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Application of Black Box Testing Using the Equivalence Partitioning Technique for Functional Testing of the QR Code Scanning Module in the Teacher Attendance System

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ABSTRACT – *Software testing is an important stage in information system development because it is used to verify whether system functions operate according to specified requirements. This study aims to apply Black Box Testing using the Equivalence Partitioning technique to evaluate the functionality of the QR Code scanning module in a web-based teacher attendance system at SMP Negeri 4 Talang Ubi. Black Box Testing evaluates system behavior based on inputs and outputs without examining the internal program structure, while Equivalence Partitioning groups input conditions into representative valid and invalid classes. Testing covered ten functional scenarios, including valid and unregistered QR Codes, damaged or unreadable QR Codes, inactive cameras, blank QR input, duplicate scanning, QR Codes belonging to other teachers, loss of internet connection, repeated scanning, and scanning during working hours. The results show that all ten tested scenarios produced outputs consistent with the specified system requirements, with 10 successful tests and 0 failed tests, resulting in a 100% functional test success rate. These findings indicate that Black Box Testing with Equivalence Partitioning can be used to identify and verify the functional behavior of the QR Code scanning module before the system is implemented in the school environment.*

Keywords *- Black Box Testing, Equivalence Partitioning, Functional Testing, QR Code Teacher Attendance System.*

Penerapan Black Box Testing Teknik Equivalence Partitioning Untuk Pengujian Fungsionalitas Modul Scan Qr Code Pada Sistem Presensi Guru

ABSTRAK – *Pengujian perangkat lunak merupakan tahap penting dalam pengembangan sistem informasi karena digunakan untuk memverifikasi apakah fungsi-fungsi sistem beroperasi sesuai dengan kebutuhan yang telah ditetapkan. Penelitian ini bertujuan untuk menerapkan Black Box Testing dengan teknik Equivalence Partitioning guna mengevaluasi fungsionalitas modul pemindaian kode QR pada sistem absensi guru berbasis web di SMP Negeri 4 Talang Ubi. Black Box Testing mengevaluasi perilaku sistem berdasarkan input dan output tanpa memeriksa struktur internal program, sedangkan Equivalence Partitioning mengelompokkan kondisi input ke dalam kelas-kelas representatif yang valid dan tidak valid. Pengujian mencakup sepuluh skenario fungsional, meliputi kode QR yang valid dan tidak terdaftar, kode QR yang rusak atau tidak terbaca, kamera tidak aktif, input QR kosong, pemindaian ganda, kode QR milik guru lain, hilangnya koneksi internet, pemindaian berulang, serta pemindaian di luar jam kerja. Hasil penelitian menunjukkan bahwa kesepuluh skenario yang diuji menghasilkan output yang sesuai dengan kebutuhan sistem yang telah ditetapkan, dengan 10 pengujian berhasil dan 0 pengujian gagal, sehingga menghasilkan tingkat keberhasilan pengujian fungsional sebesar 100%. Temuan ini mengindikasikan bahwa Black Box Testing, dengan Equivalence Partitioning dapat digunakan untuk mengidentifikasi dan memverifikasi perilaku fungsional modul pemindaian kode QR sebelum sistem diimplementasikan di lingkungan sekolah.*

Kata Kunci – *Black Box Testing, Equivalence Partitioning, Pengujian Fungsional, QR Code Sistem Presensi Guru.*

1. INTRODUCTION

Digital transformation in education is driving schools to implement information systems to support administrative activities, such as the teacher attendance process. Quick Response (QR) Code-

based attendance systems have become a widely adopted alternative because they accelerate attendance recording, improve data accuracy, and reduce reliance on conventional methods like paper-based attendance logs. Furthermore, the use of QR Codes enables automated attendance tracking, allowing attendance data to be stored in real-time and integrated with the school's database [1].

However, the successful implementation of a QR Code-based attendance system depends heavily on the functional quality of the QR Code scanning module. This module is a key component responsible for reading, validating, and processing scanned data before it is stored in the system. Errors in this module can result in valid QR Codes failing to process, invalid QR Codes being accepted by the system, or a failure to record attendance data. Such issues could potentially compromise the accuracy of teacher attendance data and undermine user trust in the system. Therefore, a software testing process is required to ensure that every function within the QR Code scanning module operates in accordance with the system's functional requirements.

