

Comparative Study of Automated Testing Tools: Quick Test Pro and Load Runner

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Abstract-Testing automation tools enables developers and testers to easily automate the entire process of testing in software development. The objective of the paper is to conduct a comparative study of automated tools such as the Mercury Quick Test Professional and the Mercury Load Runner based on criteria such as the efforts involved with generating test scripts, capability to playback the scripts, result reports, speed and cost. The fundamental goal is to analyze the features supported by these two functional testing tools that aid in minimizing the resources in script maintenance and increasing efficiency for script reuse. For the purpose of this project we took an existing VB based application that was inventory management and perform functional testing on it by these two automated testing tools.

Keywords-Quick Test Professional, Load Runner

1. INTRODUCTION

The aim of software testing process is to identify all the defects existing in a software product. It is the process of exercising and evaluating a system or system components by manual automatic means to verify that it satisfies specified requirements or to identify differences between expected and actual results.

There are two ways of testing that are manual or automation. Manual testing carried out by the testers. Testers test the software manually for the defects. It requires a tester to play the role of an end user, and use most of all features of the application to ensure its correct behavior. They follow a written test plan that leads them through a set of important test cases.

The problems with manual testing are, it is very time consuming process, not reusable, has no scripting facility, great effort required, and some errors remain uncovered.

With untrained people sitting in front of their computers. So it is no wonder that not only the “automation behind the scenes” (Unit Testing for example) gained in importance, but also the automation of User Interface Tests with all its boon and bane.

The paper surveys a set of tools that support the testing process in a variety of ways. Some tools simulate the final execution environment as a way of expediting test execution, others automate the development of test plans, and still others collect performance data during execution.

In these tough economic times, software- development managers are pushing to get more and testing done faster. Most recognize the automated testing tools facilitate higher quality and more productive testing, but acquiring such tools is often complicated. The paper had given the evaluation criteria for selecting the testing tools.

Automation testing covers all the problems of manual testing. Automation testing automates the steps of manual testing using automation tools such as Quick Test Pro (QTP) and Load Runner.

increases the test execution speed, more reliable, repeatable, programmable, comprehensive, and reusable.

2. PROBLEM STATEMENT

Testing is a critical part of the software development process. There are a lot of different automated software testing tools currently on the market. Some of these are only able to perform specific kinds of testing and only work.

When we start or research for the right automated software testing tool, it is important 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 two major tool vendors that are Load Runner (LR) and Quick Test Pro (QTP) on their test tool characteristics, test execution capability, test reporting capability, scripts reusability capability, playback capability, and vendor qualification.

3. BACKGROUND

In this section, we listed the papers that reviewed during this project.

In recent years the importance of well-designed User Interfaces has increased a lot. If nothing else, it is the rise of Web 2.0 applications, the applications for everyone. Nowadays User Interfaces have to deal much more than

The paper gives a survey which tries to give an account of what type of trends exist today in software reuse and testing. The focus was to try to find out how developers use different tools today and what are lacking, especially in the field of reuse and testing.

The papers classify and distribute a set of testing tools over the types of testing (testing methods) for three types of software products. (Web application, application software and network protocols)

The paper told us if we've got a reasonably well structured system implementation, it is very easy to add in a mechanism to capture interactions with operations that system provides and to generate playback artifacts that are meaningful. Performing operation-centric capture/replay avoids many of the pitfalls of traditional GUI centric capture/replay.

4. EVALUATION STUDY

For this study we use the current version of Load Runner and QTP that are 8.0 and 11.0 respectively.

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

1. Recording Efficiency
2. Capability of generation of scripts
3. Data driven testing
4. Test result reports
5. Reusability
6. Execution speed
7. Playback of the scripts
8. Easy to Learn
9. Cost

4.1 Recording Efficiency

Both tools are recording and playback type tools. While recording commands are inserted to check the application works as intended. These commands also called verification points or check points.

