WHITE PAPER

April 1999

Prepared By
Workstation Marketing

Compaq Computer Corporation

Contents

UNIX and Microsoft Windows NT Interoperability

The use of Microsoft® Windows NT® workstations continues to expand into more areas that were once traditional UNIX® environments. MCAD, MCAE, EDA, GIS, Financial and DCC users are drawn to Windows NT workstations for a variety of reasons: performance, ease of use, and the ability to run all their applications on one desktop. The lower cost of ownership also provides a major incentive for an organization to move to Windows NT.

While Windows NT is enjoying rapid growth, most organizations continue to utilize their existing UNIX systems. Therefore, it is very common for UNIX and Windows NT workstations to co-exist in an organization.

The purpose of this paper is to review some of the common issues that arise when Windows NT workstations are introduced into a UNIX environment, the various solutions that exist today, and the key Compaq partners who provide these solutions.

For more information about Compaq Professional Workstation product offerings, refer to www.compaq.com/products/workstations.

To find the latest version of this paper, or to find out more information on Compaq interoperability partners, refer to www.compaq.com/products/workstations/intsol/index.html

ECG051B/0199

NOTICE

The information in this publication is subject to change without notice and is provided "AS IS" WITHOUT WARRANTY OF ANY KIND. THE ENTIRE RISK ARISING OUT OF THE USE OF THIS INFORMATION REMAINS WITH RECIPIENT. IN NO EVENT SHALL COMPAQ BE LIABLE FOR ANY DIRECT, CONSEQUENTIAL, INCIDENTAL, SPECIAL, PUNITIVE, OR OTHER DAMAGES WHATSOEVER (INCLUDING WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION OR LOSS OF BUSINESS INFORMATION), EVEN IF COMPAQ HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

The limited warranties for Compaq products are exclusively set forth in the documentation accompanying such products. Nothing herein should be construed as constituting a further or additional warranty.

This publication does not constitute an endorsement of the product or products that were tested. The configuration or configurations tested or described may or may not be the only available solution. This test is not a determination of product quality or correctness, nor does it ensure compliance with any federal, state or local requirements.

Microsoft, Windows, and Windows NT are trademarks and/or registered trademarks of Microsoft Corporation.

Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies.

© 1999 Compaq Computer Corporation. All rights reserved. Printed in the U.S.A.

UNIX and Microsoft Windows NT Interoperability

April 1999

Document ECG051B/0199

Introduction

As organizations have worked to improve the productivity of their workers and reduce overall costs, many have introduced Windows NT workstations into areas that were once dominated by UNIX systems. While UNIX and Windows NT workstations were once considered separate and unique entities, today they must co-exist.

Common Interoperability Issues

As Windows NT workstations are introduced into an UNIX workstation environment, some common interoperability issues are encountered. They include the following areas of concern:

- Sharing of files, printers and plotters
- License management
- Access to applications running on UNIX or mainframe systems
- Use of UNIX utilities and scripts
- System administration

The following sections provide information on these interoperability issues and offers various solutions.

File and Printer Access

UNIX workstation users that store their data and/or applications software on a UNIX server currently use Network File System (NFS) software as the way to share these files. They also use NFS to provide access to remote printers.

Windows NT workstations use Server Message Block (SMB) as their default method for sharing files and printers. There are a variety of alternatives available to allow these two different technologies to work together.

Multiple File and Printer Sharing Alternatives

There are four main ways to provide a Windows NT workstation access to UNIX files and printers:

- Provide an NFS client on the Windows NT workstation
- Provide SMB on the UNIX server
- Introduce a gateway between the Windows NT workstation and the UNIX server
- Replace the existing UNIX server with a Windows NT server and provide an NFS server on the Windows NT server for the UNIX workstations.

NFS Client on the Windows NT Workstation

NFS clients for Windows NT workstations have been available for many years from a variety of vendors. The new Windows NT workstation NFS clients available today for Compaq Professional Workstations offer the same high levels of performance as UNIX workstation NFS clients.

