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Selenium Automation Testing Tool: A full-scale Review

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Abstract: - *Programming testing is a fundamental part of the product improvement process. Numerous product programs are presently accessible as electronic applications that might be gotten to through an internet browser. Automation testing lowers test costs and boosts job productivity, resulting in a high-quality, dependable product. Web apps add to the complexity of the programme, making it tough to test manually. It will take longer and cost more money. It's difficult to concoct right outcomes. The motivation behind this venture is to utilize the Selenium programming testing instrument to give test robotization to Web applications. It's a set of testing tools that work with a variety of browsers, operating systems, and computer languages. Selenium is a test automation framework that is used to create test cases for online applications. It has practically every one of the qualities expected to mechanize tests.*

Keywords: *Automation Testing Tools, Automated testing, Test Automation, Web Driver, Selenium IDE, Selenium.*

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I. INTRODUCTION

1.1 Software Testing

Software testing is a fundamental and crucial component of the software development process. Testing is the process of evaluating a system or a module by providing defined inputs and comparing them to the desired outputs in order to identify and correct differences between the desired and actual outputs. Software testing can be divided into two groups. There are two types of software testing: manual testing and automated software testing [1] [4]. By integrating computerized testing into the product improvement process, we can get various advantages.

The utilization of a model to computerize the development of both manual and mechanized experiments and scripts sets aside time and cash while likewise helping inclusion and diminishing chance to-showcase.

1.2 Approaches to Testing

Manual Testing is the process of manually testing software or applications without the use of software automation tools or test scripts. Manual testing is the process of manually testing software or applications to detect problems and ensure that they meet the requirements. To ensure correct behaviour, a tester must play the position of an associate user and use the majority of the application's features [13]. Each and every piece of computer code is unique. Elementary testing is complete. Because automation testing is not practicable, manual testing is needed. Automation testing is more dependable, faster than human testing, and requires fewer resources. It can run more tests in less time by reusing tests across multiple versions of an application. There are numerous factors to consider while choosing a testing tool. It is simple to integrate, compatible with the application's design and implementation, test execution, and maintenance.

Test computerization is expected for consistent conveyance and testing. Robotization testing deals with most of manual testing issues. Robotized testing expects to supplant as a significant part of the manual testing as possible with a predetermined number of contents. Automated testing software can perform tests, report on results, and compare results to previous test runs. Automation is not a total replacement for manual testing; rather, it is a continuation of manual testing with the goal of improving accuracy and speed.

1.3 Manual vs. Automated Testing: A Comparison

Table 1.1 Comparison between manual and automation testing [11].

1.4 Automation's Advantages

The execution of automated tests is substantially faster after the initial time spent creating test scripts. Test scripts cannot be forgotten after they have been produced and uploaded to the test suite, however manual testers may forget to complete some tests. Furthermore, automated tests are more accurate than manual tests since they are free of human mistake. As a result, businesses have discovered that automation software testing is an essential part of a successful software development project. What makes automated testing so vital to today's software organisations is that they invest more money in Test Automation solutions [12]. They are:

- Automation Testing takes less time and is less expensive to complete.
- Accuracy is improved through testing.
- Increase the number of tests you run.
- Automation testing accomplishes what manual testing cannot.

Automation Testing is used to quickly and regularly re-run test suites that were previously conducted manually. It is beneficial to both developers and testers [3]. Companies prefer "Automation Framework" for automation testing. The tester's main goal is to uncover all possible flaws in the software and report them to the developer so that the product's quality can be improved [6]. When it comes to client happiness, software quality becomes critical.

- Perform Manual testing is a tedious technique that requires more exertion, isn't reusable inferable from the absence of a prearranging choice, and misses a few issues.
- Automation testing solves all of the challenges associated with manual testing by utilising automation frameworks like as Selenium, QTP, and Win Runner. Manual testing is inconvenient and ineffective. Automation testing is more convenient and efficient. We can also save time and costs by automating testing.