One widely used testing method is Black Box Testing, which focuses on examining software functionality based on inputs and outputs without regard to the program code structure [2]. In black-box testing, the Equivalence Partitioning technique is highly effective because it categorizes input data into valid and invalid classes, thereby reducing the number of test cases without compromising test coverage. This technique assists testers in formulating test scenarios that are more systematic, efficient, and representative of the various conditions that may occur within the system [3], [12], [15].

Several previous studies have demonstrated that Black Box Testing using the Equivalence Partitioning technique is capable of identifying functional errors across various types of information systems. Research by Maulana and Voutama applied the Equivalence Partitioning technique to a public service website and showed that the technique effectively detects input errors [4]. Another study conducted by Triady et al. demonstrated that the application of Black Box Testing using the Equivalence Partitioning technique successfully identified functional errors on a job vacancy website, thereby enabling improvements in software quality [5] . Furthermore, research on web-based attendance systems also demonstrates that the Equivalence Partitioning technique is effective for testing input validity during the attendance process [6]. Recent research on QR Code-based attendance systems also underscores the importance of functional testing prior to implementation to ensure that all features operate according to user requirements [7], [11], [13], [14], [17], [19].

A review of prior research indicates that most studies have focused on general system testing such as login pages, input forms, data management, or the attendance system as a whole rather than specifically testing the QR Code scanning module, which serves as a core component of teacher attendance systems. This module involves complex input scenarios, including valid, invalid, damaged, and expired QR Codes, as well as instances where the camera fails to read the code. Consequently, a research gap exists regarding the lack of studies specifically applying the Equivalence Partitioning technique to evaluate the functionality of the QR Code scanning module within teacher attendance systems.

Addressing this gap, this study proposes an updated approach by applying the Black Box Testing method specifically the Equivalence Partitioning technique to test the functionality of the QR Code scanning module within a teacher attendance system. Testing is conducted by establishing equivalence classes based on input data characteristics, enabling the systematic testing of all valid and invalid conditions. This approach is expected to yield a more effective and efficient testing process with adequate coverage, compared to testing based solely on random scenarios.

Based on the foregoing, the objective of this study is to apply the Black-Box Testing method specifically the Equivalence Partitioning technique to test the functionality of the QR Code scanning module within a teacher attendance system. The findings are expected to provide insight into how well the QR Code scanning module's functionality aligns with system requirements and to serve as a reference for enhancing software quality prior to full implementation in the school environment.

2. METHOD

The research is descriptive because it presents the conditions and results observed during functional testing without examining the internal source code. The test results are documented systematically and interpreted based on the predefined functional requirements. This approach is appropriate for describing whether each tested input produces the expected system response.

The system was developed using the prototyping method. The development process began by identifying problems in the existing teacher attendance process, particularly manual attendance recording and data recapitulation. A prototype was

then developed and evaluated to ensure that the proposed functions, including QR Code scanning and attendance recording, met user needs.

After the system prototype was developed, Black Box Testing using the Equivalence Partitioning technique was applied to evaluate the functionality of the QR Code scanning module. The testing focused on system inputs and outputs without examining the internal program code structure. Test results were compared with the expected outputs defined for each scenario.

This study employs the Black Box Testing method, utilizing the Equivalence Partitioning technique, to evaluate the functionality of the QR Code scanning module within a web-based teacher attendance system. The Black Box Testing method was selected because the testing focuses on system functionality based on inputs and outputs, without regard to the program code structure.

A. Research Stages

The research process consists of the following steps:

1. Functional System Identification
   The first stage involves identifying the functional requirements for the Scan QR Code module. This identification is based on user needs and the specifications of the system that has been developed.
2. Determination of Test Classes (Equivalence Classes)
   All input data received by the Scan QR Code module is categorized into valid and invalid data classes. Each class is represented by one or more test data items, thereby making the testing process more efficient.
3. Preparation of Test Scenarios
   Based on the determined equivalence classes, several test scenarios were created to ensure that all key system functions operate according to specifications.
4. Conducting the Test
   Testing was conducted by scanning various types of QR codes using the device's camera. The system then matched the QR code data with the teacher data stored in the database.
5. Analysis of Test Results
   The test results are compared with the expected output. If the actual results match the system specifications then the test is declared Pass, whereas if it does not match it is declared Fail.

B. Research Object

The object of this study is the QR Code scanning module within the Teacher Attendance System used to record teacher attendance at SMP Negeri 4 Talang Ubi. The module's primary functions are to read QR codes, validate data, and store attendance information in the database.

C. Equivalence Partitioning Technique

The Equivalence Partitioning technique divides input data into groups sharing similar characteristics. Each group is represented by a single test case, thereby reducing the total number of tests while still effectively covering all possible conditions.