By installing an NFS client on a Windows NT workstation and providing the user with a valid UNIX account, the Windows NT user can use files and printers residing on a UNIX server or

workstation. Windows NT users can access the UNIX files by using either Windows Explorer or any Windows NT application, and can add printers and plotter access from the Windows NT control panel.

An NFS client on the Windows NT workstation provides the same flexibility a UNIX workstation user has to obtain access to files, printers and plotters that are available on UNIX serves or workstations.

SMB on a UNIX Server

SMB on a UNIX server allows any Windows NT workstation to access files, printers and plotters on that UNIX sever. SMB software is available from all the major UNIX vendors. Many vendors utilize Advanced Services for UNIX (ASU) from AT&T. ASU is native Windows NT software that AT&T licensed from Microsoft and then ported to UNIX. AT&T licenses the technology to other UNIX vendors.

Another option is to utilize SAMBA, which is open source software that is available for most flavors of UNIX, including Compaq Tru64™ UNIX, Sun Microsystems Solaris, Hewlett Packard HP-UX, and Silicon Graphics IRIX.

SMB on UNIX allows Windows NT workstations access to data stored on UNIX servers, but Windows NT users can only access data on those systems that are running SMB. Therefore, a Windows NT workstation user cannot access data from a local UNIX workstation. To share data, the UNIX and Windows NT workstation users need to store the data on the UNIX server running SMB.

NFS Gateway

A third option is to use an NFS gateway. The NFS gateway consists of software running on a Windows NT server that shares files with a UNIX server via NFS and uses SMB to share the files with Windows NT workstations.

The benefits of an NFS gateway are that no software needs to be loaded on either the Windows NT workstation or the UNIX server, and it offers a centralized location to manage the access to UNIX files, printer and plotters for the Windows NT workstations. The NFS gateway has the same limitation that SMB on a UNIX server has: to share data between a UNIX and Windows NT workstation, the data must be stored on a UNIX server that both the NFS gateway and the UNIX workstation can access. Also, this alternative requires the purchase of an additional server of adequate size to provide good performance.

NFS Server on Windows NT Server

As more Windows NT workstations are introduced, another option is to utilize a Windows NT server instead of a UNIX server. NFS server software can be provided on the Windows NT server, allowing the UNIX workstations to access the Windows NT server via NFS. The Windows NT workstations can access the Windows NT server through native SMB shares.

An NFS server on a Windows NT server eliminates the need to load software on either the Windows NT workstations or the UNIX workstations, but does require NFS server software to be installed on each Windows NT server.

Additional File Access Issues

While each of the above solutions provides file and printer access between UNIX and Windows NT workstations, there are additional issues to keep in mind.

User Accounts

Users need accounts on both their Windows NT workstation and UNIX server. Having two accounts can increase the complexity for the user. More information on how to make this issue transparent to users is provided in the system administration section of this document.

Case Sensitivity

UNIX file names are case sensitive while Windows NT file names are not. However, both UNIX and Windows NT are case preserving. Thus, a file stored on a UNIX system as FOO is different than a file stored as foo, while Windows NT does not make this distinction. Windows NT NFS clients and NFS gateways provide an option to force the case on all files stored on the UNIX server to be either all lower case or all upper case. This prevents a Windows NT user from storing two files with the same name but different cases on the UNIX system.

If files named FOO and foo are created by a UNIX user on the UNIX system, the Windows NT user will only see one of the files. The Windows NT user could mistakenly use or delete the wrong file. Therefore, care must be taken when using case in file names.

File Naming

UNIX and Windows NT have different file naming conventions. For example, Windows NT will not allow a file name to end with a '**.**' While this is acceptable in UNIX, UNIX and Windows NT users must be aware of the naming conventions on both systems to insure both groups of users can access all files.

Drive Letters

Windows NT only allows the user to create a total of 22 drive mappings (letters A through D are normally taken for the diskette drive, hard drive and CD-ROM drive while letters E through Z are available). In many environments, this is not enough. One solution is to use the Universal Naming Convention (UNC) instead of or in addition to drive mappings to access directories. This provides access to an unlimited amount of directories.

