Evaluation of Cloud based Performance Testing for Online Shopping Websites

V. Janani[1*] and K. Krishnamoorthy[2]

[1]Department of Computer Science and Engineering, Adhiyamaan College of Engineering, Hosur - 635109, Tamil Nadu, India; vajjiram.janani@gmail.com
[2]Department of Computer Science and Engineering, Sudharsan College of Engineering, Pudukkottai - 622501, Tamil Nadu, India; kkr_510@yahoo.co.in

Abstract

Performance testing of a web application is apprehensive with accomplishing response times, throughput, and resource-utilization levels that gather the performance objectives for that applications or websites. Enterprises become assume nowadays, all users with an internet access are a potential customer. Product and service accessibility in the physical location is speedily being replaced by online shopping. Online shopping in India is growing at a very fast manner. At the same time, there is an extreme competition in e-commerce space, especially among top three players namely Flipkart, Snapdeal and Amazon. When online shopping websites announce campaigns, offers, and sales, there is often an uncontrolled rush of buyers to these sites and most often the infrastructure behind these retail websites are not powerful enough to handle the huge volume. In order to evaluate the performance of the retail web applications from each physical location, cloud based performance testing will be the key solution. The performance tests could be run with the load generators by utilizing cloud service providers such as Amazon, Rack space etc. Alternatively, Cloud based performance testing tools could be used for finding the performance of a web application. There is no single tool will be used for all performance measure of a web application. The right choice of testing tools really depends on multiple parameters including customer application architecture, context and customer needs. With this analyzing the importance of the performance of the web application increasing, it is a good idea to evaluate some of the popular open source Performance testing tools. Cloud based software test automation offers Cost Effectiveness, Benefits of Virtualization, More collaboration, Quicker Testing and Reduced IT management effort.

Keywords: Cloud Testing, Customer Satisfaction, E-Commerce, Open Source Testing Tools, Performance Testing

1. Introduction

Cloud Computing is growing at an express speed. With this technology, there is bound to be an increase in demand for Cloud Testing. New cloud test should be based on an e-commerce scenario (i.e. online shopping) and define web interactions as test drivers. Thus, the test should allow the evaluation of the complete application stack. A cloud test should analyze the capacity of a system during changing load. The customers are more dissatisfied and extremely vocal on social networks by sharing poor buying experience with screenshots. It is clear that the interest for profoundly adaptable and true framework is expanding exponentially for IT driven verticals particularly e-retail, e-Learning, social insurance and so on[1,22]. With regards to e-business, performance testing takes numerous measurements. Performance testing of such a mind boggling framework has to be done in a layered methodology that is both reasonable and conveys complete scope. Enormous distributed systems can't be completely tested on User Acceptance Testing (UAT) environment. There are a few levels of testing reach out over a scope of speeds, resources and devotion to a production system. For instance, a run of the mill expansive framework may comprise of a huge number of different servers, front-end Web applications, REST (Representational State Exchange), Application Programming interface servers, inside administrations,

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* Author for correspondence

caching systems, and different databases[2]. Such a framework may process a few terabytes of information consistently and its storage is measured in petabytes due to continually hit by innumerable customers and clients. It is hard to imitate this on a UAT situation. Testing of vast scale disseminated frameworks is hard and there is much to test past conventional testing systems. Performance tests, load testing and error testing should all be undertaken with sensible usage patterns and extreme loads. Usually Performance testing approach follows Identification of Key Scenarios, Designing the scripts, setting up the Load, Generating the Load, Monitoring and Analysis and then Reporting.

2. Performance Testing Strategies

Efficient performance testing of online shopping websites and mobile applications for the huge load of extreme shopping periods requires numerous practices such as approaching the problem strategically, testing endlessly and moving testing forward with planning, practical testing that accounts for usability, performance patterns, device types, network speeds and location; virtualized testing environment and elastic execution[3]. More particularly, seller should consider the following important points for web sites and mobile testing approaches to make sure to maximize the revenue and business opportunity during holiday offer season and other promotional periods offer and adequately prepare for the next planned or unplanned spike.

