SELENIUM TEST AUTOMATION FRAMEWORK IN ON-LINE BASED APPLICATION

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ABSTRACT

Software testing is the important method to find bugs and improves the software quality. At present a lot of applications are created in web based applications that execute in a web browser. Web applications are becoming more and more complex that applications are difficult to test manually. It will increase the time and cost. Accurate results can't be provided. This can be avoided by using test automation. The objective of the paper is to make test automation for Web applications using Software testing tool, Selenium. It is a set of testing tool running with multiple browsers, operating systems and many programming languages. Selenium encloses almost all the features to automate tests and it is used to create test cases for web application.

Keywords: *Test Automation, Selenium IDE, Selenium RC, Web Driver, Selenium Grid*

I INTRODUCTION

Software testing is an important process of software program. It is to find an error and improve the quality. The process of testing software in a well intended and efficient way is known as software testing lifecycle (STLC). It can be divided into a number of different phases: planning, analysis, design, test execution, cycles, test closure and final test. Manual and Automation testing process is to help testing the software program application. In manual testing is tested by manually, without using any software tool. It takes more time and execution speed is slow, manual testing error can occur easily. There are distinct phases for manual testing like unit testing, integration testing, system testing and user acceptance testing.Automation testing is known as test automation. It increases the test coverage, improve accuracy and save time. Test automation is the use of testing tool and reduces the manual task. Automation testing is more reliable, faster than manual work and numbers of resources for task are reduced. It can reuse tests on different versions of an application and run more tests in less time. Many automation testing tools are available in the market. There are many things to be considered for selecting the testing tool. It is ease of integration, compatible with the design & implementation of the application, performance of tests and maintenance. These are all offered in an automation testing tool selenium. It is not a single tool but it's having set of different software tools like IDE, Remote control, web driver, grid. Selenium is tremendous software testing for web application.

1.1   Advantages

➢ The code for the same object can be used across different applications. At every level duplication of the work is minimized.

➢ The scripts will be of uniform quality since they make use of the same code.

➢ In automated testing, tests perform the same steps are executed at every time but in manual testing tester make many mistakes.

➢ Simple modifications to the application can be easily handled in the code.

➢ Test cases are stored and maintained, if any error occurs, we can easily check that error.

II TECHNICAL OVERVIEW

2.1 Web Testing

Web testing is completely focused on web based applications. This testing is to help reduce the efforts required to test the web applications, minimize the cost, increase software quality and used to reuse the test cases. There are different web testing are available like functional testing, compatibility testing, load testing, regression testing and performance testing.

- *Functional Testing:* It is s software testing process, which is used to test the functionality of the application. It will check the validations on all fields; verify page redirection, business logic & calculation.

- *Compatibility Testing:*Web based applications are tested on different browsers. It makes sure that the application will be reliable on all browsers. Applications are compatible with different devices like mobile, notebook etc,

- *Performance Testing:*The performances of web based applications are tested. It is the process of determining the speed of computer, software program and scalability& reliability. Load and stress tests are one of the performance test types.

- *Load Testing:*Load testing is the testing with the target of determining how well the product handles competition for system resources. It will be in the form of network traffic, CPU utilization or memory allocation. For example; multiple applications are running on a compute concurrently.

- *Stress Testing:*   This test is conducting to calculate the behavior when the system is pushed away from the breaking point. It is to determine, if the system manages recover gracefully.

2.2 Web Automation Testing

Manual testing is difficult to test the high competitive websites and web applications. It will be avoided for using web automation testing. It provides the ability to reuse, tests multiple browsers, platforms & programming languages.

Features:

> It saves time
> Minimize the cost
> Improves accuracy
> Less effort and get more results

III SELENIUM SUITE

Selenium was created by Jason Huggins working in Thought Works in 2004. He was working on a web application that required regular testing. He realized that manual testing replication was becoming more and more inefficient; he created a JavaScript program that would automatically control the browser's action. He named this program JavaScriptTestRunner. Afterward he completed this JavaScriptRunner open source which was later re-named as Selenium Core.Selenium is an open source browser automation tool, commonly used for testing the web applications. It automates the control of a web browser so that cyclic tasks can be automated. Selenium is a set of testing tools, working with multiple browsers, operating systems and writing tests in different languages like C#, java,Ruby and Python.
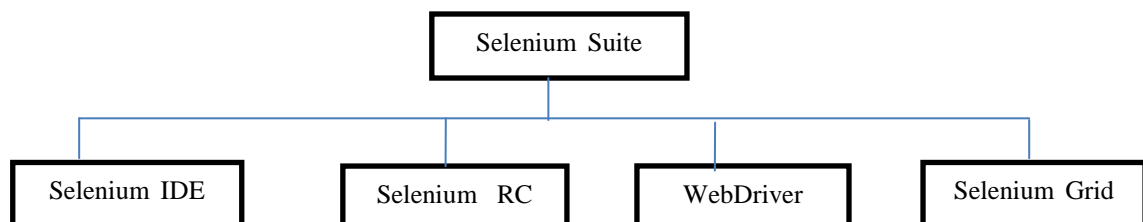