There are two kinds of testing instruments:

- Open source software testing tool. (Selenium Web Driver).
- Commercial testing software (QTP, Win runner, QA Load, and QA Test).

II. ANALYSIS

A system's behavioural feature is represented by a quality factor. Correctness, dependability, efficiency, testability, portability, and reusability are examples of high-level quality factors [8]. External qualities of a software system are known as quality factors. The test-ability of a system is more important to the software quality assurance team so that other factors like correctness, dependability, and efficiency may be easily confirmed through testing [10]. Functional quality, on the other hand, is usually imposed and measured through software testing. Quality cannot be determined by evaluating a finished product. As a result, testing is critical in achieving and evaluating the quality of a software product.

On the one hand, during development, we perform a test–find defects–fix cycle to increase product quality.

2.1 Automated Software Testing Requirements

None of the tests are automated. For a test to be automated, it must meet specific criteria. There are a variety of reasons for this, including financial constraints and a lack of manpower. There are a few fundamental questions whose answers can help you determine whether or not the test should be automated.

They are as follows [14]

• Is it possible to characterize the test arrangement's activities?
• Is it important to rehash the means in the grouping a few times?
• Is it conceivable to mechanize the strategy?
• Is the test application's presentation a similar whether it's computerized or manual?

• Is it important to run the tests on a wide range of equipment designs?

2.2 Life Cycle Diagram of the Test Automation Process

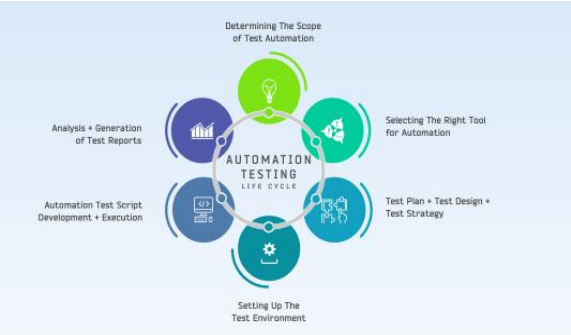

Figure 2.2.1: Automation lifecycle [12].

2.3 Complete Test Automation and Create a Test Plan:

This step determines which tests can be automated. The method of test automation is comparable to that of software development. Automating a test requires a similar amount of effort. It follows a similar cycle to that of a software development project [5].

III. SELENIUM INTRODUCTION

The Selenium Platform is a free and open-source test robotization system for mechanized testing. Selenium is a gathering of programming devices that permit you to follow test robotization in an extraordinary strategy. It permits you to manage across a wide scope of working frameworks and programs. It works with an assortment of programming dialects. Counting yet not restricted to Groovy, Ruby, Perl, Python, Java, C, and PhP. Selenium is made up of a number of components, the most important of which are three tools. Everyone has a certain job to play in the event of web application test automation.

- **Selenium IDE** : Selenium IDE gives a graphical UI to making Selenium experiments. Selenium IDE is a Firefox add-on that permits analysers to record their activities as they travel through a cycle.
- **Selenium RC** : A client-server design takes Selenium orders from the manager and runs them through the program. It generates more complicated tests by utilising the full capabilities of programming languages such as Java, C, PHP, Groovy, Python, Ruby, and PERL.
- **Selenium Web Driver**: The heir to Selenium RC, Selenium Web Driver gives commands to the browser and returns results.
- **Selenium Grid:** Selenium Grid is an answer that permits you to run tests in lined up on various PCs and programs simultaneously, bringing about a more limited execution time.

Web applications, in comparison to desktop systems, require additional modifications, such as system updates, security assaults, and user preferences. Companies cannot afford to apply regression testing to a system as a whole since the expected turnaround time for patches is low. They offered a solution to this problem when businesses are confronted with security breaches. In this case, regression testing is only applied to the code that has been changed.

It contains a variety of characteristics that are beneficial to developers. Selenium IDE is used for recording and playback, and it is also easy to use for developers that are new to the development side.

