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Testing The Authentication Platform System Using The Mccall Model

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ABSTRACT

Information technology plays a crucial role in enhancing business efficiency and effectiveness through the implementation of systems and software. Software facilitates the rapid and accurate management and pro-cessing of data, supporting business processes and increasing competitiveness. Software testing, conducted by a Quality Assurance professional, is a critical phase to ensure compliance with specifications and user requirements, as well as to mitigate the risk of technical or functional issues.This research was conducted at PT. Walden Global Service (WGS), an IT/Software House consultancy. The focus of the study was on the application of blackbox/greybox methods and the McCall model in software testing, specifically for an authentication platform developed for PT Fazpass Integrasi Indonesia.The results of the testing involved quality factors such as Correctness, Reliability, Integrity, and Efficiency. Performance testing using GTMe-trix and JMeter provided significant success percentages. Additionally, Usability testing showed the com-pleteness of documentation that facilitates the handover process between WGS and the client.The imple-mentation of the McCall model assisted Quality Assurance in categorizing criteria and Test Case catego-ries, with the output being a presentation of success and failure. This helps minimize technical or function-al issues and provides specific recommendations to users or clients regarding the feasibility and need for further development based on the testing results of factors in the Product Operation aspect of the McCall model.

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1. INTRODUCTION

Information technology plays an important role in helping companies to improve busi-ness efficiency and effectiveness[1][2]. One of the information technologies that are widely used is the creation of systems or software. In utilizing this software, proper planning and evaluation are needed with the stages of testing the quality aspects of the software being built in order to obtain the results of improvements, improvements and perfor-mance with good quality. Software Quality Assurance (SQA) is a standard for declaring a software has good system quality[3][4], [5]. The tested system certainly undergoes the SQA stage, which is a series of systematic and planned activities such as planning, designing, and testing before the system is used by users[6]. The testing process is one of the activities that can be done to maintain the quality of the software[7], [8][9]. Testing is generally only done with black-box testing techniques as in the research conducted, namely in the Quality Assurance division at PT Walden Global Service (WGS), one of the companies engaged in IT consulting / Software House where the PT WGS QA testing technique use blackbox testing combined with gray box, this testing technique focuses on testing functionality with the output generated in response to an input to the software. After blackbox / graybox testing, the results do not guarantee that the software has good

quality, so an additional process is needed to ensure the quality of the software being built. McCall is one of the testing models that ex-plains the Software Quality Factor or soft-ware quality.

In this McCall model classifies the quality factors of software into three important aspects and has a total of 11 fac-tors distributed to each aspect with the fol-lowing details, Product Operation factors consist of Correctness, reliability, usability, integrity, and efficiency, Product Revision factors consist of Maintainability, Flexibil-ity, Testability, Product Transition factors consist of Portability, Reusability, Interop-erability[10]–[13]. With the aspects of software quali-ty measurement, McCall has a good level of accuracy and detail because the criteria or quality factors of the McCall model are the most complete for use in ensuring the quality of software[14][15]. The application of the McCall model will be implemented on one of the clients of PT Walden Global Service, PT Fazpass Inte-grasi Indonesia, which makes an Authenti-cation Platform software. Authentication platform is a platform engaged in OTP man-agement that accommodates other OTP pro-viders in one platform.

2. METHOD

The method used in this research is a qualitative method to collect the necessary data by means of interviews, participant observation, field notes, documents, and audio/video materials. This data helps researchers understand the social and cultural context of the phenomenon under study[6][16].

2.1 Data Collection Methods

1) Observation
   - Direct observation of the software to be tested
   - Make relevant observation notes
2) Interview
   - Conduct interviews with Quality Assurance staff to find out their perspectives on software/system testing
   - Take notes on the interview and summarize
3) Documentation
   - Collecting relevant documents such as user guides, system specifications, and examples of previous test reports
   - Analyzing and taking notes on the documents
4) Case Study
   - Conduct a case study on the information system to be tested
   - Record and analyze case study results

2.2 Business Process and Analysis

Illustration of the flow of the business process discussed using a flow map as shown in Figure 1 below[17][18].

