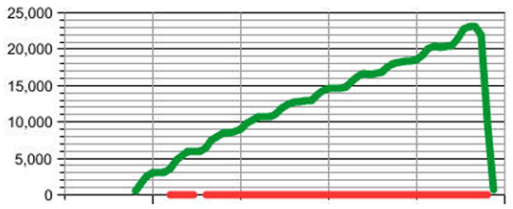




# Webmetrics Full-Service Load Testing
# Executive Summary and Report for (Sample Customer)

**Prepared for**

*Customer*

**Date of Test**

Full-Service Load Test conducted on September 1, 2010

Webmetrics Full-Service Load Testing is a consultative engagement that combines the unique strengths of our proprietary load testing software, our GlobalWatch network, and most importantly, our expertise. Our Full-Service Load Testing 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

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 Full-Service Load Testing 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

Our Full-Service Load Testing 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 while still maintaining 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 Findings

- 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.

**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 |

  

# Table of Contents

**Executive Summary** ..... **2**
- Scope of Load Test ..... 2
- Objectives of Load Test ..... 2
- Key Findings ..... 2
- Key Recommendations ..... 2

**Conclusions** ..... **3**

**Simulated Load / Load Testing Methodology** ..... **5**

**User Behaviors / Scenario Outline** ..... **6**

**Aggregate Performance Results** ..... **7**
- Commentary ..... 7

**Results by Test Iteration** ..... **8**
- Commentary on Errors ..... 11
- Page Load Times ..... 11
- Transaction Load Times ..... 13
- Summary ..... 13

**Detailed Conclusions and Recommendations** ..... **14**
- Analysis ..... 14

**Recommendations** ..... **14**
- Diagnose Network ..... 14
- Modification of Server Configuration ..... 14
- Add/Replace Hardware ..... 14

**Overall Conclusions** ..... **14**

  

# Simulated Load / Load Testing Methodology

A 60-minute load test was conducted for Customer on September 1, 2010. The test utilized two scenarios, and the load was 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
- Washington, DC
- San Jose, CA

  

# User Behaviors / Scenario Outline

***Scenario 1 – 480 concurrent users***

Page Legend

| | | |
|---|---|---|
| **Page 1** | http://customer-test.customer.com/default.aspx<br>**User 1: Load homepage** | 61,789 bytes |
| **Page 2** | customer-test.com...fEH1eXoc%3d&culture=en-US<br>**Click on Customer Office Professional 2007** | 40,000 bytes |
| **Page 3** | customer-test.com...fEH1eXoc%3d&culture=en-US<br>**Click on FAQ, How to activate programs later?** | 64,418 bytes |
| **Page 4** | http://customer-test.customer.com/default.aspx<br>**User 2: Load homepage** | 61,791 bytes |
| **Page 5** | customer-test.com...fEH1eXoc%3d&culture=en-US<br>**Click on Customer Office Small Business 2007** | 39,317 bytes |
| **Page 6** | customer-test.com...fEH1eXoc%3d&culture=en-US<br>**Click on Customer Service, Firewall** | 52,319 bytes |
| **Page 7** | http://customer-test.customer.com/default.aspx<br>**User 3: Load homepage** | 61,792 bytes |
| **Page 8** | customer-test.com...fEH1eXoc%3d&culture=en-US<br>**Click on Customer Office OneNote 2007** | 39,300 bytes |
| **Page 9** | customer-test.com...rdersummary&culture=en-US<br>**Click on Order History** | 21,429 bytes |
| **Page 10** | http://customer-test.customer.com/default.aspx<br>**User 4: Load homepage** | 61,547 bytes |
| **Page 11** | customer-test.com...q38mpQtc%3d&culture=en-US<br>**Click on Customer Office Product Professional 2007** | 39,254 bytes |
| **Page 12** | customer-test.com...tion_id=142&culture=en-US<br>**Click on How to set-up and install your trial** | 40,719 bytes |
| **Page 13** | customer-test.com...tion_id=143&culture=en-US<br>**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<br>**Load homepage** | 61,791 bytes |
| **Page 2** | customer-test.com...fEH1eXoc%3d&culture=en-US<br>**Click on random product** | 39,301 bytes |
| **Page 3** | customer-test.com...shopperinfo&culture=en-US<br>**Click Try Now for FREE!** | 22,904 bytes |
| **Page 4** | customer-test.com... id=5024358&culture=en-US<br>**Log in** | 23,136 bytes |
| **Page 5** | spf-cdn-origin.dig.../tmp/EN.OfficeOneNote.zip<br>**Click Download Now** | 463 bytes |
| **Page 6** | customer-test.com...receipt_id=&culture=en-US<br>**Download Now page - click Continue** | 19,688 bytes |
| **Page 7** | customer-test.com...efault.aspx?culture=en-US<br>**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.