File And Printer Access		
Issue	**Solution**	**Products**
Access files, printers and plotters on a UNIX server from a Windows NT workstation	NFS client software on the Windows NT workstation	Microsoft Services for UNIX Hummingbird Maestro Client Intergraph DiskAccess
	NFS gateway on a Windows NT server	Hummingbird Maestro Gateway Intergraph Access NFS Gateway
	SMB on the UNIX server	Advanced Server for UNIX SAMBA
Access files on a Windows NT server from a UNIX workstation	NFS server software on the Windows NT server	Hummingbird Maestro Server Intergraph DiskShare

License Management

Most major application software vendors provide license managers that allow both UNIX and Windows NT systems to check out licenses from one license server. This is application specific, and information about the capabilities of a specific application should be obtained from the software vendor.

Access to Applications Running on UNIX or Mainframe Systems

As UNIX workstation users move to Windows NT workstations, they will normally need to continue to have access to existing UNIX and mainframe systems. The user may need to run a character mode (text) or graphical application on a remote UNIX system, and a character mode application on a mainframe.

Character Mode Access

For running character mode applications on remote systems, a Windows NT workstation user can use the telnet client software included with the Windows NT workstation.

Graphical Access

UNIX application vendors have standardized on Xwindows as the technology basis for their graphical user interfaces. Third party Xwindows servers are available for Windows NT workstations to allow users to run Xwindows applications remotely. These Xwindows servers are designed to take advantage of the graphics acceleration available on the Windows NT workstation.

Mainframe Access

For access to mainframe applications, third-party vendors provide software for mainframe access via a variety of terminal types including VT100, IBM 3270 and IBM 5250.

Access to Applications Only Available on UNIX or Mainframe Systems		
Issue	**Solution**	**Products**
Access character mode UNIX applications from a Windows NT workstation	Telnet client software on the Windows NT workstation	Microsoft Windows NT Workstation
Access graphical UNIX applications from a Windows NT workstation	Xwindows server software on the Windows NT workstation	Hummingbird Exceed
Access legacy mainframe applications from a Windows NT workstation	VT100, IBM 3270 and 5250 emulation software on the Windows NT workstation	Hummingbird Host Explorer

Use of UNIX Commands and Scripts

Many UNIX users and system administrators have extensive knowledge of UNIX commands and use them frequently during the course of a day. They also use scripting languages to automate repetitive jobs.

Microsoft and third-party vendors provide a wide range of UNIX commands and scripting languages for Windows NT, such as:

- Directory commands chmod, ln, ls, mkdir, rmdir
- File commands basename, cat, cp, dirname, egrep, fgrep, grep, head, more, mv, rm, sort, tail, tee, touch, uniq, wc
- Editors and interpreters perl, sed, sh, vi

Common UNIX Commands and Scripting Languages for Windows NT		
Issue	**Solution**	**Products**
Use UNIX commands on a Windows NT workstation	UNIX command set on Windows NT	Microsoft Windows NT Resource Kit Microsoft Services for UNIX Mortice Kern Systems (MKS) Toolkit Softway Systems Interix
Use UNIX scripts on a Windows NT workstation	UNIX shells and scripting languages on Windows NT	Microsoft Windows NT Resource Kit Mortice Kern Systems (MKS) Toolkit Softway Systems Interix

UNIX Applications Running On A Windows NT System

Many organizations have developed UNIX software that is critical to their business. Users want to run these applications on their Windows NT workstation.

There are three main approaches to allow UNIX applications to run on Windows NT.

Application Porting

The UNIX application can be ported to native Windows NT. While Microsoft offers an extensive set of software development tools, this is normally the most time consuming approach.

There are two other approaches that take advantage of the fact that Windows NT actually consists of a kernel and different user subsystems. What most users think of as Windows NT is actually the Win32 subsystem running on the Windows NT kernel.

UNIX APIs on Win32

Libraries of UNIX APIs are available that run within the Win32 subsystem. This allows the UNIX source code to be recompiled and run as a Win32 application.

POSIX Subsystem on Windows NT

The Windows NT kernel can support multiple subsystems at the same time. POSIX compliant subsystems are available that allow UNIX code to be recompiled and run as POSIX applications on top of the Windows NT kernel.

