



## Analytical Review of User Perceived Testing Techniques

**Shivangi Kaushal**

Department of Computer Science,  
Punjabi University Regional Centre for Information  
Technology and Management, Mohali, India.

**Jagpuneet Kaur Bajwa**

Department of Computer Science,  
Punjabi University Regional Centre for Information  
Technology and Management, Mohali, India.

---

**Abstract-** *Software testing is very crucial phase of software life cycle. Software testing is the process in which a program is executed with the intent of finding errors. The aim of web application testing consists of executing the application using combinations of input and state to reveal failures [1]. There are a number of testing techniques which serve different purposes though it is impossible to find and correct all the errors. Software testing of a web based application is done so that the performance and quality of the web based application remain up to the mark so as to meet the user's requirement. The web based application is tested so as to estimate the time to load the web based application. So as to avoid any crash of the application when there is an increment in the number of users. In this paper the different software testing techniques are analyzed and performance factor is discussed which in turn help in keeping check on the quality, cost effectiveness and reliability according to user's requirements.*

**Keywords:** *Performance testing, load testing, stress testing, functional testing, web based application.*

---

### I. INTRODUCTION

Software testing is an approach in which the system or any application is tested to find out the bugs or error so as to correct them in the initial stage of their detection. Testing is done under controlled conditions. There are different types of testing such as load testing, performance testing, functional testing, stress testing, and many more. Load Tests checks the capability of the application to function properly under expected normal production conditions and measure the response time. [1]. Performance Testing is a type of testing that is performed, from one perspective, to determine how fast some abstract of a system performs under a particular workload [1].

Software testing of a web based application is a very vital task as it takes into account the user perspective that what would be useful for the user end. The aim of web application testing consists of executing the application using combinations of input and state to reveal failures [1].

With the advent of new technologies in the software world it has become important to keep software web application secure from the threats and make it user friendly. The rapid rise of Web-based E-commerce applications has led to a plethora of design and development tools designed to minimize the time to market for many e-business applications. The importance of web based applications is visible to every eye in this world. All this is due to the inherent backbone of compatibility of cross platform.

In traditional applications, the server and the client shared load between code on the server and the code installed on each client separately. So when any updates have to be done, there arose the need for installation of document on each client side. But with the upcoming of the web based application the web document is written in HTML (Hyper Text Markup Language) and JavaScript which is supported by any web browser. Web based applications deal with both client-side and server-side script.

With the web based applications becoming more complicated and with this the sophistication of these applications also enhances with time, the functionality of the web pages increase due to the different functions such as buttons, links, multiple forms, and many others. So functional and stress testing is taken in this approach to test different functions and estimate load of the web based application which will be done with the help of JavaScript code which is plugged in with any web based application whose testing needs to be done.

### II. BACKGROUND

The web based application testing needs to address different upcoming day to day challenges as there is significant growth in the field of internet technology with the advent of people becoming much aware of the new advancements in the field of web technology. With the emergence of e-commerce sites and the growth of business performed over the web, it is critical for companies to have their Web applications tested extensively. Testing tasks including ensuring that they function correctly, they are compatible over different browsers and operating system configurations and they can handle a large amount of concurrent users [2]. Due to massive user's coming in contact with the web based application it has become important to check that the application is reliable or not. Some areas of web based application require the types of testing such as regression testing, load testing, performance testing, integration testing, functional testing, acceptance testing, stress testing and many more. Although Web applications testing has much in

common with the testing of most other client/server applications, the nature of Web applications poses unique software testing challenges [2]. Testing is done by the process of generating test cases and then executing these test cases according to the input fed by the user and showing the corresponding output for the information fed by the user. The overall web based application cannot be checked properly so it's divided into sub components and testing is applied on each component and then it is gathered and the output is judged. The testing done so far has been performance and load testing. But in this paper the functional and stress testing is reviewed.

#### *A. Performance Testing*

Performance testing is important requirement for any software. It is used to check the performance of the web based application when a large number of user's access the application over a specified period of time.

A paper by Sandeep Dalal in 2012 explained the importance of testing as it affects the cost and time. The limitations of traditional system are discussed and in the automatic testing the quality improvement measures are given.

