



| X300 Seven User Environment

Symmetric Solutions

675 Old South Head Road
VAUCLUSE
NSW 2030 AUSTRALIA
Phone: +61 2 9388 8529
<http://www.symsol.com.au>
Email: info@symsol.com.au

Your NComputing Dealer

**Symmetric
Solutions** 

The logo graphic consists of two overlapping squares: a green one on top and a blue one on the bottom right.

Overview

NComputing's multi-user technology enables greatly expanded computing capabilities by allowing up to 7 or 30* users to simultaneously access a single PC. This multi-user desktop experience supports simultaneous users at lower costs in an easy to use, set-up and maintain environment that is eco friendly. The result is a significantly lower cost of computing, on-going management and power usage that is many times better than a traditional networked PC model.

Since most users only utilize a few percent of today's powerful PCs, NComputing leverages this power with small access terminals and proven software that enables a single PC or server to support up to 30 users at once. The goal in the multi-user environment is to maintain the performance of the host computer across many users; and as long as the host CPU, memory or LAN performance is not constrained, each access terminal should operate at a speed similar to the host.

NComputing and our reseller network have many customers that are utilizing up to 30 users per host. Most of these are used for office productivity with many applications, but some are used to run a single dedicated application (generally in a manufacturing or data entry environment).

In the following proof of concept we will demonstrate a 7-user environment that accesses a single (modest) host using our X300 product. Since most users today are running workloads such as email, office applications and internet browsing, these tasks represent a good measure for a proof of concept. A typical PC benchmark would not be appropriate or applicable to the multi-user environment since these benchmarks are made for stressing an individual PC in a comparison to another PC. For this demonstration, our goal is to show 7 active users all accessing a single host, while not creating constraints on the processing, memory or network capabilities of that host.

**Note: Up to 30-Users with the NComputing L-Series and up to 7-Users with the X-Series products.*

X300 Environment

For the purpose of this exercise, NComputing ran up to 7 active users and two different applications to determine productivity. The hardware configuration and setup details are described in Appendix A.

For basic office productivity, we ran a slideshow (including text, graphics and JPEG images) on PowerPoint with an automatic 3 second slide transitions to simulate usage of a typical office application. To simulate other user productivity activities, we used a multimedia video clip from YouTube.com; and for web browsing, we ran CNN.com's streaming video player, which includes text and active images. The scenarios listed in Table 1 were run.

Table 1: X300 Mixed Application Scenarios

# of Users	# of YouTube Sessions*	# of PPT sessions**	# of CNN Sessions***
1	0	0	1
2	0	1	1
3	1	1	2
4	1	1	2
5	2	1	2
6	2	2	2
7	2	3	2

* YouTube "Russian Tunnel" streaming video in small mode.

** PowerPoint with automatic 3 second slide transitions including animation.

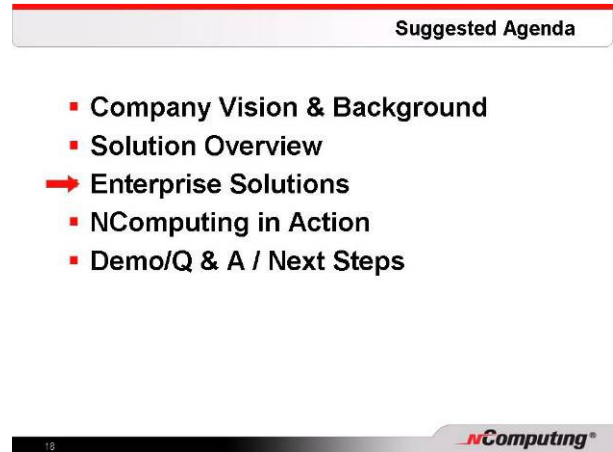
*** CNN.com streaming video in standard mode.

