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Implementation of the Black Box Method for Testing Smart Hajj Application Ministry of Religion

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Abstract

This research was conducted to assist the Ministry of Religious Affairs in testing the quality and accuracy of the Haji Pintar application. The main purpose of testing is to design tests that systematically uncover types of errors that have not been detected before. The Haji Pintar application will be tested using the Black Box method thoroughly with respect to application functionality, interfaces , data structures or external database access, performance, initiation and termination errors, usage, benefits, and results obtained from the use of the application. In testing the Haji Smart application, there are 5 types of testing from the Black Box method. The value of the overall effectiveness of the Haji Pintar application is 83.75%. With this value, the Haji Pintar application has been running according to the expected functionality but there are still errors in the application that must be updated immediately regarding the cancellation information menu and the payment information menu, which experienced problems when checking the status of the cancellation process that the congregation submitted and checking the congregation portion. Hajj includes the right to pay off or not.

Keywords: Smart Hajj Application, Testing, Black Box Method

1. INTRODUCTION

Information systems are an important factor in an agency, especially community service agencies that have a high level of routine and managed data management[1]. The Hajj Smart application is an android or smartphone -based application issued by the Director General of Hajj and Umrah Organizers of the Ministry of Religion of the Republic of Indonesia. Since the release of the Haji Pintar application in 2018, this application has been downloaded by more than 100 thousand users. In this application there are several menu options, namely registration, estimated departure, departure schedule, cancellation information, payment information, flight schedules[2].

This Smart Hajj application has never been tested by external parties before, especially by students for further research. Because of this, the author is interested in researching or testing this Smart Hajj application. In addition,

software testing has an important role in the development of an information system, with this test it can be seen that there are defects or errors in the software[3]. Software that is flawed or contains errors can give unexpected results and can cause serious losses. Software testing is expected to minimize errors and defects in software and as a measurement of software quality[4] .

Umi Hanifah, et al. Conduct research on the use of the Black Box method in Testing Outgoing Mail Information Systems. The technique of this research is the incoming and outgoing mail information system which is then carried out using Black Box testing. This method focuses on data entry, system display, memory consumption and data execution speed so that if the data input is not as expected, the system will fail. The results of testing using this method are said to be very good because all weaknesses in the system can be known before being used[5].

Previous research by Siti Rika Yulistina, et al. Regarding the Application of Boundary Value Analysis Techniques for Testing Sales Applications Using the Black Box Testing Method. This method tests the maximum and minimum number of digits to produce a valid value and is quite easy to test sales applications at PT Global Advindo. The first step in this research is to identify the functionality to be processed, ensuring that the maximum and minimum number of digits match the predetermined arrangement. The result of the application of the method used is the quality of the software is in accordance with the function, and can be utilized properly by the user[6].

The purpose of this study is to assess the functional, interface , data structure and database access, performance, initialization and termination of the Haji Pintar application[7]. To find out whether the Hajj Smart application is suitable for use by users, namely prospective pilgrims. The results of this study will provide recommendations for testing the Hajj Smart application at the Ministry of Religion and will provide the best solution for the agency for the future.

2. METHODS

2.1. Black Box Method

Black box testing is a software quality test that focuses on software functionality. Black box testing aims to find incorrect functions, interface errors, data structure errors, performance errors, initialization and termination errors[8]. In black box testing , a tool for data collection is used called a user acceptance test , this document consists of a description of the indicators of the software functionality testing procedures[9].

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The test will be planned with the initial stages of determining the Test Case to be tested, then dividing it into several input and output partitions. This is done to receive test documentation. Then the results of the Test Case will be used as a documentation table of the software being tested according to its function[10]. Making a test case aims to ensure that a system can be run properly according to initial requirements and is able to provide a response when there is an invalid input. Test Case acts as a starting point in the implementation of testing a system. From this test case, it is usually known whether the system features are running normally or not[11] .The method is applied to solve problems including procedures, measuring and analytical methods. Methods should make the reader able to reproduce your experiment. Provide enough detail to allow the work to be reproduced. The published method should be indicated by reference: only relevant modifications should be explained. Do not repeat details of existing methods, just refer it from the literature.

