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Black Box Testing using Equivalence Partitioning Technique on Bakkar Website

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Abstract

Penelitian ini bertujuan untuk mengevaluasi fungsionalitas situs web Bakkar dengan menggunakan metode Black Box Testing dan teknik Equivalence Partitioning. Fokus utama pengujian berada pada fitur login dan registrasi, yang merupakan elemen penting dalam interaksi pengguna. Teknik Equivalence Partitioning digunakan untuk membagi data masukan ke dalam kelas yang ekuivalen, baik valid maupun tidak valid, sehingga memungkinkan efisiensi dalam jumlah kasus uji tanpa mengurangi cakupan pengujian. Dalam studi ini, sebanyak 17 skenario pengujian dirancang untuk mewakili berbagai kondisi input yang mungkin ditemui oleh pengguna. Hasil pengujian menunjukkan bahwa 15 dari 17 skenario berhasil dijalankan sesuai ekspektasi, dengan tingkat keberhasilan mencapai 88,24%. Dua skenario gagal menunjukkan bahwa sistem belum mampu memberikan umpan balik yang jelas ketika menangani input yang tidak sesuai, seperti format email yang salah atau kata sandi yang tidak valid. Temuan ini menegaskan pentingnya peningkatan validasi masukan dan pemberian pesan kesalahan yang informatif agar dapat meningkatkan keandalan sistem serta kenyamanan pengguna dalam menggunakan layanan situs web tersebut.

Keywords: Black Box Testing, Equivalence Partitioning, Validasi Input, Uji Fungsional, Pengujian Website

Abstract

This study aims to evaluate the functionality of the Bakkar website using the Black Box Testing method and the Equivalence Partitioning technique. The primary focus of testing lies in the login and registration features, which are critical components of user interaction. Equivalence Partitioning was employed to divide input data into valid and invalid partitions, allowing for efficient test case coverage without sacrificing thoroughness. In total, 17 test scenarios were designed to represent various user input conditions. The results showed that 15 out of 17 test cases were executed successfully, resulting in a success rate of 88.24%. The two failed scenarios revealed that the system lacked clear feedback when handling invalid inputs, such as incorrectly formatted emails or insufficient password length. These outcomes highlight the need for better input validation and more informative error messages to improve system reliability and user experience. Overall, the findings demonstrate that the Equivalence Partitioning technique is effective for identifying functional issues in web applications and can be a practical approach for similar testing contexts.

Keywords: *Black Box Testing, Equivalence Partitioning, Functional Testing, Input Validation, Website Testing*

1. INTRODUCTION

Software testing is a process aimed at evaluating the accuracy, thoroughness, and overall quality of developed software, while also identifying any bugs or defects [1]. In today's digital landscape, web applications have become essential in supporting various business processes and user interactions, making their reliability and robustness increasingly important [2]. For web applications like the Bakkar website, testing is crucial to ensure the system operates as expected and can handle diverse user scenarios.

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The Bakkar website serves as a critical online platform for managing transactions and administrative activities. However, the system has not undergone structured functional testing, which raises concerns regarding how it handles invalid user inputs and provides feedback. Ensuring its robustness is essential to guarantee a seamless user experience and maintain user trust. Given the complexity of web applications and high user expectations, identifying potential defects early in development is necessary, as the primary goal of testing is to ensure the system meets reliability and performance standards [3].

One widely used approach to software testing is Black Box Testing, which evaluates software functionality without requiring knowledge of its internal code structure. This makes it effective in detecting unexpected behavior across different user inputs [4]. To refine this testing approach, we apply the Equivalence Partitioning technique—an input-based test case design method that divides data into partitions of valid and invalid inputs [5]. Each partition is assumed to exhibit similar behavior, so a representative test case from each is sufficient to evaluate the system's response. This technique is particularly useful for reducing the number of test cases while maintaining broad coverage of possible scenarios [6].

The Equivalence Partitioning technique is chosen over other techniques such as Boundary Value Analysis because it allows a greater variety of data within a single input class to be tested representatively [7][8]. This efficiency is crucial when validating systems that process a range of input types. By applying this technique, we aim to validate the Bakkar website's login and registration functionalities under both typical and edge-case input conditions.

Therefore, the purpose of this study is to explore the application of Black Box Testing using the Equivalence Partitioning technique on the Bakkar website. This study aims to assess the effectiveness of Equivalence Partitioning in detecting defects and ensuring the proper functioning of the website across various user inputs [9]. This paper contributes to the field of software testing by demonstrating the practical use of Equivalence Partitioning in web application testing. The findings are expected to show how Black Box Testing can effectively uncover functional errors, ensuring that the Bakkar website operates reliably across different scenarios [10].