2.1 Performance Test Regionally
Given the worldwide way of today's market, an organization needs to realize that what the Performance experience is for all clients going to their online shopping websites. By portioning Performance encounters crosswise over different regions, an association will have the capacity to think of choices to beat any degraded performance that may result come from various servers, streamlining "remote" transactions including nearby content delivery networks[21].

2.2 Test Adequately for Mobile Devices
In 2014, India has got 41% of total e-trade sales through mobile e-commerce and it seems to be India has become pioneer in online shopping through web and mobile. The report takes note of that Indian e-trade pioneers are additionally more versatile driven when contrasted with worldwide pioneers. Versatile records for around 75% of Snapdeal's requests and around 70% of Flipkart's requests. Testing for the client experience is more troublesome than any time in recent memory, as there are more gadgets, more browsers and more Platforms.

The better the portable experience, the more buyers will be slanted to do their shopping on advanced mobile phones and tablets. Retailers must expand their Performance testing across mobile properties to guarantee that the majority of the hard work and money spent to build versatile utilization is not fixed by websites that don't load and it lead to crash during peak periods[21]. Besides testing the portable end client experience, it's additionally imperative to simulate different mobile network speeds. In a few circumstances, servers need to work harder to manage things like mobile latency so a portable network speed simulation ought to be directed in conjunction with overall Performance testing.

2.3 Develop an Accurate user Model
Distinctive transactions make the framework respond in diverse ways and it's critical to fragment and list key transactions to test properly. Begin by building up a precise client model (s) that reflects how your clients utilize the site on both a normal day and a peak offer day. Basically, this will end up the websites to have standard performance test (s). Consider device types, various browsers and in addition burden sums over the site. The key is to organize Performance based on different clients, business needs and devices. This permits the organization to simulate different transactions to separate moderate processing times furthermore puts an emphasis on business needs. This likewise detaches any outsider administrations that may be backing the general site off like investigation and following administrations.

2.4 Scales with the Cloud
Organizations can effectively mange peak load on company's websites by conduct the performance testing through cloud platform. By utilizing the Cloud, Organizations can simulate the as many numbers of clients as they need without having to setup or invest resources into generate the huge load.

3. Cloud Based Performance Testing

Cloud-based performance testing gives a large number of advantages to encourage the retailer year-round, and especially during heavy load periods[4]. The advantages of cloud based performance testing are as per the following.

3.1 Guaranteed Performance

Cloud-based infrastructures are greatly appropriate to creating the peak demands required for enterprise performance testing. Huge load testing in the Cloud exploits the capacity to run tests for all intents and purposes tests virtually on-demand. Organizations can just schedule time for a test and resources are consequently provisioned[24].

3.2 Worldwide Readiness

Utilizing cloud Technologies can empower the performance administration group to assess an application's worldwide status as well as behavior tests over the globe by imitating virtual clients in an assortment of diverse areas to guarantee the site can deal with clients far and wide [24].

3.3 Cost Control

The versatility of the Cloud gives the capacity to scale computing resources up or down as expected to guarantee website performance is affordable. Utilizing utility-style valuing, organizations pay for what they utilize. In examination to a customary on-reason display, an organization would need to obtain computing power to encourage substantial client tests for the lifetime of the application.

4. Performance Testing Tools

Performance Testing makes use of the cloud as a provider of essential test infrastructure. Due to various technical factors and considerable requirements in terms of infrastructure, performance tests checking the performance efficiency of a system are cost and time intensive procedures. In these tests, real software system situations are simulated, and the response time and utilization rate of resources are measured[5]. Aiming for the best possible results, performance and load tests have to be executed in a production-like environment. This makes Performance Testing a very complex and cost-intensive issue. For the preparation and execution of the tests, questions around targets and boundaries of measurement values and identified types of issues need to be defined. In this context, an analysis of business-critical use cases, as well as a prioritization of the most frequently used components is recommended. Performance tests are executed using specialized tools like load generators or monitoring tools. During the test, not only the user's view on response times but also the system's view on the degree of resource utilization are recorded and examined[6].

