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Descriptive Study of Software Testing & Testing Tools

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ABSTRACT: Testing automation tools enables developers and testers to effortlessly computerize the complete practice of difficult in software progress. The objective of this research paper is to show comparison and study the concepts, builds and features of automated tools. Additionally, we have tried to describe the paper using tabular description of various testing tools. As, we know that Testing is very expensive task. Manual testing involves a lot of effort, Measured in person per month. These efforts can be reduced by using the automated testing with specific tools.

KEYWORDS: Software testing, types of testing, levels of testing, test case, manual testing, automation testing, comparison among tools used.

I. INTRODUCTION

In recent years, software testing is considered as one of the most popular and relevant part in the software development industry. The software testing helps in recognizing every defect obtainable in a software product. Software testing uses the key features such as verification and validation. Software testing is the process of executing software in a controlled manner, and thus it results in the questions formulation as: Does the software behave as specified and method that can be used to ensure whether the systems, responsibility can extensively test the system. Software testing strategies can be manual or automated. According to manual testing strategy, the more traditional approach, testers prepare test suites that they think will best exercise the program. Automation software testing tools helps in generating the test cases from the specification of the program or from its real text data. Manual testing is a testing technique where the test engineer prepare test case manually and execute them to identify defect in the software. Automating software testing uses scripting languages such as Python, JavaScript or Tool Command Language because the test cases can be easily executed by machines with less human intervention and attention.

II. SOFTWARE TESTING

Software testing [11] involves the execution of a software component specifications or system component specifications for the evaluation of one or more than one properties of interest. Generally, these properties areused to point those extent to which the component or system specifications are under test:

- **a)** Initially gather the requirements that can be used to guide its design for the development.
- **b)** It should respond correctly to all variety of input data.
- **c)** Must perform its tasks under the time limit.
- **d)** After installation, it can be easily run in its intended environments.
- **e)** It can achieve the desired results which the stake-holders need.

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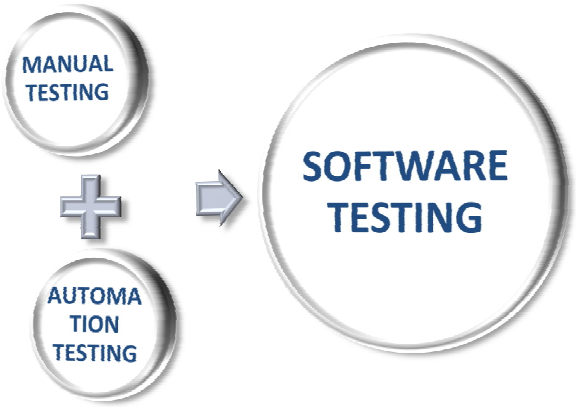

Figure 1: Software testing

III. PHASES OF THE SOFTWARE TESTING LIFECYCLE

1. **Requirements analysis**
   a) It is the initial step where testing of the cycle begins with the overview of users requirements.
   b) Here, the motive is to understand the requirements which are very essential for the testing the product.
2. **Test Case Design and Development**
   a) What was, what were and what will be the necessary component requirements.
   b) Specification of the Design are checked and tested.
   c) Reviews and suggestions of the Test Specification are considered.
3. **Test Execution**
   a) At this stage, review of the code or program is done.
   b) Execution and evaluation of the test takes place.
   c) And lastly, according to the performance, simulated results are obtained.
4. **Test Closure**
   a) Test summary report is generated.
   b) Project is De-briefed.
   c) Documentation of the project is prepared accordingly.
5. **Test Process Analysis**
   a) Reports are analyzed to improve the performance of the applications by implementing new technology and more features.

IV. LEVELS OF TESTING

a) Unit testing: Unit testing is the smallest testable part of an entire application. It is used to provide a piece of code that must satisfy the requirements.

b) Integration testing: In integration testing, the code is divided into individual segments and tested as a group. The main task of integration testing is to analyze the parameters such as functional requirements, performance requirements and reliability requirements which are placed on major design items.

c) Function testing: Functional testing can be referred as black-box testing. In functional testing, testing is done by providing validate input and thus outcomes are observed accordingly.

d) System testing: It is considered as more limited type of testing, it seeks to detect any defects within the software units that are integrated together.

