# AUTOMATED SOFTWARE TESTING FOR MULTI PLATFORM APPLICATIONS USING KATALON STUDIO

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## ABSTRACT

*The testing process is not only useful for testing existing features, but also for finding errors on websites and mobile applications. It also provides feedback to the developer about the application being tested. To test large scale applications, a test automation is needed so that testing can be done more efficiently and effectively. Katalon Studio is an automation testing tool developed by Katalon LLC to automate testing on websites, API's and mobile applications. The programming languages used to create scripts in Katalon Studio are Groovy, Java, and Javascript. The scripting technique provided by Katalon Studio is a keyword driven approach where keywords in the method of Katalon Studio are used to represent the actions performed by tester on the application being tested. Katalon Studio will also facilitate tester in documenting testing results or test reports in the form of charts, graphs, and detailed reports using Katalon Analytics. The results of the testing show that the use of Katalon Studio helps both beginner and experienced tester create and design automation testing on websites, APIs, and mobile applications with spy and record utilities features. Katalon Studio also provides interactive test reports in the form of graphic visualization. From the results of API testing, it can be concluded that Katalon Studio makes it easy for tester to do end to end API testing without additional integration with other software.*

**Keywords:** *test automation; testing tool; software testing; testing; katalon*

## I. Introduction

Software testing are activities that aim to evaluate a program or system with the aim of finding errors and determining a program according to the expected results before being submitted to the user. The primary goal of software testing is to find errors in the software so that they can be repaired and meet the specifications and needs of users, so the quality of the software can be measured. The job of Software Quality Assurance is to ensure that testing is properly planned and efficiently conducted so that it has the highest likelihood of achieving its primary goal. As the software developed, the testing process became more complicated and time-consuming – devote considerable time and effort. The issue can be minimized by doing testing, whether manual or automatic using a testing tool. Manual testing will take a lot of time because each feature has to be tried one by one and repeatedly. Therefore, automation testing or test automation is needed – to control the execution of a test and compare the actual results with those predicted in the software being tested. Test automation can run test steps that are repeated automatically and

perform additional testing that is difficult to do manually.

The nature of the artefact that being tested also affected the chosen method or technique. Testing desktop application is different from website or mobile application. Web application testing ensures that an application is fully functional and running smoothly and securely. A web application should go through a series of validations to ensure the functionality, usability, interface, compatibility, performance, and security of the application. Testing techniques also depends on testing requirement.

Using a testing tool will allow the work of testing a website or mobile application to be easier and faster. Katalon Studio is one example of testing tool. The purpose of using Katalon Studio as an automation testing tool is to make it easier for testers to perform testing activities. The tester is helped in making a test script for testing that is carried out repeatedly on the object being tested. Katalon Studio also assists testers in documenting test results through a test report and provides a visualized review process through the Katalon Analytics features.

## II. Katalon Studio

- *Introduction*

Katalon Studio is an automation testing tool developed by Katalon LLC. Katalon Studio has the ability to perform automation testing on desktop, websites, mobile applications, and APIs. As the main programming language for testing, Katalon Studio uses Groovy, Java, and JavaScript which can be executed on various modern browsers as well as iOS and Android applications. This testing tool also supports various website technologies such as HTML5, Shadow DOM, and Angular. Katalon Studio can also accept data sources in various formats such as CSV, Excel, and databases. This testing tool was developed with a keyword driven approach as the main method of writing tests with a data driven functionality approach for test execution.

- *Test Stages*

The testing steps at Katalon Studio are divided into two stages, namely test design and test execution. Test design is the stage where the tester makes a test script. Making a test script can be done in two ways, that is recording and programming. Recording is making a test script by recording all the activities or action in the tested object and translating the action into a test script. Making a test script by programming is done without recording the action.
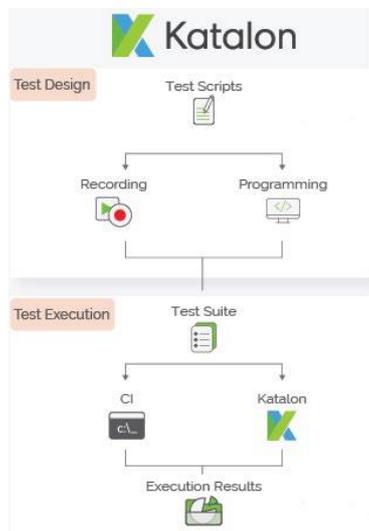