2. RESEARCH METHODS

The subject of this research is the Bakkar website. This study applies the Black Box Testing method using the Equivalence Partitioning technique to assess the functionality of input validation in the login and registration features.

2.1. Black Box Testing

Black-box testing is a software testing method that focuses on evaluating the system's external behavior, without inspecting its internal structure or source code [11]. This approach is effective for validating whether the software behaves according to its functional requirements when subjected to various user inputs [12]. On the Bakkar website, this testing focuses on core features such as login and registration, both of which involve multiple input fields that are essential for access control and user management.

2.2. Equivalence Partitioning

Equivalence Partitioning is a black-box test design technique that divides input data into partitions or classes, where each class represents a set of inputs expected to produce similar outcomes [13]. Each class represents a set of input values that are assumed to produce similar outputs, so it is sufficient to test with one value per class. In testing the BAKKAR Fried Chicken website, this technique is applied to form validation, such as filling in product prices that are grouped into valid (positive price) and invalid (zero or negative price) data [14]. For example, in the registration form, the email field is divided into classes such as:

- Valid email format (e.g., user@example.com)
- Invalid format: missing "@" (e.g., userexample.com)
- Empty input

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Similarly, for the password field, classes include:

- `Valid password (≥8 characters)`
- Invalid: too short (e.g., 6 characters)
- Mismatched confirmation password
- Empty input

These classifications help ensure that each equivalence class is tested representatively. The goal is to detect potential functional issues while minimizing redundant test cases. The overall testing flow is illustrated in the following diagram:

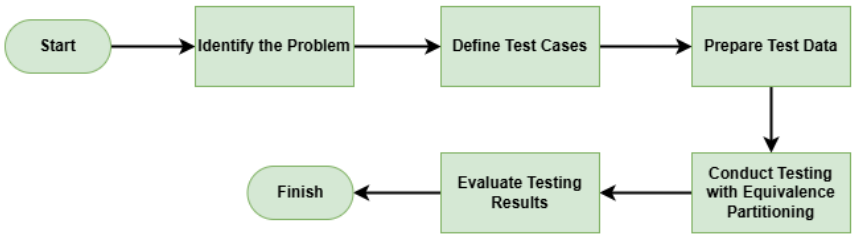

Figure 1. Testing Steps

In this study, the black box testing method with the equivalence partitioning technique was used to test the Bakkar website. The first step was to identify the problem to be tested, namely the input on the Login and Register system. After that, the test data was classified into equivalent partitions to ensure that each data category was accurately tested. Then, testing was conducted using data from each partition. The final step was to present the test results. The next figures show the actual input pages that were tested using the designed test scenarios. These include the login and registration pages, where each input field was classified into valid and invalid partitions, as shown in Figure 2 and Figure 3, respectively.

