

Survey of Selenium Tool

Geetanjali Salunke¹, Priyanka Jadhav², Khushboo Nalband³, Anuja Phapale⁴

^{1,2,3,4} Department of Information Technology
^{1,2,3,4} AISSMS IOIT, Pune, India

Abstract-*Selenium is a web application testing tool and also it is an open source freeware. This automation testing framework has gained wide acceptance as a popular and successful mode of website automated testing in a very short time span. These tools are widely used for testing graphical user interface and functionality of web-based applications developed for all types of industries such as e-commerce, travel, biotech, pharmaceuticals, and other mechanization. This testing freeware renders a cost-effective way which is an open source testing framework for performance and other parameters to ascertain compatibility, accuracy, aspect and consumption of web applications. This paper we did study on the various components of Selenium such as Selenium IDE, Selenium RC, Selenium WebDriver, Selenium Grid Most commonly used commands and comparison with QTP.*

Keywords-Comparison with QTP, Selenium Grid, Selenium IDE Selenium RC, Selenium Testing, Selenium WebDriver,

I. INTRODUCTION

Selenium is a portable software testing framework for web applications. Selenium contributes a record-recap appliance for authoring tests without learning a test scripting language such as Selenium IDE. Selenium is a collection of various software tools each with a different approach to support test automation. Maximum Selenium Quality Assurance Engineers focus on the one or two tools that most meet the needs of their task, but studying all those tools will give you many different options for approaching different test automation issues. The complete testing suite of tools which is available results in a rich set of testing functions specifically geared to the needs of testing of web applications. These operations are totally adaptable that gives many choices for locating User Interface elements and comparing expected test results against actual behaviour of an application. One of Selenium's important feature is the support for executing one's tests on multiple browser platforms [8]. Selenium is basically used for the functional testing of web based applications. It can be used for testing in the continuous integration environment. It is also useful for agile testing. It is the free software that works on all three major platforms – Windows, Mac and Linux. Selenium supports a wide range of programming languages that covers most, not limiting itself to only Java, Ruby, Perl, PHP, C# and Python. The best part of Selenium is it enables you to test webapplications with zero

knowledge of any test scripting language. You can write tests in a number of popular programming languages such as Java, Ruby, Perl, PHP, C# and Python. The tests can be built in most of the web browser platforms. Selenium establishes on most of the platforms namely Linux, Windows and Macintosh. This open-source freeware is released under the Apache 2.0 license and can be downloaded and used without any charges. This paper explains us what exactly the selenium is all about ie the need of selenium testing framework, its components and how it actually differs from QTP tool.

II. RELATED WORK

Selenium is an open source automated testing suite for web applications across different browsers and platforms which supports multiple programming language. Selenium is a type of functional web testing tool. Selenium is not only a single tool which has four components: Selenium Grid, Selenium Remote control, Selenium IDE and Selenium Web Driver. Selenium Integrated development environment is a Firefox plug-in which can be used to develop test cases, Selenium Remote control run tests inside every JavaScript compatible browser (which is now available on all web browsers) using a wide range of programming language, Web Driver was developed for better support dynamic web pages where elements of a page may change without the page itself being reloaded and Selenium Grid allows you to run your tests on different machines against different browsers.[1]

Selenium is a tool designed to generate automated tests and enhance the testing performance. Automated testing is used by software developer to save assets and time. Selenium is known an open source automation testing tool for web based application. It will run directly in the web browser and supports almost all available browsers like Google Chrome, Mozilla Firefox, Microsoft's Internet Explorer, Opera, and Macintosh Safari. It will run on all platforms like Linux, Windows and Mac. It is a very useful tool for System functional testing and browser relationship or compatibility testing. It is really strong as compare to other available automation tools and is very flexible and simple to use[3]