**Figure 1.** 2 stages in Katalon Studio

After the test design stage is complete, it is followed by the test execution stage. At this stage, the test script that has been created is combined into a test suite and executed through the Katalon Studio IDE or also can use the command line interface. The results of the test execution are a log viewer and a test report. The main feature that helps testers in conducting testing is the spy utility feature and the record utility feature. Spy utility is a feature that helps the tester capture the elements contained in the application so that these elements can be further processed by the tester. The following figure is an example of the spy utility dialog on Katalon Studio.
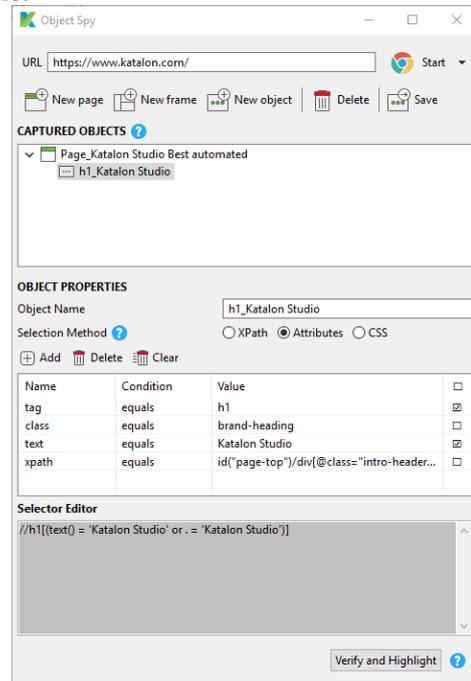


**Figure 2.** Object Spy Dialog

The record utility is useful for recording all tester activity on the application being tested. The record utility will capture the elements accessed by the tester along with the actions taken and translate it into a script. This feature is very helpful for testers who want to learn automation testing. The following figure is an example of a record utility on the website.
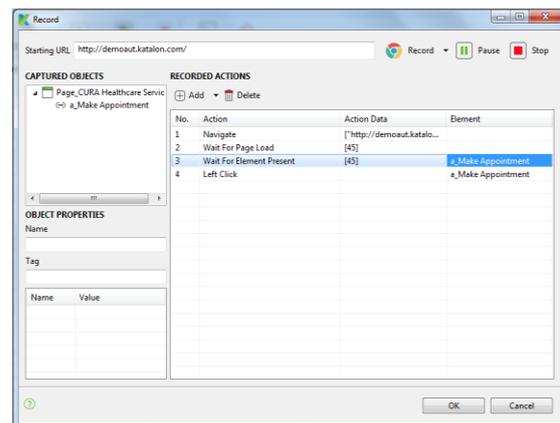


**Figure 3.** Object Record Dialog

- *Case Study*

In this paper, automation testing conducted for website, API, and mobile application. For web application testing, Katalon performs functionality, interface, compatibility, performance testing, and security testing. For API testing, Katalon perfoms only interface testing to check whether the result from the API is correct. For mobile applications, there are 2 types of mobile apps that used in this

study, which are Android and iOS application. For mobile application testing, Katalon performs functionality, interface, compatibility, performance testing, and security testing.

**Table 1.** Katalon Test Plan

| Platform | Details | | | | | |
|---|---|---|---|---|---|---|
| | **F** | **U** | **I** | **C** | **P** | **S** |
| Website App | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ |
| API | ✗ | ✗ | ✓ | ✗ | ✗ | ✗ |
| Android | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ |
| iOS | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ |

Table I shown test plan that Katalon choose as the testing techniques. F is stands for functionality testing, U is stands for usability testing, I is stands for interface testing, C is stands for compatibility testing, P is stands for performance testing, and S is stands for security testing. All platform did not test the usability because it is related directly with user.

**III. Testing a Website**

This section will explain the testing and results obtained on the website and API. The website that will be used as a trial material is the GO-ROOM website, a site for renting rooms and houses.

- *Functionality Testing*

Functionality testing is defined as a type of test that verifies that each function of a software application operates according to the specification requirements. The main purpose of functionality testing is to check the functionality of the software system. Testing on links or navigation is carried out on the GO-ROOM main page, which is on the menu bar section of the GO-ROOM website and the links contained in the footer section.