An expansive spike in clients during offer day of an internet shopping sites can undoubtedly crash, bringing about bunches of baffled clients and tremendous losses in income. By doing performance testing of such websites, web developers can see the issues early and then appropriately plan and adjust the website before it causes an issue for genuine clients. The performance testing tools are ordered into three particular classifications. 1. Freeware Load Test Tools. 2. Commercial Load Test Tools. 3. Cloud based burden Test Tools. This paper discusses about open source Cloud-based Performance testing tools such as J Meter, Load Focus and Nouvola.

Load testing is a type of performance testing performed to calculate the behavior of a component or system with increasing load, for example numbers of parallel users and/or numbers of transactions, to determine what load can be handled by the component or system. Every website has its own technology and Every Performance testing tool supports a limited number of technologies. It is necessary to choose the best tool for the website being tested and also obtain permission from the website Administrator/Proprietor to run a Load test. It is mandatory to conduct the Load Tests periodically.

Any online shopping store website needs to load quickly in order to potential customers not get frustrated and head elsewhere. Bring out a performance test using online tools such as Load Focus and Nouvola first pay attention to what it tell ask for to test the websites[7,8]. It is important to check the site speed on a regular basis. The website may load faster on developer web browser due to cached content, but it may not load that much fast on the customer's browsers. Hence, website loading time testing tool can be a real eye-opener for load testing[9,10].

4.1 Apache JMeter

JMeter is Java-based programming software that can perform a load test, performance oriented business (functional) test, regression test, and so on. Stefano Mazzocchi of the Apache Software Foundation was the first engineer of JMeter. He composed it essentially to test the execution of Apache Jserv (now called as Apache Tomcat venture). Apache later updated JMeter to improve the GUI and to include useful testing abilities. JMeter is a Java based desktop application with a graphical interface that uses the Swing graphical API. It can hence keep running on any environment/workstation that acknowledge a Java virtual machine, for instance – Windows, Linux, Mac, and so forth. JMeter reproduces a gathering of clients sending requests to a target server, and returns insights that demonstrate the performance/functionality of the target server/application through tables, diagrams, and so on[23]. The following Figure 1 depicts the work flow of Apache Jmeter.

JMeter can perform load and performance test for a wide range of server like Web HTTP, HTTPS, SOAP, Database by means of JDBC, LDAP, JMS, Mail – POP3, and so on. It is a platform independent tool. On Linux/Unix, Jmeter can be invoked by connecting on Jmeter shell script. On Windows, it can be summoned by beginning the jmeter.bat document. It has full Swing and lightweight segment support (precompiled JAR uses bundles javax.swing). Jmeter store its test plans in XML group. This implies you can create a test plan utilizing a text editor. Its full multi-threading structure permits simultaneous testing by numerous strings and synchronous inspecting of diverse capacities by isolated thread groups. It is very extensible. It can be utilized to perform automated and functional testing of the applications.

4.2 Load Focus

Load Focus is an easy to use cloud based testing platform for load testing, API monitoring, website speed testing. Cloud Load and Performance Testing, Uptime API Monitoring, Website Speed Testing Tool. Load Focus allows the user to focus on the web application behavior instead of creating the test infrastructure required. Load focus Performance testing tool is used to discover performance issues before the customer come across the problem with the application. In Load focus, the load test will be run in the cloud environment with secure server and also simulate load test scenario with complex test plans. We can run the test scenario with different browsers, no need to install anything and also run tests from multiple regions around the world for a better and more realistic result. We can schedule the test and run automatically at specific time intervals, then get notifications sent to the email account with test results. The live load test results help to understand the behavior of the web application in real time, and then edit re-run tests to understand how the application perform with changes made on load increases or decreases.