Table 1. Equivalence Partitioning Classes

No	Data Class	Condition	Expected results
1	Valid	QR Code Registered in the System	Attendance data successfully saved.
2	Invalid	QR Code Not Registered	The system displays a failure message.
3	Invalid	Damaged/Unreadable QR Code	The system prompts the user to rescan.
4	Invalid	Camera Not Detecting QR Code	The system is not processing data.
5	Invalid	Blank QR Code	The system displays a warning.
6	Valid	QR Code Corresponding to Teacher Account	Attendance successfully recorded.

D. Black Box Testing Scenarios

Testing is conducted based on the system's functional requirements, without examining the program code.

Table 2. Test Scenarios

No	Features	Inputs	Expected Outpu	Status
1	Scan Qr Code	Qr Code Valid	Attendance data successfully saved.	Pass
2	Scan Qr Code	Qr Code Invalid	"QR Code not found" message "	Pass
3	Scan Qr Code	Qr Code Damaged	Scan failed	Pass
4	Scan Qr Code	Camera Inactive	Camera error message	Pass
5	Scan Qr Code	Blank QR Code	The system is requesting a rescan.	Pass
6	Scan Qr Code	The QR code has already been used.	The system rejects it in accordance with the rules.	Pass

E. Research Flow

The research process was conducted through the following stages:

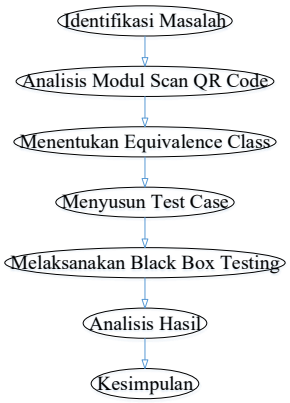

Figure 1. Research Method Diagram

F. Testing Success Criteria

The test is declared successful if:

1. All QR Code scanning functions operate as required.
2. Attendance data is successfully saved when the QR code is valid.
3. The system rejects invalid QR codes.
4. The system displays an error message appropriate to the condition.
5. No functional failures were detected during the testing process.
   1) Diagram of the Prototyping System Development Method

      The prototype method often referred to as prototyping is a system development method based on the concept of a working model. This research employs the prototype method for system development.

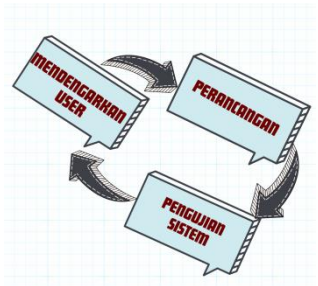

Figure 2. Prototype Model Development Method

3. RESULTS AND DISCUSSION

A. Test Results

Testing was conducted on the QR Code scanning module of the Teacher Attendance System using the Black Box Testing method with the Equivalence Partitioning technique. The objective was to ensure that each function operates according to specifications without examining the program code. Test data were categorized into valid and invalid classes, allowing each group to represent a range of possible input conditions.

Based on the test results, all key functions of the QR Code scanning module were successfully executed in accordance with system requirements. The system is capable of accepting valid QR codes, validating teacher data, automatically recording attendance times, and rejecting QR codes that do not meet the criteria. The test results indicate that the core functions meet user needs, and no functional errors disrupting the attendance process were found.

Table 3. QR Code Scanning Module Test Results

No	Test Scenario	Test Data	Expected results	Actual Results	Status
1	Scan QR Code valid	Registered QR Code	Attendance data saved	In accordance	Pass
2	Unregistered QR code scan	The QR code is not in the database.	Failed to display the message.	In accordance	Pass
3	Damaged QR code	QR Code partially unreadable	Scan failed	In accordance	Pass
4	Camera inactive	Camera disabled	Camera error message	In accordance	Pass
5	Blank QR code	No QR Code	System requests a re scan	In accordance	Pass
6	Duplicate QR code	QR Code already used	System rejects second attendance entry	In accordance	Pass
7	QR code belongs to another teacher	Data does not match user	Attendance rejected	In accordance	Pass
8	Internet connection lost	No network connection	Data not saved notification appears	In accordance	Pass
9	Repeated scanning	QR Code scanned multiple times	System saves only one record	In accordance	Pass
10	Scanning during working hours	Valid QR Code	Attendance successful	In accordance	Pass

The test results indicate that all scenarios produced outputs consistent with the system specifications.