QTP does not provide easy access to controls. When we hit the record button, application is started. It records all the actions as performed by user. But we cannot insert the checkpoint during recording. We can only insert these after recording. QTP provides three kind of recording that are context sensitive mode, analog mode and low level recording. There is no way to pause the test in middle. So, 99% testers use the context sensitive mode because it only store the actions of application that is under test by ignoring system error messages

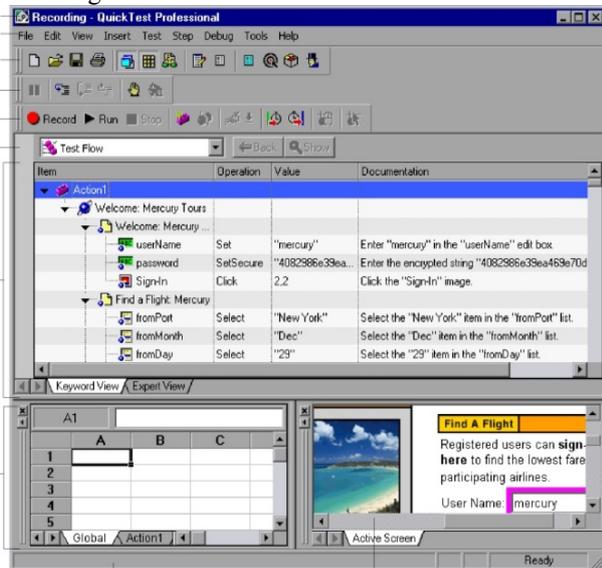


FIG: 1 Recording in QTP

In the previous section, you created an empty Web script. Now you can begin to record events directly into the script. In this section, you will track the events of one passenger reserving a flight from Denver to Los Angeles and then checking the flight itinerary.

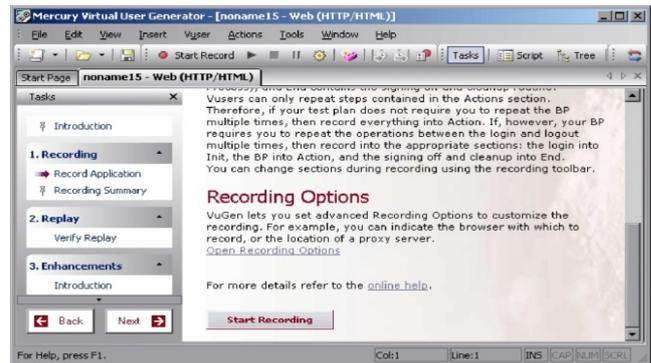


FIG: 2 Recording in Load Runner

Both tools also generate the automated documentation of the actions that performed by the users. During the recording time, QTP captures the application events based on UI of the application. Whereas Load Runner captures the application operations based on the protocol.

4.2 Capability of generation of Scripts

- QTP is object bases scripting where Load Runner is C based Scripting.
- QTP supports ".NET" application Automation not available in Load Runner.
- QTP has "Active Screen" support which captures the application, not available in LR.
- QTP has "Data Table" to store script values, variables which LR does not have.
- Using a "point and click" capability you can easily interface with objects, their definitions and create checkpoints after having recorded a script – without having to navigate back to that location in your application like you have to with Load Runner. This greatly speeds up script development.

4.3 Data-driven Testing

Nowadays data-driven testing (DDT) becomes very important part of testing. Instead of recording multiple tests to test multiple sets of input data, it is possible to make the scripts access the different sets of input data from external source line data tables, excel sheets etc. Load Runner and QTP both provide the data- driven testing.

QTP supports DDT by using inbuilt data tables which have functionality like excel sheet and easy to edit and update. Using the data tables reduces efforts of maintaining excel sheets and easy mapping of columns to the input elements by even a novice user. We can insert data table parameters into our test so that it will run several times on different sets of data. Each test run on a different set of data is called iteration. Data tables are of two types: global data table and local data table. When we want a data table to be available to all the actions in our test, then it is called global data table. Local data table is available to only one action in our test. QTP can also access the external sources though data tables.

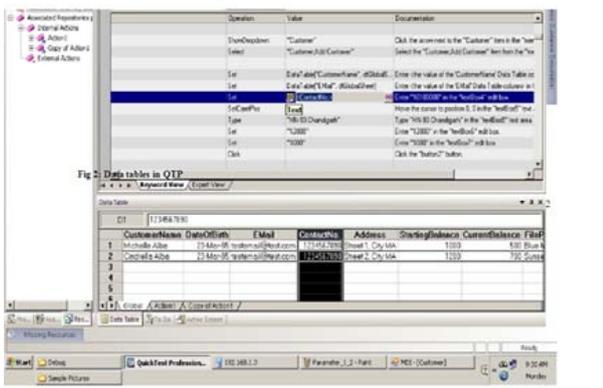


FIG: 3 Data Tables in QTP

Load Runner supports the Virtual User Generator (VuGen) is used to simulate the steps of real human users. VuGen can also run scripts for debugging. VuGen lets the user record and/or script a test to be performed against an application under test, and play back and make modifications to the script as needed, such as defining Parameterization (selecting data for keyword-driven testing).

