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Comparing Performance Testing Tools for Web Application

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ABSTRACT: Performance testing helps us to detect and eliminate the bottleneck in the application during the test phase causing the prevention of the loss while presenting it into the market or to clients. The performance testing is achieved by using the testing tool. In this paper, the performance tool like JMeter, WebLOAD is compared using the parameters like stability, monitoring of server, ease of use for installation, set up and execution, cost, etc. The primary objective is to study the tools and identify which is better and efficient.

I. INTRODUCTION

Non-functional testing is a type of software testing that examines the non-functional aspects such as performance, usability, reliability, etc. It affects clients satisfaction and justly important as functional testing. Performance testing is one of the non-functional testing techniques which determine the system parameters concerning responsiveness, stability under the various load of work. Performance testing requires the quality attributes such as reliability, scalability, speed, etc. After selecting the quality attributes, it is required to perform the performance testing technique to meet the performance requirements of the software. The main purpose of the performance testing is to detect and eliminate the state of a computing device and the overloaded network in which slows the overall performance by one component is unable to keep track with the rest of the systems. Performance testing is done to provide information about the performance of the applications to stakeholders. It reveals the improvement which is needed to implement before the software is produced in the market. Mission-critical applications such as life-saving equipment models, space launch programs should be tested to ensure that they execute without deviations for a long period.

Though there are several performance testing tools available in the market for web applications, it is important to know the tools before implementing them to any software. In this work, we discuss the tools for comparison which are WebLoad and Apache JMeter. The main purpose of the work is to know which tool is efficient to satisfy the need for the performance of the software. The characteristics of tools such as features, working, and parameters are analyzed and compared in this work for obtaining the results which are efficient for performance testing techniques.
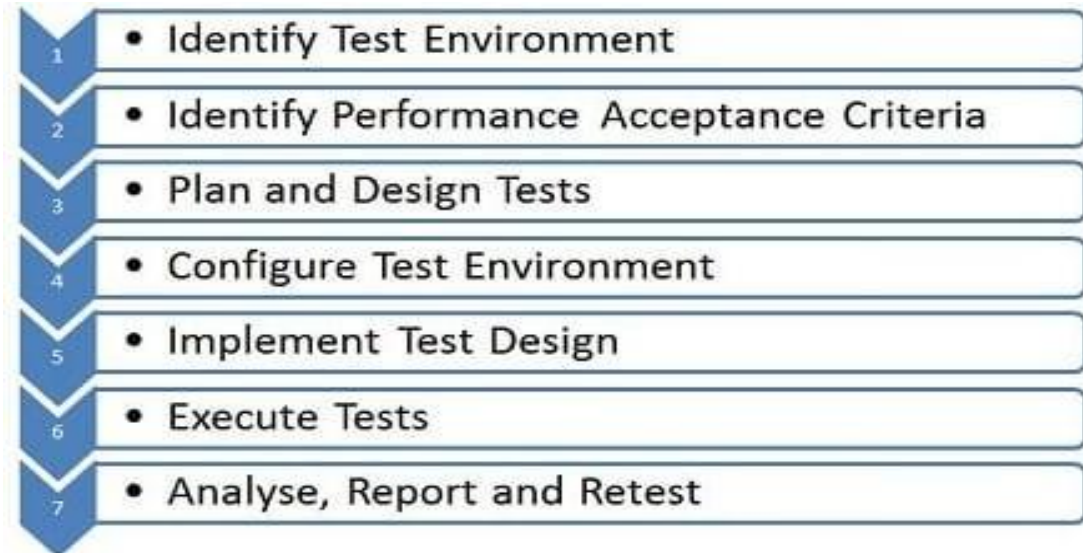
II. PERFORMANCE TESTING PROCESS

Figure 1.1: Performance Testing Process [10]

1. **Identify Test Environment**: Determine the scope of testing with test initiation checklist. Identify the physical, and logical production architecture, hardware, software, and network configuration required to begin the performance testing.

2. **Identify the Performance acceptance criteria**: Identify the desired performance quality characteristics like response time, throughput, and resource utilization.

