



## 2. Manual Testing Vs. Automation Testing:

Software testing is a huge domain, but it can be broadly categorized into two areas: manual testing and automated testing. In manual testing, test cases are executed manually without any support from tools or scripts. But with automated testing, test cases are executed with the assistance of tools, scripts, and software. Testing is an integral part of any successful software project. The type of testing (manual or automated) depends on various factors, including project requirements, budget, timeline, expertise, and suitability. Three vital factors of any project are of course time, cost, and quality - the goal of any successful project is to reduce the cost and time required to complete it successfully while maintaining quality output. When it comes to testing, one type may accomplish this goal better than the other.

Automated testing is more reliable as compared to the manual testing. Initial investment of automation testing is higher than manual testing. Performance Testing like Load Testing, Stress Testing etc. is a practical option in automation testing whereas such type of option is not available in manual testing. Automation testing covers all the problems of manual Testing. Automation testing automates the steps of manual testing using automation tools. Various tools can be used for automation testing but for study purpose four tools has been considered like Quick Test Professional (QTP), LoadRunner, Win Runner and Junit. Automation tools help to increases the test execution speed, more reliable, repeatable, programmable, comprehensive, and reusable. These four tools are very largely use in software testing process. Each of these is fulfill with quality parameter which are used for testing the quality of software testing tool.

## 3. Automation Testing Tools:

**3.1 Quick Test Professional (QTP):** QTP is an automated functional Testing tool that helps testers to execute automated regression testing in order to identify any errors, defects or gaps in contrary to the expected results of the application under test. It was designed by Mercury Interactive and later on acquired by HP and now Micro Focus. It is an icon-based tool that automates the regression and Functional Testing of an application. Both technical, as well as a non-technical tester, can use Micro Focus QTP. It provides both features- Record as well as Playback. We can test Desktop as well as the Web-based applications. It allows Business Process Testing (BPT) and it supports the largest pool of software development environments like SAP, Oracle etc...QTP tool helps the testers to perform an automated functional testing uninterrupted.

**3.2 LoadRunner:** It is a software testing tool from Micro Focus. It is used to test applications, measuring system behavior and performance under load. LoadRunner can simulate thousands of users concurrently using application software, recording and later analyzing the performance of key components of the application. Loadrunner from Micro Focus is the most widely used Load Testing tool. Performance Test Results produced by Loadrunner are used as a benchmark against other tools. Simplify testing with a project based testing solution supporting the widest range of technologies and protocols in the industry. LoadRunner Professional is part of the LoadRunner Family, a unified set of performance engineering solutions.

**3.3 WinRunner:** HP WinRunner software was an automated functional GUI testing tool that allowed a user to record and play back user interface (UI) interactions as test scripts. As a functional test suite, it worked with HP QuickTest Professional and supported enterprise quality assurance. Win Runner is the most used Automated Software Testing Tool as a functionality testing tool. It Supports C/s and web technologies such as (VB, VC++, D2K, Java, HTML, Power Builder, Delphe, Cibell (ERP)).

**3.4 Junit:** JUnit is a unit testing framework for Java programming language. JUnit has been important in the development of test-driven development, and is one of a family of unit testing frameworks collectively known as xUnit, that originated with JUnit. JUnit is a simple framework to write repeatable tests. It is an instance of the xUnit architecture for unit testing frameworks.

#### **4. Statement of Problem:**

Testing is a critical part of the software development process. There are a lot of different automated software testing tools currently in the market. Some of these are only able to perform specific kinds of testing and only work. When we start research for the right automated software testing tool, it is need to create a list of requirements to review when choosing a tool for evaluation. If we do not have list of requirements, we may waste time downloading, installing and evaluating tools that only meet some of requirements, or may not meet any of them. This research evaluate four major tools that are LoadRunner, Quick Test Pro (QTP), WinRunner and Junit with their test tool characteristics, quality parameters, data driven testing capability, capability of generation of script , recording efficiency, test execution capability, test reporting capability, scripts reusability capability etc.