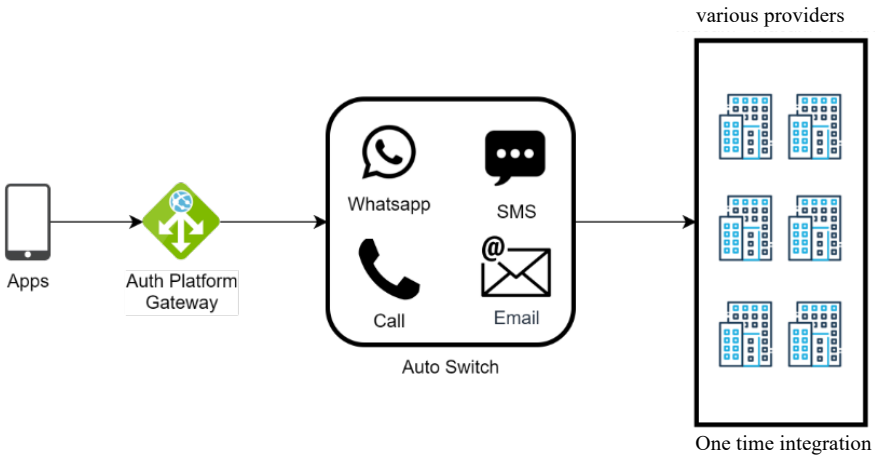


Figure 1. Authentication Platform Business Process

The basic stages of software testing to define the functions performed by the software and the behavior possessed by the software and the interaction between actors and the authentication platform system using the UML Use Case Diagram model[19]. Can be seen in Figure 2.

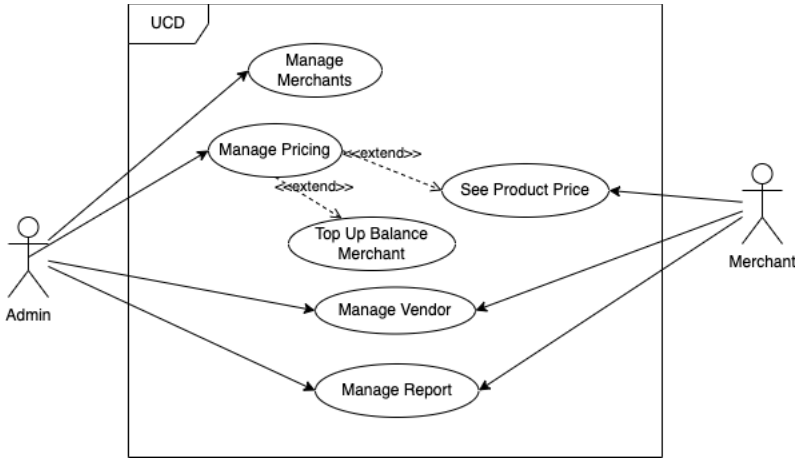


Figure 2. Use Case Diagram of Authentication Platform

2.3 Development Method

One of the software testing methods is the McCall model which will be used in the development method in this study by testing the factors contained in the Product Operation aspect, namely as follows [20];

1) Correctness, Reliability, Integrity factors are tested using Test Scenario and Test Case documents which are implemented using the WGS PT document template, namely Traceability Metrix.
2) Efficiency factor, carried out by testing performance testing based on speed parameters by GT Metrix tools, then scalability and stability parameters by JMeter tools.
3) The Usability factor focuses on testing the completeness of the documentation needed for the handover mechanism as well as documents related to the transfer of knowledge from the WGS side to the Client and from the Client side to the Staff.

3. RESULTS AND DISCUSSION

3.1 Factor Testing Correctness, Reliability, Integrity

1) For testing the "Admin Dashboard" from scenarios and testcases using the Traceability Matrix template that has been made, a success percentage of "80%" is obtained, which can be seen in Table 1 below.

