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The Analysis of Reliability Factor's Testing of an Academic Information System

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***Abstract*--Academic information system of STMIK El Rahma College is a software which has function to make academic access activities easier. The system has no good quality yet. For example, several menus are unable to be opened. Furthermore, the system has no error notification upon several menus. Hence testing software is necessitated to examine the reliability in operating of the system. McCall method has precision and detail which can be used to examine and assure the reliability of the academic information system of STMIK El Rahma. This research uses a testing procedure plan of software to obtain the reliability degree of the academic information system of STMIK El Rahma for SIMAK menu. The result of the reliability degree of the software is 49,29 %. It is obtained by several percentages such as 96% Accuracy, 0% Consistency, 62.96% Error Tolerance, 43,75% Modularity, and 43,75% Simplicity. The five percentages are divided by 5.**

Keywords-McCall; reliability; software quality; software testing.

I. INTRODUCTION

STMIK EL-Rahma Yogyakarta is one of the universities in Yogyakarta. This campus has an Academic Information System that is used for academic activities for students, lecturers, or campus employees. This system is built with the PHP programming language, CI as the framework, and MySQL for the database. The uses of this system include:

- Filling in student's personal data,
- Academic activities such as filling out study plan cards, seeing GPA (Grade Point Average) results, lecture schedules and semester examinations, list of attendees,
- Community Service Program, Advanced Education Program, Scholarship, Graduation, etc.

However, this system does not yet have good quality, even though this system must provide many features for many people.

From the existing problems and the importance of the role of academic information systems, especially for students, researchers want to examine the level the software quality by testing the reliability of STMIK El Rahma's academic information system in carrying out its functions.

II. PURPOSE

The purpose of the research conducted by the author is to measure the reliability of the STMIK El Rahma Academic Information System software in carrying out its functions based on McCall factor quality theory reliability.

III. METHODOLOGY

A. *Study of literature*

The author gets a variety of literature as learning in theory that has discussions about software testing, as well as techniques and strategies for software testing. As a basis for testing and analysis will be done. Taking references from various books, journals, final assignments, theses, theses, to base the testing and analysis by the author.

B. *Observation and Manual Testing*

Research conducted at STMIK El Rahma must be done procedurally. Observation is done by interviewing students as users, admins, and lecturers as data processors for black box testing, and programmers as system makers for testing white boxes [1].

Manual testing is a document that contains an explanation of the software being built, software guide, software requirements, and stakeholders. The manual testing document is obtained by observing the object of research.

C. *Interview*

Interviews were conducted to obtain an assessment from the users of this system. After conducting an interview with the chairperson of STMIK El Rahma, the admin, user and program manager of the STMIK El Rahma academic information system, the author received a lot of information about the system, constraints and input for the campus to improve the system.

D. *System Data*

The author takes this system data to be used as material for analysis systematically. The system data is in the form of a white box testing using source code modules, with the use of the application account. In this study the author must test directly with the programmer because the policy of the agency cannot provide the source code out of the intro.

E. *The Description of Academic Information System STMIK El Rahma Yogyakarta*

STMIK El Rahma academic information is a device software that is built using object oriented PHP programming languages, CI framework and MySQL database. The link of this system is http://stmikelrahma.ac.id/. Fig. 1-7 are the displays of the system.

- Home Page

Figure 1. Home page

- KRS (A card of study plan) menu

Figure 2. KRS page

- KHS (A card of study result) menu

Figure 3. KHS menu

- Transcript menu

Figure 4. Transcript menu

- Courses menu

Figure 5. Courses page

- Profile page

Figure 6. Profile page

- About page

Figure 7. About

F. Designing Reliability Testing

The design of the test for this study uses flow charts which are shown in Fig. 8.