#### **5. Data Representation, Analysis and Interpretation**

This research is aimed to study the comparison of various automation tools like Quick Test Pro (QTP), LoadRunner, Winrunner & Junit and identify the results of record efficiency, Capability of generation of script, Data Driven Testing, Test result report. Also test is applied on various general parameters that are mainly focuses on usability, security, efficiency, accuracy, reliability and robustness. For analysis purpose of we used scaling technique like 1 indicates Bad followed by 2 indicates Average whereas 3 indicates Good further 4 indicates Very Good, and 5 indicates Excellent.

**5.1 Quality Parameters:** To do the comparative study of various testing tools, various quality parameters are considered like Usability, Security, Efficiency, Accuracy, Reliability & Robustness. Following Table No. 1 shows the different parameters that are used to measure the software quality by using various tools

**Table No. 1: Quality Parameters**

<b>Quality Parameters</b>				
<b>Tools -&gt; Parameters ↓</b>	<b>QTP</b>	<b>LoadRunner</b>	<b>WinRunner</b>	<b>Junit</b>
Usability	5	5	5	5
Security	5	4	4	5
Efficiency	5	3	3	4
Accuracy	5	4	4	3
Reliability	5	4	3	3
Robustness	5	5	5	5
<b>Quality Parameters</b>	5	4.16	4	4.16

As per above table it clears that, QTP is excellent tool with quality parameters like Usability, Security, Efficiency, Accuracy, Reliability & Robustness followed by LoadRunner and Junit have very Good and WinRunner is Good.

**5.2 Data Driven Testing:** For data driven testing, Access data from external source, Change the data without effecting script, Way of testing parameters are considered. Following table No. 2 shows the result of Data Driven Testing.

For measuring quality of data driven testing various parameters are considered like Access data from external source, Change the data without effecting script and Way of testing. As per the following Table No.2, it clears that QTP, LoadRunner & WinRunner has excellent (5) quality of Access data from external source as compared to Junit. QTP and LoadRunner has excellent (5) quality to change the data during testing without effecting script followed by WinRunner has a very Good (4) quality to change the data during testing without effecting script.

**Table No. 2: Data Driven Testing**

<b>Data Driven Testing</b>				
<b>Tools -&gt; Parameters ↓</b>	<b>QTP</b>	<b>LoadRunner</b>	<b>WinRunner</b>	<b>Junit</b>
Access data from external source	5	5	5	-
Change the data without effecting script	5	5	4	-
Way of testing	5	4	4	3
<b>Data Driven Testing Quality</b>	5	4.6	4.3	0.33

It clears that QTP is excellent data driven testing quality followed by LoadRunner & WinRunner have Very Good and Junit is Very Bad.

**5.3 Recording Efficiency:** Various parameters like recording type, insert command, Access to record control and Auto documentation are considered with respect to various testing tools

like QTP, LoadRunner, Win Runner & Junit are considered for comparison of recording efficiency of various. For measuring the efficiency 5 scale has been considered like 1- Bad, 2 - Average, 3-Good, 4-Very Good, 5-Excellent.

Table No.3 shows the recording efficiency of various automated tools. It shows that QTP & LoadRunner has excellent recording efficiency quality that is 5 followed by WinRunner has Good quality that is 3 whereas for insert command all tools has very poor performance. For access to record control Junit has a good quality that is 4 followed by WinRunner has a 2 and QTP & LoadRunner has 1. All tools has excellent auto documentation quality that is 5 followed by Junit has Very Good that is 4.

**Table No. 3: Record Efficiency**

Recording Efficiency				
Tools → Parameters ↓	QTP	LoadRunner	WinRunner	Junit
Recording type	5	5	3	-
Insert command	1	1	1	1
Access to record control	1	1	2	4
Auto documentation	5	5	5	4
<b>Recording Efficiency</b>	3	3	2.75	3

Also we have calculated average value of recording efficiency by considering various parameters like recording type; insert command, access to record control and auto documentation. Average value of recording efficiency of QTP, LoadRunner & Junit is 3 followed by WinRunner has a 2.75. QTP, LoadRunner, Junit have a Good record efficiency and WinRunner has also on an average good record efficiency. So it clears that recording efficiency of QTP, LoadRunner, Junit is Good as compared to WinRunner.

