

A Study on Various Testing tools and Testing Strategies

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ABSTRACT

Software testing is an important activity in the life cycle of software development. Software Testing is a very crucial activity before the release of any software. Testing is basically the process to identify the correctness and completeness of the software. Once source code has been generated, software must be tested to allow errors to be identified and removed before delivery to the customer. Although it is not possible to find all the errors but our goal is to minimize as much as possible. Various techniques are used for testing software at various levels. For the automation of Software testing, several tools are available in the markets that are described further in paper.

Keywords: Software testing, Completeness, Correctness.

I. INTRODUCTION

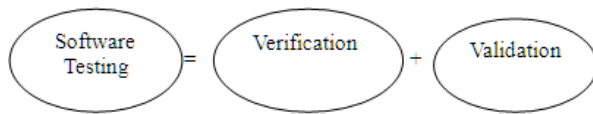
Typically, software testing is done either internally within the organization, or then is outsourced to software services providers. Software testing is also an important component of software quality assurance (SQA), and a number of software organizations are spending up to 40% of their resources on testing. There are four main objectives of testing[1]:-

- (a) Bug Discovery:-The first Objective is to find the errors at any stage of development. More the bugs discovered at early stage, less cost it will take to fix the bugs.
- (b) Bug Prevention:-Once the bug is identified, we try to reduce the number of bugs.
- (c) Quality:-Since Software is also a product, its Quality is important from user's point of view.
- (d) Customer Satisfaction:-The primary objective of testing is customer satisfaction. If we want the customer to be satisfied with the software product, then the testing should be complete and thorough.
- (e) Risk Management: - Risk is the probability that undesirable events will occur in a system. Risk must be controlled to manage them with ease. Software Testing helps in minimizing risks.
- (f) Reduce Maintenance Costs:- The maintenance costs of any software product is due to its error discovered after product delivery. Post release errors are costlier to fix, as they are difficult to detect. Thus if testing has been done effectively then the chances of post release errors are minimized and in turn, the maintenance cost is reduced.

Software Testing starts from the development phase itself. During the development phase testers check the manuals and after the coding phase actual testing starts. For testing software both manual and automated testing is required. Automated Testing should not be viewed as a replacement for manual testing. There are many activities in the life cycle of software which cannot be automated and manual testing is required.

Manual testing is a testing technique where the tester prepares test cases manually and executes them to identify errors in the software. Manual testing is a process to test the software manually to find out the errors. Manual

testing is performed without using any automated tool. Manual testing is required to test the document created at each phase of the SDLC.



Verification is done manually and validation can be done with the help of an automated tools.

Verification: To verify if system behaves as specified. It is the checking and testing of items, which includes software, for conformance and consistency of software by evaluating the results against pre-defined requirements. In verification we ask a question, are we building the product right?

Validation: In this we check the system correctness which is the process of checking that what has been specified by user and what the user actually wanted. In validation we ask a question: Are we building the right system?

II. AUTOMATION TESTING

Automated software testing is the best way to increase the effectiveness, efficiency and coverage of software testing.

Automation testing requires considerable amount of investment for buying the software & compatible hardware resources.

Automation testing does what manual testing does not. Automation testing improves the accuracy & it saves the time of the tester & organization's money.

Automation testing is best suited in the environment where the requirements are frequently changing & huge amount of regression testing is required to be performed.

III. NEED OF AUTOMATION TESTING

(a) Reducing of Testing Effort: - For testing a complete software we require more than hundreds of thousands of test cases. Executing all of them manually takes a lot a time and effort. Therefore execution of test cases using automated tool will greatly reduce the amount of time required.

(b) Helps in Regression Testing: - Regressing testing is the most time consuming process. If we automate our testing process then it will take less time and effort.

(c) Reduces Overall cost of software product: - If testing time increases cost of software increases. But using automated time and cost of overall product can be reduced.

(d) Avoid human mistakes: - Manual testing the software will increase the chances of mistakes or sometimes, we may be biased towards limited test cases while checking the software. Using Automated Testing these types of problems can be avoided.

IV. CATEGORIES OF TOOLS

(a) **Static and Dynamic Tools:** - For Static testing there are static program analysers which scan the source program and detect possible faults and anomalies.

(b) **Dynamic testing tools :-** Dynamic testing tools select test cases and execute the program to get results.

(c) **Performance testing tools:**-There are numerous systems for which performance testing is necessary. These tools help in identifying the response time and load capacity of a system. It measures the time and delay of a network[2]

(d) **Network testing tools:**-There are various applications running in the client server environments. These tools monitor the

(i) Overall performance of a system.

(ii) Functionality across server, client and the network.

