



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 10, October 2015

A Comprehensive Review of Web-based Automation Testing Tools

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ABSTRACT: Testing is indispensable in software development process. Due to increasing complexity of software being built the necessity of testing and time consumed by testing is increasing. Web based applications are common these days. The quality of web based applications needs to be good because of economic relevance of these applications. Manual testing takes a lot of effort and time, both can be reduced by automated testing tools. There are a number of testing tools available for web based automation testing. How to choose the best tool for your task is tricky. Various parameters like ease of installation and learning, performance cost etc., need to be considered. This article describes the various automated software testing tools for web based applications in detail based upon which it is easy for a tester to choose the best web based automation testing tools for the task according to his requirements.

KEYWORDS: web testing; web automation; testing tool; software quality.

I. INTRODUCTION

Software testing is a vital phase in software development cycle. Software testing phase consumes nearly 40 to 70 percent of total time of software development process [1]. The purpose of software testing is to improve the overall quality of software by detecting all the defects present in software beforehand. Software testing is a mechanism that is used to assess the functionality and validity of software. Software testing assures good quality software that works to satisfy the needs of stakeholders.

There are two ways of testing:

1. *Manual Testing:*

Manual Testing is done by tester without using any tool. Testers play the role of end users and explore the software to check its behavior, functionality and performance. A test plan is written and followed through the testing phase. It is very time consuming and execution speed of this type of testing is very slow. It takes a lot effort. A large man force is required which increases the cost of testing. Reliability of manual testing is low reliable because of human error or may be test cases are not performed with precision.

2. *Automation Testing:*

Automation testing uses automation testing tools. The job of automation testing tool is to test the intended task and to cut down the human effort. Automation testing is faster than manual testing and it is more reliable since it performs each test case with precision. Automation testing improves software quality and its reliability. Sophisticated test cases are written to detect hidden defects in the software which is not possible in manual testing.

This paper is organized into four sections. Section I is the prelude of this paper, giving introduction about the topic and describing difference between automation testing and manual testing. Section II describes web testing and web automation testing. In section III various web automation tools has been explained. Finally the last section, section IV concludes the paper.



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II. WEB TESTING AUTOMATION

A. *Web Testing:*

Web testing is software testing for web applications. Web testing is done to test web applications to address the issues like functional issues, web application security issues, integration issues, web services issues, environment issues, in web applications. Web testing increases software quality, lower the cost, uses reusable test cases that reduces testing time.

B. *Web Automation Testing:*

Manual testing tools do not fulfill the demand of organizations in testing their web applications in this dynamic and highly challenging environment. Therefore automated web testing tools are necessary to insure that web applications works correctly and have the ability to reuse. The automatic web testing tools also check the web applications' support for extending the tests across different platforms/browsers/ languages/ platforms/servers and ensure the correct behavior of web application.

III. WEB AUTOMATION TESTING TOOLS

There are a number of automation testing tools available. To choose the best one for a particular project, a number of parameters need to be considered. These parameters are such as ease of installation of tools, ease of learning (how much time the tester takes to able to use the tools efficiently), performance, cost of tool, reporting of test result etc. There are various tools available in the market. We will discuss here 10 best web automation tools and their utilities, namely:

- i. Selenium
- ii. LoadRunner
- iii. Tellurium
- iv. TestComplete
- v. SAHI Pro
- vi. QTP
- vii. Ranorex
- viii. Windmill
- ix. Watir
- x. NewLoad

The tools are described in detail as below:

i. *Selenium:*

Selenium is suite of 4 tools which are selenium IDE, selenium RC, selenium Webdriver and selenium grid. It was developed by Jason Huggins in 2004. It is an open source automated testing suite which is built to test web applications. It supports different browsers, applications, platforms and operating system. Testing with selenium requires the tester to have programming skills. Selenium does not have any inbuilt report generator.

ii. *LoadRunner:*

HP LoadRunner is a software testing tool developed by Hewlett-Packard. It is used to test applications, checking the system behavior and performance under load. Artificial load is created by simulating thousands of concurrent users and application is put through real life load and results are recorded. Tester needs to have just basic programming skills, so it is helpful for novice testers. It has the facility to generate reports in different formats.

iii. *Tellurium:*

Tellurium is an automated testing framework. It is an open source tool for testing web application. It is developed from Selenium framework and have UI module concept which is helpful in writing reusable test cases. Tester needs to have some basic programming skills. It does not enjoy the luxury of report generation.