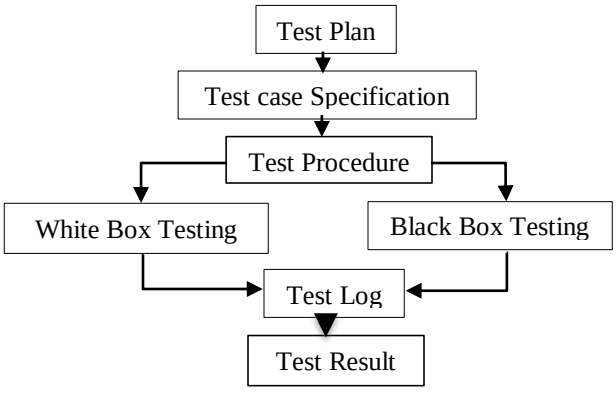

Figure 8. Software Testing Design Chart

IV. RESULT AND DISCUSSION

The results of the study obtained from the results of analysis with operating product parameters on McCall's quality theory of reliability factors, by the following:

A. Black Box Testing

A black box testing is a testing based on system functionality. Some matrices for black box testing analysis are as follows:

- Accuracy Matrix

This matrix is used to test the suitability of the results of input that are adjusted to the output produced, adjusted to the system database, and retrieval of data directly from users based on system features. Based on research, there are as many as 25 features or activities, tested with the accuracy of input and output, the result is a total remark that corresponds to 24 features (96%) [2].

- Consistency Matrix

This matrix tests the level of suitability of features based on system documentation towards the software or product system [2]. Table 1 shows this matrix.

TABLE I. CONSISTENCY MATRIX

No	Menu	Analysist Document	Pro-duct	Re-mark	Notes
1	KRS	-	√	-	This SIMAK's menu doesn't have Analysis document
	Kode	-	√	-	
	Nama Mata Kuliah	-	√	-	
	Tambah	-	√	-	
	Baru	-	√	-	
	Mengulang	-	√	-	
	Del	-	√	-	
	Nama DPA	-	√	-	
	Simpan dan Lanjutkan	-	√	-	
2	KHS	-	√	-	
	Tahun Ajaran	-	√	-	
3	Transkrip	-	√	-	
	Cetak	-	√	-	
	Tahun Ajaran	-	√	-	
4	Jadwal Kuliah	-	√	-	
	Cetak	-	√	-	
5	Profil	-	√	-	
	Ubah Password	-	√	-	
	Profil	-	√	-	
	Password	-	√	-	
	Password Baru	-	√	-	
	Konfirmasi Password	-	√	-	
	Simpan Perubahan	-	√	-	
	Batal	-	√	-	
6	Visi Misi	-	√	-	
7	About	-	√	-	
8	Help	-	√	-	
Total			0/27 x 100%		0%

The total features tested were 27 features. The results of the features are suitable for the system and there are 0 features in the system. Then the percentage results obtained for the Consistency matrix are (0 ÷ 32) × 100% = 0%. From the result of the percentage, it concludes that the system for the Consistency matrix has poor result.

- Error Tolerance Matrix

The error tolerance matrix test is conducted to determine the extent to which STMIK El Rahma academic information systems tolerate errors that occur in the system. In this test the author uses data obtained from the results of testing directly to system users [2].

From the test of this analysis the author gets the results for the Error Tolerance matrix is: Total activity tested as many as 27 features. The corresponding feature results are 17 features. Then the results of the percentage obtained for the matrix are (17 ÷ 27) × 100% = 62.96%. From the results of this percentage, the system is in error tolerance handling, this system has good handling.

B. White Box Testing

The white box testing technique is a test based on the system's source code. This test contains several matrices as follows:

- Modularity Matrix

The total files tested were 16 files. Independent file results are 7 files. Then the results obtained for this matrix are (7 ÷ 16) × 100% = 43.75%. From the results of the percentage, the

system has a poor independence value in each module file. Table 2 shows this matrix.

