to be tested. the focus of testing information systems online marketing book (e-commerce) is on the processing of data stock books on field ISBN and year published. The tested is at the time penginputan data in each field with the grouping in the table. will be known whether in the process penginputan there anomaly (error). This mistake will be used as a basis to repair / refine the information system before used at Wali Songo Bookstore.
Keywords: e-commerce, Black Box, BVA, Testing

1. INTRODUCTION

The development of information technology has now entered all areas such as education, health, business buying and selling and government. many conveniences that can be given by information technology today especially in terms of efesien, accuracy and kebaharuan information generated from information technology. the projection of information technology today is mostly felt in the form of software in the form of information systems. (Aswati, 2017). information systems can help the performance of data processing and can perform data management well because therein therein the database as a container of data.

In developing the information system required stages to produce a good quality information system. the most basic stages in producing information systems contained in the System Development Life Cycle (System Development Life Cycle) which consists of: 1). Planning Stage; 2). Phase Analysis; 3). Design Phase; 4). Implementation Phase; 5). Test Stage; 6). Maintenance stage (Aswati, 2017).

In this study the authors discuss for the testing phase in the information system of online book marketing (e-commerce) at Wali Songo Book Store Medan. Testing is a process of implementation of a program with the aim of finding an error. a good test case is where the test has the possibility of finding an unfolded error. A successful test is when the test unpacks an error that was not originally found. one of the existing types of testing is Black Box Testing (M.S. Mustaqbal, R.F. Firdaus, H. Rahmadi, 2015). Online book marketing information system (e-commerce) to be tested using Black Box (Black Box).

In the Black Box technique there are several ways such as Equivalence Partitioning, Boundary Value Analysis, Comparison Testing, Sample Testing, Robustness Tesing, and others. the way that writers use in testing information systems marketing online books (e-commerce) is Boundary Value Analysis. Boundary Value Analysis is a way of testing by determining the lower limit value and upper limit of data to be tested (M.S. Mustaqbal, R.F. Firdaus, H.Rahmadi, 2015). This test is performed on the added function of data on the information system created.

The results of the test show that there are still many shortcomings when doing data validation related to the marketing of the book is processed, so it can cause data stored on the database is not in accordance with the expected data. test results can be used as input to improve the information system. In the marketing information system of this book the authors take samples for data input on the form added data book where the focus on ISBN number and year published book.

2. LITERATURE REVIEW

The authors take references based on previous studies that have been published, among others:

1. Research conducted by Taufik Ramadhan and Victor G.utomo with the title of Designing Mobile Application for Notification of Android-Based Lecture Schedule (Case Study: STMIK Provisi Semarang can be concluded that testing the system through content and workflow of the system with Black Box Technique get the result that the system according to whichdesigned and timetable notification system successful and can be used.

2. Research conducted by M.fingerprint Mustaqbal, Roeri Fajri Firdaus and Hendra Rahmadi with the title Application Testing Using Black Box Testing Boundary Value Analysis (Case Study: SNMPTN Graduation Prediction Application) concluded that testing with Boundary Value Analysis in Black Box technique is donein the SNMPTN graduation prediction information system in terms of inputting data.the inputted data must have a validation system in case of input data error (anomaly).After the test results obtained that the input data is done in the application there is no system to validate the wrong data input. this requires the system developed again by adding a validation system to the inputted data.

3. Research conducted by Yosep Bustomi, M.ali Ramdhani Dan Rinda Cahyana with the title Design of Geographic Information Systems Spreading Place of Information Technology Research In Garut city concluded that testing of existing content in geographic information system get good system results and can be implemented.

2.1 Software Testing

Software testing is needed to ensure software / applications that have / are being made to run in accordance with the expected functionality. the developer or software

tester must prepare a special session to test the program that has been created so that errors or deficiencies can be detected early and corrected as soon as possible. testing or testing itself is a critical element of software quality assurance and is an integral part of the software development life cycle as well as analysis, design, and coding. (Shi, 2010).

Software testing should be done in the process of software engineering or software engineering. A number of software testing strategies have been proposed in the literature. All provide a template for testing for software makers. in this case, should all have common characteristics (Bhat and Quadri, 2015):

1. Testing starts at the module level and works out towards integration on computer-based systems
2. Different testing techniques according to different points in time3.testing is performed by software developers / developers and for large projects by independent group testing
3. Testing and Debugging are different activities but debugging must be accommodated on every testing strategy

Software testing is an element of a broader topic that is often interpreted as Verification and Validation (V & V)

1. Verification: refers to a set of activities that ensure that the software has implemented a function.
2. validation: refers to a different set of activities that ensure that the built software can be traced to customer needs.