**Figure 4.** Screenshot of GO-ROOM's Menu Bar and Footer

The results obtained on testing this page are the tester found an error page on the agenda link, causing Katalon Studio to be unable to continue testing on the next link. The following

is an error given by Katalon Studio along with a screenshot of the error page.
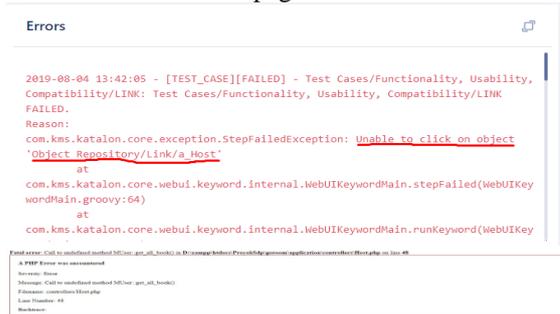


**Figure 5.** Error Found on Agenda Page

- *Interface Testing*

Interface testing is defined as a type of software testing that verifies the correct communication between two different software systems. A connection that integrates two components is called an interface. The aspect tested on the GO-ROOM website is the database connection. The goal is to check the response of the database if the connection is lost or the process of retrieving data from the database fails. Interface can be in the form of API and web service. Testing is done by disconnecting the database from the website and displaying the database error on each GO-ROOM page. The following is a capture of the database error that occurred.
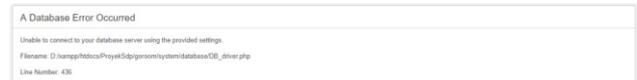


**Figure 6.** Error Database

The second trial is carried out on the booking confirmation function that can be done by the host. This function generates an error when the test is performed. There is a formatting error for entering data into the database so that the data cannot be entered into the database. The following is a capture of the error in the booking confirmation function.



**Figure 7.** Error Database for Booking Confirmation

- *Compatibility Testing*

Compatibility testing is a type of testing used to check whether software can operate on different hardware, operating systems, applications, networks, or mobile devices. The following figure shows the results of compatibility testing on Google Chrome, Firefox, and Internet Explorer using the security testing suite of tests.

**Figure 8.** Result of Compatibility Testing

The status section shows that the security test passes on all three browsers, namely Firefox, Google Chrome, and Internet Explorer which is shown in the platform section. The total shows the number of test cases tested. The other four circles show the status of the test case, namely P (Passed), F (Failed), E (Error), and I (Incomplete).

- *Performance Testing*

Performance testing is defined as a type of testing to ensure an application will perform well under the expected workload. The performance testing that will be carried out on the GO-ROOM website is load testing. The test will aim to check the time it takes for the website to load all content on the opened page. Basically, Katalon Studio does not provide features for performing performance testing. But if you still want to do performance testing, you can do it by executing several test cases simultaneously or in parallel so that you can check the load time. The following figure is the result of performance testing obtained by Katalon Analytics on the GO-ROOM website. The vertical axis shows the duration or time it takes to complete the test suite execution. The horizontal axis shows the id / sequence of execution of the test suite from the first to the last.
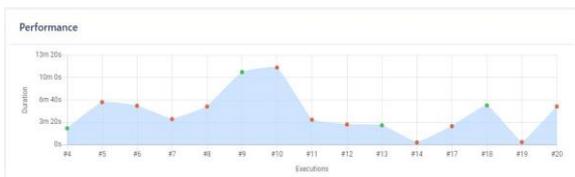

**Figure 9.** Performance Testing Result

- *Security Testing*

Security testing is defined as a type of testing that ensures systems and applications are free from any vulnerabilities, threats, and risks that can cause major losses. Security testing is about finding all possible loopholes and weaknesses in the system that might result in lost information or revenue. Security testing will test invalid input, password encryption, error messages, URL tests, and session tests on the GO-ROOM website. After conducting security testing on the GO-ROOM website, the tester found a failure on the URL test because the ad detail URL can be accessed without log in first.

However, this is considered successful by Katalon Studio because it is considered successful in navigating to the URL. The following are the results received by the tester at Katalon Studio, and can be seen that security testing on the GO-ROOM website can run smoothly.


**Figure 10.** Security Testing Result

## IV. Testing an API

This section will test the API from the themoviedb.org site. Some of the information that is requested as part of the testing interface, which is obtain filmmaking company information, get detailed actor information, get information about the film (title, release date, cast, and staff), get a list of movies based on keywords, get a list of movies and details by year, and get details of the movie keywords you are looking for. The following will provide the test results obtained by the tester when testing the API request.


**Figure 11.** API Testing Result

In the figure above, you can see the API testing test report contained in the Katalon Analytics. The status section shows a green check mark which means that the API testing on all three test cases was successful. The duration section shows the time it took for each test case to finish executing.

