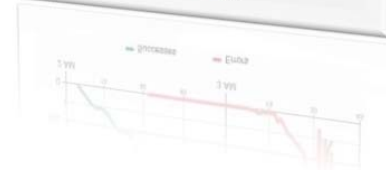
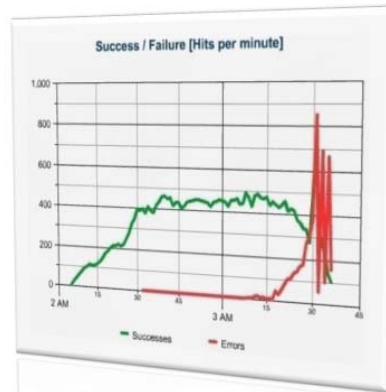
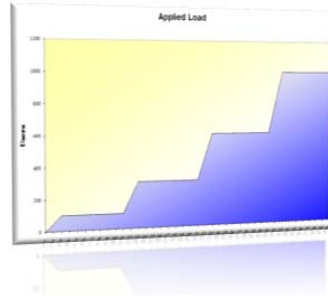




Webmetrics SiteStress Executive Summary and Report



CUSTOMER

Load Test

Date of Test:

January 1, 2010

SiteStressSM is a consultative website load testing service that combines the unique strengths of Webmetrics (a Neustar service): our proprietary load testing software, our GlobalWatch network, and, most importantly, our expertise. SiteStress is designed for businesses of all sizes that need to ensure the performance and scalability of their e-commerce sites, applications and infrastructure.

EXECUTIVE SUMMARY

Introduction

www.customer.org maintains a high-end website which has the ability to serve many simultaneous users. The website is an online opera site which includes an online streaming service.

Webmetrics' SiteStress service was used as an independent source to evaluate www.customer.org and its ability to handle increasing load in terms of users registering and loading the video player from its website.

Scope of Load Test

SiteStress is a proprietary, distributed, web-based load testing solution that has undergone years of fine-tuning and has been executed thousands of times. The software simulates typical user activity at the web site. As the software simulates this activity, it records important pieces of data that help describe or evaluate the user's experience.

Objectives of Load Test

By performing the load test on the www.customer.org website, our goal was to highlight the following areas of performance:

- What is the end user experience when the pages are under load?
- What is the number of users the system can handle and still maintain an acceptable user experience?
- What is the breaking point of the site?
- What are the combined capabilities of the hardware/software?
- What is the scalability of the application?

Results Summary

Key Statistics

- The site can handle approximately 500 concurrent users with average page load times of under 60 seconds and a negligible error rate.
- The system remained accessible, even as 500 concurrent users with a 1 to 2 second think time were applied.
- Peak throughput of 7.11Mbps was recorded during this test.
- Page 2 of both scenarios had the highest load times starting at 10.67 seconds and ending with 62.63 in Interval 10.

Key Recommendations

Webmetrics recommends investigation of the following:

- Looking into the network throughput bottlenecks such as routers, firewalls and load balancers may lead to increased performance.
- Investigate cause of high load times on Page 2 of both scenarios.

Conclusions

The site handles load gracefully in that the system does not become unstable or crash, and load time goes up relative to the amount of load being applied.

Please see our Key Recommendations for the issues that should be addressed as a matter of priority.

Please also see our Detailed Conclusions and Recommendations for all the issues that were identified and our recommended solutions.

Key Recommendations

Number	Title	Details	Significance
1	Network performance	The only errors were "Timeout", which may be related to the network losing the data.	High
2	Continue to Adjust the Application Server	At 54 concurrent users and above the load time for pages increased as users were added.	Medium
3	Add or replace hardware	This may be the only option once the server and network have been optimized.	Low

WEBMETRICS SITESTRESS REPORT

Table of Contents

EXECUTIVE SUMMARY	2
Introduction.....	2
Scope of Load Test	2
Objectives of Load Test.....	2
Conclusions.....	3
WEBMETRICS SITESTRESS REPORT	4
Simulated Load / Load Testing Methodology	5
User Behaviors / Scenario Outline.....	5
Aggregate Performance Results.....	7
Commentary.....	7
Results by Test Iteration	8
Iteration 1	8
Detailed Conclusions and Recommendations.....	14
Overall Conclusions.....	14

Simulated Load / Load Testing Methodology

A 60-minute load test was conducted for Customer on October 7th, 2008. The test utilized two scenarios, and ramped in over the course of 10 six-minute intervals to reach a total of 500 concurrent virtual users.