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e) Acceptance testing: It is also known as operational acceptance testing or field acceptance testing because it runs by following the predefined acceptance test procedures to direct the user about which data is to be used after following step-by-step procedure.

f) Regression testing: In regression testing, the applications are tested which were previously developed and analyzes if the deviations occurred when the changes are made in existing or new programs.

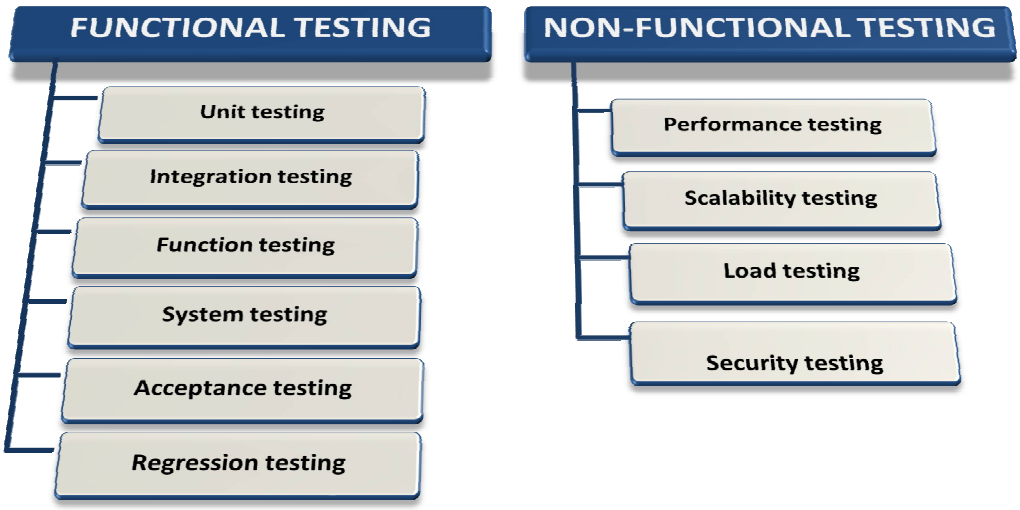

Figure 2: Types of software testing

V. MANUAL TESTING

Manual testing is a technique where we manually prepare the test cases and then these manually prepared test cases are executed to identify deviations in the software. It is most rigorous and time consuming procedure & traditional method of software testing. Manual testing is an activity where the tester must be required to possess certain set of qualities such as they should be patient, must have observing power, speculative, creativeness, innovativeness, broad-minded. This technique makes our tasks so difficult to perform on large software applications or applications with very large dataset coverage.

1. **Steps of manual testing**
   a) Analysis of the requirements
   b) Creating the test plan
   c) Creation of the test case
   d) Execution of the test case
   e) Logging the defects
   f) Defect fix & re-verification

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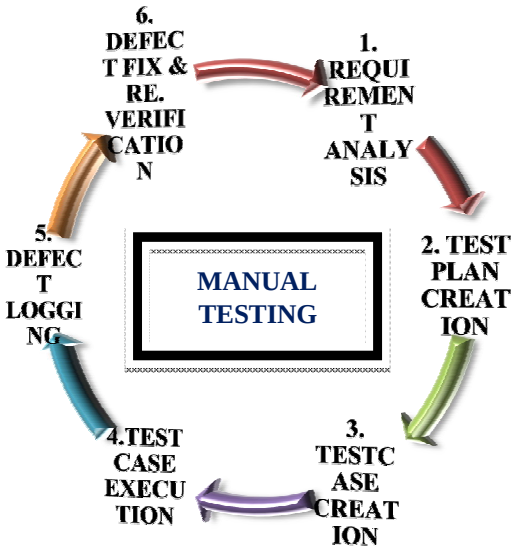

