

Software Testing With Selenium Web Driver Using Python

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Abstract

Testing of a software is being considered as a vital and important activity in the Software Development. Testing is done to ensure that software behaves as per the expectations of the users as written in the software requirement specification (SRS). Testing can be manual or automated. Now a days, many web-based applications are being run using internet browsers. The use of the Selenium web driver would reduce the effort spent on the testing. It will also reduce the cost and time in testing of the application. Selenium testing tool is helpful for developers and testers for analyzing their code. Selenium supports many commonly used programming languages like, C#, Java, Python etc. The motive of this paper is to highlight the use of Selenium tool with Python for the automated testing of the web applications.

Keywords: Selenium, Software Testing, Selenium IDE, Test Automation, SRS

1. INTRODUCTION

Software testing is [4]an important phase and it plays a crucial role in software development. Testing can be defined as checking of the output against a given set of inputs. Software must produce the right output for a given set of inputs as mentioned in the software requirement specification. If software produces right output, it means that functionality is right and there is no error in the software. On the other side, if output is not as per the specification, it means functionality is not right and there is/are errors. In this case, errors are fixed to make the software functioning right. Testing can be either manual or automated. Manual testing is done manually by the testers whereas automated testing is done with the help of tools. There are many advantages of automated testing in the software development. Automated testing reducesthe timeandthecost of testing to a large extent.

Selenium is a popular testing tool [9] which is freely available and is used for testing online and real time applications. Desktop based applications cannot be tested using Selenium. The tester has to select the testing tool in order to meet hisrequirements[8]. Different tools are used for different requirements. Selenium is best suited for the testers who are good in coding and who know how to integrate different frameworks.

On the other side, Sahi is best suited for the testers who have limited or no coding

experience. Selenium has more advance features than Sahi. Capability of report generation and the inbuilt support for excel framework are the features which are supported by Sahi but not supported by Selenium. So, Tester has to choose the testing tool according to his/her need.

II. COMPARATIVE STUDY OF MANUAL AND AUTOMATED TESTING

Whenever a tester starts testing the application manually as an end user, it is referred as manual testing. In this testing, all the test cases are written manually by the tester and need to be tested one by one [5]. This task consumes much of the effort and time in the testing phase, since all the tasks or the test cases have to be run manually by the tester. A test case is the specification of a set of inputs along with their respective outputs. A collection of all the test cases is called as test suit. The successfulness of the testing depends upon correctness of the test cases.

It is a very hectic job to test web applications manually [3]. So, automated testing is preferred. The usage of a tool for the automation of the testing process is referred as automated testing. The test cases need to be prepared manually but their execution is automated. Selenium, TestingWhiz, QTP, TestComplete, Ranorex, Sahi, Watir, Tosca Test Suite, Telerik Test Studio and Katalon Studio are a few of the popular automated software testing tools. Whenever there are a huge number of test cases, the application can be tested using any of these automated testing tools [1]. Differences between manual and automated testing are mentioned in table 1.

Table 1: Difference between manual testing and automated testing

Factors	Manual Testing	Automated Testing
Time	Every test case has to be written manually and need to be tested manually. So, it is time consuming.	The cases would be written manually but the execution is automated. So, it is time saving.
Speed	Speed of manual testing is very low	Speed of automated testing is high
Cost	Investment in the humans would be very high.	During the initial stage, cost seems to be more but later on, testing becomes cheaper
Training	No training is required.	Training of the testers is required to make them comfortable with the testing tools

III. INTRODUCTION TO SELENIUM

Selenium is an open source automated testing suit that helps in automated testing of web-applications. It is very much similar to Quick Test Pro with a difference that Selenium emphasizes on automated testing of web-based applications. When testing is performed using Selenium tool then it is termed as Selenium Testing. Selenium tool is developed by Jason Huggins in 2004 [6]. Figure1 shows various components of Selenium tool.