B. Equivalence Partitioning Analysis

The Equivalence Partitioning technique is applied by dividing input data into two main groups: valid data classes and invalid data classes. This approach reduces the number of test cases without compromising test coverage [15], [16], [17].

Table 4. Test Class Analysis

Test Class	Number of Cases	Succeed	Fail
Valid	4	4	0
Invalid	6	6	0
Total	**10**	**10**	**0**

The success percentage is calculated using the formula: Success Percentage = (Number of Successful Tests / Total Number of Tests) × 100%

So we get: (10/10) x 100% = 100%

The results indicate that all tested functions operate according to specifications.

C. Discussion

Research results indicate that implementing Black Box Testing using the Equivalence Partitioning technique enables a more efficient testing process compared to testing all possible input data. By grouping data into equivalence classes, the number of test cases is reduced while still effectively representing all potential conditions within the Scan QR Code module [11], [12], [17].

In the valid QR code scenario, the system successfully identifies the teacher, records the attendance time, and saves the data to the database without errors. Conversely, for invalid or damaged QR codes, the system displays an appropriate error message, thereby preventing the recording of incorrect data.

Furthermore, testing under conditions of a lost internet connection demonstrated that the system is capable of notifying users when data saving cannot be performed. This is crucial for maintaining the integrity of attendance data and preventing the loss of information regarding teacher attendance.

Based on all test results, no functional errors were found in the Scan QR Code module. Consequently, the module meets user requirements and is suitable for use in the teacher attendance process within the school environment.

Table 5. Summary of Test Results

Information	Mark
Jumlah Skenario Uji	10
Successful Tests	10
Failed Tests	0
Success Rate	100%

These results demonstrate that the Black-Box Testing method, utilizing the Equivalence Partitioning technique, is effective for validating the core functions of the QR Code Scanning module. In addition to enhancing testing efficiency, this method helps ensure that the system meets functional requirements prior to its implementation in the operational environment [18], [20].

4. CONCLUSION

This study aims to evaluate the functionality of the QR Code scanning module within a teacher attendance system using the Black Box Testing method and the Equivalence Partitioning technique. This technique involves categorizing input data into valid and invalid classes, thereby rendering the testing process more systematic and efficient. Based on the results of ten test scenarios, all functions within the QR Code scanning module operated in accordance with established specifications. The system successfully processed valid QR codes, rejected invalid or corrupted ones, and provided appropriate notifications for each test condition. All test scenarios achieved a "Pass" status, resulting in a 100% success rate. The findings indicate that Black Box Testing combined with Equivalence Partitioning is an effective method for validating the functionality of the QR Code scanning module. In addition to reducing the number of required test cases, this technique ensures adequate test coverage, thereby enhancing software quality prior to deployment in an operational environment. Future research could expand upon this testing by employing other techniques such as Boundary Value Analysis, Decision Table Testing, or White Box Testing to allow for a more comprehensive evaluation of the software's quality.

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BIBLIOGRAPHY

[1] D. Triady, I. A. Musdar, and H. Surasa, "Blackbox Testing on Worker's Website Using Equivalence Partitioning Method," KHARISMATech, vol. 18, no. 1, pp. 84–98, 2023.

[2] A. Saifudin et al., "Black Box Testing on a Website-Based Employee Attendance System Application Using the Equivalence Partitioning Method," Jurnal Informatika Universitas Pamulang, vol. 7, no. 2, 2022.

[3] I. Ramdhani, R. T. Sinaga, S. Ramadan, W. Diansyah, and A. Saifudin, "Black Box Testing

on a Web-Based Employee Attendance Application Using the Equivalence Partitioning Technique," OKTAL: Jurnal Ilmu Komputer dan Sains, vol. 2, no. 6, 2023.

[4] A. Sofyan, A. Nurdin, and D. Santoso, "Black Box Testing of an Employee Attendance Application Using the Equivalence Partitioning Technique," LOGIC: Journal of Computer Science and Education, vol. 2, no. 1, 2023.

[5] B. Hardika et al., "Blackbox Testing of the Garuda Farm Website Using the Equivalence Partitioning Technique," Jurnal Kridatama Sains dan Teknologi, vol. 6, no. 2, 2024.

[6] M. R. Efda and I. Nuryasin, "Testing the Scantion Application Using the Black-Box Method with the Equivalence Partitioning Technique," Journal of Information System Technology and Applications, vol. 7, no. 2, 2024.