Figure 3: PROCEDURE OF MANUAL TESTING

VI. AUTOMATION TESTING

Automating software testing is used for the development of the test scripts with the help of scripting languages. For example: Python, JavaScript etc. as the test cases can be executed by the help of machines or systems with less human intervention and attention. Developing the tests after designing process can be considered as to reduce human effort and thus making it less costly. The automation software can also be useful for entering the test data into the system or machine under test and comparison of the expected and actual results can be obtained after the generation of the detailed test reports. Test Automation requires high investment of money and resources. Large amount of developing cycles will require more execution of same test suite regularly and repetitively. With the help of test automation tool it is possible to capture this test suite and re-play it when required. Once the test suite is automated, no human interruption is required. The main goal of automation testing is to minimize the number of test cases that are to be run manually and not eliminate manual testing all together.

1. Steps of automation testing

a) Assessment and Evaluation of the tool
b) Next step is plan and then Design
c) Implementation is processed
d) After Execution generate the Report
e) Well- working procedure or Maintenance is checked

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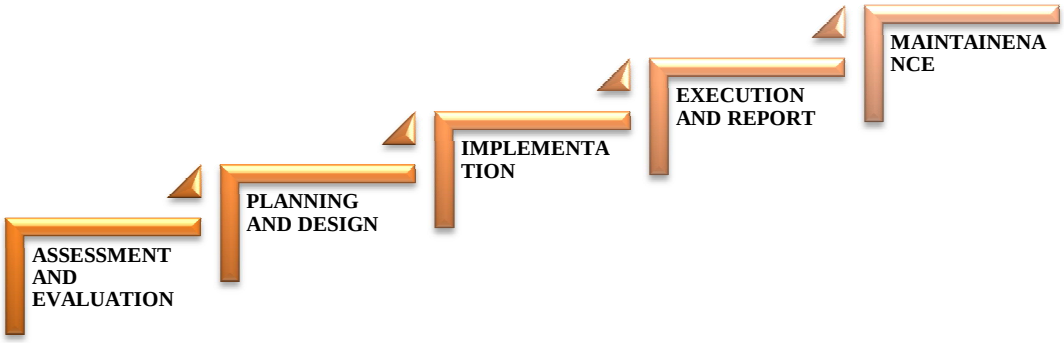

Figure 4:STEPS FOR AUTOMATION TESTING PROCESS

VII. TEST CASE

A test case is a document, which consists of set of test data, initial conditions/ Prerequisites, expected outcomes and post-conditions that are developed for a particular test scenario for the verification of compliance against a specific requirement. Test Case can be used as the main or initial point for the execution of the test, and after applying a set of input information the application has a definitive outcome that will leave the system at some end or final destination point thus can be referred as execution for the post-condition. The process of developing test cases can help in finding the problems in the requirements or design of an application.

1. **Template for designing the test case:** A test case can have the following parameters and these can be used to understand what kind of information is processed in the test case formulation. The table is describing it in easy to understandable and precise format.

S.no	PARAMETERS	DESCRIPTION
1.	Test Suite ID	The ID of the test suite that describes which test case it belongs to.
2.	Test Case ID	What is the ID of the test case
3.	Test-Case Summary	The main motive of the test case is to provide summarized information.
4.	Related Requirement	What are the requirements of the ID to which test case it is pointing.
5.	Prerequisites	Any initial data or information that can be used to fulfil the test execution mode.
6.	Test Procedure	One by one step to proceed to execute the test.
7.	Test Data	The test data, or links to the test data, that are to be used while conducting the test.
8.	Expected Result	The expected outcome from the test.
9.	Actual Result	The actual outcome from the test which can be used to fill after execution of the test.
10.	Status	Whether the output shows Pass or Fail. And the condition of, 'Not Executed' occurs when the testing is not performed and another condition occurs 'Blocked' when the testing is blocked.
11.	Remarks	Any review/suggestion on the test case or test execution.
12.	Created By	The name of the person who has created the test case.
13.	Date of Creation	On which date test case is created.
14.	Executed By	The name of the person who has executed the test case.
15.	Date of Execution	On which date the test case is executed.
16.	Test Environment	To which environment/surrounding (Hardware/Software/Network) test case belongs to.