There are several different types of software testing that include feasibility studies and simulations. (Bhat and Quadri, 2015):

1. Software engineering methods provide the basis of which quality to use.

Analysis method, design and construction in the form of action to improve quality by providing uniform technique and result according to desire.

2. The Formal Technical Reviews method helps to ensure the quality of product work is a consequence of every step of software engineering.
3. Measurement methods apply to each element of the software configuration
4. The Standards and Procedures method helps to ensure the uniformity and formality of SQA to strengthen the foundation of "total quality philosophy"

Software testing should spend 30% - 40% of the total cost of software development. testing is part of one of the software verification and validation tasks, which is part of the quality assurance software. Software testing includes:

1. Strategy: Integrate the design method of test cases in a set of planned steps
2. testing methods, including design of test cases using White Box or Black Box method

The parties related to the test are:

1. Customer, team contracting developers to develop software.
2. Users, groups who will be using the software
3. Software developers, the team that builds the software
4. Team Testing software, special team tasked to test the functions of the software
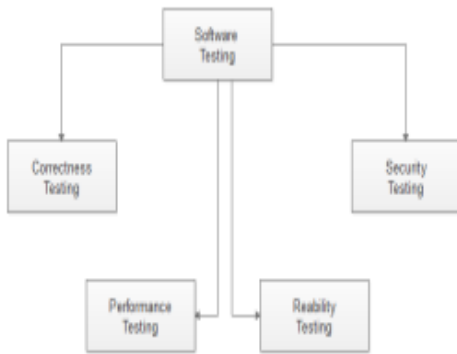
Figure 1. Software Testing Techniques

The principle of software testing are:
1. All tests shall be traceable to the software requirements specification.
2. Testing should start from a small scope to a large scope
3. Deep testing is not possible because it is impossible to execute all permutation paths
4. To be effective (having a high probability of finding fault), Testing must be performed by an independent party
5. testing should be planned long before it is done.

Good test quality is:
1. Includes all possible software operating scenarios
2. Include as many paths as possible from the structure of the program
3. Not too simple and not too complicated

2.2 Black Box Testing Technique

Black Box Testing focuses on the functional specifications of the software.

The tester can define the set of input conditions and perform testing on the functional specifications of the program. black Box Testing is not an alternative solution to White Box Testing but rather a complement to testing things that are not covered by the White Box Testing. Black Box Testing tends to find the following:
1. Functions that are not true or not.
2. Interface errors.
3. Errors on data structures and database access.
4. Performance errors (performance errors).
5. Initialization and termination errors.

Tests are designed to answer the following questions:
1. How are the functions tested to be declared valid?
2. What kind of inputs can be good test case material?
3. Is the system sensitive to certain inputs?
4. How can a set of data be isolated?
5. How much average data and how much data can the system handle?
6. What effect can make a combination of data handled specific to the operation of the system?

Currently there are many methods or techniques to implement Black Box Testing, among others:
1. Equivalence Partitioning
2. Boundary Value Analysis / Limit Testing
3. Comparison Testing
4. Sample Testing
5. Robustness Testing
6. Behavior Testing
7. Requirement Testing
8. Performance Testing
9. Endurance Testing (Endurance Testing)
10. Cause-Effect Relationship Testing

2.3 Boundary Value Analysis

Boundary value analysis is one of the black box testing techniques that perform

testing on the upper and lower limits of the value that is filled in the application. Some of the principles that underlie the boundary value analysis (BVA) are:

1. Many errors occur on input error.
2. BVA allows to select test cases that test the input value constraints.
3. BVA is a complement of equivalence partitioning. More on selecting elements in the equivalent class on the boundary side of the class.

Example:

1. For the bounded range a and b then test (a-1), a, (a + 1), (b-1), b, (b + 1).
2. If the input condition requires a sum of n values then test with a number of (n-1), n and (n + 1) values.
3. Apply the two preceding rules to the output conditions (create test table of output for maximum and minimum value).
4. If the internal data structure of the program has scope (eg buffer size, array boundary) use input data that tests the coverage limit.

In general, BVA applications can be done generically. The basic form of BVA implementation is to keep one variable at nominal value (normal or average) and allow other variables to be loaded with their extreme values. Value

which is used to test the data's extras are:

Min -------- minimal
Min + -------- above minimum
Nom -------- average
Max- -------- just below maximum
Max -------- Maximum

For example, for example will dientrikan date data. date data has three variables ie date, month and year. So for these three variables, the following

conditions can be taken: $1 \leq date \leq 31$ $1 \leq months \leq 12$ $1812 \leq year \leq 2016$

So for each data entry outside the above number will display the message "Date you fill is wrong".