2.2. Stages of Testing the Application of the Black Box Method

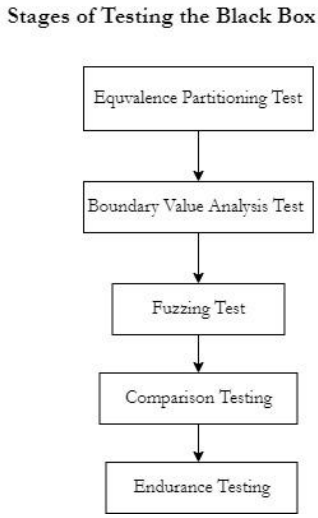

Figure 1. Stages of Testing the Black Box Method

a) Equvalence Partitioning Test, this test is carried out on forms that already exist in the Haji Pintar application by entering data according to the data type.
b) Boundary Value Analysis Test, this test is carried out on forms that already exist in the Haji Pintar application by entering data that exceeds the upper and lower limits that have been determined in the application menus.
c) Fuzzing Test, this test is carried out on an existing form in the Haji Pintar application by entering invalid input data in the application.
d) Comparison Testing, Comparison testing is testing the same data to ensure that the application gives identical output.

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e) Endurance Testing, this test is carried out on an existing form in the Haji Pintar application by conducting repeated test cases with a certain number in order to evaluate whether the program is in accordance with the requirements specifications. To test the accuracy of mathematical operations (floating point, rounding off , etc.) [4].

2.3. Determining the Value of Effectiveness

The value of effectiveness itself is the result of the percentage of the feasibility of the system[12]. The effectiveness value can provide information on how effectively the Haji Smart application is running.

$$\left(\frac{\sum Appropriate\ Conclusion}{\sum Testing\ Scenario}\right) \text{x } 100$$

Figure 2. Formula Count Score Effectiveness Each Table

Figure 2 shows the formula for calculating the effectiveness of each table. Each table consists of several test scenarios, where each test scenario has its own conclusion. How to calculate the value of the effectiveness of each table is to calculate all the appropriate conclusions in a table and divide by the total number of test scenarios in the table and multiply by 100[13].

$$\left(\frac{ef\ value\ Table\ A + ef\ value\ Table\ B + \cdots Table\ value\ n}{\sum Number\ of\ tables\ tested}\right)$$

Figure 3. Formula Count Score Overall Effectiveness

Figure 3 shows the formula for calculating the overall effectiveness value. Before calculating the overall effectiveness value, it is necessary to know the effectiveness value of each table first. How to calculate the overall effectiveness value is by adding up all the effectiveness values of each table and dividing by the total number of tables tested. The result of these calculations is the value of the effectiveness of the application.

3. RESULTS AND DISCUSSION

The Hajj Smart application is an android or smartphone -based application issued by the Director General of Hajj and Umrah Organizers of the Ministry of Religion of the Republic of Indonesia. In this application there are several menu options, namely registration, estimated departure, departure schedule, cancellation information, payment information, accommodation and flight schedules. Based on the test case table that has been made. Further testing is carried out based on the test case . The results of the Hajj Smart application testing are shown in the tables below.

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3.1. Black Box Method Test Results

a) Equvalence Partitioning Test Results
This test is carried out on forms that already exist in the Haji Pintar application by entering data according to the data type.

Tabel 1. Equvalence Partitioning Test Results

ID	Testing Scenario	Expected Results	Conclusion
TC01	Enter "Validation Number" and "NIK" in the registration menu then click "Submit".	The application is able to save data into the database and change the appearance of the application to the home menu.	Succeed
TC02	Choose embarkation on the “Select Embarkation” form and enter “No Cluster” in the Cluster Departure Schedule menu.	The application displays the results of the departure schedule for the hajj pilgrims.	Succeed
TC03	Enter "Passport Number" then click search on the Hajj Congregation Information menu.	The application displays complete information of the pilgrims concerned.	Succeed
TC04	Enter “Serving Number” then click search on the Cancellation Information menu.	The application displays the status of the cancellation process that the congregation submits.	Fail
TC05	Enter "Serving Number" then click next on the Repayment Information menu.	The application displays whether the portion of the pilgrims is entitled to be paid off or not.	Fail
TC06	Enter "Serving Number" then click search on the Estimated Departure menu.	The application displays the estimated departure schedule for Hajj pilgrims.	Succeed
TC07	Enter "Umrah Portion Number" then click search on the Umrah	The application displays complete information of the concerned Umrah	Succeed