Today everything is web based thus it is becoming more and more complex. For this vast information platform and quick release cycle quick regeneration of site is required. This requires the web application to be all-inclusive,

extensibility and efficiency. For this there exists some framework which includes automation tools. In this paper we will discuss about the Selenium automation testing tool that is used in framework for better results. As we know sometimes there may be a problem arising to choose proper framework for automation testing. Selenium is a set of tools functioning with many Operating Systems, browsers, programming languages and other different testing framework, individually with other different approaches in support of automation test for testing web based application [4]

Software testing is really a time consuming process and also complex. One way of reducing the effort associated with testing is to generate test data automatically. Testing is the most important part of software development. Quality is not an absolute term, it is value to some people or a person. With that in mind, testing can never completely establish the correctness of arbitrary computer software testing furnishes a criticism or comparison that compares the state and behaviour of the product against a specification. Software testing process can yield several artifacts, so we proposed a model to improve quality and correctness and also we reduce the software testing time. [5]

Writing auto testing is a required engineering technique that can save money and time, and in turn helps businesses better retort to changes in real world. But if we use testing framework is not properly used, there will be more problems to be caused. An auto testing framework based on the Selenium is discussed in this article which can help with these problems. The framework will use Selenium application frame work to get page value, DbFit to initiate the database, FitNesse which is used to manage the test component, and a DSL is used to write the test components. This could highly reduce the amount of lines of testing code and the time taken for the project development, lowering the error rate, facilitate writing component/fixture table, improve the productiveness of coding, and quality of final product.[6]

Selenium is a set of powerful different software tools working with many browsers, programming languages, and operating systems and testing frameworks each with a different approach to supporting automation test for testing web-based applications. JMeter which is used to replicate a heavy load in a server, network, any object to test its potency or to analyse overall performance under various load types. JMeter operates at protocol-level, besides the Selenium works at the user-level. Here in this paper, authors frame an automatic software testing framework for web applications based on the JMeter and Selenium which is both open-sources. With the use of the software framework, we readily improve the reusability and extensibility of automated test.[7]

one extension of the Selenium RC tool to perform tests in web applications that require checking data in databases. This verification is operated using new functions implemented into the Selenium framework's core. These functions allow opening as well as closing database connection and comparing test data with data stored in the database used by the web application. This solution intent to contribute to the system quality by reducing the effort during the testing process, as the verification of UI and database elements will be performed at the same time during execution of the test scripts. A case study is described to evaluate the impact of the proposed tool in terms of effort and rate of automation in the development of a new web application project.[11]

A common practice for system testing of web-based applications is to perform the test cases through a web browser. These tests are often recorded and handled by a record and replay tool, such as Selenium IDE. Mining specifications from such tests can be very useful for understanding, verifying, and debugging the system under test. This paper presents an access to mining a behaviour specification from a Selenium IDE test suite such that (a) it captures the behaviour of the tests at a high level of abstraction, (b) the behavior can be simulated, and (c) all the tests are completely reproducible from the specification.[12]

III. SELENIUM COMPONENTS

- A. Selenium IDE
- B. Selenium RC
- C. Selenium WebDriver
- D. Selenium Grid

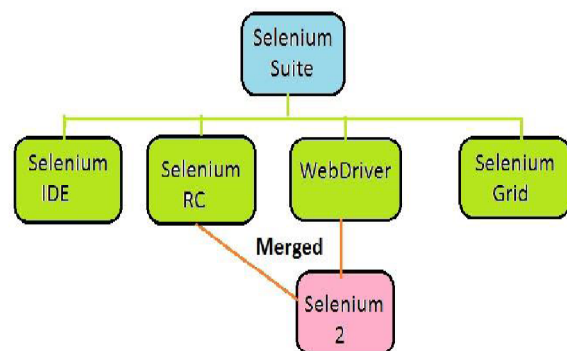


Figure. Components of Selenium

A. SELENIUM IDE

Selenium Integrated Development Environment (IDE) is a Firefox plugin that lets testers to allow testers to record their actions as they follow the workflow that they need to test. Selenium IDE has a recording feature, which archive user actions as they are performed and then exports them as a reusable script in one of many programming languages that can be later executed. It provides a Graphical User Interface for recording user actions using Firefox which is used to learn and use Selenium, but can only be used only with Firefox browser as other browsers are not supported. However, the recorded scripts can be converted into various programming languages supported by Selenium and the scripts can be executed on various other browsers as well.

