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USE OF BLACK-BOX METHOD IN TESTING TRACER INFORMATION SYSTEMS WEB-BASED STUDY

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ABSTRACT

Tracer study is an important tool for educational institutions in tracking the success of graduates after entering the world of work, This research aims to test the Tracer study information system at the Ganesha piksi polytechnic using the Black-box Testing method, Testing techniques in black-box testing there are several ways including Equivalent partitions testing, sample testing, robustness testing and others. Here it is chosen using the Equivalence Partitions Technique which is only to test if there is an error in the function, initialization.

KEYWORD
Tracer Study,
Black-Box Testing,
Equivalent Partision

1. Introduction

Tracer Study is an important process carried out by educational institutions to collect data about their graduates after entering the world of work [1], [2], [3]. This data is not only to help evaluate the effectiveness of the Education programs offered, but also to provide insight into the redesign of existing curricula to industry needs.

This testing is a crucial step to ensure that all functionality runs according to the specification and user needs. This black-box test was chosen because it allows functionality testing to require more knowledge of the source code [4]. The technique used in this study is Equivalence Partition which aims to validate each function in the system as expected and whether there are errors that may occur in the operation of the function [5].

2. Literatur Review

Rizaldi Akbar et.al (2019). Tracer Study is one method used by several universities, especially in Indonesia to get feedback from alumni. The feedback obtained from these alumni is needed by the university in their efforts to improve and develop the quality and education system. The aim of this study was to develop an e-tracer study that made it easier for AMIK Indonesia's campuses to monitor their graduates and develop intelligent system-based e-tracer studies. Broadly speaking, this study uses data collection methods through literature studies, interviews and observations. While research design uses experiments because it produces products that are decision support systems. The method used to support this research is the FMADM method using the SAW method calculation and the design method used is

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the waterfall method, which is a systematic and partial software development approach that starts at the level and progress of the system in all analyzes, designs, codes, tests, and maintenance. From the results of the study, it can be concluded that the tracker study was built with the Codeigniter and NODE framework. JS uses supporting programming languages such as HTML, CSS, Jquery, JavaScript, JSON, AJAX, Bootstrap as media in interface design. Whereas PHP as server-side and MySQL as database. while the method used for testing the application is White Box Testing and the Black Box method [6].

I Putu Agus Eka Pratama (2022). In the case of handling the Covid-19 pandemic in Indonesia, there is a 3T (Testing, Tracing, Treatment) movement promoted by the government to reduce the impact of the spread and transmission of Covid-19. For tracing, there are currently no Information Technologybased applications or services that can assist the public in simulating the tracing of the spread of Covid-19 from one location to another location and providing disaster mitigation education to users through suggestions provided by the application after the tracking process. For this reason, this study was designed and implemented using a webbased Artificial Intelligence (Breadth-First Search) algorithm called Indonesia BFS Covid-19 (IBC). This research uses Design Science Research Methodology (DSRM) and tested using BlackBox Testing. From the testing results, it is concluded that the application can simulate the process of tracing the spread of Covid-19 in Indonesia well based on the starting point and destination, and users can gain an understanding of disaster mitigation education from the advice given by the post-tracing application, as part of 3T, to help decide the impact of the spread of Covid-19 in Indonesia [7].

