TEST REPORT

Tolly.

#209103
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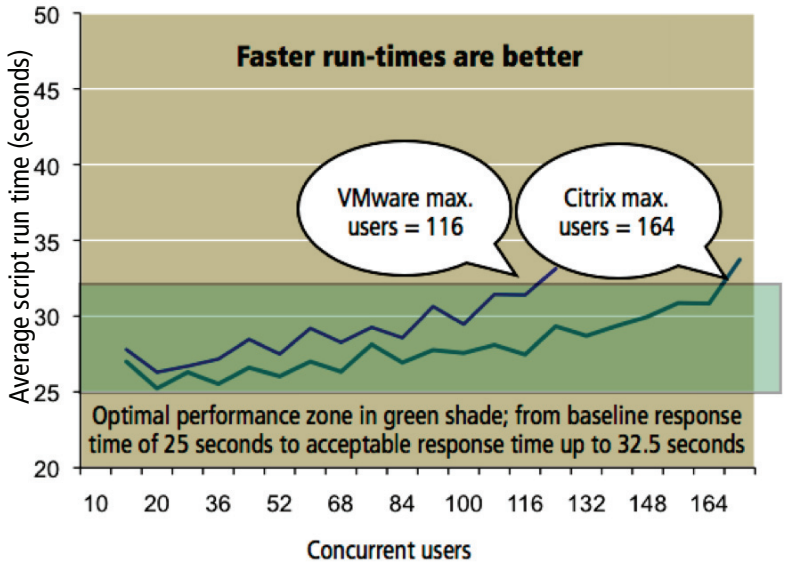
Commissioned by Citrix Systems, Inc.

Citrix XenServer 5: Optimized Performance for XenApp Compared to VMware ESX 3.5u3

EXECUTIVE SUMMARY

Citrix XenApp farms are often maintained on physical servers instead of virtual machines. Testing by Tolly shows that Citrix XenServer, which includes specific optimizations for XenApp, highlights the performance improvements that customers can obtain when choosing XenServer over a VMware Virtual Infrastructure in their XenApp Virtual Server farms. In these tests, Citrix XenServer 5 outperformed VMware ESX 3.5u3 by supporting 41% more concurrent users.

XenApp Session Scalability
Citrix XenServer 5 vs. VMware ESX 3.5u3
As reported by Citrix EdgeSight for Load Testing 3.0



Source: Tolly, February 2009

Figure 1

THE BOTTOM LINE

1. Citrix XenServer 5 outperforms VMware ESX 3.5 by 41% in user scalability tests
2. XenApp, running on XenServer, retains a consistent user experience as load is increased to 164 users
3. Virtualizing 32-bit XenApp gives IT administrators a viable approach to increasing total user density on physical servers, without the need to re-certify their existing applications and drivers for a 64-bit platform
4. Consolidating XenApp farms on XenServer results in data center reliability benefits and cost savings

RESULTS

User Scalability in a Virtualized Server Platform

Tolly engineers set out to examine the effectiveness of virtualizing the 32-bit XenApp platform running on either Citrix Systems, Inc.'s own XenServer 5, or on VMware's ESX 3.5u3. Hereafter, all references in this document to 'VMware ESX' or 'VMware ESX 3.5' imply 'VMware ESX 3.5u3'.

The objective was to determine the effective scalability of XenApp running on both platforms as it supports increasing user loads, without sacrificing user response time or the user experience.

Tests show that XenApp, running on a Citrix XenServer 5 virtualized platform, can support up to 164 users while retaining an excellent user experience. When the same test was run with XenApp running on a VMware ESX virtualized server environment, only 116 users could be supported. This demonstrates that Citrix XenServer 5 outperforms VMware ESX 3.5 by 41% in user scalability tests.

Test Setup & Methodology

Tolly personnel tested Citrix XenApp, an application delivery system that offers client-side and server-side application virtualization, on virtualized servers. The test was controlled with Citrix EdgeSight for Load Testing – an extensible client side user simulator which makes connections directly to XenApp and records performance metrics over time.

The test targets were eight XenApp 5 virtual machines; four running under Citrix XenServer 5, and four running under VMware ESX 3.5. The virtualization platforms were installed "out of the box" with default settings and the Citrix XenServer "Optimize for XenApp" button selected. Each virtual machine had the appropriate vendor's virtualized drivers installed.

The physical servers used were mainstream platforms – a pair of Hewlett-Packard Co. DL380 G5 systems outfitted with dual quad-core Intel Xeon X5450 3.0-GHz CPUs, 16 GB RAM, and dual 72-GB 15,000 RPM hard disk drives configured as RAID 1+0. Each virtual machine was allocated 3,712 MB of RAM and two virtual CPUs.

Foreground and Background Test Loads

In setting up the test, Tolly engineers started with a freshly-booted environment, and let the servers stabilize for five minutes before applying the initial background load. Load was ramped up slowly, at a rate of approximately one user every 45 seconds, to ensure that the systems were not overwhelmed by a mass-login effect. Engineers ran two

Citrix Systems, Inc.