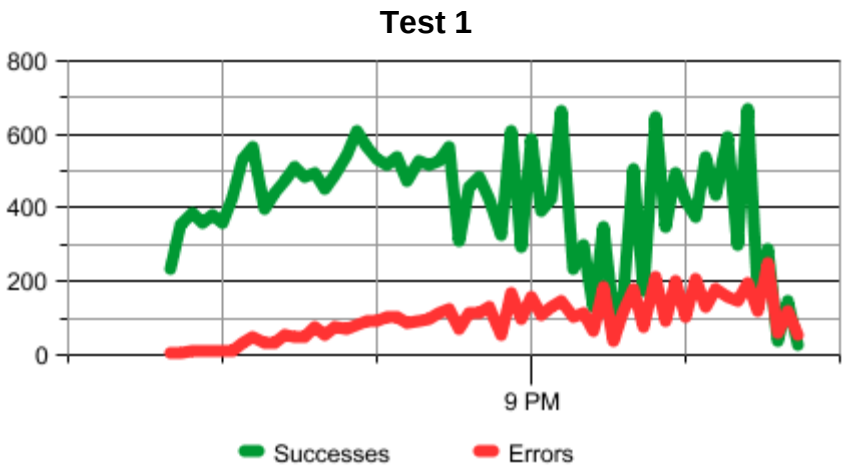


**Figure A – Aggregate Successes/Failures. Graph Test 1**

## 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.

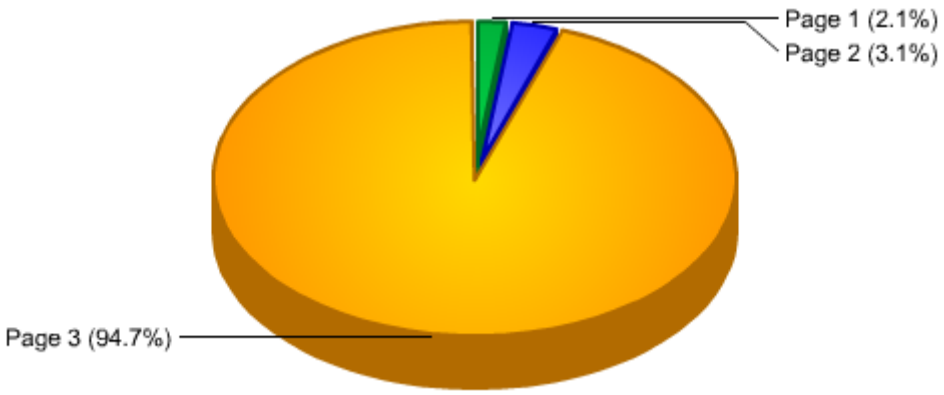


**Figure 1-1: Percent Errors by Page**

### Errors by Page

| | | |
|---|---|---|
| **Page 1**<br>Load homepage | 5 | 38.5% |
| **Page 2**<br>Click on random product | 2 | 15.4% |
| **Page 3**<br>Click Try N[illegible] for FREE! | 0 | 0.0% |
| **Page 4**<br>Log in | 0 | 0.0% |
| **Page 5**<br>Click Download Now | 6 | 46.2% |
| **Page 6**<br>Download Now page - click Continue | 0 | 0.0% |
| **Page 7**<br>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**<br>User 1: Load homepage | 16 | 41.0% |
| **Page 2**<br>Click on Customer Office Professional 2007 | 15 | 38.5% |
| **Page 3**<br>Click on FAQ, How to activate programs later? | 6 | 15.4% |
| **Page 4**<br>User 2: Load homepage | 0 | 0.0% |
| **Page 5**<br>Click on Customer Office Small Business 2007 | 1 | 2.6% |
| **Page 6**<br>Click on Customer Service, Firewall | 0 | 0.0% |
| **Page 7**<br>User 3: Load homepage | 0 | 0.0% |
| **Page 8**<br>Click on Customer Office OneNote 2007 | 0 | 0.0% |
| **Page 9**<br>Click on Order History | 1 | 2.6% |
| **Page 10**<br>User 4: Load homepage | 0 | 0.0% |
| **Page 11**<br>Click on Customer Office Product Professional 2007 | 0 | 0.0% |
| **Page 12**<br>Click on How to set-up and install your trial | 0 | 0.0% |
| **Page 13**<br>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**

