

TEST AUTOMATION IN SOFTWARE QUALITY ASSURANCE

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Abstract - Nowadays many software applications are developed as web-based application that runs directly via Internet connectivity & testing has become a very important activity in Software Development Process & Software Industry. It is very difficult to test such huge and complex web-based applications.

Automation testing uses automation tools to reduce human intervention and avoid repeatable tasks. In software testing, automation testing plays a very important & key role for improving quality of software product. Sometimes manual testing may not be effective due to its lack of coverage, none repeating in nature & inconsistency. To overcome this Automation is used in software industry. The importance of improving & controlling the quality of web-based applications will increase its economic relevance. Automation testing increases work efficiency decreases the cost to deliver a high quality & stable product at the end. Automated testing is process through which fast & effective testing can be achieved successfully. This quality of automated testing has made it an essential part of software development process. In this paper we will discuss about Test Automation Advantages, pre-requisites, reason to use automation testing, Automated Testing Process, Selenium overview, features, limitations etc.

Index Terms - Automation testing, Automation testing framework, Selenium IDE, Selenium RC, Selenium Grid, Selenium web-driver, Web applications.

1.1 INTRODUCTION

The process of software testing in a well intended and efficient way is known as (STLC) - software testing lifecycle. Automation testing is suitable for best in the repeatedly changing environment & large projects where huge amount of regression testing is required to be performed it also increases the efficiency & effectiveness of software testing. It can be divided into a number of different phases: planning, analysis, design, test execution, cycles, test closure and final test. Test automation is used to reduce the manual task. Automation testing is faster than manual work, more reliable and numbers of resources for task are reduced. It can run more tests in less time & reuse tests on different versions of an application. In this paper we have discussed one of the intelligent automated testing tool called Selenium Web Driver which 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 implementations.

1.2 ADVANTAGES

- Automation Testing Improves Accuracy & Increase Test Coverage.
- Code for the different requirements can be reused across different applications.
- At every level duplication of the work is reduced.

- Automation testing achieves what is not possible by manual testing.
- Since they make use of the same code the scripts will be of uniform quality.
- Repetitive work performed by manual tester is minimized using Automation.
- In automated testing, tests perform the same steps are executed at every time but in manual testing tester make many mistakes.
- Test cases are stored and maintained properly, if any error occurs, we can easily check that error.
- Automation Testing is less expensive & takes less time to execute.
- Generates customized report of the defects.

1.3 PRE-REQUISITES

- Developed build should always be stable.
- Filtering the automated test cases.
- Experienced & skilled resources.
- Application or module that does not change frequently.
- Segregation of test cases that needs to be automated.

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- Use of procedures & reusable functions.

1.4 REASON TO USE AUTOMATION TESTING

- Increase quality and reduce costs.
- Manually testing recurring processes and known functionalities costs departments a lot.
- Save Time & Faster Time-To-Market.
- Maximum Risk Coverage
- Parallel Automation
- Agile Development Made Easy
- Increased test effectiveness.
- Finds maximum bugs

to build the test scripts. It is a Firefox plug-in allow us to record edit & debug the selenium test cas- es. It records all actions performed by the end user & generate the test scripts. Selenium (RC) remote control

1.5 AUTOMATION TESTING PROCESS



2.1 LITERATURE REVIEW

Jason Huggins while working in Thought Works in 2004 created Selenium. While working on a web-based 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 brows- er's action. He named this program JavaScript- TestRunner. Later he completed this JavaScript Run- ner open source which was later re-named as Selenium Core. Selenium is an open source browser automation tool, commonly used for web-based applications test- ing. 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, operat- ing systems and writing tests in different languages like Ruby, C#, java & Python.

Selenium is composed of multiple software automation tools such as Selenium RC (selenium 1.0), Selenium IDE and Selenium web-driver (selenium 2.0). Selenium IDE is an integrated development envi- ronment

was main selenium project for long time. Selenium RC is slower than the selenium webdriver because it uses the java script program called selenium core. Selenium RC requires starting the server before executing the test scripts. It doesn't support the Ajax applications. To avoid the limitations of selenium RC, selenium webdriver has been invented by merging selenium and webdriver. Selenium webdriver is also known as selenium 2.0

Selenium is a suite of four components.