XenServer 5

Performance and Session Scalability for XenApp

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February 2009

XenServer Highlights

- One click optimization for XenApp
- Built-in XenApp virtual machine template
- Citrix offers EdgeSight for Load Testing scripts to help customers run their own performance comparisons
- Provisioning Services, a unique feature offered only by Citrix, simplifies management of XenApp
- Consolidation of XenApp Farms on XenServer results in significant data center reliability benefits and cost savings

Source: Citrix Systems, Inc.

test scripts in the Citrix EdgeSight for Load Testing harness: a "background" script that ran continuously on all virtual machines, and a "foreground" script that logged in a single user session to sample performance.

The EdgeSight for Load Testing controller ramped user load in 16-user increments, to a total of 240 users on each platform after three hours, 30 minutes. Users were added over a five-minute ramp-up period, then held steady for a 10-minute measurement period, during which the "foreground script" ran to verify performance. Both platforms were tested from a very low load to well beyond the acceptable performance threshold to ensure reliable results. The results shown in this document represent an average of three independent test runs.

The background load script, used to simulate a busy XenApp server environment, launched Microsoft Word and performed a number of real-world tasks around document creation and editing. Once the eight-minute task was completed, the document was closed then recreated in a continuous loop. These users were kept logged in to the system for the duration of the test.

The foreground script, used for performance measurement, simulated a single user logging in to one virtual machine on each platform. This "measurement user" connects to Microsoft Excel published through Citrix XenApp, creates a new worksheet, and logs off. This simple set of actions exercises a number of subsystems on the server, and with a 25- to 32.5-second execution time, captured performance over a varying range of load conditions, avoiding false results from quick spikes or lulls in server activity. As load increased on the platforms, Tolly engineers saw noticeable changes in user performance as the systems reached capacity. Both systems eventually reached an overcommitted state at which there was a dramatic performance drop off.

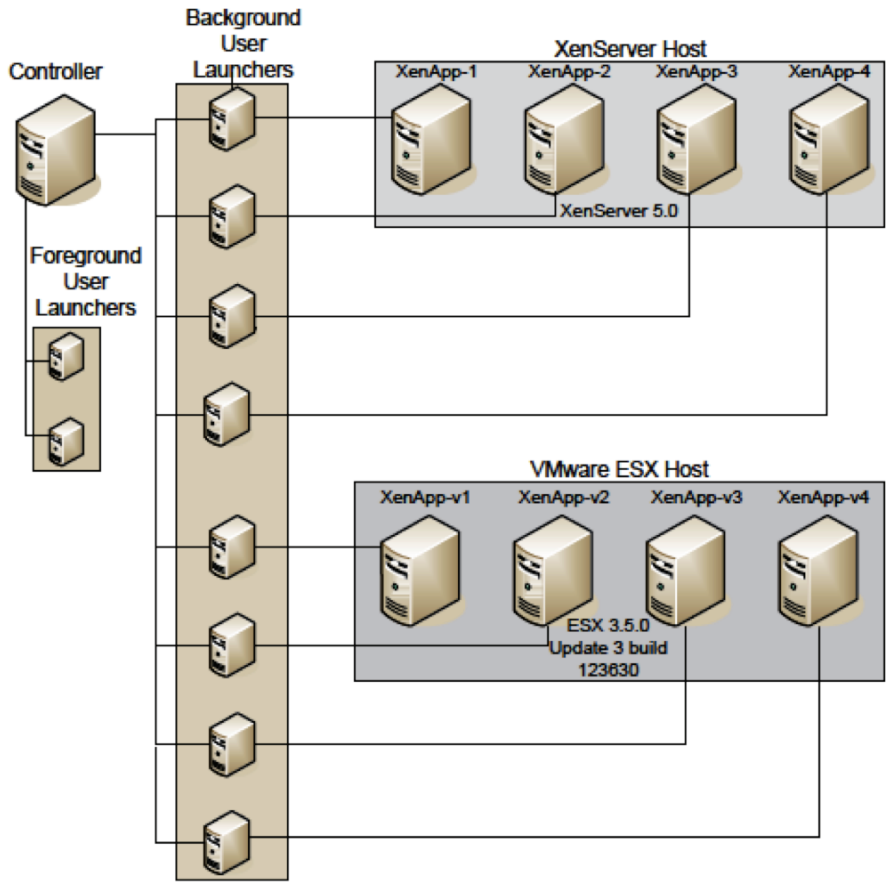
Tolly Common RFP™

The test methodology used for this report relies upon test procedures, metrics and documentation practices as defined by Tolly Common RFP, #1101 Virtual Server Performance.

To learn more about Tolly Common RFPs, go to:

http://www.CommonRFP.com

XenApp Test Environment
Citrix XenServer 5 vs. VMware ESX 3.5



Source: Tolly, February 2009

Figure 2

About Tolly…

The Tolly Group companies have been delivering world-class IT services for 20 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services.

You can reach the company via E-mail at sales@tolly.com, or via telephone at 561.391.5610.

Visit Tolly on the Internet at: http://www.tolly.com

Interaction with Competitors

In accordance with Tolly's Fair Testing Charter, Tolly personnel invited representatives from VMware to participate in reviewing the Test Methodology and commenting on their product's specific results. VMware accepted the invitation, and reviewed and approved the publication under the terms of the EULA for VMware ESX 3.5.

For more information on the Tolly Fair Testing Charter, visit: http://www.tolly.com/FTC.aspx

Terms of Usage

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