



Correctness Quality Factor Testing to Validate Data on SIPAKAR GROSS Web Application

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Abstract. The testing stage is the most important part of the web application development cycle. Testing is carried out when the web application is completed before being implemented by the user. The method of testing web applications is determined based on quality factors that have been agreed upon between the user and the developer. The web application to be tested is SIPAKAR GROSS (employee payroll web application using the gross method) and testing is carried out based on the correctness quality factor. The selection of this quality factor is to ensure that the information generated by SIPAKAR GROSS is accurate, complete, up-to-date, and available. Testing is carried out using the equivalence partitions method Black box technique. The method of testing the equivalence partitions method is based on input and output validation of the web application to be tested. Data will be grouped Users will enter data based on scenarios that have been created by the testing team From the test results involving 10 users, the output results of SIPAKAR GROSS are accurate, complete, up-to-date, and available.

Keywords: Web application testing, payroll application, gross method

1 Preface

The stages of web application development consist of five stages, namely: analysis, design, programming, testing, and maintenance [14]. Of the five stages, the testing stage is the most essential in web application development. This stage is related to the quality of the web application so that the resulting software is free from errors, defects, and failures. In modern web application development methods (such as the agile method), testing is not carried out when the device is finished, but testing is carried out at each stage of the web application development cycle [12]. In order for testing to be carried out correctly, the testing method is adjusted to the predetermined web application quality factors [4]. Software testing can be done manually or automatically [3]. Manual testing is done by creating test scenarios for software inputs, while automatic testing uses tools (for example: selenium) to test web application outputs. Testing techniques can use two methods, namely the white box and black box technique. The white box technique emphasizes the program flow, while the black box technique emphasizes the software input-output [10].

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The success of a web application is determined by whether or not the needs of users and stakeholders are met. If all the needs of users and stakeholders are met, then the application is of high quality. In addition, the success of a web application is determined based on the fulfillment of the quality factors of the web application determined at the beginning of the development of the web application. The technique of testing web applications based on quality factors differs depending on the type of quality factor. McCall's divides quality factors into three parts, namely: product operational factors, product revision factors, and product transition factors [4].

There have been many studies on testing web applications that have been carried out using various methods and techniques. [2] conducted an evaluation of testing web applications for monitoring social media and online media using ISO/IEC 9126 modeling. In this modeling, there are four factors tested, namely: usability, functionality, reliability, and efficiency. [16] conducted testing using the black box technique on the performance data information application system using the equivalence partitions method. This technique is one of the techniques used to validate software data.

The web application to be tested is an employee payroll web application using the gross method (hereinafter referred to as SIPAKAR GROSS). This application is a salary payment application at the Bendo Coffee & Sefu Ramen restaurant (one of the business units of PT Bendo Dua Saudara) located on Dr Sutomo No. 1 Street Bukit Kecil Palembang. For calculating employee salary payments using the gross method based on the principle of calculating PPh 21. SIPAKAR GROSS is web-based so it can be connected to many computers via the internet. The use of SIPAKAR GROSS is not optimal when implementing web applications in the user environment, many users do not understand the use of the web application workflow. As a result, the output of information from the web application is not accurate for use by users. This study conducted testing on the web application to determine data accuracy based on the correctness quality factor.

2 Basic Theory

2.1 Software Testing

Software testing is one of the activities to ensure software quality. Initially, software testing was only carried out at the final stage of software development. However, with the development of the concept of software quality assurance, [18] early detection of errors and defects in software has become increasingly important in order to reduce costs and efforts that must be made at the maintenance stage. Currently, software testing is carried out from the beginning and starts from the lowest level, namely module or unit testing.

Based on IEEE Standard 610.12 [9], software testing has the following definition: The process of operating a system or component under certain conditions, observing or recording the results, and making an evaluation action on some aspects of the system or component.

The process of analyzing a software item to detect differences between existing and expected conditions (i.e., bugs) and to evaluate the features of the software item.

Meanwhile, the definition of software testing according to [4] is as follows: "Software testing is a formal process carried out by a special testing team, where an integrated software unit or a complete software package is checked by running the program on a computer. Everything related to testing is done in accordance with the procedures and test cases that have been approved".

As explained at the beginning, the testing process is no longer carried out only at the end of software development. Detecting errors and defects from the start is very important to reduce the impact, costs and efforts required when the testing process is only carried out at the final stage of development. Currently, testing activities are carried out throughout the software development life cycle. Test plans for each stage in each software development life cycle have been carried out from the beginning. This is because the form of testing at each stage in the software development life cycle is different. Figure 1 below illustrates the differences in the form of testing at each stage of development.