**5.4 Capability of Generation of Script:** For measuring capability of generating script of testing tools language parameter is considered. Following Table No. 4 shows the Capability of generation of script. As per the table capability of Junit is 5 followed by QTP is 4 and LoadRunner & WinRunner has 1 resp. Junit has Excellent Capability of generation of script followed by QTP has Very good capability whereas LoadRunner and Win Runner have very bad capability.

**Table No. 4: Capability of generation of script**

Capability of Generation of Script				
Tools → Parameters ↓	QTP	LoadRunner	WinRunner	Junit
Language	4	1	1	5

**5.5 Test Report:** As a result of testing and for a Test Report various parameters are considered like Report Presentation, Information about applied check point, Graphical

information. As per the following Table No.5, it clears that QTP has excellent presentation quality that is 5 followed by LoadRunner & WinRunner have Very Good quality that is 4 and Junit have a Good quality that is 3. QTP and LoadRunner gives excellent information about applied check point that is 5 as compared to WinRunner has Very Good that is 4. Also all the tools are excellent in generation of graphical information that is 5.

**Table No.5: Test Report**

<b>Test Result Report</b>				
<b>Tools -&gt; Parameters ↓</b>	<b>QTP</b>	<b>LoadRunner</b>	<b>WinRunner</b>	<b>Junit</b>
Report Presentation	5	4	4	3
Information about applied check point	5	5	4	-
Graphical information	5	5	5	5
<b>Quality of Test Result Report</b>	5	4.6	4.3	2.6

As per above table and calculations, it clears that QTP is Excellent tool (5) regarding testing result report as compared to the other tools like LoadRunner (4.6) followed by WinRunner (4.3) and further Junit (2.6). Hence it clears that QTP is an excellent tool for generating test result as compared to the other tools like LoadRunner, WinRunner & Junit

## 6. Findings and Conclusion

In this paper performance result of different performance testing tools like QTP, LoadRunner, WinRunner & Junit with various parameters have been analyzed. The same parameters have been used for comparing performance result of various tools. These comparisons provide information to select the better tool for performance testing of applications according to performance requirement. This research work can be extended to more experiments with more tools and different comparison parameters to provide more realistic results.

### 6.1 Findings

- Recording efficiency of QTP, LoadRunner, Junit is Good as compared to WinRunner.
- Junit has Excellent Capability of generation of script followed by QTP has Very good capability whereas LoadRunner and Win Runner have very bad capability.
- QTP, LoadRunner & Win Runner has excellent quality of Access data from external source as compared to Junit.
- QTP and LoadRunner have excellent quality to change the data during testing without effecting script as compared to WinRunner and Junit.
- QTP, LoadRunner & Win Runner has excellent data driven testing quality
- QTP is excellent data driven testing quality followed by LoadRunner & WinRunner have Very Good and Junit is Very Bad.
- QTP is Excellent tool regarding testing result report as compared to the other tools like LoadRunner followed by WinRunner and further Junit .

- QTP is excellent tool with quality parameters like Usability, Security, Efficiency, Accuracy, Reliability & Robustness followed by LoadRunner and Junit have Very Good and WinRunner is good.

## 6.2 Conclusion

- Automated software testing has become necessity of companies because it saves both time and money. QTP, LoadRunner, WinRunner and Junit all are very good tools for test automation and is used in IT industry in large size.
- LoadRunner has easy to use UI and efficient playback. Using one of them can be decided based on the application features and scope of testing.
- JUnit is a Java framework for performing unit tests on code. By testing code after every change, programmers can be reassured that changing a small amount of code does not break the larger system and Winrunner used to quickly create and run sophisticated automated tests on your application
- Recording efficiency of QTP is very high as compared to other tools whereas QTP requires data security even while testing.
- LoadRunner will be best to use for applications with lesser security.
- WinRunner is best for to create reusable test script
- Junit is best for testing java based application and has Excellent Capability of generation of script as compared to other tools
- QTP and LoadRunner have excellent quality to change the data during testing without effecting script.
- QTP , LoadRunner & Win Runner has excellent data driven testing quality
- QTP is a excellent tool for generating test result as compared the other tools like LoadRunner, WinRunner & Junit
- WinRunner used to quickly create and run sophisticated automated tests on your application and is best for create reusable test script.
- Finally we found that the Quick Test Professional (QTP) is the best software testing tools among all the testing tools.

## 7. References

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