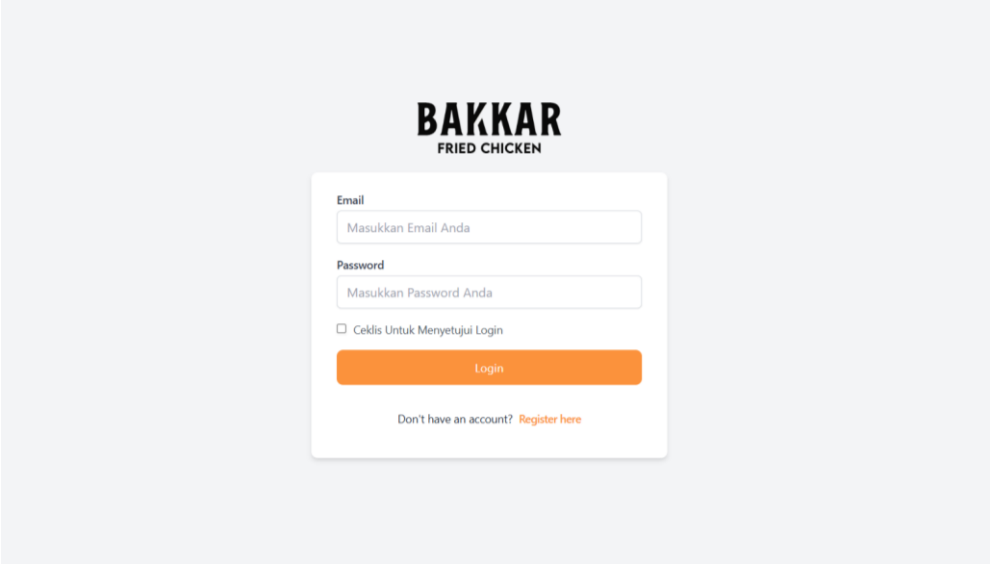

Figure 2. Login Page

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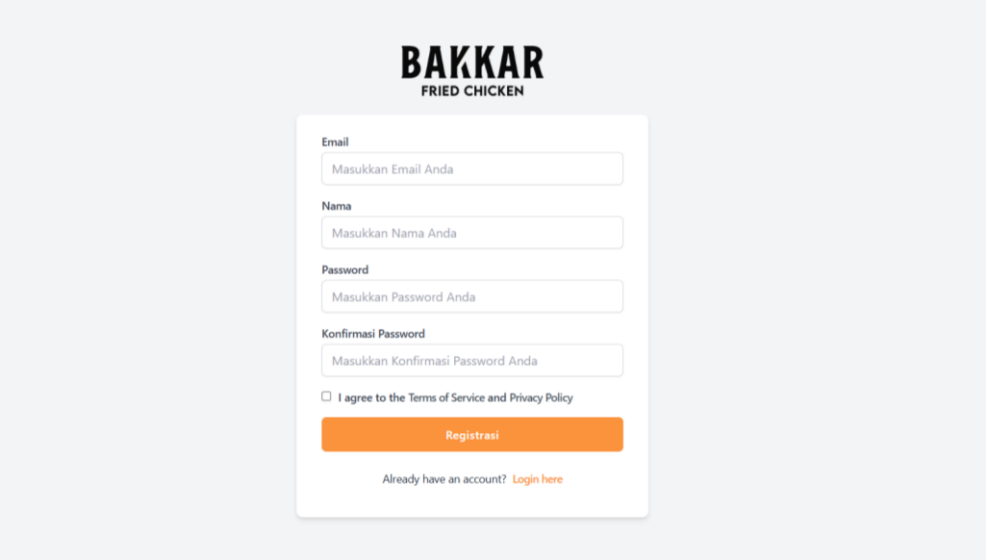

Figure 3. Register Page

The primary goal of this research is to verify that the website correctly processes user inputs by categorizing them into valid and invalid partitions and testing how the system handles these inputs. This approach helps identify potential errors in input validation and processing. For testing, focus was placed on the registration and login functionalities of the website, as these features involve several critical input fields that require precise validation. Using Equivalence Partitioning, input data for each field was categorized into valid and invalid classes, and representative test cases were selected from each partition to ensure comprehensive coverage of possible user inputs [15].

The Equivalence Partitioning technique is used in this study due to its ability to divide input data into several classes that can be tested representatively, which is crucial for systems handling various types of data [7]. This technique is chosen to obtain broad functional coverage with an efficient number of test cases, which is its primary strength. The criteria for dividing the input data into partitions are based on identifying distinct groups of inputs that are likely to be processed similarly by the system.

The following table outlines the test cases for the registration and login functionalities, based on the Equivalence Partitioning technique.

Table 1. Design of Test Categories and Application Testing Items

No.	Function	Test Case
1	Login	Admin enters a valid email and password
2	Login	Admin enters a valid email and incorrect password
3	Login	Admin enters an incorrect email and a valid password
4	Login	Admin leaves the email field empty and enters a valid password
5	Login	Admin enters a valid email and leaves the password field empty
6	Login	Admin enters valid email and password but does not check the "Agree to Login" checkbox
7	Login	Admin clicks on the "Register here" link
8	Login	Admin enters an email without “@” symbol
9	Registration	Admin enters an email that is not registered in the system
10	Registration	Admin enters an email that is already registered in the system
11	Registration	Admin fills out all fields and clicks the "Register" button
12	Registration	Admin enters matching password and confirmation password
13	Registration	Admin enters mismatched password and confirmation password
14	Registration	Admin enters a password that is too short (less than 8 characters)
15	Registration	Admin fills out all data correctly but does not check the "I agree to the Terms of Service" checkbox
16	Registration	Admin attempts to register with an email already used for another account

17	Registration	Admin only fills in email without providing a name or password

Table 1 presents the specific test cases that were designed to evaluate the login and registration functionalities of the Bakkar website. For instance, in the "Login" function, test case number 8 focuses on an invalid input (email without "@" symbol). In the "Registration" function, test case number 13 examines the scenario where passwords and confirmation passwords do not match. These test cases are derived from identifying valid and invalid partitions for each input field.

