

# Evaluation of automated web testing tools

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**Abstract:** Software testing is a main part of Software Development Life Cycle and one of the important aspects of Software Engineering. There is a wide variety of testing tools which require or not the user experience in testing software products. According to the daily use, Mobile and Web applications take the first place in development and testing. Testing automation enables developers and testers to easily automate the entire process of testing in software development saving time and costs. This paper provide a feasibility study for commercial and open source web testing tools helping developers or users to pick the suitable tool based on their requirements.

**Keywords:** Black Box Testing; web testing tools; open source; Commercial;

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## 1. INTRODUCTION

Software Testing aims to evaluating the software quality and to what degree the efficiency of that product. Testing Process including many aspects such as reliability, usability, integrity, maintainability and compatibility [1].

The Two main types of Software testing Black Box Testing and White Box [2]. Black Box Testing concerned with the specification of the System component under test which not require intensive knowledge about the internal structure of the system. White box strategy otherwise require high experience of the internal system code for developing test suits suited the test cases.

Web and Mobile applications have become very complex and crucial, Most of researches focused attention to Web application design, development, analysis, and testing, by studying and proposing methodologies and tools [3]. Mobile applications developed over more than platform which need more experience in the developing environment and structure of applications to be designed and developed.

Software Testing follow two ways manual or automation. Manual Testing has many drawbacks such as consuming time and cost, require experience, complex reusing, less efficiency and not provide scripting facility for code [4]. Automation testing reveal all complex Obstacles attached with manual testing, this type of testing create a scenarios by recording the interaction with the system under design into test cases to be tested under many Configurations [5].

Automated testing tools exist widely in the market varying in the capabilities and features which make the user puzzled for which tool suitable for his testing purpose [6]. There are two types testing tools commercial and open source tools. Open source tools are free for users to use with open source code to be modified. On the other hand, Commercial tools take advantage in organizations and mentoring capabilities providing the user with facilities needed to accomplish tasks with extra controlled features and low efforts.

The Objective of this paper is to present feasibility study of automated web testing tools through comparing the tools features for helping users to select suitable tools according to their requirements based on a study of tool's major criteria. The paper divided into sections. Section I provide a brief overview of testing tools. Section II discuss the tools features and criteria used as input to the model. Section III discuss the

related work. Section IV Methodology Section V finally provide the conclusion and future work.

## 2. RELATED WORK

Last researches interested in comparing the capabilities of the testing tools by practicing them or only based features each tool support. Harpreet Kaur, Gagan Gupta conduct a comparative study among selenium, Test Complete and QTP tools the study include many aspects but not drag the automation features of tools such as record and play-back, cross platform or browsers support features [7]. Abha Jain, Manish Jain, Sunil Dhankar[8] compare two commercial tools Ranorex vs. QTP including many features but the main concern on the cost of the total project and the study not include any open source software to compare against. Angmo, R and Sharma, M [9] compare the performance of selenium web driver against watir-web driver the two open source software, Study includes performance parameters such as execution speed which vary in the type of tested Controls. This research is efficient but require more than one tool to give the best judge to the user.

## 3. METHODOLOGY

There are a lot of web testing tools exist on the market commercial or open source. We select the tools that perform the automation testing using record scripts and then playback this scripts as an important feature in testing automation.

### 3.1 Automated Software testing tools

#### 3.1.1 Selenium webdriver

Selenium IDE is a one of the most popular free open-source automated testing tool which provide a testing framework for testing web applications and supporting multiple kind of frameworks. It can be easily downloaded from internet as a plug-in for some browsers. It is basically used by the web development community to perform automated testing of web applications. We choose in our study Selenium web-driver because Selenium IDE not support record-playback feature and also it most supportive for web-application testing [10].

### 3.1.2 Sahi

Sahi is an open source provide a testing framework based on Ruby and java script supporting the most types of web browsers and platforms. Sahi provides powerful abilities for recording and replaying across browsers; different language drivers for writing test scripts (Java, Ruby) and support for AJAX and highly dynamic web application Sahi used by IBM developers for web applications testing automation [11].