Dian Nurdiana et.al (2021). The implementation of credit transfer at Universitas Terbuka refers to the Rector's Regulation Number 119, 2018. This credit transfer could only be carried out once when students registered themselves at very first time. Recognition of credit transfer is accepted whn accomplishment of courses have been obtained from their previous universities. Through the provision of credit transfer recognition services, students are expected to be able to finish their study faster. Students can apply for credit transfer through the Faculty which would then be proceed by Study Program. Students are required to collect documents such as diplomas, transcripts, descriptions of courses at their previous university, and the submissions for courses intended to be transferred for credit. The documents which are in form of print out would later be processed in their respective Study Programs. During the process, the Study Program compiled the documents manually by recording and determining the courses approved for credit transfer. However, the study Program hasn't used a special application. Due to this limitation, several problems occurred in the process, such as the absence of filing the credit transfer application documents, the ineffectiveness of storing the credit transfer master block in the Study Program, and the large number of credit transfer applications. These problems often result in delays in the credit transfer process, thus disrupting academic services for students. Therefore, it is necessary to develop a credit transfer application that can assist in the implementation of credit transfer in the Faculty of Science and Technology. The methodology used to develop this credit transfer application is the waterfall model. For design modeling using UML (Unified Modeling Language), while software testing uses Black Box Testing and usability and acceptance tests applied the PSSUQ (Post-Study System Usability Questionnaire) method. From the results of the tests, it showed that Black Box Testing got test results of 100%, while the usability and acceptance tests using the PSSUQ method got 68% of respondents. The conclusion of this study showed that the application is ready to use and the users Agree/Good/Like on the development of a web-based credit transfer application at the Faculty of Science and Technology of the Universitas Terbuka (case study of Information Systems Study Program) [8].

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3. Methodology

The testing of the Tracer Study information system was carried out using the black-box method, using the Equivalence Partition Technique. This method was chosen because it allows for efficient testing by focusing on embedding into several partitions or classes that are considered equivalent [9]. Each of these partitions represents a group of input conditions that are assumed to produce the expected output.

The Equivslence partitioning technique is a technique that divides the input data from the soft unit into several data partitions from which the test case is derived [10]. In principle, case testing is designed to cover each partition at least once. This technique attempts to define test cases that reveal error classes, thereby reducing the number of test cases that must be developed.

This goal uses techniques to find faults

a) incorrect or missing functions

b) error in the interface

c) errors in data structures or database access

d) performance errors

e) initialization errors and the end goal

4. Result and Discussion

4.1 Result

1) Study Tracer Information System Testing

Testing the Tracer Study information system was carried out using the black-box method using the Equivalence Partition Technique. In this test, validation was carried out on several main functions of the system, such as the alumni data input function, questionnaire data input. Each function is tested based on equivalent partitions, where different inputs are grouped into categories that are considered equivalent in the expected result.

2) Database Design

The tracer information system of this study is designed using a database management system called MySQL. MySQL is a type of relational database that allows data to be more efficient.

3) Teacher Study Home Page

The Tracer Study homepage of Piksi Ganesha Polytechnic is designed to welcome users with a message that emphasizes the importance of career trace tracking and graduate education. On this page, visitors are given an introduction to the main purpose of the tracer study, which is to collect information about the career development of alumni after graduation, in order to improve the quality and relevance of the education provided.

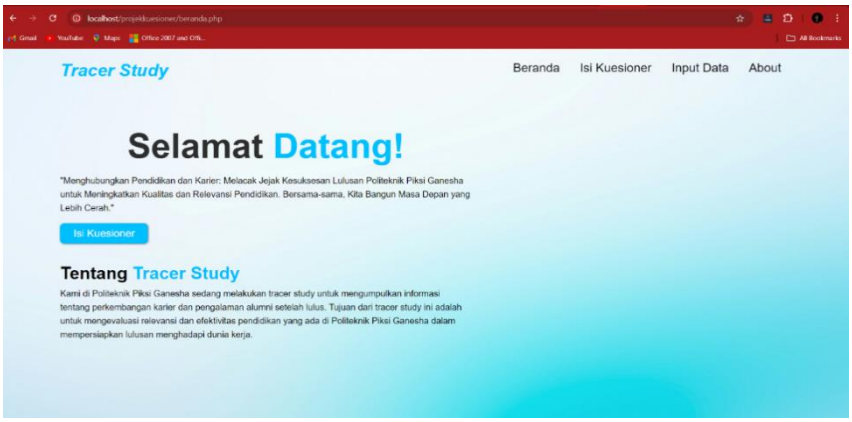

Fig. 1. Home Page

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4) Questionnaire content page (name validation)

This page is part of the Tracer Study system of Piksi Ganesha Polytechnic which is designed to validate the names of alumni before they can fill out the questionnaire. On this page, users are required to enter their name into the fields provided, then press the "Name Validation" button to ensure that their name is registered in the alumni database.