The following are screen shots of the active applications taken during the test:

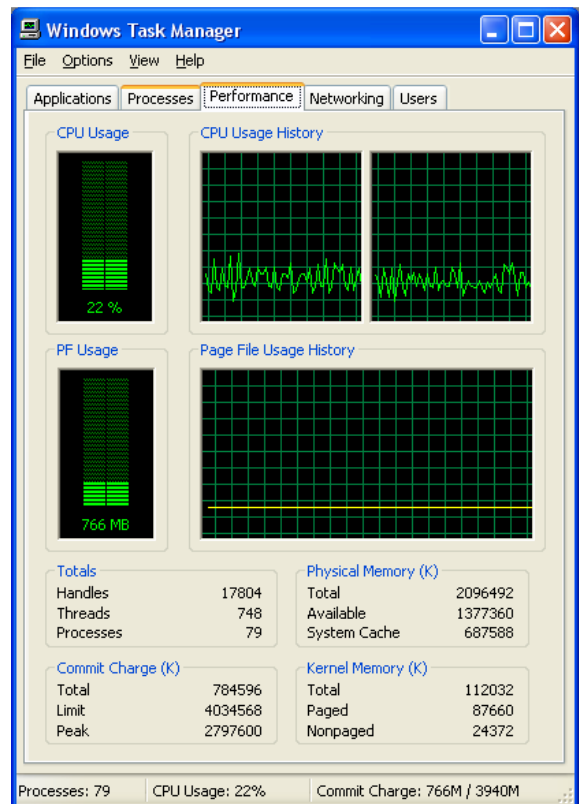
YouTube.com



MS PowerPoint



CNN.com



Performance Results

We used the Windows System Monitor to gauge system performance, and while this is not 100% accurate, it provides solid guidance as to the percent of CPU resources used in each scenario. We looked at both average CPU usage as well as peak usage during the test.

Table 2: X300 – All users running PowerPoint slide show

	Users						
	1	2	3	4	5	6	7
CPU Peak (%)	25	39	41	46	58	46	42
CPU Average (%)	2	6	7	10	12	15	16

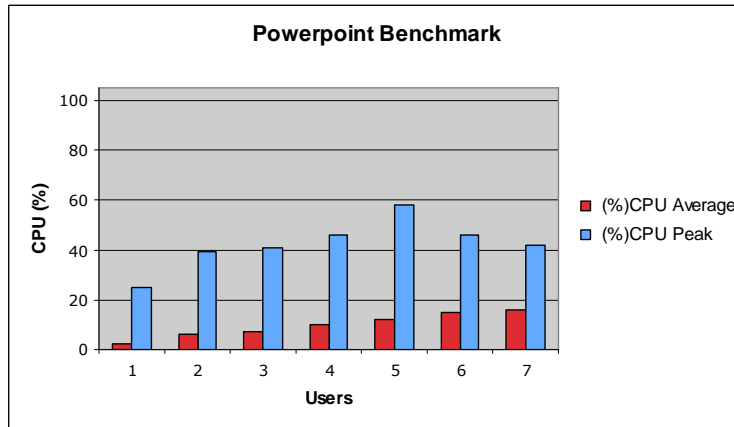
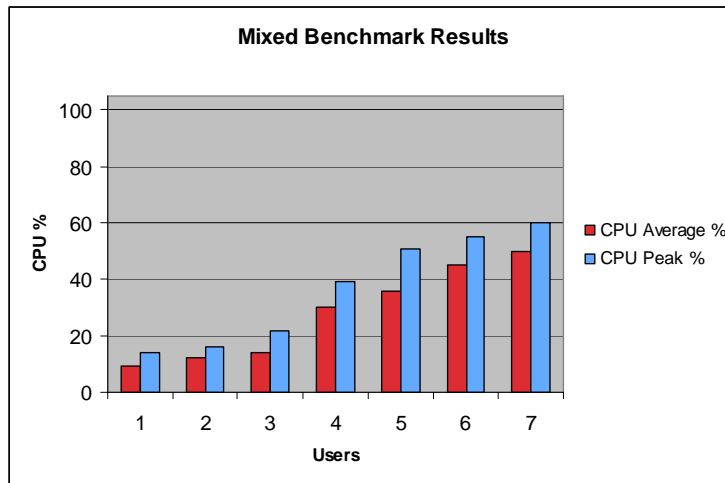


Table 3: X300 - Mixed Productivity Applications (see Table 1 for applications run)

	Users						
	1	2	3	4	5	6	7
CPU Peak %	14	16	22	39	51	55	60
CPU Average %	9	12	14	30	36	45	50



Note: performance results will vary and are dependent upon the OS, applications used, total system memory, including virtual memory and other factors.