V. VARIOUS AUTOMATION TESTING TOOLS

Different types of tools are used and are available in market for automated testing and they can be used in different areas of testing. The selection of tool is based on the type of application which we want to test like automated web testing tools, GUI testing tools

(i) **Mercury Interactive WinRunner:**-It is a tool used to perform regression testing. It automatically creates the test scripts by recording the interactions done by user on GUI of the software.

(ii) **Segue Software's Silk Test:** - This tool is also used for regression testing. Silk Test is a software performance testing tool across web,

mobile and business applications. It was developed by Segue Software then afterward it is acquired by Borland in year 2006.

It can also perform Database validation using DB Tester. Silk Test supported extensions like: .NET, Java (Swing, SWT), DOM, Internet Explorer, Google chrome, Firefox, Windows GUI.[5]

(iii) **Selenium :**-Selenium is an open source web testing tool which is used to test the functional testing of an application. It is divided into four components: First is, Selenium IDE which is used as a prototyping tool and no programming language is required. Second Selenium Remote Control that allow users to use the programming language. Third Web Driver which implement a stable approach by direct communication between the test scripts and browsers. Forth, Selenium Grid that helps to execute parallel tests on different browsers by using with Selenium Remote Control. [4][6]

Selenium is an automation tool for web based applications, which is generally used for functional regression testing.

Selenium is a web testing tool which uses simple scripts to run tests directly within a browser. It uses JavaScript and iframes to embed the test automation engine into the browser. [3] This allows the same test scripts to be used to test multiple browsers on multiple platforms.

(iv) **Watir** Watir is an open source tool for automating web browsers. This tool is simple and flexible in terms of easy to read and maintain. It supports only Internet Explorer, Firefox and Opera. It also supports multiple browsers on different platforms. [4]

(v) **Ranorex** It is a GUI test automation framework which provides testing of a wide range of desktop, web and mobile applications. Test cases once written can be executed on different platforms. This is a simple, comprehensive and cost effective tool used for automatic testing [4]. It is a better alternative to other testing tools because it tests applications from a user's perspective, using standard language and common

programming techniques like C# and VB.net. It does not require understanding a scripting language, because it is coded in pure .net code. Any one of the three languages, VB.net, C# and Iron Python can be used [1]. It simulates the user actions by record and replay tool into recording modules. Ranorex is easy to use and affordable even for small testing teams.

(vi) **Sahi** Sahi is automation and testing tool for web applications. This tool is used by the developers for fixing and reproducing bugs, QAs for functional testing and by business analysts for defining and verifying functionality. It supports java script language and offers easily editable scripts.

(vii) **Quick Test Professional** QuickTest Professional (QTP) helps the tester to perform an automated functional/regression testing. It supports only window XP and developed only in VBScript or JavaScript. With QTP it is easy to edit the script , playback and validate the results.[3]

(viii) **Tellurium** Tellurium is an open source automated testing framework for testing web applications. It was developed from Selenium framework with different testing concept. It is built with UI module concept which helps to write reusable and easily maintainable tests.[4]

(ix) **Coded UI** Coded UI is an automated testing framework that used for analyzing and testing user interfaces. Developers create a coded UI test that can test the user interface for an application functions correctly.[7]

(x) **Mercury Interactive Load Runner:-** This tool is used for performance and load testing of a system. The major advantage of this system is that it creates virtual users on a single machine and tests the system on various parameters.[3]

(xi) **Apache's JMeter:** - This is an open source tool used for performance and load testing.[3]

(xii) **IBM Rational SQA Robot:-**This tool is also used for functional testing. Synchronization of test cases with a default delay of 20 seconds is also available.

(xiii) **Soap UI:** It is used for web Service Integration Testing. SoapUI is the market leader in API Testing Tool. We can do functional, load, security and compliance tests on your API using SoapUI.[8]

VI. ANALYSIS OF AUTOMATION TOOLS

S.NO	TOOL NAME	TESTING
1	Mercury Interactive WinRunner	Regression testing
2	Seque Software's Silk Test	Regression testing
3	Selenium	Functional testing
4	Watir	Automating web browsers
5	Ranorex	Testing desktop and mobile applications.
6	Sahi	Web Applications
7	Quick Test Professional	Functional /regression Testing
8	Tellurium	Testing web applications
9	Coded UI	Testing user interfaces
10	Mercury Interactive Load Runner	Performance and load testing
11	Apache's JMeter	Performance and load testing
12	IBM Rational SQA Robot	Functional Testing

13	Soap UI	Web service Integration Testing
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VII. CONCLUSION

In this paper, we have reviewed various types of test tools available in market and which testing tool can be used for which type of testing. We have also discussed the difference of manual testing and automation testing and Why there is a need for automation Testing.

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