## V. Testing an Android APP

Android application that will be tested is the Bible which functions to provide the bible in various translations so that it can be read on mobile and also provides daily devotions, bible reading plans, and a book of spiritual songs which can be obtained by downloading it through this application.

- *Functionality Testing*

This section will provide examples of functionality testing carried out on the Android application along with the test results that have been obtained. Functionality testing will be exemplified by searching for the desired books, chapters and verses.

After testing, the application can display the book along with the chapters and verses you are looking for so that testing the functionality of this feature is successful.

- *Interface Testing*

The testing interface on the mobile application has a different definition from the testing interface on the website. If the testing interface on the website is related to API testing or web services, then interface testing on the mobile application is more related to the interface or appearance of the application itself. Some of the tests carried out on this aspect include checking menus, buttons, bookmarks, history, settings, and navigation in the application. The following will provide an example of a testing interface on the Bible application by trying the devotional menu.
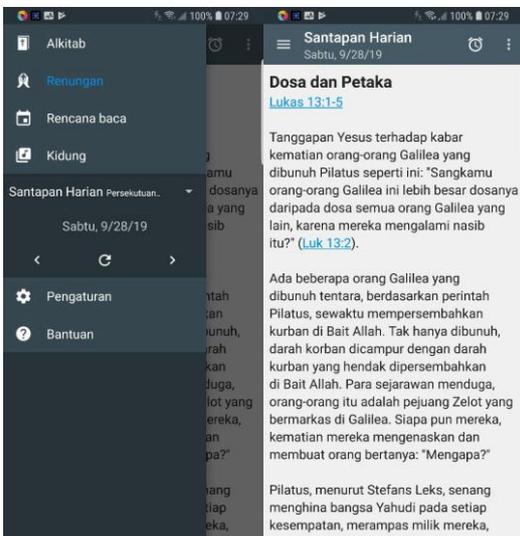


**Figure 12.** Devotional Menu on the Bible App

The test results show that the devotional menu is successfully accessed and can provide daily devotions.

- *CompatibilityTesting*

Compatibility testing in mobile application testing will test the application on different devices, screen sizes and different operating system versions. The following will provide a list of devices used for compatibility testing in the Bible application.

**Table 2.** Testing on Various Types of Android Device

| Device | Details | | |
| --- | --- | --- | --- |
| | *Version* | *Status* | *Notes* |
| Xperia X | Android 7.0 | Not Compatible | App cannot run in this device |
| Galaxy Note 5 | Android 6.0.1 | Compatible | - |

| Device | Details | | |
| --- | --- | --- | --- |
| | *Version* | *Status* | *Notes* |
| Galaxy S8+ | Android 8.0 | Compatible | - |
| OnePlus 5 | Android 7.1.1 | Compatible | - |
| Pixel | Android 7.1.2 | Compatible | - |

From the test results obtained, the Bible application cannot run on one of the devices used, namely the Xperia X device with Android 7.0 version.

- *Performance Testing*

The definition of performance testing on mobile applications is also the same as performance testing on websites where this test aims to check the speed, scalability and stability of the application being tested. Performance testing will test the load time performance of the application. The following are the results of performance testing on the Bible application obtained from Katalon Analytics.

**Figure 13.** Performance Testing Result

Based on the graphic above, the vertical axis shows the duration or time it takes to complete the test suite execution. The horizontal axis shows the id / sequence of execution of the test suite from the first to the last.

- *Security Testing*

This test aims to check security on applications such as user data. Some of the things that are focused on this test are invalid input, error message checking, and password encryption. Security testing on the Bible application will only check invalid input because this application does not require registration or login when using the application. Invalid input tested on the Bible application is to fill in the chapter and verse numbers with the number 0 when doing a search.
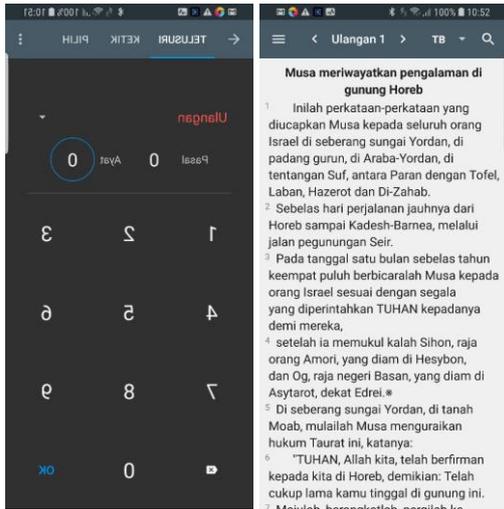
**Figure 14.** Security Testing Result

The test results show that this invalid input is resolved with a default value of 1 so that the results of article 1 or paragraph 1 will be given in the book you are looking for if the chapter or paragraph number is filled with 0.