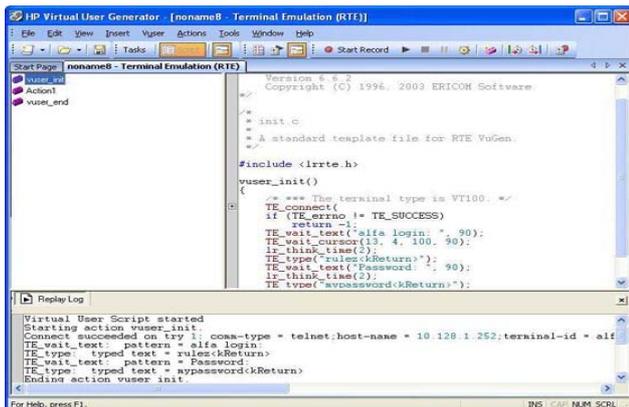


FIG: 4 Selecting Data for keyword Driven Testing (parameterization)

4.4 Test Result Reports

After execution of the test script, it is necessary to get the results of execution for performing effective analysis whether test scripts have passed or failed while running a test suite. QTP gives executive summary of the test. It shows the test steps in hierarchy tree and also provides the summary of each test step. It also provides information about checkpoints that applied during testing. QTP gives the statistics about the previous run and current run in the form of pie charts. These result reports are very user friendly and easy to understand. Load Runner also shows the result of execution. But it shows all events that occurred during play back in one pane. It does not give info about each test step like in QTP. It also does not provide graphical representation of results. In the Scenario Groups pane, you can see as Vusers gradually start to run and generate load on the system. You can see the responsiveness of the server to the Vuser actions in the online graphs

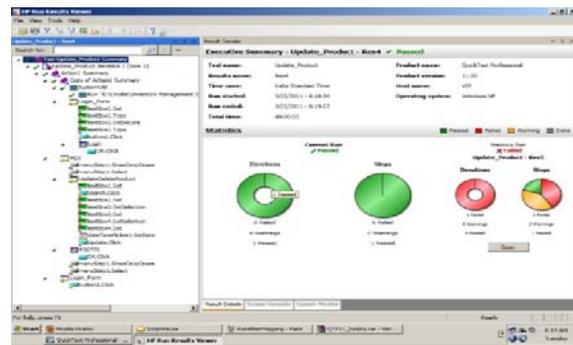


FIG: 5 Result Report in QTP

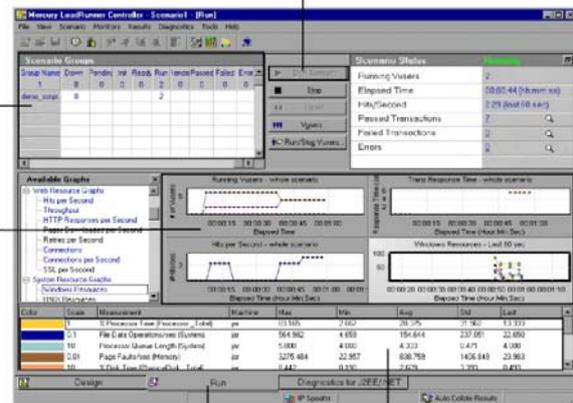


FIG: 6 Load Runner Controller Scenarios

4.5 Script Reusability

Reusing testing logic repeatedly is the ultimate goal of test automation.

QTP has inbuilt function library. It forms the backbone of the automation in framework. All the coding logic is in the form of a user-defined VB scripts. All these functions are stored in the function library. It is the place where most of the scripts reside and the place where customization can be done in the script for that project. The common scripts are reused easily. When application was modified by changing some properties of the objects, the same script can be used on the new build. QTP has object repository where it recognizes and stores info such as object's properties, values etc. object repository has option of update the object from where we can easily update the property of the object and run the same script easily

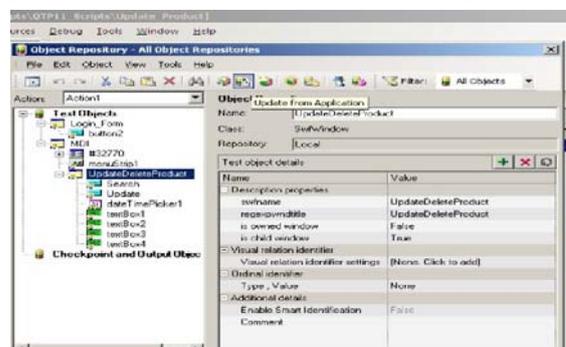


FIG: 7: Object Repository of QTP

Load Runner Run-Time settings let you emulate different kinds of real user activity and behavior. For example, you could emulate a user who responds immediately to output from the server, or a user who stops and thinks before each response. You can also configure run-time settings to specify how many times the Vuser should repeat a set of actions and how often.