	Congregation Information menu.	pilgrims.	
TC08	"Serving Number" then click search on the Special Hajj Congregation Information menu.	The application displays complete information for the specific Hajj pilgrims concerned.	Succeed

b) Boundary Value Analysis Test Results

This test is carried out on forms that already exist in the Haji Pintar application by entering data that exceeds the upper and lower limits that have been determined in the application menus.

Tabel 2. Boundary Value Analysis Test Results

ID	Testing Scenario	Expected Results	Conclusion
TC09	Fill in the "Validation Number" and "NIK" in the registration menu more than the maximum integer value in the Haji Pintar application.	The application failed to save data into the database and did not change the appearance of the application to the home menu.	Succeed
TC10	Fill in the "Validation Number" and "NIK" in the registration menu less than the maximum integer value in the Haji Pintar application .	The application failed to save data into the database and did not change the appearance of the application to the home menu.	Succeed
TC11	Fill in "No Kloter" on the Scheduled Departure Group menu more than the maximum integer value in the Haji Pintar application.	The application failed to display the results of the departure schedule for the hajj pilgrims.	Succeed
TC12	Fill in " No Kloter" in the Scheduled Departure Group menu which is less than the maximum integer value in the Haji Smart application.	The application failed to display the results of the departure schedule for the hajj pilgrims.	Succeed
TC13	Filling in the "Passport Number" in the Hajj Congregation Information menu is more than the maximum integer value in	The application failed to display the complete information of the pilgrims concerned.	Succeed

	the Smart Hajj application.		
TC14	Filling in the "Passport Number" in the Hajj Congregation Information menu is less than the maximum integer value in the Hajj Smart application.	The application failed to display the complete information of the pilgrims concerned.	Succeed
TC15	Filling in the "Portion Number" in the Cancellation Information menu is more than the maximum integer value in the Haji Pintar application.	The application failed to display the status of the cancellation process that the congregation submitted.	Fail
TC16	Filling in the "Portion Number" in the Cancellation Information menu is less than the maximum integer value in the Haji Pintar application.	The application failed to display the status of the cancellation process that the congregation submitted.	Succeed
TC17	Filling in the "Portion Number" in the Repayment Information menu is more than the maximum integer value in the Haji Pintar application.	The application failed to display whether the portion of the pilgrims was entitled to be paid off or not.	Fail
TC18	Filling in the "Portion Number" in the Repayment Information menu is less than the maximum integer value in the Haji Pintar application.	The application failed to display whether the portion of the pilgrims was entitled to be paid off or not.	Succeed
TC19	Entering "Serving Number" in the Estimated Departure menu is more than the maximum integer value in the Haji Pintar application.	The application failed to display the estimated departure schedule for Hajj pilgrims.	Succeed
TC20	Entering "Serving Number" in the Estimated Departure menu is less than the maximum integer value in the Haji Pintar application.	The application failed to display the estimated departure schedule for Hajj pilgrims.	Succeed
TC21	Entering "Umrah Portion Number" in the Umrah	The application failed to display the complete	Succeed

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	Congregation Information menu is more than the maximum integer value in the Smart Hajj application.	information of the Umrah pilgrims concerned.	
TC22	Entering "Umrah Portion Number" in the Umrah Congregation Information menu is less than the maximum integer value in the Smart Hajj application.	The application failed to display the complete information of the Umrah pilgrims concerned.	Succeed
TC23	Entering "Serving Number" in the Special Hajj Congregation Information menu is more than the maximum integer value in the Smart Hajj application.	The application failed to display complete information for the specific Hajj pilgrims concerned.	Succeed
TC24	Entering "Serving Number" in the Special Hajj Congregation Information menu is less than the maximum integer value in the Smart Hajj application.	The application failed to display complete information for the specific Hajj pilgrims concerned.	Succeed

c) Fuzzing Test Results

This test is carried out on an existing form in the Haji Pintar application by entering invalid input data in the application.

