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A Survey on Automation Testing

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ABSTRACT: The software development lifecycle model consists of requirements analysis, design, implementation, testing, deployment and maintenance. Testing is an indispensable phase in SDLC. Software testing mainly involves executing a program to find errors. High quality software can be produced by effective testing. Testing can be done manually or it can be automated. Manual testing is where a tester follows a written test plan that produces the desired test cases. Automation testing uses certain testing software tools to write and execute test cases.
Automation testing is an effective way to increase efficiency, coverage of test cases and accuracy. Both manual and automation testing have their own benefits and limitations. The main objective of this paper is to focus on automation testing.It also focuses on the importance of automation and the software testing tools.

KEYWORDS: Software testing, SDLC, Automation testing, Manual testing

I. INTRODUCTION

Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test. Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation.

In software testing, test automation is the use of special software (separate from the software being tested) to control the execution of tests and the comparison of actual outcomes with predicted outcomes. Some softwaretesting tasks, such as extensive low-level interface regression testing, can be laborious and time-consuming to do manually. In addition, a manual approach might not always be effective in finding certain classes of defects. Test automation offers a possibility to perform these types of testing effectively. Once automated tests have been developed, they can be run quickly and repeatedly. Success of test automation project is determined, among other factors, by its overall economy. Compared to manual test, creation of automated test is more expensive, but its execution is significantly less costly. Thus, when automated test is repeated certain number of times, it becomes less costly than manual test [8]. Many times, this can be a cost-effective method for regression testing of software products that have a long maintenance life. Even minor patches over the lifetime of the application can cause existing features to break which were working at an earlier point in time [4][5].

II. PURPOSE

There are several benefits and purposes for using automating the testing process of the software development lifecycle. The first concern that anyone will have is the return on investment, but studies show that automating the testing on a long-term basis will save a lot of time. It does improve the flexibility in terms of being able to run the tests from anywhere around the world and can see its results while you continue to work, it does not affect and differ you from continuing your work while the testing process is happening.
Automating your testing also helps by reducing amount of human resources that are required to do the job. Instead of having a lot of people manually doing the tests repeatedly, we can have a test automation engineer to write the scripts to automate your tests. The scripts that are written by the test automation engineer are not for one time use, instead the scripts written can be reused even if he version of the OS on the device changes, and it also allows you to redo the test in the same relative order without missing or forgetting any of the steps.
Another advantage of automation testing is that the bugs are found in the early stages of software development, hence reducing the expenses required to fix it and saving hours of time which otherwise would have been spent on fixing the

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issue at a later stage. Automation testing makes testing more reliable and much faster and quicker when you must run some standardized tests repetitively, which cannot be skipped but may cause errors when manually tested.
With the scripts that are written, it makes it easier to test more devices simultaneously and can generate comparative detailed reports in a short amount of time with the same exact parameters as the same script was run again. Automated testing helps in continuity, where automation engineers are able to exactly see that other engineers have done, , what scripts he has already written and what tests have already been performed and what bugs were already found and fixed, through clear reports.
Other additional methods can be implemented through automation testing, where through stress testing the capacities of the application and operational infrastructure will be tested to its limits, which can't be possibly done manually. It also allows to run the tests on thousands of remote and mobile devices which would be manually impossible which ensures that in the end you will have a better-quality software which will be released earlier, with less problems and having used relatively lower resources. [6]

III. LITERATURE SURVEY

The quality assurance of any system depends on its test. But to do manually, testing in most of the cases is time consuming, expensive and hectic. For the better business purpose and to save time and money automation testing is required. There are variety of tools are available in the market for this. One of the best-known tool is Selenium suite which is a combination of different automation testing tools.The test automation is not a new concept but it has been around since first day of computing industry. In 40's software testing was done by programmers not by testers and testing was often not distinguished from debugging as well. Technology of automation allows us to share information. Web automation tools have been used in research work as well. Researchers also improved a few of tools for enhanced performance and results. These tools are applied separately as well as collectively to solve the disputes in software testing.
In this rapidly changing era and highly competitive business environment, manual testing has made it difficult for organization to analysis their web sites and applications. So, to test easily the huge number of sites and applications, an automated web testing has come into existence. Web testing is a kind of software testing that accentuate on web which assists to slice down price, lessen the exertion requisite to check web applications as well as web sites, amplify software value, condense time-to-market and reusability of test cases are also be done. This type of testing also ensures that the functionality of web applications and services that are related to web is working appropriately. The testing assured that the users who are accessing the web applications acquire outcome in an adequate time. It also offers reusability and extensibility of tests across multiple languages and platform and as well as for multiple browser. Web testing involves the various type of testing like: to test functionality, compatibility, load, stress, performance, as well as testing of web services, etc. [1]
The phenomenal increase in the number of software systems created as web applications across different domains demands for a greater need for quality assurance than ever before. With all the emerging technologies in the mobile and cloud platforms that provide faster and convenient ways to access the applications, testing for the quality of applications becomes of paramount importance. Quality Assurance being an essential phase in the Software Development Life Cycle (SDLC) of every project undergoes rigorous testing spanning wide areas in functional and non-functional test requirements to ensure that the quality of the software is met before being deployed onto production. As the demand for testing surges, Organizations are always on the look out to automate their test strategies and hence effectively reducing the cost, time and labor involved with the manual intervention of the test processes.
As the demand to provide better software quality of service rises, so does the need to build an effective automation framework, that is flexible and robust to support different and multitude number of use cases for any Organization. The concept of implementing a generic framework that supports different types of data sources during test execution can be an effective solution to every Organization seeking to enhance their existing automation framework and subsequently using it to leverage across different teams or newer projects alike. This generic framework uses a web service prior to the execution phase of a test cycle to read any type of input data file and convert it into a generic datatype (specifically JSON format) to be used for further processing. Additionally, a generic framework is also used to read data from different file formats to perform validations to determine the pass or fail status of each test executed. The framework also can be used to insert test results from different data files into a database server to use a common result dashboard