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- iv. *TestComplete:*
TestComplete is an web-based automation testing tool which has features like creating, managing tests for any window or server-client software. Its developer is SmartBear Software. Quality test case generation is the purpose of this tool. Report generation is simple in and it allows the tester to create his dump files.
- v. *SAHI PRO:*
SAHI PRO is written in java script and used for industry. Sahi runs as a proxy server and configure browsers proxy setting, inject JavaScripts event handlers in to web pages, which allows it to record and playback events on the browsers. Sahi is independent of browser used. Sahi is easy to learn with readable script. Sahi has good report generation facility which allows you to show test cases in different formats, compare test cases etc.
- vi. *QTP:*
QTP is used for automated used for functional testing and regression testing. Only window XP is supported by QTP. We can easily edit the script, playback it and check the results. It supports data driven testing by using inbuilt tables which are easy to use and easy to update. QTP has excellence in showing result reports, showing each step very clearly
- vii. *Ranorex:*
It is a Graphic User Interface automation framework for testing of desktop, web-based and mobile applications. It is developed by Ranorex GmbH. Ranorex provides script free testing for non-programmers using drag and drop functionality. Tests cases developed in it are platform independent.
- viii. *Windmill:*
Windmill is cross-platform, cross-browser software testing framework, used for testing web applications. It has recorder tool that allows user to write test cases without having knowledge of a programming language for all browsers. It has good proxy manipulation facility.
- ix. *Watir:*
Water is a simple, flexible and open source tool for web automation testing. Test scripts are written in ruby language, so tester needs to have knowledge of ruby language but this is not a big task as ruby is easy to learn. It is cross-browser and platform independent.
- x. *NeoLoad:*
NeoLoad is load and stress testing tool for web applications. It works on Windows, Solaris and Linux. It is designed to check the performance of the web application under heavy load conditions. It has record and playback capability, image and test based recognition capabilities, parallel execution on multiple devices. Real time monitoring of test cases is possible in Newload. It supports good result reporting features.

The following table gives the information such as the software features like language support, hardware features like operating system and browser support and cost of the above mentioned tools.

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Table.1. Web Automation Testing Tools

S. No.	Tool Name	Developer	Language Use	Language Supported	Operating System	Cost	Function	Browser Supports
1.	Selenium	Jason huggins	Java	Domain specific language	Cross platform	Open source	Testing framework for web-based applications	All main browsers
2.	TestComplete	Smart bear software In.	Java	VBscript, C++, Jscript, Delphi script, c#script	Microsoft windows	Proprietary	Test automation tool	Firefox, IE, Google chrome
3.	LoadRunner	Hewlett-Packard	C	VB, VBscript, C#, java, JavaScript	Windows, MAC, linux	Proprietary	Load testing tool, tests the how much stress a web application can handle	Any browser
4.	Sahi Pro	Sahi	Java and JavaScript	Sahi Script, Java, Ruby Sahi script	Windows, linux	Proprietary	Test automation tool	Any browser
5.	Tellurium	Evolved from selenium	Java	Domain specific language	Cross platform	Open source	Software testing framework for web applications	Any browser
6.	QTP	HP	Java, JavaScript	VB Script, JavaScript, Visual basic, Visual C++	Windows XP	Proprietary	Web automated functional and regression testing tools	IE, Google chrome, Firefox
7.	Ranorex	Ranorex GmbH	C#	C#, VB.Net	Any desktop or mobile software	Proprietary	GUI test automation framework	Any browser
8.	Windmill	Chandler Server Web UI project	java	Python, JavaScript, Ruby	Windows, MAC, Linux	Open source	Web testing framework	All major browsers
9.	Watir	Bret Pettichord and Paul Rogers	Ruby	Java, c#, .NET	Cross-platform	Open source	Web testing framework for simple and flexible test cases	All major browsers
10.	NeoLoad	Neotys	Java	Designed through GUI	Microsoft Windows, linux, Solaris	Proprietary	For load and stress testing of web applications	IE, Firefox, Google chrome



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IV. CONCLUSION

This paper presents a thorough review on various automated software testing tools. Web based automation testing deals with automation of testing web-based applications. A variety of tools are available for web based applications which are discussed thoroughly in this paper. Functions of each tool, language supported by them, cost of each tool, platform on which they can be used and browsers supported by them are discussed in this paper. Above analysis could be of great support for a tester in selection of tool/tools for his task. Before selecting any tool, testers must compare the features of various tools and choose the best that fits the respective task.

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