Table 1: test case template

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VIII. LITERATURE SURVEY

According to various authors, software testing techniques and tools are compared with different techniques which will help in testing the metrics. After observing various articles we have concluded some of the papers as follows:

S NO.	PAPER TITLE	GOAL/ AIM	PUBLISHED IN	AUTHOR NAME
1.	Studying and Comparing Automated Testing Tools; Ranorex and Test Complete	The main aim of this paper is to highlight the features of the functional testing tools and on the basis of that results are formulated [3].	IJECS Volume 3 Issue 5 May, 2014	Neha Dubey, Mrs. Savita Shiwani
2.	Analytical Study on Manual vs. Automated Testing Using with Simplistic Cost Model	This paper focuses on the software testing techniques which are used to describe the activities that enlighten the features associated with software engineering [4].	IJECEE Volume 2 Issue 1, January 2012	Prof. (Dr.) V. N. MAURYA ,Er. RAJENDER KUMAR
3.	Comparative Study of Automated Testing Tools: Quick Test Pro and Load Runner	The aim of this paper is to analyze load runner and QTP tools and compare their parameters such as speed and cost using generated VB script [7].	IJCSIT Vol. 3 (4) , 2012	Shaveta, Sachinkumar, Nitika, Snehlata
4.	Quantitative Analysis of Automation and Manual Testing	This paper shows the efficiency and benefits of automation testing over manual testing using various types of metrics [8].	IJEIT Volume 4, Issue 1, July 2014	R. M. Sharma
5.	Software Testing Techniques	This paper deals with the Numerous software development and testing methodologies, various tools, and techniques that have been emerged in the past few decades promising to enhance software quality [10].	IJARCSS Vol 10, October-2012	ShivkumarHasmukhrai Trivedi

IX. COMPARISON AMONG SOFTWARE TESTING TOOLS

Here we have tried to show some of the software testing tools in tabular form to make the task and understanding about the tools working and techniques. Like the name of the tool, type of testing approach, their motive, year in which they are introduced and their benefits.

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S.NO	TOOL NAME	TYPE OF TESTING	OBJECTIVE	YEAR	USES AND BENEFITS
1.	Apache JMeter	Load testing, functional testing, regression testing etc.	The main aim is to test the load on serve or of group of servers by analyzing the overall network performance.	December, 1998	Used to test the performance of both type of resources such as static resources and dynamic resources.
2.	Load runner	Load testing, functional testing.	Helps in creating an accurate and appropriate framework of end-to-end system performance to specify and sort out the issues before applications go live.	November, 2006	Reduces the time consumption and skill requirement for simulation of user transactions.
3.	Quick test professional/ UFT [11]	Regression testing	Used to test the three levels of program; Interface level, service level, database level which usually helps the developers to test all three levels from single console.	2001	Easy to use, ease of navigation, results validation and report generation are the key functions of this tool.
4.	Selenium [11]	Load testing	It is not a single tool it is the formation of a suite as: • Selenium IDE • Selenium RC • Web driver • Selenium grid	2004	It is an automated testing suite for programs that are web based. Main features are record and playback tests.
5.	Test complete [11]	Unit testing and GUI testing, regression testing	Acts as a backbone for our web automation tool, desktop testing tool, mobile application automation tool these are considered as the main module for this type of testing.	1999	• Balance the speed of application delivery. • Provide quality of delivery at affordable cost.

X. CONCLUSION AND FUTURE WORK

In this paper, we have reviewed various testing tools and on the basis of that we have tried to describe them at the appropriate level. We have discussed the software testing life cycles and the difference between the manual and automation testing. We can say that automation testing is more useful and time saving then the manual testing. And for future work we will try to focus on a Particular testing tool so that it can be specifically used to calculate whether which testing is time saving and more efficient.

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BIOGRAPHY

Shalini Gautam is a student of CSE/IS Department, pursuing Master of Technology (M.Tech) degree 2014-2016 batch from Ambedkar Institute of Advanced Communication Technologies & Research, GGSIPU, Delhi. Her research interests are Data mining, Data warehousing, DBMS, software engineering, software testing etc.