Analysis of Software Testing Techniques: Theory to Practical Approach

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Abstract

In today's scenario software testing is crucial aspect for any software company because the cost of maintenance is much more than development in software companies. We all make mistakes, some of them are not important, but some of them are harmful for software life cycle. So we should start testing the code/software that we are going to generate from initial stage because at later stage recovery or debugging will not be possible and things cannot always go right –programmer make errors or bugs every moment of the code generation. Since we adopt that we cannot always time right and our work may have error full or bugs, hence we should check our own task every moment. However some errors or bugs come from bad presumption and unsighted fields, so we might make the same errors when we check our own work as we made when we did it. Ideally, we should get someone else to check our task because another person is more likely to smudge the faults. Keeping in mind the above discussion in this paper we provide detailed analysis of testing techniques to generate better test cases. This analysis helps the beginner researchers in this area to select the appropriate technique for testing.

Keywords: Software Trial Tools, Tools Effectiveness Automated Software Testing Tools, Test Scripts

1. Introduction

In the current era of globalization software development area is rapidly increased. As day to day several software project is being developed and testing play a vital role in the effective and reliable software development. Software testing is a method of executing programs with finding the software errors or bugs. It is the process of evaluating the developed system to access the quality of the final product[5]. A primary purpose of testing is to detect software failures so that defects or errors may be resolved and corrected. Testing cannot establish that a product function purely completed under all the situations. The scope of software testing includes check the code and execution of that code in various situations and environments. Software testing is used with verification and validations. If we have built the software right, then it is called verification and if we have built the right software or product then it is called validation Performance of testing is executed to determine how fast a system performs under a particular workload[6,7]. It can also serve to validate and verify other qualities like scalability, resource usage, and reliability. Software Testing have many phases, as shown in Figure 1, like Test Strategy, Test Delivery, Test Development, Bug Management, Test Execution[1]. This is the Importance task to the software development industry as well as the testers to select the best testing to manage the testing in an effective manner.

1.1 Research Contribution of this Paper

The possible outcomes that can be achieved using this analysis are given as follows:

- A complete analysis is provided for software testing techniques.
- Proposals in different categories are analysed with respect to different performance evaluation parameters.

- Finally, a systematic comparison of different protocols with similar matrices with advantages/disadvantages is provided in the text.

1.2 Organization

The rest of this paper is organized as follows: In second section, we have covered related work on software testing techniques. Third section covers details analysis and lastly section four concludes the analysis.
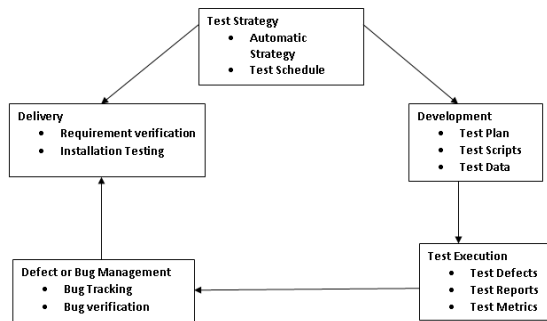

Figure 1. Phases of Software Testing.

2. Related Work

This Section provides brief discussion on some of the existing Testing Techniques. Katja[2] summarizes the difference between the automated software testing and manual software testing by suggesting that automated software testing should be used to prevent new errors in already tested modules, while manual testing is better used for finding new and unexpected errors.

Khan[3] suggested that de nes the set of activities conducted with the intent of ending errors in software. Zyl-berma and Shorten[20] show that keyword driven technique is the next generation framework of automation that divide the task of automated test case implementation from the automation areas. Brajnik[8] suggested that compare the many tools used in software testing and give the merits and demerits of software testing tools. Vishawjyoti and Sharma[16] summarizes many automation techniques used in software testing and analyze that automation technique is better than manual testing.

2.1 Motivation

From the literature survey[4–9] it has been observed that to speed up the software development several software automation trial tools are useable in the domain arena (market) but all these tools or components are only pro-

viding the testing functionality but there are no tools available to provide the testing functionality as well as management of the test suit. The benefit of the test suit management is that whenever some additional functionality is implemented in the product or the new build is developed to the software product then we do not need to test the whole software rather than developing the test case only for that functionality or build and perform testing only for that test case.

