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 are used 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.
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 valid 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.
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.

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**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
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
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.

<table>
<thead>
<tr>
<th>S.no</th>
<th>PARAMETERS</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Test Suite ID</td>
<td>The ID of the test suite that describes which test case it belongs to.</td>
</tr>
<tr>
<td>2.</td>
<td>Test Case ID</td>
<td>What is the ID of the test case</td>
</tr>
<tr>
<td>3.</td>
<td>Test-Case Summary</td>
<td>The main motive of the test case is to provide summarized information.</td>
</tr>
<tr>
<td>4.</td>
<td>Related Requirement</td>
<td>What are the requirements of the ID to which test case it is pointing.</td>
</tr>
<tr>
<td>5.</td>
<td>Prerequisites</td>
<td>Any initial data or information that can be used to fulfil the test execution mode.</td>
</tr>
<tr>
<td>6.</td>
<td>Test Procedure</td>
<td>One by one step to proceed to execute the test.</td>
</tr>
<tr>
<td>7.</td>
<td>Test Data</td>
<td>The test data, or links to the test data, that are to be used while conducting the test.</td>
</tr>
<tr>
<td>8.</td>
<td>Expected Result</td>
<td>The expected outcome from the test.</td>
</tr>
<tr>
<td>9.</td>
<td>Actual Result</td>
<td>The actual outcome from the test which can be used to fill after execution of the test.</td>
</tr>
<tr>
<td>10.</td>
<td>Status</td>
<td>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.</td>
</tr>
<tr>
<td>11.</td>
<td>Remarks</td>
<td>Any review/suggestion on the test case or test execution.</td>
</tr>
<tr>
<td>12.</td>
<td>Created By</td>
<td>The name of the person who has created the test case.</td>
</tr>
<tr>
<td>13.</td>
<td>Date of Creation</td>
<td>On which date test case is created.</td>
</tr>
<tr>
<td>14.</td>
<td>Executed By</td>
<td>The name of the person who has executed the test case.</td>
</tr>
<tr>
<td>15.</td>
<td>Date of Execution</td>
<td>On which date the test case is executed.</td>
</tr>
<tr>
<td>16.</td>
<td>Test Environment</td>
<td>To which environment/surrounding (Hardware/Software/Network) test case belongs to.</td>
</tr>
</tbody>
</table>

Table 1: test case template
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:

<table>
<thead>
<tr>
<th>S NO.</th>
<th>PAPER TITLE</th>
<th>GOAL/ AIM</th>
<th>PUBLISHED IN</th>
<th>AUTHOR NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Studying and Comparing Automated Testing Tools: Ranorex and Test Complete</td>
<td>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].</td>
<td>IJECS Volume 3 Issue 5 May, 2014</td>
<td>Neha Dubey, Mrs. Savita Shiwani</td>
</tr>
<tr>
<td>2.</td>
<td>Analytical Study on Manual vs. Automated Testing Using with Simplistic Cost Model</td>
<td>This paper focuses on the software testing techniques which are used to describe the activities that enlighten the features associated with software engineering [4].</td>
<td>IJECEE Volume 2 Issue 1, January 2012</td>
<td>Prof. (Dr.) V. N. MAURYA, Er. RAJENDER KUMAR</td>
</tr>
<tr>
<td>3.</td>
<td>Comparative Study of Automated Testing Tools: Quick Test Pro and Load Runner</td>
<td>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].</td>
<td>IJCSIT Vol. 3 (4) , 2012</td>
<td>Shaveta, Sachinkumar, Niitika, Snehlata</td>
</tr>
<tr>
<td>4.</td>
<td>Quantitative Analysis of Automation and Manual Testing</td>
<td>This paper shows the efficiency and benefits of automation testing over manual testing using various types of metrics [8].</td>
<td>IJET Volume 4, Issue 1, July 2014</td>
<td>R. M. Sharma</td>
</tr>
<tr>
<td>5.</td>
<td>Software Testing Techniques</td>
<td>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].</td>
<td>IJARCSS Vol 10, October-2012</td>
<td>ShivkumarHasmukhrai Trivedi</td>
</tr>
</tbody>
</table>

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.
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 than 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.

REFERENCES


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BIOGRAPHY

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