

# Automation Testing of Web based application with Selenium and HP UFT (QTP)

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**Abstract** - Software testing is one of the most important phases of Software Development Life Cycle and main objective to find bugs and ensure quality of the software. Software Testing can be done manually or can be automated. Manual testing is done by tester without any tool. In automation testing is done with the help of automated testing tools. The objective of the paper is to compare two automation tools, Selenium and UFT in context of testing web based application.

**Key Words:** Software Testing, QTP, UFT, Selenium.

## 1. INTRODUCTION

Software testing has different goals and objectives. The main goal is to find defects in a project created by a programmer while developing project. It is a process of checking and evaluating product in order to maintain quality of final product and to verify that every part of project satisfies its requirements as mentioned by the client in the Business Requirement Document (BRD). It is an integral part of SDLC. It is always a good practice to introduce testing as early as possible in the SDLC. This gives a sufficient time for the QA Analyst to build manual and automated test cases both.

There are two types of testing: Manual testing and Automation testing. The selection of testing that to be done manually or with automated tool totally depends upon project requirement, budget associated with project and also which testing is benefited to the project.

Manual Testing is done by tester. Tester acts as an end user and uses various features of product. Manual testing may take more time or we can say it may be more time consumable.

In manual testing chances of human errors are high as compared to automation. Automation testing covers all the problems of manual testing. Automation testing automates the steps of manual testing.

## 2. AIM OF STUDY

- 2.1 To know about Automation Testing
- 2.2 Knowledge of Automation Testing framework
- 2.3 Knowledge of Automation Testing tools
- 2.4 Evaluation of tools based on some parameters

## 3. RELATED WORK

Testing of software can be done in both Manual as well Automation. However, depending on the total budget, skilled resources available, necessity to implement automation,

current SDLC process being followed and various other factors on which decision is made to implement Automation testing or not.

### 3.1 Below are some points which highlight automation in comparison with manual testing:

- Automation test scripts run faster and require less human resources.
- It is also beneficial in situations where there are frequent changes in the AUT.
- If there are certain test cases which needs to be tested mandatorily for any other feature added then in such situation Automation testing is very much beneficial.
- Automation testing reduces manual intervention for certain processes there by for e.g if there are 4 Manual testers then the work done by them can be done by one Automation tester who will design test scripts to replicate the same procedures followed by the Manual testers.
- Automation testing is very much useful for testing the final build or the final product which will be further moved on UAT as a next phase in SDLC.
- Even though the initial cost of automation is high. Once implemented it proves to be beneficial investment to the company.

### 3.2 Test Automation Framework

Automation framework is work environment or facility which contains all the set of rules and careful planning to write the scripts in a manner which results for less effort spent in the maintainability of them.

It adds an advantage by which we can ensure the re-usability of the test scripts. Any changes in application, the scripts need little or no updating to cope up with that change. Each of the frame work has its own pros and cons depend under which circumstances these are being adopted by the Testing Team or Test Lead.

There are four kinds of automation framework which are the most widely used in industries:

#### 3.2.1 Modular

The framework divides the entire AUT into number of logical and isolated individual modules. These modules can be individual

functionalities for each module, we create a separate and independent test script. Thus, when these test scripts taken together (top-down approach or bottom-up approach) builds a larger test script representing more than one module. This kind of framework can be used if your application contains lot of inter-dependent functionalities.

It is usually used in integration testing where all the modules are tested separately and they either use top-down approach or bottom-up approach while integrating every module with one another.

### 3.2.2 Data driven

This type of framework helps the user separate the test script programming logic and the test data from each other. In this framework the data which is going to be used as an input for various tests are stored in external storing sheets like excel sheet, XML, CSV or ODBC repository.

This type of framework is very beneficial when you want to test any particular functionality whose outcomes differ based on different combinations of input parameters data. For example, in case of 'User Registration' scenario, where testing is done based on different combinations of input parameters like username, email, mobile no, etc.

### 3.2.3 Keyword driven

In Keyword driven testing not only the test data is stored in an external file but also some parts of the script are stored in an external file. When the test executes the scripts pulls out the code snippets from an external file as well as the test data from an external file.

Therefore Keyword driven testing framework is also known as an extension of the data driven framework. This type of framework is used when there are repeatable scenarios which you need to test rigorously along with the changes in your application.

### 3.2.4 Hybrid

In Hybrid Testing framework we use the combination of any of the above frameworks mentioned. As each of the frameworks has its advantages and disadvantages, in such situation Hybrid provides to be a perfect solution for implementing automation testing.