### 3.1.3 Watir-web driver

Watir is an abbreviation for Watir application testing in Ruby. Is a powerful open source tool that requires programming skills in ruby language [12]. We choose Watir web-driver for evaluation study in web automated testing as it support record-playback capability. It is available as RubyGems and capable of driving variety of browser including the major like Internet Explorer, Firefox etc. [13]. Bret Pettichord and Paul Rogers developed Watir. Watir project is composed of several other projects of which watir-classic, watershed and watir webdriver are important.

### 3.1.4 Quick Test Profession

Quick Test Profession is an automated testing tools based on graphical interface record playback capability [14]. It works by identifying the objects in the application user interface or web page and performing desired operations (such as mouse and keyboard events). QTP uses a VBScript scripting language to specify test procedures and manipulate activities. Automated testing tool QTP provides the industry's good solution for functional test and regression test automation – addressing every major software application and environment. Quick Test Professional also enables testing Java applets and applications, and multimedia objects on Applications as well as standard Windows applications, It works by identifying the objects in the application user interface or a web page and performing desired operations (such as mouse clicks or keyboard events); it can also capture objects properties [15].

### 3.1.5 Ranorex

Ranorex is a commercial and complete image-based detection tool used for programmed testing [16]. Ranorex perform testing based on Image detection and facility to record and playback. It does not necessitate to study a scripting language, since it is written in pure .net code using C#, VB.net and Iron Python. Ranorex recommended for expanded projects with new license for tools as it cost benefits but the support restricted only to companies.

### 3.1.6 Test Complete

TestComplete is a testing automation tool formulated as Smart Bear testing framework [17]. It makes available the testing of windows and web applications and is one of the primary functional testing tools in the world. TC is a graphical record-playback automation tool which supports various testing types and methodologies: unit testing, functional and GUI testing, regression testing, distributed testing. TC provide recording and capabilities of generation of test scripts.

### 3.1.7 Telerik

Telerik is a market-leading vendor of UI controls, end-to-end solutions for web and mobile applications development across all major development platforms [18]. Telerik empowers over one million developers to create compelling experiences across web and mobile applications taking the advantage of record and playback tested scripts to validate user interaction with the system. [18] Telerik Perform complex UI actions like Drag-n-drop and pure UI actions on web pages and provide comfort and speed web application testing against many browsers by only change browser type and settings.

### 3.1.8 Coded UI

Coded UI is an automated testing framework that used for analyzing and testing user interfaces. Developers create a coded UI test that can test the user interface for an application functions correctly [19]. Testing performs actions on the user interface controls for an application and verifies that the correct controls are displayed with the correct values. Developer create coded UI testing cases by recording the actions of user with applications or by writing test cases using visual studio platform and then playback this scripts for verification of user interactions.

## 3.2 Tools Features

The features below used for the evaluation process for distinguishing the capability of each tool versus the others [20]. Each parameter are listed with the up to date value based on intensive searching at tool's support website and last research papers. Table below list all evaluation parameters with the meaning of parameters.

Table 1: Evaluation Parameters

| Features               | Explanation  |
|------------------------|--|
| Cross platforms.       | To what degree tool support operating system   |
| Cross –Browsers.       | How many browsers tools able to work with  |
| Record-Playback.       | The ability of tool to record scripts to be run under different conditions.              |
| Script-language.       | Programming language used to edit testing scripts or for the creation of testing scripts |
| Ease of Learning.      | Working with GUI easy or not   |
| Data-Driven Framework. | The ability of tool to reduce efforts.   |
| Programming skills.    | Require programming skills or based on predefined steps                                  |
| Online-Support.        | Provide support or not for sudden situations and troubleshooting                         |
| Training-Cost (USD).   | The cost of tool training cost if exist  |
| Debugging support.     | Does the tool has the mechanism to handle error and provide debug or not                 |
| Report Generation.     | Effective analysis for test script   |