Testing was executed from multiple load testing servers located in the following cities:

- San Diego, CA
- Dallas, TX
- Chicago, IL
- New York, NY

User Behaviors / Scenario Outline

Scenario 1 – 480 concurrent users

Page Legend

Page 1	http://customer-test.customer.com/default.aspx User 1: Load homepage	61,789 bytes
Page 2	customer-test.com...fEH1eXoc%3d&culture=en-US Click on Customer Office Professional 2007	40,000 bytes
Page 3	customer-test.com...fEH1eXoc%3d&culture=en-US Click on FAQ, How to activate programs later?	64,418 bytes
Page 4	http://customer-test.customer.com/default.aspx User 2: Load homepage	61,791 bytes
Page 5	customer-test.com...fEH1eXoc%3d&culture=en-US Click on Customer Office Small Business 2007	39,317 bytes
Page 6	customer-test.com...fEH1eXoc%3d&culture=en-US Click on Customer Service, Firewall	52,319 bytes
Page 7	http://customer-test.customer.com/default.aspx User 3: Load homepage	61,792 bytes
Page 8	customer-test.com...fEH1eXoc%3d&culture=en-US Click on Customer Office OneNote 2007	39,300 bytes
Page 9	customer-test.com...rderssummary&culture=en-US Click on Order History	21,429 bytes
Page 10	http://customer-test.customer.com/default.aspx User 4: Load homepage	61,547 bytes
Page 11	customer-test.com...g38mpQtc%3d&culture=en-US Click on Customer Office Product Professional 2007	39,254 bytes
Page 12	customer-test.com...tion_id=142&culture=en-US Click on How to set-up and install your trial	40,719 bytes
Page 13	customer-test.com...tion_id=143&culture=en-US Click on How to buy this product now	39,080 bytes

Scenario 2 – 20 concurrent users

Page Legend

Page 1	http://customer-test.customer.com/default.aspx Load homepage	61,791 bytes
Page 2	customer-test.com...fEH1eXoc%3d&culture=en-US Click on random product	39,301 bytes
Page 3	customer-test.com...shopperinfo&culture=en-US Click Try Now for FREE!	22,904 bytes
Page 4	customer-test.com... id=5024358&culture=en-US Log in	23,136 bytes
Page 5	spf-cdn-origin.dig.../tmp/EN.OfficeOneNote.zip Click Download Now	463 bytes
Page 6	customer-test.com...receipt id=&culture=en-US Download Now page - click Continue	19,688 bytes
Page 7	customer-test.com...efault.aspx?culture=en-US Return to the Trial Portal	63,274 bytes

Aggregate Performance Results

The following Aggregate Successes/Failures graph summarizes the performance achieved during the test iteration.



Figure A – Aggregate Successes/Failures. Graph Test 1

Commentary

In the Aggregate Successes/Failures graph shown above for Test 1, the successful page views per minute for all intervals are visible as fluttering lines. The upper limit on Successes is just under 700 page views per minute, and has a steep drop just after the halfway point in Interval 8, which equates to 404 users. Although larger amounts of users were accessing the site, the load time prevented these users from being able to complete their transactions. The errors resulted in a drop in the number of successful page views per minute. Network throughput went up as load was applied, starting at 184.1 Mbytes in Interval 1 and hitting 394.3 MBytes in Interval 6.

Results by Test Iteration

Iteration 1

Overall

The site was able to effectively handle 500 concurrent users at a random 1 to 2 second think time, but with each new user added the load time increased. This increased load time caused a significant decrease in user experience by the end of the test. However, even at high load times the site was still accessible.

Analysis of Iteration 1

	Total Attempted	Failed Attempts	Failure Rate
Page Loads	31,744	6,058	19.08%
Completed Transactions	9,622	5,928	61.61%

Errors by Percent, Page, and Type

Out of 31,744 attempted page loads, 25,686 were successful, for a success rate of 80.92%. Of the 9,622 attempted transactions, 3,694 were successful, for a transaction success rate of 38.39%. Please reference the Figures 1-1 and 1-2 below for Scenario 1, and Figures 1-3 and 1-4 below for Scenario 2.