3. Detailed Analysis

3.1 Hypothesis

It is being seen that company spent their lot of investment to the software product development and not interested to invest the amount to the software product testing as compare to the investment to the development. So it gives a great responsibility to the software project manager to select the best testing tools to automate the software product because manual testing takes huge time to test the software product as compare the automation tool. So, the hypothesis for the research is if we perform the test automation and test execution in different machines. The user getting easy to manage test data as well as test cases. If user executes so many test cases on different browsers at same time. This will reduce the testing time.

3.2 Cost Defect in Software Testing

Role of cost in software testing is very crucial and important for designing the software[4]. The cost of flaws can be measured by the affect of the bugs, errors and defects and when we find them. If found defects are lesser is the cost of defect. For example, if error is found in the requirement phase then it is somewhat sleazy to point it in the condition. The correction to the requirement phase can be complete and then it can be re-issued the software. The relationship between cost defect and time is given in Figure 2.

If the error or bug is generated and the consequent flaws are detected in the requirements phase, then it is relatively sleazy to point it means bad assumptions. Similarly, if an error or bug is generated and the consequent flaws are found in the design phase then the design can be make up and reissued.

4. Manual Testing

Manual Testing is an examination process that is all work completed manually to find errors, bugs or defects in software system without the usage of any tools or automatic scripting[11–18]. In Manual Testing, Testing person execute test conditions or cases without using any automation scripts or tools. All works like designing, testing, maintenance, find defects in software system etc. in manual testing completed manually.
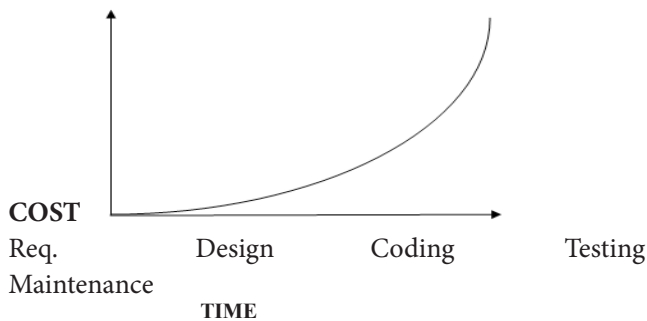

Figure 2. Relation between cost defect and time.

5. Automation Testing

Manual Testing is implementing by a person a sitting in front of a computer cautiously executing the test steps. Automation Testing is a way to using an automation tool to execute your test case suite. The automation software can also enter test data into the System under Test, compare and evaluate expected and actual outcomes and generate thorough test reports. Importance of Automated Testing in Software System Automated testing is very important for software system due to following reasons:

- By the help of save time in automated testing compare than manual testing.
- In automated testing improve accuracy than manual testing.
- Manual Testing can boring because all works complete manually so generate many errors.
- Manual Testing is tough to test for more than one language sites manually.
- Automation does not require man intercession, so we can run automated test neglected.
- By the helps of automated testing increases speed of test execution.
- By the helps of automated testing increase Test reportage.

6. Test Tool Selection

Selection of testing tools are mainly hinge upon the methodology of Application under test is cover on [12,13]. We know QTP does not support Informatics areas, so QTP cannot be used for testing Informatics covering areas. It is a nice method to conduct validate of concept of Tool testing on automatic testing.

7. Automation Tools

We know very well that many automation tools used in software testing but these three tools is very important which is follows:

1.) QTP: Full form of QTP is Quick Test Professional. It is used by HP so it is called HP's Quick Test Professional (HP Functional Test) **in Functional Testing Tool.** It is a mercury synergistic product. The tool supports superfluity of environments like Java, SAP etc. QTP supports execution handling and data driven testing.**QTP automated testing tool can be used for colligation with Quality Center, it** is like a comprehensive Management testing Tool. It is light tool which can be recommended for web or client/server applications all.

2.) Rational Robot: It is used by IBM or quality assurance teams so it is called as IBM tool. Rational Robot used to automatic retroversion, operational and constellation tests. It is used for client server, ERP and E-commerce applications. It **can be used with Rational Test Manager** which added the Management Test Activities.

3.) Selenium: It is an **open source, portable software testing layout for Web application Tool**. It supports all types of web browsers like Internet Explorer, Opera-Mini, and Mozilla Firefox etc.