## 3.3 Automation Software tools

The decision to implement automation in any organization is together taken by Project Manager, Test Team lead and sometimes even testing team is involved in the process. There are various factors on which this decision is taken which will be discussed in this paper later.

Below are two major decisions on which automation is dependent.

- Open source approach (Free)
- Commercial test tools (Paid)

Majorly the budget of the overall project is the deciding factor for implementing automation. As there are lot of free tools available in market for automation as well as paid tools. We will be majorly focusing on two most widely used tools in industry for automation testing.

### 3.3.1 Selenium

### 3.3.2 UFT (QTP)

### 3.3.3 Selenium

Selenium is an open source (freely available) software testing tool for automating web applications. You can download selenium libraries directly from their official websites [www.seleniumhq.com](http://www.seleniumhq.com). These files are available as per various languages preferred by testers for writing automated test-scripts (Java, Python, etc.)

Selenium itself is an entire framework which comprises of various components. Each of those components are used for different purpose of automating the testing process. Some of these components are used for simply 'record-playback' all the user activities on the web-app, some are widely used to automate manual test process by writing test scripts to invoke the browser and perform all the activities which a tester would perform manually and some components are used to automate mobile applications. Below are the major components of Selenium:

- a) Selenium IDE
- b) Selenium RC (selenium 1.0)
- c) Selenium WebDriver (selenium 2.0)
- d) Selenium Grid

#### a) Selenium IDE

Selenium IDE is a Firefox extension which provides an environment for recording, editing and debug tests. Selenium IDE is an integrated development environment for Selenium scripts. It is implemented as a Firefox extension, and allows you to record, edit, and debug tests. Selenium IDE includes the entire Selenium Core, allowing you to easily and quickly record and play back tests in the actual environment that they will run in. [5]

#### b) Selenium RC

Selenium RC was the flagship testing framework of the whole Selenium project for a long time. This is the first automated web testing tool that allowed users to use any of the various programming language: Java, Python, C#, Perl, Ruby, and PHP.

#### c) Selenium WebDriver

The WebDriver proves itself to be better than both Selenium IDE and Selenium RC in many aspects. It implements a more modern and stable approach in automating the browser's actions. WebDriver, unlike Selenium RC, does not rely on

JavaScript for Automation. It controls the browser by directly communicating with it.

#### d) Selenium Grid

Selenium Grid is a tool used together with Selenium RC to run parallel tests across different machines and different browsers all at the same time. Parallel execution means running multiple tests at once.

Features:

- Enables simultaneous running of tests in multiple browsers and environments.
- Saves time enormously.
- Utilizes the hub-and-nodes concept. The hub acts as a central source of Selenium commands to each node connected to it.

#### 3.3.1 UFT (QTP)

UFT formerly known as QTP (Quick Test Professional) is a tool for automation testing to test the applications.

UFT has its own Integrated Development Environment (IDE) comes with various features which enable tester to write scripts efficiently. UFT is supported only by Windows and uses VBScript Language for programming.

It supported technologies totally depends on the version of UFT is accessible for Web, Java (Core and Advanced), .Net, WPF, SAP, Oracle, Siebel, PeopleSoft, Delphi, Power Builder, Stingray 1, Terminal Emulator, Flex, Web Services, Windows Mobile, VisualAge Smalltalk, Silverlight and mainframe terminal emulators. [8]

##### A. Object Repository:

In UFT, while recording the scripts, it stores the properties of objects in Object Repository. UFT will use these stored properties while executing the recorded script.

##### B. Descriptive Programming:

It is also known as Programmatic Description. In this method we write scripts using VBScript language where object properties are directly coded instead of storing it object repository.

- a) Static Programming
- b) Dynamic Programming

## 4. EVALUATION STUDY

In this study we have used HP UFT version 14.0 and selenium version 3.4.0.

Comparison between these two tools is made on the basis of following parameters:

#### 4.1 Cost

UFT costs incurred are by licensing and in maintenance, but Selenium is a totally free, open-source tool and can be downloaded easily.

#### 4.2 Easy Learning

Selenium is to be used efficiently for which it requires proper installation and integration of various tools. Learning to use Selenium tool can be difficult.

#### 4.3 Operating System Support

Selenium allows testing to be carried out in any platform. Cross-platform testing is an essential feature with growing technology and demands of web-based testing.

Selenium tests applications on all major OSs like Windows, Linux, OS X, and Solaris. [9]

UFT can be used only on windows platform. Though it does not allow cross-platform but since windows is more widely used, UFT is of high importance as testing tool.