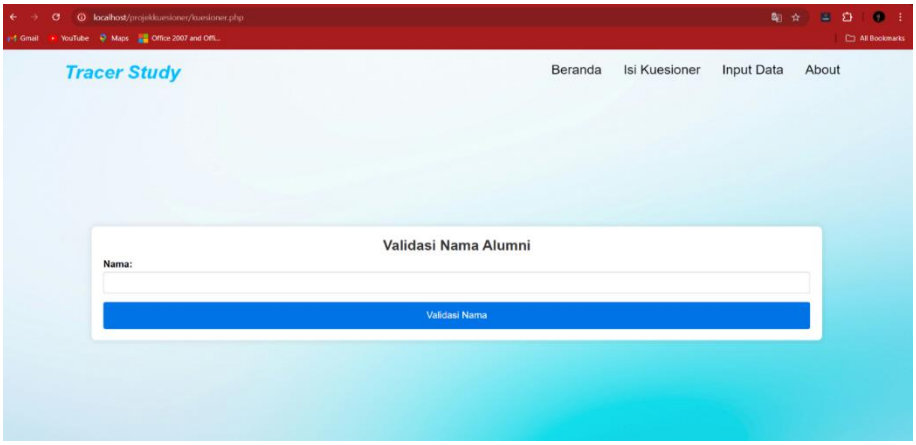

Fig. 2. Questionnaire content page (name validation)

5) Questionnaire content page

This questionnaire page is part of the Tracer Study of Piksi Ganesha Polytechnic to collect data from alumni. This page consists of several important sections that allow alumni to fill in personal information as well as provide their assessment of their experience during the study period. The first part of the questionnaire focuses on collecting personal information such as name, year of graduation, program of study, email address, and phone number. This data is used to identify respondents and associate them with institutional data.

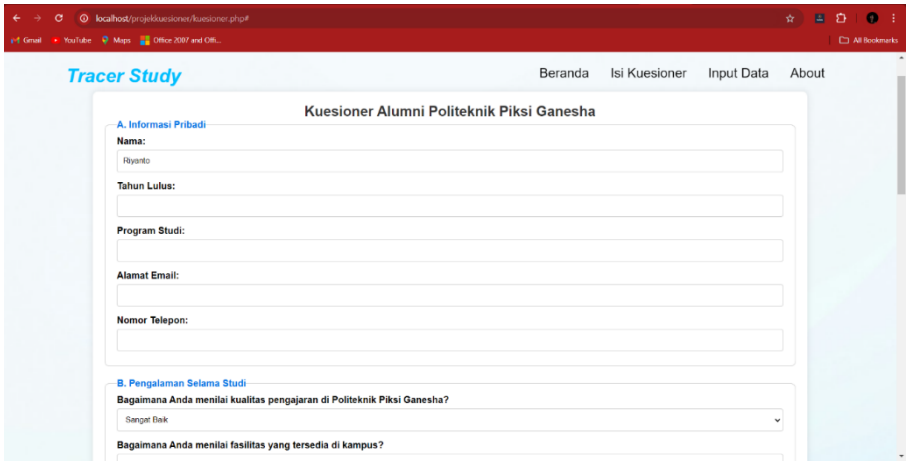

Fig. 3. Questionnaire content page

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Fig. 4. Questionnaire content advanced page

