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## A LITERATURE SURVEY ON DESIGN AND ANALYSIS OF WEB AUTOMATION TESTING FRAMEWORK - SELENIUM

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### ABSTRACT

Software testing is the important method to find bugs and improves the software quality. At present a lot of applications are created in web based applications that execute in a web browser. Web applications are becoming more and more complex that applications are difficult to test manually. It will increase the time and cost. Accurate results can't be provided. This can be avoided by using test automation. The objective of the paper is to make test automation for Web applications using Software testing tool, Selenium. It is a set of testing tool running with multiple browsers, operating systems and many programming languages. Selenium encloses almost all the features to automate tests and it is used to create test cases for web application.

**Keywords** – *Web, Test Automation, Selenium IDE, Selenium RC, Web Driver, Selenium Grid.*

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### I. INTRODUCTION

Software testing is an important process of software program. It is to find an error and improve the quality. The process of testing software in a well intended and efficient way is known as software testing lifecycle (STLC). It can be divided into a number of different phases: planning, analysis, design, test execution, cycles, test closure and final test. Manual and Automation testing process is to help testing the software program application.

In manual testing is tested by manually, without using any software tool. It takes more time and execution speed is slow, manual testing error can occur easily. There are distinct phases for manual testing like unit testing, integration testing, system testing and user acceptance testing. Automation testing is known as test automation. It increases the test coverage, improve accuracy and save time. Test automation is the use of testing tool and reduces the manual task.

Automation testing is more reliable, faster than manual work and numbers of resources for task are reduced. It can reuse tests on different versions of an application and run more tests in less time. Many automation testing tools are available in the market. There are many things to be considered for selecting the testing tool. It is ease of integration, compatible with the design & implementation of the application, performance of tests and maintenance. These are all offered in an automation testing tool selenium. It is not a single tool but it's having set of different software tools like IDE, Remote control, web driver, grid. Selenium is tremendous software testing for web application.

Selenium is an open source automation testing tool for web based applications. It runs directly on browser and supports almost all available browsers such as Firefox, chrome, IE, Opera, Safari etc. It runs on all platforms such as Windows, Linux and Macintosh. It's a very useful tool for System functional testing and browser compatibility testing. It is really strong as compare to other available automation tools and is very flexible and simple to use. There are many languages supported in Selenium but the language in which the program is built is independent of the language being used by the website or the web based application. Only need to know one language in order to work with Selenium.

Selenium is a browser automation tool, commonly used for writing end-to-end tests of web applications. A browser automation tool do expected exactly and automate the control of a browser so that repetitive tasks can be automated.

In the rest of our paper, section I say about the related work carried on ,section II say about the existing system, finally the conclusion and references related to it.

## II. LITERATURE SURVEY

### A. Test Automation Framework Based on WEB

In the year 2012, Fei Wang and Wencai Du [1] explained about the design the new test automation framework. The test automation framework that was integrated by the two kinds of test automation tool Selenium and Jmeter. Jmeter developed by Apache organization is an open source pressure test tool based on Java. It can be used on the server, the network or other object to simulate huge loading, in different pressure under a variety of testing their strength and analyze the overall performance.

**Step 1:** The information about the same type of web applications abstracts way from the web-based test automation framework and form into a single configuration file.

**Step 2:** Testing the framework

The new testing automation framework integrated by Selenium and Jmeter can share the test steps and test data among different testing, such as UI testing, backend testing, loading test and so on. It is convenient to switching in various types of testing for web applications. It supports multiple browsers and a variety of operating system. It can be widely used in web application test automation.

### B. Selenium Tool: A Web based Automation Testing Framework

In the year 2014, RigzinAngmo, Monika Sharma [2] discussed about the selenium framework. A framework may be for a set of functions within a system that interrelate the layers of an operating system and the layers of an application subsystem as well as how communication should be standardized at some level of a network. Some frameworks in computer system also include programming interfaces ,programs. A framework is more comprehensive than a protocol and more prescriptive than a structure. Selenium is a web based automation framework which uses different platform and framework according to the programming language that is used by programmer. Selenium is a set of different tools and all have different features which are useful for developer. Selenium IDE is use for record and playback as well as for those developers who are new in developing side can also use easily for their work. For developers who are good in programming language can use selenium RC or WebDriver. To run selenium tests parallel one can use selenium grid. By choosing proper framework one can save time as well as money and can improve software quality.