Determining Your Environment

The performance of each access terminal in the multi-user environment depends upon the host configuration & application needs of the customer. Specifically, performance is dependent upon the individual host hardware, memory, video card, applications being used, OS software and network conditions within any LAN/WAN. As long as the processor/memory/network utilization stays below 100%, the performance for each user should be comparable to that of the host PC. Power hungry applications can tax the processor to its limit and slow the performance of the multi-user environment; but even if these applications demand more processing power, these peak requests are generally very brief and performance should return to normal very quickly.

Although this environment does not examine performance with 7 “active” users that are typing, saving, switching between applications, sending email and more; the CPU utilization from those actions is generally 0-3% per user. Therefore, even if performed on top of the applications shown in this exercise, these tasks will be covered by the excess performance capacity of the host.

When setting up your multi-user environment, testing of your applications and usage model should be conducted to determine that host resources (CPU, memory, and networking) are sufficient to meet the performance expectations. Should the environment not meet those requirements, the options are to improve the resources in the host PC or lower the number of users.

Summary

The results from this 7-user scenario clearly confirms what our users have been utilizing every day, and that most users only utilize a small fraction of the processing and memory performance provided in today’s PCs. And that these PC’s and access terminals can power up to 7-Users simultaneously to perform productivity, office and multimedia applications on a single host with CPU resources to spare.

This environment demonstrates that NComputing utilizes this excess performance and distributes it to many users with our Multi-User technology; which results in a significantly lower cost of computing, on-going management and power usage that is many times better than a traditional networked PC model.

Appendix A – Setup Details



The hardware configuration consisted of:

- Host¹ PC
- Two X300s (2 PCI cards + 6 NComputing terminals)
- Seven 15-19" wide-panel monitors at 1024x768 resolution and 16-bit color
- 7 Keyboards and mice

Setting up this demonstration is very easy. You simply connect each Terminal to a keyboard, monitor, mouse and Host PC (via Ethernet cable); then install NComputing Terminal Server on the host PC.

See Appendix B for more detailed setup instructions.

¹ Host System Configuration: AMD Athlon 64X2 4200+ CPU, MSI K9N6GM motherboard, 3Dfuzion PCI Express Graphics (nVidia 7300LE), 2GB DDR 667 Memory, Western Digital SATA 160GB hard drive and Microsoft Windows XP SP2 and Office 2003 (cost was roughly \$500, excluding software and taxes).

Appendix B – Detailed Setup Instructions

- 1) Get a PC that is comparable to the following:
 - a. AMD Athlon 64X2 Dual Core 4200+ 2.2 GHz CPU
 - b. MSI K9N6GM motherboard
 - c. 3Dfuzion PCI Express Graphics (nVidia 7300LE)
 - d. 2GB DDR 667 Memory
 - e. Western Digital SATA 160GB Hard Drive
 - f. Microsoft Windows Server 2003 SP2
 - g. Microsoft Office 2003
- 2) Install the NComputing Terminal Server software
- 3) Create 7 users, with a unique Logon ID for each (password is optional)
- 4) Connect one keyboard, monitor and mouse to the Host and each Terminal (or to the “Console Port” of a Keyboard-Video-Mouse switch)
- 5) Connect the Ethernet cables between the Host and Terminals
- 6) Power on the KVM, Ethernet Switch, and Terminals
- 7) Logon to each Terminal using the appropriate Logon ID and password
- 8) Run the applications!

© Copyright 2007. NComputing Inc. All rights reserved. Specifications are subject to change without notice. NComputing is a trademark of NComputing Inc. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel and Pentium are registered trademarks of Intel Corporation. Linux is a registered trademark of Linus Torvalds. Other trademarks and trade names are the property of their respective owners.

Symmetric Solutions

675 Old South Head Road
VAUCLUSE
NSW 2030 AUSTRALIA
Phone: +61 2 9388 8529
<http://www.symsol.com.au>
Email: info@symsol.com.au

Your NComputing Dealer

**Symmetric
Solutions** 