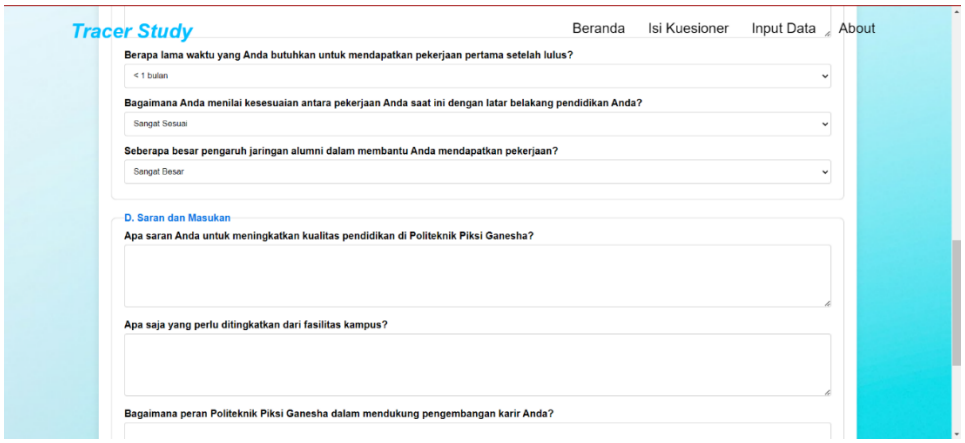

Fig. 5. Questionnaire content advanced page

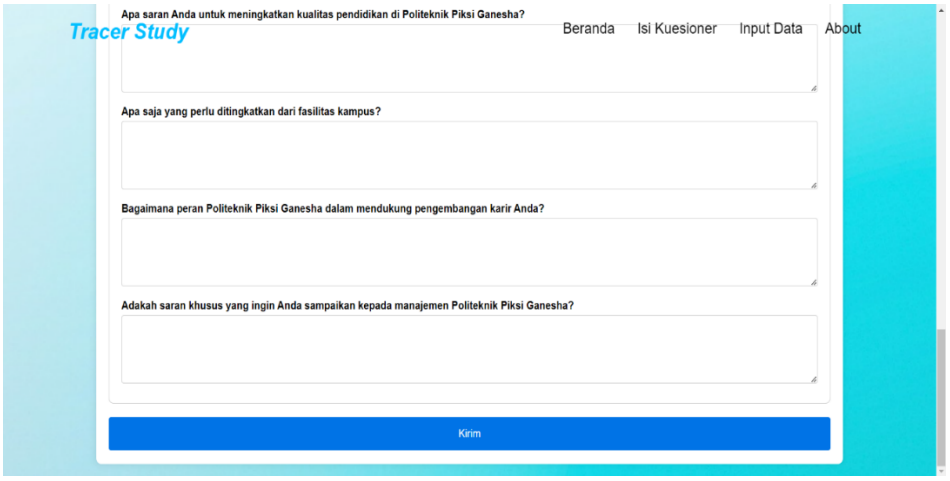

Fig. 6. Questionnaire content advanced page

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6) Data Input Page

This data input page is part of the Tracer Study of Piksi Ganesha Polytechnic to collect data from paraalumni. This page consists of several important sections that allow alumni to fill in their personal information. In this form, alumni are required to fill in several main data such as Full Name, Study Program, and Year of Graduation. The data collected through this form will be used to identify alumni and connect them with the institution's database. This questionnaire is part of the Tracer Study efforts of the Piksi Ganesha Polytechnic to collect data from alumni. This page consists of several important sections that allow alumni to fill in personal information as well as provide their assessment of their experience during the study period. The first part of the questionnaire focuses on collecting personal information such as name, year of graduation, program of study, email address, and phone number. This data is used to identify respondents and associate them with institutional data.