Table 1. Resume of Correctness, Reliability, and Integrity factors (Admin Dashboard)

No	Type McCall	Success	Failed	Total
1	Correctness	54	10	64
2	Reliability	22	5	27
3	Integrity	12	7	19
	TOTAL	**88**	**22**	**110**
	PRESENTATION	**80%**	**20%**	

2) For testing the "Merchant Dashboard" from scenarios and testcases using the Traceability Matrix template that has been made, a success percentage of "83%" is obtained, which can be seen in Table 2 below.

Table 2. Resume of Correctness, Reliability, and Integrity factors (Merchant Dashboard)

No	Type McCall	Success	Failed	Total
1	Correctness	48	10	58
2	Reliability	17	4	21
3	Integrity	21	4	25
TOTAL		**86**	**18**	**104**
PRESENTATION		**83%**	**17%**	

3.2 Efficiency Factor Testing

In testing the Efficiency factor, which is tested by Performance Testing with the help of the GT Metrix tool which focuses on Speed testing (determining the speed of system response), getting the following results;

1) Admin Dashboard

The average value obtained from the "Page Load / Second" parameter is "2.4" with the results of checking the overall data structure and components / YSlow is in the "Grade A" category.

Table 3. GTMetrix Tools Test Results (Admin Dashboard)

ADMIN DASHBOARD			
No	**Halaman Website**	**Page Load / Second**	**Result Check GTmetrix - YSlow**
1	Landing Page	2,4	**A**
2	Login	2,1	**A**
3	Dashboard	2,7	**A**
4	Merchant List	2	**A**
5	Merchant Reseller	2,4	**A**
6	Global Pricing	2,1	**A**
7	Merchant Pricing	2,3	**A**
8	Tax	2,2	**A**
9	Top Up Balance	2,2	**A**
10	Top Up History	2,2	**A**
11	Recon - Global Traffic	2,7	**A**
12	Recon - Ledger	2,2	**A**
13	Recon - OTP Uses	2,1	**A**
14	Recon - Load Usage	2,3	**A**
15	Vendor Health Check	4,7	**B**
16	User Management	2,1	**A**
Average		2,4	**GRADE A**

2) Merchant Dashboard

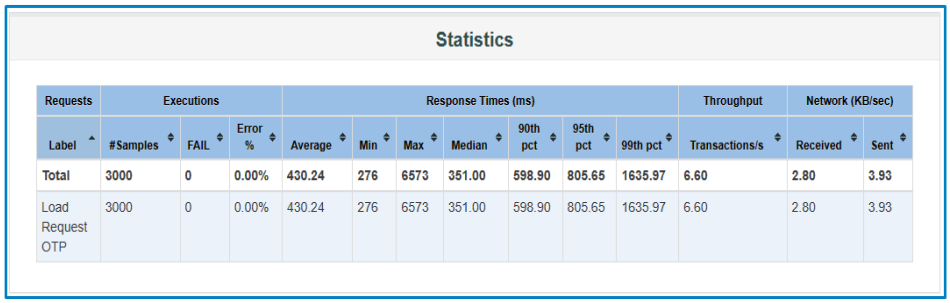
The average value obtained from the "Page Load / Second" parameter is "2.3" with the results of checking the overall data structure and components / YSlow is in the "Grade A" category.

Table 4. GT Metrix Tools Test Results (Merchant Dashboard)

MERCHANT DASHBOARD			
No	**Halaman Website**	**Page Load / Second**	**Result Check GTmetrix - YSlow**
1	Landing Page	2	**A**
2	Login	2,3	**A**
3	Home	2,3	**A**
4	Whitelist IP	2,2	**A**
5	Report	2,2	**A**
6	Proxy	2,3	**A**
7	Settings	2,5	**A**
8	End User	2,2	**A**
Average		2,3	**GRADE A**

Then the JMeter tool which focuses on Scalability testing (determining the maximum user load that can be handled by the application), gets results, namely, "can perform 3,000 OTP requests from 3 threads, in

less than 10 minutes with an average number of transactions / OTPs entering each second is 6 to 7" which can be seen in Figure 3.