Selenium RC or Web Driver can be used by developers who are proficient in programming languages [10]. The selenium grid can be used to execute concurrent selenium tests. By selecting the appropriate framework, one can save time and money while also improving software quality.

The phases of the Selenium testing process are as follows:

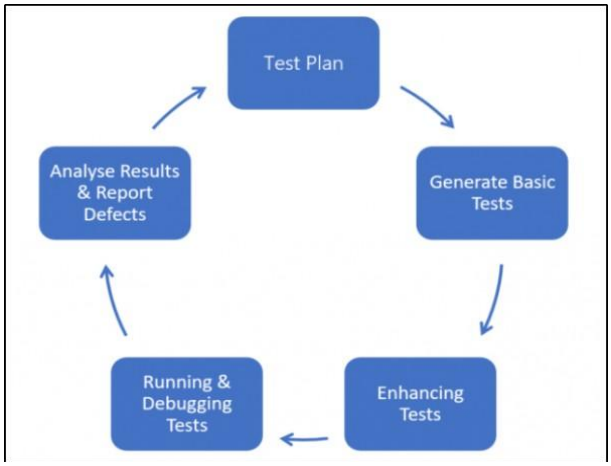

Figure 3.1: Selenium Testing Process [4].

IV. FRAMEWORK FOR AUTOMATION TESTS

In a software test plan, it is impossible to automate every test case. All GUI elements, database connections, validations, and so on are being tested. Can also be efficiently automated. When selecting whether or not to automate testing, take into account the following factors: Products that necessitate the repeated administration of the same tests. Product specifications aren't updated too often. Languages such as Java, vbscript, and automated software tools can all be used to automate processes. Test automation can be aided by a variety of tools. Unit testing is usually done with the JUnit [6] Automation Framework. Selenium [2] [7] and the Selenium Web Driver [7] are both used for web application testing. These instruments aid in the development of a testing framework.

It also covers the logical relationships between these components, as well as the physical structures necessary to create and implement tests.

Figure 4.1 depicts the framework structure. It includes the selenium [2] module, which is critical for the interplay between the framework and the web application under test.

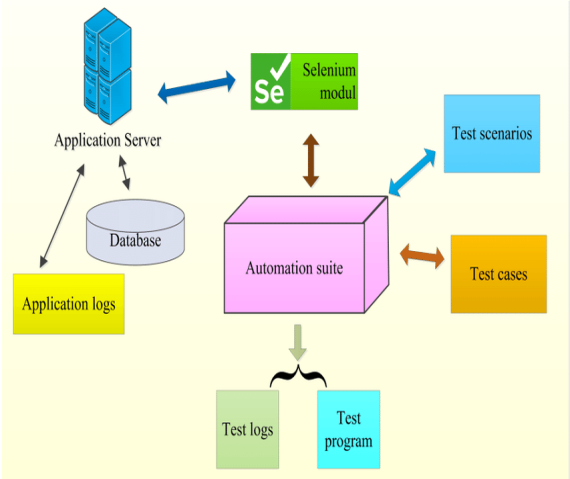

Figure 4.1: Overview of automation framework structure [5].

Frameworks come in a variety of shapes and sizes:

- Linear Structure–This is the most basic framework. A single programme was built for successive stages in a test script. There is no modularity.
- Data driven Framework - A system like this is utilized to test the way of behaving of an activity with a variable arrangement of information.
- Keyword driven Framework -Keyword-driven GUI provides a list of keywords that are used to create test cases. Some arguments or values may be required in order to utilise the keyword. Each keyword has its own set of arguments, which can be either a static value or a value from a data table.

V. CONCLUSION

The concept of testing and several testing methodologies were introduced in this study. It will assist you in comprehending the significance of test automation. The objective of a computerization testing method is to assist with programming program application testing.

From HP-QTP through Selenium, there were different web robotization devices accessible. Our examination paper centres son giving a complete outline of all web test mechanization innovations, and it goes about as an asset for future Selenium specialists. Analysers should examine the highlights of numerous apparatuses prior to settling on the most ideal one to make it happen.

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