The choice an organization makes on how to migrate applications to Windows NT depends on the size and complexity of the application and the long term objective for the application.

UNIX Applications Running on a Windows NT System		
Issue	**Solution**	**Products**
Access to UNIX applications locally on a Windows NT workstation	Migrate UNIX software to Win32 subsystem	MKS/DataFocus NuTCRACKER
	Migrate UNIX software to a POSIX subsystem	Softway Systems Interix

System Administration

When Compaq Windows NT Professional Workstations are introduced into a UNIX environment, a number of system administration issues arise.

User Accounts

Users need valid accounts on both their Windows NT workstation and the UNIX servers where their data is stored. This means a user could have two different user names and passwords. However, this can be avoided in a variety of ways.

Windows NT NFS client software can use either a pcnfsd daemon or Network Information Service (NIS) to validate users. Many of the NFS client software vendors provide utilities to automatically update the NIS password on the UNIX system every time it is changed on the Windows NT workstation. Therefore, the user will only have one username and one password for both systems.

For organizations using SMB software on a UNIX server, an NT Domain Controller can be used to validate users needing access to the UNIX server.

Access from UNIX Systems

Many times systems administrators want to be able to logon to a remote Windows NT workstation from their UNIX system. Telnet servers are available for Windows NT that provide the ability for any UNIX system to remotely log onto a Windows NT workstation.

Application Installation

For sites using NFS and Xwindows on their Windows NT workstations, this software will have to be loaded on each workstation. There are two ways to address this issue:

- Use a general purpose application, such as Microsoft Systems Management Server (SMS), which allows system administrators to define the software to be loaded on remote systems and then automatically performs the installation.
- Utilize third-party software that provides utilities to centrally manage their NFS and Xwindows software.

Asset Management

Managing a large number of Windows NT workstations can be simplified by utilizing Compaq Insight Manager. Insight Manager is based on the Desktop Management Initiative (DMI) standard for management of remote systems. Compaq has been very active in helping to develop these standards and provide DMI compliant software agents with each Windows NT Professional Workstation. These software agents work with Compaq Insight Manager to provide system administrators the ability to remotely view asset information. Compaq Insight Manager can also be used to alert system administrators if the performance of disks, memory or CPUs is degrading. If the system administrator is notified that any of these components have begun to degrade, Compaq will replace them under warranty before they fail. Compaq Insight Manager software also integrates with Microsoft SMS and can be ”snapped into” all the major enterprise management systems.

System Administration		
Issue	**Solution**	**Products**
Use UNIX commands and scripts on a Windows NT workstation	UNIX commands, shells and scripting languages on Windows NT	Microsoft Services for UNIX Mortice Kern Systems (MKS) Toolkit Softway Systems Interix
Access Windows NT workstation from a UNIX system	Telnet server on Windows NT workstation	Microsoft Services for UNIX
Synchronize Windows NT workstation and UNIX server passwords	Password synchronization software for Windows NT NFS clients	Microsoft Services for UNIX Hummingbird Maestro Intergraph DiskAccess
Remotely manage Windows NT interoperability applications	Software management application	Hummingbird Jconfig & Sconfig Microsoft SMS
Manage Windows NT workstation assets	Utilize system management software	Compaq Insight Manager

Summary

Introducing Windows NT workstations into an existing UNIX Workstation environment provides many benefits. Current Windows NT workstations provide better performance than UNIX workstation at a lower cost, while providing one desktop for running all their applications.

The Windows NT workstation environment allows a wide variety of alternatives for interoperability with existing UNIX environments. While the number of options may be confusing at first, having this variety allows users to select a solution that best fits their current and future needs.

Compaq works with Microsoft and interoperability partners to insure that the solutions available on Compaq Professional Windows NT Workstations provide maximum performance.

The following sections provide reference materials that contain more detailed information, as well as information on Compaq's workstation interoperability partners.

Reference Material

The following reference material will be useful for organizations preparing to introduce Windows NT workstations into an existing UNIX environment.