B. SELENIUM RC

Selenium Remote Control (RC) is a type of test tool that allows you to write automated web application UI tests in any programming language against any HTTP website using any mainstream JavaScript-enabled browser. The RC server also bundles Selenium Core, and automatically loads it into the browser. Selenium opens multiple browsers (one at a time) in this mode and then runs the recorded test-cases which are saved in the language of your choice. This helps in enhancing the test cases with programming techniques to cover all the required checks and test scenarios.

Selenium Remote Control (RC) was the flagship testing framework that allowed more than simple browser actions and linear execution. It makes use of the full power of programming languages such as Java,C#,PHP,Python,Ruby and PERL to create more complex tests.

Selenium RC works in such as way that the client libraries communicate with the Selenium RC Server passing each Selenium command for execution. Then the server passes the Selenium command to the browser using Selenium-Core JavaScript commands.

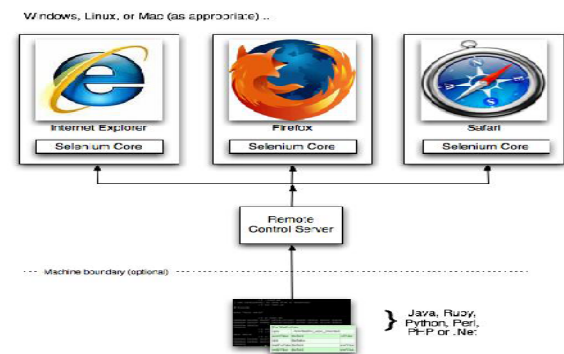


Figure. Architecture of Selenium RC

Selenium RC comes in two parts.

1. The Selenium Server launches and kills browsers in addition to that it interprets and executes the Selenese commands. It also acts as an HTTP proxy by intercepting and verifying HTTP messages passed between the browser and the application under test.
2. Client libraries that provide interface between each one of the programming language (java, C#, perl, python and php) and the Selenium-RC Server.

C. SELENIUM WEB DRIVER

Selenium WebDriver is the successor to Selenium RC which sends commands directly to the browser and retrieves results. WebDriver is a tool for automating testing web application popularly known as Selenium 2.0. WebDriver uses a different underlying framework while Selenium Remote Control uses JavaScript Selenium-Core embedded within the browser which has got some limitations. Web driver interacts directly with the browser without any intermediary unlike Selenium remote control which depends on a Server. It is used in the below context:

The developer community in Selenium strive hard to improve Selenium continuously and Integrating WebDriver with selenium is one among them.

Multi-browser testing including improved functionality for browsers not well-supported by Selenium Remote control (selenium 1.0)

