Data Driven Automation Testing of Web Application using Selenium

Accelerating the execution of test scripts with data driven approach for the test automation of web applications and deep customization of framework using reusable library

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Abstract—The goal of this paper is to set forth the approach for “Automating the Web Applications Using SELENIUM RC (an open source test automation tool)”. Selenium Remote Control (RC) is a test tool that simulates web browsers and supports six programming languages. In this framework, “selenium-java-client-driver-1.0.1” is used for driving the browsers using java.

Selenium RC provides only basic functionalities using the client drivers. But there is an effective way of expanding the functionalities by implementing the thought process to capture user actions automatically, creates a customized logger file, generation of customized test summary report. On the later part, the paper will brief on SELENIUM IDE, ANT, ECLIPSE JEE IDE, JUNIT and JXL.

This paper outlines that the above mentioned approach can be implemented as a best practice in organizations for automating the web applications in a cost effective way.

Index Terms—

1. ANT Script
2. Data Driven Framework
3. Logger
4. Reusable Library
5. Selenium IDE
6. Selenium RC
7. Test Data
8. Test Report
9. Test Screens
10. Test Suite

INTRODUCTION

Recent progress in the Software Automation Industry has shown a tremendous framework implementation in order to execute test cases for bringing out a better quality web application. As millions of people are spending many hours of time in internet, due to which, the web applications are becoming more popular and increasingly more complex since the goal of it, is to impress and gain the potential market place. Thus the need for the code quality and maintainability has grown drastically and as a result, the need for testing of these applications has become more important. Testing the web application during the application development phase has become an integral part of the Software Development Life Cycle (S.D.L.C) and these tests are typically planned to check the functionality of the application.

As the web applications face a lot of enhancements, probability of conducting repetitive testing of the application functionality goes high and thus we go for test automation in place of regression testing. Test Automation is a strategic approach designed in a form of a framework to gain control over the execution of the tests.

There is a belief that proprietary tools make the automation process very effective, as it provides support for 3rd party add-ons but is very costly. Instead of investing millions of dollars in buying the proprietary tools, companies go for open source tools to make the automation testing process cost effective since there is a challenging task on the hands of the automation industry for automating the web applications with 0% cost.

TECHNICAL OVERVIEW

A. Selenium

Initially developed by Jason Huggins and released in 2004. Selenium is very famous as it is an open source suite of tools specifically developed for testing web applications. It supports a test domain specific language (DSL) to execute tests in many programming languages such as C#, Java, Ruby, Groovy, Python, PHP, and Perl.,
B. Selenium IDE

It is a Mozilla Firefox add-on which is capable of recording the user actions and also play-back. Since selenium IDE is an integrated development environment, Tester can also edit and debug the tests in above mentioned languages. Latest version of Selenium IDE is 1.0.10.

C. Selenium RC

It is a server / solution for executing linear / regression / integration tests. RC obtains the commands from the selenium server and run the tests via the browser. Recorded user actions from the selenium IDE can be obtained in any supported programming language then imported to eclipse for test case/suite execution. It contains the client drivers such as dotnet, java, Perl, Php, python, ruby and the selenium server.

D. Eclipse Java EE IDE:

It is an extensible open source IDE. It provides a number of aids that makes programmers / testers write code much quicker and easier than using a text editor. This means that a person can spend more time learning Java, less time typing. Here eclipse IDE is user to write test cases and execute it.

AUTOMATION FRAMEWORK

A. Well known automation frameworks

A “Test Automation Framework” is an integrated system that combines the set of assumptions, concepts and tools which provides support for automated software testing. The main advantage of such a framework is it defines the organization’s way of doing things as a unique standard. If there is change to any test case then only the test case needs to be updated and the test suite and ANT script will remain the same.