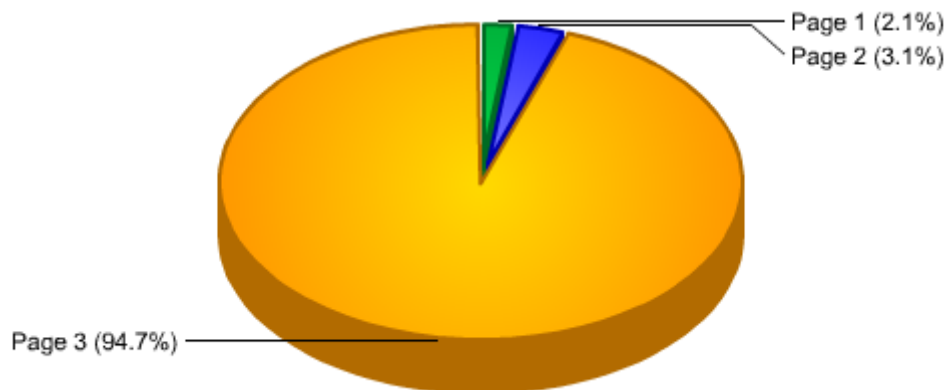


Figure 1-1: Percent Errors by Page

Errors by Page

Page 1 Load homepage	5	38.5%
Page 2 Click on random product	2	15.4%
Page 3 Click Try Now for FREE!	0	0.0%
Page 4 Log in	0	0.0%
Page 5 Click Download Now	6	46.2%
Page 6 Download Now page - click Continue	0	0.0%
Page 7 Return to the Trial Portal	0	0.0%

Errors by Type

Unable to connect	11	84.6%
500 Server closed connection without sending any data back	2	15.4%

Figure 1-2: Errors by Page and Errors by Type, Scenario 1



Figure 1-3: Percent Errors by Page

Errors by Page

Page 1 User 1: Load homepage	16	41.0%
Page 2 Click on Customer Office Professional 2007	15	38.5%
Page 3 Click on FAQ, How to activate programs later?	6	15.4%
Page 4 User 2: Load homepage	0	0.0%
Page 5 Click on Customer Office Small Business 2007	1	2.6%
Page 6 Click on Customer Service, Firewall	0	0.0%
Page 7 User 3: Load homepage	0	0.0%
Page 8 Click on Customer Office OneNote 2007	0	0.0%
Page 9 Click on Order History	1	2.6%
Page 10 User 4: Load homepage	0	0.0%
Page 11 Click on Customer Office Product Professional 2007	0	0.0%
Page 12 Click on How to set-up and install your trial	0	0.0%
Page 13 Click on How to buy this product now	0	0.0%

Errors by Type

Unable to connect	11	84.6%
500 Server closed connection without sending any data back	2	15.4%

Figure 1-4: Errors by Page and Errors by Type, Scenario 1

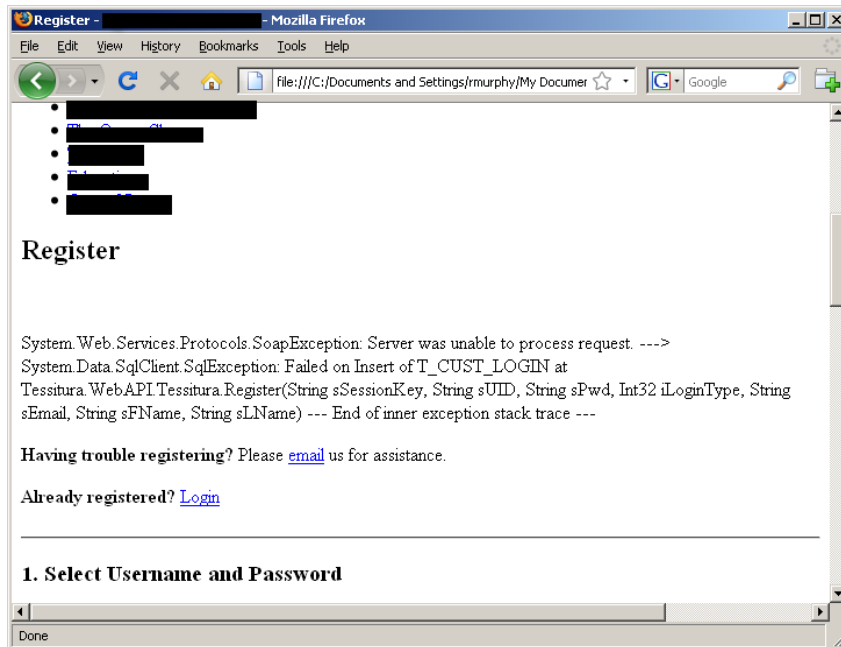


Figure 1-5: Unique Error

Commentary on Errors

Please note that all but one of the content errors received were related to the user name not being accepted by the server because the user name already existed. Because the site did bring back the correct page in the situation where the username being attempted is already present, after removing these errors, the results have a total number of 359 errors, giving a page success rate of 99.99%, and a transaction success rate of 99.98%, if the previously mentioned errors are removed from the total. The one content error which was not related to the user name can be seen above in Figure 1-5.