4.3 Nouvola

Nouvola means cloud in Italian. It's spelled differently in Italian (nuvola), but it has the same pronunciation – "new-voo-la". Nouvola is a Portland area cloud computing company offering a cloud scalability platform to help companies deploying their applications to the cloud scale successfully. Sophisticated web load generation, load testing, and application performance analytics enable the developers to uncover performance issues before they impact their business. Nouvola takes the
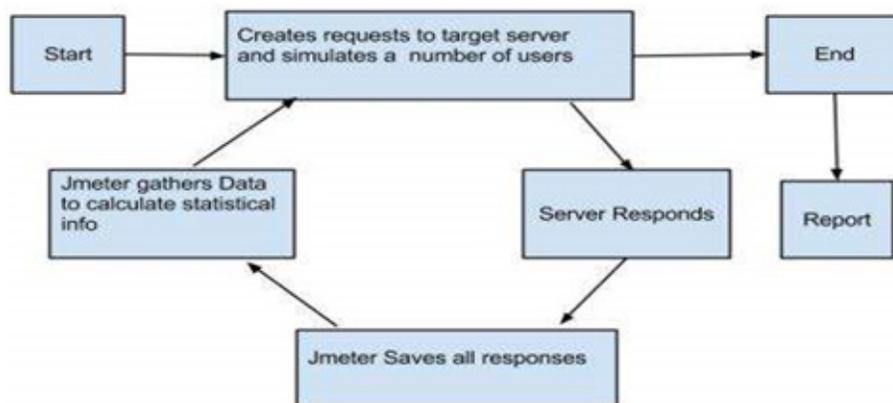

Figure 1. Work flow of Apache JMeter.

additional responsibility to construct Architecture and framework extensions and improvements, Design and implementation, testing of critical building blocks and new features, Addressing bugs and issues as reported by customers and field. Nouvola's suite of Develops Performance Testing tools will help to integrate testing into the development workflows across multi-functional teams and the enterprise. Leading edge performance testing solutions work by creating millions of virtual users geographically dispersed in the cloud, generating highly controlled traffic, executing real-life scenarios. The load is repeatable, and it can test the web application with different location and different time span.

5. Simulation Results and Discussion

The very high cost of commercial tools for performance testing has incited the development of open-source testing tools for testing web applications. These tools are fully featured, completely reliable and relevant to most load testing projects. The tools simulates a great many clients connecting with Web, application and database servers; make sensible models simulating diverse business situations; and give a vault of data to analyze and report results all through application development[11]. Open source tools are obviously accessible at no charge which introduces an enormous cost savings without obtaining commercial testing tools.

For experimental setup, we have considered India's top three online shopping websites Snap deal, Flipkart and Amazon and for simulation, online Performance testing tool Nouvola is used. We have analyzed the websites by considering three performance Parameters such as throughput, request error rates and average response time. On an offer day we have tested the websites and observed the following test results as a graph using Nouvola Performance testing tool. The following pictures are the Snapdeal, Flipkart and Amazon websites Performance analysis on an offer day. By seeing this, we can come to know that Snapdeal website is designed with high throughput, less request error rate and high average response time when compared with other websites. The following Figure 2 shows the Average Response Time Comparison with 20 virtual users for the online shopping website Snapdeal.
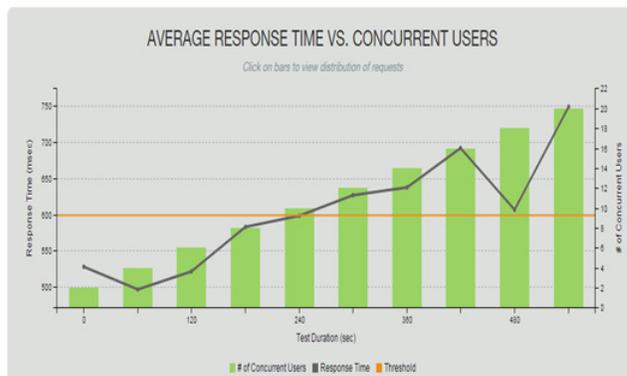

Figure 2. Snapdeal's Average Response Time for 20 virtual users.