Scott Barbber in 2004 explored different approaches and methods for load model for performance testing to show that the empirical data is rarely available but still when data is not enough different approaches can be blended to perform testing. But this can be still prone to human error. Performance testing is very important so as to find that flaws are in the model or in the implementation part. Log files are used to test the load on the application. When the actual data is not available a substitute is represented for load model to check the performance of the web application [3].

Osama Hamed and Nedat Kafri [2009] proposed a performance technique which showed that Java EE is better than .NET in terms of response time [11].

The above papers show that performance check is crucial, so in the future work performance of a web application is judged and the results will be useful for developers.

#### *B. Load Testing*

Load testing is a type of performance testing. It is done for checking the response time of the application under specific conditions.

Daniel A. Menasce [2002] describes how load testing is done and the quality of services like throughput, response time, and availability used for doing load testing. Relation between load and performance is also described. In this description is given that when to use load test and the testing parameters and their results. The tools required are also given [5].

Haroon Malik, Parminder Flora et al. [2010] a statistical technique is employed which is useful for performance analysts by reducing large performance counters [13].

#### *C. Stress Testing*

Stress testing is when the web based application is put under extreme conditions which mean stress is put on it beyond normal conditions and it reaches the breaking point of stress.

Charu Babbar and Neha Bajpai in 2011 stressed on the testing for checking the performance of web application which is decomposed into testable objects. Stress levels undergo different test sessions giving good way of testing strategy and quality enhancement of the site. Performance testing is done so that the users do not undergo the frustration level due to bad quality of service of the web application. So a heavy traffic is directed to the web application so that it can check how much load the application can take. Performance typically is referred to as how much requests the user gives up to the response the server gives in reply of the request submission. For performance testing four types of information is required:

- a) Latency for each type of request
- b) Throughput information or how much load server received.
- c) Server side resource utilization.
- d) Tests run configuration [6].

Stress testing is done on a library system also. But in this research stress testing is done on a web based application to make it more secure and user friendly.

#### *D. Functional Testing*

Functional testing is a component based testing. Functional testing is done on functions by giving input to them and examining the output. In functional testing the boundary value analysis and the equivalence class testing is done.

Vineta Arnicane [2009] presented two methods of domain testing which are equivalence class testing method and boundary value testing method. The size of the test suite generated gives the complexity of the testing method. This paper analyses the adequacy criteria of domain testing methods from three aspects – the kind of values to choose for testing, the data coverage principle, and the strategy how the chosen values are combined in test cases according to the data coverage principle [7].

Functional testing techniques such as equivalence class partitioning and boundary value analysis will be applied on different functions of the application to ensure they are working correctly.

TABLE I  
TESTING BASED SURVEY

Paper Name	Author's Name	Advantages	Year
Creating Effective Load Models for Performance Testing with Incomplete Empirical Data	Scott Barbber	Performance characteristics are measured efficiently	2004
Software Testing-Three P's Paradigm and Limitations	Sandeep Dalal and Rajender Singh Chhillar	Enhances quality using different phases and traditional systems limitations	2012
Performance Testing for Web Based Application Architectures (.NET vs. Java EE)	Osama Hamed and Nedal Kafri	Performance testing done using different load testing tools help in selecting good framework	2009
Automatic Comparison of Load Tests to Support the Performance Analysis of Large Enterprise Systems	Haroon Malik and Parminder Flora	Comparison of performance counters in limited time	2010
Survey on Software Testing Practices	J. Lee, S. Kang and D. Lee	Improvisation in Software testing tools and methods	2011
Software Testing Model for Quality	Sachin Dev Kanawat, Apurva Pandey, Abhishek Singh and Anurag Maloo	Quality improvement and cost effective	2012

### III. CONCLUSION

An overview of the existing testing techniques is provided. Existing web applications have undergone performance testing to check the quality of services of the web based application. But in this paper the functional and stress testing is reviewed with respect to user's requirements of web based applications. Functional and Stress testing is still a raw area of research as can be seen with problems that exist in web applications load time and response time. There is a need to test applications that can estimate load time so that web application's crashes could be avoided in future.