Text Books

- *Windows NT and UNIX Integration* Guide by Gunter, Burnett and Gunter, from Osborne McGraw-Hill
- *Windows NT and UNIX Integration* by Henriksen, from MacMillan Technical Publications
- *Windows NT and UNIX: Administration, Coexistence, Integration, and Migration* by Williams and Gardner, from Addison Wesley

White Papers and Tutorials

- *Technical Overview of UNIX and Windows NT Integration*

  www.microsoft.com\train_cert\courses\enm1166a.htm
- *UNIX Interoperability*

  www.microsoft.com\ntserver\nts\exec\feature\UnixInterop.asp
- *Windows NT Server from a UNIX Point of View*

  www.microsoft.com/ntserver/ntserverenterprise/techdetails/compares/winntfromunix.asp
- *Advanced Server for Compaq Tru64 UNIX Tutorial*

  www.unix.digital.com/products/adv_server/tutorial/index.html

SMB Products for UNIX Servers

- Compaq Advanced Server for Tru64 UNIX

  www.unix.digital.com/products/adv_server/
- HP Advanced Server/9000

  www.hp.com/esy/systems_networking/networking/products/advanced.html
- SAMBA

  us1.samba.org/samba/index.html
- Sun SunLink PC

  www.sun.com/servers/enterprise/sw/totalnet.html
- Syntax TotalNET Advanced Server

  www.syntax.com

Interoperability Partners

To ensure that Compaq Professional Workstations can be easily introduced into an existing UNIX workstation environment, Compaq has partnered with the leading interoperability software vendors. These partnerships ensure that customers have access to industry leading solutions that have been completely tested on Compaq Professional Workstations.

The following section provides a brief overview of Compaq's Professional Workstation interoperability partners, and a link to their web sites where the reader can find more detailed information. More information on Compaq management partners can be found at www.compaq.com/im/partners/

Hummingbird Communications, Ltd.

Hummingbird Communications Ltd. specializes in the development of enterprise software solutions, including network connectivity and business intelligence products that provide high performance access to internetwork-based information and applications. Hummingbird products are sold and supported internationally by authorized resellers in more than 40 countries. The company is headquartered in Toronto, Canada with offices strategically located throughout Canada and the United States, Australia, Switzerland, Germany, France, Italy, Sweden, the United Kingdom, and South Africa. www.hummingbird.com

INTERGRAPH

Intergraph Corporation

Intergraph Corporation is the world's largest company dedicated to supplying interactive computer graphics systems. Intergraph's business is primarily in two areas:

- Hardware (workstations and servers)
- Technical software applications requiring state-of-the-art interactive computer graphics.

The company has five primary business units addressing the hardware, software, federal, electronics, and public safety marketplaces. Intergraph is a billion-dollar, Fortune 1000 supplier of hardware, software, and services with sales and support offices in 65 countries. www.intergraph.com

Microsoft® Windows NT® Workstation

Microsoft Corporation

Microsoft products include operating systems for personal computers, server applications for client/server environments, business and consumer productivity applications, and interactive media programs, and Internet platform and development tools. Microsoft also offers online services, sells personal computer books and input devices, and researches and develops advanced technology software products. www.microsoft.com/ntworkstation/default.asp

Mortice Kern Systems, Inc.

Mortice Kern Systems Inc. (MKS) provides a complete solution for both interoperability and cross-platform development needs. MKS Toolkit is a comprehensive suite of Windows NT and UNIX utilities for Windows NT. The Toolkit enables you to customize, control and automate your software development and administrative processes. MKS NuTCRACKER can be used to develop single- or multi-threaded C, C++, or Fortran applications, shared libraries, and daemons, on Windows NT and Windows 9x. www.mks.com

Softway Systems, Inc.

Founded in September 1995, Softway Systems addresses the need of corporations, developers, ISVs, and VARs to exploit their existing investment in UNIX and Linux applications and tools as they move to new platforms. Developers of a POSIX subsystem for Microsoft Windows NT, Softway Systems develops and markets complete POSIX environments and the development tools to match. www.interix.com