3. **Plan, and Design Performance Tests**: Identify key usage scenarios, determine variability across users, identifying, and generating test data, and specify the metrics collected. This information provides the foundation for workloads.

4. **Configuring Test Environment**: Preparing conceptual strategy, available tools, designed tests, and testing environment, and resource-monitoring tools. The output of this stage would be configured load generation environment.

5. **Implement the design**: Create the performance tests according to the test planning, and design.

6. **Execute the tests**: Collect, and analyze data, problem investigation such as bottlenecks, and resource usage. Generating the report of performance analysis which consists of all performance attributes of the application.

7. **Analyze Result, Report, and Retest**: Consolidate, analyze, and share the test results. Re-prioritize, and re-execute the test based on the report. When any test result would be within the specific metric limit and all results between thresholds limits is completed.

III. LITERATURE SURVEY

Rijwan Khan, Mohammad Amjad wrote the paper which includes the importance of performance testing of web application, and analyses the bottleneck based on software, hardware, and utilization. It mainly focuses on the load test of the performance testing. To check the reliability, speed, and customers satisfaction this is the push for performance testing of application given. [1]

Zhong-sheng Qian, H. Miao, Hongwei Zeng wrote in their paper that to ensure the quality of Web applications, web testing faces very high challenges. The work proposes a Web Testing Model which starts from constructing the PFD (Page Flow DiagramJ, and designed an algorithm to derive PTT (Page Test TreeJ from PFD (Page Flow DiagramJ, and later a text translator is employed. [2]

Niclas Snellman, A. Ashraf, Ivan Porres wrote in their paper that Rich Internet Applications (RIAsJ has developed as a result of the development of asynchronous approaches for constructing interactive web applications (RIAsJ. Rich Internet Applications (RIAsJ provide much improved usability, and the capacity to deliver rich dynamic content. The extensive usage of RIAs, however, necessitates the development, and testing of highly scalable RIAs. Furthermore, cloud computing opens up new possibilities for e-commerce. [3]

Filippos I. Vokolos, Elaine J. Weyuker wrote in their paper that they used a case study describing the experience of using these approaches for testing the performance of a system as a gateway in large scale transaction processing application. [4]

Reenu Bhatia, Anitha Ganpati wrote in their paper that Load testing is employed to watch the changes in system performance with increase in load to the system. Load testing may be a non functional testing which is employed to know the system behavior under a selected expected load. At the present therews an enormous shift towards web applications, and enormous numbers of tools are available within the marketplace for web application performance analysis. [5]

Sushma Suryadevara, and Shahid Ali wrote in their paper that the study was conducted on the importance of performance testing of Web Applications, and analyzing bottleneck applications. Under a pre-defined workload, performance testing determines a few characteristics of system performance. [6]

Pratibha Fageria , Dr. Manju Kaushik wrote in their paper that devised a load testing strategy, and obtained results using the LoadRunner, an automated load testing tool. We merged the characteristics of an electronic commerce system, and used the LoadRunner to perform load testing, and analyse the results. We thoroughly outlined the electronic commerce applicationws properties, devised appropriate test cases. [7]

Monika Sharma, Vaishnavi S. Iyer, Sug, andhi Subramanian, Abhin, andhan Shetty wrote in their paper that it primarily centers around looking at load testing instruments Apache JMeter, HP, Loadrunner, Webload, the Grinder based on boundaries like Server Monitorung, Unlimited Load capacity, usability, cost, and so on. The essential target is to examine these heap testing apparatuses, and recognize which one of them better, and more proficient. [8]

V.Neetidevan wrote in his paper that IRCTC website as a Case study, and this site is tested with more than 1,00,000 virtual users, and its performance is shown with the help of Graphical charts.It can be used to simulate a heavy load on a server or group of servers, database, or network to test its strength, or to analyze overall performance under different load types. [9]

IV. THE TOOLS

The work focuses on the two performance testing tools JMeter, and WebLoad, and their comparison of performance to select the accurate, and efficient tool between them.