Page Load Times

As shown in Figure 1-6 below, load times for all pages during intervals scaled as the number of users went up in each interval. The exception to this pattern is Interval 8. In Interval 8, a large jump in load time of over 90 seconds occurs. In Interval 9, the load time normalizes back to the scale which was present before the large jump. This also occurred in Scenario 2 (Figure 1-7), but with Interval 9 only seeing a minor drop and not normalizing until Interval 10. For both scenarios, Page 2 has the highest load times compared to all other pages.

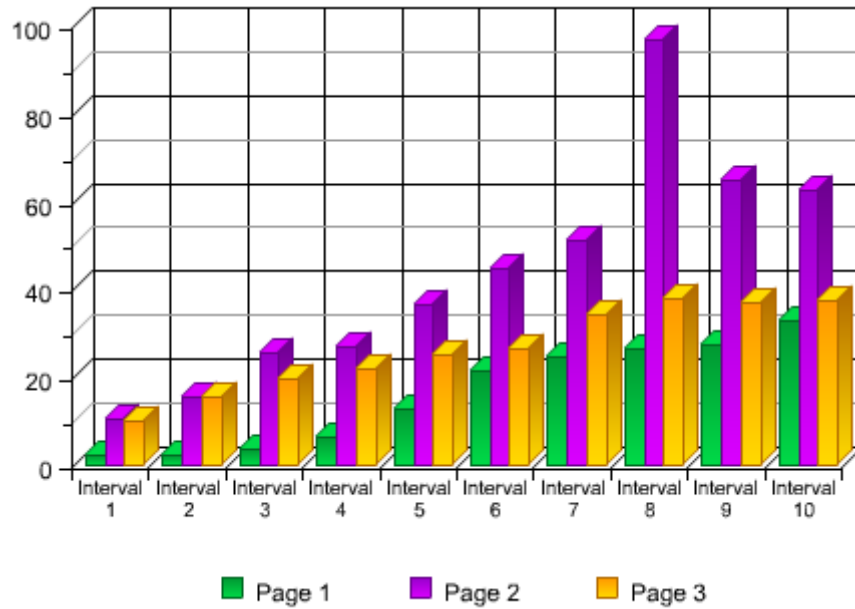


Figure 1-6: Page Load Time by Interval, Scenario 1

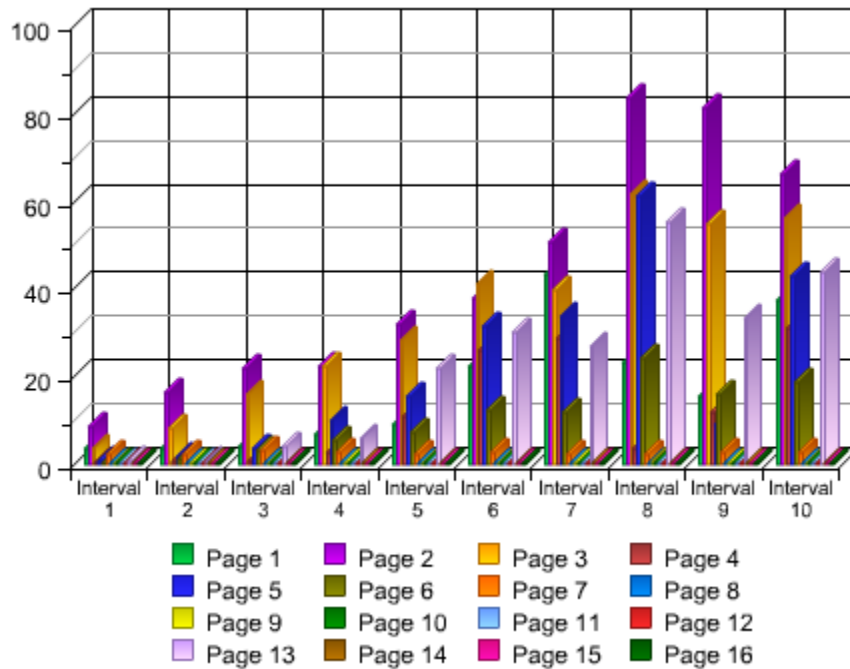


Figure 1-7: Page Load Time by Interval, Scenario 2

Transaction Load Times

Transaction load times increased through Intervals 1 to 7 consistently as the load increased. During Interval 8 the load time increased drastically (by 50 seconds) over the previous interval, then drops 30 seconds in Interval 9, then back to the expected range. Please reference the Load Time by Transaction for Scenario 1 in Figure 1-8 below:

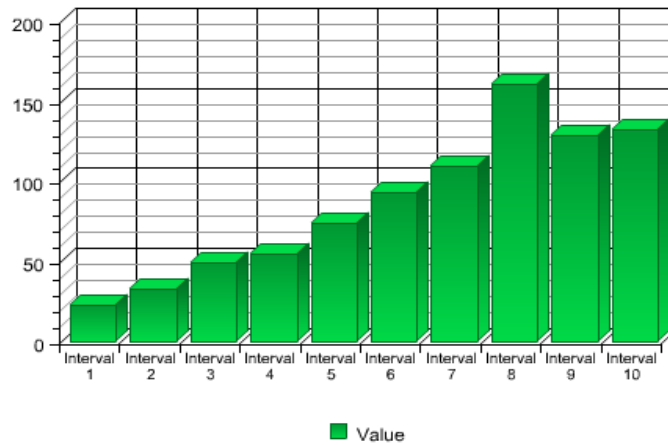


Figure 1-8: Load Time by Transaction, Scenario 1

In Scenario 2, transaction times increased in steps through Intervals 1 to 7 as the load increased—just as in Scenario 1. During Interval 8, the load time increased drastically by almost 80 seconds over Interval 7, then drops 90 seconds in Interval 9, then evens out in Interval 10. Please reference the Load Time by Transaction for Scenario 2 in Figure 1-9, below:

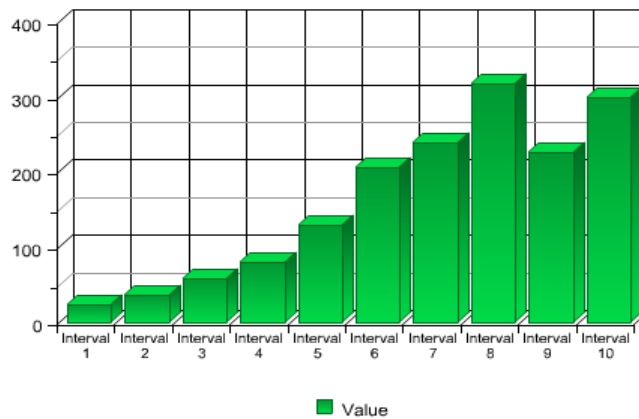


Figure 1-9: Load Time by Transaction Scenario 2

Summary

The site did reach an upper limit on performance at a level of 500 concurrent users; with transaction load times increasing 1,374% in Interval 7, but there were a low number of timeout errors.

Detailed Conclusions and Recommendations

Analysis

Webmetrics recommends looking into the network configuration or examining any data collected on the behavior of the servers themselves in terms of CPU utilization, memory utilization, etc. The error in Figure 1-5 was unique, and worthy of further investigation.

Recommendations

Diagnose Network

Based on the information available, improving or diagnosing any issues related to the network may improve performance and prevent problems related to the server not receiving the data and causing the timeout errors.

Modification of Server Configuration

By modifying your application server's ability to handle and respond to requests, it may be possible to improve performance at levels of 500 concurrent users and above. Improving load time with many concurrent users may upgrade the overall user experience.

Add/Replace Hardware

Depending on the expected traffic levels this is also an option. However, we would recommend profiling and tuning application performance before making a decision regarding the purchase of additional hardware.

Overall Conclusions

The test showed evidence that the site may have trouble handling 500 concurrent users without causing timeout errors and degrading overall user experience due to the page load times. The server does remain accessible and users are still able to access the site. Load times increased proportionally with the amount of concurrent users. In both scenarios, Page 2 is the most noticeable issue, displaying the highest page load times and contributing to the high transaction load times.

About Webmetrics

Founded in 1999, Webmetrics is a leading provider of collaborative performance management services for complex web ecosystems. Webmetrics' website testing and monitoring services are used by companies and SaaS providers that want to ensure online performance, competitive advantage and a positive end-user experience. Webmetrics' GlobalWatch services test, monitor and measure the performance of websites, web transactions, web services and streaming media to ensure 24/7 uptime and performance integrity. Webmetrics is a fully-owned service of NeuStar, Inc. (NYSE: NSR).

NeuStar Inc.

NeuStar (NYSE: NSR) is a provider of clearinghouse and directory services to the global communications and Internet industry. NeuStar's UltraDNS Services provide solutions to organizations that rely on core Internet services for their critical business processes, applications, and products. Visit www.neustar.biz and www.ultradns.com for more information.