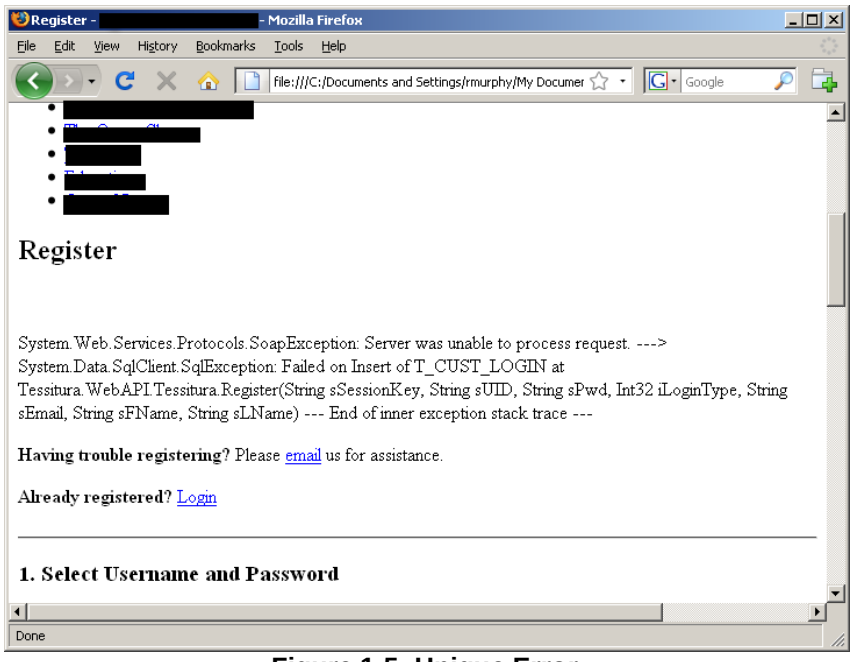


**Figure 1-5: Unique Error**

## 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%. The transaction success rate was 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 (see following page), 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.