Fig 1: Selenium Suite

Selenium is a suite of four components. First is Selenium IDE, which is an extension for Firefox that allows users to record and playback tests. Second element is Selenium RC which is a server written in java. It accepts commands for the browser via HTTP. Third element is Selenium Webdriver which provides APIs in variety of languages to allow more control and the application of standard software development practices. Finally Selenium Grid, it is possible to use the Selenium APIs to control browser instances distributed over a grid of machines. It allowing more tests to run in parallel.

3.1 Selenium IDE

Selenium IDE (Integrated Development Environment) is a tool to develop Selenium test cases. Selenium IDE was originally created by Shinya Kasatani and donated to Selenium project in 2006. It is implemented as a

Firefox Plug-in that allows recording, editing and debugging the selenium test cases. Selenium name comes from Selenium Recorder. On start-up of the Firefox, the recording option is automatically turned on. This option allows user to record any action done inside the web page. In Selenium IDE scripts are recorded in Selenese, a special test scripting language which is a set of Selenium commands. It is used to test web application. Actions, Accessors, Assertions are the classification of selenium.

3.1.1 Architecture of IDE
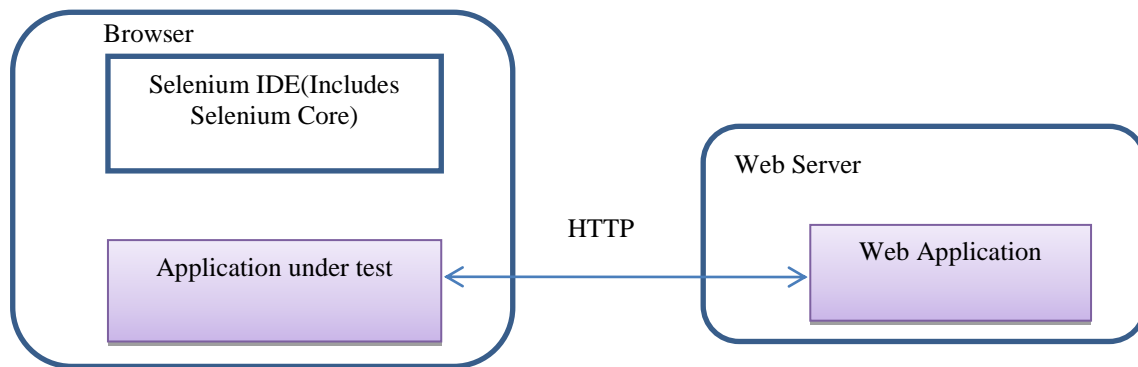
Fig 2: Architecture of IDE

3.1.2 Features

➢ It is simple and easy record and playback.

➢ Selenium Ide supports intellectual field selection options like ID's, XPath and Names.

➢ It saves test scripts in several formats like Selenese, Ruby etc.

➢ Ide allow to customization through plug-ins.

➢ Selenium Ide having an option for adding different asserts options in scripts.

➢ It allows setting breakpoints and debugging the scripts.

➢ It also supports auto complete commands.

3.1.3 Limitations

➢ Selenium IDE works only in Mozila Firefox and it cannot be used with other browsers.

➢ There is no option to verify images.

➢ It can execute scripts created in selenese only.

➢ It is difficult for checking complex test cases involving dynamic contents.

3.2 Selenium RC

To overcome the Selenium IDE limitations, ThoghtWork's engineer Paul Hammant decided to create a server that will act as HTTP proxy to "trick" the browser into believing that Selenium Core and the web application being tested come from the same domain. This system known as Selenium Remote Control. It is possible to run tests inside every JavaScript compatible browser using a wide range of programming language. Selenium RC has two components

Selenium RC has two parts:

Selenium Server: It uses Selenium core and browser's built-in JavaScript interpreter to process selenese commands (such as click, type) and report back results**.**

Selenium Client Libraries: Client libraries are the API's for the programming languages to communicate with Selenium server.