TABLE II. MODULARITY MATRIX

No	Activity Class	In	Out	Number of Line	Remark
1	About	0	1	14	dependent
2	Daftarkkl	0	1	62	dependent
3	Main	1	2	40	dependent
4	masmahasiswa	2	1	48	independent
5	maspegawai	1	1	32	independent
6	Quisioner	0	3	59	dependent
7	simambilmk	0	3	91	dependent
8	simdaftarskripsi	0	2	157	dependent
9	SimKRS_cadangan	0	3	162	dependent
10	simmktawar	1	1	25	Independent
11	Transkrip	0	2	56	dependent
12	Utility	0	1	39	dependent
13	construct	12	0	254	independent
14	khs	1	0	67	independent
15	krs	2	0	35	independent
16	Kelas_dosen	1	0	93	independent
	Total		7/16 x 100%		43 ,75%

- Simplicity Matrix

This matrix shown in Table 3 examines the ease of understanding the use of source code. The smaller the value of a module is called the more simple or easy to understand [3].

TABLE III. SIMPLICITY MATRIX

No.	Activity Class	Var-in	Var-out	Remark
1	About	0	1	not simple
2	Daftarkkl	0	1	not simple
3	Main	1	2	not simple
4	masmahasiswa	2	1	Simple
5	maspegawai	1	1	Simple
6	Quisioner	0	3	not simple
7	simambilmk	0	3	not simple
8	simdaftarskripsi	0	2	not simple
9	SimKRS_cadangan	0	3	not simple
10	simmktawar	1	1	Simple
11	Transkrip	0	2	not simple
12	Utility	0	1	not simple
13	construct	12	0	Simple
14	khs	1	0	Simple
15	krs	2	0	Simple
16	Kelas_dosen	1	0	Simple
Total		7/16 x 100%		43 ,75%

The total files tested were 16 files. The results of simple files are 9 files. Then the results obtained for this matrix are (9 ÷ 12) × 100% = 75%. From the results of these percentages, the system has an easy value to understand.

C. Reliability Testing Result

To get the results of testing the sub-factor reliability above the authors get the results of the percentage of the five matrixes are:

- Accuracy matrix is 96%
- Consistency matrix is 0%
- Error Tolerance matrix is 62.96%
- Modularity matrix is 43.75%
- The simplicity matrix is 43.75%

Then the percentage for the reliability factor is: (96% + 0% + 62.96% + 43.75% + 43.75%) ÷ 5 = 49.29%. The percentage of reliability testing results produce a poor value, because based on the results of interviews with stakeholders, their request for a minimum standard value of reliability is 60%.

Figure 9. Results of the McCall Reliability Factor Test Analysis

Based on the graph in Fig. 9, STMIK El Rahma's academic information system with the best quality sub-factor matrix based on McCall's Theory is on the Accuracy matrix with the calculation result of 96%. And on STMIK El Rahma academic information system with the worst quality is the Consistency matrix with a result of 0%. The results of testing of reliability factor is shown in Table 4 as follows:

TABLE IV. RELIABILITY FACTOR TESTING RESULTS

No	Matrix	Result
1	Accuracy	96%
2	Consistency	0%
3	Error Tolerance	62,96%
4	Modularity	43,75%
5	Simplicity	43,75%
Reliability		49,29%

V. CONCLUSION

Based on the testing, the author can provide a conclusion that the results of the quality measurement of El Rahma STMIK Academic Information System software based on McCall's Quality Theory are:

- This study has succeeded in applying the McCall method to test STMIK El Rahma's academic information system on the SIMAK menu, based on the test results, the reliability of the system is 49.29%
- This research is able to design software testing procedures to measure the level of reliability of STMIK El Rahma academic information systems.

REFERENCES

[1] D. Wardani, "Analisis Perangkat Lunak OpenGov Paperless Goverment Collaboration Suite Pada Pemerintahan Daerah Purbalingga Berdasarkan Teori Kualitas McCall's," 2014.

[2] R. Pressman, *Rekayasa Perangkat Lunak : Pendekatan Praktisi*, 7th ed. Yogyakarta: Andi Publisher, 2002.

[3] H. Sneed, "Messtechnic feur die software-qualitatssicherung," 2013.