3. RESEARCH METHOD
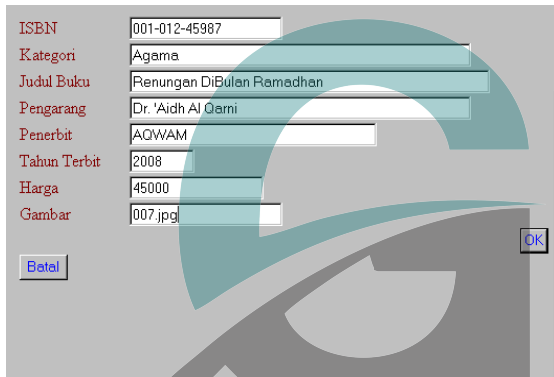
The research method used in this study as follows:

1. Observation

   By making observations of the object under study that is testing the information system of online book marketing (e-commerce) at Wali Songo Bookstore. in this case tested is data inputted in the system information whether there is validation if the data input there is anomaly (error).

2. Library Studies

   by collecting references in the form of journals and textbooks related to the topics raised in this study.

3. Boundary Value Analysis

   Tested by Black Box technique with Boundary Value Analysis stages. this is done by testing the amount of data inputted and also whether there is validation of the data inputted if there are anomalies in the information system.

4. IMPLEMENTATION And RESULT

Below is the display of results from the book marketing information system at the Wali Songo Bookstore (Nine Guardians) consists of the main page view and the form added data book. in accordance with the explanation in the introduction will be tested with Black Box Technique with Boundary Value Analysis. The author takes sample test for input form plus book data for input on ISBN filed and year published.

122-	T	Success

Table 2. Testing Two

Sample Data	Result	Conclusion
11-	F	Failed
-101	T	Success
-111-	T	Success
122-	T	Success
122	F	Failed

Table 3. TestingThree

Sample Data	Result	Conclusion
11-	F	Failed
-101	T	Success
-111-	F	Failed
122-	F	Failed
122	T	Success

Figure 1. View Home Page

Gambar 2. View Book Data Input Page

The author creates the test table as below.

4.1 ISBN Field Input Testing

Field ISBN with size 13 with type alphanumeric (char). for input is divided into 3 parts (first-middle-last). Consists of the first 3 digits plus the connecting line, the second 3 digits (middle) plus the connecting line and the last 4 digits (last).

Table 1. Testing One

Sample Data	Result	Conclusion
11-	F	Failed
101	T	Success
111	T	Success

4.2 Field Year Published Input Testing

Field year published with date type with terms yyyy (years 4 digits). Range of years published books from 2010-2017.

Table 4. TestingFour

Sample Data	Result	Conclusion
10	F	Failed
2010	T	Success

Table 5. TestingFive

Sample Data	Result	Conclusion
2009	F	Failed
2010	T	Success
2013	T	Success
2016	T	Success

5. CONCLUSION

1. Boundary Value Analysis (BVA) test results for online marketing information system for book data input in ISBN field and year published from some of the above test tables indicate that input record (data) from the field is still an anomaly (error)

2. the occurrence of anomalies at the time of input data on ISBN field and the year of publication will cause data processing to be not fast due to have to repeat back from the beginning penginputan data

3. To prevent data anomalies at the time of data entry (record) then the information system must be added alerts (warning) and also validation at the moment input error

4. Black Box testing with Boundary Value Analysis (BVA) technique on information system (application) can infer the shortcomings that exist in information system

Reference

[1] Aswati, Safrian, et al, 2017, Rapid Application Development Model Analysis Study In Information Systems Development, Journal of Matriks, Vol. 16 No. 2

[2] Mutaqbal, Msidi, Firdaus, Roeri Fajri, Rahmadi, Hendra, 2015, Application Testing Using Black Box Testing Boundary Value Analysis (Case Study: SNMPTN Graduation Prediction Application), Scientific Journal of Applied Information Technology, Vol. 1 No. 3

[3] Ramadan, Taufik, Utomo, Victor G, 2014, Designing Mobile Applications for Notification of Android-Based Lecture Schedule (Case Study: STMIK Semarang Province), Journal of Information and Communication Technology, Vol. 5 No. 2

[4] Bustomi, Josep, Ramadhani, Mali, Cahyana, Rinda, 2012, Design of Geographic Information System Distribution Place of Information Technology Research In Garut City, Journal of Garut STT Algorithm, Vol. 9 No. 20

[5] Shi, Mingtao, 2010, Software Functional Testing from the Perspective of Business Practice Computer and Information Science, www.ccssenet.org/cis

[6] Bhat, A, and Quadri, S.M.K, 2015, Equivalence Class Partitioning and Boundary Value Analysis = A review, 2nd International Conference on Computing for Sustainable Global Development (INDIACom)