3.2.1 Architecture of RC
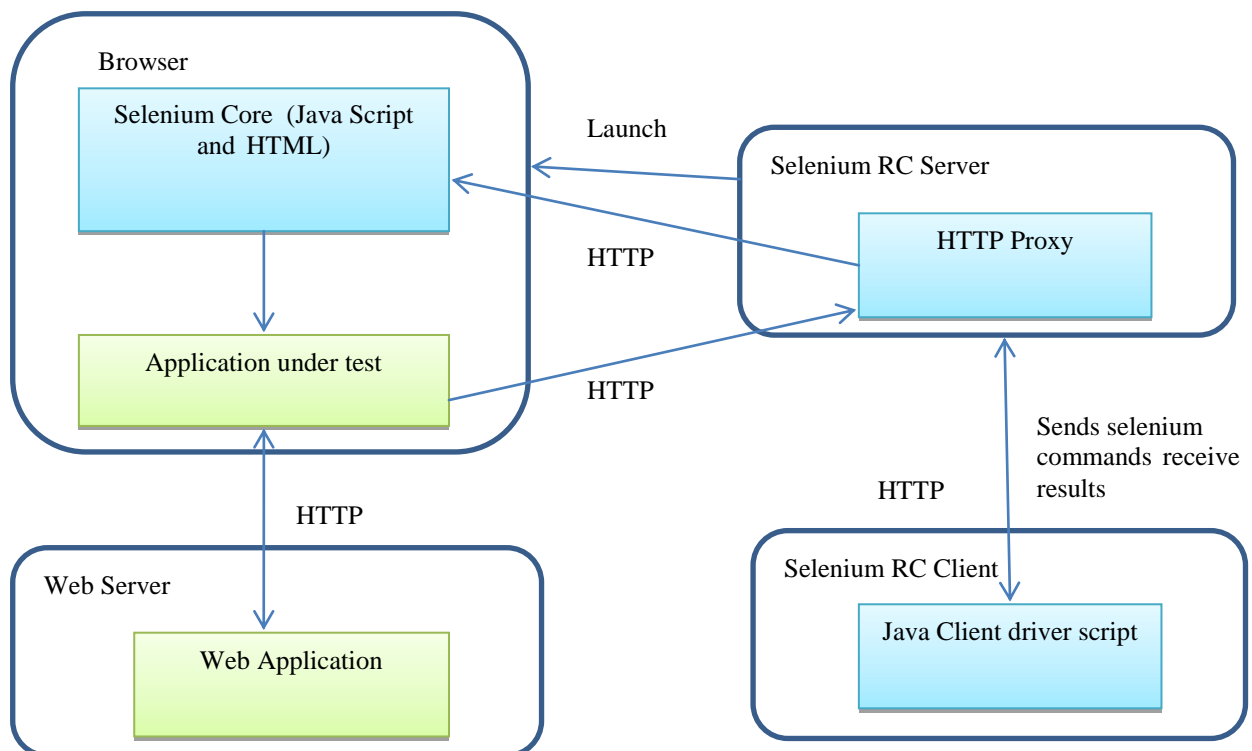
Fig 3: Architecture of RC

3.2.2 Features

- ➢ It faster execution speed than IDE.
- ➢ Cross browser and cross platform
- ➢ Have matured and complete API
- ➢ It can readily support new browsers
- ➢ Selenium can run tests automatically as many times as you want
- ➢ Selenium can support data driven testing
- ➢ It allows the user to use programming language.

3.2.3 Limitations

- ➢ Selenium RC is slow.
- ➢ It has limited features of drag and drop of objects

➢ It struggles when running concurrent tests.

➢ It does not allow simultaneously tests across different OS and browsers.

3.3 Selenium WebDriver

Simon Stewart created WebDriver 2006 when browsers and web applications were becoming more powerful and more restrictive with JavaScript programs like Selenium Core. It was the first cross platform testing framework that could control the browser. To provide a simpler, more concise programming interface. It supports dynamic web pages where elements of a page may change without the page itself being reloaded. WebDriver is the name of the key interface against which tests should be written in Java. Selenium Web Driver is the successor to Selenium RC. It does not need a special server to execute tests. It directly starts a browser instance and controls it. Selenium Grid can be used with Web Driver to execute tests on remote systems.

