

A Comparative Study of Web Service Testing Tools for Functional Requirements

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Abstract: - Web testing is the kind of software testing focusing on web applications. Testing web applications needs to take into account, failures in the application's required services/functionality, to verify the conformance of the application's behavior to specified functional requirements. The main goal of testing a Web application is to run the application using combinations of input and state to discover failures. Now days there are different open source web applications testing tools are available in the market. These tools are used for testing functional and non-functional requirements of web applications. Web Functional testing is a process to test Web applications to detect if your web application is functionally correct. Several tools, techniques and methods have been determined to test web application efficaciously. In this research paper we are discussing functional testing tool for web applications. We compare these tools in terms of features, their advantages and disadvantages so that it may help in selection of suitable testing tools for testing web applications.

Keywords: Software testing, Web application testing, Open source testing tools.

I. INTRODUCTION

Web Application Testing is a process of checking the web applications to find the potential bugs before the code is moved into the live/ production environment. The testing activities generally carried out are Functional Testing, Usability testing, Interface testing, Compatibility testing, Performance testing, Security testing. Functional Testing Functional testing ensures that individual functions are working well. Test cases should ensure that boundary conditions are tested. Invalid inputs should prompt appropriate error messages. For web applications, functional testing can range from testing whether links are working to checking whether changes made by users in a web page are reflected in the database. The success of web service technology is clearly evident from the usage and adoption of this IT technology. A large numbers of providers from different sectors of industry are shifting to web service technology. Web services are software components accessible through programmatic interfaces and can perform tasks from simple requests to complex processes. Various testing tools have been developed and designed for testing of web services. By using these test tools, web engineers can perform their tasks easily and efficiently, thus improving the quality of the system. There are

many open-source testing tools available in the market with different features and functionalities. In our study we are focusing on five types of testing tools to test functionality of applications. With the help of test tools, testers can create, manage and execute tests for a specific test environment for a particular application. The test results are compared with the expected results to evaluate the quality of the product. In this paper, we compare these tools in terms of features, architecture, test environments, software requirements.

II. FUNCTIONAL TESTING TOOLS

The main goal of functional testing a web application is to run the application using combinations of input and state to discover failures. The running environment mainly affects the non-functional requirements of a web application (e.g. Stability, compatibility, performance) while the application is responsible for functional requirements.

Description of Functional testing tools:

A Selenium

Primarily it is for automating web applications for testing purposes; Selenium is a set of different software tools each with a different approach to support test automation. Most Selenium Engineers focus on the one or two tools that meet the needs of their project, however learning all the tools will give you many different options for approaching different test automation problems. The entire suite of tools results in a rich set of testing functions specifically geared to the needs of testing of web applications of all types. These operations are highly flexible, allowing many options for locating UI elements and comparing expected test results against actual application behavior. One of Selenium's key features is the support for executing one's tests on multiple browser platforms.

B Web Application Testing in Ruby (Watir)

Watir is an open-source of Ruby libraries for automating web browsers. It allows you to write tests that are easy to read and maintain. It is simple and flexible. Watir drives browsers the same way people do. It clicks links, fills in forms, and presses buttons. Watir also checks results, such as whether expected text appears on the page. Watir is a family of Ruby libraries

but it supports your app no matter what technology it is developed in. Whilst Watir supports only Internet Explorer on Windows, Watir-WebDrivers supports Chrome, Firefox, Internet Explorer, Opera and also running in headless mode (HTMLUnit). Like other programming languages, Ruby gives you the power to connect to databases, read data files and spreadsheets, export XML, and structure your code as reusable libraries. "Ruby is the interpreted scripting language for quick and easy object-oriented programming. It has many features to process text files and to do system management tasks (as in Perl). It is simple, straight-forward, extensible, and portable.

Why Watir?

- It's a free Open Source tool. There are no costs to use the tool.
- There's a very active and growing community behind it.
- It uses Ruby, a full-featured modern scripting language, rather than a proprietary vendor script.
- It supports your web app no matter what it is developed in.
- It supports multiple browsers on different platforms.
- It is powerful and easy to use, yet beautifully lightweight.

