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WEB AUTOMATION USING SELENIUM IN JAVA

Nitin Upadhyaya, Aniket Pant, S. Karthikeyan, Anusha LS

[1,2,3,4]*Dept. of Electronics and Communication Engineering, RV college of Engineering, Karnataka, India*

Abstract - *A company designing a product highly focuses on quality assurance as it is the most important step in a product development cycle. Quality assurance through automation testing confirms the deliverance of a stable product for the customer consumption. This paper elaborates the process of automation of a website in a corporate environment. Testing of a product happens in two stages, first, the Manual testing. Manual testing ensures that the product is operating the correct way. The second stage is the Automation stage. Automation of test cases verified by the Manual testers is called Automation Testing. Automation testing is an important part in the testing process as it can verify the continuous logical and behavioral functionality over a long period of time without the Human labor involved in Manual testing. As a Product gets updated, the automation scripts for the test cases need to be updated too. Thus, the maintainability of the test script becomes a shortcoming.*

Key Words: *Automation, Java, Testing, Web Automation*

1. INTRODUCTION

Quality engineering is defined as the discipline of engineering which concerns itself with the service quality control and assurance and practices and principles of product. Gaps, errors or missing requirements as opposed to the actual requirements are identified with software testing. It can be either done using automation tools or manually.

Browsers can be used to access information and perform a variety of tasks. Browser automation tools for web browsers can perform error prone and repetitive tasks, such as filling long HTML forms. The web driver architecture is shown in Fig 1. Automation tools need to accommodate different skill levels. Sophistication of libraries and scripts depends on whether the automation is being done by a non-programmer or a advanced programmer.

The working of web browser automation tools is basically a recording of the steps in series that make up a transaction, and then by injecting JavaScript into the target web pages they play it back, followed by tracking and getting results.

Browser automation is a big part of web automation. Its main aim is to mimic how people use web browser to automate scenarios which keep repeating. It usually happens with a computer acting like a human, the process gets fragile and complex. Browser interactions are based on HTML markup, which is very often not composed with this thought in mind. HTML structure changes often. Browsers interact through network inheriting all its failures and unreliability.

2. PROBLEM STATEMENT

Websites belonging to companies in the corporate world are complex and ever-changing products which need to be tested for their bugs and irregularities on a regular basis. Due to their complexity and multiple pages, each website will have large number of test cases. Manually testing is a time and labor-intensive process.

3. LITERATURE REVIEW

In [1], the asset use of load test based on Selenium in various designs was read for load test execution. The most significant discoveries are that, headless browsers expend extensively less assets than different kinds of browser examples. Likewise, the limit of a load driver can be expanded by minimum 20% by sharing instances among client cases.

In [2], it is found out that Software testing is viewed as the most significant advancement in an SDLC. The primary target of procedures of testing is to contrast the got outcomes and ones known by the end-user. Work of a tester is eased by automating the part involving execution by using a specific software. This centers around utilization of selenium's webdriver to check an application and to exhibit this device's utilization in blend with different devices like TestNG, Maven and so forth., for increasingly simpler ways to deal with improving the nature of testing.

In [3], light is thrown on the advantages and disadvantages of using Git. Git has a wide range of commands assisting the developer to work with it and use the repository. It empowers the developer to work more efficiently. Git allows developers to branch more often to not disturb the code of the master. Within the private branch, the developer can do as desired. Disadvantage of git is that these operations can destroy or damage information about changes in the history of the code which are essential for continuous data development if the merge procedure is not overseen meticulously.

In [4], it is given that software testing is the procedure of execution of a program, having the aim of finding errors so that a software with null defect is accomplished. Hence, different testing strategies have been utilized over time. Lots of improvement has been done in this field of research. This field will gain more of significance in the future. Test case generation has numerous strategies. This paper tells us about the different perspectives of software testing, for example, importance of programming strategies and testing standards. In addition, it gives a relative report on the various types.

In [5], it is seen that there are two ways to perform software manually or by utilization of automation tools to survey the quality of the product, identify defects and being about trust in the created product. Tool for automation help in designing and executing test scripts saving the cost and time spent in manually testing the same. Automation tools are the main focal point of this paper which are currently available to support design and execution action.

4. COMPONENTS OF AUTOMATION SCRIPTS

The process of automation combines multiple software and programming languages. A strong sense of object-oriented programming in java is required to use java with selenium to run automation scripts. Most browsers are built using HTML and JavaScript hence requiring a thorough understanding of the same. Selenium, being a powerful tool, supports multiple frameworks like TestNG and maven on which frameworks are built. All these elements combine to make up an automation script.

4.1 Programming Language

Java: Java is powerful computing language that combines the advantages of previous languages like C++ and C with an elegant design. In addition to this, Java contains in itself many powerful and support software libraries for various tasks such as database, graphical user interface (GUI) programming, and network. The following explanation will be based on the Java language and its advantages for its usage in Selenium.

Java is an object-oriented (OO) programming language. This means that in order to code in Java, one requires to use and abide by the rules of object-oriented programming. This concept is a continuation from the previous programming languages. Object-oriented languages give an advantage over others by creating an object of a class which acts as a vessel holding everything inside the specified class for others to use. This emulates the real-world representation in a way that non-Object-Oriented languages just cannot. Therefore, Java is superior to the previous coding languages.