This approach is taken because Equivalence Partitioning allows for testing of a greater variety within a single input class category compared to solely relying on Boundary Value Analysis [8]. However, it's important to note that while Equivalence Partitioning focuses on representative values from each partition, Boundary Value Analysis (BVA) focuses on values at the boundaries. As mentioned in the conclusion, BVA could complement this testing in future work. By choosing Equivalence Partitioning, we ensure broader test coverage and significantly reduce testing time.

3. RESULT AND DISCUSSION

This section presents the results of the Black Box Testing conducted on the Bakkar website using the Equivalence Partitioning technique. In this Black Box testing, the examination is performed solely on the value of each input entered, without considering the internal structure or code of the system [16]. One of the advantages of the Black Box method is that the tester does not need to have an in-depth understanding of a specific programming language to conduct the testing [10]. Descriptive statistics were used to summarize the key characteristics of the test cases, such as the number of test cases per equivalence class, pass/fail rates, and the distribution of test results across different user input scenarios.

In addition, inferential statistical analyses were performed to assess the effectiveness of the Equivalence Partitioning technique in identifying defects in the Bakkar website. The tests aimed to verify whether the website's functionality was consistent with its specifications across a range of input conditions [17]. The following tables (Table 2 and Table 3) provide a detailed summary of the test scenarios and outcomes, specifically for the login and registration features.

In this study, the Black Box Testing method was applied to assess the functionality of the Bakkar website, with particular emphasis on the Equivalence Partitioning technique. This technique divides input data into distinct equivalence classes, where each class is expected to behave similarly. By testing the website under a variety of input conditions, the goal was to evaluate its performance and uncover any defects. A total of 17 test cases were created based on the identified equivalence classes, covering a range of valid and invalid user inputs, such as "Admin enters a valid email and password" or "Admin enters an incorrect email and a valid password," as shown in Tables 2 and 3.

Table 2. Login Functionality Test Cases and Results

No.	Test Scenario	Test Code	Expected Results	Test Results	Conclusion
1	Admin enters a valid email and password	L001	Admin successfully logs in. Displays the admin dashboard.	Success	Admin successfully logged in and directed to the admin dashboard.
2	Admin enters a valid email and incorrect password	L002	Admin fails to log in. A warning appears stating the password is incorrect.	Failed	Admin cannot access the admin dashboard, but no notification about what is wrong.
3	Admin enters an incorrect email and a valid password	L003	Admin fails to log in. A warning appears stating the email is incorrect.	Failed	Admin cannot access the admin dashboard, and the page directly shows a 419 | Page Expired.
4	Admin leaves the email field empty and enters a valid password	L004	Admin fails to log in. A warning appears stating that the email field is required.	Success	Admin cannot log in and receives a warning about the empty field.
5	Admin enters a valid	L005	Admin fails to log in. A	Success	Admin cannot log in and

	email and leaves the password field empty		warning appears stating that the password field is required.		receives a warning about the empty field.
6	Admin enters valid email and password but does not check the "Agree to Login" checkbox	L006	Admin fails to log in. A warning appears stating that the checkbox must be checked to agree to the login terms.	Success	Admin cannot log in and is given a warning to check the checkbox.
7	Admin clicks on the "Register here" link	L007	Admin is redirected to the registration form. Displays the registration page.	Success	Admin is successfully redirected to the registration page.
8	Admin enters an email without “@” symbol	L008	Admin fails to log in. A warning appears stating the "@" symbol is required in the email field.	Success	Admin fails to log in and receives a warning about the missing "@" symbol in the email field.

Table 3. Register Functionality Test Cases and Results

No.	Test Scenario	Test Code	Expected Results	Test Results	Conclusion
1	Admin enters an email that is not registered in the system	R001	The system accepts the new email and saves it to the database.	Success	Admin successfully registered the account, was directed to the admin dashboard, and the expected notification appeared.
2	Admin enters an email that is already registered in the system	R002	The system rejects the registration with an error message: "Email already registered. Please use a different email."	Success	Admin cannot register the account, and the expected notification appeared.
3	Admin fills out all fields and clicks the "Register" button	R003	The system processes all valid data.	Success	Admin successfully registered the account, was directed to the admin dashboard, and the expected notification appeared.
4	Admin enters matching password and confirmation password	R004	The system accepts the matching password and confirmation password.	Success	Admin successfully registered the account, and the system validated that the password and confirmation password match.
5	Admin enters mismatched password and confirmation password	R005	The system rejects the input because the password and confirmation password do not match.	Success	Admin failed to register the account, and the expected notification appeared.
6	Admin enters a password that is too short (less than 8	R006	The system rejects the input because the password is too short.	Success	Admin failed to register the account, and the expected notification

	characters)				appeared.
7	Admin fills out all data correctly but does not check the "I agree to the Terms of Service" checkbox	R007	The system rejects the input because the agreement checkbox is not checked.	Success	Admin failed to register the account, and the expected notification appeared.
8	Admin attempts to register with an email already used for another account	R008	The system rejects the registration because the email is already used for another account.	Success	Admin failed to register the account, and the expected notification appeared.
9	Admin only fills in email without providing a name or password	R009	The system rejects the input because the name and password are not filled in.	Success	Admin failed to register the account, and the expected notification appeared.