C Jmeter

JMeter is an open-source testing tool developed by Apache Software Foundation (ASF), designed to load test functional behavior and measure performance. Originally designed for testing Web Applications but has since expanded to other test functions; may be used to test performance both on static and dynamic resources (files, Servlets, Perl scripts, Java Objects, Data Bases and Queries, FTP Servers and more). JMeter offers high extensibility due to use of pluggable components. These pluggable components include timers, samplers and visualization plugins. JMeter offers user-friendly Graphical User Interface (GUI). Configuration and setting up a test plan requires very little efforts. JMeter offers a number of statistical reports as well as graphical analysis.

D SoapUI

SoapUI is an open-source testing tool for Service Oriented Architecture (SOA) and web service testing. SoapUI is an application and framework to simplify the testing of web applications and web services. Test cases can be entered using a graphical user interface. They can be executed either by using the graphical user interface or in an embedded fashion

Features/Tools	Selenium	JMeter	Waitr	Storm	SoapUI
Technology Support	HTTP request	Web-HTTP,HTTPs SOAP, KJMS Mail-SMTP(S),POP3(S) and IMAP(S), Database vis JDBC LDAP	Web HttpUnit	SOAP	Web-HTTP,HTTPs SOAP, KJMS Mail-SMTP(S),POP3(S) and IMAP(S), Database via JDBC JMS
Programming Language	Java, PHP, Javascript, Perl, Ruby, Python	Java	Ruby	F#	Java
Operating system support	Windows, Linux, Solaris OS X	Cross-Platform	Cross-Platform	Microsoft Windows	Cross-Platform
Browser Support	Internet Explorer, Firefox, Opera, HTMLUnit, Google Chrome	Internet Explorer, Firefox, Netscape	Internet Explorer, Firefox, Chrome, Safari	Cross Browser Support	Cross Browser Support
Mobile(Phones & Tablets Support)	Android, iOS	Android, iOS	Android, iOS	Android, Windows	Android, iOS
Coding Experience of Engineer	Good technical experience with integrating different pieces of frame work	User need not have much technical knowledge to work with JMeter	Knowledge of Ruby language.	Good technical experience	Easy to Use.
Software Cost	Zero	Zero	Zero	zero	Zero
Hardware resource Consumption(CPU+ RAM)	Low	High	Medium	high	Medium

Table 1: Technical overview of web service testing tools

with either Apache Ant or Apache Maven. Coming from the testing of web applications and web services, the framework now supports a lot more. When focusing on web applications, it provides all relevant operations needed to replay whole web site conversations. The web service stack is well supported with SOAP and REST based services, the ability to invoke XML schema validations for SOAP web services and XPath queries on any XML document. Besides that, other operations, such as JDBC, can be integrated in a test as well. This flexibility, combined with a simple and functional graphical user interface, makes SoapUI a highly recommendable test tool, which should also be considered for integration with a test automation framework, such as Hudson CI.

E. Storm

Storm is a free and open-source tool for testing web services. Storm is developed in F# language and is available for free to use. STORM allows you to

- Test web services written in any technology (.NET, Java, etc.)
- Dynamically invoke web service methods even those that have input parameters of complex data types.
- Save development time and money. Creating throw-away test client apps just to test the web service is just too wasteful
- Test multiple web services from within one UI.
- Edit/Manipulate the raw soap requests.

III. COMPARISON OF WEB SERVICE TESTING TOOLS FOR FUNCTIONAL REQUIREMENTS.

In this section, we present a comparison of the five web service testing tools. Web service testing is a quite challenging area for researchers. The importance of this can also be judged with the ongoing research in this field. Several methods and techniques proposed by researchers as well as development of testing tools. There are commercial as well as open-source test tools available today for testing of web services.

The five testing tools chosen for comparison are based on different platforms and technologies. A detailed technical overview of them is shown in Table 1.

CONCLUSION AND FUTURE SCOPE

Web applications are no longer simple information-based websites. Their increasing size and complexity combined with short development cycles and frequent changes in requirements present many quality assurance and testing issues. The rapid growth of web service market necessitated developing of testing methodologies, hence different methods and different tools proposed to test web services. In this paper, we present a comparative study of open-source web

service testing tools for functional testing with technical overview and features. The comparison may give researchers an informative overview with potential benefits of open-source testing tools, and also help in promotion and development of open-source testing tools. We presented an overview of five open-source web service testing tools and a technical overview of each tool, which may help researchers in selection of suitable tool.

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