JavaScript**:** JavaScript is a programming language largely used for mobile application development and direct website source code manipulation The content of Dynamic HTML (DHTML) is developed using JavaScript. It can also be integrated with its accompany languages such as Java. It is the language of choice for application developers in leading application development tools such as Android Studio.

4.2 Tools and Framework

Selenium: It consists of many tools for automation such as the IDE of selenium, selenium RC and the webdriver available for selenium which automations testing uses. IDE which stands for integrated development environment, helps in creating scripts for tests. It accounts for all the performed actions by the highest user and creates scripts for automation testing. The webdriver for selenium communicates with the internet browser, so it is quicker than the RC. It provides compatibility with browsers and supports applications of Ajax. The aim of the webdriver is to boost contemporary testing problems that come along with web applications. It shows compatibility with many programming languages to create the test scripts.

Limitations of the Webdriver: During automation testing, some test cases fail and since there is no functionality to take a screenshot for these, it is a drawback. The in-built ability to come up with results of tests the cases failed or passed or even skipped is absent and that is also a drawback. It is dependent on the other tools to come up with the reports for tests. These drawbacks of generation of test reports post the automation run is often avoided by the usage of the TestNG framework.

Test NG: it's a testing framework designed to overcome the constraints faced during the usage of JUnit testing framework. Compared to JUnit, TestNG has many new add functionalities which makes it powerful testing framework. All areas of tests like functional, integration, unit testing is covered. Eclipse IDE along with TestNG can perform report generation and parallel execution of multiple test cases. All failed and passed test cases are accounted in the TestNG generated report. The test case failure link is also given in this report. Web application defects can easily be determined by developers through this functionality.

Maven: A substantial tool for management of projects that supports POM methodology (project object model). It is utilized mainly for dependency, documentation and build of projects. Simplification of the build process is taken care by Maven. Maven with none problem utilizes the repository that may be a repository may be a directory where all the project jars, library jar, plugins or the other project specific artefacts are available. Plugins, project and library jars, and other artefacts are stored in maven.

5. METHODOLOGY

In a corporate environment the approach to automation of test cases for a website starts with the planning meeting. Each project on which the Automation team works, is scattered into number of Sprints, which spans for over a few weeks as per the agile methodology. This sprint meeting involves the capacity planning and the workload planning of the entire team.

The update of the progress on the work, and the update on any blockers faced by any of the team members towards the completion of the work item, can be discussed on a daily based meeting, known as Scrum meeting, where each one shares their status on the work item completion and discusses any issues or any common pain areas.

The types of works which can be assigned, involve server related works, Automation related works or the framework related works. Each company has test cases which must be automated to make sure the website functions without any

faults. The automation of these test cases occurs in the following format.

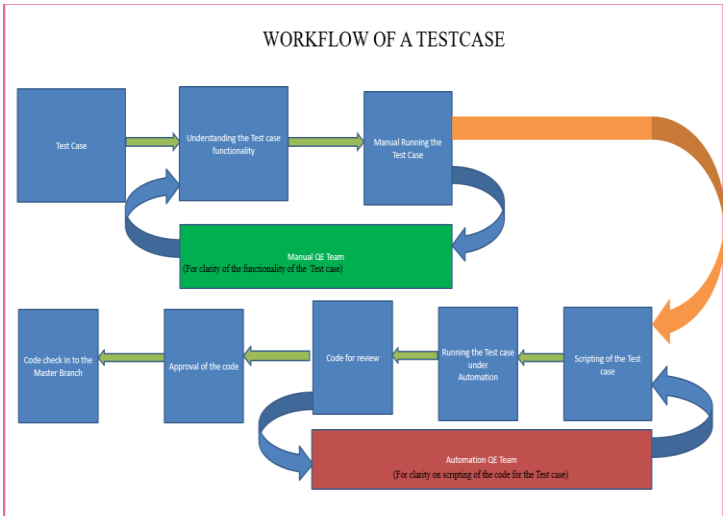

Fig 1: Workflow of a Test Case

Once the set of test cases are assigned, their functionality is understood by the manual team. The test cases are manually run to make sure that automation of the same is possible. Once the manual check is done, the test cases are approached from the scripting approach. The existing framework is used to write an automation script which can automate the entire process of testing. This automation script is submitted for review and if accepted, it is merged intothe master program. The code is reviewed by a team of code reviewers. There are regular runs of the master program on different builds of the website to make sure that the automation scripts are functioning well not only on one build but also several builds. If any errors are found in the automations script, the programmer is asked to take it up again and make it error free. These regular routinely checks are done to make sure the automation script is of high quality.

6. CONCLUSIONS

The process of automation of websites in companies can vary slightly but they all follow a generalized approach to it. Right from how the work is assigned to how it is to be executed is a skill which is developed by learning from experience. Automation testing involves more than just writing a script for a test case. It involves prerequisite knowledge, manual testing skills, knowledge on coding guidelines and the practice of using several software tools for the purpose of automation.

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BIOGRAPHIES

Nitin Upadhyaya, B.E in Electronics and Communication, RV College of Engineering.

Aniket Pant, B.E in Electronics and Communication, RV College of Engineering.

S. Karthikeyan, B.E in Electronics and Communication, RV College of Engineering.

Anusha L S, Faculty in Electronics and Communication, RV College of Engineering.