

# Test Automation – A Boon for testing

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## Abstract:

As we all are aware that today every industry is dependent on some software and no industry can afford the software to have substantial defects to stop their business even for shortest of the duration. This has caused software development companies to expect more from the Quality Assurance teams. Quality Assurance teams require robust, fast, cost effective, repeatable techniques for test execution and cannot rely only on the Manual testing. Test automation enables the organizations to achieve these objectives. But one has to keep several things in mind before going in for Test Automation. One cannot just go and start automating the manual testing.

In this white paper, author presents the "What is Test automation", "What are the advantages of Test automation", "What are the pre-requisites for test automation", "What should be the guidelines for Test automation", "When to start Test automation".

## Keywords:

Heading level	Example
QA	Quality Assurance
SLC	Software Life Cycle
GA	General Availability
TAS	Test Automation Suite
SOAP	Stability Observation Automation Program
FW	Firewall
IDS	Intrusion Detection System
IPS	Intrusion Prevention System
IAV	Inline Anti Virus
AS	Anti Spam

**Table 1 Keywords**

## 1 Introduction

We must agree that computers and computerized systems have taken over most of the operations of business and society which were once done manually. None can't even think of production in factories or maintaining the large banking records or even maintaining the employee records in a medium scale enterprise manually. Meaning everyone wants to move to automated systems as soon as possible. How can testing which is one of the most important phases of SLC (Software Life Cycle) remain unaffected? So "Automated testing" or "Test Automation" whatever you want to call it has come into the scene. Like automation in other areas of business and society, Test Automation has proved to be better in various areas.

### 3.1 Test Automation – A boon for testing

#### 3.1.1 Advantages of Test automation

1. It will avoid errors which humans can make when things become repetitive

2. Unlike humans, it cannot skip any test case by mistake
3. It can record the results accurately and on top of it always in a decided format. Results can moreover be entered into a Test case management system
4. Results in same environment conditions will always be same. In case of change of environment, one can be sure that some defect has been introduced into the product
5. It is cost effective method of achieving the desired results
6. It makes the regression process quite simple and fast. Once the automation tool is ready, with every patch released by Developers, Automation tool can be run
7. The off time (nights) can be utilized as Test automation tool can be started and completed overnight
8. Although it should not be used to downsize the team size but definitely helps in reducing the surplus man power.

Caution - Test Automation is not a replacement to Manual testing. It requires particular skill set which your manual test engineers cannot fulfill.

### ***3.1.2 When NOT to go for Test Automation***

1. When management is not ready and be patient for the results. Remember, it requires investment to automate something
2. In the absence of skilled and trained resources

### ***3.1.3 When to start automating test cases – SLC phases***

SLC consists of following phases – Feasibility Analysis, Requirements, Design, Coding, Testing, Alpha release, Beta Release, GA Release, Maintenance.

1. Test plan writing is started as soon as Requirements are frozen (although practically requirements are never frozen, so call it 90% Requirement freeze)
2. Without Test plan and test cases, you cannot automate anything so is it that we cannot start automation till the time test cases are written. Answer is NO. Every phase of SLC is important for Test Automation. Infact earlier the better. We must remember that it is QA gets involved into software/ product/ feature at the earliest in terms of writing test cases and automating them. Feature creeps, be it in software or automation tool is very costly, inefficient and haphazard way to develop it. You may realize that automation tool which has been developed is not giving correct results or rather has bad design, then it is painful for you and the company. So it is best to start off with QA at the earliest

### **3. Why Design Phase is important. Because - One can perform following tasks related to Test Automation during Design phases**

- a. During the Design phase itself, framework for Test automation should be started. This is the time when all the discussions are going on so this is the time when Test Automation engineer can understand the product/ feature and prepare his framework for Test automation.
- b. Test tools can be identified and Test automation engineer can undergo training on the test tools. Let's discussion considerations while selection the right tool. Test Automation has to understand and answer following questions while selecting tools.
  - i. What am I automating? Is it a UI based application or a client/ server application or something else. For ex if it is UI based

application, Automation tool will be dependent on the actual product/ feature release to Test group. In this case, one has to work in close association with Developers till the time release is delivered to Test group.