- **Selenium IDE:** Selenium IDE is an extension for Firefox that allows users to record and playback tests.
- **Selenium Grid:** 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.
- **Selenium RC:** Selenium RC is a server written in java. It accepts commands for the browser via HTTP.
- **Selenium WebDriver:** Selenium WebDriver, which provides APIs in variety of languages to allow more control & the application of standard software development practices. Selenium webdriver directly communicate with the browser, so selenium webdriver is faster than selenium RC. Selenium webdriver supports multiple web browsers and also support for Ajax applications. The main goal of the selenium webdriver is to improve support for modern web application testing problems. Selenium webdriver supports multiple languages to write the test scripts. However, despite all advantages of selenium web driver, it has some limitations when testing the web applications. Selenium webdriver does not have in built functionality to generate the screenshots for failure test cases. Selenium webdriver does not have inbuilt capability to generate the test results. It completely depends on third party tools to generate the test re-



ports. This limitation can be avoided by using TestNG framework.

competition for system resources. It will be in the form of network traffic, CPU utilization or

2.2 FEATURES

- It allows us to execute the tests against different browsers.
- Use a programming language of our own choice for creating test scripts.
- It directly runs with the browser by using the browser's own engine to control it.
- Support the headless HtmlUnit browser.

2.3 LIMITATIONS

- No reliable Technical Support from anybody.
- It supports Web based applications only.
- Difficult to Setup Test Environment when it compares to Vendor Tools like SilkTest, UFT & RFT etc.
- Limited support for Image Testing.
- No Built-in Reporting facility.

3.1 WEB TESTING

Web testing is completely focused on web-based applications. This testing helps to 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, performance testing, load testing & stress testing.

- **Functional Testing:** It is a software testing process, which is used to test the functionality of the application. It will check the validations on all fields; verify page redirection, calculation & business logic.
- **Compatibility Testing:** It makes sure that the application will be reliable on all browsers. Web based applications are tested on different browsers. Applications are compatible with different devices like mobile, notebook etc.
- **Performance Testing:** It is the process of determining the speed of computer, software program and scalability & reliability. The performances of web-based applications are tested. Load and stress tests are one of the performance tests types.
- **Load Testing:** Load testing is the testing with the target of determining how well the product handles

3.3. TEST AUTOMATION FRAMEWORK

Testing framework is a set of rules or guidelines used for creating & designing test cases. A framework is comprised of a combination of practices and tools that are designed to help QA professionals test more effectively.

It is not possible to automate every test case in a software test plan. The tests that need to be automated must be first decided by the testers. Hence testers must first decide which tests are to be automated. Testing all connections with database, GUI items, validations etc. can also be efficiently automated. Following factors are mainly considered while deciding to automate tests: Products that needs performing the same tests again and again. Requirements of product do not change frequently. Automation can be done by using languages like C#, Java, vbscript and automated software tools. There are a bunch of tools available that help in test automation. Typically, JUnit Automation Framework can be used for unit testing. Selenium is used for web-based application testing along with Selenium Web Driver. These tools help us to create testing framework. A Test Automation Framework can be defined as a collection of procedures, abstract concepts, processes and environment in which automated tests will be designed, created and executed. In addition, it includes the logical interactions of these components and also the physical structures used for test creation and implementation.

There are different types of frameworks:

- **Keyword driven Framework** - A keyword-driven testing is a scripting technique that uses data files to contain the keywords related to the application being tested. A keyword-driven framework is an action word based testing or table-driven testing. This is used to speed up automated testing by utilizing the keywords for a common set of actions.

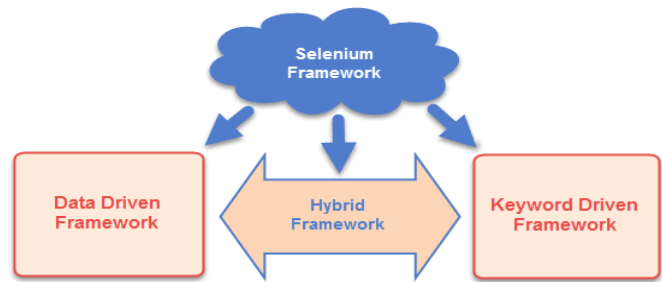
- **Data driven Framework** - Data Driven is a test automation framework which stores test data in an external files such as excel, JSON etc. In this framework, input values are read from data files and are stored into a variable in test scripts. It enables building both positive and negative test cases into a single test.

- **Hybrid Framework** - Hybrid framework is a concept where we are using the advantage of both keyword and data driven framework. Here for keywords, we will use Excel files

to maintain test cases, and for test data, we can use data provider to TestNG framework.

4.1 CONCLUSION

In this paper we have explained types of automation testing framework to test the web based applications based on selenium WebDriver. In order to test the web-based application proposed automation framework surely reduces the time required to write the test cases and increase the pass percentage of test cases. It also reduces hectic workload of manual tester. By using this framework one can generate the custom- ized test reports and also analyze the failures using screenshots of failed test cases. Tester can maintain the all data from central place. This framework is very useful for dynamically changing web-based applica- tions. The automation test scripts are easy to under- stand using this framework. In this way automation framework helps organization to test web-based appli- cations efficiently. The main benefit of using automat- ed tools is to avoid manual effort.



5.1 REFERENCES

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