Tabel 3. Fuzzing Test Results

ID	Testing Scenario	Expected Results	Conclusion
TC25	Fill in the "Validation Number" and "NIK" in the registration menu by adding letters.	The application failed to save data into the database and did not change the appearance of the application to the home menu.	Succeed
TC26	Fill in the "Validation Number" and "NIK" in the registration menu with a negative prefix.	The application failed to save data into the database and did not change the appearance of the application to the home menu.	Succeed

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

TC27	Fill in "No Kloter" in the Scheduled Departure Group menu by adding letters.	The application failed to display the results of the departure schedule for the hajj pilgrims.	Succeed
TC28	Fill in "No Kloter" in the Scheduled Group Departure menu with a negative prefix.	The application failed to display the results of the departure schedule for the hajj pilgrims.	Succeed
TC29	Fill in the "Passport Number" in the Hajj Congregation Information menu with a positive prefix.	The application failed to display the complete information of the pilgrims concerned.	Succeed
TC30	Fill in the "Passport Number" in the Hajj Congregation Information menu with a negative prefix.	The application failed to display the complete information of the pilgrims concerned.	Succeed
TC31	Fill in the “Serving Number” in the Cancellation Information menu by adding letters.	The application failed to display the status of the cancellation process that the congregation submitted.	Succeed
TC32	Fill in the “Portion Number” in the Cancellation Information menu with a negative prefix.	The application failed to display the status of the cancellation process that the congregation submitted.	Fail
TC33	Fill in the "Serving Number" in the Repayment Information menu by adding letters.	The application failed to display whether the portion of the pilgrims was entitled to be paid off or not.	Fail
TC34	Fill in the "Serving Number" in the Repayment Information menu with a negative prefix.	The application failed to display whether the portion of the pilgrims was entitled to be paid off or not.	Fail
TC35	Enter "Serving Number" in the Estimated Departure menu by adding letters.	The application failed to display the estimated departure schedule for Hajj pilgrims.	Succeed
TC36	Enter "Serving Number " in the Estimated Departure menu with a	The application failed to display the estimated departure schedule for Hajj	Succeed

	negative prefix.	pilgrims.	
TC37	Enter "Umrah Portion Number" in the Umrah Congregation Information menu by adding letters.	The application failed to display the complete information of the Umrah pilgrims concerned.	Succeed
TC38	Enter "Umrah Portion Number" in the Umrah Congregation Information menu with a negative prefix.	The application failed to display the complete information of the Umrah pilgrims concerned.	Succeed
TC39	Enter "Serving Number" in the Special Hajj Congregation Information menu by adding letters.	The application failed to display complete information for the specific Hajj pilgrims concerned.	Succeed
TC40	Enter "Serving Number" in the Special Hajj Congregation Information menu with a negative prefix.	The application failed to display complete information for the specific Hajj pilgrims concerned.	Succeed

d) Comparison Testing Results

Comparison testing is testing the same data to ensure that the application gives identical output.

Tabel 4. Results of Comparison Testing

ID	Testing Scenario	Expected Results	Conclusion
TC41	Try the Smart Hajj application on mobile and tablet.	The application has an identical appearance from the two types of devices.	Succeed

e . Endurance Testing Results

This test is carried out on an existing form in the Haji Pintar application by conducting repeated test cases with a certain number in order to evaluate whether the program is in accordance with the requirements specifications. To test the accuracy of mathematical operations (floating point, rounding off , etc.)