The research evaluates how effectively the Equivalence Partitioning technique identifies functional issues on the Bakkar website through Black Box Testing. The main objective is to ensure the website processes user inputs correctly by categorizing input data into valid and invalid classes and testing the system's response to various inputs. A total of 17 test scenarios were executed, with 15 passing successfully, resulting in an overall success rate of 88.24%. These findings indicate that Equivalence Partitioning is generally effective in detecting issues on the login and registration pages.

However, two specific test cases failed, indicating critical areas that require attention. In Test L003, where the admin entered an incorrect email and a valid password, the system responded with a “419 | Page Expired” error instead of providing a clear message about the invalid email, as shown in Table 2. This suggests a potential flaw in how session expiration or incorrect routing is handled during invalid login attempts. In Test L004, where the email field was left empty while the password was filled, the result was unexpectedly marked as “Success” even though it should have produced a more informative error about the missing email, as also shown in Table 2. This inconsistency reflects a possible mismatch between front-end validation and the expected server response.

One possible reason for these failures could be inadequate validation on the server side, leading to improper handling of edge cases such as invalid email formats or incomplete inputs. This suggests a need for a more robust validation process at both the client and server levels. To improve future testing, incorporating techniques such as Boundary Value Analysis (BVA) could help identify edge cases that Equivalence Partitioning might miss. Additionally, testing with more extreme or unusual inputs could further reveal vulnerabilities that aren’t captured with standard inputs.

The main takeaway from this study is that Equivalence Partitioning can be a really efficient way to test how a website works. It helps reduce the number of test cases needed while still covering a wide range of input scenarios. These results back up previous studies that show how this technique can find errors while keeping testing more manageable [13]. But, there are still areas that need work, like providing clearer error messages.

For the Bakkar website managers, these findings are important. They highlight how crucial it is to properly validate user input to improve the overall quality and reliability of the system. By fixing areas where the system doesn’t handle invalid input properly, user experience will be better, and users will have more trust in the platform. Managers should also pay closer attention to how sensitive user data is handled, especially during registration and login, to avoid potential issues that could negatively affect users.

This study provides useful insights into the effectiveness of Equivalence Partitioning in functional web testing, but several limitations should be considered. First, the testing was limited to two features, namely login and registration, while other key functionalities of the Bakkar website—such as order management or third-party integrations like WhatsApp—were not included. As a result, the findings represent only a partial evaluation of the website's overall performance.

In addition, the study focused exclusively on input validation and did not assess other critical aspects such as system performance, usability, or data security. These factors are essential for

understanding how the website would perform in real-world environments, particularly under high traffic or potential cybersecurity threats.

Moreover, although Equivalence Partitioning efficiently reduces the number of test cases, it may overlook rare or extreme edge cases. Some functional issues could still occur under untested conditions, highlighting the importance of supplementing this technique with additional methods in future research.

4. CONCLUSION

This study contributes to the field of software testing by demonstrating how the Black Box Testing method, specifically using the Equivalence Partitioning technique, can be effectively applied to evaluate the core functionalities of a real-world web application. By organizing user input into valid and invalid partitions, the study identified several critical issues in the login and registration features of the Bakkar website. With 17 test cases and a success rate of 88.24%, the method proved efficient in detecting functional defects while minimizing the number of test scenarios required.

For developers and system maintainers, these findings emphasize the importance of implementing stronger input validation mechanisms and providing clearer error messages. Enhancing server-side validation logic and delivering user-friendly feedback, particularly for incorrect email formats or weak passwords, can significantly improve both usability and user trust. The adoption of Equivalence Partitioning in standard quality assurance workflows also offers time efficiency without compromising the thoroughness of testing.

Future work can explore the use of complementary techniques such as Boundary Value Analysis or Decision Table Testing to identify edge cases not captured through Equivalence Partitioning. Expanding the testing scope to include other website features, such as order processing and integration with third-party platforms, would provide a more comprehensive assessment. Additionally, incorporating automated testing tools could further enhance the scalability and consistency of the testing process in more complex systems.

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