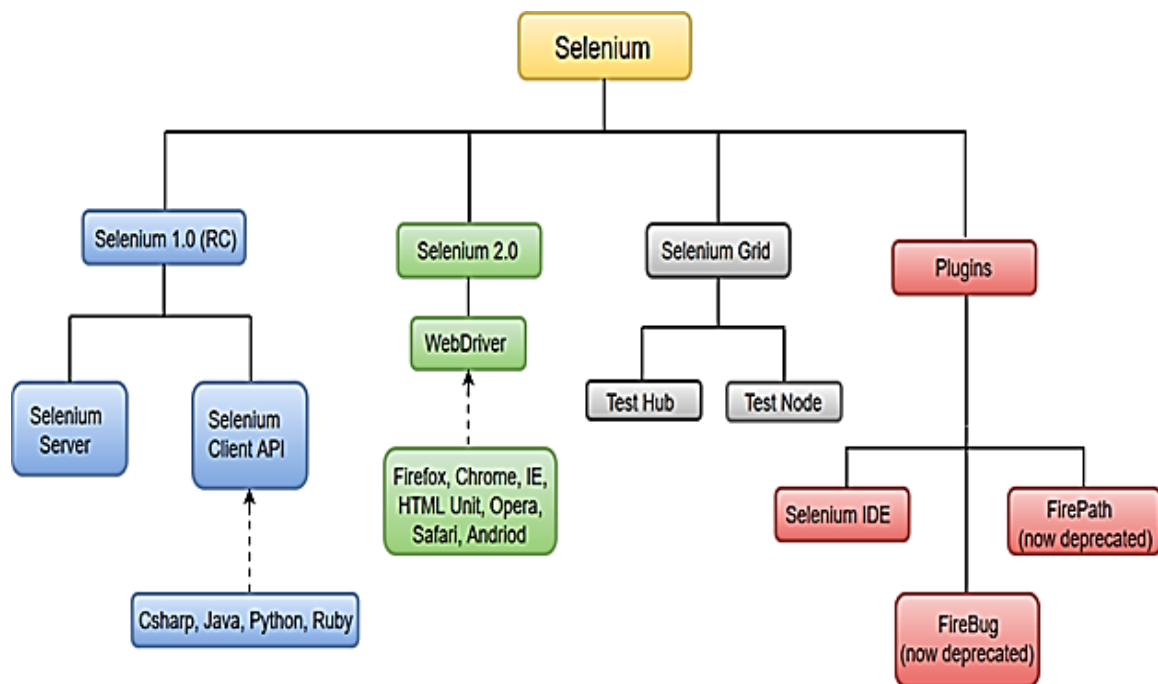


Figure1:Selenium Components

Selenium is a free-ware software and supports many platforms like Linux, Windows and Mac etc. Selenium can be used with browsers like Google-chrome, Firefox and Internet-Explorer. Java, C#, Python, Ruby can be used for scripting of the test cases. Selenium is an open source tool which focuses on compatibility [7] and also supports various browsers, platforms, languages and frameworks. Selenium provides the required support regardless of product and test configuration. Followings are the browsers supported by Selenium:

- Google Chrome.
- Internet-Explorer 7, 8, 9, 10, and 11 on appropriate combinations of Vista, Windows 7, Windows 8, and Windows 8.1
- Firefox: latest ESR, previous ESR, current release, one previous release.
- Safari.
- Opera.
- HtmlUnit.
- Phantomjs.

- Android (with Selendroid or appium)

Selenium code is written using one of the following languages:

- C#
- Java
- Perl
- PHP
- Python
- Ruby

Java is a favorite language of testers for working with Selenium. But due to ease-to-use feature of Python and Ruby, many testers has started opting these languages. Components of Selenium are defined as follows:

A. SeleniumIDE

A Firefox plug-in called selenium IDE [2], which allows the tester for recording of their actions during the workflow as they perform the test. Selenium integrated development environment can be used for building the testcases.

B. Selenium RemoteServer

The browser carries the selenium requests from the editor built in Client Server Architecture.

C. Selenium WebDriver

Selenium Remote Server is predecessor to Selenium Web Driver [8]. The interaction with the browser is achieved by sending the commands and retrieving the results.

D. SeleniumGrid

This a tool which is used for running the test cases parallelly across different machines at equal intervals of time. Selenium Grid [2] can decrease the time of execution of test cases.

Main differences between Selenium Remote Server and Web Driver are mentioned in table2.