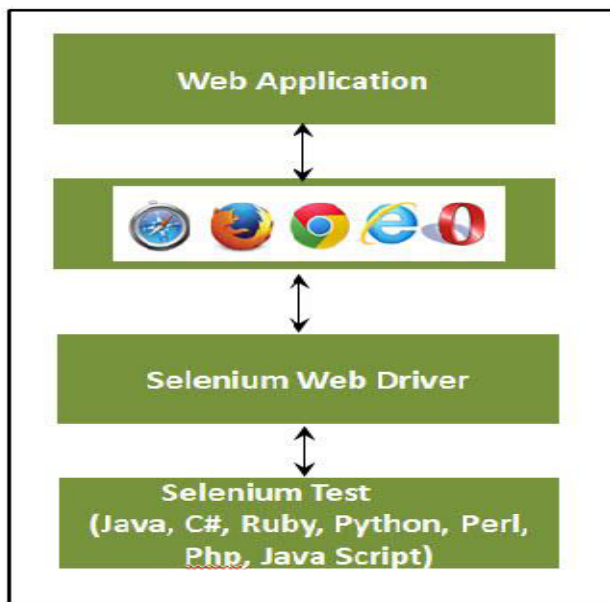


Figure. Architecture of Selenium Web driver

D. SELENIUM GRID

Selenium Grid is a tool used to run parallel tests across different machines and different browsers simultaneously which results in minimized execution time.

Selenium Grid is a tool that distributes the tests across multiple physical or virtual machines so that we can execute script in parallel (simultaneously) that results in cutting down the time required for running tests. This dramatically accelerates testing across browsers and across platforms by giving us quick and accurate feedback.

Selenium Grid allows us to execute multiple instances of WebDriver or Selenium Remote Control tests in parallel which uses same code base, hence code need NOT be present on the system they execute. The selenium-server-standalone package includes Hub, WebDriver, and Selenium RC to execute the scripts in grid.

Selenium Grid has a Hub and a Node Hub - The hub can also be understood as server which acts as the central point where the tests would be triggered. A Selenium Grid has ONLY one Hub and it is launched on a single machine once.

Node - Nodes are the Selenium instances that are attached to the Hub which will execute the tests. There can be one or more nodes in a grid which can be of any OS and can contain any of the Selenium supported Browsers.

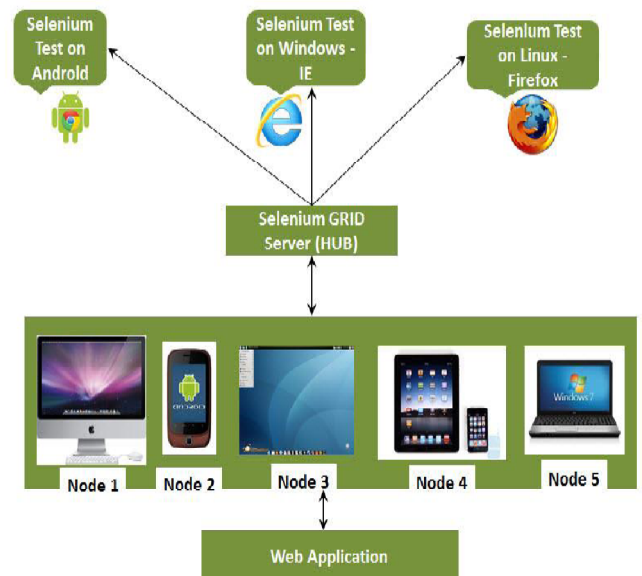


Figure. Architecture of Selenium Grid

Working with Grid: In order to work with the Grid, we need to ensure that we follow certain protocol: Configuring Hub, Configuring Nodes, Develop Script, XML Preparation, Test Execution, and Result Analysis. [13]

IV. CONCLUSIONS

Selenium is an open source software and also a web application testing tool. In a very short span of time, Selenium automation testing framework is gaining wide acceptance as a popular and successful mode of website automated testing. Selenium is the best tool for automated testing of Web-sites today. Selenium is a set of tools that supports rapid development of test automation scripts for web based applications. Selenium testing tools provides a rich set of testing functions specifically designed to fulfil needs of testing of a web based application. It is becoming very popular and it is the first/best choice of automation testers as well as organizations for automating the testing of Web Has great flexibility and extensibility. Along with its tight integration with the browser unmatched by available proprietary tools. Today everything is web based thus it is becoming more and more complex. For this, huge information platform, quick release cycle as well as quick regeneration is required. This requires the web application to be comprehensive, expansibility and efficiency. For this some framework also includes automation tools. You can reduce the cost incurred for licensing using QTP Using Selenium as the Functional Test Automation Tool.

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