### C. Design and Implementation in Selenium IDE with Web Driver

In the year 2012, NidhikaUppal, Vinay Chopra [3] Initially analysis of selenium IDE with selenium Web Driver and finally, enhance the Selenium IDE with using Web Driver and compatible with others browser. Now days the Web applications being developed to be compatible with all browsers but in Selenium IDE tool is limited to Firefox browser only and Selenium IDE cannot be tested on all browsers .If users wants to run recorded tests in different browsers like IE or Chrome then Selenium tools web driver has features to support with others browser .Integrating Selenium IDE and web driver in one single package so that recorded tests on IDE can be run as web driver tests from single UI [3].

**Step 1 :** Integrating Selenium IDE and Web Driver in one single package so that recorded tests on IDE can be run as web driver tests from single UI.

**Step 2 :** Selenium Web Driver and Changes done to achieve running test cases in IE or Google Chrome from Selenium IDE.

- Multi-browser testing including improved functionality for browsers not well-supported by Selenium IDE
- Handling multiple frames, multiple browser windows.
- And the code that calls Batch file to execute scripts:

**Step 3:** Implementation : Clicking on selenium IDE window. Running and recording testing scripts in Selenium IDE with others browser like IE, Chrome and it can only possible with web driver and it also improved functionality of browsers.

### D. Web application testing solutions with Selenium

In [4], RasulNiyazimbetov discuss about set of testing methods, with focus on web applications, and the solutions provided by the Selenium toolset. Selenium can run test directly within web browser. It uses JavaScript plugins to embed the test automation engine. Selenium plugin supports most of the popular browsers such as Google Chrome, Firefox and so on. The plugin

provides standard commands of behaving and navigation in web browser such "open a URL link", "click on element", or "type into text box". It also provides verification commands to check if the actual results match the expected ones.

**Automated Testing:** It is a very good solution for holding tests with the capability of using time. It improves test qualities with generating a large number of test cases which covers extensive testing requirements. Most of the issued aspects of any web applications can be covered. By using advanced tools; it can give faster test development process.

**Keyword Driven Testing:** It is the approach of handling tests by operations with keywords in each step of test cases. KDT divided into two stages: Planning and Implementation.

**Model Based Testing:** It is the approach of designing the models which captures higher -level of abstraction and represent desired behavior of AUT.

**Security Testing:** Security is one of the most critical issues, as web applications becoming more complex and business critical. Currently various banks offer e.g., online banking. There are a lot of other relevant services that are provided to clients through the web.

#### **E. Implementation of Selenium with JUNIT and Test-NG**

In the year 2012, Deepti Gaur, Dr. Rajender Singh Chhillar [5] implements selenium with different frameworks that is, junit and testng. To create and run integration tests with Selenium, you must complete the following steps:

- Use the Selenium IDE to record and play tests.
- Export tests created with the Selenium IDE as JUnit tests.
- Add the JUnit tests to your Java project in your IDE and run the tests.

A good test case is one that has high probability of finding an undiscovered error. A successful test is one that uncovers an undiscovered error. Test Cases in Selenium are nothing but recording the Web Application and testing that again using the Selenium tool. The IDE allows many options for running your test case. You can run a test case all at once, stop and start it, run it one line at a time, run a single command you are currently developing, and you can do a batch run of an entire test suite. Execution of test case is very flexible in the IDE. JUnit 4 and TestNG are both very popular unit test framework in Java. Both frameworks look very similar in functionality.

#### **F. Selenium keyword automation testing framework**

In the year 2014, Sherry single, Harpreetkaur [6] the Keyword Driven Framework has been created to perform Automation Testing for web applications using Software Testing Tool "Selenium Webdriver". By using Keyword Driven Framework, instead of writing multiple functions to automate driven website, we have abstracted those things to excel files and then in that excel file we are giving the steps

and the program we have written is going to drive best on the data excel set and the entire functionality of our Application under Test (AUT) gets captured as step by step instructions for every test as well as in a table. In this way, test cases are automatically tested by using Keyword driven framework.

#### **G. Software Testing Techniques for Test Cases Generation**

In the year 2013, Gaurav Saini, Kestina Rai [7] deals with various techniques available to design software testing test cases. The purpose of software testing is to identify all the defects in a program. There are many techniques available for designing of test cases as given below.

##### **a) Equivalence Partitioning**

This method divides the input domain of a program into classes of data from which test cases can be derived. Equivalence partitioning strives to define a test case that uncovers classes of errors and thereby reduces the number of test cases needed. It is based on an evaluation of equivalence classes for an input condition. An equivalence class represents a set of valid or invalid states for input conditions.