- ii. Will automation tool effect the performance of the system. For ex, in case you are trying to do performance testing of Network or Internet security bases applications, you cannot afford Test automation tool to effect the performance of the system
  - iii. What are the components of the application you want to test. For ex in Internet security based applications, there is a Management software and then the actual software which may run on a dedicated hardware applying policies to traffic. In this case, one has to see whether the tools which will automate the Management software and tools which will automate the engine of Internet security can communicate with each other so that whole product as such can be tested end-end
  - iv. What is the kind/ level of testing I am trying to automate?
  - v. What kind of results tool can provide
  - vi. Whether the tool support interaction with your Test Case management system and Defect tracking system
  - vii. Whether the integration of multiple third party tools being used for test automation of different features is possible?
- c. Test Manager can identify the human resources required for Automation the software. Remember, one needs skilled man power to automate anything

In short – this is the feasibility phase for Test automation where Framework can be prepared and automation tool can be identified. Success of Test automation will be dependent on this phase

#### 4. Why Coding phase is important

- a. This is the phase when Test cases and Test plans are more or less complete, so this is the time one can automate test cases and prepare the test scripts
- b. Again this is the time, when one (although unreleased product/ feature) can be available to Developers and Automation engineer can use it to perform testing of his tool.
- c. Identify the test cases to be automated
- d. Remember, do not start writing test scripts till the time
  - i. Formal test plan with detailed setup description and the test data are ready
  - ii. Pictorial presentation of the setups is ready
  - iii. Base databases are generatedCaution – Test automation tool works on base data, so do not start writing test automation script

In short – this is the Development phase for Test automation where Test scripts are written

5. Why Testing phase is important
  - a. In testing phase, automation tool will not only show its productivity but also the tool itself will be tested. This is like maintenance phase for Test automation tool where tool will help in stabilizing the software and vice versa
6. Why Alpha phase is important
  - a. Alpha phase means QA is complete and the product is stable. This is the time you can make assume that almost all the changes in the software are done and you can fix all the defects in your automation tool
7. Why Beta phase is important
  - a. This is the phase when feedback from customers will be incorporated in the software and automation tool may require multiple changes because of mainly UI changes. Remember – In this phase, apart from verifying the functionality, customers will provide user level feedback for the software and most of the user level feedback are related to UI
8. Why GA phase is important
  - a. This is not important for changes in Automation tool but in this phase, automation tool becomes important for the software under test. This is the phase when everyone will rely on results of Automation tool

#### ***3.1.4 Automation checklist***

1. You want to use test scripts at multiple places?
2. Combinations of various sub features you want to use
3. Is partial automation possible?
4. Features you are planning for automation?
5. Whether same test is required to be executed on multiple hardware or multiple configurations?
6. Interaction with the Test case management system. Ideally every failed test case should have associated defect with it but the percentage of ADHOC bugs is very high

#### ***3.1.5 Steps to automate testing***

1. Plan properly and decide what to automate. Management of the company has to agree to the investment required for Test automation and should be patient enough to wait for Test automation tool to develop just like a software or a product and then enjoy the results
2. Understand the product/ software/ feature, whatever you are trying to automate
3. Identify the tools to be used in automation. Refer Tool identification checklist in section 3.1.2, point 3b
4. Identify the skilled human resources to be used in automation
5. Design and prepare the framework for test automation.
6. Prepare the checklist for automation
7. Identify the test cases to be automated.
8. Start automating test scripts once test plans are ready

9. Automate (Develop) test cases
10. Test once release is out to QA
11. Let manual test team execute the test cases once so that the results of automated testing can be compared with manual tests
12. Package the automation suite and release it to manual test group
13. Educate and train the users of the automation tool
14. Let execution team use it and log defects for it
15. Maintain the automation tool

### ***3.1.6 Guidelines during Automation test or test automation can fail***

1. Planning
  - a. Test automation requires skilled resources, so do not plan your people to work on it only when manual test schedule allows.
  - b. Management has to agree to it
  - c. There has to be separate team doing Test automation as focus has to be on execution also in QA group
  - d. Remember Test automation is like development, so set up the development guidelines for Test automation
2. Building confidence about Test automation
  - a. Train the Test automation group and explain them about the advantages of Test automation. Testers may always feel that manual testing is better for them
3. Clear goals
  - a. Test automation can identify the goals and automate accordingly.
  - b. Ideally test automation should be done as follows
    - i. Identify what all features you want to automate
    - ii. Prepare framework for all the features
    - iii. Automate the highest priority test cases so that Acceptance test plan can be automated. This is the plan which can tell everyone about the sanity of the software
    - iv. Start automating individual feature set
4. Tool identification
  - a. Refer Tool identification checklist in section 3.1.2, point 3b
  - b. Training should be provided on tool usage before starting the Test automation process
5. Start early
  - a. Start automation early i.e during Design phase itself
  - b. Start automating test scripts only when test plans are ready. Of course, framework for test automation has to be ready early
6. Identification of test cases to be automated. Do not go for 100% automation. Remember – Human element is always required for good testing. What you are automating is on the basis of test cases written by an individual. Manual testing on top of Automated testing is always required. The percentage of ADHOC defects is always very high
7. Information duplicacy