### REFERENCES

- [ 1] Giuseppe A. Di Lucca and Anna Rita Fasolino, "Testing Web-based applications: The state of the art and future trends," *Science direct*, vol. 48, no. 12, pp. 1172-1186, December 2006.
- [ 2] Xiaoping Jia and Hongming Liu, "Rigorous and Automatic Testing of Web Applications," in *Sixth International Association of Science and Technology for Development International Conference on Software Engineering and Applications*, pp. 280-285, 2002.
- [ 3] Scott Barbber, "Creating Effective Load Models for Performance Testing with Incomplete Empirical Data," in *Proceedings of the Sixth IEEE International Workshop on Web Site Evolution*, pp. 51-59, September 2004.
- [ 4] Brian Robinson and Lee White, "On the Testing of User-Configurable Software Systems Using Firewalls," in *Proceedings of Software Testing, Verification and Reliabilty*, vol. 22, no. 1, pp. 3-31, January 2012.
- [ 5] Daniel A. Menasce, "Load Testing of Web Sites," *IEEE Internet Computing*, vol. 6, no. 4, pp. 70-74, July/August 2002.
- [ 6] Charu Babbar and Neha Bajpai, "Web Application Performance Analysis based on Component Load Testing," *International Journal of Technology and Applied Science*, vol. 2, pp. 22-28, 2011.

- [ 7] Vineta Arnicane, "Complexity of Equivalence Class and Boundary Value Testing Methods," *International Journal of Computer Science and Information Technology*, vol. 751, pp. 80-101, 2009.
- [ 8] S.Yoo and M. Harman, "Regression Testing Minimization, Selection and Prioritization: A Survey," in *Proceedings of Software Testing, Verification and Reliability*, vol. 22, no. 2, pp. 67-120, March 2012.
- [ 9] Zhongsheng Qian, "Towards Testing Web Applications Using Functional Components," *Journal of Software*, vol. 6, no. 4, pp. 740-745, April 2011.
- [ 10] J. Lee, S. Kang and D. Lee, "Survey on Software Testing Practices," in *Institute of Engineering and Technology Software*, vol. 6, no. 3, pp. 275-282, June 2012.
- [ 11] Osama Hamd and Nedal Kafri, "Performance Testing for Web Based Application Architectures (.NET vs. Java EE)," in *Proceedings of the First International Conference on Networked Digital Technologies*, pp. 218-224, July 2009.
- [ 12] Qinglin Wu and Yan Wang, "Performance Testing and Optimization of J2EE-based Web Applications," in *Second International Workshop on Education Technology and Computer Science*, vol. 2, pp. 681-683, March 2010.
- [ 13] Haroon Malik, Parminder Flora et al., "Automatic Comparison of Load Tests to Support the Performance Analysis of Large Enterprise Systems," in *Fourteenth European Conference on Software Maintenance and Reengineering*, pp. 222-231, March 2010.
- [ 14] Rastislav Wartiak, "Performance Testing Tool for Web Applications," Bachelor Thesis, Department of Software Engineering, Charles University, Prague, 2007.
- [ 15] David Bainbridge, Ian H. Witten et al., "Stress-Testing General Purpose Digital Library Software," *Springer-Verlag*, vol. 5714, pp. 203-214, 2009.
- [ 16] Xingen Wang, Bo Zhou and Wei Li, "Model Based Load Testing of Web Applications," in *Proceeding of the International Symposium on Parallel and Distributed Processing with Applications*, pp. 483-490, September 2010.
- [ 17] Rakesh Roshan, Rabins Porwal and Chandra Mani Sharma, "Review of Search Based Techniques in Software Testing," in *International Journal of Computer Applications*, vol. 51, no. 6, pp. 42-45, August 2012.
- [ 18] Sandeep Dalal and Rajender Singh Chhillar, "Software Testing-Three P's Paradigm and Limitations," in *International Journal of Computer Applications*, vol. 54, no. 12, pp. 49-54, September 2012.
- [ 19] Sachin Dev Kanawat, Apurva Pandey, Abhishek Singh and Anurag Maloo, "Software Testing Model for Quality," in *Advanced Materials Research*, vol. 403-408, pp. 4507-4511, November 2011.