Example: Consider a software module that is intended to accept the name of a grocery item and a list of the different sizes the item comes in, specified in ounces.

Valid - Item name is alphabetic.

Invalid - Item name is not alphabetic

### b) Boundary Value Analysis

Boundary value analysis is the technique of making sure that behavior of system is predictable for the input and output boundary conditions. Its widely recognized that input values at the extreme ends of input domain cause more errors in system. More applications errors occur at the boundaries of input domain. Boundary value analysis testing technique is used to identify errors at boundaries rather than finding those exist in centre of input domain.

Example: If u are testing for an input box accepting numbers from 1 to 1000 then there is no use in writing thousand test cases for all 1000 valid input numbers plus other test cases for invalid data.

### c) Cause effect Graphing Technique

A cause effect graph is directed graph that maps a set of causes to a set of effects. The causes may be thought of as the input to the program, and the effects may be thought of as the output. Usually the graph shows the nodes representing the causes on the left side and the nodes representing the effects on the right side. There may be intermediate nodes in between that combine inputs using logical operators such as „AND“ and „OR“.

### d) Decision table technique

Decision table technique involves testing the behavior of a system when any component involves logical conditions in it and system needs to be verified for different combinations of the conditions. Internal behavior of the system and its design involving logical conditions can be easily captured and documented with decision table testing. Testers need to analyze the specifications and then identify the conditions and actions of the system to capture them in decision tables.

## H. Web based Automation Testing and Tools

In the year 2014, Monika Sharma and RigzinAngmo, [8] discussed various web automation testing tools which will help us to understand the automation testing as well as the tools available for automation testing. The software testing includes various methods, types and levels or stages of testing. The basic testing methods are Static testing and Dynamic testing, The box approach method, Manual and Automation Testing.

**a) Web Testing :** Web testing is the name given to the software testing that focuses entirely on web applications. This helps to cut down the cost, minimize the efforts required to test web applications as well as web sites, increase software quality, reduces time-to-market and uses reusable test cases. There are various web testing available like:

- Functionality Testing
- Compatibility Testing
- Stress Testing
- Load Testing
- Web Services Functional Testing
- Web services Performance Testing
- Regression Testing

**b) Web Automation Testing :** An Automated web testing should ensure that the web applications/web sites/web services usual functionality works correctly, provides the ability to reuse and extend the tests across multiple browsers / platforms/ languages databases / servers and ensure that all the users accessing the web applications get results in an acceptable time.

There is different type of tool available (ie) Selenium, HP –QTP, Watir, testComplete, TestNg, Load Runner, WinRunner.

## I. Data Driven Automation Testing of Web Application Using Selenium

In the year 2011, Navaraj Javvaji, Anand Sathiyaseelan, Uma Maheswari Selvan, [9] the goal is to set forth the approach for “Automating the Web Applications Using SELENIUM RC. The Data driven testing is creation of test scripts to run together with their related data sets in the framework. The main advantage of the automated tests is the reusability and also the maintenance of these tests is easy. This requires the preparation of the data sheets which is completely independent of the test automation tool. Data driven framework contains some main components, they are as follows:-

**a) ANT Script:** A Script that is used to execute a set of instruction using build.xml. It is used to run

single test or batch test. Single test could be used to execute a single test suite while batch test can be used to run multiple test suites.

**b) Reusable Library:** It consists of the common functions that can be reused. It is a collection of utilities that deliver the capabilities to create detailed drill down reports in different formats, help log events and save snapshots of tests that fail

**c) Library Files:** Library files consist of the major supporting libraries files which are necessary for the automation. Ex: selenium-server.jar

**d) Logger:** Logger is mainly designed to help the user to view the step by step execution of the test scripts along with the time stamp, execution status whether it passed or failed.

**e) Test Data:** Test Data contains the excel workbooks with test data sheets holding the input values to the application under test.

**f) Test Report:** The test report is generated by ANT at the end of the test execution. The test report displays the overall execution status.

### III. CONCLUSION

An Automation testing process is to help testing the software program application. The main benefit of an automation testing is to cut down the cost, minimize the efforts required to test web applications as well as web sites, increase software quality, reduces time-to-market and uses reusable test cases. Several web automation tools such as HP-QTP to Selenium were exist. Our research article focuses on providing a review on all the web test automation tools and hence it acts as guide for future researchers in Selenium.

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