Statistics

Requests	Executions			Response Times (ms)							Throughput	Network (KB/sec)	
Label	#Samples	FAIL	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct	Transactions/s	Received	Sent
Total	**3000**	**0**	**0.00%**	**430.24**	**276**	**6573**	**351.00**	**598.90**	**805.65**	**1635.97**	**6.60**	**2.80**	**3.93**
Load Request OTP	3000	0	0.00%	430.24	276	6573	351.00	598.90	805.65	1635.97	6.60	2.80	3.93

Figure 3. Statistics Result JMeter

3.3 Efficiency Factor Testing

For testing this factor in the form of a checklist for completeness of documentation to facilitate project handover between WGS and Client as well as knowledge transfer between Client and User.

Here are the results of the documentation completeness checklist;

1) Hand Over Document
   - Traceability Matrix / TestCase Documentation [Available],
   - NDA Tech Doc WGS & Client [Available].
2) Knowledge Transfer Documen
   - Developer Documentation (User/Client) [Available],
   - API Collection (IT Division) [Available],
   - PRD Documentation (Employe) [Available].

From the tests that have been carried out, conclusions can be drawn, including the following:

1) The process of testing the blackbox / graybox testing method by Quality Assurance staff at PT WGS with the application of using the McCall testing model is as follows;
   - Quality Assurance staff first create a template document from PT WGS, namely a Traceability Matrix that is compatible with the blackbox / graybox testing method for making Test Case and Test Scenario,
   - The Test Case and Test Scenario that have been made are entered into the McCall testing model on the Product Operation aspect to be grouped according to the Correctness, Reliability and Integrity factors,
   - After the Test Case and Test Scenario have been grouped, the software is tested again on the Efficiency factor which is assisted by the JMeter and GTMetrix tools to test the Performance of the software,
   - Then proceed with testing the last factor in the Product Operation aspect of the McCall model, namely the Usability factor by testing the completeness of the documentation required for Hand Over Project to Client and Use of Software by User/Consumer.
2) The results of the application of the McCall Testing model provide a more specific assessment due to the addition of Performance Testing with Documentation Checklist to facilitate handover in helping recommendations to the client for the feasibility of the software can already be published to the public or it is felt that it is still necessary to re-develop the software based on the accumulated value and completeness of documents obtained from testing factors in the Product Operation aspect of the McCall model.

4. CONCLUSION

Using the McCall software quality model, the study “Testing the Authentication Platform System Using the McCall Model” sought to assess the quality of an authentication platform. This methodology offers a thorough framework for assessing software systems and rates software according to 11 quality characteristics. Integrity, adaptability, maintainability, usability, and dependability were among the main focuses of our investigation. Our results are summarized as follows:

1) Reliability: During testing, the authentication platform showed excellent reliability with steady performance and little downtime. This suggests that there shouldn't be any major disruptions when using the system regularly.

2) Maintainability: The architecture and codebase of the system were assessed for their level of maintainability. The outcomes showed a well-organized structure and thorough documentation, indicating that future upgrades and alterations can be applied without significant difficulties.
3) Usability: According to user feedback and usability tests, the system has an easy-to-use interface and simple navigation. This implies that users don't need much training to become proficient with the platform and may easily adjust to it.
4) Flexibility: The platform demonstrated a passable degree of adaptability, permitting some system interfaces and customizations. However, when it comes to significant or large-scale adjustments, there can be restrictions.
5) Integrity: The authentication platform's strong security features, which lower the possibility of unwanted access and data breaches, were validated by security tests. High integrity is facilitated by the use of encryption and other security measures.

The authentication platform solution performed admirably overall across the most of McCall quality factors. It is appropriate for many authentication applications due to its good usability, high dependability, and integrity. Nonetheless, flexibility might be increased to better accommodate a range of changing user needs. Subsequent efforts might concentrate on improving this feature and extending the platform's functionality. These results imply that the McCall model is a helpful instrument for evaluating the caliber of authentication systems and that it can help stakeholders and developers make well-informed choices about the additions and modifications of existing systems.

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