- a. Do not store the data (test cases and results) at multiple places. If you have Test management system, integrate it with the Test automation system so that results and test cases are stored at one location only.
- 8. Remember – Primary task of QA is to test the product/ feature
  - a. QA team exists to test the product/ feature. We can go for automation but the focus should not move to Test automation so that primary task is forgotten. Test automation may take time (even more time than what it takes to complete the manual testing for first time), so let one of the sub team i.e Test execution team keep on testing the product/ feature.
  - b. It pays best to have a separate team for Test automation
- 9. Elaborate test automation scripts
  - a. Do not write such big scripts such that testing the Test automation script itself becomes like testing the product. You may not want to automate test scripts for testing the Test automation script.
- 10. Techniques
  - a. Do not rely on “Record and Plan” technique
  - b. Do not hard code values inside the automation tool. Rely on data scripts
  - c. Refer to base database while automating test scripts
  - d. Prepare separate input files
  - e. Let the test cases be automated such that output of one is input to next
  - f. Have leaf level automated scripts so that they can be used at multiple places
- 11. Long term goals
  - a. Prepare the strategy with long term goals in mind.
  - b. Do not have expectations that Test automation will give immediate gains. Sometimes Test automation may take more time than completing the first cycle of Test execution
  - c. Test Automation framework should be generic and easy scalable/ extensible Support for error logging, log collection should be added for easy debugging
- 12. Interest
  - a. Look for an interesting name like SOAP “Stability Observation Automation Program” for the automation suite

### **3.1.7 Quoted guidelines**

1. *Test automation is two out of four pillars of the tomb (Testing), other two being Test execution and every tomb requires all the four pillars to survive and succeed -- Sundeep Dua*
2. *“When developing our test strategy, we must minimize the impact caused by changes in the applications we are testing, and changes in the tools we use to test them.” --- Carl J. Nagle*
3. *"We should focus our automation framework to deal with the common components that make up our unique applications."*
4. *"We must always remember: our ultimate goal is to simplify and perpetuate a successful automation framework."*
5. *"A good test strategy can remove the necessity for both manual and automated test scripts. The same ‘script’ should suffice for both."*

## 4 Citations

Example of automation done for product related to Internet security owned by the company I am working in.

### Product description

Product is a unified Internet security system which enforces policies on traffic for Defense Mechanisms Firewall (FW), Intrusion Detection system (IDS), Intrusion Prevention System (IPS), URL Filtering, Inline Anti Virus (IAV), Anti Spam (AS). It is managed by another application which is a client server based system having a UI. The configuration and monitoring part is done by the UI and using the multi-server architecture, policies to be enforced are downloaded on the box containing the software which enforces the policies for above mentioned Defense Mechanism

### Types of Automation tools

1. TAS for automating the UI related test cases
2. TAS for automating the server related test cases ensuring download of policies
3. Multiple TAS with same framework for automating test cases related to different modules (FW, IDS, Ipf, URL Filtering, IAV, AS)
4. TAS to automate the Monitoring feature
5. TAS to automate Acceptance plan. This has highest priority cases from individual test plans bundled as part of single test plan.
6. TAS to automate stability setup (SOAP)
7. TAS to automate performance setups

## References

- [1] Ipolicy QA processes and TAS (Test Automation Suite), SOAP (Stability Observation Automation Program)

## About the author

**Sundeep Dua** is Sr Manager, Quality Assurance for Ipolicy Networks Ltd, part of Tech Mahindra group. He is heading the group for last 2 yrs and has been responsible for Manual as well as Automated testing as well as Test Automation for Ipolicy's product which is in the area of Internet security. Familiar with various testing processes and automation tools, he helps team to develop automation strategies and tools. He has been working with Ipolicy Networks Ltd since year 2000 and is the one to start the Quality Assurance group in the company

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