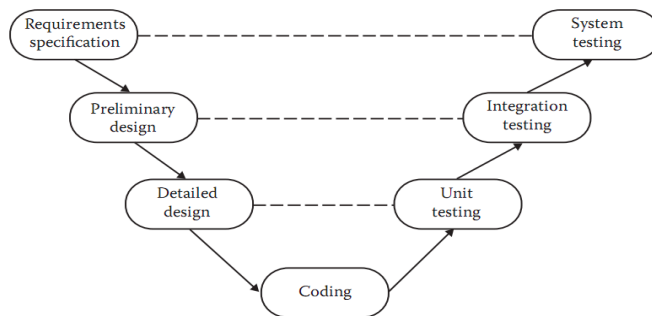


Fig 1.V-Model of Software Testing [14]

Figure 1 above illustrates that each stage of software development (left) is related to the appropriate testing activity (right). In its application, the concept can be adjusted to the development model or method used by the developer. The most important thing here is how each stage of development has a way to ensure that what is implemented is in accordance with what is expected. In this case, it is the testing activity at each stage of development to find defects. So that existing defects can be found early and reduce much greater risks, both in terms of cost and effort required.

Testing Techniques

In software testing, conceptually there are two testing techniques that can be done, namely:

1. Black Box Testing (Functionality Testing). Based on [9], the definition of Black Box Testing is (a) a testing process where the internal mechanisms of a component or system are ignored and focus on the execution conditions and output values produced in response to selected input values. (b) A testing process carried out to evaluate the fulfillment of a system or component with certain functional requirements.
2. White Box Testing (Structural Testing). A testing process that focuses on the structure and internal mechanisms of a component or system.

Testing Strategy

A software testing strategy will provide developers with a roadmap of the steps to be taken as part of the overall testing process. With a testing strategy, developers will assess whether the testing process will only be carried out on the smallest part of the system (unit) or will be carried out when the software being developed has become a complete unit. The testing strategy also determines whether the retesting process will be carried out if a new module or component is added. In general, there are two forms of software testing strategies [10], namely:

1. Big Bang Testing. Testing is carried out after the software being developed has been completely completed.
2. Incremental Testing. Testing is carried out in stages. Starting from testing at the lowest level, namely unit testing, then testing a group of units or modules, namely integration testing, until testing all modules has been integrated, namely system testing.

2.2 Payroll

Payroll is a payroll system that includes calculating each employee's income starting from basic salary, allowances, or employee taxes. Salary payment activities are expected to be carried out with a fast method so that employees can receive their salaries on time.

The benefits of payroll that can be obtained by companies and employees in the salary payment scheme are as follows:

1. Knowing the salary report, the application of payroll in employee payroll will make it easier for employees to know the details of the salary report each month. This is because payroll provides a detailed picture of the percentage of deductions for taxes, BPJS, to the net salary they will receive.
2. Save time, payroll will help the administration or HR department when the payroll period arrives. They can save time in the employee payroll process. For example, if an employee is absent from work, the payroll system will automatically calculate the amount of salary for the employee on that day.
3. Creating Tax Forms, if previously creating tax forms could take a lot of time and money, with the payroll system the company can create tax forms needed by the company and employees more easily and efficiently.

2.3 Gross Method

Definition of Gross Method According to [11], "The gross method is a tax saving method by which the company provides tax allowances in the amount of income tax that must be paid by the company's employees". According to [13] the Gross Method is a tax deduction method where the company provides PPh pasal 21, allowances which are formulated to be the same amount as the amount of PPh pasal 21, that will be deducted from employees. The conclusion of this opinion is the tax deduction method by which the company provides tax allowances to employees.

3 Research Methodology

3.1 Study of Literature

The first stage carried out in this study is a literature study related to the concept, theory and technique of testing web applications, employee payroll calculations based on PPh pasal 21, and the gross method. The literature study was conducted by reading journals, proceedings, and books on the concept, theory and technique of testing web applications, employee payroll calculations based on PPh pasal 21, and the gross method. The sources of the literature readings were obtained from libraries and the internet. The results of the literature study obtained a good understanding of the concepts and theories that will be used in the study.

3.2 Systems Analysis and Business Process

At the system analysis stage, the results obtained are a comprehensive description of the system. The system (data collection and needs location) that will be used in this study is the Bendo Coffee & Sefu Ramen restaurant on Dr. Sutomo Street No.1 Bukit Kecil Palembang. The system analysis was carried out by visiting and observing the business process at the Bendo Coffee & Sefu Ramen restaurant. In addition, the system analysis was carried out by conducting interviews with the parties involved. Finally, the system analysis was carried out by studying the documents available at the Bendo Coffee & Sefu Ramen restaurant.