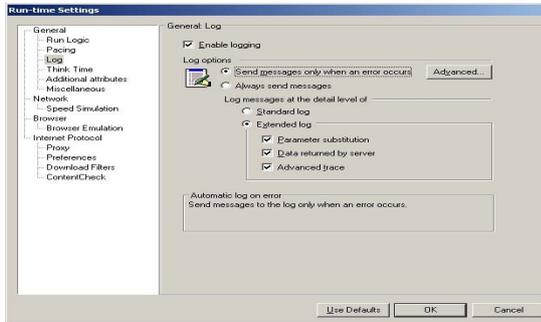


FIG: 8 Repeat a Set of Actions

4.6 Execution Speed

Execution speed of QTP is come little bit faster than Load Runner in our case. We calculated the execution speed by taking total test run time of each user screen (i.e. start test run time + end test run time). Both QTP and Load Runner result windows shows the start test run time and end time, and also total time taken.

In the case of QTP,

$$\text{Average time} = \sum t / n = 418 / 11 = 38 \text{ sec}$$

In case of Load Runner,

$$\text{Average time} = \sum T / n = 268 / 11 = 24.36 \text{ sec}$$

Where T is the time taken by each user screen in sec and n is the total number of user screens

4.7 Playback Capability

When script is played back, it replays the user actions that performed by the user during recording. If object is not recognized during replay, it gives the error message as object is not found or not identified.

In Load Runner, by recording a set of typical user actions such as booking a flight, you created real user emulation. You replay your recorded script to verify that it runs properly before you incorporate it into a load testing scenario. During replay, you can view the actions in a browser and see if everything is as you expect it be.

In our study, we seen both tools playback the scripts efficiently. Sometimes QTP did not recognize the objects during play backing. But the same problem also occurred with Load Runner too.

QTP has three modes of replaying the test. These are not listed on the tool bar. When we hit the “run” button we get the “run” dialogue box, which gives us 2 options. Three modes are:

Verify mode: it save results in new run result folder for later comparison.

Debug mode: save the results in temporary run results folder overwriting the earlier results.

Update Run mode: when we need to run the test to update

the checkpoints go to “automation” menu and select “update run mode”.

4.8 Easy to Learn

Load Runner takes more time than QTP because it has more features, and more complicated than QTP. Load Runner needs more time to explore each feature. For example, it is difficult to create a new Load runner Parameter.

QTP provides different types of testing such as Functional, Regression, Unit, Distributed, Web, and Manual Testing. Load Runner provides only Load testing.

4.9 Cost

Load Runner is very cheaper than QTP. We gather their cost information from their respective centers. Load Runner has two editions one is Enterprise and second is Standard. The cost varies with their licenses. The following table shows the cost of Load Runner with their respective licenses:

Table1. Cost table of Load Runner

Licenses	Enterprise	Standard
Node-locked	\$1999	\$999
Floating	\$4499	\$2999

QTP is available through single-seat licenses, as well as floating or concurrent licenses. Their cost is varied from country to country. Till 2010, these licenses came in the range of (\$8,000-\$15000).

5. RESULTS

For the purpose of rating the comparison parameters, we have used 5-point scale i.e. 5, 4, 3, 2, 1 as Extremely Good, Fairly Good, Average, Fairly Bad, and Extremely Bad respectively.

In this, we will divide the each parameter into sub criteria to make clear distinguish and for easy rating. We assign the points to sub criteria based on their functionality. The total value of parameter is calculated by taking average of sub criteria values.

We had already discussed about each parameter in detail. The sub criteria have taken from them only and these are also discussed in their respective parameters.

Now, we will take each parameter and their sub criteria to calculate the overall performance of each parameter in both tools.

5.1 Recording Efficiency

Sub criteria	QTP	Load Runner	Comment
Insert command	1	1	Both tools, we can't inset cmd while recording.
Recording types	5	5	Both tools provide the facility to record the mouse movements, screen co-ordinates, keystrokes and objects.
Access to record control	1	1	Recording Toolbar does not present at the application under test.
Auto documentation	5	5	Both tools provide this facility.