4.) Method to choose an Automation Tool: It is so difficult part to select right tools for software testing but it is following criteria for selection the best testing tools according to requirements:

- Simple method to debug the automation scripts
- Environment Support should be so easy
- Tools using method should be so easy
- Database Testing
- Identify Object
- Recover Error Testing
- Testing Image

Table 1. Analysis table

S.No.	Feature	QTP	Rational Roster	Selenium
1.	Scripting Language	VB Scripting	Java and C-sharp	Java, C-sharp,Ruby, Python, Perl, PHP
2.	Record and Playback option	Available	Available	Available
3.	Recording Method	Context Sensitive Mode, Low level Mode, Analog Mode	Java scripting mode, Simplified mode	Java scripting mode
4.	Browser Support	Google Chrome, Internet Explorer, Mozilla Firefox	Google Chrome, Internet Explorer, Mozilla Firefox, Netscape	Google Chrome, Internet Explorer, Mozilla Firefox, Opera-mini, Html-Unit, UC-Browser
5.	Playback Method	Excellent	Excellent	Excellent
6.	Framework Support	Data Driven, Keyword Driven, Modularity and Library Architecture	Data Driven, Keyword Driven, Modularity	Selenium + Eclips + Maven/ ANT + Jenkinds / Hudson/ Cruise Control
7.	Protocol between client and server	HTTP/HTML and SAP	HTTP, TCP Socket, SAP, Citrix, Siebel, TN3270	HTTP, TCP, UDP etc
8.	Operating System/ Platform	Only Windows like Windows XP, 2000, Vista, 8.0	Windows and LINUX others	Windows, LINUX, Solaris, OSX, Macintosh others
9.	Software cost	Licensed	Open Source	Open source & Portable
10.	Product Support	Dedicated HP support along with forum	Dedicated IBM support along with forum	Open Source Community
11.	Descriptive Programming and Regular Expression	Available	Available	Available
12.	Command Line Execution	Support Command Line Execution	Support Command Line Execution	Support Command Line Execution
13.	Database Applications	Works good with database application	Works good with database application	Works good with database application
14.	Report Generation	It allows standard reporting format in HTML, XML, etc. (Default is its own UI And HTML).	It allows default reporting in HTML, but custom coding is required for other Interfaces.	It allows default reporting in HTML, but custom coding is required for other Interfaces.

- Used simple scripting languages like VB, Python, Ruby, PHP etc.
- Support for various tests - including functional, managerial
- Support for more than one testing layouts or modules
- Ability to identify objects in any conditions
- Scalable form of test reports and find results

5.) Advantages of automated testing: Automated testing[15] have many advantages or benefits which are follows:

- Accuracy improves than manual testing
- Approx 65%-70% speed faster than manual testing
- Maximum time saving
- Low cost than manual test
- Consistency improve
- Maximum time find approximated result
- Human Intervention is no need in execution time
- Re-use test scripts in automated testing
- Reliability
- Scalability
- Efficiency increase
- Better speed compare than manual testing in executing to all test cases
- Test cases frequently and neatly

6.) Bqurious: Bqurious is a complete Test Automation and Management Suite developed keeping in mind needs of an enterprise running multiple Projects and Applications. It has the following features:

- Single platform to manage all your testing needs from any where
- Define, Manage and track
- Multiple Projects
- Multiple Releases or Sprints
- Define Requirements
- User Stories
- Automated Test creation can start as soon as screen layout design (wireframes etc.) are done.
- Create "Programming Less" Automated Functional Test Cases and map to Requirements/Stories and Releases/sprints for easy traceability.
- Manage Test Data for different environments in a single place.
- Execute automated Test Cases on one or more platform –browser combinations and Analyze consolidated results with screenshots.
- Log defect in the system of your choice at the click of button.
- Role based security .
- Support Agile and Waterfall methodologies.
- Local & Remote Execution in Parallel for Automation Suite.

8. Conclusion

According to changing the time automated software testing tools may change in their underlying quality, using method, approach and capabilities for condition to condition or situation. So selection of an automated testing tools are on the basis of software budget and testing efficiency for application type need. Therefore, optimization of such software testing tools and automated tools, testing strength is needy because we have several options available in terms of testing tools. So in this paper we present some methods that how to use software testing tools and conditions in which we use these tools. Bqurious is a complete Test Automation and Management Suite developed keeping in mind needs of an enterprise running multiple Projects and Applications and show how to use automated tools. Testers or testing person face many troubles to find the best method for their software to be tested and automatic test all the condition for project for client, so we present best methods for chose our best automated tools.

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