3.3 Development of SIPAKAR GROSS

The web application to be developed is named SIPAKAR GROSS (Employee Payroll Web Application Using Gross Method). Application development uses the RUP (Rational Unified Process) method. The method of calculating employee payroll uses the GROSS method.

3.4 SIPAKAR GROSS Testing

The SIPAKAR GROSS development test system management is a core part of this research. Testing is carried out at every stage of the SIPAKAR GROSS development cycle. There are three stages that will be tested, namely: analysis, design, and coding. The object to be tested is the output of the SIPAKAR GROSS development computer program. The next test is the SIPAKAR GROSS program code test. The test carried out is to test for errors and defects in the program. This test is carried out using the IDE where the program was created. The test with the most activities is the SIPAKAR GROSS test.

Testing is carried out after the web application is completed. To test it is determined based on the correctness quality factor which has sub-criteria of accuracy, recency, completeness, and availability. This test is carried out by creating a test scenario.

3.5 Implementation of SIPAKAR GROSS

SIPAKAR GROSS is finished, the next step is to implement it in Bendo Coffee & Sefu Ramen restaurant. SIPAKAR GROSS will be published through internet media. The staff will be given an explanation about the use of SIPAKAR GROSS. The implementation of SIPAKAR GROSS will be monitored for 3 months.

4 Result

This section is divided into two parts, namely: the results of testing the form interface data in SIPAKAR GROSS to determine the accuracy, completeness, and recency of the data and the results of testing each SIPAKAR GROSS interface link to determine the availability of the interface page.

4.1 SIPAKAR GROSS interface

Salary Data Interface View

SIPAKAR GROSS form interface is a special interface that presents employee salary information including the amount of basic salary and total allowances received by employees based on the number of attendance. In this interface, users can add new salary data to SIPAKARGROSS. The results of salary calculations can be exported in XLS or PDF format as a report.

NIP	Jumlah Kehadiran	Bulan Tahun	Gaji Pokok	Tunjangan Makan	Tunjangan Transport	Tunjangan Komunikasi	Total Tunjangan	Status Acc	Action
M Adhitya Nugratama	22	R 2022-09	Rp. 3.782.822	Rp. 60.000	Rp. 27.000	Rp. 100.000	Rp. 2.014.000	Sudah	Ubah Delete
Muhammad Yusuf Insan Perdana	20	R 2022-09	Rp. 3.782.822	Rp. 60.000	Rp. 27.000	Rp. 100.000	Rp. 1.840.000	Sudah	Ubah Delete
Rudy Erika	25	R 2022-09	Rp. 4.111.762	Rp. 60.000	Rp. 20.000	Rp. 100.000	Rp. 2.100.000	Sudah	Ubah Delete
Deni Firmansyah	27	R 2022-09	Rp. 4.111.762	Rp. 60.000	Rp. 20.000	Rp. 100.000	Rp. 2.260.000	Sudah	Ubah Delete

Fig 2. Salary Data Interface View

Salary Deduction Data Interface Display

SIPAKAR GROSS salary component deductions data interface is a special interface that presents detailed information regarding salary deductions imposed on company employees.

NIP	Potongan Iuran Koperasi	Potongan Pinjaman Koperasi	Potongan Sumsel Syariah	Potongan Bpr Pasar	Potongan Btk	Sanksi	Infaq Baznas	Total Potongan	Action
☐ M Adhitya Nugratama	25,000	0	0	0	0	0	20,000	45,000	☐ Ubah ☐ Delete
☐ Muhammad Yusuf Insan Perdana	25,000	0	0	0	0	0	20,000	45,000	☐ Ubah ☐ Delete
☐ Deni Firmansyah	25,000	1,180,000	0	0	0	0	20,000	1,225,000	☐ Ubah ☐ Delete
☐ Rudy Erika	25,000	1,180,000	0	0	1,067,800	0	20,000	2,292,800	☐ Ubah ☐ Delete

Fig 3. Salary Deduction Data Interface View

PPH 21 Calculation Data Interface Display

The PPh 21 calculation interface on SIPAKAR GROSS is a special interface used to calculate and pajak penghasilan (PPh) pasal 21 of company employees. This interface is an important part of SIPAKAR GROSS which aims to calculate the amount of tax that must be deducted from employee salaries based on applicable tax regulations. The PPh pasal 21 calculation interface functions as a tool that facilitates and ensures company compliance with applicable tax regulations. With this automatic system, the tax calculation process becomes more efficient and accurate, avoiding calculation errors and ensuring that the tax deducted is in accordance with applicable laws and regulations.