#### 4.4 Browser Support

Browser support of Selenium is very high compare to UFT. UFT supports mainly IE, Firefox, and Chrome.

Selenium supports Firefox, chrome, IE, Safari, Html Unit.[9]

#### 4.5 Scripting Languages

Selenium along with its cross-platform functionality allows scripting to be done using Java, C#, Python, Ruby, JavaScript, PHP. It takes lot of time to create scripts in selenium.

Scripting is the base for testing which can be done using VBScript in UFT. Thus, it allows even naïve users to use the tool due to simple programming skills that are needed and not necessarily an expert in scripting. However, if advanced test scripts with complex logic may require some expertise skills as for programming. Since scripting is easier, it can be done faster than in Selenium.

#### 4.6 Application under test

In selenium applications to be tested are Web Applications.

In UFT, it is supported for testing of windows desktop, web and mobile applications.

#### 4.7 Cloud Execution

UFT was designed to test one application at a time on a single machine.

Selenium can run code on one machine and test the application on remote machine. Selenium-Grid is specifically designed to run simultaneous tests on different machines using different browsers and different operating systems in parallel. Thus, it is a

perfect match for cloud-based testing architectures and services.

#### 4.8 Execution Efficiency

UFT tests one application per machine, whereas Selenium can execute multiple, simultaneous tests on a single machine.

Furthermore, UFT script execution takes more RAM and CPU power than does Selenium. UFT can run in multiple Windows VMs, but these are more resource-hungry than Linux VMs, which Selenium can utilize.

Same hardware can generate more execution power in Selenium compared to UFT.

#### 4.9 Object Storage and maintenance

Selenium recognizes objects on the basis of the DOM structure of the HTML Page. Objects are managed using UI-Element user extension and properties. [9] UFT provides built in object repository which makes stored objects reusable.

#### 4.10 Execution Speed

Execution speed of Selenium is faster than UFT in our case. We recorded execution time for UFT and selenium for 2 same scripts.

And for the same test, execution time in Selenium as show in Fig. (a)

For login test of Holachef website execution time in UFT is as shown in Fig. (b)

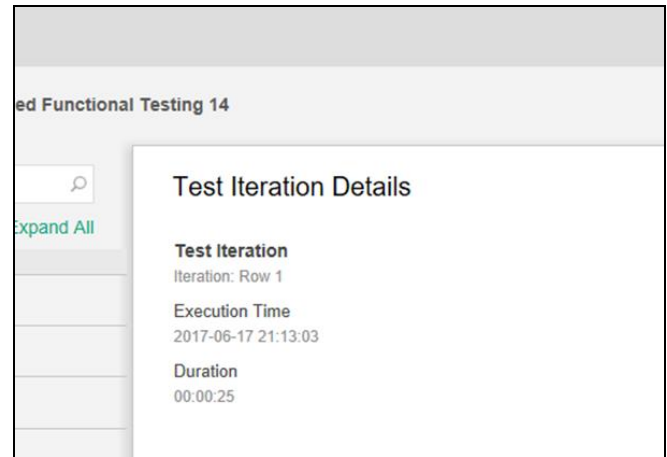


Fig. (b) Execution time in UFT(25 sec)

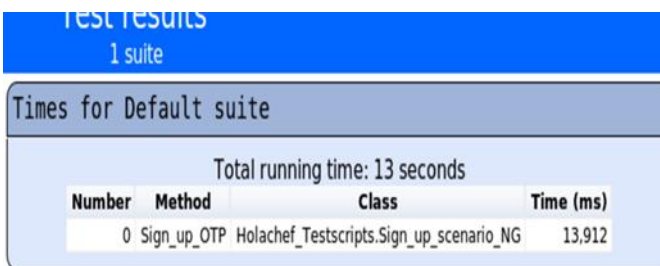
### 5. CONCLUSION

Selection of right automation tool is based on application requirement, type of application, budget and efficiency. Selenium became more popular in short span of time. Selenium framework is designed only for web application testing. If application requirements are getting fulfilled with Selenium there is no need to go for UFT.

It's the application complexity and functionality which is a major deciding factor for which type of tools should be used. When it comes to web apps selenium is better choice as compared to QTP which provides a tester more flexibility to test the applications under various complex scenarios.

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The screenshot shows 'TEST RESULTS' for '1 suite'. Below it, it says 'Times for Default suite' and 'Total running time: 13 seconds'. A table follows with the following data:

Number	Method	Class	Time (ms)
0	Sign_up_OTP	Holachef_Testscripts.Sign_up_scenario_NG	13,912

Fig.(a) Execution Time in Selenium(13 sec)

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