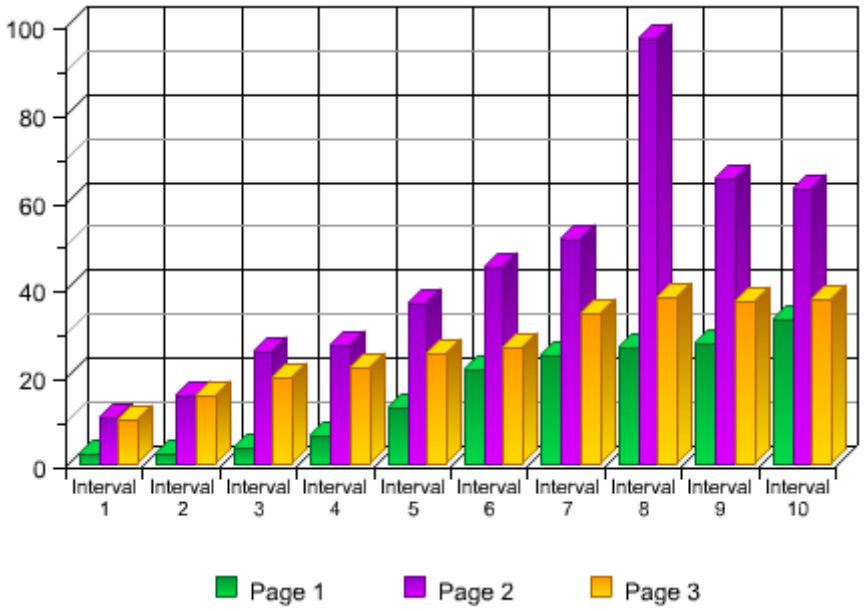


**Figure 1-6: Page Load Time by Interval, Scenario 1**

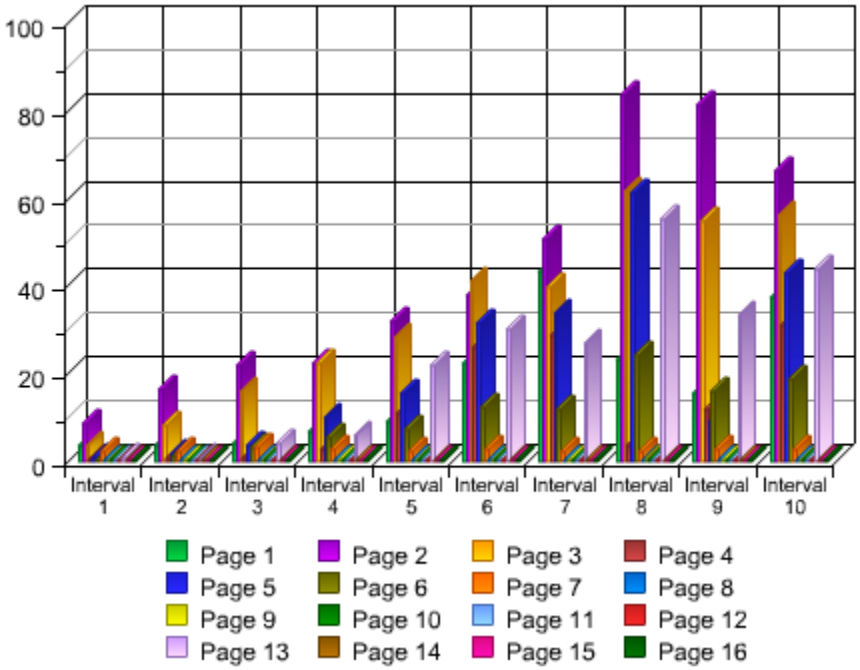


**Figure 1-7: Page Load Time by Interval, Scenario 2**

## 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 dropped 30 seconds in Interval 9, then went back to the expected range. Please reference the Load Time by Transaction for Scenario 1 in Figure 1-8 below:

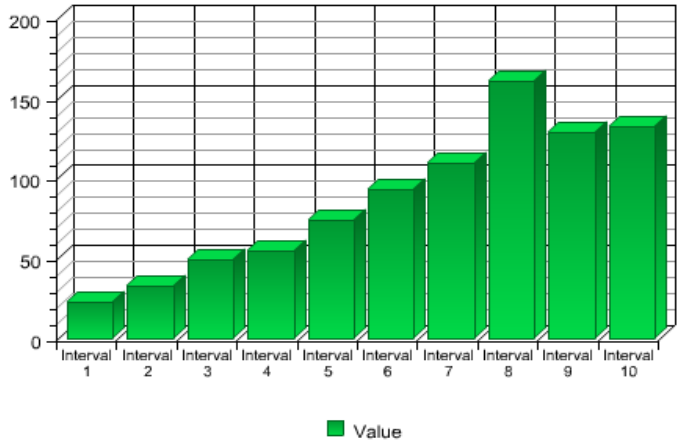


**Figure 1-8: Load Time by Transaction, Scenario 1**

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

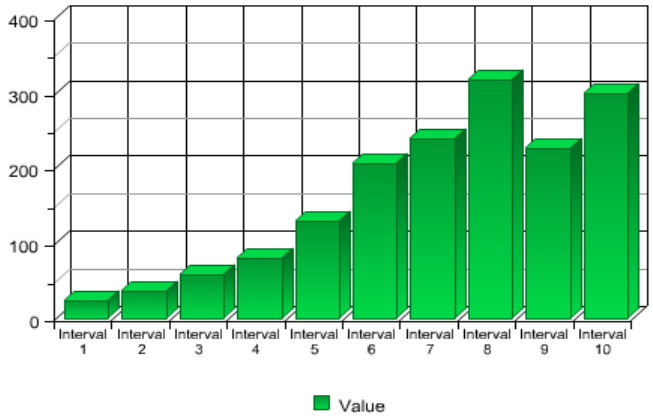


**Figure 1-9: Load Time by Transaction Scenario 2**

## 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, adding or replacing hardware 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 Neustar® Webmetrics®

Neustar, Inc. (NYSE: NSR) solves complex communications challenges and provides market-leading, innovative solutions and directory services that enable trusted communication across networks, applications, and enterprises around the world. Neustar Webmetrics services provide website monitoring and testing for companies that want to ensure online performance, competitive advantage, and a positive end-user experience. Visit us at www.neustar.biz and www.webmetrics.com.

  