[7] F. I. Pratama, E. M. N. Subroto, R. M. Haira, and M. A. Yaqin, "Black Box Testing on an OpenCart E-Commerce Application Using Equivalence Partitioning and Boundary Value Analysis Methods," Jurnal Ilmiah Informatika, vol. 8, no. 1, 2023.

[8] B. A. Priyaungga et al., "Black Box Testing on a Library Application Using the Equivalence Partitioning Technique," Journal of Information System Technology and Applications, vol. 3, no. 3, 2020.

[9] D. Widhyaestoeti et al., "Black Box Testing Equivalence Partitions for Front-End Testing on Academic Systems," Jurnal Ilmiah Teknologi Informasi Terapan, vol. 7, no. 3, 2021.

[10] J. Shadiq, A. Safei, and R. W. R. Loly, "Testing an Office Operational Vehicle Booking Application Using Black Box Testing," Information Management for Educators and Professionals, vol. 5, no. 2, 2021.

[11] D. N. Azizah, I. A. Mahendar, M. F. Alfatih, S. I. Anwar, N. M. Al Hapid, A. Wicaksono, and G. P. Mindara, "Analysis and Testing of the Combox Web Application System Using Black Box Testing with the Equivalence Partitioning Method," International Journal of Electrical Engineering, Mathematics and Computer Science, vol. 1, no. 4, pp. 37–43, 2024, doi: 10.62951/ijeemcs.v1i4.118.

[12] M. Ansfridus, B. Y. Dwiandiyanta, and A. W. R. Emanuel, "Black Box Testing dengan Metode Equivalence Partitioning pada Techno Expertise Academy (TEA) Astra Credit Companies," KONSTELASI: Konvergensi Teknologi dan Sistem Informasi, vol. 4, no. 2, 2024, doi: 10.24002/konstelasi.v4i2.8996.

[13] S. Sahyudi and A. Voutama, "Pengujian Fungsional Black Box SISKA UNSIKA dengan Equivalence Partitioning untuk Validasi Input dan Output Sistem," J-SISKO TECH, vol. 8, no. 2, 2025, doi: 10.53513/jsk.v8i2.11466.

[14] M. A. Ridwan et al., "Pengujian Black Box Pada Website Bjs Property Menggunkan Teknik Equivalence Partitioning," JOISIE, vol. 8, no. 1, pp. 65–74, 2024.

[15] M. N. Huda, M. Burhan, A. Satibi, H. A. Pradita, A. Saifudin, and I. Kusyadi, "Implementasi Black Box Testing pada Aplikasi Sistem Kasir dengan Menggunakan Teknik Equivalence Partitions," Jurnal Teknologi Sistem Informasi dan Aplikasi, vol. 5, no. 2, p. 120, 2022, doi: 10.32493/jtsi.v5i2.17645.

[16] E. Novalia and A. Voutama, "Black Box Testing dengan Teknik Equivalence Partitions Pada Aplikasi Android M-Magazine Mading Sekolah," Syntax: Jurnal Informatika, vol. 11, no. 1, pp. 23–35, 2022, doi: 10.35706/syji.v11i01.6413.

[17] H. Raihan and A. Voutama, "Pengujian Black Box Pada Aplikasi Database Perguruan Tinggi dengan Teknik Equivalence Partition," Antivirus: Jurnal Ilmiah Teknik Informatika, vol. 17, no. 1, pp. 1–18, 2023, doi: 10.35457/antivirus.v17i1.2501.

[18] P. H. Wibowo, R. W. Dike, A. Hidayat, and A. Saifudin, "Pengujian sistem informasi lembaga donasi berbasis web menggunakan metode black box testing dan teknik equivalence partitions," OKTAL: Jurnal Ilmu Komputer dan Sains, vol. 2, no. 6, pp. 1760–1763, 2023.

[19] S. D. Pratama, L. Lasimin, and M. N. Dadaprawira, "Pengujian Black Box Testing pada Aplikasi Edu Digital Berbasis Website Menggunakan Metode Equivalence dan Boundary Value," J-SISKO TECH, vol. 6, no. 2, pp. 560–569, 2023, doi: 10.53513/jsk.v6i2.8166.

[20] Adelia, Aisya, D. F. Hadafi, H. I. Abdulmalik, M. Nasir, and S. Indriasari, "Implementation of Equivalence Partitioning and Boundary Value Analysis in Black Box Testing: A Case Study on the Admin Website of PAUD KB Al Husna," Jurnal Teknologi dan Open Source, vol. 8, no. 2, 2025, doi: 10.36378/jtos.v8i2.5028.