Table No: 2

For QTP,
 The value of Parameter is = $1+5+1+5/5 = 12/5 = 2.4$
 For Load Runner,
 The value of parameter is = $1+5+1+5/5 = 12/5 = 2.4$

5.2 Capability of generation of Scripts

Sub criteria	QTP	Load Runner	Comment
Language	4	1	Load Runner supports only Load testing. QTP supports the function Testing, regression testing, vbScript based testing etc.

Table No: 3

5.3 Data- driven Testing

Sub criteria	QTP	Load Runner	comment
Access data from external sources	5	5	Both Provide facility like excel, database etc.
Change the data without effecting scripts	5	5	Both Provide facilities which keep the script separated from the data.
Way of testing	5	4	QTP provides the inbuilt data tables which Has the more easy way to DDT.

Table No: 4

For QTP,
 The value of DDT is = $5+5+5/3 = 15/3 = 5$
 For Load Runner,
 The value of DDT is = $5+5+4/3 = 14/3 = 4.6$

5.4 Test Result Report

Sub criteria	QTP	Load Runner	comment
Report presentation	5	4	QTP gives executive summary of result. Load Runner result in multiple panes.
Information about applied check points	5	5	Both provide this information.
Graphical information of the previous run	5	5	Both provide this facility

Table No: 5

For QTP,
 The value of Parameter is = $5+5+5/3 = 15/3 = 5$
 For Load Runner,
 The value of DDT is = $5+5+4/3 = 14/3 = 4.6$

5.5 Script Reusability

Both the tools have smart recognition features which permit reuse of the script on a new build.

In Load Runner, scripts can be called from one another and can be reused.

QTP allows creation of reusable actions which can be called from other actions and also passing parameters from one action to other actions. QTP can also create copy of existing actions in new actions.

The difference is that QTP has object repository concept which is different from the name mapping and it is the most powerful feature of QTP which helps in script reuse.

5.6 Execution Speed

The speed of Load Runner is more than QTP. So we rank the QTP as fairly good and Load Runner as extremely good

5.7 Playback Capability

In our study, both tools play backed the scripts efficiently. Sometimes, Load Runner did not recognize the objects but the same was also encountered with QTP too.

5.8 Easy to Learn

QTP has more features and is more complex than Load Runner, so it takes more time to learn than Load Runner.

5.9 Cost

QTP is more costly than Load Runner. The cost of QTP is three or four times of Load Runner cost.

5.10 Comparison graph based on results

The overall comparison graph is shown in Fig 9. This graph is based on parameters value that has been calculated previously.

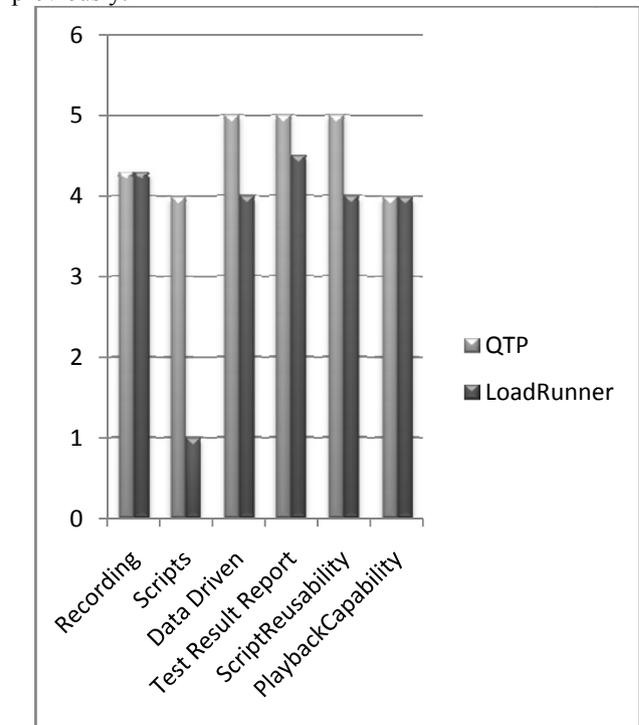


Fig: 9 Comparison QTP and Load Runner Based On Parameters

6. CONCLUSION

Automated software testing has become necessity of companies because it saves both time and money. QTP and Load Runner both are very good tools for test automation, Load Runner has easy to use UI and efficient playback. Using one of them can be decided based on the application features and scope of testing. Load Runner will be best to use for applications with lesser security needs. QTP is best where data security is needed even while testing.

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