## 4. EVALUATION STUDY

There are a number of open source and commercial windows, web and mobile application tools available in the software market [21]. Although the core functions of these tools are similar, they differ in functionality, features, usability. Keeping in view the previous mentioned aspects, we have selected the more usable web testing tools for comparison taking in consideration tools that support record-playback feature which are Selenium, Quick Test professional, Test Complete , Ranorex , Sahi ,Telerik and CodedUI. Our research work comprises of the analysis of different automated web testing tools based on the features each one support. For our comparative study we use the current version of each open source tool and the demo of commercial one. The table below constructed based on the features listed before providing the mainly features chained with each tool versus other tools. We drag commercial and open source tools for two reasons, first the main concern of each tester is how much the tool cost? And is it fulfill his needs? The open source tools take the advantage of it has low or no cost for use, maintain and distribute but the main disadvantage is it is not straight forward to use. In the other side, the commercial tools give the user the guide steps and full support to do his work under license agreement. The features not contain the experimental records for the tools but only the usability features which chained with the tools.

The evaluation study presented in a tabular form providing the evaluation study of the tools under study according to criteria mentioned before. The study give the user the basis view of how to select the suitable tools based on his/her requirement .the study list usability features of each tool against other tools and give the user near view of how to make a selection.

Table 2: Evaluation study of automated web testing tools.

| Tools/criteria        | Selenium-web driver               | Sahi              | Watir-web driver        | QTP                                 | Ranorex                  | Test Complete           | Telerik                             | Coded UI             |
|-----------------------|-----------------------------------|-------------------|-------------------------|-------------------------------------|--------------------------|-------------------------|-------------------------------------|----------------------|
| Pricing (USD)         | Open source                       | Open Source       | Open Source             | 8000                                | 1855                     | 1,069                   | 2,999                               | 999                  |
| Cross Platform        | Windows Only                      | Windows –Mac      | Windows-Mac-Linux       | Windows Only                        | Windows Only except XP   | Windows 7 and Higher    | Windows Vista and Higher            | Windows 7 and Higher |
| Browsers-support      | Chrome-Firefox-IE-Opera           | All Browsers      | Chrome-Firefox-IE-Opera | IE-Firefox-Chrome                   | IE-Firefox-Chrome-Safari | IE-Firefox-Opera-Chrome | All Browsers                        | IE Only              |
| Record-Playback       | Support                           | Support           | Support                 | Support                             | Support                  | Support                 | Support                             | Support              |
| Script-Language       | Ruby-java-python-php- java script | Java script -Ruby | Ruby based              | VB Script                           | VB script                | VBScript-C#-Jscript     | VB.net-C#                           | VB.net-C#            |
| Ease of Use           | Experience needed                 | No experience     | No experience           | Easy to learn in a short time       | Experience needed        | Experience needed       | Experience needed                   | Experience needed    |
| Data-Driven Framework | Excel-CSV                         | CSV               | XML- Excel files        | Excel files-text files-XML-DB files | CSV-Excel-SQL            | CSV-Excel-SQL           | Excel files-text files-XML-DB files | CSV-Excel-SQL        |
| Programming skills    | Required                          | Partially         | Partially               | Partially                           | Partially                | Required                | Required                            | Required             |
| Online-Support        | Strong Support                    | Strong Support    | Weak support            | Licensed                            | Strong Support           | Strong Support          | Strong Support                      | Strong Support       |
| Training-Cost (USD)   | 350                               | No training cost  | No training cost        | 250                                 | 1087                     | 449                     | 349                                 | 1251                 |
| Debugging support     | Strong                            | Partially         | Partially               | Strong                              | Strong                   | Strong                  | Strong                              | Strong               |
| Report Generation     | HTML                              | HTML              | HTML,XML                | HTML                                | HTML                     | HTML,XML                | HTML, XLS , PDF, CSV                | HTML                 |

## 5. CONCLUSION AND FUTURE WORK

Our research work comprises of the analyzation of different automated web testing tools for not also commercial but also involve open source tools. This study helping in selecting the suitable tools based on multiple criteria. Selecting tools in this area, it is important to consider multiple parameters which vary among different requirements, many requests in the market make the cost the first target to be considered, in the other hand some open sources software didn't provide support for its user as it work under user experience .The study present each tools with features which in the same and different degree with other tools and how each tool behave against others tools' features .This comparative study can be the basis for developing a model facilitate selecting the most applicable tools based on the needed requirements.

Our future work will encounter more tools and more features also that will help in building a user based requirement model. This model also will help researches to select tools helping their research work.

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