Tabel 5. Endurance Testing Results

ID	Testing Scenario	Expected Results	Conclusion

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

TC42	Tried 10 times to enter "Validation Number" and "NIK" in the registration menu then click "Submit".	The application is able to save data into the database and change the appearance of the application to the home menu.	Succeed
TC43	Tried 10 times to select embarkation on the “Select Embarkation” form and enter “No Cluster” in the Cluster Departure Schedule menu.	The application displays the results of the departure schedule for the hajj pilgrims.	Succeed
TC44	Tried 10 times to enter "Passport Number" then click search on the Hajj Congregation Information menu.	The application displays complete information of the pilgrims concerned.	Succeed
TC45	Tried 10 times to enter "Serving Number" then click search on the Cancellation Information menu.	The application displays the status of the cancellation process that the congregation submits.	Fail
TC46	Tried 10 times to enter "Serving Number" then click next on the Repayment Information menu.	The application displays whether the portion of the pilgrims is entitled to be paid off or not.	Fail
TC47	Tried 10 times to enter "Serving Number" then click search on the Estimated Departure menu.	The application displays the estimated departure schedule for Hajj pilgrims.	Succeed
TC48	Tried 10 times to enter "Umrah Portion Number" then click search on the Umrah Congregation Information menu.	The application displays complete information of the concerned Umrah pilgrims.	Succeed
TC49	Tried 10 times to enter "Serving Number" then click search on the Special Hajj Congregation Information menu.	The application displays complete information for the specific Hajj pilgrims concerned.	Succeed

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3.2. Effectiveness Value

To calculate the value of the effectiveness of an application, it is necessary to know the number of tables tested, the number of test scenarios, and the results of the test scenarios.

Tabel 6. Conclusion of Test Data Results

Table result conclusion data test	
Information	**Amount**
Table which tested	5 tables
Scenario Test	49 scenarios testing
Conclusion succeed	40 successful conclusions
Conclusion no fail	9 conclusion failed

Table 6 shows the conclusions of the overall test data results in the tests that have been carried out. After knowing the test results, here are the results of calculating the effectiveness value of each table:

Table 1: $\left(\frac{6}{8}\right) \times 100 = 75\%$
Table 2: $\left(\frac{14}{16}\right) \times 100 = 87.50\%$
Table 3: $\left(\frac{13}{16}\right) \times 100 = 81.25\%$
Table 4: $\left(\frac{1}{1}\right) \times 100 = 100\%$
Table 5: $\left(\frac{6}{8}\right) \times 100 = 75\%$

After calculating the effectiveness value of each table, it can be continued to calculate the overall effectiveness value, by adding up all the results of the effectiveness values of each table and dividing by the number of tables tested:

$$\left(\frac{(75+87,50+81,25+100+75)}{5}\right) = \left(\frac{418,75}{5}\right) = 83,75\ \%$$

The overall effectiveness value of the Haji Pintar application can be calculated by adding up each table and dividing by the total number of tables so that a value of 83.75 % is obtained. With this value, the Haji Pintar application has been running according to the expected functionality but there are still errors in the application that must be updated immediately regarding the cancellation information menu and the payment information menu, which experienced problems when checking the status of the cancellation process that the congregation submitted and checking the congregation portion. Hajj includes the right to pay off or not.

4. CONCLUSION

The Haji Pintar application testing has been successfully carried out using the Black Box method with the aim of assessing the functionality, interface, data structure and database access, performance, initialization and termination of the Haji Pintar application. Then create a test scenario and determine the value of effectiveness. To find out whether the Hajj Smart application is suitable for use by users, namely prospective pilgrims. Based on the results of testing the Haji Smart application, it can be concluded that the Haji Pintar application is in accordance with the expected functionality but there are still errors in the application that must be updated immediately regarding the cancellation information menu and the payment information menu which have problems when checking the status of the cancellation process which the congregation submits and checks the portion of the pilgrims including the right to be paid or not. The results of testing on the Haji Pintar application, from 49 test scenarios carried out 40 test scenarios were in accordance with the expected results and 9 were not appropriate, resulting in an effectiveness value of the application of 83.75%. After testing and dealing with any problems that arise in the process of this research, the author's suggestion for the next development step is to immediately correct the errors that the authors find so that the Haji Smart application can run optimally.

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