## VI. Testing an IOS APP

iOS application that will be tested is the Infinity Music App, which is an iOS application for watching and sharing music videos with fellow users of this application.

- *Functionality Testing*

Functionality testing on the iOS application will be exemplified via the register page. The following is a display of the register page from the Infinity Music App application. After testing, the register page functions properly and the application registers successfully. User can register their account through this page.
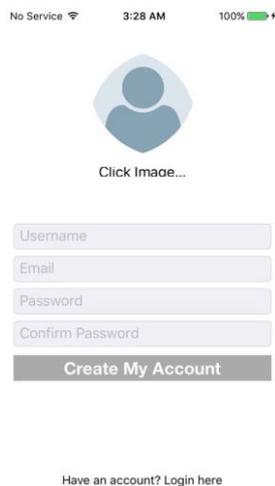


**Figure 15.** Register Screen

- *Interface Testing*

The testing interface on the mobile application has a different definition from the

testing interface on the website. If the testing interface on the website is related to API testing or web services, then interface testing on the mobile application is more related to the interface or appearance of the application itself. The following will provide an example of the testing interface on the Infinity Music App, the testing interface will be exemplified in the timeline menu.



**Figure 16.** Timeline Screen

The test results show that the timeline menu is running well and can display the appropriate information. The playlist that can be seen in the figure above contains videos that were previously shared during usability testing by creating a playlist first.

- *Compatibility Testing*

Compatibility testing in mobile application testing will test the application on different devices, screen sizes and different operating system versions. The following will provide a list of devices used for compatibility testing on the Infinity Music App application.

**Table 3.** Testing on Various Types of Apple Device

| Device | Details | |
| --- | --- | --- |
| | *Version* | *Status* |
| iPhone 6s Plus | iOS 10.1.1 | Compatible |
| iPhone 5s | iOS 9.3.4 | Compatible |
| iPhone 6s | iOS 12.1.4 | Compatible |

From the test results, all devices can open and run the Infinity Music App application smoothly.

- *Performance Testing*

The definition of performance testing on mobile applications is also the same as performance testing on websites where this test aims to check the speed, scalability and stability of the application being tested. Performance

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testing will test the load time performance of the application. The following are the results of performance testing on the Infinity Music App application obtained from Katalon Analytics.
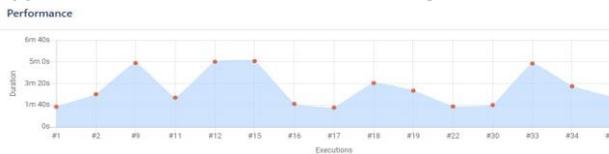


**Figure 17.** Performance Testing Result

Based on the graphic above, the vertical axis shows the duration or time it takes to complete the test suite execution. The horizontal axis shows the id / sequence of execution of the test suite from the first to the last.

- *Security Testing*

This test aims to check security on applications such as user data. Some of the things that are focused on this test are invalid input, error message checking, and password encryption. Security testing on the Infinity Music App will be exemplified on the application login page to check invalid input and error messages. The following is a capture of security testing on the Infinity Music App.
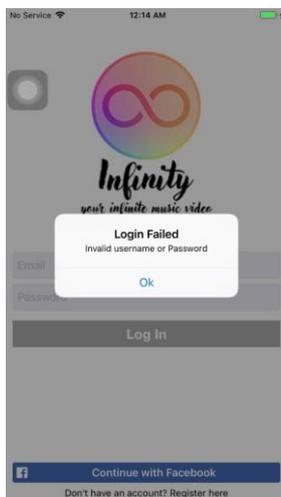


**Figure 18.** Security Testing Result

In the figure above, the application shows a failed login error message because the input from the username and / or password column is invalid or not in accordance with the provisions, in this case the two columns are not filled with any data or are left blank, causing an error message to appear.

## VII. Conclusions

The conclusion obtained from the test results using Katalon Studio is that Katalon Studio is very helpful for testers, both beginners and experienced in making test scripts with spy utility and record utility features for testing on websites and mobile applications. The tester also helps in API testing because Katalon Studio does not require additional software or integration with other software so that the tester can perform end-to-end API testing more easily. The testing report review process is helped by the Katalon Analytics which provides visualization of reports in the form of interactive charts, graphs and reports.

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