The following Figure 3 shows the Average Response Time Comparison with 20 virtual users for the online shopping website Flipkart.
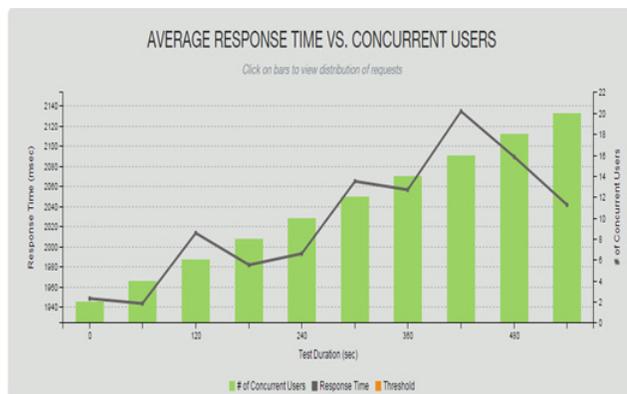

Figure 3. Flipkart's Average Response Time for 20 virtual users.

The following Figure 4 shows the Amazon's Average Response Time Comparison with 20 virtual users.
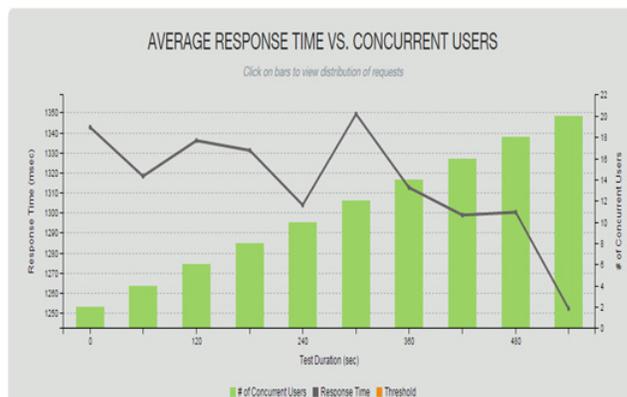

Figure 4. Amazon's Average Response Time for 20 virtual users.
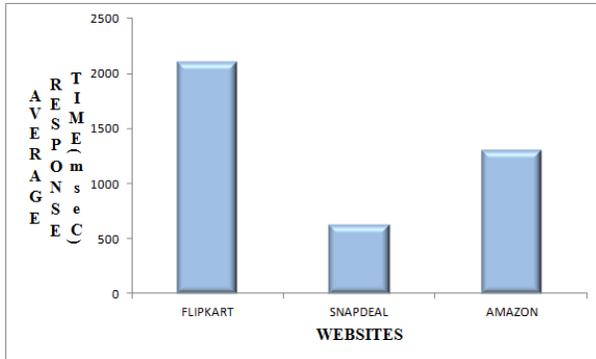
Figure 5. Average Response Time comparisons.

The above Figure 5 shows the top three online shopping websites average response time comparison on an offer day. With this evaluation results on offer day, it is observed that the Snapdeal would get more customer satisfaction than other websites because of quick average response time.

6. Conclusion

This study has highlighted some of the main aspects of online shopping websites performance and it discussed how web application performance testing is going on and how it has been evaluated. It discussed and illustrated the overall achievement in the area of performance testing of websites during peak load time. Cloud-based performance testing can provide enormous benefit to business by reducing development cost, effort, and time. As a result, organizations can progress focus their resources and energy in foundation business areas. This paper has highlighted the important issues, tools, challenges that are encountered in cloud testing. It has also provided information about various tools and associations of India's top three online shopping websites performance report based on average response time. With this evaluation report it is been observed that on an offer day how the websites loaded on customers system and gain the customers satisfaction.

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