Apache JMeter
This tool is open source, and a Java platform application that can be combined with test plan. It can be loaded on to server or network to check the performance of the application, and analyze the working condition under various conditions. It is great use in testing the functional performance of the resources like Servlets, Perl Scripts, and other Java Objects.
Apache JMeter can be executed on both in Windows, and Unix OS platforms.
Key Features:
1. The tool is open source.
2. The tool is simple, and built-in GUI.
3. The tool supports HTTP, POP3, SMTP , etc..,
4. Multiple Post processors, and pre-processors are implemented providing advanced setup, co-relation capabilities, and parameterization teardown around the sampler.

WebLOAD
This tool allows you to perform stress, and load testing on any internet application using Adobe Flex, AJAX, Oracle Forms, .NET, , etc.. The load is generated from the cloud. The strength's of this tool are JavaScript scripting language,

and ease of use with features like automatic correlation. It supports for large scale performance testing with high number of users forming load, and difficult scenarios, and helps to provide clear analysis on the functionality, and performance.

Radview WebLOAD can run both in Windows, and Unix OS platforms.

Key Features:
1. Creation of Test is easy.
2. Provides real time load simulation.
3. For future reference, the results are recorded.
4. Bottleneck detection is automatic.
5. Load Generation from Cloud.

V. CONSIDERATION OF PARAMETERS

The performance testing is very important for any software which ensures success before presenting to the clients or market. It provides the information about overall performance of the software to the stakeholders, and helps them to detect, and eliminate the performance bottleneck of an application.

The quality attributes or parameters which are considered for the comparison are –
1. Stability: To determine how stable the system is, when there is heavy load.

2. Usage: To determine the ease of use in installing, setting up, and execution of the tests.

3. Monitoring of server: It is a process to monitor resources of the server system like memory consumption, CPU usage, I/O, etc. It enables to understand, and the resource utilization which helps to improve capacity planning.

4. Generation of Load: While testing, the number of virtual users is generated to form load on the application.

5. Non-iterative execution mode: In batch processing, all the input parameters are pre-defined through scripts, control files, command line arguments.

6. Platform: The capability of execution of the tool in various platforms such as Windows, Linux , etc..

7. Cost: The cost connected with creation of the virtual users for load generation.

8. Technical Level: The technical knowledge or expertise required to run the tests in the tool.

9. Communication: The level of communication when the tool experiences error or working problems.

10. Features: The features of both the tools are compared like recording features, debugging environment, scripting, etc.

VI. COMPARISON OF TOOLS

Parameter	JMeter	WebLoad
Stability	Unstable when the load is huge	Stable
Ease of Installation	Jar file has to be unpacked	DBMS has to be installed
Monitoring of the Server	Wrapper scripts are used to synchronize	Built-in monitoring
Ease of Script writing	Positive	Positive
Ease of execution tests	Easy to run due to understanding User Interface	Tests can run easily due to high Interface of User
Generation of Load	Size of users is dependent on hardware	Can create thousands of virtual users
Batch Mode	Supported out of the box from one agent	Can be run from command line
Platform	Independent	Run in Windows Platform except the load machines run in both Linux, and Windows
Cost	Open Source under Apache	Requires Cost
Technical Level	No developer skills required	Understanding of javascript , agendas
Communication	Community chats	Online, phone, email , etc. except community chats
Recording Features	No	Yes

VII. CONCLUSION

JMeter is an open source free performance testing tool which has limited support, and features, and no cost consumption. It is platform independent, and runs in both Windows, and Linux. The server side of performance

monitoring is limited but it can be used for generic purpose in the market. It does not require developer technical skills to execute in the tool. It has constant, random, and user-defined load scheduling profiles. For support, and maintenance, the community chat is available. WebLOAD is not an open source performance testing tool but it has maximum support, and features. Only the load machines would be executed in both Windows, and Linux platform, and rest part can be run on Windows. WebLOAD has a recording feature in which the tests are recorded, and used it for future reference. It supports most of the load scheduling profiles, and supports scripting language like Java, Javascript. For support, and maintenance, online chat, phone call, expert level advice, email, tutorials, documentation, etc. are available. Thus from this work, came to know that JMeter can be used for limited support but cost free, and WebLOAD can be used for maximum support but cost effective with all the helps provided by the RadView for performance testing of Web Application.

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