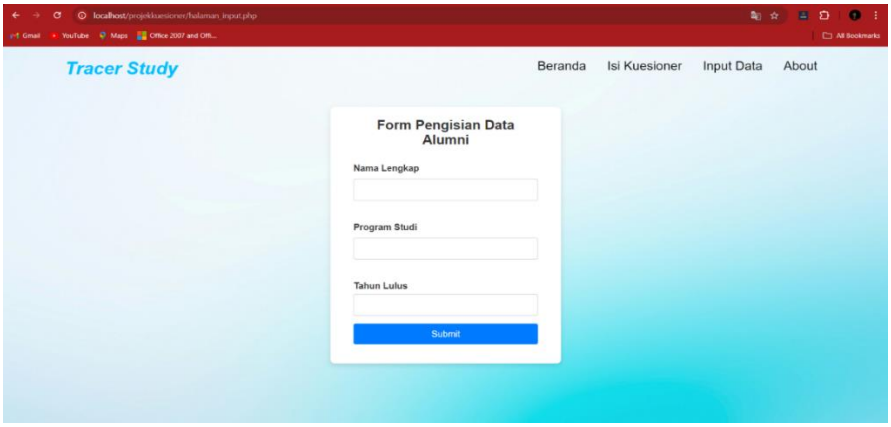
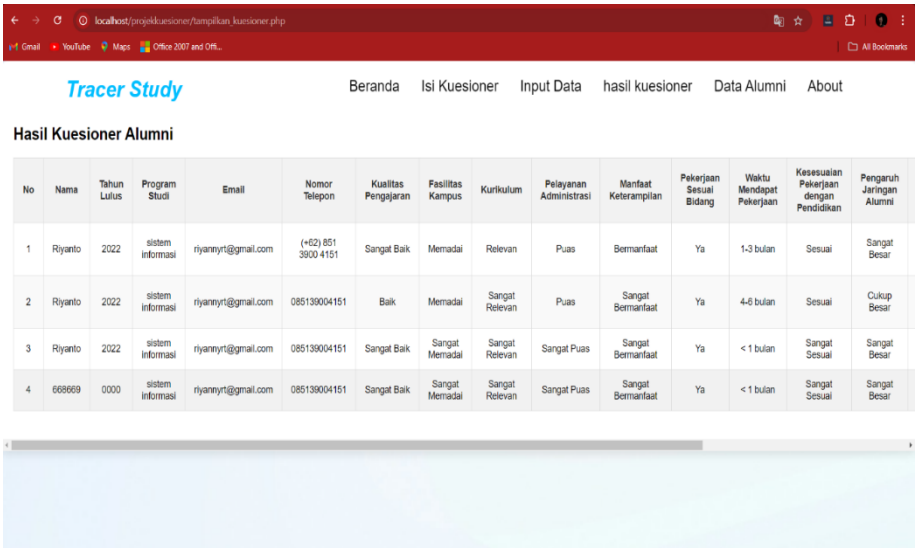


Fig. 7. Alumni data input page

7) Questionnaire Result Page

The results page of this tracer study displays alumni questionnaire data in the form of a table that includes information such as name, year of graduation, study program, as well as evaluation of the quality of teaching, campus facilities, curriculum, and administrative services. In addition, there is data on the relevance of alumni jobs to their field of study and the time it takes to get a job after graduation.



No	Nama	Tahun Lulus	Program Studi	Email	Nomor Telepon	Kualitas Pengajaran	Fasilitas Kampus	Kurikulum	Pelayanan Administrasi	Manfaat Keterampilan	Pekerjaan Sesuai Bidang	Waktu Mendapat Pekerjaan	Kesesuaian Pekerjaan dengan Pendidikan	Pengaruh Jaringan Alumni
1	Riyanto	2022	sistem informasi	riyannyrt@gmail.com	(+62) 851 3900 4151	Sangat Baik	Memadai	Relevan	Puas	Bermanfaat	Ya	1-3 bulan	Sesuai	Sangat Besar
2	Riyanto	2022	sistem informasi	riyannyrt@gmail.com	085139004151	Baik	Memadai	Sangat Relevan	Puas	Sangat Bermanfaat	Ya	4-6 bulan	Sesuai	Cukup Besar
3	Riyanto	2022	sistem informasi	riyannyrt@gmail.com	085139004151	Sangat Baik	Sangat Memadai	Sangat Relevan	Sangat Puas	Sangat Bermanfaat	Ya	< 1 bulan	Sangat Sesuai	Sangat Besar
4	668669	0000	sistem informasi	riyannyrt@gmail.com	085139004151	Sangat Baik	Sangat Memadai	Sangat Relevan	Sangat Puas	Sangat Bermanfaat	Ya	< 1 bulan	Sangat Sesuai	Sangat Besar