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to publish all the results. The ease by which the framework can be installed as a plugin to an existing automation test framework further simplifies the setup and can be readily adapted to conduct more robust and scalable tests. [2]
The biggest advantage of automated test compared to manual test automation can be repeated, quick check of the different input data and the corresponding output. The tester also will be used to design more test scripts and improve the working efficiency in software test. Typically, any modification or key software functions should be verified independently again during the regression test. Verification in regression test should be executed for all test cases. If any software function is not verified in regression test, the neglected function may lead to the failure of software. During regression test, test automation can be considerably reduced inputs of the test, and thus make testers exempted from the heavy and repeated test execution. The regression testing is effective test to find the defects in software maintenance. The framework supports regression test using script-free technology. The data separated technology can be a good and efficient test script development. This study can reduce the size, number and complexity of the script. The test framework supports automated testing tools Quick Test Professional, prove that the framework can be well worked in the specific application and performance analysis in Web based software.[3]
Costs: An analysis of costs and benefits involved is required for the accurate estimates of the return on investment of test automation. Many estimates conducted in industrial projects are limited to considerations of cost only,since the benefits of test automation are particularly hard to quantify. In many cases the investigated costs include: the costs for the testing tool or framework, the labor costs associated with automating the tests, and the labor costs associated with maintaining the automated tests. These costs can be divided into fixed and variable costs. Fixed costs are the upfront costs involved in test automation. Variable costs increase with the number of automated test executions [8].

IV. TOOLS USED FOR TEST AUTOMATION

1. Selenium

Selenium is the most widely used testing framework. This is due to the excellent compatibility it has. Selenium is used to test web applications across various browsers and platforms like Linux, mac and Windows. Also, the tester can write the test sets in various programming languages like Python, C#, PHP, Groovy, Ruby, Perl and Java. Record and playback features are also available to write test sets without learning Selenium IDE.
All the other testing tools are built upon the basic concepts of Selenium.

2. TestingWhiz
Cygnet Infotech, a CMMi Level 3 IT solutions provider, developed a code-less scripting test automation tool known as TestingWhiz. Keyword-driven, data-driven testing, and distributed testing can be performed using TestingWhiz. The other important features are that TestingWhiz can be integrated with test management tools like HP Quality Center and bug tracking tools like Jira, Mantis and Fogbuz. TestingWhiz facilitates Continuous Integration and Delivery in Agile cycles
3. HPE Unified Functional Testing (HP – UFT formerly QTP)

HPE Unified Functional Testing formally known as HP QuickTest Professional aids automated functional and regression testing of software applications. QTP offers various features like: Integration with Mercury Business Process Testing and Mercury Quality Center, Unique Smart Object Recognition, Error handling mechanism, Creation of parameters for objects, checkpoints, and data-driven tables, Automated documentation

4. TestComplete
TestComplete is a functional testing platform that offers various solutions to automate testing for desktop, web, and mobile applications by SmartBear Software.
TestComplete offers the following features:GUI testing, Scripting Language Support – JavaScript, Python, VBScript, JScript, DelphiScript, C++Script & C#Script, Test visualizer, Scripted testing, Test recording and playback.

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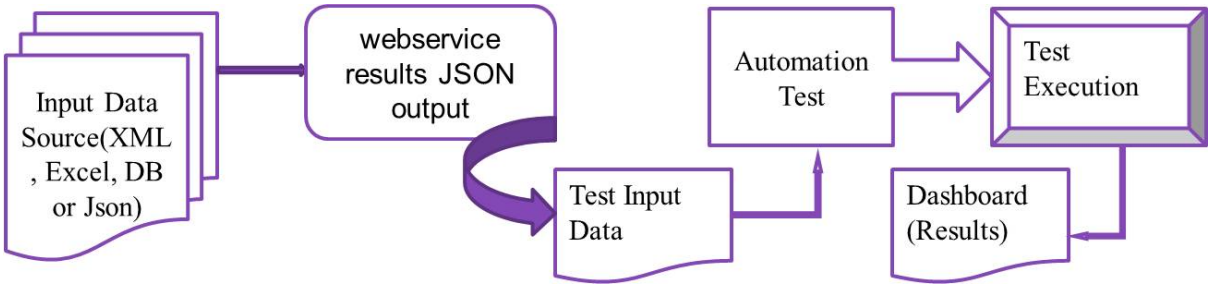

Fig.1 Shows how the web services are being used as middleware

IV. CONCLUSION

Testing and quality assurance is an integral part of product engineering cycle. Even though manual testing(both black and white box) is most widely used, test automation is gaining rapid acceptance. Software tests must be repeated often during development cycles to ensure quality. Every time source code is modified software tests should be repeated. For each release of the software it may be tested on all supported operating systems and hardware configurations. Manually repeating these tests is costly and time consuming. Once created, automated tests can be run repeatedly at no additional cost and they are much faster than manual tests. As the demand to provide better software quality of service rises, so does the need to build an effective automation framework, that is flexible and robust to support different and multitude number of use cases for any Organization.Automated software testing can reduce the time to run repetitive tests from days to hours.

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