Table2: Differences between Selenium Remote Server and Web Driver

Selenium Remote Server	Selenium Web Driver
The interaction of selenium server between the instructions and the browser.	With the use of web driver, the instructions would be directly sent to the browser.
Less Object Oriented	Purely Object Oriented
Cannot be used for MobileApplications	Mobile Applications can be tested.
Slow in performing the test cases	Faster than Selenium RemoteServer

IV. LOCATING ELEMENTS IN WEB APPLICATION

Selenium provides various methods to locate the elements in the web-application. The strategy may vary depending on where the test cases need to be applied. The methods include[9]:

```
find_element_by_id,  
find_element_by_name,  
find_element_by_xpath,  
find_element_by_link_text,  
find_element_by_partial_link_text,  
find_element_by_tag_name,  
find_element_by_class_name,  
find_element_by_css_selector
```

To find multiple elements, methods used are:

```
find_elements_by_name,  
find_elements_by_xpath,  
find_elements_by_link_text,  
find_elements_by_partial_link_text,  
find_elements_by_tag_name,  
find_elements_by_class_name,  
find_elements_by_css_selector
```

V. PYTHON VS JAVA IN SELENIUM

Java and Python are very popular programming languages. In the beginning, Java was mostly used with Selenium. But now a days, Python has also become a popular language of Selenium. In common, Python has many advantages over other programming languages. Python is simple to use and more compact when compared with Java. Python is also very easy as compared to other programming languages. It is also very user-friendly as it uses simple English keywords which are very easy to understand. Its syntax complications are also very less than other programming languages.

Python is also more useful than Java when used with Selenium. Python programs run faster as compared to Java programs. To start and end blocks, Java uses traditional braces whereas Python uses indentation. Java employs static typing whereas Python employs dynamic typing. In general words, we can say that Python is simpler and more compact as compared to Java.

VI. CONCLUSION

Selenium is a Powerful open source library used for testing of functional and regression

components in the web-applications. It is an open source tool that supports various programming languages and browsers for the automation of the test cases. Selenium supports all the common platforms and programming languages. Before Python, Java was the first choice of the testers to use with Selenium. Due to many advantages of Python, it has also become very popular language to be used with Selenium. Python is simple, usable, more useful and faster than Java.

REFERENCES

- [1]ArjunaRana , VinayRishiwal “An Automated Data Driven Continuous Testing Framework” *International Journal of Advanced Engineering Research and Applications(IJAERA)* Vol -1, Issue -3, July -2015 ISSN:254-2377
- [2]Sanjeev Gupta, Sunil Kumar, ChiragSaxena “Review Paper on Comparison of Automation Testing Tools Selenium and QTP” *MIT International Journal Of ComputerScienceandInformationTechnology*Vol–5,No2, August 2015, pp 55-57, ISSN 2230-7621
- [3] InshaAltaf,JawadAhmadDar,FirdousulRashid,Mohd. Rafiq “Survey On Selenium Tool In Software Testing” in *proceedings of the International Conference on Green Computing and Internet of Things(ICGCIoT), 2015, pp 1378-1383*
- [4] Deepthi Wilson R, Manjuprasad B “A comprehensive Review on Selenium Automation Testing Tool” at *proceedings of International Journal of Engineering Research & Technology(IJERT)*, Special Issue –2017, ISSN: 2278-0181
- [5] P VidyaSagar, ParuchuriRamya, VemuriSindhura “Testing using Selenium Web Driver”, *IEEE*,2017
- [6] ArjunSatheesh, MonishaSingh“Comparative Study of Open Source Automated WebTesting Tools: Selenium and Sahi”, *Indian Journal of Science and Technology*, Vol 10(13) April-2017, ISSN (Online) : 0974-5645.
- [7] Jyoti Devi, “AStudy on Functioning of Selenium Automation Testing Structure”, *International Journal of Advanced Research inComputer Science and Software Engineering*, Volume 7, Issue 5, May-2017, ISSN: 2277 128X.
- [8] <http://www.seleniumhq.org/docs/>
- [9] <https://selenium-python.readthedocs.io/locating-elements.html>