Fig. 8. Questionnaire Result Page

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8) Alumni data page

This page displays alumni data in the form of a simple table that contains information related to name, program of study, year of graduation, and the option to edit or delete the data. This feature allows for efficient management of alumni data, so that information can be updated or deleted as needed. This page serves as an important tool in the administration and tracking of alumni data in educational institutions, supporting efforts to maintain an organized alumni database.

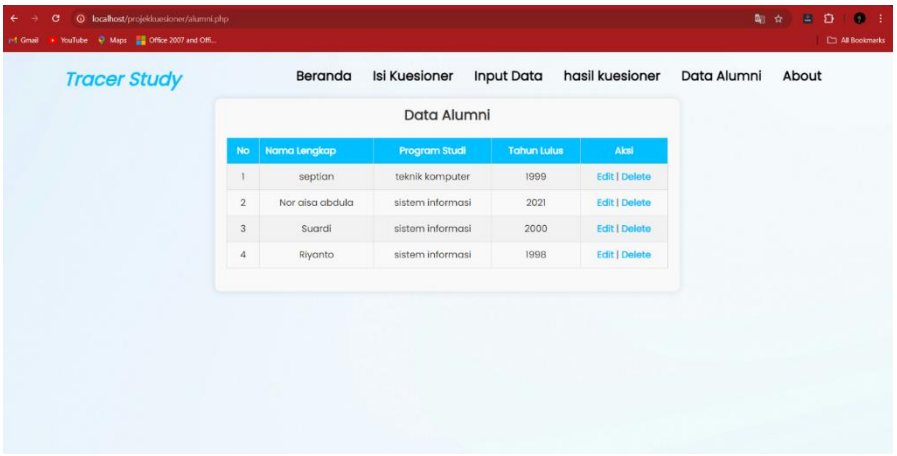

Fig. 9. Alumni data page

9) Data Update Page

This page is designed to update alumni information in a web-based system. Users can edit the data which includes full name, course of study, and year of graduation. Each data is displayed in an input form that can be edited by the user. Once the changes have been made, the "Update" button is used to save the update to the database. This page provides a simple and intuitive user experience, with a focus on data editing functionality.

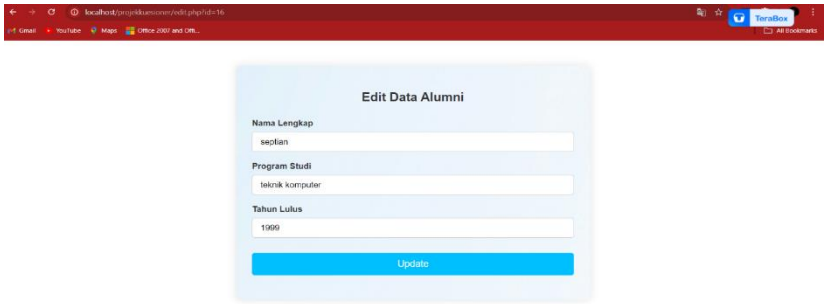

Fig. 10. Edit alumni data page

10) System Testeing

The method used to test the system in this study is the balck bok testing method. This method is used to test the functionality of the system in the form of a narrative, here are the tests of each part of the system using black box testing.

