

Intelligent Testing Tool: Selenium Web Driver

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Abstract - Testing in Software development process is the most costly and tedious process for QA Testers. As the need of Web applications are growing testing has to grow tremendously to test GUI of these web application hence the automation becomes challenging because of its dynamically changing nature. Numerous automation testing has been done since decade yet they result into halfway automated or need more tester inclusion. Hence tool for testing needs to be invented which has the ability to enhance the testing performance and its competences as well. In this paper we will discuss the new automation testing tool Selenium web driver. Selenium web driver is open source software available for different windows and different web browser.

Key Words: Automation Testing, Manual Testing, Selenium Web Driver

1. INTRODUCTION

Software testing is a procedure of executing a program or application with the purpose of finding the product bugs. It's the process of validating and verifying all the components of a system and also checking it satisfies specified requirements and achieving the expected quality [1].

Manual testing is the process of manually testing software for finding bugs this testing is performed without using any testing tool it requires a tester to play the role of an end user and verifies all the correct behavior of software components. But this testing is not effective for large projects as it requires more resources and time [1].

Automated testing is a process in which tool is used to execute the pre-defined scripts and finding the defects. Automation testing improves the accuracy, saves the tester time and resources. It is suitable for large projects and best in the repeatedly changing environment where huge amount of regression testing is required to be performed it also increases the effectiveness and efficiency of software testing [1].

In this paper we have discussed one of the intelligent automated testing tool Selenium Web Driver is the object

oriented API and newest addition to the selenium toolkit This tool provides all kind of phenomenal features and helped to overcome all the limitations of the old implementation.

Two common methodologies for test automation:

Code-Driven testing.

The interfaces to classes, modules or libraries are tested with multiple and variety of input arguments to validate that the results that are returned are precise [2].

Graphical User Interface testing (GUI).

A testing system that creates UI events, for example, keystrokes and mouse clicks and sees the varieties that outcome in the UI, to approve that the recognizable conduct of the program is exact [2].

1.1 Test Automation

Test automation is the use of special software which automates the repetitive and necessary task and controls the execution of tests comparing actual results with the expected results or perform additional testing that would be difficult to do manually. Many test automation tools give record and playback features enabling clients to intelligently record activities and replay them back to many times advantage of this tool is that it needs no coding or improvement of the software. However this methodology has several disadvantages as tests need to be re-recorded even for small changes in the application like moving the controls renaming the controls. Record and playback also frequently adds indecorous activities or erroneously records some activities [2].

There are many advantages of test automation with respect to execution time, speed of test execution, repeatability of the tests, less human intervention. There are a number of feasible and open source tools available for test automation and selenium is one of the most widely used open source tool [2].

Test automation has many advantages some of these are:

- Repeated regression testing
- Quick feedback to the developers

- Indefinite repetitions of test case execution
- Support for the development methodologies
- Agile and extreme development
- Orderly documentation of test cases
- Customized reporting of the defects
- Finding defects missed during manual testing

1.2 Selenium

Selenium is an open source automation testing tool which is used to test the web application across different platforms. Selenium uses test scripts to execute the test cases within the browser. It uses iframes and Java Scripts to embed the test automation engine into the browser. This helps to run and test same test scripts on multiple browsers on multiple platforms. Selenium is basically used for functional regression testing [2]. Selenium is a suit of components each has its own testing purpose and these components are: Selenium IDE, Selenium Remote Control, Selenium Web Driver, and Selenium Grid [5].

Selenium components:

Selenium Integrated Development Environment (IDE)
Selenium Remote Control
Web Driver
Selenium Grid

Selenium Integrated Development Environment (IDE)

Selenium Integrated Development Environment is a Firefox plugin that allow testers to record their actions. Selenium IDE has a recording feature, which records user actions and then exports them as a reusable scripts in one of the supported programming languages that can be later executed. As it only supports Firefox browser hence all the user actions are recorded using a Graphical User Interface with Firefox browser. These recorded actions then exported to various programming languages supported by selenium and then executed on many browsers [5].

Selenium Remote Control

Selenium RC is the first automated web testing tool that allow users to write web application UI test in multiple programming languages. In selenium RC selenium opens multiple browsers at the same time and then runs the saved test-cases concurrently. Selenium RC not limited to selective browsers it supports many new browsers hence user can run many test-cases with own preferred language this helps in enhancing the performance of test-cases covering all the test scenarios and checks. Selenium RC Use many programming languages like Java, C#, PHP, Python, Perl, Ruby to create complex tests [5].

Selenium Web Driver

Selenium Web Driver is an automation framework tool that supports multiple browsers and Ajax applications and implements a more modern and stable approach in automating the browser's actions. Selenium web driver is also known as selenium 2.0. It controls the browser by directly communicating with it thereby controlling it from the OS level. Selenium web driver supports multiple Programming languages to write the test scripts such as Java, C#, PHP, Python, Perl, Java [3]. Web Driver has a good control on dynamic web pages where the elements of a web pages change without the page itself being reloaded [5].