3.3.1 Architecture of WebDriver
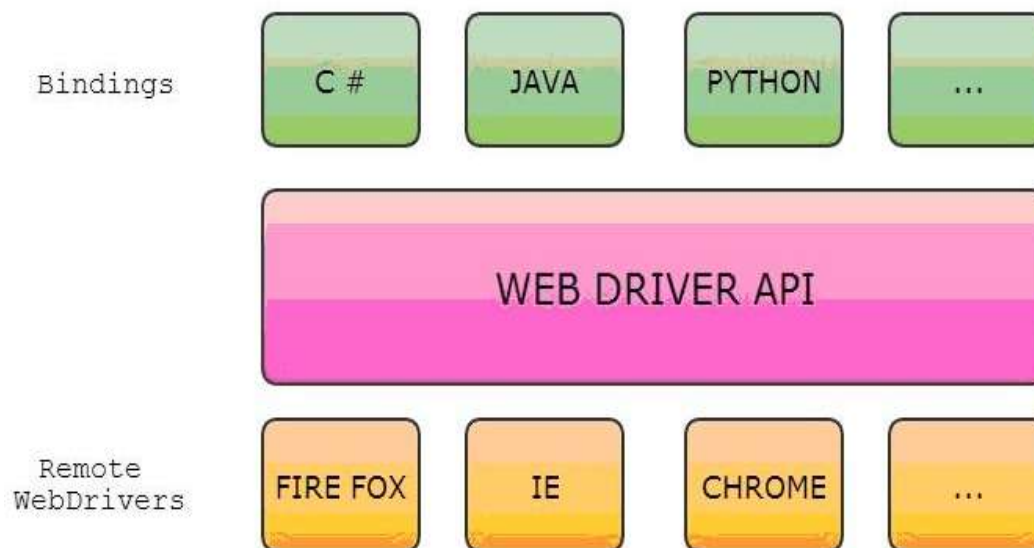
Fig 4: Architecture of WebDriver

Selenium WebDriver makes directly calls to the browser using each browser's native support for automation. There are so many browsers and many programming languages there is need for common specification provided by WebDriver API. Remote Webdriver means each browser has to implement this API.Language bindings will send the commands to the common driver API, on the other end there is going to be a driver listening to those commands and they will be executed in browser using remote WebDriver and it's going to return the result/response via API to the code/Binding. WebDriver API that communicates with the use a common wire protocol which is named as JSON Wired Protocol which is a RESTFUL webservice using JSON over HTTP.

3.3.2 Features

➢ It allows you to execute the tests against different browsers.

➢ Use a programming language of your own choice for creating test scripts

➢ This architecture is simpler than Selenium RC's architecture.

➢ It directly run with the browser by using the browser's own engine to control it.

➢ Support the headless HtmlUnit browser.

3.3.3 Limitations

➢ Selenium WebDriver cannot support new browsers because it operates on the OS level and also different browsers communicate differently with the Operating System.

➢ Built-in commands are not available.

3.4 Selenium GRID

A test of different machines against different browsers in parallel can be run by using Selenium Grid. It runs on multiple tests at the same time against different machines running different browsers and operating systems. Selenium Grid support distributed test execution. It is a server that allows tests to use web browser instances running on remote machines. One server acts as the Hub. Tests contact the hub to obtain access to browser instances. The hub offers list of servers that provide access to browser instances, and let's tests use of these instances. The tests will run parallel on multiple machines, and to manage different browser versions. Selenium Grid has 2 versions - the older Grid 1 and the newer Grid 2.

Selenium Grid uses a hub-node concept. It only run the test on a single machine called   a hub, but the execution will be done by different machines called nodes.

3.4.1 Features

➢ It can be extended by distributing tests on a number of machines. Executions can be done parallel.

➢ It manages multiple environments from a central point and make test to run easily against a huge combination of browsers as well as Operating System.

➢ Maintenance time will be reduced for the grid by allowing you to implement regular hooks to influence virtual infrastructure for instance.

3.4.2 Limitations

➢ Selenium grid by itself cannot run multiple tests in parallel, the framework like TestNG or JUnit are used to provide multiple tests to the grid

IV RELATED WORK

[2] This paper described the drawbacks in Selenium IDE tools, and find out the problems and implement them in selenium. In case testing team uses Selenium IDE only as test automation tool the functionality cannot be tested on all browsers, For that we has used Selenium IDE with Web Driver because Selenium Web Driver compatible with all browsers .So, that Integrating Selenium IDE and web driver in one single package so that recorded tests on IDE can be run as web driver tests from single UI. In this paper we had described the running and recording testing scripts in Selenium IDE with others browser like IE, Chrome and it can only possible with web driver and it's also improved functionality of browsers.

[5] In this paper we have discuss about selenium framework. Selenium is a web automation framework which uses different platform and framework according to the programming language that is used by programmer. Selenium is a set of testing tools and all have different features which are useful for developer. Selenium IDE is use for record and playback as well as for those developers who are new in developing side can also use easily for their work. Developers who are good in programming language can use selenium RC or WebDriver. To run selenium tests parallel one can use selenium grid. Choosing the proper framework one can save time as well as money and can improve software quality.

[7] This paper introduced a new automation framework integrated by selenium and Jmeter. This automation framework shares the test steps and test data which is convenient to switch in various types of testing for web application. It supports multiple browser and operating System. With use of this software framework one can efficiently improve the extensibility and reusability of automation test.

V CONCLUSION

In this paper discuss about selenium framework. The main benefit of using automated tools is to avoid manual effort. Selenium is a web based automation framework which uses different platform and programming languages. These features are record and playback and run in parallel tests. It can reduce the time and provide free software and easier for developers and programmers. Future enhancements are selenium is to test window based application. So nowadays selenium is the best available tool for web applications.

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