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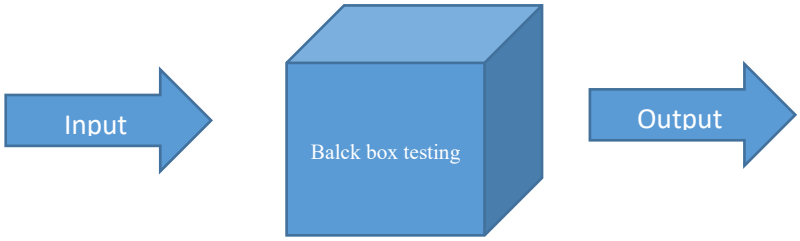

Fig. 11. Working diangram of the blackbox testing method

11) Acreditation Page content Quistionnaire Name Validation Form

The following is a test table of the questionnaire content page for the name validation form using the black box testing method.

Table 1. Testing the questionnaire body page for the name validation form

NO	TESTING ACTIVITIES	EXPECTED RESULTS	TEST RESULT	PASS/ FAIL
1	User accesses the tracer study page by clicking on the botton of the questionnaire content	Displays a questionnaire content page whose content is a name validation form	Displays a questionnaire content page whose content is a name validation form	PASS
2	User fill in the form with the name "Riyanto" and then click on name validation	Appears the questionnaire content page whose content is a questionnaire form	Appears the questionnaire content page whose content is a questionnaire form	PASS
3	User fills in the form named "rosi234" then clicks name validation	A message appears that the name is not registered, please contact the dictionary	A message appears that the name is not registered, please contact the dictionary	PASS

12) Questionnaire filling page accreditation for questionnaire form

The following is a test table of the questionnaire content page for the questionnaire form using the black box testing method.

Table 2. Questionnaire Filling Page Accreditation for questionnaire form

NO	TESTING ACTIVITIES	EXPECTED RESULTS	TEST RESULT	PASS/ FAIL
1	User fills out all questionnaire forms and clicks botton submit	A pop up appears containing a questionnaire message sent	A pop up appears containing a questionnaire message sent	PASS
2	The user fills out part of the form and some of it is blank	Unable to send questionnaire data and the message "Please fill out this field" appears	Unable to send questionnaire data and the message "Please fill out this field" appears	PASS
3	User fills in the form with the name "rosi234" and the year of graduation "two thousand twenty-two"	The name must be with letters and the year of graduation must use a number	No messages and forms sent	FAIL
4	The user did not fill out the form and then clicked botton to send	Unable to send questionnaire data and the message "Please fill out this field" appears	Unable to send questionnaire data and the message "Please fill out this field" appears	PASS

13) Data Input Page Testing

The following is a test table of the questionnaire content page for the questionnaire form using the black box testing method.

Table 3. Data input page testing

NO	TESTING ACTIVITIES	EXPECTED RESULTS	TEST RESULT	PASS/ FAIL
1	The user fills in all the data forms with the name "Riyanto", the "information systems" study program, the year of graduation "2022" and then click botton send	The data is sent and a pop-up appears that says "Data saved successfully	Data is sent and a pop up appears that says "Data saved successfully, click ok to continue"	PASS
2	The user fills in all the data forms named "Riyanto", and blanks the other fields then clicks botton send	The data is sent and a pop up appears containing "Data saved successfully"	Data is sent and a pop up appears that says "Data saved successfully, click ok to continue"	PASS
3	The user fills in all the data forms for the "information system" study program, and the "information system" study program, and blanks the name field then click botton submit	A pop up appears in the full name field "Please fill out this field"	A pop up appears in the full name field "Please fill out this field"	PASS
4	The user did not fill out the form and then clicked botton to send	Unable to send questionnaire data and the message "Please fill out this field" appears	Unable to send questionnaire data and the message "Please fill out this field" appears	PASS

14) Test page edit alumni data

The following is a test table of the questionnaire content page for the questionnaire form using the black box testing method.