There are several types of automation frameworks; some of the most commonly known frameworks include the following:

1. Data-driven testing
2. Modularity-driven testing
3. Keyword-driven testing
4. Hybrid testing
5. Model-based testing

With the onset and demand for understanding of the frameworks, many social publishing sites have uploaded materials on the internet describing these frameworks in details, however looking at the scope of the current paper; we will focus on understanding basic of Data Driven automation framework.

B. Data Driven Framework

As defined by Wikipedia “http://en.wikipedia.org/wiki/Data-driven_testing” 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.

Advantages:

1. Large amount of data can be fetched using the data sheet for repeated use of test case execution.
2. Reusability and maintenance.
3. Only the script representing a “Business Function” needs to be modified/updated in case if the functionality of the application under test (AUT) changes.
4. Few components of the framework are highly customizable such as test reports, logger.

SELENIUM BASED TEST AUTOMATION FRAMEWORK

Till now we have a clear idea on the fundamental concepts of Selenium, eclipse and data driven framework, the next step will be to come up with a basic design for the overall test automation architecture. The framework contains some main components, they are as follows.

A. ANT script
B. Reusable Library
C. Library Files
D. Logger
E. Test Data
F. Test Report
G. Test Screens
H. Test Scripts
I. Test Suite
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

Reusable library consists of the common functions that can be reused. Reusable library consists of those functions that are application independent and can be called to perform certain tasks. It can also consist of a group of tools or utilities that will enhance the overall automation framework. In this case the reusable library 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 (snap shots or screen shots of failures).

C. Library Files

Library files consist of the major supporting libraries files which are necessary for the automation. For ex: selenium-server.jar, selenium-java-client-driver.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. The logger component of the framework can be customized in many ways as per the user’s knowledge.

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.
G. Test Screens

As mentioned earlier reusable functions are called to capture the screen shot of the failed tests. The test screen can be customized by the user in the script and could be used to capture the screen shot of the AUT where ever it is required. For Ex: User Name, Password entered wrong. The error message is used as an assertion to trigger the screen capture.
H. Test Scripts

The test scripts are the .java files which represents the test cases of the AUT.

I. Test Suite

Test suite is set up to cover execution of the specified test case name and the priority of the execution takes place contiguously.

DO’S, DON’TS, MERITS & DEPENDENCIES

A. Do’s

1. Ensure the team members are trained on selenium and eclipse.
2. Under the business functionality and construct the framework components accordingly.
3. Create test data sheets and keep updating it for executing scripts to test the validation of the AUT.
4. Screenshot capture is selenium functionality, thus user can design the reusable and flexible framework.
5. Identify object elements using Firebug. It helps in providing the selected object property information.

B. Don’ts

1. Do not depend on the existing framework for longer duration, as it may get outdated and unreliable. Upgrade and additional components needs to be added to make it robust.

C. Merits

1. The data driven automation framework is robust, flexible.
2. Maintenance is easier by designing reusable components.
3. All tools used here are open source hence the money spent around the automation is almost “Zero”.
4. Basic knowledge in scripting is enough for the testers to develop test cases.

D. Dependencies

1. Selenium IDE doesn’t support the recording of user actions on Silverlight applications. Flexmonkim plug-in can be used to record the user actions on flex applications.
2. Selenium IDE is available only for Firefox browser. It can’t be used for other browsers.
3. Difficult to automate dynamic objects and values.
4. Implementing User defined exception handling mechanisms is difficult.

BIOGRAPHIES

Navaraj Javvaji is a QA Lead & Handling both the Automation, Mobile Testing CoEs in AVACORP Technologies Pvt Ltd, Chennai. He has experience in Software Quality Testing with domains like Banking, SOE, Gaming, Mobile Marketing, Telecom, Informative SMS and Mobile Application Development domains like Black Berry, Android, iPhone and good exposure in Automation Testing with open source tools like Selenium and WATIR with web based applications.

Anand Sathiyaseelan an Executive by background, he is currently involved in the team responsible activities for developing different automation frameworks and code coverage mechanism into the company and organizing the process in automation and training for Java Script, Ruby Script, WATIR, Selenium and automation based applications.

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