Selenium Grid

Selenium Grid is a tool used to run parallel tests across multiple machines on different browsers simultaneously which results in saved execution time. Selenium Grid uses hub and nodes concept where hub acts as a central point of selenium commands to each node connected to it. Selenium Grid has only one hub and nodes are instances that are attached to the hub which executes the tests [5].

2. SELENIUM WEB DRIVER: TESTING TOOL

Web Driver drives the web browser, controls the browser action and uses the browser's own engine to control it. Web driver works with web elements of a web page. Initially it locates the web elements on the web page and then performs some action on it. It communicates with all page elements in a more realistic way [3].

Locators in Web Driver

In Web Driver automation everything is identified with web components as it is a web application automation tool. Web Components are DOM Objects exhibit on the Web Page. To perform operations on a Web Element we have to find the Elements precisely [3].

As in the above articulation we need to determine some locator to distinguish web component. "By" is the class, in the class we have distinctive static techniques to recognize components as beneath

1. id
2. name
3. className
4. tagName
5. cssSelector
6. xpath
7. linkText

8. partialLinkText

- **By.id** - Use "id" attribute to locate the element.
- **By.name** - Use "name" attribute to locate the element.
- **By.className** - Use "class" attribute to locate the element.
- **By.tagName** - locates elements by their tag name
- **By.cssSelector** - finds elements based on the driver's underlying CSS Selector engine.
- **By.xpath** - locates elements via xpath.
- **By.linkText** - finds a link element by the exact text it displays.
- **By.partialLinkText** - locates elements that contain the given link text.

- `getText()` - this method is used to retrieve the message of the alert box.
- `sendKeys()` To write some text to the alert

Synchronization in Web Driver

Web Driver has two types of waits -

- **Implicit Wait** - Is utilized to set the default holding up time all through the program. This hold up is less complex to code.
- **Explicit Wait** - Is utilized to set the waiting time for a specific instance only.

Windows Handling in Web Driver

There are Two kinds of windows which we can handle using Web Driver -

- 1) HTML Windows
- 2) Pop-Ups/Alerts

HTML Windows

Many Web Applications has different windows. Web Driver manages moving between named windows using the "switchto()" method.

Alerts

Alerts can be handled using four methods -

- `accept()` - this method is used to accept and close the alert box.
- `dismiss()` - this method is used to reject and close the alert box.

Programming using Web Driver

Web Driver handles Keyboard operations and Mouse Event operations. It contains the Actions classes that are required when executing these events [6].

Below are the most commonly used keyboard and mouse events provided by the Actions Class

Method	Description
<code>clickAndHold()</code>	It performs Click operation without discharging at the present mouse region
<code>contextClick()</code>	Performs a context-click at the current mouse area.
<code>doubleClick()</code>	Performs a double click at the current mouse area.
<code>dragAndDrop(source, target)</code>	It Performs click and hold operation at the region of the source control, at that point moves to the region of the target control, at that point discharges the mouse
<code>dragAndDropBy(source, x-offset, y-offset)</code>	Performs click-and-hold at the area of the source element, moves to a given offset, and then releases the mouse.
<code>keyUp(modifier_key)</code>	Does a key release.
<code>moveByOffset(x-offset, y-offset)</code>	It performs Moving operation on mouse from its present position to the provided offset.
<code>release()</code>	Releases the pressed left mouse button at the

	present mouse location
sendKeys(onElement, charsequence)	Sends a sequence of keystrokes onto the element.

Limitations

However, despite all advantages of selenium web driver, it has some limitations. Selenium web driver has no built in report generation functionality. Selenium web driver has no built in screenshot generation functionality. It is dependent on the third party tool for report and screenshot generation [4].

3. FUTURE WORK

There is scope of running scripts at the background without disturbing the foreground processes so tester can work with different task along with running the test scripts at the background. It will help in reducing the execution time by executing the test cases concurrently in multiple browsers on multiple machines at the background what we need to do is to implement the code that will support the Multithread concept and minimizing the browser and run at the background. The future Implementation picture looks like figure 1

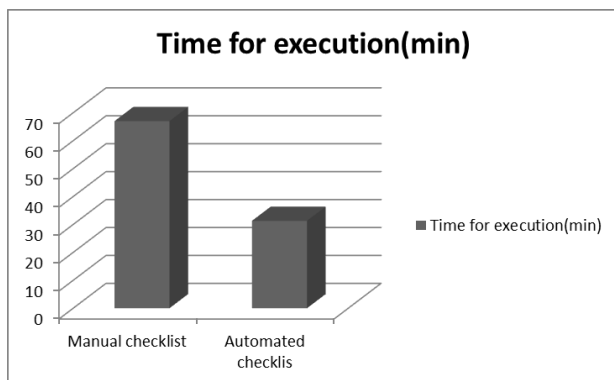


Fig -1: Execution Time

4. CONCLUSION

Selenium Web Driver is a tool for in-Web Application testing, begun by just contemplation and now it is being utilized effectively by both the engineers and clients. The most essential highlight of this tool is that it additionally encourages the testing of web applications alongside enhancing testing speed and reducing execution time for repetitive test cases. Selenium Web Driver is positively an advantage for any individual who is hoping to include an effective web testing tool to their toolbox.

5. REFERENCES

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