Table 4. Test page edit alumni data

NO	*TESTING ACTIVITIES*	*EXPECTED RESULTS*	*TEST RESULT*	*PASS/ FAIL*
1	The user updated the alumni data field name "Riyanto became erwan", the study program "information systems" became "informatics management", the year of graduation does not need to be changed	A pop-up appears, the data is successfully updated and the data is successfully changed	A pop-up appears, the data is successfully updated and the data is successfully changed	PASS
2	The user updates the alumni data of the field named "Riyanto becomes erwan", and leaves the other fields blank	A pop-up appears, the data is successfully updated and the data is successfully changed	A pop-up appears, the data is successfully updated and the data is successfully changed	PASS
3	User updated alumni data field name blank, study program "information systems" changed to "informatics management", graduation year "2021" to "2000"	A pop-up appears, the data is successfully updated and the data is successfully changed	A pop-up appears, the data is successfully updated and the data is successfully changed	PASS
4	User updates alumni data field name, study program, and year of graduation is blank	A pop-up appears, the data is successfully updated and the data is successfully changed	A pop-up appears, the data is successfully updated and the data is successfully changed	PASS

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4.2 Discussion

In the context of software development, ensuring the quality of web-based systems through effective testing methodologies is essential. The tracer information system, designed to track graduates and their employment status, plays a significant role in improving educational services and institutional development. Given the importance of its functionality and reliability, the black-box testing method has been employed in this research. This discussion elaborates on the effectiveness, relevance, and limitations of black-box testing in the tracer information system, addressing its practical applications and future implications. The black-box testing method focuses on evaluating the system's external behavior without requiring knowledge of its internal code structure. This makes it particularly useful for web-based applications like tracer systems that involve multiple stakeholders—administrators, alumni, and employers—who interact through user interfaces.

The results indicated that the system performed adequately in meeting its intended functional requirements. The black-box method effectively identified missing features, navigation issues, and inconsistencies in input validation—issues that directly affect the user experience. As the system's purpose revolves around data collection and reporting, black-box testing was instrumental in ensuring both functional correctness and user accessibility. Tracer information systems demand usability, data accuracy, and seamless interaction between modules. The black-box approach aligns well with these requirements, as it mimics real-world user interactions. Given the emphasis on functionality over code logic, this method allowed the testing team to focus on identifying problems users might encounter without delving into the software's internal workings. Additionally, black-box testing is suitable for collaborative testing scenarios. Stakeholders such as alumni or administrative staff, with minimal technical background, were able to participate in the testing process. This inclusive approach enhances the testing coverage by incorporating diverse user perspectives, leading to better detection of usability issues. Despite its effectiveness, the black-box method has inherent limitations. One major challenge is the inability to detect internal code defects or performance bottlenecks. For instance, while the method revealed functional issues during form submission, it did not provide insights into back-end processes like query performance or database optimization. Future testing efforts should complement black-box testing with white-box or gray-box methods to gain a deeper understanding of internal system behavior.

The use of black-box testing in this research demonstrates the method's practical value in ensuring the usability and functionality of a web-based tracer information system. However, further improvements can be achieved by integrating automated testing tools for regression testing and expanding the scope to include performance and security testing. To ensure long-term system reliability, institutions should adopt continuous testing strategies, particularly when the system undergoes updates or integrates new features. Collaborative testing with users and stakeholders should also be maintained to reflect evolving user needs and expectations. Additionally, it is recommended that the development team employ a combination of testing techniques, including black-box, white-box, and exploratory testing, for comprehensive quality assurance.

5. Conclusion

Pengujian Sistem Informasi tracer study menggunakan Metode Black Box Testing dengan Teknik Equivalence Partition efektif digunakan untuk menguji system ini. Pengujian ini berhasil memvalidasi fungsionalitas system, termaksud input data alumni dan pengisian kuesioner, dengan memastikan bahwa setiap fungsi berjalan sesuai dengan yang diharapkan dan tidak terjadi kesalahan pada operasi. Secara keseluruhan masih banyak kekurangan yang harus diperbaiki untuk memenuhi kebutuhan untuk

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digunakan oleh institusi dalam melacak jejak karir alumni, jadi sarannya jika membuat system infomasi tracer study diharapkan bisa memenuhi semua kebutuhan yang diinginkan oleh institusi dalam melacak jejak karir alumni.

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