HITUNG PPH 21	
Nama	: Muhammad Aditya Nugratama
Jabatan	: Staff Adm & Keuangan
Status	: Tidak kawin dan tidak mempunyai tanggungan (TK/0)
Jumlah Kehadiran	: 22 hari
Gaji Pokok	: Rp 3.782.822
Tunjangan	:
Tunjangan Makan	: Rp 1.320.000
Tunjangan Transportasi	: Rp 594.000
Tunjangan Komunikasi	: Rp 100.000
Tunjangan Kesehatan	: Rp 151.313
Tunjangan JHT	: Rp 139.964
Tunjangan JKR	: Rp 11.348
Tunjangan JPK	: Rp 48.042
Tunjangan JP	: Rp 75.656
Total Tunjangan	: Rp 2.440.324
Total Bruto	: Rp 6.223.146
Bruto setahun	: Rp 74.677.752

Fig 4. Salary Deduction Data Interface View

4.2 Correctness quality factor test results

SIPAKAR GROSS testing based on correctness quality factors using the equivalence partitions method black box technique. This method is a test based on data input on

each form in the performance data information application system, each input menu will be tested and grouped based on its function, whether the results are valid or invalid [6]. The number of users involved in the SIPAKAR GROSS test was 10 people who had different backgrounds and job positions at the Bendo Coffee and Sefu Ramen restaurants.

Testing will be conducted on each SIPAKAR GROSS interface to test the accuracy, availability, and completeness of each interface's data. Each user will operate SIPAKAR GROSS according to their respective authorizations. The form of data used in this test is alphanumeric data consisting of two data, namely numeric data and character data. In the SIPAKAR GROSS interface field, there are fields that only contain numbers such as telephone numbers, fields that only contain characters such as gender, there are fields that contain a combination of numeric and character data such as addresses. In each field, data entry will be limited to make it easier to validate data. The equivalence partition method is used as a grouping of data types to be tested in the SIPAKAR GROSS interface

To conduct black box testing using the equivalence partitions method, a test scenario is created. The correctness quality factor is used as a basic guide for creating test scenarios. Based on this test scenario, the user will enter test data into the SIPAKAR GROSS interface. The expected results of this scenario are whether the response from the SIPAKAR GROSS interface is in accordance with the specifications that have been set. The following is an example of a test scenario for the SIPAKAR GROSS employee data entry interface.

Table 1. Employee data entry interface testing

Employee data entry interface test				
No	Test Item	Expected results	Actual results	Information
1	Users enter data according to specifications on the employee data entry interface.	The system displays the message “Data saved successfully”	The system displays the message “Data saved successfully”	The aim is to ensure the data is correct
2	User enters data that does not comply with specifications on the employee data entry interface.	The system displays the error message “Data does not match”	The system displays the error message “Data does not match”	The aim is to validate all data according to specifications.
3	User employee enters blank data on data entry interface	The system displays the error message “Data does not match”	The system displays the error message “Data does not match”	The aim is to validate all data according to specifications.

In the same way, testing is carried out on all interfaces in SIPAKAR GROSS. Specifically, to test the availability of the correctness quality factor, the user clicks on the link available in SIPAKAR GROSS. If the clicked link is in accordance with the specifications, the value is available. The overall results of the black box testing technique using the equivalence partitions method based on the correctness quality factor are shown in table 2.

Table 2. Test Results Based on Correctness Quality Factors

No	Interface	Accuracy	Updates	Completeness	Availability
1	Login	√	√	√	√
2	Dashboard	√	√	√	√
3	User Data	√	√	√	√
4	Employee Data	√	√	√	√
5	Salary Data	√	√	√	√
6	Data Cuts	√	√	√	√
7	PPh pasal 21 Data	√	√	√	√
8	Calculate Salary	√	√	√	√
9	Print Salary Slip	√	√	√	√
10	Logout	√	√	√	√

5 Conclusion

Determination of the correctness quality factor provides guidance on how to test SIPAKAR GROSS. Based on these quality factors, SIPAKAR GROSS testing uses the equivalence partitions method of the Black box technique. The results of the test using this method show that the output produced by SIPAKAR GROSS is in accordance with the needs of stakeholders. All data in each interface is accurate, complete, and available according to data criteria. Likewise with the availability of each link in SIPAKAR GROSS, if the link is clicked, the interface will appear according to the specifications.

6 Recommendation

In further research, it is necessary to examine the use of other methods in testing SIPAKAR GROSS using the correctness quality factor. The purpose of using other methods is to obtain a comparison of the results of the testing techniques. It is expected that the results will get better results.

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